Tele-communications

CTC union

2009 PRODUCT CATALOG

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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Fiber Series

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PDH Series

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1. FIBER SERIES

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 Selection Table

In-band Managed Fiber Media Converter Series

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

Interface	Model Name	Description	Type	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	NEW FRM220-10/100A-1	10/100Base-TX to 100Base-FX w/ In-band 802.3ah OAM/IP management	L, S	7
Fast Ethernet	NEW 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	NEW FRM220-1000EAS	2-port 10/100/1000Base-T to 2-port 1000Base-FX SFP w/ In-band 802.3ah OAM/IP management	L, S	12
Gigabit Ethernet	NEW FRM220-1000EAS-1	10/100/1000Base-T to 1000Base-FX SFP w/ In-band 802.3ah OAM/ IP management	L, S	11
Gigabit Ethernet	NEW 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
Transponder	NEW FRM220-SML80-3R	3R Transponder card	L, S	18

Managed Fiber Media Converter Series

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	26
E1 / T1 (Power Built-in)	FIB2-E1/T1	E1/T1 to fiber	S	26
V.35/X.21/RS530/449	FIB1-DATA	2Mbps (V35/X.21/RS530/449/232) to fiber	L, S	27
V.35/X.21/RS530/449 (Power Built-in)	FIB2-DATA	2Mbps (V35/X.21/RS530/449/232) to fiber	S	27
V.35/X.21/RS530/449 (With High Speed)	FIB1-DATA/H	8Mbps (V35/X.21/RS530/449/232) to fiber	L,S	27
RS485/422/232	FIB1-Serial	RS485/422/232 to fiber	L, S	28
RS485/422/232 (Power Built-in)	FIB2-Serial	RS485/422/232 to fiber	S	28
RS485/422/232 (Self-healing fiber ring)	FIB1-Serial/FDC	Fiber Daisy Chain RS485/422/232	S	29
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

Non-managed Fiber Media Converter Series

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

Interface	Model Name	Description	Type	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
10 Gigabit Ethernet NEW	OF10G-01S	10GBase-T to 10GBase-R SFP+	S	30
Power Over Ethernet				
POE	FMC-10/100P	10/100Base-TX to 100Base-FX (PoE)	S	35
Plastic Optical Fiber				
Fast Ethernet POF NEW	FMC-10/100POF-S	10/100Base-TX to 100Base-FX SMI	S	38
Fast Ethernet POF NEW	FMC-10/100POF-O	10/100Base-TX to 100Base-FX Optolock	S	38

Fiber Switch

Fast Ethernet NEW	FSW-2104	4-port 10/100Base-TX + 100Base-FX fiber switch	S	41
Fast Ethernet NEW	FSW-2202	2-port 10/100Base-TX + 2-port 100Base-FX fiber switch	S	42
Fast Ethernet NEW	FSW-2204	4-port 10/100Base-TX + 2-port 100Base-FX fiber switch	S	42

Fiber Integrated Access 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-managed Fiber Converter 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	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	SML-10-8024	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	Optical Add/Drop MUX	L, S	54

Managed Fiber Optical 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 Multiplexer

STM-1 NEW	SDH01A	1U, 19(23)", 4-slot, 4(8) E1(T1), 1xE3(T3), 4xDatacom, 4xEthernet ADM	R	50

Multimedia Fiber Extender

HDMI NEW	HDMI-F	HDMI to fiber extender	S	56
DVI NEW	DVI-F	DVI to fiber extender	S	55

Fiber Transceiver Module

155Mbps SFP	155Mbps SFP	155M hot-pluggable fiber transceiver module	C	57
155Mbps, 1.25/2.5G CWDM SFP	CWDM SFP	155M, 1.25/2.5G CWDM hot-pluggable fiber transceiver module	C	58
1.25G GBIC	GBIC	1.25G hot-pluggable fiber transceiver module	C	58
1.25/2.5G SFP	SFP	1.25/2.5G hot-pluggable fiber transceiver module	C	58
10G XFP NEW	XFP	10G hot-pluggable fiber transceiver module	C	58
10G SFP+ NEW	SFP+	10G hot-pluggable fiber transceiver module	C	58

Fiber Patch cords

Fiber (9/125, 50/125, 62.5/125um)	Fiber Patch cords	Fiber optic patch cord	C	59

Fiber Attenuator

Fiber (9/125, 50/125, 62.5/125um)	Fiber Attenuator	Fiber attenuator	C	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 card, S = Stand-alone

Interface	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				
E1 NEW	SHRM03b-E1	2-ch E1 card	L	64
Ethernet Bridge NEW	SHRM03b-ET100	2-ch 10/100Base-TX card	L	64
V35, RS530, RS449, X.21 NEW	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 (V.35, RS530, RS449, X.21) NEW	SHDTU03b-31	Ethernet 10/100Base-TX, E1, Data (V.35, RS530, RS449, X.21) multi-interface NTU	S	68
4-wire (11.4Mbps) G.SHDSL.bis TDM CPE Modem				
E1 NEW	SHDTU03bA-E1	E1 NTU	S	65
V35, RS530, RS449, X.21 NEW	SHDTU03bA-Data	V35, RS530, RS449, X.21 NTU	S	66
Ethernet Bridge NEW	SHDTU03bA-ET100	Ethernet 10/100Base-TX NTU	S	70
Ethernet Bridge+E1+Data (V.35, RS530, RS449, X.21) NEW	SHDTU03bA-31	Ethernet 10/100Base-TX, E1, V.35 multi-interface NTU	S	68
Ethernet Bridge+E1(T1)+Data (V.35, RS530, RS449, X.21) NEW	SHDTU03bA-31T	Ethernet 10/100Base-TX, E1, T1, V.35 multi-interface NTU	S	68
G.SHDSL.bis ATM				
G.SHDSL.bis ATM Chassis				
4U chassis NEW	SHRM03b-CH	4U,19", 16-slot chassis	R	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
Ethernet Router NEW	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 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 (5.7/11.4/22.8Mbps)				
5.7Mbps Ethernet Bridge NEW	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 Family

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

Interface	Model Name	Description	Type	Page
G.SHDSL TDM				
Managed G.SHDSL TDM Chassis				
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 TDM 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 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 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	C	87
ADSL, VDSL	ALS-12	ADSL/VDSL splitter	C	86
ADSL	ALS-10-IT	Italy POTS plug ADSL splitter	C	88
ADSL	ALS-10-UK	UK POTS BT plug ADSL splitter	C	88
ADSL	ALS-10-FI	Finland POTS plug ADSL splitter	C	88
ADSL	ALS-10-FA	France POTS plug ADSL splitter	C	88
ADSL	ALS-10-EU/I	ADSL/ISDN splitter	C	89
Stand-alone Micro Filter				
ADSL, VDSL	ALS-M12	ADSL/VDSL micro filtter	C	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

3. PDH SERIES

E1 Concentrator, Access Unit, Muliplexer
Inverse Multiplexer / DXC / TDM over IP
E1 to T1 Cross Rate Converter , E1/T1 Repeater
G.703/64k ,T1 Concentrator, Access Unit, Muliplexer
E1/T1 Balun , E1/T1 Surge Protector

PDH Series Selection Table

E1 Family

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

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-mountable), Single E1 Access Unit				
RS530, RS449 /	ETU01A	*Data port to fractional E1 w/ SNMP & LCD display	S	93
V.36, RS232 / V.24 /	NEW 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	NEW EOe-1A	Ethernet over unframed E1 w/SNMP	S	97
Ethernet Bridge	EOe-1	Ethernet over unframed E1	S	98
* **Data Port**				
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 available for ETU01/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)	C	99
V.35/X.21/RS530/449	G703-E1-U	Compact size, data to unframed E1	C	100
Managed Single E1, Multi-Data Port Multiplexer				
1U Stand-alone (Rack-mountable), Managed E1 Multiplexer				
* RS530, RS449/V.36, RS232/	NEW 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	NEW 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				

Inverse Multiplexer Family

Managed E1 Concentrator				
4U Managed E1 Concentrator	ERM04	4U, 19", 13-slot concentrator w/ SNMP	R	109
E1 inverse multiplexer card				
Ethernet Bridge	ERM04-ET100	4E1 (8Mbps) inverse multiplexer card	L	109
1U Stand-alone (Rack-mountable), E1 Inverse Multiplexer				
Ethernet Bridge	ETU04A	4E1 (8Mbps) inverse multiplexer	S	110

PDH Series Selection Table

E1 Family

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

Interface	Model Name	Description	Type	Page
Managed Voice & Data E1 Multiplexer				
Managed E1 Chassis				
4U Managed Chassis NEW	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 NEW	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-mountable), Managed E1 Multiplexer				
1U Managed Chassis Interface Module	ETU02-Mux/Plus	1U, 19", 3-slot voice & data E1 multiplexer chassis w/ SNMP	R	104
E1 Trunk	ETU02-Mux/Plus-E1	Fractional E1 (Nx64k) trunk module	M	105
Sub E1	ETU02-Mux/Plus-SubE1	Fractional Sub E1 (Nx64k) module	M	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-mountable), E1 Digital Cross Connect 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

E1 to T1 Cross Rate Converter

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

Interface	Model Name	Description	Type	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	C	120
E1/T1	ETR04	1 to 4 E1/T1 Uni-directional repeater	C	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 card				
V.35, X.21, RS530, RS449/ V.36, RS232/V.24	G703/64-RM-Serial	V.35, X.21, RS530, RS449/V.36, RS232/V.24 (64 or 19.2kbps) card	L	116
Single G.703 Co-directional 64K Access Unit				
1U Stand-alone (Rack-mountable), Single G.703 Co-directional 64K Access Unit				
V.35, X.21, RS530, RS449/ V.36, RS232/V.24	G703/64A-STD	V.35, X.21, RS530, RS449/V.36, RS232/V.24 to G.703 Co-directional 64K	S	117
Ethernet Bridge	NEW 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/ 232	Compact size, V.35, X.21, RS232/V.24 to G.703 Co-directional/ contra-directional/centra-directional 64K	C	118

T1 Family

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-mountable), Single T1 Access Unit				
* RS530, RS449/V.36, RS232/ V.24,V.35, X.21, NRZ, G703/ 64/Ethernet Bridge, Router	TTU01	*Data port to fractional T1	S	123
Single T1, Multi-Data Port Multiplexer				
1U Stand-alone (Rack-mountable), T1 Multiplexer				
* RS530, RS449/V.36, RS232/ V.24, V.35, X.21, NRZ, G703/ 64/Ethernet Bridge, Router	NEW TTU02-MUX/AD	*T1 Mux, 2/4-ch data port, sub T1, w/ LCD display & dual power (AC+DC)	S	124
	TTU02-MUX	*T1 Mux, 2/4-ch data port, sub T1, w/ LCD display	S	124

Balun Family

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

Surge Protector Family

E1	SP-SE-B01	E1 surge protector	SP	126

4. IP 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, SP = Surge Protector

Interface	Model Name	Description	Type	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 Mile Family				
2/4/8-wire EFM (5.7/11.4/22.8Mbps)				
5.7Mbps Ethernet Bridge NEW	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 NEW	SHDTU03b-ET100BS	2-wire, 4-port LAN extender	S	130
G.SHDSL LAN Extender				
2.3Mbps Ethernet Bridge NEW	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	C	133
G.703 Co-directional NEW	ET100/G64	Stand-alone Ethernet to G.703 Co-direcctional 64K bridge	S	134
NRZ NEW	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

5. TESTER SERIES

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

Fiber Tester Family

Type: H = Handheld

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

Protocol Analyzer Family

V.35/X.21/RS530/RS449/RS232	HCT-6000	Datacom protocol and BER tester	H	143

PCM Analyzer Family

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

LAN Cable Tester Family

UTP, STP	LCT-300	LAN cable continuity, ID tester	H	150
UTP, STP, Coax	LCT-400	LAN cable continuity, ID tester	H	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	Type	Page
V.35 , RS530	●	V35/530IP	V.35 to RS530	C	151
V.35 , RS449	●	V35/449IP	V.35 to RS449	C	151
V.35, X.21	●	V35/X21IP	V.35 to X.21	C	151
V.35, RS232	●	V35IP	V.35 to RS232	C	152
V.35, RS232	●	V35IP-CAB	V.35 to RS232 Cable	C	153
V.35, RS485		V35/485-1	V.35 to RS485	C	154

RS485 I/F Converter Series

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

RS232 I/F Converter Series

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

Async to Sync Converter

RS232	●	icAS/IP	Async to Sync converter	C	160

DTMF to Pulse Converter

POTS		DTMF	DTMF to pulse converter	C	161

Surge Protector Series

POTS		TSP-10	Telephone/Fax surge protector	SP	162

7. MANAGEMENT

Management Software

Element Management Software Series

Type: S/W = Software

Interface	Model Name	Description	Type	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

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: S = Standalone, L = card, S/W = Software

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

Digital Video Server Family

Encoding	Stream	Codec	Model Name	Description	Type	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		NEW NVR	Enterprise network video recorder	S/W	173

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 NEW	IPCAM-8309D	Dual stream network dome camera	S	179
MPEG4, M-JPEG, In/Outdoor	Dual	Dual NEW	IPCAM-8308IR	Dual stream network IR camera	S	180
MPEG4, M-JPEG, In/Outdoor	Dual	Dual NEW	IPCAM-8318IR	Dual stream network IR camera	S	181
MPEG4, M-JPEG, In/Outdoor	Dual	Dual NEW	IPCAM-8318F	Dual stream Day&Night network camera	S	182
MPEG4, M-JPEG, In/Outdoor	Dual	Dual NEW	IPCAM-8318P	Dual stream high-speed dome network camera	S	183

Ethernet over Coax

Ethernet Bridge		NEW EOC-10	Ethernet extender over coaxial	S	184

Central Management System

CMS			Smart-View Plus	Central management system	S/W	176

FIBER SERIES

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	Type	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 NEW	FRM220-10/100A-1	10/100Base-TX to 100Base-FX w/ In-band 802.3ah OAM/IP management	L, S	7
Fast Ethernet NEW	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 NEW	FRM220-1000EAS	2-port 10/100/1000Base-T to 2-port 1000Base-FX SFP w/ In-band 802.3ah OAM/IP management	L, S	12
Gigabit Ethernet NEW	FRM220-1000EAS-1	10/100/1000Base-T to 1000Base-FX SFP w/ In-band 802.3ah OAM/ IP management	L, S	11
Gigabit Ethernet NEW	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
Transponder NEW	FRM220-SML80-3R	3R Transponder card	L, S	18

Managed Fiber Media Converter Series

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

Non-managed Fiber Media Converter Series

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

Interface	Model Name	Description	Type	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
10 Gigabit Ethernet NEW	OF10G-01S	10GBase-T to 10GBase-R SFP+	S	30
Power Over Ethernet				
POE	FMC-10/100P	10/100Base-TX to 100Base-FX (PoE)	S	35
Plastic Optical Fiber				
Fast Ethernet POF NEW	FMC-10/100POF-S	10/100Base-TX to 100Base-FX SMI	S	38
Fast Ethernet POF NEW	FMC-10/100POF-O	10/100Base-TX to 100Base-FX Optolock	S	38

Fiber Switch

Fast Ethernet NEW	FSW-2104	4-port 10/100Base-TX + 100Base-FX fiber switch	S	41
Fast Ethernet NEW	FSW-2202	2-port 10/100Base-TX + 2-port 100Base-FX fiber switch	S	42
Fast Ethernet NEW	FSW-2204	4-port 10/100Base-TX + 2-port 100Base-FX fiber switch	S	42

Fiber Integrated Access 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-managed Fiber Converter 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	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	SML-10-8024	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	Optical Add/Drop MUX	L, S	54

Managed Fiber Optical 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 Multiplexer

STM-1 NEW	SDH01A	1U, 19(23)", 4-slot, 4(8) E1(T1), 1xE3(T3), 4xDatacom, 4xEthernet ADM	R	50

Multimedia Fiber Extender

HDMI NEW	HDMI-F	HDMI to fiber extender	S	56
DVI NEW	DVI-F	DVI to fiber extender	S	55

Fiber Transceiver Module

155Mbps SFP	155Mbps SFP	155M hot-pluggable fiber transceiver module	C	57
155Mbps, 1.25/2.5G CWDM SFP	CWDM SFP	155M, 1.25/2.5G CWDM hot-pluggable fiber transceiver module	C	58
1.25G GBIC	GBIC	1.25G hot-pluggable fiber transceiver module	C	58
1.25/2.5G SFP	SFP	1.25/2.5G hot-pluggable fiber transceiver module	C	58
10G XFP NEW	XFP	10G hot-pluggable fiber transceiver module	C	58
10G SFP+ NEW	SFP+	10G hot-pluggable fiber transceiver module	C	58

Fiber Patch cords

Fiber (9/125, 50/125, 62.5/125um)	Fiber Patch cords	Fiber optic patch cord	C	59

Fiber Attenuator

Fiber (9/125, 50/125, 62.5/125um)	Fiber Attenuator	Fiber attenuator	C	60

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 Options	Fast Ethernet to Fiber	
	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

Model Name	FRM220-CH01	
Slot	1-slot	
Line Card Options	Fast Ethernet to Fiber	
	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		
Power AC	Input:Universal, 100~240 VAC;	
	Freq.: 47~63 Hz	
DC	Input: 36~72 VDC	
	AC, DC, or AC+DC	
Page	2	

16-slot, 3U, 19” Chassis

For all FRM301 series line cards

Specifications

Model Name	FRM301-CH	
Slot	16-slots	
Line Card Options	Fast Ethernet to Fiber	
	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	
Management	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 Name	FRM401-CH	
Slot	12-slots (4 channels per line card)	
Line Card Options	Fast Ethernet to Fiber	
Management	SNMP	GUI
	Telnet	Console
Power AC	Input: Manual jumper 110 or 220 VAC;	
	Freq.: 47~63 Hz	
DC	Input: 36~72 VDC ; 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

Model Name	FMC-CH08	
Slot	8-slots	
Line Card Options	Fast Ethernet to Fiber	
	Gigabit Ethernet to Fiber	
	Plastic Optic Fiber	
	LAN Extender	
Management	Non-managed	
Power AC	Input:Universal, 90~250VAC;	
	Freq.: 47~63 Hz	
DC	Input: 36~72 VDC ; 18~36 VDC (option)	
	Sinlge power AC or DC	
Page	33	

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**
Line card	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		
	FXO/FXS(POTS) to fiber	FRM220-FXO/FXS			
	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
Stand-alone with AC adapter	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
	1000BaseTX to 1000BaseFX		FIB1-1000TG FIB1-1000TS		
	MM to SM	FRM220-155MS + FRM220-CH01	FIB1-1000MG FIB1-1000DS		
	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		
Stand-alone with Internal AC/DC power	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		
	1000BaseTX to 1000BaseFX		FIB2-1000TG-AC/DC		
	MM to SM	FRM220-155MS + FRM220-CH01-AC/DC			
	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 Family

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

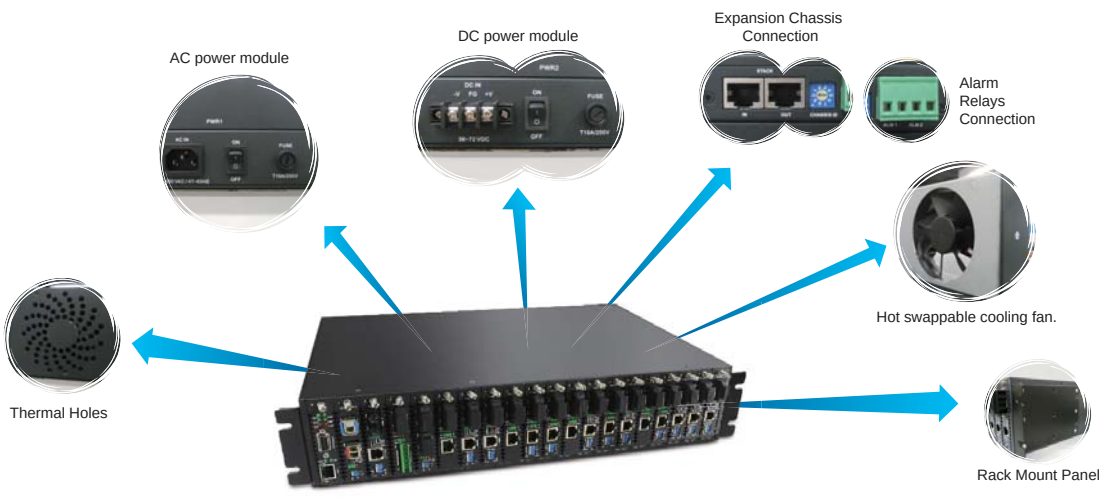
Network Management Controller

- 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 (D x W x H)mm	303 x 438 x 88mm
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 Family

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 (D x W x H)mm	CH01: 160x88x24mm 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/**AC**

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 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 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 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 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 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

FRM220-1000EAS

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 for N x 64k

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 (Async. 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 Family

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

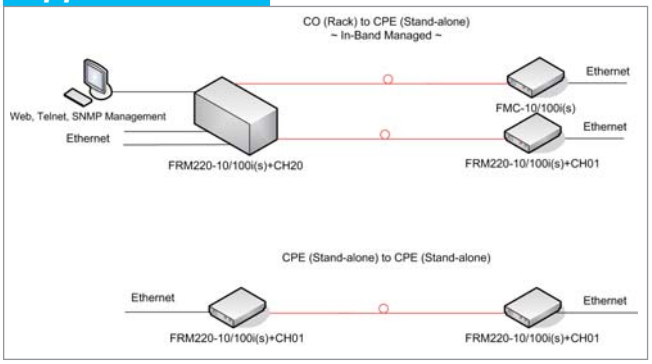
FRM220-10/100i, 10/100iS

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

Application



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, IEEE 802.3u
LEDs		Power, FEF, FX-Link, TX-SPD, TX-Duplex, TX-Link
Power		DC In 12V
Power Consumption		< 4W
Dimensions (D x W x H)mm		155 x 88 x 23mm
Weight		100g
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

- ***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

Stand-alone:
All of FRM220 Series slide-in card can be converted to stand-alone by inserting in FRM220-CH01 single slot chassis.
Please refer to FRM220-CH01 data sheet page 2.

In-band Managed Family

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

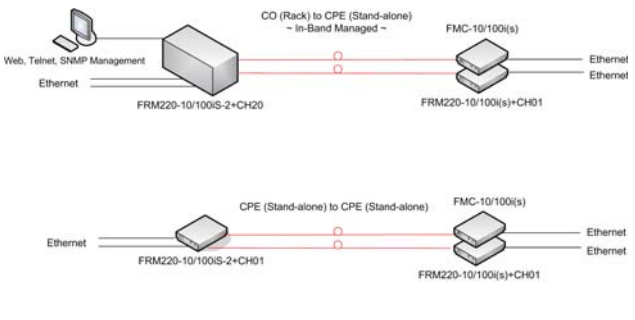
FRM220-10/100iS-2

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

Application



Specifications

Ports		
Optical Interface :	Connector :	SFP LC
	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, IEEE 802.3u
LEDs		Power, FEF, FX-Link, TX-SPD, TX-Duplex, TX-Link
Power		DC In 12V
Power Consumption		< 4W
Dimensions (D x W x H)mm		155 x 88 x 23mm
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)

Ordering Information

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

Stand-alone:
All of FRM220 Series slide-in card can be converted to stand-alone by inserting in FRM220-CH01 single slot chassis.
Please refer to FRM220-CH01 data sheet page 2.

In-band Managed Family

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.

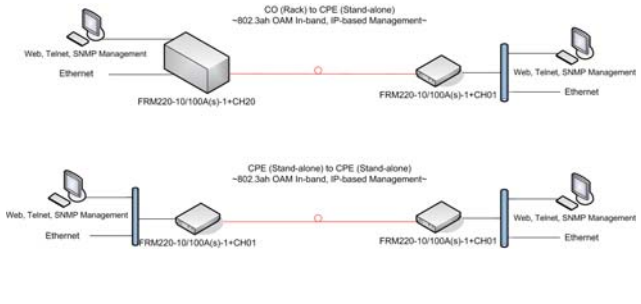
Features

- 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		
Optical Interface :	Connector :	1x9 (SC, ST, FC) or SFP LC
	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, IEEE 802.3u, IEEE802.3ah OAM
LEDs		Power, FEF, FX-Link, TX-SPD, TX-Duplex, TX-Link
Power		DC In 12V
Power Consumption		< 4W
Dimensions (D x W x H)mm		155 x 88 x 23mm
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

Stand-alone:

All of FRM220 Series slide-in card can be converted to stand-alone by inserting in FRM220-CH01 single slot chassis.
Please refer to FRM220-CH01 data sheet page 2.

In-band Managed Family

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

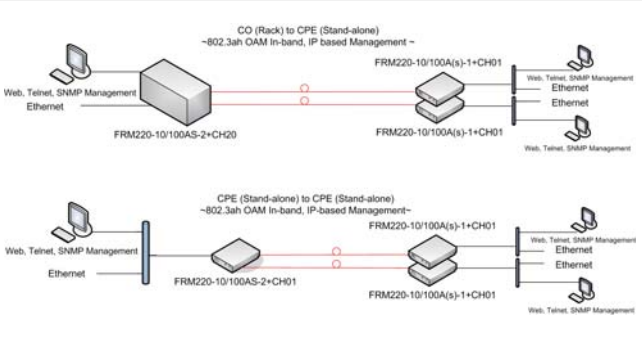
FRM220-10/100AS-2

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

Application



Specifications

Ports		
Optical Interface :	Connector :	SFP LC
	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, IEEE 802.3u, IEEE802.3ah OAM
LEDs		Power, FEF, FX-Link, TX-SPD, TX-Duplex, TX-Link
Power		DC In 12V
Power Consumption		< 4W
Dimensions (D x W x H)mm		155 x 88 x 23mm
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)

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

Stand-alone:
All of FRM220 Series slide-in card can be converted to stand-alone by inserting in FRM220-CH01 single slot chassis.
Please refer to FRM220-CH01 data sheet page 2.

Managed Family

Managed slide-in card
Gigabit Ethernet converter for FRM220

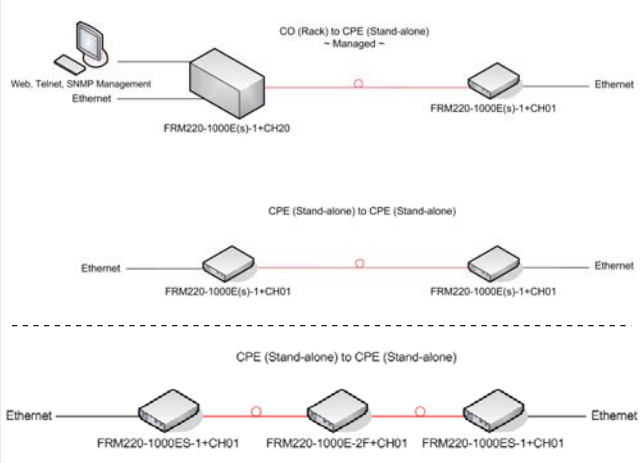
FRM220-1000E-1, 1000ES-1

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

Application



Specifications

Ports		
Optical Interface :	Connector :	1x9 (SC, ST, FC) or SFP LC
	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, IEEE 802.3u, IEEE802.3ab
LEDs		Power, FX-Link 1/2, LFP(1000E/ES-2F) Power, FX-Link , LFP, TX-Link, TX-SPD (1000E/ES-1)
Power		DC In 12V
Power Consumption		< 5W
Dimensions (D x W x H)mm		155 x 88 x 23mm
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)

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

Stand-alone:

All of FRM220 Series slide-in card can be converted to stand-alone by inserting in FRM220-CH01 single slot chassis.
Please refer to FRM220-CH01 data sheet page 2.

Managed Family

Managed slide-in card Gigabit Ethernet switch for FRM220

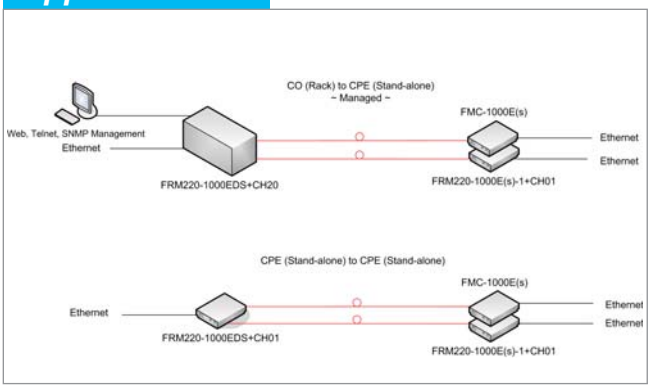
FRM220-1000EDS

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

Application



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, IEEE 802.3u, IEEE802.3ab
LEDs		Power, FX-Link 1/2, 2Ch, TX-Link, TX-SPD
Power		DC In 12V
Power Consumption		< 5W
Dimensions (D x W x H)mm		155 x 88 x 23mm
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)

Ordering Information

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

Stand-alone:
All of FRM220 Series slide-in card can be converted to stand-alone by inserting in FRM220-CH01 single slot chassis.
Please refer to FRM220-CH01 data sheet page 2.

In-band Managed Family

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

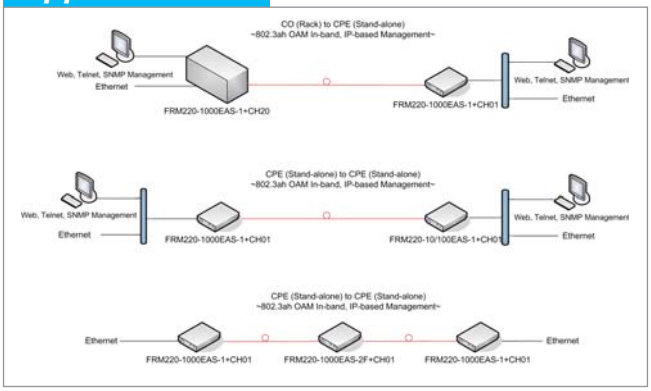
FRM220-1000EAS-1, 1000EAS-2F

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 802.1q 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
- 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



Specifications

Ports		
Optical Interface :	Connector :	SFP LC
	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, IEEE 802.3u, IEEE802.3ab, IEEE802.3ah OAM
LEDs		Power, FX-Link, Test, TX-Link, TX-SPD(1000EAS-1) Power, FX-Link1/2, Test(1000EAS-2F)
Power		DC In 12V
Power Consumption		< 15W
Dimensions (D x W x H)mm		155 x 88 x 23mm
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)

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

Stand-alone:
All of FRM220 Series slide-in card can be converted to stand-alone by inserting in FRM220-CH01 single slot chassis.
Please refer to FRM220-CH01 data sheet page 2.

In-band Managed Family

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

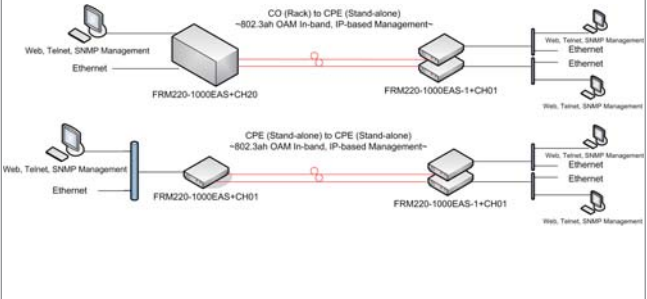
FRM220-1000EAS

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.

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 802.1q 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
- 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



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, IEEE 802.3u, IEEE802.3ab, IEEE802.3ah OAM
LEDs		Power, FX-Link, Test, TX-Link, TX-SPD
Power		DC In 12V
Power Consumption		< 15W
Dimensions (D x W x H)mm		155 x 88 x 23mm
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)

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

Stand-alone:
All of FRM220 Series slide-in card can be converted to stand-alone by inserting in FRM220-CH01 single slot chassis.
Please refer to FRM220-CH01 data sheet page 2.

In-band Managed Family

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

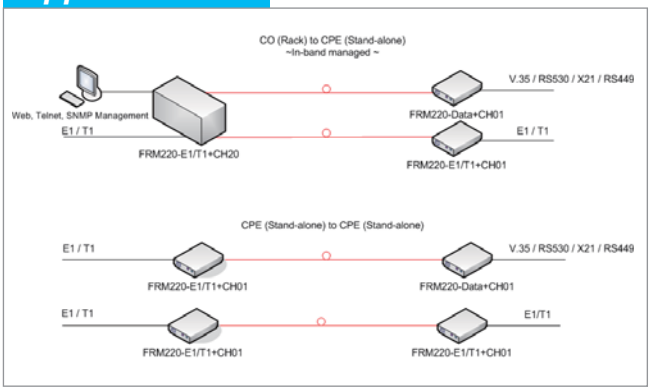
FRM220-E1/T1R, E1B
FRM220-E1/T1R-S, E1B-S

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
- Electrical and optical Loop back tests

Application



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.703, G.704, G.706, G.732, G.823 T1 ITU-T G.703, G.704, AT&T, TR-62411, ANSI T1.403
LEDs		Power, FX-Link, E1/T1 SIG, Test, SYN, RD, TD, AIS (E1/T1R) Power, FX-Link, E1 SIG, Test(E1B)
Power		DC In 12V
Power Consumption		< 5W
Dimensions (D x W x H)mm		155 x 88 x 23mm
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)

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

Stand-alone:
All of FRM220 Series slide-in card can be converted to stand-alone by inserting in FRM220-CH01 single slot chassis.
Please refer to FRM220-CH01 data sheet page 2.

In-band Managed Family

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

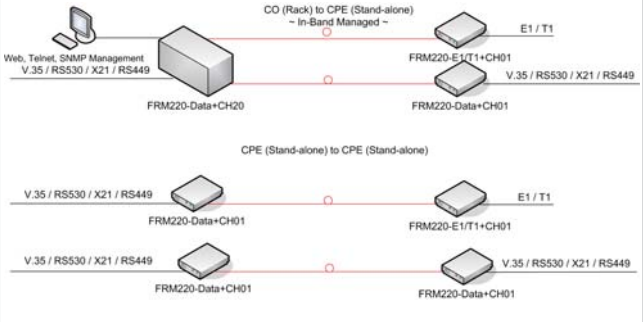
FRM220-DATA, DATA-S

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, 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 for N x 64k

Application



Specifications

Ports		
Optical Interface :	Connector :	1x9 (SC, ST, FC) or SFP LC
	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 Transmit Clock source :	Internal, Recovery, External
Standard		ITU-T
LEDs		Power, FX Link, RTS, Test , TD, RD, CTS, DCD
Power		DC In 12V
Power Consumption		< 5W
Dimensions (D x W x H)mm		155 x 88 x 23mm
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)

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-RS530*** RS530 to fiber slide-in card w/ HD26M to DB25F cable
- ***FRM220-RS449*** RS449 to fiber slide-in card w/ HD26M to DB37F cable
- ***FRM220-RS232*** RS232 to fiber 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*** X.21 to fiber SFP slide-in card w/ HD26M to DB15F cable
- ***FRM220-RS530-S*** RS530 to fiber SFP slide-in card w/ HD26M to DB25F cable
- ***FRM220-RS449-S*** RS449 to fiber SFP slide-in card w/ HD26M to DB37F cable
- ***FRM220-RS232-S*** RS232 to fiber SFP slide-in card w/ HD26M to DB25F cable

Stand-alone:
All of FRM220 Series slide-in card can be converted to stand-alone by inserting in FRM220-CH01 single slot chassis.
Please refer to FRM220-CH01 data sheet page 2.

In-band Managed Family

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

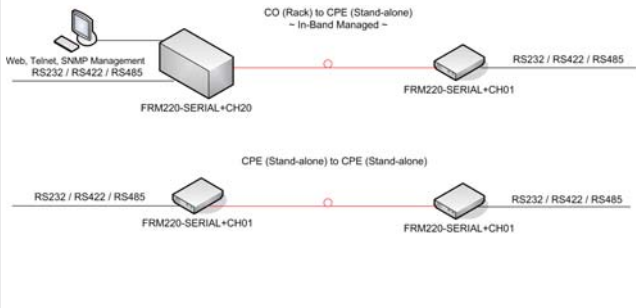
FRM220-SERIAL/485, SERIAL/485-S

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

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
	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 RS485, RS422, RS232
LEDs		Power, FX Link, DI, DO, Test
Power		DC In 12V
Power Consumption		< 5W
Dimensions (D x W x H)mm		155 x 88 x 23mm
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)

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

Stand-alone:
All of FRM220 Series slide-in card can be converted to stand-alone by inserting in FRM220-CH01 single slot chassis.
Please refer to FRM220-CH01 data sheet page 2.

In-band Managed Family

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

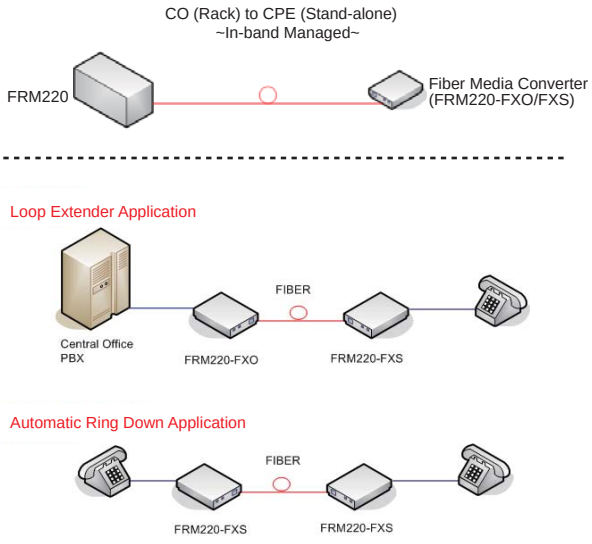
FRM220-FXO/FXS, FXO/FXS-S

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 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

Application



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 :	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 (D x W x H)mm		155 x 88 x 23mm
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)

Ordering Information

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

Stand-alone:
All of FRM220 Series slide-in card can be converted to stand-alone by inserting in FRM220-CH01 single slot chassis.
Please refer to FRM220-CH01 data sheet page 2.

Managed Family

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

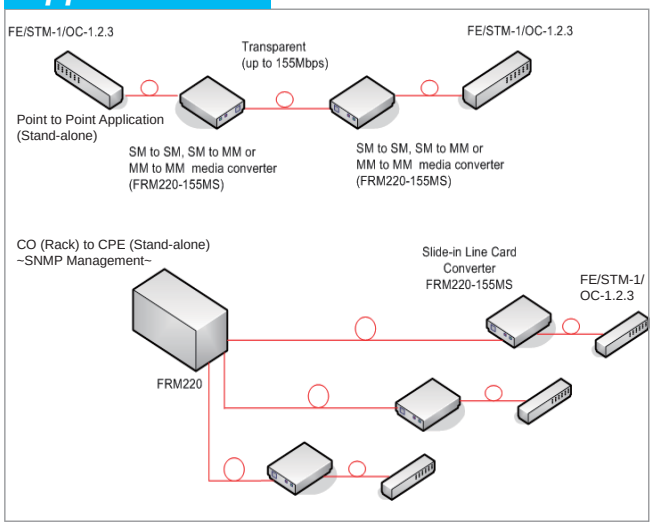
FRM220-155MS, 155MS-S

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		
Optical Interface :	Connector :	1x9 (SC, ST, FC) or SFP LC
	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, FX-Link, TX-SPD, TX-Duplex, TX-Link
Power		DC In 12V
Power Consumption		< 5W
Dimensions (D x W x H)mm		155 x 88 x 23mm
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)

Ordering Information

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

Stand-alone:
All of FRM220 Series slide-in card can be converted to stand-alone by inserting in FRM220-CH01 single slot chassis.
Please refer to FRM220-CH01 data sheet page 2.

Managed Family

Managed slide-in card 3R Repeater for FRM220

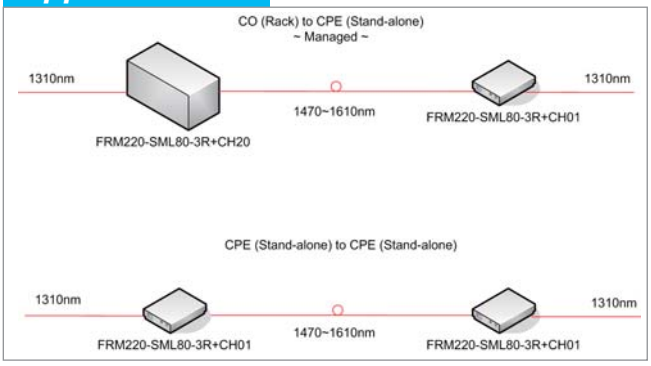
FRM220-SML80-3R

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)
- Auto Laser Shutdown (ALS)

Application



Specifications

Ports		
Optical Interface :	Connector :	SFP LC
	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
	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, Line Link, Client Link, Test
Power		DC In 12V
Power Consumption		< 5W
Dimensions (D x W x H)mm		155 x 88 x 23mm
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)

Ordering Information

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

Stand-alone:
All of FRM220 Series slide-in card can be converted to stand-alone by inserting in FRM220-CH01 single slot chassis.
Please refer to FRM220-CH01 data sheet page 2.

Managed Family

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

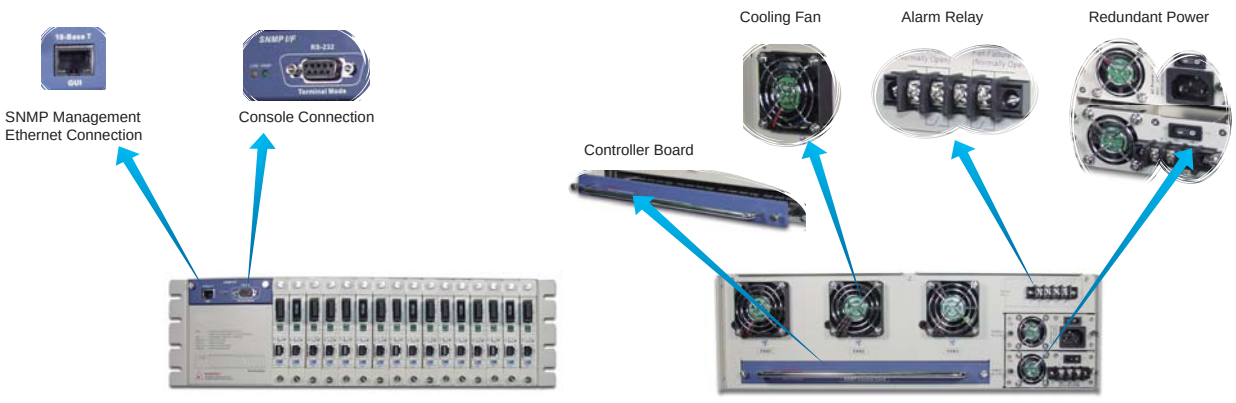
SNMP Card

- 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
Dimensions:	440mm x 280mm x 130.6mm (L x W x H).
Weight:	6.2Kg (include 1 AC power modules & two ear panels for rack-mounting)
Compliance:	FCC part 15, Subpart B, Class A, ANSI C63.4:2003 CE EN55022:2006, Class A EN55024:1998+A1:2001+A2:2003 LVD: EN 60 950-1:2001
MTBF:	65,000 h (25° C)

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

Page 23

FRM301-1000TG
Gigabit Ethernet 1000
Fiber Media Converter

Page 23

FRM301-1000DS
1.25G Dual Fiber
Media Repeater

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Model Name		**FRM301-10/100F**	**FRM301-1000ES**	**FRM301-1000TS**	**FRM301-1000TG**	**FRM301-1000DS**
Fiber Interface	Wave Length (nm)	1310/1550	1310/1470~1610	1310/1470~1610	1310/1470~1610	1310/1470~1610
	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
Copper Interface	Connecter Type	RJ-45	RJ-45	RJ-45	RJ-45	
	Ports	1-port 10/100Base-TX	1-port 10/100/1000Base-TX	1-port 1000Base-TX	1-port 1000Base-TX	
Power	Ports	✓	✓	✓	✓	✓
Front Panel	DIP Switch	✓	✓	✓	✓	
	Diagnostic LEDs	✓	✓	✓	✓	✓
Features	Local monitor & configure	✓	✓	✓	✓	✓
	Remote monitor & configure	Remote monitor	Remote monitor	Remote monitor	Remote monitor	
	Loop back test	✓	✓	✓	✓	✓
	Link Fault Pass Through	✓	✓	✓	✓	
	Auto MDIX	✓	✓	✓	✓	

FRM301-1000MG
Gigabit Multi-mode
to Single mode
Fiber Media Converter

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FRM301-E1/T1
(RJ-45/BNC)
E1/T1 Fiber Media
Converter

Page 25

FRM301-Data
(X.21/V.35/RS530/449/232)
Datacom Fiber Media
Converter

Page 26

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**
Fiber Interface	Wave Length (nm)	1310/1470~1610	1310/1550	1310/1550	1310/1550
	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
	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	✓	✓	✓	✓
	Diagnostic LEDs	✓	✓	✓	✓
Features	Local monitor & configure	✓	✓	✓	✓
	Remote monitor & configure		✓	✓	✓
	Loop back test	✓	✓	✓	✓
	Link Fault Pass Through				
	Auto MDIX				

Managed Family

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

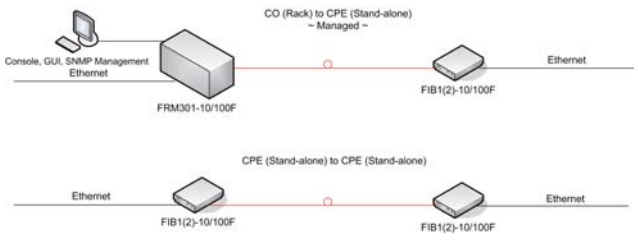
FRM301-10/100F FIB1-10/100F, FIB2-10/100F

The FRM301-10/100F, FIB1-10/100F, FIB2-10/100F are Fast Ethernet 10/100Base-TX to 100Base-FX manageable (when installed in FRM301 with management) or stand-alone media converters, which give you the options to choose from the most popular fiber cabling connectors, ST, SC, or FC. Both multi-mode and single mode converter models are available as well as BiDi which allows bi-directional transmissions using only a single fiber cable. When auto-negotiation is selected, these units will automatically tailor themselves to convert both half-duplex and full-duplex signals, depending on your specific network needs. LED indicators signal the power status of the converter, UTP port speed, Link, and duplex status, FX port Link and duplex status.

Features

- 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		
Optical Interface :	Connector :	1x9 (SC, ST, FC)
	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 Link, FX Duplex, TX SPD, TX Link, TX Duplex
Power		FIB1:DC In 9V, FIB2:AC 100 ~ 240V/ DC 24 ~ 72V
Power Consumption		< 4W
Dimensions (D x W x H)mm		FRM301/FIB1: 123 x 86 x 20mm 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, 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

FIB2-10/100F

Managed Family

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

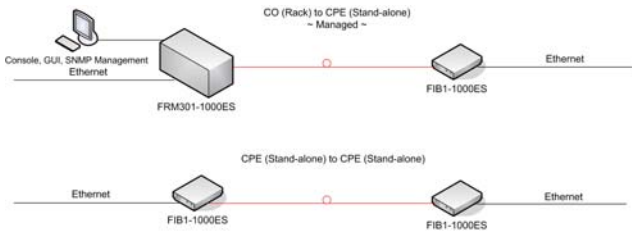
FRM301-1000ES, FIB1-1000ES

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)

Application



Specifications

Ports		
Optical Interface :	Connector :	SFP LC
	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, IEEE 802.3u, IEEE802.3ab, IEEE802.3z
LEDs		Power, FX-Link, TX-Link, TX-SPD, TX-Duplex, LLF
Power		DC In 12V
Power Consumption		< 5W
Dimensions (D x W x H)mm		FRM301/FIB1: 123 x 86 x 20mm
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

- ***FRM301-1000ES*** 10/100/1000Base-TX to 1000Base-FX SFP slide-in card
- ***FIB1-1000ES*** 10/100/1000Base-TX to 1000Base-FX SFP stand-alone converter

Managed Family

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

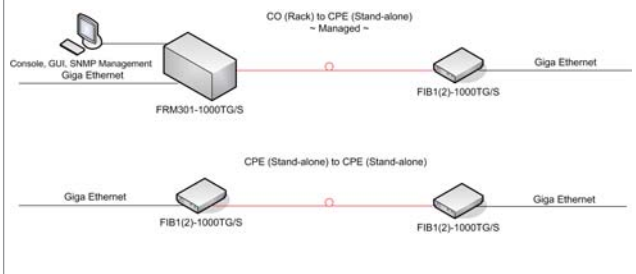
FRM301-1000TS, 1000TG
FIB1-1000TS, 1000TG, FIB2-1000TG

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)

Application



Specifications

Ports		
Optical Interface :	Connector :	1x9 (SC, ST, FC)
	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 Link, FX Duplex, TX SPD, TX Link, TX Duplex
Power		FIB1:DC In 9V, FIB2:AC 100 ~ 240V/ DC 24 ~ 72V
Power Consumption		< 4W
Dimensions (D x W x H)mm		FRM301/FIB1: 123 x 86 x 20mm 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, RoHS
MTBF		65,000 h (25°C)

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

FIB2-1000TG

Managed Family

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

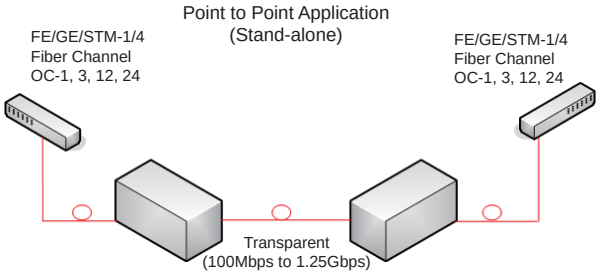
FRM301-1000MG, FIB1-1000MG

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)

Application



SM to MM or MM to MM Media
Converter (FRM301-1000MG & FIB1-1000MG)

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, MM-Link, SM-Link
Power		DC In 12V
Power Consumption		< 5W
Dimensions (D x W x H)mm		FRM301/FIB1: 123 x 86 x 20mm
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

- ***FRM301-1000MG*** Slide-in card repeater with fixed multi-mode and GBIC slot
- ***FIB1-1000MG*** Stand-alone repeater with fixed multi-mode and GBIC slot

Managed Family

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

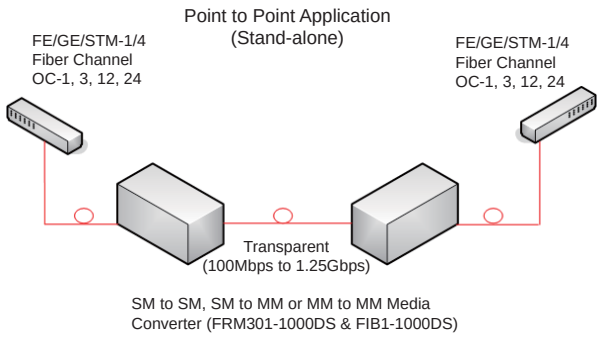
FRM301-1000DS, FIB1-1000DS

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		
Optical Interface :	Connector :	SFP LC
	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
Power Consumption		< 5W
Dimensions (D x W x H)mm		FRM301/FIB1: 123 x 86 x 20mm
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

Managed Family

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

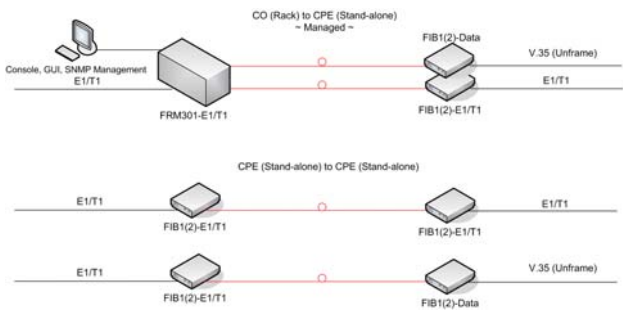
FRM301-E1/T1, FIB1-E1/T1, FIB2-E1/T1

The FRM301-E1/T1 is a fiber media transport for G.703 E1/T1 transmissions. The BNC model provides unbalanced 75 Ohm coaxial E1 connections while two RJ-45 models provide either balanced 120 Ohm E1 or 100 Ohm T1 connections over twisted pair wiring. When the FRM301-E1/T1 card is placed in the FRM301 rack with 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 FRM3010-E1/T1 also supports unframed (unstructured) E1 when connected to a remote FRM301-Data, synchronous data communications converter at 2048Kbps.

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 :	Connector :	1x9 (SC, ST, FC)
	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, G.706, G.732, G.823 T1 ITU-T G.703, G.704, AT&T, TR-62411, ANSI T1.403
LEDs		Power, FX-Link, E1/T1 SIG, Test, SYN, RD, TD, AIS (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 (D x W x H)mm		FRM301/FIB1: 123 x 86 x 20mm 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)

Ordering Information

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

FIB2-E1/T1

Managed Family

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

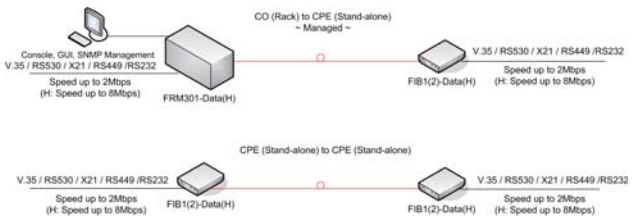
FRM301-Data, FIB1-Data, FIB2-Data
FRM301-Data/H, FIB1-Data/H

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 Data/H)
- Clock mode setting, internal, external, or recovery
- Electrical and optical loop back tests
- Compatible with FRM301-E1 on same fiber link for 2Mbps unframed

Application



Specifications

Ports		
Optical Interface :	Connector :	1x9 (SC, ST, FC)
	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
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 (D x W x H)mm		FRM301/FIB1: 123 x 86 x 20mm 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

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)		

FIB2-Data

Managed Family

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

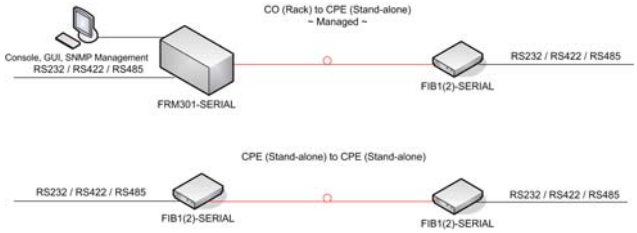
FRM301-Serial FIB1-Serial, FIB2-Serial

The FRM301-Serial provides a fiber converter solution to extend asynchronous RS-485 or RS-232 transmission distance up to 2km over multimode fiber or up to 120km over single mode fiber. The converter is equipped with multiple interface circuits for connection to RS-232 or RS-485/422 (2 or 4 wire, full or half duplex). The FRM301-Serial 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 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

- 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

Application



Specifications

Ports		
Optical Interface :	Connector :	1x9 (SC, ST, FC)
	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
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)

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

FIB2-Serial

Managed Family

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

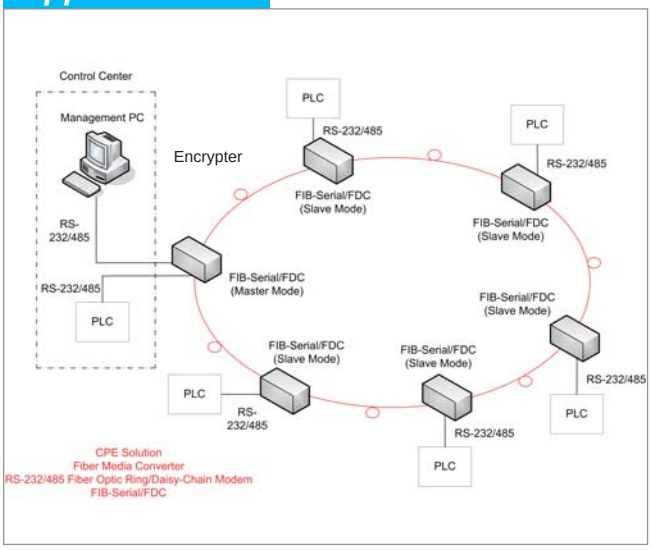
FIB1-Serial/FDC

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

Application



Specifications

Ports		
Optical Interface :	Connector :	1x9 (SC, ST, FC)
	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 RS485, RS422, RS232
LEDs		Power, FX-Link1, FX-Link2, Test, Master, Ring TD, RD
Power		< 5W
Power Consumption		FRM301/FIB1: 123 x 86 x 20mm
Dimensions (D x W x H)mm		FIB1: 138 x 86 x 40mm
Weight		0~50°C (Operating) ,0~70°C (Storage)
Temperature		10~90% non-condensing
Humidity		CE, FCC, LVD, RoHS
Certification		65,000 h (25°C)

Ordering Information

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

Managed Family

Stand-alone
10G Ethernet media converter

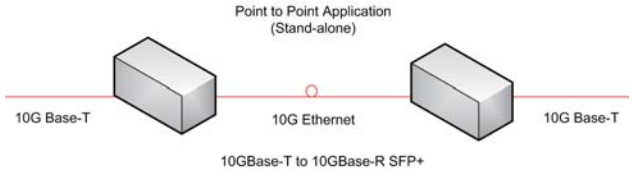
OF10G-01S

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 console port :	RJ45
	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 (D x W x H)mm		175 x 86 x 33mm
Weight		550g
Temperature		0~40°C (Operating) ,0~50°C (Storage)
Humidity		0~85% non-condensing
Certification		CE, FCC, RoHS
MTBF		57,000 hours

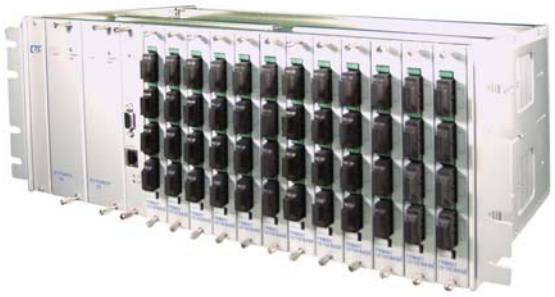
Ordering Information

- ***OF10G-01S*** 10GBase-T to 10GBase-R fiber converter

Managed Family

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

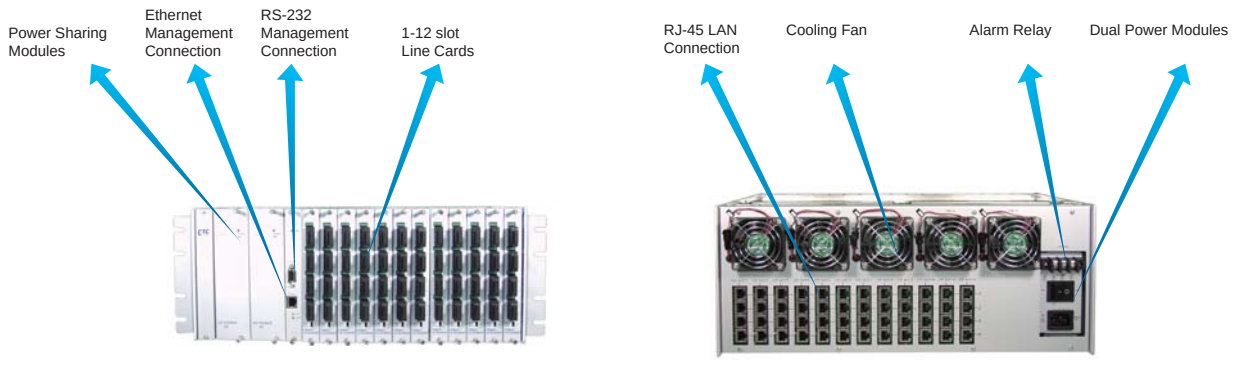
SNMP Card

- 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 ~138V, AC220: 187 ~276V DC48: 42 ~ 60V, DC72: 36 ~72V
Power Consumption	150W
Dimensions (D x W x H)mm	285 x 440 x 180mm
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)

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

Managed Family

FRM401 slide-in card
Managed Fast Ethernet fiber converter

FRM401-10/100

The FRM401-10/100 is a four channel Fast Ethernet 10/100Base-TX to 100Base-FX manageable media converter card, which gives you the options to choose from the most popular fiber cabling connectors, ST, SC, or FC. Both multi-mode and single mode converter cards are available as well as BiDi which allows bi-directional transmissions using only a single fiber cable. When auto-negotiation is selected, the Ethernet ports 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 card, UTP port speed, Link, and duplex status, FX port Link and duplex status.

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

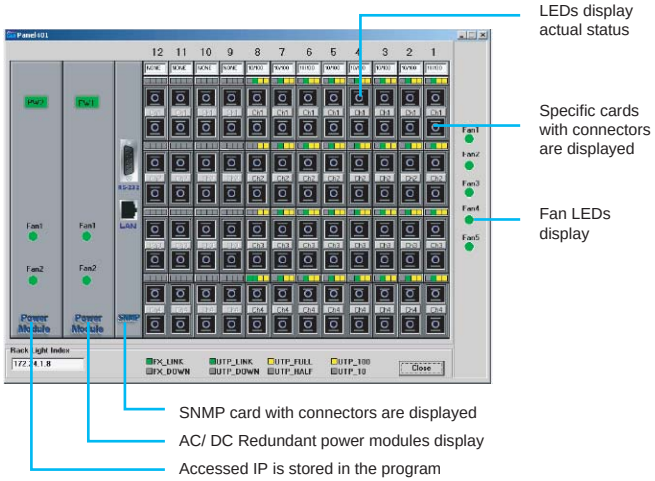
Ports	Connector :	Connector : 4x (SC, ST, FC)
Optical Interface :	Data rate :	100Mbps
	Duplex mode :	Full duplex
	Cable type :	MM 62.2/125μm, 50/125μm. SM 9/125μm
	Distance :	MM 2km, SM 15/30/50/80/120km, WDM 20/40/60/80km
	Wavelength:	1310nm, 1550nm,
Electrical Interface :	Connector :	4x RJ45
	Data 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		FX Link, TX SPD, TX Link, TX Duplex
Power		DC 48V
Power Consumption		< 4W
Dimensions (D x W x H)mm		123 x 86 x 20mm
Weight		510g
Temperature		0~50°C (Operating) ,0~70°C (Storage)
Humidity		10~90% non-condensing
Certification		CE, FCC, RoHS
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
- ***FRM-SNMP-GUI*** GUI(Graphical User Interface)

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 (D x W x H)mm	196 x 252 x 89mm
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 (D x W x H)mm	303 x 438 x 88mm
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
Non-Managed Gigabit Ethernet 10/100/1000 Fiber Media Converter with SFP slot

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

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

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

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

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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**
Fiber Interface	Wave Length (nm)	1310/1470~1610	1310/1470~1610	1310/1550	1310/1550	1310/1550	1310/1550
	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	
	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	✓	✓	✓	✓	✓	✓
	Diagnostic LEDs	✓	✓	✓	✓	✓	✓
Features	MTU (MAX Packets)	1632	1632	2046	2046	2046	2046
	Auto MDI/MDIX	✓	✓	✓	✓	Remote monitor	
	Auto-negotiation or forced mode	✓	✓	✓	✓	✓	✓
	Link Fault Pass through (LFP) functio	✓	✓	✓	✓		
	Flow control (Pause)	✓	✓	✓	✓		✓

VDSL2

VDTU2A-301
Non-Managed VDSL2 to Ethernet LAN Extender

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POF

FMC-10/100POF-O (Optolock Type)
Non-Managed Fast Ethernet 10/100 Fiber Media Converter

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POF

FMC-10/100POF-S (SMI Type)
Non-Managed Fast Ethernet 10/100 Fiber Media Converter

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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**
Fiber Interface	Wave Length (nm)	-----	650	650	1310/1550	1310/1550
	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
	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	✓	✓	✓	✓	✓
	Diagnostic LEDs	✓	✓	✓	✓	✓
Features	MTU (MAX Packets)	1522	1600	1600	2046	2046
	Auto MDI/MDIX	✓	✓	✓	✓	✓
	Auto-negotiation or forced mode	✓	✓	✓	✓	✓
	Link Fault Pass through (LFP) functio	✓	✓	✓	✓	✓
	Flow control (Pause)	✗	✓	✓	✓	✓

Non-Managed Family

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

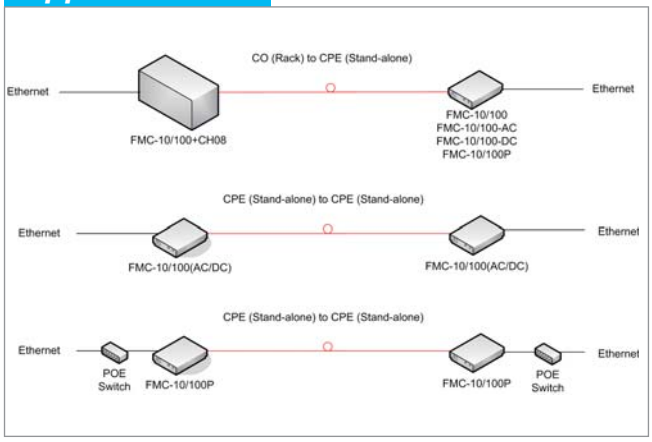
FMC-10/100, 10/100-AC FMC-10/100-DC, 10/100P

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		
Optical Interface :	Connector :	1x9 (SC, ST, FC)
	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, IEEE 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 (D x W x H)mm		FMC: 108 x 74 x 23mm, FMC-AC/DC: 192 x 86 x 30mm
Weight		FMC: 120g, FMC-AC/DC: 550g
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-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 Family

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.

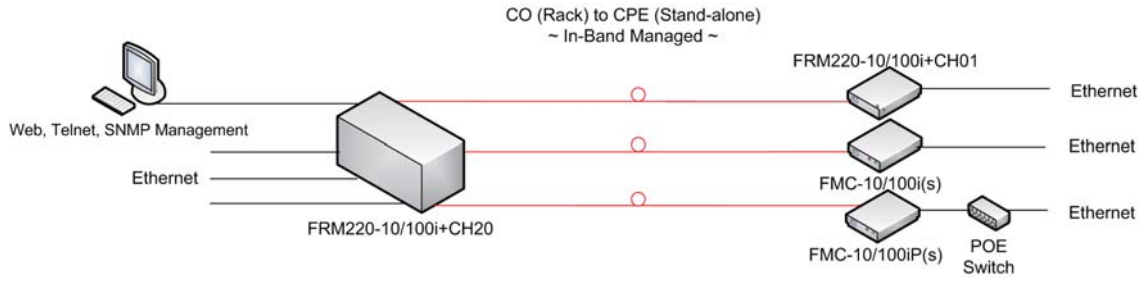
Features

- 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		
Optical Interface :	Connector :	1x9 (SC, ST, FC), SFP LC
	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, 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 (D x W x H)mm		108 x 74 x 23mm
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

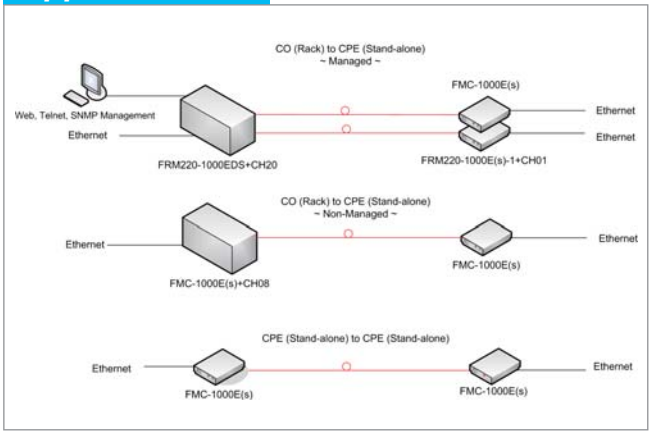
FMC-1000E, 1000ES

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

Application



Specifications

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, IEEE 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 (D x W x H)mm		108 x 74 x 23mm
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)

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

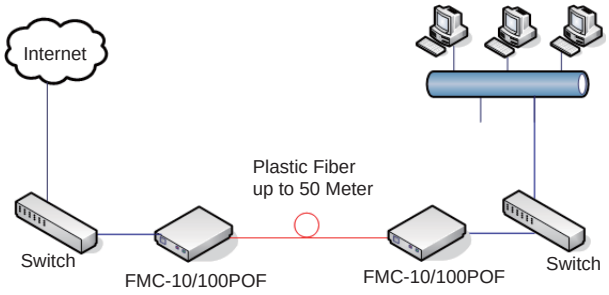
The FMC-10/100POF family is a Fast Ethernet 10/100Base-TX to 100Base-FX non-managed stand-alone media converter which uses plastic optical fiber (POF). POF, as it is widely known, offers affordable, high-end connectivity for small office and home networks. With speeds of 100 Mbps optical Ethernet, it 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

Application



Specifications

Ports	Connector :	1x9 (SC, ST, FC), SFP LC
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 (D x W x H)mm		108 x 74 x 23mm
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)

Ordering Information

- ***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

The FRM402 is a 4U 19" media convert rack chassis with 16 universal slots which accommodate the installation of the complete line of interface modules. The modular configuration of the FRM402 permits the end user to install from one to 16 interfaces to light up the fiber links within an optical fiber equipped home. Modules may be easily added or removed by hot swapping. The high density configuration is especially suited for application such as FITH (Fiber In The Home).

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 (D x W x H)mm	303 x 438 x 88mm
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

Ordering Information

- ***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 (D x W x H)mm	57 x 70 x 115mm
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.

Ordering Information

- ***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

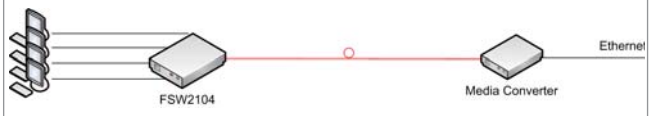
FSW-2104

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		
Optical Interface :	Connector :	1x9 (SC, ST)
	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 (D x W x H)mm		138 × 77 × 28mm
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

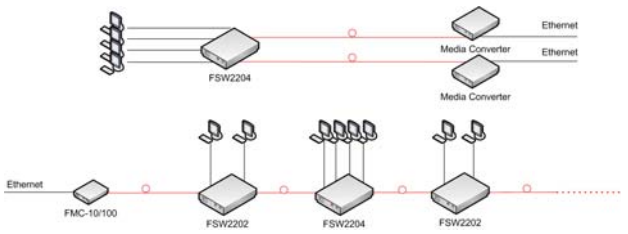
FSW-2202, FSW-2204

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

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 (D x W x H)mm		138 × 77 × 28mm
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-2202*** 2 port 10/100Base-TX + 2 port 100Base-FX fiber switch
- ***FSW-2204*** 4 port 10/100Base-TX + 2 port 100Base-FX fiber switch

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

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 (D x W x H)mm		220x 165x 29mm
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

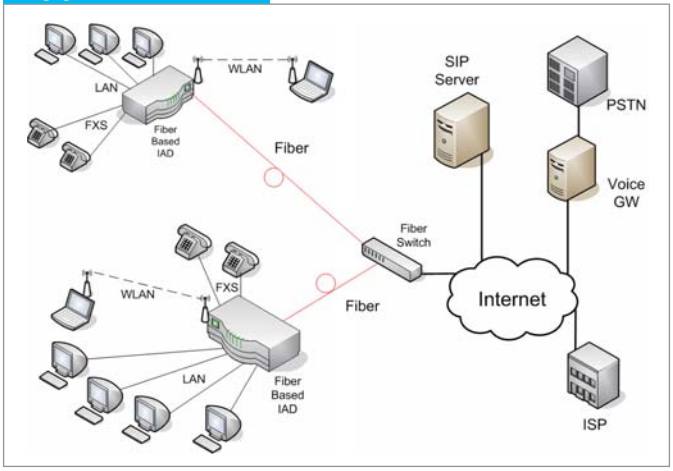
- ***GW421F*** 4-port Ethernet 2-port FXS VoIP gateway w/ 100Base-FX
- ***GW421FW*** 802.11a/b/g wireless 4-port Ethernet 2-port FXS VoIP gateway w/ 100Base-FX

Specifications

Software

Routing	Support point to point protocol (PPPoE) and user authentication via PAP, CHAP or MS-CHAP
	Routing information protocol (RIP) v1 and v2, static route
	DHCP client, server and relay agent
	NAT/PAT - 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 Bonus Services	Supports SIP (RFC 3261), SDP (RFC 2327, RFC 3264) as well as both TCP and UDP transport
	Supports User agent Client (UAC) - User agent server (UAS) call, or proxy call routing
	Supports SIP and telephone URL addressing
	Supports in-band DTMF tone sending/receiving and out-band DTMF signaling with RTP, as per 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 Network Management	SNMP GETs, SETs and TRAPs for four group in MIB-II
	Embedded syslog ; SNTP with DHCP options
	UPnP Internet gateway device (IGD) compliance
	Management and configuration via Web/HTTP
	Firmware upgrade using HTTP 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.

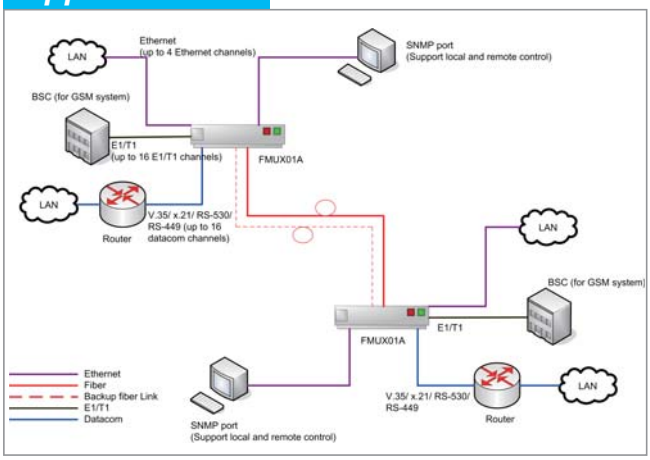
Features

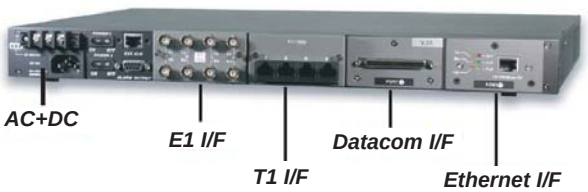
- 1U, 19 (23)" 4 slot chassis
- Alarm relay contacts provided which can offer major and minor alarms with audible and visible alarm output
- Auto Laser Shutdown (ALS) to prevent hazardous laser radiation to personnel
- Channel Capacity : 4,8,12 or 16 channels
- Configuration data is automatically stored into flash to avoid any loss caused by power disruption.
- End to end propagation delay < 2μ 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		
Optical Interface :	Connector :	1x9 (SC, ST, FC)
	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
	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 failure, E1/T1 status
Power		AC : 100 ~240V DC24 : 20 ~ 60V, DC48 : 36 ~ 72V
Power Consumption		< 40W
Dimensions (D x W x H)mm		250 x 438 x 43mm
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

E1 BNC I/F

E1/T1 Wire-Wrap I/F

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/T1 RJ - 45 I/F

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

Datacom I/F

Datacom Interface Module	
Standards	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 I/F

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 Information

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
FMUX01A--232	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

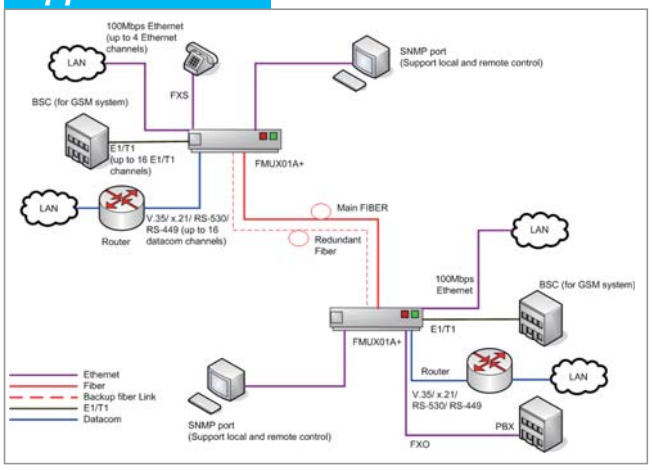
FMUX01A/Plus

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



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, SNMP :	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 ~240V DC24 : 20 ~ 60V, DC48 : 36 ~ 72V
Power Consumption		< 40W
Dimensions (D x W x H)mm		250 x 438 x 43mm
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

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


E1 BNC I/F


E1/T1 Wire-Wrap I/F

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


E1/T1 RJ - 45 I/F

T1 Interface Module	
Standards	ITU-T G.703, G.704, AT&T TR-62411,ANSI T1.403
Ports	4 ports
Framing	Unframed (clear channel)
Data rate	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 transparent	T.38 and Group III Fax relay at 2.4 ~14.4kbps Fax application
Distance	300m
Bandwidth	64K voice channel
Connector	RJ11*4 (4 voice channel /per unit)
Receive Level	Short haul - 15dB
Internet application	Support modem pass-through


Datacom I/F

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	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

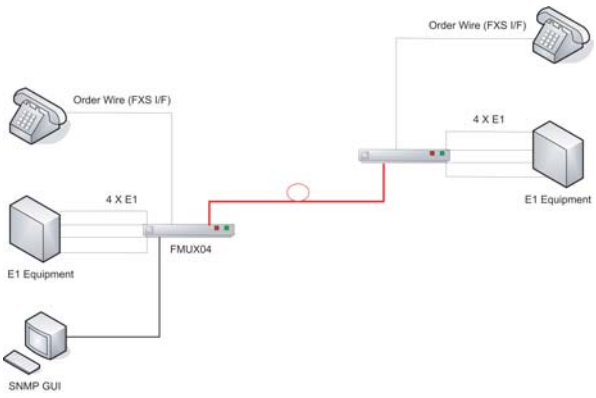
FMUX04

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

Ports		
Optical Interface :	Connector :	1x9 (SC, ST, FC)
	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 metersΩ
Standard		E1:ITU-T, T1:ITU-T, AT&T, ANSI
LEDs		PWR, Alarm, Far End /Near End Error, System failure, E1/T1 status
Power		AC : 100 ~240V DC24 : 18 ~ 36V, DC48 : 36 ~ 72V
Power Consumption		< 20W
Dimensions (D x W x H)mm		235 x 195 x 45mm
Weight		850g
Temperature		0~50°C (Operating) ,0~70°C (Storage)
Humidity		10~90% non-condensing
Certification		CE, FCC, RoHS
MTBF		57350 hours

Ordering Information

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.

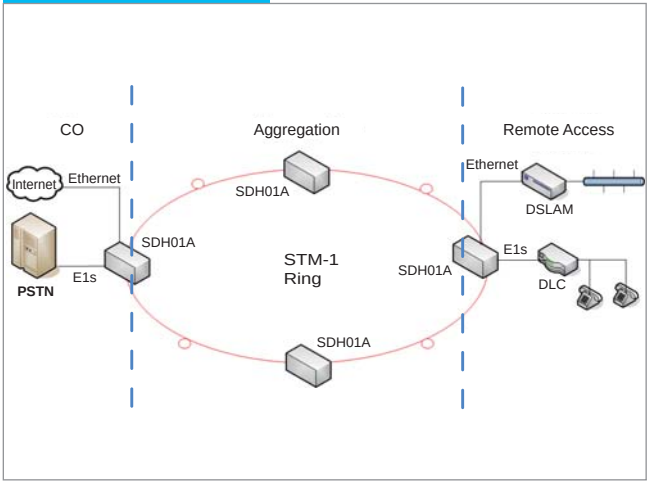
Features

- 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

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 Ground : Screw	
Standard	STM1: ITU-T G.707, G.841, G.783, G.803, G.652	
	E1: ITU-T G.703 G.704, G.706, G.732, G.823	
	Ethernet: ITU-T G.7041 GFP-F, G.707 VCAT, IEEE802.3x, 802.1p, 802.1q, 802.3ad, 802.1w, 802.1d	
	V35: ITU-T V.35, ITU-T G703	
LEDs	PWR, WK, FLT-fault, Alarm, ACO, RDI, LBK, Channels, Ethernet	
Power	AC : 90 ~ 264V	DC24 : -36 ~ -72V
Power Consumption	< 15W	
Dimensions (D x W x H)mm	312 x 440 x 44mm	
Weight	3.6 kg	
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

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

CWDM Family

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.

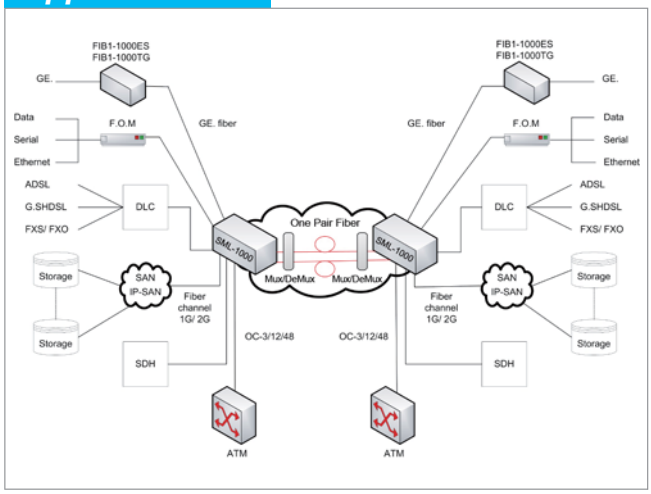
Features

- 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 9/125μm
	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 Link, Client Link	
Power	AC : 100 ~240V DC48 : 36 ~ 72V	
Power Consumption	< 12W	
Dimensions (D x W x H)mm	265 x 440 x 43mm	
Weight	3.2kg	
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

- ***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

CWDM Family

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.

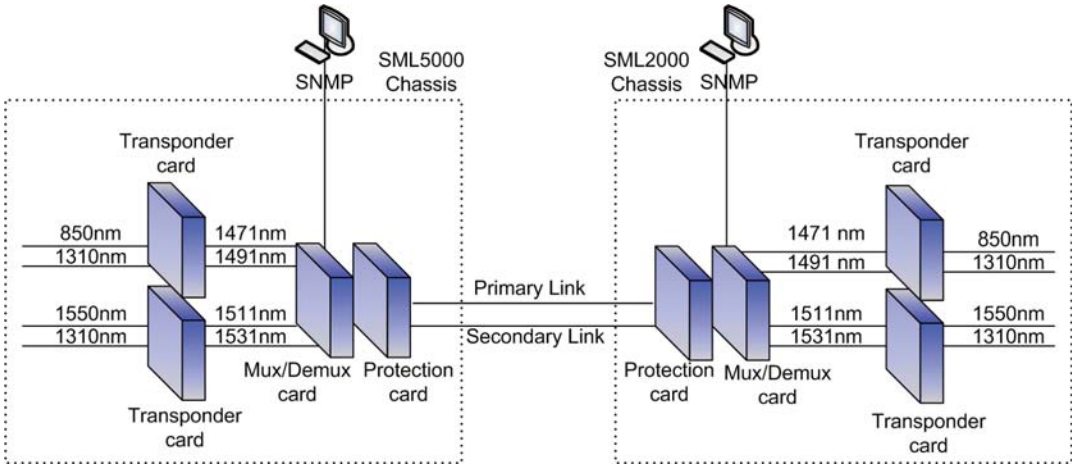
Features

- 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

Ports	Console: D-type 9-pin female SNMP, LAN : RJ45 Alarm: D-type 9-pin male
LEDs	PWR1/2, FAN1/2, Link (chassis link), Fan
Power	AC : 100 ~240V DC 24: 18 ~ 56V, DC48 : 36 ~ 72V
Power Consumption	SML2000 <25W, SML5000 <75W
Dimensions (D x W x H)mm	155 x 88 x 23mm SML2000: 250 x 440 x 89mm SML5000: 250 x 440 x 220mm
Weight	SML2000 4.8kg, SML5000 9.5kg
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

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*** 19" 2U, 6-slot chassis
- ***SML-20-9210-L*** SNMP for SigmaLinks2000
- ***SML-20-9110-R*** AC power supply (90~264VAC)
- ***SML-20-9120-R*** DC power supply (-18 ~ -56VDC)
- ***SML-20-9121-R*** DC power supply (-36 ~ -72VDC)

CWDM Family

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.

Features

- 2R regeneration (Re-amplification and reshaping)
- Line rate support from 100Mbps up to 2.5Gbps
- Client Side Wavelengths: 850/ 1310/ 1550nm
- Line Side CWDM Wavelengths: 1471/ 1491/ 1511/ 1531 / 1551/ 1571/ 1591/ 1611nm
- Optical Connector: SFP-LC (On both Line & Client Side)

Specifications

Ports	Connector :	SFP LC
Optical Interface :	Data rate :	100Mbps, 1.25Gbps, 2.5Gbps
	Cable type :	MM 62.2/125μm, 50/125μm.
	Distance :	SM 9/125μm
	Wavelength :	850, 1310, 1470 ~ 1610nm
LEDs	Power, Link(Line), Link(Client), TX/Act, Loopback	
Power	DC12V In	
Power Consumption	1channel <5W, 2 channel <10W	
Dimensions (D x W x H)mm	220 x 162 x 25mm	
Weight	900g	
Temperature	0~50°C (Operating) ,0~70°C (Storage)	
Humidity	10~90% non-condensing	
Certification	CE, FCC, RoHS	
MTBF	57,000 hours	

Ordering Information

- ***SML-50-8011-L*** 1.25G,1Ch transponder card
- ***SML-50-8012-L*** 1.25G,2Ch transponder card
- ***SML-50-8021-L*** 2.5G,1Ch transponder card
- ***SML-50-8022-L*** 2.5G, 2Ch transponder card
- ***SML-50-8032-L*** 2.5G, 2Ch transponder card

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

- 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

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 (D x W x H)mm	220 x 162 x 25mm
Weight	900g
Temperature	0~50°C (Operating) ,20~70°C (Storage)
Humidity	10~90% non-condensing
Certification	CE, FCC, RoHS
MTBF	57,000 hours

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)

CWDM Family

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.

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

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	<10W
Dimensions (D x W x H)mm	220 x 162 x 25mm
Weight	900g
Temperature	0~50°C (Operating) ,20~70°C (Storage)
Humidity	10~90% non-condensing
Certification	CE, FCC, RoHS
MTBF	57,000 hours

Ordering Information

- ***SML-50-8210-L*** Optical Protection Card

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

- 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	<10W
Dimensions (D x W x H)mm	220 x 162 x 25mm
Weight	900g
Temperature	0~50°C (Operating) ,20~70°C (Storage)
Humidity	10~90% non-condensing
Certification	CE, FCC, RoHS
MTBF	57,000 hours

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

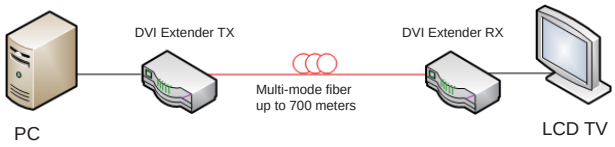
DVI-F

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

Application



Specifications

Ports	Connector :	SC
Optical Interface :	Cable type :	MM 62.2/125μm, 50/125μm
	Distance :	
	500meters	XGA with 62.2/125μm 4-LC MM cable
	700meters	XGA with 50/125μm 4-LC MM cable
	Optical property :	4 channels 850nm , -6dBm
	Max DVI Bandwidth :	1.65Gbps per channel
	Max resolution :	1600 × 1200 (4:3)
		1920 × 1080p (16:9)
		1920 × 1200 (16:10)
Electrical Interface :	Connector :	DVI-D single link
LEDs	Power	
Power	DC 5V In	
Power Consumption	< 5W	
Dimensions (D x W x H)mm	90 × 40 × 19.6mm	
Weight	65g	
Temperature	-10~50°C (Operating) ,-20~70°C (Storage)	
Humidity	10~90% non-condensing	
Certification	CE, FCC, RoHS	
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)

Multimedia Fiber Extender Family

HDMI Fiber MEdia Converter / Extender

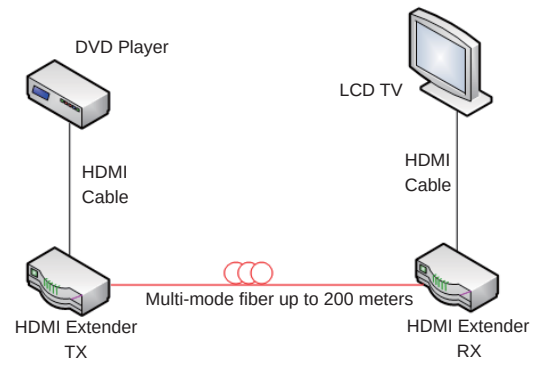
HDMI-F

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

Application



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, FX-Link, TX-SPD, TX-Duplex, TX-Link	
Power	DC In 12V	
Power Consumption	< 4W	
Dimensions (D x W x H)mm	145 × 95 × 26mm	
Weight	400g	
Temperature	-10~50°C (Operating) ,-20~70°C (Storage)	
Humidity	10~90% non-condensing	
Certification	CE, FCC, RoHS	
MTBF	65,000 h (25°C)	

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)***	***Type***	***Distance***
SFM-5000-L31	1310	MMF	-20 ~-14	-32	12	2km
SFM-5005-L31	1310	MMF	-9 ~ 0	-30	21	5km
SFS-5030-L31	1310	SMF	-15 ~ -8	-34	19	30km
SFS-5060-L31	1310	SMF	-5 ~ 0	-35	30	60km
SFS-5080-L31	1310	SMF	0 ~ +5	-36	36	80km
SFS-5100-Z55	1550	SMF	-5 ~ 0	-35	30	100km
SFS-5120-Z55	1550	SMF	0 ~ +5	-35	35	120km
SFS-5080-Cxx	CWDM	SMF	-5 ~ 0	-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)***	***Type***	***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)	Type	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)	Type	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)	Type	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)	Type	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

Fiber Types	Single-mode (9/125um), Multi-mode (50/125um, 62.5/125um). Simplex and Duplex
Connector	ST, SC, FC, LC, MTRJ, MU
Insertion Loss (dB)	< 0.2dB (typical 0.3dB)
Return Loss (dB)	-60dB
Operating Temperature	-40 ~ 75°C
Storage Temperature	-55 ~ 85°C
Tension Repellence	888N (200lbs)
Maximum diffusion	500N
Pres Repellence	1700N
Strike Repellence	0.5N/M
Ferrule Type	Ceramic
Dielectric Withstand Test	100kpsi/689N/mm(IEC793-1B1)
Swing Test	300 Cycles
Minimum Curve Radius	25.4mm

Ordering Information

□ □ □/□ □ □P-□ □ □-□M

1 2 3 4 5 6 7 8

1	2
Connector Type	
FC	FC
SC	SC
ST	ST
LC	LC
PT	Pigtail
MJ	MT-RJ
P	PC
A	APC
U	UPC

3	4
Connector Type	
FC	FC
SC	SC
ST	ST
LC	LC
PT	Pigtail
MJ	MT-RJ
P	PC
A	APC
U	UPC

5		6		7	
Fiber Mode		Cable Type			
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

FC Type


ST Type

SC Type

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

Ordering Information

FA-I□-PC□ □□

1 2 3

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

G.SHDSL.bis Family

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

Interface	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				
E1 NEW	SHRM03b-E1	2-ch E1 card	L	64
Ethernet Bridge NEW	SHRM03b-ET100	2-ch 10/100Base-TX card	L	64
V35, RS530, RS449, X.21 NEW	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 (V.35, RS530, RS449, X.21) NEW	SHDTU03b-31	Ethernet 10/100Base-TX, E1, Data (V.35, RS530, RS449, X.21) multi-interface NTU	S	68
4-wire (11.4Mbps) G.SHDSL.bis TDM CPE Modem				
E1 NEW	SHDTU03bA-E1	E1 NTU	S	65
V35, RS530, RS449, X.21 NEW	SHDTU03bA-Data	V35, RS530, RS449, X.21 NTU	S	66
Ethernet Bridge NEW	SHDTU03bA-ET100	Ethernet 10/100Base-TX NTU	S	70
Ethernet Bridge+E1+Data (V.35, RS530, RS449, X.21) NEW	SHDTU03bA-31	Ethernet 10/100Base-TX, E1, V.35 multi-interface NTU	S	68
Ethernet Bridge+E1(T1)+ Data (V.35, RS530, RS449, X.21) NEW	SHDTU03bA-31T	Ethernet 10/100Base-TX, E1, T1, V.35 multi-interface NTU	S	68
G.SHDSL.bis ATM				
G.SHDSL.bis ATM Chassis				
4U chassis NEW	SHRM03b-CH	4U,19", 16-slot chassis	R	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
Ethernet Router NEW	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 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 (5.7/11.4/22.8Mbps)				
5.7Mbps Ethernet Bridge NEW	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 Family

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

Interface	Model Name	Description	Type	Page
G.SHDSL TDM				
Managed G.SHDSL TDM Chassis				
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 TDM 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 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 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	C	87
ADSL, VDSL	ALS-12	ADSL/VDSL splitter	C	86
ADSL	ALS-10-IT	Italy POTS plug ADSL splitter	C	88
ADSL	ALS-10-UK	UK POTS BT plug ADSL splitter	C	88
ADSL	ALS-10-FI	Finland POTS plug ADSL splitter	C	88
ADSL	ALS-10-FA	France POTS plug ADSL splitter	C	88
ADSL	ALS-10-EU/I	ADSL/ISDN splitter	C	89
Stand-alone Micro Filter				
ADSL, VDSL	ALS-M12	ADSL/VDSL micro filtter	C	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

2w	Line	26AWG		24AWG		22AWG		2w	Line	26AWG		24AWG		22AWG	
	Rate	0.4mm		0.5mm		0.6mm			Rate	0.4mm		0.5mm		0.6mm	
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	13	3.96	17	5.2	21	6.4	55	3520	9	2.74	12	3.5	15	4.6
12	768	11	3.35	15	4.4	18	5.5	56	3584	9	2.74	12	3.5	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
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	10	3.05	13	4.0	17	5.0	81	5184	6	1.83	8	2.4	10	3.0
38	2432	10	3.05	13	4.0	17	5.0	82	5248	6	1.83	8	2.4	10	3.0
39	2496	10	3.05	13	4.0	17	5.0	83	5312	6	1.83	8	2.4	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								

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/ET10RS
- SHDTU03/E1
- SHDTU03/V35

G.SHDSL.bis TDM Family

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

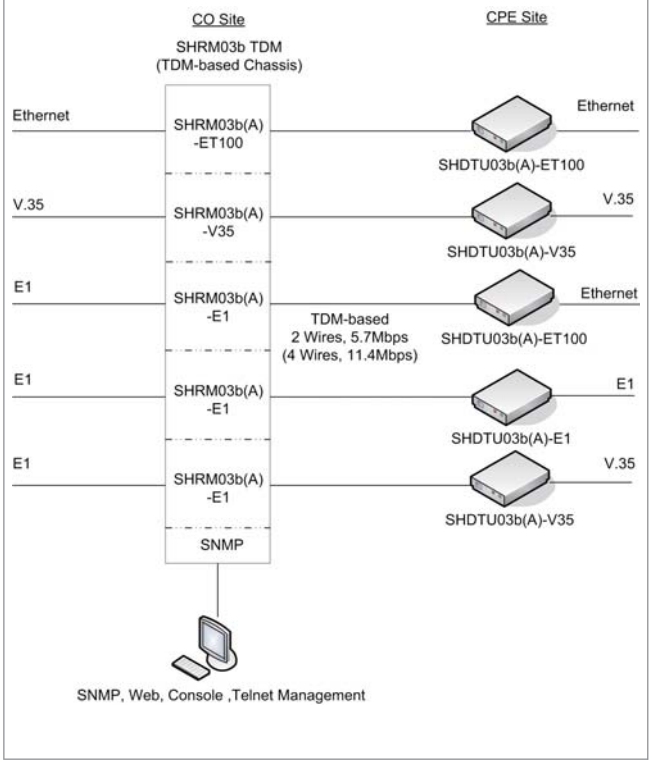
SHRM03b TDM

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

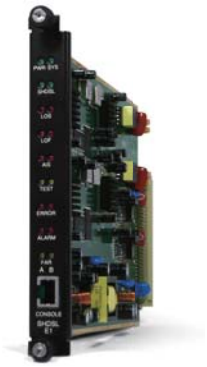
Application



Specifications

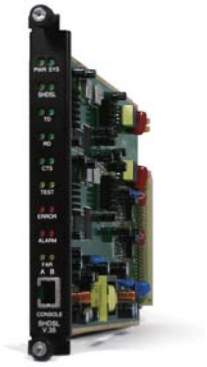
Ports		
WAN Interface	Line Rate :	ITU G.991.2 (2004)
	Coding :	trellis coded pulse amplitude modulation (TC-PAM16 and TC-PAM32)
	Support :	Annex A ,B , F and G
	Payload rates:	64Kps to 5.696Mbps (N=1 to 89) for 2-wire model. 128Kbps to11.392Mbps (N=1 to 172) for 4-wire model.
	Connection :	RJ-45 jack (2-wire or 4-wire)
	Impedance :	135 ohms
G.703 Interface (as E1)	Connection :	RJ-45 for balanced 120Ω 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 (as RS-530/V.35/X.21)	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
LAN Interface (as Ethernet)	• Single Ethernet Interface	
	• 10/100Mpbs Half/Full Duplex, Auto-sensing, Auto-Crossover	
	• Up to 1024 MAC address learning, filtering bridge	
DSL Timing	• Internal	
	• From E1 Recovery (as E1)	
	• From DTE (as V.35 and Ethernet)	
Performance Monitoring	ES, SES, UAS, LOWS, Alarms and Errors	
Loopback Tests	E1 and V.35 interface only :	
	• Local Digital Loopback	
	• Local Loopback	
	• Remote Line Loopback	
	• Remote Payload Loopback	
	• Far-end Line Loopback	
	• Far-end Payload Loopback	
	• V.54 Loopback (for V.35 interface)	
	• Build-in 2047(211-1) bit BER tester	
Management	• Console port (RJ45 , RS232C)	
	• Support firmware upgradeable	
Power	AC: 90~230VAC, 2A	
	DC: -36~-72, 6A	
Power Consumption	Maximum 200W, I/F line card: 12W maximum	
Dimensions (D x W x H)mm	Chassis: 178 x 440 x 315mm,	
	Line card: 21 x 178 x 260mm	
Weight	7.9kg	
Temperature	0~50°C (Operating) ,0~70°C (Storage)	
Humidity	10~90% non-condensing	
Certification	CE, FCC, RoHS	
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 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

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 TDM Family

G.SHDSL.bis E1 Interface Modem

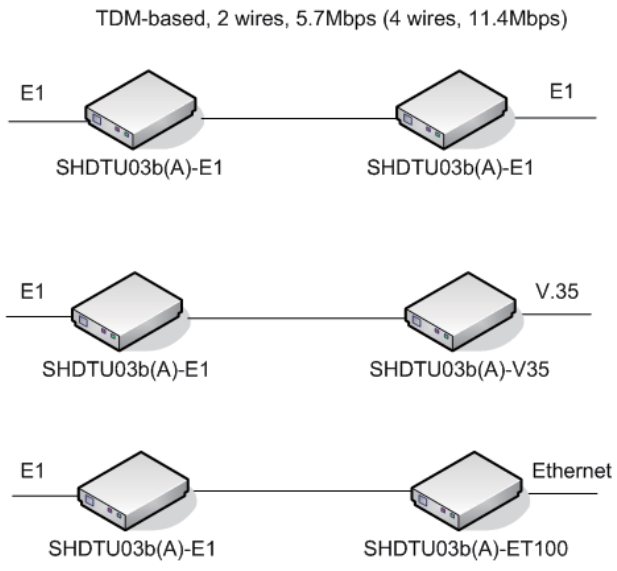
SHDTU03b-E1

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

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
G.703 Interface(as E1)	Connection :	RJ-45 for balanced 120Ω 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, Test, SYNC, Error, LBK	
DSL Timing	• Internal	
	• From E1 Recovery (as E1)	
	• From DTE (as V.35 and Ethernet)	
Performance Monitoring	ES, SES, UAS, LOWS, Alarms and Errors	
Loopback Tests	• Local Digital Loopback	
	• Local Loopback	
	• Remote Line Loopback	
	• Remote Payload Loopback	
	• Far-end Line Loopback	
	• Far-end Payload Loopback	
	• Build-in 2047(211-1) bit BER tester	
Management	• Configuration with keypads and LCD display	
	• Console port (RJ45 , RS232)	
	• Support firmware upgradeable	
Power	AC Input: 100~240V	
	DC Input: -36 ~ 72V	
	Dual power Input:100~ 240VAC, -36 ~ -72VDC	
Power Consumption	< 10W	
Dimensions (D x W x H)mm	168 x 195 x 48mm	
Weight	5.2kg	
Temperature	0~50°C (Operating) ,0~70°C (Storage)	
Humidity	10~90% non-condensing	
Certification	CE, FCC, RoHS	
MTBF	57,000 hours	

G.SHDSL.bis TDM Family

G.SHDSL.bis V35 Modem

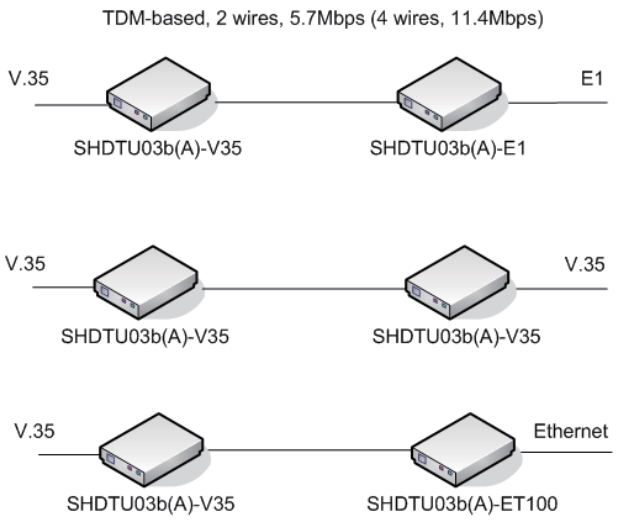
SHDTU03b-V35

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 model
	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, Test, SYNC, Error, LBK, TD, RD
DSL Timing		• Internal • From DTE (as V.35 and Ethernet)
Performance Monitoring		ES, SES, UAS, LOWS, Alarms and Errors
Loopback Tests		• Local Digital Loopback • Local Loopback • Remote Line Loopback • Remote Payload Loopback • Far-end Line Loopback • Far-end Payload Loopback • V.54 Loopback (for V.35 interface) • Build-in 2047(211-1) bit BER tester
Management		AC Input: 100~240V DC Input: -36 ~ 72V Dual power Input:100~ 240VAC, -36 ~ -72VDC
Power		< 10W
Power Consumption		168 x 195 x 48mm
Dimensions		
(D x W x H)mm		5.2kg
Weight		0~50°C (Operating) ,0~70°C (Storage)
Temperature		10~90% non-condensing
Humidity		CE, FCC, RoHS
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 TDM Family

G.SHDSL.bis Ethernet Modem

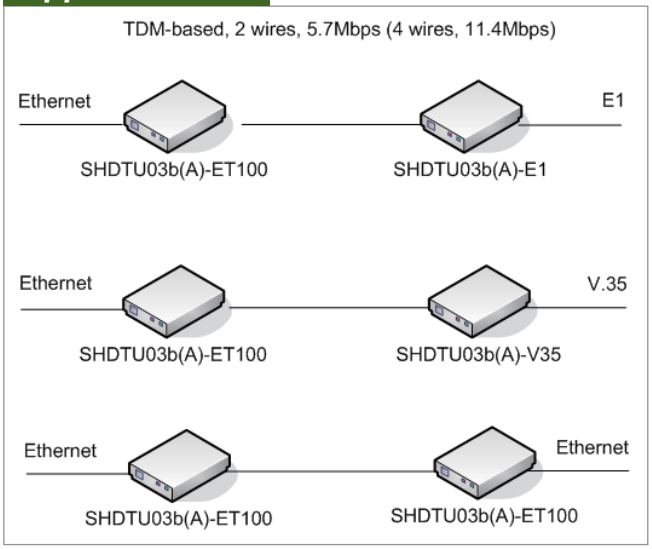
SHDTU03b-ET100

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

Application



Specifications

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

Ordering Information

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

G.SHDSL.bis Multiple Interface Modem

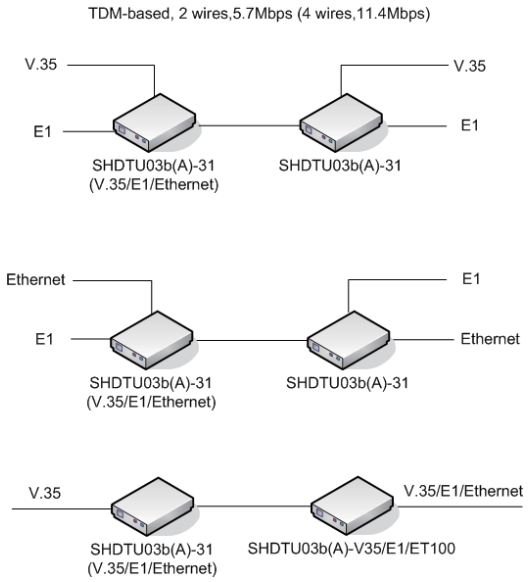
SHDTU03b-31

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 modem 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 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
- *SHDTU03b-31-AD* 2 wire E1, Data and LAN NTU with dual power

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

Ports		
WAN Interface	Line Rate :	ITU G.991.2 (2004)
	Coding :	trellis coded pulse amplitude modulation (TC-PAM16 and TC-PAM32)
	Support :	Annex A ,B , F and G
	Payload rates:	64Kps to 5.696Mbps (N=1 to 89) for 2-wire model. 128Kbps to11.392Mbps (N=1 to 172) for 4-wire model
	Connection :	RJ-45 jack (2-wire or 4-wire)
	Impedance :	135 ohms
G.703 Interface(as E1)	Connection :	RJ-45 for balanced 120Ω 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 (as RS-530/V.35/X.21)	• 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	
LAN Interface (as Ethernet)	• Single Ethernet Interface	
	• 10/100Mpbs Half/Full Duplex, Auto-sensing, Auto-Crossover	
	• Up to 1024 MAC address learning, filtering bridge	
LED	Power, Alarm, Test, SYNC, Error, LBK, E1, Data, Eth	
DSL Timing	• Internal	
	• From E1 Recovery (as E1)	
	• From DTE (as V.35 and Ethernet)	
Performance Monitoring	ES, SES, UAS, LOWS, Alarms and Errors	
Loopback Tests	E1 and V.35 interface only	
	• Local Digital Loopback	
	• Local Loopback	
	• Remote Line Loopback	
	• Remote Payload Loopback	
	• Far-end Line Loopback	
	• Far-end Payload Loopback	
	• V.54 Loopback (for V.35 interface)	
	• Build-in 2047(211-1) bit BER tester	
Management	• Configuration with keypads and LCD display	
	• Console port (RJ45 , RS232C)	
	• Support firmware upgradeable	
Power	AC Input: 100~240V	
	DC Input: -36 ~ 72V	
	Dual power Input:100~ 240VAC, -36 ~ -72VDC	
Power Consumption	< 10W	
Dimensions (D x W x H)mm	168 x 195 x 48mm	
Weight	5.2kg	
Temperature	0~50°C (Operating) ,0~70°C (Storage)	
Humidity	10~90% non-condensing	
Certification	CE, FCC, RoHS	
MTBF	57,000 hours	

G.SHDSL.bis ATM Family

G.SHDSL.bis ATM Ethernet Concentrator

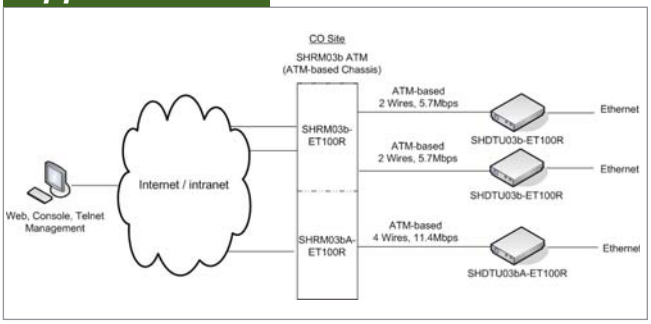
SHRM03b ATM

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

Ports	LAN Interface	• 10Base-T /100 Base-TX auto-negotiation • Auto-MDIX
	Hardware Interface	• WAN: RJ-45 • LAN: RJ-45 • Console port: RS232 • RST: Reset button for factory default
	WAN Interface	• SHDSL: ITU-T G.991.2 2004(Annex A/B/F/G) • Encoding scheme: TC-PAM16, TC-PAM32 • Data Rate: N x 64Kbps (N=3~89) • Impedance: 135 ohms
ATM		• Up to 8 PVCs • OAM F4/F5 loopback test • AAL5
ATM QoS		• UBR (Unspecified Bit Rate) • CBR (Constant Bit Rate) • VBR-rt (Variable Bit Rate Real Time) • VBR-nrt (Variable Bit Rate Non-real Time)
AAL5 Encapsulation		• VC multiplexing and SNAP/LLC • 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

Specifications

Routing	• Support IP/TCP/UDP/ARP/ICMP/IGMP protocols • IP routing with static routing and RIPv1/RIPv2 (RFC1058/2453) • IP multicast and IGMP proxy (RFC1112/2236) • Network address translation (NAT/PAT) (RFC1631) • NAT ALGs for ICQ/Netmeeting/MSN/Yahoo Messenger • DNS relay and caching (RFC1034/1035) • DHCP server, client and relay (RFC2131/2132)
Bridging	• IEEE 802.1D Transparent Bridging • IEEE 802.1q VLAN • Port-based VLAN
Security	• DMZ host/Multi-DMZ/Multi-NAT function • Virtual server mapping (RFC1631) • VPN pass-through for PPTP/L2TP/IPSec tunneling • Natural NAT firewall • Advanced stateful packet inspection (SPI) firewall • Denial of service protection • User access control; deny certain PCs access to internet services
Management	• Easy-to-use web-based GUI for quick setup, configuration and management • Menu-driven interface/Command-line interface (CLI) for local console and Telnet access • Password protected management and access control list for administration • SNMP management with SNMPv1/SNMPv2c (RFC1157/1901/1905) agent and MIB II (RFC1213/1493) • Software upgrade via web-browser/TFTP server
LEDs	• General: PWR • WAN: LNK, ACT • LAN: 1, 2, 3, 4 (ET10RS) 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 (D x W x H)mm	Chassis: 178 x 440 x 315mm Line card: 21 x 178 x 260mm
Weight	7.9kg
Temperature	0~50°C (Operating) ,0~70°C (Storage)
Humidity	10~90% non-condensing
Certification	CE, FCC, RoHS
MTBF	57,000 hours

G.SHDSL.bis ATM Family

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

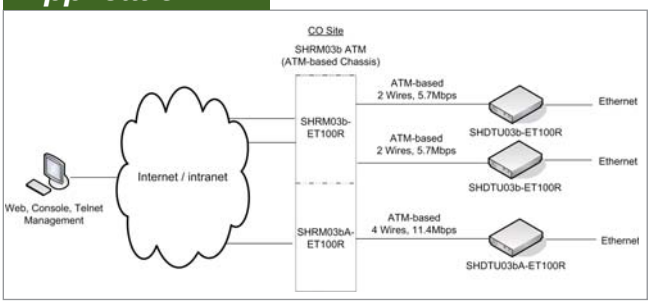
SHRM03b-ET100R, SHRM03bA-ET100R

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



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-ET100R*** 2 wire (5.7Mbps) 2Ch Ethernet 10/100Base-TX ATM bridge/router card
- ***SHRM03bA-ET100R*** 4 wire (11.4Mbps) Ethernet 10/100Base-TX ATM bridge/router card

G.SHDSL.bis ATM Family

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

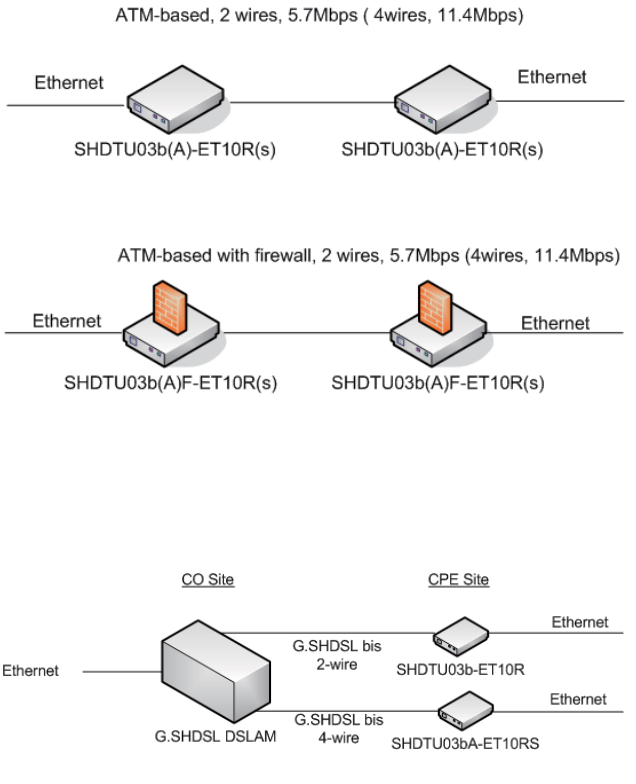
Specifications

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 Encapsulation		• VC multiplexing and SNAP/LLC • Ethernet over ATM (RFC 2684/1483) • PPP over ATM (RFC 2364) • Classical IP over ATM (RFC 1577)
PPP		• PPP over Ethernet for fixed and dynamic IP (RFC 2516) • PPP over ATM for fixed and dynamic IP (RFC 2364) • User authentication with PAP/CHAP/MS-CHAP
Routing		• Support IP/TCP/UDP/ARP/ICMP/IGMP protocols • IP routing with static routing and RIPv1/RIPv2 (RFC1058/2453) • IP multicast and IGMP proxy (RFC1112/2236) • Network address translation (NAT/PAT) (RFC1631) • NAT ALGs for ICQ/Netmeeting/MSN/Yahoo Messenger • DNS relay and caching (RFC1034/1035) • DHCP server, client and relay (RFC2131/2132)

Ordering Information

- ***SHDTU03 b -ET10R*** 2 wire 10/100Base-TX Ethernet Router
- ***SHDTU03 bF-ET10R*** 2 wire 10/100Base-TX Ethernet Router with Firewall
- ***SHDTU03 b -ET10RS*** 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

Application



Specifications

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: 1, 2, 3, 4 (ET10RS) LAN: Link, ACT (ET10R) • SHDSL: ALM
Power	DC 9V in
Power Consumption	< 9W
Dimensions (D x W x H)mm	145 x 187 x 33mm
Weight	5.2kg
Temperature	0~50°C (Operating) ,0~70°C (Storage)
Humidity	10~90% non-condensing
Certification	CE, FCC, RoHS
MTBF	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

G.SHDSL TDM Family

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

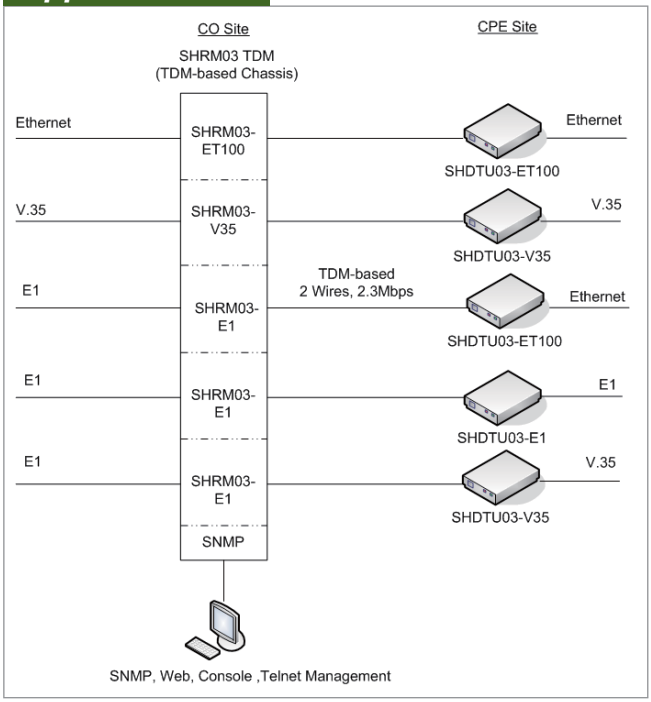
SHRM03 TDM

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
- Supports TFTP upgrade
- All interface connectors on the rear panel

Application



Ordering Information

- ***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)
- ***SHRM03-ET100*** G.SHDSL (2 wire) Ethernet TDM card with RJ-45 adapter (2 LAN ports per card)

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
Datacom Interface (under development)	• User selectable as : V.35, RS-449, RS-530, X.21 • Data Rate : 64kbps to 2304kbps • Connector : D25F (adapters available) • Timing : Internal, External, and Recovery
Ethernet Interface	• Supports 10/100Base-T auto sensing half/full duplex • Complied with IEEE 802.3/IEEE 802.3u • Operates as a self-learning bridge in transparent mode • Supports up to 128 MAC learning addresses • Supports bridge filter function
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 (D x W x H)mm	Chassis: 285 x 440 x 180mm, 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

G.SHDSL TDM Family

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 TDM Family

G.SHDSL E1 Modem

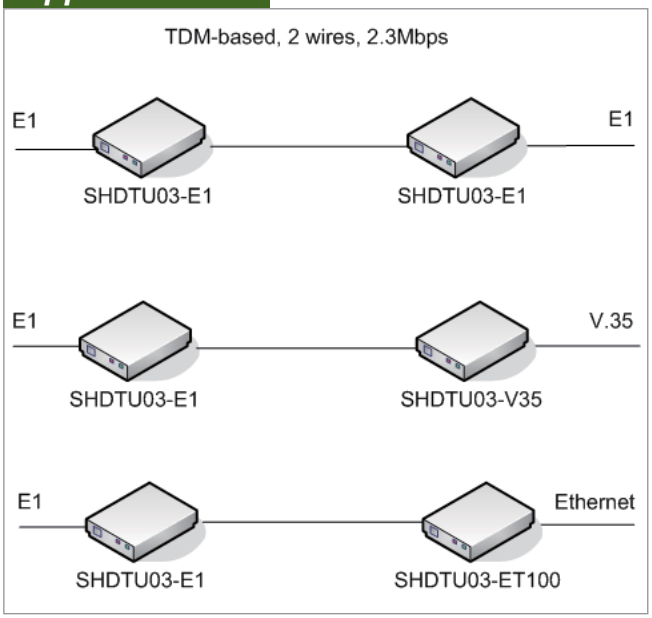
SHDTU03-E1

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 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 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



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

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
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 Consumption	10W
Dimensions (D x W x H)mm	168 x 195 x 48mm
Weight	850g
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-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

G.SHDSL TDM Family

G.SHDSL V35 Modem

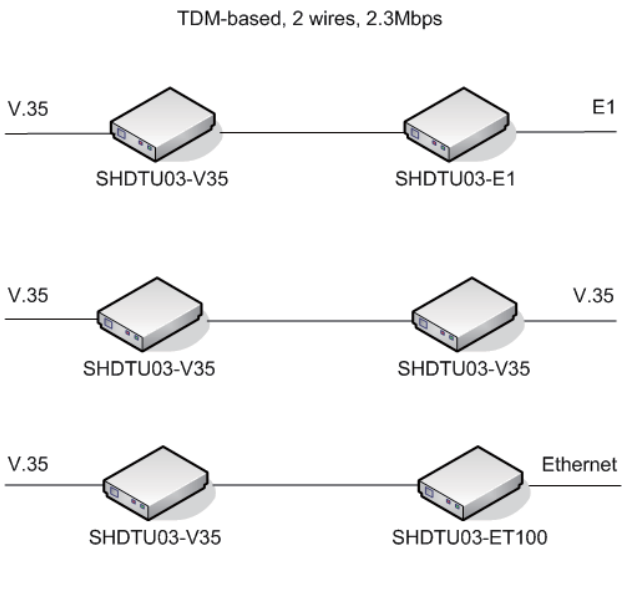
SHDTU03-V35

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

Application



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
Datacom Interface (under development)	• 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 (D x W x H)mm	168 x 195 x 48mm
Weight	850g
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-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 TDM Family

G.SHDSL Ethernet Modem

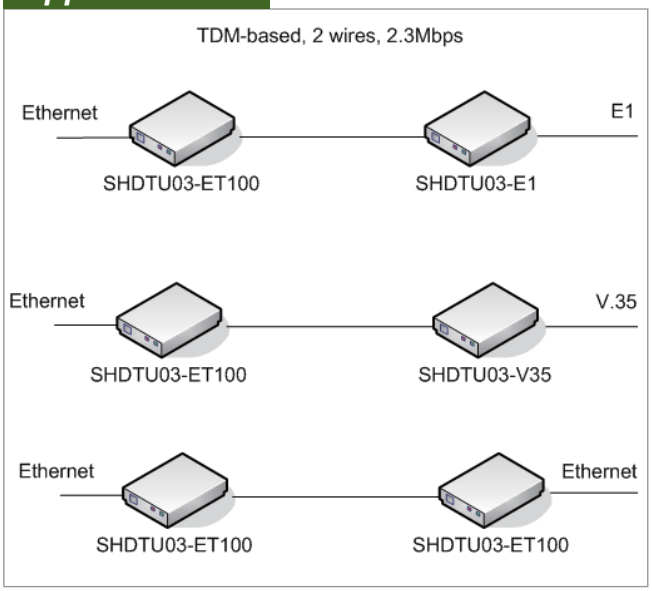
SHDTU03-ET100

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

Application



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
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	< 10W
Dimensions (D x W x H)mm	168 x 195 x 48mm
Weight	850g
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-ET100-AC*** 2 wire Ethernet 10/100Base-TX NTU with 100~240VAC
- ***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 Family

G.SHDSL.bis ATM Ethernet Concentrator

SHRM03 ATM

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

Ports	LAN Interface	• 10Base-T /100 Base-TX auto-negotiation • Auto-MDIX
	Hardware Interface	• WAN: RJ-45 • LAN: RJ-45 • Console port: RS232 • RST: Reset button for factory default
	WAN Interface	• SHDSL: ITU-T G.991.2 2004(Annex A/B/F/G) • Encoding scheme: TC-PAM16, TC-PAM32 • Data Rate: N x 64Kbps (N=3~89) • Impedance: 135 ohms
ATM		• Up to 8 PVCs • OAM F4/F5 loopback test • AAL5
ATM QoS		• UBR (Unspecified Bit Rate) • CBR (Constant Bit Rate) • VBR-rt (Variable Bit Rate Real Time) • VBR-nrt (Variable Bit Rate Non-real Time)
AAL5 Encapsulation		• VC multiplexing and SNAP/LLC • 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

Specifications

Routing	• Support IP/TCP/UDP/ARP/ICMP/IGMP protocols • IP routing with static routing and RIPv1/RIPv2 (RFC1058/2453) • IP multicast and IGMP proxy (RFC1112/2236) • Network address translation (NAT/PAT) (RFC1631) • NAT ALGs for ICQ/Netmeeting/MSN/Yahoo Messenger • DNS relay and caching (RFC1034/1035) • DHCP server, client and relay (RFC2131/2132)
Bridging	• IEEE 802.1D Transparent Bridging • IEEE 802.1q VLAN • Port-based VLAN
Security	• DMZ host/Multi-DMZ/Multi-NAT function • Virtual server mapping (RFC1631) • VPN pass-through for PPTP/L2TP/IPSec tunneling • Natural NAT firewall • Advanced stateful packet inspection (SPI) firewall • Denial of service protection • User access control; deny certain PCs access to internet services
Management	• Easy-to-use web-based GUI for quick setup, configuration and management • Menu-driven interface/Command-line interface (CLI) for local console and Telnet access • Password protected management and access control list for administration • SNMP management with SNMPv1/SNMPv2c (RFC1157/1901/1905) agent and MIB II (RFC1213/1493) • Software upgrade via web-browser/TFTP server
LEDs	• General: PWR • WAN: LNK, ACT 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 (D x W x H)mm	Chassis: 285 x 440 x 180mm 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

G.SHDSL.bis ATM Family

G.SHDSL.bis ATM Ethernet Slide-in card

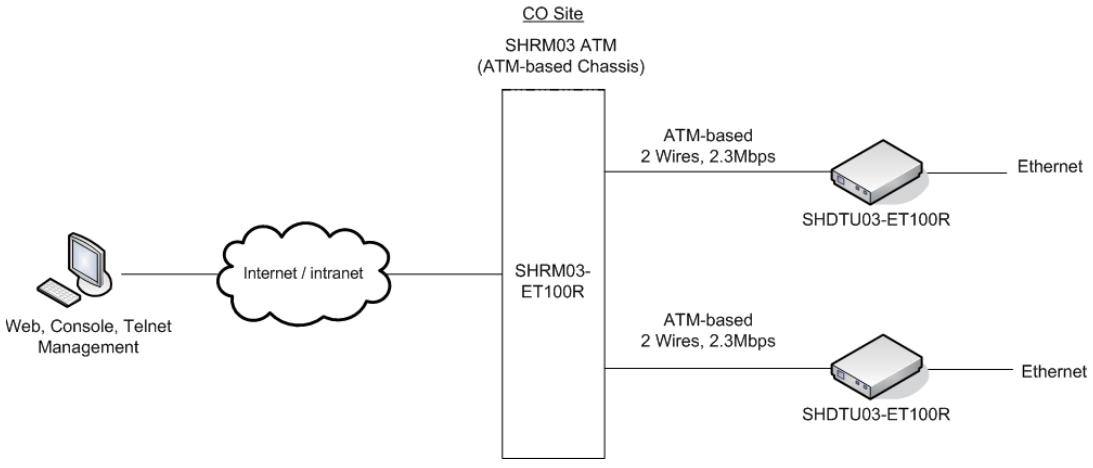
SHRM03-ET100R

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



Ordering Information

SHRM03-AA-CH	4U, 19", 14-slot chassis for dual AC power
SHRM03-DD-CH	4U, 19", 14-slot chassis for dual DC power
SHRM03-AD-CH	4U, 19", 14-slot chassis for AC + DC power
SHRM03-AC	AC 100 ~ 220 power card
SHRM03-ET100R	2 wire (2.3Mbps) 2Ch Ethernet 10/100Base-TX ATM bridge/router card

G.SHDSL ATM Family

G.SHDSL ATM Router / Bridge modem

SHDTU03-ET10R

The SHDTU03 ATM modem family is a Single-Line High Speed Digital Subscriber Line 2-wire/ 4-wire bridge/router which complies with G.991.2 and G.994.1 standards. The SHDTU03 family provides business-class, multi-rate 192Kbps to 2.304/4.608Mbps payload rates over existing single pair or two pairs copper wire. The SHDTU03 is designed not only to optimize the service bit rate from central office to customer premises but also integrates high-end Bridging/ Routing capabilities with advanced functions such as Multi-DMZ, virtual server mapping and VPN pass-through. Easy configuration and monitoring can be accomplished by using any browser. The SHDTU03 can be configured in either central or client mode providing a point-to-point solution. The SHDSL router allows customers to leverage the latest in broadband technologies to meet their growing data communication needs.

Features

- Supports Ethernet over ATM over SHDSL
- Full ATM protocol stack implementation over G.SHDSL
- Adaptive rate installation maximizes data rate based on loop conditions
- Standard ITU G.991.2
- Supports point-to-point configurations
- Data rate 2 wire up to 2.3Mbps
- Local management interface via console port
- Intuitive Web based management
- SNMP management with SNMPv1/v2 and MIB II
- Efficient IP routing and transparent learning bridge to support broadband Internet services
- VPN pass-through for safeguarded connections
- Build-in advanced SPI firewall (Firewall routers)
- 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	9W
Dimensions (D x W x H)mm	145 x 187 x 33mm
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 Encapsulation	• VC multiplexing and SNAP/LLC • Ethernet over ATM (RFC 2684/1483) • PPP over ATM (RFC 2364) • Classical IP over ATM (RFC 1577)
PPP	• PPP over Ethernet for fixed and dynamic IP (RFC 2516) • PPP over ATM for fixed and dynamic IP (RFC 2364) • User authentication with PAP/CHAP/MS-CHAP
Routing	• Support IP/TCP/UDP/ARP/ICMP/IGMP protocols • IP routing with static routing and RIPv1/RIPv2 (RFC1058/2453) • IP multicast and IGMP proxy (RFC1112/2236) • Network address translation (NAT/PAT) (RFC1631) • NAT ALGs for ICQ/Netmeeting/MSN/Yahoo Messenger • DNS relay and caching (RFC1034/1035) • DHCP server, client and relay (RFC2131/2132)
Bridging	• IEEE 802.1D Transparent Bridging • IEEE 802.1q VLAN • Port-based VLAN
Security	• DMZ host/Multi-DMZ/Multi-NAT function • Virtual server mapping (RFC1631) • VPN pass-through for PPTP/L2TP/IPSec tunneling • Natural NAT firewall • Advanced stateful packet inspection (SPI) firewall • Denial of service protection • User access control; deny certain PCs access to internet services
Management	• Easy-to-use web-based GUI for quick setup, configuration and management • Menu-driven interface/Command-line interface (CLI) for local console and Telnet access • Password protected management and access control list for administration • SNMP management with SNMPv1/SNMPv2c (RFC1157/1901/1905) agent and MIB II (RFC1213/1493) • Software upgrade via web-browser/TFTP server

ADSL Family

Managed IP DSLAM

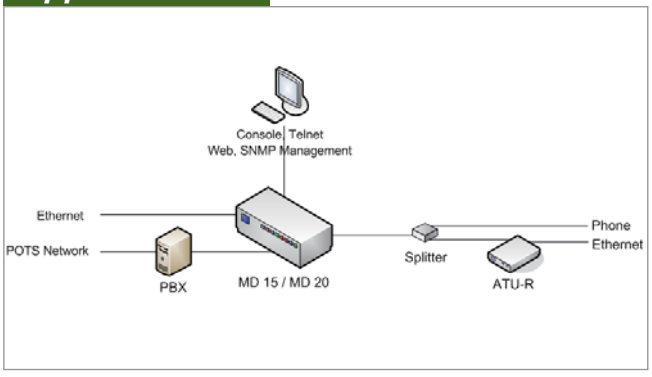
MD15

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)

Application



Specifications

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

Ordering Information

- ***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
- ***MD15-48AE-AC*** 1.5U 19" 48-port Annex A, 270 ohm ADSL2+ IP DSLAM with AC power
- ***Linux-EMS-200*** Element Management system

ADSL Family

Managed IP DSLAM

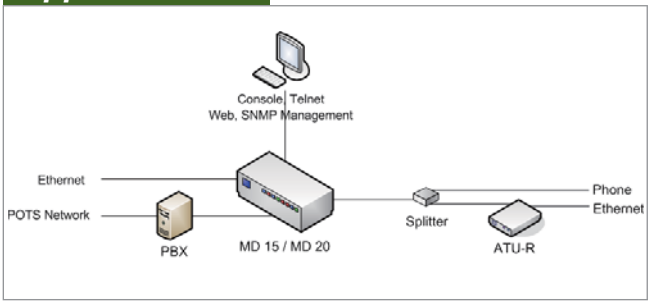
MD20

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		2 x 10/100/1000 Based-Tx or 2 x SFP (IP)
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/Interleave latency modes for G.dmt Supports Interleave mode for G.Lite ADSL to ATM signal conversion Build-in POTS splitter circuit Power Consumption:25 W(max)
Line Interface : SHDSL		24 ports per card Signal modulation and demodulation G.SHDSL to ATM signal conversion Power Consumption:21 W(max)
Management Interface		Physical Layer: IEEE 802.3 (10Mbps) Upper Layer: Ethernet, IP, SNMP,TL1
Service characteristics	ATM	QoS(UBR, rt-VBR, nrt-VBR, CBR) PVC default priority and PVC-to VLAN maping Traffic scheduling/shaping/policing
	Ethernet	IEEE 802.1d Spanning Tree Protocol (STP) IEEE 802.3ad Link aggregation Password Security on console access
Management		OSI Layer 2 Functionality MAC filtering and count limit Access control list (ACL) Multicasting support Port based and 802.1p/q Tag-based VLAN IGMP V1/V2 snooping and proxy SNMP V1/V2C
System Configuration		Multiple session Telnet, Web based and SNMP Supports point to point VCC link Software remote upgrade
Alarm and Status Surveillance		Automatic alarm/LED indication for alarm and system status Four housekeeping inputs and one alarm contact closure output
Management		Provides all system OAM&P functionalities, software remote updates.RS-232 local console interface for basic provisioning plus out-band Ethernet interface for Telnet or Web
LEDs		GbE 1/2 link, RST, ACO, ALM, SYS, DSL Status 1 ~48
Power		Input: -48 V DC (-42 V to -56 V) Dual A+B -48 V DC power input terminal
Power Consumption		130W
Dimensions (D x W x H)mm		304 x 482 x 88mm
Weight		4.5kg
Temperature		-20~70°C (Operating) ,-20~80°C (Storage)
Humidity		10~90% non-condensing
Certification		CE, FCC, RoHS, ITU-T, ETSI
MTBF		25,000 hours

ADSL Family
ADSL2+ Modem

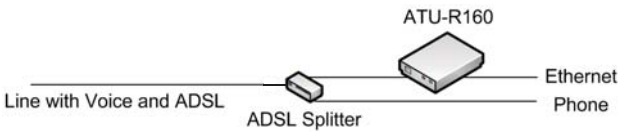
ATU-R160

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 (D x W x H)mm	125 x 88 x 27mm
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
	1 port RJ11 port for ADSL
	one reset button for factory default setting
Standard	IEEE802.3 10Base-T802,3u, 100Base-TX, RFC2516 (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 Protocols	Support up to 8PVCs
	ATM Forum UNI 3.1/4.0 PVC
	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-nrt
	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 802.1d)
	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 Family

ADSL Splitter Rack

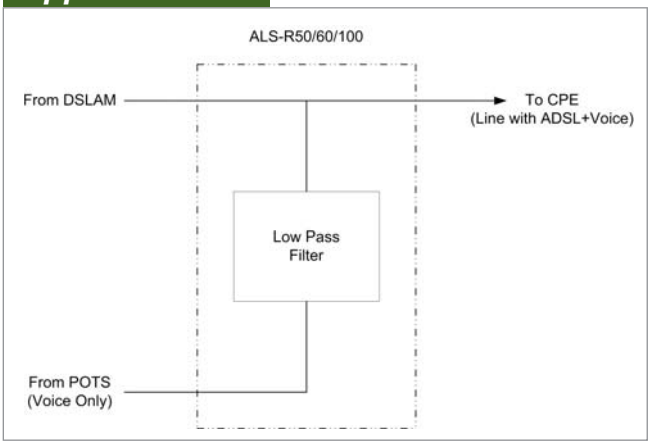
ALS-R50

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)

Application



Specifications

Impedance	300 ~ 3.4KHz (900 ohms)
Insertion Loss	1004Hz short loop: 1dB 1004Hz long loop: 0.75dB
Attenuation Distortion	200 ~ 3.4KHz short loop: -1.5 ~ 1.5dB 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 Attenuation	30K ~ 300KHz: -65dB 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 Rejection Ration	600 ~ 3.2KHz: -100dBb
Longitudinal Balance	200 ~ 1.0KHz : -60dB 1 ~ 3KHz : -60dB
DC Resistance	20 ohms
Isolation resistance to Earth	5.0M ohms
DC current carrying capacity	100mA
ESD discharge limits	15k VDC
Dimensions (D x W x H)mm	285 x 434 x 266mm
Weight	18kg
Temperature	-10~70°C (Operating) ,-15~80°C (Storage)
MTBF	10~90% non-condensing

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 Family

ADSL Splitter Rack

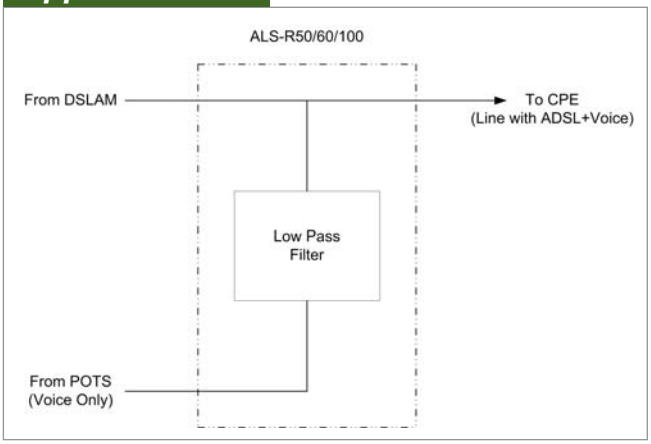
ALS-R60

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)

Application



Specifications

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

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 Splitter Family

ADSL/VDSL Splitter and Micro Filter

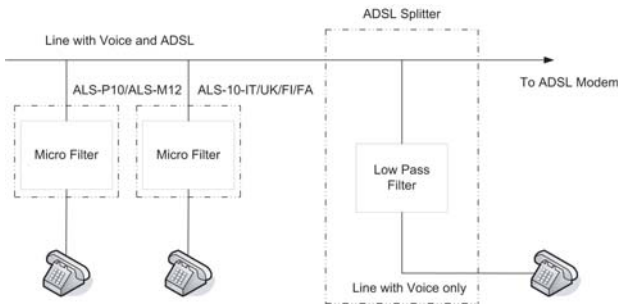
ALS-12 / ALS-M12

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

Application



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 Distortion	200 ~ 3.4KHz short loop: -1.5 ~ 1.5dB 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 Attenuation	30 ~ 300KHz: 65dB 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 Rejection Ration	600 ~ 3.2KHz: -100dBb
Longitudinal Balance	200 ~ 1.0KHz : 58dB 1 ~ 3KHz : 53dB
DC Resistance	20 ohms
Isolation resistance to Earth	5.0M ohms
DC current carrying capacity	100mA
ESD discharge limits	15k VDC
Tip to Ring Capacitance	20nf
Dimensions (D x W x H)mm	34 x 45 x 24mm
Weight	70g
Temperature	-10~70°C (Operating) ,-15~80°C (Storage)
MTBF	10~90% non-condensing

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 Family

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.

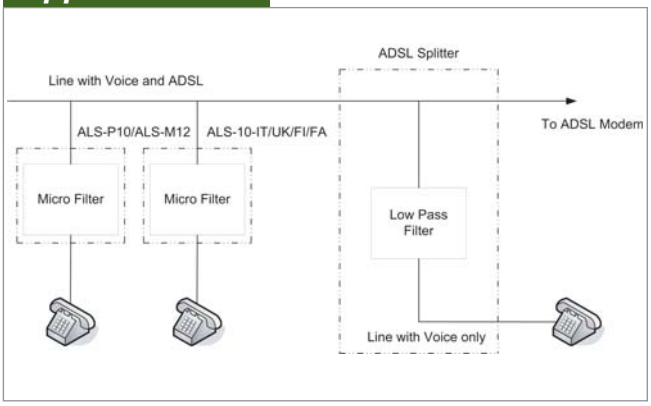
Features

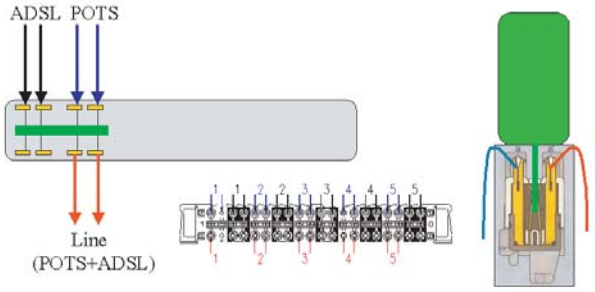
- Individual splitter
- Integrates directly in MDF (Main Distribution Frame)
- POTS service available when splitter inserted or removed (make before break)
- Various splitter designs available (POTS or ISDN)
- Includes a “Krone LSA-Plus” test plug connector

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 (D x W x H)mm	104 x 18 x 20mm
Weight	45g

Application





Ordering Information

- ***ALS-P10*** ADSL MDF splitter

ADSL Splitter Family

Regional ADSL Splitters and Micro Filters

ALS-10-IT/UK/FI/FA


ALS-M10-IT (ITALY)


ALS-M10-UK (UK)


ALS-M10-FI (Finland)

ALS-M10-FA (FRANCE)

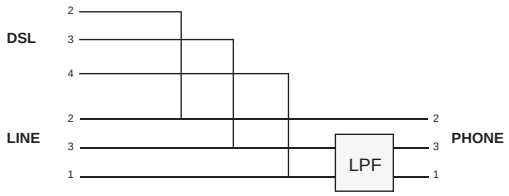
The ALS-10 regional ADSL splitters are low-cost, compact, passive low-pass filters designed to provide POTS (Plain Old Telephone System) service to a line that is utilizing ADSL/VDSL technology and customized with regional country telephone plugs. This device is designed to eliminate interference to 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

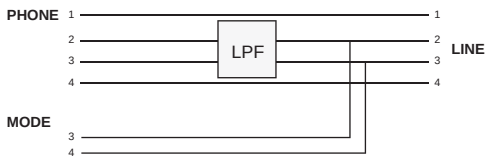
- Compact size
- Consists exclusively of all passive elements
- Designed for implementation of ADSL/VDSL CPE application
- Handles all POTS loop current from 0 ~ 100mA
- If the power of ATU-R fails, telephone service on the ADSL line will operate normally
- Provides excellent isolation between DSL and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

Application

ALS-M10-IT/ UK/ FI



ALS-M10-FA



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

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 Splitter Family

ADSL/VDSL Splitter and Micro Filter

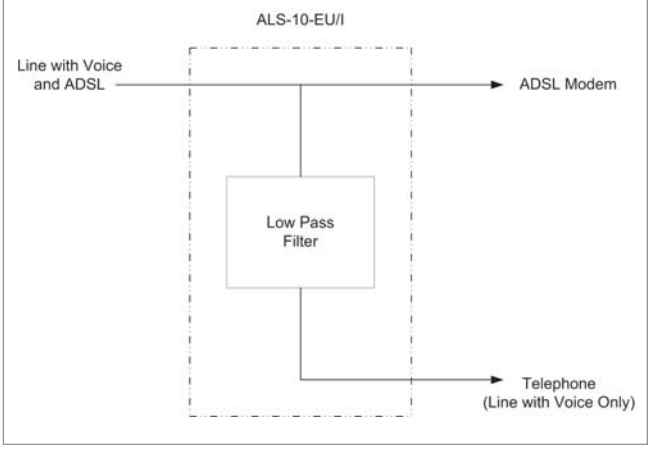
ALS-10-EU/I

The ALS-10-EU/I 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

Application



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 in ADSL band	150 ~ 1104KHz: 65dB
Insertion loss between ADSL port to line port	120 ~ 170KHz : 2dB 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 (D x W x H)mm	86 x 56 x 26mm
Weight	70g
Temperature	-10~70°C (Operating) ,-15~80°C (Storage)
Humidity	10~90% non-condensing

Ordering Information

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

VDSL Family

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

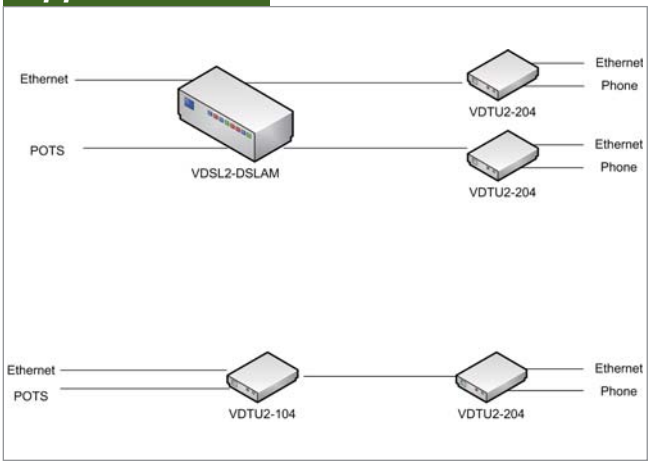
Features

- 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

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	< 5W
Dimensions (D x W x H)mm	184 x 146 x 40mm
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

E1 Concentrator, Access Unit, Muliplexer
Inverse Multiplexer / DXC / TDM over IP
E1 to T1 Cross Rate Converter , E1/T1 Repeater
G.703/64k ,T1 Concentrator, Access Unit, Muliplexer
E1/T1 Balun , E1/T1 Surge Protector

PDH Series Selection Table

E1 Family

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

Interface	Model Name	Description	Type	Page
Managed Voice & Data E1 Multiplexer				
Managed E1 Chassis				
4U Managed Chassis NEW	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 NEW	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-mountable), Managed E1 Multiplexer				
1U Managed Chassis Interface Module	ETU02-Mux/Plus	1U, 19", 3-slot voice & data E1 multiplexer chassis w/ SNMP	R	104
E1 Trunk	ETU02-Mux/Plus-E1	Fractional E1 (Nx64k) trunk module	M	105
Sub E1	ETU02-Mux/Plus-SubE1	Fractional Sub E1 (Nx64k) module	M	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-mountable), E1 Digital Cross Connect 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

E1 to T1 Cross Rate Converter

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

Interface	Model Name	Description	Type	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	C	120
E1/T1	ETR04	1 to 4 E1/T1 Uni-directional repeater	C	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 card				
V.35, X.21, RS530, RS449/ V.36, RS232/V.24	G703/64-RM-Serial	V.35, X.21, RS530, RS449/V.36, RS232/V.24 (64 or 19.2kbps) card	L	116
Single G.703 Co-directional 64K Access Unit				
1U Stand-alone (Rack-mountable), Single G.703 Co-directional 64K Access Unit				
V.35, X.21, RS530, RS449/ V.36, RS232/V.24	G703/64A-STD	V.35, X.21, RS530, RS449/V.36, RS232/V.24 to G.703 Co-directional 64K	S	117
Ethernet Bridge	NEW 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/ 232	Compact size, V.35, X.21, RS232/V.24 to G.703 Co-directional/ contra-directional/centra-directional 64K	C	118

T1 Family

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-mountable), Single T1 Access Unit				
* RS530, RS449/V.36, RS232/ V.24,V.35, X.21, NRZ, G703/ 64/Ethernet Bridge, Router	TTU01	*Data port to fractional T1	S	123
Single T1, Multi-Data Port Multiplexer				
1U Stand-alone (Rack-mountable), T1 Multiplexer				
* RS530, RS449/V.36, RS232/ V.24, V.35, X.21, NRZ, G703/ 64/Ethernet Bridge, Router	NEW TTU02-MUX/AD	*T1 Mux, 2/4-ch data port, sub T1, w/ LCD display & dual power (AC+DC)	S	124
	TTU02-MUX	*T1 Mux, 2/4-ch data port, sub T1, w/ LCD display	S	124

Balun Family

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

Surge Protector Family

E1	SP-SE-B01	E1 surge protector	SP	126

E1 CSU/DSU Family
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

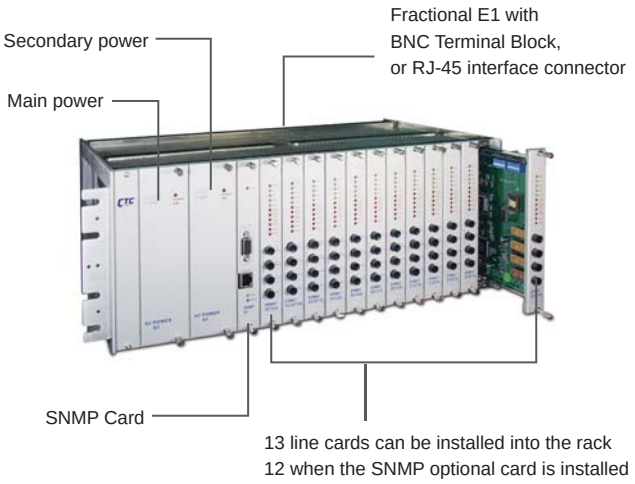
- Supports Fractional E1 and Unframed E1 with EOC control
- Hot swappable cards
- Interface Cards for V35, X21, RS530, RS449, RS232, Ethernet Bridge and Router
- I/O connectors on rear panel
- Multiple clock source selection (Internal or External: E1 recovery, DTE or DCE)
- Supports Console, Telnet,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

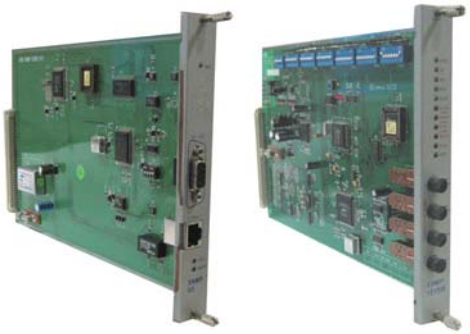
Specifications

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 Consumption	80W
Dimensions (D x W x H)mm	Chassis: 285 x 438 x 180mm 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

Specifications

Ports		
G.703 E1 &Sub-E1 Link :	Frame format :	Unframed/ Framed, CCS(PCM31)/ CAS(PCM30)/ CRC4 on/off
	Bit rate :	2.048Mbps±50 ppm
	Line Code :	AMI/ HDB3
	Receiving level:	0 to -43dB
	Line Impedance:	75 ohm(BNC) / 120 ohm (Molex, RJ-45)
	Jitter Performance :	According to ITU-T G.823
	Pulse amplitude :	Nominal 2.37V ±10% for 75ohm, Nominal 3.00V ±10% for 120ohm Zero amplitude ± 0.1V
	Connector :	BNC for 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 types :	RS-530/RS-449/RS-232, X.21/V.35, 10/100Base-T Ethernet Bridge & Router,
	Connector :	High density DB26 Female
	Line code :	NRZ (except bridge)
	Data Rate:	N x 56Kbps or N x 64Kbps, Where N equal 1 to 24
	Time slot allocation:	User defined
	Control signals:	CTS constantly On, DSR constantly ON, except during test loops, DCD constantly ON or follows RTS, except during signal loss
	Loopback :	Line loopback, Payload loopback, Local loopback, DTE loopback
	Clock modes :	Clock mode 0 (DCE1) Rx & Tx clocks (recovered) to the sync. DTE Clock mode 1 (DCE2) Rx & Tx clocks (internal oscillator) to the sync. DTE Clock mode 2 (DTE1) Rx clock to the sync. Device, Tx clock from the sync. Device Clock mode 3 (DTE2) Rx & Tx clocks from the sync. DCE (from ETC and ERC pin) Clock mode 4 (DTE3) Rx & Tx clocks from the sync. DCE (all from ETC pin)

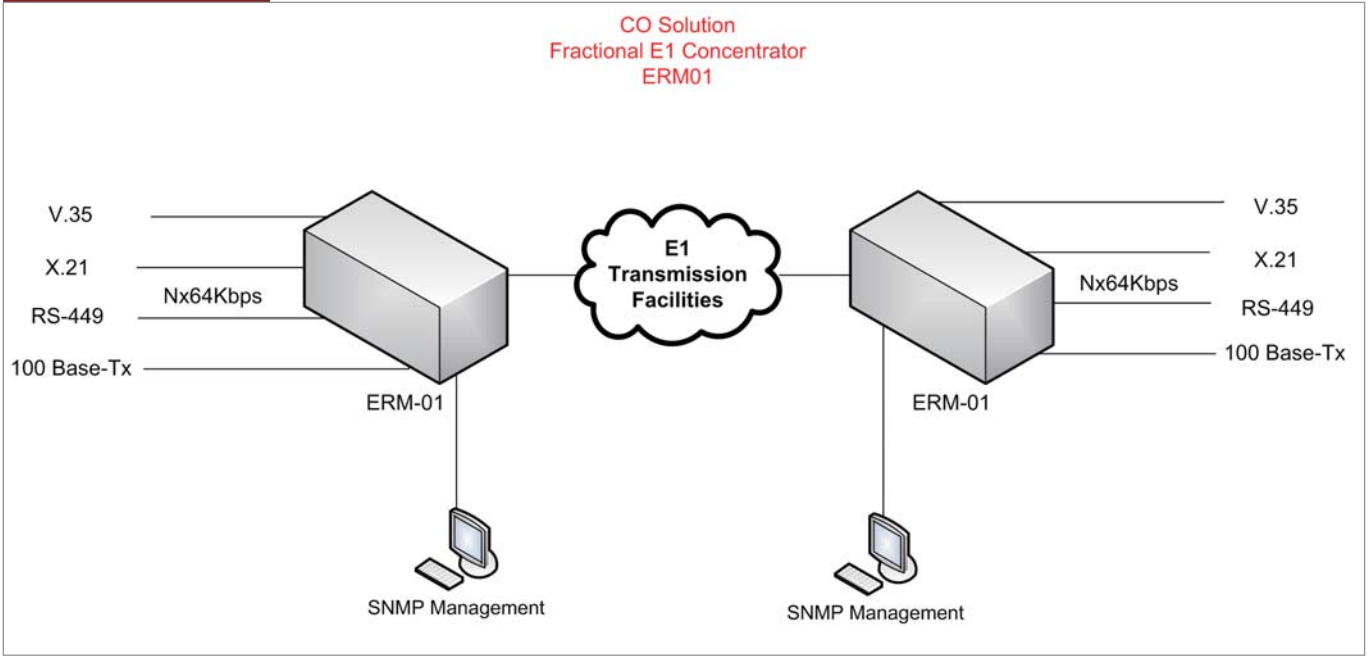




ERM01-SNMP

ERM01-Fractional
E1 Series Line Card

Application



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

Power

- ERM01/AC AC Power module (90 ~ 250 VAC)
- ERM01/DC -48 VDC Power module (-36 ~ -76 VDC)

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

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

E1 CSU/DSU Family

Managed E1 Access Unit

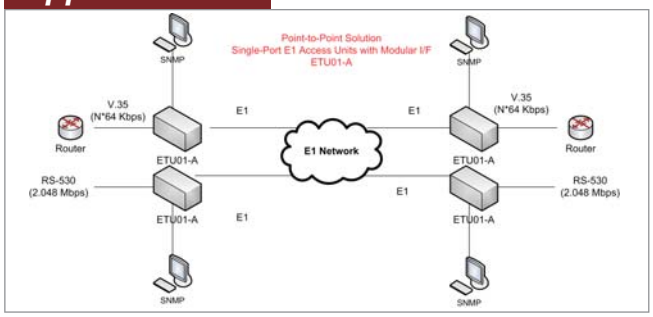
ETU01A

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



Specifications

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 receive level :	0 to -43dB
	Transmit level :	Pulse Nominal 2.37V ±10% for 75ohm
		Amplitude Nominal 3.00V ±10% for 120ohm
		Zero amplitude ±0.1V
	Jitter performance :	According to ITU-T G.823
	Connectors :	BNC(unbalanced), RJ-48(balanced)
	Clock modes :	Clock mode 0 (DCE1) Receive & transmit clock (recovered) to the sync. DTE
		Clock mode 1 (DCE2) Receive & transmit clock (internal oscillator) to the sync. DTE
		Clock mode 2 (DTE1) Receive clock to the sync. and transmit clock from the sync. device
		Clock mode 3 (DTE2) Receive and transmit clock from the sync. DCE (from ETC and ERC pin)
		Clock mode 4 (DTE3) Receive and transmit clock from the sync. DCE (all from ETC pin)I
	Diagnostics :	loopback,Digital remote loopback, Test pattern
LEDs		Power, TD, RD, RTS, DCD, Singal loss, Sync loss, Alarm
Standard		ITU-T G.703/G.704/G.706 & G.732
Power		AC: 90-250VAC ; DC: 18-72 VCD
Power Consumption		10W
Dimensions (D x W x H)mm		250mm x 195mm x 45mm
Weight		1.5kg
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

- ***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)

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-449
RS449 interface module

ETU/TTU-232
RS232 ASYN/SYNC interface module

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

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

E1 CSU/DSU Family

E1 Access Unit

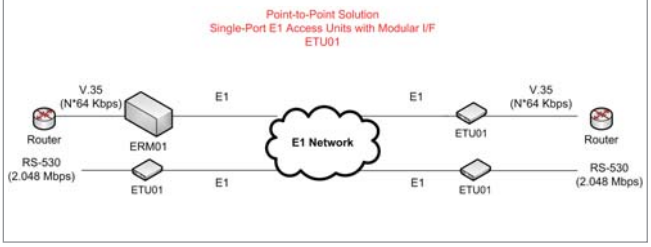
ETU01

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



Specifications

Ports	Framing :	Framed CCS (PCM31) CAS (PCM30) / Unframed CRC4 on/off
G.703 E1 Specifications	Line Code :	AMI/ HDB3
	Relative receive level :	0 to -43dB
	Transmit level :	Pulse Amplitude Nominal 2.37V ±10% for 75ohm Nominal 3.00V ±10% for 120ohm Zero amplitude ±0.1V
	Jitter performance :	According to ITU-T G.823
	Connectors :	BNC(unbalanced), RJ-48(balanced)
	Clock modes :	Clock mode 0 (DCE1) Receive & transmit clock (recovered) to the sync. DTE Clock mode 1 (DCE2) Receive & transmit clock (internal oscillator) to the sync. DTE Clock mode 2 (DTE1) Receive clock to the sync. and transmit clock from the sync. device Clock mode 3 (DTE2) Receive and transmit clock from the sync. DCE (from ETC and ERC pin) Clock mode 4 (DTE3) Receive and transmit clock from the sync. DCE (all from ETC pin)
	Test Switches :	Digital local loopback, Analog local
	Diagnostics :	Digital local and remote loopback, Analog local loopback, Test pattern
LEDs		Power, TD, RD, RTS, DCD, Singal loss, Sync loss, Alarm
Standard		ITU-T G.703/G.704/G.706 & G.732
Power		AC: 90-250VAC ; DC: 18-72 VCD
Power Consumption		10W
Dimensions (D x W x H)mm		250mm x 195mm x 45mm
Weight		1.5kg
Temperature		0~50°C (Operating) ,0~70°C (Storage)
Humidity		10~90% non-condensing
Certification		CE, FCC, RoHS
MTBF		57,000 hours

Ordering Information

- ***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)

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-449
RS449 interface module

ETU/TTU-232
RS232 ASYN/SYNC interface module

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

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

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

E1 CSU/DSU Family
Unframed E1 Access Unit

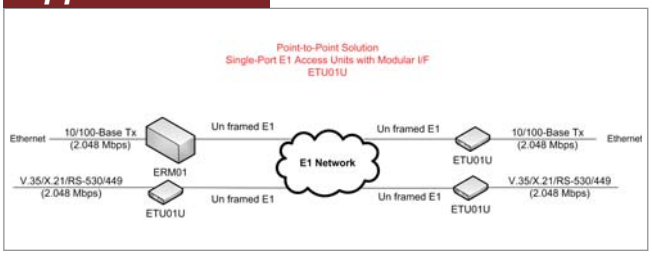
ETU01U

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

Application



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 Amplitude — Nominal 2.37V ±10% for 75ohm; Nominal 3.00V ±10% for 120ohm; Zero amplitude ±0.1V
	Jitter performance :	According to ITU-T G.823
	Connectors :	BNC(unbalanced), RJ-48(balanced)
	Clock modes :	Clock mode 0 (DCE1) Receive & transmit clock (recovered) to the sync. DTE Clock mode 1 (DCE2) Receive & transmit clock (internal oscillator) to the sync. DTE Clock mode 2 (DTE1) Receive clock to the sync. and transmit clock from the sync. device Clock mode 3 (DTE2) Receive and transmit clock from the sync. DCE (from ETC and ERC pin) Clock mode 4 (DTE3) Receive and transmit clock from the sync. DCE (all from ETC pin)
	Test Switches :	Digital local loopback, Analog local
	Diagnostics :	Digital local and remote loopback, Analog local loopback, Test pattern
LEDs		Power, TD, RD, RTS, DCD, Signal loss, Sync loss, Alarm
Standard		ITU-T G.703/G.706 & G.732
Power		AC: 90-250VAC ; DC: 18-72 VCD
Power Consumption		10W
Dimensions (D x W x H)mm		250mm x 195mm x 45mm
Weight		1.5kg
Temperature		0~50°C (Operating) ,0~70°C (Storage)
Humidity		10~90% non-condensing
Certification		CE, FCC, RoHS
MTBF		57,000 hours

Ordering Information

- ***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

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

ETU/TTU-449
RS449 interface module

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

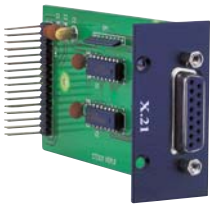
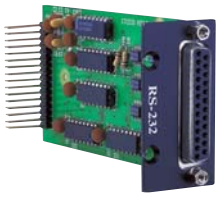
E1/T1 Access Family

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.

I/F	Photo	Description
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
G.703/64		ETU/TTU-G64 G.703 64K co-directional DB15F 64Kbps only
ET100		ETU/TTU-ET100 IEEE802.8u HDLC Bridge, RJ-45 Nx56 / Nx64
ET100R		ETU/TTU-ET100R IEEE802.8u Router HDLC,PPP, cHDLC RJ-45 Nx56 / Nx64

I/F	Photo	Description
V.35		ETU/TTU-V35 ITU-T V.35 MB34F DCE Nx56 / Nx64
X.21		ETU/TTU-X21 ITU-T X.21 DB15F DCE Nx56 / Nx64
RS-232		ETU/TTU-232 EIA RS-232, (V.24) DB25F DCE 64/128kbps Sync 19.2K baud Async
NRZ		ETU/TTU-NRZ NRZ signal 4xBNC data/clk Nx56 / Nx64

E1 CSU/DSU Family
Managed Ethernet over E1

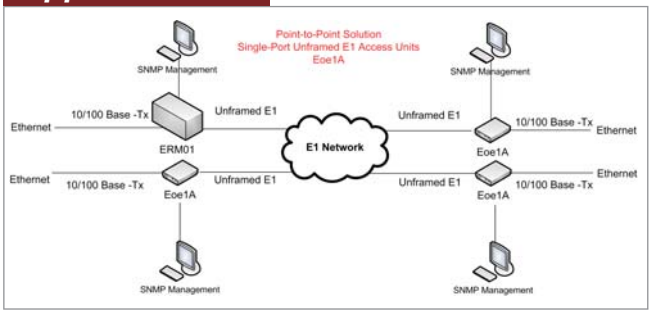
Eoe1A

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

Ports		
G.703 E1 Specifications:	Framing :	Unframed
	Line code :	AMI/ HDB3
	Bit rate :	2.048Mbps (clear channel)
	Relative receive level :	0 to -43dB
	Transmit level:	
	Pulse	Nominal 2.37V ±10% for 75ohm
	Amplitude	Nominal 3.00V ±10% for 120ohm
		Zero amplitude ±0.1V
	Jitter performance :	According to ITU-T G.823
	Connector :	BNC(unbalanced), RJ-48(balanced)
	Clock modes :	
	Clock mode 0 (DCE1)	Receive & transmit clock (recovered) to the sync. DTE
	Clock mode 1 (DCE2)	Receive & transmit clock (internal 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 & Forwarding :	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, Test
Standard		ITU-T G.703, G.706 and G.732 IEEE 802.3/802.3u
Management		Console, Telnet, Web, SNMP
Power		AC: 90-250VAC ; DC: 18-72 VCD
Power Consumption		20W
Dimensions (D x W x H)mm		250mm x 195mm x 45mm
Weight		1.5kg
Temperature		0~50°C (Operating) ,0~70°C (Storage)
Humidity		10~90% non-condensing
Certification		CE, FCC, RoHS
MTBF		57,000 hours

E1 CSU/DSU Family
Ethernet over E1

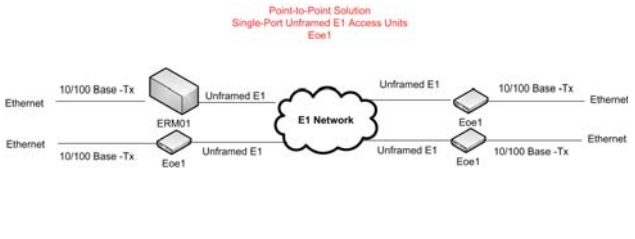
Eoe1

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



Specifications

Ports		
G.703 E1 Specifications	Framing :	Unframed
	Line Code :	AMI/ HDB3
	Bit rate:	2.048Mbps (clear channel)
	Relative receive level :	0 to -43dB
	Transmit level :	Pulse Nominal 2.37V ±10% for 75ohm Amplitude Nominal 3.00V ±10% for 120ohm Zero amplitude ±0.1V
	Jitter performance :	According to ITU-T G.823
	Connectors :	BNC(unbalanced), RJ-48(balanced)
	Clock modes :	Clock mode 0 (DCE1) Receive & transmit clock (recovered) to the sync. DTE Clock mode 1 (DCE2) Receive & transmit clock (internal oscillator) to the sync. DTE
	Control signals :	CTS constantly ON DSR constantly ON, except during test loops DCD constantly ON or follows RTS, except during signal loss
	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 & Forwarding :	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, Test
Standard		ITU-T G.703, G.706 and G.732 IEEE 802.3/802.3u
Power		AC: 90-250VAC ; DC: 18-72 VCD
Power Consumption		20W
Dimensions (D x W x H)mm		250mm x 195mm x 45mm
Weight		1.5kg
Temperature		0~50°C (Operating) ,0~70°C (Storage)
Humidity		10~90% non-condensing
Certification		CE, FCC, RoHS
MTBF		57,000 hours

Ordering Information

- ***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)

E1 CSU/DSU Family

Fractional E1 Access Unit

G703FE1

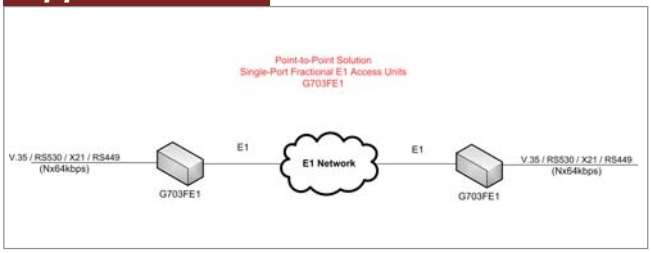
The G703FE1 stand-alone DSU/CSU is a compact, digital access unit for Unframed E1, Fractional E1, or Fractional cascaded E1 service. The G703FE1 data channel supports user-selectable transmission rates via randomly selected E1 timeslots, which provides integral multiples of 64kbps, up to a maximum 2.048Mbps, 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



Specifications

Ports		
G.703 E1 Specifications	Framing :	CAS/CCS, Unframed / Framed
	Line Code :	HDB3
	Bit rate:	2.048Mbps
	Relative receive level :	0 to -43dB
	Transmit level : Pulse Amplitude	Nominal 2.37V ±10% for 75ohm Nominal 3.00V ±10% for 120ohm Zero amplitude ±0.1V
	Jitter performance :	According to ITU-T G.823
	Connectors :	BNC(unbalanced), RJ-48(balanced)
	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 (D x W x H)mm		175mm x 99mm x 28mm
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

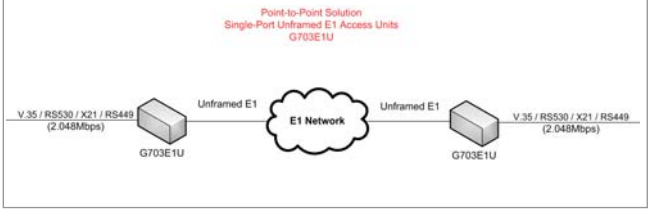
G703E1U

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 El 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

Application



Specifications

Ports		
G.703 E1 Specifications	Framing :	Unframed
	Line Code :	HDB3
	Bit rate:	2.048Mbps
	Relative receive level :	0 to -43dB
	Transmit level : Pulse	Nominal 2.37V ±10% for 75ohm
	Amplitude	Nominal 3.00V ±10% for 120ohm
		Zero amplitude ±0.1V
	Jitter performance :	According to ITU-T G.823
	Connectors :	BNC(unbalanced), RJ-48(balanced)
	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		E1 signal, timing loss
Standard		ITU-T G.703, G.706 and G.823
Power		DC 9V in
Power Consumption		4W
Dimensions (D x W x H)mm		135mm x 79mm x 28mm
Weight		180g
Temperature		0~50°C (Operating) ,0~70°C (Storage)
Humidity		10~90% non-condensing
Certification		CE, FCC, RoHS
MTBF		57,000 hours

Ordering Information

- ***G703E1U*** Data port to unframed E1

E1 Access Multiplexer Family

Managed Multi-Service E1 Multiplexer

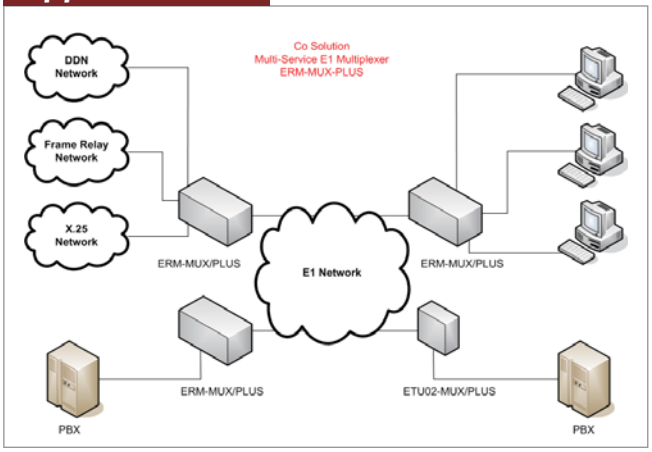
ERM-MUX/Plus

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
- Console, NMP, SNMP and Web based management

Application



Low-speed Cards

- ERM-MUX-Plus-ASYNC 6 channels RS-232 interface card (V1.2)
  Low speed: 128kbps Sync(2x64kbps)
  <=38.4kbps Async
- ERM-MUX-Plus-X50 5 channels RS-232(V24) interface card
  Low speed: 2.4K ~ 19.2K Sync or Async
- ERM-MUX-Plus-G64K 4 channels G.703 64kbps Co-Directional interface card(V1.1)

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)

Chassis Specifications

4U 19(23)"
10 I/O slots

Power	AC 90 ~250VAC	
	DC -48VDC	
Environment	Temperature	0 ~ 60C (operating)
		0 ~ 70C (storage)
	Humidity	0 ~ 90% non-condensing
Power Consumption		<150W
Dimensions (WxDxH)		350 x 438 x 176mm
Weight	8kg (chassis+dual power+8 I/O cards)	
	450g per card	
Certification	CE	

Ordering Information

Chassis

- 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)
- ERM-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

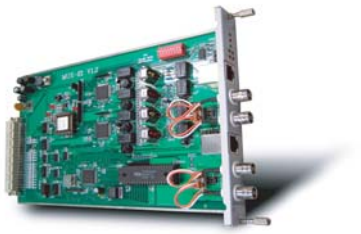
- ERM-MUX-Plus-SNMP(3) SNMP daughter board (V2.2) for Web, Telnet and SNMP management

Voice Cards *[Hot swappable & requires Power module with Voice support]*

- ERM-MUX-Plus-FXO 6 channels FXO interface card (V2.1)
- ERM-MUX-Plus-FXS 6 channels FXS interface card (V.2.3)
- ERM-MUX-Plus-E&M 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)

High-speed card

- ERM-MUX-Plus-HS-SERIAL 4 Channels V.35/X.21 / RS-449 / RS-530 (cable selected) interface card(V1.0) (Nx64kbps)



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	CRC4 on/off
Bit rate	2.048Mbps±0 ppm
Line code	AMI / HDB3
Line impedance	75 ohm(BNC) / 120 ohm(DB-15, RJ-45)
Relative receive level	0 to -43dB
Transmitter driver reach	1.5Km
Pulse amplitude	Nominal 2.37V ±10% for 75ohm Nominal 3.00V ±10% for 120ohm
Zero amplitude	±0.1V
Transmit frequency	Internal timing ±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

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 RJ-45 x 6
- On-hook resistance > 100K ohms
- 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

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

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

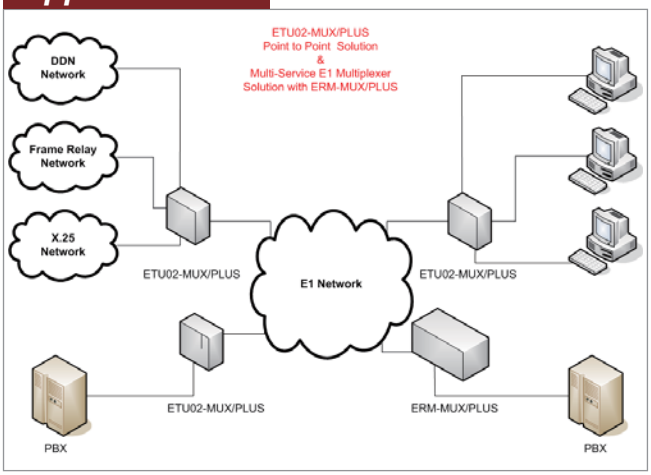
  (Internal or External: E1 recovery, DTE or DCE)

  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 (D x W x H)mm	235mm x 438mm x 45mm
Weight	2.9kg
Temperature	0~50°C (Operating) ,0~70°C (Storage)
Humidity	10~90% non-condensing
MTBF	57,000 hours

Application



Ethernet bridge

- 2 independent channels , Ethernet bridge interface

  10/100Base-TX bridge

  Auto-Negotiation

  Auto MDI/MDIX

  Forward 1522 bytes (Max.) packets

  Supports IEEE 802.1q Tag VLAN pass thru

  Support flow control (Pause)
- 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

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***

ETU02-Mux-Plus-Sub E1	E1 + Sub E1 moduleTrunk Module with One 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-prt 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

X.50 card

Specifications

- Interface types — RS232
- 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
- Line code — ITU-T G.703/64K, Co-directional
- Data rate — 64kpbs±100ppm x 2 channels
- 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 — NRZ
- 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 — ±0.1V
- Transmit frequency — Internal timing±30 ppm
- Tracking — Recovery timing±50 ppm
- External — timing±100 ppm
- Jitter performance — According to ITU-T G.823
- Compliance — ITU G.703, G.704, G.706, G.732

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
- Connector — HD68F with cable adapter
- 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 — -48
- 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 — RJ-45*4
- Impedance — 600 ohms
- Level Gain — On Tx side 0 dB — On Rx side -3.5dB
- Ring current impedance — > 7.5k ohms
- Direct current resistance — < 300 ohms
- Maximum direct current borne — > 70V

E1 Access Multiplexer Family

Managed 4 port Fractional E1 Access Multiplexer

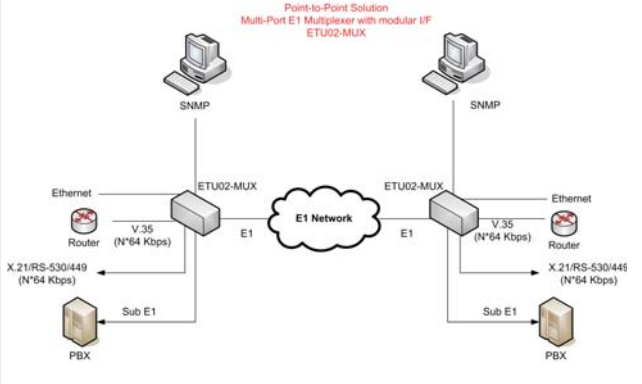
ETU02-MUX

The ETU02-MUX is a 1U 19(23)" 4 slot 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 an LCD display and LED status indicators located on the front panel or via a serial console port. These features enable users to easily configure the unit, execute the in-service diagnostics and monitor the network status. The ETU02-MUX provides for optional SNMP Network Management System, which allow the user to remotely control and manage the system via SNMP protocol. 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 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



Specifications

Ports	Framing Framed: Unframed / Framed CCS(PCM31)/ CAS(PCM30)
E1 and Sub-E1	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 level	Pulse amplitude : Nominal 2.37V ±10% for 75ohm Nominal 3.00V ±10% for 120ohm
	Zero amplitude : ±0.1V
	Transmit frequency Internal timing±100 ppm
	Tracking : Recovery timing±100 ppm
	External timing±100 ppm
	Jitter performance According to ITU-T G.823
	Return loss : 12dB for 51 ~ 102KHz 18dB for 102 ~ 2048KHz 14dB for 2048 ~ 3072KHz
	Interface connector : 15-pin D-type F, BNC
User Data Channel	Data rate : Nx56Kbps or Nx64Kbps
	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 modes	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 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)
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 (D x W x H)mm	235mm x 438mm x 45mm
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

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 ~ -75 VDC
- ***ETU02- Mux 4-DC***
  E1 Mux with 4 data ports, LCD panel display, SNMP, -36 ~ -75 VDC
- ***ETU02- Mux 2-AD***
  E1 Mux with 2 data ports, LCD panel display, SNMP, -18 ~ -36 VDC, 90 ~250V
- ***ETU02- Mux 4-AD***
  E1 Mux with 4 data ports, LCD panel display, SNMP, -18 ~ -36 VDC, 90 ~250V

E1 Access Multiplexer

4 port Fractional E1 Access Multiplexer

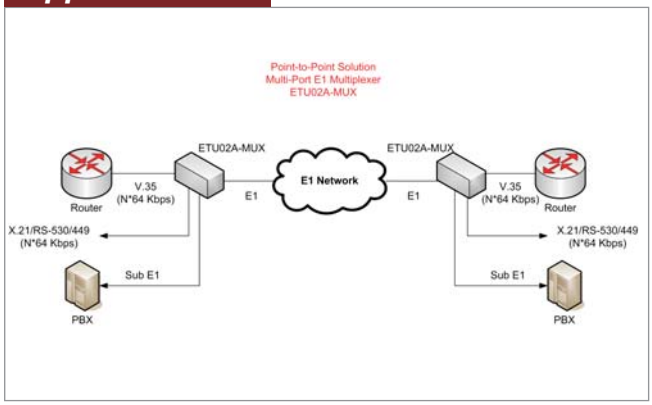
ETU02A-MUX

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)

Application



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 impedance :	75 ohm(BNC) / 120 ohm(DB-15, RJ-45)
	Relative receive level :	0 to -43dB
Transmitter level	Pulse amplitude :	Nominal 2.37V ±10% for 75ohm Nominal 3.00V ±10% for 120ohm
	Zero amplitude :	±0.1V
	Transmit frequency	Internal timing±100 ppm
	Tracking :	Recovery timing±100 ppm
	External timing±100 ppm	
	Jitter performance	According to ITU-T G.823
	Return loss :	12dB for 51 ~ 102KHz 18dB for 102 ~ 2048KHz 14dB for 2048 ~ 3072KHz
	Interface connector :	15-pin D-type F, BNC
User Data Channel	Data rate :	Nx56Kbps or Nx64Kbps
	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 modes	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 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 (D x W x H)mm	235mm x 438mm x 45mm	
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	

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
- ***ETU02A-Mux 2-AD*** 1U, 19" E1 Mux with 4 data ports, -18 ~ -72 VDC and 90 ~250VAC

E1 Access Multiplexer Family

Managed 1 port plus Ethernet Fractional E1 Access Multiplexer

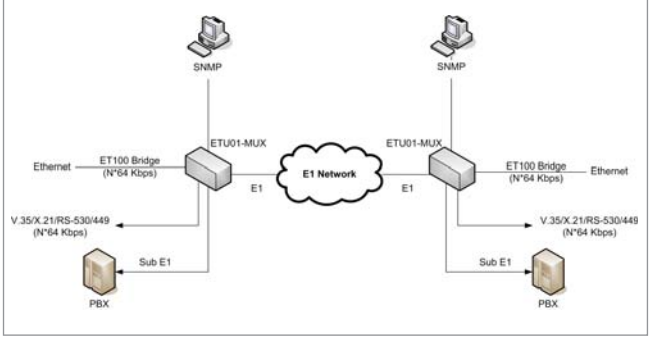
ETU01-MUX

The ETU01-MUX is a 1U half 19" single slot stand-alone or rack mountable multiplexing solution for Fractional E1 network services. One DTE device plus Bridged Ethernet may be linked to this model at data rates of 64Kbps to 2048Kbps. There is also provision for one E1 sub-link which will perform drop & insert with user-defined timeslot connections from a PABX or other E1 equipment to E1 network services. This fractional E1 multiplexer supports local control and diagnostics via an LCD display and LED status indicators located on the front panel or via a serial console port. These features enable users to easily configure the unit, execute the in-service diagnostics and monitor the network status. The ETU01-MUX provides SNMP Network Management System, which allow the user to remotely control and manage the system via SNMP protocol. 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 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
V.35 interface module

ETU/TTU-X21
X.21 interface module

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

ETU/TTU-232
RS232 ASYN/SYNC interface module

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

ETU/TTU-449
RS449 interface module

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

ETU/TTU-ET100
10/100Base-TX Ethernet 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 impedance : 75 ohm(BNC) / 120 ohm(DB-15, RJ-45)	
	Relative receive level : 0 to -43dB	
Transmitter level	Pulse amplitude : Nominal 2.37V ±10% for 75ohm Nominal 3.00V ±10% for 120ohm	
	Zero amplitude : ±0.1V	
	Transmit frequency Internal timing±100 ppm	
	Tracking : Recovery timing±100 ppm	
	External timing±100 ppm	
	Jitter performance According to ITU-T G.823	
	Return loss : 12dB for 51 ~ 102KHz 18dB for 102 ~ 2048KHz 14dB for 2048 ~ 3072KHz	
	Interface connector : 15-pin D-type F, BNC	
User Data Channel	Data rate : Nx56Kbps or Nx64Kbps	
	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 modes	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 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)	
Ethernet Specifications	Connector RJ-45 x port	
	Data Rate 10/100Mbps; Ethernet bridge	
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	20W	
Dimensions (D x W x H)mm	250mm x 195mm x 45mm	
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	

E1 Inverse Multiplexer Family

E1 Inverse Multiplexer Concentrator

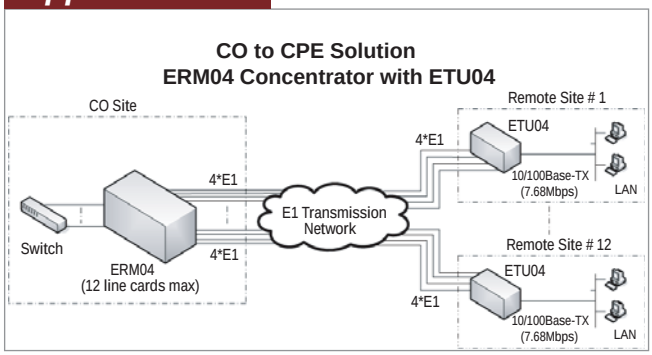
ERM04

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

Application



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 sensitivity : -43dB
		Line impedance: 75 ohm(BNC) / 120 ohm(RJ-45)
		Jitter performance: complies with ITU-T G.823
		Pulse amplitude Nominal 2.37V ±10% for 75ohm Nominal 3.00V ±10% for 120ohm
		Delay Variance: 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 aging duration: 5 ~ 10 minutes
		MAC address: 1024
		Delay: 1 frame
		Connector: RJ45
		Frame size: 64 ~1522bytes
		Console Interface: 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 ~240V, DC: -40 ~-57VDC
Power Consumption		80W
Dimensions (D x W x H)mm		285 x 438 x 177mm
Weight		6.6kg
Temperature		0~50°C (Operating) ,0~70°C (Storage)
Humidity		10~90% non-condensing
MTBF		57,000 hours

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 — AC Power module, 90 ~ 240VAC
- ERM04-DC — -48 VDC Power module, -36 ~76 VDC

Management

- ERM04-SNMP — SNMP card with both interfaces: RS-232 and 10Base-T

Optional Line card

- ERM04-4E1/Eth — 10/100Mbps Ethernet to 4E1 card

E1 Inverse Multiplexer Family

E1 Inverse Multiplexer

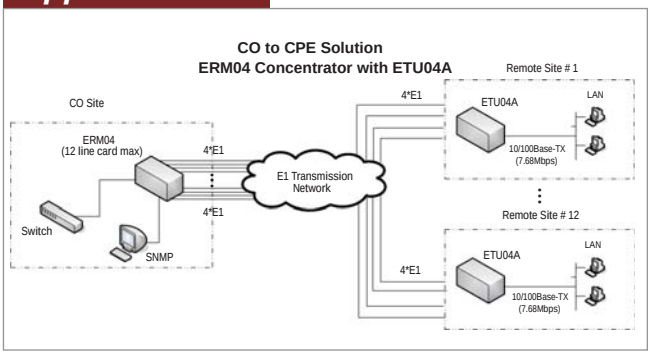
ETU04A

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

Application



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 sensitivity :	-43dB
	Line impedance:	75 ohm(BNC) / 120 ohm(RJ-45)
	Jitter performance:	complies with ITU-T G.823
	Pulse amplitude	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 ~-57VDC
Power Consumption		10W
Dimensions (D x W x H)mm		235 x 195 x 45mm
Weight		1.5kg
Temperature		0~50°C (Operating) ,0~70°C (Storage)
Humidity		10~90% non-condensing
MTBF		57,000 hours

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

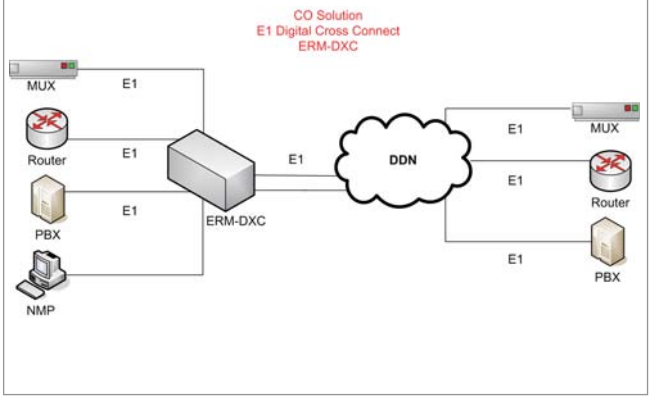
ERM-DXC

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

Ports	*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
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)
Humidity	10~90% non-condensing
MTBF	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 EI 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 128k RS530/449/232/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

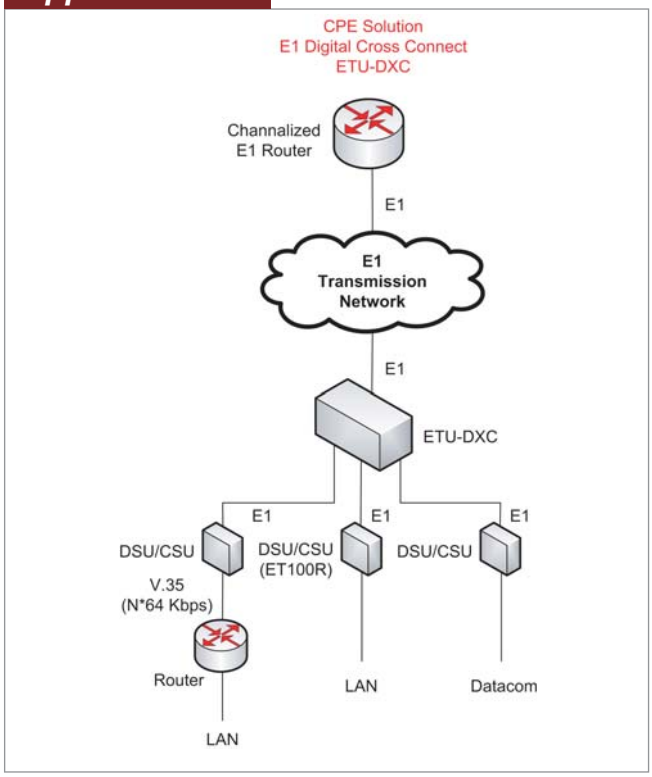
ETU-DXC

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 level:	-20 / -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
	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: 100~240VAC	DC: -18 ~72VDC
Power Consumption	20W	
Dimensions (D x W x H)mm	235 x 430 x 45mm	
Weight	2.5kg	
Temperature	0~50°C (Operating) ,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

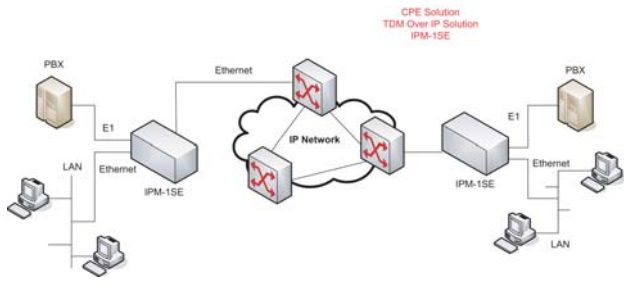
IPM-1SE

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

Ports	Ethernet
	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 (D x W x H)mm	235 x 195 x 45mm
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 ~ -72 V

G.703/64K Family

G.703 Co-directional 64K Concentrator

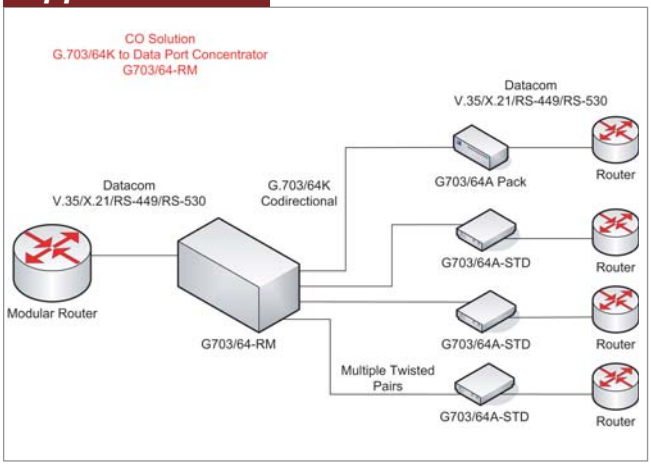
G703/64-RM

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

Application



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, RS449, 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, Timing, Err, Test
Standard	ITU-T G.703, G.823
Power	AC: 90 ~ 250 VAC DC: -36 ~ -76 VDC
Power Consumption	80W
Dimensions (D x W x H)mm	285 x 438 x 180mm
Weight	6.6kg
Temperature	0~50°C (Operating) ,0~70°C (Storage)
Humidity	10~90% non-condensing
Certification	CE, FCC
MTBF	57,000 hours

13 line cards can be installed into the rack
12 when the SNMP optional card is installed

G703/64-RM-SNMP

G703/64-RM
co-directional Line Card

Interface Cable Adapters

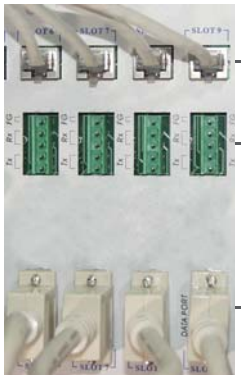
CAB-HD26MB34M-V35
CAB-HD26MB34F-V35

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

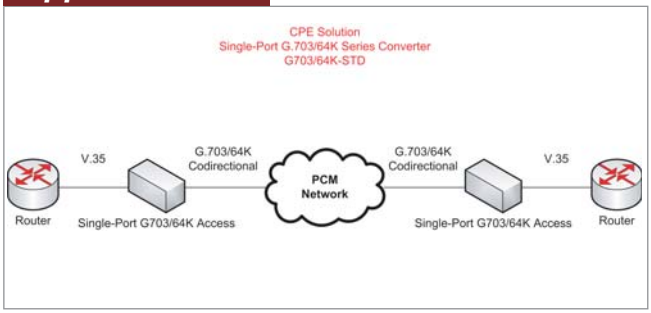
G703/64A-STD

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



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 (D x W x H)mm	235 x 195 x 45mm
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

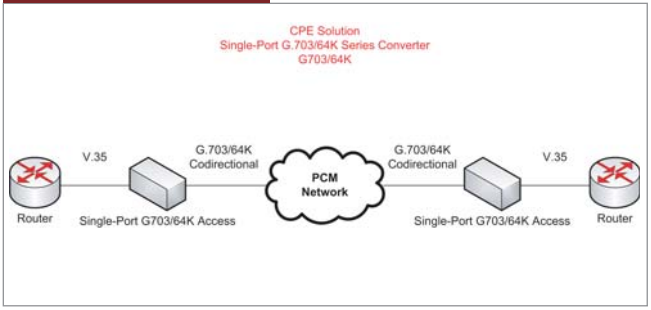
G703/64A

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

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: 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 (D x W x H)mm	135 x 79 x 30mm
Weight	180g
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-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

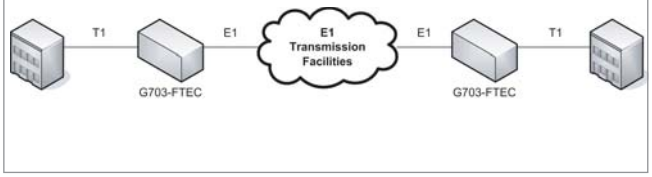
G703FTEC

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



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 (D x W x H)mm	235 x 195 x 45mm
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

- ***G703FTEC-AC*** E1 T1 converter with AC, 90 ~ 250VAC
- ***G703FTEC-DC*** E1 T1 converter with DC, -36 ~ -72VDC

E1/T1 Access Family

E1/T1 Repeater

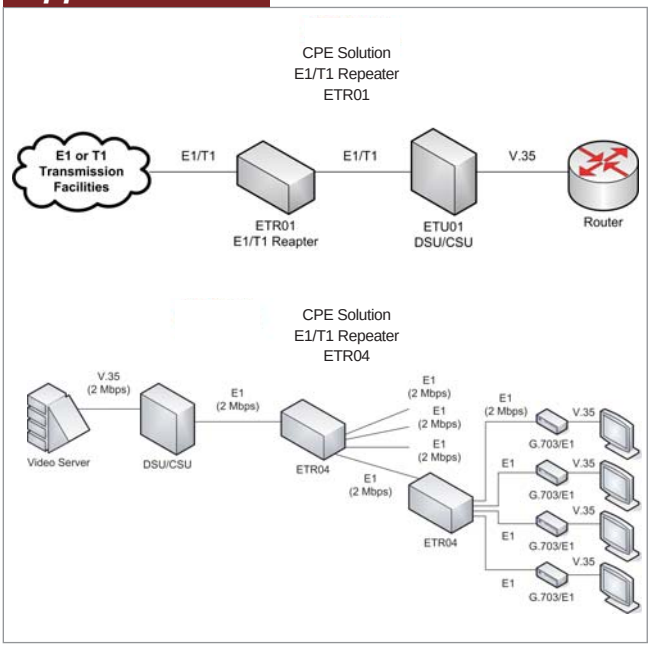
ETR01 / ETR04

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	*E1 interface*
	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 (D x W x H)mm	235 x 195 x 45mm
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

- ***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

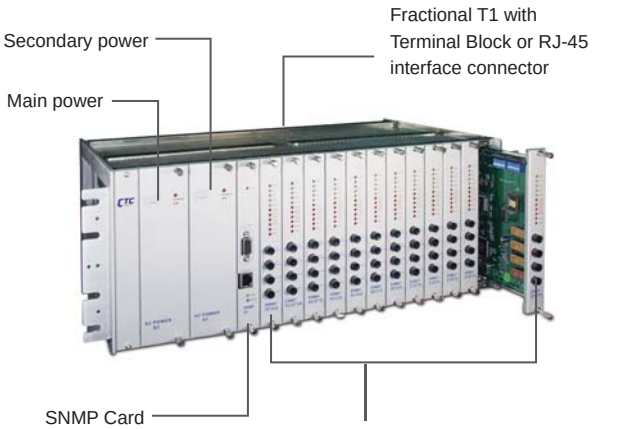
TRM01-SNMP	SNMP card with RS-232 and 10Base-T

Optional T1 cards for ERM01 series

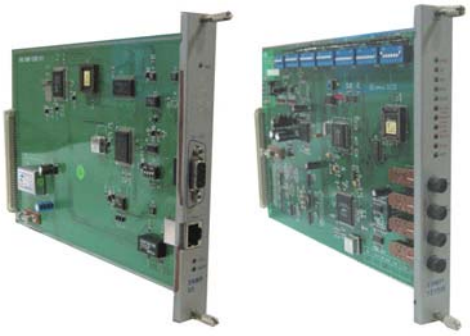
TRM01-V35	Fractional T1(N56) to V.35 card
TRM01-X21	Fractional T1(N56) to X21 card
TRM01-RS530	Fractional T1(N56) to RS530 card
TRM01-RS449	Fractional T1(N56) to RS449 card
TRM01-RS422	Fractional T1(N56) to RS422 card
TRM01-RS232	Fractional T1(N56) to RS232 card
TRM01-ET100	Fractional T1 to 10/100Base-Tx 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 & Router 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 (D x W x H)mm	Chassis: 285 x 438 x 180mm 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



13 line cards can be installed into the rack
12 when the SNMP optional card is installed



TRM01-SNMP

TRM01-Fractional
T1 Series Line Card

Interface Cable Adapters

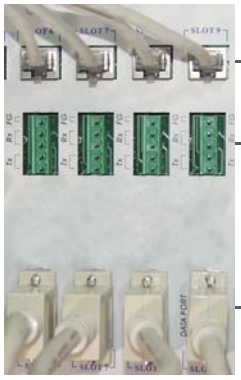
CAB-HD26MB34M-V35
CAB-HD26MB34F-V35

CAB-HD26DB25M-530
CAB-HD26DB25F-530

CAB-HD26DB37M-449
CAB-HD26DB37F-449

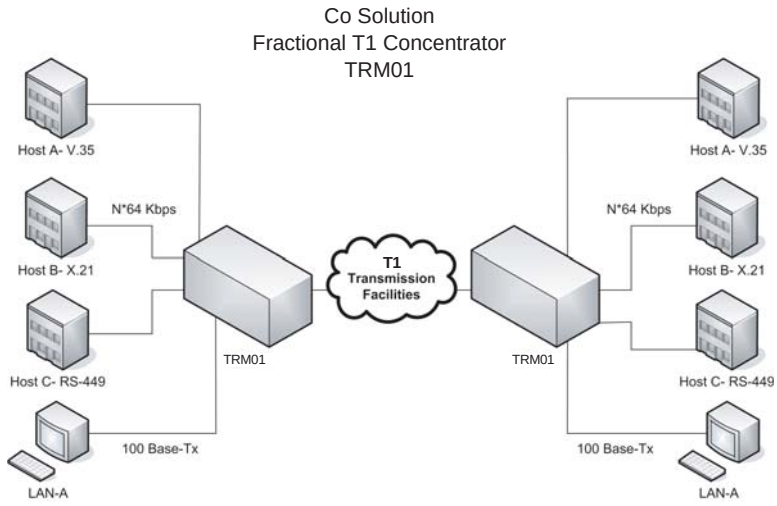
CAB-HD26DB15M-X21
CAB-HD26DB15F-X21

CAB-HD26DB25M-232
CAB-HD26DB25F-232



Rear Panel Connections

Application



T1 Access Family
Fractional T1 Access Unit

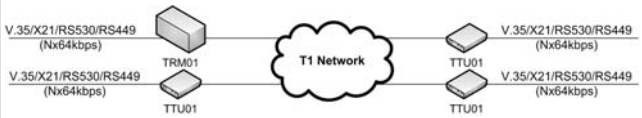
TTU01

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

Application



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 (D x W x H)mm	Chassis: 255 x 195 x 45mm
Weight	1.5kg
Temperature	0~50°C (Operating) ,0~70°C (Storage)
Humidity	10~90% non-condensing
Certification	CE, FCC, RoHS
MTBF	57,000 hours

Ordering Information

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

T1 Access Multiplexer

4 port Fractional T1 Access Multiplexer

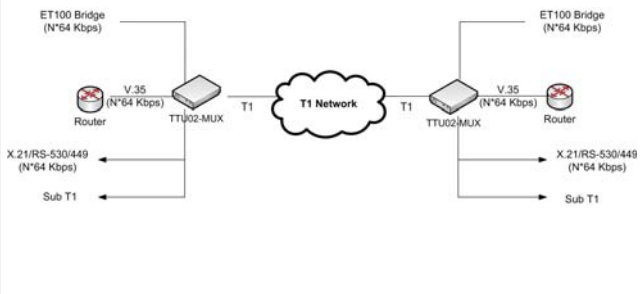
TTU02-MUX

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)

Application



Specifications

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
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 (D x W x H)mm	Chassis: 235 x 430 x 45mm
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

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 (WxDxH):	Balun-B2/S , Balun-B2/S-2 4.4cm x 5.4cm x 2.5cm Balun-B1 2.2cm x 5.6cm x 2.1cm Balun-P/S , Balun-P/S-2 2.2cm x 22.4cm x 2.1cm
Weight :	Balun-B2/S , Baluln-B2/S-2 35g Balun-B1 65g Balun-P/S , Balun-P/S-2 45g
Compliance :	ITU G.703 standard pulse

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 (WxDxH):	BLN3010/4010 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

Type	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

IP 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, SP = Surge Protector

Interface	Model Name	Description	Type	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 Mile Family				
2/4/8-wire EFM (5.7/11.4/22.8Mbps)				
5.7Mbps Ethernet Bridge	NEW 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	NEW SHDTU03b-ET100BS	2-wire, 4-port LAN extender	S	130
G.SHDSL LAN Extender				
2.3Mbps Ethernet Bridge	NEW 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	C	133
G.703 Co-directional	NEW ET100/G64	Stand-alone Ethernet to G.703 Co-direcctional 64K bridge	S	134
NRZ	NEW 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

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.

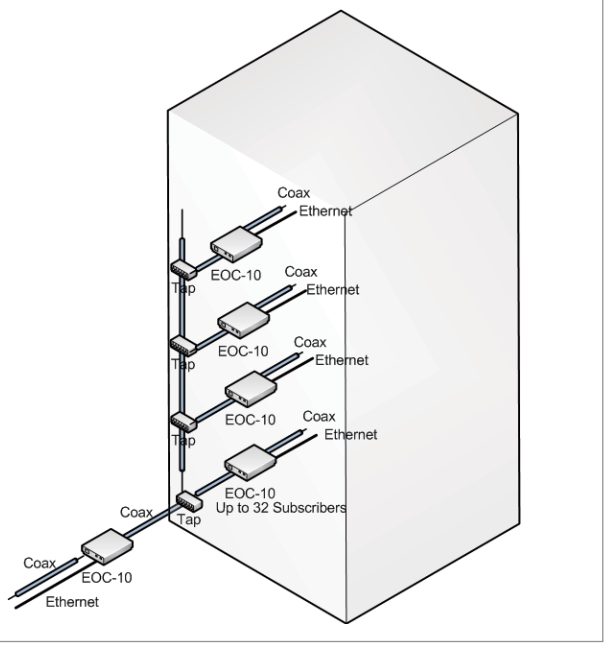
Features

- 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 Connectors, One for EoCNA, the other for TV
	Protocol Transparent to higher layer protocols
	Transmission Power and Spectrum 8 ±1 dBm, 12~28 MHz
	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 (D x W x H)mm	83 x 138 x28mm
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

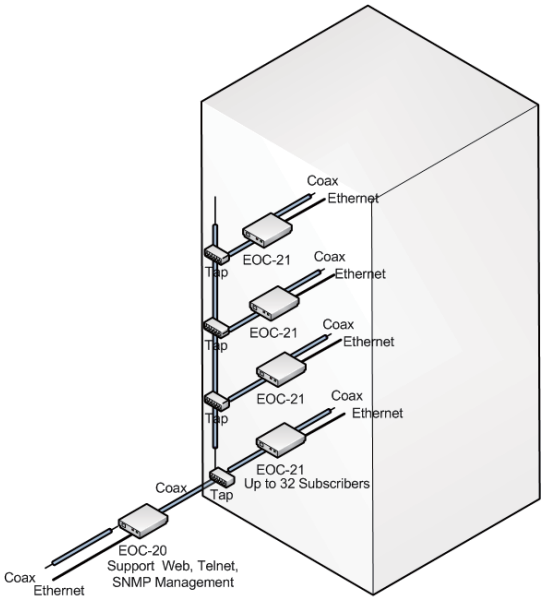
EOC-20, EOC-21

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

Application



Specifications

Ports	Fast Ethernet Interface 10/100 Mbps, RJ45
	Coax Interface Two F-Type Female Coax Connectors，One for EoCNA，the other for TV
	Protocol Transparent to higher layer protocols
	Transmission Power and Spectrum 8 ±1 dBm, 12~28 MHz
	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 (D x W x H)mm	83 x 138 x28mm
Weight	330g
Temperature	0~50°C (Operating) ,0~70°C (Storage)
Humidity	10~90% non-condensing
Certification	CE, FCC, RoHS
MTBF	35,000 hours

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

EFM-10, EFM-20, EFM-40

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

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

Specifications

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, 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 (D x W x H)mm	168 x 195 x 48mm
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

LAN Extender Family

G.SHDSL.bis 5.7Mbps LAN Extender (4 port bridge)

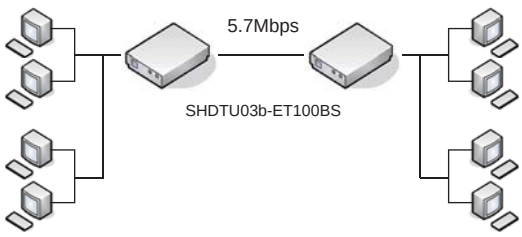
SHDTU03b-ET100BS

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

Application



Specifications

Ports	Line coding: 16 TC-PAM or 32 TC-PAM
WAN Interface	Line rate: 192Kbps ~ 5696Kbps
	Annex A, Annex B and Annex F selectable
LAN Interface	10/100Base-TX, RJ45
	Data rate: 192Kbps ~ 5696Kbps
	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 (2004), IEEE802.3, 802.3u, 802.1Q, 802.1D
Power	DC 5V via AC switching adapter
Power Consumption	3.5W
Dimensions (D x W x H)mm	130 x 161 x 28.8 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

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

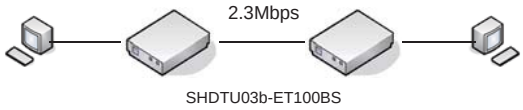
SHDTU03-ET100B

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

Application



SHDTU03b-ET100BS

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 (D x W x H)mm	130 x 161 x 28.8 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

Ordering Information

- ***SHDTU03-ET100B*** G.SHDSL 2.3Mbps LAN Extender, AC power required

LAN Extender Family
VDSL2 LAN Extender

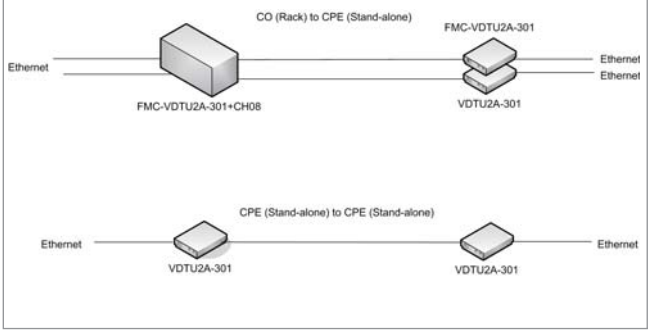
VDTU2A-301

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

Application



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 (D x W x H)mm	97 x 73 x 23mm
Weight	80g
Temperature	0~50°C (Operating) ,0~70°C (Storage)
Humidity	10~90% non-condensing
Certification	CE, FCC, RoHS
MTBF	50,000 hours

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.

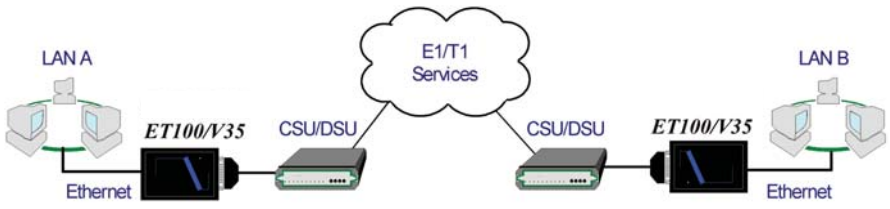
Features

- 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

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 (D x W x H)mm	135 x 79 x 25mm
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

The ET100/G64 Network Bridge is a high performance remote, self-learning, Ethernet bridge. Its compact size and low cost makes it ideal for cost-sensitive bridging applications, or as a LAN extender or segmenter over legacy 64Kbps co-directional bit stream type infrastructures. Multiple clock source settings including a built-in 64Kbps timing clock generator makes it easy to connect to other 64Kbps G.703 co-directional data equipment, making this unit's connection between 10Base-T or 100Base-TX LANs convenient.

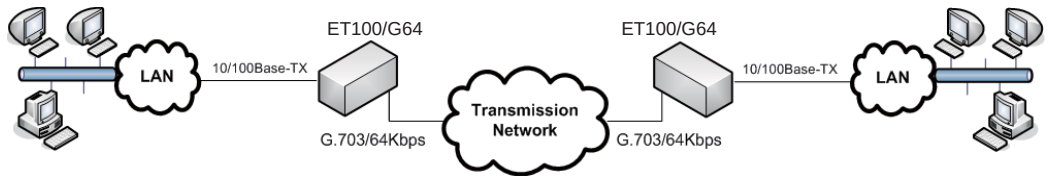
Features

- 10/100Base-TX, Full Duplex or Half Duplex
- Auto MDI/MDIX
- IEEE 802.3x flow control
- Real-time filtering with 256 MAC address tabl
- Auto address learning, aging and detection after 5 mins
- up to 340 packet-buffering capacity
- Built-in nx64K / nx56K timing clock generator for WAN link

Specifications

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 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 (D x W x H)mm	235 x 195 x 45mm
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/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.

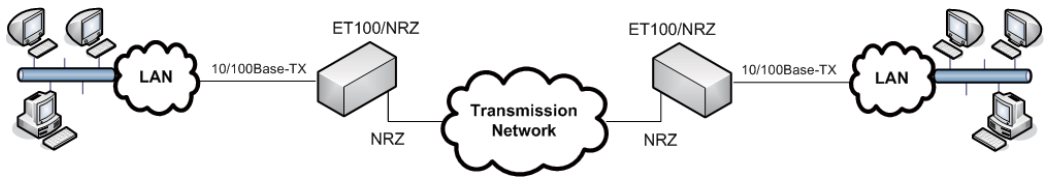
Features

- 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 (D x W x H)mm	235 x 195 x 45mm
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

Ethernet Family
Fast Ethernet Surge Protector

SP-SE-R01

SP-RE-R01-8


SP-RE-R08


SP-RE-R16


SP-RE-R24

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 (D x W x H)mm	SP-SE-R01: 85 x 55 x 24 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

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

Protocol Analyzer Family

V.35/X.21/RS530/RS449/RS232	HCT-6000	Datacom protocol and BER tester	H	143

PCM Analyzer Family

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

LAN Cable Tester Family

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

Fiber Tester Family
Optical Time Domain Reflector

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 width	30ns, 100ns, 275ns, 1μs, 2.5μs	
Measurement Time	15s, 30s, 1min, 2min, 3min	
Attenuation Deadzone	25m	
Event Deadzone	10m	
Sampling Range	1m ~ 10m	
Distance Measure Accuracy	±(1m + 5x10-5 x Distance + sampling space)	
Attenuation Detect Accuracy	±0.05dB/ dB	
Reflection Detect Accuracy	±4dB	
Data Storage	300 test traces	
Data Interface	RS-232 and USB port	
Power	1600mA/ h AC adapter (internal NiMH rechargeable battery)	
Environmental	Temperature	-10~50°C (Operating) -20~65°C (Storage)
	Humidity	0 ~ 95% non condensing
Dimensions(WxDxH)	196 x 100 x 60mm (W x D x H)	
Weight	870g	

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

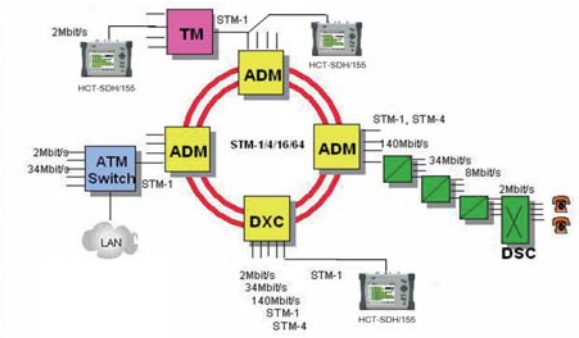
The HCT-SDH/155 transmission analyzer is a handheld, graphic color LCD touch screen, SDH/PDH measuring instrument designed for field use in analysis and maintenance of STM-1(155Mbps) and E1(2.048 Mbps) lines. The HCT-SDH/155 has both optical and electrical ports for evaluation and analysis of SDH and 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

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 (D x W x H)mm	100x 196 x 60mm
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

I/F Module

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-Ion battery. The unit includes the Basic Interfaces, basic operational firmware, comprehensive User Guide, universal AC power adapter (100~240 VAC) and a sturdy hard shell carry case.

Features

- E1, Datacom, Protocol Analyzer and BERT
- Protocols: Frame Relay, SS#7, X.25, PPP (Sync.), V5.1. V5.2, ISDN-D, Sync (BSC), HDLC, SDLC, Async
- Dual pluggable interface ports with available modules:
  Datacom Module: RS-232C/D (V.24), RS-449 (V.36), RS-530, X.21, V.35
  E1 Module: G.703 E1 (2048K)
- Supports Centronics printer & control serial port.
- LCD Display: 320x240 graphic (30 lines x 40 characters), with backlight
- Auto Configuration
- Menu driven setup
- ASYNC terminal Emulation
- File Management
- Self Tests and Diagnostics
- Display Modes: Full /Half Duplex Data, Frame / Packet and Lead Status
- Error Check: None, Parity, LRC, CRC-16, CRC-CCITT.
- Capture Buffer: SDRAM
- Line Monitor: DTE; DCE; DTE & DCE
- Emulation: DTE; DCE; MONITOR only
- Counters & Timers: 5 each internal counters and timers.
- MUX/DEMUX BERT (E1 & Datacom BERT)

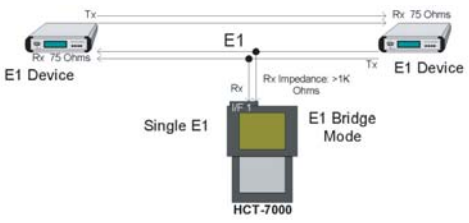
Specifications

Ports	Data Rate: Async (50 ~ 256Kbps), Sync(150 ~ 2048Kbps)
	Data Code: ASCII, EBCDIC, HEX, IPARS, Transcode, EBCD
	Data Length: ASYNC Mode: 5,6,7, or 8 bits SYNC Mode: 8 bits
	Parity Bit: ASYNC Mode:None, Odd, Even, Mark, Space.
	Stop Bits: ASYNC Mode: 1, 2
	E1 I/F Module: Signal Present, HDB3, Signal Loss, FAS Loss, AIS, RAI, MRAI, MFAS Loss, CAS Loss, Pattern Loss, Excess Zero, Error.
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

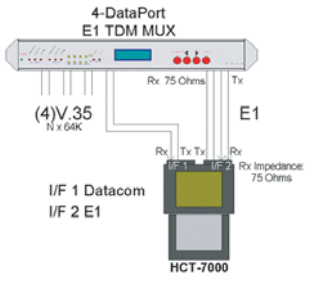
Application

■ ***E1 Terminal Mode***

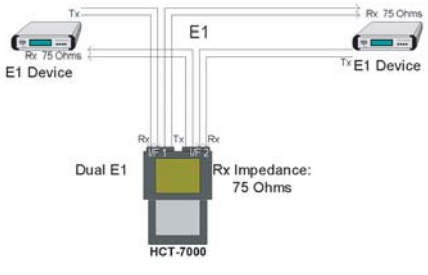
■ ***E1 Bridge Mode***



■ ***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^{-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

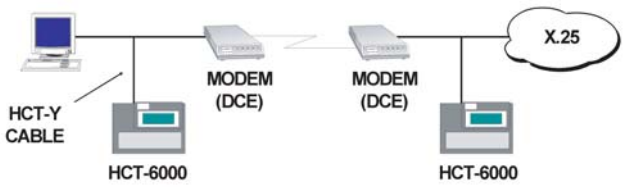
HCT-6000

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

Application



Specifications

Ports	Basic Interfaces: RS-232C/D(V.24), RS-449(V.36), RS-530, X.21,V.35, printer port, remote control port (RS-232 async)
	Protocols: ASYNC, SYNC(BSC), HDLC, SDLC, X.25, DDCMP
	Optional software: Frame Relay, PPP/SLIP, SNA ROM, G.826, Frame Relay, PPP/SLIP, SNA ROM, G.826,
	Data rate: ASYNC:50-115,200bps, SYNC:150-128,000bps
	Data code: ASCII, EBCDIC, HEX, IPARS, TRANSCODE, EBCD
	Data Length: ASYNC Mode: 5,6,7, or 8 bits, SYNC Mode: 8 bits
	Parity Bit: ASYNC Mode: None, Odd, Even
	Stop Bits: ASYNC Mode: 1, 1 1/2, 2
	Display Mode: LSB or Inverted, Normal or Inverted, Full/Half Duplex, Data and Lead Status, Frame and Packet
	Error Check: None, Parity, LRC, CRC-16, CRC-CCITT
	LCD Display: 8 lines, 32 characters per line, with backlight and contrast controls
	Capture Buffer: 512KB static ram, battery backed up.
	Line Monitor: DTE; DCE; DTE & DCE
	Emulation: DTE; DCE; MONITOR only
	BERT Patterns: 63, 511, 2047, FOX (ASCII), SPACE, MARK, ALT
	BERT Speed: 2Mbps (except HCT-6000A) 128Kbps
	Counter & Timer: 5 each internal counter and timer
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 W 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 package
- G.826 — ITU G.826 software package

BERT and Protocol Analyzers
PCM Analyzers

BTM-10

The BTM10 E1/T1 analyzer is a compact, sub-note sized E1/T1 PCM measuring instrument designed for field use in analysis and maintenance of data communications (V.35, RS-530/449/232/422 and X.21), E1 (2.048Mbps) or T1 (1.544Mbps) lines. The BTM10 performs framed, unframed, signaling analysis, drop and insert 8K voice, Nx64Kbps, or Nx56Kbps data into any time slot. The BTM10 analyzer also provides a variety of E1 or T1 line statuses, transmission performance testing (BERT) and monitoring. On the E1 or T1 line, the BTM10 may be used as a generator or receiver.

Features

- E1 BERT Analysis: E1/T1frame, code, CRC, and BPV performance analysis and generator.
- Alarm Setting: Manual or automatic alarm setting.
- VF Access: Drop and Insert 8K voice; frequency generator (transmit VF Frequency from 60 to 3950 Hz, transmit VF level from 0dBm to -55dBm) and measurement (A-law and u-law). Voice access by using telephone handset. E1/T1 pulse shape analysis. E1/T1 PCM level meter and frequency analysis.
- Pulse Shape: E1/T1 pulse shape analysis
- Signal Result: E1/T1 PCM level meter and frequency analysis
- Signaling Setting: ABCD bit setting
- Signaling Display: Display all channel's of ABCD bits
- BERT on Data port: Data port BERT performance analysis
- Remote control: Remote controlled by PC terminal or modem
- SS7 analysis: Decode and performance analysis of levels 2, 3, 4
- V5.1/V5.2 Analysis: Monitoring V5 Signaling information
- ISDN Analysis: Digital Subscriber Signaling System No.1 (DSS 1)-Monitoring ISDN D-Channel Signaling information (ITU Q.921,Q.931)

Example Analysis: off-line analysis of BERT performance

External Drop and insert: Acts as a fractional E1 or T1 converter

User Programmable pattern setting:

There are three 32 bit programmable patterns, which can be inserted onto the E1/T1 line and drop for analysis available, by passed, or idle

Timeslot setting: Timeslot, Drop and Insert Nx64k data onto E1/T1 line

Timeslot mapping data: Analyze any channel data of two frames

Slip measure: Uncontrolled, Controlled, Frame, and Timing SLIP measure

Sa bits setup and monitor: Multi-frame Sa bits setup and monitor.(E1 only)

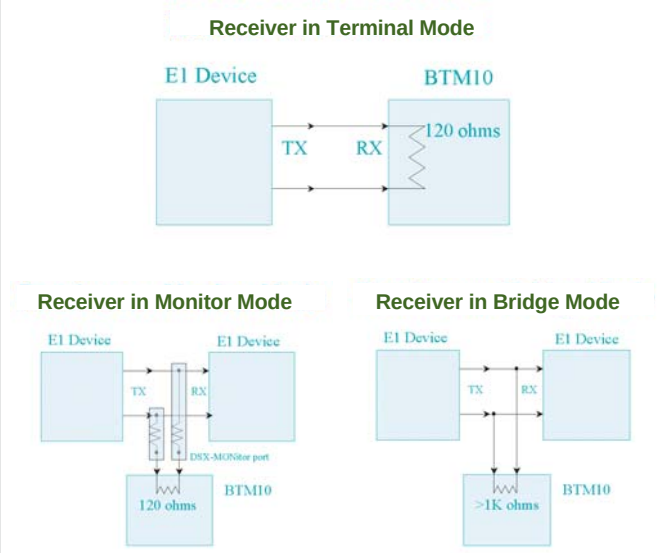
File management: Ten configuration and result memory locations can be stored and recall by user

Datacom clock measurement

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 (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

Application



Ordering Information

BTM10-E1/T1	Both E1 and T1 analyzer (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

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

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)

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

E1/T1 Datacom BERT tester

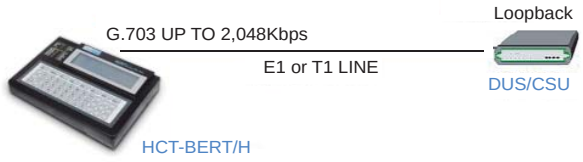
HCT-BERT/H

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	• 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.
  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

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 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 Datacom BERT Family

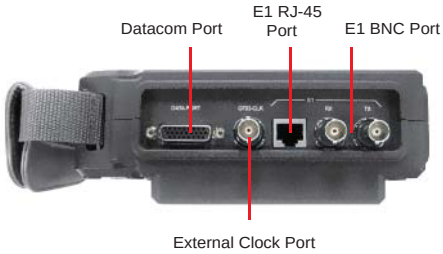
E1 Datacom BERT tester

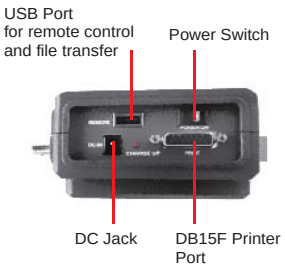
HCT-BERT/C

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





Specifications

Ports	1). E1 Receiving Interface
E1 interface	• Line code: HDB3/AMI • Pulse 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/AMI • Pulse 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) • Source of clock transmission: Internal clock: 2.048 MHz 50ppm, 100ppm. External clock: take clock from external clock interface Resume clock: take clock from receiving terminal 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
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 (D x W x H)mm	154 x 65 x 35mm
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)

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

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

RS485 I/F Converter Series

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

RS232 I/F Converter Series

Type: C = Compact, SP= Surge Protector

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

Async to Sync Converter

RS232	●	icAS/IP	Async to Sync converter	C	160

DTMF to Pulse Converter

POTS		DTMF	DTMF to pulse converter	C	161

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 (D x W x H)mm	140 x 80 x25mm
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/X21Ip-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 (D x W x H)mm	140 x 80 x25mm
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
- V35Ip-F — RS232(DB25F)-V35(DB25F) converter; DTE/DCE selectable
  w/ DB25M-MB34F adapter cable
  DC In 9V / 600mA

RS-232 to RS-449

- RS449Ip-M — RS232(DB25F)-RS-449 (DB25F) converter; DTE/DCE selectable
  w/ DB25M-DB37M adapter cable
  DC In 9V / 600mA
- RS449Ip-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.21Ip-M — RS232(DB25F)-X.21(DB25F) converter; DTE/DCE selectable
  w/ DB25M-DB15M adapter cable
  DC In 9V / 600mA
- X.21Ip-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 (D x W x H)mm	53 x 75 x 22mm
Weight	500g
Temperature	0~50°C (Operating) ,0~70°C (Storage)
Humidity	10~90% non-condensing

Application

Ordering Information

- V35IP-CAB / DCE RS232DTE ← → V35CAB / DCE ← → V.35DCE
- V35IP-CAB / DTE RS232DCE ← → V35CAB / DTE ← → 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.

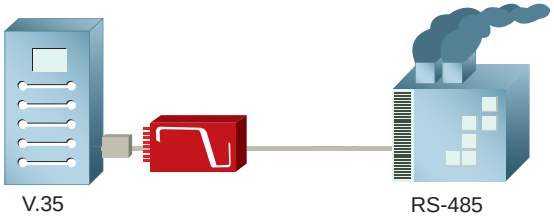
Features

- 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 (D x W x H)mm	140 x 80 x25mm
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.

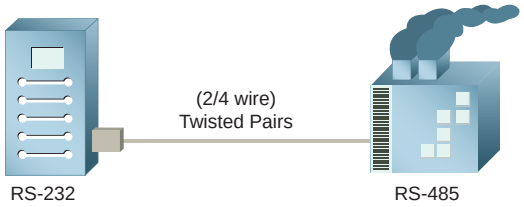
Features

- 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



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.

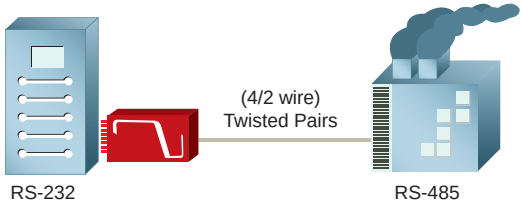
Features

- 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 (D x W x H)mm	140 x 80 x25mm
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.

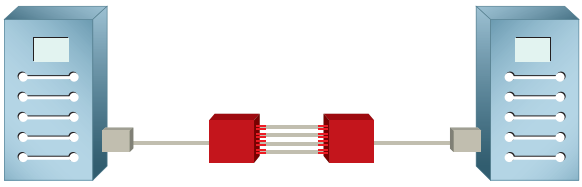
Features

- 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:RJ45 Ic232IP-2: Async RS232: DB25F, modem side: 4 screw terminal with Ground pin
LEDs	TD, RD
Power	Interface Powered
Power Consumption	< 5W
Dimensions (D x W x H)mm	ic 232IP-SM: 54 x 56 x 20mm 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
- ic232Ip-2M — Asyn RS232(DB25M) shorthaul modem ; (4 screw Terminal Block)
- ic232Ip-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.

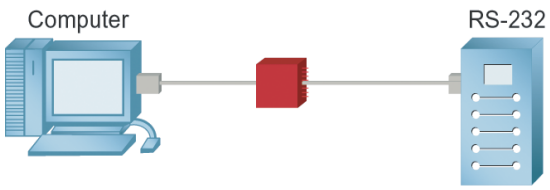
Features

- 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 (D x W x H)mm	54 x 76 x 20mm
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.

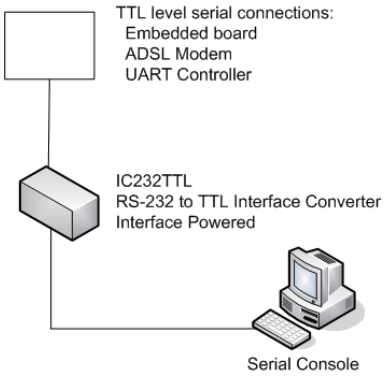
Features

- 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 (D x W x H) mm	60 x 31 x15mm

Application



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.

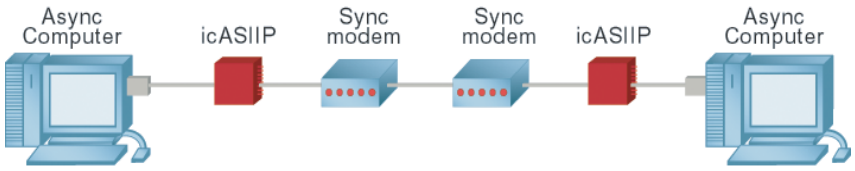
Features

- 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 (D x W x H)mm	54 x 73 x 20mm
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.

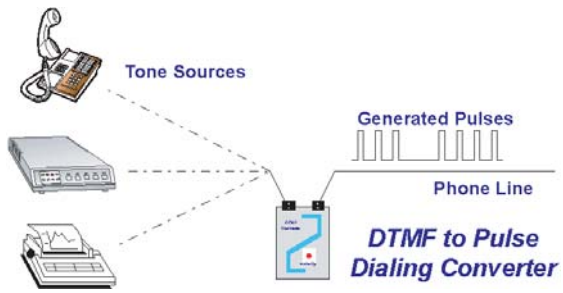
Features

- 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 (D x W x H)mm	135 x 79 x 25mm
Weight	150g
Temperature	0~50°C (Operating) ,0~70°C (Storage)
Humidity	10~90% non-condensing

Application



Ordering Information

DTMF to Plulse Dialing converter

- DTMF DTMF to Pulse dial converter

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.

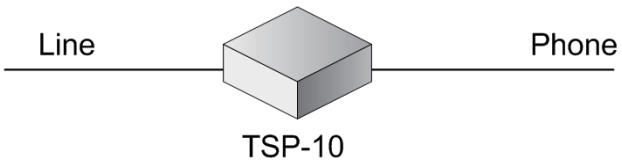
Features

- 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 (D x W x H)mm	80 x 30 x 27mm
Weight	20g
Compliance	UL 1449 (2nd Edition)

Application



Ordering Information

Telephone Surge Protector

- TSP-10 In Line Telephone Surge Protector with RJ-11 Jacks

MANAGEMENT

Management Software

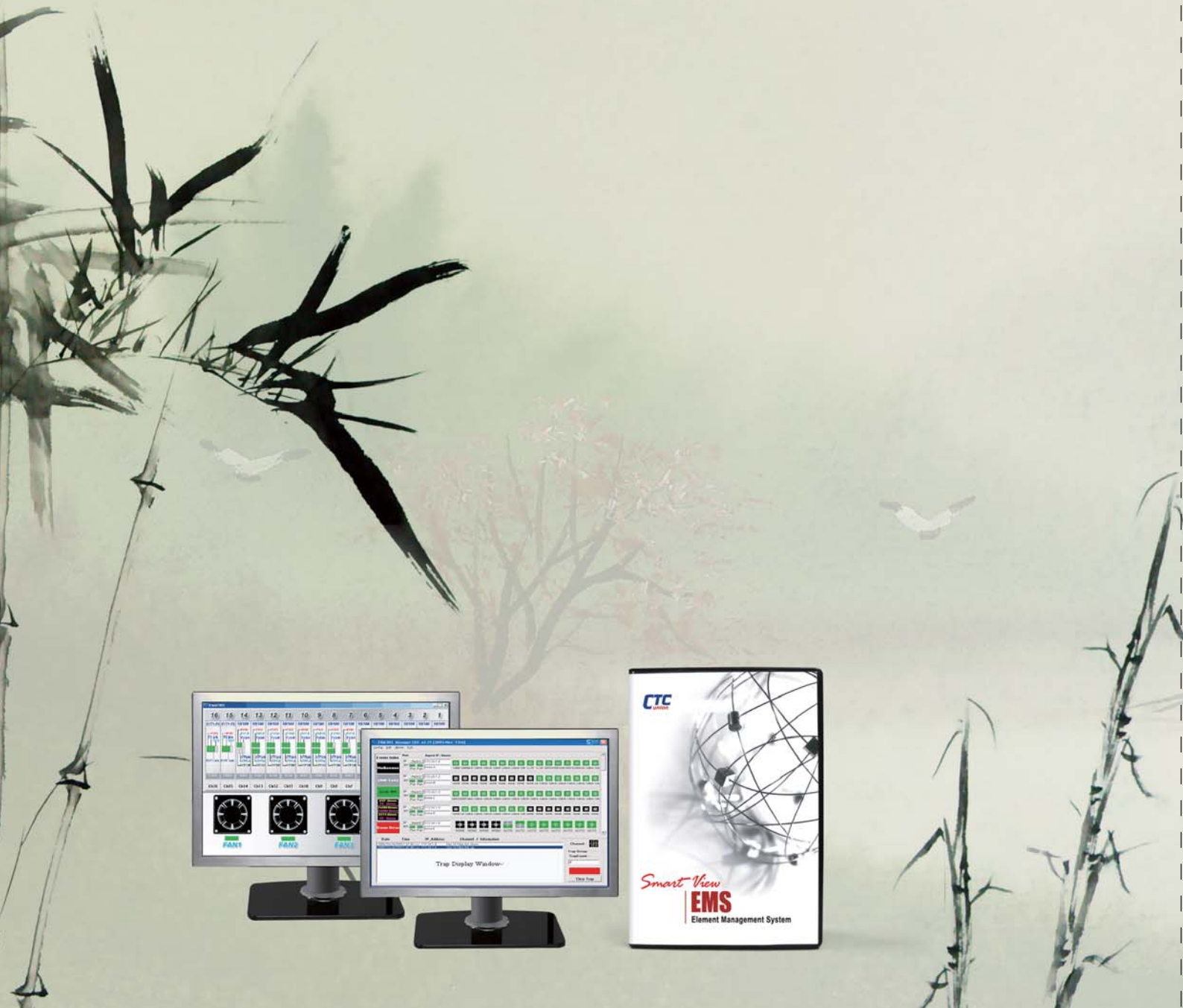
Element Management Software Series

Type: S/W = Software

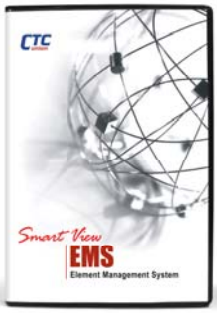
Interface	Model Name	Description	Type	Page
EMS	EMS	E-map, java based element management system software	S/W	163

Graphic User Interface Series

GUI	GUI	Graphic user interface	S/W	165



Management Software
With Topology Feature



Element Management System (EMS)

The objective of EMS is to provide four major functions for telecommunication operators:

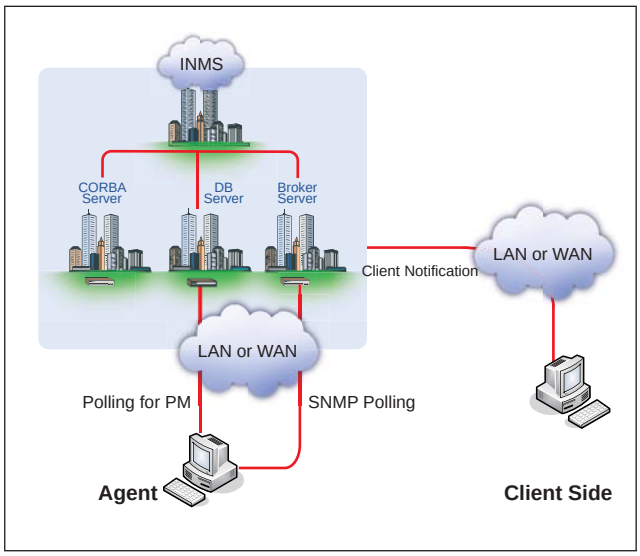
• Fault Management (FM) • Performance Management (PM) • Configuration Management (CM) • Security Management (SM)

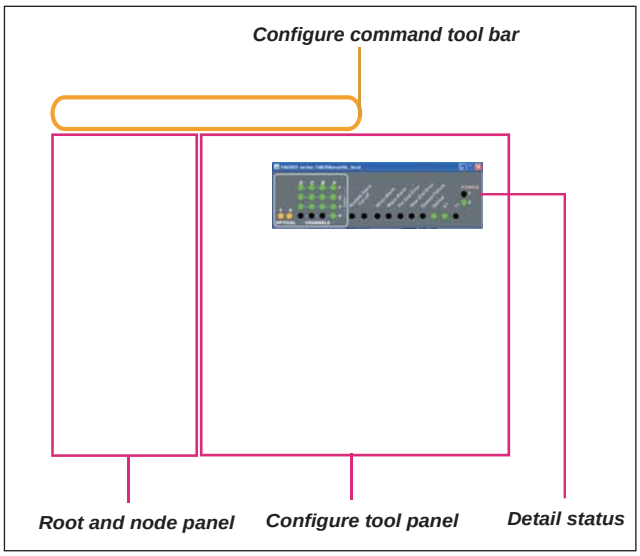
The EMS Server is designed to provide all the configuration and maintenance functions for the communication device. The method to access EMS Server functions is via CORBA protocol according OMG CORBA Specification. When a user loads EMS Client software and sets up a link to the EMS Server, it will be 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***

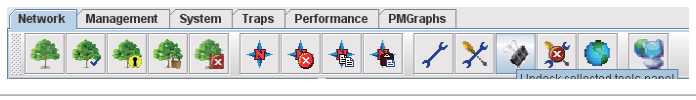
Broker Server collects the information data from the specific SNMP agents and keeps updating it to the SQL server via the JDBC (Java DataBase Connectivity) driver.

■ ***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.



Configure Command Tool Bar

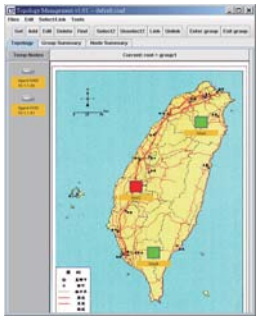
Features

- ***JAVA based***
  EMS is pure JAVA project and collects all benefits of this technology including multi platform support, module design, and client-server architecture
- ***Event driven***
  Using events as primary objects for communication minimizes network loading, increases performance and allows including a given quantity of network devices with predictable CPU and RAM loading, depending on this quantity
- ***Open architecture***
  Provides API and IDL files for integration with upper layer 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

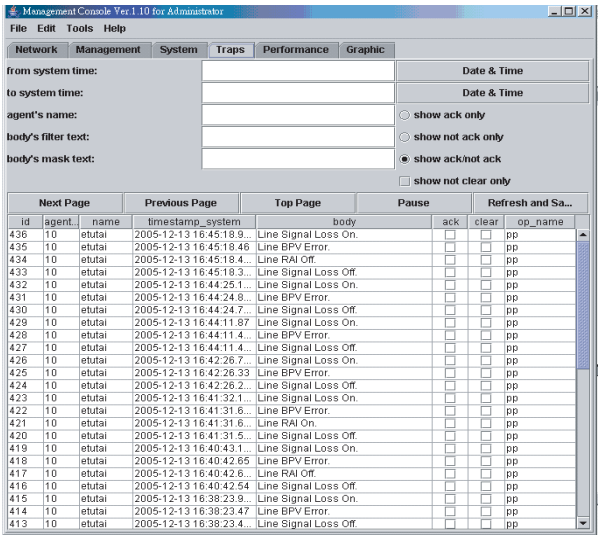
User can load maps to SQL server, load maps from SQL server or delete attached maps. Download procedure is very simple.



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



Trap List

All alarm traps will be stored in SQL database. In Traps page, press "Auto Refresh" button to get the current alarm trap records in database, and it will update status automatically. Press "Pause" button to halt the screen, then, operator can make "ack" or "clear" action. Press "refresh and save file" to get the current alarm trap records in database and save to "TrapList.txt" file in disk.

Active Alarm List

On the System tab, you can view all Active Alarm Lists. Three kinds of filters can be applied to alarm list. User may select one agents, local or remote rack, and specific status as filters to watch active alarms. The status filter can be categorize Urgent, Non-urgent, Event, Empty (don't show), and all statuses label or network element location name may be added to object .

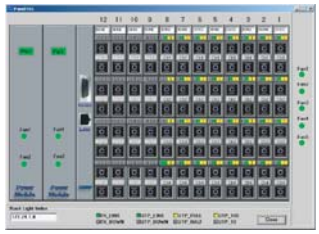
Requirement

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

Available models: ETU01A, ERM01, FMUX01A & FRM220

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

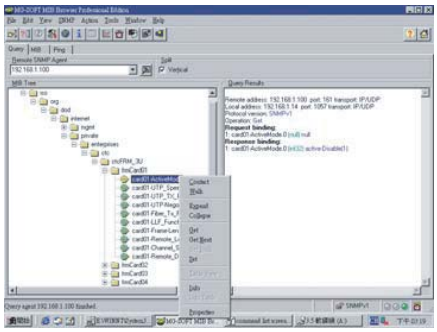
```
*******************************************
***   CTC UNION TECHNOLOGIES CO., LTD   ***
***   FRM-301 NMS Terminal Mode V1.00   ***
*******************************************
Optic Fiber Media Converent Rack Managent Main Menu :

0:SNMP card IP setup
1:Slot #1 >> Active <<      ||     9:Slot #9 >> Active <<
2:Slot #2 >> Active <<      ||     A:Slot #10>> Active <<
3:Slot #3 >> Active <<      ||     B:Slot #11>> Active <<
4:Slot #4 >> Active <<      ||     C:Slot #12>> Active <<
5:Slot #5 >> Active <<      ||     D:Slot #13>> Active <<
6:Slot #6 >> Active <<      ||     E:Slot #14>>  Empty <<
7:Slot #7 >> Active <<      ||     F:Slot #15>> Active <<
8:Slot #8 >> Active <<      ||     G:Slot #16>> Active <<
H:Set NMS Terminal Mode Password
I:Show Fan Power status

Command Function key :
'-'     : Previous Item | '+'       : Next Item
'Enter' : Accept        | 'Esc'     : Previous menu
'R'     : ReFresh Status| 'Numeric' : Select Item

##> [Slot #1 ]
```

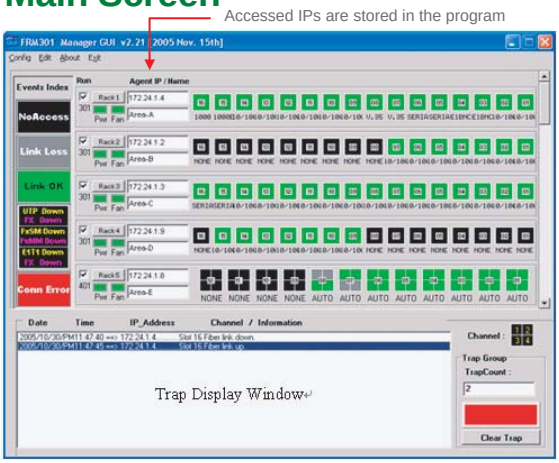
MIB Browser



Ordering Information

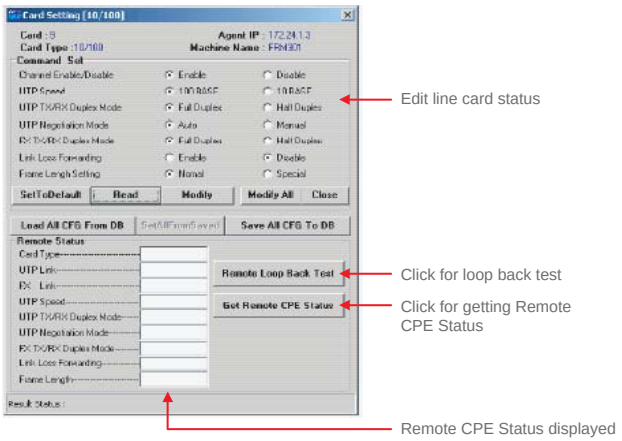
- FRM-SNMP-GUI GUI (Graphical User Interface)

Main Screen



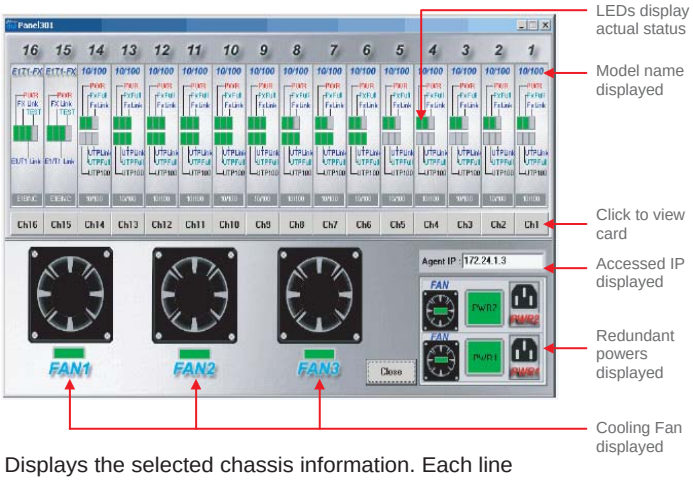
This main screen allows users to enter new or select existing IPs of all agents. When the IP is entered the list of available FRM301 / FRM401 chassis are displayed.

Fast Ethernet Line Card Setting



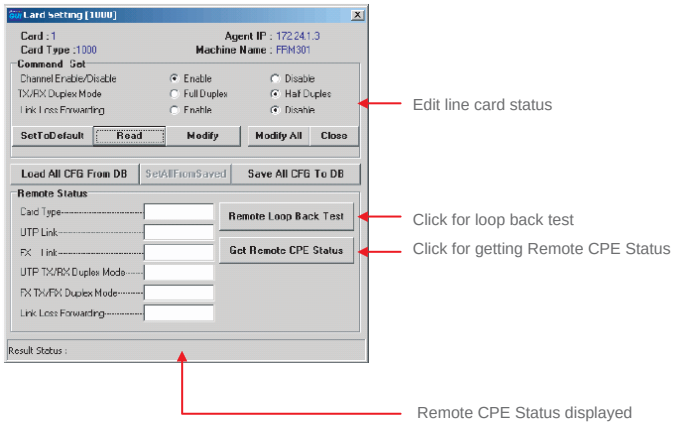
An individual card can be highlighted by clicking on the converter of Chassis screen. A screen is displayed that allows the network administrator to edit the converter's configuration, get the remote unit's status or do loop back functions.

FRM301 Rack View Screen



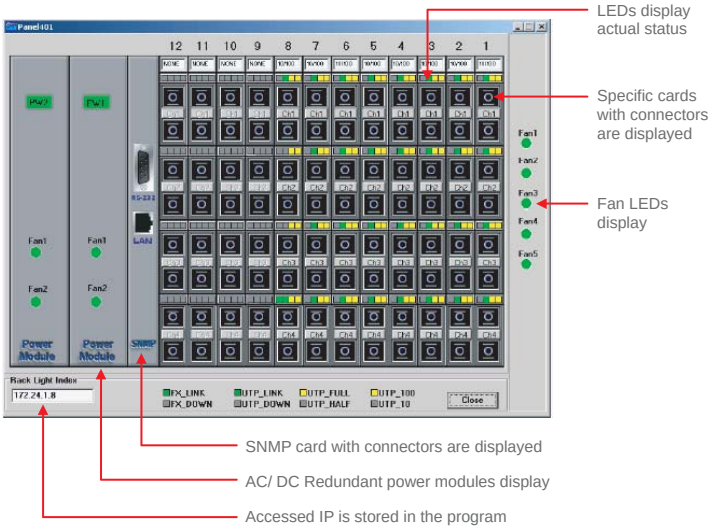
Displays the selected chassis information. Each line card is displayed with LEDs and status in real time.

Gigabit Ethernet Line Card Setting



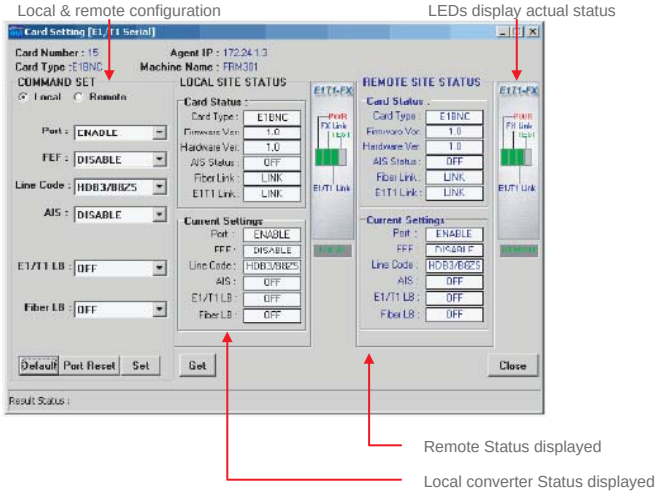
Click the button for a 1000Base line card to view and configure the local line card. Under the GUI, the card's status, Tx/Rx Duplex mode and LLF function may be read or modified.

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 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: S = Standalone, L = card, S/W = Software

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

Digital Video Server Family

Encoding	Stream	Codec	Model Name	Description	Type	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		NEW	NVR	Enterprise network video recorder	S/W	173

Network Camera Family

Encoding	Stream	Codec	Model Name	Description	Type	Page
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	NEW IPCAM-8309D	Dual stream network dome camera	S	179
MPEG4, M-JPEG, In/Outdoor	Dual	Dual	NEW IPCAM-8308IR	Dual stream network IR camera	S	180
MPEG4, M-JPEG, In/Outdoor	Dual	Dual	NEW IPCAM-8318IR	Dual stream network IR camera	S	181
MPEG4, M-JPEG, In/Outdoor	Dual	Dual	NEW IPCAM-8318F	Dual stream Day&Night network camera	S	182
MPEG4, M-JPEG, In/Outdoor	Dual	Dual	NEW IPCAM-8318P	Dual stream high-speed dome network camera	S	183

Ethernet over Coax

Ethernet Bridge			NEW EOC-10	Ethernet extender over coaxial	S	184

Central Management System

CMS			Smart-View Plus	Central management system	S/W	176

Digital Video Server Family

Dual Stream Video Encoder

DVS-8301

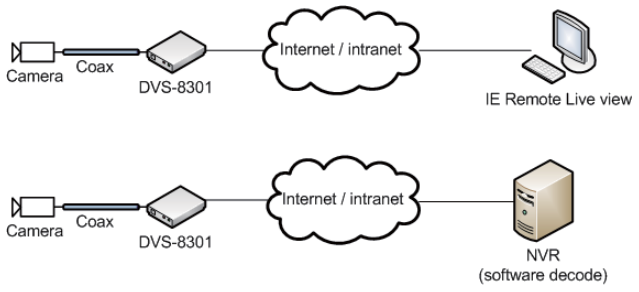
The DVS-8301 supports one analog video input stream. It delivers dual stream (MPEG-4 and MJPEG) @30 fps, 4CIF resolution for remote monitoring anywhere. In addition, the DVS-8301 supports 3GPP mobile protocol, which enables users to monitor via 3G cell phones or any RTSP (Real Time Streaming Protocol) 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

Application



Specifications

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 Memory	ARM9 based 32-bit RISC CPU, 32MB RAM, 8MB Flash
Ethernet	RJ-45 10BaseT/100BaseTX PoE
Terminal Block Connector	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

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 (D x W x H)mm	303 x 438 x 88mm
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 (D x W x H)mm	303 x 438 x 88mm
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

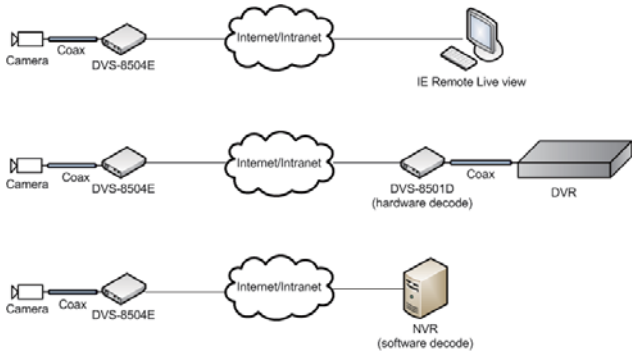
DVS-8504E

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

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 Impedance	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
Video Adjustment	Brightness, contract, ssturation, color tone level
User Account	Up to 10 user accounts for configurable
Event Action	FTP, E-mail, DO1, DO2, SMS, SNMP, local storage, remote storage, PTZ preset

Digital Video Server Family

H.264 Digital Video Decoder

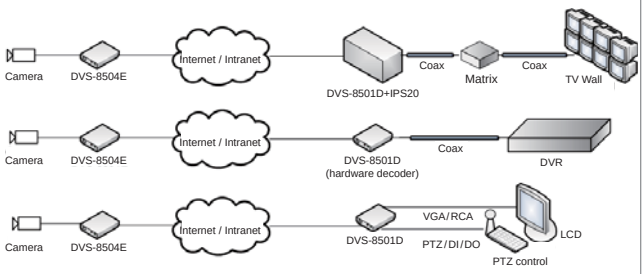
DVS-8501D

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 (Sequence 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

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 Interface	RS-485 (DB9 Interface), 1x alarm input, 1x alarm output
Remote Management	SNMP v1/v2c, Web browser
Network Connector	RJ-45, IEEE 802.3 10Base-T, 802.3u 100Base-TX
Suppoted Protocols	TCP, UDP, IP, ICMP, IGMP, PPPoE, ARP, UPnP, HTTP, HTTPS, FTP, SMTP, DHCP, DNS, DDNS, RTP
System Configuration	Backup and recovery all setting via web browser operation
Firmware Upgarde	Web browser, TFTP
User Interface Language	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*** 2U 19(23)", 20-slot managed rack chassis
- ***IPS-20-AC*** 100 ~ 240 VAC power supply module, IEC connector
- ***IPS-20-DC24*** 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

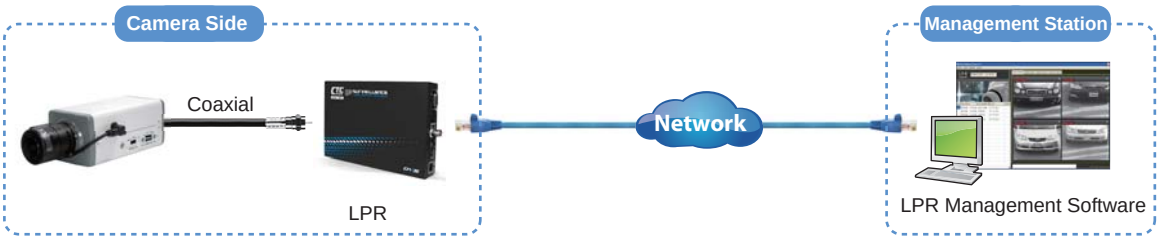
- ***DVS-8501 DV-AC*** Stand-alone with VGA port, 100 ~ 240VAC
- ***DVS-8501 DV-DC*** Stand-alone with VGA port, -18 ~ -72VDC

Embedded DSP System
License Plate Recognition

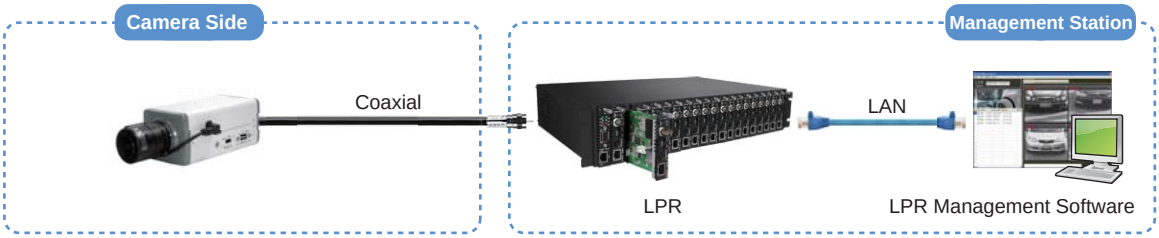
Embedded LPR

The LPR, License Plate Recognition System, is designed using a Digital Signal Processor (DSP) and to fit in a compact box. The plug-and-play feature and the user friendly interface make it easy to install and configure. Designed for long distance, high mobility or outdoor monitoring purposes, it uses analog video input and outputs the recognized results via Internet Protocol which includes a captured image and recognized results to the LPR Management Center software. Each management station supports a maximum of 16 channels (LPR boxes).

Stand-alone type



Rack chassis type



Features

- Embedded system
- Designed for 24 / 7 operation
- Watch dog timer
- Simultaneous recognition and image capture
- Recognition standard English alphabet and Arabic numbers
- Requires a minimum 4x4 pixel per character for recognition
- No IR light source required
- Supports TCP/IP protocol
- Low Power Consumption
- Recognition rate is close to 90%
- Recognition speed is < 0.2 second
- Recognition for motion up to 180km/hr

Specifications

CPU	TI TMS320 DM640 Series DSP
Memory	512K Bytes Flash / 8M Bytes SDRAM
Input	Composite video connector *1
Output	10/100Mbps
Network Protocol	UDP/IP, TCP/IP, ICMP, DHCP & HTTP
Management	Internal web server
Operating temperature	-10 to 50 degree (celsius)
Storage temperature	0 to 70 degree (Celsius)
Humidity	0 to 95% (non-condensing)
AC Power Module Input	Universal 100~240VAC; Freq.: 47~63Hz
Power consumption	12W Output: DC 12V, 1A
DC Power Module Input	18~72VDC Power consumption: 12W
Output	DC 12V, 1A
Dimension	135 x 201 x 30mm (Wx D x H)

LPR management software

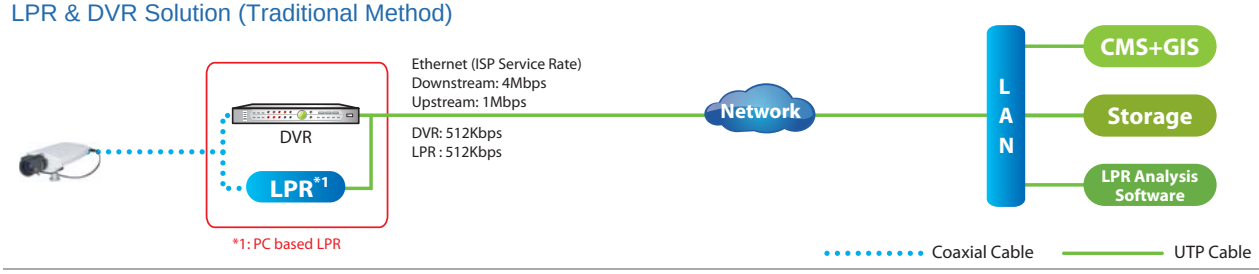
User ID and password authentication
Supports maximum 16 channels receive result and JPEG file in one management station
Uses database to store results
Supports user group management
Supports multiple conditions database search including Time, Channel, LPR IP Address, and License Plate Number
Supports English, Traditional Chinese, and Simplified Chinese user interface
Provides remote monitor LPR box status and system log
Provides database backup and recovery

DSP LPR & PC Based LPR Comparison Chart

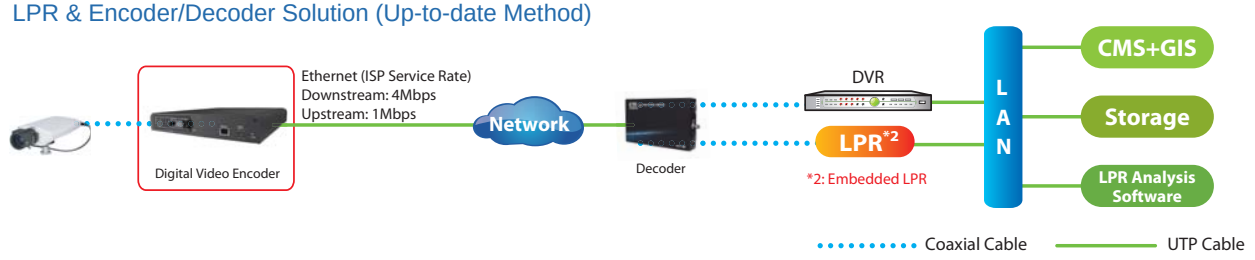
ITEM	DSP LPR System	Other - PC Based
Recognition Result	Real-time	Needs to wait for the video transmission
Recognition Speed	Reaches 180km/hr	Can only reach 120Km/hr
Motion Recognition	Enable	Disable
Plate Dimensions	Do Not Need	Needs to know
Portable	Yes	No
Compatible & Installation	High (No need to change the system)	Low (Needs to change the system)
Cost & Maintenance	Low	High
Core Technology	DSP (Plug & Play)	Takes time due to higher learning curve
Bandwidth Requirements	Small	Large
Consumption	low	High
Performance	Up to 16-CH per computer	Up to 4-CH per computer

Application

LPR & DVR Solution (Traditional Method)



LPR & Encoder/Decoder Solution (Up-to-date Method)



Ordering Information

- ***IPS20-CH20*** 2U, 19", Managed Rack, host up to 20 slots
- ***IPS20-AC*** 100 ~ 240 VAC power supply module, IEC connector
- ***IPS20-DC24*** 18 ~ 36 VDC power supply module,3 pin terminal block
- ***IPS20-DC48*** 36 ~ 72 VDC power supply module,3 pin terminal block
- ***IPS20-CH01/AC*** Stand-alone type, 1-Slot Chassis for CPE Side with Internal AC 100 ~240V Power Supply
- ***IPS20-CH01/DC*** Stand-alone type, 1-Slot Chassis for CPE Sidewith Internal DC 18 ~72V Power Supply
- ***LPR-LS*** License Plate Recognition embedded DSP system, available speed range from 0 to 40Km
- ***LPR-MS*** License Plate Recognition embedded DSP system, available speed range from 0 to 80Km
- ***LPR-HS*** License Plate Recognition embedded DSP system, available speed range from 0 to 180Km

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 format
- 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

Specifications

System Requirements

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 and Enterprise Edition)
Browser		Microsoft Internet Explorer v6.0, v7.0 with updated Service Pack

Preview

Format	H.264/MPEG-4/MJPEG
Resolution	Megapixel/D1/2CIF/CIF/QCIF
Maximum Number 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 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

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

eMap	
eMap Manager	eMap configuration and management
eMap Monitor	Creates alarm when an event occurs on a certain camera in eMap

NVR Web Client Function	
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

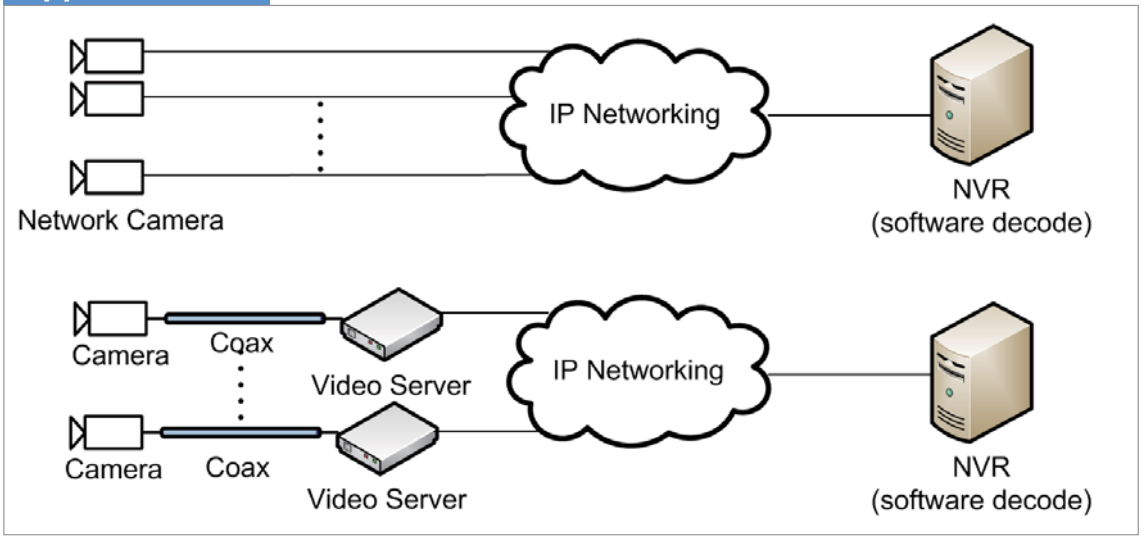
Permission Control	
Auto Login	Auto login and load the first preview layout
Multi-level Permission	User may add 10 level permission to set group according to required function
Security	Account/password defined with associated permission control
Camera Group Permission	Setup Camera Group permission for different users.
eMap Permission	Setup eMap permission for different users.

Storage Manager	
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 Management	When total space reaches its minimum free space requirement, certain space will be cleaned up. The oldest files will be removed first.

Playback	
Playback Mode	Play, Pause, Stop, Fast Forward, Fast Rewind, 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
Synchronized Playback	16-channel synchronized playback at the same time
Digital Zoom	User may zoom in/out the video display with mouse scroll wheel

PTZ Control	
PTZ Management	Manages pan, tilt, zoom operation with speed control
Protocol Supported	Pelco-P, Pelco-D
Preset Position	Goto, set, clear preset positions and patrol on preset positions
Preset Position Number	32
PTZ Tour	4 kinds of patrol path can be set up, each path can be set to patrol eight setting position
PTZ Speed	Pan, Tilt, Zoom, Focus, Iris, Auto pan speed can be set from 0 to 100
Expandable PTZ Command	User-defined PTZ command to support additional PTZ protocols
Mouse PTZ	On-screen 8-direction PTZ operation with mouse operation. This can be run under full-screen mode as well

Application



Supported Network Cameras & Video Servers

	M-JPEG	MPEG4	H.264	Audio	IR	DI/DO	PTZ
CTC Union							
IPCAM-8309F	✓	✓		✓			
IPCAM-8309FW	✓	✓		✓	✓		
IPCAM-8309D	✓	✓		✓		✓	
IPCAM-8308IR	✓	✓		✓	✓	✓	
IPCAM-8318IR	✓	✓		✓	✓	✓	
IPCAM-8318F	✓	✓		✓		✓	
IPCAM-8318P	✓	✓		✓			✓
DVS-8504E			✓	✓		✓	✓
Axis							
209FD	✓	✓					
214PTZ	✓	✓					✓
211M	✓	✓					
241Q	✓	✓					
Arecont Vision							
AV3130	✓						
AV5100	✓						
Bosch							
VideoJet-10	✓	✓		✓		✓	✓
Sony							
SNCRZ50N	✓	✓	✓	✓		✓	✓
SNCRZ30	✓					✓	✓
SNCP5	✓	✓		✓			✓
SNCX550	✓	✓	✓	✓		✓	✓
Vivitek							
IZ7151	✓	✓		✓		✓	
IP7251	✓	✓		✓		✓	
IP7151/7152	✓	✓		✓		✓	
IP7142	✓	✓		✓	✓	✓	
IP7138/7139	✓	✓		✓		✓	
IP7135/7137		✓		✓			
IP7133/7134	✓	✓		✓		✓	
IP7131/7132		✓				✓	
IP6117/6127	✓	✓				✓	
IP6112/6122	✓	✓				✓	
IP3112/3122		✓				✓	
IP2112/2122	✓					✓	
PZ7151/7152	✓	✓				✓	✓
PZ7131/7132	✓	✓				✓	✓
PZ7112/7122	✓	✓				✓	✓
PZ7111/PZ7121	✓	✓				✓	✓
PT7135/7137		✓					✓
PZ6114/PZ6124	✓	✓				✓	✓
PZ6112/6122	✓	✓				✓	✓
PT3117/PT3127	✓	✓				✓	✓
PT3112/3122	✓	✓				✓	✓
SD7151	✓	✓				✓	✓
SD6112V/6122V	✓	✓				✓	✓
FD7141	✓	✓		✓	✓	✓	
FD7131/7132	✓	✓		✓	✓	✓	
FD6112V/6122V	✓	✓		✓	✓	✓	
FD6111V/6121V	✓	✓		✓	✓	✓	
VS2403	✓					✓	✓
VS2101	✓					✓	✓
VS3100P		✓		✓		✓	✓
VS3102		✓		✓		✓	✓
VS7100	✓	✓		✓		✓	✓

	M-JPEG	MPEG4	H.264	Audio	IR	DI/DO	PTZ
ACTi							
ACM-1231/1232	✓	✓		✓	✓		
ACM-1511	✓	✓		✓	✓		
ACM-3401	✓	✓		✓	✓		
ACM-3411	✓	✓		✓	✓		
ACM-4200/4201	✓	✓		✓			
ACM-5601/5611	✓	✓		✓		✓	
ACM-7411	✓	✓		✓	✓	✓	✓
ACM-1011	✓	✓		✓	✓		
ACM-1311	✓	✓		✓	✓		
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		✓		✓		✓	✓
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

Features

Dual Monitors

- 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

Support List

Our CMS Platform Includes Popular Brands

CTC union, Panasonic, D-Link, AXIS COMMUNICATIONS, PIXORD, Mvideo, VIVOTEK, atop technology, HIKVISION, IDIS

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

Network Camera Family

Dual Stream Network Camera

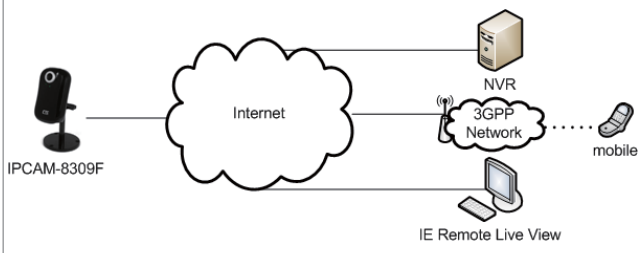
IPCAM-8309F

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



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 Memory	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

Ordering Information

- ***IPCAM-8309F*** Dual Stream Network Camera

Network Camera Family

Wireless Dual Stream Network Camera

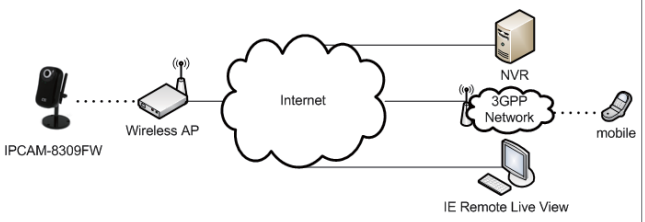
IPCAM-8309FW

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



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 Memory	ARM9 based 32-bit RISC CPU, 32MB RAM, 4MB Flash
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 log
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
Included Accessories	CD with installation and management software, Power supply, Wall-mount bracket

Ordering Information

- ***IPCAM-8309FW*** Wireless Dual Stream Network Camera

Network Camera Family

Dual Stream Network Dome Camera

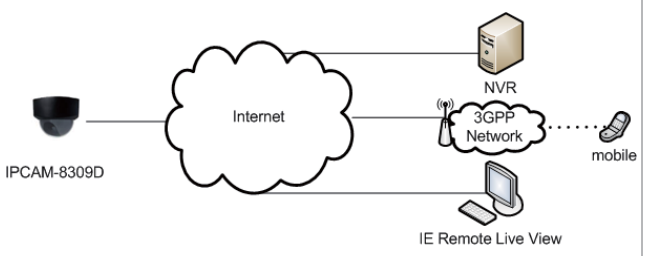
IPCAM-8309D

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 Memory	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 Connector	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	110 x 130 mm (W x H)
Approvals	CE, FCC, RoHS
Included Accessories	CD with installation and management software, Power supply

Ordering Information

- ***IPCAM-8309D*** Dual Stream Network Dome Camera

Network Camera Family

Dual Stream Network IR Camera

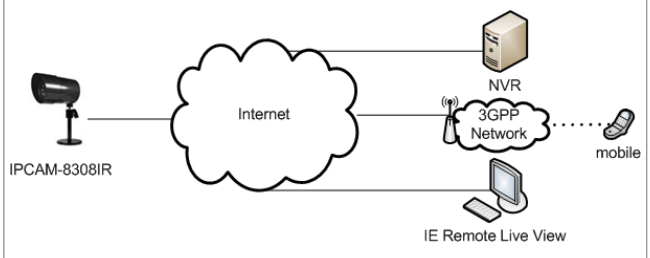
IPCAM-8308IR

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

Application



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 Memory	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 Connector	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
Included Accessories	CD with installation and management software, Power supply, Wall-mount bracket

Ordering Information

- ***IPCAM-8308IR*** Dual Stream Network IR Camera

Network Camera Family

Dual Stream Network IR Camera

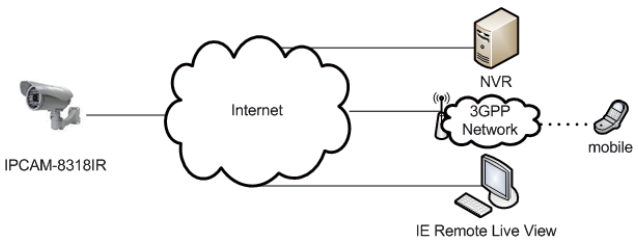
IPCAM-8318IR

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



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 Memory	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	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	0~50°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)
Approvals	CE, FCC, RoHS
Included Accessories	CD with installation and management software, Wall-mount bracket

Ordering Information

- ***IPCAM-8318IR*** Dual Stream Network IR Camera

Network Camera Family

Dual Stream Day&Night Network Camera

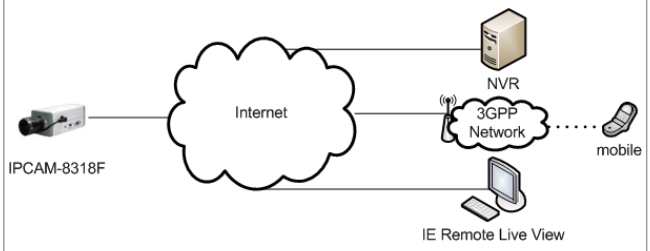
IPCAM-8318F

The IPCAM-8318F Day and Night network camera is a high performance CCD camera for professional surveillance and remote monitoring. IPCAM-8318F also receives IR light when in low light and reverts to black&white video. 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 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



Specifications

Image Sensor	1/3" Sony SuperHAD CCD 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 Memory	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 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)
Casing	Weatherproof casing with IP66
Power	DC 12V, 1A
Dimensions	265 x 85 mm (W x H)
Approvals	CE, FCC, RoHS
Included Accessories	CD with installation and management software, Power supply, Wall-mount bracket

Ordering Information

- ***IPCAM-8318F*** Dual Stream Day&Night Network Camera

Network Camera Family

Dual Stream Network High-speed Dome Camera

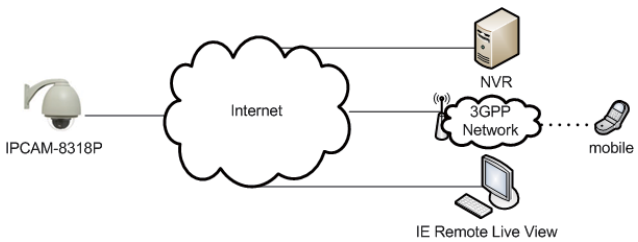
IPCAM-8318P

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



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 Memory	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

Ordering Information

- ***IPCAM-8318P*** Dual Stream Network High-speed Dome Camera

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.

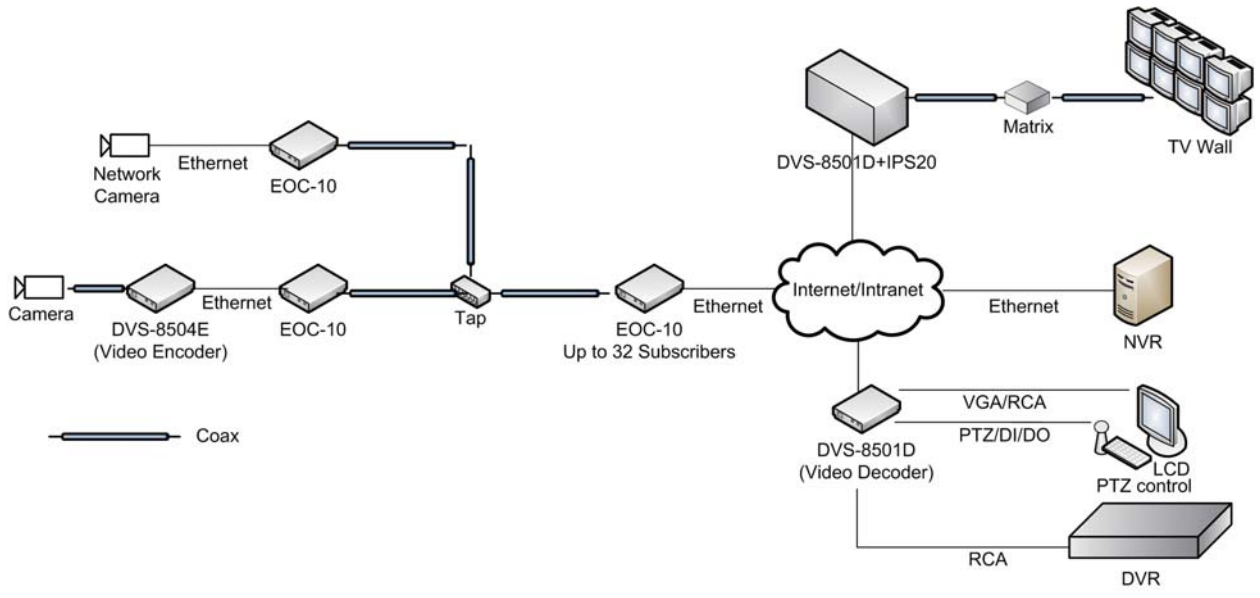
Features

- 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 Connectors, One for EoCNA, the other for TV
	Protocol	Transparent to higher layer protocols
	Transmission Power and Spectrum	8 ±1 dBm, 12~28 MHz
	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 (D x W x H)mm		83 x 138 x28mm
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

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