2014
PRODUCT CATALOG

Look@it, FIBER Network Solutions inside!

CTC union
www.ctcu.com

RoHS Compliance
MEF METRO ETHERNET FORUM MEMBER
ISO 9001
ISO 14001
c UL us

Since 1993

About CTC Union

CTC Union founded in 1993, is committed to developing and manufacturing and selling network communication products. In particular, the focus on fiber optical technologies, Ethernet technologies and the integration of broadband access technologies. With leading-edge technology and high quality service as the driving force, CTC union continued steady growth, and become a top global equipment supplier of innovative last-mile access in the telecommunications market.

CTC Union's global alliance is a network of worldwide branch offices, partners and distributors from every continent. By forming partnerships with major telecom operators, Internet Service providers and value added resellers, CTC Union reduces costs and improves services for customers. This alliance covers Europe, Asia, the Middle East, Africa, plus North and South America. This global partnership receives direct engineering and technical support from our company headquarters, located in Taipei, Taiwan.

MEF Member

As services such as voice and multimedia are moving to IP based technologies, carriers have found that their core networks can be operated more effectively and economically if the public switching networks are migrated to a next generation IP based networks. Fully in line with this world wide trends, CTC Union in 2009, became a member of the MEF (Metro Ethernet Forum) whose main goal is to provide interoperability standards for carriers and manufacturers to smoothly deploy Ethernet solutions from core networks to Last-Mile. This proactive thinking will allow CTC Union to continue developing solutions for today and tomorrow's markets.

Environment

As a socially responsible manufacturer, CTC Union is concerned with the environment and has taken active measures to reduce carbon emissions and eliminate hazardous materials in their products. None of CTC Union products use chlorofluorocarbons (CFC) in their production process and since 2007 all electronics use non-lead soldering according to RoHS and WEEE directives.

Our Vision

CTC Union's continuing mission is to provide our customers with "on time" solutions, quick and effective customer support, and valuable products with extended service life.

- Providing innovative last-mile access solutions in telecommunication market
- Providing customers with “on time” solutions, quick and effective customer support, and valuable products with extender service life.

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Performance Management

- Device performance is plotted over time using standard PM data such as ES UAS, etc.

Security Management

- User Privilege Management
- User Activity Management

Inventory Management

- Location, status and serial numbers of all assets can be managed and exported

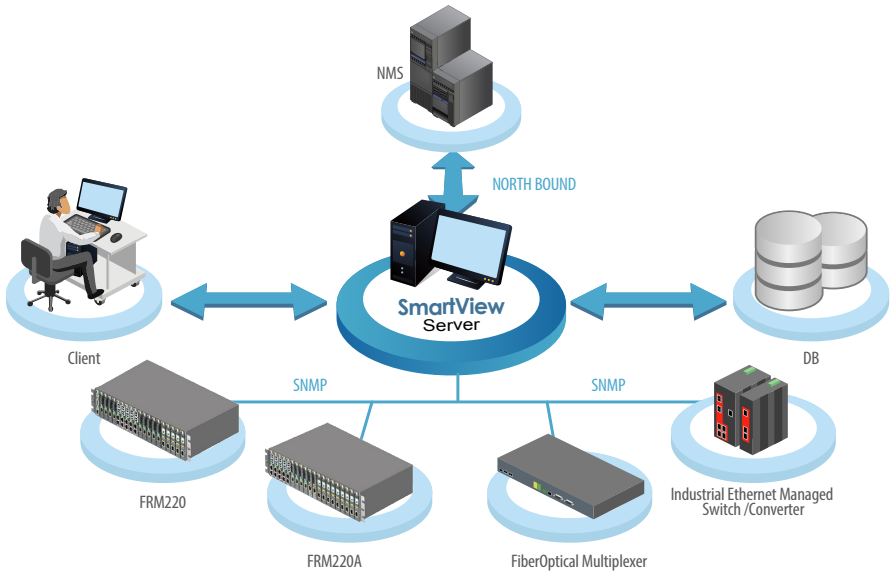
SmartView

Element Management System

- Centralized Network Management Platform
- Real-time visual representations and processing of alarms
- Easy and User-Friendly Operation Interface

- Remote access control for efficient configuration
- Traffic / Performance monitoring and management
- Alarm Trap and event log management
- Auto Discovery and Device Viewer
- Allow up to 25 administrators to login
- Applied to CTC Union's Main Products

Network Scheme Diagram



Polled Network Elements

- *User- Friendly Operation Interface*
- *Network Monitoring and Management*
- *Screen-Based User Friendly Network Management*
- *Security Access Management*

- ***Agents***

All of the CTC SNMP enabled products are able to add in the CTC Smart View EMS management Platform such as FRM220/220A, multi-service platform, FMUX series, fiber multiplexer, IGS/IFS series L2 managed switch. With the goal of having all of CTC Union's products managed under the umbrella of this single Element Management System

- ***SmartView Server***

SmartView Server handles connection management, deliver data and is responsible for communication of requests from clients. SmartView Server collects the information data from specific SNMP agents, stores the information into database and updates it to Workstation-Clients.

- ***SQL Server***

SQL Server is the place where the SmartView collected data is storied, The database will store Alarm Trap and all information. CTC Union's Smart View is compatible with Microsoft® SQL 2005, SQL 2005 Express, SQL 2008 and SQL 2008 Express.

- ***Workstation-Clients***

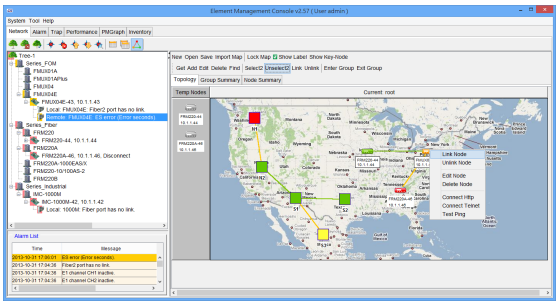
Workstations provide the JAVA applet GUI to monitor and control the agents at far end. They also receive the Alarm Traps from the corresponding SNMP Agents. Multiple workstations are allowed in this field.

Features at a Glance

- ***Configuration Management***

Topology

User can load maps to SQL server, load maps from SQL server or delete attached maps. Download procedure is very simple. Map area may be used to layout any objects from Root and Node panel.
Using drag-and-drop, put any object to map area. Any label or network element location name may be added to object. Objects in red color indicate some alarm condition is present in the device. Right clicking an object brings a popup window to select Telnet or http management directly.



Network Topology

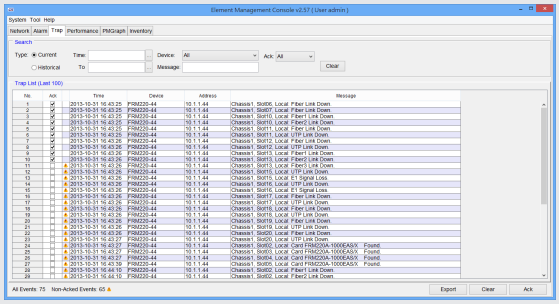
Network Element Discovery

The SmartView has a tool for automatically discovering SNMP agents on the network. Simply enter an IP address range and the discovery program will ping every IP address looking for SNMP agents. Once discovered, the agents can be selected and brought into the broker for polling.

- ***Fault Management***

Trap Collection

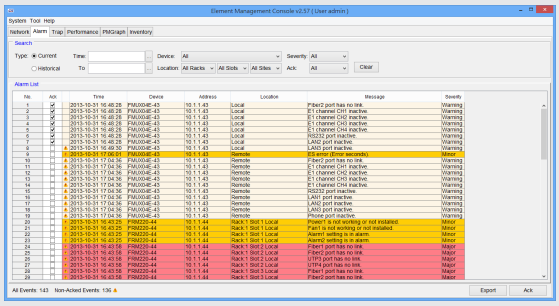
All alarm traps will be stored in SQL database. When an SNMP agent experiences an abnormal condition it will send an SNMP trap message to Smartview EMS which then receives the message, and records it in the database. Depending on preset conditions, SmartView EMS may sound an audible alarm, send an email or SMS alert message or just simply flash the trap message on the administrative console screen



Trap Messgage

Active Alarm

Three kinds of filters can be applied to alarm list. User may select one agent, local or remote rack, and specific status as filters to watch active alarms. The status filter can be categorize Major, Minor, Warning, and all statuses label or network element location name may be added to object



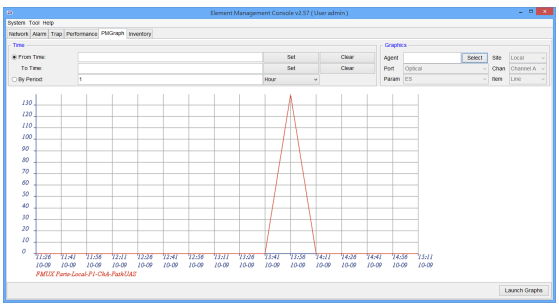
Active Warnning

Alarms sent by E-mail & SMS

The SmartView is capable of sending emails and or SMS text messages to selected administrators when critical alarms occur. Prompt notification of system problems aid in getting problems in the network fixed in the shortest time possible.

- ***Performance Management***

Device performance is plotted over time using standard PM data such as ES, UAS, etc. PM data is typically only available for PDH devices such as the ETU01A and ERM01.



Performance Graphics

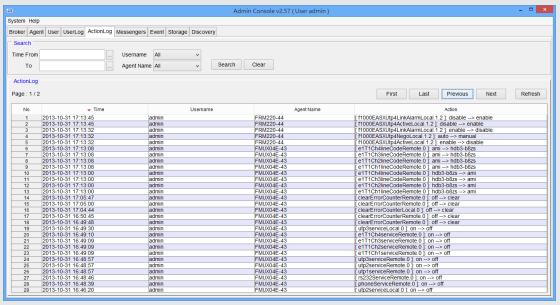
• *Security Management*

User Privilege

- The administrator can add necessary user logins with specific privileges, from Administrator to Operator and lastly to normal user.
- Radius Authentication. Supports authentication login provided by credentials stored on RADIUS server.

User Activity

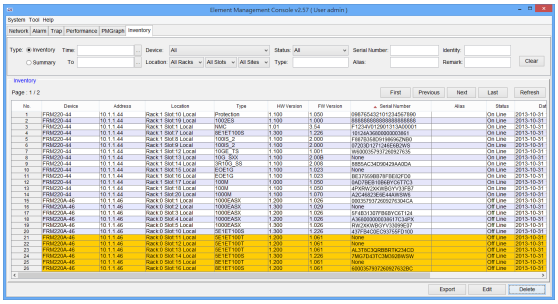
Provides viewing and clearing of the user login and configuration action logs. User client login & logouts is recorded including the client's source IP address. All activities performed on any Network Element are logged with time-stamping, the user making changes and the changes made.



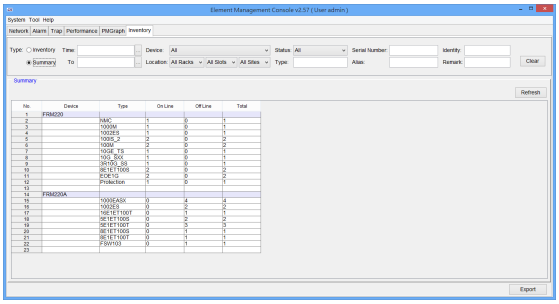
User Activity

• *Inventory Management*

The inventory management supports reading a factory programmed serial number specific for each line card. The location, status and serial numbers of all assets can be managed and exported.



Inventory List

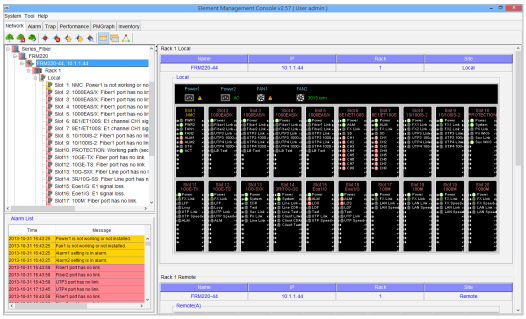


Inventory Summary

Available Models :

Multi-Service and Ethernet Aggregation platfrom, Fiber Optical Multiplexer Series and Industrial Ethernet Switch & Media Converter Series.

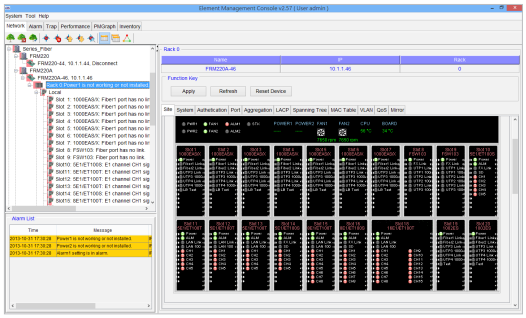
• *Multi-Service Platform*



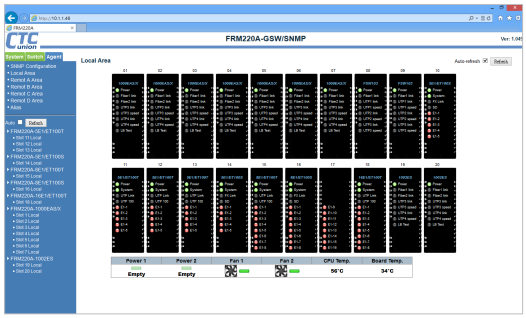
EMS Interface

Web Interface

• *Ethernet Aggregation Platform*



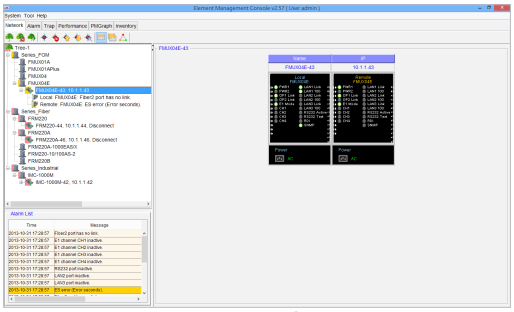
EMS Interface



Web Interface

Specifications & design are subject to change without prior notice. Please visit CTC Union website for more details.

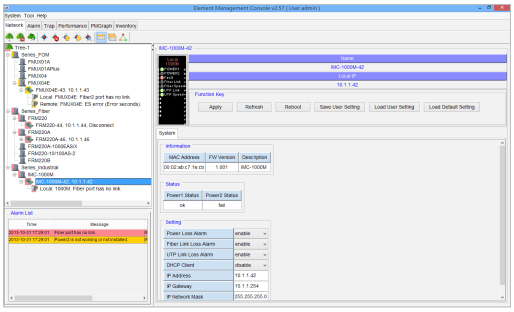
- ***Fiber Optical Multiplexer***



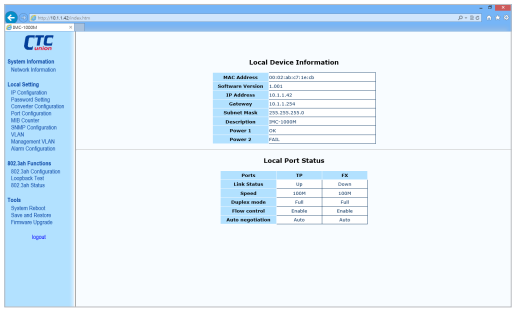
EMS Interface

Web Interface

- ***Industrial Ethernet Switch & Media Converter***



EMS Interface



Web Interface

Requirements

SmartView	Hardware (minimum)	Software	Operating System
SmartView Server	P4 1.6G or higher, 1024MB RAM, HD >2GB (free)	JAVA JRE. SmartView Kit	Windows server 2003/2008, Windows XP, Vista, Win7
SQL Database Server	P4 1.6G or higher, 1024MB RAM, HD >2GB (free)	MS-SQL Server 2005/2008. SmartView Kit	Windows
Workstation-Clients	P4 1.6G or higher, 512MB RAM, HD >1GB (free)	JAVA JRE, SmartView Kit	Windows
All-In-One	P4 2.8G or higher, 2GB RAM, HD >10GB (free)	JAVA JRE, MS-SQL Server, SmartView kit	Windows server 2003/2008, Windows XP, Vista, Win7

Ordering Information

SmartView Platform Server with Device Agents

Model Name	*Description*
SV-AGT-50	SmartView Platform with 50 device agents
SV-AGT-100	SmartView Platform with 100 device agents
SV-AGT-200	SmartView Platform with 200 device agents
SV-AGT-500	SmartView Platform with 500 device agents

SmartView Managed Modules

Model Name	*Description*
SV-FOM	Fiber Optical Multiplexer
SV-Fiber	Multi-Service Platform (FRM220 Series) Ethernet Aggregation Platform (FRM220A Series)
SV-Industrial	Industrial Ethernet Switch & Converter
SV-PDH	E1 Multiplexer & Modem

CTC SmartView SV-Industrial support Industrial Switch & Converter List

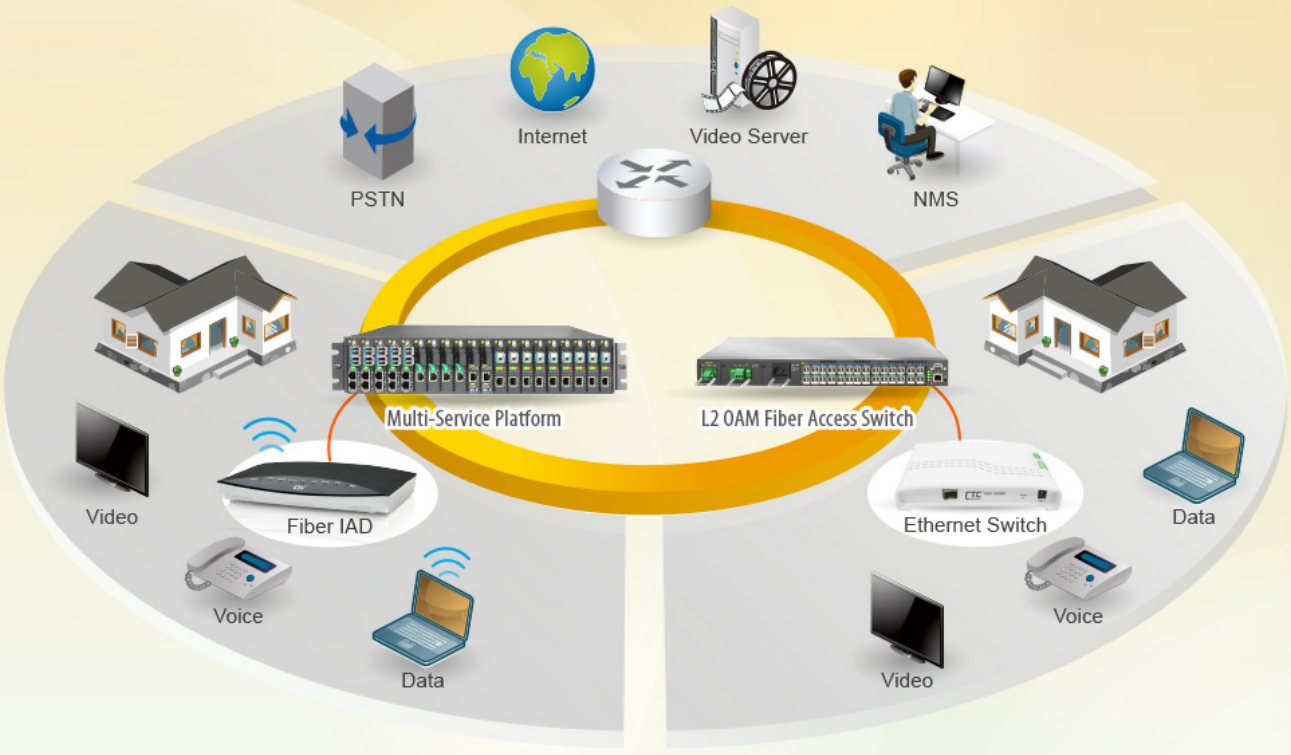
PoE Swith	IGS-803SM-8PH24, IGS-402SM-4PH24, IFS-803GSM-8PH24, IFS-402GSM-4PH24
Switch	IGS-404SM, IGS-803SM, IGS-812SM, IGS-1604SM, IFS-803GSM, IFS-1604GSM
IEC-61850-3 Switch	IPS-G803SM, IPS-803GSM
PoE Converter	IMC-1000M-PH12, IMC-1000MS-PH12, IMC-100M-PH12
Converter	IMC-1000M, IMC-1000MS, IMC-100M

SV – □□□ – □□□

Example: SV – AGT – 100

FIBER Family

Multi-Service Platform
Metro Ethernet
Mobile Backhaul for 4G LTE
FTTx
Triple Play Service (Data/Voice/Video)



10G Ethernet, Multiplexer, Fiber IAD, CWDM, L2 Ethernet Access Switch, FOM, SDH

FRM220-CH20 & FRM220-CH08

In-Band Managed Multi-Service Platform

The FRM220 series is a multi-service chassis platform, which provides a reliable solution of high density media converter modules for applications such as telecom operator, enterprise, long haul transmission and factory automation. All of critical components of FRM220 series chassis solution such as power modules, fans, management module and interface cards are hot swappable, allowing online field replacement.

FRM220 series is offered in two chassis densities, a 2U 20-slot (FRM220-CH20) and a 1U 8-slot (FRM220-CH08).

Common Features

- Supports AC/DC power module hot swappable and power redundancy
- Two alarm relays contact for critical events warning
- All modules and interface cards are hot swappable
- Chassis backplane consists of passive components

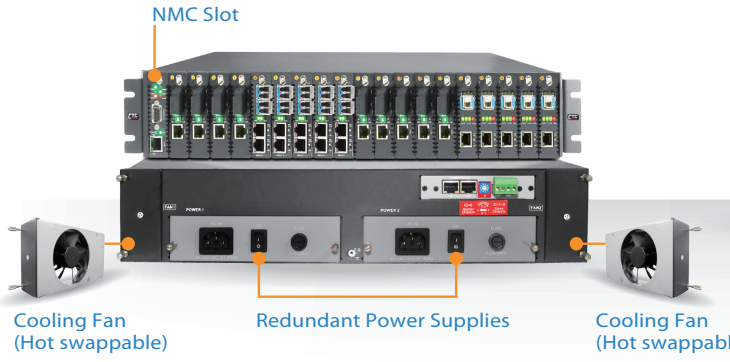
Specifications

Connectors	Console: RS232 (DB9)	
	LAN 10/100Base-TX RJ45	
Physical Specifications	Dimensions (D x W x H)	303 x 438 x 88 mm (CH20)
		310 x 440 x 44 mm (CH08)
	Weight (w/o Power)	5.2kg (CH20)
		3.5kg (CH08)
Power	AC	18~240VAC
	DC24	18~36VDC
	DC48	36~75VDC

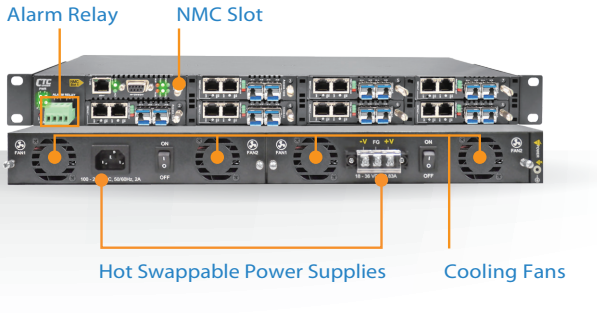
Temperatures	Operating 0~60°C
	Storage -10~70°C
Humidity	5%~90% non-condensing
MTBF	65,000 hrs
Certification	FCC Class A, VCCI Class A, CE, RoHS compliant
Safety	UL 60950-1 (FRM220-CH20)

Chassis Overview

- ***FRM220-CH20*** (2U 19" 20 Slots)



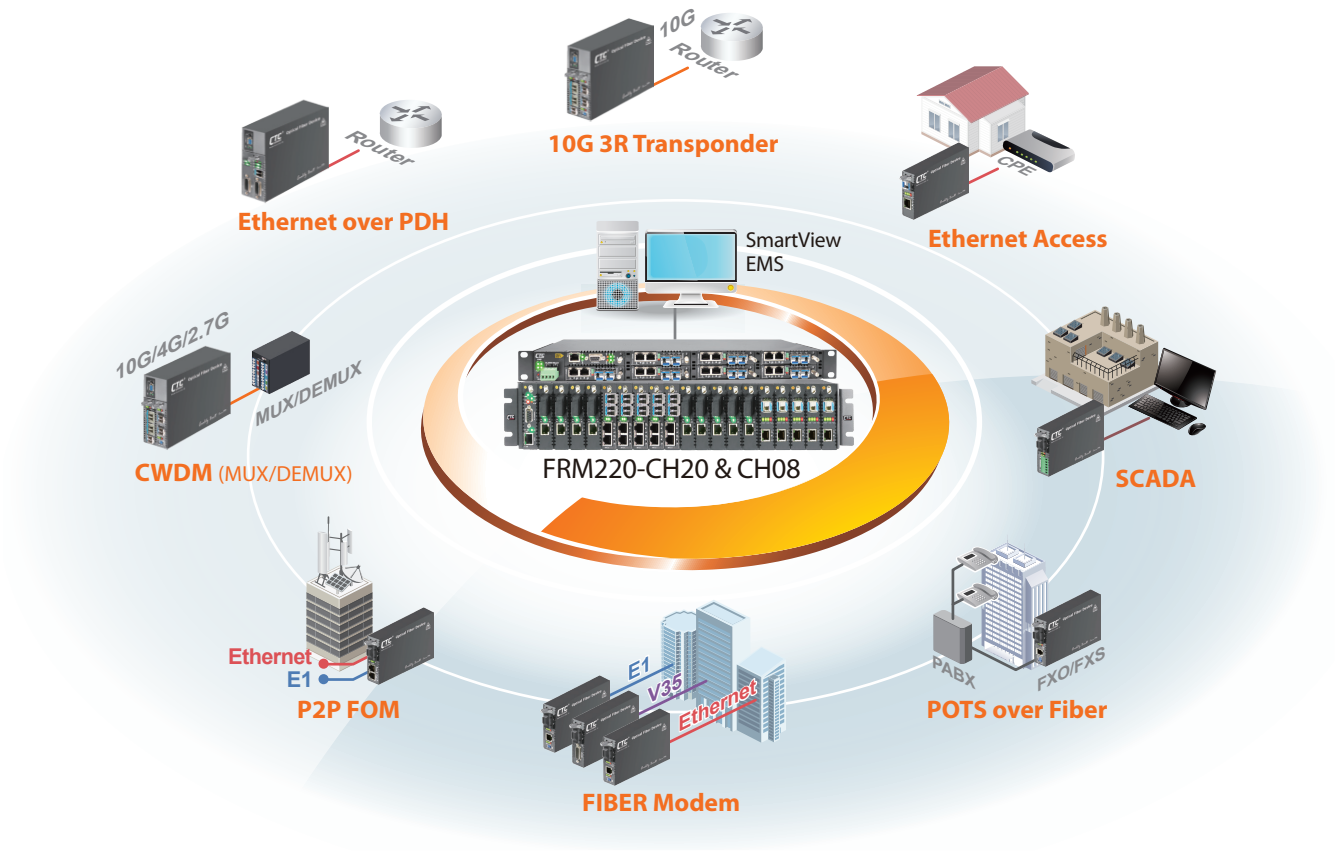
- ***FRM220-CH08*** (1U 19" 8 Slots)



Main Features

• Module Cards for Deployment Scenarios

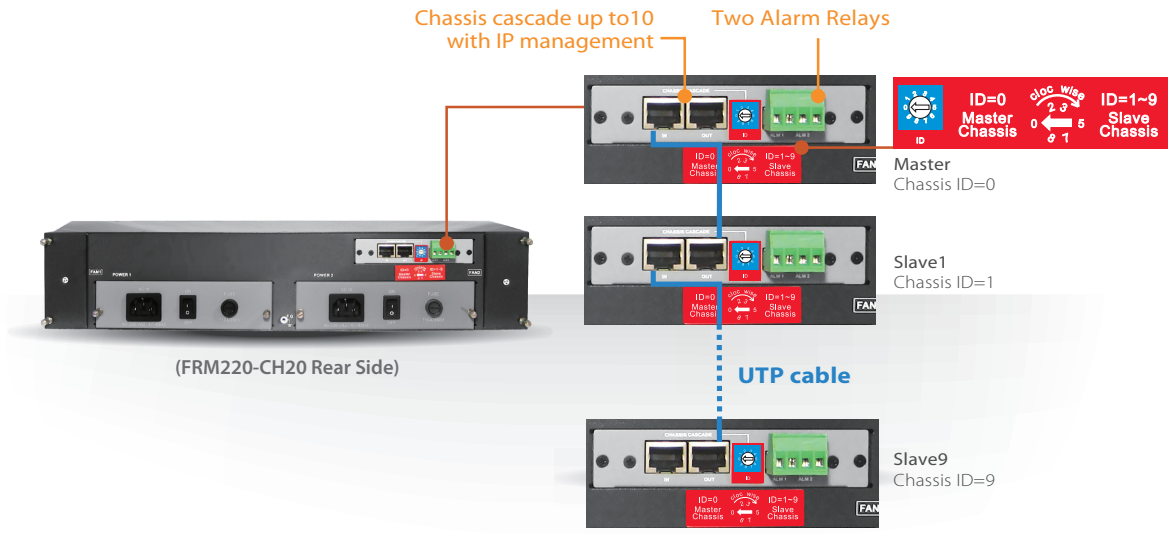
The FRM220-CH20 has been designed as a Multi-service platform. This allows network administrators to deploy the chassis in a wide range of networks.
Technologies supported by the chassis included Fast/Gigabit Ethernet, E1/T1, V35/X21/RS-530, Serial RS-485/RS-422, Voice FXO/FXS, Repeater, Fiber Multiplexer, E1 Inverse Multiplexer, CWDM Mux/DeMUX and 10G 3R Transponder



• Chassis Cascade (FRM220-CH20)

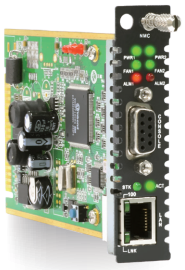
The FRM220-CH20 Chassis features cascadable management which allows managing a stack (up to 10 chassis) from a single IP address. Chassis are interconnected with standard UTP cables that carry control signals. Each chassis has its own ID, starting with the master chassis ID0 and cascading up to ID9

- Single IP managed chassis with 10 units cascaded max.
- Beneficial to centralizes management in one rack
- Scalability as the demand grows



• Network Management

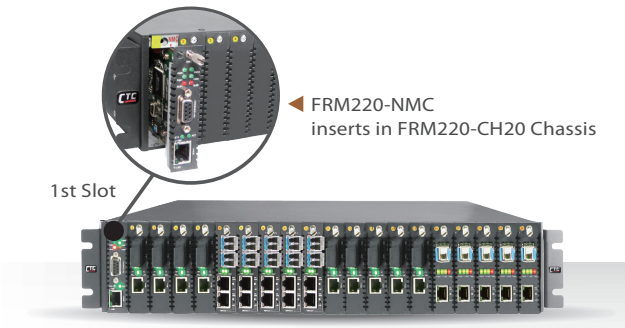
Both FRM220-CH20 and FRM220-CH08 require a NMC (Network Management Controller **FRM220-NMC**) card which must be installed into the first slot of chassis. The NMC card allows a network administrator the ability to configure and monitor the status of the blades. Management can be achieved locally over RS232, or over the network by Telnet, Web or SNMP. If the blades support Ethernet in the First Mile (IEEE 802.3ah), then the management module can also be monitored the status of a remote CPE.



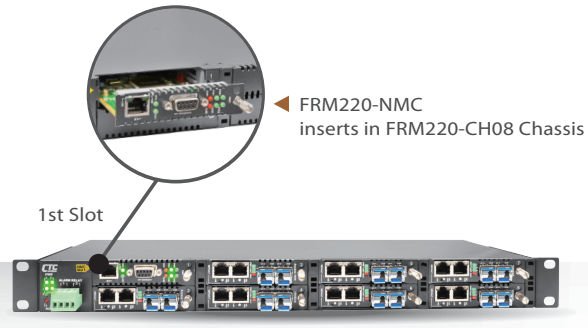
FRM220-NMC

FRM220-NMC Features

- Supports local / remote monitor and configuration
- Supports local / remote online TFTP f/w upgrade
- Fiber transceiver status & info display
- Supports multiple accesses for SNMP management
- Supports Web GUI management, Telnet, Serial console
- Supports console RS-232 port and 10/100Base-T Ethernet port
- Supports SNMP standard MIB II and enterprise MIB
- Supports NTP time synchronization
- Supports syslog
- Supports 255 entries system log



FRM220-CH20



FRM220-CH08

Ordering Information

Model Name	Type	Description
FRM220-CH20	Chassis	2U 20-Slot rack mount chassis with 20 line card blank plate
FRM220-AC	Power	Chassis power module 100 ~ 240 VAC, IEC connector 200W
FRM220-DC24	Power	Chassis power module 18 ~ 36 VDC, 3 pin terminal block 200W
FRM220-DC48	Power	Chassis power module 36 ~ 72 VDC, 3 pin terminal block 200W
FRM220-CH08	Chassis	1U 8 slots rack mount chassis with 8 line card blank plate
FRM220-CH08-AC	Power	Chassis power module 100 ~ 240 VAC, IEC connector
FRM220-CH08-DC24	Power	Chassis power module 18 ~ 36 VDC, 3 pin terminal block
FRM220-CH08-DC48	Power	Chassis power module 36 ~ 72 VDC, 3 pin terminal block
FRM220-NMC	Card	Network Management Controller card, support web, telnet, console, SNMP functions

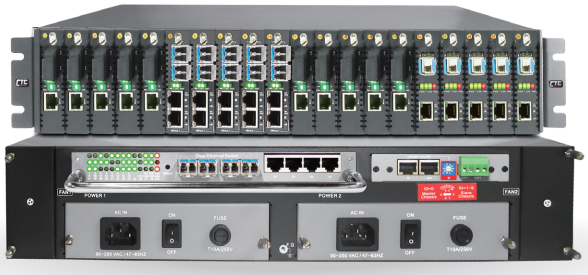
Chassis
FRM220 – □□□□
Example: FRM220 – CH20

Power Type
FRM220 – □□□□
Example: FRM220 – DC24

10G Ethernet uplink

FRM220A

Ethernet Aggregation Platform



The FRM220A series is a IP based Ethernet aggregation platform, which incorporates a 24+4 port L2 Gigabit Ethernet switch (FRM220A-GSW/SNMP) or a new 20+4 port L2 Gigabit Ethernet switch with 4x10Gigabit uplink (FRM220A-GSW/SNMP-10G). The FRM220A has a built-in Gigabit Ethernet backplane to interconnect the Ethernet access and E1 TDM based inverse multiplexer module cards with the FRM220-GSW/SNMP card. The L2 switch card supports many advanced Layer 2 switch technologies including port and tag based VLAN, QoS, LACP, RSTP to name just a few. The FRM220A chassis solution significantly lowers the OPEX for operator and service provider when deploying fiber access networks.

The product lists designed to be adequately to the FRM220A-CH20 Ethernet aggregation application such as Ethernet access and Ethernet over PDH are included

- FRM220A-1000EAS/X : 2x 10/100/1000Base-T + 2x1000Base-X OAM/IP Managed Switch
- FRM220A-1002ES : 2x 10/100/1000Base-T + 2x100/1000Base-X Managed Switch
- FRM220A-iMux Series : E1 inverse multiplexer module card
- FRM220A-FSW103 : 3x 10/100Base-TX + 100Base-FX Managed Switch

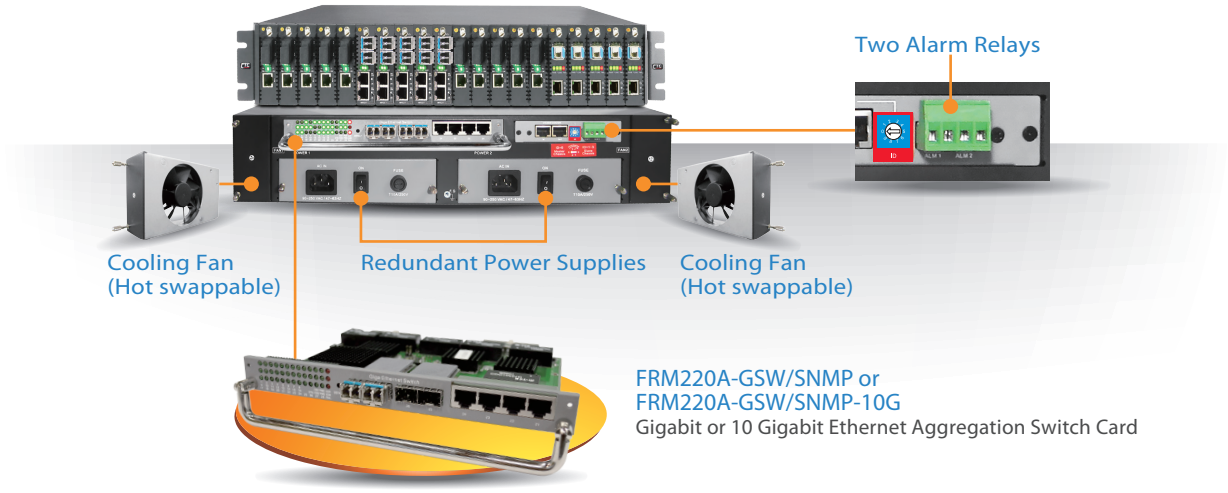
Specifications

Connectors	Consoles RS232 (DB9)	
	LAN 10/100Base-TX RJ45	
Physical Specifications	Dimensions	303 x 438 x 88 mm (D x W x H)
	Weight (w/o Power)	5.2kg
Power	AC	18~240VAC
	DC24	18~36VDC
	DC48	36~72VDC

Temperatures	Operating 0~60°C
	Storage -10~70°C
Humidity	5%~90% non-condensing
MTBF	65,000 hrs
Certification	FCC Class A, VCCI Class A, CE, RoHS compliant

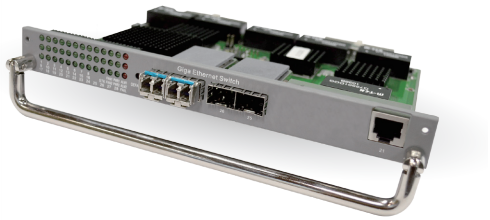
Chassis Overview

Gigabit or 10G Ethernet uplink



10G Ethernet uplink

NEW

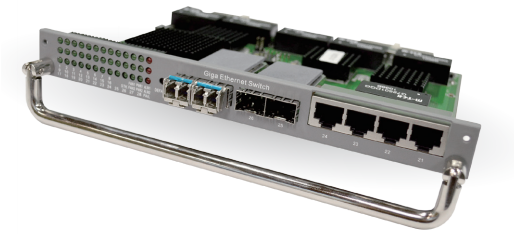


Ethernet Aggregate Switch Card

- ***FRM220A-GSW/SNMP-10G***

10G uplink Ethernet Aggregate Switch Card

The FRM220A-GSW/SNMP-10G is the next generation management module card of FRM220A chassis. It is built in gigabit Ethernet interface to connect with backplane and link to each slot of FRM220A chassis.
To aim at the Metro Ethernet application, the specifications of FRM220A-GSW/SNMP-10G fully meet the attributes of Carrier Ethernet proposed by MEF (Metro Ethernet Forum). It comply MEF 9 standard to support E-Line/E-LAN service, MEF 14 standard to enable the bandwidth profile configuration delivering SLA (Service Level Agreement) for end-to-end performance characteristics as well as MEF21 to support carrier grade service OAM management rapidly detecting and recovering from the network incidents in real time.



- ***FRM220A-GSW/SNMP***

Gigabit Ethernet Aggregate Switch Card

The FRM220A incorporates a 24+4 Gigabit Ethernet Switch. Twenty ports supply each slot of the 2U 20-slot chassis with an electrical gigabit Ethernet uplink with the remaining four electrical gigabit ports accessible via the rear of the chassis. The additional four ports are provided by SFP sockets. All eight Gigabit ports (4+4) are usable without restrictions for uplink aggregate to the Ethernet Metropolitan Area Network (E-MAN). The FRM220A-GSW/SNMP card transmits Ethernet between the subscriber equipment (bridge/ modem or network interface card) and the E-MAN. The card provides a user-networking interface with Ethernet packets. This card is capable of providing high bandwidth for assembling Ethernet traffic. The FRM220A-GSW/SNMP card is not only the system aggregate/trunk module, but also the system's control module, providing OAM Management functions.

Features

- Provides chassis aggregation via 4x1000Base-X SFP uplink slots (FRM220A-GSW/SNMP)
- Provides chassis aggregation via 4x10Gigabit Base-X SFP+ uplink slots (FRM220A-GSW/SNMP-10G)
- Supports ITU-T G.8032 Ethernet ring protection (FRM220A-GSW/SNMP-10G)
- Supports IEEE 802.1p HW based 8 priority queues and L2~L4 QoS functions (FRM220A-GSW/SNMP-10G)
- Supports IEEE 802.3ah/IEEE 802.1ag/ITU-T Y.1731 Ethernet OAM features (FRM220A-GSW/SNMP-10G)
- Supports IPv6 management (FRM220A-GSW/SNMP-10G)
- Compliant to MEF 9/MEF 14 standards for E-Line, E-LAN services (FRM220A-GSW/SNMP-10G)
- Fiber optical ports supports ring or chain topology
- Built-in gigabit Ethernet interface to link with each slot of FRM220A chassis
- Provides Web, Telnet, SNMP management interface
- Supports IEEE802.1D/802.1w/802.1s for ring protection on the trunk interfaces
- Supports IEEE 802.1Q tagged VLAN and IEEE 802.1ad Q-in-Q application

Specifications

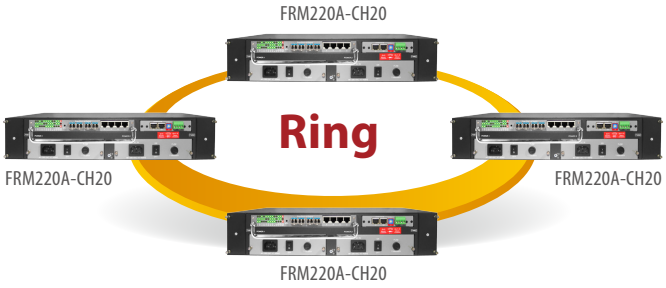
Trunk Interface	4x10/100/1000Base-T plus 4x1000Base-X/2500Base-X GbE switch trunk card (FRM220-GSW/SNMP)
	4x10G Base-X switch trunk card (FRM220-GSW/SNMP-10G)
	Supports full-duplex mode for 1000Mbps (FRM220A-GSW/SNMP)
	Supports full-duplex mode for 10G Mbps (FRM220-GSW/SNMP-10G)
Capacity	Supports up to 20 service cards
Temperature	0~60°C (Operating), -10~70°C (Storage)
Humidity	5~90% non-condensing
Certification	CE, FCC, RoHS compliant

Physical Specifications	In-band management	Provides all system OAM functions: software updates, and management system interaction through Ethernet trunk port
	Out-band management	Supports Web, Telnet and SNMP, EMS management
Indications	PWR, FAN, Alarm, STK	
Dimensions	142 x 200 x 26 mm (D x W x H)	
Weight	0.5kg	
MTBF	65,000 hrs	

Benefits of FRM220A Chassis Platform

Enabling IP Transportation Protection Mechanism

- STP/RSTP Featured Ring Protection

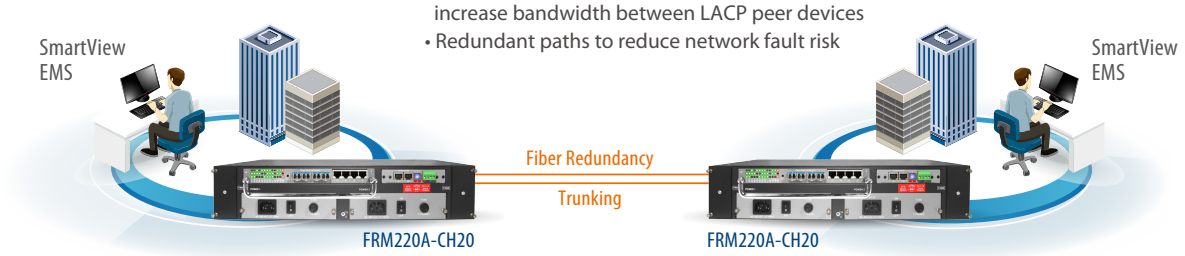


- Standard based but advanced fault protection systems
- Rapidly recovery path from failed connection (1-2 seconds min. recovery time)

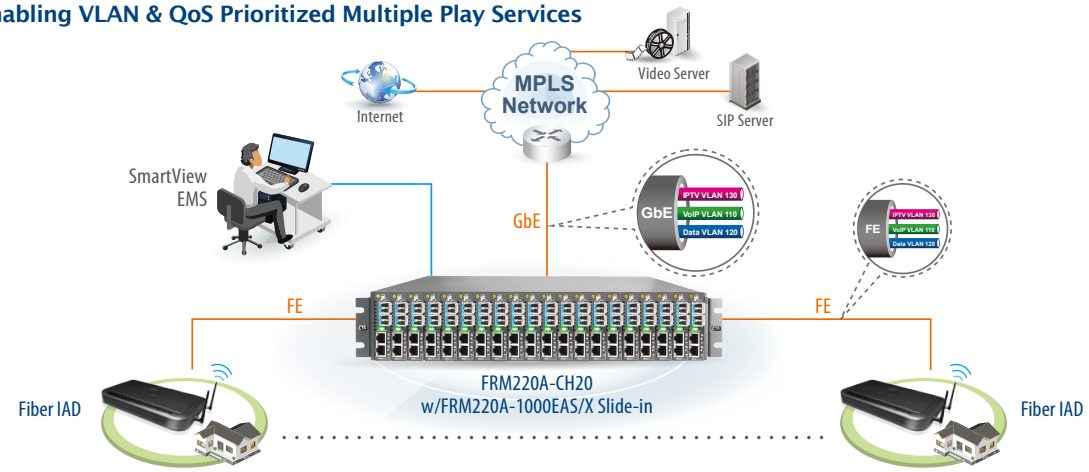
LACP Enabled Traffic Aggregation

- Fiber Redundant / Trunking Application

- Dynamically port aggregation or trucking to increase bandwidth between LACP peer devices
- Redundant paths to reduce network fault risk

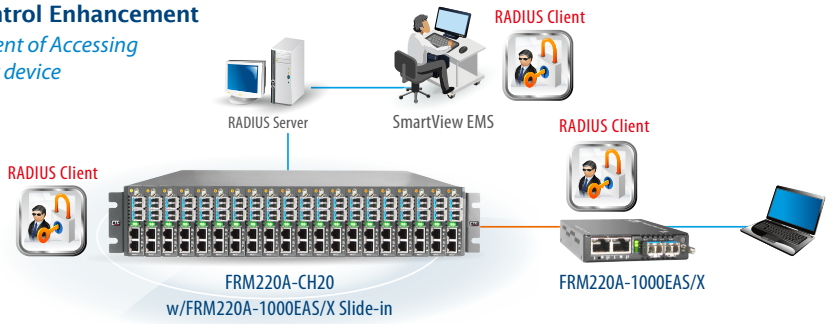


Enabling VLAN & QoS Prioritized Multiple Play Services



Secured Access Control Enhancement

- Centralized Management of Accessing the Network for user or device



Ordering Information

Model Name	Type	Description
FRM220A-CH20	Chassis	2U 20-Slot rack mount chassis with 20 line card blank plate
FRM220A-GSW/SNMP	Card	Gigabit Ethernet Aggregate switch card supports web, telnet, SNMP management interface
FRM220A-GSW/SNMP-10G	Card	10G Ethernet Aggregate switch card supports web, telnet, SNMP management interface
FRM220A-AC	Power	Chassis power module 100 ~ 240 VAC, IEC connector
FRM220A-DC24	Power	Chassis power module 18 ~ 36 VDC, 3 pin terminal block
FRM220A-DC48	Power	Chassis power module 36 ~ 72 VDC, 3 pin terminal block

FRM220A – □□□□ (Chassis)

Example: FRM220A – CH20

FRM220A – □□□ / □□□□ (Card)

Example: FRM220A – GSW/SNMP

Standalone Chassis for FRM220 Series

The FRM220 product line includes various metal chassis sizes, which can hold from one to twenty FRM220 slide-in modules. The FRM220-CH01 is one slot chassis, which can be installed with one single width blade card for stand-alone applications. The available power options are external AC adapter, built-in AC, DC power or built-in AC+DC, AC+AC, DC+DC redundant power. The FRM220-CH01M is one slot chassis with DB9 console port for local management on supported cards, which can be installed with one single width blade card for stand-alone applications. The available power options are built-in AC, DC or built-in AC+DC redundant power. The FRM220-CH02 is a two slot chassis, which can be installed with one double width blade card for stand-alone applications. The only available power supply option is an external AC adapter. The FRM220-CH02M is a two slot chassis with DB9 console port for local management, which can be installed with either one or two single width blade cards or one double width blade card. The available power supplies are built-in AC, DC or AC+DC redundant power. The FRM220-CH02/NMC is a two slot chassis and can be SNMP managed when installing one FRM220-NMC card for Web, Telnet, Console and SNMP management. The FRM220-CH02/NMC should always be used with an NMC card for management and one single width blade card. The FRM220-CH02/NMC available power options are built-in AC, DC or AC+DC redundant power.

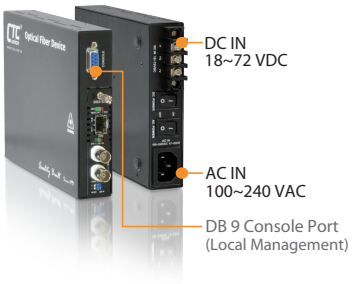
1 Slot Chassis

FRM220-CH01

• Adapter Type

FRM220-CH01M

• Power Build-in Type



2 Slots Chassis

FRM220-CH02

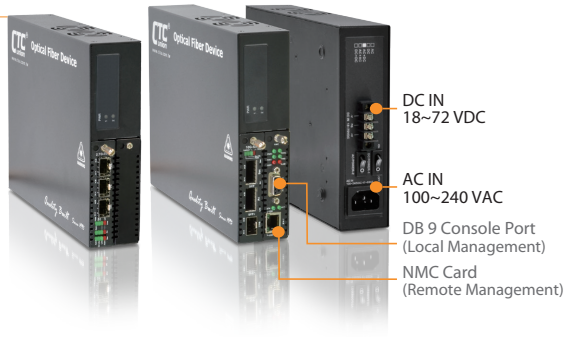
• Adapter Type

FRM220-CH02M

• Power Build-in Type

FRM220-CH02/NMC FRM220-CH02/SNMP

• Power Build-in Type



Features

- Fanless (CH01, CH01M, CH02)
- Cooling Fan (CH02M & CH02M/NMC)
- Supports DB9 console port for local management (CH01M ,CH02M)
- Telnet, Web, Console, SNMP management via NMC Card (not included) (CH02M/NMC)
- Power Type:
  - External Power: DC12
  - Internal Power: AC, DC, AD, AA or DD redundant power (option)

Specifications

Power Input (Option)	External Adapter	Input Voltage 100~240VAC 50/60Hz
		Output Voltage 120VDC 1A
	Internal Power	AC: 100~240VAC
		DC: 18~72VDC
Weight	0.5~0.8kg (CH01) , 0.9kg (CH01M)	
	0.8kg (CH02) , 1.3kg (CH02M) , 1kg (CH02M/NMC)	

Dimensions (D x W x H)	External Adapter	160 x 88 x 24mm (CH01)
		139 x 88 x 44mm (CH02)
	Internal Power	180 x 135 x 35mm (CH01)
		201 x 135 x 35mm (CH01M)
		220 x 168 x 45mm (CH02M, CH02M/NMC)

FRM220 Slide-In Card Chassis Order Information

Model Name	Description
CH01	1 Slot Chassis with 100 ~240VAC to 12VDC Adapter
CH01-AC, DC, AD	1 Slot Chassis with AC: 100 ~240VAC DC: 18 ~72VDC or Dual Power (AC+DC)
CH01M-AC, DC, AD	1 Slot Chassis with **Console** port and AC: 100 ~240VAC, DC: 18 ~72VDC or Dual Power (AC+DC)
CH02	2 Slots Chassis with 100 ~240VAC to 12VDC Adapter
CH02M-AC, DC, AD	2 Slots Chassis with **Console** port and AC: 30W 100 ~240VAC, DC:30W 18 ~72VDC or Dual Power (AC+DC)
CH02M-2-AC, DC, AD	2 Slots Chassis with **Console** port and AC:12W 100 ~240VAC, DC:12W 18 ~72VDC or Dual Power (AC+DC)
CH02/NMC-AC, DC, AD	2 Slots Chassis **without NMC** card and AC:100 ~240VAC, DC: 18 ~72VDC or Dual Power (AC+DC)
CH02/SNMP-AC, DC, AD	2 Slots Chassis with **NMC** card and AC:100 ~240VAC, DC:18 ~72VDC or Dual Power (AC+DC)

How to order

1. Local Console Management Order: CH01M and CH02M
2. Remote Web/SNMP Management Order: CH02/SNMP
3. DIP Switch Configuration Order: CH01 and CH02
4. Model name with "**M**", it means the chassis with Console Management
5. Model name with **SNMP**, it means the chassis with NMC Card

FRM220 – ☐☐☐☐ – ☐☐

Example: FRM220 – CH01–AD

Power Type

FRM220 – CH02/NMC – ☐☐

Example: FRM220 – CH02/NMC– AD

Slide-in Card vs Standalone Chassis Compatible Table

Card Name	Product Name	Page	FRM220 -CH20	FRM220A -CH20	CH08	CH02M
FRM220-NMC	Network Management Controller	2-3	✓		✓	
FRM220A-GSW/SNMP	Gigabit Ethernet Aggregate Switch Card	2-5		✓		
FRM220-10G-SXX	10G 3R Transponder SFP+ to XFP Fiber Protection	2-11	✓		✓	✓
FRM220-10G-SS	10G 3R Transponder SFP+ to SFP+	2-12	✓		✓	✓
FRM220-4G-3S	4G Multi-Rate 2R Transponder SFP to SFP Fiber Protection	2-13	✓		✓	✓
FRM220-2.7G-3S	2.7G Multi-Rate 3R Transponder SFP to SFP Fiber Protection	2-14	✓		✓	✓
FRM220-1000DS	1000Base-X to 1000Base-X SFP media converter	2-15	✓		✓	
FRM220-10GE-TS	10G Ethernet Converter 10G Base-T to SFP+	2-16	✓		✓	✓
FRM220-10GE-TX	10G Ethernet Converter 10G Base-T to XFP	2-17	✓		✓	✓
FRM220-MD40	4-Ch CWDM Mux/Demux (1551, 1571, 1591, 1611)nm	2-18	✓		✓	
FRM220-MD80	8-Ch CWDM Mux/Demux (1471 ~ 1611)nm	2-18	✓		✓	
FRM220-MD40 WA/WB	4-Ch single fiber CWDM MUX/DEMUX	2-19	✓		✓	
FRM220-MD80 WA/WB	8-Ch single fiber CWDM MUX/DEMUX	2-19	✓		✓	
FRM220-Protection	1+1 Fiber Optical Protection Switch	2-20	✓		✓	✓
FRM220-MX210	2-Port Gigabit Ethernet Multiplexer	2-21	✓		✓	✓
FRM220-1000M	10/100/1000Base-T to 1000Base-X Web Smart OAM/IP Managed Converter	2-22	✓		✓	✓
FRM220-1000MS	10/100/1000Base-T to 100/1000Base-X SFP Web Smart OAM/IP Managed Converter	2-23	✓		✓	✓
FRM220-1000EAS/X-1	OAM/IP-Based Managed Gigabit Ethernet Media Converter	2-24	✓		✓	✓
FRM220-10/100i	10/100Base-TX to 100Base-FX In-band Managed Converter	2-25	✓		✓	✓
FRM220-10/100iS	10/100Base-TX to 100Base-FX SFP In-band Managed Converter	2-26	✓		✓	✓
FRM220-10/100iS-2	Dual Channels 10/100Base-TX to 100Base-FX SFP Media Converter	2-27	✓		✓	✓
FRM220A-1000EAS/X	2-Port 10/100/1000Base-T + 2-Port 1000Base-X OAM/IP Managed Switch	2-28	✓	✓	✓	✓
FRM220A-1002ES	Hardened Gigabit Ethernet Managed Switch	2-30	✓	✓	✓	✓
FRM220A-FSW103	3x 10/100Base-TX + 100Base-FX Managed Converter	2-31	✓	✓	✓	✓
FRM220-DS3/E3	DS3/E3 over Fiber	2-32	✓		✓	✓
FRM220-ET100	Ethernet over E1 Fiber Modem	2-33	✓		✓	✓
FRM220-Data	V.35/X.21/RS530/449/232 Fiber Modem	2-34	✓		✓	✓
FRM220-E1/T1	E1/T1 Fiber Modem	2-35	✓		✓	✓
FRM220-Serial	RS485/232 Media Converter	2-36	✓		✓	✓
FRM220-FXO/FXS-4	4xPOTS over Fiber	2-37	✓		✓	✓
FRM220-FXO/FXS	POTS over Fiber	2-38	✓		✓	✓
FRM220A-Eoe1	Ethernet Bridge over E1	2-39	✓	✓	✓	✓
FRM220A-Eoe1/G	Ethernet Bridge over E1 (GFP)	2-40	✓	✓	✓	✓
FRM220-E1/Data	E1 to Data	2-43	✓		✓	✓
FRM220-FTEC	E1/T1 Cross Rate Converter	2-44	✓		✓	✓
FRM220A-iMux4	Ethernet to 4 E1 Mux NIC	2-45	✓	✓	✓	✓
FRM220A-iMux8	Ethernet to 8 E1 Mux NIC	2-46	✓	✓	✓	✓
FRM220A-iMux16	Ethernet to 16 E1 Mux NIC	2-47	✓	✓	✓	✓
FRM220-GFOM04	4-Port E1/T1+10/100/1000M Ethernet Fiber Multiplexer	2-48	✓		✓	✓
FRM220-FOM04	4-Port E1/T1+100M Ethernet Fiber Multiplexer	2-49	✓		✓	✓
FRM220-FOM01	E1/T1+100M Ethernet Fiber Multiplexer	2-50	✓		✓	✓

Power Type vs Standalone Chassis Compatible Table

Power Type (option)					
	AC: AC Power	**DC**: DC Power	AC, DC	AC, DC	AC, DC
	AD: AC+DC Power	**AA**: AC+AC Power	**DD**: DC+DC Power	AD, AA, DD	AD, AA, DD	AD, AA, DD

Slide-in Card vs Standalone Chassis Compatible Table

Card Name	Product Name	Page	CH02/SNMP	CH02	CH01	CH01M
FRM220-NMC	Network Management Controller	2-3	✓			
FRM220A-GSW/SNMP	Gigabit Ethernet Aggregate Switch Card	2-5				
FRM220-10G-SXX	10G 3R Transponder SFP+ to XFP Fiber Protection	2-11	✓			
FRM220-10G-SS	10G 3R Transponder SFP+ to SFP+	2-12	✓			
FRM220-4G-3S	4G Multi-Rate 2R Transponder SFP to SFP Fiber Protection	2-13	✓		✓	✓
FRM220-2.7G-3S	2.7G Multi-Rate 3R Transponder SFP to SFP Fiber Protection	2-14	✓			
FRM220-1000DS	1000Base-X to 1000Base-X SFP media converter	2-15	✓			✓
FRM220-10GE-TS	10G Ethernet Converter 10G Base-T to SFP+	2-16	✓			
FRM220-10GE-TX	10G Ethernet Converter 10G Base-T to XFP	2-17	✓			
FRM220-MD40	4-Ch CWDM Mux/Demux (1551, 1571, 1591, 1611)nm	2-18			✓	
FRM220-MD80	8-Ch CWDM Mux/Demux (1471 ~ 1611)nm	2-18		✓		
FRM220-MD40 WA/WB	4-Ch single fiber CWDM MUX/DEMUX	2-19			✓	
FRM220-MD80 WA/WB	8-Ch single fiber CWDM MUX/DEMUX	2-19		✓		
FRM220-Protection	1+1 Fiber Optical Protection Switch	2-20	✓			✓
FRM220-MX210	2-Port Gigabit Ethernet Multiplexer	2-21			✓	✓
FRM220-1000M	10/100/1000Base-T to 1000Base-X Web Smart OAM/IP Managed Converter	2-22	✓		✓	✓
FRM220-1000MS	10/100/1000Base-T to 100/1000Base-X SFP Web Smart OAM/IP Managed Converter	2-23	✓		✓	✓
FRM220-1000EAS/X-1	OAM/IP-Based Managed Gigabit Ethernet Media Converter	2-24			✓	✓
FRM220-10/100i	10/100Base-TX to 100Base-FX In-band Managed Converter	2-25	✓		✓	✓
FRM220-10/100iS	10/100Base-TX to 100Base-FX SFP In-band Managed Converter	2-26	✓		✓	✓
FRM220-10/100iS-2	Dual Channels 10/100Base-TX to 100Base-FX SFP Media Converter	2-27	✓		✓	✓
FRM220A-1000EAS/X	2-Port 10/100/1000Base-T + 2-Port 1000Base-X OAM/IP Managed Switch	2-28			✓	✓
FRM220A-1002ES	Hardened Gigabit Ethernet Managed Switch	2-30	✓			✓
FRM220A-FSW103	3x 10/100Base-TX + 100Base-FX Managed Converter	2-31	✓			✓
FRM220-DS3/E3	DS3/E3 over Fiber	2-32	✓			✓
FRM220-ET100	Ethernet over E1 Fiber Modem	2-33	✓		✓	✓
FRM220-Data	V.35/X.21/RS530/449/232 Fiber Modem	2-34	✓		✓	✓
FRM220-E1/T1	E1/T1 Fiber Modem	2-35	✓		✓	✓
FRM220-Serial	RS485/232 Media Converter	2-36	✓		✓	✓
FRM220-FXO/FXS-4	4x POTS over Fiber	2-37	✓			✓
FRM220-FXO/FXS	POTS over Fiber	2-38	✓		✓	✓
FRM220A-Eoe1	Ethernet Bridge over E1	2-39	✓		✓	✓
FRM220A-Eoe1/G	Ethernet Bridge over E1 (GFP)	2-40	✓		✓	✓
FRM220-E1/Data	E1 to Data	2-43	✓		✓	✓
FRM220-FTEC	E1/T1 Cross Rate Converter	2-44	✓			✓
FRM220A-iMux4	Ethernet to 4 E1 Mux NIC	2-45	✓		✓	✓
FRM220A-iMux8	Ethernet to 8 E1 Mux NIC	2-46	✓		✓	✓
FRM220A-iMux16	Ethernet to 16 E1 Mux NIC	2-47		✓		
FRM220-GFOM04	4-Port E1/T1+10/100/1000M Ethernet Fiber Multiplexer	2-48				
FRM220-FOM04	4-Port E1/T1+100M Ethernet Fiber Multiplexer	2-49		✓		
FRM220-FOM01	E1/T1+100M Ethernet Fiber Multiplexer	2-50	✓			✓

Power Type vs Standalone Chassis Compatible Table

Power Type (option)	**DC12**: AC Adapter **AD**: AC+DC Power	**AC**: AC Power **AA**: AC+AC Power	**DC**: DC Power **DD**: DC+DC Power					
	AC, DC, AD	AC, DC, AD	DC12	DC12, AC, DC, AD, AA, DD	AC, DC, AD			

FRM220-10G-SXX

10G Transponder (3R) with Optical Line Protection

The FRM220-10G-SXX is a 10G fiber to fiber 3R repeater and transponder. Based on 10 Gigabit fiber standards, this transponder supports SFP+ to XFP (SX) or XFP to XFP (XX) fiber connections. 1+1 Automatic optical line Protection Switching is supported for the aggregate XFP fiber ports. The transponder is protocol transparent, providing 3R (Re-amplification, Re-shaping and Re-clocking) between these different optical module types. One of the major applications for this converter is in connecting proprietary transceiver equipment to CWDM or DWDM when these 'colored' optical modules are not available for the proprietary equipment. With transparent bi-directional forwarding capability between the 2 fiber media, the FRM220-10G-SXX brings you the best and simplest solution for your 10G conversion between fiber and fiber.

Features

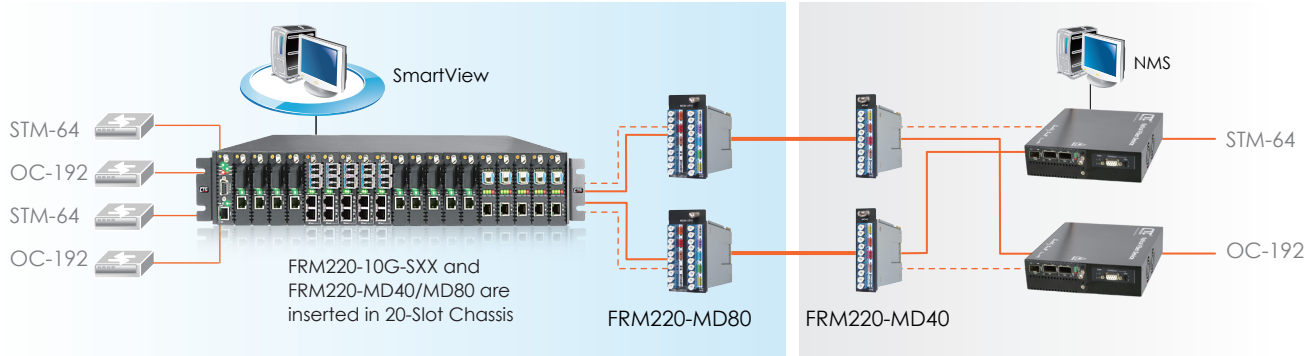
- Multiple protocol supported 10G Ethernet, STM-64, OC-192, G.709 OTU2, Fiber Channel (8 x FC)
- Network management via Web, Telnet, SNMP in central FRM220-CH20 chassis (10 cards in chassis max.)
- Protocol transparent 3R fiber media transponder / repeater
- (Re-amplification, Re-shaping and Re-clocking)
- Promotes flexibility and eases management with pluggable SFP+ or XFP transceiver
- Features two 10G ports offering multiservice 10G transponder and regenerator function
- Supports 1+1 optical line protection
- Built-in self test (BIST) function
- Provides superior optics capabilities resulting in extended transport distances for regional application.
- Extend 10G Ethernet transmission over fiber useful as a 'Transponder' in CWDM or DWDM systems for 10G Ethernet/ Fiber Channel/STM-64
- Supports Client / Line loop back tests
- Serial console for stand-alone management when inserted in CH02M dual slot chassis
- XFP power supplies: +5.0V, -5.2V, +3.3V and +1.8V
- Supports reference clock output

Specifications

Optical Interface	Connector	LC
		1x Line SFP+ to 2x Client XFP
		1x Line SFP+ to 1x Client XFP
		1x Line XFP to 1x Client XFP
	Traffic Format	OC-192/STM-64 (9.95328Gbps)
		1 Gigabit Ethernet (1.25Gbps)
		10 Gigabit Ethernet LAN(10.3125Gbps)
		G.709 OTU2 (10.709225Gbps)
		Fiber Channel
		1xFC(1.062 Gbps); 2xFC(2.125 Gbps);
		4xFC(4.25 Gbps); 8xFC(8.5 Gbps);
		10xFC(10 Gbps)
	Regeneration	Re-amplification
		Re-shaping, Re-timing

Power	Loopback	Line / Client
	Fiber	SM 9/125µm
		MM 50/125µm or 62.5/125µm
	Wavelength	Depends on SFP+ or XFP
Indications	LED (Power, Line Link, Client Link, Test, Loop back, Port Active, Alarm)	
Power Input	12VDC	
Power Consumption	<10W	
Dimensions	155 x 88 x 23mm (D x W x H)	
Weight	150g	
Temperature	0 ~ 50°C (Operating), -10 ~ 70°C (Storage)	
Humidity	10 ~ 90% non-condensing	
Certification	CE, FCC, RoHS compliant	
MTBF	65,000 hrs	

Application



Ordering Information

Model Name	Description
FRM220-10G-SXX	10G 3R SFP+ to XFP fiber protection (optional SFP+, XFP module)

Note: This card MUST be placed in CH02M chassis.
For standalone SNMP management, place this card in CH02/SNMP chassis.

FRM220-10G-SS

10G Transponder (3R)

The FRM220-10G-SS is a 10G fiber to fiber 3R repeater and transponder. Based on a number of 10 Gigabit Fiber standards, these transponders support SFP+ to SFP+ (SS) fiber connections. The transponders are protocol transparent, providing 3R (Re-amplification, Re-shaping and Re-clocking) regeneration between these different optical module types. One of the major applications for this converter is in connecting proprietary transceiver equipment to CWDM or DWDM when these 'colored' optical modules are not available for the proprietary equipment. With transparent bi-directional forwarding capability between the 2 fiber media, the FRM220-10G-SS brings you the best and simplest solution for your 10G conversion between fiber and fiber.

Features

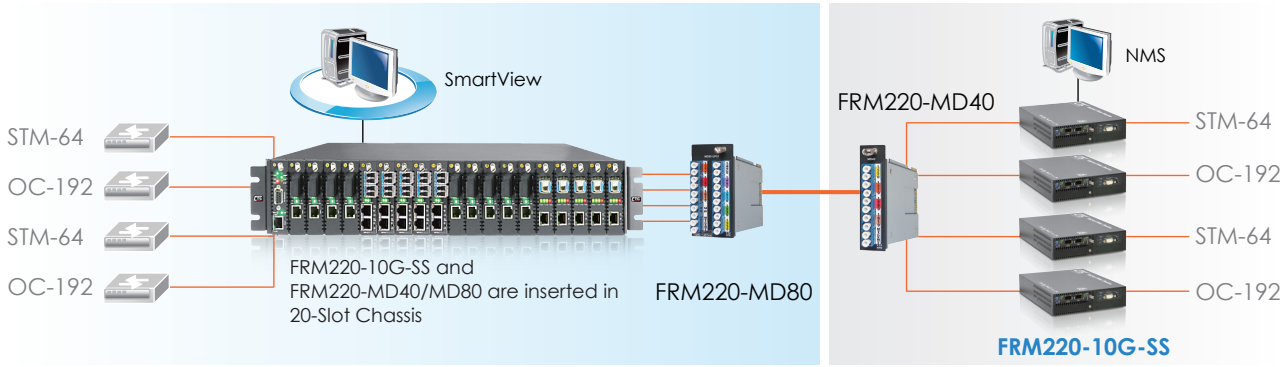
- Multiple protocol supported 10G Ethernet, STM-64, OC-192, G.709 OTU2, Fiber Channel (8 x FC)
- Network management via Web, Telnet, SNMP in central FRM220 chassis(10 cards in chassis max.)
- Protocol transparent 3R fiber media transponder / repeater (Re-amplification, Re-shaping and Re-clocking)
- Promotes flexibility and eases management with pluggable SFP+ transceiver
- Features two 10G ports offering multiservice 10G transponder and regenerator function
- Provides superior optics capabilities resulting in extended transport distances for regional application.
- Extend 10G Ethernet transmission over fiber
- Useful as a 'Transponder' in CWDM or DWDM systems for 10G Ethernet/Fiber Channel/STM-64
- Supports Client / Line loop back tests
- Serial console for stand-alone management when inserted in CH02M Single Slot Chassis
- SFP+ power supplies: +3.3V

Specifications

Optical Interface	Connector	LC, 1x Line SFP+ to 1x Client SFP+
	Traffic Format	OC-192/STM-64 (9.95328Gbps)
		10 Gigabit Ethernet LAN(10.3125Gbps)
		G.709 OTU2 (10.709225Gbps)
		Fiber Channel
		1xFC (1.062 Gbps); 2xFC (2.125 Gbps)
		4xFC (4.25 Gbps); 8xFC (8.5 Gbps)
		10xFC (10.51875 Gbps)
	Regeneration	Re-amplification
		Re-shaping, Re-timing
	Loopback	Line / Client
	Fiber	SM 9/125µm
		MM 50/125µm or 62.5/125µm

Optical Interface	Wavelength	CWDM 1470 ~ 1610nm
		DWDM 1529.55 ~ 1565.50nm
Indications	LED (Power, Line Link, Client Link, Test, Loop back, Port Active, Alarm)	
Power Input	12VDC	
Power Consumption	<10W	
Dimensions	155 x 88 x 23mm (D x W x H)	
Weight	150g	
Temperature	0 ~ 50°C (Operating), -10 ~ 70°C (Storage)	
Humidity	10 ~ 90% non-condensing	
Certification	CE, FCC, RoHS compliant	
MTBF	65,000 hrs	

Application



Ordering Information

Model Name	Description
FRM220-10G-SS	10G 3R transponder, SFP+ to SFP+ (optional SFP+ module)

Note: This card may be set by DIP switch or console, but MUST be placed in CH02M chassis.
For standalone SNMP management, place this card in CH02/SNMP chassis.

FRM220-4G-3S

4G Transponder (2R) with Optical Line Protection

The FRM220-4G-3S is a 2R 4G optical regeneration device, which consists of Re-amplification and Re-shaping. The transponder card converts a data signal to the correct wavelength for transmission on a specific channel by supporting SFP optics on both line side and client side interfaces. 1+1 Automatic optical line Protection Switching is supported for the aggregate fiber ports. When the FRM220-4G-3S card is placed in the FRM220 rack with SNMP management, the management can view the converter card's status, type, version, fiber link status and alarms. The card can be configured to enable or disable the port, reset the port and perform diagnostic loop backs.

Features

- Multiple protocol supported at bit rates 28Mbps to 4.25Gbps (Fast Ethernet, Gigabit Ethernet, OC-3, OC-6, OC-12, STM-1, STM-4, STM-16, FC-1, FC-2, FC-4)
- Network management via Web, Telnet, SNMP in central FRM220 chassis
- Local configuration via DB9 console port (when placed in CH01M or CH02M)
- Digital diagnostic monitoring of SFP module
- Perform optical repeater function (Re-amplification, Re-shaping)
- Facility loopback on both Client / Line sides
- 1+1 optic fiber protection
- Link Fault Pass-Through (LFPT)
- Auto Laser Shutdown (ALS)
- Detect transceiver transmitter error alarm

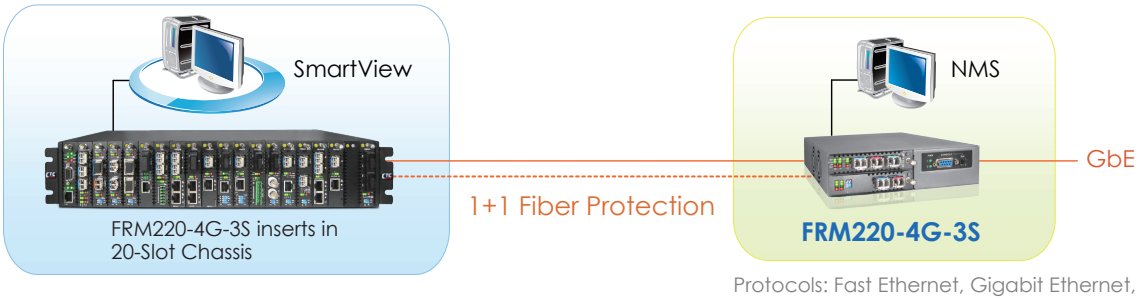
Specifications

Optical Interface	Connector	SFP LC
	Data rate	28Mbps to 4.25Gbps
	Regeneration	Re-amplification
		Re-shaping
	Loop back	Line/Client
	Fiber	MM 62.2/125μm, 50/125μm.
		SM 9/125μm
	Wavelength	MM 850, 1310nm
		SM 1310, 1550nm
		WDM 1310T/1550R, 1550T/1310R
		CWDM 1470 ~ 1610nm

Indications	LED (PWR, Line Link, Client Link, Test, Loop back, Port Active, Alarm)
Power Input	12VDC
Power Consumption	< 8W
Dimensions	155 x 88 x 23mm (D x W x H)
Weight	120g
Temperature	0 ~ 50°C (Operating), -10 ~ 70°C (Storage)
Humidity	10 ~ 90% non-condensing
Certification	CE, FCC, RoHS compliant
MTBF	65,000 hrs

Application

Managed 4G 2R Transponder with Fiber Protection



Protocols: Fast Ethernet, Gigabit Ethernet, OC-3, OC-6, OC-12, STM-1, STM-4, STM-16, FC-1, FC-2

Ordering Information

Model Name	Description
FRM220-4G-3S	4G 2R Transponder with fiber protection, (optional SFP module)

Note: This card may be set by DIP switch and placed in CH01 chassis, or set by serial console if placed in CH01M chassis

FRM220-2.7G-3S

2.7G Transponder (3R) with Optical Line Protection

The FRM220-2.7G-3S is a 3R 2.7G optical repeater and transponder, which consists of Re-amplification, Re-shaping and Re-timing. The transponder card converts a data signal to the correct wavelength for transmission on a specific channel by supporting SFP optics on both line side and client side interfaces. 1+1 Automatic optical line Protection Switching are supported for the aggregate fiber ports. When the FRM220-2.7G-3S card is placed in the FRM220 rack with SNMP management, the management can view the converter card's status, type, version, fiber link status and alarms. The card can be configured to enable or disable the port, reset the port and set the desired data rate to match the transmitted protocol.

Features

- Multiple protocol supported at bit rates 34.3Mbps to 2.7Gbps (Fast Ethernet, Gigabit Ethernet, OC-3, OC-6, OC-12, OC-24, OC-48, STM-1, STM-4 STM-16, FC-1, FC-2)
- Network management via Web, Telnet, SNMP in central FRM220 chassis
- Link Fault Pass-Through (LFPT)
- Auto Laser Shutdown (ALS)
- Local configuration via DB9 craft port In Stand-alone
- Digital diagnostic monitoring of SFP module
- Perform optical repeater function (Re-amplification, Re-shaping, and Re-clocking)
- Facility loopback on both Client / Line sides
- 1+1 optic fiber protection
- Dip switch setting data rate
- Detect transceiver transmitter error alarm

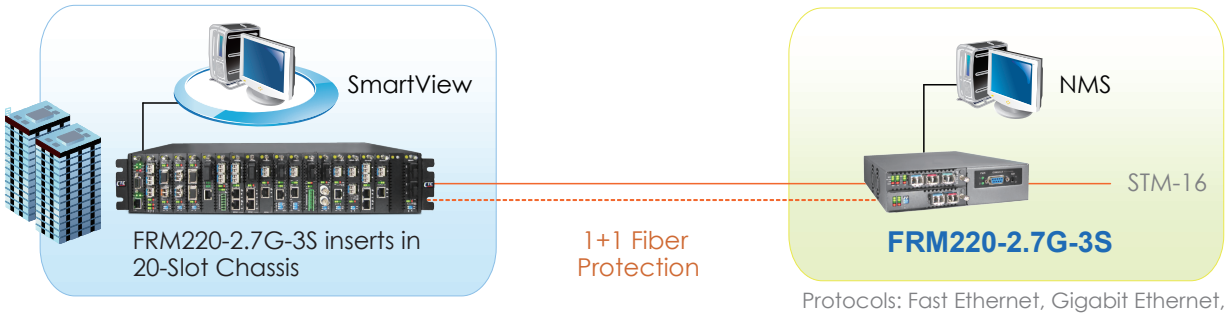
Specifications

Optical Interface	Connector	SFP LC
	Data rate	E3 to OC-48
	Regeneration	Re-amplification
		Re-shaping
		Re-clocking
	Loop back	Line/Client
	Fiber	MM 62.2/125μm, 50/125μm
		SM 9/125μm
	Wavelength	MM 850, 1310nm
		SM 1310, 1550nm
		WDM 1310T/1550R, 1550T/1310R
		CWDM 1470 ~ 1610nm

Indications	LED (PWR, Line Link, Client Link, Test, Loop back, Port Active, Alarm)
Power Input	12VDC
Power Consumption	< 10W
Dimensions	155 x 88 x 23mm (D x W x H)
Weight	120g
Temperature	0 ~ 50°C (Operating), -10 ~ 70°C (Storage)
Humidity	10 ~ 90% non-condensing
Certification	CE, FCC, RoHS compliant
MTBF	65,000 hrs

Application

Managed 2.7G 3R Transponder with Fiber Protection



Protocols: Fast Ethernet, Gigabit Ethernet, OC-3, OC-6, OC-12, OC-24, OC-48, STM-1, STM-4, STM-16, FC-1, FC-2

Ordering Information

Model Name	Description
FRM220-2.7G-3S	2.7G 3R Transponder with fiber protection, (optional SFP module)

Note: This card may be set by DIP switch or console, but MUST be placed in CH02M chassis.
For standalone SNMP management, place this card in CH02/SNMP chassis.

FRM220-1000DS

1G (2R) Transponder

The FRM220-1000DS is a fiber to fiber optical media converter and repeater that allows data rates up to 1Gbps. FRM220-1000DS supports 2R regeneration, which consists of re-amplification and reshaping. This converter is compatible with fiber interfaces such as 100Mbps Fast Ethernet, STM-1, 4, Fiber Channel 1, 2, 4 and OC3, 12. The FRM220-1000DS works as an FRM220 slide-in card, while the FRM220-1000DS plus FRM220-CH01 work as a stand-alone fiber converter. When the FRM220-1000DS card is placed in the FRM220-CH20 rack with SNMP management, the management can view the converter card's status, type and fiber link status.

Features

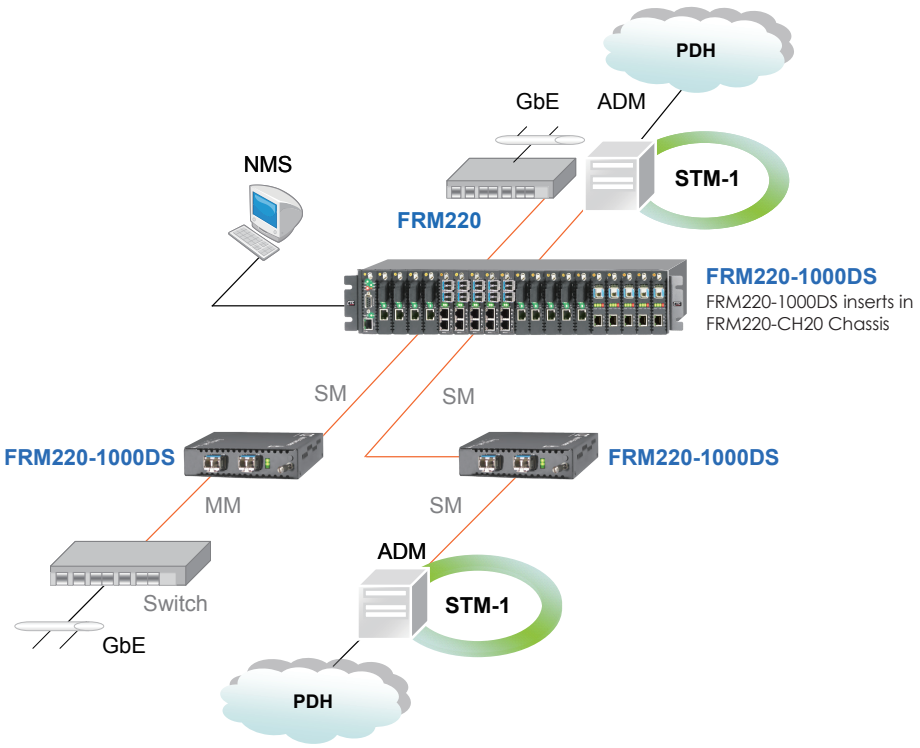
- Transparent fiber media converter / repeater
- Data rate up to 1G
- Network management via terminal or SNMP in FRM220 chassis
- Extend transmission from 2km to 120km over fiber
- Perform optical repeater function (Re-amplification & Reshaping)
- Digital diagnostic monitoring of SFP modules

Specifications

Optical Interface	Connector	SFP LC x 2
	Data rate	Up to 1G
	Duplex mode	Full duplex
	Fiber	MM 50/125μm, 62.5/125μm.
		SM 9/125μm
	Distance	MM 550m, 2km, SM 15/30/50/80/120km
		WDM 20/40/60km
	Wavelength	MM 1310nm, SM 1310,1550nm
		WDM 1310Tx/1550Rx (type A)
		1550Tx/1310Rx (type B)

Indications	LED (Power, FX-Link1, FX-Link2)
Power Input	12VDC
Power Consumption	< 5W
Dimensions	123 x 86 x 20 mm (D x W x H)
Weight	130g
Temperature	0 ~ 50°C (Operating), -10 ~ 70°C (Storage)
Humidity	10 ~ 90% non-condensing
Certification	CE, FCC, RoHS compliant
MTBF	65,000 hrs

Application



Ordering Information

Model Name	Description
FRM220-1000DS	1000Base-X SFP to 1000Base-X SFP 2R Transponder

Note: This card must use CH01M, with serial console, to configure standalone settings

FRM220-10GE-TS

10G Ethernet Media Converter
10G Base-T to 10G Base-R SFP+

The FRM220-10GE-TS is a copper to fiber 10G Ethernet media converter based on IEEE802.3an and IEEE802.3ae. With SNMP and Web-based management in the FRM220, the Network administrator can monitor, configure and control the activity of each card in the chassis. This converter uses Cat.6a/Cat 7 twisted pair cable as copper transmission media with RJ-45 and 10G optical solution with SFP+ LC connector. The data stream can be converted bi-directionally from 10GBase-T to 10GBase-R and vice versa. With full duplex wire speed forwarding capability between these two media, the FRM220-10GE-TS brings you the best and simplest solution for the 10G Ethernet conversion between copper wire and fiber.

Features

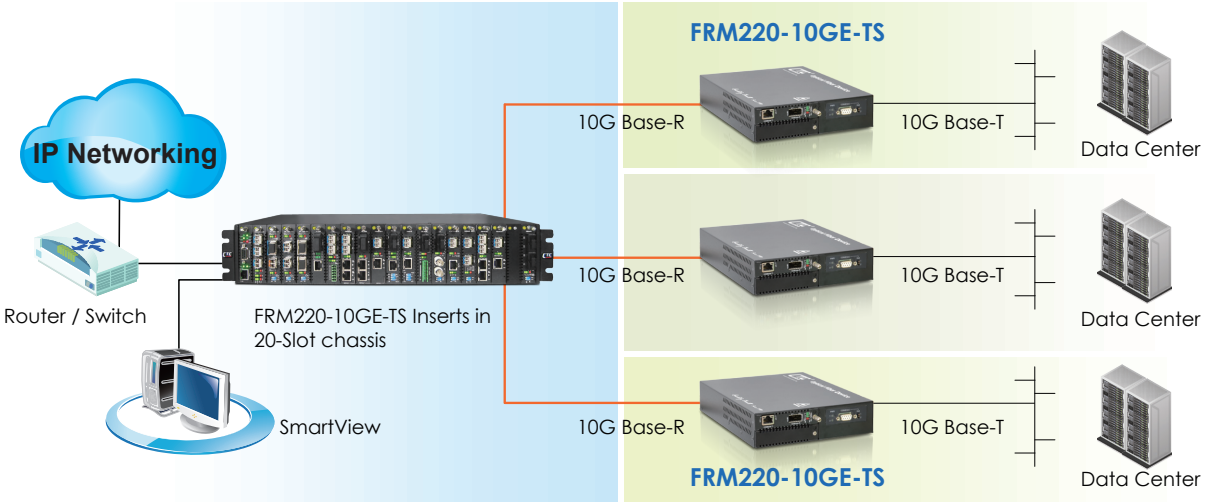
- Network Management via FRM220 Chassis
- Complies with IEEE802.3an 10GBase-T and IEEE802.3ae 10GBase-R
- Real-Time conversion between 10GBase-T and 10GBase-R
- Common used SFP+ fiber interface and RJ45 connector
- Full duplex wire speed forwarding
- Subsidiary device for 10G Ethernet transmission without fiber
- Loopback Test
- Standalone Local Management via CH02M
- Forwarding l0k bytes jumbo packet

Specifications

Optical Interface	Connector	SFP+ LC
	Data rate	10,3125Gbps
	Distance	300m, 10km, 40km, 80km
	Wavelength	1550nm
Electrical Interface	Connector	RJ45
	Data rate	10Gbps
	Cable type	Cat.6a, 7
	Distance	95 meters (Cat.7)
Management	Console port	RS-232 via CH02M
Standards	IEEE 802.3an, IEEE 802.3ae	
LEDs	SFP+, LR, Link/Act, LBK A/B, SYS	

Power	12VDC
Power Consumption	< 15W
Dimensions	155 x 88 x 23mm (D x W x H)
Weight	130g
Temperature	0 ~ 50°C (Operating), -10 ~ 70°C (Storage)
Humidity	0 ~ 85% non-condensing
Certification	CE, FCC, RoHS compliant
MTBF	57,000 hrs

Application



Ordering Information

Model Name	Description
FRM220-10GE-TS	10G Base-T RJ45 to 10G Base-R SFP+, (optional SFP+)

Note: This card MUST be placed in CH02M chassis.
For standalone SNMP management, place this card in CH02/SNMP chassis.

FRM220-10GE-TX

10G Ethernet Media Converter
10G Base-T to 10G Base-R XFP

The FRM220-10GE-TX is a copper to fiber 10G Ethernet media converter based on IEEE802.3an and IEEE802.3ae. With SNMP and Web-based management in the FRM220, the Network administrator can monitor, configure and control the activity of each card in the chassis. This converter uses Cat.6a/Cat 7 twisted pair cable as copper transmission media with RJ-45 and 10GE optical solution with XFP LC connector. The data stream can be converted bi-directionally from 10GBase-T to 10GBase-R and vice versa. With full duplex wire speed forwarding capability between these two media, The FRM220-10GE-TX brings you the best and simplest solution for the 10G Ethernet conversion between copper wire and fiber.

Features

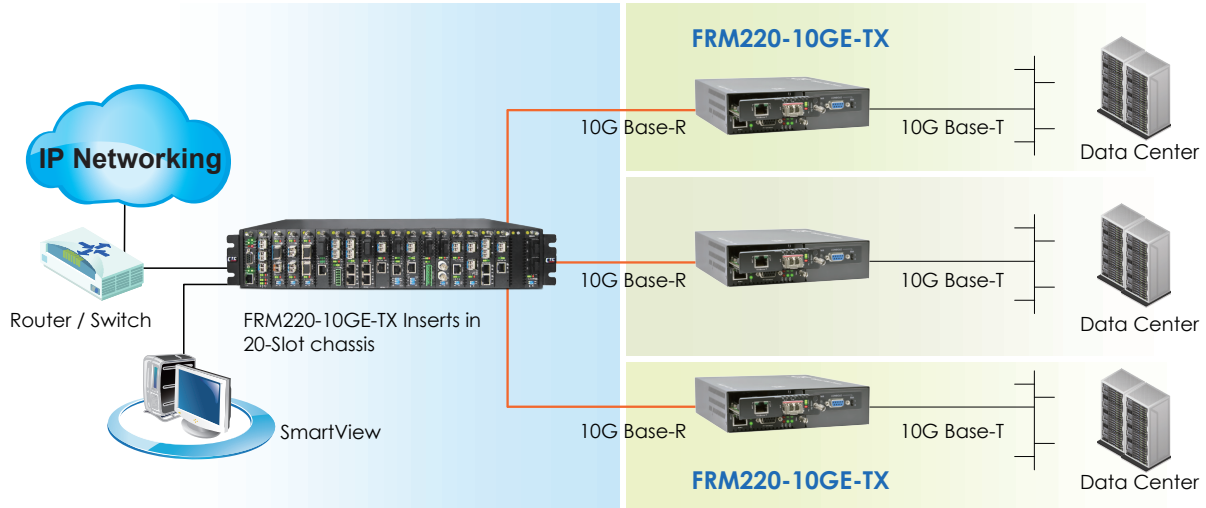
- Network Management via FRM220 Chassis
- Complies with IEEE802.3an 10GBase-T and IEEE802.3ae 10GBase-R
- Real-Time conversion between 10GBase-T and 10GBase-R
- Common used XFP fiber interface and RJ45 connector
- Full duplex wire speed forwarding
- Loopback Test
- Standalone Local Management via CH02M
- Forward 10k bytes jumbo packet

Specifications

Optical Interface	Connector	XFP LC
	Data rate	10,3125Gbps
	Distance	300m, 10km, 40km, 80km
	Wavelength	1550nm
Electrical Interface	Connector	RJ-45
	Data rate	10Gbps
	Cable type	Cat.6a, 7
	Distance	95 meters (Cat.7)
Management	Console port	RS-232 via CH02M
Standards	IEEE 802.3an, IEEE 802.3ae	
LEDs	SFP+, LR, Link/Act, LBK A/B, SYS	

Power	12VDC
Power Consumption	< 15W
Dimensions	155 x 88 x 23mm (D x W x H)
Weight	130g
Temperature	0 ~ 50°C (Operating), -10 ~ 70°C (Storage)
Humidity	0 ~ 85% non-condensing
Certification	CE, FCC, RoHS compliant
MTBF	57,000 hrs

Application



Ordering Information

Model Name	Description
FRM220-10GE-TX	10G Base-T RJ45 to 10G-Base-R XFP, (optional XFP)

Note: This card MUST be placed in CH02M chassis.
For standalone SNMP management, place this card in CH02/SNMP chassis.

FRM220-MD40
FRM220-MD80

4-Ch CWDM Dual Fiber MUX/DeMUX
8-Ch CWDM Dual Fiber MUX/DeMUX

The FRM220-MD40 is a 4 channel MUX/DeMUX, modular design card for CWDM wavelengths including 1511nm, 1531nm, 1551nm, 1571nm. The FRM220-MD40-2UP is 4 channels MUX/DeMUX, modular design card for CWDM wavelengths including 1471nm, 1491nm, 1591nm, 1611nm and two upgrade ports for CWDM wavelength ranges of 1503nm ~ 1577nm and 1260nm ~ 1457nm. The FRM220-MD80-1UP is 8 channels MUX/DeMUX, modular design card for CWDM wavelengths including 1471nm, 1491nm, 1511nm, 1531nm, 1551nm, 1571, 1591, 1611nm and one upgrade port for CWDM wavelength range of 1260nm ~ 1457nm. The MUX/DeMUX cards provide the primary wave division and combination functions for CWDM. Line side wave lengths require translation to client side equipment via a transponder card.

Features

- Full native mode performance
- Optical connectors
- Passive model requires no power
- Protocol transparent, no limitation
- Utilizes industry standard ITU CWDM wavelength

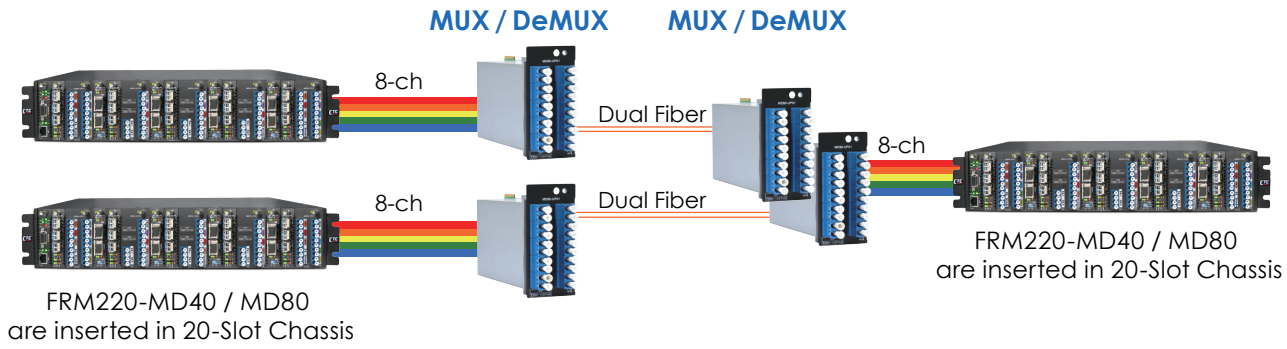
Specifications

Connector	LC
Standards	ITU-T G.694.2
Wavelength	1471, 1491, 1511, 1531, 1551, 1571, 1591, 1611nm
Upgrade Port	1503nm ~ 1577nm, 1260nm ~ 1457nm
Insertion Loss	MD40 : < 1.8dB
	MD80 : < 2.8dB
Return Loss	>45dB
MTBF	75,000 hours

Dimensions	MD40:155 x 88 x 23 mm (D x W x H)
	MD80:155 x 88 x 42 mm (D x W x H)
Weight	MD40 : 200g
	MD80 : 380g
Temperature	0 ~ 50 °C (Operating)
	-10 ~ 70 °C (Storage)
Humidity	0 ~ 95% non-condensing
Certification	RoHS compliant

Application

CWDM MUX/DeMUX



Ordering Information

Model Name	Description
FRM220-MD40-5157	4-Ch CWDM MUX/DeMUX (1511, 1531, 1551, 1571nm)
FRM220-MD40-5561	4-Ch CWDM MUX/DeMUX (1551, 1571, 1591, 1611nm)
FRM220-MD80	8-Ch CWDM MUX/DeMUX (1471 ~ 1611nm)

Note: This card may be placed in CH01 standalone chassis. (FRM220-MD40)
This card may be placed in CH02 standalone chassis. (FRM220-MD80)

FRM220 –□□□□
Example: FRM220 – MD40

FRM220-MD40 WA/WB
FRM220-MD80 WA/WB

4-Ch Single Fiber CWDM MUX/DeMUX
8-Ch Single Fiber CWDM MUX/DeMUX

The Single Fiber Optical Multiplexers are available in 4 or 8 channels versions and are used to combine signals from the traffic cards on to a single fiber. The FRM220-MD40-WA is a 4 channel single fiber MUX/DeMUX modular design card for CWDM wavelengths including 1471nm, 1511nm, 1551nm, 1591nm. The FRM220-MD40-WB is a 4 channel Single fiber MUX/DeMUX, modular design card for CWDM wavelengths including 1491nm, 1531nm, 1571nm, 1611nm. The FRM220-MD80-WA is a 8 channel single fiber MUX/DeMUX modular design card for CWDM wavelengths including 1271nm, 1291nm, 1311nm, 1331nm, 1351nm, 1411nm, 1431nm, 1451nm. The FRM220-MD80-WB is a 8 channel Single fiber MUX/DeMUX, modular design card for CWDM wavelengths including 1471nm, 1491nm, 1511nm, 1531nm, 1551nm, 1571nm, 1591nm, 1611nm. The Single fiber MUX/DeMUX cards provide the primary wave division and combination functions for CWDM. Line side wavelengths require translation to client side equipment via a transponder card.

Features

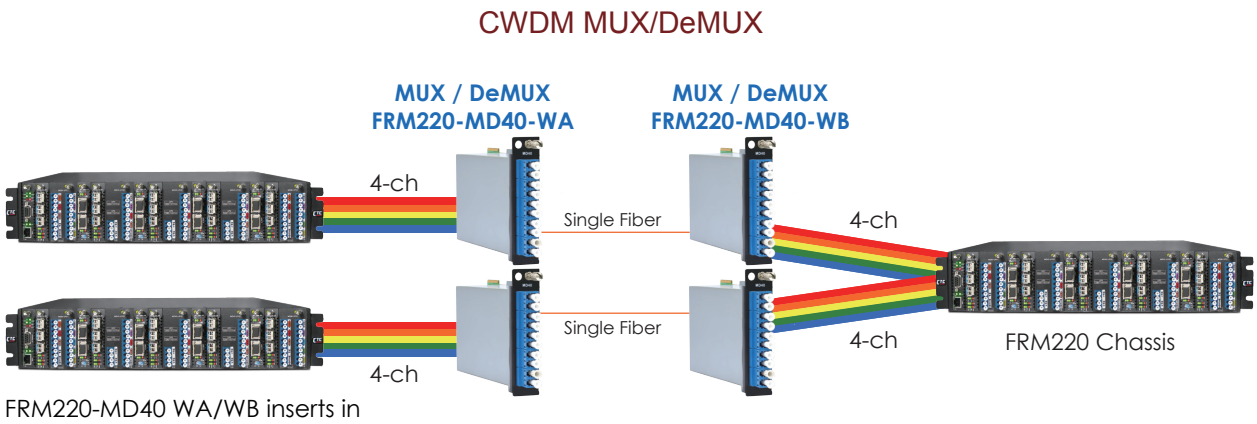
- Full native mode performance
- Optical connectors
- Passive model requires no power
- Protocol transparent, no limitation
- Utilizes industry standard ITU-T CWDM wavelength

Specifications

Connector	LC
Standards	ITU-T G.694.2
Wavelength	FRM220-MD40-WA : 1471, 1511, 1551, 1591nm
	FRM220-MD40-WB : 1491, 1531, 1571, 1611nm
	FRM220-MD80-WA : 1271, 1291, 1311, 1331, 1351, 1411, 1431, 1451nm
	FRM220-MD80-WB : 1471, 1491, 1511, 1531, 1551, 1571, 1591, 1611nm
Insertion Loss	< 1.8dB

Return Loss	>45dB
Dimensions	MD40 WA/WB :155 x 88 x 23 mm (D x W x H)
	MD80 WA/WB :155 x 88 x 42 mm (D x W x H)
Weight	FRM220-MD40 WA/WB : 200g
	FRM220-MD80 WA/WB : 380g
Temperature	0 ~ 50 °C (Operating)
	-10 ~ 70 °C (Storage)
Humidity	0 ~95% non-condensing
Certification	RoHS compliant

Application



FRM220-MD40 WA/WB inserts in 20-Slot Chassis

Ordering Information

Model Name	*Description*
FRM220-MD40-WA	4-ch CWDM MUX/DeMUX (1471, 1511, 1551, 1591nm), Bidi on WAN port
FRM220-MD40-WB	4-ch CWDM MUX/DeMUX (1491, 1531, 1571, 1611nm), Bidi on WAN port
FRM220-MD80-WA	8-Ch CWDM MUX/DeMUX (1271 ~ 1451nm), Bidi on WAN port
FRM220-MD80-WB	8-Ch CWDM MUX/DeMUX (1471 ~ 1611nm), Bidi on WAN port

Note: This card may be placed in CH01 standalone chassis. (FRM220-MD40 WA/WB)
This card may be placed in CH02 standalone chassis. (FRM220-MD80 WA/WB)

FRM220 –□□□□–□□
Example: FRM220 – MD40-WA

FRM220-Protection

1+1 Fiber Optical Protection Switch

FRM220-Protection Optical Line Protection (OLP) unit is able to provide fiber path redundancy on a channel by channel basis. These units are particularly well suited for protection in any type of fiber data transmission. This solution includes monitoring capabilities for both the working and protected path fibers. In case of a fiber cut in the active path, traffic will be switched over to the protected path in less than 50 ms. Monitoring is available through SNMP Management when FRM220-Protection card is placed in FRM220 rack with SNMP management. The management can view the converter card's status, type, version, fiber link status and alarms. The card can be configured to enable or disable the port, reset the port, and configure receive threshold levels for path switching.

Features

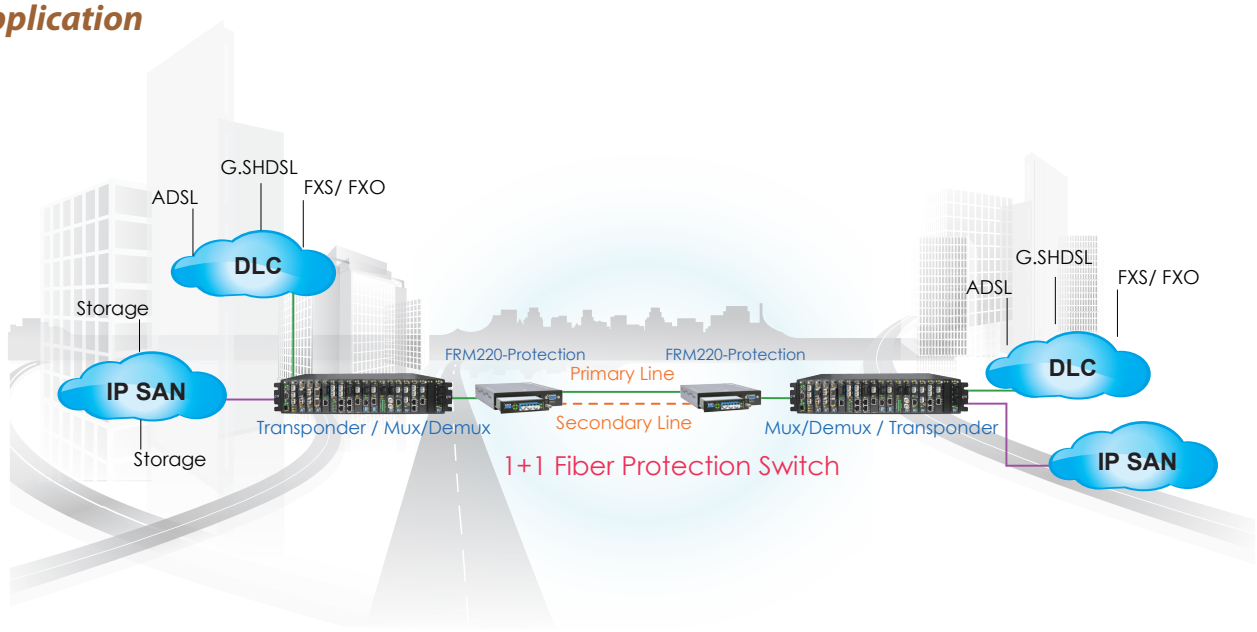
- 1+1 full optical protection
- Low channel cross talk < -55dB
- Low insertion loss < 5.5dB
- Latch feature, if power is lost the switch remains in its current state
- Protection transition < 50 ms
- Works with any combination of 1 ~16 wavelengths
- Traffic is switched in one of three modes : revertive,non-revertive, manual
- Programmable Rx threshold setting for switch-over
- Optical Interface Type : LC connectors
- Working and protected lines are physically separated fiber

Specifications

Connecter	LC
LEDs	Power System, Working Path, Protection Path, Work mode
Power	DC 12V In
Restoration Time	50ms
Range	Input PWR : +3 ~ -15dBm(TX), -2~-29dBm(RX)
	Detection : -5 ~ -29dBm
Loss	Insertion Loss < 5.5dB, Return Loss > 45dB

Power Consumption	< 5W
Dimensions	155 x 88 x 23mm (D x W x H)
Weight	130g
Temperature	0 ~ 50°C (Operating), -10 ~ 70°C (Storage)
Humidity	10 ~ 90% non-condensing
Certification	CE, FCC, RoHS compliant
MTBF	65,000 hours

Application



Ordering Information

Model Name	Description
FRM220-Protection	1+1 Fiber Optical Protection Switch

Note: This card must use CH01M, with serial console, to configure standalone settings.

FRM220-MX210

2x Gigabit Ethernet Multiplexer

FRM220-MX210 is 4-port Gigabit Ethernet switch which able to aggregate two wire-speed Gigabit Ethernet services into one 2.5G uplink, reducing CAPEX by effectively increasing fiber utilization. The Multiplexer can be used either in point-to-point topology, functioning as a media converter for transporting 2 Gigabit Ethernet services over one fiber, or in CWDM systems working as a wavelength converter for extending transmission capacity. FRM220-MX210 is equipped with one 10/100/1000M RJ-45 network management port and three SFP based ports: two 1G Ethernet service ports and one 1G/2.5G uplink port. Additionally its advanced features such as downlink and uplink loop back, auto laser shutdown and remote network management provide carriers a flexible, reliable and cost-effective two Gigabit Ethernet over one wavelength conversion solution.

Features

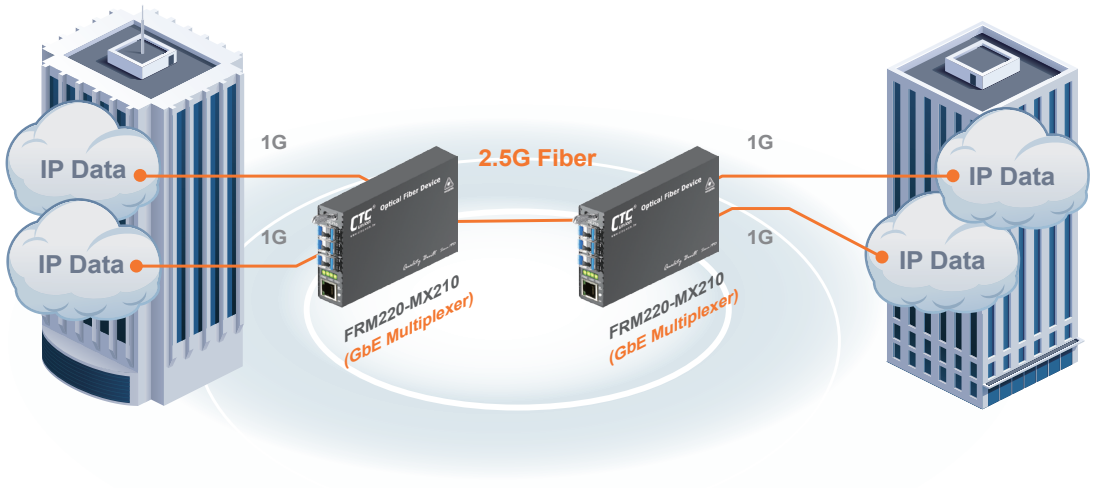
- Local configuration via DB9 craft port in stand-alone (CH01M)
- Forward 9K bytes Jumbo Packets
- Transports two Gigabit Ethernet over one wavelength doubling the CWDM system transmission capacity
- Facility loopback on both Line / client sides
- Auto Laster Shutdown (ALS)
- Hot-swappable SFP module
- Detect transceiver error Alarm
- Network Management via web, Telnet, SNMP in central FRM220 chassis
- 10/100/1000M Network management port
- Supports Q in Q double tagged frame transparent
- Supports IEEE 802.1Q Tagging and Port based VLAN
- Supports IEEE 802.1D STP
- Default port and 802.1p tag priority QoS

Specifications

Optical Interface	Port1/Port2	100Base-FX, 1000Base-X or 2500Base-X
Electrical Interface	Port3	100Base-FX or 1000Base-X
	Port4	RJ45
		10/100/1000Base-T
		MDI/MDIX auto crossover
		IEEE802.3x flow control
Standards	IEEE 802.3, 802.3u, 802.3z, 802.3ab	
LEDs	PWR, Link (Port1, Port2, Port3) Port4: Link/Speed	
Power	12VDC	

Power Consumption	< 10W
Dimensions	155 x 88 x 23mm (D x W x H)
Weight	120g
Temperature	0 ~ 50°C (Operating), -10 ~ 70°C (Storage)
Humidity	5 ~ 90% non-condensing
Certification	CE, FCC, RoHS compliant
MTBF	65,000 hrs

Application



Ordering Information

Model Name	Description
FRM220-MX210	2-port Gigabit Ethernet Multiplexer for transporting two Gigabit Ethernet over one 2.5G Fiber

Note: This card may use CH01M to provide console for initial TCP/IP settings, or use CH01 with default IP.

FRM220-1000M

10/100/1000Base-T to 1000Base-X Web Smart GbE OAM Managed Converter

The FRM220-1000M is an IEEE802.3ah OAM compliant copper to fiber Gigabit Ethernet solution designed to make conversion between 10/100/1000Base-T and 1000Base-X with SC, FC or ST connectors. With SNMP and Web-based management in the FRM220, the network administrator can monitor, configure and control the activity of each 802.3ah series card and remotely connected OAM compliant converter. Converter settings include band-width control, duplex, and speed configuration, VLAN tagging and Q-in-Q support.

Features

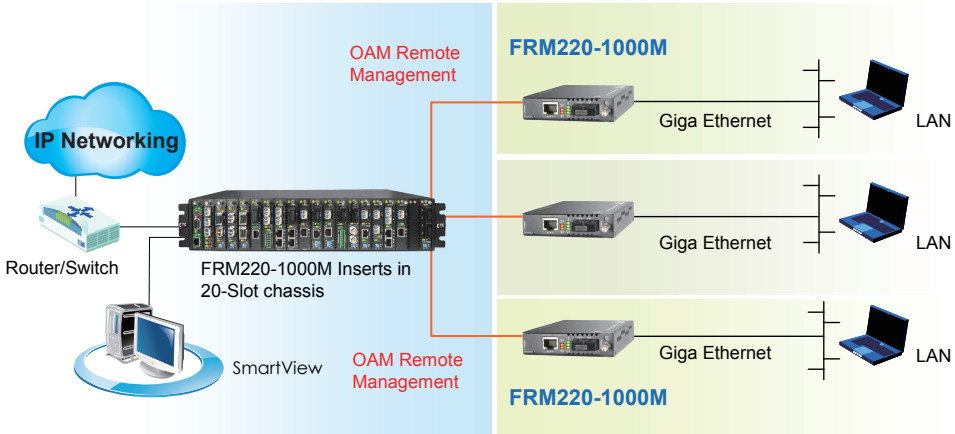
- 10/100/1000Base-T to 1000Base-X Converter
- Auto-Cross over for MDI/MDIX in TP port
- Auto-Negotiation or manual mode in TP port
- Supports flow control Enable or Disable
- Supports Jumbo Frame 9K Bite
- Ingress / Egress bandwidth control
- Supports IEEE 802.3ah OAM in-band management
- Firmware upgrade via Web
- Management Password Security
- Dying gasp (remote power failure detection)
- Supports Link Fault Pass-Through (LFPT) Function
- Supports Auto Laser Shutdown (ALS) Function
- Allow IP settings Web or Console management on stand-alone.
- Provide Product information for management
- Online local/remote f/w upgrade
- Supports 16 Tag VLAN Group
- RMON counters (for standalone unit only)

Specifications

Optical Interface	Connector	1x9 (SC)
	Data rate	125/1250Mbps
	Duplex mode	Full duplex
	Fiber	MM 50/125μm, 62.5/125μm
		SM 9/125μm
	Distance	MM 2km, SM 15/30/50/80/120km
		WDM 20/40/60/80km
	Wavelength	MM 1310nm, SM 1310,1550nm
		WDM 1310Tx/1550Rx (type A)
		1550Tx/1310Rx (type B)
Electrical Interface	Connector	RJ45
	Data rate	10Mbps, 100Mbps, 1000Mbps
	Duplex mode	Half / Full duplex
	Cable	10Base-T Cat.3, 4, 5, UTP,
		100Base-TX Cat.5, 5e or higher

Standards	IEEE 802.3, IEEE 802.3u IEEE 802.3ab, 802.3z, 802.3ah, 802.1Q
Indications	LED (Power, FX-Link, LAN Speed, LAN Link)
Power Input	12VDC
Power Consumption	< 4W
Dimensions	155 x 88 x 23mm (D x W x H)
Weight	120g
Temperature	0 ~ 50°C (Operating), -10 ~ 70°C (Storage)
Humidity	10 ~ 90% non-condensing
Certification	CE, FCC, RoHS compliant
MTBF	65,000 hrs

Application



Ordering Information

Model Name	Description
FRM220-1000M	10/100/1000Base-T to 1000Base-X, Web Smart OAM managed media converter

Note: This card may use CH01M to provide console for initial TCP/IP settings, or use CH01 with default IP.

FRM220-1000MS

10/100/1000Base-T to 100/1000Base-X SFP Web Smart GbE OAM Managed Converter

The FRM220-1000MS is an IEEE802.3ah OAM compliant copper to fiber Gigabit Ethernet solution designed to make conversion between 10/100/1000Base-T and 100/1000Base-X with SFP modules. With SNMP and Web-based management in the FRM220, the network administrator can monitor, configure and control the activity of each 802.3ah series card and remotely connected OAM compliant converter. Converter settings include bandwidth control, duplex, and speed configuration, VLAN tagging, Q-in-Q support and SFP DDMI.

Features

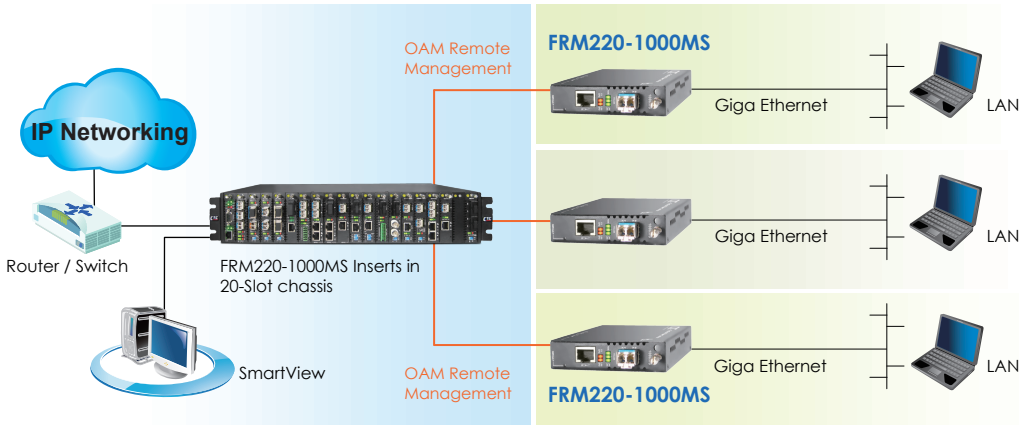
- 1-Port 10/100/1000Base-T to 100/1000Base-X Converter
- Auto-Cross over for MDI/MDIX in TP port
- Auto-Negotiation or manual mode in TP port
- Supports flow control Enable or Disable
- Supports Jumbo Frame 9K Packet
- Ingress / Egress bandwidth control
- Supports 802.3ah-OAM in-band management
- (for standalone unit only)
- Firmware upgrade via Web (for standalone unit only)
- Management Password Setting (for standalone unit only)
- Dying gasp (remote power failure detection on stand-alone)
- Supports Link Fault Pass-Through (LFPT) Function
- Supports Auto Laser Shutdown (ALS) Function
- Allow IP settings web or console management
- (for standalone unit only)
- Supports D/D function for SFP fiber transceiver
- Supports 16 Tag VLAN Group
- RMON counters (for standalone unit only)

Specifications

Optical Interface	Connector	SFP LC
	Data rate	125/1250Mbps
	Duplex mode	Full duplex
	Fiber	MM 50/125μm, 62.5/125μm. SM 9/125μm
	Distance	MM 2km, SM 15/30/50/80/120km, WDM 20/40/60/80km
	Wavelength	MM 1310nm, SM 1310,1550nm WDM 1310Tx/1550Rx (type A) 1550Tx/1310Rx (type B)
Electrical Interface	Connector	RJ45
	Data rate	10Mbps, 100Mbps, 1000Mbps
	Duplex mode	Half / Full duplex
	Cable	10Base-T Cat.3, 4, 5, UTP 100Base-TX Cat.5, 5e or higher

Standards	IEEE 802.3, 802.3u, 802.3ab, 802.3z, 802.3ah, 802.1Q
Indications	LED (Power, FX-Link, LAN Speed, LAN Link)
Power Input	12VDC
Power Consumption	< 4W
Dimensions	155 x 88 x 23mm (D x W x H)
Weight	120g
Temperature	0 ~ 50°C (Operating), -10 ~ 70°C (Storage)
Humidity	10 ~ 90% non-condensing
Certification	CE, FCC, RoHS compliant
MTBF	65,000 hrs

Application



Ordering Information

Model Name	Description
FRM220-1000MS	10/100/1000Base-T to 100/1000Base-X SFP Web smart OAM managed mediaconverter. (Optional SFP)

Note: This card may use CH01M to provide console for initial TCP/IP settings, or use CH01 with default IP.

FRM220-1000EAS/X-1

10/100/1000Base-T to 100/1000Base-X OAM/IP-Based Managed GbE Media Converter

The FRM220-1000EAS/X-1 is an IEEE802.3ah OAM compliant copper to fiber Gigabit Ethernet solution designed to make conversion between 10/100/1000Base-T and 100/1000Base-X with SFP. With stand-alone SNMP and Web-based management, the network administrator can monitor, configure and control the activity of each IEEE802.3ah series card and remotely connected OAM compliant converter. By offering IEEE802.3ah OAM in-band management, this converter can also be completely controlled and monitored from a centrally located managed rack. Based on a powerful L2 switch architecture, this converter supports bandwidth control, duplex and speed configuration, VLAN tagging, Q-in-Q, QoS, Spanning tree as well as auto laser shutdown, link fault pass through, OAM loop back and dying gasp.

Features

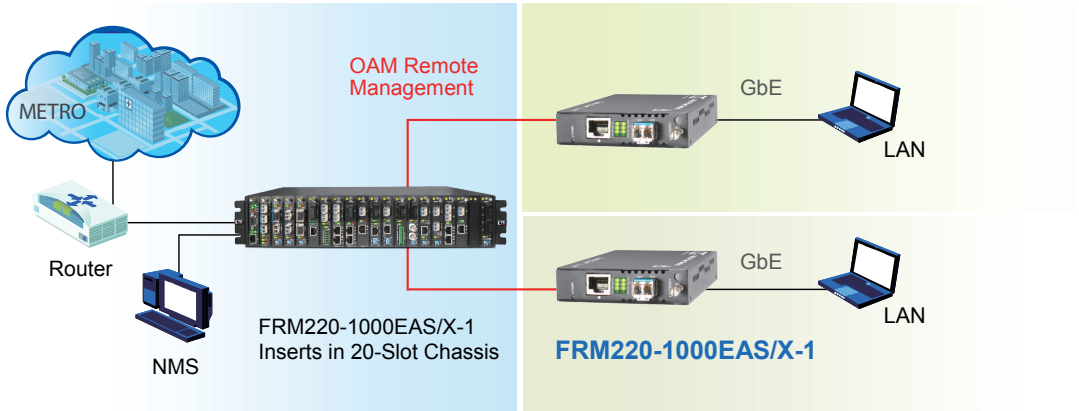
- 10/100/1000Base-T to 100/1000Base-X SFP
- Supports local / remote IEEE802.3ah OAM / IP In-band management
- Stand-alone IP Based, Web GUI, Telnet, SNMP management
- Auto-Negotiation or forced mode
- Auto MDI/MDIX
- Supports IEEE 802.1Q Tagging
- Supports Q in Q double tagging
- Forward 10K bytes Jumbo packets (max.)
- Supports Flow control (Pause)
- Supports OAM remote loopback to assist in diagnosing network problems
- Supports bandwidth control
- Supports remote CPE power fail detect (dying gasp)
- Supports Far End Fault Indication (FEFI)
- Supports Link Fault Pass-Through (LFPT)
- Supports RMON counter
- D/D function for supported SFP fiber transceiver
- Auto Laser Shutdown (ALS)
- Online local / remote f/w upgrade
- Default port and IEEE802.1Q Tagging priority QoS

Specifications

Optical Interface	Connector	SFP LC
	Data rate	100/1000Mbps
	Duplex mode	Full duplex
	Fiber	MM 50/125μm, 62.5/125μm.
		SM 9/125μm
	Distance	MM 550m, 2km, SM 15/30/50/80/120km
		WDM 20/40/60km
	Wavelength	MM 1310nm, SM 1310, 1550nm
		WDM 1310Tx/1550Rx (type A)
		1550Tx/1310Rx (type B)
Power Consumption	< 8W	
Dimensions	155 x 88 x 23mm (D x W x H)	
Weight	120g	

Electrical Interface	Connector	RJ45
	Data rate	10Mbps, 100Mbps, 1000Mbps
	Duplex mode	Half / Full duplex
	Cable	10Base-T Cat.3, 4, 5, UTP
		100Base-TX Cat.5, 5e or higher
		1000Base-T Cat.5, 5e or higher
Standards	IEEE 802.3, IEEE 802.3u, IEEE 802.1Q	
Indications	LED : Power, FX-Link, FEF, TEST, Speed(10,100,1000), FULL	
Power Input	Card : 12VDC	
	Standalone : AC, DC options	
Temperature	0 ~ 50°C (Operating), -10 ~ 70°C (Storage)	
Humidity	10 ~ 90% non-condensing	
Certification	CE, FCC, RoHS compliant	
MTBF	65,000 hrs	

Application



Ordering Information

Model Name	Description
FRM220-1000EAS/X-1	10/100/1000Base-T to 100/1000Base-X with OAM/IP-Based managed GE Media Converter, (optional SFP)

Note: This card may use CH01M to provide console for initial TCP/IP settings, or use CH01 with default IP.

FRM220-10/100 i

10/100Base-TX to 100Base-FX In-Band Managed Converter

The FRM220-10/100i is a 10/100Base Ethernet to 100Base-FX fiber slide-in card converter designed for central and remote applications. With advanced features like bandwidth control, this media converter is targeted for customer premises equipment in metro LAN, campus, enterprise and FTTx applications. By offering in-band management, this converter can be completely controlled and monitored from a centrally located managed rack controlling all converter settings including bandwidth control, duplex, and speed configuration. This media converter is completely transparent to Layer 2 and Layer 3 protocols including IEEE 802.1q, VLAN tag, Q in Q, STP, IPX, IP, etc.

Features

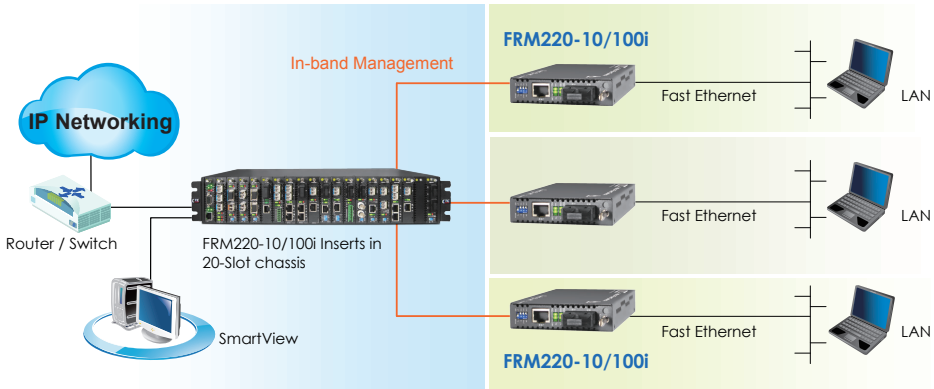
- 1-Port 10/100Base-TX to 100Base-FX Converter
- Auto-Negotiation or forced mode
- Supports remote CPE power fail detect (dying gasp)
- Supports Far End Fault Indication (FEFI)
- Supports Link Fault Pass-Through (LFPT)
- Supports Loop Back Test
- Supports RMON counter
- Auto Laser Shutdown (ALS)
- Auto MDI/MDIX
- Forward 2046 bytes (max.) packets in switch mode
- Forward 9K jumbo packets in converter mode
- Supports Q in Q double tagged frame transparent
- Supports IEEE 802.1q Tag VLAN pass thru
- Supports local / remote In-band management (Monitor and Configure) by the SNMP manager.
- Bandwidth control (Nx32Kbps or Nx512Kbps)
- Supports flow control (Pause)
- Fiber Hardware Reset (FHR)
- Online local / remote f/w upgrade

Specifications

Optical Interface	Connector	1x9 (SC, ST, FC)
	Data rate	125Mbps
	Duplex mode	Full duplex
	Fiber	MM 50/125µm, 62.5/125µm
		SM 9/125µm
	Distance	MM 2km, SM 15/30/50km
		WDM 20/40km
	Wavelength	MM 1310nm, SM 1310, 1550nm
		WDM 1310Tx/1550Rx (type A)
		1550Tx/1310Rx (type B)
Electrical Interface	Connector	RJ45
	Data rate	10Mbps, 100Mbps
	Duplex mode	Half / Full duplex
	Cable	10Base-T Cat.3, 4, 5, UTP
		100Base-TX Cat.5, 5e or higher

Standards	IEEE 802.3, IEEE 802.3u,TS-1000
Indications	LED (Power, FEF, FX-Link, TX-SPD, TX-Duplex, TX-Link)
Power Input	12VDC
Power Consumption	< 4W
Dimensions	155 x 88 x 23mm (D x W x H)
Weight	120g
Temperature	0 ~ 50°C (Operating), -10 ~ 70°C (Storage)
Humidity	10 ~ 90% non-condensing
Certification	CE, FCC, RoHS compliant
MTBF	65,000 hrs

Application



Ordering Information

Model Name	Description
FRM220-10/100i	10/100Base-TX to 100Base-FX In-band managed converter

Connector Type	Connectivity Distance
SC, ST, FC	002: 2km 015: 15km 030: 30km 050: 50km 20A: WDM 20km A type 20B: WDM 20km B type 40A: WDM 40km A type 40B: WDM 40km B type

Connector Type / Connectivity Distance

FRM220 – 10/100i – □□□□□

Example: FRM220 – 10/100i – SC002

Note: This card must use CH01M, with serial console, to configure standalone settings.
When connected as a remote to a managed central chassis, this card supports in-band management and only needs a CH01 chassis.

FRM220-10/100iS

10/100Base-TX to 100Base-FX SFP In-Band Managed Converter

The FRM220-10/100iS is a 10/100Base Ethernet to 100Base-FX fiber slide-in card converter designed for central and remote applications. With advanced features like bandwidth control, this media converter is targeted for customer premises equipment in metro LAN, campus, enterprise and FTTx applications. By offering in-band management, this converter can be completely controlled and monitored from a centrally located managed rack controlling all converter settings including bandwidth control, duplex, and speed configuration. This media converter is completely transparent to Layer 2 and Layer 3 protocols including IEEE 802.1q, VLAN tag, Q in Q, STP, IPX, IP, etc.

Features

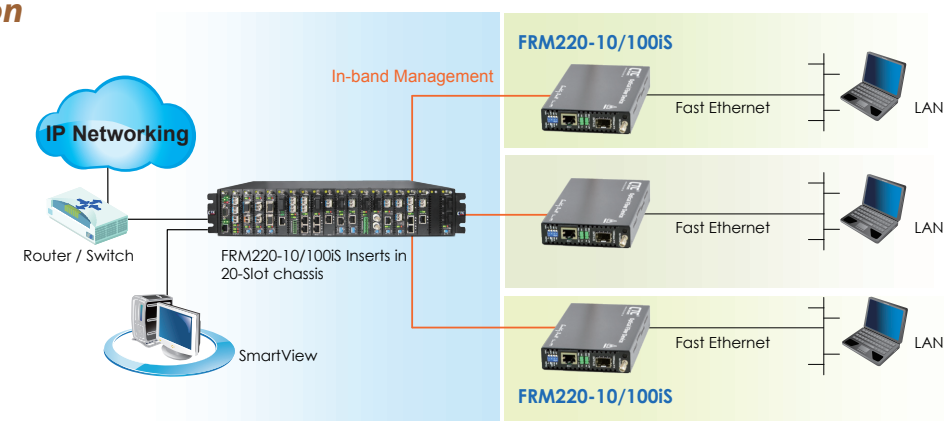
- 1-Port 10/100Base-TX to 100Base-FX Converter
- Auto-Negotiation or forced mode
- Supports remote CPE power fail detect (dying gasp)
- Supports Far End Fault Indication (FEFI)
- Supports Link Fault Pass-Through (LFPT)
- Supports Loop Back Test
- Supports RMON counter
- Auto Laser Shutdown (ALS)
- Auto MDI/MDIX
- Forward 2046 bytes (max.) packets in switch mode
- Forward 9K jumbo packets in converter mode
- Supports Q in Q double tagged frame transparent
- Supports IEEE 802.1q Tag VLAN pass thru
- Supports local / remote In-band management (Monitor and Configure) by the SNMP manager.
- Bandwidth control (Nx32K or Nx512K bps)
- Supports flow control (Pause)
- Fiber Hardware Reset (FHR)
- Online local / remote f/w upgrade

Specifications

Optical Interface	Connector	SFP LC
	Data rate	125Mbps
	Duplex mode	Full duplex
	Fiber	MM 50/125μm, 62.5/125μm
		SM 9/125μm
	Distance	MM 2km, SM 15/30/50km
		WDM 20/40km
	Wavelength	MM 1310nm, SM 1310, 1550nm
		WDM 1310Tx/1550Rx (type A)
		1550Tx/1310Rx (type B)
Electrical Interface	Connector	RJ45
	Data rate	10Mbps, 100Mbps
	Duplex mode	Half / Full duplex
	Cable	10Base-T Cat.3, 4, 5, UTP
		100Base-TX Cat.5, 5e or higher

Standards	IEEE 802.3, IEEE 802.3u,TS-1000
Indications	LED (Power, FEF, FX-Link, TX-SPD, TX-Duplex, TX-Link)
Power Input	12VDC
Power Consumption	< 4W
Dimensions	155 x 88 x 23mm (D x W x H)
Weight	120g
Temperature	0 ~ 50°C (Operating), -10 ~ 70°C (Storage)
Humidity	10 ~ 90% non-condensing
Certification	CE, FCC, RoHS compliant
MTBF	65,000 hrs

Application



Ordering Information

Model Name	Description
FRM220-10/100iS	10/100Base-TX to 100Base-FX SFP In-band managed converter

Connector Type	Connectivity Distance
SC, ST, FC	002: 2km 015: 15km 030: 30km 050: 50km 20A: WDM 20km A type 20B: WDM 20km B type 40A: WDM 40km A type 40B: WDM 40km B type

Connector Type / Connectivity Distance

FRM220 – 10/100iS – □□□□□

Example: FRM220 – 10/100iS – SC002

Note: This card must use CH01M, with serial console, to configure standalone settings.
When connected as a remote to a managed central chassis, this card supports in-band management and only needs a CH01 chassis.

FRM220-10/100iS-2

Dual Channels 10/100Base-TX to 100Base-FX In-Band Managed Converter

The FRM220-10/100iS-2 is a dual (2 in 1) 10/100Base Ethernet to 100Base-FX fiber slide-in card converter based on the popular FRM220-10/100i. With advanced features like bandwidth control, this media converter is targeted for customer premises equipment in metro LAN, campus, enterprise and FTTx applications. By offering in-band management, this converter can be completely controlled and monitored from a centrally located managed rack controlling all converter settings including band-width control, duplex, and speed configuration. By offering two completely isolated converters on one card, this card can effectively double the conversion capacity of a rack.

Features

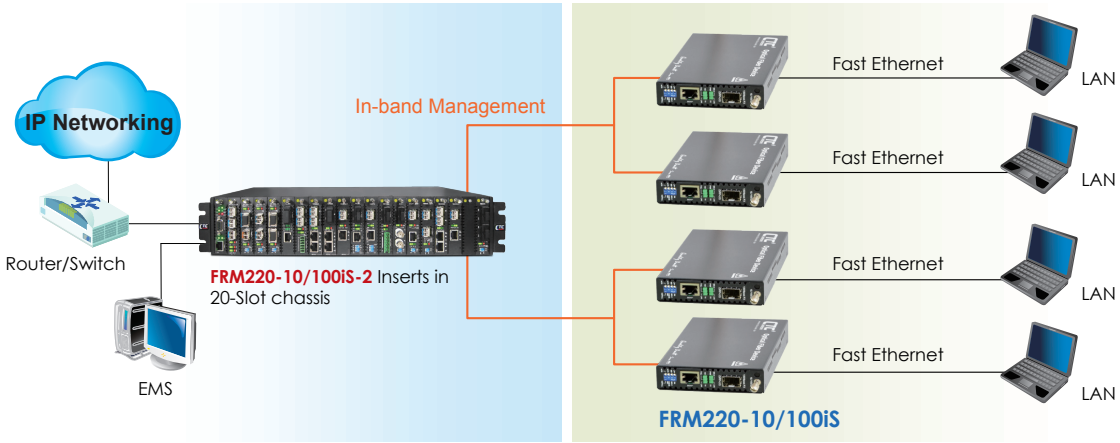
- Dual independent converters 10/100Base-TX to 100Base-FX
- Auto-Negotiation or forced mode
- Auto MDI/MDIX
- Forward 2046 bytes (max.) packets in switch mode
- Supports IEEE 802.1Q Tag VLAN pass thru
- Supports Q in Q double tagged frame transparent
- Forward 9K jumbo packets in converter mode
- Supports local / remote In-band management (Monitor and Configure) by the SNMP manager.
- Bandwidth control (Nx32Kbps or Nx512Kbps) & flow control (Pause)
- Supports remote CPE power fail detect (dying gasp)
- Supports Far End Fault Indication (FEFI) and Link Fault Pass-Through (LFPT)
- Supports Loop Back Test and RMON counter
- D/D function for supported SFP fiber transceiver
- Auto Laser Shutdown (ALS) and Fiber Hardware Reset (FHR)
- Online local / remote f/w upgrade

Specifications

Optical Interface	Connector	SFP LC
	Data rate	125 Mbps
	Duplex mode	Full duplex
	Fiber	MM 50/125µm, 62.5/125µm. SM 9/125µm
	Distance	MM 2km, SM 15/30/50/80/120km, WDM 20/40/60/80km
	Wavelength	MM 1310nm, SM 1310,1550nm WDM 1310Tx/1550Rx (type A) 1550Tx/1310Rx (type B)
Electrical Interface	Connector	RJ-45
	Data rate	10Mbps, 100Mbps
	Duplex mode	Half / Full duplex
	Cable	10Base-T Cat.3, 4, 5, UTP 100Base-TX Cat.5, 5e or higher

Standards	IEEE 802.3, IEEE 802.3u, IEEE 802.3s, TS-1000
Indications	LED (Power, FEF, FX-Link, TX-SPD, TX-Duplex, TX-Link)
Power Input	12VDC
Power Consumption	< 4W
Dimensions	155 x 88 x 23mm (D x W x H)
Weight	130g
Temperature	0 ~ 50°C (Operating), -10 ~ 70°C (Storage)
Humidity	10 ~ 90% non-condensing
Certification	CE, FCC, RoHS compliant
MTBF	65,000 hrs

Application



Ordering Information

Model Name	Description
FRM220-10/100iS-2	Dual converter 10/100Base-TX to 100Base-FX SFP with In-band management, (optional SFP)

Note: This card must use CH01M, with serial console, to configure standalone settings.
When connected as a remote to a managed central chassis, this card supports in-band management and only needs a CH01 chassis.

FRM220A-1000EAS/X

2x 10/100/1000Base-T, RJ45 and 2x 100/1000Base-X, SFP OAM/IP Managed Switch

The FRM220A-1000EAS/X is an IEEE 802.3ah OAM compliant dual copper and dual fiber Gigabit Ethernet switch solution designed to make conversion between 10/100/1000Base-T(X) and 100/1000Base-X with SFP. With embedded SNMP and Web-based management, the network administrator can monitor, configure and control the activity of each IEEE 802.3ah series card and remotely connected OAM compliant converter. Based on a powerful L2 switch architecture, this converter supports bandwidth control, duplex and speed configuration, VLAN tagging, Q-in-Q, QoS, Spanning tree, jumbo frames as well as auto laser shutdown, link fault pass through, OAM loop back and dying gasp.

Features

- 2-port 10/100/1000Base-T and 2-port 100/1000Base-X SFP
- Supports local / remote IEEE 802.3ah OAM / IP In-band management
- Standalone IP Based, Web GUI, Telnet, SNMP management
- Auto-Negotiation or forced mode
- Auto MDI/MDIX
- Supports IEEE 802.1Q Tagged and Port based VLAN
- Supports IEEE 802.1ad Q in Q double tagging
- Forward 10K bytes Jumbo packets (max.)
- Supports Flow control (Pause)
- Supports OAM remote loopback to assist in diagnosing network problems
- RADIUS Client
- Supports bandwidth control
- Supports remote CPE power fail detect (dying gasp)
- Supports Far End Fault Indication (FEFI)
- Supports Link Fault Pass-Through (LFPT)
- Supports RMON counter
- D/D function for supported SFP fiber transceiver
- Auto Laser Shutdown (ALS)
- Online local / remote f/w upgrade
- Fiber Redundant mode
- Spanning Tree Protocol
- Port Trunking
- Default port and 802.1p tag priority QoS
- Fixed or weighted priority QoS

Specifications

Optical Interface	Connector	SFP LC
	Data rate	125/1250Mbps
	Duplex mode	Full duplex
	Fiber	MM 50/125µm, 62.5/125µm.
		SM 9/125µm
	Distance	MM 550m, 2km, SM 15/30/50/80/120km
		WDM 20/40/60km
	Wavelength	MM 1310nm, SM 1310,1550nm
		WDM 1310Tx/1550Rx (type A)
		1550Tx/1310Rx (type B)
Power Consumption	< 8W	
Dimensions	155 x 88 x 23mm (D x W x H)	
Weight	130g	

Electrical Interface	Connector	RJ45
	Data rate	10Mbps, 100Mbps, 1000Mbps
	Duplex mode	Half / Full duplex
	Cable	10Base-T Cat.3, 4, 5, UTP
		100Base-TX Cat.5, 5e or higher
		1000Base-T Cat.5, 5e or higher
Standards	IEEE 802.3, IEEE 802.3u, IEEE802.1Q, IEEE 802.3ah	
Indications	LED (Power, FX-Link, Test, TX-Link, TX-SPD)	
Power Input	12VDC	
Temperature	0 ~ 50°C (Operating), -10 ~ 70°C (Storage)	
Humidity	10 ~ 90% non-condensing	
Certification	CE, FCC, RoHS compliant	
MTBF	65,000 hrs	

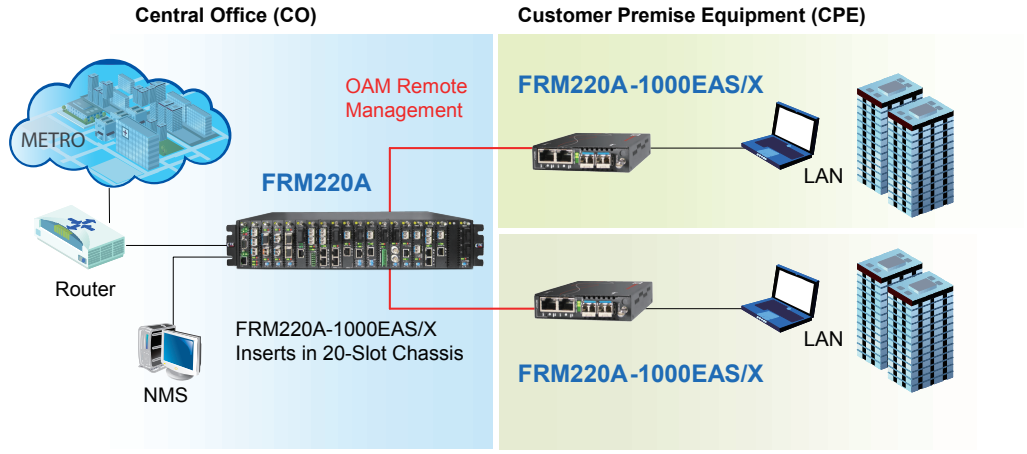
Ordering Information

Model Name	Description
FRM220-1000EAS/X	2-Port 10/100/1000Base-T and 2-Port 100/1000Base-X with OAM/IP management, (optional SFP)

Note: This card may use CH01M to provide console for initial TCP/IP settings, or use CH01 with default IP.

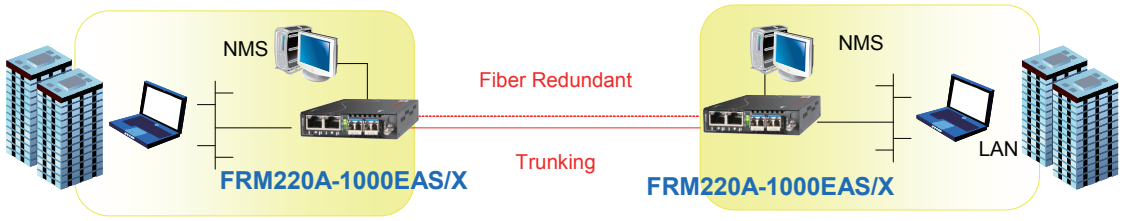
FRM220A-1000EAS/X Application

In the Centrally managed application, the main chassis, all of its cards and all fiber connected remote CPE units can be provisioned and monitored from a single management point



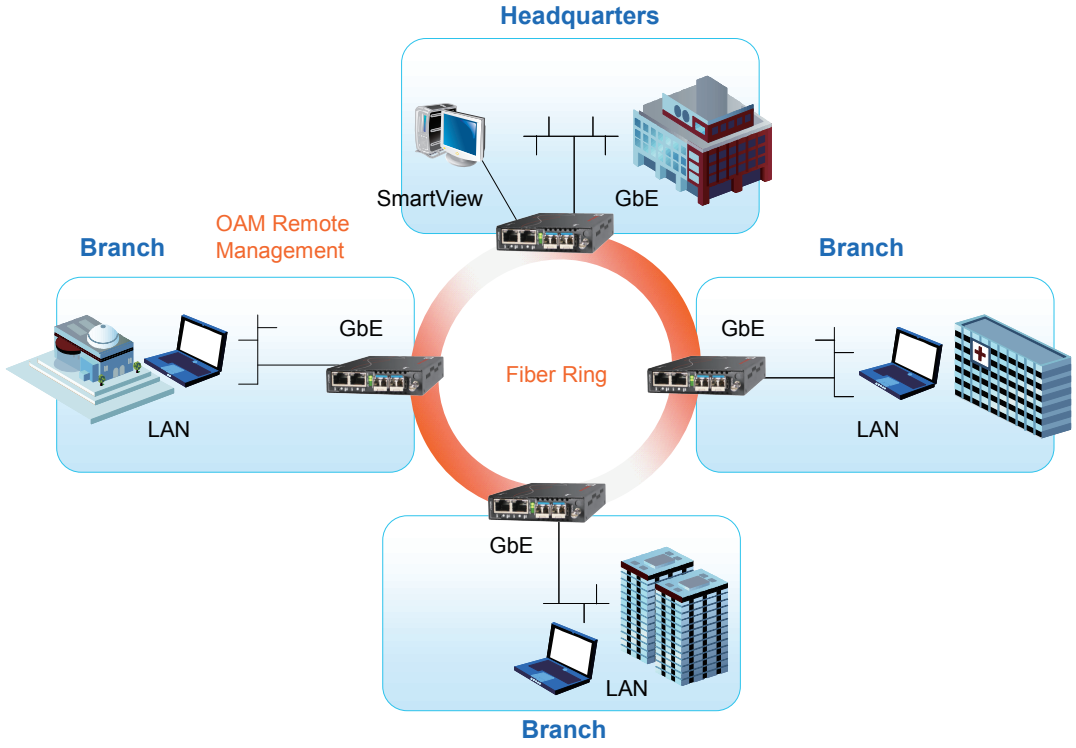
Fiber Redundant / Trunking Application

Utilizing a special trunking function, the 1000EAS/X can be deployed in stand-alone, point-to-point applications and provide 1+1 redundant fiber protection



Fiber Ring Application

In the ring or mesh topology, Spanning Tree Protocol enables a highly resilient network based on multiple 1000EAS/X units



FRM220A-1002ES

2x 10/100/1000Base-T and 2x 100/1000Base-X SFP GbE Managed Switch

The FRM220A-1002ES is a dual copper and dual fiber Gigabit Ethernet switch designed to make conversion between 10/100/1000Base-T and 100/1000Base-SX/LX with SFP connector. With SNMP and Web-based management in the FRM220 or FRM220A chassis the network administrator can monitor, configure and control the activity of each FRM220A-1002ES switch card locally via the chassis management. Based on a powerful L2 switch architecture, this converter supports bandwidth control, duplex and speed configuration, VLAN tagging, Q-in-Q, QoS, jumbo frames as well as auto laser shutdown, and link fault pass through.

Features

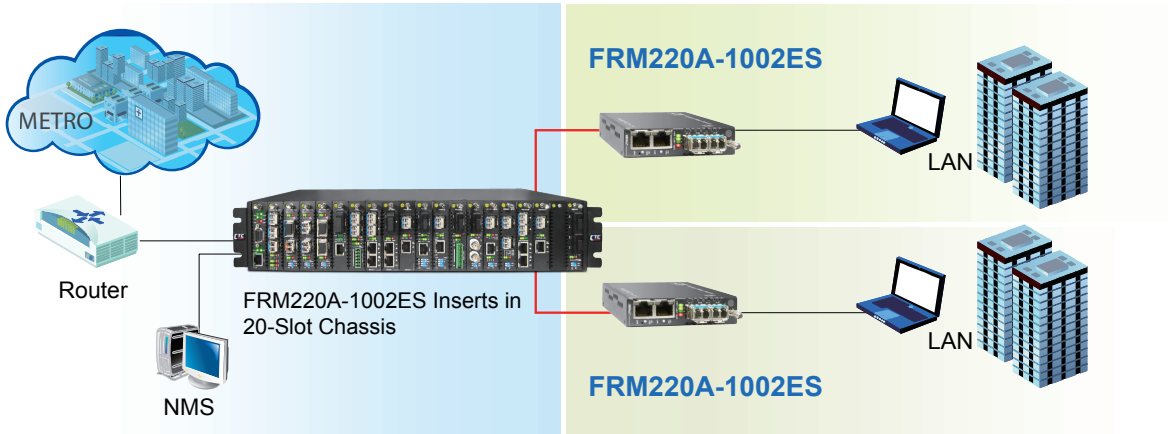
- 2-Port 10/100/1000Base-T and 2-Port 100/1000Base-X Switch
- Auto-Cross over for MDI/MDIX in TP port
- Auto-Negotiation or manual mode in TP port
- Supports flow control Enable or Disable
- Supports Jumbo Frame 10K Bytes
- Supports 16 Tag VLAN Group
- Supports Double VLAN tag (Q-in-Q)
- Supports Bandwidth control
- Supports Loop Back Test
- Supports Link Fault Pass-Through (LFPT) Function
- Supports Auto Laser Shutdown (ALS) Function
- Supports local management on FRM220A rack management.
- Console management on stand-alone.
- Supports D/D function for SFP fiber transceiver
- Provide Product information for management
- Supports the local management (Monitor or Configure status) by the SNMP manager.
- Supports FRM220A for Ethernet Aggregation

Specifications

Optical Interface	Connector	SFP LC
	Data rate	125Mbps, 1250Mbps
	Duplex mode	Full duplex
	Fiber	MM 50/125μm, 62.5/125μm
		SM 9/125μm
	Distance	MM 2km, SM 15/30/50/80/120km
		WDM 20/40/60/80km
	Wavelength	MM 1310nm, SM 1310,1550nm
		WDM 1310Tx/1550Rx (type A)
		1550Tx/1310Rx (type B)
Standards	IEEE 802.3, IEEE 802.3u, 802.3z, 802.3ab, 802.1Q, 802.3X, 802.1ad	
Indications	PWR, LNK1, LNK2, TEST, LAN Link, LAN SPEED	
Certification	FCC Part 15 Class A, CE Mark	

Electrical Interface	Connector	RJ45
	Data rate	10Mbps, 100Mbps, 1000Mbps
	Cable	10Base-T Cat.3, 4, 5, UTP
		100Base-TX Cat.5, 5e or higher
		1000Base-X Cat.5e or higher
Power	12VDC	
Dimensions	155 x 88 x 23mm (DxWxH)	
Weight	130g	
Temperature	0~50°C (Operating), -10~70°C (Storage)	
Humidity	0 ~ 95% non-condensing	

Application



Ordering Information

Model Name	Description
FRM220A-1002ES	2-Port 10/100/1000Base-T and 2-Port 100/1000Base-SX/LX SFP GE Manage Switch

Note: This card must use CH01M, with serial console, to configure standalone settings.

FRM220A-FSW103

3x 10/100Base-TX to 100Base-FX SFP Switch

The FRM220A-FSW103 is a 3-Port 10/100Base-TX and 100Base-FX SFP fiber slide-in card Ethernet switch designed for central applications. With SNMP and Web-based management in the FRM220 or FRM220A chassis, the network administrator can monitor, configure and control the activity of each FRM220A-FSW103 switch card locally via the chassis management. This switch is completely transparent to Layer 2 and Layer 3 protocols including IEEE 802.1q, VLAN tag, Q in Q, STP, IPX, IP, etc

Features

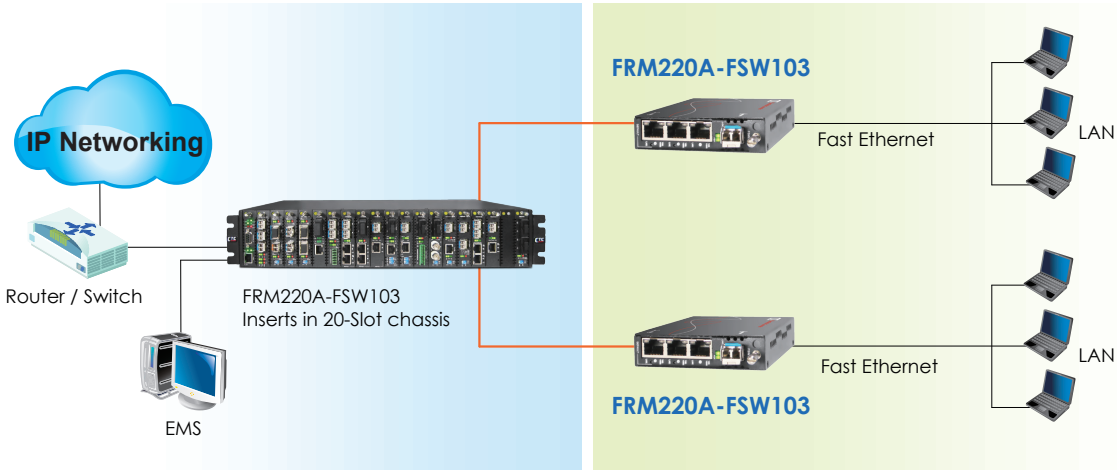
- 3-Port 10/100Base-TX + 1-Port 100Base-FX Ethernet Switch
- Auto-Cross over for MDI/MDIX in TP port
- Auto-Negotiation or manual mode in TP port
- Supports flow control
- Forward 1552 bytes (max.) packets in switch mode
- Supports Store and forward switch mode
- Supports FRM220 chassis management system
- Supports FRM220A chassis management system and Ethernet Aggregation
- Supports local management (Monitor or Configure status) by the SNMP manager.
- Supports D/D function for SFP fiber transceiver
- Provides Auto Laser Shutdown (ALS) function

Specifications

Optical Interface	Connector	SFP LC
	Data rate	125Mbps
	Duplex mode	Full duplex
	Fiber	MM 50/125μm, 62.5/125μm.
		SM 9/125μm
	Distance	MM 2km, SM 15/30/50/80/120km,
		WDM 20/40/60/80km
	Wavelength	MM 1310nm, SM 1310,1550nm
		WDM 1310Tx/1550Rx (type A)
		1550Tx/1310Rx (type B)
Electrical Interface	Connector	RJ45
	Data rate	10Mbps, 100Mbps
	Duplex mode	Half / Full duplex
	Cable	10Base-T Cat.3, 4, 5, UTP
		100Base-TX Cat.5, 5e or higher

Standards	IEEE 802.3, IEEE 802.3u
Indications	LED (Power, FEF, FX-Link, TX-SPD, TX-Duplex, TX-Link)
Power Input	12VDC
Power Consumption	< 4W
Dimensions	155 x 88 x 23mm (D x W x H)
Weight	130g
Temperature	0 ~ 80°C (Operating), -10 ~ 80°C (Storage)
Humidity	5 ~ 90% non-condensing
Certification	CE, FCC, RoHS compliant
MTBF	65,000 hrs

Application



Ordering Information

Model Name	Description
FRM220A-FSW103	3-Port 10/100Base-TX and 100Base-FX SFP Switch, (optional SFP)

Note: This card must use CH01M, with serial console, to configure standalone settings.

FRM220-DS3/E3

DS3/E3 over Fiber

NEW

The FRM220-DS3/E3 is fiber modem that works in pairs to transparently extend DS3, E3 or STS-1 transmissions over optical fiber. By utilizing pluggable SFP transceivers, these converters may be easily deployed on multimode or single mode fiber, at a distance up to 120km, or over a single core fiber using BiDi (WDM) SFP modules. The DS3/E3 connections utilize industry standard BNC connections for transmit and receive via coaxial cables. When the FRM220-DS3/E3 card is used standalone in a single slot chassis, DIP switches may be used for configuration and loopback control. When placed in a single slot chassis with console port, an easy to maneuver user menu is available via terminal to configure, monitor, and run diagnostic loop back functions. The EOC (embedded operations channel) allows in-band management to control the remotely connected modem over a working fiber link. When the FRM220-DS3/E3 card is placed in the FRM220 rack with SNMP management, the management can configure and view the local and remote converter cards' status, type, version, fiber link status and alarms.

Features

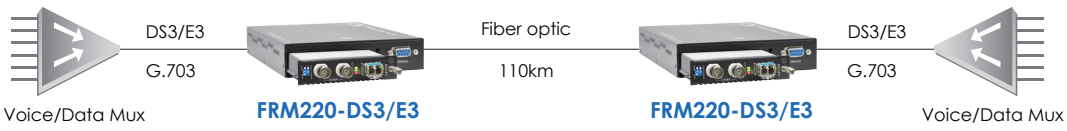
- In-band network Managed via Terminal, web or SNMP in FRM220 chassis
- DS3/E3 Coax (BNC) to Fiber SFP fiber modem
- Supports AIS (Alarm Indication Signal)
- User selectable E3 or DS3 setting
- Electrical and optical Loop back tests
- Standalone RS232 console management via CH01M

Specifications

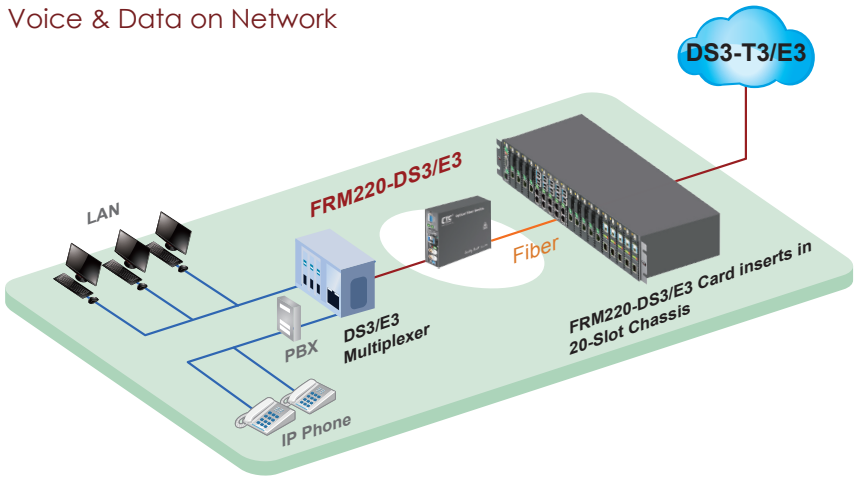
Optical Interface	Connector	SFP : LC (Uses standard 100Base-X/OC-3 SFP)
	Data Rate	DS3/T3 = 44.7 Mbps; E3 = 34.4 Mbps
Line Coding	Distance	MM 2km, SM 15/30/50/80/120km, WDM 20/40/60/80km
	Wavelength	1310nm, 1550nm, CWDM 1471nm ~ 1611nm
Dimensions	155 x 88 x 23mm (D x W x H)	
Weight	120g	
Temperature	0 ~ 50°C (Operating), -10 ~ 70°C (Storage)	
Certification	CE, FCC, RoHS compliant	

Electrical Interface	Connector	75 ohm Coax, TX output min: +2.5dBm max : +9.1dBm
		RX input min: -9.7dBm, max +10.5dBm
	Standards	ANSI, ITU-TS, ETSI, AT&T, G.703, G.921 & G.955
	Indications	Power, Coax link, coax loop-back, AIS on coax link; FX link, fiber loop-back ,AIS on FX link
Power Input	12VDC	
Power Consumption	<5W	

Application



Integrate Voice & Data on Network



Ordering Information

Model Name	Description
FRM220-DS3/E3	DS3/E3 Coax (BNC) to Fiber SFP fiber media converter

Note: This card must use CH01M, with serial console, to configure standalone settings.
When connected as a remote to a managed central chassis, this card supports in-band management and only needs a CH01 chassis.

FRM220-ET100

Fiber Modem Ethernet over E1 Fiber

FRM220-ET100 is a single port Fiber WAN (TDM) card with built-in HDLC Ethernet Bridge for the FRM220 Series. The converter supports Nx64 data rates from 64Kbps up to 2.048Mbps when linked by fiber to FRM220-Data or FRM220-E1/ T1 cards. The clock source may be selected internally or recovered from received fiber signal. The Ethernet port utilizes a single RJ- 45 connector. When the FRM220-ET100 card is placed in the FRM220 rack with SNMP management, the management can view the converter card's status, type, version, Ethernet link status and alarms. The card can be configured to enable or disable the port, reset the card, set clocking, data rate and provide digital diagnostic loopbacks. A unique feature of the FRM220-ET100 is the use of a common card design which may either be inserted in the FRM220-CH01 single slot chassis as a stand-alone modem or as a card when placed in the FRM220-CH20 In-band managed rack.

Features

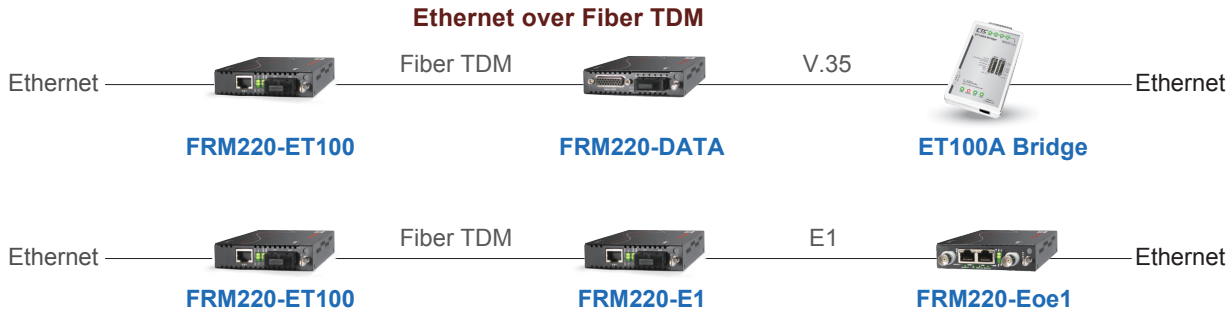
- 1-Port Ethernet to HDLC (fiber) converter
- P2P Fiber link compatible with FRM220-E1/T1 and FRM220-Data
- Clock source (internal or external)
- Nx64k data rate (64kbps~2048kbps)
- Ethernet encapsulated with ISO 13239 standard HDLC
- Loop Back with integral BERT & LED indicators
- Firmware upgradeable, when placed in managed FRM220 chassis
- Interface connectors, RJ-45 for 10/100 Base-Tx
- Fixed optical for SC or ST, 2km(MM) to 120km(SM)

Specifications

TDM (fiber) Interface	Connector	1x9 (SC, ST, FC)
	Data rate	64~2048kb/s(nx64)
	Distance	MM 2km, SM 15/30/50km
		WDM 20/40km
	Wavelength	MM 1310nm, SM 1310, 1550nm
		WDM 1310Tx/1550Rx (type A)
		1550Tx/1310Rx (type B)
Ethernet Interface	Standards	IEEE 802.3u, IEEE 802.3
	Data rate	10Mbps, 100Mbps
	Duplex mode	Half / Full duplex
	Connector	RJ-45
Tests	E1 Loops	Remote Loop back

Indications	PWR, TD/RD Act, Test, Sys, Alarm, Error
Power Input	12VDC
Power Consumption	< 5W
Dimensions	155 x 88 x 23mm (D x W x H)
Weight	130g
Temperature	0 ~ 50°C (Operating), -10 ~ 70°C (Storage)
Humidity	10 ~ 90% RH (non-condensing)
Certifications	CE, FCC, RoHS compliant
MTBF	75,000 hrs

Application



Ordering Information

Model Name	Description
FRM220-ET100	10/100Base-TX to E1 fiber modem

Connector Type	Connectivity Distance
SC, ST, FC	002: 2km 015: 15km 030: 30km 050: 50km 20A: WDM 20km A type 20B: WDM 20km B type 40A: WDM 40km A type 40B: WDM 40km B type

Connector Type / Connectivity Distance

FRM220 – ET100 – □□□□□

Example: FRM220 – ET100 – SC002

Note: This card may be set by DIP switch and placed in CH01 chassis, or set by serial console if placed in CH01M chassis.
When connected as a remote to a managed central chassis, this card supports in-band management and only needs a CH01 chassis.

FRM220-DATA

Fiber Modem V.35/X.21/RS-530/ RS-449/RS-232 over Fiber

The FRM220-DATA is a fiber modem for high-speed (up to 8.192Mbps) synchronous or low speed synchronous and asynchronous data transmissions (V.35, RS-232, RS-530, X.21 or RS-449) over fiber optical media. When the FRM220-DATA card is placed in the FRM220 rack with SNMP management, in-band management allows viewing the card and remote converter's status, type, version, fiber link status, data link status and alarms. Both card and remote can be configured to enable or disable the port, reset the port, set the data rate, modify the clock mode, and initiate local or far end loop back tests. The FRM220-Data fiber modem may also be paired with the FRM220-E1/T1 for Nx64K transmissions. When placed in a single slot chassis and used standalone without management, the card may be configured by DIP switches.

Features

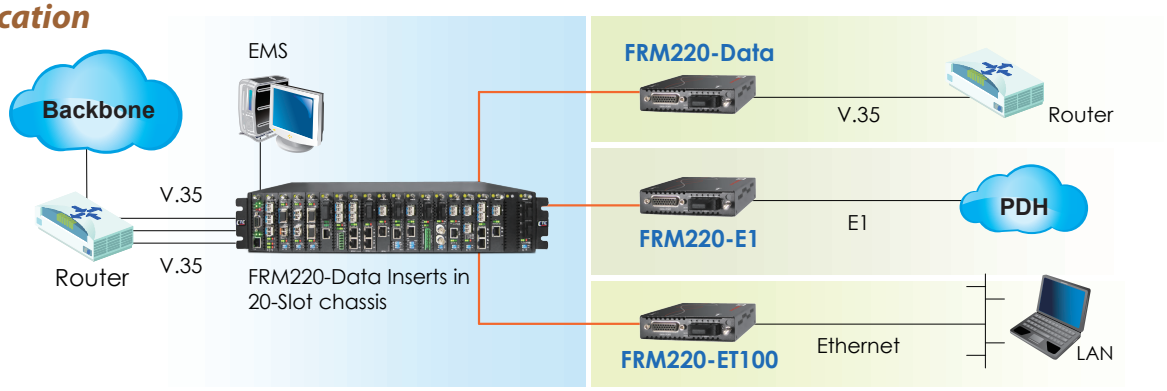
- Synchronous or Asynchronous data over fiber
- In-band network management via terminal, web or SNMP in FRM220 chassis
- Software selectable interface, V.35, X.21, RS-530, RS-449, RS-232 (sync mode)
- Software selectable DCE or DTE mode
- User selectable data rate n x 64kbps, up to 9Mbps
- Independent clock mode setting, (internal, external, or recovery) for transmit and receive
- Electrical and optical loop back tests
- Compatible with FRM220-E1 on same fiber link for N x 64k
- Standalone RS232 console management via CH01M

Specifications

Optical Interface	Connector	SFP LC
	Data rate	36.864Mbps
	Line coding	Scrambled NRZ
	Bit Error Rate	Less than 10-10
	Distance	MM 2km, SM 15/30km
		WDM 20/40km
	Wavelength	1310nm, 1550nm
Dimensions	155 x 88 x 23mm (D x W x H)	
Weight	130g	
Temperature	0 ~ 50°C (Operating), -10 ~ 70°C (Storage)	
Humidity	10 ~ 90% non-condensing	
Certification	CE, FCC, RoHS compliant	
MTBF	65,000 hrs	

Electrical Interface	Connector	HDB26F w/ adapter cable for V35
		X21, RS530, RS449,RS232
	Line Code	NRZ
	Baud Rate	RS-232 up to 384K async
		V.35/RS-530 up to 9152k sync
		where n=1 to 143 (64K ~ 9152KKbps)
	Clock source	Internal, Recovery, External
Standard	ITU-T	
Indications	LED (Power, FX Link, RTS, Test , TD, RD, CTS, DCD)	
Power Input	12VDC	
Power Consumption	<5W	

Application



Ordering Information

Model Name	Description
FRM220-V35	V.35 to fiber with V35 cable
FRM220-X21	X.21 to fiber with X.21 cable
FRM220-RS530	RS530 to fiber with RS530 cable
FRM220-RS449	RS449 to fiber with RS449 cable
FRM220-RS232	RS232 to fiber with RS232 cable
FRM220-V35-SFP	V.35 to fiber with V35 cable (SFP module not included)
FRM220-X21-SFP	X.21 to fiber with X.21 cable (SFP module not included)
FRM220-RS530-SFP	RS530 to fiber with RS530 cable (SFP module not included)
FRM220-RS449-SFP	RS449 to fiber with RS449 cable (SFP module not included)
FRM220-RS232-SFP	RS232 to fiber with RS232 cable (SFP module not included)

Connector Type	Connectivity Distance
SC, ST, FC (Not Applicable for SFP Type)	002: 2km 015: 15km 030: 30km 20A: WDM 20km A type 20B: WDM 20km B type 40A: WDM 40km A type 40B: WDM 40km B type

Interface Type / Connector Type / Connectivity Distance

FRM220 – □□□ – □□□□□

Example: FRM220 – V35 – SC002

Note: This card may be set by DIP switch and placed in CH01 chassis, or set by serial console if placed in CH01M chassis.
When connected as a remote to a managed central chassis, this card supports in-band management and only needs a CH01 chassis.

FRM220-E1/T1

E1/T1 Fiber Modem

The FRM220-E1/T1 is a fiber media transport for G.703 E1/T1 transmissions. The BNC model provides unbalanced 75 Ohm coaxial E1 connections while the RJ-45 model provides switchable balanced 120 Ohm E1 or 100 Ohm T1 connections over twisted pair wiring. When the FRM220-E1/T1 card is placed in the FRM220 rack with in-band management, the card status, type, version, fiber link status, E1 or T1 link status and alarms for both local card and remote unit can all be displayed. When set for E1 mode, the FRM220-E1/T1 also supports fractional (structured) E1 when connected to a remote FRM220-Data, synchronous data communications converter. In an E1 transmission network where end connection requires synchronous data communication such as V.35 or RS-530 (X.21, RS-449), these units eliminate the need for an extra CSU/DSU. When placed in a single slot chassis and used standalone without management, the card may be configured by DIP switches.

Features

- n-band network Managed via Terminal, web or SNMP in FRM220 chassis
- T1/E1 RJ-45 (USOC RJ-48C) or E1 Coax (BNC) to Fiber converter
- Supports AMI or B8ZS/HDB3 line codes
- T1 supports unframed to FRM220-Data
- E1 supports unframed or fractional (N x 64k) to FRM220-Data
- User selectable E1 or T1 setting
- Electrical and optical Loop back tests
- Standalone RS232 console management via CH01M

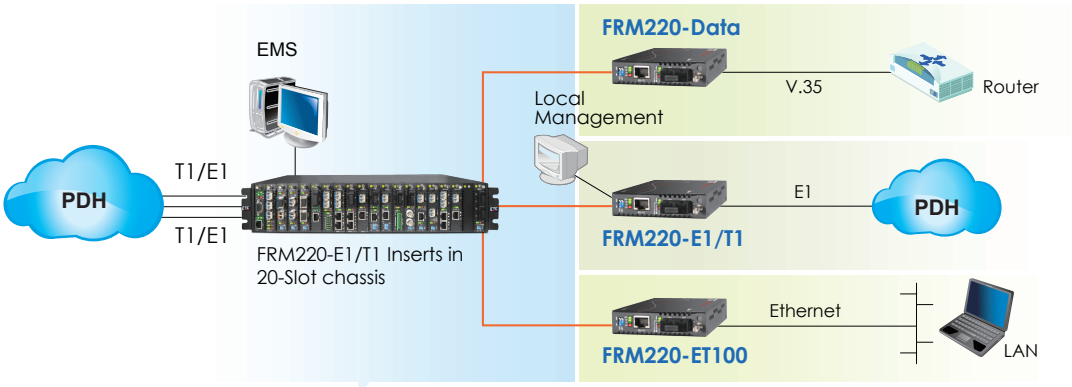
Specifications

Optical Interface	Connector	1x9 (SC, ST, FC)
	Data rate	36.864Mbps
	Line coding	Scrambled NRZ
	Bit Error Rate	Less than 10-10
	Distance	MM 2km, SM 15/30/50km
		WDM 20/40km
	Wavelength	1310nm, 1550nm
Electrical Interface	Connector	RJ45 E1-120Ω, T1-100 Ω, BNC E1-75 Ω
	Data rate	E1: 2.048Mpbs, T1:1.544Mbps
	Line Code	E1 HDB3/AMI, T1: B8ZS/AMI
	Cable type	Cat.3 or higher Twisted-Pair cable
Standards	E1 ITU-T G.703, G.704, G.706, G.732, G.823	
	T1 ITU-T G.703, G.704, AT&T, TR-62411, ANSI T1.403	

Indications	Power, FX-Link, E1/T1 SIG, Test, SYN, RD, TD, AIS
	(E1/T1R) Power, FX-Link, E1 SIG, Test(E1B)
Power Input	12VDC
Power Consumption	< 5W
Dimensions	155 x 88 x 23mm (D x W x H)
Weight	120g
Temperature	0 ~ 50°C (Operating), -10 ~ 70°C (Storage)
Humidity	10 ~ 90% non-condensing
Certification	CE, FCC, RoHS compliant
MTBF	65,000 hrs

Application

In-band Managed PDH Fiber Modem



Ordering Information

Model Name	Description
FRM220-E1/T1R	E1/T1 RJ-45 fiber modem
FRM220-E1B	E1 BNC fiber modem
FRM220-E1/T1R-SFP	E1/T1 RJ-45 fiber modem (SFP module not included)
FRM220-E1B-SFP	E1 BNC fiber modem (SFP module not included)

Connector Type / Connectivity Distance

FRM220 – □□ / □□□ – □□□□□

Example: FRM220 – E1/T1R – SC002

Connector Type	Connectivity Distance
SC, ST, FC (Not Applicable for SFP Type)	002: 2km 015: 15km 030: 30km 050: 50km 20A: WDM 20km A type 20B: WDM 20km B type 40A: WDM 40km A type 40B: WDM 40km B type

Note: This card may be set by DIP switch and placed in CH01 chassis, or set by serial console if placed in CH01M chassis.
When connected as a remote to a managed central chassis, this card supports in-band management and only needs a CH01 chassis.

FRM220-Serial

RS485/232 over Fiber

The FRM220-Serial provides a fiber modem solution to extend asynchronous RS-485 or RS-232 transmission distance up to 2km over multimode fiber or up to 120km over single mode fiber. The converter is equipped with multiple interface circuits for connection to RS-232 or RS485 (2 or 4 wire, full or half duplex). The FRM220-Serial secures data transmission over EMI resistant fiber at speeds up to 256kbps for RS-232 or up to 1024kbps for RS485. When the FRM220-Serial/485 card is placed in the FRM220 rack with SNMP management, in-band management allows configuring and viewing the card and remote converter's status, type, version, fiber link status, data link status and alarms. When placed in a single slot chassis and used standalone without management, the card may be configured by DIP switches.

Features

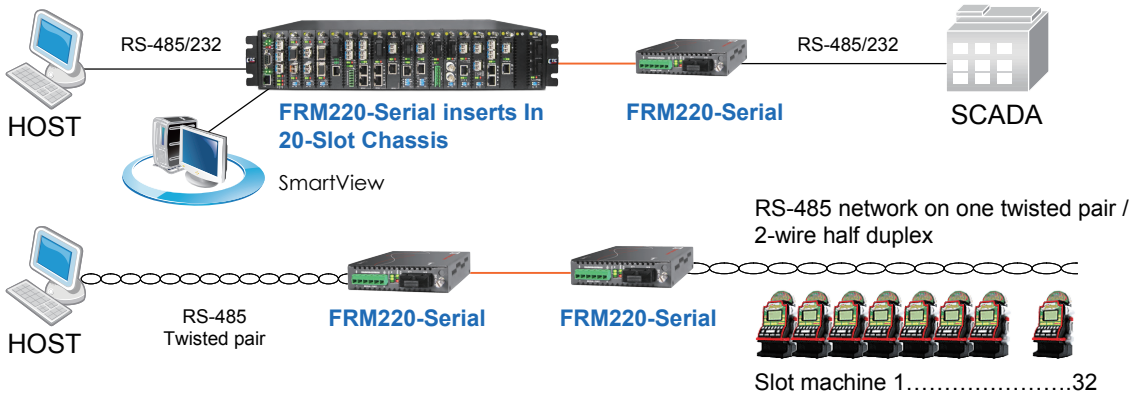
- Extend asynchronous serial transmission up to 120km over fiber
- In-band network management via terminal, Web or SNMP in FRM220-CH20 chassis
- Software selectable data interface for RS-232/ 485
- Software selectable three or five wires RS-232
- Speeds up to 256kbps for RS-232 (Async. mode)
- Speeds up to 1Mbps for RS-485
- Standalone RS232 console management via CH01M
- Software selectable two wires (half duplex) or four wires (full duplex) RS-485

Specifications

Optical Interface	Connector	SFP LC
	Data rate	36.864Mbps
	Line coding	Scrambled NRZ
	Bit Error Rate	Less than 10-10
	Fiber	MM 62.2/125µm, 50/125µm
		SM 9/125µm
	Distance	MM 2km, SM 15/30/50km
		WDM 20/40km
	Wavelength	MM 1310nm, SM 1310, 1550nm
		WDM 1310Tx/1550Rx (type A)
		1550Tx/1310Rx (type B)
Standards	EIA/TIA RS-485, RS-232	
LEDs	Power, FX Link, DI, DO, Test	
Power Input	12VDC	

Electrical Interface	Connector	6 pins Terminal block
	Data Signal Formats	RS-485 2-wire
		RS-232 RTS/CTS 5-wire
		RS-232 3-wire
	Baud Rate	RS-422, RS-485 up to 1024kbps
		RS-232 up to 256kbps
	Bit Error Rate	Less than 10-10
Power Consumption	< 5W	
Dimensions	155 x 88 x 23mm (D x W x H)	
Weight	130g	
Temperature	0 ~ 50°C (Operating), -10 ~ 70°C (Storage)	
Humidity	10 ~ 90% non-condensing	
Certification	CE, FCC, RoHS compliant	
MTBF	65,000 hrs	

Application



Ordering Information

Model Name	Description
FRM220-Serial	RS-485/232 fiber converter
FRM220-Serial-SFP	RS-485/232 fiber converter (SFP module not included)

Connector Type	Connectivity Distance
SC, ST, FC (Not Applicable for SFP Type)	002: 2km 015: 15km 030: 30km 050: 50km 20A: WDM 20km A type 20B: WDM 20km B type 40A: WDM 40km A type 40B: WDM 40km B type

Connector Type / Connectivity Distance

FRM220 – Serial – □□□□□

Example: FRM220 – E1/T1R – SC002

Note: This card may be set by DIP switch and placed in CH01 chassis, or set by serial console if placed in CH01M chassis.
When connected as a remote to a managed central chassis, this card supports in-band management and only needs a CH01 chassis.

NEW

FRM220-FXO-4
FRM220-FXS-4

4x FXO over Fiber
4x FXS over Fiber

FRM220-FXO/FXS-4 is a 4 channel POTS (Plain Old Telephone System) over fiber converter/extender. The four POTS connection uses a standard RJ-11C modular connectors for each copper pair connection. A pair of FRM220-FXO/FXS-4 is required to implement an end to end system. FXO mode connects to a telephone line (PSTN) or PBX station line and has ability to detect ringing voltages and to act as a telephone. FXS mode is the reciprocal unit and has ability to act as PSTN and connects to a telephone device. When the FRM220-FXO/FXS-4 card is placed in the FRM220 rack with SNMP management, in-band management allows configuring and viewing the card and remote converter's status, type, version, fiber link status, on hook status and alarms. When placed in a single slot chassis and used standalone without management, the card may be configured by DIP switch.

Features

- Extend telephone voice transmission up to 120km over fiber
- Network management via terminal, web or SNMP in FRM220 chassis
- Supports telephone voice transmission
- Supports caller ID Pass-Through
- Supports FXS to FXS hot line

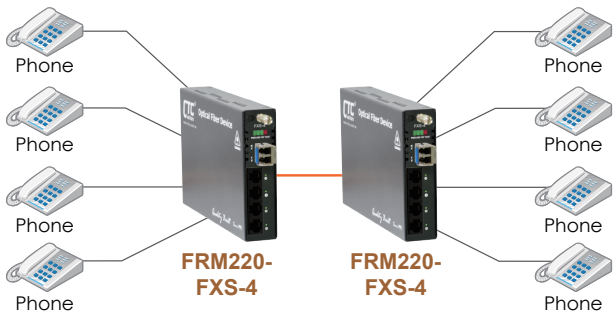
Specifications

Optical Interface	Connector	SFP-LC
	Fiber	MM 62.2/125μm, 50/125μm
		SM 9/125μm
	Distance	MM 2km, SM 15/30/50km
		WDM 20/40km
	Wavelength	MM 1310nm, SM 1310, 1550nm
		WDM 1310Tx/1550Rx (type A)
		1550Tx/1310Rx (type B)
Indications	LED (Power, FX Link, Phone Act, Test)	
Power Input	12VDC	
Power Consumption	< 5W	
Dimensions	155 x 88 x 23mm (D x W x H)	
Weight	120g	
Temperature	0 ~ 50°C (Operating), -10 ~ 70°C (Storage)	
Humidity	10 ~ 90% non-condensing	
Certification	CE, FCC, RoHS compliant	
MTBF	65,000 hrs	

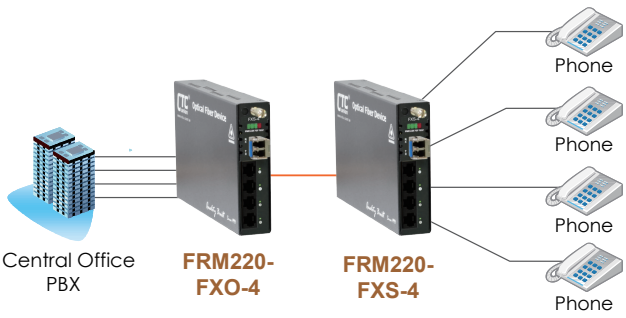
Electrical Interface	Connector	RJ-11
	FXO modle	Impedance : 600 ohms
		Coding : 16 bits liner
		Loop Current : 10~100mA
		Ring Frequency : Acceptable 20 ~50Hz
		Insertion Loss: 0.0 ± 1.0dB at 1000Hz
	FXS modle	Impedance : 600 ohms
		Coding : 16 bits liner
		Dial: DTMF and Dial Pulse
		Battery Source: 48VDC ± 4V
		Ringing Waveform : Sine wave
		Ringing Frequency : 20/25/30/35/40/45/50 Hz selectable
		Ring Cadence: FXS to FXS : On / 1 sec, Off / 2 sec
		FXO to FXS; Reproduces the cadence detected by FXO
		Insertion Loss 0.0 ± 1.0dB at 1000Hz
		REN: 4.0B(Ring Equivalence Number)

Application

Automatic Ring down hotline



Voice transmission from 2km to 120km over fiber



Ordering Information

Model Name	Description
FRM220-FXO-4	4-port FXO fiber converter
FRM220-FXS-4	4-port FXS fiber converter

Connector Type	Connectivity Distance
SC, ST, FC	002: 2km 015: 15km 030: 30km 050: 50km 20A: WDM 20km A type 20B: WDM 20km B type 40A: WDM 40km A type 40B: WDM 40km B type

Connector Type / Connectivity Distance

FMC220 – FXO-4 – □□□□□

Example: FMC220 – FXO-4 – SC002

Note: This card may be set by DIP switch and placed in CH01 standalone chassis.
When connected as a remote to a managed central chassis, this card supports in-band management.

FRM220-FXO/FXS

FXO/FXS over Fiber

FRM220-FXO/FXS is a POTS (Plain Old Telephone System) over fiber converter/extender. The POTS connection uses a standard RJ-11C modular connector for one copper pair connection. A pair of FRM220-FXO/FXS is required to implement an end to end system. FXO mode connects to a telephone line (PSTN) or PBX station line and has ability to detect ringing voltages and to act as a telephone. FXS mode is the reciprocal unit and has ability to act as PSTN and connects to a telephone device. When the FRM220-FXO/FXS card is placed in the FRM220 rack with SNMP management, in-band management allows configuring and viewing the card and remote converter's status, type, version, fiber link status, on hook status and alarms. Both card and remote can be configured to enable or disable the port, reset the port and set the FXO or FXS mode. When configured in an FXS to FXS fashion, a private "hot line" or direct line is created. When placed in a single slot chassis and used standalone without management, the card may be configured by DIP switch.

Features

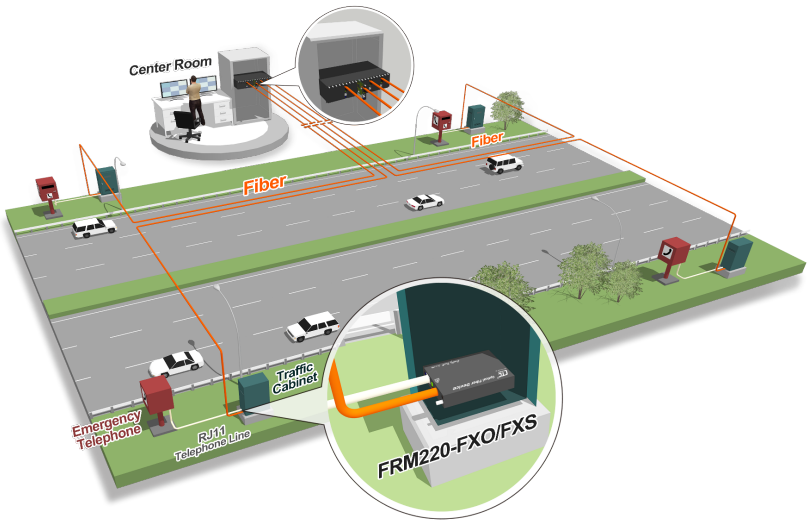
- Extend telephone voice transmission from 2km to 120km over fiber
- Network management via terminal, web or SNMP in FRM220 chassis
- Supports telephone voice transmission
- Supports caller ID Pass-Through
- Selectable FXO or FXS mode
- Supports FXS to FXS hot line

Specifications

Optical Interface	Connector	1x9 (SC)
	Fiber	MM 62.2/125μm, 50/125μm
		SM 9/125μm
	Distance	MM 2km, SM 15/30/50km
		WDM 20/40km
	Wavelength	MM 1310nm, SM 1310, 1550nm
		WDM 1310Tx/1550Rx (type A)
		1550Tx/1310Rx (type B)
Indications	LED (Power, FX Link, Phone Act, Test)	
Power Input	12VDC	
Power Consumption	< 5W	
Dimensions	155 x 88 x 23mm (D x W x H)	
Weight	120g	
Temperature	0 ~ 50°C (Operating), -10 ~ 70°C (Storage)	
Humidity	10 ~ 90% non-condensing	
Certification	CE, FCC, RoHS compliant	
MTBF	65,000 hrs	

Electrical Interface	Connector	RJ-11
	FXO modle	Impedance : 600 ohms
		Coding : 16 bits liner
		Loop Current : 10~100mA
		Ring Frequency : Acceptable 20 ~50Hz
		Insertion Loss: 0.0 ± 1.0dB at 1000Hz
		Impedance : 600 ohms
	FXS Modle	Coding : 16 bits liner
		Dial: DTMF and Dial Pulse
		Battery Source: 48VDC ± 4V
		Ringing Waveform : Sine wave
		Ringing Frequency : 20/25/30/35/40/45/50 Hz selectable
		Ring Cadence: FXS to FXS : On / 1 sec, Off / 2 sec
		FXO to FXS; Reproduces the cadence detected by FXO
		Insertion Loss 0.0 ± 1.0dB at 1000Hz
		REN: 4.0B(Ring Equivalence Number)

Application



Ordering Information

Model Name	Description
FRM220-FXO/FXS	FXO / FXS fiber converter

Connector Type	Connectivity Distance
SC, ST, FC	002: 2km 015: 15km 030: 30km 050: 50km 20A: WDM 20km A type 20B: WDM 20km B type 40A: WDM 40km A type 40B: WDM 40km B type

Connector Type / Connectivity Distance

FRM220 – FXO/FXS – □□□□□

Example: FRM220 – FXO/FXS – SC002

Note: This card may be set by DIP switch and placed in CH01 standalone chassis.
When connected as a remote to a managed central chassis, this card supports in-band management.

FRM220A-Eoe1

Ethernet Bridge over E1

- HDLC
- MTU 1522bytes
- Framed / Unframed E1

The FRM220A-Eoe1 is an Ethernet over E1 Bridge for cost-effective connection of 10/100Base-TX or 100Base-FX LANs over a single E1 transport. By using standard HDLC encapsulation, the FRM220A-Eoe1 is able to transmit up to a 2M bits Ethernet over an E1 link. The FRM220A-Eoe1 supports an E1 attenuation of up to 43 dB on twisted pair or coax cable, which provides an approximate operating range up to 2km (using 22AWG). The FRM220A-Eoe1 fully meets E1 specifications including ITU-T G.704 and G.823. The FRM220A-Eoe1 features diagnostic capabilities for performing remote loopback. The operator at either end of the line may test both the FRM220A-Eoe1 and the line in the digital loopback mode. The Ethernet copper interface supports auto-negotiation and auto MDI/MDIX, allowing plug-and-play Ethernet connection without any additional configuration. When placed in FRM220A system, the Ethernet may be aggregated to the chassis's built in Ethernet switch. When placed in a single slot chassis and used standalone without management, the card may be configured by DIP switch.

Features

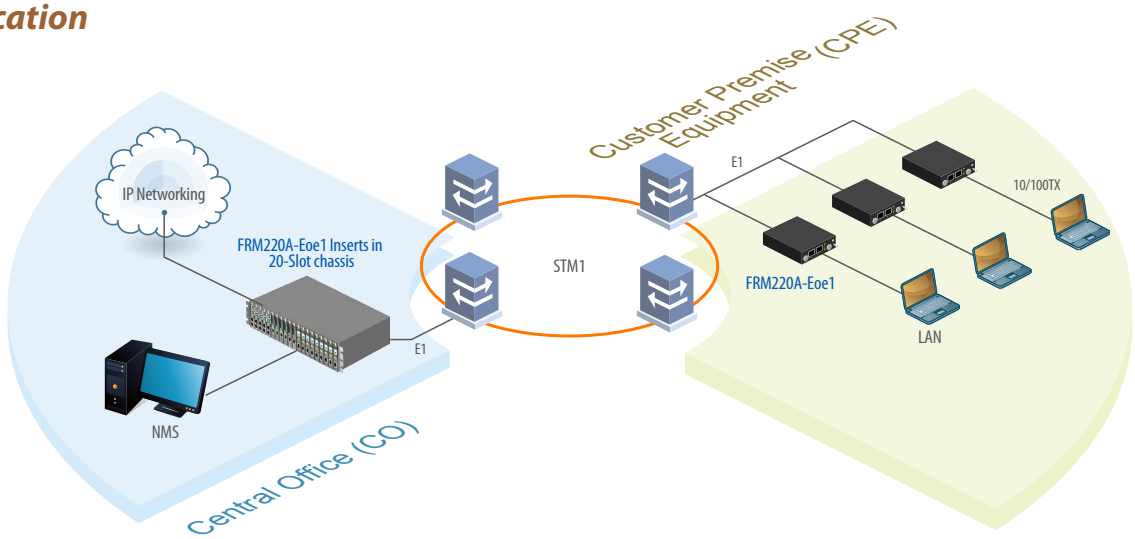
- Connects one Fast Ethernet over E1 links (64k~2048Kbps)
- Built-in HDLC bridge operates at WAN rate
- Auto-Negotiation
- Unbalanced E1/BNC or balanced E1/RJ45
- Fully compatible with FRM220A and FRM220 chassis
- SNMP management with FRM220A and FRM220 chassis
- LED Alarm indication
- Standalone RS232 console management via CH01M

Specifications

E1 Interface	Framing	Framed / Unframed
	MTU	1522bytes (Max.)
	Standard	ITU-T G.703/G.704/G.706 & G.732, G.823
	Bit rate	2.048Mbps± 50ppm
	Line code	HDB3
	Clock setting	Internal OSC or recovery clock
	Receive level	-43dB
	Line impedance	75 ohm (BNC) / 120 ohm (RJ45)
	Jitter Performance	Complies with ITU-T G.823
	Pulse shape	Complies with ITU-T G.703
	Pulse amplitude	Nominal 2.37V ± 10%
	Delay Variance	220ms
	Connector	RJ-45, BNC
	Diagnostics	Digital remote loopback

Ethernet Interface	Standards	IEEE 802.3, 802.3u
	Data rate	10/100Base-TX, Half/Full duplex
	Connector	RJ-45 10/100Base-TX
Indications	Power, ALM, E1 signal loss, E1 Alarm (AIS, LOF, RAI, LOMF), LAN link /ACT, 10/100M , SD (100Base-FX)	
Power Input	12VDC	
Power Consumption	< 12W	
Dimensions	155 x 88 x 24mm (D x W x H)	
Weight	130g	
Temperature	0 ~ 50°C (Operating), -10 ~ 70°C (Storage)	
Humidity	10 ~ 90% RH (non-condensing)	
Certifications	CE, FCC, RoHS compliant	
MTBF	65,000 hrs	

Application



Ordering Information

Model Name	Description
FRM220A-Eoe1	10/100Base-TX to E1 HDLC bridge

Note: This card may be set by DIP switch and placed in CH01 chassis, or set by serial console if placed in CH01M chassis.
When connected as a remote to a managed central chassis, this card supports in-band management and only needs a CH01 chassis.

FRM220A-Eoe1/G

Ethernet Bridge over E1 (GFP)

- HDLC & GFP
- MTU 2046bytes
- Unframed E1

NEW

The FRM220A-Eoe1/G is an Ethernet over E1 Bridge for cost-effective connection of 10/100Base-TX or 100Base-FX LANs over a single E1 transport. By using GFP (Generic Framing Procedure) or standard HDLC encapsulation, the FRM220A-Eoe1/G is able to transmit up to a 2M bits Ethernet over an E1 link. The FRM220A-Eoe1/G supports an E1 attenuation of up to 43 dB on twisted pair or coax cable, which provides an approximate operating range up to 2km (using 22AWG). The FRM220A-Eoe1/G fully meets E1 specifications including ITU-T G.704 and G.823. The Ethernet copper interface supports auto-negotiation and auto MDI/MDIX, allowing plug-and-play Ethernet connection without any additional configuration. When placed in FRM220A system, the Ethernet may be aggregated to the chassis's built in Ethernet switch. When placed in a single slot chassis and used standalone without management, the card may be configured by serial terminal.

Features

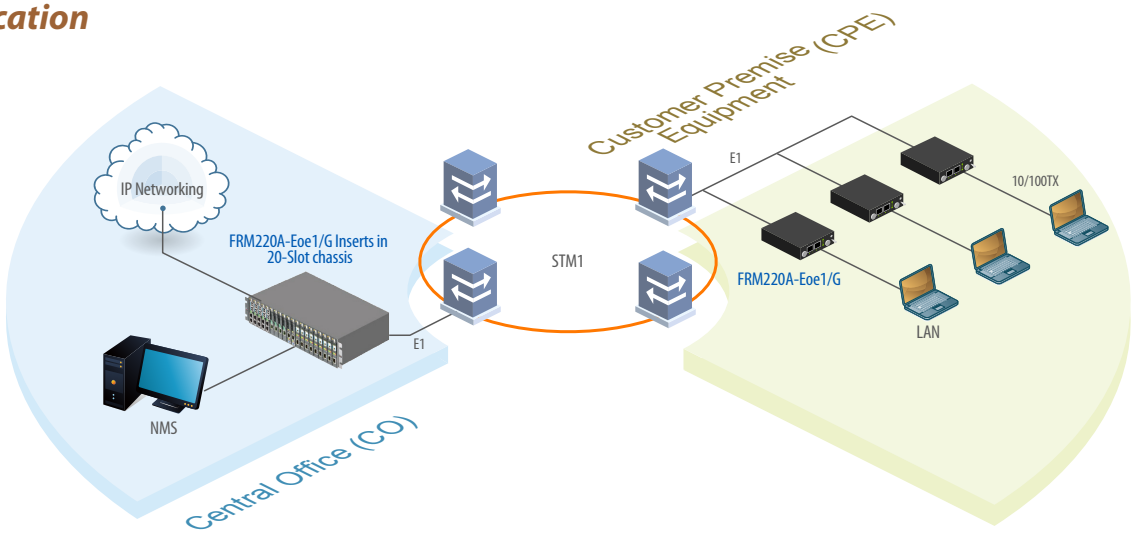
- Connects one Fast Ethernet over E1 links (2.048Mbps)
- Built-in GFP bridge operates at WAN rate
- Auto-Negotiation
- Unbalanced E1/BNC or balanced E1/RJ45
- Fully compatible with FRM220A and FRM220 chassis
- SNMP management with FRM220A and FRM220 chassis
- LED Alarm indication
- Standalone RS232 console management via CH01M

Specifications

E1 Interface	Framing	Unframed
	MTU	2046bytes
	Connector	RJ45 10/100Base-TX
	Standard	ITU-T G.703/G.704/G.706 & G.732, G.823
	Bit rate	2.048Mbps± 50ppm
	Line code	HDB3
	Clock setting	Internal OSC or recovery clock
	Receive level	-43dB
	Line impedance	75 ohm (BNC) / 120 ohm (RJ-45)
	Jitter Performance	Complies with ITU-T G.823
	Pulse Mask	Complies with ITU-T G.703
	Pulse amplitude	Nominal 2.37V ± 10%
	Delay Variance	220ms
	Connector	RJ-45, BNC

Ethernet Interface	Diagnostics	Digital remote loopback
	Standards	IEEE 802.3, 802.3u
	Data rate	10/100Base-TX, Half/Full duplex
		Encapsulation GFP (G.7041)
Indications	Power, ALM,E1 signal loss ,E1 Alarm (AIS, LOF, RAI, LOMF), LAN link /ACT, 10/100M , SD (100Base-FX)	
Power Input	12VDC	
Power Consumption	< 4W	
Dimensions	155 x 88 x 24 mm (D x W x H)	
Weight	DC12 : 280g AC/DC 48/AD : 580g	
Temperature	0 ~ 50°C (Operating), -10 ~ 70°C (Storage)	
Humidity	10 ~ 90% RH (non-condensing)	
Certifications	CE, FCC, RoHS compliant	
MTBF	65,000 hrs	

Application



Ordering Information

Model Name	Description
FRM220A-Eoe1/G	10/100Base-TX to E1 GFP bridge operates at WAN

Note: This card may be set by DIP switch and placed in CH01 chassis, or set by serial console if placed in CH01M chassis.
When connected as a remote to a managed central chassis, this card supports in-band management and only needs a CH01 chassis.

STE100A/DRK01

STE100A/RS232

RS-232 IP Device Server

The IP Device Server provides the serial device server for Windows hosts to control asynchronous RS-232 serial devices located virtually anywhere through a TCP/IP or UDP/IP connection. The Device Server has the serial port connection on one side, and a 10/100 Mbps Ethernet connection on the other side. It connects serial devices such as CNC, weight scales, and scanners to IP networks. Applications include industrial/factory automation, automatic warehouse control, and hospital/laboratory automation. The IP Device Server Windows driver is designed to control the IP Serial Server devices. The driver installs a virtual COM on Windows which maps the virtual COM port to the IP address of the IP Serial Server device across the network, enabling the Windows applications to access remote serial devices over Ethernet. IP Device Server can function as a UDP or a server or client for TCP connection. The application scenarios are direct IP mode, virtual COM mode, and paired mode.

Features

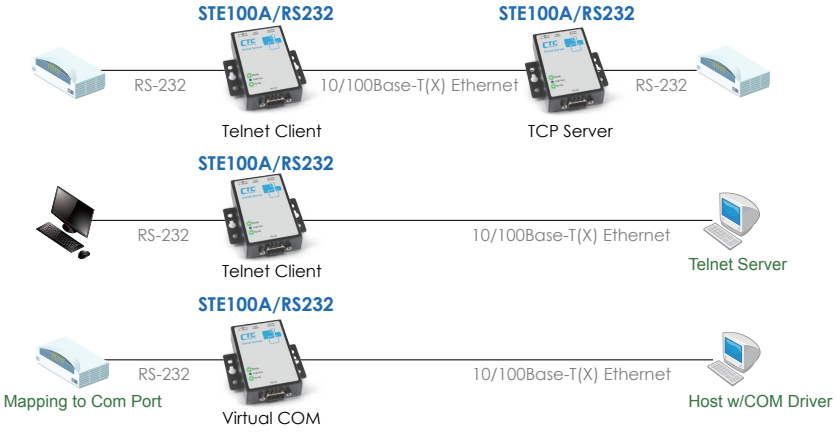
- 10/100Mbps Ethernet port
- 230.4kbps serial interface
- TCP Server, TCP client, Virtual com mode, UDP
- Supports for DHCP, HTTP, ICMP, ARP, IP, UDP, TCP, Telnet
- Easy to use with Windows utility
- Configuration by web browser
- Low power consumption with single + 12V to +48V input

Specifications

General	LED	Ready, TP Link/Act, RS232 TX/RX
	OS supported	Windows XP/2000/2003/2008/ VISTA/WIN7
Serial Interface	RS-232	
Serial Connector	DB-9 male (DTE)	
Baudrate	110 to 230.4Kbps	
Data bits	5, 6, 7, 8	
Stop bits	1, 1,5 for Data bits 5 mode; 1, 2 for data bits 6, 7, 8 mode	
Parity	None, Even, Odd	
Flow Control	None, RTS/CTS	
Data Packing Delimiter	1,2	
LAN Interface	RJ-45 connector, IEEE802.3 10/100Base-TX, Auto-detecting, Full/Half-duplex	

Communication Modes	TCP Server, TCP Client, Virtual COM mode, UDP
Protocols	TCP, UDP, IP, ARP, ICMP, HTTP, DHCP
Management	Web pages, Firmware upgrade
Security	Password Access
Power	12VDC
Operating Temperature	0 ~ 60°C
Storage Temperature	-10 ~ 70°C
Humidity	0 – 90% non-condensing
DIN rail mount	Yes
Panel mount	Yes
Dimensions	85 x 50 x 21mm (D x W x H)
Certifications	CE, FCC

Application



Ordering Information

Model Name	Description
STE100A/RS232	RS-232 IP device server
STE100A/DRK01	STE100A/RS232 DIN-Rail Mounting Kit
Optional Power	
DC-APT/12V	DC(±24 / ±48VDC) to DC(12VDC) Isolated Power Adapter

Serial Type

STE100A /□□□□□

Example: STE100A / RS232

STE100A-485

RS-485 IP Device Server

STE100A/DRK01

NEW

The IP Device Server provides the serial device server for Windows hosts to control 2 or 4 wire asynchronous RS-485 serial devices located virtually anywhere through a TCP/IP or UDP/IP connection. The Device Server has the serial port connection on one side, and a 10/100 Mbps Ethernet connection on the other side. It connects serial devices such as PLC, alarm sensors and PTZ camera control to IP networks. Applications include industrial/factory automation, public safety and surveillance systems. The IP Device Server Windows driver is designed to control the IP Serial Server devices. The driver installs a virtual COM on Windows which maps the virtual COM port to the IP address of the IP Serial Server device across the network, enabling the Windows applications to access remote serial devices over Ethernet. IP Device Server can function as a UDP or a server or client for TCP connection. The application scenarios are direct IP mode, virtual COM mode, and paired mode.

Features

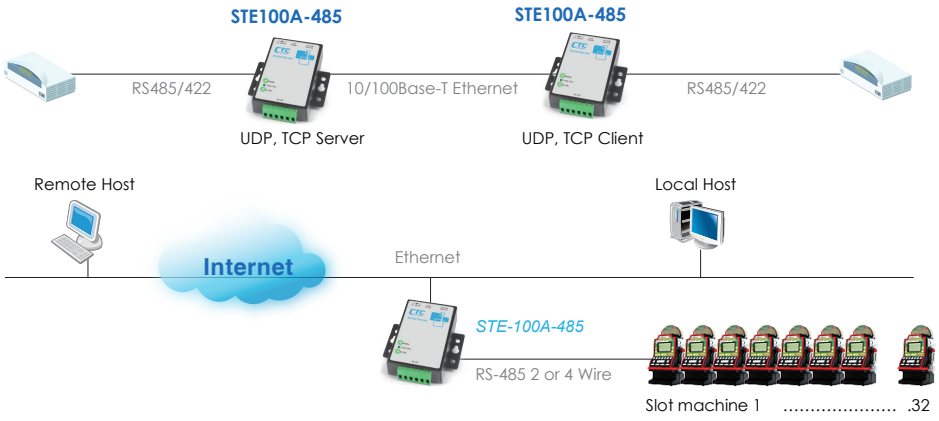
- 10/100Mbps Ethernet port
- 230.4kbps serial interface
- TCP Server, TCP client, Virtual com mode, UDP
- Supports for DHCP, HTTP, ICMP, ARP, IP, UDP, TCP
- Easy to use with Windows utility
- 2 Wire(half duplex) or 4 Wire(full duplex)RS-485
- Configuration by web browser
- Low power consumption with single + 12V to +48V input

Specifications

General	LED	Ready, TP Link/Act, Data TX/RX
	OS supported	Windows XP/2000/2003/2008/ VISTA/WIN7
Serial Interface	RS-485, RS-422 (2 or 4 Wire RS-485; 4 Wire RS-422)	
Serial Connector	Terminal Block	
Baudrate	110 to 230.4Kbps	
Data bits	5, 6, 7, 8	
Stop bits	1, 1,5 for Data bits 5 mode; 1, 2 for data bits 6, 7, 8 mode	
Parity	None, Even, Odd	
Flow Control	Full/ Half Duplex	
Data Packing Delimiter	1,2	
LAN Interface	RJ-45 connector, IEEE802.3 10/100Base-TX	

Communication Modes	TCP Server, TCP Client, Virtual COM mode, UDP
Protocols	TCP, UDP, IP, ARP, ICMP, HTTP, DHCP
Management	Web pages, Firmware upgrade
Security	Password Access
Power	12VDC
Operating Temperature	0 ~ 60°C
Storage Temperature	-10 ~ 70°C
Humidity	0 – 90% non-condensing
DIN rail mount	Yes
Panel mount	Yes
Dimensions	85 x 50 x 21mm (D x W x H)
Certifications	CE, FCC

Application



Ordering Information

Model Name	Description
STE100A-485	RS-485 IP device server
STE100A/DRK01	STE100A/RS485 DIN-Rail Mounting Kit
Optional Power	
DC-APT/12V	DC(±24 / ±48VDC) to DC(12VDC) Isolated Power Adapter

Serial Type

STE100A –□□□

Example: STE100A – 485

Specifications & design are subject to change without prior notice. Please visit CTC Union website for more details.

FRM220-E1/Data

E1 to DATA

The FRM220-E1/Data is a single port G.703/704 Fractional E1 DSU/CSU card for the FRM220/220A Series Platform Media Converter Rack. The converter supports Unframed, PCM31, PCM31+CRC4, PCM30, and PCM30+CRC4 framing modes. The clock source may be selected internally, recovered from received E1 signal, externally from the Data port or transparent. The data port interface utilizes a single hi-density 26pin connector. Cable solutions are provided for RS-530/449, X.21, V.35 and RS-232. The unit can recognize the cable type attached and automatically self-configure the interface circuits. Choosing from one of two model types, the E1 connection is either unbalanced 75 ohm with two BNC connectors or balanced 120 ohm with one RJ-45 connector. When the FRM220-E1/Data card is placed in the FRM220 rack with SNMP management, the management can view the converter card's status, type, version, E1 link status and alarms. The card can be configured to enable or disable the port, reset the card, set clocking, frame mode, interface type and provide analog or digital diagnostic loopbacks. A unique feature of the FRM220-E1/Data is the use of a common card design which may either be inserted in the FRM220-CH01 single slot chassis as a stand-alone modem or as a card when placed in the FRM220-CH20 in-band managed rack

Features

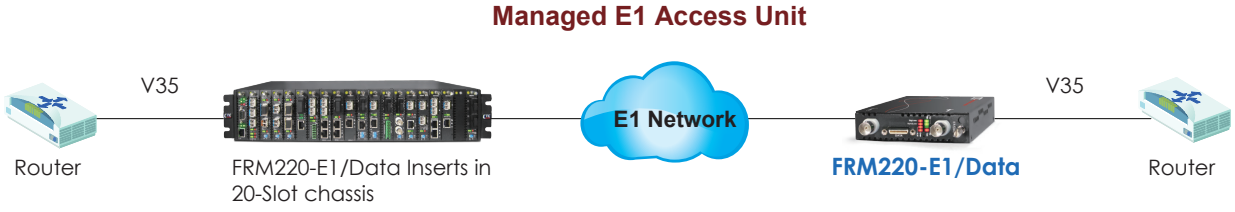
- Supports Fractional E1 and Unframed E1 services with V.35/X21/ RS530 adapter cable
- I/O connectors all located on front panel
- Multiple clock source selection and remote loopback
- (Internal or External: E1 recovery, DTE or DCE)
- Unbalanced E1/BNC or balanced E1/RJ45
- Fully compatible with FRM220-CH20 and FRM220A chassis
- SNMP management with FRM220-CH20 chassis
- LED Alarm indication
- Standalone RS232 console management via CH01M

Specifications

E1 Interface	Framing	Framed/Unframed
	Standards	ITU-T G.703/G.704/G.706 & G.732, G.823
	Bit rate	2.048Mbps± 50ppm
	Line code	HDB3
	Clock setting	Internal OSC or recovery clock
	Receive level	-43dB
	Line impedance	75 ohm (BNC) / 120 ohm (RJ45)
	Jitter Performance	Complies with ITU-T G.823
	Pulse Mask	Complies with ITU-T G.703
	Pulse amplitude	Nominal 2.37V ± 10%
	Delay Variance	8ms
	Connector	BNC / RJ-45
	Diagnostics	Digital remote loopback

Serial Interface	Standards	ITU-T, E1A
	Data rate	Nx56 / Nx64
	Connector	HDB26F w/ adapter cable for Data
LEDs	Power, TD, RD, RTS, DCD, TX Clock loss, Signal loss, Sync loss, Alarm, test error	
Power	12VDC	
Power Consumption	< 12W	
Dimensions	155 x 88 x 24mm (D x W x H)	
Weight	130g	
Temperature	0 ~ 50°C (Operating), -10 ~ 70 °C (Storage)	
Humidity	10 ~ 90% RH (non-condensing)	
Certifications	CE, FCC, RoHS compliant	
MTBF	65,000 hrs	

Application



Ordering Information

Model Name	Description
FRM220- E1/V35-R	V35 to framed E1 RJ-45 with V35 cable
FRM220- E1/V35-B	V35 to framed E1 BNC with V35 cable
FRM220- E1/X21-R	X21 to framed E1 RJ-45 with X21 cable
FRM220- E1/X21-B	X21 to framed E1 BNC with X21 cable
FRM220- E1/RS530-R	RS530 to framed E1 RJ-45 with RS530 cable
FRM220- E1/RS530-B	RS530 to framed E1 BNC with RS530 cable
FRM220- E1/RS449-R	RS449 to framed E1 RJ-45 with RS449 cable
FRM220- E1/RS449-B	RS449 to framed E1 BNC with RS449 cable
FRM220- E1/RS232-R	RS232 to framed E1 RJ-45 with RS232 cable
FRM220- E1/RS232-B	RS232 to framed E1 BNC with RS232 cable

FRM220 – □□ / □□□ – □

Example: FRM220 – E1/V35 – R

Note: This card may be set by DIP switch and placed in CH01 chassis, or set by serial console if placed in CH01M chassis.
For standalone SNMP management, place this card in CH02/SNMP chassis.

FRM220-FTEC

E1/T1 Cross Rate Converter

The FRM220-FTEC is a T1 (US Standard) /E1 (European Standard) converter and timeslot cross connect which enables conversion between one T1 signal and one E1 signal. T1 and E1 signals with framing employ u-Law and A-Law compander encoding principles respectively and encode those analog (voice) signals into 64kbits digital data. The T1 interface supports D4(SF) or ESF frame formats with B8ZS or AMI line code. The E1 interface supports CCS (PCM31) or CAS (PCM30) framing without CRC-4 and framing with CRC-4. The line coding is HDB3.

Tests and diagnostics can easily be performed from the local console interface or via Web based management of the FRM220. Diagnostics include T1 local/remote and E1 local/remote loop back. When placed in a single slot chassis and used standalone without management, the card may be configured by DIP switches.

Features

- Converts between T1 and E1 data and signaling
- Enable equipment to operate at T1 and E1 rates
- Supports G.802 Annex B (T1 over E1)
- Configures A-law/μ-law and signaling conversion
- Transparent conversion at 64kbps timeslot level
- Controlled slip for buffer over or under flow
- 24 time slots of T1 Nx64 can be inserted into E1 Nx64, 30/CAS or 31/CCS timeslots

Specifications

E1 Interface	Framing	CAS/PCM30 or CCS/PCM31 selectable
	Bit rate	2.048Mbps
	Line Code	HDB3
	Line Impedance	75 ohm (BNC) / 120 ohm (RJ-45)
		Voice channel sample rule A-Law
	CRC check	CRC-4 enable/disable
	Pulse amplitude	Nominal 2.37V ±10% for 75ohm
		Nominal 3.00V ±10% for 120ohm
	Zero amplitude	± 0.1V
	Connector	RJ-45
T1 Interface	Framing	D4, ESF selectable
	Bit rate	1.544Mbps
	Line Code	B8ZS / AMI
	Equalization	0 ~ 655 feet settable
		Voice channel sample rule μ-Law
	CRC check	CRC-6 when ESF
	Line Impedance	100 ohms
	Transmit Pulse level	3.0V ±10%,
	Receive signal level	0 ~ -10dB
	Connector	RJ-45

LEDs	PWR, Sys, Test, T1/E1
Standard	ITU-T G.703, G.704, G.706, G.823, G.824, ANSI T1.403
Power	12VDC
Power Consumption	< 5W
Dimensions	155 x 88 x 24mm (D x W x H)
Weight	130g
Temperature	0 ~ 50°C (Operating), -10 ~ 70°C (Storage)
Humidity	10 ~ 90% non-condensing
Certification	CE, FCC, RoHS compliant
MTBF	57,000 hrs

Application

Ordering Information

Model Name	Description
FRM220-FTEC	E1/T1 Cross rate converter

Note: This card must use CH01M, with serial console, to configure standalone settings.
For standalone SNMP management, place this card in CH02/SNMP chassis.

NEW

FRM220A-iMux4

Ethernet to 4E1 Multiplexer

The FRM220A-iMux4 is an E1 inverse multiplexer capable of bundling up to 4 E1 lines for cost-effective connection of 10/100Base-TX or 100Base-FX LANs over multiple E1 transports. The FRM220A-iMux4 inverse multiplexer transmits up to a 9.92Mbps Ethernet bridge channel (GFP-F encapsulated) over 4 E1 links. The FRM220A-iMux4 bridges the gap between E1 and E3, allowing bridges to operate at faster rates. It also provides high speed access to SDH/SONET backbones where the only access services available are E1 lines. The FRM220A-iMux4 supports an E1 attenuation of up to 43 dB on twisted pair or coax cable. This provides an approximate operating range up to 2km (using 22AWG). The FRM220A-iMux4 fully meets E1 specifications including ITU-T G.703 and G.823. The FRM220A-iMux4 features diagnostic capabilities for performing remote loopback. The operator at either end of the line may test both the FRM220A-iMux4 and the line in the digital loopback mode. The Ethernet copper interface supports auto-negotiation and auto MDI/MDIX, allowing plug-and-play Ethernet connection without any additional configuration.

Features

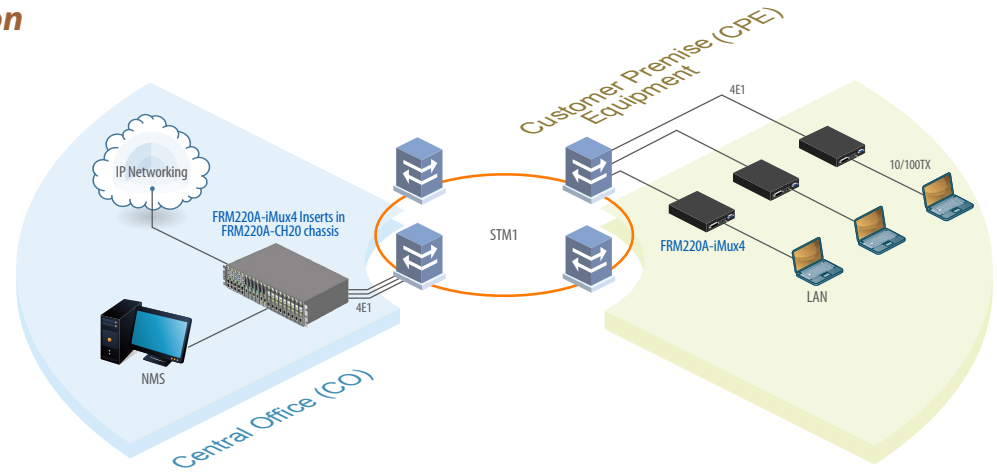
- Connects one Fast Ethernet over 1-4 E1 links (1.984 ~ 7.92Mbps)
- Built-in GFP bridge operates at WAN rate
- Auto-Negotiation
- Unbalanced E1/BNC or balanced E1/RJ45
- Fully compatible with FRM220A chassis
- SNMP management with FRM220A chassis
- LED Alarm indication
- Standalone RS232 console management via CH01M

Specifications

E1 Interface	Framing	CCS+CRC
	Standard	ITU-T G.703/G.704/G.706 & G.732, G.823
	Bit rate	2.048Mbps± 50ppm (up to 4E1)
	Line code	HDB3
	Clock setting	Internal OSC or recovery clock
	Receive level	-43dB
	Line impedance	75 ohm (BNC) / 120 ohm (RJ45)
	Jitter Performance	Complies with ITU-T G.823
	Pulse Mask	Complies with ITU-T G.703
	Pulse amplitude	Nominal 2.37V ± 10%
	Delay Variance	220ms
	Connector	RJ45, BNC
	Diagnostics	Digital remote loopback

Ethernet Interface	Standards	IEEE 802.3, 802.3u
	Data rate	10/100Base-TX, Half/Full duplex
Ethernet Interface	Connector	RJ45 10/100Base-TX
Indications	Power, ALM, E1 signal loss, E1 Alarm (AIS, LOF, RAI, LOMF), LAN link /ACT, 10/100M, SD (100Base-FX)	
Power Input	12VDC	
Power Consumption	< 6W	
Dimensions	140 x 88 x 24mm (D x W x H)	
Weight	130g	
Temperature	0 ~ 50°C (Operating), -10 ~ 70°C (Storage)	
Humidity	10 ~ 90% RH (non-condensing)	
Certifications	CE, FCC, RoHS Compliant	
MTBF	75,000 hrs	

Application



Ordering Information

Model Name	Description
FRM220A-iMux4T-R	10/100Base-TX to 4 E1 mux card with 4E1 RJ45 cable
FRM220A-iMux4T-B	10/100Base-TX to 4 E1 mux card with 4E1 BNC cable

FRM220A – iMux4T – ☐

Example: FRM220A – iMux4T – R

Cable Type

RJ45 Cable

BNC Cable

Note: This card must use CH01M, with serial console, to configure standalone settings.
When connected as a remote to a managed central chassis, this card supports in-band management and only needs a CH01 chassis.

FRM220A-iMux8

Ethernet to 8E1 Multiplexer

The FRM220A-iMux8 is an E1 inverse multiplexer capable of bundling up to 8 E1 lines for cost-effective connection of 10/100Base-TX or 100Base-FX LANs over multiple E1 transports. The FRM220A-iMux8 inverse multiplexer transmits up to a 15.87Mbps Ethernet bridge channel (GFP-F encapsulated) over 8 E1 links. The FRM220A-iMux8 bridges the gap between E1 and E3, allowing bridges to operate at faster rates. It also provides high speed access to SDH/SONET backbones where the only access services available are E1 lines. The FRM220A-iMux8 supports an E1 attenuation of up to 43 dB on twisted pair or coax cable. This provides an approximate operating range up to 2km (using 22AWG). The FRM220A-iMux8 fully meets E1 specifications including ITU-T G.703 and G.823. The FRM220A-iMux8 features diagnostic capabilities for performing remote loopback. The operator at either end of the line may test both the FRM220A-iMux8 and the line in the digital loopback mode. The Ethernet copper interface supports auto-negotiation and auto MDI/MDIX, allowing plug-and-play Ethernet connection without any additional configuration.

Features

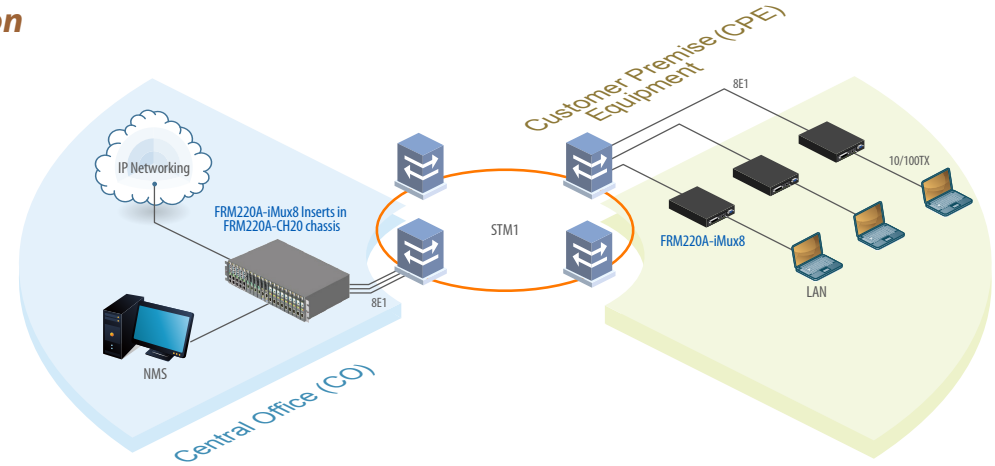
- Connects one Fast Ethernet over 1- 8 E1 links (1.984Mbps to 15.87Mbps)
- Built-in GFP bridge operates at WAN rate
- Maximum 220ms delay variance between E1 link
- Unbalanced E1/BNC or balanced E1/RJ45
- Fully compatible with FRM220A chassis
- SNMP management with FRM220A chassis
- LED Alarm indication & Auto-Negotiation
- Standalone RS232 console management via CH01M

Specifications

E1 Interface	Framing	CCS+CRC
	Standard	ITU-T G.703/G.704/G.706 & G.732, G.823
	Bit rate	2.048Mbps± 50ppm (up to 5E1)
	Line code	HDB3
	Clock setting	Internal OSC or recovery clock
	Receive level	-43dB
	Line impedance	75 ohm (BNC) / 120 ohm (RJ45)
	Jitter Performance	Complies with ITU-T G.823
	Pulse Mask	Complies with ITU-T G.703
	Pulse amplitude	Nominal 2.37V ± 10%
	Delay Variance	220ms
	Connector	RJ-45 or BNC
	Diagnostics	Digital remote loopback
Ethernet Interface	Standards	IEEE 802.3, 802.3u
	Data rate	10/100Base-TX, Half/Full duplex

Ethernet Interface	Connector	RJ-45 10/100Base-TX
		Power, ALM, E1 signal loss
Indications	Power, ALM, E1 signal loss, E1 Alarm(AIS, LOF, RAI, LOMF), LAN link /ACT, 10/100M, SD(100Base-FX)	
Power Input	12VDC	
Power Consumption	< 12W	
Dimensions	140 x 88 x 24 mm (D x W x H)	
Weight	130g	
Temperature	0 ~ 50°C (Operating), -10 ~ 70°C (Storage)	
Humidity	10 ~ 90% RH (non-condensing)	
Certifications	CE, FCC, RoHS compliant	
MTBF	65,000 hrs	

Application



Ordering Information

Model Name	Description
FRM220A-iMux8T-R	10/100Base-TX to 8 E1 mux card with 8 E1 RJ45 cable
FRM220A-iMux8T-B	10/100Base-TX to 8 E1 mux card with 8 E1 BNC cable

FRM220A – iMux8T – ☐

Example: FRM220A – iMux8T – R

Cable Type

RJ45 Cable

BNC Cable

Note: This card must use CH01M, with serial console, to configure standalone settings.
When connected as a remote to a managed central chassis, this card supports in-band management and only needs a CH01 chassis.

FRM220A-iMux16

Ethernet to 16E1 Multiplexer

The FRM220A-iMux16 is an E1 inverse multiplexer capable of bundling up to 16 E1 lines for cost-effective connection of 10/100Base-TX or 100Base-FX LANs over multiple E1 transports. The FRM220A-iMux16 inverse multiplexer transmits up to a 31.74Mbps Ethernet bridge channel (GFP-F encapsulated) over 16 E1 links. The FRM220A-iMux16 bridges the gap between E1 and E3, allowing bridges to operate at faster rates. It also provides high speed access to SDH/SONET backbones where the only access services available are E1 lines. The FRM220A-iMux16 supports an E1 attenuation of up to 43 dB on twisted pair or coax cable. This provides an approximate operating range up to 2km (using 22AWG). The FRM220A-iMux16 fully meets E1 specifications including ITU-T G.703 and G.823. The FRM220A-iMux16 features diagnostic capabilities for performing remote loopback. The operator at either end of the line may test both the FRM220A-iMux16 and the line in the digital loopback mode. The Ethernet copper interface supports auto-negotiation and auto MDI/MDIX, allowing plug-and-play Ethernet connection without any additional configuration.

Features

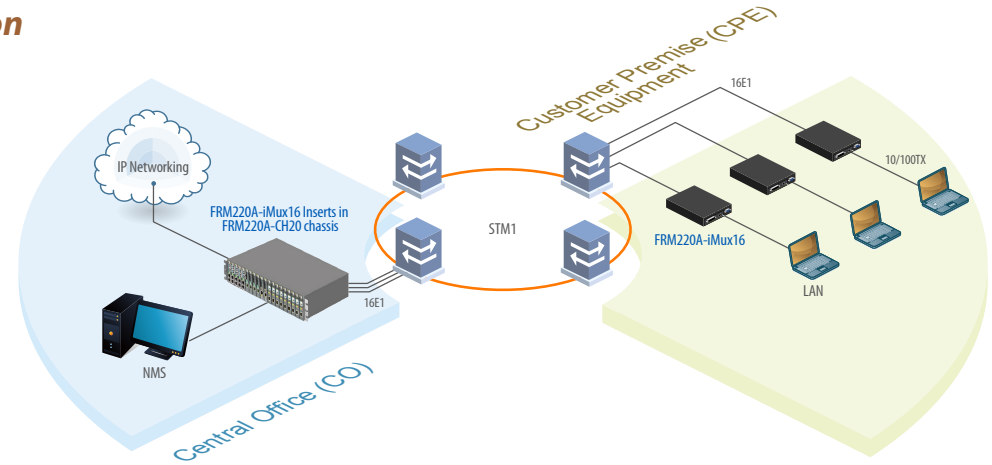
- Connects one Fast Ethernet over 1-16 E1 links (1.984Mbps to 31.74Mbps)
- Built-in GFP bridge operates at WAN rate
- Maximum 220ms delay variance between E1 links
- Unbalanced E1/BNC or balanced E1/RJ45
- Fully compatible with FRM220A chassis
- SNMP management with FRM220A chassis
- LED Alarm indication & Auto-Negotiation
- Standalone RS232 console management via CH02M

Specifications

E1 Interface	Framing	CCS+CRC
	Standard	ITU-T G.703/G.704/G.706 & G.732, G.823
	Bit rate	2.048Mbps± 50ppm (up to 5E1)
	Line code	HDB3
	Clock setting	Internal OSC or recovery clock
	Receive level	-43dB
	Line impedance	75 ohm (BNC) / 120 ohm (RJ45)
	Jitter Performance	Complies with ITU-T G.823
	Pulse Mask	Complies with ITU-T G.703
	Pulse amplitude	Nominal 2.37V ± 10%
	Delay Variance	220ms
	Connector	RJ45, BNC
	Diagnostics	Digital remote loopback
Ethernet Interface	Standards	IEEE 802.3, 802.3u
	Data rate	10/100Base-TX, Half/Full duplex

Ethernet Interface	Connector	RJ45 10/100Base-TX
		Power, ALM, E1 signal loss
Indications	Power, ALM, E1 signal loss, E1 Alarm(AIS, LOF, RAI, LOMF), LAN link /ACT, 10/100M, SD (100Base-FX)	
Power Input	12VDC	
Power Consumption	< 12W	
Dimensions	140 x 88 x 42mm (D x W x H)	
Weight	130g	
Temperature	0 ~ 50°C (Operating), -10 ~ 70°C (Storage)	
Humidity	10 ~ 90% RH (non-condensing)	
Certifications	CE, FCC, RoHS compliant	
MTBF	65,000 hrs	

Application



Ordering Information

Model Name	Description
FRM220A-iMux16T-R	10/100Base-TX to 16 E1 mux card with 16E1 RJ45 cable
FRM220A-iMux16T-B	10/100Base-TX to 16 E1 mux card with 16E1 BNC cable

FRM220A – iMux16T – ☐

Example: FRM220A – iMux16T – R

Cable Type

RJ45 Cable

BNC Cable

Note: This card may be locally configured by its own console when placed in CH02.
When connected as a remote to a managed central chassis, this card supports in-band management and only needs a CH02 chassis.

FRM220-GFOM04

4xE1/T1+ GbE Fiber Multiplexer

NEW

The FRM220-GFOM04 is a 4 channel E1/T1 fiber multiplexer with an additional Gigabit Ethernet trunk, plus order wire and clear channel RS-232, constructed as a two slot wide card for the FRM220 series. When the FRM220-GFOM04 card is placed in the FRM220 rack with NMC, the management can view the converter card's status, type, version, fiber link status and alarms. The card can be configured to enable or disable the port, reset the port, and provide local or remote diagnostic loopback. The 1+1 redundant optical aggregate of this multiplexer employs industry standard pluggable optics (SFP) operating at 1.25Mbps data rates. The SFP modules can be chosen to support single-mode, multi-mode, single fiber bi-directional or Coarse and Dense Wave Division Multiplexing (CWDM and DWDM).

Features

- 4 channels unframed E1/T1 (transparent)
- 10/100/1000Base-T Ethernet
- Auto MDI/MDIX & Auto-Negotiation or Force Mode
- Supports flow control 802.3x & 9K jumbo packets
- Supports link fault Pass-Through for Ethernet
- One clear channel RS232 up to 250Kbps(Async)
- 1+1 fiber protection, less than 50ms
- Supports Digital Diagnostics Monitoring Interface (DDMI) SFP
- AIS on signal loss on E1/T1 and fiber port
- Loopback test on E1/T1, RS232, fiber ports
- Supports local or remote In-band management (Monitor or Configure status) by SNMP manager and console port
- Supports Order wire Ear / Microphone port
- Supports On-Line F/W upgrade & Dying Gasp

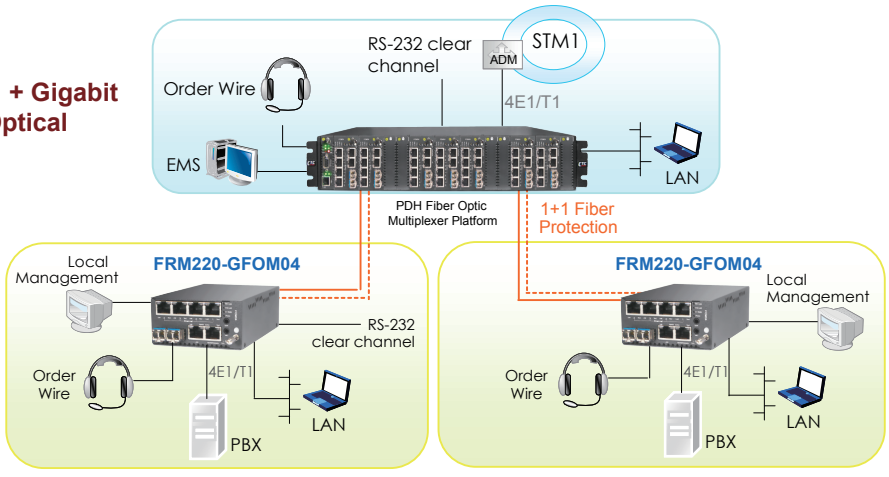
Specifications

E1/T1 ports	Framing	Unframed (transparent)
	Bit Rate	E1:2.048 Mb/s , T1: 1.544Mb/s
	Line Code	E1:AMI/HDB3, T1: AMI/B8ZS
	Line Impedance	E1: Unbalanced 75 ohms (BNC)
		E1: Balanced 120 ohms (RJ-45)
		T1: Balanced 100 ohms (RJ-45)
	Receiver sensitivity	Short haul
	"Pulse" Amplitude	Nominal 2.37V+/-10% for 75 ohms
		Nominal 3.00V+/-10% for 120 ohms
	"Zero" Amplitude	+/-0.3V
	Internal Timing	+/-30 ppm
	Jitter Performance	According to ITU-T G.823
	Performance monitoring	According to ITU-T G.821
	Standards	ITU-T G.703, G.704, G.706 and G.732
	Interface Connectors	RJ-45

E1/T1 ports	Test Loops	LLB (Local Loop Back)
		NELB (Near End Loop Back)
		RLB (Remote Loop Back)
		RRLB (Request Remote Loop Back)
Fiber	Connector	SFP LC
	Data Rate	1.25 Gbps
Ethernet	Interface Type	10/100/1000Base-T
	Connector	RJ-45
	Standards	IEEE 802.3, 802.3u, 802.3ab
	Duplex modes	full/half
Indications	FX1 Link, FX2 link, E1/T1 Mode/Link/Loopback test, Order wire phone indicator, LAN Link/Speed.	
Power Input	12VDC	
Dimensions	140 x 88 x 42mm (D x W x H)	
Weight	200g	
Temperature	0 ~ 50°C (Operating), -10 ~ 70°C (Storage)	
Humidity	10 ~ 90% RH (non-condensing)	
Certifications	CE, FCC, RoHS compliant	

Application

Managed 4E1/T1 + Gigabit Ethernet Fiber Optical Multiplexer



Ordering Information

Model Name	Description
FRM220-GFOM04-SR	4 x E1/T1 RJ-45 and 10/100/1000Base-T Ethernet Fiber Optic Multiplexer (optional SFP module)
FRM220-GFOM04-SB	4x E1 BNC and 10/100/1000Base-T Ethernet Fiber Optic Multiplexer (optional SFP module)

Connector Type

FRM220 – GFOM04 – □□

Example: FRM220 – GFOM04 – SR

Note: This card may be locally configured by its own console when placed in CH02.
When connected as a remote to a managed central chassis, this card supports in-band management and only needs a CH02 chassis.

FRM220-FOM04

4xE1/T1+ FE Fiber Multiplexer

The FRM220-FOM04 is a 4 channel E1/T1 fiber multiplexer with an additional wire speed 100M Ethernet trunk, plus order wire and clear channel RS-232, constructed as a two slot wide card for the FRM220 series. When the FRM220-FOM04 card is placed in the FRM220 rack with NMC, the management can view the converter card's status, type, version, fiber link status and alarms. The card can be configured to enable or disable the port, reset the port, and provide local or remote diagnostic loopback. The 1+1 redundant optical aggregate of this multiplexer employs industry standard pluggable optics (SFP) operating at OC3/STM-1 data rates (155M). The SFP modules can be chosen to support single-mode, multi-mode, single fiber bi-directional or Coarse and Dense Wave Division Multiplexing (CWDM and DWDM).

Features

- 4 channels unframed E1/T1 (transparent)
- 10/100Base-TX Ethernet (100M wirespeed)
- Auto MDI/MDIX & Auto-Negotiation or Force Mode
- Supports flow control 802.3x & 9K jumbo packets
- Supports link fault Pass-Through for Ethernet
- One clear channel RS232 up to 250Kbps(Async)
- 1+1 fiber protection, less than 50ms
- Supports Digital Diagnostics Monitoring Interface (DDMI) SFP
- AIS on signal loss on E1/T1 and fiber port
- Loopback test on E1/T1, RS232, fiber ports
- Supports local or remote In-band management (Monitor or Configure status) by SNMP manager and console port
- Supports Order wire Ear / Microphone port
- Supports On-Line F/W upgrade & Dying Gasp

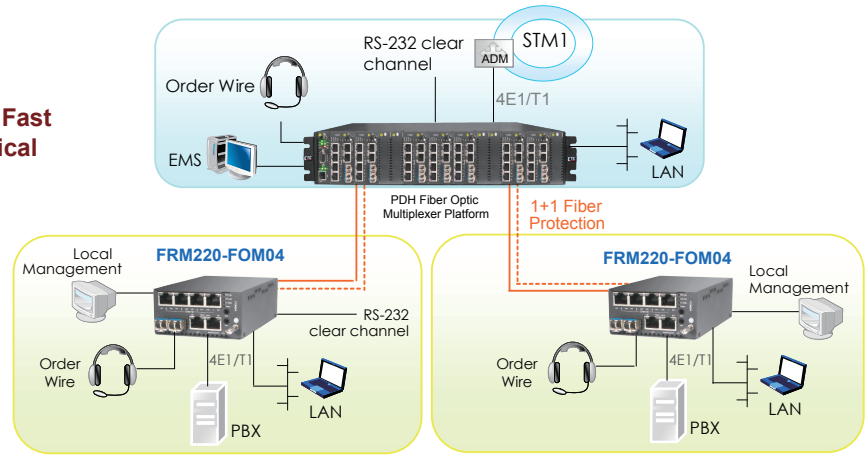
Specifications

E1/T1 ports	Framing	Unframed (transparent)
	Bit Rate	E1:2.048 Mb/s , T1: 1.544Mb/s
	Line Code	E1:AMI/HDB3, T1: AMI/B8ZS
	Line Impedance	E1: Unbalanced 75 ohms (BNC cable)
		E1: Balanced 120 ohms (RJ-45)
		T1: Balanced 100 ohms (RJ-45)
	Receiver sensitivity	Short haul
	"Pulse" Amplitude	Nominal 2.37V+/-10% for 75 ohms
		Nominal 3.00V+/-10% for 120 ohms
	"Zero" Amplitude	+/-0.3V
	Internal Timing	+/-30 ppm
	Jitter Performance	According to ITU-T G.823
	Performance monitoring	According to ITU-T G.821
	Standards	ITU-T G.703, G.704, G.706 and G.732
	Interface Connectors	RJ-45

E1/T1 ports	Test Loops	LLB (Local Loop Back)
		NELB (Near End Loop Back)
		RLB (Remote Loop Back)
		RRLB (Request Remote Loop Back)
Fiber	Connector	SFP LC
	Data Rate	155 Mbps
Ethernet	Interface Type	10/100Base-TX
	Connector	RJ-45
	Standards	IEEE 802.3, 802.3u
	Duplex modes	full/half
Indications	FX1 Link, FX2 link, E1/T1 Mode/Link/Loopback test, Order wire phone indicator, LAN Link/Speed.	
Power Input	12VDC	
Dimensions	140 x 88 x 42mm (D x W x H)	
Weight	200g	
Temperature	0 ~ 50°C (Operating), -10 ~ 70°C (Storage)	
Humidity	10 ~ 90% RH (non-condensing)	
Certifications	CE, FCC, RoHS compliant	

Application

Managed 4E1/T1 + Fast Ethernet Fiber Optical Multiplexer



Ordering Information

Model Name	Description
FRM220-FOM04-SR	4 x E1/T1 RJ-45 and 100Mbps Ethernet Fiber Optic Multiplexer(optional SFP module)
FRM220-FOM04-SB	4x E1 BNC and 100Mbps Ethernet Fiber Optic Multiplexer(optional SFP module)

FRM220 – FOM04 – □□
Example: FRM220 – FOM04 – SR

Note: This card may be locally configured by its own console when placed in CH02.
When connected as a remote to a managed central chassis, this card supports in-band management and only needs a CH02 chassis.

FRM220-FOM01

E1/T1 + FE Fiber Multiplexer

The FRM220-FOM01 is a single channel E1/T1 fiber multiplexer with an additional wire speed 100M Ethernet trunk, plus clear channel RS-232, for placement the FRM220 series. When the FRM220-FOM01 card is placed in the FRM220 rack with NMC, the management can view the converter card's status, type, version, fiber link status and alarms. The card can be configured to enable or disable the port, reset the port, and provide local or remote diagnostic loopback. The optical aggregate of this multiplexer employs either a fixed transceiver or industry standard pluggable optics (SFP) operating at OC3/STM-1 data rates (155M). The SFP modules can be chosen to support single-mode, multi-mode, single fiber bi-directional or Coarse and Dense Wave Division Multiplexing (CWDM and DWDM).

Features

- 1 channel unframed E1/T1 (transparent)
- 10/100Base-TX Ethernet (100M wirespeed)
- Auto MDI/MDIX & Auto-Negotiation or Force Mode
- Supports flow control & 9K jumbo packets
- Supports link fault Pass-Through for Ethernet
- Supports Digital Diagnostics Monitoring Interface (DDMI) SFP
- Loopback test on E1/T1, fiber ports
- Supports local or remote In-band management by SNMP manager
- Local management by console port via FRM220-CH01M chassis
- Supports On-Line F/W upgrade & Dying Gasp

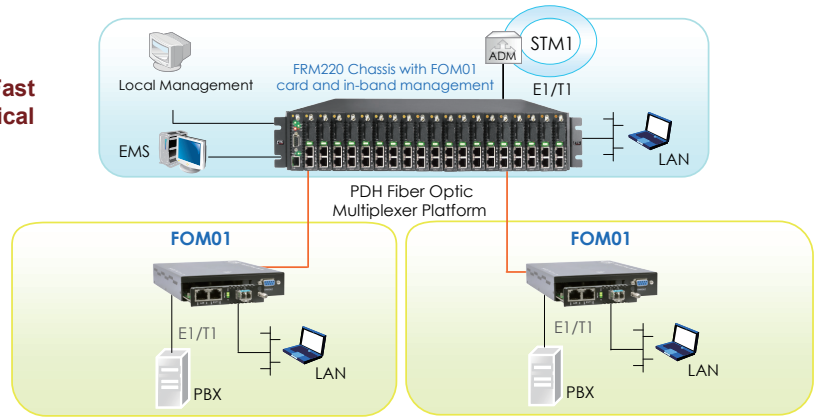
Specifications

E1/T1 ports	Framing	Unframed (transparent)
	Bit Rate	E1:2.048 Mb/s, T1: 1.544Mb/s
	Line Code	E1:AMI/HDB3, T1: AMI/B8ZS
	Line Impedance	E1: Unbalanced 75 ohms (BNC)
		E1: Balanced 120 ohms (RJ-45)
		T1: Balanced 100 ohms (RJ-45)
	Receiver sensitivity	Short haul
	"Pulse" Amplitude	Nominal 2.37V+/-10% for 75 ohms
		Nominal 3.00V+/-10% for 120 ohms
		+/-0.3V
	"Zero" Amplitude	w/external clock card option
	Internal Timing	+/-30 ppm
	Jitter Performance	According to ITU-T G.823
	Performance monitoring	According to ITU-T G.821
	Standards	ITU-T G.703, G.704, G.706 and G.732

E1/T1 ports	Interface Connectors	RJ-45
	Test Loops	LLB (Local Loop Back)
		RLB (Remote Loop Back)
Fiber	Connector	1x9 SC
	Data Rate	155 Mbps
Ethernet	Interface Type	10/100Base-TX
	Connector	RJ-45
	Standards	IEEE 802.3, 802.3u
	Duplex modes	full/half
Indications	Power FX Link, E1/T1 Mode/Link/Loopback test, LAN Link/Speed	
Power Input	12VDC	
Dimensions	140 x 88 x 23mm (D x W x H)	
Weight	130g	
Temperature	0 ~ 50°C (Operating), -10 ~ 70°C (Storage)	
Humidity	10 ~ 90% RH (non-condensing)	
Certifications	CE, FCC, RoHS compliant	

Application

Managed E1/T1 + Fast Ethernet Fiber Optical Multiplexer



Ordering Information

Model Name	Description
FRM220-FOM01-SR	E1/T1 RJ-45 and 100Mbps Ethernet Fiber Optic Multiplexer (optional SFP module)
FRM220-FOM01-SB	E1 BNC and 100Mbps Ethernet Fiber Optic Multiplexer (optional SFP module)

Connector Type	Connectivity Distance
SC, ST, FC	002: 2km 015: 15km 030: 30km 050: 50km 20A: WDM 20km A type 20B: WDM 20km B type 40A: WDM 40km A type 40B: WDM 40km B type

Connector Type / Connectivity Distance

FMC220 – FOM01 – □□ – □□□□□

Example: FMC220 – FOM01 – SR – SC002

Note: This card must use CH01M, with serial console, to configure standalone settings.
When connected as a remote to a managed central chassis, this card supports in-band management and only needs a CH01 chassis.

NEW

MSW-4424A
MSW-4424S

L2 Gigabit OAM Managed Fiber Access Switch

MSW-4424 layer 2 managed Gigabit Ethernet switches are positioned as a Carrier Ethernet access switch solution. They are equipped with 24 SFP based 100Base-FX/1000Base-X dual speed optical ports and 4 10GBase-X SFP+ or 1000Base-X SFP uplink ports. The MSW-4424 offers the best flexibility and scalability for operators and service providers to deploy their Metro Ethernet or FTTX networks. Aimed specifically at Metro Ethernet and FTTX deployment, the specifications of MSW-4424 fully meet the attributes of Carrier Ethernet proposed by the Metro Ethernet Forum. The switches comply with MEF 9 standard to support E-Line/E-LAN services and MEF 14 standard to enable the bandwidth profile configuration for delivering SLA (Service Level Agreement) with predictable end-to-end performance characteristics. MSW-4424A supports advanced service OAM management. MSW-4424S model supports timing synchronization features (Sync. E and IEEE1588v2) to enhance and migrate to a carrier grade network.

Common Key Features and Benefits

Front access and hot swappable design

All of the system modules are front accessible, the hot swappable power and FAN module are designed to keep high network availability without service interruption when components fail

Fully dual rate architecture of fiber link port

Dual speed fiber ports offer scalable physical connections for Metro Ethernet network operators

Fully Ethernet OAM enabled

Ethernet OAM features (IEEE 802.3ah/802.1ag/ITU-T Y.1731) help to rapidly detect and recover network faults and save OPEX for operators as well as increase customer satisfaction

Support Sync. Ethernet

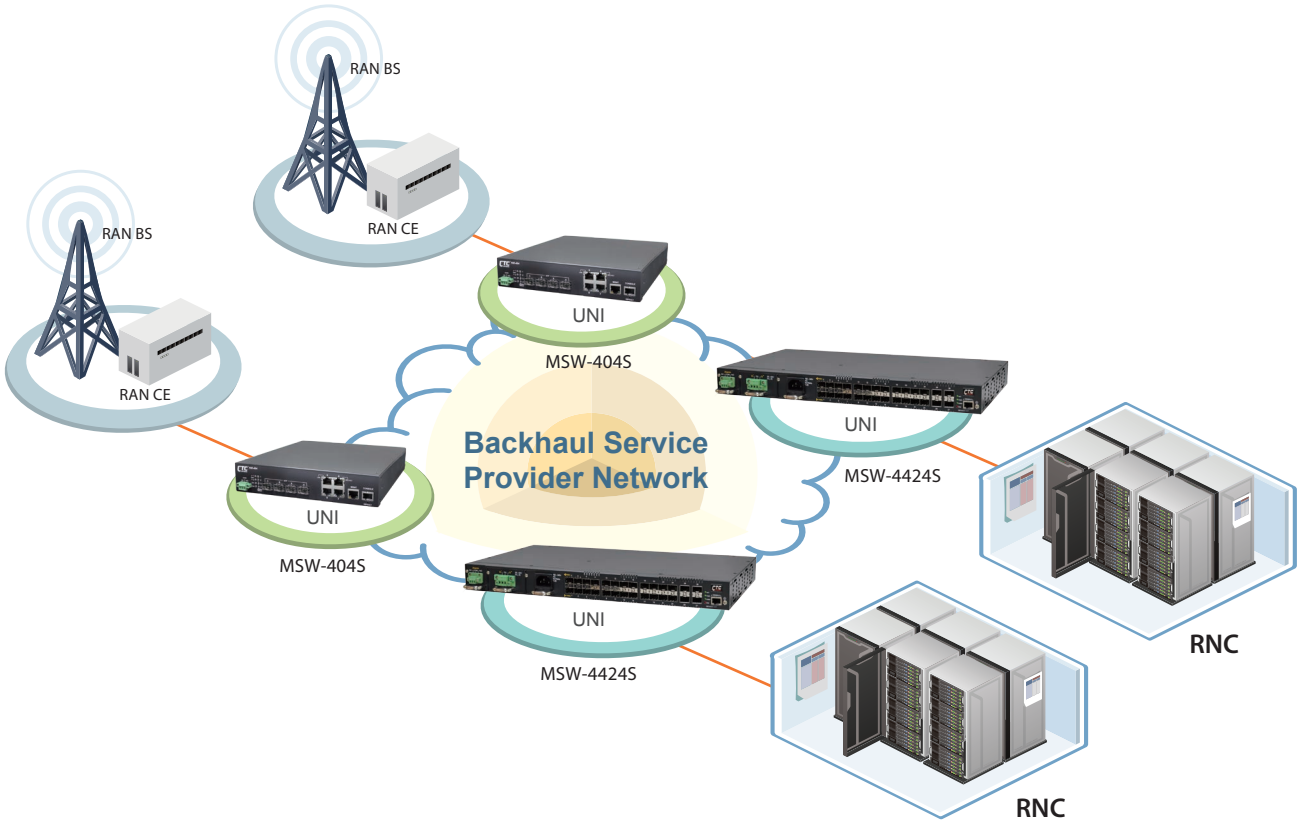
Advanced synchronization features for carrier Ethernet networks allow operators to deliver services with optimal stability and continuity in the end-to-end connectivity

Specifications

Interface	100/1000Mbps SFP slots *24 + 10Gbps SFP+ slots *4
Console Port	RJ-45 console port x 1
Filter & Forward Rate	10M (14880/14880pps); 100M (148800/148800pps)
	1000M (1488000/1488000pps)
Transmission Method	Store and Forward Switching
Standard	IEEE 802.3u, IEEE 802.3z, IEEE 802.3ae, IEEE 802.3x
	IEEE 802.1p, IEEE 802.1Q, IEEE 802.1ad, IEEE 802.1D
	IEEE 802.1w, IEEE 802.1s, IEEE 802.1x, IEEE 802.3ad
	IEEE 802.3ah, IEEE 802.1ag, ITU-T Y.1731
Packet Buffer	4M Bytes
Mac Table Size	8K
Max. Packet Size	10K Bytes
VLAN Feature	IEEE 802.1Q tagged VLAN, port based VLAN,
	MAC based VLAN, protocol based VLAN,
	private VLAN, IEEE 802.1ad Q-in-Q
QoS Feature	IEEE 802.1p 8 priority queues per port, CoS based on switch port; VLAN ID; DSCP; TCP/UDP port,
	IEEE 802.1p priority tag remarking, DSCP remarking, Port based ingress/egress rate limit
L2 switching Protection	STP, RSTP, MSTP, ITU-T G.8032 Ethernet ring protection
Trunking	IEEE 802.3ad LACP

Security	IEEE 802.1x port based access control
	MAC based access control authentication
	RADIUS authentication, limited MAC address learning
	IP/MAC binding, ACL rule based filtering, TACACS+
	IP source guard, DHCP snooping/relay option 82
	ARP inspection, IP source guard
IP Multicasting	IGMP throttling, IGMP filtering, IGMP fast leave
	IGMP snooping v1/v2/v3, MVR, MLD snooping v1/v2
Storm Control	Unicast/Broadcast/Multicast storm suppression
Management	Web/Telnet CLI/SNMP/console interface, Web/CLI
	authentication, SSH v2, HTTPs, port mirroring
	system syslog, IPv6 management, NTP, SNTP
SNMP agent	SNMP v1/v2c/v3
Software upgrade	TFTP / HTTP / HTTPs
Ethernet OAM	IEEE 802.3ah / IEEE 802.1ag / ITU-T Y.1731
Timing Options	Sync. Ethernet, IEEE 1588 V2
LED display	Power, System, Console, Link/Act, Speed
Power input	100V ~ 240VAC
	-60VDC (-48VDC Power)
	-9 ~ -32VDC (-24VDC Power)
Power Consumption	< 50W
Operating Temperature	0 ~ 50°C
Humidity	5% ~ 90% (non-condensing)
Dimensions	270.3 x 437.5 x 43.5 mm (D x W x H)
Certification	FCC, CE, RoHS compliant

Application



Mobile Backhaul Application

Ordering Information

Model Name	Description
MSW-4424A	24x100/1000Base-X (SFP) + 4 x 10GBase-X SFP+ L2 Gigabit OAM managed Fiber Access Switch
MSW-4424S	24x100/1000Base-X (SFP) + 4 x 10GBase-X SFP+ L2 Gigabit OAM managed Fiber Access Switch with Sync. E enabled

MSW – □□□□□
Example: MSW – 4424A

MSW-202 (Rev.14)

2-Port 10/100/1000Base-T + 2-Port 100/1000Base-X L2 OAM Managed Switch (EDD)

MSW-202 is a carrier class Ethernet Demarcation Device (EDD) with 2 x 10/100/1000Base-T Ethernet ports and 2 x 100/1000Base-X dual rate SFP fiber ports which enables EPL (Ethernet Private Line) & EVPL (Ethernet Virtual Private Line) services with advanced carrier Ethernet features per the Metro Ethernet Forum (MEF 9 and 14). By supporting link and service Ethernet OAM schemes, the MSW-202 also provides extensive fault detection and diagnostic capabilities to ensure that actual network use complies with pre-agreed service level agreements (SLAs).

Features

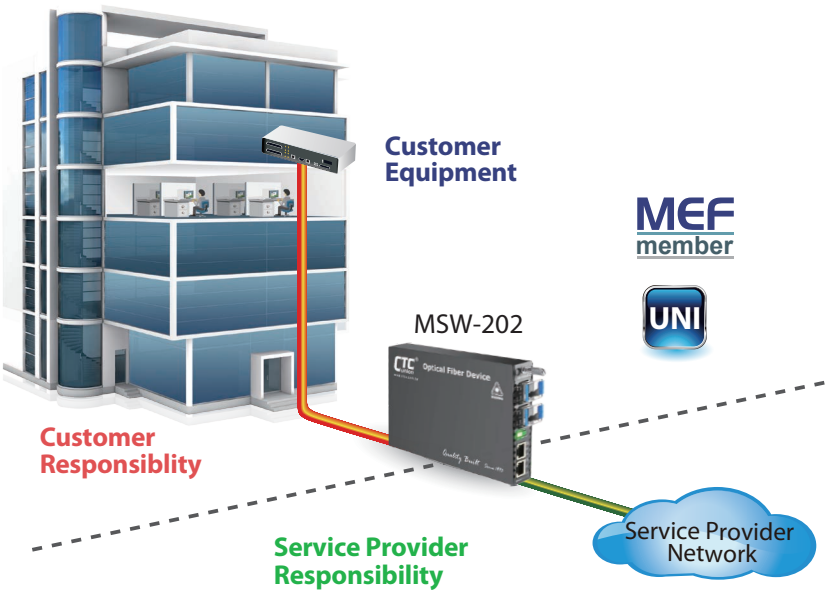
- Complies with MEF CE1.0
- Supports 8K MAC
- Spanning Tree 802.1D, 802.1s, 802.1w
- Supports 802.1Q / 256 active VLANs
- Double VLAN Tagging (C-tag/S-tag) (IEEE 802.1ad) support for ISP application
- Various QoS capability (MAC/port/802.1p/Diffserv)
- Port-based rate limiting
- DHCP Snooping
- IGMP Snooping
- IPv6 support
- IEEE 802.3x and IEEE 802.1x support
- Jumbo frame for up to 9.6K
- Extensive Ethernet OAM support
- IEEE 802.3ah, IEEE 802.1ag, ITU-T Y.1731
- SNMP v1/v2c/v3, Telnet, Web GUI
- IEEE 1588 V2 aware

Specifications

Optical Interface	**Dual-speed (100M and 1000M)** 2 WAN ports SFP based
	Fiber optic: SFP based Fast Ethernet (100BaseFX, 100BaseLX10, 100BaseBX10) Gigabit Ethernet (1000Base-SX, 1000BaseLX10, 1000BaseBX10)
LAN Interface	2 LAN ports
	Copper based : 10/100/1000Base-T RJ-45
	Supports manual 10, 100,1000Base-T, Full, Half duplex, or n-way (Auto-Negotiation) each channel

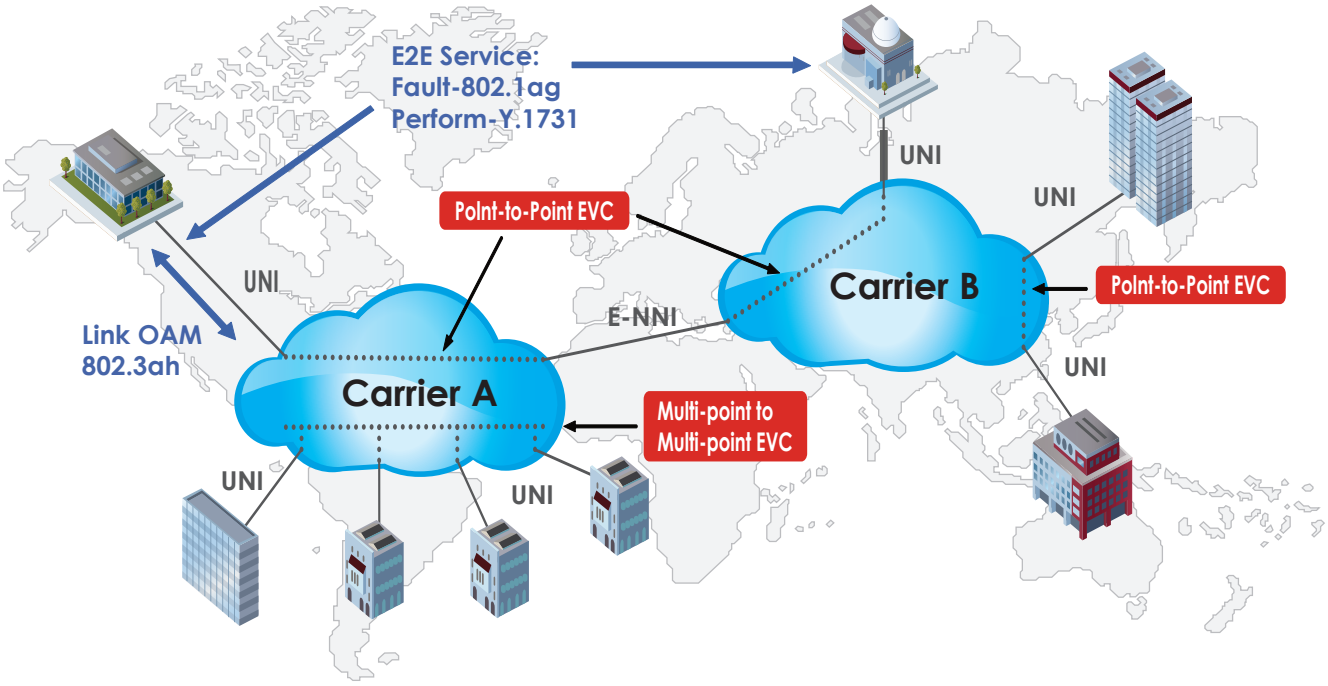
Standard	IEEE 802.3 10Base-T, IEEE 802.3u 100Base-TX,100Base-FX, IEEE 802.3z 1000Base-X, IEEE802.3ab 1000Base-T
LEDs	Power, FX-1 Link, FX-2 Link,Test, UTP-1 Link, UTP-1 100/1000, UTP-2 Link, UTP-2 100/1000
Temperature	0 ~ 50°C (Operating); -10 ~ 70°C (Storage)
Humidity	20 - 80% non-condensing (Operating); 10-90% (Storage)
Power Consumption	< 12W

Application



Application

- Ethernet in the First Mile (EFM)
- Fiber to the Premise (FTTP), E-Line and E-LAN
- Enterprise markets



First mile Ethernet fiber access

The EDD Series, at customer premises, allows operators to reach customers over fiber, while still selling a standard Ethernet copper connection. Being part of the operator's network allows the converter to act as a demarcation point between the operator and the customer.

Fully Ethernet OAM enabled

Ethernet OAM features (IEEE 802.3ah/802.1ag/ITU-T Y.1731) allow rapid detection and recovery of network faults and saves OPEX for operators as well as increasing customer satisfaction.

MEF CE2.0 standards compliant solution

MEF 9/14/21 compliant product guarantees compatibility with other MEF certified equipment and reduces the risk and cost for Metro Ethernet network deployment by operators.

Ordering Information

Model Name	Description
MSW-202	2-Port 10/100/1000Base-T + 2-Port 100/1000Base-X OAM Managed Switch

NEW

MSW-404
MSW-404S

4x SFP Slots in Dual Rate 100/1000Base-X and 4 Ports 10/100/1000Base-T RJ45 OAM Managed Ethernet Switch (EDD)

The CTC Union's MSW-404 series is the new generation of carrier grade Ethernet demarcation device for business connection and mobile backhaul transportation service delivered by carriers. The MSW-404 series is equipped 4 SFP slots in dual rate 100/1000Base-X and 4 ports 10/100/1000Base-T RJ45 network interfaces. It is designed to enable E-Line, E-LAN, E-Tree and E-Access services which are CE (Carrier Ethernet) 2.0 compliant for Metro Ethernet network deployments.

The MSW-404 series device enables carriers and service providers to delivered SLA-based network service with extensive fault detection and diagnostic capabilities which are compliant with the latest Ethernet OAM standards such as IEEE 802.3ah, IEEE 802.1ag and ITU-T Y.1731. With optionally built-in RFC2544 feature sets, The MSW-404 series also enables the service providers to perform the SLA verification anytime to ensure the quantitative latency, jitter and throughput delivery performance indexes. The CE2.0 compliant functions support EVCs and hierarchical QoS traffic management to enable service providers managing bandwidth and enforce SLA guaranteed.

MEF 22.1 defines the standard how Metro Ethernet service is adopted into the traffic transportation in the mobile backhaul application. The mobile service is time sensitive and required accurately packet delivery over a clocking synchronized network to transmit packetized data from a mobile device among base stations without loss. The MSW-404 series supports Synchronized Ethernet to fulfill the IP converged services (data, voice, video) over synchronous Ethernet aware carrier Ethernet network.

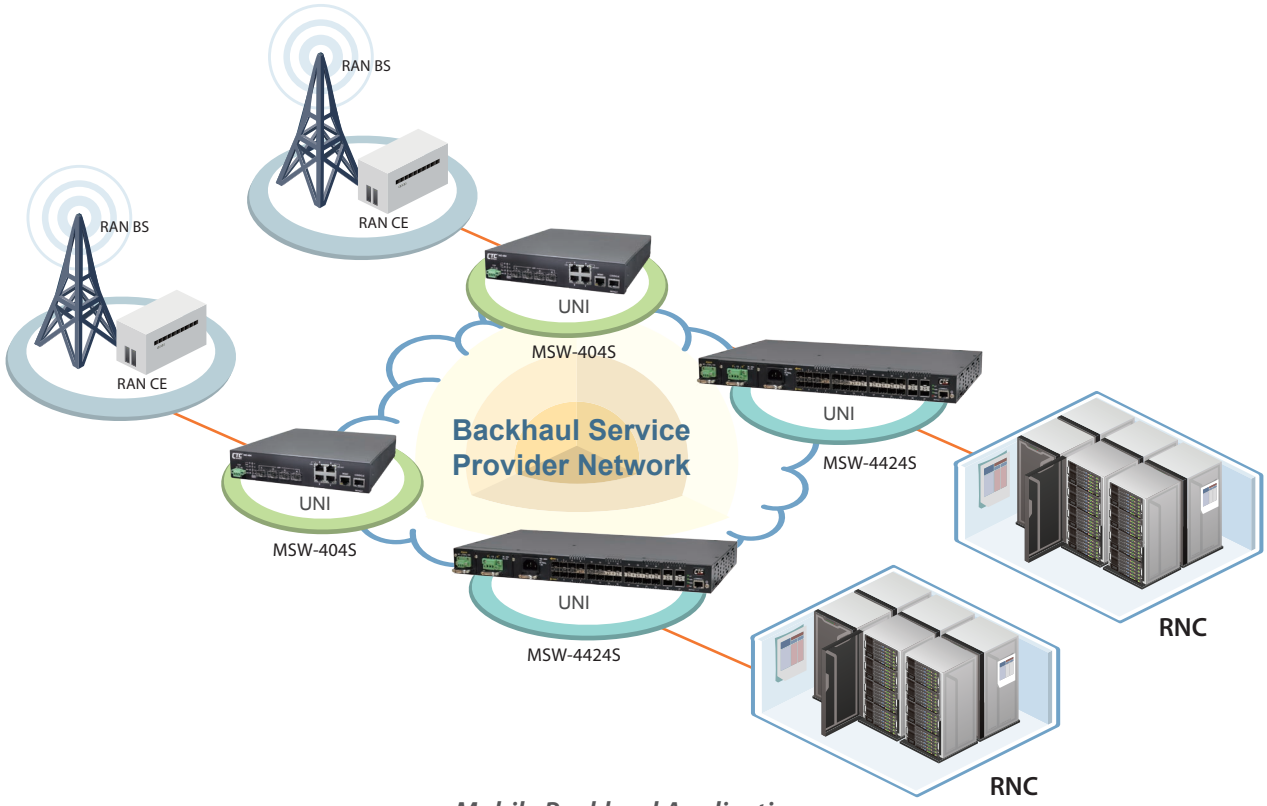
Features & Benefits

- The next generation of Ethernet demarcation device, at customer premise, fulfilling the large-scale carrier Ethernet deployment for intelligent business connection and mobile backhaul services complied to CE 2.0 standard.
- MEF 9/14/21 standards compliant product guarantees the fully interoperability with other MEF certified equipment and reduces the risks and cost of Carrier Ethernet network deployment for operators and service providers.
- Advanced clock synchronized features for carrier Ethernet network allows operators to deliver time sensitive services with optimal stability and continuity in the end-to-end connectivity.

Specifications

Interface	100/1000Mbps SFP slots * 4 + 10/100/1000Base-T RJ45 * 4
Console Port	DB-9 RS-232 console port * 1
Filter & Forward Rate	10M (14880/14880pps); 100M (148800/148800pps); 1000M (1488000/1488000pps)
Transmission Method	Store and Forward Switching
Standard	IEEE 802.3u, IEEE 802.3z, IEEE 802.3ae, IEEE 802.3x, IEEE 802.1p, IEEE 802.1Q, IEEE 802.1ad, IEEE 802.1D, IEEE 802.1w, IEEE 802.1s, IEEE 802.1x, IEEE 802.3ad
Packet Buffer	512K Bytes
MAC Table Size	8K
Max. Packet Size	9.6K Bytes
VLAN Feature	IEEE 802.1Q tagged VLAN, port based VLAN, MAC based VLAN, protocol based VLAN, private VLAN, IEEE 802.1ad Q-in-Q
QoS Feature	IEEE 802.1p 8 priority queues per port, CoS based on switch port; VLAN ID; DSCP; TCP/UDP port, IEEE 802.1p priority tag remarking, DSCP remarking, Port based ingress/egress rate limit
L2 switching protection	STP, RSTP, MSTP, ITU-T G.8031/G.8032 Ethernet ring protection
Trunking	IEEE 802.3ad LACP
Security	IEEE 802.1x port based access control, MAC based access control authentication, RADIUS authentication, limited MAC address learning, IP/MAC binding, ACL rule based filtering, TACACS+, IP source guard, DHCP snooping/relay option 82, ARP inspection, IP source guard
IP Multicasting	IGMP throttling, IGMP filtering, IGMP fast leave, IGMP snooping v1/v2/v3, MVR, MLD snooping v1/v2
Storm Control	Unicast/Broadcast/Multicast storm suppression
Management	Web/Telnet CLI/SNMP/console interface, Web/CLI authentication, SSH v2, HTTPs, port mirroring, system syslog, IPv6 management, NTP, SNTP
SNMP Agent	SNMP v1/v2c/v3
Software Upgrade	TFTP/HTTP/HTTPs
Ethernet OAM	IEEE 802.3ah, IEEE 802.1ag, ITU-T Y.1731, RFC2544
Timing Options	ITU-T G.8262 Synchronous Ethernet, IEEE 1588v2
LED Display	Power, System, Console, Link, Speed/Act
Power Input	100V ~ 240VAC, -36 ~ -60VDC
Power Consumption	< 20W
Operating Temperature	0 ~ 50°C
Humidity	5% ~ 90% (non-condensing)
Dimensions	250 x 218 x 44 mm (D x W x H)
Regulatory	FCC, CE, RoHS compliant

Application



Mobile Backhaul Application

- *Carrier Ethernet with multiple class of service*
- *Traffic Synchronization*
- *Precisely delivery of time-sensitive service*

Ordering Information

Model Name	Description
MSW-404	4 x SFP Slots in Dual Rate 100/1000Base-X and 4 Ports 10/100/1000Base-T RJ45 OAM Managed Ethernet Switch
MSW-404S	4 x SFP Slots in Dual Rate 100/1000Base-X and 4 Ports 10/100/1000Base-T RJ45 OAM Managed Ethernet Switch with Sync. E enabled

MSW – 404 □
Example: MSW – 404S

NEW

GSW-3420FM

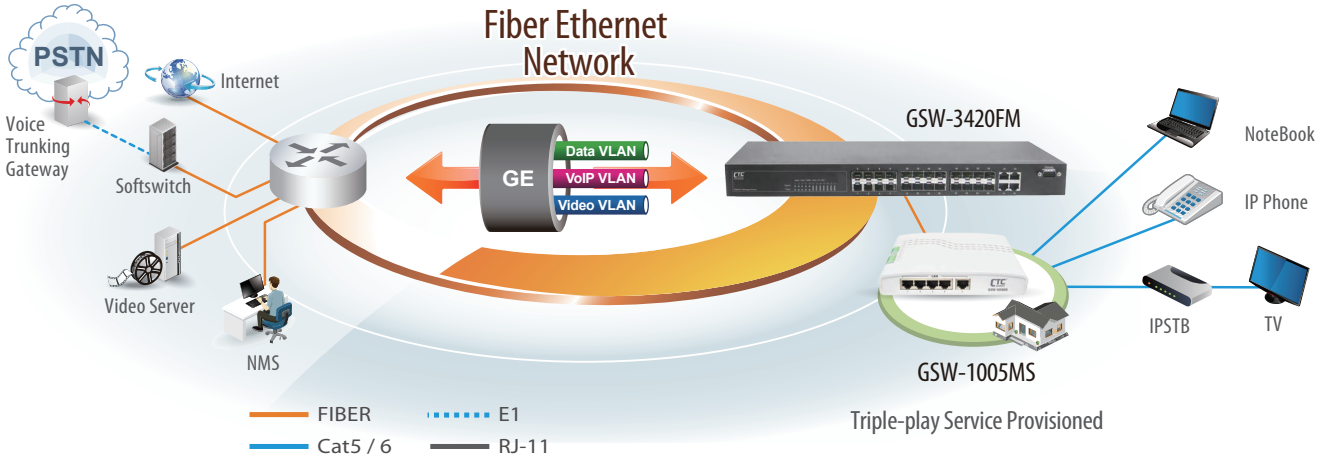
20 * 100/1000Base-X SFP slots + 4 * GbE combo ports (10/100/1000Base-T or 1000Base-X) L2 managed Ethernet Switch

GSW-3420FM is an SNMP manageable Gigabit Ethernet switch for FTTx deployment or Gigabit Ethernet fiber aggregation that equipped 20 dual rate 100/1000Base-X SFP ports and 4 Gigabit Ethernet combo (10/100/1000Base-T or 1000Base-X) ports. With advanced layer 2 and QoS features, this switch is targeted at multi-service operators (MSO) with a desire to deploy provisioned triple play services via active Ethernet FTTx network infrastructures. Fiber based network infrastructures offer the data rates required by triple play services such as high speed internet access, VoIP and HD IPTV. The GSW-3420FM Ethernet access switch provides VLAN, QoS and IGMP L2 feature sets as well as robust security management to facilitate service provider's build up of a manageable and secure FTTx access network.

Features

- 20 * SFP ports, support 100Base-FX or 1000Base-X
- 4* RJ45/SFP(100/1G) ports, auto-detect RJ45/SFP connection
- IPv6 management
- 8 priority queues are supported on each port for QoS application
- Port-based VLAN, 802.1Q VLAN, Voice VLAN and Q-in-Q(double tagging) function
- Protected Port and LoopBack Detection function
- IEEE 802.1x security function, and VLAN assignment, Guest VLAN functions
- Static Mac address access limit and Dynamic Mac address number on port
- IEEE802.1d & 802.1w & 802.1s
- IP Multicast with IGMP snooping / query / fast leave / filtering / group limited /MVR
- DHCP Client / DHCP Option 82 Relay / DHCP Snooping function
- ACL function for L2 ~ L4 packet control, Ingress/Egress rate control on port
- Broadcast/Multicast/Unicast storm control
- ARP inspection / IP source guard
- RMON 1,2,3,9
- SFP Transceiver DDMI function
- Remote port configuration setting and statistics monitoring
- Text configuration download and upload
- IEEE 802.3az power management / Green Ethernet

Application



Specifications

System

100/1G SFP Port	20
UTP/SFP Combo Port	4
CPU	416MHz MIPS 24KEc CPU as the main processor which integrated on switch controller
Memory	Flash : SPI 16MB / RAM:DDRII 128MB
Packet buffer	2M Bytes
MAC Table size	16K
Max Packet Size	9600 Bytes
Switching capability	14880pps at 10Mbps, 148810pps at 100Mbps, 1488095pps at 1Gbps with 64bytes packets
Switch capacity	48Gbps
Forwarding Rate	35.7Mpps
FAN Design	Yes
Console port	D-Sub 9
19" Rack-Mount	Yes, with kits
SFP DDMI	Yes
Dimension	172 x 440 x 44 mm (D x W x H)
Environmental Temperature	Operating : 0 ~ 50°C Storage : -25 ~ 70°C
Humidity	10% ~ 90% (non-condensing)
LED Display	Per Port : Link/Act (Green: Gigabit, Yellow:10/100M) Per Device : Power and System
Power Consumption	<30W Max.
Power Input	AC Power input (100V~240V)

LED	Status	Condition
Power	Lights(Green)	System is receiving power
System	Lights(Green)	System is ready
Link / Act	Lights	Link is ready
		1000Mbps : Green
		100Mbps : Amber
	Flashing	Data packets being received or sent

Software

Port Control	Port speed, duplex mode, and flow control Port Auto MDI/MDI-X Port frame size (jumbo frames), Maximum ingress frame size (10056 bytes) Port state (administrative status) Port status (link monitoring) Port statistics (MIB counters) Port VeriPHY (cable diagnostics)
L2 Switching	Auto MAC address learning/aging and MAC addresses (static) IEEE 802.1Q static VLAN(4096 entries Max.), Voice VLAN Port isolation, Private VLAN, static, MAC based VAN prtcol based VAN IP subnet based VLAN IEEE 802.1D STP/802.1w RSTP/802.1s MSTP IEEE 802.3ad Link Aggregation, static and LACP BPDU guard and restricted role, Error Disable Recovery DHCP client, DHCP snooping, DHCP option 82 relay ARP inspection(256 entries Max.) Port mirroring
Layer 2 Multicast	IGMP snooping v1,v2, v3 snooping, (1024 groups) IGMP snooping Fast and Immediate leave IGMP throttling, filtering, and leave proxy MVR and MVR profile IPv6 MLD VI snooping
QoS	8 Priority Queues per Port Port Based priority Scheduler priority QoS Control List(256 entries Max.) Storm control for UC, MC, and BC Policing and shaping per port and per queue Ingress Policing : Egress Shaping : DiffServ (RF 2474) remarking Tag remarking
Security	Port-based 802.1X, Single 802.1X, Multiple 802.1X MAC-based authentication, VLAN assignment, QoS assignment, Guest VLAN RADIUS accounting MAC address limit TACACS+ Web and CLI authentication and authorization Authorization ACLs for filtering, policing, and port copy IP source guard
Synchronization	NTPv4 Client
SFP DDMI	Yes
Management	HTTP server CLI console port Telnet Management access filtering SSHv2 and HTTPS IPv6 Management System Syslog Software upload through Web and TFTP SNMPv1/v2c/v3 Agent RMON Group 1, 2, 3, and 9 IEEE 802.1AB-2005 Link Layer Discovery, LLDP Text Configuration download or upload sFlow Daylight Saving

Ordering Information

Model Name	*Description*
GSW-3420FM-AC, AD	20 * 100/1000Base-X SFP slots + 4 * GbE combo ports L2 Switch with AC or AD (AC+DC) Power

Power Type

GSW – 3420FM – □□

Example: GSW – 3420FM – AD

GSW-1005MS

5-Port 10/100/1000Base-T to 1-Port 100/1000Base-X Managed GbE Switch with Cable Tray Optional

GSW-1005MS is a managed Gigabit Ethernet CPE switch designed 5-Ports 10/100/1000Base-T RJ45 and 1 port 100/1000Base-X SFP based fiber optics. The traditional transmission distance of Gigabit Ethernet over RJ45 copper can be extended up to 100km over a fiber optics interface. GSW-1005MS has a optional cable tray that allows the installer to enclose the excessive fiber within the unit, thus providing protection for the sensitive fiber at subscriber side. LEDs provide visual monitoring of Ethernet connected devices such as Ethernet home gateways, wireless access points or PC/laptop via 10/100/1000Base-T twisted pair RJ45 ports on GSW-1005MS. When GSW-1005MS is deployed as a stand-alone solution, it incorporates an easy to use Web user interface for operation, administration and maintenance both locally and remotely. All of the enabled Layer 2 features and functions of GSW-1005MS can be configured and monitored via web, CLI and SNMP management interfaces. GSW- 1005MS is particularly suitable for deploying and provisioning active Ethernet FTTX service of multi-service operators (MSO).

Features

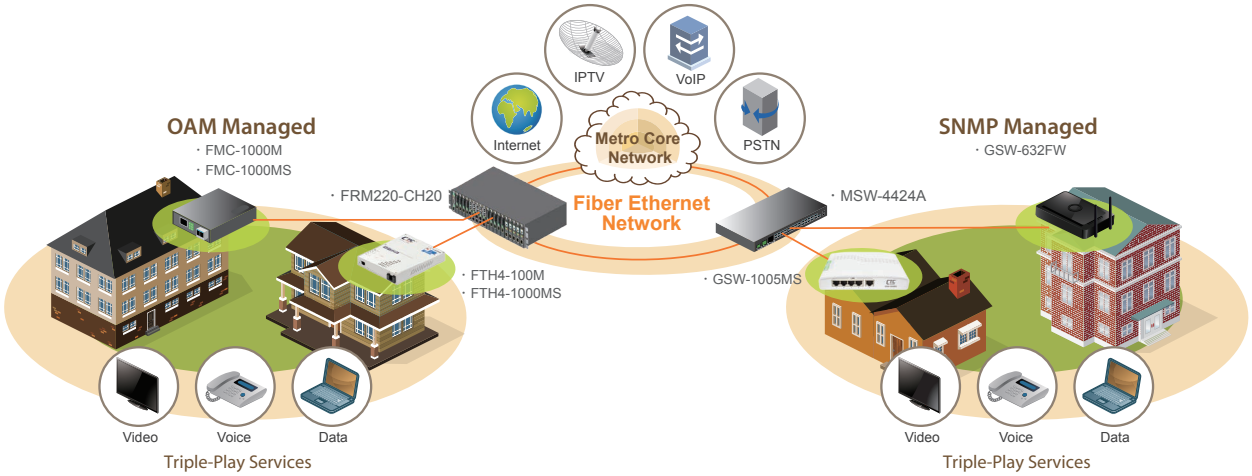
- 5-Port 10/100/1000Base-T + 100/1000Base-X SFP uplink
- Supports 9.6K Bytes jumbo frame
- Supports IEEE 802.1Q tagged VLAN & Q-in-Q VLAN stacking
- Supports IEEE 802.1p priority queue
- Supports IGMP snooping v1/v2/v3
- Supports DHCP auto provisioning
- Fiber cable tray(optional)

Specifications

Interface	10/100/1000Base-T * 5 + 100/1000Base-X SFP uplink * 1
HW Capability	Non-blocking wire speed switching performance 9.6K bytes jumbo frame forwarding 8K MAC address table
VLAN Feature	IEEE 802.1Q tagged VLAN, IEEE 802.1ad Q-in-Q
QoS Feature	IEEE 802.1p 8 priority queues per port
Bandwidth Control	Per port based egress/ingress rate limit control
IP Multicasting	IGMP snooping v1/v2/v3
Storm Control	Unicast/Broadcast/Multicast storm suppression

Management	Web/Telnet/SNMP management interface DHCP auto provisioning TFTP/HTTP firmware upgrade
SNMP agent	SNMP v1/v2c/v3
Optical interface	SFP LC connector
Power input	AC Power Adapter
Operating temperature	0 ~ 50°C
Humidity	5% ~ 90% (non-condensing)
Dimensions	120 x 170 x 35 mm (D x W x H)
Regulatory	FCC, CE, RoHS compliant

Application



QoS with Four Priority Queues

The QoS (Quality Of Service) function provides eight priority queues to support different classifications of traffic. High priority packet streams experience less delay inside the GSW-1005MS , which supports lower latency for certain delay-sensitive traffic. The GSW-1005MS can classify the packet as one of the eight priorities according to VIP port.

Remote Firmware Upgrade

The remote firmware upgrade feature enables the switch to be updated remotely via firmware upgrade including the products that were already installed in the field. This feature eliminates the need for the users to ship the product back to the supplier.

Bandwidth Control

The Bandwidth Control function allows users to set the bandwidth of GSW-1005MS switch for both ingress and egress rate and can be allocated a variety of rates up to full bandwidth capability of the devices (100Kbps ~ 1000Mbps).

Broadband Services

The GSW-1005MS product philosophy allows the end user to follow and benefit fully from the fast developments in Fiber to the home-networking solutions. The CPE is the interface between the digital broadband network and the user peripheral equipment, such as routers, wireless access points, servers, and printers. With generations of computers and home networking equipment coming and going the GSW-1005MS will be a constant and reliable factor for the delivery of broadband data services.

These services are not limited to today's broadband internet applications. In the next few years, end-users will also benefit from next generation health-care, security, communication and infotainment services. The GSW-1005MS CPE platform fully supports today's services and is ready for the next wave of new broadband services. Flexibility is key, since the CPE functionality must be matched to the requirements of those new services.

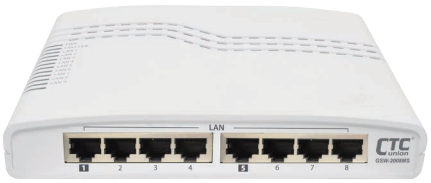
Quick Installation

The installation of the wall-mount unit of GSW-1005MS CPE is swift and straightforward. Because of its size and ideal dimensions, the GSW-1005MS CPE can be positioned easily at the user residence or home. The GSW-1005MS design allows easy access for mounting and does not need the small elements, making the installation process predictable and hassle-free. The wall-mount unit, including integrated fiber tray, not only makes fiber handling and termination easy and robust, but also eliminates the need for optical patch cords.

Ordering Information

Model Name	*Description*
GSW-1005MS	5-Port 10/100/1000Base-T to 100/1000Base-X managed Gigabit Ethernet Switch (cable tray optional)

NEW



GSW-2008MS

8-Port 10/100/1000Base-T to 2-Port100/1000Base-X Managed GbE Switch with Cable Tray Optional

The CTC Union GSW-2008MS is a managed Gigabit Ethernet CPE switch positioned as a layer 2 managed switch solution for high speed connectivity with popular traffic priority and management capabilities for small and medium businesses. It features 8-port 10/100/1000Base-T RJ45 and 2-100/1000Base-X SFP based fiber optics. The GSW-2008MS is designed with a high-performance switching architecture and offers wire-speed transportation capability for bandwidth-intensive applications of enterprises. More and more corporations are adapting new IT technologies over the network such as voice over IP, video conference to improve productivity and save operation expenditure. The GSW-2008MS also supports features such as VLAN, QoS, IGMP for multicast applications and network management to fulfill SMB requirements. The GSW2008 delivers a cost effective Gigabit Ethernet solution to meet the converged applications for enterprise customer's networks.

Features

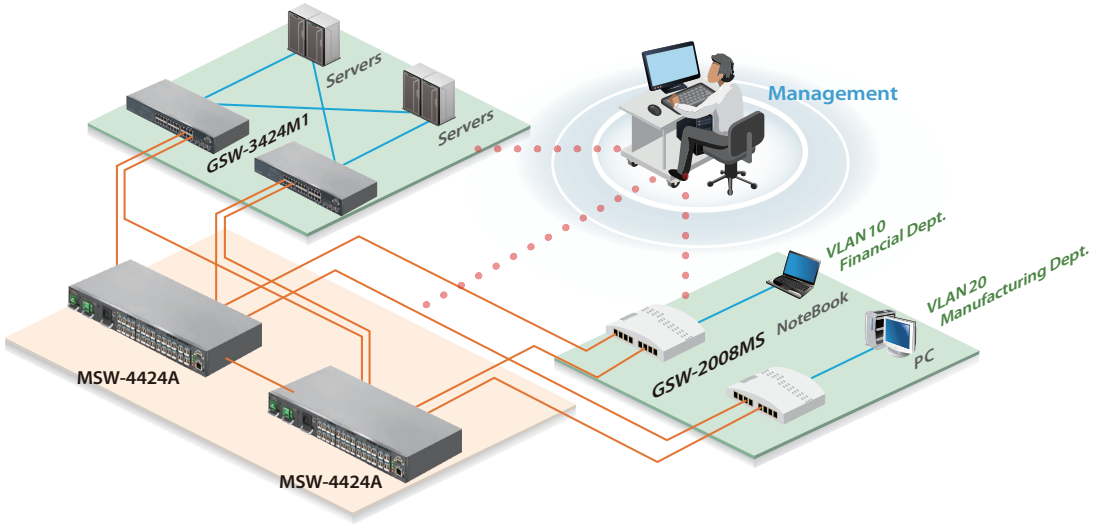
- 8-port 10/100/1000Base-T RJ45 + 2 uplink 100/1000Base-X SFP slot
- Supports 9K Bytes jumbo frame
- Supports IEEE 802.1Q tagged VLAN & Q-in-Q VLAN stacking
- Supports IEEE 802.1p priority queue
- Supports IGMP snooping v1/v2/v3
- Fiber Cable Tray (optional)

Specifications

Interface	8x 10/100/1000Base-T + 2x 100/1000Base-X SFP
HW capability	Non-blocking wire speed switching performance 9.6K bytes jumbo frame forwarding 8K MAC address table
VLAN Feature	IEEE 802.1Q tagged VLAN, IEEE 802.1ad Q-in-Q
QoS Feature	IEEE 802.1p 8 priority queues per port
Bandwidth Control	Per port based egress/ingress rate limit control
IP Multicasting	IGMP snooping v1/v2/v3
Storm Control	Unicast/Broadcast/Multicast storm suppression

Management	Web/Telnet/SNMP management interface TFTP/HTTP firmware upgrade
SNMP agent	SNMP v1/v2c/v3
Optical interface	SFP LC connector
Power input	AC Power Adapter
Operating Temperature	0 ~ 50°C
Humidity	5% ~ 90% (non-condensing)
Dimensions	170 × 120 × 35mm (D x W x H)
Certification	FCC, CE, RoHS compliant

Application



Ordering Information

Model Name	Description
GSW-2008MS	8-port 10/100/1000 Base-T to 2-port100/1000 Base-X Managed GbE Switch (cable tray optional)

FTH4-1000MS

Web Smart GbE OAM/IP Managed Converter with Cable Tray

The FTH4-1000MS is an IEEE802.3ah OAM compliant copper to fiber Gigabit Ethernet solution designed to make conversion between 10/100/1000Base-T and 100/1000Base-X with SFP based fiber optics. The FTH4-1000MS has a built-in cable tray that allows the installer to enclose the excessive fiber within the converter. When deployed as a stand-alone solution, this media converter incorporates an easy to use Web user interface for operation, administration and maintenance, both locally and remotely. By offering IEEE802.3ah OAM compliance, this converter can be linked to any IEEE802.3ah compliant fiber switch and support loop back and dying gasp functions. All functions of this converter and the remotely connected converter can be configured and monitored via Web management, including bandwidth control, duplex, speed and VLAN configuration.

Features

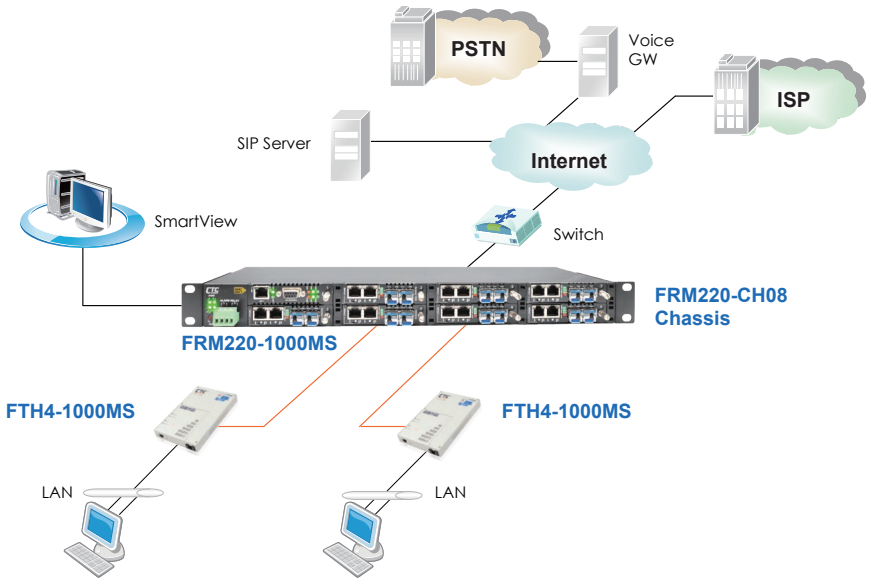
- 10/100/1000Base-T to 100/1000Base-X
- Forwarding 9k bytes Jumbo Packet
- Built-in fiber cable tray
- Ingress/Egress Bandwidth control
- Supports 802.3ah OAM/IP In-band management
- Firmware upgrade via Web
- Dying gasp (remote power failure detection)
- Supports Link Fault Pass-Through (LFPT) Function
- Supports Auto Laser Shutdown (ALS) Function
- Allow IP settings via Web management
- Supports On-Line F/W upgrade (local) by the Web manager
- Supports 16 Tag VLAN Group/ Q-in-Q
- RMON counters
- Auto-Cross over for MDI/MDIX in TP port
- Auto-Negotiation or Manual mode in TP port
- Supports flow control Enable or Disable

Specifications

Optical Interface	Connector	SFP LC
	Data rate	100/1000Mbps
	Duplex mode	Full duplex
	Fiber	MM 50/125μm, 62.5/125μm
		SM 9/125μm
	Distance	MM 2km, SM 15/30/50/80/120km
		WDM 20/40/60/80km
	Wavelength	MM 1310nm, SM 1310,1550nm
		WDM 1310Tx/1550Rx (type A)
		1550Tx/1310Rx (type B)
Standards	IEEE802.3, IEEE802.3u IEEE802.3ab, IEEE802.3z, IEEE802.3x	
Indications	LED (Power, FX-Link, LAN Speed, LAN Link)	
Power Consumption	< 4W	

Dimensions	220 x 140 x 27mm (D x W x H)	
Weight	0.72kg	
Electrical Interface	Connector	RJ-45
	Data rate	10Mbps, 100Mbps, 1000Mbps
	Duplex mode	Half / Full duplex
	Cable	10Base-T Cat.3, 4, 5, UTP,
		100Base-TX Cat.5, 5e or higher
Power	Adapter	Output Voltage:12VDC
Temperature	0 ~ 60°C (Operating), -10 ~ 70°C (Storage)	
Humidity	10 ~ 90% non-condensing	
Certification	CE, FCC, RoHS compliant	
MTBF	65,000 hrs	

Application



QoS with Four Priority Queues

The QoS (Quality Of Service) function provides four priority queues to support different classifications of traffic. High priority packet streams experience less delay inside the FTH4-1000MS , which supports lower latency for certain delay-sensitive traffic. The FTH4-1000MS can classify the packet as one of the four priorities according to VIP port.

Dying Gasp

The Dying Gasp features enables FTH4-1000MS media converter to send out a SNMP trap to alert the SNMP manager in the event of remote power failure.

Remote Firmware Upgrade

The remote firmware upgrade feature enables the media converter to be updated remotely via firmware upgrade including the products that were already installed in the field. This feature eliminates the need for the users to ship the product back to the supplier.

Bandwidth Control

The Bandwidth Control function allows users to set the bandwidth of FTH4-1000MS media converter for both ingress and egress rate and can be allocated a variety of rates up to full bandwidth capability of the devices (64Kbps ~ 1000Mbps).

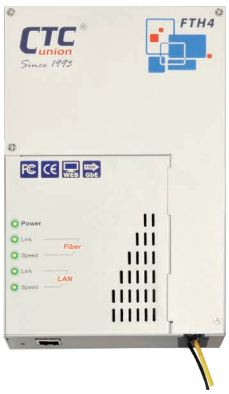
Broadband Services

The FTH4-1000MS product philosophy allows the end user to follow and benefit fully from the fast developments in Fiber to the home-networking solutions. The CPE is the interface between the digital broadband network and the user peripheral equipment, such as routers, wireless access points, servers, and printers. With generations of computers and home networking equipment coming and going the FTH4-1000MS will be a constant and reliable factor for the delivery of broadband data services.

These services are not limited to today's broadband internet applications. In the next few years, end-users will also benefit from next generation health-care, security, communication and infotainment services. The FTH4-1000MS CPE platform fully supports today's services and is ready for the next wave of new broadband services. Flexibility is key, since the CPE functionality must be matched to the requirements of those new services.

Quick Installation

The installation of the wall-mount unit of FTH4-1000MS CPE is swift and straightforward. Because of its size and ideal dimensions, the FTH4-1000MS CPE can be positioned easily at the user residence or home. The FTH4-1000MS design allows easy access for mounting and does not need the small elements, making the installation process predictable and hassle-free. The wall-mount unit, including integrated fiber tray, not only makes fiber handling and termination easy and robust, but also eliminates the need for optical patch cords.



Ordering Information

Model Name	*Description*
FTH4-1000MS	10/100/1000Base-T to 100/1000Base-X Web Smart OAM/IP managed media converter w/ cable tray

FTH4-100M

Web Smart FE OAM/IP Managed Converter with Cable Tray

The FTH4-100M is an IEEE802.3ah OAM compliant copper to fiber Fast Ethernet solution designed to make conversion between 10/100Base-TX and 100Base-FX fiber optics. The FTH4-100M has a built-in cable tray that allows the installer to enclose the excessive fiber within the converter. When deployed as a stand-alone solution, this media converter incorporates an easy to use Web user interface for operation, administration and maintenance, both locally and remotely. By offering IEEE802.3ah OAM compliance, this converter can be linked to any IEEE802.3ah compliant fiber switch and support loop back and dying gasp functions. All functions of this converter and the remotely connected converter can be configured and monitored via Web management, including bandwidth control, duplex, speed and VLAN configuration.

Features

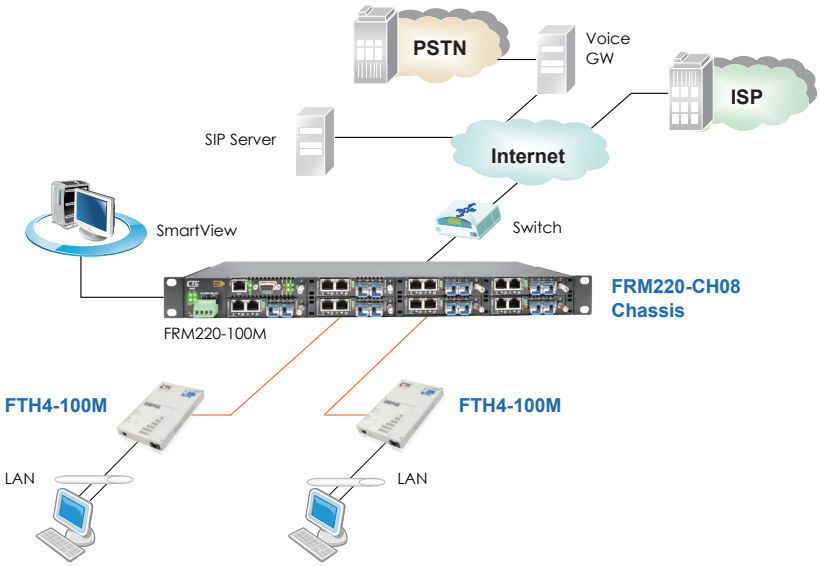
- 10/100Base-TX to 100Base-FX Converter
- Forwarding 9k bytes Jumbo Packet
- Built-in fiber cable tray
- Ingress / Egress Bandwidth control
- Support IEEE802.3ah-OAM/IP in-band management
- Firmware upgrade via Web
- Dying gasp (remote power failure detection)
- Supports Link Fault Pass-Through (LFPT) Function
- Supports Auto Laser Shutdown (ALS) Function
- Allow IP settings via Web management
- Supports On-Line F/W upgrade (local) by the Web manager
- Supports 16 Tag VLAN Group/ Q-in-Q
- RMON counters
- Auto-Cross over for MDI/MDIX in TP port
- Auto-Negotiation or Manual mode in TP port
- Supports flow control Enable or Disable

Specifications

Optical Interface	Connector	1x9 (SC, ST, FC) (Option)
	Data rate	100Mbps
	Duplex mode	Full duplex
	Fiber	MM 50/125μm, 62.5/125μm
		SM 9/125μm
	Distance	MM 2km, SM 15/30/50/80/120km
		WDM 20/40/60/80km
	Wavelength	MM 1310nm, SM 1310,1550nm
		WDM 1310Tx/1550Rx (type A)
		1550Tx/1310Rx (type B)
Standards	IEEE802.3, IEEE802.3u, IEEE802.3ah, IEEE802.3x	
Indications	LED (Power, FX-Link, LAN Speed, LAN Link)	
Power Consumption	< 4W	

Dimensions	220 x 140 x 27mm (D x W x H)	
Weight	0.72kg	
Electrical Interface	Connector	RJ-45
	Data rate	10Mbps, 100Mbps
	Duplex mode	Half / Full duplex
	Cable	10Base-T Cat.3, 4, 5, UTP,
		100Base-TX Cat.5, 5e or higher
Power	Adapter	Output Voltage: 12VDC
Temperature	0 ~ 60°C (Operating), -10 ~ 70°C (Storage)	
Humidity	10 ~ 90% non-condensing	
Certification	CE, FCC, RoHS compliant	
MTBF	65,000 hrs	

Application



QoS with Four Priority Queues

The QoS (Quality Of Service) function provides four priority queues to support different classifications of traffic. High priority packet streams experience less delay inside the FTH4-100M , which supports lower latency for certain delay-sensitive traffic. The FTH4-100M can classify the packet as one of the four priorities according to VIP port.

Dying Gasp

The Dying Gasp features enables FTH4-100M media converter to send out a SNMP trap to alert the SNMP manager in the event of remote power failure.

Remote Firmware Upgrade

The remote firmware upgrade feature enables the media converter to be updated remotely via firmware upgrade including the products that were already installed in the field. This feature eliminates the need for the users to ship the product back to the supplier.

Bandwidth Control

The Bandwidth Control function allows users to set the bandwidth of FTH4-100M media converter for both ingress and egress rate and can be allocated a variety of rates up to full bandwidth capability of the devices (64Kbps ~ 100Mbps).

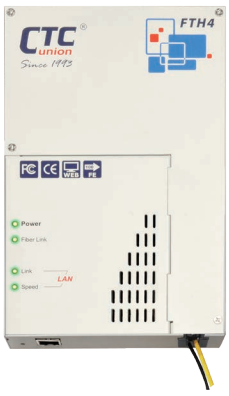
Broadband Services

The FTH4-100M product philosophy allows the end user to follow and benefit fully from the fast developments in Fiber to the home-networking solutions. The CPE is the interface between the digital broadband network and the user peripheral equipment, such as routers, wireless access points, servers, and printers. With generations of computers and home networking equipment coming and going the FTH4-100M will be a constant and reliable factor for the delivery of broadband data services.

These services are not limited to today's broadband internet applications. In the next few years, end-users will also benefit from next generation health-care, security, communication and infotainment services. The FTH4-100M CPE platform fully supports today's services and is ready for the next wave of new broadband services. Flexibility is key, since the CPE functionality must be matched to the requirements of those new services.

Quick Installation

The installation of the wall-mount unit of FTH4-100M CPE is swift and straightforward. Because of its size and ideal dimensions, the FTH4-100M CPE can be positioned easily at the user residence or home. The FTH4-100M design allows easy access for mounting and does not need the small elements, making the installation process predictable and hassle-free. The wall-mount unit, including integrated fiber tray not only makes fiber handling and termination easy and robust, but also eliminates the need for optical patch cords.



Ordering Information

Model Name	*Description*
FTH4-100M	10/100Base-TX to 100Base-FX Web Smart OAM/IP managed media converter w/ cable tray

NEW

GW-632FW

Gigabit Fiber IAD Residential Gateway

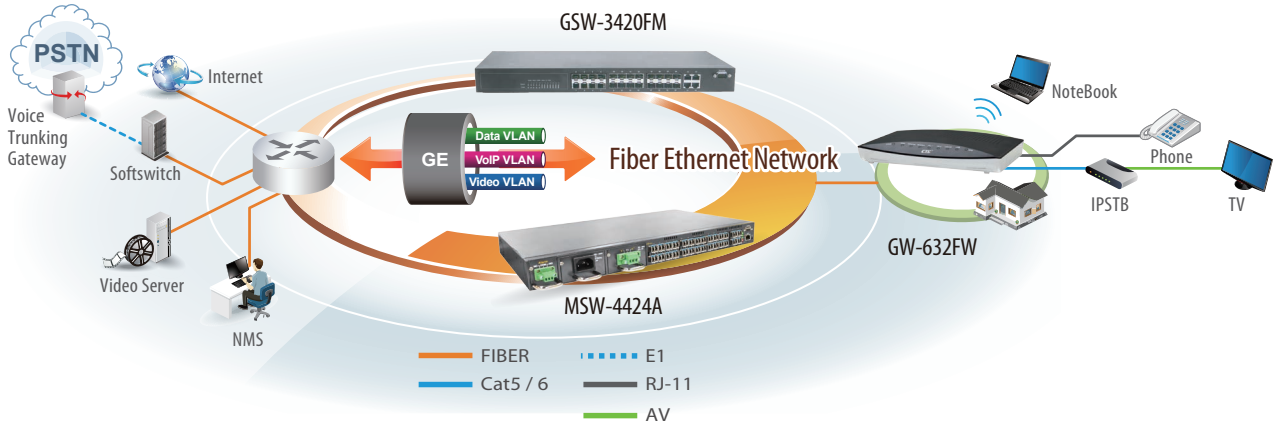
GW-632FW is a high performance Gigabit Ethernet residential gateway for Fiber-to-the-Home (FTTH) applications. It features both SFP based fiber and RJ-45 copper GbE WAN, four ports GbE LAN, two USB 2.0 host ports, WiFi 802.11 b/g/n and two VoIP FXS POTS ports. The integrated four port 10/100/1000M GbE switch features auto-crossover detection for easy connection with other Ethernet devices. The WAN port comes with RJ45 and SFP with autosensing for various types of optical transceiver modules.

The GW-632FW performs at near wire speed (1000Mbps) between WAN and LAN to provide good quality of service for high definition IPTV, VoIP and high speed Internet applications simultaneously. The two lines VoIP service over telephone uses SIP protocol to fulfill most toll quality telephony requirements for various countries. The built-in WiFi IEEE 802.11 b/g/n 2T2R provides excellent wireless performance to other client devices. The GW-632FW also supports IPv6 for future extending services. Network management may be via TR-069, Web or Telnet for advanced system provisioning and future upgrades. The two USB 2.0 host ports may be used for home cloud storage or print server applications. With these highly integrated features, the GW-632FW provides tremendous flexibility for the service provider with add on value customization to their subscribers.

Features

- Gigabit Ethernet interface with autosensing of RJ45 & SFP
- SFP port for expansion to optical connection by plug-in 100/1000M optical transceiver module
- Integrated high performance packet acceleration engine to provide near wire speed 1000Mbps WAN to LAN routing performance
- Integrated four-port Giga Ethernet switch with automatic speed sensing and crossover correction
- Supports four ports 10/100/1000 Mbps Ethernet for Internet Access or IPTV streaming video application
- IEEE 802.11-compliant WLAN supports up to 54 Mbps (11g) or 300Mbps (11n) physical link rate and air transmission is secured by WEP, WEP2, WPA, WPA2, TKIP, AES, 802.11i or 802.1x
- Supports Ethernet IEEE 802.1Q/p VLAN and priority queue, as well as IEEE 802.3x flow control
- Single fiber BiDi SC/APC receptacle.
- Supports various voice CODECs, echo cancellation, voice activity detection (VAD), comfort noise generation (CNG), caller ID, DTMF tone detection/generation and etc.
- Supports SIP signaling protocol and bonus services like call forwarding, call waiting, call transfer, call busy, call return, enquiry service, CLIP/CLIR and three way conference
- Two USB 2.0 host port may be used for application of home cloud storage and printer server
- Supports Networking protocols such as PPP, NAT, Routing, DHCP server / relay / client
- Configuration and management via CLI/Telnet, Web/HTTP, TR-064 or TR-069
- Software is upgradeable through HTTP or TFTP or TR-069One SFP Electrical Footprint interface complies MSA
- Supports Ethernet IEEE 802.1Q/p VLAN and priority, as well as IEEE 802.3x flow control

Application



Specifications

Hardware

WAN Interface	10/100/1000M Ethernet with RJ45 & SFP
Local Interface	Four ports 10/100/1000Base-T auto-sensing Ethernet switch with auto-MDIX support, in RJ-45 connector
	Two USB 2.0 host ports in type A connector, with up to 500mA / 5Vdc power supply each
	WiFi 802.11b/g/n (draft 2.0 compliance, 2T/2R @ 2.4GHz)
	Wireless LAN Access Point - Two Internal antennas: 1.5dBi - Link Rate : 300 Mbps max. - RF radiated power: maximum 100mW EIRP
LED Indicators	POWER – ON indicates RG (Residential Gateway) is correctly powered.
	WAN – GREEN ON indicate WAN port (RJ45 or SFP) is linked; GREEN blinking indicates data transmitting.
	Ethernet –GREEN ON indicates LAN port is linked; GREEN blinking ON indicates data transmitting.
	Wireless – ON indicates WLAN is active and blinking when there is traffic.
	TEL1 – ON indicates a VoIP call is undergoing, flashing while there is an incoming call.
	TEL2 – ON indicates a VoIP call is undergoing, flashing while there is an incoming call.
	Internet – ON indicates Internet connection is successfully established.
	USB – ON indicates an USB device is recognized and linked.
	WPS- blinking indicates the router is ready for WPS auto authentication.
Environment	Operation Temperature 0°C ~ +45°C
	Operation Humidity 10% ~ 90% (non-condensing)
	Storage Temperature -20°C ~ +70°C
	Storage Humidity 10% ~ 90% (non-condensing)
Power	AC Power Adapter: input 100~240 VAC 50/60 Hz; output 12 Vdc, 2 Amp
	Optional AC UPS: input 85~264 VAC / 47~70 Hz; output 12 Vdc, 2 Amp
	Power consumption < 21 W
Dimensions	160 x 255 x 42 mm (D x W x H)
Certificates	CE, FCC Part 15 Class B

Software

GbE WAN	Auto Detection between SFP and RJ-45.
WAN Connection	Static IP, or Dynamic IP by DHCP client PPPoE
	Bridge mode
	Supports of authentication of the IPoE connection via IEEE
	802.1x EAP encapsulation over LANs (EAPOL)
	Supports multiple WAN interfaces in mixed mode
Routing	Static route by gateway or interface
	Policy route by interface, source or destination IP address / subnet, protocol or port range
	Dynamic Routing with RIP v1 and v2
	IGMP proxy (v1/v2) for IP multicasting
NAT and Firewall	NAT / PAT with extensive ALG's (SIP, IRC, TFTP, H.323, SNMP and RTSP), pass-through for IPSec/L2TP/PPTP, as well as one DMZ zone
	Up to 512 translations with 16 static entries
	Virtual server supports up to 20 entries
	Firewall features MAC address filter, URL blocking, Internet cROUTERent filter, Access cROUTERrol list (ACL based on IP/Port address), schedule rule and virtual DMZ
	UPnP NAT traversal and VPN / IPSec pass-through
	Secondary IP address
QoS Features	Supports up to 8 priority queues per egress bridge port, with SP scheduling and configurable queue packet size
	Supports a downstream mapping table from 802.1p P-bits field to priority levels
	Supports a downstream mapping table from DSCP code points to priority levels
	VLAN tagged packets are mapped to priority queues according to P-bits mapping table
	Untagged IP packets are mapped to priority queues according to DSCP mapping table
	Configurable default priority level for untagged non-IP packets
Bridging	802.1Q VLAN tagging and un-tagging, 802.1p with 8 priority queues
	802.3x flow control
	Supports Unicast, Multicast and Broadcast traffic
	IGMP snooping v1/v2/v3
Wireless LAN	WEP/WPA/WAP2/WPA-PSK/WPA2-PSK supported
	Hidden SSID
	WEP: 64 or 128 bits key length
	WPA (Wi-Fi Protected Access) and WPA2 in Personal or Enterprise mode, mix of WPA and WPA2, or 802.1x sing EAP with RADIUS
	Up to four SSID's to support virtual AP
	Supports WPS (both PBC and PIN code) for easily setting up secure wireless network
	Supports WDS (Wireless Distribution System) for repeater application
	WMM (Wi-Fi Multimedia) to support QoS for media service
	Access cROUTERrol list based on MAC address
Voice Features	Supports voice CODECs like G.711, G.729A/B
	G.168 line echo cancellation with up to 32ms tail
	Adaptive jitter buffer, packet loss concealment (PLC), silence compression and Caller ID
	DTMF tone detection and generation; Fax / Modem detection and pass-through
VoIP Telephony Bonus Services	Supports SIP (RFC3261), SDP (RFC2327, RFC3264) as well as both TCP and UDP transport
	Supports User Agent Client (UAC) - User Agent Server (UAS) call, or proxy call routing
	Supports SIP and telephone URL addressing
	Supports in-band DTMF tone sending / receiving and out-band DTMF signaling with RTP, as per RFC2833
	Bonus services include: - Call Forwarding: Unconditional, No Response, On Busy - Call Waiting: Force Busy, Pickup and Release Old, Pickup and Put Old on Hold, Switch between two calls - Call Transfer, Call Back busy subscriber, Call Back last number called (call return) - Enquiry service - Three way conference
	Provisioning through TFTP client with configuration profile

System Management

Configuration and Network Management	UPnP Internet Gateway Device (IGD v1.0)
	Supports syslog with remote server
	Ping client for IP diagnostic
	Any port management with cROUTERrol list (MCL) based on IP address Support Configuration Backup and Restore
	Supports TR-069, TR-098 & TR-104
	TFTP (client), HTTP or TR-069 for firmware upgrade
	Local or remote configuration and management through Web,
	CLI, TR-064 or TR-069

Ordering Information

Model Name	Description
GW-632FW	Gigabit Fiber IAD Residential Gateway

GSW3424M1

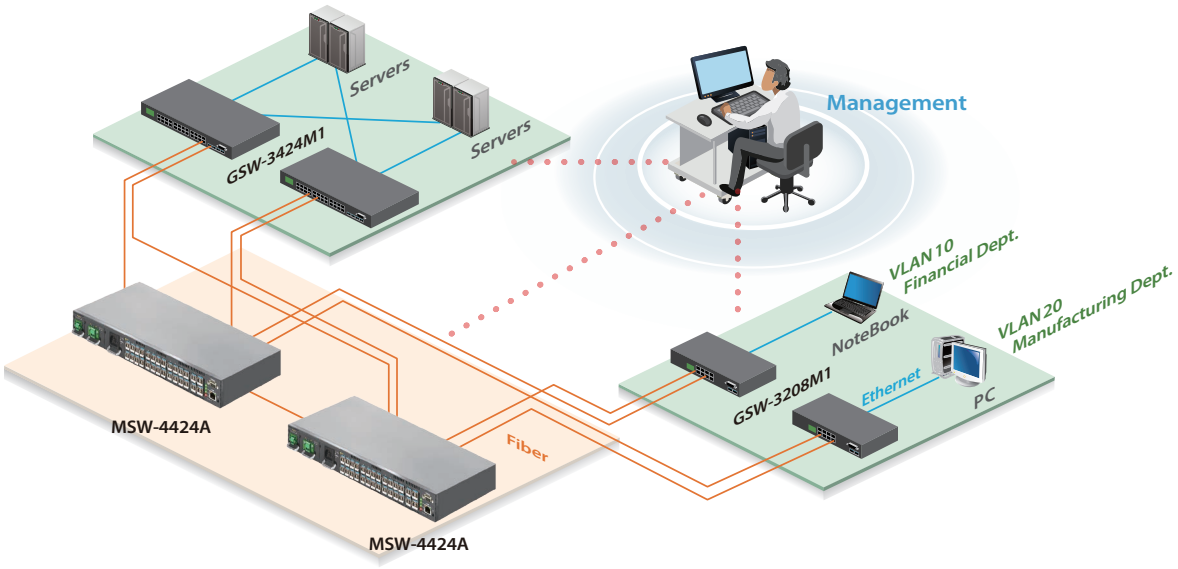
24-Port 10/100/1000Base-T + 4-Port GbE(SFP) L2 Managed Switch

GSW-3424M1 is a cost-effect, high performance, managed L2 Ethernet with 20 x 10/100/1000Base-T ports and 4 x Gigabit Ethernet combo (10/100/1000Base-T or 1000Base-X) ports. This switch supports remote management by SNMP, HTTP and Telnet interfaces along with local management by console interface. GSW-3424M1 supports many L2 switch management functions, including 802.1Q VLAN, 802.1x Port Security, Rate Control, Port Configuration, Port Mirroring, Port Statistics, QoS functions, Spanning tree and more.

Features

- 24 * RJ45 ports, with 10/100/1000Mbps, Full/Half duplex auto-negotiation and Auto-MDIX functions
- 4* Dual Speed SFP sockets, shared with TX ports of Port 21~24 ;
- auto-detect TX/SFP connection
- CISCO-like command line interface, IPv6 management
- 8 priority queues are supported on each port for QoS application
- Port-based VLAN, 802.1Q VLAN, Voice VLAN and Q-in-Q (double tagging) function
- Protected Port and LoopBack Detection function
- IEEE 802.1x security function, and VLAN assignment, Guest VLAN functions
- Static Mac address access limit and Dynamic Mac address number on port
- IEEE802.1d & 802.1w & 802.1s (spanning tree)
- IP Multicast with IGMP snooping / query / fast leave / filtering / group limited /MVR
- DHCP Client / DHCP Option 82 Relay / DHCP Snooping function
- ACL function for L2 ~ L4 packet control, Ingress/Egress rate control on port
- Broadcast/Multicast/Unicast storm control
- ARP inspection / IP source guard, RMON 1,2,3,9
- SFP Transceiver DDMI function / Dual Speed SFP Ports (100/1000Mbps)
- Remote port configuration setting and statistics monitoring
- Text configuration download and upload
- IEEE 802.3az power management / FANless / Green Ethernet

Application



Specifications

System	
10/100/1000 Base-T	24
100/1G SFP Slot	4 UTP/SFP Combo (Port 21~24)
Packet buffer	512KB
MAC Table size	8K
Max Packet size	9600 Bytes
Switching capability	14880pps at 10Mbps, 148810pps at 100Mbps, 1488095pps at 1Gbps with 64bytes packets.
Switch capacity	48Gbps
Forwarding Rate	35.7Mpps
FAN Design	FAN less
Console port	D-Sub 9
19" Rack-Mount	Yes, with kits
SFP DDMI	Yes
Dimensions	330 x 204 x 44 mm (W x D x H)
Environmental Temperature	Operating : 0 ~ 50°C Storage : -40 ~ 70°C
Humidity	10% ~ 90% (non-condensing)
LED Display	Per Port : Link/Act (Green: Gigabit, Yellow:10/100M) Per Device : Power and System
Power Consumption	18 Watt Max.
Power Input	AC Power input (100V~240V)

LED		
Power	Lights(Green)	System is receiving power
System	Lights(Green)	System is ready
Link / Act	Lights	Link is ready 1000Mbps : Green
	Flashing	10/100Mbps : Amber Data packets being received or sent

Software	
Port Control	Port speed, duplex mode, and flow control Port frame size (jumbo frames), Maximum ingress frame size (9600 bytes) Port state (administrative status) Port status (link monitoring) Port statistics (MIB counters) Port VeriPHY (cable diagnostics), Power Control
L2 Switching	Auto MAC address learning/aging and MAC addresses (static) IEEE 802.1Q static VLAN, Voice VLAN, Port isolation, Port Based VLAN, IEEE 802.1ad Provider Bridge IEEE 802.1D STP/802.1w RSTP/802.1s MSTP IEEE 802.3ad Link Aggregation, static and LACP BPDU guard and restricted role, BPDU transparency DHCP client, DHCP snooping, DHCP option 82 relay ARP inspection, Port mirroring, IP MAC binding
Layer 2 Multicast	IGMP snooping v1,v2, v3 snooping, (1024 groups) IGMP snooping Fast and Immediate leave IGMP throttling, filtering, and leave proxy IGMP proxy mode and snooping mode selection MVR, IPv6 MLD snooping
QoS	8 Priority Queues per Port Port Based priority, Scheduler priority, QoS Control List Storm control for UC, MC, and BC Policing and shaping per port and per queue Ingress Policing : (100-1000000 when the "Unit" is "kbps" or "fps" and 1-3300 when the "Unit" is "Mbps" or "kfps") Egress Shaping : (100-1000000 when the "Unit" is "kbps", and 1-3300 when the "Unit" is "Mbps".) DiffServ (RF 2474) remarking, Tag remarking
Security	Port-based 802.1X, Single 802.1X, Multiple 802.1X MAC-based authentication, VLAN assignment, QoS assignment, Guest VLAN, RADIUS accounting, MAC address limit TACACS+, Web and CLI authentication and authorization Authorization (3 levels) ACLs for filtering(256 entries), policing, and port copy IP source guard
Synchronization	NTPv4 Client
Power Saving	ActiPHY, PerfectReach, Ethernet Energy Efficient power management(EEE)
SFP DDMI	Yes
Management	HTTP server, CLI console port, Telnet, Management access filtering, SSHv2 and HTTPS IPv6 Management, System Syslog Software download through Web, SNMPv1/v2c/v3 Agent RMON Group 1, 2, 3, and 9 IEEE 802.1AB-2005 Link Layer Discovery, LLDP Text Configuration download or upload, sFlow, Daylight Saving

Ordering Information

Model Name	*Description*
GSW-3424M1	24x 10/100/1000Base-T + 4x GbE(SFP) L2 Switch, AC power supply
GSW-3424M1-DC48	24x 10/100/1000Base-T + 4x GbE(SFP) L2 Switch, DC 48V power supply

GSW – 3424M1 – □□□□
Example: GSW – 3424M1 – DC48

GSW3216M1

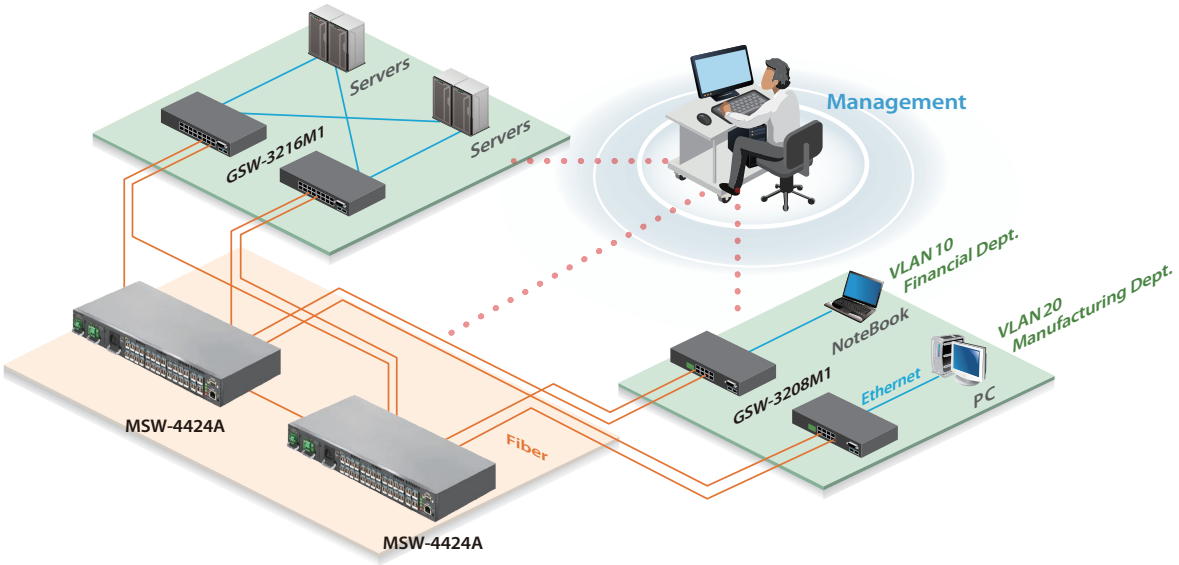
16-Port 10/100/1000Base-T + 2-Port Gbe(SFP) L2 Managed Switch

GSW-3216M1 is a cost-effect, high performance, managed L2 Ethernet with 16 x 10/100/1000Base-T ports and 2 x Gigabit Ethernet 1000Base-X ports. This switch supports remote management by SNMP, HTTP and Telnet interfaces along with local management by console interface. GSW-3216M1 supports many L2 switch management functions, including 802.1Q VLAN, 802.1x Port Security, Rate Control, Port Configuration, Port Mirroring, Port Statistics, QoS functions, Spanning tree and more.

Features

- 16 * RJ45 ports, with 10/100/1000Mbps, Full/Half duplex auto-negotiation and Auto-MDIX functions
- 2* Dual Speed SFP sockets, port 17 and port 18
- CISCO-like command line interface, IPv6 management
- 8 priority queues are supported on each port for QoS application
- Port-based VLAN, 802.1Q VLAN, Voice VLAN and Q-in-Q (double tagging) function
- Protected Port and LoopBack Detection function
- IEEE 802.1x security function, and VLAN assignment, Guest VLAN functions
- Static Mac address access limit and Dynamic Mac address number on port
- IEEE802.1d & 802.1w & 802.1s (spanning tree)
- IP Multicast with IGMP snooping / query / fast leave / filtering / group limited /MVR
- DHCP Client / DHCP Option 82 Relay / DHCP Snooping function
- ACL function for L2 ~ L4 packet control, Ingress/Egress rate control on port
- Broadcast/Multicast/Unicast storm control
- ARP inspection / IP source guard, RMON 1,2,3,9
- SFP Transceiver DDMI function / Dual Speed SFP Ports (100/1000Mbps)
- Remote port configuration setting and statistics monitoring
- Text configuration download and upload
- IEEE 802.3az power management / FANless / Green Ethernet

Application



Specifications

System	
10/100/1000 Base-T	16
100/1G SFP Slot	2
Packet buffer	512KB
MAC Table size	8K
Max Packet size	9600 Bytes
Switching capability	14880pps at 10Mbps 148810pps at 100Mbps 1488095pps at 1Gbps with 64bytes packets.
Switch capacity	36Gbps
Forwarding Rate	26.7Mpps
FAN Design	FAN less
Console port	D-Sub 9
19" Rack-Mount	Yes, with kits (optional)
SFP DDMI	Yes
Dimensions	117 x 250 x 37 mm(D x W x H)
Environmental Temperature	Operating : 0 ~ 50°C Storage : -40 ~ 70°C
Humidity	10% ~ 90% (non-condensing)
LED Display	Per Port : Link/Act (Green: Gigabit, Yellow:10/100M) Per Device : Power and System
Power Consumption	14 Watt Max.
Power Input	AC Power input (100V~240V)

LED		
Power	Lights(Green)	System is receiving power
System	Lights(Green)	System is ready
Link / Act	Lights	Link is ready 1000Mbps : Green 10/100Mbps : Amber
	Flashing	Data packets being received or sent

Software	
Port Control	Port speed, duplex mode, and flow control Port frame size (jumbo frames), Maximum ingress frame size (9600 bytes) Port state (administrative status) Port status (link monitoring) Port statistics (MIB counters) Port VeriPHY (cable diagnostics), Power Control
L2 Switching	Auto MAC address learning/aging and MAC addresses (static) IEEE 802.1Q static VLAN, Voice VLAN, Port isolation, Port Based VLAN, IEEE 802.1ad Provider Bridge IEEE 802.1D STP/802.1w RSTP/802.1s MSTP IEEE 802.3ad Link Aggregation, static and LACP BPDU guard and restricted role, BPDU transparency DHCP client, DHCP snooping, DHCP option 82 relay ARP inspection, Port mirroring, IP MAC binding
Layer 2 Multicast	IGMP v2, v3 snooping, (1024 groups) IGMP throttling, filtering, and leave proxy MVR
QoS	8 Priority Queues per Port Port Based priority, Scheduler priority, QoS Control List Storm control for UC, MC, and BC Policing and shaping per port and per queue Ingress Policing : (100-1000000 when the "Unit" is "kbps" or "fps" and 1-3300 when the "Unit" is "Mbps" or "kfps") Egress Shaping : (100-1000000 when the "Unit" is "kbps", and 1-3300 when the "Unit" is "Mbps".) DiffServ (RF 2474) remarking, Tag remarking
Security	Port-based 802.1X, Single 802.1X, Multiple 802.1X MAC-based authentication, VLAN assignment, QoS assignment, Guest VLAN, RADIUS accounting, MAC address limit TACACS+, Web and CLI authentication and authorization Authorization (3 levels) ACLs for filtering(256 entries), policing, and port copy IP source guard
Synchronization	NTPv4 Client
Power Saving	ActiPHY, PerfectReach, Ethernet Energy Efficient power management(EEE)
SFP DDMI	Yes
Management	HTTP server, CLI console port, Telnet, Management access filtering, SSHv2 and HTTPS IPv6 Management, System Syslog Software download through Web, SNMPv1/v2c/v3 Agent RMON Group 1, 2, 3, and 9 IEEE 802.1AB-2005 Link Layer Discovery, LLDP Text Configuration download or upload, sFlow, Daylight Saving

Ordering Information

Model Name	*Description*
GSW-3216M1	16x 10/100/1000Base-T + 2x GbE(SFP) L2 Switch, AC power supply
GSW-3216M1-DC48	16x 10/100/1000Base-T + 2x GbE(SFP) L2 Switch, DC 48V power supply

GSW – 3216M1 – □□□□

Example: GSW – 3216M1 – DC48

GSW3208M1

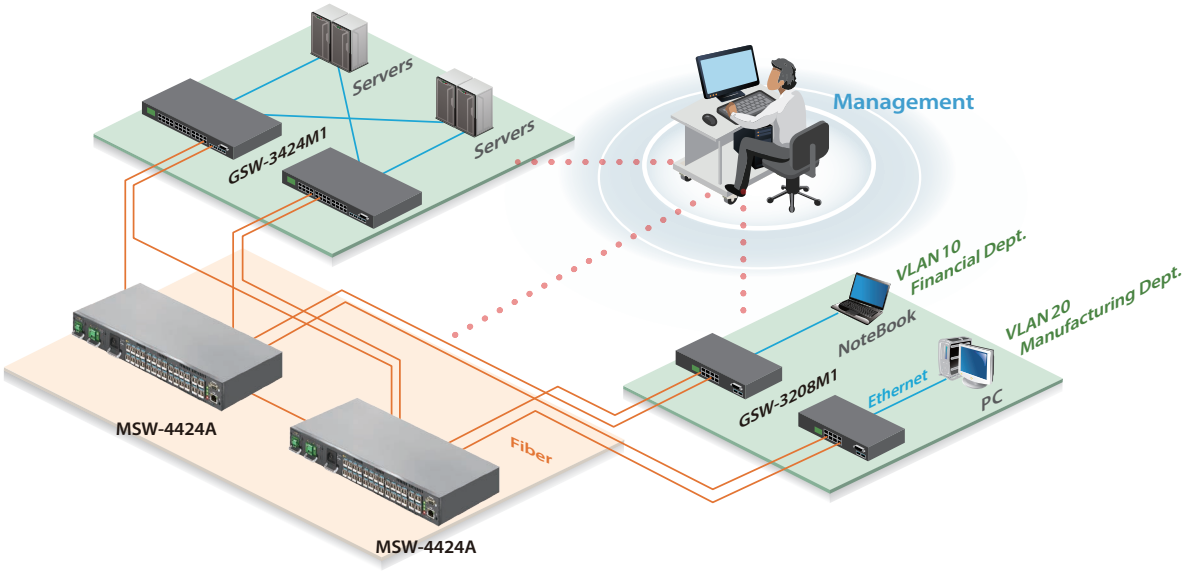
8-Port 10/100/1000Base-T + 2-Port GbE(SFP) L2 Managed Switch

GSW-3208M1 is a cost-effect, high performance, managed L2 Ethernet with 8 x 10/100/1000Base-T ports and 2 x Gigabit Ethernet 1000Base-X ports. This switch supports remote management by SNMP, HTTP and Telnet interfaces along with local management by console interface. GSW-3208M1 supports many L2 switch management functions, including 802.1Q VLAN, 802.1x Port Security, Rate Control, Port Configuration, Port Mirroring, Port Statistics, QoS functions, Spanning tree and more.

Features

- 8* RJ45 ports, with 10/100/1000Mbps, Full/Half duplex auto-negotiation and Auto-MDIX functions
- 2* Dual Speed SFP sockets, Port9 and Port10
- CISCO-like command line interface
- IPv6 management
- 8 priority queues are supported on each port for QoS application
- Port-based VLAN, 802.1Q VLAN, Voice VLAN and Q-in-Q (double tagging) function
- Protected port and LoopBack Detection function
- Q-in-Q(double tagging) function
- IEEE 802.1x security function, and VLAN assignment, Guest VLAN functions
- Static Mac address access limit and Dynamic Mac address number on port
- IEEE802.1d & 802.1w & 802.1s (spanning tree)
- IP Multicast with IGMP snooping / query / fast leave / filtering / group limited /MVR
- DHCP Client / DHCP Option 82 Relay / DHCP Snooping function
- ACL function for L2 ~ L4 packet control
- Ingress/Egress rate control on port
- Broadcast/Multicast/Unicast storm control
- ARP inspection / IP source guard
- RMON 1,2,3,9
- SFP Transceiver DDMI function / Dual Speed SFP Ports (100/1000Mbps)
- Remote port configuration setting and statistics monitoring
- Text configuration download and upload
- IEEE 802.3az power management / FANless / Green Ethernet

Application



Specifications

System	
10/100/1000 Base-T	8
100/1G SFP Slot	2
Packet buffer	512KB
MAC Table size	8K
Max Packet size	9600 Bytes
Switching capability	9600 Bytes 14880pps at 10Mbps, 148810pps at 100Mbps, 1488095pps at 1Gbps with 64bytes packets
Switch capacity	20Gbps
Forwarding Rate	14.8Mpps
FAN Design	FAN less
Console port	D-Sub 9
19" Rack-Mount	Yes, with kits (Optional)
SFP DDMI	Yes
Dimensions	117 x 250 x 37 mm(D x W x H)
Environmental Temperature	Operating : 0 ~ 50℃ Storage : -40 ~ 70℃
Humidity	10% ~ 90% (non-condensing)
LED Display	Per Port : Link/Act (Green: Gigabit, Yellow:10/100M) Per Device : Power and System
Power Consumption	8.5 Watt Max
Power Input	AC Power input (100V~240V)

LED		
Power	Lights(Green)	System is receiving power
System	Lights(Green)	System is ready
Link / Act	Lights	Link is ready 1000Mbps : Green 10/100Mbps : Amber
	Flashing	10/100Mbps : Amber Data packets being received or sent

Software	
Port Control	Port speed, duplex mode, and flow control Port frame size (jumbo frames), Maximum ingress frame size (9600 bytes), Port state (administrative status) Port status (link monitoring) Port statistics (MIB counters) Port VeriPHY (cable diagnostics), Power Control
L2 Switching	Auto MAC address learning/aging and MAC addresses (static) IEEE 802.1Q static VLAN, Voice VLAN, Port isolation, Port Based VLAN, IEEE 802.1ad Provider Bridge IEEE 802.1D STP/802.1w RSTP/802.1s MSTP IEEE 802.3ad Link Aggregation, static and LACP BPDU guard and restricted role, BPDU transparency DHCP client, DHCP snooping, DHCP option 82 relay ARP inspection, Port mirroring, IP MAC binding
Layer 2 Multicast	IGMP snooping v1,v2, v3 snooping, (1024 groups) IGMP snooping Fast and Immediate leave IGMP throttling, filtering, and leave proxy IGMP proxy mode and snooping mode selection MVR, IPv6 MLD snooping
QoS	8 Priority Queues per Port Port Based priority, Scheduler priority, QoS Control List Storm control for UC, MC, and BC Policing and shaping per port and per queue Ingress Policing : (100-1000000 when the "Unit" is "kbps" or "fps" and 1-3300 when the "Unit" is "Mbps" or "kfps") Egress Shaping : (100-1000000 when the "Unit" is "kbps", and 1-3300 when the "Unit" is "Mbps".) DiffServ (RF 2474) remarking, Tag remarking
Security	Port-based 802.1X, Single 802.1X, Multiple 802.1X MAC-based authentication, VLAN assignment, QoS assignment, Guest VLAN, RADIUS accounting, MAC address limit TACACS+, Web and CLI authentication and authorization Authorization (3 levels) ACLs for filtering(256 entries), policing, and port copy IP source guard
Synchronization	NTPv4 Client
Power Saving	ActiPHY, PerfectReach, Ethernet Energy Efficient power management(EEE)
SFP DDMI	Yes
Management	HTTP server, CLI console port, Telnet, Management access filtering, SSHv2 and HTTPS IPv6 Management, System Syslog Software download through Web, SNMPv1/v2c/v3 Agent RMON Group 1, 2, 3, and 9 IEEE 802.1AB-2005 Link Layer Discovery, LLDP Text Configuration download or upload, sFlow, Daylight Saving

Ordering Information

Model Name	*Description*
GSW-3208M1	8x 10/100/1000Base-T + 2x GbE(SFP) L2 Switch, AC power supply
GSW-3208M1-DC48	8x 10/100/1000Base-T + 2x GbE(SFP) L2 Switch, DC 48V power supply

GSW – 3208M1 – □□□□

Example: GSW – 3208M1 – DC48

FSW-2104

4-Port 10/100Base-TX and 100Base-FX Switch

The FSW-2104 provides a low cost solution for non-managed Ethernet fiber switches. The FSW-2104 is a 4-port 10/100Base-TX plus 1-port 100Base-FX Fast Ethernet switch. It is designed for small workgroup applications that require a long distance connection to the backbone, such as between buildings, offices, or within a campus location. FSW2104 provide full-duplex capability on each auto-negotiating port, for enhanced performance. A wide range of transceiver selection provides fiber connection with SC, FC or ST type connectors in multimode or single mode and at distance from 2 to 120km as well as BiDi (single fiber) at distances of 20, 40, 60, or 80km.

Features

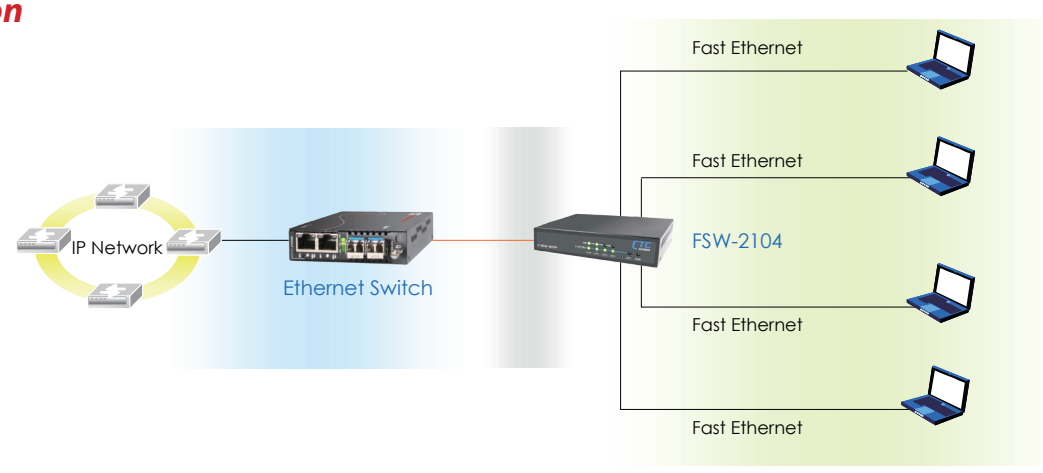
- 4-Port 10/100Base-TX to 100Base-FX
- Auto-Negotiation
- Auto MDI / MDIX
- Forward 1552 bytes (Max.) packets
- Supports 1K MAC address
- 512k bits packet buffer memory
- Supports broadcast storm protection

Specifications

Optical Interface	Connector	1x9 (SC, ST)
	Data rate	100Mbps
	Duplex mode	Full duplex
	Fiber	MM 50/125μm, 62.5/125μm. SM 9/125μm
	Distance	MM 2km, SM 15/30/50/80/120km WDM 20/40/60/80km
	Wavelength	MM 1310nm, SM 1310,1550nm WDM 1310Tx/1550Rx (type A) 1550Tx/1310Rx (type B)
Electrical Interface	Connector	RJ-45
	Data rate	10Mbps, 100Mbps
	Duplex mode	Half / Full duplex

Electrical Interface	Cable	10Base-T Cat.3, 4, 5, UTP 100Base-TX Cat.5, 5e or higher
Standards	IEEE 802.3, IEEE 802.3u	
Indications	LED (FX Link, TX SPD, TX Link/Act)	
Power Input	Card : 5 VDC Standalone : AC, DC options	
Power Consumption	< 4W	
Dimensions	138 × 77 × 28mm (D x W x H)	
Weight	450g	
Temperature	0 ~ 50°C (Operating), 0 ~ 70°C (Storage)	
Humidity	10 ~ 90% non-condensing	
Certification	CE, FCC, RoHS compliant	
MTBF	65,000 hrs	

Application



Ordering Information

Model Name	Description
FSW-2104	4-Port 10/100Base-TX to 100Base-FX Managed Switch

Connector Type	Connectivity Distance
SC	002: 2km 015: 15km 030: 30km 050: 50km 080: 80km 120:120km 20A: WDM 20km A type 20B: WDM 20km B type 40A: WDM 40km A type 40B: WDM 40km B type 60A: WDM 60km A type 60B: WDM 60km B type 80A: WDM 80km A type 80B: WDM 80km B type

Connector Type / Connectivity Distance

FSW – 2104 – □□□□□

Example: FSW – 2104 – SC002

Specifications & design are subject to change without prior notice. Please visit CTC Union website for more details.

IFC-1000PSE
IFC-1000PSE/A

Gigabit Ethernet PoE PSE Media Converter

The IFC-1000PSE/A is a copper to fiber Gigabit Ethernet solution designed to make conversion between 10/100/1000Base-T to 1000Base-SX/LX with SFP LC connector. The IFC-1000PSE complies with IEEE802.3af Power Over Ethernet standard with external AC power adapter or internal AC power build-in. This PoE media converter is a Power Sourcing Equipment (PSE) which combines data received over a TP link with 48VDC power, providing power to IEEE802.3af powered device (PD) over the existing CAT5 UTP cable. Other features include Link fault Pass-Through (LFPT), Store and Forward Switching, auto or forced mode setting for copper Ethernet as well as auto laser shutdown.

Features

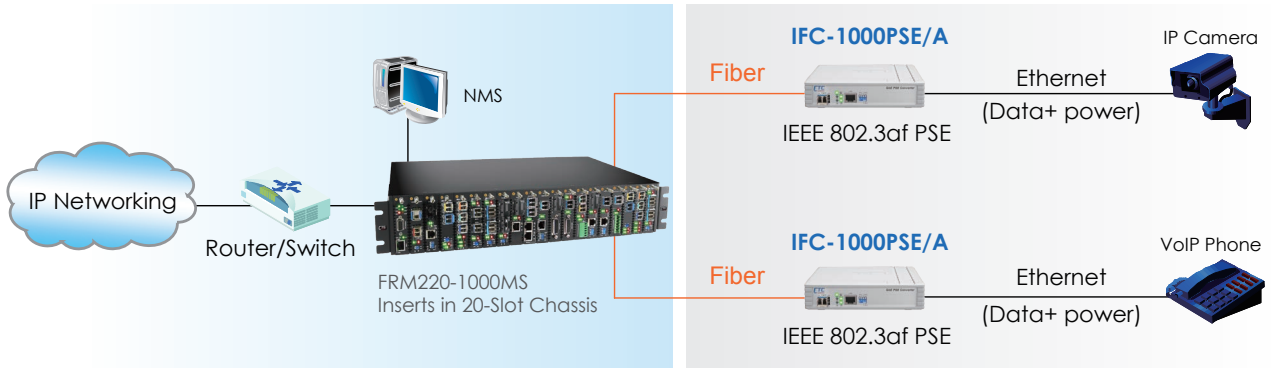
- 10/100/1000Base-T to 1000Base-SX/LX SFP
- IEEE 802.3af Compliant PSE (power sourcing equipment)
- Auto-negotiation or forced mode
- Auto MDI/MDIX
- Store and Forward Switching Mechanism
- Supports 4K MAC address
- Supports 256K Byte Packet Buffer
- Forward 1632 bytes (max.) packets
- Supports Link fault Pass-Through (LFPT) function

Specifications

Optical Interface	Connector	SFP LC
	Data rate	1250Mbps
	Duplex mode	Full duplex
	Fiber	MM 50/125μm, 62.5/125μm. SM 9/125μm
	Distance	MM 550m, 2km, SM 15/30/50/80/120km WDM 20/40/60km
	Wavelength	MM 1310nm, SM 1310,1550nm WDM 1310Tx/1550Rx (type A) 1550Tx/1310Rx (type B)
Electrical Interface	Connector	RJ-45
	Data rate	10Mbps, 100Mbps, 1000Mbps
	Duplex mode	Half / Full duplex
	Cable	10Base-T Cat 3, 4, 5, UTP 100Base-TX Cat 5, 5e or higher 1000Base-T Cat 5, 5e or higher

PSE Output Power	Class 0: 15.4w Class 1: 4w Class 2: 7w Class 3: 15.4w
Standards	IEEE 802.3, 802.3u, 802.3ab, 802.3z, 802.3af,802.3x
Indications	LED (Power, FX-Link, FX Duplex, TX-SPD, TX-Duplex, TX-Link)
Power Input	100 ~ 240VAC
Power Consumption	< 5W (w/o PSE Output Power)
Dimensions	201 x 135 x 35mm (D x W x H)
Weight	0.58kg
Temperature	0 ~ 50°C (Operating), -10 ~ 70°C (Storage)
Humidity	10 ~ 90% non-condensing
Certification	CE, FCC, RoHS compliant
MTBF	75,000 hrs

Application



Ordering Information

Model Name	Description
IFC-1000PSE/A	GE PSE media converter with DC 48V in AC adapter
IFC-1000PSE-AC	GE PSE media converter with built-in AC power 100 ~240V

Interface Power Type
IFC – □□□□□□□ – □□
Example: IFC – 1000PSE– AC

IFC-100PD

10/100Base-TX to 100Base-FX Power over Ethernet PD Media Converter

The IFC-100PD is Power over Ethernet 10/100Base-TX to 100Base-FX non-managed PD(Power Device) Fiber converter, which give you the options to choose from the most popular fiber cabling connectors, ST, SC, FC. Both multi-mode and single mode converter models are available as well as BiDi which allows bi-directional transmissions using only a single fiber cable. With Power over Ethernet (PoE) feature, IFC-100PD takes power supply over Ethernet cable from PoE Ethernet Switch and may work without external power adapter. When auto-negotiation is selected, these units will automatically tailor themselves to convert both half-duplex and full-duplex signals, according to IEEE802.3u standards. LED indicators signal the power status of the converter, UTP port speed, Link, and duplex status, FX port Link and duplex status. The stand-alone converter may also be concentrated into either the FMC-CH08 or FMC-CH17 non-managed chassis.

Features

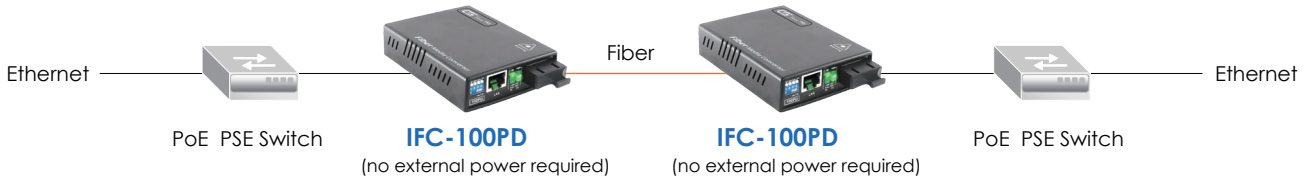
- 10/100Base-TX to 100Base-FX Converter
- Auto-Negotiation or forced mode
- Auto MDI/MDIX
- Forward 1600 bytes (Max.) packets
- Supports Q in Q double tagged frame transparent
- Supports IEEE 802.1Q Tag VLAN pass thru
- Supports flow control (Pause)
- Supports Link Fault Pass-Through (LFPT)
- Forward 9K jumbo packets in converter mode
- Supports IEEE802.3af Power over Ethernet

Specifications

Optical Interface	Connector	1x9 (SC, ST, FC)
	Data rate	125Mbps
	Duplex mode	Full duplex
	Fiber	MM 50/125μm, 62.5/125μm
		SM 9/125μm
	Distance	MM 2km, SM 15/30/50/80/120km
		WDM 20/40/60/80km
	Wavelength	WDM 1310Tx/1550Rx (type A)
		1550Tx/1310Rx (type B)
		1550Tx/1310Rx (type B)
Electrical Interface	Connector	RJ-45
	Data rate	10Mbps, 100Mpbs
	Duplex mode	Half / Full duplex
	Cable	10Base-T Cat.3, 4, 5, UTP,
		100Base-TX Cat.5, 5e or higher
		1000Base-T Cat 5, 5e or higher
	PD Input Power	48VDC

Standards	IEEE 802.3, IEEE 802.3u, IEEE 802.3af
Indications	LED (Power, FX Link, TX SPD, TX Link, TX Duplex, FEF)
Power Input	FMC: DC 12V In
Power Consumption	< 4W
Dimensions	108 x 74 x 23mm (D x W x H)
Weight	120g
Temperature	0 ~ 50°C (Operating), -10 ~ 70°C (Storage)
Humidity	10 ~ 90% non-condensing
Certification	CE, FCC, RoHS compliant
MTBF	65,000 hrs

Application



Ordering Information

Model Name	Description
IFC–100PD	10/100Base-TX to 100Base-FX PoE PD media converter

Connector Type	Connectivity Distance
SC, ST, FC	002: 2km 015: 15km 030: 30km 050: 50km 080: 80km 120:120km 20A: WDM 20km A type 20B: WDM 20km B type 40A: WDM 40km A type 40B: WDM 40km B type 60A: WDM 60km A type 60B: WDM 60km B type 80A: WDM 80km A type 80B: WDM 80km B type

Connector Type / Connectivity Distance

IFC – 100PD – □□□□□

Example: IFC – 100PD – SC002

Specifications & design are subject to change without prior notice. Please visit CTC Union website for more details.

INJ-G30

Gigabit Ethernet, IEEE802.3af/at High Power PoE Injector

This device consists of 1 PoE Injector ports. That can solve the limitation of the power outlet location and offer the system designer a flexible solution to locate the network device everywhere. The compact size and wall mounting was specifically designed for easy installation. It can be installed where space is limited; moreover, it provides smooth network migration and easy upgrade to network capacity.

Features

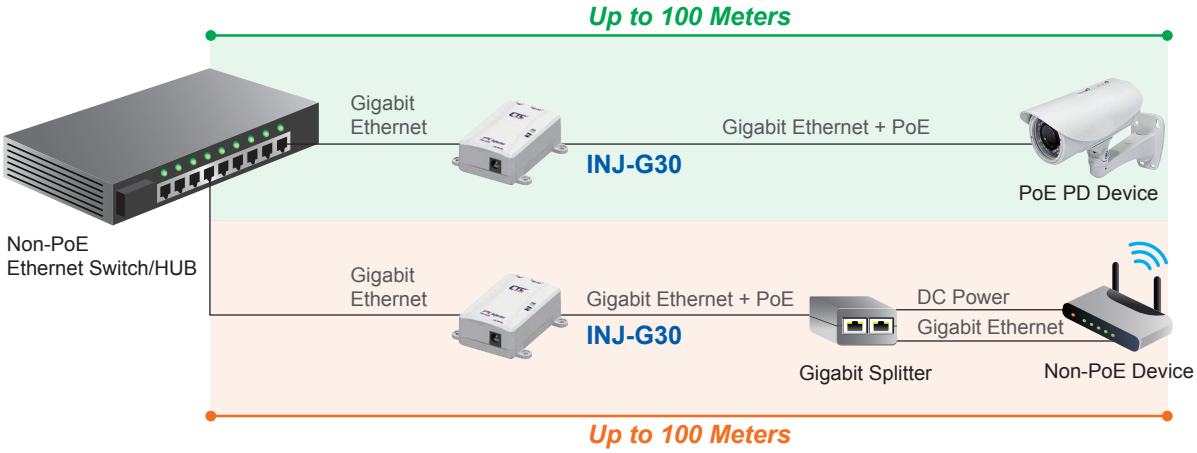
- 1 Port PoE Injector, 48V 30W output
- Compliane IEEE802.3af/at
- Providing 1 10/100/1000Mbps pass through data rate
- Wall Mountable
- Compliane with IEEE 802.3 10Base-T, IEEE 802.3u 100Base-TX and IEEE802.3ab 1000Base-T
- Safety & EMI Certificates: CE & FCC Class B Smart plug & play
- Compact Size

Specifications

Ethernet Standard	IEEE 802.3 10Base-T
	PoE standard
	Connector
Network Cable	IEEE 802.3af Power over Ethernet (PoE)
	IEEE 802.3at Power over Ethernet (PoE+)
Indications	1x RJ-45 for 10/100/1000Base-T data
	1x RJ-45 for 10/100/1000Base-T data and PoE Power output
Power Input	10Base-T Cat. 3, 4, 5e UTP/STP;
	100/1000Base-T Cat. 5 UTP/STP
Filtering/ Forwarding Rate	10/100/1000Mbps pass through data rate
PoE Power output pin	RJ45 Pin 1,2(V+), Pin 3,6(V-)
LED	System Power

External Power Supply	DC48V 0.75A Output (maximum)
	AC 100V~240VAC Input
PoE Power output	48V, 30W (maximum)
Operating Temperature	0 ~ 45°C
Storage Temperature	-20 ~ 85°C
Humidity	10 ~90% RH (Non-condensing)
Dimension	80 x 68 x 24mm (D x W x H)
Weight	138g
Installation mounting	Wall mount
Certificates	CE & FCC Class B

Application



Ordering Information

Model Name	Description
INJ-G30	1 Port Gigabit Ethernet, IEEE802.3af/at high power PoE+ Injector

FMC-CH17

FMC Chassis

The FMC-CH17 is a 2U high 19" chassis that supports up to 17 non-managed FMC or VDSL2 Bridge media converters. The FMC-CH17 provides an economic solution in low density fiber converter installations where no management features are required. Each FMC or VDTU2A-301 converter is an independent Ethernet to fiber or Ethernet to copper media converter that may be used as a stand-alone converter or placed in the FMC-CH17 chassis. With two power supplies, this chassis can support redundant power from any of two power options, universal AC (100-240VAC), DC 36-60VDC. The FMC-CH17 provides the working DC voltages for up to 17 FMC or VDTU2A-301 converters. The built in cooling fan ensures that temperatures in the rack remain within the tolerated working range.

Features

- 2U, 19", 17-Slot rack supports up to 17 x FMC converter
- Chassis with single or dual built-in power for AC or DC
- Cross flow cooling fan built-in.
- Designed for 19" Rack mounting
- FMC units are hot swappable

Specifications

Power Input	AC : 100 ~240V or DC48 : 36 ~ 60V
Power Consumption	<60W
Dimensions	199 x 476 x 88 mm (D x W x H)

Weight	7.9Kg
Temperature	0 ~ 50°C (Operating), -10 ~ 70°C (Storage)
Humidity	10 ~ 90% non-condensing
Certification	CE, FCC, RoHS Compliant
MTBF	65,000 hrs

FMC-CH17 overview

Toolless:
Easy to install or remove without any tools

FMC Option Converters
- Fast Ethernet
- Gigabit Ethernet
- VDSL2 LAN Extender

17-Slot

DC Power Terminal
Power Switch
FAN
AC Power Socket
Power Switch

Ordering Information

Model Name	Description
FMC-CH17-AC, DC, AD, AA, DD	2U, 19", 17-Slot FMC Converter Chassis with AC, DC, AD, AA or DD power

Power Type
FMC – CH17 – □□
Example: FMC – CH17 – DC

NEW

FMC-1000S

10/100/1000Base-T to 1000Base-X Gigabit Ethernet Media Converter

The FMC-1000S family are Gigabit Ethernet 10/100/1000Base-T to 1000Base-X non-managed stand-alone media converters, which give you the fiber cabling connectors, LC with SFP module. Both multi-mode and single mode converter models are available as well as BiDi which allows bi-directional transmissions using only a single fiber cable. When auto-negotiation is default setting, these units will automatically tailor themselves to convert full-duplex signals, according to IEEE802.3u standards. LED indicators signal the power status of the converter, UTP port speed and Link status FX port speed and Link status. The stand-alone converter may also be concentrated into FMC-CH17 non-managed chassis.

Features

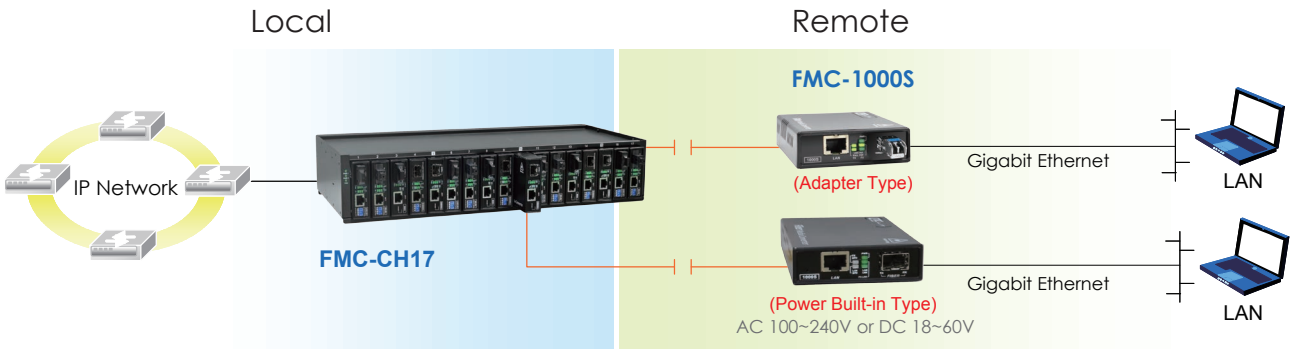
- 10/100/1000Base-T to 1000Base-X Converter
- Auto-Negotiation (default setting)
- Auto MDI/MDIX
- Forward 2048 bytes (Max.) packets
- Supports Q in Q double tagged frame transparent
- Supports IEEE 802.1Q Tag VLAN pass thru

Specifications

Optical Interface	Connector	SFP LC
	Data rate	1.25G
	Duplex mode	Full duplex
	Fiber	MM 50/125μm, 62.5/125μm
		SM 9/125μm
	Distance	MM 2km, SM 15/30km
		WDM 20/40km
	Wavelength	MM 1310nm, SM 1310,1550nm
		WDM 1310Tx/1550Rx (Type A)
		1550Tx/1310Rx (Type B)
Electrical Interface	Connector	RJ-45
	Data rate	10Mbps, 100Mbps, 1000Mbps
	Duplex mode	Full duplex
	Cable	100Base-TX Cat.5, 5e or higher
		1000Base-T Cat.5, 5e or higher

Standards	IEEE 802.3, 802.3u, 802.3Z, 802,3ab
Indications	LED (Power, FX Link, FX SPD, TX SPD, TX Link)
Power Input	Adapter Type: DC 12V
	Power Built-in Type : AC 100 ~ 240V
	Power Built-in Type: DC 18 ~ 60V
Power Consumption	< 3W
Dimensions (D x W x H)	Adapter Type:108 x 73.4 x 23mm
	Power Built-in Type : 135 x 73.4 x 23mm
Weight	Adapter Type : 120g
	Power Built-in Type : 140g
Temperature	0 ~ 50°C (Operating), -10 ~ 70°C (Storage)
Humidity	10 ~ 90% non-condensing
Certification	CE, FCC, RoHS compliant
MTBF	65,000 hrs

Application



Ordering Information

Model Name	Description
FMC-1000S	10/100/1000Base-T to 1000Base-X media converter Adapter Type
FMC-1000S-AC, DC	10/100/1000Base-T to 1000Base-X media converter with AC or DC Power
FMC-1000S-WM	10/100/1000Base-T to 1000Base-X media converter Adapter Type with Wall Mount Kits
FMC-1000S-WM-AC, DC	10/100/1000Base-T to 1000Base-X media converter with AC or DC Power and Wall Mount Kits

Wall-Mount Type

Non Wall-Mount Type

Power Type

FMC – 1000S – □□

Example: FMC – 1000S – DC

FMC-10/100

10/100Base-TX to 100Base-FX
Fast Ethernet Media Converter

NEW

The FMC-10/100 family are Fast Ethernet 10/100Base-TX to 100Base-FX non-managed stand-alone media converters, which give you the options to choose from the most popular fiber cabling connectors, ST, SC or FC. Both multi-mode and single mode converter models are available as well as BiDi which allows bi-directional transmissions using only a single fiber cable. When auto-negotiation is selected, these units will automatically tailor themselves to convert both half-duplex and full-duplex signals, according to IEEE802.3u standards. LED indicators signal the power status of the converter, UTP port speed, Link, and duplex status, FX port Link and duplex status. The stand-alone adapter type converter may also be concentrated into FMC-CH17 chassis.

Features

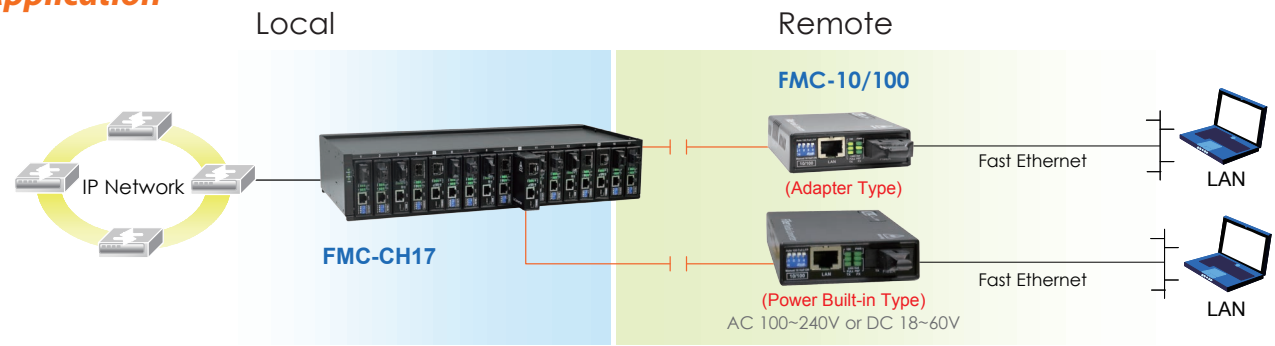
- 10/100Base-TX to 100Base-FX Converter
- Auto-Negotiation or forced mode
- Auto MDI/MDIX
- Forward 1600 bytes (Max.) packets
- Supports IEEE 802.1Q Tag VLAN pass thru
- Supports Q in Q double tagged frame transparent
- Supports flow control (Pause)
- Supports Link Fault Pass-Through (LFPT)
- Supports Far End Fault Indication (FEFI)
- Forward 9K jumbo packets in converter mode (100M/Full)

Specifications

Optical Interface	Connector	1x9 (SC, ST, FC)
	Data rate	125Mbps
	Duplex mode	Full duplex
	Fiber	MM 50/125μm, 62.5/125μm
		SM 9/125μm
	Distance	MM 2km, SM 15/30km
		WDM 20/40km
	Wavelength	MM 1310nm, SM 1310, 1550nm
		WDM 1310Tx/1550Rx (Type A)
		1550Tx/1310Rx (Type B)
Electrical Interface	Connector	RJ-45
	Data rate	10Mbps, 100Mpbs
	Duplex mode	Half / Full duplex
	Cable	10Base-T Cat.3, 4, 5, UTP
		100Base-TX Cat.5, 5e or higher

Standards	IEEE 802.3, IEEE 802.3u
Indications	LED (Power, FX Link, TX SPD, TX Link, TX Duplex, FEF)
Power Input	Adapter Type: DC 12V
	Power Built-in Type: AC 100 ~ 240V
	Power Built-in Type: DC 18 ~ 60V
Power Consumption	< 3W
Dimensions (D x W x H)	Adapter Type:108 x 73.4 x 23mm
	Power Built-in Type : 135 x 73.4 x 23mm
Weight	Adapter Type : 120g
	Power Built-in Type : 140g
Temperature	0 ~ 50°C (Operating), -10 ~ 70°C (Storage)
Humidity	10 ~ 90% non-condensing
Certification	CE, FCC, RoHS compliant
MTBF	65,000 hrs

Application



Ordering Information

Model Name	Description
FMC-10/100	10/100Base-TX to 100Base-FX Fast Ethernet media converter Adapter Type
FMC-10/100-AC, DC	10/100Base-TX to 100Base-FX Fast Ethernet media converter with AC or DC Power
FMC-10/100-WM	10/100Base-TX to 100Base-FX Fast Ethernet media converter Adapter Type with Wall Mount Kits
FMC-10/100-WM-AC, DC	10/100Base-TX to 100Base-FX Fast Ethernet media converter with AC or DC Power and Wall Mount Kits

Connector Type	Connectivity Distance
SC, ST, FC	002: 2km 015: 15km 030: 30km
	20A: WDM 20km A type 20B: WDM 20km B type 40A: WDM 40km A type 40B: WDM 40km B type

Wall-Mount Type

Non Wall-Mount Type

Power Type
FMC – 10/100 – □□
Example: FMC – 10/100 – DC

Specifications & design are subject to change without prior notice. Please visit CTC Union website for more details.

NEW

FIB-232A

RS-232 to Fiber Media Converter

The FIB-232A is a low cost, compact, fiber converter designed to extend asynchronous RS-232 transmissions up to 120Km without any repeaters. The transmissions run in fibers which provide for excellent data security as well as being immune to EMI/RFI, variations in ground potentials, and lightning strikes. The FIB-232A operates at the physical layer (OSI Layer 1) and is completely transparent to the RS-232 transmissions and protocols. The FIB-232A uses an external power adapter. Utilizing an ST or SC fiber cable, the FIB-232A operates in Full Duplex mode for bi-directional transmissions. The FIB-232A RS-232 interface operates in DCE mode for direct connection to DTE devices such as PC DB9 port.

Features

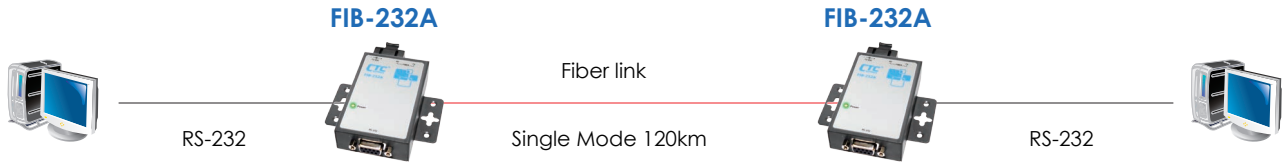
- Extends RS-232 transmission distance
  - Up to 2km with multi-mode fiber
  - Up to 120km with single-mode fiber
- Baud rates up to 230.4Kbps
- External power source supplied
- Compact size
- Designed for point to point use

Specifications

Signal Format	EIA RS-232C, ITU V.24, V.28
Mode	Asynchronous
Connector	DB9 Female, DCE
Fiber Port	1 x 9(ST, SC)
Fiber Type	Single Mode, Multi-mode
Light Source	FP Laser, DFB Laser
Wavelength	1310 nm, 1550nm
Distance	2Km, 15Km, 30Km, 60Km, 80Km, 120Km

Baud Rate	Up to 230.4Kbps
BER	10-9
Indications	LED (Power)
External Power	DC12V, 0.4A
Dimensions	85 x 50 x 21mm (D x W x H)
Weight	90g
Environment	0 ~ 50°C, 20 ~ 95% RH -20 ~ 80°C, < 95% RH
Certification	CE, FCC, RoHS compliant

Application



Ordering Information

Model Name	Description
FIB-232A	RS-232 to fiber media converter
Connector Type	**Connectivity Distance**
SC, ST, FC	002: 2km 015: 15km 030: 30km 050: 50km 080: 80km 120:120km 20A: WDM 20km A type 20B: WDM 20km B type 40A: WDM 40km A type 40B: WDM 40km B type 60A: WDM 60km A type 60B: WDM 60km B type 80A: WDM 80km A type 80B: WDM 80km B type

Connector Type / Connectivity Distance

FIB – 232A – □□□□□

Example: FIB – 232A – SC002

FMC-1000M

10/100/1000Base-T to 1000Base-X Web Smart OAM Managed Converter

NEW

The FMC-1000M family are Gigabit Ethernet 10/100/1000Base-T to 1000Base-X Web Smart OAM/IP based managed fiber media converters, which provide simple control and setting function on each Ethernet port through out of band network via a Web browser. The FMC-1000M media converters give you the fiber cabling connector, Both multi-mode and single mode converter models are available as well as BiDi which allows bi-directional transmissions using only a single fiber cable. When auto-negotiation is selected, these units will automatically tailor themselves to convert both half-duplex and full-duplex signals, according to IEEE802.3u standards. LED indicators signal the power status of the converter, UTP port speed, Link, and duplex status, FX port Link and duplex status. The stand-alone adapter type converter may also be concentrated into FMC-CH17 chassis.

Features

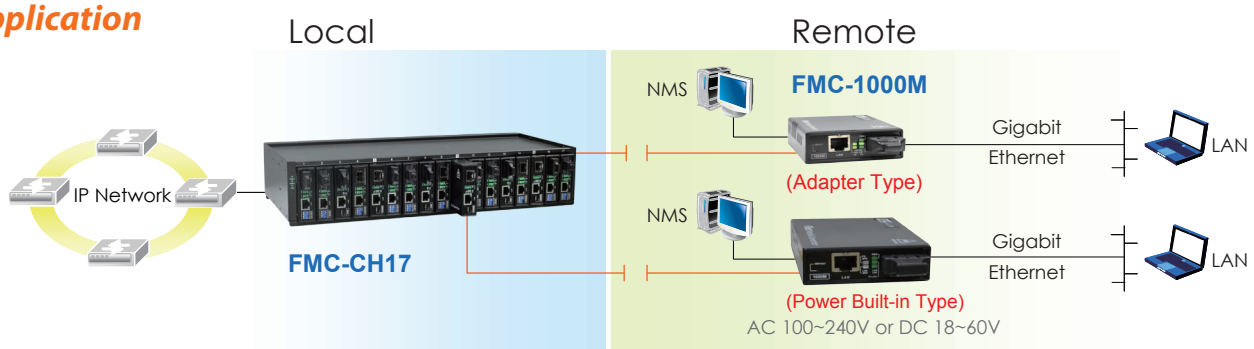
- 10/100/1000Base-T to 1000Base-X Converter
- Auto-Cross over for MDI/MDIX in TP port
- Auto-Negotiation or Manual mode in TP port
- Support flow control Enable or Disable
- Support Jumbo Frame 9K Packet
- Ingress/Egress Bandwidth control
- Support 802.3ah-OAM/IP in-band management
- Firmware upgrade via Web
- Management Password Setting
- Dying gasp (remote power failure detection)
- Support Link Fault Pass Through (LFP) Function
- Support Auto Laser Shutdown (ALS) Function
- Web management on stand-alone.
- Support On-Line F/W upgrade (local) by the Web manager
- Support 16 Tag VLAN Group
- RMON counters

Specifications

Optical Interface	Connector	1x9 (SC, ST, FC)
	Data rate	1000Mbps
	Duplex mode	Full duplex
	Fiber	MM 50/125μm, 62.5/125μm
		SM 9/125μm
	Distance	MM 550m, SM 20/40km
		WDM 20/40km
	Wavelength	MM 1310nm, SM 1310, 1550nm
		WDM 1310Tx/1550Rx (Type A)
		1550Tx/1310Rx (Type B)
Electrical Interface	Connector	RJ-45
	Data rate	10Mbps, 100Mbps, 1000Mbps
	Duplex mode	Half / Full duplex
	Cable	10Base-T Cat.3, 4, 5, UTP
		100Base-TX Cat.5, 5e or higher

Standards	IEEE 802.3, IEEE 802.3u IEEE 802.3ab, 802.3z
Indications	LED (Power, FX-Link, LAN Speed, LAN Link)
Power Input	Adapter Type: DC 12V
	Power Built-in Type : AC 100 ~ 240V
	Power Built-in Type : DC 18 ~ 60V
Power Consumption	< 3W
Dimensions (D x W x H)	Adapter Type : 108 x 73.4 x 23mm
	Power Built-in Type : 135 x 73.4 x 23mm
Weight	Adapter Type : 120g
	Power Built-in Type : 140g
Temperature	0 ~ 50°C (Operating), -10 ~ 70°C (Storage)
Humidity	10 ~ 90% non-condensing
Certification	CE, FCC, RoHS compliant
MTBF	65,000 hrs

Application



Ordering Information

Model Name	Description
FMC-1000M	10/100/1000Base-T to 1000Base-X web smart OAM/IP managed media converter Adapter Type
FMC-1000M-AC, DC	10/100/1000Base-T to 1000Base-X web smart OAM/IP managed media converter with AC or DC Power
FMC-1000M-WM	10/100/1000Base-T to 1000Base-X web smart OAM/IP managed media converter Adapter Type with Wall Mount Kits
FMC-1000M-WM-AC, DC	10/100/1000Base-T to 1000Base-X web smart OAM/IP managed media converter with AC or DC Power and Wall Mount Kits

Connector Type	Connectivity Distance
SC, ST, FC	001: 550m 020: 20km 040: 40km 20A: WDM 20km B type 40A: WDM 40km A type 20B: WDM 20km B type 40B: WDM 40km B type

Wall-Mount Type

Non Wall-Mount Type

Power Type

FMC – 1000M – □□

Example: FMC – 1000M – DC

Specifications & design are subject to change without prior notice. Please visit CTC Union website for more details.

NEW

FMC-1000MS

10/100/1000Base-T to 100/1000Base-X SFP Web Smart OAM Managed Converter

The FMC-1000MS family are Gigabit Ethernet 10/100/1000Base-T to 100/1000Base-X Web Smart OAM/IP managed fiber media converters, which provide simple control and setting function on each Ethernet port through out of band network via a Web browser. The FMC-1000MS media converters give you the fiber cabling connector, SFP-LC Both multi-mode and single mode converter models are available as well as BiDi which allows bi-directional transmissions using only a single fiber cable. When auto-negotiation is selected, these units will automatically tailor themselves to convert both half-duplex and full-duplex signals, according to IEEE802.3u standards. LED indicators signal the power status of the converter, UTP port speed, Link, and duplex status, FX port Link and duplex status. The stand-alone adapter type converter may also be concentrated into FMC-CH17 chassis.

Features

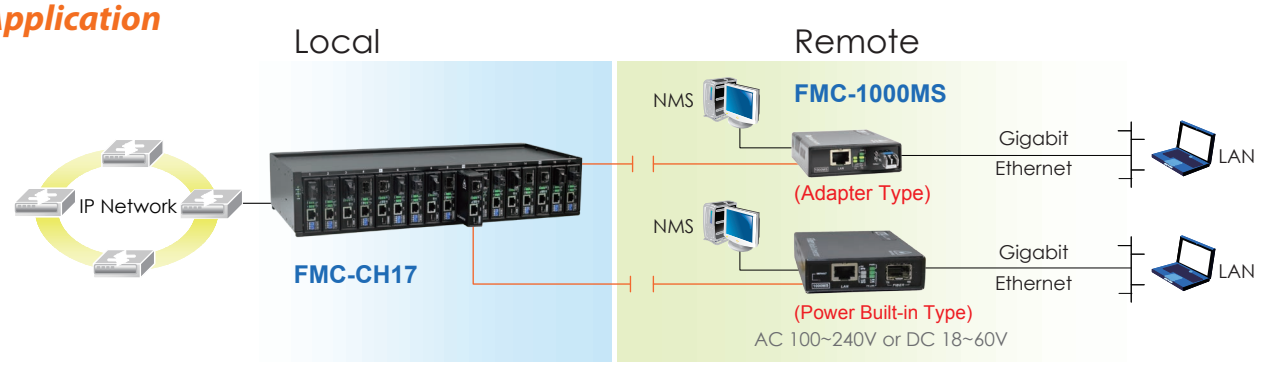
- 10/100/1000Base-T to 100/1000Base-X Converter
- Auto-Cross over for MDI/MDIX in TP port
- Auto-Negotiation or Manual mode in TP port
- Supports flow control Enable or Disable
- Supports Jumbo Frame 9K Packet
- Ingress/Egress Bandwidth control
- Supports IEEE802.3ah OAM management
- Firmware upgrade via Web
- Digital Diagnostic (DOM) SFP Support
- Management Password Setting
- Dying gasp (remote power failure detection)
- Supports Link Fault Pass-Through (LFPT) Function
- Supports Auto Laser Shutdown (ALS) Function
- Web management on stand-alone.
- Supports D/D function for SFP fiber transceiver
- Supports On-Line F/W upgrade (local) by the Web manager
- Supports 16 Tag VLAN Group
- RMON counters

Specifications

Optical Interface	Connector	SFP LC
	Data rate	125/1250Mbps
	Duplex mode	Full duplex
	Fiber	MM 50/125μm, 62.5/125μm
		SM 9/125μm
	Distance	MM 2km, SM 15/30km
		WDM 20/40km
	Wavelength	MM 1310nm, SM 1310,1550nm
		WDM 1310Tx/1550Rx (Type A)
		1550Tx/1310Rx (Type B)
Electrical Interface	Connector	RJ-45
	Data rate	10Mbps, 100Mbps, 1000Mbps
	Duplex mode	Half / Full duplex
	Cable	10Base-T Cat.3, 4, 5, UTP
		100Base-TX Cat.5, 5e or higher

Standards	IEEE 802.3, IEEE 802.3u IEEE 802.3ab, 802.3z
Indications	LED (Power, FX-Link, LAN Speed, LAN Link)
Power Input	Adapter Type: DC 12V
	Power Built-in Type : AC 100 ~ 240V
	Power Built-in Type : DC 18 ~ 60V
Power Consumption	< 3W
Dimensions (D x W x H)	Adapter Type : 108 x 73.4 x 23mm
	Power Built-in Type : 135 x 73.4 x 23mm
Weight	Adapter Type : 120g
	Power Built-in Type : 140g
Temperature	0 ~ 50°C (Operating), -10 ~ 70°C (Storage)
Humidity	10 ~ 90% non-condensing
Certification	CE, FCC, RoHS compliant
MTBF	65,000 hrs

Application



Ordering Information

Model Name	Description
FMC-1000MS	10/100/1000Base-T to 100/1000Base-X SFP web smart managed media converter (optional SFP module) Adapter Type
FMC-1000MS-AC,DC	10/100/1000Base-T to 100/1000Base-X SFP web smart managed media converter (optional SFP module) with AC or DC Power
FMC-1000MS-WM	10/100/1000Base-T to 100/1000Base-X SFP web smart managed media converter (optional SFP module) Adapter Type with Wall Mount Kits
FMC-1000MS-WM-AC	10/100/1000Base-T to 100/1000Base-X SFP web smart managed media converter (optional SFP module) with AC or DC Power and Wall Mount Kits

Wall-Mount Type

Non Wall-Mount Type

Power Type

FMC – 1000MS – □□

Example: FMC – 1000MS – DC

FMC-10/100i

10/100Base-TX to 100Base-FX
In-Band Managed Media Converter

NEW

The FMC-10/100i family are Fast Ethernet 10/100Base-TX to 100Base-FX In-band managed media converters, which give you the options to choose from the most popular fiber cabling connectors, ST, SC or FC. With advanced features like bandwidth control, this media converter is targeted for customer premises equipment in metro LAN, campus, enterprise and FTTx applications. By offering in-band management, this converter can be completely controlled and monitored from a centrally located managed rack controlling all converter settings including band-width control, duplex, and speed configuration. This media converter is completely transparent to Layer 2 and Layer 3 protocols including IEEE 802.1q, VLAN tag, Q in Q, STP, IPX, IP, etc.

Features

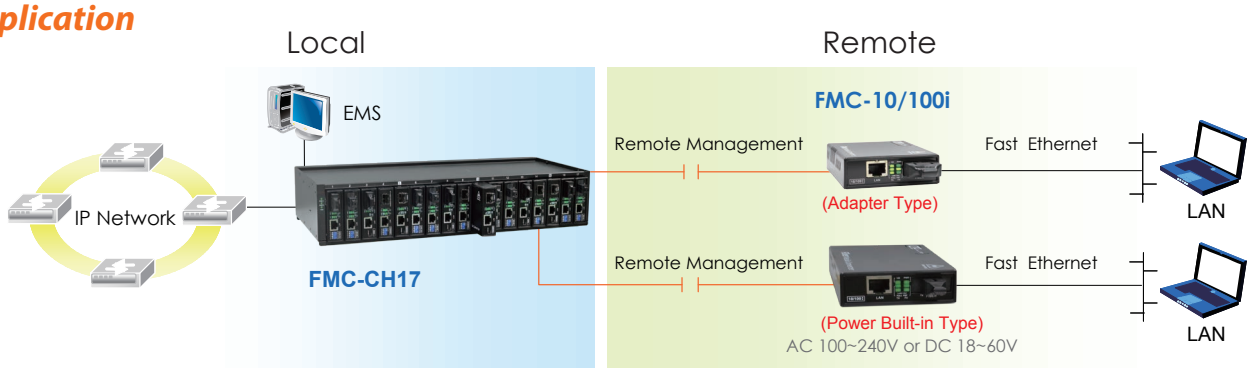
- 10/100Base-TX to 100Base-FX Converter
- Auto-Negotiation or forced mode
- Auto MDI/MDIX
- Forward 2046 bytes (Max.) packets in switch mode
- Forward 9K jumbo packets in converter mode
- Supports Q in Q double tagged frame transparent
- Supports IEEE 802.1q Tag VLAN pass thru
- Supports local / remote In-band management (Monitor and Configure) by the SNMP manager with FRM220-10/100i
- Bandwidth control (Nx32K or Nx512Kbps)
- Supports flow control (Pause)
- Supports remote CPE power fail detect (dying gasp)
- Supports Far End Fault Indication (FEFI)
- Supports Link Fault Pass-Through (LFPT)
- Supports Loop Back Test
- Supports RMON counter
- Auto Laser Shutdown (ALS)
- Fiber Hardware Reset (FHR)
- Online local / remote f/w upgrade

Specifications

Optical Interface	Connector	1x9 (SC, ST, FC)
	Data rate	125Mbps
	Duplex mode	Full duplex
	Fiber	MM 62.2/125µm, 50/125µm. SM 9/125µm
	Distance	MM 2km, SM 15/30km WDM 20/40km
	Wavelength	MM 1310nm, SM 1310,1550nm WDM 1310Tx/1550Rx (Type A) 1550Tx/1310Rx (Type B)
Standards	IEEE 802.3, IEEE 802.3u	
Power Input	Adapter Type : DC 12V	
	Power Built-in Type : AC 100 ~ 240V	
	Power Built-in Type : DC 18 ~ 60V	
LEDs	Power, FX Link, TX SPD, TX Link, TX Duplex, FEF	

Electrical Interface	Connector	RJ-45
	Data rate	10Mbps, 100Mpbs
	Duplex mode	Half / Full duplex
	Cable	10Base-T Cat.3, 4, 5, UTP 100Base-TX Cat.5, 5e
	Distance	100 meters
Power Consumption	< 3W	
Temperature	0 ~ 50°C (Operating), -10 ~ 70°C (Storage)	
Humidity	10 ~ 90% non-condensing	
Dimensions (D x W x H)	Adapter Type : 108 x 73.4 x 23mm	
	Power Built-in Type : 135 x 73.4 x 23mm	
Weight	Adapter Type : 120g	
	Power Built-in Type : 140g	
Certification	CE, FCC, RoHS compliant	
MTBF	65,000 hrs	

Application



Ordering Information

Model Name	Description
FMC-10/100i	10/100Base-TX to 100Base-FX In-band managed media converter Adapter Type
FMC-10/100i-AC, DC	10/100Base-TX to 100Base-FX In-band managed media converter with AC or DC Power
FMC-10/100i-WM	10/100Base-TX to 100Base-FX In-band managed media converter Adapter Type with Wall Mount Kits
FMC-10/100i-WM-AC, DC	10/100Base-TX to 100Base-FX In-band managed media converter with AC or DC Power and Wall Mount Kits

Connector Type	Connectivity Distance
SC, ST, FC	002: 2km 015: 15km 030: 30km 20A: WDM 20km A type 20B: WDM 20km B type 40A: WDM 40km A type 40B: WDM 40km B type

Wall-Mount Type

Non Wall-Mount Type

Power Type
FMC – 10/100i – □□
Example: FMC – 10/100i – DC

NEW

PHB-200

Managed SFP Patching Hub, 20x 100/1000Base-T to 20x 100/1000Base-X SFP

PHB-200 is a 20-channel SFP patching hub that converts Ethernet copper 100/1000Base-TX to SFPs working at 100Mbps and 1000Mbps. PHB-200 can connect to any RJ-45 Ethernet switch and supports any third-party standard SFP module from any SFP vendor. PHB-200 can also be used as an Ethernet copper-to-fiber media converter. With different kinds of fiber optic media, both multi-mode and single mode fiber are available as well as BiDi which allows bi-directional transmissions using only a single fiber to extend the distance of Fast Ethernet and Gigabit Ethernet networks. With SNMP and Web-based management, the network administrator can monitor, configure and control the activity of PHB-200 remotely.

Features

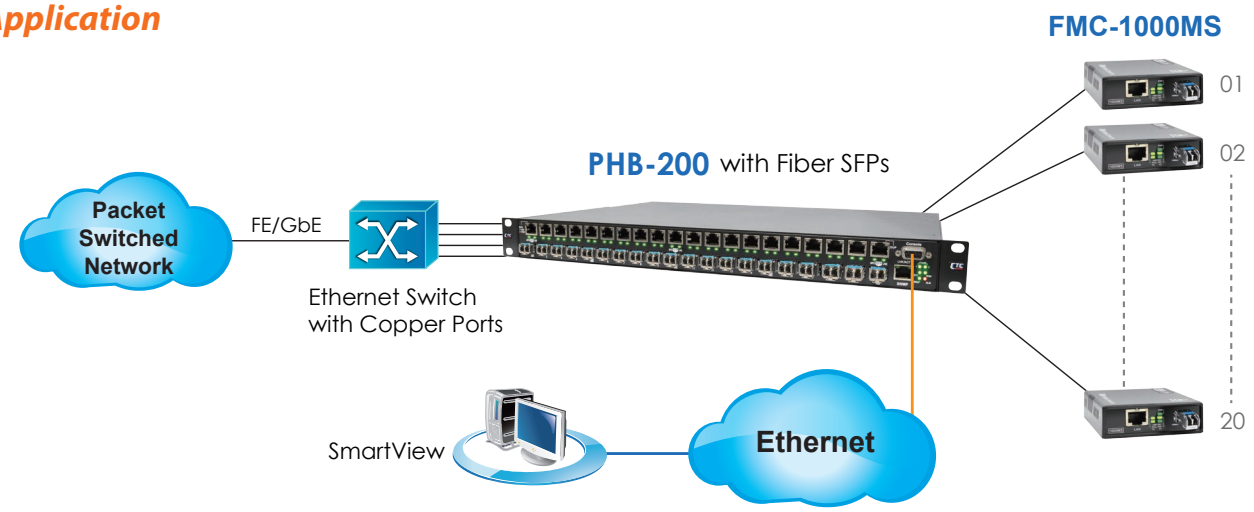
- 1U" Height 19" 20 channels SFP patching hub
- 20-port 100/1000Base-T to 20-port 100/1000Base-X SFP
- Auto MDI/MDIX in TP port
- Auto-Negotiation in TX port
- Supports hot-swappable SFPs working at 100 Mbps and 1000 Mbps
- **Supports Web, Telnet, SNMP Management (PHB-200M)**
- Local configuration via DB9 port
- Supports Link Pass-Through & Link loss Alarm
- Supports any third-party standard SFP module
- Supports SFP DDMI
- Layer 1 wire-speed conversion with fully transparent function
- Available in 3 types : power built-in AC, DC, AC+DC

Specifications

Optical Interface	Connector	SFP LC
	Number of port	20
	Data rate	100/1000Mbps
	Duplex mode	Full duplex
	Fiber	MM 50/125um, 6.25/125um, SM 9/125um
	Distance	MM 2km, SM 15/30/50/80/120km, WDM 20/40/60/80km
	Wavelength	1310nm, 1550nm, CWDM 1471nm ~ 1611nm
Management	Console, Web, Telnet, SNMP	
Control Port	RS-232 DCE, DB-9, female	
Standards	IEEE 802.3, 802.3u, 802.3ab, 802.3z, 802.3x	
Indications	Power FX-Link, Duplex, TX-Link/Act, TX-Speed	

Electrical Interface	Connector	RJ-45
	Number of port	20
	Data rate	10/100/1000Mbps
	Duplex mode	Half / Full duplex
	Cable	10Base-T Cat. 3, 4, 5 UTP 100/1000Base-T Cat.5, 5e or higher
Power	100 ~ 240VAC, 18 ~ 72 VDC	
Power Consumption	AC : 105 VA DC : 70 W	
Dimensions	180 x 440 x 44mm (D x W x H)	
Weight	3kg	
Temperature	0 ~ 50°C (Operating), -10 ~ 70°C (Storage)	
Certification	CE, FCC, RoHS compliant	

Application



Ordering Information

Model Name	Description
PHB-200M-AC, DC, AD	**Managed** 20-port 100/1000-TX to 20-port 100/1000-X SFP, built-in AC, DC or AD (AC+DC) Power
PHB-200-AC, DC, AD	20-port 100/1000-TX to 20-port 100/1000-X SFP, built-in AC, DC or AD (AC+DC) Power

Power Type

PHB – 200 □ – □□

Example: PHB – 200M – DC

MX20-3155

Dual Channel WDM MUX/DeMUX

MX20-3155 is a dual channel, passive, protocol transparent, WDM multiplexer/demultiplexer which utilizes two popular WDM lambda channels of 1310nm and 1550nm. The demultiplexed channels utilize industry standard FC connectors while the multiplexed WAN uses a duplex LC connection. Housed in a convenient 1RU 19" metal chassis, MX20-3155 offers two completely independent and isolated channels for effectively doubling the utilization of a bi-directional fiber pair.

Features

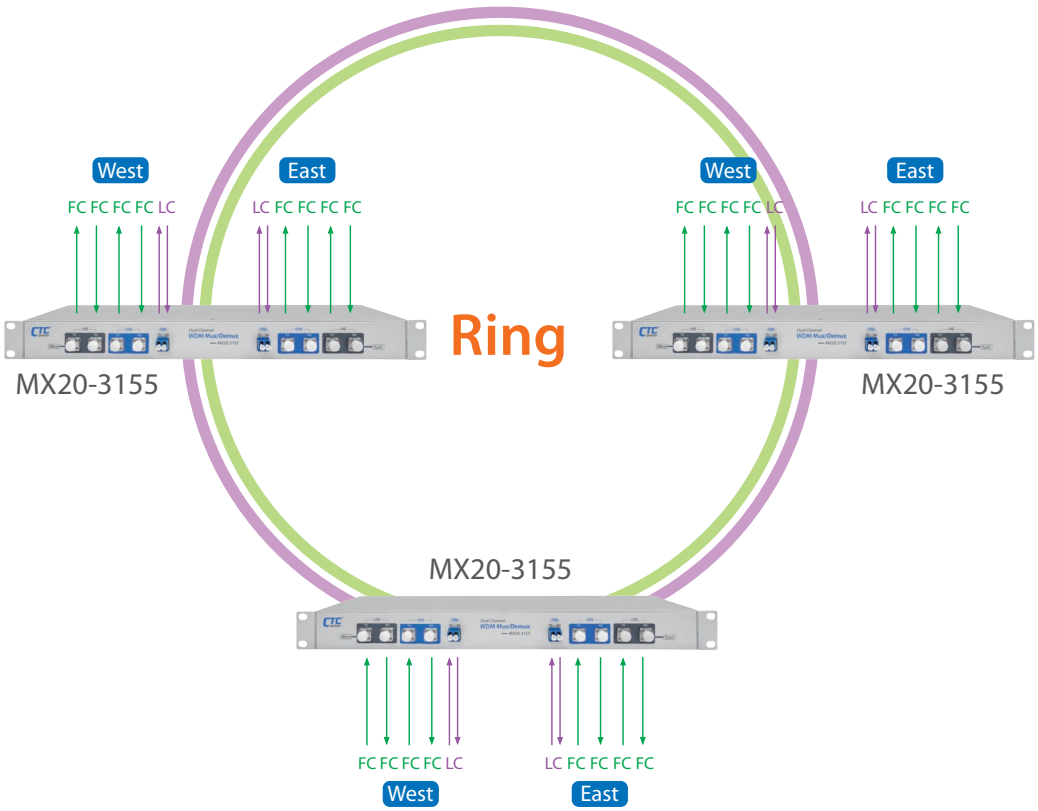
- Full native mode performance
- Optical connectors
- Passive model requires no power
- Protocol transparent, no data rate limitation
- Utilizes two popular WDM wavelengths

Specifications

Operating Wavelengths (nm)	1310/1550
Insertion Loss (max.) (dB)	0.6 with connectors for all ports
Isolation(db)	≧25
PDL (dB)	≧0.05
Retum Loss (dB)	≧55

Directivity (dB)	≧55
Temperature	-10 ~ 70°C (Operating) -40 ~ 85°C (Storage)
Fiber Type	Corning© Singlemode SMF-28E
Dimensions	432 x 150 x 43mm (D x W x H)

Application



Ordering Information

Model Name	Description
MX20-3155	1U high 19"2 channels (1310,1550) WDM MUX/DeMUX

Specifications & design are subject to change without prior notice. Please visit CTC Union website for more details.

SML40-CH04

MUX/DeMUX Passive Chassis

SML40-CH04 is a 1U 19-inch CWDM passive rack that features 4 cards capacity and supports SML-40-8181-L, 8+1 channels MUX/DEMUX cards. The 8+1 channels MUX/DEMUX card is a modular design for CWDM wavelengths including 1471nm, 1491nm, 1511nm, 1531nm, 1551nm, 1571nm, 1591nm, and 1611nm. The 1311nm CWDM channel is accessible separately. The MUX/DEMUX cards provide the primary wave division and combination functions for CWDM. Line side wave lengths require translation to client side equipment via a transponder card. The unique design makes the SML40-CH04 one of the compact CWDM solutions in the industry.

Features

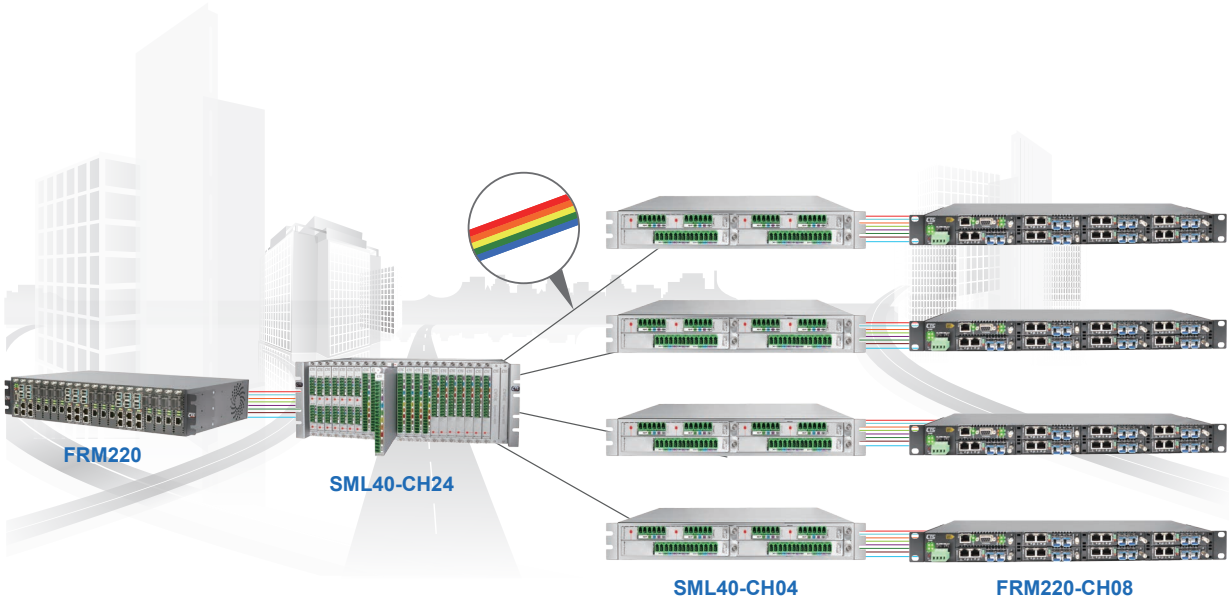
- 4-Slot for MUX/DEMUX card
- 1U, 19-inch Rack Mount
- Passive model requires no power
- Plug & Play Operation
- Optical connectors: LC connectors, SMF 9/ 125um
- Protocol transparent, no limitation
- Utilizes industry standard ITU-T CWDM wavelengths

Specifications

Connectors	LC	
Physical Specifications	Dimensions (D x W x H)	1U passive chassis : 280 x 438 x 43 mm
		Mux/ Demux card : 260 x 240 x 18 mm

Environmental Specifications	Operating 0 ~ 50°C
	Storage 0 ~ 70°C
	Relative humidity 5% ~ 90% non-condensing
Certification	RoHS compliant

Application



Ordering Information

Model Name	Description
SML40-CH04	1U 19" 4-slot chassis
SML40-CH24	4U 19" 24-slot chassis

Chassis Type
SML40 –□□□□
Example: SML40 – CH04

SML40-MD

8-Ch/5-Ch MUX/DeMUX with Monitor Port

The SML-40-MD80 is an 8 channel MUX/DeMUX modular design card for CWDM wavelengths including 1471nm, 1491nm, 1511nm, 1531nm, 1551nm, 1571nm, 1591nm, 1611nm. The SML-40-MD81 is 8 channels MUX/DeMUX modular design card with monitor port. The SML-40-MD51 is a 5 channel MUX/DeMUX modular design card for CWDM wavelengths including 1491nm, 1511nm, 1571nm, 1591nm, 1611nm. The SML-40-MD40 is a dual 4 channels Mux/Demux card with wavelengths including 1471, 1491, 1551, 1531nm. The MUX/DEMUX cards provide the primary wave division and combination functions for CWDM. Line side wave lengths require translation to client side equipment via a transponder card.

Features

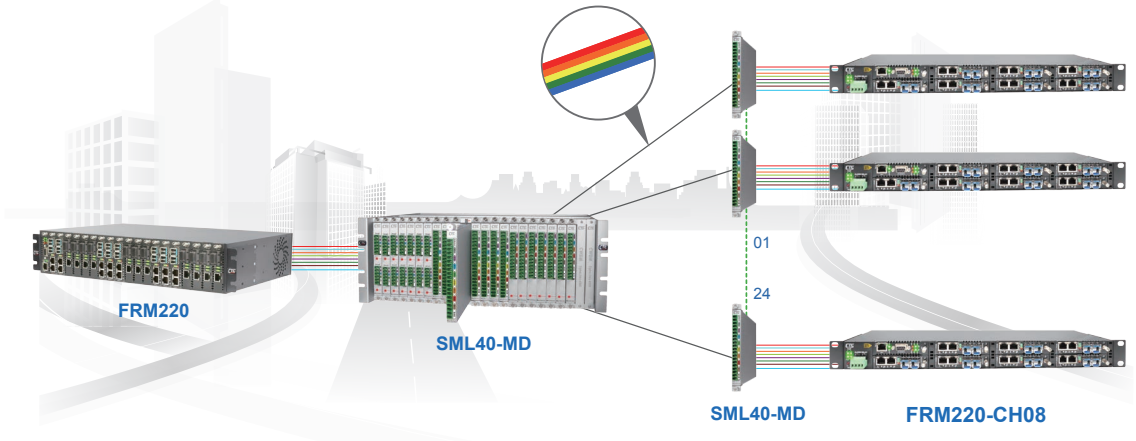
- Full native mode performance
- Optical connectors : LC connectors, SMF 9/125um (UPC or APC)
- Optical Input/Output monitor port
- Passive model requires no power
- Protocol transparent, no limitation
- Utilizes industry standard ITU CWDM wavelength

Specifications

Connector	LC
Standard	ITU-T G.694.2
Wavelength	1311,1471,1491,1511,1531,1551, 1571,1591,1611nm
Insertion Loss	< 3.5dB for CWDM wavelength
Return Loss	> 45dB
Dimensions	260 x 240 x 18.2mm (D x W x H)

Weight	0.6kg
Temperature	0 ~ 50°C (Operating), -10 ~ 70°C (Storage)
Humidity	10 ~ 90% non-condensing
Certification	CE, FCC, RoHS compliant
MTBF	75,000 hrs

Application



Ordering Information

Model Name	Description
SML40-MD80-UPC-Wavelength	8-Ch Mux/Demux Card **1471 / 1491 / 1511 / 1531 / 1551 / 1571 / 1591 / 1611**nm LC UPC wavelength selected from 1271 ~ 1611nm
SML40-MD80-APC-Wavelength	8-Ch Mux/Demux Card **1471 / 1491 / 1511 / 1531 / 1551 / 1571 / 1591 / 1611**nm LC APC wavelength selected from 1271 ~ 1611nm
SML40-MD81-UPC-Wavelength	8-Ch Mux/Demux Card **1471 / 1491 / 1511 / 1531 / 1551 / 1571 / 1591 / 1611**nm with Monitor port. LC UPC wavelength selected from 1271 ~ 1611nm
SML40-MD81--APC-Wavelength	8-Ch Mux/Demux Card **1471 / 1491 / 1511 / 1531 / 1551 / 1571 / 1591 / 1611**nm with Monitor port. LC APC wavelength selected from 1271 ~ 1611nm
SML40-MD51-UPC-Wavelength	5-Ch Mux/Demux card **1491 / 1511 / 1571 / 1591 / 1611**nm with Monitor Port LC UPC wavelength selected from 1271 ~ 1611nm
SML40-MD51-APC-Wavelength	5-Ch Mux/Demux card **1491 / 1511 / 1571 / 1591 / 1611**nm with Monitor Port LC APC wavelength selected from 1271 ~ 1611nm
SML40-2D40-UPC-Wavelength	Dual 4 ch Mux/Demux card, single direction **1471 / 1491 / 1511 / 1531**nm LC UPC wavelength selected from 1271 ~ 1611nm
SML40-2D40-APC-Wavelength	Dual 4 ch Mux/Demux card, single direction **1471 / 1491 / 1511 / 1531**nm LC APC wavelength selected from 1271 ~ 1611nm
SML40-1D80-UPC-Wavelength	8-Ch Mux/Demux card, single direction **1471 / 1491 / 1511 / 1531 / 1551 / 1571 / 1591 / 1611**nm LC UPC wavelength selected from 1271 ~ 1611nm
SML40-1D80-APC-Wavelength	8-Ch Mux/Demux card, single direction **1471 / 1491 / 1511 / 1531 / 1551 / 1571 / 1591 / 1611**nm LC APC wavelength selected from 1271 ~ 1611nm
SML40-MD-31/CWDM-UPC	1310nm plus CWDM **1470 ~ 1610**nm Mux/Demux LC UPC
SML40-MD-31/CWDM-APC	1310nm plus CWDM **1470 ~ 1610**nm Mux/Demux LC APC

SML40 –□□□□–□□□–□□□□□□□□□

Example: SML40 – MD80 – UPC – Wavelength

Specifications & design are subject to change without prior notice. Please visit CTC Union website for more details.

SML01-10G-SXX

10G 3R Transponder with Optical Line Protection

The SML01–10G–SXX is a 10G fiber to fiber 3R repeater and transponder. Based on 10 Gigabit Fiber standards, the transponder support SFP+ to XFP (SX) or XFP to XFP (XX) fiber connections. 1+1 Automatic optical line Protection Switching is supported for the aggregate XFP fiber ports. The transponder is protocol transparent, providing 3R (Re-amplification, Re-shaping and Re-clocking) regeneration between these different optical module types. One of the major applications for this converter is in connecting proprietary transceiver equipment to CWDM or DWDM when these 'colored' optical modules are not available for the proprietary equipment. With transparent bi-directional forwarding capability between the 2 fiber media, the SML01–10G–SXX brings you the best and simplest solution for your 10G conversion between fiber and fiber.

Features

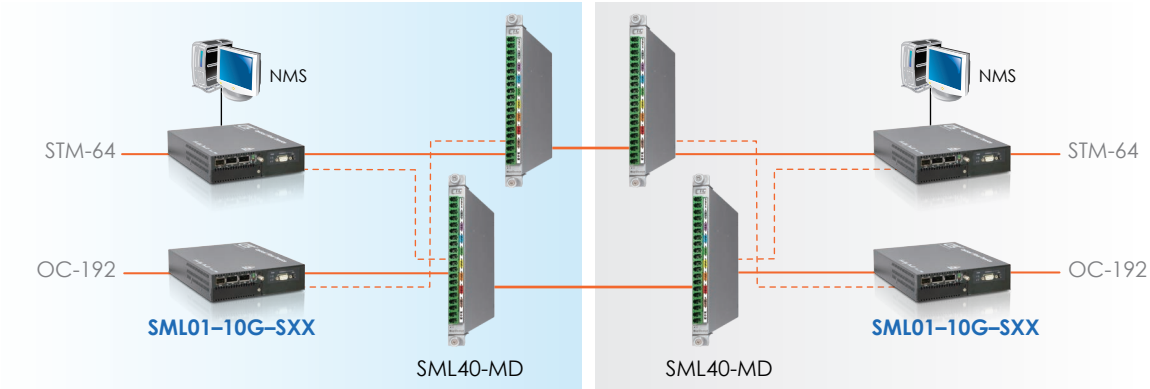
- Multiple protocol supported 10G Ethernet, STM-64, OC-192, G.709 OTU2, Fiber Channel (8 x FC)
- Network management via Web, Telnet, SNMP with NMC card inserted
- Protocol transparent 3R fiber media transponder / repeater
- (Re-amplification, Re-shaping and Re-clocking)
- Promotes flexibility and eases management with pluggable SFP+ or XFP transceiver
- Features two 10G ports offering multiservice 10G transponder and regenerator function
- Built-in self test (BIST) function
- Provides superior optics capabilities resulting in extended transport distances for regional application.
- Extend 10G Ethernet transmission over fiber useful as a 'Transponder' in CWDM or DWDM systems for 10G Ethernet/ Fiber Channel/STM-64
- Supports Client / Line loop back tests
- Serial console for stand-alone management
- XFP power supplies: +5.0V, -5.2V, +3.3V and +1.8V
- Supports reference clock output
- Supports 1+1 optical line protection

Specifications

Optical Interface	Connector	LC
		1x Line SFP+ to 2x Client XFP
		1x Line SFP+ to 1x Client XFP
		1x Line XFP to 1x Client XFP
	Traffic Format	OC-192/STM-64 (9.95328Gbps)
		1 Gigabit Ethernet (1.25Gbps)
		10 Gigabit Ethernet LAN(10.3125Gbps)
		G.709 OTU2 (10.709225Gbps)
		Fiber Channel
		1xFC(1.062 Gbps); 2xFC(2.125 Gbps);
		4xFC(4.25 Gbps); 8xFC(8.5 Gbps);
		10xFC(10 Gbps)
	Regeneration	Re-amplification
		Re-shaping, Re-timing

Optical Interface	Loopback	Line / Client
	Fiber	SM 9/125µm
		MM 50/125µm or 62.5/125µm
	Wavelength	Depends on SFP+ or XFP
Indications	LED (Power, Line Link, Client Link, Test, Loop back, Port Active, Alarm)	
Power Input	Standalone : AC, DC option	
Power Consumption	<10W	
Dimensions	155 x 88 x 23mm (D x W x H)	
Weight	150g	
Temperature	0 ~ 50°C (Operating), -10 ~ 70°C (Storage)	
Humidity	10 ~ 90% non-condensing	
Certification	CE, FCC, RoHS compliant	
MTBF	65,000 hrs	

Application



Ordering Information

Model Name	Description
SML01-10G-SXX-AC, DC, AD	Console management, standalone 10G 3R transponder with AC, DC or AD (AC+DC) Power
SML01-10G-SXX-NM-AC/DC/AD	SNMP management, standalone 10G 3R transponder with AC, DC or AD (AC+DC) Power

Note: SML01-10G-SXX-AC, DC, AD = (FRM220-10G-SXX) + (CH02M-AC, DC or AD)
SML01-10G-SXX-NM-AC, DC, AD = (FRM220-10G-SXX) + (CH02/SNMP-AC, DC or AD)

Power Type
SML01-10G-SXX – □□
Example: SML01-10G-SXX – AD

SML01-10G-SS

10G 3R Transponder

The SML01-10G-SS is a 10G fiber to fiber 3R repeater and transponder. Based on a number of 10 Gigabit Fiber standards, these transponders support SFP+ to SFP+ (SS) fiber connections. The transponders are protocol transparent, providing 3R (Re-amplification, Re-shaping and Re-clocking) regeneration between these different optical module types. One of the major applications for this converter is in connecting proprietary transceiver equipment to CWDM or DWDM when these 'colored' optical modules are not available for the proprietary equipment. With transparent bi-directional forwarding capability between the 2 fiber media, the SML01-10G-SS brings you the best and simplest solution for your 10G conversion between fiber and fiber.

Features

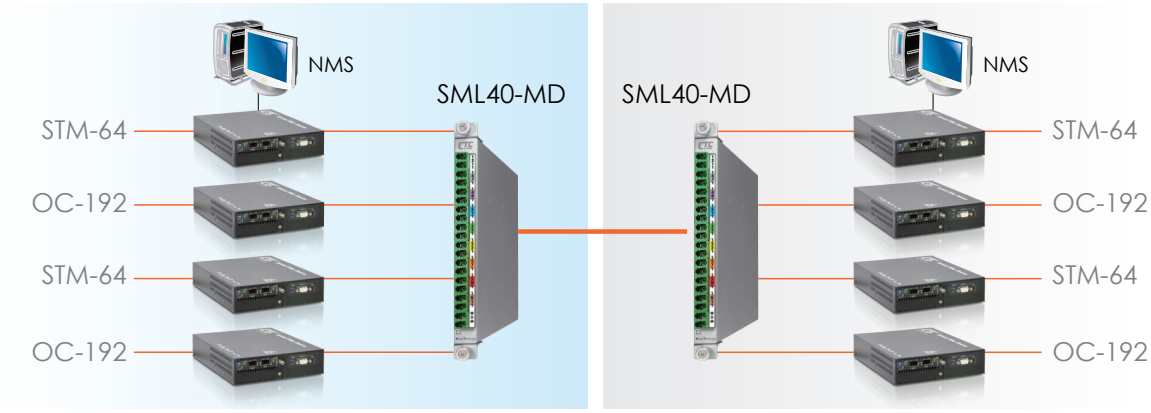
- Multiple protocol supported 10G Ethernet, STM-64, OC-192, G.709 OTU2, Fiber Channel (8 x FC)
- Network management via Web, Telnet, SNMP with NMC card inserted
- Protocol transparent 3R fiber media transponder / repeater (Re-amplification, Re-shaping and Re-clocking)
- Promotes flexibility and eases management with pluggable SFP+ transceiver
- SFP+ power supplies: +3.3V
- Features two 10G ports offering multiservice 10G transponder and regenerator function
- Provides superior optics capabilities resulting in extended transport distances for regional application.
- Extend 10G Ethernet transmission over fiber
- Useful as a 'Transponder' in CWDM or DWDM systems for 10G Ethernet/Fiber Channel/STM-64
- Supports Client / Line loop back tests
- Serial console for stand-alone management

Specifications

Optical Interface	Connector	LC, 1x Line SFP+ to 1x Client SFP+
	Traffic Format	OC-192/STM-64 (9.95328Gbps)
		10 Gigabit Ethernet LAN(10.3125Gbps)
		G.709 OTU2 (10.709225Gbps)
		Fiber Channel
		1xFC(1.062 Gbps); 2xFC(2.125 Gbps);
		4xFC(4.25 Gbps); 8xFC(8.5 Gbps);
		10xFC(10.51875 Gbps)
	Regeneration	Re-amplification
		Re-shaping, Re-timing
	Loopback	Line / Client
	Fiber	SM 9/125μm
		MM 50/125μm or 62.5/125μm

Optical Interface	Wavelength	CWDM 1470 ~ 1610nm
		DWDM 1529.55 ~ 1565.50nm
Indications	LED (Power, Line Link, Client Link, Test, Loop back, Port Active, Alarm)	
Power Input	Standalone : AC, DC option	
Power Consumption	<10W	
Dimensions	155 x 88 x 23mm (D x W x H)	
Weight	150g	
Temperature	0 ~ 50°C (Operating), -10 ~ 70°C (Storage)	
Humidity	10 ~ 90% non-condensing	
Certification	CE, FCC, RoHS compliant	
MTBF	65,000 hrs	

Application



Ordering Information

Model Name	Description
SML01-10G-SS-AC, DC, AD	Console management, standalone 10G 3R transponder with AC, DC or AD (AC+DC) Power
SML01-10G-SS-NM-AC, DC, AD	SNMP management, standalone 10G 3R transponder with AC, DC or AD (AC+DC) Power

Note: SML01-10G-SS-AC, DC, AD = (FRM220-10G-SS)+ (CH02M-AC, DC or AD)
SML01-10G-SS-NM-AC, DC, AD = (FRM220-10G-SS) + (CH02/SNMP-AC, DC or AD)

Power Type
SML01-10G-SS – □□
Example: SML01-10G-SS – AD

SML01-4G-3S

4G 2R Transponder with Optical Line Protection

The SML01-4G-3S is a 2R 4G optical regeneration device, which consists of Re-amplification and Re-shaping. The transponder card converts a data signal to the correct wavelength for transmission on a specific channel by supporting SFP optics on both line side and client side interfaces. 1+1 Automatic optical line Protection Switching is supported for the aggregate fiber ports. When the NMC card is placed in the 2-slot chassis with SML01-4G-3S, the management can view the converter card's status, type, version, fiber link status and alarms. The card can be configured to enable or disable the port, reset the port and perform diagnostic loop backs.

Features

- Multiple protocol supported at bit rates 28Mbps to 4.25Gbps (Fast Ethernet, Gigabit Ethernet, OC-3, OC-6, OC-12, OC-24, OC-48, STM-1, STM-4 STM-16, FC-1, FC-2, FC-4)
- Network management via Web, Telnet, SNMP with NMC card inserted
- Local configuration via DB9 console port
- Digital diagnostic monitoring of SFP module
- Perform optical repeater function (Re-amplification, Re-shaping)
- Facility loopback on both Client / Line sides
- 1+1 optic fiber protection
- Link Fault Pass-Through (LFPT)
- Auto Laser Shutdown (ALS)
- Detect transceiver transmitter error alarm

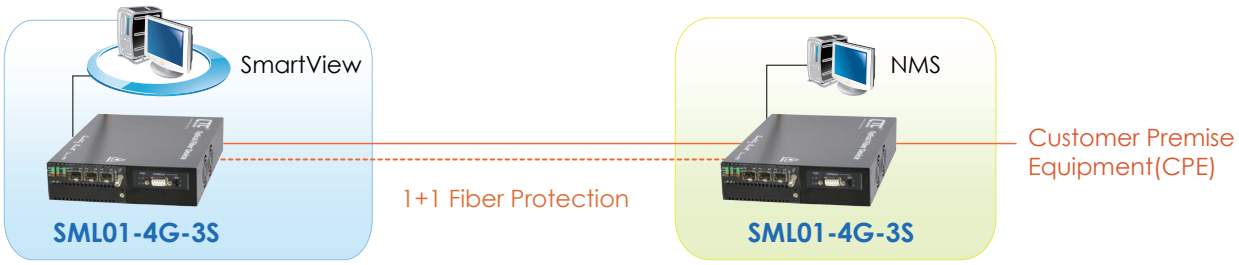
Specifications

Optical Interface	Connector	SFP LC
	Data rate	28Mbps to 4.25Gbps
	Regeneration	Re-amplification
		Re-shaping
	Loop back	Line/Client
	Fiber	MM 62.2/125µm, 50/125µm.
		SM 9/125µm
	Wavelength	MM 850, 1310nm
		SM 1310, 1550nm
		WDM 1310T/1550R, 1550T/1310R
		CWDM 1470 ~ 1610nm

Indications	LED (PWR, Line Link, Client Link, Test, Loop back, Port Active, Alarm)
Power Input	Standalone : AC, DC option
Power Consumption	< 8W
Dimensions	155 x 88 x 23mm (D x W x H)
Weight	120g
Temperature	0 ~ 50°C (Operating), -10 ~ 70°C (Storage)
Humidity	10 ~ 90% non-condensing
Certification	CE, FCC, RoHS compliant
MTBF	65,000 hrs

Application

Managed 4G 2R Transponder with Fiber Protection



Client: Fast Ethernet, Gigabit Ethernet, OC-3, OC-6, OC-12, OC-24, OC-48, STM-1, STM-4 STM-16, FC-1, FC-2

Ordering Information

Model Name	Description
SML01-4G-3S-AC, DC, AD	Console management, standalone 4G 2R transponder with AC, DC or AD (AC+DC) power
SML01-4G-3S -NM-AC, DC, AD	SNMP management, standalone 4G 2R transponder with AC, DC or AD (AC+DC) power

Note: SML01-4G-3S-AC, DC, AD = (FRM220-4G-3S) + (CH02M-AC, DC or AD)
SML01-4G-3S-NM-AC, DC, AD = (FRM220-4G-3S) + (CH02/SNMP-AC, DC or AD)

Power Type
SML01-4G-3S – □□
Example: SML01-4G-3S – AD

SML01-2.7G-3S

2.7G 3R Transponder with Optical Line Protection

The SML01-2.7G-3S is a 3R 2.7G optical regeneration device, which consists of Re-amplification, Re-shaping and Re-timing. The transponder card converts a data signal to the correct wavelength for transmission on a specific channel by supporting SFP optics on both line side and client side interfaces. 1+1 Automatic optical line Protection Switching are supported for the aggregate fiber ports. When the NMC card is placed in the 2-slot chassis with SML01-2.7G-3S, the management can view the converter card's status, type, version, fiber link status and alarms. The card can be configured to enable or disable the port, reset the port and set the desired data rate.

Features

- Multiple protocol supported at bit rates 34.3Mbps to 2.7Gbps (Fast Ethernet, Gigabit Ethernet, OC-3, OC-6, OC-12, OC-24, OC-48,
- STM-1, STM-4 STM-16, FC-1, FC-2)
- Network management via Web, Telnet, SNMP with NMC card inserted
- Link Fault Pass-Through (LFPT)
- Auto Laser Shutdown (ALS)
- Local configuration via DB9 craft port In Stand-alone
- Digital diagnostic monitoring of SFP module
- Perform optical repeater function (Re-amplification, Re-shaping, and Re-clocking)
- Facility loopback on both Client / Line sides
- 1+1 optic fiber protection
- Dip switch setting data rate
- Detect transceiver transmitter error alarm

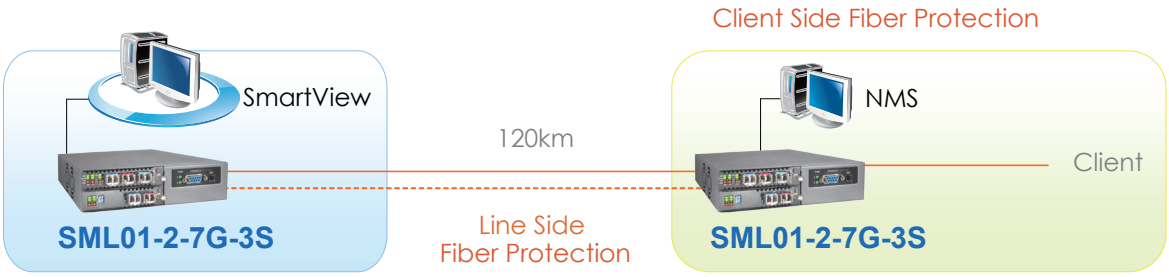
Specifications

Optical Interface	Connector	SFP LC
	Data rate	E3 to OC-48
	Regeneration	Re-amplification
		Re-shaping
		Re-clocking
	Loop back	Line/Client
	Fiber	MM 62.2/125μm, 50/125μm.
		SM 9/125μm
	Wavelength	MM 850, 1310nm
		SM 1310, 1550nm
		WDM 1310T/1550R, 1550T/1310R
		CWDM 1470 ~ 1610nm

Indications	LED (PWR, Line Link, Client Link, Test, Loop back, Port Active, Alarm)
Power Input	Standalone : AC, DC option
Power Consumption	< 10W
Dimensions	155 x 88 x 23mm (D x W x H)
Weight	120g
Temperature	0 ~ 50°C (Operating), -10 ~ 70°C (Storage)
Humidity	10 ~ 90% non-condensing
Certification	CE, FCC, RoHS compliant
MTBF	65,000 hrs

Application

Managed 2.7G 3R Transponder with Fiber Protection



Client: Fast Ethernet, Gigabit Ethernet, OC-3, OC-6, OC-12, OC-24, OC-48, STM-1, STM-4 STM-16, FC-1, FC-2

Ordering Information

Model Name	Description
SML01-2.7G-3S-AC, DC, AD	Console management, standalone 2.7G 3R transponder with AC, DC or AD (AC+DC) Power
SML01-2.7G-3S -NM-AC, DC, AD	SNMP management, standalone 2.7G 3R transponder with AC, DC or AD (AC+DC) Power

Note: SML01-2.7G-3S-AC, DC, AD = (FRM220-2.7G-3S) + (CH02M-AC, DC or AD)
SML01-2.7G-3S-NM-AC, DC, AD =(FRM220-2.7G-3S) + (CH02/SNMP-AC, DC or AD)

Power Type
SML01-2-7G-3S – □□
Example: SML01-2-7G-3S – AD

SML01-1000DS

1G (2R) Transponder

The SML01-1000DS is a fiber to fiber optical media converter and repeater that allows data rates up to 1Gbps. SML01-1000DS supports 2R regeneration, which consists of re-amplification and reshaping. This converter is compatible with fiber interfaces such as 100Mbps Fast Ethernet, 155Mbps STM-1, 4, Fiber Channel 1, 2, and OC3, 12, 24. The SML01-1000DS work as a stand-alone fiber converter. When the SML01-1000DS is placed in the 2-slot chassis with NMC card, the management can view the converter card's status, type and fiber link status.

Features

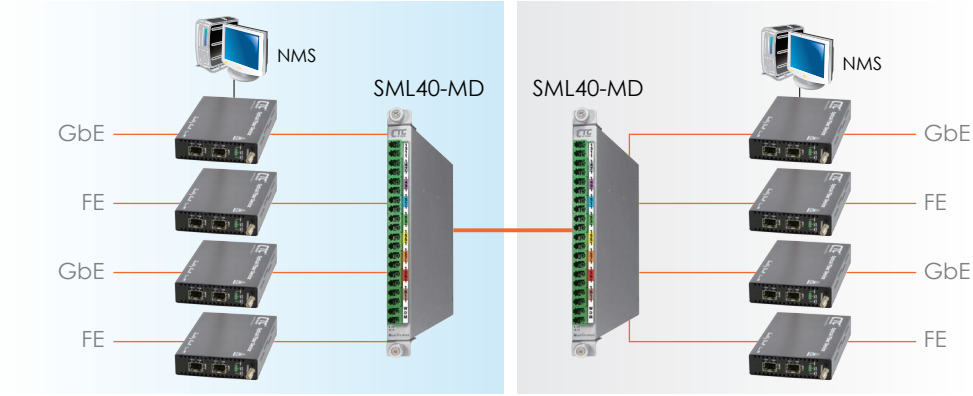
- Transparent fiber media converter / repeater
- Data rate up to 1G
- Network management via terminal or SNMP in CH02 chassis
- Extend transmission from 2km to 120km over fiber
- Perform optical repeater function (Re-amplification & Reshaping)
- Digital diagnostic monitoring of SFP modules

Specifications

Optical Interface	Connector	SFP LC x 2
	Data rate	Up to 1G
	Duplex mode	Full duplex
	Fiber	MM 50/125μm, 62.5/125μm.
		SM 9/125μm
	Distance	MM 550m, 2km, SM 15/30/50/80/120km
		WDM 20/40/60km
	Wavelength	MM 1310nm, SM 1310,1550nm
		WDM 1310Tx/1550Rx (type A)
		1550Tx/1310Rx (type B)

Indications	LED (Power, FX-Link1, FX-Link2)
Power Input	Standalone : AC, DC (Option)
Power Consumption	< 5W
Dimensions	123 x 86 x 20mm (D x W x H)
Weight	130g
Temperature	0 ~ 50°C (Operating), -10 ~ 70°C (Storage)
Humidity	10 ~ 90% non-condensing
Certification	CE, FCC, RoHS compliant
MTBF	65,000 hrs

Application



Ordering Information

Model Name	Description
SML01-1000DS-AC, DC, AD	Console management, standalone 1G 2R transponder with AC, DC or AD (AC+DC) Power
SML01-1000DS-NM-AC, DC, AD	SNMP management, standalone 1G 2R transponder with AC, DC or AD (AC+DC) Powerr

Note: SML01-1000DS-AC, DC, AD = (FRM220-1000DS) + (CH01M-AC, DC or AD)
SML01-1000DS-NM-AC, DC, AD = (FRM220-1000DS) + (CH02/SNMP-AC, DC or AD)

Power Type
SML01-1000DS – □□
Example: SML01-1000DS – AD

SML01-Protection

1+1 Fiber Optical Protection Switch

The Fiber optical protection unit is able to provide fiber path redundancy on a channel by channel basis. These units are particularly well suited for protection in fiber data transmission. The solution includes monitoring capabilities for both working and protection paths. The monitoring is available through the SNMP Management unit. In case of a fiber cut in the protecting path, traffic will be switched over to the protecting path in less than 50 ms.

Features

- 1+1 full optical protection
- Low channel cross talk < -55dB
- Low insertion loss < 5.5dB
- Latch feature, if power is lost the switch remains in its current state
- Protection transition < 50 ms
- Works with any combination of 1 ~16 wavelengths
- Traffic is switched in one of three modes : revertive,non-revertive, manual
- Programmable Rx threshold setting for switch-over
- Optical Interface Type : LC connectors
- Working and protected lines are physically separated fiber

Specifications

Connecter	LC
LEDs	Power System, Working Path, Protection Path, Work mode
Power	AC, DC (Option)
Restoration Time	50ms
Range	Input PWR : +3 ~ -15dBm(TX), -2~-29dBm(RX)
	Detection : -5 ~ -29dBm
Loss	Insertion Loss < 5.5dB, Return Loss > 45dB

Power Consumption	< 5W
Dimensions	155 x 88 x 23mm (D x W x H)
Weight	130g
Temperature	0 ~ 50°C (Operating), 20 ~ 70°C (Storage)
Humidity	10 ~ 90% non-condensing
Certification	CE, FCC, RoHS compliant
MTBF	65,000 hours

Application

Ordering Information

Model Name	Description
SML01-Protection-AC, DC, AD	Console management, standalone 1+1 Optical Protection with AC, DC or AD (AC+DC) Power
SML01-Protection-NM-AC, DC, AD	SNMP management, standalone 1+1 Optical Protection with AC, DC or AD (AC+DC) Power

Note: SML01-Protection-AC, DC, AD = (FRM220-Protection) + (CH01M-AC, DC or AD)
SML01-Protection-NM-AC, DC, AD = (FRM220-Protection) + (CH02/SNMP-AC, DC or AD)

Power Type
SML01-Protection – □□
Example: SML01-Protection – AD

SML01-MX210

2x Gigabit Ethernet Multiplexer

SML01-MX210 is 2-port Gigabit Ethernet Multiplexer which aggregates two wire-speed Gigabit Ethernet services into one 2.5G uplink, reducing the conversion CAPEX and increasing the fiber utilization effectively. The Multiplexer can be used either in point-to-point topology functioning as a media converter for transporting 2 Gigabit Ethernet services over one fiber or in CWDM system working as a wavelength converter for extending the system's transmission capacity doubly. SML01-MX210 is equipped with one 10/100/1000M RJ-45 network management port and three SFP based ports: two Gigabit Ethernet service ports and one 2.5G uplink port, enabling a flexible application as required and realizing a cost effective remote management. Additionally its advanced features such as downlink and uplink loop back, auto laser shutdown and remote network management provide carriers a flexible, reliable and cost-effective two Gigabit Ethernet over one wavelength conversion solution.

Features

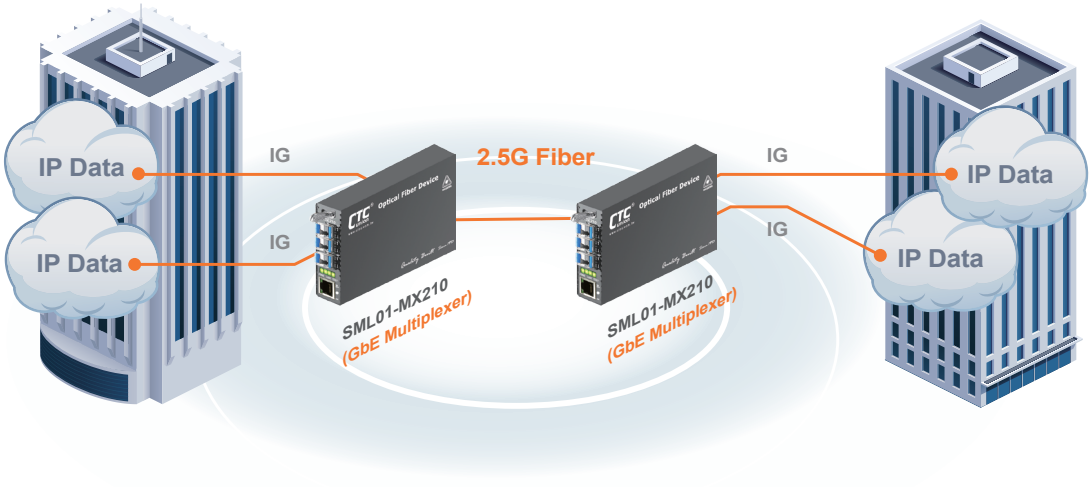
- Local configuration via DB9 craft port in stand-alone (CH01M)
- Forward 9K bytes Jumbo Packets
- Transports two Gigabit Ethernet over one wavelength doubling the CWDM system transmission capacity
- Facility loopback on both Line / client sides
- Auto Laster Shutdown (ALS)
- Hot-swappable SFP module
- Detect transceiver error Alarm
- 10/100/1000M Network management port
- Supports Q in Q double tagged frame transparent
- Supports IEEE 802.1Q Tagging and Port based VLAN
- Supports IEEE 802.1D STP
- Default port and 802.1Q tag priority QoS

Specifications

Optical Interface	Port1/Port2	100Base-FX, 1000Base-X or 2500Base-X
Electrical Interface	Port3	100Base-FX or 1000Base-X
	Port4	RJ45
		10/100/1000Base-T
		MDI/MDIX auto crossover
		IEEE802.3x flow control
Standards	IEEE 802.3, 802.3u, 802.3z, 802.3ab	
LEDs	PWR, Link (Port1, Port2, Port3) Port4: Link/Speed	

Power	AC, DC (Option)
Power Consumption	< 10W
Dimensions	155 x 88 x 23mm (D x W x H)
Weight	120g
Temperature	0 ~ 50°C (Operating) , 0 ~ 70°C (Storage)
Humidity	5 ~ 90% non-condensing
Certification	CE, FCC, RoHS compliant
MTBF	65,000 hrs

Application



Ordering Information

Model Name	Description
SML01-MX210-AC, DC, AD	Console management, standalone 2-port GE mux with AC, DC or AD (AC+DC) Power
SML01- MX210-NM-AC, DC, AD	SNMP management, standalone 2-port GE mux with AC, DC or AD (AC+DC) Power

Note: SML01- MX210-AC/DC/AD = (FRM220- MX210) +(CH01M-AC, DC or AD)
SML01- MX210-NM-AC/DC/AD =(FRM220- MX210) + (CH02/SNMP-AC, DC or AD)

Power Type
SML01-MX210 – □□
Example: SML01-MX210 – AD

SDH-1000

NG SDH GbE/STM1 Terminal Multiplexer

NEW

SDH-1000 is 1U 19" rack type GbE/STM-1 terminal multiplexer which delivers Gigabit Ethernet services over SDH networks. The product complies with SDH standards and interfaces with existing SDH backbones through a single or 1+1 protection STM-1 interface. SDH-1000 supports a variety of management access over console, Telnet and SNMP. SDH-1000 provides two Gigabit Combo ports (2-port 10/100/1000Base-T + 2-port 1000Base-X SFP slot) over STM-1 fiber. The two GbE combo ports support Link aggregation, port based VLAN and 802.1Q VLAN function.

Features

- Provides 2-port STM-1 fiber with 1+1 protection.
- Supports HDLC/GFP bridge operation
- Supports 2x GbE Combo ports
- Supports IEEE 802.1Q VLAN and QinQ, Link aggregation
- Fiber port support ALS (Auto Laser Shutdown) function
- Supports Console, GUI, Telnet and SNMP management
- Supports local and remote FTP/TFTP f/w upgrade

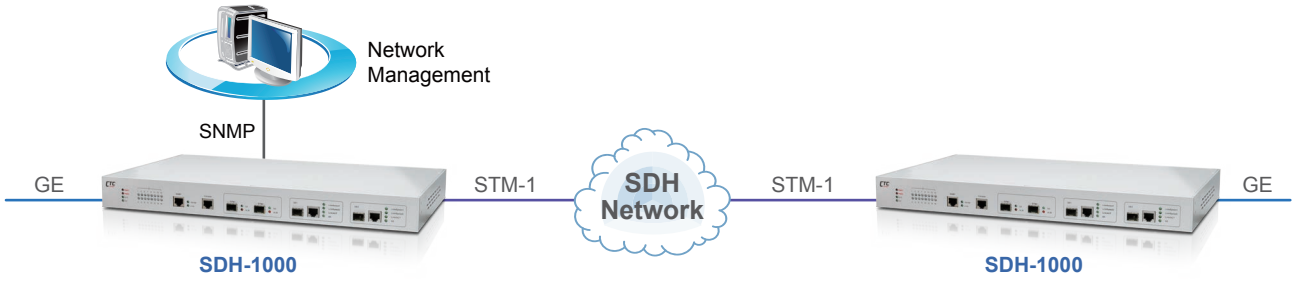
Specifications

Ethernet Interface	Supports 2x GE combo ports
	Auto Negotiation, AUTO-MIDX, 10M/100M/1000M, Full/Half Duplex
	Connector : RJ45
	Supports 802.3x flow control
Optical Interface	1000FX, SFP
	Connector : LC
	Supports 802.3x flow conrol
STM-1 Interface	Supports 2x STM-1 optical fiber port with SFP slot
	Supports 1+1 optical fiber protection
Management Port	One console port with RJ45 connector One SNMP Ethernet port with RJ45 connector
LED Indicators	SYS, PWR, PWR1, PWR2, GE (LNK/ACT, SD, ALM)

Standards	IEEE802.3 Ethernet, IEEE802.3u, IEEE802.3z, IEEE802.3x, IEEE802.1Q, IEEE802.1ad, SNMPv1/v2c/v3
Dimensions	310 x 440 x 44mm (D x W x H)
Power	AC: 90-265V, DC: -48V, Supports AC+DC
Power Consumption	<24W
Temperature	Operating: -5 ~ 50°C Humidity : ≤90% non-condensing

Application

GbE over STM-1 Application



Ordering Information

Model Name	Description
SDH-1000-AD	2x GbE Combo over STM1, P to P, 1U 19" Rack, AC+DC power

Specifications & design are subject to change without prior notice. Please visit CTC Union website for more details.

SDH04A

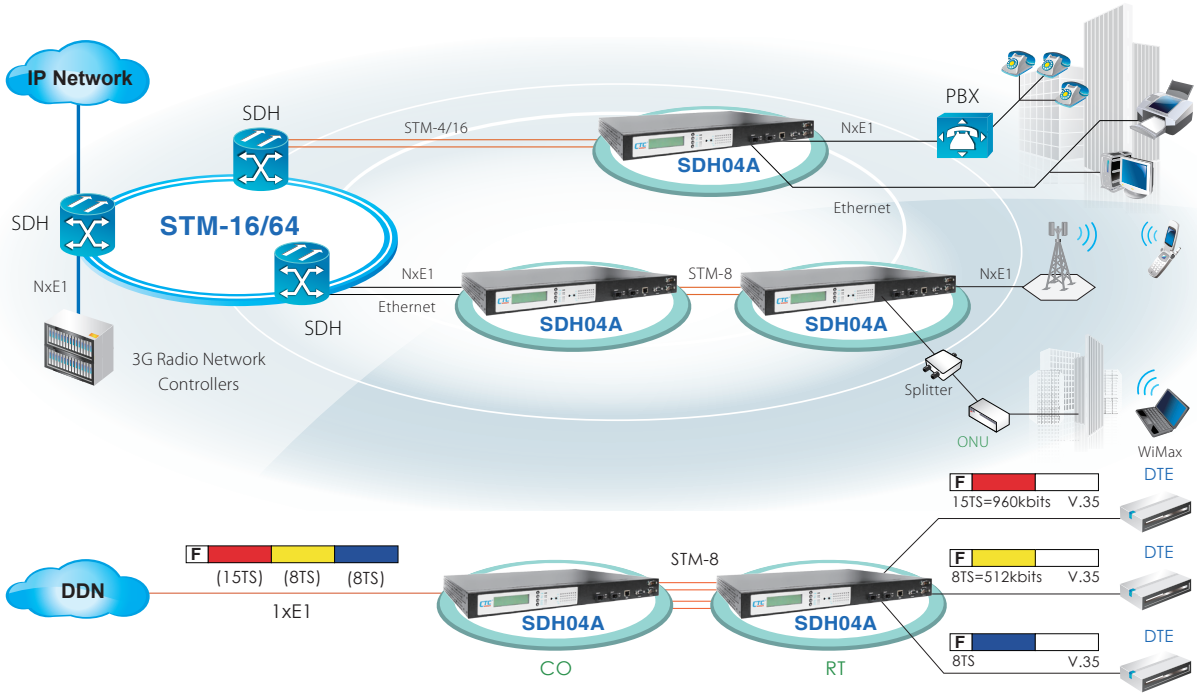
NG SDH STM4/1 Add-Drop Multiplexer

The SDH04A is a compact NG-SDH equipment which supports STM-1/4 ADM and offers various tributary interfaces like E1/T1, V.35, GbE, E3/T3…etc to provide any service in any slot. SDH04A is suitable for the applications of GSM/UMTS base station radio access networks (RAN) / MSAN and wireless backhaul. The SFP cage design in SDH04A offers the plug-and-play flexibility to change fiber modules for different bit rate and higher availability to use off-the-shelf fiber modules. SDH04A is a 1U standard form factor making it easy to fit in any 19" or 23" chassis and outdoor cabinet; Although SDH04A is a compact NG-SDH box, it also has similar flexibility of shelf-type SDH equipment, such as hot-swappable tributary cards / fiber modules / power modules and 1+1 load-sharing redundant power design. In order to supply reliable networks to carry more upcoming broadband services from wireless / HSDPA base stations to central office, CTC SDH04A provides carrier-grade Ethernet (E-Line) bundled with L2 functions to totally control QoS between end to end.

Features

- SDH04A provides multiple service solutions with standard STM-1/4 interfaces (SDH ADM/TM)
- Multiple hot-swappable tributary modules in any combination:
  4-channels E1 card (QE1R/B)
  8-channels E1/T1 card (8ET)
  8-channels E1 card (8E1R)
  4-ports Gigabit Ethernet switch card (GbE)
  4-ports V.35 Data communication Interface card (QV35)
  Single port E3/T3 interface card (ET3)
- 4 slots to support combinations of traffics in a 1U-height box
- Ethernet traffic is encapsulated and transported over SDH using Generic Framing Procedure (GFP) & Virtual Concatenation (VCAT)
- Hot swappable fiber optical module in SFP with optional 1+1 automatic protection switching (APS) for optical links.
- Automatic Laser Shutdown (ALS) based on ITU-T G.958/G.664.
- Data Communication Channel for remote control and online remote upgrade.
- Various network management interfaces: RS-232/ Ethernet/ LCD
- 1+1 Redundant AC/DC power modules with load sharing.
- Cross connect for TDM traffic (E1 & V.35)
- EMS tool for SDH04A series (GMS)
- DHCP Client/Telnet/httpd for NMS port
- Keypad Lock/ Password for LCD security

Application



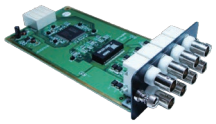
Specifications

V.35 Tributary Interface (QV35)

Data rate : 4CHx Nx64Kbps (N=1~32)
Compliance : ITU-T V.35
Clock Source : External, Internal and Recovery
Control Signal : DSR, CTS, DCD, RL, LL …
Test Loops : Local/remote line/terminal/V.54 loopback
Connector : DB44 connector (DB44 to M34 converter cable)

E3 /DS3 Tributary Interface (ET3)

Bit rate : 34.368 / 44.736 Mbps±20ppm
Compliance : ITU-T G.703, G.823, G.824
Impedance(connector) : 75Ω(BNC)
Line code : HDB3 / B3ZS
Software selectable E3/DS3 mode

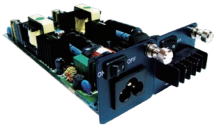


E1 Tributary Interface (QE1B)

Bit rate : 4CHx2.048Mbps±50ppm
Compliance : ITU-T G.703, G.704, G.706, G.732, G.823
Impedance (connector) : 75Ω(BNC)
Line code : HDB3 / AMI

8E1/ T1 Tributary Interface (8ET)

Bit rate :
8CHx2.048Mbps±50ppm /1.544Mbps±50ppm
Impedance(connector) :
120/100Ω software selective (wire-wrap)



AC Power Card

Input Voltage : AC90V ~ 260V
Input Frequency : 47 ~ 63Hz
Power : 27W Max

DC Power Card

Input Voltage : DC-36V ~ -72V
Power : 27W Max

Gigabit Ethernet interface (GbE)

Connector : 2xRJ45 + 2x SFP
Compliance : 802.3z, 802.3x, 802.1p, 802.3u, 802.3, G.7041 GFP-F Up to 1Gbps throughput, 802.1Q VLAN support for the full 4096 VLAN ID Up to 8K MAC address, Port trunking, Traffic rate control, loopback test

Dimension & Weight	Power Consumption	Management Interface	Operation Requirement
(WxDxH) : 442 x 312 x 44mm 1U, 19" rack mount/ wall mount/ standalone Weight : 3.7kg	27W in full load	Protocol : VT-100 ANSI/ Telnet and SNMP (EMS) Craft interface : RS232 Asyc. (EIA561) Telnet//SNMP/httpd : 10/100 BaseT (RFC 1406) LCD : 2 X 16 LCD display with key control	Operating temperature : 0 ~ 55°C Humidity : 0% ~ 100% (100% at 30°C) MTBF: > 50000 hours EMI : CISPR 22 class A ESD : IEC-61000-4-2 level 2 Lightening and Surge : IEC-61000-4-5 class3

Ordering Information

Model Name	Type	Description
SDH04A-CH	Chassis	1U 19" 4-slot, STM4/1 ADM Rack without power module
SDH04A-AC	Power	30W AC power module for SDH04A rack
SDH04A-DC	Power	30W DC power module for SDH04A rack
SDH01-4E1B	Card	4 x E1 G.703 interface card BNC
SDH01-8E1B	Card	8 x E1 G.703 interface card 75 ohm RJ48 with 8 x 1ch RJ48 to BNC cables
SDH01-8E1R	Card	8 x E1 G.703 interface card 120 ohm RJ48
SDH01-8T1/E1W	Card	8 x T1/E1 G.703 interface card Wire-Wrap
SDH01-4V35	Card	4 x V35 interface card with 2 x 2ch M34 cables
SDH01-ET3	Card	E3/DS3 interface card
SDH04-GbE	Card	4 ports Giga switch tributary card

Chassis Type
SDH04A – □□
Example: SDH04A – CH

Power Type
SDH04A – □□
Example: SDH04A – AH

Card Type
SDH04A – □□□
Example: SDH04A – GbE

FMUX1001

Modularized 16E1/T1 + 4x GbE Fiber Managed Multiplexer (E1/T1, Data, Voice, Ethernet)

The FMUX1001 is a 1U, 19" rack mountable, PDH fiber optic multiplexer that transmits up to 16 channels plus a 10/100/1000Base-T Fast Ethernet channel over a single fiber optic link. The FMUX1001 chassis suppats redundant power and hot swappable design. The AC supplies operate from 90~260VAC while DC supplies operate from 36~72VDC or 20~60VDC. From the rear of the chassis, one to four hot swappable quad E1 or T1 line cards, serial data communications (V.35, X.21, RS-530) or FXO/FXS voice cards are supported. The standard FMUX1001 configuration may be viewed or set via the front panel LCD/menu keys, serial VT-100 terminal connection, Telnet, web HTTP or SNMP.

Features

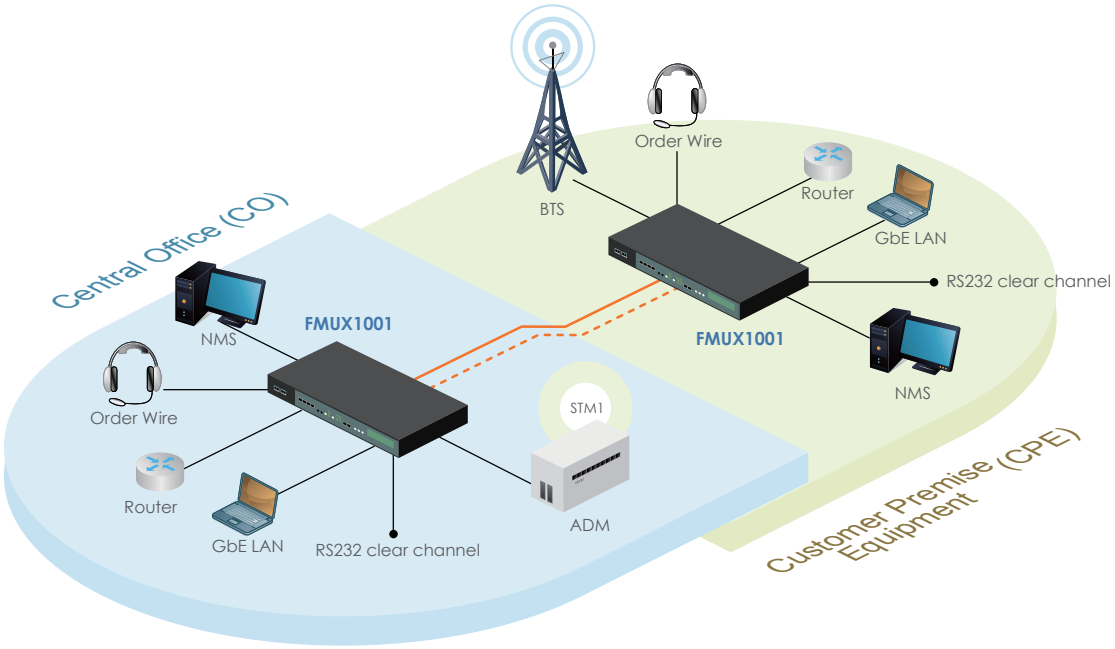
- 1U, 19 (23)" 4-slot chassis
- 16 E1 (2.048Mb/s) Multiplexer, 1000Mbps Ethernet and RS-232 data (async)
- RS-232 port for system console
- One alarm output port, one Order Wire port
- SNMP management
- LCD plus menu keys for local configuration
- Port based VLAN, tag based VLAN & bandwidth control
- Telnet and web based remote configuration
- 2 plug-in SFP slot in I/O slots for optical SFP module

Specifications

Optical Interface	Connector	SFP - LC
	Data rate	1.25G
	Bit Error Rate	Less than 10^{-12}
	Fiber	MM 62.2/125µm, 50/125µm
		SM 9/125µm
	Distance	MM 2km. SM 15/30/50/80/120km
		WDM 20/40/60/80km
	Wavelength	1310, 1550nm
Electrical Interface	Console, SNMP	RJ45
	Ethernet	4 x RJ45
	Alarm	RS232 (DB9F)

Standards	E1:ITU-T, T1:ITU-T, AT&T, ANSI, Ethernet: IEEE802.3x
Indications	PWR, Alarm, LBK, RD, LCK, RNG, ACO, Port, Channels
Power Input	TBD
Power Consumption	TBD
Dimensions	250 x 438 x 43mm (D x W x H)
Weight	3.58 kg
Temperature	0 ~ 60°C (Operating), 0 ~ 70°C (Storage)
Humidity	10 ~ 90% non-condensing
Certification	CE, FCC, RoHS compliant
MTBF	TBD

Application



Specifications - Modules

FXO/FXS I/F

FXO/FXS Module	
Standards	G.711 A-law (separate modules for FXO, FXS)
Voice channel transparent	T.38 and Group III Fax relay at 2.4 ~14.4kbps Fax application
Distance	2km
Bandwidth	64K voice channel
Connector	RJ11*4 (4 voice channel /per unit)
Internet application	Supports modem pass-through

E1/T1 RJ-45 I/F

T1 Interface Module	
Standards	ITU-T G.703, G.704, AT&T TR-62411,ANSI T1.403
Ports	4 ports
Framing	Unframed (clear channel)
Data rate	T1: 1.544 Mbps ±50 ppm
	E1: 2.048 Mbps ±50 ppm
Line code	T1: B8ZS / AMI
	E1: HDB3 / AMI
Receive Level	Short haul - 15dB
Line impedance	T1: 100 ohms ±5%
	E1: 120 ohms ±5%
Connector	RJ-45

Datacom I/F

Datacom Interface Module	
Standards	ITU-T, E1A
Card Type	V.35/ RS-530 (Include X.21 and RS-449)/ RS-232 I/F
Bit rate	n x 64K, n = 1 to 32
	V.35 & RS-530 up to 2Mbps
	RS-232 up to 115.2Kbps (ASYNC)
Line code	NRZ
Clock Mode	Transparent, Recovery
	External (From data port ETC)
	Internal (From oscillator)
Control Signal	CTS always On or follows RTS
	DSR constantly ON, except during test
	loops (RS-530 DSR always connect to DTR)
	DCD constantly ON,except during fiber signal loss
Test Loops	Local loop back, Remote loop back, V.54
Connector	Type Uses HD-68 pin D type Female with adapter cables

E1 BNC I/F

E1 Module	
Standards	ITU-T G.703, G.704, G.706, G.732
Ports	4 ports
Framing	Unframed (clear channel)
Data rate	2.048 Mbps ± 50 ppm
Line code	HDB3/AMI
Receive Level	Short haul - 15dB
Line impedance	75 ohms ± 5% / 120 ohms ± 5%
Connector	RJ-45 for 120 ohms BNC for 75 ohms Wirewrap for 120 ohm

Ordering Information

Model Name	Type	Description
FMUX1001	Chassis	1U 19"4-Slot Rack Mount Chassis
FMUX1001-AC	Power	Chassis Power Module 110~240VAC
FMUX1001-DC	Power	Chassis Power Module 36~72VDC
FMUX1001-E1/BNC	Card	4 x G.703 E1 BNC interface card
FMUX1001-E1/RJ45	Card	4 x G.703 E1 RJ-45 interface card
FMUX1001-T1/RJ45	Card	4 x G.703 T1 RJ-45 interface card
FMUX1001-V35	Card	V35 interface card with one HD68M to 4 x MB34F cable
FMUX1001-530	Card	RS-530 interface card with one HD68M to 4 x DB25F cable
FMUX1001-449	Card	RS-449 interface card with one HD68M to 4 x DB37F cable
FMUX1001-X21	Card	X.21 interface card with one HD68M to 4 x DB15F cable
FMUX1001-232/Async	Card	RS-232 Async card with one HD68M to 4 x DB9F cable
FMUX1001-FXO	Card	4 x FXO interface card
FMUX1001-FXS	Card	4 x FXS interface card

Power Type / Card Type

FMUX1001 – □□ / □□□□

Example: FMUX1001 – AC – AAAA

Power Module Type	Line Card I/F Type			
AC, DC, AC2, DC2, AD	0 : Empty	D : Quad V.35	H : Quad X.21	K : Quad High-Speed V.35
	A : Quad E1 BNC	E : Quad RS-232	I : Quad RS-449	L : Quad High-Speed RS-530
	B : Quad E1 RJ-45	F : Quad RS-530	J : Wire-Wrap I/F for Quad E1/ T1	
	C : Quad T1 RJ-45	G : Single port Fast Ethernet 10/100		

NEW

FMUX101

Modularized 16E1/T1 + 4x FE Fiber Managed Multiplexer (E1/T1, Data, Voice, Ethernet)

The FMUX101 is a 1U, 19" rack mountable, PDH fiber optic multiplexer that transmits up to 16 channels plus a 10/100Base-TX Fast Ethernet channel over a single fiber optic link. The FMUX101 chassis suppats redundant power and hot swappable design. The AC supplies operate from 90~260VAC while DC supplies operate from 36~72VDC or 20~60VDC. From the rear of the chassis, one to four hot swappable quad E1 or T1 line cards, serial data communications (V.35, X.21, RS-530) or FXO/FXS voice cards are supported. The standard FMUX101 configuration may be viewed or set via the front panel LCD/menu keys, serial VT-100 terminal connection, Telnet, web HTTP or SNMP.

Features

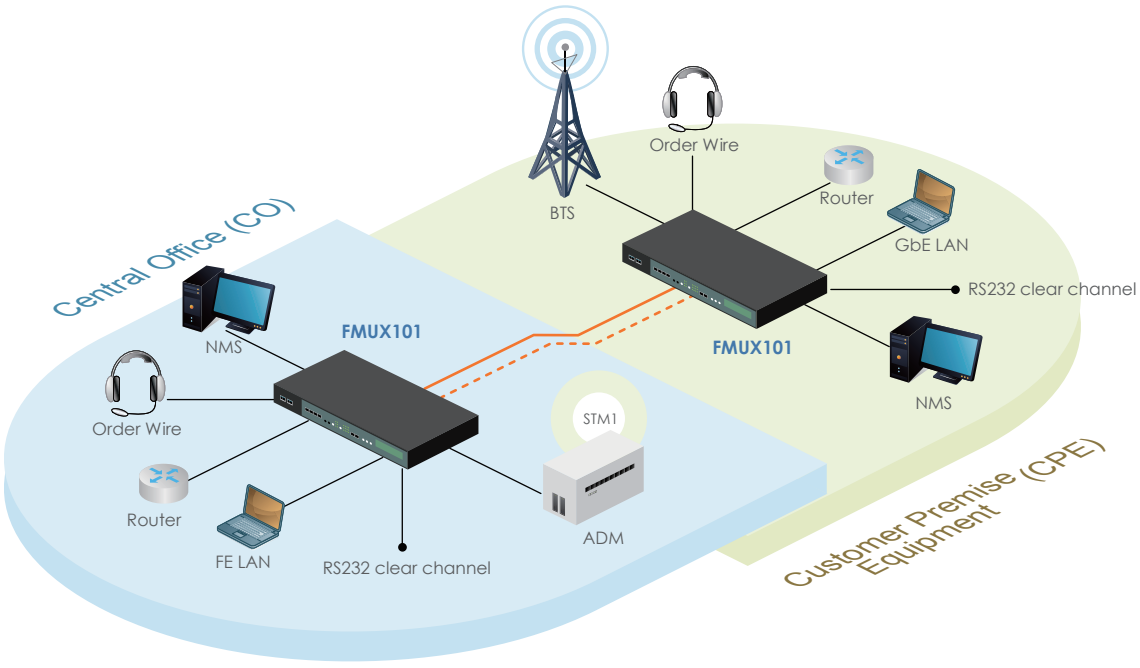
- 1U, 19 (23)" 4-slot chassis
- 16 E1 (2.048Mb/s) Multiplexer, 10/100Mbps Ethernet and RS-232 data (async)
- RS-232 port for system console
- One alarm output port, one Order Wire port
- SNMP management
- LCD plus menu keys for local configuration
- Port based VLAN, tag based VLAN & bandwidth control
- Telnet and web based remote configuration
- 2 plug-in SFP slot in I/O slots for optical SFP module

Specifications

Optical Interface	Connector	SFP - LC
	Data rate	155Mbps
	Bit Error Rate	Less than 10-11
	Fiber	MM 62.2/125μm, 50/125μm
		SM 9/125μm
	Distance	MM 2km. SM 15/30/50/80/120km
		WDM 20/40/60/80km
	Wavelength	1310, 1550nm
Electrical Interface	Console, SNMP	RJ45
	Ethernet	4 x RJ45
	Alarm	RS232 (DB9F)

Standards	E1:ITU-T, T1:ITU-T, AT&T, ANSI, Ethernet: IEEE802.3x
Indications	PWR, Alarm, LBK, RD, LCK, RNG, ACO, Port, Channels
Power Input	AC : 100 ~240V
	DC24 : 20 ~ 60V, DC48 : 36 ~ 72V
Power Consumption	< 40W
Dimensions	250 x 438 x 43mm (D x W x H)
Weight	3.58 kg
Temperature	0 ~ 50°C (Operating), 0 ~ 70°C (Storage)
Humidity	10 ~ 90% non-condensing
Certification	CE, FCC, RoHS compliant
MTBF	57350 hours

Application



Specifications - Modules

FXO/FXS I/F

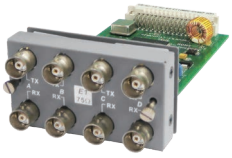
FXO/FXS Module	
Standards	G.711 A-law (separate modules for FXO, FXS)
Voice channel transparent	T.38 and Group III Fax relay at 2.4 ~14.4kbps Fax application
Distance	2km
Bandwidth	64K voice channel
Connector	RJ11*4 (4 voice channel /per unit)
Internet application	Supports modem pass-through

E1/T1 RJ-45 I/F

T1 Interface Module	
Standards	ITU-T G.703, G.704, AT&T TR-62411,ANSI T1.403
Ports	4 ports
Framing	Unframed (clear channel)
Data rate	T1: 1.544 Mbps ±50 ppm
	E1: 2.048 Mbps ±50 ppm
Line code	T1: B8ZS / AMI
	E1: HDB3 / AMI
Receive Level	Short haul - 15dB
Line impedance	T1: 100 ohms ±5%
	E1: 120 ohms ±5%
Connector	RJ-45

Datacom I/F

Datacom Interface Module	
Standards	ITU-T, E1A
Card Type	V.35/ RS-530 (Include X.21 and RS-449)/ RS-232 I/F
Bit rate	n x 64K, n = 1 to 32
	V.35 & RS-530 up to 2Mbps
	RS-232 up to 115.2Kbps (ASYNC)
Line code	NRZ
Clock Mode	Transparent, Recovery
	External (From data port ETC)
	Internal (From oscillator)
Control Signal	CTS always On or follows RTS
	DSR constantly ON, except during test
	loops (RS-530 DSR always connect to DTR)
	DCD constantly ON,except during fiber signal loss
Test Loops	Local loop back, Remote loop back, V.54
Connector	Type Uses HD-68 pin D type Female with adapter cables



E1 BNC I/F

E1 Module	
Standards	ITU-T G.703, G.704, G.706, G.732
Ports	4 ports
Framing	Unframed (clear channel)
Data rate	2.048 Mbps ± 50 ppm
Line code	HDB3/AMI
Receive Level	Short haul - 15dB
Line impedance	75 ohms ± 5% / 120 ohms ± 5%
Connector	RJ-45 for 120 ohms BNC for 75 ohms Wirewrap for 120 ohm

Ordering Information

Model Name	Type	Description
FMUX101	Chassis	1U 19"4-Slot Rack Mount Chassis
FMUX101-AC	Powe	Chassis Power Module 110~240VAC
FMUX101-DC	Powe	Chassis Power Module 36~72VDC
FMUX101-E1/BNC	Card	4 x G.703 E1 BNC interface card
FMUX101-E1/RJ45	Card	4 x G.703 E1 RJ-45 interface card
FMUX101-T1/RJ45	Card	4 x G.703 T1 RJ-45 interface card
FMUX101-V35	Card	V35 interface card with one HD68M to 4 x MB34F cable
FMUX101-530	Card	RS-530 interface card with one HD68M to 4 x DB25F cable
FMUX101-449	Card	RS-449 interface card with one HD68M to 4 x DB37F cable
FMUX101-X21	Card	X.21 interface card with one HD68M to 4 x DB15F cable
FMUX101-232/Async	Card	RS-232 Async card with one HD68M to 4 x DB9F cable
FMUX101-FXO	Card	4 x FXO interface card
FMUX101-FXS	Card	4 x FXS interface card

FMUX101 – (Power Type)(Power Type) / (Card Type)(Card Type)(Card Type)(Card Type)

Example: FMUX101 – AC – AAAA

Power Module Type	Line Card I/F Type			
AC, DC, AC2, DC2, AD	0 : Empty	D : Quad V.35	H : Quad X.21	K : Quad High-Speed V.35
	A : Quad E1 BNC	E : Quad RS-232	I : Quad RS-449	L : Quad High-Speed RS-530
	B : Quad E1 RJ-45	F : Quad RS-530	J : Wire-Wrap I/F for Quad E1/T1	
	C : Quad T1 RJ-45	G : Single port Fast Ethernet 10/100		

FMUX1600
FMUX800

16E1/T1 + 4x GbE, RJ45 Fiber Maneged Multiplexer
8E1/T1 + 4x GbE, RJ45 Fiber Maneged Multiplexer
(SNMP, Order Wire optional)

The FMUX1600/FMUX800 is 1U 19" rack mountable, PDH fiber optical Multiplexer that transmits up to 16/8 E1/T1 + 4 x 10/100/1000Base-T Gigabit Ethernet over a single fiber optic link. The FMUX1600/FMUX800 chassis in available in five different power configurations; single AC, single DC, dual AC, dual DC, or AC+DC. The AC supplies operate from 90 ~ 240VAC while DC supplies operate from 18~72VDC. On the rear of the chassis, the BNC model provides 32/16 unbalanced 75 Ohm coaxial connections with BNC connectors while the RJ-45 model provides 16/8 balanced 120 Ohm connections over twisted pair wiring with RJ45 connectors . With two SFP sockets on fiber ports, the FMUX1600/FMUX800 gives you the fiber cabling connector SFP-LC, both multi-mode and single-mode are available as well as BiDi which allows bi-directional transmissions using only a single fiber cable. 1+1 Automatic optical line protection is also supported for the aggregate fiber ports. The standard FMUX1600/FMUX800 configuration may be viewed or set via serial VT-100 terminal connection or SNMP card with web, telnet, and SNMP management

Features

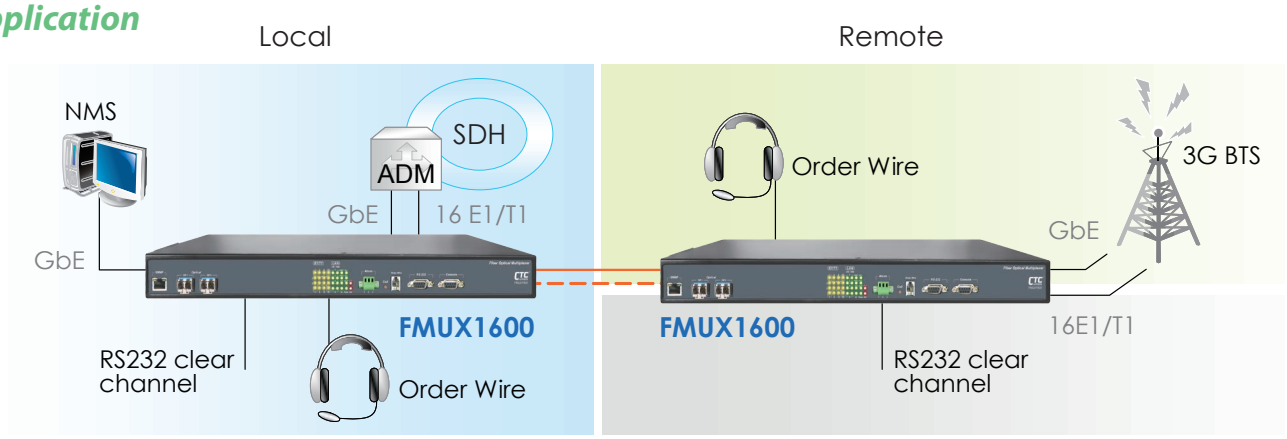
- Provides 16/8 E1/T1 G.703 transparent transmission over the fiber
- Provide 4 x 10/100/1000 Mbit/s Ethernet Ports
- Provides one RS232 channel
- Loopback test on E1/T1 fiber port
- Provides one hotline channel (order-wire)
- Supports full/half duplex, 10M/100M/1000M, auto-Negotiation
- Forward 10K byte jumbo packets on Ethernet port
- Supports 1+1 fiber line protection. Less than 50ms
- Complete alarm function and can monitor remote device status
- Power combination AC220V and DC-48V for redundant options
- Supports RS232 local management ; Supports on-line f/w upgrade
- Supports Web, Telnet, SNMP management (optional)

Specifications

Optical Interface	Connector	SFP- LC
	Data rate	1.25Gbps
	Bit Error Rate	Less than 10-11
	Distance	MM 2km, SM 15/30/50/80/120km
	Wavelength	WDM 20/40/60/80km
Electrical Interface	Connector	Console : RS232 / SNMP : RJ45
		Ethernet : RJ45 (4-port)
		Alarm : RS232 / Order wire : RJ11
E1 Interface	Standards	ITU-T G.703, G.704, G.706, G.732
	Ports	8/16 ports
	Data Rate	2.048 Mbps ± 50 ppm
	Line Code	HDB3/AMI
	Connector	RJ-45 for 120 ohms BNC for75 ohms Wire wrap for 120 ohm

T1 Interface	Standards	ITU-T G.703, G.704, AT&T TR-62411, ANSI T1.403
	Ports	8/16 ports
	Data Rate	1.544 Mbps ±50 ppm
	Line Code	B8ZS / AMI
	Connector	RJ-45 for 100 ohms Wire wrap for 100 ohms
Certification	CE, FCC, RoHS compliant	
Standards	ITU-T G.703, G.823 and G.742, ANSI, AT&T, IEEE803.2, IEEE802.3u, IEEE802.3ab	
Indications	Power, Alarm, LBK, RD, LCK, RNG, ACO, Port, channel	
Power Input	100 ~ 240VAC, 20~60VDC, 36~72VDC	
Power Consumption	<25W	
Dimensions	250 x 438 x 43mm (D x W x H)	
Weight	3.58kg	
Temperature	0 ~ 60°C (Operating), -10 ~ 70°C (Storage)	

Application



Ordering Information

Model Name	Description
FMUX1600B-AC/DC/AD	16x E1 BNC + 4 x 10/100/1000Base-T Ethernet Fiber Multiplexer, build-in AC, DC or AD Power
FMUX1600R-AC/DC/AD	16x E1/T1 RJ-45 + 4 x 10/100/1000Base-T Ethernet Fiber Multiplexer, build-in AC, DC or AD Power
FMUX1600-SNMP	SNMP Card with 10/100Base-TX Ethernet Port
FMUX800B-AC/DC/AD	8x E1 BNC + 4 x 10/100/1000Base-T Ethernet Fiber Multiplexer, build-in AC, DC or AD Power
FMUX800R-AC/DC/AD	8x E1/T1 RJ-45 + 4 x 10/100/1000Base-T Ethernet Fiber Multiplexer, build-in AC, DC or AD Power
FMUX800-SNMP	SNMP Card with 10/100Base-TX Ethernet Port
FMUX-Phone-2	2 Wires Order Wire
FMUX-Phone-4	4 Wires Order Wire

Power Type
FMUX1600 – □ – □□
Example: FMUX1600 – B – DC

FMUX–Phone – □
Example: FMUX–Phone – 2

FMUX160
FMUX80

16E1/T1 + 4x FE, RJ45 Fiber Maneged Multiplexer
8E1/T1 + 4x FE, RJ45 Fiber Maneged Multiplexer
(SNMP, Order Wire optional)

The FMUX160/FMUX80 is 1U 19" rack mountable, PDH fiber optical Multiplexer that transmits up to 16/8 E1/T1 + 4 x 10/100Base-TX Fast Ethernet over a single fiber optic link. The FMUX160/FMUX80 chassis in available in five different power configurations; single AC, single DC, dual AC, dual DC, or AC+DC. The AC supplies operate from 90 ~ 240VAC while DC supplies operate from 18~72VDC. On the rear of the chassis, the BNC model provides 32/16 unbalanced 75 Ohm coaxial connections with BNC connectors while the RJ-45 model provides 16/8 balanced 120 Ohm connections over twisted pair wiring with RJ45 connectors. the FMUX160/FMUX80 gives you the fiber cabling connector ST SC FC, both multi-mode and single-mode are available as well as BiDi which allows bi-directional transmissions using only a single fiber cable. 1+1 Automatic optical line protection is also supported for the aggregate fiber ports. The standard FMUX160/FMUX80 configuration may be viewed or set via serial VT-100 terminal connection or SNMP card with web, telnet, and SNMP management

Features

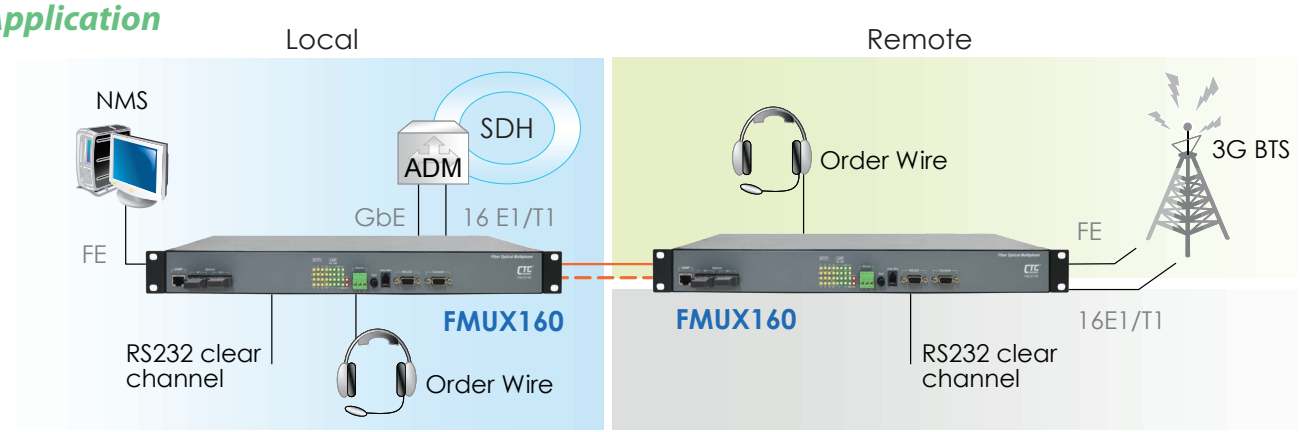
- Provides 16/8 E1/T1 G.703 transparent transmission over the fiber
- Provide 4 x 10/100 Mbit/s Ethernet Ports (100Mbps aggregate)
- Provides one RS232 channel
- Loopback test on E1/T1 fiber port
- Provides one hotline channel (order-wire)
- Supports full/half duplex, 10M/100M, auto-Negotiation
- Forward 1792 byte packets on Ethernet port
- Supports 1+1 fiber line protection. Less than 50ms
- Complete alarm function and can monitor remote device status
- Power combination AC220V and DC-48V for redundant options
- Supports RS232 local management ; Supports on-line f/w upgrade
- Supports Web, Telnet, SNMP management (optional)

Specifications

Optical Interface	Connector	ST, SC, FC
	Data rate	155.52Mbps
	Bit Error Rate	Less than 10^{-11}
	Distance	MM 2km, SM 15/30/50/80/120km WDM 20/40/60/80km
	Wavelength	1310nm, 1550nm, CWDM 1471nm~1611nm
Electrical Interface	Connector	Console : RS232 / SNMP : RJ45
		Ethernet : RJ45 (4-port)
		Alarm : RS232 / Order wire : RJ11
E1 Interface	Standards	ITU-T G.703, G.704, G.706, G.732
	Ports	8/16 ports
	Data Rate	2.048 Mbps ± 50 ppm
	Line Code	HDB3/AMI
	Connector	RJ-45 for 120 ohms BNC for75 ohms Wire wrap for 120 ohm

T1 Interface	Standards	ITU-T G.703, G.704, AT&T TR-62411, ANSI T1.403
	Ports	8/16 ports
	Data Rate	1.544 Mbps ±50 ppm
	Line Code	B8ZS / AMI
	Connector	RJ-45 for 100 ohms Wire wrap for 100 ohms
Certification	CE, FCC, RoHS compliant	
Standards	ITU-T G.703, G.823 and G.742, ANSI, AT&T, IEEE803.2, IEEE802.3u	
Indications	Power, Alarm, LBK, RD, LCK, RNG, ACO, Port, channel	
Power Input	100 ~ 240VAC, 20~60VDC, 36~72VDC	
Power Consumption	<25W	
Dimensions	250 x 438 x 43mm (D x W x H)	
Weight	3.58kg	
Temperature	0 ~ 60°C (Operating), -10 ~ 70°C (Storage)	

Application



Ordering Information

Model Name	Description
FMUX160B-AC/DC/AD	16x E1 BNC + 4 x 10/100Base-T Ethernet Fiber Multiplexer, build-in AC, DC or AD Power
FMUX160R-AC/DC/AD	16x E1/T1 RJ-45 + 4 x 10/100Base-T Ethernet Fiber Multiplexer, build-in AC, DC or AD Power
FMUX160-SNMP	SNMP Card with 10/100Base-TX Ethernet Port
FMUX80B-AC/DC/AD	8x E1 BNC + 4 x 10/100/100Base-T Ethernet Fiber Multiplexer, build-in AC, DC or AD Power
FMUX80R-AC/DC/AD	8x E1/T1 RJ-45 + 4 x 10/100Base-T Ethernet Fiber Multiplexer, build-in AC, DC or AD Power
FMUX80-SNMP	SNMP Card with 10/100Base-TX Ethernet Port
FMUX-Phone-2	2 Wires Order Wire
FMUX-Phone-4	4 Wires Order Wire

Power Type
FMUX160 – □ – □□
Example: FMUX160 – B – DC

FMUX–Phone – □
Example: FMUX–Phone – 2

FMUX04E

4E1/T1+ 3x FE Fiber Multiplexer

FMUX04E is a fixed design for 4xE1 + Fast Ethernet multi-service to dual strand fiber PDH multiplexer. FMUX04E provides E1 transmission transparently and pure 100Mbps Fast Ethernet simultaneously. The fiber optic line is based on SFP technology that allows the flexible use of Multimode or Single mode lines and enables support for different wavelengths and distances. The use of bi-directional SFPs maximizes the utilization of fiber optic line and results in saving line costs. The multiplexer can be equipped with optional AC and DC power supplies for redundant operation. With SNMP and Web-based management in the FMUX04E, the Network administrator can monitor, configure and control the activity remotely.

Features

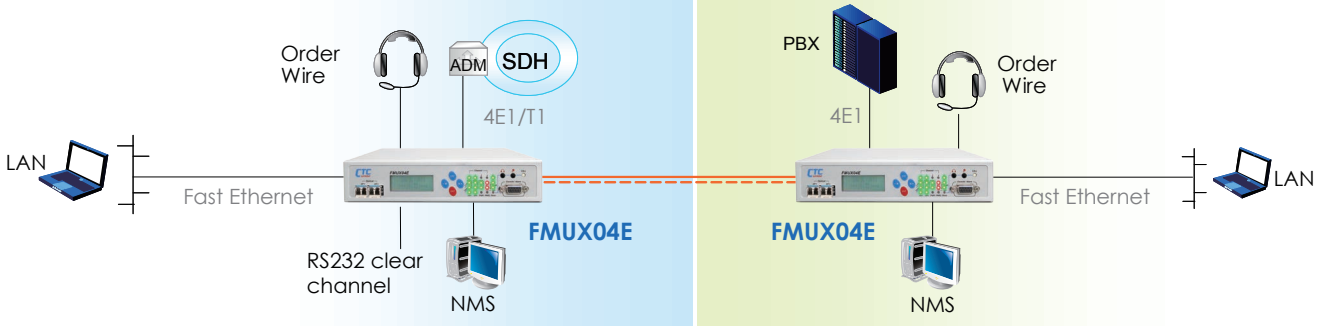
- 4 channels unframed E1/T1
- 3-CH 10/100Base-TX Ethernet
- Auto MDI/MDIX
- Auto-Negotiation or Force mode
- Supports flow control
- Supports 1552 packets (max)
- One clear channel RS232 up to 250Kbps(Async)
- 1+1 fiber protection, less than 50ms
- Supports Digital Diagnostics Monitoring Interface (DDMI)
- AIS on signal loss on E1/T1 and fiber port
- Port based VLAN function
- Loopback test on E1/T1, RS-232, fiber ports
- Supports Dying Gasp
- Supports local or remote In-band management
- Optional SNMP management
- Supports Order wire Ear / Microphone port.
- Supports On-Line F/W upgrade (local or remote) by the SNMP manager

Specifications

E1/T1 ports	Framing: Unframed (transparent)	
	Bit Rate: E1:2.048 Mb/s , T1: 1.544Mb/s	
	Line Code: E1:AMI/HDB3, T1: AMI/B8ZS	
	Line Impedance:	
	E1: Unbalanced 75 ohms (BNC)	
	E1: Balanced 120 ohms (RJ-45)	
	T1: Balanced 120 ohms (RJ-45)	
	Receiver sensitivity: Short haul	
	"Pulse" Amplitude:	Nominal 2.37V+/-10% for 75 ohms
		Nominal 3.00V+/-10% for 120 ohms
	"Zero" Amplitude: +/-0.3V	
	Internal Timing: +/-30 ppm	
	Jitter Performance: According to ITU-T G.823	
	Standard: ITU-T G.703, G.704, G.706 and G.732	
	Interface Connectors: RJ-45, BNC	

E1/T1 ports	Test Loops:	LLB (Local Loop Back)
		RLB (Remote Loop Back)
		RRLB (Request Remote Loop Back)
Ethernet	Interface Type: 10/100Base-TX	
	Connector: 3x RJ-45	
	Standard: IEEE 802.3, 802.3u	
	Duplex modes: full/half	
Indication	FX1 Link, FX2 link , E1/T1 Mode/Link/Loopback test, Order wire phone indicator , LAN Link/Speed	
Power Input	AC : 100~240VAC, DC : 18-75 VDC	
Dimensions	248 x 215 x 43mm (D x W x H)	
Operating Temperature	0 ~ 50°C (Operating)	
	-10 ~ 20°C (Storage)	
Humidity	10 ~ 90% non-condensing	
Certifications	CE, FCC, RoHS compliant	
MTBF	57,350 hrs	

Application



Ordering Information

Model Name	Description
FMUX04E-AC, DC, AD	Standalone FOM with built-in AC, DC or AD (AC+DC) Power, optional SNMP
FMUX0E4-SNMP	SNMP management card, support web, telnet, SNMP functions

* SNMP option only required in one onit of paired link

FMUX04E –□□

Example: FMUX04E – AD

FMUX04

4E1/T1 Fiber Multiplexer

The FMUX04 is a 1U half 19" stand-alone or rack mountable point-to-point multiplexer for 4*E1 or 4*T1 (selectable) transmissions over a single fiber optic link. Its half-rack format makes it ideal for low cost multiplexing applications that require up to 4-channel. All channels provide completely transparent transmission of E1 or T1 regardless of frame mode, clock source or timeslot assignment. Available in either AC or DC models, the AC supplies operate from 100~240VAC while DC supplies operate from 18~72VDC. A wide range of transceiver selection provides fiber connection with SC, FC or ST type connectors in multimode or single mode and at distance from 2 to 120km as well as BiDi (single fiber) at distances of 20, 40, 60, or 80km. Additional options include "Order Wire" phone connection (FXS port) and a SNMP management.

Features

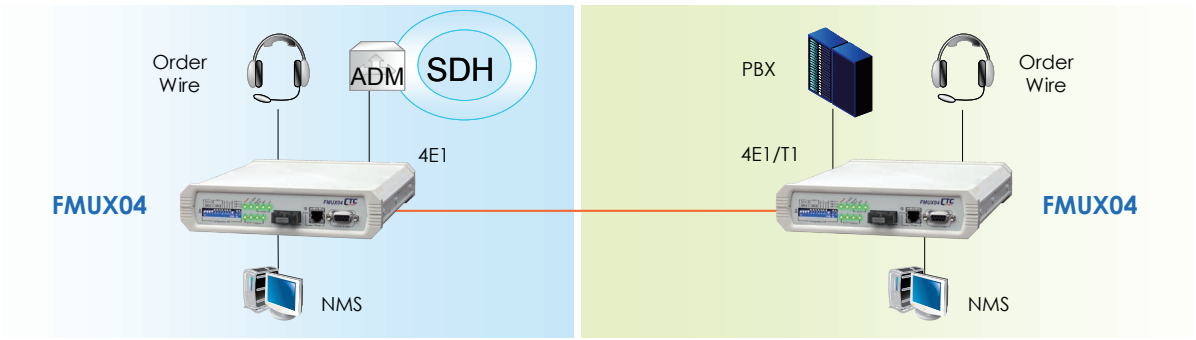
- 1U stand-alone unit
- Channel service setting and remote loop-back setting via front panel DIP switch or serial console
- Far End Fault (FEF) on fiber link, selectable
- On-line Bit Error Rate monitor feature with four error-rate classes
- Dual color LEDs indicators
- Optional dedicated Order Wire phone port (FXS, RJ-11 port)
- Console port and one alarm relay
- Optional SNMP management, Telnet, and Web Based local and remote configuration
- System BER 10^{-11}

Specifications

Optical Interface	Connector	1x9 (SC, ST, FC)
	Data rate	38Mbps
	Bit Error Rate	Less than 10-11
	Fiber	MM 62.2/125μm, 50/125μm
		SM 9/125μm
	Distance	MM 2km, SM 15/30/50/80/120km, WDM 20/40/60/80km
	Wavelength	1310, 1550nm
Electrical Interface	Console	RS-232 (DB9F) Async
	SNMP / Order wire	RJ-45 / RJ11
	E1	BNC 75 Ω, RJ45 120 Ω, T1 RJ45 100 Ω
Standard	E1: ITU-T, T1: ITU-T, AT&T, ANSI	

Indication	PWR, Alarm, Far End /Near End Error
	System failure, E1/T1 status
Power input	AC : 100 ~240V
	DC24 : 18 ~ 36V, DC48 : 36 ~ 72V
Power Consumption	< 20W
Dimensions	235 x 195 x 45mm (D x W x H)
Weight	0.85kg
Temperature	0 ~ 50°C (Operating), 0 ~ 70°C (Storage)
Humidity	10 ~ 90% non-condensing
Certification	CE, FCC, RoHS compliant
MTBF	57,350 hrs

Application



Ordering Information

Model Name	Description
FMUX04-AC/SC 015	SC, 15Km, 1310nm, 12dB
FMUX04-AC/SC 030	SC, 30Km, 1310nm, 20dB
FMUX04-AC/SC 050	SC, 50Km, 1310nm, 28dB
FMUX04-AC/SC 080	SC, 80Km, 1550nm, 29dB
FMUX04-AC/SC 120	SC, 120Km, 1550nm, 35dB, DFB Laser
FMUX04-AC/SC 20A	SC, 20km, Tx1310 /Rx1550nm (A type), 17dB
FMUX04-AC/SC 20B	SC, 20km, Tx1550 /Rx1310nm (B type) , 14dB
FMUX04-AC/SC 40A	SC, 40km, Tx1310 /Rx1550nm (A type), 25dB
FMUX04-AC/SC 40B	SC, 40km, Tx1550 /Rx1310nm (B type) , 22dB, DFB Laser
FMUX04-AC/SC 60A	SC, 60km, Tx1310 /Rx1550nm (A type), 29dB
FMUX04-AC/SC 60B	SC, 60km, Tx1550 /Rx1310nm (B type) , 29dB, DFB Laser

Model Name	Description
FMUX04-DC/SC 002	SC, MM, 2Km, 1310nm, 11dB
FMUX04-DC/SC 015	SC, 15Km, 1310nm, 12dB
FMUX04-DC/SC 030	SC, 30Km, 1310nm, 20dB
FMUX04-DC/SC 050	SC, 50Km, 1310nm, 28dB
FMUX04-DC/SC 080	SC, 80Km, 1550nm, 29dB
FMUX04-DC/SC 120	SC, 120Km, 1550nm, 35dB, DFB Laser
FMUX04-DC/SC 20A	SC, 20km, Tx1310 /Rx1550nm (A type), 17dB
FMUX04-DC/SC 20B	SC, 20km, Tx1550 /Rx1310nm (B type) , 14dB
FMUX04-DC/SC 40A	SC, 40km, Tx1310 /Rx1550nm (A type), 25dB
FMUX04-DC/SC 40B	SC, 40km, Tx1550 /Rx1310nm (B type) , 22dB, DFB Laser
FMUX04-DC/SC 60A	SC, 60km, Tx1310 /Rx1550nm (A type), 29dB
FMUX04-DC/SC 60B	SC, 60km, Tx1550 /Rx1310nm (B type) , 29dB, DFB Laser

Power Type / Connector Type / Connectivity Distance

FMUX04 – □□ / □□□□□

Example: FMUX04 – AC / SC015

Industrial Ethernet 工規

Automation, Power Substation Surveillance, Vehicle

u-Ring, SmartView

PoE Ethernet Switch, Media Converter, PoE Injector
Serial Fiber Converter, Serial Device Server

IEC 61850-3 | c UL us | EN50155 | PoE Regulated | EN50121-4

IGS-600-4PH24

6x 10/100/1000Base-T with 4x PoE+ Ethernet Switch *(120Watts, 24V Booster)*

c UL us LISTED

IGS-600-4PH24 models are non-managed industrial grade Gigabit PoE (Power over Ethernet) switches with 6x 10/100/1000Base-T PoE Ethernet ports that provide stable and reliable Ethernet transmission. Housed in rugged DIN rail or wall mountable enclosures, these switches are designed for harsh environments, such as industrial networking, intelligent transportation systems (ITS) and are also suitable for many military and utility market applications where environmental conditions exceed commercial product specifications. Standard operating temperature range models (-10 to 60°C) and wide operating temperature range models (-40 to 75°C) fulfill the special needs of industrial automation applications.

Features

- 6-Port 1000Base-T RJ-45 with 4-Port IEEE 802.3at/af PoE output (30W/Per Port)
- Maximum PoE output power budget 120W
- 24/48VDC redundant dual input power design
- Wide operating temperature -40 ~ 75°C (IGS-600-4PHE24)
- Regulated PoE output voltage at 55VDC
- UL60950-1, CE, FCC, EN50121-4 certification
- Industrial Grade EMS, EMI, EN61000-6-2, EN61000-6-4 certified
- IP30 rugged metal housing

Specifications

IEEE Standard	IEEE 802.3 10Base-T Ethernet	
	IEEE 802.3u 100Base-TX Fast Ethernet	
	IEEE 802.3ab 1000Base-T Gigabit Ethernet	
	IEEE 802.3z 1000Base-X Gigabit Ethernet	
	IEEE 802.3x Flow Control and Back Pressure	
	IEEE 802.3at, IEEE802.3af	
Switch Architecture	Back-plane (Switching Fabric): 12Gbps	
Data Processing	Store and Forward	
Flow Control	IEEE 802.3x flow control, back pressure flow control	
Provides Broadcast Storm Protection	Present, Enable /Disable set by DIP SW	
Jumbo Frame	10K Bytes	
MAC Address Table	8K	
Packet Buffer Size	1Mbits	
PoE Standard	IEEE 802.3at/af	
PoE RJ-45 pin Assignment	RJ-45 port # 1~# 4 support IEEE 802.3at/af End-Span, Alternative A mode	
	Positive (V+): RJ-45 pin 1, 2	
	Negative (V-): RJ-45 pin 3, 6	
	Data (1, 2, 3, 6, 4, 5, 7, 8)	
Network Connector	6 x RJ-45	
	10/100/1000Base-T auto negotiation speed, Auto MDI/MDI-X function, Full/Half duplex	
Network Cable	UTP/STP above Cat. 5e cable	
	EIA/TIA-568 100-ohm (100m)	
Protocols	CSMA/CD	
LED	Per unit: Power 1 (Green), Power 2 (Green), Fault (Amber)	
	Per RJ-45 port : Link/Active (Green), Speed 10 (OFF), 100 (Green), 1000 (Yellow)	
	PoE Port LED : • Active : ON • Inactive : OFF • Fault : Flash (Over Load, Short Circuit, Port failed at Startup)	
DIP SW	DIP 1	ON : Disable power failure alarm
		OFF : Enable power failure alarm
	DIP 2	ON : Disables broadcast storm protection
		OFF : Enable broadcast storm protection
Reserve Polarity Protection	Present	

Overload Current Protection	Present
Power Supply	Redundant Dual DC 24/48V (20~57VDC) Input power (Removable Terminal Block)
Power Consumption	Max 138W @24VDC input (support up to 120W for PoE Output)
PoE Power Output	Maximum PoE Output power budget 120W (30W/Per Port)
Alarm Relay Contact	Relay outputs with current carrying capacity of 1 A @24VDC
Removable Terminal Block	Provide 2 Redundant power, Alarm relay contact, 6 Pin
Operating Temperature	-10 ~ 60°C (IGS-600-4PH24)
	-40 ~ 75°C (IGS-600-4PHE24)
Operating Humidity	5% to 95% (Non-condensing)
Storage Temperature	-40 ~ 85°C
Housing	Rugged Metal, IP30 Protection
Dimensions	106 x 62.5 x 134.8mm (D x W x H)
Weight	0.84kg
Installation Mounting	DIN Rail mounting or wall mounting
EMC/EMS	CE, FCC
EMI	FCC Part 15 Subpart B Class A, CE EN 55022 Class A
	EN61000-6-4 – Emission for industrial environment
EMS	EN61000-6-2 – Immunity for Industrial environment
	EN61000-4-2 (ESD) Level 3, Criteria B
	EN61000-4-3 (RS) Level 3, Criteria A
	EN61000-4-4 (EFT) Level 3, Criteria A
	EN61000-4-5 (Surge) Level 3, Criteria B
	EN61000-4-6 (CS) Level 3, Criteria A
	EN61000-4-8 (Magnetic Field) Level 3, Criteria A
Safety	UL60950-1
Rail Traffic	EN 50121-4
Shock	IEC 60068-2-27
Freefall	IEC 60068-2-32
Vibration	IEC 60068-2-6
MTBF	296,517 Hours
Warranty	5 years

Application

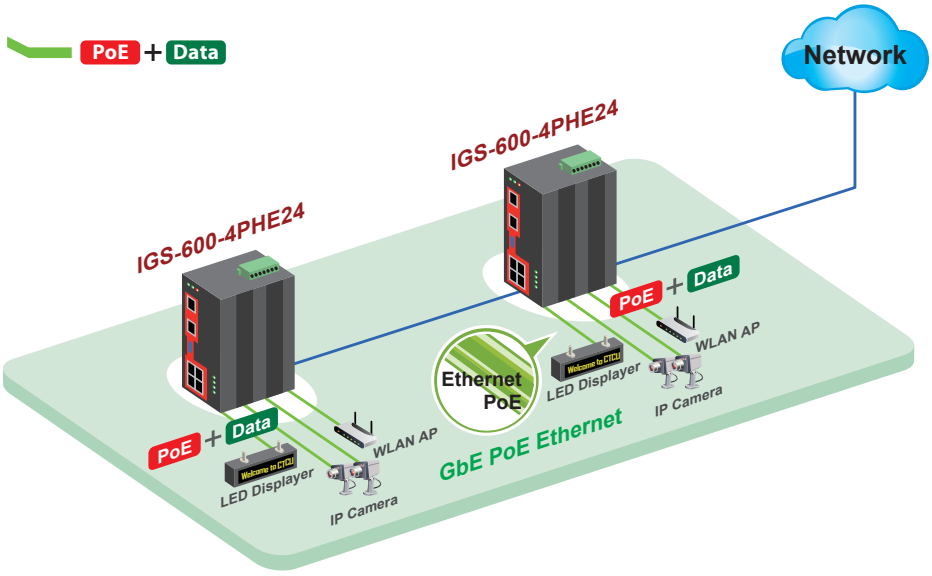
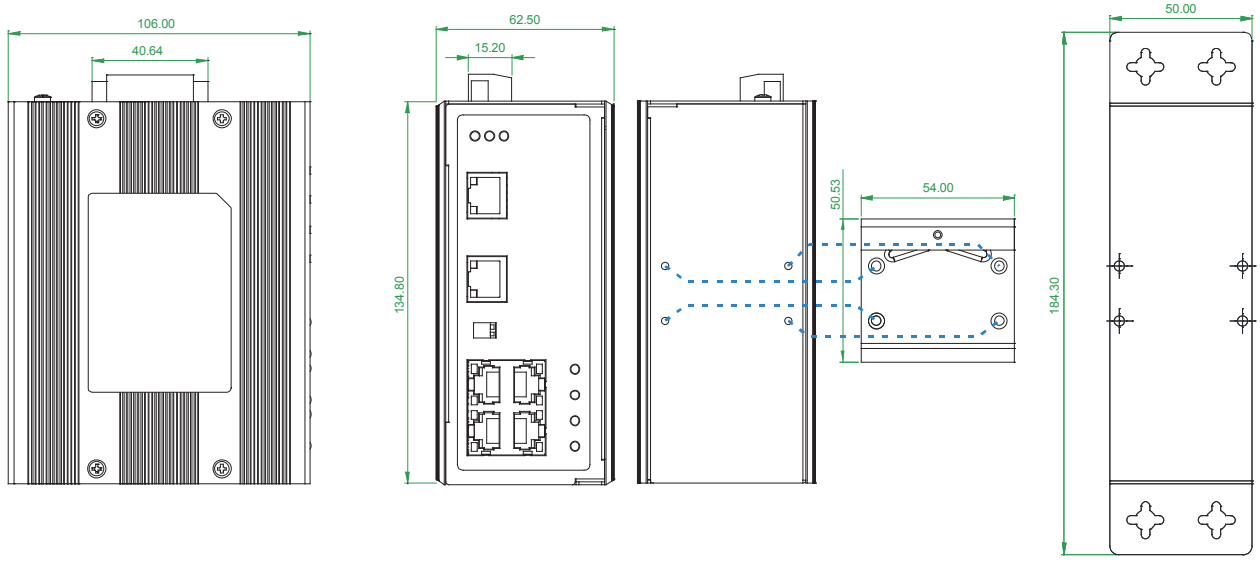


Figure : IGS-600-4PHE24 PoE Ethernet Switch Transmission

Dimensions



Side View | Front View | Rear View | DIN-Rail Kit View | Wall-Mount Kit View

Ordering Information

Model Name	Description
IGS-600-4PH24	6-Port 10/100/1000Base-T with 4-PoE Switch (30W/Per Port, Total 120W, 24V Booster) (-10 ~ 60°C)
IGS-600-4PHE24	6-Port 10/100/1000Base-T with 4-PoE Switch (30W/Per Port, Total 120W, 24V Booster) (-40 ~ 75°C)

Accessories

DR-120-24	Industrial Power, Input 88 ~ 132VAC / 176 ~ 264VAC, Output 24VDC, 120W, -10 ~ +60°C
DRP-240-48	Industrial Power, Input 85 ~ 264VAC, Output 48VDC, 240W, -10 ~ +70°C

Temperature

IGS – 600 – 4PH ☐ 24

Example: IGS – 600 – 4PHE24

IGS-401F-4PH24
IGS-402F-4PH24

4x 10/100/1000Base-T + 1 or 2x 1000Base-X Fiber with 4xPoE+ Ethernet Switch

(120 Watts, 24V Booster)

c UL us LISTED

IGS-401F/402F-4PH24 models are non-managed industrial grade Gigabit PoE (Power over Ethernet) switches with 4x 10/100/1000Base-T PoE ports and 2 fixed Gigabit Ethernet fiber ports that provide stable and reliable Ethernet transmission. Housed in rugged DIN rail or wall mountable enclosures, these switches are designed for harsh environments, such as industrial networking, intelligent transportation systems (ITS) and are also suitable for many military and utility market applications where environmental conditions exceed commercial product specifications. Standard operating temperature range models (-10 to 60°C) and wide operating temperature range models (-40 to 75°C) fulfill the special needs of industrial automation applications.

Features

- Provides 4-port IEEE802.3at/af PoE output (30W/Per Port)
- Maximum PoE output power budget 120W
- 24/48VDC redundant dual input power design
- 4-Port 1000Base-T RJ-45 with 1 or 2 Fiber Gigabit Ethernet
- Regulated PoE output voltage at 55VDC
- Wide operating temperature -40 ~ 75°C (IGS-401F-4PHE24, IGS-402F-4PHE24)
- UL60950-1, CE, FCC, EN50121-4 certification
- Industrial Grade EMS, EMI, EN61000-6-2, EN61000-6-4 certified
- IP30 rugged metal housing

Specifications

IEEE Standard	IEEE 802.3 10Base-T Ethernet
	IEEE 802.3u 100Base-TX Fast Ethernet
	IEEE 802.3ab 1000Base-T Gigabit Ethernet
	IEEE 802.3z 1000Base-X Gigabit Ethernet
	IEEE 802.3x Flow Control and Back Pressure
	IEEE 802.3at, IEEE802.3af
Switch Architecture	Back-plane (Switching Fabric): 10Gbps (IGS-401F-4PH24, IGS-401F-4PHE24)
	Back-plane (Switching Fabric): 12Gbps (IGS-402F-4PH24, IGS-402F-4PHE24)
Data Processing	Store and Forward
Flow Control	IEEE 802.3x flow control, back pressure flow control
Provides Broadcast Storm Protection	Present, Enable / Disable set by DIP SW
Jumbo Frame	10K Bytes
MAC Address Table	8K
Packet Buffer Size	1Mbits
PoE standard	IEEE 802.3at/af
PoE RJ-45 pin Assignment	RJ-45 port # 1~# 4 support IEEE 802.3at/af End-Span, Alternative A mode
	Positive (V+): RJ-45 pin 1, 2.
	Negative (V-): RJ-45 pin 3, 6.
	Data (1, 2, 3, 6, 4, 5, 7, 8)
Network Connector	4 x RJ-45
	10/100/1000Base-T auto negotiation speed, Auto MDI/MDI-X function, Full/Half duplex
	1 or 2x1000Base-X Fiber connector: SC Muti Mode or Single Mode
Network Cable	UTP/STP above Cat. 5e cable
	EIA/TIA-568 100-ohm (100m)
	Fiber Cable (Multi-mode): 50/125um, 62.5/125um Fiber Cable (Single-mode): 9/125um
Protocols	CSMA/CD
LED	Per unit: Power 1 (Green), Power 2 (Green), Fault (Amber)
	Per RJ-45 port : Link/Active (Green), Speed 10 (OFF), 100 (Green), 1000 (Yellow)
	Fiber Per port: Link/Active (Green)
	PoE Port LED : • Active : ON • Inactive : OFF • Fault : Flash (Over Load, Short Circuit, Port failed at Startup)
Safety	UL60950-1
Rail Traffic	EN 50121-4

DIP SW	DIP 1	ON : Disable power failure alarm
		OFF : Enable power failure alarm
	DIP 2	ON : Disables broadcast storm protection
		OFF : Enable broadcast storm protection
Reserve Polarity Protection	Present	
Overload Current Protection	Present	
Power Supply	Redundant Dual DC 24/48V (20~57VDC) Input power (Removable Terminal Block)	
Power Consumption	Max 143W @24VDC input (support up to 120W for PoE Output) (IGS-401F-4PH24)	
	Max 143.4W @24VDC input (support up to 120W for PoE Output) (IGS-402F-4PH24)	
PoE Power Output	Maximum PoE Output power budget 120W (30W/Per Port)	
Alarm Relay Contact	Relay outputs with current carrying capacity of 1A @24VDC	
Removable Terminal Block	Provide 2 Redundant power, Alarm relay contact, 6 Pin	
Operating Temperature	-10 ~ 60°C (IGS-401F-4PH24, IGS-402F-4PH24)	
	-40 ~ 75°C (IGS-401F-4PHE24, IGS-402F-4PHE24)	
Operating Humidity	5% to 95% (Non-condensing)	
Storage Temperature	-40 ~ 85°C	
Housing	Rugged Metal, IP30 Protection	
Dimensions	106 x 62.5 x 134.8mm (D X W X H)	
Weight	0.67kg (IGS-401F-4PH24), 0.68kg (IGS-402F-4PH24)	
Installation Mounting	DIN Rail mounting or wall mounting	
EMC/EMS	CE, FCC	
EMI	FCC Part 15 Subpart B Class A, CE EN 55022 Class A	
	EN61000-6-4 – Emission for industrial environment	
EMS	EN61000-6-2 – Immunity for Industrial environment	
	EN61000-4-2 (ESD) Level 3, Criteria B	
	EN61000-4-3 (RS) Level 3, Criteria A	
	EN61000-4-4 (EFT) Level 3, Criteria A	
	EN61000-4-5 (Surge) Level 3, Criteria B	
	EN61000-4-6 (CS) Level 3, Criteria A	
	EN61000-4-8 (Magnetic Field) Level 3, Criteria A	
Shock	IEC 60068-2-27	
Freefall	IEC 60068-2-32	
Vibration	IEC 60068-2-6	
MTBF	316,408 Hours (IGS-401F-4PH24)	
	306,704 Hours (IGS-402F-4PH24)	
Warranty	5 years	

Application

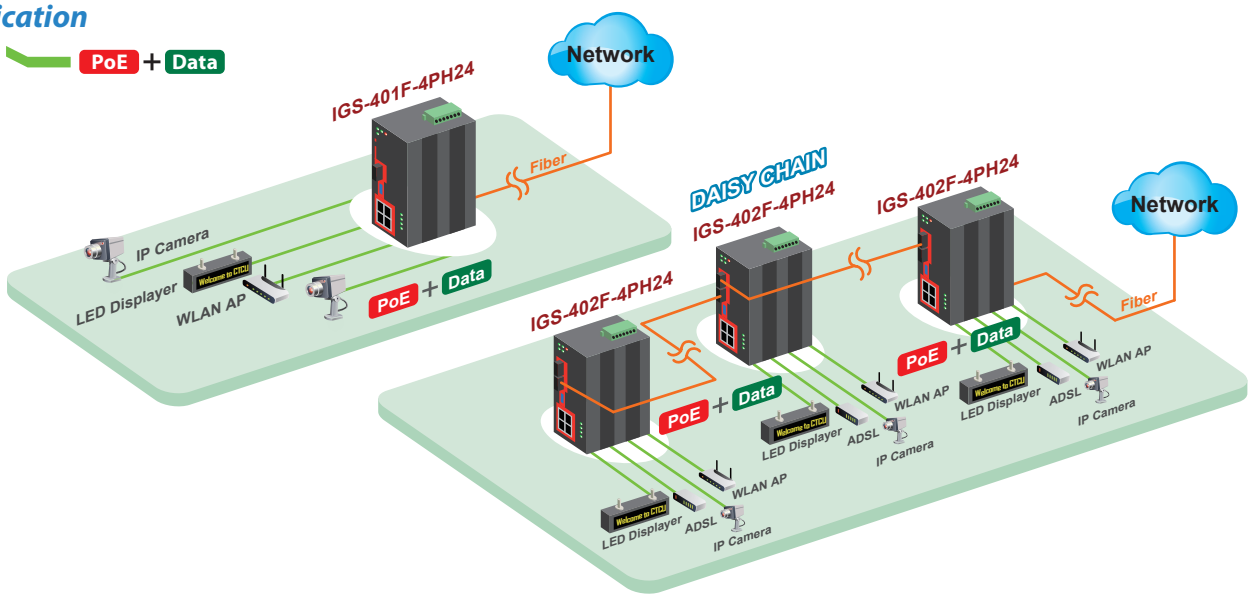
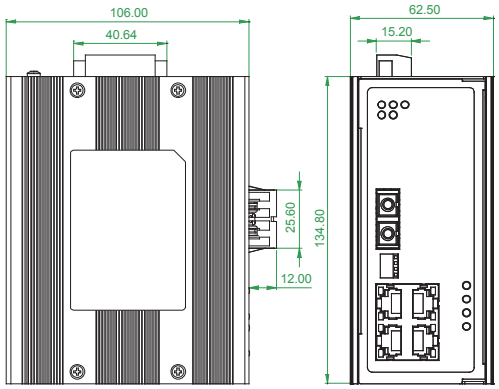


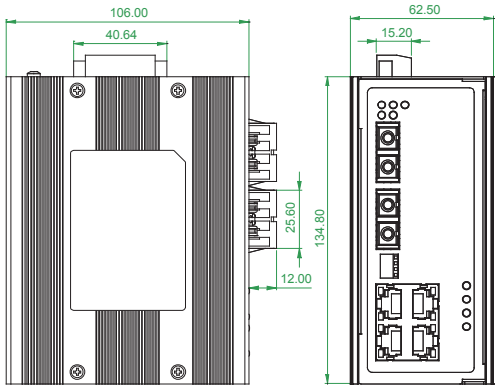
Figure : IGS-401F-4PH24 & IGS-402F-4PH24
PoE Gigabit Ethernet Switch Transmission

Dimensions

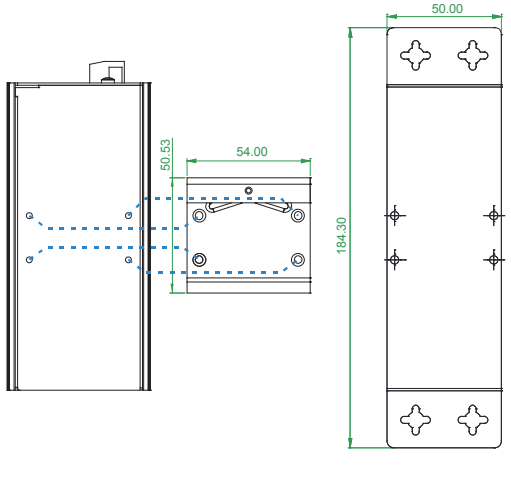
IGS-401F-4PH24



IGS-402F-4PH24



Side View Front View



Rear View DIN-Rail Kit View Wall-Mount Kit View

Ordering Information

Model Name	Description
IGS-401F-4PH24	4-Port 10/100/1000Base-T + 1-Port 1000Base Fiber with 4-PoE Switch (30W/Per Port, Total 120W, 24V Booster) (-10 ~ 60°C)
IGS-401F-4PHE24	4-Port 10/100/1000Base-T + 1-Port 1000Base Fiber with 4-PoE Switch (30W/Per Port, Total 120W, 24V Booster) (-40 ~ 75°C)
IGS-402F-4PH24	4-Port 10/100/1000Base-T + 2-Port 1000Base Fiber with 4-PoE Switch (30W/Per Port, Total 120W, 24V Booster) (-10 ~ 60°C)
IGS-402F-4PHE24	4-Port 10/100/1000Base-T + 2-Port 1000Base Fiber with 4-PoE Switch (30W/Per Port, Total 120W, 24V Booster) (-40 ~ 75°C)

Fiber Connector Type	Connectivity Distance
SC	SC001: 500m (SC, M/M) SC002: 2km (SC, M/M) SC020: 20km (SC, S/M) SC040: 40km (SC, S/M) SC020A: WDM 20km A type (TX: 1310nm) SC020B: WDM 20km B type (TX: 1550nm)

Port Number Temperature Connector Type Connectivity Distance

IGS – 40 □ F – 4PH □ 24 – □□□□

Example: IGS – 401F – 4PHE24 – SC002

Accessories

DR-120-24	Industrial Power, Input 88 ~ 132VAC / 176 ~ 264VAC, Output 24VDC, 120W, -10 ~ +60°C
DRP-240-48	Industrial Power, Input 85 ~ 264VAC, Output 48VDC, 240W, -10 ~ +70°C

IGS-402S-4PH24

4x 10/100/1000Base-T+ 2x 100/1000Base-X SFP Slot with 4x PoE+ Ethernet Switch

(120 Watts, 24V Booster)

c UL us LISTED

IGS-402S-4PH24 model is a non-managed industrial grade Gigabit PoE (Power over Ethernet) switch with 4x 10/100/1000Base-T PoE ports and 2 SFP Gigabit Ethernet fiber ports that provide stable and reliable Ethernet transmission. Housed in rugged DIN rail or wall mountable enclosures, these switches are designed for harsh environments, such as industrial networking, intelligent transportation systems (ITS) and are also suitable for many military and utility market applications where environmental conditions exceed commercial product specifications. Standard operating temperature range models (-10 to 60°C) and wide operating temperature range models (-40 to 75°C) fulfill the special needs of industrial automation applications.

Features

- Provides 4-port IEEE802.3at/af PoE output (30W/Per Port)
- Maximum PoE output power budget 120W
- 24/48VDC Redundant dual input power design
- 4-Port 1000Base-T RJ-45 with 2 Fiber Gigabit Ethernet
- Regulated PoE output voltage at 55VDC
- Wide operating temperature -40 ~ 75°C (IGS-402S-4PHE24)
- UL60950-1, CE, FCC, EN50121-4 certification
- Industrial Grade EMS, EMI, EN61000-6-2, EN61000-6-4 Certified
- IP30 rugged metal housing

Specifications

IEEE Standard	IEEE 802.3 10Base-T Ethernet
	IEEE 802.3u 100Base-TX Fast Ethernet
	IEEE 802.3ab 1000Base-T Gigabit Ethernet
	IEEE 802.3z 1000Base-X Gigabit Ethernet
	IEEE 802.3x Flow Control and Back Pressure
	IEEE 802.3at, IEEE802.3af
Switch Architecture	Back-plane (Switching Fabric): 12Gbps
Data Processing	Store and Forward
Flow Control	IEEE 802.3x flow control, back pressure flow control
Provides Broadcast Storm Protection	Present, Enable / Disable set by DIP SW
Jumbo Frame	10K Bytes
MAC Address Table	8K
Packet Buffer Size	1Mbits
PoE Standard	IEEE 802.3at/af
PoE RJ-45 Pin Assignment	RJ-45 port # 1~# 4 support IEEE 802.3at/af End-Span, Alternative A mode
	Positive (V+): RJ-45 pin 1, 2.
	Negative (V-): RJ-45 pin 3, 6.
	Data (1, 2, 3, 6, 4, 5, 7, 8)
Network Connector	4 x RJ-45
	10/100/1000Base-T auto negotiation speed, Auto MDI/MDI-X function, Full/Half duplex
	2 x SFP 100/1000Base-X dual mode slot
Network Cable	UTP/STP above Cat. 5e cable
	EIA/TIA-568 100-ohm (100m)
	Fiber Cable (Multi-mode): 50/125um, 62.5/125um
	Fiber Cable (Single-mode): 9/125um
Protocols	CSMA/CD
LED	Per unit: Power 1 (Green), Power 2 (Green), Fault (Amber)
	Per RJ-45 port : Link/Active (Green), Speed 10 (OFF), 100 (Green), 1000 (Yellow)
	Fiber Per port: Link/Active (Green)
	PoE Port LED : • Active : ON • Inactive : OFF • Fault : Flash (Over Load, Short Circuit, Port failed at Startup)
Safety	UL60950-1
Rail Traffic	EN 50121-4
MTBF	334,448 Hours
Warranty	5 years

DIP SW	DIP 1	ON : Disable power failure alarm
		OFF : Enable power failure alarm
	DIP 2	ON : Disables broadcast storm protection
		OFF : Enable broadcast storm protection
	DIP 3	ON : Fiber 2 for 100Base-FX SFP
		OFF : Fiber 2 for Gigabit SFP
	DIP 4	ON : Fiber 1 for 100Base-FX SFP
		OFF : Fiber 1 for Gigabit SFP
Reserve Polarity Protection	Present	
Overload Current Protection	Present	
Power Supply	Redundant Dual DC 24/48V (20~57VDC) Input power (Removable Terminal Block)	
Power Consumption	Max 143W @24VDC input (support up to 120W for PoE Output)	
PoE Power Output	Maximum PoE Output power budget 120W (30W/ Per Port)	
Alarm Relay Contact	Relay outputs with current carrying capacity of 1 A @24VDC	
Removable Terminal Block	Provide 2 Redundant power, Alarm relay contact, 6 Pin	
Operating Temperature	-10 ~ 60°C (IGS-402S-4PH24)	
	-40 ~ 75°C (IGS-402S-4PHE24)	
Operating Humidity	5% to 95% (Non-condensing)	
Storage Temperature	-40 ~ 85°C	
Housing	Rugged Metal, IP30 Protection	
Dimensions	106 x 62.5 x 134.8mm (D X W X H)	
Weight	0.84kg	
Installation Mounting	DIN Rail mounting or wall mounting	
EMC/EMS	CE, FCC	
EMI	FCC Part 15 Subpart B Class A, CE EN 55022 Class A	
	EN61000-6-4 – Emission for industrial environment	
EMS	EN61000-6-2 – Immunity for Industrial environment	
	EN61000-4-2 (ESD) Level 3, Criteria B	
	EN61000-4-3 (RS) Level 3, Criteria A	
	EN61000-4-4 (EFT) Level 3, Criteria A	
	EN61000-4-5 (Surge) Level 3, Criteria B	
	EN61000-4-6 (CS) Level 3, Criteria A	
	EN61000-4-8 (Magnetic Field) Level 3, Criteria A	
Shock	IEC 60068-2-27	
Freefall	IEC 60068-2-32	
Vibration	IEC 60068-2-6	

Application

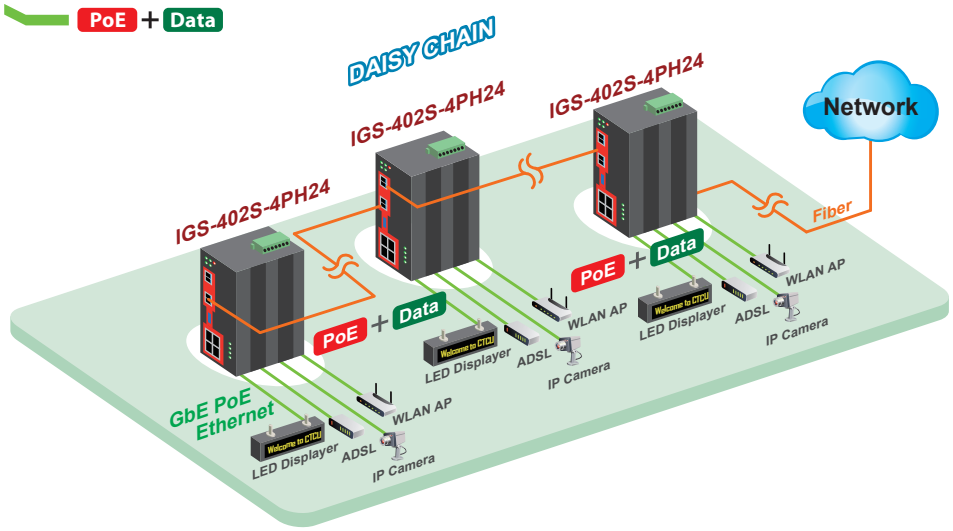
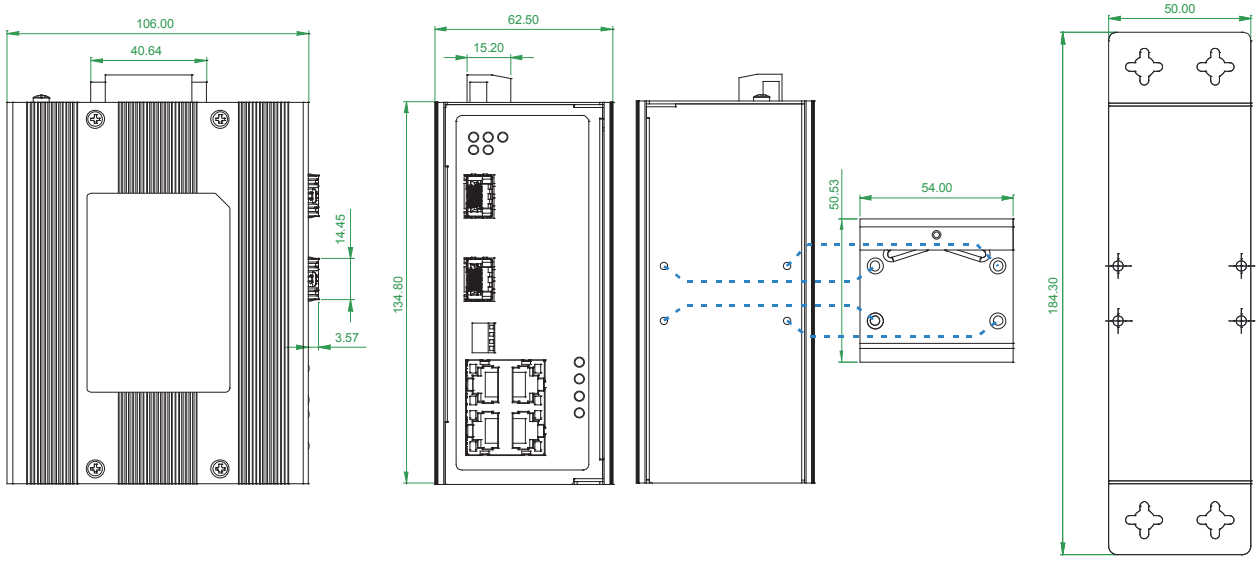


Figure : IGS-402S-4PH24 PoE Gigabit Ethernet Switch Transmission with Daisy Chain

Dimensions



Side View | Front View | Rear View | DIN-Rail Kit View | Wall-Mount Kit View

Ordering Information

Model Name	Description
IGS-402S-4PH24	4-Port 10/100/1000Base-T + 2-Port 100/1000Base SFP Slot with 4-PoE Switch (30W/Per Port, Total 120W, 24V Booster) (-10 ~ 60°C)
IGS-402S-4PHE24	4-Port 10/100/1000Base-T + 2-Port 100/1000Base SFP Slot with 4-PoE Switch (30W/Per Port, Total 120W, 24V Booster) (-40 ~ 75°C)

Accessories

DR-120-24	Industrial Power, Input 88 ~ 132VAC / 176 ~ 264VAC, Output 24VDC, 120W, -10 ~ +60°C
DRP-240-48	Industrial Power, Input 85 ~ 264VAC, Output 48VDC, 240W, -10 ~ +70°C
SFP Transceiver	Compatible, Reliable, 5-year Warranty

Temperature

IGS – 402S – 4PH □ 24

Example: IGS – 402S – 4PHE24

ISFP – M 7 040 – 31 – E

- ISFP: Industrial SFP Transceiver
- M: Multi Mode; S: Single Mode; T: Copper
- 7: GbE; 5: FE
- 040: Distance 002(2km), 020(20km), 040(40km)...
- 31: Wavelength
- E: -40~85°C; Blank: 0~70°C

IGS-803SM-8PH24

8x 10/100/1000Base-T+ 3x 100/1000Base-X SFP Slot with 8x PoE+ Managed Switch

(180 Watts, 24V Booster)

c UL us LISTED

IGS-803SM-8PH24 models are managed industrial grade Gigabit PoE (Power over Ethernet) switches with 8x 10/100/1000Base-T PoE ports and 3 SFP Gigabit/Fast Ethernet ports that provide stable and reliable Ethernet transmission. The Ethernet switches support a variety of management functions, including STP/RSTP/MSTP and ITU-T G.8032 Ring <50ms recovery time, advanced PoE management functions such as PoE device auto-checking and auto reset, PoE power weekly scheduling, layer 2 Ethernet IGMP, VLAN, QoS ,Security ,IPV6, bandwidth control, port mirroring, cable diagnostic and Green Ethernet. Housed in rugged DIN rail or wall mountable enclosures, these switches are designed for harsh environments, such as industrial networking, security automation applications, intelligent transportation systems (ITS) and are also suitable for many military and utility market applications where environmental conditions exceed commercial product specifications. Standard operating temperature range models (-10 to 60°C) and wide operating temperature range models (-40 to 75°C) fulfill the special needs of industrial automation applications.

Features

- 8x 10/100/1000Base-T RJ-45 with 3x 100/1000Base-X SFP Fiber
- 24/48VDC redundant dual input power, and built-in power booster design upto 55 VDC for PoE/PoE+ output
- Constant and regulated PoE output voltage at 55VDC
- Provides 8-port IEEE802.3af / 802.3at PoE output (30W per Port)
- Maximum PoE output power budget 180W
- Advanced PoE Management, PoE PD auto detection and auto reset, PoE configuration for power planning, weekly scheduling
- UL60950-1, CE, FCC, Rail Traffic EN50121-4 certified
- Industrial Grade EMS, EMI, EN61000-6-2, EN61000-6-4 certified
- Cable diagnostic, Measuring cable OK or broken point distance
- Supports IEEE802.3az EEE (Energy Efficient Ethernet) management to optimize the power consumption
- STP, RSTP, MSTP, ITU-T G.8032 Ethernet Protection Ring (EPR) for cabling redundant
- µ-Ring for Redundant Ethernet Ring, recovery time<20ms in 250 units
- DHCP client/Relay/Snooping/Snooping option 82/Relay option 82
- QoS, Traffic classification QoS, CoS, bandwidth width control for Ingress and Egress, Storm Control, DiffServ
- IEEE802.1q VLAN, port based VLAN, MAC based VLAN, IP subnet based VLAN, Protocol based VLAN, VLAN translation, MVR
- Dynamic IEEE 802.3ad LACP Link Aggregation, Static Link Aggregation
- IGMP/MLD snooping V1/V2/V3, IGMP Filtering/ Throttling, IGMP query, IGMP proxy reporting, MLD snooping
- Security : Port based and MAC based IEEE802.1X, RADIUS, ACL, TACACS+, HTTP/HTTPS, SSL/SSH v2
- Software upgrade via TFTP and HTTP, redundant firmware to avoid in case of upgrade failure
- RMON, MIB II, Port mirroring, Event syslog, DNS, NTP/SNTP, IEEE802.1ab LLDP
- Supports IPv6 Telnet server /ICMP v6, SNMP, HTTP, SSH/SSL, NTP/SNTP, TFTP, QoS, ACL
- CLI, Web based management, SNMP v1/v2c/v3, Telnet server for management
- SmartView Management System

Specifications

Standard	IEEE 802.3	10Base-T 10Mbit/s Ethernet
	IEEE 802.3u	100Base-TX, 100Base-FX, Fast Ethernet
	IEEE 802.3ab	1000Base-T Gbit/s Ethernet over twisted pair
	IEEE 802.3z	1000Base-X Gbit/s Ethernet over Fiber-Optic
	IEEE 802.1d	STP (Spanning Tree Protocol)
	IEEE 802.1w	RSTP (Rapid Spanning Tree Protocol)
	IEEE 802.1s	MSTP (Multiple Spanning Tree Protocol)
	ITU-T G.8032 / Y.1344	EPR (Ethernet Protection Ring)
	IEEE 802.1Q	Virtual LANs (VLAN)
	IEEE 802.1X	Port based Network Access Control, Authentication
	IEEE 802.3ad	Link aggregation for parallel links with LACP(Link Aggregation Control Protocol)
	IEEE 802.3x	Flow control for Full Duplex
	IEEE 802.3af	PoE (Power over Ethernet)
	IEEE 802.3at	PoE+ (Power over Ethernet ehancements)
	IEEE 802.1ad	Stacked VLANs, Q-in-Q
	IEEE 802.1p	LAN Layer 2 QoS/CoS Protocol for Traffic Prioritization
	IEEE 802.1ab	Link Layer Discovery Protocol (LLDP)
	IEEE 802.3az	EEE (Energy Efficient Ethernet)
VLAN ID	4096	
Switch Architecture	Back-plane (Switching Fabric): 22Gbps	
Data Processing	Store and Forward	

Flow Control	IEEE 802.3x for full duplex mode Back pressure for half duplex mode
PoE RJ-45 Pin Assignment	8 RJ-45 port support IEEE 802.3af / IEEE 802.3at End-Span, Alternative A mode.
	Positive (V+) : RJ-45 pin 1, 2. Negative (V-) : RJ-45 pin 3, 6. Data (1,2,3,6)
Network Connector	8 x RJ-45 10/100/1000Base-T auto negotiation speed, Auto MDI/MDI-X function, Full/Half duplex 3X 100/1000 Base-X dual speed mode SFP slot, with DDMI
Console	RS-232 (RJ-45)
Network Cable	UTP/STP above Cat. 5e cable
	EIA/TIA-568 100-ohm (100m)
Protocols	CSMA/CD
Reverse Polarity Protection	Present
Overload Current Protection	Present
CPU Watch Dog	Present
Power Supply	Redundant Dual DC 24/48V (20~57VDC) Input power (Removable Terminal Block)
LED	Per unit: Power 1 (Green), Power 2 (Green), Fault (Amber), CPU Act (Green), Ring Master (Yellow)
	Per RJ-45 port: 10/100 Link/Active (Green) 1000 Link/Active (Amber)
	SFP Fiber Per port: Link/Active (Green)
	PoE Port LED 1 LED /per Port : • PoE Output Power On : ON (Green) • PoE Fault (Over Load, Short Circuit, Port failed at Startup) : Flash 1times /sec (Green) • PoE Output Power Off : Off (Green)

Specifications

Jumbo Frame	9.6KB
MAC Address Table	8K
PoE Standard	IEEE802.3af, IEEE802.3at
PoE Power Output	Maximum PoE output power budget 180W (30W/per port)
Power Consumption	200.2W (180W for PoE output)
Warning Message	System Syslog, SMTP/ e-mail event message, alarm relay
Alarm Relay Contact	Relay outputs with current carrying capacity of 1 A @24VDC
Removable Terminal Block	Provide 2 redundant power, alarm relay contact, 6 Pin
Operating Temperature	-10 ~ 60°C (IGS-803SM-8PH24) -40 ~ 75°C (IGS-803SM-8PHE24)
Operating Humidity	5% to 95% (Non-condensing)
Storage Temperature	-40 ~ 85°C
Housing	Rugged Metal, IP30 Protection
Dimensions	106 x 72 x152 mm (D x W x H)
Weight	0.96kg

Software Specifications

Topology	
VLAN	IEEE 802.1q VLAN,up to 4095 ID
	IEEE 802.1q VLAN,up to 4095 Groups
	IEEE 802.1ad Q-in-Q
	Port Based VLAN
	MAC-based VLAN,up to 256 entries
	IP Subnet-based VLAN, up to 128 entries
	Protocol-based VLAN(Ethernt, SNAP, LLC), up to 128 entries
	VLAN Translation, up to 256 entries
	MVR (Multiple VLAN Registration)
Link Aggregation (Port Trunk)	Static (Hash with SA, DA, IP, TCP/UDP port), up to 5 trunk group
	Dynamic (IEEE 802.3ad LACP), up to 5 trunk group
Spanning Tree	IEEE802.1d STP
	IEEE802.1w RSTP
	IEEE802.1s MSTP
Loop Protection	Present
ITU-T G.8032 / Y.1344 ERPS (Ethernet Ring Protection)	Convergence time <50ms
	Single Ring, Sub-Ring, Multiple ring topology network
QoS Feature	
Class of Service	IEEE802.1p 8 active priorities queues for per port
Traffic Classification QoS	IEEE802.1p based CoS
	IP Precedence based CoS
	IP DSCP based CoS
	QCL(QoS Control List): MAC Access control list (Source/ Destination MAC, Ether type, Priority ID/ VLAN ID)
	QCL: IP extended access control list (Source/Destination IP, Protocol, TCP/UDP port number)
Bandwidth Control for Ingress	Rate in steps : 100 kbps / 1fps / 100fps
	Range : 100 kbps to 1Gbps / 1fps to 3300kfps
	Rate Unit : bit or frame
Bandwidth Control for Egress	Rate in steps : 100 kbps / 1fps / 100fps
	Range : 100 kbps to 1Gbps / 1fps to 3300kfps
	Rate Unit : bit or frame
	Per queue shaper
DiffServ (RF 2474) Remarking	
Storm Control	for Unicast, Broadcast, Multicast
IP Multicasting Feature	
IGMP / MLD Snooping	IGMP Snooping v1, v2, v3 / MLD Snooping v1, v2
	Port Filtering Profile
	Throttling
	Fast Leave
	Query
Security Features	
IEEE 802.1X	Port-Based
	MAC-Based
ACL	Number of rules : up to 256 entries
	for L2 / L3 / L4
RADIUS authentication & accounting	
TACACS+ authentication & accounting, TACACS+ 3.0	
HTTPS, HTTP	
SSL / SSH v2	

Installation Mounting	DIN Rail mounting or wall mounting
EMC/EMS	CE, FCC
EMI	FCC Part 15 Subpart B Class A, CE EN 55022 Class A
	EN61000-6-4 – Emission for industrial environment
EMS	EN61000-6-2 – Immunity for Industrial environment
	EN61000-4-2 (ESD) Level 3, Criteria B
	EN61000-4-3 (RS) Level 3, Criteria A
	EN61000-4-4 (EFT) Level 3, Criteria A
	EN61000-4-5 (Surge) Level 3, Criteria B
	EN61000-4-6 (CS) Level 3, Criteria A
	EN61000-4-8 (Magnetic Field) Level 3, Criteria A
Safety	UL60950-1
Rail Traffic	EN 50121-4
Shock	IEC 60068-2-27
Freefall	IEC 60068-2-32
Vibration	IEC 60068-2-6
MTBF	311,376 hrs
Warranty	5 years

User Name Password Authentication	Local Authentication
	Remote Authentication (via RADIUS / TACACS+)
Management Interface Access Filtering	Web, Telnet / SSH
Management Features	
CLI	
Web Based Management	
Telnet	Server
SNMP	V1, V2c, V3
SW & Configuration Upgrade	TFTP, HTTP
	Redundant firmware in case of upgrade failure
RMON	RMON I (1, 2, 3, 9 group), RMON II
MIB II	RFC 1213
DHCP	Client
	Relay
	Snooping
	Snooping option 82
	Relay option 82
IP Source Guard	
Port Mirroring	
Event Syslog	Syslog server (RFC3164) (Support 1 server)
Warning Message	System syslog, e-mail, alarm relay
DNS	Client, Proxy
NTP / SNTP	
LLDP (IEEE 802.1ab)	Link Layer Discovery Protocol
	LLDP-MED
IPv6 Features	
IPv6 Management	Telnet Server/ICMP v6
Stateless Auto-Configuration	
SNMP over IPv6	
HTTP over IPv6	
SSH over IPv6	
IPv6 Telnet Support	
IPv6 NTP / SNTP Support	
IPv6 TFTP Support	
IPv6 QoS	
IPv6 ACL	Number of rules: up to 256 entries
	L2 / L3 / L4
Others Features	
Green Ethernet	Supports IEEE802.3az EEE (Energy Efficient Ethernet) Management to optimize the power consumption
	Determine the cable length and lowering the power for ports with short cables
	Lower the power for a port when there is no link
	LED Power Management :Adjustment LEDs intensity
Cable Diagnostic	Measuring cable OK or broken point distance
Advanced PoE Management	PoE Configuration
	PoE Enable/Disable
	Power limit by classification
	Power limit by management
	Total PoE Power budge (maximum 180W) limitation
	Power feeding priority
	PD Auto Detection and Auto Reset
	PoE Scheduling (On/Off schedule weekly)

Application

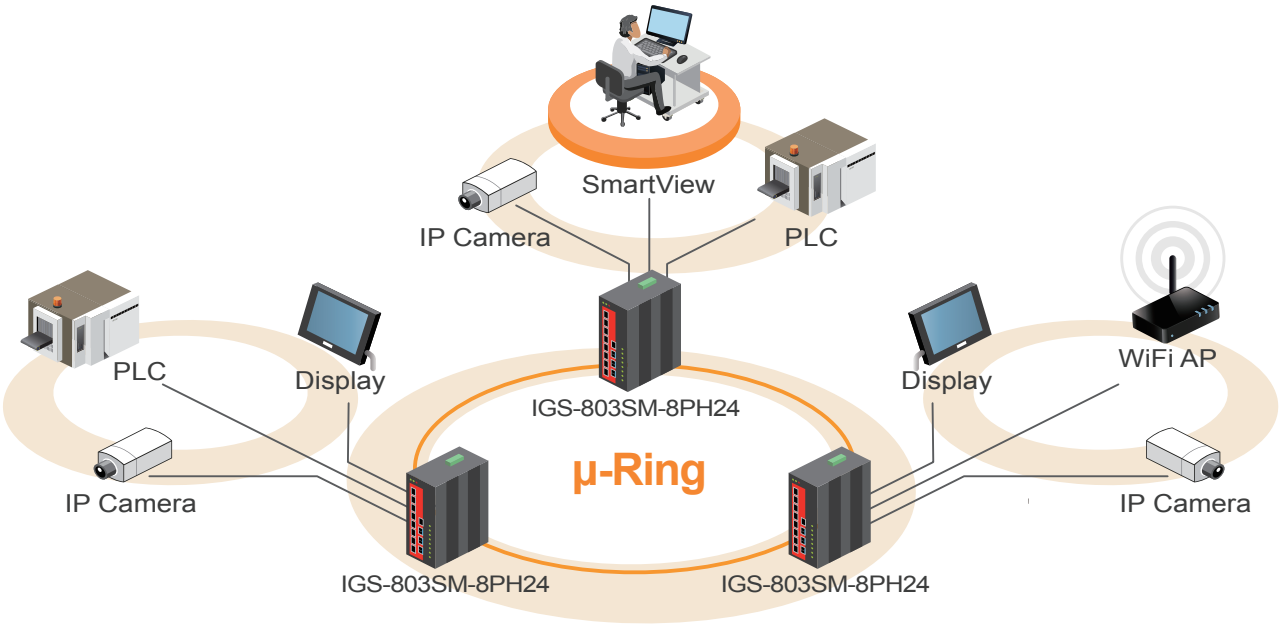
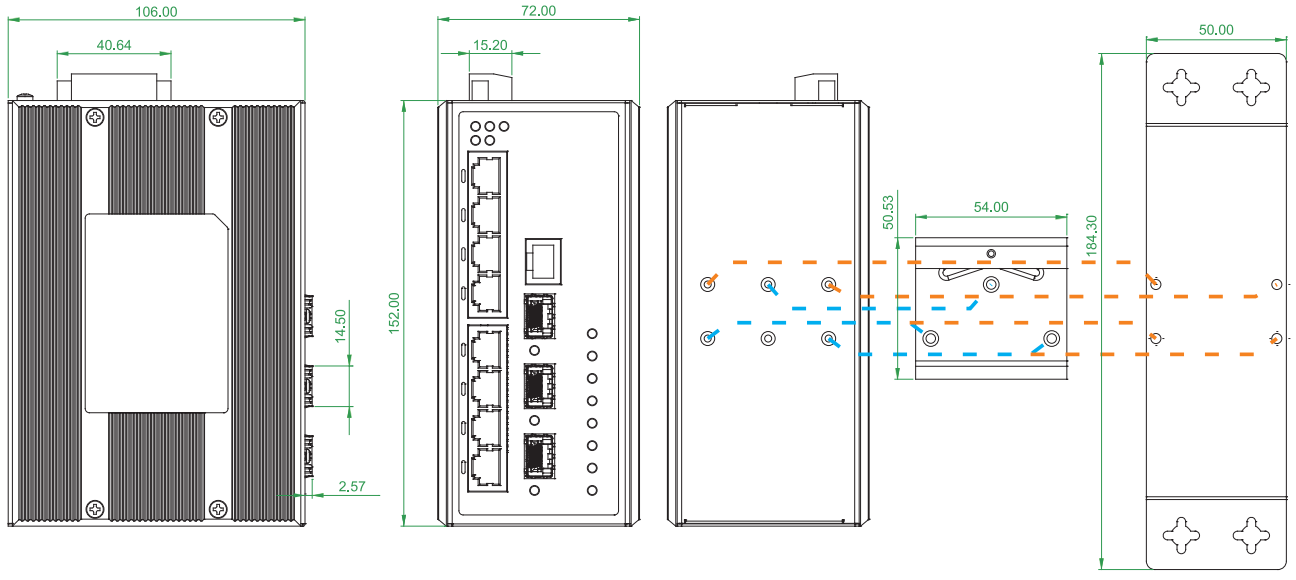


Figure : Topology

Dimensions



Side View | Front View | Rear View | DIN-Rail Kit View | Wall-Mount Kit View

Ordering Information

Model Name	Description
IGS-803SM-8PH24	8x 10/100/1000Base-T + 3x 100/1000Base-X SFP slot with 8 High Power PoE Managed Switch (30W/Per Port ,Total 180W, 24V Booster, -10~60°C)
IGS-803SM-8PHE24	8x 10/100/1000Base-T + 3x 100/1000Base-X SFP slot with 8 High Power PoE Managed Switch (30W/Per Port ,Total 180W, 24V Booster, -40~75°C)

Accessories

DR-120-24	Industrial Power, Input 88 ~ 132VAC / 176 ~ 264VAC, Output 24VDC, 120W, -10 ~ +60°C
DRP-240-48	Industrial Power, Input 85 ~ 264VAC, Output 48VDC, 240W, -10 ~ +70°C
SFP Transceiver	Compatible, Reliable, 5-year Warranty

IGS-803SM – 8PH □ 24 (Temperature)

Example: IGS-803SM – 8PH E24

ISFP – M 7 040 – 31 – E

- ISFP: Industrial SFP Transceiver
- M: Multi Mode; S: Single Mode; T: Copper
- 7: GbE; 5: FE
- 040: Distance (002(2km), 020(20km), 040(40km)...)
- 31: Wavelength
- E: -40~85°C; Blank: 0~70°C

Specifications & design are subject to change without prior notice. Please visit CTC Union website for more details.

IGS-402SM-4PH24

4x 10/100/1000Base-T+ 2x 100/1000Base-X SFP Slot with 4x PoE+ Managed Switch

(120 Watts, 24V Booster)

IGS-402SM-4PH24 models are managed industrial grade Gigabit PoE (Power over Ethernet) switches with 4x 10/100/1000Base-T PoE ports and 2 SFP Gigabit/Fast Ethernet ports that provide stable and reliable Ethernet transmission. The Ethernet switches support a variety of management functions, including STP/RSTP/MSTP and ITU-T G.8032 Ring <50ms recovery time, advanced PoE management functions such as PoE device auto-checking and auto reset, PoE power weekly scheduling, layer 2 Ethernet IGMP, VLAN, QoS ,Security ,IPv6, bandwidth control, port mirroring, cable diagnostic and Green Ethernet. Housed in rugged DIN rail or wall mountable enclosures, these switches are designed for harsh environments, such as industrial networking, security automation applications, intelligent transportation systems (ITS) and are also suitable for many military and utility market applications where environmental conditions exceed commercial product specifications. Standard operating temperature range models (-10 to 60°C) and wide operating temperature range models (-40 to 75°C) fulfill the special needs of industrial automation applications.

Features

- 4x 10/100/1000Base-T RJ-45 with 2x 100/1000Base-X SFP Fiber
- 24/48VDC redundant dual input power, and built-in power booster design up to 55 VDC for PoE/PoE+ output
- Constant and regulated PoE output voltage at 55VDC
- Provides 4-port IEEE802.3af / 802.3at PoE output (30W per Port)
- Maximum PoE output power budget 120W
- Advanced PoE management, PoE PD auto detection and auto reset, PoE configuration for power planning, weekly scheduling
- UL60950-1, CE, FCC, Rail Traffic EN50121-4 certified
- Industrial Grade EMS, EMI, EN61000-6-2, EN61000-6-4 certified
- Cable diagnostic, Measuring cable OK or broken point distance
- Supports IEEE802.3az EEE (Energy Efficient Ethernet) management to optimize the power consumption
- STP, RSTP, MSTP, ITU-T G.8032 Ethernet Protection Ring(EPR) for cabling redundant
- µ-Ring for Redundant Ethernet Ring, recovery time<20ms in 250 units
- QoS, Traffic classification QoS, CoS, bandwidth control for Ingress and Egress, Storm Control, DiffServ
- IEEE802.1q VLAN, port based VLAN, MAC based VLAN, IP subnet based VLAN, Protocol based VLAN, VLAN translation, MVR
- Dynamic IEEE 802.3ad LACP Link Aggregation, Static Link Aggregation
- IGMP/MLD snooping V1/V2/V3, IGMP Filtering / Throttling, IGMP query, IGMP proxy reporting, MLD snooping
- Security : Port based and MAC based IEEE802.1X, RADIUS, ACL, TACACS+, HTTP/HTTPS, SSL/SSH v2
- Software upgrade via TFTP and HTTP, redundant firmware case of upgrade failure
- DHCP client/Relay/Snooping/Snooping option 82/Relay option 82
- RMON, MIB II, Port mirroring, Event syslog, DNS, NTP/SNTP, IEEE802.1ab LLDP
- Supports IPv6 Telnet server /ICMP v6, SNMP, HTTP, SSH/SSL, NTP/SNTP, TFTP, QoS, ACL
- CLI, Web based management, **SNMP** v1/v2c/v3, Telnet server for management
- **SmartView** Management System

Specifications

Standard	IEEE 802.3	10Base-T 10Mbit/s Ethernet
	IEEE 802.3u	100Base-TX, 100Base-FX, Fast Ethernet
	IEEE 802.3ab	1000Base-T Gbit/s Ethernet over twisted pair
	IEEE 802.3z	1000Base-X Gbit/s Ethernet over Fiber-Optic
	IEEE 802.1d	STP (Spanning Tree Protocol)
	IEEE 802.1w	RSTP (Rapid Spanning Tree Protocol)
	IEEE 802.1s	MSTP (Multiple Spanning Tree Protocol)
	ITU-T G.8032 / Y.1344	EPR (Ethernet Protection Ring)
	IEEE 802.1Q	Virtual LANs (VLAN)
	IEEE 802.1X	Port based Network Access Control, Authentication
	IEEE 802.3ad	Link aggregation for parallel links with LACP (Link Aggregation Control Protocol)
	IEEE 802.3x	Flow control for Full Duplex
	IEEE 802.3af	PoE (Power over Ethernet)
	IEEE 802.3at	PoE+ (Power over Ethernet ehancements)
	IEEE 802.1ad	Stacked VLANs, Q-in-Q
	IEEE 802.1p	LAN Layer 2 QoS/CoS Protocol for Traffic Prioritization
	IEEE 802.1ab	Link Layer Discovery Protocol (LLDP)
	IEEE 802.3az	EEE (Energy Efficient Ethernet)
VLAN ID	4096	
Switch Architecture	Back-plane (Switching Fabric):12Gbps	

Data Processing	Store and Forward
Flow Control	IEEE 802.3x for full duplex mode Back pressure for half duplex mode
PoE RJ-45 Pin Assignment	4 RJ-45 port support IEEE 802.3af / IEEE 802.3at End-Span, Alternative A mode
	Positive (V+): RJ-45 pin 1, 2. Negative (V-): RJ-45 pin 3, 6. Data (1,2,3,6)
Network Connector	4x RJ-45 10/100/1000Base-T auto negotiation speed, Auto MDI/MDI-X function, Full/Half duplex
Console	RS-232 (RJ-45)
Network Cable	UTP/STP above Cat. 5e cable
	EIA/TIA-568 100-ohm (100m)
Protocols	CSMA/CD
Reverse Polarity Protection	Present
Overload Current Protection	Present
CPU Watch Dog	Present
Power Supply	Redundant Dual DC 24/48V (20~57VDC) Input power (Removable Terminal Block)
LED	Per unit: Power 1 (Green), Power 2 (Green), Fault (Amber), CPU Act (Green), Ring Master (Yellow)
	Per RJ-45 port: 10/100 Link/Active (Green) 1000 Link/Active (Amber)
	SFP Fiber Per port: Link/Active (Green)
	PoE Port LED 1 LED /per Port : • PoE Output Power On : ON (Green) • PoE Fault (Over Load , Short Circuit, Port failed at Startup) : Flash 1times /sec (Green) • PoE Output Power Off : Off (Green)

Specifications

Jumbo Frame	9.6KB
MAC Address Table	8K
PoE Standard	IEEE802.3af, IEEE802.3at
PoE Power Output	Maximum PoE output power budget 120W (30W/per port)
Power Consumption	TBD
Warning Message	System syslog, SMTP/ e-mail event message, alarm relay
Alarm Relay Contact	Relay outputs with current carrying capacity of 1 A @24VDC
Removable Terminal Block	Provide 2 Redundant power, Alarm relay contact, 6 Pin
Operating Temperature	-10 ~ 60°C (IGS-402SM-4PH24) -40 ~ 75°C (IGS-402SM-4PHE24)
Operating Humidity	5% to 95% (Non-condensing)
Storage Temperature	-40 ~ 85°C
Housing	Rugged Metal, IP30 Protection
Dimensions	106 x 62.5 x 134.8mm (D x W x H)
Weight	0.84kg

Software Specifications

Topology	
VLAN	IEEE 802.1q VLAN,up to 4095 ID
	IEEE 802.1q VLAN,up to 4095 Groups
	IEEE 802.1ad Q-in-Q
	Port Based VLAN
	MAC-based VLAN, up to 256 entries
	IP Subnet-based VLAN, up to 128 entries
	Protocol-based VLAN(Ethernt, SNAP, LLC), up to 128 entries
	VLAN Translation, up to 256 entries
	MVR (Multiple VLAN Registration)
Link Aggregation (Port Trunk)	Static (Hash with SA, DA, IP, TCP/UDP port), up to 5 trunk group
	Dynamic (IEEE 802.3ad LACP), up to 5 trunk group
Spanning Tree	IEEE802.1d STP
	IEEE802.1w RSTP
	IEEE802.1s MSTP
Loop Protection	Present
ITU-T G.8032 / Y.1344 ERPS (Ethernet Ring Protection)	Convergence time <50ms
	Single Ring, Sub-Ring, Multiple ring topology network
QoS Feature	
Class of Service	IEEE802.1p 8 active priorities queues for per port
Traffic Classification QoS	IEEE802.1p based CoS
	IP Precedence based CoS
	IP DSCP based CoS
	QCL(QoS Control List): MAC Access control list (Source/ Destination MAC, Ether type, Priority ID/ VLAN ID)
	QCL: IP extended access control list (Source/ Destination IP, Protocol, TCP/UDP port number)
Bandwidth Control for Ingress	Rate in steps : 100 kbps / 1fps / 100fps
	Range : 100 kbps to 1Gbps / 1fps to 3300kfps
	Rate Unit : bit or frame
Bandwidth Control for Egress	Rate in steps : 100 kbps / 1fps / 100fps
	Range : 100 kbps to 1Gbps / 1fps to 3300kfps
	Rate Unit : bit or frame
	Per queue shaper
DiffServ (RF 2474) Remarking	
Storm Control	for Unicast, Broadcast, Multicast
IP Multicasting Feature	
IGMP / MLD Snooping	IGMP Snooping v1, v2, v3 / MLD Snooping v1, v2
	Port Filtering Profile
	Throttling
	Fast Leave
	Query
Security Features	
IEEE 802.1X	Port-Based
	MAC-Based
ACL	Number of rules : up to 256 entries
	for L2 / L3 / L4
RADIUS authentication & accounting	
TACACS+ authentication & accounting, TACACS+ 3.0	
HTTPS, HTTP	
SSL / SSH v2	

Installation Mounting	DIN Rail mounting or wall mounting
EMC/EMS	CE, FCC
EMI	FCC Part 15 Subpart B Class A, CE EN 55022 Class A
	EN61000-6-4 – Emission for industrial environment
EMS	EN61000-6-2 – Immunity for Industrial environment
	EN61000-4-2 (ESD) Level 3, Criteria B
	EN61000-4-3 (RS) Level 3, Criteria A
	EN61000-4-4 (EFT) Level 3, Criteria A
	EN61000-4-5 (Surge) Level 3, Criteria B
	EN61000-4-6 (CS) Level 3, Criteria A
	EN61000-4-8 (Magnetic Field) Level 3, Criteria A
Safety	UL60950-1 (Pending)
Rail Traffic	EN 50121-4
Shock	IEC 60068-2-27
Freefall	IEC 60068-2-32
Vibration	IEC 60068-2-6
MTBF	TBD (Above 30 years)
Warranty	5 years

User Name Password Authentication	Local Authentication
	Remote Authentication (via RADIUS / TACACS+)
Management Interface Access Filtering	Web, Telnet / SSH
Management Features	
CLI	
Web Based Management	
Telnet	Server
SNMP	V1, V2c, V3
SW & Configuration Upgrade	TFTP, HTTP
	Redundant firmware in case of upgrade failure
RMON	RMON I (1, 2, 3, 9 group), RMON II
MIB II	RFC 1213
DHCP	Client
	Relay
	Snooping
	Snooping option 82
	Relay option 82
IP Source Guard	
Port Mirroring	
Event Syslog	Syslog server (RFC3164) (Support 1 server)
Warning Message	System syslog, e-mail, alarm relay
DNS	Client, Proxy
NTP /SNTP	
LLDP (IEEE 802.1ab)	Link Layer Discovery Protocol
	LLDP-MED
IPv6 Features	
IPv6 Management	Telnet Server/ICMP v6
Stateless Auto-Configuration	
SNMP over IPv6	
HTTP over IPv6	
SSH over IPv6	
IPv6 Telnet Support	
IPv6 NTP / SNTP Support	
IPv6 TFTP Support	
IPv6 QoS	
IPv6 ACL	Number of rules: up to 256 entries
	L2 / L3 / L4
Others Features	
Green Ethernet	Supports IEEE802.3az EEE (Energy Efficient Ethernet) Management to optimize the power consumption
	Determine the cable length and lowering the power for ports with short cables
	Lower the power for a port when there is no link
	LED Power Management : Adjustment LEDs intensity
Cable Diagnostic	Measuring cable OK or broken point distance
Advanced PoE Management	PoE Configuration
	PoE Enable/Disable
	Power limit by classification
	Power limit by management
	Total PoE Power budge (maximum 120W) limitation
	Power feeding priority
	PD Auto Detection and Auto Reset
	PoE Scheduling (On/Off schedule weekly)

Application

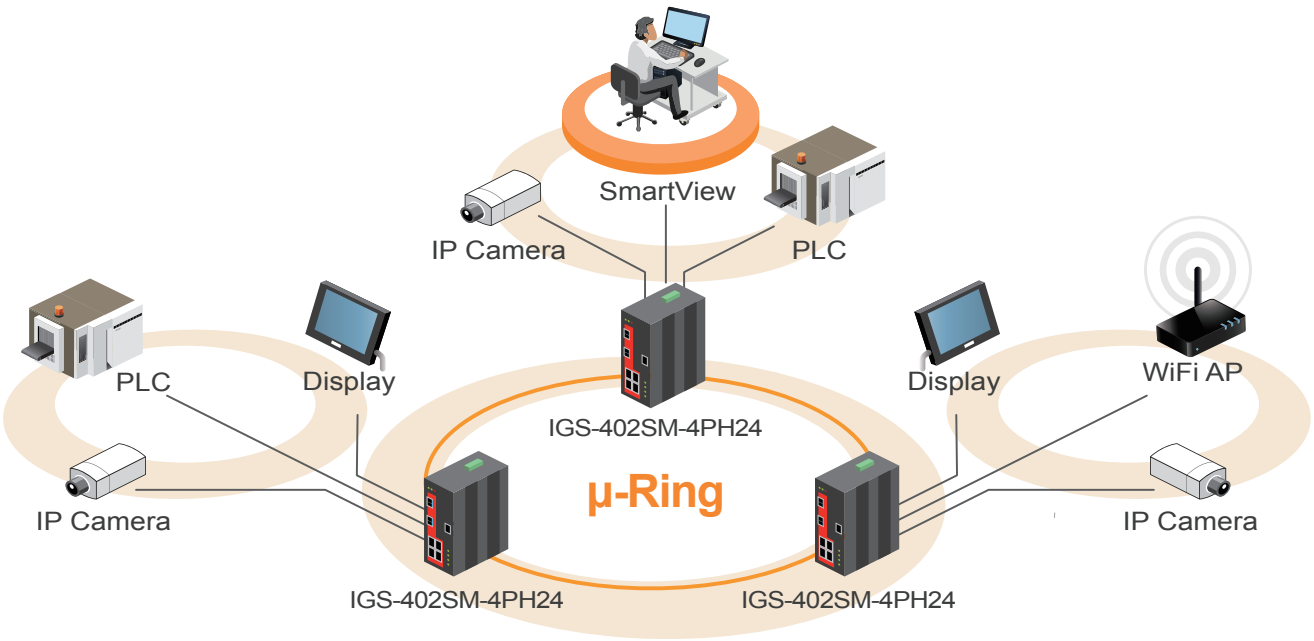
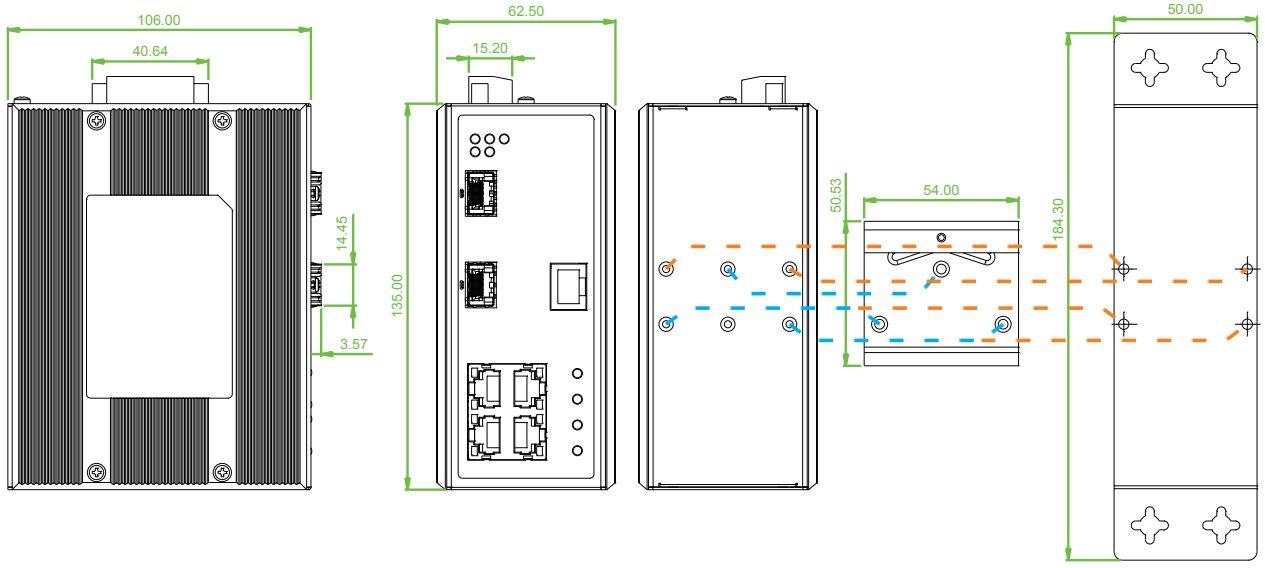


Figure : Topology

Dimensions



Side View | Front View | Rear View | DIN-Rail Kit View | Wall-Mount Kit View

Ordering Information

Model Name	Description
IGS-402SM-4PH24	4x 10/100/1000Base-T + 2x 100/1000Base-X SFP slot with 4 High Power PoE Managed Switch (30W/Per Port ,Total 120W, 24V Booster, -10~60°C)
IGS-402SM-4PHE24	4x 10/100/1000Base-T + 2x 100/1000Base-X SFP slot with 4 High Power PoE Managed Switch (30W/Per Port ,Total 120W, 24V Booster, -40~75°C)
Accessories	
DR-120-24	Industrial Power, Input 88 ~ 132VAC / 176 ~ 264VAC, Output 24VDC, 120W, -10 ~ +60°C
DRP-240-48	Industrial Power, Input 85 ~ 264VAC, Output 48VDC, 240W, -10 ~ +70°C
SFP Transceiver	Compatible, Reliable, 5-year Warranty

Temperature

IGS-402SM – 4PH ☐ 24

Example: IGS-402SM – 4PH E24

ISFP – M 7 040 – 31 – E

- ISFP: Industrial SFP Transceiver
- M: Multi Mode; S: Single Mode; T: Copper
- 7: GbE; 5: FE
- 040: Distance 002(2km), 020(20km), 040(40km)...
- 31: Wavelength
- E: -40~85°C; Blank: 0~70°C

IFS-803GSM-8PH24

8x 10/100Base-TX+ 3x 100/1000Base-X SFP Slot with 8x PoE+ Managed Switch

(180 Watts, 24V Booster)

c UL us LISTED

IFS-803GSM-8PH24 models are managed industrial grade Fast Ethernet PoE (Power over Ethernet) switches with 8x 10/100Base-TX PoE ports and 3 SFP Gigabit/Fast Ethernet ports that provide stable and reliable Ethernet transmission. The Ethernet switches support a variety of management functions, including STP/RSTP/MSTP and ITU-T G.8032 Ring <50ms recovery time, advanced PoE management functions such as PoE device auto-checking and auto reset, PoE power weekly scheduling, layer 2 Ethernet IGMP, VLAN, QoS ,Security ,IPV6, bandwidth control, port mirroring, cable diagnostic and Green Ethernet. Housed in rugged DIN rail or wall mountable enclosures, these switches are designed for harsh environments, such as industrial networking, security automation applications, intelligent transportation systems (ITS) and are also suitable for many military and utility market applications where environmental conditions exceed commercial product specifications. Standard operating temperature range models (-10 to 60°C) and wide operating temperature range models (-40 to 75°C) fulfill the special needs of industrial automation applications.

Features

- 8x 10/100Base-TX RJ-45 with 3x 100/1000Base-X SFP Fiber
- 24/48VDC redundant dual input power, and built-in power booster design up to 55 VDC for PoE/PoE+ output
- Constant and regulated PoE output voltage at 55VDC
- Provides 8-port IEEE802.3af / 802.3at PoE output (30W per Port)
- Maximum PoE output power budget 180W
- Advanced PoE management, PoE PD auto detection and auto reset, PoE configuration for power planning, weekly scheduling
- UL60950-1, CE, FCC, Rail Traffic EN50121-4 certified
- Industrial Grade EMS, EMI, EN61000-6-2, EN61000-6-4 certified
- Cable diagnostic, Measuring cable OK or broken point distance
- Supports IEEE802.3az EEE (Energy Efficient Ethernet) Management to optimize the power consumption
- STP, RSTP, MSTP, ITU-T G.8032 Ethernet Protection Ring(EPR) for cabling redundant
- µ-Ring for Redundant Ethernet Ring, recovery time<20ms in 250 units
- QoS, Traffic classification QoS, CoS, bandwidth control for Ingress and Egress, Storm Control, DiffServ
- IEEE802.1q VLAN, port based VLAN, MAC based VLAN, IP subnet based VLAN, Protocol based VLAN, VLAN translation, MVR
- Dynamic IEEE 802.3ad LACP Link Aggregation, Static Link Aggregation
- IGMP/MLD snooping V1/V2/V3, IGMP Filtering/Throttling, IGMP query, IGMP proxy reporting, MLD snooping
- Security : Port based and MAC based IEEE802.1X, RADIUS, ACL, TACACS+, HTTP/HTTPS, SSL/SSH v2
- Software upgrade via TFTP and HTTP, redundant firmware to avoid in case of upgrading failure
- DHCP client/Relay/Snooping/Snooping option 82/Relay option 82
- RMON, MIB II, Port mirroring, Event syslog, DNS, NTP/SNTP, IEEE802.1ab LLDP
- Supports IPv6 Telnet server /ICMP v6, SNMP, HTTP, SSH/SSL, NTP/SNTP, TFTP, QoS, ACL
- CLI, Web based management, **SNMP** v1/v2c/v3, Telnet server for management
- **SmartView** Management System

Specifications

Standard	IEEE 802.3	10Base-T 10Mbit/s Ethernet
	IEEE 802.3u	100Base-TX, 100Base-FX, Fast Ethernet
	IEEE 802.3ab	1000Base-T Gbit/s Ethernet over twisted pair
	IEEE 802.3z	1000Base-X Gbit/s Ethernet over Fiber-Optic
	IEEE 802.1d	STP (Spanning Tree Protocol)
	IEEE 802.1w	RSTP (Rapid Spanning Tree Protocol)
	IEEE 802.1s	MSTP (Multiple Spanning Tree Protocol)
	ITU-T G.8032 / Y.1344	EPR (Ethernet Protection Ring)
	IEEE 802.1Q	Virtual LANs (VLAN)
	IEEE 802.1X	Port based Network Access Control, Authentication
	IEEE 802.3ad	Link aggregation for parallel links with LACP(Link Aggregation Control Protocol)
	IEEE 802.3x	Flow control for Full Duplex
	IEEE 802.3af	PoE (Power over Ethernet)
	IEEE 802.3at	PoE+ (Power over Ethernet ehancements)
	IEEE 802.1ad	Stacked VLANs, Q-in-Q
	IEEE 802.1p	LAN Layer 2 QoS/CoS Protocol for Traffic Prioritization
	IEEE 802.1ab	Link Layer Discovery Protocol (LLDP)
	IEEE 802.3az	EEE (Energy Efficient Ethernet)
VLAN ID	4096	
Switch Architecture	Back-plane	
Data Processing	Store and Forward	
Flow Control	IEEE 802.3x for full duplex mode Back pressure for half duplex mode	

Jumbo Frame	9.6KB
MAC Address Table	8K
PoE Standard	IEEE802.3af, IEEE802.3at
PoE RJ-45 Pin Assignment	8 RJ-45 port support IEEE 802.3af / IEEE 802.3at End-Span, Alternative A mode. Positive (V+): RJ-45 pin 1, 2 Negative (V-): RJ-45 pin 3, 6. Data (1,2,3,6)
Network Connector	8x RJ-45 10/100BaseTX auto negotiation speed, Auto MDI/MDI-X function, Full/Half duplex 3X 100/1000 Base-X dual speed mode SFP slot, with DDMI
Console	RS-232 (RJ-45)
Network Cable	UTP/STP above Cat. 5e cable EIA/TIA-568 100-ohm (100m)
Protocols	CSMA/CD
Reverse Polarity Protection	Present
Overload Current Protection	Present
CPU Watch Dog	Present
Power Supply	Redundant Dual DC 24/48V (20~57VDC) Input power (Removable Terminal Block)
LED	Per unit: Power 1 (Green), Power 2 (Green), Fault (Amber), CPU Act (Green), Ring Master (Yellow) Per RJ-45 port: 10/100 Link/Active (Green) 1000 Link/Active (Amber) SFP Fiber Per port: Link/Active (Green) PoE Port LED 1 LED /per Port : • PoE Output Power On : ON (Green) • PoE Fault (Over Load, Short Circuit, Port failed at • Startup) : Flash 1times /sec (Green) • PoE Output Power Off : Off (Green)

Specifications

PoE Power Output	Maximum PoE output power budget 180W (30W/per port)
Power Consumption	198W (180W for PoE output)
Warning Message	System syslog, SMTP/ e-mail event message, alarm relay
Alarm Relay Contact	Relay outputs with current carrying capacity of 1 A @24VDC
Removable Terminal Block	Provide 2 redundant power, Alarm relay contact, 6 Pin
Operating Temperature	-10 ~ 60°C (IFS-803GSM-8PH24) -40 ~ 75°C (IFS-803GSM-8PHE24)
Operating Humidity	5% to 95% (Non-condensing)
Storage Temperature	-40 ~ 85°C
Housing	Rugged Metal, IP30 Protection
Dimensions	106 x 72 x152 mm (D x W x H)
Weight	0.96kg
Installation Mounting	DIN Rail mounting or wall mounting

Software Specifications

Topology	
VLAN	IEEE 802.1q VLAN,up to 4095 ID
	IEEE 802.1q VLAN,up to 4095 Groups
	IEEE 802.1ad Q-in-Q
	Port Based VLAN
	MAC-based VLAN,up to 256 entries
	IP Subnet-based VLAN, up to 128 entries
	Protocol-based VLAN(Ethernt, SNAP, LLC), up to 128 entries
	VLAN Translation, up to 256 entries
	MVR (Multiple VLAN Registration)
Link Aggregation (Port Trunk)	Static (Hash with SA, DA, IP, TCP/UDP port), up to 5 trunk group
	Dynamic (IEEE 802.3ad LACP), up to 5 trunk group
Spanning Tree	IEEE802.1d STP
	IEEE802.1w RSTP
	IEEE802.1s MSTP
Loop Protection	Present
ITU-T G.8032 / Y.1344 ERPS (Ethernet Ring Protection)	Convergence time <50ms
	Single Ring, Sub-Ring, Multiple ring topology network
QoS Feature	
Class of Service	IEEE802.1p 8 active priorities queues for per port
Traffic Classification QoS	IEEE802.1p based CoS
	IP Precedence based CoS
	IP DSCP based CoS
	QCL(QoS Control List): MAC Access control list (Source/ Destination MAC, Ether type, Priority ID/ VLAN ID)
	QCL: IP extended access control list (Source/ Destination IP, Protocol, TCP/UDP port number)
Bandwidth Control for Ingress	Rate in steps : 100 kbps / 1fps / 100fps
	Range : 100 kbps to 1Gbps / 1fps to 3300kfps
	Rate Unit : bit or frame
Bandwidth Control for Egress	Rate in steps : 100 kbps / 1fps / 100fps
	Range : 100 kbps to 1Gbps / 1fps to 3300kfps
	Rate Unit : bit or frame
	Per queue shaper
DiffServ (RF 2474) Remarking	
Storm Control	for Unicast, Broadcast, Multicast
IP Multicasting Feature	
IGMP / MLD Snooping	IGMP Snooping v1, v2, v3 / MLD Snooping v1, v2
	Port Filtering Profile
	Throttling
	Fast Leave
	Query
Security Features	
IEEE 802.1X	Port-Based
	MAC-Based
ACL	Number of rules : up to 256 entries
	for L2 / L3 / L4
RADIUS authentication & accounting	
TACACS+ authentication & accounting, TACACS+ 3.0	
HTTPS, HTTP	
SSL / SSH v2	

EMC/EMS	CE, FCC
EMI	FCC Part 15 Subpart B Class A, CE EN 55022 Class A
	EN61000-6-4 – Emission for industrial environment
EMS	EN61000-6-2 – Immunity for Industrial environment
	EN61000-4-2 (ESD) Level 3, Criteria B
	EN61000-4-3 (RS) Level 3, Criteria A
	EN61000-4-4 (EFT) Level 3, Criteria A
	EN61000-4-5 (Surge) Level 3, Criteria B
	EN61000-4-6 (CS) Level 3, Criteria A
	EN61000-4-8 (Magnetic Field) Level 3, Criteria A
Safety	UL60950-1
Rail Traffic	EN 50121-4
Shock	IEC 60068-2-27
Freefall	IEC 60068-2-32
Vibration	IEC 60068-2-6
MTBF	314,064 hrs
Warranty	5 years

User Name Password Authentication	Local Authentication
	Remote Authentication (via RADIUS / TACACS+)
Management Interface Access Filtering	Web, Telnet / SSH
Management Features	
CLI	
Web Based Management	
Telnet	Server
SNMP	V1, V2c, V3
SW & Configuration Upgrade	TFTP, HTTP
	Redundant firmware in case of upgrade failure
RMON	RMON I (1, 2, 3, 9 group), RMON II
MIB II	RFC 1213
DHCP	Client
	Relay
	Snooping
	Snooping option 82
	Relay option 82
IP Source Guard	
Port Mirroring	
Event Syslog	Syslog server (RFC3164) (Support 1 server)
Warning Message	System syslog, e-mail, alarm relay
DNS	Client, Proxy
NTP /SNTP	
LLDP (IEEE 802.1ab)	Link Layer Discovery Protocol
	LLDP-MED
IPv6 Features	
IPv6 Management	Telnet Server/ICMP v6
Stateless Auto-Configuration	
SNMP over IPv6	
HTTP over IPv6	
SSH over IPv6	
IPv6 Telnet Support	
IPv6 NTP / SNTP Support	
IPv6 TFTP Support	
IPv6 QoS	
IPv6 ACL	Number of rules : up to 256 entries
	L2 / L3 / L4
Others Features	
Green Ethernet	Supports IEEE802.3az EEE (Energy Efficient Ethernet) Management to optimize the power consumption
	Determine the cable length and lowering the power for ports with short cables
	Lower the power for a port when there is no link
	LED Power Management : Adjustment LEDs intensity
Cable Diagnostic	Measuring cable OK or broken point distance
Advanced PoE Management	PoE Configuration
	PoE Enable/Disable
	Power limit by classification
	Power limit by management
	Total PoE Power budge (maxium 180W) limitation
	Power feeding priority
	PD Auto Detection and Auto Reset
	PoE Scheduling (On/Off schedule weekly)

Application

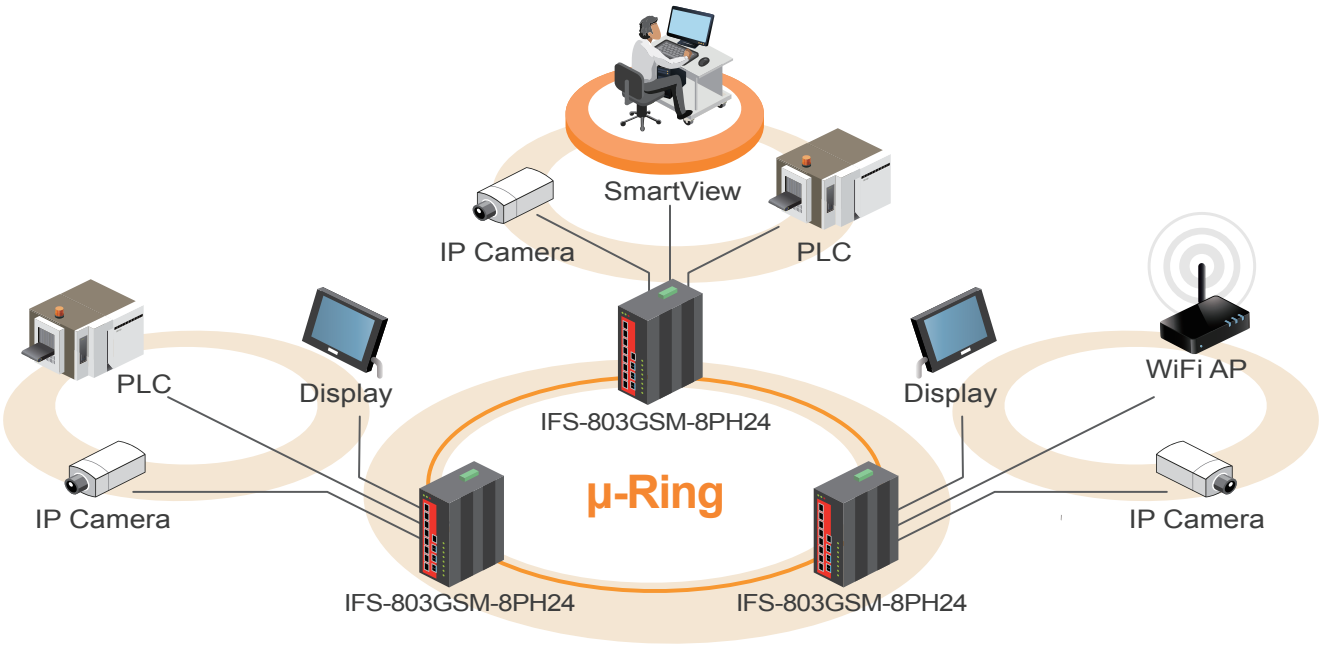
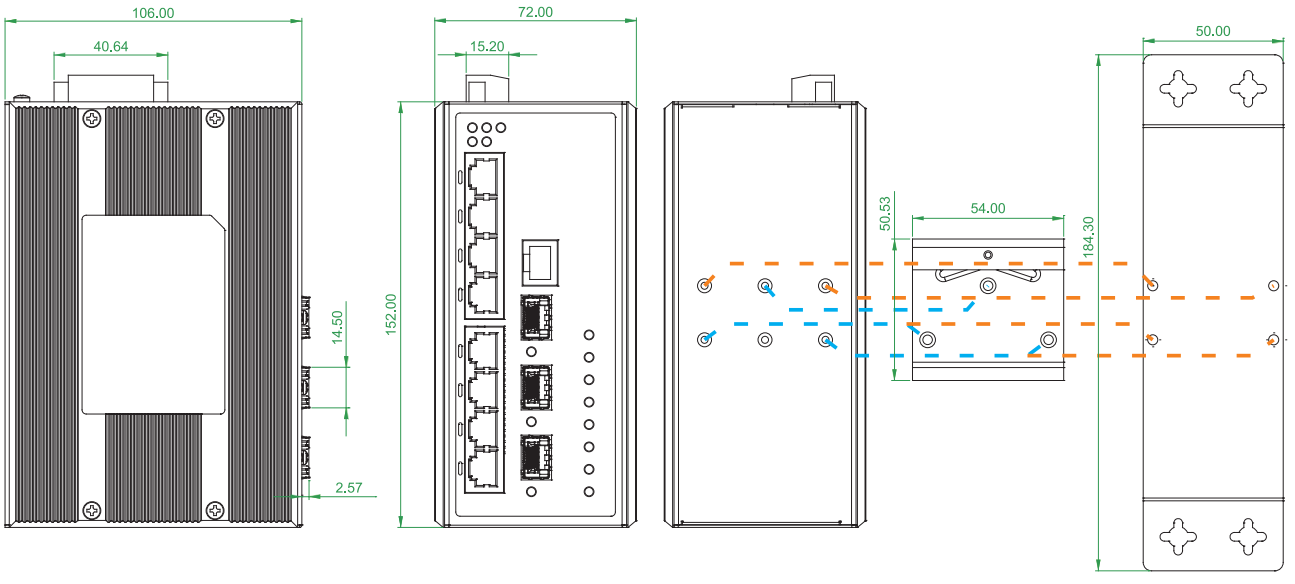


Figure : Topology

Dimensions



Side View | Front View | Rear View | DIN-Rail Kit View | Wall-Mount Kit View

Ordering Information

Model Name	Description
IFS-803GSM-8PH24	8x 10/100Base-TX + 3x 100/1000Base-X SFP slot with 8 High Power PoE Managed Switch (30W/Per Port ,Total 180W, 24V Booster, -10~60°C)
IFS-803GSM-8PHE24	8x 10/100Base-TX + 3x 100/1000Base-X SFP slot with 8 High Power PoE Managed Switch (30W/Per Port ,Total 180W, 24V Booster, -40~75°C)

Accessories

DR-120-24	Industrial Power, Input 88 ~ 132VAC / 176 ~ 264VAC, Output 24VDC, 120W, -10 ~ +60°C
DRP-240-48	Industrial Power, Input 85 ~ 264VAC, Output 48VDC, 240W, -10 ~ +70°C
SFP Transceiver	Compatible, Reliable, 5-year Warranty

Temperature

IFS-803GSM – 8PH ☐ 24

Example: IFS-803GSM – 8PH E24

ISFP – M 7 040 – 31 – E

- ISFP: Industrial SFP Transceiver
- M: Multi Mode; S: Single Mode; T: Copper
- 7: GbE; 5: FE
- 040: Distance 002(2km), 020(20km), 040(40km)...
- 31: Wavelength
- E: -40~85°C; Blank: 0~70°C

Specifications & design are subject to change without prior notice. Please visit CTC Union website for more details.

IFS-402GSM-4PH24

4x 10/100Base-TX+ 2x 100/1000Base-X SFP Slot with 4x PoE+ Managed Switch

(120 Watts, 24V Booster)

IFS-402GSM-4PH24 models are managed industrial grade Fast Ethernet PoE (Power over Ethernet) switches with 4x 10/100Base-TX PoE ports and 2 SFP Gigabit/Fast Ethernet ports that provide stable and reliable Ethernet transmission. The Ethernet switches support a variety of management functions, including STP/RSTP/MSTP and ITU-T G.8032 Ring <50ms recovery time, advanced PoE management functions such as PoE device auto-checking and auto reset, PoE power weekly scheduling, layer 2 Ethernet IGMP, VLAN, QoS ,Security ,IPV6, bandwidth control, port mirroring, cable diagnostic and Green Ethernet. Housed in rugged DIN rail or wall mountable enclosures, these switches are designed for harsh environments, such as industrial networking, security automation applications, intelligent transportation systems (ITS) and are also suitable for many military and utility market applications where environmental conditions exceed commercial product specifications. Standard operating temperature range models (-10 to 60°C) and wide operating temperature range models (-40 to 75°C) fulfill the special needs of industrial automation applications.

Features

- 4x 10/100Base-TX RJ-45 with 2x 100/1000Base-X SFP Fiber
- 24/48VDC redundant dual input power,and built-in power booster design up to 55 VDC for PoE/PoE+ output
- Constant and regulated PoE output voltage at 55VDC
- Provides 4-port IEEE802.3af / 802.3at PoE output (30W per Port)
- Maximum PoE output power budget 120W
- Advanced PoE management, PoE PD auto detection and auto reset, PoE configuration for power planning, weekly scheduling
- UL60950-1, CE, FCC, Rail Traffic EN50121-4 Certified
- Industrial Grade EMS, EMI, EN61000-6-2, EN61000-6-4 Certified
- Cable diagnostic, Measuring cable OK or broken point distance
- Supports IEEE802.3az EEE (Energy Efficient Ethernet) Management to optimize the power consumption
- STP, RSTP, MSTP, ITU-T G.8032 Ethernet Protection Ring (EPR) for cabling redundant
- µ-Ring for Redundant Ethernet Ring, recovery time<20ms in 250 units
- QoS, Traffic classification QoS, CoS, bandwidth control for Ingress and Egress, Storm Control, DiffServ
- IEEE802.1q VLAN, port based VLAN, MAC based VLAN, IP subnet based VLAN, Protocol based VLAN, VLAN translation, MVR
- Dynamic IEEE 802.3ad LACP Link Aggregation, Static Link Aggregation
- IGMP/MLD snooping V1/V2/V3, IGMP Filtering / Throttling, IGMP query, IGMP proxy reporting, MLD snooping
- Security : Port based and MAC based IEEE802.1X, RADIUS, ACL, TACACS+, HTTP/HTTPS, SSL/SSH v2
- Software upgrade via TFTP and HTTP, redundant firmware to avoid in case of upgradeing failure
- DHCP client/Relay/Snooping/Snooping option 82/Relay option 82
- RMON, MIB II, Port mirroring, Event syslog, DNS, NTP/SNTP, IEEE802.1ab LLDP
- Supports IPv6 Telnet server/ICMP v6, SNMP, HTTP, SSH/SSL, NTP/SNTP, TFTP, QoS, ACL
- CLI, Web based management, **SNMP** v1/v2c/v3, Telnet server for management
- **SmartView** Management System

Specifications

Standard	IEEE 802.3	10Base-T 10Mbit/s Ethernet
	IEEE 802.3u	100Base-TX, 100Base-FX, Fast Ethernet
	IEEE 802.3ab	1000Base-T Gbit/s Ethernet over twisted pair
	IEEE 802.3z	1000Base-X Gbit/s Ethernet over Fiber-Optic
	IEEE 802.1d	STP (Spanning Tree Protocol)
	IEEE 802.1w	RSTP (Rapid Spanning Tree Protocol)
	IEEE 802.1s	MSTP (Multiple Spanning Tree Protocol)
	ITU-T G.8032 / Y.1344	EPR (Ethernet Protection Ring)
	IEEE 802.1Q	Virtual LANs (VLAN)
	IEEE 802.1X	Port based Network Access Control, Authentication
	IEEE 802.3ad	Link aggregation for parallel links with LACP (Link Aggregation Control Protocol)
	IEEE 802.3x	Flow control for Full Duplex
	IEEE 802.3af	PoE (Power over Ethernet)
	IEEE 802.3at	PoE+ (Power over Ethernet ehancements)
	IEEE 802.1ad	Stacked VLANs, Q-in-Q
	IEEE 802.1p	LAN Layer 2 QoS/CoS Protocol for Traffic Prioritization
	IEEE 802.1ab	Link Layer Discovery Protocol (LLDP)
	IEEE 802.3az	EEE (Energy Efficient Ethernet)
VLAN ID	4096	
Switch Architecture	Back-plane (Switching Fabric): 4.8Gbps	
Data Processing	Store and Forward	
Flow Control	IEEE 802.3x for full duplex mode Back pressure for half duplex mode	
Jumbo Frame	9.6KB	

MAC Address Table	8K
PoE Standard	IEEE802.3af, IEEE802.3at
PoE RJ-45 Pin Assignment	4 RJ-45 port support IEEE 802.3af / IEEE 802.3at End-Span, Alternative A mode
	Positive (V+): RJ-45 pin 1, 2. Negative (V-): RJ-45 pin 3, 6. Data (1,2,3,6)
Network Connector	4x RJ-45 10/100Base-TX auto negotiation speed, Auto MDI/MDI-X function, Full/Half duplex 2X 100/1000 Base-X dual speed mode SFP slot, with DDMI
Console	RS-232 (RJ-45)
Network Cable	UTP/STP above Cat. 5e cable
	EIA/TIA-568 100-ohm (100m)
Protocols	CSMA/CD
Reverse Polarity Protection	Present
Overload Current Protection	Present
CPU Watch Dog	Present
Power Supply	Redundant Dual DC 24/48V (20~57VDC) Input power (Removable Terminal Block)
LED	Per unit: Power 1 (Green), Power 2 (Green), Fault (Amber), CPU Act (Green), Ring Master (Yellow)
	Per RJ-45 port: 10/100 Link/Active (Green) 1000 Link/Active (Amber)
	SFP Fiber Per port: Link/Active (Green)
	PoE Port LED 1 LED /per Port : • PoE Output Power On : ON (Green) • PoE Fault (Over Load, Short Circuit, Port failed at • Startup) : Flash 1times /sec (Green) • PoE Output Power Off : Off (Green)

Specifications

PoE Power Output	Maximum PoE output power budget 120W (30W/per port)
Power Consumption	TBD
Warning Message	System syslog, SMTP/ e-mail event message, alarm relay
Alarm Relay Contact	Relay outputs with current carrying capacity of 1 A @24VDC
Removable Terminal Block	Provide 2 redundant power, slarm relay contact ,6 Pin
Operating Temperature	-10 ~ 60°C (IFS-402GSM-4PH24) -40 ~ 75°C (IFS-402GSM-4PHE24)
Operating Humidity	5% to 95% (Non-condensing)
Storage Temperature	-40 ~ 85°C
Housing	Rugged Metal, IP30 Protection
Dimensions	106 x 62.5 x 134.8 mm (D x W x H)
Weight	0.68kg
Installation Mounting	DIN Rail mounting or wall mounting
EMC/EMS	CE, FCC

EMI	FCC Part 15 Subpart B Class A, CE EN 55022 Class A
	EN61000-6-4 – Emission for industrial environment
EMS	EN61000-6-2 – Immunity for Industrial environment
	EN61000-4-2 (ESD) Level 3, Criteria B
	EN61000-4-3 (RS) Level 3, Criteria A
	EN61000-4-4 (EFT) Level 3, Criteria A
	EN61000-4-5 (Surge) Level 3, Criteria B
	EN61000-4-6 (CS) Level 3, Criteria A
	EN61000-4-8 (Magnetic Field) Level 3, Criteria A
Safety	UL60950-1 (Pending)
Rail Traffic	EN 50121-4
Shock	IEC 60068-2-27
Freefall	IEC 60068-2-32
Vibration	IEC 60068-2-6
MTBF	TBD (Above 30 years)
Warranty	5 years

Software Specifications

Topology	
VLAN	IEEE 802.1q VLAN,up to 4095 ID
	IEEE 802.1q VLAN,up to 4095 Groups
	IEEE 802.1ad Q-in-Q
	Port Based VLAN
	MAC-based VLAN,up to 256 entries
	IP Subnet-based VLAN, up to 128 entries
	Protocol-based VLAN (Ethernt, SNAP, LLC), up to 128 entries
	VLAN Translation, up to 256 entries
	MVR (Multiple VLAN Registration)
Link Aggregation (Port Trunk)	Static (Hash with SA, DA, IP, TCP/UDP port), up to 5 trunk group
	Dynamic (IEEE 802.3ad LACP), up to 5 trunk group
Spanning Tree	IEEE802.1d STP
	IEEE802.1w RSTP
	IEEE802.1s MSTP
Loop Protection	Present
ITU-T G.8032 / Y.1344 ERPS (Ethernet Ring Protection)	Convergence time <50ms
	Single Ring, Sub-Ring, Multiple ring topology network
QoS Feature	
Class of Service	IEEE802.1p 8 active priorities queues for per port
Traffic Classification QoS	IEEE802.1p based CoS
	IP Precedence based CoS
	IP DSCP based CoS
	QCL(QoS Control List): MAC Access control list (Source/ Destination MAC, Ether type, Priority ID/ VLAN ID)
	QCL: IP extended access control list (Source/Destination IP, Protocol, TCP/UDP port number)
Bandwidth Control for Ingress	Rate in steps : 100 kbps / 1fps / 100fps
	Range : 100 kbps to 1Gbps / 1fps to 3300kfps
	Rate Unit : bit or frame
Bandwidth Control for Egress	Rate in steps : 100 kbps / 1fps / 100fps
	Range : 100 kbps to 1Gbps / 1fps to 3300kfps
	Rate Unit : bit or frame
	Per queue shaper
DiffServ (RF 2474) Remarking	
Storm Control	for Unicast, Broadcast, Multicast
IP Multicasting Feature	
IGMP / MLD Snooping	IGMP Snooping v1, v2, v3 / MLD Snooping v1, v2
	Port Filtering Profile
	Throttling
	Fast Leave
	Query
Security Features	
IEEE 802.1X	Port-Based
	MAC-Based
ACL	Number of rules : up to 256 entries
	for L2 / L3 / L4
RADIUS authentication & accounting	
TACACS+ authentication & accounting, TACACS+ 3.0	
HTTPS, HTTP	
SSL / SSH v2	

User Name Password Authentication	Local Authentication
	Remote Authentication (via RADIUS / TACACS+)
Management Interface Access Filtering	Web, Telnet / SSH
Management Features	
CLI	
Web Based Management	
Telnet	Server
SNMP	V1, V2c, V3
SW & Configuration Upgrade	TFTP, HTTP
	Redundant firmware in case of upgrade failure
RMON	RMON I (1, 2, 3, 9 group), RMON II
MIB II	RFC 1213
DHCP	Client
	Relay
	Snooping
	Snooping option 82
	Relay option 82
IP Source Guard	
Port Mirroring	
Event Syslog	Syslog server (RFC3164) (Support 1 server)
Warning Message	System syslog, e-mail, alarm relay
DNS	Client, Proxy
NTP /SNTP	
LLDP (IEEE 802.1ab)	Link Layer Discovery Protocol
	LLDP-MED
IPv6 Features	
IPv6 Management	Telnet Server/ICMP v6
Stateless Auto-Configuration	
SNMP over IPv6	
HTTP over IPv6	
SSH over IPv6	
IPv6 Telnet Support	
IPv6 NTP / SNTP Support	
IPv6 TFTP Support	
IPv6 QoS	
IPv6 ACL	Number of rules: up to 256 entries
	L2 / L3 / L4
Others Features	
Green Ethernet	Supports IEEE802.3az EEE (Energy Efficient Ethernet) Management to optimize the power consumption
	Determine the cable length and lowering the power for ports with short cables
	Lower the power for a port when there is no link
	LED Power Management : Adjustment LEDs intensity
Cable Diagnostic	Measuring cable OK or broken point distance
Advanced PoE Management	PoE Configuration
	PoE Enable/Disable
	Power limit by classification
	Power limit by management
	Total PoE Power budge (maxium 120W) limitation
	Power feeding priority
	PD Auto Detection and Auto Reset
	PoE Scheduling (On/Off schedule weekly)

Application

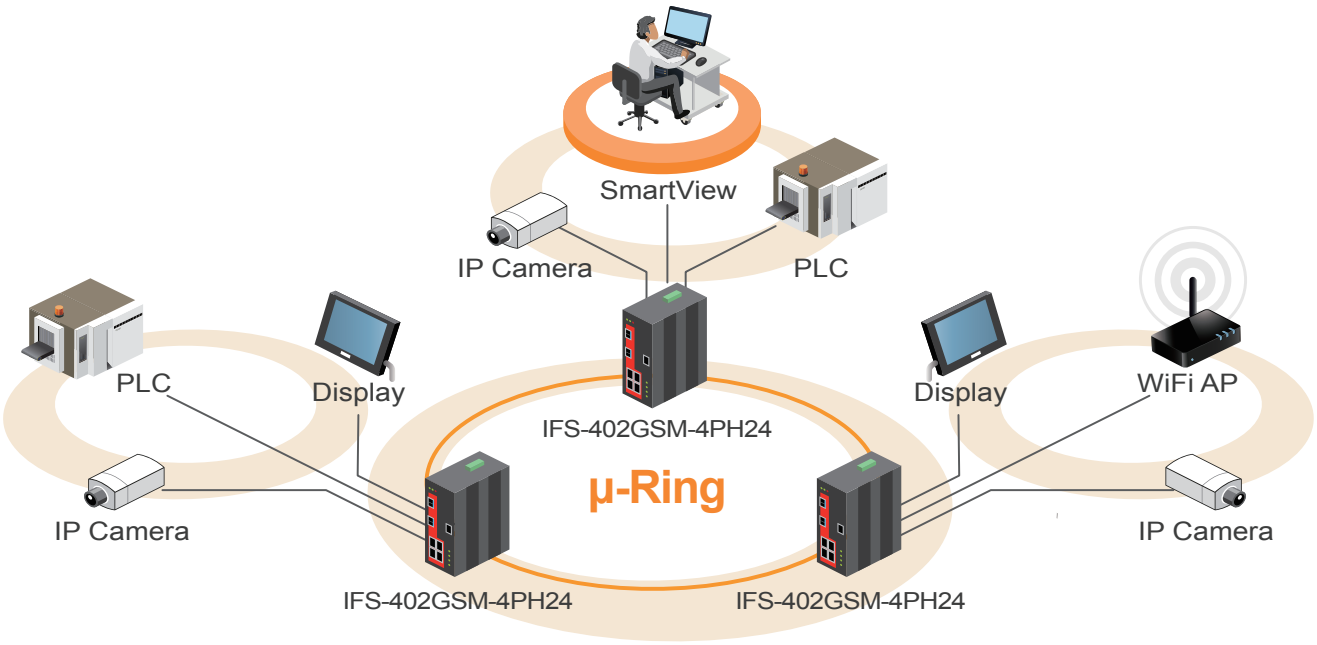
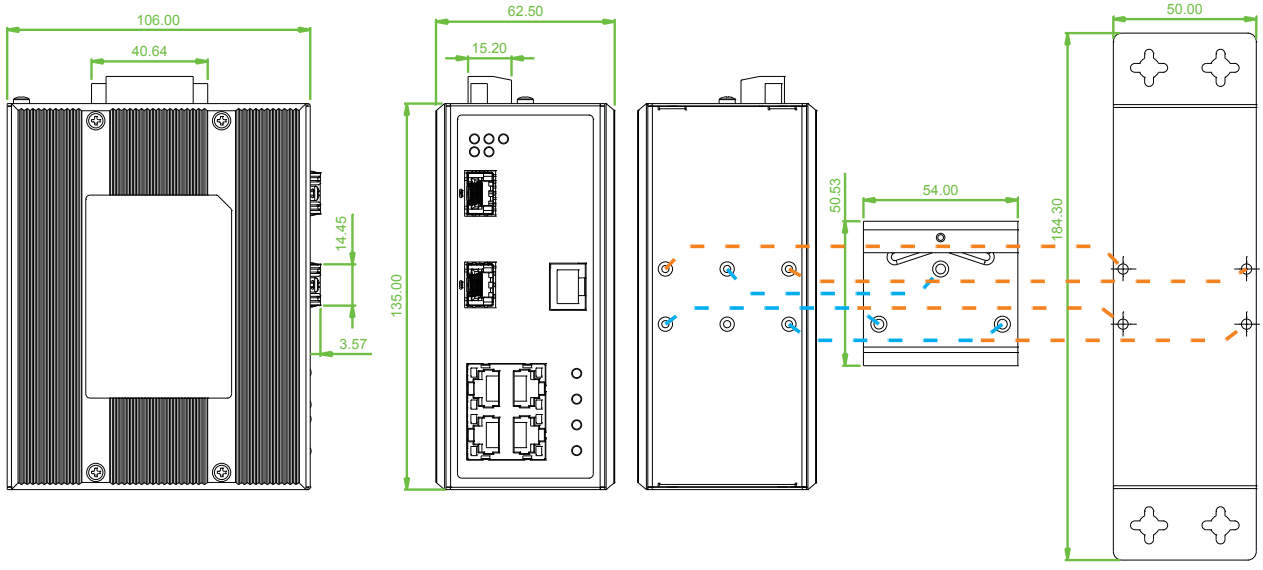


Figure : Topology

Dimensions



Side View | Front View | Rear View | DIN-Rail Kit View | Wall-Mount Kit View

Ordering Information

Model Name	Description
IFS-402GSM-4PH24	4x 10/100Base-TX + 2x 100/1000Base-X SFP slot with 4 High Power PoE Managed Switch (30W/Per Port ,Total 120W, 24V Booster, -10~60°C)
IFS-402GSM-4PHE24	4x 10/100Base-TX + 2x 100/1000Base-X SFP slot with 4 High Power PoE Managed Switch (30W/Per Port ,Total 120W, 24V Booster, -40~75°C)

Accessories

DR-120-24	Industrial Power, Input 88 ~ 132VAC / 176 ~ 264VAC, Output 24VDC, 120W, -10 ~ +60°C
DRP-240-48	Industrial Power, Input 85 ~ 264VAC, Output 48VDC, 240W, -10 ~ +70°C
SFP Transceiver	Compatible, Reliable, 5-year Warranty

Temperature

IFS-402GSM – 4PH ☐ 24

Example: IFS-402GSM – 4PH E24

ISFP – M 7 040 – 31 – E

- ISFP: Industrial SFP Transceiver
- M: Multi Mode; S: Single Mode; T: Copper
- 7: GbE; 5: FE
- 040: Distance 002(2km), 020(20km), 040(40km)...
- 31: Wavelength
- E: -40~85°C; Blank: 0~70°C

IMC-1000M-PH12

10/100/1000Base-T to 100/1000Base-FX/SX/LX Managed with PoE+ (PSE) Fiber Converter

IMC-1000MS-PH12

10/100/1000Base-T to 100/1000Base-X SFP Managed with PoE+ (PSE) Fiber Converter

NEW

IMC-1000M(S)-PH12 is a family of Managed Gigabit Ethernet media converters that support conversion between electrical 10/100/1000Base-TX and optical 1000Base-X Ethernet and as PSE (Power Source Equipment) provide PoE+ power over Ethernet. Two options are available for optical interfaces, the IMC-1000M uses a fixed optical transceiver operating at 1000Base-X, while the IMC-1000MS provides an SFP cage for 100/1000Base-X compatible SFP modules. Housed in rugged DIN rail or wall mountable enclosures, these converters are designed for harsh environments, such as industrial networking, intelligent transportation systems (ITS) and are also suitable for many military and utility market applications where environmental conditions exceed commercial product specifications.

Features

- Conversion between 10/100/1000Base-T and 100/1000Base-X Fiber cable interface
- Supports Dual Rate (100/1000) SFP for selectable Fast or Gigabit speed on fiber
- 12/24/48VDC (9.6~57VDC) redundant dual input Power, and Built-in power booster
- Constant and regulated PoE output voltage at 55VDC
- Provides IEEE802.3at PoE output (30Watts)
- IP30 rugged metal housing
- Wide operating temperature -20~75°C (IMC-1000M-PHE12, IMC-1000MS-PHE12)
- UL60950-1, CE, FCC, Railway traffic EN50121-4 certification
- Industrial grade EMS, EMI EN61000-6-2, EN61000-6-4 certification
- Supports Jumbo frame 9K bytes packet
- Ingress/Egress bandwidth control with 64K granularity
- PoE configuration and monitor
- Auto Laser Shutdown (ALS)
- Digital Diagnostic DDM for SFP support
- Supports 16 IEEE802.1Q Tag VLAN Group
- RMON counters
- SNMP alarm trap for power loss and port link down
- Web based management, **SNMP** for management
- **SmartView** Management System

Specifications

Standard	IEEE802.3 10Base-T
	IEEE802.3u 100Base-TX
	IEEE802.3u 100Base-FX
	IEEE802.3ab 1000Base-TX
	IEEE802.3z 1000Base-SX/LX
	IEEE802.3x Flow Control and Back pressure
	IEEE802.3at Power over Ethernet+, PoE+
	IEEE802.3af Power over Ethernet, PoE
	IEEE802.1q Tag VLAN
Fiber Ports	100/1000Base-FX/SX/LX, 100M /1000M Speed set by Web (IMC-1000M-PH12, IMC-1000M-PHE12)
	SFP slot for 100Base-X or 1000Base-X, 100M/1000M speed set by Web (IMC-1000MS-PH12, IMC-1000MS-PHE12)
RJ45 Ports	10/100/1000Base-T
Push Button	Reset, Load default setting
Data Process Architecture	Pass through mode
Jumbo Frame	9K bytes
Fiber Parameters	Fiber Cable (Multi-mode): 50/125um,62.5/125um
	Fiber Cable (Single-mode): 9/125um
	Wavelength: 1310nm (Multi-mode/Single-mode)
	Available distance: 500M (Multi-mode SX), 20KM (Single-mode), 40KM (Single-mode) (IMC-1000M-PH12 , IMC-1000M-PHE12)
	SFP, Distance depend on plug Fiber Tranceiver (IMC-1000MS-PH12 , IMC-1000MS-PHE12)
Link Lose Forward	TX- Fiber: If TX port link down, the media converter will force Fiber port to link down
	Fiber-TX: If Fiber port link down, the media converter will force TX port to link down
Connector and Pin Assignment	Fiber: SC (Multi-mode, 500M), SC (Single-mode, 20KM, 40KM) (IMC-1000M-PH12, IMC-1000M-PHE12) SFP Slot (IMC-1000MS-PH12, IMC-1000MS-PHE12)
	RJ-45 Socket: CAT-3/5 (10/100/1000Mbps) Twisted Pair cable
	Auto MDI/MDI-X and Auto-Negotiation Function Support
	RJ-45 Port support IEEE 802.3at/af End-Span, Alternative A mode
	PoE (V+): RJ-45 pin 1, 2
	PoE (V-): RJ-45 pin 3, 6
	Data (1,2,3,6,4,5,7,8)

LED	Per Unit: Power 1 (Green), Power 2 (Green), Fault (Amber)
	Fiber LNK/ACT (Green): ON : Connected to network, OFF: Not connected to network, BLK : Receive /Transmit Data
	Fiber Speed: Yellow : 1000Base-X, Green : 100Base-X
	RJ-45 port: Speed: 10 (OFF), 100 (Green), 1000 (Yellow)
	LNK/ACT for RJ45(Green): ON : Connected to network, OFF: Not connected to network, BLK : Networking is active
	PoE Status (Green): Flash : PoE Fault (Over-load or short), ON : PoE normal working, OFF : PoE No Power output
Reverse Polarity Protection	Present for Power Input
Overload Current Protection	Present
Power Supply	12/24/48VDC (9.6~57VDC), Redundant power with polarity reverse protect function and removable terminal block
Alarm Relay Contact	Relay outputs with current carrying capacity of 1 A @24VDC
Removable Terminal Block	Provide 2 redundant power, alarm relay contact, 7 Pin
Operating Humidity	5%~95% (Non-condensing)
Operating Temperature	-10°C~60°C (IMC-1000M-PH12, IMC-1000MS-PH12) -20°C~75°C (IMC-1000M-PHE12, IMC-1000MS-PHE12)
Storage Temperature	-40°C~85°C
Housing	Rugged Metal, IP30 Protection
Dimensions	106 x 38.6 x 142 mm (D X W X H)
Installation	DIN Rail mounting or wall mounting
Warranty	5 years
EMI	FCC Part 15 Subpart B Class A, CE EN 55022 Class A EN 61000-6-4 - Emission for industrial environment

Specifications

EMS	EN 61000-6-2 – Immunity for Industrial environment
	EN61000-4-2 (ESD) Level 3, Criteria B
	EN61000-4-3 (RS) Level 3, Criteria A
	EN61000-4-4 (EFT) Level 3, Criteria A
	EN61000-4-5 (Surge) Level 3, Criteria B
	EN61000-4-6 (CS) Level 3, Criteria A

EMS	EN61000-4-8 (Magnetic Field) Level 3, Criteria A
Safety	UL60950-1 (pending)
Railway Traffic	EN 50121-4
Shock	IEC 60068-2-27
Freefall	IEC 60068-2-32
Vibration	IEC 60068-2-6
MTBF	TBD (Above 30 years)

Software Specifications

Management	Ingress/Egress bandwidth control with 64K granularity
	Firmware upgrade via Web
	SNMP V1/V2c management
	Web management
	Supports DHCP client for automatic TCP/IP configuration
	Supports 802.1Q tag VLAN,16Tag VLAN group,
	RMON counters display
	Configuration : IP configuration, password setting, converter configuration, port configuration, MIB counter, SNMP configuration, VLAN group configuration, alarm configuration

Management	Converter, Port, Alarm configuration
Diagnostic & Monitor	Supports Link Fault Pass-through (LFP) Function
	Supports DDM Diagnostic function for SFP fiber transceiver
	Broadcast/Multicast storm filter
	SNMP alarm trap for Power loss and Port link down
PoE Configuration & Monitor	PoE Output Enable/Disable
	PoE power output setting

Application

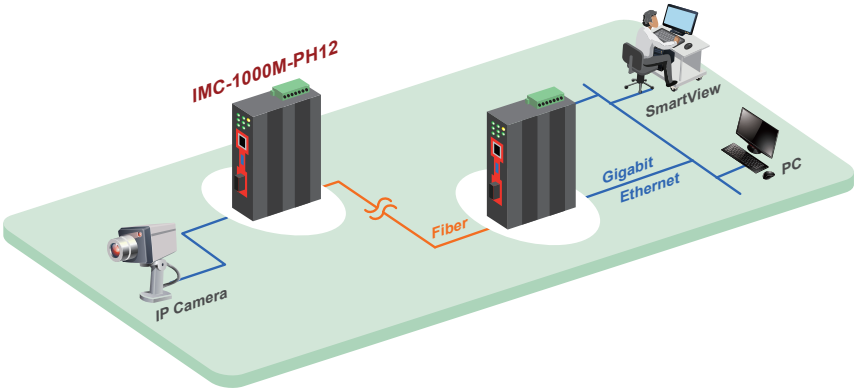
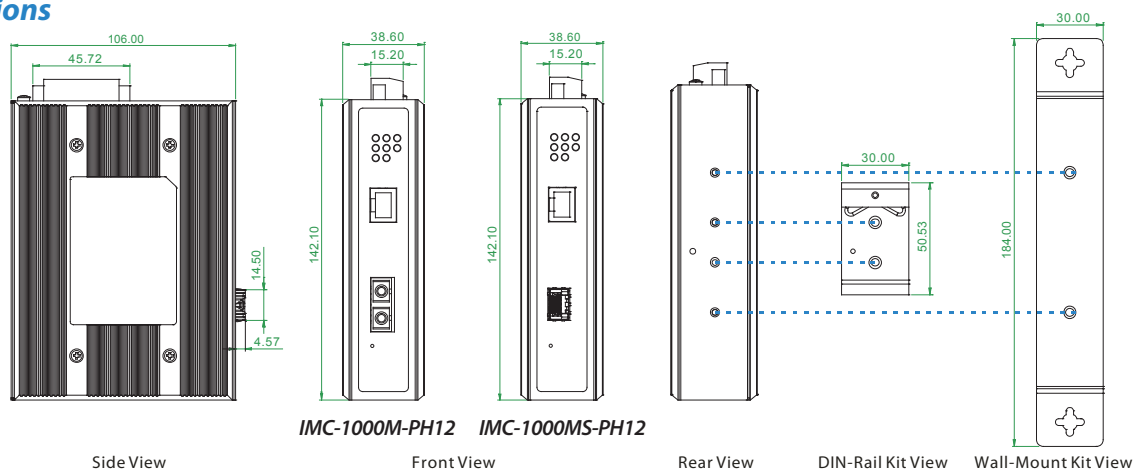


Figure : IMC-1000M-PH12 Industrial PoE Transmission

Dimensions



Ordering Information

Model Name	Description
IMC-1000M-PH12	10/100/1000Base-TX to 100/1000Base-FX/SX/LX Managment with PoE+ (PSE) Fiber Converter (30W, 12V Booster) (-10~60℃)
IMC-1000M-PHE12	10/100/1000Base-TX to 100/1000Base-FX/SX/LX Managment with PoE+ (PSE) Fiber Converter (30W, 12V Booster) (-20~75℃)
IMC-1000MS-PH12	10/100/1000Base-TX to 100/1000Base-X SFP Managment with PoE+ (PSE) Fiber Converter (30W, 12V Booster) (-10~60℃)
IMC-1000MS-PHE12	10/100/1000Base-TX to 100/1000Base-X SFP Managment with PoE+ (PSE) Fiber Converter (30W, 12V Booster) (-20~75℃)

Fiber Connector Type	Connectivity Distance
SC (IMC-1000M-PH12 & IMC-1000M-PHE12 only)	001:500M (M/M) 002 : 2km (M/M) 020:20km (S/M) 040:40km (S/M) 020A: WDM 20km A Type (TX:1310nm) 020B: WDM 20km B Type (TX:1550nm)

Temperature / Connector Type / Connectivity Distance

IMC-1000M –PH □ 12 - □□□□

Example: IMC-1000M – PHE12 – SC001

Accessories

DR-4524	Industrial Power, Input 85 ~ 264VAC, Output 24VDC, 48W, -10 ~ +50°C
MDR-40-24	Industrial Power, Input 85 ~ 264VAC, Output 24VDC, 40W, -20 ~ +70°C
MDR-60-24	Industrial Power, Input 85 ~ 264VAC, Output 24VDC, 60W, -20 ~ +70°C
SFP Transceiver	Compatible, Reliable, 5-year Warranty

ISFP – M 7 040 – 31 – E

- ISFP: Industrial SFP Transceiver
- M: Multi Mode; S: Single Mode; T: Copper
- 7: GbE; 5: FE
- 040: Distance (002(2km), 020(20km), 040(40km)...)
- 31: Wavelength
- E: -40~85℃; Blank: 0~70℃

IMC-1000-PH12

10/100/1000Base-T to 100/1000Base-FX/SX/LX with PoE+ (PSE) Fiber Converter

IMC-1000S-PH12

10/100/1000Base-T to 100/1000Base-X SFP with PoE+ (PSE) Fiber Converter

NEW

IMC-1000(S)-PH12 is a family of non-managed Gigabit Ethernet media converters that support conversion between electrical 10/100/1000Base-T and optical 1000Base-X Ethernet and as PSE (Power Source Equipment) provide PoE+ power over Ethernet. Two options are available for optical interfaces, the IMC-1000-PH12 uses a fixed optical transceiver operating at 1000Base-X, while the IMC-1000S-PH12 provides an SFP cage for 100/1000Base-X compatible SFP modules. Housed in rugged DIN rail or wall mountable enclosures, these converters are designed for harsh environments, such as industrial networking, intelligent transportation systems (ITS) and are also suitable for many military and utility market applications where environmental conditions exceed commercial product specifications.

Features

- Conversion between 10/100/1000Base-T and 100/1000Base-X Fiber cable interface
- Supports dual rate (100/1000) SFP for selectable Fast or Gigabit speed on fiber
- 12/24/48VDC (9.6~57VDC) redundant dual input power, and built-in power booster
- Constant and regulated PoE output voltage at 55VDC
- Provides IEEE802.3at PoE output (30Watts)
- IP30 rugged metal housing
- Wide operating temperature -20~75°C (IMC-1000-PHE12, IMC-1000S-PHE12)
- UL60950-1, CE, FCC, Railway traffic EN50121-4 certification
- Industrial grade EMS,EMI EN61000-6-2, EN61000-6-4 certification
- Supports Jumbo frame 9K bytes packet

Specifications

Standard	IEEE802.3 10Base-T
	IEEE802.3u 100Base-TX
	IEEE802.3u 100Base-FX
	IEEE802.3ab 1000Base-TX
	IEEE802.3z 1000Base-SX/LX
	IEEE802.3x Flow Control and Back pressure
	IEEE802.3at Power over Ethernet+, PoE+
	IEEE802.3af Power over Ethernet, PoE
	IEEE802.1q Tag VLAN
RJ45 Ports	10/100/1000Base-T
Fiber Ports	100/1000Base-SX/LX (IMC-1000-PH12, IMC-1000-PHE12)
	100/1000Base-X SFP (IMC-1000S-PH12, IMC-1000S-PHE12)
Data Process Architecture	Store and Forward mode or Pass Through mode Set by DIP SW
Jumbo Frame	9K bytes
Fiber Parameters	Fiber Cable (Multi-mode): 50/125um, 62.5/125um
	Fiber Cable (Single-mode): 9/125um
	Wavelength: 1310nm (Multi-mode/Single-mode)
	Available distance: • 500M (Multi-mode SX), 20KM (Single-mode), 50KM(Single-mode) (IMC-1000-PH12, IMC-1000-PHE12) • SFP, Distance depend on plug-in Fiber Transceiver (IMC-1000S-PH12, IMC-1000S-PHE12)
Link Fault Pass Through (LFPT)	TX- Fiber: If TX port link down, the media converter will force Fiber port to link down
	Fiber-TX: If Fiber port link down, the media converter will force TX port to link down
DIP Switch	ON: Disable Alarm For Power Loss OFF: Enable Alarm For Power Loss
	ON: Disable Alarm For Port Link-Failure OFF: Enable Alarm For Port Link-Failure
	ON: LFP Enable, OFF: LFP Disable
	Data process Architecture : ON : Pass through mode OFF : Store and Forward Switch mode
	Fiber Speed: OFF: 1000Base-X ON: 100Base-X
	PoE Output OFF: Enable PoE output ON: Disable PoE output
Connector and Pin Assignment	Fiber: SC (Multi-mode, 500M), SC (Single-mode, 20KM, 40KM) (IMC-1000-PH12, IMC-1000-PHE12) SFP Slot (IMC-1000S-PH12, IMC-1000S-PHE12)
Connector and Pin Assignment	RJ-45 Socket: CAT-3/5 (10/100/1000Mbps) Twisted Pair cable Auto MDI/MDI-X and Auto-Negotiation Function Support RJ-45 Port support IEEE 802.3at/af End-Span, Alternative A mode. PoE (V+): RJ-45 pin 1, 2. PoE (V-): RJ-45 pin 3, 6. Data (1,2,3,6,4,5,7,8)
LED	Per Unit :Power 1 (Green) ,Power 2 (Green) ,Fault (Amber)
	Fiber LNK/ACT (Green): ON: Connected to network, OFF: Not connected to network , BLK: Receive /Transmit Data
	Fiber Speed : Yellow : 1000Base-X, Green : 100 Base- X
	RJ-45 Port: Speed: 10 (OFF), 100 (Green), 1000 (Yellow)
	LNK/ACT for RJ45(Green): ON: Connected to network, OFF: Not connected to network, BLK: Networking is active
	PoE Status (Green): Flash: PoE Fault (Over-load or short), ON: PoE normal working, OFF : PoE No Power output
Reverse Polarity Protection	Present for Power Input
Overload Current Protection	Present
Power Supply	12/24/48VDC (9.6~57VDC), Redundant power with polarity reverse protect function and removable terminal block
Alarm Relay Contact	Relay outputs with current carrying capacity of 1 A @24VDC
Removable Terminal Block	Provide 2 redundant power, alarm relay contact, 7 Pin
Operating Humidity	5%~95% (Non-condensing)
Operating Temperature	-10°C~60°C (IMC-1000-PH12, IMC-1000S-PH12)
	-20°C~75°C (IMC-1000-PHE12, IMC-1000S-PHE12)
Storage Temperature	-40°C~85°C
Housing	Rugged Metal, IP30 Protection
Dimensions	106 x 38.6 x 142 mm (D x W x H)
Installation	DIN Rail mounting or wall mounting
Safety	UL60950-1 (pending)
Railway Traffic	EN 50121-4
Shock	IEC 60068-2-27
Freefall	IEC 60068-2-32
Vibration	IEC 60068-2-6

Specifications

Warranty	5 years
EMI	FCC Part 15 Subpart B Class A, CE EN 55022 Class A EN 61000-6-4 - Emission for industrial environment
EMS	EN 61000-6-2 – Immunity for Industrial environment
	EN61000-4-2 (ESD) Level 3, Criteria B

EMS	EN61000-4-3 (RS) Level 3, Criteria A
	EN61000-4-4 (EFT) Level 3, Criteria A
	EN61000-4-5 (Surge) Level 3, Criteria B
	EN61000-4-6 (CS) Level 3, Criteria A
	EN61000-4-8 (Magnetic Field) Level 3, Criteria A
MTBF	TBD (Above 30 years)

Application

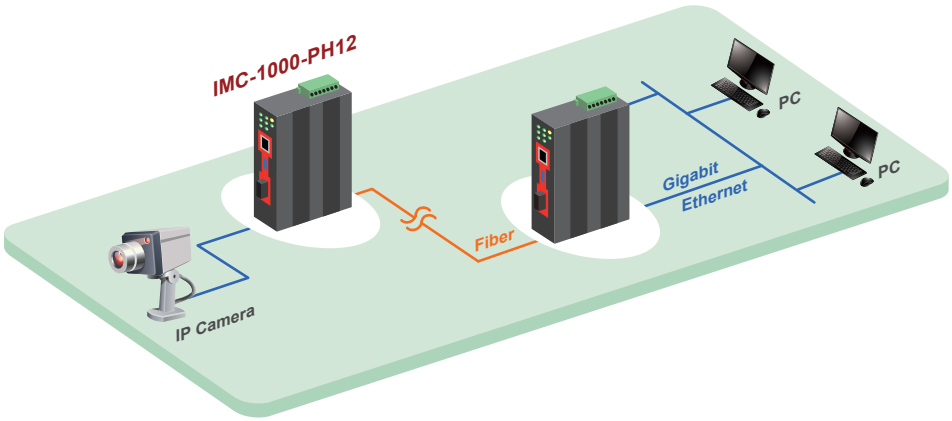
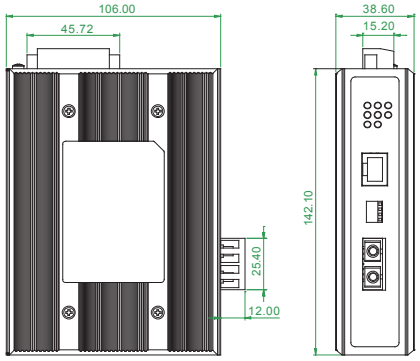


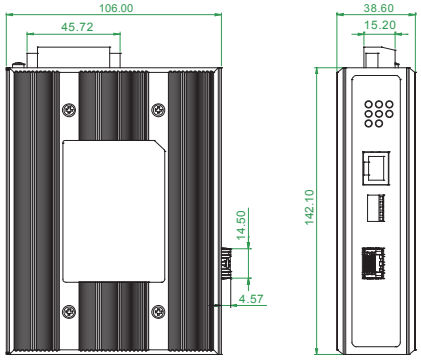
Figure : IMC-1000-PH12 Industrial PoE Transmission

Dimensions

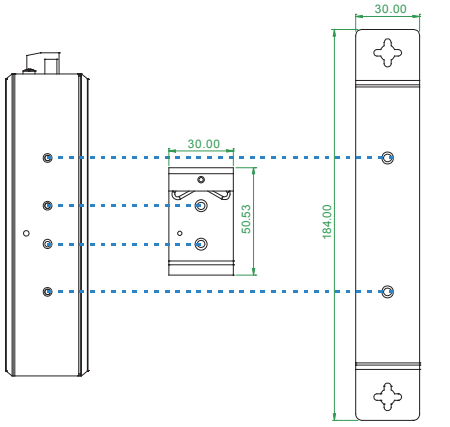
IMC-1000-PH12



IMC-1000S-PH12



Side View Front View



Rear View DIN-Rail Kit View Wall-Mount Kit View

Ordering Information

Model Name	Description
IMC-1000-PH12	10/100/1000Base-T to 100/1000Base-FX/SX/LX with PoE+ (PSE) Fiber Converter (30W, 12V Booster) (-10~60°C)
IMC-1000-PHE12	10/100/1000Base-T to 100/1000Base-FX/SX/LX with PoE+ (PSE) Fiber Converter (30W, 12V Booster) (-20~75°C)
IMC-1000S-PH12	10/100/1000Base-T to 100/1000Base-X SFP with PoE+ (PSE) Fiber Converter (30W, 12V Booster) (-10~60°C)
IMC-1000S-PHE12	10/100/1000Base-T to 100/1000Base-X SFP with PoE+ (PSE) Fiber Converter (30W, 12V Booster) (-20~75°C)

Fiber Connector Type	Connectivity Distance
SC (IMC-1000-PH12 & IMC-1000-PHE12 only)	001: 500M (M/M) 002: 2km (M/M) 020: 20km (S/M) 040: 40km (S/M) 020A: WDM 20km A Type (TX:1310nm) 020B: WDM 20km B Type (TX:1550nm)

Temperature / Connector Type / Connectivity Distance

IMC-1000 –PH □12 - □□□□□

Example: IMC-1000 – PHE12 – SC001

Accessories

DR-4524	Industrial Power, Input 85 ~ 264VAC, Output 24VDC, 48W, -10 ~ +50°C
MDR-40-24	Industrial Power, Input 85 ~ 264VAC, Output 24VDC, 40W, -20 ~ +70°C
MDR-60-24	Industrial Power, Input 85 ~ 264VAC, Output 24VDC, 60W, -20 ~ +70°C
SFP Transceiver	Compatible, Reliable, 5-year Warranty

ISFP – M 7 040 – 31 – E

- ISFP: Industrial SFP Transceiver
- M: Multi Mode; S: Single Mode; T: Copper
- 7: GbE; 5: FE
- 040: Distance (002(2km), 020(20km), 040(40km)...)
- 31: Wavelength
- E: -40~85°C; Blank: 0~70°C

IMC-100-PD

10/100Base-TX to 100Base-FX PoE PD Fiber Converter

c UL us LISTED

IMC-100-PD(E) are industrial media converters designed for conversion between electrical 10/100Base-TX and optical 100Base-FX transmission medium, which also provide PoE (Power over Ethernet) PD (Power Device) function. Simple DIP switch settings allow configuring the UTP port for auto-negotiation or for forced 10/100 speed and half/full duplex as well as for enabling LFP (Link Fault pass through), Ethernet Flow Control (802.3x) and selecting Switch Mode (store & forward) or Converter Mode (Pass-through). Industrial designed converters feature rugged design with metal housings for DIN Rail mounting, highly reliable electrical design to support very long MTBF (mean time between failure), enhanced safety and surge protection, better EMS (Electro Magnetic Susceptibility), as well as expanded operating temperature ranges.

Features

- Redundant dual DC input power 12/24/48VDC (9.6~58VDC) with additional power input capability via PoE
- Complies with 802.3af PoE/PD standard
- IP30 rugged metal housing
- Wide operating temperature -40 ~75°C (IMC-100-PDE)
- UL60950-1, CE, FCC, Rail traffic EN50121-4 certification
- Industrial Grade EMS, EMI, EN61000-6-2, EN61000-6-4 certified
- Store-and-Forward mode and Pass-through mode (set by DIP SW)
- Conversion between 10/100Base-TX and 100Base-FX cable interface
- Provides a 6 Pole DIP-Switch to set functions

Specifications

Standard	IEEE 802.3 10BASE-T
	IEEE 802.3u 100BASE-TX/100BASE-FX
	IEEE 802.3x Flow Control and Back pressure
	IEEE 802.3af PoE (Power Device PD)
RJ45 Ports	10/100Base-TX
Fiber Ports	100Base-FX (SC/ST connectors)
Switch Architecture	Store and Forward in Switch mode
	Supports 1024 MAC addresses in Switch mode
Ethernet Packet length	2046Byte (Max) in Switch mode
Jumbo Frame	9K bytes in Pass through (Converter mode)
Fiber Parameters	Fiber Cable (Multi-mode): 50/125um,62.5/125um
	Fiber Cable (Single-mode): 9/125um
	Wavelength: 1310nm (Multi-mode/Single-mode)
	Available distance: 2KM (Multi-mode) 30KM (Single-mode) 50KM (Single-mode)
Link Fault Pass Through (LFPT)	TX- Fiber: If TX port link down, the media converter will force Fiber port to link down
	Fiber-TX: If Fiber port link down, the media converter will force TX port to link down
DIP Switch	TP Auto Negotiation OFF: Auto Mode, ON: Force Mode
	Force TP Speed OFF:100 Mbps, ON:10 Mbps
	Force TP Duplex OFF:Full Duplex, ON: Half Duplex
	DIP Switch: ON: Enables LFPT(Link Fault Pass through) OFF: Disables LFPT(Link Fault Pass through)
	DIP Switch: ON: Flow Control Enable OFF: Flow Control Disable
	DIP Switch: OFF: Switching mode ON: Pass through Converter mode
Connector	Fiber: SC (Multi-mode, 2km), SC (Single-mode, 30km, 50KM) ST (Multi-mode, 2km), ST (Single-mode, 30km, 50KM)
	RJ-45 Socket: CAT-3/5 (10/100Mbps) Twisted Pair cable
	Auto MDI/MDI-X and Auto-Negotiation Function Support
LED	PWR 1 (Green): ON: Power1 active/ OFF: Power1 is inactive
	PWR 2 (Green): ON: Power2 active/ OFF: Power2 is inactive
	Fault (Red): ON : Fiber or TP has failed OFF: Fiber and TP are functional
	Fiber(Green): ON: Connected to network OFF: Not connected to network/ BLK: Receive/Transmit Data
	100(Amber): ON: 100Mbps/ OFF: 10Mbps
	LAN (Green): ON: Connected to network OFF: Not connected to network/ BLK: Networking is active
	PoE (Green) : ON: PSE Connect OFF: PSE Disconnect

Reserve Polarity Protection	Present
Overload Current Protection	Present
Power Supply	12/24/48VDC(9.6~58VDC), Redundant power with polarity reverse protect function and removable terminal block
	Provide DC Power JACK adapter cable for external power adapter
	Supports IEEE 802.3af Power over Ethernet (PoE) Power Device (PD)
Alarm Relay Contact	Relay outputs with current carrying capacity of 1 A @24VDC
Removable Terminal Block	Provide 2 Redundant power, Alarm relay contact
Power Consumption	2.9 W
Operating Humidity	5% ~ 95% (Non-condensing)
Operating Temperature	-10 ~ 60°C (IMC-100-PD), -40 ~ 75°C (IMC-100-PDE)
Storage Temperature	-40 ~ 85°C
Housing	Rugged Metal, IP30 Protection
Dimensions	106 x 38.6 x 142mm (D X W X H)
Weight	0.63 kg
Installation Mounting	DIN Rail mounting and Wall Mounting
EMI	FCC Part 15 Subpart B Class A
	EN 55022 Class A
	EN 61000-6-4 – Emission for industrial environment
EMS	EN 61000-6-2 – Immunity for Industrial environment
	EN61000-4-2 (ESD) Level 3, Criteria B
	EN61000-4-3 (RS) Level 3, Criteria A
	EN61000-4-4 (EFT) Level 3, Criteria A
	EN61000-4-5 (Surge) Level 3, Criteria B
	EN61000-4-6 (CS) Level 3, Criteria A
	EN61000-4-8 (Magnetic Field) Level 3, Criteria A
Safety	UL60950-1
Rail traffic	EN50121-4
Shock	IEC 60068-2-27
Freefall	IEC 60068-2-32
Vibration	IEC 60068-2-6 (Operating, Packing)
MTBF	755,114 Hrs
Warranty	5 years

Application

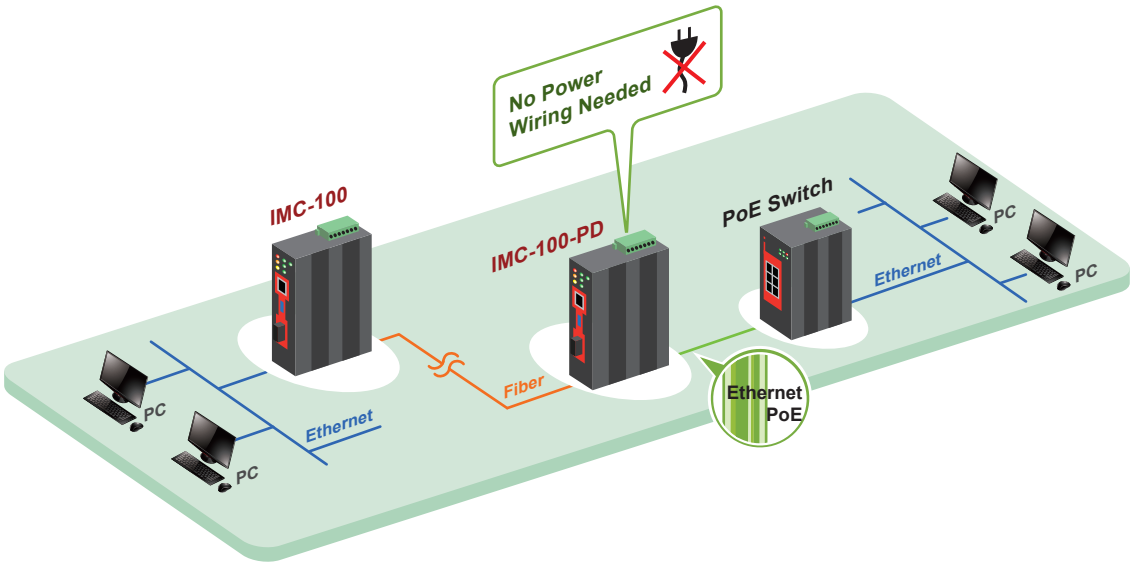
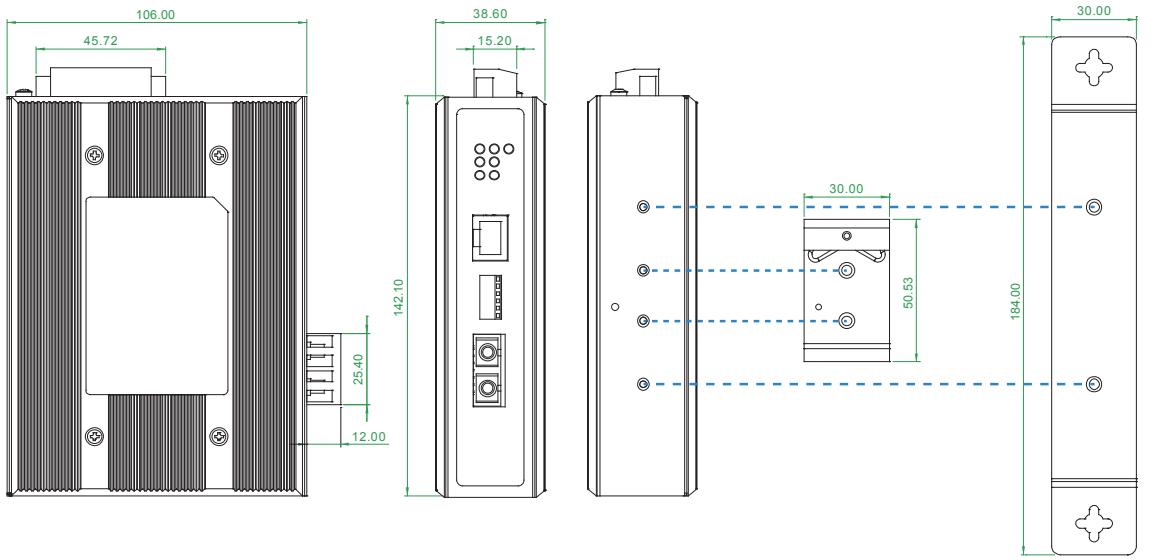


Figure : IMC-100-PD Industrial PoE Transmission

Dimensions



Side View | Front View | Rear View | DIN-Rail Kit View | Wall-Mount Kit View

Ordering Information

Model Name	Description
IMC-100-PD	10/100-TX to 100-FX Fiber Converter with PoE PD ; Temperature Range : -10 ~ 60˚C
IMC-100-PDE	10/100-TX to 100-FX Fiber Converter with PoE PD ; Temperature Range : -40 ~ 75˚C

Fiber Connector Type	Connectivity Distance
SC, ST	002:2km (M/M) 030:30km (S/M) 050:50km (S/M) 020A: WDM 20km A type (TX:1310nm) 020B: WDM 20km B type (TX: 1550nm)

Accessories

DR-4524	Industrial Power, Input 85 ~ 264VAC, Output 24VDC, 48W, -10 ~ +50°C
MDR-40-24	Industrial Power, Input 85 ~ 264VAC, Output 24VDC, 40W, -20 ~ +70°C
MDR-60-24	Industrial Power, Input 85 ~ 264VAC, Output 24VDC, 60W, -20 ~ +70°C

Temperature | Connector Type | Connectivity Distance

IMC-100-PD □ – □□□□□

Example: IMC-100-PDE – SC002

IMC-100M-PH12

10/100Base-TX to 100Base-FX with PoE+ PSE Managed Fiber Converter

(30Watts, 12V Booster)

NEW

IMC-100M-PH12 is a family of Managed Fast Ethernet media converters that support conversion between electrical 10/100Base-TX and optical 100Base-FX Ethernet and as PSE (Power Source Equipment) provide PoE+ power over Ethernet. Housed in rugged DIN rail or wall mountable enclosures, these converters are designed for harsh environments, such as industrial networking, intelligent transportation systems (ITS) and are also suitable for many military and utility market applications where environmental conditions exceed commercial product specifications.

Features

- Conversion between 10/100Base-TX and 100Base-FX Fiber cable interface
- 12/24/48VDC (9.6~57VDC) Redundant dual input power, and built-in power booster
- Constant and regulated PoE output voltage at 55VDC
- Provides IEEE802.3at PoE output (30Watts)
- IP30 rugged metal housing
- Wide operating temperature -20~75°C (IMC-100M-PHE12)
- UL60950-1, CE, FCC, Railway traffic EN50121-4 certification
- Industrial grade EMS, EMI EN61000-6-2, EN61000-6-4 certification
- Supports Jumbo frame 9K bytes packet
- Ingress/Egress bandwidth control with 64K granularity
- SNMP alarm trap for power loss and port link down
- PoE Configuration and Monitor
- Auto Laser Shutdown (ALS)
- Digital diagnostic DDM for SFP support
- Supports 16 IEEE802.1Q Tag VLAN Group
- RMON counters
- Web based management, **SNMP** for management
- **SmartView** Management System

Specifications

Standard	IEEE802.3 10Base-T
	IEEE802.3u 100Base-TX
	IEEE802.3u 100Base-FX
	IEEE802.3x Flow Control and Back pressure
	IEEE802.3at PoE+
	IEEE802.3af PoE
	IEEE802.1q Tag VLAN
Fiber Ports	100Base-FX
RJ45 Ports	10/100Base-TX
Push Button	Reset, Load Default Setting
Data Process Architecture	Pass through mode
Jumbo Frame	9K bytes
Fiber Parameters	Fiber Cable (Multi-mode): 50/125um,62.5/125um
	Fiber Cable (Single-mode): 9/125um
	Wavelength: 1310nm (Multi-mode/Single-mode)
	Available distance: 2KM (Multi-mode) 30KM (Single-mode) 50KM(Single-mode)
Link Fault Pass Through (LFPT)	TX- Fiber: If TX port link down, the media converter will force Fiber port to link down
	Fiber-TX: If Fiber port link down, the media converter will force TX port to link down
Connector and Pin Assignment	Fiber: SC (Multi-mode, 2KM), SC (Single-mode, 30KM, 50KM)
	RJ-45 Socket: CAT-3/5 (10/100Mbps) Twisted Pair cable
	Auto MDI/MDI-X and Auto-Negotiation Function Support
	RJ-45 Port support IEEE 802.3at/af End-Span, Alternative A mode
	Positive (V+): RJ-45 pin 1, 2
	Negative (V-): RJ-45 pin 3, 6
	Data (1,2,3,6)
LED	Per Unit : Power 1 (Green), Power 2 (Green), Fault (Amber)
	Fiber LNK/ACT (Green): ON: Connected to network, OFF: Not connected to network, BLK: Receive /Transmit Data
	RJ-45 Port: Speed: 10 (OFF) ,100 (Green)
	LNK/ACT for RJ45(Green): ON: Connected to network, OFF: Not connected to network, BLK: Networking is active
	PoE Status (Green): Flash: PoE Fault (Over-load or short), ON: PoE normal working, OFF : PoE No Power output

Reverse Polarity Protection	Present for Power Input
Overload Current Protection	Present
Power Supply	"12/24/48VDC (9.6~57VDC), Redundant power with polarity reverse protect function and removable terminal block"
Alarm Relay Contact	Relay outputs with current carrying capacity of 1 A @24VDC
Removable Terminal block	Provide 2 Redundant power, Alarm relay contact, 7 Pin
Operating Humidity	5%~95% (Non-condensing)
Operating Temperature	-10°C~60°C (IMC-100M-PH12)
	-20°C~75°C (IMC-100M-PHE12)
Storage Temperature	-40°C~85°C
Housing	Rugged Metal, IP30 Protection
Dimensions	106 X 38.6 X 142 mm (D x W x H)
Installation Mounting	DIN Rail mounting or wall mounting
EMI	FCC Part 15 Subpart B Class A
	CE EN 55022 Class A
	EN 61000-6-4 - Emission for industrial environment
EMS	EN 61000-6-2 – Immunity for Industrial environment
	EN61000-4-2 (ESD) Level 3, Criteria B
	EN61000-4-3 (RS) Level 3, Criteria A
	EN61000-4-4 (EFT) Level 3, Criteria A
	EN61000-4-5 (Surge) Level 3, Criteria B
	EN61000-4-6 (CS) Level 3, Criteria A
	EN61000-4-8 (Magnetic Field) Level 3, Criteria A
Safety	UL60950-1 (pending)
Rail traffic	EN 50121-4
Shock	IEC 60068-2-27
Freefall	IEC 60068-2-32
Vibration	IEC 60068-2-6
MTBF	TBD (Above 30 years)
Warranty	5 years

Software Specifications

Management	Ingress/Egress Bandwidth control with 64K granularity
	Firmware upgrade via Web
	SNMP V1/V2c Management
	Web Management
	Supports DHCP client for automatic TCP/IP configuration
	Supports 802.1Q tag VLAN,16Tag VLAN Group,
	RMON Counters Display
	Configuration : IP configuration, password setting, converter configuration, port configuration, MIB counter, SNMP configuration, VLAN group configuration, alarm configuration

Management	Converter, Port, Alarm Configuration
Diagnostic & Monitor	Supports Link Fault Pass-through (LFP) Function
	Supports DDM Diagnostic function for SFP fiber transceiver
	Broadcast/Multicast storm filter
	SNMP alarm trap for Power loss and Port link down
PoE Configuration & Monitor	PoE Output Enable/Disable
	PoE power output setting

Application

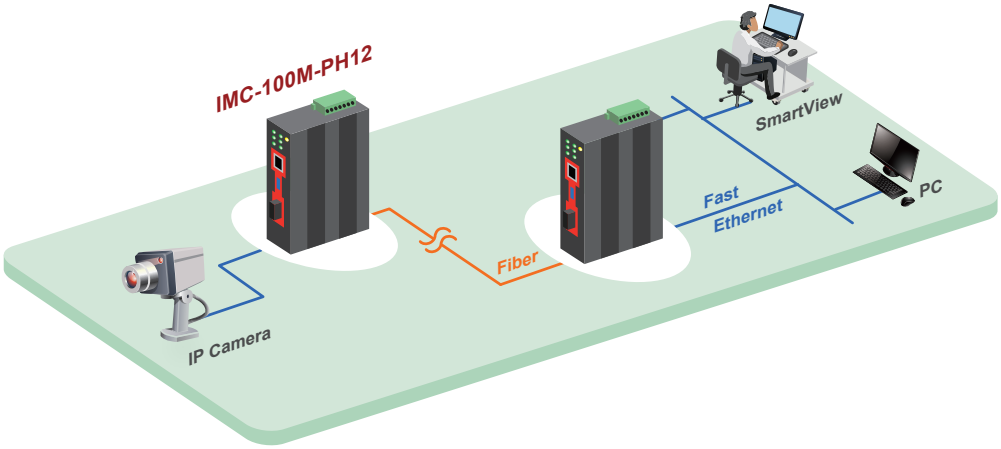
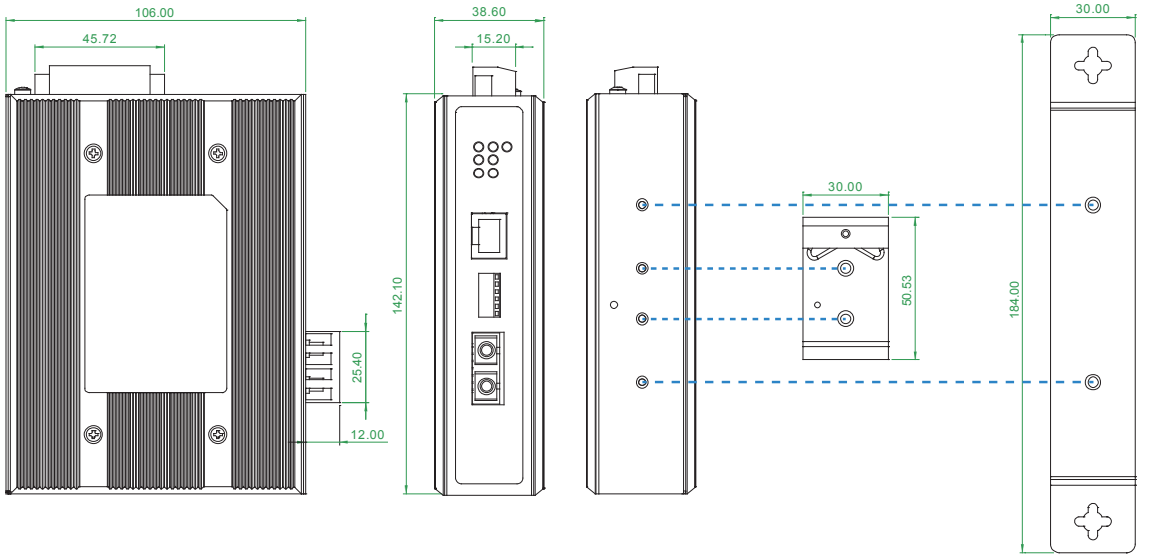


Figure : IMC-100M-PH12 Industrial PoE Transmission

Dimensions



Side View | Front View | Rear View | DIN-Rail Kit View | Wall-Mount Kit View

Ordering Information

Model Name	Description
IMC-100M-PH12	10/100Base-TX to 100Base-FX Managment With PoE+ (PSE) Fiber Converter (30W, 12V Booster) (-10~60℃)
IMC-100M-PHE12	10/100Base-TX to 100Base-FX IP Managment With PoE+ (PSE) Fiber Converter (30W, 12V Booster) (-20~75℃)

Fiber Connector Type	Connectivity Distance
SC	002:2km (M/M) 030:30km (S/M) 050:50km (S/M) 020A: WDM 20km A type (TX:1310nm) 020B: WDM 20km B type (TX: 1550nm)

Accessories

DR-4524	Industrial Power, Input 85 ~ 264VAC, Output 24VDC, 48W, -10 ~ +50℃
MDR-40-24	Industrial Power, Input 85 ~ 264VAC, Output 24VDC, 40W, -20 ~ +70℃
MDR-60-24	Industrial Power, Input 85 ~ 264VAC, Output 24VDC, 60W, -20 ~ +70℃

Temperature | Connector Type | Connectivity Distance

IMC-100M -PH ☐ 12 - ☐☐☐☐☐

Example: IMC-100M -PHE12 - SC002

INJ-IG60-24

Gigabit Ethernet PoE+ Injector IEEE802.3at/af, 15.4/30/36/60W

(24V Booster)

INJ-IG60-E24 is an industrial grade, single port, gigabit Ethernet PoE (Power over Ethernet) injector. PoE technology describes a system to pass electrical power safely, along with data, on Ethernet cabling. The original IEEE 802.3af-2003 PoE standard provides up to 15.4 W of DC power to each device. The updated IEEE 802.3at-2009 PoE standard also known as PoE+ or PoE plus, provides up to 30 W of power. Additionally, INJ-IG60-E24 can provide up to 36/60 W through the non-standard use of all 4 pairs of category 5 cable. Housed in a rugged DIN rail or wall mountable enclosure, this product is designed for harsh environments, such as industrial networking, security, intelligent transportation systems (ITS) and is also suitable for many military and utility market applications where environmental conditions exceed commercial product specifications. Standard operating temperature range models (-10 to 60°C) and wide operating temperature range models (-40 to 75°C) fulfill the special needs of industrial automation applications.

Features

- Provides 1 port IEEE802.3at/af PoE Injector
- Power output 15.4W, 30W, 36W, 60W
- 24/48VDC redundant dual input power design voltage boost up to 55VDC for PoE
- Wide operating temperature -40 ~ 75°C (INJ-IG60-E24)
- UL60950-1, CE, FCC, Railway traffic EN50121-4 certification
- Industrial Grade EMS, EMI, EN61000-6-2, EN61000-6-4 certified
- IP30 rugged metal housing

Specifications

IEEE Standard	IEEE 802.3 10Base-T Ethernet
	IEEE 802.3u 100Base-TX Fast Ethernet
	IEEE 802.3ab 1000Base-T Gigabit Ethernet
	IEEE 802.3at, IEEE802.3af
PoE Standard	IEEE802.3at, IEEE802,3af
PoE RJ-45 Pin Assignment	RJ-45 support IEEE 802.3at/af Middle-Span Alternative B mode or End-Span Alternative A mode, set by DIP SW
	End-Span, Alternative A mode Positive (V+): RJ-45 pin 1, 2. Negative (V-): RJ-45 pin 3, 6. Data (1, 2, 3, 6, 4, 5, 7, 8)
	Middle-Span, Alternative B mode Positive (V+): RJ-45 pin 4,5 Negative (V-): RJ-45 pin 7,8 Data (1, 2, 3, 6, 4, 5, 7, 8)
Network Connector	1 RJ-45 for 10/100/1000Base-T Data, and 1 RJ-45 for 10/100/1000Base-T Data with PoE Output power
Network Cable	UTP/STP above Cat. 5e cable
	EIA/TIA-568 100-ohm (100m)
LED	Per unit: Power 1 (Green), Power 2 (Green), Fault (Amber)
	PoE Status (Green): Flash (Over-load or short), ON : PoE normal working OFF : PoE No Power output
	4/2 Pairs (Green): ON: 4 Pairs PoE Power output for 60W PoE OFF: 2 Pairs PoE Power output
DIP SW	SW1 Reserved
	SW2 ON: Hi Power 36W 36W PoE output OFF: Standard PoE 802.3af (15.4W), 802.3at (30W)
	SW3 ON: 4 Pair PoE Pin Ultra-High Power 60W PoE Output OFF: 2 Pair PoE Pin depand on DIP SW 1,2
	SW4 ON: Alternative B mode PoE Power Pin 4, 5, 7, 8 (When DIP SW 3 Off) OFF: Alternative A mode PoE Power Pin 1, 2, 3, 6 (When DIP SW 3 Off)
Reserve Polarity Protection	Present
Overload Current Protection	Present
Power Supply	Redundant Dual DC 24/48V (20~57VDC) Input power (Removable Terminal Block)

PoE Power Output	Maximum Ultra High Power 60W, IEEE802.3at 30W, IEEE802.3at High power 36W, IEEE802.3af 15.4W
Power Consumption	Max 31.5W @24VDC input (support up to 30W for PoE Output)
	Max 61.8W @24VDC input (support up to 60W for PoE Output)
Alarm Relay Contact	Relay outputs with current carrying capacity of 1 A @24VDC
Removable Terminal Block	Provide 2 redundant power, alarm relay contact, 6 Pin
Operating Temperature	-10 ~ 60°C (INJ-IG60-24)
	-40 ~ 75°C (INJ-IG60-E24)
Operating Humidity	5% to 95% (Non-condensing)
Storage Temperature	-40 ~ 85°C
Housing	Rugged Metal, IP30 Protection
Dimensions	106 x 38.6 x 142mm (D x W x H)
Weight	0.63kg
Installation Mounting	DIN Rail mounting and Wall Mounting
EMC/EMS	CE, FCC
EMI	FCC Part 15 Subpart B Class A, CE EN 55022 Class A
	EN61000-6-4 – Emission for industrial environment
EMS	EN61000-6-2 – Immunity for Industrial environment
	EN61000-4-2 (ESD) Level 3, Criteria B
	EN61000-4-3 (RS) Level 3, Criteria A
	EN61000-4-4 (EFT) Level 3, Criteria A
	EN61000-4-5 (Surge) Level 3, Criteria B
	EN61000-4-6 (CS) Level 3, Criteria A
	EN61000-4-8 (PMF, Magnetic Field) Level 3, Criteria A
Safety	UL60950-1 (pending)
Rail traffic	EN 50121-4
Shock	IEC 60068-2-27
Freefall	IEC 60068-2-32
Vibration	IEC 60068-2-6
MTBF	763,725Hrs
Warranty	5 years

Application

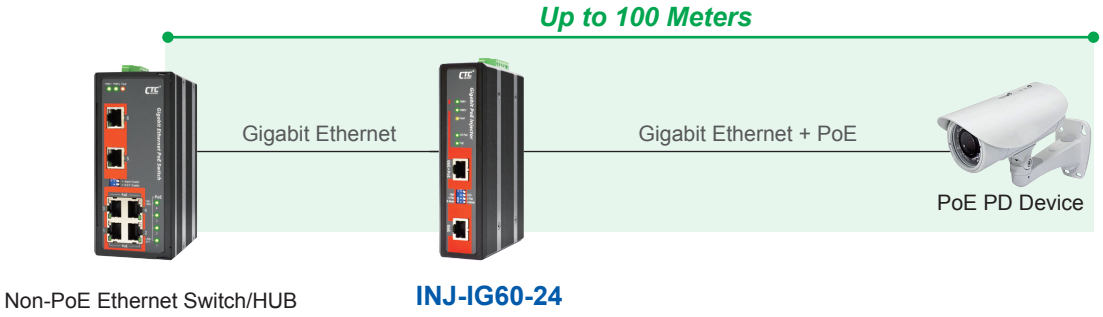
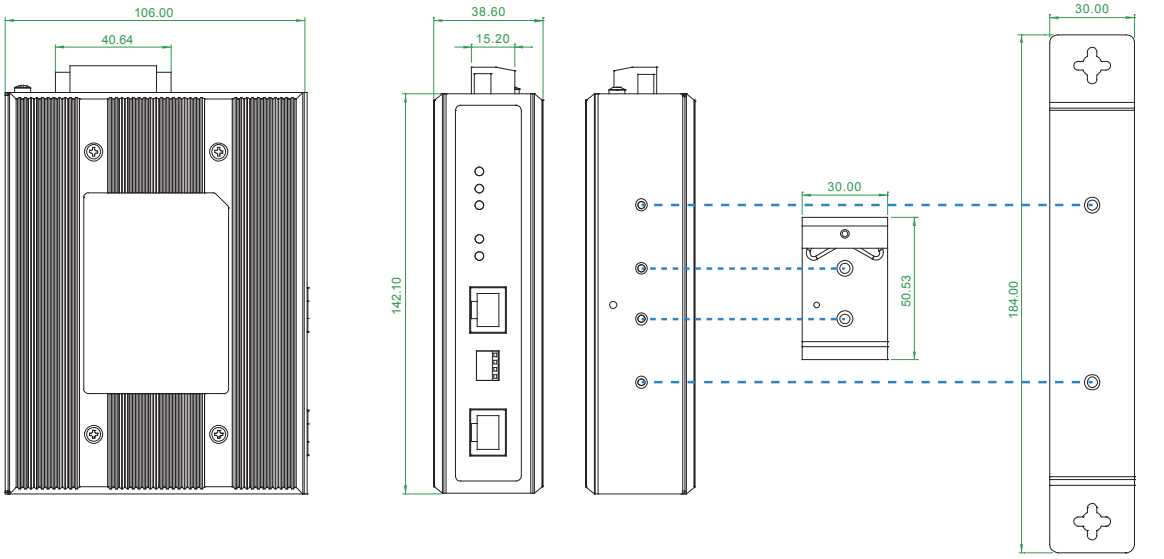


Figure : INJ-IG60-24 & INJ-IG60-E24 Gigabit Ethernet PoE Injector

Dimensions



Ordering Information

Model Name	Description
INJ-IG60-24	Industrial 10/100/1000Base-T with IEEE802.3at/af PoE Injector, 15.4/30/36/60W (24V Booster, -10 ~ 60°C)
INJ-IG60-E24	Industrial 10/100/1000Base-T with IEEE802.3at/af PoE Injector, 15.4/30/36/60W (24V Booster, -40 ~ 75°C)

Accessories

DR-120-24	Industrial Power, Input 88 ~ 132VAC / 176 ~ 264VAC, Output 24VDC, 120W, -10 ~ +60°C
DR-4524	Industrial Power, Input 85 ~ 264VAC, Output 24VDC, 48W, -10 ~ +50°C
MDR-40-24	Industrial Power, Input 85 ~ 264VAC, Output 24VDC, 40W, -20 ~ +70°C
MDR-60-24	Industrial Power, Input 85 ~ 264VAC, Output 24VDC, 60W, -20 ~ +70°C

Temperature

INJ-IG60 – ☐ 24

Example: INJ-IG60 – E24

IGS-401F

4x 10/100/1000Base-T+ 1x 1000Base-SX/LX Gigabit Ethernet Switch

IGS-402F

4x 10/100/1000Base-T+ 2x 1000Base-SX/LX Gigabit Ethernet Switch

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IGS-401F/402F models are 4 port 10/100/1000Base-T Ethernet non-managed Gigabit switches, with either 1 x 1000Base-X fiber port (IGS-401F) or 2 x 1000Base-X fiber ports, that provide stable and reliable Ethernet transmission. Housed in rugged DIN rail or wall mountable enclosures, these switches are designed for harsh environments, such as industrial networking, intelligent transportation systems (ITS) and are also suitable for many military and utility market applications where environmental conditions exceed commercial product specifications. Standard operating temperature range models (-10 to 60°C) and wide operating temperature range models (-40 to 75°C) fulfill the special needs of industrial automation applications.

Features

- 12/24/48VDC redundant dual input power design
- 4x Port 1000Base-T RJ-45 with 1 or 2 Fiber Gigabit Ethernet
- Wide operating temperature -40 ~ 75°C (IGS-401F-E, IGS-402F-E)
- Provides broadcast storm protection
- Supports DIP SW for alarm setting and broadcast storm protection
- Supports power failure alarm message by relay
- Supports flow control
- UL60950-1, CE, FCC certification
- Industrial Grade EMS, EMI, EN61000-6-2, EN61000-6-4 certified
- IP30 rugged metal housing

Specifications

IEEE Standard	IEEE 802.3 10Base-T Ethernet	
	IEEE 802.3u 100Base-TX Fast Ethernet	
	IEEE 802.3ab 1000Base-T Gigabit Ethernet	
	IEEE 802.3z 1000Base-X Gigabit Ethernet	
	IEEE 802.3x Flow Control and Back Pressure	
Switch Architecture	Back-plane (Switching Fabric): 10Gbps (IGS-401F, IGS-401F-E)	
	Back-plane (Switching Fabric): 12Gbps (IGS-402F, IGS-402F-E)	
Data Processing	Store and Forward	
Flow Control	IEEE 802.3x flow control, back pressure flow control	
Provides Broadcast Storm Protection	Present, Enable / Disable set by DIP SW	
Jumbo Frame	10K Bytes	
MAC Address Table	8K	
Packet Buffer Size	1Mbits	
Network Connector	4 x RJ-45	
	10/100/1000Base-TX auto negotiation speed, Auto MDI/MDI-X function, Full/Half duplex	
	1 or 2 1000Base-X Fiber connector : SC	
Network Cable	UTP/STP above Cat. 5e cable	
	EIA/TIA-568 100-ohm (100m)	
	Fiber Cable (Multi-mode): 50/125um, 62.5/125um	
	Fiber Cable (Single-mode): 9/125um	
Protocols	CSMA/CD	
LED	Per unit: Power 1 (Green), Power 2 (Green), Fault (Amber)	
	RJ-45 port : Link/Active (Green), Speed 10 (OFF), 100 (Green), 1000 (Yellow)	
	Fiber Per port: Link/Active (Green)	
DIP SW	DIP 1	ON : Disable power failure alarm
		OFF : Enable power failure alarm
	DIP 2	ON : Disables broadcast storm protection
		OFF : Enable broadcast storm protection
Reserve Polarity Protection	Present	
Overload current protection	Present	

Power Supply	Redundant Dual DC 12/24/48V (9.6~60VDC) Input power (Removable Terminal Block)
	Provide DC Power JACK adapter cable for external power supply
Power Consumption	Max 7.79W (IGS-401F)
	Max 7.83W (IGS-402F)
Alarm Relay Contact	Relay outputs with current carrying capacity of 1 A @24VDC
Removable Terminal Block	Provide 2 Redundant power, Alarm relay contact, 6 Pin
Operating Temperature	-10 ~ 60°C (IGS-401F, IGS-402F)
	-40 ~ 75°C (IGS-401F-E, IGS-402F-E)
Operating Humidity	5% to 95% (Non-condensing)
Storage Temperature	-40 ~ 85°C
Housing	Rugged Metal, IP30 Protection
Dimensions	106 x 62.5 x 134.8 mm (D X W X H)
Weight	0.67kg (IGS-401F), 0.68kg (IGS-402F)
Installation Mounting	DIN Rail mounting or wall mounting
EMC/EMS	CE, FCC
EMI	FCC Part 15 Subpart B Class A, CE EN 55022 Class A
	EN61000-6-4 – Emission for industrial environment
EMS	EN61000-6-2 – Immunity for Industrial environment
	EN61000-4-2 (ESD) Level 3, Criteria B
	EN61000-4-3 (RS) Level 3, Criteria A
	EN61000-4-4 (EFT) Level 3, Criteria A
	EN61000-4-5 (Surge) Level 3, Criteria B
	EN61000-4-6 (CS) Level 3, Criteria A
	EN61000-4-8 (Magnetic Field) Level 3, Criteria A
Safety	UL60950-1
Rail Traffic	EN 50121-4
Shock	IEC 60068-2-27
Freefall	IEC 60068-2-32
Vibration	IEC 60068-2-6
MTBF	407,596 Hours (IGS-401F)
	391,633 Hours (IGS-402F)
Warranty	5 years

Application

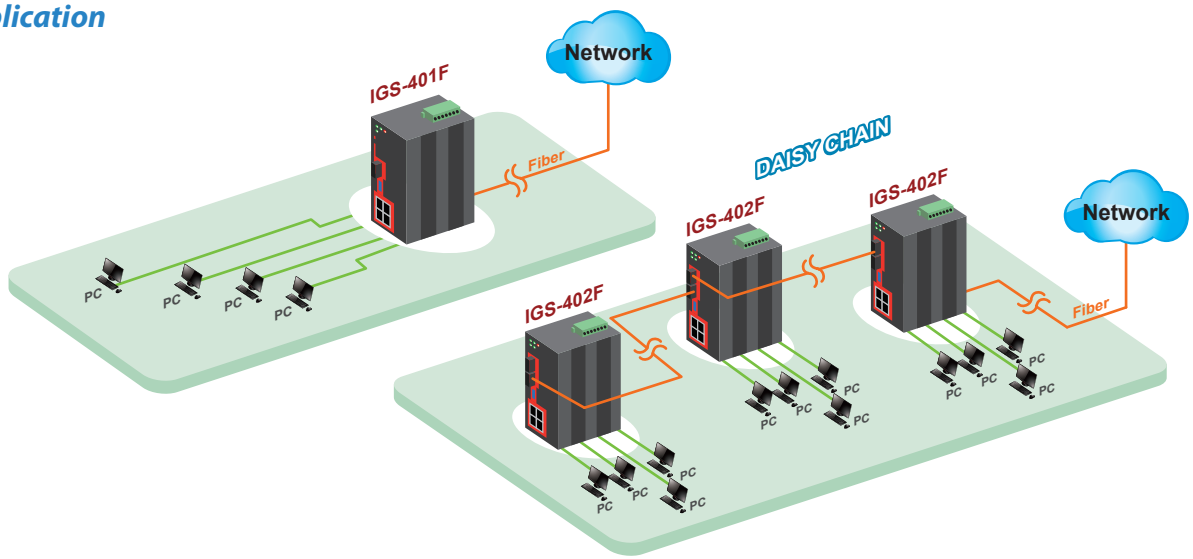
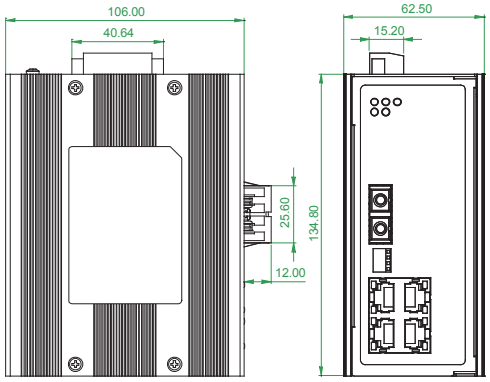


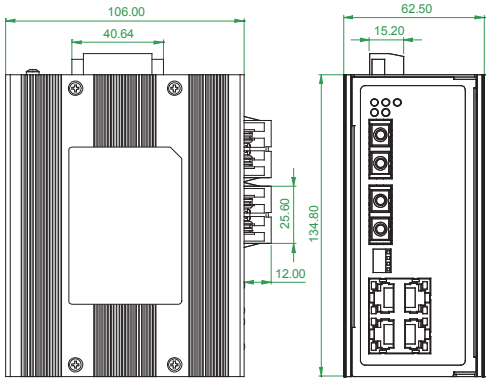
Figure : IGS-401F & IGS-402F Gigabit Ethernet Switch Transmission

Dimensions

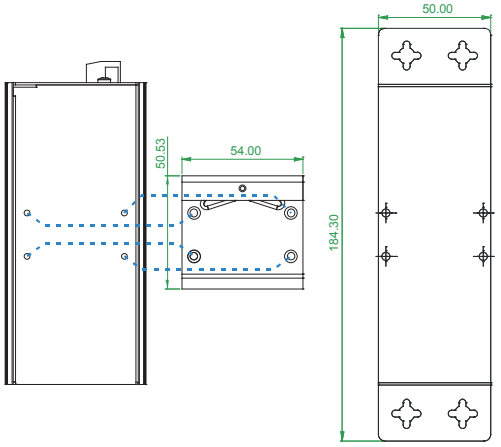
IGS-401F



IGS-402F



Side View Front View



Rear View DIN-Rail Kit View Wall-Mount Kit View

Ordering Information

Model Name	Description
IGS-401F	4-Port 10/100/1000Base-T + 1-Port 1000Base Gigabit Ethernet Switch (-10 ~ 60°C)
IGS-401F-E	4-Port 10/100/1000Base-T + 1-Port 1000Base Gigabit Ethernet Switch (-40 ~ 75°C)
IGS-402F	4-Port 10/100/1000Base-T + 2-Port 1000Base Gigabit Ethernet Switch (-10 ~ 60°C)
IGS-402F-E	4-Port 10/100/1000Base-T + 2-Port 1000Base Gigabit Ethernet Switch (-40 ~ 75°C)

Fiber Connector	Connectivity Distance
SC (IGS-401F & IGS-401F-E only)	SC001: 500m (SC, M/M) 002 : 2km (M/M) SC020: 20km (SC, S/M) SC040: 40km (SC, S/M) SC020A: WDM 20km A type (TX:1310nm) SC020B: WDM 20km B type (TX:1550nm)

Accessories

DR-4524	Industrial Power, Input 85 ~ 264VAC, Output 24VDC, 48W, -10 ~ +50°C
MDR-40-24	Industrial Power, Input 85 ~ 264VAC, Output 24VDC, 40W, -20 ~ +70°C

	Port Number	Temperature	Connector Type	Connectivity Distance
IGS – 40□ F	– □	–	□□	□□□

Example: IGS – 401F – E – SC002

IGS-402S

4x 10/100/1000Base-T+ 2x 100/1000Base-X SFP Slot Gigabit Ethernet Switch

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IGS-402S models are 4 port 10/100/1000Base-T Ethernet non-managed Gigabit switches, with 2x 1000Base-X SFP fiber ports, that provide stable and reliable Ethernet transmission. Housed in rugged DIN rail or wall mountable enclosures, these switches are designed for harsh environments, such as industrial networking, intelligent transportation systems (ITS) and are also suitable for many military and utility market applications where environmental conditions exceed commercial product specifications. Standard operating temperature range models (-10 to 60°C) and wide operating temperature range models (-40 to 75°C) fulfill the special needs of industrial automation applications.

Features

- 12/24/48VDC redundant dual input power design
- 4-Port 1000Base-T RJ-45 with 2 Fiber Gigabit Ethernet
- Wide operating temperature -40 ~ 75°C (IGS-402S-E)
- Provides broadcast storm protection
- Supports DIP SW for alarm setting and broadcast storm protection
- Supports power failure alarm message by relay
- Supports flow control
- Support dual speed option for SFP
- UL60950-1, CE, FCC, certification
- Industrial Grade EMS, EMI, EN61000-6-2, EN61000-6-4 Certified
- IP30 rugged metal housing

Specifications

IEEE Standard	IEEE 802.3 10Base-T Ethernet	
	IEEE 802.3u 100Base-TX Fast Ethernet	
	IEEE 802.3ab 1000Base-T Gigabit Ethernet	
	IEEE 802.3z 1000Base-X Gigabit Ethernet	
	IEEE 802.3x Flow Control and Back Pressure	
Switch Architecture	Back-plane (Switching Fabric): 12Gbps	
Data Processing	Store and Forward	
Flow Control	IEEE 802.3x flow control, back pressure flow control	
Provides Broadcast Storm Protection	Present, Enable / Disable set by DIP sw	
Jumbo Frame	10K Bytes	
MAC Address Table	8K	
Packet Buffer Size	1Mbits	
Network Connector	4 x RJ-45	
	10/100/1000Base-T auto negotiation speed, Auto MDI/MDI-X function, Full/Half duplex	
	2 SFP 100/1000 Base-X dual mode slot	
Network Cable	UTP/STP above Cat. 5e cable	
	EIA/TIA-568 100-ohm (100m)	
	Fiber Cable (Multi-mode): 50/125um, 62.5/125um	
	Fiber Cable (Single-mode): 9/125um	
Protocols	CSMA/CD	
LED	Per unit: Power 1 (Green), Power 2 (Green), Fault (Amber)	
	Per RJ-45 port : Link/Active (Green), Speed 10(OFF), 100(Green), 1000(Yellow)	
	Fiber Per port: Link/Active (Green)	
DIP SW	DIP 1	ON : Disable power failure alarm
		OFF : Enable power failure alarm
	DIP 2	ON : Disables broadcast storm protection
		OFF : Enable broadcast storm protection
	DIP 3	ON : Fiber 2 for 100Base-FX SFP
		OFF : Fiber 2 for Gigabit SFP
	DIP 4	ON : Fiber 1 for 100Base-FX SFP
		OFF : Fiber 1 for Gigabit SFP
Reserve Polarity Protection	Present	
Overload Current Protection	Present	
Power Supply	Redundant Dual DC 12/24/48V (9.6~60VDC) Input power (Removable Terminal Block)	
	Provide DC Power JACK adapter cable for external power supply	

Power Consumption	Max 7.83W
Alarm Relay Contact	Relay outputs with current carrying capacity of 1 A @24VDC
Removable Terminal Block	Provide 2 redundant power, alarm relay contact, 6 Pin
Operating Temperature	-10 ~ 60°C (IGS-402S)
	-40 ~75°C (IGS-402S-E)
Operating Humidity	5% to 95% (Non-condensing)
Storage Temperature	-40 ~ 85°C
Housing	Rugged Metal, IP30 Protection
Dimensions	106 x 62.5 x 134.8mm (D X W X H)
Weight	0.84kg
Installation Mounting	DIN Rail mounting or wall mounting
EMC/EMS	CE, FCC
EMI	FCC Part 15 Subpart B Class A, CE EN 55022 Class A
	EN61000-6-4 – Emission for industrial environment
EMS	EN61000-6-2 – Immunity for Industrial environment
	EN61000-4-2 (ESD) Level 3, Criteria B
	EN61000-4-3 (RS) Level 3, Criteria A
	EN61000-4-4 (EFT) Level 3, Criteria A
	EN61000-4-5 (Surge) Level 3, Criteria B
	EN61000-4-6 (CS) Level 3, Criteria A
	EN61000-4-8 (Magnetic Field) Level 3, Criteria A
Safety	UL60950-1
Rail Traffic	EN 50121-4
Shock	IEC 60068-2-27
Freefall	IEC 60068-2-32
Vibration	IEC 60068-2-6
MTBF	438,031 Hours
Warranty	5 years

Application

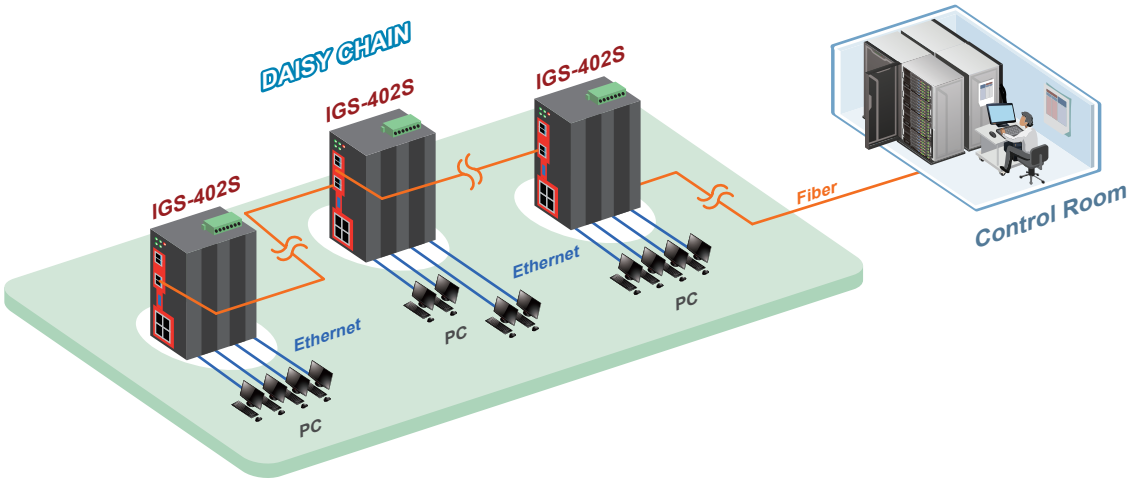
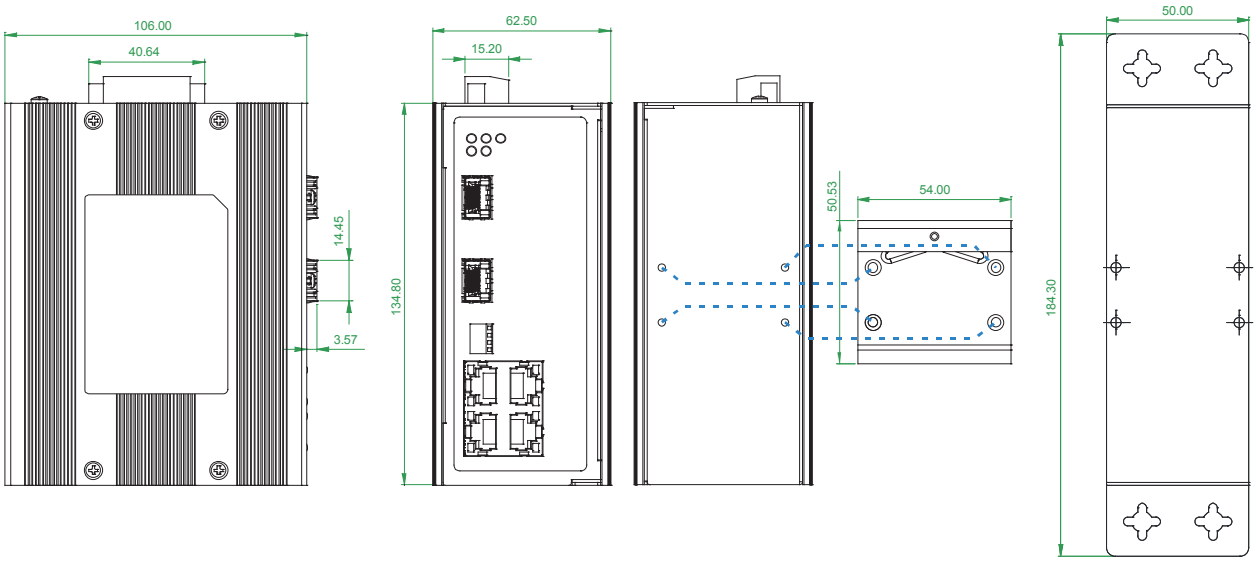


Figure : IGS-402S Gigabit Ethernet Switch Transmission with Daisy Chain

Dimensions



Side View | Front View | Rear View | DIN-Rail Kit View | Wall-Mount Kit View

Ordering Information

Model Name	Description
IGS-402S	4-Port 10/100/1000Base-T + 2-Port 100/1000Base SFP Slot Gigabit Ethernet Switch (-10 ~ 60°C)
IGS-402S-E	4-Port 10/100/1000Base-T + 2-Port 100/1000Base SFP Slot Gigabit Ethernet Switch (-40 ~ 75°C)

Accessories

DR-4524	Industrial Power, Input 85 ~ 264VAC, Output 24VDC, 48W, -10 ~ +50°C
MDR-40-24	Industrial Power, Input 85 ~ 264VAC, Output 24VDC, 40W, -20 ~ +70°C
SFP Transceiver	Compatible, Reliable, 5-year Warranty

ISFP – M 7 040 – 31 – E

- ISFP: Industrial SFP Transceiver
- M: Multi Mode; S: Single Mode; T: Copper
- 7: GbE; 5: FE
- 040: Distance 002(2km), 020(20km), 040(40km)...
- 31: Wavelength
- E: -40~85°C; Blank: 0~70°C

Temperature

IGS – 402S – □

Example: IGS – 402S – E

IGS-500

5x 10/100/1000Base-T Gigabit Ethernet Switch

IGS-800

8x 10/100/1000Base-T Gigabit Ethernet Switch

NEW

IGS-500/800 models are 5-port/8-port respectively 10/100/1000Base-T non-managed Gigabit Ethernet switches that provide stable and reliable Ethernet transmission. Housed in rugged DIN rail or wall mountable enclosures, these switches are designed for harsh environments, such as industrial networking, intelligent transportation systems (ITS) and are also suitable for many military and utility market applications where environmental conditions exceed commercial product specifications. Standard operating temperature range models (-10 to 60°C) and wide operating temperature range models (-40 to 75°C) fulfill the special needs of industrial automation applications.

Features

- 5 or 8-Port 10/100/1000Base-T RJ-45 Gigabit Ethernet Switch
- Supports broadcast storm protection
- Supports power failure alarm message by relay
- Supports flow control
- Jumbo frame supports
- Supports auto-negotiation and auto-MDI/MDI-X
- Redundant dual DC input power 12/24/48VDC (9.6~60VDC)
- IP30 rugged metal housing
- Supports DIN Rail or wall mounting installation
- Wide operating temperature -40~75°C (IGS-800-E)
- UL60950-1, CE, FCC Certification
- Industrial Grade EMS, EMI, EN61000-6-2, EN61000-6-4 certified

Specifications

IEEE Standard	IEEE 802.3 10Base-T Ethernet	
	IEEE 802.3u 100Base-TX Fast Ethernet	
	IEEE 802.3ab 1000Base-T Gigabit Ethernet	
	IEEE802.3x Flow Control	
Switch Architecture	Back-plane (Switching Fabric): 10Gbps (IGS-500, IGS-500-E)	
	Back-plane (Switching Fabric): 16Gbps (IGS-800, IGS-800-E)	
Data Processing	Store and Forward	
Flow Control	IEEE 802.3x flow control for Full duplex , back pressure for half duplex	
Provides Broadcast Storm Protection	Present	
Jumbo Frame	9.6KBytes	
MAC Address Table	8K	
Packet Buffer Size	512KByte	
Network Connector	5 x RJ-45 (IGS-500, IGS-500-E)	
	8 x RJ-45 (IGS-800, IGS-800-E)	
	10/100/1000Base-TX auto negotiation speed, Auto MDI/MDI-X function, Full/Half duplex	
Network Cable	10Base-T: 2-pair UTP/STP Cat. 5 cable	
	EIA/TIA-568 100-ohm (100m)	
	100Base-TX: 2-pair UTP/STP Cat. 5 cable	
	EIA/TIA-568 100-ohm (100m)	
Protocols	CSMA/CD	
LED	Per unit: Power 1 (Green), Power 2 (Green), Fault (Amber)	
	Per RJ-45 Port: Link/Active (Green), Speed: 10 (OFF), 100 (Green), 1000 (Yellow)	
DIP SW	DIP 1	ON : Disable
		OFF : Enable power failure alarm
	DIP 2	ON : Disables broadcast storm protection
		OFF : Enable broadcast storm protection
Reserve Polarity Protection	Present for Power Input	
Overload Current Protection	Present	
Power Supply	Redundant Dual DC 12/24/48V (9.6~60VDC) Input power (Removable Terminal Block)	
	Provide DC Power JACK adapter cable for external power supply	
Alarm Relay Contact	Relay outputs with current carrying capacity of 1 A @24VDC, NC	
Removable Terminal Block	Provide 2 redundant power, alarm relay contact, 6 Pin	

Power Consumption	TBD
Operating Temperature	-10°C~60°C (IGS-500, IGS-800)
	-40°C~75°C (IGS-500-E, IGS-800-E)
Operating Humidity	5% to 95% (Non-condensing)
Storage Temperature	-40 ~ 85°C
Housing	Rugged Metal, IP30 Protection
Dimensions	106 x 38.6 x 142 mm (D x W x H)
Weight	TBD
Installation Mounting	DIN Rail mounting or wall mounting
EMI	FCC Part 15 Subpart B Class A
	EN 55022 Class A
	EN 61000-6-4 - Emission for industrial environment
EMS	EN 61000-6-2 - Immunity for Industrial environment
	EN61000-4-2 (ESD) Level 3, Criteria B
	EN61000-4-3 (RS) Level 3, Criteria A
	EN61000-4-4 (Burst) Level 3, Criteria B
	EN61000-4-5 (Surge) Level 3, Criteria B
	EN61000-4-6 (CS) Level 3, Criteria A
	EN61000-4-8 (Magnetic Field) Level 3, Criteria A
Safety	UL60950-1(Pending)
Shock	IEC 60068-2-27
Freefall	IEC 60068-2-32
Vibration	IEC 60068-2-6
MTBF	TBD (Above 30 years)
Warranty	5 years

Application

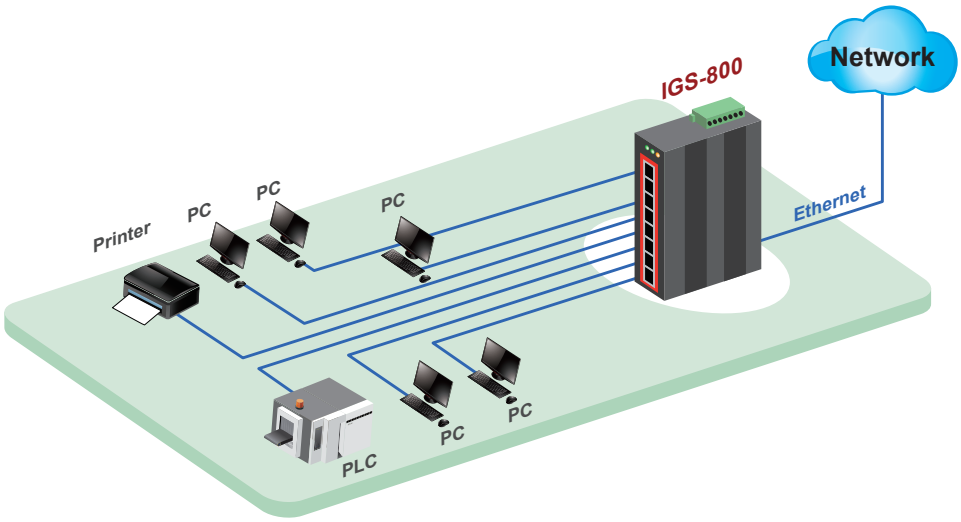
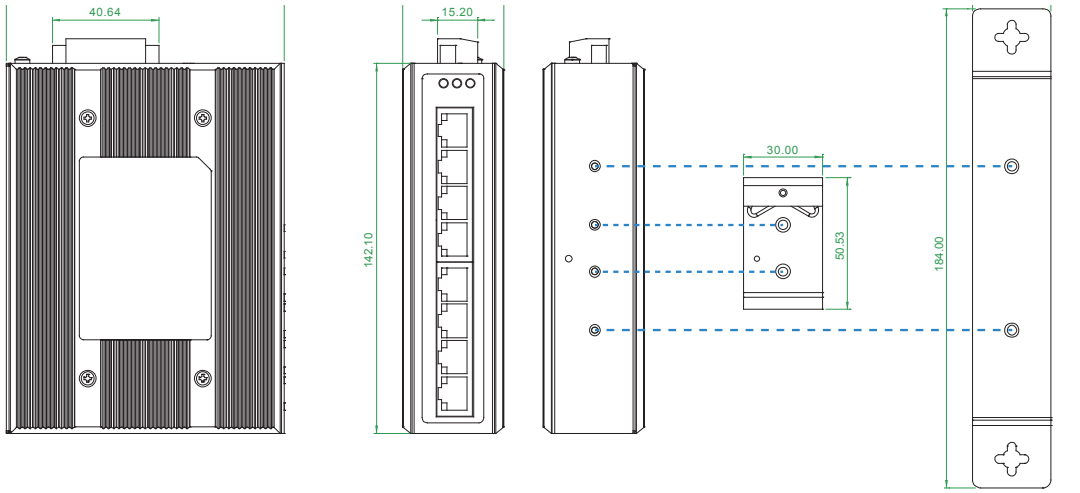


Figure : IGS-800 Gigabit Ethernet Switch Transmission

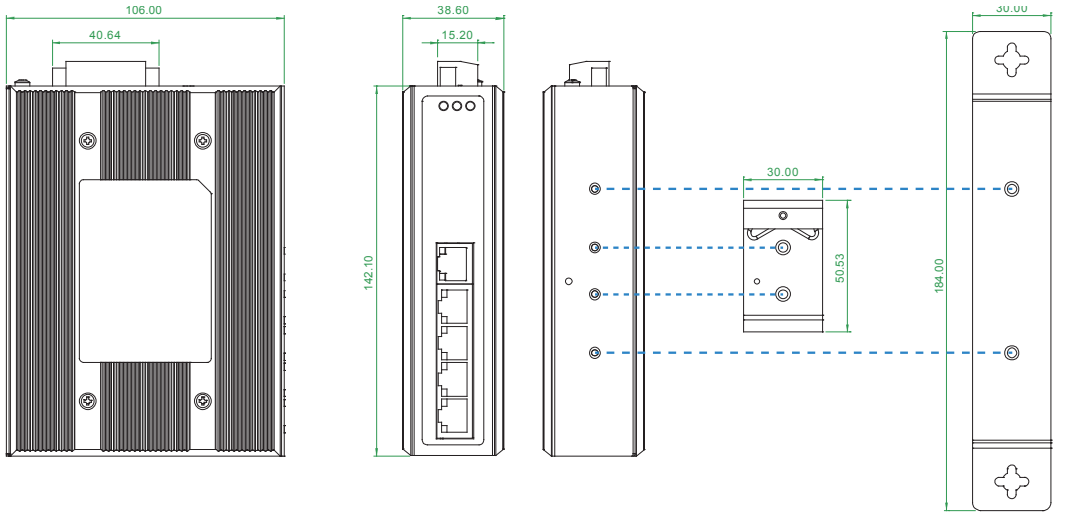
Dimensions

IGS-800



Side View | Front View | Rear View | DIN-Rail Kit View | Wall-Mount Kit View

IGS-500



Side View | Front View | Rear View | DIN-Rail Kit View | Wall-Mount Kit View

Ordering Information

Model Name	Description
IGS-500	5-Port 10/100/1000Base-T Gigabit Ethernet Switch, -10℃~60℃
IGS-500-E	5-Port 10/100/1000Base-T Gigabit Ethernet Switch, -40℃~75℃
IGS-800	8-Port 10/100/1000Base-T Gigabit Ethernet Switch, -10℃~60℃
IGS-800-E	8-Port 10/100/1000Base-T Gigabit Ethernet Switch, -40℃~75℃
Accessories	
DR-4524	Industrial Power, Input 85 ~ 264VAC, Output 24VDC, 48W, -10 ~ +50°C
MDR-40-24	Industrial Power, Input 85 ~ 264VAC, Output 24VDC, 40W, -20 ~ +70°C

Temperature

IGS – 500 – ☐

Example: IGS – 500 – E

IFS-401F

4x 10/100Base-TX + 1x 100Base-FX Fast Ethernet Switch

IFS-402F

4x 10/100Base-TX + 2x 100Base-FX Fast Ethernet Switch

IFS-401F/402F models are 4 port 10/100Base-T Ethernet non-managed Fast Ethernet switches, with either 1x 100Base-FX fiber port (IFS-401F) or 2x 100Base-FX fiber ports, that provide stable and reliable Ethernet transmission. Housed in rugged DIN rail or wall mountable enclosures, these switches are designed for harsh environments, such as industrial networking, intelligent transportation systems (ITS) and are also suitable for many military and utility market applications where environmental conditions exceed commercial product specifications. Standard operating temperature range models (-10 to 60°C) and wide operating temperature range models (-40 to 75°C) fulfill the special needs of industrial automation applications.

Features

- Redundant dual DC input power 12/24/48VDC (9.6~60VDC)
- IP30 rugged metal housing
- Wide operating temperature -40 ~ 75°C (IFS-401F-E and IFS-402F-E)
- Provides broadcast storm protection
- Supports DIP SW for alarm setting and broadcast storm protection
- Supports power failure alarm message by relay
- Supports flow control
- UL60950-1, CE, FCC Certification
- Industrial Grade EMS, EMI, EN61000-6-2, EN61000-6-4 certified
- 4-Port 10/100Base-TX (RJ-45) with 1 or 2-port 100Base-FX Fiber

Specifications

IEEE Standard	IEEE 802.3 10Base-T Ethernet	
	IEEE 802.3u 100Base-TX and 100Base-FX Fast Ethernet	
	IEEE 802.3x Flow Control and Back Pressure	
Switch Architecture	Back-plane (Switching Fabric) : 1.0 Gbps (IFS-401F, IFS-401F-E) 1.2Gbps (IFS-402F, IFS-402F-E)	
Data Processing	Store and Forward	
Transfer Rate	14,880pps for Ethernet port	
	148,800pps for Fast Ethernet port	
Flow Control	IEEE 802.3x flow control, back pressure flow control	
Provides Broadcast Storm Protection	Present	
MAC Address Table	2K	
Packet Buffer Size	448Kbits	
Network Connector	4X RJ-45, 1 Fiber (IFS-401F, IFS-401F-E)	
	4X RJ-45, 2 Fiber (IFS-402F, IFS-402F-E)	
	RJ-45 Port:	Auto MDI/MDI-X function, 10/100Base-TX auto negotiation speed, Full/Half duplex
	100Base-FX Fiber connector : SC/ST, Muti Mode/Single Mode	
Network Cable	10Base-T: 2-pair UTP/STP Cat. 5 cable	
	EIA/TIA-568 100-ohm (100m)	
	100Base-TX: 2-pair UTP/STP Cat. 5 cable	
	EIA/TIA-568 100-ohm (100m)	
	Fiber Cable (Multi-mode): 50/125um~62.5/125um	
	Fiber Cable (Single-mode): 8/125um~10/125um	
	Wavelength: 1310nm (Multi-mode/Single-mode)	
	Available distance: 2KM (Multi-Mode) 30KM (Single-Mode) 50KM (Single Mode)	
Protocol	CSMA/CD	
LED	Per unit: Power 1 (Green), Power 2 (Green), Fault (Amber)	
	RJ-45 Per port: Link/Active (Green), Speed 100 (Yellow)	
	Fiber Per port: Link/Active (Green)	
DIP SW	DIP 1	OFF : Enable power failure alarm
		ON : Disable
	DIP 2	OFF : Enable broadcast storm protection
		ON : Disables broadcast storm protection
Reverse Polarity Protection	Present	
Overload Current Protection	Present	

Power Supply	Redundant Dual DC 12/24/48V (9.6~60VDC) Input power (Removable Terminal Block)
	Provide DC Power JACK adapter cable for external power supply
Power Consumption	4.4W (IFS-401F, IFS-401F-E)
	5.8W (IFS-402F, IFS-402F-E)
Alarm Relay Contact	Relay outputs with current carrying capacity of 1 A @24VDC, NC
Removable Terminal Block	Provide 2 Redundant power, Alarm relay contact, 6 Pin
Operating Temperature	-10 ~ 60°C (IFS-401F, IFS-402F)
	-40 ~ 75°C (IFS-401F-E, IFS-402F-E)
Operating Humidity	5% to 95% (Non-condensing)
Storage Temperature	-40 ~ 85°C
Housing	Rugged Metal, IP30 Protection
Dimensions	106 x 38 x 142mm (D x W x H)
Weight	0.625Kg (IFS-401F, IFS-401F-E)
	0.63kg (IFS-402F, IFS-402F-E)
Installation Mounting	DIN Rail mounting or wall mounting
EMI	FCC Part 15 Subpart B Class A, CE EN 55022 Class A
	EN61000-6-4 – Emission for industrial environment
EMS	EN61000-6-2 – Immunity for Industrial environment
	EN61000-4-2 (ESD) Level 3, Criteria B
	EN61000-4-3 (RS) Level 3, Criteria A
	EN61000-4-4 (Burst) Level 3, Criteria B
	EN61000-4-5 (Surge) Level 3, Criteria B
	EN61000-4-6 (CS) Level 3, Criteria A
	EN61000-4-8 (Magnetic Field) Level 3, Criteria A
Safety	UL60950-1 (Pending)
Rail Traffic	EN50121-4
Shock	IEC 60068-2-27
Freefall	IEC 60068-2-32
Vibration	IEC 60068-2-6
MTBF	587,670Hrs (IFS-401F, IFS-401F-E)
	509,883Hrs (IFS-402F, IFS-402F-E)
Warranty	5 years

Application

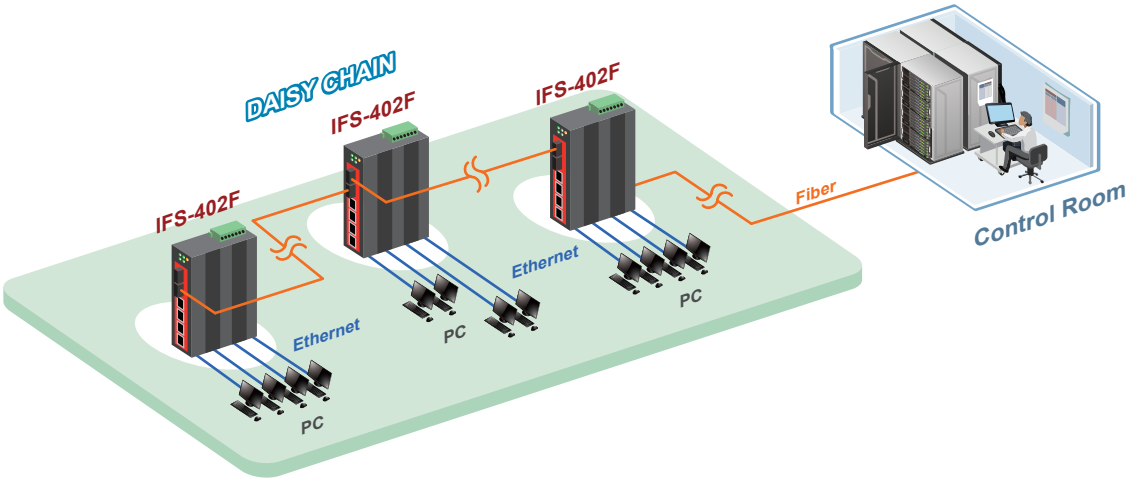
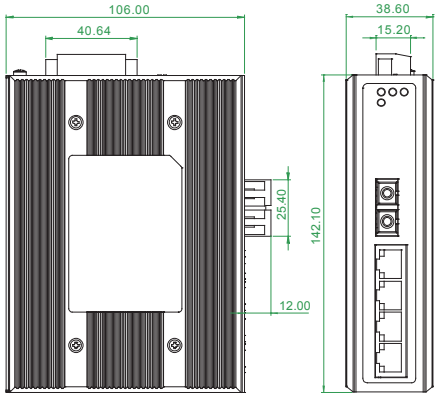


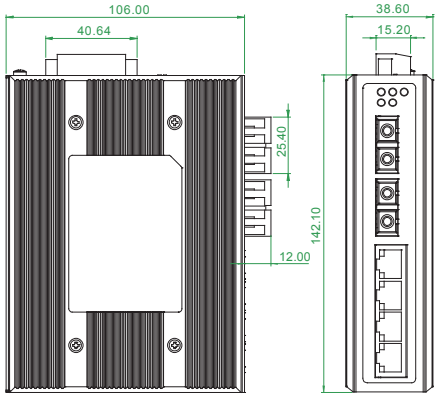
Figure : IFS-402F Fast Ethernet Switch Transmission with Daisy Chain

Dimensions

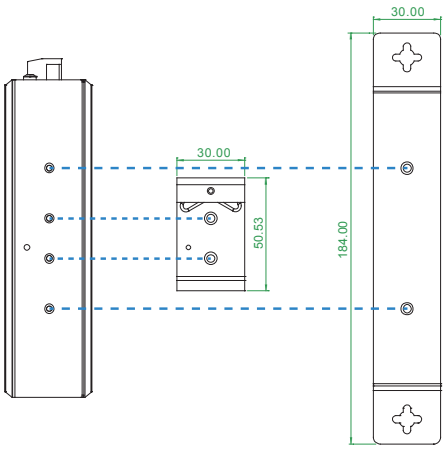
IFS-401F(-E)



IFS-402F(-E)



Side View Front View



Rear View DIN-Rail Kit View Wall-Mount Kit View

Ordering Information

Model Name	Description
IFS-401F	4-Port 10/100Base-TX + 1-Port 100Base-FX Fast Ethernet Switch, -10 ~ 60°C
IFS-401F-E	4-Port 10/100Base-TX + 1-Port 100Base-FX Fast Ethernet Switch, -40 ~ 75°C
IFS-402F	4-Port 10/100Base-TX + 2-Port 100Base-FX Fast Ethernet Switch, -10 ~ 60°C
IFS-402F-E	4-Port 10/100Base-TX + 2-Port 100Base-FX Fast Ethernet Switch, -40 ~ 75°C

Fiber Option Type	Connectivity Distance
SC, ST	002: 2km 030: 30km 050: 50km 020A: WDM 20km A type (TX:1310nm) 020B: WDM 20km B type (TX: 1550nm)

Accessories

DR-4524	Industrial Power, Input 85 ~ 264VAC, Output 24VDC, 48W, -10 ~ +50°C
MDR-40-24	Industrial Power, Input 85 ~ 264VAC, Output 24VDC, 40W, -20 ~ +70°C

Temperature Connector Type Connectivity Distance

IFS – 401F – □ – □□□□□

Example: IFS – 401F – E – SC002

IFS-500, IFS-800

5x 10/100Base-TX Fast Ethernet Switch
8x 10/100Base-TX Fast Ethernet Switch

IFS-500/800 models are 5-port/8-port respectively 10/100Base-TX non-managed Fast Ethernet switches that provide stable and reliable Ethernet transmission. Housed in rugged DIN rail or wall mountable enclosures, these switches are designed for harsh environments, such as industrial networking, intelligent transportation systems (ITS) and are also suitable for many military and utility market applications where environmental conditions exceed commercial product specifications. Standard operating temperature range models (-10 to 60°C) and wide operating temperature range models (-40 to 75°C) fulfill the special needs of industrial automation applications.

Features

- Redundant dual DC input power 12/24/48VDC (9.6~60VDC)
- IP30 rugged metal housing
- Wide operating temperature -40~75°C (IFS-500, IFS-800)
- UL60950-1, CE, FCC Certification
- Industrial Grade EMS, EMI, EN61000-6-2, EN61000-6-4 certified
- 5 or 8-Port 10/100Base-TX (RJ-45)
- Provides broadcast storm protection
- Supports DIP SW for alarm setting and broadcast storm protection
- Supports power failure alarm message by relay
- Supports flow control

Specifications

IEEE Standard	IEEE 802.3 10Base-T Ethernet	
	IEEE 802.3u 100Base-TX and 100Base-FX Fast Ethernet	
	IEEE 802.3x Flow Control and Back Pressure	
Switch Architecture	Back-plane (Switching Fabric): 1.0 Gbps (IFS-500, IFS-500-E) 1.6Gbps (IFS-800, IFS-800-E)	
Data Processing	Store and Forward	
Flow Control	IEEE 802.3x flow control, back pressure flow control	
Provides Broadcast Storm Protection	Present	
MAC Address Table	2K	
Packet Buffer Size	448Kbits	
Network Connector	5 x RJ-45 (IFS-500 ,IFS-500-E) 8 x RJ-45 (IFS-800, IFS-800-E) 10/100Base-TX auto negotiation speed, Auto MDI/MDI-X function, Full/Half duplex	
Network Cable	10Base-T: 2-pair UTP/STP Cat.5 cable	
	EIA/TIA-568 100-ohm (100m)	
	100Base-TX: 2-pair UTP/STP Cat. 5 cable	
	EIA/TIA-568 100-ohm (100m)	
Protocols	CSMA/CD	
LED	Per unit: Power 1 (Green), Power 2 (Green), Fault (Amber)	
	Per port: Link/Active (Green), Speed/100 (Yellow)	
DIP SW	DIP 1	OFF : Enable power failure alarm ON : Disable
	DIP 2	OFF : Enable broadcast storm protection ON : Disables broadcast storm protection
Reverse Polarity Protection	Present	
Overload Current Protection	Present	
Power Supply	Redundant Dual DC 12/24/48V (9.6~60VDC) Input power (Removable Terminal Block)	
	Provide DC Power JACK adapter cable for external power supply	
Power Consumption	2.9W (IFS-500, IFS-500-E) 3.9W (IFS-800, IFS-800-E)	
Alarm Relay Contact	Relay outputs with current carrying capacity of 1 A @24VDC, NC	
Removable Terminal Block	Provide 2 Redundant power, Alarm relay contact, 6 Pin	
Operating Temperature	-10 ~ 60°C (IFS-500, IFS-800)	
	-40 ~ 75°C (IFS-500-E, IFS-800-E)	

Operating Humidity	5% to 95% (Non-condensing)
Storage Temperature	-40 ~ 85°C
Housing	Rugged Metal, IP30 Protection
Dimensions	106 x 31.6 x 142mm (D x W x H)
Weight	0.625kg (IFS-500, IFS-500-E) 0.64kg (IFS-800, IFS-800-E)
Installation Mounting	DIN Rail mounting or wall mounting
EMI	FCC Part 15 Subpart B Class A, CE EN 55022 Class A
	EN61000-6-4 – Emission for industrial environment
EMS	EN61000-6-2 – Immunity for Industrial environment
	EN61000-4-2 (ESD) Level 3, Criteria B
	EN61000-4-3 (RS) Level 3, Criteria A
	EN61000-4-4 (Burst) Level 3, Criteria A
	EN61000-4-5 (Surge) Level 3, Criteria B
	EN61000-4-6 (CS) Level 3, Criteria A
	EN61000-4-8 (Magnetic Field) Level 3, Criteria A
Safety	UL60950-1 (Pending)
Rail Traffic	EN50121-4
Shock	IEC 60068-2-27
Freefall	IEC 60068-2-32
Vibration	IEC 60068-2-6
MTBF	650,473Hrs (IFS-500, IFS-500-E) 552,587Hrs (IFS-800, IFS-800-E)
Warranty	5 years

Application

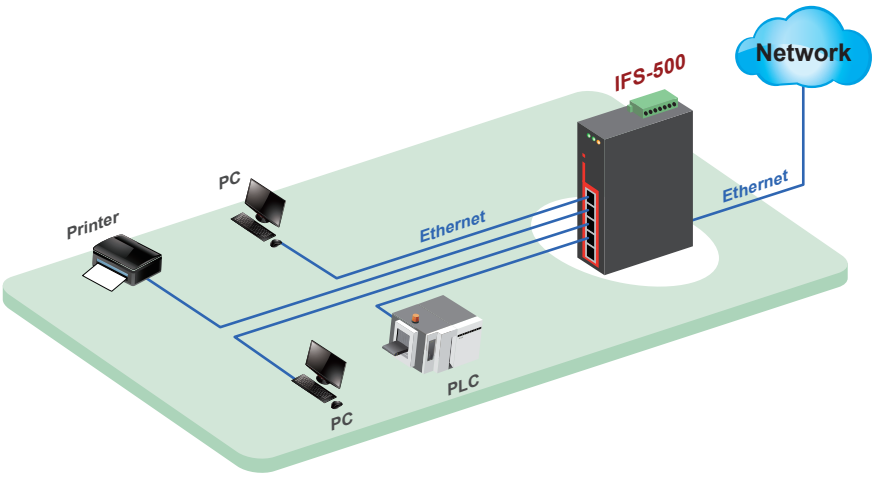
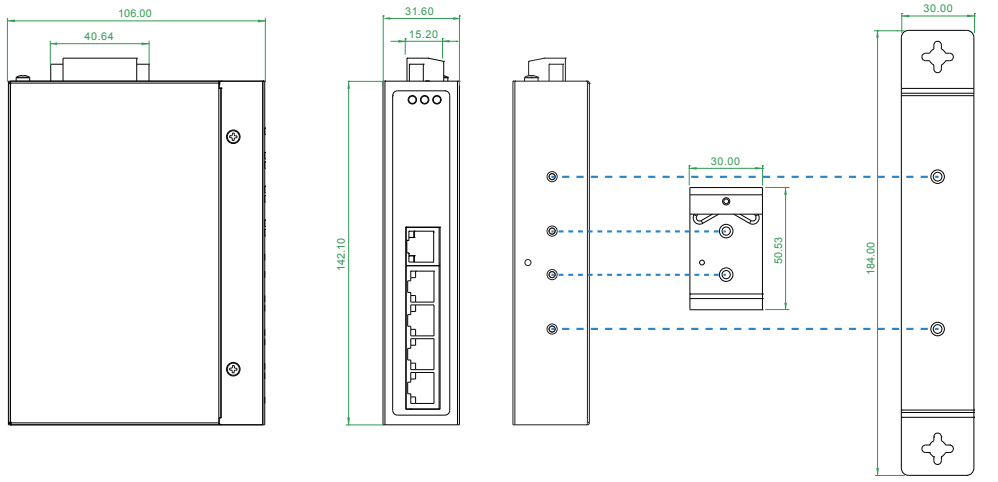


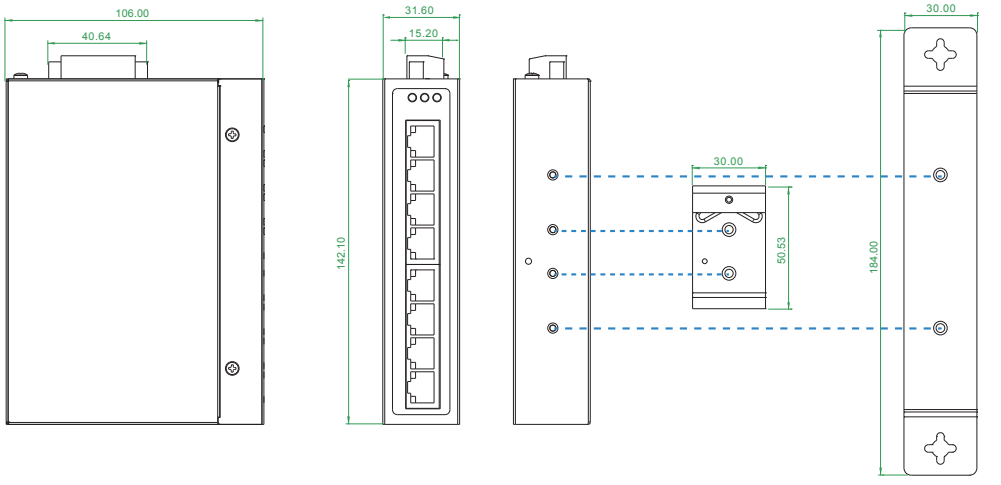
Figure : IFS-500 Fast Ethernet Switch Transmission

Dimensions

IFS-500



IFS-800



Ordering Information

Model Name	Description
IFS-500	5-Port 10/100Base-TX Ethernet Switch, -10 ~ 60°C
IFS-500-E	5-Port 10/100Base-TX Ethernet Switch, -40 ~ 75°C
IFS-800	8-Port 10/100Base-TX Ethernet Switch, -10 ~ 60°C
IFS-800-E	8-Port 10/100Base-TX Ethernet Switch, -40 ~ 75°C
Accessories	
DR-4524	Industrial Power, Input 85 ~ 264VAC, Output 24VDC, 48W, -10 ~ +50°C
MDR-40-24	Industrial Power, Input 85 ~ 264VAC, Output 24VDC, 40W, -20 ~ +70°C

Temperature

IFS – 500 – □

Example: IFS – 500 – E

IGS-803SM

8x 10/100/1000Base-T+ 3x 100/1000Base-X SFP Slot Ethernet Managed Switch

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IGS-803SM models are managed industrial grade Gigabit switches with 8 x 10/100/1000Base-T(X) ports and 3 SFP Gigabit/Fast Ethernet ports that provide stable and reliable Ethernet transmission. The Ethernet switches support a variety of management functions, including STP/RSTP/MSTP and ITU-T G.8032 Ring <50ms recovery time, layer 2 Ethernet IGMP, VLAN, QoS ,Security ,IPV6, bandwidth control, port mirroring, cable diagnostic and Green Ethernet. Housed in rugged DIN rail or wall mountable enclosures, these switches are designed for harsh environments, such as industrial networking, security automation applications, intelligent transportation systems (ITS) and are also suitable for many military and utility market applications where environmental conditions exceed commercial product specifications. Standard operating temperature range models (-10 to 60°C) and wide operating temperature range models (-40 to 75°C) fulfill the special needs of industrial automation applications.

Features

- 8x 10/100/1000Base-T RJ-45 with 3x 100/1000Base-X SFP Fiber
- UL60950-1, CE, FCC, Rail Traffic EN50121-4 certified
- Industrial Grade EMS, EMI, EN61000-6-2, EN61000-6-4 certified
- Cable diagnostic, measuring cable OK or broken point distance
- Supports IEEE802.3az EEE (Energy Efficient Ethernet) Management to optimize the power consumption
- STP, RSTP, MSTP, ITU-T G.8032 Ethernet Protection Ring (EPR) for cabling redundant
- μ-Ring for Redundant Ethernet Ring, recovery time<20ms in 250 units
- QoS, Traffic classification QoS, CoS, bandwidth control for Ingress and Egress, Storm Control, DiffServ
- IEEE802.1Q VLAN, port based VLAN, MAC based VLAN, IP subnet based VLAN, Protocol based VLAN, VLAN translation, MVR
- Dynamic IEEE 802.3ad LACP Link Aggregation, Static Link Aggregation
- IGMP/MLD snooping V1/V2/V3, IGMP Filtering/ Throttling, IGMP query, IGMP proxy reporting, MLD snooping
- Security : Port based and MAC based IEEE802.1X, RADIUS, ACL, TACACS+, HTTP/HTTPS, SSL/SSH v2
- Software upgrade via TFTP and HTTP, redundant firmware in case of upgrade failure
- DHCP client/Relay/Snooping/Snooping option 82/Relay option 82
- RMON, MIB II, Port mirroring, Event syslog, DNS, NTP/SNTP, IEEE802.1ab LLDP
- Supports IPv6 Telnet server /ICMP v6, SNMP, HTTP, SSH/SSL, NTP/SNTP, TFTP, QoS, ACL
- CLI, Web based management, SNMP v1/v2c/v3, Telnet server for management
- SmartView Management System

Specifications

Standard	IEEE 802.3	10Base-T 10Mbit/s Ethernet
	IEEE 802.3u	100Base-TX, 100Base-FX, Fast Ethernet
	IEEE 802.3ab	1000Base-T Gbit/s Ethernet over twisted pair
	IEEE 802.3z	1000Base-X Gbit/s Ethernet over Fiber-Optic
	IEEE 802.1d	STP (Spanning Tree Protocol)
	IEEE 802.1w	RSTP (Rapid Spanning Tree Protocol)
	IEEE 802.1s	MSTP (Multiple Spanning Tree Protocol)
	ITU-T G.8032 / Y.1344	EPR (Ethernet Protection Ring)
	IEEE 802.1Q	Virtual LANs (VLAN)
	IEEE 802.1X	Port based Network Access Control, Authentication
	IEEE 802.3ad	Link aggregation for parallel links with LACP(Link Aggregation Control Protocol)
	IEEE 802.3x	Flow control for Full Duplex
	IEEE 802.1ad	Stacked VLANs, Q-in-Q
	IEEE 802.1p	LAN Layer 2 QoS/CoS Protocol for Traffic Prioritization
	IEEE 802.1ab	Link Layer Discovery Protocol (LLDP)
	IEEE 802.3az	EEE (Energy Efficient Ethernet)
VLAN ID	4096	
Switch Architecture	Back-plane (Switching Fabric): 22Gbps	
Data Processing	Store and Forward	
Flow Control	IEEE 802.3x for full duplex mode Back pressure for half duplex mode	
Jumbo Frame	9.6KB	
MAC Address Table	8K	

Network Connector	8 x RJ-45 10/100/1000Base-T auto negotiation speed, Auto MDI/MDI-X function, Full/Half duplex 3x 100/1000Base-X dual speed mode SFP slot, with DDMI
Console	RS-232 (RJ-45)
Network Cable	UTP/STP above Cat. 5e cable EIA/TIA-568 100-ohm (100m)
Protocols	CSMA/CD
Reverse Polarity Protection	Present
Overload Current Protection	Present
CPU Watch Dog	Present
Power Supply	Redundant Dual DC12/24/48VDC (9.6~60VDC) Input power (Removable Terminal Block)
LED	Per unit: Power 1 (Green), Power 2 (Green), Fault (Amber), CPU Act (Green), Ring Master (Yellow) Per RJ-45 port: 10/100 Link/Active (Green) 1000 Link/Active (Amber) SFP Fiber Per port: Link/Active (Green)
Power Consumption	9.6W
Warning Message	System syslog, SMTP/ e-mail event message, alarm relay
Alarm Relay Contact	Relay outputs with current carrying capacity of 1 A @24VDC
Removable Terminal Block	Provide 2 redundant power, alarm relay contact, 6 Pin
Operating Temperature	-10 ~ 60°C (IGS-803SM) -40 ~ 75°C (IGS-803SM-E)
Operating Humidity	5% to 95% (Non-condensing)
Storage Temperature	-40 ~ 85°C
Housing	Rugged Metal, IP30 Protection
Dimensions	106 x 72 x152mm (D x W x H)
Weight	0.78 kg

Specifications

Installation Mounting	DIN Rail mounting or wall mounting
EMC/EMS	CE, FCC
EMI	FCC Part 15 Subpart B Class A, CE EN 55022 Class A
	EN61000-6-4 – Emission for industrial environment
EMS	EN61000-6-2 – Immunity for Industrial environment
	EN61000-4-2 (ESD) Level 3, Criteria B
	EN61000-4-3 (RS) Level 3, Criteria A
	EN61000-4-4 (EFT) Level 3, Criteria A
	EN61000-4-5 (Surge) Level 3, Criteria B
	EN61000-4-6 (CS) Level 3, Criteria A
	EN61000-4-8 (Magnetic Field) Level 3, Criteria A

Safety	UL60950-1
Rail Traffic	EN 50121-4
Shock	IEC 60068-2-27
Freefall	IEC 60068-2-32
Vibration	IEC 60068-2-6
MTBF	404,589 hrs
Warranty	5 years

Software Specifications

Topology	
VLAN	IEEE 802.1q VLAN, up to 4095 ID
	IEEE 802.1q VLAN, up to 4095 Groups
	IEEE 802.1ad Q-in-Q
	Port Based VLAN
	MAC-based VLAN, up to 256 entries
	IP Subnet-based VLAN, up to 128 entries
	Protocol-based VLAN (Ethernt, SNAP, LLC), up to 128 entries
	VLAN Translation, up to 256 entries
	MVR (Multiple VLAN Registration)
Link Aggregation (Port Trunk)	Static (Hash with SA, DA, IP, TCP/UDP port), up to 5 trunk group
	Dynamic (IEEE 802.3ad LACP), up to 5 trunk group
Spanning Tree	IEEE802.1d STP
	IEEE802.1w RSTP
	IEEE802.1s MSTP
Loop Protection	Present
µ-Ring	Easy set for Ethernet protection Ring, Recovery Time <20ms, Maximum 250 Node
ITU-T G.8032 / Y.1344 ERPS (Ethernet Ring Protection)	Convergence time <50ms
	Single Ring, Sub-Ring, Multiple ring topology network
QoS Feature	
Class of Service	IEEE802.1p 8 active priorities queues for per port
Traffic Classification QoS	IEEE802.1p based CoS
	IP Precedence based CoS
	IP DSCP based CoS
	QCL(QoS Control List): MAC Access control list (Source/ Destination MAC, Ether type, Priority ID/ VLAN ID)
	QCL: IP extended access control list (Source/ Destination IP, Protocol, TCP/UDP port number)
Bandwidth Control for Ingress	Rate in steps : 100 kbps / 1fps / 100fps
	Range : 100 kbps to 1Gbps / 1fps to 3300kfps
	Rate Unit : bit or frame
Bandwidth Control for Egress	Rate in steps : 100 kbps / 1fps / 100fps
	Range : 100 kbps to 1Gbps / 1fps to 3300kfps
	Rate Unit : bit or frame
	Per queue shaper
DiffServ (RF 2474) Remarking	
Storm Control	for Unicast, Broadcast, Multicast
IP Multicasting Feature	
IGMP / MLD Snooping	IGMP Snooping v1, v2, v3 / MLD Snooping v1, v2
	Port Filtering Profile
	Throttling
	Fast Leave
	Query

Security Features	
IEEE 802.1X	Port-Based
	MAC-Based
ACL	Number of rules : up to 256 entries
	for L2 / L3 / L4
RADIUS authentication & accounting	
TACACS+ authentication & accounting, TACACS+ 3.0	
HTTPS, HTTP	
SSL / SSH v2	
User Name Password Authentication	Local Authentication
	Remote Authentication (via RADIUS / TACACS+)
Management Interface Access Filtering	Web, Telnet / SSH
Management Features	
CLI	
Web Based Management	
Telnet	Server
SNMP	V1, V2c, V3
SW & Configuration Upgrade	TFTP, HTTP
	Redundant firmware in case of upgrade failure
RMON	RMON I (1, 2, 3, 9 group), RMON II
MIB II	RFC 1213
DHCP	Client
	Relay
	Snooping
	Snooping option 82
	Relay option 82
IP Source Guard	
Port Mirroring	
Event Syslog	Syslog server (RFC3164) (Support 1 server)
Warning Message	System syslog, e-mail, alarm relay
DNS	Client, Proxy
NTP /SNTP	
LLDP (IEEE 802.1ab)	Link Layer Discovery Protocol
	LLDP-MED
IPv6 Features	
IPv6 Management	Telnet Server/ICMP v6
Stateless Auto-Configuration	
SNMP over IPv6	
HTTP over IPv6	
SSH over IPv6	
IPv6 Telnet Support	
IPv6 NTP / SNTP Support	
IPv6 TFTP Support	
IPv6 QoS	
IPv6 ACL	Number of rules: up to 256 entries
	L2 / L3 / L4
Others Features	
Green Ethernet	Supports IEEE802.3az EEE (Energy Efficient Ethernet) Management to optimize the power consumption
	Determine the cable length and lowering the power for ports with short cables
	Lower the power for a port when there is no link
	LED Power Management : Adjustment LEDs intensity
Cable Diagnostic	Measuring cable OK or broken point distance

Application

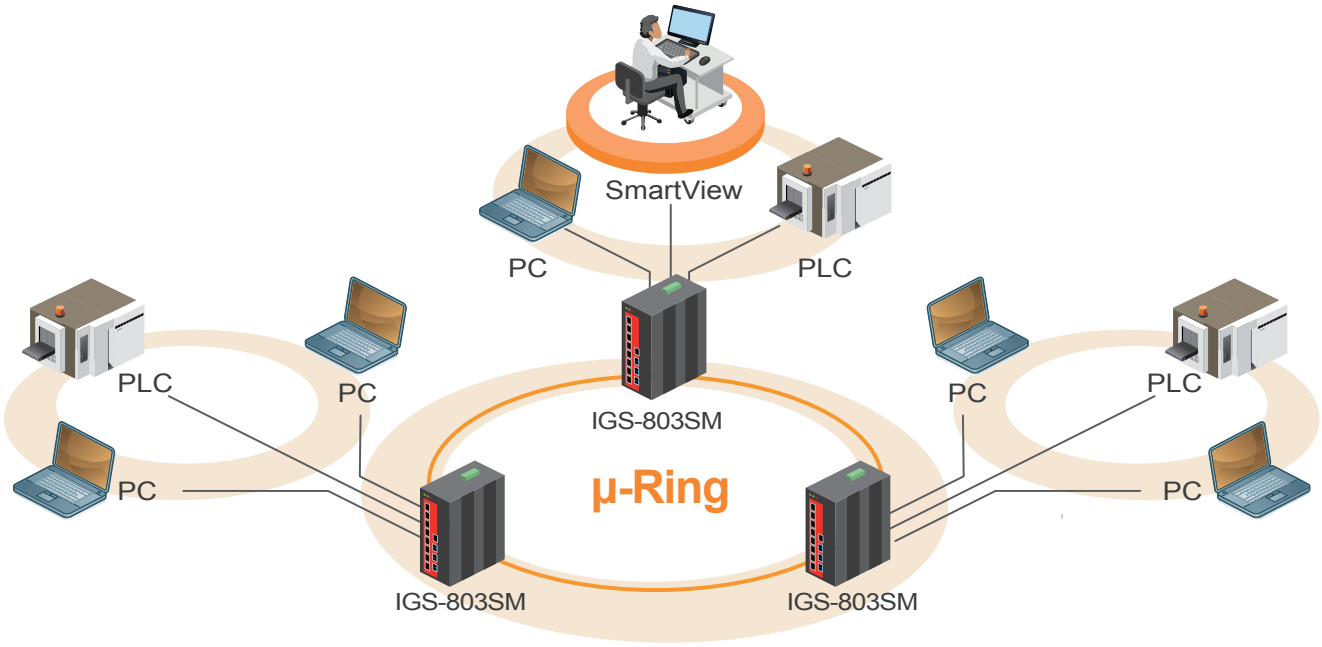
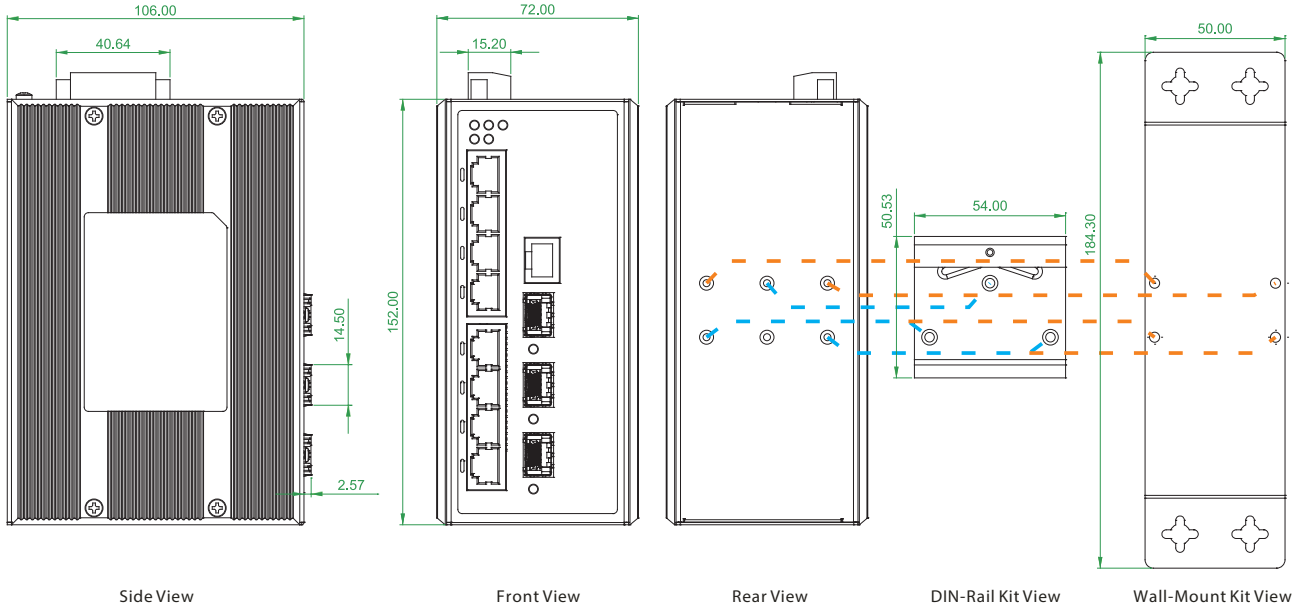


Figure : Topology

Dimensions



Side View | Front View | Rear View | DIN-Rail Kit View | Wall-Mount Kit View

Ordering Information

Model Name	Description
IGS-803SM	8x 10/100/1000Base-T + 3x 100/1000Base-X SFP Slot Managed Switch (-10~60°C)
IGS-803SM-E	8x 10/100/1000Base-T + 3x 100/1000Base-X SFP Slot Managed Switch (-40~75°C)

Accessories

DR-4524	Industrial Power, Input 85 ~ 264VAC, Output 24VDC, 48W, -10 ~ +50°C
MDR-40-24	Industrial Power, Input 85 ~ 264VAC, Output 24VDC, 40W, -20 ~ +70°C
SFP Transceiver	Compatible, Reliable, 5-year Warranty

ISFP – M 7 040 – 31 – E

- ISFP: Industrial SFP Transceiver
- M: Multi Mode; S: Single Mode; T: Copper
- 7: GbE; 5: FE
- 040: Distance (002(2km), 020(20km), 040(40km)...)
- 31: Wavelength
- E: -40~85°C; Blank: 0~70°C

Temperature

IGS-803SM – ☐

Example: IGS-803SM – E

NEW

IGS-404SM

4x 10/100/1000Base-T+ 4x 100/1000Base-X SFP Slot Ethernet Managed Switch

IGS-404SM models are managed industrial grade Gigabit switches with 4 x 10/100/1000Base-T(X) ports and 4 SFP Gigabit/Fast Ethernet ports that provide stable and reliable Ethernet transmission. The Ethernet switches support a variety of management functions, including STP/RSTP/MSTP and ITU-T G.8032 Ring <50ms recovery time, layer 2 Ethernet IGMP, VLAN, QoS ,Security ,IPV6, bandwidth control, port mirroring, cable diagnostic and Green Ethernet. Housed in rugged DIN rail or wall mountable enclosures, these switches are designed for harsh environments, such as industrial networking, security automation applications, intelligent transportation systems (ITS) and are also suitable for many military and utility market applications where environmental conditions exceed commercial product specifications. Standard operating temperature range models (-10 to 60°C) and wide operating temperature range models (-40 to 75°C) fulfill the special needs of industrial automation applications.

Features

- 4x 10/100/1000Base-T RJ-45 with 4x 100/1000Base-X SFP Fiber
- UL60950-1, CE, FCC, Rail Traffic EN50121-4 certified
- Industrial Grade EMS, EMI, EN61000-6-2, EN61000-6-4 certified
- Cable diagnostic, measuring cable OK or broken point distance
- Supports IEEE802.3az EEE (Energy Efficient Ethernet) Management to optimize the power consumption
- STP, RSTP, MSTP, ITU-T G.8032 Ethernet Protection Ring(EPR) for cabling redundant
- µ-Ring for Redundant Ethernet Ring, recovery time<20ms in 250 units
- QoS, Traffic classification QoS, CoS, bandwidth control for Ingress and Egress, Storm Control, DiffServ
- IEEE802.1Q VLAN, port based VLAN, MAC based VLAN, IP subnet based VLAN, Protocol based VLAN, VLAN translation, MVR
- Dynamic IEEE 802.3ad LACP Link Aggregation, Static Link Aggregation
- IGMP/MLD snooping V1/V2/V3, IGMP Filtering / Throttling, IGMP query, IGMP proxy reporting, MLD snooping
- Security : Port based and MAC based IEEE802.1X, RADIUS, ACL, TACACS+, HTTP/HTTPS, SSL/SSH v2
- Software upgrade via TFTP and HTTP, redundant firmware in case of upgrade failure
- DHCP client/Relay/Snooping/Snooping option 82/Relay option 82
- RMON, MIB II, Port mirroring, Event syslog, DNS, NTP/SNTP, IEEE802.1ab LLDP
- Supports IPv6 Telnet server /ICMP v6, SNMP, HTTP, SSH/SSL, NTP/SNTP, TFTP, QoS, ACL
- CLI, Web based management, **SNMP** v1/v2c/v3, Telnet server for management
- **SmartView** Management System

Specifications

Standard	IEEE 802.3	10Base-T 10Mbit/s Ethernet
	IEEE 802.3u	100Base-TX, 100Base-FX, Fast Ethernet
	IEEE 802.3ab	1000Base-T Gbit/s Ethernet over twisted pair
	IEEE 802.3z	1000Base-X Gbit/s Ethernet over Fiber-Optic
	IEEE 802.1d	STP (Spanning Tree Protocol)
	IEEE 802.1w	RSTP (Rapid Spanning Tree Protocol)
	IEEE 802.1s	MSTP (Multiple Spanning Tree Protocol)
	ITU-T G.8032 / Y.1344	EPR (Ethernet Protection Ring)
	IEEE 802.1Q	Virtual LANs (VLAN)
	IEEE 802.1X	Port based Network Access Control, Authentication
	IEEE 802.3ad	Link aggregation for parallel links with LACP (Link Aggregation Control Protocol)
	IEEE 802.3x	Flow control for Full Duplex
	IEEE 802.1ad	Stacked VLANs, Q-in-Q
	IEEE 802.1p	LAN Layer 2 QoS/CoS Protocol for Traffic Prioritization
	IEEE 802.1ab	Link Layer Discovery Protocol (LLDP)
	IEEE 802.3az	EEE (Energy Efficient Ethernet)
VLAN ID	4096	
Switch Architecture	Back-plane (Switching Fabric): 16Gbps	
Data Processing	Store and Forward	
Flow Control	IEEE 802.3x for full duplex mode Back pressure for half duplex mode	
Jumbo Frame	9.6KB	
MAC Address Table	8K	

Network Connector	4x RJ-45 10/100/1000Base-T auto negotiation speed, Auto MDI/MDI-X function, Full/Half duplex 4x 100/1000Base-X dual speed mode SFP slot, with DDMI
Console	RS-232 (RJ-45)
Network Cable	UTP/STP above Cat. 5e cable EIA/TIA-568 100-ohm (100m)
Protocols	CSMA/CD
Reverse Polarity Protection	Present
Overload Current Protection	Present
CPU Watch Dog	Present
Power Supply	Redundant Dual DC12/24/48VDC (9.6~60VDC) Input power (Removable Terminal Block)
LED	Per unit: Power 1 (Green), Power 2 (Green), Fault (Amber), CPU Act (Green), Ring Master (Yellow) Per RJ-45 port: 10/100 Link/Active (Green) 1000 Link/Active (Amber) SFP Fiber Per port: Link/Active (Green)
Warning Message	System syslog, SMTP/ e-mail event message, alarm relay
Alarm Relay Contact	Relay outputs with current carrying capacity of 1 A @24VDC
Removable Terminal Block	Provide 2 redundant power, alarm relay contact, 6 Pin
Operating Temperature	-10 ~ 60°C (IGS-404SM) -40 ~ 75°C (IGS-404SM-E)
Operating Humidity	5% to 95% (Non-condensing)
Storage Temperature	-40 ~ 85°C
Housing	Rugged Metal, IP30 Protection
Dimensions	106 x 62.5 x 135 mm (D x W x H)
Installation Mounting	DIN Rail mounting or wall mounting

Specifications

EMC/EMS	CE, FCC
EMI	FCC Part 15 Subpart B Class A, CE EN 55022 Class A
	EN61000-6-4 – Emission for industrial environment
EMS	EN61000-6-2 – Immunity for Industrial environment
	EN61000-4-2 (ESD) Level 3, Criteria B
	EN61000-4-3 (RS) Level 3, Criteria A
	EN61000-4-4 (EFT) Level 3, Criteria A
	EN61000-4-5 (Surge) Level 3, Criteria B
	EN61000-4-6 (CS) Level 3, Criteria A
	EN61000-4-8 (Magnetic Field) Level 3, Criteria A

Safety	UL60950-1 (Pending)
Rail Traffic	EN 50121-4
Shock	IEC 60068-2-27
Freefall	IEC 60068-2-32
Vibration	IEC 60068-2-6
MTBF	TBD (Above 30 years)
Warranty	5 years

Software Specifications

Topology	
VLAN	IEEE 802.1q VLAN, up to 4095 ID
	IEEE 802.1q VLAN, up to 4095 Groups
	IEEE 802.1ad Q-in-Q
	Port Based VLAN
	MAC-based VLAN, up to 256 entries
	IP Subnet-based VLAN, up to 128 entries
	Protocol-based VLAN(Ethernt, SNAP, LLC), up to 128 entries
	VLAN Translation, up to 256 entries
	MVR (Multiple VLAN Registration)
Link Aggregation (Port Trunk)	Static (Hash with SA, DA, IP, TCP/UDP port), up to 5 trunk group
	Dynamic (IEEE 802.3ad LACP), up to 5 trunk group
Spanning Tree	IEEE802.1d STP
	IEEE802.1w RSTP
	IEEE802.1s MSTP
Loop Protection	Present
µ-Ring	Easy set for Ethernet protection Ring, Recovery Time <20ms, Maximum 250 Node
ITU-T G.8032 / Y.1344 ERPS (Ethernet Ring Protection)	Convergence time <50ms
	Single Ring, Sub-Ring, Multiple ring topology network
QoS Feature	
Class of Service	IEEE802.1p 8 active priorities queues for per port
Traffic Classification QoS	IEEE802.1p based CoS
	IP Precedence based CoS
	IP DSCP based CoS
	QCL(QoS Control List): MAC Access control list (Source/ Destination MAC, Ether type, Priority ID/ VLAN ID)
	QCL: IP extended access control list (Source/ Destination IP, Protocol, TCP/UDP port number)
Bandwidth Control for Ingress	Rate in steps : 100 kbps / 1fps / 100fps
	Range : 100 kbps to 1Gbps / 1fps to 3300kfps
	Rate Unit : bit or frame
Bandwidth Control for Egress	Rate in steps : 100 kbps / 1fps / 100fps
	Range : 100 kbps to 1Gbps / 1fps to 3300kfps
	Rate Unit : bit or frame
	Per queue shaper
DiffServ (RF 2474) Remarking	
Storm Control	for Unicast, Broadcast, Multicast
IP Multicasting Feature	
IGMP / MLD Snooping	IGMP Snooping v1, v2, v3 / MLD Snooping v1, v2
	Port Filtering Profile
	Throttling
	Fast Leave
	Query
Security Features	
IEEE 802.1X	Port-Based
	MAC-Based
ACL	Number of rules : up to 256 entries
	for L2 / L3 / L4
RADIUS authentication & accounting	
TACACS+ authentication & accounting, TACACS+ 3.0	
HTTPS, HTTP	
SSL / SSH v2	
User Name Password Authentication	Local Authentication
	Remote Authentication (via RADIUS / TACACS+)

Management Interface Access Filtering	Web, Telnet / SSH
Management Features	
CLI	
Web Based Management	
Telnet	Server
SNMP	V1, V2c, V3
SW & Configuration Upgrade	TFTP, HTTP
	Redundant firmware to avoid crashing in case of upgrading failure
RMON	RMON I (1, 2, 3, 9 group), RMON II
MIB II	RFC 1213
DHCP	Client
	Relay
	Snooping
	Snooping option 82
	Relay option 82
IP Source Guard	
Port Mirroring	
Event Syslog	Syslog server (RFC3164) (Support1 server)
Warning Message	System syslog, e-mail, alarm relay
DNS	Client, Proxy
NTP /SNTP	
LLDP (IEEE 802.1ab)	Link Layer Discovery Protocol
	LLDP-MED
IPv6 Features	
IPv6 Management	Telnet Server/ICMP v6
Stateless Auto-Configuration	
SNMP over IPv6	
HTTP over IPv6	
SSH over IPv6	
IPv6 Telnet Support	
IPv6 NTP / SNTP Support	
IPv6 TFTP Support	
IPv6 QoS	
IPv6 ACL	Number of rules: up to 256 entries
	L2 / L3 / L4
Others Features	
Green Ethernet	Supports IEEE802.3az EEE (Energy Efficient Ethernet) Management to optimize the power consumption
	Determine the cable length and lowering the power for ports with short cables
	Lower the power for a port when there is no link
	LED Power Management :Adjustment LEDs intensity
Cable Diagnostic	Measuring cable OK or broken point distance

Application

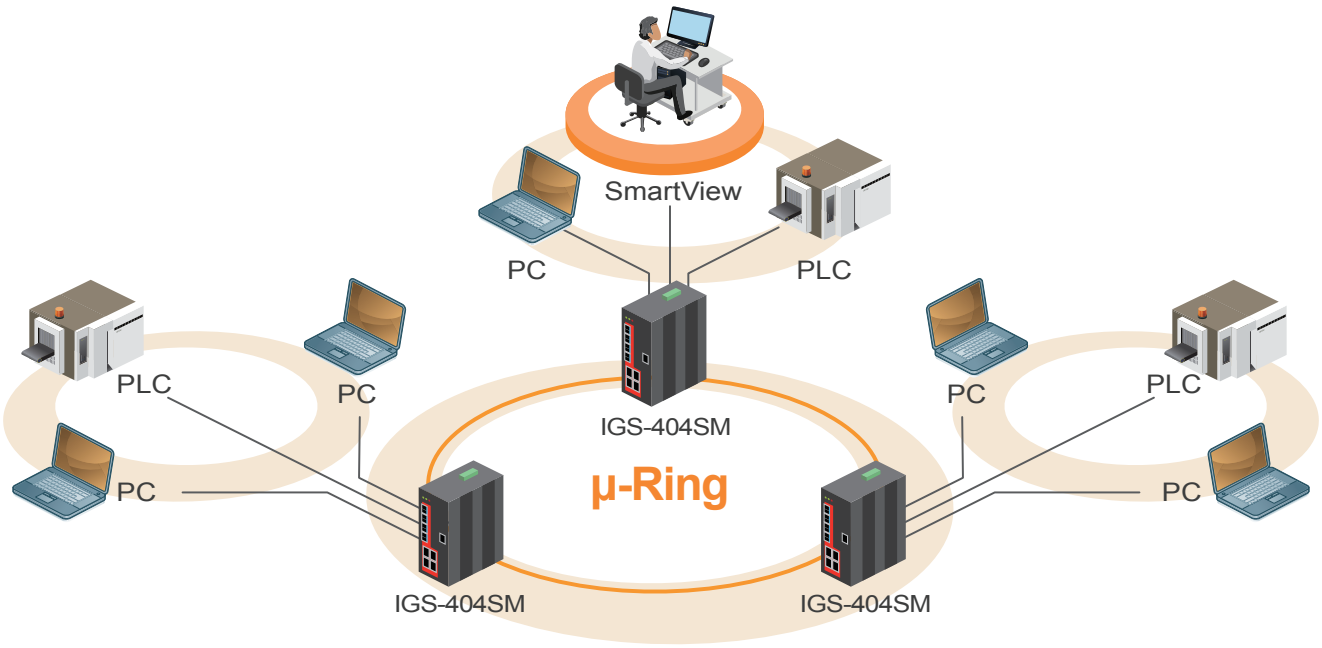
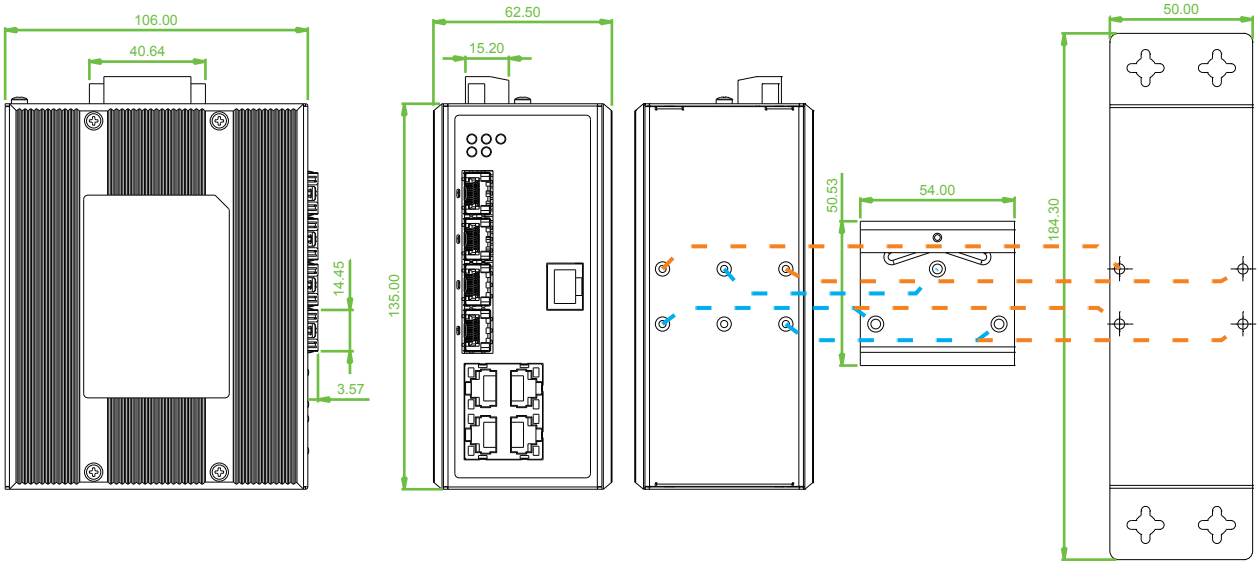


Figure : Topology

Dimensions



Side View | Front View | Rear View | DIN-Rail Kit View | Wall-Mount Kit View

Ordering Information

Model Name	Description
IGS-404SM	4x 10/100/1000Base-T + 4x 100/1000Base-X SFP Slot Managed Switch (-10~60°C)
IGS-404SM-E	4x 10/100/1000Base-T + 4x 100/1000Base-X SFP Slot Managed Switch (-40~75°C)

Accessories

DR-4524	Industrial Power, Input 85 ~ 264VAC, Output 24VDC, 48W, -10 ~ +50°C
MDR-40-24	Industrial Power, Input 85 ~ 264VAC, Output 24VDC, 40W, -20 ~ +70°C
SFP Transceiver	Compatible, Reliable, 5-year Warranty

Temperature

IGS-404SM – ☐

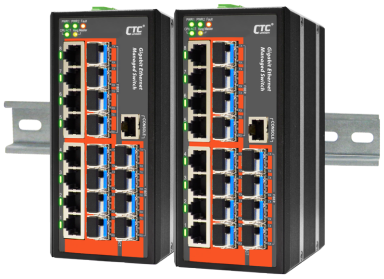
Example: IGS-404SM – E

ISFP – M 7 040 – 3 1 – E

- **ISFP**: Industrial SFP Transceiver
- **M**: Multi Mode; **S**: Single Mode; **T**: Copper
- **7**: GbE; **5**: FE
- **040**: Distance 002(2km), 020(20km), 040(40km)...
- **31**: Wavelength
- **E**: -40~85°C; **Blank**: 0~70°C

IGS-812SM

8x 10/100/1000Base-T+ 12x 100/1000Base-X SFP Slot Ethernet Managed Switch



NEW

IGS-812SM models are managed industrial grade Gigabit switches with 8x 10/100/1000Base-TX ports and 12 SFP Gigabit/Fast Ethernet fiber ports that provide stable and reliable Ethernet transmission. The Ethernet switches support a variety of management functions, including STP/RSTP/MSTP and ITU-T G.8032 Ring <50ms recovery time, layer 2 Ethernet IGMP, VLAN, QoS ,Security ,IPV6, bandwidth control, port mirroring, cable diagnostic and Green Ethernet. Housed in rugged DIN rail or wall mountable enclosures, these switches are designed for harsh environments, such as industrial networking, security automation applications, intelligent transportation systems (ITS) and are also suitable for many military and utility market applications where environmental conditions exceed commercial product specifications. Standard operating temperature range models (-10 to 60°C) and wide operating temperature range models (-40 to 75°C) fulfill the special needs of industrial automation applications.

Features

- 8x 10/100/1000Base-T RJ-45 with 12x 100/1000Base-X SFP Fiber
- UL60950-1, CE, FCC, Rail Traffic EN50121-4 certified
- Industrial Grade EMS, EMI, EN61000-6-2, EN61000-6-4 certified
- Cable diagnostic, Measuring cable OK or broken point distance
- Support IEEE802.3az EEE (Energy Efficient Ethernet) Management to optimize the power consumption
- STP, RSTP, MSTP, ITU-T G.8032 Ethernet Protection Ring (EPR) for cabling redundant
- µ-Ring for Redundant Ethernet Ring, recovery time<20ms in 250 units
- QoS, Traffic classification QoS, CoS, bandwidth control for Ingress and Egress, Storm Control, DiffServ
- IEEE802.1Q VLAN, port based VLAN, MAC based VLAN, IP subnet based VLAN, Protocol based VLAN, VLAN translation, MVR
- Dynamic IEEE 802.3ad LACP Link Aggregation, Static Link Aggregation
- IGMP/MLD snooping V1/V2/V3, IGMP Filtering / Throttling, IGMP query, IGMP proxy reporting, MLD snooping
- Security : Port based and MAC based IEEE802.1X, RADIUS, ACL, TACACS+, HTTP/HTTPS, SSL/SSH v2
- Software upgrade via TFTP and HTTP, redundant firmware to avoid in case of upgradeing failure
- DHCP client/Relay/Snooping/Snooping option 82/Relay option 82
- RMON, MIB II, Port mirroring, Event syslog, DNS, NTP/SNTP, IEEE802.1ab LLDP
- Supports IPv6 Telnet server /ICMP v6, SNMP, HTTP, SSH/SSL, NTP/SNTP, TFTP, QoS, ACL
- CLI, Web based management, **SNMP** v1/v2c/v3, Telnet server for management
- **SmartView** Management System

Specifications

Standard	IEEE 802.3	10Base-T 10Mbit/s Ethernet
	IEEE 802.3u	100Base-TX, 100Base-FX, Fast Ethernet
	IEEE 802.3ab	1000Base-T Gbit/s Ethernet over twisted pair
	IEEE 802.3z	1000Base-X Gbit/s Ethernet over Fiber-Optic
	IEEE 802.1d	STP (Spanning Tree Protocol)
	IEEE 802.1w	RSTP (Rapid Spanning Tree Protocol)
	IEEE 802.1s	MSTP (Multiple Spanning Tree Protocol)
	ITU-T G.8032 / Y.1344	EPR (Ethernet Protection Ring)
	IEEE 802.1Q	Virtual LANs (VLAN)
	IEEE 802.1X	Port based Network Access Control, Authentication
	IEEE 802.3ad	Link aggregation for parallel links with LACP (Link Aggregation Control Protocol)
	IEEE 802.3x	Flow control for Full Duplex
	IEEE 802.1ad	Stacked VLANs, Q-in-Q
	IEEE 802.1p	LAN Layer 2 QoS/CoS Protocol for Traffic Prioritization
	IEEE 802.1ab	Link Layer Discovery Protocol (LLDP)
	IEEE 802.3az	EEE (Energy Efficient Ethernet)
VLAN ID	4096	
Switch Architecture	Back-plane (Switching Fabric): 40Gbps	
Data Processing	Store and Forward	
Flow Control	IEEE 802.3x for full duplex mode Back pressure for half duplex mode	
Jumbo Frame	9.6KB	
MAC Address Table	8K	

Network Connector	8x RJ-45 10/100/1000Base-T auto negotiation speed, Auto MDI/MDI-X function, Full/Half duplex 12x 100/1000Base-X dual speed mode SFP slot, with DDMI
Console	RS-232 (RJ-45)
Network Cable	UTP/STP above Cat. 5e cable EIA/TIA-568 100-ohm (100m)
Protocol	CSMA/CD
Reverse Polarity Protection	Present
Overload Current Protection	Present
CPU Watch Dog	Present
Power Supply	Redundant Dual DC12/24/48VDC (9.6~60VDC) Input power (Removable Terminal Block)
LED	Per unit: Power 1 (Green), Power 2 (Green), Fault (Amber), CPU Act (Green), Ring Master (Yellow) Per RJ-45 port: 10/100 Link/Active (Green) 1000 Link/Active (Amber) SFP Fiber Per port: Link/Active (Green)
Warning Message	System syslog, SMTP/e-mail event message, alarm relay
Alarm Relay Contact	Relay outputs with current carrying capacity of 1 A @24VDC
Removable Terminal Block	Provide 2 redundant power, alarm relay contact, 6 Pin
Operating Temperature	-10 ~ 60°C (IGS-812SM) -40 ~ 75°C (IGS-812SM-E)
Operating Humidity	5% to 95% (Non-condensing)
Storage Temperature	-40 ~ 85°C
Housing	Rugged Metal, IP30 Protection
Dimensions	106 x 72 x152 mm (D x W x H)
Installation Mounting	DIN Rail mounting or wall mounting

Specifications

EMC/EMS	CE, FCC
EMI	FCC Part 15 Subpart B Class A, CE EN 55022 Class A
	EN61000-6-4 – Emission for industrial environment
EMS	EN61000-6-2 – Immunity for Industrial environment
	EN61000-4-2 (ESD) Level 3, Criteria B
	EN61000-4-3 (RS) Level 3, Criteria A
	EN61000-4-4 (EFT) Level 3, Criteria A
	EN61000-4-5 (Surge) Level 3, Criteria B
	EN61000-4-6 (CS) Level 3, Criteria A
	EN61000-4-8 (Magnetic Field) Level 3, Criteria A

Safety	UL60950-1 (Pending)
Rail Traffic	EN 50121-4
Shock	IEC 60068-2-27
Freefall	IEC 60068-2-32
Vibration	IEC 60068-2-6
MTBF	TBD (Above 30 years)
Warranty	5 years

Software Specifications

Topology	
VLAN	IEEE 802.1q VLAN,up to 4095 ID
	IEEE 802.1q VLAN,up to 4095 Groups
	IEEE 802.1ad Q-in-Q
	Port Based VLAN
	MAC-based VLAN,up to 256 entries
	IP Subnet-based VLAN, up to 128 entries
	Protocol-based VLAN (Ethernt, SNAP, LLC), up to 128 entries
	VLAN Translation, up to 256 entries
	MVR (Multiple VLAN Registration)
Link Aggregation (Port Trunk)	Static (Hash with SA, DA, IP, TCP/UDP port), up to 5 trunk group
	Dynamic (IEEE 802.3ad LACP), up to 5 trunk group
Spanning Tree	IEEE802.1d STP
	IEEE802.1w RSTP
	IEEE802.1s MSTP
Loop Protection	Present
μ-Ring	Easy set for Ethernet protection Ring, Recovery Time <20ms, Maximum 250 Node
ITU-T G.8032 / Y.1344 ERPS (Ethernet Ring Protection)	Convergence time <50ms
	Single Ring, Sub-Ring, Multiple ring topology network
QoS Feature	
Class of Service	IEEE802.1p 8 active priorities queues for per port
Traffic Classification QoS	IEEE802.1p based CoS
	IP Precedence based CoS
	IP DSCP based CoS
	QCL(QoS Control List) : MAC Access control list (Source/ Destination MAC, Ether type, Priority ID/ VLAN ID)
	QCL : IP extended access control list (Source/ Destination IP, Protocol, TCP/UDP port number)
Bandwidth Control for Ingress	Rate in steps : 100 kbps / 1fps / 100fps
	Range : 100 kbps to 1Gbps / 1fps to 3300kfps
	Rate Unit : bit or frame
Bandwidth Control for Egress	Rate in steps : 100 kbps / 1fps / 100fps
	Range : 100 kbps to 1Gbps / 1fps to 3300kfps
	Rate Unit : bit or frame
	Per queue shaper
DiffServ (RF 2474) Remarking	
Storm Control	for Unicast, Broadcast, Multicast
IP Multicasting Feature	
IGMP / MLD Snooping	IGMP Snooping v1, v2, v3 / MLD Snooping v1, v2
	Port Filtering Profile
	Throttling
	Fast Leave
	Query
Security Features	
IEEE 802.1X	Port-Based
	MAC-Based
ACL	Number of rules : up to 256 entries
	for L2 / L3 / L4
RADIUS authentication & accounting	
TACACS+ authentication & accounting, TACACS+ 3.0	
HTTPS, HTTP	
SSL / SSH v2	
User Name Password Authentication	Local Authentication
	Remote Authentication (via RADIUS / TACACS+)

Management Interface Access Filtering	Web, Telnet / SSH
Management Features	
CLI	
Web Based Management	
Telnet	Server
SNMP	V1, V2c, V3
SW & Configuration Upgrade	TFTP, HTTP
	Redundant firmware in case of upgrade failure
RMON	RMON I (1, 2, 3, 9 group), RMON II
MIB II	RFC 1213
DHCP	Client
	Relay
	Snooping
	Snooping option 82
	Relay option 82
IP Source Guard	
Port Mirroring	
Event Syslog	Syslog server (RFC3164) (Support 1 server)
Warning Message	System syslog, e-mail, alarm relay
DNS	Client, Proxy
NTP /SNTP	
LLDP (IEEE 802.1ab)	Link Layer Discovery Protocol
	LLDP-MED
IPv6 Features	
IPv6 Management	Telnet Server/ICMP v6
Stateless Auto-Configuration	
SNMP over IPv6	
HTTP over IPv6	
SSH over IPv6	
IPv6 Telnet Support	
IPv6 NTP / SNTP Support	
IPv6 TFTP Support	
IPv6 QoS	
IPv6 ACL	Number of rules: up to 256 entries
	L2 / L3 / L4
Others Features	
Green Ethernet	Supports IEEE802.3az EEE (Energy Efficient Ethernet) Management to optimize the power consumption
	Determine the cable length and lowering the power for ports with short cables
	Lower the power for a port when there is no link
	LED Power Management : Adjustment LEDs intensity
Cable Diagnostic	Measuring cable OK or broken point distance

Application

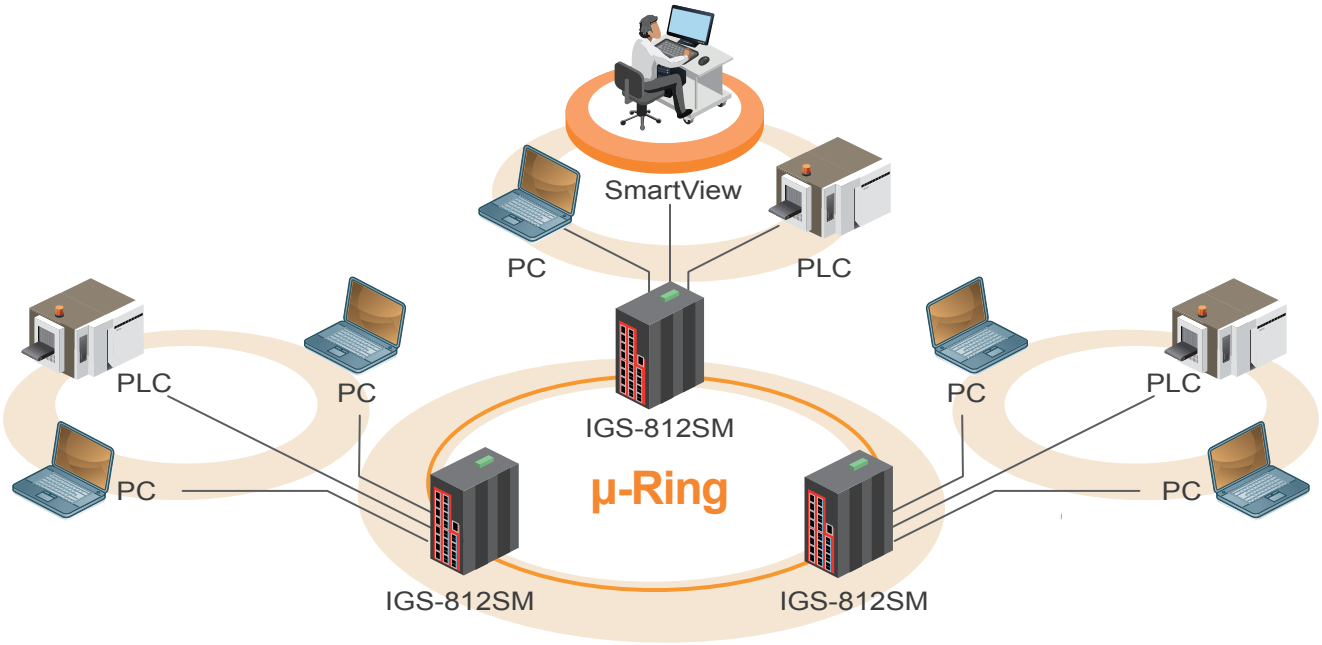
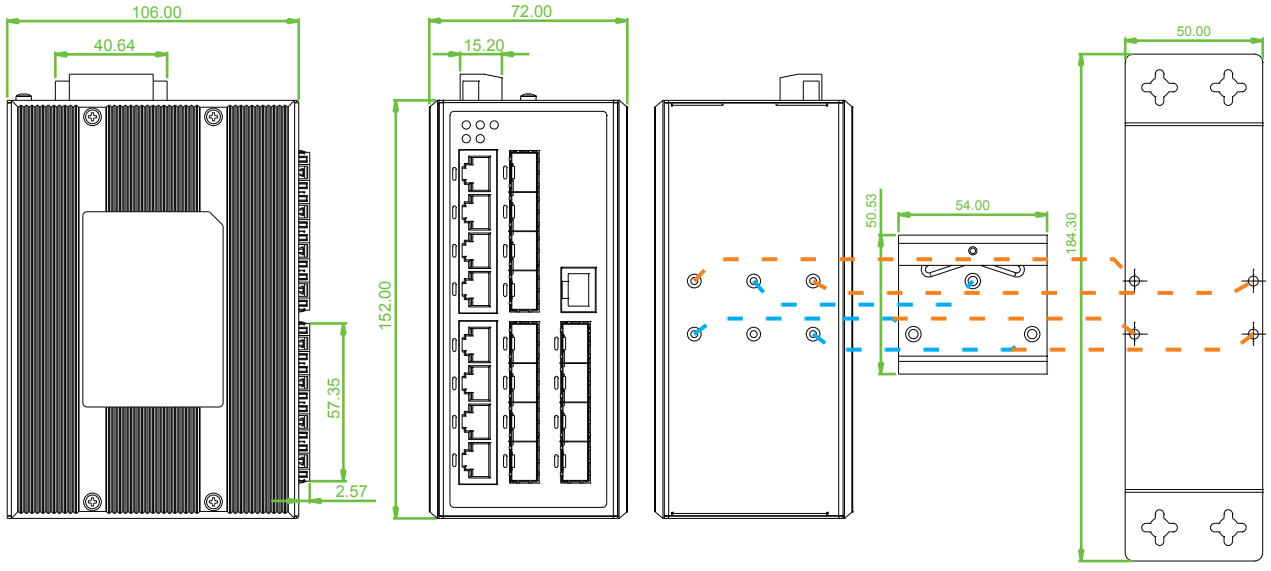


Figure : Topology

Dimensions



Side View | Front View | Rear View | DIN-Rail Kit View | Wall-Mount Kit View

Ordering Information

Model Name	Description
IGS-812SM	8x 10/100/1000Base-T + 12x 100/1000Base-X SFP Slot Managed Switch (-10~60°C)
IGS-812SM-E	8x 10/100/1000Base-T + 12x 100/1000Base-X SFP Slot Managed Switch (-40~75°C)

Accessories

DR-4524	Industrial Power, Input 85 ~ 264VAC, Output 24VDC, 48W, -10 ~ +50°C
MDR-40-24	Industrial Power, Input 85 ~ 264VAC, Output 24VDC, 40W, -20 ~ +70°C
SFP Transceiver	Compatible, Reliable, 5-year Warranty

Temperature

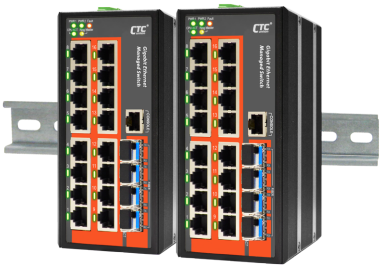
IGS-812SM – ☐

Example: IGS-812SM – E

ISFP – M 7 040 – 31 – E

- ISFP: Industrial SFP Transceiver
- M: Multi Mode; S: Single Mode; T: Copper
- 7: GbE; 5: FE
- 040: Distance 002(2km), 020(20km), 040(40km)...
- 31: Wavelength
- E: -40~85°C; Blank: 0~70°C

NEW



IGS-1604SM

16x 10/100/1000Base-T+ 4x 100/1000Base-X SFP Slot Ethernet Managed Switch

IGS-1604SM models are managed industrial grade Gigabit switches with 16x 10/100/1000Base-T ports and 4 SFP Gigabit/Fast Ethernet ports that provide stable and reliable Ethernet transmission. The Ethernet switches support a variety of management functions, including STP/RSTP/MSTP and ITU-T G.8032 Ring <50ms recovery time, layer 2 Ethernet IGMP, VLAN, QoS ,Security ,IPV6, bandwidth control, port mirroring, cable diagnostic and Green Ethernet. Housed in rugged DIN rail or wall mountable enclosures, these switches are designed for harsh environments, such as industrial networking, security automation applications, intelligent transportation systems (ITS) and are also suitable for many military and utility market applications where environmental conditions exceed commercial product specifications. Standard operating temperature range models (-10 to 60°C) and wide operating temperature range models (-40 to 75°C) fulfill the special needs of industrial automation applications.

Features

- 16x 10/100/1000Base-T RJ-45 with 4x 100/1000Base-X SFP Fiber
- UL60950-1, CE, FCC, Rail Traffic EN50121-4 Certified
- Industrial Grade EMS, EMI, EN61000-6-2, EN61000-6-4 Certified
- Cable diagnostic, Measuring cable OK or broken point distance
- Supports IEEE802.3az EEE (Energy Efficient Ethernet) Management to optimize the power consumption
- STP, RSTP, MSTP, ITU-T G.8032 Ethernet Protection Ring(EPR) for cabling redundant
- μ-Ring for Redundant Ethernet Ring, recovery time<20ms in 250 units
- QoS, Traffic classification QoS, CoS, bandwidth control for Ingress and Egress, Storm Control, DiffServ
- IEEE802.1Q VLAN, port based VLAN, MAC based VLAN, IP subnet based VLAN, Protocol based VLAN, VLAN translation, MVR
- Dynamic IEEE 802.3ad LACP Link Aggregation, Static Link Aggregation
- IGMP/MLD snooping V1/V2/V3, IGMP Filtering / Throttling, IGMP query, IGMP proxy reporting, MLD snooping
- Security : Port based and MAC based IEEE802.1X, RADIUS, ACL, TACACS+, HTTP/HTTPS, SSL/SSH v2
- Software upgrade via TFTP and HTTP, redundant firmware in case of upgrade failure
- DHCP client/Relay/Snooping/Snooping option 82/Relay option 82
- RMON, MIB II, Port mirroring, Event syslog, DNS, NTP/SNTP, IEEE802.1ab LLDP
- Supports IPv6 Telnet server /ICMP v6, SNMP, HTTP, SSH/SSL, NTP/SNTP, TFTP, QoS, ACL
- CLI, Web based management, **SNMP** v1/v2c/v3, Telnet server for management
- **SmartView** Management System

Specifications

Standard	IEEE 802.3	10Base-T 10Mbit/s Ethernet
	IEEE 802.3u	100Base-TX, 100Base-FX, Fast Ethernet
	IEEE 802.3ab	1000Base-T Gbit/s Ethernet over twisted pair
	IEEE 802.3z	1000Base-X Gbit/s Ethernet over Fiber-Optic
	IEEE 802.1d	STP (Spanning Tree Protocol)
	IEEE 802.1w	RSTP (Rapid Spanning Tree Protocol)
	IEEE 802.1s	MSTP (Multiple Spanning Tree Protocol)
	ITU-T G.8032 / Y.1344	EPR (Ethernet Protection Ring)
	IEEE 802.1Q	Virtual LANs (VLAN)
	IEEE 802.1X	Port based Network Access Control, Authentication
	IEEE 802.3ad	Link aggregation for parallel links with LACP (Link Aggregation Control Protocol)
	IEEE 802.3x	Flow control for Full Duplex
	IEEE 802.1ad	Stacked VLANs, Q-in-Q
	IEEE 802.1p	LAN Layer 2 QoS/CoS Protocol for Traffic Prioritization
	IEEE 802.1ab	Link Layer Discovery Protocol (LLDP)
	IEEE 802.3az	EEE (Energy Efficient Ethernet)
VLAN ID	4096	
Switch Architecture	Back-plane (Switching Fabric):40Gbps	
Data Processing	Store and Forward	
Flow Control	IEEE 802.3x for full duplex mode Back pressure for half duplex mode	
Jumbo Frame	9.6KB	
MAC Address Table	8K	

Network Connector	16x RJ-45 10/100/1000Base-T auto negotiation speed, Auto MDI/MDI-X function, Full/Half duplex 4X 100/1000Base-X dual speed mode SFP slot, with DDMI
Console	RS-232 (RJ-45)
Network Cable	UTP/STP above Cat. 5e cable EIA/TIA-568 100-ohm (100m)
Protocols	CSMA/CD
Reverse Polarity Protection	Present
Overload Current Protection	Present
CPU Watch Dog	Present
Power Supply	Redundant Dual DC12/24/48VDC (9.6~60VDC) Input power (Removable Terminal Block)
LED	Per unit: Power 1 (Green), Power 2 (Green), Fault (Amber), CPU Act (Green), Ring Master (Yellow) Per RJ-45 port: 10/100 Link/Active (Green) 1000 Link/Active (Amber) SFP Fiber Per port: Link/Active (Green)
Warning Message	System Syslog, SMTP/ e-Mail event message, alarm relay
Alarm Relay Contact	Relay outputs with current carrying capacity of 1 A @24VDC
Removable Terminal Block	Provide 2 redundant power, alarm relay contact, 6 Pin
Operating Temperature	-10 ~ 60°C (IGS-1604SM) -40 ~ 75°C (IGS-1604SM-E)
Operating Humidity	5% to 95% (Non-condensing)
Storage Temperature	-40 ~ 85°C
Housing	Rugged Metal, IP30 Protection
Dimensions	106 x 72 x 152mm (D x W x H)
Installation Mounting	DIN Rail mounting or wall mounting

Specifications

EMC/EMS	CE, FCC
EMI	FCC Part 15 Subpart B Class A, CE EN 55022 Class A
	EN61000-6-4 – Emission for industrial environment
EMS	EN61000-6-2 – Immunity for Industrial environment
	EN61000-4-2 (ESD) Level 3, Criteria B
	EN61000-4-3 (RS) Level 3, Criteria A
	EN61000-4-4 (EFT) Level 3, Criteria A
	EN61000-4-5 (Surge) Level 3, Criteria B
	EN61000-4-6 (CS) Level 3, Criteria A
	EN61000-4-8 (Magnetic Field) Level 3, Criteria A

Safety	UL60950-1 (Pending)
Rail Traffic	EN 50121-4
Shock	IEC 60068-2-27
Freefall	IEC 60068-2-32
Vibration	IEC 60068-2-6
MTBF	TBD (Above 30 years)
Warranty	5 years

Software Specifications

Topology	
VLAN	IEEE 802.1q VLAN,up to 4095 ID
	IEEE 802.1q VLAN,up to 4095 Groups
	IEEE 802.1ad Q-in-Q
	Port Based VLAN
	MAC-based VLAN, up to 256 entries
	IP Subnet-based VLAN, up to 128 entries
	Protocol-based VLAN (Ethernt, SNAP, LLC), up to 128 entries
	VLAN Translation, up to 256 entries
	MVR (Multiple VLAN Registration)
Link Aggregation (Port Trunk)	Static (Hash with SA, DA, IP, TCP/UDP port), up to 5 trunk group
	Dynamic (IEEE 802.3ad LACP), up to 5 trunk group
Spanning Tree	IEEE802.1d STP
	IEEE802.1w RSTP
	IEEE802.1s MSTP
Loop Protection	Present
µ-Ring	Easy set for Ethernet protection Ring, Recovery Time <20ms, Maximum 250 Node
ITU-T G.8032 / Y.1344 ERPS (Ethernet Ring Protection)	Convergence time <50ms
	Single Ring, Sub-Ring, Multiple ring topology network
QoS Feature	
Class of Service	IEEE802.1p 8 active priorities queues for per port
Traffic Classification QoS	IEEE802.1p based CoS
	IP Precedence based CoS
	IP DSCP based CoS
	QCL(QoS Control List): MAC Access control list (Source/ Destination MAC, Ether type, Priority ID/ VLAN ID)
	QCL: IP extended access control list (Source/ Destination IP, Protocol, TCP/UDP port number)
Bandwidth Control for Ingress	Rate in steps : 100 kbps / 1fps / 100fps
	Range : 100 kbps to 1Gbps / 1fps to 3300kfps
	Rate Unit : bit or frame
Bandwidth Control for Egress	Rate in steps : 100 kbps / 1fps / 100fps
	Range : 100 kbps to 1Gbps / 1fps to 3300kfps
	Rate Unit : bit or frame
	Per queue shaper
DiffServ (RF 2474) Remarking	
Storm Control	for Unicast, Broadcast, Multicast
IP Multicasting Feature	
IGMP / MLD snooping	IGMP Snooping v1, v2, v3 / MLD Snooping v1, v2
	Port Filtering Profile
	Throttling
	Fast Leave
	Query

Security Features	
IEEE 802.1X	Port-Based
	MAC-Based
ACL	Number of rules : up to 256 entries
	for L2 / L3 / L4
RADIUS authentication & accounting	
TACACS+ authentication & accounting, TACACS+ 3.0	
HTTPS, HTTP	
SSL / SSH v2	
User name password authentication	Local Authentication
	Remote Authentication (via RADIUS / TACACS+)
Management Interface Access Filtering	Web, Telnet / SSH
Management Features	
CLI	
Web Based Management	
Telnet	Server
SNMP	V1, V2c, V3
SW & Configuration Upgrade	TFTP, HTTP
	Redundant firmware in case of upgrade failure
RMON	RMON I (1, 2, 3, 9 group), RMON II
MIB II	RFC 1213
DHCP	Client
	Relay
	Snooping
	Snooping option 82
	Relay option 82
IP Source Guard	
Port Mirroring	
Event Syslog	Syslog server (RFC3164) (Support 1 server)
Warning Message	System syslog, e-mail, alarm relay
DNS	Client, Proxy
NTP /SNTP	
LLDP (IEEE 802.1ab)	Link Layer Discovery Protocol
	LLDP-MED
IPv6 Features	
IPv6 Management	Telnet Server/ICMP v6
Stateless Auto-Configuration	
SNMP over IPv6	
HTTP over IPv6	
SSH over IPv6	
IPv6 Telnet Support	
IPv6 NTP / SNTP Support	
IPv6 TFTP Support	
IPv6 QoS	
IPv6 ACL	Number of rules: up to 256 entries
	L2 / L3 / L4
Others Features	
Green Ethernet	Supports IEEE802.3az EEE (Energy Efficient Ethernet) Management to optimize the power consumption
	Determine the cable length and lowering the power for ports with short cables
	Lower the power for a port when there is no link
	LED Power Management : Adjustment LEDs intensity
Cable Diagnostic	Measuring cable OK or broken point distance

Application

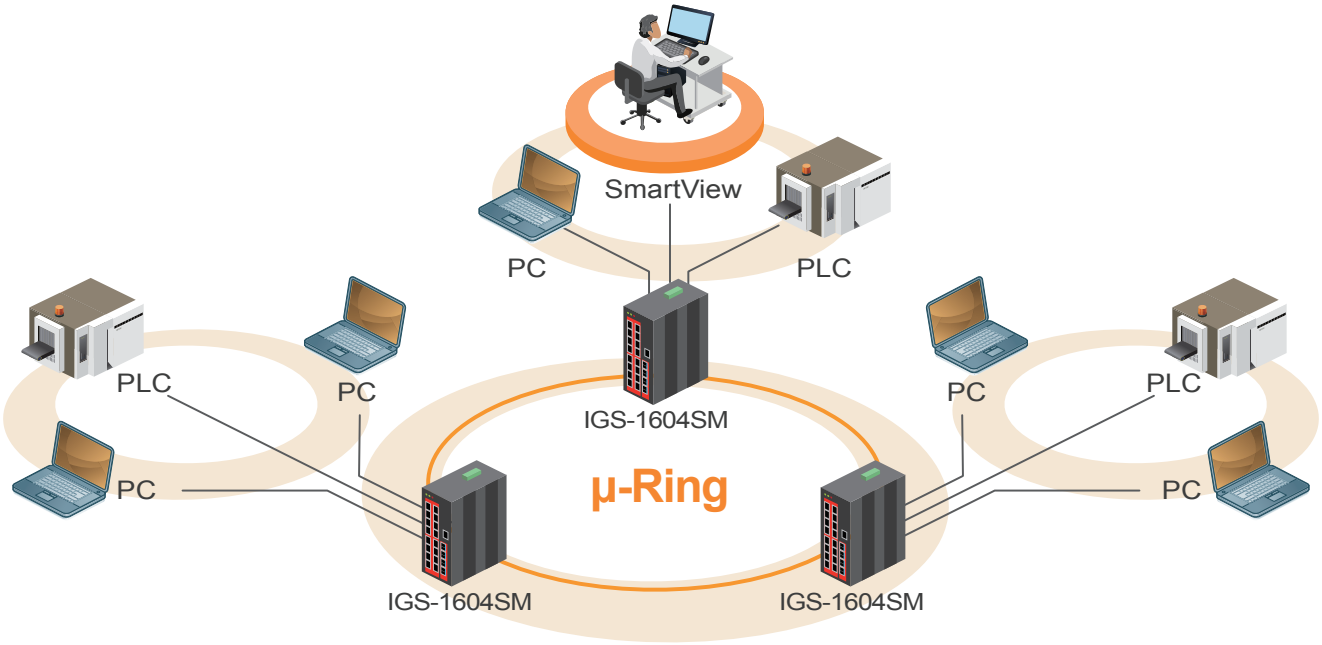
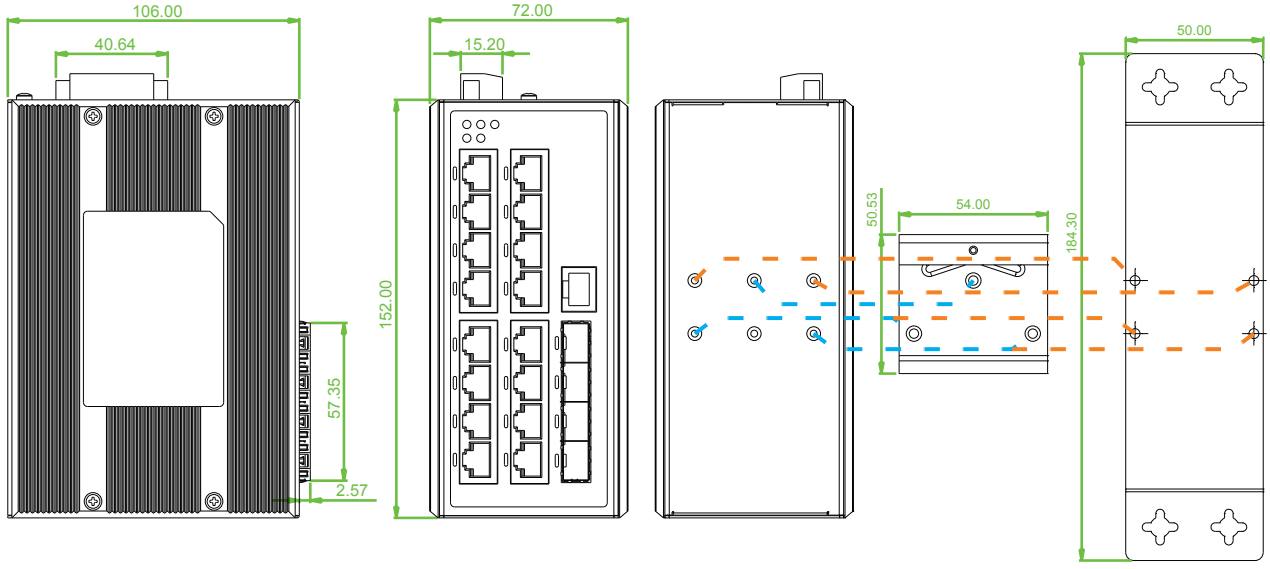


Figure : Topology

Dimensions



Side View | Front View | Rear View | DIN-Rail Kit View | Wall-Mount Kit View

Ordering Information

Model Name	Description
IGS-1604SM	16x 10/100/1000Base-T + 4x 100/1000Base-X SFP Slot Managed Switch (-10~60°C)
IGS-1604SM-E	16x 10/100/1000Base-T + 4x 100/1000Base-X SFP Slot Managed Switch (-40~75°C)

Accessories

DR-4524	Industrial Power, Input 85 ~ 264VAC, Output 24VDC, 48W, -10 ~ +50°C
MDR-40-24	Industrial Power, Input 85 ~ 264VAC, Output 24VDC, 40W, -20 ~ +70°C
SFP Transceiver	Compatible, Reliable, 5-year Warranty

ISFP – M 7 040 – 31 – E

- ISFP: Industrial SFP Transceiver
- M: Multi Mode; S: Single Mode; T: Copper
- 7: GbE; 5: FE
- 040: Distance 002(2km), 020(20km), 040(40km)...
- 31: Wavelength
- E: -40~85°C; Blank: 0~70°C

Temperature

IGS-1604SM – ☐

Example: IGS-1604SM – E

IFS-803GSM

8x 10/100Base-TX+ 3x 100/1000Base-X SFP Slot Ethernet Managed Switch

c UL us LISTED

IFS-803GSM models are managed industrial grade Fast Ethernet switches with 8 x 10/100Base-TX ports and 3 SFP Gigabit/Fast Ethernet ports that provide stable and reliable Ethernet transmission. The Ethernet switches support a variety of management functions, including STP/RSTP/MSTP and ITU-T G.8032 Ring <50ms recovery time, layer 2 Ethernet IGMP, VLAN, QoS ,Security ,IPV6, bandwidth control, port mirroring, cable diagnostic and Green Ethernet. Housed in rugged DIN rail or wall mountable enclosures, these switches are designed for harsh environments, such as industrial networking, security automation applications, intelligent transportation systems (ITS) and are also suitable for many military and utility market applications where environmental conditions exceed commercial product specifications. Standard operating temperature range models (-10 to 60°C) and wide operating temperature range models (-40 to 75°C) fulfill the special needs of industrial automation applications.

Features

- 8x 10/100Base-TX RJ-45 with 3x 100/1000Base-X SFP Fiber
- UL60950-1, CE, FCC, Rail Traffic EN50121-4 certified
- Industrial Grade EMS, EMI, EN61000-6-2, EN61000-6-4 certified
- Cable diagnostic, Measuring cable OK or broken point distance
- Supports IEEE802.3az EEE (Energy Efficient Ethernet) Management to optimize the power consumption
- STP, RSTP, MSTP, ITU-T G.8032 Ethernet Protection Ring (EPR) for cabling redundant
- μ-Ring for Redundant Ethernet Ring, recovery time<20ms in 250 units
- QoS, Traffic classification QoS, CoS, bandwidth control for Ingress and Egress, Storm Control, DiffServ
- IEEE802.1Q VLAN, port based VLAN, MAC based VLAN, IP subnet based VLAN, Protocol based VLAN, VLAN translation, MVR
- Dynamic IEEE 802.3ad LACP Link Aggregation, Static Link Aggregation
- IGMP/MLD snooping V1/V2/V3, IGMP Filtering / Throttling, IGMP query, IGMP proxy reporting, MLD snooping
- Security : Port based and MAC based IEEE802.1X, RADIUS, ACL, TACACS+, HTTP/HTTPS, SSL/SSH v2
- Software upgrade via TFTP and HTTP, redundant firmware in case of upgrade failure
- DHCP client/Relay/Snooping/Snooping option 82/Relay option 82
- RMON, MIB II, Port mirroring, Event syslog, DNS, NTP/SNTP, IEEE802.1ab LLDP
- Supports IPv6 Telnet server /ICMP v6, SNMP, HTTP, SSH/SSL, NTP/SNTP, TFTP, QoS, ACL
- CLI, Web based management, **SNMP** v1/v2c/v3, Telnet server for management
- **SmartView** Management System

Specifications

Standard	IEEE 802.3	10Base-T 10Mbit/s Ethernet
	IEEE 802.3u	100Base-TX, 100Base-FX, Fast Ethernet
	IEEE 802.3ab	1000Base-T Gbit/s Ethernet over twisted pair
	IEEE 802.3z	1000Base-X Gbit/s Ethernet over Fiber-Optic
	IEEE 802.1d	STP (Spanning Tree Protocol)
	IEEE 802.1w	RSTP (Rapid Spanning Tree Protocol)
	IEEE 802.1s	MSTP (Multiple Spanning Tree Protocol)
	ITU-T G.8032 / Y.1344	EPR (Ethernet Protection Ring)
	IEEE 802.1Q	Virtual LANs (VLAN)
	IEEE 802.1X	Port based Network Access Control, Authentication
	IEEE 802.3ad	Link aggregation for parallel links with LACP(Link Aggregation Control Protocol)
	IEEE 802.3x	Flow control for Full Duplex
	IEEE 802.1ad	Stacked VLANs, Q-in-Q
	IEEE 802.1p	LAN Layer 2 QoS/CoS Protocol for Traffic Prioritization
	IEEE 802.1ab	Link Layer Discovery Protocol (LLDP)
	IEEE 802.3az	EEE (Energy Efficient Ethernet)
VLAN ID	4096	
Switch Architecture	Back-plane : 7.6Gbps	
Data Processing	Store and Forward	
Flow Control	IEEE 802.3x for full duplex mode Back pressure for half duplex mode	
Jumbo Frame	9.6KB	
MAC Address Table	8K	
Network Connector	8x RJ-45 10/100Base-TX auto negotiation speed, Auto MDI/MDI-X function, Full/Half duplex 3x 100/1000 Base-X dual speed mode SFP slot, with DDMI	

Console	RS-232 (RJ-45)
Network Cable	UTP/STP above Cat. 5e cable EIA/TIA-568 100-ohm (100m)
Protocol	CSMA/CD
Reverse Polarity Protection	Present
Overload Current Protection	Present
CPU Watch Dog	Present
Power Supply	Redundant Dual DC12/24/48VDC (9.6~60VDC) Input power (Removable Terminal Block)
LED	Per unit: Power 1 (Green), Power 2 (Green), Fault (Amber), CPU Act (Green), Ring Master (Yellow) Per RJ-45 port: 10/100 Link/Active (Green) 1000 Link/Active (Amber) SFP Fiber Per port: Link/Active (Green)
Power Consumption	7.7W
Warning Message	System Syslog, SMTP/ e-mail event message, alarm relay
Alarm Relay Contact	Relay outputs with current carrying capacity of 1 A @24VDC
Removable Terminal Block	Provide 2 Redundant power, Alarm relay contact, 6 Pin
Operating Temperature	-10 ~ 60°C (IFS-803GSM) -40 ~ 75°C (IFS-803GSM-E)
Operating Humidity	5% to 95% (Non-condensing)
Storage Temperature	-40 ~ 85°C
Housing	Rugged Metal, IP30 Protection

Specifications & design are subject to change without prior notice. Please visit CTC Union website for more details.

Specifications

Dimensions	106 x 72 x152 mm (D x W x H)
Weight	0.78 kg
Installation Mounting	DIN Rail mounting or wall mounting
EMC/EMS	CE, FCC
EMI	FCC Part 15 Subpart B Class A, CE EN 55022 Class A
	EN61000-6-4 – Emission for industrial environment
EMS	EN61000-6-2 – Immunity for Industrial environment
	EN61000-4-2 (ESD) Level 3, Criteria B
	EN61000-4-3 (RS) Level 3, Criteria A
	EN61000-4-4 (EFT) Level 3, Criteria A
	EN61000-4-5 (Surge) Level 3, Criteria B
	EN61000-4-6 (CS) Level 3, Criteria A
	EN61000-4-8 (Magnetic Field) Level 3, Criteria A
Safety	UL60950-1
Rail Traffic	EN 50121-4
Shock	IEC 60068-2-27
Freefall	IEC 60068-2-32
Vibration	IEC 60068-2-6
MTBF	409,312hrs
Warranty	5 years

Software Specifications

Topology	
VLAN	IEEE 802.1q VLAN,up to 4095 ID
	IEEE 802.1q VLAN,up to 4095 Groups
	IEEE 802.1ad Q-in-Q
	Port Based VLAN
	MAC-based VLAN,up to 256 entries
	IP Subnet-based VLAN, up to 128 entries
	Protocol-based VLAN (Ethernt, SNAP, LLC), up to 128 entries
	VLAN Translation, up to 256 entries
	MVR (Multiple VLAN Registration)
Link Aggregation (Port Trunk)	Static (Hash with SA, DA, IP, TCP/UDP port), up to 5 trunk group
	Dynamic (IEEE 802.3ad LACP), up to 5 trunk group
Spanning Tree	IEEE802.1d STP
	IEEE802.1w RSTP
	IEEE802.1s MSTP
Loop Protection	Present
μ-Ring	Easy set for Ethernet protection Ring, Recovery Time <20ms, Maximum 250 Node
ITU-T G.8032 / Y.1344 ERPS (Ethernet Ring Protection)	Convergence time <50ms
	Single Ring, Sub-Ring, Multiple ring topology network
QoS Feature	
Class of Service	IEEE802.1p 8 active priorities queues for per port
Traffic Classification QoS	IEEE802.1p based CoS
	IP Precedence based CoS
	IP DSCP based CoS
	QCL(QoS Control List): MAC Access control list (Source/ Destination MAC, Ether type, Priority ID/ VLAN ID)
	QCL: IP extended access control list (Source/ Destination IP, Protocol, TCP/UDP port number)
Bandwidth Control for Ingress	Rate in steps : 100 kbps / 1fps / 100fps
	Range : 100 kbps to 1Gbps / 1fps to 3300kfps
	Rate Unit : bit or frame
Bandwidth Control for Egress	Rate in steps : 100 kbps / 1fps / 100fps
	Range : 100 kbps to 1Gbps / 1fps to 3300kfps
	Rate Unit : bit or frame
	Per queue shaper
DiffServ (RF 2474) Remarking	
Storm Control	for Unicast, Broadcast, Multicast
IP Multicasting Feature	
IGMP / MLD Snooping	IGMP Snooping v1, v2, v3 / MLD Snooping v1, v2
	Port Filtering Profile
	Throttling
	Fast Leave
	Query
Security Features	
IEEE 802.1X	Port-Based
	MAC-Based
ACL	Number of rules : up to 256 entries
	for L2 / L3 / L4
RADIUS authentication & accounting	
TACACS+ authentication & accounting, TACACS+ 3.0	
HTTPS, HTTP	
SSL / SSH v2	
User name password authentication	Local Authentication
	Remote Authentication (via RADIUS / TACACS+)
Management Interface Access Filtering	Web, Telnet / SSH
Management Features	
CLI	
Web Based Management	
Telnet	Server
SNMP	V1, V2c, V3
SW & Configuration Upgrade	TFTP, HTTP
	Redundant firmware in case of upgrading failure
RMON	RMON I (1, 2, 3, 9 group), RMON II
MIB II	RFC 1213
DHCP	Client
	Relay
	Snooping
	Snooping option 82
	Relay option 82
IP Source Guard	
Port Mirroring	
Event Syslog	Syslog server (RFC3164) (Support 1 server)
Warning Message	System syslog, e-mail, alarm relay
DNS	Client, Proxy
NTP /SNTP	
LLDP (IEEE 802.1ab)	Link Layer Discovery Protocol
	LLDP-MED
IPv6 Features	
IPv6 Management	Telnet Server/ICMP v6
Stateless Auto-Configuration	
SNMP over IPv6	
HTTP over IPv6	
SSH over IPv6	
IPv6 Telnet Support	
IPv6 NTP / SNTP Support	
IPv6 TFTP Support	
IPv6 QoS	
IPv6 ACL	Number of rules: up to 256 entries
	L2 / L3 / L4
Others Features	
Green Ethernet	Supports IEEE802.3az EEE (Energy Efficient Ethernet) Management to optimize the power consumption
	Determine the cable length and lowering the power for ports with short cables
	Lower the power for a port when there is no link
	LED Power Management :Adjustment LEDs intensity
Cable Diagnostic	Measuring cable OK or broken point distance

Application

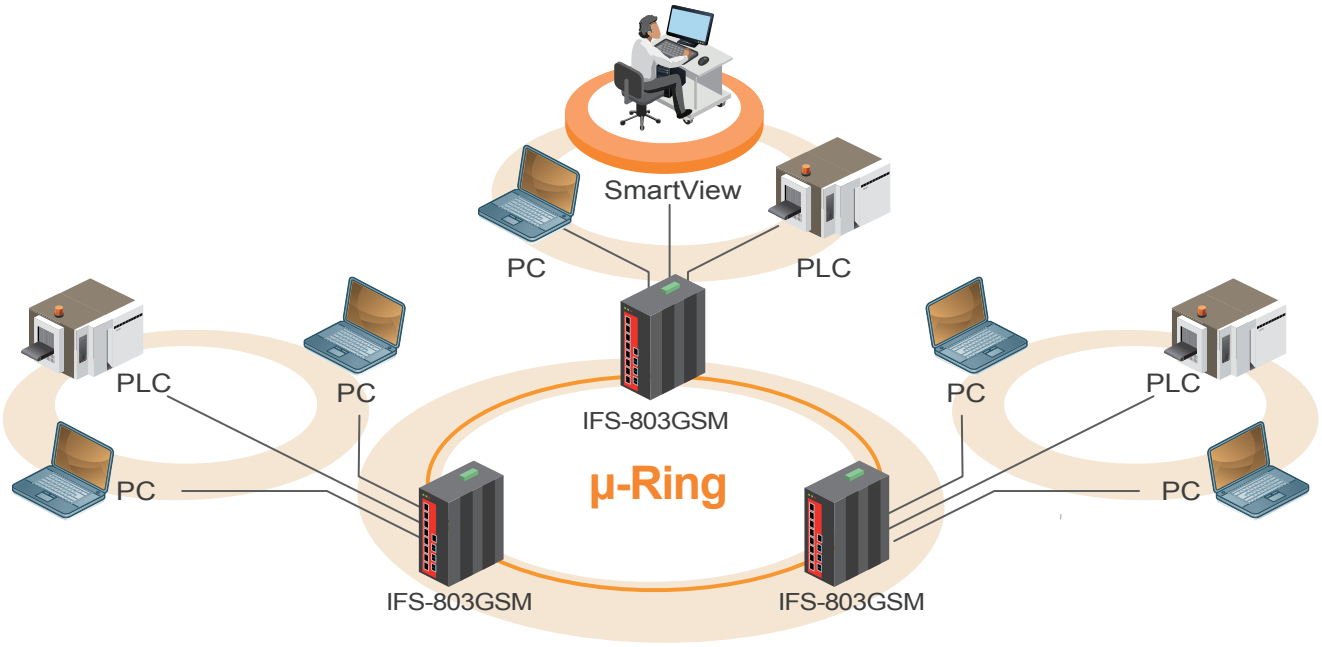
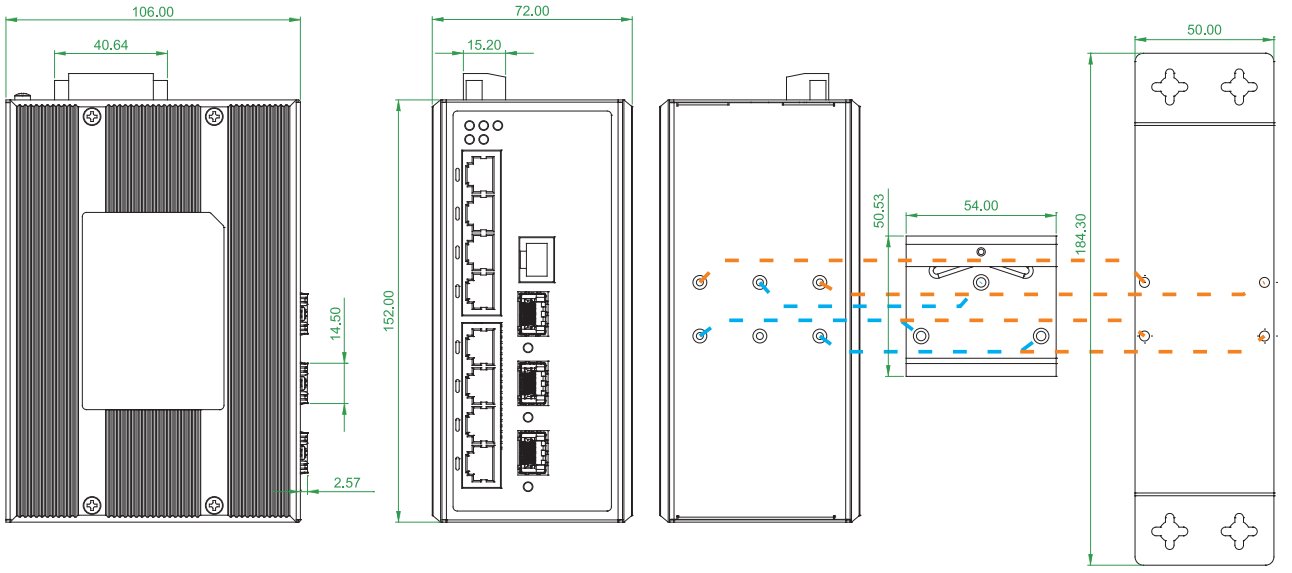


Figure : Topology

Dimensions



Side View | Front View | Rear View | DIN-Rail Kit View | Wall-Mount Kit View

Ordering Information

Model Name	Description
IFS-803GSM	8x 10/100Base-TX + 3x 100/1000Base-X SFP Slot Managed Switch (-10~60°C)
IFS-803GSM-E	8x 10/100Base-TX + 3x 100/1000Base-X SFP Slot Managed Switch (-40~75°C)
Accessories	
DR-4524	Industrial Power, Input 85 ~ 264VAC, Output 24VDC, 48W, -10 ~ +50°C
MDR-40-24	Industrial Power, Input 85 ~ 264VAC, Output 24VDC, 40W, -20 ~ +70°C
SFP Transceiver	Compatible, Reliable, 5-year Warranty

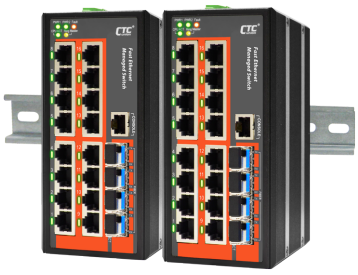
IFS-803GSM – ☐ (Temperature)

Example: IFS-803GSM – E

ISFP – M 7 040 – 31 – E

- ISFP: Industrial SFP Transceiver
- M: Multi Mode; S: Single Mode; T: Copper
- 7: GbE; 5: FE
- 040: Distance 002(2km), 020(20km), 040(40km)...
- 31: Wavelength
- E: -40~85°C; Blank: 0~70°C

NEW



IFS-1604GSM

16x 10/100Base-TX+ 4x 100/1000Base-X SFP Slot Ethernet Managed Switch

IFS-1604GSM models are managed industrial grade Fast Ethernet switches with 16x 10/100Base-TX ports and 4 SFP Gigabit/Fast Ethernet ports that provide stable and reliable Ethernet transmission. The Ethernet switches support a variety of management functions, including STP/RSTP/MSTP and ITU-T G.8032 Ring <50ms recovery time, layer 2 Ethernet IGMP, VLAN, QoS ,Security ,IPv6, bandwidth control, port mirroring, cable diagnostic and Green Ethernet. Housed in rugged DIN rail or wall mountable enclosures, these switches are designed for harsh environments, such as industrial networking, security automation applications, intelligent transportation systems (ITS) and are also suitable for many military and utility market applications where environmental conditions exceed commercial product specifications. Standard operating temperature range models (-10 to 60°C) and wide operating temperature range models (-40 to 75°C) fulfill the special needs of industrial automation applications.

Features

- 16x 10/100Base-TX RJ-45 with 4x 100/1000Base-X SFP Fiber
- UL60950-1, CE, FCC, Rail Traffic EN50121-4 certified
- Industrial Grade EMS, EMI, EN61000-6-2, EN61000-6-4 certified
- Cable diagnostic, Measuring cable OK or broken point distance
- Supports IEEE802.3az EEE (Energy Efficient Ethernet) Management to optimize the power consumption
- STP, RSTP, MSTP, ITU-T G.8032 Ethernet Protection Ring(EPR) for cabling redundant
- µ-Ring for Redundant Ethernet Ring, recovery time<20ms in 250 units
- QoS, Traffic classification QoS, CoS, bandwidth control for Ingress and Egress, Storm Control, DiffServ
- IEEE802.1Q VLAN, port based VLAN, MAC based VLAN, IP subnet based VLAN, Protocol based VLAN, VLAN translation, MVR
- Dynamic IEEE 802.3ad LACP Link Aggregation, Static Link Aggregation
- IGMP/MLD snooping V1/V2/V3, IGMP Filtering/ Throttling, IGMP query, IGMP proxy reporting, MLD snooping
- Security : Port based and MAC based IEEE802.1X, RADIUS, ACL, TACACS+, HTTP/HTTPS, SSL/SSH v2
- Software upgrade via TFTP and HTTP, redundant firmware in case of upgrade failure
- DHCP client/Relay/Snooping/Snooping option 82/Relay option 82
- RMON, MIB II, Port mirroring, Event syslog, DNS, NTP/SNTP, IEEE802.1ab LLDP
- Supports IPv6 Telnet server /ICMP v6, SNMP, HTTP, SSH/SSL, NTP/SNTP, TFTP, QoS, ACL
- CLI, Web based management, **SNMP** v1/v2c/v3, Telnet server for management
- **SmartView** Management System

Specifications

Standard	IEEE 802.3	10Base-T 10Mbit/s Ethernet
	IEEE 802.3u	100Base-TX, 100Base-FX, Fast Ethernet
	IEEE 802.3ab	1000Base-T Gbit/s Ethernet over twisted pair
	IEEE 802.3z	1000Base-X Gbit/s Ethernet over Fiber-Optic
	IEEE 802.1d	STP (Spanning Tree Protocol)
	IEEE 802.1w	RSTP (Rapid Spanning Tree Protocol)
	IEEE 802.1s	MSTP (Multiple Spanning Tree Protocol)
	ITU-T G.8032 / Y.1344	EPR (Ethernet Protection Ring)
	IEEE 802.1Q	Virtual LANs (VLAN)
	IEEE 802.1X	Port based Network Access Control, Authentication
	IEEE 802.3ad	Link aggregation for parallel links with LACP (Link Aggregation Control Protocol)
	IEEE 802.3x	Flow control for Full Duplex
	IEEE 802.1ad	Stacked VLANs, Q-in-Q
	IEEE 802.1p	LAN Layer 2 QoS/CoS Protocol for Traffic Prioritization
	IEEE 802.1ab	Link Layer Discovery Protocol (LLDP)
	IEEE 802.3az	EEE (Energy Efficient Ethernet)
VLAN ID	4096	
Switch Architecture	Back-plane : 11.2Gbps	
Data Processing	Store and Forward	
Flow Control	IEEE 802.3x for full duplex mode Back pressure for half duplex mode	
Jumbo Frame	9.6KB	
MAC Address Table	8K	

Network Connector	16x RJ-45 10/100Base-TX auto negotiation speed, Auto MDI/MDI-X function, Full/Half duplex 4x 100/1000 Base-X dual speed mode SFP slot, with DDMI
Console	RS-232 (RJ-45)
Network Cable	UTP/STP above Cat. 5e cable EIA/TIA-568 100-ohm (100m)
Protocols	CSMA/CD
Reverse Polarity Protection	Present
Overload Current Protection	Present
CPU Watch Dog	Present
Power Supply	Redundant Dual DC12/24/48VDC (9.6~60VDC) Input power (Removable Terminal Block)
LED	Per unit: Power 1 (Green), Power 2 (Green), Fault (Amber), CPU Act (Green), Ring Master (Yellow) Per RJ-45 port: 10/100 Link/Active (Green) 1000 Link/Active (Amber) SFP Fiber Per port: Link/Active (Green)
Power Consumption	TBD
Warning Message	System syslog, SMTP/ e-mail event message, alarm relay
Alarm Relay Contact	Relay outputs with current carrying capacity of 1 A @24VDC
Removable Terminal Block	Provide 2 redundant power, alarm relay contact, 6 Pin
Operating Temperature	-10 ~ 60°C (IFS-1604GSM) -40 ~ 75°C (IFS-1604GSM-E)
Operating Humidity	5% to 95% (Non-condensing)
Storage Temperature	-40 ~ 85°C
Housing	Rugged Metal, IP30 Protection
Dimensions	106 x 72 x 152 mm (D x W x H)

Specifications

Installation Mounting	DIN Rail mounting or wall mounting
EMC/EMS	CE, FCC
EMI	FCC Part 15 Subpart B Class A, CE EN 55022 Class A
	EN61000-6-4 – Emission for industrial environment
EMS	EN61000-6-2 – Immunity for Industrial environment
	EN61000-4-2 (ESD) Level 3, Criteria B
	EN61000-4-3 (RS) Level 3, Criteria A
	EN61000-4-4 (EFT) Level 3, Criteria A
	EN61000-4-5 (Surge) Level 3, Criteria B
	EN61000-4-6 (CS) Level 3, Criteria A
	EN61000-4-8 (Magnetic Field) Level 3, Criteria A
Safety	UL60950-1 (Pending)
Rail Traffic	EN 50121-4
Shock	IEC 60068-2-27
Freefall	IEC 60068-2-32
Vibration	IEC 60068-2-6
MTBF	TBD (Above 30 years)
Warranty	5 years

Software Specifications

Topology	
VLAN	IEEE 802.1q VLAN,up to 4095 ID
	IEEE 802.1q VLAN,up to 4095 Groups
	IEEE 802.1ad Q-in-Q
	Port Based VLAN
	MAC-based VLAN,up to 256 entries
	IP Subnet-based VLAN, up to 128 entries
	Protocol-based VLAN(Ethernt, SNAP, LLC), up to 128 entries
	VLAN Translation, up to 256 entries
	MVR (Multiple VLAN Registration)
Link Aggregation (Port Trunk)	Static (Hash with SA, DA, IP, TCP/UDP port), up to 5 trunk group
	Dynamic (IEEE 802.3ad LACP), up to 5 trunk group
Spanning Tree	IEEE802.1d STP
	IEEE802.1w RSTP
	IEEE802.1s MSTP
Loop Protection	Present
μ-Ring	Easy set for Ethernet protection Ring, Recovery Time <20ms, Maximum 250 Node
ITU-T G.8032 / Y.1344 ERPS (Ethernet Ring Protection)	Convergence time <50ms
	Single Ring, Sub-Ring, Multiple ring topology network
QoS Feature	
Class of Service	IEEE802.1p 8 active priorities queues for per port
Traffic Classification QoS	IEEE802.1p based CoS
	IP Precedence based CoS
	IP DSCP based CoS
	QCL(QoS Control List): MAC Access control list (Source/ Destination MAC, Ether type, Priority ID/ VLAN ID)
	QCL: IP extended access control list (Source/ Destination IP, Protocol, TCP/UDP port number)
Bandwidth Control for Ingress	Rate in steps : 100 kbps / 1fps / 100fps
	Range : 100 kbps to 1Gbps / 1fps to 3300kfps
	Rate Unit : bit or frame
Bandwidth Control for Egress	Rate in steps : 100 kbps / 1fps / 100fps
	Range : 100 kbps to 1Gbps / 1fps to 3300kfps
	Rate Unit : bit or frame
	Per queue shaper
DiffServ (RF 2474) Remarking	
Storm Control	for Unicast, Broadcast, Multicast
IP Multicasting Feature	
IGMP / MLD Snooping	IGMP Snooping v1, v2, v3 / MLD Snooping v1, v2
	Port Filtering Profile
	Throttling
	Fast Leave
	Query
Security Features	
IEEE 802.1X	Port-Based
	MAC-Based
ACL	Number of rules : up to 256 entries
	for L2 / L3 / L4
RADIUS authentication & accounting	
TACACS+ authentication & accounting, TACACS+ 3.0	
HTTPS, HTTP	
SSL / SSH v2	
User Name Password Authentication	Local Authentication
	Remote Authentication (via RADIUS / TACACS+)
Management Interface Access Filtering	Web, Telnet / SSH
Management Features	
CLI	
Web Based Management	
Telnet	Server
SNMP	V1, V2c, V3
SW & Configuration Upgrade	TFTP, HTTP
	Redundant firmware in case of upgrade failure
RMON	RMON I (1, 2, 3, 9 group), RMON II
MIB II	RFC 1213
DHCP	Client
	Relay
	Snooping
	Snooping option 82
	Relay option 82
IP Source Guard	
Port Mirroring	
Event Syslog	Syslog server (RFC3164) (Support 1 server)
Warning Message	System syslog, e-mail, alarm relay
DNS	Client, Proxy
NTP /SNTP	
LLDP (IEEE 802.1ab)	Link Layer Discovery Protocol
	LLDP-MED
IPv6 Features	
IPv6 Management	Telnet Server/ICMP v6
Stateless Auto-Configuration	
SNMP over IPv6	
HTTP over IPv6	
SSH over IPv6	
IPv6 Telnet Support	
IPv6 NTP / SNTP Support	
IPv6 TFTP Support	
IPv6 QoS	
IPv6 ACL	Number of rules: up to 256 entries
	L2 / L3 / L4
Others Features	
Green Ethernet	Supports IEEE802.3az EEE (Energy Efficient Ethernet) Management to optimize the power consumption
	Determine the cable length and lowering the power for ports with short cables
	Lower the power for a port when there is no link
	LED Power Management : Adjustment LEDs intensity
Cable Diagnostic	Measuring cable OK or broken point distance

Application

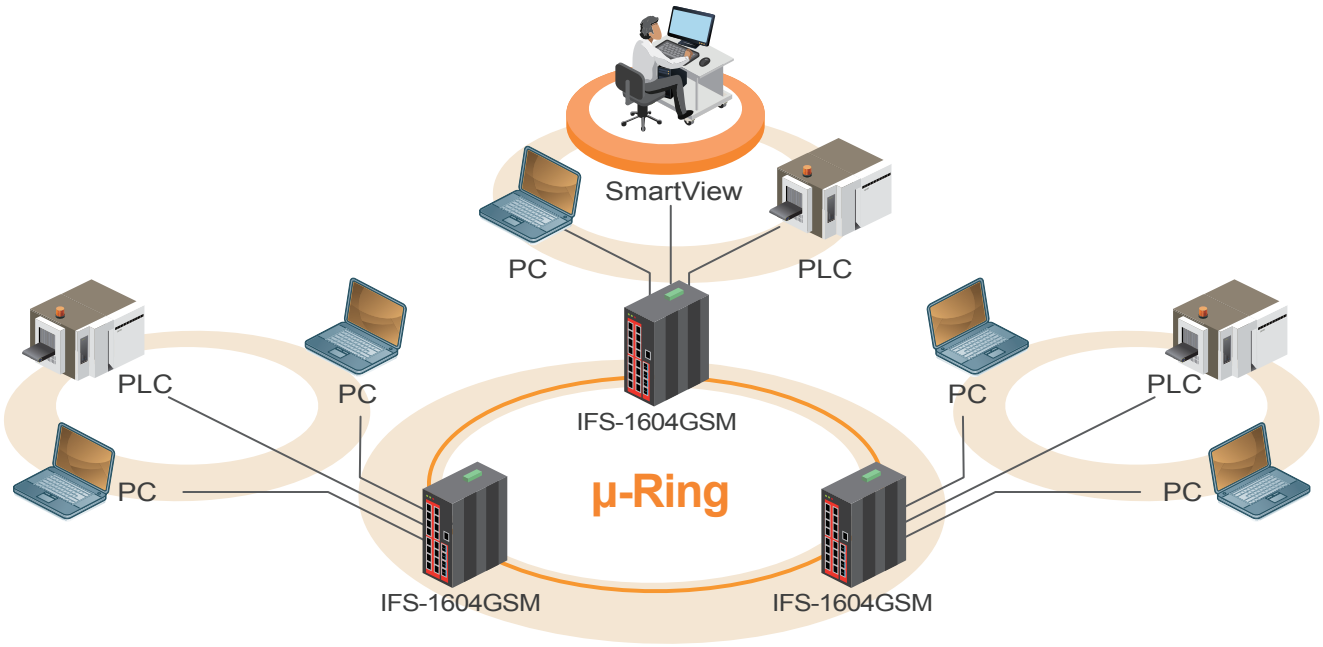
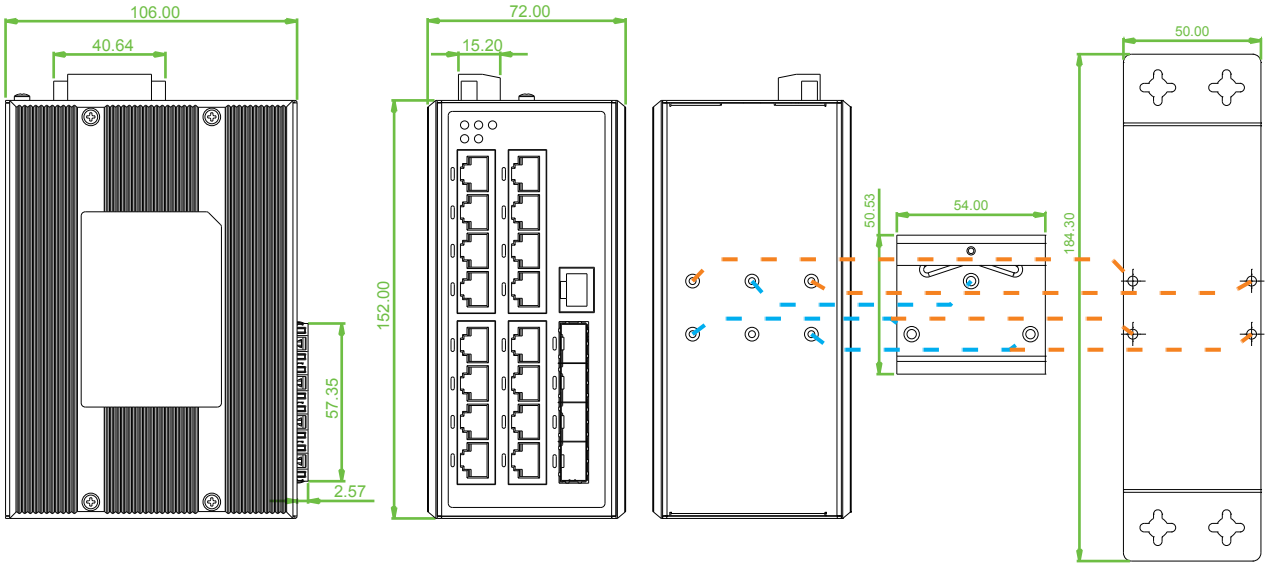


Figure : Topology

Dimensions



Side View | Front View | Rear View | DIN-Rail Kit View | Wall-Mount Kit View

Ordering Information

Model Name	Description
IFS-1604GSM	16x 10/100Base-TX + 4x 100/1000Base-X SFP Slot Managed Switch (-10~60°C)
IFS-1604GSM-E	16x 10/100Base-TX + 4x 100/1000Base-X SFP Slot Managed Switch (-40~75°C)

Accessories

DR-4524	Industrial Power, Input 85 ~ 264VAC, Output 24VDC, 48W, -10 ~ +50°C
MDR-40-24	Industrial Power, Input 85 ~ 264VAC, Output 24VDC, 40W, -20 ~ +70°C
SFP Transceiver	Compatible, Reliable, 5-year Warranty

IFS-1604GSM – □ (Temperature)

Example: IFS-1604GSM – E

ISFP – M 7 040 – 3 1 – E

- **ISFP**: Industrial SFP Transceiver
- **M**: Multi Mode; **S**: Single Mode; **T**: Copper
- **7**: GbE; **5**: FE
- **040**: Distance — 002(2km), 020(20km), 040(40km)...
- **31**: Wavelength
- **E**: -40~85°C; **Blank**: 0~70°C

IFC-Serial

RS-232/422/485 Fiber Converter

c UL us LISTED

IFC-Serial are industrial grade fiber media converters that provides a fiber connection to extend asynchronous RS-232, RS-485 or RS-422 serial transmissions over a distance of up to 2km using multimode fiber or up to 60km using single mode fiber. The duplex fiber provides point-to-point connections. Single fiber simplex connections allow connecting multiple devices in a cascaded or "daisy chain" fashion with a single fiber ring architecture. However, no redundancy is provided and any break can disable the entire ring. The converter is capable of selecting interface modes for connection to RS-232 (3 wire), RS-485 (2 wire, half duplex) or RS-422/485 (4 wire, full duplex). IFC-Serial Series media converters feature an alarm relay contact and two redundant DC power inputs. The IFC-Serial Series reliable industrial design is perfect for keeping your industrial automation applications running smoothly and continuously. The IFC-Serial Series media converters are available in two operating temperature ranges, a standard -10° to 60°C commercial temperature range or an extended -40° to 75°C range.

Features

- Supports dual channel communication, including Triple-Way communication and Two-Way communication
- Extend serial transmission distance up to 2km, 30km, 60km
- Redundant dual power inputs (12 ~ 48VDC)
- Supports half-duplex ring application
- Supports RS-232, RS-422, RS-485(2/4 wire) transmission to fiber connections
- Wide Temperature -40 ~ 75°C (IFC-Serial-E)
- Enhanced serial baudrate up to 1024kpbs
- 2.5KV isolation for serial signal
- Supports relay output for power or link failure warning
- Hardened housing with IP30 protection
- Fan-less and DIN-Rail design for harsh industrial environment
- Adjustable pull high/low resistor and terminator for RS-422/485 transmission

Specifications

Data Flow	Dual Channel Communication	Both of Triple-Way and Two-Way Communication Way (Figure 1)
Optical Interface	Connector	SC, ST
	Fiber Optical rate	36.864Mbps
	Fiber Port	One fiber
	Fiber Type	MM 2km, SM 30km/60km
	Wavelength	MM 1310nm, SM 1310, 1550nm
	Point to Point Transmission	Half or Full duplex
	Ring Transmission	Half duplex
Electrical Interface	Serial Port Connector	RS-232(DB9), RS-422/RS-485(5 pin terminal block)
		RS-485 : 4, 2 wires, RS-422 : 4 wires
	RS-485 direction	Automatically detection
	Copper Baud rate	50 up to 1024Kbps
	Isolation	2.5KV for sevic signals
	Surge Protection	8KV ESD for serial signals
	Pull High	Selected by 10 position rotary switch
	Pull Low	Selected by 10 position rotary switch
	120 ohm terminator	Built-in 120 ohm terminator (Option by Dip switch)
Environmental	Operating Temperature	-10 ~ 60°C (IFC-Serial) -40 ~ 75°C (IFC-Serial-E)
	Storage Temperature	-40 ~ 85°C
	Humidity	5 ~ 95% RH
LED Indications	PWR1, PWR2, Alarm, Master, TD, RD, Fiber Link, Ring	
Power	Power Input	Redundant Dual Power 12, 24, 48 VDC (9.6 ~ 58VDC)
	Power Consumption	5W
	Power Reversal Protection	Yes
	Over Current Protection : Signal Short Together Protected	
	Terminal Block for Power and Alarm : Terminal Block : V1+, V1-, V2+, V2-, Alarm NC, Alarm COM, Alarm NO	

Mechanical	Water & Dust Proof	IP30 Protection
	Dimensions	106 x 38 x 142 mm (D x W x H)
	Mounting	DIN-Rail or wall mount
	Weight	0.63kg
Certification	Safety	UL60950-1
	EMC	CE, FCC
	EMI	EN55022 Class A
		EN61000-6-4 – Emission for industrial environment
	EMS	EN61000-6-2 – Immunity for Industrial environment
		EN61000-4-2 ESD Level 3
		EN61000-4-3 RS Level 3
		EN61000-4-4 EFT Level 3
		EN61000-4-5 Surge Level 3
		EN61000-4-6 CS Level 3
	Free Fall	IEC 60068-2-32
	Vibration	IEC 60068-2-6
	Shock	IEC 60068-2-27
	Green	RoHS
	MTBF	797,101 Hrs

Block Diagram

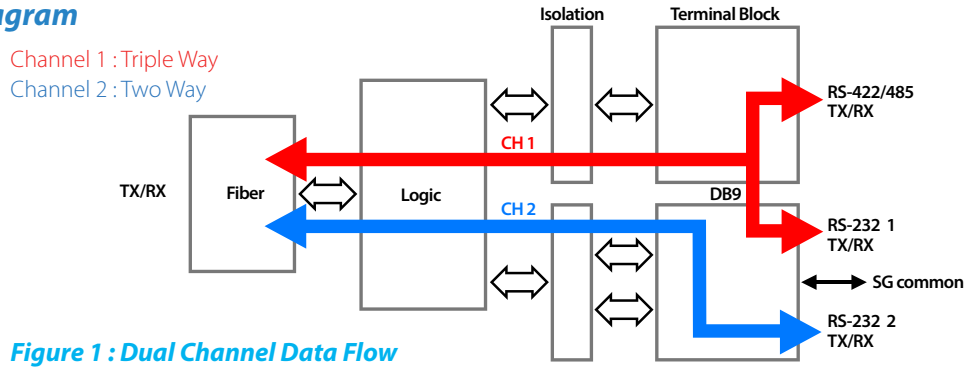


Figure 1 : Dual Channel Data Flow

Application

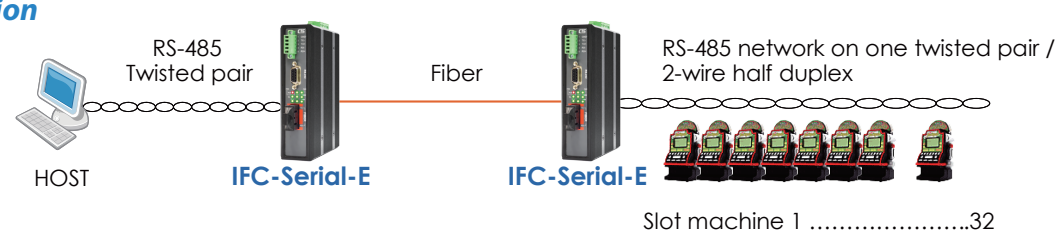


Figure 2 : Point to Point

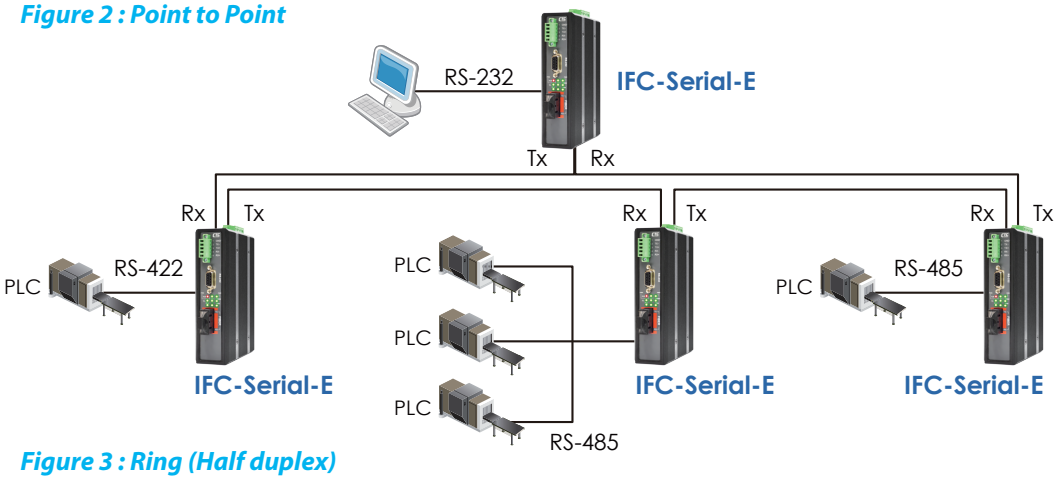
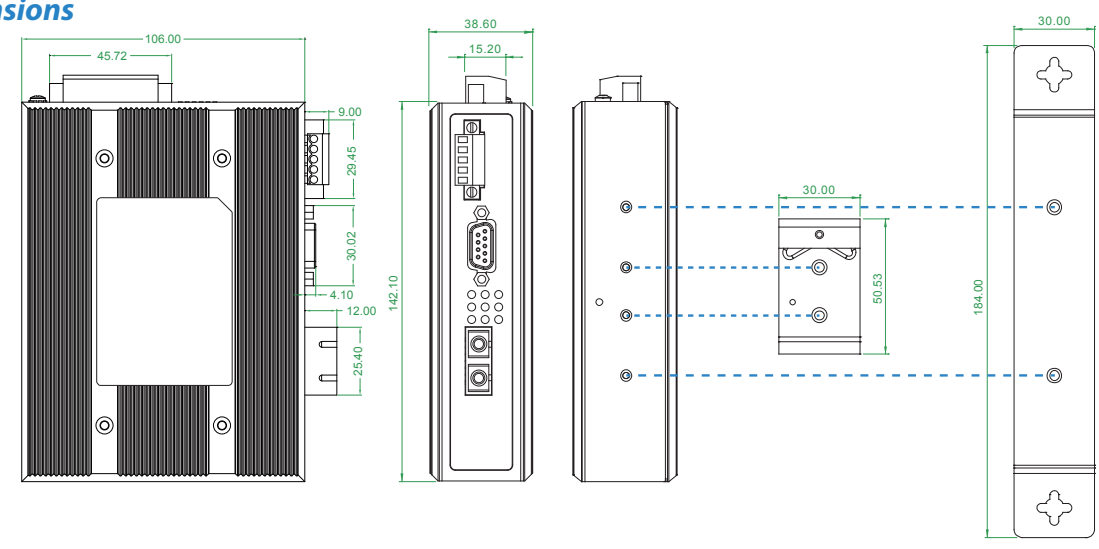


Figure 3 : Ring (Half duplex)

Dimensions



Side View | Front View | Rear View | DIN-Rail Kit View | Wall-Mount Kit View

Ordering Information

Model Name	Description
IFC-Serial	RS-232/422/485 serial to fiber media converter; Temperature Range : -10 ~ 60°C
IFC-Serial-E	RS-232/422/485 serial to fiber media converter; Temperature Range : -40 ~ 75°C
Connector Type	**Connectivity Distance**
SC, ST	002: 2km 030: 30km 060: 60km
Accessories	
DR-4524	Industrial Power, Input 85 ~ 264VAC, Output 24VDC, 48W, -10 ~ +50°C
MDR-40-24	Industrial Power, Input 85 ~ 264VAC, Output 24VDC, 40W, -20 ~ +70°C

Temperature | Connector Type | Connectivity Distance

IFS – Serial – □ – □□□□□

Example: IFS – Serial – E – SC002

IFC-FDC

RS-232/422/485 Daisy Chain Fiber Converter

c UL us LISTED

The IFC-FDC Series are industrial grade fiber media converters that provide dual fiber connections to extend asynchronous RS-232, RS-485 or RS-422 serial transmissions over a distance of up to 2km using multimode fiber or up to 60km using single mode fiber. The dual fiber inputs allow connecting multiple devices in a cascade or "daisy chain" fashion as well as creating ring architecture for fiber redundancy. The converter is capable of selecting interface modes for connection to RS-232 (3 wire), RS-485 (2 wire, half duplex) or RS-422/485 (4 wire, full duplex). IFC-FDC Series media converters feature a three-way communications plus a second independent RS-232 communication channel. Models also feature an alarm relay contact and two redundant DC power inputs. The IFC-FDC Series reliable industrial design is perfect for keeping your industrial automation applications running smoothly and continuously. The IFC-FCD Series media converters are available in two operating temperature ranges, a standard -10° to 60°C commercial temperature range or an extended -40° to 75°C range (IFC-FDC-E).

Features

- Supports dual channel communication, including Triple-Way communication, and Two-Way communication
- Extend serial transmission distance up to 2km, 30km, 60km
- Supports fiber daisy chain or ring connections
- Redundant dual power inputs (12~48VDC)
- Supports dual fiber link redundancy
- Supports RS-232, RS-422, RS-485(2/4 wire) transmission to dual fiber connections
- Enhanced serial baudrate up to 1024kpbs
- 2.5KV isolation for serial signal
- Supports relay output for power or link failure warning
- Hardened housing with IP30 protection
- Fan-less and DIN-Rail design for harsh industrial environment
- Adjustable pull high/low resistor and terminator for RS-422/485 transmission

Specifications

Data Flow	Dual Channel Communication	Both of Triple-Way and Two-Way Communication Way (Figure 1)
Optical Interface	Connector	SC, ST
	Fiber Optical rate	36.864Mbps
	Fiber Port	Two fiber ports
	Fiber Type	MM 2km, SM 30km/60km
	Wavelength	MM 1310nm, SM 1310, 1550nm
	Point to Point Transmission	Half or Full duplex
	Ring Transmission	Half / Full duplex, self-healing operation
Electrical Interface	Serial Port Connector	RS-232(DB9), RS-422/RS-485(5 pin terminal block)
		RS-485 : 4, 2 wires, RS-422 : 4 wires
	RS-485 direction	Automatically detection
	Copper Baud rate	50 up to 1024Kbps
	Serial Isolation	2.5KV for serial signals
	Surge Protection	8KV ESD for serial signals
	Pull High	Selected by 10 position rotary switch
	Pull Low	Selected by 10 position rotary switch
	120 ohm terminator	Built-in 120 ohm terminator (Option by Dip Switch)
Environmental	Operating Temperature	-10 ~ 60°C (IFC-FDC) -40 ~ 75°C (IFC-FDC-E)
	Storage Temperature	-40 ~ 85°C
	Humidity	5 ~ 95% RH
LED Indications	PWR1, PWR2, Alarm, Master, TD, RD, Fiber Link, Fiber2 Link, Ring	
Power	Power Input	Redundant Dual Power 12, 24, 48 VDC (9.6 ~ 58VDC)
	Power Consumption	6W
	Power Reversal Protection	Yes
	Over Current Protection : Signal Short Together Protected	
	Terminal Block for Power and Alarm : Terminal Block : V1+, V1-, V2+, V2-, Alarm NC, Alarm COM, Alarm NO	

Mechanical	Water & Dust Proof	IP30 Protection
	Dimensions	106 x 38 x 142mm (D x W x H)
	Mounting	DIN-Rail, wall mount
	Weight	0.64kg
Certification	Safety	UL60950-1
	EMC	CE, FCC
	EMI	EN55022 Class A
		EN61000-6-4 – Emission for industrial environment
	EMS	EN61000-6-2 – Immunity for Industrial environment
		EN61000-4-2 ESD Level 3
		EN61000-4-3 RS Level 3
		EN61000-4-4 EFT Level 3
		EN61000-4-5 Surge Level 3
		EN61000-4-6 CS Level 3
	Free Fall	IEC 60068-2-32
	Vibration	IEC 60068-2-6
	Shock	IEC 60068-2-27
	Green	RoHS
	MTBF	687,418 Hrs

Block Diagram

Channel 1 : Triple Way
Channel 2 : Two Way

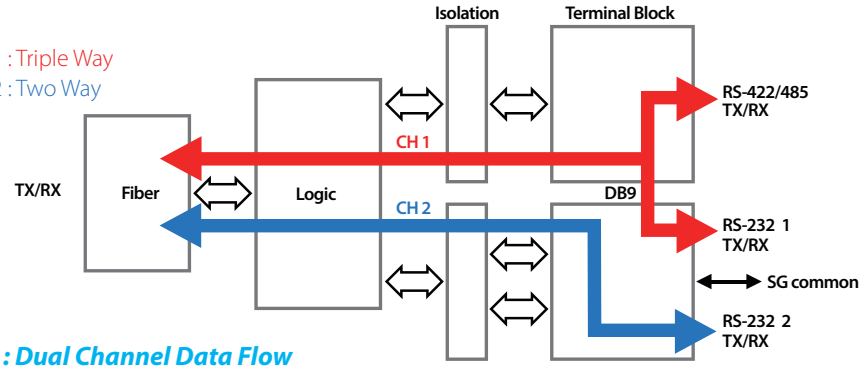


Figure 1 : Dual Channel Data Flow

Application

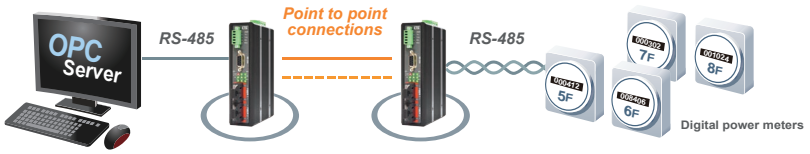


Figure 2 : Dual Fiber Auto Recovery

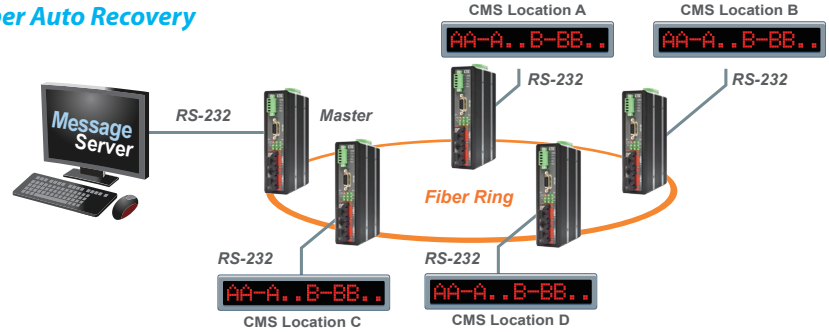


Figure 3 : Fiber Ring for RS-232 Data Broadcasting

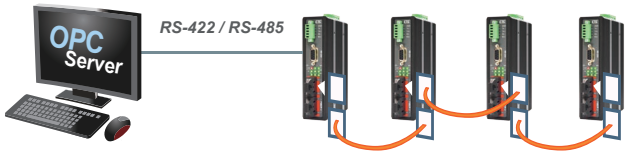
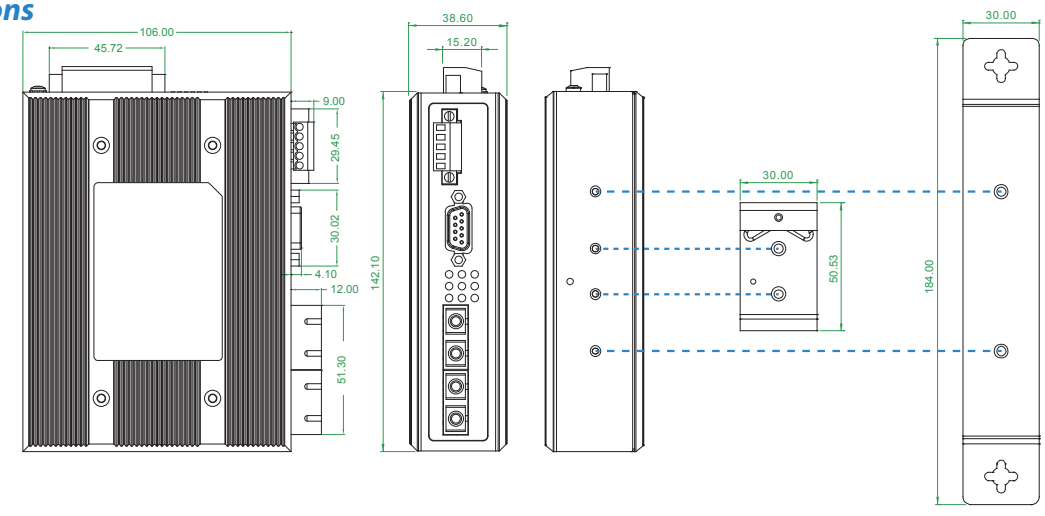


Figure 4 : RS-422/485 Fiber Daisy Chain

Dimensions



Side View | Front View | Rear View | DIN-Rail Kit View | Wall-Mount Kit View

Ordering Information

Model Name	Description
IFC-FDC	RS-232/422/485 serial to dual fiber media converter; Temperature Range : -10 ~ 60°C
IFC-FDC-E	RS-232/422/485 serial to dual fiber media converter; Temperature Range : -40 ~ 75°C

Connector Type	Connectivity Distance
SC, ST	002: 2km 030: 30km 060: 60km

Accessories

DR-4524	Industrial Power, Input 85 ~ 264VAC, Output 24VDC, 48W, -10 ~ +50°C
MDR-40-24	Industrial Power, Input 85 ~ 264VAC, Output 24VDC, 40W, -20 ~ +70°C

Temperature | Connector Type | Connectivity Distance

IFC – FDC – □ – □□□□□

Example: IFC – FDC – E – SC002

IMC-1000

10/100/1000Base-T to 100/1000Base-SX/LX Fiber Converter

IMC-1000S

10/100/1000Base-T to 100/1000Base-X SFP Slot Fiber Converter

c UL us LISTED

IMC-1000(S) is a family of Gigabit Ethernet non-managed media converters that support conversion between electrical 10/100/1000Base-T and optical 100/1000Base-X Ethernet. Simple DIP switch settings allow configuring the UTP port for auto-negotiation or for forced 10/100/1000 speed and half/full duplex as well as for enabling LFPT (Link Fault Pass Through), Ethernet flow control(802.3x) and selecting Switch Mode (store & forward) or Converter Mode (Jumbo frame Pass-through). Housed in rugged DIN rail or wall mountable enclosures, these converters are designed for harsh environments, such as industrial networking and intelligent transportation systems (ITS) and are also suitable for many military and utility market applications where environmental conditions exceed commercial product specifications.

Features

- Redundant dual DC input power 12/24/48VDC (9.6 ~ 60VDC)
- IP30 rugged metal housing
- Wide operating temperature -20 ~ 75°C (IMC-1000-E, IMC-1000S-E)
- UL60950-1, CE, FCC, Railway traffic EN50121-4 certification
- Industrial Grade EMS, EMI, EN61000-6-2, EN61000-6-4 certified
- Store-and-Forward mode and Pass through mode (set by DIP SW)
- Conversion between 10/100/1000Base-T and 100/1000Base-X Fiber cable interface
- Provide a DIP-Switch to set functions

Specifications

Standard	IEEE802.3 10Base-T
	IEEE802.3u 100Base-TX, 100Base-FX
	IEEE802.3ab 1000Base-T Gbit/s Ethernet over twisted pair
	IEEE802.3z 1000Base-X Gbit/s Ethernet over Fiber-Optic
	IEEE802.3x Flow Control
RJ45 Ports	10/100/1000Base-TX
Fiber Ports	1000Base SX/LX,100Base-FX SC (IMC-1000, IMC-1000-E) SFP Slot (IMC-1000S, IMC-1000S-E)
Data Process Architecture	Store and Forward mode or Pass through mode set by DIP SW
Jumbo Frame	9K bytes
Fiber Parameters	Fiber Cable (Multi-mode): 50/125um, 62.5/125um
	Fiber Cable (Single-mode): 9/125um
	Wavelength: 1310nm (Multi-mode/Single-mode)
	Available distance: (IMC-1000, IMC-1000-E) 500M (Multi-mode SX) 20KM (Single-mode) 40KM (Single-mode)
	SFP (IMC-1000S, IMC-1000S-E), Distance depend on Fiber Tranceiver
Link Fault Pass Through (LFPT)	TX-Fiber: If TX port link down, the media converter will force Fiber port to link down
	Fiber-TX: If Fiber port link down, the media converter will force TX port to link down
DIP Switch	Off: Alarm For Power Enable On: Alarm For Power Disable
	Off: Alarm For Port Enable On: Alarm For Port Disable
	Off: LFP Disable On: LFP Enable
	Off: Switch Mode On: Converter Mode
	Off: 1000Base-X On: 100Base-FX
Connector	Fiber: SC (Multi-mode, 500M), SC (Single-mode, 20KM, 40KM) (IMC-1000, IMC-1000-E) SFP Slot (IMC-1000S, IMC-1000S-E)
	RJ-45 Socket: CAT 5e Twisted Pair cable Auto MDI/MDI-X and Auto-Negotiation Function Supports
LED	Per Unit: Power 1 (Green), Power 2 (Green), Fault (Amber)
	LNK/ACT for Fiber(Green): ON : Connected to network/ OFF : Not connected to network/ BLK : Receive /Transmit Data
	SFP Fiber speed: Yellow : 1000Base-X Green : 100Base-FX

LED	RJ-45 port: Speed: 10 (OFF), 100 (Green), 1000 (Yellow) LNK/ACT for RJ45(Green): ON: Connected to network/ OFF: Not connected to network/ BLK: Networking is active
Reserve Polarity Protection	Present
Overload Current Protection	Present
Power Supply	12/24/48VDC (9.6~60VDC) , Redundant power with polarity reverse protect function and removable terminal block
	Provide DC Power JACK adapter cable for external Power adapter
Power Consumption	4.2W
Alarm Relay Contact	Relay outputs with current carrying capacity of 1 A @24VDC
Removable Terminal Block	Provide 2 Redundant power, Alarm relay contact
Operating Humidity	5% ~ 95% (Non-condensing)
Operating Temperature	-10 ~ 60°C (IMC-1000, IMC-1000S)
	-20 ~ 75°C (IMC-1000-E ,IMC-1000S-E)
Storage Temperature	-40 ~ 85°C
Housing	Rugged Metal, IP30 Protection
Dimensions	106 x 38 x 142 mm (D x W x H)
Weight	630g (IMC-1000, IMC-1000-E)
	620g (IMC-1000S, IMC-1000S-E)
Installation	DIN Rail or wall mounting
EMI	FCC Part 15 Subpart B Class A, EN 55022 Class A
	EN61000-6-4 – Emission for industrial environment
EMS	EN61000-6-2 – Immunity for Industrial environment
	EN61000-4-2 (ESD) Level 3, Criteria B
	EN61000-4-3 (RS) Level 3, Criteria A
	EN61000-4-4 (EFT) Level 3, Criteria A
	EN61000-4-5 (Surge) Level 3, Criteria B
	EN61000-4-6 (CS) Level 3, Criteria A
	EN61000-4-8 (Magnetic Field)
Safety	UL60950-1
Railway Traffic	EN 50121-4
Shock	IEC 60068-2-27
Freefall	IEC 60068-2-32
Vibration	IEC 60068-2-6
MTBF	563,813Hrs (IMC-1000, IMC-1000-E)
	578,980Hrs (IMC-1000S, IMC-1000S-E)
Warranty	5 years

Application & Topology

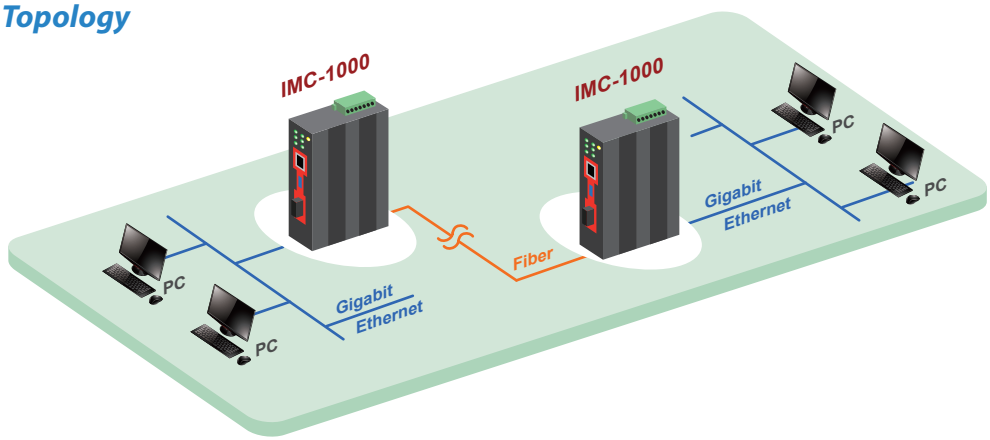
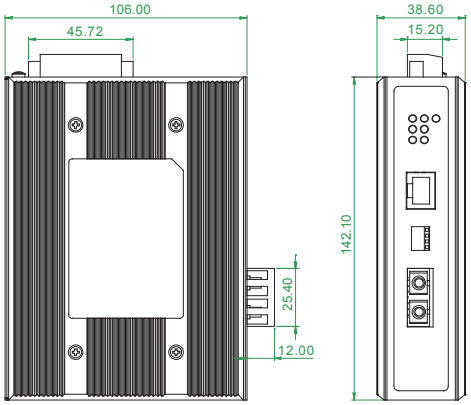


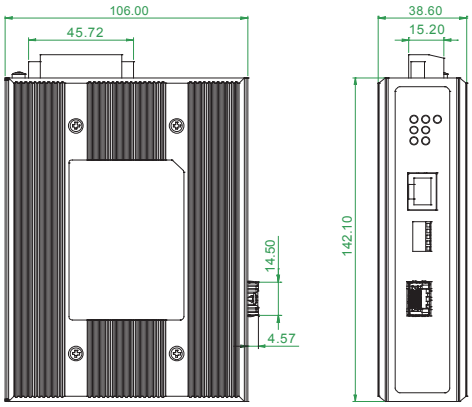
Figure : IMC-1000 Media Converter Transmission

Dimensions

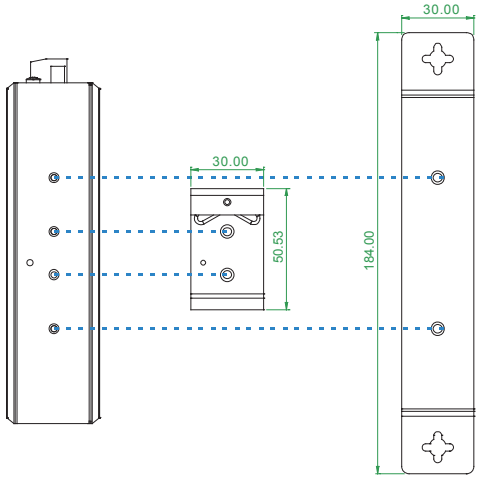
IMC-1000/1000-E



IMC-1000S/1000S-E



Side View Front View



Rear View DIN-Rail Kit View Wall-Mount Kit View

Ordering Information

Model Name	Description
IMC-1000	10/100/1000Base-T to 100/1000Base FX/SX/LX Fiber Converter Temperature Range : -10 ~ 60°C
IMC-1000-E	10/100/1000Base-T to 100/1000Base FX/SX/LX Fiber Converter Temperature Range : -20 ~ 75°C
IMC-1000S	10/100/1000Base-T to 100/1000Base FX/SX/LX SFP Slot Fiber Converter Temperature Range : -10 ~ 60°C
IMC-1000S-E	10/100/1000Base-T to 100/1000Base FX/SX/LX SFP Slot Fiber Converter Temperature Range : -20 ~ 75°C

Connector Type	Connectivity Distance
SC (IMC-1000 & IMC-1000-E only)	001:500M (M/M) 002 : 2km (M/M) 020:20km (S/M) 040:40km (S/M) 020A: WDM 20km A type (TX:1310nm) 020B: WDM 20km B type (TX: 1550nm)type

Accessories

DR-4524	Industrial Power, Input 85 ~ 264VAC, Output 24VDC, 48W, -10 ~ +50°C
MDR-40-24	Industrial Power, Input 85 ~ 264VAC, Output 24VDC, 40W, -20 ~ +70°C
SFP Transceiver	Compatible, Reliable, 5-year Warranty

ISFP – M 7 040 – 31 – E

- ISFP: Industrial SFP Transceiver
- M: Multi Mode; S: Single Mode; T: Copper
- 7: GbE; 5: FE
- 040: Distance 002(2km), 020(20km), 040(40km)...
- 31: Wavelength
- E: -40~85°C; Blank: 0~70°C

Temperature / Connector Type / Connectivity Distance

IMC – 1000 – □ – □□□□□

Example: IMC – 1000 – E – SC002

IMC-100

10/100Base-TX to 100Base-FX Fiber Converter

c UL us LISTED

IMC-100 is a family of Fast Ethernet non-managed media converters that support conversion between electrical 10/100Base-TX and optical 100Base-FX Ethernet. Simple DIP switch settings allow configuring the UTP port for auto-negotiation or for forced 10/100 speed and half/full duplex as well as for enabling LFPT (Link Fault Pass Through), Ethernet flow control(802.3x) and selecting Switch Mode (store & forward) or Converter Mode (Jumbo frame Pass-through). Housed in rugged DIN rail or wall mountable enclosures, these converters are designed for harsh environments, such as industrial networking and intelligent transportation systems (ITS) and are also suitable for many military and utility market applications where environmental conditions exceed commercial product specifications.

Features

- Redundant dual DC input power 12/24/48VDC (9.6 ~ 58VDC)
- IP30 rugged metal housing
- Wide operating temperature -40 ~ 75°C (IMC-100-E)
- UL60950-1, CE, FCC, Rail traffic EN50121-4 certification
- Industrial Grade EMS, EMI, EN61000-6-2, EN61000-6-4 certified
- Store-and-Forward mode and Pass Through mode (set by DIP SW)
- Conversion between 10/100Base-TX and 100Base-FX cable interface
- Provide a 6 Pole DIP-Switch to set functions

Specifications

Standard	IEEE 802.3 10Base-T
	IEEE 802.3u 100Base-TX/100Base-FX
	IEEE 802.3x Flow Control
RJ45 Ports	10/100Base-TX
Fiber Ports	100Base-FX (SC/ST connectors)
Switch Architecture	Store and Forward in Switch mode
	Supports 1024 MAC addresses in Switch mode
Ethernet Packet length	2046Byte (Max) in Switch mode
Jumbo Frame	9K bytes in Pass through (Converter mode)
Fiber Parameters	Fiber Cable (Multi-mode): 50/125um,62.5/125um
	Fiber Cable (Single-mode): 9/125um
	Wavelength: 1310nm (Multi-mode/Single-mode)
	Available distance: 2KM (Multi-mode) 30KM (Single-mode) 50KM (Single-mode)
Link Fault Pass Through (LFPT)	TX- Fiber: If TX port link down, the media converter will force Fiber port to link down
	Fiber-TX: If Fiber port link down, the media converter will force TX port to link down
DIP Switch	TP Auto Negotiation OFF: Auto Mode, ON: Force Mode
	Force TP Speed OFF: 100 Mbps, ON: 10 Mbps
	Force TP Duplex OFF: Full Duplex, ON: Half Duplex
	DIP Switch: ON: Enables LFPT (Link Fault Pass through) OFF: Disables LFPT (Link Fault Pass through)
	DIP Switch: ON: Flow Control Enable OFF: Flow Control Disable
	DIP Switch: OFF: Switching mode ON: Pass through Converter mode
Connector	Fiber: SC (Multi-mode, 2km), SC (Single-mode, 30km, 50KM) ST (Multi-mode, 2km), ST (Single-mode, 30km, 50KM)
	RJ-45 Socket: CAT-3/5 (10/100Mbps) Twisted Pair cable
	Auto MDI/MDI-X and Auto-Negotiation Function Support
LED	PWR 1 (Green): ON: Power1 active/ OFF: Power1 is inactive
	PWR 2 (Green): ON: Power2 active/ OFF: Power2 is inactive
	Fault (Red): ON: Fiber or TP has failed OFF: TP are functional
	Fiber (Green): ON : Connected to network OFF: Not connected to network/ BLK: Receive/Transmit Data
	100 (Amber): ON: 100Mbps/ OFF: 10Mbps
	LAN (Green): ON : Connected to network OFF: Not connected to network/ BLK: Networking is active

Reserve Polarity Protection	Present
Overload Current Protection	Present
Power Supply	12/24/48VDC(9.6~58VDC), Redundant power with polarity reverse protect function and removable terminal block
	Provide DC Power JACK adapter cable for external power adapter
Alarm Relay Contact	Relay outputs with current carrying capacity of 1 A @24VDC
Removable Terminal Block	Provide 2 redundant power, alarm relay contact
Power Consumption	2.9 W
Operating Humidity	5% ~ 95% (Non-condensing)
Operating Temperature	-10 ~ 60°C (IMC-100)
	-40 ~ 75°C (IMC-100-E)
Storage Temperature	-40 ~ 85°C
Housing	Rugged Metal, IP30 Protection
Dimensions	106 x 38 x 142mm (D X W X H)
Weight	0.62kg
Installation	DIN Rail mounting and Wall Mounting
EMI	FCC Part 15 Subpart B Class A
	EN 55022 Class A
	EN 61000-6-4 – Emission for industrial environment
EMS	EN 61000-6-2 – Immunity for Industrial environment
	EN61000-4-2 (ESD) Level 3, Criteria B
	EN61000-4-3 (RS) Level 3, Criteria A
	EN61000-4-4 (EFT) Level 3, Criteria A
	EN61000-4-5 (Surge) Level 3, Criteria B
	EN61000-4-6 (CS) Level 3, Criteria A
	EN61000-4-8 (Magnetic Field) Level 3, Criteria A
Safety	UL60950-1
Railway Traffic	EN 50121-4
Shock	IEC 60068-2-27
Freefall	IEC 60068-2-32
Vibration	IEC 60068-2-6 (Operating, Packing)
MTBF	852,727 Hrs
Warranty	5 years

Application

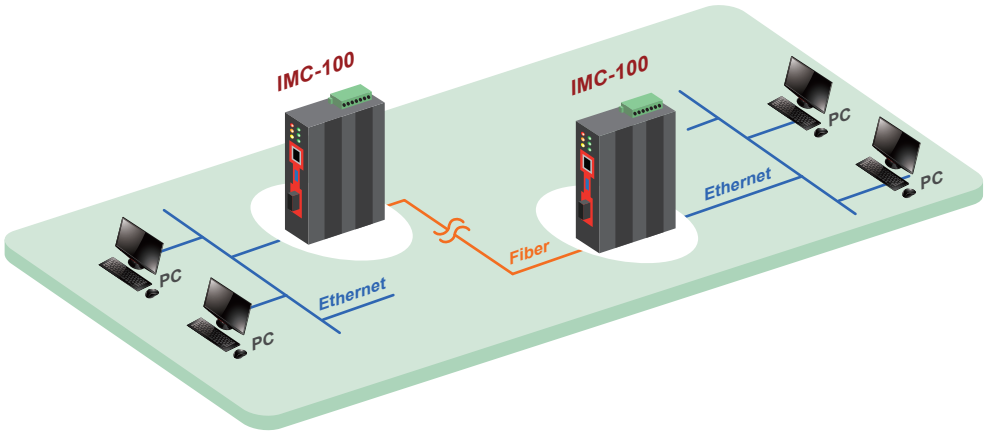
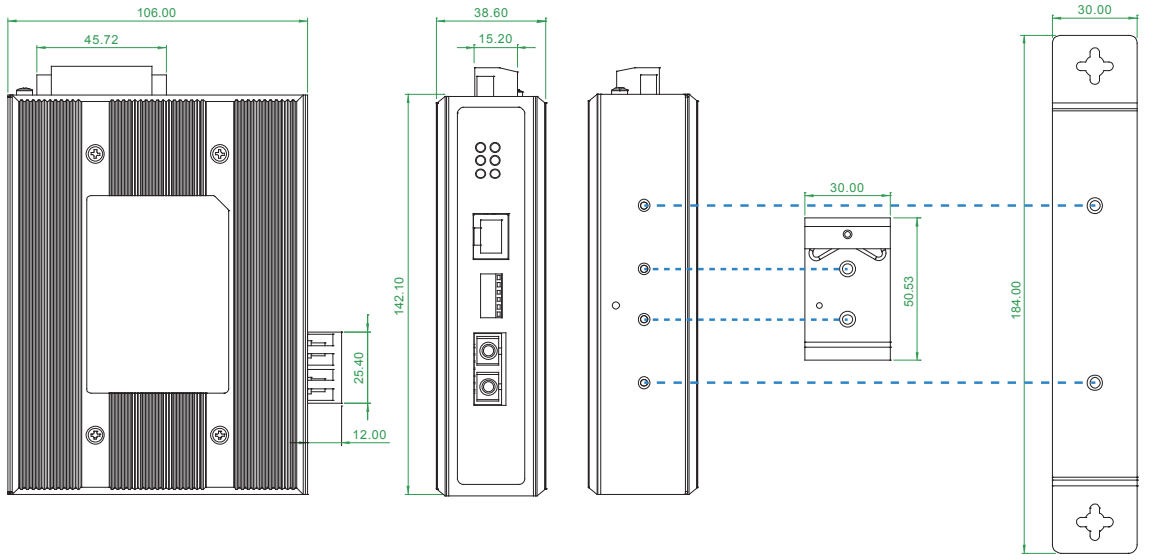


Figure : IMC-100 Media Converter Transmission

Dimensions



Side View | Front View | Rear View | DIN-Rail Kit View | Wall-Mount Kit View

Ordering Information

Model Name	Description
IMC-100	1-Port 10/100-TX to 100-FX Fiber Converter ; Temperature Range : -10 ~ 60°C
IMC-100-E	1-Port 10/100-TX to 100-FX Fiber Converter ; Temperature Range : -40 ~ 75°C

Connector Type	Connectivity Distance
SC, ST	002:2km (M/M) 030:30km (S/M) 050:50km (S/M) 020A: WDM 20km A type (TX:1310nm) 020B: WDM 20km B type (TX: 1550nm)

Accessories

DR-4524	Industrial Power, Input 85 ~ 264VAC, Output 24VDC, 48W, -10 ~ +50°C
MDR-40-24	Industrial Power, Input 85 ~ 264VAC, Output 24VDC, 40W, -20 ~ +70°C

Temperature | Connector Type | Connectivity Distance

IMC – 100 – □ – □□□□□

Example: IMC – 100 – E – SC002

IMC-1000M

10/100/1000Base-T to 100/1000Base-SX/LX Managed Fiber Converter

IMC-1000MS

10/100/1000Base-T to 100/1000Base-X SFP Managed Fiber Converter

c UL us LISTED

IMC-1000M(S) is a family of managed Gigabit Ethernet media converters that support conversion between electrical 10/100/1000Base-T and optical 100/1000Base-X Ethernet. Housed in rugged DIN rail or wall mountable enclosures, these converters are designed for harsh environments, such as industrial networking and intelligent transportation systems (ITS) and are also suitable for many military and utility market applications where environmental conditions exceed commercial product specifications. The converter is Web Smart managed with an easy to use Web user interface for OAM&P (Operation, Administration, Maintenance & Provisioning), including bandwidth control, duplex, speed, and VLAN configuration. The converter is IEEE802.3ah OAM compliant, making it able to be linked to any 802.3ah compliant fiber switch to support loop back and dying gasp functions.

Features

- Conversion between 10/100/1000Base-T and 100/1000Base-X Fiber cable interface
- Supports Dual Rate (100/1000) SFP for selectable Fast or Gigabit speed on fiber
- Redundant dual DC input power 12/24/48VDC (9.6 ~ 60VDC)
- IP30 rugged metal housing
- Wide operating temperature -20~75°C (IMC-1000M-E, IMC-1000MS-E)
- UL60950-1, CE, FCC, RailWay traffic EN50121-4 certification
- Industrial grade EMS, EMI EN61000-6-2, EN61000-6-4 certification
- RMON counters
- Supports Jumbo frame 9K bytes packet
- Ingress/Egress bandwidth control
- Supports IEEE802.3ah OAM management (In-band management)
- Remote loop back test
- Dying gasp (remote power failure detection)
- SNMP alarm trap for power loss and port link down
- Auto Laser Shutdown (ALS) (IMC-1000MS, IMC-1000MS-E)
- Digital Diagnostic DDM for SFP Support
- Web management on stand-alone.
- Supports 16 IEEE802.1Q Tag VLAN Group
- SmartView Management System

Specifications

Standard	IEEE802.3 10Base-T
	IEEE802.3u 100Base-TX , 100Base-FX
	IEEE802.3ab 1000Base-TX Gbit/s Ethernet over twisted pair
	IEEE802.3z 1000Base-X Gbit/s Ethernet over Fiber-optic
	IEEE802.3x Flow Control and Back pressure
	IEEE802.3ah OAM management
	IEEE802.1q Tag VLAN
Fiber Ports	100Base-X or 1000Base-X set by Web Supports Auto Laser Shutdown (ALS) (IMC-1000MS, IMC-1000MS-E)
RJ45 Ports	10/100/1000Base-T
CPU watch dog	Present
Push Button	Reset, Load default seting
Jumbo Frame	9K bytes
Fiber Parameters	Fiber Cable (Multi-mode): 50/125um,62.5/125um
	Fiber Cable (Single-mode): 9/125um
	Wavelength: 1310nm (Multi-mode/Single-mode)
	Available distance: 500M (Multi-mode SX) 20KM (Single-mode) 40KM (Single-mode) (IMC-1000M, IMC-1000M-E)
	SFP, Distance depend on plug-in Fiber Tranceiver (IMC-1000M, IMC-1000M-E)
Link Lose Forward	TX-Fiber: If TX port link down, the media converter will force Fiber port to link down
	Fiber-TX: If Fiber port link down, the media converter will force TX port to link down
Connector	Fiber: SC (Multi-mode, 500M), SC (Single-mode, 20KM, 40KM) (IMC-1000M, IMC-1000M-E) SFP Slot (IMC-1000MS, IMC-1000MS-E)
	RJ-45: CAT 5e (10/100/1000Mbps) Twisted Pair cable
	Auto MDI/MDI-X and Auto-Negotiation Function Supports
LED	Per Unit : Power 1 (Green), Power 2 (Green), Fault (Amber)
	Fiber LNK/ACT (Green): ON: Connected to network OFF: Not connected to network BLK: Receive /Transmit Data Fiber speed : Yellow : 1000Base-X Green : 100Base-X
	RJ-45 port: Speed: 10 (OFF), 100 (Green), 1000 (Yellow)
	LNK/ACT for RJ45(Green): ON : Connected to network/ OFF: Not connected to network/ BLK: Networking is active

Reverse Polarity Protection	Present for power Input
Overload Current Protection	Present
Power Supply	12/24/48VDC (9.6~60VDC) , Redundant power with polarity reverse protect function and removable terminal block
	Provide DC Power JACK adapter cable for external power adapter
Alarm Relay Contact	Relay outputs with current carrying capacity of 1 A @24VDC
	Relay alarm output for power fail or port link down
Removable Terminal Block	Provide 2 redundant power, alarm relay contact, 7 Pin
Power Consumption	4.8 W
Operating Humidity	5% ~ 95% (Non-condensing)
Operating Temperatur	-10° ~ 60°C (IMC-1000M, IMC-1000MS)
	-20 ~ 75°C (IMC-1000M-E, IMC-1000MS-E)
Storage Temperature	-40 ~ 85°C
Housing	Rugged Metal, IP30 Protection
Dimensions	106 x 38.6 x 142 mm (D x W x H)
Weight	0.63kg (IMC-1000M, IMC-1000M-E)
	0.62kg (IMC-1000MS, IMC-1000MS-E)
Installation	DIN Rail mounting or wall mounting
EMI	FCC Part 15 Subpart B Class A, CE EN 55022 Class A
EMS	EN 61000-6-2 – Immunity for Industrial environment
	EN61000-4-2 (ESD) Level 3, Criteria B
	EN61000-4-3 (RS) Level 3, Criteria A
	EN61000-4-4 (EFT) Level 3, Criteria A
	EN61000-4-5 (Surge) Level 3, Criteria B
	EN61000-4-6 (CS) Level 3, Criteria A
	EN61000-4-8 (Magnetic Field) Level 3, Criteria A
Safety	UL60950-1
Railway Traffic	EN 50121-4
Shock	IEC 60068-2-27
Freefall	IEC 60068-2-32
Vibration	IEC 60068-2-6
MTBF	544,905 hrs (IMC-1000M) 559,059 hrs (IMC-1000MS)
Warranty	5 years

Specifications & design are subject to change without prior notice. Please visit CTC Union website for more details.

Specifications

Management	Ingress/Egress bandwidth control with 64K granularity
	Supports IEEE802.3ah OAM management, loop back and dying gasp (Remote power failure detection)
	Firmware upgrade via Web
	Web management on stand-alone (Local)
	Supports SNMP, MIB for management
	OAM In band management (Remote)
	Supports DHCP client for automatic TCP/IP configuration
	Supports 802.1Q tag VLAN,16Tag VLAN group, RMON counters display (Stand-alone only)
	Local configuration : IP configuration, password setting, converter configuration, port configuration, MIB counter, SNMP configuration, VLAN group configuration, alarm configuration Remote configuration : IP configuration, converter configuration, port configuration, MIB counter, VLAN group configuration, alarm configuration

OAM	Supports in-band remote management from FRM220 rack management
	OAM Function: IEEE802.3ah configuration, Loopback test, IEEE802.3ah status
Diagnostic & Monitor	Remote loop back test
	Dying gasp (remote power failure detection)
	Supports Link Fault Pass-Through (LFPT) Function
	Supports DDM diagnostic function for SFP fiber transceiver
	Broadcast/Multicast/Unicast storm filter
	SNMP alarm trap for power loss and port link down

Application

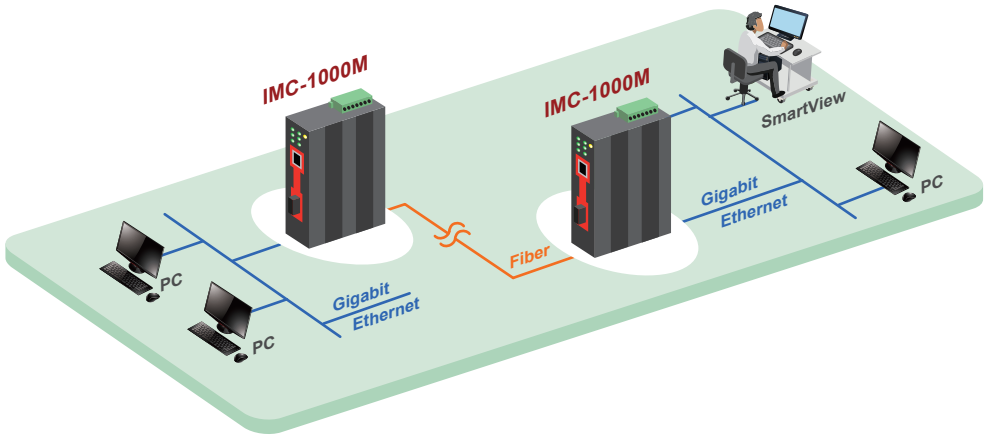
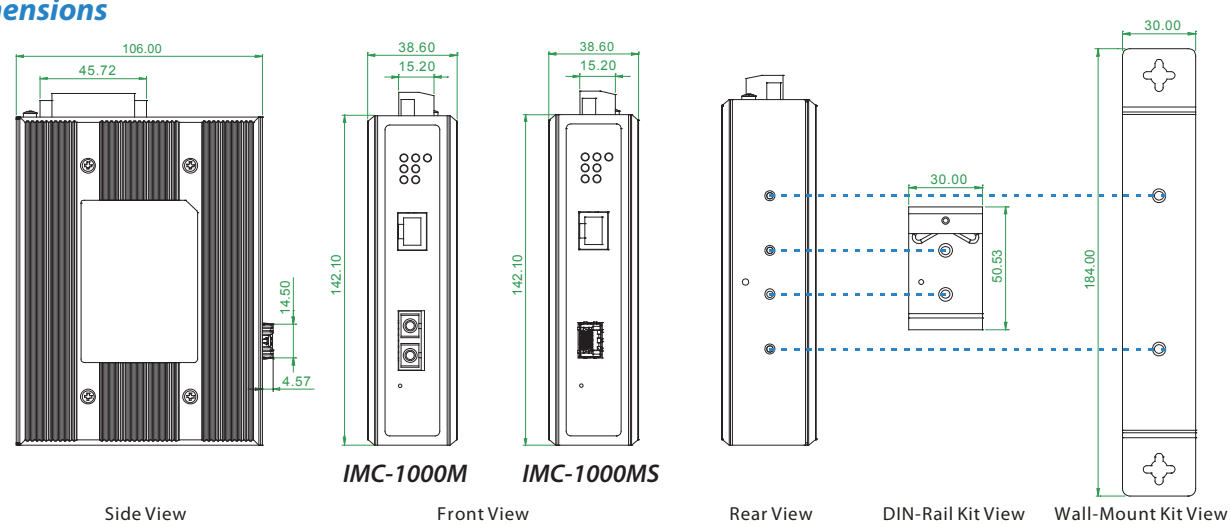


Figure : IMC-1000M Ethernet Transmission

Dimensions



Side View | Front View | Rear View | DIN-Rail Kit View | Wall-Mount Kit View

Ordering Information

Model Name	Description
IMC-1000M	Industrial Managed with OAM 10/100/1000Base-T to 100/1000Base SX/LX/FX Fiber Converter (-10 ~ 60°C)
IMC-1000M-E	Industrial Managed with OAM 10/100/1000Base-T to 100/1000Base SX/LX/FX Fiber Converter (-20 ~ 75°C)
IMC-1000MS	Industrial Managed with OAM 10/100/1000Base-T to 100/1000Base SFP Fiber Converter (-10 ~ 60°C)
IMC-1000MS-E	Industrial Managed with OAM 10/100/1000Base-T to 100/1000Base SFP Fiber Converter (-20 ~ 75°C)

Connector Type	Connectivity Distance
SC (IMC-1000M, IMC-1000M-E only)	001:500M (M/M) 002 : 2km (M/M) 020:20km (S/M) 040:40km (S/M) 020A: WDM 20km A type (TX:1310nm) 020B: WDM 20km B type (TX: 1550nm)

Accessories

DR-4524	Industrial Power, Input 85 ~ 264VAC, Output 24VDC, 48W, -10 ~ +50°C
MDR-40-24	Industrial Power, Input 85 ~ 264VAC, Output 24VDC, 40W, -20 ~ +70°C
SFP Transceiver	Compatible, Reliable, 5-year Warranty

ISFP – M 7 040 – 3 1 – E

- ISFP: Industrial SFP Transceiver
- M: Multi Mode; S: Single Mode; T: Copper
- 7: GbE; 5: FE
- 040: Distance 002(2km), 020(20km), 040(40km)...
- 3 1: Wavelength
- E: -40~85°C; Blank: 0~70°C

Temperature | Connector Type | Connectivity Distance

IMC – 1000M – □ – □□□□□

Example: IMC – 1000M – E – SC002

IMC-100M

10/100Base-TX to 100Base-FX Managed Fiber Converter

c UL us LISTED

IMC-100M is a family of managed Fast Ethernet media converters that support conversion between electrical 10/100Base-TX and optical 100Base-FX Ethernet. Housed in rugged DIN rail or wall mountable enclosures, these converters are designed for harsh environments, such as industrial networking and intelligent transportation systems (ITS) and are also suitable for many military and utility market applications where environmental conditions exceed commercial product specifications. The converter is Web Smart managed with an easy to use Web user interface for OAM&P (Operation, Administration, Maintenance & Provisioning), including bandwidth control, duplex, speed, and VLAN configuration. The converter is IEEE802.3ah OAM compliant, making it able to be linked to any 802.3ah compliant fiber switch to support loop back and dying gasp functions.

Features

- Conversion between 10/100Base-TX and 100Base-FX Fiber cable interface
- Redundant dual DC input power 12/24/48VDC (9.6 ~ 60VDC)
- IP30 rugged metal housing
- Wide operating temperature -20~75°C
- UL60950-1, CE, FCC, Railway traffic EN50121-4 certification
- Industry grade EMS, EMI EN61000-6-2, EN61000-6-4 certification
- Supports jumbo frame 9K bytes packet
- Ingress/Egress bandwidth control
- RMON counters
- Supports IEEE802.3ah OAM management (In-band management)
- Remote loop back test
- Dying gasp (remote power failure detection)
- SNMP alarm trap for power loss and port link down
- Auto Laser Shutdown (ALS)
- Digital diagnostic DDM for SFP support
- Web management on stand-alone
- Supports 16 IEEE802.1Q Tag VLAN Group
- SmartView Management System

Specifications

Standard	IEEE802.3 10Base-T
	IEEE802.3u 100Base-TX, 100Base-FX
	IEEE802.3x Flow Control and Back pressure
	IEEE802.3ah OAM management
	IEEE802.1q Tag VLAN
Fiber Ports	100Base-FX Supports Auto laser shutdown (ALS)
RJ45 Ports	10/100/1000Base-TX
CPU watch dog	Present
Push Button	Reset, Load default seting
Jumbo Frame	9K bytes
Fiber Parameters	Fiber Cable (Multi-mode): 50/125um, 62.5/125um
	Fiber Cable (Single-mode): 9/125um
	Wavelength: 1310nm (Multi-mode/Single-mode)
	Available distance: 2 KM (Muti-mode) 30KM (Single-mode) 50KM (Single-mode)
Link Lose Forward	TX-Fiber: If TX port link down, the media converter will force Fiber port to link down
	Fiber-TX: If Fiber port link down, the media converter will force TX port to link down
Connector	Fiber: SC (Multi-mode, 2KM), SC (Single-mode, 30KM, 50KM)
	RJ-45: CAT 5e (10/100Mbps) Twisted Pair cable
	Auto MDI/MDI-X and Auto-Negotiation Function Supports
LED	Per Unit : Power 1 (Green), Power 2 (Green), Fault (Amber)
	Fiber LNK/ACT (Green): ON: Connected to network OFF: Not connected to network BLK: Receive /Transmit Data
	RJ-45 port: Speed: 10 (OFF), 100 (Green)
	LNK/ACT for RJ45(Green): ON : Connected to network/ OFF: Not connected to network/ BLK: Networking is active
Reverse Polarity Protection	Present for Power Input
Overload Current Protection	Present
Power Supply	12/24/48VDC (9.6~60VDC), Redundant power with polarity reverse protect function and removable terminal block
	Provide DC Power JACK adapter cable for external power adapter
Alarm Relay Contact	Relay outputs with current carrying capacity of 1 A @24VDC
	Relay Alarm Output for Power Fail or Port link down
Removable Terminal Block	Provide 2 redundant power, alarm relay contact, 7 Pin
Operating Humidity	5% ~ 95% (Non-condensing)
Operating Temperatur	-10° ~ 60°C
	-20 ~ 75°C
Storage Temperature	-40 ~ 85°C
Housing	Rugged Metal, IP30 Protection
Dimensions	106 x 38.6 x 142 mm (D x W x H)
Installation	DIN Rail mounting or wall mounting
EMI	FCC Part 15 Subpart B Class A, CE EN 55022 Class A
EMS	EN 61000-6-2 – Immunity for Industrial environment
	EN61000-4-2 (ESD) Level 3, Criteria B
	EN61000-4-3 (RS) Level 3, Criteria A
	EN61000-4-4 (EFT) Level 3, Criteria A
	EN61000-4-5 (Surge) Level 3, Criteria B
	EN61000-4-6 (CS) Level 3, Criteria A
	EN61000-4-8 (Magnetic Field) Level 3, Criteria A
Safety	UL60950-1
Railway Traffic	EN 50121-4
Shock	IEC 60068-2-27
Freefall	IEC 60068-2-32
Vibration	IEC 60068-2-6
Warranty	5 years

Specifications

Management	Ingress/Egress bandwidth control with 64K granularity
	Supports IEEE802.3ah OAM management, loop back and dying gasp (Remote power failure detection)
	Firmware upgrade via Web
	Web management on stand-alone (Local)
	Supports SNMP, MIB for management
	OAM In band management (Remote)
	Supports DHCP client for automatic TCP/IP configuration
	Supports 802.1Q tag VLAN, 16Tag VLAN group, RMON counters display (Stand-alone only)
	Local configuration: IP configuration, password setting, converter configuration, port configuration, MIB counter, SNMP configuration, VLAN group configuration, alarm configuration
	Remote configuration: IP configuration, converter configuration, port configuration, MIB counter, VLAN group configuration, alarm configuration
OAM	Supports in-band remote management from FRM220 rack management
	OAM Function: IEEE802.3ah configuration, Loopback test, IEEE802.3ah status
Diagnostic & Monitor	Remote loop back test
	Dying gasp (remote power failure detection)
	Supports Link Fault Pass-Through (LFPT) Function
	Supports DDM diagnostic function for SFP fiber transceiver
	Broadcast/Multicast/Unicast storm filter
	SNMP alarm trap for power loss and port link down

Application

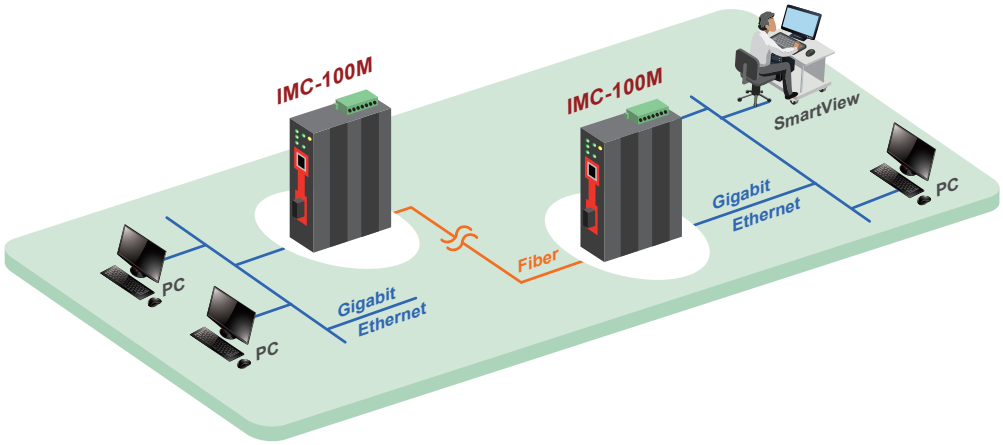
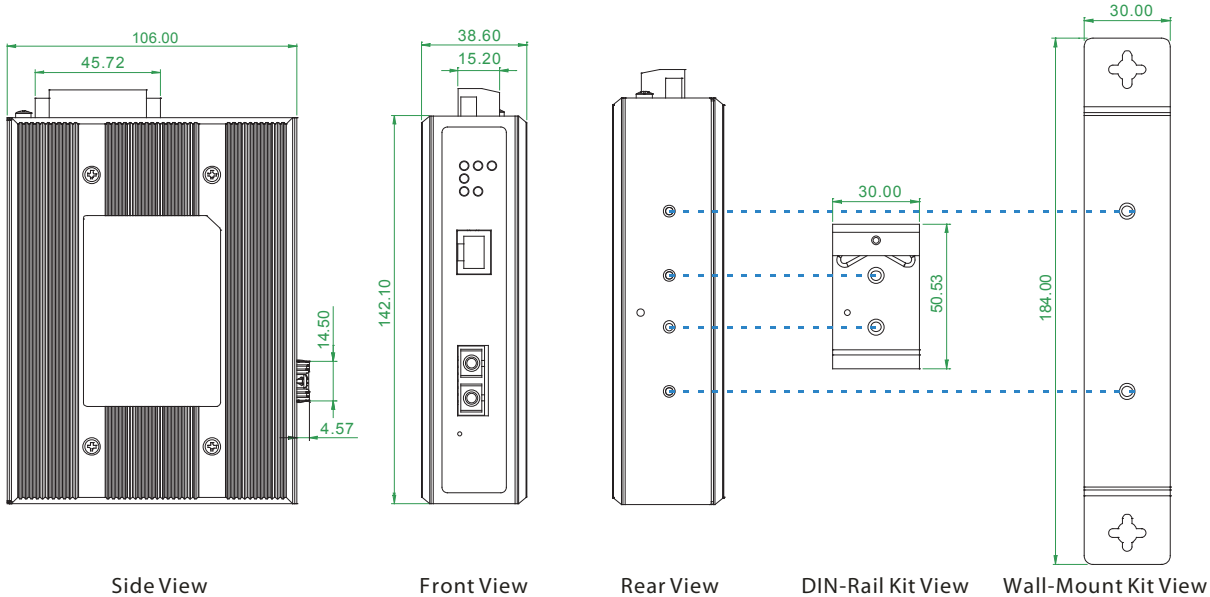


Figure : IMC-100M Ethernet Transmission

Dimensions



Side View | Front View | Rear View | DIN-Rail Kit View | Wall-Mount Kit View

Ordering Information

Model Name	Description
IMC-100M	Industrial Managed with OAM 10/100Base-TX to 100Base FX Fiber Converter (-10 ~ 60°C)
IMC-100M-E	Industrial Managed with OAM 10/100Base-TX to 100Base FX Fiber Converter (-20 ~ 75°C)

Connector Type	Connectivity Distance
SC	002: 2KM (M/M) 002 : 2km (M/M) 030k : 30km (S/M) 050: 50km (S/M) 020A: WDM 20km A type (TX:1310nm) 020B: WDM 20km B type (TX: 1550nm)

Accessories

DR-4524	Industrial Power, Input 85 ~ 264VAC, Output 24VDC, 48W, -10 ~ +50°C
MDR-40-24	Industrial Power, Input 85 ~ 264VAC, Output 24VDC, 40W, -20 ~ +70°C

Temperature | Connector Type | Connectivity Distance

IMC – 100M – □ – □□□□□

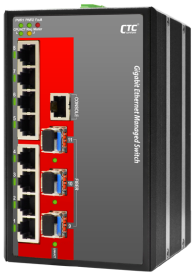
Example: IMC – 100M – E – SC002

IPS-G803SM-DD

IEC 61850-3 8x10/100/1000Base-T+ 3x 100/1000Base-X SFP Managed Switch ***(Dual isolated DC Input)***

IPS-G803SM-AD

IEC 61850-3 8x10/100/1000Base-T+ 3x 100/1000Base-X SFP Managed Switch ***(AC+isolated DC Input)***



NEW

IEC 61850-3

IPS-G803SM managed Gigabit Ethernet switch is designed to meet the demands of power substation systems and is fully compliant with the requirement of IEC 61850-3 and IEEE 1613. The switch provide a variety of redundant functions to increase the reliability of your communications system, including redundant and isolated power supplies (24/48 VDC) and 110/220 VDC/VAC), STP/RSTP/MSTP and ITU-T G.8032 Ethernet Ring Protection Switching (recovery time<50ms) and can compatibly work with other switches in the network for ring protection. The proprietary μ-Ring (with recovery time of less than 20ms) can easy to work with a variety CTC industrial managed switch for ring protection. The switch also provide many function, such as Web management, SNMP, IGMP, VLAN, LACP, QoS, Security, IPv6, bandwidth control, port mirroring, cable diagnostics and Green Ethernet. IPS-803GSM can be managed centrally and conveniently by CTC SmartView Element Management System.

Features

- 8x 10/100/1000Base-T RJ-45 with 3x 100/1000Base-X SFP Fiber
- UL60950-1, CE, FCC, certification
- IEC61850-3, IEEE1613 certified for power substation
- Redundancy isolated ±24/48 VDC power inputs (IPS-G803SM-DD)
- Isolated ±24/48VDC and 110/240VDC/VAC power input (IPS-G803SM-AD)
- Wide Operating Temperature -40~85°C
- DIN Rail mounting or wall mounting
- IP30 rugged metal housing
- Cable diagnostic, Measuring cable OK or broken point distance
- Supports IEEE802.3az EEE (Energy Efficient Ethernet) Management to optimize the power consumption
- STP, RSTP, MSTP, ITU-T G.8032 Ethernet Protection Ring(EPR), μ-Ring for cabling redundant
- μ-Ring for Redundant Ethernet Ring, recovery time<20ms in 250 units
- QoS, Traffic classification QoS, CoS, bandwidth control for Ingress and Egress, Storm Control, DiffServ
- IEEE802.1Q VLAN, port based VLAN, MAC based VLAN, IP subnet based VLAN, Protocol based VLAN, VLAN translation, MVR
- Dynamic IEEE 802.3ad LACP Link Aggregation, Static Link Aggregation
- IGMP/MLD snooping V1/V2/V3, IGMP Filtering / Throttling, IGMP query, IGMP proxy reporting, MLD snooping
- Security : Port based and Mac based IEEE802.1X, RADIUS, ACL, TACACS+, HTTP/HTTPS, SSL/SSH v2
- Software upgrade via TFTP and HTTP, redundant firmware in case of upgrade failure
- Supports DHCP client/Relay/Snooping/Snooping option 82/ Relay option 82
- Supports RMON, MIB II, Port mirroring, Event syslog, DNS, NTP/ SNTP, IEEE802.1ab LLDP
- Supports IPv6 Telnet server /ICMP v6, SNMP, HTTP, SSH/SSL, NTP/ SNTP, TFTP, QoS, ACL
- CLI, Web based management, **SNMP** v1/v2c/v3, Telnet server for management
- **SmartView** Management System

Specifications

IEEE Standard	IEEE 802.3 10Base-T Ethernet
	IEEE 802.3u 100Base-TX Fast Ethernet
	IEEE 802.3ab 1000Base-T Gigabit Ethernet
	IEEE 802.3z 1000Base-X Gigabit Ethernet
	IEEE 802.1d STP
	IEEE 802.1w RSTP
	IEEE 802.1s MSTP
	IEEE 802.1Q for VLAN Tagging
	IEEE 802.1X for Authentication
	IEEE 802.3ad for Port Trunk with LACP
	IEEE802.3x Flow Control and Back Pressure
	ITU-T G.8032/ Y.1344 EPR (Ethernet Protection Ring)
	IEEE 802.1ad Stacked VLANs, Q-in-Q
	IEEE 802.1p LAN Layer 2 QoS/CoS Protocol for Traffic Prioritization
	IEEE 802.1ab Link Layer Discovery Protocol (LLDP)
	IEEE 802.3az EEE (Energy Efficient Ethernet)
VLAN ID	4096
IGMP Group	256
Switch Architecture	Back-plane (Switching Fabric): 22Gbps
Data Processing	Store and Forward
Flow Control:	IEEE 802.3x flow control, back pressure flow control
Jumbo Frame	9.6KB
MAC Address Table	8K

Network Connector	8x RJ-45
	10/100/1000Base-T auto negotiation speed
	Auto MDI/MDI-X function, Full/Half duplex
	3x 100/1000Base-X dual speed mode SFP slot, with DDMI
Console	RS-232 (RJ-45)
Network Cable	UTP/STP above Cat. 5e cable
	EIA/TIA-568 100-ohm (100m)
Protocols	CSMA/CD
LED	Per unit : Power 1 (Green), Power 2 (Green), Fault (Amber)
	Per RJ-45 port :10/100Link/Act: Green, 1000Link/Act: Amber
	SFP Fiber Per port : Link/Active (Green)
Reverse Polarity Protection	Present for Power Input
Overload Current Protection	Present
CPU Watch Dog	Present
Power Input	**IPS-G803SM-DD** : Redundant Isolated DC ±24/48V (±18~72VDC) Input power (Removable Terminal Block)
	IPS-G803SM-AD : Redundant 1X Low Voltage Isolated DC and 1 High Voltage AC/DC DC : Isolated ±24/48V (±18~72VDC) Input power (Removable Terminal Block) AC : 88VAC~264VAC /DC85VDC~300VDC
Alarm Relay Contact	Relay outputs with current carrying capacity of 1 A @24VDC
Removable Terminal Block	Provide 2 redundant power, alarm relay contact, 6 Pin
Operating Temperature	-40°C~85°C

Operating Humidity	5% to 95% (Non-condensing)
Storage Temperature	-40°C~85°C
Housing	Rugged Metal, IP30 Protection
Installation mounting	DIN Rail mounting or wall mounting
EMC/EMS	CE, FCC
EMI	FCC Part 15 Subpart B Class A
	EN 55022 Class A
EMS	EN61000-4-2 (ESD) Level 4, Criteria B
	EN61000-4-3 (RS) Level 3, Criteria A
	EN61000-4-4 (EFT) Level 4, Criteria A
	EN61000-4-5 (Surge) Level 4, Criteria B
	EN61000-4-6 (CS) Level 4, Criteria A
	EN61000-4-8 (Magnetic Field) Level 5, Criteria A
Safety	UL60950-1 (Pending)
Power Substation	IEC 61850-3, IEEE 1613
Shock	IEC 60068-2-27
Freefall	IEC 60068-2-32
Vibration	IEC 60068-2-6
MTBF	TBD (Above 30 years)
Warranty	5 years

Software Specifications

Topology	
VLAN	IEEE 802.1q VLAN,up to 4095 ID
	IEEE 802.1q VLAN,up to 4095 Groups
	IEEE 802.1ad Q-in-Q
	Port Based VLAN
	MAC-based VLAN,up to 256 entries
	IP Subnet-based VLAN, up to 128 entries
	Protocol-based VLAN (Ethernt, SNAP, LLC), up to 128 entries
	VLAN Translation, up to 256 entries
	MVR (Multiple VLAN Registration)
Link Aggregation (Port Trunk)	Static (Hash with SA, DA, IP, TCP/UDP port), up to 5 trunk group
	Dynamic (IEEE 802.3ad LACP), up to 5 trunk group
Spanning Tree	IEEE802.1d STP
	IEEE802.1w RSTP
	IEEE802.1s MSTP
Loop Protection	Present
µ-Ring	Easy set for Ethernet Protection Ring
	Recovery time <20ms
	Maximum 250 Node
ITU-T G.8032 / Y.1344 ERPS (Ethernet Ring Protection)	Convergence time <50ms
	Single Ring, Sub-Ring, Multiple ring topology network
QoS Feature	
Class of Service	IEEE802.1p 8 active priorities queues for per port
Traffic Classification QoS	IEEE802.1p based CoS
	IP Precedence based CoS
	IP DSCP based CoS
	QCL(QoS Control List): MAC Access control list (Source/ Destination MAC, Ether type, Priority ID/ VLAN ID)
	QCL: IP extended access control list (Source/ Destination IP, Protocol, TCP/UDP port number)
Bandwidth Control for Ingress	Rate in steps : 100 kbps / 1fps / 100fps
	Range : 100 kbps to 1Gbps / 1fps to 3300kfps
	Rate Unit : bit or frame
Bandwidth Control for Egress	Rate in steps : 100 kbps / 1fps / 100fps
	Range : 100 kbps to 1Gbps / 1fps to 3300kfps
	Rate Unit : bit or frame
	Per queue shaper
DiffServ (RF 2474) Remarking	
Storm Control	for Unicast, Broadcast, Multicast
IP Multicasting Feature	
IGMP / MLD Snooping	IGMP Snooping v1, v2, v3 / MLD Snooping v1, v2
	Port Filtering Profile
	Throttling
	Fast Leave
	Query

Security Features	
IEEE 802.1X	Port-Based
	MAC-Based
ACL	Number of rules : up to 256 entries
	for L2 / L3 / L4
RADIUS authentication & accounting	
TACACS+ authentication & accounting, TACACS+ 3.0	
HTTPS, HTTP	
SSL / SSH v2	
User Name Password Authentication	Local Authentication
	Remote Authentication (via RADIUS/ TACACS+)
Management Interface Access Filtering	Web, Telnet / SSH
Management Features	
CLI	
Web Based Management	
Telnet	Server
SNMP	V1, V2c, V3
SW & Configuration Upgrade	TFTP, HTTP
	Redundant firmware in case of upgrade failure
RMON	RMON I (1, 2, 3, 9 group), RMON II
MIB II	RFC 1213
DHCP	Client
	Relay
	Snooping
	Snooping option 82
	Relay option 82
IP Source Guard	
Port Mirroring	
Event Syslog	Syslog server (RFC3164) (Support 1 server)
Warning Message	System Syslog, e-mail, alarm relay
DNS	Client, Proxy
NTP /SNTP	
LLDP (IEEE 802.1ab)	Link Layer Discovery Protocol
	LLDP-MED

Software Specifications

IPv6 Features	
IPv6 Management	Telnet Server/ICMP v6
Stateless Auto Configuration	
SNMP over IPv6	
HTTP over IPv6	
SSH over IPv6	
IPv6 Telnet Support	
IPv6 NTP / SNTP Support	
IPv6 TFTP Support	
IPv6 QoS	
IPv6 ACL	Number of rules: up to 256 entries
	L2 / L3 / L4

Others Features	
Green Ethernet	Supports IEEE802.3az EEE (Energy Efficient Ethernet) Management to optimize the power consumption
	Determine the cable length and lowering the power for ports with short cables
	Lower the power for a port when there is no link
	LED Power Management: Adjustment LEDs intensity
Cable Diagnostic	Measuring cable OK or broken point distance

Application

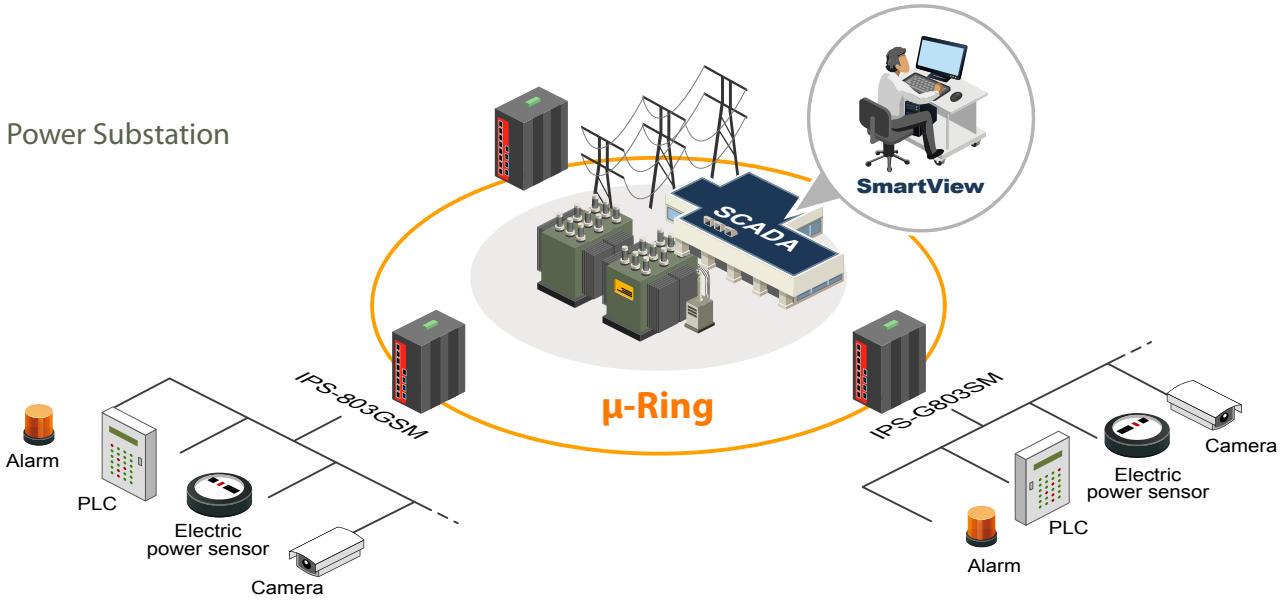


Figure : IPS Series in Power Substation Application

Ordering Information

Model Name	Description
IPS-G803SM-DD	IEC 61850-3 8x 10/100/1000Base-T+ 3x 100/1000Base-X SFP Ethernet Managed Switch (Dual isolated DC input)
IPS-G803SM-AD	IEC 61850-3 8x 10/100/1000Base-T+ 3x 100/1000Base-X SFP Ethernet Managed Switch (AC+isolated DC input)

Accessories

DR-4524	Industrial Power, Input 85 ~ 264VAC, Output 24VDC, 48W, -10 ~ +50°C
MDR-40-24	Industrial Power, Input 85 ~ 264VAC, Output 24VDC, 40W, -20 ~ +70°C
MDR-60-24	Industrial Power, Input 85 ~ 264VAC, Output 24VDC, 60W, -20 ~ +70°C
SFP Transceiver	Compatible, Reliable, 5-year Warranty

Power Type

IPS – G803SM – □□

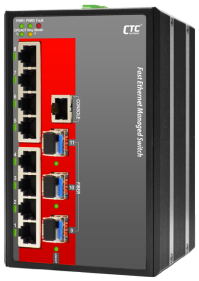
Example: IPS – G803SM – DD

ISFP – M 7 040 – 3 1 – E

- ISFP: Industrial SFP Transceiver
- M: Multi Mode; S: Single Mode; T: Copper
- 7: GbE; 5: FE
- 040: Distance 002(2km), 020(20km), 040(40km)...
- 31: Wavelength
- E: -40~85°C; Blank: 0~70°C

NEW

IEC 61850-3



IPS-803GSM-DD

IEC 61850-3 8x 10/100Base-TX+ 3x 100/1000Base-X SFP Managed Switch ***(Dual isolated DC Input)***

IPS-803GSM-AD

IEC 61850-3 8x 10/100Base-TX+ 3x 100/1000Base-X SFP Managed Switch ***(AC+isolated DC Input)***

IPS-G803SM managed Fast Ethernet switch is designed to meet the demands of power substation systems and is fully compliant with the requirement of IEC 61850-3 and IEEE 1613. The switch provide a variety of redundant functions to increase the reliability of your communications system, including redundant and isolated power supplies (24/48 VDC) and 110/220 VDC/VAC), STP/RSTP/MSTP and ITU-T G.8032 Ethernet Ring Protection Switching (recovery time<50ms) and can compatibly work with other switches in the network for ring protection. The proprietary μ-Ring (with recovery time of less than 20ms) can easy to work with a variety CTC industrial managed switch for ring protection. The switch also provide many function, such as Web management, SNMP, IGMP, VLAN, LACP, QoS, Security, IPv6, bandwidth control, port mirroring, cable diagnostics and Green Ethernet. IPS-803GSM can be managed centrally and conveniently by CTC SmartView Element Management System.

Features

- 8x 10/100/1000Base-T RJ-45 with 3x 100/1000Base-X SFP Fiber
- UL60950-1, CE, FCC, certification
- IEC61850-3, IEEE1613 certified for Power substation
- Redundancy isolated ±24/48 VDC power inputs (IPS-803GSM-DD)
- Isolated ±24/48VDC and 110/240VDC/VAC power input (IPS-803GSM-AD)
- Wide operating temperature -40~85°C
- DIN Rail mounting or wall mounting
- IP30 rugged metal housing
- Cable diagnostic, Measuring cable OK or broken point distance
- Supports IEEE802.3az EEE (Energy Efficient Ethernet) Management to optimize the power consumption
- STP, RSTP, MSTP, ITU-T G.8032 Ethernet Protection Ring(EPR),μ-Ring for cabling redundant
- μ-Ring for Redundant Ethernet Ring, recovery time<20ms in 250 units
- QoS, Traffic classification QoS, CoS, bandwidth control for Ingress and Egress, Storm Control, DiffServ
- IEEE802.1q VLAN, port based VLAN, MAC based VLAN, IP subnet based VLAN, Protocol based VLAN, VLAN translation, MVR
- Dynamic IEEE 802.3ad LACP Link Aggregation, Static Link Aggregation
- IGMP/MLD snooping V1/V2/V3, IGMP Filtering/ Throttling, IGMP query, IGMP proxy reporting, MLD snooping
- Security : Port based and MAC based IEEE802.1X, RADIUS, ACL, TACACS+, HTTP/HTTPS, SSL/SSH v2
- Software upgrade via TFTP and HTTP, redundant firmware in case of upgrade failure
- Supports DHCP client/Relay/Snooping/Snooping option 82/ Relay option 82
- Supports RMON, MIB II, Port mirroring, Event syslog, DNS, NTP/ SNTP, IEEE802.1ab LLDP
- Supports IPv6 Telnet server /ICMP v6, SNMP, HTTP, SSH/SSL, NTP/ SNTP, TFTP, QoS, ACL
- CLI, Web based management, **SNMP** v1/v2c/v3, Telnet server for management
- **SmartView** Management System

Specifications

IEEE Standard	IEEE 802.3 10Base-T Ethernet
	IEEE 802.3u 100Base-TX Fast Ethernet
	IEEE 802.3ab 1000Base-T Gigabit Ethernet
	IEEE 802.3z 1000Base-X Gigabit Ethernet
	IEEE 802.1d STP
	IEEE 802.1w RSTP
	IEEE 802.1s MSTP
	IEEE 802.1Q for VLAN Tagging
	IEEE 802.1X for Authentication
	IEEE 802.3ad for Port Trunk with LACP
	IEEE802.3x Flow Control and Back Pressure
	ITU-T G.8032/ Y.1344 EPR (Ethernet Protection Ring)
	IEEE 802.1ad Stacked VLANs, Q-in-Q
	IEEE 802.1p LAN Layer 2 QoS/CoS Protocol for Traffic Prioritization
	IEEE 802.1ab Link Layer Discovery Protocol (LLDP)
	IEEE 802.3az EEE (Energy Efficient Ethernet)
VLAN ID	4096
IGMP Group	256
Switch Architecture	Back-plane (Switching Fabric): 7.6Gbps
Data Processing	Store and Forward
Flow Control	IEEE 802.3x flow control, back pressure flow control
Jumbo Frame	9.6KB
MAC Address Table	8K

Network Connector	8x RJ-45
	10/100Base-TX auto negotiation speed
	Auto MDI/MDI-X function, Full/Half duplex
	3x 100/1000Base-X dual speed mode SFP slot, with DDMI
Console	RS-232 (RJ-45)
Network Cable	UTP/STP above Cat. 5e cable
	EIA/TIA-568 100-ohm (100m)
Protocols	CSMA/CD
LED	Per unit: Power 1 (Green), Power 2 (Green), Fault (Amber), CPU Act (Green) ,Ring Master (Yellow)
	Per RJ-45 port: Link/Active (Green)
	SFP Fiber Per port: Link/Active (Green)
Reverse Polarity Protection	Present for Power Input
Overload Current Protection	Present
CPU Watch Dog	Present
Power Input	**IPS-803GSM-DD** : Redundant Isolated DC ±24/48V (±18~72VDC) Input power (Removable Terminal Block)
	IPS-803GSM-AD : Redundant 1x Low Voltage Isolated DC and 1x High Voltage AC/DC DC: Isolated ±24/48V (±18~72VDC) Input power (Removable Terminal Block) AC: 88VAC~264VAC / DC: 85VDC~300VDC
Alarm Relay Contact	Relay outputs with current carrying capacity of 1 A @24VDC
Removable Terminal Block	Provide 2 Redundant power ,Alarm relay contact, 6 Pin
Operating Temperature	-40°C~85°C

Operating Humidity	5% to 95% (Non-condensing)
Storage Temperature	-40°C~85°C
Housing	Rugged Metal, IP30 Protection
Installation Mounting	DIN Rail mounting or wall mounting
EMC/EMS	CE, FCC
EMI	FCC Part 15 Subpart B Class A, EN 55022 Class A
EMS	EN61000-4-2 (ESD) Level 4, Criteria B
	EN61000-4-3 (RS) Level 3, Criteria A
	EN61000-4-4 (EFT) Level 4, Criteria A
	EN61000-4-5 (Surge) Level 4, Criteria B
	EN61000-4-6 (CS) Level 4, Criteria A
	EN61000-4-8 (Magnetic Field) Level 5, Criteria A
Safety	UL60950-1 (Pending)
Power substation	IEC 61850-3, IEEE 1613
Shock	IEC 60068-2-27
Freefall	IEC 60068-2-32
Vibration	IEC 60068-2-6
MTBF	TBD (Above 30 years)
Warranty	5 years

Software Specifications

Topology	
VLAN	IEEE 802.1q VLAN, up to 4095 ID
	IEEE 802.1q VLAN, up to 4095 Groups
	IEEE 802.1ad Q-in-Q
	Port Based VLAN
	MAC-based VLAN, up to 256 entries
	IP Subnet-based VLAN, up to 128 entries
	Protocol-based VLAN (Ethernt, SNAP, LLC), up to 128 entries
	VLAN Translation, up to 256 entries
	MVR (Multiple VLAN Registration)
Link Aggregation (Port Trunk)	Static (Hash with SA, DA, IP, TCP/UDP port), up to 5 trunk group
	Dynamic (IEEE 802.3ad LACP), up to 5 trunk group
Spanning Tree	IEEE802.1d STP
	IEEE802.1w RSTP
	IEEE802.1s MSTP
Loop Protection	Present
μ-Ring	Easy set for Ethernet Protection Ring
	Recovery time <20ms
	Maximum 250 Node
ITU-T G.8032 / Y.1344 ERPS (Ethernet Ring Protection)	Convergence time <50ms
	Single Ring, Sub-Ring, Multiple ring topology network
QoS Feature	
Class of Service	IEEE802.1p 8 active priorities queues for per port
Traffic Classification QoS	IEEE802.1p based CoS
	IP Precedence based CoS
	IP DSCP based CoS
	QCL(QoS Control List): MAC Access control list (Source/ Destination MAC, Ether type, Priority ID/ VLAN ID)
	QCL: IP extended access control list (Source/ Destination IP, Protocol, TCP/UDP port number)
Bandwidth Control for Ingress	Rate in steps : 100 kbps / 1fps / 100fps
	Range : 100 kbps to 1Gbps / 1fps to 3300kfps
	Rate Unit : bit or frame
Bandwidth Control for Egress	Rate in steps : 100 kbps / 1fps / 100fps
	Range : 100 kbps to 1Gbps / 1fps to 3300kfps
	Rate Unit : bit or frame
	Per queue shaper
DiffServ (RF 2474) Remarking	
Storm Control	for Unicast, Broadcast, Multicast
IP Multicasting Feature	
IGMP / MLD Snooping	IGMP Snooping v1, v2, v3 / MLD Snooping v1, v2
	Port Filtering Profile
	Throttling
	Fast Leave
	Query

Security Features	
IEEE 802.1X	Port-Based
	MAC-Based
ACL	Number of rules : up to 256 entries
	for L2 / L3 / L4
RADIUS authentication & accounting	
TACACS+ authentication & accounting, TACACS+ 3.0	
HTTPS, HTTP	
SSL / SSH v2	
User Name Password Authentication	Local Authentication
	Remote Authentication (via RADIUS / TACACS+)
Management Interface Access Filtering	Web, Telnet / SSH
Management Features	
CLI	
Web Based Management	
Telnet	Server
SNMP	V1, V2c, V3
SW & Configuration Upgrade	TFTP, HTTP
	Redundant firmware in case of upgrade failure
RMON	RMON I (1, 2, 3, 9 group), RMON II
MIB II	RFC 1213
DHCP	Client
	Relay
	Snooping
	Snooping option 82
	Relay option 82
IP Source Guard	
Port Mirroring	
Event Syslog	Syslog server (RFC3164) (Support 1 server)
Warning Message	System syslog, e-mail, alarm relay
DNS	Client, Proxy
NTP /SNTP	
LLDP (IEEE 802.1ab)	Link Layer Discovery Protocol
	LLDP-MED

Software Specifications

IPv6 Features	
IPv6 Management	Telnet Server/ICMP v6
Stateless Auto Configuration	
SNMP over IPv6	
HTTP over IPv6	
SSH over IPv6	
IPv6 Telnet Support	
IPv6 NTP / SNTP Support	
IPv6 TFTP Support	
IPv6 QoS	
IPv6 ACL	Number of rules: up to 256 entries L2 / L3 / L4

Others Features	
Green Ethernet	Supports IEEE802.3az EEE (Energy Efficient Ethernet) Management to optimize the power consumption
	Determine the cable length and lowering the power for ports with short cables
	Lower the power for a port when there is no link
	LED Power Management : Adjustment LEDs intensity
Cable Diagnostic	Measuring cable OK or broken point distance

Application

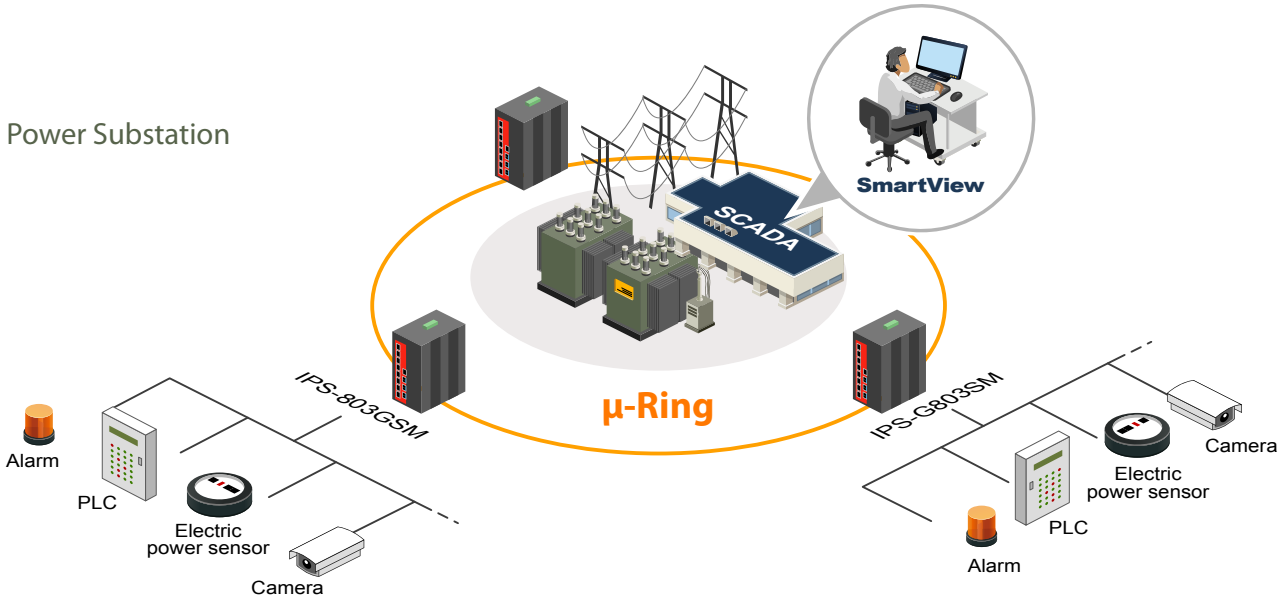


Figure : IPS Series in Power Substation Application

Ordering Information

Model Name	Description
IPS-803GSM-DD	IEC 61850-3 8x 10/100Base–TX+ 3x 100/1000Base–X SFP Ethernet Managed Switch (Dual isolated DC input)
IPS-803GSM-AD	IEC 61850-3 8x 10/100Base–TX+ 3x 100/1000Base–X SFP Ethernet Managed Switch (AC+isolated DC input)

Accessories

DR-4524	Industrial Power, Input 85 ~ 264VAC, Output 24VDC, 48W, -10 ~ +50°C
MDR-40-24	Industrial Power, Input 85 ~ 264VAC, Output 24VDC, 40W, -20 ~ +70°C
MDR-60-24	Industrial Power, Input 85 ~ 264VAC, Output 24VDC, 60W, -20 ~ +70°C
SFP Transceiver	Compatible, Reliable, 5-year Warranty

Power Type

IPS – 803GSM – □□

Example: IPS – 803GSM – DD

ISFP – M 7 040 – 31 – E

- **ISFP**: Industrial SFP Transceiver
- **M**: Multi Mode; **S**: Single Mode; **T**: Copper
- **7**: GbE; **5**: FE
- **040**: Distance 002(2km), 020(20km), 040(40km)...
- **31**: Wavelength
- **E**: -40~85°C; **Blank**: 0~70°C

ITP-500-M12

EN50155 5x 10/100Base-TX with M12 Ethernet Switch

ITP-800-M12

EN50155 8x 10/100Base-TX with M12 Ethernet Switch

NEW

EN50155

The ITP-500-M12 (ITP-800-M12) Series non-managed Fast Ethernet switches provide 5(8)x 10/100Base-TX Fast Ethernet ports. This series of unmanaged Ethernet switches is designed for industrial applications in harsh environments. The ITP-500-M12 (ITP-800-M12) series switches Ethernet ports utilize M12 connectors to ensure tight, robust connections and guarantee reliable operation against environmental disturbances such as vibration and shock. The ITP-500-M12 (ITP-800-M12) series Ethernet switches are compliant with EN 50155, covering operating temperature, power input voltage, surge, ESD, vibration, and shock, thus making these switches suitable for industrial applications in vehicle, rolling stock and railways.

Features

- 8-Port 10/100Base-TX Ethernet Switch (ITP-800-M12, ITP-800-M12-E)
- 5-Port 10/100Base-TX Ethernet Switch (ITP-500-M12, ITP-500-M12-E)
- Use M12 connector anti vibration and shock for vehicle, rolling stock, and railway applications
- Supports flow control
- Supports alarm message by relay
- DIN rail or wall mounting installation
- Supports broadcast storm protection
- Supports auto-negotiation and auto-MDI/MDI-X
- Built in 2 bypass port
- Redundant dual DC input power 12/24/48VDC (9.6~60VDC)
- IP40 rugged metal housing
- Wide operating temperature -40~75°C (ITP-800-M12-E, ITP-500-M12-E)
- UL60950-1, CE, FCC, EN50155 for railway certification
- Industrial Grade EMS, EMI, EN61000-6-2, EN61000-6-4 certified

Specifications

IEEE Standard	IEEE 802.3 10Base-T Ethernet
	IEEE 802.3u 100Base-TX Fast Ethernet
	IEEE802.3x Flow Control and Back Pressure
Switch Architecture	Back-plane (Switching Fabric): 1Gbps (ITP-500-M12, ITP-500-M12-E) Back-plane (Switching Fabric): 1.6Gbps (ITP-800-M12, ITP-800-M12-E)
Data Processing	Store and Forward
Flow Control	IEEE 802.3x flow control, back pressure flow control
Provides Broadcast Storm Protection	Present
MAC Address Table	2 K
Packet Buffer Size	448Kbits
Network Connector	5x M12 D-code Female (ITP-500-M12, ITP-500-M12-E)
	8x M12 D-code Female (ITP-800-M12, ITP-800-M12-E)
	10/100Base-TX auto negotiation speed
	Auto MDI/MDI-X function
	Full/Half duplex
	Built in 2 bypass port
Network Cable	10Base-T: 2-pair UTP/STP Cat. 5e cable
	EIA/TIA-568 100-ohm (100m)
	100Base-TX: 2-pair UTP/STP Cat. 5e cable
	EIA/TIA-568 100-ohm (100m)
Protocols	CSMA/CD
LED	Per unit: Power 1 (Green), Power 2 (Green), Fault (Amber)
	Per port: Link/Active (Green), Speed/100 (Yellow), 10 (Off)
Reverse Polarity Protection	Present for power input
Overload Current Protection	Present
Power Supply	Redundant Dual DC ±12/24/48V (±9.6~60VDC) Input power

Power & Alarm Connector	8 Pin M12 Connector (Male)
Alarm Relay Contact	Relay outputs with current carrying capacity of 1 A @24VDC, Normal close (NC)
Operating Temperature	-10°C~60°C (ITP-500-M12, ITP-800-M12)
	-40°C~75°C (ITP-500-M12-E, ITP-800-M12-E)
Operating Humidity	5% to 95% (Non-condensing)
Storage Temperature	-40°C~85°C
Housing	Rugged Metal, IP40 Protection
Weigth	TBD (ITP-500-M12)
	TBD (ITP-800-M12)
Installation Mounting	DIN rail or wall mounting
EMI	FCC Part 15 Subpart B Class A
	CE, EN 55022 Class A
	EN 61000-6-4 - Emission for industrial environment
EMS	EN 61000-6-2 - Immunity for Industrial environment
	EN61000-4-2 (ESD) Level 3, Criteria B
	EN61000-4-3 (RS) Level 3, Criteria A
	EN61000-4-4 (Burst) Level 3, Criteria B
	EN61000-4-5 (Surge) Level 3, Criteria B
	EN61000-4-6 (CS) Level 3, Criteria A
	EN61000-4-8 (Magnetic Field) Level 3, Criteria A
Safety	UL60950-1 (Pending)
Rail Traffic	EN50155
Shock	IEC 61373
Freefall	IEC 60068-2-32
Vibration	IEC 61373
MTBF	TBD (Above 30 years)
Warranty	5 years

Application

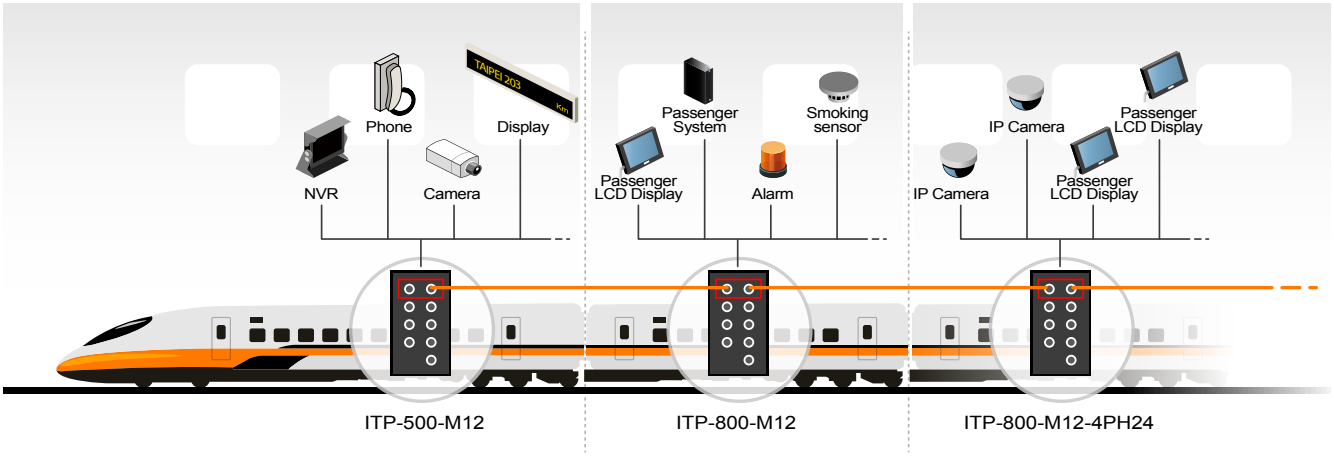


Figure : IPS Series in Railway Application

Ordering Information

Model Name	*Description*
ITP-500-M12	EN50155 5-Port 10/100Base-TX with M12 Ethernet Switch, -10°C~60°C
ITP-500-M12-E	EN50155 5-Port 10/100Base-TX with M12 Ethernet Switch, -40°C~75°C
ITP-800-M12	EN50155 8-Port 10/100Base-TX with M12 Ethernet Switch, -10°C~60°C
ITP-800-M12-E	EN50155 8-Port 10/100Base-TX with M12 Ethernet Switch, -40°C~75°C
Accessories	
DR-4524	Industrial Power, Input 85 ~ 264VAC, Output 24VDC, 48W, -10 ~ +50°C
MDR-40-24	Industrial Power, Input 85 ~ 264VAC, Output 24VDC, 40W, -20 ~ +70°C

Port Number Temperature

ITP – ☐ 00 – M12 – ☐

Example: ITP – 500 – M12 – E

ITP-800-M12-4PH24

EN50155 8x 10/100Base-TX with M12 and 4x PoE+ Ethernet Switch

NEW

EN50155

ITP-800-M12-4PH24 non-managed Ethernet switch provides 8x 10/100Base-TX Fast Ethernet ports with 4 ports having IEEE 802.3at/af compliant PoE+ (Power over- Ethernet). These switches are classified as power source equipment (PSE) and provide up to 30 watts of power per port. The ITP-800-M12- 4PH24 Ethernet switches are designed for industrial applications in harsh environments. The Ethernet ports utilize M12 connectors to ensure tight, robust connections, and guarantee reliable operation against environmental disturbances such as vibration and shock. The ITP-800-M12-4PH24 Ethernet switches are compliant with EN 50155, covering operating temperature, power input voltage, surge, ESD, vibration, and shock, thus making these switches suitable for industrial applications in vehicle, rolling stock and railways.

Features

- Provides 4-port IEEE802.3af/at PoE output (30W per port)
- 24/48VDC (20~57VDC) redundant dual input power, and built-in power booster
- Constant and regulated PoE output voltage at 55VDC
- 8-Port 10/100Base-TX Ethernet Switch
- Use M12 connector anti vibration and shock for vehicle, rolling stock, and railway applications
- Supports flow control
- Supports broadcast storm protection
- Supports auto-negotiation and auto-MDI/MDI-X
- Supports alarm message by relay
- Built in 2 bypass ports
- DIN rail or wall mounting installation
- IP40 rugged metal housing
- Wide operating temperature -40~75°C (ITP-800-M12-4PHE24)
- UL60950-1, CE, FCC, EN50155 for railway certification
- Industrial Grade EMS, EMI, EN61000-6-2, EN61000-6-4 certified

Specifications

IEEE Standard	IEEE 802.3 10Base-T Ethernet
	IEEE 802.3u 100Base-TX Fast Ethernet
	IEEE802.3x Flow Control and Back Pressure
	IEEE802.3at Power over Ethernet+, PoE+
	IEEE802.3af Power over Ethernet, PoE
Switch Architecture	Back-plane (Switching Fabric): 1.6Gbps
Data Processing	Store and Forward
Flow Control	IEEE 802.3x flow control, back pressure flow control
Provides Broadcast Storm Protection	Present
MAC Address Table	2 K
Packet Buffer Size	448Kbits
Network Connector	8x M12 D-code Female
	10/100Base-TX auto negotiation speed
	Auto MDI/MDI-X function
	Full/Half duplex
	Built in 2 bypass ports
Network Cable	10Base-T: 2-pair UTP/STP Cat. 5 cable
	EIA/TIA-568 100-ohm (100m)
	100Base-TX: 2-pair UTP/STP Cat. 5 cable
	EIA/TIA-568 100-ohm (100m)
Protocols	CSMA/CD
LED	Per unit: Power 1 (Green), Power 2 (Green), Fault (Amber)
	Per port: Link/Active (Green), Speed/100 (Yellow), 10: Off
	PoE Port LED 1 LED /per Port : • PoE Output Power On : ON (Green) • PoE Fault (Over Load , Short Circuit, Port failed at Startup) : Flash 1 times /sec (Green) • PoE Output Power Off : Off (Green)
Reverse Polarity Protection	Present for Power Input

Overload Current Protection	Present
Power Supply	Redundant Dual DC 24/48V (20~57VDC) Input power
PoE Power Output	IEEE802.3at Per Port 30W maximum, regulated 55 VDC
Power & Alarm Connector	8 Pin M12 Connector (Male)
Alarm Relay Contact	Relay outputs with current carrying capacity of 1 A @24VDC, Normal Close (NC)
Operating Temperature	-10°C~60°C (ITP-800-M12-4PH24)
	-40°C~75°C (ITP-800-M12-4PHE24)
Operating Humidity	5% to 95% (Non-condensing)
Storage Temperature	-40°C~85°C
Housing	Rugged Metal, IP40 Protection
Installation Mounting	DIN rail or wall mounting

Specifications

EMI	FCC Part 15 Subpart B Class A
	CE, EN 55022 Class A
	EN 61000-6-4 - Emission for industrial environment
EMS	EN 61000-6-2 - Immunity for Industrial environment
	EN61000-4-2 (ESD) Level 3, Criteria B
	EN61000-4-3 (RS) Level 3, Criteria A
	EN61000-4-4 (Burst) Level 3, Criteria B
	EN61000-4-5 (Surge) Level 3, Criteria B
	EN61000-4-6 (CS) Level 3, Criteria A
	EN61000-4-8 (Magnetic Field) Level 3, Criteria A
Safety	UL60950-1 (Pending)
Rail Traffic	EN50155

Shock	IEC 61373
Freefall	IEC 60068-2-32
Vibration	IEC 61373
MTBF	TBD (Above 30 years)
Warranty	5 years

Application

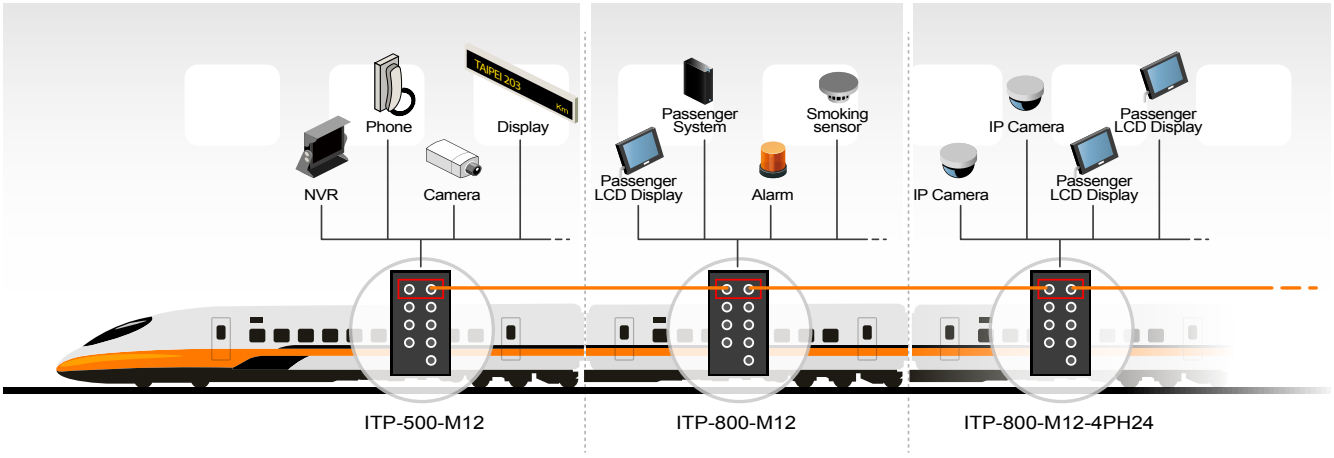


Figure : IPS Series in Railway Application

Ordering Information

Model Name	Description
ITP-800-M12-4PH24	EN50155 8-Port 10/100Base-TX with M12 and 4x PoE+ Switch (24V Booster), -10°C~60°C
ITP-800-M12-4PHE24	EN50155 8-Port 10/100Base-TX with M12 and 4x PoE+ Switch (24V Booster), -40°C~75°C

Accessories

DR-120-24	Industrial Power, Input 88 ~ 132VAC / 176 ~ 264VAC, Output 24VDC, 120W, -10 ~ +60°C
DRP-240-48	Industrial Power, Input 85 ~ 264VAC, Output 48VDC, 240W, -10 ~ +70°C

Temperature

ITP – 800 – M12 – 4PH □ 24

Example: ITP – 800 – M12 – 4PHE24

DR-120-24, DR-4524, MDR-40-24, MDR-60-24, DRP-240-48

DIN-Rail Power Supplies

DR-120-24 DR-4524 MDR-40-24 MDR-60-24 DRP-240-48

Having reliable and stable power for your industrial grade converters is the best way to improve reliability and keep any down time to a minimum. CTC Union's safety certified AC to DC power supplies that are 100% compatible with all of our industrial grade switches and converters.

Features

- Protections: Short circuit / Overload / Over voltage
- LED indicator for power on
- Cooling by free air convection
- Installation mounting by Din Rail
- UL508, UL60950-1, CE approved
- Heavy industry grade EMS approved
- 3 years warranty

Specifications

Model Name		DRP-240-48	DR-120-24	DR-4524
Output	Dc Voltage	48V	24V	24V
	Rated Current	5A	5A	2A
	Current Range	0~5A	0 ~ 5A	0 ~ 2A
	Rated Power	240W	120W	48W
	Output Voltage Adj. Range	48~53V	24 ~ 28V	21.6 ~ 26.4V
Input	Voltage Range	85 ~ 264VAC / 120 ~ 370VDC	88 ~ 132VAC / 176 ~ 264VAC, 248 ~ 370VDC by switch	85 ~ 264VAC / 120 ~ 370VDC
	Frequency Range	47 ~ 63Hz	47 ~ 63Hz	47 ~ 63Hz
	Efficiency (Typ.)	85%	84%	80%
Protection	Overload	105 ~ 150% rated output power Protection type : Constant current limiting, recovers automatically after fault condition is removed	105 ~ 150% rated output power Protection type : Constant current limiting, recovers automatically after fault condition is removed	105 ~ 150% rated output power Protection type : Constant current limiting, recovers automatically after fault condition is removed
	Over Voltage	54 ~ 60V Protection type : Shut down o/p voltage, re-power on to recover	29 ~ 33V Protection type : Shut down o/p voltage, re-power on to recover	27.6 ~ 32.4V Protection type : Shut off o/p voltage, clamping by zener diode
Alarm Relay	DC OK Relay			
Indicator	LED	Power On	Power On	Power On
Housing	Dimension	100 x 125.5 x 125.2 mm (D x W x H)	100 x 65.5 x 125.2mm (D x W x H)	67 x 78 x 93 mm (D x W x H)
	Installation Mounting	DIN Rail	DIN Rail	DIN Rail
Environment	Working Temp	-10 ~ 70°C	-10 ~ 60°C	-10 ~ 50°C
	Working Humidity	20 ~ 90% RH non-condensing	20 ~ 90% RH non-condensing	20 ~ 90% RH non-condensing
	Storage Temp., Humidity	-20 ~ 85°C , 10 ~ 95% RH	-20 ~ 85°C , 10 ~ 95% RH	-20 ~ 85°C , 10 ~ 95% RH
	Vibration	Compliance to IEC60068-2-6	Compliance to IEC60068-2-6	Compliance to IEC60068-2-6
Safety & EMC	Safety Standards	UL508, UL60950-1 approved	UL508, UL60950-1 approved	UL508 approved
	EMC Emission	Compliance to EN55011, EN55022 (CISPR22), EN61204-3 Class B, EN61000-3-2, -3	Compliance to EN55011, EN55022 (CISPR22) Class B, EN61000-3-2,-3	Compliance to EN55011, EN55022 (CISPR22) Class B, EN61000-3-2,-3
	EMC Immunity	Compliance to EN61000-4-2, 3, 4, 5, 6, 8, 11, EN55024, EN61000-6-2, EN61204-3, heavy industry level, criteria A	Compliance to EN61000-4-2, 3, 4, 5, 6, 8, 11, EN55024, EN61000-6-2 heavy industry level, criteria A	Compliance to EN61000-4-2, 3, 4, 5, 6, 8, 11, EN55024, EN61000-6-2 (EN50082-2), heavy industry level, criteria A
Others	PFC	Built in Active PFC		
	MTBF	289.9K hrs min. MIL-HDBK-217F (25°C)	136.8Khrs min. MIL-HDBK-217F (25°C)	364.6K hrs min. MIL-HDBK-217F (25°C)
	Waranty	3 Years	3 Years	3 Years

Specifications & design are subject to change without prior notice. Please visit CTC Union website for more details.

Specifications

Model Name		MDR-40-24	MDR-60-24
Output	Dc Voltage	24V	24V
	Rated Current	1.7A	2.5A
	Current Range	0 ~ 1.7A	0~2.5A
	Rated Power	40.8W	60W
	Output Voltage Adj. Range	24 ~ 30V	24~30V
Input	Voltage Range	85 ~ 264VAC / 120 ~ 370VDC	85 ~ 264VAC / 120 ~ 370VDC
	Frequency Range	47 ~ 63Hz	47 ~ 63Hz
	Efficiency (Typ.)	88%	88%
Protection	Overload	105 ~ 150% rated output power Protection type : Constant current limiting, recovers automatically after fault condition is removed	105 ~ 150% rated output power Protection type : Constant current limiting, recovers automatically after fault condition is removed
	Over Voltage	31.2 ~ 36V Protection type : Shut down o/p voltage, re-power on to recover	31.2 ~ 36V Protection type : Shut down o/p voltage, re-power on to recover
Alarm Relay	DC OK Relay	DC OK Relay will Close In Normal Relay contact rating(max.) : 30V/1A resistive	DC OK Relay will Close Relay contact rating(max.): 30V/1A resistive
Indicator	LED	DC OK	Power On
Housing	Dimension	100 x 40 x 90 mm (D x W x H)	100 x 40 x 90 mm (D x W x H)
	Installation Mounting	DIN Rail	DIN Rail
Environment	Working Temp	-20 ~ 70°C	-20 ~ 70°C
	Working Humidity	20 ~ 90% RH non-condensing	20 ~ 90% RH non-condensing
	Storage Temp., Humidity	-40 ~ 85°C , 10 ~ 95% RH	-40 ~ 85°C , 10 ~ 95% RH
	Vibration	Compliance to IEC60068-2-6	Compliance to IEC60068-2-6
Safety & EMC	Safety Standards	UL508, UL60950-1 approved	UL508, UL60950-1 approved
	EMC Emission	Compliance to EN55011, EN55022 (CISPR22), EN61204-3 Class B, EN61000-3-2,-3	Compliance to EN55011, EN55022 (CISPR22), EN61204-3 Class B, EN61000-3-2, -3
	EMC Immunity	Compliance to EN61000-4-2, 3, 4, 5, 6, 8, 11, EN55024, EN61000-6-2, EN61204-3, heavy industry level, criteria A	Compliance to EN61000-4-2, 3, 4, 5, 6, 8, 11, EN55024, EN61000-6-2, EN61204-3, heavy industry level, criteria A
Others	PFC		
	MTBF	301.7K hrs min. MIL-HDBK-217F (25°C)	299.2K hrs min. MIL-HDBK-217F (25°C)
	Waranty	3 Years	3 Years

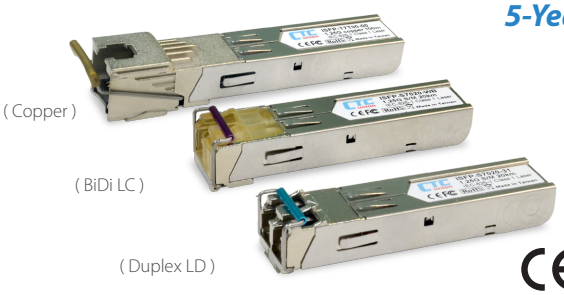
Ordering Information

Model Name	Description
DR-120-24	Industrial Power, Input 88 ~ 132VAC / 176 ~ 264VAC, Output 24VDC, 120W, -10 ~ +60°C
DR-4524	Industrial Power, Input 85 ~ 264VAC, Output 24VDC, 48W, -10 ~ +50°C
MDR-40-24	Industrial Power, Input 85 ~ 264VAC, Output 24VDC, 40W, -20 ~ +70°C
MDR-60-24	Industrial Power, Input 85 ~ 264VAC, Output 24VDC, 60W, -20 ~ +70°C
DRP-240-48	Industrial Power, Input 85 ~ 264VAC, Output 48VDC, 240W, -10 ~ +70°C

DR – □□□ – □□
Example: DR – 120 – 24

Industrial SFP Transceiver

1.25G 1000Base-X
1.25G 1000Base-T
155Mbps 100Base-FX



5-Year Warranty

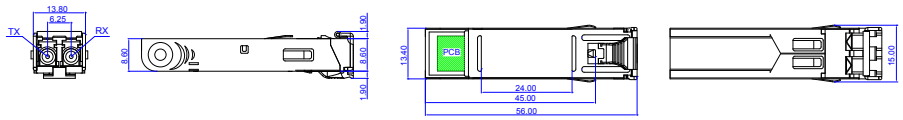
CTC industrial SFP Transceivers are highly reliable, for serial optical data communications applications specified for single mode fiber operation at 1.25G/155M bps. They operate with +3.3V power supplies and are intended for single mode or multi-mode fiber, operating at a nominal wavelength of 1310nm/1550nm/850nm. Each SFP Transceiver consists of a transmitter optical subassembly (TOSA), a receiver optical subassembly (ROSA) and an electrical subassembly. CTC's industrial SFP transceivers ensure your networks operate with maximum reliability, performance, and flexibility.

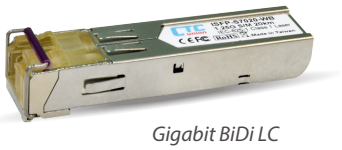
Features

- **All SFPs have been tested with the best operating performance on CTC Industrial switches**
- Single 3.3V power supply
- Duplex or Simplex LC receptacle connector
- Hot Pluggable
- Lower power dissipation
- All Gigabit SFP compliant to IEEE802.3z 1000Base-X and IEEE802.3ab 1000Base-T
- All Fast Ethernet SFP Compliant to IEEE802.3u 100Base-FX
- Industrial standard small form pluggable (SFP) package
- Compliant with Multi-Source Agreement (MSA) Small Form Factor Pluggable (SFP)
- Eye safety compliant with Class 1 laser product standard IEC825-1
- CE, FCC class B certification
- RoHS compliant
- Warranty 5 years

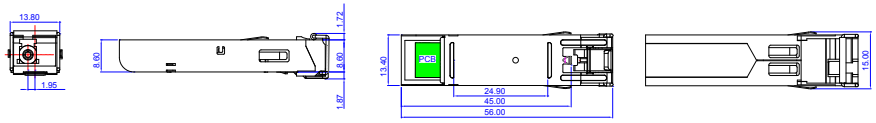
Gigabit Ethernet SFP

Gigabit Duplex LC





Gigabit BiDi LC

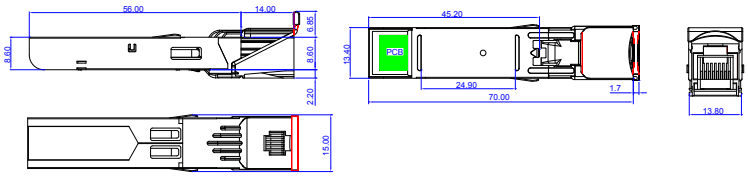


1.25G 1000Base-X

Model Name	*Cable Type*	*Typical Distance*	*Wavelength (nm)*	*TX (dBm) (Min~Max)*	*RX Sensitivity (dBm)*	*Power Budget (dB)*	*Saturation (dBm)*	*Operating Temperture*
ISFP-M7000-85	MM	550m	850	-9.5~-4	-17	7.5	-3	0~70°C
ISFP-M7002-31	MM	2km	1310	-9~-1	-19	10	-1	0~70°C
ISFP-S7020-31	SM	20km	1310	-8~-2	-23	15	-1	0~70°C
ISFP-S7040-31	SM	40km	1310	-2~3	-23	21	-3	0~70°C
ISFP-S7080-55	SM	80km	1550	0~5	-24	24	-3	0~70°C
ISFP-S7020-WA	SM	20km	T1310 / R1550	-8~2	-23	15	-2	0~70°C
ISFP-S7020-WB	SM	20km	T1550 / R1310	-8~-2	-23	15	-2	0~70°C
ISFP-S7040-WA	SM	40km	T1310 / R1550	-3~2	-23	20	-1	0~70°C
ISFP-S7040-WB	SM	40km	T1550 / R1310	-3~2	-23	20	-1	0~70°C
ISFP-M7000-85-E	MM	550m	850	-9.5~-4	-17	7.5	-3	-40~85°C
ISFP-M7002-31-E	MM	2km	1310	-9~-1	-19	10	-1	-40~85°C
ISFP-S7020-31-E	SM	20km	1310	-8~-2	-23	15	-1	-40~85°C
ISFP-S7040-31-E	SM	40km	1310	-2~3	-23	21	-3	-40~85°C
ISFP-S7080-55-E	SM	80km	1550	0~5	-24	24	-3	-40~85°C
ISFP-S7020-WA-E	SM	20km	T1310 / R1550	-8~-2	-23	15	-2	-40~85°C
ISFP-S7020-WB-E	SM	20km	T1550 / R1310	-8~-2	-23	15	-2	-40~85°C
ISFP-S7040-WA-E	SM	40km	T1310 / R1550	-3~2	-23	20	-1	-40~85°C
ISFP-S7040-WB-E	SM	40km	T1550 / R1310	-3~2	-23	20	-1	-40~85°C

Gigabit Ethernet SFP

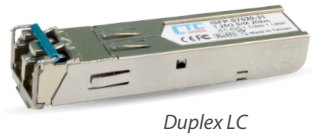
Gigabit Copper



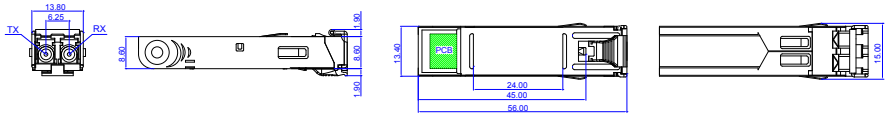
1.25G 1000Base-T

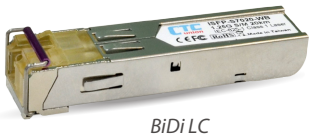
Model Name	Cable Type	Typical Distance	Wavelength (nm)	TX (dBm) (Min~Max)	RX Sensitivity (dBm)	Power Budget (dB)	Saturation (dBm)	Operating Temperture
ISFP-T7T00-00	Copper	100m	——	——	——	——	——	0~70°C
ISFP-T7T00-00-E	Copper	100m	——	——	——	——	——	-40~85°C

Fast Ethernet SFP

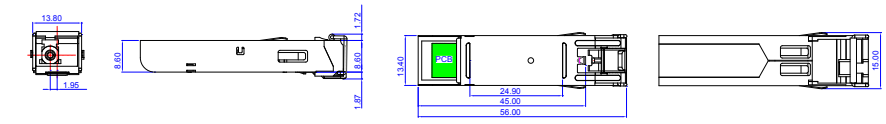


Duplex LC





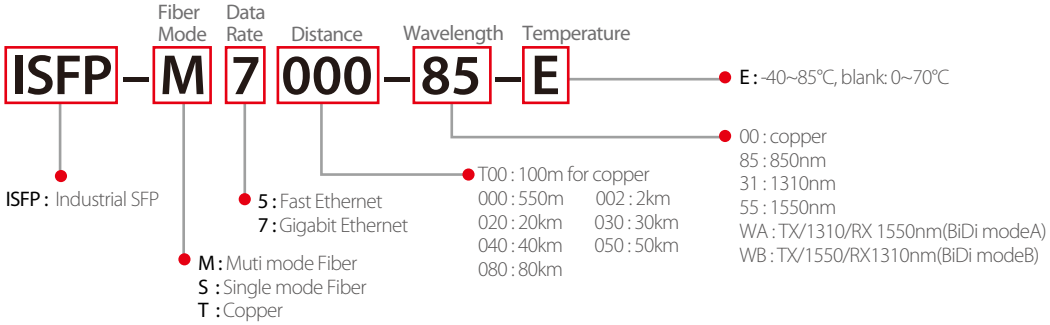
BiDi LC



155Mbps 100Base-FX

Model Name	Cable Type	Typical Distance	Wavelength (nm)	TX (dBm) (Min~Max)	RX Sensitivity (dBm)	Power Budget (dB)	Saturation (dBm)	Operating Temperture
ISFP-M5002-31	MM	2km	1310	-20~-14	-32	12	-8	0~70°C
ISFP-S5030-31	SM	30km	1310	-15~-8	-34	19	-5	0~70°C
ISFP-S5050-31	SM	50km	1310	-5~0	-35	30	-5	0~70°C
ISFP-S5020-WA	SM	20km	T1310 / R1550	-14~-8	-32	18	-3	0~70°C
ISFP-S5020-WB	SM	20km	T1550 / R1310	-14~-8	-32	18	-3	0~70°C
ISFP-S5040-WA	SM	40KM	T1310 / R1550	-8~0	-34	26	0	0~70°C
ISFP-S5040-WB	SM	40KM	T1550 / R1310	-8~0	-34	26	0	0~70°C
ISFP-M5002-31-E	MM	2km	1310	-20~-14	-32	12	-8	-40~85°C
ISFP-S5030-31-E	SM	30km	1310	-15~-8	-34	19	-5	-40~85°C
ISFP-S5050-31-E	SM	50km	1310	-5~0	-35	30	-5	-40~85°C
ISFP-S5020-WA-E	SM	20km	T1310 / R1550	-14~-8	-32	18	-3	-40~85°C
ISFP-S5020-WB-E	SM	20km	T1550 / R1310	-14~-8	-32	18	-3	-40~85°C
ISFP-S5040-WA-E	SM	40KM	T1310 / R1550	-8~0	-34	26	0	-40~85°C
ISFP-S5040-WB-E	SM	40KM	T1550 / R1310	-8~0	-34	26	0	-40~85°C

Industrial SFP naming rule



Ordering Information

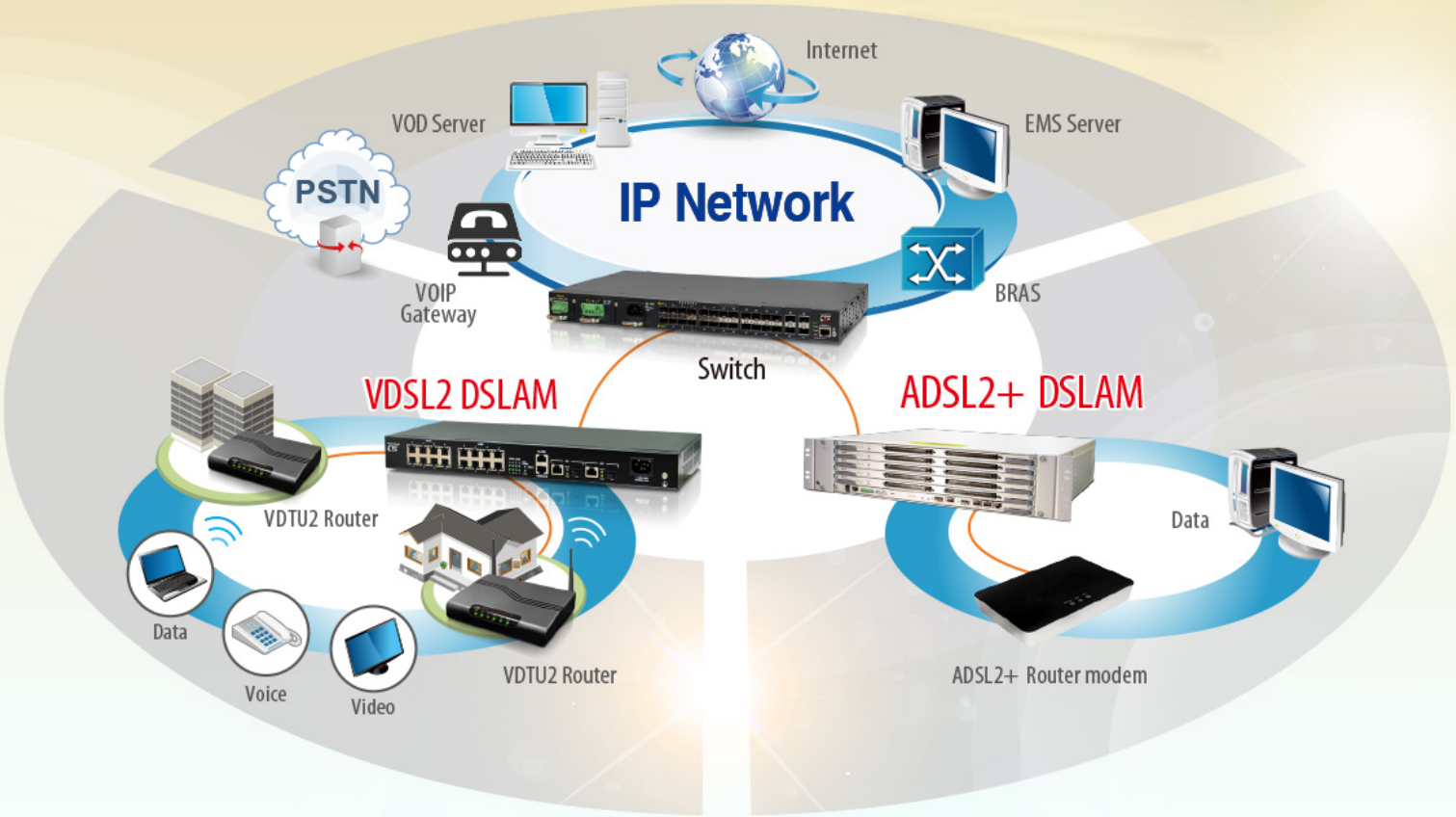
Cable Type Speed Distance Wavelength Temperature

ISFP – □□□□□□ – □□ – □

Example: ISFP – M7000 – 85 – E

DSL Series

VDSL2 IP DSLAM
ADSL2+
G.SHDSL TDM & ATM
EFM LAN Extender



Remote *Local*

VDTU2A-104-4PH

4-Port PoE Ethernet Extender with Power Feeding *(Phone Line)*

VDTU2A-104-4PH are a pair of devices that support remote power feeding to a non-managed Fast Ethernet PoE (Power over Ethernet) switch and provides Ethernet LAN extension up to 1.2km. Housed in a rugged metal chassis, the LAN extender provides an excellent solution in IP surveillance networks to extend both Ethernet and power over a simple single pair telephone wire. Up to 4 remote IP cameras (or other PoE PD devices) may be powered, with a maximum budget of 40 watts PoE available, without the requirement to run any extra electrical power lines. Standard operating temperature range is -20 to 50°C.

Features

- Local unit accepts universal AC power
- Remote power feeding eliminates the need for power service at remote unit
- IP30 rugged metal housing
- 4 port with IEEE 802.3af/at PSE at remote (40W budget)
- Remote power feeding and data operate over one twisted pair over up to 1200 meters
- Simple DIP switch setting to set and forget
- Twisted pair with auto polarity detection for easy installation
- Twisted pair connects with terminal block or RJ-11

Specifications

Standards	IEEE802.3 10BASE-T
	IEEE802.3u 100BASE-TX
	IEEE802.3x Flow Control and Back Pressure
	IEEE802.3af/at PoE
Data Architecture	Store and Forward
PoE RJ-45 pin assignment (VDTU2A-104R-4PH)	RJ-45 port 1~ 4 support IEEE 802.3at/af Positive (VCC+): RJ-45 pin 4, 5 Negative (VCC-): RJ-45 pin 7, 8 Data (1,2,3,6)
PoE standard	IEEE802.3at/af (VDTU2A-104R-4PH)
Connector	RJ11 x 1 or Terminal block x 1 for Twisted pair Phone line 4-Port RJ-45 for 10/100Base-TX Ethernet, and IEEE802.3 af/at PoE (PoE port only for VDTU2A-104R-4PH)
Ethernet Cable	UTP/STP above Cat. 5e cable, EIA/TIA-568 100-ohm (100m)
Phone line cable	Phone twisted pair above AWG24
Power deliver	Distance : 1200Meter by Twisted pair Phone line PoE 40Watt totally Supports PTZ IP cam
Power feeding Watt	Power feeding by Phone line up to 40W for Total @1,200KM, Supports Per Ethernet port up to IEEE802.3at 30W maximum
Performance and Power feeding	Phone line Distance vs Speed and Power

Distance (Meter)	300	600	900	1200
Throughput Down load /Up load	45/81	29/62	15/43	6.5/28
Power feeding by Phone line	40W	40W	40W	40W

Tested under room temperature 25°C; 24AWG twisted-pair cable

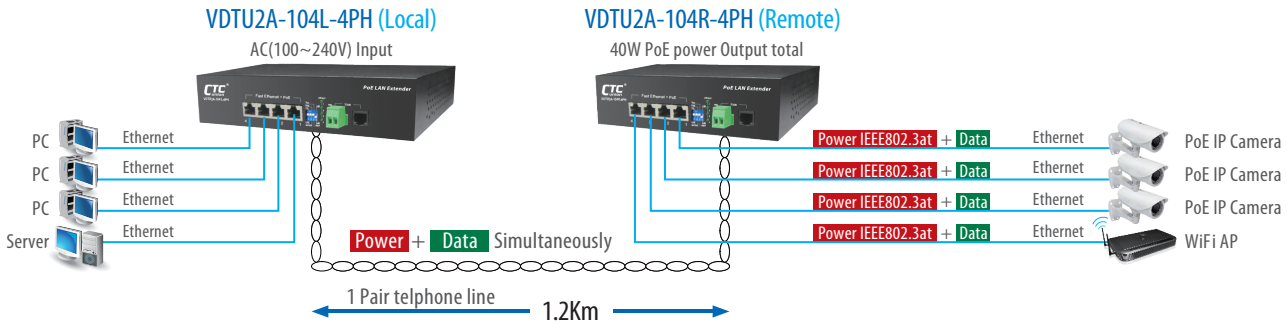
Power Input	100~240VAC (VDTU2A-104L-4PH)

DIP SW	

DIP SW	SW 1 CO / CPE	SW 2 Transmitt Mode (1)	SW 3 Transmitt Mode (2)	SW 4 Signal S/N
ON	CO	Fast	Symmetric	6 dB
OFF	CPE	Interleave	Asymmetric	9 dB

LED	RJ-45 Per port 1~4 : Link/Active (Green) Power : Green (ON: Device Power ON) CO LED OFF: Act as CPE, ON: Act as CO Link(Phone) On: Link, Flash: Linking on going, Off: disconnect
Operating Temperature	-20 ~ 50°C
Dimensions	VDTU2A-104L-4PH : 190 x 200 x 48 mm (D x W x H) VDTU2A-104R-4PH : 170 x 170 x 44 mm (D x W x H)
Housing	Metal Case
Weight	1.3KG (VDTU2A-104L-4PH) 1.0KG (VDTU2A-104R-4PH)
Operating Humidity	5 ~ 95% (Non-condensing)
Installation	Desk and Wall Mounting
Short circuit protection	Present (Phone line Power feeding short circuit protection)
Surge protection for Phone, Network Line	EN61000-4-5 Level 3 Criterial B (Line to Ground 2KV)
Reverse polarity protection	Phone line DC Power feeding polarity protection RJ-45 Network Line PoE DC Power polarity protection
Certification	CE, FCC
EMI	FCC Part 15 Subpart B Class B, EN 55022 Class B

Application



Ordering Information

Model Name	Description
VDTU2A-104-4PH	Ethernet Extender by phone line With Power Feeding and PoE (VDTU2A-104L-4PH and VDTU2A-104R-4PH)

EFM-10/20/40

4-Port EFM G.SHDSL.bis LAN Extender

EFM is an Ethernet Network Extender designed to provide bonded high-speed Ethernet First Mile services over SHDSL on existing copper infrastructure. It is a bridge mode modem that delivers Ethernet services with symmetrical bandwidth at rates up to 22.8 Mbps (4 Pairs, Standard mode with TC-PAM 32) and 61 Mbps (4Pairs, Enhanced mode with TC-PAM 128). Implemented on IEEE 802.3ah EFM standards for advanced performance and management features. EFM ensures high reliability, low expense and maximum throughput. The introduction of EFM copper bonding technology allows delivery of higher bandwidth to longer distances over multiple copper pairs, enabling a good alternative in place where fiber is not economical to deploy. This Ethernet-pure solution provides a seamless integration into today and tomorrows networks. Designed with standard-based EFM technology (2BASE-TL), deployment of Ethernet services with EFM is quick and simple on the existing copper plant.

Features

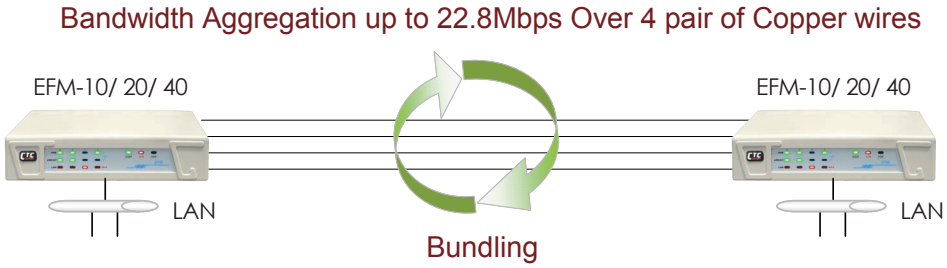
- Extending Ethernet Services to sites with existing copper infrastructure
- Supports TC-PAM 32 for 5.7 Mbps over single pair copper
- EFM Bonding up to 61 Mbps (4 pairs, TC-PAM 128)
- Flexible and Rapid Service Deployment
- Flexible configuration as CPE or CO
- Supports EFM OAM complying IEEE 802.3ah
- Low Delay, Jitter and packet loss for delay sensitive applications
- Comprehensive and easy OAM & P functions in provisioning and management
- QoS feature for guaranteed Ethernet service
- Future-proof Ethernet traffic management and QoS features

Specifications

Standards	LAN	4-Port switching hub
		10/100Base-T auto-negotiation & sensing
		Auto MDI/MDI-X
	WAN	ITU-T G.991.2.(2004)
		EFM bonding (IEEE 802.3ah OAM)
		2BASE-TL
		Data Rate: • N x 64 Kpbs (N=3~89) using TC-PAM 16/32 • Max. 5.696Mbps (1-Pair) • Max. 11.392Mbps (2-Pair) • Max. 22.784Mbps (4-Pair) • N x 64 Kbps (N=3~239) using TC-PAM 64/128 • Max. 15.296 Mbps (1-Pair) • Max. 30.592 Mbps (2-Pair) • Max. 61.184 Mbps (4-Pair) • Supports of Annex A, Annex B, Annex AF & Annex BG
LAN Protocols	802.1d Transparent Bridging	
	Up to 2K MAC Address learning bridge	
Hardware Interface	DSL : RJ-45 x 1, LAN : RJ45 x 4, Console Port x 1	
	MGMT : RJ45 x1, DC Power Jack x 1	
	Reset Button : Load Factory Default	
Indicator	LAN : Link/Act, 10/100 per port	
	System : Power, Alarm, MGMT	
	WAN : Link per loop	

Management Interface	Easy to use web-based GUI for quick setup, configuration and management
	Menu-driven interface for local console and telnet access
	Password protected management and access control list for administration
	SNMP v1/v2 (RFC1157/1901/1905) agent and MIB II (RFC1213/1493)
	EFM OAM (IEEE 802.3ah)
	Software upgrade via web-browser / TFTP
VLAN Support	IEEE 802.1Q VLAN Tagging
	Up to 8k 802.1q VLANS (ID Range 1~4094)
	Port Based VLAN, VLAN Stacking (Q-in-Q)
QoS Support	Rate limiting by rule-based/port-based
	Traffic classification based on port/802.1p/ DSCP
	WRR (Weighted Round Robin) / SPQ (Strict Priority Queuing) scheduling algorithm
Environment	Operating Temperature : 0 ~ 50°C
	Storage Temperature : -40 ~ 85°C
	Relative Humidity : 98%, non-condensing
Regulatory	ISO 9001 Quality Management, CE Approval
Physical / Electrical	Dimension : 195 x 48 x 168mm (D x W x H)
	AC Power Adapter (100 ~ 240VAC)
	Weight : 1.3kg
Memory	2MB Flash Memory, 8MB SDRAM

Application



Ordering Information

Model Name	Description
EFM-10	2W, 2Base-TL EFM LAN Extender with 4x10/100Base-TX
EFM-20	4W, 2Base-TL EFM LAN Extender with 4x10/100Base-TX
EFM-40	8W, 2Base-TL EFM LAN Extender with 4x10/100Base-TX

EFM –□□

Example: EFM – 10

VDSM2-1524

24-Port VDSL2 IP DSLAM

VDSM2-1524 is a 24-port VDSL2 IP DSLAM with 2 Gigabit Ethernet Combo interfaces built-in a1.5U height design. VDSM2-1524 offers the fastest data rate over the existing copper infrastructure. In order to connect with the growing broadband applications, VDSM2-1524 provides the idea solution in the last mile. VDSM2-1524 is able to provide a faster data transmission easily with the latest VDSL2 technology in order to handle the rapidly growing demands of triple-play media. VDSM2-1524 supports the switch management functions, such as port speed configuration, port link aggregation, IEEE 802.1Q VLAN, Q-in-Q VLAN, and ACL security. In addition, it is featured with advanced functions, such as IGMP snooping, QoS, bandwidth control and etc. VDSM2-1524 allows its users to provide a better secured network service with enforcing security policies, such as MAC filter, Static MAC, IP/MAC binding and port security.

Features

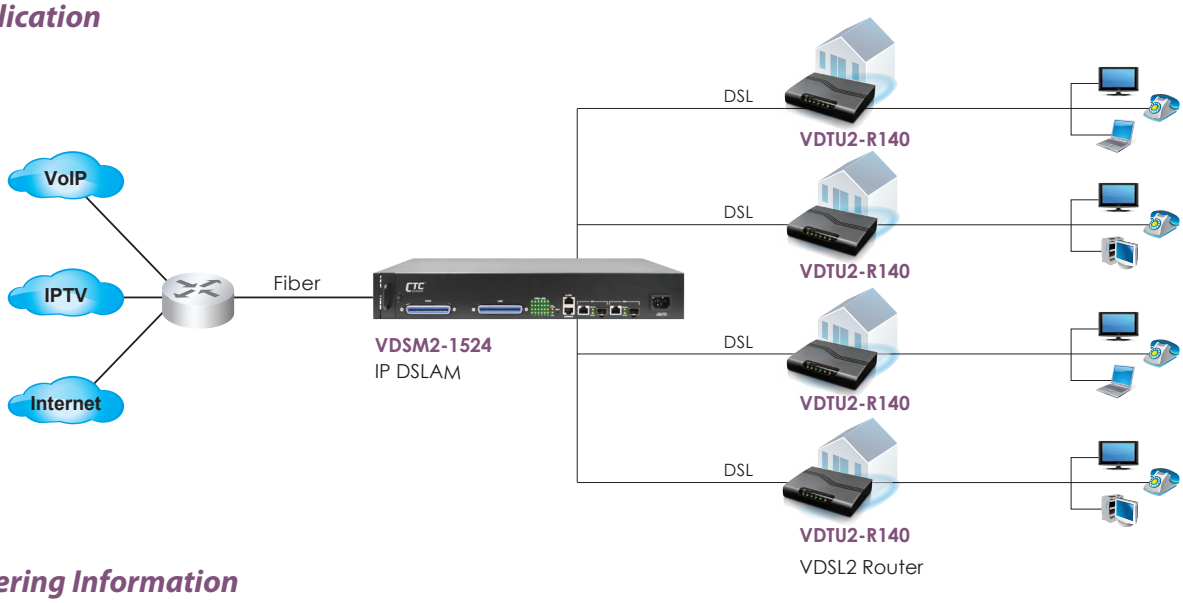
- 1.5U design, 24 VDSL2 ports splitter
- Supports VDSL2 Profiles, 8a, 8b, 8c, 8d, 12a, 12b, 17a and 30a
- Supports Traffic Classification, such as QoS, ToS, DSCP, etc
- Supports L2/L3 Content Filtering
- Configuration backup and restoration
- Supports, Port-Based VLAN, Protocol-Based VLAN, VLAN Mapping, etc
- Supports L2 Bridge Functions (IEEE 802.1d) and Multicast.
- DHCP Server/Relay/Client
- DNS Proxy
- Flexible Deployment and Maintenance.
- Web-based management with a user friendly interface.

Specifications

Chassis	1.5U High
Interfaces	24 VDSL2 Ports
	Two RJ-45 100/1000Mbps Ethernet Combo Ports
	Management Ethernet
	1 x RS-232 Serial Console
	POTS Splitter
LED Indicators	SYS, ALM, LINK, ACT
	24 x VDSL LEDs
Standards	VDSL2 ITU-T G.993.2
	VDSL2 Profiles: 8a, 8b, 8c, 8d, 12a, 12b, 17a and 30a
	802.1d L2 Bridging
	DHCP Server/Client/Relay
	IEEE 802.1Q VLAN (Port-based VLAN and Protocol-Based VLAN)
	VLAN Stacking (Q-in-Q)
	IEEE 802.1p Spanning Tree Protocol (STP)
	IEEE 802.3ad Link Aggregation

Protocols	IGMP Snooping/Proxy v1 and v2
	Multicast Forwarding with IGMP Snooping v1 and v2 (RFC 1112 and RFC 2236)
	Up to 512 Multicast Channels
	Fast and Normal Leave Modes
Security	L2 Frame Filtering by MAC Addresses
	L3 Frame Filtering by IP Addresses, protocol ID, and TCP/UDP
	DHCP and ARP Broadcasting Frames Filtering
	Supports Secured Forwarding
Management	Supports OAM&P Functions
	Supports VLAN Priority Queue (IEEE 802.1p)
	Supports CoS, ToS, DSCP, etc.
	Supports SNMP v1/v2/v3 and MIB I/II
	Web-based Graphical User Interface, Telnet, CLI and SSH
Environment	Operating Temperature : -10 ~ 50°C
	Storage Temperature : -40 ~ 70°C
	Relative Humidity : Up to 95% (non-condensing)

Application



Ordering Information

Model Name	Description
VDSM2-1524	24x 10/100-TX Ports VDSL2 IP DSLAM with 600 ohm POST Splitter

VDSM2-1008

1U, 8-Port VDSL2 IP DSLAM

NEW

VDSM2-1008 is a compact 8-port VDSL2 IP DSLAM with 2 Gigabit Ethernet Combo interfaces and built-in POTS splitter. It is compliant to ITU-T G.993.2 standard and supports VDSL2 30a profile that features 100Mbps of symmetric data rate over the existing copper wires. VDSM2-1008 is an ideal choice for ISPs and System Integrators that are looking for a high performance broadband solution for their triple play (Video, Voice and Data) applications.

VDSM2-1008 is designed to connect with the growing Carrier Ethernet infrastructure, it provides great flexibility for service providers to customize their services and brings them reliable, secure and high quality network access at low cost. In addition, VDSM2-1008 offers user-friendly management interfaces that allow service providers to monitor and control their services in a highly secure and efficient way. It features the supports for Port-based/Protocol-based VLAN, Q-in-Q, VLAN Mapping, VLAN translation, L2/L3 frame filtering and secured forwarding. Furthermore, VDSM2-1008 supports traffic classification including CoS (802.1), VLAN ID, ToS and DSCP. With all these powerful and advanced features, VDSM2-1008 VDSL2 Mini IP DSLAM is the perfect solution for service providers to deploy their broadband access, IP Surveillance, Hospitality and MTU/MDU applications.

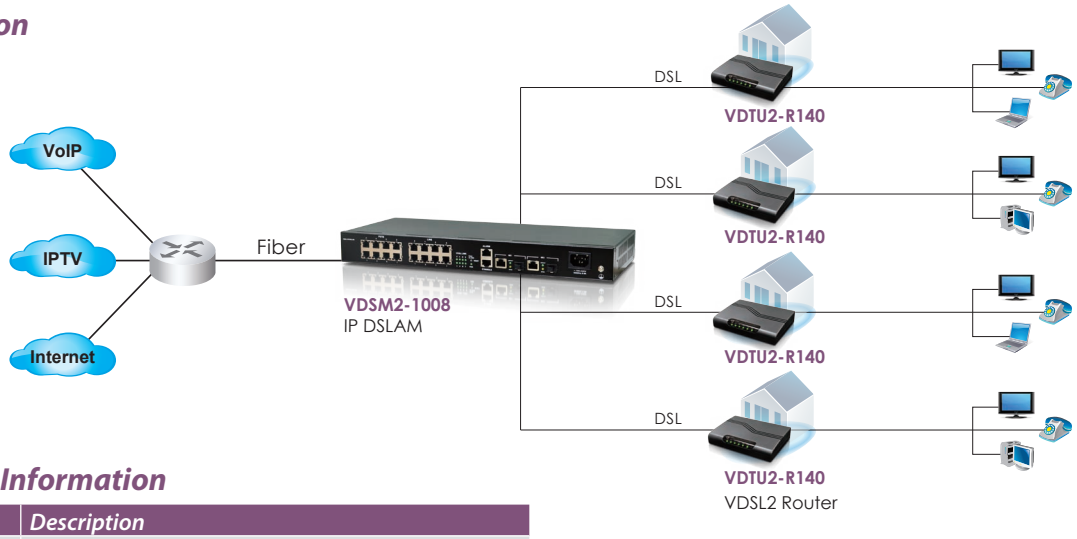
Features

- 1U design, 8 VDSL2 ports with POTS splitter
- Provides 3-FAN cooling mechanism and support low/middle/full speed based on programming temperature
- Supports VDSL2 profiles 8a/8b/8c/8d/12a/12b/17a/30a
- Supports traffic classification, such as QoS, ToS and DSCP
- Supports Port Security with MAC address filtering
- Supports Port-Based VLAN, Protocol-Based VLAN and VLAN Mapping
- Supports IEEE 802.1d STP/IEEE802.1w RSTP & IEEE-802.1s MSTP
- DHCP /Client/Relay/Option82, DNS Proxy
- Flexible deployment and maintenance
- Web-based management with a user friendly interface
- Configuration backup and restoration

Specifications

Interfaces	RJ-11 x 8 VDSL2 Ports / RJ-11 x 8 POTS Ports
	2x Gigabit Ethernet Combo ports (100/1000Base-T and SFP)
	1x RJ-45 Console Port
	1x RJ-45 Alarm Port for 4 Alarm Inputs
LED Indicators	System : PWR
	Gigabit Port : LINK/ACT, SPEED 1000/100
	Alarm : RUN/ALARM
	VDSL : VDSL Link/Sync
Standards	VDSL2 ITU-T G.993.2
	VDSL2 Profiles: 8a, 8b, 8c, 8d, 12a, 12b, 17a and 30a
	802.1d L2 Bridging
	DHCP/Client/Relay/Option82
	IEEE 802.1q VLAN Tag base
	VLAN Stacking (Q-in-Q)
	IEEE 802.1d Spanning Tree Protocol (STP)
	IEEE 802.3ad Link Aggregation
Certification	CE, FCC Part 15 Subpart B, VCCI, EN60950
Dimensions	404 x 174 x 44.5 mm (D x W x H)
Power	100-240 V AC, 50-60 Hz
Power Consumption	30Watts maximum
Protocols	IGMP Snooping/Proxy v1, v2 and v3
	Multicast Forwarding with IGMP Snooping v1 and v2 (RFC 1112 and RFC 2236)
	Multicast MAC address mapping
	Up to 512 Multicast Channels
	Profile-based Multicast Access Control (up to 8 profiles)
	Fast and Normal Leave Modes
Security	L2 Frame Filtering by MAC Addresses
	L3 Frame Filtering by IP Addresses, protocol ID, and TCP/UDP
	DHCP and ARP Broadcasting Frames Filtering
	Supports Secured Forwarding
Management	Local Management: RS-232 and Telnet CLI, Web/SNMP management
	Remote in-band Management: Web/SNMP/Telnet
	Supports SNMP v1/v2/v3
Environment	Operating Temperature : -10°C to 50°C
	Storage Temperature : -40°C to 70°C
	Humidity : 10% - 95% (non-condensing)

Application



Ordering Information

Model Name	Description
VDSM2-1008	8-Port VDSL2 IP DSLAM with POTS Splitter (600 ohm)

Specifications & design are subject to change without prior notice. Please visit CTC Union website for more details.

NEW

VDTU2-R240W

VDSL2 802.11n Wireless Router

VDTU2-R240W is a VDSL2/ADSL2+ 802.11n Wireless router with four fast Ethernet LAN ports and USB Host. It is compliant to ITU-T G.993.2 standard and supports VDSL2 30a profile that features 100Mbps of symmetric data rate over local loop. With built-in 802.11n technology, VDTU2-R240W can deliver wireless speed up to 300 Mbps and is perfectly suitable for triple play applications (video, voice and data). VDTU2-R240W VDSL2 Router is designed to meet the requirements of ISPs and carriers that intend to use one DSL device to cover end users in different loop range areas, it provides a great flexibility for their end-users to comply today's rapid-changing Internet demands. VDTU2-R240W VDSL2 is a cost-effective and high-speed Internet access solution that can provide users a smooth and reliable wireless connection.

Features

- Automatically switches from VDSL2 to ADSL2+
- Supports VDSL2 profiles 8a/8b/8c/8d/12a/12b/17a/30a
- Equipped with a one-click Wi-Fi Protected Setup (WPS) button
- Security protection with firewall
- Web-based management with user friendly interface.
- Configuration backup and restoration
- TR-069 Remote Management (Optional)

Specifications

Interfaces	
LAN	4x RJ-45 10/100Base-T Auto-sensing and Auto-MDIX switch, supports IPv6
USB	USB host x 1
Wi-Fi	802.11b/g/n and 2 External antennas
RST	"Factory reset" button & reboot button
WPS	WPS push button
Power	ON/OFF switch
DSL Compliance	
ADSL	G.dmt (ITU G.992.1) Annex A, B
	G.lite (ITU G.992.2) Annex A, B
	G.hs (ITU G.994.1)
	G.bond (ITU G.998.1)
	Maximum rate : 8 Mbps for downstream / 1 Mbps for upstream
	G.dm.bist + A196 (ITU G.992.3) Annex A, B
	G.lite.bis (ITU G992.4) Annex A, B
	Maximum rate : 12 Mbps for downstream / 1 Mbps for upstream
	G.dmt.bisplus (ITU G992.5) Annex A, B
	Maximum rate : 24 Mbps for downstream / 1,2 Mbps for upstream
ADSL2+	Up to 8 PVCs
	Supports encapsulation of bridged Ethernet over AAL5 (RFC 2684,formerly RFC1483)
	Supports encapsulation of routed IP over Ethernet over AAL5(IPoE)
	Supports encapsulation of routed IP over AAL5 (IPoA)
	Supports Classical IP according to RFC 2225 (formerly RFC1577)
	Supports PPPoA according to RFC 2364
	Supports PPPoE(default) according to RFC 2516
	Supports multiple levels of QoS
VDSL2	ITU G993.2 Annex A, B, C
	VDSL2 (ITU G993.2) Annex A,B,C, support Band plans 997, 998 refer to Annex B
	Up to 17 Mhz profile (POTS/ISDN)
	Supports VDS2 profile 8a, 8b, 8c, 8d, 12a, 12b, 17a, 30a
	Supports ATM and PTM transparent (dual-priority & dual latency) for user data

WLAN	Compliant with IEEE 802.11b, 802.11g, and IEEE 802.11n standards
	2.4 GHz configurable (5 GHz Optional)
	Up to 300 Mbps wireless operation rate
	RF Output Power: 15 ± 1.5 dBm in 2.4 GHz
	64/128-bit Wireless security with WPA/WPA-PSK, PA2/ WPA2-PSK, Mixed WPA/WPA2 support
	WPS (WiFi Protected Setup) for easy setup
USB	File Sharing
	3G backup support
VPN	VPN Pass-through
Management	Web-based GUI for remote and local management (HTTP/ HTTPS)
	Quick Start Wizard
	Configuration Backup and Restoration
	Firmware upgrade through TFTP/FTP and HTTP
	SNMP management with SNMP agent and MIB II
	Supports Syslog
	TR-069 (Optional)
QoS	ATMQoS : UBR (Default), CBR, VBR-rt, VBR-nrt
	802.1p
	IP DSCP

Specifications

Firewall	IPv6 Firewall
	Packet filtering
	URL filtering
	Parental control
Routing	Static routing and RIP v1/v2 (RFC 1058/2453)
	Supports IP/TCP/UDP/ARP/IGMP
	IP multicast and IGMP proxy (RFC 1112/2236)
	Network Address Translation (NAT/PAT)
	DNS relay and caching (RFC 1034/1035)
	DHCP server
	IP precedence (RFC 791) (Firewall router)

Power	AC Adapter : 100V-240V± / 10%
	Output : DC 12VDC
Certification	CE, FCC, RoHS compliant

Application

Ordering Information

Model Name	Description
VDTU2-R240W	VDSL2 Wi-Fi Router with 4-Port 10/100-TX Ethernet

NEW

VDTU2-R140

4-Port VDSL2 Router

VDTU2-R140 is a single-VDSL2-port router with 4 10/100Mbps Ethernet ports. It adopts the latest VDSL2 technology (ITU G.922.3), which has the extraordinary bandwidth and supports up to VDSL2 profile 30a, and it is perfectly suitable for triple play applications (video, voice and data). VDTU2-R140 is a cost effective solution that delivers high-speed Internet access to end-users over existing copper wire infrastructure. Also, it is designed to meet the requirements of ISPs and carriers that intend to use one DSL device to cover end users in different loop range areas. In addition, it provides great flexibility for their end-users to comply today's rapid-changing Internet demands. Based on the latest VDSL2 technology, VDTU2-R140 presents a cost-effective solution with high-speed Internet access over standard copper telephone cable.

Features

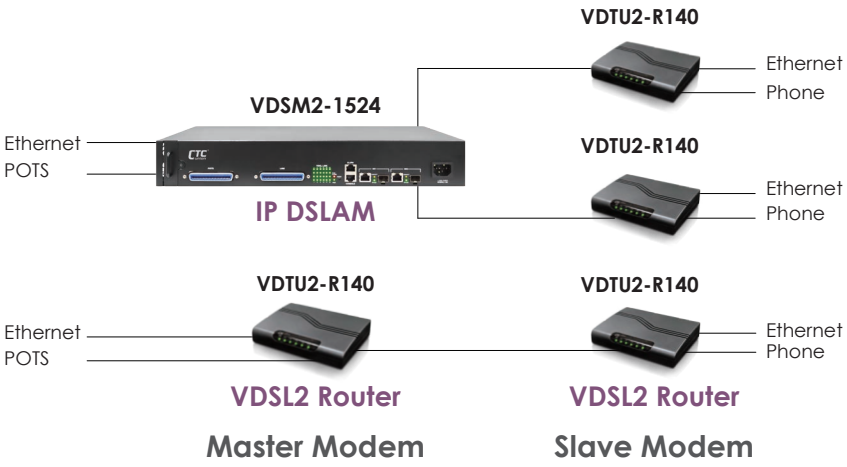
- Supports point-to-point mode (support both CO and CPE modes)
- Interoperable with major VDSL2 chipset solutions including Ikanos, Infineon, and Broadcom
- Supports up to VDSL2 profile 30a
- Supports up to 100Mbps for both Upstream and Downstream
- Build-in UPnP available, which allows automatic discovery and the broadband router's configuration
- IP/MAC address filtering
- Static route/RIP/RIP v2 routing functions
- Dynamic IP assignment
- Supports QoS to enhance traffic efficiency
- Supports NAT, which allows multiple users access the Internet with only one single external IP address
- IGMP Proxy and fast leave
- DHCP Server/Relay/Client. DNS Proxy, DDNS
- Embedded SNMP agent
- Web-based management with a friendly graphical user interface
- Configuration backup and restoration

Specifications

Standards	Compliant with ITU VDSL2 standard G.993.2 Annex A, Annex B and Annex C
	Supports VDSL2 profile: 8a, 8b, 8c, 8d, 12a, 12b, 17a and 30a
	Band plan profile: symmetric (Plan 997) and asymmetric (Plan 998)
	Built-in POTS splitter to share voice and data (Optional)
Management	Web-based GUI for quick setup, configuration and management
	Firmware upgradable from Web
	SNMP management with SNMP agent and MIB II
Interfaces	Ethernet: 4 X RJ-45 connectors for Ethernet 10/100Mbps ports with Auto-MDI/MDIX
	VDSL : 1 X RJ-11 connector for VDSL2 port
QoS	Port Based
	802.1p
	ToS/DSCP
	4 priority queues per port
	WRR/WFQ/SP/BE
Power	AC Adapter : 100V-240V± / 10%
	Output : DC 12VDC

LAN	Filtering functions for MAC/IP/Port.
	Port Based VLAN & IEEE 802.1q VLAN Tagging
	Port configuration for Bandwidth/Duplex/Speed/Flow control
Routing	Static routing and RIP v1/v2(RFC 1058/2453)
	Support IP/TCP/UDP/ARP//IGMP
	IGMP snooping and proxy (RFC 1112/2236)
	NAT ALGs for ICQ/NetMeeting/MSN/Yahoo Messenger
	DNS relay and caching (RFC 1034/1035)
	DHCP server, client and relay (RFC 2131/2132) Dynamic DNS
	IP precedence (RFC 791) (Firewall router)
Firewall	DMZ host
	Virtual server mapping (RFC1631)
	VPN pass-through for PPTP/ L2TP/ IPSec tunneling
	NAT firewall
	User access control
Weight	300g
Dimensions	131.5 x 180 x 36.5 mm (D x W x H)

Application



Ordering Information

Model Name	Description
VDTU2-R140	VDSL2 Router with 4-Port Ethernet and POST splitter 600 ohm

VDTU2-B110

VDSL2 Ethernet Bridge

VDTU2-B110 Ethernet Extender is a high-speed Ethernet Extender with one Ethernet port (RJ-45 connector) and one VDSL port (RJ-45 connector). It is a bridge mode modem, well accommodating VDSL2 (Very-high-data-rate Digital Subscribe Loop) technology to extend Ethernet service over single-pair phone line. It is compliant to ITU-T G.993.2 standard and supports VDSL2 30a profile that features 100Mbps of symmetric data rate over the existing copper wires. Supporting both symmetric and asymmetric transmission, it can reach up to 100/100 Mbps bandwidth (line rate) within 300M or 10/10 Mbps (line rate) for 1 Km long range connections. By providing ultra-high speed, VDTU2-B110 Ethernet Extender makes your telephone line achieve its best performance than before. It has the advantage of minimum installation time (simply as plug-n-play) and minimum expense by allowing video streaming and data to share the same telephone pair without interference. VDTU2-B110 Ethernet Extender delivers everything needed to quickly deploy a high-speed IP-based network for providing high-speed Internet access, video-on demand services and voice services. The resulting compact, cost-effective form factor offers Systems Integrators, small business owners an attractive Long Reach Ethernet solution.

Features

- Cost effective bridge function to connect two Ethernet LAN
- Supports flow control on Fast Ethernet port via PAUSE frame or Back Pressure
- EEE 802.1Q VLAN tag transparent
- Easy installation via simple plug-and-play
- Selectable CPE and CO mode via DIP switch: Two working modes are built in the same unit, which keep the flexibility of installation and easy provision of service but lower inventory of service provider
- Selectable VDSL2 profile mode (17a or 30a): Support up to VDSL2 30a profile to ensure high data rate.
- Selectable target band plan:
  Symmetric: Support the band plan G.997 and provide the symmetric transmission on both downstream and upstream.
  Asymmetric: Provides highest line rate in short range in asymmetric mode.
- Selectable target SNR margin

Specifications

4-Pole DIP Switch	Selectable CO or CPE mode
	Selectable 30a or 17a (VDSL2 Profile)
	Selectable Band plan (Symmetric or Asymmetric)
	Selectable target SNR margin (6dB or 9dB)
LAN Interface	RJ-45 connector
	Complies with IEEE 802.3/802.3u/802.3x
	10/100 Base-T Auto-Negotiation, Auto-MDI/MDI-X
LED	LAN : ACT/LNK,10/100Mpbs, Half/Full Duplex
	VDSL : Power On/Off, CO/CPE, Idle/Trained/Link
Power supply	DC 12 Volt over 3.5mm DC jack ; 4.2 Watt maximum

VDSL Interface	RJ-45 connector
	DMT Encoding
	Complies with ITU-T G993.1/993.2/G.997.1
	On-board surge protection
Dimensions	73.4 x 96.2 x 22.8 mm (D x W x H)
Temperature	0°C ~45°C
Humidity	0%~95%RH (non-condensing)
Certification	CE
	FCC Part 15 Class B
	EN60950

Application

Ordering Information

Model Name	Description
VDTU2-B110	VDSL2 10/100-TX Ethernet Bridge
FMC-CH17-AC/DC/AD	2U, 17-slot FMC converter Chassis with AC, DC or AD Power

VDTU2 – □□□□
Example: VDTU2 – B110

Chassis Power Type
FMC-CH17 – □□
Example: FMC-CH17 – AD

VDTU2A-301

VDSL2 LAN Extender

The VDTU2A-301 is our lowest cost LAN extension solution using the G993.1/993.2 VDSL2 technology and providing up to 100Mbps throughput with only a single copper wire pair. A LAN extender is a device that forwards traffic between LANs transparently to higher network-layer protocols over distances that far exceed the distance limitations of standard Ethernet. A LAN is a high-speed data network (usually employing Ethernet technology) that connects computer workstations, printers, servers, and other devices. Designed specifically for LAN to LAN extension and supporting both symmetrical and asymmetrical transmission at up to 100/75Mbps within 300 meters or 10/10Mbps rate at 1000 meters, this is a perfect solution to extend a LAN to an adjacent building, garage or any location outside of the 100 meter reach of Ethernet UTP.

Features

- Cost effective bridge function to connect two Ethernet LANs
- 100/75Mbps @ 300m (980 Ft)
- 10/10Mbps @ 1km (3300 Ft)
- Supports flow control via Pause frame or back pressure
- 802.1Q VLAN tag transparent
- Selectable CPE and CO mode via DIP switch
- Selectable fast and interleaved mode
- Selectable target band plan
- Selectable target SNR margin 9dB or 6dB

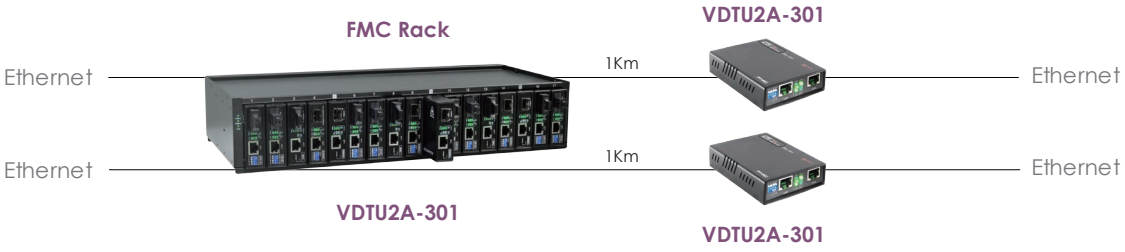
Specifications

LAN Interface	Complies with IEEE 802.3 10Base-T and
	802.3u 100Base-TX
	Connector : RJ45
	MTU : 1536 Bytes
VDSL2 Interface	Complies with ITU-T G993.1/993.2/ G997.1
	Connector : RJ45
	DMT encoding
	On-board surge protection
4-position DIP Switch	Selectable CO or CPE mode
	Selectable fast or interleave mode (Impulse noise protection)
	Selectable Band plan (Symmetric or Asymmetric)
	Selectable target SNR margin (6dB or 9dB)

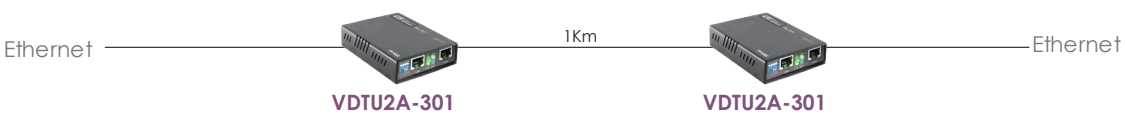
Indicator	LAN : Act/Link, 10/100Mbps, Half/Full duplex
	VDSL : CO/CPE, Idle/Trained/Link, Power
Standard	ITU-T G.993.1, 993.2, IEEE802.3, 802.3u
Power	DC 12V via AC switching adapter
Power Consumption	4.2W
Dimensions	97 x 73 x 23mm (D x W x H)
Weight	80g
Temperature	0 ~ 50°C (Operating), -10 ~ 70°C (Storage)
Humidity	10 ~ 90% non-condensing
Certification	CE, FCC, RoHS compliant
MTBF	50,000 hrs

Application

Rack to Standalone Solution



Standalone to Standalone Solution



Ordering Information

Model Name	*Description*
VDTU2A-301	VDSL2 LAN Extender with 1x 10/100Base-TX
FMC-CH17-AC/DC/AD	2U, 17-slot FMC converter Chassis with AC, DC or AD Power

VDTU2A – □□□
Example: VDTU2A – 301

Chassis Power Type
FMC-CH17 – □□
Example: FMC-CH17 – AD

VDTU2A-304

4-Port VDSL2 LAN Extender

The VDTU2A-304 VDSL2 LAN Extender is a long reach Ethernet extender with four Ethernet ports and two phone jacks, in which one is for VDSL2 connection and the other is for POTS (Plain Old Telephone Service) connection. It has built-in POTS splitter to share the existing phone line with POTS eliminating the need for replacing the existing copper wiring. It is ideal for use as an Ethernet extender to an existing Ethernet network. While accommodating VDSL2 (Very-high-data-rate Digital Subscribe Loop) technology to extend Ethernet service over single-pair phone line, VDTU2A-304 can reach up to 100/75 Mbps bandwidth (line rate) within 300M or 40/10 Mbps bandwidth (line rate) for 1 Km long-range connections. By providing ultra-high speed, VDTU2A-304 LAN Extender makes your telephone line achieve its best performance ever. It has the advantage of minimum installation time (simple as plug-n-play) and minimum expense by allowing video streaming and data to share the same telephone pair without interference. VDTU2A-304 delivers everything needed to quickly deploy a high-speed IP-based network for providing high-speed Internet access, video-on demand services and voice services. The resulting compact, cost-effective form factor offers systems integrators and small business owners an attractive long reach Ethernet solution.

Features

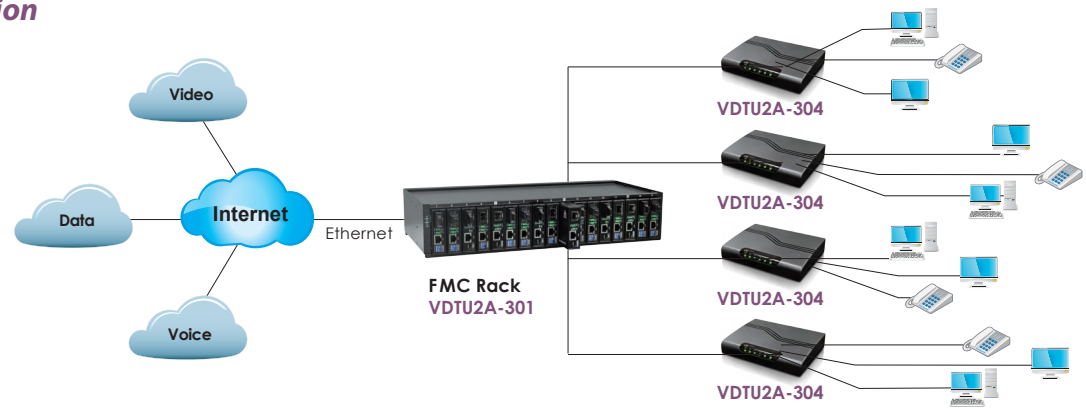
- Cost effective bridge function to connect two Ethernet LAN
- Easy installation via simple plug-and-play
- Selectable CPE and CO mode : Two working modes are built in the same unit, which keep the flexibility of installation and easy provision of service but lower inventory of service provider.
- Selectable fast and interleaved mode: Fast mode guarantees a minimum end to end latency less than 1 mS. Interleaved mode provides impulse noises protection for any impulse noise with duration less than 250uS. Interleaved mode has a maximum end to end latency of 10mS.
- Selectable target band plan : VDSL2 defines multiple band plans and configuration modes to allow asymmetric and symmetric services in same binder for data transmission.
- Asymmetric is selected that provides better downstream performance. Symmetric is selected that provides better upstream performance.
- Selectable target SNR margin: It has the ability to select fixed SNR margin value on 9 dB or 6db. The systems will maintain the SNR margin at their value across all usable loop length. The higher SNR value gets better line quality, but lower performance.

Specifications

Standards	Compliant with ITU VDSL2 standard G.993.2 Annex A, Annex B and Annex C
	Supports VDSL2 profile : 8a, 8b, 8c, 8d, 12a, 12b and 17a
	Band plan profile: symmetric (Plan 997) and asymmetric (Plan 998)
	Supports fast and interleaved mode
	Target SNR Margin : Selectable
	Built-in POTS splitter to share voice and data (Optional)
Management	Web-based GUI for quick setup, configuration and management
	Firmware upgradable from Web
LAN	Filtering functions for MAC/IP/Port
	QoS for Port/VLAN/DSCP/TCP-UDP Port number
	Port Based VLAN & IEEE 802.1q VLAN Tagging
	Port configuration for Bandwidth/Duplex/Speed/Flow control/Broadcast storm

Interfaces	Ethernet : 4x RJ-45 connectors for Ethernet 10/100Mbps ports with Auto-MDI/MDIX
	VDSL : 1 X RJ-11 connector for VDSL2 port
	Phone : 1 X RJ-11 connector for POTS Splitter (Optional)
	General : PWR and SYS
	WAN (VDSL2) : CO, CPE, LINK and ALM
	LAN (Ethernet) : 1, 2, 3, 4 LNK/ ACT
Indicators	General : PWR and SYS
	WAN (VDSL2) : CO, CPE, LINK and ALM
	LAN (Ethernet) : 1, 2, 3, 4 LNK/ ACT
Power	Input : AC 90~240V/50 ~ 60Hz ; Output : DC 12V/1A
Power consumption	9 watts maximum
Environment	Temperature : 0 ~ 45°C
	Humidity : 0% ~ 95% (non-condensing)
Dimensions	131.5 x 180 x 36.5 mm (D x W x H)
Weight	300g

Application



Ordering Information

Model Name	Description
VDTU2A-304/US	VDSL2 LAN Extender with 4-port 10/100Base-TX, splitter 600 ohm

Specifications & design are subject to change without prior notice. Please visit CTC Union website for more details.

MD15

48-Port Managed IP DSLAM with GbE Combo Uplink

The MD15 is a 1.5U 19" rack mountable "pizza box" type ADSL2+ IP DSLAM with temperature hardening. The system provides 48 ADSL2/2+ ports with built-in POTS splitters and is able to provide broadband data communication services and multimedia services on the same copper line. The unit is capable of delivering high speed data services, full-rate of ADSL2+ (up to 24mbps download) for 48 subscribers with 2 Gigabit uplinks or 10 Mbps per port for 96 subscribers in a two 48-port stacked boxes configuration. With advanced QoS features, the MD-15 is ideal for next generation broadband networks capable of delivering rich video content, DSL, POTS, and VoIP service over ADSL2+ link. The MD-15 provides two uplink ports with both electrical and optical (SFP) Gigabit Ethernet (GbE) interfaces for cascading, ring architecture or 802.3ad link aggregation. The MD15 is suitable for small size applications or deployment in remote location such as business parks or street cabinets to extend the service reach distance from central office.

Features

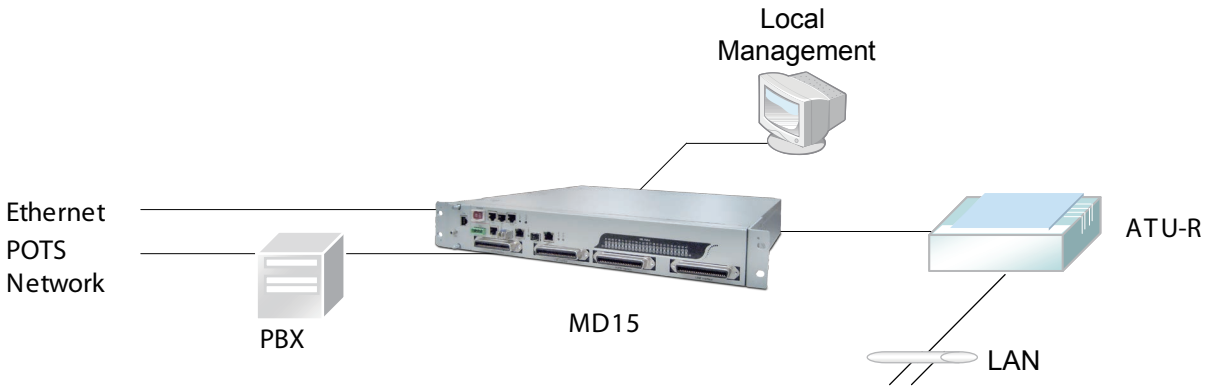
- 48 ports ADSL2/2+ solution in 1.5U chassis
- 1+1 Gigabit Ethernet trunk with combo SFP and RJ45
- Multi-ADSL speed offerings supporting ADSL, ADSL2, ADSL2+ over POTS or ISDN
- Built-in POTS splitters
- Backup firmware partition aids in upgrade failure recovery
- Temperature monitor and system over temperature protection with trap alarm
- Configuration backup and restore via TFTP
- RS-232 serial CLI and separate LAN port for web based management
- NMS/EMS for Multiple nodes management based on SNMP (option)

Specifications

VDSL2 standards	Network Interface	2x 10/100/1000Based-T or 2x SFP (IP)
	Line Interface	ADSL2/2+/ POTS(G.992.1 .2 .3 .5)
Management	Ethernet	IEEE 802.1d Spanning Tree Protocol (STP)
		IEEE 802.3ad Link aggregation
		Password Security on console access
	OSI Layer 2	MAC filtering and count limit
	Functionality	Access control list (ACL)
		Multicasting support
		Port based and 802.1p/q Tag-based VLAN
		IGMP V1/V2 snooping and proxy
		SNMP V1/V2C
System	Multiple session Telnet, web based and SNMP	
Configuration	Supports point to point VCC link Software remote upgrade	
MTBF	50,000 hrs	

Alarm and Status	Automatic alarm/LED indication for alarm and system status Four housekeeping inputs and one alarm contact closure output
Management	Provides all system OAM&P functionalities, software remote updates
	RS-232 local console interface for basic provisioning plus out-band Ethernet interface for Telnet or Web
Indications	GbE 1/2 link, RST, ACO, ALM, SYS, DSL Status 1 ~ 48
Power Input	Dual A+B feeds, -42V ~ -56VDC
	AC: 100V ~ 240VAC
Power Consumption	130W
Dimensions	265 x 482 x 66mm (D x W x H)
Weight	3.5kg
Temperature	-40 ~ 65°C (Operating), -40 ~ 70°C (Storage)
Humidity	10~90% non-condensing
Certification	CE, FCC, RoHS compliant, ITU-T, ETSI

Application



Ordering Information

Model Name	Description
MD15-48A6-AC	1.5 U 19" Rack 48-port Anx A 600Ω AC Power
MD15-48A6-DC	1.5 U 19" Rack 48-port Anx A 600Ω DC Power

MD15 – □□□□ – □□ (Power Type)

Example: MD15 – 48A6 – AC

MD30

24 ~ 120 Ports Modular Managed IP DSLAM with GbE Combo Uplink

The MD30 is a 3U 19" rack mountable ADSL2+ IP DSLAM with temperature hardening. The modular design allows hot swapping of major components such as uplink trunk card, 24-port tributary cards and cooling fan module. The system provides 24/48/72/96/120 ADSL2/2+ ports with built-in POTS splitters and is able to provide broadband data communication services and multimedia services on the same copper line. The unit is capable of delivering high speed data services, full-rate of ADSL2+ (up to 24mbps download) for 120 subscribers with 2 Gigabit uplinks. With advanced QoS features, the MD-30 is ideal for next generation broadband networks capable of delivering rich video content, DSL, POTS, and VoIP service over ADSL2+ link. The MD30 provides two uplink ports with both electrical and optical (SFP) Gigabit Ethernet (GbE) interfaces for cascading, ring architecture or 802.3ad link aggregation. The MD30 is suitable for small size applications or deployment in remote location such as business parks or street cabinets to extend the service reach distance from central office.

Features

- 3U 19(23)" 5-slot ADSL2/2+ chassis
- Modular design with hot swappable field replaceable units
- 1+1 Gigabit Ethernet trunk with combo SFP and RJ45
- Temperature monitor and system over temperature protection with trap alarm
- Backup firmware partition aids in upgrade failure recovery
- Configuration backup and restore via TFTP
- RS-232 serial CLI and separate LAN port for web based management
- NMS/EMS for Multiple nodes management based on SNMP (option)

Specifications

Network Interface	2x 10/100/1000Based-T or 2x SFP (IP) Subscriber Interface	
	ADSL2/2+/ POTS/ISDN (G.992.1 .2 .3 .5) or G.SHDSL	
Line Interface : ADSL	24 ports per card	
	Fast/Interleave latency modes for G.dmt	
	Supports Interleave mode for G.Lite	
	ADSL to ATM signal conversion	
	Build-in POTS splitter circuit	
	Power Consumption : 25 W(max)	
4-position DIP Switch	24 ports per card	
	Signal modulation and demodulation	
	G.SHDSL to ATM signal conversion	
	Power Consumption : 21 W(max)	
Indicator	LAN: Act/Link, 10/100Mbps, Half/Full duplex	
	VDSL : CO/CPE, Idle/Trained/Link, Power	
Standard	ATM	QoS (UBR, rt-VBR, nrt-VBR, CBR)
		PVC default priority and PVC-to VLAN maping
		Traffic scheduling/shaping/policing
	Ethernet	IEEE 802.1d Spanning Tree Protocol (STP)
		IEEE 802.3ad Link aggregation
		Password Security on console access
Management	OSI Layer 2 Functionality	
	MAC filtering and count limit	
	Access control list (ACL)	

Management	Multicasting support
	Port based and 802.1p/q Tag-based VLAN
	IGMP V1/V2 snooping and proxy
	SNMP V1/V2C
System Configuration	Multiple session Telnet, Web based and SNMP
	Supports point to point VCC link
	Software remote upgrade
Alarm and Status	Automatic alarm/LED indication for alarm and system status
Management	Four housekeeping inputs and one alarm contact closure output Provides all system OAM&P functionalities, software remote updates.RS-232 local console interface for basic provisioning plus out-band Ethernet interface for Telnet or Web Indications GbE 1/2 link, RST, ACO, ALM, SYS, DSL Status 1 ~48
Power Input	Input : -48 V DC (-42 V to -56 V)
	Dual A+B -48 V DC power input terminal
Power Consumption	130W
Dimensions	304 x 482 x 133 mm (D x W x H)
Weight	4.5kg
Temperature	-40 ~ 65°C (Operating), -40 ~ 70°C (Storage)
Humidity	10 ~ 90% non-condensing
Certification	CE, FCC, RoHS compliant, ITU-T, ETSI

Application

Ordering Information

Model Name	Type	Description
MD30-MA1A	Chassis	3U,19" 5 slot chassis with DC power, Cooling Fan
MD00-GE1A	Trunk Card	Giga Ethernet Uplink card with 2xGbe Combo
MD00-AL5A	Link Card	24-Port ADSL 2 Line card 600 ohm Splitter ANX-A

Chassis Type
MD30 – □□□□
Example: MD30 – MA1A

Card Type
MD00 – □□□□
Example: MD00 – GE1A

Specifications & design are subject to change without prior notice. Please visit CTC Union website for more details.

MD15A

24-Port Managed IP DSLAM with Gigabit Uplink

The MD15A is a 1.5U 19" rack mountable "pizza box" type ADSL2+ IP DSLAM with temperature hardening. The system provides 24 ADSL2/2+ ports with built-in POTS splitters and is able to provide broadband data communication services and multimedia services on the same copper line. The unit is capable of delivering high speed data services, full-rate of ADSL2+ (up to 24mbps download) for 24 subscribers with one Gigabit copper uplinks. With advanced QoS features, the MD-15A is ideal for next generation broadband networks capable of delivering rich video content, DSL, POTS, and VoIP service over ADSL2+ link. The MD15A is suitable for small size applications or deployment in remote location such as business parks or street cabinets to extend the service reach distance from central office.

Features

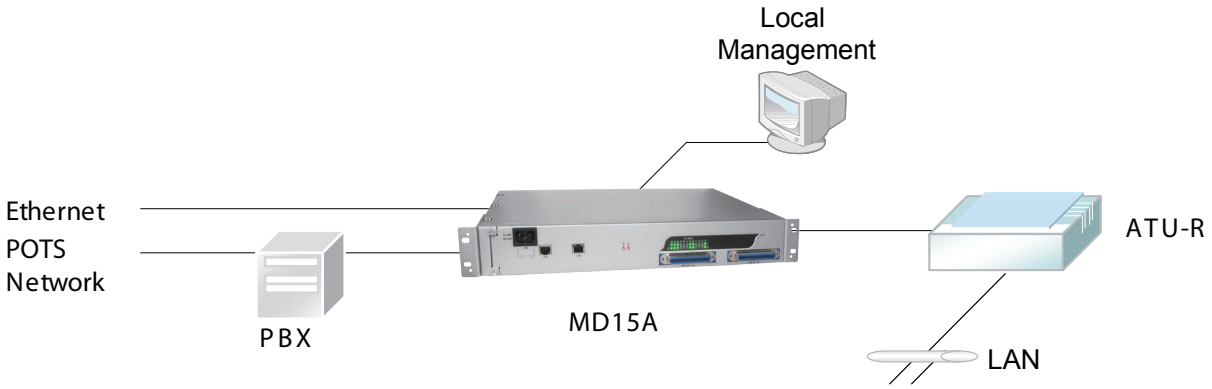
- 24 ports ADSL2/2+ solution in 1.5U chassis
- One copper Gigabit Ethernet uplink design
- Multi-ADSL speed offerings supporting ADSL, ADSL2, ADSL2+ over POTS or ISDN
- Built-in POTS splitters
- Configuration backup and restore via TFTP
- Monitors of line attenuation, noise margin, current rate, second performance data
- Backup firmware partition aids in upgrade failure recovery
- RS-232 serial CLI and separate LAN port for web based management
- NMS/EMS for Multiple nodes management based on SNMP (option)

Specifications

Network Interface	1x 10/100/1000Base-T	
Line Interface	ADSL2/2+/ POTS(G.992.1 .2 .3 .5)	
	Ethernet	Password Security on console access
	OSI Layer 2	MAC filtering and count limit
	Functionality	Access control list (ACL)
		Multicasting support
		Port based and 802.1p/q Tag-based VLAN
		IGMP V1/V2 snooping and proxy
		SNMP V1/V2C
System Configuration	Multiple session Telnet, web based and SNMP Supports point to point VCC link Software remote upgrade	
MTBF	50,000 hrs	

Alarm and Status	Automatic alarm/LED indication for alarm and system status
Management	Maintenance signal for OAM functionalities.
	Software remote updates.
	RS-232 local console interface for basic provisioning plus out-band Ethernet interface for Telnet or Web
Indications	GbE link, RST, ACO, ALM, SYS, DSL Status
Power Input	-42V ~ -56VDC, 100V ~ 240VAC
Power Consumption	130W
Dimensions	265 x 482 x 66 mm (D x W x H)
Weight	3.5kg
Temperature	-40 ~ 65°C (Operating), -40 ~ 70°C (Storage)
Humidity	5 ~ 95% non-condensing
Certification	CE, FCC, RoHS compliant, ITU-T, ETSI

Application



Ordering Information

Model Name	Description
MD15A-24A6-AC	1.5 U 19" Rack 24 port Anx A 600Ω AC Power
MD15A-24A6-DC	1.5 U 19" Rack 24 port Anx A 600Ω DC Power

Power Type

MD15A – 24A6 – □□

Example: MD15A – 24A6 – AC

TDM SHDSL Modem

2-wire G.SHDSL TDM
SHDTU03-E1, SHDTU03-ET100, SHDTU03-V35
2/4-wire G.SHDSL.bis TDM
SHDTU03b(A)-E1, SHDTU03b(A)-ET100, SHDTU03b(A)-31

SHDSL TDM modem Series is a telecommunication product designed for carriers and SME users. The standalone modems offer a variety of choices for data interfaces to meet different connection needs. SHDSL TDM modem series features E1/T1, Data and Ethernet interfaces, allowing connection to different DTE types. When equipped with multiple interfaces, the standalone SHDSL modem combines user traffic over the SHDSL link. Available DTE combinations include E1+Ethernet, T1+Ethernet that can work simultaneously to share the DSL bandwidth. The SHDSL modem supports two different connectors for G.703 E1 application that link to TDM service either by balanced 120Ω RJ45 jack or unbalanced 75Ω dual BNCs with bit rates from 64kbps to 2.048Mbps. For T1 connection, the SHDSL modem offers balanced 100Ω RJ45 Jack to carry bit rates from 64Kbps to 1.544Mbps. For Ethernet interface application, the SHDSL modem supports 10/100Mbps auto-detected Fast Ethernet with a RJ45 connector, and provides customer premise with LAN to high-speed TDM services. The data rate of LAN interface is up to 5.696Mbps (SHDSL.bis) and 2.3Mbps (SHDSL) for one pair of copper wires and 11.4Mbps (SHDSL.bis) and 4.6Mbps (SHDSL) for two pairs of copper wires. The SHDSL modem can be configured and managed via EOC, or menu-driven Asynchronous Terminal Interface, either locally or remotely.

Features

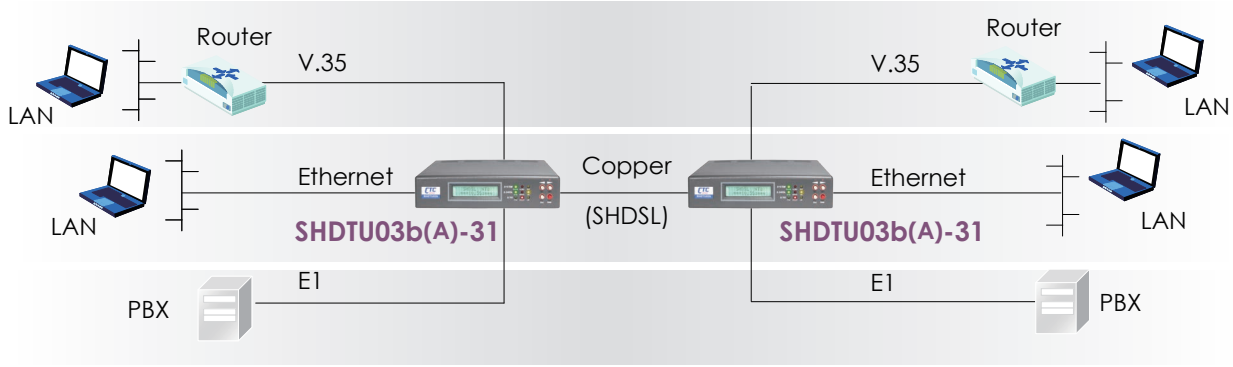
- Standard ITU-T G.991.2 supports improvement on reach, speed and interoperability in contrast to conventional SHDSL devices
- Fast and cost-effective services as voices or TDM leased line services or LAN
- Efficient usage of single wire pair on existing copper loop infrastructures
- Bandwidth guaranteed transmission equipment
- Supports multiple DTE interfaces working simultaneously on back-to back connection
- Auto rate installation maximizes data rate based on loop conditions
- Local management interface with LCD display
- Remote line loopback
- SHDSL Line performance monitoring (data rate and SNR)
- Raw and per time interval statistics

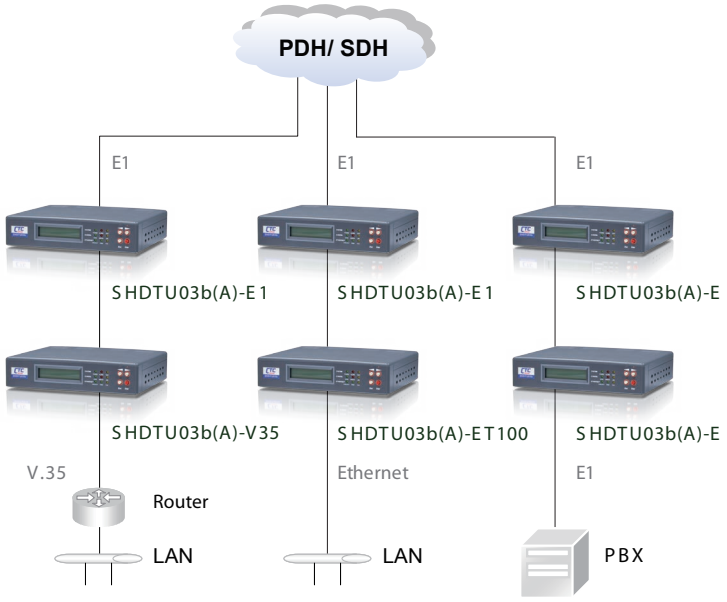
Specifications

Network Interface	Line Rate : ITU-T G.991.2 (2004), ITU-T G.994.1	
	Connection : RJ-45	
	Impedance : 135 ohms	
	SHDSL.bis	Coding : trellis coded pulse amplitude modulation (TC-PAM16 and TC-PAM32)
		Supports : Annex A, B, F and G
		Payload Rates •64Kps to 5.696Mbps (N=1 to 89) for 2-wire model •128Kbps to11.392Mbps (N=2 to 178) for 4-wire model
	SHDSL	Coding : trellis coded pulse amplitude modulation (TCPAM-16)
		Supports : Annex A (ANSI) and Annex B (ETSI)
		Payload Rates: 64kbps to 2.304Mbps (N x 64kbps, N=1 to 36)
	Connection : RJ-45 jack (2-wire or 4-wire)	
	Impedance : 135 ohms	
G.703 Interface (E1)	Connection : RJ-45 for balanced 120Ω E1 cable and	
	BNC for unbalanced 75Ω E1 cable	
	Line Rate : 2048KHz +/- 50ppm	
	Line coding : HDB3/AMI	
	Framing : PCM30/PCM30C/PCM31/PCM31C and Unframed	
	Data Rate : 64Kbps to 2.048Mbps (Nx64Kbps, N=1 to 32)	
	Operation : Full E1 and Fractional E1	
G.703 Interface (T1)	Connection : RJ-45C for balanced 100Ω T1 cable	
	Line Rate : 1544KHz +/- 50ppm	
	Line coding : B8ZS	
	Framing : SF/ESF/Unframed	
	Data Rate : 64kbps to 1.544Mbps (N=1 to 24)	
	Operation : Clear Channel and Factional T1	

LAN Interface (Ethernet)	Single Ethernet Interface
	Payload rates : Up to 5.696Mbps (for 2-wire model) or Up to 8.192Mbps (for 4-wire model)
	10/100Mpbs Half/Full Duplex, Auto-sensing, Auto-MDI/MDIX
	Up to 1024 MAC address learning
Jitter and Wander	Meets G.823 and G.824 jitter and wander requirements
DSL Timing	Internal
	From E1/T1 Recovery (E1/T1)
Performance Monitoring	ES, SES, UAS, LOWS for SHDSL
	ES, SES, UAS for E1/T1
	Alarms and Errors for SHDSL or interface
Loopback Tests (for E1, T1 only)	Local Digital Loopback
	Local Loopback
	Remote Line Loopback
	Remote Payload Loopback
	Far-end Line Loopback
	Far-end Payload Loopback
	Build-in 2047 (2^{11}-1) Bit Error Rate Tester
Management	Configuration with keypads and LCD display
	Console port (RJ45, RS232C)
	Support firmware upgradeable
Certification	CE Approval & EN60950 Certificate
Dimensions	195 x 48 x 168 mm (D x W x H)
Power	AC Input : 90~240V with 50~60Hz
	DC Input : -36V~-72V
Power Consumption	10W Max
Environment	Operation temperature : 0 to 50°C
	Humidity : Up to 95% (non-condensing)

Application





Ordering Information

2-wire G.SHDSL TDM

Model Name	*Description*
SHDTU03-E1-AD	E1 NTU, AC+DC Power (2-wire 2.3Mbps)
SHDTU03-ET100-AD	Ethernet 10/100Base-TX Ethernet Bridge NTU, AC+DC Power (2-wire 2.3Mbps)
SHDTU03-V35-AD	V35 TDM NTU, AC+DC Power w/V35 Cable (2-wire 2.3Mbps)
SHDTU03-530-AD	RS-530 TDM NTU, AC+DC Power w/RS-530 Cable (2-wire 2.3Mbps)
SHDTU03-449-AD	RS-449 TDM NTU, AC+DC Power w/RS-449 Cable (2-wire 2.3Mbps)
SHDTU03-X21-AD	X21 TDM NTU, AC+DC Power w/X21 Cable (2-wire 2.3Mbps)

2-wire / 4-wire G.SHDSL.bis TDM

Model Name	*Description*
SHDTU03b-E1-AD	E1 NTU with AC+DC Power (2-wire 5.7Mbps)
SHDTU03b-ET100-AD	Ethernet 10/100Base-TX Ethernet Bridge NTU, AC+DC Power (2-wire 5.7Mbps)
SHDTU03b-31-AD	E1/V35/LAN multi-interface NTU with AC+DC Power (2-wire 5.7Mbps)
SHDTU03bA-E1-AD	E1 NTU with AC+DC Power (4-wire 11.4Mbps)
SHDTU03bA-E100-AD	Ethernet 10/100Base-TX NTU with AC+DC Power (4-wire 11.4Mbps)
SHDTU03bA-31-AD	E1/V35/LAN multi-interface NTU with AC+DC Power (4-wire 11.4Mbps)

SHDTU03 – ☐☐ – ☐☐ (Interface / Power Type)

Example: SHDTU03 – E1 – AD

ATM SHDSL Router

2/4-wire G.SHDSL ATM
SHDTU03F-ET10R(S), SHDTU03AF-ET10RS
2/4-wire G.SHDSL.bis ATM
SHDTU03bF-ET10R(S), SHDTU03bAF-ET10RS

The SHDSL ATM modem series is 2-wire or 4-wire Ethernet Bridge/Router that complies with G.991.2 standards and has an optional built-in four port 10Base-T /100Base-TX auto-negotiation and auto-MDIX switch. The SHDSL ATM modem provides business-class, multi-rate 2-wire up to 5.7Mbps (SHDSL.bis) and 2.3Mbps (SHDSL) or 4-wire 11.4Mbps (SHDSL.bis) and 4.6Mbps (SHDSL) payload rates over existing single or two pair copper wire. SHDSL ATM modem is designed not only to optimize the service bit rate from central office to customer premises but also integrates high-end Bridging/ Routing EFM bonding capabilities with advanced functions such as virtual server mapping and VPN pass-through. The SHDSL ATM modem allows customers to leverage the latest in broadband technologies to meet their growing data communication needs. In bridge mode, the four switching ports may be configured for IEEE802.1Q VLAN or port based VLAN applications. The modem can be configured in either central or client mode providing a point-to-point solution

Features

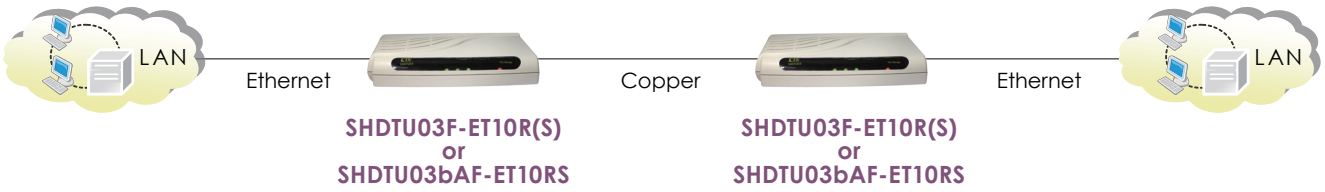
- Supports Ethernet over ATM over SHDSL
- Full ATM protocol stack implementation over G.SHDSL
- Adaptive rate installation maximizes data rate based on loop conditions
- Standard ITU G.991.2 (2004) supports improved reach, speed and interoperability compared to conventional G.SHDSL
- Supports point-to-point configurations
- Local management interface via console port
- Intuitive Web based management
- SNMP management with SNMPv1/v2 and MIB II
- Build-in advanced SPI firewall (Firewall routers)
- Efficient IP routing and transparent learning bridge to support broadband Internet services
- VPN pass-through for safeguarded connections
- DMZ host/Multi-DMZ/Multi-NAT; multiple PCs on a LAN with only one IP address
- PPPoA and PPPoE support user authentication with PAP/CHAP/MSCHAP
- Raw and time stamped statistics
- Supports firmware upgrade via web interface
- EFM (Ethernet in the First Mile) bonding per IEEE 802.3-2005; 2/4-wire bonding for HDLC per G991.2

Specifications

Ports	LAN Interface	10Base-T /100 Base-TX auto-negotiation
		Auto-MDIX
		Connector: RJ-45
	WAN Interface	SHDSL: ITU-T G.991.2(Annex A/B) ITU-T G.994.1
		SHDSL.bis: ITU-T G.991.2 2004(Annex A/B/F/G) ITU-T G.994.1
		Encoding scheme: TC-PAM16, TC-PAM32
		Data Rate: N x 64Kbps (N=3~89)
		Impedance: 135 ohm
		Data Rate :
		SHDSL: 2-wire up to 2.3Mbps, 4-wire up to 4.6Mbps
		SHDSL.bis: 2-wire up to 5.7Mbps, 4-wire up to 11.4Mbps
ATM	Up to 8 PVCs	
	OAM F4/F5 loopback test , AAL5	
ATM QoS	UBR (Unspecified Bit Rate)	
	CBR (Constant Bit Rate)	
	VBR-rt (Variable Bit Rate Real Time)	
	VBR-nrt (Variable Bit Rate Non-real Time)	
AAL5 Encapsulation	VC multiplexing and SNAP/LLC	
	Ethernet over ATM (RFC 2684/1483)	
	PPP over ATM (RFC 2364)	
	Classical IP over ATM (RFC 1577)	
PPP	PPP over Ethernet for fixed and dynamic IP (RFC 2516)	
	PPP over ATM for fixed and dynamic IP (RFC 2364)	
	User authentication with PAP/CHAP/MS-CHAP	
Indications	General: PWR	
	WAN: LNK, ACT	
	LAN: 1, 2, 3, 4 (ET10RS)	
	LAN: Link, ACT (ET10R)	
	SHDSL: ALM	
Power Input	DC 9V-12V in	
Power Consumption	< 9W	

Routing	Supports IP/TCP/UDP/ARP/ICMP/IGMP protocols
	IP routing with static routing and RIPv1/RIPv2 (RFC1058/2453)
	IP multicast and IGMP proxy (RFC1112/2236)
	Network Address Translation (NAT/PAT) (RFC1631)
	NAT ALGs for MSN/Yahoo Messenger
	DNS relay and caching (RFC1034/1035)
	DHCP server, client and relay (RFC2131/2132)
Bridging	IEEE 802.1D Transparent Bridging
	IEEE 802.1Q VLAN
	Port-based VLAN
Security	DMZ host/Multi-DMZ/Multi-NAT function
	Virtual server mapping (RFC1631)
	VPN pass-through for PPTP/L2TP/IPSec tunneling
	NAT firewall
	Advanced stateful packet inspection (SPI) firewall
	Denial of service protection
	User access control
Management	Easy-to-use web-based GUI for quick setup, configuration and management
	Menu-driven interface for local console and Telnet access
	Password protected management and access control list for administration
	SNMP management with SNMPv1/SNMPv2c (RFC1157/1901/1905), MIB II (RFC1213/1493)
	Software upgrade via web-browser/TFTP server
	Console port: RJ-232
Dimensions	145 x 187 x 33 mm (D x W x H)
Weight	0.58kg
Temperature	0 ~ 50°C (Operating), -10 ~ 70°C (Storage)
Humidity	10 ~ 90% non-condensing
Certification	CE, FCC, RoHS compliant
MTBF	57,000 hrs

Application



	SHDTU03F-ET10R	*SHDTU03F-ET10RS*	*SHDTU03AF-ET10RS*	*SHDTU03bF-ET10R*	*SHDTU03bF-ET10RS*	*SHDTU03bAF-ET10RS*
WAN	2-wire	2-wire	4-wire	2-wire	2-wire	4-wire
LAN	1	4	4	1	4	4
Auto-MDIX	Yes	Yes	Yes	Yes	Yes	Yes
Port-based VLAN	None	Yes	Yes	None	Yes	Yes
802.1Q VLAN	1LAN / 1WAN	4LAN / 1WAN	4LAN / 1WAN	1LAN / 1WAN	4LAN / 8WAN	4LAN / 8WAN
Firewall	No	No	No	Yes	Yes	Yes
Maximum data rate	2.3Mbps	2.3Mbps	4.6Mbps	5.7Mbps	5.7Mbps	11.4Mbps
Minimum data rate	64Kbps	64Kbps	128Kbps	192Kbps	192Kbps	384Kbps

Ordering Information

2-wire / 4-wire G.SHDSL ATM

Model Name	*Description*
SHDTU03F-ET10R	1-Port 10/100Base-TX ATM Bridge / Router w/Firewall (2-wire 2.3Mbps)
SHDTU03F-ET10RS	4-Port 10/100Base-TX ATM Bridge / Router w/Firewall (2-wire 2.3Mbps)
SHDTU03AF-ET10RS	4-Port 10/100Base-TX ATM Bridge / Router w/Firewall (4-wire 4.6Mbps)

2-wire / 4-wire G.SHDSL.bis ATM

Model Name	*Description*
SHDTU03bF-ET10R	1-Port 10/100Base-TX ATM Bridge / Router w/Firewall (2-wire 5.7Mbps)
SHDTU03bF-ET10RS	4-Port 10/100Base-TX ATM Bridge / Router w/Firewall (2-wire 5.7Mbps)
SHDTU03bAF-ET10RS	4-Port 10/100Base-TX ATM Bridge / Router w/Firewall (4-wire 11.4Mbps)

SHDTU03bF – □□□□□

Example: SHDTU03bF – ET10R

G.SHDSL.bis Router / NTU Performance

4 wires Rate (kbps)	2 wires Rate (kbps)	N	AWG#26 (0.4mm)	AWG#26 (0.4mm)	AWG#24 (0.5mm)	AWG#24 (0.5mm)	AWG#22 (0.6mm)	AWG#22 (0.6mm)
			kft	km	kft	km	kft	km
384	192	3	24	7.3	30	9.1	36	11
512	256	4	23	7	28.5	8.6	34.5	10.5
1024	512	8	19.5	5.9	24	7.3	29.5	9
1920	960	15	17	5.2	21	6.4	25.5	7.8
2176	1088	17	16.5	5	20.5	6.2	24.5	7.5
2560	1280	20	16	4.9	20	6.1	21.5	6.6
3584	1792	28	14	4.3	17.5	5.3	21	6.4
3840	1920	30	14	4.3	17.5	5.3	20	6.1
4352	2176	34	13.5	4.1	16.5	5	19.5	5.9
4608	2304	36	13	4	16	4.8	19.5	5.9
5120	2560	40	12.5	3.8	15.5	4.7	19	5.8
5632	2816	44	12.5	3.8	15.5	4.7	18.5	5.6
6400	3200	50	12	3.7	15	4.5	18	5.5
6912	3456	54	11	3.4	13.5	4.1	16.5	5
7424	3712	58	11	3.4	13.5	4.1	16	4.9
7680	3840	60	10.5	3.2	13	3.9	15.5	4.7
7936	3968	62	10.5	3.2	13	3.9	15	4.6
8448	4224	66	10	3	12.5	3.8	15	4.6
8960	4480	70	10	3	12.5	3.8	15	4.6
9472	4736	74	9.5	2.9	11.5	3.5	14.5	4.4
10240	5120	80	9.5	2.9	11.5	3.5	14	4.3
11136	5568	87	8.5	2.6	10.5	3.2	12.5	3.8
11392	5696	89	8.5	2.6	10.5	3.2	12	3.7

2.3Mbps G.SHDSL Router / NTU Performance

Line Speed kbps	AWG#26 (0.4mm)	AWG#24 (0.5mm)	AWG#22 (0.6mm)
64	9.7	12.8	16.0
128	8.1	10.6	13.2
192	6.9	9.1	11.4
256	6.7	8.7	11.0
320	6.7	8.7	11.0
384	6.5	8.5	10.5
448	6.4	8.4	10.5
512	6.2	8.1	10.1
576	6.1	8.0	10.0
640	5.9	7.8	9.7
704	5.8	7.7	9.6
768	4.8	6.3	7.9
832	5.5	7.2	9.0
896	5.3	6.9	8.7
960	4.9	6.5	8.1
1024	5.1	6.7	8.5
1088	5.0	6.6	8.3
1152	4.8	6.3	7.9
1216	4.8	6.3	7.9
1280	4.3	5.6	7.0
1344	4.1	5.4	6.7
1408	4.4	5.8	7.2
1472	4.4	5.8	7.2
1536	4.3	5.6	6.9
1600	4.4	5.8	7.2
1664	4.4	5.8	7.2
1728	4.2	5.4	6.8
1792	4.2	5.4	6.8
1856	4.1	5.4	6.7
1920	4.1	5.4	6.7
1984	4.0	5.2	6.5
2048	3.6	4.2	5.5
2304	3.3	3.9	4.8

TDM Series

STM1/E1 Access Multiplexer
E1 Access Multiplexer

TDM Over IP
Ethernet over E1, Coaxial Ethernet Bridge

iSAP1000

STM1/E1 Multiplexer

NEW

iSAP1000 is 1U 19" rack type STM-1/E1 terminal multiplexer which delivers traditional PDH services over SDH networks. iSAP1000 provides connectivity for up to 16E1. The product complies with SDH standards and interfaces with existing SDH backbones through a single or 1+1 protection STM-1 interface. iSAP1000 supports a variety of management access over console, Telnet and SNMP. iSAP1000 provides two Gigabit Combo ports (2-port 10/100/1000Base-T and 2-port 1000Base-X SFP slot) with 16x E1 or 2x STM-1 fiber interfaces. The two GE combo ports support Link aggregation, port based VLAN and 802.1Q VLAN function.

Features

- Provides 2-port STM-1 fiber with 1+1 protection.
- Supports Internal clock and recovery clock modes
- Supports Single E1 fractional and unframed E1 service; Multiple E1, fractional E1
- Supports PCM31, FAS+CRC4, CRC self-test
- Supports HDLC/GFP bridge operation, 16x VCG with total 16 remote device, 16E1 Per VCG, MAX data rate 32Mbps Per VCG
- Supports 16E1 balanced RJ45 or unbalanced BNC connectors
- Maximum 220ms delay variance between E1 links
- Supports 2x GbE Combo ports
- Supports IEEE 802.1Q VLAN and QinQ, Link aggregation
- Fiber port support ALS(Auto Laser Shutdown) function
- Built-in BERT for performing local and remote loopback
- Supports Console, GUI, telnet and SNMP management
- Supports local and remote FTP/TFTP f/w upgrade
- Complies with ITU-T G.8040 standard

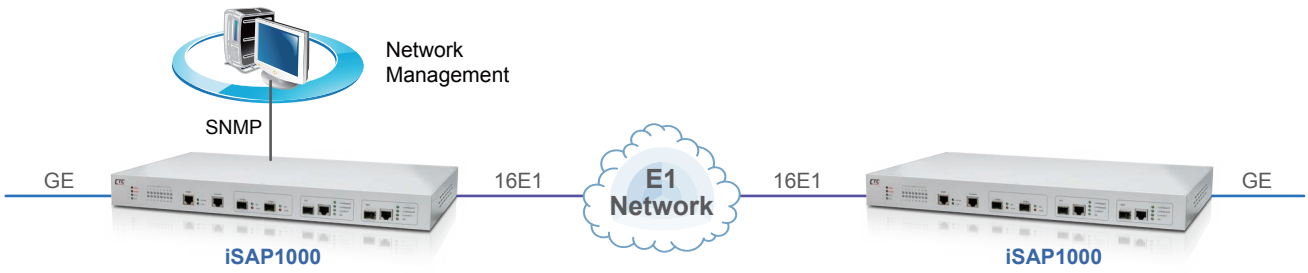
Specifications

Ethernet Interface	Supports 2x GE combo ports
	Auto Negotiation, AUTO-MIDX, 10M/100M/1000M, Full/Half Duplex
	Connector : RJ45
	Supports 802.3x flow control
Optical Interface	1000FX, SFP
	Connector : LC
	Supports 802.3x flow conrol
E1 Interface	Up to 16x E1(ITU-T G.703)
	Line Impedance : 75ΩBNC or 120ΩRJ45
	Bit rate : 2048kbps±50ppm
	Line code : HDB3
STM-1 Interface	Supports 2x STM-1 optical fiber port with SFP slot
	Supports 1+1 optical fiber protection

Management port	One console port with RJ45 connector One SNMP Ethernet port with RJ45 connector
LED Indicators	SYS, PWR, PWR1, PWR2, GE(LNK/ACT, SD), E1(LOS, SYNC)
Standards	IEEE802.3 Ethernet, IEEE802.3u, IEEE802.3Z, IEEE802.3X, IEEE802.1Q, IEEE802.1ad, SNMPv1/v2c/v3, ITU-T G.703, ITU-T G.704, ITU-T G.823
Dimensions	310 x 440 x 44mm (D x W x H)
Power	AC: 90-265V, DC: -48V, Supports AC+AC, DC+DC, AC+DC
Power Consumption	<24W
Temperature	Operating: -5 ~ 50°C Humidity : ≤90% non-condensing

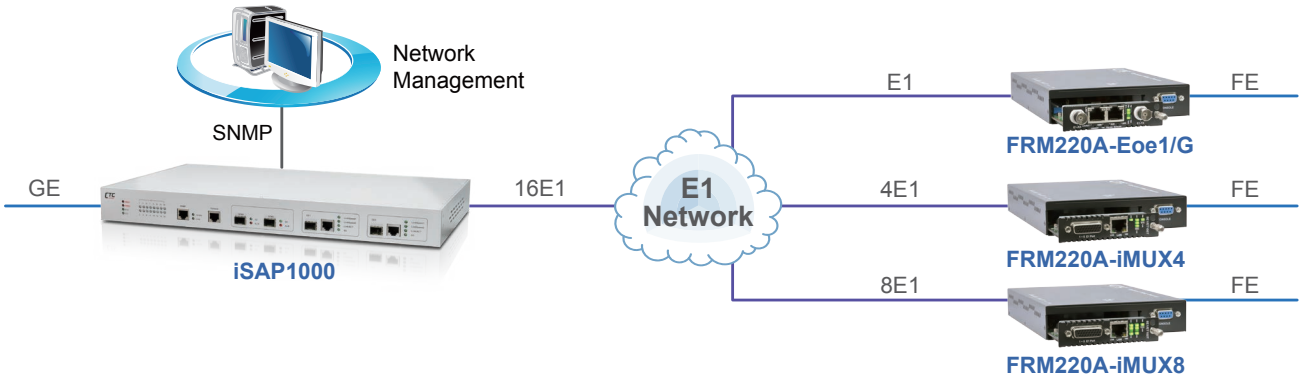
Application

P to P, GE over 16E1 application

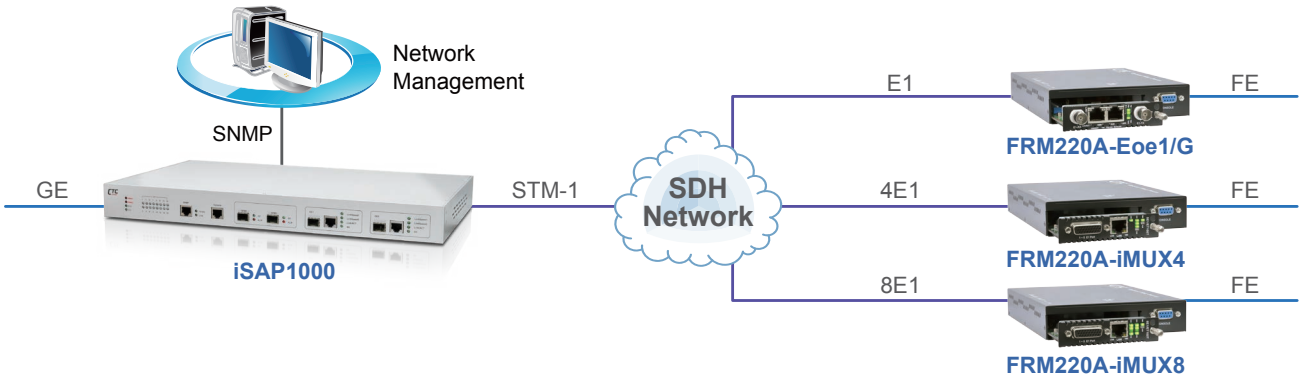


Application

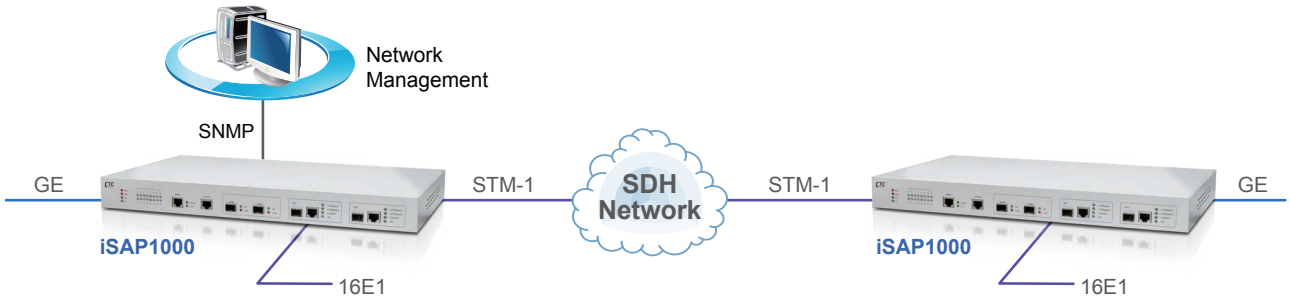
Point to Multi-points 16E1 aggregation



Point to multi-points 16E1 aggregation over STM-1



GE + 16E1 over STM-1 Application



Ordering Information

Model Name	*Description*
iSAP1000-16E1B-AD	2x GbE Combo over 16E1 BNC, P to P, 1U 19" Rack, AC+DC power
iSAP1000-16E1R-AD	2x GbE Combo over 16E1 RJ45, P to P, 1U 19" Rack, AC+DC power
iSAP1000-GE/16E1B-AD	2x GbE Combo over 16E1 BNC, P to M, 1U 19" Rack, AC+DC power
iSAP1000-GE/16E1R-AD	2x GbE Combo over 16E1 RJ45, P to M, 1U 19" Rack, AC+DC power
iSAP1000-GE/STM1-AD	2x GbE Combo over STM1, P to P, 1U 19" Rack, AC+DC power
iSAP1000-STM1B-AD	2x GbE Combo + 16E1 BNC over STM1, P to P, 1U 19" Rack, AC+DC power
iSAP1000-STM1R-AD	2x GbE Combo + 16E1 RJ45 over STM1, P to P, 1U 19" Rack, AC+DC power

Comector Power Type

iSAP 1000 – □□□□□ – □□

Example: iSAP 1000 – 16E1B – AD

iSAP5100

4.5U, Data, Ethernet, Voice STM1/ E1 Managed Multiplexer

The iSAP5100 is a 4.5U 19"18 slots rack type STM1 / E1 Time Division Multiplexer for fractional E1 network access, which is designed for non-stop operation. There are 18 slots available for hot-swappable iSAP5100 I/O cards. Two slots are provided for CPU Controller cards and two slots are provided for power supplies. Uplink supports STM1 fiber and E1 copper, two types of connection, maximum up to 96x E1 cross connect for Voice and Data. The iSAP5100 accommodates up to two separate power supplies, which may derive power from AC (110/220) or DC (-36~72V) power sources. When two power supplies are installed, the modules provide complete power redundancy and are hot swappable even during the E1 cards' transmission. The iSAP5100 provides STM1 fiber and E1 copper uplink with a the maximum E1 support of up to 96 E1 channels with cross connection for Voice and Data or interface including RS232, G703/64K, FXS, FXO, ET100 and E&M.

Interface Cards

Control card: 5100-MS-DM-96, 5100-MS-DM-155
E1 card: 5100-8E1, 5100-16E1
Power modules: 5100-AC240, 5100-DC240
I/O cards: 5100-RS232, 5100-RS232/C, 5100-G703/64K, 5100-ET100, 5100-E&M, 5100-FXS, 5100-FXO

Features

- Supports STM1 and E1 uplink
- Supports MAX. 96xE1 with full cross-connect ; Supports DS0 cross-connect
- Supports 16 channel main E1 LTU card
- Supports E1 time slot broadcast function
- Modular design for voice IO card, the voice IO card has two sub-module, each sub-module supports 4-port FXO/FXS
- All modules and cards support hot-swapping
- Multi-Interface: DCE card types included RS232 (Sync/Async), G703-64K, ET100, E&M, FXO, FXS...etc.
- Supports console and SNMP management
- Available types of power built-in : AC+AC, AC+DC, DC+DC
- Modular design, 4.5U 19", 18-slot for IO cards

Specifications

5100-MS-DM-96	
Interface	10/100Base-TX Ethernet RJ45 port
Console	RS232
E1 Cross Connect	96xE1 Transparent cross connect , Supports E1 time slot mapping / broadcast function
CAS Cross Connect	Supports 16 time slot CAS follow voice time cross connect
5100-MS-DM-155	
Interface	Supports 1-port STM-1 155M SFP Slot on CPU card, CPU redundancy (1+1)
NMS	10/100Base-TX
Console	RS232
E1 Cross Connect	155M fiber to 63E1 and 144xE1 cross connect, supports E1 /time slot mapping/broadcast function
CAS Cross Connect	Supports time slot 16 CAS follow voice time cross connect
STM-1/E1 Drop / Insert	Supports STM-1 63E1*32TS to E1/IO slot 128E1*32TS connection
5100-8E1 / 5100-16E1	
Interface	Supports 8E1/16E1 interface
Line Impedance	120 / 75 ohms
Frame format	CAS (PCM30)/CCS (PCM31)
Connector	RJ45
5100-RS232	
Data rate	≤38.4kbps Async or 64/128kbps Sync
Ports	6-port
Interface	RS232

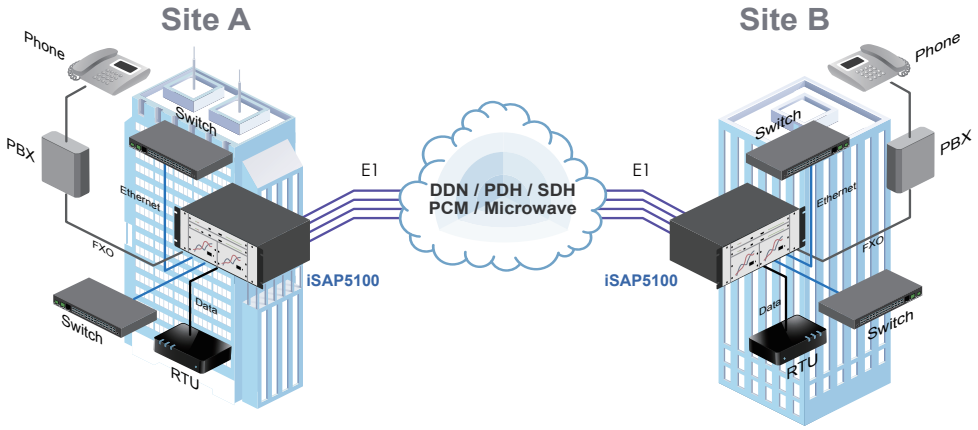
5100-RS232/C	
Data rate	9600bps, 19.2Kbps Sync/Async
Ports	6-port
Interface	RS232
5100-G.703/64K	
Data rate	64Kbps, Co-directional/Contra-directional and Centra-directional
Ports	4-port
Connector	RJ45
5100-ET100	
Standards	IEEE 802.3, 802.3u
MDI/MDIX	Auto
Data rate	10/100Mbp
Encapsulation	HDLC
Ports	4-port
Connector	RJ45
5100-E&M	
Loop current	25 mA, maximum 70mA
Ports	8-port
Connector	RJ45
5100-FXS	
ITU-T Standard	G.712/G.713/G.714
Line resistance	600Ω
Off-hook current	25mA
Line distance	2km
Ports	8-port
On-hook current	10mA+/-3mA
Effective Ring	Frequency: 25Hz Voltage: 75V, peak to peak110V MAX line resistance: 1500Ω
Connector	RJ45

5100-FXO	
ITU-T Standard	G.712, G.713, G.714
Line resistance	600Ω
Line distance	2km
Ports	8-port
Caller ID	Supports DTMF, FSK Standard
Connector	RJ45

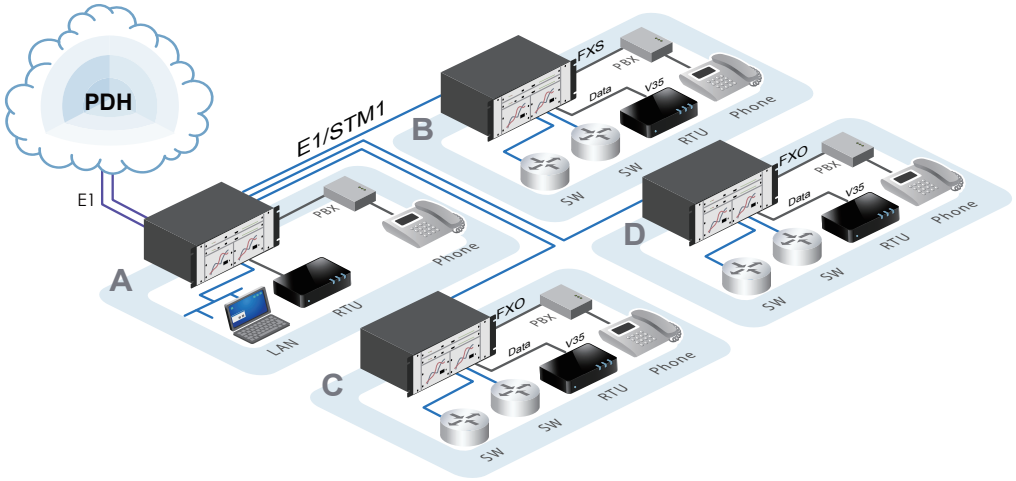
Electrical & Mechanical	
Dimensions	350 × 440 × 187 mm (D x W x H)
Environmental	Operating: 0~60°C Storage:-25~70°C Humidity: 10~90%, non-condensing
Power	AC 220V : 165~265V, 50~60Hz AC 110V, AC 220V : 90~265V,50~60Hz
Power Consumption	< 90W

Application

Connection with PBX (Private Branch Exchange)



The extension and expansion of DDN (Distributed Data)



Ordering Information

Model Name	*Type*	*Description*
iSAP5100-CH	Chassis	4.5U 19" 18-slot Chassis
iSAP5100/AC	Power	AC Power plug-in module (90 to 250 VAC)
iSAP5100/DC	Power	DC Power plug-in module (±36 to ±76 VDC)
iSAP5100-8E1R	Main E1 card	8 channels Main-E1 LTU card: Fractional E1 RJ45 with DB37M to 4 x RJ45 cable
iSAP5100-16E1R	Main E1 card	16 channels Main-E1 LTU card: Fractional E1 RJ45 with DB37M to 4 x RJ45 cable
iSAP5100-MS-DM-96	CPU-card	CPU card for 96x E1
iSAP5100-MS-DM-155	CPU-card	CPU card for STM-1
iSAP5100-FXO	Voice Card	8 channels FXO interface card
iSAP5100-FXS	Voice Card	8 channels FXS interface card
iSAP5100-E&M	Voice Card	8 channels 2/4 wires E&M voice interface card
iSAP5100-RS-232	RS-232 card	6 channels RS-232 interface card 38.4bps. Low speed: 64kbps or 128kbps sync DEC
iSAP5100-RS-232C	RS-232 card	6 channels RS-232 (V.24) interface card,Low speed: 128kbps, 19.2kbps Async with Multi-Clock function
iSAP5100-ET100	FE Card	4-CH Ethernet (10/100Base-TX) interface card (v4.0)
iSAP5100-G.703/64K	G703/64K Card	4-CH G703 64K interface card (v4.0)

iSAP5100 –□□ (Chassis)
Example: ISAP5100 – CH

iSAP5100 –□□□□ (Card Type)
Example: ISAP5100 – 8E1R

ERM-MUX-Plus

4U, E1 Multi-Service Multiplexer

The ERM-Mux / plus is a 4U 19(23)" 14-slot rack type E1 Time Division Multiplexer for Fractional E1 network access which is designed for non-stop operation. There are 10 slots available for hot-swappable ERM-Mux / plus-I/O cards. Two slots are provided for Mux-E1 cards, which may be configured for redundant 1+1 operation of the E1 lines, safe guarding against expensive network down time. Two slots are also available for CPU cards, with the second CPU card acting as a hot standby in case of primary card failure. Each Mux-E1 card may be linked to another ERM-Mux / plus Rack to provide a point-to-point variety of datacom, Ethernet & voice over E1 network services. The ERM-Mux/plus optionally accommodates up to two separate power supplies, which may derive power from AC (110/220) or DC (-48V) power sources. When two power supplies are installed, the modules provide complete power redundancy and are hot swappable even during the E1 cards' transmission. The ERM-Mux/plus provides all interface connections on the front panel. BNC and RJ-45 are used for E1 Line interface connections, RJ-45 connections are used for all voice (FXO, FXS, E&M), for 10/100 Ethernet Bridge and G.703-64K co-directional / contra-directional / center. Optional cable adapters are used to convert the DB-62F DCE ports of the I/O cards to 6xRS-232, HP68F DCE port of I/O card to 4x V.35, RS-232, RS-530, RS-449, RS-422 and X.21 or 5x X.50 channels.

Features

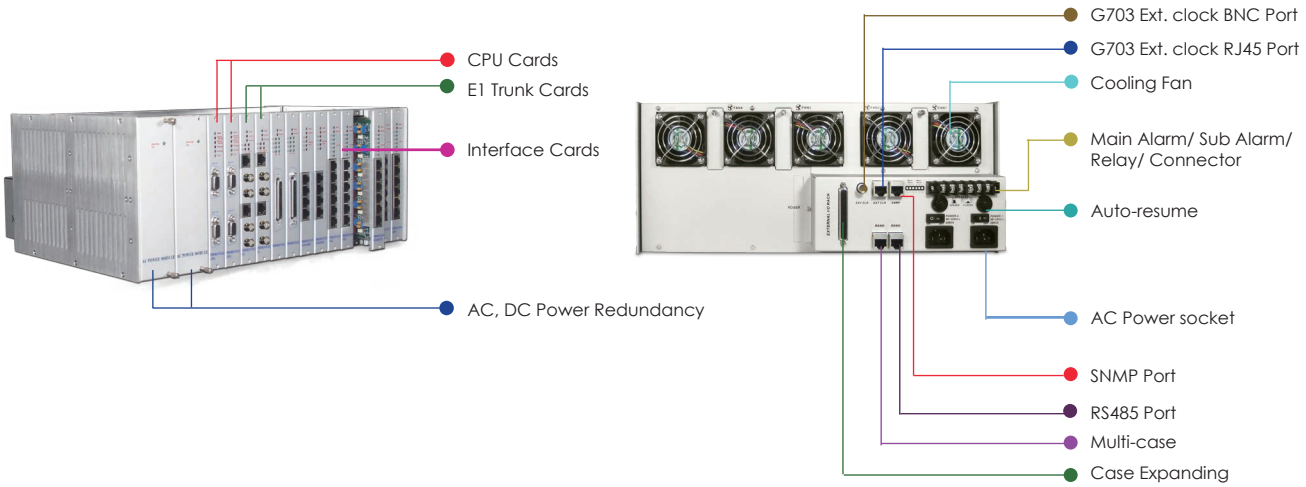
- CPU redundancy (1+1)
- E1 redundancy (1+1) and E1 card redundancy
- Power redundancy (1+1) [2AC, 2DC, AC+DC]
- DCE hot swappable card types
- Drop & Insert function
- Console, NMP,SNMP, management
- 4ch V.35 (nx64K)
- 4ch G.703 64K co-directional /contra-directional / center mode
- 2ch Ethernet bridge
- 6ch RS232
- 6ch FXS voice
- 6ch FXO voice
- 6ch E&M voice

Specifications

Connectors	Console port (RJ45, RS232C)
Physical	WAN port RJ45 Jack (2-wire, 4-wire)
Specifications	Dimensions: 350 x 438 x 176mm (W x D x H)
Power Characteristics	Weight: 8kg (chassis+dual power+8 I/O cards) 0.45kg per card

Environmental Specifications	Operating 0°C ~ 60°C Storage 0°C ~ 70°C Relative humidity 0% ~ 90% non-condensing Predicted MTBF : 65,000 hrs (25°C)
Certification	CE

ERM-Mux/plus overview



- ***1+1 Redundant***

The ERM-MUX/PLUS supports complete redundant functions for the electrical input service, the power module cards, CPU card and E1 card. The E1 backup provides 1+1 modes. All of these cards are capable of automatic switchover in case of failure. The system has complete warning and diagnostic functions for stable and reliable operation.

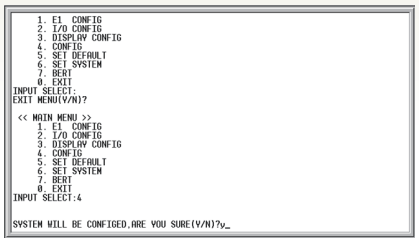
- ***Network Management***

The ERM-MUX/PLUS supports SNMP and/or NMP GUI network management with local PC or via a dedicated timeslot from the E1 line. The NMP GUI can manage more ERM-MUX/PLUS equipment via the E1 network in-line or in nested structures. A console terminal mode is supported as well. When SNMP management mode is available and selected, remote Telnet is also available for management. ERM-MUX/Plus with SNMP option is also manageable under CTC Union's Smart View EMS.

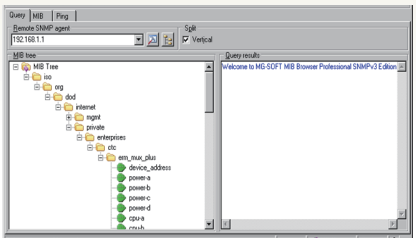
ERM-Mux / Plus Management

The intelligent NMS provides the support that the network manager needs. It consists of three parts :

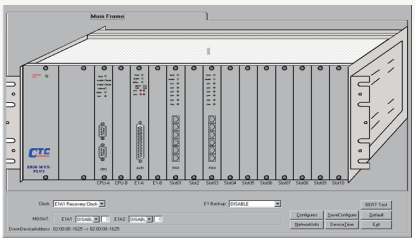
1. Terminal mode: Configuration by local RS-232 serial port; Maintenance & alarm.



2. MIB file SNMP: Configuration by RJ-45 10/100 Ethernet port; Complies with MIB-II standard.



3. GUI : Configuration by RJ-45 10/100 Ethernet port; Real time monitoring in Window® graphic mode.



- ***Cascade***

RS-485 interface is used for cascading expansion rack, and are provided by RJ-45 x 2 connectors. DB62 connector for connecting backplane data to expansion rack.

- ***Power Redundancy***

Power supply options for 110V AC, 220V AC or -48V DC, ensure maximum flexibility for central office installations. This equipment complies fully with all ITU-T standards for E1 transmissions. The modules are hot-swappable, capable of automatic switch over in case of module failure, stable, and reliable.

- ***Performance and BERT test***

System supports performance monitoring and BERT test through NMP or Terminal console according RFC 1406 recommendation. CRC-4 and BPV monitoring: CURR ES / UAS , LONG ES / UAS. Loopback test and BERT test: display Rx error amounts, Error counts and Bit-error-rate. Test patterns: 2e9-1, 2e11-1 and 2e15-1. Error Insertions and rates: Single, 10e-1, 10e-2, 10e-3, 10e-4, 10e-5, 10e-6, 10e-7.

Ordering Information

Model Name	*Type*	*Description*
ERM-MUX-PLUS/AA-CH	Chassis	4U 19" 14 slot Chassis for AC+AC power
ERM-MUX-PLUS/DD-CH	Chassis	4U 19" 14 slot Chassis for DC+DC power
ERM-MUX-PLUS/AD-CH	Chassis	4U 19" 14 slot Chassis for AC+DC power
ERM-MUX/AC	Power	AC Power plug-in module (90 to 250 VAC)
ERM-MUX/ACV	Power	AC Power plug-in module (90 to 250 VAC) with Voice support
ERM-MUX/DC	Power	DC Power plug-in module (±36 to ±76 VDC)
ERM-MUX/DCV	Power	DC Power plug-in module (±36 to ±72 VDC) with Voice support
ERM-MUX-PLUS/GUI	Management	GUI for ERM; support Windows 95, 98, 2000, XP
ERM-MUX-PLUS-2E1R	Card	2-Ch Main-E1 LTU card(V1.2); w/DB37M to 2xRJ45 cable
ERM-MUX-PLUS-2E1B	Card	2-Ch Main-E1 LTU card(V1.2); w/DB37M to 2xBNC cable
ERM-MUX-PLUS-8E1R	Card	8-Ch Main-E1 LTU card(V1.2); w/DB37M to 8xRJ45 cable
ERM-MUX-PLUS-8E1B	Card	8-Ch Main-E1 LTU card(V1.2); w/DB37M to 8xBNC cable
ERM-MUX-PLUS-CPU	Card	CPU card (V4.3) for NMP management
ERM-MUX-PLUS-SNMP	Card	SNMP card (V2.2) for NMP management
ERM-MUX-PLUS-FXO	Card	6-Ch FXO interface card(V2.1)
ERM-MUX-PLUS-FXS	Card	6-Ch FXS interface card(V4.1)
ERM-MUX-PLUS-E&M	Card	6-Ch 2/4 wires E&M voice interface card (V4.1)
ERM-MUX-PLUS-RS-232	Card	6-Ch RS-232 interface card (V4.0)
ERM-MUX-PLUS-G64K	Card	4-Ch G.703 64k interface card (V4.0)
ERM-MUX-PLUS-HS-SERIAL	Card	4-Ch V.35/X.21/RS-449/RS-530 interface card
ERM-MUX-PLUS-RS485	Card	6-Ch RS-485 / RS-422 Interface card
ERM-MUX-PLUS-ET100	Card	2-Ch Ethernet(10/100Base-TX) interface card (V4.0)

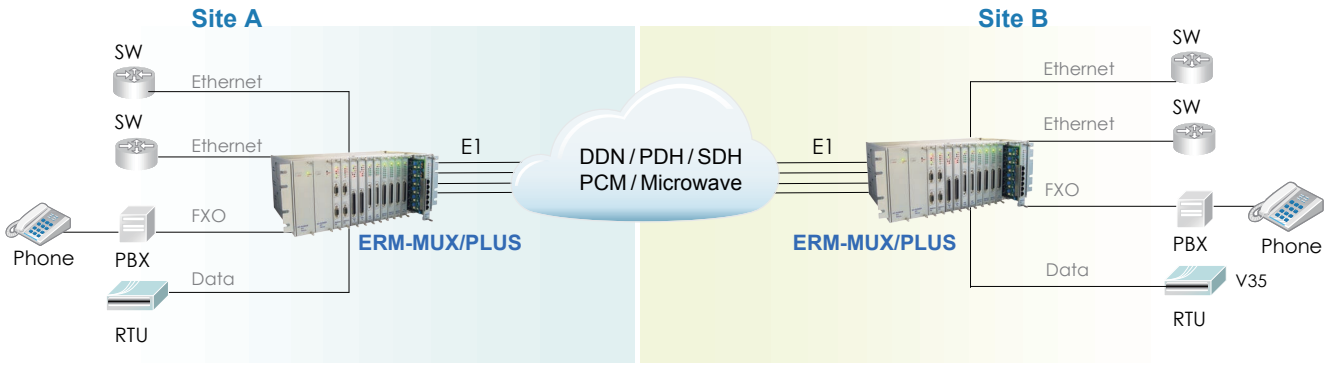
Card Type

ERM – MUX– PLUS – □□□□

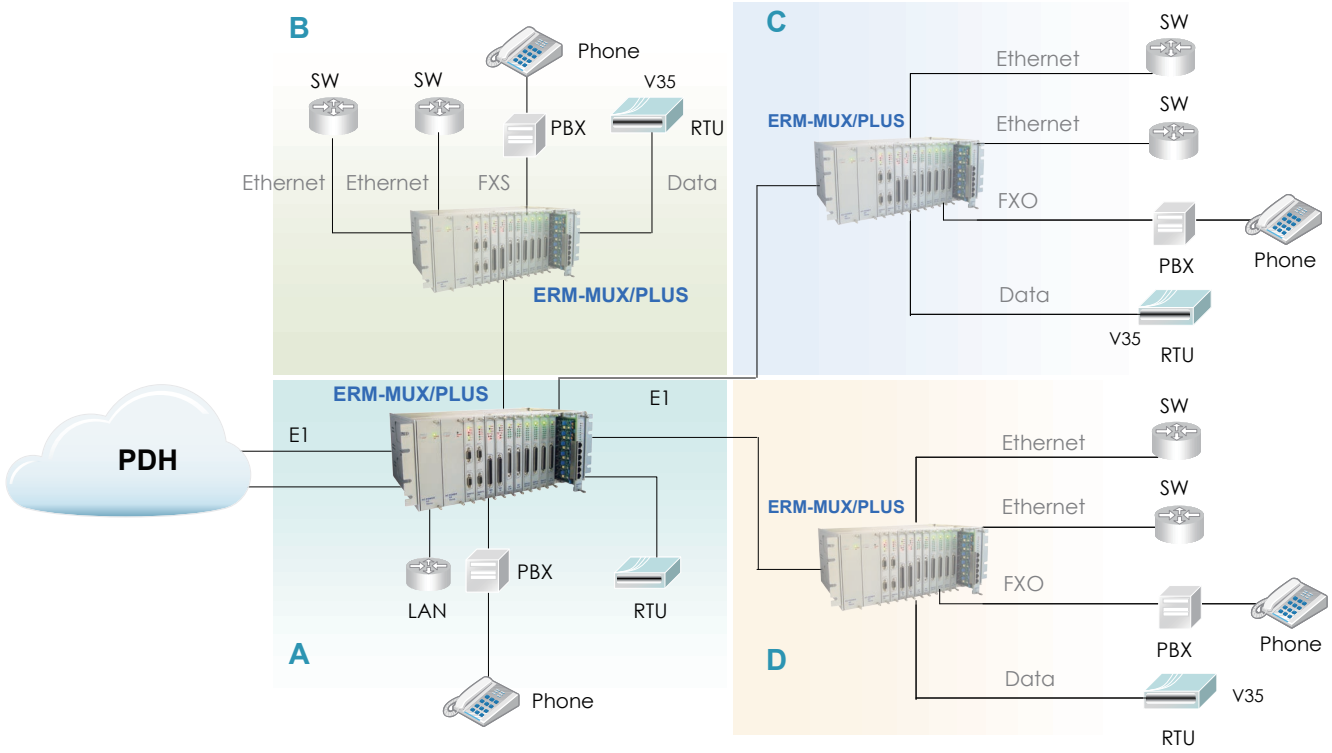
Example: ERM – MUX–PLUS – 2E1R

Application

Connection with PBX (Private Branch Exchange)



The extension and expansion of DDN (Distributed Data)



ERM-Mux / Plus-E1

G.703 E1 Aggregate Card

The ERM-Mux/plus has two dedicated slots for installing E1 aggregate cards. Currently E1 cards are available with 2, 4 or 8E1 ports. In the backplane design of the ERM-Mux/plus, a maximum of 4 E1s can carry data to and from tributary (I/O) cards. One typical application could be to install two 4E1 cards in the chassis and have the cards act as one master and one hot-standby card for E1 redundancy. For other applications, an 8E1 card could be used to cross connect E1 timelots prior to assignment to the four available backplane channels. Another application can use the 'extra' E1 aggregate channels for drop & insert (Sub-E1) rather than performing cross connection. It can quickly be seen that a large number of applications are possible with the ERM-Mux/plus's flexible design.

- Available in 2, 4, 8 E1 channels
- Supports PCM31 or PCM30 framing
- Path / Card Redundancy / Hot Swappable
- E1 timeslots can support cross-connect function
- E1 channel can act as Sub-E1 for drop & insert

Specifications

Frame format	CAS(PCM30) / CCS(PCM31) ; CRC on/off
Bit rate	2.048Mbps
Line codes	HDB3/AMI
Rx sensitivity	0 ~ -43dB
Tx driver	1.5km over 0.5mm E1 cable
Line impedance	75 ohms (unbalanced) 120 ohms (balanced)

Pulse amplitude	nominal 2.37V (75ohm) nominal 3.00V (120ohm)
Pulse shape	According to ITU-T G.703
Temperature	0°C ~ 50°C
Humidity	5 ~ 95%
MTFB	65,000 hrs

ERM-Mux / Plus-Data

Nx64 Synchronous Serial Tributary Card

The ERM-Mux/plus Nx64 Serial Tributary Card provides V.35/ X.21/ RS-530/ RS-449 Synchronous data capability. Incorporating four separate channels, each channel can independently assign any Nx64 timeslots from the aggregate E1. The single HD68 connector mates to a 1 to 4 cable that terminates to the required connector type. Four different cables provide connection to V.35's MB34, X.21's DB15, RS-530's DB25 or RS-449's DB37 female connectors. Please be sure to select the right cable for your application when ordering this card.

- Four independent Synchronous channels
- Nx64 setting from any E1 channel
- Each channel operates in native DCE mode
- Diagnostic loop backs & Hot Swappable
- LED indicators for Power, Alarm, RD/TD activity

Specifications

ITU-T and ANSI compliant Datacom interfaces	
Multiplexing Nx64K data onto E1 time-slot.	
Data speed	Nx64K(N=1 to 30, or 31)
Data access	RS-530, RS-449, V.35, X.21, supplied with corresponding interface cable

Access mode	DCE
Diagnostics	Local /Remote /Bi-directional Loop
Temperature	0°C ~ 50°C
Humidity	5 ~ 95%
MTFB	65,000 hrs

ERM-Mux / Plus-G64K

G.703 64K Co-directional Tributary Card

The ERM-Mux/plus G64K Tributary Card provides 4 independent G.703 64Kbps Co-directional data channel capability. Each channel can independently assign any 64Kbps timeslot from the aggregate E1. Individual Shielded RJ-45 connectors that conform to USOC RJ-48C standard wiring provide the G.703 connections. Standard UTP or alternately shielded UTP are both acceptable cabling media. These data channels may be linked to multiplexers, terminal equipment or satellite/micro-wave transmission equipment. In Co-directional signaling, the clock signals are recovered from the received G.703 data stream. Only Tx and Rx pairs or a total of 4 wires are required in 64Kbps co-directional transmission.

- 4 independent channels
- 1x64 setting from any E1 channel
- Transparent synchronous rate of 64kbps
- Co-directional clock recovered from Rx G.703
- Diagnostic loop backs / LED indicators for Power, Alarm, Tx/Rx activity / Hot Swappable

Specifications

ITU-T G.703, G.823 64kbps compliant interfaces	
Multiplexing 1x64K data onto E1 time-slot	
Data speed	64Kbps +/-100ppm
Data access	RJ-45 per USOC RJ-48C standard
Line code	Co-directional
Pulse shape	according to G.703

Transmit distance	600M or less (0.5~0.7mm TP)
Diagnostics	Local /Remote /Bi-directional Loop
Temperature	0°C ~ 50°C
Humidity	5 ~ 95%
MTFB	65,000 hrs

ERM-Mux / Plus-CPU

CPU Control Card

CPUA and CPUB slots can insert two CPU modules that automatically work in redundant operation mode. CPU modules are responsible for all parameter setup from local PC or from the selected in-band E1line. The setup of the ERM-MUX/Plus may be accomplished by:
Local PC connected by Ethernet to SNMP (can extend to multiple chassis with RS485 twisted-pair)
Local PC connected by serial NMP port to Windows® NMP GUI. E1 network connected to SNMP/NMP GUI. Local terminal console mode

- RS-232 port for dumb terminal at 9.6k, 8bit, no parity
- SNMP V1 and V2C support (Optional)
- MIB file compliant to MIB-II ASN.1
- Firmware upgrade by TFTP
- Hot swappable

ERM-Mux / Plus-ET100

Fast Ethernet Bridge Tributary Card

The ERM-Mux/plus Ethernet Bridge Tributary Card provides Ethernet over E1 capability. Incorporating two separate channels, this transparent bridge supports industry standard HDLC encapsulation. The WAN data rate depends on the number of E1 timeslots assigned (Nx64). The front panel has two RJ-45 shielded connectors for connection of 10Base-T or 100Base-TX Ethernet and status LEDs for each channel to display link state, speed, duplex and activity. Rounding out each bridge channel are support for 256 MAC filter address learning table and 340 packets buffer to aid in handling LAN side burst traffic.

- Two independent Ethernet over E1 channels
- Utilizes HDLC WAN encapsulation
- MAC Address learning table with 5 minute aging
- Auto-MDIX and Auto-Negotiation & Hot Swappable

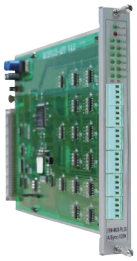
Specifications

Standards	IEEE 802.3, IEEE802.3u
Automatic address learning, aging and deletion after 5 min.	
Throughput latency	1 frame
MDI / MDIX	Auto
Filtering	256 MAC address table
Buffer	340 packets

Encapsulation	HDLC
10Base-T/100Base-TX, Full or half duplex	
Packet sizes	64 ~ 1522 bytes
Temperature	0°C ~ 50°C
Humidity	5 ~ 95% (non-condensing)
MTFB	65,000 hrs

ERM-Mux / Plus-RS485

Asynchronous RS-485/442 Serial Tributary Card



The ERM-Mux/plus Asynchronous RS485/422 Serial Tributary Card provides six independent RS-485/ RS-422 data channel capability. Incorporating six separate channels, each channel can independently assign any Nx64 timeslots from the aggregate E1. Each channel uses a pluggable 4-pin terminal block for connection one or two twisted pair wires. No cables are provided with this card. When connecting to RS-485, the channel supports 4-wire Full Duplex or 2-wire Half Duplex RS-485 transmissions for serial control or data acquisition.

- Six independent channels
- Nx64 setting from any E1 channel
- Transparent asynchronous rates up to 128kbps
- Diagnostic loop backs & Hot Swappable

Specifications

Interface	RS-422 4 wire, RS485 4/2 wire
LEDs	RS-485/422 TD/RD, Power, Alarm
Baud Rate	Async mode <= 128K
Bit Error Rate	Less than 10-10
Connector	4pin Terminal Block x 6

Duplex	Full / Half
Temperature	0°C ~ 50°C
Humidity	5 ~ 95%
MTFB	65,000 hrs

ERM-Mux / Plus-RS232

RS232 Sync/Asyn Tributary Card

The ERM-Mux/plus Sync/Async RS232 Serial Tributary Card provides six independent RS-232 data channel capability. Incorporating six separate channels, each channel can independently assign any Nx64 timeslots from the aggregate E1. The single DB62 connector mates to a 1 to 6 cable that terminates to DB25 female connectors. These serial data channels may be linked to leased line modems for further extension or connected to other data terminal or data acquisition devices. When configured for synchronous use, the data connectors carry both clock and data. For asynchronous use, the clock signals can be ignored.

- Six independent channels
- Nx64 setting from any E1 channel
- Transparent asynchronous rates up to 115.2kbps
- Synchronous 64 or 128Kbps, DCE mode
- Diagnostic loop backs & Hot Swappable
- LED indicators for Power, Alarm, RD/TD activity

Specifications

ITU-T V.24 compliant Datacom interfaces	
Multiplexing Nx64K data onto E1 time-slot	
Data speed	Nx64K(N=1 to 2)
Data access	RS-232, supplied with corresponding interface cable
Access mode	DCE

Diagnostics	Local /Remote /Bi-directional Loop
Temperature	0°C ~ 50°C
Humidity	5 ~ 95%
MTFB	65,000 hrs

Specifications & design are subject to change without prior notice. Please visit CTC Union website for more details.

ERM-Mux / Plus-E&M

E&M Voice Tributary Card

The ERM-Mux/plus E&M Voice Tributary Card provides six independent Ear & Mouth Voice channel capability. Each channel can independently assign any 64Kbps timeslot from the aggregate E1. Individual Shielded RJ-45 connectors provide the voice connections. Standard UTP or alternately shielded UTP are both acceptable cabling media. These voice channels may be linked to PBX (Private Branch Exchange) to facilitate voice to voice connections. The channels support selection of Type 1~5, support 2 or 4 wire operation and have 0.5dB steps for signal attenuation. When using this card, an appropriate voice compatible power module must be used in the ERM-MUX/Plus.

- Six independent channels
- 2/4 wire independent setting
- 1x64 setting from any E1 channel
- E&M Signaling PBX trunks & Supports types I, II, III, IV or V
- Provides E line, M line, SB (battery) and SG (ground) lines
- G.711 Codec & Hot Swappable
- LED indicators for Power, Alarm, activity

Specifications

Loop current	5~30 mA, maximum 70 mA
Return loss	300-600Hz >12dB (2W) 600-3400Hz >15dB (2W) 300-3400Hz >20dB (4W)
Group delay	@-10dBm0 <750uSec(2W) <600uSec(4W)
Total Distortion	according to ITU-T G.223
Channel crosstalk	< -65dB, 1020Hz@0dBm
Noise	< -65dBm0p weighted
Temperature	0°C ~ 50°C
Humidity	5 ~ 95%
MTFB	65,000 hrs

ERM-Mux / Plus-FXO

FXO Voice Tributary Card

The ERM-Mux/plus FXO Voice Tributary Card provides six independent Foreign Exchange Office Voice channel capability. Each channel can independently assign any 64Kbps timeslot from the aggregate E1. Individual Shielded RJ-45 connectors provide the voice connections. Standard UTP or alternately shielded UTP are both acceptable cabling media. These voice channels may be linked to PBX (Private Branch Exchange) or PSTN (Public Switched Telephone Network) to facilitate voice to voice connections. When using this card, an appropriate voice compatible power module must be used in the ERM-Mux/plus.

- Six independent channels
- 2 wire / G.711 Codec
- 1x64 setting from any E1 channel
- PCM30 R2 Signaling PSTN trunks
- Links PBX to PBX or extends POTS & Hot Swappable
- LED indicators for Power, Alarm, activity

Specifications

On-hook DC resistance	> 100K Ohms
Ring AC resistance	> 7.5K Ohms
Ring power sensitivity	< 50mW
Off-hook DC resistance	< 300 Ohms
Max. Input Voltage	70VDC
Max. Input Current	150mA
Channel crosstalk	< -65dB, 1020Hz@0dBm
Noise	< -65dBm0p weighted
Return loss	300-600Hz >12dB (2W) 600-3400Hz >15dB (2W) 300-3400Hz >20dB (4W)
Temperature	0°C ~ 50°C
Humidity	5 ~ 95%
MTFB	65,000 hrs

ERM-Mux / Plus-FXS

FXS Voice Tributary Card

The ERM-Mux/plus FXS Voice Tributary Card provides six independent Foreign Exchange Station Voice channel capability. These 6 channel tributary cards are designed for voice applications over E1. Typically, an FXS connects to a standard telephone set. The FXS needs to sense on-hook, off-hook or disconnected status. It also must be able to provide ring function to a telephone set and it must pass caller-ID information. In the ERM-Mux/plus point-to-point application, the FXS can connect to a remote FXO (Foreign Exchange Office) when deployed as an extension from PBX (Private Branch Exchange) or PSTN (Public Switched Telephone Network). It may also connect to a remote FXS, also for extension from PBX or as a direct 'hotline' voice connection. Individual Shielded RJ-45 connectors provide the voice connections. When using this card, an appropriate voice compatible power module must be used in the ERM-Mux/plus.

- Six independent channels
- 2 wire & G.711 Codec
- 1x64 setting from any E1 channel
- Provides ring function
- Supports caller-ID forwarding / PSTN extension or direct "Hot-line"
- Links telephone to telephone or extends POTS
- LED indicators for Power, Alarm, activity / Hot Swappable

Specifications

Effective ring voltage	AC 75VRMS +/-15V@25Hz +/-3Hz, <10% THD
Ring voltage at 300mA load	>50VACRMS
Loop resistance	<1.8K Ohms, including 300 Ohms for telephone
On-hook current	10mA +/-3mA
Off-hook loop current	18-50mA
Channel crosstalk	< -65dB, 1020Hz@0dBm
Noise	< -65dBm0p weighted
Surge protection	1000V, 10uSec transient response, decay to 50% in 700uSec 300VRMS for less than 200mSec; no component damage 220VRMS for 15 minutes; damage only local loop
Temperature	0°C ~ 50°C
Humidity	5 ~ 95%
MTFB	65,000 hrs

ETU02-MUX-Plus

1U, E1 Multi–Service Multiplexer

The ETU02-MUX/PLUS is a 1U 19(23)" 3 slot rack type E1 Time Division Multiplexer for Fractional E1 network access which provides an economic solution for central site or remote installations. There are 3 slots available for hot-swappable ETU02-MUX/PLUS-I/O cards. One front panel slot is provided for MUX-E1 card, which provides either single E1 main link or main E1 link plus a drop and insert sub-E1 port. The MUX-E1 card may be linked to another ETU02-MUX/PLUS or ERM-MUX/PLUS Rack to provide a point-to-point variety of datacom, Ethernet & voice over E1 network services. The ETU02-MUX/PLUS optionally accommodates up to two separate power supplies, which may derive power from AC (110/220) or DC (-48V) power sources. When two power supplies are installed, the modules provide complete power redundancy and are hot swappable even during the E1 cards' transmission. The ETU02-MUX/PLUS provides BNC and RJ-45 for E1 Line interface connections, RJ-45 connections are used for all voice (FXO, FXS, E&M), for 10/100 Ethernet Bridge and G.703/64K Co-directional. Optional cable adapters are used to convert the DB-62F DCE ports of the I/O cards to 4xRS-232 or HP68F DCE ports of I/O card to 2x V.35, RS-530, RS-449, RS-422 and X.21 channels.

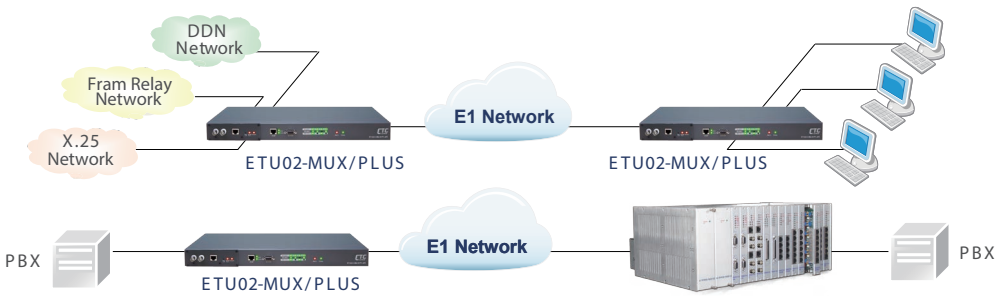
Features

- 1U 19" 3-slot chassis
- Provides 3 slots, removable interfaces: V35, X21, RS530, RS449, RS232, G.703 Co-directional, Ethernet Bridge, FXO, FXS and E&M, 8-ch E1 DXC
- Optional drop and insert E1 port (Sub E1)
- Setup and Control via RS-232 terminal
- Multiple clock source selection (Internal or External: E1 recovery, DTE or DCE)
- Optional SNMP management
- Digital cross connect solution up to 16E1

Specifications

Indications	Power, Signal loss, Sync loss, Alarm (AIS, MRAI, RAI), TD, RD, Error, Test
Standard	ITU-T G.703/G.704/G.706 & G.732, G823
Power / Consumption	AC: 90 ~250V / 20W
Dimensions / Weight	235 x 438 x 45mm (D x W x H) / 2.9kg
Temperature	0 ~ 50°C (Operating), -10 ~ 70°C (Storage)
Humidity	10 ~ 90% non-condensing
MTBF	57,000 hrs

Application



FXO

- Provides 4 independent channels
- Connects directly to PSTN

Specifications

Connector	RJ-45*4
Impedance	600 ohms
Level Gain	On Tx side 0 dB On Rx side -3.5dB
Ring current impedance	> 7.5k ohms
Direct current resistance	< 300 ohms
Maximum direct current borne	> 70V

G.703/64K co-directional card

- 2-channels, Co-directional 64K interface

Specifications

Interface types	G.703/64K, Co-directional
Connector	RJ45 x 2
Line code	ITU-T G.703/64K, Co-directional
Data rate	64kpbs±100ppm x 2 channels
Line impedance	120 ohms (balanced)
Frame mode	Unframed only

8E1-DXC

- 8 independent channels
- E1 P to P 64kbps transparent data cross connect
- Supports Broadcasting and E1 channel backup
- Maximum 2 card per chassis

Specifications

Connectors	BNC for unbalanced ; RJ-45 for balanced
Framing Format	Unframed / Framed CCS(PCM31) / CAS (PCM30)
CRC check	CRC4 on/off
Bit rate	2.048Mbps±0 ppm
Line code	AMI / HDB3
Line impedance	75 ohm(BNC) / 120 ohm(DB-15, RJ-45)

FXS

- Provides 4 independent channels
- Connects to standard telephones

Specifications

Connector	RJ45 x 4
Impedance	600 ohms
Level Gain	On Tx side 0 dB; On Rx side -3.5dB
Ring current Output	75±15V
Frequency	25±3Hz
Feeding voltage	-48
Loop resistance	1800 ohms
Connecting distance	up to 4km
Wire Gauge	0.4mm
Feeding working current	20mA

ET-100 Ethernet Bridge card

- 2 independent channels, Ethernet bridge interface 10/100Base-TX bridge
  Auto-Negotiation, Auto MDI/MDIX
  Forward 1522 bytes (Max.) packets
  Supports IEEE 802.1Q Tag VLAN pass thru
  Supports flow control (Pause)

Specifications

LAN Specifications	
Standard	Fully compliant with IEEE 802.3/802.3u
Connector	RJ-45x2, 10/100Base-TX, Auto-negotiation
Speed	10Base-T/100Base-TX, Full or half duplex
Frames	Supports 64 to 1522 byte packet lengths
WAN Specifications	
Protocol	Synchronous HDLC
Rates	N*64 or N*56Kbps, up to 2048Kbps

E1 and Sub E1 module

- Single E1 card supports both RJ45 and BNC connector
- Single E1 + Sub E1 card supports BNC connector
- Each E1 loop provides clock to be used as system clock source

SUB E1

E1

Specifications

Connectors	BNC for unbalanced ; RJ-45 for balanced
Framing Format	Unframed / Framed CCS (PCM31) / CAS (PCM30)
CRC check	CRC4 on/off
Bit rate	2.048Mbps±0 ppm
Line code	AMI / HDB3
Line impedance	75 ohm (BNC) / 120 ohm (DB-15, RJ-45)
Relative receive level	0 to -43dB
Transmitter driver reach	1.5Km
Pulse amplitude	Nominal 2.37V ±10% for 75ohm Nominal 3.00V ±10% for 120ohm
Zero amplitude	±0.1V
Transmit frequency	Internal timing ±30 ppm
Tracking	Recovery timing ±50 ppm
External	timing±100 ppm
Jitter performance	According to ITU-T G.823
Compliance	ITU G.703, G.704, G.706, G.732

E&M

- BD/GD wires are for battery and ground detection
- E&M card provides 4 independent channels
- E&M interface provides 1 pair of E and 1 pair of M
- Each E&M can support Type I, II, III, IV or V
- Loop current range is normally 5-30mA, 70mA max
- Timeslot 16 complies with ITU-T G.711
- TX / RX attenuation, and 2 / 4 wire operation

Specifications

Input level	0 to -16dBr, in 0.5dB steps
Output level	0 to -16dBr, in 0.5dB steps
Impedance	600 ohms, option
Return loss	2-wire 300-600Hz: >12dB 2-wire 600-3400Hz: >15dB 4-wire 300-3400Hz: >20dB
Group delay	2-wire @ -10dBm: < 750μ second 4-wire @ -10dBm: < 600μ second
Total distortion	According to ITU-T G223
Channel cross-talk	Not exceed -65dB, 1020Hz@0dBm
Out-of-band Signal attenuation	-25dBm@4.6~72KHz
Level not to exceed	-50dBm
Noise	<-65dBm
Interface connector	RJ-45*4

RS-232 card

- 4-channels
- Data rate:
  Asynchronous mode <= 38.4Kbps (4-channels),
  Synchronous mode = 19.2/38.4/64/128Kbps

Specifications

Interface type	RS-232
Connector	HD62F (female) with cable adapter
Line code	NRZ
Data rate	3.84kbps x 4ch or 64/128kbps x 4ch

Nx64 card

- 2-channels , High speed data interface
- Data rate:
  N*64kbps, where N=1 to 31 in CCS
  N=1 to 30 in CAS

Specifications

Interface types	RS-530, X.21, V.35, RS-449, RS-232
Connector	HD68F (female) with cable adapter
Line code	NRZ
Data rate	Nx64kbps

Ordering Information

Model Name	*Type*	*Description*
ETU02-MUX/Plus/AC	Chassis	1U 19" 3+1 slot Chassis with SNMP card and AC Power
ETU02-MUX/Plus/DC48	Chassis	1U 19" 3+1 slot Chassis with SNMP card and DC 48V Power
ETU02-MUX/Plus/DC24	Chassis	1U 19" 3+1 slot Chassis with SNMP card DC 24V Power
ETU/E1SUB	Card	Single E1 + Sub E1 card supports BNC connector
ETU/E1	Card	Single E1 card supports both RJ45 and BNC connector
ETU/N64	Card	2-Ch V.35/X.21/RS-449 Modue, N X 64Kbps
ETU/232	Card	4-Ch RS-232 Modul
ETU/232-C	Card	4-Ch RS-232 Module with Clock
ETU/ET100	Card	2-Ch 10/100Base-T EthernetModule RJ-45
ETU/FXS	Card	4-Ch FXS Interface Module RJ-45
ETU/FXO	Card	4-Ch FXO Interface Module R-J45
ETU/E&M	Card	4-Ch E&M Interface Module R-J45
ETU/G64	Card	2-Ch G.703 64Kbps Co-directional Module RJ-45
ETU/8E1-DXC	Card	ETU/8E1-DXC is one type of card with two type of cables. BNC and RJ45
ETU/8E1-DXC-R	Cable	8-Ch E1 DXC card with 8-port RJ45 cable
ETU/8E1-DXC-B	Cable	8-Ch E1 DXC card with 8-port BNC cable

Power Type

ETU02 – MUX – Plus – □□

Example: ETU02 – MUX – Plus – AC

ETU01A

Single Port Modular E1 CSU/DSU with LCD and SNMP

The ETU01A single port stand-alone CSU/DSU provides our best digital access solution for E1 and Fractional E1 network services termination. A DTE device may be linked to an ETU01A at data rates of 56Kbps to 2048Kbps. The ETU01A features user replaceable dataport modules for a number of interface standards; including Ethernet bridge, router, V.35, X.21, RS-530, RS-449, G.703 64Kbps Co-directional and RS-232. The ETU01A supports local control and diagnostics via LCD display, keypad and LED status indicators located on the front panel as well as via a menu driven RS-232 console port in conjunction with a standard terminal.

These features enable users to easily configure the unit, execute the in-service diagnostics and monitor the network status. The ETU01A provides optional SNMP (Simple Network Management Protocol), which allows the user to remotely control, diagnose and monitor the system using industry standard SNMP protocol, our proprietary MIB and any network management software.

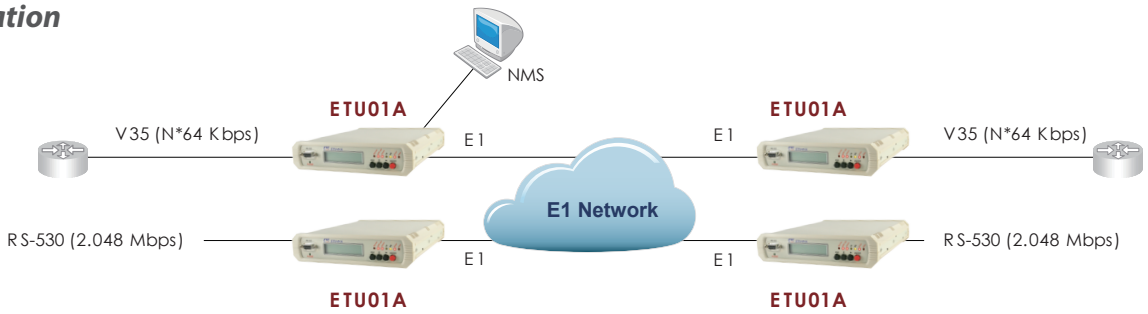
Features

- Supports Fractional E1 and Unframed E1 service with EOC control
- Removable interfaces, support V.35, X.21, RS-530, RS-449, RS-232, G.703 Co-directional, NRZ, Ethernet Bridge and Router
- I/O connectors on rear panel
- Multiple clock source selection (Internal or External: E1 recovery, DTE or DCE)
- Supports Console, Telnet and SNMP management
- Menu keys and LCD display
- SNMP V1, V2C, V3 supported
- Supported by Smart View EMS
- Built-in BERT with V.54 diagnostic capabilities for performing local and remote loopback

Specifications

G.703 E1	Framing	Framed CCS (PCM31) CAS (PCM30) / Unframed CRC4 on/off
	Line Code	AMI/ HDB3
	LCD display	16*2 character LCD with
	Bit rate	backlight N*56K or N*64Kbps, where N=1~31 in CCS or 1~30 in CAS
	Relative receive level	0 to -43dB
	Transmit level:	
	Pulse	Nominal 2.37V ±10% for 75ohm
	Amplitude	Nominal 3.00V ±10% for 120ohm Zero amplitude ±0.1V
	Jitter performance	According to ITU-T G.823
	Connectors	BNC(unbalanced), RJ-48(balanced)
	Clock modes:	
	Clock mode 0	Receive & transmit clock (DCE1) (recovered) to the sync DTE
	Clock mode 1	Receive & transmit clock (DCE2) (internal oscillator) to the sync DTE
G.703 E1	Clock mode 2	Receive clock to the sync and transmit (DTE1) clock from the sync device
	Clock mode 3	Receive and transmit clock from the (DTE2) sync DCE (from ETC and ERC pin)
	Clock mode 4	Receive and transmit clock from the (DTE3) sync DCE (all from ETC pin)
Diagnostics	local loopback,Digital remote loopback, Test pattern	
Indicators	LEDs (Power, TD, RD, Signal loss, Sync loss, Error and test)	
Standards	ITU-T G.703/G.704/G.706 & G.732	
Power Input	AC: 90-250VAC, DC: 18-72 VCD	
Power Consumption	10W	
Dimensions	250 x 195 x 45 mm (D x W x H)	
Weight	1.5kg	
Temperature	0 ~ 50°C (Operating), -1 ~ 70°C (Storage)	
Humidity	10 ~ 90% non-condensing	
Certification	CE, FCC, RoHS compliant	
MTBF	65,000 hrs	

Application



Ordering Information

Model Name	*Type*	*Description*
ETU01A/AC	Power	1U, 19/2", Data port to framed E1 with 100 ~240VAC
ETU01A/DC	Power	1U, 19/2", Data port to framed E1 with -48VDC

Power Type

ETU01A/□□

Example: ETU01A/AC

Interface Module	*Description*
ETU/TTU-V35	V.35 interface module
ETU/TTU-X21	X.21 interface module
ETU/TTU-530	RS-530 interface module
ETU/TTU-449	RS-449 interface module
ETU/TTU-232	RS-232 ASYN/SYNC interface module
ETU/TTU-G64	G.703 64Kbps co-directional interface module
ETU/TTU-NRZ	NRZ interface module (4 * BNC)
ETU/TTU-ET100	10/100 Base-Tx Ethernet E1 Bridge interface module
ETU/TTU-ET100R	10/100 Base-Tx Ethernet Routing interface module

Please refer to page 12-15

ETU011

Single Modular Port E1 CSU/DSU

The ETU011 stand-alone DSU/CSU is a digital access unit for Unframed E1, Fractional E1, or Fractional cascaded E1 service. The ETU011 data channel supports user-selectable transmission rates via randomly selected E1 timeslots, which provides integral multiples of 64kbps, up to a maximum 2.048Mbps (unframed), for a line attenuation of up to 43 dB on twisted pair or coax cable. This provides an approximate operating range up to 2km (using 22AWG). The ETU011 packs the data channels into the E1 link in user-selected time slots. The unused time slots can insert IDLE code (in frame mode). The ETU011 front panel sports status LEDs for monitoring both the CSU and DSU conditions and push button switches for initiating local and remote loopback with integral BERT.

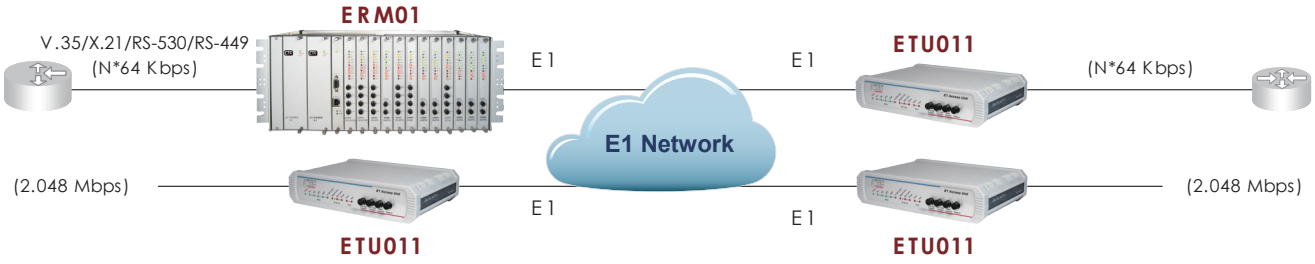
Features

- Supports Fractional E1 and Unframed E1 service
- Removable interfaces, support V.35, X21, RS-530, RS-449, RS-232, G.703 Co-directional, NRZ, Ethernet Bridge and Router
- I/O connectors on rear panel
- Multiple clock source selection
- (Internal or External: E1 recovery, DTE or DCE)
- Built-in BERT with V.54 diagnostic capabilities for performing local and remote loopback

Specifications

G.703 E1	Framing	Framed CCS (PCM31) CAS (PCM30)/ Unframed CRC4 on/off
	Line Code	AMI/ HDB3
	Bit rate	N*56K or N*64Kbps, where N=1~31 in CCS or N equal 1~30 in CAS
	Relative receive level	-43dB
	Transmit level:	
	Pulse	Nominal 2.37V ±10% for 75 ohm
	Amplitude	Nominal 3.00V ±10% for 120 ohm Zero amplitude ±0.1V
	Jitter performance	According to ITU-T G.823
	Connectors	BNC(unbalanced), RJ-48(balanced)
	Clock modes:	
	Clock mode 0	Receive & transmit clock (DCE1) (recovered) to the sync DTE
	Clock mode 1	Receive & transmit clock (DCE2) (internal oscillator) to the sync DTE
G.703 E1	Clock mode 2	Receive clock to the sync. and transmit (DTE1) clock from the sync device
	Clock mode 3	Receive and transmit clock from the (DTE2) sync DCE (from ETC and ERC pin)
	Clock mode 4	Receive and transmit clock from the (DTE3) sync DCE (all from ETC pin)
Indicators	LEDs (Power, TD, RD, RTS, DCD, Signal loss, Sync loss, Alarm)	
Standards	ITU-T G.703/G.704/G.706 & G.732	
Power Input	AC: 90-250VAC, DC: -18 ~ -75VDC	
Power Consumption	10W	
Dimensions	250 x 195 x 45 mm (D x W x H)	
Weight	0.51kg	
Temperature	0°C ~ 50°C (Operating), -10°C ~ 70°C (Storage)	
Humidity	10 ~ 90% non-condensing	
Certification	CE, FCC, RoHS compliant	
MTBF	57,000 hrs	

Application



Ordering Information

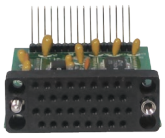
Model Name	*Type*	*Description*
ETU011-AC	Power	1U, 19/2", Data port to framed E1 w/ built-in AC 90 ~ 250 VAC
ETU011-DC	Power	1U, 19/2", Data port to framed E1 w/ built-in DC -18 ~ -72 VDC
Interface Module		***Description***
ETU/TTU-V35		V.35 interface module
ETU/TTU-X21		X.21 interface module
ETU/TTU-530		RS-530 interface module
ETU/TTU-449		RS-449 interface module
ETU/TTU-232		RS-232 ASYN/SYNC interface module
ETU/TTU-G64		G.703 64Kbps co-directional interface module
ETU/TTU-NRZ		NRZ interface module (4 * BNC)
ETU/TTU-ET100		10/100 Base-TX Ethernet E1 Bridge interface module
ETU/TTU-ET100R		10/100 Base-TX Ethernet Routing interface module

Please refer to page 12-15

Power Type
ETU011 – □□
Example: ETU011 – AC

Interface Module for ETU01A and ETU011

ETU/TTU-V35

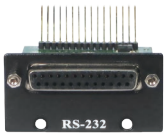


V.35 Interface

Features :

- Compliant with ITU-T V.35 standards
- Winchester type 34-pin MB34 M-Block female connector
- Synchronous data rate at Nx64 (where N=1 to 32)
- Data Communications Equipment interface electrically
- compatible to ITU-T V.11 (RS-422)

ETU/TTU-232

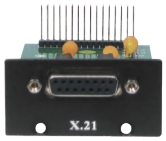


RS-232 Interface

Features :

- Compliant with EIA RS-232-C (Unbalanced)
- Compatible to ITU-T V.24 25-pin D Sub female connector
- Synchronous data rate at 64 or 128Kb/s Asynchronous (transparent) at up to 19.2K or 38.4K Data Communications Equipment interface

ETU/TTU-X21

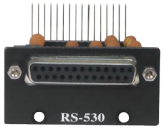


X.21 Interface

Features :

- Compliant with ITU-T X.21 standard (Balanced)
- 15-pin D Sub female connector
- Synchronous data rate at Nx64 (where N=1 to 32)
- Data Communications Equipment interface electrically compatible to V.11

ETU/TTU-530



RS-530 Interface

Features :

- Compliant with Category 1 EIA-530 (Balanced) 25-pin D Sub female connector
- Synchronous data rate at Nx64 (where N=1 to 32)
- Data Communications Equipment interface electrically compatible to RS-422

ETU/TTU-NRZ

Non-Return to Zero Interface

Features :

- 4 BNC connectors: TxD,TxC,RxD and RxC (Data&Clock)
- NRZ line coding Logic "1" 0V +/- 0.3V Logic "0" -1.5V +/- 0.3V
- Synchronous data rate Nx64 (where N=1 to 32)

ETU/TTU-449

RS-449(V.36) Interface

Features :

- Compliant with EIA/TIA-530-A (Balanced)
- 37-pin D Sub female connector
- Synchronous data rate at Nx64 (where N=1 to 32)
- Data Communications Equipment interface electrically compatible to RS-422

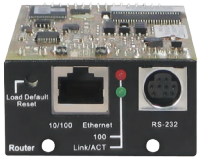
ETU/TTU-G64

G.703 64K
Co-directional Interface

Features :

- Pulse shape compliant with ITU-T G.703
- Clock frequency: 64KHz
- Pulse Amplitude: 1.0V
- Zero Amplitude: 0V
- Impedance: 120 Ohms
- 15-Pin D Sub connector
- Range: up to 800m with 24AWG

ETU/ TTU-ET100R

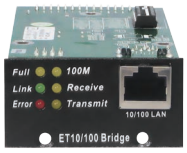


10/100 Base-TX Ethernet Router

Features :

- Ethernet port IP Address/subnet mask
- Dynamic Routing RIP I & II, Send or Receive on Ethernet or WAN
- PPP, HDLC and Cisco® HDLC WAN protocol encapsulatoin

ETU/TTU-ET100



10/100 Base-TX Ethernet Bridge

Features :

- High performance bridge for 10Base-T or 100Base-TX Ethernet extension
- Transparent half / Full duplex support on WAN / LAN interface
- Provides Ethernet over E1 economically

Ordering Information

Model Name	*Description*
ETU/TTU-V35	V.35 interface module
ETU/TTU-X21	X.21 interface module
ETU/TTU-530	RS-530 interface module
ETU/TTU-449	RS-449 interface module
ETU/TTU-232	RS-232 ASYN/SYNC interface module
ETU/TTU-G64	G.703 64Kbps co-directional interface module
ETU/TTU-NRZ	NRZ interface module (4 * BNC)
ETU/TTU-ET100	10/100Base-TX Ethernet E1 Bridge interface module
ETU/TTU-ET100R	10/100Base-TX Ethernet Routing interface module

Interface
ETU/TTU –□□□
Example: ETU/TTU – V35

ETU01-Plus

Single V.35 Port E1 CSU/DSU

The ETU01-Plus stand-alone DSU/CSU is a digital access unit for Unframed E1 or Fractional E1 service. The ETU01-Plus data channel supports user-selectable transmission rates via randomly selected E1 timeslots, which provides integral multiples of 64kbps, up to a maximum 2.048Mbps (unframed), for a line attenuation of up to 43 dB on twisted pair or coax cable. This provides an approximate operating range up to 2km (using 22AWG). The ETU01-PLUS packs the data channels into the E1 link in user-selected time slots. The ETU01-Plus front panel sports status LEDs for monitoring the CSU and DSU conditions and pushbutton switches for initiating local and remote loopback with integral BERT. The ETU01-Plus features a fixed on-board V.35 interface.

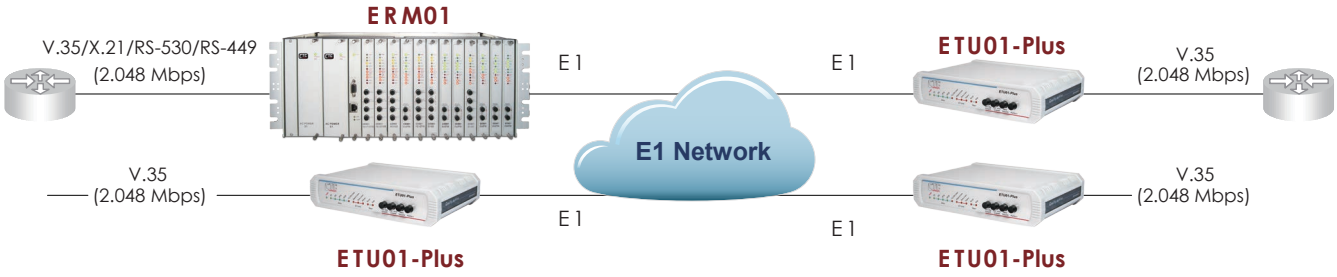
Features

- Supports Fractional E1 and Unframed E1 service with EOC control
- Model with fixed V.35 interface for price critical applications
- Multiple clock source selection (Internal or External: E1 recovery, DTE or DCE)
- Built-in BERT with V.54 diagnostic capabilities for performing local and remote loopback
- Fixed V.35 port with MB34F connector
- I/O connectors all located on rear panel

Specifications

G.703 E1	Framing	Framed CCS (PCM31) CAS (PCM30)/ Unframed CRC4 on/off
	Line Code	AMI/ HDB3
	Data rate	N*56K or N*64Kbps, where N=1~31 in CCS or N equal 1~30 in CAS
	Relative receive level	-43dB
	Transmit level:	
	Pulse	Nominal 2.37V ±10% for 75 ohm
	Amplitude	Nominal 3.00V ±10% for 120 ohm Zero amplitude ±0.1V
	Jitter performance	According to ITU-T G.823
	Connectors	BNC(unbalanced), RJ-48(balanced)
	Clock modes:	
	Clock mode 0	Receive & transmit clock (DCE1) (recovered) to the sync DTE
	Clock mode 1	Receive & transmit clock (DCE2) (internal oscillator) to the sync DTE
	Clock mode 2	Receive clock to the sync. and transmit (DTE1) clock from the sync device
	Clock mode 3	Receive and transmit clock from the (DTE2) sync DCE (from ETC and ERC pin)
	Clock mode 4	Receive and transmit clock from the (DTE3) sync DCE (all from ETC pin)
Indications	LEDs (Power, TD, RD, RTS, DCD, Siganl loss, Sync loss, Alarm)	
Standards	ITU-T G.703/G.704/G.706 & G.732	
Power Input	AC: 90-250VAC , DC: -18 ~ -75 VDC	
Power Consumption	10W	
Dimensions	195 x 160 x 45 mm (D x W x H)	
Weight	0.51kg	
Temperature	0°C ~ 50°C (Operating), -10°C ~ 70°C (Storage)	
Humidity	10 ~ 90% non-condensing	
Certification	CE, FCC, RoHS compliant	
MTBF	55,000 hrs	

Application



Ordering Information

Model Name	*Type*	*Description*
ETU01/Plus-AC	Power	1U, 19/2", Fixed V.35 port to framed E1 w/ built-in AC 90 ~ 250 VAC
ETU01/Plus-DC	Power	1U, 19/2", Fixted V.35 port to framed E1 w/ built-in DC -18 ~ -75 VDC

Power Type

ETU01/Plus –□□

Example: ETU01/Plus – AC

FTEC-100

T1/E1 Cross Rate Converter

The FTEC-100 is a standalone T1 (US Standard), E1 (European Standard) converter and timeslot cross connect which enables conversion between one T1 signal and one E1 signal. T1 and E1 signals with frames employ u-Law and A-Law encoding principles respectively and encode those analog signals into 64kbits digital data. The E1 interface supports CCS (PCM31) or CAS (PCM30) frames with or without CRC-4 and with HDB3 line coding. The T1 interface supports D4 or ESF frame formats with B8ZS or AMI line code. Multiple clock source selection provides maximum flexibility in connecting both T1 and E1. The clock source may be from the T1 recovery clock, from the E1 recovery clock, from the internal oscillator, from an external clock or via transparent timing. All setup controls can be performed via RS-232 console port and ASCII terminal. Tests and diagnostics can easily be performed. Diagnostics include T1 local/remote and E1local/remote loop back

Features

- Converts between T1 and E1 data and signaling
- Enable equipment to operate at T1 and E1 rates
- Support G.802 Annex B (T1 over E1)
- Configures A-law/μ-law and signaling conversion
- Transparent conversion at 64kbps timeslot level
- Controlled slip for buffer over or under flow
- 24 timeslots of T1 Nx64 can be inserted into E1 Nx64, 30/CAS or 31/CCS timeslots

Specifications

E1 interface	Framing	CAS/PCM30 or CCS/PCM31 selectable
	Bit rate	2.048Mbps
	Line Code	HDB3
	Line Impedance	75 ohm (BNC) / 120 ohm (RJ-45)
		Voice channel sample rule A-Law
	CRC check	CRC-4 enable/disable
	Pulse amplitude	Nominal 2.37V ±10% for 75ohm,
		Nominal 3.00V ±10% for 120ohm
	Zero amplitude	± 0.1V
	Connector	RJ-45 and BNC pair
Specifications	Framing	D4, ESF selectable
	Bit rate	1.544Mbps
	Line Code	B8ZS / AMI
	Equalization	0 ~ 655 feet settable
		Voice channel sample rule μ-Law
	CRC check	CRC-6 when ESF

T1 interface	Line Impedance	100 ohms
	Transmit Pulse level	3.0V ±10%,
	Receive signal level	0 ~ -10dB
	Connector	RJ-45
LEDs	PWR, Sys, Test, T1/E1	
Standards	ITU-T G.703, G.704, G.706, G.823, G.824, ANSI T1.403	
Power	AC : 100~240 V	
	DC : 36~72 V	
Power Consumption	< 5W	
Dimensions	201 x 135 x 35 mm (D x W x H)	
Weight	130g	
Temperature	0 ~ 60°C (Operating), -10 ~ 70°C (Storage)	
Humidity	10 ~ 90% non-condensing	
Certification	CE, FCC, RoHS compliant	
MTBF	57,000 hrs	

Application

Ordering Information

Model Name	*Description*
FTEC-100/AC	E1/T1 Cross rate converter with RS232 console and built-in AC power
FTEC-100/DC	E1/T1 Cross rate converter with RS232 console and built-in DC power

Power Type
FTEC - 100 – □□
Example: FTEC - 100 – AC

IPM-1SE/V35

E1/V.35 over Ethernet Access Unit

IPM-1SE/V35 is designed as a multi-service access platform for PDH and V.35 over Ethernet applications. Structured/unstructured E1 and V.35 data can be mapped/de-mapped into/from Ethernet packets. An adaptive clock recovery method for Ingress PDH (PSN -> TDM) clock generation is implemented to support E1 (ITU-T G.824) Jitter performance.

Cost-effective LAN deployment (PDH and V.35 over ethernet)

IPM-1SE/V35 provides cost-effective applications of traditional circuit-switched system over Ethernet. With IPM-1SE/V35, it is easy to interconnect with existing phone systems and V.35 over Ethernet that are used to carry data, voice and video.

Transparent transmission

IPM-1SE/V35 can transparently transport proprietary signaling that are required to support PBX features, including call conference, call forwarding and SS7. Customer can easily apply and enjoy better integration of TDM, V.35 and Ethernet devices with lower network expense.

Bypass international toll

With a pair of IPM-1SE/V35 and guaranteed internet bandwidth, it is sure to save cost dramatically, and to ensure the QoS of voice based on interconnections of TDM telecommunications equipment.

Features

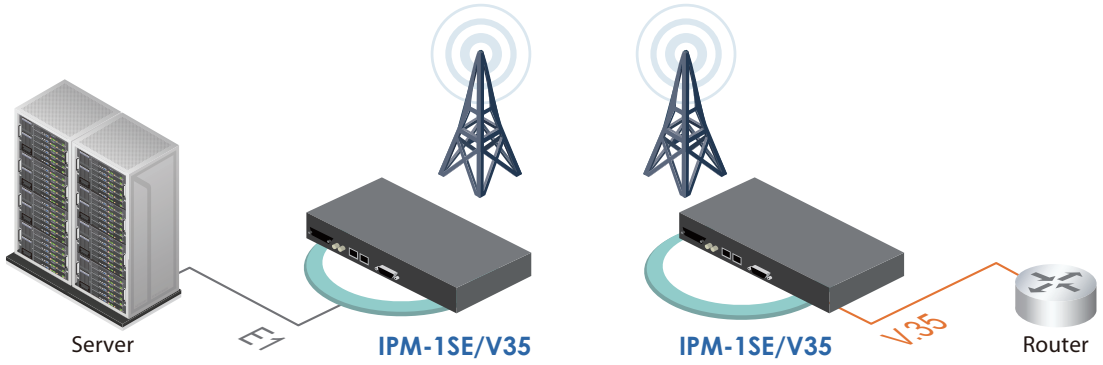
- Supports IEFT RFC4533 Structure-Agnostic TDM over Packet (SAToP), Metro Ethernet Forum MEF8.
- One E1 NRZ Serial Interface with LOS/AIS detection.
- One V.35 (Nx64K) interface.
- Use Raw Encapsulation method for PDH payload over Ethernet packet.
- Supports Circuit Emulation Service over Ethernet (CESoE) transport over Ethernet networks.
- Comply with IEFT draft standard for CESoPSN and SAToP; Metro Ethernet Forum MEF8 IA.
- Supports both Point-to-Point and Point-to-Multipoint operation.
- Supports Adaptive Clock recovery block for Ingress PDH (PSN -> TDM) clock generation. Recovered clock jitter is compliant to ITU-T G.824 (E1 Jitter Control).
- Configurable jitter buffer depth to compensate up to 40ms of Packet Delay Variation.
- Lost packets processing/compensation via PW (Pseudo Wire) control field Sequence Number.
- Provides Subscriber side data traffic bandwidth control to guarantee enough TDM payload bandwidth.
- PDH LOS detection triggered PW L field or payload AIS generation at Egress direction (TDM -> PSN).
- Configurable IEEE 802.3 DA/SA assignment.

Specifications

Line interface (CPE side)	Port: One E1 (ITU-T G.703) and one V.35. Interface: RJ-48c (120 Ohm), BNC (75 Ohm) and M/34 female (V.35, DCE). E1 Line Coding: HDB3
Ethernet interface (CPE/CO side)	Port: two 100 Base-T Ethernet. One is for downlink and the other is for uplink Interface: RJ-45
Dimensions	44 x 370 x 215 mm (D x W x H)

Power	AC: 110 ~ 240V @ 47 ~ 65Hz DC: -72V ~ -36V
Environment	Ambient temperature: 0°C ~ 50°C (0°C ~ 65°C, optional) Storage temperature: 0°C~ 85°C Relative humidity: 5 ~ 95% non condensing
Management	Console port (CLI) or SNMP-based / Web GUI management

Application



Ordering Information

Model Name	*Description*
IPM-1SE/V35-AD	E1/V35 over Ethernet access unit with AC+DC Power

IPM-E1, IPM-2E1 IPM-4E1

E1/2E1/4E1 over Ethernet
Web Management

IPM-E1/2E1/4E1 is designed as a multi-service access platform for PDH over IP applications. E1 frames can be mapped/de-mapped into/from IP packets. An adaptive clock recovery method for Ingress PDH (PSN->TDM) clock generation is implemented to support E1 (ITU-T G.823) Jitter performance.

IPM-E1/2E1/4E1 provides cost-effective applications of traditional circuit-switched system over IP. It is easy to interconnect existing phone systems over IP that are used to carry data, voice and video. With high precision clock recovery technology, IPM-E1/2E1/4E1 is capable of supporting 2G/3G/4G backhaul and provides smooth services. IPM-E1/2E1/4E1 can transparently transport proprietary signaling that are required to support PBX features, including call conference, call forwarding and SS7. Customer can easily apply and enjoy better integration of TDM and IP devices with lower network expense. With a pair of IPM-E1/2E1/4E1 and guaranteed internet bandwidth, it is sure to save cost dramatically, and to ensure the QoS of voice based on interconnections of TDM equipment.

Features

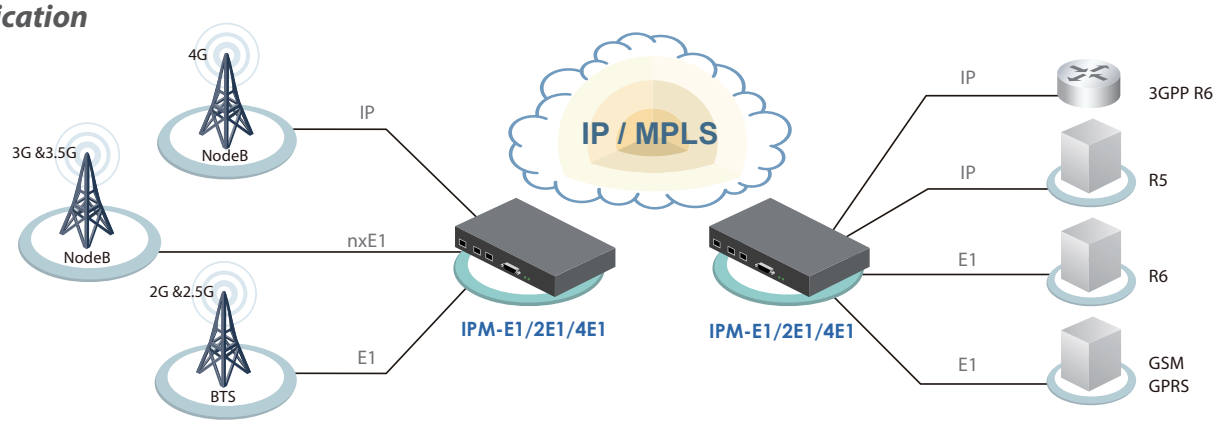
- Supports Web Management
- Supports IETF RFC4553 Structure-Agnostic TDM over Packet (SAToP), Metro Ethernet Forum MEF8
- Use Raw Encapsulation method for PDH payload over Ethernet packet
- Supports Circuit Emulation Service over Ethernet networks
- Comply with IETF draft standard for CESoPSN and SAToP; Metro Ethernet Forum MEF8 IA
- Supports both Point-to-Point and Point-to-Multipoint operation
- Supports Adaptive Clock recovery block for Ingress PDH (PSN -> TDM) clock generation. Recovered clock jitter is compliant to ITU-T G.823 (E1 Jitter Control)
- Configurable jitter buffer depth to compensate PDV (Packet Delay Variation) with the flexible setting of 11ms, 23ms, 40ms, 75 ms
- Lost packets processing / compensation via PW (Pseudo Wire) control field Sequence Number
- Provide Subscriber side Data traffic bandwidth control to guarantee enough TDM payload bandwidth
- PDH LOS detection triggered PW L field or payload AIS generation at Egress direction (TDM->PSN)
- Configurable IEEE 802.3 DA/SA assignment
- LED alarm display for E1 Power failure status
- E1 NRZ Serial Interface with LOS/AIS detection

Specifications

E1 Interface	Standards	ITU-T G.703, G.704, G.706, G.732
	Ports	1, 2 or 4-Port
	Data Rate	2.048Mbps ±50ppm
	Connector	RJ-48c for 120 ohm
	Line Coding	HDB3
Ethernet Interface	WAN Port	100 Base-TX Ethernet
	Interface	RJ-45
	LAN port	100 Bases-TX Ethernet
	Interface	RJ-45

Dimensions	125 x 320 x 44 mm (D x W x H)
Power	AC: 85 ~ 264V @ 47 ~ 63Hz
	DC: -72V ~ -36V
Environment	Ambient temperature: 0° ~ 50°
	Storage temperature: 0°~ 85°
	Humidity: 5 ~ 95% non-condensing
Management	Console or Telnet / Web / SNMP management (via Ethernet)

Application



Ordering Information

Model Name	Description
IPM-E1-AD	E1 over Ethernet with built-in AC+DC Power
IPM-2E1-AD	2E1 over Ethernet with built-in AC+DC Power
IPM-4E1-AD	4E1 over Ethernet with built-in AC+DC Power

Port Number Power Type
IPM – □□□ – □□
Example: IPM – 2E1 – AD

Specifications & design are subject to change without prior notice. Please visit CTC Union website for more details.

NEW

IPM-T1, IPM-2T1 IPM-4T1

T1/2T1/4T1 over Ethernet
Web Management

IPM-T1/2T1/4T1 is designed as a multi-service access platform for PDH over IP applications. T1 frames can be mapped/de-mapped into/from IP packets. An adaptive clock recovery method for Ingress PDH (PSN->TDM) clock generation is implemented to support T1 (ITU-T G.824) Jitter performance.

IPM-T1/2T1/4T1 provides cost-effective applications of traditional circuit-switched system over IP. It is easy to interconnect existing phone systems over IP that are used to carry data, voice and video. With high precision clock recovery technology, IPM-T1/2T1/4T1 is capable of supporting 2G/3G/4G backhaul and provides smooth services. IPM-T1/2T1/4T1 can transparently transport proprietary signaling that are required to support PBX features, including call conference, call forwarding and SS7. Customer can easily apply and enjoy better integration of TDM and IP devices with lower network expense. With a pair of IPM-T1/2T1/4T1 and guaranteed internet bandwidth, it is sure to save cost dramatically, and to ensure the QoS of voice based on interconnections of TDM equipment.

Features

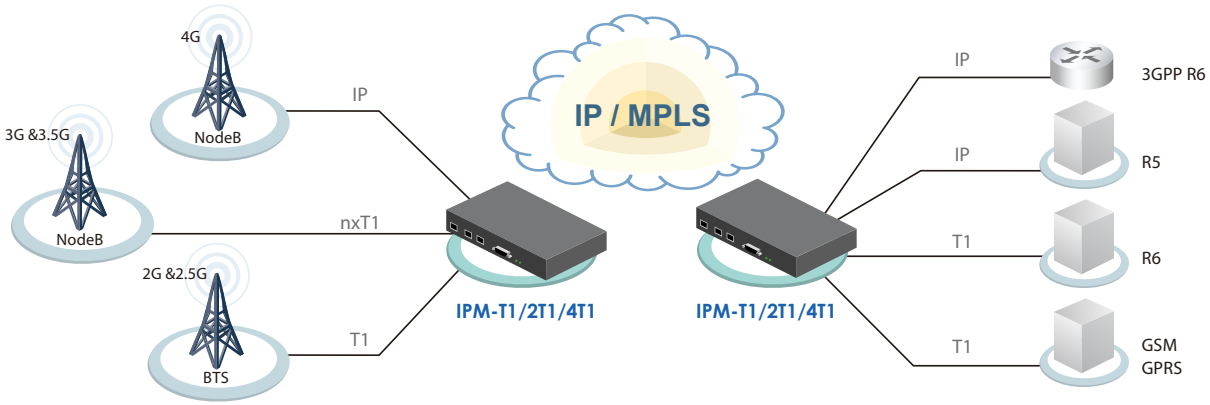
- Supports Web Management
- Supports IETF RFC4553 Structure-Agnostic TDM over Packet (SAToP), Metro Ethernet Forum MEF8
- Use Raw Encapsulation method for PDH payload over Ethernet packet
- Supports Circuit Emulation Service over Ethernet networks
- Comply with IETF draft standard for CESoPSN and SAToP; Metro Ethernet Forum MEF8 IA
- Supports both Point-to-Point and Point-to-Multipoint operation.
- Supports Adaptive Clock recovery block for Ingress PDH (PSN -> TDM) clock generation. Recovered clock jitter is compliant to ITU-T G.824 (T1 Jitter Control)
- Configurable jitter buffer depth to compensate PDV (Packet Delay Variation) with the flexible setting of 11ms, 23ms, 40ms, 75 ms
- Lost packets processing / compensation via PW (Pseudo Wire) control field Sequence Number
- Provide Subscriber side Data traffic bandwidth control to guarantee enough TDM payload bandwidth
- PDH LOS detection triggered PW L field or payload AIS generation at Egress direction (TDM->PSN)
- Configurable IEEE 802.3 DA/SA assignment
- LED alarm display for T1 Power failure status
- T1 NRZ Serial Interface with LOS/AIS detection

Specifications

T1 Interface	Standards	TU-T G.703, G.704, ANSI TI.403
	Ports	1, 2 or 4-Port
	Data Rate	1.544Mbps ±32ppm
	Connector	RJ-48c for 100 ohm
	Line Coding	B8ZS
Ethernet Interface	WAN Port	100 Base-TX Ethernet
	Interface	RJ-45
	LAN port	100 Bases-TX Ethernet
	Interface	RJ-45

Dimensions	125 x 320 x 44 mm (D x W x H)
Power	AC: 85 ~ 264V @ 47 ~ 63Hz
	DC: -72V ~ -36V
Environment	Ambient temperature: 0° ~ 50°
	Storage temperature: 0°~ 85°
	Humidity: 5 ~ 95% non-condensing
Management	Console or Telnet / Web / SNMP management (via Ethernet)

Application



Ordering Information

Model Name	*Description*
IPM-T1-AD	T1 over Ethernet with built-in AC+DC Power (CO & CPE)
IPM-2T1- AD	2T1 over Ethernet with built-in AC+DC Power (CO & CPE)
IPM-4T1-AD	4T1 over Ethernet with built-in AC+DC Power (CO & CPE)

Port Number Power Type

IPM – □□□ – □□

Example: IPM – 2T1 – AD

IPM-8E1, IPM-16E1

8E1/16E1 over Ethernet
Web Management

NEW

IPM-8E1 & IPM-16E1 is designed as a multi-service access platform for PDH over IP applications. E1 frames can be mapped/de-mapped into/ from IP packets. An adaptive clock recovery method for Ingress PDH (PSN->TDM) clock generation is implemented to support E1 (ITU-T G.823) Jitter performance.

IPM-8E1 & IPM-16E1 provides cost-effective applications of traditional circuit-switched system over IP. It is easy to interconnect existing phone systems over IP that are used to carry data, voice and video. With high precision clock recovery technology, IPM-8E1 & IPM-16E1 is capable of supporting 2G/3G/4G backhaul and provides smooth services. IPM-8E1 & IPM-16E1 can transparently transport proprietary signaling that are required to support PBX features, including call conference, call forwarding and SS7. Customer can easily apply and enjoy better integration of TDM and IP devices with lower network expense. With a pair of IPM-8E1 & IPM-16E1 and guaranteed internet bandwidth, it is sure to save cost dramatically, and to ensure the QoS of voice based on interconnections of TDM equipment.

Features

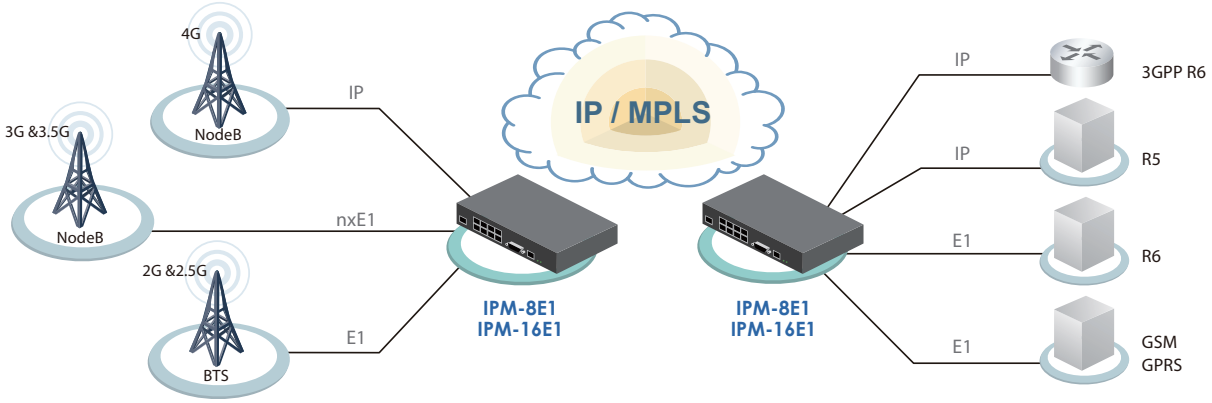
- Supports Web Management
- Supports IETF RFC4553 Structure-Agnostic TDM over Packet (SAToP), Metro Ethernet Forum MEF8
- 8 /16 x E1 NRZ Serial Interface with LOS/AIS detection
- Use Raw Encapsulation method for PDH payload over IP packet
- Supports Circuit Emulation Service over IPE
- Comply with IETF draft standard for CESoPSN and SAToP; Metro Ethernet Forum MEF8 IA
- Supports both Point-to-Point and Point-to-Multipoint operation
- Configurable IEEE 802.3 DA/SA assignment
- Supports 8/16 independent Adaptive Clock recovery block for Ingress PDH (PSN->TDM) clock generation. Recovered clock jitter is compliant with ITU-T G.823 (E1 Jitter Control)
- Independent configurable jitter buffer depth to compensate up to 250ms of Packet Delay Variation
- Lost packets processing / compensation via PW (Pseudo Wire) control field Sequence Number
- PDH LOS detection triggered PW L field or payload AIS generation at Egress direction (TDM->PSN)
- LED alarm display for E1 Power failure status

Specifications

E1 Interface	Standards	ITU-T G.703, G.704, G.706, G.732
	Ports	8 or 16-Port
	Data Rate	2.048Mbps ±50ppm
	Connector	RJ-45 for 120 ohm
	Line Coding	HDB3
Ethernet Interface	WAN Port	1 x 100Base-TX Ethernet
	Interface	RJ-45
Dimensions	268 x 290 x 44 mm (D x W x H)	

Power	AC: 85 ~ 264V @ 47 ~ 63Hz
	DC: -72V ~ -36V
Environment	Ambient temperature: 0° ~ 50°
	Storage temperature: 0°~ 85°
	Humidity: 5 ~ 95% non-condensing
Management	Console port or Telnet/ Web / SNMP-based management via NMS port

Application



Ordering Information

Model Name	Description
IPM-8E1-AD	8E1 over Ethernet with built-in AC+DC Power (CO & CPE)
IPM-16E1-AD	16E1 over Ethernet with built-in AC+DC Power (CO & CPE)

Port Number Power Type
IPM – □□□□ – □□
Example: IPM – 16E1– AD

Specifications & design are subject to change without prior notice. Please visit CTC Union website for more details.

NEW

IPM-8T1, IPM-16T1

8T1/16T1 over Ethernet
Web Management

IPM-8T1 & IPM-16T1 is designed as a multi-service access platform for PDH over IP applications. T1 frames can be mapped/de-mapped into/ from IP packets. An adaptive clock recovery method for Ingress PDH (PSN->TDM) clock generation is implemented to support T1 (ITU-T G.824) Jitter performance.

IPM-8T1 & IPM-16T1 provides cost-effective applications of traditional circuit-switched system over IP. It is easy to interconnect existing phone systems over IP that are used to carry data, voice and video. With high precision clock recovery technology, IPM-8T1 & IPM-16T1 is capable of supporting 2G/3G/4G backhaul and provides smooth services. IPM-8T1 & IPM-16T1 can transparently transport proprietary signaling that are required to support PBX features, including call conference, call forwarding and SS7. Customer can easily apply and enjoy better integration of TDM and IP devices with lower network expense. With a pair of IPM-8T1 & IPM-16T1 and guaranteed internet bandwidth, it is sure to save cost dramatically, and to ensure the QoS of voice based on interconnections of TDM equipment.

Features

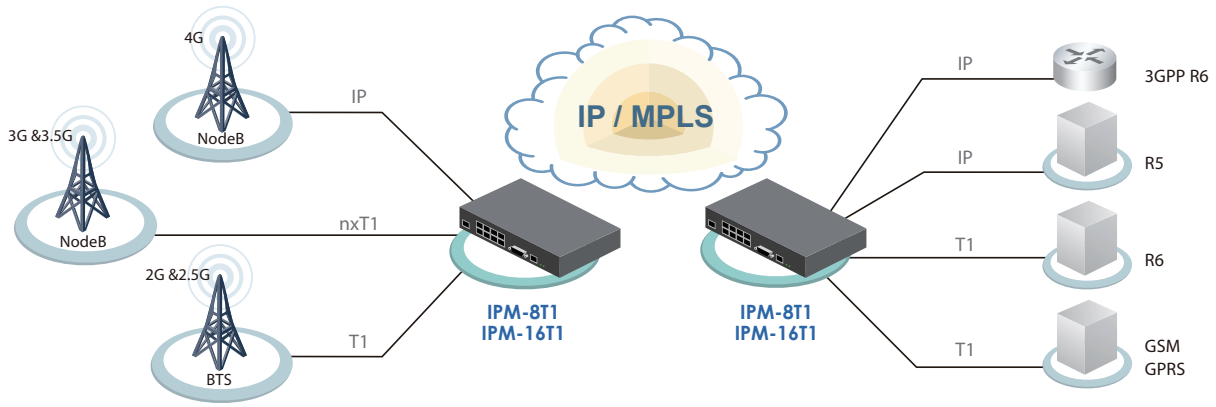
- Supports Web Management
- Supports IETF RFC4553 Structure-Agnostic TDM over Packet (SAToP), Metro Ethernet Forum MEF8
- 8 /16 x T1 NRZ Serial Interface with LOS/AIS detection
- Use Raw Encapsulation method for PDH payload over IP packet
- Supports Circuit Emulation Service over IPE
- Comply with IETF draft standard for CESoPSN and SAToP; Metro Ethernet Forum MEF8 IA
- Supports both Point-to-Point and Point-to-Multipoint operation
- Configurable IEEE 802.3 DA/SA assignment
- Supports 8/16 independent Adaptive Clock recovery block for Ingress PDH (PSN->TDM) clock generation. Recovered clock jitter is compliant with ITU-T G.824 (T1 Jitter Control)
- Independent configurable jitter buffer depth to compensate up to 250ms of Packet Delay Variation
- Lost packets processing / compensation via PW (Pseudo Wire) control field Sequence Number
- PDH LOS detection triggered PW L field or payload AIS generation at Egress direction (TDM->PSN)
- LED alarm display for T1 Power failure status

Specifications

T1 Interface	Standards	ITU-T G.703, G.704, ANSI TI.403
	Ports	8 or 16-Port
	Data Rate	1.544Mbps ±32ppm
	Connector	RJ-48c for 100 ohm
	Line Coding	B8ZS
Ethernet Interface	WAN Port	1 x 100Base-TX Ethernet
	Interface	RJ-45
Dimensions	268 x 290 x 44 mm (D x W x H)	

Power	AC: 85 ~ 264V @ 47 ~ 63Hz
	DC: -72V ~ -36V
Environment	Ambient temperature: 0° ~ 50°
	Storage temperature: 0°~ 85°
	Humidity: 5 ~ 95% non-condensing
Management	Console port or Telnet/ Web / SNMP-based management via NMS port

Application



Ordering Information

Model Name	*Description*
IPM-8T1-AD	8T1 over Ethernet with built-in AC+DC Power (CO & CPE)
IPM-16T1-AD	16T1 over Ethernet with built-in AC+DC Power (CO & CPE)

Port Number Power Type
IPM – □□□□ – □□
Example: IPM – 16T1– AD

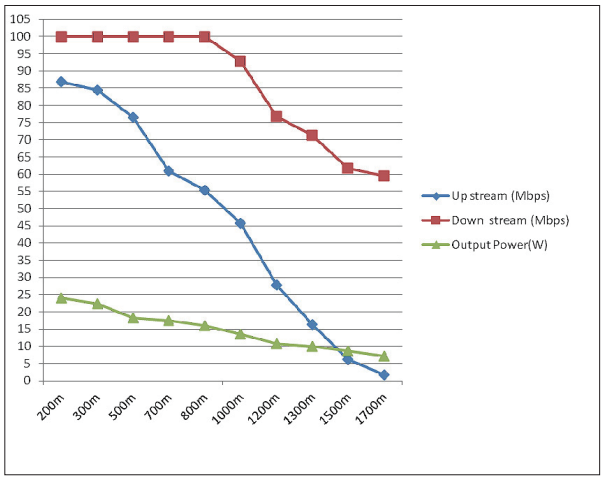
EOC-101-P

PoE Ethernet Extender with Power Feeding (Coaxial Cable)

Features

- Long transmission distance up to 1500 meters (Max.)
- Remote power feeding
- Simultaneous transmission of power and Ethernet data over coaxial cable
- High transmission bandwidth, support HD IP Camera 1080P/30fps
- High power transmission for long distance: 12W (DC12V /1A) @1000 Meters (EOC-101L-P)
- Complies with standard IEEE802.3 and IEEE802.3u

Output Power and Bandwidth Efficiency (Based on RG-6)



Coaxial Cable Distance vs Speed and Power

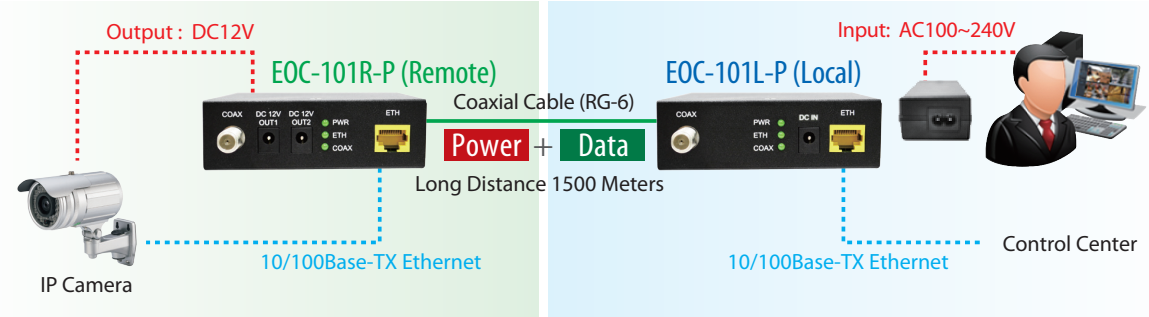
Distance (meter)	300	500	700	1000	1200	1500
Up stream (Mbps)	76	69	55	41	25	5
Down stream (Mbps)	90	90	90	82	69	55
PoE Output Power (W)	18	16	15	12	95	75

Specifications

Standards	IEEE802.3 10Base-T	
	IEEE802.3u 100Base-TX	
	IEEE802.3x Flow Control for Ethernet	
	IEEE802.3at PoE+	
Transmission Medium	Coaxial Cable (RG-6 Drop cable)	
Remote Site Power Output	2x DC 12V output, total 1A/12W @ 1000meters coaxial cable	
LED	Power (Green)	On: power on / Off : Power Off
	ETH LNK/ACT (Green)	On: Ethernet Port Link / Flash : Data TX / RX
	Coax LNK/ACT (Green)	On: Coaxial link / Fast Flash : Data TX/RX / Slow Flash : Standby for connection
Power Consumption	32.2W (12W Power feeding for IP Camera + EOC-101L-P + EOC-101R-P) @1000meter coaxial cable	
Power Input	1x DC jack for power adapter (AC100~240V, 50/60Hz)	

Power Adapter	Input AC100~ 240AC (50/60Hz) Output 63VDC , 0.8A	
Connectors	Remote	RJ-45x1, F-Type BNCx1, DC jack 12V output x2
	Local	RJ-45x1, F-Type BNCx1, DC jack 48V input x1
Dimensions	Remote	123.6 x 95 x 30mm (D x W x H)
	Local	123.6 x 95 x 30mm (D x W x H)
Operation Temperature	0 ~50°C	
Weight	Total Net : 640g	
Humidity	10% ~ 90% RH, non-condensing	
Protection	Over current, Overvoltage Protection	
Certification	CE / FCC Part 15 class B	
EMS protection	EN61000-4-5 Surge level 3 Criteria B for coaxial cable , Ethernet and Power	

Application



Ordering Information

Model Name	Description
EOC-101-P	Remote Power Feeding Ethernet Extender over Coaxial Cable (Remote, Local)

Specifications & design are subject to change without prior notice. Please visit CTC Union website for more details.

EOC-10A

Gigabit Ethernet / CATV over Coax Modem

The EOC-10A is point-to-point EoCNA (Ethernet over Coax Network Alliance) solution that efficiently extends 10/100/1000Mbps Ethernet circuits up to 700 meters (2,296feet) at full Fast Ethernet speed using existing coaxial cable. The EOC-10A will allow Ethernet connectivity in existing facilities or homes without pulling extra cable. This is perfect solution for Ethernet on the factory floor where systems have been upgraded from slower serial communication to Ethernet networking. Installation is easy with absolutely no settings required. The EOC-10A is used in Coaxial cable systems to extend Ethernet connectivity over existing CCD/CATV grade Coaxial cable. The EOC-10A works by sharing the same cable with CATV signals, without interference to the existing CATV signals.

Features

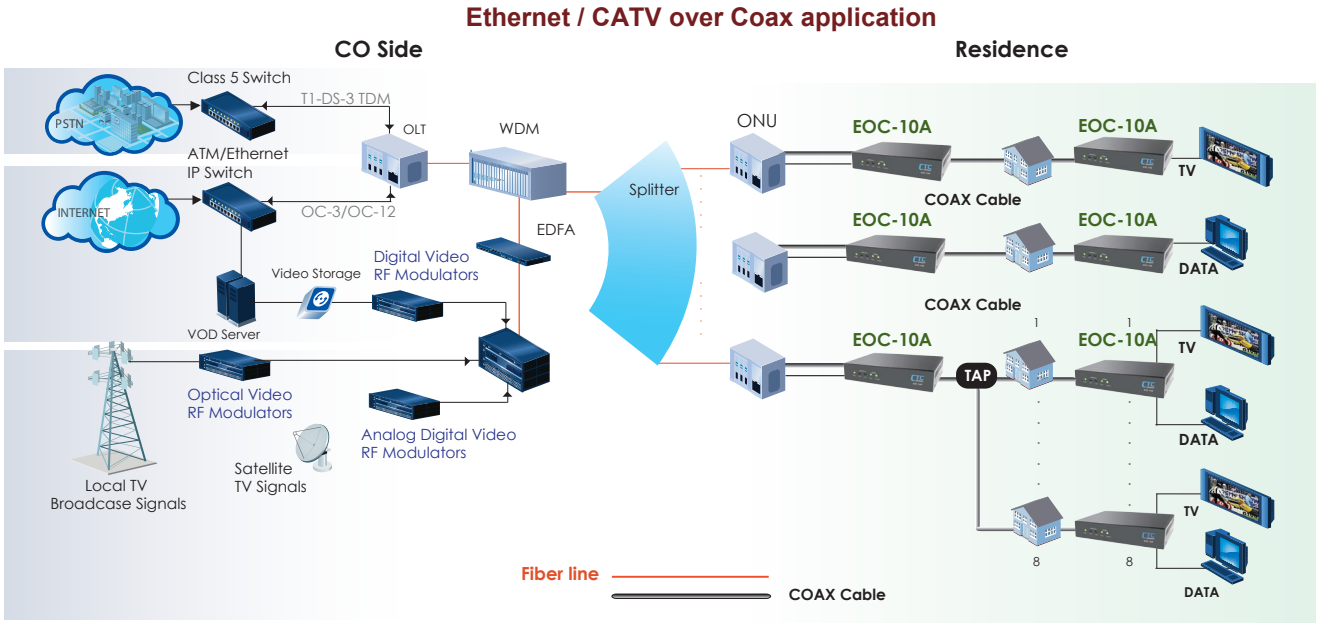
- Extends LAN connectivity using existing coaxial cable
- Transmits CATV and Ethernet over the same coaxial cable
- 192Mbps @ up to 700 meters (2,296feet)
- 64Mbps @ 1.2Km (4,000feet)
- Supports point to point
- Supports point to multi-point up to 8 nodes over tap/splitter
- Asymmetrical using EoCNA standard
- Operates transparently to high layer protocols such as TCP/IP
- Auto MDI / MDIX
- Auto negotiation
- Plug and Play, no configuration required
- Status LEDs for simple monitoring

Specifications

Ethernet Interface	Two 10/100/1000 Mbps, RJ45
Coax Interface	Two F-Type Female Coax Connectors, One for EoCNA, the other for TV/ CCD
Protocol	Transparent to higher layer protocols
Transmission Power and Spectrum	0 dBm, 12~44 MHz
Physical layer	224Mbps maximum speed
transmission speed and distance	Up to 192Mbps@700 meters
	Up to 64Mbps @ 1.2Km (-176dBm/Hz Noise Floor)
Indications	LEDs (PWR, LAN Link/Act, Coax Link/Act, Sync)

Standards	IEEE802.3, IEEE802.3u, IEEE802.3ab, IEEE802.3x
Power Input	12VDC (via AC switching adapter)
Power Consumption	<4W
Dimensions	83 x 138 x28mm (D x W x H)
Weight	0.33kg
Temperature	0 ~ 50°C (Operating), -10 ~ 70°C (Storage)
Humidity	10 ~ 90% non-condensing
Certification	CE, FCC, RoHS compliant
MTBF	57,000 hrs

Application



Ordering Information

Model Name	*Description*
EOC-10A	CATV+2x10/100/1000-T over Coax Modem with AC Adapter

Eoe1A

Ethernet over E1 with SNMP Management

The Eoe1A is a Channel Service Unit for unframed ITU-T G.703 E1 that features a built-in Ethernet bridge. The CSU has a built-in Network Terminating Unit (NTU) and may connect to either 75 Ohm unbalanced, BNC connectors or to 120 Ohm balanced, unframed E1 via twisted pairs and a shielded RJ-45 connector. The Eoe1A Ethernet Bridge uses HDLC encapsulation to transport Ethernet packets across the WAN and supports 10/100 auto-negotiation or manual settings for 10M, 100M, Full or Half Duplex Ethernet. The Ethernet port also supports a standard auto-MDIX feature that will completely eliminate Ethernet cross-over cables or the guessing that is sometimes involved in choosing a cable when connecting to a HUB or a PC. The Eoe1A is very easy to configure by a menu driven serial console interface. SNMP and proprietary MIB add the ability to manage the Eoe1A centrally through third party network management software or via CTC Union's EMS management system.

Features

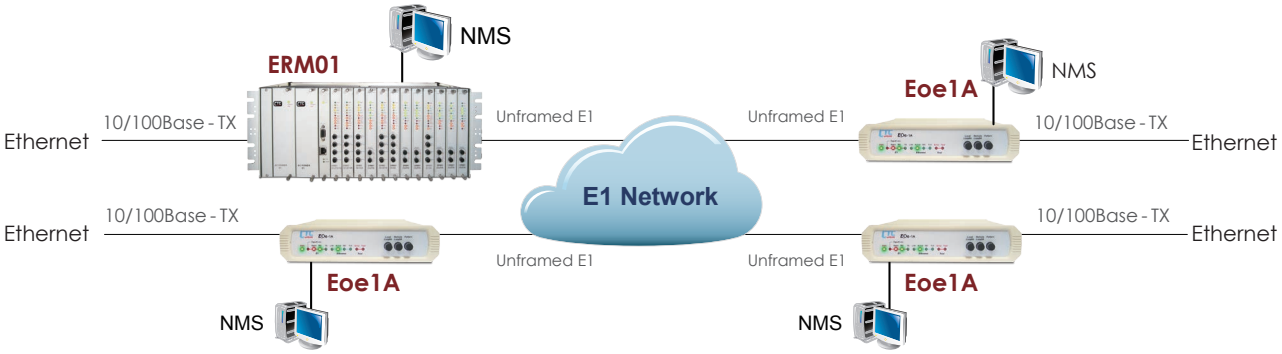
- Supports 10/100Base-TX Ethernet over Unframed E1
- Automatic address learning, aging and deletion after 5 minutes
- Auto padding of undersized packets to meet the minimum Ethernet packet size requirement
- Buffering modes can be selected according to the setting of WAN and LAN line speeds
- Forwarding and filtering rate at WAN speed with throughput latency of 1 frame
- Auto MDI / MDIX
- Real-time filtering with 256 MAC address table
- Supports Console, SNMP and Web management
- Adjustable pay load rates of: 10K, 32K, 64K, 128K, 256K, 512K, 1024K & 2048K

Specifications

G.703 E1 Specifications	
Framing	Unframed
Line code	AMI/ HDB3
Bit rate	2.048Mbps (clear channel)
Relative receive level	0 to -43dB
Transmit level	Pulse Nominal 2.37V ±10% for 75ohm Amplitude Nominal 3.00V ±10% for 120ohm Zero amplitude ±0.1V
Jitter performance	According to ITU-T G.823
Connector	BNC(unbalanced), RJ-48(balanced)
Clock modes	Clock mode 0: Receive & transmit clock (DCE1)(recovered) to the sync DTE Clock mode 1: Receive & transmit clock (DCE2)(internal oscillator) to the sync DTE
Diagnostics	
Test Switches	Digital local loopback, Analog local loopback, Digital local and remote loopback, 2047 Test pattern
Ethernet Specifications	
Connector	RJ-45

Data Rate	10/100Mbps; Half Duplex / 20/ 200Mbps; Full duplex
Filtering & Forwarding	90,000 packets/sec
Delay	1 frame
Frame Buffer	340 frames
MAC Table	256 MAC address
Protocols	Synchronous HDLC
Indications	LEDs (Power, Signal Loss, Alarm, Link, TD, RD, 100, Full, Error, Error, Test)
Standards	ITU-T G.703, G.706 and G.732, IEEE 802.3/802.3u
Management	Console, Web, SNMP
Power Input	AC: 90-250VAC ; DC: 18-72 VCD
Power Consumption	20W
Dimensions	250 x 195 x 45mm (D x W x H)
Weight	1.5kg
Temperature	0°C ~ 50°C (Operating), -10°C ~ 70°C (Storage)
Humidity	10 ~ 90% non-condensing
Certification	CE, FCC, RoHS compliant
MTBF	57,000 hrs

Application



Ordering Information

Model Name	*Description*
Eoe1A/AC	1U half 19" Ethernet over unframed E1 SNMP with AC power (100 ~ 240 V)
Eoe1A/DC	1U half 19" Ethernet over unframed E1 SNMP with DC power(18 ~ 75 V)
Eoe1A/AD	1U half 19" Ethernet over unframed E1SNMP with AC (100~240V) and DC (18 ~ 75 V)

Power Type
Eoe1A –□□
Example: Eoe1A – AD

ET100A

Ethernet to WAN (Synchronous) Bridge

The ET100A Network Bridge is a high performance remote, self-learning, Ethernet bridge. Its compact size and low cost makes it ideal for cost-sensitive bridging applications, or as a LAN extender or segmenter over bit stream type infrastructures. The built-in n x 64 (56)Kbps timing clock generator makes it easy to connect to other n x 64 (56)Kbps related data equipment. Several options of data interfaces, including V.35, RS-530, RS-449, RS-232, and X.21 make this unit's connection between 10Base-T or 100Base-TX LAN and various data port interfaces convenient.

Features

- Protocol : Synchronous HDLC (ISO 13239), PPP, CISCO® HDLC
- 10Base-T or 100Base-TX Ethernet bridge
- Auto MDI/MDIX
- Selectable data port : V.35, RS-530, RS-449, RS-232, X.21
- Transparent half / Full duplex support on WAN, LAN interface
- Nx64, Nx56 timing clock generator for Sync WAN link
- LEDs indication for LAN, WAN status

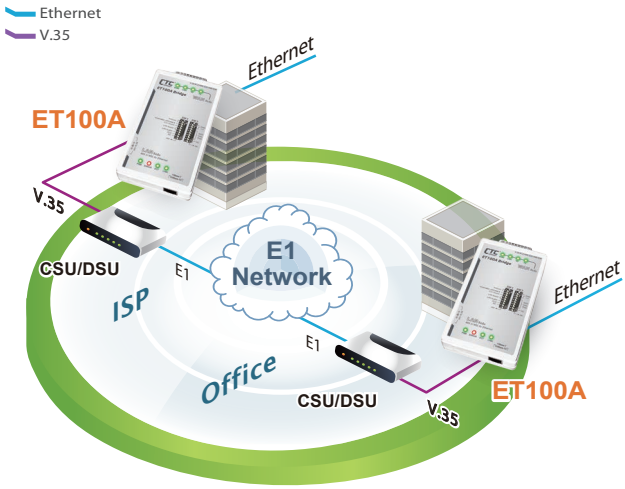
Specifications

WAN Interface	Interface :	Selectable RS-232(Sync), V.35, RS-530, RS-449, RS-232, X.21(cable solution)
	Protocol :	Synchronous HDLC (ISO 13239), PPP, CISCO® HDLC
	Connector :	DB25M
	Type :	DTE port
	Data rate:	RS-232(Sync) up to 128Kbps
		V.35, X21, RS-530, RS-449 up to 2Mbps
		Nx64(56)Kbps up to 2048Kbps
	Clock source :	Tx/Rx internal or external All Configuration by Dip switch (Protocol, interface, Clock mode, data rate)
Indications	LEDs (PWR, WAN Rx/Tx, LAN Tx/Rx/Link/Err/Speed)	
Power	12VDC	

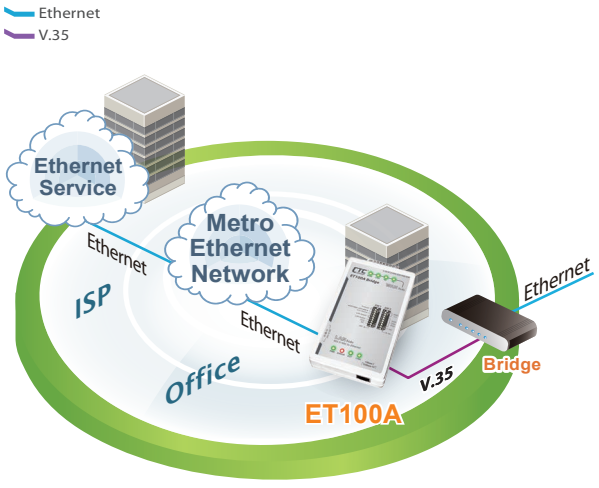
LAN Interface	Compliant with IEEE 802.3, 802.3u
	Connector: RJ-45
	Speeds: 10/100Base-TX, Full/Half duplex
	Frames: Support 64 ~ 1536 byte packet lengths
Bridge Specifications	Address learning, aging and deletion after 5 minutes
	256 addresses MAC table
Power Consumption	< 5 W
Dimensions	135 x 79 x 25mm (D x W x H)
Weight	180g
Temperature	0°C ~ 50°C (Operating), -10°C ~ 70°C (Storage)
Humidity	10 ~ 90% non-condensing
Certification	CE, FCC, RoHS compliant

Application

Ethernet over TDM, Point to Point



HDLC Bridge Application



Ordering Information

Model Name	*Description*
ET100A	Compact size, Ethernet to WAN (V.35, X21, RS-530, RS-449, RS-232) bridge w/ DC 12V AC switching adapter
ET100A-V35	10/100TX Ethernet bridge with V35M cable
ET100A-X21	10/100TX Ethernet bridge with X21M cable
ET100A-RS530	10/100TX Ethernet bridge with RS530M cable
ET100A-RS232	10/100TX Ethernet bridge with RS232M cable
ET100A-RS449	10/100TX Ethernet bridge with RS449M cable

ET100A –□□□

Example: ET100A – V35

Optional Accessories	
CAB-DB25FMB34M-V35	V.35 adapter cable: DB25 to MB34 Male, 1meter
CAB-DB25FMB34F-V35	V.35 adapter cable: DB25 to MB34 Female, 1meter
CAB-DB25FDB25M-530(232)	RS-530(232) adapter cable: DB25 Female to DB25 Male, 1meter
CAB-DB25FDB25F-530(232)	RS-530(232) adapter cable: DB25 Female to DB25 Female, 1meter
CAB-DB25FDB37M-449	RS-449 adapter cable: DB25 Female to DB37 Male, 1meter
CAB-DB25FDB37F-449	RS-449 adapter cable: DB25 Female to DB37 Female, 1meter

Tester Series

Offers the reliability necessary

Optical Fiber Tester
(OTDR, Optical light source & power meter)

E1 BERT

Protocol Analyzer

OTDR-30A

Single Mode Optical Time Domain Reflectometer

The OTDR-30A is an OTDR (Optical Time Domain Reflectometer) based optical fault locator and analysis tool for optical fiber networks. The OTDR-30A supports Single mode 1310nm, 1550nm with Dynamic Range 28/26dB.The OTDR features a light, compact, hand-held design with an intelligent user interface that is easy and quick to use. The color LCD display with bright backlight makes testing work more comfortable and convenient, whether during daylight or in low light conditions. As a fault locating and analyzing tool, the OTDR-30A is much more economical than traditional OTDRs. In addition to its 1000 plus internal curve storage, the OTDR-30A can save and transfer the measurement curves data to a PC via serial or USB port for further analysis or printing with Window based "Trace Manager" software. When set in auto measurement mode, the user can activate the measurement operations easily by the push of only one button. The OTDR-30A is ideal for optical fiber installation, maintenance, field construction, and other on-site fault-location analysis.

Features

- Ideal for LAN/WAN certification & trouble-shooting
- Fiber length/splice/fiber-end detection
- Handheld & lightweight
- Overall fiber applications:
- SM: 1310/1550nm(with filter), up to 28dB
- Quick start: <5 seconds
- Hotkeys: Easiest operation in the world, push-and-test
- High precision measurement, 1000 test records storage
- USB/RS-232 data interface
- Bellcore file format (.sor)
- PC software for traces batch editing & flexible printing
- Multilanguage: EN/DE/FR/ES/PT/RU/KR/CN
- 8 hrs continuous operation/20 hrs standby
- Dust-shock proof (2m drop test)

Specifications

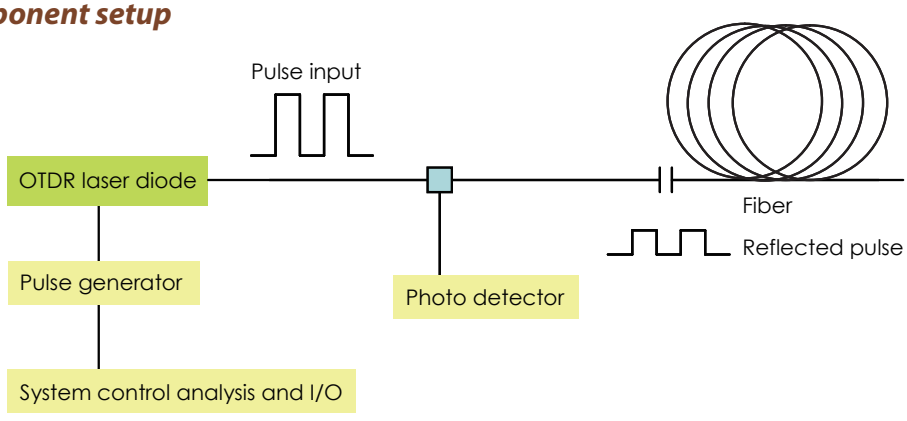
Model Name	Wavelength (±20nm)	Dynamic Range	Event DeadZone(m)	Attenuation DeadZone(m)
OTDR-30A	1310/1550	28/26dB	1.8	8

Selectable Range (Km)	0.3,1.3, 2.5, 5, 10, 20, 40, 80, 120
Pulse Width	5ns, 12ns, 30ns, 100ns, 275ns, 1µs, 2.5µs, 10µs
Averaging Time	15s, 30s, 1min, 2min, 3min
Distance Measure Accuracy	±(1m + 5×10-5×distance + sampling space)
Attenuation Detect Accuracy	±0.05 dB/ dB
Reflection Detect Accuracy	±4 dB
Data Storage	1000 records
Connectivity	USB/RS-232

Connector	FC/PC (Interchangeable SC, ST)
Power Supply	NiMH Battery / AC Adapter
Battery Life	8 hours continuous operation; 20 hours standby (on one charge)
Operating Temperature	0 ~ 50°C
Storage Temperature	-20 ~ 70°C
Relative Humidity	0 ~ 95% (non-condensing)
Weight	1kg (2.2 lbs)
Dimensions	100 x 196 x 60mm (D x W x H)

Visible Fault Locator (Only available with Type B/N and C/N)	
Output Power (dBm)	≥ -3
Max Measurement Range	5 Km

An OTDR component setup



Ordering Information

Model Name	Description
OTDR-30A	28/26dB, 1310/1550nm, Single mode OTDR tester

OLS-200

Optical Light Source

OLS-200, a compact, handheld tester, provides stable laser light source in two different wavelengths for fiber cable testing. By providing the two most popular wavelengths, 1310nm and 1550nm, the OLS-200 is an ideal tester designed for optical fiber networks. When used in conjunction with any third party optical power meter or the OPM-500A from CTC Union, the actual optical attenuation of a fiber link can be determined during pre-installation of active devices or for troubleshooting in-field fiber problems.

Features

- Highly stable multi-wavelength single mode laser output
- Industry standard and easily adapted FC connector
- Continuous Wave (CW) or Modulation modes
- Selectable wavelengths 1310nm or 1550nm
- Built-in Lithium Ion rechargeable battery
- Works up to 45 hours on full charge
- Auto power off after 10 minutes idle
- Easy to operate via keys and LCD display
- Portable and light weight
- Use with OPM-500A or other third party power meter

Specifications

Working Wavelength(nm)	1310/1550 (Selectable)
Laser Type	FP-LD
Optical Power Output	-7 dBm
Modulation Frequencies	0 (CW), 270, 1000, 2000Hz
Connector	FC/PC
Temperature	-10 ~ 60°C (Operating) , -25 ~ 70°C (Storage)
Auto shutoff(min)	10

Battery working time(hrs)	45
Dimensions	33 x 100 x 185 mm (D x W x H)
Battery Power	Internal 7.4V 800mAh rechargeable battery
	100~240AC Power Adapter/Charger, 8.4VDC@1A output
Weight	295g

An OTDR component setup

Ordering Information

Model Name	*Description*
OLS-200	Optical Light Source, -7 dBm (1310/1550nm)

Specifications & design are subject to change without prior notice. Please visit CTC Union website for more details.

OPM-500A/500B

Optical Power Meter

OPM-500, a compact, handheld tester, provides stable laser light power measurement in five different wavelengths for fiber cable testing. By measuring the most popular wavelengths, 850nm, 980nm, 1300nm, 1310nm, 1490nm and 1550nm, the OPM-500 is an ideal tester designed for active optical fiber networks. When used in conjunction with any third party optical light source or the OLS-200 from CTC Union, the actual optical attenuation of a fiber link can be determined during pre-installation of active devices or for troubleshooting in-field fiber problems.

Features

- Highly stable laser light level & power measurement
- Industry standard fiber connector adapters for FC
- Backlit LCD display with auto shutoff
- Selectable wavelengths 850 ~ 1550nm
- Built-in Lithium Ion rechargeable battery
- Works up to 48 hours on full charge
- Auto power off after 10 minutes idle
- Easy to operate via keys and LCD display
- Portable and light weight
- Use with OLS-200 or any other third party light source

Specifications

Model	OPM-500A	OPM-500B
Dynamic Range	-70 ~ +3	-50 ~ +26
Wavelength range(nm)	800 ~ 1700	
Connector	FC/PC (optional SC, ST)	
Working Wavelength(nm)	850, 980, 1300, 1310, 1490, 1550	
Resolution(dB)	0.01	
Temperature	-10 ~ 60°C (Operating) , -25 ~ 70°C (Storage)	
Diode Type	InGaAs PIN ph	

Auto shutoff time(min)	10
Battery working time(hrs)	48
Dimensions	33 x 82 x 172 mm (D x W x H)
Power	nternal 7.4V 800mAh rechargeable battery
	100~240AC Power Adapter/Charger, 8.4VDC@1A output
Weight	295g

Ordering Information

Model Name	*Description*
OPM-500A	850, 980, 1300, 1310, 1490, 1550, -70 ~ +3dBm
OPM-500B	850, 980, 1300, 1310, 1490, 1550, -50 ~ +26dBm

OPM –□□□□

Example: OPM – 500A

HCT-BERT/C

E1/Datacom BER Tester

The HCT-BERT/C tester is a compact, color-LCD, graphic-user-interface, single hand E1 Bit error rate tester designed for field use in analysis and maintenance of data communications (V.35, RS530, X.21, RS232) and E1 (2.048Mbps) lines. The HCT-BERT/C performs framed, unframed drop and insert Nx64Kbps, or nx56Kbps data into any time slot. The HCT-BERT/C tester also provides a variety of E1 line statuses, transmission performance testing (BERT) and monitoring. On the E1 line, the HCT-BERT/C may be used as a generator or receiver.

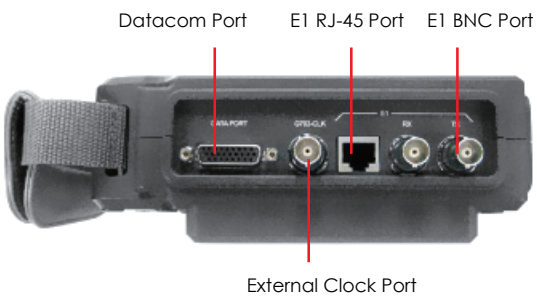
Features

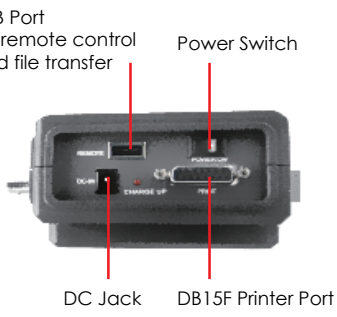
- Color LCD display graphic mode
- USB port for remote control
- Results Report
- Supports G.821/826, M.2100 BERT analysis
- Sa bits setup and monitor
- Internal Memory storage of test result; Direct display on LCD screen
- Print out via Parallel Printer port
- Portable for field use
- Upgradeable for advanced features
- Rechargeable battery with battery low indicator
- Supports CRC & BPV performance analysis
- Datacom BERT analysis available for V.35, RS-530, X.21 and RS-449
- V.35/ V.24/RS-232/449/530/ X.21

Specifications

E1 interface	E1 Receiving Interface
	• Line code: HDB3/AMI • Pulse feature: ITU G.703 • Jitter tolerance: ITU G.823 • Input port: BNC (non-balance), RJ45 (balanced) • Input mode: Impedance: 75ohm (unbalanced), 120ohm (balanced) • Bridging mode: impedance > 1000 ohm
	E1 Transmission Interface
	• Line code: HDB3/AMI • Pulse shape: ITU G.703 • Pulse amplitude: Nominal 2.37V for BNC 75 ohm Nominal 3.00V for RJ45 120 ohm • Zero amplitude: ±0.1 V at max • Jitter tolerance: ITU G.823 • Output port model: BNC (non-balanced), RJ45 (balanced) • Source of clock transmission: Internal clock: 2.048 MHz ±50ppm, ±100ppm. External clock: receive clock from external clock interface Recovery clock: take clock from received E1 Signal
	E1 Frame Format
	• PCM31, PCM31+CRC, PCM30, PCM30+CRC • Unframed mode, Automatic detection
Other Functions	Color Display Screen: Character/graphic mode
	Test Results Report
	• 100 test results max available in storage • Direct display on LCD screen • Print via printer port available
	Modular Design for Easy Update

Error Rate Test (BERT Test)	BERT Patterns
	• 511, 2047, 2E15-1, 2E15-1 (reverse), 2E20-1, 2E20-1 (reverse), QRSS, 2E23-1, 2E23-1 (inverted), all 1, all 0, alternate, 1100, 3 IN 24, 1 IN 16, 1 IN 8, 1 IN 4, User programmable 1/2/3
	BERT Display Format
	• Error counting, Alarm counting, ITU G.821, ITU G.826 • M.2100, Histogram
	BERT Transmission Error Rate
	• Insert one forced error • Fixed error rate of 10-3~10-7
	Quality Analysis
	• Receiving seconds, Error seconds, Alarm seconds • Error Free seconds, Error rate, Valid seconds • Severely error seconds, G.821 error seconds • G.826 error seconds, Unavailable seconds
	Data Port BERT Test
	• Data rate of the multiple of 64Kbps: N*64Kbps (N=1~36)
Indications	LEDs (DTE, DCE, DATA PORT, TD, RD, DCD, RTS, CTS, DTR, DSR, TC, RC XTC)
Power Input	AC100 ~ 240V Adapter to DC 9V 2A
Dimensions	179 x 134 x 68 mm (D x W x H)
Weight	0.8kg
Temperature	0 ~ 50°C (Operating), -10 ~ 70°C (Storage)
Humidity	10 ~ 90% non-condensing
MTBF	35,000 hrs





Ordering Information

Model Name	Description
HCT-BERT/C	E1 / Datacom analyzer

Specifications & design are subject to change without prior notice. Please visit CTC Union website for more details.

HCT-7000

Dual Port E1/Datacom Protocol Analyzer and BERT

The HCT-7000, our flagship tester, is a portable, battery powered E1 and data communication tester, designed for a wide range of protocol analysis and BERT (Bit Error Rate Test) at full E1 speeds (2.048Mbps) and is fully suitable for equipment installations, on-line or off-line diagnostics, debugging, and interface development. The HCT-7000 features a backlit Liquid Crystal Display (LCD), push-button switch keyboard, interface lead indicator LEDs, user replaceable data port interface modules and internal rechargeable Li-Ion battery. The unit includes the Basic Interfaces, basic operational firmware, comprehensive User Guide, universal AC power adapter (100~240 VAC) and a sturdy hard shell carry case.

Features

- E1, Datacom, Protocol Analyzer and BERT
- Protocols: Frame Relay, SS#7, X.25, PPP (Sync.), V5.1. V5.2, ISDN-D, Sync (BSC), HDLC, SDLC, Async
- Dual pluggable interface ports with available modules:
- Datacom Module: RS-232C/D (V.24), RS-449 (V.36), RS-530, X.21, V.35, E1 Module: G.703 E1 (2048K)
- Supports Centronics printer & control serial port.
- LCD Display: 320x240 graphic (30 lines x 40 characters), with backlight
- Auto Configuration
- Menu driven setup
- ASYNC terminal Emulation
- File Management
- Self Tests and Diagnostics
- Display Modes: Full /Half Duplex Data, Frame / Packet and Lead Status
- Error Check: None, Parity, LRC, CRC-16, CRC-CCITT
- Capture Buffer: SDRAM
- Line Monitor: DTE; DCE; DTE & DCE
- Emulation: DTE; DCE; MONITOR only
- Counters & Timers: 5 each internal counters and timers
- MUX/DEMUX BERT (E1 & Datacom BERT)

Specifications

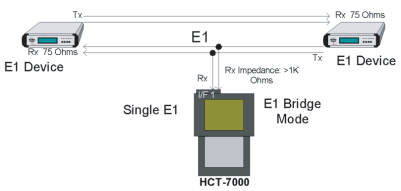
Ports	Data Rate	Async (50 ~ 256Kbps); Sync (150 ~ 2048Kbps)
	Data Code	ASCII, EBCDIC, HEX, IPARS, Transcode, EBCD
	Data Length	ASYNC Mode: 5,6,7, or 8 bits SYNC Mode: 8 bits
	Parity Bit	ASYNC Mode:None, Odd, Even, Mark, Space
	Stop Bits	ASYNC Mode: 1, 2
	E1 I/F Module	Signal Present, HDB3, Signal Loss, FAS Loss, AIS, RAI, MRAI, MFAS Loss, CAS Loss, Pattern Loss, Excess Zero, Error

Indications	System	External power, I/F 1 Error, I/F 2 Error, Paused
	Datacom I/F Module	TD, RD, RTS, CTS, DSR, DTR, DCD, RI, XTC, TC, RC, RL, LL, TM
Power Input	AC100~240V adapter to DC 19V/2.9A	
Dimensions	220 x 275 x 65mm (D x W x H)	
Weight	2.5 Kg	
Temperature	0 ~ 50°C (Operating), -10 ~ 70°C (Storage)	
Humidity	10 ~ 90% non-condensing	
Certification	CE, FCC	
MTBF	35,000 hrs	

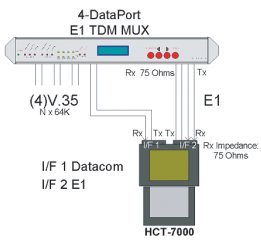
Product Overview (Misc.)

Product Overview (Connectors)

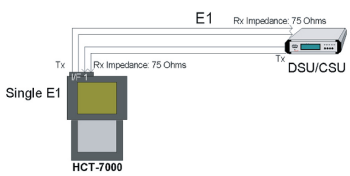
E1 Bridge Mode



MUX feature - E1 BERT & Datacom BERT



E1 Terminal Mode



Surge Protector Series

PoE Surge Protector
Ethernet Surge Protector
Phone line, E1/V35

SP-POE-01

Power Over Ethernet 1-Port Surge Protector

The SP-POE-01 is a single port, Ethernet surge protector designed to protect all 8 lines used in a standard CAT5e cable. The product is compatible with 10/100Base-T(X) networks and 48V Power-over-Ethernet systems. The Standard 802.11af allows the methods of implementing PoE: The SP-POE-01 applies data to the pairs (pins 1/2 and pins 3/6) and power to the unused pairs (pins 4/5 and pins 7/8). The SP-POE-01 offered protection is provided on all 8 Ethernet pins (6.8V clamping on Data pins 1,2,3,6 and 53V clamping on POE pins 4,5,7,8). Network connections are made via standard female RJ45 connectors. Grounding is accomplished via a ground wire.

Features

- 10/100Mbps data rate
- Compatible with 48V power over Ethernet systems
- 6.8V Data / 53V PoE clamping voltage
- 5KA surge discharge current
- CAT5 and CAT5e compatible. All 8 pins protected.
- Integral mounting feet and separate ground wire (SP-POE-16, SP-POE-24)
- Shielded RJ45 jacks and metal enclosure for EMI noise suppression

Specifications

Voltage	Data 5V ; PoE 48V
Clamping Voltage	6.8V Data (Pins 1,2,3,6) 53V PoE (Pins 4,5,7,8)
Max Surge Discharge Current	5KA (8/20uS)
Peak Pulse Current	100A (10/1000uS)
Pins Protected	Data : 1, 2, 3, 6 PoE : 4, 5, 7, 8
Insulation Lost	< 0.5dB (10Mbps)
Data Rate	10/100 Mbps

Response Time	line/line <1 ns; line/ground < 100ns
Operating Temperature	-20 ~ +75°C
Storage Temperature	-40 ~ +85°C
Operating Humidity	0% ~ 95% non condensing
Dimensions (D x W x H)	38 x 106 x 26 mm (1-port) 73 x 143 x 44 mm (8-port) 73 x 483 x 44 mm (16/24-port)
Weight	75 g (1-port), 435g (8-porte), 1.4kg (16/24-port)

Ordering Information

Model Name	Description
SP-POE-01	1-port RJ45 10/100Base-TX PoE Ethernet Surge Protector (Data: 1,2,3,6. PoE: 4,5,7,8)
SP-POE-24	24-port RJ45 10/100Base-TX PoE Ethernet Surge Protector (Data: 1,2,3,6. PoE: 4,5,7,8)

SP – POE –□□
Example: SP – POE – 01

SP-GPOE-01

Single Port, Gigabit Ethernet PoE Surge Protector

The SP-GPOE-01 is a single port, Gigabit Ethernet PoE surge protector designed to protect all 8 lines used in a standard CAT5e cable. The product is compatible with 1000Base-T networks and 48V Power-over-Ethernet systems. The Standard 802.11af allows the methods of implementing PoE: The SP-GPOE-01 applies data to the pairs (pins 1/2 and pins 3/6) and power to the unused pairs (pins 4/5 and pins 7/8). The SP-GPOE-01 offers protection is provided on all 8 Ethernet pins (6.8V clamping on Data pins 1,2,3,6 and 53V clamping on POE pins 4,5,7,8). Network connections are made via standard female RJ45 connectors. Grounding is accomplished via a ground wire.

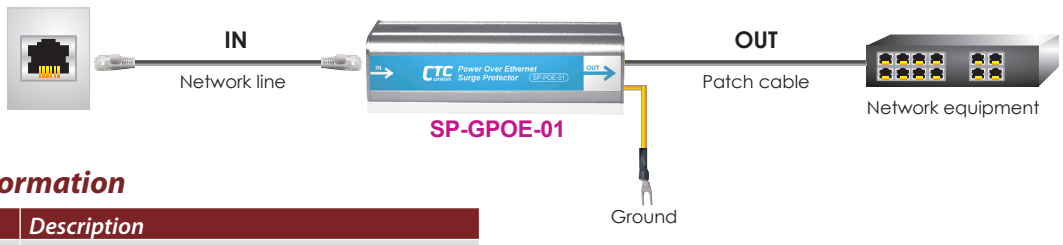
Features

- 1000Mbps data rate
- Compatible with 48V power over Ethernet systems
- 63V PoE clamping voltage
- 1.5KA surge discharge current
- CAT5 and CAT5e compatible. All 8 pins protected.
- Integral mounting feet and separate ground wire
- Shielded RJ45 jacks and metal enclosure for EMI noise suppression

Specifications

Operating Voltage	UN	63V
Max. continuous operating voltage peak current line to line (8/20us)	Imax	1.5KA
Max. continuous operating voltage peak current line to ground (8/20us)	Imax	1.5KA
Voltage protection level (line to line)	UP	≤ 120V
Voltage protection level (line to ground)	UP	≤ 120V

Insertion Loss	< 0.5dB
Data rate	1000Mbps
NM Surge response time	≤ 1ns
Connector	RJ45
Data lines protected	1-8
Operating Temperature	-40 ~ 80°C
Dimensions	38 x 106 x 26mm (D x W x H)



Ordering Information

Model Name	Description
SP-GPOE-01	Single Port, 1000Base-T GE PoE Surge Protector

SP-GE-01

Gigabit Ethernet 1-Port Surge Protector

The SP-GE-01 Series is designed to work on Category 5e Gigabit Ethernet (GE) transmission lines as well as Category 6 applications. They are ideal to protect expensive equipment against surges and transients entering a building on exposed transmission lines. Available in both Single unit and Rack mountable surge protectors with female to female RJ-45 connectors.

Features

- Ethernet 10/100/1000Base-T Data line protection
- Exceeds CAT 5 & 6 Transmission Values
- Fast energy absorption when over-voltage occurs
- Low series resistance and minimal capacitance values to preserve the data information

Specifications

Operating Voltage	Un 5V
Max. continuous operating voltage	Uc 6V
Peak Current Normal Mode (line to ground, 8 /20uS)	In 2.5KA
Peak Current Common Mode (line to line, 8/20uS)	In 300A
Voltage protection level (line to ground,10/700uS)	Up <=500V
Voltage protection level (line to line,10/700uS)	Up <=30V
NM Surge Response Time (ns)	tA <1ns

Transmission Speeds	Vs 10/100/1000Mbps
Bandwidth / Insertion Loss	fG 250Mhz ; Ae < 0.5dB
Connector / Data Lines Protected	RJ45 ; 8
Operating Temperature	-40 ~ 80°C degree
Dimensions	38 x 106 x 38 mm (1-port) 73 x 148 x 44 mm (8-port) 73 x 480 x 44 mm (16/24-port)
Weight	75g (1-port); 0.44kg (8-port); 1.4kg (16/24-port)
Certification	IEC 61644-1

Ordering Information

Model Name	Description
SP-GE-01	1-port RJ45 10/100/1000Base-T Ethernet Surge Protector (pin 1,2,3,4,5,6,7,8)
SP-GE-24	24-Port RJ45 10/100/1000Base-T Ethernet Surge Protector (pin 1,2,3,4,5,6,7,8)

SP – GE –□□
Example: SP – GE – 01

SP-ETH-01

Fast Ethernet Surge Protector

A surge protector is an appliance designed to protect electrical devices from voltage spikes. A surge protector attempts to regulate the voltage supplied to an electric device by either blocking or by shorting to ground voltages above a safe threshold. The SP-ETH-01 will ensure the reliable operation of RJ-45 twisted pair based networking equipment running Ethernet. Single unit and rack mountable surge protectors are both available.

Features

- Ethernet 10/100Base-TX Data line protection
- Fast energy absorption when over-voltage occurs
- Low series resistance and minimal capacitance values to preserve the data information

Specifications

Un	5V
Uc	6.8V
Isn(discharge current)	2.5KA
Imax	5KA
Ures	< 30V
tA (Response time)	< 1ns
Protected Cores	SP-ETH-08: 8 pins SP-ETH-01-8: 8 pins SP-ETH-16: 8 pins SP-ETH-01-4: 4 pins SP-ETH-24: 8 pins

Attenuation in dB	< 0.5dB (100MHz)
Capacitance	< 40pF
Dimensions	38 x 106 x 38 mm (1-port) 73 x 143 x 44 mm (8-port) 73 x 480 x 44 mm (16/24-port)
Weight	75g (1-port) ; 440g (8-port) ; 1.38kg (16-port) ; 1.40kg (24-port)
Certification	IEC 61644-1

Ordering Information

Model Name	Description
SP-ETH-01-4	1-port RJ45 10/100Base-TX Ethernet Surge Protector (pin 1,2,3,6)
SP-ETH-01-8	1-port RJ45 10/100Base-TX Ethernet Surge Protector (pin 1,2,3,4,5,6,7,8)
SP-ETH-08	8-Port RJ45 10/100Base-TX Ethernet Surge Protector (pin 1,2,3,4,5,6,7,8)
SP-ETH-16	16-Port RJ45 10/100Base-TX Ethernet Surge Protector (pin 1,2,3,4,5,6,7,8)
SP-ETH-24	24-Port RJ45 10/100Base-TX Ethernet Surge Protector (pin 1,2,3,4,5,6,7,8)

Port Number
SP – ETH –□□–□
Example: SP – ETH – 01– 4

TSP-10

Phone Line Surge Protector

A surge protector is an appliance designed to protect electrical devices from voltage spikes. A surge protector attempts to regulate the voltage supplied to an electric device by either blocking or by shorting to ground voltages above a safe threshold. The TSP-10 will ensure the reliable operation of POTS based equipment such as telephones, FAX machines and dialup modems.

- rotect FAX and dialup modems from surges on telephone lines
- Control transient over voltage to a low level to ensure maximum protection for your equipment
- LED indicator flashes for ring indication and lights during device off-look operation

Specifications

Surge current	8 x 20u sec of 500A
DC spark over voltage	160 ~ 240VDC
Dimensions	80 x 30 x 27mm (D x W x H)
Weight	20g
Compliance	UL 1449 (2nd Edition)

Ordering Information

Model Name	Description
TSP-10	In Line Telephone Surge Protector with RJ-11 Jacks

SP-SE-B01

E1 Surge Protector

A surge protector is an appliance designed to protect electrical devices from voltage spikes. A surge protector attempts to regulate the voltage supplied to an electric device by either blocking or by shorting to ground voltages above a safe threshold. The SP-SE-B01 will ensure the reliable operation of coaxial based networking equipment running ArcNet, Satellite/CCTV and 75 ohm E1 communication systems.

- Protect E1 Access Units using coaxial cable from transient surge voltages
- Compact in-line installation
- Low shunt capacitance to reduce signal loss
- Maximum system up time
- State of the art, avalanche diode technology

Specifications

Type	SP-SE-B01
Connection	BNC
Un	10V
U-max	18V
Discharge current	10KA
Response time	< 10ns
Insertion loss (40MHz)	0.5dB
Dimensions	38 x 68 x 27mm (D x W x H)
Weight	70g
Compliance	IEC 61644-1, draft 98

Ordering Information

Model Name	Description
SP-SE-B01	75 ohm, BNC, 1 port Coax cable surge protector

SP-V35-01

V.35 Surge Protector

The SP-V35-01, V.35 Data Line Surge protector, prevents damage to V.35 data ports and data errors due to electrical surges. These surges originate from a wide variety of sources, including lightning strikes, static charge buildup, electric motors, fluorescent lights or the normal AC power protection equipment. Data line transients can be damaging to V.35 hardware. The surge protector intercepts harmful data line transients and diverts them safely to chassis ground through a grounding wire. The SP-V35-S01 plugs directly into an M/34 data port. All standard data, clocking and control signals on the ITU-T V.35 interface are protected. The SP-V35-S01 uses sophisticated circuits, which allow the unit to operate at the data rates up to 10 Mbps. The SP-V35-S01 can take repeated surge "hits" without degrading in performance or letting harmful energy through to the data port.

- Standard V.35 data Lines on the M/34 cable adapter
- Data Rates up to 10 Mbps
- Plugs Directly into V.35 Port (One Male, One Female M/34 cable adapter)
- Diverts Harmful Transients to Chassis Ground through Braided Metal Strap
- Able to take Repeated Surges without Degrading in Performance
- Prevents equipment in case of a Severe Surge
- Surge Handling Capacity of 1,500 Watts

Specifications

Interface	V.35
Maximum Data Rate	10 Mbps
Connectors	• 34-pin M-block male • 34-Pin M-block female
Leads/Signals Protected	All V.35 leads/signals
Capacitance	< 40pF
Maximum Surge Protection	(Current, 8 x 20 µs at Standard Clamp Voltage) 370 amps
Standard Clamp Voltage	30 volts
Series Resistance	None
Temperature	- 40 ~ 85°C
Humidity	10 ~ 90% relative, non-condensing
Dimensions	120 x 52 x 30 mm (D x W x H) plus 50 cm of cable (fully extended) on either side for a total length 70 cm
Weigh	300g

Ordering Information

Model Name	Description
SP-V35-01	V35 Data line surge protector

Balun

Modular Design
Rack Mountable

G.703 Balun Patch Panel
G.703 Krone IDC Balun

G.703 BNC/RJ45
Coax to Twisted Pair

BP20-CH

24-Port BNC to RJ45 E1 Balun Chassis

The ITU-T G.703 balun panel matches multiple sets of dual 75 ohm coax connections to multiple 120 ohm twisted pair connections, supporting data stream rates of 2-8 Mbps for E1 and E2. The patch panel bi-directionally matches not only signal impedance, but also the pulse shapes of the signals according to the ITU-T G.703 standard. The modular construction allows up to 24 separate G.703 BALUN Modules in a 19" rack mountable chassis. This modular design provides a cost-effective solution and can be purchased in separate components.

Features

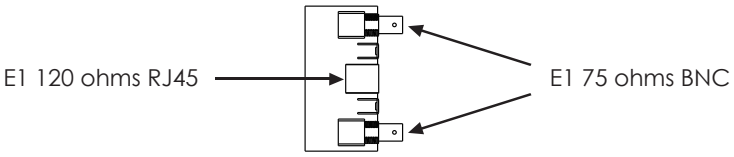
- Connects 75 ohm dual coax to 120 ohm twisted pair
- Mounts in standard 19" Rack
- No AC power or batteries needed
- Link-to data isolation: Mini. 250V
- Bi-directional signal conversion
- Operating temperature 0°C ~ 75°C
- Typical distance: 180m via Cat.5e cable

Specifications

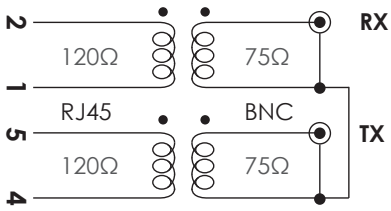
Data Rate	2 to 8Mbit/s speed version for E1, E2 data streams
Impedance	75 ohm to 120 ohm
Insertion loss	Max 0.3dB (2Mbps); Max 0.5dB (8Mbps)
Return loss	75 ohm -47.5dB (2Mbps); -37.9dB (8Mbps) 120ohm -43.5dB (2Mbps); -34.5dB (8Mbps)
Dimension	483 x 88 x 46.2mm (D x W x H)
Weight	2.3kg

24-Port G703 patch panel

G.703 BALUN Modules



G.703 BALUN Pin Assignment



Ordering Information

Model Name	*Description*
BP20-CH	2U, 19" 24 ports G703 balun patch panel chassis fixed type G703 balun module not included
BP20-M01	1-port fixed type G703 Balun module female BNC to UTP RJ45 on the same side

BP20 –□□
Example: BP20 – CH

BLN-3010, BLN-4010
BLN-5010, BLN-6010

G.703 TDC Balan

A balun is a type of electrical transformer that can convert electrical signals that are balanced to signals that are unbalanced and vice versa. They are also used to change impedance of twisted pair's 120 ohm to coaxial's 75 ohm. An E1 balun's function is generally to convert an E1 carrier signal from coaxial cable to UTP CAT-5 cable. The BLN4010 is miniature Balun designed for applications where space is restricted due to small dimensions or high densities. The fully shielded design is intended for panel mounting and IDC twisted pair termination is available in either standard BNC or 1.6/5.6 jack unbalanced connectors.

Features

- Converts between 75 (coax)/120 (twisted pair) for E1 (2048 kbps)
- Works in either direction
- Body parts plated with minimum 5u Ni(Nickel)
- Contacts plated with minimum 1.25u Ni(Nickel) and 1.25uAu(Gold)
- Coax connectors with BeCu spring contacts and Teflon insulators
- Coaxial connector insertion cycle > 500
- IDC contacts Phosphor Bronze
- IDC connect/disconnect cycle > 20
- IDC to suit 24.26.28 AWG Copper wire
- Integrated cable anchor allows cable to be inserted after termination on IDC

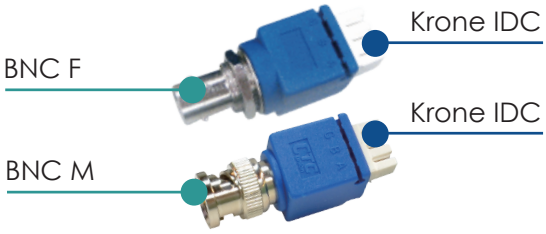
Specifications

Data rate	2048Kbps
Unbalanced interface	75 ohm impedance, 1xBNC or 1x 1.6/5.6 Jack
Balanced interface	120 ohm impedance, IDC

Dimensions	17 x 16 x 48 mm (D x W x H)
Weight	15g
Compliance	ITU G.703 standard pulse

BLN-3010 : 1.6 / 5.6 Jack to Krone IDC

BLN-5010 : BT43 to Krone IDC



BLN-4010F : BNC F to Krone IDC
BLN-4010M : BNC M to Krone IDC

BLN-6010 : SMZ to Krone IDC

Ordering Information

Model Name	*Description*
BLN-3010	75 ~ 120 ohm Balun, 1.6/5.6 Jack to Krone IDC IDC Pin Assignment PA(-), PB(+), PG(G)
BLN-4010F	75 ~ 120 ohm Balun, BNC/F to Krone IDC IDC Pin Assignment PA(-), PB(+), PG(G)
BLN-4010M	75 ~ 120 ohm Balun, BNC/M to Krone IDC IDC Pin Assignment PA(-), PB(+), PG(G)
BLN-5010	75 ~ 120 ohm Balun, BT43 to Krone IDC IDC Pin Assignment PA(-), PB(+), PG(G)
BLN-6010	75 ~ 120 ohm Balun, SMZ to Krone IDC IDC Pin Assignment PA(-), PB(+), PG(G)

BLN –□□□□
Example: BLN – 3010

Balun-P/S
Balun-B1/B2

G.703 Coax to Twisted Pair

A balun is a type of electrical transformer that can convert electrical signals that are balanced to signals that are unbalanced and vice versa. They are also used to change impedance of twisted pair's 120 ohm to coaxial's 75 ohm. An E1 balun's function is generally to convert an E1 carrier signal from coaxial cable to UTP CAT-5 cable.

Features

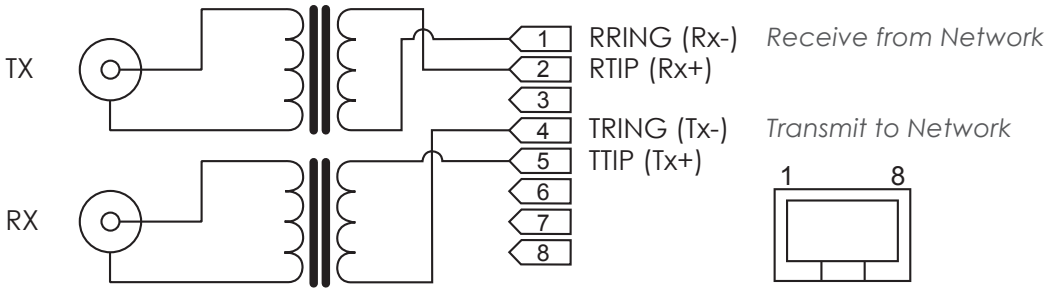
- Converts between 75 ohm coax and 120 ohm twisted pair for E1 (2048Kbps)
- Easy to install
- No power required
- Small, light-weight Balun
- Works in either direction
- Works for balanced and unbalanced E1

Specifications

Data rate	2048Kbps
Unbalanced interface	75 ohm impedance, 2xBNC
Balanced interface	120 ohm impedance, 1xRJ-45
Dimensions	Balun-B2/S , Balun-B2/S-2 54 x 44 x 25 mm (W x D x H)
	Balun-B1 56 x 22 x 21mm (D x W x H)
	Balun-P/S, Balun-P/S-2 22 x 224 x 21mm (W x D x H)

Weight	Balun-B2/S , Balun-B2/S-2	35g
	Balun-B1	65g
	Balun-P/S , Balun-P/S-2	45g
Compliance	ITU G.703 standard pulse	

BNC 75 ohm **RJ-45 120 ohm**



Ordering Information

Model Name	*Description*
Balun-P/S	Two BNC pigtail type RJ45 Shielded - 2xBNC/M with 6" pigtail RJ45 PIN ASSIGNMENT: P1(+) / P2(-) , P4(+) / P5(-)
Balun-B1/S	One BNC box type RJ45 Shielded - 1xBNC/M RJ45 PIN ASSIGNMENT: P4(+) / P5(-)
Balun-B2/S	Two BNC box type RJ45 Shielded - 2xBNC/F RJ45 PIN ASSIGNMENT: P1(+) / P2(-) , P4(+) / P5(-)

Balun –☐/☐
Example: Balun – P/S

MEMOS

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Printed 1/2014 V1.0