CTC union ®

2013
PRODUCT CATALOG

Looking for Fiber Network Solutions ?

10G Ethernet Converter
10G 3R Transponder
L2 Ethernet Access Switch
Metro Ethernet & **FTTx**

Industrial Fiber
High Power **PoE** Switch
CWDM & DWDM Transponder

RoHS Compliance

MEF
METRO ETHERNET FORUM
MEMBER

ISO 9001   ISO 14001

www.ctcu.com

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

Table of Contents 2013

Chapter 1 Fiber Series

Multi-Service Platform

Table of Contents 2013

Chapter 1 Fiber Series

Table of Contents 2013

Table of Contents 2013

Chapter 4 TDM Series

Chapter 5 Testers

Chapter 6 Surge Protectors

Table of Contents 2013

Chapter 7 Management

Chapter 8 Baluns

Chapter 9 Video Access Systems

Fiber Network Transmission Solutions

Multi-Service

High Speed Data Transmission

Easy Deployment

Router

Ethernet over PDH

SCADA

Ethernet
E1
P2P FOM

PABX

FXO/FXS

POTS over Fiber

E1
V35
Ethernet

Fiber Modem

FRM220-CH20 & FRM220-CH08

CPE

Ethernet Access

Router

10G 3R Transponder

10G/4G/2.7G

MUX/DEMUX
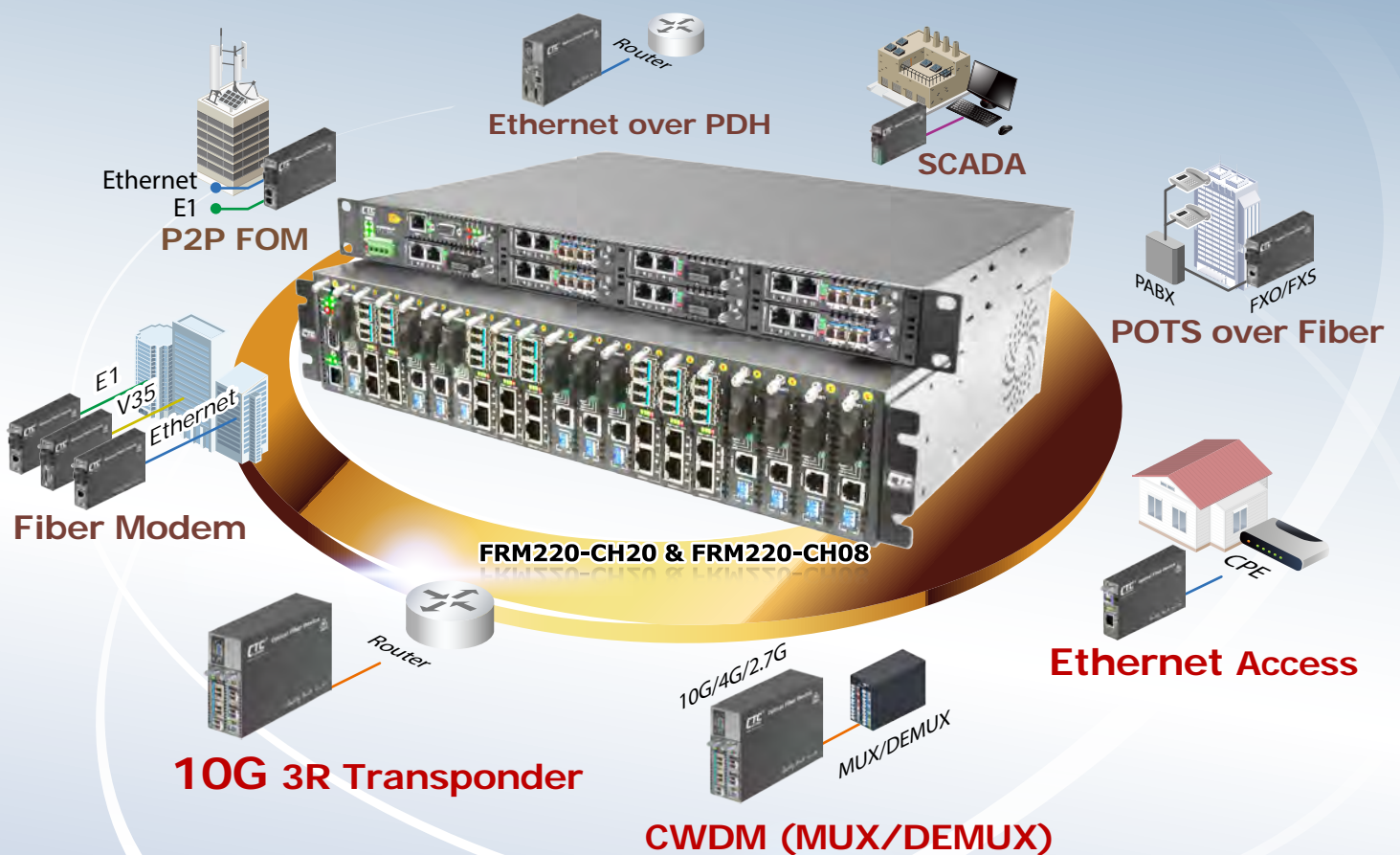
CWDM (MUX/DEMUX)

:: **Multi-Service Platform**

:: **Fiber Optical Multiplexer**

:: **10G 3R Transponder**

:: **10G Ethernet Converter**

:: **FTTX**

:: **L2 Ethernet Access Switch**

:: **CWDM/DWDM**
(Transponder /Mux/Demux/OADM)

FRM220-CH20
In-Band Managed Multi-Service Platform

FRM220A-CH20
Ethernet Aggregation Platform

The FRM220-CH20 or FRM220A-CH20 is a 2U high 19" Rack, 20-Slot modular media converter chassis with redundant power and all hot swappable design. It provides an economic solution in high density fiber converter installations in enterprises or central offices. Particularly, FRM220A chassis supports uplink Gigabyte Ethernet switch, for efficient scalability and easy deployment in access networks. All critical components, Power, fans, management module and interface cards are hot swappable, allowing online field replacement. The chassis also has a pair of alarm relays and is able to stack up to 10 chassis as one management IP address. A number of cards are available that support different protocols including Ethernet, Voice, Data, transponders, FOM and IMUX.

FRM220 Cards for Deployment Scenarios

The FRM220 series is positioned as a multi-service platform. All of the interface cards can be categorized in eight deployment scenarios to easily understand and select.

Module Cards for Deployment Scenarios

FIBER　Phone
E1　Serial
V35
Ethernet

CWDM (MUX/DEMUX)
- FRM220-MD40 WA/WB
- FRM220-MD80 WA/WB
- FRM220-MD40, FRM220-MD80
- FRM220-MX210

SCADA
- FRM220-Serial

Ethernet over PDH
- FRM220A-Eoe-1
- FRM220A-iMUX 5 (5 E1)
- FRM220A-iMUX 8 (8 E1)
- FRM220A-iMUX 16 (16 E1)

FRM220-CH20 & FRM220A-CH20

Ethernet Access
- FRM220-10GE-TX
- FRM220-10GE-TS
- FRM220-100M
- FRM220-1000MS
- FRM220-1000M
- FRM220A-1002ES
- FRM220A-1000EAS/X
- FRM220A-FSW103
- FRM220-1000EAS/X-1

10G 3R Transponder
- FRM220-10G/4G/2.7G
- FRM220-1000DS

P2P FOM
- FRM220-FOM01
- FRM220-FOM04

FIBER Modem
- FRM220-E1/T1
- FRM220-ET100
- FRM220-DATA
- FRM220-DS3/E3

POTS over Fiber
- FRM220-FXO/FXS

Features

- 2U 19" 20-slot Chassis with AC/DC power redundancy
- Chassis backplane consists of passive components
- All modules and cards support hot-swapping
- Chassis supports uplink Gigabit Ethernet switch 4-port 10/100/1000Base-T + 4-port 1000Base-X SFP trunk card (FRM220A-CH20 only)

- E1 Inverse Multiplexers are supported by Gigabit Switch
- Two alarm relays
- Chassis cascade up to 10 with one IP management (FRM220-CH20 only)

Specifications

Connectors	Console RS232(DB9)	
	LAN 10/100 Base TX RJ45	
Physical Specifications	Dimensions	438 x 303 x 88mm(W x D x H)
	Weight	5.2kg w/o power supply
Power Characteristics	AC	100 ~ 240VAC
	DC24	18 ~ 36VDC
	DC48	36 ~ 75VDC

Temperature	Operating 0 ~ 60℃
	Storage -10 ~ 70℃
humidity	5% ~ 90% non-condensing
Predicted MTBF	65,000 hrs
Certification	FCC class A, VCCI class A, CE, RoHS

Chassis Overview

FRM220-CH20

Two Alarm Relays

Chassis cascade up to 10 with one IP management

FRM220-CH20 Chassis Cascade

ID=0 Master Chassis | clockwise | ID=1~9 Slave Chassis

FRM220-NMC

Master

Slave1

UTP cable

Slave9

Thermal Fan (Hot swappable)

Single or optional redundant power supplies

Thermal Fan (Hot swappable)

FRM220A-CH20

Two Alarm Relays

Thermal Fan (Hot swappable)

Single or optional redundant power supplies

Thermal Fan (Hot swappable)

FRM220A-GSW/SNMP
Gigabit Ethernet Aggregation Switch Card

Main Features

Power Redundancy

Both chassis power supplies are hot swappable and modular. Installing two into a chassis provides redundancy should a single power supply fail. A fully loaded chassis can run continuously with only one power module fitted into the chassis.

Cooling Fan

To further increase system reliability, the FRM220-CH20 or FRM220A-CH20 chassis is fitted with two hot swappable fan modules. Both fan modules can be easily removed from the rear of the chassis, without interruption to the operation of the line cards.

Multi-Protocol Support *(FRM220-CH20 only)*

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 only)*

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

Network Management *(FRM220-CH20 only)*

The FRM220-CH20 chassis provides an NMC (Network Management Controller) 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 configure and monitor the status of a remote blade.

Gigabit Ethernet Switch with Network Management *(FRM220A-CH20 only)*

The FRM220A-CH20 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/IP Management function.

FRM220 & FRM220A Application Diagram

FRM220-NMC inserts in FRM220-CH20 Chassis

FRM220A-GSW/SNMP Ethernet Switch card inserts in FRM220A-CH20 Chassis
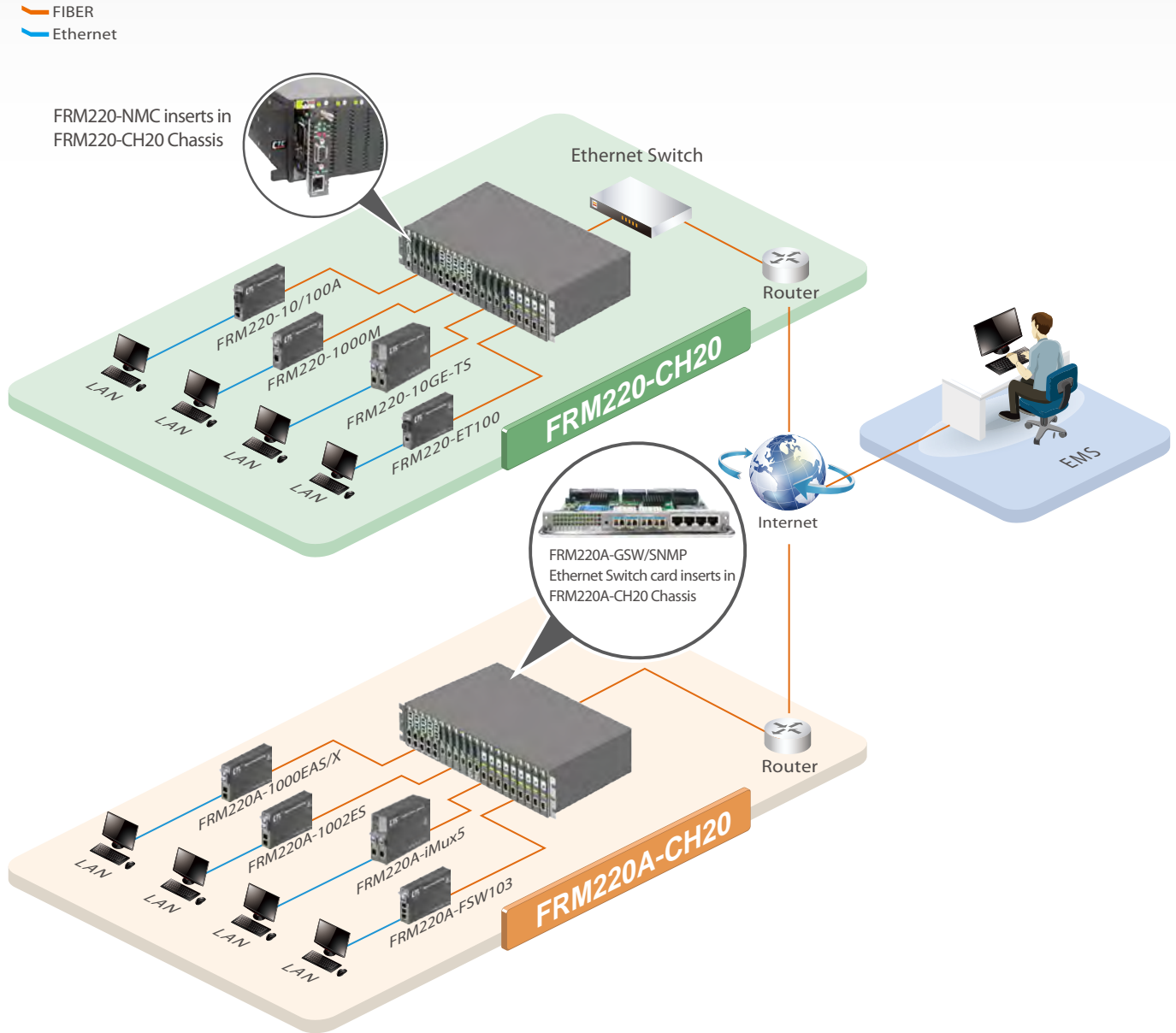
Comparison Table

Chassis Type	Slot	Power Type	NMC	Ethernet Aggregation Card	Chassis Cascade
FRM220-CH20	20	AC, DC, AD, AA, DD	✓		✓
FRM220A-CH20	20	AC, DC, AD, AA, DD		✓	
FRM220-CH08	8	AC, DC, AD, AA, DD	✓		

Note: AC: AC Power   DC: DC Power   AD: AC+DC Power   AA: AC+AC Power   DD: DC+DC Power

Ordering Information

Model Name	Type	Description
FRM220-CH20	Chassis	2U 20-Slot rack mount chassis with 20 line card blank plate
FRM220A-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

Chassis

FRM220 – ☐☐☐☐

Example: FRM220 – CH20

FRM220 – ☐☐

Example: FRM220 – AC

FRM220-CH08

In-Band Managed
Multi-Service Platform

The FRM220-CH08 is a 1U high 19" Rack, 8-slot modular media converter rack. It provides an economic solution for fiber converter installations in enterprises or central offices. All critical components, power, management module and interface cards are hot swappable, allowing online field replacement. The hot-swappable power modules can be chosen from AC100-240V, DC18-36. or DC 36-75V. The chassis also has alarm relays. Management is supported by installing an NMC card into slot#1. A number of cards are available that support different protocols including Ethernet, Voice, Data, transponders, FOM and IMUX.

Features

- 1U 19" 8-slot Chassis with AC/DC power redundancy
- Chassis backplane consists of passive components
- All modules and cards support hot-swapping
- Two alarm relays

Specifications

Connectors	Console RS232(DB9)
	LAN 10/100 Base TX RJ45
Physical Specifications	Dimensions 440 x 310 x 44mm (W x D x H)
	Weight 3.5kg w/o power supply
Environmental Specifications	Operating 0 ~ 60℃
	Storage -10 ~ 70℃

	Relative humidity 5% ~ 90% non-condensing
	Predicted MTBF : 65,000 hrs
Power Characteristics	AC	100 ~ 240VAC ,150W
	DC24	18 ~ 36VDC
	DC48	36 ~ 75VDC, 150W
Certification	FCC class A, VCCI class A, CE, RoHS

Power Redundancy

The two FRM220-CH08 chassis power supplies are hot swappable and modular. Installing two into a chassis provides redundancy should a single power supply fail. A fully loaded chassis can run continuously with only one power module fitted into the chassis.

Cooling Fan

To further increase system reliability, the FRM220-CH08 chassis is fitted with two fixed fans on each power unit. The fans rotate speed status can be shown through NMC management.

Network Management

The FRM220-CH08 chassis requires an NMC (Network Management Controller) 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 configure and monitor the status of a remote CPE.

Protocol Support

The FRM220-CH08 chassis 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/RS530, Serial RS485/422, Voice FXO/FXS, Repeater, Fiber Multiplexer, E1 Inverse Multiplexer and 10G, 2.7G Transponders.

Chassis Overview

(Front) SNMP
Alarm relay

(Rear) Cooling Fans
Hot Swappable Power Supplies
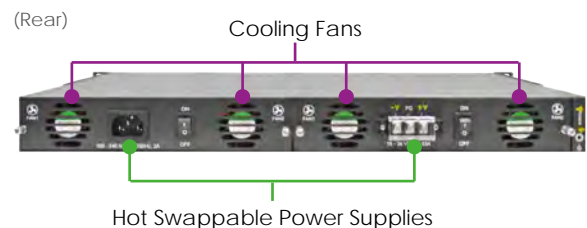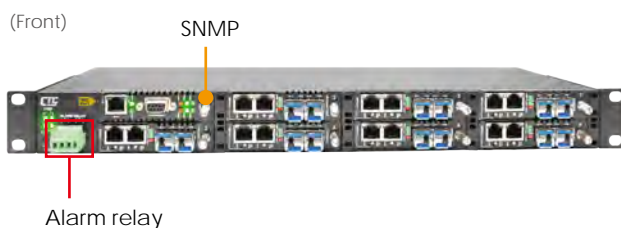
Ordering Information

Model Name	Type	Description
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-AD48	Power	Chassis power module 36 ~ 72 VDC module, 3 pin terminal block

Chassis
FRM220 – ☐☐☐☐
Example: FRM220 – CH08

Power Type
FRM220 – **CH08** – ☐☐☐☐
Example: FRM220 – CH08 – DC24

FRM220 Slide-in Card Chassis

The FRM220 Chassis 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, 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 can be installed with either one or two single width blade cards or one double width blade card. The FRM220-CH02/NMC available power options are built-in AC, DC or AC+DC redundant power.

FRM220 One Slot Chassis
FRM220-CH01

FRM220-CH01 (w/External adapter)   FRM220-CH01 (Power built-in)
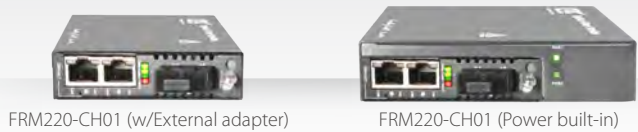
Features

- One slot chassis for FRM220 Single width blade line cards.
- Available in six types: external power adapter or power built-in AC, DC, AC+DC, AC+AC or DC+DC
- Fanless
- AC power 100 ~ 240VAC

Specifications

Power Input (option)	AC power	100 ~ 240VAC
	DC power	18 ~ 72VDC
	External Adapter	Input voltage 100 ~ 240VAC 50/60Hz
	Output voltage	12VDC 1A
Dimensions	External adapter	160 x 88 x 24 mm(D x W x H)
	Internal power	180 x 135 x 35 mm(D x W x H)
Weight	0.5 ~ 0.8 kg	

FRM220 One Slot Chassis with Console Port
FRM220-CH01M

Features

- One slot chassis for FRM220 Single width blade line cards.
- Supports DB9 console port for local management
- Available in three types: power built-in AC,DC,AC+DC
- Fanless

Specifications

Power Input (option)	AC power	100 ~ 240VAC
	DC power	18 ~ 72VDC
Dimensions	201 x 135 x 35mn(D x W x H)	
Weight	0.9 kg	

Comparison Table

Chassis Type	Slot	Power Type	Console Port	Console Fan	NMC
FRM220-CH01	1	DC12, AC, DC, AD, AA, DD			
FRM220A-CH01M	1	AC, DC, AD	✔		
FRM220-CH02	2	DC12			
FRM-CH02/NMC	2	AC, DC, AD		✔	✔
FRM220A-CH02M	2	AC, DC, AD	✔	✔	

Note: DC12: AC Adapter   AC:AC Power   DC: DC Power   AD: AC+DC Power   AA: AC+AC Power   DD: DC+DC Power

1

FRM220 Two-Slot Chassis

FRM220-CH02

Features

- Two-slot chassis for FRM220 line cards.
- Supports either one or two single width blades or one double width blade.
- Power Type: external power adapter
- Fanless

Specifications

Power Input (option)	External Adapter	Input voltage 100 ~ 240VAC 50/60Hz 18 ~ 72VDC
		Output voltage 12VDC 1A
Dimensions	139 x 88 x 44mn(D x W x H)	
weight	0.8 kg	

FRM220 Two-Slot Chassis with Console Port

FRM220-CH02M

Features

- Two-slot chassis for FRM220 line cards.
- Supports backplane connection between two slots
- Supports DB9 console port for local management
- Supports either one or two single width blades or one double width blade.
- Available in three types: power built-in AC, DC, AC+DC
- Cooling Fan

Specifications

Power Input (option)	AC power	100 ~ 240VAC
	DC power	18 ~ 72VDC
Dimensions	220 x 168 x 45mn(D x W x H)	
Weight	1.3 kg	

FRM220 SNMP Manageable Two-Slot Chassis

FRM220-CH02/NMC

Features

- Two-slot chassis for FRM220 line cards.
- Supports backplane connection between two slots
- Telnet, Web, Console, SNMP manageable via NMC card (not included)
- Supports either one or two single width blades or one double width blade.
- Available in three types: power built-in AC, DC, AC+DC
- Cooling Fan

Specifications

Power Input (option)	AC power	100 ~ 240VAC
	DC power	18 ~ 72VDC
Dimensions	220 x 168 x 45mn(D x W x H)	
Weight	1 kg	

Ordering Information

Model Name	Description
FRM220-CH01	1 Slot Chassis with 100 ~240VAC to 12VDC adapter
FRM220-CH01-AC	1 Slot Chassis with 100 ~240VAC
FRM220-CH01-DC	1 Slot Chassis with 18 ~75VDC
FRM220-CH01-AD	1 Slot Chassis with 100~240VAC + 18 ~75VDC
FRM220A-CH01M-AC	1 Slot Chassis with console port and 100 ~240VAC
FRM220A-CH01M-DC	1 Slot Chassis with console port and 18 ~75VDC
FRM220A-CH01M-AD	1 Slot Chassis with console port and AC 100~240V + DC 18 ~75V
FRN220-CH02	2 slots Chassis with 100 ~240VAC to 12VDC adapter
FRM220-CH02M-AC	2 slots Chassis with console port and 30W 100 ~240VAC
FRM220-CH02M-DC	2 slots Chassis with console port and 30W 18 ~75VDC
FRM220-CH02M-AD	2 slots Chassis with console port and 30W AC 100~240V + DC 18 ~75V
FRM220-CH02M-2-AC	2 slots Chassis with console port and 12W 100 ~240VAC
FRM220-CH02M-2-DC	2 slots Chassis with console port and 12W 18 ~75VDC
FRM220-CH02M-2-AD	2 slots Chassis with console port and 12W AC 100~240V + DC 18 ~75V
FRM220-CH02/NMC-AC	2 slots Chassis with 100 ~240VAC , optional NMC card
FRM220-CH02/NMC-DC	2 slots Chassis with 18 ~75VDC , optional NMC card
FRM220-CH02/NMC-AD	2 slots Chassis with AC 100~240V + DC 18 ~75V , optional NMC card

FRM220 – ☐☐☐☐

Example: FRM220 – CH01

Chassis Type   Power Type

FRM220A – ☐☐☐☐ – ☐☐

Example: FRM220A – CH01M – DC

Slide-in Card vs Standalone Chassis Compatible Table

Card Name	Product Name	Page	FRM220 - CH20	FRM220A - CH20	CH08	CH02M
FRM220-NMC	Network Management Controller	1-10	✓		✓	
FRM220A-GSW/SNMP	Gigabit Ethernet Aggregate Switch Card	1-11		✓		
FRM220-10G-SXX	10G 3R Transponder SFP+ to XFP Fiber Protection	1-12	✓		✓	✓
FRM220-10G-SS	10G 3R Transponder SFP+ to SFP+	1-13	✓		✓	✓
FRM220-4G-2S	4G Multi-Rate 2R Transponder SFP to SFP	1-14	✓		✓	✓
FRM220-4G-3S	4G Multi-Rate 2R Transponder SFP to SFP Fiber Protection	1-15	✓		✓	✓
FRM220-2.7G-2S	2.7G Multi-Rate 3R Transponder SFP to SFP	1-16	✓		✓	✓
FRM220-2.7G-3S	2.7G Multi-Rate 3R Transponder SFP to SFP Fiber Protection	1-17	✓		✓	✓
FRM220-1000DS	1000Base-X to 1000Base-X SFP media converter	1-18	✓		✓	
FRM220-Protection	1+1 Fiber Optical Protection Switch	1-19	✓		✓	✓
FRM220-MD40	4-Ch CWDM Mux/Demux (1551, 1571, 1591, 1611)nm	1-20	✓		✓	
FRM220-MD80	8-Ch CWDM Mux/Demux (1471 ~ 1611)nm	1-20	✓		✓	
FRM220-MD40 WA/WB	4-Ch single fiber CWDM MUX/DEMUX	1-21	✓		✓	
FRM220-MD80 WA/WB	8-Ch single fiber CWDM MUX/DEMUX	1-21	✓		✓	
FRM220-MX210	2-Port Gigabit Ethernet Multiplexer	1-22	✓		✓	✓
FRM220-10GE-TS	10G Ethernet Converter 10G Base-T to SFP+	1-23	✓		✓	✓
FRM220-10GE-TX	10G Ethernet Converter 10G Base-T to XFP	1-24	✓		✓	✓
FRM220-1000M	10/100/1000Base-T to 1000Base-X SFP Web Smart OAM/IP Managed Converter	1-25	✓		✓	✓
FRM220-1000MS	10/100/1000Base-T to 1000Base-X SFP Web Smart OAM/IP Managed Converter	1-26	✓		✓	✓
FRM220-100M	10/100Base-T(X) to 100Base-FX Web Smart OAM/IP Managed Converter	1-27	✓		✓	✓
FRM220-10/100i	10/100Base-T(X) to 100Base-FX In-band Managed Converter	1-28	✓		✓	✓
FRM220-10/100i-2E	2-Port 10/100Base-T(X) to 100Base-FX Media Converter	1-29			✓	✓
FRM220-1000EAS/X-1	OAM/IP-Based Managed Gigabit Ethernet Media Converter	1-30	✓			
FRM220A-1000EAS/X	2-Port 10/100/1000Base-T + 2-Port 1000Base-X OAM/IP Managed Switch	1-31	✓	✓	✓	✓
FRM220-10/100AS-2	2-Port 10/100Base-T(X) to 2-Port 100Base-FX, OAM/IP Media Converter	1-33	✓		✓	✓
FRM220-10/100iS-2	Dual Channels 10/100Base-T(X) to 100Base-FX SFP Media Converter	1-34	✓		✓	✓
FRM220-10/100A	10/100Base-TX to 100Base-FX, OAM/IP Media Converter	1-35	✓		✓	✓
FRM220A-1002ES	Hardened Gigabit Ethernet Managed Switch	1-36	✓	✓	✓	✓
FRM220A-FSW103	3-Port 10/100Base-T(X) + 100Base FX Managed Switch	1-37	✓	✓	✓	✓
FRM220-ET100	Ethernet over E1 Fiber Modem	1-38	✓		✓	✓
FRM220-Data	V.35/X.21/RS530/449/232 Fiber Modem	1-39	✓		✓	✓
FRM220-E1/T1	E1/T1 Fiber Modem	1-40	✓		✓	✓
FRM220-DS3/E3	DS3/E3 over Fiber	1-41	✓		✓	✓
FRM220-Serial	RS485/232 Media Converter	1-42	✓		✓	✓
FRM220-FXO/FXS	POTS over Fiber	1-43	✓		✓	✓
FRM220A-Eoe1	Ethernet Bridge over E1 (HDLC)	1-44	✓	✓	✓	✓
FRM220A-Eoe1/G	Ethernet Bridge over E1 (GFP)	1-45	✓	✓	✓	✓
FRM220A-iMux5	Ethernet to 5 E1 Mux NID	1-46	✓	✓	✓	✓
FRM220A-iMux8	Ethernet to 8 E1 Mux NID	1-47	✓	✓	✓	✓
FRM220A-iMux16	Ethernet to 16 E1 Mux NID	1-48	✓	✓	✓	✓
FRM220-E1/Data	V.35/RS-530/X.21 to E1	1-49	✓		✓	✓
FRM220-FOM04	4-Port E1/T1+100M Ethernet Fiber Multiplexer	1-50	✓		✓	✓
FRM220-FOM01	E1/T1+100M Ethernet Fiber Multiplexer	1-51	✓		✓	✓

Power Type vs Standalone Chassis Compatible Table

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

Product specifications are subject to change without notice.

Slide-in Card vs Standalone Chassis Compatible Table

Card Name	Product Name	Page	CH02/NMC	CH02	CH01	CH01M
FRM220-NMC	Network Management Controller	1-10				
FRM220A-GSW/SNMP	Gigabit Ethernet Aggregate Switch Card	1-11				
FRM220-10G-SXX	10G 3R Transponder SFP+ to XFP Fiber Protection	1-12	✓			
FRM220-10G-SS	10G 3R Transponder SFP+ to SFP+	1-13	✓			
FRM220-4G-2S	4G Multi-Rate 2R Transponder SFP to SFP	1-14	✓		✓	✓
FRM220-4G-3S	4G Multi-Rate 2R Transponder SFP to SFP Fiber Protection	1-15	✓		✓	✓
FRM220-2.7G-2S	2.7G Multi-Rate 3R Transponder SFP to SFP	1-16	✓			
FRM220-2.7G-3S	2.7G Multi-Rate 3R Transponder SFP to SFP Fiber Protection	1-17	✓			
FRM220-1000DS	1000Base-X to 1000Base-X SFP media converter	1-18			✓	
FRM220-Protection	1+1 Fiber Optical Protection Switch	1-19	✓			✓
FRM220-MD40	4-Ch CWDM Mux/Demux (1551, 1571, 1591, 1611)nm	1-20	✓		✓	
FRM220-MD80	8-Ch CWDM Mux/Demux (1471 ~ 1611)nm	1-20		✓		
FRM220-MD40 WA/WB	4-Ch single fiber CWDM MUX/DEMUX	1-21			✓	
FRM220-MD80 WA/WB	8-Ch single fiber CWDM MUX/DEMUX	1-21		✓		
FRM220-MX210	2-Port Gigabit Ethernet Multiplexer	1-22	✓		✓	✓
FRM220-10GE-TS	10G Ethernet Converter 10G Base-T to SFP+	1-23	✓			
FRM220-10GE-TX	10G Ethernet Converter 10G Base-T to XFP	1-24	✓			
FRM220-1000M	10/100/1000Base-T to 1000Base-X SFP Web Smart OAM/IP Managed Converter	1-25	✓		✓	✓
FRM220-1000MS	10/100/1000Base-T to 1000Base-X SFP Web Smart OAM/IP Managed Converter	1-26	✓		✓	✓
FRM220-100M	10/100Base-T(X) to 100Base-FX Web Smart OAM/IP Managed Converter	1-27	✓		✓	✓
FRM220-10/100i	10/100Base-T(X) to 100Base-FX In-band Managed Converter	1-28	✓		✓	✓
FRM220-10/100i-2E	2-Port 10/100Base-T(X) to 100Base-FX Media Converter	1-29	✓		✓	✓
FRM220-1000EAS/X-1	OAM/IP-Based Managed Gigabit Ethernet Media Converter	1-30				
FRM220A-1000EAS/X	2-Port 10/100/1000Base-T + 2-Port 1000Base-X OAM/IP Managed Switch	1-31			✓	✓
FRM220-10/100AS-2	2-Port 10/100Base-T(X) to 2-Port 100Base-FX, OAM/IP Media Converter	1-33			✓	✓
FRM220-10/100iS-2	Dual Channels 10/100Base-T(X) to 100Base-FX SFP Media Converter	1-34	✓		✓	✓
FRM220-10/100A	10/100Base-TX to 100Base-FX, OAM/IP Media Converter	1-35			✓	✓
FRM220A-1002ES	Hardened Gigabit Ethernet Managed Switch	1-36	✓		✓	✓
FRM220A-FSW103	3-Port 10/100Base-T(X) + 100Base FX Managed Switch	1-37	✓			
FRM220-ET100	Ethernet over E1 Fiber Modem	1-38	✓		✓	✓
FRM220-Data	V.35/X.21/RS530/449/232 Fiber Modem	1-39	✓		✓	✓
FRM220-E1/T1	E1/T1 Fiber Modem	1-40	✓		✓	✓
FRM220-DS3/E3	DS3/E3 over Fiber	1-41	✓			✓
FRM220-Serial	RS485/232 Media Converter	1-42	✓		✓	✓
FRM220-FXO/FXS	POTS over Fiber	1-43	✓		✓	✓
FRM220A-Eoe1	Ethernet Bridge over E1 (HDLC)	1-44	✓		✓	✓
FRM220A-Eoe1/G	Ethernet Bridge over E1 (GFP)	1-45	✓		✓	✓
FRM220A-iMux5	Ethernet to 5 E1 Mux NID	1-46	✓			✓
FRM220A-iMux8	Ethernet to 8 E1 Mux NID	1-47	✓			✓
FRM220A-iMux16	Ethernet to 16 E1 Mux NID	1-48		✓		
FRM220-E1/Data	V.35/RS-530/X.21 to E1	1-49	✓		✓	✓
FRM220-FOM04	4-Port E1/T1+100M Ethernet Fiber Multiplexer	1-50		✓		
FRM220-FOM01	E1/T1+100M Ethernet Fiber Multiplexer	1-51	✓			✓

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	CH02/NMC	CH02	CH01	CH01M
				AC, DC, AD	AC, DC, AD	DC12	DC12, AC, DC, AD, AA, DD	AC, DC, AD

FRM220-NMC

Network Management Controller

The FRM220-NMC is a Network Management Controller card that can be placed in a compatible FRM220 series chassis to provide network management functions. The management interface supports a local RS-232 serial console or remote TCP/IP management by Telnet, HTTP or SNMP protocols. The card is designed to be hot swapped so that it may be field replaced without affecting any online service of any other rack cards. The card also supports online firmware upgrade from TFTP server, using any user interface. Support for any standard NMS is provided by the included enterprise MIB file. CTC Union also provides and maintains their own EMS (Element Management System) which is a Java based client/server manager for monitoring and maintaining a large number of network elements over a long period of time.

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

Specifications

Electrical Interface	Console RS232 port
	LAN 10/100Base-TX
Management Interface	In-band management: provide all system OAM/IP functions: software updates, and management system interaction through Ethernet port.
	Out-band management: supports Web, Telnet and SNMP , EMS management
OAM/IP	Configuration Management
	Performance Management

OAM/IP	Fault Management
	Status Monitoring
Indications	PWR, Fan, Alarm Act, STK, LAN LNK/SPD
Dimensions	155 x 88 x 23mm (D x W x H)
Weight	120g
Temperature	0 ~ 60°C (Operating) , -10 ~ 70°C (Storage)
Humidity	10 ~90% non-condensing
Certification	CE, FCC, LVD, RoHS
MTBF	65,000 hrs

Chassis Overview

FRM220-CH20
(2U/19" rack mountable, 20 slots)

◀ FRM220-NMC

Ordering Information

Model Name	Description
FRM220-NMC	Network Management Controller card, support web, telnet, console, SNMP functions

Note: The card is suitable for use in CH02-NMC, CH08 and CH20 standalone chassis.

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 4 electrical (RJ-45) 10/100/1000T ports plus 4 optical (SFP) 1000X/2500Base-X Gigabit Ethernet ports
- Optical Ethernet ports Support stacking in Ring or Chain topology
- Each chassis slot has one gigabit Ethernet uplink
- Provides Web, Telnet, SNMP for out-band management
- Supports IEEE802.1d Ethernet bridge function between trunk Ethernet ports
- Supports Rapid Spanning Tree Protocol (RSTP) for the trunk interfaces per IEEE 802.1w

- Supports automatic source MAC learning and block duplicate ones
- Supports IEEE 802.1q Port-base VLAN and Tag-base VLAN
- Supports static VLAN management
- Supports Link Aggregation in IEEE 802.3ad that allows GbE links to be aggregated together as logical link.
- Supports Simple Network Time Protocol (SNTP)
- Supports VLAN level QoS function and 4 priority queues for QoS
- Supports f/w upgrade via http

Specifications

Trunk Interface	4x 10/100/1000Base-T plus 4x 1000Base-X/ 2500Base-X GbE Switch trunk card.
	Auto-adaptive between full-duplex and half-duplex
	Operation modes for 10, 100 , 1000 Mbps operation speed on RJ45 trunk port basis.
	The system only supports full-duplex mode for 1000 Mbps.
	zs both RJ45 and optical SFP (Mini-GBIC) connectors
Capacity	Supports up to 20 service cards

Management Interface	In-band management: provide 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 26mm (D x W x H)
Weight	0.5kg
Temperature	0 ~ 60°C (Operating), -10 ~ 70°C (Storage)
Humidity	5 ~ 90% non-condensing
Certification	CE, FCC, LVD, RoHS
MTBF	65,000 hrs

Chassis Overview

FRM220A-GSW/SNMP
Gigabit Ethernet Aggregation Switch Card

FRM220A-CH20
(2U/19" rack mountable, 20 slots)

Ordering Information

Model Name	Description
FRM220-GSW/SNMP	Gigabit Ethernet Aggregate switch card supports web, telnet, SNMP functions

FRM220-10G-SXX

10G 3R Transponder
with Optical line Protection

The FRM220-10G-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 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

- 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
- Supports 1+1 optical line protection
- Built-in self test (BIST) function

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

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	Card : 12VDC , Standalone : AC,DC option	
Power Consumption	<10W	
Dimensions	155 x 88 x 23mm (D x W x H)	
Weight	150g	
Temperature	0 ~ 60℃ (Operating), -10 ~ 70℃ (Storage)	
Humidity	10 ~ 90% non-condensing	
Certification	CE, FCC, LVD, RoHS	
MTBF	65,000 hrs	

Application

Central Office (CO)

Customer Premise Equipment (CPE)

Smart View EMS

NMS

FRM220-MD40

STM-64
OC-192
STM-64
OC-192

FRM220-10G-SXX and FRM220-MD40/MD80 are inserted in FRM220-CH20 Chassis

FRM220-MD80

STM-64

OC-192

FRM220-10G-SXX
FRM220-MD40,MD80
with FRM220-10G-SXX

Ordering Information

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

Note: The card is suitable for use in CH02M standalone chassis.

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FRM220-10G-SS

10G 3R Transponder

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 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
	Wavelength	CWDM 1470 ~ 1610nm
		DWDM 1529.55 ~ 1565.50nm

Indications	LED (Power, Line Link, Client Link, Test, Loop back, Port Active, Alarm)
Power Input	Card : 12VDC , Standalone : AC,DC option
Power Consumption	<10W
Dimensions	155 x 88 x 23mm (D x W x H)
Weight	150g
Temperature	0 ~ 60°C (Operating), -10 ~ 70°C (Storage)
Humidity	10 ~ 90% non-condensing
Certification	CE, FCC, LVD, RoHS
MTBF	65,000 hrs

Application

Central Office (CO) — Customer Premise Equipment (CPE)

Smart View EMS, NMS, FRM220-MD40, FRM220-MD80, STM-64, OC-192, FRM220-10G-SS

FRM220-10G-SS and FRM220-MD40/MD80 are inserted in FRM220-CH20 Chassis

Ordering Information

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

Note: The card is suitable for use in CH02M standalone chassis.

FRM220-4G-2S

4G 2R Transponder

The FRM220-4G-2S is a 4G 2R 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. When the FRM220-4G-2S 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, OC-24, OC-48, STM-1, STM-4 STM-16, FC-1, FC-2, FC-4)
- Network management via Web, Telnet, SNMP in central FRM220 chassis
- Link Fault Pass-Through (LFPT)
- Auto Laser Shutdown (ALS)

- 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
- Detect transceiver transmitter error alarm

Specifications

Optical Interface	Connector	SFP LC
	Data rate	28Mbps ~ 4.25Gbps
	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) CWDM 1470 ~ 1610nm

Indications	LED (PWR, Line Link, Client Link, Test, Loop back, Port Active, Alarm)
Power Input	Card : 12VDC Standalone : AC, DC options
Power Consumption	< 7W
Dimensions	155 x 88 x 23mm (D x W x H)
Weight	120g
Temperature	0 ~ 50℃ (Operating), -10 ~ 70℃ (Storage)
Humidity	10 ~ 90% non-condensing
Certification	CE, FCC, LVD, RoHS
MTBF	65,000 hrs

Application

Managed 4G 2R Transponder

STM-64
OC-192
STM-64
OC-192

Smart View EMS

FRM220-4G-2S and FRM220-MD40/MD80 are inserted in FRM220-CH20 Chassis

FRM220-MD80

FRM220-MD40

NMS

STM-64
OC-192
STM-64
OC-192

FRM220-4G-2S

Ordering Information

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

Note: The card is suitable for use in CH01M standalone chassis.

FRM220-4G-3S

4G 2R Transponder 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, OC-24, OC-48, 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	Card : 12VDC , Standalone : AC,DC option
Power Consumption	< 8W
Dimensions	155 x 88 x 23mm (D x W x H)
Weight	120g
Temperature	0 ~ 50℃ (Operating), -10 ~ 70℃ (Storage)
Humidity	10 ~ 90% non-condensing
Certification	CE, FCC, LVD, RoHS
MTBF	65,000 hrs

Application

Managed 4G 2R Transponder with Fiber Protection

Smart View EMS

NMS

FRM220-4G-3S inserts in FRM220-CH20 Chassis

1+1 Fiber Protection

FRM220-4G-3S

Customer Premise Equipment(CPE)

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

Note: The card is suitable for use in CH02M standalone chassis.

Specifications & design are subject to change without prior notice. Please visit CTC Union website for more details.
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FRM220-4G-3S | 1-15

FRM220-2.7G-2S

2.7G 3R Transponder

The FRM220-2.7G-2S is a 2.7G 3R 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. When the FRM220-2.7G-2S 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.

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
- Dip switch setting data rate
- Detect transceiver transmitter error alarm

Specifications

Optical Interface	Connector	SFP LC		Indications	LED (PWR, Line Link, Client Link, Test, Loop back, Port Active, Alarm)
	Data rate	E3 to OC-48			
	Duplex mode	Full duplex		Power Input	Card : 12VDC
	Fiber	MM 50/125µm, 62.5/125µm.			Standalone : AC, DC options
		SM 9/125µm		Power Consumption	< 10W
	Distance	MM 2km, SM 15/30/50/80/120km, WDM 20/40/60/80km		Dimensions	155 x 88 x 23mm (D x W x H)
				Weight	120g
	Wavelength	MM 1310nm, SM 1310,1550nm		Temperature	0 ~ 60℃ (Operating), -10 ~ 70℃ (Storage)
		WDM 1310Tx/1550Rx (type A)		Humidity	10 ~ 90% non-condensing
		1550Tx/1310Rx (type B)		Certification	CE, FCC, LVD, RoHS
		CWDM 1470 ~ 1610nm		MTBF	65,000 hrs

Application

Central Office (CO)

Customer Premise Equipment (CPE)

Smart View EMS

NMS

STM-64
OC-192
STM-64
OC-192

FRM220-MD40

FRM220-2.7G-2S and FRM220-MD40/MD80 are inserted in FRM220-CH20 Chassis

FRM220-MD80

STM-64
OC-192
STM-64
OC-192

FRM220-2.7G-2S

2.7G 3R Repeater

1550nm — 120km — 120km — 120km — 1550nm

FRM220-2.7G-2S

Ordering Information

Model Name	Description
FRM220-2.7G-2S	2.7G 3R Transponder, (optional SFP module)

Note: The card is suitable for use in CH02M standalone chassis.

FRM220-2.7G-3S

2.7G 3R Transponder with Optical Line Protection

The FRM220-2.7G-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 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.

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	Card : 12VDC , Standalone : AC,DC option
Power Consumption	< 10W
Dimensions	155 x 88 x 23mm (D x W x H)
Weight	120g
Temperature	0 ~ 60℃ (Operating), -10 ~ 70℃ (Storage)
Humidity	10 ~ 90% non-condensing
Certification	CE, FCC, LVD, RoHS
MTBF	65,000 hrs (25℃)

Application

Managed 2.7G 3R Transponder with Fiber Protection

Client Side Fiber Protection

Smart View EMS

NMS

120km

Client

FRM220-2.7G-3S inserts in FRM220-CH20 Chassis

Line Side Fiber Protection

FRM220-2.7G-3S

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
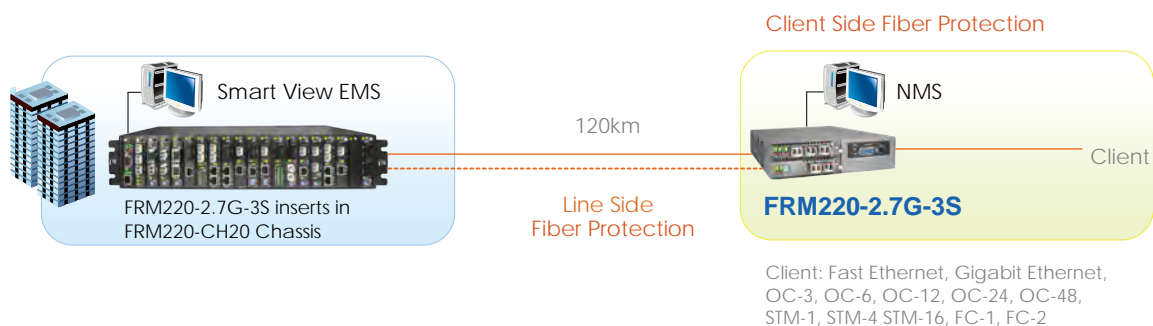
Ordering Information

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

Note: The card is suitable for use in CH02M standalone chassis.

Specifications & design are subject to change without prior notice. Please visit CTC Union website for more details.
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FRM220-2.7G-3S | **1-17**

NEW

FRM220-1000DS

1000Base-X to 1000Base-X SFP media converter

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, 155Mbps STM-1, 4, Fiber Channel 1, 2, and OC3, 12, 24. 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	Card : 12VDC	
	Standalone : AC, DC options	
Power Consumption	< 5W	
Dimensions	123 x 86 x 20mm (D x W x H)	
Weight	130g	
Temperature	0 ~ 50℃ (Operating), -10 ~ 70℃ (Storage)	
Humidity	10 ~ 90% non-condensing	
Certification	CE, FCC, LVD, RoHS	
MTBF	65,000 hrs (25℃)	

Application

Optical Line Repeater with SFP slot

PDH

LAN

ADM

NMS

STM-16

FRM220

FRM220-1000DS
FRM220-1000DS inserts in
FRM220-CH20 Chassis

SM   SM

FRM220-1000DS   **FRM220-1000DS**

SM

ADM

Switch

STM-16

LAN

PDH
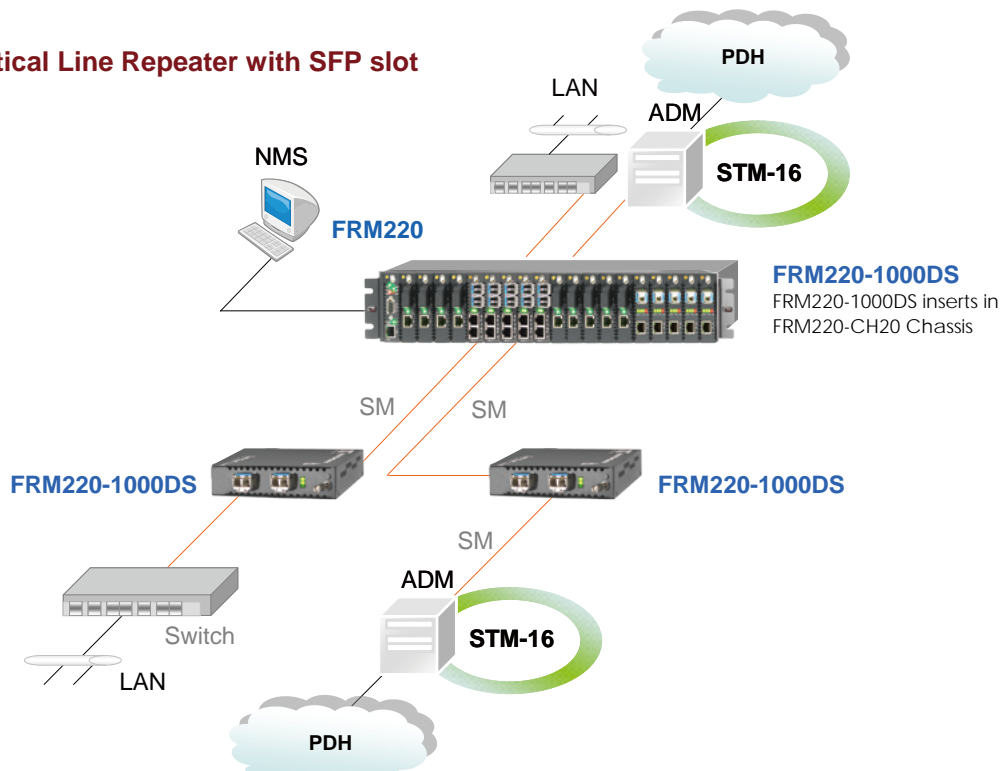
Ordering Information

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

Note: The card is suitable for use in CH01 standalone chassis.

FRM220-Protection

1+1 Fiber Optical Protection Switch

NEW

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	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 ~ 60℃ (Operating), 20 ~ 70℃ (Storage)
Humidity	10 ~ 90% non-condensing
Certification	CE, FCC, RoHS
MTBF	65,000 hours

Application

Ordering Information

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

Note: The card is suitable for use in CH01M standalone chassis.

FRM220-MD40
FRM220-MD80

4Ch / 8Ch CWDM Dual Fiber MUX / DeMUX

The FRM220-MD40 is 4 channels 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
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 ~ 60 ℃ (Operating)
	-10 ~ 70 ℃ (Storage)
Humidity	0 ~ 95% non-condensing
Certification	RoHS
MTBF	75,000 hours

Application

CWDM Mux/DeMux
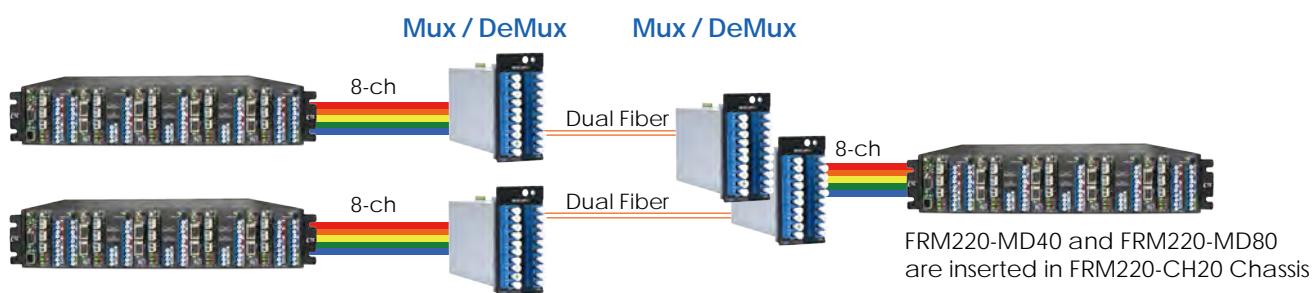
Mux / DeMux   **Mux / DeMux**

8-ch

Dual Fiber

8-ch

8-ch

Dual Fiber

8-ch

FRM220-MD40 and FRM220-MD80 are inserted in FRM220-CH20 Chassis

FRM220-MD40 and FRM220-MD80 are inserted in FRM220-CH20 Chassis

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: FRM220-MD40 is suitable for use in CH01 standalone chassis
FRM220-MD80 is suitable for use in CH02 standalone chassis

FRM220 – ☐☐☐☐

Example: FRM220 – MD40

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

4-Ch / 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
Standard	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 ~ 60 °C (Operating)
	-10 ~ 70 °C (Storage)
Humidity	0 ~95% non-condensing
Certification	RoHS

Application

CWDM Mux/DeMux
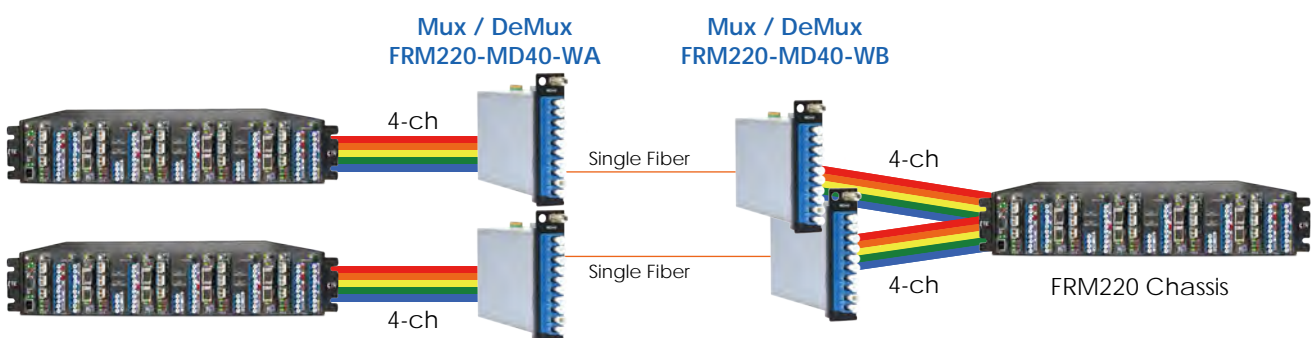
FRM220-MD40 WA/WB inserts in
FRM220-CH20 Chassis

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)
FRM220-MD80-WB	8-Ch CWDM Mux/Demux (1471 ~ 1611nm)

Note: FRM220-MD40-WA/WB is suitable for use in CH01 standalone chassis
FRM220-MD80-WA/WB is suitable for use in CH02 standalone chassis

FRM220 – ☐☐☐☐ – ☐☐

Example: FRM220 – MD40 – WA

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FRM220-MD40 WA/WB
FRM220-MD80 WA/WB | **1-21**

FRM220-MX210

2-Port Gigabit Ethernet Multiplexer

NEW

FRM220-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. FRM220-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)
- How-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	DC 12V in
Power Consumption	< 10W
Dimensions	155 x 88 x 23mm (D x W x H)
Weight	120g
Temperature	0 ~ 60°C (Operating) , 0 ~ 70°C (Storage)
Humidity	5 ~ 90% non-condensing
Certification	CE, FCC, RoHS
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: The card is suitable for use in CH01 standalone chassis.

FRM220-10GE-TS

10G Ethernet Media Converter

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	DC 12V In
Power Consumption	< 15W
Dimensions	155 x 88 x 23mm (D x W x H)
Weight	130g
Temperature	0 ~ 40℃ (Operating), 0 ~ 50℃ (Storage)
Humidity	0 ~ 85% non-condensing
Certification	CE, FCC, RoHS
MTBF	57,000 hrs

Application

Central Office (CO)

Customer Premise Equipment (CPE)

FRM220-10GE-TS

10G Base-R

10G Base-T

Data Center

IP Networking

Router / Switch

FRM220-10GE-TS Inserts in FRM220-CH20 chassis

10G Base-R

10G Base-T

Data Center

EMS

10G Base-R

10G Base-T

FRM220-10GE-TS

Data Center

Ordering Information

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

Note: The card is suitable for use in CH02M standalone chassis.

Specifications & design are subject to change without prior notice. Please visit CTC Union website for more details.
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FRM220-10GE-TS | **1-23**

FRM220-10GE-TX

10G Ethernet Media Converter

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	DC 12V In
Power Consumption	< 15W
Dimensions	155 x 88 x 23mm (D x W x H)
Weight	130kg
Temperature	0 ~ 40℃ (Operating), 0 ~ 50℃ (Storage)
Humidity	0 ~ 85% non-condensing
Certification	CE, FCC, RoHS
MTBF	57,000 hrs

Application

Central Office (CO) Customer Premise Equipment (CPE)

FRM220-10GE-TX

IP Networking

Router / Switch

EMS

FRM220-10GE-TX Inserts in FRM220-CH20 chassis

10G Base-R   10G Base-T   Data Center

10G Base-R   10G Base-T   Data Center

10G Base-R   10G Base-T   Data Center
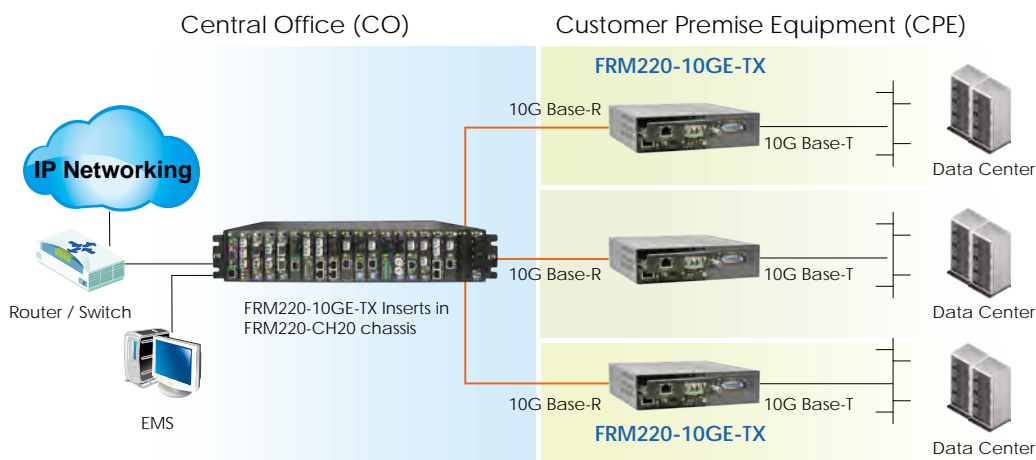
FRM220-10GE-TX

Ordering Information

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

Note: The card is suitable for use in CH02M standalone chassis.

FRM220-1000M

Gigabit Ethernet Web Smart OAM Managed Media 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 connector. 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. By offering 802.3ah OAM Compliant 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

- 1-Port 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 Packet
- Ingress / Egress bandwidth control
- Supports 802.3ah-OAM in-band management
- Firmware upgrade via Web
- Management Password Setting

- 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
- Supports On-Line F/W upgrade (local) by the Web manager
- 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	Card : 12VDC
	Standalone : AC, DC options
Power Consumption	< 4W
Dimensions	155 x 88 x 23mm (D x W x H)
Weight	120g
Temperature	0 ~ 60℃ (Operating), -10 ~ 70℃ (Storage)
Humidity	10 ~ 90% non-condensing
Certification	CE, FCC, LVD, RoHS
MTBF	65,000 hrs (25℃)

Application

Central Office (CO)

Customer Premise Equipment (CPE)

OAM Remote Management

FRM220-1000M

IP Networking

Giga Ethernet

LAN

Router/Switch

FRM220-1000M Inserts in FRM220-CH20 chassis

Giga Ethernet

LAN

EMS

OAM Remote Management

Giga Ethernet

LAN

FRM220-1000M

Ordering Information

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

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FRM220-1000M | **1-25**

FRM220-1000MS

Gigabit Ethernet Web Smart OAM Managed Media 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(X) and dual rate 100/1000Base-X with SFP LC connector. When deployed as a stand-alone solution, this media converter incorporates an easy to use Web user interface for operation, administration and maintenance of both local and remotely connected FRM220-1000MS converters. By offering 802.3ah OAM compliance, this converter can be linked to any 802.3ah compliant fiber switch and support loop back and dying gasp functions. When placed in our centrally controlled and managed rack, all functions of this converter and the remotely connected converter can be configured and monitored via in-band management, including band-width control, duplex, speed, VLAN configuration and more.

Features
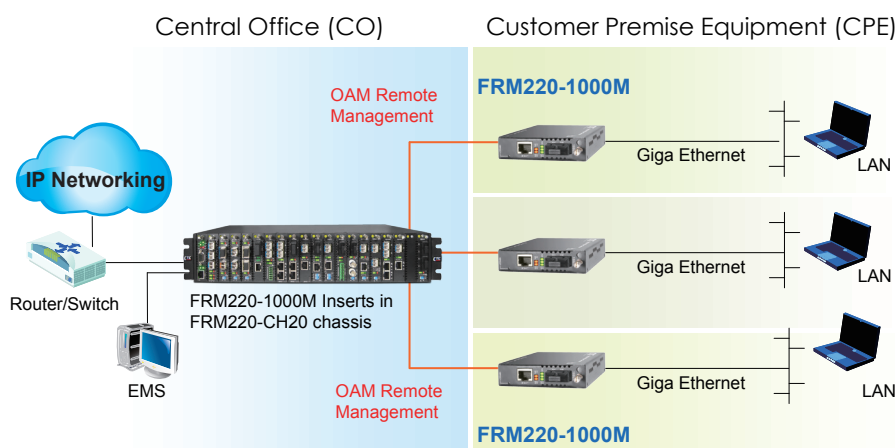
- 1-Port 10/100/1000Base-T to 100/1000Base-X Converter
- Auto-Cross over for MDI/MDIX in TP port
- Auto-Negotiation or manual mode in TP port
- Supports flow control **Enable** or **Disable**
- Supports Jumbo Frame 9K Packet
- Ingress / Egress bandwidth control
- Supports 802.3ah-OAM in-band management (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	Card : 12VDC
	Standalone : AC, DC options
Power Consumption	< 4W
Dimensions	155 x 88 x 23mm (D x W x H)
Weight	120g
Temperature	0 ~ 60°C (Operating), -10 ~ 70°C (Storage)
Humidity	10 ~ 90% non-condensing
Certification	CE, FCC, LVD, RoHS
MTBF	65,000 hrs

Application

Central Office (CO)　　　　Customer Premise Equipment (CPE)

OAM Remote Management

FRM220-1000MS

IP Networking

Giga Ethernet　　LAN

Router / Switch

FRM220-1000MS Inserts in FRM220-CH20 chassis

Giga Ethernet　　LAN

EMS

OAM Remote Management

Giga Ethernet　　LAN

FRM220-1000MS

Ordering Information

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

Note: The card is suitable for use in CH01 standalone chassis.

Specifications & design are subject to change without prior notice. Please visit CTC Union website for more details.
CTC UNION TECHNOLOGIES CO., LTD.　www.ctcu.com

FRM220-100M

Fast Ethernet Web Smart OAM Managed Media Converter

The FRM220-100M is an IEEE802.3ah OAM compliant copper to fiber Fast Ethernet solution designed to make conversion between 10/100Base-TX and 100Base-FX with SC, FC or ST connector. When deployed as a stand-alone solution, this media converter incorporates an easy to use Web user interface for operation, administration and maintenance of both local and remotely connected FRM220-100M converters. By offering 802.3ah OAM compliance, this converter can be linked to any 802.3ah compliant fiber switch and support loop back and dying gasp functions. When placed in our centrally controlled and managed rack, all functions of this converter and the remotely connected converter can be configured and monitored via in-band management, including bandwidth control, duplex, speed, VLAN configuration and more.
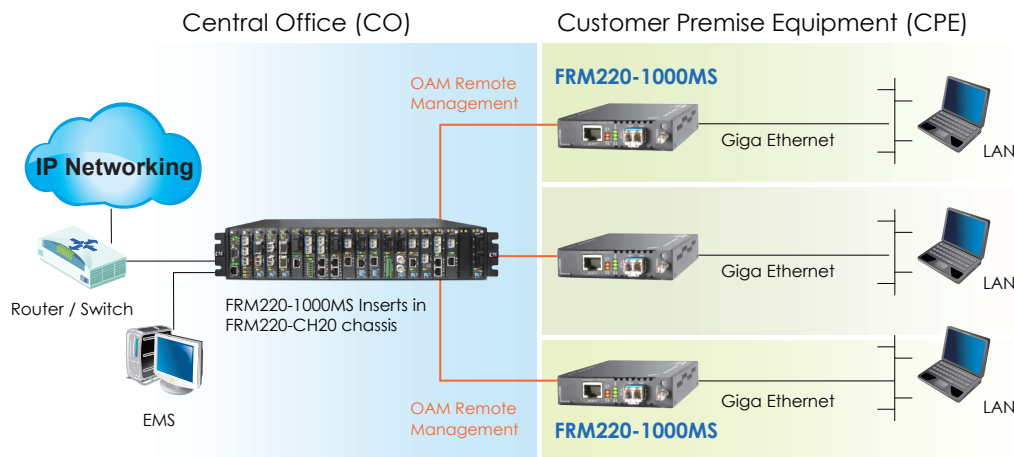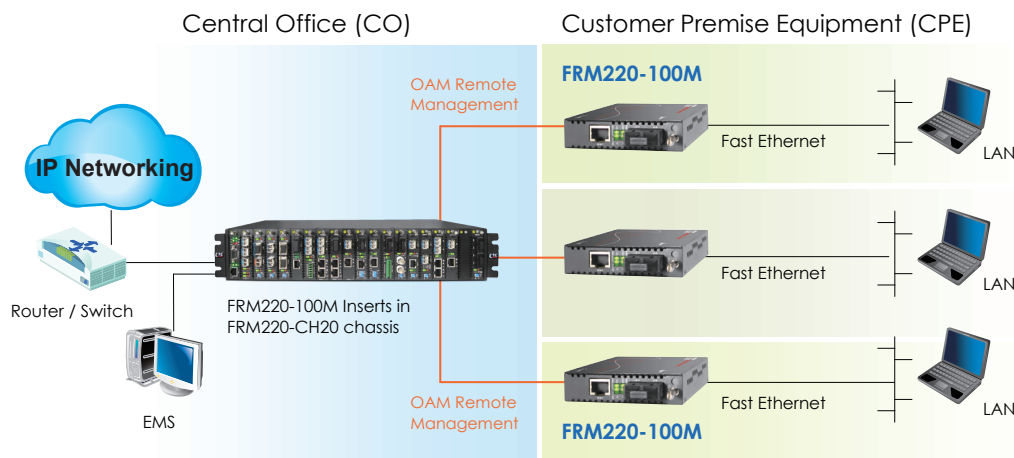
Features

- 1-Port 10/100Base-T(X) to 100Base-FX Converter
- Auto-Cross over for MDI/MDIX in TP port
- Auto-Negotiation or manual mode in TP port
- Dying gasp (remote power failure detection) on standalone unit
- Supports Link Fault Pass-Through (LFPT) Function
- Supports Auto Laser Shutdown (ALS) Function
- 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)
- Password Setting (for standalone unit only)
- Allow IP settings web or console management (for standalone unit only)
- Supports 16 Tag VLAN Group (for standalone unit only)
- RMON counters (for standalone unit only)

Specifications

Optical Interface	Connector	1x9 (SC, ST, FC)(Option)
	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	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, IEEE 802.3ah, IEEE 802.1Q
Indications		LED (Power, FX-Link, LAN Speed, LAN Link)
Power Input		Card : 12VDC Standalone : AC, DC options
Power Consumption		< 4W
Dimensions		155 x 88 x 23mm (D x W x H)
Weight		120g
Temperature		0 ~ 60℃ (Operating), -10 ~ 70℃ (Storage)
Humidity		10 ~ 90% non-condensing
Certification		CE, FCC, LVD, RoHS
MTBF		65,000 hrs

Application

Central Office (CO)   **Customer Premise Equipment (CPE)**

OAM Remote Management

FRM220-100M

IP Networking

Fast Ethernet   LAN

Router / Switch

FRM220-100M Inserts in FRM220-CH20 chassis

Fast Ethernet   LAN

EMS

Fast Ethernet   LAN

OAM Remote Management

FRM220-100M

Ordering Information

Connector Type   Connectivity Distance

FRM220 –**100M** – ☐☐☐☐☐

Example: FRM220 –100M – SC002

Model Name	Description
FRM220-100M	10/100Base-T(X) to 100Base-FX Web smart OAM managed media converter

Note: The card is suitable for use in CH01 standalone chassis.

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

Specifications & design are subject to change without prior notice. Please visit CTC Union website for more details.
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FRM220-100M | **1-27**

FRM220-10/100i

Fast Ethernet 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 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.
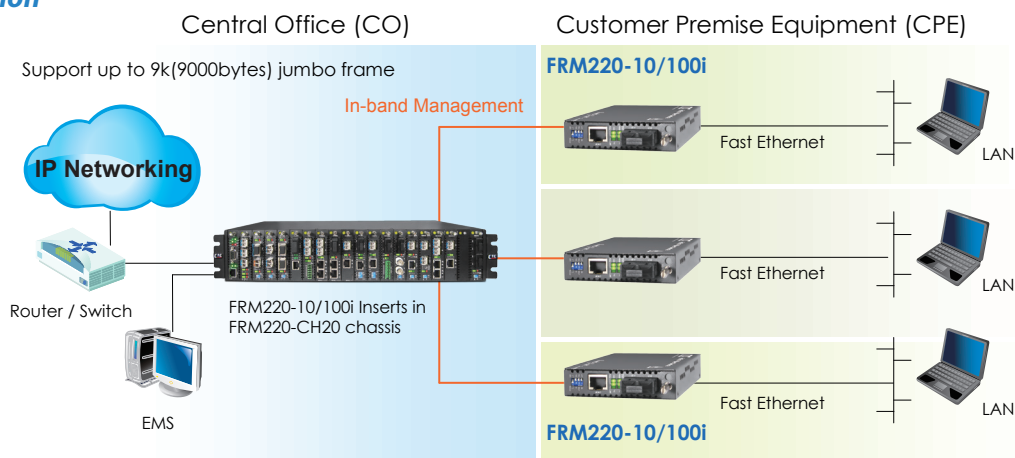
Features

- 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 Nx512Kbps)
- Supports flow control (Pause)
- Fiber Hardware Reset (FHR)
- Online local / remote f/w upgrade
- Must be placed in managed chassis to realize any management features

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	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,TS-1000
Indications		LED (Power, FEF, FX-Link, TX-SPD, TX-Duplex, TX-Link)
Power Input		Card : 12VDC Standalone : AC, DC options
Power Consumption		< 4W
Dimensions		155 x 88 x 23mm (D x W x H)
Weight		120g
Temperature		0 ~ 60℃ (Operating), -10 ~ 70℃ (Storage)
Humidity		10 ~ 90% non-condensing
Certification		CE, FCC, LVD, RoHS
MTBF		65,000 hrs

Application

Central Office (CO)

Customer Premise Equipment (CPE)

Support up to 9k(9000bytes) jumbo frame

In-band Management

FRM220-10/100i

IP Networking

Router / Switch

FRM220-10/100i Inserts in FRM220-CH20 chassis

EMS

Fast Ethernet — LAN

Fast Ethernet — LAN

Fast Ethernet — LAN

FRM220-10/100i

Ordering Information

Model Name	Description
FRM220-10/100i	10/100Base-T(X) to 100Base-FX In-band managed converter

Note: The card is suitable for use in CH01 standalone chassis.

Connector Type   Connectivity Distance

FRM220 –10/100i – ☐☐☐☐☐

Example: FRM220 –10/100i – SC002

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

FRM220-10/100i-2E

Fast Ethernet In-band Managed Converter

The FRM220-10/100i-2E is a 2-port 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 standalone chassis 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.
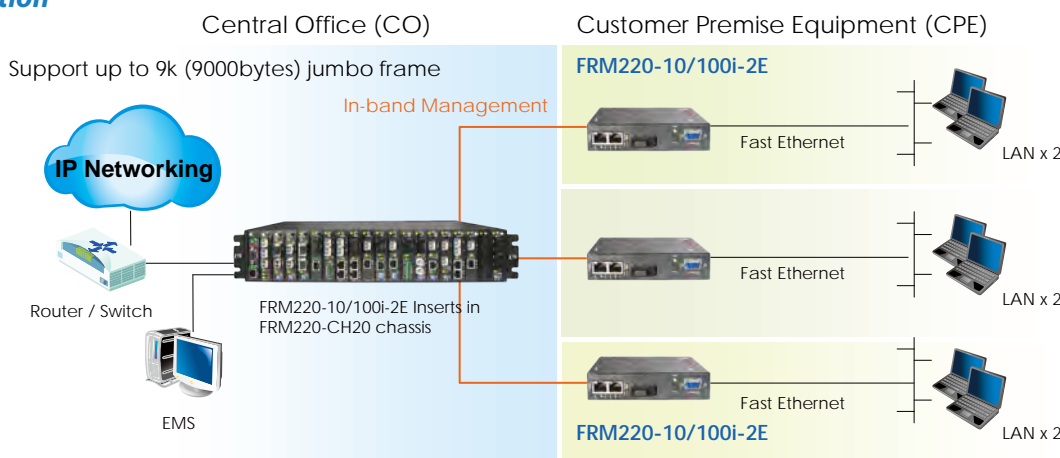
Features

- 2-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 Fiber Loop Back Test
- 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 local management with CH01M standalone chassis.
- Bandwidth control (Nx32K or Nx512Kbps)
- Supports flow control (Pause)
- Fiber Hardware Reset (FHR)
- Must be placed in managed chassis to realize any management features

Specifications

Optical Interface	Connector	1x9 (SC,FC,ST)
	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	RJ-45
	Data rate	10Mbps, 100Mbps

Electrical Interface	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		Card: 12VDC Standalone : AC, DC options
Power Consumption		< 5W
Dimensions		155 x 88 x 23mm (D x W x H)
Weight		120g
Temperature		0 ~ 60℃ (Operating), -10 ~ 70℃ (Storage)
Humidity		10 ~ 90% non-condensing
Certification		CE, FCC, LVD, RoHS
MTBF		65,000 hrs

Application

Central Office (CO)   Customer Premise Equipment (CPE)

Support up to 9k (9000bytes) jumbo frame

FRM220-10/100i-2E

In-band Management

IP Networking

Fast Ethernet   LAN x 2

Router / Switch   Fast Ethernet   LAN x 2

FRM220-10/100i-2E Inserts in FRM220-CH20 chassis

EMS   Fast Ethernet   LAN x 2

FRM220-10/100i-2E

Ordering Information

Connector Type   Connectivity Distance

Model Name	Description
FRM220-10/100i-2E	2-port 10/100Base-T(X) to 100Base-FX In-band managed converter

FRM220 **–10/100i-2E** – ☐☐☐☐☐

Example: FRM220 **–10/100i-2E** – SC002

Note: The card is suitable for use in CH01 standalone chassis.

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

FRM220-1000EAS/X-1

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

NEW

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-TX and 1000Base-X with SFP. With SNMP and Web-based management in the FRM220, 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 Compliant 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, IPX, IP, etc.
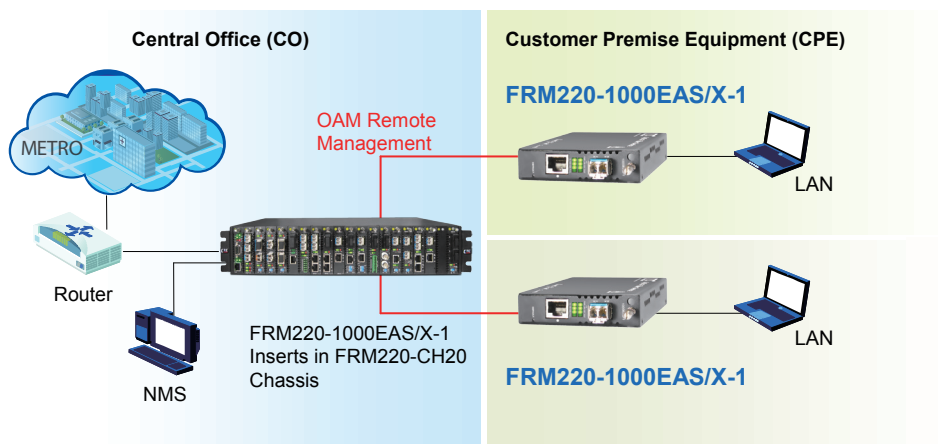
Features

- 10/100/1000Base-T to 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
- Forward 10K bytes Jumbo packets (max.)
- Supports Q in Q double tagging
- Supports IEEE 802.1Q Tagging
- 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	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)	
Electrical Interface	Connector	RJ45	
	Data rate	10Mbps, 100Mbps, 1000Mbps	
	Duplex mode	Half / Full duplex	

Electrical Interface	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		
Power Consumption	< 8W		
Dimensions	155 x 88 x 23mm (D x W x H)		
Weight	120g		
Temperature	0 ~ 60℃ (Operating), -10 ~ 70℃ (Storage)		
Humidity	10 ~ 90% non-condensing		
Certification	CE, FCC, LVD, RoHS		
MTBF	65,000 hrs		

Application

Central Office (CO)

METRO

OAM Remote Management

Router

NMS

FRM220-1000EAS/X-1 Inserts in FRM220-CH20 Chassis

Customer Premise Equipment (CPE)

FRM220-1000EAS/X-1

LAN

LAN

FRM220-1000EAS/X-1

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: The card is suitable for use in CH01 standalone chassis.

FRM220A-1000EAS/X

2-Port 10/100/1000Base-T + 2-Port 100/1000Base-X OAM/IP Managed Switch

The FRM220A-1000EAS/X is an IEEE 802.3ah OAM compliant dual copper to dual fiber Gigabit Ethernet solution designed to make conversion between 10/100/1000Base-T(X) and 100/1000Base-X with SFP. With SNMP and Web-based management in the FRM220, the network administrator can monitor, configure and control the activity of each IEEE 802.3ah series card and remotely connected OAM compliant converter. By offering IEEE 802.3ah OAM Compliant 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

- 2-port 10/100/1000Base-T to 2-port 100/1000Base-X SFP
- Supports local / remote IEEE 802.3ah OAM / IP In-band management
- Stand-alone IP Based, Web GUI, Telnet, SNMP management
- Auto-Negotiation or forced mode
- Auto MDI/MDIX
- Forward 10K bytes Jumbo packets (max.)
- Supports IEEE 802.1ad Q in Q double tagging
- Supports IEEE 802.1Q Tagged and Port based VLAN
- 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
- 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)
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	Card : 12VDC
	Standalone : AC, DC options
Power Consumption	< 8W
Dimensions	155 x 88 x 23mm (D x W x H)
Weight	130g
Temperature	0 ~ 60℃ (Operating), -10 ~ 70℃ (Storage)
Humidity	10 ~ 90% non-condensing
Certification	CE, FCC, LVD, RoHS
MTBF	65,000 hrs

Ordering Information

Model Name	Description
FRM220A-1000EAS/X	2-Port 10/100/1000Base-T + 2-Port 100/1000Base-X with OAM/IP management, (optional SFP)

Note: The card is suitable for use in CH01 standalone chassis.

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
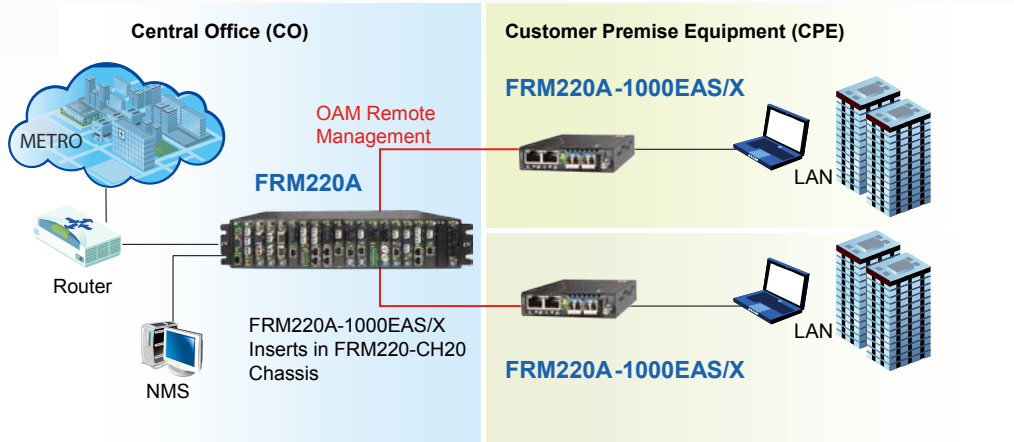
Fiber Redundant / Trunking Application

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
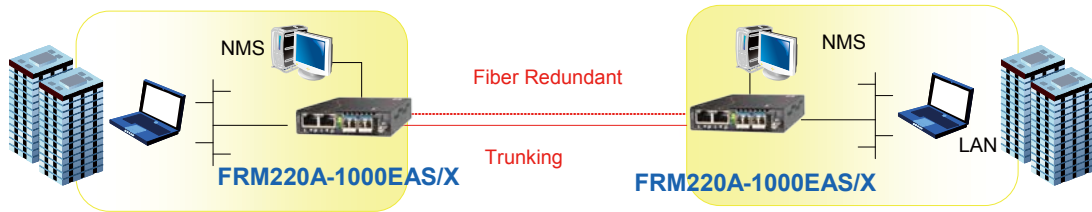
Fiber Ring Application

In the ring or mesh topology, Spanning Tree Protocol enables a highly resilient network based on multiple 1000EAS/X units
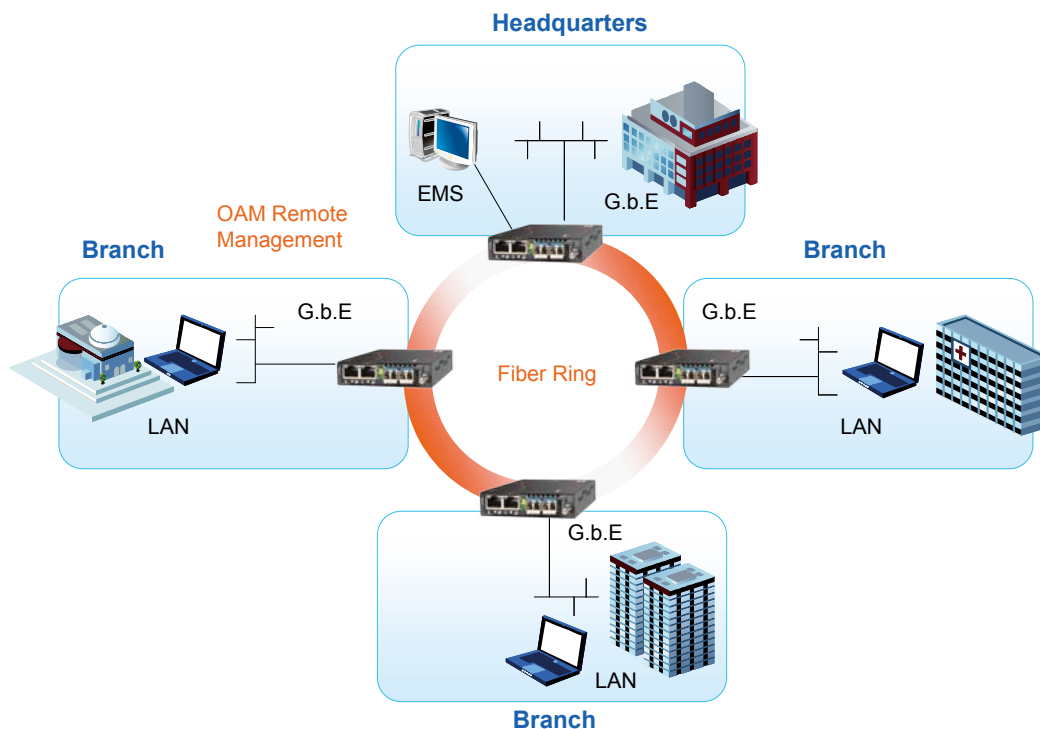
FRM220-10/100AS-2

2-Port 10/100Base-T(X) + 2-Port 100Base-FX, OAM / IP Managed Switch

The FRM220-10/100AS-2 is an IEEE802.3ah OAM compliant two copper to two fiber Fast Ethernet solution designed to make conversion between 10/100Base-T(X) and 100Base-FX with SFP. With SNMP and Web-based management in the FRM220, the network administrator can monitor, configure and control the activity of each IEEE 802.3ah series card and remotely connected OAM compliant converter. By offering IEEE 802.3ah OAM Compliant 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

- Supports local / remote IEEE 802.3ah OAM / IP In-band management
- Stand-alone IP Based, Web GUI, Telnet, SNMP management
- 2-port 10/100Base-T(X) plus 2-port 100Base-FX SFP
- Auto-Negotiation or forced mode
- Auto MDI/MDIX
- Forward 1536 bytes (max.) packets
- Supports IEEE 803.1ad Q in Q double tagging
- Supports IEEE 802.1Q Tagged and Port based VLAN
- Supports port trunking
- Bandwidth control Ingress (128K ~ 64M), Engress (128K ~ 8M)
- Supports flow control (Pause)

- Supports remote CPE power fail detect (dying gasp)
- Supports QoS Port Priority
- Supports Link Fault Pass-Through (LFPT)
- Supports Loop Back Test
- Supports RMON counter
- D/D function for supported SFP fiber transceiver
- Auto Laser Shutdown (ALS)
- Online local / remote f/w upgrade
- Fiber Redundant
- Spanning Tree Protocol

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

Electrical Interface	Cable	10Base-T Cat.3, 4, 5, UTP, 100Base-TX Cat.5, 5e or higher
Standards		IEEE 802.3, IEEE 802.3u, IEEE 802.1Q, IEEE 802.3ah
Indications		LED (Power, Test, FX-Link, TX-Speed, TX-Link)
Power Input	Card	: 12VDC
	Standalone : AC, DC options	
Power Consumption		< 4W
Dimensions		155 x 88 x 23mm (D x W x H)
Weight		130g
Temperature		0 ~ 60℃ (Operating), -10 ~ 70℃ (Storage)
Humidity		10 ~ 90% non-condensing
Certification		CE, FCC, LVD, RoHS
MTBF		65,000 hrs

Application

Fiber Ring Application

Smart View EMS

OAM Remote Management

Fast Ethernet

Fast Ethernet

Fast Ethernet

Fiber Ring

LAN

LAN

Fast Ethernet

LAN

OAM Remote Management

FRM220-10/100AS-2

LAN

LAN

FRM220-10/100AS-2 Inserts in FRM220-CH20 chassis
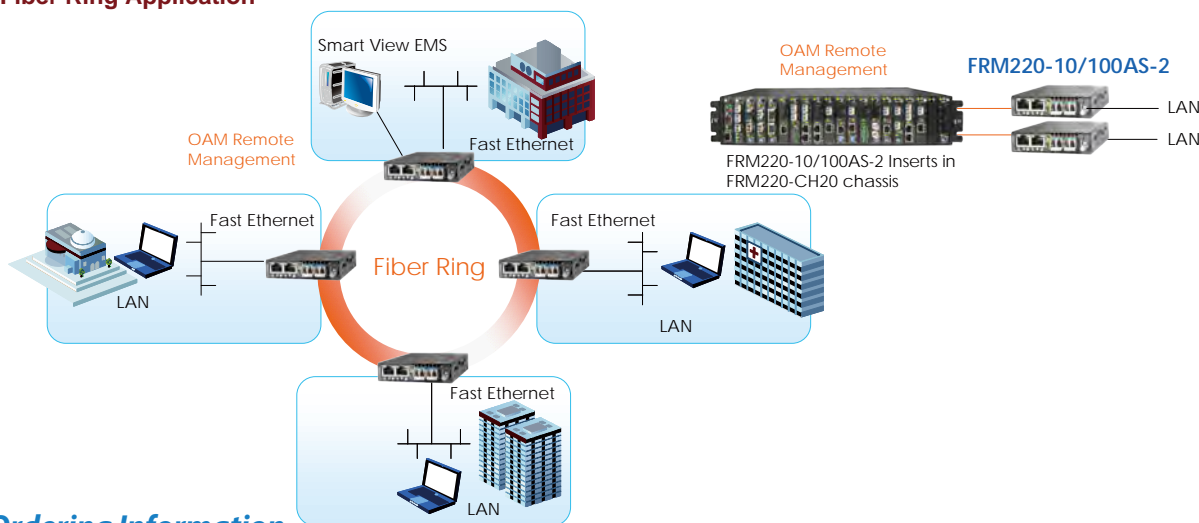
Ordering Information

Model Name	Description
FRM220-10/100AS-2	2-Port 10/100Base-T(X) + 2-Port 100Base-FX with OAM/IP management (optional SFP)

Note: The card is suitable for use in CH01 standalone chassis.

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

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FRM220-10/100iS-2

Dual Fast Ethernet In-band Managed Converter

The FRM220-10/100iS-2 is a dual (two in one) 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 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

- 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
- 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 Nx512Kbps)
- Support 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
- D/D function for supported SFP fiber transceiver
- Auto Laser Shutdown (ALS)
- Fiber Hardware Reset (FHR)
- Online local / remote f/w upgrade
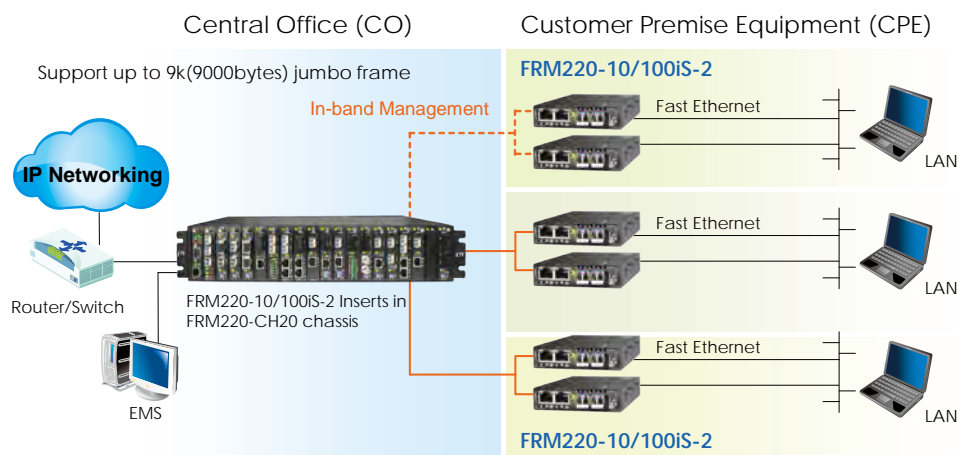- Must be placed in managed chassis to realize any management features

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	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,TS-1000
Indications		LED (Power, FEF, FX-Link, TX-SPD, TX-Duplex, TX-Link)
Power Input		Card : 12VDC Standalone : AC, DC options
Power Consumption		< 4W
Dimensions		155 x 88 x 23mm (D x W x H)
Weight		130g
Temperature		0 ~ 60°C (Operating), -10 ~ 70°C (Storage)
Humidity		10 ~ 90% non-condensing
Certification		CE, FCC, LVD, RoHS
MTBF		65,000 hrs

Application

Central Office (CO)　　　　　Customer Premise Equipment (CPE)

Support up to 9k(9000bytes) jumbo frame

In-band Management

IP Networking

Router/Switch

FRM220-10/100iS-2 Inserts in FRM220-CH20 chassis

EMS

FRM220-10/100iS-2
Fast Ethernet
LAN

Fast Ethernet
LAN

Fast Ethernet
LAN
FRM220-10/100iS-2

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: The card is suitable for use in CH01 standalone chassis.

FRM220-10/100A

2-Port 10/100Base-T(X) + 100Base-FX OAM/IP Managed Switch

The FRM220-10/100A is an IEEE802.3ah OAM compliant copper to fiber Fast Ethernet solution designed to make conversion between 2-Port 10/100Base-T(X) and 100Base-FX with SC, FC or ST connector. With SNMP and Web-based management in the FRM220, the network administrator can monitor, configure and control the activity of each IEEE 802.3ah series card and remotely connected OAM compliant converter. By offering IEEE 802.3ah OAM Compliant 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.
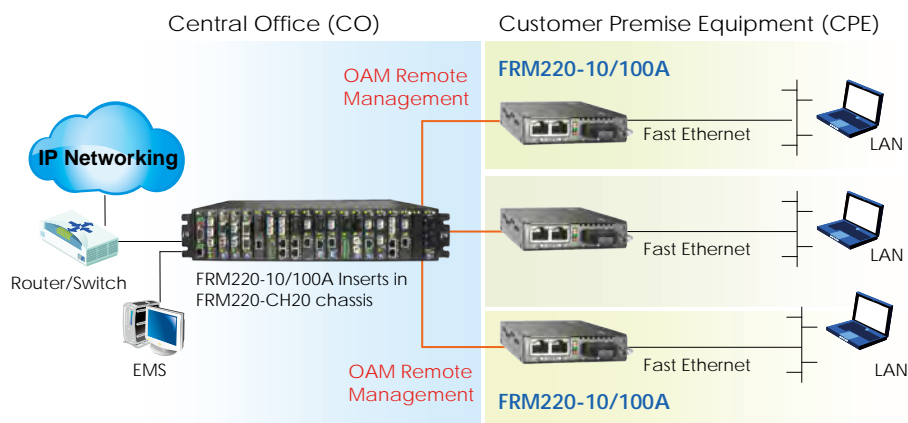
Features

- 2-port 10/100Base-T(X) to 100Base-FX
- Supports local / remote 802.3ah OAM / IP In-band management
- Stand-alone IP Based, Web GUI, Telnet, SNMP management
- Auto-Negotiation or forced mode
- Auto MDI/MDIX
- Forward 1536 bytes (max.) packets
- Supports Q in Q double tagging
- Supports IEEE 802.1Q Tag VLAN
- Bandwidth control Ingress (128K ~ 64M), Engress (128K ~ 8M)
- Supports flow control (Pause)
- Supports remote CPE power fail detect (dying gasp)
- Supports QoS Port Priority
- Supports Link Fault Pass-Through (LFPT)
- Supports Loop Back Test
- Supports RMON counter
- Auto Laser Shutdown (ALS)
- Online 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 15/30/50/80/120km, 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

Electrical Interface	Cable	10Base-T Cat.3, 4, 5, UTP, 100Base-TX Cat.5, 5e or higher
Standards		IEEE 802.3, IEEE 802.3u, IEEE 802.1Q, IEEE 802.3ah
Indications		LED (Power, Test, FX-Link, TX-Speed, TX-Link)
Power Input		Card : 12VDC Standalone : AC, DC options
Power Consumption		< 4W
Dimensions		155 x 88 x 23mm (D x W x H)
Weight		130g
Temperature		0 ~ 60℃ (Operating), -10 ~ 70℃ (Storage)
Humidity		10 ~ 90% non-condensing
Certification		CE, FCC, LVD, RoHS
MTBF		65,000 hrs

Application

Central Office (CO)

Customer Premise Equipment (CPE)

OAM Remote Management

FRM220-10/100A

IP Networking

Router/Switch

FRM220-10/100A Inserts in FRM220-CH20 chassis

EMS

Fast Ethernet

LAN

Fast Ethernet

LAN

OAM Remote Management

Fast Ethernet

LAN

FRM220-10/100A

Ordering Information

Model Name	Description
FRM220-10/100A	2-Port 10/100Base-T(X) to 100Base-FX with OAM/IP management(optional SFP)

Note: The card is suitable for use in CH01 standalone chassis.

Connector Type   Connectivity Distance

FRM220 –10/100A – ☐☐☐☐☐

Example: FRM220 –10/100A – SC002

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

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FRM220-10/100A | **1-35**

FRM220A-1002ES

Gigabit Ethernet Managed Switch

The FRM220A-1002ES is a dual copper to dual fiber Gigabit Ethernet managed 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 SNMP manager, the functions including bandwidth control, QoS, VLAN, duplex and speed configuration.
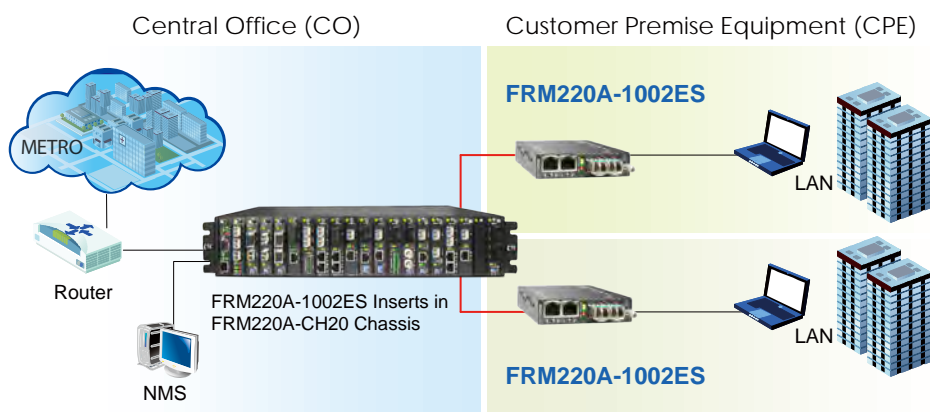
Features

- 2-Port 10/100/1000Base-T to 2-Port 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 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)		
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		

Standards	IEEE 802.3, IEEE 802.3u, 802.3z, 802.3ab, 802.1Q, 802.3X, 802.1ad		
LED Indications	PWR, LNK1, LNK2, TEST, LAN Link, LAN SPEED		
Power	Power Input : DC 12V in		
	Power Consumption : < 5V		
Mechanical	Dimensions	155 x 88 x 23mm (DxWxH)	
	Weight	130g	
	Physical Characteristics : Housing: Metal		
Environmental	Temperature	Operating / Storage: 0~60°C / -10~70°C (FRM220-1002ES)	
	Humidity	0 ~ 95% non-condensing	
Certification	FCC Part 15 Class A,CE Mark		

Application

Central Office (CO)

Customer Premise Equipment (CPE)

METRO

Router

FRM220A-1002ES Inserts in FRM220A-CH20 Chassis

NMS

FRM220A-1002ES

LAN

LAN

FRM220A-1002ES

Ordering Information

Model Name	Description
FRM220A-1002ES	2-Port 10/100/1000Base-T to 2-Port 100/1000Base-SX/LX SFP GE Manage Switch, 0 ~ 60°C

Note: The card is suitable for use in CH01 standalone chassis.

FRM220A-FSW103

3-Port 10/100Base-T(X) + 100Base-FX Ethernet Switch

The FRM220A-FSW103 is a 3-Port 10/100Base-T(X) to 100Base-FX SFP fiber slide-in card Ethernet switch designed for central and remote 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 SNMP manager. this switch can be completely controlled and monitored from a centrally located managed rack controlling all switch settings including duplex and speed configuration. 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

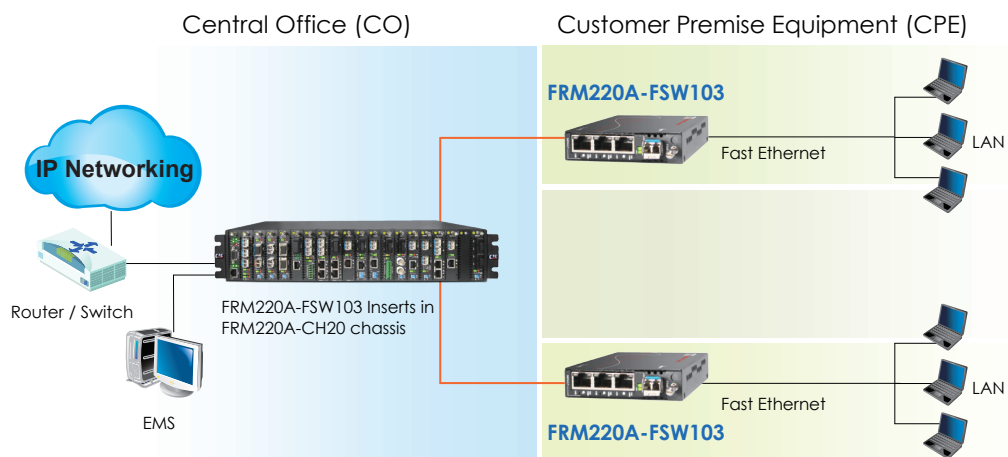- 3-Port 10/100Base-T(X) + 1-Port 100Base-FX Ethernet Switch
- Auto-Cross over for MDI/MDIX in TP port
- Auto-Negotiation or manual mode in TP port
- Supports flow control
- Forward 1552 bytes (max.) packets in switch mode
- Supports Store and forward switch mode
- Supports FRM220 chassis management 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
- Provides Product information for management
- Supports On-Line F/W upgrade (local) by the SNMP manager

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

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 (Power, FEF, FX-Link, TX-SPD, TX-Duplex, TX-Link)
Power Input		Card : 12VDC Standalone : AC, DC options
Power Consumption		< 4W
Dimensions		155 x 88 x 23mm (D x W x H)
Weight		130g
Temperature		0 ~ 80℃ (Operating), -10 ~ 80℃ (Storage)
Humidity		5 ~ 90% non-condensing
Certification		CE, FCC, LVD, RoHS
MTBF		65,000 hrs

Application

Central Office (CO)

Customer Premise Equipment (CPE)

IP Networking

Router / Switch

FRM220A-FSW103 Inserts in FRM220A-CH20 chassis

EMS

FRM220A-FSW103

Fast Ethernet

LAN

FRM220A-FSW103

Fast Ethernet

LAN

Ordering Information

Model Name	Description
FRM220A-FSW103	3-Port 10/100Base-T(X) to 100Base-FX SFP Switch, (optional SFP)

Note: The card is suitable for use in CH01 standalone chassis.

Specifications & design are subject to change without prior notice. Please visit CTC Union website for more details.
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FRM220A-FSW103 | **1-37**

FRM220-ET100

Fiber Modem Ethernet over E1 Fiber

FRM220-ET100 is a single port Fiber WAN (TDM) card with built-in HDLC Bridge for the FRM220 Series Platform Media Converter Racks. 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.
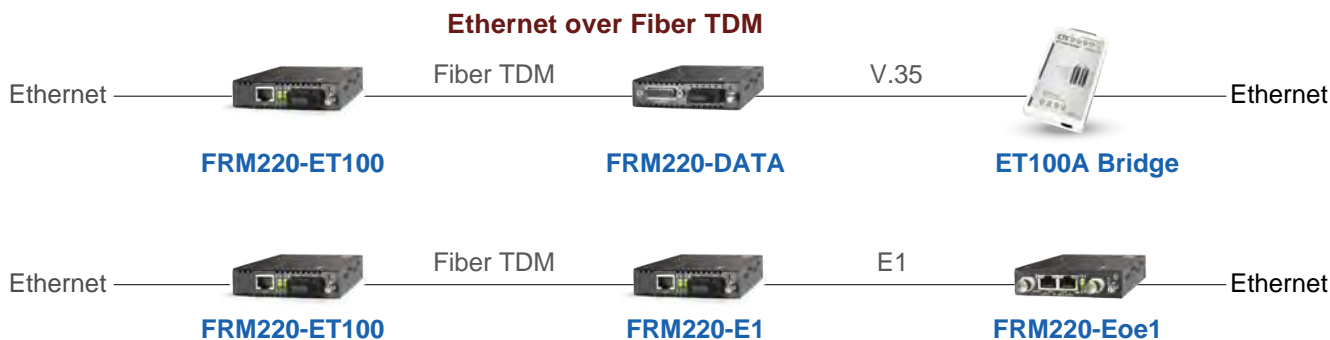
Features

- 1-Port Ethernet to HDLC (fiber) converter.
- P2P Fiber link compatible with FRM220-E1/T1 and FRM220-Data
- Interface connectors, RJ-45 for 10/100 Base-Tx.
- Fixed optical for SC or ST, 2km(MM) to 120km(SM)
- TDM settings.
  - 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

Specifications

TDM (fiber) Interface	Connector	1x9 (SC, ST, FC)
	Data rate	64~2048kb/s(nx64)
	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)
Tests	E1 Loops	Remote Loop back
	BERT	Integral 511 pattern generator
Ethernet Interface	Standards	IEEE 802.3u, IEEE 802.3
	Data rate	10Mbps, 100Mbps
	Duplex mode	Half / Full duplex
	Connector	RJ-45

Indications	PWR, TD/RD Act., Test, Sys, Alarm, Error
Power Input	Card : 12 VDC
	Standalone : AC, DC option
Power Consumption	< 5W
Dimensions	155 x 88 x 23mm (D x W x H)
Weight	130g
Temperature	0 ~ 60℃ (Operating), -10 ~ 70℃ (Storage)
Humidity	10 ~ 90% RH (non-condensing)
Certifications	CE, FCC, RoHS
MTBF	75,000 hrs

Application

Ethernet over Fiber TDM

Ethernet —— Fiber TDM —— V.35 —— Ethernet

FRM220-ET100　　　　**FRM220-DATA**　　　　**ET100A Bridge**

Ethernet —— Fiber TDM —— E1 —— Ethernet

FRM220-ET100　　　　**FRM220-E1**　　　　**FRM220-Eoe1**

Ordering Information

Model Name	Description
FRM220-ET100	10/100Base-T(X) to E1 fiber modem

Note: The card is suitable for use in CH01M standalone chassis.

Connector Type　Connectivity Distance

FRM220 –**ET100** – ☐☐☐☐☐

Example: FRM220 –ET100 – SC002

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

Specifications & design are subject to change without prior notice. Please visit CTC Union website for more details.
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FRM220-Data

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

FRM220-Data   FRM220-Data-SFP

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.

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	1x9 (SC, ST, FC)
	Data rate	36.864Mbps
	Line coding	Scrambled NRZ
	Bit Error Rate	Less than 10-10
	Distance	MM 2km, SM 15/30/50/80/120km, WDM 20/40/60/80km
	Wavelength	1310nm, 1550nm
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	Card : 12VDC
	Standalone : AC, DC options
Power Consumption	< 5W
Dimensions	155 x 88 x 23mm (D x W x H)
Weight	130g
Temperature	0 ~ 60℃ (Operating), -10 ~ 70℃ (Storage)
Humidity	10 ~ 90% non-condensing
Certification	CE, FCC, LVD, RoHS
MTBF	65,000 hrs

Application
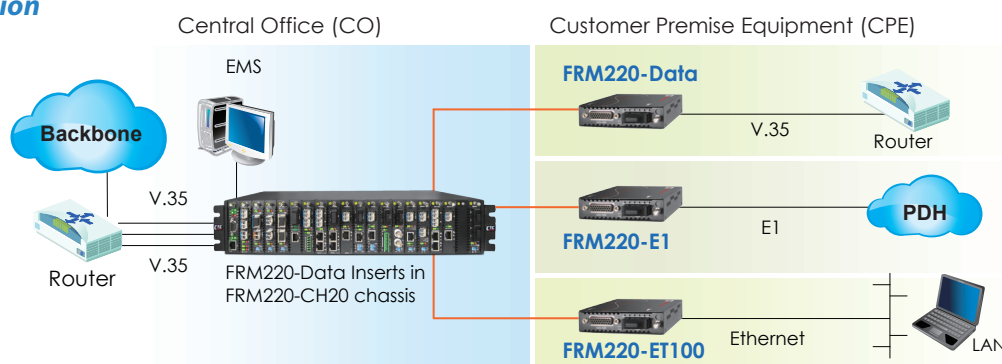
Ordering Information

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)

Note: The card is suitable for use in CH01M standalone chassis.

Interface Type / Connector Type / Connectivity Distance

FRM220 – ☐☐☐ – ☐☐ ☐☐☐☐
Example: FRM220 – V35 – SC002

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

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FRM220-Data | **1-39**

FRM220-E1/T1

Fiber Modem E1/T1 over Fiber

FRM220-E1/T1   FRM220-E1/T1-SFP

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. Configuration is also available to enable or disable the port, reset the port, do far end fault setting, and initiate local or far end loop-back tests. 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.
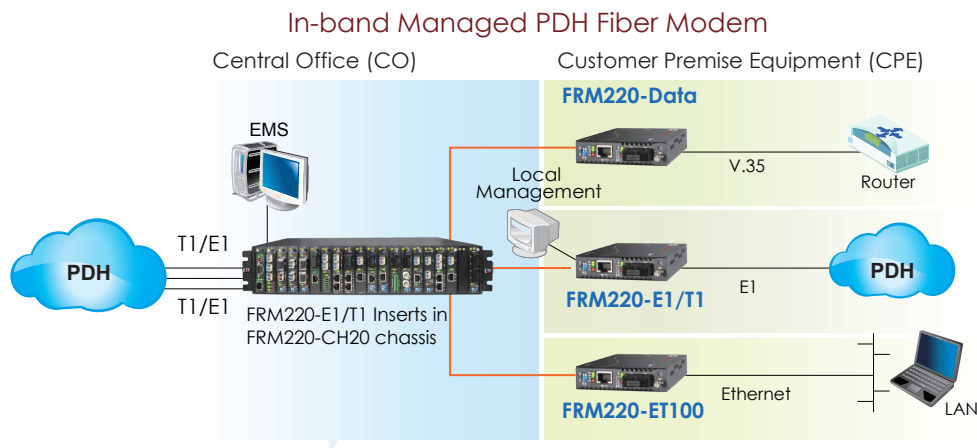
Features

- In-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
- AIS when signal is lost

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 15/30/50/80/120km
		WDM 20/40/60/80km
	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	Card : 12VDC
	Standalone : AC, DC options
Power Consumption	< 5W
Dimensions	155 x 88 x 23mm (D x W x H)
Weight	120g
Temperature	0 ~ 60℃ (Operating), -10 ~ 70℃ (Storage)
Humidity	10 ~ 90% non-condensing
Certification	CE, FCC, LVD, RoHS
MTBF	65,000 hrs

Application

In-band Managed PDH Fiber Modem

Central Office (CO)   Customer Premise Equipment (CPE)

FRM220-Data

EMS

Local Management

V.35   Router

T1/E1

PDH

FRM220-E1/T1 Inserts in FRM220-CH20 chassis

T1/E1

FRM220-E1/T1   E1   PDH

FRM220-ET100   Ethernet   LAN

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)

Note: The card is suitable for use in CH01M standalone chassis.

FRM220 – ☐☐ / ☐☐☐ – ☐☐☐☐☐

Connector Type   Connectivity Distance

Example: FRM220 – E1/T1R – SC002

Connector Type	Connectivity Distance		
SC, ST, FC	002: 2km 015: 15km 030: 30km 050: 50km 080: 80km 120:120km		
(Not Applicable for SFP Type)	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		

FRM220-DS3/E3

DS3/E3 over Fiber

NEW

The FRM220-DS3/E3 is a copper to DS3 /E3 fiber media converter designed for long-distance transport of DS3/E3 signals. The DS3/E3 supports Small Form Pluggable (SFP) which give you the options to choose from a wide range of standard SFPs in multi-mode and single mode types as well as BiDi which allows bi-directional transmissions using only a single fiber cable. CWDM wavelength SFPs can also be used to increase the bandwidth capacity of the fiber infrastructure. With SNMP and Web-based management in FRM220 chassis, the network administrator can monitor, configure and control the activity of FRM220-E3/D3 card in the chassis locally and a stand-alone device installed at the remote location.

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
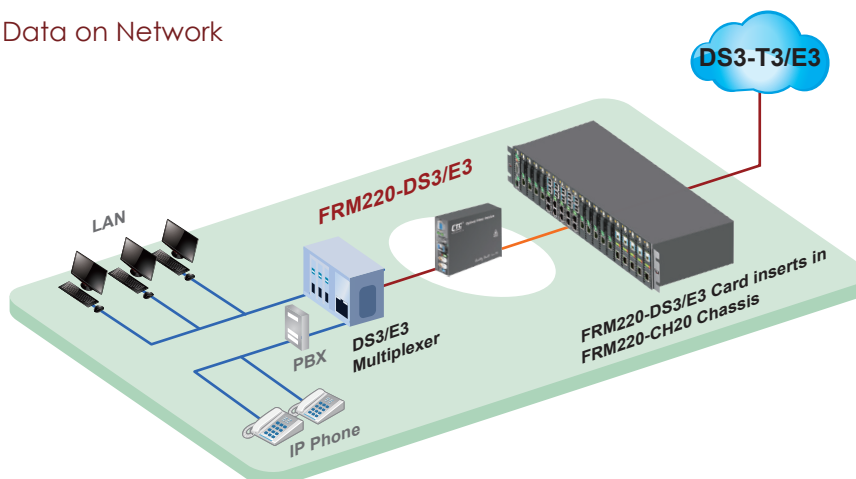- Standalone RS232 console management via CH01M

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
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	Card	12VDC
	Standalone	AC, DC options
Power Consumption	<5W	
Dimensions	155 x 88 x 23mm (D x W x H)	
Weight	120g	
Temperature	0 ~ 60℃ (Operating), -10 ~ 70℃ (Storage)	
Certification	CE, FCC, LVD, RoHS	

Application

DS3/E3
G.703

Voice/Data Mux

FRM220-DS3/E3

Fiber optic
110km(68 miies)

FRM220-DS3/E3

DS3/E3
G.703
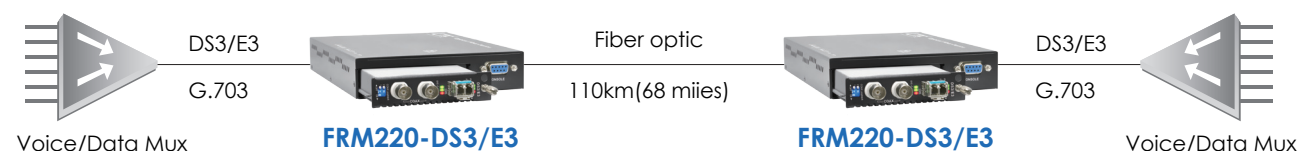
Voice/Data Mux

Integrate Voice & Data on Network

DS3-T3/E3

FRM220-DS3/E3

LAN

DS3/E3 Multiplexer

PBX

IP Phone

FRM220-DS3/E3 Card inserts in FRM220-CH20 Chassis

Ordering Information

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

Note: The card is suitable for use in CH01M standalone chassis.

Specifications & design are subject to change without prior notice. Please visit CTC Union website for more details.
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FRM220-DS3/E3 | **1-41**

FRM220-Serial

RS-485 / 232 over Fiber

FRM220-Serial   FRM220-Serial-SFP

The FRM220-Serial provides a fiber converter 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 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 and set the interface type.
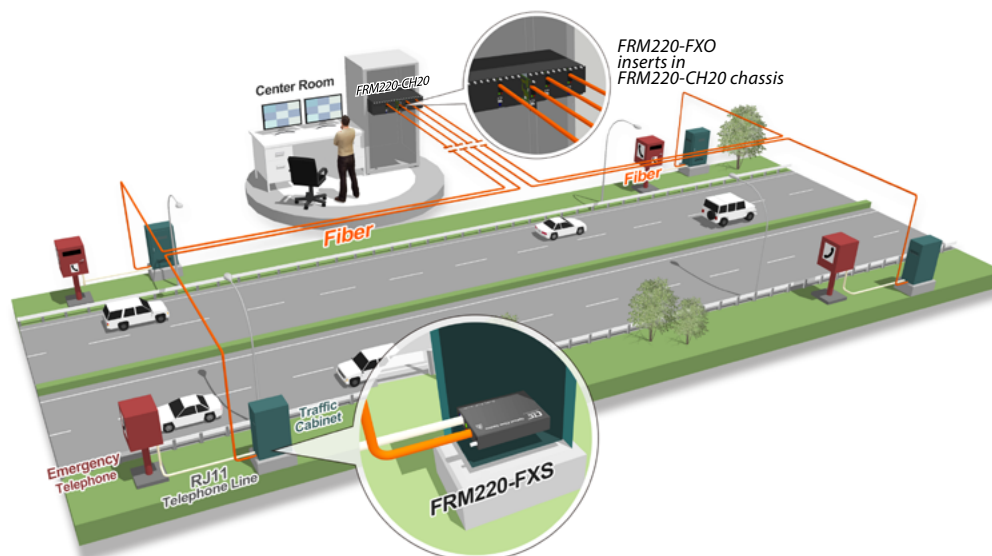
Features

- Extend asynchronous serial transmission from 2km 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 two wires (half duplex) or four wires (full duplex) RS-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

Specifications

Optical Interface	Connector	1x9 (SC, ST, FC)
	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 15/30/50/80/120km,
		WDM 20/40/60/80km
	Wavelength	MM 1310nm, SM 1310, 1550nm,
		WDM 1310Tx/1550Rx(type A)
		1550Tx/1310Rx(type B)
Electrical Interface	Connector	6 pins Terminal block
	Data Signal	RS-485 2-wire
	Formats	RS-232 RTS/CTS 5-wire
		RS-232 3-wire

Electrical Interface	Baud Rate	RS-422, RS-485 up to 1024kbps
		RS-232 up to 256kbps
	Bit Error Rate	Less than 10-10
Standards		EIA/TIA RS-485, RS-232
LEDs		Power, FX Link, DI, DO, Test
Power Input		Card : 12VDC
		Standalone : AC, DC options
Power Consumption		< 5W
Dimensions		155 x 88 x 23mm (D x W x H)
Weight		130g
Temperature		0 ~ 60℃ (Operating), -10 ~ 70℃ (Storage)
Humidity		10 ~ 90% non-condensing
Certification		CE, FCC, LVD, RoHS
MTBF		65,000 hrs

Application

RS-485/232

HOST   EMS   **FRM220-Serial inserts In FRM220-CH20 Chassis**   **FRM220-Serial**   RS-485/232   SCADA

RS-485 Twisted pair

HOST   **FRM220-Serial**   **FRM220-Serial**

RS-485 network on one twisted pair / 2-wire half duplex

Slot machine 1…………………32

Ordering Information

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

Note: The card is suitable for use in CH01M standalone chassis.

Connector Type   Connectivity Distance

FRM220 – Serial – ☐☐☐☐☐

Example: FRM220 – Serial – SC002

Connector Type
SC, ST, FC
(Not Applicable for SFP Type)

Connectivity Distance

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

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FRM220-FXO/FXS

FXO / FXS 2-wire Fiber Converter

FRM220-FXO/FXS POTS phone line converter extender is used to connect PSTN voice signals to distant Plain Old Telephone (POTS) devices. FRM220-FXO/FXS provides a fiber media transport for POTS transmission and features an RJ-11C for copper connection. A pair of FRM220-FXO/FXS is required to implement an end to end system. FXO mode connects to a telephone line or PBX 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 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.

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 15/30/50/80/120km, WDM 20/40/60/80km
	Wavelength	MM 1310nm, SM 1310, 1550nm, WDM 1310Tx/1550Rx(type A), 1550Tx/1310Rx(type B)
Electrical Interface	Connector	RJ-11
	FXO mode	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 mode	Impedance : 600 ohms
		Coding : 16 bits liner
		Dial: DTMF and Dial Pulse
		Battery Source: 48VDC ± 4V
		Ringing Waveform : Sine wave

Electrical Interface	FXS mode	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)
Indications		LED (Power, FX Link, Phone Act, Test)
Power Input		Card : 12VDC
		Standalone : AC, DC options
Power Consumption		< 5W
Dimensions		155 x 88 x 23mm (D x W x H)
Weight		120g
Temperature		0 ~ 60℃ (Operating), -10 ~ 70℃ (Storage)
Humidity		10 ~ 90% non-condensing
Certification		CE, FCC, LVD, RoHS
MTBF		65,000 hrs

Application

FRM220-FXO inserts in FRM220-CH20 chassis

Ordering Information

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

Note: The card is suitable for use in CH01 standalone chassis.

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

FRM220 – FXO/FXS – ☐☐☐☐☐

Example: FRM220 – FXO/FXS – SC002

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FRM220-FXO/FXS | **1-43**

FRM220A-Eoe1

Ethernet Bridge over E1

· HDLC
· Max. Framing Size 1522bytes
· Framed / Unframed E1

The FRM220A-Eoe1 is a slide-in card E1 Ethernet Bridge for cost-effective connection of 10/100Base-T(X) or 100Base-FX LANs over E1 transports. The FRM220A-Eoe1 transmits up to a 2.048Mbps Ethernet bridge channel (HDLC encapsulated) over E1 links. The FRM220A-Eoe1 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-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.
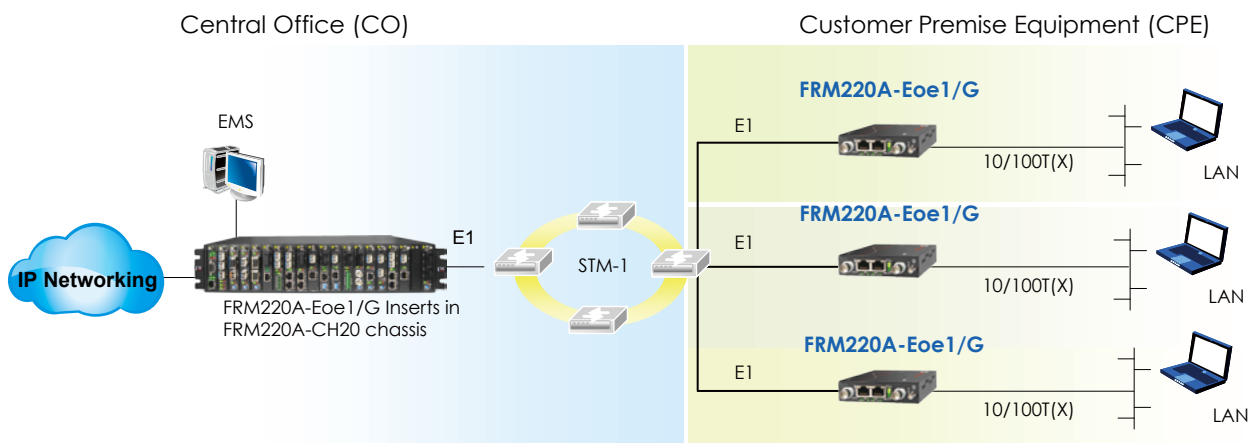
Features

◆ 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
	Max. Framing Size	1522bytes
	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 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
	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		AC adapter : 100~240VAC to 12VDC
		AC 100 ~ 240V, DC -18 ~ 75V
Power Consumption		< 12W
Dimensions		DC12 : 160 x 88 x 24mm (D x W x H)
		AC/DC48/AD : 201 x 135 x 35mm (D x W x H)
Weight		130g
Temperature		0 ~ 60℃ (Operating), -10 ~ 70℃ (Storage)
Humidity		10 ~ 90% RH (non-condensing)
Certifications		CE, FCC, RoHS
MTBF		65,000 hrs

Application

Managed E1 Bridge
Delivering point-to-point Fast Ethernet service across E1 circuits

Central Office (CO)   Customer Premise Equipment (CPE)

EMS

IP Networking

FRM220A-Eoe1 Inserts in
FRM220A-Ch20 chassis

E1

STM-1

FRM220A-Eoe1
E1
10/100T(X)
LAN

FRM220A-Eoe1
E1
10/100T(X)
LAN

FRM220A-Eoe1
E1
10/100T(X)
LAN

Ordering Information

Model Name	Description
FRM220A-Eoe1	10/100Base-T(X) to E1 HDLC bridge

Note: The card is suitable for use in CH01M standalone chassis.

FRM220A-Eoe1/G

Ethernet Bridge over E1

· HDLC & GFP
· Max. Framing Size 2046bytes
· Unframed E1

The FRM220A-Eoe1/G is a slide-in card E1 Ethernet Bridge for cost-effective connection of 10/100Base-T(X) or 100Base-FX LANs over E1 transports. The FRM220A-Eoe1/G transmits up to a 2.048Mbps Ethernet bridge channel (Generic Framing Procedure or HDLC Encapsulated) over E1 links. The FRM220A-Eoe1/G 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-Eoe1/G fully meets E1 specifications including ITU-T G.703 and G.823. The FRM220A-Eoe1/G features diagnostic capabilities for performing remote loopback. The operator at either end of the line may test both the FRM220A-Eoe1/G 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 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
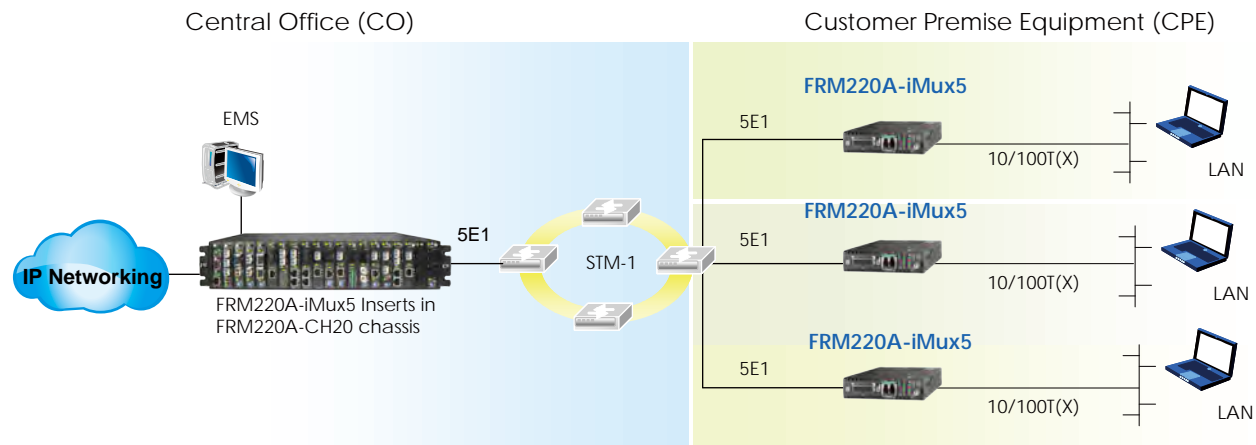- Standalone RS232 console management via CH01M

Specifications

E1 Interface		
	Framing	Unframed
	Max. Framing Size	2046bytes
	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 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-T(X), Half/Full duplex
		Encapsulation GFP (G.7041)
	Connector	RJ45 10/100Base-T(X)
Indications		Power, ALM,E1 signal loss ,E1 Alarm (AIS, LOF, RAI, LOMF), LAN link /ACT, 10/100M , SD(100Base-FX)
Power Input		AC adapter : 100~240VAC to 12VDC
		AC 90 ~ 264V, DC -18 ~ 75V
Power Consumption		< 4W
Dimensions		DC12 : 160 x 88 x 24mm (D x W x H)
		AC/DC48/AD : 201 x 135 x 35mm (D x W x H)
Weight		120g
Temperature		0 ~ 60°C (Operating), -10 ~ 70°C (Storage)
Humidity		10 ~ 90% RH (non-condensing)
Certifications		CE, FCC, RoHS
MTBF		65,000 hrs

Application

Central Office (CO)   Customer Premise Equipment (CPE)

EMS

FRM220A-Eoe1/G

E1

10/100T(X)

LAN

FRM220A-Eoe1/G

E1

10/100T(X)

LAN

IP Networking

E1

STM-1

FRM220A-Eoe1/G Inserts in
FRM220A-CH20 chassis

FRM220A-Eoe1/G

E1

10/100T(X)

LAN

Ordering Information

Model Name	Description
FRM220A-Eoe1/G	10/100Base-T(X) to E1 GFP bridge operates at WAN

Note: The card is suitable for use in CH01M standalone chassis.

Specifications & design are subject to change without prior notice. Please visit CTC Union website for more details.
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FRM220A-Eoe1/G | 1-45

FRM220A-iMux5

5E1 Inverse Multiplexer

The FRM220A-iMux5 is an E1 inverse multiplexer capable of bundling up to 5 E1 lines for cost-effective connection of 10/100Base-(TX) or 100Base-FX LANs over multiple E1 transports. The FRM220A-iMux5 inverse multiplexer transmits up to a 9.92Mbps Ethernet bridge channel (GFP-F encapsulated) over 5 E1 links. The FRM220A-iMux5 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-iMux5 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-iMux5 fully meets E1 specifications including ITU-T G.703 and G.823. The FRM220A-iMux5 features diagnostic capabilities for performing remote loopback. The operator at either end of the line may test both the FRM220A-iMux5 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.
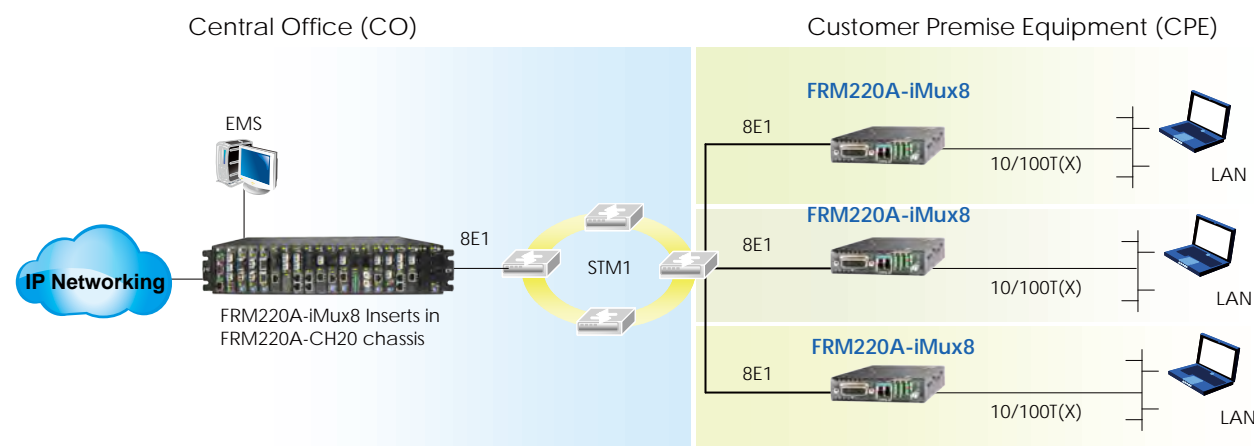
Features

- Connects one Fast Ethernet over 1-5 E1 links (1.984 ~ 9.92Mbps)
- 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 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-T(X), Half/Full duplex
		100Base-FX

Ethernet Interface	Connector	RJ45 10/100Base-T(X)
		SFP-LC 100Base-FX
Indications		Power, ALM,E1 signal loss, E1 Alarm (AIS, LOF, RAI, LOMF), LAN link /ACT, 10/100M , SD(100Base-FX)
Power Input		AC adapter : 100~240VAC to 12VDC
		AC 100 ~ 240V, DC -18 ~ 75V
Power Consumption		< 6W
Dimensions		DC12 : 160 x 88 x 24 (D x W x H)mm
		AC/DC48/AD : 201 x 135 x 35 (D x W x H)mm
Weight		130g
Temperature		0 ~ 60℃ (Operating), -10 ~ 70℃ (Storage)
Humidity		10 ~ 90% RH (non-condensing)
Certifications		CE, FCC, RoHS
MTBF		75,000 hrs

Application

Managed E1 Bridge
Delivering point-to-point Fast Ethernet service across E1 circuits

Central Office (CO)   Customer Premise Equipment (CPE)

EMS

IP Networking

FRM220A-iMux5 Inserts in FRM220A-CH20 chassis

STM-1

5E1

FRM220A-iMux5
5E1
10/100T(X)
LAN

FRM220A-iMux5
5E1
10/100T(X)
LAN

FRM220A-iMux5
5E1
10/100T(X)
LAN

Ordering Information

Model Name	Description
FRM220A-iMux5T-R	10/100Base-T(X) to 5 E1 mux card with 5E1 RJ45 cable
FRM220A-iMux5T-B	10/100Base-T(X) to 5 E1 mux card with 5E1 BNC cable

Note: The card is suitable for use in CH01M standalone chassis.

FRM220A – iMux5T – ☐

Example: FRM220A – iMux5T – R

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

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FRM220A-iMux8

8E1 Inverse Multiplexer

The FRM220A-iMux8 is an E1 inverse multiplexer capable of bundling up to 8 E1 lines for cost-effective connection of 10/100Base-T(X) 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.
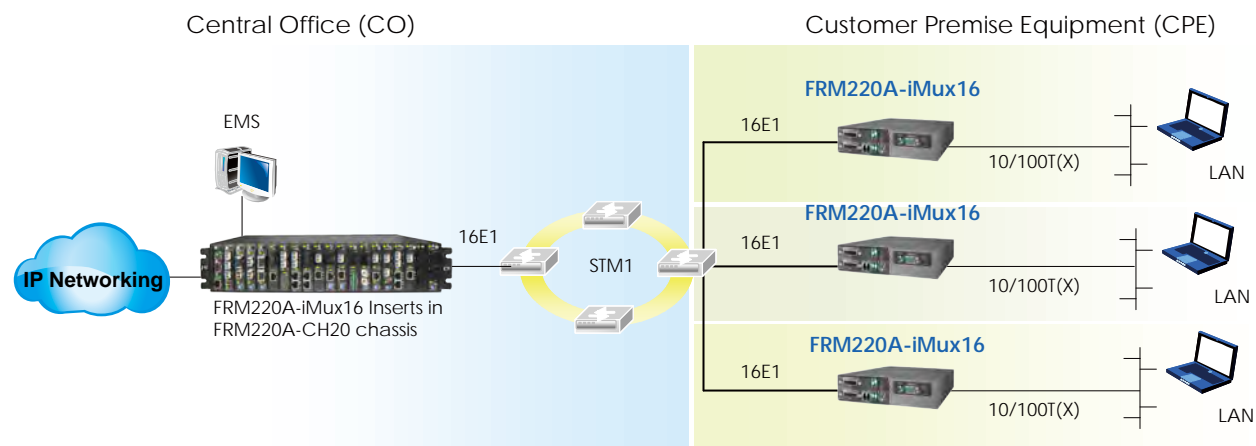
Features

- Connects one Fast Ethernet over 1-8 E1 links (1.984Mbps to 15.87Mbps)
- Built-in GFP bridge operates at WAN rate
- Auto-Negotiation
- 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
- 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	RJ45, BNC
	Diagnostics	Digital remote loopback
Ethernet Interface	Standards	IEEE 802.3, 802.3u
	Data rate	10/100Base-T(X), 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		AC adapter : 100~240VAC to 12VDC
		AC 100 ~ 240V, DC -18 ~ 75V
Power Consumption		< 12W
Dimensions		DC12 : 160 x 88 x 24mm (D x W x H)
		AC/DC48/AD : 201 x 135 x 35mm (D x W x H)
Weight		130g
Temperature		0 ~ 60°C (Operating), -10 ~ 70°C (Storage)
Humidity		10 ~ 90% RH (non-condensing)
Certifications		CE, FCC, RoHS
MTBF		65,000 hrs

Application

Central Office (CO)

Customer Premise Equipment (CPE)

EMS

IP Networking

8E1

FRM220A-iMux8 Inserts in FRM220A-CH20 chassis

STM1

FRM220A-iMux8

8E1

10/100T(X)

LAN

FRM220A-iMux8

8E1

10/100T(X)

LAN

FRM220A-iMux8

8E1

10/100T(X)

LAN

Ordering Information

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

Note: The card is suitable for use in CH01M standalone chassis.

FRM220A – iMux8T – ☐

Example: FRM220A – iMux8T – R

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FRM220A-iMux8 | **1-47**

FRM220A-iMux16

16E1 Inverse Multiplexer

The FRM220A-iMux16 is an E1 inverse multiplexer capable of bundling up to 16 E1 lines for cost-effective connection of 10/100Base-T(X) 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
- Auto-Negotiation
- 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
- 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-T(X), Half/Full duplex
		100Base-FX

Ethernet Interface	Connector	RJ45 10/100Base-T(X)
		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		AC adapter : 100~240VAC to 12VDC
		AC 100 ~ 240V, DC -18 ~ 75V
Power Consumption		< 12W
Dimensions		DC12 : 160 x 88 x 24mm (D x W x H)
		AC/DC48/AD : 201 x 135 x 35mm (D x W x H)
Weight		130g
Temperature		0 ~ 60°C (Operating), -10 ~ 70°C (Storage)
Humidity		10 ~ 90% RH (non-condensing)
Certifications		CE, FCC, RoHS
MTBF		65,000 hrs

Application

Central Office (CO)   Customer Premise Equipment (CPE)

EMS

IP Networking

FRM220A-iMux16 Inserts in
FRM220A-CH20 chassis

16E1

STM1

FRM220A-iMux16
16E1
10/100T(X)
LAN

FRM220A-iMux16
16E1
10/100T(X)
LAN

FRM220A-iMux16
16E1
10/100T(X)
LAN

Ordering Information

Model Name	Description
FRM220A-iMux16T-R	10/100Base-T(X) to 16 E1 mux card with 2x 8E1 RJ45 cables
FRM220A-iMux16T-B	10/100Base-T(X) to 16 E1 mux card with 2x 8E1 BNC cables

Note: The card is suitable for use in CH02M standalone chassis.

FRM220A – iMux16T – ☐

Example: FRM220A – iMux16T – R

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FRM220-E1/Data

Data to Fractional E1

The FRM220-E1/DATA slide in card DSU/CSU is a digital access unit for Unframed or Fractional E1 services. The FRM220-E1/DATA data channel supports user-selectable transmission rates via selected E1 timeslots, which provides integral multiples of 64kbps or 56kbps, 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 FRM220-E1/DATA front panel provides status LEDs for monitoring the CSU and DSU conditions for initiating local and remote loopback with integral BERT. The FRM220-E1/DATA features a Data cable adapter for connection to industry standard routers. When the FRM220-E1/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, 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 test.

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 / RJ45
	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	AC adapter : 100~240VAC to 12VDC	
	AC 100 ~ 240V, DC -18 ~ 75V	
Power Consumption	< 12W	
Dimensions	DC12 : 160 x 88 x 24mm (D x W x H)	
	AC/DC48/AD : 201 x 135 x 35mm (D x W x H)	
Weight	130g	
Temperature	0 ~ 60℃ (Operating), -10 ~ 70 ℃ (Storage)	
Humidity	10 ~ 90% RH (non-condensing)	
Certifications	CE, FCC, RoHS	
MTBF	65,000 hrs	

Application

Managed E1 Access Unit

FRM220-E1/Data

V35

Router

FRM220-E1/Data Inserts in
FRM220-CH20 chassis

E1 Network

V35

Router

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

Note: The card is suitable for use in CH01M standalone chassis.

FRM220 − ☐☐ / ☐☐☐ − ☐

Example: FRM220 − E1/V35 − R

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FRM220-E1/Data | **1-49**

FRM220-FOM04

4-Port E1/T1+100M Ethernet Fiber Multiplexer

FRM220-FOM04 is a modular design 4xE1/T1 + Fast Ethernet multi-service to dual strand fiber PDH multiplexer. FRM220-FOM04 provides E1/T1 transmission transparently and pure 100Mbps Fast Ethernet simultaneously. The fiber optic line is based on the SFP technology that allows a flexible use of Multimode or Single mode lines and enables the support of different wavelengths and distances. The use of bi-directional SFPs maximizes the utilization of the fiber optic line and results in saving line costs. 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.

Features

- 4 channels unframed E1/T1 (transparent)
- 10/100Base-T(X) Ethernet (100M wirespeed)
- Auto MDI/MDIX
- Auto-Negotiation or Force Mode
- Supports flow control 802.3x
- Supports 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 Dying Gasp
- 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.

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
		Nom
	"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, BNC

E1/T1 ports	Test Loops	LLB (Local Loop Back)
		NELB (Near End Loop Back)
		RLB (Remote Loop Back)
		RRLB (Request Remote Loop Back)
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		AC adapter, 12VDC
Dimensions		88 x 42 x 139mm (D x W x H)
Weight		200g
Temperature		0 ~ 60°C (Operating), -10 ~ 70°C (Storage)
Humidity		10 ~ 90% RH (non-condensing)
Certifications		CE, FCC, RoHS

Application

Managed 4E1/T1 + Fast Ethernet Fiber Optical Multiplexer
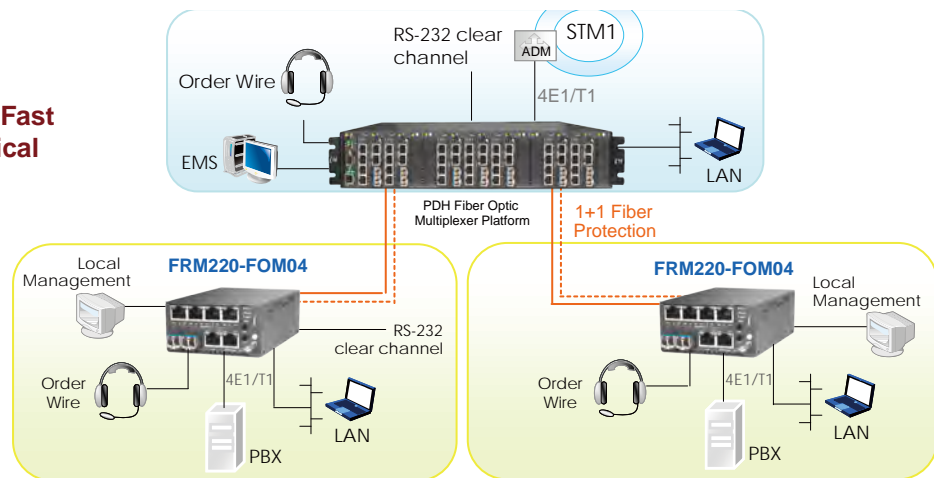
Ordering Information

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)

Note: The card is suitable for use in CH02M standalone chassis.

FRM220 – FOM04 – ☐☐

Example: FRM220 – FOM04 – SR

FRM220-FOM01

E1 / T1+100M Ethernet Fiber Multiplexer

FRM220-FOM01 is a modular design for E1/T1 + Fast Ethernet multi-service to fiber PDH multiplexer. FRM220-FOM01 provides E1/T1 transmission transparently, pure 100Mbps Fast Ethernet simultaneously. The fiber optic line gives you the options to choose from most popular fiber cabling connectors such as, ST, SC, FC or SFP-LC. Both multi-mode and single mode models are available as well as BiDi which allows bi-directional transmissions using only a single fiber cable, 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.

Features

- ◆ 1 channel unframed E1/T1 (transparent)
- ◆ 10/100Base-T(X) Ethernet (100M wirespeed)
- ◆ Auto MDI/MDIX
- ◆ Auto-Negotiation or Force Mode
- ◆ Supports flow control
- ◆ Supports 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 Dying Gasp
- ◆ 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.

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
	Transmit Frequency Tracking	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, BNC
	Test Loops	LLB (Local Loop Back)
		RLB (Remote Loop Back)
Ethernet	Interface Type	10/100Base-T(X)
	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	AC adapter, 12VDC
Dimensions	155 x 88 x 23mm (D x W x H)
Weight	130g
Temperature	0 ~ 60°C (Operating), -10 ~ 70°C (Storage)
Humidity	10 ~ 90% RH (non-condensing)
Certifications	CE, FCC, RoHS

Application

Managed E1/T1 + Fast Ethernet Fiber Optical Multiplexer

Local Management

FRM220 Chassis with FOM01 card and in-band management

STM1

ADM

E1/T1

EMS

LAN

PDH Fiber Optic Multiplexer Platform

FOM01

E1/T1

PBX

LAN

FOM01

E1/T1

PBX

LAN
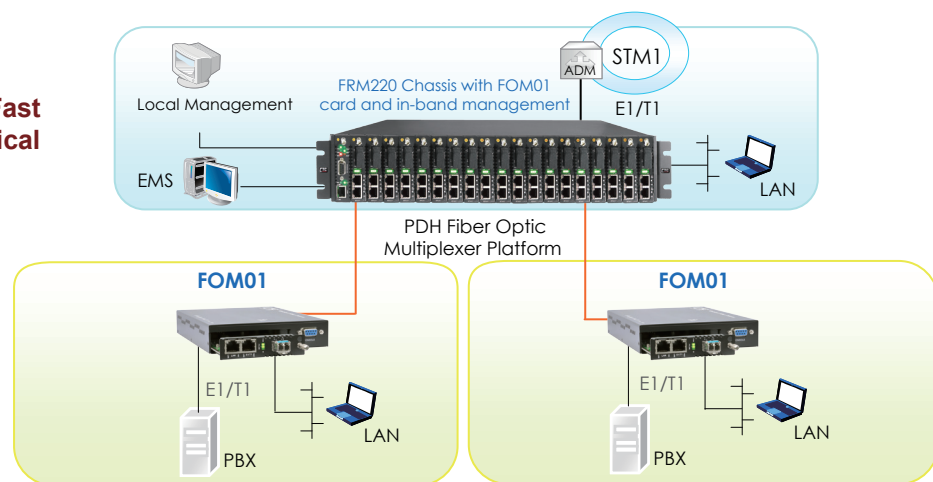
Ordering Information

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)

Note: The card is suitable for use in CH01M standalone chassis.

Connector Type   Connectivity Distance

FRM220 – FOM01 – ☐☐ – ☐☐☐☐☐

Example: FRM220 – FOM01 – SR – SC002

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

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FRM220-FOM01 | **1-51**

FMC-CH17

2U, 17-Slot Non-Managed 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 three power options, universal AC (100-240VAC), DC 18-36VDC or DC 36-72VDC. 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 FMC converter
- Chassis with single or dual built-in power for AC or DC.
- Cross flow cooling fan built-in.
- Designed for rack mounting
- FMC units are hot swappable

Specifications

Power Input	AC : 100 ~240V or		Temperature	0 ~ 50℃ (Operating), -10 ~ 70℃ (Storage)
	DC48 : 36 ~ 72V		Humidity	10 ~ 90% non-condensing
Power Consumption	< 100W		Certification	CE, FCC, RoHS
Dimensions	274 x 476 x 88 mm (D x W x H)		MTBF	65,000 hrs
Weight	7.9 kg			

FMC-CH17 overview

17-Slot

FMC Units
- Fast Ethernet
- Power over Ethernet
- Gigabit Ethernet
- Plastic Optic Fiber
- VDSL2 LAN Extender

Rackmount bracket

Card Locking mechanism

AC Power Jack

Fuse

Power Switch

FAN
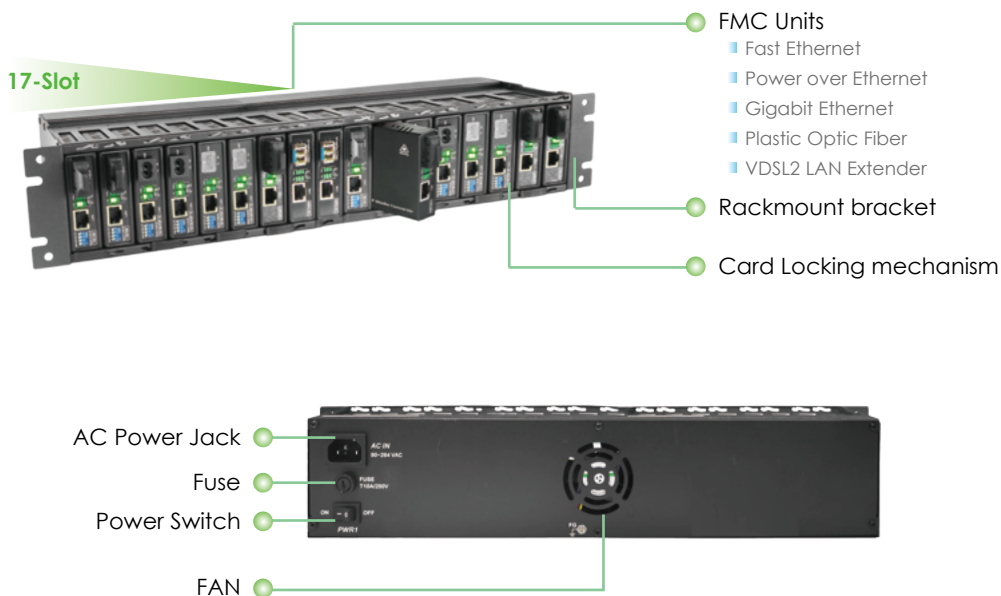
Ordering Information

Model Name	Description
FMC-CH17-AC	2U, 19", 17-Slot FMC Rack with 100 ~240VAC
FMC-CH17-DC	2U, 19", 17-Slot FMC Rack with 36~75VDC
FMC-CH17-AD	2U, 19", 17-Slot FMC Rack with AC +DC redundant power
FMC-CH17-AA	2U, 19", 17-Slot FMC Rack with AC +AC redundant power
FMC-CH17-DD	2U, 19", 17-Slot FMC Rack with DC+DC redundant power

Power Type

FMC – CH17 – ☐☐

Example: FMC – CH17 – AC

FMC-CH08

2U, 8-Slot Non-managed Chassis

The FMC-CH08 is a 2U high 10" (or half 19") chassis that supports up to 8 non-managed FMC or VDSL2 Bridge media converters. The FMC-CH08 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-CH08 chassis. When two chassis are connected in tandem, they fit exactly into a 2U 19" rack space. With one of three built-in power options of universal AC (100-240VAC), DC 18-36VDC or DC 36-72VDC, the FMC-CH08 provides the working DC voltages for up to 8 FMC or VDTU2A-301 converters. The built in cooling fan ensures that temperatures in the rack remain within the tolerated working range.

Features

- 2U, 10" (or half 19") rack supports up to 8-FMC converters
- Chassis with single built-in power available in AC or DC models.
- Cross flow cooling fan built-in.
- Designed for rack mounting in tandem or placing on a shelf
- FMC units are hot swappable

Specifications

Power Input	AC	100 ~240V
	DC24	18 ~ 36V
	DC48	36 ~ 72V
Power Consumption	< 45W	
Dimensions	196 x 252 x 89 mm (D x W x H)	

Weight	1.47 kg
Temperature	0 ~ 50℃ (Operating), -10 ~ 70℃ (Storage)
Humidity	10 ~ 90% non-condensing
Certification	CE, FCC, RoHS
MTBF	65,000 hrs

FMC-CH08 Front view

8-Slot

FMC Units
- Fast Ethernet
- Power over Ethernet
- Gigabit Ethernet
- Plastic Optic Fiber
- VDSL2 LAN Extender

Rackmount bracket

Card Locking mechanism

FMC-CH08 Back view

DC Power
Terminal block

Fuse

Power Switch
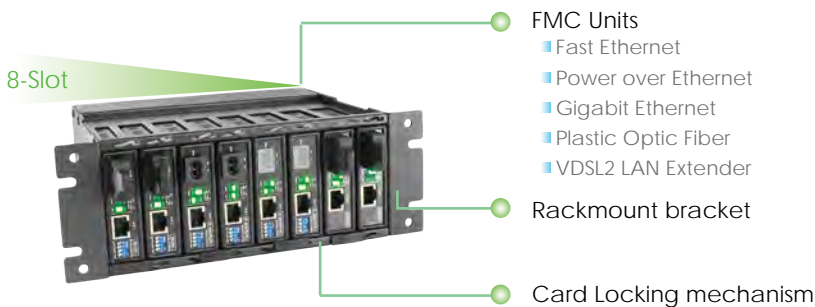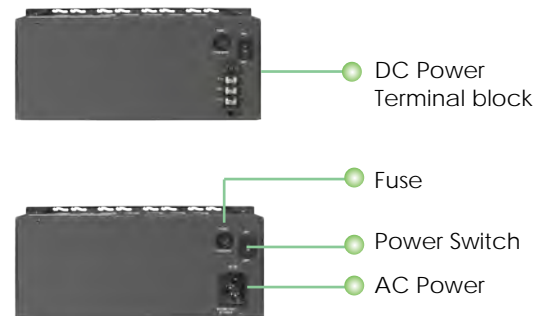
AC Power

Ordering Information

Model Name	Description
FMC-CH08-AC	2U, 10" 8-Slot FMC Rack with 100 ~ 240VAC
FMC-CH08-DC-24	2U, 10" 8-Slot FMC Rack with 18 ~36VDC
FMC-CH08-DC-48	2U, 10" 8-Slot FMC Rack with 36 ~75VDC

Power Type

FMC – **CH08** – ☐☐

Example: FMC – CH08 – AC

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FMC-CH08 | 1-53

FMC-10/100i

Fast Ethernet In-band Managed Media Converter

(With Adapter)   (Power Built-in Type)

The FMC-10/100i family are 10/100Base Ethernet to 100Base-FX fiber stand-alone converters designed for fiber connection to FRM220-10/100i card in a managed FRM220-CH20 chassis. 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-T(X) 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
	Cable type	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	Connector	RJ-45
	Data rate	10Mbps, 100Mpbs
	Duplex mode	Half / Full duplex
	Cable type	10Base-T Cat.3, 4, 5, UTP, 100Base-TX Cat.5, 5e,
	Distance	100 meters

Standards	IEEE 802.3, IEEE 802.3u, IEEE802.3ab
LEDs	Power, FX Link, TX SPD, TX Link, TX Duplex, FEF
Power Input	FMC adapter type: DC 12V In FMC power built-in type: AC 100 ~ 240V/ DC 18 ~ 72V
Power Consumption	< 4W
Dimensions	FMC adapter type:108 x 74 x 23mm (D x W x H) FMC power built-in type: 192 x 86 x 30mm (D x W x H)
Weight	FMC adapter type:120g FMC power built-in type: 0.55kg
Temperature	0 ~ 50℃ (Operating), -10~70℃ (Storage)
Humidity	10 ~ 90% non-condensing
Certification	CE, FCC, RoHS
MTBF	65,000 hrs

Application

Central Office (CO)

Customer Premise Equipment (CPE)

EMS

Remote Management

FMC-10/100i

Fast Ethernet

LAN

(Adapter Type)

Ethernet

Router/Switch

FRM220-CH20

FRM220-10/100i Inserts in FRM220-CH20 chassis

Fast Ethernet

LAN

Fast Ethernet

LAN

(Power Built-in Type)
DC 72V, AC 100 ~ 240V

Ordering Information

Model Name	Description
FMC-10/100i	10/100Base-T(X) to 100Base-FX In-band managed media converter
FMC-10/100i-AC	10/100Base-T(X) to 100Base-FX In-band managed media converter w/ AC Power
FMC-10/100i-DC	10/100Base-T(X) to 100Base-FX In-band managed media converter w/ DC Power

Connector Type   Connectivity Distance

FMC – 10/100i – ▢▢▢▢▢

Example: FMC – 10/100i – SC002

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

FMC-100M

Web Smart OAM Managed Fast Ethernet Media Converter

The FMC-100M family are Fast Ethernet 10/100Base-T(X) to 100Base-F(X) Web Smart OAM 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-100M media converters give you the options to choose from the most popular fiber cabling connectors, ST, SC, FC, or 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. These stand-alone converters may also be concentrated into either the FMC-CH08 or FMC-CH17 chassis.
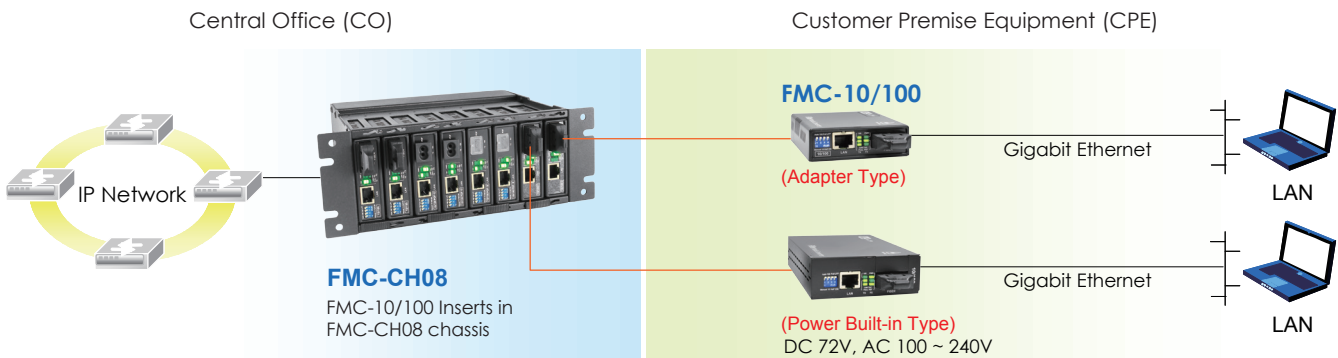
Features

- 10/100Base-T(X) to 100Base-FX Converter
- Auto-Cross over for MDI/MDIX in TP port
- Auto-Negotiation or Manual mode in TP port
- Dying gasp (remote power failure detection)
- Supports Link Fault Pass-Through (LFPT) Function
- Supports Auto Laser Shutdown (ALS) Function
- Supports flow control Enable or Disable
- Supports Jumbo Frame 9K Packet
- Ingress/Egress Bandwidth control
- Supports IEEE802.3ah-OAM management
- Firmware upgrade via Web
- Password Setting for management
- Allow IP settings Web or Console management
- Supports 16 Tag VLAN Group
- RMON counters

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)
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	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
MTBF	65,000 hrs

Application

Central Office (CO)

Customer Premise Equipment (CPE)

NMS

Backbone

FMC-CH08

FMC-100M Inserts in FMC-CH08 chassis

FMC-100M

Fast Ethernet

LAN

Ordering Information

Connector Type

Connectivity Distance

FMC – 100M – ☐☐☐☐☐

Example: FMC – 100M – SC002

Model Name	Description
FMC-100M	10/100Base-T(X) to 100Base-FX web smart OAM managed 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

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FMC-1000MS

Web Smart OAM / IP Managed Gigabit Ethernet Media Converter

(With Adapter)   (Power Built-in Type)

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 either the FMC-CH08 or 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 15/30/50/80/120km,
		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, 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	FMC adapter type: DC 12V In
	FMC power built-in type: AC 100 ~ 240V/ DC 18 ~ 72V
Power Consumption	< 4W
Dimensions	FMC adapter type:108 x 74 x 23mm (D x W x H)
	FMC power built-in type: 192 x 86 x 30mm (D x W x H)
Weight	FMC adapter type:120g
	FMC power built-in type: 0.55kg
Temperature	0 ~ 60°C (Operating), -10 ~ 70°C (Storage)
Humidity	10 ~ 90% non-condensing
Certification	CE, FCC, LVD, RoHS
MTBF	65,000 hrs

Application

Central Office (CO)   Customer Premise Equipment (CPE)

NMS

FMC-1000MS

Gigabit Ethernet

LAN

(Adapter Type)

NMS

Gigabit Ethernet

LAN

(Power Built-in Type)
DC 72V, AC 100 ~ 240V

IP Network

FMC-CH08
FMC-1000MS Inserts in FMC-CH08 chassis

Ordering Information

Model Name	Description
FMC-1000MS	10/100/1000Base-T to 100/1000Base-X SFP web smart OAM/IP managed media converter (optional SFP module)
FMC-1000MS-AC	10/100/1000Base-T to 100/1000Base-X SFP web smart OAM/IP managed media converter (optional SFP module) w/AC power
FMC-1000MS-DC	10/100/1000Base-T to 100/1000Base-X SFP web smart OAM/IP managed media converter (optional SFP module) w/DC power

FMC-10/100

Non-Managed Fast Ethernet Media Converter

(With Adapter)   *(Power Built-in Type)*

The FMC-10/100 family are Fast Ethernet 10/100Base-T(X) 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 either the FMC-CH08 or FMC-CH17 chassis.
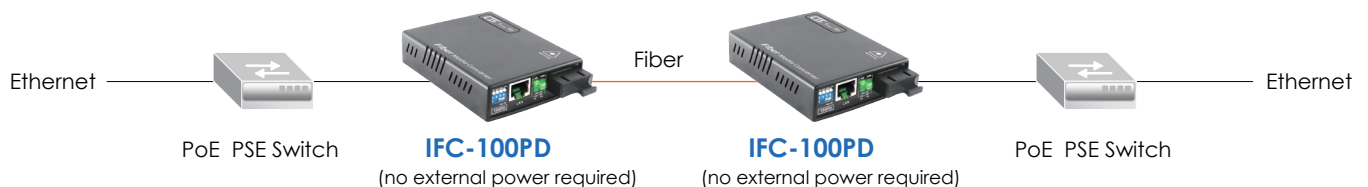
Features

- 10/100Base-T(X) 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)
- 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 15/30/50/80/120km, WDM 20/40/60/80km
	Wavelength	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	FMC adapter type: DC 48V In FMC power built-in type: AC 110 ~ 240V/ DC 18 ~ 72V
Power Consumption	< 4W
Dimensions	FMC adapter type:108 x 74 x 23mm (D x W x H) FMC power built-in type: 192 x 86 x 30mm (D x W x H)
Weight	FMC adapter type:120g FMC power built-in type: 0.55kg
Temperature	0 ~ 60℃ (Operating), -10 ~ 70℃ (Storage)
Humidity	10 ~ 90% non-condensing
Certification	CE, FCC, RoHS
MTBF	65,000 hrs

Application

Central Office (CO)

Customer Premise Equipment (CPE)

IP Network

FMC-CH08
FMC-10/100 Inserts in
FMC-CH08 chassis

FMC-10/100

(Adapter Type)

Gigabit Ethernet

LAN

(Power Built-in Type)
DC 72V, AC 100 ~ 240V

Gigabit Ethernet

LAN

Ordering Information

Connector Type   Connectivity Distance

FMC – 10/100 – ☐☐☐☐☐

Example: FMC – 10/100 – SC002

Model Name	Description
FMC-10/100	10/100Base-T(X) to 100Base-FX Non-managed media converter
FMC-10/100-AC	10/100Base-T(X) to 100Base-FX Non-managed media converter w/ AC Power
FMC-10/100-DC	10/100Base-T(X) to 100Base-FX Non-managed media converter w/ DC Power

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	

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

FMC Compact Media Converters

FMC-10/100POF

Non-Managed Fast Ethernet Plastic Optical Fiber Converter

The FMC-10/100POF family is a Fast Ethernet 10/100Base-T(X) to 100Base-FX non-managed stand-alone media converter which uses plastic optical fiber (POF). POF, as it is widely known, offers affordable, high-end connectivity for small office and home networks. With speeds of 100 Mbps optical Ethernet, it is a superior alternative to copper used in traditional networks. This is especially true for applications such as triple play and IPTV. The advantages to professional installers and amateur do-it-yourselfers are numerous. The discrete 2mm x 4.5mm duplex cable is easily concealed under carpets or easily pulled inside walls without breaking, while it can be easily cut with a pair of scissors. POF is robust enough to survive even the most novice installer. Troubleshooting is a snap as it uses 650nm visible red light to transfer data from one device to another. A quick glance inside the cable will indicate connectivity to the network by a red glow; no red light means no connection. It's that simple. POF is completely safe. Because it is a light-based solution, there is no EMI (electro-magnetic interference) so it won't interfere with or be interfered by other electrical equipment. POF is already used in millions of cars worldwide to drive entertainment and information networks and has been proven reliable even in the most rugged environments. These stand-alone converters may also be concentrated into either the FMC-CH08 or FMC-CH17 non-managed chassis.

Features

- 10/100Base-T(X) 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)
- Supports Far End Fault Indication (FEFI)
- Compact size and simple installation

Specifications

Optical Interface	Connector	Optolock
	Data rate	125Mbps
	Duplex mode	Full duplex
	Fiber	Duplex POF cable
	Distance	MM 50 meters
	Wavelength	MM 650nm
	Source	LED
Electrical Interface	Connector	RJ-45
	Data rate	10Mbps, 100Mbps
	Duplex mode	Half / Full duplex
	Cable	10Base-T Cat.3, 4, 5, UTP,

Electrical Interface	Cable	100Base-TX Cat.5, 5e or higher
Standards		IEEE 802.3, IEEE 802.3u, IEEE802.3ab
Indications		LED (Power, FX Link, TX SPD, TX Link, TX Duplex, FEF)
Power Input		12VDC
Power Consumption		< 4W
Dimensions		97 x 74 x 23mm (D x W x H)
Weight		120g
Temperature		0 ~ 50℃ (Operating), -10 ~ 70℃ (Storage)
Humidity		10 ~ 90% non-condensing
Certification		CE, FCC, RoHS
MTBF		65,000 hrs

Easy to Install

Step 1   Step 2   Step 3
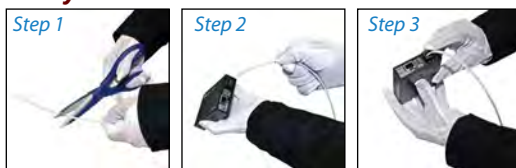
Step 1: Simple cut POF with sharp scissors or razor blade
Step 2: Hold the "Optolock^{TM}" and insert the cables all the way
Step 3: Press the "Optolock^{TM}" to lock the cable

On remote side, the cable with visible red LED indication must plug in the RX port. The link is then complete.

Application

FRM220

Miniswith

Multi-service Platform

FMC-10/100POF

Router

Fiber Ring

FRM220

FMC-10/100POF

FRM220

FMC-CH08 Chassis

Switch

FRM220

FMC-10/100POF

Fiber to the Home Solution
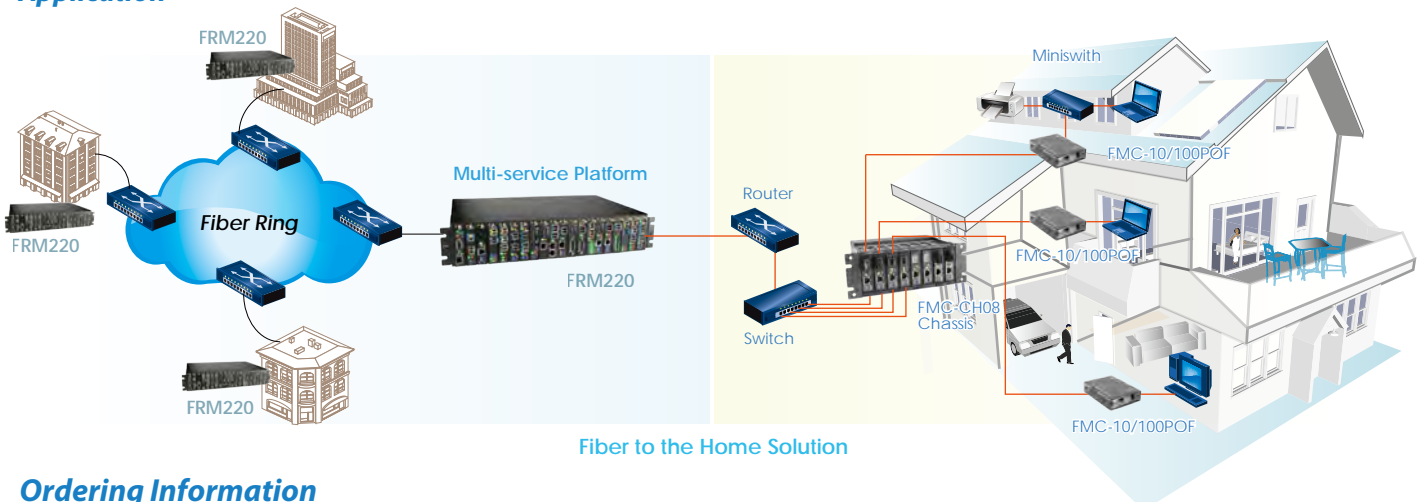
Ordering Information

Model Name	Description
FMC-10/100 POF-O	10/100Base-T(X) to 100Base-FX POF, Optolock connector

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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	95 x 50 x 22mm (D x W x H)
Weight	90g
Environment	0 ~ 50℃, 20 ~ 95% RH
	-20 ~ 80℃, < 95% RH
Certification	CE, FCC, RoHS

Application

FIB-232A   **FIB-232A**

RS-232   Fiber link   RS-232

Single Mode 120km
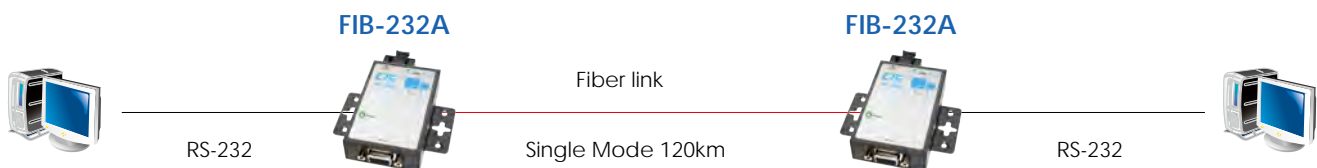
Ordering Information

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   Connectivity
Type   Distance

FIB – **232A** – ☐☐☐☐☐

Example: FIB – 232A – SC002

Specifications & design are subject to change without prior notice. Please visit CTC Union website for more details.
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FIB-232A | **1-59**

IFC-100PD

Non-Managed Power Over Ethernet PD Converter

The IFC-100PD is Power over Ethernet 10/100Base-T(X) 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-T(X) 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)
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
	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℃ (Operating), -10 ~ 70℃ (Storage)
Humidity	10 ~ 90% non-condensing
Certification	CE, FCC, RoHS
MTBF	65,000 hrs

Application

Ethernet — PoE PSE Switch — **IFC-100PD** (no external power required) — Fiber — **IFC-100PD** (no external power required) — PoE PSE Switch — Ethernet

Ordering Information

Model Name	Description
IFC-100PD	10/100Base-T(X) to 100Base-FX PoE PD media converter

IFC – 100PD – ☐☐☐☐☐
Connector Type   Connectivity Distance

Example: IFC – 100PD – SC002

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

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℃ (Operating), -10 ~ 70℃ (Storage)
Humidity	10 ~ 90% non-condensing
Certification	CE, FCC, LVD, RoHS
MTBF	75,000 hrs

Application

Central Office (CO)　　　　Customer Premise Equipment (CPE)

NMS

IP Networking

Router/Switch

FRM220-1000MS
Inserts in FRM220
Chassis

IFC-1000PSE/A
Fiber
IEEE 802.3af PSE
Ethernet
(Data+ power)
IP Camera

IFC-1000PSE/A
Fiber
IEEE 802.3af PSE
Ethernet
(Data+ power)
VoIP Phone
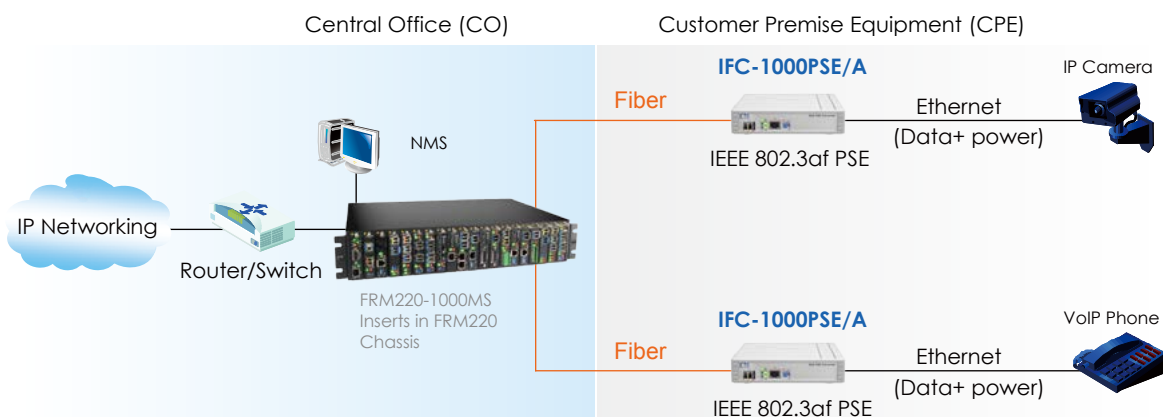
Ordering Information

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

Specifications & design are subject to change without prior notice. Please visit CTC Union website for more details.
CTC UNION TECHNOLOGIES CO., LTD.　www.ctcu.com

IFC-1000PSE , IFC-1000PSE/A | **1-61**

Metro Ethernet

Europe

America

Asia
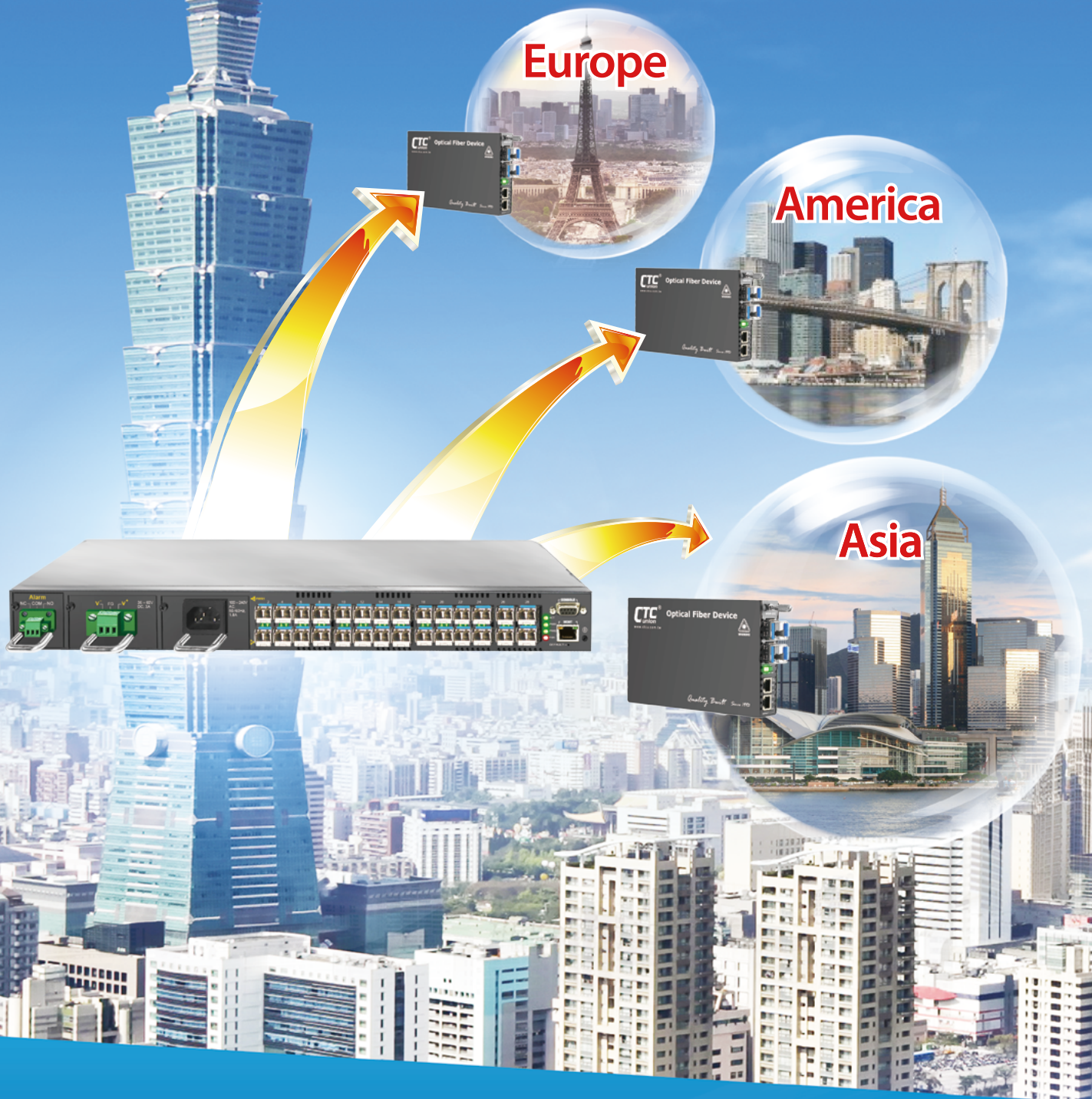
Scalability as service demand drives

Fully Ethernet OAM enabled

MEF standards compliant solution

MEF
member

MSW-4424A
MSW-3424A

L2 Gigabit OAM Managed Fiber Access Switch

NEW

The CTC Union unveils two new layer 2 Gigabit Ethernet switches – MSW-4424A and MSW-3424A which are positioned as a Carrier Ethernet access switch solution. They are equiped with 24 100Base-FX/1000Base-X dual speed SFP slots and 4 10G Base-X SFP+ or 1000Base-X SFP uplink slots. The MSW-4424A and MSW-3424A offer the best flexibility and scalability for operators or service providers to deploy their Metro Ethernet or FTTX networks.

Aimed specifically for Metro Ethernet and FTTX deployment, the specifications of MSW-4424A and MSW-3424A fully meet the attributes of Carrier Ethernet proposed by MEF. They comply with MEF 9 standard to support E-Line/E-LAN services and MEF 14 standard to enable the bandwidth profile configuration delivering SLA (Service Level Agreement) for end-to-end performance characteristics. They also support advanced service OAM management and Ethernet synchronization features 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 IEEE 1588 V2 and SyncE
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(MSW-4424A)		Security	IEEE 802.1x port based access control,
	100/1000Mbps SFP slots *24 + 1000Mbps SFP slots *4(MSW-3424A)			MAC based access control authentication,
Console Port	RJ-45 console port x 1			RADIUS authentication, limited MAC address learning,
Filter & Forward Rate	10M (14880/14880pps); 100M (148800/148800pps);			IP/MAC binding, ACL rule based filtering, TACACS+,
	1000M (1488000/1488000pps)			IP source guard, DHCP snooping/relay option 82,
Transmission method	Store and Forward Switching			ARP inspection, IP source guard
Standard	IEEE 802.3u, IEEE 802.3z, IEEE 802.3ae, IEEE 802.3x,		IP multicasting	IGMP throttling, IGMP filtering, IGMP fast leave,
	IEEE 802.1p, IEEE 802.1Q, IEEE 802.1ad, IEEE 802.1D,			IGMP snooping v1/v2/v3, MVR, MLD snooping v1/v2
	IEEE 802.1w, IEEE 802.1s, IEEE 802.1x, IEEE 802.3ad,		Storm Control	Unicast/Broadcast/Multicast storm suppression
	IEEE 802.3ah, IEEE 802.1ag, ITU-T Y.1731		Management	Web/Telnet CLI/SNMP/console interface, Web/CLI
Packet Buffer	4M Bytes			authentication, SSH v2, HTTPs, port mirroring,
Mac Table Size	8K			system syslog, IPv6 management, NTP, SNTP
Max. Packet Size	10K Bytes		SNMP agent	SNMP v1/v2c/v3
VLAN feature	IEEE 802.1Q tagged VLAN, port based VLAN,		Software upgrade	TFTP / HTTP / HTTPs
	MAC based VLAN, protocol based VLAN,		Ethernet OAM	IEEE 802.3ah / IEEE 802.1ag / ITU-T Y.1731, Sync. Ethernet,
	private VLAN, IEEE 802.1ad Q-in-Q		management	IEEE 1588 V2 (Optional)
QoS feature	IEEE 802.1p 8 priority queues per port, CoS based		LED display	Power, System, Console, Link/Act, Speed
	on switch port; VLAN ID; DSCP; TCP/UDP port,		Power input	100V ~ 240V AC, -36 ~ -72V DC
	IEEE 802.1p priority tag remarking, DSCP remarking,		Power consumption	< 50W
	Port based ingress/egress rate limit		Operating temperature	0 ~ 50°C
L2 switching protection	STP, RSTP, MSTP, ITU-T G.8032 Ethernet ring protection		Humidity	5% ~ 90% (non-condensing)
Trunking	IEEE 802.3ad LACP		Dimension	270.3 x 437.5 x 43.5 (D x W x H)mm
			Regulatory	FCC, CE, RoHS

Application

Mobile Backhaul Application
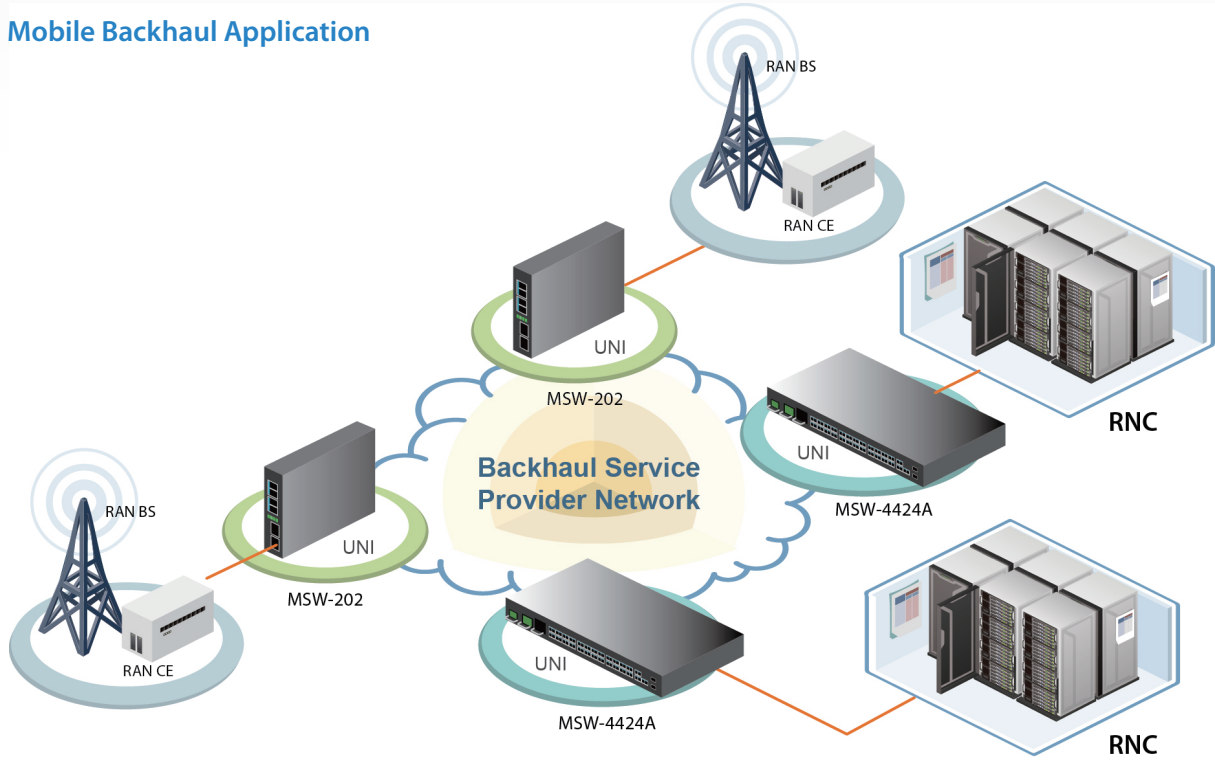
Ordering Information

Model Name	Description
MSW-4424A	24x100/1000Base-X(SFP) + 4 x 10GbE(SFP+) L2 Gigabit OAM managed Fiber Access Switch
MSW-3424A	24x100/1000Base-X(SFP) + 4 x GbE(SFP) L2 Gigabit OAM managed Fiber Access Switch

MSW – ☐☐☐☐☐

Example: MSW – 4424A

Specifications & design are subject to change without prior notice. Please visit CTC Union website for more details.
CTC UNION TECHNOLOGIES CO., LTD.   www.ctcu.com

MSW-202

Ethernet Demarcation Device

CTC Union's carrier Ethernet demarcation transports Gigabit Ethernet (GbE) traffic over fiber, enabling EPL (Ethernet Private Line) & EVPL (Ethernet Virtual Private Line) services with advanced carrier Ethernet features per MEF (Metro Ethernet Forum 9 and 14 specifications). Supporting link and service Ethernet OAM schemes, the CTC Carrier Ethernet Demarcation Device also provides extensive fault detection and diagnostic capabilities to ensure that actual network use complies with pre-agreed service level agreements (SLAs).

Features

- MEF 9, MEF 14: EPL and EVPL
- 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 IEEE802.1x support
- Jumbo frame for up to 9.6K
- Extensive Ethernet OAM support
  - IEEE802.3ah, IEEE802.1ag, ITU-T Y.1731
- SNMP v1/v2c/v3, Telnet, Web GUI

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℃ (Operating); -10 ~ 70℃ (Storage).
Humidity	20 - 80% non-condensing (Operating); 10-90% (Storage).
Power Consumption	Consumption: < 12W

Customer Equipment

MEF member

UNI

Customer Responsiblity

Service Provider Responsibility

Service Provider Network
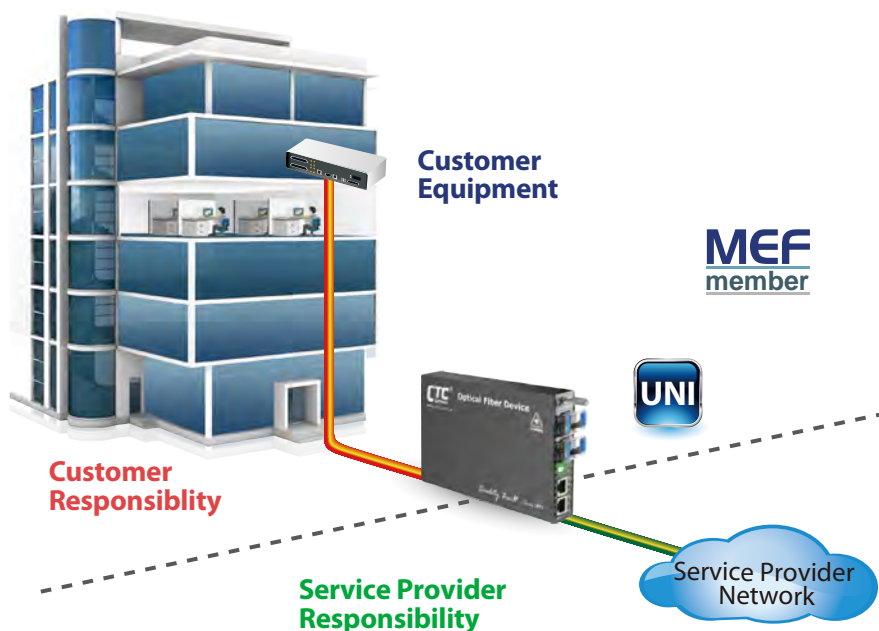
Application

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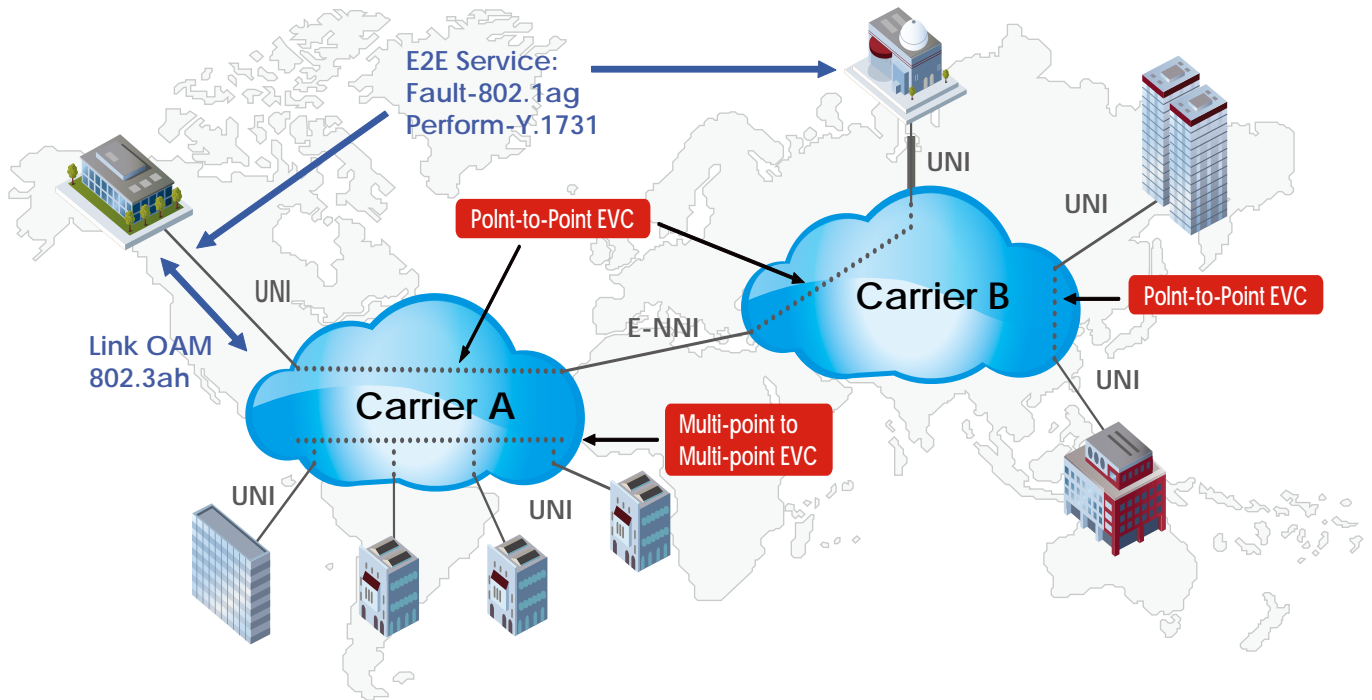
First mile Ethernet fiber access

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 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 / IP Swith

ESW-4424M
ESW-3424M

L2 Managed Gigabit Ethernet Switches

NEW

The CTC Union ESW-4424M/3424M is positioned as a layer 2+ Gigabit managed Ethernet switch solution. It provides 24 100Base-FX / 1000Base-X dual speed SFP slots 4 10GBase-X or 1000Base-X SFP uplink slots.

An all front access design fulfills the concept of NEBS (Network Equipment-Building System). All system modules, including fiber transceivers, power supply and FAN are hot swappable. Also, the ESW-4424M/3424M supports AC or DC power supplies and power redundancy function to enhance high network availability. In case any component module failure occurs, the network administrator can easily swap the failed module without impacting the network service.

More and more corporations are adapting new IT technologies over the network such as voice over IP and video conferencing into daily operations to improve productivity and save operation expenditure. As business grows, the expansion of networks inside enterprises increases as well. Any network fault or incident will cause serious loss during network downtime for enterprises. Therefore, a high performance and robust switch solution, to guarantee availability and resiliency of network operations is essential for business.

Common Key Features and Benefits

Complete network security by isolating groups
VLANs provide network segmentation, partitioning and segregation of business functional groups into their private LAN of enterprise.

Various security mechanisms to restrict un-authorized access
CTC Union switches support various mechanisms from layer 2 to layer 4 security inspection and make it easy for network administrators to easily deploy security policy and manage the network services accessible inside the enterprise.

Various management connectivity
CTC Union switches offer convenient management interfaces. Secure features such as SSH, HTTPS and SNMP v3 protect data by encrypting the administrative traffic to prevent hackers from interception and attack.

Specifications

Interface	100/1000Mbps SFP slots * 24 + 10Gbps SFP+ slots * 4 (ESW-4424M)
	100/1000Mbps SFP slots * 24 + 1000Mbps SFP slots * 4 (ESW-3424M)
Console Port	RJ-45 console port * 1
Filter & Forward Rate	10M (14880/14880pps); 100M (148800/148800pps); 1000M (1488000/1488000pps)
Transmission Method	Store and Forward Switching
Packet Buffer	32 Mbits
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	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
LED Display	Power, System, Console, Link/Act, Speed
Power Input	100V ~ 240V AC, -36 ~ -72V DC
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)
Regulatory	FCC, CE, RoHS

Application

Ordering Information

Model Name	Description
ESW-4424M	100/1000Mbps SFP slots * 24 + 10Gbps SFP+ slots*4 L2 Gigabit Ethernet managed fiber switch
ESW-3424M	100/1000Mbps SFP slots * 24 + 1Gbps SFP slots*4 L2 Gigabit Ethernet managed fiber switch

ESW – ☐☐☐☐☐

Example: ESW – 4424M

GSW-3424M1

24x 10/100/1000Base-T RJ45 +
4x 100/1000Base-X SFP
L2 Managed Switch

GSW-3424M1 is a cost-effect high performance L2 Ethernet managed switch - 24* 10/100/1000Mbps TX ports and 4* SFP ports are supported. This switch supports remote management by SNMP, HTTP and Telnet interfaces, and local management by console interface. GSW-3424M1 supports many L2 switch management functions, e.g. 802.1Q VLAN, 802.1x Port Security, Rate Control, Port Configuration, Port Mirroring, Port Statistics, QoS functions, ... etc.   Auto-MDIX function is supported for every TX port of the switch for easy cable connection.

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

Central Office (CO)

Customer Premise Equipment (CPE)

Media Converter

Internet

L2 Managed Switch

GSW-3424M1

Multi-Service Platform

Media Converter

Department-4

Department-3

Department-2

Department-1

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℃ 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	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-3208M1

8x 10/100/1000Base-T RJ45 +
2x 100/1000Base-X SFP
L2 Managed Switch

GSW-3208M1 is a cost-effect high performance L2 Ethernet management switch - 8* 10/100/1000Mbps TX ports and 2* SFP ports are supported. This switch supports remote management by SNMP, HTTP and Telnet interfaces, and local management by console interface. GSW-3208M1 supports many L2 switch management functions, e.g. 802.1Q VLAN, 802.1x Port Security, Rate Control, Port Configuration, Port Mirroring, Port Statistics, QoS functions, ... etc.   Auto-MDIX function is supported for every TX port of the switch for easy cable connection.

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	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	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	250 x 117 x 37 mm(W x D 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

FSW-2104

Non-Managed Fast Ethernet 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-T(X) 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℃ (Operating), 0 ~ 70℃ (Storage)
Humidity		10 ~ 90% non-condensing
Certification		CE, FCC, RoHS
MTBF		65,000 hrs

Application

Fast Ethernet

Fast Ethernet

FSW-2104

Fast Ethernet

Fast Ethernet

IP Network

Ethernet Switch
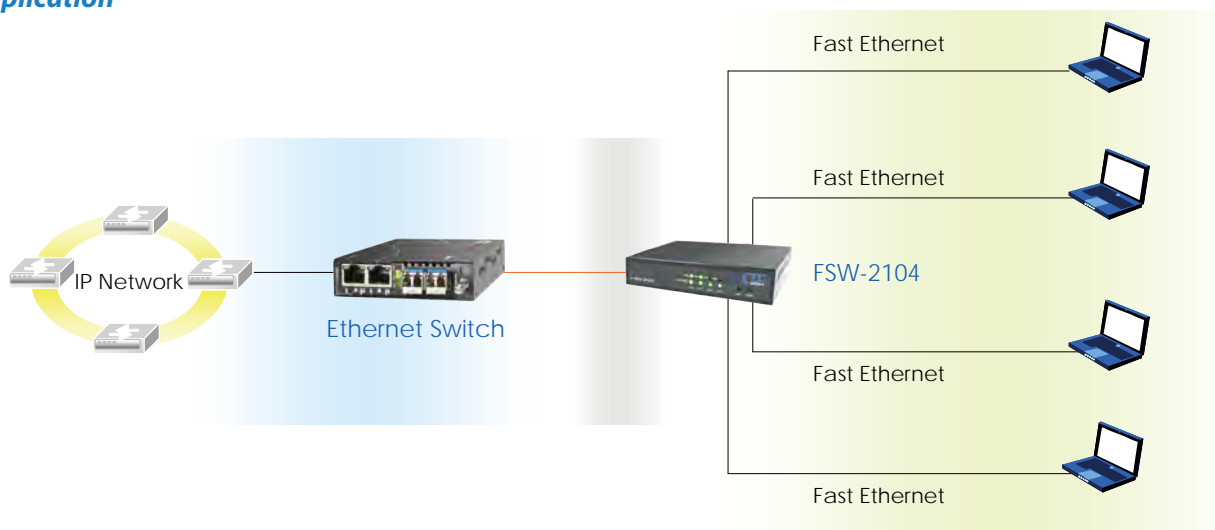
Ordering Information

Model Name	Description
FSW-2104	4-port 10/100Base-T(X) to 100Base-FX unmanaged 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

ESW-3105M

L2 Managed Gigabit Ethernet Switch

NEW

The CTC Union ESW-3105M is positioned as a layer 2 managed Gigabit Ethernet switch solution for high speed connectivity with popular traffic priority and management capability for small and medium business. It features 5-port 10/100/1000Base-T RJ45 and 1 uplink 100/1000Base-X SFP slot. The ESW-3105M is designed with 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 ESW-3105M also supports features such as VLAN, QoS, IGMP for multicast application and network management to fulfill SMB requirements. It will indeed deliver a cost effective Gigabit Ethernet solution to meet the converged applications for enterprise customers.

Features

- 5-ports 10/100/1000Base-T RJ45 + 1 uplink 100/1000Base-X SFP slot
- Supports 10K 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
- Optional kits for rack mountable installation

Specifications

Interface	10/100/1000Base-T x 5 + 100/1000Base-X SFP uplink x1
HW capability	Non-blocking wire speed switching performance
	10K bytes jumbo frame forwarding
	2K MAC address table
VLAN feature	IEEE 802.1Q tagged VLAN, IEEE 802.1ad Q-in-Q
QoS feature	IEEE 802.1p 4 priority queues per port
Bandwidth Control	Per port based egress/ingress rate limit control
IP multicasting	IGMP snooping v1/v2
Storm Control	Unicast/Broadcast/Multicast storm suppression

Configuration and Network management	Web/Telnet/SNMP management interface TFTP/HTTP firmware upgrade
SNMP agent	SNMP v1/v2c
Optical interface	SFP-LC connector
Power input	100V ~ 240V AC
Operating Temperature	0 ~ 50°C
Humidity	5% ~ 90% (non-condensing)
Dimensions	170 × 120 × 35mm (D x W x H)
Regulatory	FCC, CE, RoHS

Application

Ordering Information

Model Name	Description
ESW-3105M	10/100/1000Base-T RJ45 * 5 +100/1000Base-X SFP slot*1 L2 Managed Gigabit Ethernet switch

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PHB-200

Managed SFP Patching Hub
20-port 100/1000-T(X) to 20-port 100/1000-X SFP

NEW

PHB-200 is a 20-channel SFP patching hub that converts Ethernet copper 100/1000Mbps 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(X) 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
- Supports 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
Electrical Interface	Connector	RJ45
	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(X) Cat.5, 5e or higher

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
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 ~ 60℃ (Operating), -10 ~ 70℃ (Storage)
Certification	CE, FCC, LVD, RoHS

Application

Packet Switched Network — FE/GbE — Ethernet Switch with Copper Ports — **PHB-200** with Fiber SFPs — Fiber — Ethernet

NMS
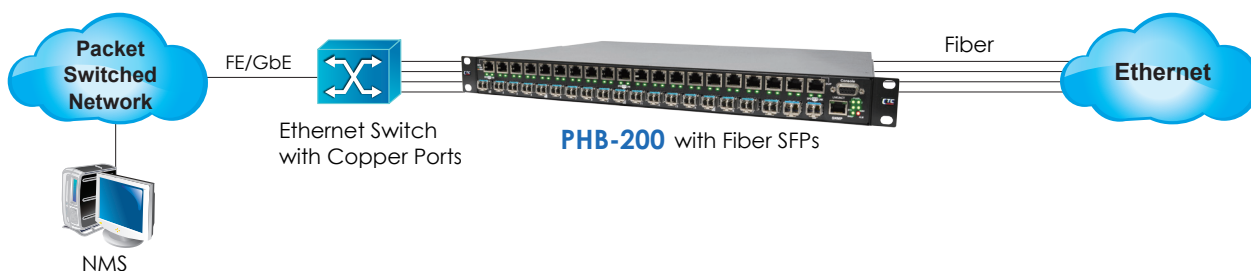
Ordering Information

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

Power Type

PHB – 200☐ – ☐☐

Example: PHB – 200M – AC

Specifications & design are subject to change without prior notice. Please visit CTC Union website for more details.
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PHB-200 | 1-75

FTH4-100M

OAM/IP Managed Fast Ethernet Media Converter with Fiber Cable Tray

The FTH4-100M is an IEEE802.3ah OAM compliant copper to fiber Fast Ethernet solution designed to make conversion between 10/100Base-T(X) and 100Base-FX with SC, FC ,ST connector. The FTH4-100M has a built-in cable tray that allows the user 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 local 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 band-width 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)
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			IEEE802.3, IEEE802.3u, IEEE802.3ah
Indications			LED (Power, FX-Link, LAN Speed, LAN Link)
Power	External		Input Voltage:100 - 240VAC
	Adapter		Output Voltage:12VDC
Power Consumption	< 4W		
Dimensions	220 x 140 x 27mm (D x W x H)		
Weight	0.72kg		
Temperature	0 ~ 60℃ (Operating), -10 ~ 70℃ (Storage)		
Humidity	10 ~ 90% non-condensing		
Certification	CE, FCC, LVD, RoHS		
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.
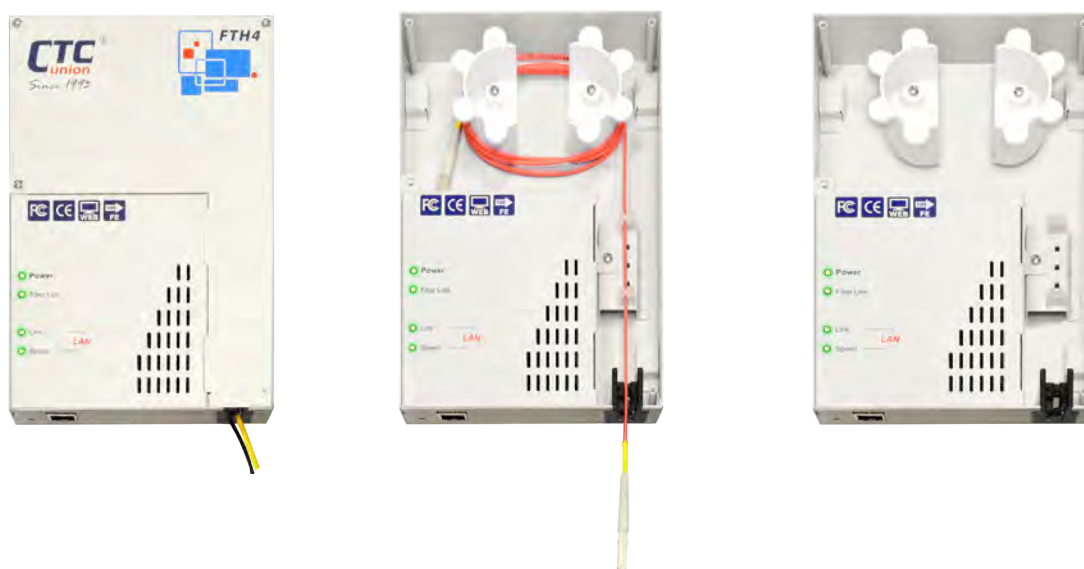
Ordering Information

Model Name	Description
FTH4-100M	10/100Base-T(X) to 100Base-FX Web Smart OAM/IP managed media converter w/ cable tray

Specifications & design are subject to change without prior notice. Please visit CTC Union website for more details.
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FTH4-100M | 1-77

FTH4-1000MS

OAM/IP Managed Giga Ethernet Media Converter with Fiber 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 LC connector. The FTH4-1000MS has a built-in cable tray that allows the user 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 of both local 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 band-width 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)	
Electrical Interface	Connector	RJ-45	
	Data rate	10Mbps, 100Mbps, 1000Mbps	
	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 IEEE 802.3ab, IEEE 802.3z		
Indications	LED (Power, FX-Link, LAN Speed, LAN Link)		
Power	External Adapter	Input Voltage:100 - 240VAC Output Voltage:12VDC	
Power Consumption	< 4W		
Dimensions	220 x 140 x 27mm (D x W x H)		
Weight	0.72kg		
Temperature	0 ~ 60°C (Operating), -10 ~ 70°C (Storage)		
Humidity	10 ~ 90% non-condensing		
Certification	CE, FCC, LVD, RoHS		
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

Specifications & design are subject to change without prior notice. Please visit CTC Union website for more details.
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FTH4-1000MS | **1-79**

NEW

GSW-1005MS

OAM/IP Managed Gigabit Ethernet Switch
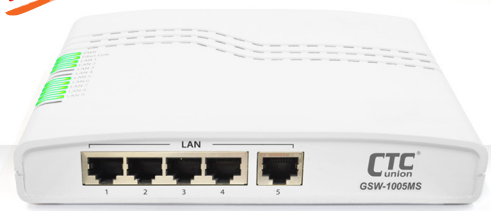
The GSW-1005MS is an IEEE 802.3ah OAM compliant Gigabit Ethernet CPE switch designed to make conversion between 5-Port 10/100/1000Base-T RJ45 and 1 port 100/1000Base-X fiber optics with SFP LC connector. The traditionally transmission distance of Gigabit Ethernet over RJ45 copper interface can be extended from 550m to 100km over fiber optics interface. Also, the GSW-1005MS has a built-in cable tray that allows the user to enclose the excessive fiber within the switch. It provides protection for the sensitive fiber at subscriber site. The GSW-1005MS is fully compliant with IEEE 802.3, 802.3u, 802.3ab and 802.3z standards. Users can simply connect the other device such as Ethernet home gateway, wireless access point or NIC on PC/laptop via 10/100/1000Base-T twisted pair RH-45 port of GSW-1005MS CPE switch without crossover the Ethernet cable and monitor the device status over the comprehensive LED display. 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 local and remotely. By offering IEEE 802.3ah compliant OAM standard, it can be linked to any IEEE802.3ah OAM compliant fiber access switch and support loop back and dying gasp functions. All of the enabled Layer 2 features and functions of FTH-1005MS can be configured and monitored via web management interface. The GSW-1005MS is the most suitable solution for deploying and provisioning FTTX service of operators or service providers.

Features

- 5-Port 10/100/1000Base-T + 100/1000Base-X SFP uplink
- Support 9.6K Bytes jumbo frame
- Support IEEE 802.3ah OAM in-band management
- Support IEEE 802.1Q tagged VLAN & Q-in-Q VLAN stacking

- Support IEEE 802.1p priority queue
- Support IGMP snooping v1/v2
- Support DHCP auto provisioning
- Build-in fiber cable tray

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 4 priority queues per port
Bandwidth Control	Per port based egress/ingress rate limit control
IP multicasting	IGMP snooping v1/v2
Storm Control	nicast/Broadcast/Multicast storm suppression

Configuration and Network management	Web/Telnet/SNMP management interface IEEE 802.3ah OAM in-band management DHCP auto provisioning TFTP/HTTP firmware upgrade
SNMP agent	SNMP v1/v2c
Optical interface	SFP-LC connector
Power input	100V ~ 240V AC
Operating temperature	0 ~ 50℃
Humidity	5% ~ 90% (non-condensing)
Dimensions	120 x 170 x 35 mm(D x W x H)
Regulatory	FCC, CE, RoHS
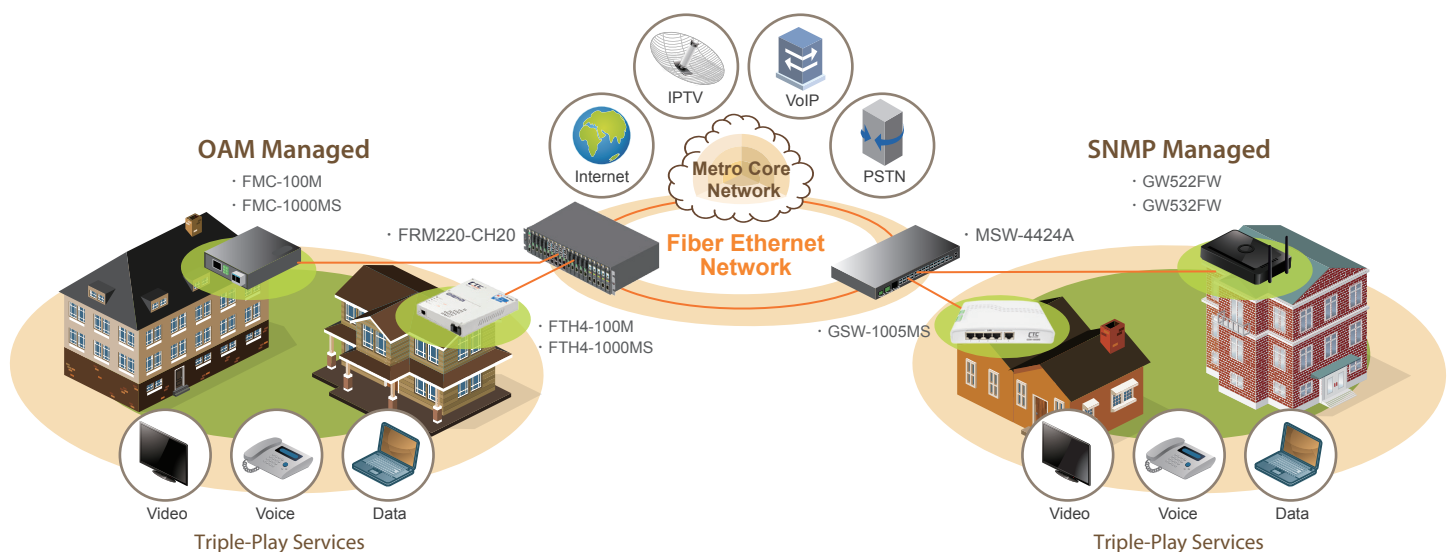
Application

OAM Managed
- FMC-100M
- FMC-1000MS
- FRM220-CH20
- FTH4-100M
- FTH4-1000MS

IPTV
VoIP
Internet
Metro Core Network
PSTN

Fiber Ethernet Network

- MSW-4424A
- GSW-1005MS

SNMP Managed
- GW522FW
- GW532FW

Video Voice Data
Triple-Play Services

Video Voice Data
Triple-Play Services

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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 GSW-1005MS , which supports lower latency for certain delay-sensitive traffic. The GSW-1005MS can classify the packet as one of the four priorities according to VIP port.

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 GSW-1005MS 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 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 1000Base-X OAM/IP managed Gigabit Ethernet Switch (cable tray optional)

SML-SNMP

Network Management Controller

The SML-SNMP is the Network Management Controller card that can be placed in a compatible SML2000 or SML5000 chassis to provide network management functions. The management interface supports a local RS-232 serial console or remote TCPIP management by Telnet, HTTP or SNMP protocols. The card is designed to be hot swapped so that it may be field replaced without affecting any online service of any other rack cards. The card also supports online firmware upgrade from TFTP server, using any user interface. Support for any standard NMS is provided by the included proprietary MIB file.

Features

- Communicates with CWDM Control Card by RS-485
- Management control to Mux/Demux card, Protection card and Transponder Card
- SNMP v1 Trap, MIB file
- 3 ports 10/100TX UTP ports plus 2 x100Mbps SFP slot

- Telnet access control
- Real-Time Clock feature
- TFTP SNMP F/W upgrade
- In chassis cascade mode, only chassis #0 SNMP card works, the other Chassis #1 to #5 SNMP cards are idle.

Specifications

Electrical	Console RS232 port
Interface	3x LAN 10/100Base-TX
	2 x 100Base-FX SFP slot
Management Interface	SNMP management: provide all system for Network management functions: software updates, and management system interaction through Ethernet port
	Out-band management : supports Web,Telnet and SNMP management

Indications	PWR, LAN LNK/SPD
Dimensions	220 x 162 x 25mm (D x W x H)
Weight	0.9kg
Temperature	0 ~ 50℃ (Operating), -10 ~ 60℃ (Storage)
Humidity	10 ~ 90% non-condensing
Certification	CE, FCC, LVD, RoHS
MTBF	65,000 hrs

Web GUI Manager

Console / Telnet Management

Ordering Information

Model Name	Type	Description
SML50-SNMP	NMC Card	5U Chassis SNMP card supports web, telnet, console , SNMP functions
SML20-SNMP	NMC Card	2U Chassis SNMP card supports web, telnet, console , SNMP functions

SML ☐☐☐☐ **– SNMP**

Example: SML 50 – SNMP

SML-TR12
SML-TR22

Dual Channel 1.25G / 2.5G Transponder

The transponder card converts a data signal to the correct wavelength for transmission on a specific CWDM channel. By supporting SFP optics on both line side and client side interfaces, the transponder provides a truly flexible and easy to deploy solution for all applications. The transponder supports 2R regeneration, which consists of re-amplification and reshaping.

Features

- 2R regeneration (Re-amplification and reshaping)
- Line rate support from 100Mbps up to 2.5Gbps
- Client Side Wavelengths: 850, 1310, 1550nm

- Line Side CWDM Wavelengths: 1471/ 1491/ 1511/ 1531 / 1551/ 1571/ 1591/ 1611nm
- Optical Connector: SFP-LC (On both Line & Client Side)

Specifications

Optical Interface	Connector	SFP LC
	Data rate	100Mbps, 1.25Gbps, 2.5Gbps
	Fiber	MM 62.2/125µm, 50/125µm, SM 9/125µm
	Distance	550m to 60km
	Wavelength	850, 1311, 1471 ~ 1611nm
Indication	Power, Link(Line), Link(Client), TX/Act, Loopback	
Power Input	12 VDC	

Power Consumption	1channel <5W, 2 channel <10W
Dimensions	220 x 162 x 25mm (D x W x H)
Weight	0.9kg
Temperature	0 ~ 50℃ (Operating), -10 ~ 70℃ (Storage)
Humidity	10 ~ 90% non-condensing
Certification	CE, FCC, RoHS
MTBF	57,000 hrs

Application

CWDM 2-Service over dual fiber with Protection

City-A

City-B

G.SHDSL

ADSL

FXS/ FXO

DLC

Fiber Redundant

Mux / Demux

G.SHDSL

ADSL

FXS/ FXO

DLC

Storage

Primary Line

Storage

Storage

IP SAN

Secondary Line

IP SAN

Storage

Storage

Mux/ Demux

Transponder
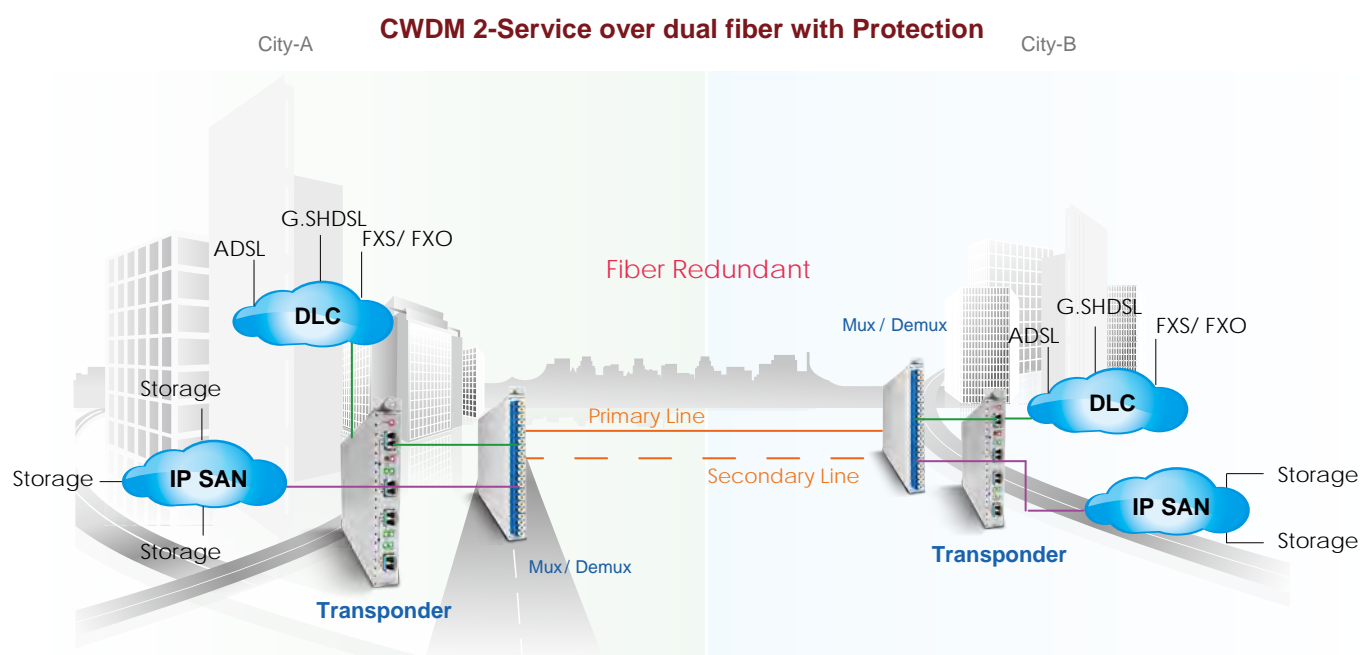
Transponder

Ordering Information

Model Name	Type	Description
SML-TR12	NMC Card	1.25G, 2 Ch Transponder card
SML-TR22	NMC Card	2.5G, 2 Ch Transponder card

SML – ☐☐☐☐

Example: SML – TR12

Specifications & design are subject to change without prior notice. Please visit CTC Union website for more details.
CTC UNION TECHNOLOGIES CO., LTD.   www.ctcu.com

SML-TR12 , SML-TR22 | 1-83

SML-MD51
SML-MD91

5 / 9 Channel MUX/DeMUX with Monitor Port
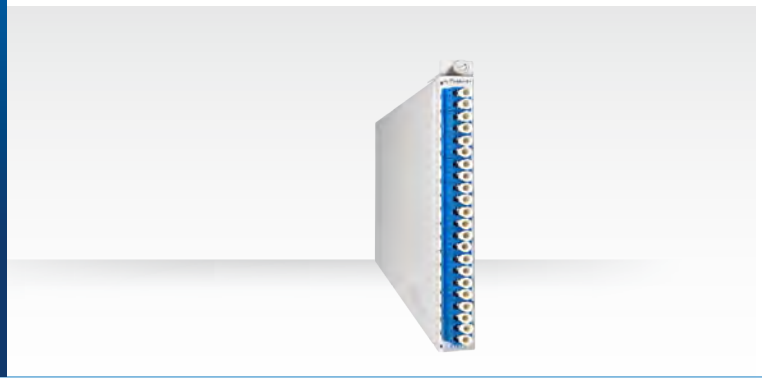
Optical Mux/Demux (Multiplexer/Demultiplexer) cards are available in 5-channel or 9-channel models and are used to combine signals from 1-channel or 2-channel transponder cards on to a single pair of fiber. A 1311nm CWDM channel is accessible separately. The MUX/DeMUX cards provide the primary wave division and combination functions. Line side wave lengths require translation to client side equipment via the transponder card.

Features

- Two different CWDM Mux/ DeMUX are available:
  5 Ch (1531/1551/1571/1591/1611nm)
  9 Ch (1471/1491/1511/1531/1551/1571/1591/1611 + 1311nm)
- Full native mode performance
- Optical connectors: LC connectors, SMF 9/ 125mm

- Optical input/ output monitoring port
- Passive model requires no power
- Protocol transparent, no limitation
- Utilizes industry standard ITU CWDM wavelengths

Specifications

Connecter	LC
Standard	ITU-T G.694.2
Wavelength	SML-MD90 1311, 1471, 1491, 1511, 1531, 1551, 1571, 1591, 1611nm
	SML-MD50 1531, 1551, 1571, 1591, 1611nm
Insertion Loss	SML-MD90 < 3.5dB for CWDM wavelength
	SML-MD50 < 5.0dB for CWDM wavelength

Return Loss	> 45dB
Dimensions	220 x 162 x 25mm (D x W x H)
Weight	0.9kg
Temperature	0 ~ 50℃ (Operating), -10 ~ 70℃ (Storage)
Humidity	10 ~ 90% non-condensing
Certification	CE, FCC, RoHS
MTBF	57,000 hrs

Application

City-A

City-B

CWDM Mux/DeMux Service

SML-2000

SML-MD91/51   **SML-MD91/51**

SML-2000

SML-5000

CWDM specific wavelengths

CWDM specific wavelengths
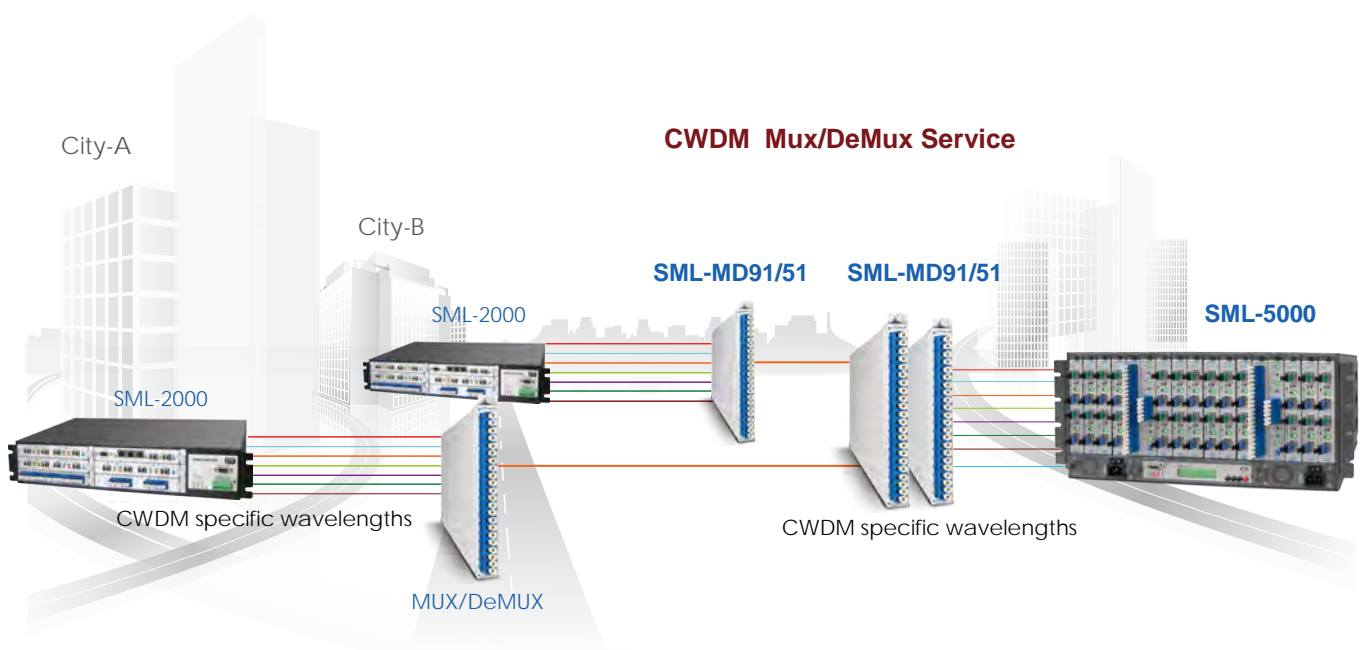
MUX/DeMUX

Ordering Information

Model Name	Description
SML-MD51	5Ch Mux/Demux (1531,1551,1571,1591,1611)nm with monitor port
SML-MD91	9Ch Mux/Demux (1311, 1471, 1491, 1511, 1531, 1551,1571, 1591, 1611)nm with monitor port

SML – ☐☐☐☐

Example: SML – MD51

SML-OADM

Optical Add-Drop Multiplexer

An Optical Add/Drop Multiplexer takes a single wavelength from a trunk, pulls the signal out, and allows a new signal at the same wavelength to be inserted into the trunk at roughly the same spot. All the other wavelengths Pass-Through the Add/Drop Multiplexer with only a small loss of power (usually < 2.5dB including connectors and adapters). An Optical Add/Drop Multiplexer (OADM) is available allowing a single wavelength to be dropped or added at specific sites in linear Add/Drop topology.

Features

- Single Add/Drop Channel
- Operating channel : 1311,1471,1491,1511,1531,1551,1571, 1591,1611nm
- Passive optical module, no power required

- Protocol transparent, no limitation
- Utilizes Industry standard ITU CWDM wavelengths
- Optical connectors : LC

Specifications

Number of channels	CWDM: 1 add/drop channel, 2 add/drop channels
Operating Channel CWDM add & drop channel	Any channels out of 1471, 1491, 1511, 1531, 1551, 1571, 1591, 1611, 1311 nm (to be defined via order information)
Channel width: CWDM channels	>=13nm (around center wavelength)
Insertion Loss	IN-OUT >= 2.5 dB Add to Drop < 2.0 dB
Isolation	CWDM adjacent channel Isolation >= 30dB CWDM non-adjacent ch's at CWDM drop port >= 35dB

Optical Return Loss	>= 50dB
PDL	>= 0.1dB
Environment	Temperature : 0 ~ 50℃ (Operating), -20 ~ 70℃ (Storage)
Fiber Type	9 / 125 / 250um
Dimensions	162 x 220 x 25mm (W x D x H)
Weight	0.9kg
Compliance	FCC part 15 class A, CE Mark

Application

CWDM Add Drop Multiplexer

City-A

Mux / Demux

OADM

Mux / Demux

City-B

SML-5000

SML-5000

Mux / Demux

Drop

ADD

CWDM specific wavelengths

Gigabit Ethernet   STM-4   City-C
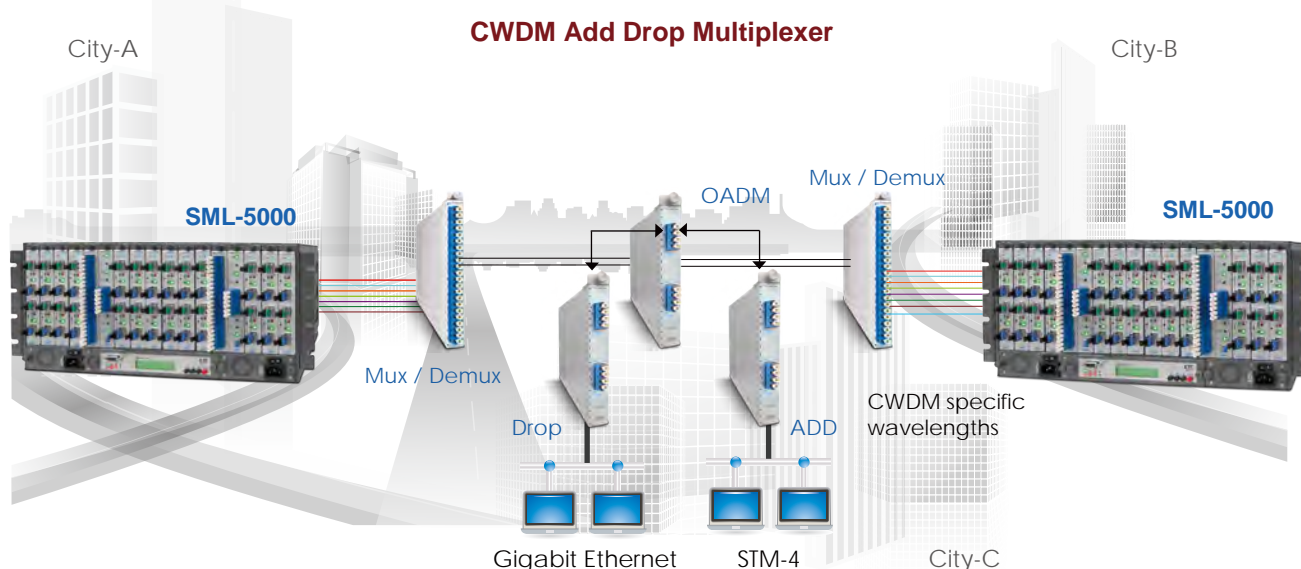
Ordering Information

Model Name	Description
SML-OADM-31	1311nm Drop / Insert card, LC
SML-OADM-47	1471nm Drop / Insert card, LC
SML-OADM-49	1491nm Drop / Insert card, LC
SML-OADM-51	1511nm Drop / Insert card, LC
SML-OADM-53	1531nm Drop / Insert card, LC
SML-OADM-55	1551nm Drop / Insert card, LC
SML-OADM-57	1571nm Drop / Insert card, LC
SML-OADM-59	1591nm Drop / Insert card, LC
SML-OADM-61	1611nm Drop / Insert card, LC

SML – OADM – ☐☐
Example: SML – OADM – 31

Specifications & design are subject to change without prior notice. Please visit CTC Union website for more details.
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SML-OADM | 1-85

SML-Protection

Optical Line Protection Switch
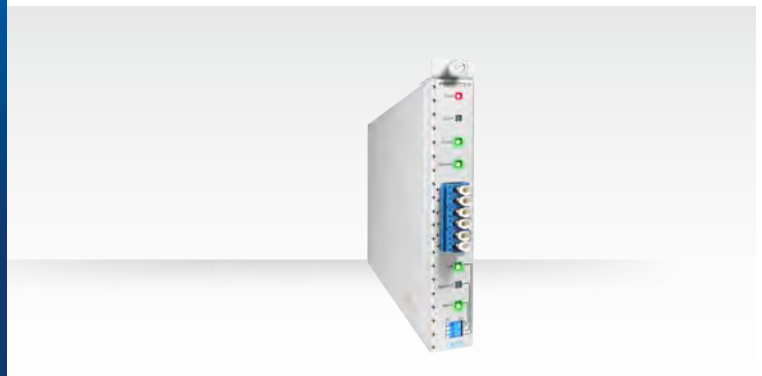
An optical protection unit is able to provide fiber path redundancy on a channel by channel basis. These units are particularly well suited for protection in fiber data transmission. The solution includes monitoring capabilities for both working and protection paths. The monitoring is available through 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 < 6.5dB
- Latch feature, if power is lost the switch remains in its current state
- Protection transition < 50 ms
- Supports stand-alone use with simple RS-232 console

- Works with any combination of 1 ~16 wavelengths
- Traffic is switched in one of three modes : Auto, Semi-Auto, Manual
- 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 (threshold setting)
Loss	Insertion Loss < 6.5dB, Return Loss > 45dB

Power Consumption	<10W
Dimensions	220 x 162 x 25mm (D x W x H)
Weight	0.9kg
Temperature	0 ~ 50℃ (Operating), 20 ~ 70℃ (Storage)
Humidity	10 ~ 90% non-condensing
Certification	CE, FCC, RoHS
MTBF	57,000 hrs

Application

CWDM 2-Service over dual fiber with Protection

City-A

G.SHDSL

ADSL   FXS/ FXO

DLC

1+1 Fiber Protection

City-B

G.SHDSL

ADSL   FXS/ FXO

Storage

Storage — IP SAN

Storage

Protection   **Protection**

Primary Line

Secondary Line

DLC

Transponder

MUX/DeMUX

Transponder

IP SAN

Storage

Storage
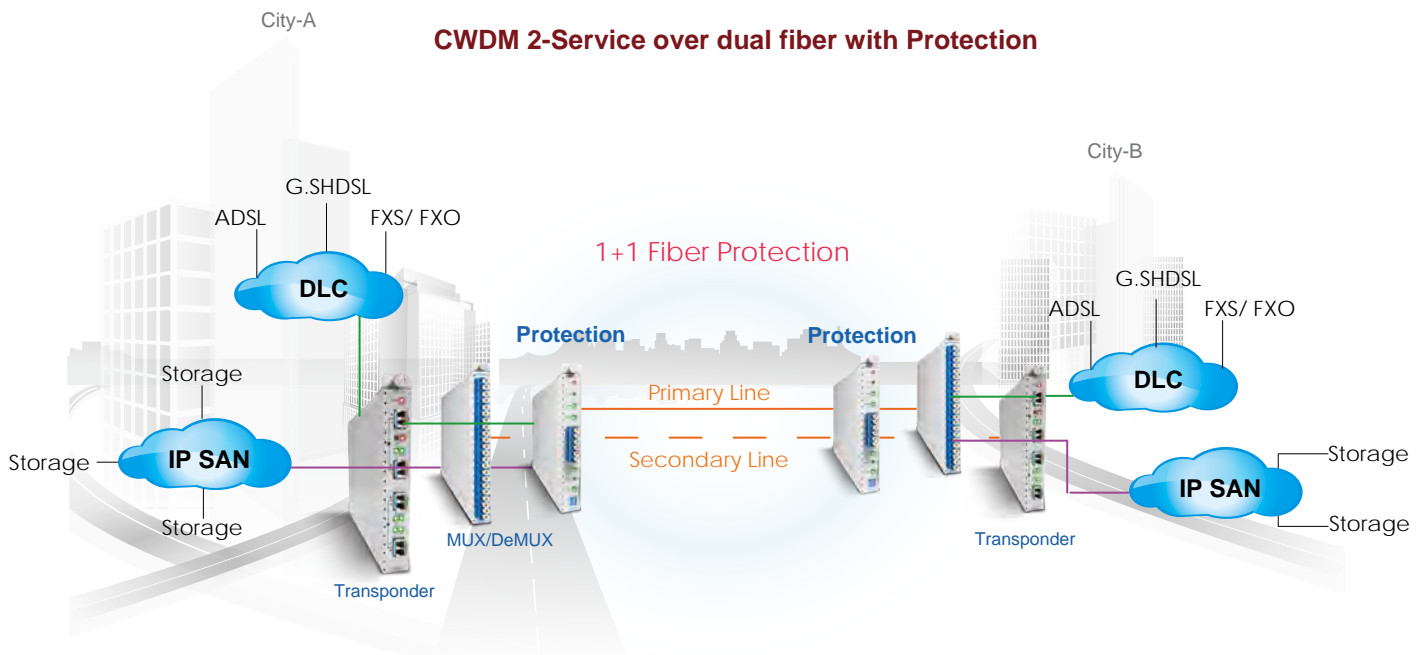
Transponder

Ordering Information

Model Name	Description
SML-Protection	Optical Line Protection switch card

SML-1000

1U, 4 Channel Transponder Rack

The SML-1000 is a multi-rate transponder platform (up to 2.5G transponder) that provides the capability to transport a wide variety of service types from 155 Mbps to 2.48 Gbps, including services such as ESCON, SONET OC-3 through OC-48, SDH STM-1 through STM-16, Gigabit Ethernet, 1-or 2-Gbps Fiber Channel. The 2.5G transponder card architecture contains a single client interface that is mapped to a single-line CWDM interface, without accessing any cross-connect fabric.

The interface to the client is via a variety of Small Form-Factor Pluggable (SFP) optics modules, enabling a wide service mix and different fiber types (single- and multimode), wavelengths (850 and 1310 nm), and fiber reach (short reach/intra-office, intermediate reach/long haul, etc.). The SFP optical modules are equipped with LC connectors to enable high-density placement.

Features

- 1U 19" 4Ch Transponder Rack
- R2R regeneration (Re-amplification and reshaping)
- Line rate support from 100Mbps up to 2.5Gbps
- Client Side Wavelength: 850/ 1310/ 1550nm
- Line Side CWDM Wavelength 1471/ 1491/ 1511/ 1531 / 1551/ 1571/ 1591/ 1611nm
- Optical Connector: SFP-LC (On both Line & Client Side)
- Protocol transparent

Specifications

Connectors	SFP-LC (Line Side)	
	SFP-LC (Client Side)	
Physical Specifications	Dimensions	265 x 440 x 43mm (W x D x H)
	Weight	3.2kg w/o P/S
Power Characteristics	AC input	100 ~ 240V AC
	DC input	48VDC, 72VDC

Environmental Specifications	Operating	0 ~ 50°C
	Storage	-10 ~ 70°C
	Relative humidity	5% ~ 90% non-condensing
	Predicted MTBF	65,000 hrs
Certification	FCC , CE, RoHS	

Application
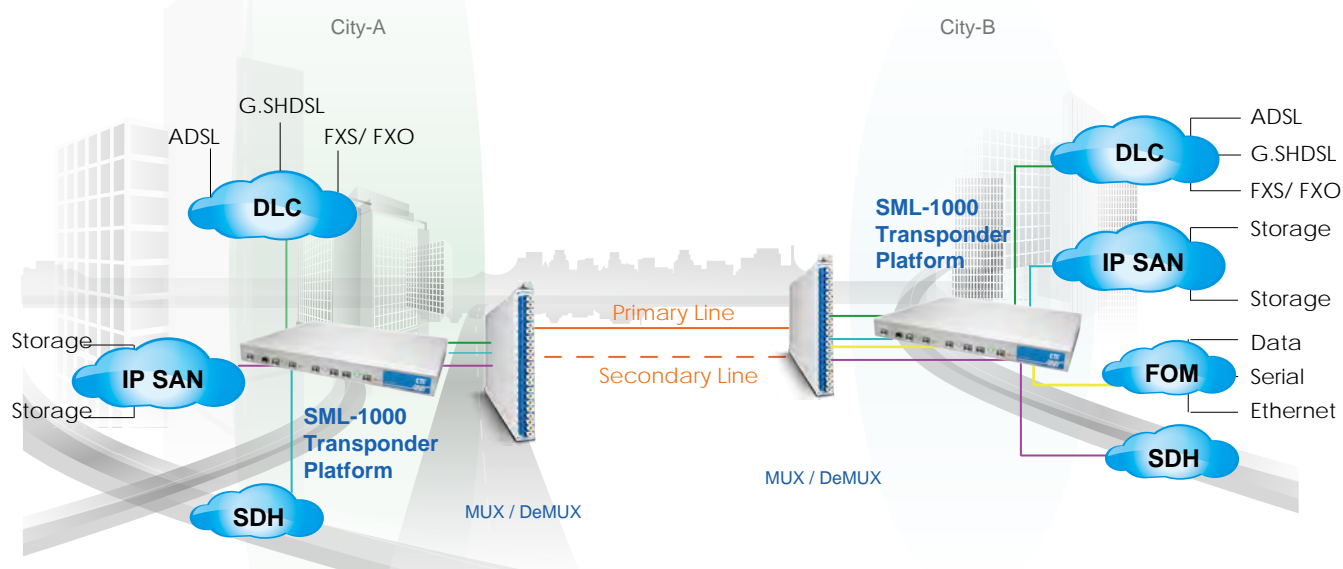
Ordering Information

Model Name	Description
SML-1000-AA	1U 19" 4 Ch Transponder rack with Internal Dual AC power
SML-1000-DD	1U 19" 4 Ch Transponder rack with Internal Dual DC power
SML-1000-AD	1U 19" 4 Ch Transponder rack with Internal AC + DC power

SML – 1000 – ☐☐
Example: SML – 1000 – AA

SML40-CH04

1U, 4-Slot MUX / DeMUX Passive Rack

NEW

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 on power
- Plug & Play Operation

- Optical connectors: LC connectors, SMF 9/ 125um
- Protocol transparent, no limitation
- Utilizes industry standard ITU-T CWDM wavelengths

Specifications

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

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

Application

SML-1000

SML-2000

SML-1000

SML-2000

SML40-CH04

Mux / DeMUX

SML40-CH24
4U 19" 24-slot chassis

SML-2000

SML-1000

SML-1000

SML-2000
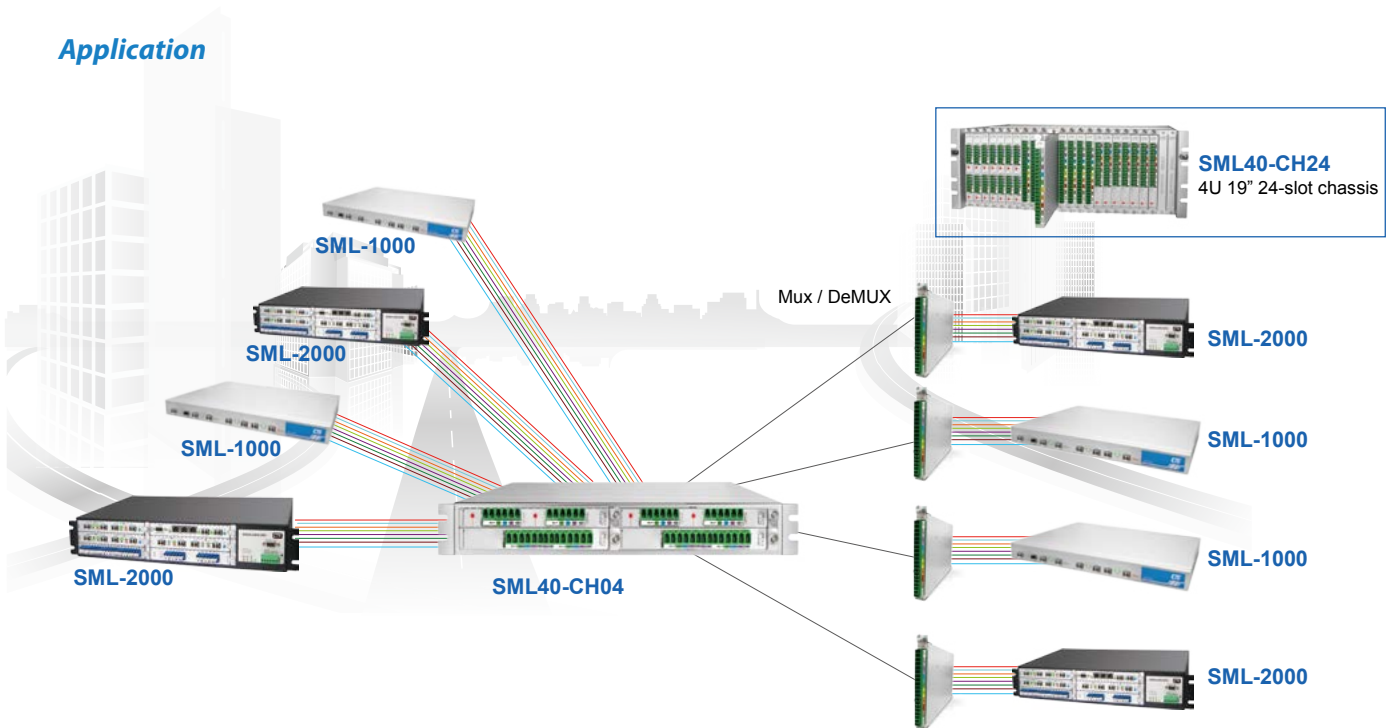
Ordering Information

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 / 5 Channel MUX / DeMUX with Monitor Port
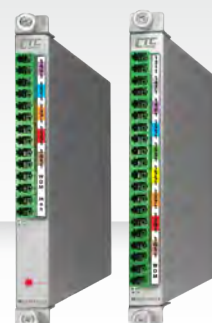
The SML-40-MD80 is an 8 channel MUX/DeMUX modular design card for CWDM wavelengths including 1471nm, 1491nm, 1511nm, 1531nm, 1551nm, 1571nm, 1591nm, 1611nm. The SML-40-MD81 is 8 channels MUX/DeMUX modular design card with monitor port. The SML-40-MD51 is a 5 channel MUX/DeMUX modular design card for 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℃ (Operating), -10 ~ 70℃ (Storage)
Humidity	10 ~ 90% non-condensing
Certification	CE, FCC, RoHS
MTBF	75,000 hrs

Application

SML-5000

SML-2000

SML-5000

SML-2000

4U 24-Slot Mux / DeMUX chassis

SML40-MD

SML-2000

SML-1000

SML-4000

SML-2000

01

24
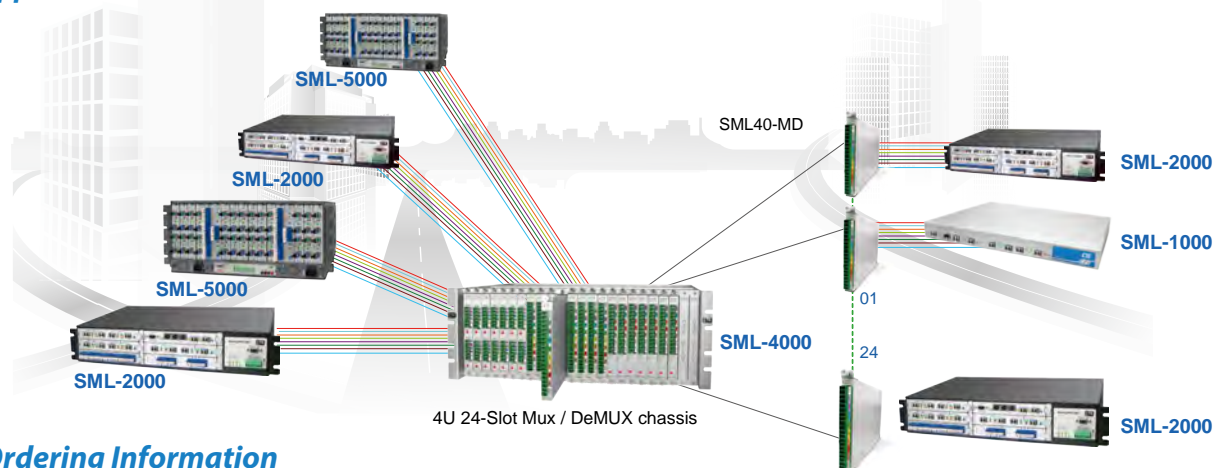
Ordering Information

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

SML40 – ☐☐☐☐ – ☐☐☐ – ☐☐☐☐☐☐☐☐☐☐☐

Example: SML40 – MD80 – UPC – Wavelenght

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SML40-MD | 1-89

SML-5000

5U, 17-Slots CWDM Managed Chassis

The SigmaLinks 5000 is a flexible, cost-effective optical transport system, designed to multiplex, de-multiplex and switch high-speed data for storage, video and voice applications. The SML-5000 is housed in a 5U, 19" or 23" rack mountable transport platform for ITU G.694.2 compliant CWDM applications, which features 17 universal hot-swappable module slots. Currently supported module line cards include SNMP, Transponders, Mux/ Demux, OADM and Optical protection. The SML-5000 supports optional redundant power and SNMP management. Another unique feature of the SML-5000 is a line card design which may be transformed into stand-alone units. The use of a common PCB card which may either be placed in the rack or used as a stand-alone unit reduces manufacturing costs as well as the inventory of spares required by distributors, installers, and end users. The NMS (Network Management System) option includes an SNMP card (agent) and standard MIB file for importation and compilation into network management platforms such as HP OpenView or CA Unicenter. This allows remote configuration and system monitoring via industry standard network management software.

Features

- 5U 19 (23)" chassis accommodate up to 17 card modules
- All modules are hot-swappable
- Redundant AC, DC power and cooling fans
- Chassis cascade up to 6 with one IP management
- Temperature sensors constantly monitor internal environment

- LCD status indication with keypad control
- TFTP firmware upgrade
- Supports Console, Telnet, SNMP and Web management
- Alarm Relay contacts
- Up to 8 CWDM wavelengths in compliance with ITU G.694.2

Specifications

Connectors	Console port features an RS232 (DB9) connector, Alarm : Terminal Block	
Physical Specifications	Dimensions	440 x 250 x 220mm (W x D x H)
	Weight	9.5kg w/o P/S
Power Characteristics	AC input	100 ~ 240V AC
	DC input	24VDC, 48VDC, 72VDC

Environmental Specifications	Operating	0 ~ 50°C
	Storage	-10 ~ 70°C
	Relative humidity 5% ~ 90% non-condensing	
	Predicted MTBF 65,000 hrs	
Certification	FCC class A, VCCI class A, CE, RoHS	

SigmaLinks 5000 Major Components
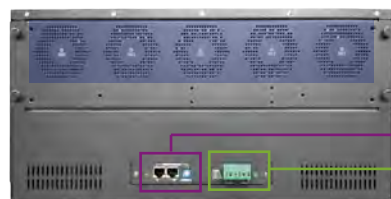
Control Card with LCD menu operation
For power, temperature monitoring and local control

AC Power Module Hot swappable 90~264VAC

DC Power Module Hot swappable18~74VDC

Hot swappable Line Cards:
Transponder
Mux/Demux
Optical line Protection
Optical Add/Drop Mux (OADM)
SNMP

Field replaceable Intelligent Fan

5RU 19' or 23" rack mountable Main Chassis

Chassis cascade up to ID5

Alarm relay

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Control card with LCD Menu Operation

This hot-swappable controller serves two basic and very important functions; It provides a local human interface for monitoring/provisioning the SML5000 and it provides a communication link to the SNMP card that supports remote management via Telnet, Web or SNMP. The local maintenance interface can employ a serial "dumb" terminal with user friendly menu system or a 16x2 character backlit LCD and push-button navigation menu for provisioning and monitoring power, temperature and alarm conditions of the chassis and cards.

Power Redundancy

SML5000 chassis power supplies are hot swappable and modular.
Installing two modules into a chassis provides redundancy should a single power supply fail.

Intelligent Cooling Fan

To further increase system reliability, the SML-5000 chassis is fitted with one fan module, incorporating five cooling fans, fixed on the rear of the chassis. The cooling fans may be manually controlled or programmed to start whenever the internal environmental temperature exceeds 40°C.

Chassis cascade

The SML-5000 features cascadeable management which allows managing a stack (up to 6 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 ID5.

Network Management

The SML-5000 chassis provides an SNMP card which can be installed into any slot of chassis. The SNMP card gives 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.

Protocol Supported

The SML-5000 chassis allows network administrators to deploy the chassis in a wide range of networks. Technologies supported by the chassis included Transponder, Mux/Demux, Optical line Protection and Optical Add/Drop Mux (OADM).

Application

CWDM 8-Service over a dual strand fiber

City-A

City-B

SML-2000

Mux / Demux

Mux / Demux

SML-5000

SML-2000

CWDM specific wavelengths

Mux / Demux

CWDM specific wavelengths

Mux / Demux
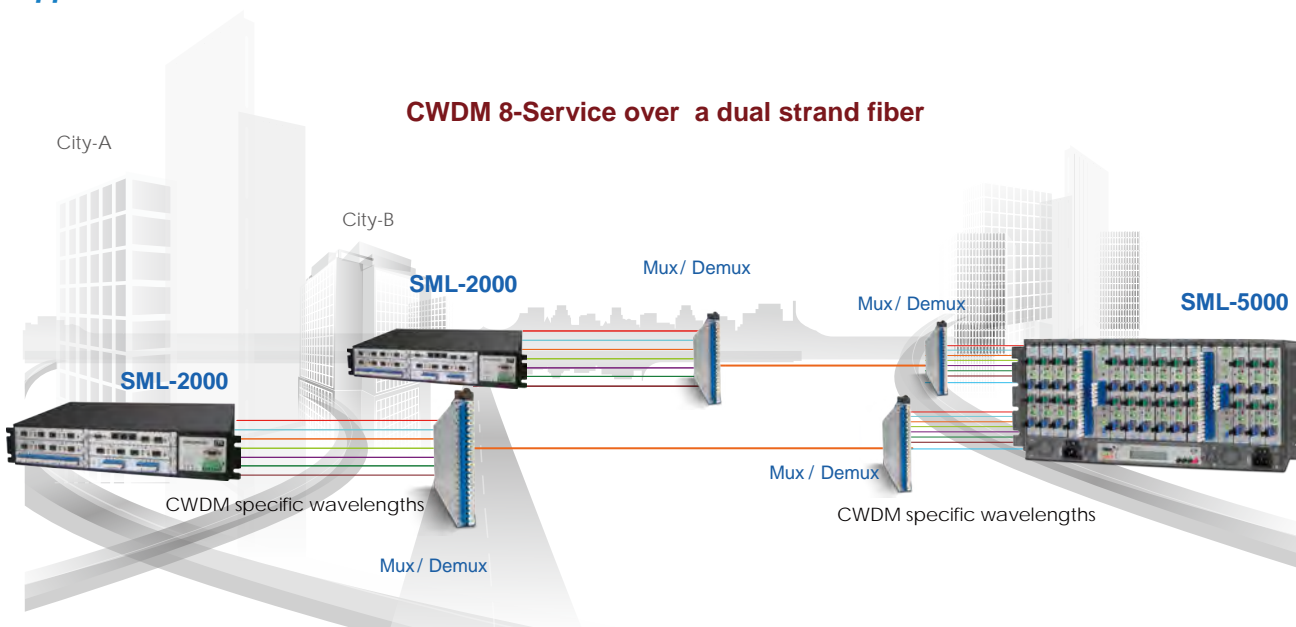
Ordering Information

Model Name	Type	Description
SML50-Chassis	Chassis	5U, 19(23)" 17-slot chassis with hot swappable redundant power
SML50-AC	Power	5U chassis AC power supply (90 ~ 264 VAC)
SML50-DC24	Power	5U chassis DC power supply (18 ~ 56 VDC)
SML50-DC48	Power	5U chassis DC power supply (36 ~ 72 VDC)
SML50-SNMP	NMC Card	5U Chassis SNMP card supports web, telnet, console , SNMP functions

Chassis Type

SML50 – ☐☐☐☐☐☐☐

Example: SML50 – Chassis

Power Type

SML50 – ☐☐

Example: SML50 – AC

SML-2000

2U, 6-Slots CWDM Managed Chassis

The SigmaLinks 2000 is a flexible, cost-effective optical transport system, designed to multiplex, de-multiplex and switch high-speed data for storage, video and voice applications. The SML-2000 is housed in a standard 2U, 19" or 23" rack mountable transport platform for ITU G.694.2 compliant CWDM applications, which features 6 universal hot-swappable module slots. Currently supported module line cards include SNMP, Transponders, Mux/Demux, OADM, Optical protection and optical channel monitors. The SML2000 supports optional redundant power and SNMP management. Another unique feature of the SML2000 is a line card design which may be transformed into stand-alone units. The use of a common PCB card which may either be placed in the rack or used as a stand-alone unit reduces manufacturing costs as well as the inventory of spares required by distributors, installers, and end users. The NMS (Network Management System) option includes an SNMP card (agent) and standard MIB file for importation and compilation into network management platforms such as HP OpenView or CA Unicenter. This allows remote configuration and system monitoring via industry standard network management software.

Features

- 2U 19 (23)" chassis accommodate up to 6 card modules
- All modules are hot-swappable
- Redundant AC, DC power and cooling fans
- TFTP firmware upgrade

- Supports Console, Telnet, SNMP and Web management
- Alarm Relay contacts
- Up to 8 CWDM wavelengths in compliance with ITU G.694.2

Specifications

Connectors	Console port features an RS232 (DB9) connector, Alarm : Terminal Block
Physical Specifications Dimensions	440 x 250 x 89mm (W x D x H)
Weight	4.8kg w/o P/S
Power Characteristics AC input	100 ~ 240V AC
DC input	24VDC, 48VDC, 72VDC

Environmental Specifications	Operating	0 ~ 50°C
	Storage	-10 ~ 70°C
	Relative humidity 5% ~ 90% non-condensing	
	Predicted MTBF 65,000 hrs	
Certification	FCC class A, VCCI class A, CE, RoHS	

SigmaLinks 2000 Major Components

2RU 19 or 23" rack mountable Main Chassis

6-Slots for Line Cards, Hot Swappable:
· Transponder
· Mux/DeMux
· Optional line Protection
· Optional Add/Drop Mux
· SNMP

Serial Console

LED Indicators

Alarm Contacts

AC Power Module Hot swappable 90~264VAC

Cooling Fans

DC Power Module Hot swappable 18~56VDC or 36~72VDC

Power Redundancy

SML2000 chassis power supplies are hot swappable and modular.
Installing two modules into a chassis provides redundancy should a single power supply fail.

Intelligent cooling fans

To further increase system reliability, the SML2000 chassis is fixed with two cooling fans on the rear of the chassis.

Network Management

The SML2000 chassis provides an SNMP card which can be installed into any slot of chassis. The SNMP card gives 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.

Protocol Supported

The SML2000 chassis allows network administrators to deploy the chassis in a wide range of networks. Technologies supported by the chassis included Transponder, Mux/Demux, Optical line Protection and Optical Add/Drop Mux (OADM).

Application

CWDM 8-Service over dual fiber with Protection

City-A

City-B

Fiber Redundant

Mux / Demux

SML-2000

Primary Line

Secondary Line

SML-2000

CWDM specific wavelengths

CWDM specific wavelengths

Mux / Demux
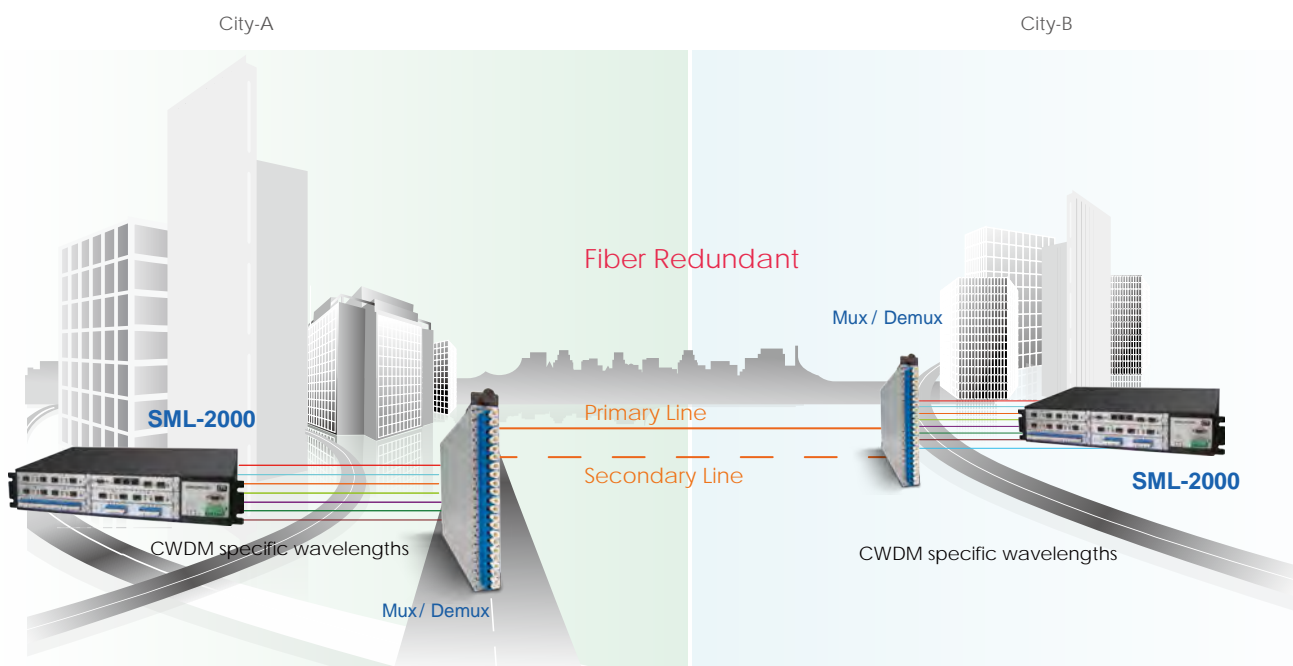
Ordering Information

Model Name	Type	Description
SML20-Chassis	Chassis	2U, 19(23)" 6-slot Chassis with hot swappable redundant power
SML20-AC	Power	2U chassis AC power supply (90 ~ 264 VAC)
SML20-DC24	Power	2U chassis DC power supply (18~ 56 VDC)
SML20-DC48	Power	2U chassis DC power supply (36 ~ 72 VDC)
SML20-SNMP	NMC Card	2U Chassis SNMP card supports web, telnet, console , SNMP functions

Chassis Type

SML20 – ☐☐☐☐☐☐☐

Example: SML20 – Chassis

Power Type

SML20 – ☐☐

Example: SML20 – AC

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SML-2000 | **1-93**

Fiber Optical Multiplexers

FMUX1000i

16 Ch E1/T1, 8x 10/100/1000-T Ethernet Fiber Multiplexer

FMUX1000i is an innovative gigabit multi-service fiber optic transport system which can transmit both E1/T1 and Ethernet data streams over redundant gigabit fiber optic links. The gigabit Ethernet traffic and a separated 16 E1/T1 transparent data are multiplexed into 1.25Gbps by using a patented physical coding method to achieve a high performance and economic broadband access solution. The FMUX1000i can be adopted as a broadband backhaul of 3G mobile networks or private network access for campus and office building. FMUX1000i is a modular design which supports E1/T1 and combo Ethernet interface cards. There are 4 hot swappable tributary slots equipped for each FMUX1000i system. The Ethernet tributary card is equipped with two 10/100/1000 RJ45 and two Gigabit SFP fiber ports. For E1/T1 card, the 4 E1/T1 ports can be programmed as either E1 or T1 individually. Any combination of Ethernet and E1/T1 cards can be placed in the four plug-in slots.

Features

- GbE traffic and separated 16E1 data are transmitted simultaneously
- 1Gbps throughput for aggregate Ethernet traffic
- Supports advanced Ethernet interface features like jumbo frame size(9K bytes), Provider Ethernet bridge by VLAN stacking (QinQ, IEEE802.1ad), QoS and traffic rate control
- Supports various loopback and BERT for system diagnosis
- 1+1 protection switch and Automatic Laser Shutdown[ALS] for aggregate fiber interfaces
- Built-in EOC channel for OAM&P
- Supports VT100, Telnet, SNMP and client server based NMS interfaces
- Loss of Power indication for power failure of the remote unit

- Remote software upgradable
- Supports order-wire for craft person's voice communication
- Supports one RS-232 Async. channel for auxiliary data communication
- AC and DC power redundancy, hot swappable
- Form C relay contacts for audible and visible alarm outputs
- Complies with the specifications of class A of CISPR 22 and class A of FCC Part 15 Subpart B Rules of U.S.A
- Complies with the electrostatic discharge immunity (ESD) IEC 61000-4-2 level 2
- RoHS Compliant

Specifications

System	System capacity :
	Any combination of E1/T1 and Combo Ethernet cards for 4 x hot swappable tributary plug-in slots. E1/T1 4ch, 8 ch,12 ch Max.16ch or GbE combo ports 2ch, 4ch, 6ch Max.8ch
	Aggregate Ethernet throughput : 1 Gbps
Aggregate – Gigabit Optical Interface	Number of port 2, 1+1 protection
	Line rate 1.25G bps
	Optical central wavelength 1310 nm nominal
	Connector type LC (SFP housing)
Management	Console Port Electrical: RS232, DCE Protocol: VT-100 Connector: DB9, female
	Telnet Access via NMS Ethernet port
	SNMP SNMP v1, v2c; Up to 3 Trap IPs
	Management Embedded operations channel over fiber
	Loss of Power Loss of power indication for remote unit
	Auxiliary Data Channel 300 – 115200 bps , RS232C
	Order-wire 300 – 3.4K Hz voice channel, RJ11 4 wire telephone handset interface

Alarm	Alarm History Alarm Type
	(i.e. RAI, AIS, LOS,RDI, LOF, AIS, CV, ES, SES, UAS, LPR, AOC)
	Alarm Queue Maximum 100 alarm records which record the latest alarm type, location, and date & time
	Alarm Threshold CV, ES, SES, UAS
Power	AC Module 90 to 240 VAC, 60 +/- 3Hz
	48 VDC Module -42 to -56 VDC
	Redundancy AC+DC, DC+DC or AC+AC
	Power Consumption Max. 20W per system
Physical and Environmental	Dimensions 441x 445x 320 mm(W x H x D)
	Temperature 0 - 45℃ (shelf) or 0 - 65 ℃ @ 10 – 90 % RH Non condensing (Outdoor)
	Mounting 19 inch rack mount
Certification	EMC EN55022 Class A, EN55024, FCC Part 15 Class A
	Safety EN60950-1, IEC60950-1
Standards Compliance	ITU-T G.703, G.704, G.823, G.826
	IEC 61000-4-5 class 3
	IEEE 802.3, 802.3u, 802.3z, 802.3x, 802.1q, 802.1ad (Q-in-Q)
	IETF RFC 1643, RFC 1157, RFC 1213, RFC 1406, RFC 2863

Ordering Information

Model Name	Type	Description
FMUX1000i-CH	Chassis	Fiber Mux w/ LCD and In-band SNMP, optional SFP
FMUX1000-AC	Power	AC power module 100 ~ 240VAC
FMUX1000-DC	Power	DC power module -36 ~ -72V
FMUX1000-4E1/T1-R	Interface Module	4E1/T1 card with RJ45 connector
FMUX1000-4E1/T1-W	Interface Module	4E1/T1 card with Wire-wrap connector
FMUX1000-4E1-B	Interface Module	4E1 card with RJ45 to BNC cable
FMUX1000-GC	Interface Module	2 GbE Combo Ethernet card optional SFP module
FMUX1000-GF-4E1/T1-R	Interface Module	2 GbE SFP and 4x E1/T1 RJ45 card optional SFP module
FMUX1000-GT-4E1/T1-R	Interface Module	Dual 10/100/1000-T and 4E1/T1 RJ45 card

Cassis Type

FMUX1000i – ☐☐

Example: FMUX1000i – CH

Card Type

FMUX1000 – ☐☐☐ – ☐☐ – ☐

Example: FMUX1000 – 4E1/T1 – R

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E1 Interface Specification

E1 frame	PCM31,PCM31C,PCM30,PCM30C and unframed, Framed (ITU-T G.703 and G.704 standard) Line Code HDB3
Rates	2.048Mbps+/-50ppm
Output Signal	ITU-T G.703
Input Signal	ITU-T G.703
Impedance	75 ohm unbalanced or 120 ohm balanced, software programmable
Jitter requirements	Meet ITU-T G.823
Connector	RJ45(optional RJ45 to BNC cable)
Channel	4 channels E1 per cacrd
Surge Protection	IEC 61000-4-5 class 3

4Ch E1/T1 card   *RJ45 to BNC cable*

The E1/T1 4-Channel card is modular design which can slide into the Gigabit fiber Multiplexer chassis and provide four completely independent ITU-T G.703 E1 or T1(DS1) interfaces. The E1/T1 4-channel card comes with RJ45 connectors that are designed to connect to E1 120 Ohm balanced or for T1 100 Ohm balanced connections. RJ45 to BNC cable is available for E1 75 Ohm unbalanced connections. The E1/T1 4-Channel card can be programmed as either E1 or T1.

T1 Interface Specification

T1 frame	SF, ESF and unframed, field selectable, Meet ITU-T G.703 and G.704 standard
Line Code	AMI / B8ZS(selectable)
Rates	1.544M bps ± 50 ppm
Output Signal	DS1 with 0, -7.5, -15 dB LBO
Input Signal	DS1 with 0 dB to -26 dB ALBO
Impedance	100 ohm , balanced
Pulse Template	Per AT&T TR 62411
Connector	RJ45
Channel	4 channels T1 per card
Surge Protection	IEC 61000-4-5 class 3

2Ch Combo Gigabit Ethernet card

The Gigabit Ethernet tributary card is equipped with 2 ports 10/100/1000 Base-T and 2 ports 1000Base-X SFP slots. The complete functions included Ethernet Bridge, VLAN stacking (QinQ, IEEE802.1ad) , Jumbo Frame packet, IEEE 802.1q VLAN, BPDU packet and Pause Frame transparency,Packet classification based on the 802.1P, 4 priority queues for packet classification, Strict Priority or WRR Scheduling of the 4 priority queues and bandwidth control: 256Kbps, 512Kbps, 5Mbps and 50Mbps for different ranges of port speed.

Gigabit Ethernet specification

Standard	Complies with IEEE802.3, IEEE802.3u, IEEE802.3ab and IEEE802.3z
Data rate	10/100/1000Base-T for twisted pair GbE, 1000Base-X for optical GbE
Connector	RJ45 for twisted pair GbE and LC (SFP) for optical GbE
No. of ports	2 x RJ45 and 2 x SFP combo / 2 x RJ45 or 2 x SFP

E1/T1 plus Gigabit Ethernet Card

The E1/T1 plus Gigabit Ethernet tributary card is equipped with 2-port 10/100/1000Base-T or 2-port Gigabit SFP slot plus 4x E1/T1 Channels. The G.703 E1 or T1(DS1) interfaces module is available in two options, one, with two 10/100/1000 copper gigabit ports or with two SFP slots for 1.25g SFP modules. RJ45 to BNC cable is available for E1 75 Ohm unbalanced connections. The E1/T1 4-Channel card can be programmed as either E1 or T1.

Application   Managed 16E1 + GbE Fiber Optical Multiplexer

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

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FMUX1000i | 1-95
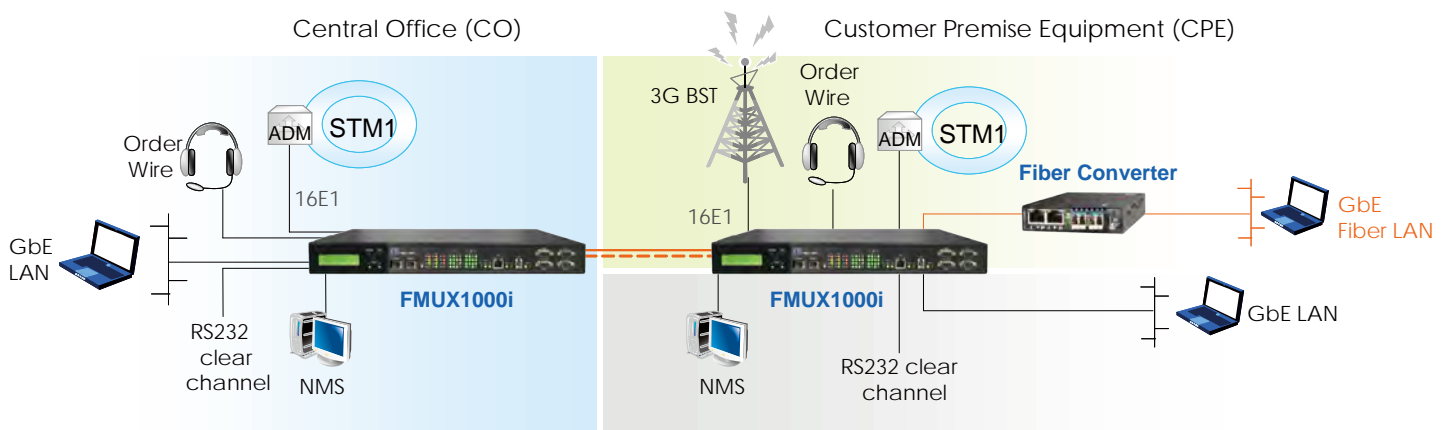
FMUX01A / Plus

16 Ch E1/T1, 3x 10/100-T(X) Ethernet Fiber Multiplexer

The FMUX01A/Plus is a 1U, 19" rack mountable, PDH fiber optic multiplexer that transmits up to 16 channels plus a wire speed 100Base-TX Fast Ethernet channel over a single fiber optic link. The FMUX01A/Plus chassis is available in five different power configurations: single AC, single DC, dual AC, dual DC or AC+DC. 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 FMUX01A/Plus 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, 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 & bandwith control
- Telnet and web based remote configuration
- 2 plug-in I/O slots for optical interface cards

Specifications

Optical Interface	Connector	1x9 (SC, ST, FC)
	Data rate	155.52Mbps
	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	3 x RJ45
	Alarm	RS232 (DB9F)

Standards	E1:ITU-T, T1:ITU-T, AT&T, ANSI, Ethernet: IEEE802.3x
Indication	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℃ (Operating), 0 ~ 70℃ (Storage)
Humidity	10 ~ 90% non-condensing
Certification	CE, FCC, RoHS
MTBF	57350 hours

Application
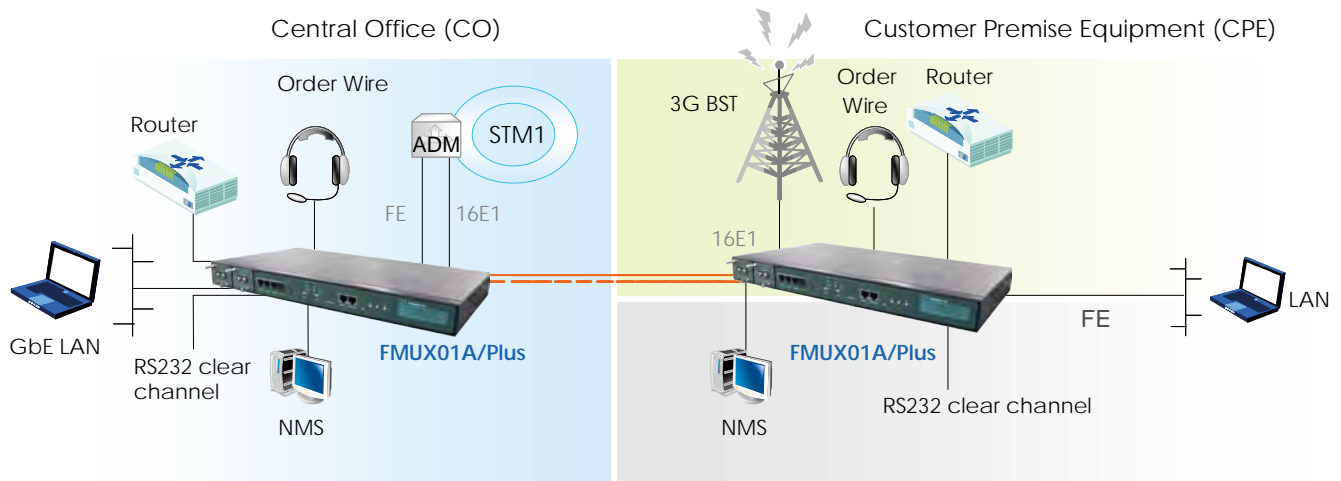
Specifications - Modules

Fiber Optical Module I/F

Fiber Optical Module ()

Ports	1 + 1 ports (two for redundancy)
Fiber Cable	9/ 125 um for single mode ; 50/ 125 or 62.5/ 125 for multi-mode
System Power Gain	> 25dB@1*10-10
Wavelength Range	1280 — 1550nm
Connector	SC, FC, ST

The switching time between is less than 50m sec

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	Support modem pass-through

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	1.544 Mbps ±50 ppm
Line code	B8ZS / AMI
Receive Level	Short haul - 15dB
Line impedance	100 ohms ±5%
Connector	RJ-45 for 100 ohms Wirewrap for 100 ohms

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 Wire-Wrap 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

Fiber Optical Multiplexers

Ordering Information

Model Name	Type	Description
FMUX01A/Plus - AC	Chassis w/Power	Chassis with 110 ~ 240 VAC
FMUX01A/Plus - DC24	Chassis w/Power	Chassis with 24VDC
FMUX01A/Plus - DC48	Chassis w/Power	Chassis with 48VDC
FMUX01A/Plus - AD24	Chassis w/Power	Chassis with one AC and one DC power for Redundant 24VDC
FMUX01A/Plus - AD48	Chassis w/Power	Chassis with one AC and one DC power for Redundant 48VDC
FMUX01A/Plus - AA	Chassis w/Power	Chassis with two 100 ~240VAC power for Redundant
FMUX01A/Plus - DD24	Chassis w/Power	Chassis with two DC power for Redundant 24VDC
FMUX01A/Plus - DD48	Chassis w/Power	Chassis with two DC power for Redundant 48VDC
FMUX01A/Plus - E1/BNC	Card	4 x G.703 E1 BNC interface card
FMUX01A/Plus - E1/RJ45	Card	4 x G.703 E1 RJ-45 interface card
FMUX01A/Plus - T1/RJ45	Card	4 x G.703 T1 RJ-45 interface card
FMUX01A/Plus - T1/Wire	Card	4 x G.703 T1 Wire-Wrap interface card
FMUX01A/Plus - E1/Wire	Card	4 x G.703 E1 Wire-Wrap interface card
FMUX01A/Plus - V35	Card	V35 interface card with one HD68M to 4 x MB34F cable
FMUX01A/Plus - 530	Card	RS-530 interface card with one HD68M to 4 x DB25F cable
FMUX01A/Plus - 449	Card	RS-449 interface card with one HD68M to 4 x DB37F cable
FMUX01A/plus - X21	Card	X.21 interface card with one HD68M to 4 x DB15F cable
FMUX01A/Plus - 232/Async	Card	RS-232 Async card with one HD68M to 4 x DB9F cable
FMUX01A/Plus - FXO	Card	4 x FXO interface card
FMUX01A/plus - FXS	Card	4 x FXS interface card
FMUX01A/Plus - EXT/CLK	Card	External Clock interface card
FMUX01A/Plus - SC002	Card	SC, MM, 2Km, 1310nm, 11dB
FMUX01A/Plus - FC002	Card	FC, MM, 2Km, 1310nm, 11dB
FMUX01A/Plus - ST002	Card	ST, MM, 2Km, 1310nm, 11dB
FMUX01A/Plus - SC015	Card	SC, 15Km, 1310nm
FMUX01A/Plus - FC015	Card	SC, 15Km, 1310nm
FMUX01A/Plus - ST015	Card	ST, 15Km, 1310nm
FMUX01A/Plus - SC030	Card	SC, 30Km, 1310nm
FMUX01A/Plus - FC030	Card	FC, 30Km, 1310nm
FMUX01A/Plus - ST030	Card	ST, 30Km, 1310nm
FMUX01A/Plus - SC050	Card	SC, 50Km, 1310nm
FMUX01A/Plus - FC050	Card	FC, 50Km, 1310nm
FMUX01A/Plus - ST050	Card	ST, 50Km, 1310nm
FMUX01A/Plus - SC080	Card	SC, 80Km, 1550nm
FMUX01A/Plus - FC080	Card	FC, 80Km, 1550nm
FMUX01A/Plus - ST080	Card	ST, 80Km, 1550nm
FMUX01A/Plus - SC120	Card	SC, 120Km,1550nm
FMUX01A/Plus - FC120	Card	FC, 120Km, 1550nm
FMUX01A/Plus - ST120	Card	ST, 120Km, 1550nm
FMUX01A/Plus - SC20A	Card	SC, 20km, Tx1310/Rx1550nm (A type)
FMUX01A/Plus - SC20B	Card	SC, 20km, Tx1550/Rx1310nm (B type)
FMUX01A/Plus - SC40A	Card	SC, 40km, Tx1310/Rx1550nm (A type)
FMUX01A/Plus - SC40B	Card	SC, 40km, Tx1550/Rx1310nm (B type)
FMUX01A/Plus - SC60A	Card	SC, 60km, Tx1310/Rx1550nm (A type)
FMUX01A/Plus - SC60B	Card	SC, 60km, Tx1550/Rx1310nm (B type)
FMUX01A/Plus - SC80A	Card	SC, 80km, Tx1310/Rx1550nm (A type)
FMUX01A/Plus - SC80B	Card	SC, 80km, Tx1550/Rx1310nm (B type)

FMUX01A/Plux – ▢▢ / ▢▢▢▢ – ▢ – ▢▢▢▢▢▢
Power Type, Card Type, Power Redundant Type, Connector Type, Distance Connectivity

Example: FMUX01A/Plux – AC – AAAA – S – SC002

Power Module Type	Line Card I/F Type		Fiber Redundant Type	Connector Type	Distance Connectivity		
AC, DC, AC2, DC2, AD	O : Empty	G : Single port Fast Ethernet 10/100	S: standard	SC, ST, FC	002: 2km	20A: 20km	20B: 20km
	A : Quad E1 BNC	H : Quad X.21	R: redundant		030: 30km	40A: 40km	40B: 40km
	B : Quad E1 RJ-45	I : Quad RS-449			050: 50km	60A: 60km	
	C : Quad T1 RJ-45	J : Wire-Wrap I/F for Quad E1/ T1			080: 80km	60B: 60km	
	D : Quad V.35	K : Quad High-Speed V.35			120: 120km		
	E : Quad RS-232	L : Quad High-Speed RS-530					
	F : Quad RS-530						

FMUX160
FMUX80

16 or 8x E1 + 4 x 10/100 Ethernet Fiber Multiplexer

NEW

The FMUX160/FMUX80 is 1U 19" rack mountable, PDH fiber optical Multiplexer that transmits up to 16E1/8E1 + 4 x 10/100Base-T(X) 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 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, fiber port
- Provides one hotline channel (order-wire)
- Supports full/half duplex, 10M/100M, auto-Negotiation
- Supports IEEE802.1q tagged and port based VLAN

- 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 (options)

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

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	<40W
Dimensions	250 x 438 x 43mm (D x W x H)
Weight	3.58kg
Temperature	0 ~ 60°C (Operating), -10 ~ 70°C (Storage)
Certification	CE, FCC, LVD, RoHS

Application

Central Office (CO)

Order Wire

ADM | STM1

GE | 16E1

FE LAN

RS232 clear channel

NMS

FMUX160

Customer Premise Equipment (CPE)

3G BST

Order Wire

16E1

NMS

FMUX160

RS232 clear channel

GE

LAN

Ordering Information

Power Type

FMUX160 ☐ – ☐☐

Example: FMUX160 B – AC
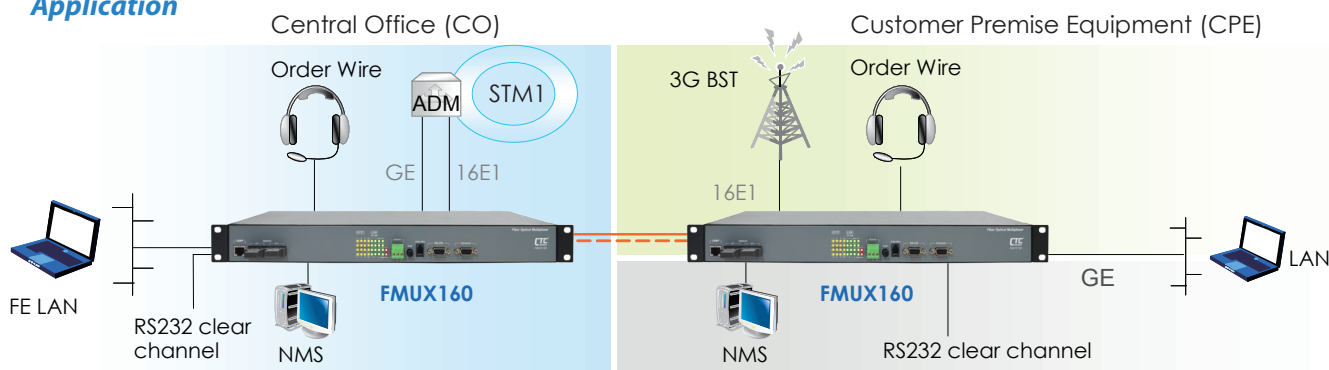
Chassis

Model Name	Description
FMUX160B-AC	16x E1 BNC + 4 x 10/100Base-T(X) Ethernet fiber multiplexer, built-in AC power
FMUX160B-DC	16x E1 BNC + 4 x 10/100Base-T(X) Ethernet fiber multiplexer, built-in DC power
FMUX160B-AD	16x E1 BNC + 4 x 10/100Base-T(X) Ethernet fiber multiplexer, built-in AC+DC power
FMUX160R-AC	16x E1 RJ45 + 4 x 10/100Base-T(X) Ethernet fiber multiplexer, built-in AC power
FMUX160R-DC	16x E1 RJ45 + 4 x 10/100Base-T(X) Ethernet fiber multiplexer, built-in DC power
FMUX160R-AD	16x E1 RJ45 + 4 x 10/100Base-T(X) Ethernet fiber multiplexer, built-in AC+DC power
FMUX80B-AC	8x E1 BNC + 4 x 10/100 Ethernet fiber multiplexer, built-in AC power
FMUX80B-DC	8x E1 BNC + 4 x 10/100 Ethernet fiber multiplexer, built-in DC power
FMUX80B-AD	8x E1 BNC + 4 x 10/100 Ethernet fiber multiplexer, built-in AC+DC power
FMUX80R-AC	8x E1 RJ45 + 4 x 10/100 Ethernet fiber multiplexer, built-in AC power
FMUX80R-DC	8x E1 RJ45 + 4 x 10/100 Ethernet fiber multiplexer, built-in DC power
FMUX80R-AD	8x E1 RJ45 + 4 x 10/100 Ethernet fiber multiplexer, built-in AC+DC power

SNMP

FMUX-SNMP	SNMP card with 10/100Base-T(X) Ethernet port

Order Wire Phone

FMUX-Phone	2/4 wires FXS phone card

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

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

FMUX04E

4-Ch E1 / T1+3-Port 100M Fast Ethernet 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-T(X) 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
	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	236.4 x 195.2 x 44mm(D x W x H)
Operating	0 ~ 50℃ (Operating)
Temperature	-10 ~ 20℃ (Storage)
Humidity	10 ~ 90% non-condensing
Certifications	CE, FCC, RoHS
MTBF	57,350 hrs

Application

Customer Premise Equipment (CPE)   Customer Premise Equipment (CPE)

Order Wire

ADM SDH

4E1/T1

PBX

Order Wire

4E1

LAN

Fast Ethernet

FMUX04E

RS232 clear channel

NMS

FMUX04E

Fast Ethernet   LAN

NMS
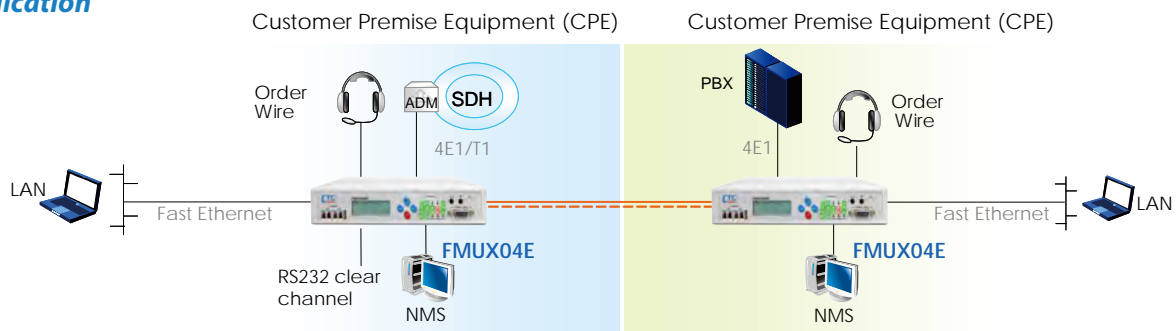
Ordering Information

Model Name	Description
FMUX04E-AC	Standalone FOM with built-in AC power, optional SNMP
FMUX04E-DC	Standalone FOM with built-in DC power, optional SNMP
FMUX04E-AD	Standalone FOM with built-in 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 – AC

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

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FMUX04

4-Ch E1/ 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	RJ-45
	Order wire	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
MTBF	57,350 hrs

Application
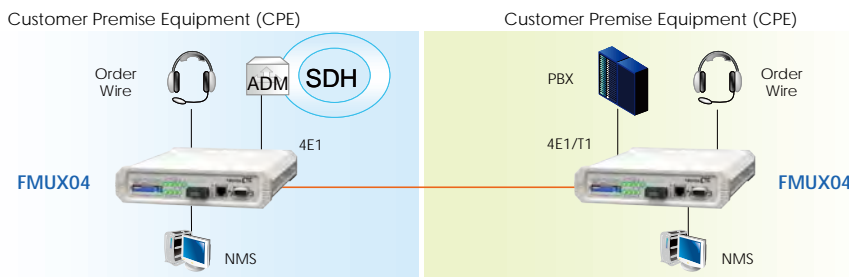
Ordering Information

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
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

Specifications & design are subject to change without prior notice. Please visit CTC Union website for more details.
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FMUX04 | **1-101**

SDH04A

1U, STM 4 / STM 1 NG-SDH ADM Rack

The SDH04A is a compact NG-SDH equipment which supports STM-1/4 ADM and offers various tributary interfaces like E1/T1, V.35, FE/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 Ethernet switch over SDH interface card (QSW)
    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

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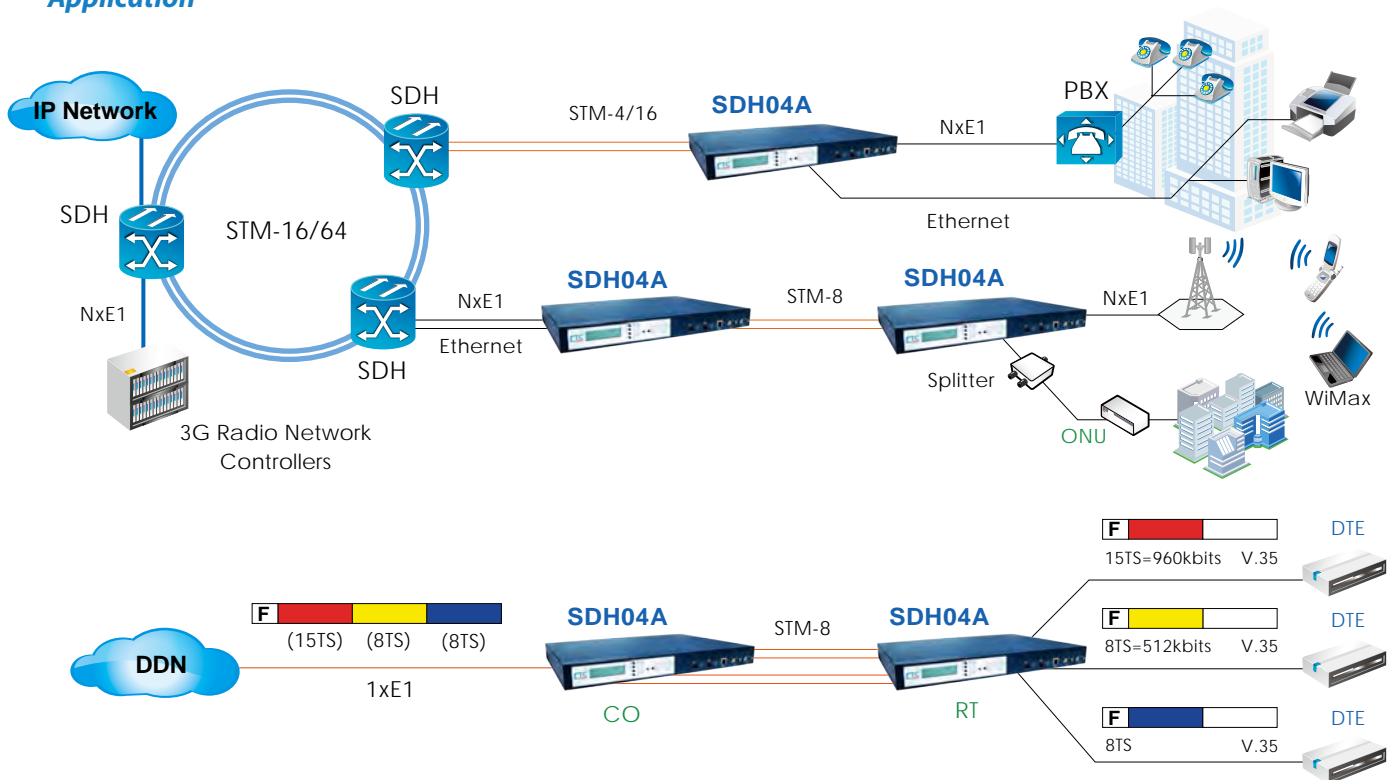
Specifications

Ethernet Tributary Interface (QSW)
Data rate : 4CH x 10/100Mbps with auto negotiation
Compliance : ITU-T G.7041 GFP-F, G.707 VCAT
IEEE 802.3x, 802.1p, 802.1Q (Q-in-Q),802.3ad
Mode : L2 Switch 100Mbps throughput
Connector : RJ-45

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)

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

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

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

8E1/ T1 Tributary Interface (8ET)
Bit rate :
8CHx2.048Mbps±50ppm /1.544Mbps±50ppm
Impedance(connector) :
120/100Ω software selective (wire-wrap)

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
(WxDxH) : 442 x 312 x 44mm 1U, 19" rack mount/ wall
mount/ standalone
Weight : 3.7kg

Power Consumption
27W in full load

Management Interface
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

Operation Requirement
Operating temperature : 0 ~ 55℃
Humidity : 0% ~ 100% (100% at 30℃)
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
SDH01-4SW	Card	Ethernet over SDH card, 4 * 10/100 BaseTx RJ45
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 – AC

Card Type
SDH04A – ☐☐☐
Example: SDH04A – Gbe

Industrial Fiber Series

Stable, Reliable and Scalable

-40℃ ~ 75℃ Wide Temperature

Hardened GbE Ethernet Switches

Serial to Daisy Chain Media Converters

Ethernet Media Converters with **PoE PD**

High Power PoE Ethernet Switches

Serial Device Servers

Industrial Fiber Series

CTC Union offers a variety of industrial networking solutions, including Fast Ethernet and Gigabit Ethernet switches, copper to fiber media converters and serial interface to fiber converters as well as Power over Ethernet related products. CTC Union's industrial network products ensure efficient and reliable transmission performance by its hardened design of robust mechanical, dual and wide range power input, high EMS protection and long MTBF. Especially, provides wide operating temperature for harsh industrial environment. CTC Union's industrial network products designed for communication demanding applications, such as renewable energy data transmitting , video and process monitoring, ITS, IP surveillance, and DCS systems.

- *Wide Temperature -40°C ~ 75°C Models Available*
- *Industrial Grade EMS Certified*
- *Hazardous Location Applications*
- *Fan less and high MTBF*
- *5-Year Warranty*

Serial Device Servers

Industrial Media Converters

High Power PoE Ethernet Switch / Injector

Industrial Ethernet Switches

UL60950-1	**Surge Protection** Protect Electronics from Power Surges	**RoHS** Caring for the Earth	**ESD** Electrostatic Discharge Protection	**P**ower **o**ver **E**thernet	**Wide Temperature** Harsh Environments
Anti-Vibration	Dust-Proof	Isolation	IEC-61850-3	EN50121-4	**Ring Technology** Redundant Ring

Industrial Media Converters

CTC Union's industrial media converters are robust devices and be designed to provide reliable and stable media conversion from 100/1000Base-T(X) to 100/1000Base-X (SX/LX/LHX/ZX) and from RS-232/422/485 digital electric single to optical fiber (and vice versa). CTC Union's industrial media converters are rugged design with metal housings, use industrial-grade components to support very long MTBF (mean time between failures), provide enhanced safety, surge and EMS protection, the industrial media converters are excellent devices for your industrial automation applications in harsh environments.

Industrial Ethernet Switches

CTC Union provides a wide range of industrial Ethernet switches that support bps Gigabit and 100Mbps Fast Ethernet options with RJ45 copper and fiber ST/SC/SFP connectors. These rugged switches use industrial-grade components to meet strict industry standards. Other features include hardened case, broadcast storm protection, dual power inputs, power failure alarm and -40 to 75°C operating temperature, make them ideal for harsh environments

Industrial PoE Ethernet Switches

CTC Union's PoE (Power over Ethernet) switches are classified as power source equipment (PSE) provide high bandwidth 100/bps Gigabit data transmission and provide up to 30watts of power consumption per PoE port, These PoE switches can be used to power IEEE802.3af/at compliant power devices (PD), when use in this way, user can reduce the effort needed for installing power and eliminate the needed for additional wiring. CTC Union's PoE switches support 24/48VDC power input booster to fit all the common 24/48 VDC power system that easy found in industrial fields or cabinets.

Serial Device Servers

CTC Union provides IP device servers to control serial devices or equipment located virtually anywhere through a TCP/IP or UDP/IP connection. The IP device server can support various operation modes such as direct IP, virtual COM and paired mode to fulfill rigorous industrial application scenarios. CTC Union's IP device server offers an efficient way to easily control and monitor devices with legacy interfaces such as CNC, weighted scales and scanners, all over modern Ethernet-based networks.

ETC Billing System

While moving cars traverse the tollway, the electronic ticketing billing system reduces traffic congestion during peak hours. CTC Union's industrial Ethernet media converters are compact and robust devices designed to convert and transmit Gigabit Ethernet or Fast Ethernet transmission over fiber optic networks by converting digital electric Ethernet signals to optical signals.

- *Power over Ethernet*
- *Ring Technology*
- *Dust-Proof*

Romote Control Room
(Billing System)
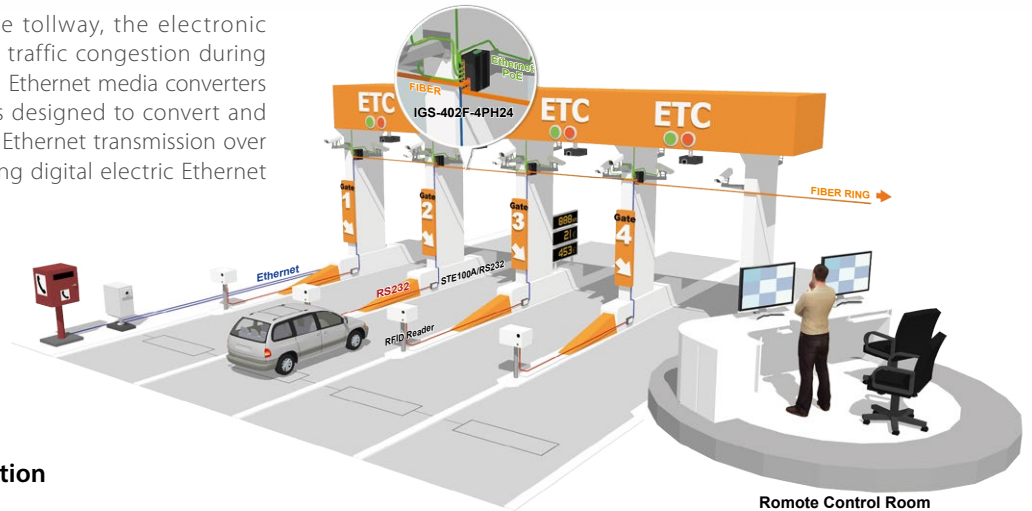
ITS and ETC Billing Application

- FIBER
- Ethernet PoE
- Ethernet
- RS232

High Power PoE Ethernet Switch

RFID Reader

Gate 3

Gate 2

PoE Camera

Serial to Ethernet Device Server

Gate 4

Gate 1

ETC Toll Display

FRM220A-CH20
w/FRM220A-1000EAS/X slide in

FIBER

FIBER RING

Ethernet PoE

Control Room (Billing System)

Ethernet Media Converter

CMS

Gigabit Ethernet Switch

FIBER

Serial to Fiber Media Converter

Traffic light

Vehicle Detector Controller

Emergeney Telephone

Fan Detector

RainDetector

Anemometer

Humidity

Smoking sensor

Media Converters

Serial Media Converter
- 1 x port serial interface: RS-232,RS-422 or RS-485 (2/4-wire)
- 1 x port fiber interface: SC, ST (2km, 30km, 60km)
- Supports fiber ring transmission
- 2.5KV isolation for serial signal

IFC-Serial
P. 2-12

Ethernet Media Converter
- 1 x 10/100Base-T(X) RJ45
- 1 x 100Base-FX: SC,ST(2km, 30km, 60km), SFP
- Redundant dual DC input 12/24/48 VDC (9.6~60VDC)
- FAN-less and DIN-Rail designed for harsh industrial environment

IMC-100
P. 2-16

High Power PoE Ethernet Switch
- 4 x 100/1000Base-T(X) RJ45 with copper
- 2-port 1000Base-X optical fiber
- 4 x copper ports with high power PoE(PSE) function
- Redundant dual port input24/48 VDC(20~57VDC)

IGS-402F-4PH24
P. 2-8

Industrial Gigabit Ethernet Switch
- 4 x Port 1000Base-TX RJ-45 with 1x Fiber Gigabit Ethernet
- Industrial grade EMS certification
- Redundant dual DC input 12/24/48 VDC (9.6~60VDC)

IGS-401F   *P. 2-30*

Serial Device Servers
- Supports RS-232/422/485 serial interface
- Port RJ-45 Ethernet 10/100Base-T(X)
- Easy to user with Windows utility
- TCP Server, TCP Client, UDP, Virtual COM, Paired Mode

STE100A/RS232 &   *P. 2-34*
STE100A-485   *P. 2-35*

Ethernet Aggregation Platform
(2U/19" rack mountable, 20-slots)

FRM220A-CH20   *P. 1-2*

OAM/IP Managed Ethernet Switch
- 2-port 100/1000Base-T to 2-port 100/1000Base-X SFP
- Supports local/remote IEEE802.3ah OAM/IP in-band management

FRM220A-1000EAS/X *P. 1-31*

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Renewable Energy

CTC Union provides a variety of rugged Ethernet products to fulfill different requirements in the renewable energy industry, such as wind power plants. Wind power plants require a great amount of system information management and remote wind turbine monitoring. CTC Union's products integrate control, communication, and management and are used throughout the power generation, transmission, and distribution stages. In addition, wind power systems are often situated in harsh environments with high day-night temperature differences and serious dust/sand storms. The rugged electro-magnetic environment of motor control systems requires an industrial switch with excellent anti-electromagnetic interference capability and long MTBF. CTC Union's reliable solutions are designed for harsh industrial environments, and to keep renewable energy applications running continuously.

▮ Renewable Energy Application

FIBER
Ethernet PoE
Ethernet

• *Wide Temperature -40°C ~ 75°C Models Available*
• *Hazardous Location Application*
• *Power over Ethernet*
• *Ring Technology*
• *Dust-Proof*
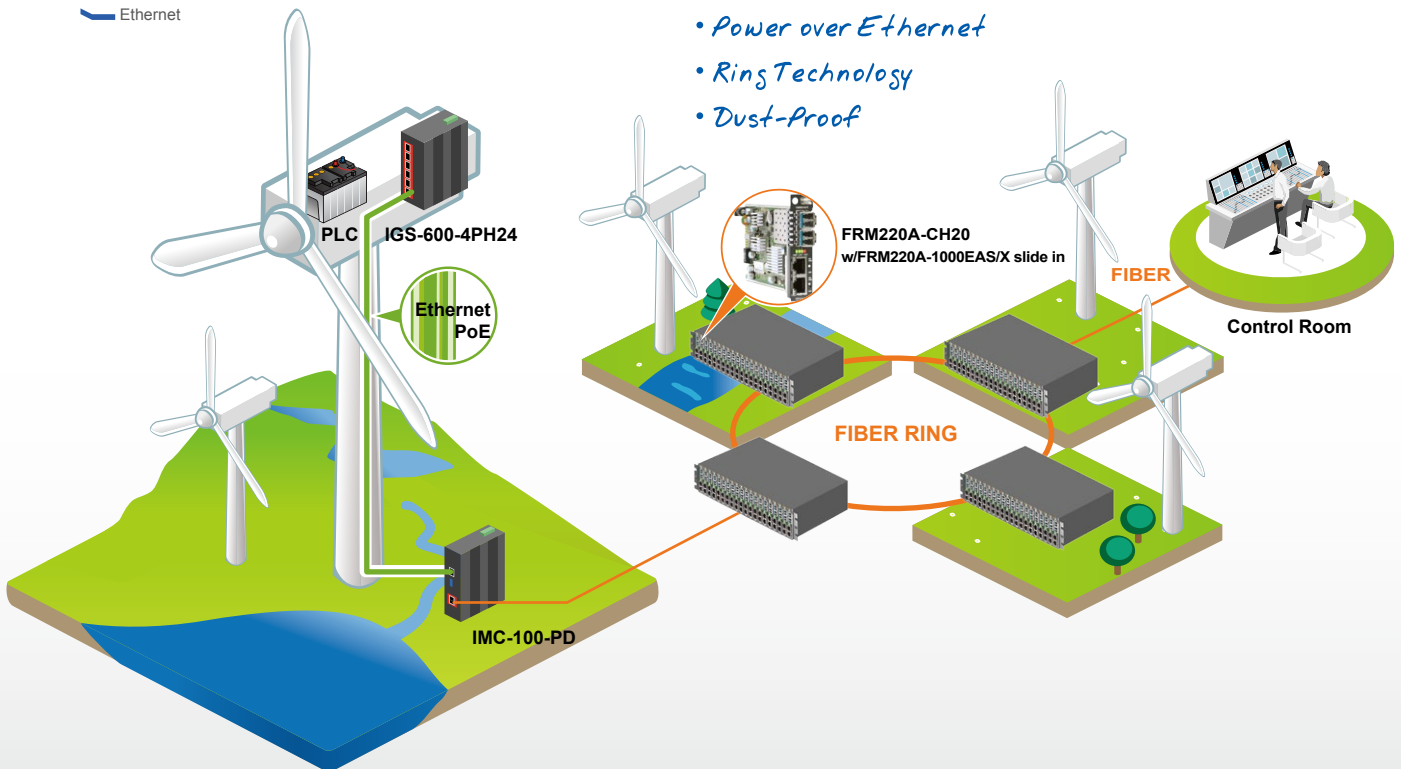
PLC   IGS-600-4PH24

Ethernet
PoE

IMC-100-PD

FRM220A-CH20
w/FRM220A-1000EAS/X slide in

FIBER

Control Room

FIBER RING

IGS-600-4PHE24
P. 2-6

Industrial High Power PoE Ethernet Switch

• 6 x 100/1000Base-T(X) RJ45 with copper
• 4 x copper ports with high power PoE(PSE) function
• Redundant dual DC input 12/24/48 VDC (9.6~60VDC)
• Provides broadcast storm protection

IMC-100-PD
P. 2-18

Ethernet Media Converter

• 1 x 10/100Base-T(X) RJ45 with PoE/PD
• 1 x 100Base-FX: SC,ST(2km, 30km, 60km), SFP
• Redundant dual DC input 12/24/48 VDC (9.6~60VDC)
• FAN-less and DIN-Rail designed for harsh
  industrial environment

FRM220A-CH20
P. 1-2

Ethernet Aggregation Platform

(2U/19" rack mountable, 20-slots)

FRM220A-1000EAS/X
P. 1-31

OAM/IP Managed Ethernet Switch

• 2-port 100/1000Base-T(X) to 2-port
  100/1000Base-X SFP
• Supports local/remote 802.3ah OAM/IP
  in-band management
• Stand-alone IP Based, Web GUI, Telnet,
  SNMP Management
• Forward 10k bytes jumbo packets(max.)

Kiosk & Bus Surveillance

Kiosk Application

— Ethernet

- *Compact Design*
- *High MTBF*
- *Fan Less*

IP Camera

Panel PC

Card Reader

ADSL

Printer

IFS-500
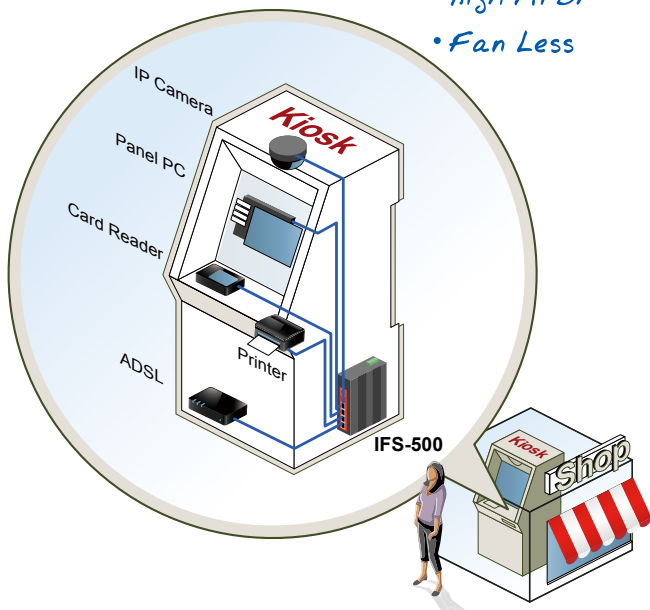
As the highly distributed multimedia informtion system's market expands, Kiosks and digital signage are at every corner we turn and are becoming a common part of daily life. As we can see, more and more kiosks, with multifunctional capabilities, are beginning to pop up in supermarkets, airports, hotels and other public areas. The kiosk is loaded with advanced features and the requirement for a powerful device is needed to handle the real-time data handling. CTC Union's IFS-500 & IFS-800 provide 5 or 8 ports 10/100Base transmission to connect all the kiosk's peripheral devices, with its compact design and multiple interfaces, both models will become the perfect solution to easily integrate into the small sized kiosks for multi-communication purposes.

Industrial Fast Ethernet Switches

- 5/8-port 10/100Base-T(X) RJ45 copper
- Redundant dual power input 12/24/48 VDC (9.6~60 VDC)
- Provides broadcast storm protection
- Provides enable/disable Power-Fault-Alarm by relay output

IFS-500 & IFS-800
P. 2-24
P. 2-26

Bus Surveillance Application

— Ethernet PoE
— Ethernet

- *Power over Ethernet*
- *Anti-Vibration*
- *High MTBF*
- *Fan Less*

Camera 3

Camera 4

Camera 1

Camera 2

NVR

IGS-600-4PH24

24VDC Output
Power Battery

IGS-600-4PH24
Support 24VDC power Input
on vehicles application

Video surveillance in buses and other mobile systems has become highly important due to the increased number of criminal threats. Now, more and more buses are being equipped with IP cameras which require a total IP surveillance network solution. CTC Union's IGS-600-4PH24 6-port Industrial 24V PoE Ethernet Switch provides a high speed, simple and cost effective solution for configuring small Industrial Gigabit Ethernet networks that require power over Ethernet. The vibration resistance, wide operating temperature and fan-less design with no movable parts, make IGS-600-4PH24 the ideal solution for this application.
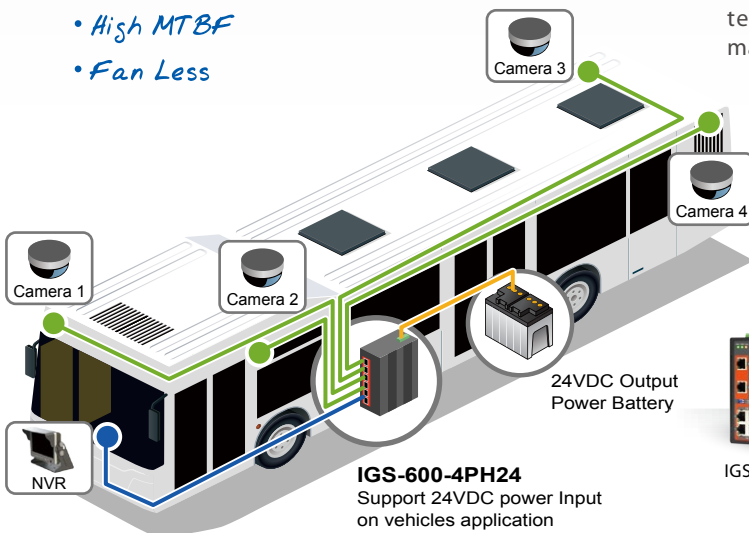
Industrial High Power PoE Ethernet Switch

- 6 x 100/1000Base-T(X) RJ45 with copper
- 4 x copper ports with high power PoE(PSE) function
- Redundant dual DC input 12/24/48 VDC (9.6 ~ 60VDC)
- Provides broadcast storm protection

IGS-600-4PH24
P. 2-6

Factory Automation

Building factory automation with high data transmission efficiency to support reliable and uninterrupted video streaming system from the assembly line to the management room is a big challenge for system engineers. In order to achieve the requirements of system engineers that allow Ethernet-based and legacy serial-based devices to communicate with other processing machinery and at the same time capture high resolution machine vision images on the processing line for remote monitoring and control, CTC Union's IGS-401F Gigabit Ethernet switches, DVS-8401E video servers and STE100A device servers are ideal for providing an economical, high-bandwidth data transmission system, that is swift and dependable for the process automation network.

Factory Automation Application

- FIBER
- Ethernet
- RS232
- Coaxial Cable

• Wide Temperature -40°C ~ 75°C Models Available
• High MTBF

FRM220A-1000EAS/X Card inserts in FRM220A Chassis

Industrial Gigabit Ethernet Switch

- 4 x Port 1000Base-T(X) RJ-45 with 1 x Fiber Gigabit Ethernet
- Industrial grade EMS certification
- Redundant dual DC input 12/24/48 VDC (9.6~60VDC)
- FAN-less and DIN-Rail designed for harsh industrial environment

IGS-401F
P. 2-30

Serial Device Servers

- Supports RS-232/422/485 serial interface
- Port RJ-45 Ethernet 10/100Base-T(X)
- Easy to user with Windows utility
- TCP Server, TCP Client, UDP, Virtual COM, Paired Mode

STE100A/RS232 & STE100A-485
P. 2-34
P. 2-35

Ethernet Aggregation Platform
(2U/19" rack mountable, 20-slots)

FRM220A-CH20
P. 1-2

OAM/IP Managed Ethernet Switch

- 2-port 100/1000Base-T(X) to 2-port 100/1000Base-X SFP
- Supports local/remote 802.3ah OAM/IP in-band management
- Stand-alone IP Based, Web GUI, Telnet, SNMP Management
- Forward 10k bytes jumbo packets(max.)

FRM220A-1000EAS/X
P. 1-31

Digital Video Server

- D1 resolution @ 30FPS (NTSC) @ 25FPS (PAL)
- Dual H.264 streams
- 1 x Video in, 1 x Audio In / Out
- Built-in Web server for management

DVS-8501E
P. 9-8

Specifications & design are subject to change without prior notice. Please visit CTC Union website for more details.
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Factory Automation | **2-5**

IGS-600-4PH24
IGS-600-4PHE24

6-Port 10/100/1000Base-T(X) with 4-Port PoE+ unmanaged Gigabit Ethernet Switch

CTC's industrial High Power PoE switches are specifically designed to meet IEEE 802.3af/at standards for powering network devices with up to 30 watts output per PoE port. With PoE function, It becomes simplified to install network devices such as IP surveillance cameras, wireless access points, IP phones, and other PoE enabled devices in outdoor or remote areas where are hard-to-reach power source. The IGS-600-4PH(E)24, 6-port copper unmanaged full-gigabit Ethernet switches, support 4-port Power-over-Ethernet on ports 1 to 4. The switches are classified as power source equipment (PSE) can be used to power IEEE 802.3af/at standard devices (PD), eliminating the need of additional power cable wiring. Moreover, it built-in power input booster of 24 VDC and 48VDC for PoE/PoE+ output without external power converters or power supplies, it is able to fit all the common 24/48 VDC power system found in industrial fields or cabinets. IGS-600-4PH(E)24 support IEEE 802.3/802.3u/802.3x/803.3ab with 10/100/1000M, full/half-duplex, MDI/MDI-X auto-sensing to provide an economical high-bandwidth solution for your industrial Ethernet network. Wide operating temperature (-40 ~ 75°C), E models, especially for industrial harsh environment 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 Size	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 (VCC+): RJ-45 pin 1, 2.
	Negative (VCC-): RJ-45 pin 3, 6.
	Data (1, 2, 3, 6, 4, 5, 7, 8)
Network Connector	6 x RJ-45
	10/100/1000BaseT(X) 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)
Protocol	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	0 ~ 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
Dimension	62.5 x 106 x 134.8mm (W X D X H)
Weight	0.84kg
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 (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	296,517 Hours
Warranty	5 years

Application

IGS-600-4PHE24 PoE Ethernet Switch Transmission

PoE + Data

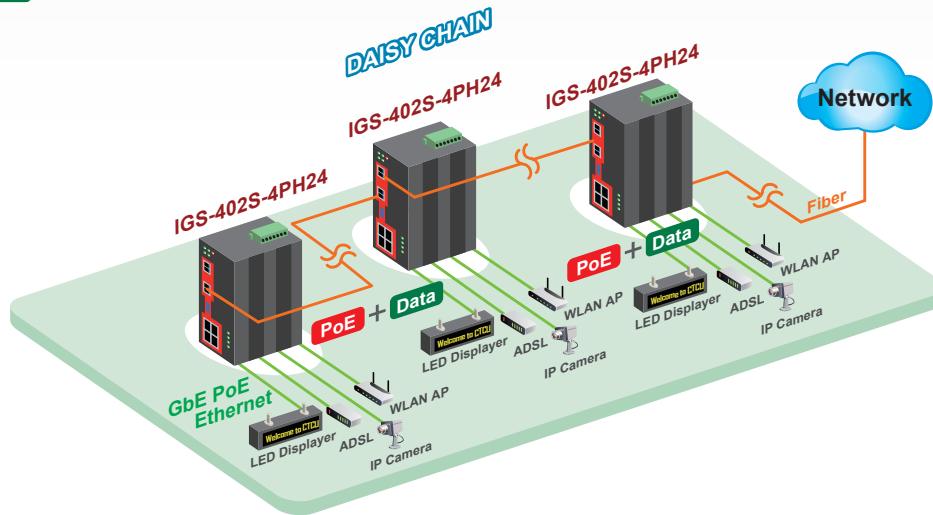## Dimensions

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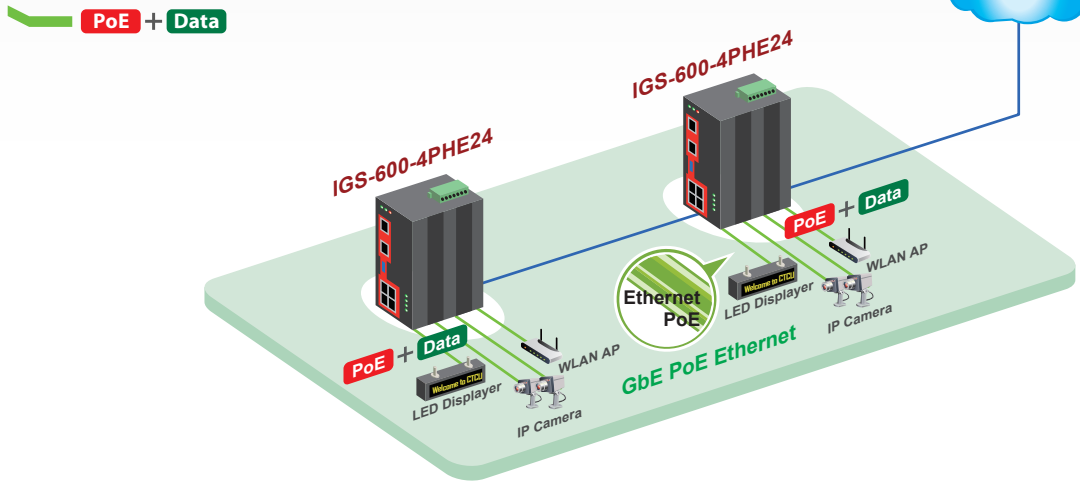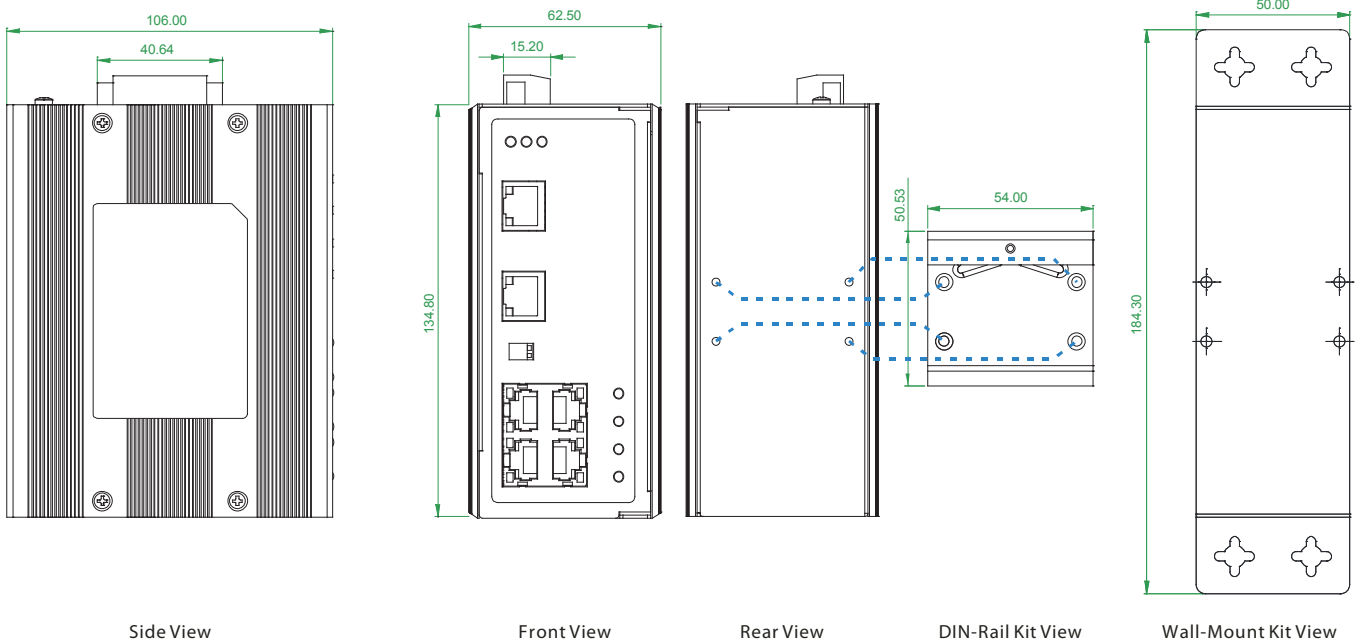
Ordering Information

Model Name	Description
IGS-600-4PH24	6-Port 10/100/1000Base-T(X) with 4-PoE Switch (30W/Per Port, Total 120W, 24V Booster) (0 ~ 60˚C)
IGS-600-4PHE24	6-Port 10/100/1000Base-T(X) with 4-PoE Switch (30W/Per Port, Total 120W, 24V Booster) (-40 ~ 75˚C)

Temperature

IGS – 600 – 4PH☐24

Example: IGS – 600 – 4PHE24

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IGS-600-4PH24, IGS-600-4PHE24 | 2-7

IGS-401F-4PH24 & 4PHE24
IGS-402F-4PH24 & 4PHE24

4-Port 10/100/1000Base-T(X) with 1 or 2 Fiber and 4-Port PoE+ unmanaged Gigabit Ethernet Switch

CTC's industrial High Power PoE switches are specifically designed to meet IEEE 802.3af/at standards for powering network devices with up to 30 watts output per PoE port. With PoE function, It becomes simplified to install network devices such as IP surveillance cameras, wireless access points, IP phones, and other PoE enabled devices in outdoor or remote areas where are hard-to-reach power source. The IGS-401F-4PH(E)24 and IGS-402F-4PH(E)24, 5-port and 6-port unmanaged full-gigabit Ethernet switches, support 4-port Power-over-Ethernet on ports 1 to 4 and 1-port or 2-port 1000Base-X optical fiber. The switches are classified as power source equipment (PSE) can be used to power IEEE 802.3af/at standard devices (PD), eliminating the need of additional power cable wiring. Moreover, it built-in power input booster of 24 VDC and 48VDC for PoE/PoE+ output without external power converters or power supplies, it is able to fit all the common 24/48 VDC power system found in industrial fields or cabinets. These PoE switches support IEEE 802.3/802.3u/802.3x/802.3ab with 10/100/1000M, full/half-duplex, MDI/MDI-X auto-sensing to provide an economical high-bandwidth solution for your industrial Ethernet network. Wide operating temperature (-40 ~ 75℃), E models, especially for industrial harsh environment 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℃ (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	DIP SW	DIP 1	On : Disable power failure alarm
	IEEE 802.3u 100Base-TX Fast Ethernet			Off : Enable power failure alarm
	IEEE 802.3ab 1000Base-T Gigabit Ethernet		DIP 2	On : Disables broadcast storm protection
	IEEE 802.3z 1000Base-X Gigabit Ethernet			Off : Enable broadcast storm protection
	IEEE 802.3x Flow Control and Back Pressure	Reserve polarity protection	Present	
	IEEE 802.3at, IEEE802.3af			
Switch Architecture	Back-plane (Switching Fabric): 10Gbps (IGS-401F-4PH24, IGS-401F-4PHE24)	Overload current protection	Present	
	Back-plane (Switching Fabric): 12Gbps (IGS-402F-4PH24, IGS-402F-4PHE24)	Power Supply	Redundant Dual DC 24/48V (20~57VDC) Input power (Removable Terminal Block)	
Data Processing	Store and Forward	Power Consumption	Max 143W @24VDC input (support up to 120W for PoE Output) (IGS-401F-4PH24)	
Flow Control	IEEE 802.3x flow control, back pressure flow control			
Provides broadcast storm protection	Present, Enable / Disable set by DIP sw		Max 143.4W @24VDC input (support up to 120W for PoE Output) (IGS-402F-4PH24)	
Jumbo Frame	10K Bytes	PoE Power Output	Maximum PoE Output power budget 120W (30W/Per Port)	
MAC address Table Size	8K	Alarm Relay Contact	Relay outputs with current carrying capacity of 1A @24VDC	
Packet Buffer Size	1Mbits	Removable Terminal Block	Provide 2 Redundant power, Alarm relay contact, 6 Pin	
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	Operating Temperature	0 ~ 60℃ (IGS-401F-4PH24, IGS-402F-4PH24)	
	Positive (VCC+): RJ-45 pin 1, 2.		-40 ~ 75℃ (IGS-401F-4PHE24, IGS-402F-4PHE24)	
	Negative (VCC-): RJ-45 pin 3, 6.	Operating Humidity	5% to 95% (Non-condensing)	
	Data (1, 2, 3, 6, 4, 5, 7, 8)	Storage Temperature	-40 ~ 85℃	
Network Connector	4 x RJ-45	Housing	Rugged Metal, IP30 Protection	
	10/100/1000BaseT(X) auto negotiation speed, Auto MDI/MDI-X function, Full/Half duplex	Dimension	62.5 x 106 x 134.8mm (W X D X H)	
		Weight	0.67kg (IGS-401F-4PH24), 0.68kg (IGS-402F-4PH24)	
	1 or 2x1000Base-X Fiber connector: SC Muti Mode or Single Mode	Installation mounting	DIN Rail mounting and Wall Mounting	
Network Cable	UTP/STP above Cat. 5e cable	EMC/EMS	CE, FCC	
	EIA/TIA-568 100-ohm (100m)	EMI	FCC Part 15 Subpart B Class A, CE EN 55022 Class A	
			EN61000-6-4 – Emission for industrial environment	
	Fiber Cable (Multi-mode): 50/125um, 62.5/125um Fiber Cable (Single-mode): 9/125um	EMS	EN61000-6-2 – Immunity for Industrial environment	
Protocol	CSMA/CD		EN61000-4-2 (ESD) Level 3,Criteria B	
LED	Per unit: Power 1 (Green), Power 2 (Green), Fault (Amber)		EN61000-4-3 (RS) Level 3,Criteria A	
	Per RJ-45 port : Link/Active (Green), Speed 10 (OFF), 100 (Green), 1000 (Yellow)		EN61000-4-4 (EFT) Level 3,Criteria A	
			EN61000-4-5 (Surge) Level 3,Criteria B	
	Fiber Per port: Link/Active (Green)		EN61000-4-6 (CS) Level 3,Criteria A	
	PoE Port LED : Active : ON Inactive : OFF Fault : Flash (Over Load, Short Circuit, Port failed at Startup)		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	316,408 Hours (IGS-401F-4PH24)	
			306,704 Hours (IGS-402F-4PH24)	
		Warranty	5 years	

Application

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

PoE + **Data**
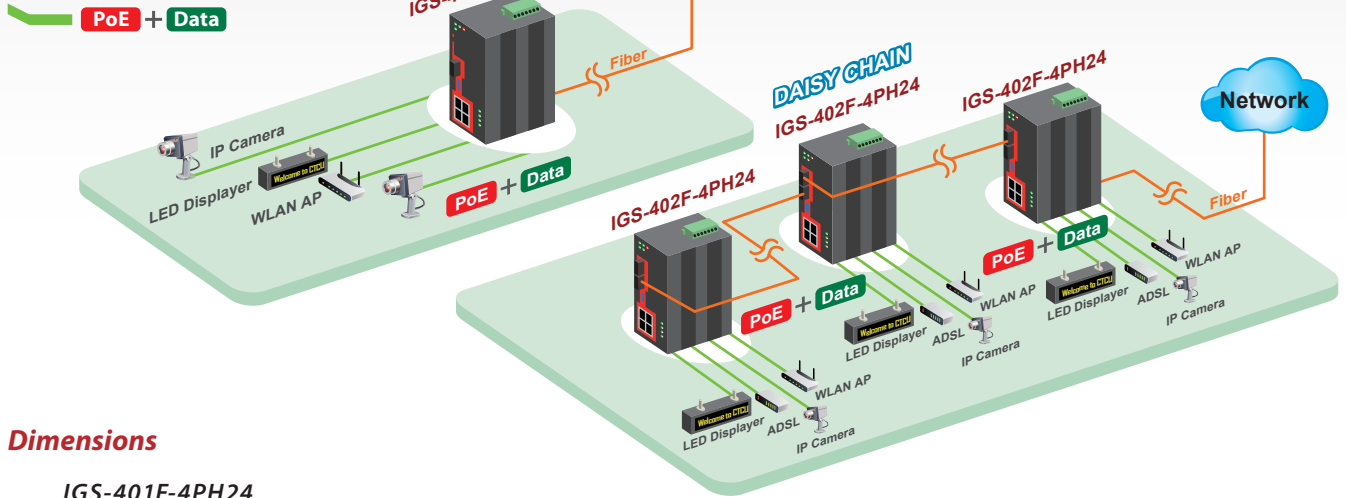
Dimensions

IGS-401F-4PH24
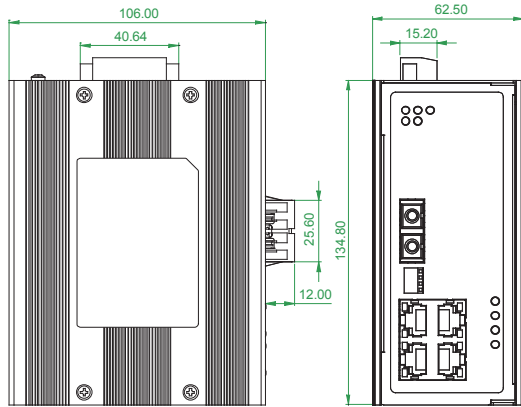
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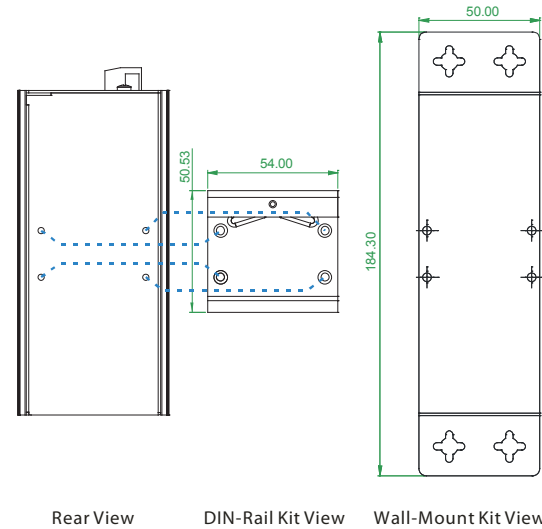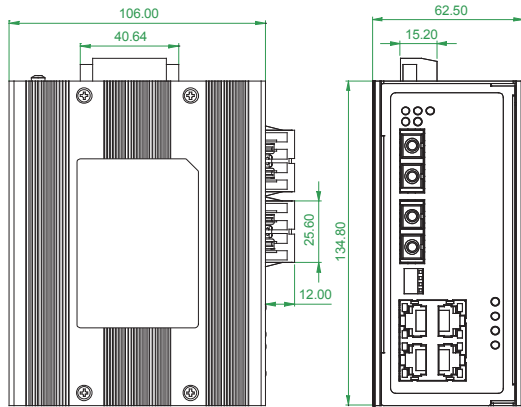
Side View Front View

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

Ordering Information

Model Name	Description
IGS-401F-4PH24	4-Port 10/100/1000Base-T(X) + 1-Port 1000Base Fiber with 4-PoE Switch (30W/Per Port, Total 120W, 24V Booster) (0 ~ 60°C)
IGS-401F-4PHE24	4-Port 10/100/1000Base-T(X) + 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(X) + 2-Port 1000Base Fiber with 4-PoE Switch (30W/Per Port, Total 120W, 24V Booster) (0 ~ 60°C)
IGS-402F-4PHE24	4-Port 10/100/1000Base-T(X) + 2-Port 1000Base Fiber with 4-PoE Switch (30W/Per Port, Total 120W, 24V Booster) (-40 ~ 75°C)
Fiber Option	**Connectivity Distance**
SC	SC001: 500m (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)

Temperature Connector Type Connectivity Distance

IGS – 40 ☐ F – 4PH ☐ 24 – ☐☐☐☐☐

Example: IGS – 4 0 2 F – 4 P H E 2 4 – SC002

PoE Ethernet Switches

IGS-402S-4PH24
IGS-402S-4PHE24

4-Port 10/100/1000Base-T(X) with 2 SFP Slots Fiber and 4-Port PoE+ unmanaged Gigabit Ethernet Switch

CTC's industrial High Power PoE switches are specifically designed to meet IEEE 802.3af/at standards for powering network devices with up to 30 watts output per PoE port. With PoE function, It becomes simplified to install network devices such as IP surveillance cameras, wireless access points, IP phones, and other PoE enabled devices in outdoor or remote areas where are hard-to-reach power source. The IGS-402S-4PH(E)24, 6-port unmanaged full-gigabit Ethernet switches, support 4-port Power-over-Ethernet on ports 1 to 4 and 2-port 1000Base-X (SFP slot) optical fiber. Switchable 100Base SFP or 1000Base SFP can set up easily using the DIP switches located on the front panel. The switches are classified as power source equipment (PSE) can be used to power IEEE 802.3af/at standard devices (PD), eliminating the need of additional power cable wiring. Moreover, it built-in power input booster of 24 VDC and 48VDC for PoE/PoE+ output without external power converters or power supplies, it is able to fit all the common 24/48 VDC power system found in industrial fields or cabinets. The switches support IEEE 802.3/802.3u/802.3x/802.3ab with 10/100/1000M, full/half-duplex, MDI/MDI-X auto-sensing to provide an economical high-bandwidth solution for your industrial Ethernet network. Wide operating temperature (-40 ~ 75℃), E models, especially for industrial harsh environment 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℃ (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 Size	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 (VCC+): RJ-45 pin 1, 2.	
	Negative (VCC-): RJ-45 pin 3, 6.	
	Data (1, 2, 3, 6, 4, 5, 7, 8)	
Network Connector	4 x RJ-45	
	10/100/1000Base-T(X) 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	
Protocol	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)	

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	0 ~ 60℃ (IGS-402S-4PH24) -40 ~ 75℃ (IGS-402S-4PHE24)	
Operating Humidity	5% to 95% (Non-condensing)	
Storage Temperature	-40 ~ 85℃	
Housing	Rugged Metal, IP30 Protection	
Dimension	62.5 x 106 x 134.8mm (W X D X H)	
Weight	0.84kg	
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 (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	334,448 Hours	
Warranty	5 years	

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Application

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

PoE + Data

Dimensions

Side View	Front View	Rear View	DIN-Rail Kit View	Wall-Mount Kit View
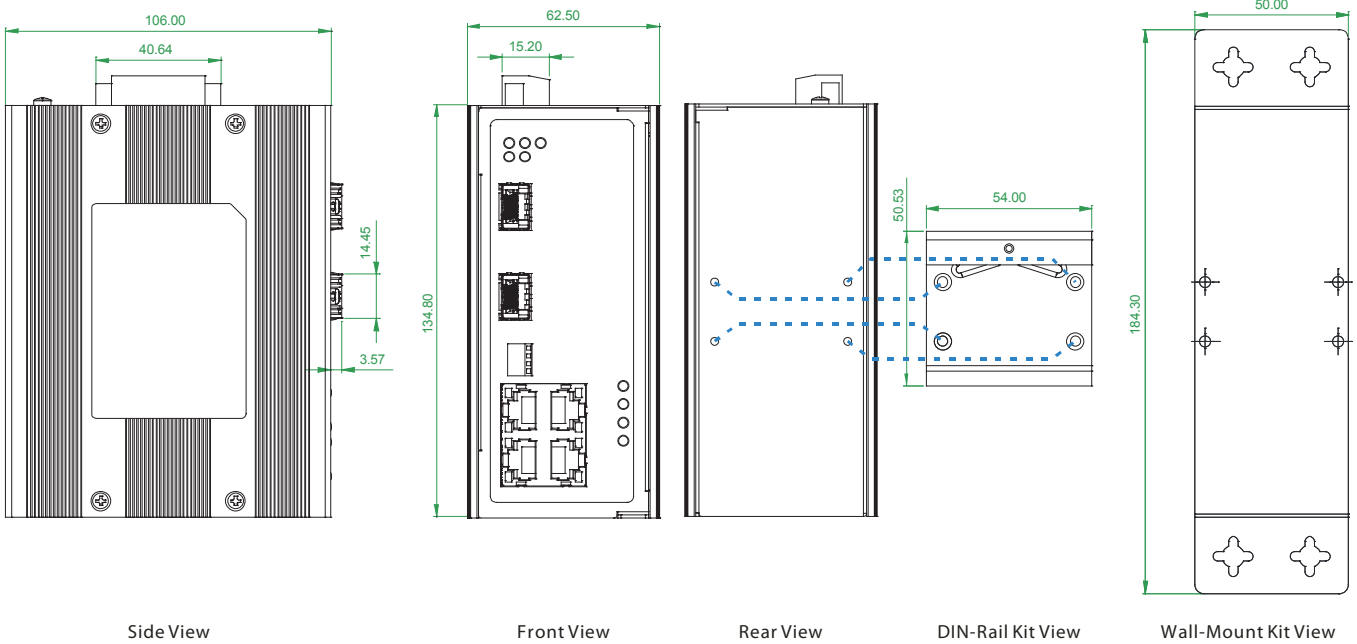
Ordering Information

Model Name	Description
IGS-402S-4PH24	4-Port 10/100/1000Base-T(X) + 2-Port 100/1000Base SFP Slot with 4-PoE Switch (30W/Per Port, Total 120W, 24V Booster) (0 ~ 60°C)
IGS-402S-4PHE24	4-Port 10/100/1000Base-T(X) + 2-Port 100/1000Base SFP Slot with 4-PoE Switch (30W/Per Port, Total 120W, 24V Booster) (-40 ~ 75°C)

Temperature

IGS – 402S – 4PH ☐ 24

Example: IGS – 402S – 4PHE24

Serial Media Converters

IFC-Serial
IFC-Serial-E

RS-232 / 422 / 485 Fiber Converter

The IFC-Serial Series are industrial grade fiber media converters that provide a rugged solution 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 converter is capable of selecting interface modes for connection to RS-232 (3 or 5 wire), RS-485 (2 or 4 wire, half or full duplex) or RS-422 (4 wire, full duplex). The IFC-Serial Series secures asynchronous serial data transmissions over EMI resistant fiber at speeds up to 1024kbps. IFC-Serial Series media converters feature two alarm relay contacts 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 0 ~ 60℃ model range or an extended -40 ~ 75℃ range.

Features

- Wide temperature -40 ~ 75℃ (IFC-Serial-E)
- 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
- 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

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	0 ~ 60℃, -40 ~ 75℃ (wide temperature for IFC-Serial-E model)
		Storage Temperature: -40 ~ 85℃
		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	38 x 106 x 142mm (W x D x H)
	Mounting	DIN-Rail, Wall Mount
	Weight	0.63kg
Regulatory Approvals	Safety	UL508(Pending)
	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

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Application

Point to Point

RS-485
Twisted pair

Fiber

RS-485 network on one twisted pair /
2-wire half duplex

HOST

IFC-Serial-E   **IFC-Serial-E**

Slot machine 1 32

Ring (Half duplex)

RS-232

IFC-Serial-E

Tx   Rx

Rx   Tx   Rx   Tx   Rx   Tx

IFC-Serial-E   **IFC-Serial-E**   **IFC-Serial-E**

RS-422   RS-485   RS-485

PLC   PLC   PLC   PLC   PLC

Dimensions

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

Ordering Information

Temperature   Connector Type   Connectivity Distance

IFC – Serial – ☐ – ☐☐☐☐☐

Example: IFC – Serial – E – SC002
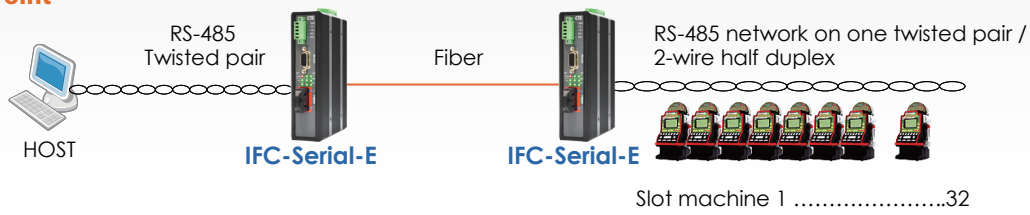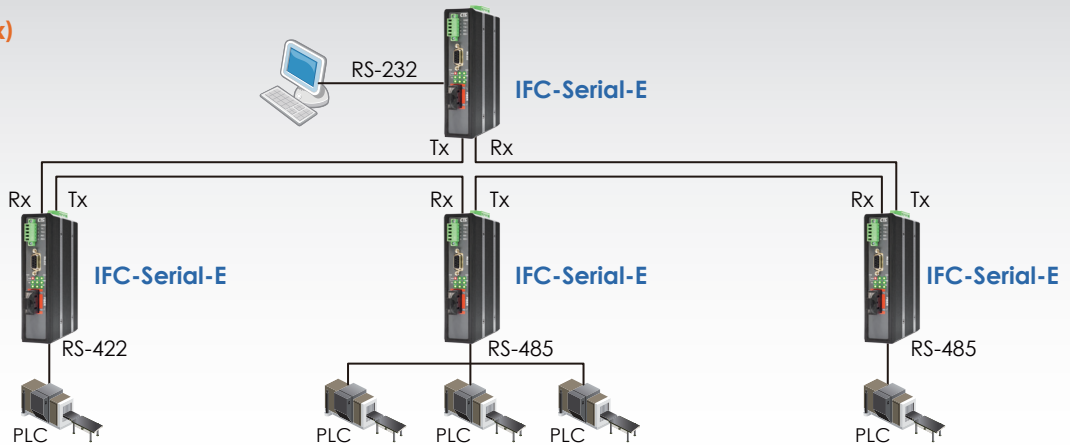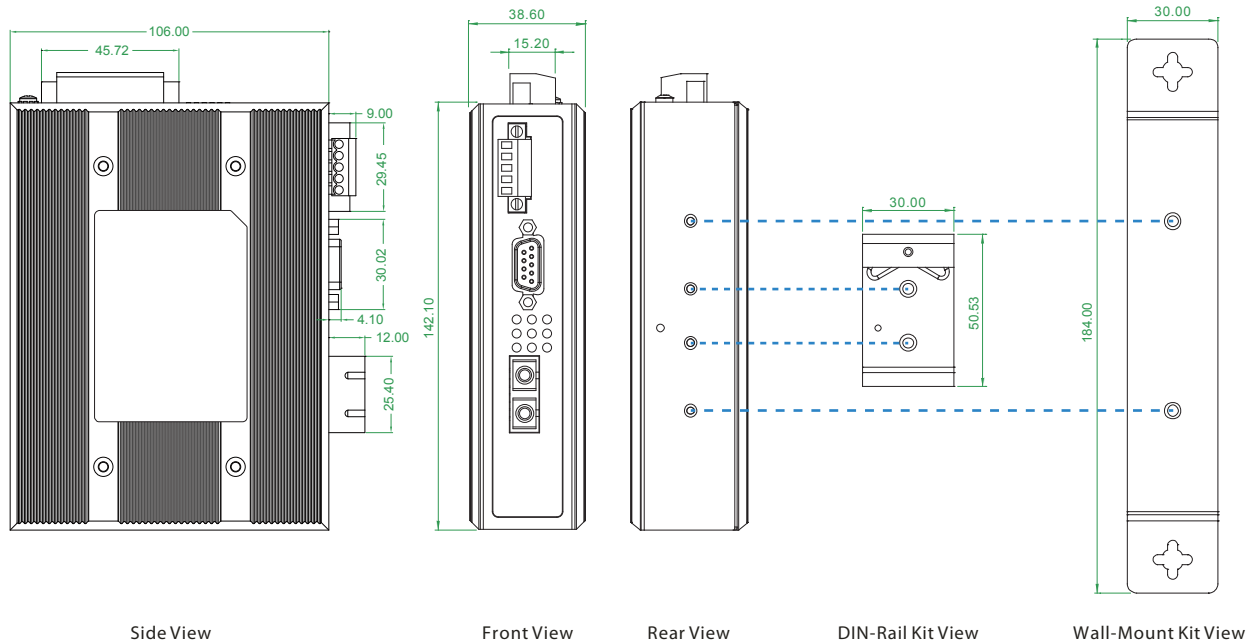
Model Name	Description
IFC-Serial	RS-232/422/485 serial to fiber media converter; Temperature Range : 0 ~ 60°C
IFC-Serial-E	RS-232/422/485 serial to fiber media converter (wide range temp.); Temperature Range : -40 ~ 75°C

Connector Type	Connectivity Distance
SC, ST	002: 2km 030: 30km 060: 60km

Specifications & design are subject to change without prior notice. Please visit CTC Union website for more details.
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IFC-Serial, IFC-Serial-E | **2-13**

IFC-FDC
IFC-FDC-E

RS-232 / 422 / 485 Daisy Chain Fiber Converter

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 or 5 wire), RS-485 (2 or 4 wire, half or full duplex) or RS-422 (4 wire, full duplex). The IFC-FDC Series secures asynchronous serial data transmissions over EMI resistant fiber at speeds up to 1024kbps. IFC-FDC Series media converters feature two alarm relay contacts 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-FDC Series media converters are available in two operating temperature ranges, a standard 0 ~ 60°C model range or an extended -40 ~ 75°C range.

Features

- 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

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	0 ~ 60°C, -40 ~ 75°C (wide temperature for IFC-FDC-E model)
		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	38 x 106 x 142mm (W x D x H)
	Mounting	DIN-Rail, Wall Mount
	Weight	0.64kg
Regulatory Approvals	Safety	UL508(Pending)
	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

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Application

Dual Fiber Auto Recovery

OPC Server — RS-485 — *Point to point connections* — RS-485 — Digital power meters (5F, 6F, 7F, 8F)

Fiber Ring for RS-232 Data Broadcasting

Message Server — RS-232 — *Master* — Fiber Ring

CMS Location A — RS-232
CMS Location B — RS-232
CMS Location C — RS-232
CMS Location D — RS-232
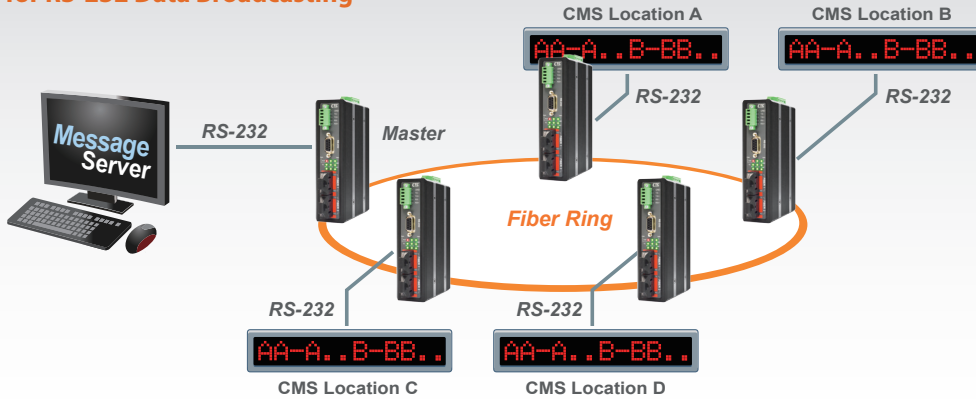
RS-422/485 Fiber Daisy Chain

OPC Server — RS-422 / RS-485

Dimensions

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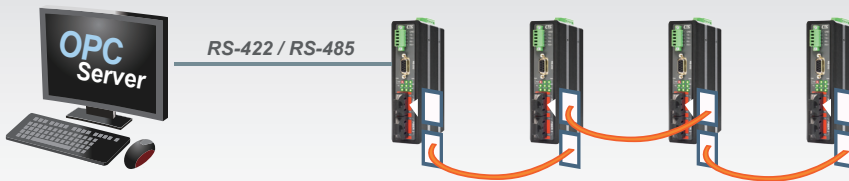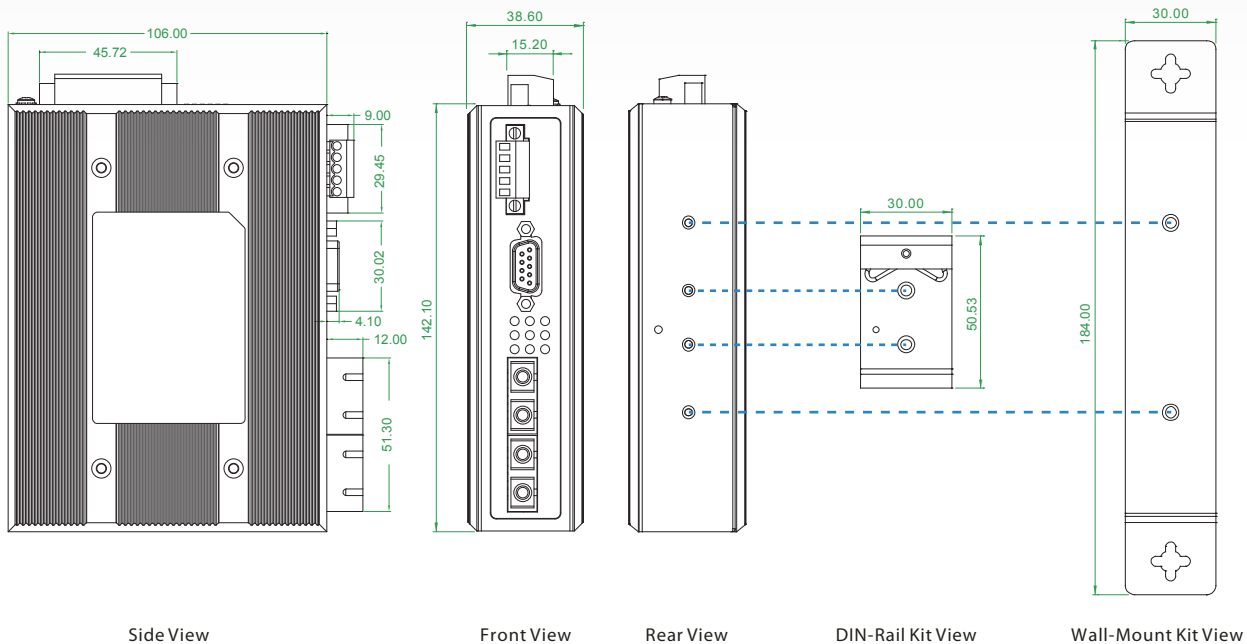
Ordering Information

Model Name	Description
IFC-FDC	RS-232/422/485 serial to dual fiber media converter; Temperature Range : 0 ~ 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

IFC – FDC – ☐ – ☐☐☐☐☐

Temperature / Connector Type / Connectivity Distance

Example: IFC – FDC – E – SC002

Ethernet Media Converters

IMC-100
IMC-100-E

10/100Base-T(X) to 100Base-FX Fiber Converter

IMC-100(E) are industrial media converters designed for conversion between electrical 10/100Base-T(X) and optical 100Base-FX transmission medium. 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) Control(802.3X) and selecting Switch Mode (store & forward) or Converter Mode (Pass-through). Industrial designed converters feature rugged design with metal housings or wall mounting 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)
- IP30 rugged metal housing
- Wide operating temperature -40 ~ 75℃ (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-T(X) 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-T(X)/100Base-FX
	IEEE 802.3x Flow Control
RJ45 Ports	10/100Base-T(X)
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	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	1. TP Auto Negotiation OFF: Auto Mode, ON: Force Mode
	2. Force TP Speed OFF:100 Mbps , ON:10 Mbps
	3. Force TP Duplex OFF:Full Duplex, ON: Half Duplex
	4. DIP Switch: ON: Enables LFPT(Link Fault Pass through) OFF: Disables LFPT(Link Fault Pass through)
	5. DIP Switch: ON: Flow Control Enable OFF: Flow Control Disable
	6. 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	0 ~ 60℃(IMC-100), -40 ~ 75℃(IMC-100-E)
Storage Temperature	-40 ~ 85℃
Housing	Rugged Metal, IP30 Protection
Case Dimension	38 x 106 x 142mm (W X D 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 (Pending)
Rail traffic	EN50121-4
Shock	IEC 60068-2-27
Freefall	IEC 60068-2-32
Vibration	IEC 60068-2-6 (Operating, Packing)
MTBF	852,727 Hrs
Warranty	5 years

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Application

IMC-100 Media Converter Transmission

Dimensions

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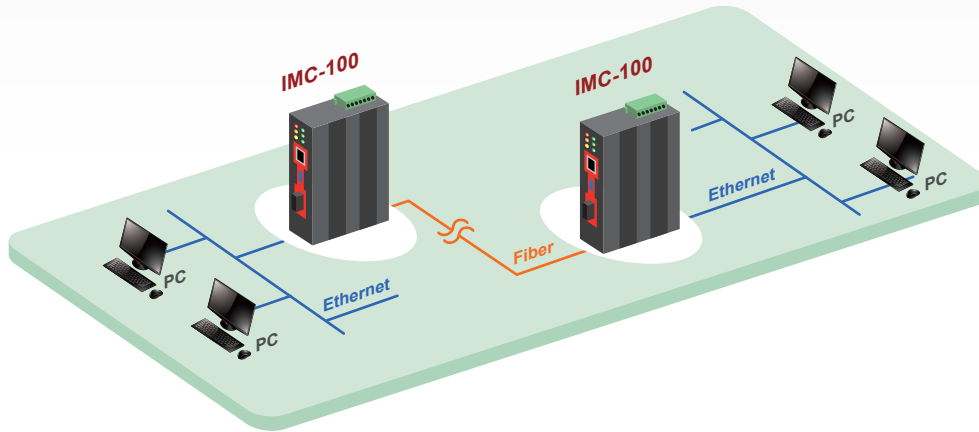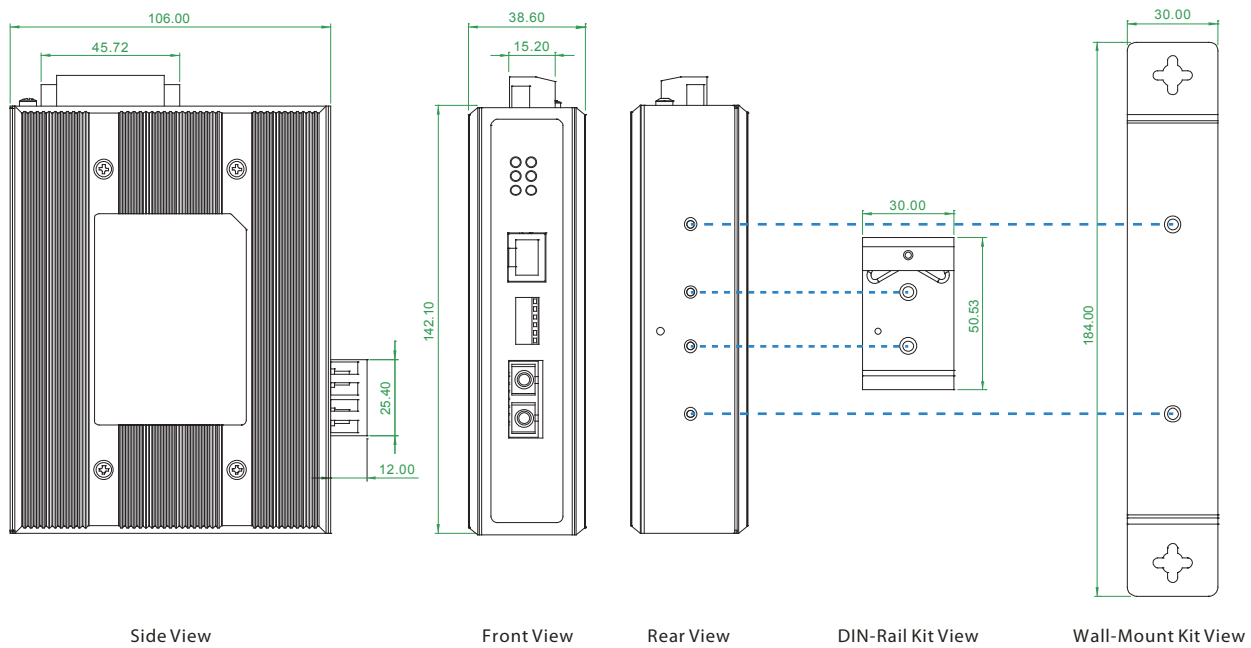
Ordering Information

Model Name	Description
IMC-100	1-Port 10/100-T(X) to 100-FX Fiber Converter ; Temperature Range : 0 ~ 60°C
IMC-100-E	1-Port 10/100-T(X) to 100-FX Fiber Converter ; 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)type

IMC – 100 – ☐ – ☐☐☐☐☐

Temperature / Connector Type / Connectivity Distance

Example: IMC – 100 – E – SC002

Ethernet Media Converters

IMC-100-PD
IMC-100-PDE

10/100Base-T(X) to 100Base-FX Fiber Converter with PoE PD

IMC-100-PD(E) are industrial media converters designed for conversion between electrical 10/100Base-T(X) and optical 100Base-FX transmission medium, which also provide PoE PD (Power over Ethernet) 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) 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-T(X) 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-T(X)/100BASE-FX
	IEEE 802.3x Flow Control and Back pressure
	IEEE 802.3af PoE (Power Device PD)
RJ45 Ports	10/100Base-T(X)
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	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	1. TP Auto Negotiation OFF: Auto Mode, ON: Force Mode
	2. Force TP Speed OFF:100 Mbps , ON:10 Mbps
	3. Force TP Duplex OFF:Full Duplex, ON: Half Duplex
	4. DIP Switch: ON: Enables LFPT(Link Fault Pass through) OFF: Disables LFPT(Link Fault Pass through)
	5. DIP Switch: ON: Flow Control Enable OFF: Flow Control Disable
	6. 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

LED	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	0 ~ 60℃(IMC-100-PD), -40 ~ 75℃(IMC-100-PDE)
Storage Temperature	-40 ~ 85℃
Housing	Rugged Metal, IP30 Protection
Case Dimension	38 x 106 x 142mm (W X D X H)
Weight	0.63 kg
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 (Pending)
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

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Application

IMC-100-PD Industrial PoE Transmission

No Power
Wiring Needed

IMC-100

IMC-100-PD

PoE Switch

PC

PC

PC

Ethernet

Fiber

Ethernet
PoE

Ethernet

PC

PC

Dimensions

106.00

45.72

38.60

15.20

142.10

25.40

12.00

30.00

30.00

50.53

184.00

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

Ordering Information

Temperature | Connector Type | Connectivity Distance

IMC – 100 – PD☐ – ☐☐☐☐☐

Example: IMC – 100 – P D E – SC002
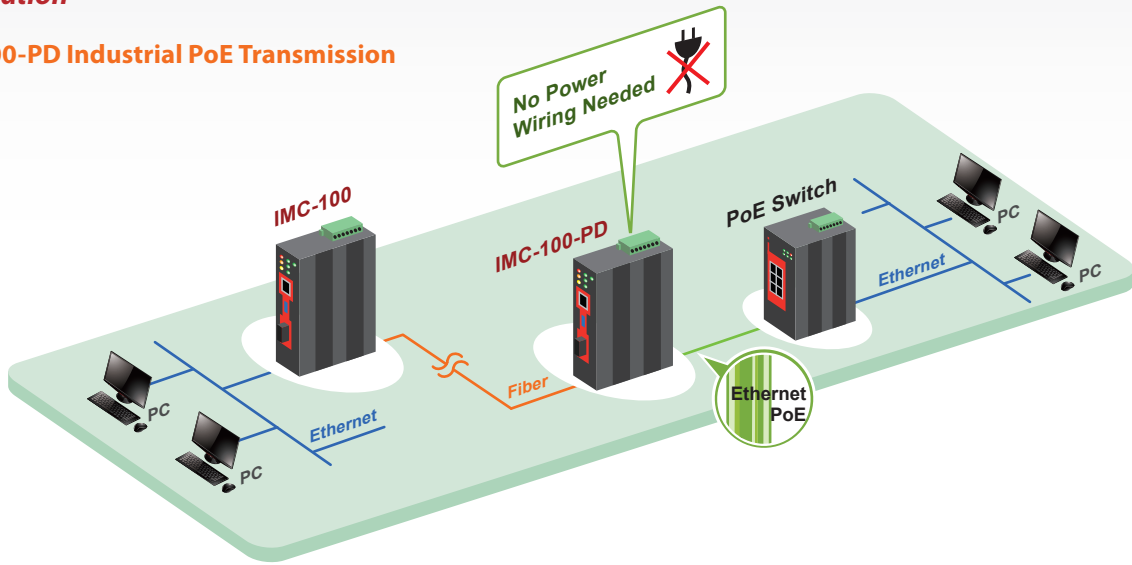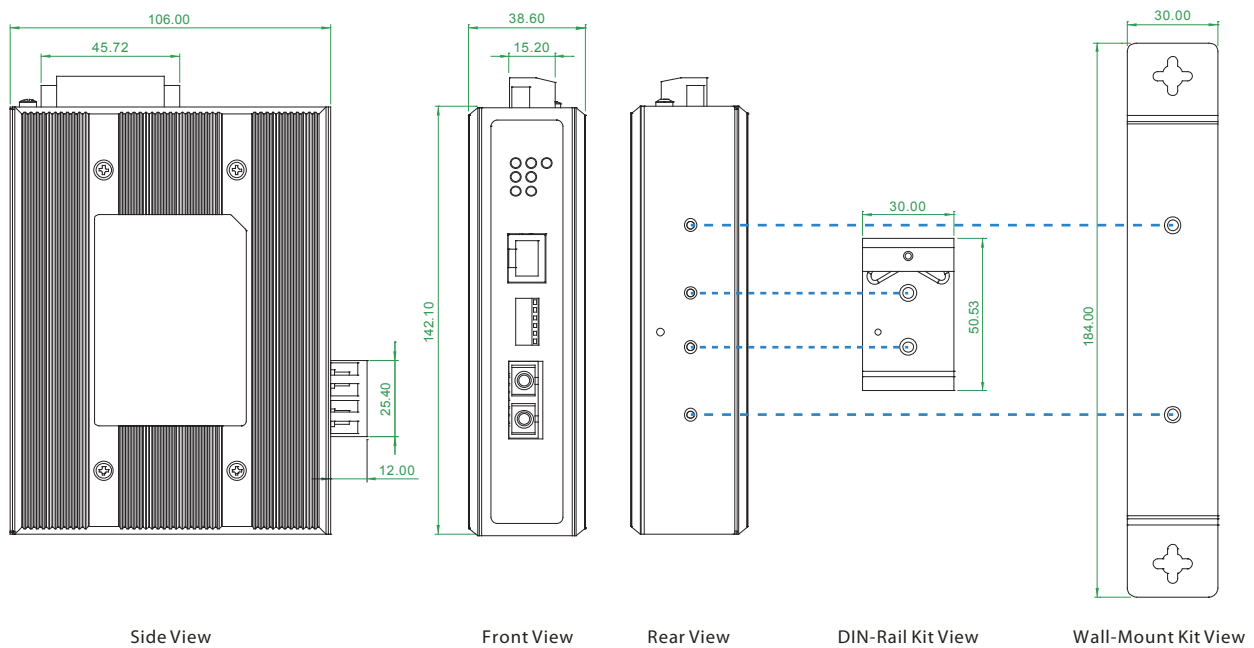
Model Name	Description
IMC-100-PD	10/100-T(X) to 100-FX Fiber Converter With PoE PD ; Temperature Range : 0 ~ 60˚C
IMC-100-PDE	10/100-T(X) to 100-FX Fiber Converter With PoE PD ; Temperature Range : -40 ~ 75˚C

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)type

IMC-1000/1000-E
IMC-1000S/1000S-E

10/100/1000Base-T(X) to 100/1000Base-FX/SX/LX SFP Fiber Converter

NEW

IMC-1000(-E) and IMC-1000S(-E) are industrial media converters designed for conversion between electrical 100/1000Base-T(X) and optical 100/1000Base-X SC Connector (IMC-1000) or a 100/1000 dual speed SFP (IMC-1000S) transmission medium. Simple DIP switch settings allow configuring the UTP port for auto-negotiation or for forced 100/1000 speed and half/full duplex as well as for enabling LFP (Link Fault pass through), flow Control(802.3X) and selecting Switch Mode (store & forward) or Converter Mode (Pass-through). Industrial designed converters feature rugged design with metal housings or wall mounting 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 ~ 60VDC)
- IP30 rugged metal housing
- Wide operating temperature -20 ~ 75℃ (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(X) 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-T(X)

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	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 Support

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

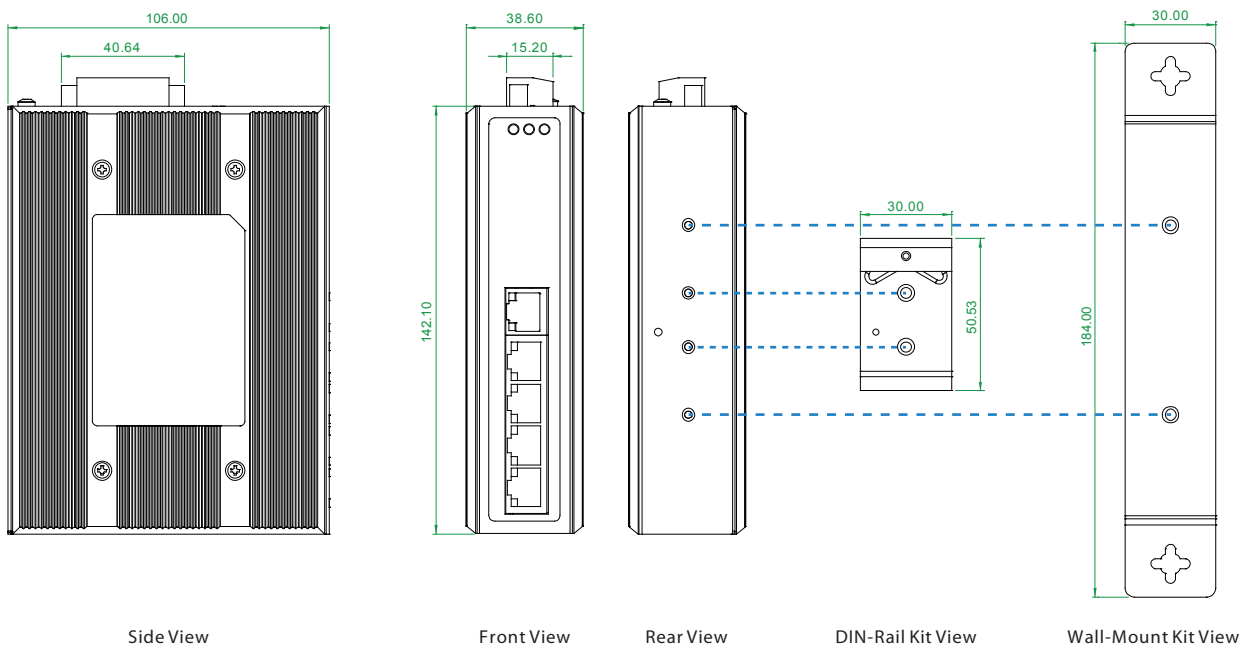|	

LED	SFP Fiber speed(Yellow):
	    ON : 1000Base-X
	    OFF: 100Base-FX

	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	0 ~ 60℃ (IMC-1000, IMC-1000S) -20 ~ 75℃ (IMC-1000-E ,IMC-1000S-E)
Storage Temperature	-40 ~ 85℃
Housing	Rugged Metal, IP30 Protection
Case Dimension	38 x 106 x 142 mm(W x D x H)
Weight	630g (IMC-1000, IMC-1000-E)
	620g (IMC-1000S, IMC-1000S-E)
Installation	DIN Rail mounting and 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 (pending)
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

IMC-1000 Media Converter Transmission
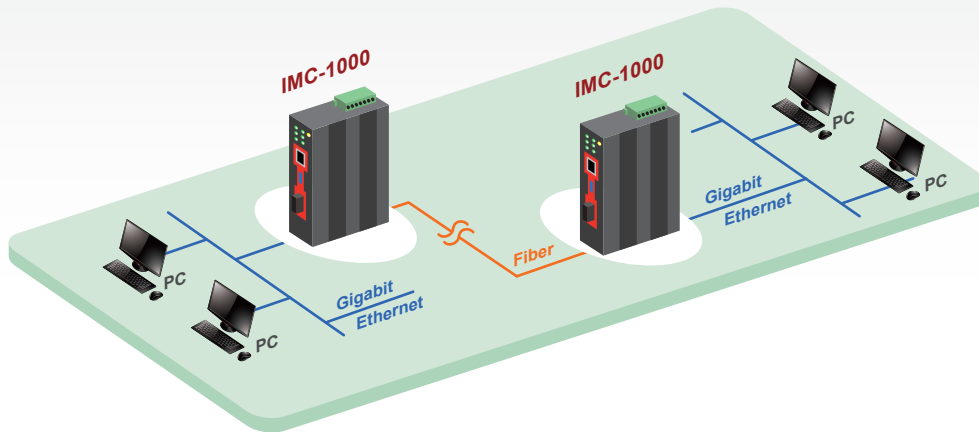
Dimensions

IMC-1000/1000-E
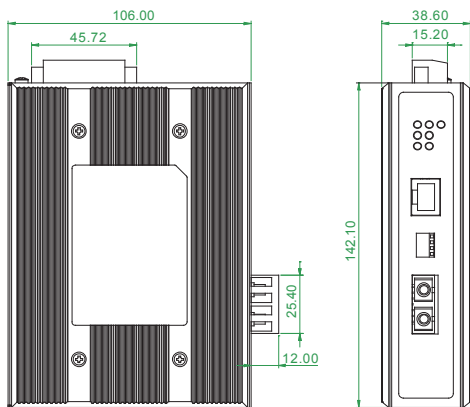
IMC-1000S/1000S-E
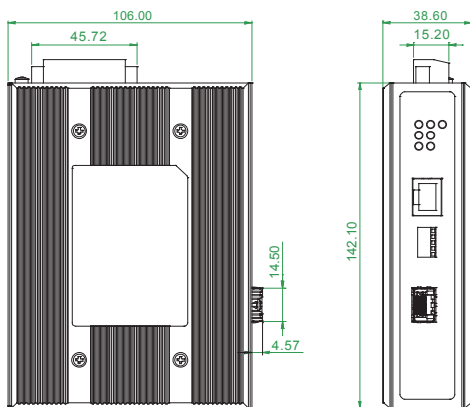
Side View   Front View
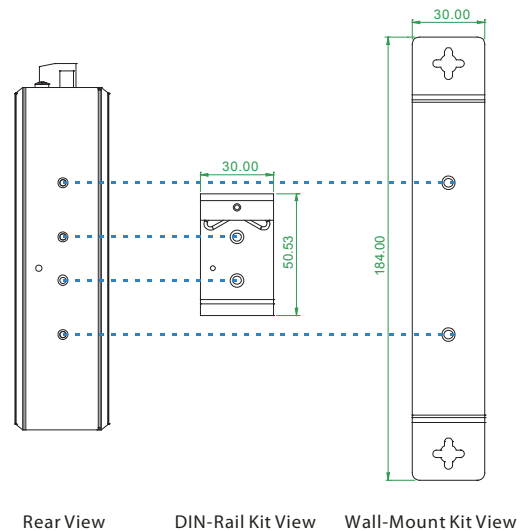
Rear View   DIN-Rail Kit View   Wall-Mount Kit View

Ordering Information

Model Name	Description
IMC-1000	10/100/1000Base-T(X) to 100/1000Base FX/SX/LX Fiber Converter Temperature Range : 0 ~ 60˚C
IMC-1000-E	10/100/1000Base-T(X) to 100/1000Base FX/SX/LX Fiber Converter Temperature Range : -20 ~ 75˚C
IMC-1000S	10/100/1000Base-T(X) to 100/1000Base FX/SX/LX SFP Slot Fiber Converter Temperature Range : 0 ~ 60˚C
IMC-1000S-E	10/100/1000Base-T(X) to 100/1000Base FX/SX/LX SFP Slot Fiber Converter Temperature Range : -20 ~ 75˚C

Fiber Connector Type	Connectivity Distance
SC (IMC-1000/IMC-1000-E)	001:500M (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

Temperature Connector Type Connectivity Distance

IMC – 1000☐ – ☐ – ☐☐☐☐☐

Example: IMC – 1 0 0 0 S – E – SC002

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

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IMC-1000/1000-E, IMC-1000S/1000S-E | **2-21**

IFC-1400
IFC-1400X

Industrial Fast Ethernet Switch

The IFC-1400(X) is industrial grade Fast Ethernet Switch that provides 4-port 10/100Base-T(X) and 1-port 100Base-FX. The reliable hardware design is suitable for keeping industrial automation application running continuously. Each IFC-1400(X) media converter come with two relay output alarms and two redundant DC power inputs to help prevent damage and loss. The IFC-1400(X) Ethernet Switch available in models that support operating temperatures of -40 to 75 degree C.

Features

- 4-port 10/100Base-T(X) to 100Base-FX Switch
- Auto-Negotiation
- Auto MDI/MDIX
- Supports max forwarding packet length 1552 bytes
- Supports Q in Q double tagged frame transparent
- Supports IEEE 802.1q Tag VLAN pass thru
- Supports flow control (Pause)
- Supports Far End Fault
- Supports two Relay out (Arc-Free Contact)

Industrial Grade Performance

- Power or Optical Fiber failure alarm by relay output
- Supports DIN-Rail & wall mount
- -40 ~ 75℃ operating temperature range (IFC-1400X)
- Redundant dual DC power inputs

Specifications

Optical Interface	Connector	1 x 9 (SC,FC,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	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
LED Indications		PWR 1/2, FX-Link/Act, LAN1-Link/Act, LAN2-Link/Act, Alarm (Power or Optical Fiber Failure Alarm)
Power		Power Input: 12-48 VDC Power Consumption : < 4.8W
Mechanical	Dimensions	106 x 62.5 x 134.8mm (D x W x H)
	Weight	460g
	Physical Characteristics	Housing: Metal
	IP Protection	IP30
Environmental	Temperature	Operating: -0 ~ 60℃ (IFC-1400) -40 ~ 75℃ (IFC-1400X) Storage: -40 ~ 75℃
	Humidity	0 ~ 90% non-condensing
Approvals	EMI	FCC Part 15, CISPR ClassA
	MTBF	135,202 hrs

Application

Dimensions

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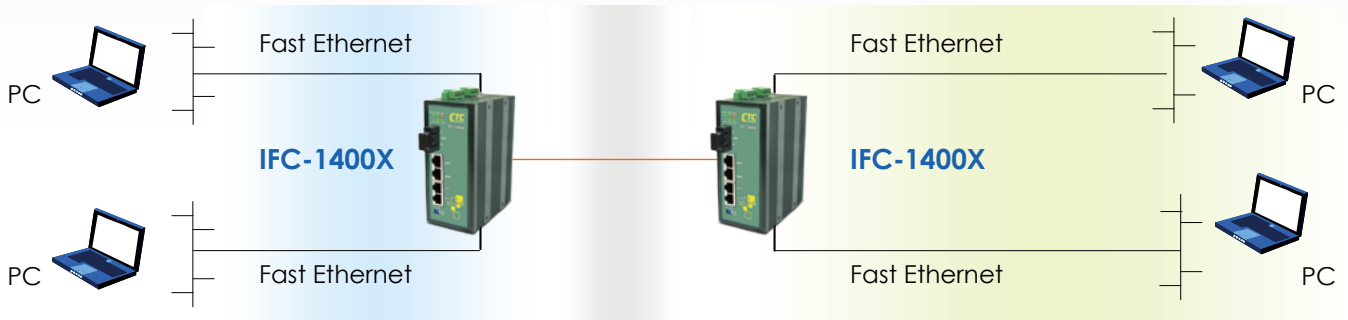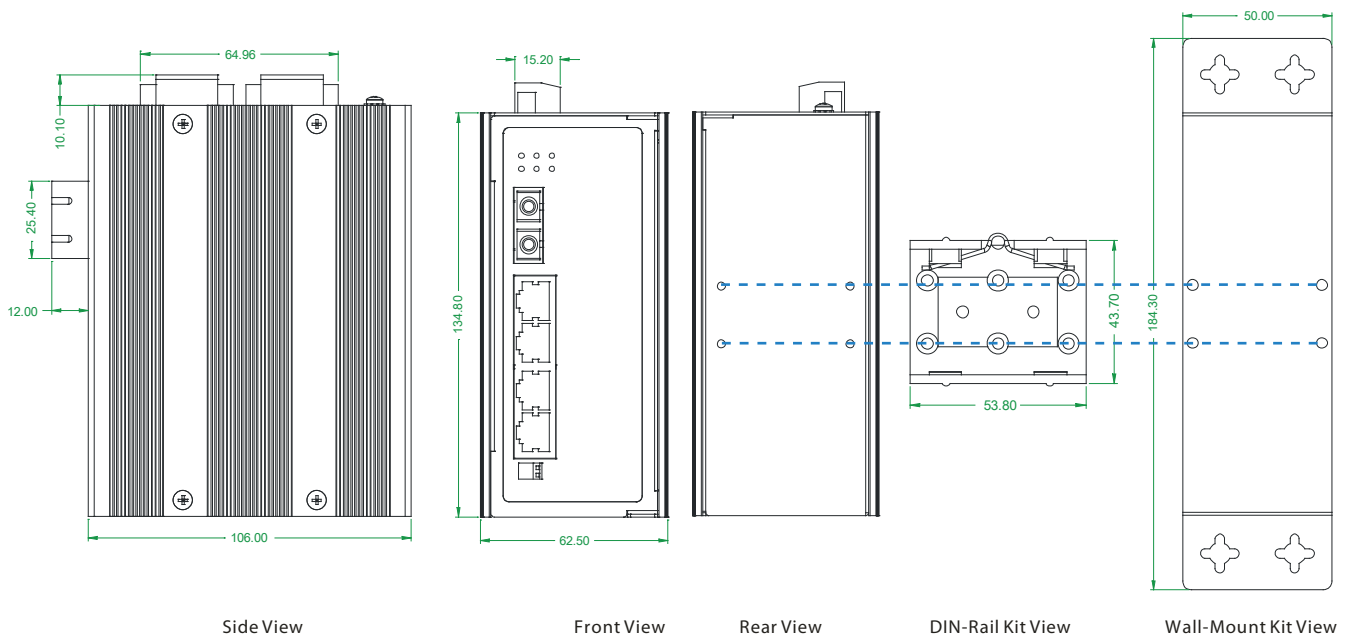
Ordering Information

Model Name	Description
IFC-1400	4-Port 10/100Base-T(X) to 100Base-FX Fast Ethernet switch; Temperature Range : 0 ~ 60°C
IFC-1400X	4-Port 10/100Base-T(X) to 100Base-FX Fast Ethernet switch (wide range temp.); Temperature Range : -40 ~ 75°C

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	

Temperature   Connector Type   Connectivity Distance

IFC – 1400 ☐ – ☐☐☐☐☐

Example: IFC – 1400 X – SC002

Industrial Ethernet Switches

IFS-800
IFS-800-E

8-Port unmanaged 10/100Base-T(X) Fast Ethernet Switch

The IFS-800 series are 8-port 10/100Base-T(X) Ethernet switches that provide stable and reliable transmission for your industrial Ethernet connections. A relay output of power-failures warning and broadcast storm protecting functions can provide network engineers to prevent network break in advance. The switches are designed for harsh industrial environments and comply with FCC, UL, CE and EN50121-4 standard as well as comply with industrial grade high EMS protection. The IFS-800 switches use robust mechanical and components provide long MTBF. Standard operating temperature range models (0 ~ 60°C) and wide operating temperature range models (-40 to 75°C) that they 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-800-E)
- UL60950-1, CE, FCC
- Industrial Grade EMS, EMI, EN61000-6-2, EN61000-6-4 Certified
- 8-Port 10/100Base-T(X) <RJ-45>

Specifications

IEEE Standard	IEEE 802.3 10Base-T Ethernet
	IEEE 802.3u 100Base-TX Fast Ethernet
	IEEE 802.3x Flow Control and Back Pressure
Switch Architecture	Back-plane (Switching Fabric): 1.6Gbps (IFS-800 ,IFS-800-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 Size	2K
Packet Buffer Size	448Kbits
Network Connector 10/100TX	8 x RJ-45
	10/100BaseT(X) 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)
Protocol	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
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	3.9W
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	0 ~ 60°C (IFS-800)
	-40 ~ 75°C (IFS-800-E)
Operating Humidity	5% to 95% (Non-condensing)
Storage Temperature	-40 ~ 85°C
Housing	Rugged Metal ,IP30 Protection
Case Dimension	38 X 106 X 142mm (W X D X H)
Weight	0.64kg
Installation mounting	DIN Rail mounting and 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	552,587 Hrs
Warranty	5 years

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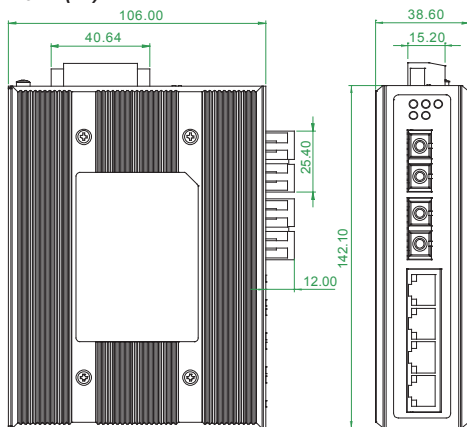## Application

IFS-800 Fast Ethernet Switch Transmission

Dimensions

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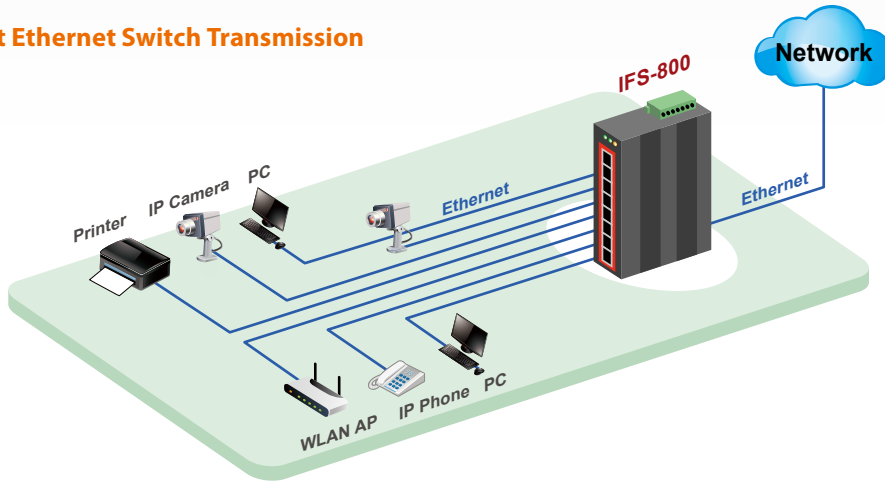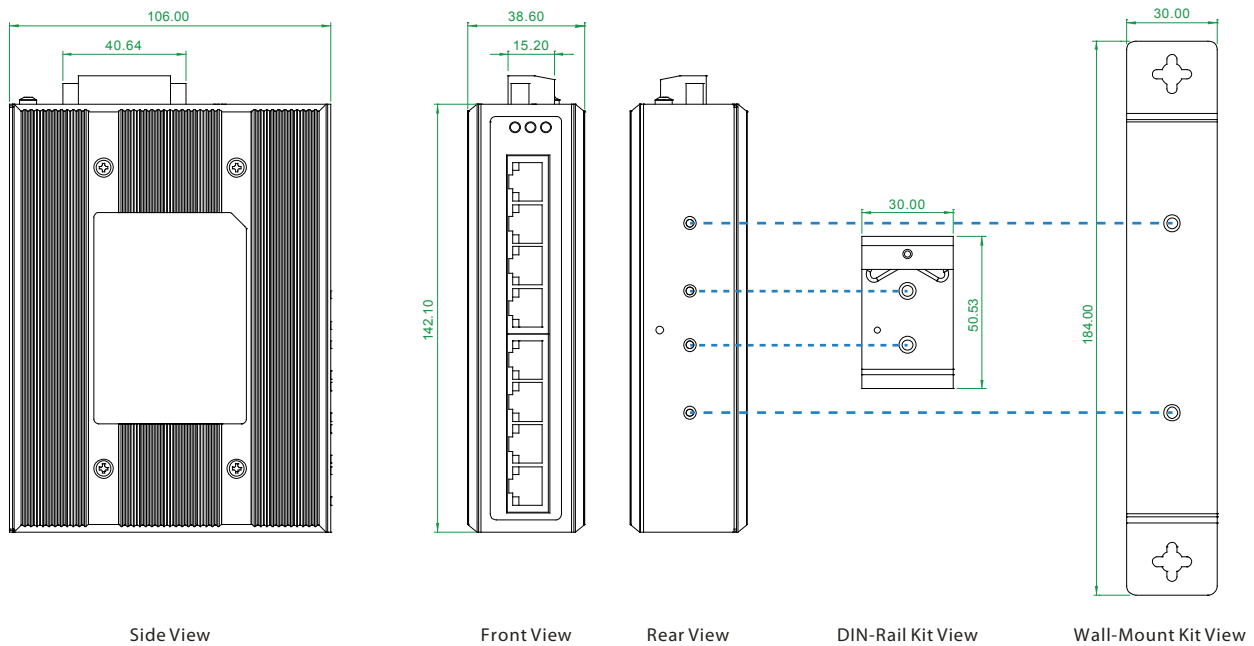
Ordering Information

Model Name	Description
IFS-800	8-Port 10/100Base-T(X) unmanaged Switch, 0 ~ 60℃
IFS-800-E	8-Port 10/100Base-T(X) unmanaged Switch, -40 ~ 75℃

Temperature

IFS – 800 – ☐

Example: IFS – 800 – E

Specifications & design are subject to change without prior notice. Please visit CTC Union website for more details.
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IFS-800, IFS-800-E | **2-25**

Industrial Ethernet Switches

IFS-500
IFS-500-E

5-Port unmanaged 10/100Base-T(X) Fast Ethernet

The IFS-500 series are 5-port 10/100Base-T(X) Ethernet switches that provide stable and reliable transmission for your industrial Ethernet connections. A relay output of power-failures warning and broadcast storm protecting functions can provide network engineers to prevent network break in advance. The switches are designed for harsh industrial environments and comply with FCC, UL, CE and EN50121-4 standard as well as comply with industrial grade high EMS protection. The IFS-500 switches use robust mechanical and components provide long MTBF. Standard operating temperature range models (0 to 60°C) and wide operating temperature range models (-40 to 75°C) that they 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-E)

- ◆ UL60950-1, CE, FCC
- ◆ Industrial Grade EMS, EMI, EN61000-6-2, EN61000-6-4 Certified
- ◆ 5- Port 10/100Base-T(X) <RJ-45>

Specifications

IEEE Standard	IEEE 802.3 10Base-T Ethernet
	IEEE 802.3u 100Base-TX Fast Ethernet
	IEEE 802.3x Flow Control and Back Pressure
Switch Architecture	Back-plane (Switching Fabric): 1Gbps (IFS-500 ,IFS-500-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 Size	2K
Packet Buffer Size	448Kbits
Network Connector 10/100TX	5 x RJ-45
	10/100BaseT(X) 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)
Protocol	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
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	2.9W
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	0 ~ 60°C (IFS-500, IFS-800)
	-40 ~ 75°C (IFE-500-E, IFS-800-E)
Operating Humidity	5% to 95% (Non-condensing)
Storage Temperature	-40 ~ 85°C
Housing	Rugged Metal ,IP30 Protection
Case Dimension	38 X 106 X 142mm (W X D X H)
Weight	0.625kg
Installation mounting	DIN Rail mounting and 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	650,473Hrs
Warranty	5 years

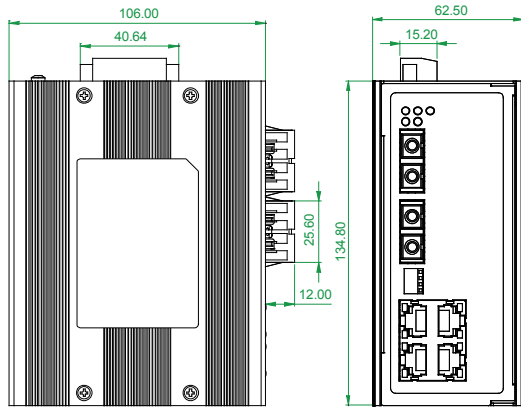## Application

IFS-500 Fast Ethernet Switch Transmission

Dimensions

Side View　　Front View　　Rear View　　DIN-Rail Kit View　　Wall-Mount Kit View
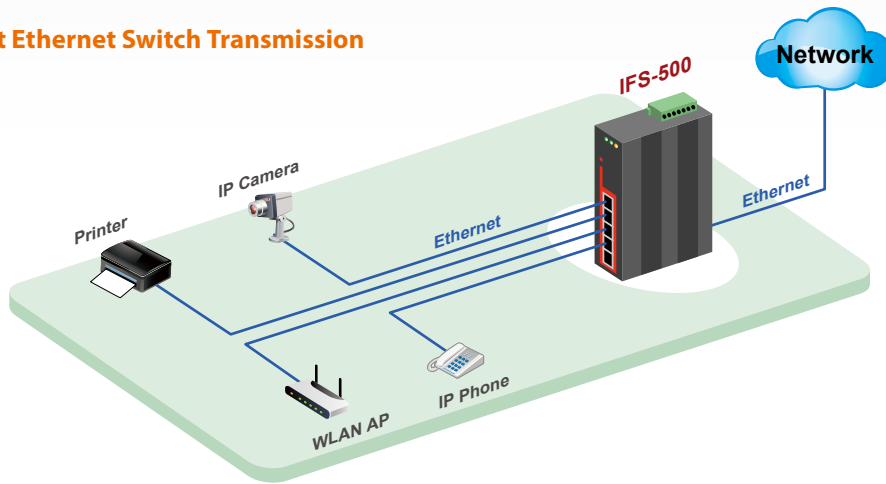
Ordering Information

Model Name	Description
IFS-500	5-Port 10/100Base-T(X) unmanaged Switch, 0 ~ 60℃
IFS-500-E	5-Port 10/100Base-T(X) unmanaged Switch, -40 ~ 75℃

Temperature

IFS – 500 – ☐

Example: IFS – 500 – E

Specifications & design are subject to change without prior notice. Please visit CTC Union website for more details.
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IFS-500, IFS-500-E | 2-27

IFS-401F, IFS-401F-E
IFS-402F, IFS-402F-E

4-Port 10/100Base-T(X) with fiber
Fast unmanaged Ethernet Switch

The IFS-401(-E) and IFS-402F(-E) series are 5 or 6-port Ethernet switches with 4-port 10/100Base-T(X) and 1 or 2-port 100Base-FX optical fiber, provide stable and reliable transmission for your industrial Ethernet connections. A relay output of power-failures warning and broadcast storm protecting functions can provide network engineers to prevent network break in advance. The switches are designed for harsh industrial environments and comply with FCC, UL, CE and EN50121-4 standard as well as comply with industrial grade high EMS protection. The IFS-401(-E) and IFS-402F(-E) switches use robust mechanical and components provide long MTBF. Standard operating temperature range models (0 ~ 60℃) and wide operating temperature range models (-40 ~ 75℃) that they 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℃ (IFS-401F-E and IFS-402F-E)

- ◆ UL60950-1, CE, FCC
- ◆ Industrial Grade EMS, EMI, EN61000-6-2, EN61000-6-4 Certified
- ◆ 4-Port 10/100Base-T(X) <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 Size	2K
Packet Buffer Size	448Kbits
Network Connector 10/100TX/100FX	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, 10/100BaseT(X) auto negotiation speed, Full/Half duplex
	100BaseFX 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
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	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	0 ~ 60℃ (IFS-401F, IFS-402F)
	-40 ~ 75℃ (IFS-401F-E, IFS-402F-E)
Operating Humidity	5% to 95% (Non-condensing)
Storage Temperature	-40 ~ 85℃
Housing	Rugged Metal ,IP30 Protection
Case Dimension	38 X 106 X 142mm (W X D X H)
Weight	0.625Kg (IFS-401F, IFS-401F-E)
	0.63kg (IFS-402F, IFS-402F-E)
Installation mounting	DIN Rail mounting and 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

2

Application

IFS-402F Fast Ethernet Switch Transmission with Dasiy Chain
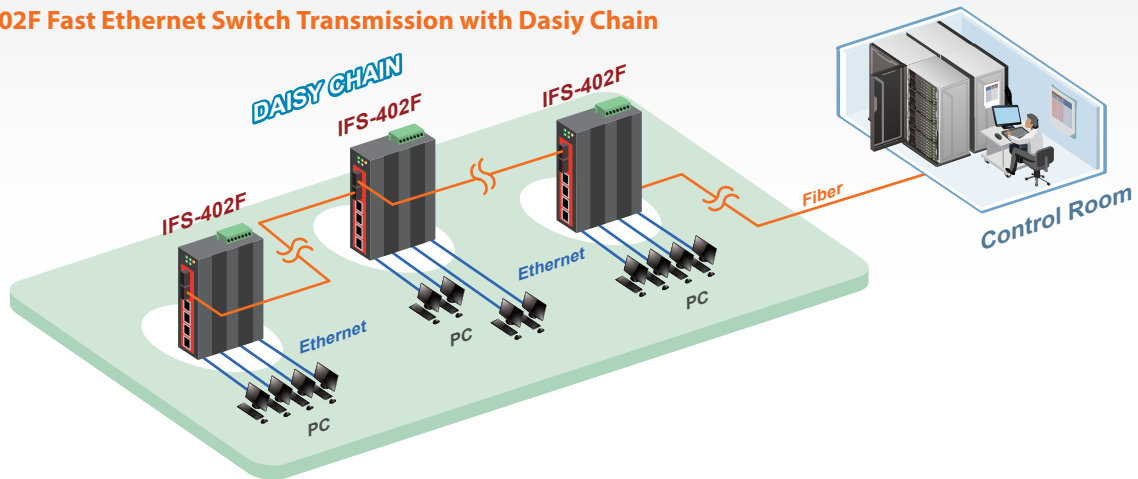
Dimensions

IFS-401F(-E)
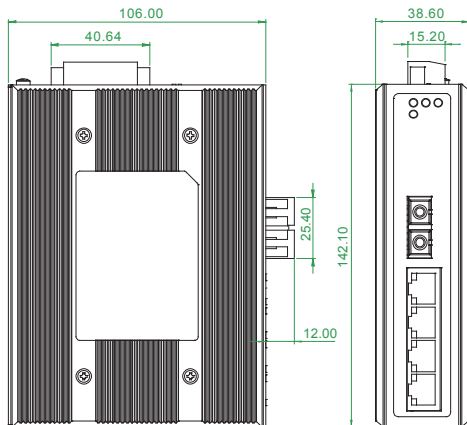
IFS-402F(-E)

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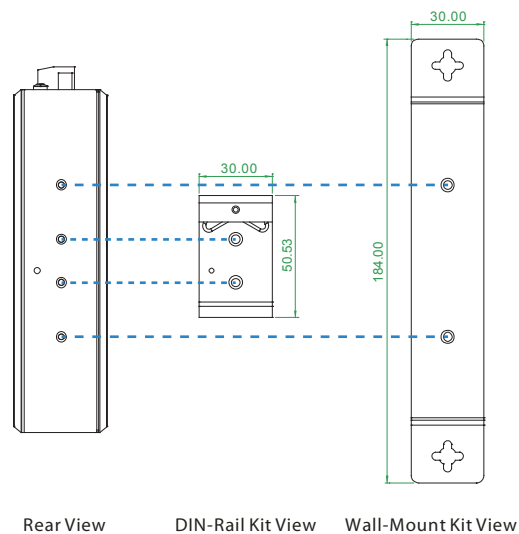
Rear View   DIN-Rail Kit View   Wall-Mount Kit View

Ordering Information

Model Name	Description
IFS-401F	4-Port 10/100Base-T(X) + 1-Port 100Base-FX fiber, 0 ~ 60°C
IFS-401F-E	4-Port 10/100Base-T(X) + 1-Port 100Base-FX fiber, -40 ~ 75°C
IFS-402F	4-Port 10/100Base-T(X) + 2-Port 100Base-FX fiber, 0 ~ 60°C
IFS-402F-E	4-Port 10/100Base-T(X) + 2-Port 100Base-FX fiber, -40 ~ 75°C

Fiber Connector 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)

| | Temperature | Connector Type | Connectivity Distance |

IFS – 401F – ☐ – ☐☐☐☐☐

Example: IFS – 401F – E – SC002

**IFS-401F, IFS-401F-E
IFS-402F, IFS-402F-E** 2-29

IGS-401F/401F-E
IGS-402F/402F-E

4-Port 10/100/1000Base-T(X) with 1 or 2-Port Fiber unmanaged Gigabit Ethernet Switch

NEW

The IGS-401F(-E) and IGS-402F(-E) are equipped 5 and 6 Gigabit Ethernet ports and come with one or two 1000Base-X fiber optic port and 4 ports 10/100/1000Base-T(X) support IEEE 802.3/802.3u/802.3x/802.3ab, full/half-duplex, MDI/MDI-X auto-sensing, making them ideal for providing an economical high-bandwidth solution for your industrial Gigabit Ethernet network. The IGS-401F(-E) and IGS-402F(-E) switches built-in relay warning function for alerting power failures; providing broadcast storm protection function to eliminate the broadcast storming in your networks. The switches can be installed easily on a DIN-Rail or Wall mounted, IGS-401F-E and IGS-402F-E wide operating temperature (-40 to 75°C) models especially for industrial harsh environment applications

Features

- 12/24/48VDC Redundant dualinput 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)
- 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-T(X) 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 Size	8K
Packet Buffer Size	1Mbits
Network Connector	4 x RJ-45
	10/100/1000Base-T(X) 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
Protocol	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	0 ~ 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
Dimension	62.5 x 106 x 134.8mm (W X D X H)
Weight	0.67kg (IGS-401F), 0.68kg (IGS-402F)
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 (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	407,596 Hours (IGS-401F) 391,633 Hours (IGS-402F)
Warranty	5 years

Application

IGS-401F & IGS-402F Gigabit Ethernet Switch Transmission
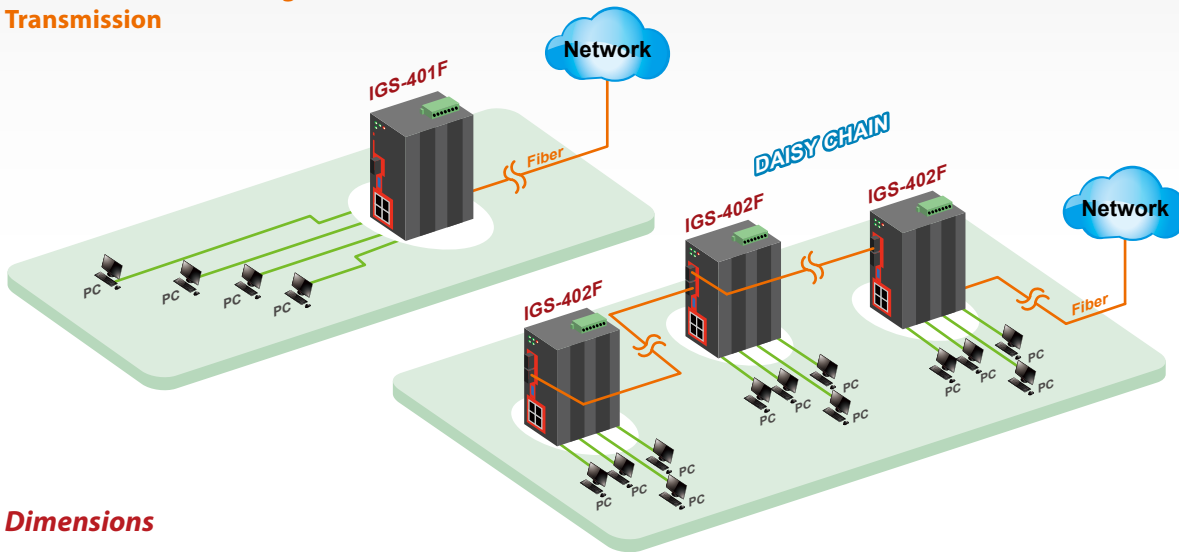
Dimensions

IGS-401F
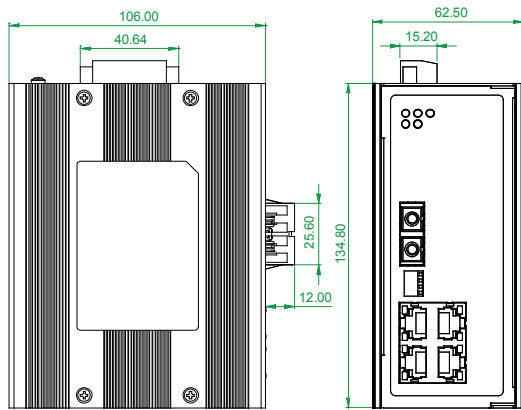
IGS-402F

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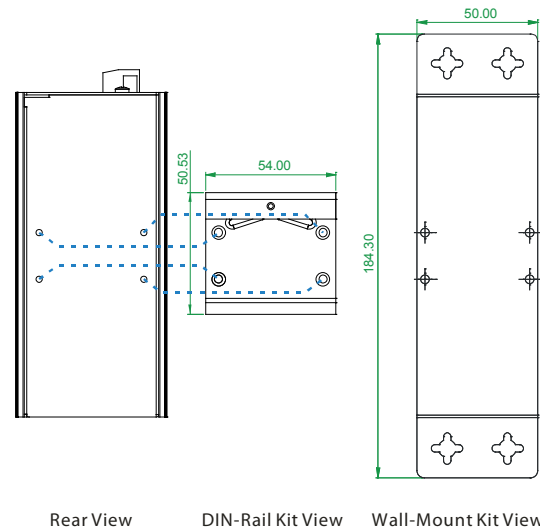
Rear View   DIN-Rail Kit View   Wall-Mount Kit View

Ordering Information

Model Name	Description
IGS-401F	4-Port 10/100/1000Base-T(X) + 1-Port 1000Base FIber (0 ~ 60°C)
IGS-401F-E	4-Port 10/100/1000Base-T(X) + 1-Port 1000Base Fiber (-40 ~ 75°C)
IGS-402F	4-Port 10/100/1000Base-T(X) + 2-Port 1000Base FIber (0 ~ 60°C)
IGS-402F-E	4-Port 10/100/1000Base-T(X) + 2-Port 1000Base Fiber (-40 ~ 75°C)

Fiber Connector Type	Connectivity Distance
SC	SC001: 500m (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)

Temperature   Connector Type   Connectivity Distance

IGS – 40☐ F – ☐ – ☐☐☐☐☐

Example: IGS – 4 0 1 F – E – SC002

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IGS-401F/401F-E, IGS-402F/402F-E | **2-31**

IGS-402S
IGS-402S-E

4-Port 10/100/1000Base-T(X) with 2 SFP Slots Fiber unmanaged Gigabit Ethernet Switch

NEW

The IGS-402S(-E) are equipped 6 Gigabit Ethernet ports and come with two 1000Base-X(SFP slot) fiber optic ports. 4 ports 10/100/1000BaseT(X) support IEEE 802.3/802.3u/802.3x/802.3ab, full/half-duplex, MDI/MDI-X auto-sensing, making them ideal for providing an economical high-bandwidth solution for your industrial Gigabit Ethernet network, switchable 100Base SFP or 1000Base SFP can set up easily using the DIP switches located on the Front panel. The IGS-402S(-E) switches built-in relay warning function for alerting power failures; providing broadcast storm protection function to eliminate the broadcast storming in your networks. The switches can be installed easily on a DIN-Rail or Wall mounted, IGS-402S-E wide operating temperature (-40 ~ 75℃) models especially for industrial harsh environment applications.

Features

- ◆ 12/24/48VDC Redundant dualinput Power Design
- ◆ 4-Port 1000Base-T RJ-45 with 2 Fiber Gigabit Ethernet
- ◆ Wide Operating Temperature -40 ~ 75℃ (IGS-402S-E)
- ◆ 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	Overload current protection	Present
	IEEE 802.3u 100Base-T(X) Fast Ethernet	Power Supply	Redundant Dual DC 12/24/48V (9.6~60VDC) Input power (Removable Terminal Block)
	IEEE 802.3ab 1000Base-T Gigabit Ethernet		
	IEEE 802.3z 1000Base-X Gigabit Ethernet		Provide DC Power JACK adapter cable for external power supply.
	IEEE 802.3x Flow Control and Back Pressure		
Switch Architecture	Back-plane (Switching Fabric): 12Gbps	Power Consumption	Max 7.83W
Data Processing	Store and Forward	Alarm Relay Contact	Relay outputs with current carrying capacity of 1 A @24VDC
Flow Control	IEEE 802.3x flow control, back pressure flow control	Removable Terminal Block	Provide 2 Redundant power ,Alarm relay contact, 6 Pin
Provides broadcast storm protection	Present, Enable / Disable set by DIP sw	Operating Temperature	0 ~ 60℃ (IGS-402S)
Jumbo Frame	10K Bytes		-40 ~75℃ (IGS-402S-E)
MAC address Table Size	8K	Operating Humidity	5% to 95% (Non-condensing)
Packet Buffer Size	1Mbits	Storage Temperature	-40 ~ 85℃
Network Connector	4 x RJ-45	Housing	Rugged Metal, IP30 Protection
	10/100/1000BaseT(X) auto negotiation speed, Auto MDI/MDI-X function, Full/Half duplex	Dimension	62.5 x 106 x 134.8mm (W X D X H)
	2 SFP 100/1000 Base-X dual mode slot	Weight	0.84kg
Network Cable	UTP/STP above Cat. 5e cable	Installation mounting	DIN Rail mounting and Wall Mounting
	EIA/TIA-568 100-ohm (100m)	EMC/EMS	CE, FCC
	Fiber Cable (Multi-mode): 50/125um, 62.5/125um	EMI	FCC Part 15 Subpart B Class A, CE EN 55022 Class A
	Fiber Cable (Single-mode): 9/125um		EN61000-6-4 – Emission for industrial environment
Protocol	CSMA/CD	EMS	EN61000-6-2 – Immunity for Industrial environment
LED	Per unit: Power 1 (Green), Power 2 (Green), Fault (Amber)		EN61000-4-2 (ESD) Level 3,Criteria B
	Per RJ-45 port : Link/Active (Green), Speed 10(OFF), 100(Green), 1000(Yellow)		EN61000-4-3 (RS) Level 3,Criteria A
			EN61000-4-4 (EFT) Level 3,Criteria A
	Fiber Per port: Link/Active (Green)		EN61000-4-5 (Surge) Level 3,Criteria B
DIP SW	DIP 1	On : Disable power failure alarm	EN61000-4-6 (CS) Level 3,Criteria A
		Off : Enable power failure alarm	EN61000-4-8 (Magnetic Field) Level 3, Criteria A
	DIP 2	On : Disables broadcast storm protection	Safety	UL60950-1 (Pending)
		Off : Enable broadcast storm protection	Rail Traffic	EN 50121-4
	DIP 3	On : Fiber 2 for 100Base-FX SFP	Shock	IEC 60068-2-27
		Off : Fiber 2 for Gigabit SFP	Freefall	IEC 60068-2-32
	DIP 4	On : Fiber 1 for 100Base-FX SFP	Vibration	IEC 60068-2-6
		Of f: Fiber 1 for Gigabit SFP	MTBF	438,031 Hours
Reserve polarity protection	Present	Warranty	5 years

Application

IGS-402S Gigabit Ethernet Switch Transmission with Daisy Chain

Dimensions

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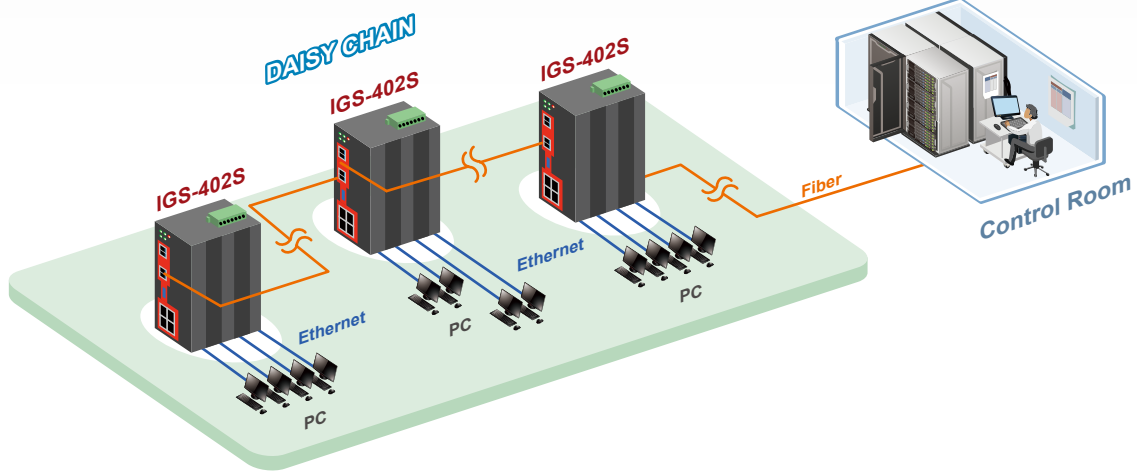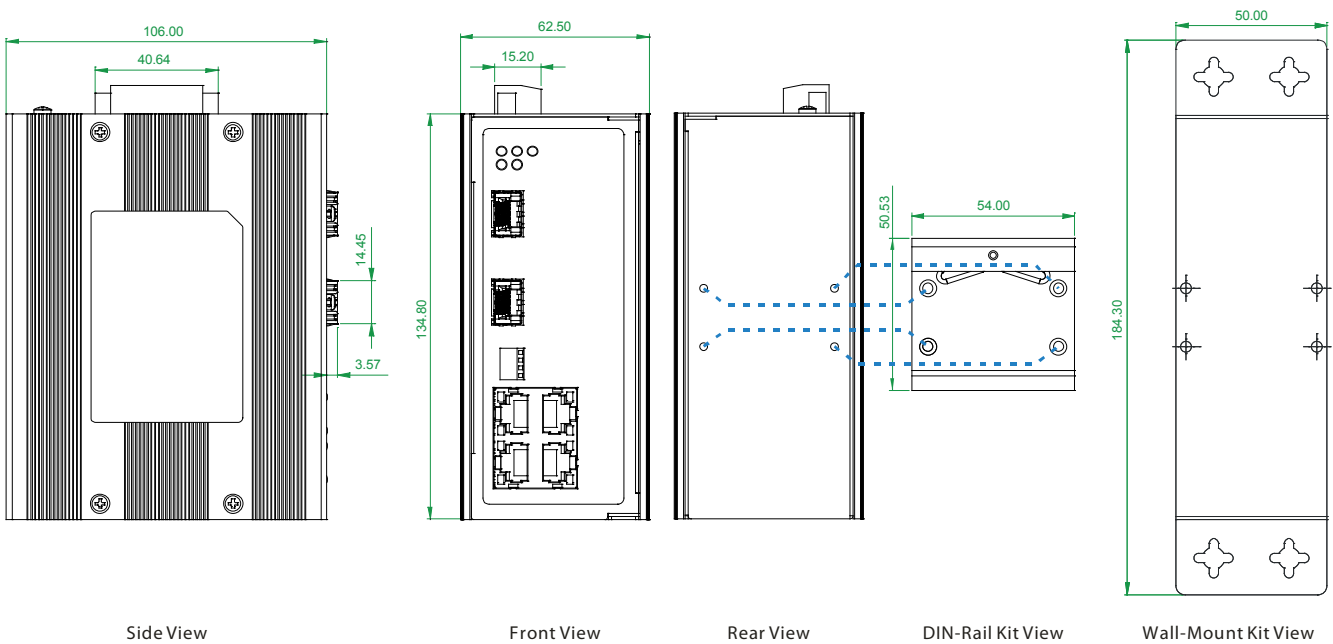
Ordering Information

Model Name	Description
IGS-402S	4-Port 10/100/1000Base-T(X) + 2-Port 100/1000Base SFP Slot (0 ~ 60°C)
IGS-402S-E	4-Port 10/100/1000Base-T(X) + 2-Port 100/1000Base SFP Slot (-40 ~ 75°C)

Temperature

IGS – 402S – ☐

Example: IGS – 402S – E

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IGS-402S, IGS-402S-E | **2-33**

STE100A / RS232

RS-232 IP Device Server

The IP Serial Server provides the serial device server for Windows hosts to control serial devices located virtually anywhere through a TCP/IP or UDP/IP connection. The IP Serial Server has the asynchronous serial port connection on one side, and a 10/100 Mbps Ethernet connection on the other side. It connects devices, such as CNC, weight scales, and scanners. Applications include industrial/factory automation, automatic warehouse control, and hospital/laboratory automation. The IP Serial 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 Serial 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. When in the paired mode one IP Serial Server must set as a client and the other must set as a server in TCP connection.

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-T(X), 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	AC Adapter, 12VDC output
Operating Temperature	0 ~ 60℃
Storage Temperature	-10 ~ 70℃
Humidity	0 – 90% non-condensing
DIN rail mount	Yes
Panel mount	Yes
Dimensions	53 x 85 x 21mm (W x D 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	
CAB-DC24	+12 or +24 VDC Cable wire - cable with 2 open wire (Red for +24V, Back for +0V)
DC-DC/48	-48VDC to 12VDC Adapter - 1 Amp, 5 Watts, Output 12 VDC, Input -48VDC
DC-APT/12V	DC(±24 / ±48VDC) to DC(12VDC) Isolated Power Adapter

Serial Type

STE100A / □□□□□

Example: STE100A / RS232

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STE100A - 485

RS-485 IP Device Server

NEW

The IP Serial Server provides the serial device server for Windows hosts to control serial devices located virtually anywhere through a TCP/IP or UDP/IP connection. The IP Serial Server has the asynchronous serial port connection on one side, and a 10/100 Mbps Ethernet connection on the other side. It connects devices, such as CNC, weight scales, and scanners. Applications include industrial/factory automation, automatic warehouse control, and hospital/laboratory automation. The IP Serial 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 Serial 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. When in the paired mode one IP Serial Server must set as a client and the other must set as a server in TCP connection.

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-T(X), 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	AC Adapter, 12VDC output
Operating Temperature	0 ~ 60℃
Storage Temperature	-10 ~ 70℃
Humidity	0 – 90% non-condensing
DIN rail mount	Yes
Panel mount	Yes
Dimensions	53 x 85 x 21mm (W x D x H)
Certifications	CE, FCC

Application

STE100A-485   STE100A-485

RS485/422   10/100Base-T Ethernet   RS485/422

UDP, TCP Server   UDP, TCP Client

Remote Host   Local Host

Internet   Ethernet

STE-100A-485

RS-485 2 or 4 Wire

Slot machine 1 .... .32

Ordering Information

Model Name	Description
STE100A-485	RS-485 IP device server
Optional Power	
CAB-DC24	+12 or +24 VDC Cable wire - cable with 2 open wire (Red for +24V, Back for +0V)
DC-DC/48	-48VDC to 12VDC Adapter - 1 Amp, 5 Watts, Output 12 VDC, Input -48VDC
DC-APT/12V	DC(±24 / ±48VDC) to DC(12VDC) Isolated Power Adapter

Serial Type

STE100A – ☐☐☐

Example: STE100A – 485

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STE100A - 485 | **2-35**

EFM-10, EFM-20, EFM-40

EFM 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. EFM extends the reach of Ethernet services to the sites by using bonded copper pairs. Up to 4 pairs can be bonded together for aggregated bandwidth over 45Mbps (Enhanced mode with TC-PAM 128 line coding technology). Designed with standard-based EFM technology (2BASE-TL), deployment of Ethernet services with EFM is quick and simple on the existing copper plant. It operates mainly in Point-to-Point connection between remote office and enterprise headquarters, providing symmetrical high-speed connectivity that is ideal for large and small-to-medium enterprises to deliver business-class Ethernet service.

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-PAN 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

Network Interface	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 PAF)
		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) • Support 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 x 1, 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℃
	Storage Temperature: -40 ~ 85℃
	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 with 50 ~ 60Hz)
	Weight: 1.3kg
Memory	2MB Flash Memory , 4MB SDRAM

Application

Bandwidth Aggregation up to 22.8Mbps Over 4 pair of Copper wires

EFM-10/ 20/ 40   EFM-10/ 20/ 40

LAN   LAN

Aggregation
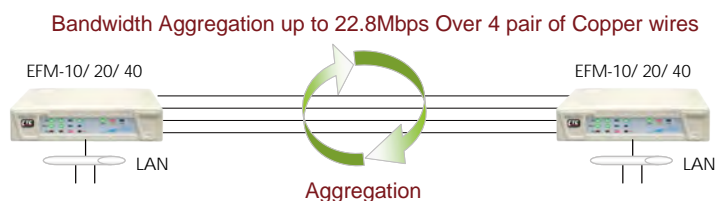
Ordering Information

Model Name	Description
EFM-10	2W, 2Base-TL EFM LAN Extender with 4x10/100Base-T(X)
EFM-20	4W, 2Base-TL EFM LAN Extender with 4x10/100Base-T(X)
EFM-40	8W, 2Base-TL EFM LAN Extender with 4x10/100Base-T(X)

EFM – ☐☐

Example: EFM – 10

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EFM-10, EFM-20, EFM-40 | **3-1**

LAN Extender

VDTU2A-301
VDSL2 LAN Extender

The VDTU02A-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℃ (Operating), -10 ~ 70℃ (Storage)
Humidity	10 ~ 90% non-condensing
Certification	CE, FCC, RoHS
MTBF	50,000 hrs

Application

Rack to Standalone Solution

VDTU2A-301
FMC Rack
Ethernet — 1Km — Ethernet
VDTU2A-301
Ethernet — 1Km — Ethernet
VDTU2A-301

Standalone to Standalone Solution

Ethernet — 1Km — Ethernet
VDTU2A-301   VDTU2A-301
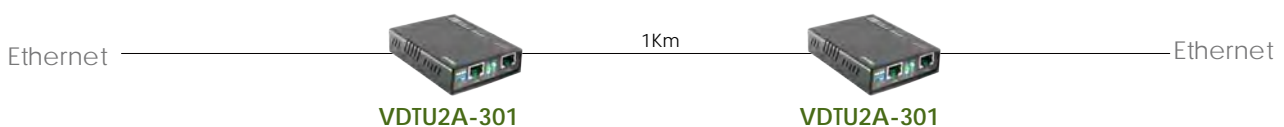
Ordering Information

Model Name	Description
VDTU2A-301	VDSL2 LAN Extender with 1x10/100Base-T(X)

VDTU2A-304

VDSL2 Bridge LAN Extender
with 4-Port 10/100Base-T(X) Ethernet

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

VDSL2 standards	Compliant with ITU VDSL2 standard G.993.2 Annex A, Annex B and Annex C
	Support VDSL2 profile: 8a, 8b, 8c, 8d, 12a, 12b and 17a
	Band plan profile: symmetric (Plan 997) and asymmetric (Plan 998)
	Support fast and interleaved mode
	Target SNR Margin: 6dB and 9dB
	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: 4 X 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)
Indicators	General : PWR and SYS
	WAN(VDSL2) : CO, CPE, LINK and ALM
	LAN (Ethernet) : 1,2,3,4 LNK/ ACT
Physical/Electrical	External Power Adaptor: Input : AC 90~240V/50 ~ 60Hz Output : DC 12V/1A
	Power consumption : 9 watts maximum.
	Temperature : 0 ~ 45°C
	Humidity : 0% ~ 95% (non-condensing)

Application
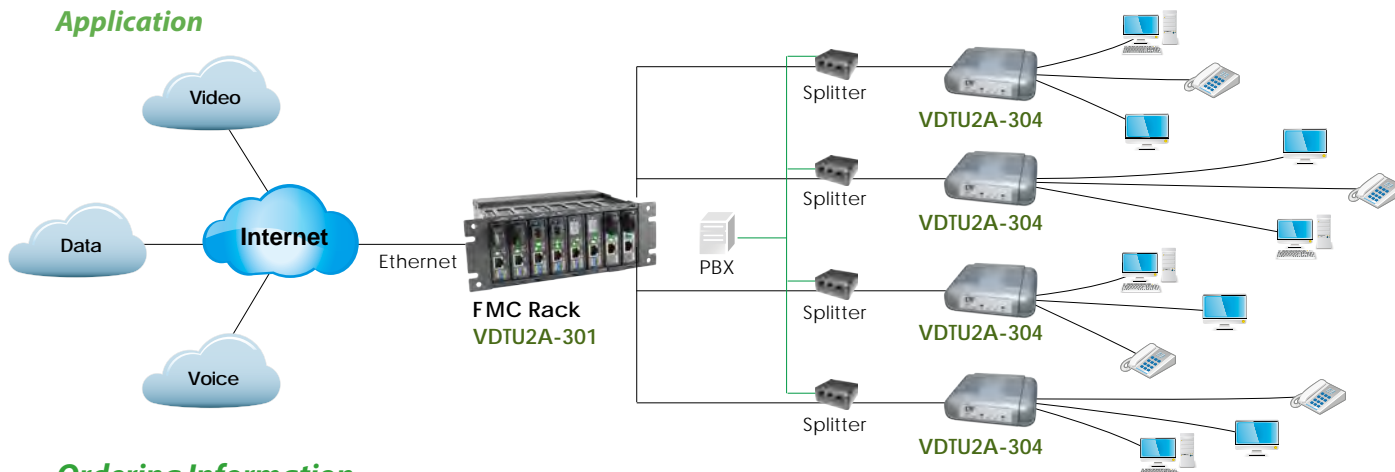
Ordering Information

Model Name	Description
VDTU2A-304/US	VDSL2 LAN Extender with 4-port 10/100Base-T(X), splitter 600 ohm
VDTU2A-304/EU	VDSL2 LAN Extender with 4-port 10/100Base-T(X), splitter 900 ohm

VDTU2A – 304 / ☐☐

Example: VDTU2A – 304 / US

VDSM2-1524

1.5U 24-Port VDSL2 IP DSLAM

NEW

VDSM2-1524 is a 24-port VDSL2 IP DSLAM with 2 Gigabit Ethernet Combo interfaces built-in a 1.5U 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 Space Efficient Design with Up to 24 VDSL2 Ports with Splitters.
- Supports VDSL2 Profiles, such as, 8a, 8b, 8c, 8d, 12a, 12b, 17a and 30a.
- Supports Powerful Traffic Classification Tools, such as QoS, ToS, DSCP, etc.
- Supports L2/L3 Content Filtering.
- Supports VLAN features, such as, 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.
- Configuration backup and restoration.

Specifications

Case	1.5U High Pizza-Box Type	Protocol Support	IGMP Snooping/Proxy v1 and v2
Interfaces	8/16/24 VDSL2 Ports		Multicast Forwarding with IGMP Snooping v1 and v2 (RFC 1112 and RFC 2236)
	Two RJ-45 100/1000Mbps Ethernet Combo Ports		
	Management Ethernet		Up to 512 Multicast Channels
	1 x RS-232 Serial Console		Fast and Normal Leave Modes
	POTS Splitter	Security	L2 Frame Filtering by MAC Addresses
LED Indicators	SYS, ALM, LINK, ACT		L3 Frame Filtering by IP Addresses, protocol ID, and TCP/UDP
	24 x VDSL LEDs		DHCP and ARP Broadcasting Frames Filtering
Standards Support	VDSL2 ITU-T G.993.2		Support Secured Forwarding
	VDSL2 Profiles: 8a, 8b, 8c, 8d, 12a, 12b, 17a and 30a	Management	Supports OAM&P Functions
	802.1d L2 Bridging		Supports VLAN Priority Queue (IEEE 802.1p)
	DHCP Server/Client/Relay		Supports CoS, ToS, DSCP, etc.
	IEEE 802.1q VLAN (Port-based VLAN and Protocol-Based VLAN)		Supports SNMP v1/v2/v3 and MIB I/II
	VLAN Stacking (Q-in-Q)		Web-based Graphical User Interface, Telnet, CLI and SSH
	IEEE 802.1p Spanning Tree Protocol (STP)	Operating Requirements	Operating Temperature: -10 ~ 50°C
	IEEE 802.3ad Link Aggregation		Storage Temperature: -40 ~ 70°C
			Relative Humidity: Up to 95% (non-condensing)

Application

VoIP

IPTV

Internet

Fiber

VDSM2-1524

DSL — VDSL2 Router

DSL — VDSL2 Router

DSL — VDSL2 Router

DSL — VDSL2 Router
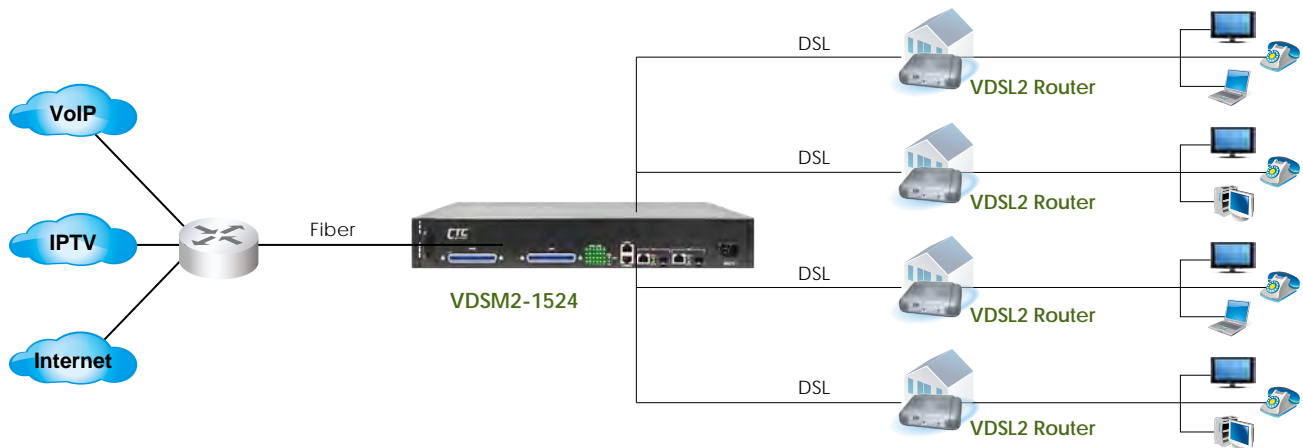
Ordering Information

Model Name	Description
VDSM2-1524/US	VDSL2 IP DSLAM with 24 Ethernet Ports with Splitter 600 ohm
VDSM2-1524/EU	VDSL2 IP DSLAM with 24 Ethernet Ports with Splitter 900 ohm

VDSM2 – 1524 / □□

Example: VDSM2 – 1524 / US

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VDSL2 / ADSL2⁺

VDTU2-R140

4-Port VDSL2 Router

NEW

3

VDSL2 / ADSL2+

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.
- Embedded SNMP agent.
- Web-based management with a friendly graphical user interface.
- Configuration backup and restoration.

Specifications

VDSL2 standards	Compliant with ITU VDSL2 standard G.993.2 Annex A, Annex B and Annex C	Routing	Static routing and RIP v1/v2(RFC 1058/2453)
	Supports VDSL2 profile: 8a, 8b, 8c, 8d, 12a, 12b, 17a and 30a		Support IP/TCP/UDP/ARP//IGMP
	Band plan profile: symmetric (Plan 997) and asymmetric (Plan 998)		IGMP snooping and proxy (RFC 1112/2236)
			NAT ALGs for ICQ/NetMeeting/MSN/Yahoo Messenger
	Built-in POTS splitter to share voice and data(Optional)		DNS relay and caching (RFC 1034/1035)
Management	Web-based GUI for quick setup, configuration and management		DHCP server, client and relay (RFC 2131/2132)
	Firmware upgradable from Web		IP precedence (RFC 791) (Firewall router)
	SNMP management with SNMP agent and MIB II	Firewall	DMZ host/Multi-DMZ/Multi-NAT function
LAN	Filtering functions for MAC/IP/Port.		Virtual server mapping (RFC1631)
	Port Based VLAN & IEEE 802.1q VLAN Tagging		VPN pass-through for PPTP/L2TP/IPSec tunneling
	Port configuration for Bandwidth/Duplex/Speed/Flow control		Natural NAT firewall
QoS	Port Based		User access control: deny certain access of PCs to Internet (Firewall Router)
	802.1p	Interfaces	Ethernet: 4 X RJ-45 connectors for Ethernet 10/100Mbps ports with Auto-MDI/MDIX
	By ToS/DSCP		
	4-level priority queue per port		VDSL : 1 X RJ-11 connector for VDSL2 port
	WRR/WFQ/SP		

Application

Ethernet
Phone
VDTU2-R140

Ethernet
POTS
VDSM2-1024

Ethernet
Phone
VDTU2-R140

Ethernet
POTS
VDTU2-R140
Master Modem

Ethernet
Phone
VDTU2-R140
Slave Modem
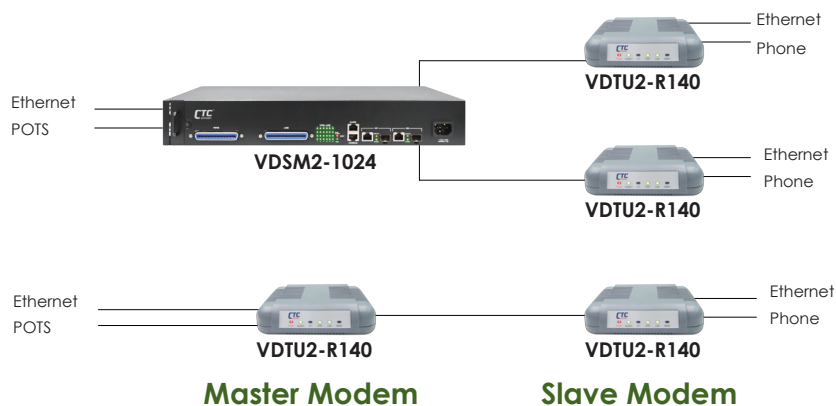
Ordering Information

Model Name	Description
VDTU2-R140-1	VDSL2 Router with 4-Port Ethernet with splitter 600 ohm

Specifications & design are subject to change without prior notice. Please visit CTC Union website for more details.
CTC UNION TECHNOLOGIES CO., LTD.   www.ctcu.com

VDTU2-R140 | **3-5**

MD30

3U 24 / 48 / 72 / 96 / 120 Ports Managed IP DSLAM with Two GE Ports

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	2 x 10/100/1000 Based-Tx or 2 x SFP (IP) Subscriber Interface		Multicasting support		
	ADSL2/2+/ POTS/ISDN(G.992.1 .2 .3 .5) or G.SHDSL		Port based and 802.1p/q Tag-based VLAN		
Line Interface : ADSL	24 ports per card		IGMP V1/V2 snooping and proxy		
	Fast/Interleave latency modes for G.dmt		SNMP V1/V2C		
	Supports Interleave mode for G.Lite		System Configuration	Multiple session Telnet, Web based and SNMP	
	ADSL to ATM signal conversion			Supports point to point VCC link	
	Build-in POTS splitter circuit			Software remote upgrade	
	Power Consumption:25 W(max)		Alarm and Status	Automatic alarm/LED indication for alarm and system status	
Line Interface : SHDSL	24 ports per card		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	
	Signal modulation and demodulation				
	G.SHDSL to ATM signal conversion				
	Power Consumption:21 W(max)				
Management Interface	Physical Layer: IEEE 802.3 (10Mbps)				
	Upper Layer: Ethernet, IP, SNMP,TL1				
Service characteristics	ATM	QoS(UBR, rt-VBR, nrt-VBR, CBR)	Power Input	Input: -48 V DC (-42 V to -56 V)	
		PVC default priority and PVC-to VLAN maping		Dual A+B -48 V DC power input terminal	
		Traffic scheduling/shaping/policing	Power Consumption	130W	
	Ethernet	IEEE 802.1d Spanning Tree Protocol (STP)	Dimensions	133 x 482 x 304mm (H x W x D)	
		IEEE 802.3ad Link aggregation	Weight	4.5kg	
		Password Security on console access	Temperature	-40 ~ 65°C (Operating), -40 ~ 70°C (Storage)	
Management	OSI Layer 2 Functionality		Humidity	10 ~ 90% non-condensing	
	MAC filtering and count limit		Certification	CE, FCC, RoHS, ITU-T, ETSI	
	Access control list (ACL)				

Application

Local Management

Ethernet
POTS
Network

PBX

MD30

ATU-R

LAN

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	24L, ANSI 600 ohm Splitter ANX-A

Chassis Type

MD30 – ☐☐☐☐

Example: MD30 – MA1A

Card Type

MD00 – ☐☐☐☐

Example: MD00 – GE1A

MD15

1.5U 48-Port Managed IP DSLAM

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
- 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

Ports	Network Interface	2 x 10/100/1000 Based-Tx or 2 x SFP (IP)
	Line Interface	ADSL2/2+/ POTS(G.992.1 .2 .3 .5)
Service characteristics	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
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℃ (Operating), -40 ~ 70℃ (Storage)
Humidity	10~90% non-condensing
Certification	CE, FCC, RoHS, ITU-T, ETSI
MTBF	50,000 hrs (25℃)

Application

Local Management

Ethernet POTS Network

PBX

MD15

ATU-R

LAN

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

Power Type

MD15 – ☐☐☐☐ – ☐☐

Example: MD15 – 48A6 – AC

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CTC UNION TECHNOLOGIES CO., LTD.   w w w . c t c u . c o m

MD15 | 3-7

MD15A

1.5U 24-Port Managed IP DSLAM with Single Gigabit Ethernet Trunk

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
- Monitors of line attenuation, noise margin, current rate, second performance data.

- 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	1 x 10/100/1000 Base-T(X)	
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	
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 66mm (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, ITU-T, ETSI
MTBF	50,000 hrs

Application

Local Management

Ethernet
POTS
Network

PBX

MD15A

ATU-R

LAN

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 – ☐☐☐☐ – ☐☐

Example: MD15A – 24A6 – AC

SHRM03b TDM

4U,16-Slot Managed G.SHDSL.bis TDM Chassis

The SHRM03b TDM chassis is a 4U 19(23)" rack that supports dual power and 16-slot for 2 wires dual channels, 4 wires single channel hot swappable cards for G.703 E1, T1 and bridged Ethernet. Utilizing industry standard SNMP protocol, the management feature can configure and monitor each local channel and the connected remote modems. In addition, RS-232 console and Telnet provide menu based management while embedded Web offers a user friendly graphical environment for OAM&P. This Rack is 100% compatible with our SHDTU03b standalone TDM based CPE modems for E1, serial data and Ethernet.

Features

- 4U 19(23)" 16-slot chassis
- Interface Cards for E1/T1 Ethernet (Bridge)
- Up to 30 ports per chassis (2 ports per card for 2 wires)
- Hot swappable
- Data rate 2 wire up to 5.7Mbps and 4 wire up to 11.4Mbps

- Adaptive rate feature maximizes data rate based on loop conditions
- Supports console terminal, Telnet, web and SNMP management
- Supports TFTP upgrade
- All interface connectors on the rear panel

Specifications

Connectors	Console port (RJ45, RS232C)
	WAN port RJ45 Jack (2-wire, 4-wire)
Physical Specifications	Dimensions: 178mm x 440mm x 315mm (W x D x H)
	Weight: 7.9kg w/o P/S
Power Characteristics	AC : 90 ~ 230V AC 47/63Hz
	DC : 24VDC, 48VDC, 72VDC

Environmental Specifications	Operating: 0 ~ 50℃
	Storage: -10 ~ 70℃
	Relative humidity 5% ~ 90% non-condensing
	Predicted MTBF : 65,000 hrs
Certification	FCC class A, VCCI class A, CE, RoHS

SHRM03b TDM front view

SNMP Management

16-slot for Line Card Removal / Replacement

Power Redundancy

SHRM03b TDM back view

SNMP Management Port

Cooling Fan Power Terminal

Alarm Relays

Circuit breakers provide over current protection for AC or DC inputs.

Main Switch control the input flow of AC or DC

IEC connector supply AC voltage (110-220VAC) Terminal strip for DC power (48VDC)

Technologies supported E1, T1

Technologies supported 10/100Base-T(X) Ethernet.

Power Redundancy

All the SHRM03b TDM chassis power supplies are hot swappable and modular, installing two into a chassis, provides redundancy should a single power supply fail. A fully loaded chassis can run continuously with only one power module fitted into the chassis.
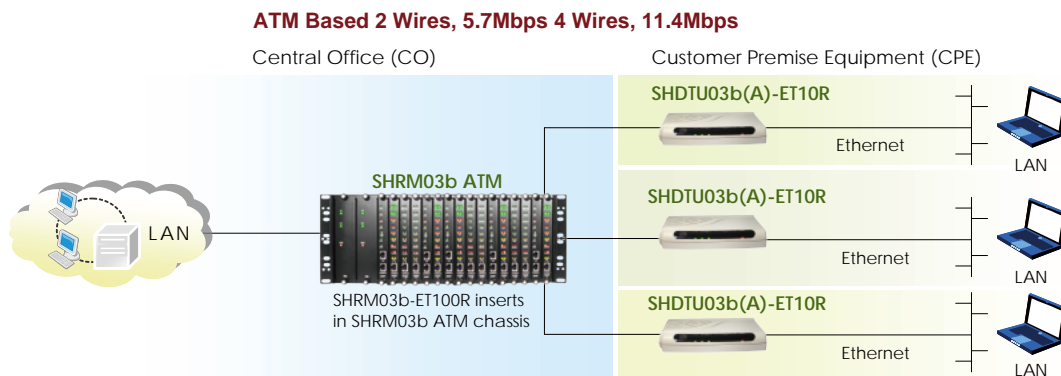
Cooling Fan

The cooling fan unit is an optional component. In a stacked chassis scheme, where ambient temperature may be higher than 25C (77F), or the chassis is fully loaded with line cards, the fan option is recommended to keep cooler air moving through the chassis. The fan box is designed to be placed on top of the SHRM03b chassis and pulls warm air up and out of the chassis, expelling it out the rear of the fan box. The cooling fan unit will add 1U rack space to the chassis for an overall total of 5U.

Network Management

The SHRM03b TDM chassis provides an SNMP Management card which must be installed into the SNMP slot of chassis. The SNMP card provides 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. The management module can also configure and monitor the status of a remote CPE modem.

Protocol Supported

The SHRM03b TDM chassis has been designed as a Managed platform. This allows network administrators to deploy the chassis in a wide range of networks. Technologies supported by the chassis included E1, T1 and 10/100Base-T(X) Ethernet.

Application

TDM Based 2Wires, 5.7Mbps 4 Wires, 11.4Mbps
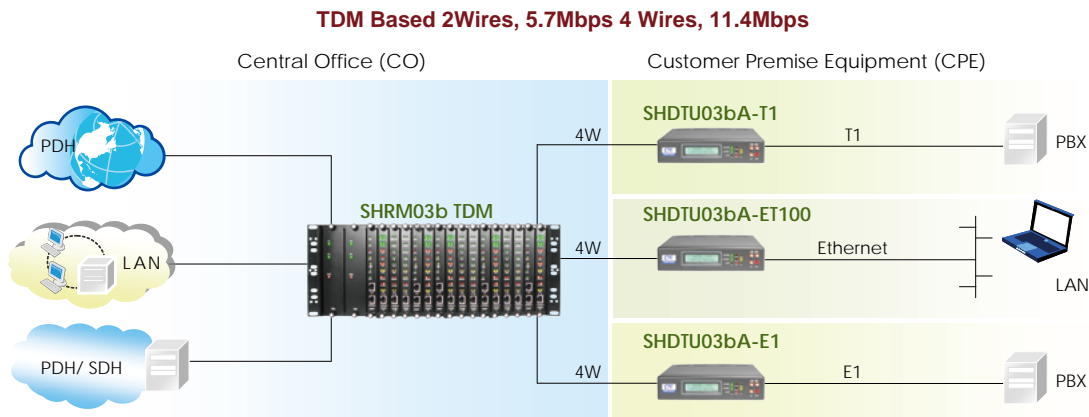
Ordering Information

Model Name	Type	Description
SHRM03b-CH-AD	Chassis	4U, 19" 16 Slot Chassis with One Dual AC/DC Power Moduel
SHRM03b-FAN	Fan	Chassis Cooling Fan Tray
SHRMb03-AD	Power	AC 110V~240V + DC36~72V Power Module
SHRM03b-SNMP	Card	SNMP Management Card
SHRM03bA-E1	Card	1 Ch/4W or 2 Ch/2W G.SHDSL.bis wire-wrap to E1 BNC/RJ45 Card
SHRM03bA-T1	Card	1 Ch/4W or 2 Ch/2W G.SHDSL.bis wire-wrap to T1 RJ45 Card
SHRM03bA-ET100	Card	1 Ch/4W or 2 Ch/2W G.SHDSL.bis wire-wrap to 10/100TX RJ45 Ethernet Bridge Card
SHRM03bA-E1-RJ45	Card	1 Ch/4W or 2 Ch/2W G.SHDSL.bis RJ45 to E1 BNC/RJ45 Card
SHRM03bA-T1-RJ45	Card	1 Ch/4W or 2 Ch/2W G.SHDSL.bis RJ45 to T1 BNC/RJ45 Card
SHRM03bA-ET100-RJ45	Card	1 Ch/4W or 2 Ch/2W G.SHDSL.bis RJ45 to 10/100TX RJ45 Ethernet Bridge Card

Chassis Type Power Type
SHRM03b – ☐☐ – ☐☐
Example: SHRM03b – CH – AD

Power Type
SHRM03b – ☐☐
Example: SHRM03b – AD

Card Type
SHRM03b ☐ – ☐☐
Example: SHRM03b A – E1

Fan
SHRM03b – ☐☐☐
Example: SHRM03b – FAN

SHRM03b TDM Slide-in Card

Wire wap   RJ45

Rear Panel
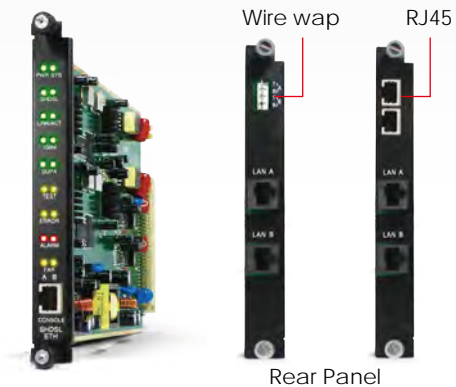
Ethernet Card

- ◆ 10/100Mpbs Half / Full Duplex, Auto-sensing, Auto-Crossover
- ◆ Standard ITU G.991.2 (2004) supports improved reach, speed and interoperability
- ◆ Local management interface with console
- ◆ Remote line loopback
- ◆ G.SHDSL.bis Line performance monitoring (data rate and SNR)
- ◆ Raw and per time interval statistics
- ◆ Supports 2 wires / 2Ch or 4 wires / 1Ch per card
- ◆ Connector : RJ-45 Ethernet Interface
- ◆ Up to 1024 MAC address learning, filtering bridge

3

G.SHDSL.bis TDM

Application

TDM Based 2 Wires 2 Channels 5.7Mbps Application

SHRM03b TDM

SHRM03b-ET100

NMS

SHRM03b-ET100

2W

2W

SHRM03b-ET100

SHRM03b-ET100

TDM Based 4 Wires 1 Channels 11.4Mbps Application

SHRM03b TDM

NMS

SHRM03bA-ET100

4W

SHRM03bA-ET100

SHRM03b TDM Slide-in Card

Wire wap   RJ45

Rear Panel
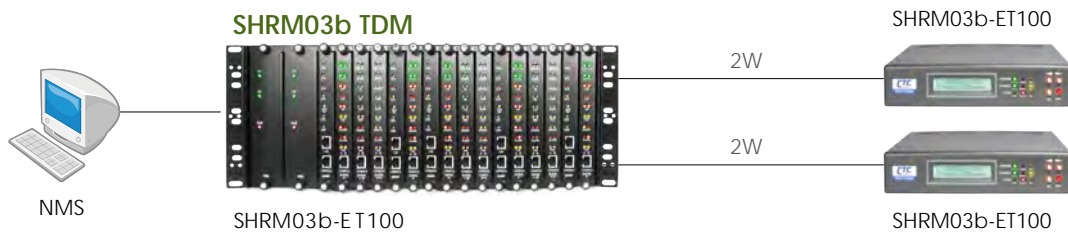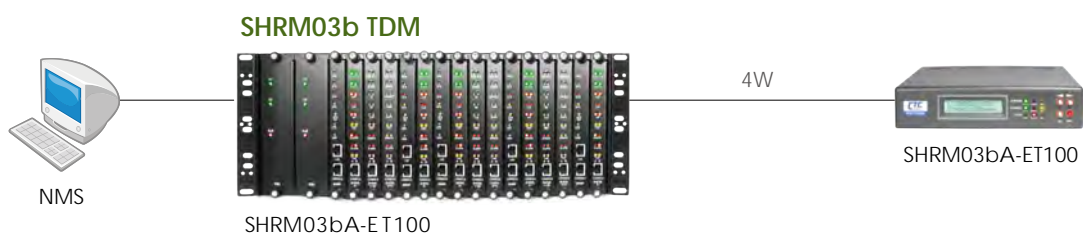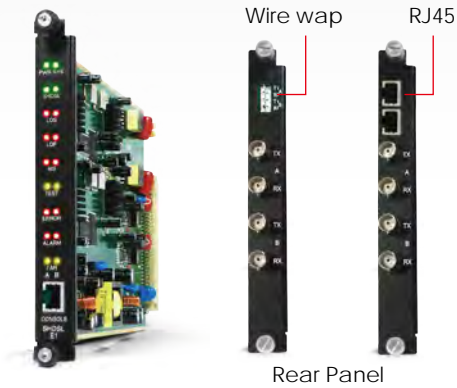
E1 Card

- Supports E1 and fractional E1 over SHDSL
- Connection: RJ-48C for balanced 120Ω E1 cable and BNC for unbalanced 75Ω E1 cable
- Line Rate : 2048KHz +/- 50ppm
- Line code: 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
- Local management interface with console
- Remote line loopback
- E1 performance monitoring and alarm buffer
- G.SHDSL.bis Line performance monitoring (data rate and SNR)
- Raw and per time interval statistics
- Supports 2 wires / 2Ch or 4 wires / 1Ch per card

Wire wap   RJ45

Rear Panel
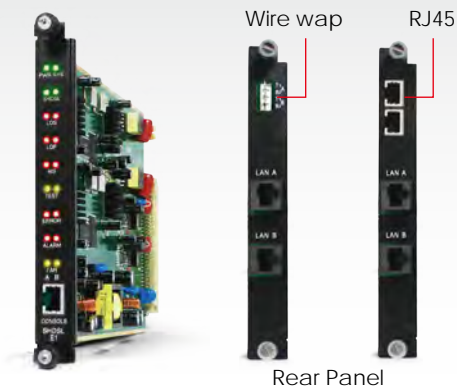
T1 Card   G.703 Interface (as T1)

- Connection: RJ-48C for balanced 100Ω T1 cable
- Line Rate : 1544KHz +/- 50ppm
- Line code: B8ZS
- Framing: SF/ESF/Unframed
- Data Rate : 64kbps to 1.536Mbps (N=1 to 24)
- Operation : Clear Channel and Factional T1
- Local management interface with console
- Remote line loopback
- T1 performance monitoring and alarm buffer
- G.SHDSL.bis Line performance monitoring (data rate and SNR)
- Raw and per time interval statistics
- Supports 2 wires / 2Ch or 4 wires / 1Ch per card

Application

TDM Based 2 Wires 2 Channels 5.7Mbps Application

SHRM03b TDM

SHRM03b-E1(T1)

NMS

SHRM03b-E1(T1)

2W

2W

SHRM03b-E1(T1)

SHRM03b-E1(T1)

TDM Based 4 Wires 1 Channels 11.4Mbps Application

SHRM03b TDM

NMS

SHRM03bA-E1(T1)

4W

SHRM03bA-E1(T1)
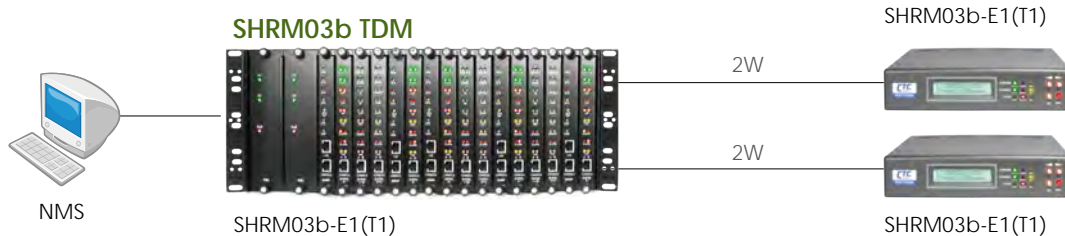
G.SHDSL.bis TDM NTU

- **SHDTU03b-E1**
- **SHDTU03b-E1/T1**
- **SHDTU03b-ET100**
- **SHDTU03b-31**

3

G.SHDSL.bis TDM

G.SHDSL.bis Series 2-Wire/4-Wire SHDSL.bis NTU 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. SHDTU03b series features E1/T1, Data and Ethernet interfaces, allowing connection to different DTE types. When equipped with multiple interfaces, the standalone SHDSL.bis NTU 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.bis NTU 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.bis NTU offers balanced 100Ω RJ45 Jack to carry bit rates from 64Kbps to 1.544Mbps. For Ethernet interface application, the SHDSL.bis NTU 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 for one pair of copper wires and 8.192Mbps for two pairs of copper wires. The SHDSL.bis NTU can be configured and managed via EOC, or menu-driven VT100 compatible Asynchronous Terminal Interface, either locally or remotely. The SHDSL.bis NTU provides the capability that identifies the maximum line rate supported by the copper loop. This powerful automatic configuration capability makes installation and service provisioning simple and painless. Furthermore it provides flexible manually setting of the maximum NTU speed at different levels for different customer-tailored service offerings.

Features

- ◆ Standard ITU G.991.2 (2004) supports improvement on reach, speed and interoperability in contrast to conventional G.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
- ◆ Supports multiple DTE interfaces working simultaneously on back-to-back connection
- ◆ Auto rate installation maximizes data rate based on loop conditions

- ◆ Wetting current sink to protect SHDSL.bis line
- ◆ Local management interface with LCD display
- ◆ Remote line loopback
- ◆ SHDSL.bis Line performance monitoring (data rate and SNR)
- ◆ Raw and per time interval statistics
- ◆ Bandwidth guaranteed transmission equipment

Specifications

Network Interface	
	Line Rate: ITU G.991.2 (2004)
	Coding: trellis coded pulse amplitude modulation (TC-PAM16 and TC-PAM32)
	Support: 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
	Connection: RJ-45 jack (2-wire or 4-wire)
	Impedance: 135 ohms

G.703 Interface (E1)	
	Connection: RJ-48C 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(211-1) Bit Error Rate Tester

Management	
	Configuration with keypads and LCD display
	Console port (RJ45 , RS232C)
	Support firmware upgradeable
	SNMP management via Ethernet port (Optional)

Regulatory	
	ISO 9001 Quality Management
	CE Approval & EN60950 Certificate

Physical / Electrical	
	Dimensions: 195 x 48 x 168 mm (D x W x H)
	AC Input: 90~240V with 50~60Hz
	DC Input: -36V~-72V
	Power Consumption: 10W Max
	Operation temperature: 0 to 50℃
	Humidity: Up to 95% (non-condensing)
	External screw for frame grounding

Application

Public Network

E1, T1, Ethernet   SHRM03b TDM   Smart View

E1   2-wire G.SHDSL.bis

SHDTU03b-E1   **SHDTU03b-ET100**

E1   Ethernet

PBX   Ethernet Switch   LAN

Router   V.35   V.35   Router

LAN   LAN

Ethernet   Copper   Ethernet
LAN   **SHDTU03b(A)-31** (SHDSL) **SHDTU03b(A)-31**   LAN

PBX   E1   E1   PBX
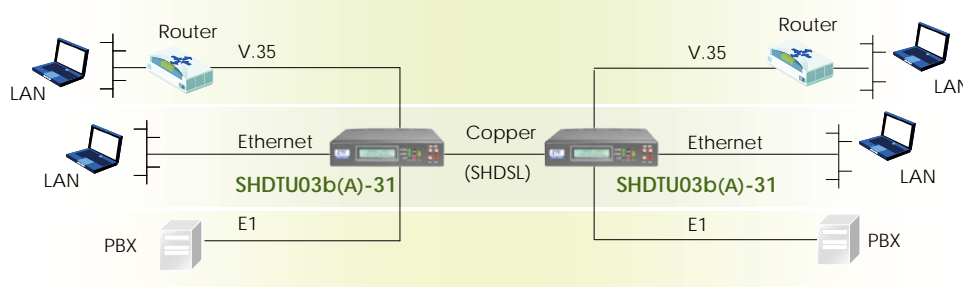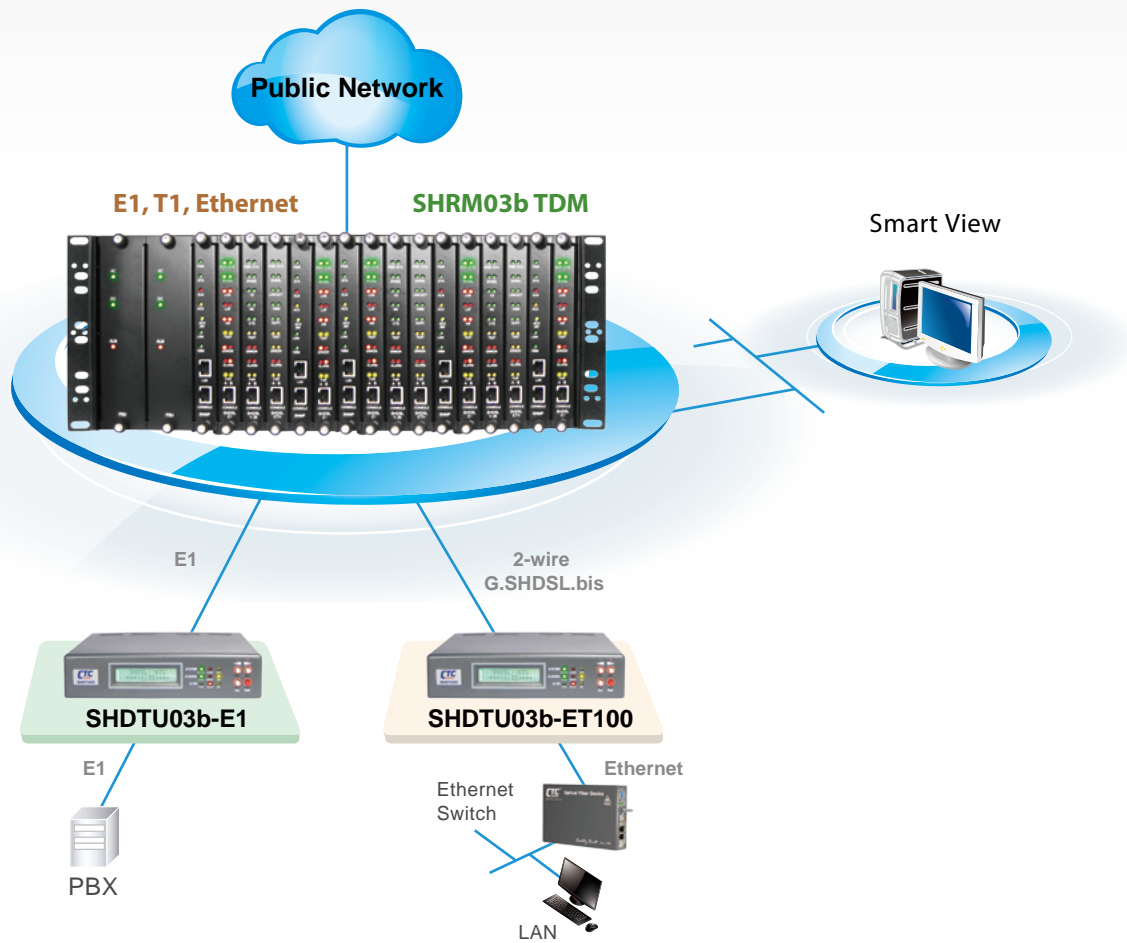
Ordering Information

2-wire (5.7MMbps) G.SHDSL.bis TDM modem

Model Name	Description
SHDTU03b-E1-AD	E1 NTU with AC + DC power
SHDTU03b-E1/T1-AD	E1/T1 NTU with AC + DC power
SHDTU03b-ET100-AD	Ethernet 10/100Base-T(X) NTU with AC + DC power
SHDTU03b-31-AD	E1/V35/LAN multi-inteface NTU with AC + DC power
SHDTU03b-31T-AD	T1(E1)/V35//LAN multi-inteface NTU with AC + DC power

Power Type
SHDTU03b – E1– ▢▢
Example: SHDTU03b – E1 – AD

4-wire (11.4MMbps) G.SHDSL.bis TDM modem

Model Name	Description
SHDTU03bA-E1-AD	E1 NTU with AC + DC power
SHDTU03bA-E1/T1-AD	E1/T1 NTU with AC + DC power
SHDTU03bA-ET100-AD	Ethernet 10/100Base-T(X) NTU with AC + DC power
SHDTU03bA-31-AD	E1/V35/LAN multi-interface NTU with AC + DC power
SHDTU03bA-31T-AD	T1(E1)/V35/LAN multi-interface NTU with AC + DC power

Power Type
SHDTU03bA – E1– ▢▢
Example: SHDTU03bA – E1 – AD

SHRM03b ATM

4U 15-Slot Non-Managed G.SHDSL.bis ATM Chassis

The SHRM03b ATM chassis is a 4U 19(23)" rack that supports dual power and 15 slots for dual channel, hot swappable ET100R Bridge / Router Ethernet cards. The SHDTU03b-ET100R ATM card series are G.SHDSL 2-wire/ 4-wire routers which comply with G.991.2 & G.994.1 standards. The SHDTU03b family provides business-class, multi-range 192Kbps to 5.696/11.392Mbps payload rates over existing single pair or two pairs copper wire. The SHDTU03b is designed not only to optimize the service bit rate from central office to customer premises but also integrates high-end Bridging/ Routing capabilities with advanced functions such as Multi-DMZ, virtual server mapping and VPN. pass-through. The SHDSL.bis router allows customers to leverage the latest in broadband technologies to meet their growing data communication needs.

Features

- 4U 19(23)" 15-slot chassis
- Interface Cards for Ethernet (Bridge & Routing)
- Up to 30 ports per chassis (2 ports per card for 2 wire model)
- Hot swappable

- Data rate 2-wire up to 5.7Mbps and 4-wire up to 11.4Mbps
- Adaptive rate feature maximizes data rate based on loop conditions
- All interface connectors on the rear panel

Specifications

Connectors	Console port (RJ-45, RS-232) card
	WAN port RJ45 Jack (2-wire, 4-wire)
Physical Specifications	Dimensions: 178 x 440 x 315mm (D x W x H)
	Weight: 7.9kg w/o P/S
Power Characteristics	AC : 90 ~ 230V AC 47/63Hz
	DC : 24VDC, 48VDC, 72VDC

Environmental Specifications	Operating 0 ~ 50°C
	Storage -10 ~ 70°C
	Relative humidity 5% ~ 90% non-condensing
	Predicted MTBF : 65,000 hrs
Certification	FCC class A, VCCI class A, CE, RoHS

SHRM03b ATM front view

15 slots for Line Card Removal / Replacement

Power Redundancy

SHRM03b ATM back view

Cooling Fan Power Terminal

Alarm Relay

Circuit breakers provide over current protection for AC or DC inputs.

Main Switch control the input flow of AC or DC
IEC connector supply AC voltage (110-220VAC)
Terminal strip for DC power (48VDC)

Technologies supported 10/100Base-T(X) Ethernet.
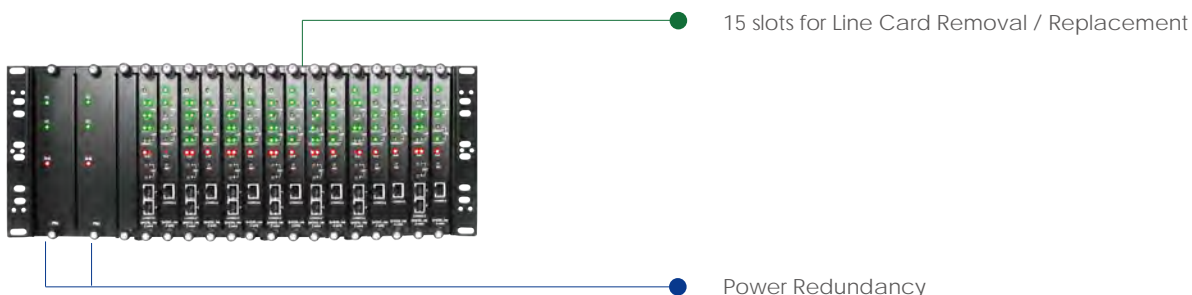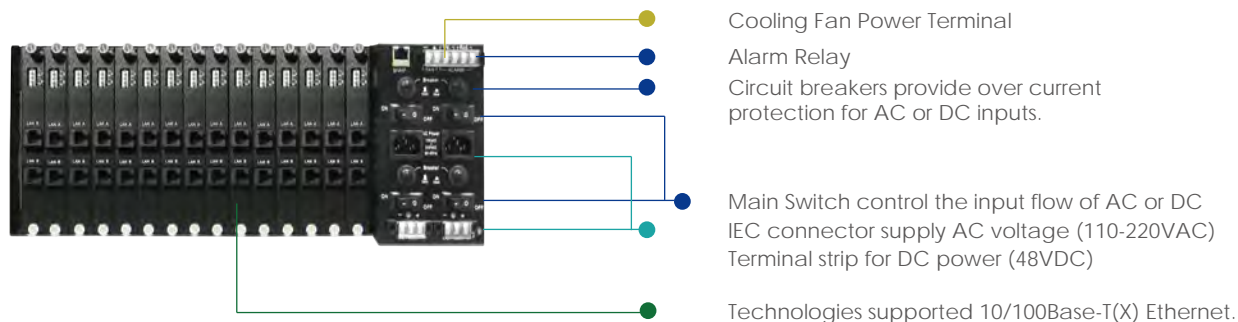
G.SHDSL.bis ATM Ethernet Router Slide-in Card

SHRM03b-ET100R
Data rate 2 wire up to 5.7Mbps

- 2 channel, 2 wires G.SHDSL.bis
- 10/100Base-T(X) ATM Router v vvvcard
- With Ethernet connector (HD26 to RJ45)
- Embedded console & Web management

SHRM03bA-ET100R
Data rate 4 wire up to 11.4Mbps

- 1 channel, 4 wires G.SHDSL.bis
- 10/100Base-T(X) ATM Router card
- With Ethernet connector (HD26 to RJ45)
- Embedded console & Web management

Power Redundancy
All the SHRM03b ATM chassis power supplies are hot swappable and modular, installing two into a chassis, provides redundancy should a single power supply fail. A fully loaded chassis can run continuously with only one power module fitted into the chassis.

Cooling Fan
The cooling fan unit is an optional component. In a stacked chassis scheme, where ambient temperature may be higher than 25C (77F), or the chassis is fully loaded with line cards, the fan option is recommended to keep cooler air moving through the chassis. The fan box is designed to be placed on top of the SHRM03b chassis and pulls warm air up and out of the chassis, expelling it out the rear of the fan box. The cooling fan unit will add 1U rack space to the chassis for an overall total of 5U.

Protocol Supported
The SHRM03b ATM chassis has been designed as a Non-Managed concentrator. This allows network administrators to deploy the chassis in a wide range of network. Technologies supported 10/100Base-T(X) Ethernet Router.

Application

ATM Based 2 Wires, 5.7Mbps 4 Wires, 11.4Mbps

Central Office (CO)

Customer Premise Equipment (CPE)

SHDTU03b(A)-ET10R
Ethernet
LAN

SHRM03b ATM

SHDTU03b(A)-ET10R
Ethernet
LAN

LAN

SHRM03b-ET100R inserts
in SHRM03b ATM chassis

SHDTU03b(A)-ET10R
Ethernet
LAN

Ordering Information

Model Name	Type	Description
SHRM03b-CH-AD	Chassis	4U, 19" 15-Slot Chassis with One Dual AC/DC Power Moduel
SHRM03b-FAN	Fan	Chassis Cooling Fan Tray
SHRMb03-AD	Power	AC 110V~240V + DC36~72V Power Module
SHRM03b-ET100R	Card	2 Ch/2W G.SHDSL.bis wire-wrap to 10/100Base-T(X) ATM Router Card
SHRM03bA-ET100R	Card	1 Ch/4W G.SHDSL.bis wire-wrap to 10/100Base-T(X) ATM Router Card
SHRM03bF-ET100R	Card	2 Ch/2W G.SHDSL.bis wire-wrap to 10/100Base-T(X) ATM Router Card
SHRM03bAF-ET100R	Card	1 Ch/4W G.SHDSL.bis wire-wrap to 10/100Base-T(X) ATM Router Card
SHRM03b-ET100R-RJ45	Card	2 Ch/2W G.SHDSL.bis RJ-45 to 10/100Base-T(X) ATM Router Card
SHRM03bA-ET100R-RJ45	Card	1 Ch/4W G.SHDSL.bis RJ-45 to 10/100Base-T(X) ATM Router Card
SHRM03bF-ET100R-RJ45	Card	2 Ch/2W G.SHDSL.bis RJ-45 to 10/100Base-T(X) ATM Router Card
SHRM03bAF-ET100R-RJ45	Card	1 Ch/4W G.SHDSL.bis RJ-45 to 10/100Base-T(X) ATM Router Card

Chassis Type   Power Type

SHRM03b – ☐☐ – ☐☐

Example: SHRM03b – CH – AD

Power Type

SHRM03b – ☐☐

Example: SHRM03b – AD

Card Type

SHRM03b ☐ – ☐☐☐☐☐☐

Example: SHRM03b A – ET100R

Fan

SHRM03b – ☐☐☐

Example: SHRM03b – FAN

SHRM03b-ET100R
SHRM03bA-ET100R

G.SHDSL.bis ATM Ethernet Router Slide-in Card

The SHRM03b-ET100R is a dual channel ATM G.SHDSL.bis 2-wire/ 4-wire router card which comply with G.991.2 & G.994.1 standards. The SHRM03 family provides business-class, multi-range 192Kbps to 5.696/11.392Mbps payload rates over existing single pair or two pairs copper wire. The SHRM03b is designed not only to optimize the service bit rate from central office to customer premises but also integrates high-end Bridging/ Routing capabilities with advanced functions such as Multi-DMZ, virtual server mapping and VPN pass-through. The SHDSL.bis router allows customers to leverage the latest in broadband technologies to meet their growing data communication needs. This card is 100% compatible with our SHDTU03b standalone ATM based CPE Bridge/Router modems.

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
- Data rate 2 wire up to 5.7Mbps and 4 wire up to 11.4Mbps
- Local management interface via console port
- Intuitive Web based management
- SNMP management with SNMPv1/v2 and MIB II

- Efficient IP routing and transparent learning bridge to support broadband Internet services
- VPN pass-through for safeguarded connections
- Build-in advanced SPI firewall (Firewall routers)
- 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
- SHDSL Line performance monitoring
- Raw and time stamped statistics
- Supports firmware upgrade via web interface

Application

SHRM03b ATM

SHRM03b-ET100R

2W — SHDTU03b-ET10R

2W — SHDTU03b-ET10RS

SHRM03b ATM

SHRM03bA-ET100R
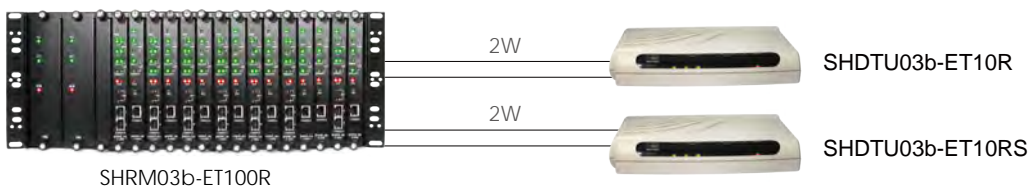
4W — SHDTU03bA-ET10RS
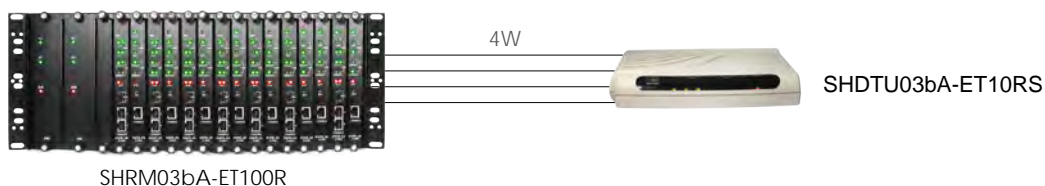
SHDTU03bF-ET10R
SHDTU03bF-ET10RS
SHDTU03bAF-ET10RS

2 / 4 - Wire G.SHDSL.bis EFM ATM Ethernet Bridge / Router

The SHDTU03bF-ET10RS is a G.SHDSL bis Bridge/Router in 2-wire or 4-wire which complies with G.991.2 (2004) standards and has an optional built-in four port 10Base-T /100Base-TX auto-negotiation and auto-MDIX switch. The SHDTU03bF family provides business-class, multi-range 192Kbps to 5.7Mbps (2-wire) or 384Kbps to 11.4Mbps (4-wire) payload rates over existing single or two pair copper wire. SHDTU03bF-ET10R 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 Multi-DMZ, virtual server mapping and VPN pass-through. The G.SHDSL.bis router 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
- Data rate 2 wire up to 5.7Mbps and 4 wire up to 11.4Mbps
- Local management interface via console port
- Intuitive Web based management
- SNMP management with SNMPv1/v2 and MIB II
- Efficient IP routing and transparent learning bridge to support

- broadband Internet services
- VPN pass-through for safeguarded connections
- Build-in advanced SPI firewall (Firewall routers) (option)
- 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
- Supports TR069 (Optional)
- 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
	Hardware Interface	WAN: RJ-45
		Console port: RS-232
	WAN Interface	SHDSL: ITU-T G.991.2 2004(Annex A/B/F/G)
		Encoding scheme: TC-PAM16, TC-PAM32
		Data Rate: N x 64Kbps (N=3~89)
		Impedance: 135 ohm
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	
Routing	User authentication with PAP/CHAP/MS-CHAP	
	Support 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 ICQ/Netmeeting/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
	Natural NAT firewall
	Advanced stateful packet inspection (SPI) firewall
	Denial of service protection
	User access control; deny certain PCs access to internet services
Management	Easy-to-use web-based GUI for quick setup, configuration and management
	Menu-driven interface/Command-line interface (CLI) 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
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
Dimensions	145 x 187 x 33mm (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
MTBF	57,000 hrs

Application

Ethernet   Copper   Ethernet

SHDTU03bF-ET10R(S)
or
SHDTU03bAF-ET10RS

SHDTU03bF-ET10R(S)
or
SHDTU03bAF-ET10RS

TDM Based
2 Wires, 5.7Mbps 4 Wires, 11.4Mbps

Central Office (CO)

Customer Premise Equipment (CPE)

SHRM03b ATM

SHDTU03bF-ET10R
Ethernet — LAN

SHDTU03bF-ET10RS
Ethernet — LAN

SHDTU03bAF-ET10RS
Ethernet — LAN

3

G.SHDSL.bis ATM

	SHDTU03bF-ET10R	*SHDTU03bF-ET10RS*	*SHDTU03bAF-ET10RS*
WAN	2-wire	2-wire	4-wire
LAN	1	4	4
Auto-MDIX	Yes	Yes	Yes
Port-based VLAN	None	Yes	Yes
802.1q VLAN	1LAN / 1WAN	4LAN / 8WAN	4LAN / 8WAN
Firewall	Yes	Yes	Yes
Maximum data rate	5.7Mbps	5.7Mbps	11.4Mbps
Minimum data rate	192Kbps	192Kbps	384Kbps

Ordering Information

Model Name	Description
SHDTU03bF-ET10R	1-Port 10/100Base-T(X) ATM Router w/Firewall
SHDTU03bF-ET10RS	4-Port 10/100Base-T(X) ATM Router w/Firewall
SHDTU03bAF-ET10RS	4-Port 10/100Base-T(X) ATM Router w/Firewall

Note: SHDTU03bF-ET10R: 2-wire (5.7Mbps) G.SHDSL.bis ATM Ethernet Bridge / Router
        SHDTU03bAF-ET10RS: 4-wire (11.4Mbps) G.SHDSL.bis ATM Ethernet Bridge / Router

Card Type

SHRM03bF – ☐☐☐☐☐
Example: SHRM03bF – ET10R

Specifications & design are subject to change without prior notice. Please visit CTC Union website for more details.
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SHDTU03bF-ET10R, SHDTU03bF-ET10RS,
SHDTU03bAF-ET10RS   **3-19**

SHRM03 TDM

4U, 13-Slot Managed G.SHDSL TDM Concentrator

The SHRM03 TDM chassis is a 4U 19(23)" rack that supports dual power and 12 slots for dual channel, hot swappable cards for G.703 E1, V.35 (RS-530/449/X.21) and bridged Ethernet. Utilizing industry standard SNMP protocol, the management feature can configure and monitor each local channel and the connected remote modems. In addition, RS-232 console and Telnet provide menu based management with embedded Web offers a user friendly graphical environment for OAM&P. This Rack is 100% compatible with our SHDTU03 standalone TDM based CPE modems for E1, serial data and Ethernet.

Features

- 4U 19(23)" 13-slot chassis
- Interface Cards for E1, V.35, Ethernet (Bridge)
- Up to 26 ports per chassis (2 ports per card)
- Hot swappable
- Data rate 2 wire up to 2.3Mbps

- Adaptive rate feature maximizes data rate based on loop conditions
- Supports console terminal, Telnet, web and SNMP management
- Supports TFTP upgrade
- All interface connectors on the rear panel

Specifications

SHDSL Interface	Line code : 16 level Trellis Coded PAM
	Line data rate : User selectable from 64kbps to 2.304Mbps
	Support : ANSI (Annex A) and ETSI (Annex B)
	Support wetting current : 4mA-20mA and alarm on failure
	Compliance: ITU-T G.991.2
Datacom Interface	User selectable as : V.35, RS-449, RS-530, X.21
	Data Rate : 64kbps to 2304kbps
	Connector : D25F (adapters available)
	Timing : Internal, External, and Recovery
Ethernet Interface	Supports 10/100Base-T auto sensing half/full duplex
	Complied with IEEE 802.3/IEEE 802.3u
	Operates as a self-learning bridge in transparent mode
	Supports up to 128 MAC learning addresses
	Supports bridge filter function
Performance	SHDSL PM : ES-crc, SES-crc, UAS, LOSW seconds
	E1 PM : ES, SES, UAS seconds
	Current 15-minute period and 96 previous 15-minute periods of SHDSL and E1 performance parameters
Management	Console port (RJ-45 , RS-232)
	Support firmware upgrade

LEDs	E1	PWR, SHDSL, FE1, LOF, LOS, TEST, LOOP, ALARM, and FAR ALARM
	V.35	PWR, SHDSL, TD, RD, CTS, TEST, LOOP, ALARM, and FAR ALARM
	Ethernet	PWR, SHDSL, 10M/ACT, 100M/ACT, COL, TEST, LOOP, ALARM, and FAR ALARM

E1 Interface	Line code: HDB3/AMI
	Data rate: 64kbps to 2048kbps
	Operation: full or fractional
	Impedance: 120 ohms balanced / 75 ohms unbalanced
	Framing: structured with or without CRC-4 or unstructured
	Timing: internal, and G.703
	Compliance: ITU-T G.703, G.704, G.706, G.821, G.823, G.826, CTR12
	Transmit level
	Pulse amplitude: Nominal 2.37V+10% for 75 ohm / Nominal 3.00V+10% for 120 ohm
	Zero amplitude: +0.1V
	Transmit frequency tracking
	Internal timing : +/- 30ppm
	Loopback timing :+/- 50ppm
	External timing : +/- 100ppm
	Jitter performance : ITU-T G.823
	Interface connections : BNC for unbalanced, 5 pin wire connector for balanced

Power	AC: 90~230VAC, 2A DC: -36~-72, 6A
Power Consumption	Maximum 200W, I/F line card: 12W maximum
Dimensions	Chassis 285 x 440 x 180mm (D x W x H)
	Line card 280 x 25 x 260mm (D x W x H)
Weight	6.5kg
Temperature	0 ~ 50℃ (Operating), 0 ~ 70℃ (Storage)
Humidity	10 ~ 90% non-condensing
Certification	CE, FCC, RoHS
MTBF	57,000 hours

G.SHDSL TDM Dual Channel Slide-in Card

SHRM03-E1   SHRM03-V35   SHRM03-ET100

- ◆ Supports E1 and fractional E1 over SHDSL (E1 card)
- ◆ E1 performance monitoring and alarm buffer (E1 card)
- ◆ Supports Nx64 V.35, X.21, RS-530, and RS-449 over SHDSL (V.35 card)
- ◆ Supports 10Base-T and 100Base-TX over SHDSL (Ethernet card)
- ◆ Standard ITU G.991.2
- ◆ Fast and cost-effective services of voice or TDM on a single wire pair on existing
- ◆ Local management interface with console menu
- ◆ Remote line loopback
- ◆ G.SHDSL Line performance monitoring (data rate and SNR)
- ◆ Raw and per time interval statistics

3

G.SHDSL TDM

Application

TDM Based 2Wires, 2.3Mbps

Central Office (CO)

Customer Premise Equipment (CPE)

IP Networking — Router — SHRM03-TDM

LAN

PDH/ SDH

Local Management

SHDTU03-V35 — V.35 — Router
SHDTU03-ET100 — Ethernet — LAN
SHDTU03-E1 — E1 — PBX
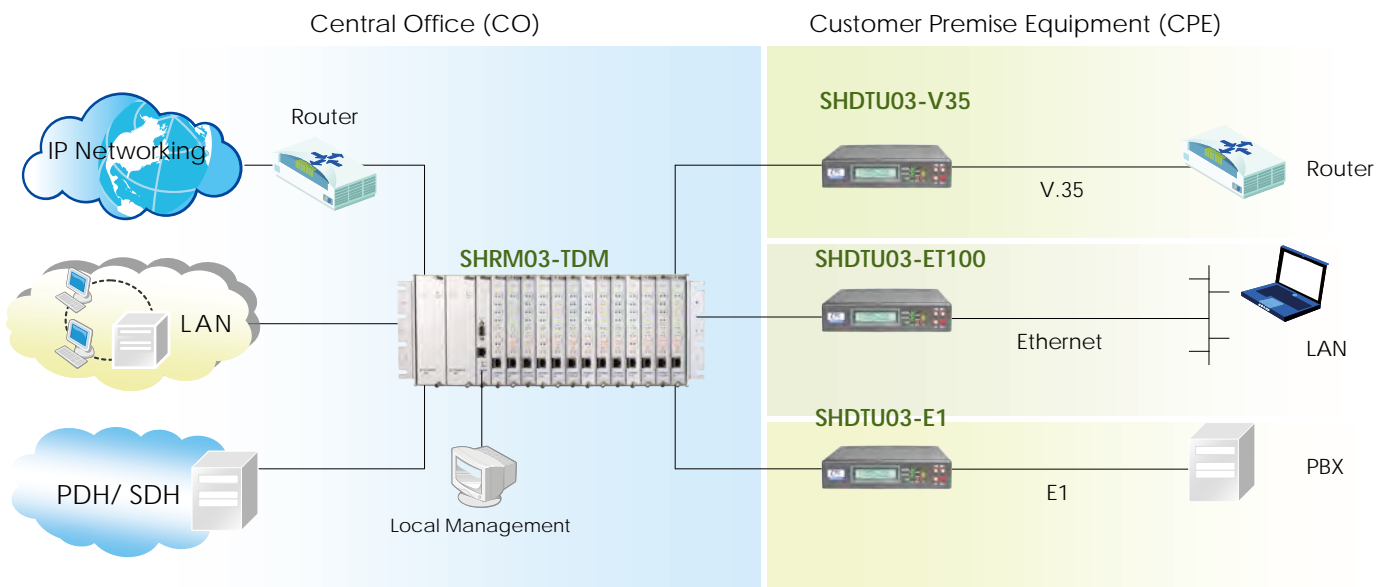
Ordering Information

Model Name	Type	Description
SHRM03-AA-CH	Chassis	4U, 19" 13-Slot Chassis for Dual AC module
SHRM03-DD-CH	Chassis	4U, 19" 13-Slot Chassis for Dual 48V DC In
SHRM03-AD-CH	Chassis	4U, 19" 13-Slot Chassis for one AC module +one 48V DC In
SHRM03-AC	Power	AC 110V/AC 220V Power Module
SHRM03-FAN	Fan	Chasssis Cooling Fan Tray
SHRM03-SNMP	Card	SNMP card with console cable
SHRM03-E1	Card	2 Ch / 2 W E1 Card
SHRM03-V35/2T	Card	2 Ch / 2 W V.35 Card
SHRM03-X.21/2T	Card	2 Ch / 2 W X.21 Card
SHRM03-RS-530/2T	Card	2 Ch / 2 W RS-530 Card
SHRM03-RS-449/2T	Card	2 Ch / 2 W RS-449 Card
SHRM03-ET100/2T	Card	2 Ch / 2 W Ethernet 10/100Base-TX Card

Power Type   Chassis

SHRM03 – ☐☐ – ☐☐
Example: SHRM03 – AA – CH

Power Type

SHRM03 – ☐☐
Example: SHRM03 – AC

Card

SHRM03 – ☐☐
Example: SHRM03 – E1

Fan

SHRM03 – ☐☐☐
Example: SHRM03 – FAN

G.SHDSL TDM NTU

• **SHDTU03-E1** • **SHDTU03-ET100**
• **SHDTU03-V35**

CTC SHDTU03 series SHDSL NTU is a telecommunication product designed for carriers and SME users. This series of SHDSL NTUs offers a variety of choices for data interfaces to meet different connection needs. The standalone G.SHDSL modems feature E1, and Ethernet interfaces, allowing connection to different DTE types. When equipped with multiple interfaces, the standalone SHDTU03 Series NTU combines user traffic over the SHDSL link. The SHDSL NTU supports two different connectors for G.703 E1 application that link to TDM service either by balanced 120 ohm RJ45 jack or unbalanced 75O dual BNCs with bit rates from 64kbps to 2.048Mbps. For Ethernet interface application, the SHDSL NTU 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 2.304Mbps with one pair of copper wires. The SHDSL NTU can be configured and managed via EOC, or menu-driven VT100 compatible Asynchronous Terminal Interface, either locally or remotely. The SHDSL NTU provides the capability that identifies the maximum line rate supported by the copper loop. This powerful automatic configuration capability makes installation and service provisioning simple and painless. Furthermore, it provides flexible manually setting of the maximum NTU speed at different levels for different customer-tailored service offerings

Features

- Standard G.SHDSL (ITU G.991.2) supports improved reach/speed and greater interoperability
- Fast and cost-effective provisioning of traditional frame relay (FR or T-HDLC) or TDM leased line services
- Use existing copper loop infrastructures
- Operate in back to back connection
- Efficient single wire pair usage
- Up to 2.312Mbps symmetric service bit rate

- Auto rate installation maximizes data rate based on loop conditions
- Wetting current sink to protect SHDSL line (Optional)
- Local management interface with LCD display
- Remote line loopback
- SHDSL Line performance monitoring (Data Rate and SNR)
- Raw and per time interval statistics
- Bandwidth guaranteed transmission equipment
- Remote firmware upgrade

Specifications

WAN Interface	Line Rate: SHDSL per G.991.2
	Coding: trellis coded pulse amplitude modulation (TCPAM-16)
	Support: Annex A(ANSI) and Annex B(ETSI)
	Payload rates: 64kbps to 2.304Mbps (N x 64kbps, N=1 to 36)
	Connection: RJ-45 jack
	Impedance: 135 ohms
G.703 Interface (E1)	Connection: RJ-48C 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
Data Interface (V.35/ RS-530 or V.36/X.21)	Connection:DB-25(F)
	Payload rates: Up to 2.304Mbps (N=1 to 36)
	Support V.35/RS-530 or V.36/X.21
LAN Interface (Ethernet)	Single Ethernet Interface
	Payload rates: Up to 2.304Mbps (N=1 to 36)
	10/100Mpbs Half/Full Duplex, Auto-sensing, Auto-MDI/MDIX
	Up to 2048 MAC address learning, filtering Bridge
DSL Timing	Internal
	From E1/T1 Recovery (as E1/T1)
	From DTE (as V.35)
Performance Monitoring	ES, SES, UAS, LOWS for SHDSL
	ES, SES, UAS for E1/T1
	Alarms and Errors for SHDSL or interface

Management	Configuration with keypads and LCD display
	Console port (RJ45, RS232C)
	Support firmware upgradeable
	SNMP management via Ethernet port(Optional)
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
	V.54 Loopback(For V.35 interface only)
	Build-in 2047 bit (2 11 -1) BER Tester
Regulatory	ISO 9001 Quality Management
	CE Approval & EN60950 Certificate
Physical / Electrical	Dimensions: 195 x 48 x 168 mm (D x W x H)
	AC Input: 90~240VAC with 50~60Hz
	DC Input: -36V~ -72V
	Power Consumption: 10W Max
	Operation temperature: 0 to 50℃
	Humidity: Up to 95% (non-condensing)
	External screw for frame grounding

Application

Public Network

E1, T1, Ethernet   **SHRM03 TDM**

Smart View

3

G.SHDSL TDM

2-wire G.SHDSL   **2-wire G.SHDSL**

SHDTU03-E1   **SHDTU03-V35**   **SHDTU03-ET100**

E1   V.35   **Ethernet**

Ethernet Switch

Router   Router

LAN

Ordering Information

SHDTU03 − E1− ☐☐

Example: SHDTU03 − E1 − AD
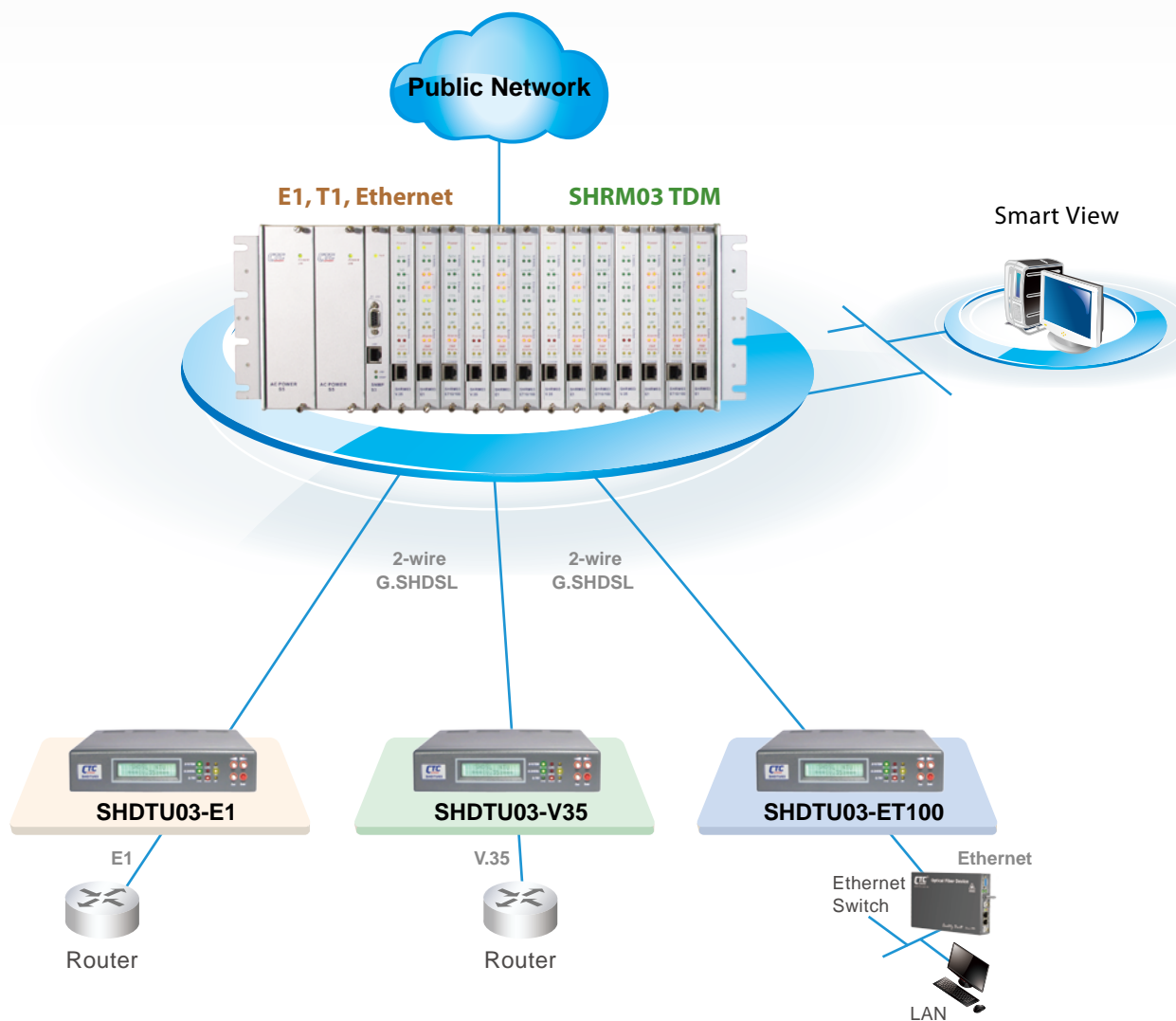
2-wire (2.3Mbps) G.SHDSL TDM E1 NTU

Model Name	Description
SHDTU03-E1-AD	E1 NTU, AC+DC power

2-wire (2.3Mbps) G.SHDSL TDM Ethernet Bridge NTU

Model Name	Description
SHDTU03-ET100-AD	Ethernet 10/100Base-T(X) NTU, AC+DC power

2-wire (2.3Mbps) G.SHDSL TDM NTU

Model Name	Description
SHDTU03-V35-AD	V35 NTU, AC+DC power w/ V35 cable
SHDTU03-530-AD	RS530 NTU, AC+DC power w/ RS530 cable
SHDTU03-449-AD	RS449 NTU, AC+DC power w/ RS449 cable
SHDTU03-X21-AD	X21 NTU, AC+DC power w/ X.21 cable

Specifications & design are subject to change without prior notice. Please visit CTC Union website for more details.
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G.SHDSL TDM NTU | **3-23**

SHDTU03-E1/SNMP
SHDTU03-V35/SNMP
SHDTU03-ET100/SNMP

2 - Wire G.SHDSL TDM
E1 / Data / ET100 NTU

NEW

SHDTU03 SNMP Series SHDSL NTU is a telecommunication products designed for carriers and SME users. The standalone G.SHDSL modems feature three different interface models: E1 interface, Serial interface and Ethernet interface, allowing connection to different DTE types.

E1 Interface Model (SHDTU03-E1/SNMP)
The SHDSL NTU supports two different connectors for G.703 E1 application, balance 120Ω RJ45 jack and unbalance 75Ω dual BNCs. The G.703 interface can carry 64kbps to 2.048Mbps.

Serial Interface Model (SHDTU03-V35/SNMP)
It provides customer premises with high-speed and low-speed TDM service via a DB25 interface. The industry standard DB25 interface can be configured as a V.35/RS530 or V.36/X.21 connection. The DB25 connection can transfers data up to 2.304Mbps..

Ethernet Interface Model (SHDTU03-ET100/SNMP)
It offers customer premises with high-speed TDM services via four LAN interface. The industry standard LAN interface can detect a 10Mbps or 100Mbps connection automatically.

They can be configured and managed via EOC, or menu-driven VT100 compatible Asynchronous Terminal Interface, either locally or remotely. Also, they can be configured and managed by management port with SNMP. The G.SHDSL NTU 5066GE series is equipped with an auto rate capability that identifies the maximum line rate supported by the copper loop. This powerful automatic configuration capability makes installation and service provisioning simple and painless. Further flexibility is provided in the ability to manually set the maximum NTU speed at different levels for different customer-tailored service offerings.

Features

- Standard G.SHDSL (ITU G.991.2) supports improved reach/speed and greater interoperability
- Fast and cost-effective provisioning of traditional frame relay (FR or T-HDLC) or TDM leased line services
- Use existing copper loop infrastructures
- Can operate in back to back connection
- Efficient single wire pair usage
- Wetting current sink to protect SHDSL line
- Management interface through console port or telnet or web browser and SNMP

- Diagnostic loopback
- SHDSL Line performance monitoring
- Raw and per time interval statistics
- Bandwidth guaranteed transmission equipment
- SNMP management port with SNMP version 1 and 2c
- Remote firmware upgrade
- Can use dual power supply input as AC or DC

Application

TDM-based, 2 wires, 2.3Mbps

Central Office (CO)   Customer Premise Equipment (CPE)

Specifications

WAN Interface	Line Rate: SHDSL per G.991.2		Performance Monitoring	ES, SES, UAS, LOWS for SHDSL
	Coding: Trellis Coded Pulse Amplitude Modulation (TCPAM-16)			ES, SES, UAS for E1
				Alarms and Errors for SHDSL ,E1 interface
	Support: Annex A (ANSI) and Annex B (ETSI)		Management	Configuration with touch buttons
	SHDSL mode: STU-R, STU-C-INTCLK and STU-C-EXTCLK			Console port (RJ45, RS232C)
	Payload rates :			Support firmware upgradeable
	• 64Kbps to 2.304Mbps (N x 64kbps, N=1 to 36) for Serial interface			SNMP management via Ethernet port
	• 64Kbps to 2.304Mbps (N x 64kbps, N=1 to 36) for Ethernet interface			Easy to use Telnet for quick setup
	• 64Kbps to 2.048Mbps (N x 64kbps, N=1 to 32) for E1 interface		Loopback Tests	Local Digital Loopback
				Local Loopback
	Connector: RJ-45			Remote Line Loopback
	Impedance: 135 ohms			Remote Payload Loopback
E1 Interface	Connection: RJ-45 for balanced 120Ω E1 cable			Far-end Line Loopback
	Connection: BNC for unbalanced 75Ω E1 cable			Far-end Payload Loopback
	Line Rate: 2048KHz +/- 50ppm			Build-in 2047 Test pattern & BER Tester
	Line Encoding: HDB3 or AMI		Physical/Electrical	AC Input: 90~240Vac with 50 ~ 60Hz
	Framing: PCM30 / PCM30C / PCM31 / PCM31C and Unframed			DC Input: –42V~ –72Vdc
	Data Rate: 64Kbps to 2.048Mbps (Nx64Kbps , N=1 to 32)			Power Consumption: 12W Max
	Operation: Full E1 and Fractional E1			Operation temperature: 0 ~ 50˚C
SERIAL Interface (as V.35)	Connection: DB-25(F)			Humidity: Up to 95% (non-condensing)
	Payload rates: Up to 2.304Mbps (N=1 to 36)			External screw for frame grounding
	Support RS-530, V.35 or V.36/X.21		Regulatory	ISO 9001 Quality Management
LAN Interface (as Ethernet)	Four Ethernet ports			CE Approval & EN60950 Certificated
	10/100Mpbs Half/Full Duplex, Auto-sensing, Auto-Crossover			ITU K20, K21 Certificated
	Up to 2048 MAC address learning			
	Connection: four RJ-45 for Ethernet cable			
DSL Timing	Internal /External			
	From DTE Recovery			

3

G.SHDSL TDM

Ordering Information

2-wire (2.3Mbps) G.SHDSL TDM E1 NTU

Model Name	Description
SHDTU03-E1/SNMP	SHDSL NTU with E1 interface
SHDTU03-V35/SNMP	SHDSL NTU with V35 interface
SHDTU03-ET100/SNMP	SHDSL NTU with Ethernet interface

Interface

SHDTU03 – ☐☐☐☐☐ / **SNMP**

Example: SHDTU03 – ET100 / SNMP

SHRM03 ATM

G.SHDSL ATM Ethernet Router Concentrator
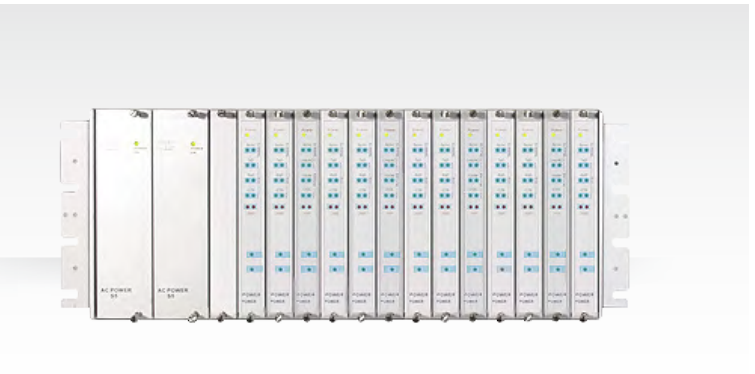
The SHRM03 ATM based chassis is a 4U 19(23)" 13-slot card rack that allows customers to concentrate their G.SHDSL ATM based bridge/router Ethernet lines into a central location with hot swappable capabilities and redundant power supplies. The SHRM03 ATM line card is equipped with two independent channels that support adaptive auto-rate, Annex A or Annex B, bridging or routing, and embedded SNMP, Telnet and Web interface for de-centralized provisioning and management. This rack is 100% compatible with our SHDTU03/ET10R and ET10RS standalone 2.3M stand-alone modems.

Features

- 4U 19(23)" 13-slot chassis (Non-managed)
- Interface Cards for Ethernet (Router & Bridge)
- Up to 26 ports per chassis (2 ports per card)

- Hot swappable
- Adaptive rate feature maximizes data rate based on loop conditions
- All interface connectors on the rear panel

Specifications

Ports	LAN Interface	10Base-T /100 Base-TX auto-negotiation Auto-MDIX
	Hardware Interface	WAN : RJ-45 LAN: RJ-45
		Console port: RS232
		RST: Reset button for factory default
	WAN Interface	SHDSL: ITU-T G.991.2 2004(Annex A/B/F/G)
		Encoding scheme: TC-PAM16, TC-PAM32
		Data Rate: N x 64Kbps (N=3~89)
		Impedance: 135 ohms
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	
	Classical IP over ATM (RFC 1577)	
	PPP over ATM (RFC 2364)	
	Ethernet over ATM (RFC 2684/1483)	
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	
Routing	Support 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 ICQ/Netmeeting/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
	Natural NAT firewall
	Advanced stateful packet inspection (SPI) firewall
	Denial of service protection
	User access control; deny certain PCs access to internet services
Management (on card)	Easy-to-use web-based GUI for quick setup, configuration and management
	Menu-driven interface/Command-line interface (CLI) for local console and Telnet access
	Password protected management and access control list for administration
	SNMP management with SNMPv1/ SNMPv2c (RFC1157/1901/1905) agent and MIB II (RFC1213/1493)
	Software upgrade via web-browser/TFTP server
LEDs	• General: PWR • SHDSL: ALM
	• WAN: LNK, ACT • LAN: Link, ACT (ET10R)
Power	DC: -36V to -72V, 6A AC: 90V to 230V, 2A
Power Consumption	Total 200W Max
	Interface Line Card: 12W maximum
	Management Control Card: 5W maximum
Dimensions	Chassis: 285 x 440 x 180mm (D x W x H)
	Line card: 280 x 25 x 260mm (D x W x H)
Weight	6.5kg
Temperature	0 ~ 50°C (Operating), 0 ~ 70°C (Storage)
Humidity	10 ~ 90% non-condensing
Certification	CE, FCC, RoHS
MTBF	57,000 hours

Ordering Information

Model Name	Type	Description
SHRM03-AA-CH	Chassis	4U, 19" 13-Slot Chassis with One Dual AC/DC Power Moduel
SHRM03-DD-CH	Chassis	4U, 19" 13-Slot Chassis with One Dual DC Power Moduel
SHRM03-AD-CH	Chassis	4U, 19" 13-Slot Chassis with One Dual AC Power Moduel
SHRM03-FAN	FAN	Chasssis Cooling Fan Tray
SHRM03-AC	Power	AC 110V/AC 220V Power Module
SHRM03-ET100R/2A	Card	2Ch/2-wires G.SHDSL to 10/100Base-FX ATM Router card

Power Type   Chassis

SHRM03 – ☐☐ – ☐☐

Example: SHRM03 – AA – CH

Power Type

SHRM03 – ☐☐

Example: SHRM03 – AC

Fan

SHRM03 – ☐☐☐

Example: SHRM03 – FAN

Card Type

SHRM03 – ☐☐☐☐☐☐ / ☐☐

Example: SHRM03 – ET100R/2A

SHRM03-ET100R

G.SHDSL ATM Ethernet
Slide-in Card

The SHRM03-ET100R Blade is a Single-Line High Speed Digital Subscriber Line 2-wire bridge/router which complies with G.991.2 and G.994.1 standards. The SHRM03-ET100R provides business-class, multi-rate 64Kbps to 2.304Mbps payload rates over existing single pair or two pairs copper wire. The SHRM03-ET100R is designed not only to optimize the service bit rate from central office to customer premises but also integrates high-end Bridging/ Routing capabilities with advanced functions such as Multi-DMZ, virtual server mapping and VPN pass-through. Easy configuration and monitoring can be accomplished by using any browser. The SHRM03-ET100R card provides two independent channels and can be configured in either central or client mode providing a point-to-point solution in a rack concentrator. The SHDSL router allows customers to leverage the latest in broadband technologies to meet their growing data communication needs.

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
- Supports point-to-point configurations
- Data rate 2 wire up to 2.3Mbps
- Local management interface via console port & menu
- Intuitive Web based management
- SNMP management with SNMPv1/v2 and MIB II

- 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
- SHDSL Line performance monitoring
- Raw and time stamped statistics
- Supports firmware upgrade via web interface

Application

ATM-based 2 Wires, 2 channels per card

SHRM03 ATM
SHRM03-ET100R Slide-in
Card inserts in SHRM03 ATM
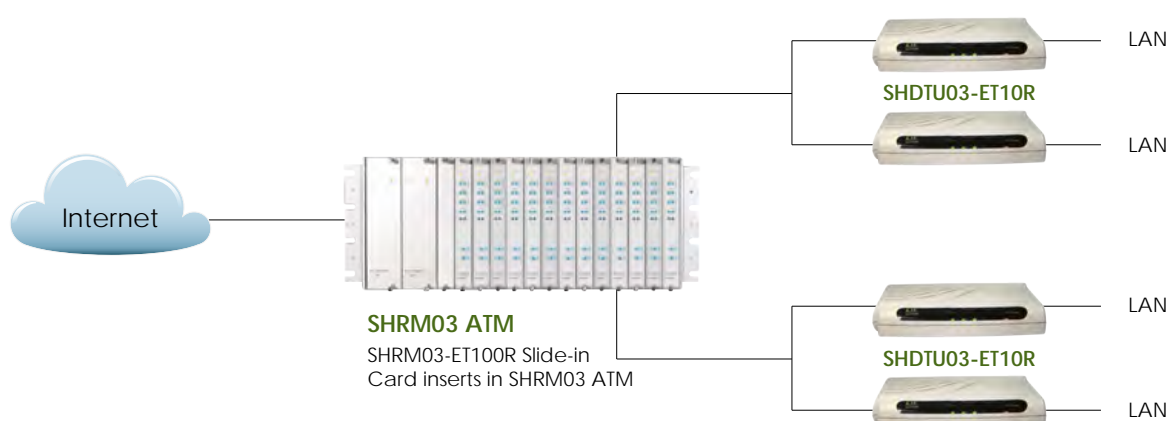
Ordering Information

Model Name	Description
SHRM03-ET100R	2 Ch / 2W Ethernet 10/100Base-TX ATM Router Card

Specifications & design are subject to change without prior notice. Please visit CTC Union website for more details.
CTC UNION TECHNOLOGIES CO., LTD.   www.ctcu.com

SHRM03-ET100R | **3-27**

SHDTU03-ET10R
SHDTU03-ET10RS
SHDTU03A-ET10RS

2 / 4 - Wire G.SHDSL ATM Ethernet Bridge / Router

The SHDTU03 ATM modem family is a Single-Line High Speed Digital Subscriber Line 2-wire/ 4-wire bridge/router which complies with G.991.2 and G.994.1 standards. The SHDTU03 family provides business-class, multi-rate 192Kbps to 2.304/4.608Mbps payload rates over existing single pair or two pairs copper wire. The SHDTU03 is designed not only to optimize the service bit rate from central office to customer premises but also integrates high-end Bridging/ Routing capabilities with advanced functions such as Multi-DMZ, virtual server mapping and VPN pass-through. Easy configuration and monitoring can be accomplished by using any browser. The SHDTU03 can be configured in either central or client mode providing a point-to-point solution. The SHDSL router allows customers to leverage the latest in broadband technologies to meet their growing data communication needs.

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
- Supports point-to-point configurations
- Data rate 2 wire up to 2.3Mbps
- Local management interface via console port
- Intuitive Web based management
- SNMP management with SNMPv1/v2 and MIB II
- Efficient IP routing and transparent learning bridge to support

- broadband Internet services
- VPN pass-through for safeguarded connections
- Build-in advanced SPI firewall (Firewall routers) (option)
- 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
- SHDSL Line performance monitoring
- Raw and time stamped statistics
- Supports firmware upgrade via web interface

Specifications

Ports	LAN Interface	10Base-T /100 Base-TX auto-negotiation Auto-MDIX
	Hardware Interface	WAN: RJ-45 LAN: RJ-45
		Console port: RS232
		RST: Reset button for factory default
	WAN Interface	SHDSL: ITU-T G.991.2(Annex A/B)
		Encoding scheme: TC-PAM16, TC-PAM32
		Data Rate: N x 64Kbps (N=3~89)
		Impedance: 135 ohms
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
Routing		Support 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 ICQ/Netmeeting/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
		Natural NAT firewall
		Advanced stateful packet inspection (SPI) firewall
		Denial of service protection
		User access control; deny certain PCs access to internet services
Management		Easy-to-use web-based GUI for quick setup, configuration and management
		Menu-driven interface/Command-line interface (CLI) for local console and Telnet access
		Password protected management and access control list for administration
		SNMP management with SNMPv1/SNMPv2c (RFC1157/1901/1905) agent and MIB II (RFC1213/1493)
		Software upgrade via web-browser/TFTP server
LEDs		• General: PWR • WAN: LNK, ACT • SHDSL: ALM
		• LAN: 1, 2, 3, 4 (ET10RS) LAN: Link, ACT (ET10R)
Power		DC 9V-12V in
Power Consumption		9W
Dimensions		145 x 187 x 33mm (D x W x H)
Weight		400g
Temperature		0 ~ 50℃ (Operating), 0 ~ 70℃ (Storage)
Humidity		10 ~ 90% non-condensing
Certification		CE, FCC, RoHS
MTBF		57,000 hours

Application

	SHDTU03-ET10R(S) or SHDTU03-ET10RS		SHDTU03-ET10R(S) or SHDTU03A-ET10RS	
LAN	Ethernet	Copper	Ethernet	LAN
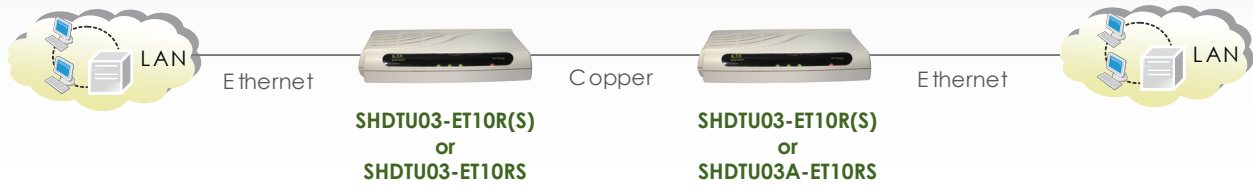
ATM Based, 2Wires, 2.3Mbps   4Wires, 4.6Mbps

Central Office (CO)   Customer Premise Equipment (CPE)

SHRM03 ATM

SHDTU03-ET10R — Ethernet — LAN
SHDTU03-ET10RS — Ethernet — LAN

SHDTU03-ET10RS — Ethernet — LAN
SHDTU03A-ET10RS — Ethernet — LAN
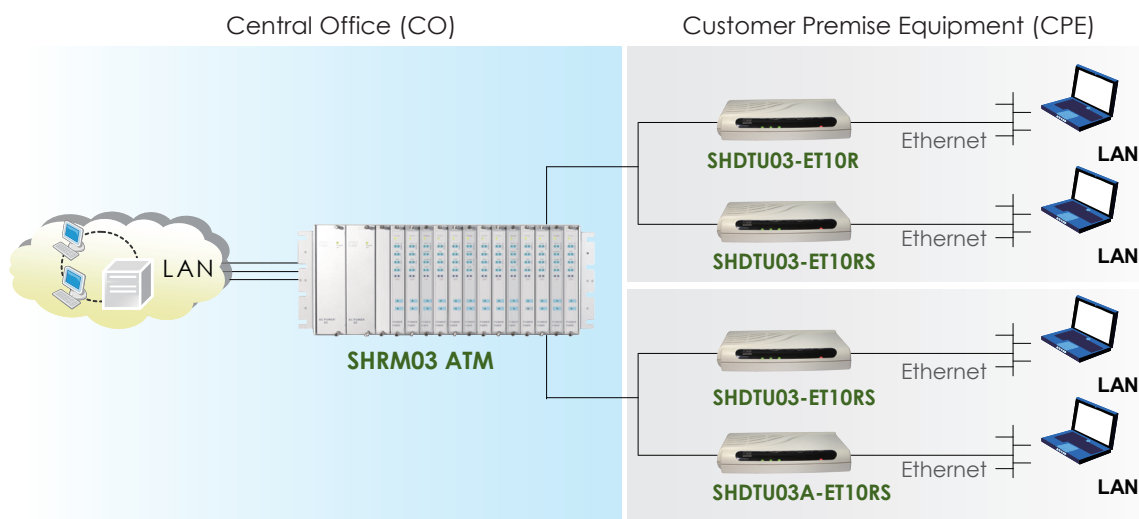
	SHDTU03-ET10R	SHDTU03-ET10RS	SHDTU03A-ET10RS
WAN	2-wire	2-wire	4-wire
LAN	1	4	4
Auto-MDIX	Yes	Yes	Yes
Port-based VLAN	None	Yes	Yes
802.1q VLAN	1LAN / 1WAN	4LAN / 1WAN	4LAN / 1WAN
Firewall	No	No	No
Maximum data rate	2.3Mbps	2.3Mbps	4.6Mbps
Minimum data rate	64Kbps	64Kbps	128Kbps

Ordering Information

Model Name	Description
SHDTU03-ET10R	1-Port 10/100Base-T(X) ATM Router w/firewall
SHDTU03-ET10RS	4-Port 10/100Base-T(X) ATM Router w/firewall
SHDTU03A-ET10RS	4-Port 10/100Base-T(X) ATM Router w/firewall

Note: SHDTU03-ET10RS: 2-wire (2.3Mbps) G.SHDSL ATM Ethernet Bridge / Router
SHDTU03A-ET10RS: 4-wire (4.6Mbps) G.SHDSL ATM Ethernet Bridge / Router

SHRM03 – ☐☐☐☐☐☐
Example: SHRM03 – ET10RS

Specifications & design are subject to change without prior notice. Please visit CTC Union website for more details.
CTC UNION TECHNOLOGIES CO., LTD.   www.ctcu.com

SHDTU03-ET10R, SHDTU03-ET10RS, SHDTU03A-ET10RS | 3-29

3

G.SHDSL ATM

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

Extending the Performance of Your Copper Infrastructure

E1 Inverse Mux *1, 5, 8, 16 E1 Mobile Backhaul*

TDM over **IP (IP Mux)**

E1 Access Multiplexer

DXC

E1/ T1 Access Unit

Ethernet to WAN Bridge

iSAP5100

4.5U, 18 Slots Data, Ethernet, Voice STM1/E1 Managed Multiplexer

NEW
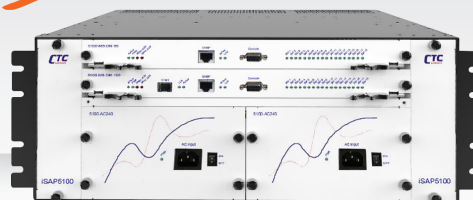
The iSAP5100 is a 4.5U 19" 18 slots rack type STM1 / E1 Time Division Multiplexer for fractional E1 network access, which is designed for non-stop operation. There are 18 slots available for hot-swappable iSAP5100 I/O cards. Two slots are provided for CPU Controller cards and two slots are provided for 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 , RS485 , G703/64K, V35, 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-N*64K/V35, 5100-G703/64K , 5100-ET100, 5100-E&M, 5100-FXS, 5100-FXO, 5100-RS485

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 N*64K, 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 128xE1 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-N*64K/V35	
Data rate	N×64kbps(N=1~30 or 31)
Ports	4-port
Connector	V.35 Interface

5100-G703/64K	
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

5100-RS485	
Baud Rate	9600bps ~ 64Kbps
Ports	6-port
Connector	RS485/422 interface

Electrical & Mechanical	
Dimensions(W×D×H)	440mm × 350mm × 187mm
Environmental	Operating: 0~60℃ Storage:-25~70℃ Humidity: 10~90%, non-condensing
Power	AC 220V: 165~265V, 50~60Hz AC 110V, AC 220V: 90~265V,50~60Hz -48V:-36~-72VDC
Power Consumption	< 90W

Application

Connection with PBX (Private Branch Exchange)
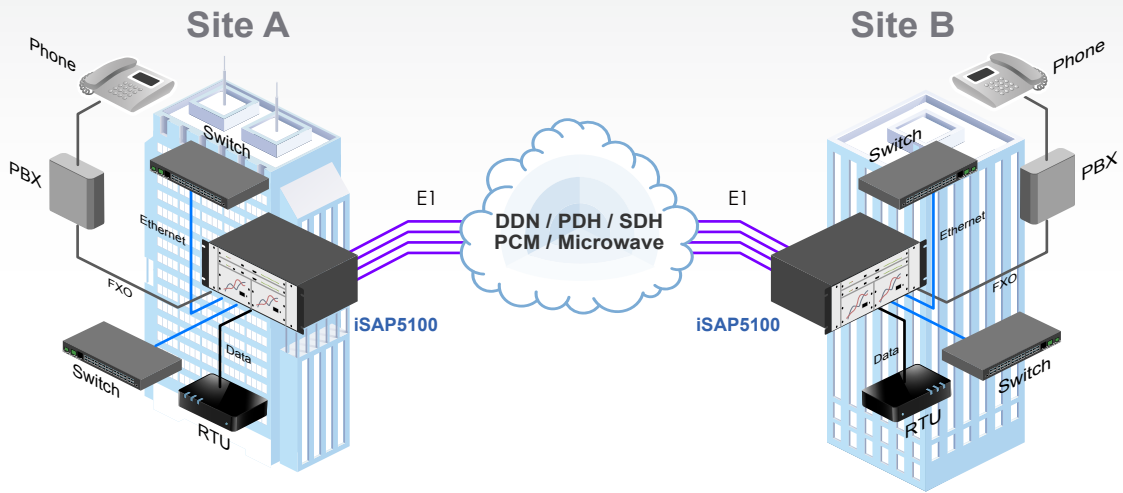
The extension and expansion of DDN (Distributed Data)
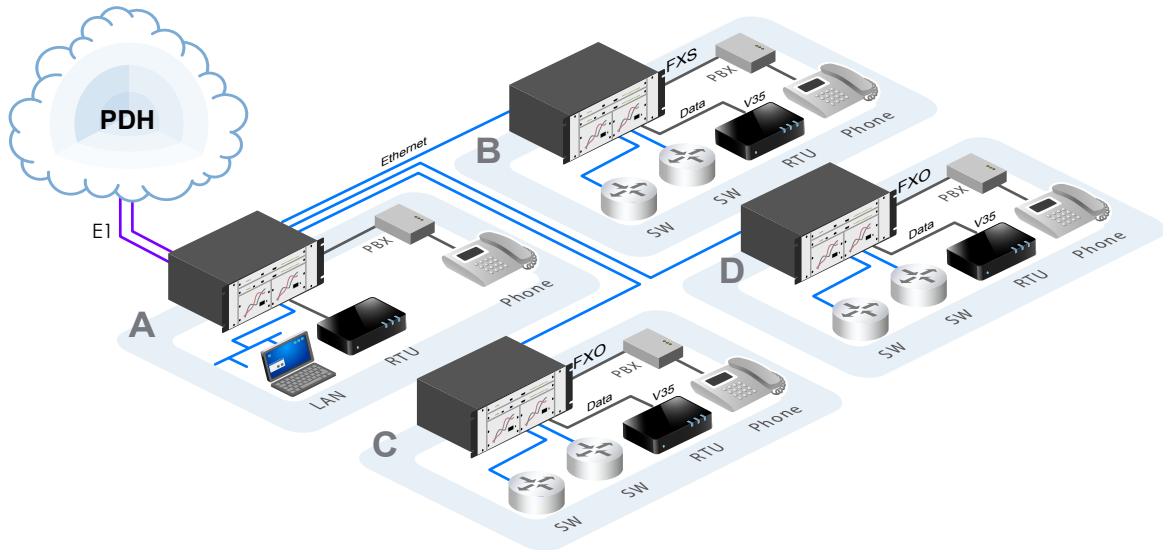
Ordering Information

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-VC	Voice Card	16 channels voice compression card
iSAP5100-RS-232	RS-232 card	6 channels RS-232 interface card 38.4bps. Low speed: 64kbps or 128kbps sync DEC
iSAP5100-V35	V35 card	4 channels V.35 (cable selected) DB68 to 4 x MD4 cable
iSAP5100-ET100	FE Card	2-CH Ethernet (10/100Base-Tx) interface card (v4.0)
iSAP5100-G.703/64K	G703/64K Card	4-CH G703 64K interface card (v4.0)

Chassis
iSAP5100 – ☐☐
Example: iSAP5100 – CH

Card
iSAP5100 – ☐☐☐☐
Example: iSAP5100 – 8E1R

CTC UNION TECHNOLOGIES CO., LTD.   w w w . c t c u . c o m

ERM-MUX-PLUS

4U, 10 I/O Slot Data, Ethernet, Voice E1 Managed 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) WAN port RJ45 Jack (2-wire, 4-wire)
Physical	Dimensions: 350 x 438 x 176mm (W x D x H)
Specifications	Weight: 8kg (chassis+dual power+8 I/O cards) 0.45kg per card
Power Characteristics	AC : AC 90 ~250VAC, DC : DC -48VDC

Environmental Specifications	Operating 0℃ ~ 60℃
	Storage 0℃ ~ 70℃ Relative humidity 0% ~ 90% non-condensing Predicted MTBF : 65,000 hrs (25℃)
Certification	CE

ERM-Mux/plus overview

- CPU Cards
- E1 Trunk Cards
- Interface Cards
- AC, DC Power Redundancy

- G703 Ext. clock BNC Port
- G703 Ext. clock RJ45 Port
- Cooling Fan
- Main Alarm/ Sub Alarm/ Relay/ Connector
- Auto-resume
- AC Power socket
- SNMP Port
- RS485 Port
- Multi-case
- Case Expanding
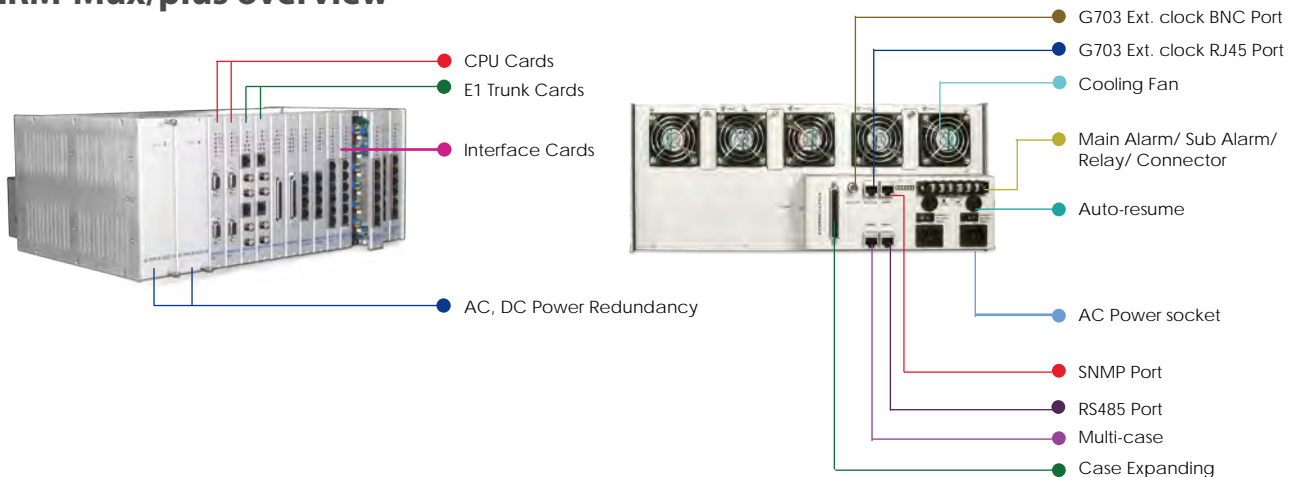
1+1 Redundant

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 SNMP: Configuration by RJ-45 10/100 Ethernet port; Real time monitoring & trap alarm 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-4E1R	Card	4-Ch Main-E1 LTU card(V1.2); w/DB37M to 4xRJ45 cable
ERM-MUX-PLUS-4E1B	Card	4-Ch Main-E1 LTU card(V1.2); w/DB37M to 4xBNC 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)

4

E1 Access Multiplexer

ERM – MUX – PLUS – ☐☐☐☐

Example: ERM – MUX – PLUS – 2E1R

Connection with PBX (Private Branch Exchange)

Site A

SW
Ethernet
SW
Ethernet
Phone
FXO
PBX
Data
RTU
ERM-MUX/PLUS
E1

DDN / PDH / SDH
PCM / Microwave

E1
ERM-MUX/PLUS
Site B
SW
Ethernet
SW
Ethernet
FXO
PBX
Phone
Data
RTU
V35

The extension and expansion of DDN (Distributed Data)

B
SW
SW
Phone
V35
Ethernet
Ethernet
FXS
PBX
RTU
Data
ERM-MUX/PLUS

C
SW
Ethernet
SW
Ethernet
FXO
PBX
Phone
Data
V35
RTU
ERM-MUX/PLUS

ERM-MUX/PLUS
E1
PDH
E1
LAN
PBX
RTU
Phone
A

D
SW
Ethernet
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FXO
PBX
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Data
V35
RTU
ERM-MUX/PLUS
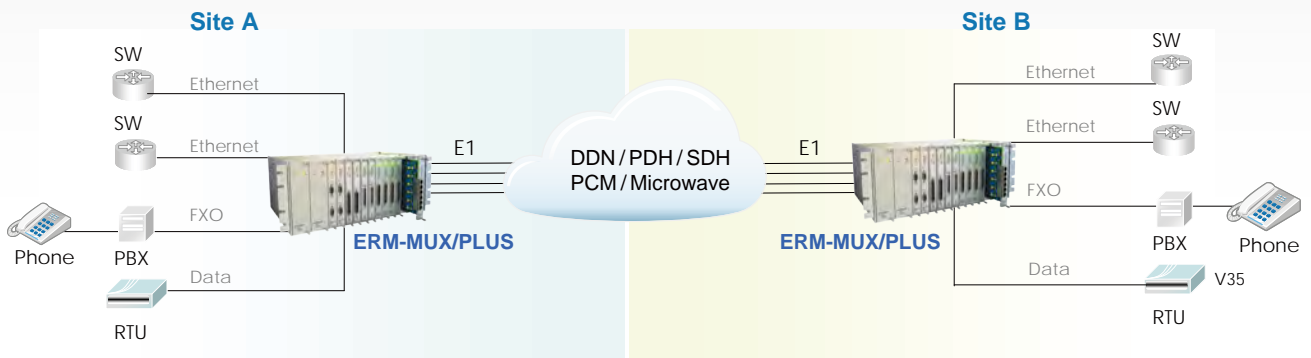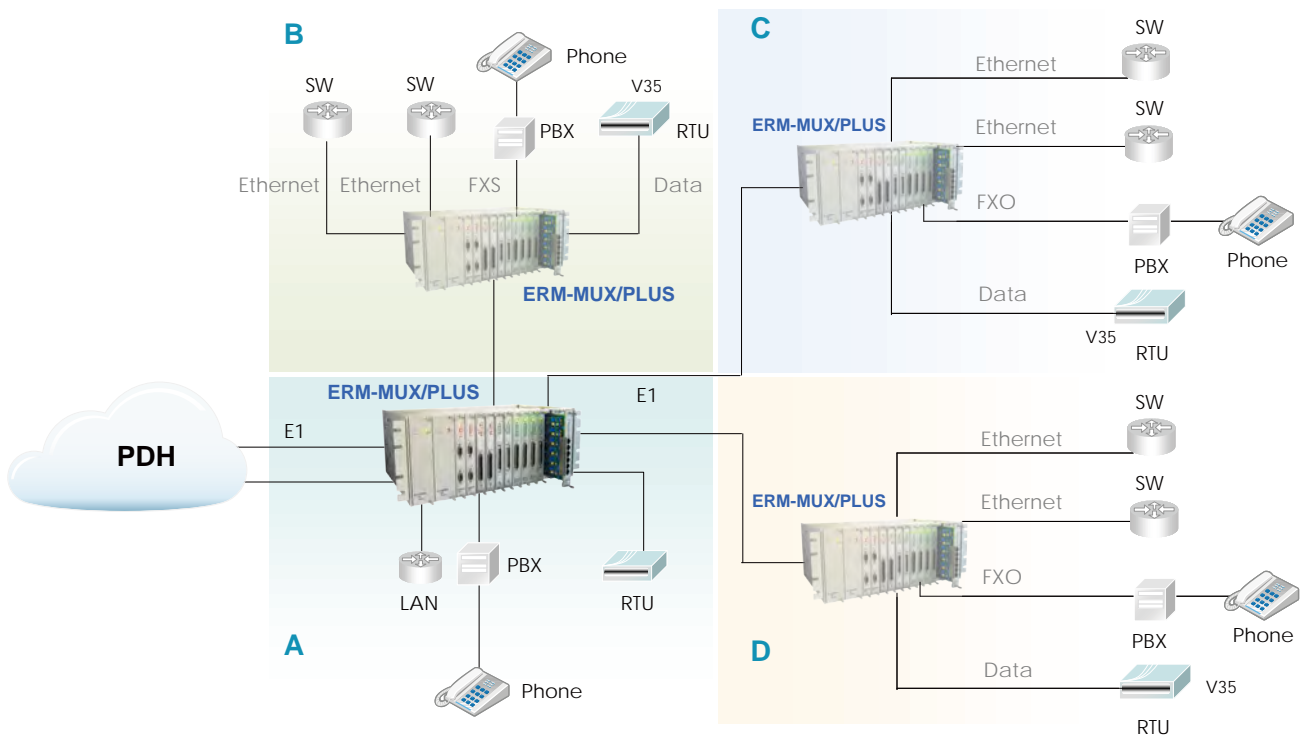
ERM-Mux/Plus-E1

G.703 E1 Aggregate Card
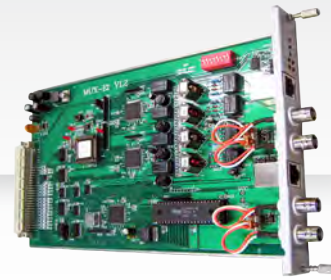
The ERM-Mux/plus has two dedicated slots for installing E1 aggregate cards. Currently E1 cards are available with 2, 4 or 8E1 ports. In the backplane design of the ERM-Mux/plus, a maximum of 4 E1s can carry data to and from tributary (I/O) cards. One typical application could be to install two 4E1 cards 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.

Features

- Available in 2, 4, 8 E1 channels
- Supports PCM31 or PCM30 framing
- Can provide path/card redundancy

- E1 timeslots can support cross-connect function
- E1 channel can act as Sub-E1 for drop & insert
- All cards are hot swappable

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-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.

Features

- 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.

Features

- 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℃ ~ 50℃
Humidity	5 ~ 95% (non-condensing)
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.

Features

- Four independent Synchronous channels
- Nx64 setting from any E1 channel
- Each channel operates in native DCE mode

- Diagnostic loop backs
- LED indicators for Power, Alarm, RD/TD activity
- Hot swappable

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℃ ~ 50℃
Humidity	5 ~ 95%
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.

Features

- 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℃ ~ 50℃
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.

Features

- 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
- LED indicators for Power, Alarm, RD/TD activity
- Hot swappable

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℃ ~ 50℃
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.

Features

- 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-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.

Features

- Six independent channels
- 2/4 wire independent setting
- 1x64 setting from any E1 channel
- E&M Signaling PBX trunks
- Provides E line, M line, SB (battery) and SG (ground) lines

- Supports types I, II, III, IV or V
- G.711 Codec
- LED indicators for Power, Alarm, activity
- Hot swappable

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

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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.

Features

- 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
- LED indicators for Power, Alarm, activity
- Hot swappable

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.

Features

- 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

4

E1 Access Multiplexer

ETU02-MUX-Plus

1U, 3 I/O Slot Data, Ethernet, Voice E1 Managed 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
- Digtal cross connect solution up to 16E1

Specifications

ndications	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
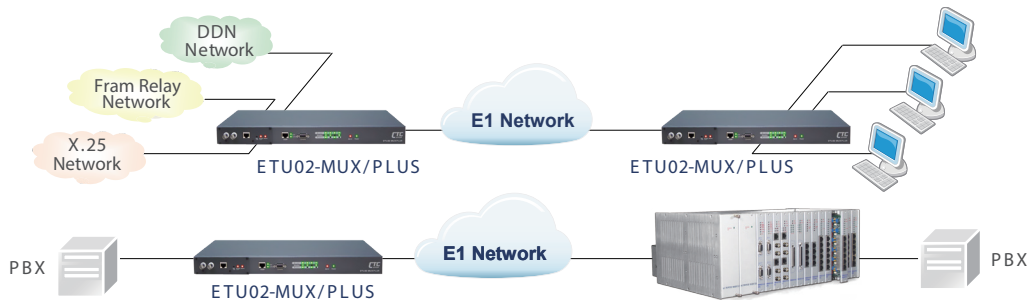
FXO

- 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
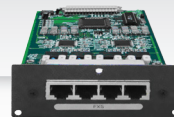
Specifications

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
  Support 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

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

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

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

ETU/E1SUB

ETU/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

Ordering Information

Model Name		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

4

E1 Access Multiplexer

ETU02 – MUX / PLUS / □□
Example: ETU02 – MUX / PLUS / AC

Specifications & design are subject to change without prior notice. Please visit CTC Union website for more details.
CTC UNION TECHNOLOGIES CO., LTD.   w w w . c t c u . c o m
ETU02-MUX-Plus | **4-13**

ERM01

4U 13-Slot Managed E1 Concentrator

The ERM01 is a 4U 19(23)" concentrator rack type E1 DSU/CSU for Fractional and Unframed G.703 E1 Access for central office installations. There are 13 slots available for hot swappable G.703 E1 cards. An optional SNMP card can be installed into the last slot for configuration and management, leaving 12 slots available for G.703 cards. The SNMP card provides both local control via an RS-232 serial console port and remote IP management using Telnet or industry standard SNMP protocol. Each E1 card may be linked to a remote E1/FE1 stand-alone Access Unit for various LAN, Data, or hosts over E1 network services. The ERM01 accommodates an optional second hot swappable shared power supply module which may derive power from AC (90-250) or DC (-48V) power sources. On the rear panel, combinations of BNC, RJ-45 and wire-wrap terminals are utilized for E1 Line interface connections. Adapter cables are used to convert the HDB26F DCE data ports to V.35, RS-530, RS-449, X.21 or 10/100 Base Ethernet depending on the installed card.

Features

- Managed chassis (Optional) with DSU/CSU blades
- Supports Fractional and Unframed E1 with EOC control
- Hot swappable blades and power modules
- Interface Cards for V.35, X.21, RS-530, RS-449, RS-232, Ethernet Bridge and Router
- I/O connectors all 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
- Supports local serial Console, remote Telnet and SNMP
- Supported by SmartView EMS

Specifications

G.703 E1	
Frame format	Unframed/ Framed, CCS(PCM31)/ CAS(PCM30)/ CRC4 on/off
Bit rate	2.048Mbps±50 ppm
Line Code	AMI/ HDB3
Receiving level	0 ~ -43dB
Line Impedance	75 ohm(BNC) / 120 ohm (RJ-45)
Jitter Performance	According to ITU-T G.823
Pulse amplitude	Nominal 2.37V ±10% for 75ohm, Nominal 3.00V ±10% for 120ohm Zero amplitude ± 0.1V
Connector	BNC for unbalanced and RJ-45 for balanced
Transmit frequency	Internal timing ±30 ppm
tracking	Loopback timing ±50 ppm External timing ±100 ppm
Return loss	12dB for 51 ~ 102KHz 18dB for 102 ~ 2048KHz 14dB for 2048~ 3072KHz
User Data Channel	
Interface Types	RS-530/RS-449/RS-232,X.21/V.35, 10/100Base-T Ethernet Bridge & Router
Connector	High density DB26 Female
Line code	NRZ (except bridge)
Data Rate	N x 56Kbps or N x 64Kbps, Where N equal 1 to 32
Time slot allocation	User defined
Control signals	CTS constantly On, DSR constantly ON, except during test loops, DCD constantly ON or follows RTS, except during signal loss

|	
Loopback	Line loopback, Payload loopback, Local loopback, DTE loopback
Clock modes	Clock mode 0 Rx & Tx clocks (recovered) to (DCE1) sync DTE Clock mode 1 Rx & Tx clocks (internal oscillator) to(DCE2) sync DTE Clock mode 2 Rx clock to sync device,(DTE1) Tx clock from sync device Clock mode 3 Rx & Tx clocks from (DTE2) sync DCE (from ETC and ERC pin) Clock mode 4 Rx & Tx clocks from sync DCE (DTE3) (all from ETC pin)
Standards	ITU-T G.703, G.704, G.706 and G.732 and ETSI ETS 300 420
Power Input	AC: 100~240VAC, DC: -42~-55
Power Consumption	80W
Dimensions	Chassis : 285 x 438 x 180mm (D x W x H) Line card: 260 x 22 x 180mm (D x W x H)
Weight	6.6kg
Temperature	0 ~ 50°C (Operating), -10 ~ 70°C (Storage)
Humidity	10 ~ 90% non-condensing
Certification	CE, FCC, RoHS
MTBF	57,000 hrs

ERM01 overview

Secondary power
Main power
Fractional E1 with BNC Terminal Block, or RJ-45 interface connector
SNMP Card
13 line cards can be installed into the rack 12 when the SNMP optional card is installed

E1 unbalanced BNCs
Alarm Relay Contacts
Main Switch
HDB26F Data Port
IEC AC Mains Input
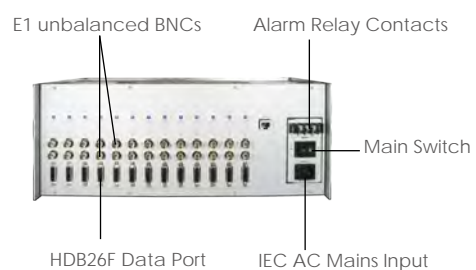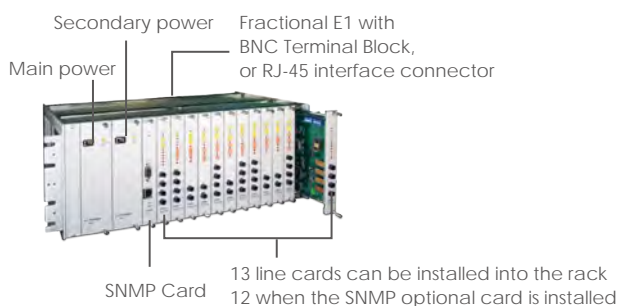
E1 CSU/ DSU Slide-in Card

Network Management Card
· ERM01-SNMP

Ethernet Bridge Card
Unframed/ Framed E1 to 10/100Base-TX
· ERM01-FE1/ET100
· ERM01-E1U/ET100

E1 to Data Card
Unframed/ Framed E1 to Data Card
· ERM01-FE1/V.35   · ERM01-E1U/V.35
· ERM01-FE1/RS-530   · ERM01-E1U/RS-530
· ERM01-FE1/RS-449   · ERM01-E1U/RS-449
· ERM01-FE1/X.21   · ERM01-E1U/X.21
· ERM01-FE1/RS-422   · ERM01-E1U/RS-422

Ethernet Router Card
Unframed/ Framed E1 to 10/100Base-TX
· ERM01-FE1/ET100R
· ERM01-E1U/ET100R

4

E1/T1 Concentrator
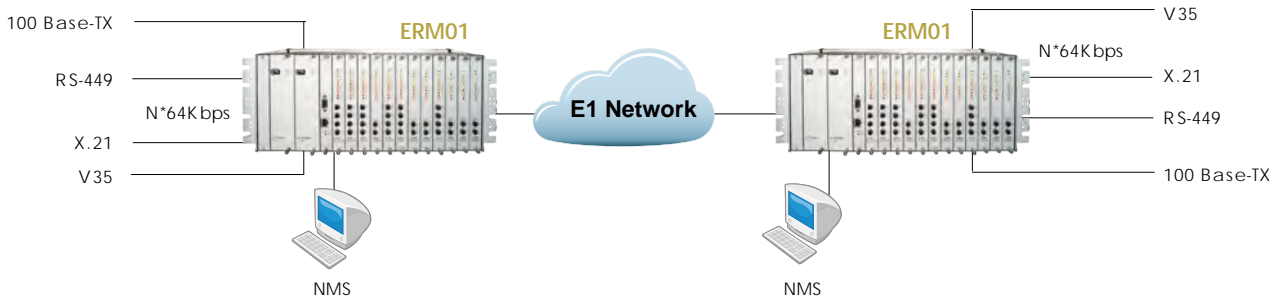
Ordering Information

Model Name	Type	Description
ERM01-BR/AC-CH	Chassis	4U 19" 13-Slot chassis AC power type w/ BNC, RJ-45 on rear panel
ERM01-BR/DC-CH	Chassis	4U 19" 13-Slot chassis DC power type w/ BNC, RJ-45 on rear panel
ERM01R/AC-CH	Chassis	4U 19" 13-Slot chassis AC power type w/ RJ-45 on rear panel
ERM01R/DC-CH	Chassis	4U 19" 13-Slot chassis DC power type w/ RJ-45 on rear panel
ERM01B/AC-CH	Chassis	4U 19" 13-Slot chassis AC power type w/ BNC on rear panel
ERM01B/DC-CH	Chassis	4U 19" 13-Slot chassis DC power type w/ BNC on rear panel
ERM01/AC	Power	AC Power plug-in module (90 to 250 VAC)
ERM01/DC	Power	-48 VDC Power plug-in module (±36 to ±76 VDC)
ERM01-SNMP	SNMP	SNMP card with both interfaces: RS-232 and 10/100Base-TX
ERM01-FE1/ET100	Card	Fractional E1 to 10/100Base-T/Tx Ethernet Bridge
ERM01-FE1/ET100R	Card	Fractional E1 to 10/100Base-T/Tx Ethernet Router
ERM01-FE1/V35	Card	Fractional E1 to V.35 card
ERM01-FE1/RS530	Card	Fractional E1 to Serial: RS-530 (cable selected)
ERM01-FE1/RS449	Card	Fractional E1 to Serial: RS-449 (cable selected)
ERM01-FE1/X21	Card	Fractional E1 to Serial: X.21 (cable selected)
ERM01-FE1/RS422	Card	Fractional E1 to Serial: RS-422 (cable selected)
ERM01-E1-U/ET100	Card	Unframed E1 <--> 10/100Base-T/Tx Ethernet Bridge
ERM01-E1-U/ET100R	Card	Unframed E1 <--> 10/100Base-T/Tx Ethernet Router
ERM01-E1-U/V35	Card	Unframed E1 <--> V.35 card
ERM01-E1-U/RS530	Card	Unframed E1 to RS-530 (cable selected)
ERM01-E1-U/RS449	Card	Unframed E1 to RS-449 (cable selected)
ERM01-E1-U/X21	Card	Unframed E1 to X.21 (cable selected)

ERM01 – ☐☐ / ☐☐ – ☐☐
Example: ERM01 – BR / AC – CH

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ERM01 | **4-15**

ERM01-SNMP

Network Management Card

This single slot card is installed in the last slot of the chassis, just before the power modules. The card has an RS-232 serial port on a DB9 female connector for connection of any standard dumb terminal for an easy menu driven configuration. The RJ-45 jack is a 10/100 Ethernet connector for IP based management. The SNMP card supports remote Telnet management with the same user friendly menu interface as local console. SNMP can be used by compiling the enterprise MIB into your favorite network management software.

Features

- RS-232 port for dumb terminal at 38.4k 8bit no parity
- Ethernet port for 10/100Base-TX compliant with IEEE802.3u
- SNMP V1 and V2C support

- MIB file compliant to MIB-II ASN.1
- Firmware upgrade by TFTP
- Hot swappable

Specifications

Electrical	Console RS-232 port
Interface	LAN 10/100Base-TX
Network Management	・ Network management: provide all system software updates, and management system interaction through Ethernet port. ・ Out-band management: supports Telnet and SNMP , EMS 　・ Configuration Management 　・ Performance Management 　・ Fault Management 　・ Status Monitoring

Indications	PWR, Link SNMP
Dimensions	260 x 22 x 180mm (D x W x H)
Weight	0.25kg
Temperature	0℃ ~ 50℃ (Operating) -10℃ ~ 60℃ (Storage)
Humidity	10 ~ 90% non-condensing
Certifications	CE, FCC, LVD, RoHS
MTBF	65,000 hrs

GUI Management
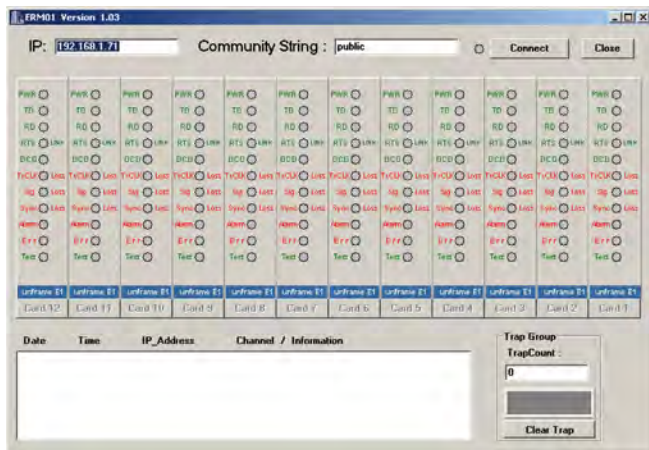
Serial Console Management

```
*************************************************************
******* CTC UNION TECHNOLOGIES CO., LTD *******
******* ERM-01 NMS Terminal Mode V4.01 *******
*************************************************************
Main Menu and Rack Status:
1:Slot #1 >> FE1 << || 7:Slot #7 >> FE1 <<
2:Slot #2 >> FE1 << || 8:Slot #8 >> FE1 <<
3:Slot #3 >> FE1 << || 9:Slot #9 >> FE1 <<
4:Slot #4 >> FE1 << || A:Slot #10 >> FE1 <<
5:Slot #5 >> FE1 << || B:Slot #11 >> FE1 <<
6:Slot #6 >> FE1 << || C:Slot #12 >> FE1 <<
Command Function Key:
'1' to '9', 'A' to 'C': I/O Cards Setting
'R': Refresh Status
'ESC' Logout
'S': System Configuration and TFTP Setup
'M': Manager Configuration Setup
```

ERM01-FE1/ET100R

Fractional E1 to 10/100Base-TX Ethernet Router Card

The ERM01-FE1/ET100R Router Card is a single slot card that can be installed in any available slot to provide IP over E1 transmission. The router engine uses an embedded system which can be configured and controlled from a serial port, Telnet or Web based user interface. It supports industry standard encapsulations of PPP and HDLC as well as proprietary header for Cisco® router's HDLC.

Features

- Ethernet port IP Address/subnet mask
- WAN port IP Address/subnet mask
- Router Name / Password
- RS-232 Console Port Management
- Web/Telnet Management
- WAN port IP address/subnet mask
- DHCP server/client ; NAT Function
- Virtual Server Mapping ; SNMP MIB-2 supported

- Supports VPN pass through ; Forwarding IP multicast support
- DNS proxy server ; SNTP supported
- Simple Statistical ; Ping and Trace route
- Static Routing Setup
- Routing Table (manually set up to 32 entries minimum)
- Dynamic Routing RIP I & II, Send or Receive on Ethernet or WAN
- PPP, HDLC and Cisco® HDLC WAN protocol encapsulatoin
- Flash Upgrade (via TFTP)

Specifications

Hardware	Samsung ARM9 integrated communications 166MHz processor, 8MB Flash, and 32MB pipeline RAM for code, data and buffers
Connection	1 x Ethernet LAN port (10/100)
WAN Speed	Synchronous Port N56/N64 up to 2048Kbps
LAN Speed	Ethernet LAN port 10/100 Mbps

Function	Proxy Routing, IP Routing, Static Routing, Dynamic Routing, DHCP Client/ DHCP Server, IP Mapping, Packet Filtering
Protocols	PPP, NAT, RIP 1/2, TCP/IP
Security	PAP/CHAP, NAT, Filter
LED	Link/ACT : On=link ; Flash=Activity 100 : On=100Base ; Off=10Base

ERM01-FE1/ET100

Fractional E1 to 10/100Base-TX Ethernet Bridge Card

The ERM01-FE1/ET100 Bridge Card is a single slot card that can be installed in any available slot to provide Ethernet over E1 transmission. The bridge engine uses an ASIC design for wire speed performance and supports industry standard HDLC encapsulation. The ERM01-E1U-ET100 bridge is an economical solution for LAN to LAN applications over framed or Unframed E1 transport.

Features

- High performance bridge for 10Base-T or 100Base-TX Ethernet extension.
- Auto-MDI/MDIX detects and corrects crossed cable.
- Ethernet LAN Interface on RJ-45 connector.
- Transparent half / Full duplex support on WAN / LAN interface.
- Automatic LAN table learning and aging.
- IEEE 802.3x flow control.

- Filter mode (pure bridge) or repeater mode selectable
- Provides Ethernet over E1 economically
- No IP address settings required
- Simple DIP switch setting to control filtering, packet buffer and
- Ethernet auto/forced mode
- HDLC WAN protocol encapsulatoin

Specifications

Bridge	LAN Table: 256 MAC address with 5 minute automatic aging Filtering and Forwarding : wire speed Packet size; 64~1522 Bytes Buffer : 340 frames Delay : 1 frame

LAN	Standard : compliant to IEEE802.3 /803.2u Data rate : 10Base-T / 100Base-TX, Full or Half Duplex Connector : RJ45
General	IP bridging over G.703 E1 ISO standard HDLC encapsulation WAN Speed: Nx64 (where N=1 to 31) for Fractional E12048Kbps for Unframed E1

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

CTC UNION TECHNOLOGIES CO., LTD.   www.ctcu.com   *ERM01-FE1/ET100R , ERM01-FE1/ET100* **4-17**

ERM01-FE1/Data

Fractional E1 to Data Card

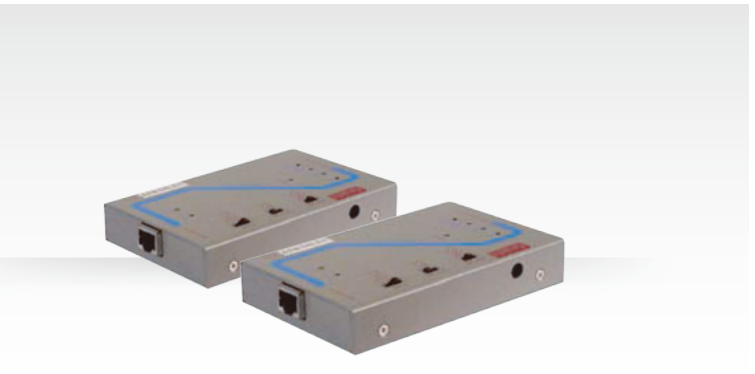The high-speed data cards are available in two E1 types; one for fractional E1 and one for Unframed E1 (transparent) and with data communication interfaces for V.35, RS-530, X.21 and RS-449(V.36). All line cards come with adapter cables that terminate in the appropriate user interface for DCE. Simple DIP Switch settings provide all the control for E1 and Dataport settings. When the ERM01 is equipped with optional SNMP, centralized management can configure and monitor the card and performance without manual DIP setting.

Features

- HS (up to 2Mb/s) Serial interface card for serial transport over G.703 E1.
- DIP switch or SNMP managed (Optional)
- Hot swappable without effecting any other line card

- Front panel pushbuttons to activate loop testing with integral 511 pattern BERT.
- LED status indicators for power, TD, RD,RTS, DCD and alarm indicators for Tx CIK Loss; Signal Loss, Sync Loss and errors.

Specifications

- Compliant with ITU-T standards for V.35, RS-530, X.21 and V.36
- Synchronous transmission at Nx64 data rate (2.048M for Unframed)

- Line code: NRZ
- Control Signals: CTS always ON

Cable Adapter

- HDB26M to MB34F for V.35
- HDB26M to DB25F for RS-530

- HDB26M to DB37F for RS-449(V.36)
- HDB26M to DB15F for X.21

ERM01-E1U/ET100R

Fractional E1 to 10/100Base-TX Ethernet Bridge Card

The ERM01-E1U/ET100R Router Card is a single slot card that can be installed in any available slot to provide IP over E1 transmission. The router engine uses an embedded system which can be configured and controlled from a serial port, Telnet or Web based user interface. It supports industry standard encapsulations of PPP and HDLC as well as proprietary header for Cisco® router's HDLC.

Features

- Ethernet port IP Address/subnet mask
- WAN port IP Address/subnet mask
- Router Name / Password
- RS-232 Console Port Management
- Web/Telnet Management
- WAN port IP address/subnet mask
- DHCP server/client
- NAT Function
- Virtual Server Mapping
- SNMP MIB-2 supported
- Supports VPN pass through

- Forwarding IP multicast support
- DNS proxy server
- SNTP supported
- Simple Statistical
- Ping and Trace route
- Static Routing Setup
- Routing Table (manually set up to 32 entries minimum)
- Dynamic Routing RIP I & II, Send or Receive on Ethernet or WAN
- PPP, HDLC and Cisco® HDLC WAN protocol encapsulatoin
- Flash Upgrade (via TFTP)

Specifications

Hardware	Samsung ARM9 integrated communications 166MHz processor, 8MB Flash, and 32MB pipeline RAM for code, data and buffers	Function	Proxy Routing, IP Routing, Static Routing, Dynamic Routing, DHCP Client/ DHCP Server, IP Mapping, Packet Filtering
Connection	1 x Ethernet LAN port (10/100)	Protocols	PPP, NAT, RIP 1/2, TCP/IP
WAN Speed	Synchronous Port 2048Kbps	Security	PAP/CHAP, NAT, Filter
LAN Speed	Ethernet LAN port 10/100 Mbps	LED	Link/ACT : On=link ; Flash=Activity 100 : On=100Base ; Off=10Base

ERM01-E1U/ET100

Unframed E1 to 10/100Base-TX Ethernet Bridge Card

The ERM01-E1U/ET100 Bridge Card is a single slot card that can be installed in any available slot to provide Ethernet over E1 transmission. The bridge engine uses an ASIC design for wire speed performance and supports industry standard HDLC encapsulation. The ERM01-E1U-ET100 bridge is an economical solution for LAN to LAN applications over an Unframed E1 transport.

Features

- High performance bridge for 10Base-T or 100Base-TX Ethernet extension.
- Auto-MDI/MDIX detects and corrects crossed cable.
- Ethernet LAN Interface on RJ-45 connector.
- Transparent half / Full duplex support on WAN / LAN interface.
- Automatic LAN table learning and aging.

- IEEE 802.3x flow control.
- Filter mode (pure bridge) or repeater mode selectable
- Provides Ethernet over E1 economically
- No IP address settings required
- Simple DIP switch setting to control filtering, packet buffer and Ethernet auto/forced mode

Specifications

Bridge	LAN Table: 256 MAC address with 5 minute automatic aging Filtering and Forwarding : wire speed Packet size; 64~1522 Bytes Buffer : 340 frames Delay : 1 frame

LAN	Standard : compliant to IEEE802.3 /803.2u Data rate : 10Base-T / 100Base-TX, Full or Half Duplex Connector : RJ45
General	IP bridging over G.703 E1 ISO standard HDLC encapsulation WAN Speed: 2048Kbps for Unframed E1

4

E1/T1 Concentrator

ERM01-E1U/Data

Unframed E1 to Data Card

The high-speed data cards are available in two E1 types; one for fractional E1 and one for Unframed E1 (transparent) and with data communication interfaces for V.35, RS-530, X.21 and RS-449(V.36). All line cards come with adapter cables that terminate in the appropriate user interface for DCE. Simple DIP Switch settings provide all the control for E1 and Dataport settings. When the ERM01 is equipped with optional SNMP, centralized management can configure and monitor the card and performance without manual DIP setting.

Features

- HS (2Mb/s) Serial interface card for serial transport over G.703 E1.
- DIP switch or SNMP managed (Optional)
- Hot swappable without effecting any other line card

- Front panel pushbuttons to activate loop testing with integral 511 pattern BERT.
- LED status indicators for power, TD, RD, RTS, DCD and alarm indicators for Tx CIK loss; Signal loss, Sync loss and errors.

Specifications

- Compliant with ITU-T standards for V.35, RS-530, X.21 and V.36
- Synchronous transmission at 2.048Mbps

- Line code: NRZ
- Control Signals: CTS always ON

Cable Adapter

- HDB26M to MB34F for V.35
- HDB26M to DB25F for RS-530

- HDB26M to DB37F for RS-449(V.36)
- HDB26M to DB15F for X.21

ETU01A

Single Modular Port E1
CSU/DSU w/ LCD and SNMP

The ETU01A single port stand-alone DSU/CSU 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
Specifications	Line Code	AMI/ HDB3
	LCD display	16*2 character LCD with backlight
	Bit rate	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

	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
Indications		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 45mm (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, LVD, RoHS
MTBF		65,000 hrs
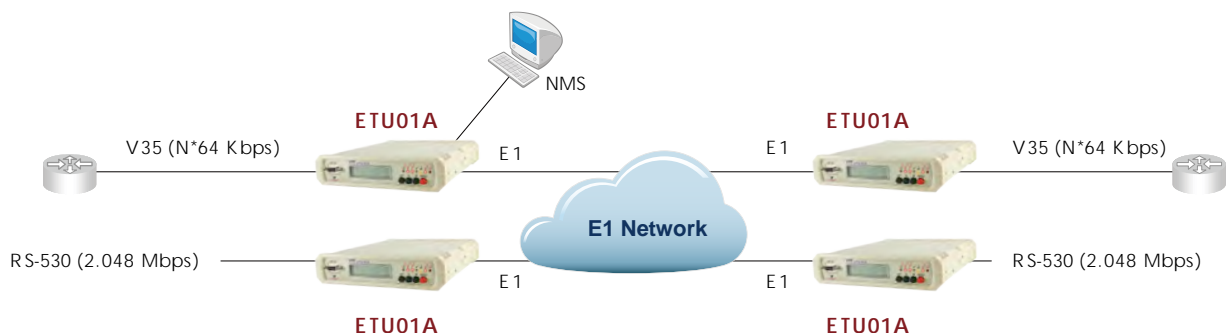
Ordering Information

Model Name	Type	Description
ETU01A/AC	Power	1U, 19/2", Data port to framed E1 w/ 100 ~240VAC
ETU01A/DC	Power	1U, 19/2", Data port to framed E1 w/ -48VDC
ETU01A/AD	Power	1U, 19/2", Data port to framed E1 w/ -48VDC and 100 ~240VAC

ETU01A / ☐☐

Example: ETU01A / AC

ETU011

Single Modular Port E1 CSU/DSU
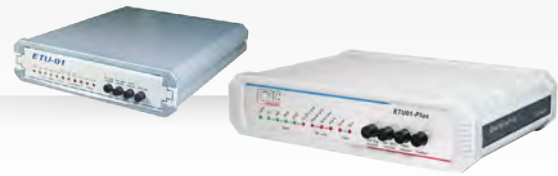
The ETU011 stand-alone DSU/CSU is a digital access unit for Unframed E1, Fractional E1, or Fractional cascaded E1 service. The ETU011 data channel supports user-selectable transmission rates via randomly selected E1 timeslots, which provides integral multiples of 64kbps, up to a maximum 2.048Mbps (unframed), 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
Specifications	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, Signal loss, Sync loss, Alarm)
Standard		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 45mm (D x W x H)
Weight		0.51kg
Temperature		0℃ ~ 50℃ (Operating), -10℃ ~ 70℃ (Storage)
Humidity		10 ~ 90% non-condensing
Certification		CE, FCC, RoHS
MTBF		57,000 hrs

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

ETU011 – ☐☐

Example: ETU011 – AC

Specifications & design are subject to change without prior notice. Please visit CTC Union website for more details.
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ETU011 | 4-21

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
- I/O connectors all located 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
- Fixed V.35 port with MB34F connector

Specifications

G.703 E1	Framing	Framed CCS (PCM31) CAS (PCM30) / Unframed CRC4 on/off
Specifications	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 45mm (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
MTBF		55,000 hrs
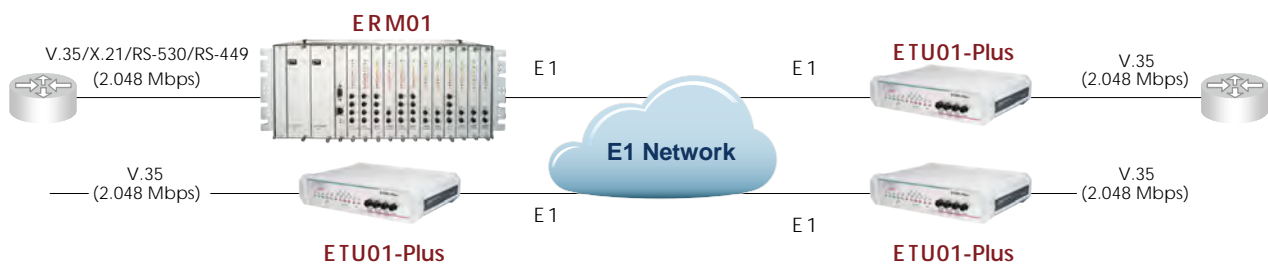
Ordering Information

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

ETU01/Plus – ☐☐
Example: **ETU01/Plus – AC**

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

Interface Modules for
ETU Family Access Units

When purchasing one of our single or multi-port access units or multiplexers that support user replaceable interface modules, our ETU/TTU interface modules provide easily selectable electrical interfaces for a wide selection of user applications. In addition to standard datacom interfaces such as V.35, RS-530, X.21, RS-449, etc. Ethernet modules are also available for bridging or routing of Ethernet over E1 or T1 network services.

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)
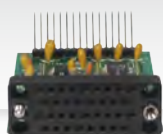
ETU/TTU-232

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

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	10/100 Base-T/Tx Ethernet E1 Bridge Function interface module
ETU/TTU-ET100R	10/100 Base-T/Tx Ethernet Routing Function interface module

ETU/TTU – ☐☐☐

Example: **ETU/TTU** – V35

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CTC UNION TECHNOLOGIES CO., LTD.   www.ctcu.com

ETU/TTU | **4-23**

ETU/ TTU-ET100R

10/100 Base-TX Ethernet Router
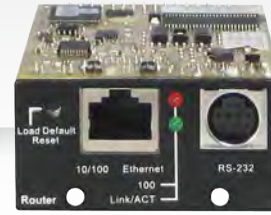
When the E1/T1 standalone access units are installed with an ET100R Interface, the unit is not only an access unit for E1 or T1 but also becomes a high performance WAN Router for 10/100BASE-T Ethernet extension. The ET100R Ethernet Router interface module for CTC Union's ETU/TTU Series DSU/CSU Access Units may be accessed via the RS-232 asynchronous communication port, a serial crossover cable (provided) and text based terminal emulation software (Hyper Terminal TM). Once an IP address has been established for the subnet, the ET100R may also be accessed via Telnet or web GUI. The serial port and Telnet configuration CLI are identical and may include password protection.

Features

- Ethernet port IP Address/subnet mask
- WAN port IP Address/subnet mask
- Router Name / Password
- RS-232 Console Port Management
- Web/Telnet Management
- WAN port IP address/subnet mask
- DHCP server/client
- NAT Function
- Virtual Server Mapping
- SNMP MIB-2 supported
- Supports VPN pass through

- Forwarding IP multicast support
- DNS proxy server
- SNTP supported
- Simple Statistical
- Ping and Trace route
- Static Routing Setup
- Routing Table (manually set up to 32 entries minimum)
- Dynamic Routing RIP I & II, Send or Receive on Ethernet or WAN
- PPP, HDLC and Cisco® HDLC WAN protocol encapsulatoin
- Flash Upgrade (via TFTP)

Specifications

Hardware	Samsung ARM9 integrated communications 166MHz processor, 8MB Flash, and 32MB pipeline RAM for code, data and buffers
WAN Speed	Synchronous Port N56/N64 up to 2048Kbps
LAN Speed	Ethernet LAN port 10/100 Mbps

Function	Static Routing, Dynamic Routing, DHCP Client/ DHCP Server, IP Mapping, Packet Filtering
Protocols	PPP, NAT, RIP 1/2, TCP/IP
Security	PAP/CHAP, NAT, Filter
LED	Link/ACT : On=link ; Flash=Activity 100 : On=100Base ; Off=10Base

CLI Commands

```
ET100R#show interface summary

name      hw type     hw addr          ip addr       ip mask       status

eth1      Ethernet    00:02:AB:06:00:01 192.168.0.1   255.255.255.0   up
hdlc1     Cisco HDLC  ------           192.168.1.1   255.255.255.192 up
lo        Loopback    ------           127.0.0.1     255.0.0.0       up


ET100R#show ip route

Kernel IP routing table
Destination   Gateway    Genmask         Flags Metric Ref   Use Iface
192.168.1.0   0.0.0.0    255.255.255.192 U     0      0       0 hdlc1
192.168.0.0   0.0.0.0    255.255.255.0   U     0      0       0 eth1


ET100R#
```

Web GUI Management

Ethernet —— Router —— E1 Network —— ETU01A-ET100R —— Ethernet
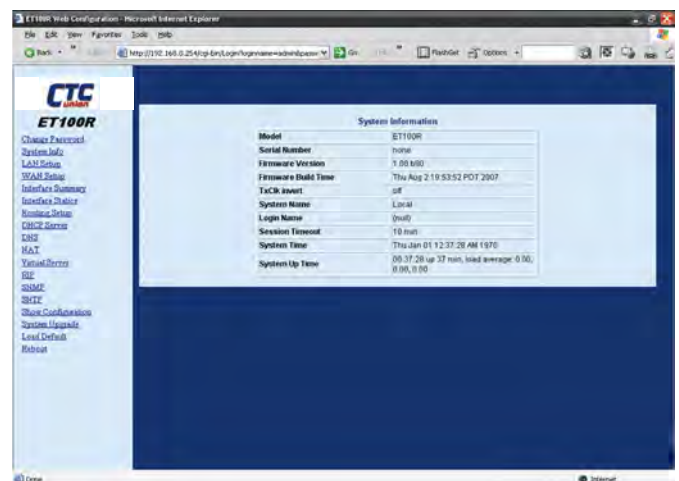
Ordering Information

Model Name	Description
ETU/TTU-ET100R	10/100 Base-T/Tx Ethernet Routing Function interface module

ETU/ TTU-ET100

10/100 Base-TX Ethernet Bridge

The ET100 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. ET100 provides an Ethernet (IEEE802.3u) Bridge function over the WAN when matched to another ET100 module, ET100 standalone, or a compatible bridge utilizing standard HDLC (ISO 13239) protocol. The interface connection is a shielded RJ-45 connector for 10/100Base Ethernet and auto-MDIX and operates at any n56/n64 fractional or unframed E1 speed.

Features

- High performance bridge for 10Base-T or 100Base-TX Ethernet extension.
- Auto-MDI/MDIX detects and corrects crossed cable.
- Ethernet LAN Interface on RJ-45 connector.
- Transparent half / Full duplex support on WAN / LAN interface.
- Automatic LAN table learning and aging.

- IEEE 802.3x flow control.
- Filter mode (pure bridge) or repeater mode selectable
- Provides Ethernet over E1 economically
- No IP address settings required
- Simple DIP switch setting to control filtering, packet buffer and Ethernet auto/forced mode

Specifications

Bridge	LAN Table: 256 MAC address with 5 minute automatic aging Filtering and Forwarding : wire speed Packet size; 64~1522 Bytes Buffer : 340 frames Delay : 1 frame

LAN	Standard : compliant to IEEE802.3 /802.3u Data rate : 10Base-T / 100Base-TX, Full or Half Duplex Connector : RJ45
General	IP bridging over G.703 E1 ISO standard HDLC encapsulation WAN Speed: Nx64 (where N=1 to 31) for Fractional E1 2048Kbps for Unframed E1

Ethernet ———— ETU01A-ET100 ——— E1 Network ——— ETU01A-ET100 ———— Ethernet

Ordering Information

Model Name	Description
ETU/TTU-ET100	10/100Base-T/Tx Ethernet E1 Bridge Function interface module

Specifications & design are subject to change without prior notice. Please visit CTC Union website for more details.
CTC UNION TECHNOLOGIES CO., LTD. www.ctcu.com

ETU/ TTU-ET100 | **4-25**

G703 / 64A

G.703 64Kbps Co-Directional Compact Standalone Unit

The G703/64A is a compact stand-alone interface converter that allows full conversion between G.703 64Kbps co-directional services and a number of data port interfaces including ITU V.35, X.21, EIA RS-530, RS-449 and RS-232 hardware. The interface converters are very easy to implement. Simply select the mode and appropriate interface settings by DIP switch, select an adapter cable, configure the required timing for translation via internal DIP switches, and connect to appropriate power. This model features full compliance with all the relevant ITU & EIA standards under 64Kbps network environments with high reliability. G.703 64K Family of products may be used in Packet Switching Networks, ISDN and DDN. They are also useful for data terminals which access PCM, 64K/2048Kbps digital channels as well as digital microwave channels. Additionally, it may be connected to satellite communication channels

Features

- Palm size single port G703 64kbps access unit
- Interface: V35, X21, RS530, RS449 or RS232 with cable adapters.
- Data rate : 64Kbps Sync and Async RS232 up to 19.2Kbps
- Fully transparent signal conversion
- Selectable timing modes: recovery, transparent, data port or internal OSC
- Selectable co-directional, centra-directional or contra-directional
- Diagnostics: local analog and digital loopback

Specifications

Interface	G.703/64K interface
	Types: Co-directional, Centra-directional, or Contra-directional 64Kbps
	Frame format: Unframed
	Line: 4 wires, 0.5 ~0.7mm twisted pair cable
	Range: up to 800 meters over 24AWG
	Impedance: 120 ohm
	Pulse amplitude: Nominal 1.0V ±10
	Zero amplitude: ±0.1V
	Clock frequency: 64KHz
	Frequency tracking: ±100ppm
	Connector: RJ-45
Data interface	Types: V.35, X.21, RS-530, RS-449, RS-232 with adapter cable
	Data rate: 64kbps for Sync. 19.2kbps for Async
	Connector DB25F

Indications	LEDs (Power, RD, SD, GRD, GSD, Signal loss, Timing loss)
Standard	ITU-T G.703, G.823
Power Input	9VDC
Power Consumption	5W
Dimensions	135 x 79 x 30mm (D x W x H)
Weight	360g
Temperature	0℃ ~ 50℃ (Operating), -10℃ ~ 70℃ (Storage)
Humidity	10 ~ 90% non-condensing
Certification	CE, FCC
MTBF	57,000 hrs

Ordering Information

Model Name	Description
G703/64A-232	G.703 64kbps Converter with single RS-232 interface with adapter cable
G703/64A	G.703 64k Converter with DB25 interface Optional Cables solution for V.35 / RS-530 / RS-449 / X.21

G703/64A – ☐☐☐
Example: **G703/64A – 232**

Specifications & design are subject to change without prior notice. Please visit CTC Union website for more details.
CTC UNION TECHNOLOGIES CO., LTD.   www.ctcu.com

G703 / 64A-STD

G.703 64Kbps Co-Directional to
V.35 / RS-530 / 449 / 232 / X.21

The G703/64A-STD is a 1U half 19" stand-alone or rack mountable interface converter that allows full conversion between G.703 64Kbps co-directional services and a number of data port interfaces including ITU V.35, X.21, EIA RS-530, RS-449 and RS-232 hardware. The interface converters are very easy to implement. Simply select the mode, appropriate interface settings and adapter cable, configure the required timing for translation via internal DIP switches, and connect to appropriate power. This model features full compliance with all the relevant ITU & EIA standards under 64Kbps network environments with high reliability. G.703 64K Family of products may be used in Packet Switching Networks, ISDN and DDN. They are also useful for data terminals which access PCM, 64K/2048Kbps digital channels as well as digital microwave channels. Additionally, they may be connected to satellite communication channels.

Features

- 1U half-19" single port G703 64kbps access unit
- Interface: V.35, X.21, RS530, RS449 and RS232 with cable
- Data rate: 64Kbps Sync and Async RS232 up to 19.2Kbps
- Fully transparent signal conversion
- Selectable timing modes: recovery, transparent, data port or internal OSC
- Data port provides 10bit FIFO
- Diagnostics: local and remote analog and local digital loopback

Specifications

Network Interface	Types: co-directional, centra-directional, or contra-directional 64Kbps Frame format: Unframed Line: 4 wires, 0.5 ~0.7mm twisted pair cable Range: up to 800 meters over 24AWG Impedance: 120 ohm Pulse amplitude: Nominal 1.0V ±10 Zero amplitude: ±0.1V Clock frequency: 64KHz Frequency tracking: ±100ppm Connector: DB9F
Data interface	Types: V.35, X.21, RS-530, RS-449, RS-232 with adapter cable Data rate: 64kbps for Sync. 19.2kbps for Async Connector DB25F

Indications	LEDs (Power, TD, RD, RTS, DCD, TX, RX, Signal, Timing, Err, Test)
Standards	ITU-T G.703, G.823
Power Input	AC: 90 ~ 250 VAC DC24: -18 ~ -36 VDC, DC48: -36 ~ -72 VDC
Power Consumption	10W
Dimensions	235 x 195 x 45mm (D x W x H)
Weight	1.6kg
Temperature	0℃ ~ 50℃ (Operating), -10℃ ~ 70℃ (Storage)
Humidity	10 ~ 90% non-condensing
Certification	CE, FCC
MTBF	57,000 hrs

Single - Port G703 / 64K Access **Single - Port G703 / 64K Access**
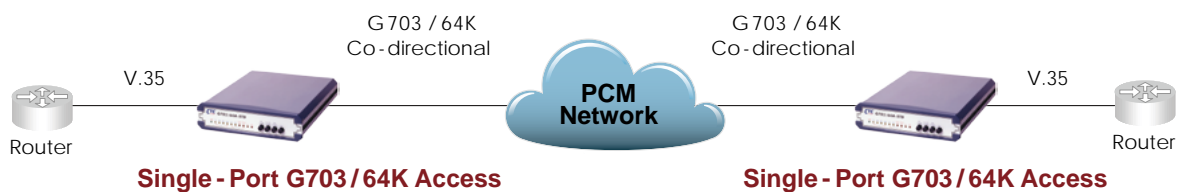
Ordering Information

Model Name	Description
G703/64A-STD/AC	Access Units with AC power supply (90 ~ 250 VAC) Support interface: V.35 / RS-530 / RS-449 / X.21 / RS-232
G703/64A-STD/DC	Access Units with -48 VDC power supply (±36 ~ ±75 VDC) Support interface: V.35 / RS-530 / RS-449 / X.21 / RS-232
G703/64A-STD/DC+24	Access Units with +24 VDC power supply (±18 ~ ±36 VDC) Support interface: V.35 / RS-530 / RS-449 / X.21 / RS-232

G703/64A – STD / ☐☐
Example: G703/64A – STD / AC

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G703 / 64A-STD | **4-27**

IPM-1SE

Single E1/ T1/J1 over Ethernet (IP)

The IPM-1SE is a 1U half 19" stand-alone or rack mountable pseudo wire (PW) device that transmits a real-time bit stream of TDM data (Time Division Multiplexing) over a packet switched network (IP network). Unlike other traffic types that can be carried over pseudo wires (e.g. ATM, frame relay, and Ethernet), TDM is a real-time bit stream, which traditionally carries voice-grade telephony channels. One critical issue in implementing TDM over IP is clock recovery. In native TDM networks the physical layer carries highly accurate timing information along with the TDM data, but when emulating TDM over Packet Switched Networks this synchronization is absent. The IPM-1SE is able to accurately regenerate the timing signals to the exacting standards and conformance with ITU-T. As core networks continue their conversion from traditional switched technology to IP based networks, the IPM-1SE provides a solution to continue using legacy TDM equipment, such as PABX, while the core migrates to IP based networks.

Features

- Supports synchronous TDM based and Ethernet service over IP network
- Devices can be cascaded to increase the number of interfaces
- Point to point application for E1/T1/J1 over IP
- Provides accurate E1/T1/J1 clock recovery
- Supports f/w upgrade
- Console terminal CLI, Telnet and MIB-2 SNMP support

Specifications

Ethernet	Data rate: 10/100Base-Tx, Half/full duplex Connector: RJ45	TDM T1 / J1	Framing: Unframed, D4, ESF Bit rate: 1.544Mbps Line Code: B8ZS / AMI Line Impedance: 100/120 ohms Pulse amplitude: Nominal 3.0 ±20%, Zero amplitude: ±0.15V Receive level: short haul -15dB, long haul -43dB Connector: RJ45
TDM E1	Framing: framed/unframed traffic (ITU-T G.704) Bit rate: 2.048Mbps Line Code: HDB3 / AMI Line Impedance: 75 ohm(BNC) / 120 ohm(RJ-45) Pulse amplitude: Nominal 2.37V ±10% for 75ohm, Nominal 3.00V ±10% for 120ohm Zero amplitude: ±0.1V Receive level: short haul -15dB, long haul -43dB Connector: RJ45 for 120 ohms, BNC for 75 ohms	Indicators	System, TDM, Uplink, LAN
		Standards	ITU-T G.703, G.704, G.706, G.732 and G.823 IEEE802.3, 802.3u
		Power Input	AC: 100~240VAC DC: -18 ~72VDC
		Power Consumption	15W
		Dimensions	235 x 195 x 45mm (D x W x H)
		Weight	1.6kg
		Temperature	0°C ~ 50°C (Operating), -10°C ~ 70°C (Storage)
		Humidity	10 ~ 90% non-condensing
		Certification	CE, FCC, RoHS
		MTBF	57,000 hrs

Ordering Information

Model Name	Description
IPM-1SE-AC	E1/T1 IP MUX with 100 ~ 240 VAC
IPM-1SE-DC+24	E1/T1 IP MUX with 24VDC
IPM-1SE-DC	E1/T1 IP MUX with 48VDC

IPM – ☐☐☐ – ☐☐
Example: IPM – 1SE – AC

IPM-1SE / V35

E1 / V.35 Over Ethernet
Multi - Service Access Platform

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

User 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 215mm (H x W x D)
Main power supply	AC: 110 ~ 240V @ 47 ~ 65Hz DC: -72V ~ -36V (Option)

Environment condition	Ambient temperature: 0°C ~ 50°C (0°C ~ 65°C, optional) Storage temperature: 0°C~ 85°C Relative humidity: 5 ~ 95% non condensing
Configuration and management	RS-232 console port (CLI) or SNMP-based management
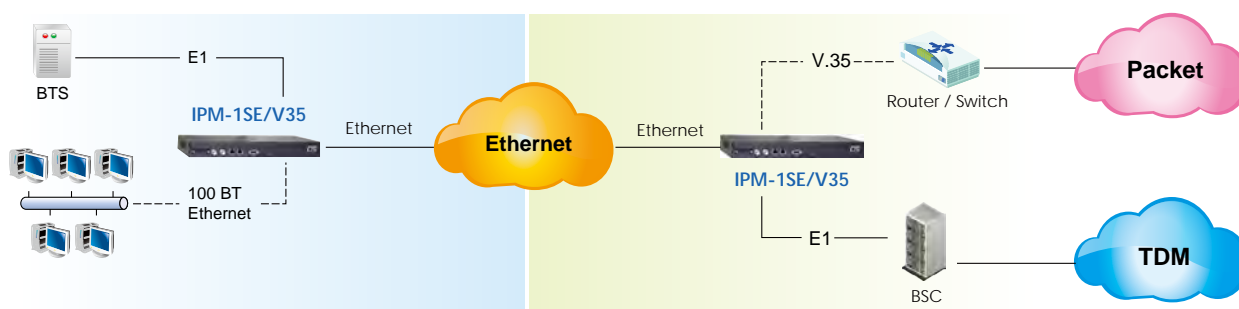
Application

Ordering Information

Model Name	Description
IPM-1SE/V35-AC	E1/V35 over Ethernet access unit with 100 ~240VAC

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CTC UNION TECHNOLOGIES CO., LTD.   www.ctcu.com

IPM-1SE / V35 | **4-29**

IPM-4SE

4 port E1 over Ethernet

IPM-4SE is designed as a multiservice access platform for PDH over Ethernet applications. E1 frames 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.823) Jitter performance.

IPM-4SE provides cost-effective applications of traditional circuit switched system over Ethernet. With IPM-4SE, it is easy to interconnect existing phone systems over Ethernet that are used to carry data, voice and video. With high precision clock recovery technology, IPM-4SE is capable of supporting 2G/3G backhaul and provides smooth services. IPM-4SE can transparently transport proprietary signaling that is required to support PBX features, including call conference, call forwarding and SS7.

Features

- Supports IEFT RFC4533 Structure-Agnostic TDM over Packet (SAToP), Metro Ethernet Forum MEF8.
- 4 x E1 NRZ Serial Interface with LOS/AIS detection
- Use Raw Encapsulation method for PDH payload over IP packet.
- Supports Circuit Emulation Service over IP.
- 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 4 independent Adaptive Clock recovery block for Ingress PDH (PSN -> TDM) clock generation. Recovered clock jitter is compliant with ITU-T G.824 (E1 Jitter Control).

- Independent configurable jitter buffer depth to compensate up to 250ms of Packet Delay Variation.
- Supports framed/unframed traffic (ITU-T G.704)
- 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 PWL field or payload AIS generation at Egress direction (TDM -> PSN).
- Configurable IEEE 802.3 DA/SA assignment.
- Configuration can be made through RS-232 console port.

Specifications

User interface	Port: up to 4 x E1 (ITU-T G.703) Interface: RJ-48c (120 Ohm) Line Coding: HDB3
Ethernet interface	Port: 100 Base-T Ethernet Interface: RJ-45
Dimensions	44 x 370 x 215mm (H x W x D)
Main power supply	AC: 110 ~ 240V @ 47 ~ 65Hz DC: -72V ~ -36V (Option)

Environment condition	Ambient temperature: 0℃ ~ 50℃ (0℃ ~ 65℃, optional) Storage temperature : 0℃~ 85℃ Relative humidity: 5 ~ 95% non condensing
Configuration and management	RS-232 console port, CLI or SNMP-based management

Application

Ordering Information

Model Name	Description
IPM-4SE-AD (CO)	4-E1 over Ethernet CO modem with AC+DC power
IPM-4SE-AD (CPE)	4-E1 over Ethernet CPE modem with AC+DC power

IPM – 4SE – ☐☐ (☐☐)

Example: IPM – 4SE – AD(CO)

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Eoe1A

Ethernet over Unframed 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
Protocol	Synchronous HDLC
Indications	LEDs (Power, Signal Loss, Alarm, Link, TD, RD, 100, Full,Error, Error, Test)
Standard	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℃ ~ 50℃ (Operating), -10℃ ~ 70℃ (Storage)
Humidity	10 ~ 90% non-condensing
Certification	CE, FCC, RoHS
MTBF	57,000 hrs

Managed Unframed E1 Point to Point
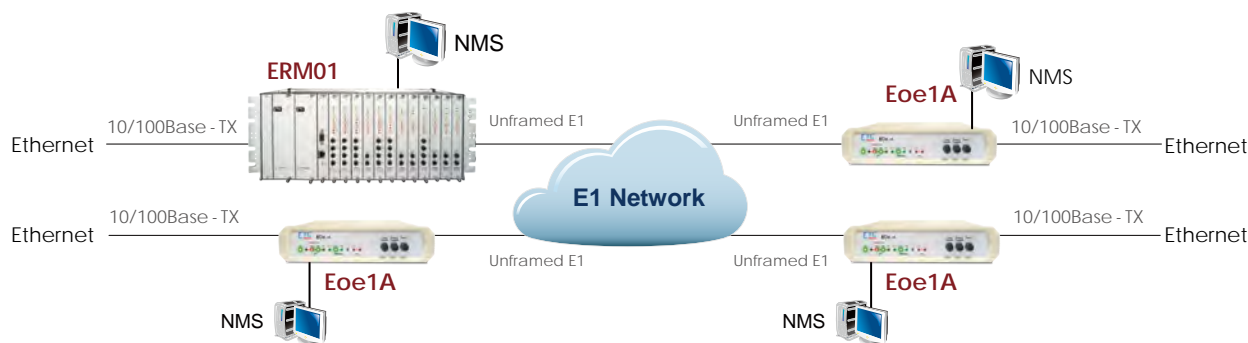
Ordering Information

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)

Eoe1A / ☐☐

Example: Eoe1A / AC

Specifications & design are subject to change without prior notice. Please visit CTC Union website for more details.
CTC UNION TECHNOLOGIES CO., LTD.   www.ctcu.com

Eoe1A | 4-31

NEW

ET100A

Ethernet to WAN
(V.35, RS - 530, RS - 449, RS-232, X.21) 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/Async), 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(Async) up to 115.2Kbps • 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)
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 • 340 packet buffer
Indications	LEDs (PWR, WAN Rx/Tx, LAN Tx/Rx/Link/Err/Speed)
Power	12VDC
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

■ Ethernet over TDM, Point to Point
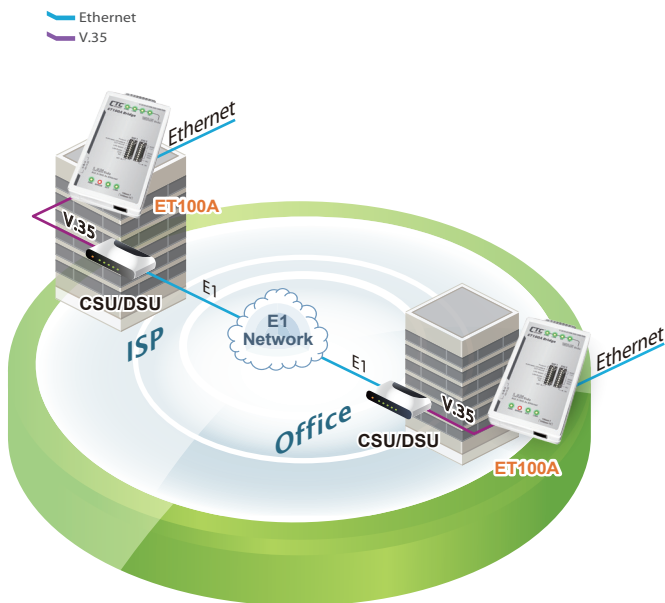
Ethernet
V.35

■ HDLC Bridge Application
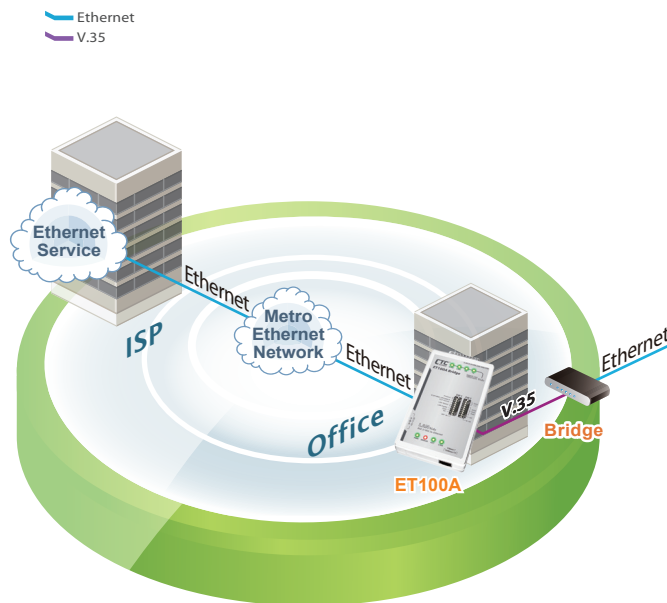
Ethernet
V.35

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

Optional Accessories

CAB-DB25FMB34M-V35	V.35 adapter cable: DB25 Female to MB34 Male , 1meter
CAB-DB25FMB34F-V35	V.35 adapter cable: DB25 Female 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

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

CTC UNION TECHNOLOGIES CO., LTD. www.ctcu.com

ET100/NRZ

Ethernet to NRZ Bridge

The ET100/NRZ Network Bridge is a high performance, remote, self-learning Ethernet bridge. Its solid design makes it ideal for cost-sensitive bridging applications, or as a LAN extender or segmenter over NRZ bit stream type infrastructures. Multiple clocking options including a built-in n x 64(56)Kbps timing clock generator makes it easy to connect to other n x 64Kbps NRZ data equipment.

Features

◆ 10BASE-T/100BASE-TX, Auto, Full Duplex or Half Duplex
◆ HP Auto-MDI/MDIX detects and corrects crossed cable
◆ IEEE 802.3x flow control enable/disable
◆ Real-time filtering with 256 MAC address table
◆ Automatic address learning, aging and deletion after 5 minutes
◆ Up to 340 packet-buffering capacity

◆ Forwarding and filtering rate at wire speed with throughput latency of 1 frame.
◆ 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
◆ Built-in nx64K / nx56K timing clock generator for WAN link

Specifications

WAN Interface	Type: Fixed type NRZ Protocol: Synchronous HDLC (ISO 13239) Connector: 4x BNC Data rate: Nx64Kbps, up to 2048Kbps Clock source: Tx/Rx internal or recovery from NRZ
LAN Interface	• Compliant with IEEE 802.3, 802.3u • Connector: RJ45 • Data rate: Nx64Kbps • 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 • 340 packet buffer
Indications	PWR, TD/RD, Link, LAN Rx/Tx, 100M, Full, Err, Test

Standards	IEEE802.3, 802.3u, ISO 13239
Power Input	AC: 100 ~240V, DC 18 ~ 72V
Power Consumption	<15W
Dimensions	235 x 195 x 45mm (D x W x H)
Weight	0.95kg
Temperature	0℃ ~ 50℃ (Operating), -10℃ ~ 70℃ (Storage)
Humidity	10 ~ 90% non-condensing
Certification	CE, FCC, RoHS
MTBF	57,000 hrs

Ethernet to NRZ Point to Point
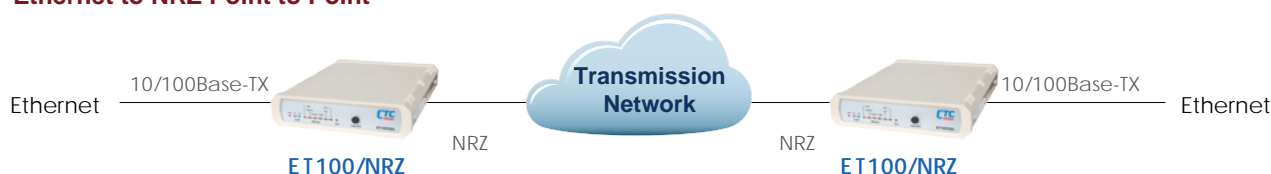
Ordering Information

Model Name	Description
ET100/NRZ-AC	10/100Base-TX Ethernet to NRZ BNC interface with Internal AC 100~240V power
ET100/NRZ-DC	10/100Base-TX Ethernet to NRZ BNC interface with Internal DC 18~72V power

ET100/NRZ – ▢▢

Example: ET100/NRZ – AC

ET100/G64

Ethernet to G.703
Co-Directional 64K Bridge
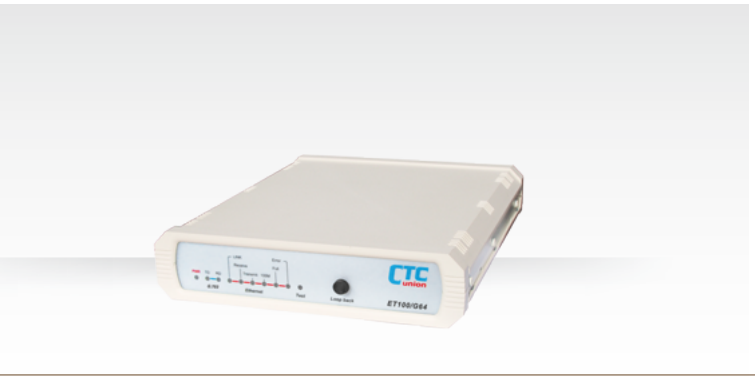
The ET100/G64 Network Bridge is a high performance remote, self-learning, Ethernet bridge. Its compact size and low cost makes it ideal for cost-sensitive bridging applications, or as a LAN extender or segmenter over legacy 64Kbps co-directional bit stream type infrastructures. Multiple clock source settings including a built-in 64Kbps timing clock generator makes it easy to connect to other 64Kbps G.703 co-directional data equipment, making this unit's connection between 10Base-T or 100Base-TX LANs convenient.

Features

- 10/100Base-TX, Full Duplex or Half Duplex
- Auto MDI/MDIX
- IEEE 802.3x flow control
- Real-time filtering with 256 MAC address tabl

- Auto address learning, aging and detection after 5 mins
- up to 340 packet-buffering capacity
- Built-in nx64K / nx56K timing clock generator for WAN link

Specifications

WAN Interface	Type: Co-directional 64Kbps Line code: Co-directional Line: 4 wires 19 to 26 AWG Range: up to 800 meters over 24 AWG Impedance: 120 ohms Pulse Amplitude: Nominal 1.0V±10% Zero Amplitude: Nominal 0V±0.1V Clock Frequency: ±100ppm Connector: RJ45 Frame format: Unframed
LAN Interface	• Compliant with IEEE 802.3, 802.3u • Connector: RJ45 • Data rate: 64Kbps • Speeds: 10/100Base-TX, Full/Half duplex • Frames: Support 64 ~ 1536 byte packet lengths

Bridge Specifications	• Protocol: Synchronous HDLC (ISO 13239) • Address learning, aging and deletion after 5 minutes • 256 addresses MAC table • 340 packet buffer
Indications	PWR, TD/RD, Link, LAN Rx/Tx, 100M, Full, Err, Test
Standard	IEEE802.3, 802.3u, ITU-T G.703, G.823
Power Input	AC: 100 ~240V, DC 18~72V
Power Consumption	< 5W
Dimensions	235 x 195 x 45mm (D x W x H)
Weight	0.95kg
Temperature	0℃ ~ 50℃ (Operating), -10℃ ~ 70℃ (Storage)
Humidity	10 ~ 90% non-condensing
Certification	CE, FCC, RoHS
MTBF	57,000 hrs

Ethernet to G.703 64Kbps Point to Point
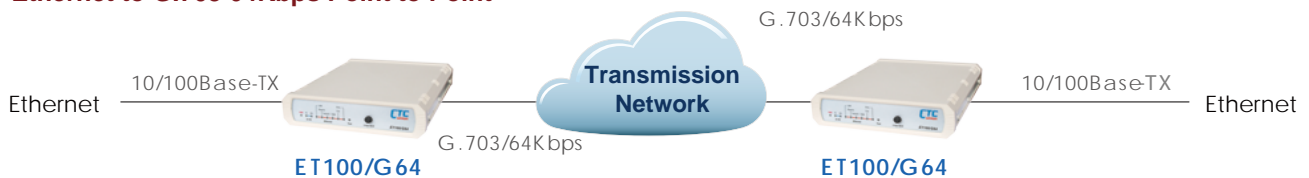
Ordering Information

Model Name	Description
ET100/G64-AC	Ethernet to G.703 Co-directional 64K bridge with AC power
ET100/G64-DC	Ethernet to G.703 Co-directional 64K bridge with DC power

ET100/G64 – ☐☐

Example: ET100/G64 – AC

Tester Series
Offers the Power Stability and Reliability Necessary

Optical Fiber Tester

E1 Bert

Protocol Analyzer

PCM Analyzer

LAN Cable Tester

OTDR Tester

28/26dB 1310/1550nm

OTDR-30A(3028)

Single Mode Optical Time Domain Reflectometer

The OTDR-30A(3028) is an OTDR (Optical Time Domain Reflectometer) based optical fault locator and analysis tool for optical fiber networks. The OTDR-30A(3028) 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(3028) is much more economical than traditional OTDRs. In addition to its 1000 plus internal curve storage, the OTDR-30A(3028) 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(3028) 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)
- CE, FCC, FDA certificates

Specifications

Model Name	Wavelength (±20nm)	Dynamic Range	Event DeadZone(m)	Attenuation DeadZone(m)
OTDR- 30A(3028)	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	$\pm(1m + 5\times10^{-5}\times distance + sampling\ space)$
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℃
Storage Temperature	-20 ~ 70℃
Relative Humidity	0 ~ 95% (non-condensing)
Weight	1kg (2.2 lbs)
Dimensions	196 x 100 x 60mm (W x D 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

Pulse input

OTDR laser diode

Pulse generator

System control analysis and I/O

Photo detector

Fiber

Reflected pulse
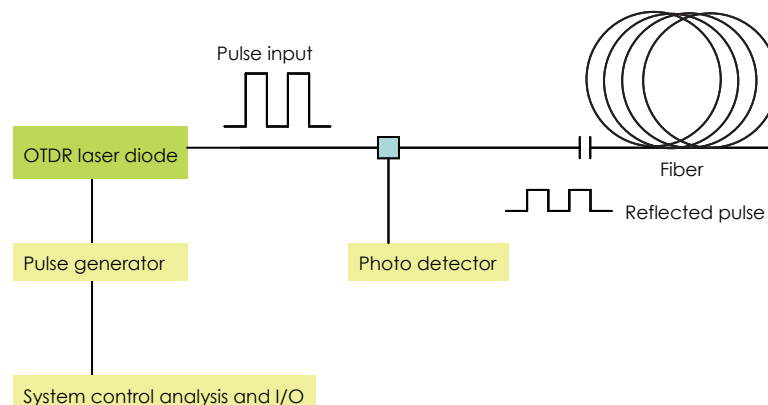
Ordering Information

Model Name	Description
OTDR-30A(3028)	28/26dB, 1310/1550nm, Single mode OTDR tester

OTDR-30A(3028)

HCT-SDH155

STM-1 and G.703 E1 Analyzer / BERT

The HCT-SDH155 combines advanced PDH and SDH test functions in a single unit, eliminating the need for multiple, purpose-built test platforms for the commissioning or troubleshooting of E1 to STM-1 circuits. The extensive list of PDH and SDH features available on the HCT-SDH155 allows users to perform a wide range of tests from simple bit-error-rate (BER) analysis to more advanced network characterization and troubleshooting.

Features

- Mixed and bulk payload generation and analysis from 64kbit/s to 155Mbit/s
- High-order mappings: STS-1/3c AU-3/AU-4
- Low-order mappings: VT1.5/2/6, VC-11/12/2/3
- Section/RS, line/MS, high-order (HO) and low-order (LO) path overhead manipulation and monitoring
- Section/RS, line/MS, high-order and low-order path alarm/error generation and monitoring
- Performance monitoring: G.821, G.826, G.828, G.829, M.2100, M.2101

- Automatic protection switching and service disruption time measurements
- Round-trip delay measurements
- Frequency offset generation
- Frequency analysis and power measurement
- Through mode analysis
- Programmable error/alarm injection
- Fractional E1 testing
- Tandem connection monitoring

Specifications

Test Mode	SDH Path, SDH Demux, SDH Mux, SDH Monitor, SDH Through PDH Path, PDH Monitor, PDH Through
Ports	Electric port : BNC, unbalanced Optic port : SFP-LC (1310nm, 1550nm)
Frequency offset	±99 ppm, 1ppm per step
Clock sources	Internal, External and Recovery
PRBS	2n-1 (n=9, 11, 15, 20, 23), all "1" or all "0" Customer can edit insertion and analyzing overhead
SOH	J0, B1, B2, E1, E2, F1, D1, D2, D3, D4, D5, D6, D7, D8, D9, D10, D11, D12, S1, M1
POH	J1, B3, C2, G1, F2, H4, F3, K3, N1, V5, J2, N2, K4 Pointer sequence adjustment according to ITU-T G.783 Monitor alarm and performance according to ITU-T G.783, G.958

SDH Alarms	LOS, AIS, OOF, EFAS, LOF, RS/HP/LP TIM, MS/ AU/TU AIS, MS/HP/LP RDI,AU/TU LOP, HP/LP UNQ, TU LOM, HP/LP PLM, RFI MS-/HP-/LP-FERF
PDH Alarms	LOF, RAI, CRCL, MAIS, CASL, MRAI
TCM	UNQ, LTC, RDI, ODI, TIM, AIS From D1 ~ D3, D4 ~ D12, E1, E2, F1 transparent channel, insert/pick-up PRBS ITU-T mappings for SDH, including the concatenated ones
Standards	ITU-T G.703, G.957, G.783, G.958
Power Input	DC12V with AC switching adapter
Dimensions	100 x 196 x 60mm (W x D x H)
Weight	0.87kg
Temperature	0 ~ 50°C (Operating), 0 ~ 70°C (Storage)
Humidity	10 ~ 90% non-condensing
MTBF	30,000 hrs
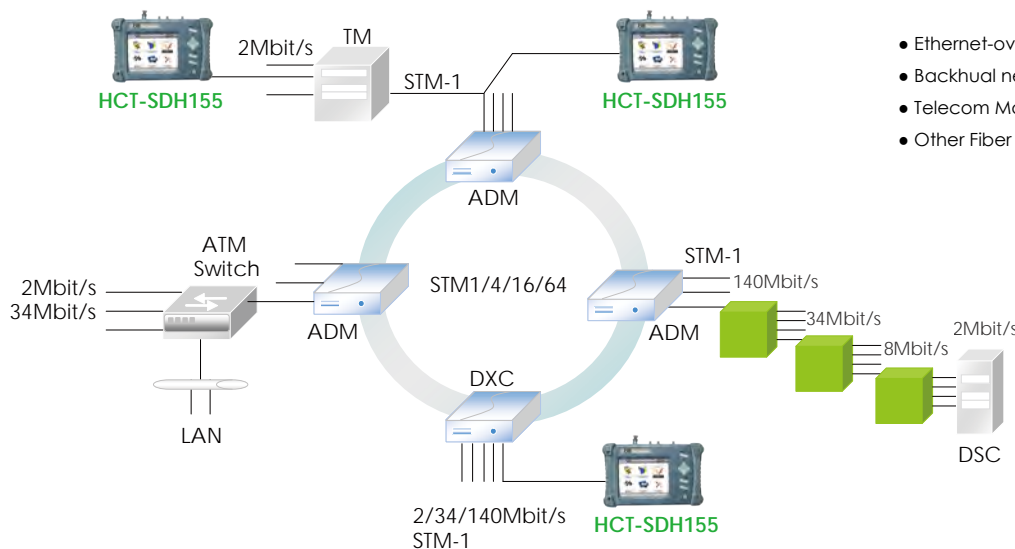
- Ethernet-over-TDM network
- Backhual network
- Telecom Maintenance
- Other Fiber Optical Measurement

Ordering Information

Model Name	Description
HCT-SDH155	SDH & PDH analyzer

5

Optical Fiber Tester

NEW

OLS-200

Optical Light Source

The OLS-200 is an Optical Light Source that can be used in conjunction with our OPM-500 Optical Power Meter to test installed fiber cabling for attenuation loss over medium to long distances. The OLS-200 can provide 2 wavelength outputs according to the specific requirements including, 1310/1550nm wavelength for single mode and 850/1300nm wavelength for multimode fiber. Together with any optical power meter, it acts as a perfect solution for confirming or troubleshooting an optical fiber network.

Features

◆ Large LCD display working wavelength status

◆ Single key change working wavelength Easy operation

◆ Optional 10 minutes auto shutoff function

◆ Low battery indicator

Specifications

Working Wavelength(nm)	1310/1550
Emitter Type	FP-LD
Dynamic Range(dBm)	-7 ~ -7 (1310/1550nm)
Modulation frequency(Hz)	CW / 270, 1K , 2K (1310nm/1550nm)
Fiber mode	SM , MM
Connector	FC/PC

Temperature	-10 ~ 60℃ (Operating) , -25 ~ 70℃ (Storage)
Auto shutoff(min)	10
Battery working time(hrs)	45
Dimensions	185 × 100 × 33 mm (H x W x D)
Power	Alkaline Battery (3 x AA 1.5 V Battery)
Weight	295g

Optical Output

Power Interface

LCD Panel

ON/OFF Key

λ Key

Light Key

Wave Key

Ordering Information

Model Name	Description
OLS-200	Optical Light Source, -7 ~ -7dBm (1310/1550nm)

OLS – ☐☐☐

Example: OLS – 200

OPM-500A
OPM-500B
Optical Power Meter

NEW

The OPM-500 is a handheld optical power meter (OPM) device used to measure the absolute or relative power of an optical signal. The OPM-500 consists of a calibrated sensor and display. The sensor consists of a photodiode that operates in the desired range of wavelengths. On the unit, measured optical power is shown and appropriate wavelength is displayed. This ingenious device has a wide range of power measurements with high precision.

Features

- User self recalibration function
- Lithium rechargeable battery - supports 240 hours continuous operation
- Displays optical power in mw, dB and dBm
- Optional 10 minutes auto shutoff function
- Large LCD display and optional backlight
- RS-232 console port

5

Optical Power Meter

Specifications

Model	OPM-500A	OPM-500B
Dynamic Range	-70 ~ +3	-50 ~ +26
Wavelength range(nm)	800 ~ 1700	
Connector	SC/ST/FC	
Photodetector	0.3mm InGaAs	
Uncertainty	±0.2 (5%)	
Working Wavelength(nm)	850, 980, 1300, 1310, 1490, 1550, 1650	

Resolution(dB)	0.01
Temperature	-10 ~ 60℃ (Operating) , -25 ~ 70℃ (Storage)
Auto shutoff time(min)	10
Battery working time(hrs)	140
Dimensions	172 × 82 × 33mm (H x W x D)
Power	Alkaline Battery (3 x AA 1.5 V Battery)
Weight	300g

Optical Output

Power Interface

ON/OFF Key

Light Key

DB Key

LCD Panel

Auto/Off Key

Zero Key

λ Key

Ordering Information

Model Name	Description
OPM-500A	850, 980, 1300, 1310, 1490, 1550, 1650nm, -70 ~ +3dBm
OPM-500B	850, 980, 1300, 1310, 1490, 1550, 1650nm, -50 ~ +26dBm

OPM – ☐☐☐☐

Example: OPM – 500A

Specifications & design are subject to change without prior notice. Please visit CTC Union website for more details.
CTC UNION TECHNOLOGIES CO., LTD.   www.ctcu.com

OPM-500A , OPM-500B | **5-5**

HCT-BERT/C

E1 / Datacom BER Tester with Color LCD

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	1). 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
	2). 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
	3). E1 Frame Format
	• PCM31, PCM31+CRC, PCM30, PCM30+CRC
	• Unframed mode, Automatic detection

Other Functions	1). Color Display Screen: Character/graphic mode 2). Test Results Report • 100 test results max available in storage • Direct display on LCD screen • Print via printer port available 3). Modular Design for Easy Update

Error Rate Test (BERT Test)	1). 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 2). BERT Display Format • Error counting, Alarm counting, ITU G.821, ITU G.826 • M.2100, Histogram 3). BERT Transmission Error Rate • Insert one forced error • Fixed error rate of 10-3~10-7 4). 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 5). 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	AC230V adapter to DC 9V 2A
Dimensions	134 x 179 x 68mm (W x D x H)
Weight	0.8kg
Temperature	0 ~ 50℃ (Operating), -10 ~ 70℃ (Storage)
Humidity	10 ~ 90% non-condensing
MTBF	35,000 hrs

Datacom Port   E1 RJ-45 Port   E1 BNC Port

USB Port for remote control and file transfer   Power Switch

External Clock Port

DC Jack   DB15F Printer Port

Ordering Information

Model Name	Description
HCT-BERT/C	E1 / Datacom analyzer

HCT-6000

128Kbps Protocol Analyzer with 2M BERT

The HCT-6000 is a portable, battery powered communication tester, designed for a wide range of protocol analysis up to 128K bps and BERT (Bit Error Rate Tester) at full T1 (1.544Mbps) or E1 (2.048Mbps) speeds and is fully suitable for equipment installations, on-line or off-line diagnostics, debugging, and interface development. It features a backlit Liquid Crystal Display (LCD), tactile membrane switch keyboard, interface lead indicator LEDs, and internal rechargeable batteries. The unit includes a full assortment of interface adapter cables, comprehensive User Guide, AC power adapter (100 to 240VAC) and a sturdy zippered nylon carry case. The HCT-6000A has the same features as the HCT-6000 with the exception of BERT support only to 128K bps.

Features

- Menu driven setup
- Auto Configuration and Scan
- ASYNC terminal emulation
- 128K BERT (Low Speed)
- 2M BERT (High Speed)
- Frame Relay Analysis (option)

- System Reset Function
- Up/Down Load
- On-Line Monitor
- File Management
- Remote Control
- Self Tests and Diagnostics

5

Protocol Analyzer

Specifications

Basic Interfaces	RS-232C/D(V.24), RS-449(V.36), RS-530, X.21,V.35, printer port, remote control port (RS-232 async)
Protocols	ASYNC, SYNC(BSC), HDLC, SDLC, X.25, DDCMP
Optional software	Frame Relay, PPP/SLIP, SNA ROM, G.826
Data rate	ASYNC : 50-115,200bps, SYNC : 150-128,000bps
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
Stop Bits	ASYNC Mode: 1, 1 1/2, 2
Display Mode	LSB or Inverted, Normal or Inverted, Full/Half Duplex, Data and Lead Status, Frame and Packet
Error Check	None, Parity, LRC, CRC-16, CRC-CCITT
LCD Display	8 lines, 32 characters per line, with backlight and contrast controls

Capture Buffer	512KB static ram, battery backed up.
Line Monitor	DTE; DCE; DTE & DCE
Emulation	DTE; DCE; MONITOR only
BERT Patterns	63, 511, 2047, FOX (ASCII), SPACE, MARK, ALT
BERT Speed	2Mbps (except HCT-6000A) 128Kbps
Counter & Timer	5 each internal counter and timer
Indications	LEDs (TD, RD, RTS, CTS, DSR, DTR, DCD, TC, RC, XTC, DTE,ECE, Sync loss)
Power Input	100~240VAC adapter to 12VDC 600mA
Dimensions	237 x 173 x 37mm (W x D x H)
Weight	1.2 Kg
Temperature	0 ~ 50℃ (Operating), -10 ~ 70℃ (Storage)
Humidity	10 ~ 90% non-condensing
Certification	CE, FCC
MTBF	35,000 hrs

Line Testing application

HCT-Y CABLE

Modem (DCE)

Modem (DCE)

X.25

HCT-Y CABLE
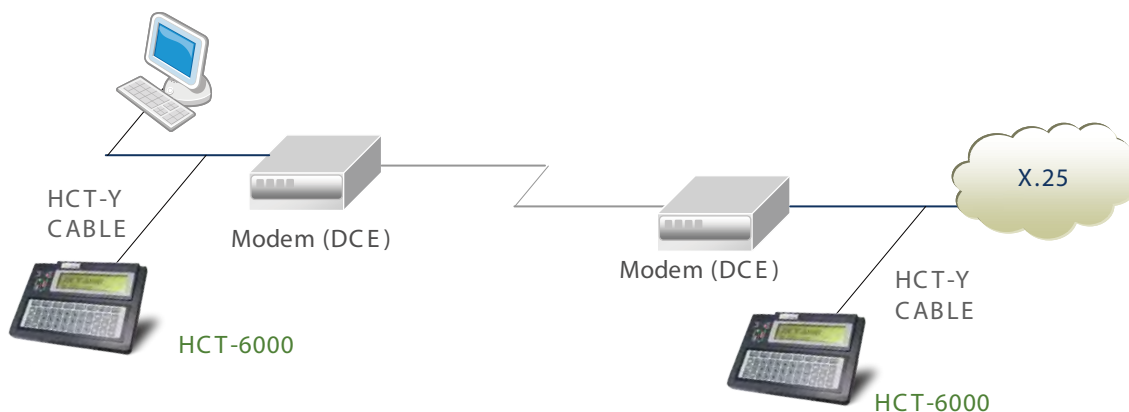
HCT-6000

HCT-6000

HCT-6000 Back view
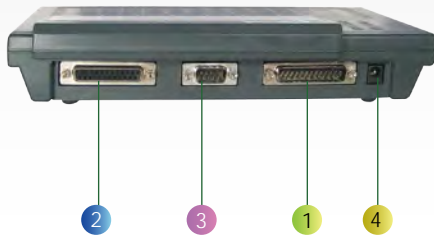
COMMUNICATION

V.24/RS232, V.35, or RS-449. (switch selectable)

note: G.703 available with optional external adapter and set to RS-449 mode.

2 **PRINTING** CENTRONICS Parallel port.

3 **REMOTE** Serial port used for remote control.

4 **Power** DC9V in.

PROTOCOL ANALYSIS

The HCT-6000 is capable of performing protocol analysis for ASYNC, SYNC, HDLC, SDLC(NRZI), SDLC, DDCMP, X.25 (Frame and Packet), and FRAME RELAY, as well as options for testing TCP/IP, SLIP, PPP, and detailed testing of FRAME RELAY.

AUTO CONFIGURATION

The HCT-6000 provides the ability to analyze line data to automatically detect and set communication protocol type, data RATE, data CODE, data FORMAT, parity and synchronous PATTERN.

BERT/BLERT : Bit/block Error Rate Test

a. Transmit/ Receive Patterns : Includes Mark, Space, ALT, FOX, 63, 511, 2047. The 2Mbps BERT also includes 215-1, 220-1, 223-1 and QRSS.
b. Data Block Size : Under CCITT specifications, 63, 511, 1000, 2047 bits.
c. Error Rate Test : Contains a bit counter, bit erroe numbers, a block counter, block error numbers, error seconds, forced errors, and bit error rate as a calculation of total no. of received error bits total no. of received bits.

INTERNAL TIMERS & COUNTERS

The HCT-6000 contains five registers for Timers (in milliseconds) and five registers for Counters (in units) for program start/stop.

HARD COPY PRINT

A standard centronics interface with Female DSUB-25 connector is provided for printing captured data, programming, setup configuration information, and BERT results.

TERMINAL EMULATION

The HCT-6000 provides a complete setup of all communication parameters, Baud rate, data bits, stop bits, parity bit, etc., including Half duplex (local echo) and Full Duplex (remote echo) modes and in either DCE (data communication equipment, such as modems) or DTE (data terminal equipment, terminals) configurations.

DATA LINE MONITOR

Simulation : DCE or DTE, Data and Status, Frame and Packet. Record data in real-time into capture memory.
Monitor : DTE only, DCE only, or DTE/DCE at the same time.
Protocols : SDLC, SDLC(NRZI), HDLC, SYNC(BSC), ASYNC, DDCMP, X.25, FRAME RELAY.

SUPPORTED INTERFACE STANDARDS

V.35, RS-422, X.20/X.21, RS-485, RS-449, RS-530, RS-232 interfaces.

BCC / Error Checking

ASYNC LRC, CRC-16, NONE. SYNC CRC-16, LRC, CRC-CCITT, NONE. HDLC CRC-CCITT, SDLC CRC-CCITT, X.25 CRC-CCITT
Frame Relay CRC-CCITT

DATA CODES

ASCII, EBCDIC, HEX, IPARS, TRANSCODE, EBCD.

2M BERT Test Patterns

The transmit patterns under 2M BERT include 63/127/511/2047, MARK (all 1's), SPACE (all 0's), ALT(0101), 2e15-1, 2e20-1, 2e23-1, and QRSS. In SYNC mode only.

2M BERT Test Speeds

The speeds available under 2M BERT are 48k, N64 values of 64k, 128k, 192k, 256k, 320k, 384k, 448k,512k, 576k, 640k, 704k, 768k, 832k, 896k, 960k,1024k, 1088k, 1152k, 1216k, 1280k, 1344k, 1408k,1472k, 1536k, 1544k, 1600k, 1664k, 1728k, 1792k, 1856k, 1920k, 1984k, 2048k, plus N56 values of 56k, 112k, 168k, 224k, 280k, 336k, 392k, 448k, 504k, 560k,616k, 672k, 728k, 784k, 840k, 896k, 952k, 1008k,1064k, 1120k, 1176k, 1232k, 1288k, 1344k, 1400k,1456k, 1512k, 1568k, 1624k, 1680k, 1736k, and 1792kbps.

Ordering Information

Model Name	Description
HCT-6000	128K Protocol Analyzer & 2M BERT
HCT-6000A	124K Protocol Analyzer & 128M BERT
Optional Function	
Frame-Relay : s/w package	TCP/IP : TCP/IP,PPP,SLIP s/w package
SNA ROM : SNA ROM Package	G.826 : G.826 ITU recommendation

HCT – ☐☐☐☐

Example: HCT – 6000

CTC UNION TECHNOLOGIES CO., LTD.   www.ctcu.com

HCT-7000

Dual Port E1 / Datacom
Protocol Analyzer and BER Tester

I/F Modules

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 S YNC 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		275 x 220 x 65mm (W x D x H)
Weight		2.5 Kg
Temperature		0 ~ 50℃ (Operating), -10 ~ 70℃ (Storage)
Humidity		10 ~ 90% non-condensing
Certification		CE, FCC
MTBF		35,000 hrs

Product Overview (Misc.)

Contrast Control

I/F Modules

Power Sw.
DC Jack

Microphone

LED Indiactors

Speaker

Product Overview (Connectors)

Interface 1 slot

Interface 2 slot

DB15 printer port (Centronics like)

DB9 Remote Ctrl port (DCE)

Lithium Ion Battery

PC Card slot

E1 Bridge Mode

Tx   Rx 75 Ohms
E1
E1 Device   E1 Device
Rx 75 Ohms   Tx
                       Rx Impedance: >1K
Rx   Ohms
Single E1   E1 Bridge
             Mode
HCT-7000
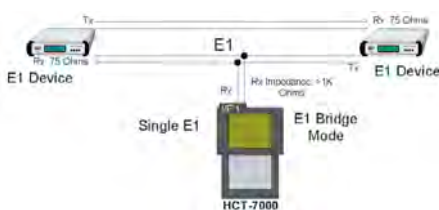
MUX feature - E1 BERT & Datacom BERT

4-DataPort
E1 TDM MUX
                    Rx 75 Ohms   Tx
(4)V.35   E1
N x 64K
              Rx Tx Tx   Rx
                       Rx Impedance
                       75 Ohms
I/F 1 Datacom
I/F 2 E1
HCT-7000

E1 Terminal Mode

                      E1   Rx Impedance 75 Ohms
Tx   DSU/CSU
      Rx Impedance 75 Ohms
Single E1
HCT-7000
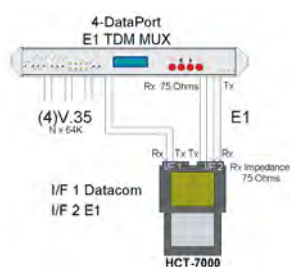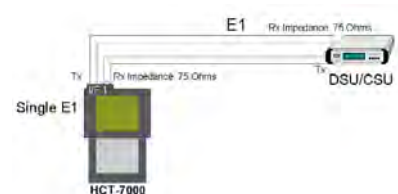
Specifications for G.703 E1 BERT

BERT Patterns
63, 127, 29-1 (511), 2-11 (2047), 2-15 ITU standard,
2-15 non- standard (inverted), 2-20 ITU standard,
2-20 non-standard (inverted), QRSS, 2-23 ITU standard,
2-23-1 non-standard (inverted), ALL ONEs (Mark), ALL ZEROs (Space)
ALT (0101..), 3 in 24, 1 in 16, 1 in 8, 1 in 4, User Programmable

BERT Display Format
ITU G.821 , ITU G.826

BERT Transmit Error Rate
Force Single Error: Logic (Bit), Frame, CRC, and BPV(Bipolar Violation)
Force 10-3 to 10-7 Error Rate: Logic (Bit), Frame, CRC, and BPV

Performance Analysis:
Logic, Frame, CRC, BPV, E-bit Errors
Receive Counter ; Error Seconds
Error Free Seconds ; Error Rate
G.821 Available Seconds ; G.821 Degraded Minutes
G.821 Severely Error Seconds ; G.821 errored Seconds
G.821 Unavailable Seconds ; G.826 Blocks
G.826 Available Seconds ; G.826 errored block (EB)
G.826 Background block error (BBE)
G.826 errored second (ES) ; G.826 Severely error second (SES)
G.826 errored second ratio (ESR)
G.826 Severely error second ratio (SESR)
G.826 Background block error ratio (BBER)
LOF (Loss of Frame) Events ; Severely Error Frame Count
COFA (Change of Frame Alignment) Events

Specifications for Datacom BERT

DTE or DCE Synchronous BERT
Interface : RS-232, V.35, X.21, RS-449, RS-530

Data rates for 56Kbps Multiples; Nx56Kbps (n=1~32)
56k, 112k, 168k, 224k, 280k, 336k, 392k, 448k, 504k,
560k, 616k, 672k, 728k, 784k, 840k, 896k, 952k, 1008k,
1064k, 1120k, 1176k, 1232k,1288k, 1344k, 1400k, 1456k,
1512k, 1568k,1624k, 1680k, 1736k, and 1792k bps

Data rates for 64Kbps Multiples; Nx64Kbps (n=1~32)
64k, 128k, 192k, 256k, 320k, 384k, 448k, 512k, 576k, 640k,
704k, 768k, 832k, 896k, 960k, 1024k, 1088k, 1152k, 1216k, 1280k,
1344k,1408k, 1472k, 1536k, 1544k, 1600k, 1664k, 1728k, 1792k,
1856k, 1920k, 1984k, and 2048k bps.

BERT Patterns:
63, 127, 29-1 (511), 2-11 (2047), 2-15 ITU standard,
2-15 non- standard (inverted), 2-20 ITU standard,
2-20 non-standard (inverted), QRSS, 223 -1 ITU standard,
2-23 non-standard (inverted), ALL ONEs (Mark), ALL ZEROs (Space),
ALT (0101..), 3 in 24, 1 in 16, 1 in 8, 1 in 4, User Programmable

Tx Clock Source:
The Tx Clock may be set to internal or external.
The polarity may also be inverted.

Rx Clock Source:
The Rx Clock is set to external. The polarity of
the external clock may also be inverted

BERT Transmit Error Rate: single, 10e-3, 10e-4, 10e-5, 10e-6, or 10e-7

Flow Control:
DCE permitted to transmit on RTS signal or not,
DTE permitted to transmit on CTS signal or not.

Ordering Information

Model Name	Description
HCT-7000	A Master unit with Backlight LCD, Tactile switch keyboard, Interface LED indicators, Internal rechargeable battery AC power adapter (90~260VAC), Sturdy Carry Case
Hardware Options	
Datacom Interface Module	Datacom 2M BERT with the following protocol analysis Frame Monitor and Emulation Pack Async, Sync, SDLC, HDLC, X.25,and DDCMP Two HD26 ports supporting RS-232,V.35,RS-530/RS-449 X.21. programmable interface with the optional adapted cable Standard accessory : HD26/M to V.35(F/M) cable x 1
E1 Interface Module	E1 Logic, Frame, CRC, BPV, E-bit BERT,G.821.826 BERT ITU M.2100 BERT; CCS analysis for SS#7,ISDN,V5 Optional software for the E1 Frame Relay protocol analysis and Two BNC ports,one DB15 for Balance and one Bantam for receiving external clock The standard accessories are two BNC to BNC 75 ohm cables
Software Options	
Frame Relay (A) Protocol	Frame Relay Analysis Software package; 2M Frame Monitor Emulation based on ITU Q.933, T1.618/T1.617; RFC1490 (RFC2427) packets
Frame Relay (B) Protocol	LMI analysis Application Software package; Performance Statistics Automatic DLCI detection; Pings for end-to-end routing tests DLCI statistics; Filtering
Analysis Software Package	
PPP Protocols	PPP Frame Monitor and Emulation Pack.
SS#7 F/W	E1 CCS SS#7 Protocol Analysis Firmware Pack.
ISDN F/W	E1 CCS ISDN/PRI Protocol Analysis Firmware Pack.
V5 F/W	E1 CCS V5.1/V5.2 Protocol Analysis Firmware Pack.

Standard Accessories
Two slots for Slide-In-Module
Remote control port and printer port
Standard accessories : Remote control cable DB9/M to DB9/F x 1
Printer cable DB15/M to C36/M x 1
The hardware optional modules and
the software packages are required for separate order.

BTM10

E1/T1 Analyzer and BER Tester

The BTM10 E1/T1 analyzer is a compact, sub-note sized E1/T1 PCM measuring instrument designed for field use in analysis and maintenance of data communications (V.35, RS-530/449/232/422 and X.21), E1 (2.048Mbps) or T1 (1.544Mbps) lines. The BTM10 performs framed, unframed, signaling analysis, drop and insert 8K voice, Nx64Kbps, or Nx56Kbps data into any time slot. The BTM10 analyzer also provides a variety of E1 or T1 line statuses, transmission performance testing (BERT) and monitoring. On the E1 or T1 line, the BTM10 may be used as a generator or receiver.

Features

- E1 BERT Analysis: E1/T1frame, code, CRC, and BPV performance analysis and generator.
- Alarm Setting: Manual or automatic alarm setting.
- VF Access: Drop and Insert 8K voice; frequency generator (transmit VF Frequency from 60 to 3950 Hz, transmit VF level from 0dBm to -55dBm) and measurement (A-law and u-law). Voice access by using telephone handset. E1/T1 pulse shape analysis. E1/T1 PCM level meter and frequency analysis.
- Pulse Shape: E1/T1 pulse shape analysis
- Signal Result: E1/T1 PCM level meter and frequency analysis
- Signaling Setting: ABCD bit setting
- Signaling Display: Display all channel's of ABCD bits
- BERT on Data port: Data port BERT performance analysis
- Remote control: Remote controlled by PC terminal or modem
- SS7 analysis: Decode and performance analysis of levels 2, 3, 4
- V5.1/V5.2 Analysis: Monitoring V5 Signaling information

- ISDN Analysis: Digital Subscriber Signaling System No.1 (DSS 1)-Monitoring ISDN D-Channel Signaling information (ITU Q.921,Q.931)
- Example Analysis: off-line analysis of BERT performance
- External Drop and insert: Acts as a fractional E1 or T1 converter
- User Programmable pattern setting: There are three 32 bit programmable patterns, which can be inserted onto the E1/T1 line and drop for analysis available, by passed, or idle
- Timeslot setting: Timeslot, Drop and Insert Nx64k data onto E1/T1 line
- Timeslot mapping data: Analyze any channel data of two frames
- Slip measure: Uncontrolled, Controlled, Frame, and Timing SLIP measure
- Sa bits setup and monitor: Multi-frame Sa bits setup and monitor.(E1 only)
- File management: Ten configuration and result memory locations can be stored and recall by user
- Datacom clock measurement
- Round trip delay measurement

5

PCM Analyzer

Specifications

General	• 1 port E1 (BNC unbalanced and DB15 balanced), T1 (DB15 balanced) ITU G.703(E1), ANSI T1.403(T1) & ITU G.703(T1) • 1 port data communications s/w selectable V.35, RS530, X.21, RS-232 • 1 port RS-232 console, remote • 1 port parallel printer port Print out via parallel Port • LCD display 32 Characters x 8 Lines, Text / Graphic mode

Indications	LEDs (TD, RD, RTS, CTS, DSR, DTR, DCD, TC, RC, XTC, DTE, DCE, Sync loss)
Power Input	AC100~240V adapter to DC 12V 1A
Dimensions	137 x 235 x 54mm (W x D x H)
Weight	1.6 Kg
Temperature	0 ~ 50℃ (Operating), -10 ~ 70℃ (Storage)
Humidity	10 ~ 90% non-condensing
Certification	CE, FCC
MTBF	35,000 hrs

Receiver in Terminal Mode
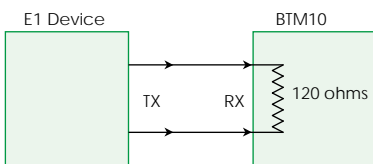
Receiver in Bridge Mode
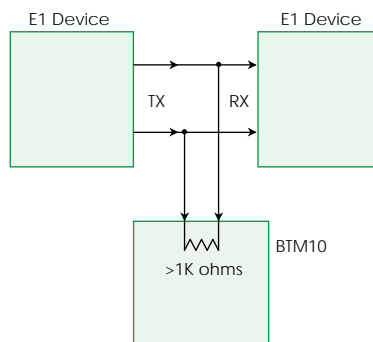
Receiver in Monitor Mode
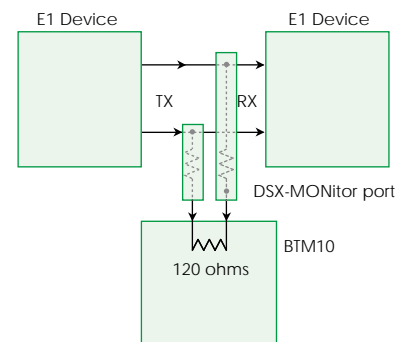
E1 Specification

1. Receiver Interface of E1/CEPT
- Line Code: HDB3/AMI
- Pulse characteristics: meets ITU G.703
- Jitter Tolerance: meets ITU G.823
- Input Port Type: Coaxial pair Symmetrical pair DB15 (balanced)
- Input mode (with AGC):
  Termination: Coaxial Pair Impedance:75ohm resistive (unbalanced)
  Symmetrical Pair Impedance: 120ohm resistive (balanced)
  Return Loss: >18dB
  Receive Sensitivity:+3dB to -40dB
  Bridge Mode: Impedance: >1000ohm Receive Sensitivity: +3dB to -30dB
  DSX-Monitor Mode: Coaxial Pair Impedance 75ohm resistive(unbalanced)
  Symmetrical Pair Impedance:120 ohm resistive (balanced)
  Receive Sensitivity: +6dBdsx to -30dBdsx
  Receive Timing Range: 2.048MHz±4000Hz

2. Transmitter Interface of E1/CEPT
- Bit Rate:2048Kbps ±3ppm
- Line Code:HDB3/AMI
- Pulse characteristics: Meets ITU G.703
- Pulse Amplitude: Nominal 2.37V for Coaxial Pair 75 ohm Nominal 3.00V for Symmetrical Pair 120 ohm
- Zero Amplitude: ±0.1 V max.
- Jitter Tolerance: Meets ITU G.823
- Output Port Type: Coaxial pair: BNC (unbalanced) Symmetrical pair: Bantam or DB15 (balanced)
- TX Clock Source:
  1.Internal Timing: 2.048MHz ±3ppm.
  2.Internal Timing plus 50ppm offset (30ppm factory option)
  3.Internal Timing minus 50ppm offset (30ppm factory option)
  4.Recovery from RX Timing (Loop Timing)
  5.External Timing
  6.Data Port Timing

3. E1/CEPT Frame Structure
Unframed / FAS (PCM31) / FAS+CRC4 (PCM31 with CRC) FAS+CAS (PCM30) / FAS+CRC4+CAS (PCM30 with CRC)

4. Line Build Out
0dB / -7.5dB / -15dB / -22.5dB (Accuracy: ±1dB)

5. E1/T1 Analyzer Mode
1. Channel Map
2. Line Attenuation
3. Slip Measure
4. Signaling
5. General Status: Signal Present / HDB3 / Pattern Sync / Frame Sync / Looping
6. Results: Bit Errors / BPV Errors / Frame Errors / CRC Errors / G.821 Analysis / G.826 Analysis
7. Alarm/Warning: Signal Loss(Pulses) / Frame Loss / Pattern Loss /Excess Zero Error / One Density / AIS / SLIP / RAI / MRAI
8. Print out of test results.

T1 Specification

1. Receiver Interface of T1/DS1
- Line Code: B8ZS/AMI
- Pulse characteristics: meets ITU G.703
- Jitter Tolerance: meets ITU G.824
- Input Port Type: Symmetrical pair: Bantam or DB15 (balanced), and BNC Symmetrical pair
- Input mode (with AGC):
  Termination: Symmetrical Pair Impedance: 100ohm resistive ±5% resistive (unbalanced)
  Return Loss: >18dB
  Receive Sensitivity: ±6dB to -36dB
  Bridge Mode: Impedance: >1000ohm
  Receive Sensitivity: +6dB to -36dB
  DSX-Monitor Mode: Symmetrical Pair Impedance: 100ohm resistive ±5% resistive (unbalanced)
  Receive Sensitivity: up to -30dBdsx
  Receive Timing Range: 1.544MHz ±4000Hz

2. Transmitter Interface of T1/DS1
- Bit Rate: 1544kbps ± 3ppm
- Line Code: B8ZS/AMI
- Pulse characteristics: Meets ITU G.703
- Pulse Amplitude: Nominal 3.00V for Symmetrical Pair 100 ohm
- Zero Amplitude: ±0.1 V max.
- Jitter Tolerance: Meets ITU G.824
- Output Port Type: Symmetrical pair: Bantam or DB15 (balanced)
- TX Clock Source:
  1. Internal Timing: 1.544MHz ±3ppm
  2. Internal Timing plus 50ppm offset (30ppm factory option)
  3. Internal Timing minus 50ppm offset (30ppm factory option)
  4. Recovery from RX Timing (Loop Timing)
  5. External Timing
  6. Data Port Timing

3. T1/DS1 Frame Structure
ESF / ESF+CRC6 / D4(SF) / SLC-96 / T1DM / Unframed

4. Line Build Out:
0dB , -7.5dB , -15dB , -22.5dB (Accuracy: ±1dB)

Specifications for G.703 E1/T1 BERT

1. BERT Patterns
- 63, 127, 29-1 (511), 211-1 (2047), 215-1 ITU standard,
- 215-1 non- standard (inverted), 220-1 ITU standard,
- 220 -1 non-standard (inverted), QRSS, 223 -1 ITU standard,
- 223-1 non-standard (inverted), ALL ONEs (Mark), ALL ZEROs (Space), ALT (0101..), 3 in 24, 1 in 16, 1 in 8, 1 in 4, User Programmable

2.BERT Display Format
- Normal ITU-M.2100 (option) / ITU G.821 / ITU G.826

3. BERT Transmit Error Rate
- Force Single Error: Logic (Bit), Frame, CRC, and BPV (Bipolar Violation)
- Force 10-3 to 10-7 Error Rate: Logic (Bit), Frame, CRC, and BPV

4. Performance Analysis
- Logic, Frame, CRC, BPV, E-bit Errors
- Receive Counter
- Error Seconds
- Error Free Seconds
- Error Rate
- G.821 Available Seconds
- G.821 Degraded Minutes
- G.821 Severely Error Seconds
- G.821 Error Seconds
- G.821 Unavailable Seconds
- G.826 Blocks
- G.826 Available Seconds
- G.826 errored block (EB)
- G.826 background block error (BBE)
- G.826 errored second (ES)
- G.826 severely errored second (SES)
- G.826 errored second ratio (ESR)
- G.826 severely errored second ratio (SESR)
- G.826 background block error ratio (BBER)
- LOF (Loss of Frame) Events
- COFA (Change of Frame Alignment) Events
- Severely Errored Frame Count.

Specifications for Datacom BERT

Mode A: DTE or DCE Synchronous BERT
- Interface
  RS-232, V.35, X.21, RS-449, RS-530
- Data rates for 56Kbps Multiples; Nx56Kbps (n=1~24)
  56k, 112k, 168k, 224k, 280k, 336k, 392k, 448k, 504k, 560k, 616k, 672k, 728k, 784k, 840k, 896k, 952k, 1008k, 1064k, 1120k, 1176k, 1232k,1288k, 1344k, 1400k, 1456k, 1512k, 1568k,1624k, 1680k, 1736k, and 1792k bps.
- Data rates for 64Kbps Multiples; Nx64Kbps (n=1~32)
  64k, 128k, 192k, 256k, 320k, 384k, 448k, 512k, 576k, 640k, 704k, 768k, 832k, 896k, 960k, 1024k, 1088k, 1152k, 1216k, 1280k, 1344k,1408k, 1472k, 1536k, 1544k, 1600k, 1664k, 1728k, 1792k, 1856k, 1920k, 1984k, and 2048k bps.
- BERT Patterns:
  63, 127, 29-1 (511), 211-1 (2047), 215-1 ITU standard, 215-1 non- standard(inverted), 220-1 ITU standard, 220 -1 non-standard(inverted), QRSS, 223 -1 ITU standard, 223-1 non-standard(inverted), ALL ONEs (Mark), ALL ZEROs (Space), ALT (0101..), 3 in 24, 1 in 16, 1 in 8, 1 in 4, User Programmable
- TX Clock Source:
  The Tx Clock may be set to internal or external. The polarity may also be inverted.
- Rx Clock Source:
  The Rx Clock is set to external. The polarity of the external clock may also be inverted.]
- BERT Transmit Error Rate:
  single, 10e-3, 10e-4, 10e-5, 10e-6, or 10e-7.
- Flow Control:
  DCE permitted to transmit on RTS signal or not,

Mode B: DTE or DCE Synchronous BERT

1. Data Rate
- Asynchronous: from 50 to 115.2K bps.
- Synchronous: from 150 to 72K bps.

2. BERT Patterns
- 63, 511, 2047, FOX, SPACE, MARK, and ALT

3. Tx Clock Source
- DTE or DCE

4. Flow Control
- Xon/Xoff, RTS/CTS, or disable

Ordering Information

Model Name	Description
BTM10-E1	E1 analyzer (Full function ; with pulse shape/datacom function)
Optional Function	
Datacom Feature	Datacom BERT External drop/insert
Pulse shape Feature	Pluse shape Analysis Singal result level measurement
BTM10-SS # 7	Decode or Level 2,3 and 4 Performance Measurement
BTM10-ISDN	ITU Q.921, Q.931 recommendation
BTM10-V5 (V5.1, V5.2)	ITU G.964, G.965 recommendation
BTM10-M.2100	ITU M.2100 recommendation

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BTM10 | **5-13**

LCT-300/400

Handy LAN Cable Continuity Tester / Cable Identifier

LCT-300   LCT-400

The LCT-300/LCT-400 LAN Cable Testers are intelligent continuity testers for LAN cables which save time on the job. Their intuitive operations keep you from wasting time working through complex menus. A remote terminator helps in identifying cables when labeling after installation.

Features

- Hand-held and easy to operate
- Battery low indicator
- Can review the captured pin assignment and failure status
- Easy to read cable status to verify cable continuity; open, short, and mismatches
- Easy to read LCD display, with 2 line by 12 characters with LCD back light
- Automatic power shut down feature for extended battery life
- Identify and trace the other end's ID (using supplied terminator)

- Maximum testing length is up to 1030 meters
- Standard pin configurations and (4) user defined cable modes memorized in CPU
- Suggestion mode for intelligent cable identification (Cable type each)
- Tests for shielded and non-shielded cable types (Extra feature for LCT-400)
- Easy to identify RJ-45 and BNC cable types against preset wiring schemes

Specifications

General	
Connector	RJ45
Control Key	ENTER, Mode, ESC
Power Input	DC 9V battery
Dimensions	154 x 65 x 35mm (W x D x H)
Weight	300g
Temperature	0 ~ 50℃ (Operating), -10 ~ 70℃ (Storage)
Humidity	10~90% non-condensing
MTBF	35,000 hrs
Cable & Recognized	・Tests for shielded and non-shedlded cable types ・Unshielded twisted pair (UTP) 100 ohms category 3, 4 & 5

Wiring Schemes	・Foil shiedlded twisted pair (FTP) 100 ohms & 120 ohms category 3 ・Shielded twisted pair (STP) 150 ohms type 1 & 6 ・10Base-T, 100Base-TX and 100Base-T4 ・TP-PMEDIA / TIA-568A/B ・Token ring ・USOC ・10Base / HUB (AT&T 258A) ・Plus user defined
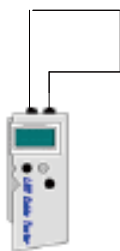
Local Test   **Remote Test**   **Terminator Loopback**
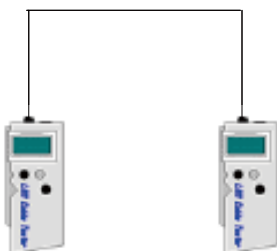
Ordering Information

Model Name	Description
LCT300BK	RJ-45 LAN cable tester with LCD backlight
LCT400BK	RJ-45/BNC cable tester with LCD backlight
LCT-T/x-R	RJ-45 Terminator with "id" code ; where "x" =id of terminators (#1--#8)

LCT ☐☐☐☐☐

Example: LCT 300BK

Surge Protector Series

Protect your valuable equipments from dangerous power surges and spikes

PoE Surge Protector
V35 Surge Protector

Ethernet Surge Protector
Telephone Surge Protector

G703 E1 BNC Surge Protector

SP-POE-01

Fast Ethernet
PoE 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
- 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℃
Storage Temperature	-40 ~ +85℃
Operating Humidity	0% ~ 95% non condensing
Dimensions	38 x 106 x 26 mm (D x W x H)
Weight	75 g

Ordering Information

Model Name	Description
SP-POE-01	1-port RJ45 10/100Base-T(X) PoE Ethernet Surge Protector (Data: 1,2,3,6. PoE: 5,6,7,8)

SP-POE-08

8-Port Fast Ethernet
PoE Surge Protector

The SP-POE-08 is 8-port, Ethernet surge protector designed to protect all 8 lines on each port, used in a standard CAT5e or higher 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-08 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-08 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, CAT5e or higher compatible. All 8 pins protected.
- Integral mounting feet and separate ground wire
- 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℃
Storage Temperature	-40 ~ +85℃
Operating Humidity	0% ~ 95% non condensing
Dimensions	73 x 143 x 44 mm (D x W x H)
Weight	435 g

Ordering Information

Model Name	Description
SP-POE-08	8-port RJ45 10/100Base-T(X) PoE Ethernet Surge Protector (Data: 1,2,3,6. PoE: 5,6,7,8)

Specifications & design are subject to change without prior notice. Please visit CTC Union website for more details.
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SP-POE-16

16-Port Fast Ethernet
PoE Surge Protector

The SP-POE-16 is 16-port, Ethernet surge protector designed to protect all 8 lines on each port, used in a standard CAT5e or higher 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-16 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-16 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, CAT5e or higher compatible. All 8 pins protected.
- Integral mounting feet and separate ground wire
- 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	73 x 483 x 44 mm (D x W x H)
Weight	1.4 kg

Ordering Information

Model Name	Description
SP-POE-16	16-port RJ45 10/100Base-T(X) PoE Ethernet Surge Protector (Data: 1,2,3,6. PoE: 5,6,7,8)

SP-POE-24

24-Port Fast Ethernet
PoE Surge Protector

The SP-POE-24 is a 24-port Ethernet surge protector rack designed to protect all 8 lines used in standard CAT5e cable. The product is compatible with 10/100Base-T(X) networks and 48V Power Over Ethernet system.   The Standard 802.11af allows the methods of implementing POE. The SP-POE-24 applies protection to the data pairs (pins 1/2 and pings 3/6) and power over the unused pairs (pins4/5 and pins 7/8). The SP-POE-24 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 8pins protected
- Integral rack mounting brackets and separate ground wire

- Shielded RJ45 jacks and metal enclosure for noise suppression.
- Applications
  Wireless Access Point (WAPs)
  IP Telephony Sets
  IP Cameras
  Switches.

Specifications

Operating 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 (8/20 μs)
Peak Pulse Current	(10/1000 μs)
Pins Protected	Data: 1, 2, 3, 6 PoE : 4, 5, 7, 8
Insertion Loss	< 0.5dB (10Mbps)

Data Rate	10/100Mbps
Response Time	line/ line<1ns line/ground<100ns
Operating Temperature	-20 ~ 75°C
Storage Temperature	-40 ~ 85°C
Operating Humidity	0% ~ 95% non condensing
Dimensions	73 × 483 × 44mm (D x W x H)
Weight	1.4kg

Ordering Information

Model Name	Description
SP-POE-24	24-port RJ45 10/100Base-T(X) PoE Ethernet Surge Protector (Data: 1,2,3,6. PoE: 5,6,7,8)

6

PoE Surge Protector

SP-GPOE-01

Gigabit Ethernet
PoE Surge Protector

NEW

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	Insertion Loss		< 0.5dB
Max. continuous operating voltage peak current line to line (8/20us)	Imax	1.5KA	Data rate		1000Mbps
			NM Surge response time		≤ 1ns
Max. continuous operating voltage peak current line to ground (8/20us)	Imax	1.5KA	Connector		RJ45
			Data lines protected		1-8
Voltage protection level (line to line)	UP	≤ 120V	Operating Temperature		-40 ~ 80℃
Voltage protection level (line to ground)	UP	≤ 120V	Dimensions		38 x 106 x 26mm (D x W x H)

IN   Network line   **OUT**   Patch cable   Network eguipment

SP-GPOE-01

Ground

Ordering Information

Model Name	Description
SP-GPOE-01	Single Port, 1000Base-T GE PoE Surge Protector

TSP-10

Telephone 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.

Features

- Protect 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
- Meet UL 1449

Specifications

Surge current	8 x 20u sec of 500A		Weight	20g
DC spark over voltage	160 ~ 240VDC		Compliance	UL 1449 (2nd Edition)
Dimensions	80 x 30 x 27mm (D x W x H)			

Ordering Information

Model Name	Description
TSP-10	In Line Telephone Surge Protector with RJ-11 Jacks

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: In: 8 pins

Attenuation in dB	< 0.5dB (100MHz)
Capacitance	< 40pF
Dimensions (D x W x H)	38 x 106 x 38mm (1-port) 73 x 143 x 44mm (8-port) 73 x 480 x 44mm (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-T(X) Ethernet Surge Protector (pin 1,2,3,6)
SP-ETH-01-8	1-port RJ45 10/100Base-T(X) Ethernet Surge Protector (pin 1,2,3,4,5,6,7,8)
SP-ETH-08	8-Port RJ45 10/100Base-T(X) Ethernet Surge Protector (pin 1,2,3,4,5,6,7,8)
SP-ETH-16	16-Port RJ45 10/100Base-T(X) Ethernet Surge Protector (pin 1,2,3,4,5,6,7,8)
SP-ETH-24	24-Port RJ45 10/100Base-T(X) Ethernet Surge Protector (pin 1,2,3,4,5,6,7,8)

SP – ETH – □□ – □
Example: SP – ETH – 01– 4

SP-GE-01

Gigabit Ethernet 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℃ degree
Dimensions	38 x 106 x 38 mm (1-port) 73 x 148 x 44mm (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-08	8-Port RJ45 10/100/1000Base-T Ethernet Surge Protector (pin 1,2,3,4,5,6,7,8)
SP-GE-16	16-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

Specifications & design are subject to change without prior notice. Please visit CTC Union website for more details.
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SP-ETH-01 , SP-GE-01 | 6-5

6

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.

Features

- 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	(1) 34-pin M-block male (2) 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℃
Humidity	10 ~ 90% relative, non-condensing
Dimensions	120 x 52 x 30mm (D x W x H) plus 50 cm of cable(fully extended) on either side for a total length 70 cm
Weight	300g

Ordering Information

Model Name	Description
SP-V35-01	V35 Data line surge protector

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.

Features

- 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

Management

Superior Design with Real-Time Monitor and control

GUI Graphic User Interface

EMS Element Management Software

EMS

CTC Union Smart View
Element Management System

The objective of EMS is to provide four major functions for telecommunication operators:
• Fault Management (FM)   • Performance Management (PM)   • Configuration Management (CM)   • Security Management (SM)

The EMS Server is designed to provide all the configuration and maintenance functions for the communication device. The method to access EMS Server functions is via CORBA protocol according OMG CORBA Specification. When a user loads EMS Client software and sets up a link to the EMS Server, it will be possible to monitor and control all network devices via CORBA actions. EMS Server uses SNMP Protocol to monitor and control the network devices via SET GET and TRAP SNMP actions.

The major tasks include:
1. Collect configuration information from SNMP Agents via SNMP protocol and send to them control commands to change their state.
2. Guarantee storage of all information in external database server
3. Transfer control and configuration data to and from client SW via CORBA
4. Organize and maintain control objects in database and client configuration constructions, which describe system.
5. Provide role access to mentioned above objects

Network Scheme Diagram
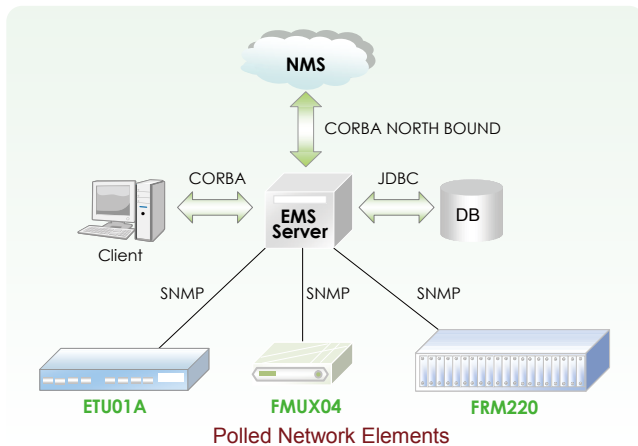
Agents
By utilizing a modular design, a large variety of configurations may be realized and the unit may be custom tailored for each specific application.

CORBA Server
CORBA Name Service provides the ORB (Object Request Broker) central component of CORBA. It encompasses the entire communication infrastructure necessary to identify and locate objects, handle connection management, deliver data and is responsible for communication of requests.

EMS server
EMS Server collects the information data from the specific SNMP agents and keeps updating it to the SQL server via the JDBC (Java DataBase Connectivity) driver.

SQL Server
SQL Server is the place where the EMS collected data is stored, The database will store Alarm Trap and all informations.
CTC Union's EMS is compatible with Microsoft® SQL 2005, SQL 2005 Express, SQL 2008 and SQL 2008 Express.

Workstation-Clients
Workstations act as clients in the CORBA architecture. They 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.
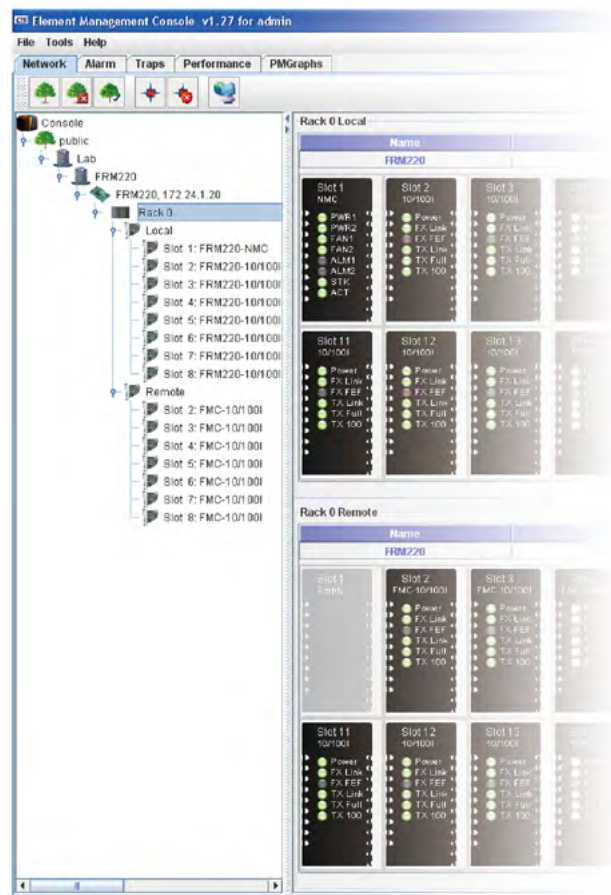
Configure Command Tool Bar
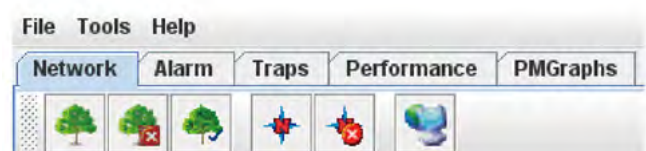
Features

◆ **JAVA based**
EMS is pure JAVA project and collects all benefits of this technology including multi platform support, module design, and client-server architecture.

◆ **Event driven**
Using events as primary objects for communication minimizes network loading, increases performance and allows including a given quantity of network devices with predictable CPU and RAM loading, depending on this quantity.

◆ **Open architecture**
Provides API and IDL files for integration with upper layer NMS systems.

◆ **Database support**
Support for Microsoft® SQL Server. Flexible SQL interface design for server and client optimization by customer.

◆ **Data integrity**
All data is located in the same place. User profiles are stored to and loaded from one source. User created objects are stored and loaded remotely and/or locally. There are well-defined procedures for backup and restore configuration, topology, alarm and user data.

◆ **Standard SNMP and CORBA**
support design has no assumption to any CORBA vendor. Tested with different Object Request Brokers.

Installation Screen
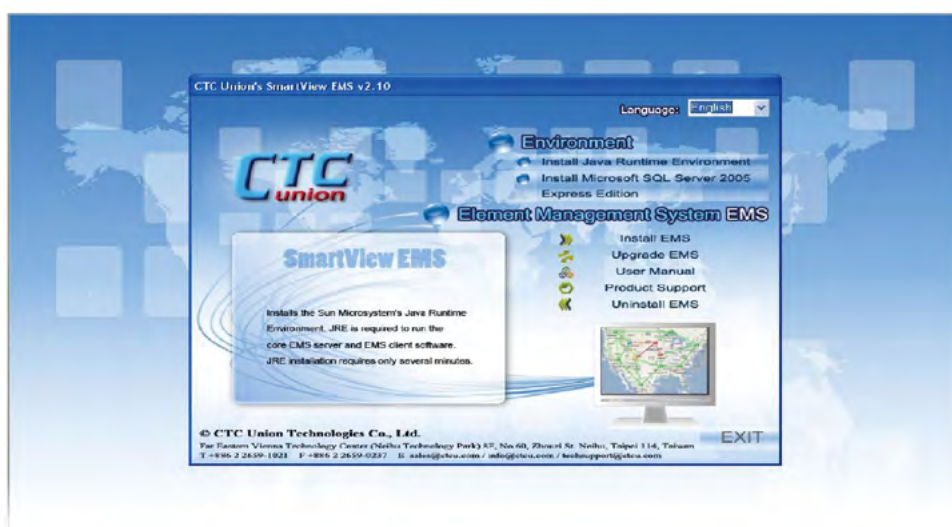
Available models
◆ FRM220
◆ FRM220A
◆ ETU01A
◆ ERM-MUX/Plus
◆ ERM01
◆ FMUX01A
◆ FMUX01A/Plus
◆ FMUX04
◆ FMUX04E
◆ SML2000/5000

Requirements

EMS	Hardware (minimum)	Software	Operating System
EMS Server	P4 1.6G or higher, 512MB RAM, HD >2GB (free)	JAVA JRE. EMS Kit, ODBC Driver	Windows server 2003/2008, Windows XP, Vista, Win7
SQL database Server	P4 1.6G or higher, 512MB RAM, HD >2GB (free)	MS-SQL Server 2005/2008.EMS Kit	Windows
CORBA Server	PIII 800 or higher, 128MB RAM, HD >1GB (free)	JAVA JRE. EMS Kit	Windows, Linux
Workstation-Clients	PIII 800 or higher, 128MB RAM, HD >1GB	JAVA JRE. EMS Kit	Windows, Linux
All-In-One	P4 2.8G or higher, 2GB RAM, HD >10GB (free)	JAVA JRE, EMS kit, MS-SQL Server, ODBC Driver	Windows server 2003/2008, Windows XP, Vista, Win7

Ordering Information

Model Name	Type	Description
SV-PLF-05	Smart View Platform server	Platform server with 5 client user admission
SV-PLF-25	Smart View Platform server	Platform server with 25 client user admission
SV-PLF-50	Smart View Platform server	Platform server with 50 client user admission
SV-AGT-50	Smart View Device Agents	50 device agents
SV-AGT-100	Smart View Device Agents	100 device agents
SV-AGT-200	Smart View Device Agents	200 device agents
SV-AGT-500	Smart View Device Agents	500 device agents
SV-FOM	Managed Modules	FMUX04, FMUX01A, FMUX01A/Plus managed modules
SV-PDH	Managed Modules	ETU01A managed module; ERM01
SV-Fiber	Managed Modules	FRM220, FRM220A
SV-CWDM	Managed Modules	Sigma Links 5000/2000 managed module

SV – ☐☐☐ – ☐☐☐
Example: SV – AGT – 100

7

EMS

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EMS | **7-3**

EMS Management Functions

CTC Union Smart View
Element Management System

Topology

Getting Topology Map node

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.

Fig. 1: Topology Manager ready to Get Agents
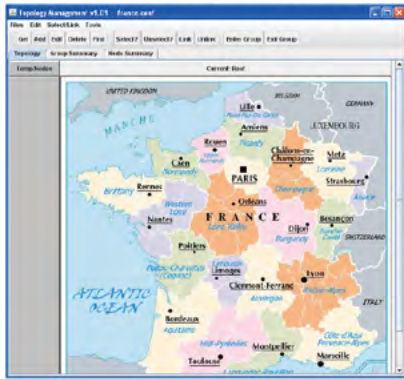
Fig. 2: Topology Manager Get Agents

Select all of the nodes you want to include in this map from the 'Topology Management' main window.

Fig.3: Drag Agents into the Topology Map

Drag and Drop Agents

Fig. 4: Connecting Links on the Topology Map
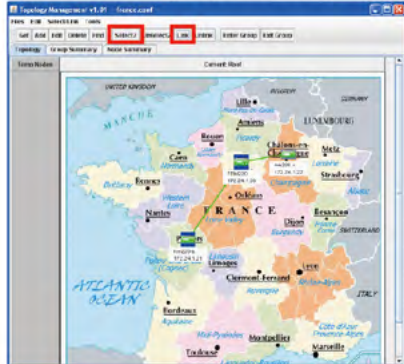
Fig. 5: Managing Alarms
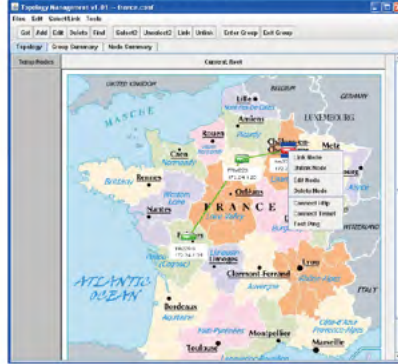
Troubleshooting Alarms

If any Agent experiences an alarm condition, the agent's icon color will change from "Green" to "Red". Use the mouse and 'Right-click' the Agent's icon. The pull-down menu will appear as the Figure5.

To link two agents together
- First select one of the agents.
- Next click the "Select2" function button.
- Then click on the second Agent.
- When both are highlighted in Blue,
- Click the "Link" function button.

Fault Management

Trap List

All alarm traps will be stored in SQL database. In Traps page, press "Auto Refresh" button to get the current alarm trap records in database, and it will update status automatically. Press "Pause" button to halt the screen, then, operator can make "ack" or "clear" action. Press "refresh and save file" to get the current alarm trap records in database and save to "TrapList.txt" file in disk.
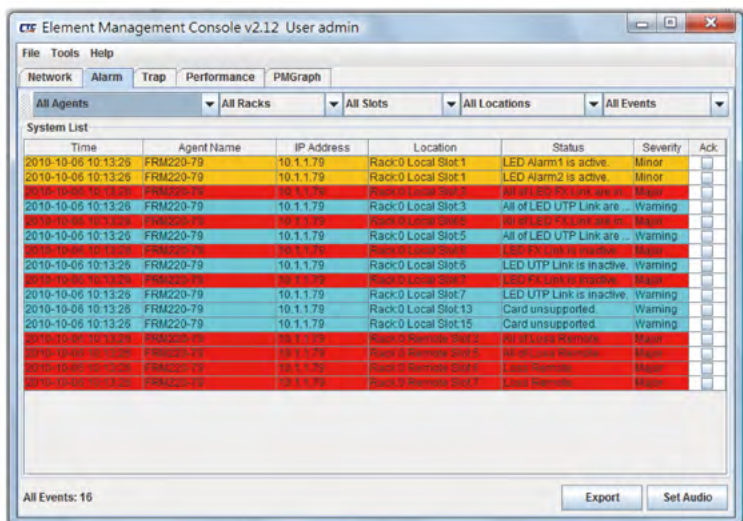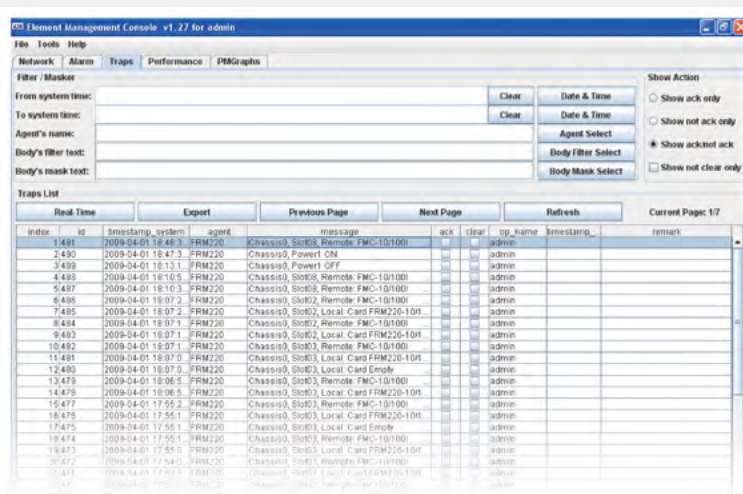
Active Alarm List

On the System tab, you can view all Active Alarm Lists. 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 .

Security

Activity Log

All activities performed on any Network Element are logged with time-stamping, the user making changes and the changes made.
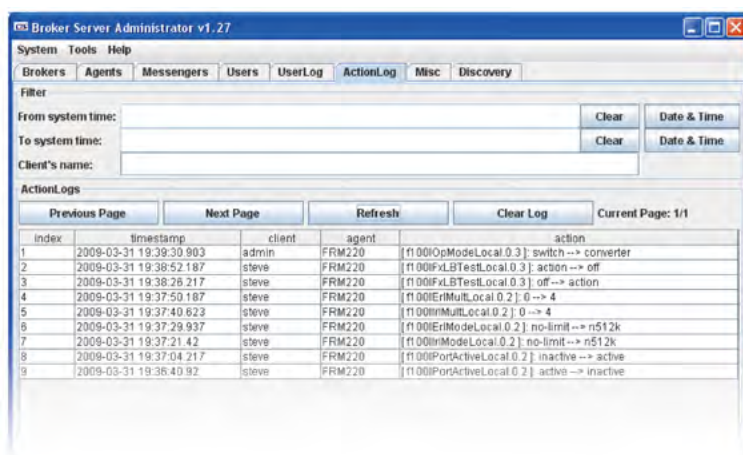
EMS Management Functions

CTC Union Smart View
Element Management System

Management & Alerts

Network Element Discovery

The EMS 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.
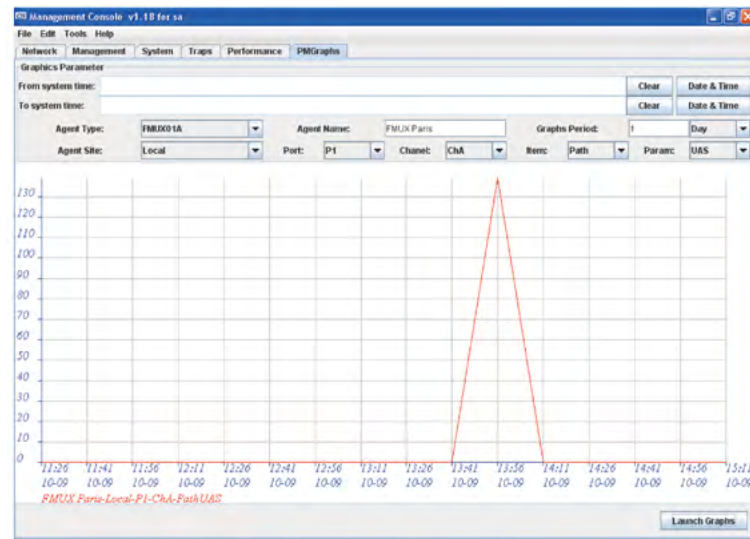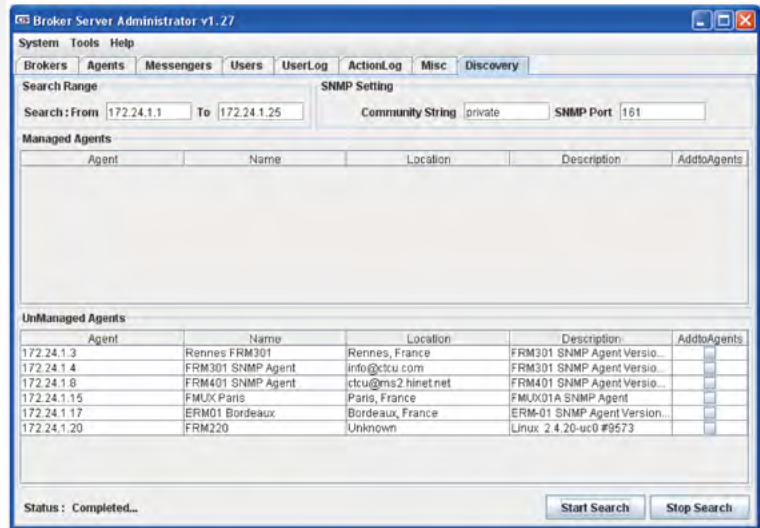
Performance Monitoring

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.

Alarms sent by E-mail & SMS

The EMS 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.
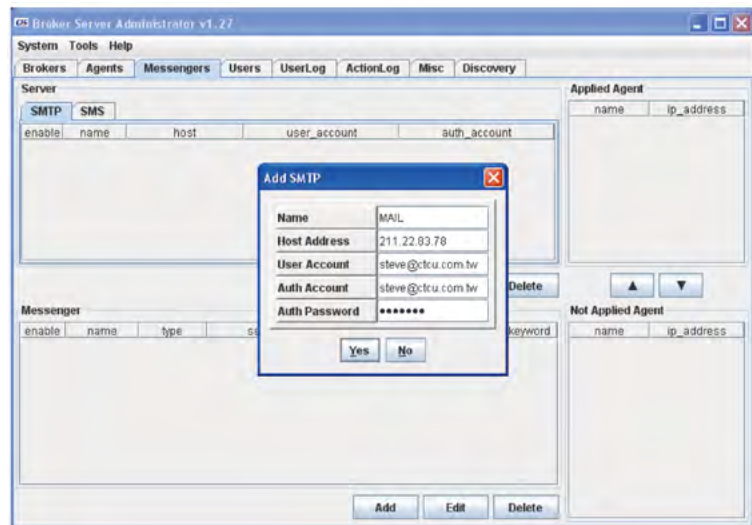
FRM220-NMC

Management System - Graphical User Interface

The Web GUI of FRM220-NMC behaves just like any other web based application. The following graphic (Figure 3.1) shows all of the areas that may be clicked for further configuration. Slots without any line card or without manageable line card will be shown as 'Empty'.
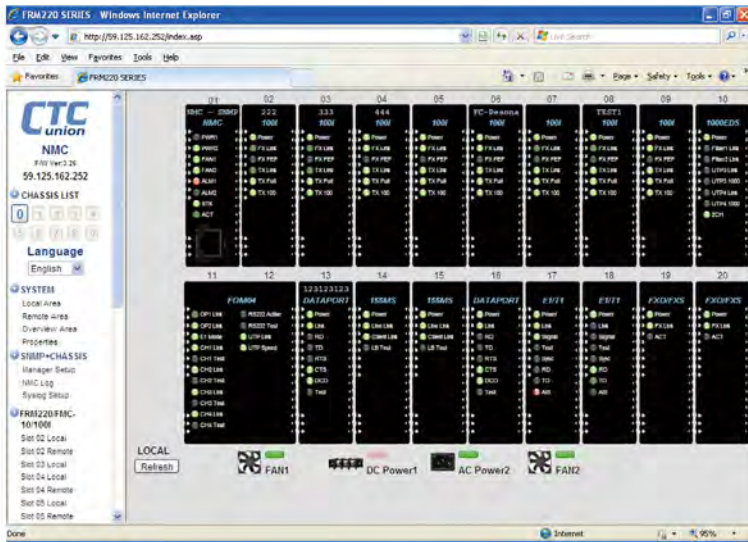
Figure 3.1 Selectable features of the Main Web GUI

Chassis List

Use the "Chassis List" control to select the chassis in the cascade group. Using only one IP address and one single point of management, up to 10 chassis (ID 0~9) can be managed.

Language

The NMC currently supports four different language interfaces; English, Simplified Chinese, Traditional Chinese and Japanese user interfaces.

System Information

Clicking on the "System" item will display an overview screen (Figure 3.2) that allows setting system information, TFTP kernel and file system update, date & time setting, and parameter management.

Figure 3.2 System Information

SNMP + Chassis

Click on "SNMP+Chassis" from the left hand window menu bar.

Header

The top header of Figure 3.3 displays the chassis ID (0 for the master chassis, 1~9 for cascaded slave chassis), the slot number for NMC is always 1, NMC is always in local and the version displayed in the format h/w-s/w. In the below example, the NMC hardware version is 1.0 while the software version is 3.263 and kernel build 14622.

Chassis Information

The Chassis Information group displays the power supply types and the power and fan status. There are slots for installing one or two power modules. They may hold either AC or DC type modules. Power 1 refers to the module installed in the left slot as viewed from the rear of the chassis, while Power 2 refers to the right slot. An OK status indicates the power module is working within normal parameters. Fan status is indicated with both the current RPM (speed) of the cooling fans and with a status of OK or Failed. If the RPM of the fan falls below 1650RPM, a failed status will be indicated

Figure 3.3 SNMP+Chassis Information

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FRM220-NMC | **7-7**

FRM220A - GSW/SNMP

Management System - Graphical User Interface

The Web GUI of FRM220A-GSW/SNMP behaves just like any other web based application. The following graphic (Figure 3.4) shows all of the areas that may be clicked for further configuration. Slots without any line card or without manageable line card will be shown as 'Empty'.

Figure 3.4 Selectable features of the Main Web GUI

Alias Configuration

The Alias panel configuration allows for up to 10 ASCII characters to describe each of the local twenty slots as well as remote in-band connected converters. The names are then displayed for each card on the home page graphic.

SNMP Configuration

Clicking on the "SNMP Configuration" item will display an overview screen that allows setting the SNMP system information(Figure 3.5), including enabling the mode, selecting SNMP version, setting up trap management and configuring community strings.

Balun

Modular Design
Cost-Effective Solution
Rack Mountable
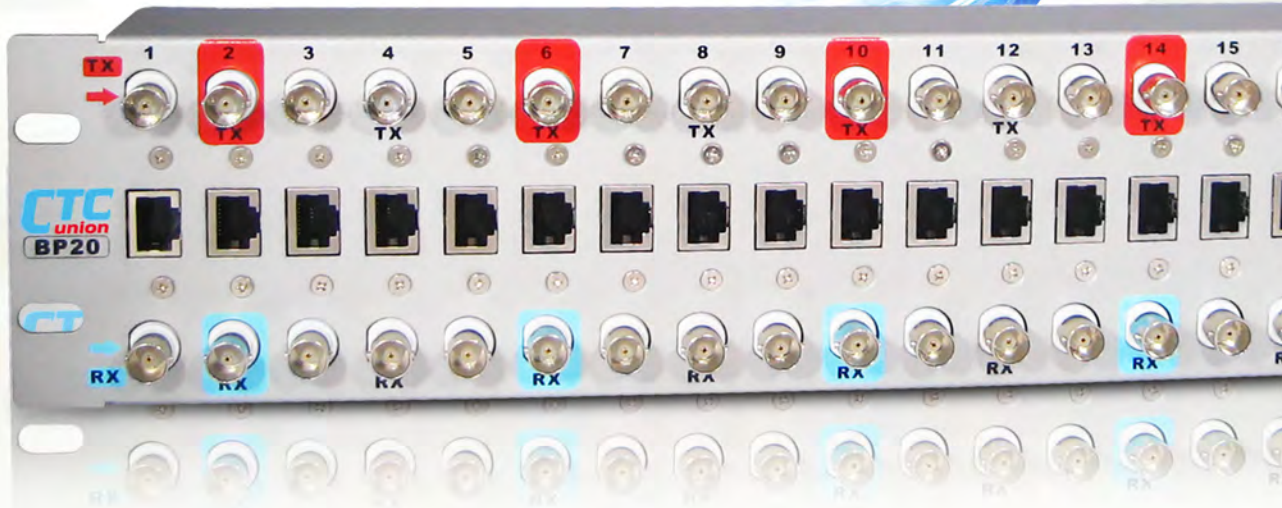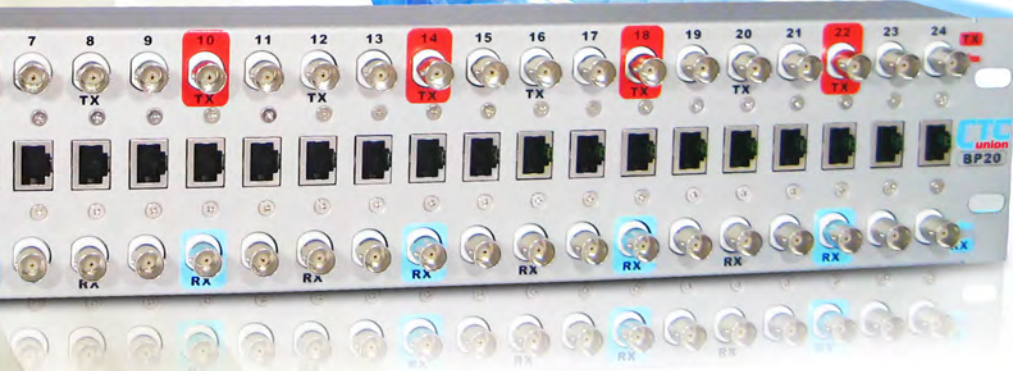
Coax to **Twisted Pair**

Balun Patch Panel

Mini Balun

BP20

24-port BNC to RJ45 E1 Balun Rack
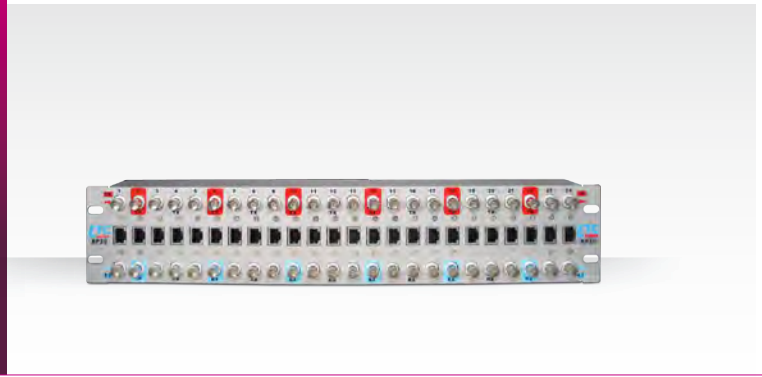
The ITU-T G.703 balun panel matches multiple sets of dual 75 ohm coax connections to multiple 120 ohm twisted pair connections, supporting data stream rates of 2-8 Mbps for E1 and E2. The patch panel bi-directionally matches not only signal impedance, but also the pulse shapes of the signals according 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℃ ~ 75℃
- ◆ Typical distance: 180m via Cat.5e cable

Specifications

Data Rate	2 to 8Mbit/s speed version for E1 , E2 data streams
Impedance	75 ohm to120 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

E1 120 ohms RJ45

E1 75 ohms BNC
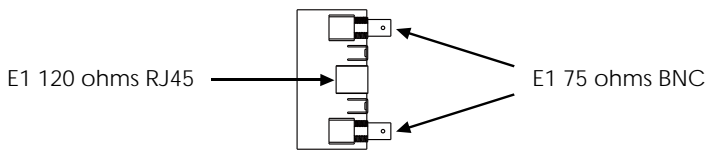
G.703 BALUN Pin Assignment

2
1
5
4
120Ω
120Ω
75Ω
75Ω
RJ45
BNC
RX
TX
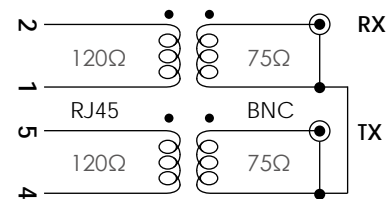
Ordering Information

Model Name	Description
BP20-CH	2U, 19" 24 ports G703 balun patch panel rack Fixed type G703 balun module not included
BP20-M01	1-port fixed type G703 Balun module Female BNC to STP RJ45 on the same side

BP20 – ▢▢
Example: BP20 – CH

BLN-3010 BLN-4010
BLN-5010 BLN-6010
G703 Mini Balun

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 ohm coax and 120 ohm twisted pair for E1(2048Kbps)
- 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	1.7cm x 1.6cm x 4.8cm (D x W x H)
Weight	15g
Compliance	ITU G.703 standard pulse
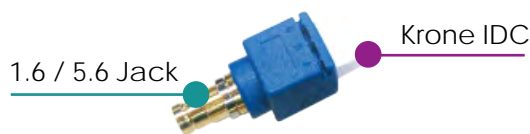
BLN-3010 : 1.6 / 5.6 Jack to Krone IDC

BLN-5010 : BT43 to Krone IDC

BLN-4010 : BNC 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-4010	75 ~ 120 ohm Balun, BNC/F 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 4.4 x 5.4 x 2.5cm (W x D x H) Balun-B1 2.2 x 5.6 x 2.1cm (W x D x H) Balun-P/S , Balun-P/S-2 2.2cm x 22.4cm x 2.1cm

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

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

Video Access Systems

Intelligent Video Capabilities

Blade Design for Space Saving

Outstanding H.264 Performance

H.264 DVS
Encoder & Decoder
Intelligent Digital Video Server
(iDVS)

NVR

NVR

IP Video Management Software

The CTC Union Network Video Recorder is a complete recording solution for CTC Union network cameras and video servers which is easy to use and install. It also supports multi brand and megapixel network cameras from other manufacturers such as AXIS, ACTi, SONY, Bosch, Arecont Vision, VIVOTEK, etc. The NVR always give you the same image quality as the original image from the camera or video server because it stores directly in digital format. NVR is also able to receive and record audio streams. The NVR provides Web browser viewing of video so no other viewing software needs to be installed on the remote viewing station.

Features

- Automatic disaster recovery of video data.
- Instant playback up to 512x times with video search function.
- Support mult-core CPU suitable for performance demanding tasks.
- Full remote control through Internet Explorer.

- Multi-layer central management architecture.
- Multiple polygon regions motion detection.
- Online system configuration change.
- Graphical activity diagram display in real-time.

Solution Architecture Overview
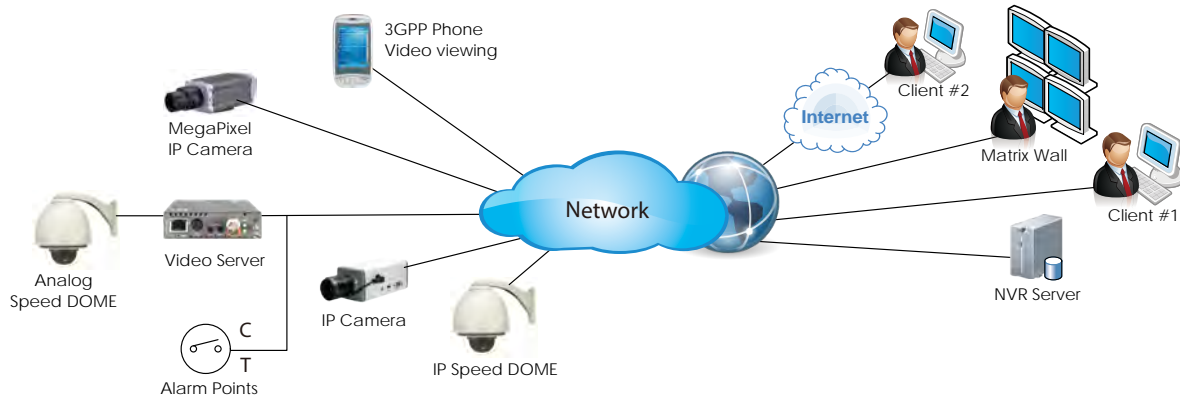
Central Management System – Multi-layered Architecture
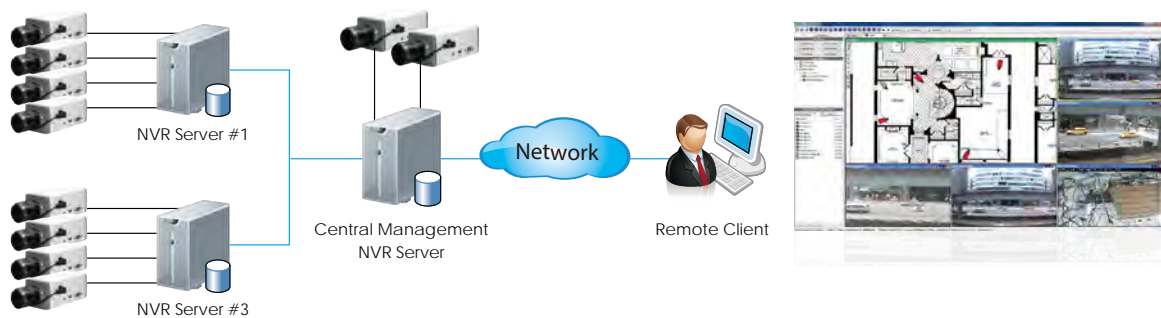
Specifications

	Professional	Intelligent	Panoramic
Instant playback	✓	✓	✓
512x Smart Search	✓	✓	✓
Full remote control & 3GPP	✓	✓	✓
Multiple monitor	✓	✓	✓
Central management & eMAP	✓	✓	✓
Software motion detection	✓	✓	✓
Visual tamper detection	✓	✓	✓
Object counting		✓	
Missing object/foreign object		✓	
Panorama view			✓
Panoramic digital PTZ			✓

Video Management Software Features

Display

Display mode	1, 2, 1+3, 1+4, 1+5, 1+7, 1+9, 1+11, 1+12, 1+15, 2x2, 3x3, 4x4, 5x5, 8x8, 16x16 maximum 256 views.
Digital PTZ	Digital pan-tilt zoom during live and playback. Support mouse wheel.
Instant playback	Switch to playback mode from live.
OSD	On Screen Display of meta-data information, including: timestamp, bps, Fps, playing state, recording status.
Tour	Sequence tour.
Multiple monitors	Maximum 6 monitors.

Recording and Playback

Speed	1/2/4/8/16/32/64/128/256/512x and slow motion peed control.
Frame-reduced recording	Record at a significantly low frame-rate when there is no event to extend storage usage.
Synchronized playback	25-channel synchronized playback at the same time . Also supported in remote console.
Graphical time-bar	Graphically displays video data/event/storage size/activity on time-bar.
Motion detection	Support both hardware and software-based motion detection.

Event and Trigger

Flexible policy engine	Allow any logic combination (AND/OR) of conditions to trigger predefined actions.
Trigger conditions	Trigger conditions include: system start, configuration change, video loss, DI/DO change, recording changed, alarm, and motion
Event log	Triggered event will be recorded into an event log.
E-mail with split-view	Email notification with snapshot aggregating multiple channels in a split-view image.

Export Function

Export to AVI	Export video clips to AVI format
Export footage	Export multiple channels in to single file.

eMap

eMap manager	Intuitivelynavigating (pan-tilt-zoom) to cameras. Edits map and choose arbitrary location and angle of a camera icon which reflects the camera situation in real-time.
Google map	Integrate with Google map.
eMap control and monitor	Control DI/DO, monitor and manage device status, and process alarm directly on eMap.

Remote and Mobile Functions

3GPP mobile device	Live video streaming to 3GPP mobile device.
Remote client application	Perform live viewing, playback, and all other features through remote client application.
Internet Explorer	Perform all features through remote Internet Explorer.

Central Management

Multi-site management	Connect to multiple servers to perform all kinds of remote tasks.
Live and playback	Allow live viewing and playback search on all managed servers.
Integrated security	Automatically synchronize all user credentials and permissions among managed servers.
Multi-layered structure	Allow multiple-layer of management servers to increase manageability and flexibility.
Remote control	Remotely control the central server with full functions.

PTZ Control

PTZ management	Manage pan, tilt, zoom operation with speed control.
Preset position	Go to, set, clear preset positions and patrol on preset positions.
Mouse PTZ	On-Screen pan-tilt-zoom with mouse and wheel operation.

Security

Multi-level permission	Unlimited levels of permission to set group according to required functions
User right control	Account/password defined with associated permission control
Digital watermarking	Protect and detect video data against digital tampering.

9

NVR

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NVR | **9-3**

IPS20

2U 20 - Slot Blade Chassis

The CTC Union IPS20 is a 2U 19" rack with 20 slots for holding up to 20 interchangeable and hot-swappable CTC Union blades such as Digital Video Encoder, Decoder and Fiber Media Converter. The power modules are designed for redundant power supply capability for reliable and professional installation. The IPS20 gives flexibility, scalability, and functionality to construct a multi-task system.

Features

- ◆ 2U 19" 20 slots Chassis with AC/DC power redundancy
- ◆ Chassis mainboard consists of passive components
- ◆ All modules and cards support hot-swap function

- ◆ Supports Intelligent Digital Video Server blade card
- ◆ Supports H.264 Digital Video Encoder and Decoder blade card
- ◆ Support Fiber Media Converter series product

Specifications

Physical	Dimension	303 x 438 x 88mm (W x D x H)
Specifications	Weight	5.2kg without power supply
Power Characteristics	AC	100 ~ 240VAC
	DC24	18 ~ 36VDC
	DC48	36 ~ 75VDC

Environmental	Operating	-10 ~ 60℃
Specifications	Storage	-20 ~ 70℃
	Relative humidity	10% ~ 90% non-condensing
	Predicted MTBF	75,000 hrs
Certification	FCC class A, VCCI class A, CE, RoHS	

20-Slot Blade Platform

Technologies Supported:

- ● DVS-8501E blade Card(1-slot, 1-ch H.264 digital video encoder)
- ● DVS-8501E-H blade Card (2 slots, 1-ch H.264 digital video encoder with hard disk interface)
- ● DVS-8501D blade Card (1 slot, 1-ch H.264 digital video decoder)
- ● iDVS-01 blade Card(2 Slots Intelligent video server for Surveillance and Transportation applications)
- ● Fiber Media Converter series products. (Refer to FRM220 series)

Thermal fan holes

Chassis backplane consists of passive components

Hot swappable cooling fans

Single or optional redundant power supply
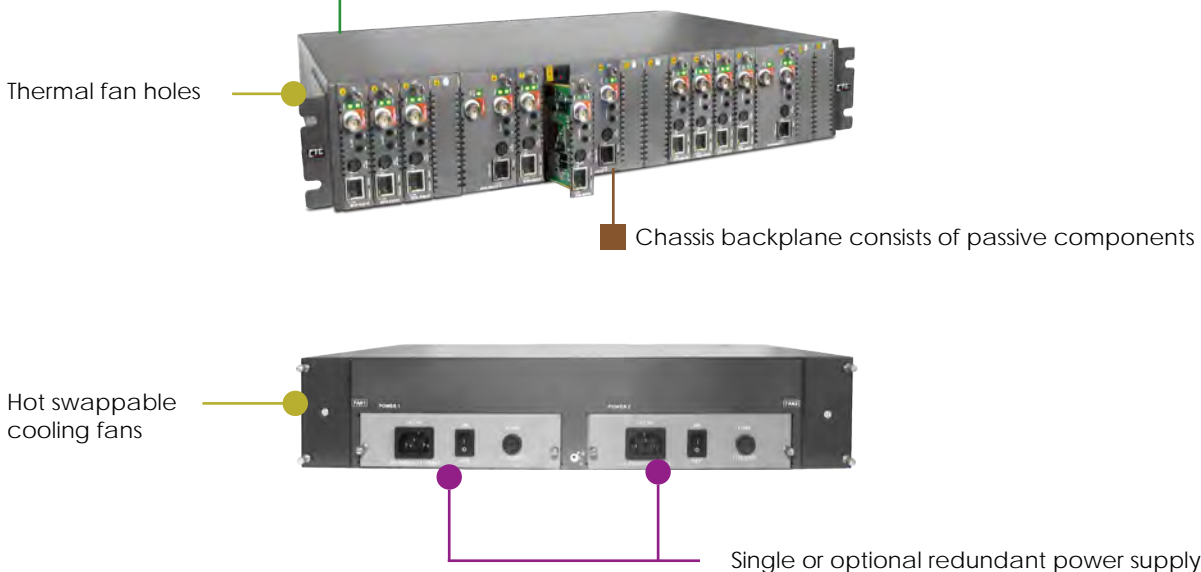
Video Server Modules

DVS-8501E

1 Channel Digital Video Encoder

Features :

- H.264/ M-JPEG Video Compression
- Up to D1 resolution @ 30FPS,(NTSC) @ 25FPS (PAL)
- 1 Video in, 1 audio in/out
- 1 Digital Input/ 1 Digital Output
- 1xRS-485(DB9 interface)
- Pelco D, P PTZ Protocol

DVS-8501E-H

1 Channel Digital Video Encoder with H.D.D Interface

Features :

- Supports 2.5" SATA hard-disk tray for local storage
- H.264/ M-JPEG Video Compression
- Up to D1 resolution @ 30FPS,(NTSC) @ 25FPS (PAL)
- 1 Video in/out (loop), 1 Audio in/out
- 1 Digital Input/ 1 Digital Output
- 1xRS-485(DB9 interface)
- Pelco D, P PTZ Protocol

DVS-8501D

1 Channel Digital Video Decoder

Features :

- Complies with H.264 compression
- Provides high quality analog video and audio decoding
- Programmable sequence mode for multiple video sources
- Decodes video source up to 64CH
- Supports two-way audio

Fiber Media Converter

Features :

- Supports FRM220 Fast Ethernet and Gigabit Ethernet series slide-in card
- Increase surveillance platform transmission capability
- Allows network administrators to deploy the chassis in wide range of network
- Easy to build flexible and scalable network infrastructure

iDVS-01

1 Channel H.264 Intelligent Digital Video Encoder

Features :

- Multiple H.264 streams
- D1 resolution @ 30FPS(NTSC), @ 25FPS (PAL)
- 1 video in / out, 1 audio in / out
- Built-in Web server for management
- Supports HTTPS and password protection
- Supports logic (AND / OR) event alarms
- Supports two-way audio
- 1 Digital Input / 1 Digital Output

Intelligent function
- Tripwire Detection
- Intrusion Detection
- Virtual Fence Detection
- Missing Left Detection (option)
- Abandoned Objects Detection
- Video Loss Detection
- Scene change Detection (option)

Application

Centralized Application

FIBER
Coaxial Cable

NVR / CMS
Control Room

L2 Ethernet Switch
GSW-3424M1

DVS-8501E card inserts
into IPS20 Chassis

Analog Cameras
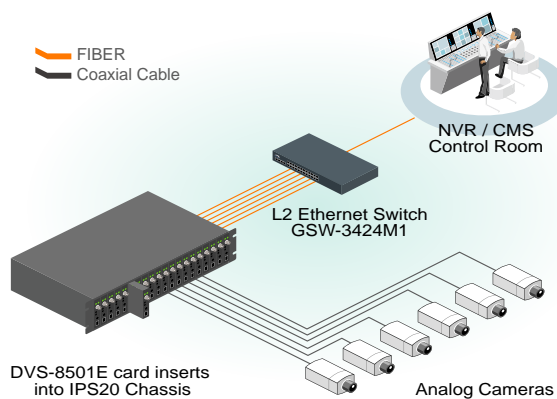
Hybrid Video Application

FIBER
PoE Ethernet
Coaxial Cable

NVR / CMS
Control Room

L2 Ethernet Switch
GSW-3424M1

PoE Switch

PoE IP Cameras

Media Convert cards insert
into IPS20 Chassis

DVS-8501E

Analog Cameras
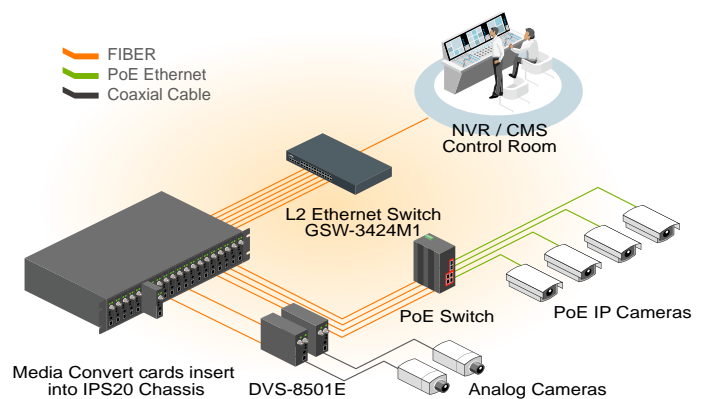
Ordering Information

Model Name	Type	Description
IPS20	Chassis	2U, 19" 20-Slot Blade Chassis
IPS20-AC	Power	100 ~ 240VAC power supply module
IPS20-DC24	Power	18 ~ 36 VDC power supply module
IPS20-DC48	Power	36 ~ 72 VDC power supply module

IPS20 – ☐☐☐☐
Example: IPS20 – DC24

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9

Chassis

Video Access System Blade Card Chassis

CTC Union's Video Access System is a highly efficient system based on a universal blade design. The high quality H.264 DVS (Digital Video Server) can provide full D1 resolution with 30/25 (NTSC/PAL) FPS.

DVS blades can fit in IPS series racks together with CTC Union's FRM fiber series blades to form a complete and multi-functional solution. The hot swappable blades also enable a quick replacement of internal drives for lower maintenance cost and less Mean Time To Repair.

The risk of video data loss resulting from transmission or central system error will never be a trouble again. CTC Union's DVS series provides unique and powerful local storage capability to minimize this kind of risk, thanks to CTC Union's modular blades design. Now customers can build up an IP surveillance system according to the exact channels they want. By using the 1 channel single blades design, customers have the best flexibility and scalability ever! In addition to DVS, As for the monitoring and recording tasks, CTC Union's high performance NVR (Network Video Recorder) can provide a convenience and easy-to-use platform for analyzing, distributing, and managing image data.

CTC Union is dedicated to providing our customers the most efficient way to build up a system and create value!

IPS01

1 - Slot H.264 Digital Video Encoder / Decoder Chassis

The CTC Union IPS01 is a single slot rack for holding one CTC Union blades such as Digital Video Encoder and Fiber Media Converter. The built-in power module is designed for convenience and professional installation. The IPS01 gives flexibility, scalability, and functionality to make a high performance standalone.

Features

- ◆ 1-slot chassis for encoder, decoder line cards.
- ◆ Available in six types: external power adapter or power built-in AC, DC, AC+DC, AC+AC or DC+DC.
- ◆ Fanless

1 slot Multi-service Platform Technologies Supported
- ◆ DVS-8501E (1-slot, 1-ch H.264 digital video encoder)
- ◆ DVS-8501D blade Card (1-slot, 1-ch H.264 digital video decoder)
- ◆ Fiber Media Converter series products. (Refer to FRM220 series)

- ◆ Dimensions :
  external power 139 x 88 x 24mm (D x W x H)
  internal power 180 x 135 x 30mm (D x W x H)1 slot Multi-service

Power Input : Power adapter
- ◆ Input voltage : 100 ~ 240VAC 50/60Hz
- ◆ Output voltage :12VDC 1A
- ◆ AC power : 100 ~ 240VAC
- ◆ DC power : 24VDC, 48VDC, 72VDC

Ordering Information

Model Name	Description
IPS01	1 Slot Chassis with 100 ~240VAC to 12VDC adpator
IPS01-AC	1 Slot Chassis with 100 ~240VAC Power
IPS01-DC	1 Slot Chassis with 18 ~75VDC Power
IPS01-AD	1 Slot Chassis with 100~240VAC + 18 ~75VDC Power

IPS01 – ☐☐
Example: IPS01 – AC

IPS02

2 - Slot H.264 Digital Video Encoder / Decoder Chassis

The CTC Union IPS02 is a 2-slot rack for holding up to 2 interchangeable and hot-swappable CTC Union blades such as Digital Video Server and Fiber Media Converter. The IPS02 gives flexibility, scalability, and functionality to make a high performance standalone device.

Features

- 2-slot chassis for encoder, decoder line cards
- Supports either one or two single width blades or one double width blade.

2-slot Multi-service Platform Technologies Supported
- DVS-8501E (1-slot, 1-ch H.264 digital video encoder)
- DVS-8501E-H Blade Card (2-slot, 1-ch H.264 digital video encoder w/ hard disk)
- DVS-8501D Blade Card (1-slot, 1-ch H.264 digital video decoder)
- Fiber Media Converter series products. (Refer to FRM220 series)

- Power type: external power adapter
- Fanless
- Dimensions: 139 x 88 x 44.5mm (D x W x H)

Power Input : Power adapter
- Input voltage : 100 ~ 240VAC 50/60Hz
- Output voltage : 12VDC 2A

Ordering Information

Model Name	Description
IPS02-DC12-1	2 slot Chassis with 100 ~240VAC to 12VDC adpator(1 DC Jack)
IPS02-DC12-2	2 slot Chassis with 100 ~240VAC to 12VDC adpator(2 DC Jack)

IPS02-DC12 – ☐
Example: IPS02-DC12 – 1

IPS04

4 - Slot H.264 Digital Video Encoder / Decoder Chassis

The CTC Union IPS04 is a 4-slot rack for holding up to 4 interchangeable and hot-swappable CTC Union blades such as Digital Video Server and Fiber Media Converter. The IPS04 gives flexibility, scalability, and functionality to help construct a multi-task system.

Features

- Four slots chassis for encoder, decoder line cards
- Supports one to four single width blades or two double width blades.

4-slot Multi-service Platform Technologies Supported
- DVS-8501E (1-slot, 1-ch H.264 digital video encoder)
- DVS-8501E-H Blade Card 2-slot, 1-ch H.264 digital video encoder w/hard disk)
- DVS-8501D Blade Card (1-slot, 1-ch H.264 digital video decoder)
- Fiber Media Converter series products. (Refer to FRM220 series)

- Fanless
- Dimension : 162 x 87 x 88mm (D x W x H)

Power Input : Power adapter
- Input voltage : 100 ~ 240VAC 50/60Hz
- Output voltage :12VDC 3A
- AC power : 100 ~ 240VAC
- DC power : 24VDC, 48VDC, 72VDC

9

Chassis

Ordering Information

Model Name	Description
IPS04	4 slot Chassis with 100 ~240VAC to 12VDC adpator

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IPS02 , IPS04 **9-7**

DVS-8501E

1- Ch H.264 Digital Video Encoder

CTC Union DVS-8501E Video Encoder Blade is a 1-ch video encoder provides H.264 & M-JPEG cutting edge video compression technologies. It can deliver multiple or individual configurable video streams simultaneously with full D1 resolution at 30/25 (NTSC/PAL) FPS and remote monitoring. This means that several video streams can be configured with different resolutions, frame rates and bit rate for different needs. The DVS-8501E can also provide dual-stream transmissions for recording and monitoring. The web management offers the convenience user access to detailed alarm detection and actions. When the DVS-8501E blades are used with CTC IPS series racks, this combination can effectively convert the analog security systems to high efficient performance IP based solution.

Features

- ◆ Dual H.264 streams
- ◆ D1 resolution @ 30FPS,(NTSC) @ 25FPS (PAL)
- ◆ 1 video in, 1 audio in / out
- ◆ Built-in Web server for management
- ◆ Supports HTTPS and password protection
- ◆ Provides main and sub video streams with different resolution

- ◆ Supports logic (AND / OR) event alarms
- ◆ Supports two-way audio
- ◆ 1 Digital Input / 1 Digital Output connections
- ◆ Supports privacy mask
- ◆ Fan less design

DVS 8501E Rack Solution

DVS 8501E Stand-Alone Solution

Specifications

Video Compression	H.264/M-JPEG	PTZ Patrol	4 Tour mode (Each mode has 10 positions)
Video Stream	Main Stream, Sub stream (Main Stream to select D1 or 4CIF)(Slave stream only to select CIF or QCIF)	Remote Management	Web (CGI)
		Dimension	Line card type: 88 x 137 x 20.8mm (W x D x H)
Video Resolutions	D1: 720x480(NTSC)/720x576(PAL) 4CIF: 704x480(NTSC)/704x576(PAL) 2CIF: 704x240(NTSC)/704x288(PAL) CIF: 352x240(NTSC)/352x288(PAL) QCIF: 176x120(NTSC)/176x144(PAL)	Operating condition	-10 ~ 60 degree (Celsius)
		Storage condition	-20 ~ 85 degree (Celsius)
		Operating Humidity	0 ~ 95% (non-condensing)
		Power Input	12VDC, 1A
		System Reset	Reset button (factory default)
Operating System	Embedded Linux	LED Indications	Power, LAN, video status
Video Frame Rate	1 ~ 30 FPS	Motion Detection	Drag and drop configurable detection windows
Video Quality	5 levels (Medium, standard, good, detailed, excellent), Auto	Configuration Backup / Recovery	Web browser
Video Input	1, BNC, 75 ohm, 1 Vp-p	Firmware Upgrade	Web browser
Network Connector	RJ-45, IEEE 802.3 10Base-T, 802.3u 100Base-TX	NTP	Sync with PC, Sync with NTP server, Manual
Network Protocols	TCP, UDP, IP, ICMP, PPPoE, ARP, UPnP, HTTP, HTTPS, FTP, SMTP, DHCP, DNS, DDNS, RTP, RTSP, NTP	Video Adjustment	Brightness, contract, saturation, color tone level
		User Account	Up to 10 user accounts for configurable
Audio Inputs	1 channel audio, Microphone in	Event Action	FTP, E-mail, DO1, SMS, remote storage, PTZ preset
Audio Output	1 channel audio, Line out	Event Sending Path	FTP; E-mail (forwarding JPEG picture)
Audio Compression	ADPCM G.711	Digital Zoom	4x
Audio Stream	Two-way (H.264 only)	Snapshot	Live view mode (JPEG format)
Input / Output Signal	6V p-p, +10dBm max	Event Define	User define video frame rate and video resolution and video quality when alarm input and motion detection
Input / Output Impedance	600 ohms		
Terminal Block	1xRS-485 (DB9 interface), 1 alarm input, 1 alarm output	Text Overlay	Configurable text color, background color, date/time, display position
PTZ Protocol	Pelco D, P	Privacy Mask	Support 3 privacy mask window
PTZ Baud Rate	2400, 4800, 9600, 12800, 19200 Kbps	System Language	English, Simplified Chinese, Traditional Chinese
PTZ Control Speed	Pan, Tilt, Zoom, Focus, Iris	Log	System log, operating log
PTZ Preset	32 Preset positions	NVR Support	CTC Union , NUUO

DIMENSION DIAGRAM

Ordering Information

Model Name	Description
DVS-8501E	1-Ch H.264 Digital Video Encoder

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DVS-8501E | **9-9**

9

Digital Video Server

DVS-8501E-H

1- Ch H.264 Digital Video Encoder w / Internal SATA Interface

CTC Union DVS-8501E-H Video Encoder Blade is a 1-ch video encoder provides H.264 & M-JPEG high performance video compression technologies. It can deliver multiple or individual configurable video streams simultaneously with full D1 resolution at 30/25 (NTSC/PAL) FPS and remote monitoring. The DVS-8501E-H can also provide dual-stream transmissions for recording and monitoring. The built-in SATA interface enables powerful storage capability for the DVS-8501E-H to do the video streaming transmission and local storage at the same time. The web management offers the user convenience access to detailed alarm detection and actions. When DVS-8501E blades are used with CTC IPS series racks with various channels choices, this combination can effectively convert the analog security systems to high performance IP based solution.

Features

- Dual H.264 streams
- D1 resolution @ 30FPS(NTSC), @ 25FPS (PAL)
- 1 video in / out, 1 audio in / out
- Built-in Web server for management
- Supports HTTPS and password protection
- Supports 2.5" SATA DH/SSD tray for local storage

- Provides main and sub video streams with different resolution
- Supports logic (AND / OR) event alarms
- Supports two-way audio
- 1 Digital Input / 1 Digital Output connections
- Supports privacy mask
- Fan less design

DVS 8501E-H Rack Solution
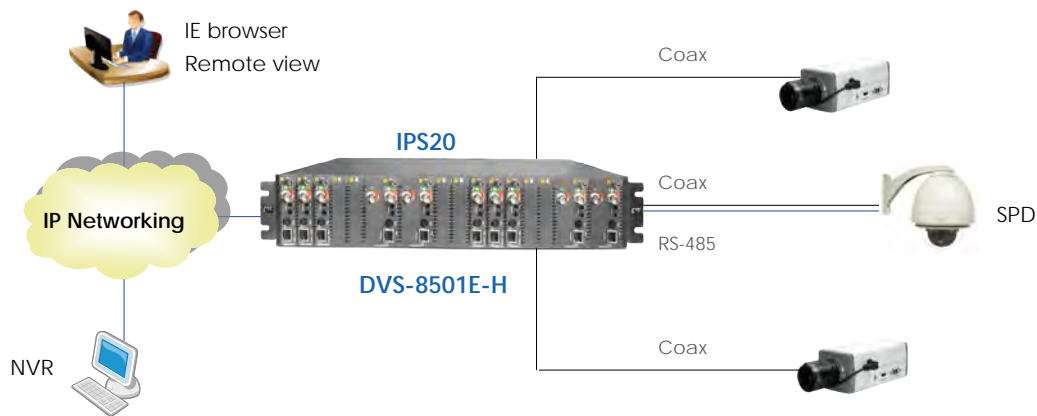
DVS 8501E-H Stand-Alone Solution

Specifications

Video Compression	H.264/M-JPEG	PTZ Patrol	4 Tour mode (Each mode has 10 positions)
Video Stream	Main Stream, Sub stream (Main Stream to select D1 or 4CIF) (Slave stream only to select CIF or QCIF)	Remote Management	Web (CGI)
		Dimension	Line card type: 88 x 139 x 42.1mm (W x D x H)
Video Resolutions	D1: 720x480(NTSC)/720x576(PAL) 4CIF: 704x480(NTSC)/704x576(PAL) 2CIF: 704x240(NTSC)/704x288(PAL) CIF: 352x240(NTSC)/352x288(PAL) QCIF: 176x120(NTSC)/176x144(PAL)	Operating condition	-10 ~ 60 degree (Celsius)
		Storage condition	-20 ~ 85 degree (Celsius)
		Operating Humidity	0 ~ 95% (non-condensing)
		Power Input	12VDC, 2A
		System Reset	Reset button (factory default)
Operating System	Embedded Linux	LED Indications	Power, LAN, video status
Video Bit Rate	32K/64K/128K/256K/384K/512K/768K/1024K/1.5M/2M	Motion Detection	Drag and drop configurable detection windows
		Configuration Backup / Recovery	Web browser
Video Frame Rate	1 ~ 30 FPS		
Video Quality	5 levels (Medium, standard, good, detailed, excellent), Auto	Local Storage	2.5" SATA HDD *1 (Hard drive is not include)
		Firmware Upgrade	Web browser
Video Input	1, BNC, 75 ohm, 1 Vp-p	NTP	Sync with PC, Sync with NTP server, Manual
Video Output	1, BNC, 75 ohm, 1 Vp-p	Video Adjustment	Brightness, contract, saturation, color tone level
Network Connector	RJ-45, IEEE 802.3 10Base-T, 802.3u 100Base-TX	User Account	Up to 10 user accounts for configurable
Network Protocols	TCP, UDP, IP, ICMP, PPPoE, ARP, UPnP, HTTP, HTTPS, FTP, SMTP, DHCP, DNS, DDNS, RTP, RTSP, NTP, IGMP	Event Action	FTP, E-mail, DO1, SMS, remote storage, PTZ preset
		Event Sending Path	FTP; E-mail (forwarding JPEG picture)
Audio Inputs	1 channel audio, Microphone in	Digital Zoom	4x
Audio Output	1 channel audio, Line out	Snapshot	Live view mode (JPEG format)
Audio Compression	ADPCM G.711	Playback	Playback via IE browser
Audio Stream	Two-way (H.264 only)	Event Define	User define video frame rate and video resolution and video quality when alarm input and motion detection
Input / Output Signal	6V p-p, +10dBm max		
Input / Output Impedance	600 ohms		
Terminal Block	1xRS-485 (DB9 interface), 1 alarm input, 1 alarm output	Text Overlay	Configurable text color, background color, date/time, display position
PTZ Protocol	Pelco D, P	Privacy Mask	Support 3 privacy mask window
PTZ Baud Rate	2400, 4800, 9600, 12800, 19200 Kbps	System Language	English, Simplified Chinese, Traditional Chinese
PTZ Control Speed	Pan, Tilt, Zoom, Focus, Iris	Log	System log, operating log
PTZ Preset	32 Preset positions	NVR Support	CTC Union , NUUO

DIMENSION DIAGRAM

Ordering Information

Model Name	Description
DVS-8501E-H	1-Ch H.264 Digital Video Encoder with Internal SATA Interface

Specifications & design are subject to change without prior notice. Please visit CTC Union website for more details.
CTC UNION TECHNOLOGIES CO., LTD.   www.ctcu.com
DVS-8501E-H | 9-11

9

Digital Video Server

DVS-8504E-H

4 - Ch H.264 Digital Video Encoder w / Internal SATA Interface

CTC Union DVS-8504E-H is a standalone H.264 video encoder. It can connect up to 4 analog video cameras and transfer these streams from analog format to digital format simultaneously through H.264 video compression technology. The DVS-8504E-H provides high resolution and various video layouts from 1CH/ D1 to 4CH/ CIF and can also delivers multiple or individual configurable video streams at the same time. The DVS-8504E-H can be also provides dual-stream transmissions for recording and monitoring. The built-in SATA interface enables powerful storage capability for the DVS-8504E-H to do the video streaming transmission and local storage at the same time. The web management offers the user convenience access to detailed alarm detection and actions. CTC Union DVS-8504E-H provides an easy way to migrate the analog system to high performance IP based solution.

Features

- Dual H.264 streams
- D1 resolution @ 30FPS, CIF resolution@120FPS
- 1-CH D1 / 2-CH 2CIF / 4-CH CIF
- Built-in Web server for management
- Supports HTTPS and password protection
- Supports 3.5" SATA HD/SSD tray for local storage
- Provides main and sub video streams with different resolution
- Supports logic (AND / OR) event alarms
- Supports two-way audio
- 4 Digital Input / 2 Digital Output connections
- Supports privacy mask
- Fan less design
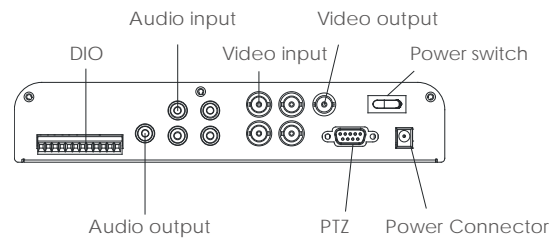
DVS 8504E-H CIF Resolution Application
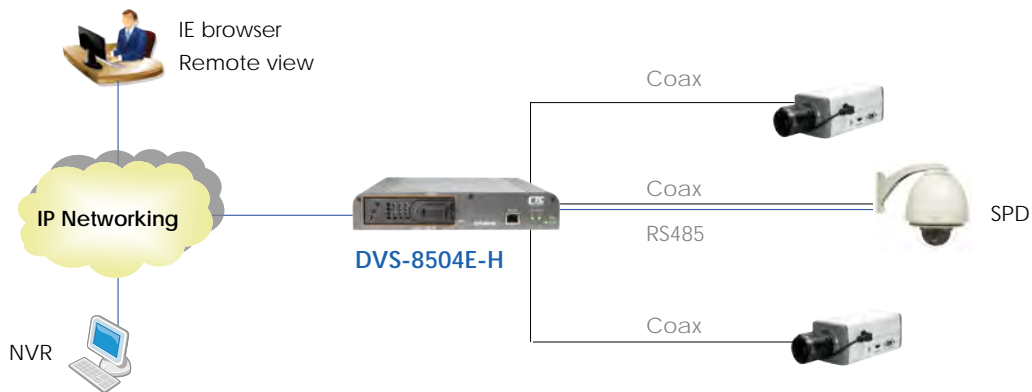
DVS 8504E-H D1 Resolution Application

Specifications

Video Compression	H.264/M-JPEG		PTZ Patrol	4 Tour mode (Each mode has 10 positions)
Video Stream	"Main Stream, Sub stream (Main Stream to select D1 or 4CIF) (Slave stream only to select CIF or QCIF) "		Remote Management	Web (CGI)
			Dimension	Line card type: 238 x 257.4 x 44mm (W x D x H)
Video Resolutions	"D1: 720x480(NTSC)/720x576(PAL) 4CIF: 704x480(NTSC)/704x576(PAL) 2CIF: 704x240(NTSC)/704x288(PAL) CIF: 352x240(NTSC)/352x288(PAL) QCIF: 176x120(NTSC)/176x144(PAL)"		Operating condition	-10 ~ 60 degree (Celsius)
			Storage condition	-20 ~ 85 degree (Celsius)
			Operating Humidity	0 ~ 95% (non-condensing)
			Power Input	12VDC, 2A
			System Reset	Reset button (factory default)
Operating System	Embedded Linux		LED Indications	Power, LAN, video status
Video Bit Rate	32K/64K/128K/256K/384K/512K/768K/1024K/1.5M/ 2M		Motion Detection	Drag and drop configurable detection windows
			Configuration Backup / Recovery	Web browser
Video Frame Rate	1 ~ 30 FPS		Local Storage	3.5" SATA HDD *1 (Hard drive is not include)
Video Quality	5 levels (Medium, standard, good, detailed, excellent), Auto		Firmware Upgrade	Web browser
			NTP	Sync with PC, Sync with NTP server, Manual
Video Input	4, BNC, 75 ohm, 1 Vp-p		Video Adjustment	Brightness, contract, saturation, color tone level
Video Output	"1, BNC, 75 ohm, 1 Vp-p (D1/4CIF supported full screen, 2CIF/CIF supported quad mode)"		User Account	Up to 10 user accounts for configurable
			Event Action	FTP, E-mail, DO1, DO2, SMS, local storage, remote storage,PTZ preset
Network Connector	RJ-45, IEEE 802.3 10Base-T, 802.3u 100Base-TX		Event Sending Path	FTP; E-mail (forwarding JPEG picture)
Network Protocols	TCP, UDP, IP, ICMP, PPPoE, ARP, UPnP, HTTP, HTTPS, FTP, SMTP, DHCP,DNS, DDNS, RTP, RTSP, NTP		Digital Zoom	4x
			Snapshot	Live view mode (JPEG format)
Audio Inputs	4 channels mono audio (RCA)		Playback	Playback via IE browser
Audio Output	1 channel mono audio (RCA)		Event Define	User define video frame rate and video resolution and video quality when alarm input and motion detection
Audio Compression	ADPCM G.711			
Audio Stream	Two-way (H.264 only)			
Input / Output Signal	6V p-p, +10dBm max		Text Overlay	Configurable text color, background color, date/ time, display position
Input / Output Impedance	600 ohms		Privacy Mask	Support 1 privacy mask window
Terminal Block	1xRS-485 (DB9 interface), 4 alarm input, 2 alarm output		System Language	English, Simplified Chinese, Traditional Chinese
			Log	System log, operating log
PTZ Protocol	Pelco D, P		NVR Support	CTC Union , NUUO
PTZ Baud Rate	2400, 4800, 9600, 12800, 19200 Kbps			
PTZ Control Speed	Pan, Tilt, Zoom, Focus, Iris			
PTZ Preset	32 Preset positions			

DIMENSION DIAGRAM

238 mm

257.40mm

4.44mm

Hard drive

Network Connector
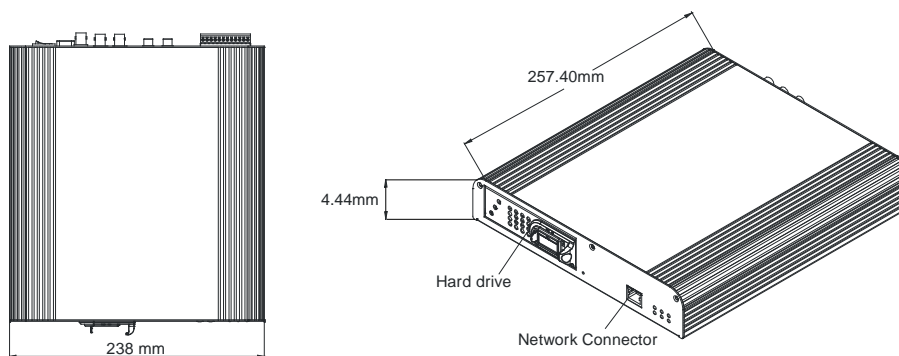
Ordering Information

Model Name	Description
DVS-8504E-H	4-Ch H.264 Digital Video Encoder with Internal SATA Interface

Specifications & design are subject to change without prior notice. Please visit CTC Union website for more details.
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DVS-8504E-H | **9-13**

DVS-8501D

1- Ch H.264 Digital Video Decoder

CTC Union DVS-8501D is a 1-ch video decoder with cutting edge H.264 video compression technology compatible with the CTC Union H.264 video encoders. It enables convert the digitalized video data back to analog format for various back-side devices such as TV wall, legacy DVR, and Joysticks. The DVS-8501D can decode video source up to 64 channels. When DVS-8501D blades are used with CTC IPS series racks with various channels choices, the DVS-8501D can become standalone type with VGA port for LCD monitor video output or rack type for professional installation in the control room.

Features

- Complies with H.264 compression technology
- Provides high quality analog video and audio decoding
- Programmable sequence mode for Dual video sources
- Decodes video source up to 64 channels (Sequence display mode)
- Built-in Web server for easy management

- Supports secure management and encrypted video streams
- VGA port for stand-alone type (DVS-8501DV only)
- Supports two-way audio
- Card fits in one-slot or 20-slot chassis

DVS 8501D Rack Solution
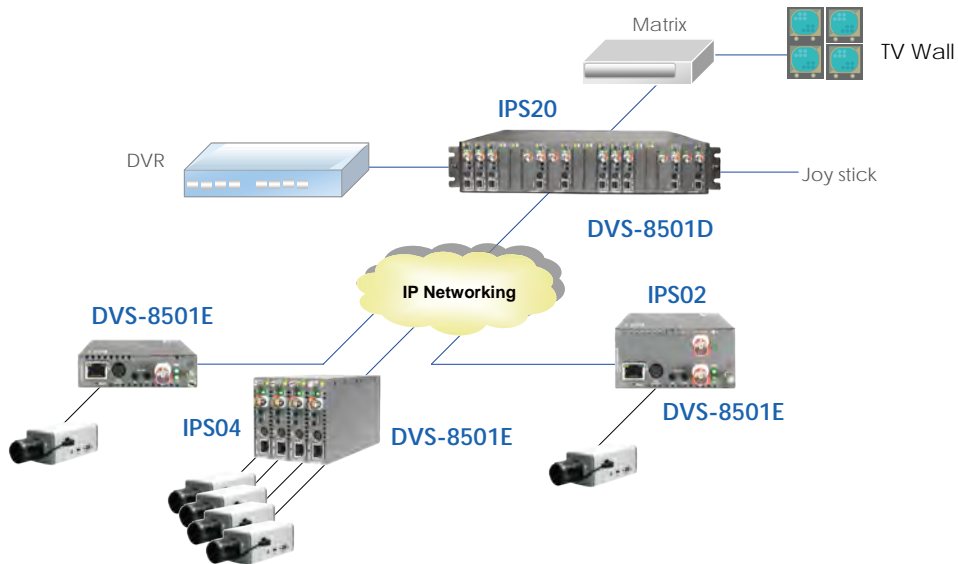
DVS 8501D Stand-Alone Solution
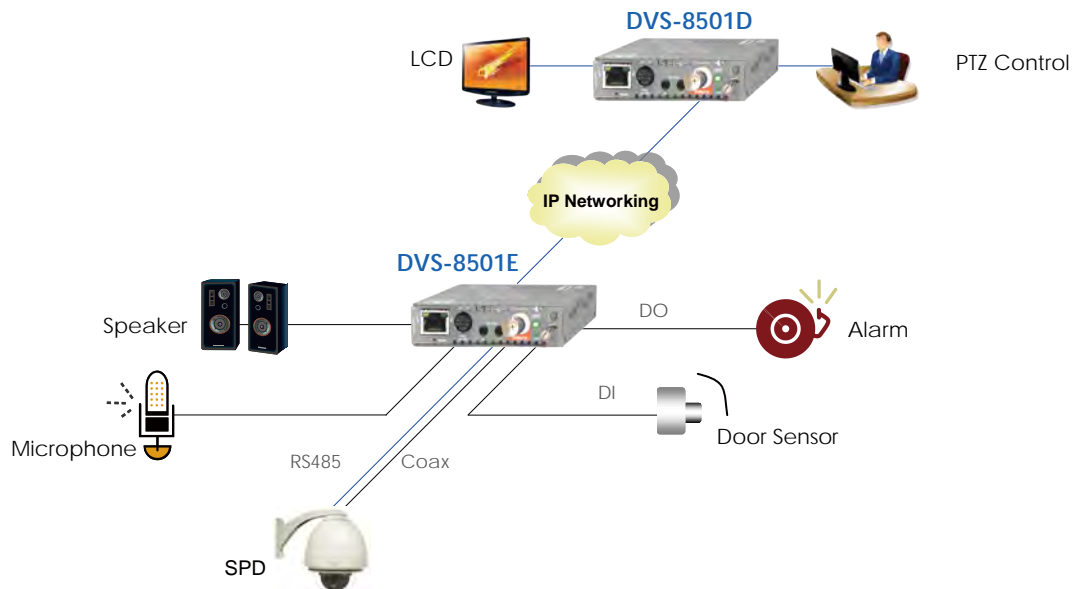
Specifications

Video Decoding	H.264 video with resolution up to D1	Remote Management	Web (CGI)
	64 different video sources	Network Connector	RJ-45, IEEE 802.3 10Base-T, 802.3u 100Base-TX
	(support manual cycling , automatic cycling)	Network Protocols	TCP, UDP, IP, ICMP, PPPoE, ARP, UPnP, HTTP, HTTPS, FTP, SMTP, DHCP,
Video Resolutions	D1 720x480(NTSC)/720x576(PAL)		DNS, DDNS, RTP, RTSP
	4CIF: 704x480(NTSC)/704x576(PAL)	System Configuration	Backup and recovery all setting via web browser operation
	2CIF 704x240(NTSC)/704x288(PAL)		
	CIF 352x240(NTSC)/352x288(PAL)	Firmware Upgrade	Web browser
	QCIF 176x120(NTSC)/176x144(PAL)	User Interface Language	English, Simplified Chinese, Traditional Chinese
Operating System	Embedded Linux	Log	System log, operating log
Frame rate	Frame rates up to 30 (NTSC) / 25 (PAL) in all resolution	Operating condition	-10 ~ 60°C degree (Celsius)
		Storage condition	-20 ~ 85°C degree (Celsius)
Decoding Source	CTCU DVS-8504E-H / DVS-8501E / DVS-8501E-H / DVS-8504E-FD	Operating Humidity	Humidity 0 ~ 95% (non-condensing)
		Power Input	12VDC, 1A
Video Output	1, BNC, 75 ohm, 1 Vp-p (for DVS-8501D)	System Reset	Reset button (factory default)
	1 BNC & 1 VGA (for DVS-8501DV series product)	LED Indications	Power, LAN, video status
Output Channel	1 channel mono audio, 3.5mm phone jack	Dimension	Line card type: 88 x 137 x 20.8mm (W x D x H)
Audio Compression	ADPCM G.711	Net Weight	Line card type: 100g
Microphone	Omni-directional		
Alarm and PTZ Interface	RS-485 (DB9 Interface), 1x alarm input, 1x alarm output		

DIMENSION DIAGRAM

Ordering Information

Model Name	Description
DVS-8501D	1-Ch H.264 Digital Video Decoder
DVS-8501DV-DC	1-Ch H.264 Digital Video Decoder with VGA Connector and Internal DC power
DVS-8501DV-AC	1-Ch H.264 Digital Video Decoder with VGA Connector and Internal AC power

DVS – ☐☐☐☐☐

Example: DVS – 8501D

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DVS-8501D | **9-15**

9

Digital Video Server

DVS-8301

1- Ch MPEG4 Digital Video Server

The DVS-8301 converts a single analog video stream to digital format. It delivers dual stream (MPEG-4 and MJPEG) @30 fps, 4CIF resolution for remote monitoring anywhere. In addition, the DVS-8301 supports 3GPP mobile protocol, which enables users to monitor via 3G cell phones or any RTSP (Real Time Streaming Protocol) compatible multimedia software on the go.

A complete set of security features includes user access management and HTTPS encryption. DVS-8301 provides one audio stream for two-way audio applications, is a PoE (Power over Ethernet) enabled unit and has powerful event management that includes image upload to FTP server, alarm notification and I/O control. Pan/Tilt/Zoom control is done over RS-485.

Features

- ◆ Simultaneous Motion-JPEG & MPEG-4 streams, up to 4CIF resolution
- ◆ Excellent image quality with up to 30 fps in all resolutions
- ◆ PoE (Power over Ethernet) enabled device
- ◆ Supports two-way audio
- ◆ Digital I/O for external alarm or sensor
- ◆ Supports 3GPP/ISMA RTSP
- ◆ Supports multiple PTZ control protocols through RS-485
- ◆ UPnP for fast and easy installation

51.6mm

Power Connector   Network Connector
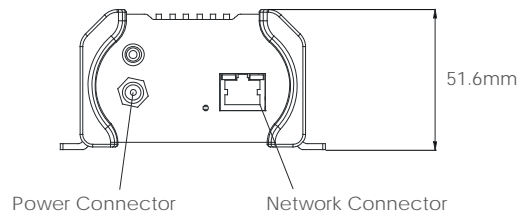
DVS 8301E Stand-alone Solution
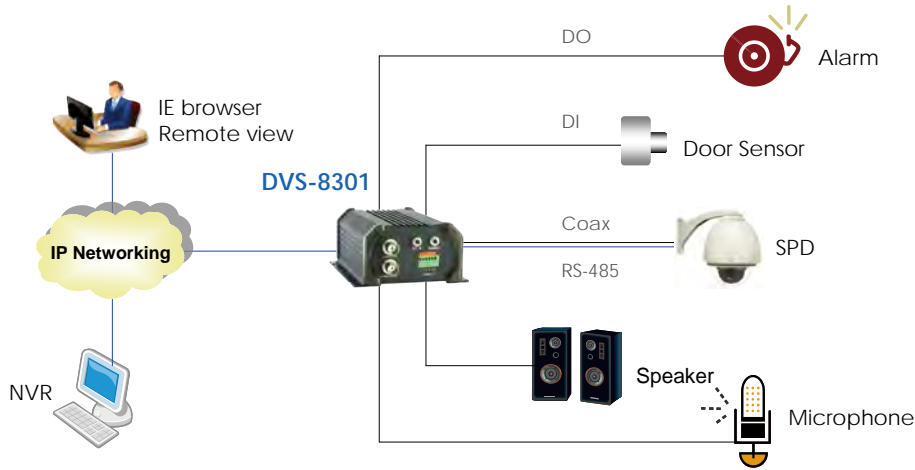
Specifications

Video Input	BNC, looping, 75ohms, 1Vp-p	Audio compression	ADPCM 64Kbps
Video Compression	MPEG4 Simple Profile, Motion JPEG	Alarm Trigger	External input, Motion detection
Bit Rate	64K ~ 2Mbps	Alarm Events	Pre and post alarm buffer
Video Adjustment	Brightness, Contrast, Hue, Saturation, Constant Bit Rate (CBR), Variable Bit Rate (VBR)		File upload via FTP
			Notification via email
PTZ Interface	RS-485		External output activation
PTZ protocols	Pelco D/P	Security	Password protection, HTTPS encryption, user access log
PTZ application	32 preset position, 4 patrol function		
Processor and memory	32 Bits RISC Processor, 8MB Flash, 64MB SDRAM, Embedded Linux	Operating Condition	0 ~ 50℃
		Storage Condition	0 ~ 70℃
LED Indications	Network, Power	Operating Humidity	20 ~ 80% RH (non-condensing)
Ethernet	RJ-45 10BaseT/100BaseTX PoE	Power	12VDC, 1A
Terminal Block Connector	RS-485/1 alarm input/ 1 relay output	Dimension	119 x 98 x 51.6 mm (D x W x H)
		Approvals	CE, FCC, RoHS
Audio streaming	Two-way	Include Accessories	CD with installation and management software, Power supply
Audio Input	3.5 mm mic/line in		
Audio Output	3.5 mm line out jack	NVR Support	CTC Uni

DIMENSION DIAGRAM

98mm

119mm

Video input
Video output
Audio input
DIO
Audio output
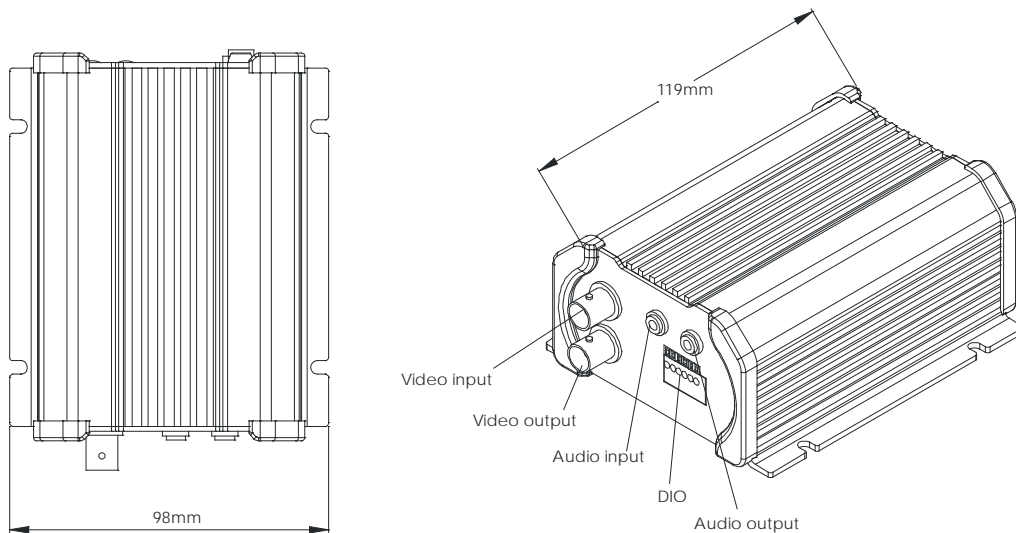
Ordering Information

Model Name	Description
DVS-8301	1-Ch MPEG4 Digital Video Encoder

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

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DVS-8301 | **9-17**

9

Digital Video Server

DVS-8504E-FDS

4 - Ch D1 Digital Video Server

NEW

The DVS-8504E-FDS offers highly-effective H.264 video compression. It can deliver multiple or individual configurable video streams simultaneously at full 30FPS all resolutions up to D1 (720x480 in NTSC, 720x576 in PAL). This means that several video streams can be configured with different resolutions, frame rates and bit rate for different needs.

The DVS-8504E-FDS can also provide dual-stream transmissions for recording and monitoring. The DVS can also provide video for viewing at two different locations or have the main stream be recorded and have the sub-stream available for live viewing.

Features

- Dual H.264 streams
- D1 resolution @ 30FPS(NTSC), @ 25FPS (PAL)
- 4-video input, 4-audio input
- Provides main and sub video streams with different resolution
- Supports two-way audio
- 4-Digital Input / 2-Digital Output connections
- Supports privacy mask
- Fan less design

Specifications

Video Compression	H.264(MPEG-4 Part 10/AVC) Motion JPEG
Resolutions	D1 : NTSC 720x480@ 120FPS / PAL 720x576@ 100FPS
Image Settings	Contrast, Brightness, Color, Saturation
Digital Video Output	3D De-interlace/3D De-noise
Audio Input	AAC 8K x 4
Alarm / Event Management	DI x 4 , DOx 2 , 1x12V@0.5A AUX
Image Disconnected	SD card/HDD disconnected recovering recording , SD card/HDD local redundancy
Motion Detection	3 Detection Zones Setting , Adjustable Alarm Values and Sensitivity
Video Streaming	Dual Steams (Local , Remote recording)
Connector	Video in x 4(BNC connector) , Video out x1(D-SUB 15PIN) Ethernet 10 Base-T / 100 Base-TX /1000 Base-T RS-232 x 1 RS-485 x 1 USB port 2.0 Device x 1 (Support Zeebee , 3G) Line In x4 (RCA Connector) , Line out x 1 Supports Class 10 SD Card (Option) Supports 2.5 SATA Interface(Option)

Supported Protocols	TCP/IP , DHCP , HTTP , FTP , PPPoE , RTP Over TCP , RTSP , 3G , 2.4G , ZeeBee , NTP (RFC 1305) , IPV4 , IPV6
Firmware Upgrade	Manual, Web Browser
Accessories	IR Remote Control (Option)
Dimension	220 (W) x 44 (H) x 155 (D) mm
Weight	1 kg
Operating	Temperature:0° ~ 50°
Environment	Humidity:20%~80% , Non-condensing
Power Source	DC 12V
Power Consumption	25W (Max)
Approvals	CE FCC

DVS-8504E-FDS

FRM220-1000EAS/X or
FRM220-10/100-AS2

DVS-8504E-FDS

Fiber Ring

DVS-8504E-FDS

DVS-8504E-FDS

DVS-8504E-FDS

DVS-8504E-FDS

DVS-8504E-FDS

Coaxial
EOC   EOC

Coaxial
EOC   EOC

Coaxial
EOC   EOC

Coaxial
EOC   EOC

G.SHDSL.bis/EFM

Fiber Converter   G.SHDSL.bis   G.SHDSL.bis

E1

Fiber Converter   Eoe1   Eoe1

VDSL

Fiber Converter   VDTU   VDTU

Fiber

Media
Converter

Internet /SDH

Playback

Live View

Client Site

Server Farm
Broadcasting Server, NVR Server, Alarm Server
3G PP Server, DHCP Server

TV Wall

9

Digital Video Server

Ordering Information

Model Name	Description
DVS-8504E-FDS	4-Ch D1 Digital Video Server

Specifications & design are subject to change without prior notice. Please visit CTC Union website for more details.
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DVS-8504E-FDS | **9-19**

iDVS-01

1- Ch H.264 Intelligent Digital Video Encoder

iDVS-01 (Intelligent Digital Video Server) not only offer highly-effective H.264 Video but also can analyze and identify at front side when the rule of alarm event were set up. Once event is triggered, iDVS-01 will transmit a video and snapshot with object frame and send alarm message to Alarm server and NVR.

Features

Video encoder

- Dual H.264 streams
- D1 resolution @ 30FPS(NTSC), @ 25FPS (PAL)
- 1 video in / out, 1 audio in / out
- Built-in Web server for management
- Supports HTTPS and password protection
- Supports logic (AND / OR) event alarms
- Supports two-way audio
- 1 Digital Input / 1 Digital Output connections

Intelligent function

- Tripwire Detection
- Intrusion Detection
- Virtual Fence Detection
- Abandoned Objects Detection
- Video Loss Detection

Specifications

Intelligent analysis	
Function	"Tripwire Detection/ Intrusion Detection/ Virtual Fence Detection/ Abandoned Objects Detection/ Video Loss Detection"

Video encoder	
Operating System	Embedded Linux
Compression	H.264 / M-JPEG
Frame rate	30/25(NTSC/PAL) fps in all resolution
Video Stream	Dual H.264 streams
Resolution	D1 720x480(NTSC)/720x576(PAL) 4CIF 704x480(NTSC)/704x576(PAL) 2CIF 704x240(NTSC)/704x288(PAL) CIF 352x240(NTSC)/352x288(PAL) QCIF 176x120(NTSC)/176x144(PAL)
Video Bit rate	32K/ 64K/ 128K/ 256K/ 384K/ 512K/ 768K/ 1024K/ 1.5M/ 2M
Video Quality	Medium / Standard / Good / Detailed / Excellent
Video Input / Output	1, BNC, 75 ohm, 1Vp-p
Image Adjustment	brightness, contrast, saturation, hue

Audio	
Audio Streaming	Two way audio
Audio Compression	ADPCM G.711 (H.264)
Audio Input	1 channel Line in
Audio Output	1 channel Line out

Network	
Ethernet	RJ-45, 10/100 Base-T
Remote Management	Web(CGI)
Network Protocols	RTSP, RTCP, RTP, TCP, IPV4, UDP(Unicast), HTTP, HTTPS, SMTP, NTP,DHCP, FTP, UPnP, DNS ,DDNS, ARP, PPPOE
Firmware upgrade	Web Browser
NTP	Sync with PC, Sync with NTP server, Manual

Event	
DIO	1-channel DI and 1-Channel DO
Motion Detection	Drag and drop configurable detection windows
Event Action	FTP, E-mail, DO, SMS
Event Sending path	FTP, E-mail (forwarding Snapshot picture)
Event define	User define video frame rate and video resolution and quality when alarm input and motion detection

General	
Operation Temperature	-10 ~ 50°C
Storage Temperature	-20 ~ 60°C
Power Source	DC12V±10%
Power Consumption	3A Max
External Dimension	Line card type: 88 x 139 x 42.1mm(W x D x H)

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Intelligent Video Analytics

Intrusion Detection

Abandoned Objects Detection

Tripwire Detection

Virtual Fence Detection

DIMENSION DIAGRAM

137mm

Power Connector

Video out
Video In
Network Connector
DIO
Audio In
Audio out
Status LED
Power LED

42.1mm

88mm

9
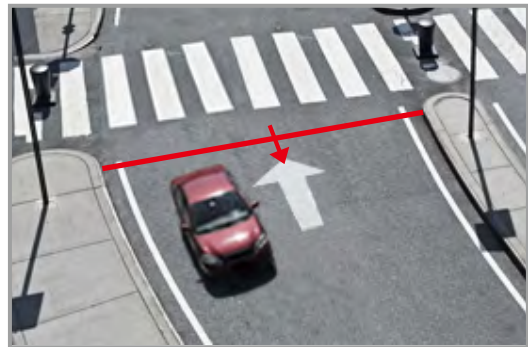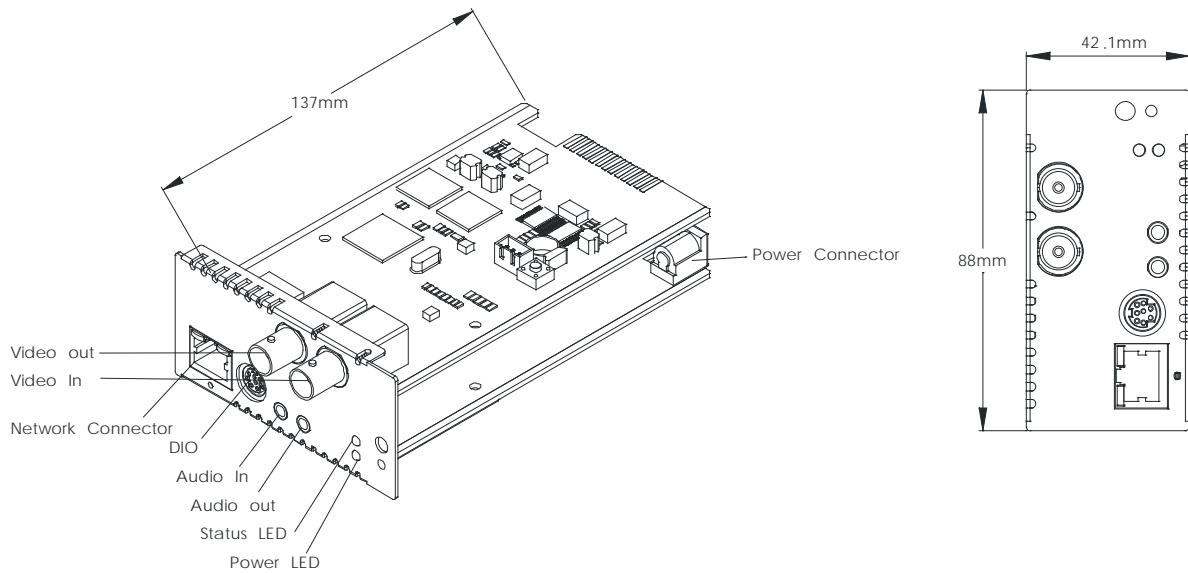
IDVS

Ordering Information

Model Name	Description
iDVS01-S	1-Ch H.264 Intelligent Digital Video Encoder

Intelligent Surveillance Systems

CTC Union offers a full range of intelligent surveillance systems, from mobile NVR, intelligent DVS to integrated PoE Switches. CTC Union intelligent surveillance systems, assure system reliability and performance in traffic control security, public security, business building security and community security.

▍ Traffic Surveillance Application

Fiber
Power
Ethernet
PoE Ethernet
Coaxial

PoE Ethernet Switch
IGS-402F-4PHE24

L2 Ethernet Switch
ESW-3424M

4-ch D1
Digital Video Server
DVS-8504E-FDS

4-ch H.264
Digital Video Encoder
DVS-8504E-H

NVR

- *High Bandwidth Transmission*
- *-40°~75°C Wide Temperature*
- *High EMS Protection*
- *High Power PoE*
- *Scalable*
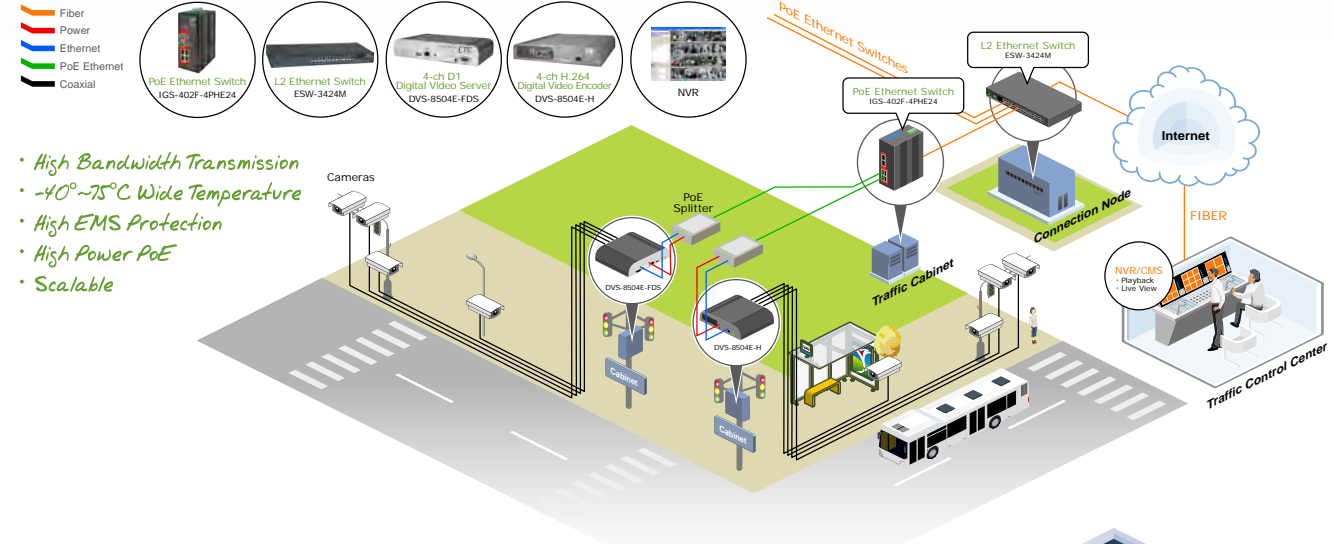
▍ Building Surveillance Application

Fiber
Power
Ethernet
PoE Ethernet
Coaxial

PoE Ethernet Switch
IGS-402F-4PH24

L2 Ethernet Switch
ESW-3424M

Intelligent Digital
Video Encoder
IDVS-01

4-ch D1
Digital Video Server
DVS-8504E-FDS

NVR

- *High Bandwidth Transmission*
- *Intelligent Application*
- *High EMS Protection*
- *High Power PoE*
- *Scalable*
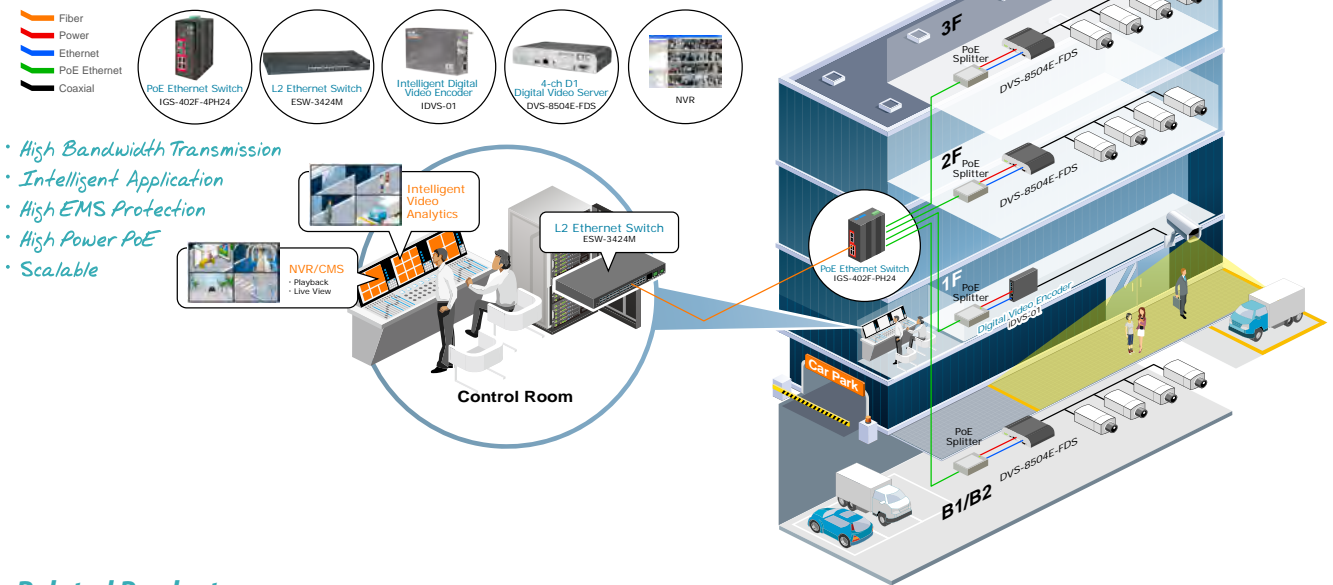
Related Products

PoE Ethernet Switch
IGS-402F-PHE24 & IGS-402F-PH24
- Provides 4-Port 100/1000Base-T(x) RJ45 Copper with 2-port 1000Base-X Optical Fiber
- PoE (PSE) IEEE802.3af and IEEE802.3at Compliant

P. 2-8

L2 Ethernet Switch
ESW-3424M
- 24x100/1000Base-X (SFP) Slots+4x1Gbps (SFP) Slots
- Completely network security isolated among disparate groups
- Various security mechanisms to restrict the un-authorized access

P. 1-67

4-ch D1 Digital Video Server
DVS-8504E-FDS
- 4x Digital Input & 2 Digital Output Connections
- D1 Resolution @30FPS(NTSC), @25FPS(PAL)
- 4x Video Input & 4x Audio Input

P. 9-18

1-ch H.264 Intelligent Digital Video Encoder
IDVS-01
- Tripwire Detection
- Intrusion Detection
- Virtual Fence Detection
- Abandoned Objects Detection
- Video Loss Detection

P. 9-20

4-ch H.264 Digital Video Encoder
DVS-8504E-H
- 4 Digital Input/2 Digital Output Connections
- D1 Resolution @30FPS, CIF Resolution@120FPS
- Built-in Web Server for Management

P. 9-12

NVR
All-in-one IP Video Managed Software (NVR/CMS/IVS/360˚)
- Automatic Disaster Recovery of Video Data.
- Instant Playback up to 512x Times with Video Search Function.
- Supports Multi-Brand IP Camera

P. 9-2

Chapter **1** Fiber Series

Multi-Service Platform

Chapter **1** Fiber Series

Chapter **2** Industrial Fiber Series

Chapter 3 DSL Series

Chapter **4** **TDM Series**

Chapter **5** Testers

Chapter **6** Surge Protectors

Chapter **7** Management

Chapter **8** Baluns

Chapter **9** Video Access Systems

Find Industrial Ethernet Solutions here!

Serial & Ethernet **Media Converter**

Hardened **Gigabit** Ethernet Switch

High Power **PoE** Switch