



Make Your **Network** Better



Copper Solution

E1 / T1 Access Units DXC / TDM over IP Multiservice Access Multiplexers xDSL / G.SHDSL.bis / Tester

Fiber Solution

Fiber Media Converter Fiber Optical Multiplexer CWDM / SDH / IAD / Tester Fiber Transceiver Multimedia Fiber Extender

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G.SHDSL ATM

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Fiber Series Selection Table

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4U Managed Chassis	FRM401	4U, 19" 12 slots Managed Chassis	R	31
Fast Ethernet	FRM401-10/100	4-port 10/100Base-TX to 100Base-FX	L	32

Interface	Model Name	Description	Туре	Pag
2U Non-managed Chassis	FMC-CH08	2U, 10" 8 slots Unmanaged Chassis	R	33
Fast Ethernet	FMC-10/100	10/100Base-TX to 100Base-FX	S	35
Gigabit Ethernet	FMC-1000E	10/100/1000Base-T to 1000Base-FX	S	37
Gigabit Ethernet	FMC-1000ES	10/100/1000Base-T to 1000Base-FX SFP	S	37
10 Gigabit Ethernet	OF10G-01S	10GBase-T to 10GBase-R SFP+	S	30
Power Over Ethernet	<u>r</u>			
POE	FMC-10/100P	10/100Base-TX to 100Base-FX (PoE)	S	35
Plastic Optical Fiber	1	` '		1 00
	FMC-10/100POF-S	10/100Base-TX to 100Base-FX SMI	S	38
	MFMC-10/100POF-O	10/100Base-TX to 100Base-FX Optolock	S	38
Fiber Switch	1 1 100 107 1001 01 0	10/100Base 17/10 100Base 17/ Optobook	3	30
	FSW-2104	4 140/400D TV 400D EV.C		1
		4-port 10/100Base-TX + 100Base-FX fiber switch	S	41
	FSW-2202	2-port 10/100Base-TX + 2-port 100Base-FX fiber switch	S	42
	FSW-2204	4-port 10/100Base-TX + 2-port 100Base-FX fiber switch	S	42
Fiber Integrated Acce				
Fiber IAD	GW421F	4-port Ethernet, 2-port FXS VoIP gateway with 100Base-FX	S	43
Wireless Fiber IAD	GW421FW	802.11a/b/g wireless, 4-port Ethernet, 2-port FXS VoIP gateway with 100Base-FX	S	43
Wall Mount Non-man	aged Fiber Co	onverter Series		
Non-managed Chassis	FRM402	4U, 19" 16 slots Managed Chassis	R	39
Fast Ethernet	FRM402-10/100	4-port 10/100Base-TX to 100Base-FX	L	39
Gigabit Ethernet	FRM402-1000	2-port 1000Base-T to 1000Base-FX	L	39
RS485/422/232	FRM402-Serial	RS485/422/232 to fiber	L	39
Fast Ethernet	FWM-10/100	10/100Base-TX to 100Base-FX	S	40
Gigabit Ethernet	FWM-1000	1000Base-T to 1000Base-FX	S	4(
RS485/422/232	FWM-Serial	RS485/422/232 to fiber	S	40
CWDM				
5U Managed CWDM Chassis	SML-50-9051	5U, 19(23)", 17 slots chassis	R	52
2U Managed CWDM Chassis	SML-20-9021	2U, 19(23)", 6 slots chassis	R	52
1U Non-managed CWDM Chassis		1U, 19(23)", 4-ch 1.25/2.5G 2R transponder chassis	R	51
1.25G 2R Transponder Card	SML-50-8012	1.25G 2-ch transponder	L, S	53
2.5G 2R Transponder Card	SML-50-8022	2.5G 2-ch transponder	L, S	53
MUX/DeMUX Card	SML-50-8181	4/5/8/9-ch MUX/DEMUX	L, S	53
Protection Card	SML-50-8210	Fiber Optical Protection Switch	L, S	54
OADM Card	SML-50-8301		L, S	54
		Optical Add/Drop MUX	L, 3	32
Managed Fiber Optical	al Multiplexer			
16-ch FOM	FMUX01A	1U, 19(23)", 4-slot, 4xE1(T1), 4xDatacom, 1xEthernet FOM	R	4
16-ch FOM w/ order wire	FMUX01A/Plus	1U, 19(23)", 100Mbps Ethernet, 4slot, 4xE1(T1), 4xFXO(FXS), 4xDatacom FOM	R	47
4-ch FOM w/ order wire	FMUX04	4-port E1 or T1 FOM	S	49
Managed SDH Multip	lexer			
STM-1	SDH01A	1U, 19(23)", 4-slot, 4(8) E1(T1), 1xE3(T3), 4xDatacom, 4xEthernet ADM	R	50
Multimedia Fiber Exte	ender			
HDMI	HDMI-F	HDMI to fiber extender	S	56
	DVI-F	DVI to fiber extender	S	55
Fiber Transceiver Mo	dule			
155Mbps SFP	155Mbps SFP	155M hot-pluggable fiber transceiver module	С	57
155Mbps, 1.25/2.5G CWDM SFF		155M, 1.25/2.5G CWDM hot-pluggable fiber transceiver module	C	58
1.25G GBIC	GBIC	1.25G hot-pluggable fiber transceiver module	С	58
1.25/2.5G SFP	SFP		С	
		1.25/2.5G hot-pluggable fiber transceiver module		58
	XFP	10G hot-pluggable fiber transceiver module	С	58
	SFP+	10G hot-pluggable fiber transceiver module	С	58
Fiber Patch cords	T	1		
Fiber (9/125, 50/125, 62.5/125um)	Fiber Patch cords	Fiber optic patch cord	С	59
Fiber Attenuator				
Fiber (9/125, 50/125, 62.5/125um)	Fiber Attenuator	Fiber attenuator	С	60

2. xDSL SERIES

G.SHDSL.bis / G.SHDSL ADSL / ADSL2 / VDSL / VDSL2



xDSL Series Selection Table

G.SHDSL.bis Family		Type: R = Rack, L = Line ca	ırd, <mark>S =</mark> Staı	nd-alone
Interface	Model Name	Description	Туре	Page
G.SHDSL.bis TDM				
Managed G.SHDSL.bis TDM C	hassis			
4U Managed Chassis	SHRM03bT-CH	4U, 19", 16-slot managed chassis w/ SNMP	R	63
2-wire (5.7Mbps) TDM card				
E1	SHRM03b-E1	2-ch E1 card	L	64
Ethernet Bridge	SHRM03b-ET100	2-ch 10/100Base-TX card	L	64
V35, RS530, RS449, X.21 NE	SHRM03b-Data	2-ch V35, RS530, RS449, X.21 card	L	64
2-wire (5.7Mbps) G.SHDSL.bis	TDM CPE Modem			
E1	SHDTU03b-E1	E1 NTU	S	65
V35, RS530, RS449, X.21	SHDTU03b-Data	V35, RS530, RS449, X.21 NTU	S	66
Ethernet Bridge	SHDTU03b-ET100	Ethernet 10/100Base-TX NTU	S	67
Ethernet Bridge+E1+Data №	SHDTU03b-31	Ethernet 10/100Base-TX, E1, Data (V.35, RS530, RS449, X.21)	S	68
(V.35, RS530, RS449, X.21)		multi-interface NTU		
4-wire (11.4Mbps) G.SHDSL.bis	s TDM CPE Modem			
E1 NE	SHDTU03bA-E1	E1 NTU	S	65
V35, RS530, RS449, X.21 NE	SHDTU03bA-Data	V35, RS530, RS449, X.21 NTU	S	66
Ethernet Bridge	SHDTU03bA-ET100	Ethernet 10/100Base-TX NTU	S	70
Ethernet Bridge + E1 + Data	SHDTU03bA-31	Ethernet 10/100Base-TX, E1, V.35 multi-interface NTU	S	68
(V.35, RS530, RS449, X.21)				
Ethernet Bridge + E1(T1)+	SHDTU03bA-31T	Ethernet 10/100Base-TX, E1, T1, V.35 multi-interface NTU	S	68
Data (V.35, RS530, RS449, X.21,)			
G.SHDSL.bis ATM				
G.SHDSL.bis ATM Chassis				
4U chassis	SHRM03b-CH	4U,19", 16-slot chassis	R	69
2/4-wire (5.7/11.4Mbps) ATM	card			
Ethernet Router	SHRM03b-ET100R	2-ch 2-wire (5.7Mbps) Ethernet 10/100Base-TX router card	L	70
Ethernet Router	SHRM03bA-ET100R	4-wire (11.4Mbps) Ethernet 10/100Base-TX router card	L	70
2-wire (5.7Mbps) G.SHDSL.bis	ATM Bridge/Router			
Ethernet Router	SHDTU03b-ET10R	1-port 10/100Base-TX Ethernet Router	S	71
Ethernet Router w/Firewall	SHDTU03bF-ET10R	1-port 10/100Base-TX Ethernet Router w/ Firewall	S	71
Ethernet Router	SHDTU03b-ET10RS	4-port 10/100Base-TX Ethernet Router	S	71
Ethernet Router w/Firewall	SHDTU03bF-ET10RS	4-port 10/100Base-TX Ethernet Router w/ Firewall	S	71
4-wire (11.4Mbps) G.SHDSL.bis	s ATM Bridge/Router	,		
Ethernet Router	SHDTU03bA-ET10RS	4-port 10/100Base-TX Ethernet Router	S	71
Ethernet Router w/Firewall	SHDTU03bAF-ET10RS	4-port 10/100Base-TX Ethernet Router w/ Firewall	S	71
G.SHDSL.bis Ethernet First Mile	•			
2/4/8-wire EFM (5.7/11.4/22.8N	lbps)			
5.7Mbps Ethernet Bridge	EFM-10	2-wire, 4-port LAN extender	S	129
11.4Mbps Ethernet Bridge	EFM-20	4-wire, 4-port LAN extender	S	129
22.8Mbps Ethernet Bridge	EFM-40	8-wire, 4-port LAN extender	S	129

Type: R = Rack, L = Line card, S = Stand-alone, C = Compact

Interface	Model Name	Description	Туре	Page
G.SHDSL TDM				
Managed G.SHDSL TDM Chass	sis			
4U Managed Chassis	SHRM03-CH	4U, 13-slot managed Chassis	R	73
2-wire (2.3Mbps) TDM card				
E1	SHRM03-E1	2-ch E1 card	L	73
V35, RS530, RS449, X.21	SHRM03-V35 X21	2-ch V35, RS530, RS449, X.21 card	L	73
Ethernet Bridge	SHRM03-ET100	2-ch Ethernet 10/100Base-TX card	L	73
2-wire (2.3Mbps) G.SHDSL TDI	M CPE Modem			
E1	SHDTU03-E1	E1 NTU	S	75
V35, RS530, RS449, X.21	SHDTU03-V35 X21	V35, RS530, RS449, X.21 NTU	S	76
Ethernet Bridge	SHDTU03-ET100	Ethernet 10/100Base-TX NTU	S	79
G.SHDSL ATM				
G.SHDSL ATM Chassis				
4U Chassis	SHRM03-CH	4U, 13-slot chassis	R	78
2-wire (2.3Mbps) ATM card				
Ethernet Router	SHRM03-ET100R	2-ch 2-wire (2.3Mbps) Ethernet 10/100Base-TX router card	L	79
2-wire (2.3Mbps) G.SHDSL ATM	M Bridge/Router			
Ethernet Router	SHDTU03-ET10R	1-port Ethernet 10/100Base-TX Router	S	80
Ethernet Router w/Firewall	SHDTU03F-ET10R	1-port Ethernet 10/100Base-TX Router w/ Firewall	S	80
Ethernet Router	SHDTU03-ET10RS	4-port Ethernet 10/100Base-TX Router	S	80
Ethernet Router w/Firewall	SHDTU03F-ET10RS	4-port Ethernet 10/100Base-TX Router w/ Firewall	S	80
4-wire (4.6Mbps) G.SHDSL ATM	M Bridge/Router		•	•
Ethernet Router	SHDTU03A-ET10RS	4-port Ethernet 10/100Base-TX Router	S	80
Ethernet Router w/Firewall	SHDTU03AF-ET10RS	4-port Ethernet 10/100Base-TX Router w/ Firewall	S	80

ADSL Family

IP DSLAM				
1.5U Managed IP DSLAM	MD15	1.5U, 19", 48-port ADSL2+ IP DSLAM	R	81
2U Managed IP DSLAM	MD20	2U, 19", 72-port ADSL2+ IP DSLAM	R	82
Modem				
ADSL2+ Modem	ATU-R160-1	ADSL2/ADSL2+ 1-port modem w/ USB	S	83
ADSL2 ⁺ Modem	ATU-R160-4	ADSL2/ADSL2+ 4-port modem	S	83
ADSL Splitter				
Rack				
6U Rack	ALS-R50	6U, 19", 16-slot (384 loop max)	R	84
ADSL Splitter Line Card	ALS-R50 24P-11	24-port ADSL POTS splitter card	L]
6U Rack	ALS-R60	6.75U, 19", 20-slot (640 loop max)	R	85
ADSL Splitter Line Card	ALS-R60 32P-11	32-port ADSL POTS splitter card	L]
Stand-alone Splitter				
ADSL	ALS-P10	ADSL MDF type splitter	С	87
ADSL, VDSL	ALS-12	ADSL/VDSL splitter	С	86
ADSL	ALS-10-IT	Italy POTS plug ADSL splitter	С	88
ADSL	ALS-10-UK	UK POTS BT plug ADSL splitter	С	88
ADSL	ALS-10-FI	Finland POTS plug ADSL splitter	С	88
ADSL	ALS-10-FA	France POTS plug ADSL splitter	С	88
ADSL	ALS-10-EU/I	ADSL/ISDN splitter	С	89
Stand-alone Micro Filter				
ADSL, VDSL	ALS-M12	ADSL/VDSL micro filtter	С	86

VDSL Family

Modem				
VDSL2	VDTU2-104	VDSL2 4-port Ethernet 10/100Base-TX CO modem	S	90
VDSL2	VDTU2-204	VDSL2 4-port Ethernet 10/100Base-TX CPE modem	S	90



PDH Series Selection Table

Managed E1 Concentrator
4U Managed E1 Concentrator

Ethernet Bridge

Ethernet Bridge

E1 inverse multiplexer card

ERM04

ETU04A

1U Stand-alone (Rack-mountable), E1 Inverse Multiplexer

ERM04-ET100

Interface	Model Name	Description	Type	Page
E1 CSU/DSU				
Managed E1 Concentrator				-
4U Managed E1 Concentrator	ERM01	4U, 19", 13-slot fractional E1 (Nx64k) / unframed E1 concentrator w/ SNMP	R	91
Fractional E1 card				
V.35	ERM01-V35	V.35 to fractional E1 (Nx64k)	L	92
RS530/449/X.21	ERM01-Serial	RS530/449/X.21 to fractional E1 (Nx64k)	L	92
Ethernet Bridge	ERM01-ET100	Ethernet 10/100Base-TX Bridge over fractional E1 (Nx64k)	L	92
Ethernet Router	ERM01-ET100R	Ethernet 10/100Base-TX Router over fractional E1 (Nx64k)	L	92
Unframed E1 card				
V.35	ERM01-V35-U	V.35 to unframed E1	L	92
RS530/449/X.21	ERM01-Serial-U	RS530/449/X.21 to unframed E1	L	92
Ethernet Bridge	ERM01-ET100-U	Ethernet 10/100Base-TX Bridge over unframed E1	L	92
Ethernet Router	ERM01-ET100R-U	Ethernet 10/100Base-TX Router over unframed E1	L	92
Single E1 Access Unit				
1U Stand-alone (Rack-mountal	ole), Single E1 Acce	ess Unit		
RS530, RS449 /	ETU01A	*Data port to fractional E1 w/ SNMP & LCD display	S	93
V.36, RS232 / V.24 /	ETU01A-AD	*Data port to fractional E1 w/ SNMP, LCD display & dual power	S	93
V.35, X.21, NRZ, G703 / 64 /	ETU01	*Data port to fractional E1	S	94
Ethernet Bridge, Router	ETU01U	*Data port to unframed E1	S	95
Managed Ethernet Bridge	EOe-1A	Ethernet over unframed E1 w/SNMP	S	97
Ethernet Bridge	EOe-1	Ethernet over unframed E1	S	98
* Data Port		<u> </u>		
RS530	ETU/TTU-530	RS530 I/F module	M	96
RS449/V.36	ETU/TTU-449	RS449/V.36 I/F module	M	96
RS232/V.24	ETU/TTU-232	RS232/V.24 I/F module	M	96
V.35	ETU/TTU-V35	V.35 I/F module	M	96
X.21	ETU/TTU-X21	X.21 I/F module	M	96
NRZ	ETU/TTU-NRZ	NRZ I/F module	M	96
G703/64	ETU/TTU-G64	G.703/64K co-directional I/F module	M	96
Ethernet Bridge	ETU/TTU-ET100	Ethernet 10/100Base-TX Bridge I/F module	M	96
Ethernet Router	ETU/TTU-ET100R	Ethernet 10/100Base-TX Routing I/F module	M	96
All of the above I/F modules are	e available for ETU0	1/ETU01A/ETU01U/ETU01-MUX/ETU02/TTU01/TTU02 models		
Compact, Stand-alone, Single	E1 Access Unit			
V.35/X.21/RS530/449	G703-FE1A	Compact size, data to fractional E1 (Nx64k)	С	99
V.35/X.21/RS530/449	G703-E1-U	Compact size, data to unframed E1	С	100
Managed Single E1, Multi-Data I	Port Multiplexer			
1U Stand-alone (Rack-mountal	ole), Managed E1 M	ultiplexer		
* RS530, RS449/V.36, RS232/NE	ETU02-MUX/AD	*E1 Mux, 2/4-ch data port, sub E1, w/ SNMP, LCD display dual power (AC+DC)	S	106
V.24, V.35, X.21, NRZ, G703/	ETU02-MUX	*E1 Mux, 2/4-ch data port, sub E1, w/ SNMP & LCD display	S	106
64/Ethernet Bridge, Router	ETU01-MUX/AD	*E1 Mux, data port w/Ethernet bridge on board, sub E1 & LCD display	S	108
V.35, X.21, RS232/V.24,	ETU02A-MUX	*E1 Mux, 2/4-ch data port, sub E1	S	107
RS530, RS449/V.36				

4U, 19", 13-slot concentrator w/ SNMP

4E1 (8Mbps) inverse multiplexer card

4E1 (8Mbps) inverse multiplexer

R

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PDH Series Selection Table

E1 Family	Type: R = Rack, L = Line card, S = Stand-alone, M = Module

Interface	Model Name	Description	Туре	Page
Managed Voice & Data E1 Multi	plexer			
Managed E1 Chassis				-
4U Managed Chassis	ERM-Mux/Plus	4U, 19", 14-slot voice & data E1 multiplexer chassis w/ SNMP	R	101
Interface Card				
E1 Trunk	ERM-Mux/Plus-E1	2 fractional E1 (Nx64k) trunk card	L	102
Sub E1	ERM-Mux/Plus-Sub E1	2 fractional Sub E1 (Nx64k) card	L	102
Ethernet Bridge	ERM-Mux/Plus-ET100	2-ch Ethernet 10/100Base-TX bridge card	L	102
Ethernet Router	ERM-Mux/Plus-ET100R	2-ch Ethernet 10/100Base-TX router card	L	102
V.35, X.21, RS530, RS449/V.36	ERM-Mux/Plus-HS-Serial	6-ch high-speed (2Mbps) V.35, X.21, RS530, RS449/V.36 (Nx64k) card	L	102
RS232/V.24	ERM-Mux/Plus-LS-232	6-ch RS232/V.24 Async (≦38.4kbps) & Sync (64/128kbps) card	L	102
RS232/V.24	ERM-Mux/Plus-LS-X50	5-ch RS232/V.24 Async & Sync (≦38.4kbps) card	L	102
G.703 Co-directional 64K	ERM-Mux/Plus-LS-G64	4-ch G.703 Co-directional 64K card	L	102
FXO	ERM-Mux/Plus-FXO	6-ch FXO voice card	L	103
FXS	ERM-Mux/Plus-FXS	6-ch FXS voice card	L	103
E&M	ERM-Mux/Plus-E&M	6-ch 2/4-wire Type I,II,III,IV E&M voice card	L	103
Magneto	ERM-Mux/Plus-Magneto	6-ch Magneto voice card	L	103
Loop Disconnect	ERM-Mux/Plus-LD	4-ch Loop Disconnect voice card	L	103
1U Stand-alone (Rack-mounta	ble), Managed E1 Multip	lexer		
1U Managed Chassis	ETU02-Mux/Plus	1U, 19", 3-slot voice & data E1 multiplexer chassis w/ SNMP	R	104
Interface Module				
E1 Trunk	ETU02-Mux/Plus-E1	Fractional E1 (Nx64k) trunk module	M	105
Sub E1	ETU02-Mux/Plus-SubE1	Fractional Sub E1 (Nx64k) module	М	105
Ethernet Bridge	ETU02-Mux/Plus-ET100	1-ch Ethernet 10/100Base-TX bridge module	M	104
V.35, X.21, RS530, RS449/V.36	ETU02-Mux/Plus-N64	2-ch V.35, X.21, RS530, RS449/V.36 (Nx64k) module	М	105
RS232/V.24	ETU02-Mux/Plus-232	4-ch RS232/V.24 Async (≦38.4kbps) & Sync (64/128kbps) module	M	105
G.703 Co-directional 64K	ETU02-Mux/Plus-G64	2-ch G.703 Co-directional 64K module	M	105
FXO	ETU02-Mux/Plus-FXO	4-ch FXO voice module	M	105
FXS	ETU02-Mux/Plus-FXS	4-ch FXS voice module	M	105
E&M	ETU02-Mux/Plus-E&M	4-ch 2/4-wire E&M voice module	M	105

DXC Family

DXC Concentrator				
4U Managed E1 Chassis	ERM-DXC	4U, 19", 11-slot, E1 digital cross connect multiplexer w/SNMP	R	111
Interface Card				
8E1	ERM-DXC-8E1	8-ch fractional E1 (Nx64k) card	L	112
Ethernet Bridge	ERM-DXC-ET10	2-ch Ethernet 10/100Base-TX bridge card	L	112
V.35, X.21, RS530, RS449/	ERM-DXC-HS-Serial	2-ch high-speed (2Mbps) V.35, X.21, RS530, RS449 / V.36, RS232 / V.24 (Nx64k) card	L	112
V.36, RS232/V.24	ERM-DXC-MS-Serial	3-ch medium-speed (64/128kbps) V.35, X.21, RS530, RS449 / V.36, RS232 / V.24 card	L	112
RS232/V.24	ERM-DXC-LS-232	4-ch RS232/V.24 64kbps Sync / 19.2kbps Async card	L	112
RS232/V.24	ERM-DXC-X50	5-ch RS232/V.24 Async & Sync (≦19.2kbps) card	L	112
DXC Concentrator				
1U Stand-alone (Rack-mountal	ole), E1 Digital Cross Co	onnect Multiplexer		
8 E1	ETU-DXC/A-8	1U, stand-alone 8-ch E1 digital cross connect multiplexer	S	113
16 E1	ETU-DXC/A-16	1U, stand-alone 16-ch E1 digital cross connect multiplexer	S	113

TDM over IP

1U Stand-alone (Rack-mountable), IP multiplexer				
E1/T1 IP Mux	IPM-1SE	E1/T1 over IP network	S	114

F1 to T1 Cross Rate Converter	Type: R = Rack, L = Line card, S = Stand-alone, C = Compact, SP = Surge Protector
E I to I I Cross Rate Converter	Type: K = Rack, L = Line card, S = Stand-alone, C = Compact, SP = Surge Protecto

Interface	Model Name	Description	Туре	Page
E1, T1	G703FTEC	1U, stand-alone, E1 (T1) to T1 (E1) cross rate converter	S	119

Repeater Family

E1/T1	ETR01	1 x E1/T1 repeater	С	120
E1/T1	ETR04	1 to 4 E1/T1 Uni-directional repeater	С	120

G.703/64k Family

G.703 Co-directional 64K Concentrator								
4U Concentrator	G703/64-RM	4U, 19", 13-slot, G.703 Co-directional 64K concentrator	R	115				
G.703 Co-directional 64K care	G.703 Co-directional 64K card							
V.35, X.21, RS530, RS449/	G703/64-RM-Serial	V.35, X.21, RS530, RS449/V.36, RS232/V.24 (64 or 19.2kbps) card	L	116				
V.36, RS232/V.24								
Single G.703 Co-directional 64l	K Access Unit							
1U Stand-alone (Rack-mountal	ole), Single G.703 Co	-directional 64K Access Unit						
V.35, X.21, RS530, RS449/	G703/64A-STD	V.35, X.21, RS530, RS449/V.36, RS232/V.24 to G.703 Co-directional 64K	S	117				
V.36, RS232/V.24								
Ethernet Bridge	ET100/G64	Ethernet over G.703 Co-directional 64K	S	134				
Compact, Stand-alone, Single	G.703 Co-directional	64K Access Unit						
V.35, X.21, RS232/V.24	G703/64A-V35/X21/	Compact size, V.35, X.21, RS232/V.24 to G.703 Co-directional/	С	118				
	232	contra-directional/centra-directional 64K						

T1 Family

I I diffily								
T1 Concentrator								
4U Concentrator	TRM01	4U, 19", 13-slot fractional T1 (Nx64k) concentrator	R	121				
Fractional T1 card								
V.35	TRM01-V35	V.35 to fractional T1 (Nx64k)	L	122				
RS530/449/X.21	TRM01-Serial	RS530/449/X.21 to fractional T1 (Nx64k)	L	122				
Ethernet Bridge	TRM01-ET100	Ethernet 10/100Base-TX bridge over fractional T1 (Nx64k)	L	122				
Ethernet Router	TRM01-ET100R	Ethernet 10/100Base-TX router over fractional T1 (Nx64k)	L	122				
Single T1 Access Unit								
1U Stand-alone (Rack-mountal	ole), Single T1 Acce	ss Unit						
* RS530, RS449/V.36, RS232/	TTU01	★ Data port to fractional T1	S	123				
V.24, V.35, X.21, NRZ, G703/								
64/Ethernet Bridge, Router								
Single T1, Multi-Data Port Mult	iplexer							
1U Stand-alone (Rack-mountal	ole), T1 Multiplexer							
* RS530, RS449/V.36, RS232/100	TTU02-MUX/AD	★T1 Mux, 2/4-ch data port, sub T1, w/ LCD display & dual power (AC+DC)	S	124				
V.24, V.35, X.21, NRZ, G703/	TTU02-MUX	★T1 Mux, 2/4-ch data port, sub T1, w/ LCD display	S	124				
64/Ethernet Bridge, Router								

Balun Family

E1	Balun-P	E1 75 to 120 ohms balun (pig-tail type)	В	125
E1	Balun-B1/B2	E1 75 to 120 ohms balun (RJ-45 to 1/2 BNC)	В	125
E1	BLN3010	E1 IDC (mini) balun (1.6/5.6 Jack to IDC)	В	125
E1	BLN4010	E1 IDC (mini) balun (BNC to IDC)	В	125

Surge Protector Family

E1 SP-SE-B01	E1 surge protector	SP	126	
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NETWORKING

Ethernet over Coax / G.SHDSL.bis Ethernet First Mile LAN Extender (G.SHDSL.bis, G.SHDSL, VDSL2) Ethernet Bridge to Data, NRZ, G64 / Ethernet Surge Protector



Ethernet over Coax Family Type: S = Stand-alone, C = Compact, S				
Interface	Model Name	Description		Page
Modem			·	
Ethernet Bridge	EOC-10	Unmanaged Ethernet extender over coaxial cable modem	S	127
Ethernet Bridge	EOC-20	Managed Ethernet extender over coaxial cable (CO modem)	S	128
Ethernet Bridge	EOC-21	Managed Ethernet extender over coaxial cable (CPE modem)	S	128
G.SHDSL.bis Ethernet First I	Mile Family			
2/4/8-wire EFM (5.7/11.4/22.8)	Mbps)			
5.7Mbps Ethernet Bridge	EFM-10	2-wire, 4-port LAN extender	S	129
11.4Mbps Ethernet Bridge	NEW EFM-20	4-wire, 4-port LAN extender	S	129
22.8Mbps Ethernet Bridge	NEW EFM-40	8-wire, 4-port LAN extender	S	129
G.SHDSL.bis LAN Extender				
5.7Mbps Ethernet Bridge	SHDTU03b-ET100BS	2-wire, 4-port LAN extender	S	130
G.SHDSL LAN Extender			·	
2.3Mbps Ethernet Bridge	SHDTU03-ET100B	2-wire, LAN extender	S	131
VDSL2 LAN Extender				
Ethernet Bridge	VDTU2A-301	VDSL2 LAN extender	S	132
Ethernet Bridge Family				
V.35, RS530, RS449, X.21	ET100	Ethernet to WAN (V.35, RS530, RS449, X.21) bridge	С	133
G.703 Co-directional	NEW ET100/G64	Stand-alone Ethernet to G.703 Co-directional 64K bridge	S	134

Surge Protector Family

NEW ET100/NRZ

NRZ

Ethernet	SP-SE-S01-4	4-wire Ethernet surge protector	SP	136
Ethernet	SP-SE-S08-8	8-port 8-wire Ethernet surge protector	SP	136
Ethernet	SP-RE-R16-8	16-port 8-wire Ethernet surge protector	SP	136
Ethernet	SP-RE-R24-8	24-port 8-wire Ethernet surge protector	SP	136

Stand-alone Ethernet to NRZ bridge



Fiber Tester / Protocol Analyzer / PCM Analyzer / LAN Cable Tester

Fiber Tester Family

Type:	н	Hai	ndh	nel	d

Interface	Model Name	Description	Туре	Page
Fiber (9/125µm)	OTDR-30A	Single mode fiber optical time domain reflectometer	Н	137
STM-1	HCT-SDH155	SDH/PDH network analyzer up to 155Mbit/s	Н	138
Fiber (9/125, 50/125, 62.5/125µm)	OPM-300A/B	Optical power meter	Н	139
Fiber (9/125, 50/125, 62.5/125µm)	OLS-100	Optical laser source	Н	140

Protocol Analyzer Family

V.35/X.21/RS530/RS449/RS232	HCT-6000	Datacom protocol and BER tester	Н	143
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PCM Analyzer Family

E1/T1/V.35/X.21/RS530/	BTM10	E1/ T1/ Datacom transmission analyzer/ BERT	Н	144
RS449/RS232				
E1/T1/V.35/X.21/RS530/	HCT-BERT/H	E1/ T1/ Datacom, BER tester	Н	147
RS449/RS232				
E1/V.35/X.21/RS530/RS449	HCT-BERT/C	E1/Datacom, BER tester w/ color LCD display	Н	149
E1/V.35/X.21/RS530/RS449/RS232	HCT-7000	Dual interface E1/ Datacom, protocol analyzer and BER tester	Н	141

LAN Cable Tester Family

UTP, STP	LCT-300	LAN cable continuity, ID tester	Н	150
UTP, STP, Coax	LCT-400	LAN cable continuity, ID tester	Н	150







6

INTERFACE CONVERTER

V.35 Interface Converter / RS485 Interface Converter Family RS232 Interface Converter Family / Async to Sync Converter DTMF to Pulse Converter / Telephone Surge Protector

V.35 I/F Converter Series

Type: C = Compact, SP= Surge Protector

Interface	Interface Powered	Model Name	Description	Туре	Page	
V.35 , RS530	•	V35/530IP	V.35 to RS530	С	151	
V.35 , RS449	•	V35/449IP	V.35 to RS449	С	151	
V.35, X.21	•	V35/X21IP	V.35 to X.21	С	151	
V.35, RS232	•	V35IP	V.35 to RS232	С	152	
V.35, RS232	•	V35IP-CAB	V.35 to RS232 Cable	С	153	
V.35, RS485		V35/485-1	V.35 to RS485	С	154	

RS485 I/F Converter Series

RS485/422, RS232	•	ic485IP-1	RS485/RS422 to Async RS232, 4 screw terminal	С	155
RS485/422, RS232	•	ic485IP-2	RS485/RS422 to Async RS232 RJ-45	С	155
RS485, RS232		ic485-3	RS485 to RS232	С	156
RS485, V.35		V35/485-1	RS485 to V.35	С	154

RS232 I/F Converter Series

RS232, RS449	•	449IP	RS232 to RS449	С	152
RS232, X.21	•	X21IP	RS232 to X.21	С	152
RS232, V.35	•	V35IP-CAB	RS232 to V.35 Cable	С	153
RS232, V.35	•	V35IP	RS232 to V.35	С	152
RS232, RS485/422	•	ic485IP-1	Async RS232 to RS422/ RS485, 4 screw terminal	С	155
RS232, RS485/422	•	ic485IP-2	Async RS232 to RS422/ RS485, RJ-45	С	155
RS232, RS485		ic485-3	RS232 to RS485	С	156
RS232	•	ic232IP-SM	Async RS232 short haul modem, RJ-45	С	157
RS232	•	ic232IP-2	Async RS232 short haul modem, 4-screw terminal	С	157
RS232		icCL-2	RS232, current loop converter	С	158
RS232	•	ic232TTL	RS232 to TTL/CMOS	С	159

Async to Sync Converter

RS232	•	icAS/IP	Asvnc to Svnc converter	С	160	ı
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DTMF to Pulse Converter

POTS DTMF DTMF to pulse converter C 169

Surge Protector Series

POTS	TSP-10	Telephone/Fax surge protector	SP	162









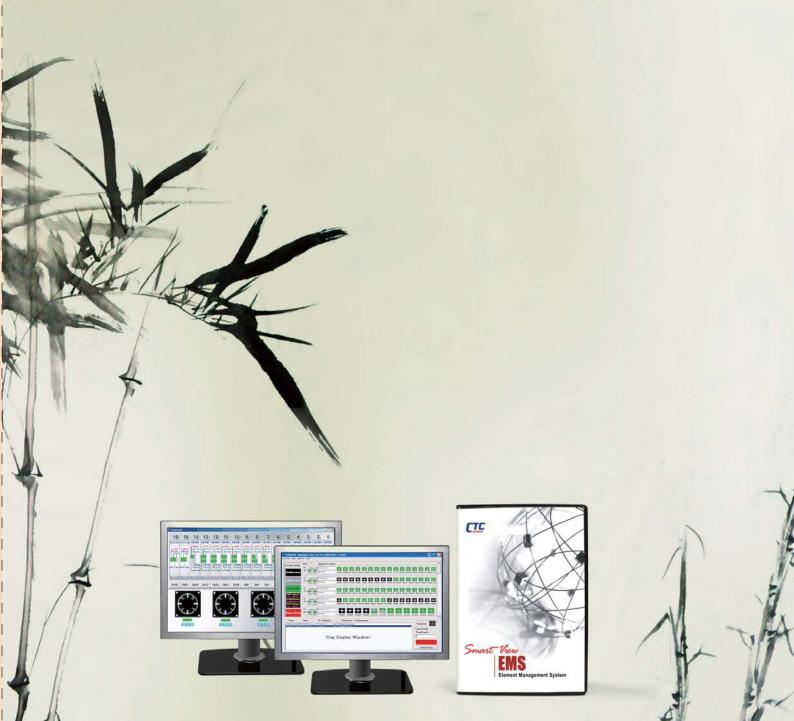
Element Management Software Series

Type: S/W = Software

Interface	Model Name	Description	Туре	Page
EMS	EMS	E-map, java based element management system software	S/W	163

Graphic User Interface Series

GUI	GUI	Graphic user interface	S/W	165	
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8. IP SURVEILLANCE

Embedded License Plate Recognition / Digital Video Server Network Video Recorder / Network Camera Ethernet over Coax / Central Management System

Embedded License Plate Recognition Family

Type:	= Standalone,	= card,	S/W	= So	ftware

Product Model Name		Description	Туре	Page
Embedded LPR	WLPR-LS	License plate recognition (speed from 0~40Km/hr)	L, S	171
Embedded LPR	LPR-MS	License plate recognition (speed from 0~80Km/hr)	L, S	171
Embedded LPR	LPR-HS	License plate recognition (speed from 0~180Km/hr)	L, S	171

Digital Video Server Family

Encoding	Stream	Codec	Model Name	Description	Туре	Page
H.264			IPS-CH20	2U 19" 20-slot H.264 digital video decoder chassis w/ SNMP	L, S	168
H.264	Dual		DVS-8501D	1-ch H.264 digital video decoder	L, S	170
H.264	Dual		DVS-8504E	4-ch H.264 digital video encoder	S	169
MPEG4, M-JPEG	Dual	Dual	DVS-8301	1-ch dual stream video encoder	S	167

Network Video Recorder Family

NVR	N	NVR	Enterprise network video recorder	S/W	173	
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Network Camera Family

MPEG4, M-JPEG, Indoor	Dual	Dual	IPCAM-8309F	Dual stream network camera	S	177.
MPEG4, M-JPEG, Indoor	Dual	Dual	IPCAM-8309FW	Dual stream network camera	S	178
MPEG4, M-JPEG, Indoor	Dual	Dual N	IPCAM-8309D	Dual stream network dome camera	S	179
MPEG4, M-JPEG, In/Outdoor	Dual	Dual N	IPCAM-8308IR	Dual stream network IR camera	S	180
MPEG4, M-JPEG, In/Outdoor	Dual	Dual NE	IPCAM-8318IR	Dual stream network IR camera	S	181
MPEG4, M-JPEG, In/Outdoor	Dual	Dual N	WIPCAM-8318F	Dual stream Day&Night network camera	S	182
MPEG4, M-JPEG, In/Outdoor	Dual	Dual NE	IPCAM-8318P	Dual stream high-speed dome network camera	S	183

Ethernet over Coax

Ethe	rnet Bridge	N	EOC-10	Ethernet extender over coaxial	S	184	
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Central Management System

	CMS		Smart-View Plus	Central management system	S/W	176	
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Fiber Media Converter / Fiber Switch / Fiber Integrated Access Device CWDM / Fiber Optical Multiplexer / SDH Multiplexer Multimedia Fiber Extender / SFP/GBIC Fiber Transceiver Module Fiber Patch cords / Fiber Attenuator



FIBER SERIES

In-band Managed Fiber Media Converter Series Type: R = Rack, L = Line card, S = Stand-alone					
Interface	Model Name	Description	Туре	Page	
2U In-band Managed Chassis	FRM220-CH20	2U, 19" 20 slots In-band managed chassis	R	1	
Stand-Alone Chassis	FRM220-CH01	CPE stand-alone one slot chassis	S	2	
Fast Ethernet	FRM220-10/100I	10/100Base-TX to 100Base-FX w/ In-band Management	L	5	
Fast Ethernet	FRM220-10/100I-2	2-port 10/100Base-TX to 2-port 100Base-FX w/ In-band	L	6	
Fast Ethernet	FMC-10/100I	10/100Base-TX to 100Base-FX w/ In-band Management	S	36	
Fast Ethernet	FMC-10/100IS	10/100Base-TX to 100Base-FX SFP w/ In-band Management	S	36	
Power Over Ethernet	FMC-10/100IP	10/100Base-TX to 100Base-FX w/ In-band Management	S	36	
Power Over Ethernet	FMC-10/100IPS	10/100Base-TX to 100Base-FX SFP w/ In-band Management	S	36	
Fast Ethernet	FRM220-10/100A-1	10/100Base-TX to 100Base-FX w/ In-band 802.3ah OAM/IP management	L, S	7	
Fast Ethernet	FRM220-10/100AS-2	2-port 10/100Base-TX to 2-port 100Base-FX w/ In-band 802.3ah OAM/IP management	L, S	8	
Gigabit Ethernet	FRM220-1000EAS	M220-1000EAS 2-port 10/100/1000Base-T to 2-port 1000Base-FX SFP L, S w/ In-band 802.3ah OAM/IP management		12	
Gigabit Ethernet	FRM220-1000EAS-1	10/100/1000Base-T to 1000Base-FX SFP w/ In-band 802.3ah OAM/ IP management	L, S	11	
Gigabit Ethernet	FRM220-1000EAS-2F	2-port 1000Base-FX SFP w/ In-band 802.3ah OAM/IP	L, S	11	
E1/T1	FRM220-E1/T1	E1/T1 to fiber	L, S	13	
V.35/X.21/RS530/449/232	FRM220-Data	8Mbps (V35/X.21/RS530/449/232) to fiber	L, S	14	
RS485/422/232	FRM220-Serial	RS485/422/232 to fiber	L, S	15	
POTS 2-wire	FRM220-FXO/FXS	POTS to fiber	L, S	16	

Managed Fiber Media Converter Series

Transponder

STM-1	FRM220-155MS	155Mbps fiber repeater	L, S	17
Gigabit Ethernet	FRM220-1000EDS	2-port 10/100/1000Base-T to 2-port 1000Base-FX SFP	L, S	10
Gigabit Ethernet	FRM220-1000ES-1	10/100/1000Base-T to 1000Base-FX SFP	L, S	9
Gigabit Ethernet	FRM220-1000ES-2F	2-port 1000Base-FX SFP	L, S	9
3U Managed Chassis	FRM301	3U, 19" 16 slots SNMP Managed Chassis	R	19
Fast Ethernet	FIB1-10/100F	10/100Base-TX to 100Base-FX	L, S	21
Fast Ethernet (Power Built-in)	FIB2-10/100F	10/100Base-TX to 100Base-FX	S	21
Gigabit Ethernet	FIB1-1000ES	10/100/1000Base-T to 1000Base-FX SFP	L, S	22
Gigabit Ethernet	FIB1-1000TS	1000Base-T to 1000Base-FX SFP	L, S	23
Gigabit Ethernet	FIB1-1000TG	1000Base-T to 1000Base-FX GBIC	L, S	23
Gigabit Ethernet(Power Built-in)	FIB2-1000TG	1000Base-T to 1000Base-FX GBIC	S	23
Gigabit Ethernet	FIB1-1000DS	1.25G SFP repeater	L, S	25
Gigabit Ethernet	FIB1-1000MG	1000Base-SX to 1000Base-LX GBIC	L, S	24
E1 / T1	FIB1-E1/T1	E1/T1 to fiber	L, S	25
E1 / T1 (Power Built-in)	FIB2-E1/T1	E1/T1 to fiber	S	25
V.35/X.21/RS530/449	FIB1-DATA	2Mbps (V35/X.21/RS530/449/232) to fiber	L, S	26
V.35/X.21/RS530/449 (Power Built-in)	FIB2-DATA	2Mbps (V35/X.21/RS530/449/232) to fiber	S	26
V.35/X.21/RS530/449 (With High Speed)	FIB1-DATA/H	8Mbps (V35/X.21/RS530/449/232) to fiber	L,S	26
RS485/422/232	FIB1-Serial	RS485/422/232 to fiber	L, S	27
RS485/422/232 (Power Built-in)	FIB2-Serial	RS485/422/232 to fiber	S	27
RS485/422/232 (Self-healing fiber ring)	FIB1-Serial/FDC	Fiber Daisy Chain RS485/422/232	S	28
4U Managed Chassis	FRM401	4U, 19" 12 slots Managed Chassis	R	31
Fast Ethernet	FRM401-10/100	4-port 10/100Base-TX to 100Base-FX	L	32

Interface	Model Name	Description	Туре	Page
2U Non-managed Chassis	FMC-CH08	2U, 10" 8 slots Unmanaged Chassis	R	33
Fast Ethernet	FMC-10/100	10/100Base-TX to 100Base-FX	S	35
Gigabit Ethernet	FMC-1000E	10/100/1000Base-T to 1000Base-FX	S	37
Gigabit Ethernet	FMC-1000ES	10/100/1000Base-T to 1000Base-FX SFP	S	37
	OF10G-01S	10GBase-T to 10GBase-R SFP+	S	30
Power Over Ethernet	T 100-010	100Dase-1 to 100Dase-1 of 1 +	3	30
POE	FMC-10/100P	10/100Base-TX to 100Base-FX (PoE)	S	25
	1 MC-10/100F	10/100Dase-17 to 100Dase-17 (FOL)	3	35
Plastic Optical Fiber	EMO 40/400DOE 0	40/400D TV 4- 400D EV CMI		
	FMC-10/100POF-S	10/100Base-TX to 100Base-FX SMI	S	38
	FMC-10/100POF-O	10/100Base-TX to 100Base-FX Optolock	S	38
Fiber Switch				
	FSW-2104	4-port 10/100Base-TX + 100Base-FX fiber switch	S	41
	FSW-2202	2-port 10/100Base-TX + 2-port 100Base-FX fiber switch	S	42
	FSW-2204	4-port 10/100Base-TX + 2-port 100Base-FX fiber switch	S	42
Fiber Integrated Acce	ess Device			
Fiber IAD	GW421F	4-port Ethernet, 2-port FXS VoIP gateway with 100Base-FX	S	43
Wireless Fiber IAD	GW421FW	802.11a/b/g wireless, 4-port Ethernet, 2-port FXS VoIP gateway with 100Base-FX	S	43
Wall Mount Non-mana	aged Fiber Co	onverter Series		
Non-managed Chassis	FRM402	4U, 19" 16 slots Managed Chassis	R	39
Fast Ethernet	FRM402-10/100	4-port 10/100Base-TX to 100Base-FX	L	39
Gigabit Ethernet	FRM402-1000	2-port 1000Base-T to 1000Base-FX	L	39
RS485/422/232	FRM402-Serial	RS485/422/232 to fiber	L	39
Fast Ethernet	FWM-10/100	10/100Base-TX to 100Base-FX	S	40
Gigabit Ethernet	FWM-1000	1000Base-T to 1000Base-FX	S	40
RS485/422/232	FWM-Serial	RS485/422/232 to fiber		40
CWDM				
5U Managed CWDM Chassis	SML-50-9051	5U, 19(23)", 17 slots chassis	R	52
2U Managed CWDM Chassis	SML-20-9021	2U, 19(23)", 6 slots chassis		52
1U Non-managed CWDM Chassis	+	1U, 19(23)", 4-ch 1.25/2.5G 2R transponder chassis		51
1.25G 2R Transponder Card	SML-50-8012	1.25G 2-ch transponder	R L, S	53
2.5G 2R Transponder Card	SML-50-8022	2.5G 2-ch transponder	L, S	53
MUX/DeMUX Card	SML-50-8181	4/5/8/9-ch MUX/DEMUX	L, S	53
Protection Card	SML-50-8210	Fiber Optical Protection Switch	L, S	54
OADM Card	SML-50-8301	Optical Add/Drop MUX	L, S	54
		<u> </u>	L, 3	54
Managed Fiber Optica	ai Multiplexer			
16-ch FOM	FMUX01A	1U, 19(23)", 4-slot, 4xE1(T1), 4xDatacom, 1xEthernet FOM	R	45
16-ch FOM w/ order wire	FMUX01A/Plus	1U, 19(23)", 100Mbps Ethernet, 4slot, 4xE1(T1), 4xFXO(FXS), 4xDatacom FOM	R	47
4-ch FOM w/ order wire	FMUX04	4-port E1 or T1 FOM	S	49
Managed SDH Multiple	lexer			
STM-1	SDH01A	1U, 19(23)", 4-slot, 4(8) E1(T1), 1xE3(T3), 4xDatacom, 4xEthernet ADM	R	50
Multimedia Fiber Exte	ender			
HDMI	HDMI-F	HDMI to fiber extender	S	56
DVI	DVI-F	DVI to fiber extender	S	55
Fiber Transceiver Mo	dule			
155Mbps SFP	155Mbps SFP	155M hot-pluggable fiber transceiver module	С	57
155Mbps, 1.25/2.5G CWDM SFF		155M, 1.25/2.5G CWDM hot-pluggable fiber transceiver module		58
1.25G GBIC	GBIC	1.25G hot-pluggable fiber transceiver module 1.25G hot-pluggable fiber transceiver module		58
1.25/2.5G SFP	SFP	1.25G not-pluggable fiber transceiver module 1.25/2.5G hot-pluggable fiber transceiver module		58
	XFP	1.23/2.35 not-pluggable fiber transceiver module 10G hot-pluggable fiber transceiver module	C	58
	SFP+		С	
	VOLL+	10G hot-pluggable fiber transceiver module	<u> </u>	58
Fiber Patch cords	E. 5			
Fiber (9/125, 50/125, 62.5/125um)	Fiber Patch cords	Fiber optic patch cord	С	59
Fiber Attenuator				

Fiber Media Converter Chassis Specification

20-slot, 2U, 19" Chassis



For all FRM220 series line cards

Specifications

Model Name		FRM220-CH20		
Slot		20-slots		
Line Card	ł	Fast Ethernet to Fiber		
Options		Gigabit Ethernet to Fiber		
		E1/T1 to Fiber		
		RS-485/422/232 to Fiber		
		V.35/X.21/RS-530/449 to Fiber		
		FXO/FXS to Fiber		
		Fiber (SM) to Fiber (MM)		
Management		OAM Web		
		SNMP Console		
		Telnet		
Power	AC	Input:Universal, 100~240 VAC;		
_		Freq.: 47~63 Hz		
_	DC	Input: 36~72 VDC; 18~36 VDC (option)		
		1+1 Redundancy, hot-swappable		
Page		1		

1-slot Chassis



For all FRM220 series line cards

Specifications

Slot	Model Name		FRM220-CH01		
Gigabit Ethernet to Fiber	Slot		1-slot		
E1/T1 to Fiber RS-485/422/232 to Fiber V.35/X.21/RS-530/449 to Fiber FXO/FXS to Fiber FXO/FXS to Fiber Fiber (SM) to Fiber (MM) Management Power	Line Card	d	Fast Ethernet to Fiber		
RS-485/422/232 to Fiber V.35/X.21/RS-530/449 to Fiber FXO/FXS to Fiber Fiber (SM) to Fiber (MM) Management Power AC Input:Universal, 100~240 VAC; Freq.: 47~63 Hz DC Input: 36~72 VDC AC, DC, or AC+DC	Options		Gigabit Ethernet to Fiber		
V.35/X.21/RS-530/449 to Fiber FXO/FXS to Fiber Fiber (SM) to Fiber (MM)			E1/T1 to Fiber		
FXO/FXS to Fiber Fiber (SM) to Fiber (MM) Management Power AC Input: Universal, 100~240 VAC; Freq.: 47~63 Hz DC Input: 36~72 VDC AC, DC, or AC+DC			RS-485/422/232 to Fiber		
Power AC Input:Universal, 100~240 VAC; Freq.: 47~63 Hz DC Input: 36~72 VDC AC, DC, or AC+DC			V.35/X.21/RS-530/449 to Fiber		
Power AC Input:Universal, 100~240 VAC; Freq.: 47~63 Hz DC Input: 36~72 VDC AC, DC, or AC+DC			FXO/FXS to Fiber		
Power AC Input:Universal, 100~240 VAC; Freq.: 47~63 Hz DC Input: 36~72 VDC AC, DC, or AC+DC			Fiber (SM) to Fiber (MM)		
Freq.: 47~63 Hz DC Input: 36~72 VDC AC, DC, or AC+DC	Managen	nent			
Freq.: 47~63 Hz DC Input: 36~72 VDC AC, DC, or AC+DC					
Freq.: 47~63 Hz DC Input: 36~72 VDC AC, DC, or AC+DC					
DC Input: 36~72 VDC AC, DC, or AC+DC	Power	AC	Input:Universal, 100~240 VAC;		
AC, DC, or AC+DC			Freq.: 47~63 Hz		
		DC	Input: 36~72 VDC		
Page 2			AC, DC, or AC+DC		
1 490 2	Page		2		

16-slot, 3U, 19" Chassis



For all FRM301 series line cards

Specifications

Model Name		FRM301-CH
Slot		16-slots
Line Card	d	Fast Ethernet to Fiber
Options		Gigabit Ethernet to Fiber
		E1/T1 to Fiber
		RS-485/422/232 to Fiber
		V.35/X.21/RS-530/449 to Fiber
		Fiber (SM) to Fiber (MM)
		RS485/232/422
		Fiber Daisy Chain
Manager	nent	SNMP GUI
		Telnet Console
Power	AC	Input:Universal, 90~240 VAC;
		Freq.: 47~63 Hz
	DC	Input: 18~56 VDC ; 36~72 VDC (option)
		1+1 Redundancy, hot-swappable
Page		19

12-slot, 4U, 19" Chassis 4 channels per line card



For all FRM401 series line cards

Specifications

Model Na	ame	FRM401-CH		
Slot		12-slots (4 channels per line card)		
Line Card	d	Fast Ethernet to	Fiber	
Options				
Management		SNMP	GUI	
		Telnet	Console	
		101101		
Power	AC	Input: Manual jur	mper 110 or 220 VAC;	
		Freq.: 47~63 Hz		
	DC	Input: 36~72 VD	C; 18~36 VDC (option)	
		1+1 Redundancy	/ (2*AC or 2*DC)	
Page		31		

8-slot , 2U, 10" Chassis (or half 19")



For all FMC series media converters

Specifications

ations
FMC-CH08
8-slots
Fast Ethernet to Fiber
Gigabit Ethernet to Fiber
Plastic Optic Fiber
LAN Extender
Non-managed

Freq.: 47~63 Hz

Page

Sinlge power AC or DC

DC Input: 36~72 VDC; 18~36 VDC (option)

Fiber Media Concentrator Selection Table

		In-band Managed, 2U Rack, host up to 20 line card	Managed, 3U Rack, host up to 16 line card	Managed, 4U Rack, host up to 12 line card, 4-channel per line card, totally 48 channels	Non-Managed, 1U Rack, host up to 8 line card
Model Name		FRM220	FRM301	FRM401	FMC-CH08
	10/100BaseTX to 100BaseFX	FRM220-10/100 I	FRM301-10/100	FRM401-10/100	FMC-10/100
	10/100/1000BaseTX to 1000BaseFX	FRM220-1000EAS + FRM220-1000EDS	FRM301-1000ES		FMC-1000ES
	1000BaseTX to 1000BaseFX		FRM301-1000TG FRM301-1000TS		
	MM to SM	FRM220-155MS	FRM301-1000MG FRM301-1000DS		
Line card	FXO/FXS(POTS) to fiber	FRM220-FXO/FXS			
Lille Card	E1/T1 to fiber	FRM220-E1/T1	FRM301-E1/T1		
	V35, X21, RS530 to fiber	FRM220-Data	FRM301-Data		
	RS485, RS422, RS232 to fiber	FRM220-Serial	FRM301-Serial		
	Plastic Optic Fiber				FMC-10/100POF-S FMC-10/100POF-O
	VDSL2				VDTU2A-301
	10/100BaseTX to 100BaseFX	FRM220-10/100I + FRM220-CH01	FIB1-10/100	FIB1-10/100	FMC-10/100
	10/100/1000BaseTX to 1000BaseFX	FRM220-1000EAS + FRM220-CH01 FRM220-1000EDS + FRM220-CH01	FIB1-1000ES		FMC-1000ES
Stand-alone	1000BaseTX to 1000BaseFX		FIB1-1000TG FIB1-1000TS		
with AC	MM to SM	FRM220-155MS + FRM220-CH01	FIB1-1000MG FIB1-1000DS		
adapter	FXO/FXS(POTS) to fiber	FRM220-FXO/FXS + FRM220-CH01			
	E1/T1 to fiber	FRM220-E1/T1 + FRM220-CH01	FIB1-E1/T1		
	V35, X21, RS530 to fiber	FRM220-Data + FRM220-CH01	FIB1-Data		
	RS485, RS422, RS232 to fiber	FRM220-Serial + FRM220-CH01	FIB1-Serial		
	10/100BaseTX to 100BaseFX	FRM220-10/100I + FRM220-CH01-AC/DC	FIB2-10/100-AC/DC	FIB2-10/100-AC/DC	FMC-10/100-AC/DC
	10/100/1000BaseTX to 1000BaseFX	FRM220-1000EAS + FRM220-CH01-AC/DC FRM220-1000EDS + FRM220-CH01-AC/DC	FIB2-1000ES-AC/DC		
Stand-alone	1000BaseTX to 1000BaseFX		FIB2-1000TG-AC/DC		
with Internal	MM to SM	FRM220-155MS + FRM220-CH01-AC/DC			
AC/DC power	FXO/FXS(POTS) to fiber	FRM220-FXO/FXS + FRM220-CH01-AC/DC			
	E1/T1 to fiber	FRM220-E1/T1 + FRM220-CH01-AC/DC	FIB2-E1/T1-AC/DC		
	V35, X21, RS530 to fiber	FRM220-Data + FRM220-CH01-AC/DC	FIB2-Data-AC/DC		
	RS485, RS422, RS232 to fiber	FRM220-Serial + FRM220-CH01-AC/DC	FIB2-Serial-AC/DC		

In-band Managed 20 Slots Media Converter Center

FRM220-CH20



The FRM220-CH20 is a 2U high 19" Rack, 20 slot modular media converter rack. It provides an economic solution in high density fiber converter installations in enterprises or central offices. All critical components, Power, fans, management module and interface cards are hot swappable, allowing online field replacement. The hot-swappable power modules can be chosen from AC100-240V, DC18-36. or DC 36-72V. The chassis also has a pair of alarm relays and is able to stack up to 10 chassis as one management unit.

Features

- 2U 19" 20-slot Chassis with AC/DC power redundancy
- Chassis cascade up to 10 with one IP management
- Chassis backplane consists of passive components
- All modules and cards support hot-swap function
- Two alarm relays

Network Management Controller

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

Specifications

Ports	Network Management Controller Card:
	Electrical Interface :Console RS232,
	LAN 10/100Base-TX
LEDs	Network Management Controller Card:
	Power, Fan, Alarm, Act, STK, LAN LNK/SPD
Power	AC: 100 ~240V
	DC24 : 18 ~ 36V, DC48 : 36 ~ 72V
Power Consumption	150W
Dimensions	303 x 438 x 88mm
(D x W x H)mm	
Weight	5.2kg
Temperature	0~50°C (Operating) ,0~70°C (Storage)
Humidity	10~90% non-condensing
Certification	CE, FCC, RoHS
MTBF	65,000 h (25°C)

Overview



Ordering Information

■ FRM220-CH20 2U, 19", 20-slot In-band Managed chassis

■ 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 Management Controller Card

In-band Managed 1-Slot Media Converter Chassis

FRM220-CH01



The FRM220-CH01 is a single-slot chassis for fiber media converter cards available in a number of different power option models; external AC switching adapter, built-in universal AC, built-in -48VDC and AC+DC Dual power. The FRM220-CH01 slide-in chassis may be applied in point to point applications or may be linked to a centrally located FRM220 rack. All the interface cards of the FRM220 may be placed in either the 20 slot chassis or the single slot chassis, making them a common network component and minimizing the requirement for spares.

Features

- Stand-alone case for all FRM220 cards
- Available in four case types: external power adapter or power built-in AC, DC or AC+DC
- Fanless



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

Specifications

Ports	One slot chassis	
Power	CH01 Adapter Input: 100 ~ 240VAC.	
	CH01 Adapter Output: DC12V 1A	
	CH01-AC: 100 ~240VAC	
	CH01-DC24: 18 ~ 36VDC, CH01-DC48: 36 ~ 72VDC	
	CH01-AD: Input 100 ~ 240VAC, 18 ~ 72VDC	
Power Consumption	12W	
Dimensions	CH01: 160x88x24mm	
(D x W x H)mm	CH01-AC/DC/AD: 201x135x35mm	
Weight	CH01: 280g	
	CH01-AC/DC/AD: 580g	
Temperature	0~50°C (Operating) ,0~70°C (Storage)	
Humidity	10~90% non-condensing	
Certification	CE, FCC, RoHS	
MTBF	65,000 h (25°C)	

Overview







Rear Panel of FRM220-CH01/DC



Rear Panel of FRM220-CH01/AD

Ordering Information

■ FRM220-CH01 Stand-alone one-slot chassis w/ external AC adapter

■ FRM220-CH01/AC Stand-alone one-slot chassis w/ internal AC 100 ~240V power supply
■ FRM220-CH01/DC Stand-alone one-slot chassis w/ internal DC 18 ~72V power supply

■ FRM220-CH01/AD Stand-alone one-slot chassis w/ internal AC 100~240V & DC 36 ~72V power inputs

FRM220 Managed Fiber Media Converter Slide-in Card Family

All the FE/E1/T1/Data/Serial line cards are available in fiber transceiver distances as follows:

Single mode: 15/30/50/80/120Km, Multi-mode: 2Km and WDM: 20/40/60/80Km

GbE series line cards are available in 10/20/40/50/80/120Km, Multi-mode: 550M/2Km & WDM:10/20/40/60/80Km



FRM220-10/100I FRM220-10/100IS

In-Band Management Fast Ethernet Fiber Converter

Page 5

10/100Base-TX to 100Base-FX

Auto-Negotiation or forced mode

Auto MDI/MDIX

Forward 2046 bytes (Max.) packets in switch mode

Forward 9K jumbo packets in converter mode

Bandwidth control (Nx32K or Nx512Kbps)

Support flow control (Pause)

Supports remote CPE power fail detect (dying gasp)

Supports Far End Fault

Supports Link Fault Pass through (LFP)

Supports Loop Back Test

Auto Laser Shutdown (ALS)

Online local / remote f/w upgrade



FRM220-10/100IS-2

In-Band Management Fast Ethernet Fiber Converter

Page 6

Dual Converter 10/100Base-TX to 100Base-FX

Auto-Negotiation or forced mode

Auto MDI/MDIX

Forward 2046 bytes (Max.) packets in switch mode

Bandwidth control (Nx32K or Nx512Kbps)

Support flow control (Pause)

Supports remote CPE power fail detect (dying gasp)

Supports Far End Fault

Supports Link Fault Pass through (LFP)

Supports Loop Back Test

Auto Laser Shutdown (ALS)

Online local / remote f/w upgrade



FRM220-10/100A-1 FRM220-10/100AS-1

In-Band OAM Management Fast Ethernet Fiber Converter

Page 7

Supports local / remote 802.3ah OAM / IP

In-band management

Stand-alone IP Based, Web GUI, Telnet,

SNMP management

10/100Base-TX to 100Base-FX

Auto-Negotiation or forced mode

Auto MDI/MDIX

Forward 2046 bytes (Max.) packets

Bandwidth control (Nx32K or Nx512Kbps)

Support flow control (Pause

Supports remote CPE power fail detect (dying gasp)

Supports Far End Fault

Supports Link Fault Pass through (LFP)

Supports Loop Back Test

Auto Laser Shutdown (ALS)
Online local / remote f/w upgrade



FRM220-10/100AS-2

In-Band OAM Management Fast Ethernet Fiber Converter

Page 8

Supports local / remote 802.3ah OAM / IP In-band

Stand-alone IP Based, Web GUI, Telnet,

SNMP management

2-port 10/100Base-TX plus 2-port 100Base-FX SFP

Auto-Negotiation or forced mode

Auto MDI/MDIX

Forward 2046 bytes (Max.) packets

Supports IEEE 802.1q Tag and Port based VLAN

Supports port trunking

Bandwidth control (Nx32K or Nx512Kbps)

Support flow control (Pause)

Supports remote CPE power fail detect (dying gasp)

Supports Far End Fault

Supports Link Fault Pass through (LFP)

Supports Loop Back Test

D/D function for supported SFP fiber transceiver

Auto Laser Shutdown (ALS)

Online local / remote f/w upgrade



FRM220-1000E-1 FRM220-1000ES-1

Managed Giga Ethernet Converter

Page 9

10/100/1000Base-T to 1000Base-SX/LX SFP Managed card

Auto-negotiation or forced mode

Auto MDI/MDIX Forward 2046 bytes (Max.) packets

Support Bandwidth Control (70k ~ 250Mbps)

Supports Flow control (Pause)

Support Link fault pass through (LFP) function

Supports remote CPE power fail detect (dying gasp)

Auto Laser Shutdown (ALS)

Online local f/w upgrade



FRM220-1000E-2F FRM220-1000ES-2F

Managed Giga Ethernet Converter

Page 9

Dual 1000Base-SX/LX SFP Managed card

Auto-negotiation or forced mode

Auto MDI/MDIX

Forward 2046 bytes (Max.) packets

Support Bandwidth Control (70k ~ 250Mbps)

Supports Flow control (Pause)

Support Link fault pass through (LFP) function

Supports remote CPE power fail detect (dying gasp)

Auto Laser Shutdown (ALS)

Online local f/w upgrade



FRM220-1000EDS

Managed Giga Ethernet Converter

Page 10

2-port 10/100/1000Base-T to 2-port

1000Base-SX/LX SFP Managed card

Supports dual converter mode or switch mode

Auto-negotiation or forced mode

Auto-negotiation

Auto MDI/MDIX

Forward 2046 bytes (Max.) packets

Support Bandwidth Control (70k ~ 250Mbps)

Supports Flow control (Pause)

Support Link fault pass through (LFP) function

Supports remote CPE power fail detect (dying gasp)

Auto Laser Shutdown (ALS)

Online local f/w upgrade



FRM220-1000EAS-1 FRM220-1000EAS-2F

In-band OAM management Giga Ethernet Converter

Page 11

Supports local / remote 802.3ah OAM / IP In-band

Stand-alone IP Based, Web GUI, Telnet,

SNMP management

10/100/1000Base-T to 1000Base-SX/LX SFP

Auto-Negotiation or forced mode

Auto MDI/MDIX

Forward 2046 bytes (Max.) packets

Supports IEEE 802.1q Tag and Port based VLAN

Supports OAM remote loopback to assist in

diagnosing network problems Supports bandwidth control

Supports Flow control (Pause)

Supports remote CPE power fail detect (dying gasp)

Supports Far End Fault

Supports Loop Back Test

Supports Link Fault Pass through (LFP)

Auto Laser Shutdown (ALS)
Online local / remote f/w upgrade

3



FRM220-1000EAS

In-band OAM management Giga Ethernet Fiber Converter

Page 12

Supports local / remote 802.3ah OAM / IP In-band management .

Stand-alone IP Based, Web GUI, Telnet,

SNMP management

2-port 10/100/1000Base-T to 2-port

1000Base-SX/LX SFP

Auto-Negotiation or forced mode

Auto MDI/MDIX

Forward 2046 bytes (Max.) packets

Supports IEEE 802.1q Tag and Port based VLAN

Supports Flow control (Pause)

Supports OAM remote loopback to assist in

diagnosing network problems

Supports bandwidth control Supports remote CPE power fail detect (dying gasp)

Supports Far End Fault

Supports Link Fault Pass through (LFP)

Supports Loop Back Test

Auto Laser Shutdown (ALS)

Online local / remote f/w upgrade



FRM220-E1/T1R FRM220-E1/T1R-S

In-Band OAM Management Fast Ethernet Fiber Converter

Page 13

In-band network Managed via Terminal, web or SNMP in FRM220-CH20 chassis

T1/E1 RJ-45 (USOC RJ-48C) or E1 Coax (BNC)

to Fiber converter

Supports AMI or B8ZS/HDB3 line codes

T1 supports unframed to FRM220-Data

E1 supports unframed or fractional (N x 64k) to FRM220-Data

User selectable line code setting,

Electrical and optical Loop back tests



FRM220-E1B FRM220-E1B-S

In-Band OAM Management Fast Ethernet Fiber Converter

Page 13

n-band network Managed via Terminal, web or SNMP in FRM220-CH20 chassis

T1/E1 RJ-45 (USOC RJ-48C) or E1 Coax (BNC) to Fiber converter

Supports AMI or B8ZS/HDB3 line codes

T1 supports unframed to FRM220-Data

E1 supports unframed or fractional (N x 64k) to FRM220-Data

User selectable line code setting,

Electrical and optical Loop back tests



FRM220-DATA FRM220-DATA-S

In-band management V35/X21/RS530 Copper to Fiber Converter

Page 14

Synchronous or Asynchronous data over fiber In-band network management via terminal, web or SNMP in FRM220-CH20 chassis

Software selectable interface, V.35, X.21, RS530.

RS449, RS232

Software selectable DCE or DTE mode

User selectable data rate n x 64kbps, up to 9Mbps Independent clock mode setting, (internal, external, or recovery) for transmit and receive

Electrical and optical loop back tests

Compatible with FRM220-E1 on same fiber link



FRM220-SERIAL/485 FRM220-SERIAL/485-S

In-band management RS485/422/232 Copper to Fiber Converter

Page 15

Extend asynchronous serial transmission from 2km to 120km over fiber

In-band network management via terminal, web or SNMP in FRM220-CH20 chassis

Software selectable data interface for RS232/ 422/ 485

Software selectable two wires (half duplex) or

four wires (full duplex) RS485 Software selectable three or five wires RS232

Speeds up to 256kbps for RS232 (Asvnc, mode)

Speeds up to 1Mbps for RS485/ 422



FRM220-FXO/FXS FRM220-FXO/FXS-S

Managed POTS Over Fibert Converter

Page 16

Extend telephone voice transmission from 2km to 120km over fiber

Network management via terminal, web or SNMP in FRM220-CH20 chassis

Supports telephone voice transmission

Supports caller ID pass through

Selectable FXO or FXS mode

Supports FXS to FXS hot line



FRM220-155MS FRM220-155MS-S

Managed 155M Repeater

Page 17

Transparent fiber media converter / repeater up to 155Mbps (Fast Ethernet, OC3, STM-1)

Network management via terminal, web or SNMP in FRM220-CH20 chassis

Extend transmission from 2km to 120km over fiber

Perform optical repeater function

(Re-amplification & Reshaping)

Supports Client / Line loop back test Link Fault Pass through (LFP)

Auto Laser Shutdown (ALS)



FRM220-TDR-3R

Managed 155M Repeater

Page 18

Transparent fiber media converter / repeater up to 2.5Gbps (Fast Ethernet, OC3, STM-1,STM-4, STM-16,FC-1, FC-2)

Network management via terminal, web or SNMP in FRM220-CH20 chassis

Extend transmission from 2km to 120km over fiber

Perform optical repeater function

(Re-amplification & Reshaping, Re-clocking)

Supports Client / Line loop back test

Link Fault Pass through (LFP) Auto Laser Shutdown (ALS)

In-band Managed slide-in card Fast Ethernet Converter for FRM220

FRM220-10/100i, 10/100iS



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

Features

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

CPE (Stand-alone) CO (Rack) to CPE (Stand-alone) - In-Band Managed Ethernet FMC-10/100i(s) Ethernet FRM220-10/100i(s)+CH20 FRM220-10/100i(s)+CH01 CPE (Stand-alone) to CPE (Stand-alone) Ethernet FRM220-10/100i(s)+CH01

Specifications

Ports	Connector:	1x9 (SC, ST, FC) or SFP LC
Optical Interface :	Data rate :	100Mbps
	Duplex mode : Full duplex	
	Cable type :	MM 62.2/125μm, 50/125μm.
		SM 9/125μm
	Cable length:	MM 2km, SM 15/30/50/80/120km,
		WDM 20/40/60/80km
	Wavelength:	MM 1310nm, SM 1310, 1550nm,
		WDM 1310Tx/1550Rx(type A),
		1550Tx/1310Rx(type B)
Electrical Interface:	Connector:	RJ45
	Data rate :	10Mbps, 100Mbps
	Duplex mode	: Half / Full duplex
	Cable type :	10Base-T Cat.3, 4, 5, UTP,
		100Base-TX Cat.5, 5e
	Cable length:	100 meters
Standard	IEEE 802.3, IE	EEE 802.3u
LEDs	Power, FEF, FX-Link, TX-SPD, TX-Duplex, TX-Link	
Power	DC In 12V	
Power Consumption	< 4W	
Dimensions	155 x 88 x 23mm	
(D x W x H)mm		
Weight	100g	
Temperature	0~50°C (Oper	rating) ,0~70°C (Storage)
Humidity	10~90% non-condensing	
Certification	CE, FCC, RoHS	
MTBF	65,000 h (25°C)	

Ordering Information

■ *FRM220-10/100i* 10/100Base-TX to 100Base-FX slide-in card ■ *FRM220-10/100iS* 10/100Base-TX to 100Base-FX SFP slide-in card

In-band Managed slide-in card 2-Ch Fast Ethernet Converter for FRM220

FRM220-10/100iS-2



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

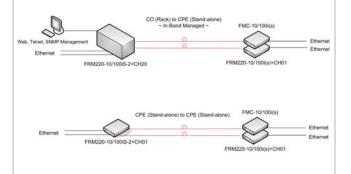
Features

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

Specifications

Ports	Connector:	SFP LC
Optical Interface :	Data rate :	100Mbps
	Duplex mode	: Full duplex
	Cable type :	MM 62.2/125μm, 50/125μm.
		SM 9/125μm
	Cable length:	MM 2km, SM 15/30/50/80/120km,
		WDM 20/40/60/80km
	Wavelength:	MM 1310nm, SM 1310, 1550nm,
		WDM 1310Tx/1550Rx(type A),
		1550Tx/1310Rx(type B)
Electrical Interface:	Connector:	RJ45
	Data rate :	10Mbps, 100Mbps
	Duplex mode	: Half / Full duplex
	Cable type :	10Base-T Cat.3, 4, 5, UTP,
		100Base-TX Cat.5, 5e
	Cable length:	100 meters
Standard	IEEE 802.3, IE	EEE 802.3u
LEDs	Power, FEF, F	X-Link, TX-SPD, TX-Duplex, TX-Link
Power	DC In 12V	
Power Consumption	< 4W	
Dimensions	155 x 88 x 23r	mm
(D x W x H)mm		
Weight	120g	
Temperature	0~50°C (Operation	ating) ,0~70°C (Storage)
Humidity	10~90% non-c	condensing
Certification	CE, FCC, LVD, RoHS	
MTBF	65,000 h (25°0	C)
		

Application



Ordering Information

■ FRM220-10/100iS-2 Dual converter 10/100Base-TX to 100Base-FX slide-in card

OAM/IP In-band Managed slide-in card Fast Ethernet converter for FRM220

FRM220-10/100A-1, 10/100AS-1



The FRM220-10/100A is an IEEE802.3ah OAM compliant copper to fiber Fast Ethernet solution designed to make conversion between 10/100Base-TX and 100Base-FX with SC, FC or ST connector. With SNMP and Web-based management in the FRM220, the network administrator can monitor, configure and control the activity of each 802.3ah series card and remotely connected OAM compliant converter. By offering 802.3ah OAM Compliant in-band management, this converter can be completely controlled and monitored from a centrally located managed rack controlling all converter settings including band-width control, duplex, and speed configuration. This media converter is completely transparent to Layer 2 and Layer 3 protocols including IEEE 802.1q, VLAN tag, Q in Q, STP, IPX, IP, etc.

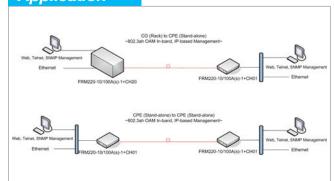
Features

- Supports local / remote 802.3ah OAM / IP In-band management
- Stand-alone IP Based, Web GUI, Telnet, SNMP management
- 10/100BASE-TX to 100BASE-FX
- Auto-Negotiation or forced mode
- Auto MDI/MDIX
- Forward 2046 bytes (max.) packets
- Supports Q in Q double tagged frame transparent
- Supports IEEE 802.1q Tag VLAN pass thru
- Bandwidth control (Nx32K or Nx512Kbps)
- Support flow control (Pause)
- Supports remote CPE power fail detect (dying gasp)
- Supports Far End Fault
- Supports Link Fault Pass through (LFP)
- Supports Loop Back Test
- Supports RMON counter
- D/D function for supported SFP fiber transceiver
- Auto Laser Shutdown (ALS)
- Fiber Hardware Reset (FHR)
- Online local / remote f/w upgrade

Specifications

Ports	Connector:	1x9 (SC, ST, FC) or SFP LC
Optical Interface :	Data rate :	100Mbps
	Duplex mode : Full duplex	
	Cable type :	MM 62.2/125μm, 50/125μm.
		SM 9/125μm
	Cable length:	MM 2km, SM 15/30/50/80/120km,
		WDM 20/40/60/80km
	Wavelength:	MM 1310nm, SM 1310, 1550nm,
		WDM 1310Tx/1550Rx(type A),
		1550Tx/1310Rx(type B)
Electrical Interface :	Connector:	RJ45
	Data rate :	10Mbps, 100Mbps
	Cable type :	10Base-T Cat.3, 4, 5, UTP,
		100Base-TX Cat.5, 5e
	Cable length:	100 meters
Standard	IEEE 802.3, IE	EEE 802.3u, IEEE802.3ah OAM
LEDs	Power, FEF, FX-Link, TX-SPD, TX-Duplex, TX-Link	
Power	DC In 12V	
Power Consumption	< 4W	
Dimensions	155 x 88 x 23mm	
(D x W x H)mm		
Weight	100g	
Temperature	0~50°C (Operating) ,0~70°C (Storage)	
Humidity	10~90% non-condensing	
Certification	CE, FCC, LVD, RoHS	
MTBF	65,000 h (25°	C)

Application



Ordering Information

- FRM220-10/100A-1 10/100Base-TX to 100Base-FX slide-in card w/ 802.3ah OAM In-band management
- FRM220-10/100AS-1 10/100Base-TX to 100Base-FX SFP slide-in card w/ 802.3ah OAM In-band management

OAM/IP In-band Managed slide-in card Fast Ethernet switch for FRM220

FRM220-10/100AS-2



The FRM220-10/100AS-2 is an IEEE802.3ah OAM compliant two copper to two fiber Fast Ethernet solution designed to make conversion between 10/100Base-TX and 100Base-FX with SFP. With SNMP and Web-based management in the FRM220, the network administrator can monitor, configure and control the activity of each 802.3ah series card and remotely connected OAM compliant converter. By offering 802.3ah OAM Compliant in-band management, this converter can be completely controlled and monitored from a centrally located managed rack controlling all converter settings including band-width control, duplex, and speed configuration. This media converter is completely transparent to Layer 2 and Layer 3 protocols including IEEE 802.1q, VLAN tag, Q in Q, STP, IPX, IP, etc.

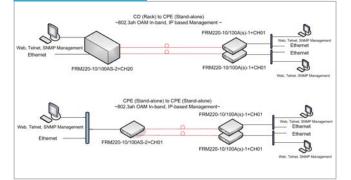
Features

- Supports local / remote 802.3ah OAM / IP In-band management
- Stand-alone IP Based, Web GUI, Telnet, SNMP management
- 2-port 10/100Base-TX plus 2-port 100Base-FX SFP
- Auto-Negotiation or forced mode
- Auto MDI/MDIX
- Forward 2046 bytes (max.) packets
- Supports Q in Q double tagged frame transparent
- Supports IEEE 802.1q Tag and Port based VLAN
- Supports port trunking
- Bandwidth control (Nx32K or Nx512Kbps)
- Support flow control (Pause)
- Supports remote CPE power fail detect (dying gasp)
- Supports Far End Fault
- Supports Link Fault Pass through (LFP)
- Supports Loop Back Test
- Supports RMON counter
- D/D function for supported SFP fiber transceiver
- Auto Laser Shutdown (ALS)
- Fiber Hardware Reset (FHR)
- Online local / remote f/w upgrade

Specifications

Ports	Connector:	SFP LC
Optical Interface :	Data rate :	100Mbps
	Duplex mode	: Full duplex
	Cable type :	MM 62.2/125μm, 50/125μm.
		SM 9/125µm
	Cable length:	MM 2km, SM 15/30/50/80/120km,
		WDM 20/40/60/80km
	Wavelength:	MM 1310nm, SM 1310, 1550nm,
		WDM 1310Tx/1550Rx(type A),
		1550Tx/1310Rx(type B)
Electrical Interface :	Connector :	RJ45
	Data rate :	10Mbps, 100Mbps
	Duplex mode	Half / Full duplex
	Cable type :	10Base-T Cat.3, 4, 5, UTP,
		100Base-TX Cat.5, 5e
	Cable length:	100 meters
Standard	IEEE 802.3, IE	EEE 802.3u, IEEE802.3ah OAM
LEDs	Power, FEF, F	X-Link, TX-SPD, TX-Duplex, TX-Link
Power	DC In 12V	
Power Consumption	< 4W	
Dimensions	155 x 88 x 23r	mm
(D x W x H)mm		
Weight	120g	
Temperature	0~50°C (Operation	ating) ,0~70°C (Storage)
Humidity	10~90% non-c	condensing
Certification	CE, FCC, LVD, RoHS	
MTBF	65,000 h (25°0	C)
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Application



Ordering Information

■ FRM220-10/100AS-2 2-port 10/100Base-TX to 2-port 100Base-FX slide-in switch card w/ In-band 802.3ah OAM management

Managed Family

Managed slide-in card Gigabit Ethernet converter for FRM220

FRM220-1000E-1, 1000ES-1



The FRM220-1000E(s)-1 is a copper to fiber Gigabit Ethernet solution designed to make conversion between 10/100/1000Base-TX and 1000Base-SX/LX with SC or SFP LC connector. With SNMP and Web-based management in the FRM220, the Network administrator can monitor, configure and control the activity of each card in the chassis. This converter also supports features such as ingress/egress bandwidth control, auto or forced mode setting for copper Ethernet as well as auto laser shutdown.

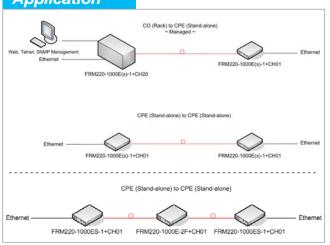
Features

- 10/100/1000Base-T to 1000Base-SX/LX SFP Managed card
- Auto-negotiation or forced mode
- Auto MDI/MDIX
- Forward 2046 bytes (max.) packets
- Support Bandwidth Control (70k ~ 250Mbps)
- Supports Flow control (Pause)
- Support Link fault pass through (LFP) function
- Supports remote CPE power fail detect (dying gasp)
- Auto Laser Shutdown (ALS)
- Online local f/w upgrade

Specifications

Ports	Connector:	1x9 (SC, ST, FC) or SFP LC
Optical Interface :	Data rate :	1000Mbps
	Duplex mode	: Full duplex
	Cable type :	MM 62.2/125μm, 50/125μm.
		SM 9/125µm
	Cable length:	MM 2km, SM 15/30/50/80/120km,
		WDM 20/40/60/80km
	Wavelength:	MM 850, 1310nm, SM 1310, 1550nm,
		WDM 1310Tx/1550Rx(type A),
		1550Tx/1310Rx(type B)
Electrical Interface:	Connector:	RJ45
	Data rate :	10Mbps, 100Mpbs, 1000Mbps
	Duplex mode	: Half / Full duplex
	Cable type :	10Base-T Cat.3, 4, 5, UTP,
		100Base-TX Cat.5, 5e
	Cable length:	100 meters
Standard	IEEE 802.3, IE	EEE 802.3u, IEEE802.3ab
LEDs	Power, FX-Lin	k 1/2, LFP(1000E/ES-2F)
	Power, FX-Lin	k , LFP, TX-Link, TX-SPD (1000E/ES-1)
Power	DC In 12V	
Power Consumption	< 5W	
Dimensions	155 x 88 x 23mm	
(D x W x H)mm		
Weight	120g	
Temperature	0~50°C (Operating) ,0~70°C (Storage)	
Humidity	10~90% non-condensing	
Certification	CE, FCC, LVD, RoHS	
MTBF	65,000 h (25°C)	

Application



Managed Family

Managed slide-in card Gigabit Ethernet converter for FRM220

FRM220-1000E-2F, 1000ES-2F



The FRM220-1000E(s)-2F is a copper to fiber Gigabit Ethernet solution designed to make conversion between 1000Base-SX/LX and 1000Base-SX/LX with SC or SFP LC connector. With SNMP and Web-based management in the FRM220, the Network administrator can monitor, configure and control the activity of each card in the chassis. This converter also supports features such as ingress/egress bandwidth control, auto or forced mode setting for copper Ethernet as well as auto laser shutdown.

Ordering Information

FRM220-1000E-1

- 10/100/1000Base-T to 1000-SX/LX slide-in card
- FRM220-1000ES-1 10/100/1000Base-T to 1000-SX/LX SFP slide-in card
- FRM220-1000E-2F 2-port 1000-FX slide-in card
- FRM220-1000ES-2F 2-port 1000-FX SFP slide-in card

Managed slide-in card Gigabit Ethernet switch for FRM220

FRM220-1000EDS



SEPIC

Connector :

The FRM220-1000EDS is a dual channel (two in one) copper to fiber Gigabit Ethernet solution designed to make conversion between 10/100/1000Base-TX and 1000Base-SX/LX with SFP connector. With SNMP and Web-based management in the FRM220, the Network administrator can monitor, configure and control the activity of each card in the chassis. This converter also supports features such as ingress/egress bandwidth control, auto or forced mode setting for copper Ethernet as well as auto laser shutdown.

Features

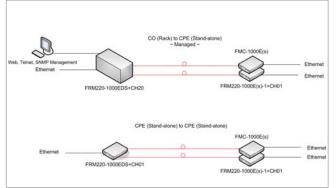
- 2-port 10/100/1000Base-T to 2-port 1000Base-SX/LX SFP Managed card
- Supports dual converter mode or switch mode
- Auto-negotiation or forced mode
- Auto MDI/MDIX
- Forward 2046 bytes (max.) packets
- Support Bandwidth Control (70k ~ 250Mbps)
- Supports Flow control (Pause)
- Support Link fault pass through (LFP) function
- Supports remote CPE power fail detect (dying gasp)
- Auto Laser Shutdown (ALS)
- Online local f/w upgrade

Specifications

Dorte

Ports	Connector:	SFP LC
Optical Interface :	Data rate :	1000Mbps
	Duplex mode : Full duplex	
	Cable type :	MM 62.2/125μm, 50/125μm.
		SM 9/125µm
	Cable length:	MM 2km, SM 15/30/50/80/120km,
		WDM 20/40/60/80km
	Wavelength:	MM 850, 1310nm, SM 1310, 1550nm
		WDM 1310Tx/1550Rx(type A),
		1550Tx/1310Rx(type B)
Electrical Interface :	Connector:	RJ45
	Data rate :	10Mbps, 100Mpbs, 1000Mbps
	Duplex mode	Half / Full duplex
	Cable type :	10Base-T Cat.3, 4, 5, UTP,
		100Base-TX Cat.5, 5e,
		1000Base-T Cat. 5e or higher
	Cable length:	100 meters
Standard	IEEE 802.3, IE	EEE 802.3u, IEEE802.3ab
LEDs	Power, FX-Lin	k 1/2, 2Ch, TX-Link, TX-SPD
Power	DC In 12V	
Power Consumption	< 5W	
Dimensions	155 x 88 x 23ı	mm
(D x W x H)mm		
Weight	120g	
Temperature	0~50°C (Oper	ating) ,0~70°C (Storage)
Humidity	10~90% non-	condensing
Certification	CE, FCC, LVD, RoHS	
MTBF	65,000 h (25°	C)

Application



Ordering Information

■ FRM220-1000EDS 2-port 10/100/1000Base-T to 2-port 1000-SX/LX SFP slide-in card

In-band Management slide-in card Gigabit Ethernet converter for FRM220

FRM220-1000EAS-1, 1000EAS-2F



The FRM220-1000EAS is an IEEE802.3ah OAM compliant copper to fiber Fast Ethernet solution designed to make conversion between 10/100/1000Base-TX and 1000Base-SX/LX with SFP connector. With SNMP and Web-based management in the FRM220, the network administrator can monitor, configure and control the activity of each 802.3ah series card and remotely connected OAM compliant converter. By offering 802.3ah OAM Compliant in-band management, this converter can be completely controlled and monitored from a centrally located managed rack controlling all converter settings including band-width control, duplex, and speed configuration. This media converter is completely transparent to Layer 2 and Layer 3 protocols including IEEE 802.1q, VLAN tag, Q in Q, STP, IPX, IP, etc. The FRM220-1000EAS-1 is a single copper to single optical converter while the 1000EAS-2F is a two optical port converter.

Features

- Supports local / remote 802.3ah OAM / IP In-band management
- Stand-alone IP Based, Web GUI, Telnet, SNMP management
- 10/100/1000Base-T to 1000Base-SX/LX SFP
- Auto-Negotiation or forced mode
- Auto MDI/MDIX
- Forward 2046 bytes (max.) packets
- Supports Q in Q double tagged frame transparent
- Supports IEEE 802.1g Tag and Port based VLAN
- Supports Flow control (Pause)
- Supports OAM remote loopback to assist in diagnosing network problems
- Supports bandwidth control
- Supports remote CPE power fail detect (dying gasp)
- Supports Far End Fault
- Supports Link Fault Pass through (LFP)
- Supports Loop Back Test
- Supports RMON counter
- D/D function for supported SFP fiber transceiver
- Auto Laser Shutdown (ALS)
- Fiber Hardware Reset (FHR)
- Online local / remote f/w upgrade

Application CO (Ruck) to CPE (Stand-alone) -002.340 OMM to-band, IP-based Management Web, Telnet, DABP Management FRM220-100EAS-1-CH01 FRM220-100EAS-1-CH01

Specifications

Ports	Connector:	SFP LC
Optical Interface :	Data rate :	1000Mbps
	Duplex mode	: Full duplex
	Cable type :	MM 62.2/125μm, 50/125μm.
		SM 9/125µm
	Cable length:	MM 2km, SM 15/30/50/80/120km,
		WDM 20/40/60/80km
	Wavelength:	MM 850, 1310nm, SM 1310, 1550nm
		WDM 1310Tx/1550Rx(type A),
		1550Tx/1310Rx(type B)
Electrical Interface:	Connector:	RJ45
	Data rate :	10Mbps, 100Mpbs, 1000Mbps
	Duplex mode:	Half / Full duplex
	Cable type :	10Base-T Cat.3, 4, 5, UTP,
		100Base-TX Cat.5, 5e,
		1000Base-T Cat. 5e or higher
	Cable length:	100 meters
Standard	IEEE 802.3, IE	EEE 802.3u, IEEE802.3ab,
	IEEE802.3ah	OAM
LEDs	Power, FX-Lin	k, Test, TX-Link, TX-SPD(1000EAS-1)
	Power, FX-Lin	k1/2, Test(1000EAS-2F)
Power	DC In 12V	
Power Consumption	< 15W	
Dimensions	155 x 88 x 23r	mm
(D x W x H)mm		
Weight	120g	
Temperature	0~50°C (Operation	ating) ,0~70°C (Storage)
Humidity	10~90% non-c	condensing
Certification	CE, FCC, LVD	, RoHS
MTBF	65,000 h (25°0	C)

Ordering Information

- FRM220-1000EAS-1 10/100/1000Base-T to 1000Base-SX/LX SFP slide-in card w/ 802.3ah In-band OAM management
- FRM220-1000EAS-2F 2-port 1000Base-SX/LX SFP slide-in card w/ 802.3ah In-band OAM management

In-band Management slide-in card Gigabit Ethernet switch for FRM220

FRM220-1000EAS



The FRM220-1000EAS is an IEEE802.3ah OAM compliant dual copper to dual fiber Fast Ethernet solution designed to make conversion between 10/100/1000Base-TX and 1000Base-SX/LX with SFP connector. With SNMP and Web-based management in the FRM220, the network administrator can monitor, configure and control the activity of each 802.3ah series card and remotely connected OAM compliant converter. By offering 802.3ah OAM Compliant in-band management, this converter can be completely controlled and monitored from a centrally located managed rack controlling all converter settings including band-width control, duplex, and speed configuration. This media converter is completely transparent to Layer 2 and Layer 3 protocols including IEEE 802.1q, VLAN tag, Q in Q, STP, IPX, IP, etc.

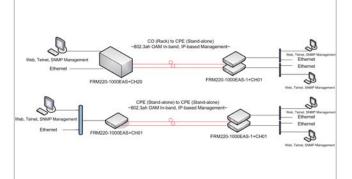
Specifications

Features

- Supports local / remote 802.3ah OAM / IP In-band management
- Stand-alone IP Based, Web GUI, Telnet, SNMP management
- 2-port 10/100/1000Base-T to 2-port 1000Base-SX/LX SFP
- Auto-Negotiation or forced mode
- Auto MDI/MDIX
- Forward 2046 bytes (max.) packets
- Supports Q in Q double tagged frame transparent
- Supports IEEE 802.1g Tag and Port based VLAN
- Supports Flow control (Pause)
- Supports OAM remote loopback to assist in diagnosing network problems
- Supports bandwidth control
- Supports remote CPE power fail detect (dying gasp)
- Supports Far End Fault
- Supports Link Fault Pass through (LFP)
- Supports Loop Back Test
- Supports RMON counter
- D/D function for supported SFP fiber transceiver
- Auto Laser Shutdown (ALS)
- Fiber Hardware Reset (FHR)
- Online local / remote f/w upgrade

Ports	Connector:	SFP LC
Optical Interface :	Data rate :	1000Mbps
	Duplex mode	: Full duplex
	Cable type :	MM 62.2/125μm, 50/125μm.
		SM 9/125μm
	Cable length:	MM 2km, SM 15/30/50/80/120km,
		WDM 20/40/60/80km
	Wavelength:	MM 850, 1310nm, SM 1310, 1550nm
		WDM 1310Tx/1550Rx(type A),
		1550Tx/1310Rx(type B)
Electrical Interface :	Connector :	RJ45
	Data rate :	10Mbps, 100Mpbs, 1000Mbps
	Duplex mode:	Half / Full duplex
	Cable type :	10Base-T Cat.3, 4, 5, UTP,
		100Base-TX Cat.5, 5e,
		1000Base-T Cat. 5e or higher
	Cable length:	100 meters
Standard	IEEE 802.3, IE	EEE 802.3u, IEEE802.3ab,
	IEEE802.3ah	OAM
LEDs	Power, FX-Lin	k, Test, TX-Link, TX-SPD
Power	DC In 12V	
Power Consumption	< 15W	
Dimensions	155 x 88 x 23r	mm
(D x W x H)mm		
Weight	120g	
Temperature	0~50°C (Oper	ating) ,0~70°C (Storage)
Humidity	10~90% non-c	condensing
Certification	CE, FCC, LVD), RoHS
MTBF	65,000 h (25°0	C)

Application



Ordering Information

■ FRM220-1000EAS 2-port 10/100/1000Base-T to 2- port 1000-SX/LX SFP slide-in card w/ 802.3ah In-band OAM management

In-band Managed slide-in card E1/T1 to Fiber converter for FRM220

FRM220-E1/T1R, E1B FRM220-E1/T1R-S, E1B-S



The FRM220-E1/T1 is a fiber media transport for G.703 E1/T1 transmissions. The BNC model provides unbalanced 75 Ohm coaxial E1 connections while the RJ-45 model provides switchable balanced 120 Ohm E1 or 100 Ohm T1 connections over twisted pair wiring. When the FRM220-E1/T1 card is placed in the FRM220 rack with in-band management, the card status, type, version, fiber link status, E1 or T1 link status and alarms for both local card and remote unit can all be displayed. Configuration is also available to enable or disable the port, reset the port, do far end fault setting, and initiate local or far end loop-back tests. When set for E1 mode, the FRM220-E1/T1 also supports fractional (structured) E1 when connected to a remote FRM220-Data, synchronous data communications converter. In an E1 transmission network where end connection requires synchronous data communication such as V.35 or RS-530 (X.21, RS-449), these units eliminate the need for an extra CSU/DSU.

Features

- In-band network Managed via Terminal, web or SNMP in FRM220-CH20 chassis
- T1/E1 RJ-45 (USOC RJ-48C) or E1 Coax (BNC) to Fiber converter
- Supports AMI or B8ZS/HDB3 line codes
- T1 supports unframed to FRM220-Data
- E1 supports unframed or fractional (N x 64k) to FRM220-Data
- User selectable E1 or T1 setting

Application

■ Electrical and optical Loop back tests

I/T1+CH01

Specifications

Ports	Connector:	1x9 (SC, ST, FC) or SFP LC
Optical Interface :	Cable type :	MM 62.2/125μm, 50/125μm.
		SM 9/125μm
	Cable length:	MM 2km, SM 15/30/50/80/120km,
		WDM 20/40/60/80km
	Wavelength:	MM 1310nm, SM 1310, 1550nm,
		WDM 1310Tx/1550Rx(type A),
		1550Tx/1310Rx(type B)
Electrical Interface:	Connector:	RJ45 E1-120Ω, T1-100 Ω,
		BNC E1-75 Ω
	Data rate :	E1: 2.048Mpbs, T1:1.544Mbps
	Line Code :	E1 HDB3/AMI, T1: B8ZS/AMI
	Cable type :	Cat.3 or higher Twisted-Pair cable
Standard	E1 ITU-T G.70	03, G.704, G.706, G.732, G.823
	T1 ITU-T G.70	03, G.704, AT&T, TR-62411, ANSI T1.403
LEDs	Power, FX-Lin	ık, E1/T1 SIG, Test, SYN, RD, TD, AIS
	(E1/T1R) Po	ower, FX-Link, E1 SIG, Test(E1B)
Power	DC In 12V	
Power Consumption	1 < 5W	
Dimensions	155 x 88 x 23mm	
(D x W x H)mm		
Weight	120g	
Temperature	0~50°C (Oper	rating) ,0~70°C (Storage)
Humidity	10~90% non-	condensing
Certification	CE, FCC, LVE	D, RoHS
MTBF	65,000 h (25°	C)
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CO (Rack) to CPE (Stand-alone) -In-band managed V.35 / RS530 / X21 / RS449 FRM220-Bit71+CH01 FRM220-E1/T1+CH01 CPE (Stand-alone) to CPE (Stand-alone) V.35 / RS530 / X21 / RS449 FRM220-E1/T1+CH01 FRM220-E1/T1+CH01 FRM220-E1/T1+CH01

Ordering Information

■ FRM220-E1/T1R E1/T1 (RJ45) to fiber slide-in card
■ FRM220-E1/T1R-S E1/T1 (RJ45) to fiber SFP slide-in card
■ FRM220-E1B E1 (BNC) to fiber slide-in card

■ FRM220-E1B-S E1 (BNC) to fiber SFP slide-in card

In-band Managed slide-in card V.35/X.21/RS-530/449/232 to fiber converter

FRM220-DATA, DATA-S



The FRM220-DATA is a media converter for high-speed (up to 8.192Mbps) synchronous or low speed synchronous and asynchronous data transmissions (V.35, RS-232, RS-530, X.21 or RS-449) over fiber optical media. When the FRM220-DATA card is placed in the FRM220 rack with SNMP management, in-band management allows viewing the card and remote converter's status, type, version, fiber link status, data link status and alarms. Both card and remote can be configured to enable or disable the port, reset the port, set the data rate, modify the clock mode, and initiate local or far end loop back tests. The FRM220-Data converter may also be paired with the FRM220-E1/T1 for Nx64K transmissions.

Features

- Synchronous or Asynchronous data over fiber
- In-band network management via terminal, web or SNMP in FRM220-CH20 chassis
- Software selectable interface, V.35, X.21, RS530, RS449,
- Software selectable DCE or DTE mode
- User selectable data rate n x 64kbps, up to 9Mbps
- Independent clock mode setting, (internal, external, or recovery) for transmit and receive
- Electrical and optical loop back tests

Application

Compatible with FRM220-E1 on same fiber link for N x 64k

Specifications

Ports	Connector:	1x9 (SC, ST, FC) or SFP LC
Optical Interface :	Data rate :	36.864Mbps
	Line coding :	Scrambled NRZ
	Bit Error Rate	: Less than 10 ⁻¹⁰
	Cable type :	MM 62.2/125μm, 50/125μm.
		SM 9/125μm
	Distance :	MM 2km, SM 15/30/50/80/120km,
		WDM 20/40/60/80km
	Wavelength:	1310nm, 1550nm
Electrical Interface :	Connector:	HDB26F w/ adapter cable for V35,
		X21, RS530, RS449,RS232
	Line Code :	NRZ
	Baud Rate:	RS-232 up to 384K sync and async
		V.35/RS-530 up to 9152k sync, async
		up to 2048k N*64Kbps ,
		where n=1 to 143 (64K ~ 9152KKbps)
	Receive and	Internal, Recovery, External
	Transmit Cloc	k
	source:	
Standard	ITU-T	
LEDs	Power, FX Lir	nk, RTS, Test , TD, RD, CTS, DCD

DC In 12V

155 x 88 x 23mm

10~90% non-condensing

CE, FCC, LVD, RoHS

65,000 h (25°C)

0~50°C (Operating) ,0~70°C (Storage)

< 5W

	CO (Rack) to CPE (Stand-alone)	
	~ In-Band Managed ~ E	1/11
Web, Telnet, SNMP Management V.35 / RS530 / X21 / RS449	FRM220-E1/T1+CH01 V.35	/ RS530 / X21 / RS449
FRM220-Data+CH2	FRM220-Data+CH01	
	CPE (Stand-alone) to CPE (Stand-alone)	
V.35 / RS530 / X21 / RS449	0 E	/T1

Web, Telnet, SNMP Management V.35 / RS530 / X21 / RS449	FRM220-E1/T1+CH01 V.35 / RS530 / X21 / RS4
FRM220-Data+CH20	FRM220-Data+CH01
CPE (S	Stand-alone) to CPE (Stand-alone)
V.35 / RS530 / X21 / RS449 FRM220-Data+CH01	O E1/T1
V.35 / RS530 / X21 / RS449 FRM220-Data+CH01 V.35 / RS530 / X21 / RS449	FRM20-E1/T1-CH01 V35 / R5530 / X21 / R544

Ordering Information

FRM220-V35 V35 to fiber slide-in card w/ HD26M to MB34F cable

FRM220-X21 X.21 to fiber slide-in card w/ HD26M to DB15F cable

FRM220-RS232 RS232 to fiber slide-in card w/ HD26M to DB25F cable FRM220-RS232-S RS232 to fiber SFP slide-in card w/ HD26M to DB25F cable

■ FRM220-V35-S

V35 to fiber SFP slide-in card w/ HD26M to MB34F cable

■ FRM220-X21-S

Power

Dimensions

Humidity

MTBF

Certification

(D x W x H)mm Weight Temperature

Power Consumption

X.21 to fiber SFP slide-in card w/ HD26M to DB15F cable

FRM220-RS530 RS530 to fiber slide-in card w/ HD26M to DB25F cable FRM220-RS530-S RS530 to fiber SFP slide-in card w/ HD26M to DB25F cable

FRM220-RS449 RS449 to fiber slide-in card w/ HD26M to DB37F cable FRM220-RS449-S RS449 to fiber SFP slide-in card w/ HD26M to DB37F cable

In-Band Managed slide-in card RS-232/422/485 to fiber converter

FRM220-SERIAL/485, SERIAL/485-S

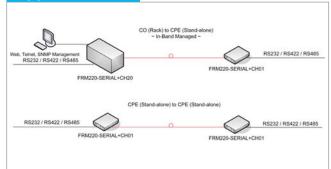


The FRM220-Serial/485 provides a fiber converter solution to extend asynchronous RS-485 or RS-232 transmission distance up to 2km over multimode fiber or up to 120km over single mode fiber. The converter is equipped with multiple interface circuits for connection to RS-232 or RS-485/422 (2 or 4 wire, full or half duplex). The FRM220-Serial secures data transmission over EMI resistant fiber at speeds up to 460kbps for RS-232 or up to 1024kbps for RS-485/422. When the FRM220-Serial/485 card is placed in the FRM220 rack with SNMP management, in-band management allows viewing the card and remote converter's status, type, version, fiber link status, data link status and alarms. Both card and remote can be configured to enable or disable the port, reset the port and set the interface type.

Features

- Extend asynchronous serial transmission from 2km to 120km over fiber
- In-band network management via terminal, web or SNMP in FRM220-CH20 chassis
- Software selectable data interface for RS232/ 422/ 485
- Software selectable two wires (half duplex) or four wires (full duplex) RS485
- Software selectable three or five wires RS232
- Speeds up to 256kbps for RS232 (Async. mode)
- Speeds up to 1Mbps for RS485/422

Application



Specifications

opecinications ————————————————————————————————————				
Ports	Connector:	1x9 (SC, ST, FC) or SFP LC		
Optical Interface :	Data rate :	36.864Mbps		
	Line coding :	Scrambled NRZ		
	Bit Error Rate	Bit Error Rate : Less than 10 ⁻¹⁰		
	Cable type :	MM 62.2/125μm, 50/125μm. SM 9/125μm		
	Cable length:	MM 2km, SM 15/30/50/80/120km,		
		WDM 20/40/60/80km		
	Wavelength:	MM 1310nm, SM 1310, 1550nm,		
		WDM 1310Tx/1550Rx(type A),		
		1550Tx/1310Rx(type B)		
Electrical Interface:	Connector:	6 pins Terminal block		
	Data Signal	RS485 2-wire		
	Formats :	RS422 4-wire		
		RS232 RTS/CTS 5-wire		
		RS232 3-wire		
	Baud Rate:	RS422, RS485 up to 1024kbps		
		RS232 up to 256kbps		
	Bit Error Rate	: Less than 10 ⁻¹⁰		
Standard	EIA/TIA RS48	5, RS422, RS232		
LEDs	Power, FX Lin	k, DI, DO, Test		
Power	DC In 12V			
Power Consumption	η < 5W			
Dimensions	155 x 88 x 23	mm		
(D x W x H)mm				
Weight	120g			
Temperature	0~50°C (Oper	ating) ,0~70°C (Storage)		
Humidity	10~90% non-condensing			
Certification	CE, FCC, LVE), RoHS		
MTBF	65,000 h (25°C)			
-				

Ordering Information

■ FRM220-Serial Serial (RS485/422/232) to fiber slide-in card

■ FRM220-Serial—S Serial (RS485/422/232) to fiber SFP slide-in card

In-band Managed slide-in card POTS (FXO/FXS) to fiber converter

FRM220-FXO/FXS, FXO/FXS-S



FRM220-FXO/FXS POTS phone line converter extender is used to connect PSTN voice signals to distant Plain Old Telephone (POTS) devices. FRM220-FXO/FXS provides a fiber media transport for POTS transmission and features an RJ-11C for copper connection. A pair of FRM220-FXO/FXS is required to implement an end to end system. FXO mode connects to a telephone line or PBX and has ability to detect ringing voltages and to act as a telephone. FXS mode is the reciprocal unit and has ability to act as PSTN and connects to a telephone device. When the FRM220-FXO/FXS card is placed in the FRM220 rack with SNMP management, in-band management allows viewing the card and remote converter's status, type, version, fiber link status, on hook status and alarms. Both card and remote can be configured to enable or disable the port, reset the port and set the FXO or FXS mode.

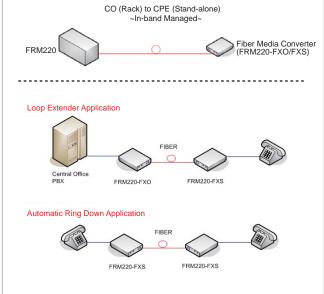
Features

- Extend telephone voice transmission from 2km to 120km
- Network management via terminal, web or SNMP in FRM220-CH20 chassis
- Supports telephone voice transmission
- Supports caller ID pass through
- Selectable FXO or FXS mode
- Supports FXS to FXS hot line

	Specification	IS		
	Ports	Connector:	1x9 (SC, ST, FC) or SFP LC	
	Optical Interface :	Cable type :	MM 62.2/125μm, 50/125μm. SM 9/125μm	
		Cable length:	MM 2km, SM 15/30/50/80/120km,	
			WDM 20/40/60/80km	
		Wavelength:	MM 1310nm, SM 1310, 1550nm,	
			WDM 1310Tx/1550Rx(type A),	
			1550Tx/1310Rx(type B)	
	Electrical Interface :	Connector:	RJ-11	
		FXO mode:	Impedance : 600 ohms	
			Coding : 16 bits liner	
			Loop Current : 10~100mA	
			Ring Frequency : Acceptable 20 ~50Hz	
			Insertion Loss: 0.0 ± 1.0dB at 1000Hz	
		FXS mode:	Impedance : 600 ohms	
			Coding: 16 bits liner	
			Dial: DTMF and Dial Paul	
			Battery Source: 48VDC ± 4V	
			Ringing Waveform : Sine wave	
			Ringing Frequency:	
			20/25/30/50 Hz selectable	
			Ring Cadence:	
			FXS to FXS : On / 1 sec, Off / 2 sec	
			FXO to FXS; Reproduces the	
			cadence detected by FXO	
			Insertion Loss 0.0 ± 1.0dB at 1000Hz	
			REN: 4.0B(Ring Equivalence Number)	
	LEDs	Power, FX Link, Phone Act, Test		
	Power	DC In 12V		
	Power Consumption	< 5W		
	Dimensions	155 x 88 x 23r	mm	
	(D x W x H)mm			
	Weight	120g		
	Temperature	0~50°C (Oper	ating) ,0~70°C (Storage)	
	Humidity	10~90% non-c	condensing	
_	Certification	CE, FCC, LVC), RoHS	

65,000 h (25°C)

Application



Ordering Information

FRM220-FXO/FXS POTS to fiber slide-in card

■ FRM220-FXO/FXS-S POTS to fiber SFP slide-in card

Stand-alone:

MTBF

Managed slide-in card SM/MM, MM/SM converter / repeater



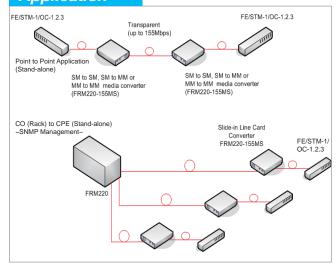
FRM220-155MS, 155MS-S

The FRM220-155MS is a fiber to 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 interfaces such as 100Mbps Fast Ethernet, 155Mbps STM1 and OC3. The FRM220-155MS works well with FRM220-CH20 chassis as slide-in card or with FRM220-CH01, one slot chassis as a stand-alone fiber converter. When the FRM220-155MS card is placed in the FRM220 rack with SNMP management, the management can view the converter card's status, type, version, fiber link status and alarms. The card can be configured to enable or disable the port, reset the port or enable/disable Auto Laser Shutdown.

Features

- Transparent fiber media converter / repeater up to 155Mbps (Fast Ethernet, OC3, STM-1)
 - Network management via terminal, web or SNMP in
- FRM220-CH20 chassis
- Extends transmission from 2km to 120km over fiber
- Performs optical repeater function (Re-amplification & Reshaping)
- Supports Client / Line loop back test
- Link Fault Pass through (LFP)
- Auto Laser Shutdown (ALS)

Application



Specifications

Ports	Connector:	1x9 (SC, ST, FC) or SFP LC
Optical Interface :	Data rate :	Up to 155.52Mbps
		(Fast Ethernet, OC3, STM-1)
	Duplex mode	: Full duplex
	Regeneration : 2R	
	Loop back:	Line/Client
	Cable type :	MM 62.2/125μm, 50/125μm.
		SM 9/125μm
	Wavelength:	MM 1310nm, SM 1310, 1550nm,
		WDM 1310Tx/1550Rx(type A),
		1550Tx/1310Rx(type B)
LEDs	Power, FEF, F	X-Link, TX-SPD, TX-Duplex, TX-Link
Power	DC In 12V	
Power Consumption	< 5W	
Dimensions	155 x 88 x 23	mm
(D x W x H)mm		
Weight	120g	
Temperature	0~50°C (Oper	rating) ,0~70°C (Storage)
Humidity	10~90% non-	condensing
Certification	CE, FCC, LV	D, RoHS
MTBF	65,000 h (25°C)	
·		<u>- </u>

Ordering Information

- FRM220-155MS Slide-in card repeater
- FRM220-155MS-SFP Slide-in card repeater with SFP slots

Managed slide-in card 3R Repeater for FRM220

FRM220-SML80-3R



The FRM220-SML80-3R is an optical 3R regeneration device, which consists of re-amplification, reshaping and retiming. The transponder card converts a data signal to the correct wavelength for transmission on a specific channel by supporting SFP optics on both line side and client side interfaces. When the FRM220-SML80-3R card is placed in the FRM220 rack with SNMP management, the management can view the converter card's status, type, version, fiber link status and alarms. The card can be configured to enable or disable the port, reset the port and set the desired data rate.

Features

- Transparent fiber media converter / repeater up to 2.5Gbps (Fast Ethernet, OC3, STM-1,STM-4, STM-16,FC-1, FC-2)
- Network management via terminal, web or SNMP in FRM220-CH20 chassis
- Extend transmission from 2km to 120km over fiber
- Perform optical repeater function (Re-amplification, Reshaping & Re-clocking)
- Supports Client / Line loop back test
- Link Fault Pass through (LFP)

FRM220-SML80-3R+CH01

■ Auto Laser Shutdown (ALS)

Connector: Ports Optical Interface:

Certification

MTBF

Specifications

Data rate: Up to 2.5Gbps (Fast Ethernet, OC3, STM-1,STM-4, STM-16,FC-1, FC-2) Regeneration: 3R Loop back: Line/Client MM 62.2/125μm, 50/125μm. Cable type : SM 9/125µm MM 1310nm, SM 1310, 1550nm, Wavelength: WDM 1310Tx/1550Rx(type A), 1550Tx/1310Rx(type B) LEDs Power, Line Link, Client Link, Test DC In 12V Power < 5W Power Consumption Dimensions 155 x 88 x 23mm (D x W x H)mm Weight 120g Temperature 0~50°C (Operating) ,0~70°C (Storage) Humidity 10~90% non-condensing

CE, FCC, LVD, RoHS

65,000 h (25°C)

SFP LC

Application CO (Rack) to CPE (Stand-alone) 1310nm 1310nm 1470~1610nm FRM220-SML80-3R+CH01 FRM220-SML80-3R+CH20 CPE (Stand-alone) to CPE (Stand-alone) 1310nm 1310nm

1470~1610nm

FRM220-SML80-3R+CH01

Ordering Information

FRM220-SML80-3R 3R Transponder Slide-in card with dual SFP slots

Managed 16-Slot Media Converter Center

FRM301



The FRM301 is a 3U, 19(23)" fiber media platform rack that features 16 cards capacity. Supported cards include Ethernet 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 supported cards include G.703 E1/T1, Datacom (V35, X.21, RS530/ 449/ 232) and Serial (RS485/ 422/ 232) data communication interfaces over fiber media.

Features

- 3U 19" 16-slot Chassis with AC/DC power redundancy
- All modules and cards support hot-swapping
- Two alarm relays

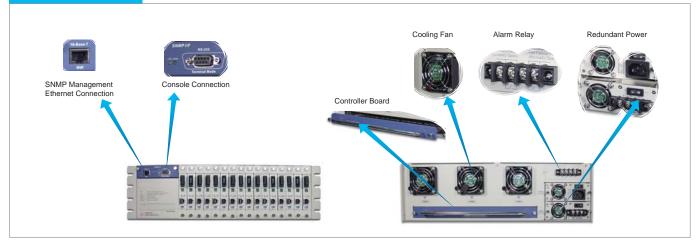
SNMP Card

- Supports local / remote monitor
- Supports local configuration.
- Supports online TFTP f/w upgrade
- Supports multiple accesses for SNMP management
- Supports Windows® GUI management, Telnet, Serial console
- Supports console RS-232 port and 10/100Base-T Ethernet port
- Supports SNMP standard MIB II and proprietary MIB

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	
Dimensioner		
Dimensions:	440mm x 280mm x 130.6mm (L x W x H).	
Weight:	440mm x 280mm x 130.6mm (Lx W x H). 6.2Kg (include 1 AC power modules &	
	6.2Kg (include 1 AC power modules &	
Weight:	6.2Kg (include 1 AC power modules & two ear panels for rack-mounting)	
Weight:	6.2Kg (include 1 AC power modules & two ear panels for rack-mounting) FCC part 15, Subpart B, Class A,	
Weight:	6.2Kg (include 1 AC power modules & two ear panels for rack-mounting) FCC part 15, Subpart B, Class A, ANSI C63.4:2003	
Weight:	6.2Kg (include 1 AC power modules & two ear panels for rack-mounting) FCC part 15, Subpart B, Class A, ANSI C63.4:2003 CE EN55022:2006, Class A	

Overview



Ordering Information

FRM301 Chassis

■ FRM301-CH 3U, 19 (23)", 16-slot chassis

Power

- FRM301-AC AC (90 ~ 264 VAC) power supply module, IEC connector
- FRM301-DC24 DC (-18 ~ -56 VDC) power supply module, 3-pin terminal block
- FRM301-DC48 DC (-36 ~ -72 VDC) power supply module, 3-pin terminal block

Network management

- FRM301-SNMP/C SNMP card with RS-232 and Ethernet 10/100Base-T
- FRM-SNMP-GUI GUI (Graphical User Interface) management software

FRM301 Fiber Media Converter Slide-in Cards

All the FE/E1/T1/Data/Serial cards are available in fiber transceiver distances as follows:

Single mode: 15/30/50/80/120Km, Multi-mode: 2Km and WDM: 20/40/60/80Km

GbE series cards are available in 10/20/40/50/80/120Km, Multi-mode: 550M/2Km & WDM:10/20/40/60/80Km



FRM301-10/100F Fast Ethernet 10/100 Fiber Media Converter

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FRM301-1000ES Gigabit Ethernet 10/100/1000 Fiber Media Converter

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FRM301-1000TS Gigabit Ethernet 1000 Fiber Media Converter



FRM301-1000TGGigabit Ethernet 1000
Fiber Media Converter



FRM301-1000DS 1.25G Dual Fiber Media Repeater

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F	Page	29

Model Name		FRM301-10/100F	FRM301-1000ES	FRM301-1000TS	FRM301-1000TG	FRM301-1000DS
	Wave Length (nm)	1310/1550	1310/1470~1610	1310/1470~1610	1310/1470~1610	1310/1470~1610
Fiber Interface	Connecter Type	SC, ST, FC	LC	LC	SC	LC
	Ports	1-port 100Base-FX	1-port 1000Base-SX/LX	1-port 1000Base-SX/LX	1-port 1000Base-SX/LX	2-port 1000Base-SX/LX
C l-tf	Connecter Type	RJ-45	RJ-45	RJ-45	RJ-45	
Copper Interface	Ports	1-port 10/100Base-TX	1-port 10/100/1000Base-TX	1-port 1000Base-TX	1-port 1000Base-TX	
Power	Ports	√	✓	✓	✓	✓
Front Bonol	DIP Switch	✓	✓	√	✓	
Front Panel	Diagnostic LEDs	✓	✓	✓	✓	✓
	Local monitor & configure	✓	✓	✓	✓	✓
	Remote monitor & configure	Remote monitor	Remote monitor	Remote monitor	Remote monitor	
Features	Loop back test	✓	✓	✓	✓	✓
	Link Fault Pass Through	✓	✓	√	✓	
	Auto MDIX	/	√	√	1	

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FRM301-1000MGGigabit Multi-mode

Gigabit Multi-mode to Single mode Fiber Media Converter

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FRM301-E1/T1 (RJ-45/BNC)

E1/T1 Fiber Media Converter

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FRM301-Data (X.21/V.35/RS530/449/232)

Datacom Fiber Media Converter

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FRM301-Serial (RS-485/422/232)

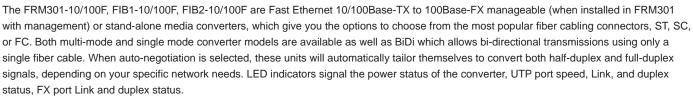
Serial Fiber Media Converter

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Model Name		FRM301-1000MG	FRM301-E1/T1	FRM301-Data	FRM301-Serial
	Wave Length (nm)	1310/1470~1610	1310/1550	1310/1550	1310/1550
Fiber Interface	Connecter Type	SC	SC, ST	SC, ST	SC, ST, FC, LC
	Ports	2-port 1000Base-SX/LX	1-port Fiber	1-port Fiber	1-port Fiber
Copper Interface	Connecter Type		RJ-45, BNC	HD26F	6-pin Terminal Block
Copper Interface	Ports		1-port Copper E1/T1	1-port Copper V35/X21/RS530/232	1-port Copper RS485/422/232
Power	Ports	√	✓	✓	✓
Front Panel	DIP Switch	✓	✓	✓	√
rioni ranei	Diagnostic LEDs	✓	✓	✓	✓
	Local monitor & configure	✓	✓	✓	✓
	Remote monitor & configure		✓	✓	✓
Features	Loop back test	✓	✓	✓	✓
	Link Fault Pass Through				
	Auto MDIX				

Slide-in card & stand-alone **Fast Ethernet fiber converter**

FRM301-10/100F

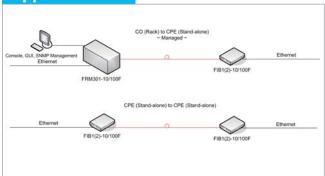


FIB1-10/100F, FIB2-10/100F

Features

- 10/100Base-TX to 100Base-FX Converter
- Auto-Negotiation or forced mode
- Auto MDI/MDIX
- Forward 1600 bytes (Max.) packets
- Supports Q in Q double tagged frame transparent
- Supports IEEE 802.1q Tag VLAN pass thru
- Supports local monitor and configure by the SNMP manager.
- Support flow control (Pause)
- Supports Link Fault Pass through (LFP)
- Supports Loop Back Test
- Auto Laser Shutdown (ALS)

Application



Specifications

Ports	Connector:	1x9 (SC, ST, FC)	
Optical Interface :	Data rate :	100Mbps	
	Duplex mode : Full duplex		
	Cable type :	MM 62.2/125μm, 50/125μm.	
		SM 9/125µm	
	Distance :	MM 2km, SM 15/30/50/80/120km,	
		WDM 20/40/60/80km	
	Wavelength:	1310nm, 1550nm	
Electrical Interface :	Connector:	RJ45	
	Data rate :	10Mbps, 100Mbps	
	Duplex mode:	Half / Full duplex	
	Cable type :	10Base-T Cat.3, 4, 5, UTP,	
		100Base-TX Cat.5, 5e	
	Distance:	100 meters	
Standard	IEEE 802.3, IE	EEE 802.3u	
LEDs	Power, FX Lin	k, FX Duplex, TX SPD,	
	TX Link, TX D	uplex	
Power	FIB1:DC In 9V	/, FIB2:AC 100 ~ 240V/ DC 24 ~ 72V	
Power Consumption	< 4W		
Dimensions	FRM301/FIB1	: 123 x 86 x 20mm	
(D x W x H)mm	FIB2: 192 x 86	3 x 30mm	
Weight	FRM301: 290g, FIB1: 340g, FIB2: 550g		
Temperature	0~50°C (Operation	ating) ,0~70°C (Storage)	
Humidity	10~90% non-condensing		
Certification	CE, FCC, RoHS		
MTBF	65,000 h (25°C)		

Ordering Information

FRM301-10/100F 10/100Base-TX to 100Base-FX slide-in card

FIB1-10/100F 10/100Base-TX to 100Base-FX stand-alone converter

■ FIB2-10/100F 10/100Base-TX to 100Base-FX AC or DC power built-in



Slide-in card & stand-alone Gigabit Ethernet fiber converter

FRM301-1000ES, FIB1-1000ES



The FRM301-1000ES and FIB1-1000ES are Gigabit Ethernet 10/100/1000Base-T to 1000Base-SX/LX SFP. They are managed (when installed in FRM301 with management) or non-managed stand-alone media converters, which give you the options to choose from a wide range of industry standard SFP modules with LC connectors. SFPs in multi-mode and single mode 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

- 10/100/1000Base-T to 1000Base-SX/LX SFP
- Network management via terminal, or SNMP in FRM301-CH chassis
- Auto-negotiation or forced mode
- Auto MDI/MDIX
- Forward 1632 bytes (Max.) packets
- Supports Flow control (Pause)
- Support Link Fault Pass through (LFP) function
- Auto Laser Shutdown (ALS)

Specifications

Humidity

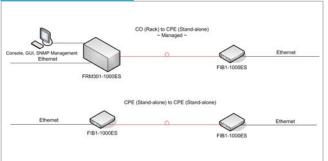
Certification MTBF

Ports	Connector:	SFP LC
Optical Interface :	Data rate :	1000Mbps
	Duplex mode :	Full duplex
	Cable type :	MM 62.2/125μm, 50/125μm.
		SM 9/125µm
	Distance :	MM 2km, SM 15/30/50/80/120km,
		WDM 20/40/60/80km
	Wavelength:	850, 1310, 1550nm
Electrical Interface :	Connector:	RJ45
	Data rate :	10Mbps, 100Mpbs, 1000Mbps
	Duplex mode:	Half / Full duplex
	Cable type :	10Base-T Cat.3, 4, 5, UTP,
		100Base-TX Cat.5, 5e,
		1000Base-T Cat. 5e or higher
	Distance:	100 meters
Standard	IEEE 802.3, IE	EEE 802.3u, IEEE802.3ab, IEEE802.3
LEDs	Power, FX-Link	k, TX-Link, TX-SPD, TX-Duplex, LLF
Power	DC In 12V	
Power Consumption	< 5W	
Dimensions	FRM301/FIB1:	123 x 86 x 20mm
(D x W x H)mm		
Weight	FRM301: 290g	ı, FIB1:340g
Temperature	0~50°C (Opera	ating) ,0~70°C (Storage)
	Standard LEDs Power Power Consumption Dimensions (D x W x H)mm Weight	Optical Interface : Data rate : Duplex mode : Cable type : Distance : Wavelength: Connector : Data rate : Duplex mode: Cable type : Distance : Data rate : Duplex mode: Cable type : Distance: Standard IEEE 802.3, IE LEDs Power, FX-Link Power DC In 12V Power Consumption < 5W Dimensions FRM301/FIB1: (D x W x H)mm Weight FRM301: 2900

10~90% non-condensing CE, FCC, LVD, RoHS

65,000 h (25°C)

Application



Ordering Information

■ FRM301-1000ES

10/100/1000Base-TX to 1000Base-FX SFP slide-in card

■ FIB1-1000ES

10/100/1000Base-TX to 1000Base-FX SFP stand-alone converter

Slide-in card & stand-alone Gigabit Ethernet fiber converters

FRM301-1000TS, 1000TG FIB1-1000TS, 1000TG, FIB2-1000TG



The FRM301-1000TS and 1000TG are transparent Gigabit Ethernet 1000Base-T to 1000Base-SX/LX SFP or GBIC. They are managed (when installed in FRM301 with management) or non-managed stand-alone media converters, which give you the options to choose from a wide range of industry standard SFP modules with LC connectors. SFPs in multi-mode and single mode models are available as well as BiDi which allows bi-directional transmissions using only a single fiber cable. Because they are completely transparent to Ethernet packets, they are able to support any size frames, including undersized or jumbo packets (9K bytes). LED indicators signal the power status of the converter, UTP port speed, Link, and duplex status, FX port Link and duplex status.

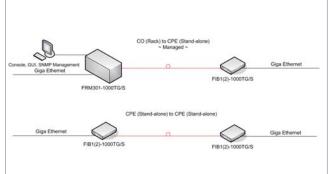
Features

- 1000Base-T to 1000Base-SX/LX
- Network management via terminal or SNMP in FRM301-CH chassis
- Auto-negotiation or forced mode
- Auto MDI/MDIX
- Forward 9k bytes (Max.) packets
- Support Link Fault Pass through (LFP) function
- Auto Laser Shutdown (ALS)

Specifications Ports

Ports	Connector:	1x9 (SC, ST, FC)	
Optical Interface :	Data rate :	100Mbps	
	Duplex mode :	Full duplex	
	Cable type :	MM 62.2/125μm, 50/125μm.	
		SM 9/125µm	
	Distance :	MM 2km, SM 15/30/50/80/120km,	
		WDM 20/40/60/80km	
	Wavelength:	1310nm, 1550nm	
Electrical Interface :	Connector:	RJ45	
	Data rate :	10Mbps, 100Mbps	
	Duplex mode:	Half / Full duplex	
	Cable type :	10Base-T Cat.3, 4, 5, UTP,	
		100Base-TX Cat.5, 5e	
	Distance:	100 meters	
Standard	IEEE 802.3, IEEE 802.3u		
LEDs	Power, FX Lin	k, FX Duplex, TX SPD,	
	TX Link, TX D	uplex	
Power	FIB1:DC In 9V	, FIB2:AC 100 ~ 240V/ DC 24 ~ 72V	
Power Consumption	< 4W		
Dimensions	FRM301/FIB1: 123 x 86 x 20mm		
(D x W x H)mm			
	FIB2: 192 x 86		
Weight			
, ,	FRM301: 290g	5 x 30mm	
Weight	FRM301: 290g	3 x 30mm g, FIB1: 340g, FIB2: 550g ating) ,0~70°C (Storage)	
Weight Temperature	FRM301: 290g 0~50°C (Opera	s x 30mm g, FIB1: 340g, FIB2: 550g ating) ,0~70°C (Storage) condensing	

Application



Ordering Information

■ FRM301-1000TS 1000Base-TX to 1000Base-SX/LX SFP slide-in card

■ FIB1-1000TS 1000Base-TX to 1000Base-SX/LX SFP stand-alone converter

■ FRM301-1000TG 1000Base-TX to 1000Base-SX/LX GBIC slide-in card

■ FIB1-1000TG 1000Base-TX to 1000Base-SX/LX GBIC stand-alone converter

■ FIB2-1000TG 1000Base-TX to 1000Base-SX/LX GBIC with AC or DC power built-in



Slide-in card & stand-alone Gigabit SM/MM, MM/SM fiber converter / repeater

FRM301-1000MG, FIB1-1000MG



The FRM301-1000MG and FIB1-1000MG are transparent multi-mode fiber to GBIC fiber converters that at speeds up to 1.25Gbps. They are managed (when installed in FRM301 with management) or non-managed stand-alone media converters, which give you the options to choose from a wide range of industry standard GBIC modules with SC connectors. With one fixed multi-mode transceiver on board, these converters are best deployed in multi-mode to single mode fiber applications. LED indicators signal the power status of the converter, UTP port speed, Link, and duplex status, FX port Link and duplex status.

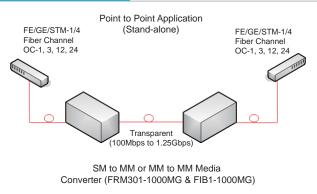
Features

- Transparent fiber media converter / repeater
- Data rate to 1.25G
- Network management via terminal or SNMP in FRM301-CH chassis
- Extend transmission from 2km to 120km over fiber
- Perform optical repeater function (Re-amplification & Reshaping)

Specifications

Ports	Connector :	1x9 SC MM, GBIC SC	
	Data rate :	1.25Gbps	
	Duplex mode : Full duplex		
	Cable type :	MM 62.2/125μm, 50/125μm.	
		SM 9/125μm	
	Distance :	MM 2km, SM 15/30/50/80/120km,	
		WDM 20/40/60/80km	
	Wavelength:	850, 1310, 1550nm	
Standard	IEEE802.3ab, IEEE802.3z		
LEDs			
Power			
Power Consumption			
Dimensions			
(D x W x H)mm			
Weight	FRM301: 290	g, FIB1:340g	
Temperature	0~50°C (Operating) ,0~70°C (Storage) 10~90% non-condensing CE, FCC, LVD, RoHS		
Humidity			
Certification			
MTBF	65,000 h (25°	°C)	

Application



Ordering Information

■ FRM301-1000MG

Slide-in card repeater with fixed multi-mode and GBIC slot

■ FIB1-1000MG

Stand-alone repeater with fixed multi-mode and GBIC slot

Slide-in card & stand-alone Dual fiber converter / repeater

FRM301-1000DS, FIB1-1000DS

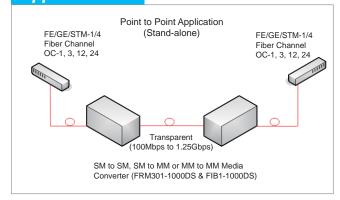


The FRM301-1000DS is a fiber to fiber optical media converter and repeater that allows data rates up to 2.5Gbps. FRM301-1000DS supports 2R regeneration, which consists of re-amplification and reshaping. This converter is compatible with fiber interfaces such as 100Mbps Fast Ethernet, 155Mbps STM1, 4, 16, Fiber Channel 1, 2, and OC3, 12, 24, 48. The FRM301-1000DS works as an FRM301 slide-in card, while the FIB1-1000DS is a stand-alone fiber converter. When the FRM301-1000DS card is placed in the FRM301 rack with SNMP management, the management can view the converter card's status, type and fiber link status.

Features

- Transparent fiber media converter / repeater
- Data rate up to 2.5G
- Network management via terminal or SNMP in FRM301-CH chassis
- Extend transmission from 2km to 120km over fiber
- Perform optical repeater function (Re-amplification & Reshaping)

Application



Specifications

Ports	Connector:	SFP LC	
Optical Interface :	Data rate :	Up to 2.5G	
	Duplex mode : Full duplex		
	Cable type :	MM 62.2/125μm, 50/125μm.	
		SM 9/125μm	
	Distance :	MM 2km, SM 15/30/50/80/120km,	
		WDM 20/40/60/80km	
	Wavelength:	850, 1310, 1550nm,	
Standard	IEEE802.3ab, IEEE802.3z		
LEDs	Power, FX-Link1, FX-Link2,		
Power	DC In 12V	DC In 12V	
Power Consumption	< 5W		
Dimensions	FRM301/FIB1: 123 x 86 x 20mm		
(D x W x H)mm			
Weight	FRM301: 290g, FIB1:340g		
Temperature	0~50°C (Operating) ,0~70°C (Storage)		
Humidity	10~90% non-condensing		
Certification	CE, FCC, LVD, RoHS		
MTBF	65,000 h (25°	C)	

Ordering Information

■ FRM301-1000DS

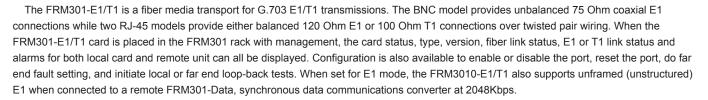
Slide-in card repeater with SFP slots

■ FIB1-1000DS

Stand-alone repeater with SFP slots

Slide-in card & stand-alone Managed E1/T1 fiber converter

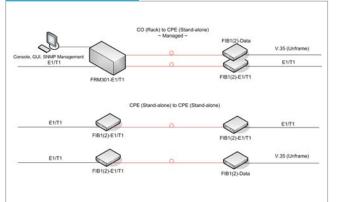
FRM301-E1/T1, FIB1-E1/T1, FIB2-E1/T1



Features

- In-band managed via terminal, GUI or SNMP in FRM301-CH chassis
- T1/E1 RJ-45 (USOC RJ-48C) or E1 Coax (BNC) to Fiber converter
- Supports AMI or B8ZS/HDB3 line codes
- E1 supports unframed to FRM301-Data
- User selectable line code setting
- Electrical and optical loop back tests

Application



Specifications

Ports

Optical Interface :	Cable type :	MM 62.2/125μm, 50/125μm.
		SM 9/125µm
	Distance :	MM 2km, SM 15/30/50/80/120km,
		WDM 20/40/60/80km
	Wavelength:	1310nm, 1550nm
Electrical Interface:	Connector:	RJ45 E1-120Ω, T1-100 Ω,
		BNC E1-75 Ω
	Data rate :	E1: 2.048Mpbs, T1:1.544Mbps
	Line Code :	E1 HDB3/AMI, T1: B8ZS/AMI
	Cable type :	Cat.3 or higher Twisted-Pair cable
		100 meters
Standard E1 ITU-T G.703, G.704		03, G.704, G.706, G.732, G.823
	T1 ITU-T G.703, G.704, AT&T, TR-62411, ANSI T1.40 Power, FX-Link, E1/T1 SIG, Test, SYN, RD, TD, AIS	
LEDs		
	(E1/T1R) Power, FX-Link, E1 SIG, Test(E1B)	
Power	FIB1:DC In 9V, FIB2:AC 100 ~ 240V/ DC 24 ~ 72V	
Power Consumption	< 5W	
Dimensions	FRM301/FIB1	: 123 x 86 x 20mm
(D x W x H)mm	FIB2: 192 x 8	6 x 30mm
Weight	FRM301: 290	g, FIB1:340g, FIB2: 550g
Temperature	0~50°C (Operating) ,0~70°C (Storage)	
Humidity	10~90% non-condensing	
Certification	CE, FCC, LVD, RoHS	
MTBF	65,000 h (25°C)	

Connector:

1x9 (SC, ST, FC)

FXX-	XXX-	XX-	XXX
Product Type	Interface Type	Connector Type	Connectivity Distance
FRM301	E1R → E1 RJ45	SC	MM: 2km
FIB1	E1B → E1 BNC	ST	SM: 15/30/50/80/120km
FIB2	T1R → T1 RJ45	FC	WDM: 20/40/60/80km



Slide-in card & stand-alone V.35/X.21 **RS-530/449/232** fiber converter

FRM301-Data, FIB1-Data, FIB2-Data FRM301-Data/H, FIB1-Data/H



The FRM301-DATA and DATA/H are media converters for Nx64K up to 2.048Mbps or high-speed (up to 8.192Mbps for "H" model) synchronous or low speed synchronous and asynchronous data transmissions (V.35, RS-232, RS-530, X.21 or RS-449) over fiber optical media. When the FRM301-DATA card is placed in the FRM301 rack with SNMP management, in-band management allows viewing the card and remote converter's status, type, version, fiber link status, data link status and alarms. Both card and remote can be configured to enable or disable the port, reset the port, set the data rate, modify the clock mode, and initiate local or far end loop back tests. The FRM301-Data converter may also be paired with the FRM301-E1 for 2048K transmissions.

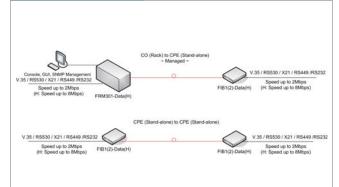
Features

- Synchronous or Asynchronous data over fiber
- In-band management via terminal, GUI or SNMP in FRM301-CH chassis
- Supports interface: V.35, X.21, RS530, RS449, RS232
- DCE mode
- User selectable data rate Nx64kbps, up to 2Mbps (9Mbps for
- Clock mode setting, internal, external, or recovery
- Electrical and optical loop back tests
- Compatible with FRM301-E1 on same fiber link for 2Mbps unframed

Specifications		
Ports	Connector:	1x9 (SC, ST, FC)
Optical Interface :	Data rate :	36.864Mbps
	Line coding :	Scrambled NRZ
	Bit Error Rate	:Less than 10 ⁻¹⁰
	Cable type :	MM 62.2/125μm, 50/125μm.
		SM 9/125μm
	Distance :	MM 2km, SM 15/30/50/80/120km,
		WDM 20/40/60/80km
	Wavelength:	1310nm, 1550nm
Electrical Interface:	Connector:	HDB26F w/ adapter cable for V35,
		X21, RS530, RS449,RS232
	Line Code :	NRZ
	Baud Rate :	N*64Kbps , where n=1 to 32
		(64K ~ 2048kbps) Low speed, Sync
		or Async, 75 to 115.2kbps
	Clock mode :	Transparent, Recovery, External,
		Internal RC, TC, ETC normal or
		inverted
Standard	ITU-T	

	IIIVEILEU
Standard	ITU-T
LEDs	Power, FX Link, TD, RD, RTS,CTS, DCD, Test
Power	FIB1:DC In 9V, FIB2:AC 100 ~ 240V/ DC 24 ~ 72V
Power Consumption	< 5W
Dimensions	FRM301/FIB1: 123 x 86 x 20mm
(D x W x H)mm	FIB2: 192 x 86 x 30mm
Weight	FRM301: 290g, FIB1:340g, FIB2: 550g
Temperature	0~50°C (Operating) ,0~70°C (Storage)
Humidity	10~90% non-condensing
Certification	CE, FCC, LVD, RoHS

Application

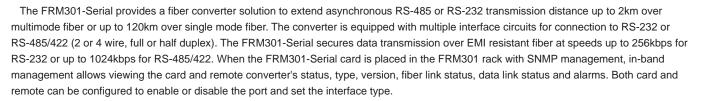


Ordering information						
FXX-	XXX-	XX-	XXX			
Product Type	Interface Type	Connector Type	Connectivity Distance			
FRM301	V35 → V35	SC	MM: 2km			
FIB1	X21 → X21	ST	SM: 15/30/50/80/120km			
FIB2	RS530 → RS530	FC	WDM: 20/40/60/80km			
	RS449 → RS449					
	RS232 → RS232					
	V35H → V35(8M)					
	X21 → X21(8M)					
	RS530H → RS530(8M)					



Slide-in card & stand-alone Serial RS-485/232 fiber converter

FRM301-Serial FIB1-Serial, FIB2-Serial



Features

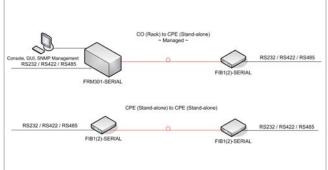
- Extends asynchronous serial transmission from 2km to 120km over fiber
- In-band management via terminal, GUI or SNMP in FRM301-CH chassis
- Software selectable data interface for RS232/ 422/ 485
- Software selectable two wires (half duplex) or four wires (full duplex) RS485
- Software selectable three or five wires RS232
- Speeds up to 256kbps for RS232 (Async. mode)
- Speeds up to 1Mbps for RS485/422

Specifications

	Ports	Connector:	1x9 (SC, ST, FC)
	Optical Interface :	Data rate :	36.864Mbps
		Line coding:	Scrambled NRZ
		Bit Error Rate	:Less than 10 ⁻¹⁰
		Cable type :	MM 62.2/125μm, 50/125μm.
			SM 9/125µm
		Distance :	MM 2km, SM 15/30/50/80/120km,
			WDM 20/40/60/80km
		Wavelength:	1310nm, 1550nm
	Electrical Interface :	Connector:	6 pins Terminal block
		Data :	Signal Formats
			RS485/422 2-wire, 4-wire
			RS232 RTS/CTS 5-wire, 3-wire
		Baud Rate :	RS422, RS485 up to 1024kbps
			RS232 up to 256kbps
7			

	110202 up to 200kbp3
Standard	EIA/TIA RS485, RS422, RS232
LEDs	Power, DI, FX Link, Test
Power	FIB1:DC In 9V, FIB2:AC 100 ~ 240V/ DC 24 ~ 72V
Power Consumption	< 5W
Dimensions	FRM301/FIB1: 123 x 86 x 20mm
(D x W x H)mm	FIB2: 192 x 86 x 30mm
Weight	FRM301: 290g, FIB1:340g, FIB2: 550g
Temperature	0~50°C (Operating) ,0~70°C (Storage)
Humidity	10~90% non-condensing
Certification	CE, FCC, LVD, RoHS
MTBF	65,000 h (25°C)

Application



Ordering Information

■ FRM301-Serial Serial (RS485/422/232) to fiber slide-in card

■ FIB1-Serial Serial (RS485/422/232) to fiber stand-alone converter

■ FIB2-Serial Serial (RS485/422/232) to fiber with AC or DC power built-in



Slide-in card & stand-alone RS-485/232 Daisy Chain fiber converter

Chief Charles Charles

FIB1-Serial/FDC

The FRM301-Serial/FDC provides a dual fiber connection converter solution to extend asynchronous RS-485 or RS-232 transmission distance up to 2km over multimode fiber or up to 120km over single mode fiber. The dual fiber inputs allow connecting multiple devices in a cascade or "daisy chain" fashion as well as creating ring architecture for fiber redundancy. The converter is equipped with multiple interface circuits for connection to RS-232 or RS-485/422 (2 or 4 wire, full or half duplex). The FRM301-Serial?FDC secures data transmission over EMI resistant fiber at speeds up to 256kbps for RS-232 or up to 1024kbps for RS-485/422. When the FRM301-Serial/FDC card is placed in the FRM301 rack with SNMP management, in-band management allows viewing the card and remote converter's status, type, version, fiber link status, data link status and alarms. Both card and remote can be configured to enable or disable the port and set the interface type.

Features

- Extend asynchronous serial transmission from 2km to 120km over fiber
- In-band management via terminal, GUI or SNMP in FRM301-CH chassis
- Two fiber ports support daisy chain and ring architecture
- Multi-drop operation over fiber ring
- Software selectable data interface for RS232/422/485
- Software selectable two wires (half duplex) or four wires (full duplex) RS485
- Software selectable three or five wires RS232
- Speeds up to 256kbps for RS232 (Async. mode)
- Speeds up to 1Mbps for RS485/422

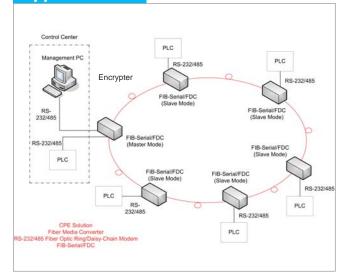
Specifications

Certification

Specifications					
Ports	Connector:	1x9 (SC, ST, FC)			
Optical Interface :	Data rate :	31.104Mbps			
	Line coding :	Scrambled NRZ			
	Bit Error Rate: Less than 10 ⁻¹¹				
	Cable type :	MM 62.2/125μm, 50/125μm.			
		SM 9/125μm			
	Distance :	MM 2km, SM 15/30/50/80/120km,			
		WDM 20/40/60/80km			
	Wavelength:	1310nm, 1550nm			
Electrical Interface:	Connector:	6 pins Terminal block			
	Data :	Signal Formats			
		RS485/422 2-wire , 4-wire			
		RS232 RTS/CTS 5-wire, 3-wire			
		RS423 RTS/CTS 5-wire, 3-wire			
		TTL 3-were			
	Baud Rate :	RS422, RS485 up to 1024kbps			
		RS232 up to 256kbps			
		TTL up to 1024kbps			
Standard	EIA/TIA RS48	35, RS422, RS232			
LEDs	Power, FX-Lir	nk1, FX-Link2, Test, Master, Ring TD, RD			
Power	< 5W				
Power Consumption	FRM301/FIB1	: 123 x 86 x 20mm			
Dimensions	FIB1: 138 x 86 x 40mm				
(D x W x H)mm					
Weight	0~50°C (Ope	rating) ,0~70°C (Storage)			
Temperature	10~90% non-	condensing			
Humidity	CE, FCC, LVD, RoHS				

65,000 h (25°C)

Application



Ordering Information

■ FIB1-Serial/FDC Serial (RS485/422/232) to dual fiber stand-alone converter

Stand-alone 10G Ethernet media converter

OF10G-01S

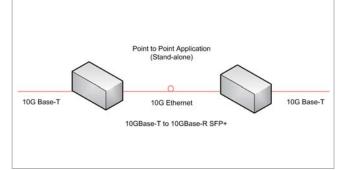


The OF10G-01S is a non-managed 10G fiber to copper Ethernet media converter. Based on IEEE802.3an and IEEE802.3ae, this converter uses Cat.6a/Cat.7 twisted pair cable as copper transmission media with RJ-45 and the latest 10G optical solution, SFP+. The data stream can be converted bi-directionally from 10GBase-R to 10GBase-T and vice versa. With full duplex wire speed forwarding capability between these 2 media, the OF10G-01S brings you the best and simplest solution for the 10G Ethernet conversion between copper wire and fiber.

Features

- Complies with IEEE802.3an 10GBase-T and IEEE802.3ae 10GBase-R
- Real-Time conversion between 10GBase-T and 10GBase-R
- Common used SFP+ fiber interface and RJ45 connector
- Full duplex wire speed forwarding
- Subsidiary device for 10G Ethernet transmission without fiber
- Test loopback function via console port

Application



Specifications

Ports	Connector :	SFP+ LC		
Optical Interface :	Data rate :	10GMbps		
	Cable type :	850, 1310nm		
	Distance :	300m, 10km		
	Wavelength:	1550nm		
Electrical Interface :	Connector:	RJ45		
	Data rate :	10GMbps		
	RS-232	RJ45		
	console port :			
	Cable type :	Cat. 6a		
	Distance :	95 meters		
Standard	IEEE 802.3an, , IEEE 802.3ae			
LEDs	SFP+, LR, Link/Act, LBK A/B, SYS			
Power	DC 12V In			
Power Consumption	< 15W			
Dimensions	175 x 86 x 33	mm		
(D x W x H)mm				
Weight	550g			
Temperature	0~40°C (Operating) ,0~50°C (Storage)			
Humidity	0~85% non-c	ondensing		
Certification	CE, FCC, RoHS			
MTBF	57,000 hours			

Ordering Information

■ **OF10G-01S** 10GBas

10GBase-T to 10GBase-R fiber converter

Managed 12 Slots Media Converter Center

FRM401



The FRM401 is a 4U, 19(23)" fiber media platform rack that features 12 cards capacity and supports a four channel (four in one) Ethernet copper to fiber converter card for 10/100Base-TX to 100Base-FX 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. The FRM401-SNMP management option provides a serial console, Telnet or SNMP management to configure each channel on the line cards and monitor chassis power, fan and card status.

Features

- 4U 19 (23)"chassis, 12 slots for cards
- Rack with dual power modules designed for AC or DC power sharing, plus cooling fans
- All modules and cards support hot-swapping
- All electrical signals connect from rear, optical from front
- Two alarm relays

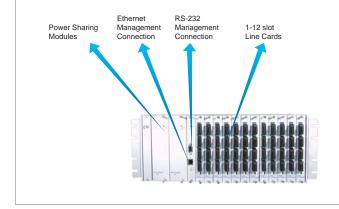
SNMP Card

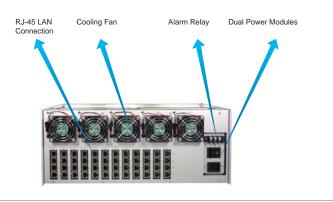
- Supports local / remote monitor
- Supports local configuration.
- Supports online TFTP f/w upgrade
- Supports multiple accesses for SNMP management
- Supports Windows® GUI management, Telnet, Serial console
- Supports console RS-232 port and 10/100Base-T Ethernet port,
- Supports SNMP standard MIB II and proprietary MIB

Specifications

Ports	SNMP Card :	Console RS232,
		LAN 10/100Base-TX RJ45
LEDs	SNMP Card :	Power, Link, SNMP
Power	AC110 : 85 ~1	38V, AC220: 187 ~276V
	DC48: 42 ~ 60	OV, DC72: 36 ~72V
Power Consumption	150W	
Dimensions	285 x 440 x 1	80mm
(D x W x H)mm		
Weight	7.9 kg	
Temperature	0~50°C (Oper	rating) ,0~70°C (Storage)
Humidity	10~90% non-	condensing
Certification	CE, FCC, Rol	HS
MTBF	65,000 h (25°	C)

Overview





Ordering Information

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

■ FRM4/AC-110 AC (85-138VAC) power module
■ FRM4/AC-220 AC (187-276 VAC) power module
■ FRM4-DC DC (42 to 60 VDC) power module

Network management

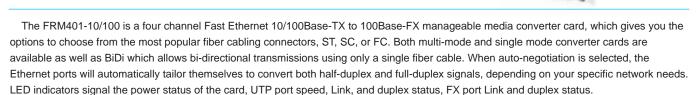
■ FRM401-SNMP SNMP card with RS-232 and Ethernet 10/100Base-T
■ FRM-SNMP-GUI GUI (Graphical User Interface) management software

Card

■ FRM401-10/100 4-port 100/00Base-TX to 100Base-FX

FRM401 slide-in card Managed Fast Ethernet fiber converter

FRM401-10/100



Features

- 4Ch 10/100Base-TX to 100Base-FX Converter
- Auto-Negotiation or forced mode
- Auto MDI/MDIX
- Forward 1600 bytes (Max.) packets
- Supports Q in Q double tagged frame transparent
- Supports IEEE 802.1q Tag VLAN pass thru
- Supports local monitor and configure by the SNMP manager.
- Support flow control (Pause)
- Supports Link Fault Pass through (LFP)
- Supports Loop Back Test
- Auto Laser Shutdown (ALS)

Specifications

Ports	Connector:	Connector : 4x (SC, ST, FC)		
Optical Interface :	Data rate :	100Mbps		
	Duplex mode	: Full duplex		
	Cable type :	MM 62.2/125μm, 50/125μm.		
		SM 9/125µm		
	Distance :	MM 2km, SM 15/30/50/80/120km,		
		WDM 20/40/60/80km		
	Wavelength:	1310nm, 1550nm,		
	Connector:	4x RJ45		
	Data rate :	10Mbps, 100Mbps		
Electrical Interface:	Duplex mode	Half / Full duplex		
	Cable type :	10Base-T Cat.3, 4, 5, UTP,		
		100Base-TX Cat.5, 5e		
	Distance :	100 meters		
Standard	IEEE 802.3, IEEE 802.3u			
LEDs	FX Link, TX S	PD, TX Link, TX Duplex		
Power	DC 48V			
Power Consumption	< 4W			
Dimensions	123 x 86 x 20i	mm		
(D x W x H)mm				
Weight	510g			
Temperature	0~50°C (Oper	ating) ,0~70°C (Storage)		
Humidity	10~90% non-o	condensing		
Certification	CE, FCC, Rol-	HS .		
MTBF	65,000 h (25°	C)		

Management Software

FRM401 Rack View Screen

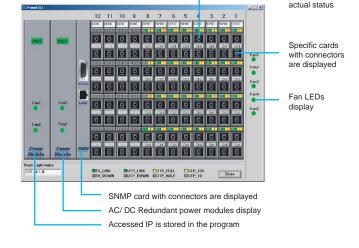
FRM401 GUI

The FRM-GUI is a Windows based management software designed and written specifically to manage the FRM301 and FRM401 via SNMP protocol. This program makes configuring and monitoring multiple chassis quick and easy. The chassis and card views show real-time status of power, fans and all installed converter cards. A trap window displays alarm messages along with the address of the unit and time. The software is compatible with all 32 bit versions of Windows including Win2K, XP and Vista.

Ordering Information

■ FRM401-10/100

4-port 100/00Base-TX to 100Base-FX



LEDs display

Non-Managed Family

Non-Managed 8 Slots Media Converter Center

FMC-CH08



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 low density fiber converter installations where no management features are required. Each FMC or VDTU2A-301 converter is an independent Ethernet to fiber or Ethernet to copper media converter that may be used as a stand-alone converter or placed in the FMC-CH08 chassis. When two chassis are connected in tandem, they fit exactly into a 2U 19" rack space. With one of three built-in power options of universal AC (100-240VAC), DC 18-36VDC or DC 36-72VDC, the FMC-CH08 provides the working DC voltages for up to 8 FMC or VDTU2A-301 converters. The built in cooling fan ensures that temperatures in the rack remain within the tolerated working range.

Features

- 2U, 10" (or half 19") rack supports up to 8 FMC converter
- Chassis with single built-in power available in AC or DC models.
- Cross flow cooling fan built-in.
- Designed for rack mounting in tandem

Specifications

Power	AC: 100 ~240V
	DC24 : 18 ~ 36V, DC48 : 36 ~ 72V
Power Consumption	< 45W
Dimensions	196 x 252 x 89mm
(D x W x H)mm	
Weight	1.47 kg
Temperature	0~50°C (Operating) ,0~70°C (Storage)
Humidity	10~90% non-condensing
Certification	CE, FCC, RoHS
MTBF	65,000 h (25°C)

Non-managed Family

Non-Managed 17 Slots Media Converter Center

FMC-CH017



The FMC-CH17 is a 2U high 19" chassis that supports up to 17 non-managed FMC or V2MC media converters. The FMC-CH17 provides an economic solution in low density fiber converter installations where no management features are required. Each FMC or VDTU2A-301 converter is an independent Ethernet to fiber or Ethernet to copper media converter that may be used as a stand-alone converter or placed in the FMC-CH17 chassis. With two slots for hot swappable power modules, this chassis can support redundant power from any of three power options, universal AC (100-240VAC), DC 18-36VDC or DC 36-72VDC. The FMC-CH17 provides the working DC voltages for up to 17 FMC or VDTU2A-301 converters. The built in cooling fan ensures that temperatures in the rack remain within the tolerated working range.

Features

- 2U, 19 (23)" rack supports up to 17 FMC converter
- Chassis with redundant AC / DC power
- Cooling fan
- LED indicators

Specifications

LEDs	Power, Fan
Power	AC: 100 ~240V
	DC24 : 18 ~ 36V, DC48 : 36 ~ 72V
Power Consumption	<100W
Dimensions	303 x 438 x 88mm
(D x W x H)mm	
Weight	7.9 kg
Temperature	0~50°C (Operating) ,0~70°C (Storage)
Humidity	10~90% non-condensing
Certification	CE, FCC, RoHS
MTBF	65,000 h (25°C)

Ordering Information

FMC-CH08

- 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-CH17

■ FMC-CH17-CH 2U 19" 17-slot chassis ■ FMC-CH17-AC AC 100 ~ 240V power module

■ FMC-CH17-DC24 DC 18 ~36V power module

■ FMC-CH17-DC48 DC 36 ~72 power module

FMC Non-Managed Fiber Media Converter Family

All the FE converters are available with fiber transceivers that support distances as follows:

Single mode: 15/30/50/80/120Km, Multi-mode: 2Km and WDM: 20/40/60/80Km

GbE converters are available in 10/20/40/50/80/120Km, Multi-mode: 550M/2Km & WDM:10/20/40/60/80Km

POF converters reach up to 50 meters













FMC-1000ES

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Non-Managed Gigabit Ethernet 10/100/1000 Fiber Media Converter with SFP slot FMC-1000E

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Non-Managed Gigabit Ethernet 10/100/1000 Fiber Media Converter FMC-10/100

Non-Managed Fast Ethernet 10/100 Fiber Media Converter

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FMC-10/100P

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Non-Managed Fast Ethernet 10/100 Fiber Media Converter with PoE Feature FMC-10/100I

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In-band Managed Fast Ethernet 10/100 Fiber Media Converter FMC-10/100IP

In-band Managed Fast Ethernet 10/100 Fiber Media Converter with PoE Feature

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Model Name		FMC-1000ES	FMC-1000E	FMC-10/100	FMC-10/100P	FMC-10/100I	FMC-10/100IP
	Wave Length (nm)	1310/1470~1610	1310/1470~1610	1310/1550	1310/1550	1310/1550	1310/1550
Fiber Interface	Connecter Type	SFP-LC	SC	SC, ST, FC	SC, ST, FC	SC, ST, FC	SC, ST, FC
	Ports	1-port 1000Base-SX/LX	1-port 1000Base-SX/LX	1-port 100Base-FX	1-port 100Base-FX	1-port 100Base-FX	1-port 100Base-FX
Copper Interface	Connecter Type	RJ-45	RJ-45	RJ-45	RJ-45	RJ-45	
Copper interface	Ports	1-port 10/1001000Base-T	1-port 10/1001000Base-T	1-port 10/100Base-TX	1-port 10/100Base-TX	1-port 10/100Base-TX	
Power	DC 12V	✓	✓	✓	✓	✓	✓
Front Panel	DIP Switch	✓	✓	✓	✓	✓	✓
rioni ranei	Diagnostic LEDs	✓	✓	✓	✓	✓	✓
	MTU (MAX Packets)	1632	1632	2046	2046	2046	2046
	Auto MDI/MDIX	✓	✓	✓	✓	Remote monitor	
Features	Auto-negotiation or forced mode	✓	✓	✓	✓	✓	✓
	Link Fault Pass through (LFP) functio	✓	✓	✓	✓		
	Flow control (Pause)	J	1		J		J



VDTU2A-301

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Non-Managed VDSL2 to Ethernet LAN Extender



POF

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FMC-10/100POF-O (Optolock Type)

Non-Managed Fast Ethernet 10/100 Fiber Media Converter POF

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FMC-10/100POF-S (SMI Type)

Non-Managed Fast Ethernet 10/100 Fiber Media Converter FMC-10/100-AC (Internal AC power)

Non-Managed Fast Ethernet 10/100 Fiber Media Converter

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FMC-10/100-DC (Internal DC power)

Non-Managed Fast Ethernet 10/100 Fiber Media Converter

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Model Name		VDTU02A-301	FMC-10/100POF-O	FMC-10/100POF-S	FMC-10/100-AC	FMC-10/100-DC
	Wave Length (nm)		650	650	1310/1550	1310/1550
Fiber Interface	Connecter Type		Optolock	SMI	SC, ST, FC	SC, ST, FC
	Ports		1-port 100Base-FX	1-port 100Base-FX	1-port 100Base-FX	1-port 100Base-FX
Copper Interface	Connecter Type	1x RJ-45 to 1x RJ11	RJ-45	RJ-45	RJ-45	RJ-45
Copper Interface	Ports	RJ45: 10/100Base-TX, RJ11:VDSL2	1-port 10/100Base-TX	1-port 10/100Base-TX	1-port 10/100Base-TX	1-port 10/100Base-TX
Power	DC 12V	✓	√	✓	✓	✓
Front Panel	DIP Switch	✓	✓	✓	√	✓
rioni ranei	Diagnostic LEDs	✓	✓	✓	✓	✓
	MTU (MAX Packets)	1522	1600	1600	2046	2046
	Auto MDI/MDIX	✓	✓	✓	√	✓
Features	Auto-negotiation or forced mode	✓	✓	✓	✓	✓
	Link Fault Pass through (LFP) functio	✓	✓	✓	√	✓
	Flow control (Pause)	Х	√	√	1	

Non-Managed Family

Non-managed Fast Etherent to fiber media converter with PoE (802.3af PD)

FMC-10/100, 10/100-AC FMC-10/100-DC, 10/100P

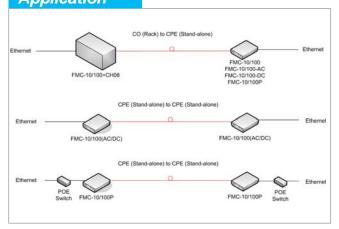


The FMC-10/100 family are Fast Ethernet 10/100Base-TX to 100Base-FX non-managed stand-alone media converters, which give you the options to choose from the most popular fiber cabling connectors, ST, SC, FC, or SFP-LC. Both multi-mode and single mode converter models are available as well as BiDi which allows bi-directional transmissions using only a single fiber cable. When auto-negotiation is selected, these units will automatically tailor themselves to convert both half-duplex and full-duplex signals, according to IEEE802.3u standards. LED indicators signal the power status of the converter, UTP port speed, Link, and duplex status, FX port Link and duplex status. These stand-alone converters may also be concentrated into either the FMC-CH08 or FMC-CH17 non-managed chassis.

Features

- 10/100Base-TX to 100Base-FX Converter
- Auto-Negotiation or forced mode
- Auto MDI/MDIX
- Forward 1600 bytes (Max.) packets
- Supports Q in Q double tagged frame transparent
- Supports IEEE 802.1q Tag VLAN pass thru
- Support flow control (Pause)
- Supports Link Fault Pass through (LFP)
- Forward 9K jumbo packets in converter mode
- Supports 802.3af Power over Ethernet (only FMC-10/100P)

Application



Specifications

Ports	Connector:	1x9 (SC, ST, FC)	
Optical Interface :	Data rate :	100Mbps	
	Duplex mode	: Full duplex	
	Cable type :	MM 62.2/125μm, 50/125μm.	
		SM 9/125μm	
	Distance:	MM 2km, SM 15/30/50/80/120km,	
		WDM 20/40/60/80km	
	Wavelength:	1310nm, 1550nm	
Electrical Interface :	Connector:	RJ45	
	Data rate :	10Mbps, 100Mpbs	
	Duplex mode	: Half / Full duplex	
	Cable type :	10Base-T Cat.3, 4, 5, UTP,	
		100Base-TX Cat.5, 5e	
	Cable length:	100 meters	
Standard	IEEE 802.3, II	EEE 802.3u	
LEDs	Power, FX Link, TX SPD, TX Link, TX Duplex, FEF		
Power	FMC: DC 12V In,		
	FMC-AC/DC:	AC 100 ~ 240V/ DC 24 ~ 72V	
Power Consumption	< 4W		
Dimensions	FMC: 108 x 7	4 x 23mm,	
(D x W x H)mm	FMC-AC/DC:	192 x 86 x 30mm	
Weight	FMC: 120g, F	MC-AC/DC: 550g	
Temperature	0~50°C (Oper	rating) ,0~70°C (Storage)	
Humidity	10~90% non-	condensing	
Certification	CE, FCC, Rol	HS	
MTBF	65,000 h (25°	C)	

Ordering Information

FMC-10/100 10/100Base-TX to 100Base-FX

FMC-10/100-AC 10/100Base-TX to 100Base-FX w/ built-in AC power FMC-10/100-DC 10/100Base-TX to 100Base-FX w/ built-in DC power FMC-10/100P 10/100Base-TX to 100Base-FX w/ Power over Ethernet

In-band Managed Fast Etherent to fiber media converter

FMC-10/100i, 10/100iS FMC-10/100iP, 10/100iPS



The FMC-10/100i family are 10/100Base Ethernet to 100Base-FX fiber stand-alone converters designed for fiber connection to FRM220-10/100i card in a managed FRM220-CH20 chassis. With advanced features like bandwidth control, this media converter is targeted for customer premises equipment in metro LAN, campus, enterprise and FTTx applications. By offering in-band management, this converter can be completely controlled and monitored from a centrally located managed rack controlling all converter settings including band-width control, duplex, and speed configuration. This media converter is completely transparent to Layer 2 and Layer 3 protocols including IEEE 802.1q, VLAN tag, Q in Q, STP, IPX, IP, etc.

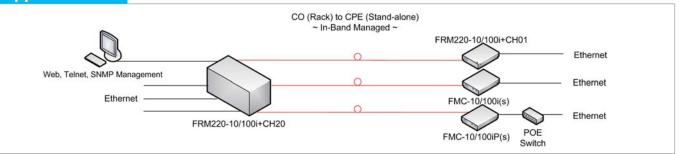
Features

- 10/100Base-TX to 100Base-FX Converter
- Auto-Negotiation or forced mode
- Auto MDI/MDIX
- Forward 2046 bytes (Max.) packets in switch mode
- Forward 9K jumbo packets in converter mode
- Supports Q in Q double tagged frame transparent
- Supports IEEE 802.1q Tag VLAN pass thru
- Supports local / remote In-band management (Monitor and Configure) by the SNMP manager with FRM220-10/100i.
- Bandwidth control (Nx32K or Nx512Kbps)
- Support flow control (Pause)
- Supports remote CPE power fail detect (dying gasp)
- Supports Far End Fault
- Supports Link Fault Pass through (LFP)
- Supports Loop Back Test
- Supports RMON counter
- D/D function for supported SFP fiber transceiver
- Auto Laser Shutdown (ALS)
- Fiber Hardware Reset (FHR)
- Online local / remote f/w upgrade
- Supports 802.3af Power over Ethernet (only FMC-10/100IP)

Specifications

Ports	Connector:	1x9 (SC, ST, FC), SFP LC
Optical Interface :	Data rate :	100Mbps
	Duplex mode : Full duplex	
	Cable type :	MM 62.2/125μm, 50/125μm.
		SM 9/125μm
	Distance :	MM 2km, SM 15/30/50/80/120km,
		WDM 20/40/60/80km
Electrical Interface :	Wavelength:	1310, 1550nm
	Connector:	RJ45
	Data rate :	10Mbps, 100Mpbs
	Duplex mode : Half / Full duplex	
	Cable type :	10Base-T Cat.3, 4, 5, UTP,
		100Base-TX Cat.5, 5e,
	Distance :	100 meters
Standard	IEEE 802.3, IEEE 802.3u, IEEE802.3ab	
LEDs	Power, FX Link, TX SPD, TX Link, TX Duplex, FEF	
Power	DC 12V In	
Power Consumption	< 4W	
Dimensions	108 x 74 x 23mm	
(D x W x H)mm		
Weight	120g	
Temperature	0~50°C (Operating) ,0~70°C (Storage)	
Humidity	10~90% non-	condensing
Certification	CE, FCC, RoHS	
MTBF	65,000 h (25°C)	
·	·	·

Application



Ordering Information

■ FMC-10/100i 10/100Base-TX to 100Base-FX w/ In-band Management

■ FMC-10/100iS 10/100Base-TX to 100Base-FX SFP w/ In-band Management

■ FMC-10/100iP 10/100Base-TX to 100Base-FX w/ In-band Management & Power over Ethernet

FMC-10/100iPS 10/100Base-TX to 100Base-FX SFP w/ In-band Management & Power over Ethernet

Non-managed Family

Non-managed Gigabit Etherent Fiber media converters

FMC-1000E, 1000ES



The FMC-1000E is a copper to fiber Gigabit Ethernet solution designed to make conversion between 10/100/1000Base-TX and 1000Base-SX/LX. The FMC-1000ES provides the fiber gigabit with SFP connector. This non-managed converter has a simple DIP switch for setting auto or forced mode and for enabling or disabling its LFP (Link Fault Pass-thru) feature.

Features

- 10/100/1000Base-T to 1000Base-FX
- Auto-negotiation or forced mode
- Auto MDI/MDIX
- Forward 1632 bytes (Max.) packets
- Supports Flow control (Pause)
- Supports Link Fault Pass through (LFP) function

Specifications

Certification

MTBF

	Ports	Connector:	1x9 (SC, ST, FC), SFP LC
	Optical Interface :	Data rate :	1000Mbps
		Duplex mode	: Full duplex
		Cable type :	MM 62.2/125μm, 50/125μm.
			SM 9/125μm
		Distance:	MM 2km, SM 15/30/50/80/120km,
			WDM 20/40/60/80km
		Wavelength:	850, 1310, 1550nm
	Electrical Interface :	Connector:	RJ45
		Data rate :	10Mbps, 100Mpbs, 1000Mbps
		Duplex mode	: Half / Full duplex
		Cable type :	10Base-T Cat.3, 4, 5, UTP,
			100Base-TX Cat.5, 5e,
			1000Base-T Cat. 5e or higher
		Cable length:	100 meters
	Standard	IEEE 802.3, II	EEE 802.3u, IEEE802.3ab, IEEE802.3z
	LEDs	Power, FX-Link, TX-Link, TX-SPD, TX-Duplex, LFP	
	Power	DC In 12V	
	Power Consumption	< 5W	
	Dimensions	108 x 74 x 23mm	
	(D x W x H)mm		
	Weight	120g	
	Temperature	0~50°C (Operating) ,0~70°C (Storage)	
	Humidity	10~90% non-	condensing

CE, FCC, LVD, RoHS

65,000 h (25°C)

CO (Rack) to CPE (Stand-alone) - Managed FMC-1000E(s) FRM220-1000E(s)-1+CH01 CO (Rack) to CPE (Stand-alone) - FRM220-1000E(s)-1+CH01 Ethernet FMC-1000E(s)-1+CH01 CO (Rack) to CPE (Stand-alone) - Nort-Managed FMC-1000E(s) Ethernet CPE (Stand-alone) to CPE (Stand-alone) Ethernet Ethernet

Ordering Information

■ FMC-1000E Unmanaged Gigabit Ethernet 10/100/1000Base-T to 1000Base-FX

■ FMC-1000ES Unmanaged Gigabit Ethernet 10/100/1000Base-T to 1000Base-SX/LX SFP

Non-Managed Family

Non-managed Fast Etherent Plastic fiber media converters

FMC-10/100POF-O, 10/100POF-S



1x9 (SC, ST, FC), SFP LC

The FMC-10/100POF family is a Fast Ethernet 10/100Base-TX to 100Base-FX non-managed stand-alone media converter which uses plastic optical fiber (POF). POF, as it is widely known, offers affordable, high-end connectivity for small office and home networks. With speeds of 100 Mbps optical Ethernet, it is a superior alternative to copper used in traditional networks. This is especially true for applications such as triple play and IPTV. The advantages to professional installers and amateur do-it-yourselfers are numerous. The discrete 2mm x 4.5mm duplex cable is easily concealed under carpets or easily pulled inside walls without breaking, while it can be easily cut with a pair of scissors. POF is robust enough to survive even the most novice installer. Troubleshooting is a snap as it uses 650nm visible red light to transfer data from one device to another. A quick glance inside the cable will indicate connectivity to the network by a red glow; no red light means no connection. It's that simple.

POF is completely safe. Because it is a light-based solution, there is no EMI (electro-magnetic interference) so it won't interfere with or be interfered by other electrical equipment. POF is already used in millions of cars worldwide to drive entertainment and information networks and has been proven reliable even in the most rugged environments. These stand-alone converters may also be concentrated into either the FMC-CH08 or FMC-CH17 non-managed chassis.

Features

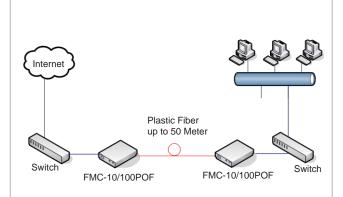
- 10/100Base-TX to 100Base-FX Converter
- Auto-Negotiation or forced mode
- Auto MDI/MDIX
- Forward 1600 bytes (Max.) packets
- Supports Q in Q double tagged frame transparent
- Supports IEEE 802.1q Tag VLAN pass thru
- Support flow control (Pause)
- Supports Link Fault Pass through (LFP)
- Compact size and simple installation

Specifications

Ports

1 0110		17.0 (00) 01) 10); 011 20
Optical Interface :	Data rate :	100Mbps
	Duplex mode : Full duplex	
	Cable type :	Simplex POF cable
	Distance :	MM 50meters
	Wavelength:	MM 650nm
Electrical Interface :	Connector:	RJ45
	Data rate :	10Mbps, 100Mpbs
	Duplex mode	: Half / Full duplex
	Cable type :	10Base-T Cat.3, 4, 5, UTP,
		100Base-TX Cat.5, 5e
	Distance :	100 meters
Standard	IEEE 802.3, IEEE 802.3u	
LEDs	Power, FX Link, TX SPD, TX Link, TX Duplex, FEF	
Power	DC 12V In	
Power Consumption	< 4W	
Dimensions	108 x 74 x 23mm	
(D x W x H)mm		
Weight	120g	
Temperature	0~50°C (Operating) ,0~70°C (Storage)	
Humidity	10~90% non-condensing	
Certification	CE, FCC, RoHS	
MTBF	65,000 h (25°C)	

Application

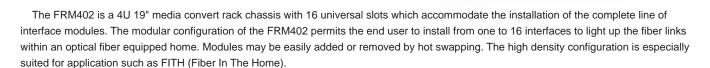


- FMC-10/100POF-S 10/100Base-TX to 100Base-FX SMI
- *FMC-10/100PPF-O* 10/100Base-TX to 100Base-FX Optolock

Non-Managed Family

Non-managed 16 slot Media Converter Center

FRM402



Features

- 4U 19 (23)"chassis, 16 slots for cards
- Rack with dual power modules designed for AC or DC power sharing, plus cooling fans
- All modules and cards support hot-swapping
- All electrical and optical signals connect from front
- Two alarm relays

Specifications

LEDs	Power	
Power	AC: 100 ~240V	
	DC24 : 18 ~ 36V, DC48 : 36 ~ 72V	
Power Consumption	<100W	
Dimensions	303 x 438 x 88mm	
(D x W x H)mm		
Weight	7.9 kg	
Temperature	0~50°C (Operating) ,0~70°C (Storage)	
Humidity	10~90% non-condensing	
Certification	CE, FCC, RoHS	
MTBF	57,000 hours	

FRM402-10/100 card

- 4Ch 10/100Base-TX to 100Base-FX per card
- Auto-Negotiation or forced mode
- Auto MDI/MDIX
- Forward 1600 bytes (Max.) packets
- Supports Q in Q double tagged frame transparent
- Supports IEEE 802.1q Tag VLAN pass thru
- Support flow control (Pause)
- Supports Link Fault Pass through (LFP)



FRM402-1000 card

- Dual channel 1000Base-T to 1000Base-SX/LX
- Auto-negotiation or forced mode
- Auto MDI/MDIX
- Forward 9k bytes (Max.) packets
- Support Link Fault Pass through (LFP) function



FRM402-Serial card

- Dual channel Serial converter (RS485/422/232) per card
- Extend asynchronous serial transmission from 2km to 120km over fiber
- Selectable data interface for RS232/ 422/ 485
- Selectable two wires (half duplex) or four wires (full duplex) RS485
- Selectable 3 wires (TD,RD,SG) or 5 wires (TD, RD, SG, CTS, RTS) RS232
- Speeds up to 256kbps for Async RS232.
- Speeds up to 1Mbps for RS485/422



- **FRM402-CH** 4U 19" 16-slot chassis
- FRM402-10/100 4-Ch 10/100Base-TX to 100Base-FX card
 FRM402-1000 2-Ch 100Base-TX to 1000Base-FX card
 FRM402-Serial 2-Ch Serial (RS485/422/232) to fiber card

Wall Mount Converter Family

Fiber in the home solution

FWM







The FWM (Fiber Wall Mount) family of converters are a solution for Fiber In The Home (FITH) that provide 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. The 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 for which copper based solutions fall short. The benefits include: Displacement of copper, future proofing, return on investment (will grow exponentially) unlimited bandwidth, and simple installation.

Features

■ Plug-in Unit for in-wall installation using FWM-K outlet

Specifications

LEDs	Power	
Power	DC 9V in	
Power Consumption	< 5W	
Dimensions	57 x 70 x 115mm	
(D x W x H)mm		
Weight	200 g	
Temperature	0~50°C (Operating) ,0~70°C (Storage)	
Humidity	10~90% non-condensing	
Certification	CE, FCC, RoHS	
MTBF	57,000 hours	

FWM-10/100

- 10/100Base-TX to 100Base-FX
- Auto-Negotiation or forced mode
- Auto MDI/MDIX
- Forward 1600 bytes (Max.) packets
- Supports Q in Q double tagged frame transparent
- Supports IEEE 802.1q Tag VLAN pass thru
- Support flow control (Pause)
- Supports Link Fault Pass through (LFP)

FWM-1000

- 1000Base-T to 1000Base-SX/LX
- Auto-negotiation or forced mode
- Auto MDI/MDIX
- Forward 9k bytes (Max.) packets
- Support Link Fault Pass through (LFP) function

FWM-Serial

- Dual channel Serial converter (RS485/422/232) per card
- Extend asynchronous serial transmission from 2km to 120km over fiber
- Selectable data interface for RS232/ 422/ 485
- Selectable two wires (half duplex) or four wires (full duplex) RS485
- Selectable 3 wires (TD,RD,SG) or 5 wires (TD, RD, SG, CTS, RTS) RS232
- Speeds up to 256kbps for Async RS232.
- Speeds up to 1Mbps for RS485/422



FWM-K

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.



- FRM402-10/100 4-Ch 10/100Base-TX to 100Base-FX card
- FRM402-1000 2-Ch 100Base-TX to 1000Base-FX card
- FRM402-Serial 2-Ch Serial (RS485/422/232) to fiber card

Non-Managed Family

Non-managed Fast Ethernet Fiber Switch



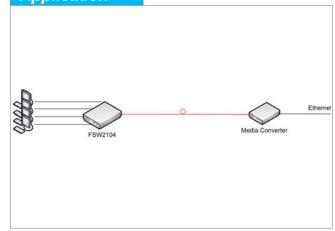
FSW-2104

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

Features

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

Application



Specifications

Ports	Connector:	1x9 (SC, ST)	
Optical Interface :	Data rate :	100Mbps	
	Duplex mode : Full duplex		
	Cable type :	MM 62.2/125μm, 50/125μm.	
		SM 9/125µm	
	Distance :	MM 2km, SM 15/30/50/80/120km,	
		WDM 20/40/60/80km	
	Wavelength:	1310, 1550nm	
Electrical Interface :	Connector:	RJ45	
	Data rate :	10Mbps, 100Mbps	
	Duplex mode	: Half / Full duplex	
	Cable length:	10Base-T Cat.3, 4, 5, UTP,	
		100Base-TX Cat.5, 5e	
	Distance :	100 meters	
Standard	IEEE 802.3, IEEE 802.3u		
LEDs	FX Link, TX SPD, TX Link/Act		
Power	DC 5V In		
Power Consumption	< 5W		
Dimensions	138 × 77 × 28mm		
(D x W x H)mm			
Weight	450g		
Temperature	0~50°C (Operating) ,0~70°C (Storage)		
Humidity	10~90% non-condensing		
Certification	CE, FCC, RoHS		
MTBF	57,000 hours		

Ordering Information

■ FSW-2104

4 port 10/100Base-TX + 1 port 100Base-FX fiber switch

Non-Managed Family

Non-managed Fast Ethernet Fiber Switch



FSW-2202, FSW-2204

The FSW-2200 family provides a low cost solution for non-managed Ethernet fiber switches. The FSW-2202 is a 2-port 10/100Base-TX plus 2-port 100Base-FX Fast Ethernet switch. The FSW-2204 is a 4-port 10/100Base-TX plus 2-port 100Base-FX Fast Ethernet Switch. They are all designed for small workgroup applications that require a long distance connection to the backbone, such as between buildings, offices, or within a campus location. They provide full-duplex capability on each auto-negotiating port, for enhanced performance. A wide range of transceiver selection provides fiber connection with SC, FC or ST type connectors in multimode or single mode and at distance from 2 to 120km as well as BiDi (single fiber) at distances of 20, 40, 60, or 80km.

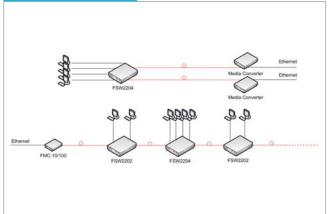
Features

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

Specifications

Ports	Connector:	1x9 (SC, ST)
Optical Interface :	Data rate :	100Mbps
	Duplex mode :	: Full duplex
	Cable type :	MM 62.2/125μm, 50/125μm.
		SM 9/125µm
	Distance:	MM 2km, SM 15/30/50/80/120km,
		WDM 20/40/60/80km
	Wavelength:	1310, 1550nm
Electrical Interface:	Connector:	RJ45
	Data rate :	10Mbps, 100Mbps
	Duplex mode :	: Half / Full duplex
	Cable length:	10Base-T Cat.3, 4, 5, UTP,
		100Base-TX Cat.5, 5e
	Distance :	100 meters
Standard	IEEE 802.3, IEEE 802.3u	
LEDs	FX Link, TX SPD, TX Link/Act	
Power	DC 5V In	
Power Consumption	< 5W	
Dimensions	138 × 77 × 28mm	
(D x W x H)mm		
Weight	450g	
Temperature	0~50°C (Operating) ,0~70°C (Storage)	
Humidity	10~90% non-condensing	
Certification	CE, FCC, RoHS	
MTBF	57,000 hours	

Application



Ordering Information

■ FSW-2202

2 port 10/100Base-TX + 2 port 100Base-FX fiber switch 4 port 10/100Base-TX + 2 port 100Base-FX fiber switch

■ FSW-2204

Integrated Access Device Family

Fiber IAD gateway with 4 port switch and 2 port FXS (SIP)

GW421F, GW421FW



The GW421F is a single mode Fiber and VoIP-based IAD (Internet Access Device), which is designed to interoperate with end-to-end fiber from major vendors to meet the worldwide market requirements of triple-play services. It is Class 1 laser product complying with EN 60825-1. The integrated Ethernet switch features automatic crossover-correction and auto-negotiation for easy connection to user's PCs or LAN environment. The GW421FW model also features a built-in 802.11g WLAN which brings relief to those troublesome wirings. Two lines of telephony service are provided using VoIP technology with SIP and MGCP signaling protocol.

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

Specifications

Specifications	5	
Ports	Connector:	SC
Optical Interface :	Data rate :	100Mbps
	Duplex mode : Full duplex	
	Cable type :	SM 9/125µm
	Distance :	WDM 20km
	Wavelength:	T1310/R1550nm
Electrical Interface :	Connector:	RJ45
	Data rate :	10Mbps, 100Mbps
	Duplex mode : Half / Full duplex	
	Cable type :	10Base-T Cat.3, 4, 5, UTP,
		100Base-TX Cat.5, 5e
	Distance :	100 meters
LEDs	Power, WAN, Internet, TEL1, TEL2, Ethernet, WLAN	
Power	DC 15V In	
Power Consumption	< 15W	
Dimensions	220x 165x 29mm	
(D x W x H)mm		
Weight	450g	
Temperature	0~50°C (Operating) ,0~70°C (Storage)	
Humidity	10~90% non-condensing	
Certification	CE, FCC, RoHS	
MTBF	57,000 hours	

Ordering Information

■ GW421F

4-port Ethernet 2-port FXS VoIP gateway w/ 100Base-FX

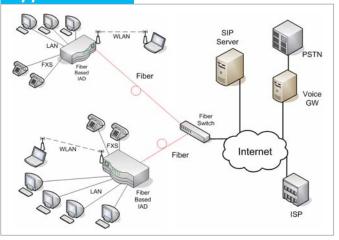
■ GW421FW

802.11a/b/g wireless 4-port Ethernet 2-port FXS VoIP gateway w/ 100Base-FX

Specifications

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 - RFC 1631 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; 802.1i			
	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 vocie CODEC s 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	Supports SIP (RFC 3261), SDP (RFC 2327, RFC 3264) as well as both TCP and UDP transport			
Bonus Services	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 RFC 2833			
	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	SNMP GETs, SETs and TRAPs for four group in MIB-II			
Network	Embedded syslog; SNTP with DHCP options			
Management	UPnP Internet gateway device (IGD) compliance			
	Management and configuration via Web/HTTP			
	Firmware upgrade using HTTP and TFTP			
	Supports TR-069 and with parameters: Device info, management server, time, IPPing diagonostic, etc.			
	Supports TR-014			

Application



FOM Family

E1/T1/Datacom/Ethernet Fiber Optical Multiplexer

FMUX01A



The FMUX01A is a 1U, 19" rack mountable, E1/T1, serial data communications & 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 hot swappable 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.

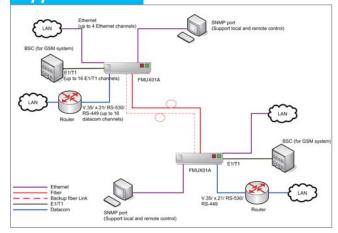
Features

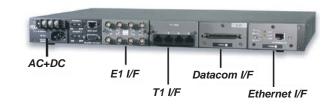
- 1U, 19 (23)" 4 slot chassis
- Alarm relay contacts provided which can offer major and minor alarms with audible and visible alarm output
- Auto Laser Shutdown (ALS) to prevent hazardous laser radiation to personnel
- Channel Capacity: 4,8,12 or 16 channels
- Configuration data is automatically stored into flash to avoid any loss caused by power disruption.
- End to end propagation delay $< 2\mu$ sec
- Management : Local side is managed via Keypad or Terminal.
- Remote side is managed in-band via keypad or Terminal.
- Telnet & SNMP local/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 is less than 50 m sec
- Supports embedded optical BERT
- Supports fiber, E1/T1/ datacom Local and Remote Loop-Back.
- Supports hot-swapping of a optical module
- TFTP upgradeable (for SNMP option)

Specifications

Ports	Connector:	1x9 (SC, ST, FC)
Optical Interface :	Data rate :	51.84Mbps
	Bit Error Rate	:Less than 10 ⁻¹¹
	Cable type :	MM 62.2/125μm, 50/125μm.
		SM 9/125μm
	Distance :	MM 2km. SM 15/30/50/80/120km,
		WDM 20/40/60/80km
	Wavelength:	1310, 1550nm
Electrical Interface : Console, SNMP, EXT CLK : RJ45		MP, EXT CLK: RJ45
	Alarm :	RS232 (DB9F)
Standard	E1:ITU-T, T1:ITU-T, AT&T, ANSI, Ethernet: IEEE802.3x	
LEDs	PWR, Alarm, Far End /Near End Error, System	
	E1/T1 status	
Power	AC: 100 ~240V	
	DC24:20~6	60V, DC48 : 36 ~ 72V
Power Consumptio	n < 40W	
Dimensions	250 x 438 x 43mm	
(D x W x H)mm		
Weight	3.58 kg	
Temperature	0~50°C (Operating) ,0~70°C (Storage)	
Humidity	10~90% non-condensing	
Certification	CE, FCC, RoHS	
MTBF	57350 hours	

Application





Specifications - 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





Fiber Optical 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



Datacom Interface Module	
Standards	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)
	V.35H & RS-530H 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



Ethernet Interface Module	
Standards	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

Ordering Informa	ntion
Chassis	Description
FMUX01A-AC	Chassis with one AC power
FMUX01A-DC	Chassis with one DC power
FMUX01A-AC2	Chassis with two AC powers
FMUX01A-DC2	Chassis with two DC powers
FMUX01A-AD	Chassis with one AC and one DC power
Interface cards	Description
E1	
FMUX01A-E1/BNC	4ch G.703 E1 BNC interface card
FMUX01A-E1/RJ45	4ch G.703 E1 RJ-45 interface card
FMUX01A-T1/RJ45	4ch G.703 T1 RJ-45 interface card
FMUX01A-E1/Wire-Wrap	4ch G.703 E1 wire-wrap interface card
V.35 / X.21 / RS-530 /449 /	/232
FMUX01A-V35	4ch V35 interface card with one HD68M to 4 x MB34F cable
FMUX01A-V35H	1ch V.35 (8M) interface card with HD68M to 1 x MB34F cable
FMUX01A-530H	1ch RS-530 (8M) interface card with HD68M to 1 x DB25F
FMUX01A-530	4ch RS-530 interface card with one HD68M to 4 x DB25F cable
FMUX01A-449	4ch RS-449 interface card with one HD68M to 4 x DB37F cable
FMUX01A232	4ch RS-232 interface card with one HD68M to 4 x DB25F cable
FMUX01A-X21	4ch X.21 interface card with one HD68M to 4 x DB15F cable
Fast Ethernet	
FMUX01A-Ethernet	1ch 10/100Mbps Ethernet Bridge card (Throughput 8M)
External Clock	
FMUX01A-EXT/CLK	External Clock interface card
Fiber Uplink Cards	Transceiver Type
FMUX01A-SCXXX	MM : 002km
FMUX01A-STXXX	SM: 015,030,050,080,120km
FMUX01A-FCXXX	WDM: 20A/B,40A/B, 60A/B, 80A/Bkm

FOM Family

E1/T1/Voice/Datacom Fiber Multiplexer with Built-in 100Mbps Ethernet Trunk



FMUX01A/Plus

The FMUX01A/Plus is a 1U, 19" rack mountable, PDH fiber optic multiplexer that transmits up to 16 channels plus a wire speed 100Base-TX Fast Ethernet channel over a single fiber optic link. The FMUX01A/Plus chassis is available in five different power configurations: single AC, single DC, dual AC, dual DC or AC+DC. The AC supplies operate from 90~260VAC while DC supplies operate from 36~72VDC or 20~60VDC. From the rear of the chassis, one to four hot swappable quad E1 or T1 line cards, serial data communications (V.35, X.21, RS-530) or FXO/FXS voice cards are supported. The standard FMUX01A/Plus configuration may be viewed or set via the front panel LCD/menu keys, serial VT-100 terminal connection, Telnet or SNMP.

Features

- 1U, 19 (23)" 4 slot chassis
- 16 E1 (2.048Mb/s) Multiplexer, 100Mbps Ethernet and RS-232 data (async)
- RS-232 port for system console
- One alarm output port, one Order Wire port
- SNMP management
- LCD plus menu keys for local configuration
- 2 plug-in I/O slots for optical interface cards

Application 100Mcps Ethernet (up to 4 Ethernet Channels) FXI BSC (for GSM system) FXI FMUX01A FRouter datacom channels) FROW FROM FROW FROM FROW FROM FROM

Specifications

Ports	Connector:	1x9 (SC, ST, FC)
Optical Interface :	Data rate :	155.52Mbps
	Bit Error Rate	:Less than 10 ⁻¹¹
	Cable type :	MM 62.2/125μm, 50/125μm.
		SM 9/125µm
	Distance:	MM 2km. SM 15/30/50/80/120km,
		WDM 20/40/60/80km
	Wavelength:	1310, 1550nm
Electrical Interface:	Console, SNI	MP: RJ45
	Ethernet :	2 x RJ45
	Alarm :	RS232 (DB9F)
Standard	E1:ITU-T, T1:ITU-T, AT&T, ANSI, Ethernet: IEEE802.3x	
LEDs	PWR, Alarm,	LBK, RD, LCK, RNG, ACO, Port, Channels
Power	AC: 100 ~24	0V
	DC24 : 20 ~ 6	60V, DC48 : 36 ~ 72V
Power Consumptio	n < 40W	
Dimensions	250 x 438 x 4	3mm
(D x W x H)mm		
Weight	3.58 kg	
Temperature	0~50°C (Ope	rating) ,0~70°C (Storage)
Humidity	10~90% non-	condensing
Certification	CE, FCC, Ro	HS
MTBF	57350 hours	

Specifications - 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





Fiber Optical 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	

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



Datacom Interface Module	
Standards	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)
	V.35H & RS-530H 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

Ordering information	"	
Master Unit	Description	
FMUX01A/Plus -AC	Chassis with one AC power	
FMUX01A/Plus -DC1	Chassis with one DC power (20~60V)	
FMUX01A/Plus -DC2	Chassis with one DC power (36~72V)	
FMUX01A/Plus -AD1	Chassis with one AC and one DC power for Redundancy(20~60V)	
FMUX01A/Plus -AD2	Chassis with one AC and one DC power for Redundancy (36~72V)	
FMUX01A/Plus -AA	Chassis with two AC power for Redundancy	
FMUX01A/Plus -DD1	Chassis with two DC power for Redundancy(20~60V)	
FMUX01A/Plus -DD2	Chassis with two DC power for Redundancy(36~72V)	
Interface Modules	Description	
E1/T1		
FMUX01A/Plus -E1/BNC	4 x G.703 E1 BNC interface card	
FMUX01A/Plus -E1/RJ45	4 x G.703 E1 RJ-45 interface card	
FMUX01A/Plus -T1/RJ45	4 x G.703 T1 RJ-45 interface card	
FMUX01A/Plus -T1/Wire Wrap	4 x G.703 T1 Wire-Wrap interface card	
FMUX01A/Plus -E1/Wire Wrap	us -E1/Wire Wrap 4 x G.703 E1 Wire-Wrap interface card	
V.35 / X.21 / RS-530 /449 /232		
FMUX01A/Plus -V35	V35 interface card with one HD68M to 4 x MB34F cable	
FMUX01A/Plus -530	RS-530 interface card with one HD68M to 4 x DB25F cable	
FMUX01A/Plus -449	RS-449 interface card with one HD68M to 4 x DB37F cable	
FMUX01A/Plus -X21	X.21 interface card with one HD68M to 4 x DB15F cable	
Voice		
FMUX01A/Plus -FXO	4 x FXO interface card	
FMUX01A/Plus -FXS	4 x FXS interface card	
External Clock		
FMUX01A/Plus -EXT/CLK	External Clock interface card	
Fiber Uplink Modules	Transceiver Type	
FMUX01A/Plus -SCXXX	MM : 002km	
FMUX01A/Plus -STXXX	SM: 015,030,050,080,120km	
FMUX01A/Plus -FCXXX	WDM: 20A/B,40A/B, 60A/B, 80A/Bkm	

FOM Family

Fixed 4E1/4T1 Fiber Multiplexer with optional Order Wire / SNMP



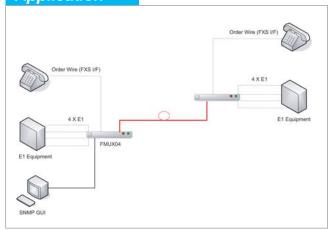
FMUX04

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

Features

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

Application



Specifications

<u> </u>			
Ports	Connector:	1x9 (SC, ST, FC)	
Optical Interface :	Data rate :	38Mbps	
	Bit Error Rate	:Less than 10 ⁻¹¹	
	Cable type :	MM 62.2/125μm, 50/125μm.	
		SM 9/125μm	
	Distance:	MM 2km, SM 15/30/50/80/120km,	
		WDM 20/40/60/80km	
	Wavelength:	1310, 1550nm	
Electrical Interface:	Console:	RS232 (DB9F) Async	
	SNMP:	RJ45	
	Order wire :	RJ11	
	E1:	BNC 75 Ω, RJ45 120 Ω	
		T1 RJ45 100 Ω , 100 meters Ω	
Standard	E1:ITU-T, T1:I	TU-T, AT&T, ANSI	
LEDs	PWR, Alarm, Far End /Near End Error,		
	System failure	e, E1/T1 status	
Power	AC: 100 ~240V		
	DC24:18~3	66V, DC48 : 36 ~ 72V	
Power Consumption	< 20W		
Dimensions	235 x 195 x 4	5mm	
(D x W x H)mm			
Weight	850g		
Temperature	0~50°C (Oper	rating) ,0~70°C (Storage)	
Humidity	10~90% non-condensing		
Certification	CE, FCC, RoHS		
MTBF	57350 hours		

Master Unit	Connector Type	Transceiver Type	
FMUX04-AC/SC	SC	MM: 2km	
FMUX04-DC/SC	ST	SM: 15/30/50/80/120km	
	FC	WDM: 20/40/60/80km	

SDH Family

E1/E3/Datacom/Ethernet SDH Add/Drop Multiplexer

SDH01A



The SDH01A, STM-1 Based Multi-Service Provisioning Platform, is an advanced compact Add Drop Multiplexer which can transmit up to 63 E1 and/or data service such as V.35 and Ethernet via an SMT-1 ring. The optical interface complies with international telecommunication standards, such as ITU-T G.655, G.652, and G.653. By utilizing a modular design for aggregate and low speed tributaries, the SDH01A can meet your network demands with a flexible combination of services at a lower cost. All of the pluggable modules are designed to be hot swapped without any interruption to traffic when plugging in or out. In addition to the E1 tributaries, other data interfaces are also provided for data communications such as V.35 and 10/100M Ethernet. Users can select any combination of modules according to their requirements. With its full function and multi-access capability, the SDH01A is your best choice for optical SDH networks.

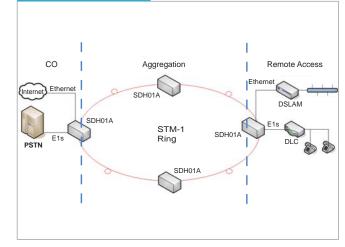
Features

- Stand-alone and rack-mount in 19 or 23 inch EIA rack.
- Up to 32 E1 (4, 8, 12, 16 & 32)
- Flexible ADM (add/drop multiplexer) with 63 available VC12 resources
- Up to 4 tributary cards per unit.
- Every module hot swappable
- Backup configurations in flash for system restart or power failure.
- Various services, such as E1, V.35 and 10/100M Ethernet
- Ethernet traffic is encapsulated and transported over SDH using Generic Framing Procedure (GFP) & Virtual Concatenation (VCAT)
- E1 transparent transmission with HDB3 or AMI line coding
- EoS (Ethernet over SDH) for E-LAN. Supports Ethernet traffic in all nodes of rings
- Single-ended network management
- 1+1 APS for optical line and module (optical redundancy)
- Three timing synchronization modes
- Alarm relays
- Alarm and performance monitoring
- Administration security with login by username and password assigned by supervisor
- Menu-driven and SNMP management interfaces
- Local and remote loop back functions for optical and E1 I/Fs
- Dual power AC + DC

Specifications

Specification	15	
Ports	Connector:	1x9 (SC, FC)
Optical Interface :	Data rate :	155.52Mpbs (STM-1)
	Cable type :	SM 9/125μm
	Distance :	SM 30/60/120km, WDM 60km
	Wavelength:	1310nm, 1550nm
Electrical Interface :	Console :	D-type 9-pin female
	SNMP, LAN :	RJ45
	Alarm :	D-type 9-pin male
	Frame Groun	d : Screw
Standard	STM1: ITU-T	G.707, G.841, G.783, G.803, G.652
	E1: ITU-T G.7	703 G.704, G.706, G.732, G.823
	Ethernet: ITU	-T G.7041 GFP-F, G.707 VCAT,
	IEE	E802.3x, 802.1p, 802.1q, 802.3ad,
	802	.1w, 802.1d
	V35: ITU-T V.	35, ITU-T G703
LEDs	PWR, WK, FL	T-fault, Alarm, ACO, RDI, LBK, Channels
	Ethernet	
Power	AC: 90 ~ 264	V DC24 : -36 ~ -72V
Power Consumption	η < 15W	
Dimensions	312 x 440 x 4	4mm
(D x W x H)mm		
Weight	3.6 kg	
Temperature	0~50°C (Ope	rating) ,0~70°C (Storage)
Humidity	10~90% non-condensing	
Certification	CE, FCC, Rol	HS
MTBF	50,000 hours	

Application



Master Unit	Description	
SDH01A-CH-AD	1U 19" STM1 ADM chassis with RS-232 DB9	
	Console cable and AC + DC	
Master Unit	Description	
SDH01-QE1B	4 x E1 G.703 interface card BNC	
SDH01-8E1B	8 x E1 G.703 interface card 75 ohm RJ48 with	
	8 x 1ch RJ48 to BNC cables	
SDH01-8E1R	8 x E1 G.703 interface card 120 ohm RJ48	
SDH01-QV35	4 x V35 interface card with 2 x 2ch M34 cables	
SDH01-QSW	Ethernet over SDH card, 4 x 10/100 BaseTX RJ45	
SDH01-ET3	E3/DS3 interface card	
Fiber Uplink Cards	Transceiver Type	
SDH01-OPT-SCXX	SM :030,050,120km	
SDH01-OPT-FCXX	WDM: 60A/B, km	

4 channel transponder rack

SML-1000



The SML-1000 is a multi-rate transponder platform (up to 2.5G transponder) that provides the capability to transport a wide variety of service types from 155 Mbps to 2.48 Gbps, including services such as ESCON, SONET OC-3 through OC-48, SDH STM-1 through STM-16, Gigabit Ethernet, 1-or 2-Gbps Fiber Channel over a 100-GHz, ITU-compliant wavelength. The 2.5G transponder card architecture contains a single client interface that is mapped to a single-line CWDM interface, without accessing any cross-connect fabric.

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

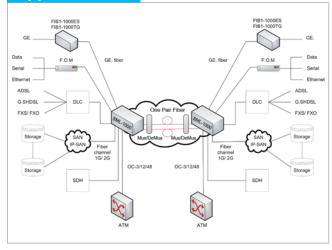
Features

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

Specifications

Ports	Connector:	SFP LC	
Optical Interface :	Data rate :	100Mbps, 1.25Gbps, 2.5Gbps	
	Cable type :	MM 62.2/125μm, 50/125μm. SM 9/125μ	
	Distance :	MM 2km. SM 15/30/50/80/120km,	
		WDM 20/40/60/80km	
	Wavelength:	850, 1310, 1470 ~ 1610nm	
Standard	ITU-T		
LEDs	Power, Line I	Link, Client Link	
Power	AC: 100 ~24	OV DC48 : 36 ~ 72V	
Power Consumption	on < 12W		
Dimensions	265 x 440 x 4	13mm	
(D x W x H)mm			
Weight	3.2kg		
Temperature	0~50°C (Operating) ,0~70°C (Storage)		
Humidity	10~90% non-	10~90% non-condensing CE, FCC, RoHS	
Certification	CE, FCC, Ro		
MTBF	50,000 hours		

Application



Ordering Information

■ SML-8024-AA Chassis with Internal Dual AC powe
■ SML-8024-DD Chassis with Internal Dual DC power
■ SML-8024-AD Chassis with Internal AC + DC power

Managed 5U/2U Chassis

SML-5000, 2000





The SigmaLinks5000/2000 is a flexible, cost-effective optical transport system, designed to multiplex, de-multiplex and switch high-speed data for storage, video and voice applications. The SML-5000/2000 is housed in a standard 5U/2U, 19" or 23" rack mountable transport platform for ITU G.694.2 compliant CWDM applications, which features 17/6 universal hot-swappable module slots. Currently supported module line cards include SNMP, Transponders, Mux/ Demux, OADM, Optical protection and optical channel monitors. The SML-5000/2000 supports optional redundant power and SNMP management. Another unique feature of the SML-5000/2000 is a line card design which may be transformed into stand-alone units. The use of a common PCB card which may either be placed in the rack or used as a stand-alone unit reduces manufacturing costs as well as the inventory of spares required by distributors, installers, and end users. The NMS (Network Management System) option includes an SNMP card (agent) and standard MIB file for importation and compilation into network management platforms such as HP OpenView or CA Unicenter. This allows remote configuration and system monitoring via industry standard network management software.

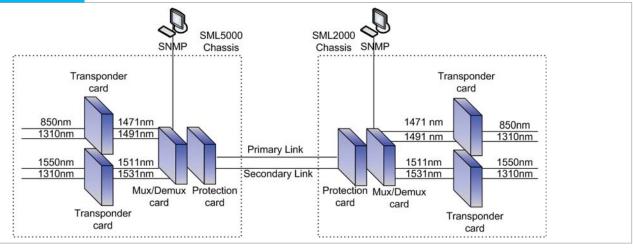
Features

- 5U/2U , 19 (23") chassis, accommodates up to 17/6 card modules
- All modules are hot-swappable
 Redundant AC/DC Power and cooling fans
- Alarm Relay contacts
- Chassis Cascade up to 6 Chassis (SML-5000 model only)
- LCD status indication with keypad control (SML-5000 model only)
- TFTP firmware upgrade
- Supports Console, Telnet, SNMP and Web management
- Up to 8 CWDM wavelengths in compliance with ITU G.694.2

Specifications

Console: D-type 9-pin female
SNMP, LAN: RJ45
Alarm: D-type 9-pin male
PWR1/2, FAN1/2, Link (chassis link), Fan
AC: 100 ~240V
DC 24: 18 ~ 56V, DC48 : 36 ~ 72V
SML2000 <25W, SML5000 <75W
155 x 88 x 23mm
SML2000: 250 x 440 x 89mm
SML5000: 250 x 440 x 220mm
SML2000 4.8kg, SML5000 9.5kg
0~50°C (Operating) ,0~70°C (Storage)
10~90% non-condensing
CE, FCC, RoHS
57,000 hours

Application



Ordering Information

For SigmaLinks5000 Series

■ *SML-50-9051-R* 19" 5U, 17-slot chassis
■ *SML-50-9210-L* SNMP for SigmaLinks5000
■ *SML-50-9110-R* AC power supply (90~264VAC)

■ SML-50-9120-R DC power supply (-18 ~ -56VDC)
■ SML-50-9121-R DC power supply (-36 ~ -72VDC)

SigmaLinks2000 Series
■ SML-20-9021-R

■ SML-20-9021-R

■ SML-20-9210-L

■ SML-20-9110-R

■ SML-20-9120-R

■ SML-20-9121-R

DC power supply (-18 ~ -56VDC)

■ SML-20-9121-R

DC power supply (-36 ~ -72VDC)

Line Cards for SigmaLinks

Transponder

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



Mux/DeMux

Optical Mux/Demux (Multiplexer/Demultiplexer) 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 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 Wavelengths: 850/ 1310/ 1550nm
- Line Side CWDM Wavelengths: 1471/ 1491/ 1511/ 1531 / 1551/ 1571/ 1591/ 1611nm
- Optical Connector: SFP-LC (On both Line & Client Side)

Features

- Four different CWDM Mux/ Demux are available:
 - 4 Ch (1531/1551/1571/1591nm)
 - 4+1 Ch (1531/1551/1571/1591/ + 1311nm)
 - 8 Ch (1471/1491/1511/1531/1551/1571/1591/1611nm)
 - 8+1 Ch (1471/1491/1511/1531/1551/1571/1591/1611 + 1311nm)
- Full native mode performance
- Optical connectors: LC connectors, SMF 9/ 125mm
- Optical input/ output monitoring port
- Passive model requires no power
- Protocol transparent, no limitation
- Utilizes industry standard ITU CWDM wavelengths

Specifications

Connector:	SFP LC
Data rate :	100Mbps, 1.25Gbps, 2.5Gbps
Cable type :	MM 62.2/125μm, 50/125μm.
Distance :	SM 9/125μm
Wavelength:	850, 1310, 1470 ~ 1610nm
Power, Link(L	ine), Link(Client), TX/Act, Loopback
DC12V In	
1channel <5W, 2 channel <10W	
220 x 162 x 25mm	
900g	
0~50°C (Operating) ,0~70°C (Storage)	
10~90% non-condensing	
CE, FCC, RoHS	
57,000 hours	
	Data rate: Cable type: Distance: Wavelength: Power, Link(L DC12V In 1channel <5V 220 x 162 x 2 900g 0~50°C (Ope 10~90% non- CE, FCC, Rol

Specifications

Connecter	LC		
Standard	ITU-T G.694.2		
Wavelength	SML-50-8181 1310, 1470, 1490, 1510, 1530, 1550, 1570,		
	1590, 1610nm		
	SML-50-8141 1310, 1550, 1570, 1590, 1610nm		
Insertion Loss	SML-50-8181 < 3.5dB for CWDM wavelength		
	SML-50-8141 < 5.0dB for CWDM wavelength		
Return Loss	> 45dB		
Dimensions	sions 220 x 162 x 25mm		
(D x W x H)mm			
Weight	900g		
Temperature	perature 0~50°C (Operating) ,20~70°C (Storage)		
Humidity	10~90% non-condensing		
Certification	ication CE, FCC, RoHS		
MTBF	57,000 hours		

Ordering Information

SML-50-8011-L
 SML-50-8012-L
 SML-50-8021-L
 SML-50-8022-L
 SML-50-8032-L
 SML-50-8032-L
 SML-50-8032-L

Ordering Information

SML-50-8041-L 4+1 channels Mux/DeMux card

(1551/1571/1591/1611 + 1311nm)

■ SML-50-8043-L 8+1 channels Mux/DeMux card (1471/1491/1511/

1531/1551/1571/1591/1611 + 1311nm)

Line Cards for SigmaLinks

Optical Protection

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



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 < 0.5dB 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 optical protection
- Low channel cross talk < -55dB; Low insertion loss < 6.5dB
- Latch feature, if power is lost the switch remains in its current state
- Protection transition □ 50 ms
- Works with any combination of 1 ~16 wavelengths
- Traffic is switched in one of three modes : Auto, Semi-Auto, Manual
- Optical Interface Type : LC connectors
- Working and protected lines are physically separated fiber

Features

- Single Add/Drop Channel
- Operating channel: 1311,1471,1491,1511,1531,1551,1571, 1591,1611nm
- Passive optical module, no power required
- Protocol transparent, no limitation
- Utilizes Industry standard ITU CWDM wavelengths
- Optical connectors : LC

Specifications

Connecter	LC		
LEDs	Power System, Working Path, Protection Path, Work mode		
Power	DC 12V In		
Restoration Time	50ms		
Range	Input PWR :+3 ~ -15dBm(TX), -2~-29dBm(RX).		
	Detection: -5 ~ -29dBm		
Loss Insertion Loss < 6.5dB, Return Loss > 45dB			
Power Consumption	n <10W		
Dimensions	220 x 162 x 25mm		
(D x W x H)mm			
Weight	900g		
Temperature	0~50°C (Operating) ,20~70°C (Storage)		
Humidity	nidity 10~90% non-condensing		
Certification	CE, FCC, RoHS		
MTBF	57,000 hours		

Specifications

Connecter	LC	
LEDs	Power System, Working Path, Protection Path, Work mode	
Power	DC 12V In	
Restoration Time	50ms	
Range	Input PWR :+3 \sim -15dBm(TX), -2 \sim -29dBm(RX).	
	Detection: -5 ~ -29dBm	
Loss Insertion Loss < 6.5dB, Return Loss > 45dB		
Power Consumption <10W		
Dimensions	ons 220 x 162 x 25mm	
(D x W x H)mm		
Weight	900g	
Temperature	0~50°C (Operating) ,20~70°C (Storage)	
Humidity	midity 10~90% non-condensing	
Certification	CE, FCC, RoHS	
MTBF	57,000 hours	

Ordering Information

■ SML-50-8210-L Optical Protection Card

Ordering Information

■ **SML-50-8041-L** 1 channel, OADM Drop/Insert card, (00/1311, 01/1471, 02/1491, 03/1511, 04/1531, 05/1551, 06/1571, 07/1591, 08/1611nm)

Multimedia Fiber Extender Family

DVI Fiber Media Converter / Extender

DVI-F



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.

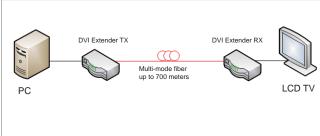
Features

- Long distance image transmission
- High resolution and image quality
- Optical fiber, no RF interference
- DVI-D single link

Specifications

Opcomoditions		
Ports	Connector:	SC
Optical Interface :	Cable type :	MM 62.2/125μm, 50/125μm
	Distance :	
	500meters	XGA with 62.2/125 μ m 4-LC MM cable
	700meters	XGA with 50/125µm 4-LC MM cable
	Optical prope	erty: 4 channels 850nm, -6dBm
	Max DVI Bandwidth : 1.65Gbp	
	Max resolution: 1600 x 1200 (4:3)	
		1920 × 1080p (16:9)
		1920 × 1200 (16:10)
[]t-i -tf	Connector:	DVI D single link

Application



		1920 × 1200 (16:10)
Electrical Interface :	Connector:	DVI-D single link
LEDs	Power	
Power	DC 5V In	
Power Consumption	< 5W	
Dimensions	90 × 40 × 19.6	6mm
(D x W x H)mm		
Weight	65g	
Temperature	-10~50°C (Op	erating) ,-20~70°C (Storage)
Humidity	10~90% non-c	condensing
Certification	CE, FCC, Rol-	ds
MTBF	57000 hous	

Ordering Information

■ DVI-F

DVI-F/T Fiber Media Converter Transmitter (Connect to PC)
DVI-F/R Fiber Media Converter Receiver (Connect to Monitor)

55

Multimedia Fiber Extender Family

HDMI Fiber MEdia Converter / Extender



HDMI-F

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.

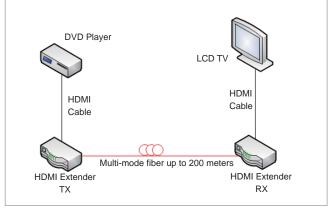
Features

- Long distance video and audio transmission
- High resolution and image quality
- HDCP fully compliant without copper wire
- No RF Interference by optical fiber
- Class 1 laser product complies with EN 60825-1
- HDMI Type A connector

Specifications

Ports	Connector:	SC
Optical Interface :	Cable type :	MM 62.2/125μm
	Distance:	MM 1310nm, SM 1310, 1550nm,
		WDM 1310Tx/1550Rx(type A),
	Max resolution	:1550Tx/1310Rx(type B)
Electrical Interface :	Connector:	HDMI
LEDs	Power, FEF, I	FX-Link, TX-SPD, TX-Duplex, TX-Link
Power	DC In 12V	
Power Consumption	< 4W	
Dimensions	145 × 95 × 26	6mm
(D x W x H)mm		
Weight	400g	
Temperature	-10~50°C (Op	perating) ,-20~70°C (Storage)
Humidity	10~90% non-	condensing
Certification	CE, FCC, Ro	HS
MTBF	65,000 h (25°	°C)

Application



Ordering Information

■ HDMI-F

HDMI-F/T HDMI Fiber Media Converter Transmitter HDMI-F/R HDMI Fiber Media Converter Receiver

Fiber Transceiver Family

Hot-pluggable fiber transceiver modules



SFP/GBIC

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 or long reach applications.

Features

- Features
- SFP & SFP+ Multi-Source Agreement compliant
- Single 3.3V power supply
- Duplex or Simplex LC receptacle connector

- Up to 10Gb/s bi-directional data links
- Class 1 laser safety standard IEC825 compliant
- Hot Pluggable
- Lower power dissipation

Ordering Information

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

100Base-X Dual fiber SFP

Model Name	Wavelength(nm)	Media	Optical Power(dBm)	Sensitivity(dBm)	Туре	Distance
SFM-5000-L31	1310	MMF	-20 ~ -14	-32	12	2km
SFM-5005-L31	1310	MMF	-9 ~ O	-30	21	5km
SFS-5030-L31	1310	SMF	-15 ~ -8	-34	19	30km
SFS-5060-L31	1310	SMF	-5 ~ O	-35	30	60km
SFS-5080-L31	1310	SMF	0 ~ +5	-36	36	80km
SFS-5100-Z55	1550	SMF	-5 ~ O	-35	30	100km
SFS-5120-Z55	1550	SMF	0 ~ +5	-35	35	120km
SFS-5080-Cxx	CWDM	SMF	-5 ~ O	-35	30	
SFS-5100-Cxx	CWDM	SMF	0 ~ +5	-35	35	
SFT-5000-R45		Copper				100m

100Base-BX. Single fiber Bi-Directional SFP

						
Model Name	Wavelength(nm)	Media	Optical Power(dBm)	Sensitivity(dBm)	Туре	Distance
SFS-5010-WA	T1310/R1550	MMF	-14 ~ -8	-28	14	10km
SFS-5010-WB	T1550/R1310	MMF	-14 ~ -8	-28	14	10km
SFS-5020-WA	T1310/R1550	SMF	-14 ~ -8	-32	18	20km
SFS-5020-WB	T1550/R1310	SMF	-14 ~ -8	-32	18	20km
SFS-5040-WA	T1310/R1550	SMF	-8 ~ -0	-34	26	40km
SFS-5040-WB	T1550/R1310	SMF	-8 ~ -0	-34	26	40km
SFS-5060-WA	T1310/R1550	SMF	-5 ~ -0	-34	29	60km
SFS-5060-WB	T1550/R1310	SMF	-5 ~ -0	-34	29	60km

1.25Gbps (1000Base-X, Fiber Channel) GBIC

Model Name	Wavelength(nm)	Media	Optical Power(dBm)	Sensitivity(dBm)	Type	Distance
GBM-7000-S85	850	MMF	-9.5 ~ -4	-17	26	550m
GBM-7002-L31	1310	MMF	-9 ~ -1	-19	29	2km
GBM-7010-L31	1310	SMF	-9.5 ~ -3	-20	10.5	10km
GBM-7040-L31	1310	SMF	-2 ~ +3	-23	21	40km
GBM-7050-Z55	1550	SMF	-3 ~ +2	-24	21	50km
GBM-7080-Z55	1550	SMF	0 ~ +5	-24	24	80km
GBM-7120-Z55	1550	SMF	0 ~ +5	-30	30	120km

1.25Gbps (1000Base-X, Fiber Channel) SFP

Model Name	Wavelength(nm)	Media	Optical Power(dBm)	Sensitivity(dBm)	Туре	Distance
SFM-7000-S85	850	MMF	-9.5 ~ -4	-17	26	550m
SFM-7002-L31	1310	MMF	-9 ~ -1	-19	29	2km
SFS-7010-L31	1310	SMF	-9.5 ~ -3	-20	10.5	10km
SFS-7020-L31	1310	SMF	-8 ~ -2	-23	15	20km
SFS-7040-L31	1310	SMF	-2 ~ +3	-23	21	40km
SFS-7060-Z55	1550	SMF	-3 ~ +2	-24	21	60km
SFS-7080-Z55	1550	SMF	0 ~ +5	-24	24	80km
SFS-7120-Z55	1550	SMF	0 ~ +5	-30	30	120km
SFS-7040-Cxx	CWDM	SMF	-5 ~ 0	-23	18	
SFS-7080-Cxx	CWDM	SMF	0 ~ +5	-24	24	
SFS-7100-Cxx	CWDM	SMF	0 ~ +5	-30	30	
SFT-7000-R45		Copper				100m

1.25Gbps (1000Base-X, Single Fiber Bi-Directional) SFP

Model Name	Wavelength(nm)	Media	Optical Power(dBm)	Sensitivity(dBm)	Туре	Distance
SFS-7010-WA	T1310/R1550	SMF	-9 ~ -3	-20	11	10km
SFS-7010-WB	T1550/R1310	SMF	-9 ~ -3	-20	11	10km
SFS-7020-WA	T1310/R1550	SMF	-7 ~ -2	-22	15	20km
SFS-7020-WB	T1550/R1310	SMF	-7 ~ -2	-22	15	20km
SFS-7040-WA	T1310/R1550	SMF	-3 ~ -2	-23	20	40km
SFS-7040-WB	T1550/R1310	SMF	-3 ~ -2	-23	20	40km
SFS-7060-WA	T1310/R1550	SMF	0 ~ +5	-24	24	60km
SFS-7060-WB	T1550/R1310	SMF	0 ~ +5	-24	24	60km

2.5Gbps Multi-Rate (155M ~ 2.67G) SFP

Model Name	Wavelength(nm)	Media	Optical Power(dBm)	Sensitivity(dBm)	Туре	Distance
SFS-9002-L31	1310	SMF	-10 ~ -3	-18	8	2km
SFS-9015-L31	1310	SMF	-5 ~ 0	-18	13	15km
SFS-9025-Z55	1550	SMF	-5 ~ 0	-18	13	25km
SFS-9040-L31	1310	SMF	-3 ~ +2	-27	24	40km
SFS-9080-Z55	1550	SMF	-3 ~ +2	-28	25	80km
SFS-9100-Z55	1550	SMF	0 ~ +5	-30	30	100km
SFS-9040-Cxx	CWDM	SMF	-1 ~ +4	-21	20	40km
SFS-9080-Cxx	CWDM	SMF	-2 ~ +3	-28	26	80km
SFS-9100-Cxx	CWDM	SMF	0 ~ +5	-30	30	100km

10Gbps SFP+

Model Name	Wavelength(nm)	Media	Optical Power(dBm)	Sensitivity(dBm)	Туре	Distance
SFM-1000-SR85	850	MMF	-7.3 ~ -1	-9.1	1.8	300m
SFS-1010-LR31	1310	SMF	-8.2 ~ +0.5	-14.4	6.2	10km

Fiber Accessories Family

Fiber Patch Cords & Pigtail

Cables

Fiber patch cable and pigtail are ultra reliable devices featuring low insertion loss and back reflection. The fiber patch cable and pigtail come with your choice of simplex or duplex cable configurations and various types of pigtail and connector terminations to meet your requirement.

Features

- Meets JIS C5973 F04 type and EIA/TIA 604-3A standards
- Economical in both design and termination process
- Reduce assembly time and simplify training
- Reduce maintenance and creates consistent optical performance
- Stabile performance

Application

- CATV Networks
- Telecommunication Networks
- Data communication Networks
- Active device termination
- Instrumentation

Specifications

Single-mode (9/125um),
Multi-mode (50/125um, 62.5/125um).
Simplex and Duplex
ST, SC, FC, LC, MTRJ, MU
< 0.2dB (typical 0.3dB)
-60dB
-40 ~ 75°C
-55 ~ 85°C
888N (200lbs)
500N
1700N
0.5N/M
Ceramic
100kpsi/689N/mm(IEC793-1B1)
300 Cycles
25.4mm



	1		2
	Connec	tor Type	
FC	FC	Р	PC
SC	SC	Α	APC
ST	ST	U	UPC
LC	LC		
PT	Pigtail		
MJ	MT-RJ		

	3	4	4
	Connec	tor Type	
FC	FC	Р	PC
SC	SC	Α	APC
ST	ST	U	UPC
LC	LC		
PT	Pigtail		
MJ	MT-RJ		

	5			7	
1	Fiber Mode		Cable	Тур	е
S	Single-mode	D	Duplex	5	50/125um
M	Multi-mode	S	Simplex	6	62.5/125um
				9	9/125um

8
Cable Length
Meter =M □
(example 1Meter=1M)

Fiber Accessories Family

Fiber Attenuator

Attenuator



CTC Union offers 1 ~ 20dB 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

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

Specifications

Mode Type	SM, MM
Operating wavelength (nm)	1310, 1550
MAX PDI (dB)	≤ 0.1
Attenuation Value	± 0.5dB (< 10dB)
	± 1.0dB (> 10dB)
Return Loss (dB)	UPC > 55db, APC> 60dB, PC>45dB
Operating Temperature	-30 ~ 75°C
Storage Temperature	-40 ~ 85°C
Connector Type	SC, FC, ST, LC



1	2	3
Fiber mode	Connector Type	Attenuation Value
S: Single-mode	S: SC	01 ~ 25 dB
M: Multi-mode	F: FC	
	L: LC	

2. xDSL SERIES

G.SHDSL.bis / G.SHDSL ADSL / ADSL2 / VDSL / VDSL2



xDSL SERIES

11.4Mbps Ethernet Bridge NEW EFM-20

22.8Mbps Ethernet Bridge WEV EFM-40

G.SHDSL.bis Family Type: R = Rack, L = Line card, S = Stand-aloneInterface **Model Name** Description Type Page G.SHDSL.bis TDM Managed G.SHDSL.bis TDM Chassis 4U Managed Chassis NEW SHRM03bT-CH 4U, 19", 16-slot managed chassis w/ SNMP R 63 2-wire (5.7Mbps) TDM card L NEW SHRM03b-E1 2-ch E1 card 64 Ethernet Bridge NEW SHRM03b-ET100 2-ch 10/100Base-TX card Ĺ 64 V35, RS530, RS449, X.21 (EW) SHRM03b-Data 2-ch V35_RS530_RS449_X 21 card т 64 2-wire (5.7Mbps) G.SHDSL.bis TDM CPE Modem SHDTU03b-E1 E1 NTU S 65 V35, RS530, RS449, X.21 SHDTU03b-Data V35, RS530, RS449, X.21 NTU S 66 Ethernet Bridge S SHDTU03b-ET100 Ethernet 10/100Base-TX NTU Ethernet Bridge + E1 + Data SHDTU03b-31 Ethernet 10/100Base-TX, E1, Data (V.35, RS530, RS449, X.21) S 68 (V.35, RS530, RS449, X.21) multi-interface NTU 4-wire (11.4Mbps) G.SHDSL.bis TDM CPE Modem NEW SHDTU03bA-E1 E1 NTU S V35, RS530, RS449, X.21 NEW SHDTU03bA-Data V35, RS530, RS449, X.21 NTU S 66 Ethernet 10/100Base-TX NTU Ethernet Bridge NEW SHDTU03bA-ET100 S 70 Ethernet Bridge + E1 + Data SHDTU03bA-31 S Ethernet 10/100Base-TX, E1, V.35 multi-interface NTU (V.35, RS530, RS449, X.21) Ethernet Bridge + E1(T1)+ SHDTU03bA-31T Ethernet 10/100Base-TX, E1, T1, V.35 multi-interface NTU Data (V.35, RS530, RS449, X.21) G.SHDSL.bis ATM G.SHDSL.bis ATM Chassis 4U chassis NEW SHRM03b-CH R 4U.19", 16-slot chassis 69 2/4-wire (5.7/11.4Mbps) ATM card Ethernet Router NEW SHRM03b-ET100R 2-ch 2-wire (5.7Mbps) Ethernet 10/100Base-TX router card L 70 NEW SHRM03bA-ET100R Ethernet Router 70 4-wire (11.4Mbps) Ethernet 10/100Base-TX router card L 2-wire (5.7Mbps) G.SHDSL.bis ATM Bridge/Router Ethernet Router S SHDTU03b-ET10R 1-port 10/100Base-TX Ethernet Router 71 Ethernet Router w/Firewall SHDTU03bF-ET10R S 1-port 10/100Base-TX Ethernet Router w/ Firewall Ethernet Router SHDTU03b-ET10RS 4-port 10/100Base-TX Ethernet Router S 71 Ethernet Router w/Firewall SHDTU03bF-ET10RS S 4-port 10/100Base-TX Ethernet Router w/ Firewall 71 4-wire (11.4Mbps) G.SHDSL.bis ATM Bridge/Router Ethernet Router SHDTU03bA-ET10RS 4-port 10/100Base-TX Ethernet Router S Ethernet Router w/Firewall SHDTU03bAF-ET10RS 4-port 10/100Base-TX Ethernet Router w/ Firewall S 71 G.SHDSL.bis Ethernet First Mile 2/4/8-wire EFM (5.7/11.4/22.8Mbps) 5.7Mbps Ethernet Bridge NEW EFM-10 2-wire, 4-port LAN extender 129

4-wire, 4-port LAN extender

8-wire, 4-port LAN extender

S

S

129

Type: $\mathbb{R} = \text{Rack}$, $\mathbb{L} = \text{Line card}$, $\mathbb{S} = \text{Stand-alone}$, $\mathbb{C} = \text{Compact}$

Interface	Model Name	Description	Туре	Page
G.SHDSL TDM			-	
Managed G.SHDSL TDM Chass	sis			
4U Managed Chassis	SHRM03-CH	4U, 13-slot managed Chassis	R	73
2-wire (2.3Mbps) TDM card				
E1	SHRM03-E1	2-ch E1 card	L	74
V35, RS530, RS449, X.21	SHRM03-V35 X21	2-ch V35, RS530, RS449, X.21 card	L	74
Ethernet Bridge	SHRM03-ET100	2-ch Ethernet 10/100Base-TX card	L	74
2-wire (2.3Mbps) G.SHDSL TDI	M CPE Modem			
E1	SHDTU03-E1	E1 NTU	S	75
V35, RS530, RS449, X.21	SHDTU03-V35 X21	V35, RS530, RS449, X.21 NTU	S	76
Ethernet Bridge	SHDTU03-ET100	Ethernet 10/100Base-TX NTU	S	77
G.SHDSL ATM				
G.SHDSL ATM Chassis				
4U Chassis	SHRM03-CH	4U, 13-slot chassis	R	78
2-wire (2.3Mbps) ATM card				
Ethernet Router	SHRM03-ET100R	2-ch 2-wire (2.3Mbps) Ethernet 10/100Base-TX router card	L	79
2-wire (2.3Mbps) G.SHDSL ATM	M Bridge/Router			
Ethernet Router	SHDTU03-ET10R	1-port Ethernet 10/100Base-TX Router	S	80
Ethernet Router w/Firewall	SHDTU03F-ET10R	1-port Ethernet 10/100Base-TX Router w/ Firewall	S	80
Ethernet Router	SHDTU03-ET10RS	4-port Ethernet 10/100Base-TX Router	S	80
Ethernet Router w/Firewall	SHDTU03F-ET10RS	4-port Ethernet 10/100Base-TX Router w/ Firewall	S	80
4-wire (4.6Mbps) G.SHDSL ATI	M Bridge/Router			
Ethernet Router	SHDTU03A-ET10RS	4-port Ethernet 10/100Base-TX Router	S	80
Ethernet Router w/Firewall	SHDTU03AF-ET10RS	4-port Ethernet 10/100Base-TX Router w/ Firewall	S	80

ADSL Family

IP DSLAM				
1.5U Managed IP DSLAM	MD15	1.5U, 19", 48-port ADSL2+ IP DSLAM	R	81
2U Managed IP DSLAM	MD20	2U, 19", 72-port ADSL2+ IP DSLAM	R	82
Modem				
ADSL2+ Modem	ATU-R160-1	ADSL2/ADSL2+ 1-port modem w/ USB	S	83
ADSL2 ⁺ Modem	ATU-R160-4	ADSL2/ADSL2+ 4-port modem	S	83
ADSL Splitter				
Rack				
6U Rack	ALS-R50	6U, 19", 16-slot (384 loop max)	R	84
ADSL Splitter Line Card	ALS-R50 24P-11	24-port ADSL POTS splitter card	L	
6U Rack	ALS-R60	6.75U, 19", 20-slot (640 loop max)	R	85
ADSL Splitter Line Card	ALS-R60 32P-11	32-port ADSL POTS splitter card	L	
Stand-alone Splitter				
ADSL	ALS-P10	ADSL MDF type splitter	С	87
ADSL, VDSL	ALS-12	ADSL/VDSL splitter	С	86
ADSL	ALS-10-IT	Italy POTS plug ADSL splitter	С	88
ADSL	ALS-10-UK	UK POTS BT plug ADSL splitter	С	88
ADSL	ALS-10-FI	Finland POTS plug ADSL splitter	С	88
ADSL	ALS-10-FA	France POTS plug ADSL splitter	С	88
ADSL	ALS-10-EU/I	ADSL/ISDN splitter	С	89
Stand-alone Micro Filter				
ADSL, VDSL	ALS-M12	ADSL/VDSL micro filtter	С	86

VDSL Family

Modem				
VDSL2	VDTU2-104	VDSL2 4-port Ethernet 10/100Base-TX CO modem	S	90
VDSL2	VDTU2-204	VDSL2 4-port Ethernet 10/100Base-TX CPE modem	S	90

5.7Mbps G.SHDSL.bis Router / NTU Performance

_ 	Line	207	₩G	24/	WG	22A	WG		Line	26/	٩WG	24	WG	22A	WG
2w	Rate	0.4	mm	0.5	mm	0.6	mm	2w	Rate	0.4	ŀmm	0.5	mm	0.6	mm
N=	Kbps	kft	km	kft	km	kft	km	N=	Kbps	kft	km	kft	km	kft	km
3	192	14	4.27	18	5.5	23	7.0	47	3008	10	3.05	13	4.0	17	5.0
4	256	14	4.27	18	5.5	23	7.0	48	3072	10	3.05	13	4.0	17	5.0
5	320	14	4.27	18	5.5	23	7.0	49	3136	10	3.05	13	4.0	17	5.0
6	384	14	4.27	18	5.5	23	7.0	50	3200	10	3.05	13	4.0	17	5.0
7	448	14	4.27	18	5.5	23	7.0	51	3264	9	2.74	12	3.5	15	4.6
8	512	13	3.96	17	5.2	21	6.4	52	3328	9	2.74	12	3.5	15	4.6
9	576	13	3.96	17	5.2	21	6.4	53	3392	9	2.74	12	3.5	15	4.6
10	640	12	3.66	16	4.9	19	5.8	54	3456	9	2.74	12	3.5	15	4.6
11	704 768	13 11	3.96 3.35	17 15	5.2 4.4	21 18	6.4 5.5	55 56	3520 3584	9	2.74	12 12	3.5	15 15	4.6
13	832	11	3.35	15	4.4	18	5.5	57	3648	9	2.74	12	3.5	15	4.6 4.6
14	896	11	3.35	15	4.4	18	5.5	58	3712	9	2.74	12	3.5	15	4.6
15	960	11	3.35	15	4.4	18	5.5	59	3776	9	2.74	12	3.5	15	4.6
16	1024	11	3.35	15	4.4	18	5.5	60	3840	9	2.74	12	3.5	15	4.6
17	1088	11	3.35	15	4.4	18	5.5	61	3904	9	2.74	12	3.5	15	4.6
18	1152	11	3.35	15	4.4	18	5.5	62	3968	8	2.44	11	3.2	13	4.0
19	1216	11	3.35	15	4.4	18	5.5	63	4032	8	2.44	11	3.2	13	4.0
20	1280	11	3.35	15	4.4	18	5.5	64	4096	8	2.44	11	3.2	13	4.0
21	1344	11	3.35	15	4.4	18	5.5	65	4160	8	2.44	11	3.2	13	4.0
22	1408	11	3.35	15	4.4	18	5.5	66	4224	8	2.44	11	3.2	13	4.0
23	1472	11	3.35	15	4.4	18	5.5	67	4288	8	2.44	11	3.2	13	4.0
24	1536	11	3.35	15	4.4	18	5.5	68	4352	8	2.44	11	3.2	13	4.0
25	1600	10	3.05	13	4.0	17	5.0	69	4416	8	2.44	11	3.2	13	4.0
26	1664	10	3.05	13	4.0	17	5.0	70	4480	8	2.44	11	3.2	13	4.0
27	1728	10	3.05	13	4.0	17	5.0	71	4544	8	2.44	11	3.2	13	4.0
28	1792	10	3.05	13	4.0	17	5.0	72	4608	8	2.44	11	3.2	13	4.0
29	1856	10	3.05	13	4.0	17	5.0	73	4672	7	2.13	10	3.0	12	3.5
30	1920	10	3.05	13	4.0	17	5.0	74	4736	8	2.44	11	3.2	11	3.4
31	1984	10	3.05	13	4.0	17	5.0	75	4800	7	2.13	9	2.7	11	3.4
32	2048	10	3.05	13	4.0	17	5.0	76	4864	7	2.13	9	2.7	11	3.4
33	2112	10	3.05	13	4.0	17	5.0	77	4928	7	2.13	9	2.7	11	3.4
34	2176	10	3.05	13	4.0	17	5.0	78	4992	6	1.83	8	2.4	10	3.0
35	2240	10	3.05	13	4.0	17	5.0	79	5056	6	1.83	8	2.4	10	3.0
36	2304	10	3.05	13	4.0	17	5.0	80	5120	6	1.83	8	2.4	10	3.0
37	2368 2432	10	3.05	13 13	4.0	17 17	5.0	81	5184	6	1.83	8	2.4	10	3.0
38	2432	10 10	3.05	13	4.0	17	5.0 5.0	82 83	5248 5312	6	1.83 1.83	8	2.4	10 10	3.0
40	2560	10	3.05	13	4.0	17	5.0	84	5376	6	1.83	8	2.4	10	3.0
41	2624	10	3.05	13	4.0	17	5.0	85	5440	6	1.83	8	2.4	10	3.0
42	2688	10	3.05	13	4.0	17	5.0	86	5504	6	1.83	8	2.4	10	3.0
43	2752	10	3.05	13	4.0	17	5.0	87	5568	6	1.83	8	2.4	10	3.0
44	2816	10	3.05	13	4.0	17	5.0	88	5632	6	1.83	8	2.4	10	3.0
45	2880	10	3.05	13	4.0	17	5.0	89	5696	6	1.83	8	2.4	10	3.0
46	2944	10	3.05	13	4.0	17	5.0		2000						0.0

Note: The loop distance above is based on SNR>= 6dB

2.3Mbps G.SHDSL Router / NTU Performance

Line Speed kbps	0.4mm 26 AWG km	0.5mm 24 AWG km	0.6mm 22 AWG km
64	9.7	12.8	16.0
128	8.1	10.6	13.2
192	6.9	9.1	11.4
256	6.7	8.7	11.0
320	6.7	8.7	11.0
384	6.5	8.5	10.5
448	6.4	8.4	10.5
512	6.2	8.1	10.1
576	6.1	8.0	10.0
640	5.9	7.8	9.7
704	5.8	7.7	9.6
768	4.8	6.3	7.9
832	5.5	7.2	9.0
896	5.3	6.9	8.7
960	4.9	6.5	8.1
1024	5.1	6.7	8.5
1088	5.0	6.6	8.3
1152	4.8	6.3	7.9
1216	4.8	6.3	7.9
1280	4.3	5.6	7.0
1344	4.1	5.4	6.7
1408	4.4	5.8	7.2
1472	4.4	5.8	7.2
1536	4.3	5.6	6.9
1600	4.4	5.8	7.2
1664	4.4	5.8	7.2
1728	4.2	5.4	6.8
1792	4.2	5.4	6.8
1856	4.1	5.4	6.7
1920	4.1	5.4	6.7
1984	4.0	5.2	6.5
2048	3.6	4.2	5.5
2304	3.3	3.9	4.8

The above table applied to the following models:

■ SHDTU03/ET10R

■ SHDTU03/E1

■ SHDTU03/ET10RS

■ SHDTU03/V35

G.SHDSL.bis TDM E1/V.35/LAN Concentrator

SHRM03b TDM

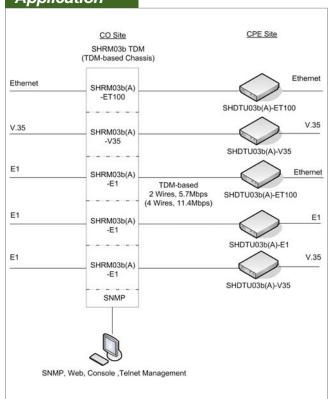


The SHRM03b-CH chassis is a 4U 19(23)" rack that supports dual power and 14 slots for dual channel, hot swappable cards for G.703 E1, V.35 (RS-530/449/X.21) and bridged Ethernet. Utilizing industry standard SNMP protocol, the management feature can configure and monitor each local channel and the connected remote modems. In addition, RS-232 console and Telnet provide menu based management while embedded Web offers a user friendly graphical environment for OAM&P. This Rack is 100% compatible with our SHDTU03b standalone TDM based CPE modems for E1, serial data and Ethernet.

Features

- 4U 19(23)" 14 slot chassis
- Interface Cards for E1, V.35, Ethernet (Bridge)
- Up to 28 ports per chassis (2 ports per card)
- Hot swappable
- Data rate 2 wire up to 5.7Mbps and 4 wire up to 11.4Mbps
- Adaptive rate feature maximizes data rate based on loop conditions
- Supports console terminal, Telnet, web and SNMP management
- Supports TFTP upgrade
- All interface connectors on the rear panel

Application



Specifications

		-
Ports	Line Rate :	ITU G.991.2 (2004)
WAN Interface	Coding :	trellis coded pulse amplitude modulation
		(TC-PAM16 and TC-PAM32)
	Support :	Annex A ,B , F and G
	Payload rates:	$64\mbox{Kps}$ to $5.696\mbox{Mbps}$ (N=1 to 89) for 2-wire model.
		128Kbps to11.392Mbps (N=1 to 172) for 4-wire mod
	Connection :	RJ-45 jack (2-wire or 4-wire)
	Impedance :	135 ohms
G.703 Interface	Connection:	RJ-45 for balanced 120 $\!\Omega$ E1 cable and BNC for
(as E1)		unbalanced 75Ω E1 cable
	Line Rate :	2048KHz +/- 50ppm
	Framing:	PCM30/PCM30C/PCM31/PCM31C and Unframed
	Data Rate :	64Kbps to 2.048Mbps (Nx64Kbps , N=1 to 32)
	Operation :	Full E1 and Fractional E1
Data Interface	Payload rates :	Up to 5.696Mbps(for 2-wire model) or Up to
(as RS-530/V.35/X.21)	,	8.192Mbps(for 4-wire model)
,	Support :	V.35/RS-530 or V.36/X.21
LAN Interface	Single Etherne	et Interface
(as Ethernet)		lalf/Full Duplex, Auto-sensing, Auto-Crossover
(do Eulerriel)		AC address learning, filtering bridge
DSL Timing	Internal	3, 4 3 4
2 0 2 · · · · · · · · · · · · · · · · ·	• From E1 Reco	verv (as E1)
		s V.35 and Ethernet)
Performance Monito		UAS, LOWS, Alarms and Errors
Loopback Tests	E1 and V.35 inte	
200000000000000	Local Digital L	*
	Local Loopbace	
	Remote Line L	
	Remote Paylo	
	• Far-end Line L	
	Far-end Paylo	•
	-	((for V.35 interface)
		211-1) bit BER tester
Management		RJ45 , RS232C)
Management		are upgradeable
Dower	AC: 90~230VAC	
Power		
Dawar Canavinantian	DC: -36~-72, 6A	
		/, I/F line card: 12W maximum
Dimensions	Chassis: 178 x	
(D x W x H)mm	Line card: 21 x	178 X 260mm
Weight	7.9kg	···· 0. 70°0 (01)
Temperature		ing) ,0~70°C (Storage)
Humidity	10~90% non-co	
Certification	CE, FCC, RoHS	<u> </u>
MTBF	57,000 hours	

E1 card



- Supports E1 and fractional E1 over SHDSL
- Standard ITU G.991.2 (2004) supports improved reach, speed and interoperability compared to conventional G.shdsl
- Fast and cost-effective services of voice or TDM on a single wire pair on existing copper loop infrastructure
- Wetting current to protect copper line (optional)
- Local management interface with console
- Remote line loopback
- E1 performance monitoring and alarm buffer
- G.SHDSL.bis Line performance monitoring (data rate and SNR)
- Raw and per time interval statistics

V35 card



- Supports Nx64 V.35, X21, RS530, and RS449 over SHDSL
- Standard ITU G.991.2 (2004) supports improved reach, speed and interoperability compared to conventional G.shdsl
- Fast and cost-effective services of TDM on a single wire pair on existing copper loop infrastructure
- Wetting current to protect copper line (optional)
- Local management interface with console
- Remote line loopback
- G.SHDSL.bis Line performance monitoring (data rate and SNR)
- Raw and per time interval statistics

Ethernet card



- Supports 10Base-T and 100Base-TX over SHDSL
- Standard ITU G.991.2 (2004) supports improved reach, speed and interoperability compared to conventional G.shdsl
- Fast and cost-effective services of data on a single wire pair on existing copper
- Wetting current to protect copper line (optional)
- Local management interface with console
- Remote line loopback
- G.SHDSL.bis Line performance monitoring (data rate and SNR)
- Raw and per time interval statistics

Ordering Information

SHRM03b-AA-CH 4U, 19", 14-slot chassis for dual AC power SHRM03b-DD-CH 4U, 19", 14-slot chassis for dual DC power SHRM03b-AD-CH 4U, 19", 14-slot chassis for AC + DC power

SHRM03b-AC

AC 100 ~ 220 power card

SHRM03b-SNMP

SNMP I/F card with MIB and console cable

SHRM03b-E1

G.SHDSL (2 wire) E1 TDM card with RJ-45

adapter (2 E1 ports per card)

SHRM03b-V35

G.SHDSL (2 wire) V.35 TDM card with HD26

adapter cable (2 data ports per card)

SHRM03b-ET100

G.SHDSL (2 wire) Ethernet TDM card with RJ-45 adapter (2 LAN ports per card)

G.SHDSL.bis E1 Interface Modem



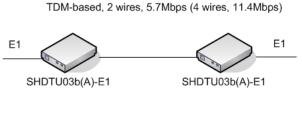
SHDTU03b-E1

The CTC SHDTU03b family of G.SHDSL.bis TDM based modem is a telecom product for carriers or SME users. The SHDTU03b-E1 offers an ITU-T G.703 DTE interface which works over an SHDSL interface. The modem supports two different connectors for G.703 E1 application (balanced 120 Ohm RJ45 or unbalanced 75 Ohm dual BNCs) at bit rates from 64kbps to 2.048Mbps. The SHDTU03b-E1 can be configured and managed via EOC, or menu-driven VT100 compatible Async. terminal Interface, either locally or remotelyfor different customer-tailored services. Three types of TDM 2-wire line cards are available on this shelf, 2-channel E1 card, 2-channel V35,X21,RS530 card and 2-channel Ethernet bridge card, each channel provides symmetric line rates from 192kbps to 5.696Mbps.

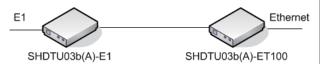
Features

- Supports E1 and fractional E1 over SHDSL
- Standard ITU G.991.2 (2004) supports improved reach, speed and interoperability compared to conventional G.shdsl
- Fast and cost-effective services of voice or TDM on a single or two wire pair of existing copper loop infrastructure
- Wetting current to protect copper line (optional)
- Local management interface with console
- Remote line loopback
- E1 performance monitoring and alarm buffer
- G.SHDSL.bis Line performance monitoring (data rate and SNR)
- Raw and per time interval statistics

Application







Ordering Information

■ SHDTU03b-E1-AC 2 wire E1 NTU with 100~240VAC
■ SHDTU03b-E1-DC 2 wire E1 NTU with -36 ~ -72VDC
■ SHDTU03b-E1-AD 2 wire E1 NTU with AC+DC power
■ SHDTU03bA-E1-AC 4 wire E1 NTU with -36 ~ -72VDC
■ SHDTU03bA-E1-AD 4 wire E1 NTU with AC+DC power

Specifications

Specification	S				
Ports	Line Rate :	ITU G.991.2 (2004)			
WAN Interface	Coding:	trellis coded pulse amplitude modulation			
		(TC-PAM16 and TC-PAM32)			
	Support :	Annex A ,B , F and G			
	Payload rates:	64Kps to 5.696Mbps (N=1 to 89) for 2-wire model			
		128Kbps to11.392Mbps (N=1 to 172) for 4-wire mode			
	Connection :	RJ-45 jack (2-wire or 4-wire)			
	Impedance :	135 ohms			
G.703 Interface(as E1)	Connection:	RJ-45 for balanced 120 $\!\Omega$ E1 cable and BNC for			
		unbalanced 75Ω E1 cable			
	Line Rate :	2048KHz +/- 50ppm			
	Framing:	PCM30/PCM30C/PCM31/PCM31C and Unframed			
	Data Rate :	64Kbps to 2.048Mbps (Nx64Kbps , N=1 to 32)			
	Operation:	Full E1 and Fractional E1			
LED	Power, Alarm, To	est, SYNC, Error, LBK			
DSL Timing	Internal				
	From E1 Recovery (as E1)				
	• From DTE (as	s V.35 and Ethernet)			
Performance Monito	ring ES, SES,	UAS, LOWS, Alarms and Errors			
Loopback Tests	Local Digital Lo	oopback			
	Local Loopbace	ck			
	Remote Line L	_oopback			
	Remote Paylor	ad Loopback			
	• Far-end Line L	_oopback			
	Far-end Paylor	ad Loopback			
	• Build-in 2047(2	211-1) bit BER tester			
Management	Configuration v	with keypads and LCD display			
	Console port (RJ45 , RS232)			
	Support firmwa	are upgradeable			
Power	AC Input: 100~2	240V			
	DC Input: -36 ~	72V			
	Dual power Inpu	ut:100~ 240VAC, -36 ~ -72VDC			
Power Consumption	< 10W				
Dimensions	168 x 195 x 48n	nm			
(D x W x H)mm					
Weight	5.2kg				
Temperature	0~50°C (Operat	ting) ,0~70°C (Storage)			
Humidity	10~90% non-co	ndensing			
Certification	CE, FCC, RoHS	3			
MTBF	57,000 hours				

G.SHDSL.bis V35 Modem



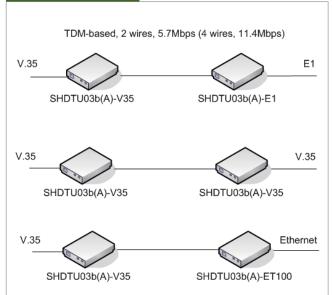
SHDTU03b-V35

The CTC SHDTU03b family of G.SHDSL.bis TDM based modem is a telecom product for carriers or SME users. The SHDTU03b-V35 offers a V.35 DTE interface which works over an SHDSL interface. The V.35 interface provides high-speed TDM services by way of a DB25 I/F and adapter cable. The factory selected RS-530 interface will electrically support RS-530, X.21and RS-449 with appropriate adapter cable. The data rate of DB25 I/F may be up to 5.696Mbps within one pair copper wires or 11.392Mbps within two pairs copper wires. The SHDTU03b-V35 can be configured and managed via EOC, or menu-driven VT100 compatible Async. terminal Interface, either locally or remotely.

Features

- Supports Nx64 V.35, X21, RS530, and RS449 over SHDSL
- Standard ITU G.991.2 (2004) supports improved reach, speed and interoperability compared to conventional G.shdsl
- Fast and cost-effective services of TDM on a single or two wire pair of existing copper loop infrastructure
- Wetting current to protect copper line (optional)
- Local management interface with console
- Remote line loopback
- G.SHDSL.bis Line performance monitoring (data rate and SNR)
- Raw and per time interval statistics

Application



Specifications

Ports	Line Rate :	ITU G.991.2 (2004)
WAN Interface	Coding:	trellis coded pulse amplitude modulation
		(TC-PAM16 and TC-PAM32)
	Support :	Annex A ,B , F and G
	Payload rates:	64Kps to 5.696Mbps (N=1 to 89) for 2-wire model
		128Kbps to11.392Mbps (N=1 to 172) for 4-wire mode
	Connection :	RJ-45 jack (2-wire or 4-wire)
	Impedance :	135 ohms
G.703 Interface(as E1)	Payload rates :	Up to 5.696Mbps(for 2-wire model) or Up to
		8.192Mbps(for 4-wire model)
	Support :	V.35/RS-530 or V.36/X.21
	Framing:	
	Data Rate :	
	Operation:	
LED	Power, Alarm, Te	est, SYNC, Error, LBK, TD, RD
DSL Timing	Internal	
	• From DTE (as	V.35 and Ethernet)
Performance Monito	ring ES, SES,	UAS, LOWS, Alarms and Errors
Loopback Tests	• Local Digital Lo	oopback
	• Local Loopbac	k
	• Remote Line L	oopback
	Remote Payloa	ad Loopback
	• Far-end Line L	oopback
	• Far-end Payloa	ad Loopback
	• V.54 Loopback	(for V.35 interface)
	• Build-in 2047(2	211-1) bit BER tester
Management	AC Input: 100~2	240V
	DC Input: -36 \sim	72V
	Dual power Inpu	ut:100~ 240VAC, -36 ~ -72VDC
Power	< 10W	
Power Consumption	168 x 195 x 48n	nm
Dimensions		
(D x W x H)mm	5.2kg	
Weight	0~50°C (Operat	ing) ,0~70°C (Storage)
Temperature	10~90% non-co	ndensing
Humidity	CE, FCC, RoHS	3
Certification	57,000 hours	
MTBF		

Ordering Information

■ **SHDTU03b-Data-AC** 2 wire Data(V35,X.21,RS530,RS449)

NTU with 100~240VAC

■ **SHDTU03b-Data -DC** 2 wire Data(V35,X.21,RS530,RS449)

NTU with -36 ~ -72VDC

■ **SHDTU03b-Data -AD** 2 wire Data(V35,X.21,RS530,RS449)

NTU with AC+DC power

■ **SHDTU03bA-Data-AC** 4 wire Data(V35,X.21,RS530,RS449) NTU with 100~240VAC

■ **SHDTU03bA-Data - DC** 4 wire Data(V35,X.21,RS530,RS449) NTU -36 ~ -72VDC

■ SHDTU03bA-Data - AD 4 wire Data(V35,X.21,RS530,RS449) NTU AC+DC power

G.SHDSL.bis Ethernet Modem



SHDTU03b-ET100

The CTC SHDTU03b family of G.SHDSL.bis TDM based modem is a telecom product for carriers or SME users. The SHDTU03b-ET100 offers a 10/100Base-TX interface which works over an SHDSL interface. The Ethernet interface provides Ethernet over TDM services by way of a HDLC encapsulation and RJ-45 connector. The data rate of Ethernet I/F may be up to 5.696Mbps within one pair copper wires or 11.392Mbps within two pairs copper wires. The SHDTU03b-ET100 can be configured and managed via EOC, or menu-driven VT100 compatible Async. terminal Interface, either locally or remotely.

Features

- Supports 10Base-T and 100Base-TX over SHDSL
- Standard ITU G.991.2 (2004) supports improved reach, speed and interoperability compared to conventional G.shdsl
- Fast and cost-effective services of data on a single or two wire pair of existing copper loop infrastructure
- Wetting current to protect copper line (optional)
- Local management interface with console
- Remote line loopback
- G.SHDSL.bis Line performance monitoring (data rate and SNR)
- Raw and per time interval statistics

Specifications

Ports	Line Rate :	ITU G.991.2 (2004)	
WAN Interface	Coding :	trellis coded pulse amplitude modulation	
		(TC-PAM16 and TC-PAM32)	
	Support :	Annex A ,B , F and G	
	Payload rates:	64Kps to 5.696Mbps (N=1 to 89) for 2-wire model.	
		128Kbps to11.392Mbps (N=1 to 172) for 4-wire model	
	Connection :	RJ-45 jack (2-wire or 4-wire)	
	Impedance :	135 ohms	
LAN Interface	Single Ethern	net Interface	
(as Ethernet)	• 10/100Mpbs	Half/Full Duplex, Auto-sensing, Auto-Crossover	
	• Up to 1024 N	IAC address learning, filtering bridge	
LED	Power, Alarm,	Test, SYNC, Error, LBK, Link/Act, speed, Col	
DSL Timing	 Internal 		
	• From DTE (a	as V.35 and Ethernet)	
Performance Mon	itoring ES, SES	, UAS, LOWS, Alarms and Errors	
Management	 Configuration with keypads and LCD display 		
	Console port (RJ45 , RS232C)		
	 Support firmv 	vare upgradeable	
Power	AC Input: 100	~240V	
	DC Input : -36 ~ 72V		
	Dual power Inp	out :100~ 240VAC, -36 ~ -72VDC	
Power Consumpti	on < 10W		
Dimensions	168 x 195 x 48	lmm	
(D x W x H)mm			
Weight	5.2kg		
Temperature	0~50°C (Opera	ating) ,0~70°C (Storage)	
Humidity	10~90% non-c	ondensing	
Certification	CE, FCC, RoH	S	
MTBF	57,000 hours		

Ordering Information

SHDTU03b(A)-ET100

Ethernet

■ SHDTU03b-ET100-AC 2 wire Ethernet 10/100Base-TX NTU with 100~240VAC

Ethernet

SHDTU03b(A)-ET100

■ SHDTU03b-ET100-DC 2 wire Ethernet 10/100Base-TX NTU with -36 ~ -72VDC

■ SHDTU03b-ET100-AD 2 wire Ethernet 10/100Base-TX NTU with AC+DC power

■ SHDTU03bA-ET100-AC 4 wire Ethernet 10/100Base-TX NTU with 100~240VAC

■ SHDTU03bA-ET100-DC 4 wire Ethernet 10/100Base-TX NTU with -36 ~ -72VDC

■ SHDTU03bA-ET100-AD 4 wire Ethernet 10/100Base-TX NTU with AC+DC power

G.SHDSL.bis Multiple Interface Modem



ITU G.991.2 (2004)

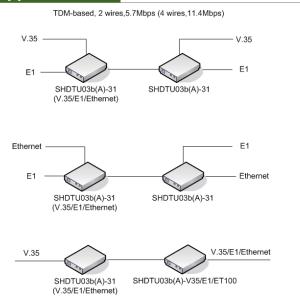
SHDTU03b-31

The CTC SHDTU03b family of G.SHDSL.bis TDM based modem is a telecom product for carriers or SME users. In one device, the SHDTU03b-31 offers three DTE I/Fs (E1, V.35, and Ethernet), which can work simultaneously to share DSL bandwidth. The user-configurable interfaces provide flexible application for various connections. The modem supports two different connectors for G.703 E1 application (balanced 120 Ohm RJ45 or unbalanced 75 Ohm dual BNCs) at bit rates from 64kbps to 2.048Mbps. The V.35 interface provides high-speed TDM services by way of a DB25 I/F and adapter cable. The factory selected RS-530 interface will electrically support RS-530, X.21and RS-449 with appropriate adapter cable. The data rate of DB25 I/F may be up to 5.696Mbps within one pair copper wires or 8.192Mbps within two pairs copper wires. The modern provides 10/100Mbps auto-negotiated Fast Ethernet via an RJ45 LAN connector, which offers customer premise high-speed LAN over TDM services. The SHDTU03b-31 can be configured and managed via EOC, or menu-driven VT100 compatible Async. terminal Interface, either locally or remotely.

Features

- 3-in-1 dot bis modem
- Supports E1, fractional E1, Nx64 V.35, X21, RS530, RS449 and Ethernet over SHDSL
- Standard ITU G.991.2 (2004) supports improved reach, speed and interoperability compared to conventional G.shdsl
- Fast and cost-effective services of voice, TDM and data on a single or two wire pair of existing copper loop infrastructure
- Wetting current to protect copper line (optional)
- Local management interface with console
- Remote line loopback
- E1 performance monitoring and alarm buffer
- G.SHDSL.bis Line performance monitoring (data rate and SNR)
- Raw and per time interval statistics

Application



Ordering Information 2 wire (5.7Mbps) G.SHDSL.bis TDM

SHDTU03b-31-AD

Multi-Interface modem

SHDTU03b-31-AC 3U, 19 (23)", 16-slot chassis SHDTU03b-31-DC 2 wire E1, Data and LAN NTU with DC power

2 wire E1, Data and LAN NTU with dual power

MTBF

4 wire (11.4Mbps) G.SHDSL.bis TDM Multi-Interface modem

- SHDTU03bA-31-AC 4 wire E1, Data and LAN NTU with AC power
- SHDTU03bA-31-DC 4 wire E1, Data and LAN NTU with DC power
- SHDTU03bA-31-AD 4 wire E1, Data and LAN NTU with dual power
- SHDTU03bA-31T-AD 4 wire T1/E1, Data and LAN NTU with dual power

Specifications

Line Rate

1 0110		
WAN Interface	Coding :	trellis coded pulse amplitude modulation
		(TC-PAM16 and TC-PAM32)
	Support :	Annex A ,B , F and G
	Payload rates:	64Kps to 5.696Mbps (N=1 to 89) for 2-wire model.
		128Kbps to11.392Mbps (N=1 to 172) for 4-wire mode
	Connection :	RJ-45 jack (2-wire or 4-wire)
	Impedance :	135 ohms
G.703 Interface(as E1)	Connection :	RJ-45 for balanced 120 Ω E1 cable and BNC for
		unbalanced 75Ω E1 cable
	Line Rate :	2048KHz +/- 50ppm
	Framing :	PCM30/PCM30C/PCM31/PCM31C and Unframed
	Data Rate :	64Kbps to 2.048Mbps (Nx64Kbps , N=1 to 32)
	Operation :	Full E1 and Fractional E1
Data Interface	Payload rates:	Up to 5.696Mbps(for 2-wire model) or Up to
(as RS-530/V.35/X.21)		8.192Mbps(for 4-wire model)
	• Support V.35/R	RS-530 or V.36/X.21
LAN Interface	Single Etherne	t Interface
(as Ethernet)	• 10/100Mpbs H	alf/Full Duplex, Auto-sensing, Auto-Crossove
	• Up to 1024 MA	C address learning, filtering bridge
LED	Power, Alarm, Te	est, SYNC, Error, LBK, E1, Data, Eth
DSL Timing	Internal	
	• From E1 Reco	very (as E1)
	• From DTE (as	V.35 and Ethernet)
Performance Monito	ring ES, SES,	UAS, LOWS, Alarms and Errors
Loopback Tests	E1 and V.35 inte	erface only
	Local Digital Lo	popback
	 Local Loopbac 	k
	• Remote Line L	oopback
	Remote Payloa	ad Loopback
	Far-end Line L	oopback
	Far-end Payloa	ad Loopback
	V.54 Loopback	(for V.35 interface)
	• Build-in 2047(2	211-1) bit BER tester
Management	Configuration v	vith keypads and LCD display
	Console port (F	RJ45 , RS232C)
	Support firmwa	are upgradeable
Power	AC Input: 100~2	40V
	DC Input: -36 ~	72V
	Dual power Inpu	t:100~ 240VAC, -36 ~ -72VDC
Power Consumption		
Dimensions	168 x 195 x 48m	nm
(D x W x H)mm		
Weight	5.2kg	
Temperature		ing) ,0~70°C (Storage)
Humidity	10~90% non-coi	
Certification	CE, FCC, RoHS	
NATOL	E7 000 hours	

57,000 hours

G.SHDSL.bis ATM Ethernet Concentrator

SHRM03b ATM

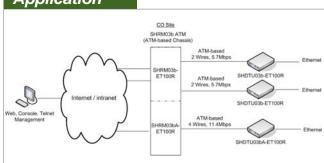


The SHRM03b-CH chassis is a 4U 19(23)" rack that supports dual power and 15 slots for dual channel, hot swappable ET100R Bridge/Router Ethernet cards. The SHDTU03b-ET100R ATM card series are G.SHDSL 2-wire/ 4-wire routers which comply with G.991.2 & G.994.1 standards. The SHDTU03 family provides business-class, multi-range 192Kbps to 5.696/11.392Mbps payload rates over existing single pair or two pairs copper wire. The SHDTU03b is designed not only to optimize the service bit rate from central office to customer premises but also integrates high-end Bridging/ Routing capabilities with advanced functions such as Multi-DMZ, virtual server mapping and VPN pass-through. The SHDSL.bis router allows customers to leverage the latest in broadband technologies to meet their growing data communication needs.

Features

- 4U 19(23)" 15 slot chassis
- Interface Cards for Ethernet (Bridge & Routing)
- Up to 30 ports per chassis (2 ports per card)
- Hot swappable
- Data rate 2 wire up to 5.7Mbps and 4 wire up to 11.4Mbps
- Adaptive rate feature maximizes data rate based on loop conditions
- All interface connectors on the rear panel

Application



Specifications

Specificati	10115		
Ports	LAN Interface	• 10Base-T /100 Base-TX auto-negotiation	
		Auto-MDIX	
	Hardware	• WAN: RJ-45	
	Interface	• LAN: RJ-45	
		Console port: RS232	
		RST: Reset button for factory default	
	WAN Interface	• SHDSL: ITU-T G.991.2 2004(Annex A/B/F/G)	
		• Encoding scheme: TC-PAM16, TC-PAM32	
		• Data Rate: N x 64Kbps (N=3~89)	
		Impedance: 135 ohms	
ATM	• Up to 8 PVCs		
• OAM F4/F5		opback test	
	• AAL5		
ATM QoS • UBR (Unspecified Bit Rate) • CBR (Constant Bit Rate)		fied Bit Rate)	
		t Bit Rate)	
	 VBR-rt (Variab 	le Bit Rate Real Time)	
	VBR-nrt (Varia	ble Bit Rate Non-real Time)	
AAL5	 VC multiplexin 	g and SNAP/LLC	
Encapsulation	• Ethernet over	ATM (RFC 2684/1483)	
PPP over ATM (RFC 2364)Classical IP over ATM (RFC 157		I (RFC 2364)	
		ver ATM (RFC 1577)	
PPP	PPP over Ether	ernet for fixed and dynamic IP (RFC 2516)	
	• PPP over ATM for fixed and dynamic IP (RFC 2364)		

• User authentication with PAP/CHAP/MS-CHAP

Specifications

opcomoation			
Routing	Support IP/TCP/UDP/ARP/ICMP/IGMP protocols		
	• IP routing with static routing and RIPv1/RIPv2		
	(RFC1058/2453)		
	• IP multicast and IGMP proxy (RFC1112/2236)		
	 Network address translation (NAT/PAT) (RFC1631) 		
	NAT ALGs for ICQ/Netmeeting/MSN/Yahoo Messenger		
	DNS relay and caching (RFC1034/1035)		
	DHCP server, client and relay (RFC2131/2132)		
Bridging	IEEE 802.1D Transparent Bridging		
	• IEEE 802.1q VLAN		
	Port-based VLAN		
Security	DMZ host/Multi-DMZ/Multi-NAT function		
	Virtual server mapping (RFC1631)		
	VPN pass-through for PPTP/L2TP/IPSec tunneling		
	Natural NAT firewall		
	Advanced stateful packet inspection (SPI) firewall		
	Denial of service protection		
	User access control; deny certain PCs access to		
	internet services		
Management	Easy-to-use web-based GUI for quick setup, configuration		
Ü	and management		
	Menu-driven interface/Command-line interface (CLI) for		
	local console and Telnet access		
	Password protected management and access control list		
	for administration		
	SNMP management with SNMPv1/SNMPv2c		
	(RFC1157/1901/1905) agent and MIB II (RFC1213/1493)		
	, , ,		
	 Software upgrade via web-browser/TFTP server 		
LEDs	Software upgrade via web-browser/TFTP server General: PWR		
LEDs			
LEDs	General: PWR		
LEDs	• General: PWR • WAN: LNK, ACT • LAN: 1, 2, 3, 4 (ET10RS)		
LEDs	General: PWR WAN: LNK, ACT		
	General: PWR WAN: LNK, ACT LAN: 1, 2, 3, 4 (ET10RS) LAN: Link, ACT (ET10R)		
LEDs	General: PWR WAN: LNK, ACT LAN: 1, 2, 3, 4 (ET10RS) LAN: Link, ACT (ET10R) SHDSL: ALM		
Power	General: PWR WAN: LNK, ACT LAN: 1, 2, 3, 4 (ET10RS) LAN: Link, ACT (ET10R) SHDSL: ALM DC: -36V to -72V, 6A		
	• General: PWR • WAN: LNK, ACT • LAN: 1, 2, 3, 4 (ET10RS) LAN: Link, ACT (ET10R) • SHDSL: ALM DC: -36V to -72V, 6A AC: 90V to 230V, 2A		
Power	General: PWR WAN: LNK, ACT LAN: 1, 2, 3, 4 (ET10RS) LAN: Link, ACT (ET10R) SHDSL: ALM DC: -36V to -72V, 6A AC: 90V to 230V, 2A Total 200W Max Interface Line Card: 12W maximum		
Power	General: PWR WAN: LNK, ACT LAN: 1, 2, 3, 4 (ET10RS) LAN: Link, ACT (ET10R) SHDSL: ALM DC: -36V to -72V, 6A AC: 90V to 230V, 2A Total 200W Max		
Power Power Consumption Dimensions	General: PWR WAN: LNK, ACT LAN: 1, 2, 3, 4 (ET10RS) LAN: Link, ACT (ET10R) SHDSL: ALM DC: -36V to -72V, 6A AC: 90V to 230V, 2A Total 200W Max Interface Line Card: 12W maximum Management Control Card: 5W maximum		
Power Power Consumption Dimensions (D x W x H)mm	General: PWR WAN: LNK, ACT LAN: 1, 2, 3, 4 (ET10RS) LAN: Link, ACT (ET10R) SHDSL: ALM DC: -36V to -72V, 6A AC: 90V to 230V, 2A Total 200W Max Interface Line Card: 12W maximum Management Control Card: 5W maximum Chassis: 178 x 440 x 315mm Line card: 21 x 178 x 260mm		
Power Power Consumption Dimensions (D x W x H)mm Weight	General: PWR WAN: LNK, ACT LAN: 1, 2, 3, 4 (ET10RS) LAN: Link, ACT (ET10R) SHDSL: ALM DC: -36V to -72V, 6A AC: 90V to 230V, 2A Total 200W Max Interface Line Card: 12W maximum Management Control Card: 5W maximum Chassis: 178 x 440 x 315mm Line card: 21 x 178 x 260mm 7.9kg		
Power Power Consumption Dimensions (D x W x H)mm Weight Temperature	General: PWR WAN: LNK, ACT LAN: 1, 2, 3, 4 (ET10RS) LAN: Link, ACT (ET10R) SHDSL: ALM DC: -36V to -72V, 6A AC: 90V to 230V, 2A Total 200W Max Interface Line Card: 12W maximum Management Control Card: 5W maximum Chassis: 178 x 440 x 315mm Line card: 21 x 178 x 260mm		
Power Power Consumption Dimensions (D x W x H)mm Weight	General: PWR WAN: LNK, ACT LAN: 1, 2, 3, 4 (ET10RS) LAN: Link, ACT (ET10R) SHDSL: ALM DC: -36V to -72V, 6A AC: 90V to 230V, 2A Total 200W Max Interface Line Card: 12W maximum Management Control Card: 5W maximum Chassis: 178 x 440 x 315mm Line card: 21 x 178 x 260mm 7.9kg 0~50°C (Operating) ,0~70°C (Storage)		

G.SHDSL.bis ATM Ethernet Dual Channel Slide-in Card

SHRM03b-ET100R, SHRM03bA-ET100R

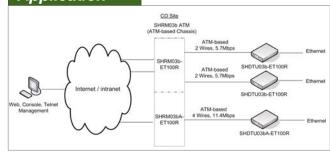
The SHDTU03b-ET100R is a dual channel ATM G.SHDSL 2-wire/ 4-wire router card which comply with G.991.2 & G.994.1 standards. The SHDTU03 family provides business-class, multi-range 192Kbps to 5.696/11.392Mbps payload rates over existing single pair or two pairs copper wire. The SHDTU03b is designed not only to optimize the service bit rate from central office to customer premises but also integrates high-end Bridging/ Routing capabilities with advanced functions such as Multi-DMZ, virtual server mapping and VPN pass-through. The SHDSL.bis router allows customers to leverage the latest in broadband technologies to meet their growing data communication needs. This card is 100% compatible with our SHDTU03b standalone ATM based CPE Bridge/Router modems.



Features

- Supports Ethernet over ATM over SHDSL
- Full ATM protocol stack implementation over G.SHDSL
- Adaptive rate installation maximizes data rate based on loop conditions
- Standard ITU G.991.2 (2004) supports improved reach, speed and interoperability compared to conventional G.shdsl
- Supports point-to-point configurations
- Data rate 2 wire up to 5.7Mbps and 4 wire up to 11.4Mbps
- Local management interface via console port
- Intuitive Web based management
- SNMP management with SNMPv1/v2 and MIB II
- Efficient IP routing and transparent learning bridge to support broadband Internet services
- VPN pass-through for safeguarded connections
- Build-in advanced SPI firewall (Firewall routers)
- DMZ host/Multi-DMZ/Multi-NAT; multiple PCs on a LAN with only one IP address
- PPPoA and PPPoE support user authentication with PAP/CHAP/MSCHAP
- SHDSL Line performance monitoring
- Raw and time stamped statistics
- Supports firmware upgrade via web interface

Application



- SHRM03b-AA-CH
- SHRM03b-DD-CH
- SHRM03b-AD-CH
- SHRM03b-AC
- SHRM03b-ET100R
- SHRM03bA-ET100R
- 4U, 19", 14-slot chassis for dual AC power
- 4U, 19", 14-slot chassis for dual DC power
- 4U, 19", 14-slot chassis for AC + DC power
- AC 100 ~ 220 power card
- 2 wire (5.7Mbps) 2Ch Ethernet
- 10/100Base-TX ATM bridge/router card
- 4 wire (11.4Mbps) Ethernet 10/100Base-TX
- ATM bridge/router card

G.SHDSL.bis ATM Router / Bridge modem

SHDTU03b-ET10R



The SHDTU03b-ET10R is a G.SHDSL bis Bridge/Router in 2-wire or 4-wire which complies with G.991.2 (2004) standards and has an optional built-in four port 10Base-T /100Base-TX auto-negotiation and auto-MDIX switch. The 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 pair copper wire. SHDTU03b-ET10R 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 switching ports may be configured for IEEE802.1Q VLAN or port based VLAN applications. The modem can be configured in either central or client mode providing a point-to-point solution.

Features

- Supports Ethernet over ATM over SHDSL
- Full ATM protocol stack implementation over G.SHDSL
- Adaptive rate installation maximizes data rate based on loop conditions
- Standard ITU G.991.2 (2004) supports improved reach, speed and interoperability compared to conventional G.shdsl
- Supports point-to-point configurations
- Data rate 2 wire up to 5.7Mbps and 4 wire up to 11.4Mbps
- Local management interface via console port
- Intuitive Web based management
- SNMP management with SNMPv1/v2 and MIB II
- Efficient IP routing and transparent learning bridge to support broadband Internet services
- VPN pass-through for safeguarded connections
- Build-in advanced SPI firewall (Firewall routers)
- DMZ host/Multi-DMZ/Multi-NAT; multiple PCs on a LAN with only one IP address
- PPPoA and PPPoE support user authentication with PAP/CHAP/MSCHAP
- SHDSL Line performance monitoring
- Raw and time stamped statistics
- Supports firmware upgrade via web interface

Specifications

Ports	LAN Interface: • 10Base-T /100 Base-TX auto-negotiation
	• Auto-MDIX
	Hardware Interface : • WAN: RJ-45
	• LAN: RJ-45
	Console port: RS232
	 RST: Reset button for factory default
	WAN Interface: • SHDSL: ITU-T G.991.2 2004(Annex A/B/F/G
	• Encoding scheme: TC-PAM16, TC-PAM32
	• Data Rate: N x 64Kbps (N=3~89)
	• Impedance: 135 ohms
ATM	• Up to 8 PVCs
	OAM F4/F5 loopback test
	• AAL5
ATM QoS	UBR (Unspecified Bit Rate)
	CBR (Constant Bit Rate)
	VBR-rt (Variable Bit Rate Real Time)
	VBR-nrt (Variable Bit Rate Non-real Time)
AAL5 Encapsul	ation • VC multiplexing and SNAP/LLC
	• Ethernet over ATM (RFC 2684/1483)
	• PPP over ATM (RFC 2364)
	Classical IP over ATM (RFC 1577)
PPP	PPP over Ethernet for fixed and dynamic IP (RFC 2516)
	• PPP over ATM for fixed and dynamic IP (RFC 2364)
	User authentication with PAP/CHAP/MS-CHAP
Routing	Support IP/TCP/UDP/ARP/ICMP/IGMP protocols
	 IP routing with static routing and RIPv1/RIPv2
	(RFC1058/2453)
	• IP multicast and IGMP proxy (RFC1112/2236)
	• Network address translation (NAT/PAT) (RFC1631)
	NAT ALGs for ICQ/Netmeeting/MSN/Yahoo Messenger
	DNS relay and caching (RFC1034/1035)
	 DHCP server, client and relay (RFC2131/2132)

Ordering Information

■ SHDTU03 b -ET10R 2 wire 10/100Base-TX Ethernet Router

■ SHDTU03 bF-ET10R 2 wire 10/100Base-TX Ethernet Router with Firewall 2 wire 4 port 10/100Base-TX Ethernet Router

■ SHDTU03 bF-ET10RS 2 wire 4 port 10/100Base-TX Ethernet Router with Firewall

■ SHDTU03 bA-ET10RS 4 wire 4 port 10/100Base-TX Ethernet Router

■ SHDTU03 bAF-ET10RS 4 wire 4 port 10/100Base-TX Ethernet Router with Firewall

Ethernet

ATM-based, 2 wires, 5.7Mbps (4wires, 11.4Mbps) Ethernet SHDTU03b(A)-ET10R(s) SHDTU03b(A)-ET10R(s) ATM-based with firewall, 2 wires, 5.7Mbps (4wires, 11.4Mbps) Ethernet SHDTU03b(A)F-ET10R(s) SHDTU03b(A)F-ET10R(s)

G.SHDSL bis

G.SHDSL bis

4-wire

G.SHDSL DSLAM

SHDTU03b-ET10R

SHDTU03bA-ET10RS

Specifications Bridging • IEEE 802.1D Transparent Bridging • IEEE 802.1q VLAN • Port-based VLAN • DMZ host/Multi-DMZ/Multi-NAT function Security • Virtual server mapping (RFC1631) • VPN pass-through for PPTP/L2TP/IPSec tunneling Natural NAT firewall • Advanced stateful packet inspection (SPI) firewall • Denial of service protection • User access control; deny certain PCs access to internet services Management • Easy-to-use web-based GUI for quick setup, configuration and management • Menu-driven interface/Command-line interface (CLI) for local console and Telnet access • Password protected management and access control list for administration • SNMP management with SNMPv1/SNMPv2c (RFC1157/1901/1905) agent and MIB II (RFC1213/1493) • Software upgrade via web-browser/TFTP server LEDs • General: PWR • WAN: LNK, ACT • LAN: 1, 2, 3, 4 (ET10RS) LAN: Link, ACT (ET10R) • SHDSL: ALM DC 9V in Power Consumption < 9W **Dimensions** 145 x 187 x 33mm (D x W x H)mm Weight 5.2kg 0~50°C (Operating) ,0~70°C (Storage) Temperature Humidity 10~90% non-condensing

CE, FCC, RoHS

57,000 hours

	SHDTU03-ET10R	SHDTU03-ET10RS	SHDTU03F-ET10R	SHDTU03F-ET10RS	SHDTU03AF-ET10R	SHDTU03AF-ET10RS
WAN	2-wire	2-wire	2-wire	2-wire	4-wire	4-wire
LAN	1	4	1	4	1	4
Auto-MDIX	None	Yes	None	Yes	None	Yes
Port-based VLAN	None	Yes	None	Yes	None	Yes
802.1q VLAN	1LAN/8WAN	4LAN/8WAN	1LAN/8WAN	4LAN/8WAN	1LAN/8WAN	4LAN/8WAN
IP precedence	Yes	Yes	Yes	Yes	Yes	Yes
Maximum data rate	2.3Mbps	2.3Mbps	2.3Mbps	2.3Mbps	4.6Mbps	4.6Mbps
Minimum data rate	64Kbps	64Kbps	64Kbps	64Kbps	128Kbps	128Kbps

Certification

MTBF

Ethernet

Ethernet

G.SHDSL TDM E1/V.35/LAN Concentrator

SHRM03 TDM



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

Features

- 4U 19(23)" 13 slot chassis
- Interface Cards for E1, V.35, Ethernet (Bridge)
- Up to 26 ports per chassis (2 ports per card)
- Hot swappable
- Data rate 2 wire up to 2.3Mbps
- Adaptive rate feature maximizes data rate based on loop conditions
- Supports console terminal, Telnet, web and SNMP management

CPE Site

■ Supports TFTP upgrade

Application

All interface connectors on the rear panel

SHRM03 TDM (TDM-based Chassis) Ethernet SHRM03-SHDTU03-ET100 V.35 V.35 SHRM03 V35 SHDTU03-V35 TDM-based 2 Wires, 2.3Mbps E1 SHRM03 E1 SHDTU03-ET100 E1 E1 SHRM03 E1 SHDTU03-F1 E1 V.35 SHRM03 SHDTU03-V35 SNMP

Ordering Information

SNMP, Web, Console , Telnet Management

Oracimg imorni	acion
■ SHRM03-AA-CH	4U, 19", 13-slot chassis for dual AC power
■ SHRM03-DD-CH	4U, 19", 13-slot chassis for dual DC power
■ SHRM03-AD-CH	4U, 19", 13-slot chassis for AC + DC power
■ SHRM03-AC	AC 100 ~ 220 power card
■ SHRM03-SNMP	SNMP I/F card with MIB and console cable
■ SHRM03-E1	G.SHDSL (2 wire) E1 TDM card with RJ-45
	adapter (2 E1 ports per card)
■ SHRM03-V35	G.SHDSL (2 wire) V.35 TDM card with HD26
	adapter cable (2 data ports per card)

G.SHDSL (2 wire) Ethernet TDM card with

RJ-45 adapter (2 LAN ports per card)

Specifications Ports • 1

Ports

• Line code : 16 level Trellis coded PAM

• Line data rate : User selectable from 64kbps to 2.304Mbps

• Support : ANSI (Annex A) and ETSI (Annex B)

Support wetting current : 4mA-20mA and alarm on failure

Compliance: ITU-T G.991.2

Obstacom Interface
 User selectable as: V.35, RS-449, RS-530, X.21
 Data Rate: 64kbps to 2304kbps

Connector : D25F (adapters available)
 Timing : Internal External and Recovery

* Timing : Internal, External, and Recovery

Fithernet Interface

* Supports 10/100Base-T auto sensing hal

Supports 10/100Base-T auto sensing half/full duplex

• Complied with IEEE 802.3/IEEE 802.3u

• Operates as a self-learning bridge in transparent mode

• Supports up to 128 MAC learning addresses

• Supports bridge filter function

E1 Interface

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

connector for balanced

Performance

- SHDSL PM : ES-crc, SES-crc, UAS, LOSW seconds
- E1 PM : ES, SES, UAS seconds
- Current 15-minute period and 96 previous 15-minute periods of SHDSL and E1 performance parameters

Management

- Console port (RJ45 , RS232C)
- Support firmware upgradeable

LEDs

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

Power AC: 90~230VAC, 2A
DC: -36~-72, 6A

Power Consumption Maximum 200W, I/F line card: 12W maximum

 Dimensions
 Chassis: 285 x 440 x 180mm, Line card: 280 x 25 x 260mm

 (D x W x H)mm
 Weight

 6.5kg
 Famperature

 Humidity
 10~90% non-condensing

 Certification
 CE, FCC, RoHS

 MTBF
 57,000 hours

■ SHRM03-ET100

G.SHDSL TDM E1/V.35/LAN Dual Channel Slide-in Card

E1 card



- Supports E1 and fractional E1 over SHDSL
- Standard ITU G.991.2
- Fast and cost-effective services of voice or TDM on a single wire pair on existing copper loop infrastructure
- Wetting current to protect copper line (optional)
- Local management interface with console
- Remote line loopback
- E1 performance monitoring and alarm buffer
- G.SHDSL Line performance monitoring (data rate and SNR)
- Raw and per time interval statistics

V35 card



- Supports Nx64 V.35, X21, RS530, and RS449 over SHDSL
- Standard ITU G.991.2
- Fast and cost-effective services of TDM on a single wire pair on existing copper loop infrastructure
- Wetting current to protect copper line (optional)
- Local management interface with console
- Remote line loopback
- G.SHDSL Line performance monitoring (data rate and SNR)
- Raw and per time interval statistics

Ethernet card



- Supports 10Base-T and 100Base-TX over SHDSL
- Standard ITU G.991.2
- Fast and cost-effective services of data on a single wire pair on existing copper loop infrastructure
- Wetting current to protect copper line (optional)
- Local management interface with console
- Remote line loopback
- G.SHDSL Line performance monitoring (data rate and SNR)
- Raw and per time interval statistics

G.SHDSL E1 Modem



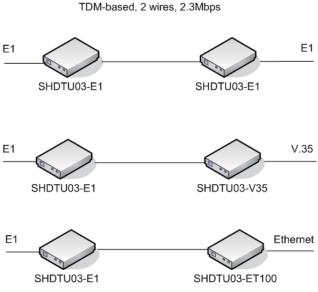
SHDTU03-E1

The CTC SHDTU03 family of G.SHDSL TDM based modems is a telecom product for carriers or SME users. The SHDTU03-E1 offers an ITU-T G.703 DTE interface which works over an SHDSL interface. The modern supports two different connectors for G.703 E1 application (balanced 120 Ohm RJ45 or unbalanced 75 Ohm dual BNCs) at bit rates from 64kbps to 2.048Mbps. The SHDTU03b-E1 can be configured and managed via EOC, or menu-driven VT100 compatible Async. terminal Interface, either locally or remotely.

Features

- Supports E1 and fractional E1 over SHDSL
- Standard ITU G.991.2
- Fast and cost-effective services of voice or TDM on a single or two wire pair of existing copper loop infrastructure
- Wetting current to protect copper line (optional)
- Local management interface with console
- Remote line loopback
- E1 performance monitoring and alarm buffer
- G.SHDSL Line performance monitoring (data rate and SNR)
- Raw and per time interval statistics

Application



Ordering Information

■ SHDTU03-E1-AC 2wire E1 NTU with 100~240VAC SHDTU03-E1-DC 2wire E1 NTU with -36 ~ -72VDC SHDTU03-E1-AD 2wire E1 NTU with AC+DC power

Specifications

Ports · Line code: 16 level Trellis coded PAM SHDSL Interface • Line data rate : User selectable from 64kbps to 2.304Mbps • Support : ANSI (Annex A) and ETSI (Annex B) • Support wetting current : 4mA-20mA and alarm on failure • Compliance: ITU-T G.991.2 • Line code: HDB3/AMI E1 Interface • Data rate: 64kbps to 2048kbps • Operation: full or fractional

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

• SHDSL PM : ES-crc, SES-crc, UAS, LOSW seconds Performance • E1 PM : ES, SES, UAS seconds • Current 15-minute period and 96 previous 15-minute periods of SHDSL and E1 performance parameters Diagnostic • E1 line loopback / Local SHDSL loopback / Remote SHDSL loopback / Remote payload loopback Management · Configuration with keypads and LCD display • Console port (RJ45, RS232) • Support firmware upgradeable **LEDs** • PWR, SHDSL, FE1, LOF, LOS, TEST, LOOP, ALARM, and FAR ALARM

	Power	AC Input: 100~240V
		DC Input: -36 ~ 72V
	Power Consumptio	n 10W
Dimensions		168 x 195 x 48mm
	(D x W x H)mm	
	Weight	850g
	Temperature	0~50°C (Operating) ,0~70°C (Storage)
	Humidity	10~90% non-condensing
_	Certification	CE, FCC, RoHS
	MTBF	57,000 hours

G.SHDSL V35 Modem



SHDTU03-V35

The CTC SHDTU03 family of G.SHDSL TDM based modems is a telecom product for carriers or SME users. The SHDTU03-V35 offers a V.35 DTE interface which works over an SHDSL interface. The V.35 interface provides high-speed TDM services by way of a DB25 I/F and adapter cable. The factory selected RS-530 interface will electrically support RS-530, X.21and RS-449 with appropriate adapter cable. The data rate of DB25 I/F may be up to 2.304Mbps with one pair copper wires. The SHDTU03-V35 can be configured and managed via EOC, or menu-driven VT100 compatible Async. terminal Interface, either locally or remotely.

Features

- Supports Nx64 V.35, X21, RS530, and RS449 over SHDSL
- Standard ITU G.991.2
- Fast and cost-effective services of TDM on a single or two wire pair of existing copper loop infrastructure
- Wetting current to protect copper line (optional)
- Local management interface with console
- Remote line loopback
- G.SHDSL Line performance monitoring (data rate and SNR)
- Raw and per time interval statistics

SHDSL Interface

Ports

Specifications

Line code : 16 level Trellis coded PAM
 Line data rate : User selectable from 64kbps to 2.304Mbps

Support : ANSI (Annex A) and ETSI (Annex B)

Support wetting current : 4mA-20mA and alarm on failure

Compliance: ITU-T G.991.2

Datacom Interface

• User selectable as: V.35, RS-449, RS-530, X.21

• Data Rate: 64kbps to 2304kbps

Connector : D25F (adapters available)

• Timing : Internal, External, and Recovery

Performance • SHDSL PM : ES-crc, SES-crc, UAS, LOSW seconds

Diagnostic • Local SHDSL loopback / Remote SHDSL loopback /
Remote payload loopback

Management • Configuration with keypads and LCD display

Console port (RJ45, RS232)Support firmware upgradeable

LEDs • PWR, SHDSL, TD, RD, CTS, TEST, LOOP, ALARM, and

FAR ALARM, and FAR ALARM

Power AC Input: 100~240V

DC Input: -36 ~ 72V

Power Consumption 10W
Dimensions 1683

 Dimensions
 168 x 195 x 48mm

 (D x W x H)mm
 850g

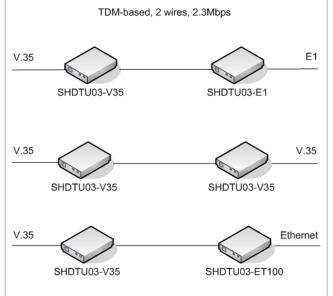
Temperature 0~50°C (Operating) ,0~70°C (Storage)

Humidity 10~90% non-condensing

Certification CE, FCC, RoHS

MTBF 57,000 hours

Application



Ordering Information

■ **SHDTU03-Data-AC** 2 wire Data(V35,X.21,RS530,RS449) NTU with 100~240VAC

■ SHDTU03-Data-DC 2 wire Data(V35,X.21,RS530,RS449) NTU with -36 ~ -72VDC ■ SHDTU03-Data-AD 2 wire Data(V35,X.21,RS530,RS449) NTU with AC+DC power

G.SHDSL Ethernet Modem



SHDTU03-ET100

The CTC SHDTU03 family of G.SHDSL TDM based modems is a telecom product for carriers or SME users. The SHDTU03-ET100 offers a 10/100Base-TX interface which works over an SHDSL interface. The Ethernet interface provides Ethernet over TDM services by way of a HDLC encapsulation and RJ-45 connector. The data rate of Ethernet I/F may be up to 2.304Mbps with one pair copper wires. The SHDTU03-ET100 can be configured and managed via EOC, or menu-driven VT100 compatible Async. terminal Interface, either locally or remotely.

Features

- Supports 10Base-T and 100Base-TX over SHDSL
- Standard ITU G.991.2
- Fast and cost-effective services of data on a single or two wire pair of existing copper loop infrastructure
- Wetting current to protect copper line (optional)
- Local management interface with console
- Remote line loopback
- G.SHDSL Line performance monitoring (data rate and SNR)
- Raw and per time interval statistics

Specifications

Specification	1113		
Ports	Line code: 16 level Trellis coded PAM		
SHDSL Interface	• Line data rate : User selectable from 64kbps to 2.304Mbps		
	Support : ANSI (Annex A) and ETSI (Annex B)		
	Support wetting current : 4mA-20mA and alarm on failure		
	Compliance: ITU-T G.991.2		
Ethernet Interface	Supports 10/100Base-T auto sensing half/full duplex		
	Complied with IEEE 802.3/IEEE 802.3u		
	Operates as a self-learning bridge in transparent mode		
	Supports up to 128 MAC learning addresses		
	Supports bridge filter function		
Performance	SHDSL PM : ES-crc, SES-crc, UAS, LOSW seconds		
Management	Configuration with keypads and LCD display		
	Console port (RJ45 , RS232)		
	Support firmware upgradeable		
LEDs	• Ethernet : PWR, SHDSL, 10M/ACT, 100M/ACT, COL, TEST		
	LOOP, ALARM, and FAR ALARM		
Power	AC Input: 100~240V		
	DC Input : -36 ~ 72V		
Power Consumption	on < 10W		
Dimensions	168 x 195 x 48mm		
(D x W x H)mm			
Weight	850g		
Temperature	0~50°C (Operating) ,0~70°C (Storage)		
Humidity	10~90% non-condensing		
Certification	CE, FCC, RoHS		
MTBF	57,000 hours		

TDM-based, 2 wires, 2.3Mbps Ethernet SHDTU03-ET100 SHDTU03-E1 Ethernet V.35 SHDTU03-ET100 SHDTU03-V35

Ordering Information

SHDTU03-ET100

■ SHDTU03-ET100-AC 2 wire Ethernet 10/100Base-TX NTU with 100~240VAC

SHDTU03-ET100

■ SHDTU03-ET100-DC 2 wire Ethernet 10/100Base-TX NTU with -36 ~ -72VDC

■ SHDTU03-ET100-AD 2 wire Ethernet 10/100Base-TX NTU with AC+DC power

G.SHDSL.bis ATM Ethernet Concentrator

SHRM03 ATM



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

The SHRM03 ATM based chassis is a 4U 19(23)" 14 slot card rack that allows customers to concentrate their G.SHDSL ATM based bridge/router Ethernet lines into a central location with hot swappable capabilities and redundant power supplies. The SHRM03 ATM line card is equipped with two independent channels that support adaptive auto-rate, Annex A or Annex B, bridging or routing, and embedded SNMP, Telnet and Web interface for de-centralized provisioning and management. This rack is 100% compatible with our SHDTU03/ET10R and ET10RS standalone 2.3M stand-alone modems.

Features

- 4U 19(23)" 13 slot chassis
- Interface Cards for Ethernet (Router & Bridge)
- Up to 26 ports per chassis (2 ports per card)
- Hot swappable
- Adaptive rate feature maximizes data rate based on loop conditions
- All interface connectors on the rear panel

Specifications

Routing

	 IP routing with static routing and RIPv1/RIPv2
	(RFC1058/2453)
	• IP multicast and IGMP proxy (RFC1112/2236)
	Network address translation (NAT/PAT) (RFC1631)
	NAT ALGs for ICQ/Netmeeting/MSN/Yahoo Messenger
	DNS relay and caching (RFC1034/1035)
	DHCP server, client and relay (RFC2131/2132)
Bridging	IEEE 802.1D Transparent Bridging
	• IEEE 802.1q VLAN
	Port-based VLAN
Security	DMZ host/Multi-DMZ/Multi-NAT function
	Virtual server mapping (RFC1631)
	VPN pass-through for PPTP/L2TP/IPSec tunneling
	Natural NAT firewall
	 Advanced stateful packet inspection (SPI) firewall
	Denial of service protection
	 User access control; deny certain PCs access to
	internet services
Management	• Easy-to-use web-based GUI for quick setup, configuration
	and management
	Menu-driven interface/Command-line interface (CLI) for
	local console and Telnet access
	Password protected management and access control list
	for administration
	SNMP management with SNMPv1/SNMPv2c
	(RFC1157/1901/1905) agent and MIB II (RFC1213/1493)
	Software upgrade via web-browser/TFTP server
LEDs	General: PWR
	• WAN: LNK, ACT
	LAN: Link, ACT (ET10R)
	• SHDSL: ALM
Power	DC: -36V to -72V, 6A
	AC: 90V to 230V, 2A
Power Consumption	Total 200W Max
	Interface Line Card: 12W maximum
	Management Control Card: 5W maximum
Dimensions	Chassis: 285 x 440 x 180mm
(D x W x H)mm	Line card: 280 x 25 x 260mm
Weight	6.5kg
Temperature	0~50°C (Operating) ,0~70°C (Storage)
Humidity	10~90% non-condensing
Certification	CE, FCC, RoHS
MTBF	57,000 hours

Specifications

Specifications		
Ports	LAN Interface	10Base-T /100 Base-TX auto-negotiation
		Auto-MDIX
	Hardware	• WAN: RJ-45
	Interface	• LAN: RJ-45
		Console port: RS232
		RST: Reset button for factory default
	WAN Interface	• SHDSL: ITU-T G.991.2 2004(Annex A/B/F/G)
		• Encoding scheme: TC-PAM16, TC-PAM32
		Data Rate: N x 64Kbps (N=3~89)
		Impedance: 135 ohms
ATM	• Up to 8 PVCs	
	• OAM F4/F5 loo	opback test
	• AAL5	
ATM QoS	UBR (Unspecified Bit Rate)	
	CBR (Constan	t Bit Rate)
	 VBR-rt (Variab 	le Bit Rate Real Time)
	VBR-nrt (Varia	ble Bit Rate Non-real Time)
AAL5	 VC multiplexin 	g and SNAP/LLC
Encapsulation	• Ethernet over	ATM (RFC 2684/1483)
	• PPP over ATM	(RFC 2364)
	Classical IP ov	rer ATM (RFC 1577)
PPP	PPP over Ether	ernet for fixed and dynamic IP (RFC 2516)
	• PPP over ATM	for fixed and dynamic IP (RFC 2364)
	 User authentic 	ation with PAP/CHAP/MS-CHAP

G.SHDSL.bis ATM Family

G.SHDSL.bis ATM Ethernet Slide-in card

SHRM03-ET100R



The SHDTU03 ATM modem family is a Single-Line High Speed Digital Subscriber Line 2-wire bridge/router which complies with G.991.2 and G.994.1 standards. The SHDTU03 family provides business-class, multi-rate 64Kbps to 2.304Mbps payload rates over existing single pair or two pairs copper wire. The SHDTU03 is designed not only to optimize the service bit rate from central office to customer premises but also integrates high-end Bridging/ Routing capabilities with advanced functions such as Multi-DMZ, virtual server mapping and VPN pass-through. Easy configuration and monitoring can be accomplished by using any browser. The SHDTU03-ET100R card provides two independent channels and can be configured in either central or client mode providing a point-to-point solution in a rack concentrator. The SHDSL router allows customers to leverage the latest in broadband technologies to meet their growing data communication needs.

Features

- Supports Ethernet over ATM over SHDSL
- Full ATM protocol stack implementation over G.SHDSL
- Adaptive rate installation maximizes data rate based on loop conditions
- Standard ITU G.991.2
- Supports point-to-point configurations
- Data rate 2 wire up to 2.3Mbps
- Local management interface via console port
- Intuitive Web based management
- SNMP management with SNMPv1/v2 and MIB II
- Efficient IP routing and transparent learning bridge to support broadband Internet services
- VPN pass-through for safeguarded connections
- Build-in advanced SPI firewall (Firewall routers)
- DMZ host/Multi-DMZ/Multi-NAT; multiple PCs on a LAN with only one IP address
- PPPoA and PPPoE support user authentication with PAP/CHAP/MSCHAP
- SHDSL Line performance monitoring
- Raw and time stamped statistics
- Supports firmware upgrade via web interface

Application CO Site SHRM03 ATM (ATM-based Chassis) ATM-based 2 Wires, 2.3Mbps Ethernet SHDTU03-ET100R SHRM03-Internet / intranet ET100R ATM-based Web, Console, Telnet 2 Wires, 2.3Mbps Management Ethernet SHDTU03-ET100R

Ordering Information

■ SHRM03-AA-CH

■ SHRM03-DD-CH

■ SHRM03-DD-CH

■ SHRM03-AD-CH

■ SHRM03-AC

AC 100 ~ 220 power card

■ SHRM03-AC AC 100 ~ 220 power card

■ SHRM03-ET100R 2 wire (2.3Mbps) 2Ch Ethernet

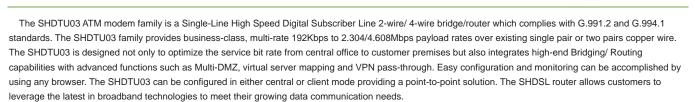
10/100Base-TX ATM bridge/router card

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G.SHDSL ATM Family

G.SHDSL ATM Router / Bridge modem

SHDTU03-ET10R



Features

- Supports Ethernet over ATM over SHDSL
- Full ATM protocol stack implementation over G.SHDSL
- Adaptive rate installation maximizes data rate based on loop conditions
- Standard ITU G.991.2
- Supports point-to-point configurations
- Data rate 2 wire up to 2.3Mbps
- Local management interface via console port
- Intuitive Web based management
- SNMP management with SNMPv1/v2 and MIB II
- Efficient IP routing and transparent learning bridge to support broadband Internet services
- VPN pass-through for safeguarded connections
- Build-in advanced SPI firewall (Firewall routers)
- DMZ host/Multi-DMZ/Multi-NAT; multiple PCs on a LAN with only one IP address
- PPPoA and PPPoE support user authentication with PAP/CHAP/MSCHAP
- SHDSL Line performance monitoring
- Raw and time stamped statistics
- Supports firmware upgrade via web interface

Specifications

LEDs	General: PWR
	• WAN: LNK, ACT
	• LAN: 1, 2, 3, 4 (ET10RS)
	LAN: Link, ACT (ET10R)
	• SHDSL: ALM
Power	DC 9V in
Power Consumption	on 9W
Dimensions	145 x 187 x 33mm
(D x W x H)mm	
Weight	400g
Temperature	0~50°C (Operating) ,0~70°C (Storage)
Humidity	10~90% non-condensing
Certification	CE, FCC, RoHS
MTBF	57,000 hours
	·

Ordering Information

■ SHDTU03 -ET10R	2 wire 10/100Base-TX Ethernet Router

■ SHDTU03 F-ET10R 2 wire 10/100Base-TX Ethernet Router with Firewall

■ SHDTU03 -ET10RS 2 wire 4 port 10/100Base-TX Ethernet Router

■ SHDTU03 F-ET10RS 2 wire 4 port 10/100Base-TX Ethernet Router with Firewall

■ SHDTU03 A-ET10RS 4 wire 4 port 10/100Base-TX Ethernet Router

■ SHDTU03 AF-ET10RS 4 wire 4 port 10/100Base-TX Ethernet Router with Firewall

Specifications

Ports	LAN Interface: • 10Base-T /100 Base-TX auto-negotiation
	Auto-MDIX
	Hardware Interface : • WAN: RJ-45
	• LAN: RJ-45
	Console port: RS232
	RST: Reset button for factory default
	WAN Interface: • SHDSL: ITU-T G.991.2(Annex A/B)
	• Encoding scheme: TC-PAM16, TC-PAM32
	 Data Rate: N x 64Kbps (N=3~89)
	Impedance: 135 ohms
ATM	Up to 8 PVCs
	OAM F4/F5 loopback test
	• AAL5
ATM QoS	UBR (Unspecified Bit Rate)
	CBR (Constant Bit Rate)
	VBR-rt (Variable Bit Rate Real Time)
	VBR-nrt (Variable Bit Rate Non-real Time)
AAL5 Encapsulat	ion • VC multiplexing and SNAP/LLC
	• Ethernet over ATM (RFC 2684/1483)
	PPP over ATM (RFC 2364)
	Classical IP over ATM (RFC 1577)
PPP	PPP over Ethernet for fixed and dynamic IP (RFC 2516)
	• PPP over ATM for fixed and dynamic IP (RFC 2364)
	User authentication with PAP/CHAP/MS-CHAP
Routing	Support IP/TCP/UDP/ARP/ICMP/IGMP protocols
	 IP routing with static routing and RIPv1/RIPv2
	(RFC1058/2453)
	• IP multicast and IGMP proxy (RFC1112/2236)
	 Network address translation (NAT/PAT) (RFC1631)
	NAT ALGs for ICQ/Netmeeting/MSN/Yahoo Messenger
	DNS relay and caching (RFC1034/1035)
	 DHCP server, client and relay (RFC2131/2132)
Bridging	IEEE 802.1D Transparent Bridging
	• IEEE 802.1q VLAN
	Port-based VLAN
Security	DMZ host/Multi-DMZ/Multi-NAT function
	Virtual server mapping (RFC1631)
	 VPN pass-through for PPTP/L2TP/IPSec tunneling
	Natural NAT firewall
	 Advanced stateful packet inspection (SPI) firewall
	Denial of service protection
	• User access control; deny certain PCs access to internet
	services
Management	Easy-to-use web-based GUI for quick setup, configuration
Ü	and management
	Menu-driven interface/Command-line interface (CLI) for loca
	console and Telnet access
	Password protected management and access control list
	for administration
	SNMP management with SNMPv1/SNMPv2c

(RFC1157/1901/1905) agent and MIB II (RFC1213/1493)

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• Software upgrade via web-browser/TFTP server

LAN Interface: • 10Base-T /100 Base-TX auto-negotiation

Managed IP DSLAM

MD15

The MD-15 is a 1.5U 19" rack mountable "pizza box" type ADSL2+ IP DSLAM with temperature hardening. The system provides 24/48 ADSL/2/2+ ports with built-in POTS splitters and is able to provide broadband data communication services and multimedia services on the same copper line. The unit is capable of delivering high speed data services, full-rate of ADSL2+ (up to 24mbps download) for 48 subscribers with 2 Gigabit uplinks or 10 Mbps per port for 96 subscribers in a two 48-port stacked boxes configuration. With advanced QoS features, the MD-15 is ideal for next generation broadband networks capable of delivering rich video content, DSL, POTS, and VoIP service over ADSL2+ link. The MD-15 provides two uplink ports with both electrical and optical (SFP) Gigabit Ethernet (GbE) interfaces for cascading, ring architecture or 802.3ad link aggregation. The MD-15 is suitable for small size applications or deployment in remote location such as business parks or street cabinets to extend the service reach distance from central office.

Features

- 12/24/48 ports ADSL2/2+ solution in 1.5U chassis
- 1+1 Gigabit Ethernet trunk with combo SFP and RJ45
- Multi-ADSL speed offerings supporting ADSL, ADSL2, ADSL2+ over POTS or ISDN
- Built-in POTS splitters
- Temperature monitor and system over temperature protection with trap alarm
- Backup firmware partition aids in upgrade failure recovery
- Configuration backup and restore via TFTP
- RS-232 serial CLI and separate LAN port for web based management
- NMS/EMS for Multiple nodes management based on SNMP (option)

Specifications

Ports Network Interface		face
	2 x 10/100/1000	Based-Tx or 2 x SFP (IP)
	Line Interface	
	ADSL2/2+/ POT	TS(G.992.1 .2 .3 .5)
Service	Ethernet	IEEE 802.1d Spanning Tree Protocol (STP)
characteristics		IEEE 802.3ad Link aggregation
		Password Security on console access
	OSI Layer 2	MAC filtering and count limit
	Functionality	Access control list (ACL)
		Multicasting support
		Port based and 802.1p/q Tag-based VLAN
		IGMP V1/V2 snooping and proxy
		SNMP V1/V2C
System	Multiple session	Telnet, web based and SNMP
Configuration	Supports point	to point VCC link
	Software remot	e upgrade
Alarm and Status	Automatic alarm/LED indication for alarm and system status	
Surveillance	Four housekeep	ping inputs and one alarm contact closure
	output	
Management	Provides all sys	stem OAM&P functionalities, software remote
	updates.	
	RS-232 local co	onsole interface for basic provisioning plus
	out-band Etherr	net interface for Telnet or Web
LEDs	GbE 1/2 link, R	ST, ACO, ALM, SYS, DSL Status 1 ~48
Power	Dual A+B feeds	s, -42V ~ -56V DC (DC model)
	AC: 100V ~ 240	OV (AC model)
Power Consumption	130W	
Dimensions	265 x 482 x 66r	mm
(D x W x H)mm		
Weight	3.5kg	
Temperature	-10~65°C (Ope	rating), -10~70°C (Storage)
Humidity	10~90% non-co	ondensing
Certification	CE, FCC, RoHS	S, ITU-T, ETSI
MTBF	25,000 hours	

Application Console Telnet Web. SNMP Management Ethernet POTS Network PBX MD 15 / MD 20 ATU-R

Ordering Information

■ MD15-48AE-AC

■ *MD15-48A6-DC* 1.5U 19" 48-port Annex A, 600 ohm ADSL2+ IP DSLAM with DC power

■ MD15-48AE-DC 1.5U 19" 48-port Annex A, 270 ohm ADSL2+ IP DSLAM with DC power

■ *MD15-48A6-AC* 1.5U 19" 48-port Annex A, 600 ohm ADSL2+ IP DSLAM with AC power

1.5U 19" 48-port Annex A, 270 ohm ADSL2+ IP DSLAM with AC power

■ Linux-EMS-200 Element Management system

Managed IP DSLAM

MD20



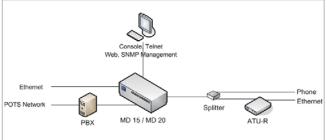
2 x 10/100/1000 Based-Tx or 2 x SFP (IP)

The MD-20 is a 2U 19" rack mountable "pizza box" type ADSL2+ IP DSLAM with temperature hardening. The modular design allows hot swapping of major components such as uplink trunk card, 24 port tributary cards and cooling fan module. The system provides 24/48/72 ADSL/2/2+ ports with built-in POTS splitters and is able to provide broadband data communication services and multimedia services on the same copper line. The unit is capable of delivering high speed data services, full-rate of ADSL2+ (up to 24mbps download) for 72 subscribers with 2 Gigabit uplinks. With advanced QoS features, the MD-20 is ideal for next generation broadband networks capable of delivering rich video content, DSL, POTS, and VoIP service over ADSL2+ link. The MD-20 provides two uplink ports with both electrical and optical (SFP) Gigabit Ethernet (GbE) interfaces for cascading, ring architecture or 802.3ad link aggregation. The MD-20 is suitable for small size applications or deployment in remote location such as business parks or street cabinets to extend the service reach distance from central

Features

- 2U 19(23)" 3 slot ADSL2/2+ chassis
- Modular design with hot swappable field replaceable units
- 1+1 Gigabit Ethernet trunk with combo SFP and RJ45
- Temperature monitor and system over temperature protection with trap alarm
- Backup firmware partition aids in upgrade failure recovery
- Configuration backup and restore via TFTP
- RS-232 serial CLI and separate LAN port for web based management
- NMS/EMS for Multiple nodes management based on SNMP (option)

Application



Ordering Information 24 port ADSL2 card

Multi-ADSL speed offerings supporting ADSL, ADSL2, ADSL2+ over POTS or ISDN Full rate operation with up to 24Mbps downstream and up to 3.5Mbps upstream (Annex M) Built-in POTS splitters

MD20-MA1A	2U DC powered rack
MD20-GE1A	Giga Ethernet Trunk card
MD20-AL5A	24 ports ANSI 600 Splitter Annex-A with two 25
	pairs IDC cable, 50 pin, 5m
MD20-AL5B	24 ports ISDN Splitter Annex-B with two 25 pairs
	IDC cable, 50 pin, 5m
MD20-AL5E	24 ports ETSI 270 Splitter Annex-A with two 25 pairs
	IDC cable, 50 pin, 5m
MD20-SL6A	24 ports ATM based SHDSL Annex-A/B with two 25
	pairs IDC cable, 50 pin, 5m

■ Linux-EMS-200 Element Management system

Specifications

Ports

Network Interface	Subscriber Interface		
	ADSL2/2+/ POTS/ISDN(G.992.1 .2 .3 .5)		
	or G.SHDSL		
Line Interface : ADSL	24 ports per card		
	Fast/Inter	leave latency modes for G.dmt	
	Supports	Interleave mode for G.Lite	
	ADSL to A	ATM signal conversion	
	Build-in P	OTS splitter circuit	
	Power Consumption:25 W(max)		
Line Interface : SHDSL			
	Signal mo	odulation and demodulation	
	G.SHDSL	to ATM signal conversion	
	Power Co	onsumption:21 W(max)	
Management Interface	Physical I	Layer: IEEE 802.3 (10Mbps)	
	Upper La	yer: Ethernet, IP, SNMP,TL1	
Service	ATM	QoS(UBR, rt-VBR, nrt-VBR, CBR)	
characteristics		PVC default priority and PVC-to VLAN maping	
		Traffic scheduling/shaping/policing	
	Ethernet	IEEE 802.1d Spanning Tree Protocol (STP)	
		IEEE 802.3ad Link aggregation	
		Password Security on console access	
Management	OSI Laye	r 2 Functionality	
	MAC filter	ring and count limit	
	Access co	ontrol list (ACL)	
	Multicasti	ng support	
	Port base	d and 802.1p/q Tag-based VLAN	
	IGMP V1/	V2 snooping and proxy	
	SNMP V1	/V2C	
System	Multiple session Telnet, Web based and SNMP		
Configuration	Supports point to point VCC link		
		remote upgrade	
Alarm and Status	Automatio	c alarm/LED indication for alarm and system status	
Surveillance		ekeeping inputs and one alarm contact closure output	
Management		all system OAM&P functionalities, software remote	
		RS-232 local console interface for basic	
		ng plus out-band Ethernet interface for Telnet or Web	
LEDs		ink, RST, ACO, ALM, SYS, DSL Status 1 ~48	
Power		V DC (-42 V to -56 V)	
		-48 V DC power input terminal	
Power Consumption			
Dimensions	304 x 482	2 x 88mm	
(D x W x H)mm			
Weight	4.5kg	(2 - 1) 22 222 (2)	
Temperature		(Operating) ,-20~80°C (Storage)	
Humidity		non-condensing	
Certification	CE, FCC, RoHS, ITU-T, ETSI		
MTBF	25,000 ho	DUTS	

ADSL2+ Modem



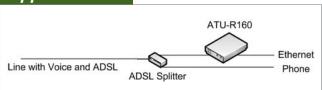
ATU-R160

The ATU-R160 ADSL2+ router is a full-featured ADSL router that provides high-speed Internet access and Ethernet direct connections to individual PCs or local area network with 10/100 Base-T Ethernet. The ATU-R160 uses an advanced ADSL chipset solution with a complete set of industry standard features that provide high-speed ADSL, ADSL2 and ADSL2+ Internet access for SOHO and residential users. The modem is available in two models, one with integral 4 port Ethernet switch and the other with single Ethernet port plus one USB port.

Features

- Full rate operation with up to 24Mbps downstream data rate and up to 1Mbps upstream data rate enables high-speed Internet access
- Web GUI configuration and management
- Supports TFTP upgrade
- Provides ALGs to support most major applications, such as MSN Messenger, CUSeeMe, ICQ, IRC, LDAP, PPTP, FTP, Quake, SIP, H.323, NetBios Over TCP/IP
- Enables end-to-end ATM support, which allows traffic management and QoS
- Built-in DHCP server automatically assigns IP addresses to all workstations on your LAN
- All management and monitoring can be done through Telnet session
- UPnP support

Application



Specifications

Web Management	Web-based GUI Configuration / Management
	CLI (Command Line Interface) via serial interface or
	Telnet over Ethernet
	Telnet Remote Management
	Firmware upgrade via FTP / TFTP
	SNMP Support
	Built-in Diagnostic tool
	TR-069, CPE WAN Management Protocol
LEDs	ADSL, DATA, LAN, USB, PWR
Power	DC 12V in
Power Consumption	130W
Dimensions	125 x 88 x 27mm
(D x W x H)mm	
Weight	3.5kg
Temperature	0~50°C (Operating) ,20~70°C (Storage)
Humidity	10~90% non-condensing
Certification	CE, FCC, RoHS
MTBF	25,000 hours

Specifications

Ports	1 port USB port with USB V1.1 (12Mbps)		
Interface	1/4 ports RJ45 Ethernet		
Interiace	1 port RJ11 port for ADSL		
	one reset button for factory default setting		
Standard	IEEE802.3 10Base-T802,3u, 100Base-TX, RFC2516		
Otandard	(PPPoE), ANSI T1.413 issue 2		
	ITU-T G.992.1 (G.dmt)		
	ITU-T G.992.2 (G.lite)		
	G.994.1 (G.hs, Multimode)		
	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, L, M)		
	Reach Extended ADSL (RE ADSL)		
Data Rates	WAN to LAN up to 90Mbps, LAN to LAN up to 100Mbps		
ATM and PPP	Support up to 8PVCs		
Protocols	ATM Forum UNI 3.1/4.0 PVC		
1 10100013	Multi Protocol over AAL5 (RFC1483 / 2684)		
	VC and LLC Multiplexing		
	PPP over Ethernet (RFC 2516)		
	PPP over ATM (RFC 2364)		
	Traffic Shaping (ATM QoS) UBR, CBR, VBR, VBR-rt, VBR-nr		
	OAM F4 and F5 segment end-to-end loop-back, AIS,		
	and RDI OAM cells		
	VPI is 0-255 and VCI is 32-65535		
Bridging / Routing	Ethernet to ADSL self-learning Transparent Bridging (IEEE 802.1		
	IP routing-RIPv2 (backward compatible with RIPv1)		
	Static IP routing		
	Routing (TCP/IP/UDP/ARP/ICMP)		
	IP Multicast IGMP v1/v2		
IP Management	NAT (Network Address Translation)		
•	NAPT (Network Address and Port Translation)		
	DHCP Server / Relay / Client (WAN Port)		
	VPN (IPSec, PPTP, L2TP) Pass-Through		
	DNS Proxy		
	Dynamic DNS		
	UPnP support		
	Virtual Server (Port forwarding) and DMZ host		
Security	PPP over PAP		
•	PPP over CHAP, DoS protection		
	Stateful packet inspection		
	Built-in NAT Firewall		
	IP-based Packet filtering		
	Password Protected System management		

Ordering Information

■ ATU-R160-1A	ADSL2+ 1-port Annex A modem with USB port
■ ATU-R160-1B	ADSL2+ 1-port Annex B modem with USB port
■ ATU-R160-4A	ADSL2+ 4-port Annex A modem
■ ATU-R160-4B	ADSL2+ 4-port Annex B modem

ADSL Splitter Rack

ALS-R50



The ALS-R50 is a 6U, 16 slot, 19(23)" rack mountable chassis for concentrated central office POTS splitters used in conjunction with ADSL DSLAMs. The chassis motherboard is available in 4 different configurations, one with wire-wrap POTS, one with wire-wrap POTS plus DC blocking, one with IDC connector POTS and one with IDC connector POTS with DC blocking. Each physical card provides 24 loops. In the wire-wrap POTS configuration, the 24 loops of each card go directly to one group of connectors (POTS / Line / DSLAM). In the IDC connector based configuration, the 24 loop cards are grouped into sets of 4 cards or 96 loops. Therefore, IDC based configuration must be populated with 4,8,12 or 16 card sets. Each card set provides high density connections to the central office DSLAM using 2-50 pin (2.54mm pitch) locking header IDC connectors and cables. Each connector supports 24 loops. In the wire-wrap configuration, DSLAM connections are provided by 2-50 pin locking header IDC connectors while POTS and line connections are provided via two sets each of 12x4 wire wrap terminals.

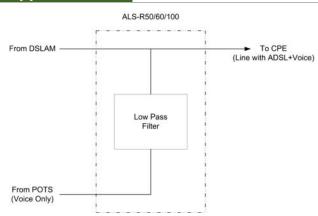
Features

- 6U 19(23)" rack
- Consists exclusively of all passive elements
- Designed for implementation of ADSL CO application
- Handles all POTS loop current from 0 ~ 100mA
- If the power on 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 loops Max)

Specifications

Impedance	300 ~ 3.4KHz (900 ohms)
Insertion Loss	1004Hz short loop: 1dB
	1004Hz long loop: 0.75dB
Attenuation	200 ~ 3.4KHz short loop: -1.5 ~ 1.5dB
Distortion	3.4K ~ 4.0KHz short loop: -2 ~ 2dB
	200 ~ 3.4KHz long loop: -1.5 ~ 0.5dB
	3.4K ~ 4.0KHz long loop: -1.5 ~ 1dB
Cut off Frequency	-3dB (8KHz)
ADSL Band	30K ~ 300KHz: -65dB
Attenuation	300kk ~ 1104Hz: -55dB
Delay Distortion	600 ~ 3.2KHz: 200us
	200 ~ 4.0KHz: 250us
Return Loss	ERL: 8dB
	SRL-L: 5dB
	SRL-H: 5dB
Common Mode	600 ~ 3.2KHz: -100dBb
Rejection Ration	
Longitudinal	200 ~ 1.0KHz : -60dB
Balance	1 ~ 3KHz : -60dB
DC Resistance	20 ohms
Isolation resistance	5.0M ohms
to Earth	
DC current	100mA
carrying capacity	
ESD discharge limits	S 15k VDC
Dimensions	285 x 434 x 266mm
(D x W x H)mm	
Weight	18kg
Temperature	-10~70°C (Operating) ,-15~80°C (Storage)
MTBF	10~90% non-condensing

Application



Ordering Information

■ *ALS-R50W* ADSL splitter rack, with wire wrap and 50 pin locking IDC connectors

■ ALS-R50C ADSL splitter rack, with 50 pin locking IDC connectors

■ ALS-R50WB ADSL splitter rack, with wire wrap and 50 pin locking IDC connectors, DC blocking

■ ALS-R50CB ADSL splitter rack, with 50 pin locking IDC connectors, DC blocking
■ ALS-R50 24P-11 ADSL splitter card for ALS-R50, 24 loops per card, 900 ohms, 8KHz

ADSL Splitter Rack

ALS-R60



The ALS-R60 is a 8U, 20 slot, 19(23)" rack mountable chassis for concentrated central office POTS splitters used in conjunction with ADSL DSLAMs. The chassis motherboard is available only with wire-wrap POTS and Line connections and HDB78 pin connectors for 32 loop per card DSLAMs. Each physical card provides 32 loops each of 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).

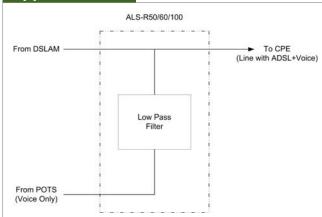
Features

- 8U 19(23)" rack
- Consists exclusively of all passive elements
- Designed for implementation of ADSL CO application
- Handles all POTS loop current from 0 ~ 100mA
- If the power on 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 loops Max)

Specifications

Impedance	0.3 ~ 3.4KHz (900 ohms)
Insertion Loss	1004Hz short loop: 1dB
	1004Hz long loop: 0.75dB
Attenuation	200 ~ 3.4KHz short loop: -1.5 ~ 1.5dB
Distortion	3.4K ~ 4.0KHz short loop: -2 ~ 2dB
	200 ~ 3.4KHz long loop: -1.5 ~ 0.5dB
	3.4K ~ 4.0KHz long loop: -1.5 ~ 1dB
Cut off Frequency	-3dB (8KHz)
Insertion Loss in	32 ~ 300KHz: -65dB
ADSL Band	
Delay Distortion	600 ~ 3.2KHz: 200us
	200 ~ 4.0KHz: 250us
Return Loss	ERL: 8dB
	SRL-L: 5dB
	SRL-H: 5dB
Common Mode	600 ~ 3.2KHz: -100dBb
Rejection Ration	
Longitudinal	200 ~ 1.0KHz : -60dB
Balance	1 ~ 3KHz : -60dB
DC Resistance	20 ohms
Isolation resistance	5.0M ohms
to Earth	
DC current	100mA
carrying capacity	
ESD discharge limits	S 15k VDC
Tip to Ring Capacita	INCE 20 ~ 115 nF
(without modem con	nected)
Dimensions	300 x 434 x 320mm
(D x W x H)mm	
Weight	18kg
Temperature	-10~70°C (Operating) ,-15~80°C (Storage)
MTBF	10~90% non-condensing

Application



Ordering Information

- ALS-R60 ADSL line splitter rack, with wire wrap and 68 pin IDC cable connectors
- ALS-R60 32P-11 ADSL line splitter card for ALS-R60, 32 loops per card, 900 ohms, 8KHz

ADSL/VDSL Splitter and Micro Filter



ALS-12 / ALS-M12

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). The ALS-12 provides point of entry filter to split the incoming line to the ADSL/VDSL modem and the POTS telephone. The ALS-M12 is a micro-filter designed to simply drop a POTS telephone off a line carrying ADSL/VDSL signal.

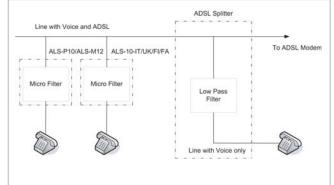
Features

- Compact size
- Consists exclusively of all passive elements
- Designed for implementation of ADSL/VDSL CPE application
- Handles all POTS loop current from 0 ~ 100mA
- If the power of ATU-R fails, telephone service on the ADSL line will operate normally
- Provides excellent isolation between DSL and POTS
- The POTS splitter and Low-pass filter provides RJ-11 connectors for ATU-R/VTU-R and POTS interfaces
- The POTS Low-pass micro filter provides RJ-11 connectors for ATU-R/VTU-R and Phone

Specifications

Standard	Annex E.2 of ITU-T G.992.3	
Impedance	600 ohms	
Insertion Loss	1004Hz short loop: 1dB	
	1004Hz long loop: 0.75dB	
Attenuation	200 ~ 3.4KHz short loop: -1.5 ~ 1.5dB	
Distortion	3.4K ~ 300KHz short loop: -2 ~ 2dB	
	200 ~ 3.4KHz long loop: -1.5 ~ 0.5dB	
	3.4K ~ 300KHz long loop: -1.5 ~ 1dB	
Cut off Frequency	-3dB (10KHz)	
ADSL Band	30 ~ 300KHz: 65dB	
Attenuation	300 ~ 1104KHz: 55dB	
Delay Distortion	600 ~ 3.2KHz: 200us	
	200 ~ 4.0KHz: 250us	
Return Loss	ERL: 6dB	
	SRL-L: 5dB	
	SRL-H: 3dB	
Common Mode	600 ~ 3.2KHz: -100dBb	
Rejection Ration		
Longitudinal	200 ~ 1.0KHz : 58dB	
Balance	1 ~ 3KHz : 53dB	
DC Resistance	20 ohms	
Isolation resistance	5.0M ohms	
to Earth		
DC current	100mA	
carrying capacity		
ESD discharge limits	S 15k VDC	
Tip to Ring	20nf	
Capacitance		
Dimensions	34 x 45 x 24mm	
(D x W x H)mm		
Weight	70g	
Temperature	-10~70°C (Operating) ,-15~80°C (Storage)	
MTBF	10~90% non-condensing	

Application



Ordering Information

■ ALS-12 ADSL/VDSL line splitter for CPE application, 600 ohms, 8KHz, RJ-11

■ ALS-12-C ADSL/VDSL line splitter for CPE application with surge protection, 600 ohms, 8KHz, RJ-11

■ ALS-M12 ADSL/VDSL micro filter for CPE application, 600 ohm, 8KHz, RJ-11

ADSL MDF Splitter

ALS-P10

The ALS-P10 filters with Siemens / Krone type terminals, can be directly plugged into the existing terminals at central office one by one, as needed, thus eliminating need for extra terminal blocks and cabling. This leads to lower costs compared with ordinary splitters deployment, which requires operators to install large splitter racks and equipment awaiting presumable future use. With the ALD-P10, no extra cabling or terminal blocks are needed and with Krone LSA Plus terminals, only minor new cabling is needed. The plug type filters are easy to install onto the terminal blocks with no extra tools required. Filters act like disconnection plugs in that the contacts inside the terminal are disconnected and the filter connects in series to the loop pair. The plug type splitter requires the space of two pairs of LSA Plus terminal block. Individual filters can be plugged adjacent to each other and will not block neighboring pairs from insertion of new wires. Thus ADSL can be connected to subscribers independently.

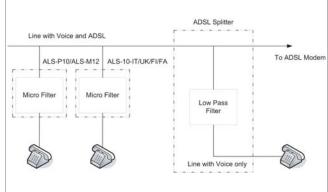
Features

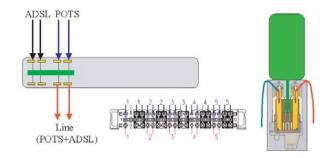
- Individual splitter
- Integrates directly in MDF (Main Distribution Frame)
- POTS service available when splitter inserted or removed (make before break)
- Various splitter designs available (POTS or ISDN)
- Includes a "Krone LSA-Plus" test plug connector

Specifications

Filter Type	Low Pass: Corner Frequency 7kHz (±1kHz). Optimal
	matching 600ohms DC path Max. 100mA
	High Pass Corner Frequency 22kHz (±2kHz).
	Optimal matching 135ohms no DC path
Over Voltage	Filter Adapted to POTS voltages (Max. ±200V)
Dimensions	104 x 18 x 20mm
(D x W x H)mm	
Weight	45g

Application





Ordering Information

■ ALS-P10 ADSL MDF splitter

Regional ADSL Splitters and Micro Filters

ALS-10-IT/UK/FI/FA









ALS-M10-UK (UK) AL

(UK) ALS-M10-FI (Finla

ALS-M10-FA (FRANC

The ALS-10 regional ADSL splitters 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 and customized with regional country telephone plugs. This device is designed to eliminate interference to POTS equipment by blocking high frequency energy (20 KHz~12MHz). The ALS-10 provides point of entry filter to split the incoming line to the ADSL/VDSL modem and the POTS telephone.

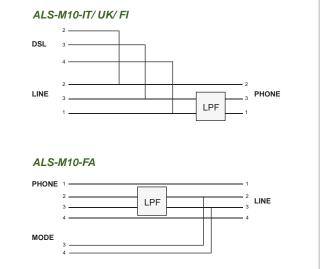
Features

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

Specifications

Low pass filter order	3 Pole
Impedance	60300 ~ 3.4KHz: 600 ohms
Insertion Loss	1004Hz short loop: 1dB
	1004Hz long loop: 0.75dB
Attenuation	200 ~ 3.4KHz short loop: -1.5 ~ 1.5dB
Distortion	3.4K ~ 4.0KHz short loop: -2 ~ 2dB
	200 ~ 3.4KHz long loop: -1.5 ~ 0.5dB
	3.4K ~ 4.0KHz long loop: -1.5 ~ 1dB
Cut off Frequency	-3dB (12KHz)
ADSL Band	30KHz: -25dB
Attenuation	50KHz: -40dB
Delay Distortion	600 ~ 3.2KHz: 200us
	200 ~ 4.0KHz: 250us
Return Loss	ERL: 6dB
	SRL-L: 5dB
	SRL-H: 3dB
Longitudinal	200 ~ 1.0KHz : 58dB
Balance	1 ~ 3KHz : 53dB
DC Resistance	20 ohms
Isolation resistance	5.0M ohms
to Earth	
DC current	100mA
carrying capacity	
ESD discharge limits	S 15k VDC
Tip to Ring	20nf
Capacitance	
Dimensions	81 x 31 x 28mm
(D x W x H)mm	
Weight	45g
Temperature	-10~70°C (Operating) ,-15~80°C (Storage)
MTBF	10~90% non-condensing

Application



Ordering Information

■ ALS-10-IT POTS plug ADSL splitter for Italy

■ **ALS-10-UK** POTS plug ADSL splitter for United Kingdom

■ ALS-10-FI POTS plug ADSL splitter for Finland
■ ALS-10-FA POTS plug ADSL splitter for France

ADSL/VDSL Splitter and Micro Filter

ALS-10-EU/I



The ALS-10-EU/l is a low-cost, compact, low pass filter designed for ISDN-BA with 2B1Q or 4B3T baseband line codes coinciding with ADSL signals. It integrates a low pass filters that block the high frequency energy from reaching the ISDN-BA device and provides isolation from impedance effects of the ISDN-BA device on the ADSL modem. 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 to 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 specifications are based on ETSI TS 101 952-1-3 V1.1.1 for ISDN-BA requirements.

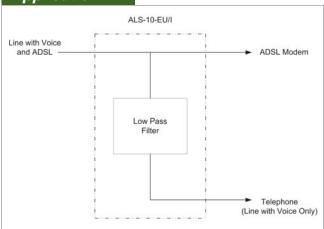
Features

- Compact size
- Consists exclusively of all passive elements
- Designed for implementation of ADSL/VDSL CPE application
- Handles all ISDN loop current from 0 ~ 60mA
- If the power of ATU-R fails, telephone service on the ADSL line will operate normally
- Provides excellent isolation between DSL and ISDN
- The ISDN splitter and Low-pass filter provide RJ-11 connectors for ATU-R/VTU-R and ISDN interfaces

Specifications

Standard	ETSI TS 101-952-1-3 V.1.1.1
	Annex E.2 of ITU-T G.992.1
Impedance	135 / 150 ohms
Isolation	Wire A to B: 5.0M ohms
Insertion Loss	1 ~ 40KHz : 0.8dB
	40 ~ 80KHz : 2dB
	1 ~ 60KHz: 1.2dB
	60 ~ 80KHz: 2dB
Insertion loss	150 ~ 1104KHz: 65dB
in ADSL band	
Insertion loss betwe	en 120 ~ 170KHz : 2dB
ADSL port to line po	ort 170 ~ 1104KHz: 1dB
Return loss at ISDN	1 ~ 40KHz : 16dB
	40 ~ 80KHz: 14dB
	1 ~ 60KHz : 16dB
	60 ~ 80KHz: 14dB
Unbalance to earth	300 ~ 30KHz: 40dB
	30 ~ 1104KHz: 46dB
	1104KHz ~ 3MHz:40dB
Delay Distortion	300 ~ 80KHz: 20us
DC Resistance	12.5 ohms
Dimensions	86 x 56 x 26mm
(D x W x H)mm	
Weight	70g
Temperature	-10~70°C (Operating) ,-15~80°C (Storage)
Humidity	10~90% non-condensing
· · · · · · · · · · · · · · · · · · ·	· · · · · · · · · · · · · · · · · · ·

Application



Ordering Information

■ ALS-10-EU/I European standard ADSL over ISDN Splitter

VDSL2 modem



VDTU2-104, VDTU2-204

The VDTU2-104 / VDTU2-204 are VDSL2 (Very-High-Bit-Rate Digital Subscriber Line 2) ITU-T G.993.2 standard modems used as an access technology that exploits the existing infrastructure of copper wires that were originally deployed for POTS services. They can be deployed from central offices, from fiber-fed cabinets located near the customer premises or within buildings. ITU-T G.993.2 VDSL2 is the newest and most advanced standard of DSL broadband wire line communications. Designed to support the wide deployment of "triple play" services such as voice, video, data, high definition television (HDTV) and interactive gaming, VDSL2 enables operators and carriers to gradually, flexibly, and cost efficiently upgrade existing xDSL infrastructure. ITU-T G.993.2 (VDSL2) is an enhancement to G.993.1 VDSL that permits the transmission of asymmetric and symmetric (Full-Duplex) aggregate data rates up to 200 Mbit/s on twisted pairs using a bandwidth up to 30 MHz. VDSL2 deteriorates quickly from a theoretical maximum of 250 Mbit/s at 'source' to 100 Mbit/s at 500m and 50 Mbit/s at 1km. From 1km and beyond, VDSL2 degrades at a much lower rate, performing the same as ADSL2 but still outperforming standard VDSL. This means that VDSL2-based systems, unlike VDSL1 systems, are not limited to short loops or MTU/MDUs only, but can also be used for medium range applications

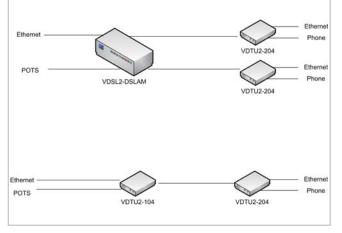
Features

- Very High-speed Digital Subscriber Line version 2 (VDSL2) modem
- 4 ports 10/100BaseTX LAN
- Supports Router with firewall or Bridge mode
- Bandwidth control
- POTS/ISDN splitter on board
- Auto speed on VDSL2 port
- Supported protocols: HTTP, TFTP, PPPoE, uPnP, NAT/DHCP/DMZ
- Supports loopback test
- Supports SNR indication
- Surge protection on DSL port

Specifications

opeomoune	
Standard	IEEE 802.3, IEEE802.3u, ETSI, ITU, ANSI VDSL2
Ports	VDSL2 Interface:
	Connector: RJ11
	VDTU02-104 for Master modem
	VDTU02-204 for Slave modem
	POTS/ISDN Splitter port RJ11
	Ethernet Interface:
	Connector: RJ45
	4 port 10/100Base-TX Ethernet Bridge & Router
Performance	100Mbps / 300meter
Management	Console port:RS232
	Support firmware upgradeable
LEDs	Power, Ethernet Link/Act, DSL link
Power	DC 12V in
Power Consumption	On < 5W
Dimensions	184 x 146 x 40mm
(D x W x H)mm	
Weight	650g
Temperature	0~50°C (Operating) ,0~70°C (Storage)
Humidity	10~90% non-condensing
Certification	CE, FCC, RoHS
MTBF	35,000 hours

Application



Ordering Information

■ VDTU2-104 VDSL2 4-port Ethernet 10/100Base-TX for local side

■ VDTU2-204 VDSL2 4-port Ethernet 10/100Base-TX for remote side





PDH Series Selection Table

E1 Family	Type: R = Rack, L = Line card, S = Stand-alone, M = Module

Interface	Model Name	Description	Туре	Page
Managed Voice & Data E1 Multi	plexer			
Managed E1 Chassis				-
4U Managed Chassis	ERM-Mux/Plus	4U, 19", 14-slot voice & data E1 multiplexer chassis w/ SNMP	R	101
Interface Card				
E1 Trunk	ERM-Mux/Plus-E1	2 fractional E1 (Nx64k) trunk card	L	102
Sub E1	ERM-Mux/Plus-Sub E1	2 fractional Sub E1 (Nx64k) card	L	102
Ethernet Bridge	ERM-Mux/Plus-ET100	2-ch Ethernet 10/100Base-TX bridge card	L	102
Ethernet Router	ERM-Mux/Plus-ET100R	2-ch Ethernet 10/100Base-TX router card	L	102
V.35, X.21, RS530, RS449/V.36	ERM-Mux/Plus-HS-Serial	6-ch high-speed (2Mbps) V.35, X.21, RS530, RS449/V.36 (Nx64k) card	L	102
RS232/V.24	ERM-Mux/Plus-LS-232	6-ch RS232/V.24 Async (≦38.4kbps) & Sync (64/128kbps) card	L	102
RS232/V.24	ERM-Mux/Plus-LS-X50	5-ch RS232/V.24 Async & Sync (≦38.4kbps) card	L	102
G.703 Co-directional 64K	ERM-Mux/Plus-LS-G64	4-ch G.703 Co-directional 64K card	L	102
FXO	ERM-Mux/Plus-FXO	6-ch FXO voice card	L	103
FXS	ERM-Mux/Plus-FXS	6-ch FXS voice card	L	103
E&M	ERM-Mux/Plus-E&M	6-ch 2/4-wire Type I,II,III,IV E&M voice card	L	103
Magneto	ERM-Mux/Plus-Magneto	6-ch Magneto voice card	L	103
Loop Disconnect	ERM-Mux/Plus-LD	4-ch Loop Disconnect voice card	L	103
1U Stand-alone (Rack-mounta	ble), Managed E1 Multip	lexer		
1U Managed Chassis	ETU02-Mux/Plus	1U, 19", 3-slot voice & data E1 multiplexer chassis w/ SNMP	R	104
Interface Module				
E1 Trunk	ETU02-Mux/Plus-E1	Fractional E1 (Nx64k) trunk module	M	105
Sub E1	ETU02-Mux/Plus-SubE1	Fractional Sub E1 (Nx64k) module	М	105
Ethernet Bridge	ETU02-Mux/Plus-ET100	1-ch Ethernet 10/100Base-TX bridge module	M	104
V.35, X.21, RS530, RS449/V.36	ETU02-Mux/Plus-N64	2-ch V.35, X.21, RS530, RS449/V.36 (Nx64k) module	M	105
RS232/V.24	ETU02-Mux/Plus-232	4-ch RS232/V.24 Async (≦38.4kbps) & Sync (64/128kbps) module	M	105
G.703 Co-directional 64K	ETU02-Mux/Plus-G64	2-ch G.703 Co-directional 64K module	M	105
FXO	ETU02-Mux/Plus-FXO	4-ch FXO voice module	M	105
FXS	ETU02-Mux/Plus-FXS	4-ch FXS voice module	M	105
E&M	ETU02-Mux/Plus-E&M	4-ch 2/4-wire E&M voice module	M	105

DXC Family

DXC Concentrator				
4U Managed E1 Chassis	ERM-DXC	4U, 19", 11-slot, E1 digital cross connect multiplexer w/SNMP	R	111
Interface Card				
8E1	ERM-DXC-8E1	8-ch fractional E1 (Nx64k) card	L	112
Ethernet Bridge	ERM-DXC-ET10	2-ch Ethernet 10/100Base-TX bridge card	L	112
V.35, X.21, RS530, RS449/	ERM-DXC-HS-Serial	2-ch high-speed (2Mbps) V.35, X.21, RS530, RS449 / V.36, RS232 / V.24 (Nx64k) card	L	112
V.36, RS232/V.24	ERM-DXC-MS-Serial	3-ch medium-speed (64/128kbps) V.35, X.21, RS530, RS449 / V.36, RS232 / V.24 card	L	112
RS232/V.24	ERM-DXC-LS-232	4-ch RS232/V.24 64kbps Sync / 19.2kbps Async card	L	112
RS232/V.24	ERM-DXC-X50	5-ch RS232/V.24 Async & Sync (≦19.2kbps) card	L	112
DXC Concentrator				
1U Stand-alone (Rack-mountal	ole), E1 Digital Cross Co	onnect Multiplexer		
8 E1	ETU-DXC/A-8	1U, stand-alone 8-ch E1 digital cross connect multiplexer	S	113
16 E1	ETU-DXC/A-16	1U, stand-alone 16-ch E1 digital cross connect multiplexer	S	113

TDM over IP

1U Stand-alone (Rack-mountable), IP multiplexer				
E1/T1 IP Mux	IPM-1SE	E1/T1 over IP network	S	114

F1 to T1 Cross Rate Converter	Type: R = Rack, L = Line card, S = Stand-alone, C = Compact, SP = Surge Protector
E I to I I Cross Rate Converter	Type: K = Rack, L = Line card, S = Stand-alone, C = Compact, SP = Surge Protecto

Interface	Model Name	Description	Туре	Page
E1, T1	G703FTEC	1U, stand-alone, E1 (T1) to T1 (E1) cross rate converter	S	119

Repeater Family

E1/T1	ETR01	1 x E1/T1 repeater	С	120
E1/T1	ETR04	1 to 4 E1/T1 Uni-directional repeater	С	120

G.703/64k Family

G.703 Co-directional 64K Concentrator					
4U Concentrator	G703/64-RM	4U, 19", 13-slot, G.703 Co-directional 64K concentrator	R	115	
G.703 Co-directional 64K care	d				
V.35, X.21, RS530, RS449/	G703/64-RM-Serial	V.35, X.21, RS530, RS449/V.36, RS232/V.24 (64 or 19.2kbps) card	L	116	
V.36, RS232/V.24					
Single G.703 Co-directional 64l	K Access Unit				
1U Stand-alone (Rack-mountal	ole), Single G.703 Co	-directional 64K Access Unit			
V.35, X.21, RS530, RS449/	G703/64A-STD	V.35, X.21, RS530, RS449/V.36, RS232/V.24 to G.703 Co-directional 64K	S	117	
V.36, RS232/V.24					
Ethernet Bridge	ET100/G64	Ethernet over G.703 Co-directional 64K	S	134	
Compact, Stand-alone, Single G.703 Co-directional 64K Access Unit					
V.35, X.21, RS232/V.24	G703/64A-V35/X21/	Compact size, V.35, X.21, RS232/V.24 to G.703 Co-directional/	С	118	
	232	contra-directional/centra-directional 64K			

T1 Family

I I diffily					
T1 Concentrator					
4U Concentrator	TRM01	TRM01 4U, 19", 13-slot fractional T1 (Nx64k) concentrator		121	
Fractional T1 card					
V.35	TRM01-V35	V.35 to fractional T1 (Nx64k)	L	122	
RS530/449/X.21	TRM01-Serial	RS530/449/X.21 to fractional T1 (Nx64k)	L	122	
Ethernet Bridge	TRM01-ET100	Ethernet 10/100Base-TX bridge over fractional T1 (Nx64k)	L	122	
Ethernet Router	TRM01-ET100R	Ethernet 10/100Base-TX router over fractional T1 (Nx64k)	L	122	
Single T1 Access Unit					
1U Stand-alone (Rack-mountal	ole), Single T1 Acce	ss Unit			
* RS530, RS449/V.36, RS232/	TTU01	★ Data port to fractional T1	S	123	
V.24, V.35, X.21, NRZ, G703/					
64/Ethernet Bridge, Router					
Single T1, Multi-Data Port Mult	Single T1, Multi-Data Port Multiplexer				
1U Stand-alone (Rack-mountable), T1 Multiplexer					
* RS530, RS449/V.36, RS232/100	TTU02-MUX/AD	★T1 Mux, 2/4-ch data port, sub T1, w/ LCD display & dual power (AC+DC)	S	124	
V.24, V.35, X.21, NRZ, G703/	TTU02-MUX	★T1 Mux, 2/4-ch data port, sub T1, w/ LCD display	S	124	
64/Ethernet Bridge, Router					

Balun Family

E1	Balun-P	E1 75 to 120 ohms balun (pig-tail type)	В	125
E1	Balun-B1/B2	E1 75 to 120 ohms balun (RJ-45 to 1/2 BNC)	В	125
E1	BLN3010	E1 IDC (mini) balun (1.6/5.6 Jack to IDC)	В	125
E1	BLN4010	E1 IDC (mini) balun (BNC to IDC)	В	125

Surge Protector Family

E1 SP-SE-B01	E1 surge protector	SP	126	
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Managed E1 Concentrator

ERM01



The ERM01 is a 4U 19(23)" rack type E1 DSU/CSU for unframed E1 and Fractional E1 Digital Access which is nested in a hub to provide solutions for central office installations. There are 13 slots available for hot swappable 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 G.703 cards. The SNMP card provides both local control via an RS-232 serial console port and remote management using Telnet or industry standard SNMP protocol via an Ethernet 10/100BASE-TX connection. A free Windows™ 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 an optional second hot swappable shared power supply module which may derive power from AC (90-250) or DC (-48V) power sources. On the rear panel, combinations of BNC, RJ-45 and wire-wrap terminals are utilized for E1 Line interface connections. Adapter cables are used to convert the HDB26F DCE data ports to V.35, RS-530, RS-449, X.21 or 10/100 Base Ethernet depending on the installed card.

Features

- Supports Fractional E1 and Unframed E1 with EOC control
- Hot swappable cards
- Interface Cards for V35, X21, RS530, RS449, RS232, Ethernet Bridge and Router
- I/O connectors on rear panel
- Multiple clock source selection (Internal or External: E1 recovery, DTE or DCE)
- Supports Console, Telnet, SNMP and GUI management
- Supported by EMS
- Built-in BERT with V.54 diagnostic capabilities for performing local and remote loopback

Specifications			
Ports	Frame format :Unframed/ Framed, CCS(PCM31)/		
G.703 E1 &Sub-E1 Link	:	CAS(PCM30)/ CRC4 on/off	
	Bit rate :	2.048Mbps±50 ppm	
	Line Code :	AMI/ HDB3	
	Receiving lev	elD: to -43dB	
	Line Impedan	ice: 75 ohm(BNC) / 120 ohm (Molex, RJ-45)	
	Jitter Perform	ance : According to ITU-T G.823	
	Pulse amplitu	de: Nominal 2.37V ±10% for 750hm,	
		Nominal 3.00V ±10% for 120ohm	
		Zero amplitude ± 0.1V	
	Connector:	BNC for unbalanced, 5 Pin Wire	
		and RJ-45 for balanced	
	Transmit freq	: Internal timing ±30 ppm	
	tracking:	Loopback timing ±50 ppm	
		External timing ±100 ppm	
	Return loss :	12dB for 51 ~ 102KHz	
		18dB for 102 ~ 2048KHz	
		14dB for 2048~ 3072KHz	
User Data Channel:	Interface type	s: RS-530/RS-449/RS-232,	
		X.21/V.35,	
		10/100Base-T Ethernet Bridge & Router,	
	Connector:	High density DB26 Female	
	Line code :	NRZ (except bridge)	

Data Rate:

Loopback:

N x 56Kbps or N x 64Kbps, Where

DSR constantly ON, except during test loops, DCD constantly ON or follows RTS, except

Line loopback, Payload loopback, Local

sync. DTE

the sync. DTE Clock mode 2 Rx clock to the sync. Device,

Clock mode 3 Rx & Tx clocks from the

(DTE3) (all from ETC pin)

Clock mode 1 Rx & Tx clocks (internal oscillator) to

Clock mode 4 Rx & Tx clocks from the sync. DCE

Tx clock from the sync. Device

sync. DCE (from ETC and ERC pin)

N equal 1 to 24 Time slot allocation: User defined Control signals: CTS constantly On,

during signal loss

loopback, DTE loopback Clock modes: Clock mode 0 Rx & Tx clocks (recovered) to the

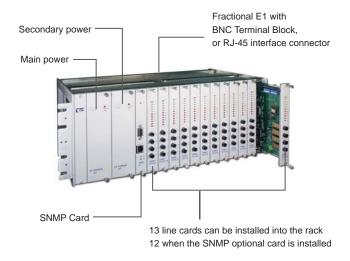
(DCE1)

(DCE2)

(DTE1)

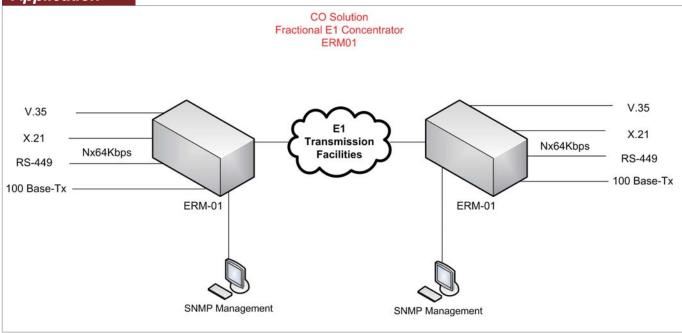
Specifications

Standard	TU-T G.703, G.704, G.706 and G.732 and ETSI ETS 300 420
Power	AC: 100~240VAC
	DC: -42~-55
Power Consump	otion 80W
Dimensions	Chassis: 285 x 438 x 180mm
_(D x W x H)mm	Line card: 260 x 22 x 180mm
Weight	6.6kg
Temperature	0~50°C (Operating) ,0~70°C (Storage)
Humidity	10~90% non-condensing
Certification	CE, FCC, RoHS
MTBF	57,000 hours









Ordering Information

ERM01 Chassis

■ ERM01-AC-CH AC power type Chassis w/ BNC, RJ45 interface on real panel

■ ERM01-DC-CH DC power type Chassis w/ BNC, RJ45 interface on real panel

■ ERM01R-AC-CH AC power type Chassis w/ RJ45 interface on real panel

■ ERM01R-DC-CH DC power type Chassis w/ RJ45 interface on real panel

■ ERM01B-AC-CH AC power type Chassis w/ BNC interface on real panel

■ ERM01B-DC-CH DC power type Chassis w/ BNC interface on real panel

Fractional E1 card

- ERM01-FE1/ET100; FE1(N64) to 10/100Base-T/Tx Ethernet Bridge
- ERM01-FE1/ET100R; FE1(N64) to 10/100Base-T/Tx Ethernet Routing
- ERM01-FE1/V35; FE1(N64) to V.35 with cable adapter
- ERM01-FE1/RS530; FE1(N64) to RS530 with cable adapter
- ERM01-FE1/RS449; FE1(N64) to RS449 with cable adapter
- ERM01-FE1/X21; FE1(N64) to X.21 with cable adapter
- ERM01-FE1/RS422; FE1(N64) to RS422 with cable adapter

Power

■ ERM01/AC AC Power module (90 ~ 250 VAC)

■ ERM01/DC -48 VDC Power module (-36 ~ -76 VDC)

Unframed E1 card

- ERM01-E1U-ET100; Unframed E1 to 10/100Base-T/Tx Ethernet Bridge
- ERM01-E1U-ET100R; Unframed E1 to 10/100Base-T/Tx Ethernet Router
- ERM01-E1U-V35; Unframed E1 to V.35 with cable adapter
- ERM01-E1U-RS530; Unframed E1 to RS530 with cable adapter
- ERM01-E1U-RS449; Unframed E1 to RS449 with cable adapter
- ERM01-E1U-X21; Unframed E1 to X21 with cable adapter
- ERM01-E1U-RS422; Unframed E1 to RS422 with cable adapter

Managed E1 Access Unit

ETU01A



The ETU01A single port stand-alone DSU/CSU provides our best digital access solution for E1 and Fractional E1 network services termination. A DTE device may be linked to an ETU01A at data rates of 56Kbps to 2048Kbps. The ETU01A features user replaceable dataport modules for a number of interface standards; including Ethernet bridge, router, V.35, X.21, RS-530, RS-449, G.703 64Kbps Co-directional and RS-232. The ETU01A supports local control and diagnostics via LCD display, keypad and LED status indicators located on the front panel as well as via a menu driven RS-232 console port in conjunction with a standard terminal. These features enable users to easily configure the unit, execute the in-service diagnostics and monitor the network status. The ETU01A provides optional SNMP (Simple Network Management Protocol), which allows the user to remotely control, diagnose and monitor the system using industry standard SNMP protocol, our proprietary MIB-II, and any network management software.

Features

- Supports Fractional E1 and Unframed E1 service with EOC control
- Removable interfaces, support V35, X21, RS530, RS449, RS232, G.703 Co-directional, NRZ, Ethernet Bridge and Router
- I/O connectors on rear panel
- Multiple clock source selection

 (Internal or External: E1 recovery, DTE or DCE)
- Supports Console, Telnet and SNMP management
- Menu keys and LCD display
- Supported by EMS
- Built-in BERT with V.54 diagnostic capabilities for performing local and remote loopback

Application SiMP Single-Port El Access Units with Modular IF South NY.35 (NY64 Klops) Router RS-530 (2.046 Mlops) ETU01-A E1 E1 E1 RS-530 (2.046 Mlops)

Ordering Information

■ ETU01A-AC Data port to framed E1 w/ AC power (90 ~ 250 VAC)
 ■ ETU01A-DC24 Data port to framed E1 w/ DC -24V (-18 ~ -36 VDC)
 ■ ETU01A-DC48 Data port to framed E1 w/ DC -48V (-36 ~ -72 VDC)
 ■ ETU01A-AD24 Data port to framed E1 w/ DC -24V (-18 ~ -36 VDC)

& AC power (90 ~ 250 VAC)

■ **ETU01A-AD48** Data port to framed E1 w/ DC -48V (-36 ~ -72 VDC)

& AC power (90 ~ 250 VAC)

Specifications

Specifications	5		
Ports	Framing:	Framed CCS (PCM31) CAS (PCM30) / Unframed	
G.703 E1 Specifications		CRC4 on/off	
	Line Code :	AMI/ HDB3	
	LCD display :	16*2 character LCD with backlight	
	Bit rate:	N*56K or N*64Kbps, where N=1~31 in CCS or	
		1~30 in CAS	
	Relative rece	ive level: 0 to -43dB	
	Transmit leve	el: Pulse Nominal 2.37V ±10% for 75ohm	
		Amplitude Nominal 3.00V ±10% for 120ohm	
		Zero amplitude ±0.1V	
	Jitter perform	ance: According to ITU-T G.823	
	Connectors :	BNC(unbalanced), RJ-48(balanced)	
	Clock modes	: Clock mode 0 Receive & transmit clock	
		(DCE1) (recovered) to the sync. DTE	
		Clock mode 1 Receive & transmit clock	
		(DCE2) (internal oscillator) to the sync. DTE	
		Clock mode 2 Receive clock to the sync. and transm	
		(DTE1) clock from the sync. device	
		Clock mode 3 Receive and transmit clock from the	
		(DTE2) sync. DCE (from ETC and ERC pin)	
		Clock mode 4 Receive and transmit clock from the	
		(DTE3) sync. DCE (all from ETC pin)I	
	Diagnostics :	loopback, Digital remote loopback, Test pattern	
LEDs	Power, TD, R	D, RTS, DCD, Singal loss, Sync loss, Alarm	
Standard	ITU-T G.703/	G.704/G.706 & G.732	
Power	AC: 90-250V/	AC ; DC: 18-72 VCD	
Power Consumption	10W		
Dimensions	250mm x 195	5mm x 45mm	
(D x W x H)mm			
Weight	1.5kg		
Temperature	0~50°C (Ope	rating) ,0~70°C (Storage)	
Humidity	10~90% non-	condensing	
Certification	CE, FCC, LVD, RoHS		
MTBF	65,000 h (25°	°C)	

Optional Interface Modules



ETU/TTU-530 RS530 interface module



ETU/TTU-V35
V.35 interface module



ETU/TTU-X21
X.21 interface module



ETU/TTU-NRZ NRZ interface module (4 * BNC)



ETU/TTU-ET100 10/100Base-T/Tx Ethernet E1 Bridge Function interface module



ETU/TTU-449 RS449 interface module



ETU/TTU-G64 G.703 64Kbps co-directional interface module



ETU/TTU-232 RS232 ASYN/SYNC interface module



ETU/TTU-ET100R 10/100 Base-T/Tx Ethernet Routing Function interface module

E1 Access Unit

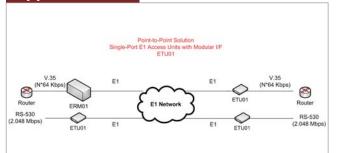


The ETU01 stand-alone DSU/CSU is a digital access unit for Unframed E1, Fractional E1, or Fractional cascaded E1 service. The ETU01 data channel supports user-selectable transmission rates via randomly selected E1 timeslots, which provides integral multiples of 64kbps, up to a maximum 2.048Mbps (unframed), for a line attenuation of up to 43 dB on twisted pair or coax cable. This provides an approximate operating range up to 2km (using 22AWG). The ETU01 packs the data channels into the E1 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 front panel sports status LEDs for monitoring both the CSU and DSU conditions and push button switches for initiating local and remote loopback with integral BERT. The ETU01 features user replaceable data port modules for a number of interface standards; including Ethernet bridge, router, V.35, X.21, RS-530, RS-449, G.703 64Kbps co-directional and RS-232.

Features

- Supports Fractional E1 and Unframed E1 service with EOC control
- Removable interfaces, support V35, X21, RS530, RS449, RS232, G.703 Co-directional, NRZ, Ethernet Bridge and Router
- I/O connectors on rear panel
- Multiple clock source selection (Internal or External: E1 recovery, DTE or DCE)
- Built-in BERT with V.54 diagnostic capabilities for performing local and remote loopback

Application



Ordering Information

■ ETU01-AC Data port to framed E1 w/ AC power (90 ~ 250 VAC)

■ **ETU01-DC24** Data port to framed E1 w/ DC -24V (-18 ~ -36 VDC)

■ **ETU01-DC48** Data port to framed E1 w/ DC -48V (-36 ~ -72 VDC)

Specifications

Ports	Framing:	Framed CC	CS (PCM31) CAS (PCM30) / Unframed		
G.703 E1 Specifications		CRC4 on/o	ff		
	Line Code :	AMI/ HDB3	-		
	Relative receive level: 0 to -43dB				
	Transmit leve	el: Pulse	Nominal 2.37V ±10% for 75ohm		
		Amplitude	Nominal 3.00V ±10% for 120ohm		
			Zero amplitude ±0.1V		
	Jitter perform	Jitter performance : According to ITU-T G.823			
	Connectors :	BNC(unbal	anced), RJ-48(balanced)		
	Clock modes	: Clock mode	e 0 Receive & transmit clock		
		(DCE1)	(recovered) to the sync. DTE		
		Clock mode	e 1 Receive & transmit clock		
		(DCE2)	(internal oscillator) to the sync. DTE		
		Clock mode	e 2 Receive clock to the sync. and trans		
		(DTE1)	clock from the sync. device		
		Clock mode	e 3 Receive and transmit clock from the		
		(DTE2) syn	nc. DCE (from ETC and ERC pin)		
		Clock mode	e 4 Receive and transmit clock from the		
		(DTE3) syn	nc. DCE (all from ETC pin)		
	Test Switches	Test Switches: Digital local loopback, Analog local			
	Diagnostics:	Digital loca	l and remote loopback, Analog local		
		loopback, 7	Test pattern		
LEDs	Power, TD, R	D, RTS, DO	CD, Singal loss, Sync loss, Alarm		
Standard	ITU-T G.703/	G.704/G.70	06 & G.732		
Power	AC: 90-250V	AC;	DC: 18-72 VCD		
Power Consumption	10W				
Dimensions	250mm x 195	5mm x 45m	m		
(D x W x H)mm					
Weight	1.5kg				
Temperature	0~50°C (Ope	rating) ,0~7	'0°C (Storage)		
Humidity	10~90% non-	-condensing			
Certification	CE, FCC, Ro	HS			
MTBF	57,000 hours				

Optional Interface Modules



ETU/TTU-530 RS530 interface module



ETU/TTU-V35
V.35 interface module



ETU/TTU-X21
X.21 interface module



ETU/TTU-NRZ NRZ interface module (4 * BNC)



ETU/TTU-ET100 10/100Base-TX Ethernet E1 Bridge Function interface module



ETU/TTU-449 RS449 interface module



ETU/TTU-G64 G.703 64Kbps co-directional interface module





Unframed E1 Access Unit

ETVOT-U

ETU01U

The ETU01U stand-alone DSU/CSU is a digital access unit for Unframed E1 service termination. The ETU01U data channel supports 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 ETU01U front panel sports status LEDs for monitoring both the CSU and DSU condition and push button switches for initiating local and remote loopback with integral BERT.

The ETU01U features user replaceable data port modules for a number of interface standards; including Ethernet bridge, router, V.35, X.21, RS-530, and RS-449. The ETU01U fully meets El specifications including ITU-T G.703, G.706, G.732, and G.823.

Features

- Supports Unframed E1 (2.048Mbps)
- Removable interfaces, support V35, X21, RS530, RS449,
 NRZ, Ethernet Bridge and Router
- I/O connectors on rear panel
- Multiple clock source selection (Internal or External: E1 recovery, DTE or DCE)
- Built-in BERT with V.54 diagnostic capabilities for performing local and remote loopback

Specifications

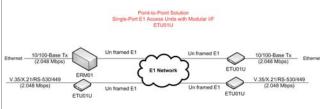
Specifications	5	
Ports	Framing:	Unframed
G.703 E1 Specifications	Line Code :	AMI/ HDB3
	Bit rate:	2.048Mbps (clear channel)
	Relative rece	ive level: 0 to -43dB
	Transmit leve	el: Pulse Nominal 2.37V ±10% for 75ohm
		Amplitude Nominal 3.00V ±10% for 120ohm
		Zero amplitude ±0.1V
	Jitter perform	ance: According to ITU-T G.823
	Connectors :	BNC(unbalanced), RJ-48(balanced)
	Clock modes	: Clock mode 0 Receive & transmit clock
		(DCE1) (recovered) to the sync. DTE
		Clock mode 1 Receive & transmit clock
		(DCE2) (internal oscillator) to the sync. DTE
		Clock mode 2 Receive clock to the sync. and transmi
		(DTE1) clock from the sync. device
		Clock mode 3 Receive and transmit clock from the
		(DTE2) sync. DCE (from ETC and ERC pin)
		Clock mode 4 Receive and transmit clock from the
		(DTE3) sync. DCE (all from ETC pin)
	Test Switches	S: Digital local loopback, Analog local
	Diagnostics:	Digital local and remote loopback, Analog local
		loopback, Test pattern
LEDs	Power, TD, R	D, RTS, DCD, Signal loss, Sync loss, Alarm
Standard	ITU-T G.703/	G.706 & G.732
Power	AC: 90-250V/	AC ; DC: 18-72 VCD
Power Consumption	10W	
Dimensions	250mm x 195	5mm x 45mm
(D x W x H)mm		
Weight	1.5kg	
Temperature	0~50°C (Ope	rating) ,0~70°C (Storage)

10~90% non-condensing

CE, FCC, RoHS

57,000 hours

Application Point of Single Port E1 Acc



Ordering Information

■ ETU01U/AC Data port to unframed E1 w/ AC power (90 ~ 250 VAC)
■ ETU01U/DC24 Data port to unframed E1 w/ DC -24V (-18 ~ -36 VDC)

■ **ETU01U/DC48** Data port to unframed E1 w/ DC -48V (-36 ~ -72 VDC)

Optional Interface Modules



ETU/TTU-530 RS530 interface module



ETU/TTU-V35 V.35 interface module



ETU/TTU-X21 X.21 interface module



Humidity

MTBF

Certification

ETU/TTU-NRZ NRZ interface module (4 * BNC)





ETU/TTU-ET100R 10/100 Base-T/Tx Ethernet Routing Function interface module



ETU/TTU-ET100 10/100Base-T/Tx Ethernet E1 Bridge Function interface module

E1/T1 Access Family

Replaceable modules for E1/T1 access units & multiplexers

ETU/TTU I/F Modules



When purchasing one of our single or multi-port access units or multiplexers that support user replaceable interface modules, our ETU/TTU interface modules provide easily selectable electrical interfaces for a wide selection of user applications. In addition to standard datacom interfaces such as V.35, RS-530, X.21, RS-449, etc. Ethernet modules are also available for bridging or routing of Ethernet over E1 or T1 network services.

l/F	Photo	Description
RS-530	RS-530	ETU/TTU-530 EIA RS-530 DB25F DCE Nx56 / Nx64

RS-449

ETU/TTU-449 EIA RS-449. ITU V.36 DB37F DCE(cable) Nx56 / Nx64



ETU/TTU-G64 G.703 64K co-directional DB15F 64Kbps only

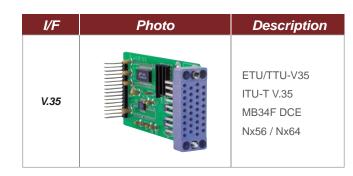


ET100R

ETU/TTU-ET100 IEEE802.8u HDLC Bridge, RJ-45 Nx56 / Nx64



ETU/TTU-ET100R IEEE802.8u Router HDLC, PPP, cHDLC RJ-45 Nx56 / Nx64





ETU/TTU-X21 ITU-T X.21 DB15F DCE Nx56 / Nx64



ETU/TTU-232 EIA RS-232, (V.24) DB25F DCE 64/128kbps Sync 19.2K baud Async



ETU/TTU-NRZ NRZ signal 4xBNC data/clk Nx56 / Nx64

Managed Ethernet over E1



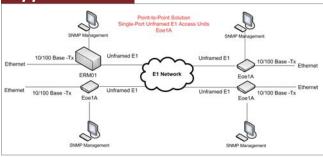
Eoe1A

The EOE1-A is a Channel Service Unit for unframed ITU-T G.703 E1 that features a built-in Ethernet bridge. The CSU has a built-in Network Terminating Unit (NTU) and may connect to either 75 Ohm unbalanced, BNC connectors or to 120 Ohm balanced, unframed E1 via twisted pairs and a shielded RJ-45 connector. The EOE1-A 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 EOE1-A is very easy to configure by a menu driven serial console interface. SNMP and proprietary MIB add the ability to manage the EOE1-A centrally through third party network management software or via CTC Union's EMS management system.

Features

- Supports 10/100Base-TX Ethernet over Unframed E1
- Automatic address learning, aging and deletion after 5 minutes
- Auto padding of undersized packets to meet the minimum
 Ethernet packet size requirement
- Buffering modes can be selected according to the setting of WAN and LAN line speeds
- Forwarding and filtering rate at WAN speed with throughput latency of 1 frame
- Auto MDI / MDIX
- Real-time filtering with 256 MAC address table
- Supports Console, Telnet, SNMP and Web management

Application



Ordering Information

■ **Eoe1-AC** Ethernet over E1 Unit with AC Power

(90~265 V, 47 ~ 63 Hz)

■ **Eoe1-DC24** Ethernet over E1 Unit with DC Power (18 ~ 36 V)

■ **Eoe1-DC48** Ethernet over E1Unit with DC Power (36 ~ 72 V)

Specifications

Specifications				
Ports	Framing:	Unframed		
G.703 E1 Specifications:	Line code :	AMI/ HDB3		
_	Bit rate :	2.048Mbps (clear channel)		
	Relative receive level: 0 to -43dB			
	Transmit level:			
	Pulse No	ominal 2.37V ±10% for 75ohm		
	Amplitude No	ominal 3.00V ±10% for 120ohm		
_	Ze	ero amplitude ±0.1V		
	Jitter performa	Ince: According to ITU-T G.823		
_	Connector: BNC(unbalanced), RJ-48(balanced			
	Clock modes :			
	Clock mode 0	Receive & transmit clock		
	(DCE1) (re	covered) to the sync. DTE		
	Clock mode 1	Receive & transmit clock		
_	(DCE2) (in	ternal oscillator) to the sync. DTE		
_	Test Switches	: Digital local loopback, Analog local		
	Diagnostics:	Digital local and remote loopback,		
_		Analog local loopback, Test pattern		
Ethernet Specifications :	Connector:	RJ-45		
	Data Rate :	10/100Mbps; Half Duplex / 20/		
		200Mbps; Full duplex		
	Filtering & For	warding: 90,000 packets/sec		
	Delay:	1 frame		
	Frame Buffer :	340 frames		
	MAC Table :	256 MAC address		
	Protocol:	Synchronous HDLC		
LEDs	Power, Signal	Loss, Alarm, Link, TD, RD, 100, Full,		
	Error, Error, Te	est		
Standard	ITU-T G.703,	G.706 and G.732		
	IEEE 802.3/80)2.3u		
Management	Console, Telne	et, Web, SNMP		
Power	AC: 90-250VA	C ; DC: 18-72 VCD		
Power Consumption	20W			
Dimensions	250mm x 195r	mm x 45mm		
(D x W x H)mm				
Weight	1.5kg			
Temperature	0~50°C (Operation	ating) ,0~70°C (Storage)		
Humidity	10~90% non-c	condensing		
Certification	CE, FCC, Roh	IS		
MTBF	57,000 hours			

Ethernet over E1



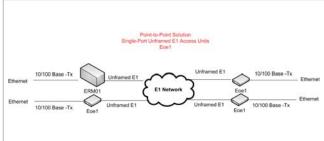
Eoe1

The Eoe1 is a Channel Service Unit for unframed ITU-T G.703 E1 that features a built-in Ethernet bridge. The CSU has a built-in Network Terminating Unit (NTU) and may connect to either 75 Ohm unbalanced, BNC connectors or to 120 Ohm balanced, unframed E1 via twisted pairs and a shielded RJ-45 connector. The Eoe1 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 Eoe1 is very easy to configure by DIP switch setting

Features

- Supports 10/100Base-TX Ethernet over Unframed E1
- Automatic address learning, aging and deletion after 5 minutes
- Auto padding of undersized packets to meet the minimum
 Ethernet packet size requirement
- Buffering modes can be selected according to the setting of WAN and LAN line speeds
- Forwarding and filtering rate at WAN speed with throughput latency of 1 frame
- Auto MDI / MDIX
- Real-time filtering with 256 MAC address table

Application



Ordering Information

■ **Eoe1-AC** Ethernet over E1 Unit with AC Power (90~265VAC)

■ **Eoe1-DC24** Ethernet over E1 Unit with DC Power (-18 ~ -36 VDC)

■ **Eoe1-DC48** Ethernet over E1 Unit with DC Power (- 36 ~ -72 VDC)

Specifications

Ports	Framing :	Unframed
G.703 E1 Specifications	Line Code :	AMI/ HDB3
	Bit rate:	2.048Mbps (clear channel)
	Relative rece	ive level: 0 to -43dB
	Transmit leve	: Pulse Nominal 2.37V ±10% for 75ohm
		Amplitude Nominal 3.00V ±10% for 120ohm
		Zero amplitude ±0.1V
	Jitter perform	ance: According to ITU-T G.823
	Connectors :	BNC(unbalanced), RJ-48(balanced)
	Clock modes	: Clock mode 0 Receive & transmit clock
		(DCE1) (recovered) to the sync. DTE
		Clock mode 1 Receive & transmit clock
		(DCE2) (internal oscillator) to the sync. DTE
	Control signa	Is: CTS constantly ON
		DSR constantly ON, except during test loops
		DCD constantly ON or follows RTS, except
		during signal loss
	Test Switches	S: Digital local loopback, Analog local
	Diagnostics:	Digital local and remote loopback, Analog local
		loopback, Test pattern
Ethernet Specifications	Connector:	RJ-45
	Data Rate :	10/100Mbps; Half Duplex / 20/200Mbps; Full duplex
	Filtering & Fo	rwarding: 90,000 packets/sec
	Delay :	1 frame
	Frame Buffer	: 340 frames
	MAC Table :	256 MAC address
	Protocol:	Synchronous HDLC
LEDs	Power, Signa	I Loss, Alarm, Link, TD, RD, 100, Full, Error,
	Error, Test	
Standard	ITU-T G.703,	G.706 and G.732
	IEEE 802.3/8	02.3u
Power	AC: 90-250V	AC ; DC: 18-72 VCD
Power Consumption	20W	
Dimensions	250mm x 195	imm x 45mm
(D x W x H)mm		
Weight	1.5kg	
Temperature	0~50°C (Ope	rating) ,0~70°C (Storage)
Humidity	10~90% non-	condensing
Certification	CE, FCC, Ro	HS
MTBF	57,000 hours	

Fractional E1 Access Unit

G703FE1



The G703FE1 stand-alone DSU/CSU is a compact, digital access unit for Unframed E1, Fractional E1, or Fractional cascaded E1 service. The G703FE1 data channel supports user-selectable transmission rates via randomly selected E1 timeslots, which provides integral multiples of 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 G703FE1 packs the data channels into the E1 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 G703FE1 top panel sports status LEDs for monitoring both the CSU and DSU condition and slide switches for initiating digital or analog loopback

DIP switches set all E1 parameters and random timeslot assignment for easy 'set and forget' operation. The data port is a fixed RS-530 with adapter cables for V.35, X.21 or RS-449. The G703FE1 fully meets E1 specifications including ITU-T G.703, G.704, G.706, G.732, and G.823.

Features

- Supports Fractional E1 and Unframed E1
- Support fixed V35, X21, RS530, RS449, RS232 with cable adapter
- Easily configure with simple DIP switches (DTE, DCE, Framing, time slot, clock mode, etc.)
- Multiple clock source selection (Internal or External: E1 recovery, DTE or DCE)
- Manual switch for performing local and remote loopback

Application Point-to-Povd Solution Single-Port Fractional E1 Access Units Q703FE1 E1 E1 Network G703FE1 V35 / RSS30 / X21 / RS449 (Nx648bps) G703FE1 G703FE1

Specifications

Specifications			
Ports	Framing:	CAS/CCS, Unframed / Framed	
G.703 E1 Specifications	Line Code :	HDB3	
	Bit rate:	2.048Mbps	
	Relative recei	ive level: 0 to -43dB	
	Transmit leve	I : Pulse Nominal 2.37V ±10% for 75ohm	
		Amplitude Nominal 3.00V ±10% for 120ohm	
		Zero amplitude ±0.1V	
	Jitter perform	ance: According to ITU-T G.823	
	Connectors :	BNC(unbalanced), RJ-48(balanced)	
	CRC check :	CRC-4 enable/disable	
Data port Specifications	Type :	RS530, V35, RS449, X21	
	Line code :	NRZ	
	Data rate: 64kbps ~ 2.048Mbps		
	Connector:	DB25F	
LEDs	WAN port RD	/RD	
Standard	ITU-T G.703, G.704, G.706 and G.823		
Power	DC 9V in		
Power Consumption	4W		
Dimensions	175mm x 99mm x 28mm		
(D x W x H)mm			
Weight	360g		
Temperature	0~50°C (Operating) ,0~70°C (Storage)		
Humidity	10~90% non-condensing		
Certification	CE, FCC, RoHS		
MTBF	57,000 hours		

Ordering Information

■ G703FE1

Data port to Unframed / Fractional (N64) E1

E1 CSU/DSU Family Unframed E1 Access Unit



G703E1U

The G703E1U stand-alone DSU/CSU is a compact, digital access unit for Unframed E1 service termination. The G703E1U data channel supports 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 G703E1U top panel sports status LEDs for monitoring both the CSU and DSU condition and slide switches for initiating digital or analog loopback.

DIP switches set all E1 parameters for easy 'set and forget' operation. The data port is a fixed RS-530 with adapter cables for V.35, X.21 or RS-449. The G703FE1 fully meets EI specifications including ITU-T G.703, G.706, G.732, and G.823.

Features

- Supports Unframed E1
- Support fixed V35, X21, RS530, RS449 with cable adapter
- Easily configure with simple DIP switches (DTE, DCE, Framing, time slot, clock mode, etc.)
- Multiple clock source selection (Internal or External: E1 recovery, DTE or DCE)
- Performing local and remote loopback

Specifications

Ports	Framing:	Unframed	
G.703 E1 Specifications	Line Code :	HDB3	
	Bit rate:	2.048Mbps	
	Relative recei	ve level: 0	to -43dB
	Transmit leve	I : Pulse	Nominal 2.37V ±10% for 75ohm
		Amplitude	Nominal 3.00V ±10% for 120ohm
			Zero amplitude ±0.1V
	Jitter performa	ance : Accor	ding to ITU-T G.823
	Connectors :	BNC(unbala	anced), RJ-48(balanced)
	CRC check :	CRC-4 enab	ole/disable
Data port Specifications	Type :	RS530, V35	i, RS449, X21
	Line code :	NRZ	
	Data rate :	64kbps ~ 2.	048Mbps
	Connector:	DB25F	
LEDs	E1 signal, tim	ing loss	
Standard	ITU-T G.703,	G.706 and	G.823
Power	DC 9V in		
Power Consumption	4W		
Dimensions	135mm x 79n	nm x 28mm	
(D x W x H)mm			
Weight	180g		
Temperature	0~50°C (Oper	0~70, rating)	0°C (Storage)
Humidity	10~90% non-	condensing	
Certification	CE, FCC, Rol	HS	
MTBF	57,000 hours		

Application



Ordering Information

■ G703E1U

Data port to unframed E1

E1 Access Multiplexer Family

Managed Multi-Service E1 Multiplexer

ERM-MUX/Plus



The ERM-MUX/PLUS is a 4U 19(23)" 14 slot rack type E1 Time Division Multiplexer for Fractional E1 network access which is designed for non-stop operation. There are 10 slots available for hot-swappable ERM-MUX/PLUS-I/O cards. Two slots are provided for MUX-E1 cards, which may be configured 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 standby in case of primary card failure. Each MUX-E1 card may be linked to another ERM-MUX/PLUS Rack to provide a point-to-point variety of datacom, Ethernet & voice over E1 network services. The ERM-MUX/PLUS optionally accommodates up to two separate power supplies, which may derive power from AC (110/220) or DC (-48V) power sources. When two power supplies are installed, the modules provide complete power redundancy and are hot swappable even during the E1 cards' transmission. The ERM-MUX/PLUS provides all interface connections on the front panel. BNC and RJ-45 are used for E1 Line interface connections, RJ-45 connections are used for all voice (FXO, FXS, E&M), for 10/100 Ethernet Bridge/Router and G.703/64K Co-directional. Optional cable adapters are used to convert the DB-62F DCE ports of the I/O cards to 6xRS-232, HP68F DCE port of I/O card to 4x V.35, RS-232, RS-530, RS-449, RS-422 and X.21 or 5x X.50 channels

Features

- CPU redundancy (1+1)
- E1 redundancy (2+2)
- Power redundancy (1+1) [2AC, 2DC, AC+DC]
- DCE hot swappable card types
 - 4ch V.35 (nx64K)
 - 4ch G.703 64K co-directional
 - 2ch Ethernet bridge
 - 1ch Ethernet router
 - 5ch X.50
 - 6ch RS232 (low speed)
 - 6ch FXS voice
 - 6ch FXO voice
 - 6ch E&M voice
 - 6ch Magneto voice
 - 4ch Loop Disconnect voice
- Drop & Insert function

Application

■ Console, NMP, SNMP and Web based management

Chassis Specifications

4U 19(23)"	Power	AC 90 ~250\	/AC
10 I/O slots	DC -48VDC		
	Environment	Temperature	0 ~ 60C (operating)
			0 ~ 70C (storage)
		Humidity	0 ~ 90% non-condensing
	Power Cons	umption	<150W
	Dimensions	(WxDxH)	350 x 438 x 176mm
	Weight	8kg (chassis-	+dual power+8 I/O cards)
		450g per car	d
	Certification	CE	

Ordering Information

■ ERM-MUX-Plus-AA-CH Chassis for AC+AC power ■ ERM-MUX-Plus-DD-CH Chassis for DC+DC power ■ ERM-MUX-Plus-AD-CH Chassis for AC+AD power

Power Cards [Hot swappable]

■ ERM-MUX-Plus-AC AC Power module (90 ~ 250 VAC) ■ FRM-MUX-Plus-ACV

AC Power module (90 ~ 250 VAC)

with Voice support

■ ERM-MUX-Plus-DC DC Power module (-36 ~ -76 VDC) ■ ERM-MUX-Plus-DCV DC Power module (-36 ~ -72 VDC)

with Voice support

E1 Cards

■ ERM-MUX-Plus-E1 2 channels Main-E1 LTU card(V3.2): Unframed / Fractional E1 (RJ45 pin1,2,3,4)

■ ERM-MUX-Plus-SUB E1 2 channels SUB-E1 LTU card(V1.0):

G.703/G.704 (Fractional E1)

CPU Card

■ ERM-MUX-Plus-CPU CPU card (V2.0) for NMP management

SNMP board

■ FRM-MUX-Plus-FXO

High-speed card

Voice Cards [Hot swappable &

requires Power module with Voice support]

■ ERM-MUX-Plus-SNMP(3) SNMP daughter board (V2.2) for Web,

Telnet and SNMP management

(cable selected) interface card(V1.0) (Nx64kbps)

Low-speed Cards

■ ERM-MUX-Plus-X50

■ ERM-MUX-Plus-G64K

■ ERM-MUX-Plus-ASYNC 6 channels RS-232 interface card (V1.2)

ERM-MUX-Plus-E&M Low speed: 128kbps Sync(2x64kbps)

6 channels FXO interface card (V2.1) ■ FRM-MUX-Plus-FXS 6 channels FXS interface card (V.2.3)

6 channels 2/4 wires E&M voice interface card (V2.1) ■ ERM-MUX-Plus-MAGNETO 6 channels MAGNETO interface card (V1.0)

■ ERM-MUX-Plus-LD 4 channels Loop Disconnect interface card (V1.0)

■ ERM-MUX-Plus-HS-SERIAL 4 Channels V.35/X.21 / RS-449 / RS-530

5 channels RS-232(V24) interface card Low speed: 2.4K ~ 19.2K Sync or Async

4 channels G.703 64kbps Co-Directional

interface card(V1.1)

<=38.4kbps Asvnc

Fast Ethernet Cards

- ERM-MUX-Plus-ET10/100(3)2 Channels Ethernet (10/100Base-TX) Bridge card(V1.0)
- ERM-MUX-Plus-ET100R 1-Channel Ethernet (10/100Base-TX) Router card(V1.0)

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G.703 E1 Trunk Card

- 1+1 E1 mode or 2 E1 mode
- Hot-swappable
- Multiple clock source selection (Internal or External: E1 recovery, DTE or DCE)
- 2+2 protection when 2 E1 trunk cards installed
- Unbalanced BNC or balanced RJ-45

Sub E1 I/O Card

- Each card provides two independent E1 loops
- Hot-swappable
- Provides convenient connection to PBX E1 trunk
- First channel E1 recovery can be used as system clock source
- Connectors: BNC for unbalanced; RJ-45 for balanced

Specifications

■ Framing Framed Unframed / Framed CCS(PCM31) / CAS(PCM30)

■ CRC check■ Bit rate■ Line code■ AMI / HDB3

■ Line impedance 75 ohm(BNC) / 120 ohm(DB-15, RJ-45)

Relative receive level 0 to -43dBTransmitter driver reach 1.5Km

■ Pulse amplitude Nominal 2.37V ±10% for 75ohm
Nominal 3.00V ±10% for 120ohm

■ Zero amplitude ±0.1V

■ Transmit frequency Internal timing ±50 ppm

Recovery timing ±50 ppm

External timing ±100 ppm

■ Jitter performance According to ITU-T G.823
■ Compliance ITU G.703, G.704, G.706, G.732

Ethernet Bridge I/O Card

 Supports 2 independent channels of 10/100Base-TX Ethernet over E1

Specifications

- Automatic address learning, aging and deletion after 5 minutes
 Forwarding and filtering rate at WAN speed with throughput latency of 1 frame
- Auto MDI / MDIX
- Real-time filtering with 256 MAC address table
- LAN Specifications

Standard Fully compliant with IEEE 802.3/802.3u

Connector RJ-45

Speed 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 Specifications

Protocol Synchronous HDLC
Rates nX64, up to 1984Kbps

Ethernet Router I/O Card

■ Supports 1 independent routed IP channel over E1

Specifications

■ Hot swappable

Protocols supported: DHCP, NAT, RIP I, RIP II, Telnet, HTTP, TFTP and ARP Supports encapsulation for PPP, HDLC and cHDLC

16 entry manual routing table

Auto MDI / MDIX

■ LAN Specifications

Standard Fully compliant with IEEE 802.3/802.3u

Connector RJ-45

Speed 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 Specifications

Protocol Selectable PPP, HDLC or cHDLC

Rates nX64, up to 1984Kbps

Datacom I/O Specifications

High Speed Nx64 Card

- 4-channels, High speed Synchronous data interface
- Interface type: V.35/RS-530/X.21/RS-449
- Connector: HD68 female with appropriate cable adapter
- Line code: NRZ
- Data rate: Nx64Kbps, where N=1 to 31 in CCS and N=1 to 30 in CAS
- Complies with ITU-T and EIA specifications

ASYNC I/O Card

- 6-channels, Async. <=38.4Kbps or Sync. 64/128Kbps
- Interface type: RS-232 (V.24)
- Connector: HDB62 female with appropriate cable adapter
- Line code: NRZ
- Data rate: Asynchronous mode <= 38.4Kbps (6-channels)

Synchronous mode = 19.2/38.4/64/128Kbps

X50 I/O Card

- 5-channels, <=19.2Kbps, supports Async or Sync
- Interface type: RS-232 (V.24)
- Connector: HDB62 connector, female (DCE) with adapter cable
- Line code: NRZ
- Data rate: From 2.4K ~ 19.2Kbps x 5-channels
- Loopback type: Local loopback, remote loopback
- Complies with EIA specifications

G703/64k I/O Card

- 4-channels, co-directional 64K interface
- 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)

FXS Voice I/O Card

- FXS card provides 6 independent channels
- Hot-swappable
- Each card has one alarm LED and 6 ring indicator LEDs
- Connects to standard analog telephone
- Connector: RJ45 x 6

Magneto Voice I/O card

- 6 independent channels
- Each card has one alarm LED and 6 ring indicator LEDs

Specifications

- Effective ring voltage AC 75VRMS±15V@25Hz ±3Hz
- Ring voltage > AC50VRMS @ 300mA
- Loop resistance < 1.8k ohms, Voltage -48VDC @ 300 ohms
- Handset current 10mA ±3mA
 Loop current range 18 ~50mA (off-look)
- Surge protection
 - 1000V, 10u Sec transient response, decay to 50% in 700u Sec 300VRMS for less than 200m Sec; no damage to any components 220VRMS for 15 minutes damage only local loop no fire hazard.
- Input level 0 to -5dBr, adjustable in 0.5dB steps
 Output level 0 to -7.5dBr, adjustable in 0.5dB steps
- Impedance 600 ohms
- Return loss 300-600Hz: >12dB, 600-3400Hz: >15dB
- Group delay @ -10dBm < 750µ second
- Total distortion According to ITU-T G223
- Channel cross-talk Not exceeding -65dB, 1020Hz@0dBm
 Out-of-band Signal attenuation -25dBm@4.6~72KHz
- Level Not to exceed -50dBm
- Noise < -65dBm

E&M Trunk I/O card

- E&M card provides 6 independent channels
- Supports Type I, II, III, IV or V
- Supports independent setting of type
- BD/GD wires are for battery and ground detection
- Timeslot 16 complies with ITU-T G.711
- TX / RX attenuation and 2 / 4 wire operation

Specifications

- Input level 0 to -16dBr, in 0.5dB steps
 Output level 0 to -16dBr, in 0.5dB steps
- Impedance 600 ohms
- Return loss 2-wire 300-600Hz: >12dB 2-wire 600-3400Hz: >15dB
 - 4-wire 300-3400Hz: >20dB
- Group delay 2-wire @ -10dBm: < 750µ second 4-wire @ -10dBm: < 600µ second
- Total distortion According to ITU-T G223
- Channel cross-talk Not to exceed -65dB, 1020Hz@0dBm
 Out-of-band Signal attenuation -25dBm@4.6~72KHz
- Level Not to exceed -50dBm
- Noise < -65dBm ■ Interface connector RJ-45 x 6



FXO Voice I/O card

- 6 independent channels
- Hot-swappable
- Each card has one alarm LED and 6 ring indicator LEDs
- Connects directly to PSTN

Specifications

- Connector■ On-hook resistance■ Off-hook resistance< 300 ohms
- Input level 0 ~ 50dBr, adjustable in 0.5dB steps
 Output level 0 ~ 7.5dBr, adjustable in 0.5dB steps
- Impedance 600 ohms
- Power DC voltage: >70V; DC current: 150mA

Loop Disconnect Voice I/O Card

- LD provides 4 independent channels
- Hot-swappable
- Each card has one alarm LED and 4 ring indicator LEDs

Specifications

- Connector RJ-45*4
- Surge protection 1000V, 10u Sec transient response, decay
 - to 50% in 700u Sec.
 - 300VRMS for less than 200m Sec; no damage
 - to any components.
 - 220VRMS for 15 minutes damage only local
 - loop no fire hazard.
- Input level 0 to -5dBr, adjustable in 0.5dB steps
 Output level 0 to -7.5dBr, adjustable in 0.5dB steps
- Impedance 600 ohms
- Return loss 300-600Hz: >12dB, 600-3400Hz: >15dB
- Group delay -10dBm: < 750µ second
 Total distortion According to ITU-T G223
- Channel cross-talk Not to exceed -65dB, 1020Hz@0dBm
 Out-of-band Signal attenuation -25dBm@4.6~72KHz
- Level Not to exceed -50dBm
- Noise <-65dBm

E1 Access Multiplexer Family

Managed Multi-Service E1 Multiplexer

ETU02-MUX-Plus



The ETU02-MUX/PLUS is a 1U 19(23)" 3 slot rack type E1 Time Division Multiplexer for Fractional E1 network access which provides an economic solution for central site or remote installations. There are 3 slots available for hot-swappable ETU02-MUX/PLUS-I/O cards. One slot is provided for MUX-E1 card, which provides either single E1 main link or main E1 link plus a drop and insert sub-E1 port. The MUX-E1 card may be linked to another ETU02-MUX/PLUS or ERM-MUX/PLUS Rack to provide a point-to-point variety of datacom, Ethernet & voice over E1 network services. The ETU02-MUX/PLUS optionally accommodates up to two separate power supplies, which may derive power from AC (110/220) or DC (-48V) power sources. When two power supplies are installed, the modules provide complete power redundancy and are hot swappable even during the E1 cards' transmission. The ETU02-MUX/PLUS provides BNC and RJ-45 for E1 Line interface connections, RJ-45 connections are used for all voice (FXO, FXS, E&M), for 10/100 Ethernet Bridge and G.703/64K Co-directional. Optional cable adapters are used to convert the DB-62F DCE ports of the I/O cards to 4xRS-232 or HP68F DCE ports of I/O card to 2x V.35, RS-530, RS-449, RS-422 and X.21 channels.

Features

- 1U 19" 3-slot chassis
- Provides 3 slots, removable interfaces: V35, X21, RS530, RS449, RS232, G.703 Co-directional, Ethernet Bridge, FXO, FXS and E&M
- Optional drop and insert E1 port (Sub E1)
- Setup and Control via RS-232 terminal

Multiple clock source selection

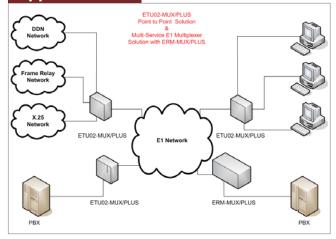
(Internal or External: E1 recovery, DTE or DCE)

Optional SNMP management

Specifications

LEDs	Power, Signal loss, Sync loss,
	Alarm (AIS, MRAI, RAI), TD, RD, Error, Test
Standard	ITU-T G.703/G.704/G.706 & G.732, G823
Power	AC: 90 ~250V
Power Consumption	20W
Dimensions	235mm x 438mm x 45mm
(D x W x H)mm	
Weight	2.9kg
Temperature	0~50°C (Operating) ,0~70°C (Storage)
Humidity	10~90% non-condensing
MTBF	57,000 hours

Application



Ordering Information

■ Managed E1 Time Division Multiplexer

ETU02-Mux-Plus-AC 19" 1U chassis with AC Power and SNMP
ETU02-Mux-Plus-DC 19" 1U chassis with DC Power and SNMP

■ Optional E1 Trunk Module

 ${\bf ETU02\text{-}Mux\text{-}Plus\text{-}Sub} \,\, {\bf E1} \,\, \, {\bf E1} \, + {\bf Sub} \,\, {\bf E1} \,\, {\bf moduleTrunk} \,\, {\bf Module} \,\, {\bf with} \,\, {\bf One} \,\, {\bf Main}$

E1 and One Sub E1 Lines in BNC Type Both

ETU02-Mux-Plus-E1 E1 Trunk Module with One Main E1 Line in BNC Type

■ Optional Interface Module

ETU02-Mux-Plus-N64 2-port Datacom (V.35, X.21, RS-449) Module

ETU02-Mux-Plus-232 4-port RS-232 Modules

ETU02-Mux-Plus-ET100 2-port 10/100Base-TX Ethernet module

ETU02-Mux-Plus-FXS 4-port FXS Module RJ-45
ETU02-Mux-Plus-FXO 4-port FXO Module RJ-45
ETU02-Mux-Plus-E&M 4-port E&M Module RJ-45 s

ETU02-Mux-Plus-G64 2-port G.703 64Kbps Co-directional module RJ-45

Ethernet bridge



10/100Base-TX bridge

Auto-Negotiation

Auto MDI/MDIX

Forward 1522 bytes (Max.) packets
Supports IEEE 802.1g Tag VLAN pass thru

Support flow control (Pause)

■ Standard IEEE 802.3/802.3u

■ Connector RJ-45 x 2

10/100Base-TX, Auto-negotiation

■ Frames Supports 64-1522 bytes packet length

■ WAN protocol Synchronous HDLC

■ WAN rate N*64Kbps, up to 2048Kbps

Specifications

LAN Specifications

■ Standard Fully compliant with IEEE 802.3/802.3u

■ Connector RJ-45x2

■ Speed 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 Specifications

■ Protocol Synchronous HDLC

■ Rates N*64 or N*56Kbps, up to 2048Kbps

X.50 card

Specifications

■ Interface types RS23

■ Connector DB62F with cable adapter

■ Line code NRZ

■ Data rate 2.4K ~ 19.2kpbs x 5Ch
■ Loopback type Local/Remote loopback

G.703/64K co-directional card



■ 2-channels, Co-directional 64K interface

■ Interface type: ITU-T G.703/64K

■ Connector: RJ-45 x 2 ■ Line code: Co-directional

■ Data rate: 64Kbps ± 100ppm x 2-channels ■ Line impedance: 120 ohm (balanced)

■ Frame mode: Unframed only

Specifications

■ Interface types G.703/64K, Co-directional

■ Connector RJ45 x 2

ITU-T G.703/64K, Co-directional ■ Line code 64kpbs±100ppm x 2 channels Data rate

■ Line impedance 120 ohms Frame mode Unframed only

Async card



■ 4-channels

■ Interface type: RS-232 (V.24)

■ Connector: HD62 female with appropriate cable adapter

■ Line code: NRZ

■ Data rate: Asynchronous mode <= 38.4Kbps (4-channels), Synchronous mode = 19.2/38.4/64/128Kbps

Specifications

Interface RS232

■ Connector HD62F with cable adapter

■ Line code

■ Data rate 3.84kbps x 4ch or 64/128kbps x 4ch

E&M



■ BD/GD wires are for battery and ground detection

■ E&M card provides 4 independent channels

■ E&M interface provides 1 pair of E and 1 pair of M

■ Each E&M can support Type I, II, III, IV or V

■ Loop current range is normally 5-30mA, 70mA max

■ Timeslot 16 complies with ITU-T G.711

TX / RX attenuation, and 2 / 4 wire operation

Specifications

■ Input level 0 to -16dBr, in 0.5dB steps Output level 0 to -16dBr. in 0.5dB steps ■ Impedance 600 ohms, option ■ Return loss 2-wire 300-600Hz: >12dB 2-wire 600-3400Hz: >15dB

4-wire 300-3400Hz: >20dB

■ Group delay 2-wire @ -10dBm: < 750μ second

4-wire @ -10dBm: < 600μ second

■ Total distortion According to ITU-T G223

■ Channel cross-talk Not exceed -65dB, 1020Hz@0dBm ■ Out-of-band Signal attenuation -25dBm@4.6~72KHz

■ Level not to exceed -50dBm Noise <-65dBm ■ Interface connector RJ-45*4

E1 and Sub E1 module



■ Single E1 or 1+1 E1 card (E1 and Sub-E1), provides unbalanced BNC or balanced RJ45 connector

■ Each E1 loop provides clock to be used as system clock source

Specifications

■ Connectors BNC for unbalanced ; RJ-45 for balanced ■ Framing Framed Unframed / Framed CCS(PCM31) / CAS(PCM30)

■ CRC check CRC4 on/off ■ Bit rate 2.048Mbps±0 ppm ■ Line code AMI / HDB3

■ Line impedance 75 ohm(BNC) / 120 ohm(DB-15, RJ-45)

■ Relative receive level 0 to -43dB ■ Transmitter driver reach 1.5Km

■ Pulse amplitude Nominal 2.37V ±10% for 75ohm

Nominal 3.00V ±10% for 120ohm

■ Zero amplitude

■ Transmit frequency Internal timing±30 ppm ■ Tracking Recovery timing±50 ppm ■ External timing±100 ppm ■ Jitter performance According to ITU-T G.823 ■ Compliance ITU G.703, G.704, G.706, G.732

Nx64 card



■ 2-channels , High speed data interface

■ Interface type: V35/RS-530/X.21/RS-449

■ Connector: HD68 female with appropriate cable adapter

■ Line code: NRZ

■ Data rate: N*64kbps, where N=1 to 31 in CCS

N=1 to 30 in CAS

Specifications

■ Interface types RS530, X.21, V.35, RS449, RS232 HD68F with cable adapter Connector

Line code NRZ ■ Data rate Nx64kbps

FXS



■ Provides 4 independent channels

■ Connects to standard telephones

Specifications

■ Connector RJ45 x 4 ■ Impedance 600 ohms

■ Level Gain On Tx side 0 dB On Rx side -3.5dB

■ Ring current Output 75±15V ■ Frequency 25±3Hz ■ Feeding voltage Loop resistance 1800 ohms Connecting distance up to 4km Wire Gauge 0.4mm Feeding working current 20mA

FXO



■ Provides 4 independent channels

■ Connects directly to PSTN

Specifications

■ Connector R.I-45*4 ■ Impedance 600 ohms

■ Level Gain On Tx side 0 dB On Rx side -3.5dB

> 7.5k ohms

■ Ring current impedance ■ Direct current resistance < 300 ohms ■ Maximum direct current borne > 70V

All 1, All 0, Alt, 0011, 3 in 24, 1 in 16, 1 in 8,

1 in 4 test pattern

(internal oscillator0 to the sync DTE

Clock mode 0 (DCE3) Receive and transmit clock from the

sync DCE (from ETC and ERC pin)

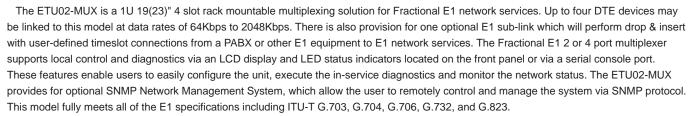
Clock mode 0 (DCE1) Receive and transmit clock (recovered) to the sync DTE

Clock mode 0 (DCE2) Receive and transmit clock

E1 Access Multiplexer Family

Managed 4 port Fractional E1 Access Multiplexer

ETU02-MUX



Clock modes

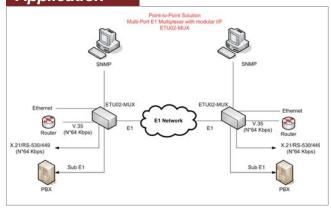
Features

- Provides 4 slots, removable interfaces: V35, X21, RS530, RS449, RS232, G.703 Co-directional, NRZ, Ethernet Bridge and Router.
- Optional drop and insert E1 port (Sub E1)
 Built-in BERT with V.54 diagnostic capabilities for performing local and remote loopback
- Setup and Control via front Panel with LCD display or RS-232 terminal

Multiple clock source selection (Internal or External: E1 recovery, DTE or DCE)

■ Optional SNMP management

Application



Ordering Information

■ ETU02- Mux 2-AC

E1 Mux with 2 data ports, LCD panel display, SNMP, 90 ~250V

■ ETU02- Mux 4-AC

E1 Mux with 4 data ports, LCD panel display, SNMP, 90 ~250V

■ ETU02- Mux 2-DC

E1 Mux with 2 data ports, LCD panel display, SNMP, -18 ~ -36 VDC

■ ETU02- Mux 2-DC

E1 Mux with 2 data ports, LCD panel display, SNMP, -36 \sim -75 VDC

■ ETU02- Mux 4-DC

E1 Mux with 4 data ports, LCD panel display, SNMP, -36 \sim -75 VDC

■ ETU02- Mux 2-AD

E1 Mux with 2 data ports, LCD panel display, SNMP, -18 \sim -36 VDC, 90 $\sim\!\!250V$

■ ETU02- Mux 4-AD

E1 Mux with 4 data ports, LCD panel display, SNMP, -18 \sim -36 VDC, 90 $\sim\!\!250V$

Specifications	5	
Ports	Framing Fram	ned: Unframed / Framed CCS(PCM31)/ CAS(PCM3
E1 and Sub-E1	Bit rate :	2.048Mbps±0 ppm
	Line code :	AMI / HDB3
	Line impedan	ce: 75 ohm (BNC) / 120 ohm (DB-15, RJ-45)
	Relative recei	ve level: 0 to -43dB
Transmitter level	Pulse amplitu	de: Nominal 2.37V ±10% for 75ohm
		Nominal 3.00V ±10% for 120ohm
	Zero amplitud	le: ±0.1V
	Transmit freq	uency Internal timing±100 ppm
	Tracking :	Recovery timing±100 ppm
	External timin	g±100 ppm
	Jitter perform	ance According to ITU-T G.823
	Return loss :	12dB for 51 ~ 102KHz
		18dB for 102 ~ 2048KHz
		14dB for 2048 ~ 3072KHz
	Interface con	nector: 15-pin D-type F, BNC
User Data Channel	Data rate :	Nx56Kbps or Nx64Kbps
	Control signal	ls: CTS constantly on
		DSR constantly on, except during test loops
		DCD constantly on or follows RTS, except during
		signal loss
	Loopback :	Line, Payload, local, DTE loopback
	BERT Test Pa	atterns: 511, 2047, 2e15-1, 2e20-1, QRSS, 2e23-

· 44 44 mm-6 🗖

	Clock mode 0 (DCE4) Receive and transmit clock from the
	sync DCE (all from ETC pin)
Key Pad	4 operation keys
LCD	16 x 2 character backlit LCD
LEDs	Signal loss, Sync loss, Alarm (AIS, MRAI, RAI), TD, RD,
	Error, Test
Standard	ITU-T G.703/G.704/G.706, G.732 & G823
Power	AC: 90 ~250V,
	DC24: -18 ~-36VDC, DC48: -36 ~-72VDC
Power Consumption	10W
Dimensions	235mm x 438mm x 45mm
(D x W x H)mm	
Weight	2.9kg
Temperature	0~50°C (Operating) ,0~70°C (Storage)
Humidity	10~90% non-condensing
Certification	CE, FCC, RoHS
MTBF	57,000 hours
•	

E1 Access Multiplexer

4 port Fractional E1 Access Multiplexer



ETU02A-MUX

The ETU02A-MUX is a 1U 19(23)" 2 or 4 fixed data port rack mountable multiplexing solution for Fractional E1 network services. Up to four DTE devices may be linked to this model at data rates of 64Kbps 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 port multiplexer supports local control and diagnostics 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 ETU02A-MUX provides software configurable fixed data ports in conjunction with adapter cables for V.35, RS-530, X.21, RS-449 or RS-232 This model fully meets all of the E1 specifications including ITU-T G.703, G.704, G.706, G.732, and G.823.

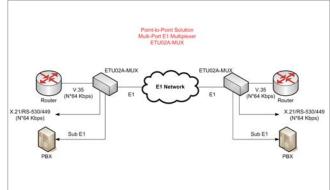
Features

- Provides 4 fixed interfaces: V35, X21, RS530, RS449 and RS232
- Optional drop and insert E1 port (Sub E1)
- Performing local and remote loopback
- Setup and Control via RS-232 terminal
- Multiple clock source selection (Internal or External: E1 recovery, DTE or DCE)

Specifications

	Specifications)		
	Ports	Framing Framed: Unframed / Framed CCS(PCM31)/ CAS(PCM30)		
	E1 and Sub-E1 interface	Bit rate :	2.048Mbps±0 ppm	
		Line code :	AMI / HDB3	
		Line impedan	ce: 75 ohm(BNC) / 120 ohm(DB-15, RJ-45)	
		Relative recei	ve level: 0 to -43dB	
	Transmitter level	Pulse amplitu	de: Nominal 2.37V ±10% for 750hm	
			Nominal 3.00V ±10% for 120ohm	
		Zero amplitude : ±0.1V		
		Transmit frequency Internal timing±100 ppm		
		Tracking:	Recovery timing±100 ppm	
		External timin	g±100 ppm	
		Jitter performa	ance According to ITU-T G.823	
		Return loss :	12dB for 51 ~ 102KHz	
			18dB for 102 ~ 2048KHz	
			14dB for 2048 ~ 3072KHz	
		Interface conr	nector: 15-pin D-type F, BNC	
	User Data Channel	Data rate :	Nx56Khps or Nx64Khps	

Application



User Data Channel

Clock modes

Control signals: CTS constantly on

DSR constantly on, except during test loops

DCD constantly on or follows RTS, except
during signal loss

Loopback : Line, Payload, local, 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 pattern

Clock mode 0 (DCE1) Receive and transmit clock (recovered) to the sync DTE

Clock mode 0 (DCE2) Receive and transmit clock

Clock mode o (DCE2) Receive and transmit clock

(internal oscillator0 to the sync DTE Clock mode 0 (DCE3) Receive and transmit clock

from the sync DCE (from ETC and ERC pin)

Clock mode 0 (DCE4) Receive and transmit clock from the sync DCE (all from ETC pin)

LEDs Signal loss, Sync loss, Alarm (AIS, MRAI, RAI), TD,

RD, Error, Test

Standard ITU-T G.703/G.704/G.706 & G.732, G823

Power AC: 90 ~250V,

DC24: -18 ~-36VDC, DC48: -36 ~-72VDC

 Power Consumption
 10W

 Dimensions
 235mm x 438mm x 45mm

(D x W x H)mm

MTBF

Weight 2.9kg

Temperature 0~50°C (Operating) ,0~70°C (Storage)

Humidity 10~90% non-condensing

Certification CE, FCC, RoHS

57.000 hours

Ordering Information

■ *ETU02A-Mux 2-AC* 1U, 19" E1 Mux with 2 data ports, 90 ~250VAC

■ *ETU02A-Mux 4-AC* 1U, 19" E1 Mux with 4 data ports, 90 ~250VAC

■ ETU02A-Mux 2-DC 1U, 19" E1 Mux with 2 data ports, -18 ~ -72 VDC ■ ETU02A-Mux 4-DC 1U, 19" E1 Mux with 4 data ports, -18 ~ -72 VDC

■ ETU02A-Mux 2-AD 1U, 19" E1 Mux with 2 data ports, -18 ~ -72 VDC

and 90 ~250VAC

and 90 ~250 VAI

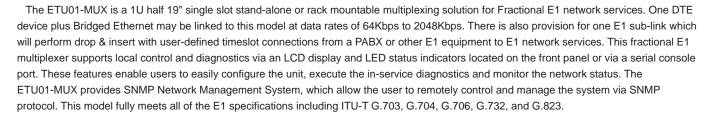
■ ETU02A-Mux 2-AD 1U, 19" E1 Mux with 4 data ports, -18 ~ -72 VDC and 90 ~250VAC

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E1 Access Multiplexer Family

Managed 1 port plus Ethernet Fractional E1 Access Multiplexer

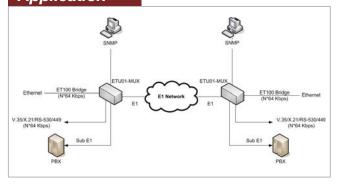
ETU01-MUX



Features

- Provides 1 slot, removable interfaces: V35, X21, RS530, RS449, RS232, G.703 Co-directional and NRZ
- Ethernet bridge on board
- Drop and insert E1 port (Sub E1)
- Built-in BERT with V.54 diagnostic capabilities for performing local and remote loopback
- Setup and Control via front Panel with LCD display or RS-232 terminal
- Multiple clock source selection (Internal or External: E1 recovery, DTE or DCE)
- SNMP management

Application



Optional Interface Modules



ETU/TTU-530 RS530 interface module



ETU/TTU-V35



ETU/TTU-X21



ETU/TTU-NRZ NRZ interface module (4 * BNC)



ETU/TTU-449





ETU/TTU-ET100R Routing Function interface



ETU/TTU-G64

ETU/TTU-ET100 E1 Bridge Function interface module

Ordering Information

- ETU01-Mux-AC E1 Mux with one data port and Ethernet, 100 ~ 240VAC
- ETU01-Mux-DC E1 Mux with one data port and Ethernet, -18 ~ -72 VDC
- ETU01-Mux-AD E1 Mux with one data port and Ethernet, 100 ~ 240VAC, -18 ~ -72 VDC

Specifications			
Ports	Framing Framed: Unframed / Framed CCS(PCM31)/ CAS(PCM30)		
E1 and Sub-E1 interface	Bit rate :	2.048Mbps±0 ppm	
	Line code :	AMI / HDB3	
	Line impedar	nce: 75 ohm(BNC) / 120 ohm(DB-15, RJ-45)	
	Relative receive level: 0 to -43dB		
Transmitter level	Pulse amplitu	ude: Nominal 2.37V ±10% for 750hm	
		Nominal 3.00V ±10% for 120ohm	
	Zero amplitud	de: ±0.1V	
	Transmit freq	uency Internal timing±100 ppm	
	Tracking:	Recovery timing±100 ppm	
	External timir	ng±100 ppm	
	Jitter perform	ance According to ITU-T G.823	
	Return loss :	12dB for 51 ~ 102KHz	
		18dB for 102 ~ 2048KHz	
		14dB for 2048 ~ 3072KHz	
	Interface con	nector: 15-pin D-type F, BNC	
User Data Channel	Data rate :	Nx56Kbps or Nx64Kbps	
	Control signa	Ils: CTS constantly on	
		DSR constantly on, except during test loops	
		DCD constantly on or follows RTS, except	
		during signal loss	
	Loopback:	Line, Payload, local, DTE loopback	
	BERT Test Pa	atterns: 511, 2047, 2e15-1, 2e20-1, QRSS, 2e23-1,	

1 in 4 test pattern Clock mode 0 (DCE1) Receive and transmit clock(recovered) to the sync DTE

Clock mode 0 (DCE2) Receive and transmit clock (internal oscillator0 to the sync DTE

All 1, All 0, Alt, 0011, 3 in 24, 1 in 16, 1 in 8,

Clock mode 0 (DCE3) Receive and transmit clock from the sync DCE (from ETC and ERC pin)

Clock mode 0 (DCE4) Receive and transmit clock from the

	sync DCE (all from ETC pin)		
hernet Specifications	Connector	RJ-45 x port	
	Data Rate	10/100Mbps; Ethernet bridge	

Clock modes

MTBF

Key Pad	4 operation keys
LCD	16 x 2 character backlit LCD
LEDs	Signal loss, Sync loss, Alarm (AIS, MRAI, RAI), TD, RD,
	Error, Test
Standard	ITU-T G.703/G.704/G.706 & G.732, G823
Power	AC: 90 ~250V,
	DC24: -18 ~-36VDC. DC48: -36 ~-72VDC

]	DC24: -18 ~-36VDC, DC48: -36 ~-72VDC	
Power Consumption 2	20W	
Dimensions (D x W x H	H)mm 250mm x 195mm x 45mm	

57,000 hours

Difficusions (D x W x	T)IIIII 250IIIII X 195IIIII X 45IIIII
Weight	1.6kg
Temperature	0~50°C (Operating) ,0~70°C (Storage)
Humidity	10~90% non-condensing
Certification	CE. FCC. RoHS

E1 Inverse Multiplexer Family

E1 Inverse Multiplexer Concentrator

ERM04



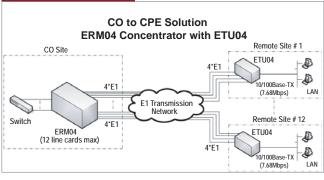
The ERM04 is a 4U 19(23)" 12 card slot inverse E1 multiplexer central office concentrator rack. Each card able to bundle up to 4 E1 lines for cost-effective connection of 10/100BaseT LANs over multiple E1 transports. The ERM04 inverse multiplexer rack cards are capable of transmitting 7.68Mbps Ethernet bridge channels (HDLC encapsulated) over sets of 4 E1 links. The ERM04 bridges the gap between E1 and E3, allowing bridges to operate at faster rates than with just single E1 access. It also provides high speed access to SDH/SONET backbones where the only access services available are E1 lines. The ERM04 card supports an E1 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 cards fully meet E1 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 card, the line and the remote stand-alone in the digital loopback mode. The Ethernet interface supports auto-negotiation and auto MDI/MDIX, allowing plug-and-play Ethernet connection without any additional configuration.

Features

- 4U 19 (23)" 12-slot chassis.
- 12 slots for ERM04 cards
- Dual AC or DC power
- SNMP management option
- Each card connects one fast Ethernet channel over up to four E1 links (1.92Mbps to 7.68Mbps)
- Built-in HDLC bridge operates at WAN rate
- Auto-negotiation
- Maximum 8ms delay variance between E1 links
- Unbalanced E1 I/F(BNC) or balanced E1(RJ45)
- Fully compatible with ETU04A

Specifications	S	
Ports	Framing Framed: Unframed (Transparent)	
E1 Interface	Bit rate :	2.048Mbps±50ppm (up to 4E1)
	Line code :	HDB3
	Clock Setting	: Internal OSC or recovery clock
	Receive sens	sitivity: -43dB
	Line impedar	nce: 75 ohm(BNC) / 120 ohm(RJ-45)
	Jitter perform	ance: complies with ITU-T G.823
	Pulse amplitu	ide Nominal 2.37V ±10% for 75ohm
		Nominal 3.00V ±10% for 120ohm
	Delay Varian	ce: 8ms
	Diagnostics:	Digital remote loopback
	Connector:	75 ohm(BNC) / 120 ohm(RJ-45)
Ethernet Interface	Data rate:	10/100Base-TX, Half/Full duplex
	Throughout:	1E1 Ch 320 frames/sec
		2E1 Ch 632 frames/sec
		3E1 Ch 942 frames/sec
		4E1 Ch 1262 frames/sec
	Automatic ag	ing duration: 5 ~ 10 minutes
	MAC address	3: 1024
	Delay:	1 frame
	Connector:	RJ45
	Frame size:	64 ~1522bytes
	Console Inter	face: DB9F DEC
LEDs	Power, E1 status, CRC, TMO, Ethernet link, Loop	
Standard	ITU-T G.703/G.704/G.706 & G.732, G823	
Power	AC: 100 ~24	DV,
	DC: -40 ~-57	VDC

Application



Ordering Information

■ ERM04/AC-CH 19" 4U 12-slot Chassis for AC power ■ ERM04/DC-CH 19" 4U 12-slot Chassis for DC power

Power modules

■ ERM04-AC
 ■ ERM04-DC
 AC Power module, 90 ~ 240VAC
 ■ ERM04-DC
 -48 VDC Power module, -36 ~76 VDC

Management

Power Consumption

Dimensions

Temperature

Weight

Humidity MTBF

(D x W x H)mm

■ ERM04-SNMP SNMP card with both interfaces: RS-232 and 10Base-T

57,000 hours

Optional Line card

■ ERM04-4E1/Eth 10/100Mbps Ethernet to 4E1 card

80W

285 x 438 x 177mm

10~90% non-condensing

0~50°C (Operating) ,0~70°C (Storage)

E1 Inverse Multiplexer Family

E1 Inverse Multiplexer

ETU04A



The ETU04A is a 1U half 19" stand-alone or rack mountable inverse E1 converter capable of bundling up to 4 E1 lines for cost-effective connection of 10/100BaseT LANs over multiple E1 transports. The ETU04A inverse multiplexer transmits up to a 7.68Mbps Ethernet bridge channel (HDLC encapsulated) 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 services available are E1 lines. The ETU04A supports an E1 attenuation of up to 43 dB on twisted pair or coax cable. This provides an approximate operating range up to 2km (using 22AWG). The ETU04A fully meets E1 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 and auto MDI/MDIX, allowing plug-and-play Ethernet connection without any additional configuration.

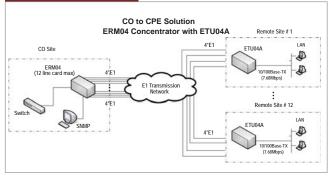
Features

- Each unit connects one fast Ethernet channel over up to four E1 links (1.92Mbps to 7.68Mbps)
- Built-in HDLC bridge operates at WAN rate
- Auto-negotiation
- Maximum 8ms delay variance between E1 links
- Unbalanced E1/BNC or balanced E1/RJ45
- Fully compatible with ERM04
- SNMP management with ERM04 chassis
- LED alarm indication

Specifications

Ports	Framing Framed: Unframed (Transparent)	
E1 Interface	Bit rate :	2.048Mbps±50ppm (up to 4E1)
	Line code :	HDB3
	Clock Setting	: Internal OSC or recovery clock
	Receive sens	itivity: -43dB
	Line impedan	ce: 75 ohm(BNC) / 120 ohm(RJ-45)
	Jitter performance: complies with ITU-T G.823	
	Pulse amplitu	de Nominal 2.37V ±10% for 75ohm
	Delay Variance: 8ms	
	Connector:	75 ohm(BNC) / 120 ohm(RJ-45)
Ethernet Interface	Data rate:	10/100Base-TX, Half/Full duplex
	Throughout:	1E1 Ch 320 frames/sec
		2E1 Ch 632 frames/sec
		3E1 Ch 942 frames/sec
		4E1 Ch 1262 frames/sec
	Automatic aging duration: 5 ~ 10 minutes	
	MAC address: 1024	
	Delay:	1 frame
	Connector:	RJ45
	Frame size:	64 ~1522bytes
LEDs	Power, E1 status, CRC, TMO, Ethernet link, TX, TX, Loop	
Standard	ITU-T G.703/G.704/G.706 & G.732, G823	
Power	AC: 100 ~240V,	
	DC: -40 ~-57	VDC
Power Consumption	10W	
Dimensions	235 x 195 x 45mm	
(D x W x H)mm		
Weight	1.5kg	
Temperature	0~50°C (Operating) ,0~70°C (Storage)	
Humidity	10~90% non-condensing	
MTBF	57,000 hours	

Application



Ordering Information

■ ETU04A/R-AC 4E1 Inverse Multiplexer with 120 ohm RJ-45, 100~240VAC

■ ETU04A/R-DC 4E1 Inverse Multiplexer with 120 ohm RJ-45, 36 ~ 72VDC

■ ETU04A/B-AC 4E1 Inverse Multiplexer with 75 ohm BNC, 100~240VAC

ETU04A/B-DC 4E1 Inverse Multiplexer with 75 ohm BNC, 36 ~ 72VDC

E1 DXC Family

E1 Digital Cross Connect Rack

ERM-DXC

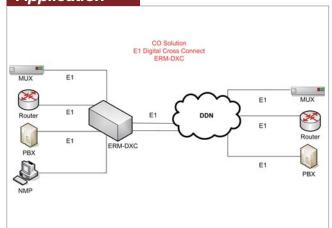


The ERM-DXC is a 4U 19(23)" 11 slot rack type E1 Digital Cross Connect for Fractional E1 network access which is nested in a concentrator and provides an economic solution for central site users. There are 11 slots available for ERM-DXC I/O cards for installation into the ERM-DXC rack. A CPU card is installed into the last slot for configuration and management. The CPU card provides both local control via an RS-232 menu driven console port and remote management using proprietary NMP software. Each DXC-E1 card may be linked to another ERM-DXC Rack to provide the main functions 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. Cable adapters terminating in BNC or RJ-45 are used for 8xE1 Line interface connections, 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.

Features

- 4U 19(23)" 11-slot chassis
- Digital cross connect solution for up to 64 E1
- Cross connect and multiplex data, voice and signaling for up to 2048 timeslots
- Supports Hot-swapping of all cards
- Dual power sharing design
- All interface connectors are on the rear panel
- LED line status display on each card face
- Supports console terminal to setup and monitor operation locally

Application



Specifications

Porte

8E1 I/O module

Interface type: G.703, G.704

Framing: 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 unbalanced and RJ-45 for balanced

Transmit freq: Internal timing±30 ppm

tracking: Loopback timing±50 ppm,External timing±100 ppm

Nx64 module

Interface types: RS530,RS449, RS232, X.21, V.35, Connector: High density DB62F with cable adapter

Line code: NRZ

Data Rate: N x 64kbps

Async module

Interface types: RS232

Connector: High density DB62F with cable adapter

Line code: NRZ

Data Rate: ≤19.2kbps x 6ch or 64kbps 6ch

64K/128K module

Interface types: RS530, RS449, X.21,V.35,

Connector: High density DB62F with cable adapter

Line code: NRZ

Data Rate: 64kbps x 3ch or 128kbps 3ch

X.50 module

Interface types: RS232

Connector: High density DB62F with cable adapter

Line code: NRZ

Data Rate: ≤19.2kbps x 5ch

Ethernet module

Interface types: Ethernet 10Base-T

Connector: High density DB62F with cable adapter

Data Rate: LAN 10Mbps, Half duplex

WAN Nx64kbps

	THE THE MAP			
LEDs	Power, TD, RD, Error, Test, Singal loss, Sync loss,, Alarm			
Standard	TU-T G.703, G.704, G.706, G.732 and G.823			
Power	AC: 100~240VAC DC: -48VDC			
Power Consumption	80W			
Dimensions (D x W x H)mm 350 x 438 x 176mm				
Weight	8 Kg			
Temperature	0~50°C (Operating) ,0~70°C (Storage) 10~90% non-condensing			
Humidity				
MTRF	57 000 hours			

CPU Card

- Provides the timing systems selection and timing signals
- Provides the control and switching for I/O modules parameters and functions
- Core matrix for 64 El cross connection

8E1 card

- 8Ch G.703 fractional E1 card
- Hot-swappable
- Multiple clock source selection (Internal or External: E1 recovery, DTE or DCE)
- Unbalanced BNC or balanced RJ-45 with appropriate cable adapter

Nx64 card

- 2-channels, high speed data interface
- Interface type: RS-530/X.21/RS-449/RS-232
- Connector: HDB62 female with appropriate cable adapter
- Line code: NRZ
- Data rate: N*64kbps, where N=1 to 31 in CCS and N=1 to 30 in CAS

Ethernet card

- Supports 2 independent HDLC bridge channels
- 10/100Base-TX bridge
- Auto-Negotiation
- Auto MDI/MDIX
- Forward 1522 bytes (Max.) packets
- Supports IEEE 802.1q Tag VLAN pass thru
- Support flow control (Pause)

X50 card

- Hot swappable card
- Supports 5 sub-rate channels (up to 19.2k) in one 64k timeslot
- RS-232 standard data interface
- Connector: HDB62 female with appropriate cable adapter

A/Sync card

- Hot swappable card
- Supports 4 channels of 64k, 38.4k Asyn or 128k Sync
- RS-232 standard data interface
- Connector: HDB62 female with appropriate cable adapter

64k/128k card

- Hot swappable card
- Supports 3 channels of 64k or 128kRS530/449/232/X21/V35
- Connector: HDB62 female with appropriate cable adapter

Ordering Information

ERM-DXC Chassis

■ ERM-DXC-CH 19" 4U 11-slot Chassis

Power Card

■ ERM-DXC-AC AC Power, 90 ~ 250 VAC does not support voice card
■ ERM-DXC-DC DC Power, -36 ~ -76 VDC does not support voice card

Optional Line Cards for ERM-DXC

I/O card

■ ERM-DXC-8XE1 8x E1 card

■ ERM-DXC-ET10 2x Ethernet 10BaseT card

■ ERM-DXC-ASYN 4x RS232 / V.24 interface card, 64kbps Sync / 19.2kbps Async

■ ERM-DXC-X50 5x X.50 interface card - 19.2 kbps Sync / Async

■ ERM-DXC-64/128 3x V.35, X.21, RS449, RS530 with cable adapter; 64 or 128kbps
 ■ ERM-DXC-N64 2x V.35, X.21, RS449, RS530 with cable adapter; Nx64kbps

E1 DXC Family

E1 Digital Cross Connect Access Unit



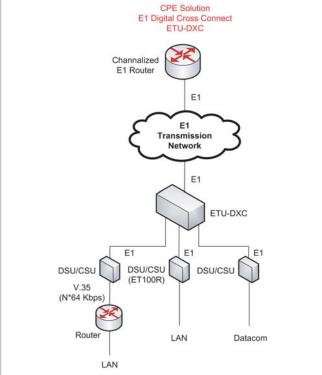
ETU-DXC

The ETU-DXC is a 1U 19" stand-alone or rack mountable Digital Cross Connect offering 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 (DDN) 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. Local control is provided via an RS-232 menu driven console port and remote management using proprietary NMP software. This equipment does not support signaling and is therefore not applicable for voice applications.

Features

- 1U 19(23)" stand-alone rack, 8 or 16 E1 port
- Balanced E1 (120ohm) or unbalanced E1 (75ohm) switchable
- Complies with all ITU-T specifications
- E1 point-to-point 64Kbps transparent data cross connect
- Supports console terminal menu configuration and proprietary NMS
- System clock recovered from any E1 or from internal oscillator

Application



Specifications

Ports	Framing:	Unframed/ Framed
E1 interface :	Bit rate:	2.048Mbps±50 ppm
	Line Code:	AMI/ HDB3
	Receiving lev	el: -20 / -43dB
	Line Impedan	ce: 75 ohm(BNC) / 120 ohm
		(Molex, RJ-45)
	Jitter Perform	ance: According to ITU-T G.823
	Pulse amplitu	de: Nominal 2.37V ±10% for 75ohm
		Nominal 3.00V ±10% for 120ohm
	Connector:	DB25 with cable adapter
	Management	NMP management system
	Diagnostics:	Local digital, local analog,
		remote loopback
	E1 system Tx	clock:
	Recovery:	Recovered from any one E1 Rx signal
	Internal: 2.	048MHz±50ppm internal oscillator
LEDs	Power, Alarm	, Activity
Standard	ITU-T G.703,	G.704, G.706, G.732 and G.823
Power	AC: 100~240	VAC DC: -18 ~72VDC
Power Consumption	20W	
Dimensions	235 x 430 x 4	5mm
(D x W x H)mm		
Weight	2.5kg	
Temperature	0~50°C (Ope	rating) ,0~70°C (Storage)
Humidity	10~90% non-	condensing
MTBF	57,000 hours	

Ordering Information

■ ETU-DXC/A.8-AC 8 E1 cross connect with AC power (100 ~ 240VAC)

■ ETU-DXC/A.16-AC 16 E1 cross connect with AC power (100 ~ 240VAC)

■ ETU-DXC/A.8-DC 8 E1 cross connect with DC power (-18 ~ -72DC)

■ ETU-DXC/A.16-DC 16 E1 cross connect with DC power (-18 ~ -72DC)

E1 cable adapters

■ CAB-DB25BNCF8-E1 DB25 to 8xBNC connectors (for 75 ohm)

■ CAB-DB25RJ45M4-E1 DB25 to 4xRJ45 connectors (for 120 ohm)

E1 Access Family

TDM over IP Access Unit



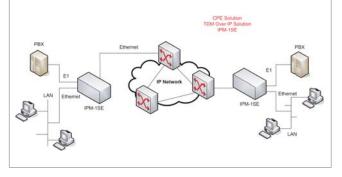
IPM-1SE

The IPM-1SE is a 1U half 19" stand-alone or rack mountable pseudo wire (PW) device that transmits a real-time bit stream of TDM data (Time Division Multiplexing) over a packet switched network (IP network). Unlike other traffic types that can be carried over pseudo wires (e.g. ATM, frame relay, and Ethernet), TDM is a real-time bit stream, which traditionally carries voice-grade telephony channels. One critical issue in implementing TDM over IP is clock recovery. In native TDM networks the physical layer carries highly accurate timing information along with the TDM data, but when emulating TDM over Packet Switched Networks this synchronization is absent. The IPM-1SE is able to accurately regenerate the timing signals to the exacting standards and conformance with ITU-T. As core networks continue their conversion from traditional switched technology to IP based networks, the IPM-1SE provides a solution to continue using legacy TDM equipment, such as PABX, while the core migrates to IP based networks.

Features

- Supports synchronous TDM based and Ethernet service over IP network
- Devices can be cascaded to increase the number of interfaces
- Point to point application for E1/T1/J1 over IP
- Provides accurate E1/T1/J1 clock recovery
- Supports f/w upgrade
- Console terminal CLI, Telnet and MIB-2 SNMP support

Application



Specifications

Ethernet

Ports

	Data rate: 10/100Base-Tx, Half/full duplex
	Connector: RJ45
	E1 interface
	Framing: Unframed
	Bit rate: 2.048Mbps
	Line Code: HDB3
	Line Impedance: 75 ohm(BNC) / 120 ohm(RJ-45)
	Pulse amplitude:Nominal 2.37V ±10% for 75ohm,
	Nominal 3.00V ±10% for 120ohm
	Zero amplitude: ±0.1V
	Receive level: short haul -15dB, long haul -43dB
	Connector: RJ45 for 120 ohms, BNC for 75 ohms
	T1 interface
	Framing: Unframed, D4, ESF
	Bit rate: 1.544Mbps
	Line Code: B8ZS / AMI
	Line Impedance: 100 ohms
	Pulse amplitude: Nominal 3.0 ±20%,
	Zero amplitude: ±0.15V
	Receive level: short haul -15dB, long haul -43dB
	Connector: RJ48C
LEDs	System, TDM, Uplink, LAN
Standard	TU-T G.703, G.704, G.706, G.732 and G.823
	IEEE802.3, 802.3u, 802.1p and 802.1q
Power	AC: 100~240VAC DC: -18 ~72VDC
Power Consumption	15W
Dimensions	235 x 195 x 45mm
(D x W x H)mm	
Weight	1.6kg
Temperature	0~50°C (Operating) ,0~70°C (Storage)
Humidity	10~90% non-condensing
Certification	CE, FCC, RoHS
MTBF	57,000 hours

Ordering Information

■ IPM-1SE-AC

TDM over IP Unit with AC 90~265 V, 47 ~ 63 Hz

■ IPM-1SE-DC

TDM over IP Unit with DC -36 \sim -72 V

G.703/64K Family

G.703 Co-directional 64K Concentrator

G703/64-RM

The G703/64-RM is a 4U 19(23)" rack type G.703 64Kbps co-directional converter which is nested in a hub to provide solutions for central office installations. There are 13 slots available for hot swappable G.703 64K cards for installation into the G703/64-RM rack. An optional SNMP card can be installed into the last slot for configuration and management, leaving 12 slots available for G.703 64K cards. The SNMP card provides both local control via an RS-232 serial console port and remote management using industry standard SNMP protocol via an Ethernet 10BASE-T connection. Each G.703 64K card may be linked to a remote G.703 64K co-directional stand-alone converter for various 64kbps data communication services. The G703/64-RM accommodates an optional second hot swappable shared power supply module which may derive power from AC (90-250) or DC (-48V) power sources. On the rear panel, combinations of RJ-45 and wire-wrap terminals are utilized for 64K co-directional line interface connections. Adapter cables are used to convert the HDB26F DCE data ports to V.35, RS-530, RS-449, X.21 or RS-232 depending on the installed card.

Features

- 19" 4U G.703 / 64kbps Rack Mount Concentrator
- Up to 12 slots for independent LTU-cards + 1 slot for SNMP management
- Supports hot swapping
- Single port access to G.703 64kbps services
- Interface Supports V.35, X21, RS-232/449/530
- Fully transparent signal conversion
- SNMP Management
- Perform local and remote loopback functions

CO Solution G.703/64-RM Datacom V.35/X.21/RS-449/RS-530 Datacom V.35/X.21/RS-449/RS-530 Codirectional G703/64-RM G703/64-STD Router Modular Router Multiple Twisted Pairs G703/64A-STD Router Router

Specifications

Ports	G.703/64K interface
	Types: Co-directional 64Kbps
	Frame format: Unframed
	Line: 4 wires, 0.5 ~0.7mm twisted pair cable
	Impedance: 120 ohm
	Pulse amplitude: Nominal 1.0V ±10
	Zero amplitude: ±0.1V
	Clock frequency: 64KHz
	Frequency tracking: ±100ppm
	Connector: wire wrap and RJ-45
	Data interface
	Types: V.35, X.21, RS530, RS449, RS232 with
	adapter cable
	Data rate: 64Kbps for Sync, 19.2Kbps for Async
	Data type: Balanced for V.35, X.21, RS530, RS44
	Unbalanced for RS232
	Control signals:
	CTS constantly on
	DSR constantly on, except during test loops
	DCD constantly on or follow RTS except when
	signal loss
LEDs	Power, TD, RD, RTS, DCD, TX, RX, Signal, Timin
	Err, Test
Standard	ITU-T G.703, G.823
Power	AC: 90 ~ 250 VAC
	DC: -36 ~ -76 VDC
Power Consumption	80W
Dimensions	285 x 438 x 180mm
(D x W x H)mm	
Weight	6.6kg
Temperature	0~50°C (Operating) ,0~70°C (Storage)
Humidity	10~90% non-condensing
Certification	CE, FCC
MTBF	57,000 hours





G703/64-RM-SNMP

co-directional Line Card

Interface Cable Adapters



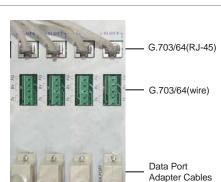
CAB-HD26MB34M-V35 CAB-HD26MB34F-V35



CAB-HD26DB25M-530 CAB-HD26DB25F-530



CAB-HD26DB37M-449 CAB-HD26DB37F-449



CAB-HD26DB15M-X21 CAB-HD26DB15F-X21



CAB-HD26DB25M-232 CAB-HD26DB25F-232

Rear Panel Connections

Ordering Information

■ G703/64-RM-CH/AC 19" 4U 11-slot Chassis ■ G703/64-RM-CH/DC 19" 4U Chassis for DC

Power Card

■ RM01/AC AC Power card, 90 ~ 250 VAC ■ RM01/DC DC Power card, -36 ~ -76 VDC

Management

■ G703/64-RM-SNMP SNMP card with RS-232 and 10Base-T Ethernet

Line cards

■ G703/64-RM-SERIAL V35,X21,RS530,RS449,RS232 (with adapter cables)

G.703/64K Family

G.703 Co-directional 64kbps Access Unit

G703/64A-STD



The G703/64A-STD is a 1U half 19" stand-alone or rack mountable interface converter that allows full conversion between G.703 64Kbps co-directional services and a number of data port interfaces including ITU V.35, X.21, EIA RS-530, RS-449 and RS-232 hardware. The interface converters are very easy to implement. Simply select the mode, appropriate interface settings and adapter cable, configure the required timing for translation via internal DIP switches, and connect to appropriate power. This model features full compliance with all the relevant ITU & EIA standards under 64Kbps network environments with high reliability. G.703 64K Family of products may be used in Packet Switching Networks, ISDN and DDN. They are also useful for data terminals which access PCM, 64K/2048Kbps digital channels as well as digital microwave channels. Additionally, it may be connected to satellite communication channels.

Features

- 1U half-19" single port G703 64kbps access unit
- Interface: V.35, X.21, RS530, RS449 and RS232
- Data rate: 64Kbps Sync and Async RS232 up to 19.2Kbps
- Fully transparent signal conversion
- Selectable timing modes: recovery, transparent, data port or internal OSC
- Data port provides 10bit FIFO
- Diagnostics: local and remote analog and local digital

Application CPE Solution Single-Port G 703/64K Series Converter G703/64K-STD V.35 G.703/64K Codirectional PCM Network Single-Port G703/64K Access Router Single-Port G703/64K Access Router

Specifications

Ports	G.703/64K interface
	Types: co-directional, centra-directional,
	or contra-directional 64Kbps
	Frame format: Unframed
	Line: 4 wires, 0.5 ~0.7mm twisted pair cable
	Range: up to 800 meters over 24AWG
	Impedance: 120 ohm
	Pulse amplitude: Nominal 1.0V ±10
	Zero amplitude: ±0.1V
	Clock frequency: 64KHz
	Frequency tracking: ±100ppm
	Connector: DB9F
	Data interface
	Types: V.35, X.21, RS530, RS449, RS232 with
	adapter cable
	Data rate: 64kbps for Sync. 19.2kbps for Async
	Connector DB25F
LEDs	Power, TD, RD, RTS, DCD, TX, RX, Signal, Timing,
	Err, Test
Standard	ITU-T G.703, G.823
Power	AC: 90 ~ 250 VAC
	DC24: -18 ~ -36 VDC, DC48: -36 ~ -72 VDC
Power Consumption	10W
Dimensions	235 x 195 x 45mm
(D x W x H)mm	
Weight	1.6kg
Temperature	0~50°C (Operating) ,0~70°C (Storage)
Humidity	10~90% non-condensing
Certification	CE, FCC
MTBF	57,000 hours

Ordering Information

■ **G703/64A-STD/AC** AC power 90 ~ 250 VAC

■ **G703/64A-STD/DC48** -48 VDC power -36 ~ -72 VDC

■ G703/64A-STD/DC24 -24 VDC power -18 ~ -36 VDC

G.703/64K Family

G.703 Co-directional 64kbps Access Unit

G703/64A



The G703/64A is a compact stand-alone interface converter that allows full conversion between G.703 64Kbps co-directional services and a number of data port interfaces including ITU V.35, X.21, EIA RS-530, RS-449 and RS-232 hardware. The interface converters are very easy to implement. Simply select the mode and appropriate interface settings by DIP switch, select an adapter cable, configure the required timing for translation via internal DIP switches, and connect to appropriate power. This model features full compliance with all the relevant ITU & EIA standards under 64Kbps network environments with high reliability. G.703 64K Family of products may be used in Packet Switching Networks, ISDN and DDN. They are also useful for data terminals which access PCM, 64K/2048Kbps digital channels as well as digital microwave channels. Additionally, it may be connected to satellite communication channels

Features

- Palm size single port G703 64kbps access unit
- Interface: V35, X21, RS530, RS449 and RS232 with cable adapters.
- Data rate: 64Kbps Sync and Async RS232 up to 19.2Kbps
- Fully transparent signal conversion
- Selectable timing modes: recovery, transparent, data port or internal OSC
- Selectable co-directional, centra-directional or contra-directional
- Diagnostics: local analog and digital loopback

Application



Specifications

	Types: Co-directional, Centra-directional,
	or Contra-directional 64Kbps
	Frame format: Unframed
	Line: 4 wires, 0.5 ~0.7mm twisted pair cable
	Range: up to 800 meters over 24AWG
	Impedance: 120 ohm
	Pulse amplitude: Nominal 1.0V ±10
	Zero amplitude: ±0.1V
	Clock frequency: 64KHz
	Frequency tracking: ±100ppm
	Connector: RJ-45
	Data interface
	Types: V.35, X.21, RS530, RS449, RS232 with
	adapter cable
	Data rate: 64kbps for Sync. 19.2kbps for Async
	Connector DB25F
LEDs	Power, RD, SD, GRD, GSD, Signal loss, Timing loss
Standard	ITU-T G.703, G.823
Power	DC 9V in
Power Consumption	5W
Dimensions	135 x 79 x 30mm
(D x W x H)mm	
Weight	180g
Temperature	0~50°C (Operating) ,0~70°C (Storage)
Humidity	10~90% non-condensing
Certification	CE, FCC
MTBF	57,000 hours

G.703/64K interface

Ordering Information

- **G703/64A-530** G.703 64k Converter with DB25 interface
 - Optional Cables adapter for V.35, X.21,RS530,RS449; AC adapter required
- G703/64A-232 G.703 64kbps Converter with single RS232 interface

AC adapter required

E1/T1 Access Family E1/T1 Cross-Rate Converter



G703FTEC

The G703-FTEC is 1U half 19" stand-alone or rack mountable T1 (US Standard), E1 (European Standard) converter and timeslot cross connect which enables conversion between one T1 signal and one E1 signal. T1 and E1 signals with frames employ u-Law and A-Law compander encoding principles respectively and encode those analog signals into 64kbits digital data. The E1 interface supports CCS (PCM31) or CAS (PCM30) frames with or without CRC-4 and with HDB3 line coding. The T1 interface supports D4 or ESF frame formats with B8ZS or AMI line code. Multiple clock source selection provides maximum flexibility in connecting both T1 and E1. The clock source may be from the T1 recovery clock, from the E1 recovery clock, from the internal oscillator, from an external clock or via transparent timing. All setup controls can be performed via internal DIP switch settings or via the RS-232 console port and ASCII terminal. Tests and diagnostics can easily be performed from the front panel pushbutton switches. Diagnostics include T1 local/remote and E1 local/remote loop back.

Features

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

Application



Ordering Information

■ G703FTEC-AC E1 T1 converter with AC, 90 ~ 250VAC

■ **G703FTEC-DC** E1 T1 converter with DC, -36 ~ -72VDC

Specifications

MTBF

Specifications	
Ports	E1 interface
	Framing: CAS/PCM30 or CCS/PCM31 selectable
	Bit rate: 2.048Mbps
	Line Code: HDB3
	Line Impedance: 75 ohm (BNC) / 120 ohm (RJ-45)
	Voice channel sample rule A-Law
	CRC check: CRC-4 enable/disable
	Pulse amplitude: Nominal 2.37V ±10% for 75ohm,
	Nominal 3.00V ±10% for 120ohm
	Zero amplitude: ±0.1V
	Connector: RJ-45 and BNC pair
	T1 interface
	Framing: D4, ESF selectable
	Bit rate: 1.544Mbps
	Line Code: B8ZS / AMI
	Equalization: 0 ~655 feet settable
	Voice channel sample rule u-Law
	CRC check: CRC-6 when ESF
	Line Impedance: 100 ohms
	Transmit Pulse level: 3.0V ±10%,
	Receive signal level: 0 ~-10dB
	Connector: RJ-45 and Bantam Jacks
LEDs	Power Alarm
Standard	ITU-T G.703, G.704, G.706, G.823, G.824, ANSI T1.403
Power	AC: 100~240VAC
	DC24: -18 ~36VDC, DC48: -36 ~72VDC
Power Consumption	15W
Dimensions	235 x 195 x 45mm
(D x W x H)mm	
Weight	1.6kg
Temperature	0~50°C (Operating) ,0~70°C (Storage)
Humidity	10~90% non-condensing
Certification	CE, FCC, RoHS

57,000 hours

E1/T1 Access Family E1/T1 Repeater

ETR01 / ETR04

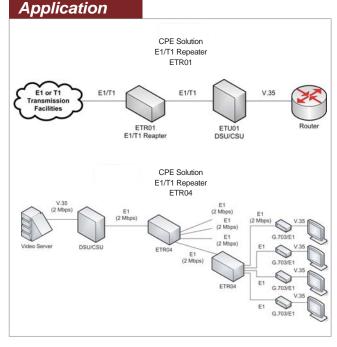


The ETR01 and ETR04 are E1/T1 long-haul, OSI Layer One repeaters. The compact design, low cost, and easy operation make the ETR an excellent choice for E1 or T1 link extension. The ETR01 provides a simple 1 pair (Tx/Rx) in, 1 pair (Tx/Rx) out repeater interface, while the ETR04 provides a 1 (Rx) in, 4 (Tx) out interface. Setup is extremely simple. Just select the proper termination impedance from the three position slide switch (75 or 120 Ohm for E1 or 100 Ohm for T1) and then select the proper line code (AMI or B8ZS for T1, HDB3 for E1). The E1/T1 signal is completely recovered with new pulse shape and low jitter.

Features

- Fully integrated transceivers for long-haul T1 or E1 interface
- Selectable E1 75ohms, E1 120 ohms, T1 100 ohms line impedance
- Selectable line codes AMI, B8ZS, HDB3

Application



Specifications

Ports

	Bit rate: 2.048Mbps
	Line Code: AMI/HDB3
	Line Impedance: 75 ohm (BNC) / 120 ohm (RJ-45)
	Receive level: 0 ~-43dB
	Pulse amplitude: Nominal 2.37V ±10% for 75ohm,
	Nominal 3.00V ±10% for 120ohm
	Zero amplitude: ±0.1V
	Connector: RJ-45 for ETR01, BNC for ETR01-BNC
	T1 interface
	Bit rate: 1.544Mbps
	Line Code: B8ZS / AMI
	Line Impedance: 100 ohms
	Receive signal level: 0 ~ -36dB
	Pulse amplitude: Nominal 3.0 ±10%@100 ohms
	Zero amplitude: ±0.1V
	Connector: RJ-45
LEDs	PWR, Signal loss
Standard	ITU-T G.703, G.736, G.775, G.823, ETSI 300~166
	and 300~233 AT&T Pub 62411, ANSI T1.403, T1.408
Power	DC 9V in
Power Consumption	5W
Dimensions	235 x 195 x 45mm
(D x W x H)mm	
Weight	450g
Temperature	0~50°C (Operating) ,0~70°C (Storage)
Humidity	10~90% non-condensing
Certification	CE, FCC, RoHS
MTBF	57,000 hours

E1 interface

Ordering Information

■ ETR01 1x RJ45 to 1x RJ45 (1 in 1 out)
■ ETR01-BNC 1xRJ45 to 2xBNC (1 in 1 out)
■ ETR04 1x RJ45 to 4x RJ45 (1 in 4 out)

T1 Access Family

Fractional T1 Concentrator

TRM01



The TRM01 is a 4U 19(23)" rack type T1 DSU/CSU for unframed T1 and Fractional T1 Digital Access which is nested in a hub to provide solutions for central office installations. There are 13 slots available for hot swappable T1 (DS1) cards for installation into the TRM01 rack. An optional SNMP card can be installed into the last slot for configuration and management, leaving 12 slots available for T1 (DS1) cards. The SNMP card provides both local control via an RS-232 serial console port and remote management using industry standard SNMP protocol via an Ethernet 10BASE-T connection. Each T1 (DS1) card may be linked to a remote T1/FT1 stand-alone Access Unit for various LAN, Video Conference, or hosts over T1 (DS1) network services. The TRM01 accommodates an optional second hot swappable shared power supply module which may derive power from AC (90-250) or DC (-48V) power sources. On the rear panel, combinations of RJ-45 and wire-wrap terminals are utilized for T1 (DS1) Line interface connections. Adapter cables are used to convert the HDB26F DCE data ports to V.35, RS-530, RS-449, X.21 or 10/100 Base Ethernet depending on the installed card.

Features

- Supports Fractional T1 and Unframed T1 service
- Hot swappable cards
- Removable interfaces, support V35, X21, RS530, RS449, RS232, Ethernet Bridge and Router
- I/O connectors on rear panel
- Multiple clock source selection (Internal or External: T1 recovery, DTE or DCE)
- Supports Console and SNMP management
- Performing local and remote loopback

Ordering Information

Chassis

■ TRM01/AC-CH 19" 4U 12-slot Chassis for AC power TRM01/DC-CH 19" 4U 12-slot Chassis for DC power

Power

■ TRM01-AC
 Power module (90 ~ 250 VAC)
 ■ TRM01-DC
 Power module (-36 ~ -76 VDC)

Optional Networking management module

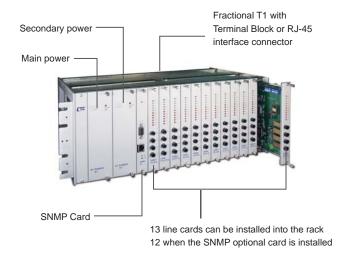
■ TRM01-SNMP SNMP card with RS-232 and 10Base-T

Optional T1 cards for ERM01 series

■ TRM01-V35	Fractional T1(N56) to V.35 card
■ TRM01-X21	Fractional T1(N56) to X21 card
■ TRM01-RS530	Fractional T1(N56) to RS530 card
■ TRM01-RS449	Fractional T1(N56) to RS449 card
■ TRM01-RS422	Fractional T1(N56) to RS422 card
■ TRM01-RS232	Fractional T1(N56) to RS232 card
■ TRM01-ET100	Fractional T1 to 10/100Base-Tx Ethernet Bridge
■ TRM01-ET100R	Fractional T1 to 10/100Base-Tx Ethernet Bridge

Specifications

Ports	T1 Interface
	Frame format: Unframed, SF (D4), ESF
	Bit rate: 1.544Mbps
	Line Code: B8ZS / AMI
	Receiving level: 0 to -36dB
	Pulse amplitude: Nominal 3.0V ±10%
	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.824
	Connector: RJ-45 and 5 Pin Wire-wrap (balanced)
	Data Interface
	Interface types: RS-530/RS-449/RS-232, X.21/V.35,
	10/100Base-T Ethernet Bridge & Route
	Connector: HDB26 Female
	Line code: NRZ (except bridge)
	Data Rate: 1.544Mbps (Unframed/framed)
	Nx56kbps or Nx64Kbps
	Time slot allocation: user defined
LEDs	Power, TD, RD, Error, Test, Signal loss, Sync loss,
	Alarm LED: Sync Loss, Signal Loss, Alarm
	(AIS, MRAI, RAI), TD, RD, Error, Test.
Standard	ITU-T G.703, G.704, G.706, G.733, G.824,
	ANSI T1.403, AT&T TR-62411
Power	AC: 100~240VAC DC: -36~-76
Power Consumption	80W
Dimensions	Chassis: 285 x 438 x 180mm
(D x W x H)mm	Line card: 260 x 22 x 180mm
Weight	6.6kg
Temperature	0~50°C (Operating) ,0~70°C (Storage)
Humidity	10~90% non-condensing
Certification	CE, FCC, RoHS
MTBF	57,000 hours





TRM01-SNMP

T1 Series Line Card

Interface Cable Adapters



CAB-HD26MB34M-V35 CAB-HD26MB34F-V35



CAB-HD26DB25M-530 CAB-HD26DB25F-530



CAB-HD26DB37M-449 CAB-HD26DB37F-449

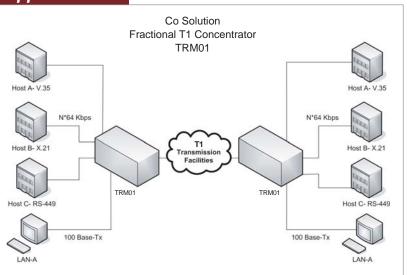


CAB-HD26DB15M-X21 CAB-HD26DB25M-232 CAB-HD26DB15F-X21 CAB-HD26DB25F-232



Rear Panel Connections

Application



T1 Access Family

Fractional T1 Access Unit



TTU01

The TTU01 stand-alone DSU/CSU is a digital access unit for Unframed T1 or Fractional T1 service termination. The TTU01 data channel supports user-selectable transmission rates via randomly selected T1 (DS1) timeslots, which provides integral multiples of 56/64kbps, up to a maximum 1.544Mbps (unframed). The TTU01 packs the data channels into the T1 (DS1) link in user-selected time slots. The TTU01 front panel sports status LEDs for monitoring both the CSU and DSU conditions and push button switches for initiating local and remote loopback with integral BERT. The TTU01 features user replaceable data port modules for a number of interface standards; including Ethernet bridge, Ethernet router, V.35, X.21, RS-530, RS-449, G.703 64Kbps Co-directional and RS-232.

Features

- 1U half-19" supports Fractional T1 and Unframed T1
- Removable interfaces, support V35, X21, RS530, RS449, RS232, NRZ, Ethernet Bridge and Router
- I/O connectors on rear panel
- Multiple clock source selection (Internal or External: T1 recovery, DTE or DCE)
- Built-in BERT with V.54 diagnostic capabilities for performing local and remote loopback

V.35/X21/RS530/RS449 (Nx64kbps) V.35/X21/RS530/RS449 (Nx64kbps) TTU01 TTU01 V.35/X21/RS530/RS449 (Nx64kbps) TTU01 TTU01 TTU01 TTU01 V.35/X21/RS530/RS449 (Nx64kbps)

Ordering Information

Master Units

■ TTU01/AC Data port to fractional T1 units with AC power
■ TTU01/DC24 Data port to fractional T1 units with DC

(-18 ~ -36VDC) power

■ TTU01/DC48 Data port to fractional T1 units with DC

(-36 ~ -72VDC) power

Optional Interface Modules

■ ETU/TTU-V35 V.35 interface module
■ ETU/TTU-X21 X.21 interface module
■ ETU/TTU-530 RS530 interface module
■ ETU/TTU-449 RS449 interface module

■ ETU/TTU-232 RS232 ASYN/SYNC interface module
■ ETU/TTU-G64 G.703 64Kbps co-directional interface module

■ ETU/TTU-NRZ NRZ interface module (4 * BNC)

■ ETU/TTU-ET100 10/100Base-T/Tx Ethernet E1 Bridge Function interface module
■ ETU/TTU-ET100R 10/100 Base-T/Tx Ethernet Routing Function interface module

Specifications

Ports T1 Interface

E1 interface : Frame format: Unframed, SF (D4), ESF

Bit rate: 1.544Mbps

Line Code: B8ZS / AMI Line impedance: 100 ohms Receiving level: 0 to -36dB

Pulse amplitude: Nominal 3.0V ±20%

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.824 Connector: 15 Pin D type female , Bantam

Data Interface

Interface types: V.35, RS530, RS449, RS232, X.21, NRZ 10/100Base-T Ethernet Bridge & Router

Line code: NRZ (except bridge)

Data Rate: 1.544Mbps (Unframed/framed)

Nx56kbps or Nx64Kbps

Time slot allocation: user defined

LEDs Power, TD, RD, Error, Test, Signal loss, Sync loss, Alarm LED: Sync Loss, Signal Loss, Alarm (AIS, MRAI, RAI), TD, RD, Error, Test.

Standard ITU-T G.703, G.704, G.706,G.733, ANSI T1.403, AT&T TR-62411

Power AC: 100~240VAC DC24: -18~-36VDC, DC48: -36~-76VDC

Power Consumption 10W
Dimensions Chassis: 255 x 195 x 45mm

(D x W x H)mm

MTBF

Weight 1.5kg

Temperature 0~50°C (Operating) ,0~70°C (Storage)

Humidity 10~90% non-condensing

Certification CE, FCC, RoHS

57,000 hours

123

T1 Access Multiplexer

4 port Fractional T1 Access Multiplexer

TTU02-MUX



The TTU02-MUX is a 1U 19(23)" 4 slot rack mountable multiplexing solution for Fractional T1 (DS1) network services. Up to four DTE devices may be linked to this model at data rates of 64Kbps to 1544Kbps. There is also provision for one optional T1 sub-link which will perform drop & insert with user-defined timeslot connections from a PABX or other T1 (DS1) equipment to T1 network services. The Fractional T1 2 or 4 port 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. This model

Features

- Provides 4 slots, removable interfaces: V35, X21, RS530, RS449, RS232, NRZ, Ethernet Bridge and Router.
- Optional drop and insert T1 port (Sub T1)
- Performing local and remote loopback
- Setup and Control via front Panel with LCD display or RS-232 terminal
- Multiple clock source selection (Internal or External: T1 recovery, DTE or DCE)

Specifica	tions
Ports	T1 , Sub-T1 Interface
	Frame format: SF (D4), ESF
	Bit rate: 1.544Mbps
	Line Code: B8ZS / AMI
	Line impedance: 100 ohms
	Receiving level: 0 to -36dB
	Pulse amplitude: Nominal 3.0V ±10%
	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.824
	Connector: 15 Pin D type female, RJ-45
	Data Interface
	Interface types: RS530, RS449, RS232, X.21, V.35,

NRZ, G64K, 10/100Base-T Ethernet

Bridge & Router

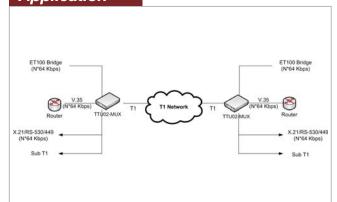
Line code: NRZ (except bridge)

Data Rate: 1.544Mbps (Unframed/framed)

Nx56kbps or Nx64Kbps Time slot allocation: user defined

	Time siot allocation: user defined
Key Pad	4 operation keys
LCD	16 x 2 character backlit LCD
LEDs	Power, TD, RD, Error, Test, Signal loss, Sync loss,
	Alarm LED: Sync Loss, Signal Loss, Alarm
	(AIS, MRAI, RAI), TD, RD, Error, Test.
Standard	ITU-T G.703, G.704, G.706,G.733, ANSI T1.403,
	AT&T TR-62411
Power	AC: 100~240VAC
	DC24: -18~-36VDC, DC48: -36~-76VDC
Power Consumption	10W
Dimensions	Chassis: 235 x 430 x 45mm
(D x W x H)mm	
Weight	2.8kg
Temperature	0~50°C (Operating) ,0~70°C (Storage)
Humidity	10~90% non-condensing
Certification	CE, FCC, RoHS
MTBF	57,000 hours
	LCD LEDs Standard Power Power Consumption Dimensions (D x W x H)mm Weight Temperature Humidity Certification

Application



Ordering Information

■ TTU02- Mux 2-AC T1 Mux with 2 data ports, LCD panel display, SNMP, 90 ~250V

TTU02- Mux 4-AC T1 Mux with 4 data ports, LCD panel display, SNMP, 90 ~250V

TTU02- Mux 2-DC T1 Mux with 2 data ports, LCD panel display, SNMP, -18 ~ -36 VDC

TTU02- Mux 2-DC T1 Mux with 2 data ports, LCD panel display, SNMP, -36 ~ -75 VDC

TTU02- Mux 4-DC T1 Mux with 4 data ports, LCD panel display, SNMP, -36 ~ -75 VDC

TTU02- Mux 2-AD T1 Mux with 2 data ports, LCD panel display, SNMP, -18 ~ -36 VDC, 90 ~250V

TTU02- Mux 4-AD T1 Mux with 4 data ports, LCD panel display, SNMP, -18 ~ -36 VDC, 90 ~250V

Balun Family G.703 Coax to Twisted Pair

Balun-P/S / Balun-B1/B2



A balun is a type of electrical transformer that can convert electrical signals that are balanced to signals that are unbalanced and vice versa. They are also used to change impedance of twisted pair's 120 ohm to coaxial's 75 ohm. An E1 balun's function is generally to convert an E1 carrier signal from coaxial cable to UTP CAT-5 cable.

Features

- Converts between 75 ohm coax and 120 ohm twisted pair for E1 (2048Kbps)
- Easy to install
- No power required
- Small, light-weight Balun
- Works in either direction
- Works for balanced and unbalanced E1

Specifications

Data rate:	2048Kbps
Unbalanced interface	:75 ohm impedance, 2xBNC
Balanced interface :	120 ohm impedance, 1xRJ-45
Dimensions	Balun-B2/S , Balun-B2/S-2
(WxDxH):	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

Ordering Information

E1 Balun

■ Balun-P/S Two BNC pigtail type

RJ45 Shielded - 2xBNC/M with 6" pigtail

RJ45 PIN ASSIGNMENT: P1(+) / P2(-) , P4(+) / P5(-)

■ Balun-B1/S One BNC box type

RJ45 Shielded - 1xBNC/F

RJ45 PIN ASSIGNMENT: P4(+) / P5(-)

■ Balun-B2/S Two BNC box type

RJ45 Shielded - 2xBNC/F

RJ45 PIN ASSIGNMENT: P1(+) / P2(-) , P4(+) / P5(-)

Balun Family

G.703 Mini Balun

BLN3010 / BLN4010





A balun is a type of electrical transformer that can convert electrical signals that are balanced to signals that are unbalanced and vice versa. They are also used to change impedance of twisted pair's 120 ohm to coaxial's 75 ohm. An E1 balun's function is generally to convert an E1 carrier signal from coaxial cable to UTP CAT-5 cable. The BLNX010 are miniature Baluns designed for applications where space is restricted due to small dimensions or high densities. The fully shielded design intended for panel mounting and IDC twisted pair termination are available in either standard BNC or 1.6/5.6 jack unbalanced connectors

Features

- Converts between 75 ohm coax and 120 ohm twisted pair for E1(2048Kbps)
- Works in either direction
- Body parts plated with minimum 5u Ni(Nickel)
- Contacts plated with minimum 1.25u Ni(Nickel) and 1.25uAu(Gold)
- Coax connectors with BeCu spring contacts and Teflon insulators
- Coaxial connector insertion cycle > 500
- IDC contacts Phosphor Bronze
- IDC connect/disconnect cycle > 20
- IDC to suit 24.26.28 AWG Copper wire
- Integrated cable anchor allows cable to be inserted after termination on IDC

Specifications

Data rate:	2048Kbps
Unbalanced interface: 75 ohm impedance, 1xBNC or 1x 1.6/5.6 Jack	
Balanced interface :	120 ohm impedance, IDC
Dimensions	BLN3010/4010
(WxDxH):	1.7cm x 1.6cm x 4.8cm
Weight:	BLN3010/4010 15g
Compliance :	ITU G.703 standard pulse

Ordering Information

IDC Balun

■ BLN-3010 75 to 120 ohm Balun, 1.6/5.6 Jack to Krone IDC IDC Pin Assignment PA(-), PB(+), PG(G)

■ BLN-4010 75 to 120 ohm Balun, BNC to Krone IDC

IDC Pin Assignment PA(-), PB(+), PG(G)

E1 Access Family

Coaxial Surge Protector

SP-SE-B01



A surge protector is an appliance designed to protect electrical devices from voltage spikes. A surge protector attempts to regulate the voltage supplied to an electric device by either blocking or by shorting to ground voltages above a safe threshold. The SP-SE-B01 will ensure the reliable operation of coaxial based networking equipment running ArcNet, Satellite/CCTV and 75 ohm E1 communication systems.

Features

- Protect E1 Access Units using coaxial cable from transient surge voltages
- Compact in-line installation
- Low shunt capacitance to reduce signal loss
- Maximum system up time
- State of the art, avalanche diode technology

Specifications

Туре	SP-SE-B01
Connection	BNC
Un	10V
U-max	18V
Discharge current	10KA
Response time	< 10ns
Insertion loss (40MHz)0.5dB	
Dimensions (WxDxH) 38 x 68 x 27mm
Weight	70g
Compliance	IEC 61644-1, draft 98

Ordering Information

Coax Surge Protector

■ SP-SE-B01 75 ohm, BNC, 1 port Coax cable surge protector



Ethernet over Coax / G.SHDSL.bis Ethernet First Mile LAN Extender (G.SHDSL.bis, G.SHDSL, VDSL2) Ethernet Bridge to Data, NRZ, G64 / Ethernet Surge Protector



Ethernet over Coax Family

Type: S = Stand-alone, C = Compact, SP = Surge Protector

Interface	Model Name	Description	Туре	Page
Modem				
Ethernet Bridge	EOC-10	Unmanaged Ethernet extender over coaxial cable modem	S	127
Ethernet Bridge	EOC-20	Managed Ethernet extender over coaxial cable (CO modem)	S	128
Ethernet Bridge	EOC-21	Managed Ethernet extender over coaxial cable (CPE modem)	S	128
G.SHDSL.bis Ethernet First Mi	le Family			
2/4/8-wire EFM (5.7/11.4/22.8MI	ops)			
5.7Mbps Ethernet Bridge	EFM-10	2-wire, 4-port LAN extender	S	129
11.4Mbps Ethernet Bridge	EFM-20	4-wire, 4-port LAN extender	S	129
22.8Mbps Ethernet Bridge	EFM-40	8-wire, 4-port LAN extender	S	129
G.SHDSL.bis LAN Extender				
5.7Mbps Ethernet Bridge	SHDTU03b-ET100BS	2-wire, 4-port LAN extender	S	130
G.SHDSL LAN Extender				
2.3Mbps Ethernet Bridge	SHDTU03-ET100B	2-wire, LAN extender	S	131
VDSL2 LAN Extender				
Ethernet Bridge	VDTU2A-301	VDSL2 LAN extender	S	132
Ethernet Bridge Family				
V.35, RS530, RS449, X.21	ET100	Ethernet to WAN (V.35, RS530, RS449, X.21) bridge	С	133
G.703 Co-directional	ET100/G64	Stand-alone Ethernet to G.703 Co-direcctional 64K bridge	S	134
NRZ	ET100/NRZ	Stand-alone Ethernet to NRZ bridge	S	135

Surge Protector Family

Ethernet	SP-SE-S01-4	4-wire Ethernet surge protector	SP	136
Ethernet	SP-SE-S08-8	8-port 8-wire Ethernet surge protector	SP	136
Ethernet	SP-RE-R16-8	16-port 8-wire Ethernet surge protector	SP	136
Ethernet	SP-RE-R24-8	24-port 8-wire Ethernet surge protector	SP	136



LAN Extender

Ethernet over Coax

the man the test

EOC-10

The EOC-10 is point-to-point and point-to-multipoint EoCNA (Ethernet over Coax Network Alliance) solution that efficiently extends 10/100 Ethernet circuits up to 900 meters (2,952feet) at full Fast Ethernet speed using existing coaxial cable. The EOC-10 will allow Ethernet connectivity in existing facilities or homes without pulling extra cable. This is perfect solution for Ethernet on the factory floor where systems have been upgraded from slower serial communication to Ethernet networking. Installation is easy with absolutely no settings required. The EOC-10 is used in Coaxial cable systems to extend Ethernet connectivity over existing CCD/CATV grade Coaxial cable. The EOC-10 works by sharing the same cable with CATV signals, without interference to the existing CATV signals.

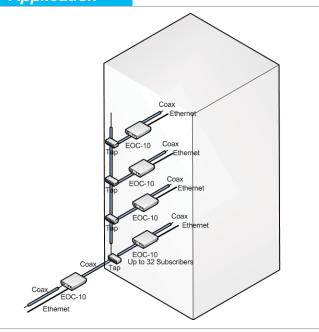
Features

- Extends LAN connectivity using existing coaxial cable
- Transmits CATV and Ethernet over the same coaxial cable
- 112Mbps (PHY speed) @ 900 meters (2,952feet)
- 32Mbps (PHY speed) @ 1.2Km (4,000feet)
- Supports point to point and point to multi-point up to 32 nodes over tap/splitter
- Asymmetrical using EoCNA standard
- Operates transparently to high layer protocols such as TCP/IP
- Auto MDI / MDIX
- Auto negotiation
- Plug and Play, no configuration required
- Status LEDs for simple monitoring

Specifications

Ports	Fast Ethernet Interface 10/100 Mbps, RJ45			
	Coax InterfaceTwo F-Type Female Coax Connectors			
	One for EoCNA, the other for TV			
	Protocol Transparent to higher layer protocols			
	Transmission Power 8 ±1 dBm, 12~28 MHz			
	and Spectrum			
	Physical layer transmission speed and distance			
	Up to 112Mbps@900 meters			
	Up to 32Mbps @ 1.2Km (-176dBm/Hz Noise Floor)			
LEDs	PWR, LAN Link/Act, Coax Link/Act, Coax Sync			
Standard	ITU G.9954, IEEE802.3, IEEE802.3u, IEEE802.3x			
Power	DC 5V (via AC switching adapter)			
Power Consumption	6W			
Dimensions	83 x 138 x28mm			
(D x W x H)mm				
Weight	330g			
Temperature	0~50°C (Operating) ,0~70°C (Storage)			
Humidity	10~90% non-condensing			
Certification	CE, FCC, RoHS			
MTBF	57,000 hours			

Application



Ordering Information

■ EOC-10

10/100Base-TX Ethernet over coax, AC adapter required

LAN Extender

Ethernet over Coax with IP Management

EOC-20, EOC-21





Fast Ethernet Interface 10/100 Mbps. RJ45

The EOC-20/21 is a point-to-multipoint EoCNA (Ethernet over Coax Network Alliance) solution that efficiently extends 10/100 Ethernet circuits up to 900 meters (2,952feet) at full Fast Ethernet speed using existing coaxial cable. The EOC-20 is a master unit which acts as a bridge and distributes bandwidth to up to 32 EOC-21 subscriber units in a fashion similar to time division multiplexing. The EOC-21 is actually where all the packet processing takes place. At the heart of this device is a 6 port L2/3/4 switching gateway controller. By placing all the management in the cpe units, Multi-Service Operators can guarantee that no single client will be able to hog all of the EoCNA bandwidth and effect other customer's service. This allows deployment of triple-play applications where quality of service must be maintained. The EOC-20/21 works by sharing the same cable with CATV signals, without interference to the existing CATV signals.

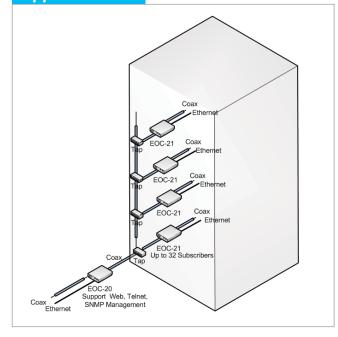
Features

- Extends LAN connectivity using existing coaxial cable
- Transmits CATV and Ethernet over the same coaxial cable
- Supports VLAN tag and port, QOS, bandwidth control, auto-provisioning via TFTP
- Supports Web, Telnet and SNMP management
- Two (2) Ethernet ports, one for STB (Set Top Box), one for LAN
- 112Mbps @ 900 meters (2,952feet) reach
- 32Mbps @ 1.2Km (4,000feet)
- Supports point to point and point to multi-point with up to 32 nodes over tap/splitter
- Asymmetrical using EoCNA standard
- Operates transparently to high layer protocols such as TCP/IP
- Auto MDI / MDIX
- Auto negotiation
- Status LEDs for simple monitoring

Specifications

Ports	Fast Ethernet Interface 10/100 Mbps, RJ45
	Coax InterfaceTwo F-Type Female Coax Connectors
	One for EoCNA , the other for TV
	Protocol Transparent to higher layer protocols
	Transmission Power 8 ±1 dBm, 12~28 MHz
	and Spectrum
	Physical layer transmission speed and distance
	160Mbps maximum speed
	Up to 112Mbps @ 900 meters
	Up to 32Mbps @ 1.2Km (-176dBm/Hz Noise Floor)
Quality of Service	Priority Based on IEEE802.1p and TCP/UDP port
	Priority Based on 802.1Q Tag
	Guaranteed QoS based on Layer II Parameterized QoS
Management	Diagnostic EoCNA function
	Secured/Isolated Communication between devices
	Provision/Denial of Service
	CPE profile download provision & SNMP
	read/write & Web Manager setting
	DHCP snooping
	DHCP Option 82 support
	DHCP session manager
	NetBIOS filtering
	ARP support
	Port Rate limit function for HCNA port or Port Based
LEDs	EOC20: PWR, LAN Link/Act, STB Link/Act,
	Coax Link/Act, Coax Sync
	EOC21: PWR, Alarm, Sys, LAN Link/Act,
	STB Link/Act, Coax Link/Act, Coax Sync
Standard	ITU G.9954, IEEE802.3, IEEE802.3u, IEEE802.3x,
	IEEE802.1Q, IEEE802.1p, IGMPv1/v2
Power	DC 5V (via AC switching adapter)
Power Consumption	6W
Dimensions	83 x 138 x28mm
(D x W x H)mm	
Weight	330g
Temperature	0~50°C (Operating) ,0~70°C (Storage)
Humidity	10~90% non-condensing
Certification	CE, FCC, RoHS
MTBF	35,000 hours

Application



Ordering Information

- EOC-20
- Master unit, 2 port 10/100 Ethernet over Coax, AC adapter required
- **EOC-21** Slave unit, 2 port 10/100 Ethernet over Coax, AC adapter required

LAN Extender Family

Ethernet First Mile Extender





The EFM-X0 is an Ethernet Network Extender designed to provide bonded, high-speed services over SHDSL on existing copper infrastructure using standards based EFM (Ethernet in the First Mile) technology (2Base-TL). EFM, also known as IEEE 802.3ah, is a collection of protocols specified in IEEE 802.3, defining Ethernet in access networks, i.e. first or last mile. With Wide, Metro and Local Area Networks already standardized, EFM allows a continuous Ethernet network across the globe, eliminating non-native transports such as Ethernet over ATM from access networks. EFM also addresses other issues, required for mass deployment of Ethernet services, such as operations, administration & management (OAM) and spectral compatibility with existing technologies such as voice, ASDL, VDSL and SHDSL. The EFM-X0 is a bridge mode modem that delivers Ethernet services with symmetrical bandwidth at rates up to 22.8Mbps with four bonded copper pairs. This "Pure Ethernet" solution provides a seamless integration into today and tomorrow's networks. The modem operates in point-to-point connections between remote office and enterprise headquarters, providing business-class Ethernet service at symmetrical high-speed connectivity that is ideal for small-to-medium enterprises.

Features

- Extends Ethernet services to sites with existing copper infrastructure
- EFM Bonding (PAF, PME Aggregation Function) up to 22.8Mbps (4 pairs)
- Flexible configuration as CPE or CO
- Supports EFM OAM complying with IEEE 802.3ah
- Low Delay, Jitter and Packet Loss for delay sensitive applications
- Comprehensive and easy OAM&P functions for provisioning and management
- QoS feature for guaranteed Ethernet service
- Web-based GUI for setup, configuration and management
- Menu-driven interface for local control via console or telnet
- Password protected management and access control list for administration
- Supports firmware upgrade via web

Specifications

Specifications	<u> </u>
Ports	Connector : RJ45, 8 pins
WAN Interface	• SHDSL.bis: ITU-T G.991.2 (2004) Annex AF/BG
	Encoding scheme: 16-TCPAM, 32-TCPAM
	• 2BASE-TL, 64/65-octet encoding
	EFM bonding (IEEE 802.3ah PAF)
	Maximum date rate is 22.8Mbps for 8-wire mode
	(5.7Mbps/Port x 4Ports=22.8Mbps)
	• Impedance: 135 ohms
LAN Interface	• Four RJ45 Connectors
	4-ports switching hub
	• 10/100 Base-T auto-sensing and auto-negotiation
	Auto-MDI/MDIX (Auto-Crossover)
	802.1d Transparent Bridging
QoS	ingress Rate control
	Egress Traffic shaping
	Classification based on Port Base / VLAN Tag / DSCP
	4 Priority Queues
	WRR(Weighted round-robin)/ BE(Best Effort) /
	SP(Strictly Priority)
VLAN	802.1Q Tag-Based VLAN
	Port-Based VLAN
	Port-Based Q-in-Q
	Priority Re-mapping
	VLAN Trunk mode
Management	Easy to use web-based GUI for quick setup,
Ŭ	configuration and management
	Menu-driven interface/Command line interface (CLI) for
	local console and telnet access
	Password protected management and access control list
	for administration
	• SNMP v1/v2 (RFC1157/1901/1905) agent and MIB II
	(RFC1213/1493)
	• EFM OAM (IEEE 802.3ah)
	Software upgrade via web-browser/TFTP
LEDs	WAN Link/Activity, LAN Link/Act/Speed
	System: Power, Alarm and Management
Memory	2MB Flash Memory , 4MB SDRAM
Standard	ITU-T G.991.2, IEEE802.3, 802.3u, 802.3ah, 802.3ad
Power	DC 9V via AC power adapter
Power Consumption	9W
Dimensions	168 x 195 x 48mm
(D x W x H)mm	
Weight	1.3Kg
Temperature	0~50°C (Operating) ,0~70°C (Storage)
Humidity	10~90% non-condensing
Certification	CE, FCC, RoHS
MTBF	35,000 hours
MITEL	33,000 HOUIS

Typical Ranges (26 AWG)

Data Rate	1-pair		2-pair		4-pair	
[kbps]	[km]	[mi]	[km]	[mi]	[km]	[mi]
192	8	4.9	8	4.9	8	4.9
512	6.4	3.9	6.7	4.1	6.7	4.1
1536	5.7	3.5	6	3.7	6.5	4
2048	5.1	3.1	5.7	3.5	6.4	3.9
4096	3.9	2.4	5.1	3.1	5.7	3.5
4608	3.5	2.1	5	3	5.5	3.4
5696	2.9	1.8	4.6	2.8	5.1	3.1
11392			2.9	1.8	4.6	2.8
17088					3.5	2.1
22784					2.9	1.8

Ordering Information

■ **EFM10** 4 port LAN extender, 2 wire, 5.7Mbps, AC power required

■ **EFM20** 4 port LAN extender, 4 wire, 11.4Mbps, AC power required

■ **EFM40** 4 port LAN extender, 8 wire, 22.8Mbps, AC power required

LAN Extender Family

G.SHDSL.bis 5.7Mbps LAN Extender (4 port bridge)

SHDTU03b-ET100BS

The SHDTU03b-ET100BS is a low cost LAN extension solution using the latest G.991.2 (2004), G.SHDSL.bis technology and providing 192Kbps ~ 5.7Mbps throughput with only a single copper wire pair. A LAN extender is a device that forwards traffic between LANs transparently to higher network-layer protocols over distances that far exceed the distance limitations of standard Ethernet. A LAN is a high-speed data network (usually employing Ethernet technology) that connects computer workstations, printers, servers, and other devices. Designed specifically for LAN to LAN extension, this is a perfect solution to extend a LAN to an adjacent building, garage or any location outside of the 100 meter reach of Ethernet UTP.

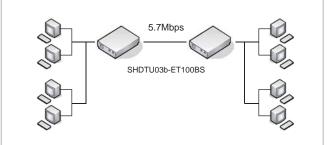
Features

- Extends LAN connectivity using copper pair
- Symmetrical up / downstream data rates from 192Kbps ~ 5.696Mbps
- Adaptive or Fixed rate
- STU-C / STU-R mode selectable
- Supports 802.1Q port and tag based VLAN
- 4 port 10/100 Base-TX Ethernet with 64Kbps bandwidth control granularity
- Auto MDI / MDIX
- Auto-Negotiation
- Console port setting
- Status LEDs for simple monitoring

Specifications

Line coding: 16 TC-PAM or 32 TC-PAM
Line rate: 192Kbps ~ 5696Kbps
Annex A, Annex B and Annex F selectable
10/100Base-TX, RJ45
Data rate: 192Kbps ~ 5696Kbps
Packet sizes: 1518/1522(default),
1536/1784 selectable
MAC address filtering bridge up to 2K
Power, LAN, Link/Act, Speed, Alarm
ITU-T G.991.2 (2004), IEEE802.3,
802.3u, 802.1Q, 802.1D
DC 5V via AC switching adapter
3.5W
130 x 161 x 28.8 mm
0.3kg
0~50°C (Operating) ,0~70°C (Storage)
10~90% non-condensing
CE, FCC
35,000 hours

Application



Ordering Information

■ SHDTU03b-ET100BS

4 port LAN Extender, G.SHDSL.bis 5.7Mbps, AC adapter required

LAN Extender Family

G.SHDSL 2.3Mbps LAN Extender



SHDTU03-ET100B

The SHDTU03-ET100B is a low cost LAN extension solution using the G.991.2 G.SHDSL technology and providing 64Kbps ~ 2.3Mbps throughput with only a single copper wire pair. A LAN extender is a device that forwards traffic between LANs transparently to higher network-layer protocols over distances that far exceed the distance limitations of standard Ethernet. A LAN is a high-speed data network (usually employing Ethernet technology) that connects computer workstations, printers, servers, and other devices. Designed specifically for LAN to LAN extension, this is a perfect solution to extend a LAN to an adjacent building, garage or any location outside of the 100 meter reach of Ethernet UTP.

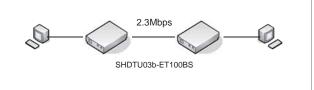
Features

- Extends LAN connectivity using copper pair
- Symmetrical up / downstream data rates from 64Kbps ~ 2.3Mbps
- 2.3Mbps @ 3.9km (13,000 Ft)
- 64Kbps @ 12.8km (42,000 Ft)
- Adaptive or Fixed rate
- STU-C / STU-R mode selectable
- Auto MDI / MDIX
- Auto-Negotiation
- Console port setting.
- Status LEDs for simple monitoring

Specifications

Ports	Line coding: TC-PAM
WAN Interface	Line rate: 64Kbps ~ 2304Kbps
	Annex A or Annex B selectable
LAN Interface	10/100Base-TX, RJ45
	Data rate: 64Kbps ~ 2304Kbps
	Packet sizes: 1518/1522(default),
	1536/1784 selectable
	MAC address filtering bridge up to 2K
LEDs	Power, LAN, Link/Act, Speed, Alarm
Standard	ITU-T G.991.2, IEEE802.3, 802.3u,
	802.1Q, 802.1D
Power	DC 5V via AC switching adapter
Power Consumption	3.5W
Dimensions	130 x 161 x 28.8 mm
(D x W x H)mm	
Weight	0.3kg
Temperature	0~50°C (Operating) ,0~70°C (Storage)
Humidity	10~90% non-condensing
Certification	CE, FCC
MTBF	35,000 hours

Application



Ordering Information

■ SHDTU03-ET100B G.SHDSL 2.3Mbps LAN Extender, AC power required

LAN Extender Family VDSL2 LAN Extender



VDTU2A-301

The VDTU02A-301 is our lowest cost LAN extension solution using the G993.1/993.2 VDSL2 technology and providing up to 100Mbps throughput with only a single copper wire pair. A LAN extender is a device that forwards traffic between LANs transparently to higher network-layer protocols over distances that far exceed the distance limitations of standard Ethernet. A LAN is a high-speed data network (usually employing Ethernet technology) that connects computer workstations, printers, servers, and other devices. Designed specifically for LAN to LAN extension and supporting both symmetrical and asymmetrical transmission at up to 100/75Mbps within 300 meters or 10/10Mbps rate at 1000 meters, this is a perfect solution to extend a LAN to an adjacent building, garage or any location outside of the 100 meter reach of Ethernet UTP.

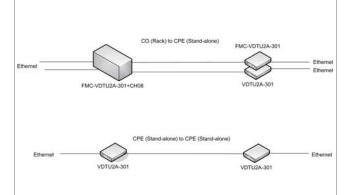
Features

- Cost effective bridge function to connect two Ethernet LAN
- 100/75Mbps @ 300m (980 Ft)
- 10/10Mbps @ 1km (3300 Ft)
- Support flow control via Pause frame or back pressure
- 802.1Q VLAN tag transparent
- Selectable CPE and CO mode via DIP switch
- Selectable fast and interleaved mode
- Selectable data rate
- Selectable target SNR margin 9dB or 6dB

Specifications

Ports	Complies with IEEE 802.3 10Base-T and
LAN Interface	802.3u 100Base-TX
	Connector: RJ45
VDSL2 Interface	Complies with ITU-T G993.1/993.2
	Connector: RJ45
	DMT encoding
	On-board surge protection
LEDs	LAN: Act/Link, 10/100Mbps, Half/Full duplex
	VDSL: CO/CPE, Idle/Trained/Link
Standard	ITU-T G.993.1, 993.2, IEEE802.3, 802.3u
Power	DC 12V via AC switching adapter
Power Consumption	4.2W
Dimensions	97 x 73 x 23mm
(D x W x H)mm	
Weight	80g
Temperature	0~50°C (Operating) ,0~70°C (Storage)
Humidity	10~90% non-condensing
Certification	CE, FCC, RoHS
MTBF	50,000 hours
	·

Application



Ordering Information

■ VDTU2A-301 LAN Extender

Ethernet Bridge Family

Ethernet over WAN (V.35, X.21, RS530, RS449, RS232)



ET100

The ET100 Network Bridge is a high performance remote, self-learning, Ethernet bridge. Its compact size and low cost makes it ideal for cost-sensitive bridging applications, or as a LAN extender or segmenter over bit stream type infrastructures. The built-in n x 64(56)Kbps timing clock generator makes it easy to connect to other n x 64(56)Kbps related data equipment. Several options of data interfaces, including V.35, RS-530, RS-449, X.21 and RS-232, make this unit's connection between 10Base-T or 100Base-TX LAN and various data port interfaces convenient.

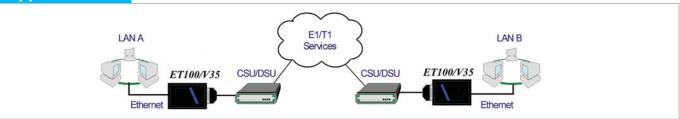
Features

- High performance bridge for 10Base-T or 100Base-TX Ethernet extension
- Auto MDI/MDIX
- Selectable data port: V.35, X.21, RS530, RS449, RS232
- Transparent half / Full duplex support on WAN, LAN interface
- Nx64, Nx56 timing clock generator for Sync WAN link
- LEDs indication for LAN, WAN status

Specifications	5
Ports	WAN Interface
	Interface : Selectable RS232(Sync), V.35,
	RS530/449, X.21
	Protocol: Synchronous HDLC (ISO 13239)
	Connector: DB25M
	Type: DTE port
	Data rate: • RS232 up to 128Kbps
	• V35, X21, RS530, RS449 up to 2Mbps
	 Nx64(56)Kbps up to 2048Kbps
	Clock source: Tx/Rx internal or external
	LAN Interface
	Compliant with IEEE 802.3, 802.3u
	Connector: RJ45
	Speeds: 10/100Base-TX, Full/Half duplex
	• Frames: Support 64 ~ 1522 byte packet lengths
	Bridge Specifications
	• Protocol: Synchronous HDLC (ISO 13239)
	Address learning, aging and deletion after 5 minutes
	• 256 addresses MAC table

	340 packet buffer
LEDs	PWR, WAN Rx/Tx, LAN Tx/Rx/Link/Err/Speed
Standard	IEEE802.3, 802.3u
Power	DC 9 V in
Power Consumption	<5W
Dimensions	135 x 79 x 25mm
(D x W x H)mm	
Weight	150g
Temperature	0~50°C (Operating) ,0~70°C (Storage)
Humidity	10~90% non-condensing
Certification	CE, FCC, RoHS
MTBF	35,000 hours

Application



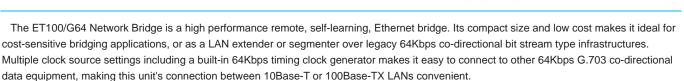
Ordering Information

■ **ET100** Compact Ethernet bridge: 10Base-T/100Base-TX to Data interfaces: with optional cable for V35/ RS530 / RS449 / X.21 / RS232 (Sync only); DC 9V power adapter

Ethernet Bridge Family

Ethernet over G.703 Co-directional 64K Bridge

ET100/G64



Features

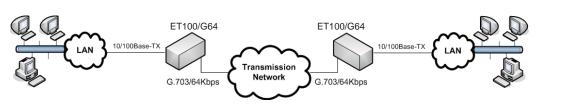
- 10/100Base-TX, Full Duplex or Half Duplex
- Auto MDI/MDIX
- IEEE 802.3x flow control
- Real-time filtering with 256 MAC address tabl
- Auto address learning, aging and detection after 5 mins
- up to 340 packet-buffering capacity
- Built-in nx64K / nx56K timing clock generator for WAN link

Specifications				
Ports	WAN Interface			
	Type: Co-directional 64Kbps			
	Line code: Co-directional			
	Line: 4 wires 19 to 26 AWG			
	Range: up to 800 meters over 24 AWG			
	Impedance: 120 ohms			
	Pulse Amplitude: Nominal 1.0V±10%			
	Zero Amplitude: Nominal 0V±0.1V			
	Clock Frequency: ±100ppm			
	Connector: RJ45			
	Frame format: Unframed			
	LAN Interface			
	Compliant with IEEE 802.3, 802.3u			
	Connector: RJ45			
	Data rate: 64Kbps			
	Speeds: 10/100Base-TX, Full/Half duplex			
	• Frames: Support 64 ~ 1536 byte packet lengths			
	Bridge Specifications			
	Protocol: Synchronous HDLC (ISO 13239)			
	Address learning, aging and deletion after 5 minut			

- Address learning, aging and deletion after 5 minutes
- 256 addresses MAC table
- 340 packet buffer

LEDs	PWR, TD/RD, Link, LAN Rx/Tx, 100M, Full, Err, Test
Standard	IEEE802.3, 802.3u, ITU-T G.703, G.823
Power	AC: 100 ~240V, DC 18~72V
Power Consumption	<5W
Dimensions	235 x 195 x 45mm
(D x W x H)mm	
Weight	950g
Temperature	0~50°C (Operating) ,0~70°C (Storage)
Humidity	10~90% non-condensing
Certification	CE, FCC, RoHS
MTRF	57.000 hours

Application



Ordering Information

■ ET100/G64-AC G.703 64K to Ethernet modem with AC power

■ ET100/G64-DC G.703 64K to Ethernet modem with DC power

Ethernet Bridge Family

Ethernet over NRZ Bridge



ET100/NRZ

The ET100/NRZ Network Bridge is a high performance, remote, self-learning Ethernet bridge. Its solid design makes it ideal for cost-sensitive bridging applications, or as a LAN extender or segmenter over NRZ bit stream type infrastructures. Multiple clocking options including a built-in n x 64(56)Kbps timing clock generator makes it easy to connect to other n x 64Kbps NRZ data equipment.

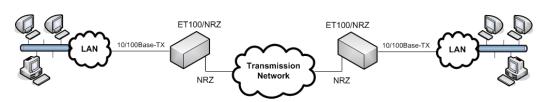
Features

- 10BASE-T/100BASE-TX, Auto, Full Duplex or Half Duplex
- HP Auto-MDI/MDIX detects and corrects crossed cable
- IEEE 802.3x flow control enable/disable
- Real-time filtering with 256 MAC address table
- Automatic address learning, aging and deletion after 5 minutes
- Up to 340 packet-buffering capacity
- Forwarding and filtering rate at wire speed with throughput latency of 1 frame.
- Auto padding of undersized packets to meet the minimum
 Ethernet packet size requirement
- Buffering modes can be selected according to the setting of WAN and LAN line speeds
- Built-in nx64K / nx56K timing clock generator for WAN link

Specifications

Ports	WAN Interface
	Type: Fixed type NRZ
	Protocol: Synchronous HDLC (ISO 13239)
	Connector: 4x BNC
	Data rate: Nx64Kbps, up to 2048Kbps
	Clock source: Tx/Rx internal or recovery from NRZ
	LAN Interface
	Compliant with IEEE 802.3, 802.3u
	Connector: RJ45
	Data rate: Nx64Kbps
	Speeds: 10/100Base-TX, Full/Half duplex
	• Frames: Support 64 ~ 1536 byte packet lengths
LEDs	PWR, TD/RD, Link, LAN Rx/Tx, 100M, Full, Err, Test
Standard	IEEE802.3, 802.3u, ISO 13239
Power	AC: 100 ~240V, DC 18 ~ 72V
Power Consumption	<15W
Dimensions	235 x 195 x 45mm
(D x W x H)mm	
Weight	950g
Temperature	0~50°C (Operating) ,0~70°C (Storage)
Humidity	10~90% non-condensing
Certification	CE, FCC, RoHS
MTBF	57,000 hours

Application



Ordering Information

- ET100/NRZ-AC 10/100BaseTx Ethernet to NRZ BNC interface with Internal AC 100~240V power supply
- ET100/NRZ-DC 10/100BaseTx Ethernet to NRZ BNC interface with Internal DC 18~72V power supply

135

Ethernet Family

Fast Ethernet Surge Protector

SP-SE-R01



A surge protector is an appliance designed to protect electrical devices from voltage spikes. A surge protector attempts to regulate the voltage supplied to an electric device by either blocking or by shorting to ground voltages above a safe threshold. The SP-SE-R01 will ensure the reliable operation of RJ-45 twisted pair based networking equipment running Ethernet. Single unit and rack mountable surge protectors are both

Features

- Ethernet 10/100Base-TX Data line protection
- Fast energy absorption when over-voltage occurs
- Low series resistance and minimal capacitance values to preserve the data information

Specifications

Un	5V
Uc	6.8V
Isn (discharge current)	2.5KA
Imax	5KA
Ures	<30V
tA (Response time)	< 1ns
Protected Cores	SP-SE-R01: 4 pins
	SP-SE-R08: 8 pins
	SP-SE-R16: 8 pins
	SP-SE-R24: In: 8 pins
Attenuation in dB	<0.5dB (100MHz)
Series Capacity	40PF
Dimensions	SP-SE-R01: 85 x 55 x 24 mm
(D x W x H)mm	SP-SE-R08: 73 x 143 x 44mm
	SP-SE-R16: 73 x 480 x 44mm
	SP-SE-R24: 73 x 480 x 44mm
Weight	SP-SE-R01: 75g
	SP-SE-R08: 435g
	SP-SE-R16: 1380g
	SP-SE-R24: 1400g
Certification	IEC 61644-1

Ordering Information

SP-SE-R01 1 port 10/100Base-TX Ethernet Surge Protector
 SP-SE-R08 8 Ports 10/100Base-TX Ethernet Surge Protector
 SP-RE-R16 16 Ports 10/100Base-TX Ethernet Surge Protector
 SP-RE-R24 24 Ports 10/100 Base-TX Ethernet Surge Protector

TESTER SERIES

Fiber Tester / Protocol Analyzer / PCM Analyzer / LAN Cable Tester



Fiber Tester Family

Type: H = Handheld

71.				
Interface	Model Name	Description	Туре	Page
Fiber (9/125µm)	OTDR-30A	Single mode fiber optical time domain reflectometer	Н	137
STM-1	HCT-SDH155	SDH/PDH network analyzer up to 155Mbit/s	Н	138
Fiber (9/125, 50/125, 62.5/125µm)	OPM-300A/B	Optical power meter	Н	139
Fiber (9/125, 50/125, 62.5/125µm)	OLS-100	Optical laser source	Н	140

Protocol Analyzer Family

V.35/X.21/RS530/RS449/RS232	HCT-6000	Datacom protocol and BER tester	Н	143

PCM Analyzer Family

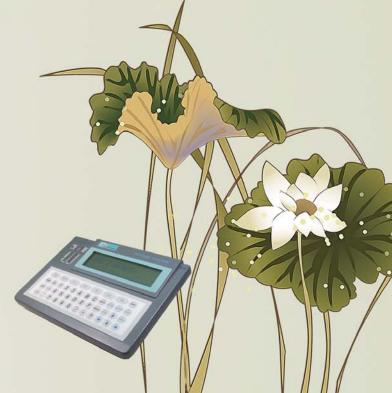
E1/T1/V.35/X.21/RS530/	BTM10	E1/ T1/ Datacom transmission analyzer/ BERT	Н	144
RS449/RS232				
E1/T1/V.35/X.21/RS530/	HCT-BERT/H	E1/ T1/ Datacom, BER tester	Н	147
RS449/RS232				
E1/V.35/X.21/RS530/RS449	HCT-BERT/C	E1/Datacom, BER tester w/ color LCD display	Н	149
E1/V.35/X.21/RS530/RS449/RS232	HCT-7000	Dual interface E1/ Datacom, protocol analyzer and BER tester	Н	141

LAN Cable Tester Family

UTP, STP	LCT-300	LAN cable continuity, ID tester	Н	150
UTP, STP, Coax	LCT-400	LAN cable continuity, ID tester	Н	150







Fiber Tester Family Optical Time Domain Reflector

MATERIAL STATES OF THE STATES

OTDR-30A

The OTDR-30A is an OTDR (Optical Time Domain Reflectometer) based optical fault locator and analysis tool for optical fiber networks. The OTDR features a light, compact, hand-held design with an intelligent user interface that is easy and quick to use. The color LCD display with bright backlight make testing work more comfortable and convenient, whether during daylight or in low light conditions. As a fault locating and analyzing tool, the OTDR-30A is much more economical than traditional OTDRs. In addition to its 300 plus internal curve storage, the OTDR-30A can save and transfer the measurement curves data to a PC via serial or USB port for further analysis or printing with Window(r) based "Trace Manager" software. When set in auto measurement mode, the user can activate the measurement operations easily by the push of only one button. The OTDR-30A is ideal for optical fiber installation, maintenance, field construction, and other on-site fault-location analysis.

Features

- Auto off function conserves battery energy
- Backlight supports testing work at low light conditions
- Built-in NiMH rechargeable battery supports 5 hours continuous operation
- Dual wavelength capability (1310 & 1550 nm)
- Dust, damp and shock resistant design for field application
- Easy to use, no tedious learning process
- Fast test & color LCD displays all measurement information
- Large memory capacity (300 test curves)
- LCD indicators for battery charge and LD lasing status
- Low battery Indicator
- Lightweight, portable and economical
- RS-232/USB data upload ports
- Trace Manager PC software for previously stored data analysis and reporting

Specifications

Dynamic Range	24dB
Wavelength	1310/ 1550 ±20nm
Fiber Type	Single Mode
Optical Connection	Single Port
Emitter Type	LD
Connector Type	FC/PC, SC/PC or ST/PC
Selectable Range	1.3, 2.5, 5, 10, 20, 40, 80 120km
Selectable pulse widtl	η 30ns, 100ns, 275ns, 1μs, 2.5μs
Measurement Time	15s, 30s, 1min, 2min, 3min
Attenuation Deadzone	e 25m
Event Deadzone	10m
Sampling Range	1m ~ 10m
Distance Measure Ac	curacy ±(1m + 5x10-5 x Distance + sampling space)
Attenuation Detect Ac	ccuracy ±0.05dB/ dB
Reflection Detect Acc	uracy ±4dB
Data Storage	300 test traces
Data Interface	RS-232 and USB port
	•
Power	1600mA/ h AC adapter
Power	1600mA/ h AC adapter (internal NiMH rechargeable battery)
Power Environmental	·
	(internal NiMH rechargeable battery)
	(internal NiMH rechargeable battery) Temperature -10~50°C (Operating)
	(internal NiMH rechargeable battery) Temperature -10~50°C (Operating) -20~65°C (Storage)
Environmental	(internal NiMH rechargeable battery) Temperature -10~50°C (Operating) -20~65°C (Storage) Humidity 0 ~ 95% non condensing

Application

- Splicing loss detection
- Fiber attenuation measurement
- Acceptance testing
- Fiber break locating
- Fiber length measurement
- Fiber identification

Ordering Information

- *OTDR-30A-FC* 24/24dB, 1310/1550nm, Single mode OTDR tester with FC connector
- OTDR-30A-SC 24/24dB, 1310/1550nm, Single mode OTDR tester with SC connector
- OTDR-30A-ST 24/24dB, 1310/1550nm, Single mode OTDR tester with ST connector

SDH Tester Family Handheld SDH and PDH Network Analyzer

HCT-SDH155

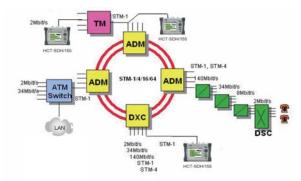
The HCT-SDH/155 transmission analyzer is a handheld, graphic color LCD touch screen, SDH/PDH measuring instrument designed for field use in analysis and maintenance of STM-1(155Mbps) and E1(2.048 Mbps) lines. The HCT-SDH/155 has both optical and electrical ports for evaluation and analysis of SDH and PDH networks with results displayed according to ITU-T G.821, G.826, G.828, G.829, M.2100 or M.2101. Its easy operation, light weight, long working time and low price make an ideal solution for field work.

Features

- Displays according to ITU-T G.821/826/828/829 and M.2100/2101
- Tandem Connection Monitoring (TCM) and APid tests
- Supports pointer adjustment test
- Automatic Protection Switching (APS)
- Round trip delay measurement (STM-1 and E1)
- Scan VC4, VC3, VC12 tributary signals
- Firmware update through USB
- Operates by key-press or touch screen

Application

- Maintenance Telecom
- Maintenance CATV
- Test Lab of Fiber Optic
- Other Fiber Optical Measurement



Specifications

Specifications	S
Ports	Electric port : BNC, unbalanced
	Optic port: SFP-LC (1310nm, 1550nm)
	Frequency offset: ±99 ppm, 1ppm per step
	Clock sources: Internal, External and Recovery
	PRBS: 2n-1 (n=9, 11, 15, 20, 23), all "1" or al1 "0"
	Customer can edit insertion and analyzing overhead
	SOH: J0, B1, B2, E1, E2, F1, D1, D2, D3, D4, D5,
	D6, D7, D8, D9, D10, D11, D12, S1, M1
	POH: J1, B3, C2, G1, F2, H4, F3, K3, N1, V5, J2, N2, K4
	Pointer sequence adjustment according to ITU-T G.783
	Monitor alarm and performance according to
	ITU-T G.783, G.958
	SDH: LOS, AIS, OOF, EFAS, LOF, RS/HP/LP
	TIM, MS/AU/TU AIS, MS/HP/LP RDI,AU/TU
	LOP, HP/LP UNQ, TU LOM, HP/LP PLM,
	RFI MS-/HP-/LP-FERF
	PDH: LOF, RAI, CRCL, MAIS, CASL, MRAI
	TCM: UNQ, LTC, RDI, ODI, TIM, AIS
	From D1 ~ D3, D4 ~ D12, E1, E2, F1 transparent
	channel, insert/pick-up PRBS
	ITU-T mappings for SDH,
	including the concatenated ones
	SDH Test Mode:
	SDH Path, SDH Demux, SDH Mux, SDH Monitor,
	SDH Through
	PDH Test Mode:
	PDH Path, PDH Monitor, PDH Through
Standard	ITU-T G.703, G.957, G.783, G.958
Power	C12V with AC switching adapter
Dimensions	100x 196 x 60mm
(D x W x H)mm	
Weight	870g
Temperature	0~50°C (Operating), 0~70°C (Storage)
Humidity	10~90% non-condensing
MTBF	30,000 hours

Ordering Information

■ HCT-SDH155 SDH & PDH analyzer

Fiber Tester Family Optical Power Meter



OPM-300A, OPM-300B

The OPM-300 is a handheld optical power meter (OPM) device used to measure the absolute or relative power of an optical signal. The OPM-300 consists of a calibrated sensor and display. The sensor consists of a photodiode that operates in the desired range of wavelengths. On the unit, measured optical power is shown and appropriate wave length is displayed. This ingenious device has a wide range of power measurements with high precision.

Features

- User self recalibration function
- Large LCD display and optional backlight
- Displays optical power in mw, dB and dBm
- Absolute and relative power measurement
- Quick response, without warm-up time
- Moisture, dust and water resistant design
- Low battery consumption (more than 240 hours continuous operation on three alkaline batteries)
- Optional 10 minutes auto shutoff function

Specifications

Ports	Wavelength: 800~1650nm
	Calibrated Wavelength:
	800, 980, 1300, 1310, 1550nm
	Measure Range:
	OPM-300A -70~ +3dBm
	OPM-300B -50 ~ +26dBm
	Data Interface: RS-232
	Detector Type: InGaAs
	Range of Use: Single/ Multiple mode fiber
	Accuracy: ±0.25dB (5%) @25°C & -10dBm
	Resolution: 0.01dB
	Connector: FC/ PC (Interchangeable SC, ST)
Power	1.5V AA Battery
Dimensions(WxDxH)	74x 152 x 26mm
Weight	200g
Temperature	0 ~ 50°C (Operating), 0 ~ 70°C (Storage)
Humidity	10 ~ 90% non-condensing
Certification	CE, FCC
MTBF	30,000 hours

Ordering Information

■ *OPM-300A* 850, 980, 1300, 1310, 1550nm, -70 ~ +3dBm

■ *OPM-300B* 850, 980, 1300, 1310, 1550nm, -50 ~+26dBm

Fiber Tester Family Optical Laser Source



OLS-100

The OLS-100 is an Optical Light Source that can be used in conjunction with our OPM-300 Optical Power Meter to test installed fiber cabling for attenuation loss over medium to long distances. The OLS-100 can provide 1 to 4 wavelength outputs according to the specific requirements including 650nm visible red source, 1310/1550nm wavelength for single mode fiber and 850/1300nm wavelength for multimode fiber. Together with any optical power meter, it acts as a perfect solution for confirming or troubleshooting an optical fiber network.

Features

- Compact size
- Highly stable output power
- More than 45 hours working battery life
- Large LCD display
- Easy operation

Specifications

Model	OLS-100			
Wavelengths(nm)	650	1310/1550	850/1300	More wavelengths can be optional the maximum can be four wav
Emitter Type	FP-LD			
Output Power(dBm)	0	-7	-20	Other emitted can be optional
Spectral Width(nm)	≤ 10			
Output Stability	± 0.05dB/15mins; ± 0.1dB/ 8hours			
Modulation Frequencies	CW,2Hz	CW,270Hz,1KHz,2KHz		
Optical Connector	FC universal adaptor	FC/PC		
Power Supply	Alkaline Battery(3 AA 1.5V batteries)			
Operating Temperature(°C)	-10 ~ +60			
Storage Temperature(°C)	-25 ~ +70			
Dimension(mm)	152 x 74 x 26			
Weight	180g			

Ordering Information

■ OLS-100

650, 1310/1550, 850/1300nm, 0 ~ -20dBm

BERT and Protocol Analyzer Family 2M E1 and Datacom Protocol Analyzer



HCT-7000

The HCT-7000, our flagship tester, is a portable, battery powered E1 and data communication tester, designed for a wide range of protocol analysis and BERT (Bit Error Rate Test) at full E1 speeds (2.048Mbps) and is fully suitable for equipment installations, on-line or off-line diagnostics, debugging, and interface development. The HCT-7000 features a backlit Liquid Crystal Display (LCD), push-button switch keyboard, interface lead indicator LEDs, user replaceable data port interface modules and internal rechargeable Li-lon battery. The unit includes the Basic Interfaces, basic operational firmware, comprehensive User Guide, universal AC power adapter (100~240 VAC) and a sturdy hard shell carry case.

Features

- E1, Datacom, Protocol Analyzer and BERT
- Protocols: Frame Relay, SS#7, X.25, PPP (Sync.), V5.1. V5.2, ISDN-D, Sync (BSC), HDLC, SDLC, Async
- Dual pluggable interface ports with available modules:

Datacom Module: RS-232C/D (V.24), RS-449 (V.36), RS-530,

X.21, V.35

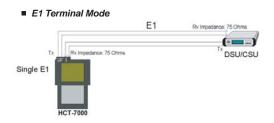
E1 Module: G.703 E1 (2048K)

- Supports Centronics printer & control serial port.
- LCD Display: 320x240 graphic (30 lines x 40 characters), with backlight
- Auto Configuration
- Menu driven setup
- ASYNC terminal Emulation
- File Management
- Self Tests and Diagnostics
- Display Modes: Full /Half Duplex Data, Frame / Packet and Lead Status
- Error Check: None, Parity, LRC, CRC-16, CRC-CCITT.
- Capture Buffer: SDRAM
- Line Monitor: DTE; DCE; DTE & DCE
- Emulation: DTE; DCE; MONITOR only
- Counters & Timers: 5 each internal counters and timers.
- MUX/DEMUX BERT (E1 & Datacom BERT)

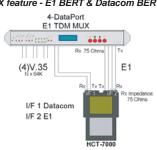
Specifications

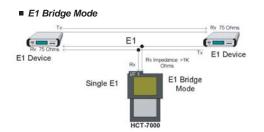
Ports			
PORS	Data Rate: Async (50 ~ 256Kbps),		
	Sync(150 ~ 2048Kbps)		
	Data Code: ASCII, EBCDIC, HEX, IPARS,		
	Transcode, EBCD		
	Data Length: ASYNC Mode: 5,6,7, or 8 bits		
	SYNC Mode: 8 bits		
	Parity Bit: ASYNC Mode: None, Odd, Even, Mark, Space.		
	Stop Bits: ASYNC Mode: 1, 2		
	E1 I/F Module: Signal Present, HDB3, Signal Loss,		
	FAS Loss, AIS, RAI, MRAI,		
	MFAS Loss, CAS Loss, Pattern Loss,		
	Excess Zero, Error.		
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.		
Power	AC100~240V adapter to DC 19V/2.9A		
Dimensions(WxDxH)	275 x 220 x 65mm		
Weight	2.5 Kg		
Temperature	0 ~ 50°C (Operating), -20 ~ 60°C (Storage)		
Humidity	10~90% non-condensing		
Certification	CE, FCC		
MTBF	35,000 hours		

Application

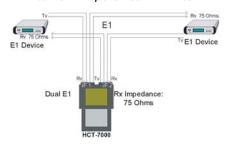


■ MUX feature - E1 BERT & Datacom BERT





■ E1 Dual Port - Drop and Insert BERT Test



Specifications for G.703 E1 BERT

■ BERT Patterns

63, 127, 29⁻¹ (511), 2⁻¹¹ (2047), 2⁻¹⁵ ITU standard,

2⁻¹⁵ non- standard (inverted), 2⁻²⁰ ITU standard,

2⁻²⁰ non-standard (inverted), QRSS, 2⁻²³ ITU standard,

2⁻²³-1 non-standard (inverted), ALL ONEs (Mark), ALL ZEROs (Space)

ALT (0101..), 3 in 24, 1 in 16, 1 in 8, 1 in 4, User Programmable

■ BERT Display Format

ITU G.821

ITU G.826

■ BERT Transmit Error Rate

Force Single Error: Logic (Bit), Frame, CRC, and BPV(Bipolar Violation)
Force 10-3 to 10-7 Error Rate: Logic (Bit), Frame, CRC, and BPV

■ Performance Analysis:

Logic, Frame, CRC, BPV, E-bit Errors

Receive Counter

Error Seconds

Error Free Seconds

Error Rate

G.821 Available Seconds

G.821 Degraded Minutes

G.821 Severely Error Seconds

G.821 errored Seconds

G.821 Unavailable Seconds

G.826 Blocks

G.826 Available Seconds

G.826 errored block (EB)

G.826 Background block error (BBE)

G.826 errored second (ES)

G.826 Severely error second (SES)

G.826 errored second ratio (ESR)

G.826 Severely error second ratio (SESR)

G.826 Background block error ratio (BBER)

LOF (Loss of Frame) Events

COFA (Change of Frame Alignment) Events

Severely Error Frame Count.

Specifications for Datacom BERT

DTE or DCE Synchronous BERT

■ Interface

RS-232, V.35, X.21, RS-449, RS-530

Data rates for 56Kbps Multiples; Nx56Kbps (n=1~32)
 56k, 112k, 168k, 224k, 280k, 336k, 392k, 448k, 504k,

560k, 616k, 672k, 728k, 784k, 840k, 896k, 952k, 1008k, 1064k, 1120k, 1176k, 1232k,1288k, 1344k, 1400k, 1456k,

1512k, 1568k,1624k, 1680k, 1736k, and 1792k bps

■ Data rates for 64Kbps Multiples; Nx64Kbps (n=1~32)

64k, 128k, 192k, 256k, 320k, 384k, 448k, 512k, 576k, 640k, 704k, 768k, 832k, 896k, 960k, 1024k, 1088k, 1152k, 1216k, 1280k, 1344k,1408k, 1472k, 1536k, 1544k, 1600k, 1664k, 1728k, 1792k,

1856k, 1920k, 1984k, and 2048k bps.

■ BERT Patterns:

63, 127, 29⁻¹ (511), 2⁻¹¹ (2047), 2⁻¹⁵ ITU standard,

2⁻¹⁵ non- standard (inverted), 2⁻²⁰ ITU standard,

2-20 non-standard (inverted), QRSS, 223 -1 ITU standard,

 $2^{\text{-23}}$ non-standard (inverted), ALL ONEs (Mark), ALL ZEROs (Space),

ALT (0101..), 3 in 24, 1 in 16, 1 in 8, 1 in 4, User Programmable

Tx Clock Source:

The Tx Clock may be set to internal or external.

The polarity may also be inverted.

■ Rx Clock Source:

The Rx Clock is set to external. The polarity of the external clock may also be inverted

■ BERT Transmit Error Rate:

single, 10e-3, 10e-4, 10e-5, 10e-6, or 10e-7

■ Flow Control:

DCE permitted to transmit on RTS signal or not,

DTE permitted to transmit on CTS signal or not.

Ordering Information

Master Unit

■ HCT 7000 Master unit with LCD display and AC power adapter

Hardware Options

■ Datacom Interface Module Two HD26 ports module with adapter cable for RS-232,V.35, RS-530, RS-449, X.21.

■ E1 Interface Module Two BNC ports module with adapter cable

Software Options

■ Frame Relay (A) Protocol Frame Relay Analysis Software package

Analysis software package

■ SS#7 F/W E1 CCS SS#7 Protocol Analysis Firmware Pack.

■ ISDN –D F/W E1 CCS ISDN D-channel Protocol Analysis Firmware Pack.

■ V5 F/W E1 CCS V5.1/V5.2 Protocol Analysis Firmware Pack

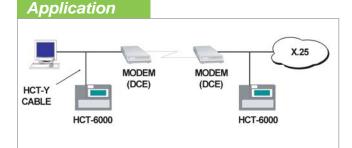
BERT and Protocol Analyzer BERT and Datacom, Protocol tester

HCT-6000

The HCT-6000 is a portable, battery powered communication tester, designed for a wide range of protocol analysis up to 128K bps and BERT (Bit Error Rate Tester) at full T1 (1.544Mbps) or E1 (2.048Mbps) speeds and is fully suitable for equipment installations, on-line or off-line diagnostics, debugging, and interface development. It features a backlit Liquid Crystal Display (LCD), tactile membrane switch keyboard, interface lead indicator LEDs, and internal rechargeable batteries. The unit includes a full assortment of interface adapter cables, comprehensive User Guide, AC power adapter (100 to 240VAC) and a sturdy zippered nylon carry case. The HCT-6000A has the same features as the HCT-6000 with the exception of BERT support only to 128K bps.

Features

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



Specifications

Ports	Basic Interfaces: RS-232C/D(V.24), RS-449(V.36), RS-530				
	X.21,V.35, printer port, remote control por				
	(RS-232 async)				
	Protocols: ASYNC, SYNC(BSC), HDLC, SDLC, X.25, DDCM Optional software: Frame Relay, PPP/SLIP, SNA ROM, G.826, Frame Relay, PPP/SLIP, SNA ROM, G.826,				
					Data rate: ASYNC:50-115,200bps, SYNC:150-128,000bps
					Data code: ASCII, EBCDIC, HEX, IPARS, TRANSCODE, EBC
	Data Length: ASYNC Mode: 5,6,7, or 8 bits,				
	SYNC Mode: 8 bits				
	Parity Bit: ASYNC Mode: None, Odd, Even				
	Stop Bits: ASYNC Mode: 1, 1 1/2, 2				
	Display Mode: LSB or Inverted, Normal or Inverted,				
	Full/Half Duplex, Data and Lead Status, Frame and Packet				
	Error Check: None, Parity, LRC, CRC-16, CRC-CCITT				
	LCD Display: 8 lines, 32 characters per line, with backlight				
	and contrast controls				
	Capture Buffer: 512KB static ram, battery backed up.				
	Line Monitor: DTE; DCE; DTE & DCE				
	Emulation: DTE; DCE; MONITOR only				
	BERT Patterns: 63, 511, 2047, FOX (ASCII), SPACE,				
	MARK, ALT				
	BERT Speed: 2Mbps (except HCT-6000A) 128Kbps				
	Counter & Timer: 5 each internal counter and timer				
LEDs	TD, RD, RTS, CTS, DSR, DTR, DCD, TC, RC, XTC,				
	DTE,ECE, Sync loss				
Power	AC100~240V adapter to DC 12V 600mA				
Dimension (D x V	V x H) mm 237 x 173 x 37mm				
Weight	1.2 Kg				
Temperature	0~50°C (Operating), -20~60°C (Storage)				
Humidity	10~90% non-condensing				
Certification	CE, FCC				
MTBF	35,000 hours				

Ordering Information

Master Unit

■ HCT-6000A

128K Protocol Analyzer & 128K /BERT

■ HCT-6000 128K Protocol Analyzer & 2M BERT

Optional software

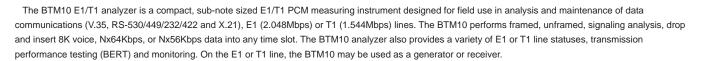
■ Frame-Relay Frame-Relay software package■ TCP/IP TCP/IP,PPP,SLIP software package

SNA ROM SNA ROM software packageG.826 ITU G.826 software package

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BERT and Protocol Analyzers PCM Analyzers

BTM-10



Features

- E1 BERT Analysis: E1/T1frame, code, CRC, and BPV performance analysis and generator.
- Alarm Setting: Manual or automatic alarm setting.
- VF Access: Drop and Insert 8K voice; frequency generator (transmit VF Frequency from 60 to 3950 Hz, transmit VF level from 0dBm to -55dBm) and measurement (A-law and u-law). Voice access by using telephone handset. E1/T1 pulse shape analysis. E1/T1 PCM level meter and frequency analysis.
- Pulse Shape: E1/T1 pulse shape analysis
- Signal Result: E1/T1 PCM level meter and frequency analysis
- Signaling Setting: ABCD bit setting
- Signaling Display: Display all channel's of ABCD bits
- BERT on Data port: Data port BERT performance analysis
- Remote control: Remote controlled by PC terminal or modem
- SS7 analysis: Decode and performance analysis of levels 2, 3, 4
- V5.1/V5.2 Analysis: Monitoring V5 Signaling information
- ISDN Analysis: Digital Subscriber Signaling System No.1

 (DSS 1)-Monitoring ISDN D-Channel Signaling information (ITU Q.921,Q.931)

Example Analysis: off-line analysis of BERT performance External Drop and insert: Acts as a fractional E1 or T1 converter User Programmable pattern setting:

There are three 32 bit programmable patterns, which can be inserted onto the E1/T1 line and drop for analysis available, by passed, or idle

Timeslot setting: Timeslot, Drop and Insert Nx64k data onto E1/T1 line

Timeslot mapping data: Analyze any channel data of two frames Slip measure: Uncontrolled, Controlled, Frame,

and Timing SLIP measure

Sa bits setup and monitor: Multi-frame Sa bits setup and monitor.(E1 only)

File management: Ten configuration and result memory

Datacom clock measurement

Ordering Information

■ BTM10-E1/T1 Both E1 and T1 analyzer

locations can be stored and recall by user

(Full function; with pulse shape/datacom function)

■ BTM10A-E1/T1 Without pulse shape function

■ BTM10B-E1/T1 Without datacom function

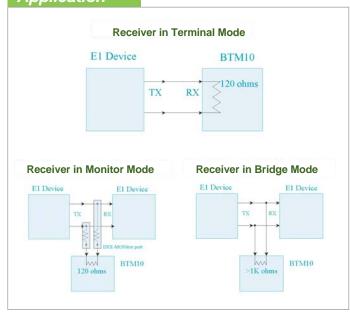
■ BTM10C-E1/T1 Without pulse shape/datacom function

■ BTM10D-E1/T1 Without VF/pulse shape function

Specifications

General	• 1 port E1 (BNC unbalanced and DB15 balanced),
	T1 (DB15 balanced)
	ITU G.703(E1), ANSI T1.403(T1) & ITU G.703(T1)
	• 1 port data communications
	s/w selectable V.35, RS530, X.21, RS-232
	• 1 port RS-232 console, remote
	• 1 port parallel printer port
	Print out via parallel Port
	LCD display
	32 Characters x 8 Lines, Text / Graphic mode
LEDs	TD, RD, RTS, CTS, DSR, DTR, DCD, TC, RC, XTC,
	DTE,ECE, Sync loss
Power	AC100~240V adapter to DC 12V 1A
Dimensions	137 x 235 x 54mm
(D x W x H)mm	
Weight	1.6 Kg
Temperature	0~50°C (Operating), -20~60°C (Storage)
Humidity	10~90% non-condensing
Certification	CE, FCC
MTBF	35,000 hours

Application



Optional Function

■ Datacom Feature Datacom BERT

External drop/insert

■ Pulse shape Feature Pulse shape Analysis

Signal result level measurement

■ BTM10-SS # 7 Decode or Level 2,3 and 4 Performance Measurement

■ BTM10-ISDN ITU Q.921, Q.931 recommendation

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E1 specification

1.Receiver Interface of E1/CEPT

■ Line Code: HDB3/AMI

■ Pulse characteristics: meets ITU G.703

■ Jitter Tolerance: meets ITU G.823

■ Input Port Type: Coaxial pair Symmetrical pair DB15 (balanced)

■ Input mode (with AGC):

Termination: Coaxial Pair Impedance:75ohm resistive (unbalanced)

Symmetrical Pair Impedance:120ohm resistive (balanced)

Return Loss: >18dB

Receive Sensitivity:+3dB to -40dB

Bridge Mode: Impedance: >1000ohm Receive Sensitivity: +3dB to -30dB

DSX-Monitor Mode: Coaxial Pair Impedance 75ohm resistive(unbalanced)

Symmetrical Pair Impedance:120 ohm resistive

(balanced)

Receive Sensitivity: +6dBdsx to -30dBdsx

Receive Timing Range: 2.048MHz±4000Hz

2.Transmitter Interface of E1/CEPT

■ Bit Rate:2048K bit/s+/-3ppm

■ Line Code:HDB3/AMI

■ Pulse characteristics: Meets ITU G.703

■ Pulse Amplitude: Nominal 2.37V for Coaxial Pair 75 ohm

Nominal 3.00V for Symmetrical Pair 120 ohm

■ Zero Amplitude:+0.1 V max.

■ Jitter Tolerance: Meets ITU G.823

■ Output Port Type: Coaxial pair: BNC (unbalance)

Symmetrical pair: Bantam or DB15 (balanced)

■ TX Clock Source:

1.Internal Timing: 2.048MHz+/-3ppm.

2.Internal Timing plus 50ppm offset(30ppm factory option)

3.Internal Timing minus 50ppm offset(30ppm factory option)

4.Recovery from RX Timing (Loop Timing)

5.External Timing

6.Data Port Timing

3. E1/CEPT Frame Structure

Unframed / FAS (PCM31) / FAS+CRC4 (PCM31 with CRC) FAS+CAS (PCM30) / FAS+CRC4+CAS (PCM30 with CRC)

4. Line Build Out

0dB / -7.5dB / -15dB / -22.5dB (Accuracy: +/-1dB)

5. E1/T1 Analyzer mode

1.Channel Map

2.Line Attenuation

3.Slip Measure

4.Signaling

5.General Status: Signal Present / HDB3 / Pattern Sync /

Frame Sync / Looping

6.Results: Bit Errors / BPV Errors / Frame Errors / CRC Errors /

G.821 Analysis / G.826 Analysis

7.Alarm/Warning: Signal Loss(Pulses) / Frame Loss / Pattern Loss /

Excess Zero Error / One Density / AIS / SLIP / RAI / MRAI

8.Print out of test results.

T1 Specification

1.Receiver Interface of T1/DS1

■ Line Code: B8ZS/AMI

■ Pulse characteristics: meets ITU G.703

■ Jitter Tolerance: meets ITU G.824

■ Input Port Type: Symmetrical pair: Bantam or DB15 (balanced),

and BNC Symmetrical pair

■ Input mode (with AGC):

Termination: Symmetrical Pair Impedance: 100ohm resistive +/-

5% resistive(unbalanced)

Return Loss: >18dB

Receive Sensitivity:+6dB to -36dB

Bridge Mode: Impedance: >1000ohm

Receive Sensitivity: +6dB to -36dB

DSX-Monitor Mode: Symmetrical Pair Impedance:

100ohm resistive +/- 5% resistive(unbalanced)

Receive Sensitivity: up to -30dBdsx

Receive Timing Range: 1.544MHz +/- 4000Hz

2.Transmitter Interface of T1/DS1

■ Bit Rate: 1544K bit/s+/-3ppm

■ Line Code: B8ZS/AMI

■ Pulse characteristics: Meets ITU G.703

■ Pulse Amplitude: Nominal 3.00V for Symmetrical Pair 100 ohm

■ Zero Amplitude: +0.1 V max.

■ Jitter Tolerance: Meets ITU G.824

■ Output Port Type: Symmetrical pair: Bantam or DB15 (balanced)

■ TX Clock Source:

1. Internal Timing: 1.544MHz +/-3ppm

2. Internal Timing plus 50ppm offset (30ppm factory option)

3. Internal Timing minus 50ppm offset (30ppm factory option)

4. Recovery from RX Timing (Loop Timing)

5. External Timing

6. Data Port Timing

3. T1/DS1 Frame Structure

ESF / ESF+CRC6 / D4(SF) / SLC-96 / T1DM / Unframed

4.Line Build Out:

0dB , -7.5dB , -15dB , -22.5dB (Accuracy: +/-1dB)

IP Networking

Specifications for G.703 E1/T1 BERT

1. BERT Patterns

- 63, 127, 29-1 (511), 211-1 (2047), 215-1 ITU standard,
- 215-1 non- standard (inverted), 220-1 ITU standard,
- 220 -1 non-standard (inverted), QRSS, 223 -1 ITU standard,
- 223-1 non-standard (inverted), ALL ONEs (Mark), ALL ZEROs (Space), ALT (0101...), 3 in 24, 1 in 16, 1 in 8, 1 in 4, User Programmable

2.BERT Display Format

■ Normal ITU-M.2100 (option) / ITU G.821 / ITU G.826

3. BERT Transmit Error Rate

- Force Single Error: Logic (Bit), Frame, CRC, and BPV (Bipolar Violation)
- Force 10-3 to 10-7 Error Rate: Logic (Bit), Frame, CRC, and BPV

4. Performance Analysis

- Logic, Frame, CRC, BPV, E-bit Errors
- Receive Counter
- Error Seconds
- Error Free Seconds
- Error Rate
- G.821 Available Seconds
- G.821 Degraded Minutes
- G.821 Severely Error Seconds
- G.821 Error Seconds
- G.821 Unavailable Seconds
- G.826 Blocks
- G.826 Available Seconds
- G.826 errored block (EB)
- G.826 background block error (BBE)
- G.826 errored second (ES)
- G.826 severely errored second (SES)
- G.826 errored second ratio (ESR)
- G.826 severely errored second ratio (SESR)
- G.826 background block error ratio (BBER)
- LOF (Loss of Frame) Events
- COFA (Change of Frame Alignment) Events
- Severely Errored Frame Count.

Specifications for Datacom BERT

Mode A: DTE or DCE Synchronous BERT

■ Interface

RS-232, V.35, X.21, RS-449, RS-530

- Data rates for 56Kbps Multiples; Nx56Kbps (n=1~24) 56k, 112k, 168k, 224k, 280k, 336k, 392k, 448k, 504k, 560k, 616k, 672k, 728k, 784k, 840k, 896k, 952k, 1008k, 1064k, 1120k, 1176k, 1232k,1288k, 1344k, 1400k, 1456k, 1512k, 1568k,1624k, 1680k, 1736k, and 1792k bps.
- Data rates for 64Kbps Multiples; Nx64Kbps (n=1~32) 64k, 128k, 192k, 256k, 320k, 384k, 448k, 512k, 576k, 640k, 704k, 768k, 832k, 896k, 960k, 1024k, 1088k, 1152k, 1216k, 1280k, 1344k,1408k, 1472k, 1536k, 1544k, 1600k, 1664k, 1728k, 1792k, 1856k, 1920k, 1984k, and 2048k bps.
- BERT Patterns:

63, 127, 29-1 (511), 211-1 (2047), 215-1 ITU standard, 215-1 non- standard(inverted), 220-1 ITU standard, 220-1 non-standard(inverted), QRSS, 223-1 ITU standard, 223-1 non-standard(inverted), ALL ONEs (Mark), ALL ZEROs (Space), ALT (0101...), 3 in 24, 1 in 16, 1 in 8, 1 in 4, User Programmable

■ Tx Clock Source:

The Tx Clock may be set to internal or external. The polarity may also be inverted.

Rx Clock Source:

The Rx Clock is set to external. The polarity of the external clock may also be inverted.

■ BERT Transmit Error Rate:

single, 10e-3, 10e-4, 10e-5, 10e-6, or 10e-7.

■ Flow Control:

DCE permitted to transmit on RTS signal or not, DTE permitted to transmit on CTS signal or not.

Mode B: DTE or DCE Synchronous BERT

- 1. Data Rate
- Asynchronous: from 50 to 115.2K bps.
- Synchronous: from 150 to 72K bps.
- 2. BERT Patterns
- 63, 511, 2047, FOX, SPACE, MARK, and ALT
- 3. Tx Clock Source
- DTE or DCE
- 4. Flow Control
- Xon/Xoff, RTS/CTS, or disable

E1/T1 Datacom BERT tester

HCT-BERT/H

The HCT-BERT/H is a compact, sub-note sized E1/T1 Bit Error Rate Tester (BERT) designed for field use in maintenance of data communications (V.35, RS-530/449/232/422 and X.21), 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 analyzer also provides a variety of E1 or T1 line statuses, transmission performance testing (BERT) and monitoring. On the E1 or T1 line, the BTM10 may be used as a generator or receiver.

Features

- E1 BERT Analysis: E1/T1frame, code, CRC, and BPV performance analysis and generator.
- Alarm Setting: Manual or automatic alarm setting.
- 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
- Example Analysis: off-line analysis of BERT performance
- External Drop and insert: Acts as a fractional E1 or T1 converter
- User Programmable pattern setting:

There are three 32 bit programmable patterns, which can be inserted onto the E1/T1 line and drop for analysis available, by passed, or idle

- Timeslot setting: Timeslot, Drop and Insert Nx64k data onto E1/T1 line
- Timeslot mapping data: Analyze any channel data of two frames
- Slip measure: Uncontrolled, Controlled, Frame,

and Timing SLIP measure

- Sa bits setup and monitor: Multi-frame Sa bits setup and monitor.(E1 only)
- File management: Ten configuration and result memory locations can be stored and recall by user
- Datacom clock measurement

Application



Ordering Information

■ HCT-BERT/H E1 / T1 /Datacom BERT

Specifications

Ports	orts • 1 port E1 (BNC unbalanced and DB15 balanced	
	T1 (DB15 balanced)	
	ITU G.703(E1), ANSI T1.403(T1) & ITU G.703(T1)	
	1 port data communications	
	s/w selectable V.35, RS530, X.21, RS-232	
	• 1 port RS-232 console, remote	
	1 port parallel printer port	
	Print out via parallel Port	
	LCD display	
	32 Characters x 8 Lines, Text / Graphic mode	
LEDs	TD, RD, RTS, CTS, DSR, DTR, DCD, TC, RC, XTC,	
	DTE,ECE, Sync loss	
Power	AC100~240V adapter to DC 12V 1A	
Dimension (D x W	/ x H) mm 137 x 235 x 54mm	
Weight	1.6 Kg	
Temperature	0~50°C (Operating), -20~60°C (Storage)	
Humidity	10~90% non-condensing	
Certification	CE, FCC	
MTBF	35,000 hours	

G.703 E1/T1 BERT specification

1. BERT Patterns

63, 127, 29-1 (511), 211-1 (2047), 215-1 ITU standard, 215-1 non- standard (inverted), 220-1 ITU standard, 220-1 non-standard (inverted), QRSS, 223-1 ITU standard, 223-1 non-standard (inverted), ALL ONEs (Mark), ALL ZEROs (Space), ALT (0101..), 3 in 24, 1 in 16, 1 in 8, 1 in 4, User Programmable

2. BERT Display Format

Normal ITU-M.2100 (option) ITU G.821 ITU G.826

3. BERT Transmit Error Rate

Force Single Error: Logic (Bit), Frame, CRC, and BPV (Bipolar Violation) Force 10-3 to 10-7 Error Rate: Logic (Bit), Frame, CRC, and BPV

4. Performance Analysis

Logic, Frame, CRC, BPV, E-bit Errors / Receive Counter

Error Seconds / Error Free Seconds / Error Rate

G.821 Available Seconds / G.821 Degraded Minutes

G.821 Severely Error Seconds / G.821 Error Seconds

G.821 Unavailable Seconds / G.826 Blocks

G.826 Available Seconds / G.826 errored block (EB)

G.826 background block error (BBE) / G.826 errored second (ES)

G.826 severely errored second (SES)

G.826 errored second ratio (ESR)

G.826 severely errored second ratio (SESR)

G.826 background block error ratio (BBER)

LOF (Loss of Frame) Events

COFA (Change of Frame Alignment) Events

Severely Errored Frame Count.

E1 Specification

1.Receiver Interface of E1/CEPT

- Line Code:HDB3/AMI
- Pulse characteristics: meets ITU G.703
- Jitter Tolerance: meets ITU G.823
- Input Port Type: Coaxial pair

Symmetrical pair

DB15 (balanced)

- Input mode (with AGC):Coaxial Pair Impedance:
- Termination: 75ohm resistive (unbalanced)

Symmetrical Pair Impedance:

120ohm resistive(balanced)

Return Loss: >18dB

Receive Sensitivity:+3dB to -40dB

Impedance: >1000ohm

■ Bridge Mode: Receive Sensitivity: +3dB to -30dB

Coaxial Pair Impedance

■ DSX-Monitor Mode:75ohm resistive(unbalanced)

Symmetrical Pair Impedance:

120 ohm resistive (balanced)

Receive Sensitivity: +6dBdsx to -30dBdsx

■ Receive Timing Range: 2.048MHz±4000Hz

2.Transmitter Interface of E1/CEPT

- Bit Rate:2048K bit/s+/-3ppm
- Line Code: HDB3/AMI
- Pulse characteristics: Meets ITU G.703
- Pulse Amplitude: Nominal 2.37V for Coaxial Pair 75 ohm

Nominal 3.00V for Symmetrical Pair 120 ohm

- Zero Amplitude: +0.1 V max.
- Jitter Tolerance: Meets ITU G.823
- Output Port Type: Coaxial pair: BNC (unbalanced)

Symmetrical pair: Bantam or DB15 (balanced)

- TX Clock Source: 1. Internal Timing: 2.048MHz+/-3ppm.
 - Internal Timing plus 50ppm offset (30ppm factory option)
 - Internal Timing minus 50ppm offset (30ppm factory option)
 - 4. Recovery from RX Timing (Loop Timing)
 - 5. External Timing
 - 6. Data Port Timing

3. E1/CEPT Frame Structure

- Unframed
- FAS (PCM31)
- FAS+CRC4 (PCM31 with CRC)
- FAS+CAS (PCM30)
- FAS+CRC4+CAS (PCM30 with CRC)

4. Line Build Out

0dB / -7.5dB / -15dB

E1/T1 Analyzer mode

- Channel Map
- Line Attenuation
- Slip Measure
- Signaling
- General Status:

Signal Present / HDB3 / Pattern Sync / Frame Sync / Looping

Results:

Bit Errors / BPV Errors / Frame Errors / CRC Errors / G.821 Analysis / G.826 Analysis

- Alarm/Warning:
 - Signal Loss(Pulses) / Frame Loss / Pattern Loss / EXcess Zero Error / One Density / AIS / SLIP / RAI / MRAI
- Print out of test results.

T1 specifications

1. Receiver Interface of T1/DS1

- Line Code:B8ZS/AMI
- Pulse characteristics: meets ITU G.703
- Jitter Tolerance: meets ITU G.824
- Input Port Type: Symmetrical pair: Bantam or DB15 (balanced)
- 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

2. Transmitter Interface of T1/DS1

- Bit Rate: 1544K bit/s+/-3ppm
- Line Code: B8ZS/AMI
- Pulse characteristics: Meets ITU G.703
- Pulse Amplitude: Nominal 3.00V for Symmetrical Pair 100 ohms
- Zero Amplitude:+0.1 V max.
- Jitter Tolerance: Meets ITU G.824
- Output Port Type: Symmetrical pair: Bantam or DB15 (balanced)
- TX Clock Source:1. Internal Timing: 1.544MHz+/-3ppm.
 - 2. Internal Timing plus 50ppm offset
 - 3. Internal Timing minus 50ppm offset
 - 4. Recovery from RX Timing (Loop Timing)
 - 5. External Timing
 - 6. Data Port Timing

3. T1/DS1 Frame Structure

ESF / ESF+CRC6 / D4(SF) / SLC-96 / T1DM / Unframed

4. Line Build Out

0dB / -7.5dB / -15dB / -22.5dB (Accuracy: +/-1dB)

Datacom BERT Specification

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, 29-1 (511), 211-1 (2047), 215-1 ITU standard,

215-1 non- standard(inverted), 220-1 ITU standard,

220 -1 non-standard(inverted), QRSS, 223 -1 ITU standard,

223-1 non-standard(inverted), ALL ONEs (Mark), ALL ZEROs (Space), ALT (0101..), 3 in 24, 1 in 16, 1 in 8, 1 in 4, User Programmable

■ Tx Clock Source: The Tx Clock may be set to internal or external.

The polarity may also be inverted.

Rx Clock Source: The Rx Clock is set to external. The polarity of

■ BERT Transmit Error Rate: single, 10e-3, 10e-4, 10e-5, 10e-6, or 10e-7.

the external clock may also be inverted.

- Flow Control: DCE permitted to transmit on RTS signal or not,

 DTE permitted to transmit on CTS signal or not.
- Mode B: DTE or DCE Synchronous BERT
 - Data Rate: Asynchronous: from 50 to 115.2K bps. Synchronous: from 150 to 72K bps.
 - 2. BERT Patterns: 63, 511, 2047, FOX, SPACE, MARK, and ALT
 - 3. Tx Clock Source: DTE or DCE.
 - 4. Flow Control: Xon/Xoff, RTS/CTS, or disable

E1 Datacom BERT Family

E1 Datacom BERT tester



HCT-BERT/C

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 data communications (V.35, RS530, X.21, RS232) and 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

en

Specifications

te

E1 interface

1). E1 Receiving Interface

Line code: HDB3/AMIPulse feature: ITU G.703

• Dithering tolerance: ITU G.823

- Input port: BNC (non-balance), RJ45 (balance)
- Input mode: Impedance: 75ohm (unbalance),

120ohm (balance)

• Bridging mode: Impedance > 1000 ohm

2). E1 Transmission Interface

Line code: HDB3/AMIPulse feature: ITU G.703

• Pulse amplitude: Nominal 2.37V for BNC 75 ohm

Nominal 3.00V for RJ45 120 ohm

- Zero amplitude: 0.1 V at max
- Dithering tolerance: ITU G.823
- Output port model: BNC (non-balance), RJ45 (balance)

3). E1 Frame Format

- PCM31, PCM31+CRC, PCM30, PCM30+CRC
- Non-framing mode, Automatic detection

Error Rate Test (BERT Test)

1). BERT Pattern (Patterns)

511, 2047, 2E15-1, 2E15-1 (reverse), 2E20-1, 2E20-1 (reverse), QRSS, 2E23-1, 2E23-1 (reverse), all 1, all 0, alternate, 1100, 3 IN 24, 1 IN 16, 1 IN 8, 1 IN 4, User programming 1/2/3

2). BERT Display Format

- Error counting, Alarm counting, ITU G.821, ITU G.826
- M.2100, Histogram

3). BERT Transmission Error Rate

- Insert one error compulsorily
- Apply an error rate of 10-3-10-7 compulsorily

4). Quality Analysis:

- Receiving seconds, Error seconds, Alarm seconds
- Free-of-error seconds, Error rate, Valid seconds
- Serious error seconds, G.821 error seconds
- G.826 error seconds, Invalid seconds

5). Data Port BEST Test

• Data rate of the multiple of 64Kbps: N*64Kbps (N=1~36)

Other Functions

1). Color Display Screen: Character/graphic mode

2). Test Results Report

- 100 pieces of test results at max available in storage
- Direct display on LCD screen
- Print via printer port available

3). Modular Design for Easy Update

	-,g	
LEDs	DTE, DCE, DATA PORT, TD, RD, DCD, RTS, CTS, DTR	
	DSR, TC, RC XTC	
Power	AC230V adapter to DC 9V 2A	
Dimension (D x W	x H) mm 134 x 179 x 68mm	
Weight	800g	
Temperature	0~50°C (Operating),-20~60°C (Storage)	
Humidity	10~90% non-condensing	
MTBF	35,000 hours	





Ordering Information

■ HCT-BERT/C E1 & Datacom analyzer

Cable Tester Family LAN Cable Tester

LCT-300 / LCT-400



The LCT-300 / LCT-400 LAN Cable Testers are intelligent continuity testers for LAN cables which save time on the job. Their intuitive operations keep you from wasting time working through complex menus. A remote terminator helps in identifying cables when labeling after installation.

Features

- Hand-held and easy to operate
- Battery low indicator
- Can review the captured pin assignment and failure status
- Easy to read cable status to verify cable continuity; open, short, and mismatches
- Easy to read LCD display, with 2 line by 12 characters with LCD back light
- Automatic power shut down feature for extended battery life
- Identify and trace the other end's ID (using supplied terminator)
- Maximum testing length is up to 1030 meters
- Standard pin configurations and (4) user defined cable modes memorized in CPU
- Suggestion mode for intelligent cable identification (Cable type each)
- Tests for shielded and non-shielded cable types (Extra feature for LCT-400)
- Easy to identify RJ-45 and BNC cable types against preset wiring schemes

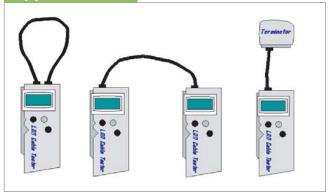
Specifications

General	
Connector	RJ45
Control Key	ENTER, Mode, ESC
Power	DC 9V battery
Dimensions	154 x 65 x 35mm
(D x W x H)mm	
Weight	300g
Temperature	0~50°C (Operating),-20~60°C (Storage)
Humidity	10~90% non-condensing
MTBF	35,000 hours

Cable & Recognized Wiring Schemes

Tests for shielded and non-shedlded cable types
Unshielded twisted pair (UTP) 100 ohms category 3, 4 & 5
Foil shiedlded twisted pair (FTP) 100 ohms & 120 ohms category 3
Shielded twisted pair (STP) 150 ohms type 1 & 6
10Base-T, 100Base-TX and 100Base-T4
TP-PMEDIA / TIA-568A/B
Token ring
USOC
10Base / HUB (AT&T 258A)
Plus user defined

Application



Ordering Information

■ LCT300BK RJ45 LAN Cable tester with LCD backlight

■ LCT400BK RJ45/BNC cable tester with LCD Backlight

■ LCT-T/X-R ID terminator (1 ~ 8)

MTERFACE CONVERTER

V.35 Interface Converter / RS485 Interface Converter Family RS232 Interface Converter Family / Async to Sync Converter DTMF to Pulse Converter / Telephone Surge Protector

V.35 I/F Converter Series

Type: C = Compact

71-1-1					
Interface	Interface Powered	Model Name	Description	Туре	Page
V.35 , RS530	•	V35/530IP	V.35 to RS530	С	151
V.35 , RS449	•	V35/449IP	V.35 to RS449	С	151
V.35, X.21	•	V35/X21IP	V.35 to X.21	С	151
V.35, RS232	•	V35IP	V.35 to RS232	С	152
V.35, RS232	•	V35IP-CAB	V.35 to RS232 Cable	С	153
V.35, RS485		V35/485-1	V.35 to RS485	С	154

RS485 I/F Converter Series

RS485/422, RS232	•	ic485IP-1	RS485/RS422 to Async RS232, 4 screw terminal	С	155
RS485/422, RS232	•	ic485IP-2	RS485/RS422 to Async RS232 RJ-45	С	155
RS485, RS232		ic485-3	RS485 to RS232	С	156
RS485, V.35		V35/485-1	RS485 to V.35	С	154







RS232 I/F Converter Series

Type: C = Compact, SP= Surge Protector

Interface	Interface Powered	Model Name	Description	Туре	Page
RS232, RS449	•	449IP	RS232 to RS449	С	152
RS232, X.21	•	X21IP	RS232 to X.21	С	152
RS232, V.35	•	V35IP-CAB	RS232 to V.35 Cable	С	153
RS232, V.35	•	V35IP	RS232 to V.35	С	152
RS232, RS485/422	•	ic485IP-1	Async RS232 to RS422/ RS485, 4 screw terminal	С	155
RS232, RS485/422	•	ic485IP-2	Async RS232 to RS422/ RS485, RJ-45	С	155
RS232, RS485		ic485-3	RS232 to RS485	С	156
RS232	•	ic232IP-SM	Async RS232 short haul modem, RJ-45	С	157
RS232	•	ic232IP-2	Async RS232 short haul modem, 4-screw terminal	С	157
RS232		icCL-2	RS232, current loop converter	С	158
RS232	•	ic232TTL	RS232 to TTL/CMOS	С	159

Async to Sync Converter

RS232	•	icAS/IP	Async to Sync converter	С	160	
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DTMF to Pulse Converter

POTS DTMF DTMF to pulse converter C	<i>i</i>	C 161	
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Surge Protector Series

POTS	TSP-10	Telephone/Fax surge protector	SP	162







V.35 Interface Powered Family V.35 Interface Powered Converter



V35/530IP, V35/449IP, V35/X21IP

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 2048kbps. 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

Features

- Electrically converters SYNC ITU-T V.35 to RS-530 / RS-449 / X.21 (three models)
- DCE/DTE switch selectable
- Data rate up to 2.048Mbps
- Complies with ITU-T V.35, X.21 and EIA RS-449, RS-530
- Interface powered, no external DC power required for the "IP" converter family
- An external power adapter (9VDC@600mA) may be used if the application of the unit is in a poor communication environment

Specifications

Data rate	Up to 2Mbps
Connector	DB25F with V.35, X.21, RS530, RS449 cable adapter
LEDs	PWR, Signal status, DCE/DTE mode
Power	DC 9V via AC adapter
Power Consumption	< 5W
Dimensions	140 x 80 x25mm
(D x W x H)mm	
Weight	150g
Temperature	0~50°C (Operating) ,0~70°C (Storage)
Humidity	10~90% non-condensing

Ordering Information

V.35 to RS-530

■ V35/530Ip-M V35(DB25F)-RS530(DB25F) converter; DTE/DCE selectable

w/ V35 cable (DB25M-MB34M cable)

DC In 9V / 600mA

■ V35/530Ip-F V35(DB25F)-RS530(DB25F) converter; DTE/DCE selectable

w/ V35 cable (DB25M-MB34F cable)

DC In 9V / 600mA

V.35 to RS-449

■ V35/449Ip-M V35(DB25F)-RS449(DB25F) converter; DTE/DCE selectable

w/V35 cable (DB25M-MB34M cable)

DC In 9V / 600mA

■ V35/449Ip-F V35(DB25F)-RS449(DB25F) converter; DTE/DCE selectable

w/V35 cable (DB25M-MB34F cable)

DC In 9V / 600mA

V.35 to X.21

■ V35/X21Ip-M V35(DB25F)-X21(DB25F) converter; DTE/DCE selectable

w/V35 cable (DB25M-MB34M cable)

DC In 9V / 600mA

■ V35/X21lp-F V35(DB25F)-X21(DB25F) converter; DTE/DCE selectable

w/V35 cable (DB25M-MB34F cable)

DC In 9V / 600mA

RS-232 Interface Powered Family RS-232 Interface Powered Converter



V35IP / 449IP / X21IP

The RS232IP 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 RS232IP 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 RS232IP family converters are DB25 female with standard pin out, while a cable adapter is required for V.35, X.21 or RS-449/530 side. All three models may be interchanged as long as the correct V.35, X.21 or RS-449/530 cable is applied.

Features

- Electrical SYNC RS-232 interface converter to V.35 / RS-449 / X.21 (three models)
- Interface powered, no external DC power required for the "IP" converter family
- DCE/DTE switch selectable
- Data rate up to 128Kbps
- Complies with EIA RS-232, RS-449, RS-530 and ITU-T V.35, X.21
- An external power adapter (9VDC@600mA) may be used if the application of the unit is in a poor communication environment

Specifications

Data rate	Up to 128Kbps		
Connector	DB25F with V.35, X.21, RS530, RS449 cable adapter		
LEDs	PWR, Signal status, DCE/DTE mode		
Power	DC 9V in via AC adapter		
Power Consumption	< 5W		
Dimensions	140 x 80 x25mm		
(D x W x H)mm			
Weight	150g		
Temperature	0~50°C (Operating) ,0~70°C (Storage)		
Humidity	10~90% non-condensing		

Ordering Information

RS-232 to V.35

■ V35Ip-M RS232(DB25F) to V35(DB25F) converter; DTE/DCE selectable

w/ DB25M toMB34M adapter cable

DC In 9V / 600mA

■ V35lp-F RS232(DB25F)-V35(DB25F) converter; DTE/DCE selectable

w/ DB25M-MB34F adapter cable

DC In 9V / 600mA

RS-232 to RS-449

■ RS449lp-M RS232(DB25F)-RS-449 (DB25F) converter; DTE/DCE selectable

w/ DB25M-DB37M adapter cable

DC In 9V / 600mA

■ RS449lp-F RS232(DB25F)-X.21(DB25F) converter; DTE/DCE selectable

w/ DB25M-DB37F adapter cable

DC In 9V / 600mA

RS-232 to X.21

■ X.21lp-M RS232(DB25F)-X.21(DB25F) converter; DTE/DCE selectable

w/ DB25M-DB15M adapter cable

DC In 9V / 600mA

■ X.21lp-F RS232(DB25F)-X.21(DB25F) converter; DTE/DCE selectable

w/ DB25M-DB15F adapter cable

DC In 9V / 600mA

RS-232 Interface Powered Family RS-232 Interface Powered Converter



V35IP-CAB

The V35IP-CAB interface converter allows full bi-directional synchronous conversion between RS-232C (V.24) and V.35 hardware. These converters all work WITHOUT an EXTERNAL POWER SUPPLY. The V35IP-CAB interface converter is designed for synchronous RS-232 operation at data rates up to and including 128kbps. It 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 interface. The physical connections for the V35IP-CAB converter is a DB25 female with standard pin out in DTE or DCE, while a cable is molded with MB34 connector for V.35.

Features

- Electrical SYNC RS-232 interface converter to V.35
- Interface powered, no external DC power required for the "IP" converter family
- DCE and DTE separate models
- Complies with EIA RS-232 and ITU-T V.35
- RS-232 pin 9 may be used to provide 5~9VDC external power if the application of the unit is in a poor communication environment

Specifications

Data rate	Up to 128Kbps			
Power	DC power acceptable (RS232 DB25 Pin 9)			
Power Source	RS232 Interface powered or external AC adapter			
LEDs	TD, RD			
Power Consumption	< 5W			
Dimensions	53 x 75 x 22mm			
(D x W x H)mm				
Weight	500g			
Temperature	0~50°C (Operating) ,0~70°C (Storage)			
Humidity	10~90% non-condensing			

Application RS-232 V.35

Ordering Information

■ V35IP-CAB / DCE RS232DTE \leftarrow → V35CAB / DCE \leftarrow → V.35DCE

■ V35IP-CAB / DTE RS232DCE \leftarrow → V35CAB / DTE \leftarrow → V.35DTE

V.35 Interface Family V.35 to RS-485 Interface Converter



V35/485-1

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-25 female 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, switch selectable, 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.

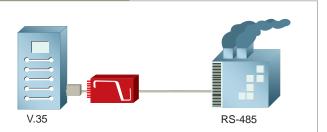
Features

- Electrically converts SYNC V.35 to RS-485
- RS-485; 2 or 4 wire, Half or Full Duplex
- V.35 handshaking; DTR/DSR, RTS/CTS or Auto
- 2500V electrical isolation minimum
- DTE/DCE switch selectable
- Easy to configure
- External DC power required

Specifications

Data rate	Up to 2Mbps		
Connector	V.35: DB25F with adapter cable		
	RS485: 5 screw terminals block		
LEDs	TX/RX on 485 side and TD/RD on V.35 side		
Power	DC 9V in via AC adapter		
Power Consumption	< 6W		
Dimensions	140 x 80 x25mm		
(D x W x H)mm			
Weight	150g		
Temperature	0~50°C (Operating) ,0~70°C (Storage)		
Humidity	10~90% non-condensing		

Application



Ordering Information

V.35 to RS-485

■ V35/485-1 V35-RS422/485; 5 screw Terminal Block[DC Power required]

Isolation, Auto, Flow control, w/V35 cable, DC In 9V / 600mA

RS-485 Interface Powered Family

RS232 to RS422 /RS485 Interface Converter



ic485IP-1, ic485IP-2

The ic485IP Interface Converters provide asynchronous conversion between RS-232 interface and RS-485 standard interface. The RS-232 interface connection is via the unit's DB-25 female connector, while the RS-485 side's connection is via either a five screw terminal block or an RJ-45. The ic485IP converter's circuitry is not electrically 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

- Electrically converts ASYNC RS-232 to RS-485/422
- Baud rate up to 128kbps
- DCE/DTE switch selectable
- RTS/CTS control, full/half duplex
- Simulation/monitor select switch

Specifications

Data rate	Up to 128Kbps
Connector	RS232: DB25F
	RS485: 4 screw terminals block (ic485IP-1)
	RS485: RJ-45 connector (ic485IP-2)
LEDs	TD, RD, External DC Power
Power	Interface Powered or External DC 9V in
Power Consumption	< 5W
Dimensions	ic 485IP-1: 54 x 76 x20mm
(D x W x H)mm	ic 485IP-2: 54 x 56 x 20mm
Weight	60g
Temperature	0~50°C (Operating) ,0~70°C (Storage)
Humidity	10~90% non-condensing

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

Ordering Information

RS-232 to RS-422 / 485

■ ic485IP-1 Async RS232 (DB25F) to RS422/485, 4-Screw Terminal Block

DC In 9V / 300mA

■ ic485IP-2 Async RS232(DB25F) to RS422/485; RJ45

DC In 9V / 300mA

RS-485 Interface Family RS-485 to RS-232 Interface Converter



ic485-3

The ic485-3 Interface Converter provides asynchronous conversion between RS-232 interface and RS-485 standard interface. The RS-232 interface connection is via the unit's DB-25F female 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.

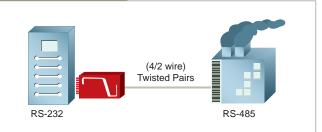
Features

- Electrically converts RS-485 to RS-232
- RS-485; 2 or 4 wire, Half or Full Duplex
- Supports optical isolation, electrical isolation of 2500V minimum
- DTE/DCE switch selectable
- Data rate up to 128Kbps
- 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,	
	115.2K or 128K	
Connector	RS232: DB25F with adapter cable	
	RS485: 5 screw terminals block	
LEDs	TX/RX on 485 side and TD/RD on RS232 side	
Power	DC 9V in via AC adapter	
Power Consumption	< 6W	
Dimensions	140 x 80 x25mm	
(D x W x H)mm		
Weight	180g	
Temperature	0~50°C (Operating) ,0~70°C (Storage)	
Humidity	10~90% non-condensing	

Application



Ordering Information

RS-232 to RS-485

■ ic485-3 RS232-RS422/485; 5-Screw Terminal Block, [DC Power required] Isolation, Auto Flow control, DC In 9V / 300mA

RS-232 Interface Powered Family

RS-232 Interface Short Haul Modem







ic232IP-SM / ic232IP-2

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.

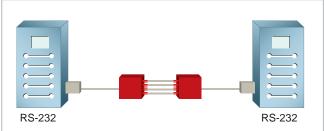
Features

- Extend ASYNC RS-232 up to 10km depending on wire gauge and data rate
- Interface powered, no external DC power required for the "IP" converter family
- Full Duplex over 2 twisted pairs (Cat. 3 or better)
- Baud rate up to 128Kbps
- DCE/DTE switch selectable

Specifications

Data rate	Up to 128Kbps	
Connector	Ic232IP-SM: Async RS232: DB25F, modem side:RJ4	
	Ic232IP-2: Async RS232: DB25F, modem side:	
	4 screw terminal with Ground pin	
LEDs	TD, RD	
Power	Interface Powered	
Power Consumption	< 5W	
Dimensions	ic 232IP-SM: 54 x 56 x 20mm	
(D x W x H)mm	ic 232IP-2: 54 x 76 x 20mm	
Weight	50g	
Temperature	0~50°C (Operating) ,0~70°C (Storage)	
Humidity	10~90% non-condensing	

Application



Ordering Information

RS-232 Short Haul Modem

■ ic232IP-SM / M Asyn RS232(DB25M) shorthaul modem; RJ45 ■ ic232IP-SM / F Asyn RS232(DB25F) short haul modem; RJ45

■ ic232lp-2M Asyn RS232(DB25M) shorthaul modem; (4 screw Terminal Block)
■ ic232lp-2F Asyn RS232(DB25F) shorthaul modem; (4 screw Terminal Block)

RS232 Interface Family RS232 Current Loop Converter



icCL-2

Current loop devices use current on or current off to transmit binary digits. The icCL converter interfaces RS-232 systems to 20mA or 60mA current loop ports with open circuit voltages up to 30 V. This series of converters works without any external power supply. All the units are very easy to implement. Simply connect the appropriate interface cable and select the DCE/DTE type.

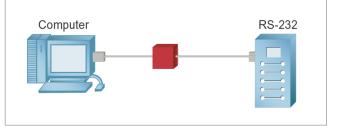
Features

- Electrically converts ASYNC RS-232 to Current Loop
- Full duplex, 19.2kbps to 400ft
- Baud rate up to 128kbps
- Current Loop connection by 4 screw terminal
- DCE/DTE switch selectable
- 20/60mA switch selectable
- External DC power required

Specifications

Data rate	Up to 128Kbps		
Connector	RS232: DB25F or DB25M		
	Current loop: 4 screw terminal block		
LEDs	TD, RD		
Power	DC 9V in		
Power Consumption	< 6W		
Dimensions	54 x 76 x 20mm		
(D x W x H)mm			
Weight	60g		
Temperature	0~50°C (Operating) ,0~70°C (Storage)		
Humidity	10~90% non-condensing		

Application



Ordering Information

RS-232 Current Loop Converter

■ icCL-2/M RS232(DB25M) Current loop ; 4 Screw Terminal Block,

[DC Power required], DC In 9V / 300mA

■ icCL-2/F RS232(DB25F) Current loop; 4 Screw Terminal Block,

[DC Power required], DC In 9V / 300mA

RS-232 Interface Powered Family

RS-232 to TTL/CMOS Interface Converter



ic232TTL

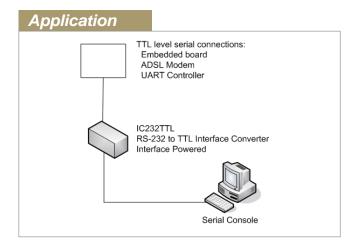
The ic232TTL converts RS-232 to TTL/CMOS compatible level. Two channels are used to convert from RS-232 to 0/+5 VDC signals, and two channels are used to convert from 0/+5 VDC signals to RS-232. Therefore, this converter supports TD, RD, RTS, and CTS. The RS-232 side is a DB9 female connector while the TTL/CMOS side is a DB9 male connector. This unit is powered from the RS-232 data and handshake lines whether the lines are high or low and may work at baud rates up to 115.2kbps. The handshaking lines (pins 7[RTS] and 4[DTR]) 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.

Features

- Electrically converters ASYNC RS-232 to TTL/CMOS level
- Interface powered, no external DC power required for this converter
- RS-232 DB9F connects directly to PC COM port
- TTL/CMOS level connects directly to embedded system's UART
- Baud rate up to 115.2k

Specifications

TTL / CMOS Input	RS232 Output
Low (< +0.8V)	+5V minimum, +9V typical
High (> +2V)	-5V minimum, -9V typical
TRS232 Input	TTL / CMOS Output
Low $< +0.8V \& > -15V$	+3.5V minimum, +4.6V typical
High > $+2V \& < +15V$	+0.4V minimum, +0.1V typical
Weight	20g
Dimension	60 x 31 x15mm
(D x W x H) mm	



Ordering Information

RS-232 to TTL / CMOS

■ ic232TTL Asyn RS232 (DB9F) to TTL/CMOS (DB9M) [No Power required]

RS-232 Interface Powered Family Async to Sync Interface Converter



icAS/IP

The icAS/IP, interface converter allows full conversion between a computer / terminal RS-232 asynchronous port and a synchronous modem. The icAS/IP conforms to the ITU-T V.22 standard and accommodates the difference in frequency between the asynchronous port and synchronous modem. This unit derives its baud rate automatically from the transmit clock of the modem and operates at data rates from 300 to 19200bps.

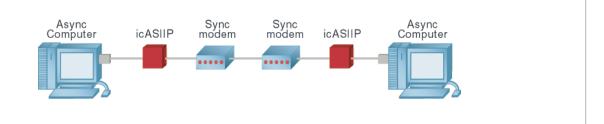
Features

- Convert ASYNC RS-232 to SYNC (HDLC) V.22 protocol
- Automatically adjusts baud rate
- Baud rate up to 19.2kbps
- Fully transparent to signals
- Function set by dip switch
- Interface powered, no external DC power required for the "IP" converter family
- An external power adapter (9VDC@600mA) may be used if the application of the unit is in a poor communication environment

Specifications

Data rate	300 ~ 19200bps		
Connector	RS232: DB25F or DB25M with adapter cable		
Standard	ITU-T V.22		
LEDs	Power, link		
Power	DC 9V in		
Power Consumption	< 5W		
Dimensions	54 x 73 x 20mm		
(D x W x H)mm			
Weight	150g		
Temperature	0~50°C (Operating) ,0~70°C (Storage)		
Humidity	10~90% non-condensing		

Application



Ordering Information

Async to Sync Converter

■ icAS/IP Async to Sync converter ; V.22 protocol , w/Sync RS232 cable

POTS Family

DTMF to Pulse Dialing Converter



DTMF

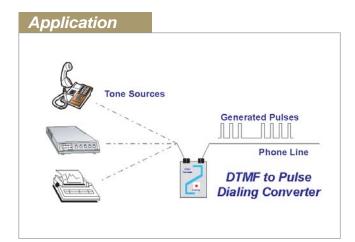
The DTMF to PULSE Dialing Converter is an electronic device used to convert the DTMF tones from telephone, modem, or fax equipment to standard telephone pulses. Connecting the device is very easy. Simply connect between the tone source device and the phone line. Received tones are held in buffer and output as pulses after 3 seconds of not receiving any more tones.

Features

- Receives DTMF tones from POTS and outputs pulses
- Powered from the telephone line
- Detects DTMF tones
- 32 character buffer
- 20 second time-out will cease any conversion
- Pulse dialing rate factory settable for 10pps or 20pps
- Make/break ratio factory settable for 40/60 or 33.3/66.6

Specifications

Connector	2 x RJ11
LEDs	Wake-Up
Pulse dialing rate	10pps (default) or 20pps
Make/Break ratio	40:60 (default) or 33.3:66.6
Dimensions	135 x 79 x 25mm
(D x W x H)mm	
Weight	150g
Temperature	0~50°C (Operating) ,0~70°C (Storage)
Humidity	10~90% non-condensing



Ordering Information

DTMF to Plulse Dialing converter

■ DTMF DTMF to Pulse dial converter

IP Networking

POTS Family

Telephone Surge Protector



TSP-10

A surge protector is an appliance designed to protect electrical devices from voltage spikes. A surge protector attempts to regulate the voltage supplied to an electric device by either blocking or by shorting to ground voltages above a safe threshold. The TSP-10 will ensure the reliable operation of POTS based equipment such as telephones, FAX machines and dialup modems.

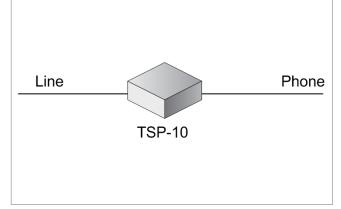
Features

- Protect FAX and dialup modems from surges on telephone lines
- Control transient over voltage to a low level to ensure maximum protection for your equipment
- LED indicator flashes for ring indication and lights during device off-look operation
- Meet UL 1449

Specifications

Surge current	8 x 20u sec of 500A	
DC spark over voltage 160 ~ 240V		
Dimensions	80 x 30 x 27mm	
(D x W x H)mm		
Weight	20g	
Compliance	UL 1449 (2 nd Edition)	

Application



Ordering Information

Telephone Surge Protector

■ TSP-10 In Line Telephone Surge Protector with RJ-11 Jacks

MANAGEMENT

Management Software

Element Management Software Series

Type: S/W = Software

Interface	Model Name	Description	Туре	Page
EMS	EMS	E-map, java based element management system software	S/W	163

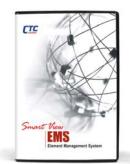
Graphic User Interface Series

GUI	GUI	Graphic user interface	S/W	165	





Management SoftwareWith Topology Feature



Element Management System (EMS)

The objective of EMS is to provide four major functions for telecommunication operators:

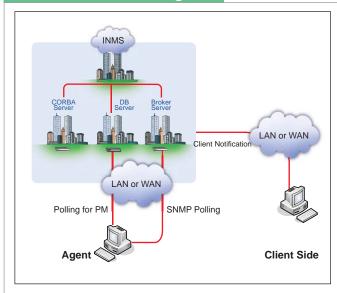
• Fault Management (FM) • Performance Management (PM) • Configuration Management (CM) • Security Management (SM)

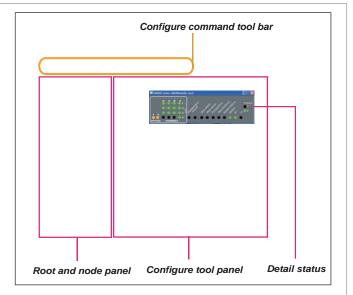
The EMS Server is designed to provide all the configuration and maintenance functions for the communication device. The method to access EMS Server functions is via CORBA protocol according OMG CORBA Specification. When a user loads EMS Client software and sets up a link to the EMS Server, it will be 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 provides the ORB (Object Request Broker) central component of CORBA. It encompasses the entire communication infrastructure necessary to identify and locate objects, handle connection management, deliver data and is responsible for communication of requests.

Broker server

Broker Server collects the information data from the specific SNMP agents and keeps updating it to the SQL server via the JDBC (Java DataBase Connectivity) driver.

■ SQL Server

SQL Server is the place where the Broker collected data is stored, the database will store Alarm Trap and all informations. CTC Union's EMS is compafible with MS-SQL 2000, 2005 and MS-SQL 2005 Express.

■ Workstation-Clients

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



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 for microsoft SQL server Flexible SQL interface design for server and client optimization by customer

■ Data integrity

All data is located in the same place. User profiles are stored to and loaded from one source. User created objects are stored and loaded remotely and/or locally. There are well-defined procedures for backup and restore configuration, topology, alarm and user data.

■ Standard SNMP and CORBA support

Design has no assumption to any CORBA vendor. Tested with different Object Request Brokers

System Structure

Getting Topology Map node

User can load maps to SQL server, load maps from SQL server or delete attached maps. Download procedure is very simple.

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.

System Structure

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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.

ile Edit 1	Tools Help					
Network	Management	System	Traps	Performances		
all agent	s	-	all racks	-	all statuses	-
Agent II) Agent N	Name	Rack	Status	Source	Meaning
4	FMUX-3	1	ocal	(Urgent)	Agent	T1(R)
4	FMUX-3	1	ocal	(Urgent)	Agent	Major
4	FMUX-3		ocal	(Urgent)	Agent	Near End
A	FMUX-3		emote	(Event)	Agent	ACO
4	FMUX-3	ı	emote	(Non-urgent)	Agent	Opti-2
4	FMUX-3	1	emote	(Urgent)	Agent	Far End
3	FMUX-2		ocal	(Event)	Agent	ACO
3	FMUX-2	- 1	ocal	(Non-urgent)	Agent	Opti-2
3	FMUX-2	1	ocal	(Urgent)	Agent	Far End
3	FMUX-2	- 1	emote	(Urgent)	Agent	T1(R)
3	FMUX-2		emote	(Urgent)	Agent	Major
3	FMUX-2	- 1	emote	(Urgent)	Agent	Near End

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 .

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

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 :

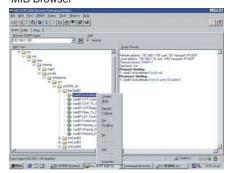
- 1. Terminal mode: Configuration by local RS-232 serial port; Maintenance & alarm
- 2. MIB file SNMP: Configuration by RJ-45 10/100 Ethernet port; Complies with MIB-II standard
- 3. GUI SNMP: Configuration by RJ-45 10/100 Ethernet port; Real time monitoring & trap alarm in Window® graphic mode

Features

- View which type of cards occupy the chassis slots
- Full Read/ Write capabilities
- Full Read/ Write capabilities
- 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/XP/Vista GUI (Graphical User Interface)
- Configuration settings up or download to/from management PC
- Loop-back test capability
- Get CPE status of remote side

Terminal Mode

MIB Browser



Ordering Information

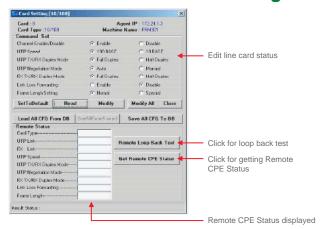
■ FRM-SNMP-GUI GUI (Graphical User Interface)

Main Screen



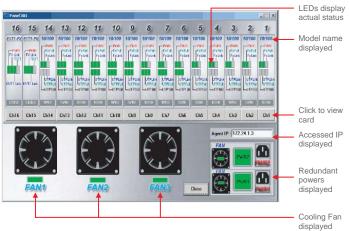
This main screen allows users to enter new or select existing IPs of all agents. When the IP is entered the list of available FRM301 / FRM401 chassis are displayed.

Fast Ethernet Line Card Setting



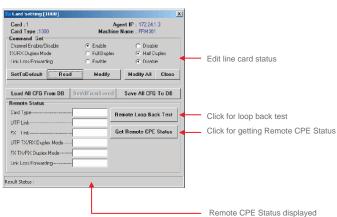
An individual card can be highlighted by clicking on the converter of Chassis screen. A screen is displayed that allows the network administrator to edit the converter's configuration, get the remote unit's status or do loop back functions.

FRM301 Rack View Screen



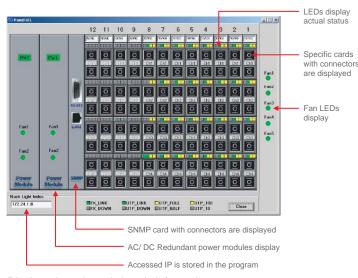
Displays the selected chassis information. Each line card is displayed with LEDs and status in real time.

Gigabit Ethernet Line Card Setting

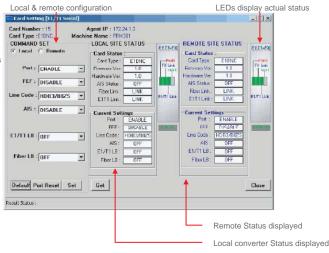


Click the button for a 1000Base line card to view and configure the local line card. Under the GUI, the card's status, Tx/Rx Duplex mode and LLF function may be read or modified.

FRM401 Rack View Screen



Displays the selected chassis information. Each line card is displayed with LEDs and status in real time. FRM301 E1/T1 Screen



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.

IP Survelllance

Embedded License Plate Recognition / Digital Video Server Network Video Recorder / Network Camera Ethernet over Coax / Central Management System

Digital Video Server Family

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Encoding	Stream	Codec	Model Name	Description	Type	Page
H.264			IPS20	2U 19" 20-slot H.264 digital video decoder chassis w/ SNMP	L, S	168
H.264	Dual		DVS-8501D	1-ch H.264 digital video decoder	L, S	170
H.264	Dual		DVS-8504E	4-ch H.264 digital video encoder	S	169
MPEG4, M-JPEG	Dual	Dual	DVS-8301	1-ch dual stream video encoder	S	167

Network Video Recorder Family

NVR		NEW NVR	Enterprise network video recorder	S/W	173	
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Stream	Codec	Model Name	Description	Туре	Page
Dual	Dual	IPCAM-8309F	Dual stream network camera	S	177.
Dual	Dual	IPCAM-8309FW	Dual stream network camera	S	178
Dual	Dual NE	WIPCAM-8309D	Dual stream network dome camera	S	179
Dual	Dual NE	WIPCAM-8308IR	Dual stream network IR camera	S	180
Dual	Dual NE	WIPCAM-8318IR	Dual stream network IR camera	S	181
Dual	Dual NE	WIPCAM-8318F	Dual stream Day&Night network camera	S	182
Dual	Dual NE	WIPCAM-8318P	Dual stream high-speed dome network camera	S	183
	Dual Dual Dual Dual Dual Dual Dual	Dual Dual Dual Dual Dual Dual Dual Dual Dual	Dual Dual IPCAM-8309F Dual Dual IPCAM-8309FW Dual Dual IPCAM-8309D Dual Dual NEW IPCAM-8308IR Dual Dual NEW IPCAM-8318IR Dual Dual NEW IPCAM-8318IR Dual Dual NEW IPCAM-8318IR	Stream Codec Model Name Description Dual Dual IPCAM-8309F Dual stream network camera Dual Dual IPCAM-8309FW Dual stream network camera Dual Dual NEW IPCAM-8309D Dual stream network dome camera Dual Dual NEW IPCAM-8308IR Dual stream network IR camera Dual Dual NEW IPCAM-8318IR Dual stream network IR camera Dual Dual NEW IPCAM-8318F Dual stream Day&Night network camera	Stream Codec Model Name Description Type Dual Dual IPCAM-8309F Dual stream network camera S Dual Dual IPCAM-8309FW Dual stream network camera S Dual Dual IPCAM-8309D Dual stream network dome camera S Dual Dual IPCAM-8308IR Dual stream network IR camera S Dual Dual IPCAM-8318IR Dual stream network IR camera S Dual Dual IPCAM-8318F Dual stream Day&Night network camera S

Ethernet over Coax

Ethernet Bridge	NE	EOC-10	Ethernet extender over coaxial	S	184
Ethernet bridge		EOC-10	Ethernet extender over coaxial	3	104

Central Management System

CMS Smart-View Plus Central management system	S/W	176	
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Digital Video Server Family

Dual Stream Video Encoder

DVS-8301

The DVS-8301 supports one analog video input stream. It delivers dual stream (MPEG-4 and MJPEG) @30 fps, 4CIF resolution for remote monitoring anywhere. In addition, the DVS-8301 supports 3GPP mobile protocol, which enables users to monitor via 3G cell phones or any RTSP (Real Time Streaming Protocol) compatible multimedia software on the go.

A complete set of security features includes user access management and HTTPS / SSL encryption. DVS-8301 provides a one channel audio stream for two-way audio applications. Remote power feeding via PoE (Power over Ethernet) is also a feature of the unit. Powerful event management, including image upload to FTP server, alarm notification and I/O control are standard features. Pan/Tilt/Zoom control is done over the RS-485 interface.

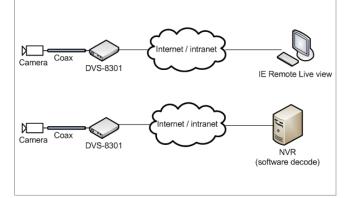
Features

- Simultaneous Motion JPEG & MPEG-4 streams up to 4CIF resolution
- Excellent image quality with up to 30 fps in all resolutions
- PoE (Power over Ethernet) enabled device
- Supports two-way audio
- Digital I/O for external alarm or sensor
- Supports 3GPP/ISMA RTSP
- Supports multiple PTZ control protocols through RS-485
- UPnP for fast and easy network installation
- Free bundled 16 channel surveillance & recording software

Specifications

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Video Input	1, BNC, looping, 75ohms, 1Vp-p
Video Compression	MPEG4 Simple Profile, Motion JPEG
Video Resolutions	4CIF: NTSC=704*480, PAL=704*576,
	CIF: NTSC=352*240, PAL=352*288,
	QCIF: NTSC=176*120, PAL=176*144
Bit Rate	64K ~2Mbps
Video Adjustment	Brightness, Contrast, Hue, Saturation,
	Constant Bit Rate (CBR), Variable Bit Rate (VBR)
PTZ Interface	RS-485
PTZ Protocols	Pelco D/ Pelco P
PTZ Application	32 preset position, 4 patrol function
LED Indications	Network, Power
Operation System	Linux 2.4
Processor and Memo	ry ARM9 based 32-bit RISC CPU, 32MB RAM,
	8MB Flash
Ethernet	RJ-45 10BaseT/100BaseTX PoE
Terminal Block Conne	ector RS-485/1 alarm input/ 1 relay output
Audio Streaming	Two-way
Audio Input	3.5 mm mic/line in
Audio Compression	ADPCM 64Kbps
Alarm Trigger	External input, Motion detection
Alarm Events	Pre and post alarm buffer
	File upload via FTP
	Notification via email
	External output activation
Network Protocol	TCP/IP, DHCP, PPPoE, ARP, ICMP, FTP, SMTP,
	DNS, NTP, IGMP, UPnP, RTSP, RTP, HTTP, TCP,
	UDP, 3GPP/ISMA RTSP
Application Program	CTCU IP installer (Win32 Application)
	16 channel recording software (SVP-Express)
Security	Password prtection, HTTPS encryption, user access log
Operating Condition	0~50°C
Storage Condition	0~70°C
Operating Humidity	20~80% RH (non-condensing)
Power	DC 12V, 1A
Dimension	129*98*51.6 mm (W*D*H)
Approvals	CE, FCC, RoHS
Include Accessories	CD with installation and management software,
	Power supply

Application



Ordering Information

■ DVS-8301

1 Channel Dual Stream Video Encoder

IP Surveillance Managed Platform

Chassis For IP Surveillance Series



IPS-CH20

The IPS-CH20 is a 2U high 19" Rack, 20 slot modular rack. The IPS-CH20 provides an economic solution in high density Network video card 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

- 2U 19" 20-slot Chassis with AC/DC power redundancy
- Chassis cascade up to 10 with one management IP
- Chassis mainboard consists of passive components
- All modules and cards support hot-swap function
- Two alarm relays
- Supports License Plate Recognition Slide-in Card
- Supports H.264 Digitial Video Decoder Slide-in Card

Specifications

 Power	AC: 100 ~240V
	DC24 : 18 ~ 36V, DC48 : 36 ~ 72V
Power Consumption	150W
Dimensions	303 x 438 x 88mm
(D x W x H)mm	
Weight	5.2kg
Temperature	0~50°C (Operating) ,0~70°C (Storage)
Humidity	10~90% non-condensing
Certification	CE, FCC, RoHS
MTBF	65,000 h (25°C)

Ordering Information

- IPS-220-CH20 2U, 19", 20-slot In-band Managed chassis
- IPS-220-AC 100 ~ 240 VAC power supply module, IEC connector
- IPS-220-DC24 18 ~ 36 VDC power supply module, 3 pin terminal block
- *IPS-220-DC48* 36 ~ 72 VDC power supply module, 3 pin terminal block

IP Surveillance Managed Platform

Chassis For IP Surveillance Series



IPS-CH01

The IPS-CH01 is a single-slot chassis for Slide-in Decoder or LPR cards with a number of different power options. The IPS-CH01 slide-in chassis may be applied in point to point applications or may be linked to a centrally located IPS rack. The power supply can be chosen from AC100-240V, DC 18-72V or external AC switching adapter.

Features

- License Plate Recognition
- H.264 Digitial Video Decoder

Specifications

Power	AC: 100 ~240V
	DC24 : 18 ~ 36V, DC48 : 36 ~ 72V
Power Consumption	150W
Dimensions	303 x 438 x 88mm
(D x W x H)mm	
Weight	5.2kg
Temperature	0~50°C (Operating) ,0~70°C (Storage)
Humidity	10~90% non-condensing
Certification	CE, FCC, RoHS
MTBF	65,000 h (25°C)

Ordering Information

- IPS-220-CH01 Stand-alone one-slot chassis w/ external AC adapter
- IPS-220-CH01/AC Stand-alone one-slot chassis w/ internal AC 100 ~240V power supply
- IPS-220-CH01/DC Stand-alone one-slot chassis w/ internal DC 18 ~72V power supply
- IPS-220-CH01/AD Stand-alone one-slot chassis w/ internal AC 100~240V & DC 36 ~72V power inputs

Digital Video Server Family

H.264 Digital Video Encoger



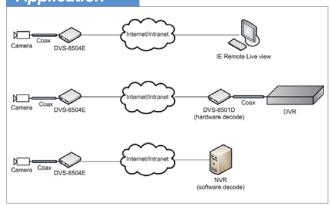
DVS-8504E

The DVS-8504E offers highly-effective H.264 video compression. It can deliver multiple or individual configurable video streams simultaneously at full 30fsp frame rate in all resolutions up to D1 (720x480 in NTSC, 720x576 in PAL). This means that several video streams can be configured with different resolutions, frame rates and bit rate for different needs. The DVS-8504E can also provide dual-stream transmissions for recording and monitoring. The DVS-8504E has provision for a SATA hard-disk for local or backup recording applications. The DVS can also provide video for viewing at two different locations or have the main stream be recorded and have the sub-stream available for live viewing. The web management offers the user access to detailed alarm detection and actions.

Features

- Multiple H.264 streams
- D1 resolution @ 30FPS, CIF resolution@120FPS
- 1-CH D1 / 2-CH 2CIF / 4-CH CIF
- Built-in Web server for management
- Supports HTTPS and password protection
- Supports 3.5" SATA hard-disk tray for local storage
- Provides main and sub video streams with different resolution
- Supports logic (AND / OR) event alarms
- Supports two-way audio
- 4 Digital Input / 2 Digital Output connections
- Supports privacy mask
- Fanless design

Application



Specifications

Event Sending	Path FTP; E-mail (forwarding JPEG picture)		
Digital Zoom	4x		
Snapshot	Live view mode (JPEG format)		
Playback	Playback via IE browser		
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		
System Language English, Simplified Chinese, Traditional Chinese			
Log	System log, operating log		
·	·		

Ordering Information

■ **DVS-8504E** 4 Channel H.264 Digital Video Encoder

Specifications

Specifications				
Video Compression	H.264			
Video Stream	Dual-stream H.264 (Main/*1Sub stream) controllable			
	frame rate and bandwidth VBR/CBR			
	*1Slave stream must choosethe resolution lower			
	than the Master stream			
Video Resolutions	D1 720x480(NTSC) / 720x576(PAL)			
	2CIF 704x240(NTSC) / 704x288(PAL)			
	CIF 352x240(NTSC) / 352x288(PAL)			
	QCIF 176x120(NTSC) / 176x144(PAL)			
Operating System	Embedded LINUX			
Video Bit Rate	32K/64K/128K/384K/512K/768K/1024K/1.5M/2M			
Video Frame Rate	1 ~ 30 per channel			
Video Quality	5 levels (Medium, standard, good, detailed, excellent			
Video Inputs	4, BNC, 75 ohm, 1 Vp-p			
Video Output	1, BNC, 75 ohm, 1 Vp-p (D1 supported full screen,			
	2CIF and CIF supported quad mode)			
Audio Inputs	4 channels mono audio (RCA)			
Audio Output	1 channel mono audio (RCA)			
Audio Compression	ADPCM G.726, G.711			
Audio Stream	Two-way			
Input / Output Signal	6V p-p, +10dBm max			
Input / Output Impeda	nce 600 ohms			
Terminal Block	1xRS-485 (DB9 interface), 4x alarm input,			
	2x alarm output			
PTZ Protocols	Pelco D, Pelco P			
PTZ Baud Rate	2400, 4800, 9600, 12800, 19200 Kbps			
PTZ Control Speed	Pan, Tilt, Zoom, Focus, Iris			
PTZ Preset	32 Preset positions			
PTZ Patrol	4 Tour mode (Each mode has 10 positions)			
Remote Management	Web browser, SNMP v1/v2c			
Operating Condition	0 to 50 degrees (Celsius)			
Storage Condition	-10 to 70 degrees (Celsius)			
Operating Humidity	0 to 95% (non-condensing)			
Power Input	12VDC, 2A			
System Reset	Reset button (factory default)			
LED Indications	Power, LAN, video status			
Motion Detection	Drag and drop configurable detection windows			
Local Storage	3.5" SATA HDD *1 (Hard drive is not include)			
Configuration Backup	/Recovery Web browser			
Firmware Upgarde	Web browser, TFTP			
NTP	Sync with PC, Sync with NTP server, Manual			
NTP Video Adjustment	<u> </u>			
NTP	Sync with PC, Sync with NTP server, Manual			
NTP Video Adjustment	Sync with PC, Sync with NTP server, Manual Brightness, contract, ssturation, color tone level			

Digital Video Server Family

H.264 Digital Video Decoder

DVS-8501D

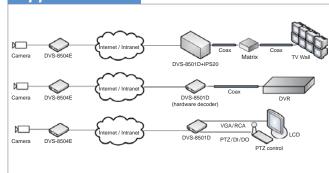


The DVS-8501D is a card designed video decoding module compatible with the DVS-8504E encoder. Using this design, it is possible to deliver video decoding signals (up to D1 resolution @30FPS) via IP network, with high compression rate, at latency of less than one second. The DVS-8501D can switch between 64 video sources for browsing.

Features

- Complies with H.264 compression technology
- Provides high quality analog video and audio decoding
- Programmable sequence mode for multiple video sources
- Decodes video source up to 64 channels (Seguence display mode)
- Built-in Web server for easy management
- Supports secure management and encrypted video streams
- VGA port for stand-alone type
- Supports two-way audio
- Card fits in one-slot or 20-slot chassis

Application



Specifications

Specifications				
Video Decoding	H.264 video with resolution up to D1			
	64 different video sources			
	(support manual cycling, automatic cycling)			
Video Resolutions	D1 720x480(NTSC) / 720x576(PAL)			
	2CIF 704x240(NTSC) / 704x288(PAL)			
	CIF 352x240(NTSC) / 352x288(PAL)			
	QCIF 176x120(NTSC) / 176x144(PAL)			
Operating System	Embedded Linux			
Frame Rate	Frame rates up to 30 (NTSC) / 25 (PAL) in all			
	resolution depend on encoder frame rates.			
Decoding Source	DVS-8504E			
Video Output	1, BNC, 75 ohm, 1 Vp-p			
Video Output	1, BNC, 75 ohm, 1 Vp-p (for DVS-8501D)			
	1 BNC & 1 VGA (for DVS-8501DV series product)			
Output Channel	1 channel mono audio, 3.5mm phone jack			
Audio Compression	ADPCM G.726, G.711			
Microphone	Omni-directional			
Alarm and PTZ Interfa	ace RS-485 (DB9 Interface), 1x alarm input,			
	1x alarm output			
	SNMP v1/v2c, Web browser			
Network Connector	,			
Suppoted Protocols	TCP, UDP, IP, ICMP, IGMP, PPPoE, ARP, UPnP,			
	HTTP, HTTPS, FTP, SMTP, DHCP, DNS, DDNS, RTF			
System Configuration	Backup and recovery all setting via web			
	browser operation			
Firmware Upgarde	Web browser, TFTP			
	age English, Simplified Chinese, Traditional Chinese			
Log	System log, operating log			
Operating Condition	0 to 50 degrees (Celsius)			
Storage Condition	-10 to 70 degrees (Celsius)			
Operating Humidity	Humidity 0 to 95% (non-condensing)			
Power Input	12VDC, 1A			
System 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			

Ordering Information

Chassis

IPS-20
 IPS-20-AC
 IPS-20-DC24
 IPS-20-DC24
 IPS-20-DC48
 IPS-20-DC48
 2U 19(23)", 20-slot managed rack chassis
 100 ~ 240 VAC power supply module, IEC connector
 18 ~ 36 VDC power supply module, 3 pin terminal block
 IPS-20-DC48
 36 ~ 72 VDC power supply module, 3 pin terminal block

Card options

■ **DVS-8501D** 1 Channel H.264 Digital Video Decoder

■ IPS-20-NMC Network managed card, supports console, Telnet, Web and SNMP

Stand-alone options

■ **DVS-8501 DV-AC** Stand-alone with VGA port, 100 ~ 240VAC

■ **DVS-8501 DV-DC** Stand-alone with VGA port, -18 ~ -72VDC

Network Video Recorder Family

Enterprise Network Video Recorder

NVR



The CTC Network Video Recorder is a complete recording solution for CTC Union network cameras which is easy to use and install. It also supports multi brand and megapixel network camera from other manufacturers such as AXIS, ACTi, SONY, Bosch, Arecont Vision, VIVOTEK, etc. The NVR always give you the same image quality as the original image from the camera or video server because it stores directly in digital format. NVR is also able to receive and record audio streams. The NVR provides Web browser viewing of video so no other viewing software needs to be installed on the remote viewing station.

Features

- Supports multiple sites surveillance
- Manage all cameras with tree-directory display
- Supports 1, 4, 5, 6, 8, 9, 10, 12, 13, 16, 25 window layout
- Supports management up to 25 cameras via unlimited tab
- Supports Megapixel / H.264 / MPEG-4 / MJPEG video stream
- Multiple-channel preview in full-screen mode
- Supports different frame rates for preview and recording
- Digital zoom on preview and playback
- Continuous, Schedule, Motion, Alarm Recording
- Supports motion detection and Digital I/O event from hardware
- Maximum 120 seconds pre-event recording
- Expandable PTZ commands
- Search video clips by date, time and event
- Time-based search bar
- 25-channel synchronized playback
- Supports eMap Management and editable map with arbitrarily set the camera icon on the point of view
 Supports remote IE browser connection to NVR (without installation of NVR software)
- A large number date writing of disk optimization
- Automatic error detection which reduces crash or cease to function
- Implementation of real-time screen picture browsing and playback of video information available at the multi-channel monitor
- Supports multi-core processors
- Exported video files can provide a single channel to a single file, a single channel to multiple files, multi-channel to a single file, multi-channel to multiple files
- Storage space spreadsheet tool
- Supports maximum 512X playback speed
- Support language: English, German, Traditional Chinese,
 Simplified Chinese

Ordering Information

■ NVR-4	4 channels network video recording software
■ NVR-8	8 channels network video recording software
■ NVR-12	12 channels network video recording software
■ NVR-16	16 channels network video recording software
■ NVR-20	20 channels network video recording software
■ NVR-25	25 channels network video recording software
■ NVR-28	28 channels network video recording software
■ NVR-32	32 channels network video recording software
■ NVR-36	36 channels network video recording software
■ NVR-64	64 channels network video recording software

Specificatio	ns			
System Require	ments			
PC Specification	16 Channel:	Intel Core 2 Duo 2.4 GHz, 1 GB Memory,		
		250 GB HDD, Gigabit Ethernet,		
		nVidia GeForce 7600 256 MB RAM		
	32 Channel:	Intel Core 2 Duo 2.67 GHz, 2 GB Memory,		
		250 GB HDD, Gigabit Ethernet,		
		nVidia GeForce 7600 256MB RAM		
	48 Channel:	Intel Core 2 Quad 2.67 GHz, 4 GB Memory,		
		250 GB HDD, Gigabit Ethernet,		
		nVidia GeForce 7600 256MB RAM		
	64 Channel:	Intel Core 2 Quad 2.67 GHz, 4 GB Memory		
		250 GB HDD, Gigabit Ethernet,		
		nVidia GeForce 7600 256MB RAM		
Graphic Card	ATI Radeon	1950, nVidia GeForce 8600GT		
Operating System	Windows XP	Professional, Windows 2003, Windows Vista		
	(Business ar	nd Enterprise Edition)		
Browser	Microsoft Into	ernet Explorer v6.0, v7.0 with updated		
	Service Pack	<		
Preview				
Format	H.264/MPE	G-4/MJPEG		
Resolution	Megapixel/D	01/2CIF/CIF/QCIF		
Maximum Number	of Camera	Unlimited		
Window Layout	1, 4, 5, 6, 8,	9, 10, 12, 13, 16, 25		

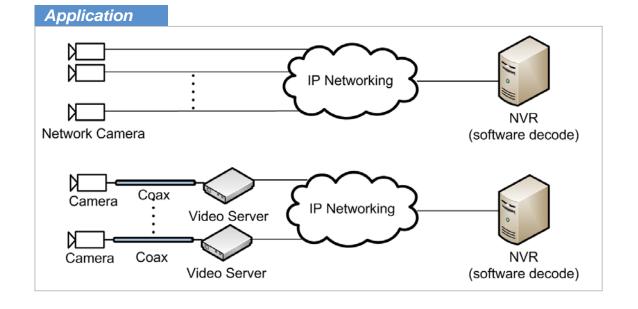
Resolution	Megapixel/D1/2CIF/CIF/QCIF
Maximum Number of	of Camera Unlimited
Window Layout	1, 4, 5, 6, 8, 9, 10, 12, 13, 16, 25
Tree Display Panel	User may drag-n-drop to drag a video source to the
	layout manager for preview
Web Client	Remote preview via Internet Explorer
Patrol Mode	Switches and displays each preview window accordingly
	Pre-defined layout can be set to patrol mode as well
1-Way Audio	Supports 1-way audio.
Create Snapshots	Creates snapshot images and can be searched as an
	event index later on
Advanced Preview I	Mode Maximum 25-channel preview at the same time
	with auto-drop frame mode according to CPU loading
Layout Manager	Setup pre-defined window layout to group certain
	cameras in the same layout. Layout manager can be
	displayed in full-screen mode.
Digital Zoom	User may zoom in/out the video display with mouse
	scroll wheel

Recording	
Schedule Recording	Records video with user-defined schedule and
	time period
Alarm Recording	Records video when a digital input event is triggered
Motion Recording	Records video when motion detected
Pre-event Recording	User-defined time period to record before a certain
	event occurs. Maximum 120 seconds.

Specifications

Opoomouno	
Event Handling	
Event Types	Handles motion detection, alarm, video loss,
	network disconnection events
Hot-Spot Window	Activates and switches the channel with event to the
	hot-spot window. The original video in the hot-spot
	window will then be switched over
Event Log	Triggered event will be recorded into an event log
Play Audio File	Play audio file and beep on the machine
еМар	
eMap Manager	eMap configuration and management
eMap Monitor	Creates alarm when an event occurs on a certain
	camera in eMap
NVR Web Client Fu	*****
Remote Preview	Preview via Web browser
Remote Playback	Search and playback via Web browser
Remote Search	Search certain events via Web browser
Remote Map	Manage map via Web browser
Permission Control	
Auto Login	Auto login and load the first preview layout
Multi-level Permissi	on User may add 10 level permission to set group
	according to required function
Security	Account/password defined with associated
	permission control
Camera Group Perr	mission Setup Camera Group permission for different users
eMap Permission	Setup eMap permission for different users.

Number of Drives	Supports up to 30 drives in one machine		
Recycle Recording	The oldest video clip will be overwritten when the disk		
	reaches its minimum space requirement		
Total Space Manage	ement When total space reaches its minimum free space		
	requirement, certain space will be cleaned up.		
	The oldest files will be removed first.		
Dlavibasis			
Playback Mode	Play, Pause, Stop, Fast Forward, Fast Rewind,		
T layback Wode	Play Backward, Play frame by frame,		
	1/2/4/8/16/32/64/128/256/512x Speed Control		
Play Multiple Files	Plays multiple files in sequence for a period of time.		
Export Video	Exports a period of video clips into one AVI file		
•	ack 16-channel synchronized playback at the same time		
Digital Zoom	User may zoom in/out the video display with mouse		
2.g.ta. 200	ood may zoom myour mo vidoo dioplay mai modoo		
	scroll wheel		
	scroll wheel		
PTZ Control	scroll wheel		
PTZ Control PTZ Management	scroll wheel Manages pan, tilt, zoom operation with speed control		
PTZ Management	Manages pan, tilt, zoom operation with speed control		
PTZ Management Protocol Supported	Manages pan, tilt, zoom operation with speed control Pelco-P, Pelco-D		
PTZ Management Protocol Supported	Manages pan, tilt, zoom operation with speed control Pelco-P, Pelco-D Goto, set, clear preset positions and patrol on preset positions		
PTZ Management Protocol Supported Preset Position	Manages pan, tilt, zoom operation with speed control Pelco-P, Pelco-D Goto, set, clear preset positions and patrol on preset positions aber 32		
PTZ Management Protocol Supported Preset Position Preset Position Num	Manages pan, tilt, zoom operation with speed control Pelco-P, Pelco-D Goto, set, clear preset positions and patrol on preset positions		
PTZ Management Protocol Supported Preset Position Preset Position Num	Manages pan, tilt, zoom operation with speed control Pelco-P, Pelco-D Goto, set, clear preset positions and patrol on preset positions aber 32 4 kinds of patrol path can be set up, each path can be set up atrol eight setting position		
PTZ Management Protocol Supported Preset Position Preset Position Num PTZ Tour	Manages pan, tilt, zoom operation with speed control Pelco-P, Pelco-D Goto, set, clear preset positions and patrol on preset positions aber 32 4 kinds of patrol path can be set up, each path can be set up atrol eight setting position		
PTZ Management Protocol Supported Preset Position Preset Position Num PTZ Tour PTZ Speed	Manages pan, tilt, zoom operation with speed control Pelco-P, Pelco-D Goto, set, clear preset positions and patrol on preset positions Aber 32 4 kinds of patrol path can be set up, each path can be set to patrol eight setting position Pan, Tilt, Zoom, Focus, Iris, Auto pan speed can be set		
PTZ Management Protocol Supported Preset Position Preset Position Num PTZ Tour PTZ Speed	Manages pan, tilt, zoom operation with speed control Pelco-P, Pelco-D Goto, set, clear preset positions and patrol on preset positions ber 32 4 kinds of patrol path can be set up, each path can be set opatrol eight setting position Pan, Tilt, Zoom, Focus, Iris, Auto pan speed can be set from 0 to 100		
PTZ Management Protocol Supported Preset Position Preset Position Num PTZ Tour PTZ Speed	Manages pan, tilt, zoom operation with speed control Pelco-P, Pelco-D Goto, set, clear preset positions and patrol on preset positions aber 32 4 kinds of patrol path can be set up, each path can be set to patrol eight setting position Pan, Tilt, Zoom, Focus, Iris, Auto pan speed can be set from 0 to 100 mmand User-defined PTZ command to support		



Supported Network Cameras & Video Servers

	M-JPEG	MPEG4	H.264	Audio	IR	DI/DO	PTZ
CTC Union							
IPCAM-8309F		1		√			
IPCAM-8309FW	1	1		1	_/		
IPCAM-8309D	1	1		1		1	
IPCAM-8308IR	1	1			_/	_/	
IPCAM-8318IR	-/-	./		_/	-/	1	
	/	/		- /		· /	
IPCAM-8318F		· /		V		~	
IPCAM-8318P	-	-		√		,	
DVS-8504E				√		√	
Axis							
209FD	V	√					
214PTZ	√	√					<u> </u>
211M	√	√					
241Q	✓	\checkmark					
Arecont Vis	sion						
AV3130	✓						
AV5100	√						
Bosch							
VideoJet-10	1	1		1		/	1
Sony		-					
SNCRZ50N	1	1		1		1	1
SNCRZ30	1	_	•	_		1	
SNCP5		/		/		•	
SNCX550	/	/		/		/	
		~		~		V	
Vivitek	1 /						
IZ7151	V	V		√		√	
IP7251	V	√		√		√	
IP7151/7152	√	√		√		√	
IP7142	✓	√		√	√	√	
IP7138/7139	√	√		√		√	
IP7135/7137		√		√			
IP7133/7134	✓	✓		✓		✓	
IP7131/7132		\checkmark				✓	
IP6117/6127	✓	✓				✓	
IP6112/6122	✓	✓				✓	
IP3112/3122		√				√	
IP2112/2122	√					√	
PZ7151/7152	1	√				√	√
PZ7131/7132	1	1				1	1
PZ7112/7122	1	1				1	
PZ7111/PZ7121	-/					-/	
PT7135/7137		1				•	
PZ6114/PZ6124	/	/				/	
PZ6112/6122	V	V				V /	<u> </u>
-	-	V				V	<u> </u>
PT3117/PT3127	V	√				V	<u> </u>
PT3112/3122	V	√				V	√
SD7151	1	√				√	<u>√</u>
SD6112V/6122V	✓	✓				√	√
FD7141	✓	✓		✓	✓	√	
FD7131/7132	✓	✓		✓	✓	✓	
FD6112V/6122V	✓	✓		✓	✓	✓	
FD6111V/6121V	✓	✓		✓	1	✓	
VS2403	√					√	√
VS2101	✓					✓	√
VS3100P		√		√		√	√
VS3102		√		√		1	<u> </u>
VS7100	1	1		1		1	<u> </u>
		•		*		-	

	M-JPEG	MPEG4	H.264	Audio	IR	DI/DO	PTZ
ACTi	,						
ACM-1231/1232	√	✓		√	1		
ACM-1511	✓	✓		✓	1		
ACM-3401	✓	✓		✓	/		
ACM-3411	✓	√		✓	\		
ACM-4200/4201	✓	✓		✓			
ACM-5601/5611	✓	✓		✓		✓	
ACM-7411	✓	✓		✓	1	✓	√
ACM-1011	✓	✓		√	1		
ACM-1311	✓	✓		✓	1		
ACM-1431/1432	√	\		>	>		
ACM-5001	✓	✓		√		✓	
ACM-5711	√	√		√		√	
CAM-5201/5221	√	√		√		√	
CAM-5301/5321	√	\		>		\	
ACM-3001	✓	\		>			
ACM-3011	√	\		>	>		
ACM-3211	✓	√		>	>		
ACM-3311	✓	✓		✓	\		
CAM-7300	✓	✓		✓	>	✓	✓
ACM-4000/4001	✓	✓					
ACM-8201/8211	✓	✓		√		✓	✓
ACM-8511	✓	✓		✓		✓	✓
CAM-6500/6510		✓		√	√	✓	✓
CAM-6600		✓		\	>	✓	√
ACD-2100	✓	✓		✓			✓
ACD-2200	✓	✓		✓			✓
ACD-2300	✓	✓		√		✓	✓
ACD-2400	✓	✓		✓		✓	✓
SED-2120		✓				✓	✓
SED-2140		✓		✓		✓	√
SED-2320Q		✓		√		✓	1
SED-2610		✓		✓		✓	✓
JVC							
C30U	✓			✓		√	√
C625U	✓			✓		✓	✓
C655U	✓						✓
IQinVision							
IQ755	✓			✓		√	
IQ753	✓			✓		✓	

Management Software Family

Central Management System

Smart-View Plus

- Supports network cameras up to 64 channels or more by package license
- Supports whole series products of CTC Union, VIVOTEK, AXIS, PIXORD, and more network cameras
- Utilizes complete functions supplied by network cameras for easy configuration
- Dual monitor support for viewing live video and playback simultaneously
- Printing and image / video export for evidence



- Complete system and event log database
- Enables manual control, preset and patrol of PTZ and dome camera
- Enables I/O connection on cameras
- Remote access from windows application
- Built-in web server for connection from client browser

Dual Monitors

Features

- Multiplexing operation (simultaneous record, playback, archive, remote view, live view)
- Built-in watch dog timer; system will recover if any abnormal operation is detected
- Supports multi-layer E-Map central alarm management system
- Multi-nodes can be managed through single administrator
- Full-time recording, scheduled recording, event recording, no limit for save path
- Authorization via the customer required quantity, also the online registration, no extra hardware needed
- History records kept for all operation and system logs
- Supports SQL server and SQL express database
- Supports database backup and recovery function
- Group setting management based on the user requirement, including cameras, station, play-back, events, and PTZ control by authorization
- Monitor live audio, record, playback and backup audio on one or multiple cameras.
- All events can be filtered by day, time and/or camera
- System supports single-user login authentication or you can connect to multiple sites, and each site can be connected with multiple users at the same time
- Self-define 1, 2, 4, 9, 16, 25, 36, 49, 64 channels and sequence mode
- Live view of up to 64 cameras simultaneously per computer monitor (up to 128 when using dual monitors)
- System supports various surveillance devices, such as network cameras, video servers, DVRs, I/O controllers, and access controls
- Pre-alarm and post-alarm recording
- Supports up to 4CIF@30FPS video
- Monitoring screen supports group rotation, snapshot, and CIF/4CIF full screen
- Configurations are flexible; you can set each camera individually for resolution, compression, frame rate and recording events
- Supports web browser monitoring/playback
- Supports motion detect alarm and send out the notifiation via email, real-time image, preset, recording, set on do & set do off

Our CMS Platform Includes Popular Brands CTC union Panasonic D-Littk PIXORD MVICE MVICE LITTE MVICE MVICE



The Comprehensive Surveillance System for Enterprise

Ordering Information

■ **SVP-P** Smart-View Plus Platform with 32 nodes (can support thousands links)

*Efficient links in Smart-View Plus depends on server load and bandwidth requirements

■ SVP-O Smart-View Plus Option, with 4 Links add-on package

Dual Stream Network Camera



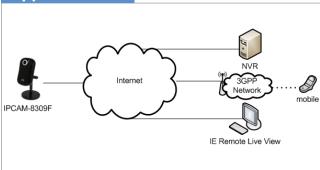
IPCAM-8309F

The IPCAM-8309F provides the best image quality in the low light conditions with excellent performance. IPCAM-8309F offers full VGA resolution for low-cost indoor surveillance applications. The camera also provides the best bandwidth efficiency with simultaneous MPEG-4 and Motion JPEG streams. The built-in microphone enables two-way audio application for remote users. In addition, the IPCAM-8309F supports 3GPP mobile protocol, which enables users to monitor via 3G cell phones or any RTSP (Real Time Streaming Protocol) compatible multimedia software on the go. A complete set of security features includes user access management and HTTPS / SSL encryption.

Features

- Simultaneous Motion JPEG & MPEG-4 streams up to VGA resolution
- Excellent image quality with up to 30 fps in all resolutions
- Superior low-light performance with automatic night-mode
- Supports two-way audio with built-in microphone
- Optimal synchronization of audio and video
- Supports 3GPP/ISMA (RTSP)
- UPnP for fast and easy Installation
- Free bundled 16 channel surveillance and recording software

Application



Ordering Information

■ IPCAM-8309F Dual Stream Network Camera

Specifications

Image Sensor	1/4" Progressive VGA CMOS
	Effective pixels 640 x 480
Minimum Illumination	1 Lux@F2.0
Video Compression	MPEG4 Part-2, Motion JPEG
Video Adjustment	Brightness, Contrast, Hue, Saturation,
	Constant Bit Rate (CBR), Variable Bit Rate (VBR)
Bit Rate	64K ~2Mbps
Video Resolution	640 x 480
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
Digital Zoom	10x
Operating System	Embedded Linux 2.4
Processor and Memor	ry ARM9 based 32-bit RISC CPU, 32MB RAM, 4MB Flash
Ethernet	RJ-45 10BaseT/100BaseTX
Audio Streaming	Two-way
Audio Input	Built-in microphone
Audio Output	3.5 mm line out jack
Audio Compression	ADPCM 64Kbps
Alarm Trigger	Motion detection
Alarm Events	Pre and post alarm buffer
	File upload via FTP
	Notification via email
Network Protocols	TCP/IP, DHCP, PPPoE, ARP, ICMP, FTP, SMTP, DNS
	NTP, IGMP, UPnP, RTSP, RTP, HTTP, TCP, UDP,
	3GPP/ISMA RTSP
Application Program	CTCU IP installer (Win32 Application)
	16 channel recording software (SVP-Express)
Security	Password protection, HTTPS encryption, user access log
Operating Condition	0~45°C
Operating Humidity	20~80% RH (non-condensing)
Power	DC 5V, 1.2A
Dimensions	98 x 58 x 31mm (W x D x H)
Approvals	CE, FCC, RoHS
Included Accessories	CD with installation and management software,
	Power supply, Wall-mount bracket

Wireless Dual Stream Network Camera

IPCAM-8309FW

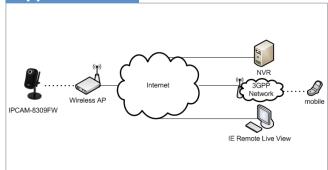


The IPCAM-8309FW provides the best image quality in the low light conditions with excellent performance. IPCAM-8309FW offers full VGA resolution for low-cost indoor surveillance applications. The camera also provides the best bandwidth efficiency with simultaneous MPEG-4 and Motion JPEG streams. The built-in microphone enables two-way audio application for remote users. In addition, the IPCAM-8309FW supports 3GPP mobile protocol, which enables users to monitor via 3G cell phones or any RTSP (Real Time Streaming Protocol) compatible multimedia software on the go. A complete set of security features includes user access management and HTTPS / SSL encryption. The IPCAM-8309FW network camera is supplied with both IEEE 802.11g and Ethernet network interfaces.

Features

- Simultaneous Motion JPEG & MPEG-4 streams up to VGA resolution
- Excellent image quality with up to 30 fps in all resolutions
- Superior low-light performance with 6 night-vision LEDs
- Wireless IEEE 802.11g and Ethernet for installation
- Supports two-way audio with built-in microphone
- Optimal synchronization of audio and video
- Supports 3GPP/ISMA (RTSP)
- UPnP for fast and easy Installation
- Free bundled 16 channel surveillance and recording software

Application



Ordering Information

■ IPCAM-8309FW Wireless Dual Stream Network Camera

Specifications

·	
Image Sensor	1/4" Progressive VGA CMOS
	Effective pixels 640x480
Minimum Illumination	1 Lux@F2.0
Video Compression	MPEG4 Part-2, Motion JPEG
Video Adjustment	Brightness, Contrast, Hue, Saturation,
	Constant Bit Rate (CBR), Variable Bit Rate (VBR)
Bit Rate	64K ~2Mbps
Video Resolution	640 x 480
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
Digital Zoom	10x
LED	6 night-vision LEDs
Operating System	Linux 2.4
Processor and Memor	ry ARM9 based 32-bit RISC CPU, 32MB RAM, 4MB Flast
Ethernet	RJ-45 10BaseT/100BaseTX, Wireless 802.11 b/g Wi-Fi
Audio Streaming	Two-way
Audio Input	Built-in microphone
Audio Output	3.5 mm line out jack
Audio Compression	ADPCM 64Kbps
Alarm Trigger	Motion detection
Alarm Events	Pre and post alarm buffer
	File upload via FTP
	Notification via email
Network Protocols	TCP/IP, DHCP, PPPoE, ARP, ICMP, FTP, SMTP, DNS
	NTP, IGMP, UPnP, RTSP, RTP, HTTP, TCP, UDP,
	3GPP/ISMA RTSP
Application Program	CTCU IP installer (Win32 Application)
	16 channel recording software (SVP-Express)
Security	Password protection, HTTPS encryption, user access lo
Operating Condition	0~45°C
Operating Humidity	20~80% RH (non-condensing)
Power	DC 5V, 1.2A
Dimensions	104 x 63 x 35mm (W x D x H)
Approvals	CE, FCC, RoHS
T. F. C. C.	
Included Accessories	CD with installation and management software,

Dual Stream Network Dome Camera



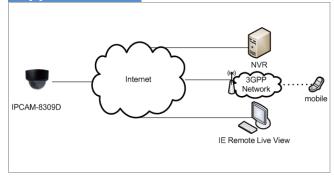
IPCAM-8309D

The IPCAM-8309D is a powerful network dome camera with VGA (640*480) resolution for professional surveillance and remote monitoring. The integrated Power over Ethernet allows power to be supplied to the camera via the network cable. Additionally, the product offer multi-level password protection and HTTPS / SSL encryption. The IPCAM-8309D also supports 3GPP mobile protocol, which enables users to monitor via 3G cell phones or any RTSP (Real Time Streaming Protocol) compatible multimedia device on the go.

Features

- 1/4" progressive scan CMOS sensor
- Simultaneous Motion JPEG & MPEG-4 streams up to 4CIF resolution
- Excellent image quality with up to 30 fps in all resolution
- PoE (Power over Ethernet) enabled device
- Supports two-way Audio
- Digital Input / Output port for external alarm & sensor
- Supports 3GPP/ISMA RTSP
- UPnP for fast and easy Installation
- Free bundled 16 channel surveillance and recording software

Application



Specifications

-	
Image Sensor	1/4" Progressive VGA CMOS
	Effective pixels 640x480
Lens	4.0mm, F2.0
Minimum Illumination	0.5Lux
Video Compression	MPEG4, Motion JPEG
Video Adjustment	Brightness, Contrast, Hue, Saturation,
	Constant Bit Rate (CBR), Variable Bit Rate (VBR)
Bit Rate	64K ~2Mbps
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
Digital Zoom	10x
Operating System	Embedded Linux 2.4
Processor and Memor	ry ARM9 based 32-bit RISC CPU, 64MB RAM,
	8MB Flash
Ethernet	RJ-45 10BaseT/100BaseTX PoE
Audio Streaming	Two-way
Audio Input	3.5 mm mic/line in
Audio Output	3.5 mm line out jack
Audio Compression	ADPCM 64Kbps
Terminal Block Conne	ctor 1 alarm input/ 1 relay output
Alarm Trigger	External input, Motion detection
Alarm Events	Pre and post alarm buffer
	File upload via FTP
	Notification via email
	External output activation
Network Protocols	TCP/IP, DHCP, PPPoE, ARP, ICMP, FTP, SMTP,
	DNS, NTP, IGMP, UPnP, RTSP, RTP, HTTP, TCP,
	UDP, 3GPP/ISMA RTSP
Application Program	CTCU IP installer (Win32 Application)
	16 channel recording software (SVP-Express)
Security	Password protection, HTTPS encryption, user access lo
Operating Condition	0~50°C
Operating Humidity	20~80% RH (non-condensing)
Power	DC 12V, 1A
Dimensions	110 x 130 mm (W x H)
	CE, FCC, RoHS
Approvals	- , ,
Approvals Included Accessories	CD with installation and management software,

Ordering Information

■ IPCAM-8309D Dual Stream Network Dome Camera

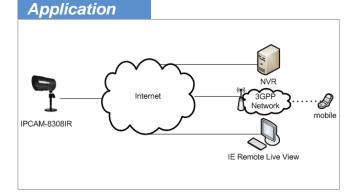
Dual Stream Network IR Camera

IPCAM-8308IR

The IPCAM-8308IR Day and Night network camera is a high performance camera for professional surveillance and remote monitoring. The IPCAM-8308IR has a 15 meter IR (Infrared) range and is enclosed in a IP66 waterproof housing. With integrated Power over Ethernet, power can be supplied to the camera via the network cable. Additionally, the product offer multi-level password protection and HTTPS encryption.

Features

- 1/4" progressive scan CMOS sensor
- Simultaneous Motion JPEG & MPEG-4 streams up to 4CIF resolution
- Excellent image quality with up to 30 fps in all resolution
- PoE (Power over Ethernet) enabled device
- Supports two-way audio
- IR working distance up to 15M
- IP66 water resistance
- Supports 3GPP/ISMA RTSP
- UPnP for fast and easy Installation
- Free bundled 16 channel surveillance and recording software



Ordering Information

■ IPCAM-8308IR Dual Stream Network IR Camera

Specifications

Image Sensor	1/4" Progressive VGA CMOS
	Effective pixels 640x480
Lens	4.3mm, F2.0
Video Compression	MPEG4, Motion JPEG
Video Adjustment	Brightness, Contrast, Hue, Saturation,
	Constant Bit Rate (CBR), Variable Bit Rate (VBR)
Bit Rate	64K ~2Mbps
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
Digital Zoom	10x
IR LED	24, 850nm LEDs
IR working Distance	15M
Operating System	Embedded Linux 2.4
Processor and Memor	y ARM9 based 32-bit RISC CPU, 64MB RAM, 8MB Flas
Ethernet	RJ-45 10BaseT/100BaseTX PoE
Audio Streaming	Two-way
Audio Input	3.5 mm mic/line in
Audio Output	3.5 mm line out jack
Audio Compression	ADPCM 64Kbps
Terminal Block Conne	ctor 1 alarm input/ 1 relay output
Alarm Trigger	External input, Motion detection
Alarm Events	Pre and post alarm buffer
	File upload via FTP
	Notification via email
	External output activation
Network Protocols	TCP/IP, DHCP, PPPoE, ARP, ICMP, FTP, SMTP, DNS,
	NTP, IGMP, UPnP, RTSP, RTP, HTTP, TCP, UDP,
	3GPP/ISMA RTSP
Application Program	CTCU IP installer (Win32 Application)
	16 channel recording software (SVP-Express)
Security	Password protection, HTTPS encryption, user access log
Operating Condition	0~50°C
Operating Humidity	20~80% RH (non-condensing)
Power	DC 12V, 1A
Dimensions	99 x 73 mm (W x H)
Approvals	CE, FCC, RoHS
Approvals	02,100,1010
Included Accessories	CD with installation and management software,

Dual Stream Network IR Camera

IPCAM-8318IR

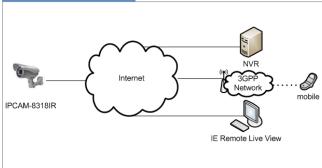


The IPCAM-8318IR Day and Night network camera is a high performance CCD camera for professional surveillance and remote monitoring. The IPCAM-8308IR has a 35 meter IR (Infrared) reach and is enclosed in an IP66 waterproof housing. With integrated Power over Ethernet, power can be supplied to the camera via the network cable. Additionally, the product offer multi-level password protection and HTTPS encryption.

Features

- 1/3" Sony Super HAD high resolution CCD sensor (520TVL)
- Simultaneous Motion JPEG & MPEG-4 streams up to 4CIF resolution
- Excellent image quality with up to 30 fps in all resolutions
- PoE (Power over Ethernet) enabled device
- Supports two-way audio
- IR working distance up to 35M
- IP66 water resistance
- Supports 3GPP/ISMA RTSP
- UPnP for fast and easy installation
- Free bundled 16 channel surveillance and recording software

Application



Ordering Information

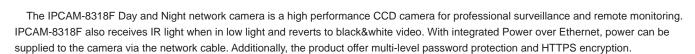
■ IPCAM-8318IR Dual Stream Network IR Camera

Specifications

Specifications	
Image Sensor	1/3" Sony SuperHAD CCD
	Effective pixels 640x480
Lens	16 mm, F2.0
Minimum Illumination	0.3 Lux, F2.0; 0 Lux LED on
Horizontal Resolution	520TVL
S/N Ratio	> 48dB
Video Output	1, BNC, 75ohm, 1.0 Vp-p
Gain Control	Auto
White Balance	Auto
Day/Night Function	Auto
Color Rollingless	Auto
Shutter Time	1/50 (60) ~1/100,000 sec
Video Compression	MPEG4, Motion JPEG
Video Adjustment	Brightness, Contrast, Hue, Saturation,
	Constant Bit Rate (CBR), Variable Bit Rate (VBR)
Bit Rate	64K ~2Mbps
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
Digital Zoom	10x
IR LED	36, 850nm LEDs
IR working Distance	35M
Operating System	Linux 2.4
Processor and Memor	ry ARM9 based 32-bit RISC CPU, 64MB RAM, 8MB Fla:
Ethernet	RJ-45 10BaseT/100BaseTX PoE
Audio Streaming	Two-way
Audio Input	3.5 mm mic/line in
Audio Output	3.5 mm line out jack
Audio Compression	ADPCM 64Kbps
Alarm Trigger	Motion detection
Alarm Events	Pre and post alarm buffer
	File upload via FTP
	Notification via email
Network Protocols	TCP/IP, DHCP, PPPoE, ARP, ICMP, FTP, SMTP,
	DNS, NTP, IGMP, UPnP, RTSP, RTP, HTTP, TCP,
	UDP, 3GPP/ISMA RTSP
Application Program	CTCU IP installer (Win32 Application)
-	16 channel recording software (SVP-Express)
Security	Password protection, HTTPS encryption, user access I
Operating Condition	0~50°C
Operating Humidity	20~80% RH (non-condensing)
Casing	Weatherproof casing with IP66
Power	DC 12V, 1A
Dimensions	265 x 85 mm (W x H)
Dimensions	
Approvals	CE, FCC, RoHS

Dual Stream Day&Night Network Camera

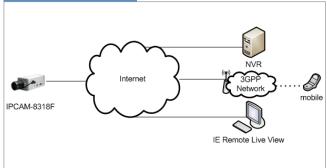
IPCAM-8318F



Features

- 1/3" Sony Super HAD CCD (420TVL)
- Simultaneous Motion JPEG & MPEG-4 streams up to 4CIF resolution
- Excellent image quality with up to 30 fps in all resolution
- Supports two-way audio
- Digital I/O for external alarm or sensor
- Supports 3GPP/ISMA RTSP
- PoE (Power over Ethernet) enabled the device
- UPnP for fast and easy installation
- Free bundled 16 channel surveillance and recording software

Application



Ordering Information

■ IPCAM-8318F Dual Stream Day&Night Network Camera

Image Sensor	1/3" Sony SuperHAD CCD
ŭ	Effective pixels 640x480
Minimum Illumination	0.3 Lux, F2.0
Horizontal Resolution	420TVL
S/N Ratio	> 48dB
Video Output	1, BNC, 75ohm, 1.0 Vp-p
Lens Type	CS-mount
Back Light Control	Auto
Gain Control	Auto
White Balance	Auto
Day/Night Mode	Color, Black/White
Electronic Shutter	1/50 (60) ~1/100,000 sec
Video Compression	MPEG4, Motion JPEG
Video Adjustment	Brightness, Contrast, Hue, Saturation,
	Constant Bit Rate (CBR), Variable Bit Rate (VBR)
Bit Rate	64K ~2Mbps
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
Digital Zoom	10x
Operating System	Embedded Linux 2.4
Processor and Memor	ry ARM9 based 32-bit RISC CPU, 64MB RAM,
	8MB Flash
Ethernet	RJ-45 10BaseT/100BaseTX PoE
Audio Streaming	Two-way
Audio Input	3.5 mm mic/line in
Audio Output	3.5 mm line out jack
Audio Compression	ADPCM 64Kbps
Alarm Trigger	External input, Motion detection
Alarm Events	Pre and post alarm buffer
	File upload via FTP
	Notification via email
	External output activation
Network Protocols	TCP/IP, DHCP, PPPoE, ARP, ICMP, FTP, SMTP,
	DNS, NTP, IGMP, UPnP, RTSP, RTP, HTTP, TCP,
	UDP, 3GPP/ISMA RTSP
Application Brogram	CTCU IP installer (Win32 Application)
Application Program	CTCO II IIIstallei (WIII32 Application)
Application Frogram	16 channel recording software (SVP-Express)
Security	16 channel recording software (SVP-Express)
	16 channel recording software (SVP-Express)
Security	16 channel recording software (SVP-Express) Password protection, HTTPS encryption, user access to
Security Operating Condition	16 channel recording software (SVP-Express) Password protection, HTTPS encryption, user access to 0~50°C
Security Operating Condition Operating Humidity	16 channel recording software (SVP-Express) Password protection, HTTPS encryption, user access to 0~50°C 20~80% RH (non-condensing)
Security Operating Condition Operating Humidity Casing	16 channel recording software (SVP-Express) Password protection, HTTPS encryption, user access to 0~50°C 20~80% RH (non-condensing) Weatherproof casing with IP66
Security Operating Condition Operating Humidity Casing Power	16 channel recording software (SVP-Express) Password protection, HTTPS encryption, user access to 0~50°C 20~80% RH (non-condensing) Weatherproof casing with IP66 DC 12V, 1A
Security Operating Condition Operating Humidity Casing Power Dimensions Approvals	16 channel recording software (SVP-Express) Password protection, HTTPS encryption, user access to 0~50°C 20~80% RH (non-condensing) Weatherproof casing with IP66 DC 12V, 1A 265 x 85 mm (W x H)

Dual Stream Network High-speed Dome Camera

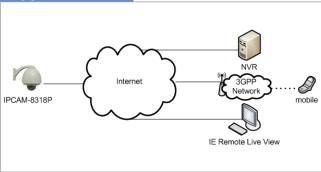
IPCAM-8318P

The IPCAM-8318P High-speed Night network dome is a high performance CCD camera for professional surveillance and remote monitoring. The IPCAM-8318P IP speed dome utilizes a 1/4" Sony Super HAD CCD and gives 480TVL high video quality, with 26x optical zooming and optimized distant target focusing. The IPCAM-8318P is enclosed in IP66 waterproof housing. Additionally, the product offers multi-level password protection and HTTPS encryption.

Features

- 1/4" Sony Super HAD CCD (480TVL)
- Simultaneous Motion JPEG & MPEG-4 streams up to 4CIF resolution
- Excellent image quality with up to 30 fps in all resolutions
- 26x optical and 10x digital zoom
- IP66 waterproof, designed for outdoor or indoor applications
- Pendant and wall-mount installations for various environments
- Supports 3GPP/ISMA RTSP
- UPnP for fast and easy installation
- Free bundled 16 channel surveillance and recording software

Application



Ordering Information

■ IPCAM-8318P Dual Stream Network High-speed Dome Camera

Specifications

Image Sensor	1/4" Sony Super HAD CCD (480TVL)
Electronic Shutter	1/60 (50) ~1/100,000
S/N Ratio	> 48dB
Zoom	26x optical and 10x digitial, total 260x
Lens	F1.6~3.8 f=3.5~91mm
Minimum Illumination	2.5 Lux at F1.6, 0.07 Lux at F1.6 (Slow shutter)
Pan Range	360 degrees endless
Tilt Range	0~180 degrees
Video Output	1, BNC, 75ohm, 1.0Vp-p
Video Compression	MPEG4 Simple Profile, Motion JPEG
Video Resolutions	4CIF NTSC=704 x 480, PAL=704 x 576
	CIF NTSC=352 x 240, PAL=352 x 288
	QCIF NTSC=176 x 120, PAL=176 x 144
Bit Rate	64K ~2M bits/sec
Video Adjustment	Brightness, Contrast, Hue, Saturation,
	Constant Bit Rate (CBR), Variable Bit Rate (VBR)
Camera Control	Support 32 preset position
Waterproof	IP66
Operating System	Embedded Linux 2.4
Processor and Memor	ry ARM9 based 32-bit RISC CPU, 64MB RAM,
	8MB Flash
Ethernet	RJ-45 10BaseT/100BaseTX
Alarm Trigger	External input, Motion detection
Alarm Events	Pre and post alarm buffer
	File upload via FTP
	Notification via email
	External output activation
Network Protocols	TCP/IP, DHCP, PPPoE, ARP, ICMP, FTP, SMTP,
	DNS, HTTP, NTP, IGMP, UPnP, RTSP, RTP, TCP,
	UDP, 3GPP/ISMA RTSP
Application Program	CTCU IP installer (Win32 Application)
	16 channel recording software (SVP-Express)
Security	Password protection, HTTPS encryption, user access log
Dimensions	150 x 262mm (D x H)
Operating Condition	-10~50°C
Storage Condition	0~70°C
Operating Humidity	20~80% RH (non-condensing)
Power	AC 24V
Power Consumption	Max: 13W
Included Accessories	CD with installation and management software,
	Power supply

LAN Extender

Ethernet over Coax



EOC-10

The EOC-10 is point-to-point and point-to-multipoint EoCNA (Ethernet over Coax Network Alliance) solution that efficiently extends 10/100 Ethernet circuits up to 900 meters (2,952feet) at full Fast Ethernet speed using existing coaxial cable. The EOC-10 will allow Ethernet connectivity in existing facilities or homes without pulling extra cable. This is perfect solution for Ethernet on the factory floor where systems have been upgraded from slower serial communication to Ethernet networking. Installation is easy with absolutely no settings required. The EOC-10 is used in Coaxial cable systems to extend Ethernet connectivity over existing CCD/CATV grade Coaxial cable. The EOC-10 works by sharing the same cable with CATV signals, without interference to the existing CATV signals.

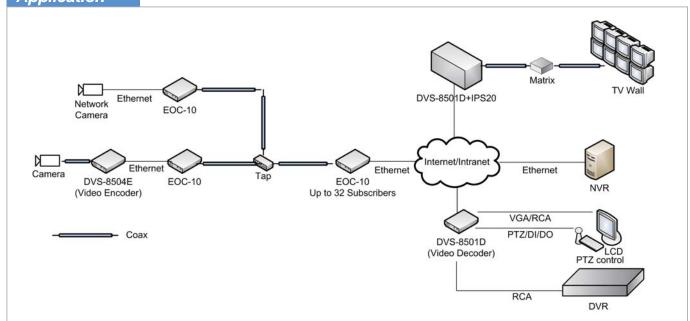
Features

- Extends LAN connectivity using existing coaxial cable
- Transmits CATV and Ethernet over the same coaxial cable
- 112Mbps (PHY speed) @ 900 meters (2,952feet)
- 32Mbps (PHY speed) @ 1.2Km (4,000feet)
- Supports point to point and point to multi-point up to 32 nodes over tap/splitter
- Asymmetrical using EoCNA standard
- Operates transparently to high layer protocols such as TCP/IP
- Auto MDI / MDIX
- Auto negotiation
- Plug and Play, no configuration required
- Status LEDs for simple monitoring

Specifications

Ports	Fast Ethernet Interface 10/100 Mbps, RJ45
	Coax Interface Two F-Type Female Coax Connector
	One for EoCNA, the other for TV
	Protocol Transparent to higher layer protocols
	Transmission Power 8 ±1 dBm, 12~28 MHz
	and Spectrum
	Physical layer transmission speed and distance
	Up to 112Mbps@900 meters
	Up to 32Mbps @ 1.2Km (-176dBm/Hz Noise Floor)
LEDs	PWR, LAN Link/Act, Coax Link/Act, Coax Sync
Standard	ITU G.9954, IEEE802.3, IEEE802.3u, IEEE802.3x
Power	DC 5V (via AC switching adapter)
Power Consumption	6W
Dimensions	83 x 138 x28mm
(D x W x H)mm	
Weight	330g
Temperature	0~50°C (Operating), 0~70°C (Storage)
Humidity	10~90% non-condensing
Certification	CE, FCC, RoHS
MTBF	57,000 hours

Application



Ordering Information

■ EOC-10

10/100Base-TX Ethernet over coax, AC adapter required





IP Surveillance Solutions

Video Server / Network Camera Network Video Recorder

License Plate Recognition Central Management System







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