CTC union

2008 PRODUCTS CATALOG

Make Your **Network** Better

≫ Copper Solution

E1 / T1 Access Nodes
DXC / TDM over IP
Multiservice Access Multiplexers
xDSL / IAD / Tester

≫ Fiber Solution

FMC / FOM / CWDM
SDH / IAD / Tester

≫ IP Surveillance Solution

Video Server / IP Camera / CMS

A More Intelligent Network

In-band Managed Fiber Media Concentrator

New

FE
GE
TDM
FXO/FXS
Datacom
STM-1/OC-3

NON-Intrusive on fiber transmission
Provides the most comprehensive platform for various I/F

Triple (Quadruple) Play

Meets Rising Demands For Upstream Network Bandwidth

New

8-slot Chassis Concentrator
Capable of holding any FMC series
media converters.
(FE/GE/POF/VDSL2, etc)

Extremely cost effective,
non-managed solution
for fiber and copper media
conversion

Adding more functions on existing cable

Ethernet Extender over Coax Cable

New

* Extend Ethernet signals over the existing CATV cable

* Works over taps and splitters to provide Ethernet to up to 32 subscribers

* Ethernet VLAN & Bandwidth control support

* 160Mbps @ up to 800 meters (2,624 feet), reach down to 4Mbps

@about 1.2Km (400 feet) transmission rate and distance (Better than VDSL2)

IP Surveillance Series

DVS, IP Camera, CMS, the Comprehensive System

New

* H.264/MPEG4/MJPEG Digital Video Server
* MPEG4/MJPEG CMOS IP Camera
* CMS Platform up to thousands camera

Please See Page 1-1

BEST Solution in xDSL

G.SHDSL.bis (up to 11.4Mbps, 4-wire, via copper)

New

2-wire/4-wire Router with
4-port Switching Hub
(Firewall optional)

E1/V.35/Ethernet
Multi-Interface NTU Modem

Please See Page 4-14&17

Advanced Fiber Optical Multiplexer

Built-in 100M Ethernet Trunk Bandwidth

New

155Mbps bandwidth in optical trunk & built-in
10/100 Ethernet make PDH network more efficient
and flexible to assign to 4 E1/T1, 4 FXO/FXS,
Datacom, and FE I/F (max. 16-ch).

* Redundancy for power and fiber link.
* Standard SNMP and EMS for management.
* Modular and hot-swappable design for easier installation and interface change.

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Make your network better.

CTC union

CUSTOMER'S SATISFACTION
IS ALWAYS WHAT WE CARE!

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exTension
Communication

4. BROADBAND ACCESS -
ADSL2+, G.SHDSL / G.SHDSL.bis, VDSL / VDSL2

5. EOC (Ethernet over Coax)

6. MEASUREMENT

7. INTERFACE CONVERTER

8. ACCESSORIES

9. MANAGEMENT

1. IP Surveillance

IP Surveillance Family				
Embedded Type	**Product Name**	**Description**	**Type**	**Page**
Digital Video Server	DVS-8504E	4-channel H.264 Digital Video Eecoder	S	1-3
Digital Video Server	DVS-8501D	1-channel H.264 Digital Video Decoder	S, R	1-4
Digital Video Server	DVS-8301	1-channel Motion-JPEG & MPEG4 Digital Video Server	S	1-5
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Digital Video Server	DVS-8202	2-channel Motion-JPEG Digital Video Server	S	1-6
Digital Video Server	DVS-8204	4-channel Motion-JPEG Digital Video Server	S	1-6
IP Camera	IPCAM-8309F	Dual Stream CMOS IP Camera	S	1-7
IP Camera	IPCAM-8309FW	Wireless Dual Stream CMOS IP Camera	S	1-8
Central Management System	Smart-View Plus	The Comprehensive Surveillance System for Enterprise	S/W	1-9

S= Stand-alone, R=Rack, S/W=Software

All You Can Watch and Do From

CMS

Power Plant Security

DI / DO

Entrance

Sewage Disposal

Power Plant Security

Central Office Security

Warehouse Security

Humidity Sensor

Dam Security

Temp. Sensor

Entrance Guard

Traffic Monitor

Fire Alarm

Video Monitor

RFID

▸ **Wide Scalability,**   ▸ **Remote Accessibility,**   ▸ **Distributed Architecture**
Find Your IP Surveillance Solution @ CTC Union

Are you ready for Full D1 & H.264 ?

DVS-8504E

DVS-8501D (line card)

4-Ch H.264 Digital Video Encoder

1. Up to Full D1 resolution
2. One hard Disk Tray (SATA, SATA-2)
3. Supports two-way audio
4. 4DI/2DO
5. Supports PTZ control
6. Supports SNMP & Web management
7. Supports 1-CH D1 / 2-CH 2CIF / 4-CH CIF
8. Live view & simultaneous recording using different resolutions

1-Ch H.264 Digital Video Decoder (fits in both 20-slot and 1-slot chassis)

1. Line card design
2. Supports two-way audio
3. One BNC output
4. Optional VGA output (for 1-slot Chassis)
5. Supports SNMP & Web management

Digital Video Server

DVS-8504E

H.264 Digital Video Encoder
w/ Dual-stream & Smart web management

The DVS-8504E is a highly-effective video encoder and features the latest H.264 compression technology. It can delivery Full D1 image within a limited bandwidth and is also capable of including a SATA hard-disk for different bandwidths and storage applications, DVS-8504E provides dual-streams transmission for configuration with (Main stream and Sub-stream) This design can provide the full D1 resolution (Main stream) when the bandwidth is wide enough and provide the CIF format resolution (Sub-stream) when the bandwidth is limited. The DVS can also provide video for veiwing at two different locations or have the main stream be recorded and have the sub-stream available for live viewing. It is designed with the smart web management to offer detailed alarm detection and actions. (includes AND & OR logic) When connected with the FRM220, SNMP can manage and monitor the whole surveillance system.

Features

- Complies with H.264 compression technology
- Up to full D1 resolution
- Supports 1-CH D1 / 2-CH 2CIF / 4-CH CIF
- Built-in Web server for easy management
- Supports secure management and encrypted video streams
- Provides 3.5″ SATA hard-disk for local storage
- Supports main stream and sub-stream configurable
- Designs with logic detection function (AND & OR detections)
- Supports two-way audio
- 4 DI / 2 DO connections provided
- Supports privacy mask function

Specifications

Application

Motion Detection	Drag and drop configurable detection windows
Storage	Local storage 3.5" SATA HDD *1
Video Rotate	Mirror, Invert
Configuration Backup / Recovery	Web browser
Firmware Upgarde	Web browser, TFTP
NTP	Sync with PC, Sync with NTP server, Manual
Video Adjustment	Brightness, contract, ssturation, color tone level
FTP Client	Server name, username, password
Event Action	FTP, E-mail, DO1, DO2, SMS, SNMP, local store, remote store, PTZ preset
Event Sending Path	FTP, E-mail (forwarding JPEG pictures)
Live Video Digital Zoom	Adjustable 4X digital zoon
Video Snapshot	Live view mode (JPEG format)
SMTP	SMTP server name
Event Define	User define video frame rate and video resolution and video quality when alarm input and motion detection
Text Overlay	Configurable text color, background color, date/time, display position
Privacy Mask	Support 1 privacy mask window
Language	English, Simplified Chinese, Traditional Chinese
Log	System log, operating log

Specifications

Image Compression

Video Compression	H.264 (CBR/VBR)
Video Resolution	D1: NTSC=704*480, PAL=704*576, 2CIF: NTSC=704*240, PAL=704*288, CIF: NTSC=352*240, PAL=352*288, QCIF: NTSC=176*120, PAL=176*144
Video Stream	Master stream & Slave stream (Slave stream must choose the resolution lower than the Master stream)
Operating System	Embedded LINUX
Bit Rate	32K/64K/128K/384K/512K/768K/1024K/1.5M/2M
Frame Rate	1/16, 1/8, 1/4, 1/2, 1, 2, 3, 5, 8, 10, 15, 20, 25, 30
Video Quality	5 level (Medium, standard, good, detailed, excellent), Auto

Video Interface

Input Channel	4 channels
Video Format	NTSC / PAL configurable
Signal	1V p-p, 75 ohms
Output Channel	1 Channel (Quad mode)

Audio Interface

Input Channel	4 channels mono audio (RCA)
Output Channel	1 channel mono audio (RCA)
Audio Compression	ADPCM G.726, G.711
Application	Two-way audio
Input / Output Signal	6V p-p, +10dBm max
Input / Output Impedance	600 ohms

Data Interface

GPIO	RS-485/RS-232 (DB9 interface), 4x alarm input, 2x alarm output
PTZ Protocol	Support Pelco D, Pelco P
PTZ Baud Rate	2400, 4800, 9600, 12800, 19200 Kbps
PTZ Control Speed	Pan, Tilt, Zoo, Focus, Iris
PTZ Preset	32 Preset position
PTZ Patrol	4 Tour mode (Each mode has 10 positions)
Console Interface	RS-232
Management	Telnet, Console, Web (GUI) SNMP v1/v2c with smart web management

Environment

Operating temperature	0 to 70 degree (celsius)
Storage temperature	-30 to 85 degree (celsius)
Humidity	0 to 95% (non-condensing)
Input Power	12VDC, 1A
Reset	Reset button (factory default)
LED Indications	Power, LAN, video status

Order Information

- DVS-8504E   4 Channels H.264 Digital Video Encoder

Digital Video Server

Digital Video Server

DVS-8501D

H.264 Digital Video Decoder w/ Smart Web Management

The DVS-8501D is a small-form modular designed on the video decoding module. With this design, it can delivery video decoding signal (up to D1 resolution) via any transmission media. The latency is less than one second. It can switch between 64 video sources for browsing.

Features

- Complies with H.264 compression technology
- Provides high quality analog video and audio
- Sequence mode for multiple video sources
- Built-in Web server for easy management
- Supports secure management and encrypted video streams
- Decodes video source up to 64 channels
- Provides a expansion slot for VGA port (FRM220-CH01)
- Supports two-way audio
- Fits in single-slot chassis or 20-slot chassis

Specifications

Application	
Configuration Backup / Recovery	Web browser
Firmware Upgarde	Web browser, TFTP
NTP	Sync with PC, Sync with NTP server, Manual
Language	English, Simplified Chinese, Traditional Chinese
Log	System log, operating log
Environment	
Operating temperature	0 to 70 degree (celsius)
Storage temperature	0 to 70 degree (celsius)
Humidity	0 to 95% (non-condensing)
Input Power	12VDC, 1A
Reset	Reset button (factory default)
LED Indications	Power, LAN, video status
Dimension	Line card type: 110*100*45mm (W*D*H)
Net Weight	Line card type: 100g

Application

Specifications

Video Decoding	
Video Decoding	H.264 video with resolution up to 4CIF 64 different video sources (support manual cycling、automatic cycling)
Video Resolution	D1 704x480(NTSC)/704x576(PAL) 2CIF 704x240(NTSC)/704x288(PAL) CIF 352x240(NTSC)/352x288(PAL) QCIF 176x120(NTSC)/176x144(PAL)
Operating System	Embedded Linux
Frame	Frame rates up to 30 (NTSC) / 25 (PAL)
Bit Rate	up to 2Mbps
Video Interface	
Video Input	CTCU H.264 Encoder
Video Output	NTSC / PAL configurable
Resolution	> 500 TVL (depending on source)
Output Channel	1 BNC & 1 VGA (optional FRM220-CH01/AC or FRM220-CH01/DC chassis)
Audio Decoding	
Output Channel	1 channel mono audio (RCA)
Audio Compression	ADPCM G.726, G.711
Microphone	Omni-directional
Data Interface	
GPIO Interface	RS-485 / RS-232 (DB9 Interface), 1x alarm input, 1x alarm output
Management	Telnet, Console, Web (GUI), SNMP v1/v2c
Network Interface	
Ethernet	IEEE 802.3 10Base-T, 802.3u 100Base-TX
Protocol	TCP(UDP)/IP, ICMP, IGMP, PPPoE, ARP, UPnP, HTTP, HTTPS, TFTP, FTP, SMTP, DHCP, DNS, DDNS, RTP/TCP(UDP)

Order Information

Line card options:
- DVS-8501D   1 Channel H.264 Digital Video Decoder
  (When ordering DVS-8501D, you must choose one of the chassis options below)
- FRM220-NMC   Network managed card, support console RS-232 port and 10/100Base-T Ethernet port, w/Web, SNMP/MIB file

Chassis options:
- FRM220-CH20   2U high, 19 inch, 20-slot managed rack chassis
- FRM220-CH01/AC   Stand-alone type, 1-slot chassis (with VGA I/F) with internal AC 100-240V power supply
- FRM220-CH01/DC   Stand-alone type, 1-slot chassis (with VGA I/F) with internal DC 18-72V power supply

Fiber Series

PDH Series

Broadband Access

EoCoax

Measurement

Interface Converter

Datacom Accessories

Network Management

Digital Video Server

DVS-8301

Dual Stream Networking Digital Video Server(MPEG4 & Motion-JPEG)

Features

- PoE (Power over Ethernet) built-in
- Simultaneous Motion-JPEG & MPEG-4 Dual Streaming
- Excellent image quality with up to 30 fps in Full D1 resolution
- 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
- Bundled 16 channel surveillance software

Specifications

Network Environment	
Network Interface	10/100Base-T Ethernet
Protocol	TCP/IP, DHCP, PPPoE, ARP, ICMP, FTP, SMTP, DNS, NTP, IGMP, UPnP, RTSP, RTP, HTTP, TCP, UDP, 3GPP/ISMA RTSP
Management	
Installation	Using CTCU IP installer (Win32 Application)
Protocol	Remote upgarde via FTP, Customized Web UI is upgradeable via FTP and Telnet
Security	Multi-tier access control for configuration
Recording	Directly from web UI while viewing the live video stream, 16 channel free recording sofware
General Specification	
Dimension	129*98*51.6mm (W*D*H)
Approvals	CE, FCC
Operating Temp.	0~50°C (Operating) ; 0~70°C (Storage)
Operating Humidity	20~80% RHG
Input Voltage	DC 12V, 1A
Power Consumption	Min: 0.44W ; Max: 12.95W
Package Contents	
Content	CD Title with manuals and S/W, Quick installation guide, Power adapter.

Specifications

Video Interface	
Input Channel	One Channel
Video Format	NTSC, PAL
Video Compression	MPEG4 Simple Profile, Motion-JPEG
Video Resolution	4CIF: NTSC=702*480, PAL=702*576, CIF: NTSC=352*240, PAL=352*288, QCIF: NTSC=176*120, PAL=176*144
Video Bit Rate	64K ~2M bits/sec
Video Adjustment	Brightness, Contrast, Hue, Saturation, Frame rate, Bit rate, Constant Bit Rate (CBR), Variable Bit Rate (VBR)
Camera Control	Pan/Tilt/Zoom supported via serial port (RS-485), support 32 preset position, support 4 patrol function
Hardware	
System	CPU: 32 Bits RISC Processor, ROM: 8M Bytes FlashROM RAM: 64MB SDRAM, Embedded OS : Linux
LED Indications	Network and power status
Connector	
Ethernet	One RJ-45 (supports Power-over-Ethernet)
One mini-DIN	For RS-485/GPIO
Audio In	One 3.5mm jack (supports two-way audio ADPCM 64Kbps)
Audio Out	One 3.5mm jack (supports two-way audio ADPCM 64Kbps)
BNC	One BNC video input, and one BNC loopback video output
GPIO	Fully opto-isolated one alarm input and one relay output
Event Trigger & Action	
Trigger	GPIO input/Motion detection
Action	Pre and post alarm buffer
	FTP image to remote side
	E-mail image to specify account
	Relay out to control external devices

Order Information

- DVS-8301   1 Channel Dual Stream Network Digital Video Server (MPEG4 & Motion-JPEG)

Digital Video Server
DVS-8201/8202/8204

Motion-JPEG Networking Digital Video Server

DVS-8201/8202/8204 Networking Video Server is an network-based digital video server, capable of connecting one/two/four channels of video sources to distribute their compressed live video into Intranet-Internet through Internet Explorer connection.

DVS-8201/8202/8204 is a self-contained Web Server, so users could access the camera just browsing website over Internet using standard browser such as Internet Explorer or Netscape, and do all the management, configuration, and monitoring easily.

DVS-8201/8202/8204 contains image compression chipset that is capable of delivering standard JPEG, MJPEG, and real-time video into limited network bandwidth.

Features

- Self-Contained HTTP Web Server providing Internet capability
- IP assignment via ARP/Web Page/IP, easy to install for users.
- JAVA-based web page providing maximum platform compatibility
- Active-X control for Internet Explorer providing maximum performance.
- Motion Detection / Date / Time / GPIO Input for event trigger
- Email / FTP / Relay Out for event action
- Programmable event script for various applications.
- DDNS support for dynamic IP application
- Remote Upgradeable firmware and user content pages via FTP
- Server operating control through CGI base script easy for users to integrate the application for users.
- Standard BNC connectors, automatic video standard (NTSC/PAL) detection.
- Green power, fan less, hardware watchdog providing robustness system in critical environment

Ordering Informations

- DVS-8201   1 Channel Motion-JPEG Network Video Server
- DVS-8202   2 Channels Motion-JPEG Network Video Server
- DVS-8204   4 Channels Motion-JPEG Network Video Server

Specifications

Video Interface	
Input Channel	DVS-8201 One Channel
	DVS-8202 Two Channels
	DVS-8204 Four Channels
Video Format	NTSC, PAL configurable
Video Compression	JPEG, Motion-JPEG
Video Resolution	NTSC: 704*480(single), 352*240(quad)
	PAL: 704*576(single), 352*288(quad)
Video Performance	Video through-put: Up to 30 frame per second
	Network through-put: Max. up to 800K Bytes pre second
Signal	1.0 VP-P
Impedance	75 ohms
Video Adjustment	Brightness, contrast, hue, saturation, quality level
Interface Connector	8201:BNC*1, 8202:BNC*2, 8204:BNC*4
Camera Control	Pan/Tilt/Zoom supported via serial port (RS-485)
Hardware	
CPU	32 Bits RISC Processor
ROM	2M Bytes FlashROM
RAM	16M Bytes SDRAM
WatchDog	Chip to monitor out tolerance system voltage and abnormal program execution
Two RS-232 Serial Port	One for external modem, one for PTZ control
Ethernet Connection	RJ-45 for 10/100Mbps Ethernet connection
LED Indications	Network and power/system status
GPIO	Fully opto-isolated four alarm input and one relay output
Event Trigger & Action	
User Programable	Event script and wizard supported
Trigger	Time(frequency)/GPIO input/Motion
Action	Store image to internal buffer
	FTP image to remote side
	E-mail image to specify account
	Relay out to control external devices
Installation	
Assign IP address	Using ARP/via RS-232/IP installer
System Requirements	
System	Windows 2000 SP4 or Windows
Browser	Internet Explorer 6.0
Software	DirectorX 9.0C
General	
Dimension	243*44.5*153mm (W*D*H)
Power	DC 12V, 1A or DC 10~24V, 1A
Power Consumption	7W
Temperature	5~50ºC (Operating) : 0~70ºC (Storage)
Humidity	0~95%

1

IP Surveillance

Fiber Series

PDH Series

Broadband Access

EoCoax

Measurement

Interface Converter

Datacom Accessories

Network Management

IP Camera

IPCAM-8309F

Dual Stream CMOS IP Camera

Features

- Simultaneous motion-JPEG and MPEG-4
- Excellent image quality with up to 30 fps in all resolutions
- Superior low-light performance with automatic night-mode
- Two-way audio with built-in microphone
- Optimal synchronization of audio and video
- Support 3GPP/ISMA (RSTP)
- UPnP for fast and easy Installation
- Bundled 16 channel surveillance software

Application

Remote Site Browse via IE & Record

3GPP Network

3GPP Mobile Phone

Internet

Switch

Speaker

Local Site Browse via IE & Record

IPCAM-8309F

Specifications

Video & Audio Interface	
Image Sensor	1/4" Progressive CMOS Sensor
Zoom	10 X Digital
Video Compression	MPEG4 Part-2, Motion JPEG
Video Max Resolution	640 x 480 (VGA)
Minimum Illumination	1 Lux at F2.0
Frame Rate	Motion JPEG: Up to 30 fps in all resolutions MPEG-4: Up to 30 fps in all resolutions
Video Stream	Simultaneous Motion JPEG and MPEG-4 Controllable frame rate and bandwidth 3GPP/ISMA RTSP compatible
Audio	Two-way (full duplex) ; Built-in microphone
Hardware	
Operation System	Linux 2.4
System Requirement	Pentium III CPU 500 MHz or higher, or equivalent AMD 128MB RAM Windows 98, ME, 2000, XP, Vista Internet Explorer 6 or later
Processors and Memory	ARM9 based 32-bit RISC CPU 32MB RAM, 4MB Flash
Connector	
Ethernet	One RJ-45
Audio Out	One 3.5mm jack
Alarm & Event Management	
Detection	Multi-window motion detection, image upload over FTP, e-mail
Notification	HTTP notification over TCP and e-mail
Network Environment	
Network Interface	IEEE 802.3 10/100Base-T Ethernet
Supported Protocols	HTTP, TCP/IP, 3GPP/ISMA RTSP, SMTP, FTP, ICMP IGMP, DHCP, UPnP, ARP, DNS, DynDNS, PPPoE, NTP
Video Surveillance Software	
Software	Professional surveillance application for viewing, recording and archiving up to 16 channel
General Specification	
Dimension	98*58*31mm (W*D*H)
Approvals	CE, FCC, RoHS
Operating Temp.	$0\sim45^oC$ (32 - 113°F)
Operating Humidity	20~80% RHG
Input Voltage	DC 5V, 1.2A

Order Information

- IPCAM-8309F   Dual Stream CMOS IP Camera

IP Camera

IPCAM-8309FW

Wireless Dual Stream CMOS IP Camera

1

IP Surveillance

Fiber Series

PDH Series

Broadband Access

EoCoax

Measurement

Interface Converter

Datacom Accessories

Network Management

Features

- Complies with wireless IEEE 802.11b/g standards
- Simultaneous motion-JPEG and MPEG-4
- Excellent image quality with up to 30 fps in all resolutions
- Superior low-light performance with 6 night-vision LEDs
- Two-way audio with built-in microphone
- Optimal synchronization of audio and video
- Support 3GPP/ISMA (RSTP)
- UPnP for fast and easy Installation
- Bundled 16 channel surveillance software

Application

IPCAM-8309FW

Order Information

- IPCAM-8309FW   Wireless Dual Stream CMOS IP Camera

Specifications

Video & Audio Interface	
Image Sensor	1/4" Progressive CMOS Sensor
Zoom	10 X Digital
Video Compression	MPEG4 Part-2, Motion JPEG
Video Max Resolution	640 x 480 (VGA)
Minimum Illumination	0 Lux at F2.0 with night-vision LEDs on
Frame Rate	Motion JPEG: Up to 30 fps in all resolutions MPEG-4: Up to 30 fps in all resolutions
Video Stream	Simultaneous Motion JPEG and MPEG-4 Controllable frame rate and bandwidth 3GPP/ISMA RTSP compatible
Audio	Two-way (full duplex) ; Built-in microphone
Hardware	
Operation System	Linux 2.4
System Requirement	Pentium III CPU 500 MHz or higher, or equivalent AMD 128MB RAM Windows 98, ME, 2000, XP, Vista Internet Explorer 6 or later
Processors and Memory	ARM9 based 32-bit RISC CPU 32MB RAM, 4MB Flash
Connector	
Ethernet	One RJ-45
Audio Out	One 3.5mm jack
Alarm & Event Management	
Detection	Multi-window motion detection, image upload over FTP, e-mail
Notification	HTTP notification over TCP and e-mail
Network Environment	
Network Interface	IEEE 802.11b/g wireless
Supported Protocols	HTTP, TCP/IP, 3GPP/ISMA RTSP, SMTP, FTP, ICMP IGMP, DHCP, UPnP, ARP, DNS, DynDNS, PPPoE, NTP
Video Surveillance Software	
Software	Professional surveillance application for viewing, recording and archiving up to 16 channel
General Specification	
Dimension	104*63*35mm (W*D*H)
Approvals	CE, FCC, RoHS
Operating Temp.	0~45°C (32 - 113°F)
Operating Humidity	20~80% RHG
Input Voltage	DC 5V, 1.2A

Smart Management
Smart-View Plus

The Comprehensive Surveillance System for Enterprise

CTC Union Smart-View Plus is a surveillance system that integrates video monitoring,I/O control and access control in delivering the most comprehensive security architecture for enterprise level security operation. Smart-View Plus provides cost-effective scalability to support thousands of camera and sensors. Its cascaded management technology and modular architecture help reduce the total cost of ownerships and streamline security operations for today's enterprises.

Features

All-in-One Surveilance Solution
CTC Union Smart-View Plus and a versatile API/SDK provides you endless integration possibilities with video monitoring, access control, POS systems, alarms, gate barriers, etc.

Enterprise-Level Surveillance Management
Smart-View Plus provides the architectural and distribution management distributed process with centralized capabilities. With the system's cascaded management technology, the headquarters can manage the whole system, track all surveillance events and monitor the critical video while the remote stations can monitor their own.

Scalabilities
Support for multiple servers, sites and clients allows you to extend the systems to fit your organization.

Compatibility
Compatible with multiple venders' IP cameras and digital video servers with MJPG (Motion-JPEG) and MPEG4.

Automatic Alert
Major/minor events alert through e-mail or instant messages to authorized administrators.

Flexible Storage Capability
In-unit storage as well as centralized storage are available to enhance resiliency to network failure and improve disaster recovery capability.

Specifications

Input Device	
IP Camera	Axis 205/2100/2120/2130, D-Link: 2000/2100+/2100/2100G/5300 5300W/5300G/900/900W Panasonic: KX-HCM130/KX-HCM180 Pixord:120/200/205/240/241 Vivotek: PT2111/3112/3114/PZ6112/IP3111
Dome Camera	Dynacolor D7720 Sony D30/D31 Lilin PIH-7XNFIP Series Pelco D/P series
I/O Controller	Atop GW-26A
Access Controller	Atop GW-26A, Poris Series
Video Server	Axis:2400/2401/241S CTC Union: DVS-8201/02/04, DVS-8301 Vivotek: 2402/VS3102
	Application Programming Interface (APIs) are available for device integration
Video	
Input Source	QCIF, CIF, 4CIF ; Record: CIF, 4CIF Playback: CIF, 4CIF ; Export: AVI
Event Management	
Input Soruce	I/O devices (sensor input), video motion detection, access control events (normal open, invaild card, incorrect password, and invalid time segment)
Trigger Actions	I/O devices (relay output, disable sensor input), video recording, send e-mail, send SMS to mobile phone, control PTZ camera to present postion, pop-up video on Smart-View Plus Client.

Applications

Ordering Information

Model	Description
SVP-P	Smart-View Plus Platform with 32 nodes (can support thousands links) *Efficient links in smart-view plus depend on server level and bandwidth flow
SVP-O	Smart-View Plus Option, with 4 Links add-on package

Surveillance Architecture

1 IP Surveillance

Fiber Series

PDH Series

Broadband Access

EoCoax

Measurement

Interface Converter

Datacom Accessories

Network Management

2. Fiber Series

Fiber Series				
Network Type	**Model Name**	**Description**	**Type**	**Page**
In-band Managed Fiber Media Converter Series				
In band Managed Chassis	FRM220-CH20	2U, 19" 20 slots In band Managed Chassis	**R, M**	2-3
Stand-Alone Chassis	FRM220-CH01	CPE stand-alone one slot chassis	**S**	2-4
Fast Ethernet	FRM220-10/100I	10/100Base-TX to 100Base-FX w/ In band Management	**L, S, M**	2-5
Fast Ethernet	FRM220-10/100A	10/100Base-TX to 100Base-FX w/ In band 802.3 OAM	**L, S, M**	2-6
Gigabit Ethernet	FRM220-1000EAS	2-port 10/100/1000Base-TX to 2-port 1000Base-FX SFP w/ in band 802.3 OAM function	**L, S, M**	2-7
Fast Ethernet, STM-1	FRM220-155MS	155M Dual fiber media repeater (MM to SM)	**L, S, M**	2-8
E1/T1	FRM220-E1/T1	BNC or RJ45 to MM or SM	**L, S, M**	2-9
V.35/X.21/RS-530/449	FRM220-Data	2M (V35/X.21/RS530/449/232) 26-pin to MM or SM	**L, S, M**	2-10
RS-422/485/232	FRM220-Serial	(RS422/485/232) Terminal Block to MM or SM	**L, S, M**	2-11
POTS 2-wire	FRM220-FXO/FXS	Twisted Pair to MM or MS	**L, S, M**	2-12
Fast Ethernet	FMC-10/100I	10/100Base-TX to 100Base-FX w/ In band Management	**S, M**	2-13
Power Over Ethernet	FMC-10/100IP	10/100Base-TX to 100Base-FX w/ In band Management	**S, M**	2-13
Managed Fiber Media Converter Series				
Gigabit Ethernet	FRM220-1000EDS	2-port 10/100/1000Base-TX to 2-port 1000Base-FX SFP	**L, S, M**	2-14
Managed Chassis	FRM301	3U, 19" 16 slots SNMP Managed Chassis	**R, M**	2-15
Fast Ethernet	FIB1-10/100F	10/100Base-TX to 100Base-FX MM or SM	**L, S, M**	2-16
Fast Ethernet *(With Built-in Power)*	FIB2-10/100F	10/100Base-TX to 100Base-FX MM or SM	**S, M**	2-16
Gigabit Ethernet	FIB1-1000ES	10/100/1000Base-TX to 1000Base-FX SFP MM or SM	**L, S, M**	2-17
Gigabit Ethernet	FIB1-1000TS	1000Base-TX to 1000Base-FX SFP MM or SM	**L, S, M**	2-18
Gigabit Ethernet	FIB1-1000TG	1000Base-TX to 1000Base-FX GBIC MM or SM	**L, S, M**	2-18
Gigabit Ethernet *(With Internal Power)*	FIB2-1000TG	1000Base-TX to 1000Base-FX GBIC MM or SM	**S, M**	2-18
Gigabit Ethernet	FIB1-1000DS	1.25G Dual SFP media repeater (MM to SM)	**L, S, M**	2-19
Gigabit Ethernet	FIB1-1000MG	1000Base-SX to 1000Base-LX GBIC (MM to SM)	**L, S, M**	2-19
E1/T1	FIB1-E1/T1	BNC or RJ45 to MM or SM	**L, S, M**	2-20
E1/T1 *(With Built-in Power)*	FIB2-E1/T1	BNC or RJ45 to MM or SM	**S, M**	2-20
V.35/X.21/RS-530/449	FIB1-DATA	2M (V35/X.21/RS530/449/232) 26-pin to MM or SM	**L, S, M**	2-21
V35/X.21/RS530/449 *(With Built-in Power)*	FIB2-DATA	2M (V35/X.21/RS530/449/232) 26-pin to MM or SM	**S, M**	2-21
V.35/X.21/RS-530/449 *(With High Speed)*	FIB1-DATA/H	8M (V35/X.21/RS530/449) 26-pin to MM or SM	**S, M**	2-21
RS-485/422/232	FIB1-Serial	(RS485/422/232) Terminal Block to MM or SM	**L, S, M**	2-22
RS-485/422/232 *(With Built-in Power)*	FIB2-Serial	(RS485/422/232) Terminal Block to MM or SM	**S, M**	2-22
RS-485/422/232 *(With Fiber Ring)*	FIB1-Serial/FDC	(RS485/422/232) Terminal Block to Dual Fiber MM or SM	**S, M**	2-23
Managed Chassis	FRM401	4U, 19" 12 slots Managed Chassis	**R, M**	2-24
Fast Ethernet	FRM401-10/100	4ch 10/100Base-TX to 100Base-FX MM or SM	**L, S, M**	2-24
Unmanaged Fiber Media Converter Series				
Unmanaged Chassis	FMC-CH08	2U, 10" 8 slots Unmanaged Chassis	**S**	2-25
Fast Ethernet	FMC-10/100	10/100Base-TX to 100Base-FX MM or SM	**S**	2-26
Gigabit Ethernet	FMC-1000E	10/100/1000Base-TX to 1000Base-FX MM or SM	**S**	2-27
Gigabit Ethernet	FMC-1000ES	10/100/1000Base-TX to 1000Base-FX SFP MM or SM	**S**	2-27
Power Over Ethernet	FMC-10/100P	10/100Base-TX to 100Base-FX MM or SM (PoE)	**S**	2-28

R = Rack, L = Line card, S = Stand-alone, M = Management

2. Fiber Series

R = Rack, L = Line card, S = Stand-alone, M = Management

AC power module

DC power module

Expansion Chassis Connection

Alarm Relays Connection

Hot swappable cooling fan.

Thermal Holes

Rack Mount Panel

Management Card

Ethernet 10/100 In-band line card

STM-1 MM to SM line card with SFP

STM-1 MM to SM line card

Datacom Serial line card with SFP

Datacom Serial line card

Voice (FXO/FXS) line card

In-band Managed Platform

FRM220-CH20

In-band Managed 20 Slots Media Converter Center

The FRM220-CH20 is a 2U high 19" Rack, 20 slot modular media converter center. The FRM220 provides an economic solution in high density Fiber Converter installations in enterprises or central offices. The Power Modules are designed for redundant power supply operation. All critical components, Power, fans, management module and interface cards are hot swappable allowing online field replacement. The hot-swappable power supply can be chosen from AC100-240V, DC18-36. and DC 36-72V.

Features

- Support local or remote Monitor
- Supporter local or remote Configure
- Support On-Line TFTP Line card F/W upgrade (local or remote)
- Two User Programmable Alarm
- Chassis cascade up to 10 with one IP management
- Display fiber transmission information
- Console, SNMP, Web Management
- AC/DC Power Redundant
- Line Card Hot-swappable
- Whole chassis if consist of passive components
- All the modules are supporting hot-swappable function.
- Offers multiple accesses for SNMP management.
- Supports NTP Time Server

Specifications

- Temperature: 0 - 50° C (Operating);
  0 - 70° C (Storage).
- Humidity: 20-80% non-condensing (Operating);
  10-90%   (Storage).
- Power: Input: 1+1 Redundancy mode, Hot-swappable
- AC Power Module Input: Universal, 100~240VAC; Freq.: 47~63 Hz
  Power Consumption : 150W
- DC Power Module Input : 36~72 VDC
  Input : 18~-36VDC (option)
  Power Consumption : 150W
- Fan: Removable type for ease maintenance
- Dimensions: 438mm x 302.25mm x 88mm (LxWxH).
- Compliance: FCC part 15, Subpart B, Class A,
  ANSI C63.4:2003
  CE EN55022:2006, Class A
  EN55024:1998+A1:2001+A2:2003
  LVD: EN 60 950-1:2001
- MTBF: 65,000 h (25°C)

Application

CO (Rack) to CPE (Stand-alone)
~In-band Management~

Central side CO (Rack) to Remote side CO (Rack)
~In-band Management~

Ordering Information

- **FRM220-CH20** 2U, 19", In-band Managed Rack, host up to 20 slots
- **FRM220-AC** 100 ~ 240 VAC power supply module, IEC connector
- **FRM220-DC24** 18 ~ 36 VDC power supply module,
  3 pin terminal block
- **FRM220-DC48** 36 ~ 72 VDC power supply module,
  3 pin terminal block
- **FRM220-NMC** Network Managed Card, support console
  RS-232 port and 10/100Base-T Ethernet port,
  w/Web, SNMP/MIB file

IP Surveillance

2 Fiber Series

PDH Series

Broadband Access

EoCoax

Measurement

Interface Converter

Datacom Accessories

Network Management

Stand-alone one-slot chassis

FRM220-CH01

Stand-alone Media Converters for Broadband and Data Networks

The FRM220-CH01 is a single-slot chasis for fiber media converter line cards available in a number of different models, with AC or DC power supplies built-in. The FRM220-CH01 slide-in chassis may be applied in point to point applications or may be linked to a centrally located FRM220 rack. The power supply can be chosen from AC100-240V, DC 18-72V or external AC switching adapter.

FRM220-CH01/AC

FRM220-CH01/DC

FRM220-CH01

Rear Panel of FRM220-CH01/AC

Rear Panel of FRM220-CH01/DC

Specifications

■ Temperature: 0 - 50° C (Operating);
0 - 70° C (Storage).
■ Humidity: 20-80% non-condensing (Operating);
10-90% (Storage).
■ AC Power Module Input: Universal, 100~240VAC; Freq.: 47~63 Hz
Power Consumption : 12W
Output : DC 12V, 1A
■ DC Power Module Input : 18~-72VDC
Power Consumption : 12W
Output : DC 12V, 1A
■ Dimensions: 88mm x 160mm x 24mm (FRM220-CH01)
(WxDxH) 135mm x 201mm x 30mm (FRM220-CH01/AC)
135mm x 201mm x 30mm (FRM220-CH01/DC).
■ Compliance: FCC part 15, Subpart B, Class A,
ANSI C63.4:2003
CE EN55022:2006, Class A
EN55024:1998+A1:2001+A2:2003
LVD: EN 60 950-1:2001
■ MTBF: 65,000 h (25°C)

Application

CO (Rack) to CPE (Stand-alone)

FRM220

Fiber Media Converter

CO (Stand-alone) to CPE (Stand-alone)

Fiber Media Converter

Fiber Media Converter

Ordering Information

■ **FRM220-CH01** Stand-alone type, 1-Slot Chassis for CPE Side with external AC 100-240 switching adapter
■ **FRM220-CH01/AC** Stand-alone type, 1-Slot Chassis for CPE Side with Internal AC 100 ~240V Power Supply
■ **FRM220-CH01**/DC Stand-alone type, 1-Slot Chassis for CPE Side with Internal DC 18 ~72V Power Supply

All the FRM220 series slide-in cards are available with one-slot Chassis

In-band Managed Platform
FRM220-10/100 I

In-band Management Slide-in line card converter for FRM220 Series

The FRM220-10/100 I is a 10/100Base Ethernet to 100Base-FX fiber slide-in line card converter designed for CPE applications when connection to the FRM220 managed media converter platform. With advanced features like in-band management, 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 to provide control over 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

- Auto-Cross over for MDI/MDIX in TP port
- Supports far end fault (FEF) function
- Auto-Negotiation or Manual mode in TP port
- Supports link fault pass through (LFP) function
- Supports flow control
- Bandwidth control (32K or 512Kbps x N)
- Supports Loop Back Test
- Forward 2046 bytes (max.) packets in switch mode
- Forward 9K jumbo packets in converter mode
- Supports forwarding mode option
  Store and forward (switch) mode , Convert mode (small latency)
- Supports local or remote In-band management (Monitor or Configure status) by the SNMP manager in FRM220
- Supports remote CPE power fail detection (Dying gasp)
- Provides Auto Laser Shutdown (ALS) function
- Supports Fiber Hardware Reset (FHR) function
- Provides fiber transceiver information for management
- Supports On-Line F/W upgrade (local or remote) by the SNMP manager in FRM220

Application

CO (Rack) to CPE (Stand-alone)
~In-band OAM Management~

FRM220

Slide-in Line Card Converter

Specifications

LAN Interface Specification
- One RJ-45 female connector for straight or cross-over connection.
- Supports 10/100Base-T, Full, Half duplex n-way (Auto-Negotiation).
- Supports Full, Half duplex, 10M, 100M speed manual mode selections.
- Transmission Packet Rate for 10/100Base-T : 14880bps /148800bps.
- Copper TP cable 4 pair Cat. 3 or 5 UTP

Optical Interface Specification
- Transceiver Connector type：ST, SC & FC
- Wavelength(typical)：multi-mode: 1310nm；
  single-mode：1310nm/1550nm up to 120Km
  WDM：1310/1550nm or 1550/1310nm(A/B type) up to 80Km
- Supports Full, Half duplex selections
- Supports the auto-adjustment function, no extra attenuations needs.

General Specification

Complies with	IEEE 802.3 10Base-T, 802.3u 100Base-TX and 100Base-FX standards.
6 diagnostic LEDs :	Power / FEF / FX-Link ,TX-Speed / TX-Duplex / TX-Link
Temperature:	0 - 50° C (Operating); 0 - 70° C (Storage).
Humidity:	20-80% non-condensing (Operating); 10-90% (Storage).
Power:	DC Jack : Switching adaptor (12V, 400mA) Consumption: < 4W
Dimensions:	155mm x 88mm x 23mm (LxWxH).
Weight:	100g.
Compliance:	FCC part 15, Subpart B, Class A, ANSI C63.4:2003 CE EN55022:2006, Class A EN55024:1998+A1:2001+A2:2003 LVD: EN 60 950-1:2001
MTBF:	65,000 h (25°C)

Ordering Information

- **FRM220-10/100 I**   In-band Managed, 10/100Base-TX to 100Base-FX slide-in line card converter

IP Surveillance

2

Fiber Series

PDH Series

Broadband Access

EoCoax

Measurement

Interface Converter

Datacom Accessories

Network Management

Fiber Media Converter

In-band Managed Platform
FRM220-10/100A

In-band Management Slide-in line card converter for FRM220 Series

This IEEE802.3ah OAM compliant copper to fiber Fast Ethernet solution is designed to make conversion between 10/100Base-TX and 100Base-FX with SC or ST connector. With SNMP agent and GUI Web-based management in the FRM220, the Network administrator can monitor, configure and control the activity of each 802.3ah series line card. This 802.3ah OAM Compliant media converter, with its Q-in-Q and maximum interoperability will enable carriers and serivce provides to have a clear vision of their network and conveniently manage their demarcation point.

Features

■ Complies with 802.3 10Base-T, 802.3u 100Base-TX, 100Base-FX
■ 802.3ah In-band OAM management compliant
■ 10/100Mbps auto-negotiation or forced mode operation on the TP interface
■ Fiber Auto-Negotiation or force mode
■ Forward 9K jumbo packets (in converter mode)
■ Supports Flow control function
■ Supports OAM remote loopback to assist in diagnosing network problems
■ Supports bandwidth control
■ Supports Dying Gasp Reporting for power outage
■ Supports QoS Classification
■ Supports local / remote monitor
■ Supports local / remote Configuration
■ Supports Q in Q double tagged frame transparent
■ Supports remote firmware upgrade
■ Supports IEEE 802.1q Tag VLAN pass thru
■ Compatible with FRM220 Managed Chassis

Application

CO (Rack) to CPE (Stand-alone)
~802.3ah OAM In-band Management~

CO (Stand-alone) to CPE (Stand-alone)
~802.3ah OAM Web Management~

Specifications

LAN Interface Specification
■ One RJ-45 female connector for straight or cross-over connection.
■ Supports 10/100Base-TX, n-way (Auto-Negotiation).
■ Supports Full, Half duplex, 10M, 100M speed manual mode selections.
■ Transmission Packet Rate for 10Base-T: 14880 per second
   100Base-TX: 148800 per second
■ Copper TP cable 4 pair Cat. 3 4, 5e or 6 UTP

Optical Interface Specification
■ Transceiver Connector type：ST or SC
■ Supports Full, Half auto duplex selection, 100Mbps speed
■ Supports auto-receive sensitivity function, no extra attenuators needed.

General Specification
■ Standards   IEEE802.3 10Base-T,
                              IEEE802.3u 100Base-TX, 100Base-FX,
                              IEEE 802.3ah In-band OAM management compliant
■ 6 diagnostic LEDs :   Power/FX-Link ,TX-Speed/TX-Duplex/TX-Link/FEF
■ Temperature: 0 - 50° C (Operating);
                              0 - 70° C (Storage).
■ Humidity: 20-80% non-condensing (Operating);
                              10-90%   (Storage).
■ Power: DC Jack : Switching adaptor (12V, 400mA)
                              Consumption: < 4W
■ Dimensions: 155mm x 88mm x 23mm (LxWxH).
■ Weight: 120g.
■ Compliance: FCC part 15, Subpart B, Class A,
                              ANSI C63.4:2003
                              CE EN55022:2006, Class A
                                 EN55024:1998+A1:2001+A2:2003
                              LVD: EN60950-1:2001
■ MTBF: 65,000 h (25°C)

Ordering Information

■ *FRM220-10/100A*   In-band Managed, 10/100Base-TX to 100Base-FX slide-in line card converter, supports 802.3ah In-band OAM management

In-band Managed Platform
FRM220-1000EAS

In-band Management Slide-in line card converter for FRM220 Series

This IEEE802.3ah OAM compliant copper to fiber Gigabit Ethernet solution is designed to make conversion between 10/100/1000Base-TX and 1000Base-FX with SFP-LC connector. With SNMP agent and GUI Web-based management in the FRM220, the Network administrator can monitor, configure and control the activity of each 802.3ah series line card. This 802.3ah OAM Compliant media converter, with its Q-in-Q and maximum interoperability will enable carriers and serivce provides to have a clear vision of their network and conveniently manage their demarcation point.

Features

- 802.3ah In-band OAM management compliant
- 10/100/1000Mbps auto-negotiation or forced mode operation on the TP interface
- Fiber Auto-Negotiation or force mode
- Supports Flow control function
- Supports OAM remote loopback to assist in diagnosing network problems
- Supports bandwidth control
- Supports Dying Gasp Reporting for power outage
- Supports QoS Classification
- Supports local / remote monitor
- Supports local / remote Configuration
- Supports Q in Q double tagged frame transparent
- Supports remote firmware upgrade
- Supports IEEE 802.1q Tag VLAN pass thru
- Compatible with FRM220 Managed Chassis

Application

CO (Rack) to CPE (Stand-alone)
~802.3ah OAM In-band Management~

FRM220 — Slide-in Line Card Converter

CO (Stand-alone) to CPE (Stand-alone)
~802.3ah OAM Web Management~

Slide-in Line Card Converter — Slide-in Line Card Converter

Specifications

LAN Interface Specification
- Two RJ-45 female connectors for straight or cross-over connection.
- Supports 2-port 10/100/1000Base-TX, n-way (Auto-Negotiation).
- Supports Full, Half duplex, 10/100/1000 speed force mode selections.
- Transmission Packet Rate for 10Base-T: 14880 per second 100Base-TX: 148800 per second ; 1000Base-TX: 1488000 per second
- Copper TP cable 4 pair Cat. 5e or 6 UTP

Optical Interface Specification
- Transceiver Connector type：SFP-LC
- Supports 2-port, 1000Mbps SFP slot
- Supports auto-receive sensitivity function, no extra attenuators needed.

General Specification
- Standards — IEEE 802.3 10Base-T, IEEE 802.3u 100Base-TX , 100Base-FX, IEEE 802.3ab, 802.3z 1000Base-TX, 1000Base-FX IEEE 802.3ah In-band OAM management compliant
- 6 diagnostic LEDs : Power / FX-Link ,TX-Speed / TX-Duplex / TX-Link / FEF
- Temperature: $0 - 50^o$ C (Operating); $0 - 70^o$ C (Storage).
- Humidity: 20-80% non-condensing (Operating); 10-90% (Storage).
- Power: DC Jack : Switching adaptor (12V, 1A) Consumption: < 12W
- Dimensions: 155mm x 88mm x 23mm (LxWxH).
- Weight: 120g.
- Compliance: FCC part 15, Subpart B, Class A, ANSI C63.4:2003 CE EN55022:2006, Class A EN55024:1998+A1:2001+A2:2003 LVD: EN60950-1:2001
- MTBF: 65,000 h $(25^o C)$

Ordering Information

- **FRM220-1000EAS** — In-band Managed, 2-port 10/100/1000Base-TX to 2-port 1000-FX SFP slot switch supports 802.3ah In-band OAM management

IP Surveillance

2 Fiber Series

PDH Series

Broadband Access

EoCoax

Measurement

Interface Converter

Datacom Accessories

Network Management

Fiber Media Converter

Fiber Managed Platform
FRM220-155MS

Stand-alone Fiber Media Converter and Repeater

FRM220-155MS is a fiber optical media converter and repeater that allows data rates up to 155Mbps. FRM220-155MS supports 2R regeneration, which consists of re-amplification and reshaping. This converter is compatible with fiber interface such as 100Mbps Fast Ethernet, 155Mbps STM1and OC3. FRM220-155MS works well with FRM220 Chassis as Slide-in Card in CO side or FRM220-CH01, one slot chassis as a stand-alone fiber converter

Features

- Converts multi-mode 850nm to single-mode 1310/1550nm, multi-mode to multi-mode or single mode to single mode
- Comply with IEEE802.3u 100Base-FX Standard
- Compatible with FRM220 Chassis for SNMP management
- Extend Fiber Optic distance up to 2Km (MM), 120Km (SM)
- Multi-rate support up to 155Mbps
- Perform optical repeater function (Re-amplification & reshaping)
- Optical Connector: SC & SFP-LC Type
- Supports Client / Line loop back test
- Supports link pass through
- Supports auto laser shutdown

Specifications

Rate	Up to OC-3/STM-1 (155Mbps)	
LEDs	PWR, Line Link, Client Link & Test	
Power	External AC/ DC required; 12V DV; 1A	
Environment	Temperature	0 - 50°C (Operating)
		0 - 70°C (Storage)
	Humidity	20 - 80% non condensing (Operating)
		10 - 90% (Storage)
Power Cunsumption	< 4W	
Dimensions(WxDxH)	155mm x 88mm x 23mm (LxWxH)	
Weight	120g	
Compliance	FCC part 15 class A, CE	
MTFB	257063 hours	

Applications

FE/STM-1/OC-1.2.3

Transparent (up to 155Mbps)

FE/STM-1/OC-1.2.3

Point to Point Application (Stand-alone) ~In-band Management~

SM to SM, SM to MM or MM to MM media converter (FRM220-155MS)

SM to SM, SM to MM or MM to MM media converter (FRM220-155MS)

Slide-in Line Card Converter FRM220-155MS

FE/STM-1/OC-1.2.3

CO (Rack) to CPE (Stand-alone) ~In-band Management~

FRM220

Ordering Information

Chassis
- FRM220-CH20
  2U 19″ 20-slot managed chassis
- FRM220-CH01
  1-slot chassis with AC power adapter
- FRM220-CH01-AC
  1-slot chassis with internal AC power
- FRM220-CH01-DC
  1-slot chassis with internal DC power

Line Card
- FRM220-155MS
  MM to SM Converter with SC connector
- FRM220-155MS-SFP
  Fiber repeater with dual SFP slot

In-band Managed Platform
FRM220-E1/T1

Stand-alone E1/T1 to Fiber Media Converter

The **FRM220-E1** is a fiber media transport for G.703 E1 transmission. The BNC model provides unbalanced 75 Ohm coaxial connections while the RJ-45 model provides balanced 120 Ohm connections over twisted pair wiring. The **FRM220-T1** is a fiber media transport for G.703 T1 transmission and features an RJ-45 connector for connection to 100 Ohm twisted pair wiring. When the **FRM220-E1** or **FRM220-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 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.

Features

- Network Management via Terminal or SNMP in FRM220 Chassis
- T1/E1 RJ-45 (USOC RJ-48C) or Coax (BNC) to Fiber converter
- Support AMI or B8ZS/HDB3 line codes
- Unframed (transparent clear channel) mode, can use point to point (CPE) solution with FRM220-Data
- User selectable line code setting, Far End Fault (FEF) setting, Loop back test

Application

CO (Rack) to CPE (Stand-alone)
~In-band Management~

Ordering Information

- **FRM220-E1R**   In-band managed E1 to fiber media converter slide-in card with RJ-45 connector
- **FRM220-E1B**   In-band managed E1 to fiber media converter slide-in card with BNC connector
- **FRM220-T1R**   In-band managed T1 to fiber media converter slide-in card with RJ-45 connector

Specifications

E1/T1 Interface Specification
- RJ-45 (120 ohms) and BNC (75 ohms) for E1 connectors and RJ-45 (100 ohms)for T1 connector
- Standard: E1: ITU-T G.703, G.704, G706, G.732, G.823
  T1: ITU-T G.703, G.704, AT&T TR-62411, ANSI T1. 403

Fiber Interface Specification
- Transceiver Connector type: 155 Mbps SFP LC
- Wavelength: 1310nm, 1550nm,
- Fiber Type: 9/125um single mode; 62.2/125um multi-mode

General Specification
- 6 diagnostic LEDs :   Power, FLK(FX-Link) , Test, Di/DO
- Temperature: 0 - 50° C (Operating); 0 - 70° C (Storage).
- Humidity: 20-80% non-condensing (Operating); 10-90% (Storage).
- Power: DC Jack : Switching adaptor (12V, 1A) Consumption: < 4W
- Dimensions: 155mm x 88mm x 23mm (LxWxH).
- Weight: 120g.
- Compliance: FCC part 15, Subpart B, Class A, ANSI C63.4:2003
  CE EN55022:2006, Class A
      EN55024:1998+A1:2001+A2:2003
  LVD: EN60950-1:2001
- MTBF: 65,000 h (25°C)

IP Surveillance

2 Fiber Series

PDH Series

Broadband Access

EoCoax

Measurement

Interface Converter

Datacom Accessories

Network Management

Fiber Media Converter

In-band Managed Platform
FRM220-DATA

Stand-alone V.35/RS-530/449/232/X.21 to Fiber Converter

The **FRM220-DATA** is a media converter for V.35, RS-232, RS-530, X.21 or RS-449 high-speed (8.192Mbps) synchronous or low speed synchronous and asynchronous data transmission over optical fiber media. When the **FRM220-DATA** card is placed in the FRM220 rack with SNMP management, the card status, type, version, fiber link status, data link status and alarms can all be displayed. Configuration is also available 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.

Features

- 1 port data communication on HDB26 female (adapter cable required)
- Network management via Terminal or SNMP in FRM220 chassis
- Optical Bit Error Rate less than 10^{-11}
- User selectable n x 64Kbps (n x 256Kbps for H type) data rate, clock mode setting, asynchronous setting, Loop back tests
- Unframed (transparent clear channel) mode, can use point to point (CPE) solution with FRM220-E1

Application

CO (Rack) to CPE (Stand-alone)
~In-band Management~

FRM220

Fiber Media Converter

Ordering Information

- **FRM220-V35**   In-band managed E1 to fiber media converter slide-in card with DB25 female connector (DB25 male to MB34 female cable)
- **FRM220-X21**   In-band managed E1 to fiber media converter slide-in card with DB25 female connector (DB25 male to DB15 female cable)
- **FRM220-232**   In-band managed T1 to fiber media converter slide-in card with DB25 female connector
- **FRM220-530**   In-band managed E1 to fiber media converter slide-in card with DB25 female connector
- **FRM220-449**   In-band managed T1 to fiber media converter slide-in card with DB25 female connector (DB25 male to DB37 female cable)

Specifications

Data-port (V.35) Interface Specification
- Interface Rate: 8.192Mbps+-50ppm
- Connector: V.35 (DB25) female
- Interface type: DCE
- Clock: G.703 resume clock, internal /external clock

Fiber Interface Specification
- Transceiver Connector type: 155 Mbps SFP LC
- Wavelength: 1310nm, 1550nm,
- Fiber Type: 9/125um single mode; 62.2/125um multi-mode

General Specification
- 6 diagnostic LEDs :   Power, FLK(FX-Link) , Test, DI/DO
- Temperature: $0 - 50^o$ C (Operating); $0 - 70^o$ C (Storage).
- Humidity: 20-80% non-condensing (Operating); 10-90%   (Storage).
- Power: DC Jack : Switching adaptor (12V, 1A) Consumption: < 4W
- Dimensions: 155mm x 88mm x 23mm (LxWxH).
- Weight: 120g.
- Compliance: FCC part 15, Subpart B, Class A, ANSI C63.4:2003 CE EN55022:2006, Class A   EN55024:1998+A1:2001+A2:2003 LVD: EN60950-1:2001
- MTBF: 65,000 h (25^oC)

In-band Managed Platform
FRM220-SERIAL

Stand-alone RS-232/422/485 Copper to Fiber Media Converter

The **FRM220-Serial** provides a fiber converter solution to extend RS-232 or RS-485 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 RS-485/422 (2 or 4 wire). The **FRM220-Serial** secures data transmission over EMI resistant fiber at speeds up to 256kbps for RS-232 or up to 1024kbps for RS-422/485. When the **FRM220-Serial** is linked to the FRM220 with **FRM220-Serial** card, it allows network engineers to get greater functionality through advanced SNMP features. The network administrator can manage any converter module from anywhere on the network, detect any link loss and maintain each loop.

Features

◢
- Extend serial transmission from 2 to 120 km over fiber
- Selectable data I/F for RS232/ 422/ 485
- Selectable two or four wire RS-485/ 422
- Selectable three or five wire RS-232
- SNMP management features with FRM220 Chassis
- Speeds up to 256Kbps for RS-232 (Async mode)
- Speeds up to 1024Kbps for RS-485/ 422
- Support fiber auto-adjustment function, no extra attenuators needed

Application

CO (Rack) to CPE (Stand-alone)
~In-band Management~

FRM220   Fiber Media Converter

Ordering Information

◢
- **FRM220-SERIAL/SFP** In-band managed serial (RS-232/485/422) slide-in card with SFP slot
- **FRM220-SERIAL** In-band managed serial (RS-232/485/422) slide-in card

Specifications

◢
Serial Interface Specification
- One 6-pin terminal block for conversion between RS485/422/232.
- Standard: EIA/ TIA RS485/422/232

Fiber Interface Specification
- Transceiver Connector type: 155 Mbps SFP LC
- Wavelength: 1310nm, 1550nm,
- Fiber Type: 9/125um single mode; 62.2/125um multi-mode

General Specification
- 6 diagnostic LEDs :   Power, FLK(FX-Link) , Test, Di/DO
- Temperature: $0 - 50^o$ C (Operating); $0 - 70^o$ C (Storage).
- Humidity: 20-80% non-condensing (Operating); 10-90%   (Storage).
- Power: DC Jack : Switching adaptor (12V, 1A) Consumption: < 4W
- Dimensions: 155mm x 88mm x 23mm (LxWxH).
- Weight: 120g.
- Compliance: FCC part 15, Subpart B, Class A, ANSI C63.4:2003 CE EN55022:2006, Class A EN55024:1998+A1:2001+A2:2003 LVD: EN60950-1:2001
- MTBF: 65,000 h (25^oC)

IP Surveillance

2 Fiber Series

PDH Series

Broadband Access

EoCoax

Measurement

Interface Converter

Datacom Accessories

Network Management

Fiber Media Converter

In-band Managed Platform
FRM220-FXO/FXS

Fiber Optic Phone Line (POTS) Extender

FRM220-FXO/FXS POTS phone line converter extender system is used to connect Central-Office voice signals to distant Plain Old Telephone device (POTS), using the standard telephone signaling. *FRM220-FXO/FXS* is fiber media transport for POTS transmission and features an RJ-11C for copper connection. *FRM220-FXO/FXS* are 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 Central Office and connects to a telephone device.

Features

- Support telephone voice transmission
- Supports caller ID function
- Supports multi-mode or single mode fiber
- Supports FXO or FXS mode
- Supports auto-ring function
- Also available for rack type (FRM220)

Application

Ordering Information

- **FRM220-FXO/FXS**   In-band managed POTs 2-wire copper to fiber media converter

Specification

FXO RJ-11C Interface Specification
- Interface Connector : RJ-11C
- Impedance : 600 ohms
- REN : 0.4B
- Loop Current : 10 to 100mA
- Insert Loss : 0.0 1.0dB at 1000Hz

FXS RJ-11C Interface Specification
- Interface Connector : RJ-11C
- Impedance : 600 ohms
- Feedback Voltage : 48VDC+/-5V
- Ring : 90Vp-p
- Frequency : 15-30Hz
- Insert Loss: 0.0 1.0dB at 1000H

Fiber Interface Specification
- Transceiver Connector type: SC
- Wavelength: 1310nm, 1550nm,
- Fiber Type: 9/125um single mode; 62.2/125um multi-mode

General Specification
- 6 diagnostic LEDs :   Power, FLK(FX-Link) , Test, Di/DO
- Temperature: 0 - 50° C (Operating); 0 - 70° C (Storage).
- Humidity: 20-80% non-condensing (Operating); 10-90%   (Storage).
- Power: DC Jack : Switching adaptor (12V, 1A) Consumption: < 4W
- Dimensions: 155mm x 88mm x 23mm (LxWxH).
- Weight: 120g.
- Compliance: FCC part 15, Subpart B, Class A, ANSI C63.4:2003 CE EN55022:2006, Class A EN55024:1998+A1:2001+A2:2003 LVD: EN60950-1:2001
- MTBF: 65,000 h (25°C)

2-12

In-band Managed Platform
FMC-10/100 IP

In-band Management Media Converter
features with Power over Ethernet (802.3af PD)

The FMC-10/100 IP is a 10/100Base Ethernet to 100Base-FX fiber media converter designed for CPE applications when connection to the FRM220 managed media converter platform. With advanced features like Power over Ethernet (802.3af PD) and in-band management, 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 to provide control over all converter settings including band-width control, duplex, and speed configuration. By utilizing PoE, this convert is capable of drawing power from any PoE enabled Ethernet switch, thus eliminating the need for any other power source for the converter. 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

- Auto-Cross over for MDI/MDIX in TP port
- Supports far end fault (FEF) function
- Auto-Negotiation or Manual mode in TP port
- Supports link fault pass through (LFP) function
- Supports flow control
- Bandwidth control (32K or 512Kbps x N)
- Supports Loop Back Test
- Forward 2046 bytes (max.) packets in switch mode
- Forward 9K jumbo packets in converter mode
- Supports forwarding mode option
- Store and forward (switch) mode , Convert mode (small latency)
- Supports local or remote In-band management (Monitor or Configure status) by the SNMP manager in FRM220
- Supports remote CPE power fail detection (Dying gasp)
- Provides Auto Laser Shutdown (ALS) function
- Supports Fiber Hardware Reset (FHR) function
- Provides Product information for management
- Supports On-Line F/W upgrade (local or remote) by the SNMP manager in FRM220

Application

CO (Rack) to CPE (Stand-alone)
~In-band Management~

FRM220

Fiber Media Converter

Ordering Information

- **FMC-10/100 I**   In-band Managed, 10/100Base media converter
- **FMC-10/100 IP**   In-band Managed, 10/100Base media converter with Power over Ethernet feature

Specifications

LAN Interface Specification
- One RJ-45 female connector for straight or cross-over connection.
- Supports 10/100Base-T/TX, Full, Half duplex n-way (Auto-Negotiation).
- Supports Full, Half duplex, 10/100 speed force mode selections.
- Transmission Packet Rate for 10/100Base-TX : 14880bps /148800bps.
- Copper TP cable 4 pair Cat. 3 or 5 UTP

Optical Interface Specification
- Transceiver Connector type：ST, SC & FC
- Wavelength(typical)：multi-mode: 1310nm；
  single-mode：1310nm/1550nm up to 120Km
  WDM：1310/1550nm or 1550/1310nm(A/B type) up to 80Km
- Supports Full, Half duplex selections
- Supports the auto-adjustment function, no extra attenuations needs.

General Specification
- Complies with   IEEE 802.3 10Base-T, 802.3u 100Base-TX and 100Base-FX standards.
- 6 diagnostic LEDs :   Power / PoE Power/ FX-Link ,TX-Speed / TX-Duplex / TX-Link
- Temperature: 0 - 50° C (Operating); 0 - 70° C (Storage).
- Humidity: 20-80% non-condensing (Operating); 10-90% (Storage).
- Power: DC Jack : Switching adaptor (12V, 400mA) Consumption: < 4W
- Dimensions: 108mm x 73.4mm x 23mm (LxWxH).
- Weight: 100g.
- Compliance: FCC part 15, Subpart B, Class A, ANSI C63.4:2003 CE EN55022:2006, Class A EN55024:1998+A1:2001+A2:2003 LVD: EN 60 950-1:2001
- MTBF: 65,000 h (25°C)

IP Surveillance

2 Fiber Series

PDH Series

Broadband Access

EoCoax

Measurement

Interface Converter

Datacom Accessories

Network Management

Fiber Media Converter

Managed Platform

FRM220-1000EDS

Managed Slide-in line card converter for FRM220 Series

This copper to fiber Gigabit Ethernet solution is designed to make conversion between 10/100/1000Base-TX and 1000Base-FX with SFP-LC connector. With SNMP agent and GUI Web-based management in the FRM220, the Network administrator can monitor, configure and control the activity of each line card in the chassis. This media converter, with its maximum interoperability will enable carriers and serivce provides to have a clear vision of their network and conveniently manage their demarcation point.

Features

- ■ SNMP management compliant
- ■ 10/100/1000Mbps auto-negotiation or forced mode operation on the TP interface
- ■ Fiber Auto-Negotiation
- ■ Supports Flow control function
- ■ Supports Dying Gasp Reporting for power outage
- ■ Supports local monitor
- ■ Supports local configuration
- ■ Supports IEEE 802.1q Tag VLAN pass thru
- ■ Compatible with FRM220 Managed Chassis

Application

CO (Rack) to CPE (Stand-alone)
~SNMP Management~

FRM220

Slide-in Line Card Converter

CO (Stand-alone) to CPE (Stand-alone)
~SNMP Management~

Slide-in Line Card Converter

Slide-in Line Card Converter

Ordering Information

- ■ **FRM220-1000EDS** SNMP Managed, 2-port 10/100/1000Base-TX to 2-port 1000-FX SFP slot switch

Specifications

LAN Interface Specification
- ■ Two RJ-45 female connectors for straight or cross-over connection.
- ■ Supports 2-port 10/100/1000Base-TX, n-way (Auto-Negotiation).
- ■ Supports Full, Half duplex, 10/100/1000 speed force mode selections.
- ■ Transmission Packet Rate for 10Base-T: 14880 per second 100Base-TX: 148800 per second ; 1000Base-TX: 1488000 per second
- ■ Copper TP cable 4 pair Cat. 5e or 6 UTP

Optical Interface Specification
- ■ Transceiver Connector type：SFP-LC
- ■ Supports 2-port, 1000Mbps SFP slot
- ■ Supports auto-receive sensitivity function, no extra attenuators needed.

General Specification
- ■ Standards   IEEE 802.3 10Base-T, IEEE 802.3u 100Base-TX , 100Base-FX, IEEE 802.3ab, 802.3z 1000Base-TX, 1000Base-FX compliant
- ■ 6 diagnostic LEDs :   Power / FX-Link ,TX-Speed / TX-Duplex / TX-Link / FEF
- ■ Temperature: 0 - 50° C (Operating); 0 - 70° C (Storage).
- ■ Humidity: 5-90% non-condensing (Operating); 10-90%   (Storage).
- ■ Power: DC Jack : Switching adaptor (12V, 1A) Consumption: < 5W
- ■ Dimensions: 155mm x 88mm x 23mm (LxWxH).
- ■ Weight: 120g.
- ■ Compliance: FCC part 15, Subpart B, Class A, ANSI C63.4:2003 CE EN55022:2006, Class A EN55024:1998+A1:2001+A2:2003 LVD: EN60950-1:2001
- ■ MTBF: 65,000 h (25°C)

Managed 3U Rack Type
FRM301

16-slot Media Converter Chassis

The FRM301 is a standard 3U, 19″ or 23″ rack mountable, fiber media platform that features 16 line cards capacity. Currently supported line cards include copper to fiber converters for 10/100Base-TX, or 10/100/1000Base-TX over multimode fiber (up to 2 km), single mode fiber (up to 120 km) or utilizing WDM (up to 60 km). WDM (Wave Division Multiplexing) converts each input-output data stream into separate wavelengths of light and transmits/receives these channels through the same optical fiber. Other FRM301 line cards can also support G.703 E1/T1, Datacom (V35, X.21, RS530/ 449/ 232) and Serial (RS485/ 422/ 232) data communication interfaces over fiber.

Features

- 3U, 19" (or 23") rack with convertible stand-alone units, rack accommodates up to 16 units
- CPE Remote status monitor
- Loop-back test
- Once the converter is installed, it is hot-swappable to avoid any other network downtime.
- Rack with Dual power modules designed for redundant power application, AC and/or DC, cooling fans included
- SNMP, serial console, Telnet management
- Supports an auto recovery function; the system can restore all settings back to original working status when the power or the connection is resumed
- TFTP Firmware upgrade
- Windows Based GUI

Line Card Modules

Model	Description
FRM301-10/100F	10/100Base-TX to 100Base-FX MM or SM
FRM301-10/100W	10/100Base-TX to 100Base-FX BIDI
FRM301-1000TG	1000Base-TX to 1000Base-SX/LX GBIC
FRM301-1000TS	1000 Base-TX to 1000 Base-SX/LX SFP
FRM301-1000ES	10/100/1000Base-TX to 1000Base SX/LX SFP
FRM301-1000MG	1000 Base-SX to 1000Base-LX MM to SM
FRM301-E1R/E1B	TDM G.703 E1 to FX MM or SM
FRM301-T1R	TDM G.703 T1 to FX MM or SM
FRM301-SERIAL	RS422/485/232/423 Terminal block to FX MM or SM

Specifications

Material	Stainless paint	
Power	AC	90 — 264 VAC
	DC	-18 — -56 VDC
		-36 — -72 VDC
Environment	Temperature	0 — 50°C (Operating)
		0 — 70°C (Storage)
	Humidity	20 — 80% non condensing (Operating)
		10 — 90% (Storage)
Power Consumption	80W	
Dimensions(WxDxH)	440mm x 280mm x 130.6mm	
Weight	7.875kg (include 1 AC power modules & two ear panels for rack-mounting)	
Compliance	FCC part 15 class A, CE Mark	
MTBF	65000 hours	

Ordering Info

Rack Mount FRM301 Chassis	
FRM301-CH	3U, 19(23)" , 16-slot Chassis
Power Supply Module	
FRM301-AC	AC (90 to 264 VAC) power supply module, IEC connector
FRM301-DC1	DC (±18 to ±56 VDC) power supply module, 3-pin terminal block
FRM301-DC2	DC (±36 to ±72 VDC) power supply module, 3-pin terminal block
Network management	
FRM301-SNMP/C	SNMP card with RS-232 and 10Base-T interface
FRM-SNMP-GUI (Software)	GUI (Graphical User Interface)

Managed Platform
FIB1-10/100F & FIB2-10/100F

Stand-alone Fast Ethernet to Fiber Media Converter

FIB1-10/100F and FIB2-10/100F series are Fast Ethernet 10/100Base-TX to 100Base-FX manageable 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, depending on your specific network needs. LED indicators signal the power status of the converter, UTP port speed, Link, and duplex status, FX port Link and duplex status.

Features

- Ability to force 10Mbps or 100Mbps at TP port
- Auto Crossover for MDI/MDIX at TP port
- Auto Negotiation at TP port
- Compatible with FRM301 Chassis with SNMP management
- Full or Half-Duplex on copper
- Store and forward Switching mechanism
- Supports link-loss-forwarding function, loop-Back test, and remote state monitor Flow Control
- Support GUI, SNMP Management with FRM301 Chassis
- Buffer: 128Kbyte

Ordering Info

FIBX-10/100	X	XX	XXX	X
Product Type	Fiber Type	Connector Type	Connectivity Distance	Function Type
FIB1 Family	S: Single	ST	002: 2km	F: with
FIB2 Family	M: Multi	SC	015: 15km	advanced
	W: WDM	FC	030: 30km	feature
			050: 50km	
			080: 80km	
			120: 120km	
			*20A: 20km [WDM only]	
			*20B: 20km [WDM only]	
			*40A: 40km [WDM only]	
			*40B: 40km [WDM only]	
			*60A: 60km [WDM only]	
			*60B: 60km [WDM only]	

*20A must be coupled with 20B
*40A must be coupled with 40B

Specifications

Standard	IEEE 802.3 10Base-T, 802.3u 100Base-TX and 100Base-FX standards	
LEDs	PWR, LLF, Fiber Link, TP Link/ Duplex/ Speed	
Power	FIB1	External AC Adapter; 5VDC@ 1A
	FIB2	AC Model: 100 — 240 VAC ± 10%; Frequency: 50 — 60Hz DC Model: 24 — 72VDC ±10%
Environment	Temperature	0 — 50°C (Operating); 0 — 70°C (Storage)
	Humidity	20 — 80% non condensing (Operating); 10 — 90% (Storage)
Power Consumption	FIB1	< 4W
	FIB2	< 4W
Dimensions(WxDxH)	FIB1	85.6mm x 122.6mm x 20mm
	FIB2	85.6mm x 191.7mm x 30mm
Weight	FIB1	340g
	FIB2	550g
Compliance	CE, FCC Class A	
MTBF	65000 Hours	

Application

IP Surveillance

2 Fiber Series

PDH Series

Broadband Access

EoCoax

Measurement

Interface Converter

Datacom Accessories

Network Management

Managed Platform
FIB1-1000ES

Stand-alone Gigabit Ethernet Media Converter

The FIB1-1000ES is a stand-alone optical fiber media converter for 10/100/1000Base TX to 1000Base-SX/LX that also provides NMS functions for Link-Loss-Forwarding, Remote-Monitoring-Status, and Loop-Back-Test. These optional features are especially useful when the stand-alone units are linked to our FRM301 with SNMP management. When auto-negotiation is selected, these units will automatically tailor themselves to convert speed or duplex, depending on your specific network needs.

Another unique feature of the FIB1-1000ES converter is the use of a common PCB card which may either be placed in the rack (FRM301 series line card) or used as a stand-alone converter (FIB1 series). When installed in an FRM301 rack with SNMP, network administrators are able to manage any converter module from anywhere on the network, detect any loss and maintain each loop.

Features

■ Ability to force 10Mbps or 100Mbps or 1000Mbps on UTP port

■ Auto-Cross over for MDI/MDIX on UTP port

■ Auto-Negotiation on UTP port

■ Compatible with FRM301 Chassis for SNMP management

■ Full or Half-Duplex on UTP port

■ Max. Packet Size: 1632 Bytes

■ Store and Forward Switching Mechanism

■ Supports Auto / Force Mode on FX port

■ Supports link-loss-forwarding function, loop-Back test, remote state monitor

■ MAC address: 8K
  Buffer: 128Kbyte

Specifications

Standard	IEEE 802.3 10Base-T, 802.3u 100Base-TX, 802.3ab 1000Base-T and 802.3z 1000Base-SX/LX standards	
Connector	TX	10/100/1000 Mbps RJ45
	FX	1000 Mbps SFP LC
LEDs	PWR, LLF, FX link, TP Link/Speed/Duplex	
Power	External AC adapter; 12VDC@1A	
Environment	Temperature	0 — 50°C (Operating)
		0 — 70°C (Storage)
	Humidity	10 — 90% (Operating)
Power Consumption	< 4W	
Dimensions(DxWxH)	85.6mm x 122.6mm x 20mm	
Weight	340g	
Compliance	FCC part 15 class A, CE	
MTBF	65000 Hours	

Application

Ordering Info

FIB1-1000ES	10/100/1000Base-TX to 1000Base-FX Gigabit converter, SFP-LC type, SFP not included
SFP Module Options	
SFM-7000-S85	SFP, MM , 850nm , 550m, LC
SFS-7010-L31	SFP, SM, 1310nm , 10km, LC
SFS-7040-H31	SFP, SM, 1310nm, 40km, DFB,LC
SFS-7050-X55	SFP, SM, 1550nm, 50km, DFB, LC
SFS-7080-Z55	SFP, SM, 1550nm, 80km, DFB, LC
SFS-7010-WA	SFP, BiDi, T1310/R1550nm, 10Km, LC
SFS-7010-WB	SFP, BiDi, T1550/R1310nm, 10Km, LC
SFS-7020-WA	SFP, BiDi, T1310/R1550nm, 20Km, LC
SFS-7020-WB	SFP, BiDi, T1550/R1310nm, 20Km, LC
SFS-7040-WA	SFP, BiDi, T1310/R1550nm, 40Km, LC
SFS-7040-WB	SFP, BiDi, T1550/R1310nm, 40Km, LC
SFS-7060-WA	SFP, BiDi, T1310/R1550nm, 60Km, LC
SFS-7060-WB	SFP, BiDi, T1550/R1310nm, 60Km, LC

IP Surveillance

2 Fiber Series

PDH Series

Broadband Access

EoCoax

Measurement

Interface Converter

Datacom Accessories

Network Management

Fiber Media Converter

Managed Platform
FIB1-1000TS,
FIB1-1000TG / FIB2-1000TG

Stand-alone Gigabit Ethernet Media Converter

FIB1-1000TS

FIB1-1000TG

The FIB1-1000TS, FIB1-1000TG/FIB2-1000TG are stand-alone optical fiber media converter for 1000Base-T to 1000Base-SX/LX that also provides NMS functions for Link-Loss- Forwarding, Remote-Monitoring-Status, and Loop-Back-Test. These optional features are especially useful when the stand-alone units are linked to one of our rack type units with SNMP management. When auto-negotiation is selected, these units will automatically tailor themselves to convert both half-duplex and full-duplex signals, depending on your specific network needs.

Another unique feature of the FIB1-1000TS, FIB1-1000TG/FIB2-1000TG converter is the use of a common PCB card which may either be placed in the rack (FRM301 series line card) or used as a stand-alone converter (FIB1 series). When installed in an FRM301 rack with SNMP, network administrators are able to manage any converter module from anywhere on the network, detect any loss and maintain each loop.

Features

- Auto-Cross over for MDI/MDIX in TP port
- Compatible with FRM301 Chassis for SNMP management
- Maximum package Size: 9K Byte
- Supports Link-Loss-Forwarding function, Loop-Back diagnostic test, remote state monitor

Application

Specifications

Standard	802.3ab 1000Base-T , 802.3z 1000Base-SX/LX standards	
LEDs	PWR, LLF, LBT, FX Link/Duplex, TP Link	
Power	FIB1	External AC adaptor required, 12VDC;1A
	FIB2	AC Model: 100-240 VAC +/- 10% Fequency: 50-60Hz DC Model: 24-72VDC+/-10%
Environment	Temperature	0 — 50°C (Operating) 0 — 70°C (Storage)
	Humidity	20 — 80% non condensing 10 — 90% (Storage)
Power Consumption	FIB1	<4W
	FIB2	AC Model: <6W DC Model: <9W
Dimensions(WxDxH)	FIB1	85.6 x 122.6 x 20 mm
	FIB2	85.6 x 191.7 x 30 mm
Weight	FIB1	300g
	FIB2	550g
Compliance	FCC part 15 class A, CE	
MTBF	65000 Hours	

Ordering Info

FIB1-1000TS	1000Base-TX to 1000Base-SXLX SFP LC but SFP is not included, With AC power Adaptor, 12V DC, 1A
FIB1-1000TG	1000Base-TX to 1000Base-SXLX GBIC SC With AC power Adaptor, 12V DC, 1A
FIB2-1000TG/AC	1000Base-TX to 1000Base-SXLX GBIC SC,with built-in power supply, AC model 100-240VAC
FIB2-1000TG/DC	1000Base-TX to 1000Base-SXLX GBIC SC,with built-in power supply, DC model 24-72VDC
GBIC Module Options	
GBM-7000-S85	GBIC, MM, 850nm, 550m, SC
GBM-7000-L31	GBIC, MM, 1310nm, 2km, SC
GBS-7010-L31	GBIC, SM, 1310nm, 10km, SC
GBS-7040-H31	GBIC, SM, 1310nm, 40km DFB, SC
GBS-7050-X55	GBIC, SM, 1550nm, 50km, DFB, SC
GBS-7080-Z55	GBIC, SM, 1550nm, 80km, DFB, SC
GBS-7120-E55	GBIC, SM, 1550nm, 120km, DFB, SC
GBS-7010-WA	GBIC, BiDi, T1310/R1550nm, 10km, SC
GBS-7010-WB	GBIC, BiDi, T1550/R1310nm, 10km, SC
GBS-7020-WA	GBIC, BiDi, T1310/R1550nm, 20km, SC
GBS-7020-WB	GBIC, BiDi, T1550/R1310nm, 20km,SC
GBS-7040-WA	GBIC, BiDi, T1310/R1550nm, 40km, SC
GBS-7040-WB	GBIC, BiDi, T1550/R1310nm, 40km, SC
GBS-7060-WA	GBIC, BiDi, T1310/R1550nm, 60km, SC
GBS-7060-WB	GBIC, BiDi, T1550/R1310nm, 60km, SC

Managed Platform
FIB1-1000DS/FIB1-1000MG

Stand-alone Fiber Media Converter and Repeater

FIB-1000DS/FIB1-1000MG is a fiber optical media converter and repeater that allows data rates up to 1.25Gbps. FIB1-1000DS supports 2R regeneration, which consists of re-amplification and reshaping. This converter is compatible with fiber interface such as Fast and Gigabit Ethernet, FDDI, STM-1, STM-4, OC1, OC3, OC12, OC24, 1G Fiber Channel.

FIB1-1000DS

FIB1-1000MG

Features

- Converts MM to MM, MM to SM, SM to SM
- Compatible with FRM301 Chassis for SNMP management
- Extend Fiber Optic distance up to 2km (Multi-mode)
- Multi-rate support from 100Mbps up to 1.25Gbps
- Performs optical repeater function (Re-amplification and reshaping)
- Extend Fiber Optic distance up to 120km (Single-mode)
- Optical Connector : SFP-LC (FIB1-1000DS),
                       GBIC-SC (FIB1-1000MG) Type

Ordering Information

FIB1-1000DS	Fiber media converter and repeater, line rates support 100Mbps to 1.25Gbps (without SFP-LC Fiber Transceivers)
FIB1-1000MG	Fiber media converter and repeater, line rates support 100Mbps to 1.25Gbps (without GBIC-SC Fiber Transceivers)

Specifications

Data Rates	Transparent mode up to 1.25Gbps	
	FDDI, 100Mbit Ethernet	
	STM-1, STM-4	
	OC1, OC3, OC12, OC24	
	ESCON	
	Fiber Channel	
	Gigabit Ethernet	
LEDs	PWR, MM Link, SM Link	
Power	External AC adapter; 12VDC@ 1A	
Environment	Temperature	0 — 50°C (Operating); 0 — 70°C (Storage)
	Humidity	20 — 80% non condensing (Operating); 10 — 90% (Storage)
Power Consumption	< 4W	
Dimensions(WxDxH)	85.6mm x 122.6mm x 20mm	
Weight	340g	
Compliance	FCC part 15 class A, CE	
MTBF	65000 Hours	

Applications

FE/ GE/
Fiber channel/
STM-1.4.8
OC-1.2...24

SM to SM,
SM to MM or
MM to MM
media converter
(FIB1-1000DS/
FIB1-1000MG)

FE/ GE/
Fiber channel/
STM-1.4.8
OC-1.2...24

Transparent
(100M to 1.25G)

Fiber Managed Platform
FIB1-E1/T1 & FIB2-E1/T1

Stand-alone E1/T1 to Fiber Converter

The FIB1/FIB2-E1 is a fiber media transport for G.703 E1 transmission. The BNC model provides unbalanced 75 Ohm coaxial connections while the RJ-45 model provides balanced 120 Ohm connections over twisted pair wiring. The FIB1/FIB2-T1 is a fiber media transport for G.703 T1 transmission and features an RJ-45 connector for connection to 100 Ohm twisted pair wiring. When the FIB1/FIB2-E1 or T1 card is placed in the FRM301 rack with SNMP management, the card status, type, version, fiber link status, E1 or T1 link status and alarms 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.

Features

- Network Management via Terminal or SNMP in FRM301 Chassis
- T1/E1 RJ-45 (USOC RJ-48C) or Coax (BNC) to Fiber converter
- Support AMI or B8ZS/HDB3 line codes
- Unframed (transparent clear channel)
- User selectable line code setting, Far End Fault (FEF) setting, Loop back test

Specifications

Standard		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
LEDs		PWR, Fiber Link, Line (E1 or T1) Link, Test mode
Power	FIB1	External AC Adapter 9VDC@ 1A
	FIB2	AC Model: 100 — 240 VAC ± 10%; Frequency: 50 — 60 Hz DC Model: 24 — 72 VDC ±10%
Environment	Temperature	0 — 50°C (Operating); 0 — 70°C (Storage)
	Humidity	20 — 80% non condensing (Operating); 10 — 90% (Storage)
Power Cunsumption	FIB1	< 5W
	FIB2	< 2W
Dimensions(WxDxH)	FIB1	85.6mm x 122.6mm x 20mm
	FIB2	85.6mm x 191.7mm x 30mm
Weight	FIB1	300g
	FIB2	AC model: 500g; DC model: 550g
Compliance		CE, FCC Class A
MTBF		65000 Hours

Ordering Info

FIBX-E1/T1	XXX-	XX-	XXX
Product Type	Interface Type	Connector Type	Connectivity Distance
FIB1 Family	E1R	ST	002: 2km
FIB2 Faimly	E1B	SC	015: 15km
	T1R	LC	030: 30km
			050: 50km
			080: 80km
			120: 120km
			*20A: 20km [WDM only]
			*20B: 20km [WDM only]
			*40A: 40km [WDM only]
			*40B: 40km [WDM only]
			*60A: 60km [WDM only]
			*60B: 60km [WDM only]

*20A must use couple with 20B
*40A must use couple with 40B

Application

IP Surveillance

2 Fiber Series

PDH Series

Broadband Access

EoCoax

Measurement

Interface Converter

Datacom Accessories

Network Management

Fiber Managed Platform
FIB1-Data & FIB2-Data
FIB1-Data/H & FIB2-Data/H

Stand-alone V.35/RS-530/449/232/X.21 to Fiber Converter

The FIB1/FIB2-DATA is a media converter for V.35, RS-232, RS-530, X.21 or RS-449 high-speed (2.048Mbps) synchronous or low speed synchronous and asynchronous data transmission over optical fiber media. The FIB1/FIB2-DATA/H is a high speed media converter for V.35, RS-530, X.21 or RS-449 high-speed (8.192Mbps) synchronous data transmission over optical fiber media. When the FIB1/FIB2-DATA card is placed in the FRM301 rack with SNMP management, the card status, type, version, fiber link status, data link status and alarms can all be displayed. Configuration is also available 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.

Features

- 1 port data communication on HDB26 female (adapter cable required)
- Network management via Terminal or SNMP in FRM301 chassis
- Optical Bit Error Rate less than 10^{-11}
- User selectable n x 64Kbps (n x 256Kbps for H type) data rate, clock mode setting, asynchronous setting, Loop back tests

Specifications

Standard	ITU-T	
LEDs	PWR, Fiber Link, TD, RD, RTS, CTS, DCD, Test	
Power	FIB1	Input: 100~240VAC ; 47~63Hz Output: 9VDC ; 1A
	FIB2	AC Model: 100 — 240 VAC±10%; Frequency : 47 — 63Hz DC Model: 24 — 72 VDC±10%
Environment	Temperature	0 — 50°C (Operating)
		0 — 70°C (Storage)
	Humidity	up to 90% non-condensing
Power Cunsumption	FIB1	< 5W
	FIB2	< 5W
Dimensions(DxWxH)	FIB1	85.6mm x 122.6mm x 20mm
	FIB2	85.6mm x 191.7mm x 30mm
Weight	FIB1	300g
	FIB2	550g
Compliance	CE, FCC Class A	
MTBF	65000 Hours	

Ordering Info

FIBX- Product Type	XXX- Copper Interface Type	XX- Connector Type	XXX Connectivity Distance
FIB1 Family	V35	ST	002: 2km
FIB2 Family	232	SC	015: 15km
	530	LC	030: 30km
	X21		050: 50km
	449		080: 80km
			120: 120km
			*20A: 20km [WDM only]
			*20B: 20km [WDM only]
			*40A: 40km [WDM only]
			*40B: 40km [WDM only]
			*60A: 60km [WDM only]
			*60B: 60km [WDM only]

*20A must use couple with 20B
*40A must use couple with 40B

Application

IP Surveillance

2 Fiber Series

PDH Series

Broadband Access

EoCoax

Measurement

Interface Converter

Datacom Accessories

Network Management

Fiber Media Converters

Managed Platform
FIB1-Serial & FIB2-Serial

Stand-alone RS-232/485/422 Copper to Fiber Converter

The FIB1/FIB2-Serial provides a fiber converter solution to extend RS-232 or RS-485 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, RS-422, or RS-485 (2 or 4 wire). The FIB-Serial secures data transmission over EMI resistant fiber at speeds up to 256kbps for RS-232 or up to 1024kbps for RS-422/485. When the FIB1/FIB2-Serial is linked to the FRM301 with FIB1-SERIAL card, it allows network engineers to get greater functionality through advanced SNMP features. The network administrator can manage any converter module from anywhere on the network, detect any link loss and maintain each loop.

Features

- Extend serial transmission from 2 to 120 km over fiber
- Selectable data I/F for RS232/ 422/ 485/ TTL
- Selectable two or four wire RS-485/ 422
- Selectable three or five wire RS-232
- SNMP management features with FRM301 Chassis
- Speeds up to 256Kbps for RS-232 (Async mode)
- Speeds up to 1024Kbps for RS-485/ 422 and TTL
- Support auto-adjustment function, no extra attenuators needed

Specifications

Standard	EIA/ TIA RS485/ 422/ 232	
LEDs	Power, Data, Test, Fiber Link	
Power	FIB1	Input: 100~240VAC ; 47~63Hz Output: 9VDC ; 1A
	FIB2	AC Model: 100~240 VAC ± 10%; Frequency: 47~63 Hz DC Model: 24~72 VDC ±10%
Environment	Temperature	0 — 50°C (Operating) ; 0 — 70°C (Storage)
	Humidity	up to 90% non-condensing
Power Consumption	FIB1	< 5W
	FIB2	< 5W
Dimensions(WxDxH)	FIB1	85.6mm x 122.6mm x 20mm
	FIB2	85.6mm x 191.7mm x 30mm
Weight	FIB1	300g
	FIB2	550g
Compliance	CE, FCC part 15 class A	
MTBF	65000 Hours	

Ordering Info

FIBX-Serial	X/–	XX-	XXX
Product Type	Fiber Type	Connector Type	Connectivity Distance
FIB1 Family	S: Single	ST	002: 2km
FIB2 Family	M: Multi	SC	015: 15km
	W: WDM	FC	030: 30km
			050: 50km
			080: 80km
			120: 120km
			*20A: 20km [WDM only]
			*20B: 20km [WDM only]
			*40A: 40km [WDM only]
			*40B: 40km [WDM only]
			*60A: 60km [WDM only]
			*60B: 60km [WDM only]

*20A must use couple with *20B
*40A must use couple with *40B

Application

Unmanaged Platform
FIB1-Serial/FDC

RS232/ 485 Fiber Optic Ring/ Daisy-chain Modem

The FIB1-Serial/FDC is a asynchronous fiber optic Ring/ Daisy-chain modem which operates over a fiber link to connect remote terminals and computers, connected in multi-drop, to a central host. The FIB1-Serial/FDC allows for totally redundant, fault tolerant, self-healing operation, providing uninterrupted communications between networks nodes, even if a fiber break occurs in one device in the ring or chain fails.

Features

■ Asynchronous transmission at data rate from DC to 256Kbps

■ Auto-detect the slave device on the host side

■ Automatically prevent a runaway data condition

■ Host/Slave selectable

■ In-band management will not cause any interruption for the Data communication

■ LED indicators for easy-learning of failure-detection

■ Multi-drop operation over a fiber link

■ Provides in a linear bus topology or daisy-chain topology

■ Provides support for RS-232 or RS-422(RS-485) I/F

■ Total number of device (host + slave) can up to 256

■ Transmission range up to 50Km over single mode fiber

Specifications

Standard	EIA/TIA RS-484/232
LEDs	Power, TD/RD transmit, FX link1/Link2, Test, Master and Ring
Power	−18 −− −32 VDC
Environment	Temperature	0 — 60°C (Operating); 0 — 70°C (Storage)
	Humidity	10 — 90% non condensing (Operating); 0 — 95% (Storage)
Power Cunsumption	< 4W
Dimensions(WxDxH)	85.6mm x 122.6mm x 20mm
Weight	340g
Compliance	FCC part 15 class A, CE

Ordering Info

FIB1-Serial/FDC	100X/	xx	xxx
	Fiber Type	Connector Type	Connectivity Distance
	S: Single	ST	002: 2km
	M: Multi	SC	015: 15km
	W: WDM	FC	030: 30km
			050: 50km
			080: 80km
			120: 120km
			*20A: 20km [WDM only]
			*20B: 20km [WDM only]
			*40A: 40km [WDM only]
			*40B: 40km [WDM only]
			*60A: 60km [WDM only]
			*60B: 60km [WDM only]

*20A must use couple with *20B
*40A must use couple with *40B

Application

IP Surveillance

2 Fiber Series

PDH Series

Broadband Access

EoCoax

Measurement

Interface Converter

Datacom Accessories

Network Management

Fiber Media Converter

Managed 4U Rack Type
FRM401

12-slot Media Converter Chassis

The FRM401 is a copper to fiber media converter chassis that fits in a 19″ or 23″ rack and occupies 4U (7 inch) of rack space. The Hot Swappable Line Cards for the FRM401 are available in 10/100Base-TX Ethernet standard to fiber (100Base-FX) connection for multi-mode (up to 2Km) or single mode (up to 120Km) with all the popular connector types such as SC, ST, or FC. Line Cards are also available with the latest WDM (Wave Division Multiplexing) technology (up to 60Km and must be coupled) which converts the transmission and receiving data streams into separate wavelengths and allows bi-directional transport through a single fiber strand.

Each Line Card contains four separate and identical media converters and may include optional features such as Link-loss forwarding, loop back testing, get remote status Packet size up to 1600 Bytes to support VLAN and QOS transmissions pass thru. A chassis, fully loaded with 12 Line Cards, can provide a total of 48 loops in a high density configuration especially suited for applications such as FTTH (Fiber to the Home).

Features

- 4U high, 19″(or 23″) rack, accommodates up to 12 line cards, each converter card provides four complete fiber converters

- Once the converter is installed, it is hot-swappable to avoid any other network downtime.

- Rack with Dual power modules designed for AC or DC power sharing, cooling fans included

- SNMP, serial console, Telnet management

- Supports an auto recovery function; the system can restore all settings back to original working status when the power or the connection is resumed

- Windows Based GUI

Specifications

Power	AC	85 — 138 or 187 — 276 VAC
	DC	-42 — -60 VDC
Environment	Temperature	0 — 50°C (Operating); 0 — 70°C (Storage)
	Humidity	10 — 90% non condensing
Power Consuption	150W	
Dimensions(WxDxH)	438mm x 285mm x 180mm	
Weight	790g (empty chassis plus bracket)	
Compliance	FCC part 15 class A, CE Mark	
MTBF	66,480 hours	

Ordering Info

Rack Mount FRM401 Chassis	
FRM401-CH/AC	4U, 19" 12-slot Chassis for AC power
FRM401-CH/DC	4U, 19" 12-slot Chassis for DC power
Power Supplier Module	
FRM4/AC-110	AC (85VAC-138V) power supply module
FRM4/AC-220	AC (187-276VAC) power supply module
FRM4-DC	DC (42 to 60 VDC) power supply module
Network management	
FRM401-SNMP	SNMP card with RS-232 and 10Base-T interface
FRM-SNMP-GUI (Software)	GUI (Graphical User Interface)

FRM401 Front Panel View

FRM401 Rear Panel View

Line Card Modules

Model	Description	Distance	Connector
FRM401-10/100F	10/100Base-TX to 100Base-FX	MM : 2km SM : 15/30/50/80/120km	SC/FC/ST
FRM401-10/100W	10/100Base-TX to 100Base-FX BiDi	WDM : 20/40/60km	

Unmanaged Platform
FMC-CH08

Unmanaged 8 Slots Media Concentrator

The FMC-CH08 is a 2U high 10" (or half 19") chassis that supports up to 8 non-managed FMC or V2MC media converters. The FMC-CH08 provides an economic solution in medium density fiber converter installations where no management features are required. Each FMC or V2MC converter is an independent Ethernet to fiber or Ethernet to copper media converter and 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 its 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 V2MC 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 or V2MC units stand-alone units
- Chassis with single built-in power available in AC or DC models. Cross flow cooling fan built-in.
- Designed for rack mounting in single or tandem (2 chassis) configuration.

Application

FMC-CH08   FMC or V2MC Media Converter

Available Media Conveterts

- **FMC-10/100**   10/100Base-TX to 100Base-FX
  (Please see page 2-23)

- **FMC-1000E**   10/100/1000Base-TX to 1000Base-SX/LX
  (Please see page 2-24)

- **FMC-10000ES**   10/100/1000Base-TX to 1000Base-SX/LX
  with SFP-LC slot
  (Please see page 2-24)

- **FMC-10/100POF-O**   10/100Base-TX to 100Base-FX,
  supports plastic Optic Fiber, Optolock connector
  (Please see page 2-26)

- **FMC-10/100POF-S**   10/100Base-TX to 100Base-FX,
  supports plastic Optic Fiber, SMI connector
  (Please see page 2-26)

- **VDTU2A-301**   VDSL2 LAN extender
  (V2MC)   (Please see page 4-19)

Specifications

- Temperature: $0 - 50^o$ C (Operating);
  $0 - 70^o$ C (Storage).
- Humidity: 20-80% non-condensing (Operating);
  10-90% (Storage).
- Power: Input: 90-250VAC
  24VDC Input,18-36VDC ;
  48VDC Input, 36-72VDC
- Dimensions: 178.7mm x 251.6mm x 88mm (LxWxH).
- Power Consumption: < 40W (8-slot fully loaded)
- Compliance: FCC part 15, Subpart B, Class A,
  ANSI C63.4:2003
  CE EN55022:2006, Class A
  EN55024:1998+A1:2001+A2:2003
  LVD: EN 60 950-1:2001
- MTBF: 65,000 h (25^oC)

Ordering Information

- **FMC-CH08-AC**   8 slots Rack with Internal AC 100 ~ 240V
- **FMC-CH08-DC24**   8 slots Rack with Internal DC 24V
- **FMC-CH08-DC48**   8 slots Rack with Internal DC 48V

FMC-10/100POF-O

FMC-10/100POF-S

VDTU2A-301
(V2MC)

FMC-10/100

Unmanaged Platform
FMC-10/100

10/100Base Ethernet Fiber Media Converter

The FMC-10/100 is a 10/100Base Ethernet to 100Base-FX fiber media converter designed for CPE applications when installed in or connection to the FMC-CH08 unmanaged media converter platform or in stand-alone point to point applications. The FMC-10/100 converter supports auto-negotiation on the copper Ethernet side as well as forced mode. With advanced features like LFP (Link Fault Pass-thru), FEF (Far-End Fault), Switch mode (store & forward, 1600 Bytes maximum frame size) or Converter mode (100/Full to 100/Full, low latency, 9K Bytes packet support), this media converter is targeted for customer premises equipment in metro LAN, campus, enterprise and FTTx applications. By offering simple DIP switch settings, this converter can provide complete control over all converter settings including 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

- Auto-Cross over for MDI/MDIX in TP port
- Supports far end fault (FEF) function
- Auto-Negotiation or Manual mode in TP port
- Supports link fault pass through (LFP) function
- Supports LED indicators
- Supports Converter mode or switch mode function operation
- Packet lengths up to 1600 bytes in Switch mode,
  Or the packet length is not limited in Converter mode

General Specification

General Specification
- Complies with   IEEE 802.3 10Base-T, 802.3u 100Base-TX and 100Base-FX standards.
- Temperature: 0 - 50° C (Operating); 0 - 70° C (Storage).
- Humidity: 20-80% non-condensing (Operating); 10-90%   (Storage).
- Power: Input: (AC adaptor) 90-250VAC Internal AC power: 100~240VAC Internal DC power: 18~72VDC
- Dimensions: 108mm x 73.4mm x 23mm (LxWxH).
- Power Consumption: < 4W
- Compliance: FCC part 15, Subpart B, Class A, ANSI C63.4:2003 CE EN55022:2006, Class A EN55024:1998+A1:2001+A2:2003 LVD: EN 60 950-1:2001
- MTBF: 65,000 h (25°C)

Technical Specifications

LAN Interface Specification
- One RJ-45 female connector for straight or cross-over connection.
- Supports 10/100Base-TX, Full, Half duplex n-way (Auto-Negotiation).
- Supports Full, Half duplex, 10/100 speed manual selections.
- Transmission Packet Rate for 10/100Base-TX : 14880bps/148800bps.
- Copper TP cable 4 pair Cat. 3 or 5 UTP

Optical Interface Specification
- Transceiver Connector type：ST, SC, WDM
- Wavelength(typical)：multi-mode: 1310nm； single-mode：1310nm/1550nm up to 120Km WDM：1310/1550nm or 1550/1310nm(A/B type) up to 60Km
- Supports Full, Half duplex selections

Ordering Information

- **FMC-10/100**   10/100Base-TX to 100Base-FX converter
- **FMC-10/100-AC**   10/100Base-TX to 100Base-FX converter with internal AC power (100-240VAC)
- **FMC-10/100-DC**   10/100Base-TX to 100Base-FX converter with internal DC power (18-72VDC)

FMC-10/100-AC

FMC-10/100-DC

Fiber Media Converter

Unmanaged Platform
FMC-1000E/1000ES

Unmanaged Gigabit Ethernet Media Converter

The FMC-1000E is a stand-alone optical fiber media converter for 10/100/1000Base-T to 1000Base-SX/LX that also provides auto-negotiation and Link Fault Pass-Through. When auto-negotiation is selected, these units will automatically tailor themselves to convert both half-duplex and full-duplex signals, depending on your specific network needs. The FMC-1000E converter may be placed in the unmanaged rack (FMC-CH08) as a slide-in-converter or used as a stand-alone converter (FMC series).

Features

- Auto-Cross over for MDI/MDIX in TP port
- Auto-Negotiation or Manual mode (10M, 100M & 1000M) in TP port
- Supports link fault pass through (LFP) function
- Maximum packet size: 1632 Bytes
- Supports remote CPE power fail detection (Dying GASP)

Application

CO (Rack) to CPE (Stand-alone)

FMC-CH08   FMC-1000E/1000ES

CO (Stand-alone) to CPE (Stand-alone)

FMC-1000E/1000ES   FMC-1000E/1000ES

Ordering Information

- **FMC-1000E** — Unmanaged, 10/100/1000Base-T to 1000-Base SX/LX media converter
- **FMC-1000ES** — Unmanaged, 10/100/1000Base-T to 1000-Base SX/LX media converter with SFP-LC slot

Specifications

LAN Interface Specification
- One RJ-45 female connector for straight or cross-over connection.
- Supports 10/100/1000Base-TX, n-way (Auto-Negotiation).
- Supports Full, Half duplex, 10/100/1000 speed force mode selections.
- Transmission Packet Rate for 10Base-T: 14880 per second 100Base-TX: 148800 per second ; 1000Base-TX: 1488000 per second
- Copper TP cable 4 pair Cat. 5e or 6 UTP

Optical Interface Specification
- Transceiver Connector type：SC(FMC-1000E) ; SFP-LC(FMC-1000ES)
- Supports Full, Half auto duplex selection, 1000Mbps speed
- Supports auto-receive sensitivity function, no extra attenuators needed.

General Specification
- Standards   IEEE802.3 10Base-T, IEEE802.3u 100Base-TX , 100Base-FX, IEEE802.3ab 1000Base-TX, 1000Base-FX
- 6 diagnostic LEDs :   Power / FX-Link ,TX-Speed / TX-Duplex / TX-Link
- Temperature: $0 - 50^o$ C (Operating); $0 - 70^o$ C (Storage).
- Humidity: 20-80% non-condensing (Operating); 10-90%   (Storage).
- Power: DC Jack : Switching adaptor (12V, 400mA) Consumption: < 4W
- Dimensions: 95mm x 73.4mm x 23mm (LxWxH).
- Weight: 120g.
- Compliance: FCC part 15, Subpart B, Class A, ANSI C63.4:2003 CE EN55022:2006, Class A EN55024:1998+A1:2001+A2:2003 LVD: EN60950-1:2001
- MTBF: 65,000 h (25^oC)

IP Surveillance

2 Fiber Series

PDH Series

Broadband Access

EoCoax

Measurement

Interface Converter

Datacom Accessories

Network Management

Fiber Media Converter

Un-Managed Platform
FMC-10/100P

10/100Base Ethernet Fiber Media Converter Features with Power over Ethernet (802.3af PD)

The FMC-10/100P is a 10/100Base Ethernet to 100Base-FX fiber media converter with PoE (Power over Ethernet) designed for CPE applications when connection to the FMC-CH08 unmanaged media converter platform or in stand-alone point to point applications. The FMC-10/100P converter supports auto-negotiation on the copper Ethernet side as well as forced mode. With advanced features like LLP (Link Loss Pass-thru), FEF (Far-End Fault), Switch mode (store & forward, 1600 Bytes maximum frame size) or Converter mode (100/Full to 100/Full, low latency, 9K Bytes packet support), this media converter is targeted for customer premises equipment in metro LAN, campus, enterprise and FTTx applications. By offering simple DIP switch settings, this converter can provide complete control over all converter settings including duplex and speed configuration. By utilizing PoE, this convert is capable of drawing power from any PoE enabled Ethernet switch or Midspan device, thus eliminating the need for any other power source for the converter. 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

- Auto-Cross over for MDI/MDIX in TP port
- Supports far end fault (FEF) function
- Auto-Negotiation or Manual mode in TP port
- Supports link fault pass through (LFP) function
- Support LED indicators
- Support Converter mode or Switch mode function operation
- Packet lengths up to 1600 bytes in Switch mode,
  Or the packet length is not limited in Converter mode

General Specification

General Specification

- Complies with   IEEE 802.3 10Base-T, 802.3u 100Base-TX,
                       100Base-FX and 802.3af (PoE) standards.
- Temperature: 0 - 50° C (Operating);
                       0 - 70° C (Storage).
- Humidity: 20-80% non-condensing (Operating);
                       10-90%   (Storage).
- Power: Input: (AC adaptor) 90-250VAC
- Dimensions: 108mm x 73.4mm x 23mm (LxWxH).
- Power Consumption: < 4W
- Compliance: FCC part 15, Subpart B, Class A,
                       ANSI C63.4:2003
                       CE EN55022:2006, Class A
                           EN55024:1998+A1:2001+A2:2003
                       LVD: EN 60 950-1:2001
- MTBF: 65,000 h (25°C)

Technical Specifications

LAN Interface Specification

- One RJ-45 female connector for straight or cross-over connection.
- Supports 10/100Base-TX, Full, Half duplex n-way (Auto-Negotiation).
- Supports Full, Half duplex, 10/100 speed manual selections.
- Transmission Packet Rate for 10/100Base-TX : 14880bps /148800bps.
- Copper TP cable 4 pair Cat. 3 or 5 UTP

Optical Interface Specification

- Transceiver Connector type：ST, SC, WDM
- Wavelength(typical)：multi-mode: 1310nm；
                       single-mode：1310nm/1550nm up to 120Km
                       WDM：1310/1550nm or 1550/1310nm(A/B type) up to 80Km
- Supports Full, Half duplex selections

Ordering Information

- **FMC-10/100P**   10/100Base-TX to 100-Base-FX converter
                       with PoE feature

Unmanaged, 4U Rack Type
FRM402

16-Slot Media Converter Chassis

The **FRM402** is a 19″ rack mountable chassis with 16 universal slots which accommodates the installation of the complete line of its interface modules. The modular configuration of the **FRM402** permits the end user to install from one to 16 interfaces to light up the fiber links within a home. Modules may be easily added or removed. The high density configuration is especially suited for application such as FITH (Fiber In The Home).

Features

- 4U high, 19″ rack, accommodates up to 16 line cards, each converter card provides two or four complete fiber conveters
- Once the converter is installed, it is hot-swappble to avoid any other network downtime.
- RACK with Dual power modules designed for AC or DC power sharing, cooling fans included

Gigabit Ethernet I/O

- 2-Channel 1000Base-TX to 1000Base-FX per card
- Auto-Cross over for MDI/MDIX in TP port
- Maximun packet size 9K bytes
- Supports Auto and Forced mode in fiber port
.

RS-485/422/232 Serial I/O

- 2-Channel Serial (RS-485/422/232) per card
- Support Copper RS-232 (3 or 5 wires) or RS-485/422 (2 or 4 wires)
- Support speed up to 256Kbps using RS-232
- Support speed up to 1024Kbps using RS-485/422
- Connector type : DB9

Fast Ethernet I/O

- 4-Channel 10/100Base-TX to 100Base-FX per card
- Ability to force 10Mbps or 100Mbps at TP port
- Auto crossover for MDI/MDIX at TP port
- Auto Negotiation at TP port
- Full or Half duplex at TP port
- Store and forward switching mechanism

Ordering Information

- **FRM402** — 4U, 19″, 16-slot un-managed chassis
- **FRM402-10/100** — 4-Channel 10/100Base-TX to 100Base-FX (MM or SM) line card for FRM402
- **FRM402-1000** — 2-Channel 1000Base-TX to 1000Base-FX (MM or SM) line card for FRM402
- **FRM402-Serial** — 2-Channel serial (RS-485/422/232) to fiber (MM or SM) line card for FRM402

IP Surveillance

2 Fiber Series

PDH Series

Broadband Access

EoCoax

Measurement

Interface Converter

Datacom Accessories

Network Management

Fiber Media Converter

CPE Converter Module type
FWM Series

CPE Converter Module for FRM402

The CTC Union Fiber In The Home (FITH) System is a ground breaking solution that will make available to the end user unlimited bandwidth and connectivity for all current and yet to be developed consumer electronics. Broadband services will be fully powered all the way through the home or business. This provides a full modular, flexible and cost effective solution. CTC Union's unique product provides homeowners unlimited bandwidth so that they can experience the full benefit of HDTV, video servers, true broadband networking and the capabilities of the fully automated home. The benefits include: *Displacement of copper, Future proofing, Return on investment (will grow exponentially) Unlimited bandwidth, Simple installation*.

Features

- Plug-in unit for in-wall installation using FWM-K outlet

FWM-K (Fiber Wall-mount Kit)

The CTC Union fiber wall-mount kit is a metal frame with an optical connector, power connector and the ability to accept the complete line of Fiber Wall Media Converters:
* 10/100 Ethernet
* Gigabit Ethernet
* RS-485/422/232
It fits simply in a single gang box with two screws.

Serial Converter Module

- RS-485/422/232 copper to fiber
- Fiber Wall-mount converter

FWM-Serial

Gigabit Ethernet Converter Module

- 1000Base-TX to 1000Base-FX
- Fiber Wall-mount converter

FWM-1000

Fast Ethernet Converter Module

- 10/100Base-TX to 100Base-FX
- Fiber Wall-mount converter

FWM-10/100

Ordering Information

- **FWM-K** — Universal outlet adapter with wall-mount kit
- **FWM-10/100** — CPE side, 1-Channel 10/100Base-TX to 100Base-FX, fiber wall-mount converter (MM or SM)
- **FWM-1000** — CPE side, 1-Channel 1000Base-TX to 1000Base-FX, fiber wall-mount converter (MM or SM)
- **FWM-Serial** — CPE side, 1-Channel serial (RS-485/422/232) line card, fiber wall-mount converter (MM or SM)

Rack Solution for CWDM
Sigma Links 5000

5U Chassis Rack Type

Sigma Links 5000 is a flexible, cost-effective optical transport system, designed to multiplex, demultiplex and switch high-speed data for storage, video and voice applications. Sigma Links 5000 is housed in a standard 5U, 19″ or 23″ rack mountable transport platform for CWDM application, which features 17 universal hot-swappable module slots. Currently supported module line cards include SNMP, Transponders, Mux/Demux, OADM, Optical protection and optical channel monitors. The Sigma Links 5000 supports optional redundant power and SNMP management. Another unique feature of 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 high, 19″ (or 23″) rack with convertible stand-alone units, rack accommodates up to 17 card modules
- All modules are hot-swappable with AC/DC Power redundant and cooling fans module
- Alarm Relay contacts
- Chassis Cascade up to 6 Chassis
- LED and LCD status indication with keypad control
- TFTP firmware upgrade
- Support Console, Telnet, SNMP, Web management
- Up to 8 CWDM wavelengths in compliance with ITU G.694.2

Specifications

Slots	17 slots in front for slide-in-module	
	2 slots in front for power supply module	
Power	AC module	90 — 264 VAC
		Frequency: 47 — 63 Hz
	DC module	-18 — -56 VDC
		-36 — -72 VDC
Environment	Temperature	0-50°C (Operating)
		-20-70°C (Storage)
	Humidity	10 — 90% (Storage)
Power Consumption	72W	
Dimensions(WxDxH)	440mm x 247mm x 219.2mm	
Weight	9.5kg (Not including any line-cards)	
Compliance	FCC part 15 class A, CE Mark	

Ordering Info

Main Chassis	
SML-50-9051-R	19" 5U 17 slots Chassis
Network Management	
SML-50-9210-L	SNMP Card
Power	
SML-50-9110-R	AC power supply (90 to 264 VAC)
SML-50-9120-R	DC power supply (±18 to ±56 VDC)
SML-50-9121-R	DC power supply (±36 to ±72 VDC)

Application -
Optical Network Approach

Application -
Point to point add/ drop

IP Surveillance

2 Fiber Series

PDH Series

Broadband Access

EoCoax

Measurement

Interface Converter

Datacom Accessories

Network Management

CWDM

Rack Solution for CWDM
Sigma Links 2000

2U Chassis Rack Type

Sigma Links 2000 is a flexible, cost-effective optical transport system, designed to multiplex, demultiplex and switch high-speed data for storage, video and voice applications. Sigma Links 2000 is housed in a standard 2U, 19″ or 23″ rack mountable transport platform for CWDM application, which features 6 universal hot-swappable module slots. Currently supported module line cards include SNMP, Transponders, OADM, Mux/Demux, Optical protection and optical channel monitors. The Sigma Links 2000 supports optional redundant power and SNMP management. Another unique feature of the Sigma Links 2000 is line card designs which may be transformed

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 high, 19″ (or 23″) rack with convertible stand-alone units, rack accommodates up to 6 card modules
- All modules are hot-swappable with AC/DC Power redundant and cooling fans module
- Alarm Relay contacts
- LED status indication
- TFTP firmware upgrade
- Support Console, Telnet, SNMP, Web management
- Up to 8 CWDM wavelengths in compliance with ITU G.694.2

Specifications

Slots	6 slots in front for slide-in-module	
	2 slots in back for power supply module	
Power	AC module	90 — 264 VAC
		Frequency: 47 — 63 Hz
	DC module	-18 — -56 VDC
		-36 — -72 VDC
Environment	Temperature	0-50°C (Operating)
		-20-70°C (Storage)
	Humidity	10 — 90% (Storage)
Power Consumption	25W	
Dimensions(WxDxH)	440mm x 260mm x 89mm	
Weight	4.8kg (Not including any line-cards)	
Compliance	FCC part 15 class A, CE Mark	

Ordering Info

Main Chassis	
SML-20-9021-R	19" 2U 6 slots Chassis
Network Management	
SML-20-9210-L	SNMP Card
Power	
SML-20-9110-R	AC power supply (90 to 264 VAC)
SML-20-9120-R	DC power supply (±18 to ±56 VDC)
SML-20-9121-R	DC power supply (±36 to ±72 VDC)

SNMP

Communicates with single or multiple chassis's control card via RS-485 serial protocol.

Features

- 2 x 100 Base-FX (SFP) ports
- 3 x 10/100M Base-TX ports
- In chassis cascade mode, the SNMP option is required only in chassis #0, the master chassis
- Management control to Mux/Demux card, Protection card & Transponder Card, OADM Card, SNMP v1 Trap, MIB file
- Real-Time Clock feature
- Supports Telnet access control
- Supports web browser control feature
- TFTP SNMP F/W upgradeable

Specifications

Power	12VDC, 1.2A	
Environment	Temperature	0-50°C (Operating) ;
		-20-70°C (Storage)
	Humidity	10 — 90% (Storage)
Power Consumption	5W	
Dimensions(WxDxH)	162mm x 220mm x 25mm	
Weight	0.9kg	
Compliance	FCC part 15 class A, CE Mark	

Transponder

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, which provides a truly flexible and easy to deploy solution for all applications. The transponder supports 2R regeneration, which consists of re-amplification and reshaping.

Mux/ Demux

Optical Mux/Demux (Multiplexes/Demultiplexes) cards are available in 4-channel or 8-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 non-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

- ■ 2R 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 Type (Line Side), SFP-LC Type (Client Side)

Features

- ■ Four different CWDM Mux/ Demux are available: 4 channels, 4+1channels, 8 channels, 8+1 channels
- ■ 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

Wavelength	Client Side	850/1310/ 1550nm
	Line Side	1471/ 1491/ 1511/ 1531/ 1551/ 1571/ 1591/ 1611 nm
Power	12VDC, 1.2A	
Environment	Temperature	0 — 50°C (Operating) ; -20 — 70°C(Storage)
	Humidity	10 — 90% (Storage)
Power Consumption	5W	
Dimensions(WxDxH)	162mm x 220mm x 25mm	
Weight	0.9kg	
Compliance	FCC part 15 class A, CE Mark	

Specifications

Wavelength (according to ITU-T G.694.2)		4 channels 1531/ 1551/ 1571/ 1591 nm
		4+1 channels 1531/ 1551/ 1571/ 1591nm + 1311 nm
		8 channels 1471/ 1491/ 1511/ 1531/ 1551/ 1571 /1591/1611 nm
		8+1 channels 1471/ 1491/ 1511/ 1531/ 1551/ 1571/ 1591/ 1611nm +1311 nm
Environment	Temperature	0 — 50°C (Operating) ; -20 — 70°C (Storage)
	Humidity	10 — 90% (Storage)
Dimensions(WxDxH)	162mm x 220mm x 25mm	
Weight	0.9kg	
Compliance	FCC part 15 class A, CE Mark	

Application

Stand-alone Model   Line Card Model

IP Surveillance

2 Fiber Series

PDH Series

Broadband Access

EoCoax

Measurement

Interface Converter

Datacom Accessories

Network Management

Available Line Cards for CWDM

Protection

CTCU offers an optical protection unit that is able to fiber path redundancy on a channel by channel basis. These unit 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.

OADM

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

- 1+1 full optic protection

- Low channel cross talk (< -55dB)

- Low insertion loss (< 6.5dB)

- The switch has "Latching" possibility, if power is lost, the switch remains in its current position

- Time from line failure to restored traffic is less than 50 ms

- The unit works for any combination of 1 ~16 wavelengths

- Traffic is switched under three mode Auto, Semi-Auto, Manual

- Optical Interface Type : LC connectors

- Working and protecting lines are physically separated fiber stretches that can be regarded as individual transmission links

Optical Performance

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

Specifications

Power	12VDC, 1.2A	
Environment	Temperature	0 — 50°C (Operating); -20 — 70°C(Storage)
	Humidity	10 — 90% (Storage)
Power Consumption	10W	
Dimensions(WxDxH)	162mm x 220mm x 25mm	
Weight	0.9kg	
Compliance	FCC part 15 class A, CE Mark	

Specifications

Environment	Temperature	0 — 50°C (Operating); -20 — 70°C (Storage)
	Humidity	10 — 90% (Storage)
Fiber Type	9 / 125 / 250um	
Dimensions(WxDxH)	162mm x 220mm x 25mm	
Weight	0.9kg	
Compliance	FCC part 15 class A, CE Mark	

Ordering Info

Transponder	
SML-50-8011-L/S	1.25G, 1-Channel Transponder card, Line rates support 100Mbps to 1.25Gbps (without SFP Fiber Transceiver)
SML-50-8012-L/S	1.25G, 2-Channel Transponder card, Line rates support 100Mbps to 1.25Gbps (without SFP Fiber Transceiver)
SML-50-8021-L/S	2.5G, 1-Channel Transponder, Line rates support 100Mbps to 2.5Gbps (without SFP Fiber Transceiver)
SML-50-8022-L/S	2.5G, 2-Channel Transponder, Line rates support 100Mbps to1.25Gbps (without SFP Fiber Transceiver)

Protection	
SML-50-8210-L/S	Optical Line Protection Switch

L: Line Card
S: Stand-alone

OADM	
SML-50-831X-L/S	1 channel, OADM Drop/Insert card X= 0:(1311),X=1:(1471),X=2:(1491), X=3:(1511),X=4:(1531),X=5)1551), X=6:(1571),X=7:(1591),X= 8:(1611)nm
SML-50-832X-L/S	2 channels, OADM Drop/Insert card, LC X=1:(1471& 1491), X=2:(1551& 1571), X=3:(1551& 1571), X=4:(1591& 1611)nm

Mux/ Demux	
SML-50-8140-L/S	4 channel Mux/Demux unit (1531, 1551, 1571, 1591)nm
SML-50-8141-L/S	4+1 channel Mux/Demux unit (1311,1531 , 1551, 1571, 1591)nm
SML-50-8180-L/S	8 channel Mux/Demux unit(1471, 1491, 1511, 1531, 1551, 1571, 1591, 1611)nm
SML-50-8181-L/S	8+1 channel Mux/Demux unit (1311,1471 , 1491, 1511, 1531, 1551, 1571, 1591, 1611)nm

Point to Point Solution FOM Series
FMUX01A

Fiber Optical E1/ T1/ Datacom/ Ethernet Multiplexer

The FMUX01A is a single unit (1U), 19" rack mountable, E1/T1, Datacom & Ethernet Bridge Multiplexer that transmits up to 16 channels over a single fiber optic link. The FMUX01A features a modular design that provides a wide variety of customized user configurations. The optical fiber interface modules are available in single mode or multi-mode fiber connections and a number of connector types. The FMUX01A 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 quad E1 or T1 line cards, datacom (V.35, X.21, RS-530), or Ethernet Bridge cards are supported. All line cards provide completely transparent transmission of E1, T1, datacom, or Ethernet regardless of frame mode or timeslot assignment. Optional hardware cards are also available for external clock and SNMP. The standard FMUX01A configuration may be viewed or set via the front panel LCD/menu keys, serial VT-100 terminal connection or Telnet/SNMP with SNMP option.

Features

- Alarm relay contacts provided which can offer major and minor alarms with audible and visible alarm output
- Auto Laser Shutdown (ALS) to prevent hazardous laser radiation to personnel
- Channel Capacity : 4,8,12 or 16 channels
- Configuration data is automatically stored into flash to avoid any loss caused by power disruption and will be restored immediately by the system at startup
- End to end propagation delay is less than 2 u sec
- Management : Local side can be managed via Keypad or Terminal. Remote side can be managed in-band via keypad or Terminal. Telnet & SNMP local and remote management with optional SNMP
- Real Time Clock (RTC) run by backup battery to avoid time setting loss caused by power disruption
- Redundant Fiber 1+1 Protection, the switching time between is less than 50 m sec
- Supports embedded optical BERT
- Supports E1/ T1/ Datacom Local and Remote Loop-Back.
- Supports hot-swapping of a optical module; will not affect or interrupt the operation and communication
- TFTP remote software upgradeable (for SNMP option)

Specifications

Console interface	Interface	RS-232D(RJ-45) Asynchronous
	Bit rate	19200,8,N,1
Power	AC	90 — 260 VAC
	DC	36 — 72 VDC 20 — 60 VDC *optional
Environment	Temperature	0 — 55°C (Operating) 0 — 70°C (Storage)
	Humidity	10 — 95% non condensing
Power Consumption	40W	
LEDs	Power 1 & 2, Optical 1 & 2 (for optical signal and link status)	
	Minor & Major Alarms, Far End & Near End Error	
	System Failure, E1 & T1 (for signal status)	
Dimensions(WxDxH)	438mm x 43mm x 250 mmmm	
Weight	3.58Kg (empty chassis without any I/F & optical module); 4.5Kg (with 4 I/F & 2 optical modules)	
System Performance(BER)	<= 10-11	
Alarm	4 relay contacts	
Compliance	FCC, Part 15, Sub B (Class A) European standard EN55022: 1994/A1 : 1995/A2 : 1997 Class A, EN61000-3-2:1995, EN61000-3-3:1995 and EN50082-1:1997	
MTBF	57350 hours	

Application

Ordering Info - Unit

FMUX 01A-	XXXX/	X	XX	XXX
Power Module Type	Line Card I/F Type	Fiber Redundant Type	Connector Type	Distance Connectivity
AC	0: Empty	S:standard	SC	002: 2km
DC	A: Quad E1 BNC	R:redundant	ST	030: 30km
AC2	B: Quad E1 RJ-45		FC	050: 50km
DC2	C: Quad T1 RJ-45			080: 80km
AD	D: Quad V.35			120: 120km
	E: Quad RS-232			20A: 20km
	F: Quad RS-530			20B: 20km
	G: Single port Fast Ethernet 10/100			40A: 40km
	H: Quad X.21			40B: 40km
	I: Quad RS-449			60A: 60km
	J: Wire-Wrap I/F for Quad E1/T1			60B: 60km
	K: Quad High-speed V.35			
	L: Quad High-Speed RS-530			

*20A must be coupled with 20B   *60A must be coupled with 60B
*40A must be coupled with 40B

Interface Modules

E1/T1 RJ - 45 I/F   E1 BNC I/F   E1/T1 Wire-Wrap I/F   Ethernet I/F   Datacom I/F

Fiber Optical Module	
Ports	1 + 1 ports (redundant)
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

E1 Interface 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 ohms

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

Ethernet Interface Module	
Standard	IEEE 802.3 / 802.3u
Ports	1 port
Data rate	8Mbps (Full duplex)
Filtering and Forwarding	60000 frames per second
Delay	1 frame
WAN Protocol	Raw HDLC
Connector	Shielded RJ-45

Datacom Interface Module	
Standard	N/A
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 128Kbps (SYNC)
Line code	NRZ
Clock Mode	Transparent, Recovery
	External (From data port)
	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

New

High-speed Datacom Interface Module	
Standard	N/A
Card Type	V.35/ RS-530
Bit rate	n x 64K/ n x 256K, n = 1 to 32
	V.35 & RS-530 up to 8Mbps
Line code	NRZ
Clock Mode	Transparent, Recovery
	External (From data port)
	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

AC+DC   E1 I/F   T1 I/F   Datacom I/F   Ethernet I/F

Ordering Info - Modules

For Individual Purchase of Extra Modules		
E1/T1 Interface Card	FMUX01A-E1/BNC	4 x G.703 E1 BNC
	FMUX01A-E1/RJ45	4 x G.703 E1 RJ-45
	FMUX01A-T1RJ45	4 x G.703 T1 RJ-45
	FMUX01A-E1/ Wire-Wrap	4 x G.703 wire-wrap
Ethernet Interface Card	FMUX01A-Ethernet	1 x 10/100 Mbps Ethernet Bridge
External Clock	FMUX01A-EXT/CLK	External clock
SNMP	FMUX01A-SNMP	support console RS-232 port and 10/100Base-T Ethernet port, with SNMP MIB file
GUI	FMUX01A-GUI	GUI, support WIN 95, 98, 2000,XP
EMS	FMUX01A-EMS	EMS, server-client architecture with MS-SQL database

Optical Transceiver Interface		
FMUX01-A-X/	XX	XXX
Fiber Redundant	Connector Type	Distance Connectivity
S: standard	SC	002: 2km
R: redundant	ST	030: 30km
	FC	050: 50km
		080: 80km
		120: 120km
		20A: 20km
		20B: 20km
		40A: 40km
		40B: 40km
		60A: 60km
		60B: 60km

IP Surveillance

2 Fiber Series

PDH Series

Broadband Access

EoCoax

Measurement

Interface Converter

Datacom Accessories

Network Management

E1/T1/Voice/Datacom/Ethernet FOM
FMUX01A+

With Built-in 100Mbps Ethernet Trunk Bandwidth

The FMUX01A+ is a PDH fiber optic multiplexer, featuring a fully new design concept to challenge the existing high capacity PDH. The powerful ASIC integrates 16 E1 channels, a full rate 100Mbps Ethernet channel and a clear asynchronous RS-232 data channel into one fiber optical link. And the absolute modular structure provides the most flexible combination for customer's application and keeps the expanding capacity for future upgrade. FMUX01A+ provides two slots of optical link for hot swappable optical interface cards, which can perform optional 1+1 auto protection switch (APS) and optical interface ALS (Automatic Laser Shutdown/Reduction). The appropriate optical interface cards may be selected to support multi-mode or single-mode fiber cable operation. FMUX01A+ provides 4 slots of tributary with various plug-in modules which include 4-channel E1 module, 4-channel FXO/FXS module and 4-channel N*64K module. The maximum capacity will be up 4 plug-in modules which could be combinations with above modules, and the 100Mbps Ethernet data link is an extra channel to be multiplexed into an optical link.

Features

- Multiplexer of 16E1 (2.048Mb/s) channels, 1*100Mbps Ethernet channel and 1*RS-232 data channel (async)

- Provides one RS-232 port for system console

- Provides one alarm output port, one order wire port

- Provides EMS which is Windows based GUI SNMP network management system when a SNMP card installed

- Provides controllable menu via LCD

- Provides 4 plug-in I/O slots, each slot uses the following service:
  4-channel E1(75 ohm) Module
  4-channel E1(120 ohm) Module
  4-channel T1(100 ohm) Module
  4-channel N*64K Module, providing up to 2.048Mbps for V.35 (or X.21, RS-232, RS-449, RS-530) DCE port
  4-channel FXO voice Module
  4-channel FXS voice Module

- Provides two 10/100Mbps Ethernet ports with VLAN features (on board), working in force/auto-negotiation mode

- Provides 2 plug-in I/O slots for optical interface cards

Specifications

Console Interface	Type	RS-232D(RJ-45) Asynchronous
	Bit rate	19200,8,N,1
Power	AC	90 — 260 VAC
	DC	36 — 72 VDC
		20 — 60 VDC *optional
Environment	Temperature	0 — 55°C (Operating)
		0 — 70°C (Storage)
	Humidity	10 — 95% non condensing
Power Consumption	40W	
LEDs	MAJ(Major Alarm), MIN(Minor Alarm), LBK(Loopback), RDI(Remote Defect Indication), PWR(Power), LCK(Optical Link Lock), RNG(Order-Wire Function), ACO(Alarm Cut Off), Ports and Channels	
Dimensions(WxDxH)	438mm x 43mm x 250 mmmm	
Weight	3.58Kg (empty chassis without any I/F & optical module)4.5Kg (with 4 I/F & 2 optical modules)	
System Performance(BER)	<= 10^{-11}	
Alarm	4 relay contacts	
Compliance	FCC, Part 15, Sub B (Class A) European standard EN55022: 1994/A1 : 1995/A2 : 1997 Class A, EN61000-3-2:1995, EN61000-3-3:1995 and EN50082-1:1997	
MTBF	57350 hours	

Ordering Info - Unit

FMUX01A+- XXX/ XXX/	XXXX/	X	XX	XXX
Power Module Type	Line Card I/F Type	Fiber Redundant Type	Connector Type	Distance Connectivity
AC	0: Empty	S	SC	002: 2km
DC	A: Quad E1 BNC	R	ST	030: 30km
AC2	B: Quad E1 RJ-45		FC	050: 50km
DC2	C: Quad T1 RJ-45			080: 80km
AD	D: Wire-wrap I/F for Quad E1/T1			120: 120km
	E: Quad V.35			20A: 20km
	F: Quad RS-232			20B: 20km
	G: Quad RS-530			40A: 40km
	H: Quad X.21			40B: 40km
	I: Quad RS-449			60A: 60km
	J: Quad FXO			60B: 60km
	K: Quad FXS			

Application

Interface Modules

Fiber Optical Module	
Ports	1 + 1 ports (redundant)
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

E1 Interface 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

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 Interface Module	
Standard	N/A
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 128Kbps (SYNC)
Line code	NRZ
Clock Mode	Transparent, Recovery
	External (From data port)
	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

FXO/FXS Module	
Standards	G.711 A-law
Voice channel transparent	T.38 and Group III Fax relay at 2.4 ~14.4kbps Fax application
Distance	300m
Bandwidth	64K voice channel
Connector	RJ11*4 (4 voice channel /per unit)
Receive Level	Short haul - 15dB
Internet application	Support modem pass-through

E1/T1 (RJ-45) Interface Module   E1 (BNC) Interface Module   Datacom Interface Module

Ordering Info - Modules

For Individual Purchase of Extra Modules		
E1/T1 Interface Card	FMUX01A+-E1/BNC	4 x G.703 E1 BNC
	FMUX01A+-E1/RJ45	4 x G.703 E1 RJ-45
	FMUX01A+-T1/RJ45	4 x G.703 T1 RJ-45
Datacom Module	FMUX01A+-Datacom	4 x N*64 (V.35 connector)
FXO Module	FMUX01A+-FXO	4 x FXO voice channel module
FXS Module	FMUX01A+-FXS	4 x FXS voice channel module
External Module	FMUX01A+-EXT/CLK	External clock module

Optical Transceiver Interface		
FMUX01A+-X/	XX	XXX
Fiber Redundant	Connector Type	Distance Connectivity
S: standard	SC	002: 2km
R: redundant	ST	030: 30km
	FC	050: 50km
		080: 80km
		120: 120km
		20A: 20km
		20B: 20km
		40A: 40km
		40B: 40km
		60A: 60km
		60B: 60km

IP Surveillance

2

Fiber Series

PDH Series

Broadband Access

EoCoax

Measurement

Interface Converter

Datacom Accessories

Network Management

CPE/ CO Solution FOM Series
FMUX04

Fiber Optical E1/ T1 Multiplexer

The FMUX04 is a 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. Additional options include "Order Wire" phone connection (FXS port) and an SNMP option.

Features

■ Stand-alone unit (1U, 1.75"). An optional mounting kit is available for single or side-by-side mounting in a 19" rack

■ Channel service setting and remote loop-back setting via front panel DIP switch

■ Far End Fault (FEF) on fiber link, selectable

■ On-line Bit Error Rate monitor feature with four error-rate classes

■ Provides 2 color based LEDs for clear indication

■ Provides one optional dedicated order wire phone port, (FXS, RJ-11 port)

■ Provides one supervisory port (DB9 connector) for ASCII terminal and one alarm relay contact

■ SNMP management (Optional) with additional support for Telnet or Web based local or remote configuration

■ Single mode or multimode fiber link distance up to 120Km depending on ordered model

■ Supports M/M or S/M with ST, SC, FC, or WDM(SC)

■ System BER <= 10^{-11}

Specifications

Console interface	Interface	RS-232 (DB-9F) Asynchronous
	Bit rate	19200,8,N,1
Power	AC	90 — 260 VAC
	DC	20 — 60 VDC
Environment	Temperature	0 — 55°C (Operating); 0 — 70°C (Storage)
	Humidity	10 — 95% non
Power Consumption	20W	
LEDs	PWR, Optical 1 (for optical signal and link status)	
	Minor & Major Alarms, Far End & Near End Error	
	System Failure, E1 & T1 (for signal status)	
Dimensions(WxDxH)	195mm x 45mm x 255 mm	
Weight	850g	
System Performance(BER)	$<= 10^{-11}$	
Alarm	Single relay contact	
MTBF	57,350 hours	
Compliance	FCC, Part 15, Sub B (Class A) European standard EN55022: 1994/A1 : 1995/A2 : 1997 Class A, EN61000-3-2:1995, EN61000-3-3:1995 and EN50082-1:1997	

Application

Ordering Info

FMUX04-XX/ Power Type	XX Connector Type	XXX Distance Connectivity
AC	SC	002: 2km
DC	ST	030: 30km
	FC	050: 50km
		080: 80km
		120: 120km
		20A: 20km
		20B: 20km
		40A: 40km
		40B: 40km
		60A: 60km
		60B: 60km

*020A must be coupled with 020B
*040A must be coupled with 040B
*060A must be coupled with 060B

Individual Purchase	
FMUX04-Phone	Optional Phone (FXS)
FMUX04-SNMP	Optional SNMP agent

Interface Specification

E1 Interface	
Standards	ITU-T G.703, G.736, G.775, G.823
Ports	4 ports
Framing	Transparent (clear channel)
Data rate	2.048 Mbps
Line code	HDB3/ AMI
Receive Level	-43dB
Line impedance	75 ohms ±5% / 120 ohms ±5%
Connector	RJ-45 for 120 ohms
	BNC for 75 ohms
Pulse amplitude	Nominal 2.37V ± 10% for 75 ohms
	Nominal 3.00V ± 10% for 120 ohms
Zero amplitude	±0.1V

T1 Interface	
Standards	ITU-T G.703, G.736, G.775, G.823
Ports	4 ports
Framing	Transparent (clear channel)
Data rate	1.544 Mbps
Line code	B8ZS/ AMI
Receive Level	-36dB
Line impedance	100 ohms ±5%
Connector	RJ-45 for 100 ohms
Pulse amplitude	Nominal 3.00V ± 20%
Zero amplitude	±0.1V

IP Surveillance

2 Fiber Series

PDH Series

Broadband Access

EoCoax

Measurement

Interface Converter

Datacom Accessories

Network Management

Ethernet and TDM services over STM-1
SDH155B

4-port Ethernet/ STM-1 Converter

SDH155B is a stand-alone converter that enables simple and efficient connection of 4 ports Fast Ethernet 100BaseT or 4 x E1 2.048M traffic over STM-1 Fiber optic Interface lines. **SDH155B** serves as cost-effective alternative to ATM devices and routers. The **SDH155B**'s packet-over-SDH encapsulation protocol enables virtually total utilization of SDH payload traffic, since only a small header is required. **SDH155B** supports VLAN bridging, flow control and backpressure, according to IEEE802.3x requirements.

Features

- Connects 10/100Base-T Ethernet LANs over STM1 line
- 1U high stand-alone with SFP fiber optic interface
- Complies with G.957 Standard
- Supports one Order Wire phone port
- Supports Virtual concatenation enables configuring the bandwidth of the IP channel in increments of 2Mbps (VC-12)
- Support SDH standards of Generic Framing Procedure (GFP) or Link Access Procedure (LAPS)
- Supports 1 port 10/100 Base-TX Ethernet on board, with a slot for optional 4 x E1 Module or 4 x 100Mbps Ethernet module
- Supports Bandwidth control over Ethernet in increments 2 Mbps, up to 100Mbps wire-speed
- Supports AC or DC power supply
- Supports console and SNMP management

Application

SDH155B

SDH155B

Specifications

General Specifications		
LEDs	PWR, SD, LOS, LOF, LOP, MS-AIS, P-AIS & P-RDI, LNK/ACT, FDX & 100, SYS & CLKMODE	
Power	AC	90 — -264VDC
	DC	-36 — -72VDC
Environment	Temperature	0 — 40°C (Operating); -20— 65°C (Storage)
	Humidity	0 — 90% non condensing
Power Consumption	10W	
Dimensions(WxDxH)	220mm x 285mm x 44.5mm	
Weight	1.5Kg	
Compliance	TBA	
MTBF	TBA	

Fiber Optical Port	
Standard	ITU-T G.957
Rate	155.52 Mbit/s ± 20 ppm
Wavelength	1310nm: 1550nm
Operating wavelength	1261—1360nm
Coverage	1480 ~ 1580nm
Output Power	-15 — -8dBm
Sensitivity	-36dBm
Fiber Connector type	Standard SFP/LC
Fiber Optical type	Single model optical fiber 9/125um
Electrical Port	
Standard	ITU-T G.703
Rate	2.048 Mbit/s ± 20 ppm
Output Peak-to-peak voltage	3.0 ± 0.1V
Sensitivity	-15dBm
Connector Type	Standard BNC
100Base-Tx Port (mainboard)	
Standard	IEEE802.3u
Rate	100MbpsFull-duplex and auto-adapted
Support	Auto-MDIX Function
MACAddress table size	1024
Maximum Ethernet frame	1536 Bytes
100Base-Tx Port (sub-card)	
Standard	IEEE802.3
Rate	100MbpsFull-duplex
Support	Auto-MDIX Function
Maximum Ethernet frame	1600 Bytes
G.703-E1Port (sub-card)	
Standard	G.703
Rate	2.048Mbps

Ordering Info

Master Unit:	
SDH155B/AC	100BaseT RJ-45 to STM-1 155M; with SFP slot, internal AC power (100V ~240V AC)
SDH155B/DC	100BaseT RJ-45 to STM-1 155M SC; with SFP slot, internal -48VDC power (±36 to ±72VDC)

Ethernet and TDM services over Fiber
SDH155A

SDH 155Mbps Multi-Service Access Equipment

The **SDH155A** provides an economical MSAP multiplexing solution for SDH network services, By Ethernet, E1 different operational data packets directly encapsulated in the 155M SDH transmission channels, to the existing SDH network to transmit Ethernet data and E1 data provides a simple and effective method of application. The **SDH155A** is 1U high, 19" equipment, compact structure, high integration, user-friendly environment in various installation. The equipment with various LED warning lights instructions and status monitoring, It can also monitor network management system through more state statistical information and warning instructions. It also provides a simple and efficient connection of 4 ports Fast Ethernet 100BaseT or 4 x E1 (2.048M) traffic over STM-1 Fiber optic Interface lines. It serves as cost-effective alternative to ATM devices and routers. Its packet-over-SDH encapsulation protocol enables virtually total utilization of SDH payload traffic, since only a small header is required.

4* E1 Module

4* Ethernet Module

Features

- Comply with ITU-T G.957 STM Standard
- Supports Two SDH 155M Uplink Fiber Optical Ports
- Supports ADM work module and TM work module
- Supports Internal Clock and Recover Clock
- Supports Local Loop and To Remote Loop
- Supports test of Virtual concatenation Channels and separate VC-12 Channels
- Supports complete SDH overhead processing functions
- Supports trace byte set and line performance monitoring alarm
- Supports Virtual concatenation of VC-12
- Supports ≤50 unit random Virtual concatenation and 16ms can be tolerated routing delay
- Supports SDH Standards of GFP or LAPS
- Supports with 4 slots for optional 4*10/100Mbps Ethernet module or 4*E1 module
- Supports IEEE802.1Q Tag base VLAN
- Supports IEEE802.1ad Q-in-Q VLAN
- Supports IEEE802.1p QoS
- Supports all the 100 Base-Tx Ethernet interface to work independently adjustable bandwidth, 2M particles, Each port provides 1 MB of cache, All Ethernet interfaces support High Speed 100 Mbps, full-duplex work
- Supports AC, DC, AC+DC, AC+AC, DC+DC power supply
- Supports a sevice telephone ,can be point-to-point call addressable
- Supports Console、WEB and SNMP (Optional accessories) management

Specifications

Fiber Optical Module		
Standard	ITU-T G.957	
Type	Single Mode, 9/125um	
Connector	LC/SFP	
Rate	155.52 Mbps ± 20 ppm	
Operating Wavelength Converage	1261~1360nm ; 1480~1580nm	
Output Power	-15 ~ -8dBm	
Sensitivity	-36dBm	
4*Ethernet Interface Module		
Standard	IEEE 802.3 & 802.3u	
Output Peak-to-peak voltage	1.0 ± 0.1V	
Connector	Shielded RJ-45	
Data Rate	100Mbps; Full Duplex and auto-adapted	
VLAN support	Frame-through	
Supports	Auto-MDIX function & MAC address filtering function	
MAC address	1024 Bytes	
Maximum Ethernet Frame	1536 Bytes	
Data Cache	1MB	
4*G.703 E1 Interface Module		
Standard	ITU-T G.703	
Rate	2.048Mbps	
General Specifications		
LEDs	LOS*2, LOF*2, ALM & SYS	
Power	AC	165~264V, 60 ± 3Hz
	DC	-36 — -72VDC
Environment	Temperature	0 — 40°C (Operating)
		-20 — 65°C (Storage)
	Humidity	0 — 90% non condensing
Power Consumption	30W	
Dimensions(WxDxH)	440mm x 300mm x 43mm (WxDxH)	
Weight	5Kg	

Ordering Information

- SDH155A-CH-AC   1U 19", 4-slot rack chassis with single AC power
- SDH155A-CH-DC   1U 19", 4-slot rack chassis with single DC power
- SDH155A-CH-AD   1U 19", 4-slot rack chassis with single AC power and single DC power as redundancy
- SDH155A-CH-AA   1U 19", 4-slot rack chassis with two AC power, one AC power as redundancy
- SDH155A-CH-DD   1U 19", 4-slot rack chassis with two DC power, one DC power as redundancy
- SDH155A-E1/RJ45   4-channel G.703 E1 RJ-45 interface card
- SDH155A-ET100   4-channel 10/100Base-TX (RJ45) interface card

IP Surveillance

2

2 Fiber Series

PDH Series

Broadband Access

EoCoax

Measurement

Interface Converter

Datacom Accessories

Network Management

Fiber Gateway

GW421F & GW421FW

Fiber Based IAD With Wireless LAN

The GW421W is a single mode Fiber and VoIP-based IAD, which is designed to interoperate with end-to-end fiber CO from major vendors to meet the worldwide market requirements. It is Class 1 laser product complied with EN 60825-1. The integrated Ethernet switch features automatic crossover-correction and speed sensing for easily connecting to user's PCs or LAN environment. Alternatively the built-in 802.11g WLAN brings relief to those troublesome wirings. Two lines of telephony service are provided using VoIP technology with SIP and MGCP signaling protocol. By offering the flexibility to service provider with one model that fits different kind of internet applications.

Features

- Fiber interface supports up to 100 Mbps downstream and 100 Mbps upstream rates

- Integrated four-port Ethernet switch with automatic speed-sensing and crossover correction

- 802.11b/g WLAN supports up to 54 Mbps transmission rate

- Secures transmitting encryption by either 802.1x; WEP; WEP2; WPA; WPA2; TKIP; AES; 802.11i

- One FXO port for failsafe lifeline, two FXS ports for VoIP using POTS phone set

- Supports voice CODECs like G.711, G.726, G.729AB, BV16, ILBC, T.38 etc.; programmable G.168 echo cancellation, adaptive jitter buffer and packet loss concealment

- Voice activity detection (VAD), comfort noise generation (CNG) and caller ID

- DTMF tone detection and generation; Fax / Modem detection and pass-through

- Supports SIP signaling protocol and bonus services like call forwarding, call waiting, call transfer, call busy, call return, enquiry service, CLIP/CLIR and three way conference

- Supports Networking protocols such as PPP, NAT, Routing, DHCP server / relay / client

- Configuration and management by Web-browser through the Ethernet interface and remotely through WAN interface

- Firmware upgradeable through HTTP / TFTP

- Supports TR-069 and TR-104

Ordering Information

- GW421F   Fiber based IAD with fiber uplink

- GW421FW   Fiber based IAD with fiber uplink & wireless LAN

Specifications

Hardware		
Local Interface	Four 10/100 Base-T Ethernet ports in RJ-45 connector, comply with IEEE 802.3u	
	Integrated 802.11g WLAN Access Point with external antenna, backward compatible with 802.11b	
WAN Interface	Single-mode single fiber transceiver Operates at a nominal wavelength of 1310 nm and receiver at 1550nm.	
	Build-in 1310/1550 nm WDM filter Bi-directional single fiber	
Analog Voice Interface	2 * FXS ports with RJ-11 connectors for analog phone set connection	
	1 * FXO port with RJ-11 connector for PSTN	
Indicators	Front Panel	PWR – ON when the power supply is properly connected.
		WAN – Blinking while ADSL is training, and ON when
		WLAN – Blinking while WLAN is transmitting data, and ON
		TEL1 – Green when VoIP call is working.
		TEL2 – Green when VoIP call is working.
		LAN1-4 – Green when LAN is
	Rear Panel	Each Ethernet port got speed (10/100) and activity indicators.
OAM&P	Through Web browser, remotely or locally	
	One hidden console port (RS-232) for maintenance	
Environment	Operation Temperature: 0°C ~ 45°C	
	Operation Humidity: 5% ~ 95% (non-condensing)	
	Storage Temperature: -20°C ~ +85°C	
	Storage Humidity: 5% ~ 95% (non-condensing)	
Power	DC adapter :Input 120 VAC/60Hz or 230VAC/50Hz; Output 15VAC 1A, power consumption: Less than 15 watts	
Dimensions(WxDxH)	165 x 220 x 29mm	
Certification	CE, CB (TBD)	

Specifications

Software	
Routing	Support Point-to-Point Protocol (PPPoE) and user authentication via PAP, CHAP or MS-CHAP
	Routing Information Protocol (RIP) v1 and v2, static route
	DHCP client, server and relay agent
	NAT / PAT – RFC1631 with support for extensive ALGs
	DNS relay
Firewall	NAT: 16 sessions, DMZ and ALGs
	Stateful Packet Inspection (SPI) with DOS protection - Ping of Death, SYN Flood LAND
	Protection against IP and MAC address spoofing
	UPnP NAT traversal and VPN / IPSec pass-through
Wireless	Supports 802.1x; WEP; WEP2; WPA; WPA2; TKIP; AES; 802.11i
	Hidden SSID
	WMM for advanced Quality of Service
	AES in hardware
	125 High Speed Mode: Standards-plus performance enhancement delivers best real-world performance as the client card use the same 125 High Speed Mode
Voice	FXO for failsafe lifeline
	Supports voice CODECs like G.711, G.726, G.729AB, BV16, ILBC, T.38 etc
	G.168 line echo cancellation with programmable tail
	Adaptive jitter buffer, packet loss concealment (PLC), voice activity detection (VAD), comfort noise generation (CNG) and Caller ID
	DTMF tone detection and generation; Fax / Modem detection and pass-through
VoIP and Telephony Bonus Services	Supports SIP (RFC3261), SDP (RFC2327, RFC3264) as well as both TCP and UDP transport
	Supports User Agent Client (UAC) - User Agent Server (UAS) call, or proxy call routing
	Supports SIP and telephone URL addressing
	Supports in-band DTMF tone sending / receiving and out-band DTMF signaling with RTP, as per RFC2833
	Bonus services include: − Call Forwarding: Unconditional, No Response, On Busy − Call Waiting: Force busy, Pickup and release old, Pickup and put old on hold, Switch between two calls − Call Transfer, Call Back busy subscriber, Call Back last number called (call return) − Enquiry service
	Provisioning through TFTP client with configuration profile
Configuration and Network Management	SNMP GETs, SETs and TRAPs for four groups in MIB-II
	Embedded syslog; SNTP with DHCP options
	UPnP Internet Gateway Device (IGD) compliance
	Management and configuration via Web / HTTP
	Firmware upgrade using HTTP or TFTP
	Support TR-069 and with parameters: DeviceInfo, management server, time, IPPingDiagonostic, etc
	Support TR-104

Application

IP Surveillance

2 Fiber Series

PDH Series

Broadband Access

EoCoax

Measurement

Interface Converter

Datacom Accessories

Network Management

Plastic Optic Fiber Media Converter

FMC-10/100POF

Unmanaged Media Converter with POF (SMI & Optolock)

SMI Type

Plastic Optic Fiber, or POF as it is widely known, offers affordable, high-end connectivity for 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-yourself users are numerous. The discrete 2mm x 4.5mm duplex cable is easily concealed under carpets or inside walls. While it's very lightweight and can be 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 red light to transfer data from one device to another. A quick glance inside the cable will indicate connectivity to the network a red light seen by the human eye means the cable is connected; no red light means no connection. It's that simple.

POF is completely safe. Because it's a light-based solution, there is no EMI (electro-magnetic interference) so it won't interfere with other electrical equipment. Even a beloved pet biting through it would not be harmed. Likewise POF and the content it carries are completely immune to electrical noise, so they are not affected by the electrical equipment the POF passes. Even other existing networks or wireless systems in the house cannot interfere with data passing through the its cable. 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.

Features

- RJ-45 to POF conversion
- POF link to 50 meter
- Cat. 5 UTP link to 100 meter
- Compact size and simple installation
- Supports store and forward
- Supports Auto-MDI/X function on Ethernet
- LED display for link/activity, full/half,10/100
- DC Powered 12V/400mA. (with AC adapter)

Optolock Type

Application

Fiber Optic Networking for Enterprises and Home Purpose

Internet

Plastic Fiber up to 50 Meter

Switch

FMC-10/100POF

FMC-10/100POF

Switch

Specifications

LAN Interface Specification

- One RJ-45 female connector for straight or cross-over connection.
- Supports 10/100Base-TX, Full, Half duplex n-way (Auto-Negotiation).
- Supports Full, Half duplex, 10/100 speed manual selections.
- Transmission Packet Rate for 10/100Base-TX : 14880bps/148800bps.
- Copper TP cable 4 pair Cat. 3 or 5 UTP
- Link length Up to 100 m* for full duplex application

Optical Interface Specification

- Wavelength 650nm
- Link length Up to 50 meter
- Connector type SMI POF or Optolock POF port (multi-mode)
- Transmitted optical power type: -8.0dBm
- Received sensitivity type: -17.0dBm
- Spectral width (FWHM): 18nm

General Specification

- Complies with   IEEE 802.3 10Base-T, 802.3u 100Base-TX and 100Base-FX standards.
- 6 diagnostic LEDs :   Power, Ethernet & Fiber linking and working statuses.
- Temperature: $0 - 50^o$ C (Operating); $0 - 70^o$ C (Storage).
- Humidity: 20-80% non-condensing (Operating); 10-90%   (Storage).
- Power: Input: DC in : 12V/400mA, DC.
- Dimensions: FMC-10/100POF-S: 96.5 x 73.4 x 23mm (LxWxH). FMC-10/100POF-O: 100.4 x 73.4 x 23mm (LxWxH).
- Weight: 80g.
- Compliance: FCC part 15 class A, CE Mark.
- MTBF: > 50,000 h (25^oC)

Ordering Information

- **FMC10/100POF-S**   SMI connector, up to 50m, 650nm, 9dB
- **FMC10/100POF-O**   Optolock connector, up to 50m, 650nm, 9dB

HDMI Fiber Media Converter

HDMI-F

Optical HDMI Extender

High-Definition Multimedia Interface (HDMI) is a compact audio/video connector interface for transmitting uncompressed digital streams. It represents a digital alternative to consumer analog standards such as composite video, VGA, RF (coaxial cable), S-Video, and SCART. The HDMI-F Fiber Converter connects digital audio/video sources such as Blu-ray Disc players, set-top boxes, personal computers, video game consoles, and AV receivers to a compatible digital audio device and/or video monitor such as a high definition television (HDTV) using EMI immune fiber optical cables.

The HDMI specification does not define a maximum cable length. As with all cables, signal attenuation becomes too high at a certain length. With HDMI, this length usually cannot exceed 15 meters. The HDMI-F Fiber Media Converter overcomes these cable deficiencies by converting the HDMI electrical signals into 2 fiber cores, providing high performance with good signal quality without the problems of long copper cables.

Features

- Long distance video and audio transmission
- High resolution and image quality
- HDCP fully compliant
- No RF Interference from optical fiber
- Class 1 laser product complies with EN 60825-1
- HDMI Type A connection
- Complies with DVI 1.2 standard, speed up to 5Gbps

Applications

- Remote monitor for traffic, industrial, military control
- LCD, Projector, Plasma display connection
- Large video wall system
- Theater

Application

DVD Player	LCD TV
HDMI Cable	HDMI Cable
HDMI Extender TX	HDMI Extender RX

Multi-mode fiber up to 200 meters

Specifications

Max Length	200M	62.5/125 MMF 4-LC 50/125 MMF 4-LC
Max Resolution	1920*1080	
HDCP Compliant	YES	
CEC Compliant	YES	
Operating Voltage	5VDC	
Electrical Power Consumption	TX: 3W	5V/600mA
	RX: 3W	5V/600mA
Operating Temperature	-10°C ~ 50°C	
Storage Temperature	-20°C ~ 75°C	
Dimension	145*95*26mm	(L*W*H)
Weight	430+/-5%	
Requirements	HDMI Source	DVD player or PC
	HDMI Sink	LCD TV or Projector
	Power Source	100 ~ 240VAC, 50 ~ 60 Hz, 0.2A electricity
Safety Regulation	CE and FCC approved	

Ordering Information

- **HDMI-F/T**
  HDMI Fiber Media Converter Transmitter
  (Connects to Blu-ray or DVD player)

- **HDMI-F/R**
  HDMI Fiber Media Converter Receiver
  (Connects to LCD or Projector)

IP Surveillance

2 Fiber Series

PDH Series

Broadband Access

EoCoax

Measurement

Interface Converter

Datacom Accessories

Network Management

DVI Fiber Media Converter
DVI-F

Optical DVI Extender

The Digital Visual Interface (DVI) is a video interface standard designed to maximize the visual quality of digital display devices such as flat panel LCD computer displays and digital projectors. "DVI-D" stands for "DVI-Digital" and supports digital transfers only. The maximum length of DVI cables is not included in the specification since it is dependent on bandwidth requirements (the resolution of the image being transmitted), but in general, a maximum length of 15 feet (4.5m) will work for displays at resolutions of 1920x1200. The DVI-F overcomes this distance limitation by using EMI immune fiber optical cable. The DVI-F work in pairs, one transmitter, one receiver.

Features

- Long distance image transmission up from 300 ~ 700 meters via multi-mode fiber
- High resolution and image quality
- No RF Interference by optical fiber
- Class 1 laser product complies with EN 60825-1
- Provides a DVI-D (single link) connector
- CE and FCC approved

Applications

- Remote monitor for traffic, industrial, military control
- LCD, Projector, Plasma display connection
- Large video wall system
- Multi-monitor for Advertising

Resolution & Distance

UXGA (1600*1200)	300m (62.5/125) / 500m (50/125)	~1.65Gbps
TV (1920*1080)	300m (62.5/125) / 500m (50/125)	
SXGA (1250*1024)	400m (62.5/125) / 600m (50/125)	~1.25Gbps
XGA (1024*768)	500m (62.5/125) / 700m (50/125)	
TV (1920*1080)	500m (62.5/125) / 700m (50/125)	~800Mbps
TV (1280*720)	500m (62.5/125) / 700m (50/125)	
SVGA (800*600)	500m (62.5/125) / 700m (50/125)	
VGA (640*480)	500m (62.5/125) / 700m (50/125)	250Mbps

Specifications

Max Length	500M@XGA	62.5/125 MMF 4-LC
	700M@XGA	50/125 MMF 4-LC
Max Resolution	1920*1200 (16:9)	Single Link
	1600*1200 (4:3)	
Max DVI Bandwidth	1.65Gbps per channel	
EDID Support	Pseudo DDC	Customers optional
HDCP Compliant	No	
Operating Voltage	5VDC	
Supply Current	180mA+/-30	TX module
	280mA+/-30	RX module
Optical Property	4 channels 850nm @ -6dBm	+/-3dBm
Operating Temperature	-10°C ~ 50°C	
Storage Temperature	-20°C ~ 75°C	
Dimension	90*40*19.6mm	(L*W*H)
Weight	65g	
Requirements	DVI PC or DVI signal source	Transmitter
	DVI monitor or projector	Receiver
	Power Source	100 ~ 240VAC, 50 ~ 60Hz, 0.2A

Application

PC
DVI Extender TX
DVI Extender RX
LCD TV
Multi-mode fiber up to 700 meters

Ordering Information

- **DVI-F/T**
  DVI Fiber Media Converter Transmitter (Connects to PC)

- **DVI-F/R**
  DVI Fiber Media Converter Receiver (Connects to Monitor)

IP Surveillance

2 Fiber Series

PDH Series

Broadband Access

EoCoax

Measurement

Interface Converter

Datacom Accessories

Network Management

Comparison Table

Transceiver - SFP

Transceiver		Media	Max. Data (bps)	Connector	Wavelength (nm)	Max. Output Power (dBm)	Min. Output Power (dBm)	Sensitivity (dBm)	Power Budget (dB)	Diode	BER	Note
SFP	Standard	MM (550M)	1.25G	LC	850	-4	-9.5	-18	8.5	VCSEL	$<10^{-12}$	
		MM (2KM)	155M	LC	1310	-14	-20	-31	11	LED	$<10^{-10}$	
			1.25G	LC	1310	-1	-9	-19	10	FP	$<10^{-12}$	
			2.5G	LC	1310	-3	-9	-20	11	FP	$<10^{-12}$	
		SM (10KM)	1.25G	LC	1310	-3	-9.5	-20	10.5	FP	$<10^{-12}$	
		SM (15KM)	2.5G	LC	1310/ 1550	0	-5	-20	15	DFB	$<10^{-12}$	
		SM (30KM)	155M	LC	1310	-8	-15	-34	19	FP	$<10^{-12}$	
		SM (40KM)	1.25G	LC	1310/ 1550	1	-4	-24	20	DFB	$<10^{-12}$	
			2.5G	LC	1310	3	-2	-28	26	DFB	$<10^{-12}$	
				LC	1550	4	-1	-21	20	DFB	$<10^{-12}$	
		SM (50KM)	155M	LC	1310	0	-5	-35	30	FP	$<10^{-10}$	
		SM (80KM)	1.25G	LC	1550	5	0	-24	24	DFB	$<10^{-12}$	
			2.5G	LC	1550	3	-2	-28	26	DFB	$<10^{-12}$	
		SM (120KM)	155M	LC	1550	5	0	-35	35	DFB	$<10^{-10}$	
			1.25G	LC	1550	5	0	-30	30	DFB	$<10^{-12}$	
	WDM (BiDi)	SM 20A (20KM)	155M	LC	Tx : 1310 Rx : 1550	-8	-14	-32	18	FP	$<10^{-10}$	
		SM 20B (20KM)	155M	LC	Tx : 1550 Rx : 1310	-8	-14	-32	18	FP	$<10^{-10}$	
		SM 40A (40KM)	155M	LC	Tx : 1310 Rx : 1550	0	-8	-34	26	FP	$<10^{-10}$	
		SM 40B (40KM)	155M	LC	Tx : 1550 Rx : 1310	0	-8	-34	26	DFB	$<10^{-10}$	
		SM 60A (60KM)	155M	LC	Tx : 1310 Rx : 1550	0	-5	-34	29	FP	$<10^{-10}$	
		SM 60B (60KM)	155M	LC	Tx : 1550 Rx : 1310	0	-5	-34	29	DFB	$<10^{-10}$	
		SM 10A (10KM)	1.25G	LC	Tx : 1310 Rx : 1550	-3	-9	-21	12	FP	$<10^{-12}$	
		SM 10B (10KM)	1.25G	LC	Tx : 1550 Rx : 1310	-3	-9	-21	12	DFB	$<10^{-12}$	
		SM 20A (20KM)	1.25G	LC	Tx : 1310 Rx : 1550	-2	-8	-23	15	FP	$<10^{-12}$	
		SM 20B (20KM)	1.25G	LC	Tx : 1550 Rx : 1310	-2	-8	-23	15	DFB	$<10^{-12}$	
		SM 40A (40KM)	1.25G	LC	Tx : 1310 Rx : 1550	2	-3	-23	20	DFB	$<10^{-12}$	
		SM 40B (40KM)	1.25G	LC	Tx : 1550 Rx : 1310	2	-3	-23	20	DFB	$<10^{-12}$	
		SM 60A (60KM)	1.25G	LC	Tx : 1310 Rx : 1550	5	0	-24	24	DFB	$<10^{-12}$	
		SM 60B (60KM)	1.25G	LC	Tx : 1550 Rx : 1310	4	-2	-25	23	DFB	$<10^{-12}$	
	CWDM	SM 040 (40KM)	1.25G	LC	1470/ 1490/ 1510 1530/ 1550/ 1570 1590/ 1610	1	-4	-24	20	DFB	$<10^{-12}$	
		SM 080 (80KM)	1.25G	LC	1470/ 1490/ 1510 1530/ 1550/ 1570 1590/ 1610	5	0	-23	23	DFB	$<10^{-12}$	
		SM 120 (120KM)	1.25G	LC	1470/ 1490/ 1510 1530/ 1550/ 1570 1590/ 1610	5	0	-30	30	DFB	$<10^{-12}$	
		SM 040 (40KM)	2.5G	LC	1470/ 1490/ 1510 1530/ 1550/ 1570 1590/ 1610	4	-1	-21	20	DFB	$<10^{-12}$	
		SM 080 (80KM)	2.5G	LC	1470/ 1490/ 1510 1530/ 1550/ 1570 1590/ 1610	3	-2	-28	26	DFB	$<10^{-12}$	
		SM 120 (120KM)	2.5G	LC	1470/ 1490/ 1510 1530/ 1550/ 1570 1590/ 1610	5	0	-30	30	DFB	$<10^{-12}$	

Note:

1. MM: Multi-Mode/ SM: Single-Mode

2. WDM (BiDi): Bi-Direction in one single fiber. *10A must be coupled with 10B, 20A must be coupled with 20B, and 40A with 40B, 60A with 60B.

3. CWDM: For Sigma Link 2000/5000 products use only

3. PDH Series

CSU/DSU				
Network Type	**Product Name**	**Description**	**Type**	**Page**
Comparison Table for E1 Access Series Models				3-2
G.703 E1	G703FE1	E1 to Data (Fixed I/F)	C	3-3
G.703 E1	G703FE1A	E1 to Data (Fixed I/F) Cascadable	C	3-3
G.703 E1	G703E1-U	E1 Unframed to Data (Fixed I/F)	C	3-3
G.703 E1	ETU01	E1 to Data, Ethernet	S	3-4
G.703 E1	ETU01U	E1 Unframed to Data	S	3-5
G.703 E1	ETU01A	E1 to Data, Ethernet/ SNMP/ EMS	S	3-6
G.703 E1	ETU01D	E1 to Data	S	3-7
G.703 E1	EOE-1	E1 to Ethernet (Unframed)	S	3-8
G.703 E1	ERM01	E1 to Data/ Ethernet (concentrator)	R	3-9
DXC				
Network Type	**Product Name**	**Description**	**Type**	**Page**
G.703 E1	ETU-DXC	E1 Digital Cross Connect (8 or 16 ch)	S	3-11
G.703 E1	ERM-DXC	E1 Digital Cross Connect	R	3-12
TDM over IP				
Network Type	**Product Name**	**Description**	**Type**	**Page**
G.703 E1	IPM-1SE	TDM over IP	S	3-14
Multiplexer				
Network Type	**Product Name**	**Description**	**Type**	**Page**
G.703 E1	ETU01C	E1 MUX/ Data, Sub E1	S	3-15
G.703 E1	ETU02-MUX	E1 MUX/ Data, Ethernet, Sub E1	S	3-16
G.703 E1	ETU02-A-MUX	E1 MUX/ Data, Sub E1	S	3-17
G.703 E1	ETU02-MUX/Plus	E1 MUX/ Data, Voice, Ethernet, Sub E1	S	3-18
G.703 E1	ERM-MUX/Plus	E1 MUX/ Data, Voice, Ethernet, Sub E1	R	3-21
Inverse Multiplexer				
Network Type	**Product Name**	**Description**	**Type**	**Page**
G.703 E1	ETU04A	Ethernet over 4 E1 (Bridge)	S	3-25
G.703 E1	ERM04	Ethernet over 4 E1 (Bridge) Concentrator	R	3-26
Interface Module				
Network Type	**Product Name**	**Description**	**Type**	**Page**
G.703 E1	ETU Modules	Various Modules for ETU01 Series Models	C	3-27
G.703 E1	ET100R	Routing Module for ETU01 Series Models	C	3-28

R = Rack, S = Stand-alone, C = Compact

IP Surveillance

Fiber Series

3 PDH Series

Broadband Access

EoCoax

Measurement

Interface Converter

Datacom Accessories

Network Management

Comparison Table

E1 Access Series

Model Name		ETU01	ETU01A	ETU01U	EOE-1	ETU01C	ETU01D	G703E1-U	G703FE1	G703FE1-A
Modular I/F		v	v	v						
Unframed E1		v	v	v	v		v	v	v	v
Fractional E1		v	v			v	v		v	v
Fractional Cascade E1		v	v							v
Sub-E1						v				
Data Port	V.35	v	v	v		v	v	v	v	v
	X.21	v	v	v		v		v	v	v
	RS-232	v	v							
	RS-530	v	v	v		v		v	v	v
	RS-449	v	v	v		v		v	v	v
	G.703/64K	v	v	v						
	NRZ/BNC	v	v	v						
	ET10/100	v	v	v	v					
	ET100R	v	v	v						
SNMP Management			v							
Power	AC Model (VAC)	90~250	90~250	90~250	90~250	90~250	90~250			
	DC Model (VDC)	-18 ~ -75	-18 ~ -75	-18 ~ -75	-18 ~ -72	-18 ~ -75	-36 ~ -75			
	AC Adapter (VAC)							110 or 220	110 or 220	110 or 220
	DC Adapter (VDC)							9	9	9
Power Consumption (W)		10	10	10	10	10	10	4	4	4

CO Side Solution

4U, 19", 13-slot E1 and Fractional E1 Concentrator With SNMP Management

1U, 19", Fractional E1 2/4 ports Multiplexer With Sub E1 and SNMP Management

CPE Side Solution

1U, 10", Single port Modular, Fractional E1 Access Unit With SNMP Management

Compact-size, Single-port E1/Fractional E1Access Unit

E1 NTU Series
G703FE1/ FE1A/ E1-U

Single-Port E1/ Fractional E1 Access Units

The G703FE1/ FE1A/ E1-U Access Units are single port access units for Unframed E1 or Fractional E1 services, depending on the model. Data Port rates are selectable via DIP-switches, for any multiple of 64Kbps up to 2048kbps (Fractional models only). User data is placed into the E1 frame, using only the required number of timeslots. Timeslot assignment is accomplished according to the Data Port speed and irandomly selected by DIP switches. The main E1 link may be clocked from the recovered receive clock (LBT), from the data port, or from an internal oscillator.

The data channel interface is standard E1A-530. Adapter cables are available for V.35, X.21 and RS-449. The G703FE1/ FE1A/ E1-U's DIP and slide switches, located on the side and front panels, provide for easy setup and control of all functions.
The G703FE1A model may be cascaded as an E1 Multiplexer. The unused channel timeslots will pass through E1/Rx to E1/Tx.

Features

- Terminate E1/ Fractional E1 Service
- Clock Regeneration from incoming HDB3 data
- Decoded data in NRZ form
- Diagnostic loopbacks both for G.703 and Data Port sides
- Interface conversion between G.703 and RS-530, RS-449 (V.36), X.21 or V.35 interfaces (Cable Solution)
- LTU (Line Terminating Unit) built in unit
- DTE/ DCE switchable Data Port

Specifications

Data rate	G703E1-U	2048kbps
	G703FE1/ FE1A	DIP selectable sync N x 64kbps to 2048kbps
Framing	G703E1-U	CAS/CCS,Unframe/Frame
	G703FE1/ FE1A	FAS (CCS, PCM-31); MFAS (CAS, PCM-30)
Power	DC 9VAC Adapter for 110VAC or 220VAC	
Environment	Temperature	0 — 55°C (Operating); 0 — 70°C (Storage)
	Humidity	10 — 95% non
Power Consumption	G703E1-U	< 4W
	G703FE1/ FE1A	< 4W
LEDs	G703E1-U	E1 Signal, timing loss
	G703FE1/ FE1A	WAN port TD/RD
Dimensions(WxDxH)	G703E1-U	79mm x 135mm x 28mm
	G703FE1/ FE1A	99mm x 179mm x 30mm
Weight	G703E1-U	180g
	G703FE1/ FE1A	360g
Compliance	FCC part 15 class A, CE, ITU-T G.703, G.704, G.723, G.823	

Ordering Info

G703XXXXX/	XXX	X
	Copper Interface Type	Connector Type
G703FE1	V35	F
G703FE1A	X21	M
G703E1-U	530	
	449	

Cables for different I/F solutions	
V35	DB25-V35 Cable
X21	DB25-DB15 Cable
530	DB25-DB25 Cable
449	DB25-DB37 Cable
Cables for connecting Cisco Routers directly	
CAB-DB25MLHF60M3M	RS-530 adapter cable for high speed transmission, connect to Cisco LHF60
CAB-DB25MSSHP26M3M	RS-530 adapter cable for high speed transmission, connect to Cisco SSHP26

Adapter	DC 9V — 48V adapter

Application

CPE Solution
Single-Port FE1 Access Units
G703 FE1/FE1-A

N*64 Kbps — G703FE1/FE1A — E1 — E1 Network — E1 — G703FE1/FE1A — N*64 Kbps

E1 NTU Series
ETU01

Single-Port Fractional E1 Access Unit, modular I/F

The ETU01 is a single port access unit for Unframed EI, Fractional EI, or Fractional cascade EI service. The ETU01 data channels support user-selectable transmission rates, which are integral multiples of 56 or 64kbps, up to a maximum 2.048Mbps, 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 packs the data channels into the EI link in user-selected time slots. The unused time slots can insert IDLE code (in frame mode) or insert receive side same timeslots data (in cascade mode).

The ETU01 has many types of user-replaceable data channel modules, which directly support the following interfaces: V.35, X.21, RS-530, G.703 64k Codirectional, RS-232, 10/100 Base-TX Ethernet Bridge, 10/100 Base-TX Ethernet Router, and NRZ/BNC. RS-449 is supported by means of an DB25 to DB37 adapter cable. The ETU01 fully meets EI specifications including ITU-T G.703, G.704, G.706, G.732, and G.823.

Features

- Terminate E1/ Fractional E1 Serivice
- User-replaceable data channel modules
- Multiple clock source selection
- Support user-selectable transmission rates
- Support local loopback and remote digital loopback.
- Supports rack mounting option

Ordering Info

| ETU01-AC | ETU01, Fractional E1, no data port AC type |
| ETU01-DC | ETU01, Fractional E1, no data port DC type |

Optional Interface Modules	
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-530 interface module plus RS-449 cable adapter
ETU/TTU-232	RS-232 interface module
ETU/TTU-G64K-CO	G.703/64K Co-directional I/F
ETU/TTU-NRZ	NRZ/BNC interface module
ETU/TTU-ET10/100	10/100Base-T Ethernet Bridge
ETU/TTU-ET100R	10/100Base-T Ethernet Router

Specifications

Clock modes	Clock mode 0 (DCE1)	Receive and transmit clock (recovered)to the synchronous DTE
	Clock mode 1 (DCE2)	Receive and transmit clock (internal oscillator) to the synchronous DTE
	Clock mode 2 (DTE1)	Receive clock to the synchronous,and transmit clock from thesynchronous device
	Clock mode 3 (DTE2)	Receive and transmit clock from the Synchronous DCE (from ETC andERC pin)
	Clock mode 4 (DTE3)	Receive and transmit clock from the Synchronous DCE (all from ETC pin)
Data rate		N x 56kbps or N x 64 kbpswhere N equal 1 to 31 in CCS or N equal 1 to 30 in CAS
Power	AC	90 — 250 VAC
	DC	-18 — -75 VDC
Environment	Temperature	0 — 50°C (Operating); 0 — 70°C (Storage)
	Humidity	0 — 90% non condensing
Power Consumption		20W
LEDs		PWR, TD, RD, RTS, DCD, Signal loss, Sync loss, Alarm
Dimensions(WxDxH)		195mm x 255mm x 45mm
Weight		1.5kg
Test Switch/ Diagnostics		Digital local loopback Digital remote loopback Analog local loopback Test pattern
Compliance		CE, FCC part 15 class A, ITU-T G.703, G.704, G.706and G.732.

Application

IP Surveillance

Fiber Series

3 PDH Series

Broadband Access

EoCoax

Measurement

Interface Converter

Datacom Accessories

Network Management

E1 NTU Series
ETU01U

Single-Port, unframed E1 Access Unit

The ETU01U is a single port access unit for Unframed EI service. Two models, one supporting AC (90-250V) and one supporting DC (-18 ~ -72V), are available. The ETU01U data channel supports a fixed transmission rate of 2.048Mbps. The built-in LTU with a line attenuation of up to 43 dB on twisted pair or coax cable, provides an approximate operating range up to 2km (using 22AWG). The ETU01U packs the data channel into the EI link transparently. The ETU01U has many types of user-replaceable data channel modules, which directly support the following interfaces: V.35, X.21, RS-530, 10/100BASE-T Ethernet Bridge, and 10/100BASE-T Ethernet Router. RS-449 is supported by RS-530 module and a DB25 to DB37 adapter cable. The ETU01U fully meets all of the EI specifications including ITU-T G.703 and G.823. The ETU01U features V.54 diagnostic capabilities for performing local loopback and remote digital loopback. The operator at either end of the line may test both the ETU01U and the line in the digital loopback mode. The loopback is controlled by either a manual switch or by the DTE interface for V.35 and RS-530. A front panel switch generates an internal 511 bit pseudo random test pattern, according to ITU-T, for direct end-to-end integrity testing. The Err indicator flashes for each bit error detected.

Features

- Available with many types of user-replaceable data channel modules
- Multiple clock source selection
- Fixed 2.048Mbps rate
- Support local loopback and remote digital loopback.

Ordering Info

ETU01U Unframed E1	
ETU01U/AC	AC type
ETU01U/DC	DC type
Optional Interface Modules	
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-530 interface module plus RS-449 cable adapter
ETU/TTU-G64K-CO	G.703/64K Co-directional I/F
ETU/TTU-NRZ	NRZ/BNC interface module
ETU/TTU-ET100	10/100Base-T Ethernet Bridge
ETU/TTU-ET100R	10/100Base-T Ethernet Router

Specifications

Clock modes	Clock mode 0 (DCE1)	Receive and transmit clock (recovered) to the synchronous DTE
	Clock mode 1 (DCE2)	Receive and transmit clock (internal oscillator) to the synchronous DTE
	Clock mode 2 (DTE1)	Receive clock to the synchronous,and transmit clock from the synchronous device
	Clock mode 3 (DTE2)	Receive and transmit clock from the Synchronous DCE (from ETC andERC pin)
	Clock mode 4 (DTE3)	Receive and transmit clock from theSynchronous DCE (all from ETC pin)
Data rate	2048Kbps (clear channel)	
Power	AC	90 — 250 VAC
	DC	-18 — -75 VDC
Environment	Temperature	0 — 50°C (Operating); 0 — 70°C (Storage)
	Humidity	0 — 90% non condensing
Power Consumption	10W	
LEDs	TD, RD, RTS, DCD, signal loss, alarm	
Dimensions(WxDxH)	195mm x 255mm x 45mm	
Weight	1.5kg	
Test Switch/ Diagnostics	Digital local loopback Digital remote loopback Analog local loopback Test pattern	
Compliance	CE, FCC part 15 class A, ITU-T G.703, G.706 and G.732.	

Application

E1 NTU Series
ETU01A

Single-Port, Modular, Fractional E1 Access Unit

The ETU01A provides our best digital access solution for E1 and Fractional E1 network services. 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, 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 an 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 allow the user to remotely control, diagnose and monitor the system using industry standard SNMP protocol, our proprietary MIB-II, and any network management software.

Features

- Terminate E1/ Fractional E1 service
- In-band Control
- Integrates high speed data and E1 link with an intelligent E1/ Fractional E1 Access Unit.
- IDLE Code:00-FF by user setting
- Selectable data rates: Nx64Kbps, Nx56Kbps (N=1~32)
- Setup and Control via front Panel with LCD display or ASCII terminal
- V.54 diagnostic capabilities for performing local loopback and remote digital loopback.
- SNMP enabled device (optional)

Ordering Info

ETU01A/AC	ETU01A & universal AC power supply
ETU01A/DC	ETU01A & DC power supply
ETU01A-SNMP	Optional SNMP card (installs at special slot)
Optional Interface Modules	
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-530 interface module plus RS-449 cable adapter
ETU/TTU-232	RS-232 interface module
ETU/TTU-G64K-CO	G.703/64K Co-directional I/F
ETU/TTU-NRZ	NRZ/BNC interface module
ETU/TTU-ET10/100	10/100Base-T Ethernet Bridge
ETU/TTU-ET100R	10/100Base-T Ethernet Router
Accessory	
DB15M-RJ45	AT&T Pub 62411 to USOC RJ-48C adapter

Specifications

Local Control	16 x 2 character LCD with backlight	
Data Rates	N x 64Kbps, Where N equal 1 to 31 in CCS, and N equal to 30 in CAS	
Connector	BNC & RJ-45 (USOC RJ-48C)	
Framing	Unframed/ Framed CCS(PCM31)/ CAS(PCM30)/ CRC4 on/off	
Bit rate	2.048Mbps ±50 ppm	
Line code	AMI/ HDB3	
Line impedance	75 ohm(BNC); 120 ohm(RJ-45)	
Relative receive level	0 to -43dB	
Transmit level	Pulse amplitude	Nominal 2.37V ±10% for 75ohm
		Nominal 3.00V ±10% for 120ohm
Zero amplitude	±0.1V	
Loopback	Line loopback; Payload loopback; Local loopback; DTE loopback; remote loopback	
BERT Test patterns	511, 2047, 2e15-1, 2e20-1,QRSS, 2e23-1, All 1, All 0, Alt, 0011, 3 in 24, 1 in 16, 1 in 8, 1 in 4 test patterns	
Data rate	Selectable N*64Kbps, N*56Kbps	
Modular Interface	V.35, RS-530, X.21, RS-449, RS-232, G.703 64 codirectional, 10/100Base-T Ethernet, and NRZ/BNC	
Power	AC	90 — 250 VAC
	DC	-18 — -75 VDC
Environment	Temperature	0 — 50°C (Operating); 0 — 70°C (Storage)
	Humidity	0 — 90% non condensing
Power Consumption	10W	
LEDs	Power, Sig Loss, SYNC Loss, Alarm, TD, RD, Error, Test	
Dimensions(WxDxH)	195mm x 235mm x 45mm	
Weight	1.5kg	
Compliance	CE, FCC part 15 class A, ITU-T G.703, G.704, G.706and G.732.	

Application

3

PDH Series

IP Surveillance

Fiber Series

Broadband Access

EoCoax

Measurement

Interface Converter

Datacom Accessories

Network Management

E1 NTU Series
ETU01D

Single-Port Fractional E1 Access Unit

The ETU01D provides an economic digital access solution for E1 and Fractional E1 network services. A DTE device may be linked to an ETU01D at data rates of 64Kbps to 2048Kbps. The ETU01D features a fixed dataport for V.35 interface. The ETU01D supports local control and diagnostics via LCD display, keypad and LED status indicators located on the front panel as well as via an 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.

Features

- Terminates fractional E1 service

- Integrates high speed data and E1 link with an intelligent E1/ Fractional E1 Access Unit.

- IDLE Code:00-FF by user setting

- Selectable data rates: Nx64Kbps, Nx56Kbps (N=1~32)

- Setup and Control via front Panel with LCD display or ASCII terminal

Application

CPE Solution
Single Port Fractional E1 Access Unit
ETU01D

Ordering Info

ETU01D/AC	ETU01D & universal AC power supply
ETU01D/DC	ETU01D & DC power supply

Rear Panel of AC Model

Rear Panel of DC Model

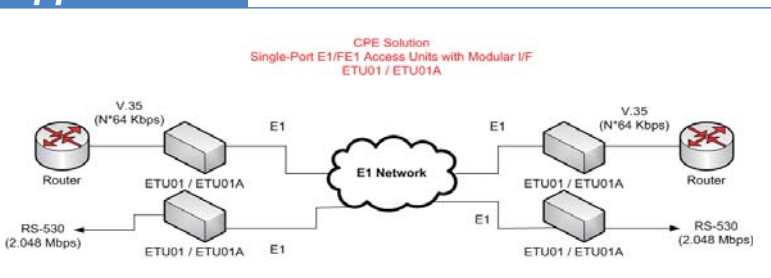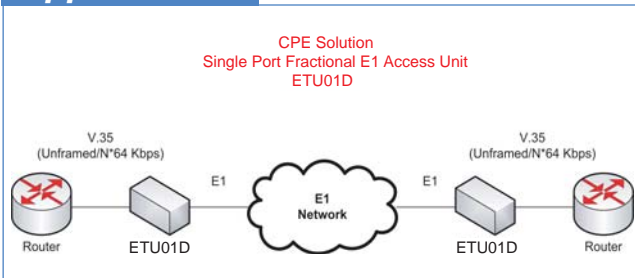## Specifications

Local Control	16 x 2 character LCD with backlight	
Data Rates	N x 64Kbps, Where N equal 1 to 31 in CCS, and N equal to 30 in CAS	
Connector	BNC & RJ-45 (USOC RJ-48C)	
Framing	Unframed/ Framed CCS(PCM31)/ CAS(PCM30)/ CRC4 on/off	
Bit rate	2.048Mbps ±50 ppm	
Line code	AMI/ HDB3	
Line impedance	75 ohm(BNC); 120 ohm(RJ-45)	
Relative receive level	0 to -43dB	
Transmit level	Pulse amplitude	Nominal 2.37V ±10% for 75ohm
		Nominal 3.00V ±10% for 120ohm
Zero amplitude	±0.1V	
Loopback	Line loopback; Payload loopback Local loopback; DTE loopback	
Transmit frequency tracking	Internal timing±30 ppm	
	Loopback timing±50 ppm	
	External timing±100 ppm	
Jitter performance	According to ITU-T G.823	
BERT Test patterns	2047, 2e15-1, QRSS	
Power	AC	90 — 250 VAC
	DC	-36 — -75 VDC
Environment	Temperature	0 — 50°C (Operating); 0 — 70°C (Storage)
	Humidity	0 — 90% non condensing
Power Consumption	10W	
LEDs	Power, Signal Loss, SYNC Loss, Alarm, TD, RD, Error, Test	
Dimensions(WxDxH)	195mm x 235mm x 45mm	
Weight	1.5kg	
Surge Protection	DC Sparkover Voltage: 230±20%	
Compliance	ITU-T G.703, G.704, G.706 and G.732 and ETSI ETS 300 420	

E1 NTU Series
EOE-1

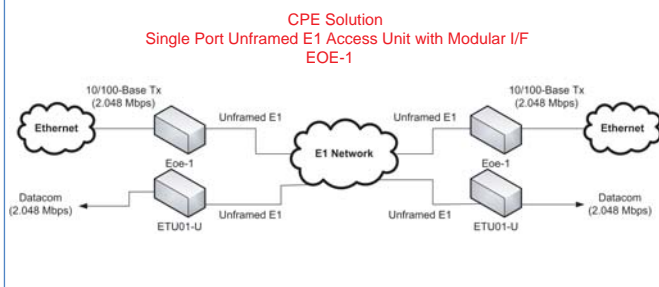## Single-Port 10/100 Base Ethernet Over G.703 Unframed E1 Access Unit

The EOE-1 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, unframed E1 via coaxial cable and BNC connectors or to 120 Ohm balanced, unframed E1 via twisted pairs and a shielded RJ-45 connector. The EOE-1 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 EOE-1 is very easy to configure by using simple DIP switch settings. Both the E1 and Ethernet Bridge configuration settings require only two 8-pole DIP switches. Once configured and set, the EOE-1 requires no further adjustments.

Features

- Terminates Unframed E1 service
- 10BASE-T/100BASE-TX, Full Duplex or Half Duplex
- 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
- Ethernet interface has automatic Twisted Pair polarity correction
- Forwarding and filtering rate at WAN speed with 2.048mbps throughput latency of 1 frame
- HP Auto-MDI/MDIX detects and corrects crossed cable
- Real-time filtering with 256 address tables
- Up to 340 packet-buffering capacity

Application

CPE Solution
Single Port Unframed E1 Access Unit with Modular I/F
EOE-1

Ordering Info

| EOE-1/AC | AC power input (90 — 250VAC) |
| EOE-1/DC | DC power input (-18 — -72VDC) |

Specifications

G.703 E1 Specifications		
Framing	Unframed	
Bit rate	2.048Mbps	
Line code	AMI/ HDB3	
Line Impedance	75 ohm(BNC)/ 120 ohm(DB-15, RJ-45)	
Relative receive level	0 to -43dB	
Transmit level	Pulse amplitude	Nominal 2.37V ±10% for 75ohm
		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 (DCE1)	Receive and transmit clock (recovered) to the synchronous DTE
	Clock mode 1 (DCE2)	Receive and transmit clock (internal oscillator) to the synchronous DTE
Test switches/Diagnostics	Remote loopback, Test pattern Local loopback	
Compliance	ITU-T G.703, G.706 and G.732	
Ethernet Specifications		
Standard	IEEE 802.3/802.3u	
Connector	RJ-45	
Data Rate	10/100Mbps; Half Duplex 20/200Mbps; Full duplex	
FilteringandForwarding	90,000 packets/sec	
Delay	1 frame	
Frame Buffer	340 frames	
MAC Table	256 MAC address	
General Specifications		
Connector	RJ-45	
Speeds	10BASE-T/100BASE-TX, Full or Half Duplex	
Protocol	Synchronous HDLC	
Power	AC	90 — 250 VAC
	DC	-18 — -72 VDC
Environment	Temperature	0 — 50°C (Operating); 0 — 70°C (Storage)
	Humidity	10 — 90% non condensing
Power Consumption	20W	
LEDs	Power, Signal Loss, Alarm, Link, TD, RD, 100, Full, Error, Error, Test	
Dimensions(WxDxH)	195mm x 235mm x 45mm	
Weight	1.5Kg	

IP Surveillance

Fiber Series

3 PDH Series

Broadband Access

EoCoax

Measurement

Interface Converter

Datacom Accessories

Network Management

E1 Access Series
ERM01

E1 and Fractional E1 Concentrator

The ERM01 series is a rack type E1 DSU/CSU for unframed E1 and Fractional E1 Digital Access which is nested in a hub to provide solution for central office installations. There are 13 slots available for G.703 E1 cards for installation into the ERM01 rack. An optional SNMP card can be installed into the last slot for configuration and management, leaving 12 slots available for line cards. The SNMP card provides both local control via an RS-232 Craft port and remote management using industry standard SNMP protocol via an Ethernet 10/100BASE-TX connection. A Windows^{TM} based GUI software is available to aid in configuring the chassis in a graphical environment.

Each E1 card may be linked to a remote E1/FE1 stand-alone Access Unit for various LAN, Video Conference, or Hosts over E1 network services. The ERM01 accommodates a redundant power supply as optional equipment, which may derive power from AC (90-250) or DC (-48V) power sources. On the rear panel, BNC, RJ-45 and Terminal Blocks are utilized for E1 Line interface connectors. Adapter cables are used to convert the DB26F DCE data ports to V.35, RS-530, X.21 or 10/100 Base Ethernet.

Features

- Terminates E1/ Fractional E1 service
- Hot swappable line cards
- Both unframed and Fractional E1 types
- Datacom, Ethernet Bridge or Router
- All connection on rear panel
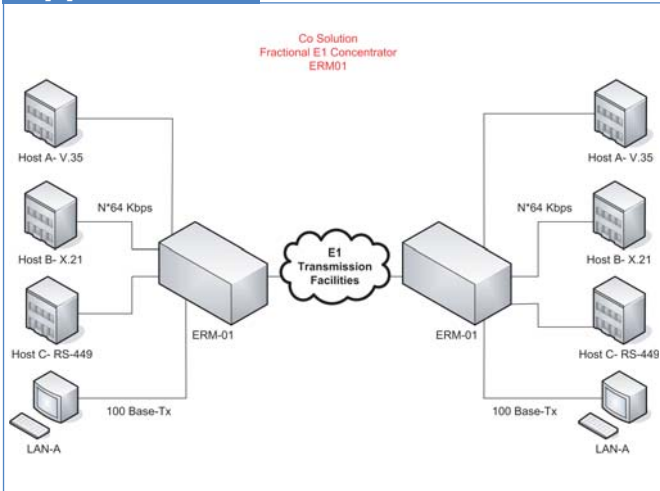- SNMP enabled device
- Supported by CTC's EMS

General Specification		
Console port	RS-232, DB9F: 19200, 8, N,1	
Power	AC	90 — 250VAC
	DC	-42 — -55VDC, 50 — 60Hz
Environment	Temperature	0 — 60°C (Operating); 0 — 70°C (Storage)
	Humidity	0 — 90% non condensing
Power Consumption	80W	
LEDs	Sync Loss, Signal Loss, Alarm (AIS, MRAI, RAI), TD, RD, Error, Test	
Dimensions(WxDxH)	285mm x 438mm x 180mm	
Weight	6.6Kg (Chassis +1 power card)250g (Per line card)	

Specifications

E1 Link	
Frame format	Unframed/ Framed CCS(PCM31)/ CAS(PCM30)/ CRC4 on/off
Bit rate	2.048Mbps ±50 ppm
Line Code	AMI/ HDB3
Receiving level	0 to -43dB
Line Impedance	75 ohm(BNC)/ 120 ohm(Molex, 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 unbalanced5 Pin Wire and RJ-45 for balanced
Transmit frequency tracking	Internal timing ±30 ppm Loopback timing ±50 ppm External timing ±100 ppm
Return loss	12dB for 51 — 102KHz 18dB for 102 — 2048KHz 14dB for 2048 — 3072KHz
Compliance	ITU-T G.703, G.704, G.706 and G.732 and ETSI ETS 300 420

User Data Channel Specification		
Interface types	RS-530/ RS-449/ RS-232 X.21/ V.35 10/100Base-TX Ethernet Bridge 10/100Base-TX Ethernet Router	
Connector	High density DB26 Female	
Line code	NRZ (except bridge and router)	
Data Rate	N x 56Kbps or N x 64Kbps, Where N equals 1 to 32	
Time slot allocation	User defined; E1-U is unframed only	
Control signals	CTS constantly ON	
	DSR constantly ON, except during test loops	
	DCD constantly ON or follows RTS, except during signal loss	
Alarm LED	Sync Loss, Signal Loss, Alarm (AIS, MRAI, RAI), TD, RD, Error, Test.	
Loopback	Local analog loopback; Digital loopback; remote loopback	
Clock modes	Clock mode 0 (DCE1)	Rx & Tx clocks (recovered) to the sync. DTE
	Clock mode 1 (DCE2)	Rx & Tx clocks (internal oscillator) to the sync. DTE Clock mode 2 (DTE1) Rx clock to the sync. Device, Tx clock from the sync. Device
	Clock mode 3 (DTE2)	Rx & Tx clocks from the sync. DCE (from ETC and ERC pin)
	Clock mode 4 (DTE3)	Rx & Tx clocks from the sync. DCE (all from ETC pin)

Application

Co Solution
Fractional E1 Concentrator
ERM01

Ordering Info

ERM01-SNMP

Optional Networking Management Module	
ERM01-SNMP	SNMP plug-in card with both interfaces: RS-232 and 10/100 Base-TX, windows GUI software, proprietary MIB-II file

ERM01-ET100R   ERM01-SERIAL

Card for ERM01 (without optical adapter cables)	
ERM01-V35	LTU card: FE1 to V.35
ERM01-ET100	LTU card: FE1 to 10/100 Base-TX Bridge
ERM01-ET100R	LTU card: FE1 to 10/100 Base-TX Router
ERM01-SERIAL	LTU card: FE1 to Serial: RS-530/ RS-499/ X.21
ERM01-V35-U	LTU card: Unframed E1 to V.35
ERM01-ET100-U	LTU card: Unframed 10/100 Base-TX Bridge
ERM01-ET10R-U	LTU card: Unframed E1 to 10/100 Base-TX Router
ERM01-SERIAL-U	LTU card: Unframed E1 to Serial: RS-530/ RS-499/ X.21 (with selected cable)

Master Unit: Rack Mount ERM01 Chassis	
ERM01/AC-CH	19 inch, 4U rack mount chassis for AC
ERM01/DC-CH	19 inch, 4U rack mount chassis for DC

Power Module for ERM01	
RM01/AC	AC power plug-in module
RM01/DC	DC-48V power plug-in module

Cable (Not-included items)	
CAB-HD26MB34M-V35	V.35 adapter cable: HD26 male to MB34 male, 2 meter
CAB-HD26MB34F-V35	V.35 adapter cable: HD26 male to MB34 female, 2 meter
CAB-HD26RJ45F-ET10	Ethernet adapter: HD26 male to RJ-45 female
CAB-HD26DB15M-X21	X.21 adapter cable: HD26 male to DB15 male, 2 meter
CAB-HD26DB15F-X21	X.21 adapter cable: HD26 male to DB15 female, 2 meter
CAB-HD26DB37M-449	RS-449 adapter cable: HD26 male to DB37 male, 2 meter
CAB-HD26DB37F-449	RS-449 adapter cable: HD26 male to DB37 female, 2 meter
CAB-HD26DB25M-530	RS-530 adapter cable: HD26 male to DB25 male, 2 meter
CAB-HD26DB25F-530	RS-530 adapter cable: HD26 male to DB25 female, 2 meter

IP Surveillance

Fiber Series

3 PDH Series

Broadband Access

EoCoax

Measurement

Interface Converter

Datacom Accessories

Network Management

E1 Access Series
ETU-DXC

E1 Digital Cross Connect Access Unit

The ETU-DXC Digital Cross Connect offers two models, the ETU-DXC/8 and the ETU-DXC/16. These units provide 8 or 16 E1 circuits (inputs and outputs) respectively. Within the E1 circuits, non-blocking, fully transparent cross-connects between 64Kbps timeslots can be efficiently implemented. This equipment may be used as a core building block in a digital data network based upon multiple E1 lines. When combined with Time Division Multiplexing (TDM) equipment such as the ETU02-MUX or ERM-MUX/PLUS, the main functions of a DDN network may be performed. This equipment does not support signaling and is therefore not applicable for voice applications.

Features

- 8 or 16 E1 ports depending on model.
- 19", 1U Standard, Stand-alone or rack mountable
- Balanced E1 (120ohm) or unbalanced E1(75ohm) switchable
- Complies with all ITU-T specifications
- E1 point-to-point 64Kbps transparent cross connect
- Provides user friendly interface NMP function
- System clock recovered from any E1 or from internal oscillator
- SNMP enabled device (optional)*

* to be announced

Specifications

Frame format	Unframed/ Framed
	CCS(PCM31)
	CRC4 On/ Off
Bit rate	2.048Mbps±50 ppm
Line Code	AMI/ HDB3
Receiving level	-20 / -43dB
Line Impedance	75 ohm, unbalanced (BNC)
	120 ohm, balanced (RJ-45) or High impedance
Jitter Performance	According to ITU-T G.823
Pulse amplitude	Nominal 2.37V ±10% for 75ohm
	Nominal 3.00V 10% for 120ohm
Connector	DB25 (adapter cable for 4xE1)
Management	NMP management system
Diagnostics	Local digital, local analog, remote loopback
E1 system Tx clock source	Recovery	Recovery from any one E1 Rx signal
	Internal	2.048MHz ±50ppm
Power	AC	90 — 250VAC
	DC	-48 (-40 — -57)VDC
Environment	Temperature	0 — 50°C (Operating)
		0 — 70°C (Storage)
	Humidity	0 — 90% non condensing
Power Consumption	20W
LEDs	Alarm, Activity, Power
Dimensions(WxDxH)	195mm x 235mm x 45mm
Weight	2.5kg
Compliance	ITU-T G.703, G.704, G.823

Application

Ordering Info

ETU-DXC	XX-	XX
	Ports type	Power type
	8	AC
	16	DC

NMP
Network Management Protocol software (For Windows™ only)

Optional Adapter Cable	
CAB-DB25BNCF8-E1	DB25 Male to BNC x 8
CAB-DB25RJ45M4-E1	DB25 Male to RJ45 x 4

E1 Access Series
ERM-DXC

E1 Digital Cross Connect Rack Type

The ERM-DXC is a Rack Type E1 Digital Cross Connect for Fractional E1 network access which is nested in a hub and provides an economic solution for central site users. There are 11 slots available for ERM-DXC I/O cards for installation into the ERM-DXC rack. A CPU card is installed into the last slot for configuration and management. The CPU card provides both local control via an RS-232 craft port and remote management using proprietary NMP software. Each MUX-E1 card may be linked to another ERM-DXC Rack to provide the main function of a DDN network. The ERM-DXC 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 power sharing and are hot swappable even during the E1 cards' transmission. The ERM-DXC provides all interface connections on the rear panel. BNC and RJ-45 are used for E1 Line interface connection, while optional cable adapters are used to convert the DB-62F DCE ports of the I/O cards to V.35, RS-530, RS-449, RS-232 or X.21. When cards are inserted in slots, LEDs will show the Line status on the front panel.RS-530, RS-449, RS-422, X.21 and X.50. When cards are inserted in slots, LEDs will show the Line status on the front panel.

Features

- All Interface and connectors are on the Rear Panel
- Digital Cross Connect Solution in a Standard 19" Rack
- High density & compact design in a 4U high rack
- Hot Swapping of cards and redundant power supplies supported
- LED Line status display on each card
- Optional Power Source, AC or DC for power supplies
- Standard console port allows terminal to setup and monitor operation locally
- Up to 11 I/O cards may be installed

Features - CPU

- Provides the timing systems selection and timing signals
- Provides the control and switching I/O modules parameters and functional conditions
- The core of the 64 lines El cross connector
- Hot Swapping of cards and redundant power supplies supported
- With function of Monitor, Cross-Connection

Specifications

Power	AC	90 — 250VAC
	DC	-48VDC
Environment	Temperature	0 — 60°C (Operating); 0 — 70°C (Storage)
	Humidity	0 — 90% non condensing
Power Consumption	80W	
Dimensions(WxDxH)	350mm x 438mm x 176mm	
Weight	8kg (Chassis + dual power card + 8 I/O cards) 450g (per line card)	
Compliance	ITU-G.703, G.704, G.706, G.732, and G.823	

Application

3-12

Specifications - *8*E1 Voice I/O*

Standard	G.703, G.704
connectors	BNC for unbalanced RJ45 Connector for balanced
Interface connector	High density DB62 Female with appropriate cable adapter
Framing	CCS(PCM31) / CAS(PCM30) CRC4 On/Off
Bit rate	2.048Mbps ±50 ppm
Line code	HDB3
Line impedance	75 ohm / 120ohm switchable via software
Jitter performance	According to ITU-T G.823
Compliance	ITU-T G.703, G.704, G.706 and G.732

Specifications - *4*E1 Voice I/O*

Standard	G.703, G.704
connectors	BNC for unbalanced RJ45 Connector for balanced
Interface connector	High density DB62 Female with appropriate cable adapter
Framing	CCS(PCM31)/ CAS(PCM30) CRC4 On/Off
Bit rate	2.048Mbps ±50 ppm
Line code	HDB3
Line impedance	75 ohm/ 120ohm switchable via software
Jitter performance	According to ITU-T G.823
Compliance	ITU-T G.703, G.704, G.706 and G.732

Specifications - *Datacom*

N x 64 Module, 4 channels, High Speed Data Interfaces		
Interfaces types	RS-530, X.21, V.35, RS-449 and RS-232	
Connector	HD68 Female with appropriate cable adapter	
Line code	NRZ	
Data rate	N x 64kbps, where N equal 1 to 31 in CCS and N equal 1 to 30 in CAS	
Async Module, 6 channels, <= 38.4kbps Async or 6 channels, 64/128kbps Sync		
Interfaces types	RS-232(V.24)	
Connector	HD62 Female with appropriate cable adapter	
Line code	NRZ	
Data rate	<=38.4kbps x 6ch or 64/128kbps x 6 channels	
G.703/64K Co-directional Module, 4 channels, Co-directional 64K		
Interfaces types	G.703/64K Co-directional	
Connector	RJ-45 x 4	
Line code	ITU-T G.703/64K, Co-directional	
Data rate	64Kbps ±100ppm x 4 channels	
Line impedance	120 ohm (balanced)	
Frame mode	Unframed only	
X.50 Module, 5 channels, <=19.2kbps, supports Async or Sync		
Interfaces types	RS-232(V.24)	
Connector	High density DB62 connector, Female(DCE) with appropriate cable	
Line code	NRZ	
Data rate	From 2.4k — 19.2kbps x 5ch	
Loopback type	Local loopback; Remote loopback	
64K/128K Module, 3-64K or 3-128K Data Interfaces		
Interfaces types	RS-530, X.21, V.35, RS-449	
Connector	High density DB62 female with appropriate cable adapter	
Line code	NRZ	
Data rate	64kbps x 3ch or 128kbps x 3xh	

Specifications - *Ethernet I/O*

Standard	IEEE 802.3/ 802.3u		
connector	RJ45		
Speeds	10Base-T/100Base-TX, Full or half duplex		
Frame	Supports 64 to 1522 byte packet length		
Length	Frames for VLAN tagging, etc		
Interface types	Ethernet 10Base-T I/F		
Connector	High density DB62 female with appropriate cable adapter		
Data rate	LAN	10Mbps; half duplex 20mbps; full duplex	
	WAN	N x 64kbps where N=1 to 31 in CCS; N=1 to 30 in CAS	

Specifications - *Power*

AC	Input 110/ 220 VAC ±15
DC	Input 48VDC (-40 — 57V)

Ordering Info

Master Unit: Rack Mount ERMDXC Chassis	
ERM-DXC/AC-CH	19 inch, 4U rack mount chassis for AC
ERM-DXC/DC-CH	19 inch, 4U rack mount chassis for DC

Optical I/O card	
ERM-DXC/8E1	8 channels G.703/ G.704(E1) card, n*64K drop and insert
ERM-DXC/DC	4 channels G.703/ G.704(E1) Voice card
ERM-DXC/DC	2 channels Ethernet 10Base-T I/F card

Optional Networking Management Module	
ERM-DXC/ SNMP	SNMP card with both interfaces: RS-232 and 10Base-T

Optional Low-Speed Interface Card	
ERM-DXC-LS-232	4 channels RS-232 (V.24) interface card
ERM-MUX-50	5 channels X.50 interface card

Optional Mid-Speed Interface Card	
ERM-MUX-MS-Serial	3 channels V.35/ X.21/ RS-449/ RS-530 (cable selected) interface card

Optional High-Speed Interface Card	
ERM-MUX-HS-Serial	2 ports V.35/ X.21/ RS-449/ RS-530 (cable selected) interface card

Optional Cable (Non-included item)	
Please contact regional sales representative for detailed information	

E1 Access Series
IPM-1SE

TDM over IP Access Units

The IPM-1SE provides a type of pseudowire (PW) function where a real-time bit stream (TDM) is transmitted over a packet switched network (PSN). By TDM (Time Division Multiplexing) we mean a T1 or E1 signal, while the PSN is based either on an IP or raw Ethernet network. Unlike other traffic types that can be carried over pseudowires (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.
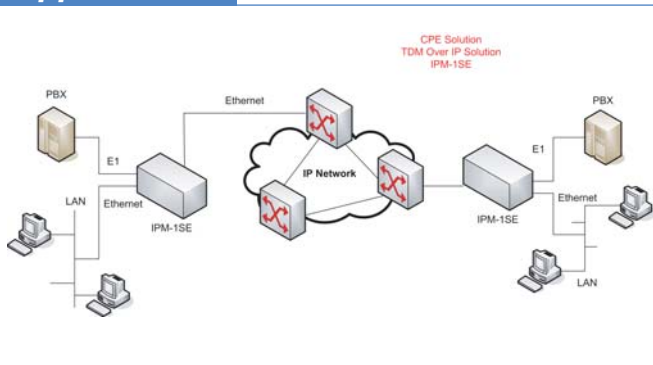
In native TDM networks the physical layer carries highly accurate timing information along with the TDM data, but when emulating TDM over Packet Switched Networks this synchronization is absent. The IPM-1SE is able to accurately regenerate the timing signals to the exacting standards and conformance 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 PBX, while still using IP based networks for.

Features

- Configurable with CLI via: RS-232/V.24 & Telnet via Ethernet (Configuration stored in flash)
- Devices can be cascaded to increase the number of interfaces
- Point-to-point application
- Provides accurate E1/T1 clock recovery
- Remotely upgradeable
- Supports SNMP management
- Supports synchronous TDM-based and Ethernet services over IP and Ethernet networks
- Supports rack mounting option

Application

Ordering Info

| IPM-1SE-AC | Provide one E1 and one ethernet port over IP network, AC Power (90 — 265 VAC, 47 — 63 Hz) |
| IPM-1SE-DC | Provide one E1 and one ethernet port over IP network, DC Power (-18 ~ -75 VDC) |

Specifications

Uplink and LAN Ethernet specifications	
Standards	IEE 802.3, 802.3U, 802.1p and 802.1q
Data Rate	10 or 100 Mbps, Half-Duplex or Full-Duplex
Range	Up to 100 meters on UTP category 5
Connector	RJ45
E1 Link	
Port	1 port
Framing	Unframed/ CCS(PCM31)/ CAS(PCM30)
Bit rate	2.048Mbps
Line code	HDB3
Line impedance	75 ohm(BNC)/ 120 ohm(DB-15, 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	RJ-48C for 120 ohms/ BNC for 75 ohms
Compliance	ITU-T G.703, G.704, G.706, and G.732.
T1 Link	
Ports	1 port
Framing	Unframed, D4, ESF
Data rate	1.544 Mbps
Line Code	B8ZS / AMI
Receive Level	Short haul - 15dB/ Long haul - 36dB
Line impedance	100 ohms
Pulse amplitude	Nominal 3.0 ±20%
Zero amplitude	±0.15V
Connector	RJ48C
Compliance	ITU-T G.703, G.704, AT&T TR-62411, ANSI T1.403
Control interface	
Standards	RS-232/V.24 (DCE) (Direct connection to PC)
Data rate	115200 baud
Data format	One start bit/ 8 data bits/ No parity/ One stop bit
Connector	DB-9 Female
General Specifications	
Connector	AC Model: 3 Pin plug DC Model: Plug in type 3Pin terminal Blocks
Power	AC	100 — 240 VAC
	DC	-18 — -75 VDC
Environment	Temperature	0 — 40°C (Operating); 0 — 70°C (Storage)
	Humidity	10 — 90% non condensing
Power Consumption	15W
LEDs	System, TDM, Uplink, LAN
Dimensions(WxDxH)	195mm x 235mm x 45mm
Weight	1.6kg

IP Surveillance

Fiber Series

3 PDH Series

Broadband Access

EoCoax

Measurement

Interface Converter

Datacom Accessories

Network Management

E1 NTU Series
ETU01C

2-Port, Fractional E1 Access Unit with E1 sub-Link

The ETU01C provides an economic multiplexing solution for Fractional E1 network services. Two DTE devices may be linked to the ETU01C at data rates of 64Kbps to 2048Kbps. The ETU01C also provides one E1 sub-link which may perform Drop & Insert with user-defined timeslot connections from a PABX or other E1 equipment to E1 network services. The ETU01C supports local control and diagnostics via front panel LCD and menu pushbuttons or a serial RS-232 console port. This feature enables users to easily configure the unit, execute the in-service diagnostics and monitor the network status. The ETU01C is available in two different voltage models. Voltage models include AC (100~240VAC) or DC (18~72VDC). The E1 interface is selectable as either unbalanced BNC (75 ohm) or balanced RJ-45 (120 ohm).

Features

- Terminate Fractional E1 service
- Setup and Control via front Panel with LCD display or ASCII terminal
- Built-in BERT testing function
- IDLE Code:00-FF by user setting
- Integrates high speed data and E1 link with an intelligent E1/ Fractional E1 Access Unit.
- Selectable data rates: Nx64Kbps (N=1~32)
- Supports E1 drop & insert port
- Supports V.35 or RS-530 selectable data interface channel. (Cable Solution for V.35, X.21, or RS-449)
- Supports rack mount option

Specifications

Local control	16 x 2 character LCD with backlight	
Data rate	Selectable Nx64Kbps, Nx56Kbps (N=1~32)	
Fixed cable solution Interface	V.35, RS-530, X.21, or RS-449	
Power	AC	90 — 250 VAC
	DC	-18 — -75 VDC
Environment	Temperature	0 — 50°C (Operating); 0 — 70°C (Storage)
	Humidity	0 — 90% non condensing
Power Consumption	10W	
LEDs	Power, Sig Loss, SYNC Loss, Alarm, TD, RD, Error, Test	
Dimensions(WxDxH)	195mm x 235mm x 45mm	
Weight	1.5kg	
Compliance	CE, FCC part 15 class A, ITU-T G.703, G.706, G.723, G.823	

Ordering Info

ETU01C-AC	ETU01C & AC power supply (with LCD)
ETU01C-DC	ETU01C & DC power supply (with LCD)

Optional Cables fot other I/F	
CAB-DB25MB34F-V35	DB25M to MB34F, DCE, length 1 meter
CAB-DB25MB15F-X21	DB25M to MB15F, DCE, length 1 meter
CAB-DB25DB37F-449	DB25M to MB37F, DCE, length 1 meter

Application

IP Surveillance

Fiber Series

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Interface Converter

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Network Management

E1 Multiplexer

E1 Access Series
ETU02-MUX

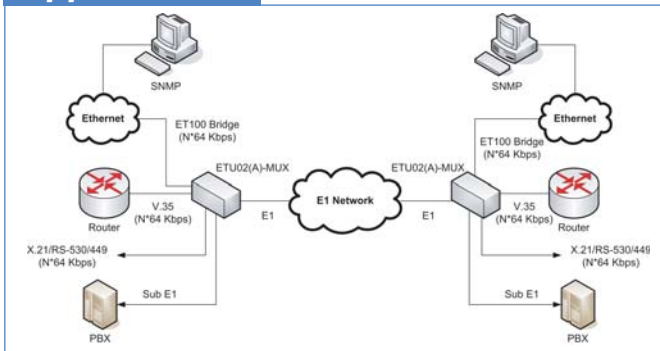## Fractional E1 2-Port/ 4-Port Multiplexer with sub E1

These units provide multiplexing solution for Fractional E1 network services. Up to four DTE devices may be linked to this model at data rates of 56Kbps to 2048Kbps. There is also provision for one optional E1 sub-link which will perform Drop & Insert with user-defined timeslot connections from a PABX or other E1 equipment to E1 network services. The Fractional E1 2 or 4 ports Multiplexer supports local control and diagnostics via an LCD display and LED status indicators located on the front panel or via a serial console port.

These features enable users to easily configure the unit, execute the in-service diagnostics and monitor the network status. The ETU02-MUX provides for optional SNMP Network Management System functions, which allow the user to remotely control and manage the system. These models fully meet all of the EI specifications including ITU-T G.703, G.704, G.706, G.732, and G.823.

Features

- Terminates E1/ Fractional E1 service
- Integrates high speed data and E1 link with an intelligent fractional E1 access unit
- Supports up to 4 Data channels
- Modular interface design for other I/F solutions
- Optional E1 drop & insert port
- Setup and Control via front Panel with LCD display or RS-232 terminal
- SNMP enabled device (optional)
- Supports rack mounting option

Application

Ordering Info

Main Unit	
ETU02-MUX.2	Optional SNMP card (installs in special
ETU02-MUX.4	V.35 interface module
Power Module	
AC	AC power module (90-250VAC)
DC	DC power module (18-72VDC)
AD	AC and DC power modules
Modules	
ETU02-SNMP	Optional SNMP card (installs in special
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-530 interface module plus RS-449 cable adapter
ETU/TTU-G64K-CO	G.703/64K Co-directional I/F
ETU/TTU-NRZ	NRZ/BNC interface module
ETU/TTU-ET100	10/100Base-T Ethernet Bridge
ETU/TTU-ET100R	10/100Base-T Ethernet Router
E1	Sublink E1 Link Card (module)

Specifications

E1 & Sub-E1 Link		
Framing Framed	CCS(PCM31) / CAS(PCM30) / CRC4	
Bit rate	2.048Mbps ±50 ppm	
Line code	AMI / HDB3	
Line impedance	75 ohm(BNC) / 120 ohm(DB-15)	
Relative receive level	0 to -43dB	
Transmit level		
Pulse amplitude	Nominal 2.37V ±10% for 75ohm	
	Nominal 3.00V ±10% for 120ohm	
Zero amplitude	±0.1V	
Transmit frequency tracking	Internal timing±100 ppm	
	Loopback timing±100 ppm	
	External timing±100 ppm	
Jitter performance	According to ITU-T G.823	
Interface connectors	15-pin, D-type female, BNC	
User Data Channel		
Data Rate	N x 56Kbps or N x 64Kbps, Where N equal 1 to 31in CCS, And N equal 1 to 30 in CAS	
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	
BERT Test patterns	511, 2047, 2e15-1, 2e20-1,QRSS, 2e23-1, All 1, All 0, Alt, 0011, 3 in 24, 1 in 16, 1 in 8, 1 in 4 test patterns	
Clock modes		
Clock mode 0 (DCE1)	Receive and transmit clock (recovered) to the synchronous DTE	
Clock mode 0 (DCE2)	Receive and transmit clock (internal oscillator) to the synchronous DTE	
Clock mode 0 (DCE3)	Receive and transmit clock from the Synchronous DCE (from ETC and ERC	
Clock mode 0 (DCE4)	Receive and transmit clock from the Synchronous DCE (all from ETC pin)	
General Specification		
LEDs	Alarm LED Sync Loss, Signal Loss, Alarm (AIS, MRAI, RAI), TD, RD, Error, Test.	
Power	AC	90 - 250VAC
	DC	18 - 72VDC
	AC+DC	90 - 250VAC ; 18 - 72VDC
Environment	Temperature	0 - 60°C (Operating); 0 - 70°C (Storage)
	Humidity	0 - 90% non condensing
Power Consumption	20W	
Dimensions(WxDxH)	430mm x 235mm x 45mm	
Weight	2.9kg	
Surge Protection	DC Sparkover Voltage: 230±0% Impulse	
Compliance	CE, FCC part 15 Class A, ITU G.703, G.704, G.706, G.732, G.823	

E1 Access Series
ETU02A-MUX

Fractional E1 2-Port/ 4-Port Multiplexer

The ETU02A-MUX provides an economic multiplexing solution for Fractional E1 network services. Up to four DTE devices may be linked to an ETU02A-MUX at data rates of 56Kbps to 2048Kbps. The ETU02A-MUX supports local control and diagnostics via an RS-232 console port connected to a standard serial terminal. This feature enables users to easily configure the unit, execute the in-service diagnostics and monitor the network status.
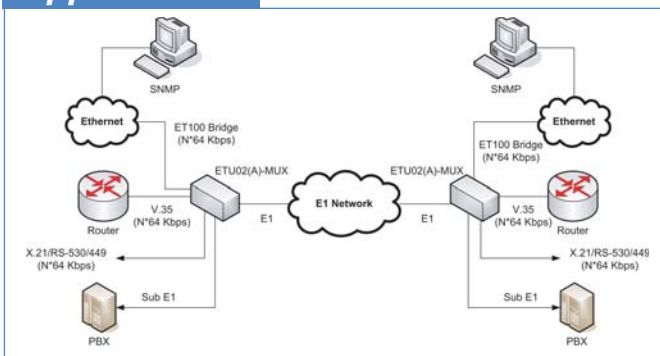
Features

- Terminates Fractional E1 Service
- Data Interface: Fixed DB25F (RS-530/232) utilizing hardware and software configuration and cable solution for V.35, RS-530, RS-449 and X.21
- Integrates high speed data and E1 link with an intelligent E1/ Fractional E1Access Unit
- Optional Sub-E1 interface module
- Setup and Control via DB9F, RS-232 terminal port
- Supports either two or four Data channels
- Supports rack mounting option

Application

Ordering Info

ETU02A-MUX.	X/	XX
	2	AC
	4	DC

Optional Interface cables	
E1	Sublink E1 Link Card (module)
CAB-DB25DB25F	RS-530 (RS-232)Extension cable
CAB-DB25MB34F	V.35 adapter cable (female)
CAB-DB25DB15F	X.21 adapter cable (female)
CAB-DB25DB37F	RS-449 adapter cable (female)

Specifications

E1 & Sub-E1 Link		
Framing Framed	CCS(PCM31) / CAS(PCM30) / CRC4 on/off	
Bit rate	2.048Mbps ±50 ppm	
Line code	AMI/ HDB3	
Line impedance	75 ohm(BNC)/ 120 ohm(DB-15)	
Relative receive level	0 to -43dB	
Transmit level		
Pulse amplitude	Nominal 2.37V ±10% for 75ohm	
	Nominal 3.00V ±10% for 120ohm	
Zero amplitude	±0.1V	
Transmit frequency tracking	Internal timing ±100 ppm	
	Loopback timing ±100 ppm	
	External timing ±100 ppm	
Jitter performance	According to ITU-T G.823	
Return loss	12dB for 51~102KHz	
	18dB for 102~2048KHz	
	14dB for 2048~3072KHz	
Interface connectors	15-pin, D-type female, BNC	
User Data Channel		
Data Rate	N x 56Kbps or N x 64Kbps, Where N equal 1 to 31in CCS, And N equal 1 to 30 in CAS	
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	
BERT Test patterns	511, 2047, 2e15-1, 2e20-1,QRSS, 2e23-1, All 1, All 0, Alt, 0011, 3 in 24, 1 in 16, 1 in 8, 1 in 4 test patterns	
Clock modes		
Clock mode 0 (DCE1)	Receive and transmit clock (recovered) to the synchronous DTE	
Clock mode 0 (DCE2)	Receive and transmit clock (internal oscillator) to the synchronous DTE	
Clock mode 0 (DCE3)	Receive and transmit clock from the Synchronous DCE (from ETC and ERC pin)	
Clock mode 0 (DCE4)	Receive and transmit clock from the Synchronous DCE (all from ETC pin)	
General Specification		
LED	Alarm LED Sync Loss, Signal Loss, Alarm (AIS, MRAI, RAI), TD, RD, Error, Test.	
Power	AC	90 — 250VAC
	DC	-18 — -72VDC
Environment	Temperature	0 — 60°C (Operating); 0 — 70°C (Storage)
	Humidity	0 — 90% non condensing
Power Consumption	10W	
Dimensions(WxDxH)	430mm x 235mm x 45mm	
Weight	2.9kg	
Surge Protection	DC Sparkover Voltage: 230±0% Impulse	
Compliance	CE, FCC part 15 class A, ITU G.703, G.704, G.706, G.732, G.823	

IP Surveillance

Fiber Series

3 PDH Series

Broadband Access

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E1 Multiplexer

E1 Access Series
ETU02-MUX/PLUS

Time-Divisioned Multi-Service Multiplexer with SNMP

The ETU02-MUX/Plus provides an economic multiplexing solution for Fractional E1 network services. Up to three DTE device ports may be linked to this model at data rates of 56Kbps to 2048Kbps. There is also provision for one optional E1 sub-link which will perform Drop & Insert with user-defined timeslot connections to a PABX or other E1 equipment. The Fractional E1 with 3 ports Multiplexer supports local control and diagnostics via serial console port. These features enable users to easily configure the unit, execute the in-service diagnostics and monitor the network status. The ETU02-MUX/Plus provides for optional SNMP Network Management System functions, which allow the user to remotely control and manage the system. This model fully meets all of the E1 specifications including ITU-T G.703, G.704, G.706, G.732, and G.823.

Features

- Channel rate and the maximum rate that can be selected by the user are N*64kb/s to 1984kb/s.

- User can configure the device, diagnosis testing and monitoring equipment operation status simply and conveniently.

- Can be configured as CPE side equipment with ERM-MUX/PLUS

- Setup and Control via front Panel with RS-232 terminal

- SNMP enabled device, supports MIB and GUI

- Standard 19"/1U dimension, supports rack mounting

- WAN side supports both Fractional/Unframed E1, also supports sub-E1 link

- Supports E1 circuit monitoring, alarm indication and shunt circuit interface connection identification function.

- Providing 3 plug-in I/O slots, each slot can choose from the following optional module:
  2-channel N*64K Module, providing up to 2.048Mbps for V.35 (or x.21, RS-449, RS-530) DCE port
  2-channel G.703/64K Module
  4-channel RS-232 Module, providing Sync & Async modes
  2-channel ET100 Bridge Module
  4-channel FXO voice Module
  4-channel FXS voice Module
  4-channel E&M voice Module

General Specifications

LEDs	Alarm LED Sync Loss, Signal Loss, Alarm (AIS, MRAI, RAI), TD, RD, Error, Test.	
Power	AC	90 — 250VAC
Environment	Temperature	0 — 60°C (Operating); 0 — 70°C (Storage)
	Humidity	0 — 90% non condensing

Power Consumption	20W
Dimensions(WxDxH)	430mm x 235mm x 45mm
Weight	2.9kg
Surge Protection	DC Sparkover Voltage: 230±0% Impulse
Compliance	CE, FCC part 15 Class A, ITU G.703, G.704, G.706, G.732, G.823

Main E1 & Sub-E1

Features

- 1+1 E1 mode (Main E1 & Sub-E1)

- Each card provides two E1 loops, each loop provides E1A/E1B channel independently

- Each E1 loop may provide clock to be used as system clock source

- Unbalanced BNC or balanced RJ-45

Specifications

Connectors	BNC for unbalanced; RJ45 Connector for balanced	
Framing	Unframed/Framed; CCS(PCM31)/ CAS(DCM30)	
Bit rate	2.048Mbps ±50 ppm	
Line code	AMI/ HDB3	
Line impedance	75 ohm, unbalanced (BNC) 120 ohm, balanced (RJ-45)	
Relative receive level	I0/ -43dB	
Transmit level	Pulse amplitude	Nominal 2.37V ±10% for 75ohm
		Nominal 3.00V ±10% for 120ohm
	Zero amplitude	±0.1V
Transmit frequency tracking	Internal timing ±30 ppm	
	Loopback timing ±50 ppm	
	External timing ±100 ppm	
Jitter performance	According to ITU-T G.823	
Compliance	ITU-T G.703, G.704, G.706 and G.732	

Optional Data Port Modules

▶ N*64 Module

▶ G.703/64K Module

Specifications 2-Ch N*64 Module

N x 64 Module, 2 channels, High Speed Data Interfaces	
Interfaces types	RS-530, X.21, V.35, RS-449 and RS-232
Connector	HD68 Female with appropriate cable adapter
Line code	NRZ
Data rate	N x 64kbps, where N equal 1 to 31 in CCS and N equal 1 to 30 in CAS

Specifications 2-Ch G703/64K Module

G.703/64K Co-directional Module, 2 channels, Co-directional 64K	
Interfaces types	G.703/64K Co-directional
Connector	RJ-45 x 2
Line code	ITU-T G.703/64K, Co-directional
Data rate	64Kbps ±100ppm x 4 channels
Line impedance	120 ohm (balanced)
Frame mode	Unframed only

▶ ET100 Bridge Module

▶ RS-232 Module

Specifications 1-Ch Ethernet Module

Ethernet Bridge Module, 2 independent channels	
Standard	Fully compliant with IEEE 802.3/ 802.3u
Connector	RJ-45 x 2
Speeds	10/100BASE-TX, auto-negotiation
Frames	Supports 64 to 1522 byte packet lengths, standard and extended length frames for VLAN tagging, etc
WAN	
Protocol	Synchronous HDLC
Rates	n x 64Kbps, up to 2048Kbps

Specifications 4-Ch RS-232 Module

RS-232 Module Async, 4 channels, <= 38.4kbps Async or 4 channels, 64/128kbps Sync	
Interfaces types	RS-232(V.24)
Connector	HD62 Female with appropriate cable adapter
Line code	NRZ
Data rate	<=38.4kbps x 4channels 64/128Kbps x 4channels

Optional Voice Modules

▶ E&M Voice Module

Features

- 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
- Each E&M voice channel can independently set Type
- 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 4-Ch E&M Voice Module

Input level	0 to -16dBr, in 0.5dB steps
Output level	0 to -16dBr, in 0.5dB steps
Impedance	900 or 600 Ohms; option
Return loss	2Wire 300-600Hz: >12dB 2Wire 600-3400Hz: >15dB 4Wire 300-3400Hz: >20dB
Group delay	2Wire @-10dBm0: <750uSec 4Wire @-10dBm0: <600uSec
Total Distortion	according to ITU-T G.223
Channel Cross-talk	not exceed -65dB, 1020Hz@0dBm
Out-of-band signal attenuation	-25dBm@4.6K-72KHz
Level not to exceed	-50dBm
Noise	<-65dBm0p weighted
Interface Connector	RJ45 x 4

Optional Voice Modules

▶ FXO Voice Module

Features

- ■ FXO card provides 4 independent channels
- ■ Connect directly to PSTN

Specifications 4-Ch FXO Voice Module

Connector	RJ-45 x 4
Impedance	600 ohms
Level Gain	On Tx side: 0 dB
	On Rx side: -3.5 dB
Ring Current Impedance	>7.5K ohms
Direct Current Resistance (off-hook)	< 300 ohms
Maximum Direct Current Borne	> 70 V

▶ FXS Voice Module

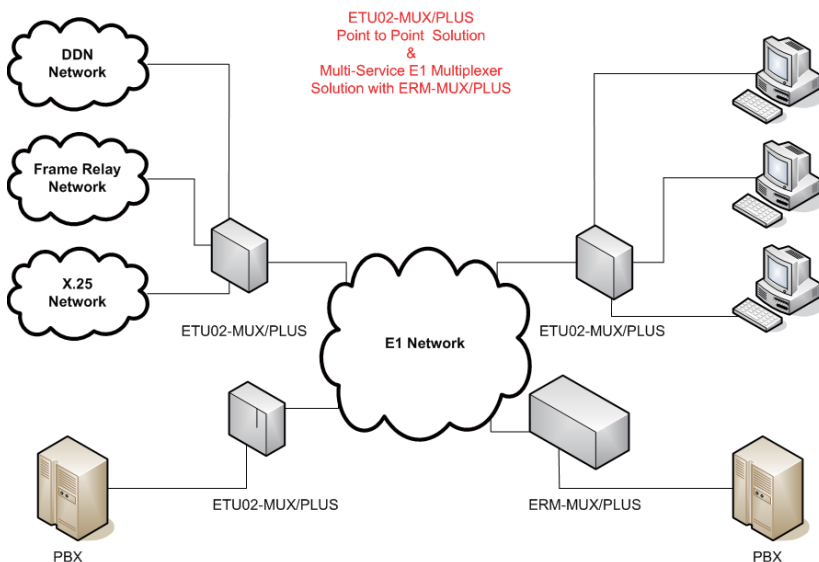### Features

- ■ FXS card provides 4 independent channels
- ■ Connects to standard telephones

Specifications 4-Ch FXS Voice Module

Connector	RJ-45 x 4
Impedance	600 ohms
Level Gain	On Tx side: 0 dB
	On Rx side: -3.5 dB
Ring Current Output	75±15V
Frequency	25±3Hz
Feeding Voltage	-48V
Loop Resistance	1800 ohms
Connecting Distance	up to 4Km
Wire Gauge	0.4mm
Feeding Working Current	20mA

Applications

ETU02-MUX/PLUS
Point to Point Solution
&
Multi-Service E1 Multiplexer
Solution with ERM-MUX/PLUS

DDN Network — Frame Relay Network — X.25 Network — ETU02-MUX/PLUS — E1 Network — ETU02-MUX/PLUS — PBX — ETU02-MUX/PLUS — ERM-MUX/PLUS — PBX

Ordering Information

Main Unit	
ETU02-MUX/PLUS-AC	19" 1U Rack Mountable Chassis with AC Power, Including SNMP Module
ETU02-MUX/PLUS-DC	19" 1U Rack Mountable Chassis with DC Power, Including SNMP Module
Optional E1 Trunk Module	
ETU/E1	E1 Trunk Module with One Main E1 Line in BNC Type
ETU/E1SUB	E1 Trunk Module with One Main E1 and One Sub E1 line in BNC Type

Optional Data Port Modules	
ETU/N64	Supports N X 64Kbps with 2 Channels for V.35, X.21, RS-449
ETU/232	RS-232 Interface Module, Supports 4 Channels, Date Rate ≤38.4Kbps in Async Mode, 19.2/38.4/64/128Kbps Selectable
ETU/G64	G.703 64Kbps Co-directional Interface Module in RJ-45 Type, Supports 2 Channels
ETU/ET100	10/100Base-T Auto Negotiation Interface Module, Supports Two Channels
Optional Voice Modules	
ETU/FXO	FXO Interface Module in RJ-45 Type, Supports 4 Channels
ETU/FXS	FXS Interface Module in RJ-45 Type, Supports 4 Channels
ETU/E&M	E&M Interface Module in RJ-45 Type, Supports 4 Channels

IP Surveillance

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E1 Access Series
ERM-MUX/PLUS

Multi-Service E1 Multiplexer

The ERM-MUX/PLUS is a Rack Type E1 CSU/DSU Time Division Multiplexer for Fractional E1 network access which is designed for non-stop operation and provides an economic solution for central site installations. There are 10 slots available for hot-swappable ERM-MUX/PLUS-I/O cards for installation into the ERM-MUX/PLUS Rack. Two slots are provided for MUX-E1 cards, which may be configured as four separate E1 links or for redundant 2+2 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 stand by in case of primary card failure. Each MUX-E1 card may be linked to another ERM-MUX/PLUS Rack to provide a variety of Datacom & 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. Optional cable adapters are used to convert the DB-62F DCE ports of the I/O cards to RS-232 or HP68F DCE port of I/O card to V.35, RS-232, RS-530, RS-449, RS-422, X.21 and X.50. When cards are inserted in slots, LEDs will show the Line status on the front panel.
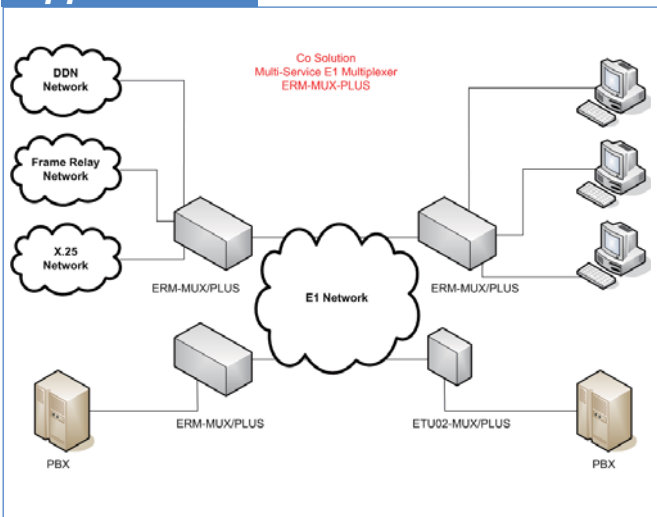
Features

- CPU redundancy (1+1)
- Drop & Insert function
- E1 redundancy (2+2)
- Datacom (V.35, RS-530, X.21), G.703/64 co-directional, Ethernet, FXO, FXS, E&M, LD
- NMP, SNMP and Web based management
- Power redundancy (1+1) [AC+AC, DC+DC, AC+DC]

Specifications

General Specification		
Power	AC	90 — 250VAC
	DC	-48VDC
Environment	Temperature	0 — 60°C (Operating); 0 — 70°C (Storage)
	Humidity	0 — 90% non condensing
Power Consumption	10W	
Dimensions(WxDxH)	350mm x 438mm x 176mm	
Weight	8kg (Chassis + dual power card + 8 I/O cards) 450g (per line card)	
Compliance	ITU-G.703, G.704, G.706, G.732, and G.823	

Application

Other Datacom I/O

Specifications

N x 64 Module, 4 channels, High Speed Data Interfaces	
Interfaces types	RS-530, X.21, V.35, RS-449 and RS-232
Connector	HD68 Female with appropriate cable adapter
Line code	NRZ
Data rate	N x 64kbps, where N equal 1 to 31 in CCS and N equal 1 to 30 in CAS
Async Module, 6 channels, <= 38.4kbps Async or 6 channels, 64/128kbps Sync	
Interfaces types	RS-232(V.24)
Connector	HD62 Female with appropriate cable adapter
Line code	NRZ
Data rate	<=38.4kbps x 6ch or 64/128kbps x 6 channels
G.703/64K Co-directional Module, 4 channels, Co-directional 64K	
Interfaces types	G.703/64K Co-directional
Connector	RJ-45 x 4
Line code	ITU-T G.703/64K, Co-directional
Data rate	64Kbps ±100ppm x 4 channels
Line impedance	120 ohm (balanced)
Frame mode	Unframed only
X.50 Module, 5 channels, <=19.2kbps, supports Async or Sync	
Interfaces types	RS-232(V.24)
Connector	High density DB62 connector, Female(DCE) with appropriate cable
Line code	NRZ
Data rate	From 2.4k — 19.2kbps x 5ch
Loopback type	Local loopback; Remote loopback

G.703 E1 I/O

Features

- 1+1 E1 protection or 2-E1 mode
- Hot-Swappable card
- 2 + 2 protection when 2 cards installed
- Unbalanced BNC or balanced RJ-45

Specifications 1+1 E1 Line Card

Connectors	BNC for unbalanced;		
	RJ45 Connector for balanced		
Framing	Unframed/Framed; CCS(PCM31)/ CAS(DCM30)		
Bit rate	2.048Mbps ±50 ppm		
Line code	AMI/ HDB3		
Line impedance	75 ohm, unbalanced (BNC)		
	120 ohm, balanced (RJ-45)		
Relative receive level	l 0/ -43dB		
Transmit level	Pulse amplitude	Nominal 2.37V ±10% for 75ohm	
		Nominal 3.00V ±10% for 120ohm	
	Zero amplitude	±0.1V	
Transmit frequency tracking	Internal timing ±30 ppm		
	Loopback timing ±50 ppm		
	External timing ±100 ppm		
Jitter performance	According to ITU-T G.823		
Compliance	ITU-T G.703, G.704, G.706 and G.732		

Ethernet I/O

Features

- Auto padding of undersized packets to meet the minimum Ethernet packet size requirement
- Automatic address learning, aging and deletion after 5 minutes
- Bridge module - 2 channels
- Buffering modes can be selected according to the setting of WAN and LAN line speeds
- Ethernet interface has automatic Twisted Pair polarity correction LAN
- Forwarding and filtering rate at wire speed with through put latency of 1 frame
- Real-time filtering with 256 address tables
- Up to 340 packet-buffering capacity

Specifications 2-Ch Ethernet Bridge Card

LAN	
Standard	Fully compliant with IEEE 802.3/ 802.3u
Connector	RJ45
Speeds	10BASE-T/100BASE-TX, Full or Half Duplex
Frames	Supports 64 to 1522 byte packet lengths, standard and extended length frames for VLAN tagging, etc
WAN	
Protocol	Synchronous HDLC
Rates	n x 64(56) Kbps, up to 2048Kbps

Sub-E1 I/O

Features

- Each card provides two E1 loops, each loop provides E1A/E1B channel independently
- Hot-Swappable
- Each first E1 loop may provide external clock to be used as system clock source

Specifications 2-Ch Sub E1 Card

Connectors	BNC for unbalanced;		
	RJ45 Connector forbalanced		
Framing	Framed CCS(PCM31) / CAS(PCM30)		
CRC check	CRC4 On/Off		
Bit rate	2.048Mbps ±50 ppm		
Line code	AMI/ HDB3		
Line impedance	75 ohm, unbalanced (BNC)		
	120 ohm, balanced (RJ-45)		
Relative receive level	0/ -43dB		
Transmit level	Pulse amplitude	Nominal 2.37V ±10% for 75ohm	
		Nominal 3.00V ±10% for 120ohm	
	Zero amplitude	±0.1V	
Loopback type	Remote digital loopback		
Jitter performance	According to ITU-T G.823		
Compliance	ITU-T G.703, G.704, G.706 and G.732		

IP Surveillance

Fiber Series

3 PDH Series

Broadband Access

EoCoax

Measurement

Interface Converter

Datacom Accessories

Network Management

E&M Voice I/O

Features

- BD/GD wires are for battery and ground detection
- E&M card provides 6 independent channels
- E&M interface provides 1 pair of E and 1 pair of M
- E&M wires used in communicating control information
- Each E&M can support Type I, II, III, IV or V
- Each E&M voice channel can independently set Type
- 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 6-Ch E&M Voice Card

Input level	0 to -16dBr, in 0.5dB steps
Output level	0 to -16dBr, in 0.5dB steps
Impedance	900 or 600 Ohms; option
Return loss	2Wire 300-600Hz: >12dB
	2Wire 600-3400Hz: >15dB
	4Wire 300-3400Hz: >20dB
Group delay	2Wire @-10dBm0: <750uSec
	4Wire @-10dBm0: <600uSec
Total Distortion	according to ITU-T G.223
Channel Cross-talk	not exceed -65dB, 1020Hz@0dBm
Out-of-band signal attenuation	-25dBm@4.6K-72KHz
Level not to exceed	-50dBm
Noise	<-65dBm0p weighted
Interface Connector	RJ45 x 6

FXO Voice

Specifications 6-Ch FXO Voice Card

Connectors	RJ-45 x 6	
On-hook resistance	> 100K ohms	
Off-hook resistance	< 300 ohms	
Input level	0 to -5dBr, adj. in 0.5dB steps	
Output level	0 to -7.5dBr, adj.in 0.5dB steps	
Impedance	600 Ohms	
Power	DC voltage	>70V
	DC current	>150mA

Features

- FXO card provides 6 independent channels
- Card has one alarm LED and 6 ring indicator LEDs
- Connect directly to PSTN

FXS Voice

Features

- FXS card provides 6 independent channels
- Card has one alarm LED and 6 ring indicator LEDs
- Connects to standard telephones

Specifications 6-Ch FXS Voice Card

Connectors	RJ-45 x 6
Effective ring voltage	AC 75VRMS ±15V@25Hz ±3Hz sine less than 10% THD
Ring voltage	>AC50VRMS at 300mA load
Loop resistance	<1.8K Ohms; voltage -48VDC including 300 Ohms
Handset current	>18mA
On-hook current	10mA ±3mA
Loop current range	18-50mA(off-hook)
Surge protection	1000V, 10uSec transient response, decay to 50% in 700uSec 300VRMS for less than 200mSec; no damage to any components 220VRMS for 15 minutes damage only local loop, no fire hazard
Input level	0 to -5dBr, adj. in 0.5dB steps
Output level	0 to -7.5dBr, adj. in 0.5dB steps
Impedance	900 or 600 Ohms; option
Return loss	300-600Hz: >12dB; 600-3400Hz: >15dB
Group delay	-10dBm0: <750uSec
Total Distortion	According to ITU-T G.223
Channel crosstalk	< -65dB, 1020Hz@0dBm
Out-of-band signal attenuation	-25dBm@4.6K-72KHz; not to exceed -50dBm
Noise	< -65dBm0p weighted

Loop Detect Voice

Features

- LD (loop detect) provides 4 independent channels
- Hot swappable card
- Connectors located on face

Specifications

Connectors	RJ-45 x 4
Surge protection	1000V, 10uSec transient response, decay to 50% in 700uSec 300VRMS for less than 200mSec; no damage to any components 220VRMS for 15 minutes damage only local loop, no fire hazard
Input level	0 to -5dBr, adj. in 0.5dB steps
Output level	0 to -7.5dBr, adj.in 0.5dB steps
Impedance	900 or 600 Ohms; option
Return loss	300-600Hz: >12dB; 600-3400Hz: >15dB
Group delay	@-10dBm0: <750uSec
Total Distortion	According to ITU-T G.223
Channel crosstalk	Not exceed -65dB, 1020Hz@0dBm
Out-of-band signal attenuation	-25dBm@4.6K-72KHz; not to exceed -50dBm
Noise	<-65dBm0p weighted

SNMP

Features

- Able to read and set or modify the configuration at the same time
- The NMS enables the administrator to load the default setting configuration or save setting for later recovery
- Support for Telnet to operate from remote site in terminal mode. TFTP function to upgrade firmware
- Card configuration can be saved for recall later or for use on replacement line cards
- Supports web based management and monitoring functions

EMS

Features

- Management systems design for common case, suitable for huge network
- Vendor specific management systems which is easy to implement vendor specific functions

Ordering Info

Master Unit : Rack Mount ERM-MUX/PLUS Chassis	
ERM-MUX/PLUS/AA-CH	19", 4U rack mount chassis for AC+AC power
ERM-MUX/PLUS/AD-CH	19", 4U rack mount chassis for AC+DC power
ERM-MUX/PLUS/DD-CH	19", 4U rack mount chassis for DC+DC power
Optional SNMP Module for ERM-MUX/PLUS	
ERM-MUX/PLUS/SNMP	SNMP interface module (installs onto the CPU card)
CPU Card	
ERM-MUX/PLUS-CPU	CPU card for NMP management (without SNMP I/F module)
Voice Interface Card	
ERM-MUX/PLUS-FXO	6 channels FXO voice interface card
ERM-MUX/PLUS-FXS	6 channels FXS voice interface card
ERM-MUX/PLUS-E&M	6 channels 2/4 wires E&M voice interface card
ERM-MUX-PLUS-MAGNETO	6 channels MAGNETO interface card
ERM-MUX-PLUS-LD	4 channels loop detect voice card

Low-Speed Interface Card	
ERM-MUX-PLUS-LS-232	6 channels RS-232(V.24) interface card
ERM-MUX-PLUS-G64K	4 channels G.703 64Kbps Co-directional
ERM-MUX-PLUS-X50	5 channels RS-232(V.24) interface card
High-Speed Interface Card	
ERM-MUX-PLUS-HS-SERIAL	4 channels V.35/X.21/RS-449/RS-530 (cable selected) interface card
ERM-MUX-PLUS-ET10/100	2 Channels Ethernet (10/100Base Tx) interface card
Power Module for ERM-MUX/PLUS (Redundant Power Protection Available)	
ERM-MUX/AC	AC power plug-in module (110/220 VAC)
ERM-MUX/ACV	AC power plug-in module with Voice Support
ERM-MUX/DC	DC power plug-in module (±48VDC)
ERM-MUX/DCV	DC power plug-in module with Voice Support
LTU Card	
ERM-MUX-PLUS-E1	2 channels main E1 LTU card: G.703/G.704 (Fractional E1)
ERM-MUX-PLUS-SubE1	2 channels E1A/E1B card: G.703/G.704

ETU04A

4E1 Inverse Converter with Remote Monitor Capability

The ETU04A is an inverse E1 converter that will multi-link up to 4 E1 lines and offers simple, cost-effective connection between E1 service and 10/100BaseT LANs. The ETU04A inverse converter transmits a 7.68Mbps Ethernet bridge channel over 4 E1 links. The ETU04 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 service available is E1 lines. The ETU04A supports 4*2.048Kbps G.703 E1 lines, 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 ETU04A fully meets EI specifications including ITU-T G.703 and G.823. The ETU04A features diagnostic capabilities for performing remote loopback. The operator at either end of the line may test both the ETU04A and the line in the digital loopback mode. The Ethernet interface supports auto-negotiation, allowing plug-and-play Ethernet connection without any additional configuration.

Features

- Ethernet over 4 E1

- Allows maximum of 8ms delay variance between E1 links, the system will automatically shut-down a link when the delay value is over-range

- Built-in bridge operating at Fast Ethernet rates

- Provides alarm indication output via LED

- Supports data rates from 1.92Mbps to 7.68Mbps

- E1 complies with ITU-T G.703, and G.823

- Link compatible with ERM04 & ETU04

- Separate models for BNC or RJ-45

- Supports RS-232 console for configuration (TBA)

- Supports remote monitor function through the SNMP provided by ERM04

Ordering Info

ETU04A/R-AC	4 E1 lines with balanced RJ-45 connector to 10/100Mbps with AC power input
ETU04A/R-DC	4 E1 lines with balanced RJ-45 connector to 10/100Mbps with DC power input
ETU04A/B-AC	4 E1 lines with unbalanced BNC connector to 10/100Mbps with AC power input
ETU04A/B-DC	4 E1 lines with unbalanced BNC connector to 10/100Mbps with DC power input

Specifications

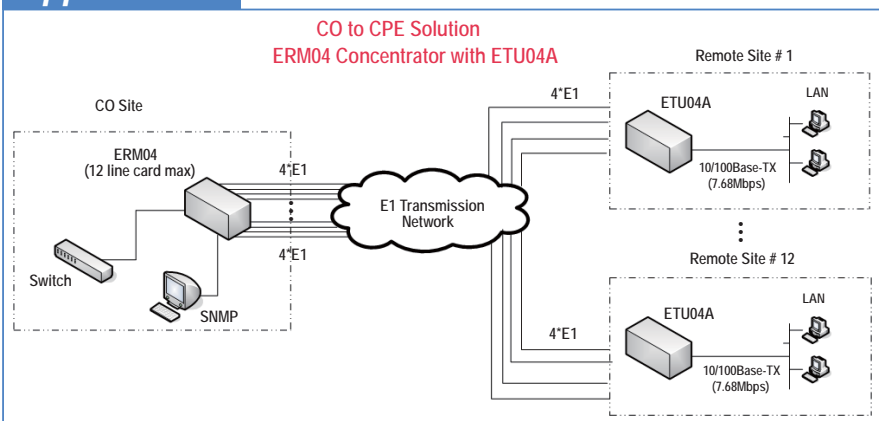| E1 interface		
Frame format	Unframed (Transparent)	
Bit rate	2.048Mbps ±50ppm (up to 4 E1s)	
Line Code	Line code HDB3	
Clock Setting	Internal OSC or recovery clock	
Receive sensitivity level	-43dB	
Line Impedance	Unbalanced 75 Ohms +/- 5%	
Jitter Performance	Complies with ITU-T G.823	
Pulse amplitude	Nominal 2.37V ± 10%	
Delay Variance	8 ms (maximum)	
Connector	BNC pairs or RJ-45 (by model)	
Ethernet Interface		
Data Rate	10/ 100Mbps; Half Duplex (20/ 200Mbps; Full duplex)	
Throughput	1E1 channel 320 frame/sec	
	2E1 channels 632 frame/sec	
	3E1 channels 942 frame/sec	
	4E1 channels 1262 frame/sec	
Automatic aging duration	5—10 minutes	
MAC address	1024	
Delay	1 frame	
Connector	Shielded RJ-45	
Frame Size	64-1522 bytes	
General Specification		
Standard	IEEE 802.3U	
Power	AC	90 — 250VAC
	DC	-40 — -57 VDC
Environment	Temperature	0 — 50°C (Operating); 0 — 70°C (Storage)
	Humidity	0 — 90% non condensing
Power Consumption	10W	
LEDs	PWR, LOS(A~D), LOF(A~D), CRC, TMO, LINK, TX, RX, LOOP	
Dimensions (WxDxH)	195mm x 235mm x 45mm	
Weight	1.5kg	
Surge Protection	DC Sparkover Voltage: 230±0% Impulse	
Compliance	ITU G.703, G.704, G.706, G.732, G.823	

Application

CO to CPE Solution
ERM04 Concentrator with ETU04A

IP Surveillance

Fiber Series

3 PDH Series

Broadband Access

EoCoax

Measurement

Interface Converter

Datacom Accessories

Network Management

E1 Inverse Multiplexer

E1 Access Series
ERM04

E1 Inverse Multiplexer - Rack Type

The ERM04 is an inverse E1 multiplexer central office concentrator rack, with each line card able to multi-link up to 4 E1 lines for cost-effective connection of 10/100BaseT LANs over E1 transports. The ERM04 inverse multiplexer rack line cards are capable of transmitting 7.68Mbps Ethernet bridge channels over sets of 4 E1 links. The ERM04 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 service available is E1 lines. The ERM04 line card supports 4*2.048Kbps G.703 E1 lines, for a line attenuation of up to 43 dB on twisted pair or coax cable.

This provides an approximate operating range of up to 2km (using 22AWG). The ERM04 line cards fully meet EI specifications including ITU-T G.703 and G.823. The ERM04 features diagnostic capabilities for performing remote loopback. The operator at either end of the line may test both the ERM04 line card and the line in the digital loopback mode. The Ethernet interface supports auto-negotiation, allowing plug-and-play Ethernet connection without any additional configuration.

Features

- Central Solution in 4RU, 19 or 23" rack
- 12 line card slots for ERM04-LC inverse E1 bridge line cards
- Dual AC or DC optional power
- SNMP management option
- Each line card connects one fast Ethernet channel over up to four E1 links
- Each line card supports data rates from 1.92Mbps to 7.68Mbps
- Built-in bridge operates at WAN rate
- Plug and play LAN connection (auto-negotiation support)
- Fully compatible with IEEE 802.3, IEE 802.3U & IEEE 802.1Q
- Allows maxmium of 8ms delay variance between E1 links
- Unbalanced E1 I/F(BNC) or balanced E1 (RJ-45) complies with ITU-T G.703, G.704, G.823
- Fully compatible with ETU04A CPE devices
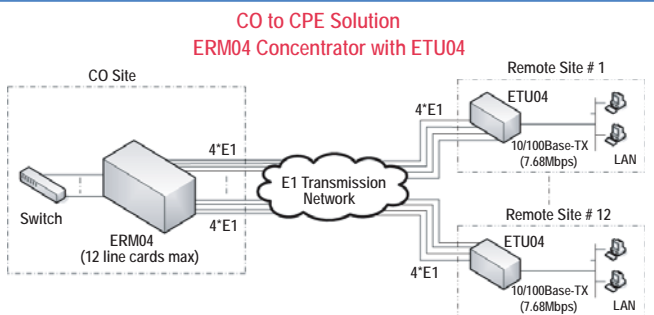
Ordering Info

Chassis Unit	
ERM04/AC-CH	19 inch, 4U rack mount chassis for AC
ERM04/DC-CH	19 inch, 4U rack mount chassis for DC
RM01/AC	AC plug-in power module
RM01/DC	DC(-48V) plug-in power module

I/O card	
ERM04-IOB	ERM04 Line Card, 75 ohm BNC
ERM04-IOR	ERM04 Line Card, 120 ohm RJ-45

Optional Networking Management Module	
ERM04-SNMP	SNMP card with both interfaces: RS-232 and 10Base-T

Optional Cable (Non-included item)	
Please contact regional sales representative for the detail information	

Specifications

E1 interface	
Frame format	Unframed (Transparent)
Bit rate	2.048Mbps ±50ppm (up to 4 E1s)
Line Code	Line code HDB3
Clock Setting	Internal OSC or recovery clock
Receive sensitivity level	-43dB (long haul) ; -12dB (short haul) selectable
Line Impedance	Unbalanced: 75 Ohms +/-5%
	Balanced: 120 Ohms +/-5%
Jitter Performance	Complies with ITU-T G.823
Pulse mask	Complies with ITU-T G.703
Pulse amplitude	Nominal 2.37V ± 10% (Unbalanced)
	Nominal 3.00V ± 10% (Balanced)
Delay Variance	8 ms (maximum)
Diagnostics	Digital remote loopback
Connector	Unshielded BNC pairs (75 Ohm)
	Shielded RJ-45 (120 Ohm)

Ethernet Interface		
Data Rate	10/ 100Mbps; Half Duplex (20/ 200Mbps; Full duplex)	
Throughput	1E1 channel 320 frame/sec	
	2E1 channels 632 frame/sec	
	3E1 channels 942 frame/sec	
	4E1 channels 1262 frame/sec	
Automatic aging duration	5—10 minutes	
MAC address	1024	
Delay	1 frame	
Connector	Shielded RJ-45	
Frame Size	64-1522 bytes	

Console Interface		
RS-232 serial port	9600, 8bits, no, parity, 1 stop	
Connector	DB9 female, DCE	

General Specification		
Power	AC	100-240VAC @47-63Hz
	DC	-40 — -57 VDC
Environment	Temperature	0 — 50°C (Operating); 0 — 70°C (Storage)
	Humidity	0 — 90% non condensing
Power Consumption	80W	
LEDs	PWR, E1 status, CRC, TMO, Ethernet Link, LOOP	
Dimensions (WxHxD)	438mm x 177mm x 285mm	
Weight	6.6Kg (14.5lb.) Net (chassis + 1 power) ; 250g per line card	

Application

CO to CPE Solution
ERM04 Concentrator with ETU04

ETU Series Interface Modules

Various Interface modules for E1/T1 Access Units

When purchasing one of our single port access units or multi-port multiplexers, our ETU/TTU Interface modules provide the total solution to your data interface needs. In addition to standard datacom interfaces, Ethernet modules are also available for bridging or routing of Ethernet over E1 or T1 network.

Data Port Interface Module Options

Type	Photo	Description	Type	Photo	Description
RS-530		Connector: RS-530/DB25F Speed: Fractional E1 (N64/N56) Model: ETU/TTU-530	V.35		Connector: V.35/MB34F Speed: Fractional E1 (N64/N56) Model: ETU/TTU-V35
RS-449		Connection: RS-530/DB25F /RS-449M(F) additional Cable Speed: Fractional E1 (N64/N56) Model: ETU/TTU-449	X.21		Connector: X.21/DB15F Speed: Fractional E1 (N64/N56) Model: ETU/TTU-X21
G.703/64		Connector: DB15F G.703/64Kbps Codirectional Speed: 64Kbps Model: ETU/TTU-G64	RS-232		Connector: RS-232/DB25F RS232 Sync(Async) Speed: 128Kbps (19.2Kbps) Model: ETU/TTU-232
ET100		Connection: RJ-45 10Base-T/100Base-Tx (Ethernet Bridge) Speed: Fractional E1 Model: ETU/TTU-ET100	NRZ		Connector: BNC(x4) NRZ Speed: Fractional E1 Model: ETU/TTU-NRZ
ET100R		Connection: RJ-45 10/100Base-T/Tx (Ethernet Routing) Speed: Fractional E1 Model: ETU/TTU-ET100R			

ETU01A Rear

ETU01/ETU01A/ETU01-U/ETU02/TTU01/TTU02 are available with the modules listed above

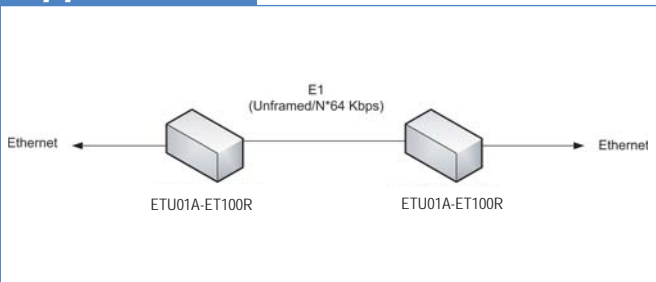## ETU Interface Module

ETU Series Interface Module
ET100R

E1/T1 to Ethernet Router

When the E1/T1 stand-alone access units are installed with an ET100R Interface, the unit is not only a 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, is design based upon the engine of the IPR 1600 synchronous IP router. The ET100R 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. The serial port and Telnet configuration menus are identical and may include password protection.

Features

- DHCP function/ NAT function
- Flash Upgrade (via TFTP)
- IP Mapping/ Client Filtering
- RIP I, RIP II, Send or Receive on Ethernet or WAN
- Router Ethernet port IP Address/ subnet mask
- Router Name/ Password
- Routing Table (manually set up to 16 entries)
- WAN PPP or HDLC Encapsulation
- WAN port IP address/ subnet mask

Application

ETU01A-ET100R   ETU01A-ET100R

Ordering Info

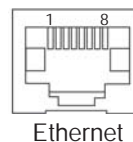| The Following Models Can be Ordered with Router Module	
ETU01	Single port fractional E1 access unit
ETU01A	Single port fractional E1 access unit
ETU01-U	Single port E1 access unit
ETU02-MUX	4 port E1 multiplexer
TTU01	Single port fractional T1 access unit
TTU02-MUX	4 port T1 multiplexer

Specifications

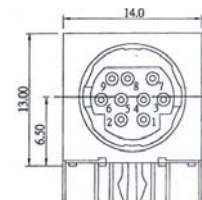| Hardware	Samsung ARM9 integrated communications 166MHz processor, 8MB Flash, and 32MB pipeline RAM for code, data and buffers	
Connection	1 x Ethernet LAN port (10/100)	
WAN Speed	Synchronous Port N56/N64 up to 2048Kbps	
LAN Speed	Ethernet LAN port 10/100 Mbps	
Function	Proxy Routing, IP Routing, Static 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

The physical interfaces for the ET100R are an RJ-45 connector and mini DIN9 connector with the pin assignments as follows :

Mini-DIN 9 Pin Assignment

Pin	Circuit	Direction	Description
1	NC		
2	RD	Output	Receive Data
3	TD	Input	Transmit Data
4	DTR	Input	
5	GND	--	Signal Ground
6	DSR	Output	
7	RTS	Input	Request to Send
8	CTS	Output	Clear to Send
9	NC		

Ethernet

Normal
1.Tx+
2.Tx-
3.Rx+
6.Rx-

IP Surveillance

Fiber Series

3 PDH Series

Broadband Access

EoCoax

Measurement

Interface Converter

Datacom Accessories

Network Management

4. Broadband Access

ADSL Family				
Network Type	**Product Name**	**Description**	**Type**	**Page**
ADSL	ALS-R50	6U, 19", 16 slots (384 loop max)	R	4-2
ADSL	ALS-R60	6.75U, 19", 20 slots (640 loop max)	R	4-3
ADSL	ALS-P10	ADSL MDF Type filtter	C	4-4
ADSL	ALS-12	ADSL/VDSL splitter	C	4-5
ADSL	ALS-M12	ADSL/VDSL micro filtter	C	4-5
ADSL	ALS-10-IT	Regional ADSL splitter for Italy	C	4-6
ADSL	ALS-10-UK	Regional ADSL splitter for UK	C	4-6
ADSL	ALS-10-FI	Regional ADSL splitter for Finland	C	4-6
ADSL	ALS-10-FA	Regional ADSL splitter for France	C	4-6
ADSL	ALS-10-EU/I	ADSL/ ISDN splitter	C	4-7
ADSL	ATU-R150	ADSL2/ADSL2+ modem	S	4-8

Network Type	**Product Name**	**Description**	**Type**	**Page**
G.SHDSL TDM Series	SHRM03-E1	2-wire, E1 to G.SHDSL concentrator	L	4-9
G.SHDSL TDM Series	SHRM03-V35	2-wire, V.35 to G.SHDSL concentrator	L	4-9
G.SHDSL TDM Series	SHRM03-ET100	2-wire10/100 BASE TX to G.SHDSL concentrator, 2W/TDM	L	4-9
G.SHDSL TDM Series	SHDTU03-E1	2-wire, E1 to G.SHDSL modem	S	4-11
G.SHDSL TDM Series	SHDTU03-V35	2-wire, V.35 to G.SHDSL modem	S	4-12
G.SHDSL TDM Series	SHDTU03-ET100	2-wire, 10/100 BASE TX to G.SHDSL modem	S	4-13
G.SHDSL.bis TDM Series	SHDTU03b-ET100	2-wire G.SHDSL.bis modem with LAN interface	S	4-14
G.SHDSL.bis TDM Series	SHDTU03b-V35	2-wire G.SHDSL.bis modem with V.35 interface	S	4-14
G.SHDSL.bis TDM Series	SHDTU03b-E1	2-wire G.SHDSL.bis modem with E1 interface	S	4-14
G.SHDSL.bis TDM Series	SHDTU03b-EVL	2-wire G.SHDSL.bis modem with E1/V.35/LAN multi-interface	S	4-14
G.SHDSL ATM Series	SHRM03-ET100R	2-wire, 10/100 BASE TX to G.SHDSL concentrator	L	4-15
G.SHDSL ATM Series	SHDTU03-ET10R	2-wire G.SHDSL router with single port	S	4-16
G.SHDSL ATM Series	SHDTU03-ET10RS	2-wire G.SHDSL router with four-port switching hub	S	4-16
G.SHDSL ATM Series	SHDTU03F-ET10R	2-wire G.SHDSL router with single port & firewall protection	S	4-16
G.SHDSL ATM Series	SHDTU03F-ET10RS	2-wire G.SHDSL router with four-port switching hub & firewall protection	S	4-16
G.SHDSL ATM Series	SHDTU03A-ET10RS	4-wire G.SHDSL router with four-port switching hub	S	4-16
G.SHDSL ATM Series	SHDTU03AF-ET10RS	4-wire G.SHDSL router with four-port switching hub with firewall protection	S	4-16
G.SHDSL.bis ATM Series	SHDTU03bF-ET10R	2-wire G.SHDSL.bis router with single port & firewall protection	S	4-17
G.SHDSL.bis ATM Series	SHDTU03bF-ET10RS	2-wire G.SHDSL.bis router with four-port switching hub & firewall protection	S	4-17
G.SHDSL.bis ATM Series	SHDTU03bAF-ET10RS	4-wire G.SHDSL.bis router with four-port switching hub & firewall protection	S	4-17

VDSL Family				
Network Type	**Product Name**	**Description**	**Type**	**Page**
VDSL2 Family	V2MC-10/100	VDSL2 to Fast Ethernet media converter	S	4-19
FMC Family	FMC-CH08	8-slot chassis concentrator for FMC & V2MC media converters	R	4-20

R = Rack, S = Stand-alone, C = Compact

ADSL Rack Type Splitter

ADSL Splitter Series
ALS-R50

Rack Type Splitter

The ALS-R50 rack connections are organized into two-card sets. Each physical card provides 24 loops. A two card set provides 48 loops. Each card set provides high density connections to the central office DSLAM using 2-50 pin (2.54mm pitch) locking header connector and ribbon cables. Each ribbon Connector supports 24 loops. POTS and line connections are provided via two sets each of 12x4 wire wrap terminals.
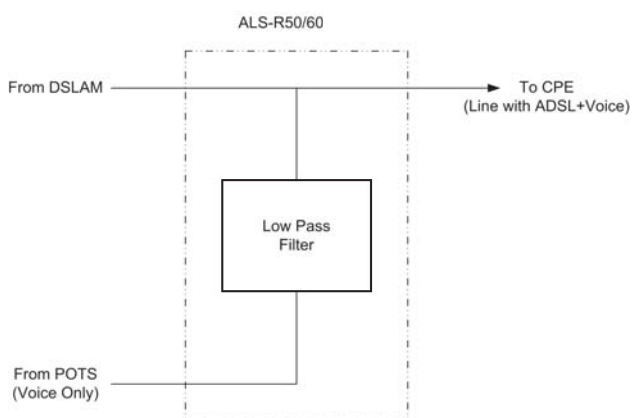
Features

- 6U high 19" rack
- Consists exclusively of all passive elements
- Designed for implementation of ADSL CO application
- Handles all POTS loop current from 0mA to 100mA
- If the power supply or ATU-C/ATU-R fails, telephone service on the ADSL line will operate normally
- Provides excellent isolation between DSL and POTS
- Up to 16 cards (384 loop max)

Application

Specifications

Standard	Annex E.2 of ITU-T G.992.1	
Impedance	900 ohms	
Insertion Loss	1004Hz short loop	1dB
	1004Hz Long loop	0.75dB
Attenuation distortion	200 to 3.4Khz short loop	-1.5 — 1.5dB
	3.4 to 300KHz short loop	-2 — 2dB
	200 to 3.4KHz long loop	-1.5 — 0.5dB
	3.4 to 300KHz long loop	-1.5 — 1dB
Cut off frequency	-3dB	8Khz
ADSL band Attenuation	30 — 300KHz	-65dB
	300 — 1104KHz	-55dB
Delay Distortion	600 — 3.2KHz	200us
	200 — 4KHz	250us
Return Loss	ERL	8dB
	SRL-L	5dB
	SRL-H	5dB
Common Mode Rejection Ration	600 — 3.2KHz	-100dB
DC Resistance	20Ohms	
Isolation resistance to	5M Ohms	
Longitudinal	200 — 1KHz	-60dB
	1 — 3KHz	-60dB
DC Current carrying capacity	100mA	
Environment	Temperature	-10 — 70°C (Operating); -15 — 80°C (Storage)
	Humidity	0 — 90% non condensing
Dimensions(WxDxH)	434mm x 285mm x 265.6mm	
Weight	18kg	

Ordering Info

ALS-R50-P	ADSL Line Splitter Rack, for CO application, w/wire wrap and 50pin locking ribbon cable connections
ALS-R50 24P-11 Card	ADSL Line Splitter Card, 24 Loops, 900 ohm, 8k Hz

Side navigation tabs: IP Surveillance | Fiber Series | PDH Series | **4 Broadband Access** | EoCoax | Measurement | Interface Converter | Datacom Accessories | Network Management

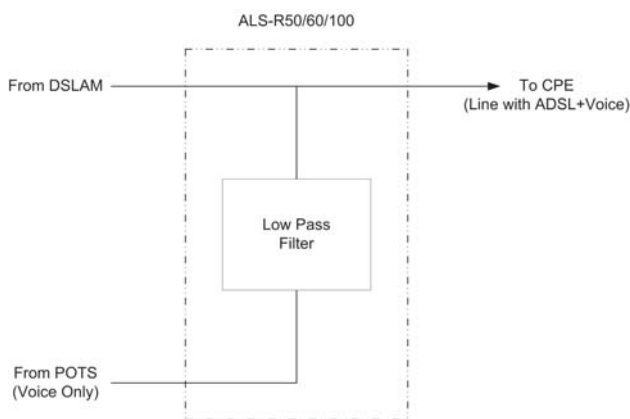## ADSL Splitter Series
ALS-R60

Rack Type Splitter

The ALS-R60 is a rack mount solution for central office or service providers, containing up to 20 cards with 32 each ADSL line splitters which provide low-pass filters designed to provide POTS (Plain Old Telephone System) service to a line that is utilizing ADSL technology. This device is designed to eliminate interference to POTS equipment by blocking the high frequency ADSL signal (20 KHz~12 MHz).

Features

- 8U high 19" rack
- Consists exclusively of all passive elements
- Designed for implementation of ADSL/ ADSL2/ ADSL2+ CO application
- Handles all POTS loop current from 0mA to 100mA
- If the power supply or ATU-C/ATU-R fails, telephone service on the ADSL line will operate normally
- Provides excellent isolation between DSL and POTS
- Up to 20 cards (640 loop max)

Application

Specifications

Standard	Annex E.2 of ITU-T G.992.3	
Impedance	900 ohms	
Insertion Loss	1004Hz short loop	1dB
	1004 Hz Long loop	0.75dB
Attenuation distortion	200 to 3.4Khz short loop	-1.5 — 1.5dB
	3.4 to 300KHz short loop	-2 — 2dB
	200 to 3.4KHz long loop	-1.5 — 0.5dB
	3.4 to 300KHz long loop	-1.5 — 1dB
Cut off frequency	-3dB	8Khz
ADSL band	30 — 300KHz	-65dB
Attenuation	300 —1104KHz	-55dB
Delay Distortion	600 — 3.2KHz	200us
	200 — 4KHz	250us
Return Loss	ERL	8dB
	SRL-L	5dB
	SRL-H	5dB
Common Mode Rejection Ration	600 — 3.2KHz	-100dB
DC Resistance	20Ohms	
Isolation resistance to	5M Ohms	
Longitudinal	200 — 1KHz	-60dB
	1 — 3KHz	-60dB
DC Current carrying capacity	100mA	
Environment	Temperature	-10 — 70°C (Operating); -15 — 80°C (Storage)
	Humidity	0 — 90% non condensing
Dimensions(WxDxH)	436mm x 300mm x 300mm	
Weight	18kg	

Ordering Info

ALS-R60-8	ADSL Line Splitter Rack, for CO application, w/wire wrap and IDC 68pins cable connections
ALS-R60 32P-11 Card	ADSL Line Splitter Card, 32 Loops, 900 ohm, 8KHz

ADSL Splitter Series
ALS-P10

ADSL MDF Type Splitter

The ALS-P10 filters can be directly plugged into the existing terminals of the CO one by one, as needed, thus eliminating need for extra terminal blocks and cabling. This leads to lower costs compared with ordinary splitters, which require operators to install large splitter racks and equipment awaiting presumable future use. With Siemens/ Krone type terminals, no extra cabling or terminal blocks are needed at all; with Krone LSA Plus terminals only minor new cabling are needed. The plug type filters are easy to install onto the terminal blocks; no tools are needed.

Filters act like disconnection plugs: the contacts inside the terminal are disconnected and the filter connects in series to the pair. Individual filters can be plugged adjacent to each other and they don't block neighboring pairs from insertion of new wires. Thus ADSL can be connected to subscribers independently, which is an asset. The plug type splitter requires the space of two pairs of LSA Plus terminal block.
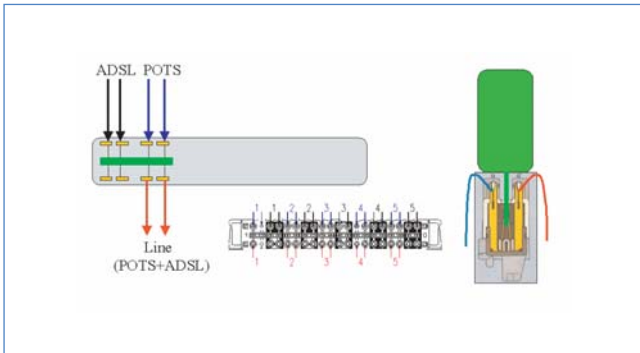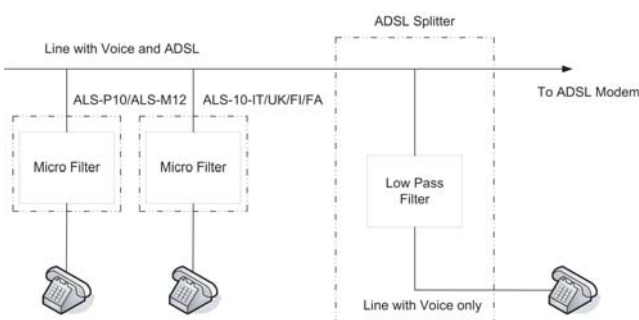
Features

- Individual splitter
- Integrates directly in MDF, no racks required
- Minimum number of contact points
- POTS service available with splitter removed (make-before-break)
- Various splitter designs available (POTS, ISDN, ...)
- Tinned Krone LSA Plus test plug reed connectors

Specifications

Filter Type	Low pass	corner freq. 7kHz (±1kHz), optimal matching 600ohms, DC path max. 100mA
	High pass	corner freq. 22kHz (±2kHz), optimal matching 135ohms, no DC path
Over voltage	Filter adapted to POTS voltages (max.±200V)	
Dimensions(WxDxH)	18mm x 104mm x 20mm	
Weight	45g	

Application

Ordering Info

ALS-P10	ADSL MDF Type Splitter

IP Surveillance
Fiber Series
PDH Series
4 Broadband Access
EoCoax
Measurement
Interface Converter
Datacom Accessories
Network Management

ADSL Splitter Series
ALS-12/ ALS-M12

ADSL Splitter and Micro Filter

The ALS-12/ ALS-M12 are low-cost, compact, passive low-pass filters designed to provide POTS (Plain Old Telephone System) service to a line that is utilizing ADSL/VDSL technology. This device is designed to eliminate interference to POTS equipment by blocking high frequency energy (20 KHz~12MHz).
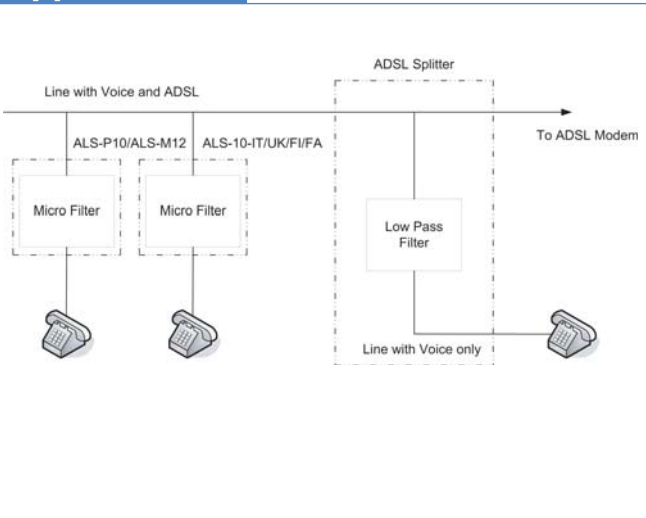
ALS-12

ALS-M12

Features

- Compact size
- Consists exclusively of all passive elements
- Designed for implementation of ADSL CPE application
- Handles all POTS loop current from 0mA to 100mA
- If the power supply or ATU-C/ATU-R fails, telephone service on the ADSL line will operate normally
- Provides excellent isolation between DSL and POTS
- The POTS splitter at remote end shall provide the RJ-11 connector for ATU-R/VTU-R line interface
- The POTS splitter and Low-pass filter shall provide the RJ-11 connectors for ADSL/VDSL line interfaces as well as POTS interface of splitter/Low-pass filter at remote end

Application

Line with Voice and ADSL

ALS-P10/ALS-M12   ALS-10-IT/UK/FI/FA

ADSL Splitter

Micro Filter   Micro Filter   Low Pass Filter

To ADSL Modem

Line with Voice only

Specifications

Standard	Annex E.2 of ITU-T G.992.3	
Impedance	600 Ohms	
Insertion Loss	1004Hz short loop	1dB
	1004 Hz Long loop	0.75dB
Attenuation distortion	200 to 3.4Khz short loop	-1.5 — 1.5dB
	3.4 to 300KHz short loop	-2 — 2dB
	200 to 3.4KHz long loop	-1.5 — 0.5dB
	3.4 to 300KHz long loop	-1.5 — 1dB
Cut off frequency	-3dB	10KHz
ADSL band Attenuation	30 — 300KHz	65dB
	300 — 1104KHz	55dB
Delay Distortion	600 — 3.2KHz	200us
	200 — 4KHz	250us
Return Loss	ERL	6dB
	SRL-L	5dB
	SRL-H	3dB
Common Mode Rejection Ration	600 — 3.2KHz	-100dB
DC Resistance	20Ohms	
Isolation resistance to	5MOhms	
Longitudinal	200 — 1KHz	58dB
	1 — 3KHz	53dB
DC Current carrying capacity	100mA	
Environment	Temperature	-10 — 70°C (Operating); -15 — 80°C (Storage)
	Humidity	0 — 90% non condensing
Dimensions(WxDxH)	ALS-12	45mm x 34mm x 24mm
	ALS-M12	45mm x 34mm x 24mm
Weight	ALS-12	70g
	ALS-M12	70g

Ordering Info

ALS-12	ADSL Line Splitter for ADSL/VDSL CPE application, 600 ohm, 8K Hz , DSL is RJ-11
ALS-12-C	ADSL Line Splitter with surge protector for ADSL/VDSL CPE application, 600 ohm, 8K Hz , DSL is RJ-11
ALS-M12	The ADSL/ VDSL micro Filter

IP Surveillance

Fiber Series

PDH Series

4 Broadband Access

EoCoax

Measurement

Interface Converter

Datacom Accessories

Network Management

ADSL Splitter

ADSL Splitter Series
ALS-M10-IT/UK/FI/FA

Regional ADSL/VDSL Splitters and Micro Filter

The ALS-10-IT/UK/FI/FA are low-cost, compact, passive low-pass filter designed to provide POTS (plain Old Telephone System) service to a line that utilizing ADSL technology. This device is designed to eliminate interference to POTS equipment by blocking high frequency energy (20 KHz~1.1MHz).

ALS-M10-IT(ITALY)   ALS-M10-UK(UK)

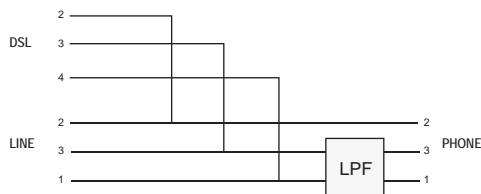ALS-M10-FI(Finland)   ALS-M10-FA(FRANCE)

Features

- Compact size
- Consists exclusively of all passive components
- Designed for implementation of ADSL/VDSL CPE application
- Handles all POTS loop current from 0mA to 100mA
- If the power supply or ATU-C/ATU-R fails, telephone service on the ADSL line will operate normally
- Provides excellent isolation between DSL and POTS
- The POTS splitter at remote end shall provide the RJ-11 connector for ATU-R/VTU-R modem interface
- The POTS splitter and Low-pass filter shall provide the Regional connectors for ADSL/VDSL line interfaces as well as POTS interface of splitter/Low-pass filter at remote end
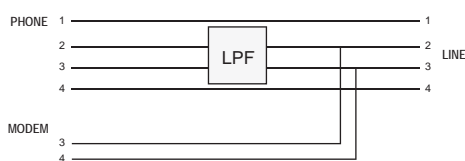
ALS-M10-IT/ UK/ FI

DSL 2 3 4
LINE 2 3 1
LPF
PHONE 2 3 1

ALS-M10-FA

PHONE 1 2 3 4
LPF
LINE 1 2 3 4
MODEM 3 4

Specifications

Standard	Annex E.2 of ITU-T G.992.3	
Impedance	600 Ohms	
Connector	RJ-11	
Insertion Loss	1004Hz short loop	1dB
	1004 Hz Long loop	0.75dB
Attenuation distortion	200 to 3.4Khz short loop	-1.5 — 1.5dB
	3.4 to 300KHz short loop	-2 — 2dB
	200 to 3.4KHz long loop	-1.5 — 0.5dB
	3.4 to 300KHz long loop	-1.5 — 1dB
Cut off frequency	-3dB	12KHz
ADSL band Attenuation	30KHz	-25dB
	50KHz	-40dB
Delay Distortion	600 — 3.2KHz	200us
	200 — 4KHz	250us
Return Loss	ERL	6dB
	SRL-L	5dB
	SRL-H	3dB
Common Mode Rejection Ration	600 — 3.2KHz	-100dB
DC Resistance	20Ohms	
Isolation resistance to	5MOhms	
Longitudinal	200 — 1KHz	58dB
	1 — 3KHz	53dB
DC Current carrying capacity	100mA	
Environment	Temperature	-15 — 70°C (Operating); -10 — 80°C (Storage)
	Humidity	15 — 90% non condensing
Compliance	ITU-T K.21	

Ordering Info

ALS-10-IT	Italy standard ADSL Splitter
ALS-10-UK	UK standard ADSL Splitter
ALS-10-FI	Finland standard ADSL Splitter
ALS-10-FA	France standard ADSL Splitter

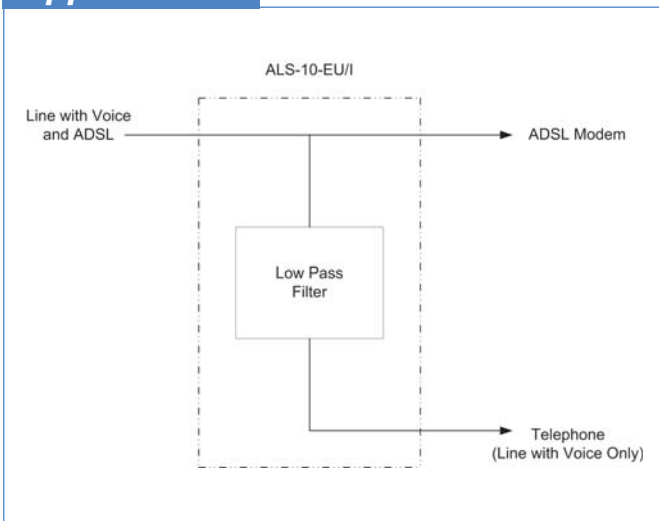## ADSL Splitter Series
ALS-10-EU/I

ADSL ISDN Splitter

The ALS-10-EU/I is a low-cost, compact, designed to implement the functionality of low pass filter in ISDN-BA with 2B1Q or 4B3T baseband linecodes over ADSL application. It integrates low pass filters that block the high frequency energy from reaching the ISDN-BA device and provide isolation from impedance effects of the ISDN-BA device on ADSL. Because the ISDN splitter connects directly to the subscriber loop media, it must also provide some protection for externally induced line hits or faults which could damage any attached equipment or endanger humans interacting with the installed equipment.

The circuit protection will be provided mostly by standard central office line protection means and additional protection measures built into splitter to protect against line overstress which could damage the splitter itself. The electrical and transmission specification is based on ETSI TS 101 952-1-3 V1.1.1 for ISDN-BA requirements.

Features

- Consists exclusively of all passive components
- Designed for implementation of ADSL CPE application
- Handles all ISTN loop current from 0 to 60 mA
- If the power supply or ATU-C/ATU-R fails, telephone service on the ADSL line will operate normally
- Provides excellent isolation between DSL and ISDN

Application

Specifications

Standard	ETSI TS 101-952-1-3 V.1.1.1	
Impedance	135/ 150 Ohms	
Isolation	Wire A to B	5 Mohms
	DC resistance	12.5 Ohms
Insertion loss	1 — 40KHz	0.8dB
	40 — 80KHz	2dB
	1 — 60KHz	1.2dB
	60 — 80KHz	2dB
Insertion loss in ADSL band	150 — 1104KHz	65dB
Insertion loss between ADSL port to LINE port	120 — 170KHz	2dB
	170 — 1104KHz	1dB
Return loss at ISDN port	1 — 40KHz	16dB
	40 — 80KHz	14dB
	1 — 60KHz	16dB
	60 — 80KHz	14dB
Unbalance about earth	300 — 30KHz	40dB
	30 — 1104KHz	46dB
	1104KHz — 3MHz	40dB
Group delay distortion	300 — 80KHz	20us
Environment	Temperature	-10 — 60°C (Operating); -10 — 80°C (Storage)
	Humidity	15 — 90% non condensing
Dimensions(WxDxH)	56mm x 86mm x 26mm	
Weight	70g	
Compliance	Annex E.2 of ITU-T G.992.1	

Ordering Info

ALS-10-EU/I	European standard ADSL Splitter for ISDN

ADSL Modem Series
ATU-R150

ADSL2+ Bridge/ Router Modem

The new standards ADSL 2 and ADSL 2+ provide greater reach and higher data rates. The two technologies were developed side by side, and are downwardly compatible with the existing G.992.1 ADSL standard. ADSL 2+ (G.992.5) brings ADSL access to users who until now were located too far from the operator's central office. The increased reach is possible because of new modulation techniques in conjunction with improved error correction through trellis coding.

Essentially an upgrade to traditional ADSL technologies, ADSL 2+ brings the possibility of multi-megabit bandwidth and greater reach for broadband services,meaning easy deployment and expansion into rural areas, where coverage is low. With up to 24 megabit connections possible, mass-market applications such as video on demand, premium access and networked gaming are improved tremendously.

Features

- Texas Instruments Chip solution
- ADSL/ADSL2/ADSL2+ supported
- All Digital Loop ADSL supported
- Comprehensive Firewall & Security Function
- Cost-effective sharing of a single DSL connection
- Ethernet supported for LAN connection
- Reach Extended ADSL2 (READSL2) supported
- UPnP NAT Traversal & Device Identification supported
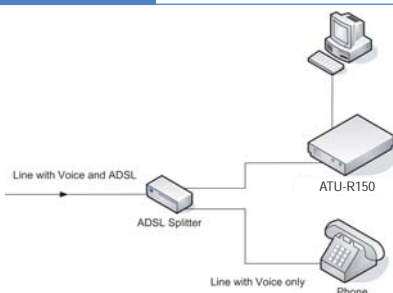- Web-based interface for easy configuration

Specifications

General Specification		
Physical Interface	WAN	One ADSL line RJ-11 port
	LAN	One LAN RJ-45 port for 10/100M Ethernet LAN connection
Power	9VAC, AC Power Adapter for 110VAC or 220VAC	
Environment	Temperature	0 — 40°C (Operating); -20 — 70°C (Storage)
	Humidity	10 — 90%
Power Consumption	10W	
LEDs	INTERNET/PPP, PWR, WAN, LAN	
Dimensions(WxDxH)	145mm x 175mm x 34mm	
Weight	230g	
Compliance	FCC Part 15, CE	

Specifications

Software Specifications	
ADSL Modem	ANSI T1.413 issue 2
	All Digital Loop ADSL
	G.994.1 (G.hs, Multimode)
	ITU-T G.992.1 (G.dmt)/ITU-T G.992.2 (G.lite)
	ITU-T G.992.3 (ADSL2 G.dmt.bis)/
	ITU-T G.992.4(ADSL2.G.lite.bis)
	ITU-T G.992.5 (ADSL2+, Annex A, B, I, J, L & M)
PPP supports	PPP over ATM PVC (RFC2364)
	PPP over Ethernet (RFC2516)
	PPP authentication:PAP, CHAP & MS-CHAP
Security	Demilitarized Zone (DMZ) Management
	Utility Password-protected
	Deny of Service (DoS) protection
	Firewall with NAT
	Packet Filtering ; Content Filtering
	Stateful Packet Inspection (SPI) firewall
	VPN pass through (IPsec, PPTP)
ATM Attributes	Adaptation Layers AAL5, AAL2 and AAL0 are supported
	OAM F4/F5 loop back
	Up to 8 PVCs
Bridge Mode	Bridge Filtering
	IEEE 802.1D transparent bridging
	RFC 1483 Bridge
Router Mode	DHCP (RFC1541) Server, Relay and Client
	DNS relay/ IGMP v1 and v2/ ToS supported
	Network Address Translation (NAT)/ Network Address Port Translation (NAPT)
	RFC 1483 Route/ IPoA (RFC1577)
	RIP 1 & 2 supported
Regulatory Approvals	FCC Part 15 ; FCC Part 68, CE, LVD (upon customer's request)
Quality of Service (QoS)	Constant Bit Rate (CBR), Real-Time Variable Bit Rate (VBR-rt), Non-Real-Time Variable Bit Rate (VBR-nrt) and Unspecified Bit Rate (UBR)
Management	Remote/ local configuration & management through SNMP v1/v2, web and telnet
	Firmware upgrade and reset to default via Web management

Application

Line with Voice and ADSL

ATU-R150

ADSL Splitter

Line with Voice only   Phone

Ordering Info

ATU-R150A	ADSL2/2+ Bridge/ Router Modem with RJ-11 & RJ-45, Annex-A
ATU-R150B	ADSL2/2+ Bridge/ Router Modem with RJ-11 & RJ-45, Annex-B

IP Surveillance

Fiber Series

PDH Series

4 Broadband Access

EoCoax

Measurement

Interface Converter

Datacom Accessories

Network Management

TDM Modem Series
SHRM03-E1/ V35/ ET100

G.SHDSL Modem Concentrator

The SHRM03 offers three different ways to connect customers over high-speed DSL services; TDM based G.703 E1, TDM based serial DCE port or TDM based Ethernet Bridge. The SHRM03 is equipped with an adaptive 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 by the ability to manually set the maximum speed at different levels for different customer-tailored service offerings. This Rack is 100% compatible with our SHDTU03 standalone CPE modem.

Features

- All interface connectors on the rear panel
- Central solution in standard 19 inch rack
- Downloadable software for easy upgrade
- E1 and fractional E1 capable
- Each line card supports two channels of single pair (two-wire) for E1/Datacom/Ethernet solution N x 64k rate selectable from 64kbps to 2.304Mbps
- Hot swappable cards and redundant (optional) power supplies
- Menu oriented console screens for ease of use
- Optional SNMP network management system card
- Up to 13 cards (26 loops) can be installed + 1 SNMP card

Specifications

General Specification		
Power	AC 100V/ 220V, DC -48V	
Environment	Temperature	0 — 50°C (Operating); 20 — 70°C (Storage)
	Humidity	5% — 90% non-condensing
Power Cunsumption	100W	
Dimensions(WxDxH)	438 x 285 x 180mm	
Weight	6.5kg	

E1 Specifications		
Line code	HDB3/ AMI	
Data rate	64 — 2048kbps	
Operation	Full or Fractional	
Impedance	120 ohms balanced/ 75 ohms unbalanced	
Framing	Structured with or without CRC-4	
Timing	Internal clock or G.703 recovery	
Jitter performance	ITU-T G.823	
Connectors	BNC for unbalanced, 5 pin wire connector or RJ-45 for balanced	
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
Ethernet Interface Specifications		
Standard	IEEE 802.3/IEEE 802.3u	
Encapsulation	Raw HDLC	
packet size	maximum 1536	
SHDSL Interface Specifications		
Standard	ITU-T G.991.2	
Line code	16 level Trellis coded PAM	
Data rate	64kbps — 2.304Mbps	
Support	ANSI (Annex A) and ETSI (Annex B)	
Datacom Interface Specifications		
Data Rate	64kbps — 2304kbps	
Connectors	HD26 (cable adapters available)	
Timing	Internal, External	

Specifications - Software

Software Specifcation		
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	
	Current 24-hour period and 7 previous 24-hour periods of SHDSL and E1 performance parameters	
Diagnostic	E1 line loopback	
	V.54 loopback	
	Local SHDSL loopback	
	Remote SHDSL loopback	
	Remote payload loopback (Specifications are subject to change without notice)	
LEDs indication	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

Ordering Info

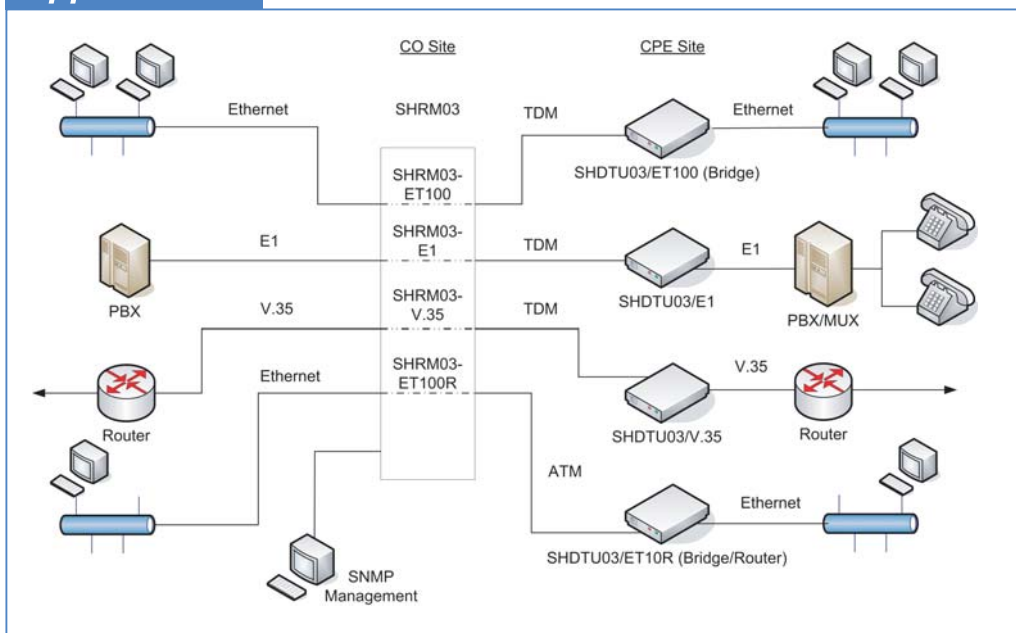**SHRM03-AC**   **SHRM03-SNMP**   **SHRM03-E1/2T**   **SHRM03-V35/2T**   **SHRM03-ET100/2T**

Rack Mount SHRM03 Chassis	
SHRM03-AA/CH	4U, 19" 14 slots Chassis for AC + AC Power
SHRM03-AD/CH	4U, 19" 14 slots Chassis for AC + DC Power
SHRM03-DD/CH	4U, 19" 14 slots Chassis for DC + DC Power
SHRM03-AC	AC100V, AC220V Power Module
SHRM03-SNMP	SNMP I/F card with MIB and Console cable

Optional Line Card	
SHRM03-E1/2T	G.SHDSL (2W) E1 (2 channels) TDM line card with E1 connector adapters
SHRM03-V35/2T	G.SHDSL (2W) V35 (2 channels) TDM line card
SHRM03-ET100/2T	G.SHDSL (2W) 10/100Base TX Bridge (2 channels) TDM line card with RJ-45 adapters

Application

IP Surveillance

Fiber Series

PDH Series

4 Broadband Access

EoCoax

Measurement

Interface Converter

Datacom Accessories

Network Management

TDM Modem Series
SHDTU03-E1

E1 SHDSL Modem

The SHDTU03-E1 connects customers to high-speed G.703 E1 services via TDM based G.SHDSL at up to 2.048Mbps. The SHDTU03-E1 is configured and managed via a menu-driven VT-100 compatible asynchronous terminal interface on RS-232. The SHDTU03-E1 acts as either a CO or CPE in point-to-point applications or as a CPE device when connected to our SHRM03 TDM based rack.

Features

- Adaptive rate installation maximizes data rate based on loop conditions
- Bandwidth guaranteed transmission equipment
- Can operate in back to back configurations
- Efficient single wire pair usage
- Fast and cost-effective provisioning of traditional or TDM leased line services
- Local management interface with LCD display
- Raw and time stamped statistics
- Remote loopback
- SHDSL Line performance monitoring
- Standard G.SHDSL (ITU G.991.2) support for improved reach/ speed and greater interoperability
- Use existing copper loop infrastructures
- Up to 2.048Mbps symmetrical service bit rate

Specifications

Line Rate	SHDSL per ITU G.991.2	
Coding	Trellis coded pulse amplitude modulation	
Support	ANSI (Annex A) and ETSI (Annex B)	
Payload rates	192kbps to 2.048Mbps	
Connector	RJ-45	
Framing	G.703/G.704 (unframed / framed) CRC 4 enable/disable	
DSL Timing	Network (Recovery)/ Internal/ DTE	
G.703 Interface	RJ-48C for E1(120ohms) & BNC for E1 (75 ohms)	
Loopback	Local Loopback/ Digital Loopback Remote Loopback/ Built-in bit error rate tester	
Performance Monitoring	ES, SES, UAS, Alarms, Errors for E1/T1*, SHDSL Threshold Crossing Notification	
Power	AC	90 — 240VAC
	DC	-48VDC
Environment	Temperature	0 — 50°C (Operating); 20 — 70°C (Storage)
	Humidity	5% — 90% non-condensing
Power Cunsumption	10W	
Dimensions(WxDxH)	19.5cm x 16.8cm x 4.8cm	
Weight	850g	
Compliance	CE, FCC	

Application

Ordering Info

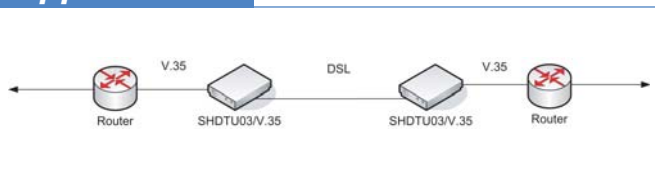|	
SHDTU03-E1/2T-AC	G.703 E1 interface, LCD panel & AC Type
SHDTU03-E1/2T-DC	G.703 E1 interface, LCD panel & DC Type

TDM Modem Series
SHDTU03-V35

Datacom SHDSL Modem

The SHDTU03-V35 connects customers to high-speed data communication services via TDM based G.SHDSL at up to 2.304Mbps. The SHDTU03-V35 is configured and managed via a menu-driven VT-100 compatible asynchronous terminal interface on RS-232. The SHDTU03-V35 acts as either a CO or CPE in point-to-point applications or as a CPE device when connected to our SHRM03 TDM based rack. This modem is equipped with an adaptive rate capability that identifies the maximum line rate supported by the copper loop. This powerful feature makes installation and service provisioning simple and painless.

Features

- Adaptive rate installation maximizes data rate based on loop conditions
- Bandwidth guaranteed transmission equipment
- Can operate in point-to-point configurations
- Efficient single wire pair usage
- Fast and cost-effective provisioning of traditional TDM leased line services
- Local management interface with LCD display
- Raw and time stamped statistics
- Remote loopback
- SHDSL Line performance monitoring
- Standard G.SHDSL (ITU G.991.2) support for improved reach/ speed and greater interoperability
- Use existing copper loop infrastructures
- Up to 2.304Mbps symmetrical service bit rate

Application

Specifications

Line Rate	SHDSL per ITU G.991.2	
Coding	Trellis coded pulse amplitude modulation	
Support	ANSI (Annex A) and ETSI (Annex B)	
Payload rates	192kbps to 2.304Mbps	
Connector	RJ-45	
DSL Timing	Network (Recovery)/ Internal/ DTE	
Loopback	Local Loopback/ Digital Loopback	
	Remote Loopback/ Built-in bit error rate tester	
Performance Monitoring	ES, SES, UAS, Alarms, SHDSL Threshold Crossing Notification	
Power	AC	90 — 240VAC
	DC	-48VDC
Environment	Temperature	0 — 50°C (Operating); 20 — 70°C (Storage)
	Humidity	5% — 90% non-condensing
Power Cunsumption	10W	
Dimensions(WxDxH)	19.5cm x 16.8cm x 4.8cm	
Weight	850g	
Compliance	CE, FCC	

Ordering Info

SHDTU03-V35/2T-AC	G.703 V.35 interface, LCD panel & AC Type with DB25 Male to MB34 Female
SHDTU03-V35/2T-DC	G.703 V.35 interface, LCD panel & DC Type with DB25 Male to MB34 Female
SHDTU03-X.21/2T-AC	G.703 X.21 interface, LCD panel & AC Type with DB25 Male to DB15 Female Cable
SHDTU03-X.21/2T-DC	G.703 X.21 interface, LCD panel & DC Type with DB25 Male to DB15 Female
SHDTU03-449/2T-AC	G.703 449 interface, LCD panel & AC Type with DB25 Male to DB37 Female Cable
SHDTU03-449/2T-DC	G.703 449 interface, LCD panel & DC Type with DB25 Male to DB37 Female Cable
SHDTU03-530/2T-DC	G.703 530 interface, LCD panel & AC Type with DB25 Male to DB25 Female Cable
SHDTU03-530/2T-DC	G.703 530 interface, LCD panel & DC Type with DB25 Male to DB25 Female Cable

IP Surveillance

Fiber Series

PDH Series

4 Broadband Access

EoCoax

Measurement

Interface Converter

Datacom Accessories

Network Management

TDM Modem Series
SHDTU03-ET100

Ethernet SHDSL Modem

The SHDTU03-ET100 connects customers to Ethernet Bridging via TDM based G.SHDSL at up to 2.304Mbps. The SHDTU03-ET100 is configured and managed via a menu-driven VT-100 compatible asynchronous terminal interface on RS-232. The SHDTU03-ET100 acts as either a CO or CPE in point-to-point applications or as a CPE device when connected to our SHRM03 TDM based rack. This modem is equipped with an adaptive rate capability that identifies the maximum line rate supported by the copper loop. This powerful feature makes installation and service provisioning simple and painless.

Features

- Adaptive rate installation maximizes data rate based on loop conditions
- Bandwidth guaranteed transmission equipment
- Can operate in point-to-point configurations
- Efficient single wire pair usage
- Fast and cost-effective provisioning of traditional frame relay (FR or T-HDLC) or TDM leased line services
- Local management interface with LCD display
- Raw and time stamped statistics
- Remote loopback
- SHDSL Line performance monitoring
- Standard G.SHDSL (ITU G.991.2) support for improved reach/speed and greater interoperability
- Use existing copper loop infrastructures
- Up to 2.304Mbps symmetrical service bit rate

Specifications

Line Rate	SHDSL per ITU G.991.2	
Coding	Trellis coded pulse amplitude modulation	
Support	ANSI (Annex A) and ETSI (Annex B)	
Payload rates	192kbps to 2.304Mbps	
Connector	RJ-45	
DSL Timing	Network (Recovery)/ Internal/ DTE	
Loopback	Local Loopback/ Digital Loopback	
	Remote Loopback/ Built-in bit error rate tester	
Performance Monitoring	ES, SES, UAS, Alarms, SHDSL Threshold Crossing Notification	
Power	AC	90 — 240VAC
	DC	-48VDC
Environment	Temperature	0 — 50°C (Operating); 20 — 70°C (Storage)
	Humidity	5% — 90% non-condensing
Power Cunsumption	10W	
Dimensions(WxDxH)	19.5cm x 16.8cm x 4.8cm	
Weight	850g	
Compliance	CE, FCC	

Ordering Info

SHDTU03-ET100/2T-AC	10/100 Base-T Ethernet interface, LCD panel & AC Type
SHDTU03-ET100/2T-DC	10/100 Base-T Ethernet interface, LCD panel & DC Type

Application

G.SHDSL Modem

G.SHDSL.bis Modem
SHDTU03b
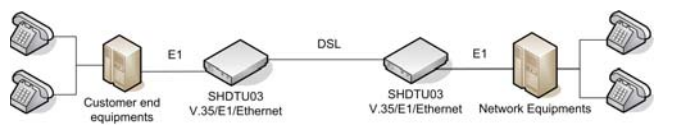
2/4-wire G.SHDSL.bis Modem

The CTC SHDTU03b series SHDSL.bis is a telecommunication product for carriers or SME users. In one device, it offers three DTE interfaces (E1, V.35, and Ethernet), which can work simultaneously to share the DSL bandwidth. This user-configurable interface during the installation provides a flexible design for various connections.

The SHDSL.bis supports two different connectors on G.703 E1 application, which provide the connection to TDM services (either balanced 120Ω RJ45 jack or unbalanced 75Ω dual BNCs) by the bit rate from 64kbps to 2.048Mbps. As a V.35 interface application, it links to high-speed TDM services by a DB25 interface, which can work as V.35 or RS-530/V.36/X.21 (factory setting) connection. The data rate of DB25 interface is up to 5.696Mbps within one pair copper wires and 8.192Mbps within two pairs copper wires. The SHDSL.bis provides the 10/100Mbps auto-detected Fast Ethernet by a RJ45 connector, which offers customer premise from LAN to high-speed TDM services. The SHDSL.bis can be configured and managed via EOC, or menu-driven VT100 compatible Asynchronous Terminal Interface, either locally or remotely.

Fiber Series

PDH Series

4

Broadband Access

EoCoax

Measurement

Interface Converter

Datacom Accessories

Network Management

Features

- Standard ITU G.991.2 (2004) supports improvement on reach, speed and interoperability compared to conventional G.shdsl devices
- Fast and cost-effective services of voice, TDM leased line, or LAN
- Efficient usage of single wire pair on existing copper loop infrastructures
- Supports all DTE interfaces working simultaneously on point to point connection.
- Wetting current sink to protect SHDSL.bis line (optional)
- 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

Application

Ordering Informations

SHDTU03b-E1	2/4-wire G.SHDSL.bis modem with E1 interface
SHDTU03b-V.35	2/4-wire G.SHDSL.bis modem with V.35 interface
SHDTU03b-ET100	2/4-wire G.SHDSL.bis modem with LAN (RJ-45) interface
SHDTU03b-EVL	2/4-wire G.SHDSL.bis modem with E1/V.35/LAN multiple interfaces

General Specifications

Jitter and Wander	Meets G.823 & G.824 requirements	
Wetting Current	Maximum 20mA for DSL loops	
DSL Timing	Network (Recovery)	
	Internal/ DTE	
	From E1 Recovery (as E1)/From DTE (as V.35)	
Loopback	Local Loopback	
	Digital Loopback (as E1&V.35 only)	
	Remote Loopback	
	Far-end Loopback (as E1&V.35 only)	
	V.54 Loopback (as V.35 only)	
	Built-in bit error rate tester (as E1&V.35 only)	
Management	Configuration with keypad and LCD display	
	Console port (RJ-45, RS-232)	
	Support firmware upgrade	
Performance Monitoring	ES, SES, UAS, Alarms,	
	Error for SHDSL.bis or E1 (as E1 application)	
Power	AC	90 ~ 240VAC@50 ~ 60Hz
	DC	-48VDC
Environment	Temperature	-5 ~ 60°C
	Humidity	5 ~ 90% non-condensing
Power Cunsumption	10W	
Dimensions	19.5cm x 16.8cm x 4.8cm (WxDxH)	
Weight	850g	
Compliance	CE, FCC	
Surge Immunity	L1:L2 1KV ; L1/L2:PE 2KV	
Lighting	4KV	
External screw for frame ground		

Specifications

Network Interface	
Line Rate	SHDSL.bis per ITU G.991.2 (2004)
Coding	TC-PAM16, TC-PAM32
Support	Annex A, B, F & G
Payload rates	up to 5.969Mbps (N x 64Kbps, N=3 to 89) within one pair
	up to 11.392Mbps (N x 64Kbps, N=3 to 89) within two pairs
Connector	RJ-45
Protection	ITU-T K.20/K.21
G. 703 Interface (as E1 interface)	
Line Rate	2048KHz +/- 50ppm
Line Code	HDB3/AMI
Framing	PCM30/30C/31/31C and Unframed
Data rates	64Kbps to 2.048Mbps (N x 64Kbps, N=1 to 32)
Operation	Full E1 or Fractional E1
Impedance	RJ-45 for balance 120 ohm ; BNC for unbalance 75 ohm
DTE Interface (as V.35 interface)	
Payload rates	up to 5.969Mbps (N x 64Kbps, N=3 to 89) within one pair
	up to 8.192Mbps (N x 64Kbps, N=3 to 128) within two pairs
Support	V.35 or RS-530/V.36/X.21 (need factory setting)
Connector	DB25 female connector
LAN Interface (as Ethernet Bridge interface)	
Support	IEEE 802.3/802.3u 10/100Base-T/TX ,
	IEEE 802.1D STP BPDU forwarding,
	IEEE 802.1P QoS and 802.1Q VLAN transparency
Data rates	10/100Mbps, half/full duplex,
	auto-sensing, auto crossover
MAC address	up to 1024 MAC address learning, filtering bridge
Connector	RJ-45 Jack

ATM Modem Series

SHRM03-ET100R

G.SHDSL Modem Concentrator

The SHRM03 ATM based line card rack 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 provisioning and management. This rack is 100% compatible with our SHDTU03/ET10R and ET10RS standalone cpe modems.

SHRM03-ET100R Line Card

Features

- All interface connections on the rear panel
- Central solution in 19" rack
- Software upgrade via TFTP or Web interface
- IP based in-band management
- Each card supports two channels of single pair (two wire) for Ethernet Bridging or Routing solution at nx64 rates up to 2.304Mbps.
- Hot swappable cards and redundant (optional) power supplies
- Web browser screens for easy use
- SNMP agent embedded in each channel
- Up to 13 cards (26 loops) may be placed in one rack

Specifications

General Specification		
Power	AC 100V/ 220V, DC -48V	
Environment	Temperature	0 — 50°C (Operating); 20 — 70°C (Storage)
	Humidity	5% — 90% non-condensing
Power Consumptin	100W	
Dimensions (WxDxH)	438 x 285 x 180mm	
Weight	6.5kg (empty chassis)	

Ordering Info

Rack Mount SHRM03 Chassis	
SHRM03-AA/CH	4U, 19" 14 slots Chassis for AC + AC Power
SHRM03-AD/CH	4U, 19" 14 slots Chassis for AC + DC Power
SHRM03-DD/CH	4U, 19" 14 slots Chassis for DC + DC Power
SHRM03-AC	AC100V, AC220V Power Module
SHRM03-ET100R	G.SHDSL (2loop/2W) 10/100Base-T Ethernet Router and Bridge (2 channels) ATM Base Line card

Specifications - SHRM03-ET100R

Routing
DHCP server, client and relay (RFC2131/ 2132)
DNS relay and caching (RFC1034/ 1035)
IP multicast and IGMP proxy (RFC1112/ 2236)
IP routing with static routing and RIPv1/ RIPv2 (RFC1058/ 2453)
NAT ALGs for ICQ/ Netmeeting/ MSN/ Yahoo Messenger
Network address translation (NAT/ PAT) (RFC1631)
Support IP/TCP/UDP/ARP/ICMP/IGMP protocols

Bridging
IEEE 802.1D transparent learning bridge
IEEE 802.1Q VLAN
Spanning tree protocol

Security
Advanced Stateful packet inspection (SPI) firewall (Optional Firewall Router)
Application level gateway for URL and keyword blocking (Firewall Router)
DMZ host/ Multi-DMZ/Multi-NAT function
Natural NAT firewall
User access control: deny certain PCs access to Internet service (Firewall Router)
Virtual server mapping (RFC1631)
VPN pass-through for PPTP/ L2TP/ IPSec tunneling

Management
Easy-to-use web-based GUI for quick setup, configuration and management
Menu-driven interface/Command-line interface (CLI) for Telnet access
Password protected management and access control list for administration
SNMP management with SNMPv1/ SNMPv2 (RFC1157/ 1901/ 1905) agent and MIB II(RFC1213/ 1493)
Software upgrade via web-browser/ TFTP server

ATM
AAL5
OAM F5 AIS/RDI and loopback
Up to 8 PVCs

ATM QoS
CBR (Constant bit rate)
UBR (Unspecified bit rate)
VBR-rt (Variable bit rate real-time)
VBR-nrt (Variable bit rate non-real-time)

AAL5 Encapsulation
Classical IP over ATM (RFC 1577)
Ethernet over ATM (RFC 2684/1483)
PPP over ATM (RFC 2364)
VC multiplexing and SNAP/LLC

PPP
PPP over ATM for fixed and dynamic IP (RFC 2364)
PPP over Ethernet for fixed and dynamic IP (RFC 2516)
User authentication with PAP/CHAP/MS-CHAP

ATM Modem Series
SHDTU03-ET10R/ SHDTU03F-ET10R
SHDTU03A-ET10RS/ SHDTU03AF-ET10RS

2-Wire/ 4-Wire SHDSL Router with single port or 4-port Switching Hub

The SHDTU03 ATM modem series are G.SHDSL2-wire/ 4-wire routers which comply with G.991.2 standards. The SHDTU03 family provides business-class, multi-range 64Kbps to 2.304/4.608Mbps payload rates over exiting single pair or two pairs copper wire. The SHDTU03, SHDSL router, 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 router allows customers to leverage the latest in broadband technologies to meet their growing data communication needs.

Features

- Adaptive rate installation maximizes data rate based on loop conditions
- Bandwidth guaranteed transmission equipment
- Can operate in point-to-point configurations
- Efficient single wire pair usage
- Raw and time stamped statistics
- SHDSL Line performance monitoring
- Standard G.SHDSL (ITU G.991.2) support for improved reach/ speed and greater interoperability
- Use existing copper loop infrastructures
- Up to 2.304Mbps (2-wire) or 4.608Mbps (4-wire) symmetrical service bit rate

Specifications

General Specification		
Standard	G991.2	
LEDs	General	PWR
	WAN	LNK, ACT
	LAN	10M/ ACT, 100M/ ACT (1-port router)
	SHDSL	ALM
Power	DC	9VDC with AC adapter 110V/220V
Environment	Temperature	0 — 45°C (Operating); 20 — 70°C (Storage)
	Humidity	0% — 95% non-
Power Cunsumption	9W	
Dimensions(WxDxH)	18.7cm x 14.5cm x 3.3cm	
Weight	400g	
Compliance	CE, FCC	

Ordering Info

SHDTU03-ET10R	Standalone 2-wire SHDSL router with single Ethernet port
SHDTU03-ET10RS	Standalone 2-wire SHDSL router with 4-port switching HUB
SHDTU03F-ET10R	Standalone 2-wire SHDSL router with firewall protection and single Ethernet port
SHDTU03F-ET10RS	Standalone 2-wire SHDSL router with firewall protection and 4-port switching HUB
SHDTU03A-ET10RS	Standalone 4-wire SHDSL router with 4-port switching hub
SHDTU03AF-ET10RS	Standalone 4-wire SHDSL router with firewall protection and 4-port switching HUB

Application

Single port rear

4-port rear

IP Surveillance

Fiber Series

PDH Series

4 Broadband Access

EoCoax

Measurement

Interface Converter

Datacom Accessories

Network Management

ATM Bridge & Router Modem
SHDTU03b

.bis

2/4-wire G.SHDSL.bis Bridge/Router

SHDTU03b, G.SHDSL bis Router Family are G.SHDSL .bis (Symmetrical High Speed Digital Subscriber Loop) 2-wire/4-wire routers which comply with G.991.2 (2004) standards and with optional feature of a built-in four port 10Base-T /100Base-TX auto-negotiation and auto-MDIX switch. The SHDTU03b 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 pairs copper wire. SHDTU03b, G.SHDSL.bis router, 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 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 ports 10Base-T /100Base-T auto-negotiation and auto-MDIX switching ports may be configured for IEEE802.1Q VLAN or port based VLAN applications.

Features

- Standard G.SHDSL ITU-T G.991.2 (2004)
- Use existing copper loop infrastructures
- Can operate in back to back configurations
- SHDSL Line performance monitoring
- Local management interface via console port
- Intuitive Web based configuration
- Complies with UL 1950, FCC part 15 Class B, EN60950
- Raw and time stamped statistics
- Bandwidth guarantee transmission equipment

Specifications

General Specifications	
Supports	ITU-T 991.2 (2004), Annex A, B, F & G
Coding	TC-PAM 16, TC/PAM-32
Data Rate	Up to 5.696Mbps, N x 64Kbps (N=3 to 89, default value=89) with one pair ; Up to 11.392Mbps, N x 64Kbps (N=3 to 89, default value=89) with two pairs
Impedance	135 ohm
LED Indicators	General: Power, G.SHDSL: Link/Active, Ethernet: 1, 2, 3, 4, Alarm
Dimensions (WxHxD)	18.7 x 3.3 x 14.5 cm
Power	9VDC (via power adapter)
Power Consumption	9 Watts
Tempature	0~45ºC for operating ; 0~70ºC for storage
Hunidity	0~95% (non-condensing)
Memory	2MB flash memory, 8MB SDRAM
Ethernet	4-port switching hub (for ET10RS model), support 10/100Base-T/TX, auto-negotiation, auto-MDIX
WAN interface connetor	RJ-45
LAN interface connector	RJ-45 x 4 (for ET10RS model)
Console port	RS-232 (DB9F)

	SHDTU03bF-ET10R	SHDTU03bF-ET10RS	SHDTU03bAF-ET10RS
WAN	2-Wire	2-Wire	4-Wire
LAN	1	4	4
Auto-MDIX	None	Yes	Yes
Port-based VLAN	None	Yes	Yes
802.1q VLAN	1LAN / 8WAN	4LAN / 8WAN	4LAN / 8WAN
IP Precedence	Yes	Yes	Yes
Maximum Data Rate	5.7Mbps	5.7Mbps	11.4Mbps
Mininum Data Rate	192Kbps	192Kbps	384Kbps

Ordering Information

SHDTU03bF-ET10R	Stand-alone 2-wire G.SDHSL.bis router with firewall protection and single Ethernet port
SHDTU03bF-ET10RS	Stand-alone 2-wire G.SDHSL.bis router with firewall protection and 4-port switching HUB
SHDTU03bAF-ET10RS	Stand-alone 4-wire G.SDHSL.bis router with firewall protection and 4-port switching HUB

Data Rate - 1 Pair	Data Rate - 2 Pair	Range (Mile/Km)
192Kbps	384Kbps	4.35/7.0
384Kbps	768Kbps	3.73/6.0
512Kbps	1.024Mbps	3.54/5.7
768Kbps	1.537Mbps	3.25/5.25
1.024Mbps	2.048Mbps	2.93/4.8
1.536Mbps	3.072Mbps	2.7/4.35
2.304Mbps	4.608Mbps	2.44/4.0
3.072Mbps	6.144Mbps	2.17/3.5
3.52Mbps	7.04Mbps	2.05/3.3
4.096Mbps	8.192Mbps	1.86/3.0
4.608Mbps	9.216Mbps	1.68/2.7
5.056Mbps	10.112Mbps	1.62/2.6
5.696Mbps	11.392Mbps	1.3/2.1

*Above distance based on 26AWG twisted-pair wiring

Specifications - Software

Routing

Support IP/TCP/UDP/ARP/ICMP/IGMP protocols

DNS relay and caching (RFC1034/ 1035)

IP multicast and IGMP proxy (RFC1112/ 2236)

DHCP server (RFC2131/ 2132)

IP routing with static routing and RIPv1/ RIPv2 (RFC1058/ 2453)

NAT ALG (Application Layer Gateway) for ICQ/ Netmeeting/ MSN/ Yahoo Messenger

Network address translation and port address translation (NAT/ PAT) (RFC1631)

IP precedence (RFC 791) (for Firewall Router)

Bridging

IEEE 802.1D transparent learning bridge

IEEE 802.1Q Port-base VLAN (for 4-port swiching HUB models)

Security

DMZ host/ Multi-DMZ/Multi-NAT functions

Natural NAT firewall

Virtual server mapping (RFC1631)

VPN server pass-through for PPTP/ L2TP/ IPSec tunneling

Advanced Stateful packet inspection (SPI) firewall (for Firewall Router)

Application level gateway for URL and keyword blocking (for Firewall Router)

User access control: deny certain PCs access to Internet service (for Firewall Router)

Management

Easy-to-use web-based GUI for quick installation, configuration and management

Menu-driven interface/Command-line interface (CLI) for local console and Telnet access management

Password protected management and access control list for administration

SNMP management with SNMPv1/ SNMPv2 (RFC1157/ 1901/ 1905) agent and MIB II(RFC1213/ 1493)

Software upgrade via web-browser/ TFTP server

ATM

Up to 8 PVCs

ATM forum UNI3.1/UNI4.0

UBR/CBR/VBR-rt/VBR-nrt for QoS

AAL5 (ATM adeptation layer type 5)

OAM F5 AIS/RDI and loopback

AAL5 Encapsulation

Classical IP over ATM (RFC 1577)

Ethernet over ATM (RFC 2684/1483)

PPP over ATM (RFC 2364)

VC multiplexing and SNAP/LLC

PPP

PPP over ATM (RFC 2364)

PPP over Ethernet (RFC 2516)

User authentication with PAP/CHAP/MS-CHAP

Application

IP Surveillance

Fiber Series

PDH Series

4 Broadband Access

EoCoax

Measurement

Interface Converter

Datacom Accessories

Network Management

VDSL2 Bridge Modem
VDTU2A-301(V2MC)

VDSL2 to Ethernet Media Converter

VDTU2A-301(V2MC) is a Long Reach Ethernet media converter with one Ethernet port (RJ-45 connector) and one VDSL2 port. (RJ-45 connector) This model is a bridge mode modem, well accommodating VDSL2 (Very-high-data-rate Digital Subscriber Loop 2) technologies to extend Ethernet service over single-pair phone line. Supporting both symmetric and asymmetric transmission, it can reach up to 100/75 Mbps bandwidth (line rate) within 300M or 10/10 Mbps (line rate) for 1 Km long range connections. By providing ultra-high speed, *VDTU2A-301(V2MC)* makes your telephone line achieve its best performance than before. It has the advantage of minimum installation time (simply as plug-n-play) and minimum expense by allowing video streaming and data to share the same telephone pair without interference.

Features

■ Cost effective bridge function to connect two Ethernet LAN

■ Support flow control on Fast Ethernet port via PAUSE frame or Back Pressure

■ IEEE 802.1Q VLAN tag transparent

■ Easy installation via simple plug-and-play

■ Selectable CPE and CO mode via DIP switch:

■ Two working modes are built in the same unit, which keep the flexibility of installation and easy provision of service but lower inventory of service provider.

■ Selectable fast and interleaved mode:

■ Selectable target data rate

■ Selectable target SNR margin 9dB or 6dB

Specifications

LAN interface	
RJ-45 connector	
Complying with IEEE 802.3/802.3u/802.3x	
10/100Base-T/TX, Auto-Negotiation, Auto-MDI/MDI-X	
VDSL2 interface	
RJ-45 connector	
DMT encoding	
Complying with ITU-T G993.1/993.2	
On-board surge protection	
LED indicators	
LAN: Act/Link, 10/100Mbps, Half/Full Duplex	
VDSL: Power On/Off, CO/CPE, Idle/Trained/Link	
General Specifications	
Power Supply	DC single 12 Volt over 3.5mm DC jack
Power Consumption	4.2 Watt maximum
Temperature	0-50 ^{0} C (Operating)
	0-70 ^{0} C (Storage)
Humidity	20-80% non-condesing (Operating)
	10-90% (Storage)
Dimensions (LxWxH)	97mm x 73mm x 23mm

Application

Symmetric Mode						
Loop Distance	Packet Size		Line Rate		Data Rate	
Km	Upstream (packet/sec)	Downstream (packet/sec)	Upstream (Mbps)	Downstream (Mbps)	Upstream (Mbps)	Downstream (Mbps)
0	148810	127688	100	85.8	74.4	63.8
0.4	90225	97854	60.6	65.8	45.1	48.9
0.6	35905	52928	24.1	35.6	18	26.5
1	17414	34042	11.7	22.9	8.7	17
1.4	924	25828	0.6	17.4	0.5	12.9
1.6	808	22602	0.5	15.2	0.4	11.3
2	575	10768	0.4	7.2	0.3	5.4
2.4	229	9146	0.2	6.1	0.1	4.6
2.6	link down	link down	link down	link down	link down	link down

Un-Managed Platform
FMC-CH08
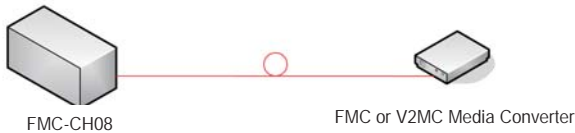
Un-Managed 8 Slots Media Converter Center

The FMC-CH08 is a 2U high 10" chassis that supports up to 8 non-managed FMC or V2MC media converters. The FMC-CH08 provides an economic solution in medium density fiber converter installations where no management features are required. Each FMC or V2MC converter is an independent Ethernet to fiber or Ethernet to copper media converter and 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 its 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 V2MC converters. The built in cooling fan ensures that temperatures in the rack remain within the tolerated working range.

Features

- 2U, 10 (or 19) inch RACK supports up to 8 FMC or V2MC units stand-alone units
- Chassis with single built-in power available in AC or DC models. Cross flow cooling fan built-in.
- Designed for rack mounting in single or tandem (2 chassis) configuration.

Application

FMC-CH08   FMC or V2MC Media Converter

Available Media Conveterts

FMC-10/100	10/100Base-T/TX to 100Base-FX (please see page 2-23)
FMC-1000E	10/100/1000Base-TX to 100Base-SX/LX (please see page 2-24)
FMC-1000ES	10/100/1000Base-TX to 100Base-SX/LX with SFP-LC slot (please see page 2-24)
FMC-10/100POF-O	10/100Base-T/TX to 100Base-FX, supports plastic optic fiber, optolock connector (please see page 2-26)
FMC-10/100POF-S	10/100Base-T/TX to 100Base-FX, supports plastic optic fiber, SMI connector (please see page 2-26)
VDTU2A-301 (V2MC)	VDSL2 to 10/100Base-T/TX (please see page 4-19)

Specifications

Temperature	0-50 ^{0} C (Operating)
	0-70 ^{0} C (Storage)
Humidity	20-80% non-condesing (Operating)
	10-90% (Storage)
Power Input	90-250VAC
	24VDC Input, 18-36VDC
	48VDC Input, 36-72VDC
Dimensions (LxWxH)	178.7mm x 251.6mm x 88mm
Power Input	＜40W (8-slot fully loades)
Compliance	FCC part 15, Subpart B, Class A,
	ANSI C 63.4:2003
	CE EN55022:2006, Class A
	EN55024:1998+A1:2001+A2:2003
	LVD:EN 60 950-1:2001
MTBF	65,000 h(25^{0}C)

Ordering Information

FMC-CH08-AC	8-slot Rack with Internal AC 100 - 240V
FMC-CH08-DC24	8-slot Rack with Internal DC 24V
FMC-CH08-DC48	8-slot Rack with Internal DC 48V

FMC-10/100POF-O

FMC-10/100POF-S

VDTU2A-301 (V2MC)

FMC-10/100

IP Surveillance

Fiber Series

PDH Series

4 Broadband Access

EoCoax

Measurement

Interface Converter

Datacom Accessories

Network Management

5. EOC (Ethernet over Coax)

Cable Modem

Extends New Services On The Same Coaxial Cable

VoIP

CATV

Ethernet

IP Camera

Coax Cable

EOC

Up to 32 subscribers over taps (splitters)

EOC10/20(Master Mode)

EOC21(Slave Mode)

* Extends Ethernet signals over the existing CATV cable
* Works over taps and splitters to provide Ethernet to up to 32 subscribers
* Ethernet VLAN & Bandwidth control support
* 160Mbps @ up to 800 meters (2,624 feet), reach down to 4Mbps
  @about 1.2Km (400 feet) transmission rate and distance (Better than VDSL2)

IP Surveillance

Fiber Series

PDH Series

Broadband Access

5

EoCoax

Measurement

Interface Converter

Datacom Accessories

Network Management

Ethernet over Coax Family

Ethernet Over Coax Series
EOC-10

Ethernet Extender over Coax Cable

The **EOC-10/11** is point-to-point EoC (Ethernet over Coax) solution that efficiently extends 10/100 Ethernet circuits to over 800 meters (2,624feet) at 160Mbps using existing coaxial cable. The **EOC-10/11** will allow Ethernet connectivity in existing facilities or homes without pulling extra cable. This is perfect solution for Ethernet on the factory floor where systems have been upgraded from slower serial communication to Ethernet networking. Installation is easy with a single switch setting. One end is set for local and the other remote. The **EOC-10/11** is used in Coaxial cable systems to extend Ethernet connectivity over existing CCD/CATV grade Coaxial cable.

Features

■ High-Speed up to 160Mbps communications link over existing Coaxial Cable, Symmetrical on EoCNA

■ 160Mbps@ up to 800 meters(2,624feet), reach down to 4Mbps @ about 1.2Km(4,000feet)

■ Operates transparently to high layer protocols such as TCP/IP

■ Auto-MDIX and auto-negotiation 10Base-T or 100Base-TX and Full or Half-Duplex on the Ethernet port

■ Plug and Play design for simple installation, single switch configuration

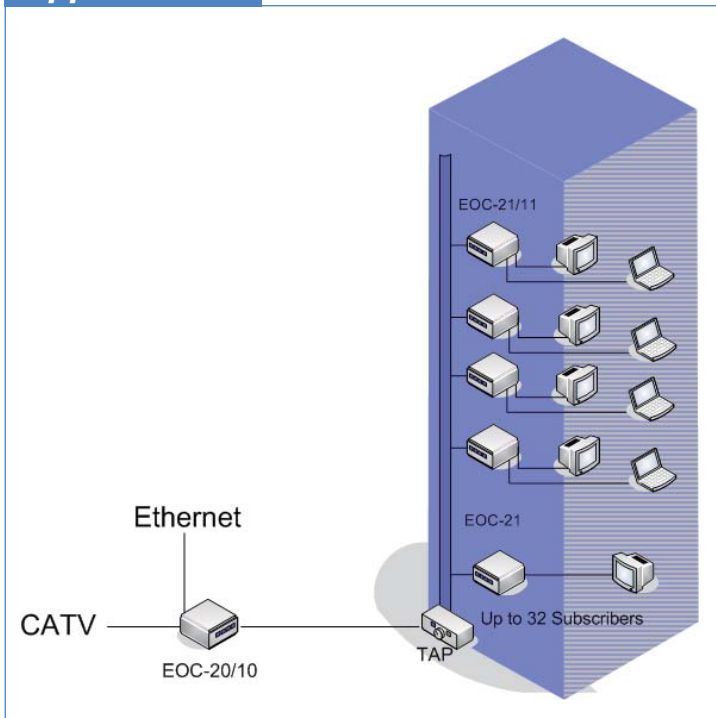■ Status LEDs for simple monitoring of the device and connection status

Application

■ Extend LAN connectivity to a remote site or between buildings

■ Connect Ethernet to different Room over existing home Coaxial infrastructure

■ Connect new controller technology on the factory floor using existing wiring

■ Extend Ethernet connectivity from a backbone network to an isolated location via Coaxial cable

■ Transmit Video and traffic controller information over existing Coaxial cable

Specifications

■ *Network Standards:*
ITU G.9954 Ethernet Over Coaxial Network (EoCNA)
IEEE802.3 10BASE-T, 10Mbit/s
IEEE802.3u 100BASE-TX, Fast Ethernet at 100Mbit/s, Auto-negoatiaton
IEEE802.3x Full Duplex and Flow Control

■ *Protocol:*
Transparent to higher layer protocols

■ *Connectors :*
Fast Ethernet One RJ45 Connector
Coax: Two F-Type Female Coax Connectors
      One for EoCNA, the other for TV

■ *Transmission Power and Spectrum:*
0 +/-0.5 dBm
12-28 MHZ

■ *Transmission Speed and Distance:*
Up to 160Mbps@800 meters ; reach down to 4Mbps @ about 1.2Km
Up to 4000 Feet (-176dBm/Hz Noise Floor)

■ *Fast Ethernet Interface:*
10/100 Mbps
MDI/MDI-X Auto Crossover

■ *Quality of Service:*
Priority Base on IEEE802.1p and TCP/UDP port
Guaranteed QoS base on Layer II Parameterized QoS

■ *Network Management:*
Diagnosis of EoCNA function
Secured/Isolated Communication between DEVs
Provision/Denial of Service

■ *Indicators:*
"Power" LED
EoCNA Link/Act, SyncMode LED
LAN Link/Act LED

■ *Environmental Conditions:*
Operating Temperature: 0C ~ 55C (32F~131F)
Storage Temperature: -10C ~ 65C (14F~149F)
Operating Humidity: 10% ~ 90%Non-condensing

■ *Power Requirement:*
External Power Supply: 5V DC
Power Consumption: < 3.25 WattsPhysical

■ *Dimension: 155mm(W) x 83mm(D) x 30mm(H)*

■ *Unit Weight: 300 g*

■ *Emissions Compliance: FCC part 15 Class A, CE Mark*

Ethernet Over Coax Series
EOC-20/EOC-21

Ethernet Extender over Coax Cable

The *EOC-20/EOC-21* is point-to-point EoC (Ethernet over Coax) solution that efficiently extends 10/100 Ethernet circuits to over 800 meters(2,624feet) at 160Mbps using existing coaxial wire. The *EOC-20/EOC-21* will allow Ethernet connectivity in existing facilities or home without pulling extra cable. This is perfect solution for Ethernet on the factory floor where systems have been upgraded from slower serial communication to Ethernet networking. Installation is easy with a single switch setting. One end is set for local and the other remote. The *EOC-20/EOC-21* is used in Coaxial cable system to extend Ethernet connectivity over existing CCD/CATV grade Coaxial wire.

Features

- High-Speed up to 160Mbps communications link over existing Coaxial Cable, Symmetrical on EoCNA
- 160Mbps@ up to 800 meters(2,624feet), reach down to 4Mbps@about 1.2Km(4,000feet)
- Operates transparently to high layer protocols such as TCP/IP
- Auto-MDIX and auto-nogotiation 10Base-T or 100Base-TX and Full or Half-Duplex on the Ethernet port
- Plug and Play design for simple installation, single switch config
- Status LEDs for simple monitoring of the device and connection status
- Supports cascaded mode, can up to 32 units

Application

- Extend LAN connectivity to a remote site or between buildings
- Connect Ethernet to different rooms over existing home Coaxial infrastructure
- Connect new controller technology on the factory floor using existing wiring
- Extend Ethernet connectivity from a backbone network to an isolated location via Coaxial cable
- Transmit Video and traffic controller information over existing Coaxial cable

Specifications

- *Network Standards:*
  ITU G.9954 Ethernet Over Coaxial Network (EoCNA)
  IEEE802.3 10BASE-T, 10Mbit/s
  IEEE802.3u 100BASE-TX, Fast Ethernet at 100Mbit/s, Auto-negoatiaton
  IEEE802.3x Full Duplex and Flow Control
  IEEE802.1Q port-base VLANs and/or 802.1Q tag-based VLANs
  IEEE802.1p Multi-Priority assignment, Defferential queue weight,
         Port-based and queue-based rate limitation
  Multicast Applications: Support IGMPv1/v2 snooping.
  Port Rate limit function
- *Protocol:*
  Transparent to higher layer protocols
- *Connectors :*
  Fast Ethernet: Two RJ45 Connectors
           One for PC and the other for STB
  Coax: Two F-Type Female Coax Connectors
       One for EoCNA, the other for TV
- *Transmission Power and Spectrum:*
  0 +/-0.5 dBm
  12-28 MHZ
- *Transmission Speed and Distance:*
  Up to 160Mbps@800 meters, reach down to 4Mbps @about 1.2Km
  Up to 4000 Feet (-176dBm/Hz Noise Floor)
- *Fast Ethernet Interface:*
  10/100 Mbps
  MDI/MDI-X Auto Crossover

- *Quality of Service:*
  Priority Base on IEEE802.1p and TCP/UDP port
  Guaranteed QoS base on Layer II Parameterized QoS
- *Network Management:*
  Diagnosis of EoCNA function
  Secured/Isolated Communication between DEVs
  Provision/Denial of Service
- *Indicators:*
  "Power" LED
  EoCNA Link/Act, SyncMode LED
  LAN Link/Act LED
- *Environmental Conditions:*
  Operating Temperature: 0C ~ 55C (32F~131F)
  Storage Temperature: -10C ~ 65C (14F~149F)
  Operating Humidity: 10% ~ 90%Non-condensing
- *Power Requirement:*
  External Power Supply: 5V DC
  Power Consumption: < 6 Watts
- *Physical Dimension: 155mm(W) x 83mm(D) x 30mm(H)*
- *Unit Weight: 300 g*
- *Emissions Compliance: FCC part 15 Class A, CE Mark*

Application

Ordering Info

EOC-10	Single-port 10/100Base-TX Ethernet over Coaxial Cable (master mode on CO side)
EOC-20	2-port 10/100Base-TX Ethernet over Coaxial Cable, management supported (master mode on CO side)
EOC-21	2-port 10/100Base-TX Ethernet over Coaxial Cable, management supported (slave mode on CPE side)

IP Surveillance

Fiber Series

PDH Series

Broadband Access

5 EoCoax

Measurement

Interface Converter

Datacom Accessories

Network Management

6. Measurement

Protocol Family				
Network Type	**Product Name**	**Description**	**Type**	**Page**
Tester	HCT-7000	E1/ T1/ Datacom, Protocol and BERT	**S**	6-2
Tester	HCT-6000	Datacom Protocol and BERT tester	**S**	6-4
Tester	HCT-6000A	Datacom Protocol and BERT tester	**S**	6-4
Tester	HCT-BERT/H	E1/ T1/ Datacom, BERT	**S**	6-5
Tester	HCT-BERT/C	E1/Datacom, BERT with color LCD display	**S**	6-6
PCM Family				
Network Type	**Product Name**	**Description**	**Type**	**Page**
Tester	BTM10	E1/ T1/ Datacom Transmission Analyzer/	**S**	6-7
LAN Family				
Network Type	**Product Name**	**Description**	**Type**	**Page**
Tester	LCT-300	LAN cable tester	**S**	6-10
Tester	LCT-400	LAN cable tester with RJ-45 to BNC adapters	**S**	6-10

S = Stand-alone

Bert & Protocol Analyzers
HCT-7000

E1/ T1/ Datcom, Protocol and BERT tester

The HCT-7000 is a portable, battery powered 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.

I/F Module

IP Surveillance

Fiber Series

PDH Series

Broadband Access

EoCoax

6 Measurement

Interface Converter

Datacom Accessories

Network Management

Features

- Auto Configuration
- ASYNC terminal emulation
- File Management, upload/download file or captured data to PC for analysis
- Menu driven setup
- Self Tests and Diagnostics
- Frame Relay Analysis S/W Package:
  1). 2M frame monitor and emulation based on ITU Q.933, ANSI T1.618/T1.617 and RFC1490 (RFC2427) packets
  2). PING
  3). LMI setup
- User password setting or Radius authentication for Remote Access

Specifications - *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 = 1~32)	
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, 2^9-1 (511), 2^{11}-1 (2047), 2^{15}-1 ITU standard, 2^{15}-1 non- standard(inverted), 2^{20}-1 ITU standard, 2^{20} -1 non-standard(inverted), QRSS, 2^{23} -1 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	
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, 10^3, 10^4, 10^5, 10^6, or 10^7	
Flow Control	
DCE permitted to transmit on RTS signal or not	
DTE permitted to transmit on CTS signal or not	

Specifications

General Specifications

Interface Modules (Dual Port)	Datacom Interface Module	RS-232C/D (V.24), RS-449 (V.36), RS-530, X.21, V.35
	E1 Interface Module	G.703 E1 (2048K)
Basic Interfaces	Centronics printer & Craft control serial	
Protocols	Async, Sync (BSC), HDLC, SDLC, X.25, Frame Relay, SS#7, PPP (Sync.), V5.1.	
Data Rate	ASYNC	50 — 256Kbps
	SYNC	150 — 2048Kbps
Data Code	ASCII, EBCDIC, HEX, IPARS, Transcode, EBCD	
Data Length	ASYNC	5,6,7, or 8 bits
	SYNC	8 bits
Parity Bit	ASYNC	None, Odd, Even, Mark, Space
Stop Bits	ASYNC	1, 2
Display Modes	Data only	Full Duplex/ Half Duplex
	Data and Lead	Status/ Frame and Packet
Error Check	None, Parity, LRC, CRC-16, CRC-CCITT	
LCD Display	320x240 dots graphic	
Capture Buffer	SDRAM	
Line Monitor	DTE, DCE, DTE & DCE	
Emulation	DTE, DCE & MONITOR only	
LEDs	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
	E1 I/F Module	Signal Present, HDB3, Signal Loss, FAS Loss, AIS, RAI, MRAI, MFAS Loss, CAS Loss, Pattern Loss, Excess Zero, Erro
Power	AC	100 — -240VAC Adapter
	DC	19VDC
Environment	Temperature	0 — 50°C (Operating); -20 — 65°C (Storage)
	Humidity	0 — 90% non condensing
Power Consumption	10W	
Dimensions(WxDxH)	220mm x 65mm x 275mm	
Weight	1.6Kg	

Specifications - *G.703 E1/T1 BERT*

BERT Patterns	
63, 127, 2^9-1 (511), 2^{11}-1 (2047), 2^{15}-1 ITU standard,	
2^{15}-1 non-standard(inverted), 2^{20}-1 ITU standard,	
2^{20}-1 non-standard(inverted), QRSS, 2^{23} -1 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	
BERT Display Format	
Normal ITU-M.2100 (option)	
ITU G.821	
BERT Transmit Error Rate	
Force Single Error: Logic (Bit), Frame, CRC, and	
BPV (BipolarViolation)	
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	

Ordering Info

HCT 7000	A Master unit include a backlight LCD, switch keyboard, interface lead indicator LEDs, internal rechargeable battery, AC power adapter (90~260VAC), sturdy carry case
Hardware Options	
E1 Interface Module	E1 Logic, Frame, CRC, BPV, E-bit BERT, G.821/826 BERT, M.2100 BERT. Two BNC ports, the standard accessories are two BNC to BNC 75 ohm cables
Optional Adaptor Cables for E1 I/F	DB15/RJ-45 adaptor CAB-DB15BANF2-E1 CAB-DB15BANM2-E1 CAB-BANMIPM-E1 CAB-BAN3PSM-E1
Datacom Interface Module	Two HD26 ports supporting RS-232, V.35, RS-530/RS-449, X.21interface.
Optional Adaptor Cables for Datacom I/F	CAB-HD26DB25M(F)-232-1 CAB-HD26DB25M(F)-530-1 CAB-HD26DB25M(F)-449-1 CAB-HD26DB25M(F)-X21-1 CAB-HD26DB25M(F)-V35-1
Software Options	
Frame Relay Suite	Frame Relay Emulation & Monitor, PING and LMI setup
SS#7 F/W	E1/T1 CCS SS#7 Protocol Analysis Firmware Pack
ISDN F/W	E1 CCS ISDN-D Channel Protocol Analysis Firmware
V5 F/W	E1 CCS V5.1/V5.2 Protocol Analysis

Application

E1 Terminal Mode

E1 Bridge Mode

MUX feature - E1 BERT & Datacom BERT

E1 Dual Port - Drop and Insert BERT Test

IP Surveillance

Fiber Series

PDH Series

Broadband Access

EoCoax

6 Measurement

Interface Converter

Datacom Accessories

Network Management

Protocol Tester

Bert & Protocol Analyzers
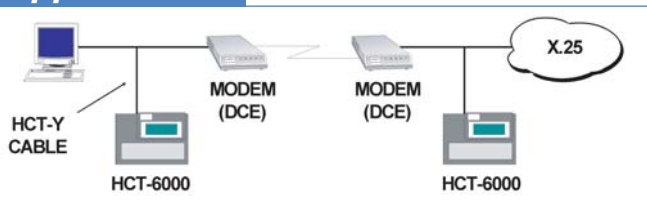# HCT-6000/ 6000A

Bert and Datacom Protocol tester

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 2M BERT.

Features

- 128K BERT (Low Speed)
- 2M BERT (High Speed)
- ASYNC terminal emulation
- Auto Configuration and Scan
- File Management
- Frame Relay Analysis
- Menu driven setup
- On-Line Monitor
- Remote Control
- Self Tests and Diagnostics
- System Reset Function
- Up/Down Load

Application

Ordering Info

HCT 6000	A Master unit includes a backlight LCD, pushbutton switch keyboard, internal rechargeable battery, AC power adapter (100~240VAC), soft shell carry case
Hardware Options	
There is one remote control port (RS-232 async) and one printer port (Centronics)	
The standard cable accessories include one remote control cable DB9M to DB9F+DB25F and one printer cable DB15M to C36M	
Software Options	
Optional software packages Frame Relay, PPP/SLIP, SNA ROM, G.826, M.2100	

Specifications

Basic Interfaces	RS-232C/(V.24), RS-449(V.36), RS-530, X.21,V.35, Centronics Printer port, Remote control port (RS-232 async)	
Protocols	ASYNC, SYNC(BSC), HDLC, SDLC, X.25, DDCMP	
Optional	Frame Relay, SNA, PPP, SLIP	
Data Rate	ASYNC	50 — 115,200bps
	SYNC	150 — 128,000bps
Data Code	ASCII, EBCDIC, HEX, IPARS, RANSCODE, EBCD	
Data Length	ASYNC	5,6,7, or 8 bits
	SYNC	8 bits
Parity Bit	ASYNC	None, Odd, Even
Stop Bits	ASYNC	1, 1 1/2, 2
Display Modes	Data only	Full Duplex/ Half Duplex
	Data and Lead	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 or DCE	
BERT Patterns	63, 511, 2047, FOX (ASCII), SPACE, MARK, ALT	
BERT Speed	2Mbps (N x 56, N x 64) 128Kbps (HCT6000A)	
LEDs	Leads	TD, RD, RTS, CTS, DSR, DTR, DCD, TC, RC, XTC (both SPACE and MARK)
	Interface	RS-232, V.35, RS-530/449, X.21
	External power	External adapter in use, Sync Loss & Battery low
	I/F power	DC9V out RS-232 I/F pin 9 is on
Power	AC	100 — 240VAC Adapter
	DC	12VDC
Environment	Temperature	0 — 50°C (Operating); -20 — 65°C (Storage)
	Humidity	0 — 90% non condensing
Dimensions(WxDxH)	173mm x 237mm 37mm	
Weight	1.1Kg	

E1/ T1/ Datacom BERT
HCT-BERT/H

E1/ T1/ Datacom Bit Error Rate tester

The HCT-BERT/H Bit Error Rate tester is a compact, notebook sized E1/T1 PCM measuring instrument designed for field use in analysis and maintenance of E1 (2.048Mbps) or T1 (1.544Mbps) lines. The HCT/BERT-H performs framed, unframed, signaling analysis, drop and insert Nx64Kbps, or nx56Kbps data into any time slot. The HCT-BERT/H series analyzer also provides a variety of E1 or T1 line statuses, transmission performance testing (BERT) and monitoring. On the E1 or T1 line, the HCT-BERT/H series product may be used as a generator or receiver.

Features

- Internal Memory storage of test result. / Direct display on LCD screen
- Loop Back Code Setting and Detection: IN Band, Out Band and ITU-T V.54 BERT Histogram Analysis
- Portable for field use
- Results Report
- Round Trip Delay Measurement
- Signaling Display: Display all channels of ABCD bits
- Supports CRC, and BPV performance analysis and generator
- User Programmable Pattern Setting: There are three 32 bit programmable patterns, which can be inserted onto the E1/T1 line and drop for analysis
- Upgradeable for advanced features
- DS0 Control Loop Codes (optional): TIP, LSC, LBE, FEV
- Print out via Parallel Printer port / Print out via RS-232 Series Port (option)

Specifications

Standard	ITU Q.921,Q.931	
Timeslot	Setting	Available, bypassed, or idle timeslot, Drop and Insert N x 64k data onto E1/T1 line
	Mapping Data	Analyze any channel data of two frames
LCD display	32 Characters x 8 Lines, Text/	
Power	AC	100 — 240VAC Adapter
	DC	12VDC
Environment	Temperature	0 — 50°C (Operating); -20 — 65°C (Storage)
	Humidity	0 — 90% non condensing
Power Consumption	TBA	
Dimensions(WxDxH)	220mm x 65mm x 275mm	
Weight	1.6Kg	

Application

G.703 UP TO 2,048Kbps

E1 or T1 LINE

Loopback

DUS/CSU

HCT-BERT/H

DB15 (Female): Printer Port

DB15(Male): E1/T1 TX and RX Port

Datacomm Port

DB9 (Male): Remote Control Port/Serial

BNC x 2: E1 TX and RX Ports

External Clock In

DC Jack

Power Switch

Slide Switch: External (Reference) Clock Setting: TTL/PCM

Bantam x 2: E1/T1 TX and RX Ports

Ordering Info

HCT-BERT/H	E1/T1 Datacom BERT Analyzer

IP Surveillance

Fiber Series

PDH Series

Broadband Access

EoCoax

6 Measurement

Interface Converter

Datacom Accessories

Network Management

BERT Tester

E1/ Datacom BERT
HCT-BERT/C

Color-LCD Analyzer

The HCT-BERT/C analyzer is a compact, color-LCD, graphic-user-interface, single hand E1 PCM measuring instrument designed for field use in analysis and maintenance of E1 (2.048Mbps) lines. The HCT-BERT/C performs framed, unframed, signaling analysis, drop and insert Nx64Kbps, or nx56Kbps data into any time slot. The HCT-BERT/C analyzer 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
- Support 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 CRV & BPV performance analysis
- Datacom BERT analysis available for V.35/ V.24/ RS-232/449/530/ X.21

Connectors

Datacom Port
E1 RJ-45 Port
E1 BNC Port
External Clock Port

USB Port for remote control and file transfer
Power Switch
DC Jack
DB15F Printer Port

Bert & Protocol Analyzers
BTM10

PCM Analyzers

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 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

- BERT Histogram Analysis
- LCD display 32 Characters x 8 Lines, Text / Graphic mode
- Portable for field use
- Print out via Parallel Printer port
- Rechargeable Battery with battery low indicator
- Results Report: Internal Memory storage of test result:
  Direct display on LCD screen
  Print out via Parallel Printer port
- Upgradeable for advanced features
- Loop Back Code Setting and Detection:
  IN Band and Out Band
- Pulse Wave Analyzer (optional):
  ITU G.703(E1), ANSI T1.403(T1) & ITU G.703(T1)
- DS0 Control Loop Codes (optional):
  TIP, LSC, LBE, FEV
- VF Noise Measurement (optional):
  C-Message Weighting, P-Weighting

Functions

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
VF Noise Measurement	C-Message Weighting, P-Weighting
Pulse Shape	E1/T1 pulse shape mask
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
Examine Analysis	Off-line analysis of BERT performance
External Drop & Insert	Acts as a Fractional E1 or T1 converter
User Programmable	32 bit Programmable patterns which can be inserted onto the E1/T1 line and drop for analysis
Pattern Setting	Available, bypassed, 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	Multiframe Sa bits setup and monitor.(E1 only)
File Management	Ten configuration and result memory locations can be stored and recall by user
ISDN Analysis	Digital Subscriber Signaling System No.1 (DSS 1)-Monitoring ISDN D-Channel Signaling information (ITU Q.921,Q.931)
V5.1/V5.2 Analysis	Monitoring V5 Signaling information

Specifications

General Specifications		
Power	AC	100 — 240VAC Adapter
	DC	12VDC
Environment	Temperature	0 — 50°C (Operating); -20 — 65°C (Storage)
	Humidity	0 — 95% non condensing
Power Consumption	10W	
Dimensions(WxDxH)	235mm x 173mm x 54mm	
Weight	1.6Kg	

Specifications - E1

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	
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 — -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 — 1000Hz
Transmitter Interface of E1/CEPT		
Bit Rate	2048K bit/s ± 3ppm	
Line Code	HDB3/ AMI	
Pulse characteristics	Meets ITU G.703	
Pulse Amplitude	Nominal 2.37V for CoaxialPair 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	Internal Timing: 2.048MHz ± 3ppm	
	Internal Timing + 50ppm offset (30ppm factory option)	
	Internal Timing - 50ppm offset (30ppm factory option)	
	Recovery from RX Timing (Loop Timing)	
	External Timing	
	Data Port Timing	
E1/CEPT Frame Structure	Unframed	
	FAS (PCM31)/ FAS+CRC4 (PCM31 with CRC)	
	FAS+CAS (PCM30)/ FAS+CRC4+CAS (PCM30 with CRC)	
Line Build Out	0dB, -7.5dB, -15dB, -22.5dB (Accuracy: ±1dB)	

Specifications - T1

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)	
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 ± 5% resistive Receive Sensitivity: up to -30dBdsx
	Receive Timing Range	1.544MHz ± 4000Hz
Transmitter Interface of T1/DS1		
Bit Rate	1544K bit/s ± 3ppm	
Line Code	B8ZS/ AMI	
Pulse characteristics	Meets ITU G.703	
Pluse 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	Internal Timing: 1.544MHz ± 3ppm	
	Internal Timing +50ppm offset (30ppm factory option)	
	Internal Timing -50ppm offset (30ppm factory option)	
	Recovery from RX Timing (Loop Timing)	
	External Timing	
	Data Port Timing	
T1/DS1 Frame Structure	ESF/ ESF+CRC6/ D4(SF)/ SLC-96/ T1DM/ Unframed	
Line Build Out	0dB, -7.5dB, -15dB, -22.5dB (Accuracy: ±1dB)	

IP Surveillance

Fiber Series

PDH Series

Broadband Access

EoCoax

6 Measurement

Interface Converter

Datacom Accessories

Network Management

Specifications - G.703 E1/T1 BERT

BERT Patterns	
63, 127, 2^9-1 (511), 2^{11}-1 (2047), 2^{15}-1 ITU standard, 2^{15}-1 non-standard(inverted), 2^{20}-1 ITU standard, 2^{20}-1 non-standard(inverted), QRSS, 2^{23} -1 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	
BERT Display Format	
Normal ITU-M.2100 (option)	
ITU G.821	
BERT Transmit Error Rate	
Force Single Error: Logic (Bit), Frame, CRC, and BPV (Bipolar Violation)	
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 - 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 = 1~32)	
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, 2^9-1 (511), 2^{11}-1 (2047), 2^{15}-1 ITU standard, 2^{15}-1 non-standard(inverted), 2^{20}-1 ITU standard, 2^{20}-1 non-standard(inverted), QRSS, 223 -1 ITU standard, 2^{23}-1 non-standard(inverted), ALL ONEs (Mark), ALL ZEROs (Space),	
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, 10^3, 10^4, 10^5, 10^6, or 10^7	
Flow Control	
DCE permitted to transmit on RTS signal or not	
DTE permitted to transmit on CTS signal or not	

Ordering Info

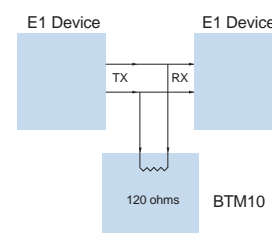| BTM10-E1	E1 PCM Multi-Tester with Full Features
BTM10A-E1	E1 PCM Multi-Tester without Pulse Shape Feature
BTM10B-E1	E1 PCM Multi-Tester without Datacom Feature
BTM10C-E1	E1 PCM Multi-Tester without Pulse Shape and Datacom Feature

Application

Receiver in Terminal Mode

Receiver in Monitor Mode

Receiver in Bridge Mode

Cable Tester
LCT-300/ LCT-400

LAN Cable Tester

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.

LCT-400

LCT-300

Features

- Automatic power shut down feature for extended battery life
- Auto scan pin assignment
- Battery low indicator
- Can review the captured pin assignment and failure status
- Easy to read cable status and verify cable continuity; open, short, and mismatches
- Easy to read LCD display, with 2 line by 12 characters with LCD back light
- Hand-held and easy to operate
- 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

Features - extra on LCT-400

- Easy to identify RJ-45 and BNC cable types against preset wiring schemes
- 10Base-2

Application

Specifications

Connectors	RJ-45	
Control keys	ENTER, MODE, ESC	
Power	DC	9VDC
Environment	Temperature	5 — 45°C (Operating); -20 — 65°C (Storage)
	Humidity	0 — 90% non condensing
Dimensions(WxDxH)	65mm x 154mm x 35mm	
Weight	300g	

Cable & Recognized Wiring Schemes

Tests for shielded and non-shielded cable types
Unshielded Twisted Pair (UTP 100ohm category 3, 4 & 5)
Foil shielded Twisted Pair (FTP 100ohm and 120ohm Category 3)
Shielded Twisted Pair (STP 150ohm type 1 & 6)
10Base-T, 100Base-TX and 100Base -T4
TP-PMDEIA/ TIA-568A/ B
Token Ring
USOC
10Base/HUB (AT&T 258A)
Plus user defined

Ordering Info

LCT-300 BK	Basic unit with Back Light and (1) terminators
LCT-400 BK	LCT-300 plus (2) RJ-45 to BNC adapters
LCT-T/X-R	X=ID of terminator (1 - 8)

IP Surveillance

Fiber Series

PDH Series

Broadband Access

EoCoax

6 Measurement

Interface Converter

Datacom Accessories

Network Management

7. Interface Converter

RS-232 Based IP				
Network Type	**Product Name**	**Description**	**Type**	**Page**
RS-232	V35IP	RS-232 to V.35	C	7-2
RS-232	449IP	RS-232 to RS-449	C	7-2
RS-232	X21IP	RS-232 to X.21	C	7-2
RS-232	V35IP-CAB	RS-232 to V.35 Cable	C	7-3
V.35 Base IP				
Network Type	**Product Name**	**Description**	**Type**	**Page**
V.35	V35/530IP	V.35 to RS-530	C	7-4
V.35	V35/449IP	V.35 to RS-449	C	7-4
V.35	V35/X21IP	V.35 to X.21	C	7-4
RS-232 to RS-485				
Network Type	**Product Name**	**Description**	**Type**	**Page**
V.35	IC485-3	RS-232 to RS-435	C	7-5
4ch RS-232 to TTL/CMOS				
Network Type	**Product Name**	**Description**	**Type**	**Page**
RS-232	ic232TTL	DB9F-RS-232 to DB9M-TTL/CMOS	C	7-6
RS-232 to RS-442/485				
Network Type	**Product Name**	**Description**	**Type**	**Page**
RS-232	IC485IP-1F	Async RS-232, DB25 male to RS422/ RS-485, 4 screw terminal	C	7-7
RS-232	IC485IP-1M	Async RS-232, DB25 female to RS422/ RS-485, 4 screw terminal	C	7-7
RS-232	IC485IP-2	Async RS-232, DB25 female to RS422/ RS-485, RJ-45	C	7-7
V35 to RS-485				
Network Type	**Product Name**	**Description**	**Type**	**Page**
V.35	V35/485-1	V.35 to RS-485	C	7-8
RS-232 Short Haul Modem				
Network Type	**Product Name**	**Description**	**Type**	**Page**
RS-232	IC232IP-SM/M	Async RS-232 Short Haul Modem, RJ-45 connector	C	7-9
RS-232	IC232IP-SM/F	Async RS-232 Short Haul Modem, RJ-45 connector	C	7-9
RS-232	IC232IP-2M	Async RS-232 Short Haul Modem, 4-screw connector,DB25M	C	7-9
RS-232	IC232IP-2F	Async RS-232 Short Haul Modem, 4-screw connector,DB25F	C	7-9
RS-232 Current Loop				
Network Type	**Product Name**	**Description**	**Type**	**Page**
RS-232	icCL-2/M	RS-232, Current loop converter	C	7-10
RS-232	icCIL-2F	RS-232, Current loop converter	C	7-10

C = Compact

RS-232 Interface Powered
V35IP/ 449IP/ X21IP/ 530IP

RS-232 to V.35/ RS-449/ X.21/ RS-530 Interface Converter

The RS232 IP family of interface converters allows full bi-directional synchronous conversion between RS-232C (V.24) and V.35, X.21 or RS-449/530 hardware. These converters all work WITHOUT an EXTERNAL POWER SUPPLY. The RS232 IP interface converters are designed for synchronous RS-232 operation at data rates up to and including 128kbps. They may also be applied to asynchronous RS-232 using only TD & RD signals, while ignoring TC, RC, and XTC timing signals. Asynchronous RS-232 requires three times greater data throughput on the synchronous side's V.35, X.21 or RS-449/530 interface.

The physical connections for all RS232 IP family converters are DB25 female connectors. The RS-232 side supports direct connection to the DB25 connector with standard pin-out, while an adapter cable is required on the V.35, X.21 or RS-449/530 side to provide the proper interface connection. The V35IP model's interface does not require balanced signals for the handshaking signals and therefore cannot be adapted for X.21, RS-449 or RS-530 use. However, the 449IP or X21IP models may be interchanged as long as the correct adapter cable is applied.

Features

■ DCE/DTE: Switch settable

■ Power Source: Interface powered. No external DC power adapter is required for the "IP" converter family. However, an external adapter (DC9V@600mA) may be used if the application of the unit is in a poor communication environment.

Specifications

Data Rate	Up to 2Mbps	
Connectors	V.35 side - V.35 cable adapter, X.21, RS-449/530 side - DB25F (Requires adapter cable)	
LEDs	Signal status, DCE/DTE mode, Power	
Environment	Temperature	0 — 50°C (Operating); 20 — 70°C (Storage)
	Humidity	5% — 90% non-condensing
Power Cunsumption	< 5W	
Dimensions(WxDxH)	80mm x 140mm x 25 mm	
Weight	150g	
Compliance	RS-232, RS-449, RS-530 - EIA ; V.35, X.21 - ITU-T	

Ordering Info

RS-232 <—> V.35	
V35IP-M	RS-232 to V.35 Interface Converter, interface powered, with DB25M to MB34M adapter cable
V35IP-F	RS-232 to V.35 Interface Converter, interface powered, with DB25M to MB34F adapter cable.
RS-232 <—> RS-449	
449IP-M	RS-232 to RS-449 Interface Converter, interface powered, with DB25M to DB37M adapter cable
449IP-F	RS-232 to RS-449 Interface Converter, interface powered, with DB25M to DB37F adapter cable
RS-232 <—> X.21	
X21IP-M	RS-232 to X.21 Interface Converter, interface powered, with DB25M to DB15M adapter cable
X21IP-F	RS-232 to X.21 Interface Converter, interface powered, with DB25M to DB15F adapter cable

IP Surveillance
Fiber Series
PDH Series
Broadband Access
EoCoax
Measurement
7 Interface Converter
Datacom Accessories
Network Management

RS-232 Interface Powered
V35IP-CAB

RS-232 to V.35 IP-Cable

The Cable Type family of interface converters allows full conversion between RS-232 and V.35 hardware. The interface converter is very easy to implement. When signal power of the RS-232 interface side is enough, the power indicator will light. No external DC power adapter is required in this case. The RS-232 DB25 PIN#9 external power is required only if application of the unit is in a poor communication environment.

Features

- **V35IP-CAB/DCE**
  RS-232DTE <—> V35CAB/DCE <—> V.35DCE

- **V35IP-CAB/DTE**
  RS-232DCE <—> V35CAB/DTE <—>V.35DTE

Specifications

Baud Rate	Up to 128kbps	
Power	DC power acceptable (RS-232 DB25 PIN #9)	
Power Source	RS-232 Interface powered and external	
LEDs	TD, RD	
Environment	Temperature	0 — 50°C (Operating); 20 — 70°C (Storage)
	Humidity	5% — 90% non-condensing
Power Consumption	< 5W	
Length	3m	
Dimensions(WxDxH)	75mm x 53mm x 22 mm	
Weight	500g	

Application

RS-232   V.35

Ordering Info

PV35CAB/DCE Type	
V35Ip-CAB/DCE-MF	V35/MB34-M to RS232/DB25F
V35Ip-CAB/DCE-MM	V35/MB34-M to RS232/DB25M
V35Ip-CAB/DCE-FF	V35/MB34-F to RS232/DB25F
V35Ip-CAB/DCE-FM	V35/MB34-F to RS232/DB25M

V35CAB/DTE Type	
V35Ip-CAB/DTE-MM	V35/MB34-M to RS232/DB25M
V35Ip-CAB/DTE-MF	V35/MB34-M to RS232/DB25F
V35Ip-CAB/DTE-FM	V35/MB34-F to RS232/DB25M
V35Ip-CAB/DTE-FF	V35/MB34-F to RS232/DB25F

V.35 Interface Powered
V35/530IP, V35/449IP, V35/X21IP

V.35 to RS-530/ RS-449/ X.21 Interface Converter

V35/530IP   V35/X21IP

V35/449IP

The V35IP family of interface converters allows full bi-directional synchronous conversion between V.35 and X.21 or RS-449/530 hardware. These converters all work WITHOUT an EXTERNAL POWER SUPPLY. The V35IP interface converters are designed for synchronous V.35 operation at data rates up to and including 128kbps. They may also be applied to asynchronous V.35 using only TD & RD signals, while ignoring TC, RC, and XTC timing signals. Asynchronous V.35 requires three times greater data throughput on the synchronous side's X.21 or RS-449/530 interface.

The physical connections for all V35IP family converters are DB25 female connectors and V.35 adapter cable. The V.35 side requires the supplied DB25 to MB34 adapter cable to connect directly to V.35 equipment.
Adapter cables are also required for connection to X.21 and RS-449 equipment. RS-530 equipment may be directly connected to the V35IP converter.

Features

■ DCE/DTE: Switch settable

■ Power Source: Interface powered. No external DC power adapter is required for the "IP" converter family. However, an external adapter (DC9V@600mA) may be used if the application of the unit is in a poor communication environment.

Specifications

Data Rate	Up to 2Mbps	
Connectors	V.35 side -V.35 cable adapter,X.21, RS-449/530 side -DB25F (Requires adapter cable)	
LEDs	PWR, Signal status, DCE/DTE mode	
Environment	Temperature	0 — 50°C (Operating); 20 — 70°C (Storage)
	Humidity	5% — 90% non-condensing
Power Cunsumption	< 5W	
Dimensions(WxDxH)	80mm x 140mm x 25 mm	
Weight	150g	

Ordering Info

V.35 <—> RS-530	
V35/530IP-M	V.35 to RS-530 Interface Converter, interface powered
V35/530IP-F	V.35 to RS-530 Interface Converter, interface powered, with DB25M to MB34F adapter cable
V.35 <—> RS-449	
V35/449IP-M	V.35 to RS-449 Interface Converter, interface powered, with DB25M to DB37M adapter cable
V35/449IP-F	V35/449IP-F V.35 to RS-449 Interface Converter, interface powered, with DB25M to DB37F adapter cable
V.35 <—> X.21	
V35/X21IP-M	V.35 to X.21 Interface Converter, interface powered, with DB25M to DB15M adapter cable
V35/X21IP-F	V.35 to X.21 Interface Converter, interface powered, with DB25M to DB15F adapter cable

IP Surveillance

Fiber Series

PDH Series

Broadband Access

EoCoax

Measurement

7 Interface Converter

Datacom Accessories

Network Management

RS-232 Interface Converter
ic485-3

RS-232 to RS-485 Interface Converter

The ic485-3 Interface Converter provides conversion between RS-232 interface and RS-485 standard interface. The RS-232 interface connection is via the unit's DB-25F female D-Type connector, while the RS-485 side's connection is via a five screw terminal block. The ic485-3 converter's circuitry provides a high degree of electrical isolation between the RS-232 and RS-485 sides. The RS-232 side may operate as DTE or DCE, has provisions for establishing hardware flow control, and has LEDs to indicate data transmission and reception. The RS-485 side may operate in either two wire half duplex or four wire half or full duplex and also has LED's to indicate data transmission and reception.

Features

- RS-485; 2 or 4 wire, Half or Full Duplex
- DTE/DCE selectable
- Easy to configure
- Electrical Isolation: 2500V minimum
- External DC power required
- RS-232 handshaking; DTR/DSR, RTS/CTS, or Auto

Specifications

Data Rate	1200, 2400, 4800, 9600, 19.2K, 38.4K, 57.6K or 115.2K	
Connectors	RS-232 DB-25F; RS-485 5-screw terminals block	
LEDs	TX/ RX on both side and TD/RD on RS-232 side	
Power	9VDC	
Environment	Temperature	0 — 50°C (Operating); 20 — 70°C (Storage)
	Humidity	5% — 90% non-condensing
Power Cunsumption	< 6W	
Dimensions(WxDxH)	80mm x 140mm x 25 mm	
Weight	180g	

Application

RS-232   (4/2 wire) Twisted Pairs   RS-485

Ordering Info

RS-232 <—> RS-485	
ic485-3	RS232/DB25F-RS422/485; 5 screw terminals [DC Power required], Isolation, Auto. Flow control

Converts RS-232 to TTL/ CMOS
ic232TTL

DB9F-RS-232 to DB9M-TTL/CMOS Interface Converter

The ic232TTL converts RS-232 to TTL/CMOS compatible level. Two channels are used to convert from RS-232 to 0/+5 VDC signals, and two channels are used to convert from 0/+5 VDC signals to RS-232. This converter supports TD, RD, RTS, and CTS. The RS-232 side is a DB9 female connector. The TTL/CMOS side is a DB9 male connector. This unit may work at baud rates up to 128 kbps and is powered by the signals on pins 7(RTS), 4(DTR), and 3(TD) of the RS-232 interface.

The handshaking lines may be in either a high or low condition, but must be present to power the converter. It is important that TTL/CMOS logic, and only TTL/CMOS logic (0 to +5 VDC) be used for the TTL/CMOS side of the converter. The maximum sinking current for one TTL/CMOS output is 3.2 mA. The maximum source current for one TTL/CMOS is 1 mA. Signal levels are inverted by the converter.

Pin Assignment

DB9F: RS-232		DB9M: TTL/ CMOS
Pin	Function	Pin
5	GND	5
3(Input)	TD	3(Output)
2(Output)	RD	2(Input)
7(Input)	RTS	7(Output)
8(Output)	CTS	8(Input)

```
1 ←— DCD
       DSR
6 ←—
       DTR
4 ←—
```

Specifications

Electronic Specifications	
TTL/ CMOS Input	RS-232 Output
Low (<+0.8V)	+5V minimum, +9V typical
High (>+2V)	-5V minimum, -9V typical
TRS-232 Input	TTL/ CMOS Output
Low (<+0.8V) & (>-15V)	+3.5V minimum, +4.6V typical
High (>+2.8V) & <+15V)	+0.4V minimum, +0.1V typical

Dimensions(WxDxH)	31mm x 60mm x 15mm
Weight	20g

Application

TTL level serial connections:
 Embedded board
 ADSL Modem
 UART Controller

IC232TTL
RS-232 to TTL Interface Converter
Interface Powered

Serial Console

Ordering Info

ic232TTL	Async RS-232 (DB9 female) to TTL/CMOS (DB9 male), no power required

Converts RS-232 to RS-422/ RS-485
ic485IP-1F, ic485IP-1M, ic485IP-2

RS-232 to RS-422/ RS-485 Interface Converter

The ic485IP interface converters allow full conversion between RS-232 and RS-485 hardware. The IP series converters work WITHOUT an EXTERAL POWER SUPPLY. All the units are very easy to implement. Simply connect the appropriate interface cable and select the DCE/DTE type required with the Function Switches.

ic485IP-1F

ic485IP-1M

ic485IP-2

Features

- ■ Baud Rate: Up to 128Kbps
- ■ DCE/ DTE device setting selectable
- ■ RTS/ CTS control Full/Half duplex
- ■ Simulation/ Monitor selectable.

Specifications

Connectors	ic485IP-1M	RS-232 side DB25M; RS-485 side 4 screw terminal
	ic485IP-2	RS-232 side DB25F; RS-485 side 4 screw terminal
	ic485IP-1F	RS-232 side DB25F; RS-485 side 4 screw terminal
LEDs	TD/ RD/ External DC power	
Power	Interface powered, External 9VDC/ 300mA power acceptable	
Environment	Temperature	0 — 50°C (Operating); 20 — 70°C (Storage)
	Humidity	5% — 90% non-condensing
Power Cunsumption	< 5W	
Dimensions(WxDxH)	ic485IP-1M	76mm x 54mm x 20 mm
	ic485IP-2	56mm x 53mm x 20 mm
	ic485IP-1F	76mm x 54mm x 20 mm
Weight	ic485IP-1M	60g
	ic485IP-2	60g
	ic485IP-1F	47g

Application

(2/4 wire) Twisted Pair

RS-232   RS-485

Ordering Info

ic485IP-1F	Async RS-232, DB 25 female to RS-422/485, 4-screw terminal
ic485IP-1M	Async RS-232, DB25 male to RS-422/485, 4-screw terminal
ic485IP-2	Async RS-232, DB25 female to RS-422/485, RJ-45 connector

IP Surveillance

Fiber Series

PDH Series

Broadband Access

EoCoax

Measurement

7 Interface Converter

Datacom Accessories

Network Management

V.35 to RS-485

Converts V.35 to RS-485

V35/485-1

V.35 to RS-485 Interface Converter

The V35/485-1 Interface Converter provides conversion between V.35 and RS-485 standard interfaces. The V.35 interface connection is via a supplied adapter cable and the unit's DB-25F female D-Type connector, while the RS-485 side's connection is via a five screw terminal block. The V35/485-1 converter's circuitry provides a high degree of electrical isolation between the V.35 and RS-485 sides. The V.35 side may operate as DTE or DCE, has provisions for establishing hardware flow control, and has LEDs to indicate data transmission and reception. The RS-485 side may operate in either two wire half duplex or four wire half full duplex.

Features

- RS-485; 2 or 4 wire, Half or Full Duplex

- V.35 handshaking; DTR/DSR, RTS/CTS, or Auto

- 2500V Isolation minimum

- DTE/DCE selectable

- Easy to configure

- External DC power required

Specifications

Data Rate	1200, 2400, 4800, 9600, 19.2K, 38.4K, 57.6K or 115.2K	
Connectors	V.35 DB-25F plus adapter cable; RS-485 5-screw terminal block	
LEDs	TX/RX on both side and TD/RD on RS-232 side	
Power	External 9VDC/ 300mA Adapter	
Environment	Temperature	0 — 50°C (Operating); 20 — 70°C (Storage)
	Humidity	5% — 90% non-condensing
Power Consumption	< 6W	
Dimensions(WxDxH)	140mm x 80mm x 25 mm	
Weight	150g	

Application

V.35   RS-485

Ordering Info

V35/485-1	V35-RS422/485; 5 screw terminal [DC Power required], Isolation, Auto. Flow control w/V.35 cable, Adapter

RS-232 Short Haul Modem

ic232IP-SM/M, ic232IP-SM/F, ic232IP-2M, ic232IP-2F

Async RS-232 to RJ-45 or 4-screw Terminal Block

The ic232IP, asynchronous, Short Haul Modem, overcomes the limited distances of the RS-232 standard by converting DCE/DTE equipment to full duplex 2 twisted pair wire (Category 3 or better). The ic232IP-SM operates up to 10 Km depending on the wire gauge and data rate.

ic232IP-SM/F

ic232IP-2F

ic232IP-2M

Features

- Baud Rate: Up to 128Kbps
- DCE/DTE switchable
- Simulation only

Application

RS-232   RS-232

Ordering Info

ic232IP-SM/M	Async RS-232 Short Haul Modem, RJ-45 connector
ic232IP-SM/F	Async RS-232 Short Haul Modem, RJ-45 connector
ic232IP-2M	Async RS-232 Short Haul Modem, 4-screw connector, DB25M
ic232IP-2F	Async RS-232 Short Haul Modem, 4-screw connector, DB25F

Specifications

Connectors	ic232IP-SM/M	Async RS-232 side: DB25F; Modem side: RJ45
	ic232IP-SM/F	Async RS-232 side: DB25F; Modem side: RJ45
	ic232IP-2F	Async RS-232 side: DB25F; Modem side: 4-screw termination with Ground pin
	ic232IP-2M	Async RS-232 side: DB25M; Modem side: 4-screw termination with Ground pin
LEDs	TD, RD	
Power	Interface powered	
Environment	Temperature	0 — 50°C (Operating); 20 — 70°C (Storage)
	Humidity	5% — 90% non-condensing
Power Cunsumption	< 5W	
Dimensions(WxDxH)	ic232IP-SM/M	56mm x 53mm x 20 mm
	ic232IP-SM/F	56mm x 53mm x 20 mm
	ic232IP-2F	77mm x 55mm x 20 mm
	ic232IP-2M	76mm x 54mm x 20 mm
Weight	ic232IP-SM/M	45g
	ic232IP-SM/F	45g
	ic232IP-2F	57g
	ic232IP-2M	55g

RS-232 Current Loop
icCL-2/M & icCL-2/F

RS-232 Current Loop Converter

The icCL's interface converters allow full conversion between RS-232 and current loop hardware. The series converters work without an External power supply. All the units are very easy to implement. Simply connect the appropriate interface cable and select the DCE/DTE type required with the function switches.

icCL-2/M

icCL-2/F

Features

- Full duplex , 19.2Kbps to 4000ft
- Baud Rate is up to 128Kbps
- Current Loop: 4-screw terminal
- DCE/DTE switchable
- 20/60mA selectable

Application

| Computer | | RS-232 |

Specifications

Connectors	icCL-2/M	RS-232 side/ -DB25F
	icCL-2/F	RS-232 side/ -DB25F
LEDs	TD, RD	
Power	External 9VDC, 300mA power required	
Environment	Temperature	0 — 50°C (Operating); 20 — 70°C (Storage)
	Humidity	5% — 90% non-condensing
Power Cunsumption	<6W	
Dimensions(WxDxH)	ic232IP-SM/F	76mm x 54mm x 20mm
	ic232IP-2F	76mm x 54mm x 20mm
Weight	ic232IP-SM/F	60g
	ic232IP-2F	60g

Ordering Info

icCL-2/ M	RS-232 current loop, DB25 male, 4-screw terminator, DC power require, with adapter
icCL-2/ F	RS-232 current loop, DB25 female, 4-screw terminator, DC power require, with adapter

IP Surveillance

Fiber Series

PDH Series

Broadband Access

EoCoax

Measurement

7

Interface Converter

Datacom Accessories

Network Management

8. Accessories

Fiber Accessories				
Network Type	**Product Name**	**Description**	**Type**	**Page**
Fiber Cable	Fiber Patch cords	Fiber Optic Patch Cord	A	8-2
Fiber Connectors	Fiber Attenuator	Fiber Attenuator	A	8-2
Fiber Transceiver	Fiber Transceiver-GBIC	GBIC Fiber Transceiver modules	A	8-3
Fiber Transceiver	Fiber Transceiver-SFP	SFP Fiber Transceiver Modules	A	8-3
Network Cable				
Network Type	**Product Name**	**Description**	**Type**	**Page**
Network Cable	Cisco Cable	Cisco Equipment	A	8-5
Adapter	Adapter	Cisco Equipment	A	8-5
Changer	Gender Changer	Cisco Equipment	A	8-5
Impedance Converter				
Network Type	**Product Name**	**Description**	**Type**	**Page**
Balun	Balun-P	75 → 120 ohms (RJ-45 to Two BNC pigtail)	A	8-6
Balun	Balun-B1/B2	75 → 120 ohms (RJ-45 to 1 or 2 BNC)	A	8-6
Balun	BLN3010	G.703 Mini Balun (1.6 / 5.6 Jack to IDC)	A	8-6
Balun	BLN4010	G.703 Mini Balun (BNC to IDC)	A	8-6
Surge Protector				
Network Type	**Product Name**	**Description**	**Type**	**Page**
Surge Protector	SP-SE-R01-4	4-port Ethernet Surge Protector	A	8-7
Surge Protector	SP-SE-R08-8	8-port Ethernet Surge Protector	A	8-7
Surge Protector	SP-RE-R16-8	16-port Ethernet Surge Protector	A	8-7
Surge Protector	SP-RE-R24-8	24-port Ethernet Surge Protector	A	8-7
Surge Protector	SP-SE-B01	Coaxial to BNC E1 75 ohm Surge Protector	A	8-8
Surge Protector	TSP-10	Telephone Surge Protector	A	8-8

A = Accessory

Fiber Accessories

Fiber Patch cords & Pigtail

Cables

Fiber Patch cable & Pigtail are ultra reliable devices featuring low insertion loss and back reflection. The Fiber Patch cable & Pigtail come with your choice of simplex or duplex cable configurations, and various types of pigtail and connector terminations to meet your requirements.

Fiber Accessories

Fiber Mode Attenuator

Attenuator

FC Type

SC Type

CTC Union offers 1~20 dB and standard attenuation values at 3, 5, 10, 15 and 20 dB, advantaging economy scale for mass productive supply and custom-made attenuation value meeting your specific requirement , supported by our technical team to obtain the best synergy .

Features

- ■ Various connector type available
- ■ Low back reflection loss
- ■ PC ferrule with 20mm radius fast polishing
- ■ Applications include CATV, Fiber optic sensors, Local area network, Testing instruments, and Telecommunications

Features

- ■ Low back reflection
- ■ High power endurance
- ■ Precise control of attenuation range
- ■ Easy installation
- ■ Environmentally stable
- ■ Customer design specification
- ■ Readily panel mountable

Specifications

Mode type	single mode	multi mode
Typical Insertion Loss	0.15dB	0.3dB
Typical Return Loss	-50°C	—
Operating Temperature	-40 — 75°C	
Storage Temperature	-55 — 85°C	

Specifications

Mode Type	SM, MM
Operating Wavelength (nm)	1310 / 1550
Bandwidth, nm	±40
Attenuation Accuracy (typcial, including connector)	1 — 5dB (±1.0)
	6 — 10dB (±1.5)
	11 — 15dB (±2.0)
	16 — 20dB (±2.0)
Back Reflection, dB	<= -40 (convex polishing), <= -60 (Angled type)
Operating Temperature	-40 — 75°C
Storage Temperature	-50 — 85°C
Connector Type	ST, SC , FC

Ordering Info

XX	X/-	X	X	X	XM
Connector Type (1) ------ (2)	Ferrule Type	Fiber Mode	Offering mode	Fiber type	Cable length
FC ------ FC	P: PC	S: SM	S: Simplex	5: 50/125um	please
SC ------ SC	S: SPC	M: MM	D: Duplex	6: 62.5/125um	specify
ST ------ ST	V: VPC			9: 9/125um	in meter
LC -----LC	A: APC				
DT ---Pigtail					
MJ -----MT-RJ					

Ordering Info

FA-I	X-	PC	X	XX-
I-In Line Type	Mode Type	Polishing Type	Fiber Type	Attenuation Value
I-In Line Type	S-SM	PC	S-SC	1 ~ 25Db
	M-MM	SPC	F-FC	
		VPC	T-ST	

GBIC Transceiver
SFP Transceiver

Fiber Transceiver

GBIC Transceiver

SFP Transceiver

GBIC/ SFP Transceivers are high performance, cost effective modules for serial optical data communications applications specified for a single mode at 1.25/2.5Gbps. They operate with +3.3V/5V power supplies and are intended for single mode or multi-mode fiber, operating at a nominal wavelength of 1310(850) nm. Each GBIC/ SFP Transceiver consists of a transmitter optical subassembly, a receiver optical subassembly and an electrical subassembly. GBIC/ SFP Transceivers are duplex SC/ LC transceiver designed for use in Gigabit Ethernet and to provide an IEEE-802.3z compliant link for 1.25/2.5Gbps short reach applications.

Features

- Eye Safety
- High speed backplane interconnects
- PECL differential input & output logic levels
- Small Form Factor Pluggable MSA compliant
- Switched backbones
- Uncooled MQW structure laser

Specifications

Standard	IEEE-802.3z, EN60825-1, SDH & SONET, Gigabit Ethernet (1000Base-SX), ANSI specifications for Fiber	
	single mode	1310nm FP-LD
	multi-mode	850nm VCSEL
Data PECL different input	1.25G module	300 — 1860mV
	2.5G module	400 — 1660 mV
Lead soldering	260°C	
Data Rate	155Mbps, 622Mbps & 2.5Gbps, NRZ	
Power	3.3V	
Environment	Temperature	-20 — 70°C (Operating); -40 — 85°C (Storage)
	Humidity	20 — 80% non condensing (Operating); 10 — 90% (Storage)
Dimensions(WxDxH)	GBIC	33.5 x 57 x 12 mm
	SFP	14 x 55 x 13.5 mm
Weight	GBIC	50g
	SFP	20g
Compliance	CE, FCC part 16	

Ordering Info

XX	X-	X	XXX-	XXX
Connector Type	Fiber Type	Speed Type	Connectivity Distance	Wave length
GB: GBIC	S: SM	9: 2.5G	000: 2km/ 550m	S85: SX850
SF: SFP	M: MM	7: 1.25G	010: 10km	L31: LX1310
		5: 155M	040: 40km	Z55: ZX1550
			080: 80km	WA: T13/ R15
			120: 120km	WB: T15/ R13
				CXX: CWDM

WE CARE
ABOUT THE
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Cisco Cable

Network Cables

HD26 Series   LFH200 Series   LFH60 Series   CAB-OCT-Asyn/ Modem

Bay Network, 3COM, Intel, Nortel Cables and other customized cable are all offered. Please inquire.

Ordering Info

Model Name	Description
LFH60 connector Series	
CAB-X21FC	LFH60-X21/DB15 DCE;3m
CAB-X21MT	LFH60-X21/DB15 DTE;3m
CAB-232FC	LFH60-232/DB25 DCE;3m
CAB-232MT	LFH60-232/DB25 DTE;3m
CAB-V35FC	LFH60-V35/MB34 DCE;3m
CAB-V35MT	LFH60-V35/MB34 DTE;3m
CAB-449FC	LFH60-449/DB37 DCE;3m
CAB-449MT	LFH60-449/DB37 DTE;3m
CAB-530MT	LFH60-530/DB25 DTE;3m
CAB-530FC	LFH60-530/DB25 DCE;3m
CAB-2X21FC	LFH60-Two X21/DB15 DCE ,3m
CAB-2X21MT	LFH60-Two X21/DB15 DTE ,3m
CAB-2V35FC	LFH60- Two V35/MB34 DCE ,3m
CAB-2V35MT	LFH60- Two V35/MB34 DTE ,3m
HP26 SS series	
CAB-SS-232FC	HP26-232/DB25 DCE;3m
CAB-SS-232MT	HP26-232/DB25 DTE;3m
CAB-SS-449FC	HP26-449/DB37 DCE;3m
CAB-SS-449MT	HP26-449/DB37 DTE;3m
CAB-SS-530FC	HP26-530/DB25 DCE;3m
CAB-SS-530MT	HP26-530/DB25 DTE;3m
CAB-SS-X21FC	HP26-X21/DB15 DCE;3m
CAB-SS-X21MT	HP26-X21/DB15 DTE;3m
CAB-SS-V35FC	HP26-V35/MB34 DCE;3m
CAB-SS-V35MT	HP26-V35/MB34 DTE;3m
CAB-SS-SS	

Model Name	Description
LFH200 connector series	
CAB-OCT-V35FC	LFH200- 8xV35 DCE;1.8m
CAB-OCT-V35MT	LFH200- 8xV35 DTE;1.8m
CAB-OCT-X21FC	LFH200- 8xX21 DCE;1.8m
CAB-OCT-X21MT	LFH200- 8xX21 DTE;1.8m
CAB-OCT-232FC	LFH200- 8x232 DCE;1.8m
CAB-OCT-232MT	LFH200- 8x232 DTE;1.8m
CAB-OCT-449FC	LFH200- 8x449 DCE;1.8m
CAB-OCT-449MT	LFH200- 8x449 DTE;1.8m
CAB-OCT-530FC	LFH200- 8x530 DCE;1.8m
CAB-OCT-530MT	LFH200- 8x530 DTE;1.8m
HD50 connector series	
CAB-NPV35TV2	HD50 V35- 3M
CAB-NP232T	HD50 DB25M- 3M
CAB-NPV35CV2/FC	HD50 V35
CAB-NPV35CV2/MT	HD50 V35
CAB-OCT-ASYNC	DB68- RJ45x8 ;Cable with shield w/o Gender changer; Length: 1.5 meters
CAB-OCT-MODEM	DB68- RJ45x8 ;Cable with shield w/8 x DB25 /RJ45 Gender changer; 1.5 meters

Adaptor &
Gender Changer

Adaptor & Changer

Gender Changer   V.35/M to DB25/F   RS-232 Standard DB25/M to DB/9F

All kinds of adapan be produced (customer-design), if customer provides the following information.
    Connector: 1. Connector Type
               2. Pin Assignment

Ordering Info

Gender Changer	Male-Male
	Female-Female

RS-232 Standard	DB25/M to DB/9F
	DB25/F to D39F
	DB25/F to DB9M
	DB25/M to DB9M
V.35 Adapter	V.35/M to DB25/F

Balun-P
Balun-B1/ B2

Coax to Twisted Pair

Balun-B2/S & Balun-B2/S-2

The E1 Balun is a media adapter for E1 networks which allows unbalanced 75 ohm coaxial interface equipment to operate over 120 ohm balanced two twisted pairs (4-wire), or vise versa.

Balun-B1

Balun-P/S & Balun-P/S-2

BLN3010
BLN4010

G.703 Mini Balun

BLN3010

The mini Balun is ideal for applications where size and space are restricted due to small dimensions or high density. They provide a full shielded terminator which is intended for panel or cable mounting, come with a variety coaxial interfaces and IDC twisted pair termination which allows installation without special tools. The mini Balun supports E1 to E3 (2-34 Mbps) speeds. Conversion to twisted pair cabling enables the use of high density IDC modules in Digital Distribution Frames (DDF) thus decreasing wiring densities more than 5 times.

BLN4010

Features

- Conversion 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

Features

- Body parts plated min. 5uNi
- Contacts plated min. 1.25uNi & min. 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 (2 x BNC)	
Balanced interface	120 ohm; impedance (1 x RJ-45)	
Dimensions(WxDxH)	Balun-B2/S & Baluln-B2/S-2	4.4cm x 5.4cm x 2.5cm
	Balun-B1	2.2cm x 5.6cm x 2.1cm
	Balun-P/S & Balun-P/S-2	2.2cm x 22.4cm x 2.1cm
Weight	Balun-B2/S & Baluln-B2/S-2	35g
	Balun-B1	65g
	Balun-P/S & Balun-P/S-2	45g
Compliance	ITU G.703 standard pulse	

Specifications

Dimensions (WxDxH)	1.7cm x 1.6cm x 4.8cm
Weight	15g

Ordering Info

BLN3010	75 ohm to 120 ohm Balun 1.6/5.6 Jack/IDC
BLN4010	75 ohm to 120 ohm Balun BNC Bulkhead Jack/IDC

Ordering Info

Balun-P/S & Balun-P/S-2	120 ohm 2-twisted pair on RJ-45 to 2-75 ohm BNC, male (Pigtails)
Balun-B1	120 ohm 1-twisted pair on RJ-45 to 1-75 ohm BNC, male
Balun-B2/S & Baluln-B2/S-2	120 ohm 2-twisted pair on RJ-45 to 2-75 ohm BNC, female

IP Surveillance

Fiber Series

PDH Series

Broadband Access

EoCoax

Measurement

Interface Converter

08 Datacom Accessories

Network Management

SP-SE-R01-8, SP-SE-R08-8
SP-RE-R16-8, SP-RE-R24-8

Ethernet Surge Protectors

SP-RE-R08

SP-RE-R16

SP-RE-R24

SP-RE-R01-8

The RJ45 type 10/100Base-T data line protection devices are designed for basic and fine protection of information-based systems from surges as caused by atmospheric discharges (lightning) or by capacitive or inductive interferences. Incoming surges are limited by transzorb diodes. Powerful gas diverters are used for grounding the fine protection devices. Decoupling of the protection module is ensured by the line path between the basic and the fine protection device. The path must have a minimum length of 5 m. The protection modules are directly used on the device to be protected, i.e. at the transition point from the lightning zone 1 to 3 according to Class 2+3, Category C2/IEC 61644-1, draft 98.

Features

■ Data line protection : RJ45 10/100Base-T Ethernet

■ Fast energy absorption when over-voltages occur

■ Compactness

■ Low series resistance and minimal capacitance values to preserve the data information

Specifications

Un	5V	
Umax	6.8V	
Lighting discharge current per path	SP-SE-R01-8	In: 0.5KA; Imax: 5KA
	SP-SE-R08-8	
	SP-SE-R16-8	In: 0.25KA; Imax: 5KA
	SP-SE-R24-8	
Protected Cores	SP-SE-R01-8	
	SP-SE-R08-8	1 — 8 pins
	SP-SE-R16-8	
	SP-SE-R24-8	
Attenuation in dB	< 0.5dB (100MHz)	
TA	< 10ns	
Series Capacity	40 PF	
Dimensions	SP-SE-R01-8	55mm x 85mm x 24mm
	SP-SE-R08-8	143mm x 73mm x 44mm
	SP-SE-R16-8	480mm x 73mm x 44mm
	SP-SE-R24-8	
Weight	SP-SE-R01-8	75g
	SP-SE-R08-8	435g
	SP-SE-R16-8	1.38kg
	SP-SE-R24-8	1.38kg
Compliance	IEC 61644-1, draft 98	

Ordering Info

SP-SE-R01-8	Standalone Type Ethernet 10/100Base-T, RJ45 1 Port Ethernet Surge Protector
SP-SE-R08-8	Standalone Type Ethernet 10/100Base-T, RJ45 8 Ports Ethernet Surge Protector
SP-RE-R16-8	Rack Type Ethernet 10/100Base-T, RJ45 16 Ports Ethernet Surge Protector
SP-RE-R24-8	Rack Type Ethernet 10/100Base-T, RJ45 24 Ports Ethernet Surge Protector

Surge Protector

SP-SE-B01

Coaxial Surge Protector

The Coax series of data communication line surge protectors will ensure the reliable operation of coaxial based networking equipment running Arc Net, Satellite/cable/Closed circuit TV and most 75ohms Coax communication system.

Features

- Compact in-line installation
- Low shunt capacitance to reduce signal loss
- Maximized system up-time
- State of the art, avalanche diode technology

Specifications

Type	SP-SE-B01-E1
Connection	BNC
Un	10V
U-max	18V
Discharge current	10KA
Response time	<10ns
Insertion (40MHz)	0.5dB
Dimensions(WxDxH)	38mm x 68mm x 27mm
Weight	70g
Compliance	IEC 61644-1, draft 98

Ordering Info

SP-SE-B01-E1	75 ohm, 1 port coaxial cable surge protector

Surge Protector

TSP-10

Telephone Surge Protector

The TSP-10 is an "in-line" design surge protector that can be installed anywhere in the line between your phone service and device. The TSP-10 is equipped with RJ-11 jacks for easy connection to modular phone systems. Simply connect the phone service to the "LINE" connector side and connect your telephone, fax machine or other device requiring protection into the "PHONE" connector.

Features

- Applications include Computers and computer modems, ADSL modems, Fax machines, telephones and answering machines, Dial-up fire/burglar alarms.
- Controls transient over voltages to a low level to ensure maximum protection for your equipment
- LED indicator flashes for ring indication and lights during device "off-hook" operation
- Meet UL 1449 (2ND Edition)
- Simple installation
- Sturdy ABS housing

Specifications

Surge current	8 x 20u sec of 500A
DC Sparkover Voltage	160 — 240V
Dimensions(WxDxH)	30mm x 80mm x 27mm
Weight	20g
Compliance	UL 1449 (2nd Edition)

Ordering Info

TSP-10	Telephone Surge Protector

IP Surveillance

Fiber Series

PDH Series

Broadband Access

EoCoax

Measurement

Interface Converter

08 Datacom Accessories

Network Management

9. Management - EMS

Management

Management Software
Element Management System (EMS)

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 provided the ORB (Object Request Broker) central component of CORBA. It encompasses the entire communication infrastructure necessary to identify and locate objects, handle connection management, and deliver data and is responsible for communication of requests.

Broker server
Broker Server collects the information data from the specific SNMP agent and keeps updating it to the SQL server via the JDBC (Java DataBase Connectivity) driver.

SQL Server
SQL Server is the place where the Broker collected data is stored, the database will store Alarm Trap and all informations.

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.

IP Surveillance | Fiber Series | PDH Series | Broadband Access | EoCoax | Measurement | Interface Converter | Datacom Accessories

9 Network Management

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 systems

- **Database support**
  Support of any SQL server (Oracle, Informix, Microsoft etc.) Flexible SQL interface design for server and client optimization by customer

- **Standard SNMP and CORBA support**
  Design has no assumption to any CORBA vendor. Tested with different Object Request Brokers

- **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.

System Structure

Getting Map node
User can load maps to SQL server, load maps from SQL server or delete attached maps. Download procedure is very simple. First, select the world.jpg and the world map will be attached on Configure tool panel. Second, Map area may be used to layout any objects from Root and Node panel. Third, Using drag-and-drop, put any object to map area. Any label or network element location name may be added to object .

Requirement

EMS	Hardware	Software	Operating System
Broker Server	P4 1.6G or higher, 512MB RAM, HD >2GB (free)	JAVA JDK or JRE. EMS Kit ODBC Driver	Windows, Linux, BSD
SQL database Server	P4 1.6G or higher, 512MB RAM, HD >2GB (free)	MS-SQL Server 7.0 (or MS-SQL 2000) EMS Kit.	Windows 2000 Pro or Server, Windows 2003 Server, Windows XP
CORBA Server	PIII 800 or higher, 128MB RAM, HD >1GB (free)	JAVA JDK or JRE. EMS Kit	Windows, Linux, BSD
Workstation-Clients	PIII 800 or higher, 128MB RAM, HD >1GB	JAVA JRE. EMS Kit	Windows, Linux, BSD
All-In-One	P4 2.8G or higher, 1GB RAM, HD >10GB (free)	JAVA JDK or JRE, EMSkit, MS-SQL Server, ODBC Driver	Windows 2000 Pro or Server, Windows 2003 Server, Windows XP

System Structure

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 agents, local or remote rack, and specific status as filters to watch active alarms. The status filter can be categorize Urgent, Non-urgent, Event, Empty (don't show), and all statuses label or network element location name may be added to object .

Management Software
FRM301/ 401 GUI

Minimal setup, maximum uptime and optimum security are the goals of every network manager. To achieve these goals, network management systems must support various important functions :
1. Fault management - correlates fault management data from all network devices, solates faults and initiates recovery actions
2. Configuration management
3. Performance management

CTC Union develops a perfect solution for the above managements. 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

The management information base (MIB), includes the standard MIB and the enterprise specific MIB, which is defined by product manufacturers for management of their specific equipment. All CTC Union FRM series products provide the option for embedded SNMP agents which allow communication with standard SNMP management software or with our proprietary GUI SNMP manager software. This provides for powerful and efficient network element configuration and monitoring.

Features

- ■ View which type of cards occupy the chassis slots
- ■ Full Read/ Write capabilities
- ■ Change individual card settings
- ■ Enable/ Disable individual cards or channels
- ■ Monitor power module and fan assembly in the unit
- ■ Alarm detection for each card, power module & fan assembly
- ■ Poll readings
- ■ Cards maintain their configuration even if the Management Module fails
- ■ Fully compliant SNMP interface with Windows® 95/NT/98/2000 GUI (Graphical User Interface)
- ■ Configuration settings up or download to/from management PC
- ■ Link-loss forwarding
- ■ Loop-back test capability
- ■ Get CPE status of remote side
- ■ Pass through QoS & TAG-VLAN frames selectable

Terminal Mode

MIB Browser

Ordering Info

FRM-SNMP-GUI	GUI (Graphical User Interface)

System Structure

Main Screen

Accessed IPs are stored in the program

This main screen allows users to enter new or select existing IPs of all agents. When the IP is entered the list of available FRM301/FRM401 chassis are displayed.

FRM301 Rack View Screen

LEDs display actual status

Model name displayed

Click to view card

Accessed IP displayed

Redundant powers displayed

Cooling Fan displayed

Displays the selected chassis information. Each line card is displayed with LEDs, and status.

FRM401 Rack View Screen

LEDs display actual status

Specific cards with connectors are displayed

Fan LEDs display

SNMP card with connectors are displayed

AC/ DC Redundant power modules display

Accessed IP is stored in the program

Displays the selected chassis information. Each line card is displayed with LEDs, and status.

Fast Ethernet Line Card Setting

Edit line card status

Click for loop back test

Click for getting Remote CPE Status

Remote CPE Status displayed

An individual card can be highlighted by clicking on the converter of Chassis screen. A screen is displayed that allows the network administrator to edit the converter's configuration, get the remote unit's status or do loop back functions.

Gigabit Ethernet Line Card Setting

Edit line card status

Click for loop back test

Click for getting Remote CPE Status

Remote CPE Status displayed

Click the button for a 1000Base line card to view and configure the local line card. Under the GUI, the card's status, Tx/Rx Duplex mode and LLF function may be read or modified.

FRM301 E1/T1 Screen

Local & remote configuration

LEDs display actual status

Remote Status displayed

Local converter Status displayed

If an E1/T1 line card is installed in any slot, the status of the E1/T1 link, port settings and loop back functions may be viewed by clicking the channel button.

Alpha-Numeric Product index

Alpha-Numeric Product index

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