# Access Transmission Solution

*Mobile Backhaul*

*Cloud Services*

*Triple Play Services*

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*Government*

*Data Center*


*Bank*


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## iAccess™ Multi-Service Platform

- Mobile Fronthaul & Backhaul for 4G LTE
- 40G/10G Ethernet for Data Center Solution
- Carrier Ethernet (NID & EDD)
- CWDM & DWDM

# iAccess™ Multi-Service Platform - FRM220 Series

## In-Band Managed Multi-Service Platform-FRM220-CH20/08/04A

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The FRM220 series is a multi-service chassis platform, which provides a reliable solution of high density media converter modules for applications such as telecom operator, enterprise, long haul transmission and factory automation. All of critical components of FRM220-CH20 and FRM220-CH08 chassis such as power modules, fans, management module and interface cards are hot swappable, allowing online field replacement. FRM220-CH04A is a fixed type AC, DC power built-in chassis. The available power options are built-in AC, DC power or built-in AC+DC, AC+AC, DC+DC redundant power.
FRM220 series is offered in three chassis densities, a 2U 20-slot (FRM220-CH20), a 1U 8-slot (FRM220-CH08), and a 1U 4-slot (FRM220-CH04A)

## Feature

- Supports AC/DC power module hot swappable and power redundancy (CH20 & CH08)
- Supports fixed type AC/DC power built-in and power redundancy (CH04A)
- Two alarm relays contact for critical events warning
- Interface cards are hot swappable
- Chassis backplane consists of passive components

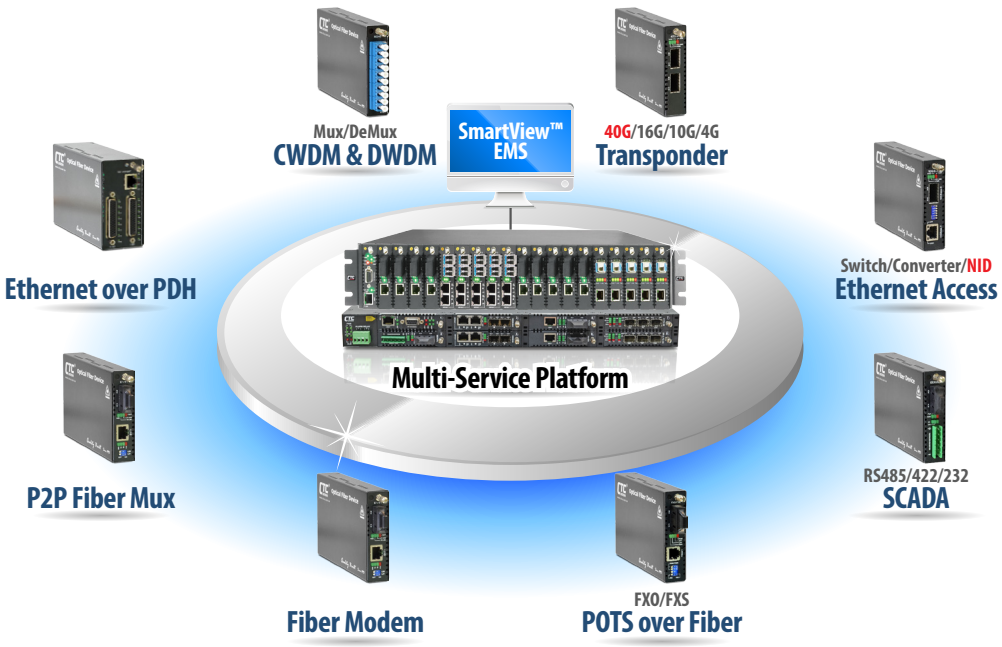
## Specifications

| | | |
|---|---|---|
| **Connectors** | Console: RS232 (DB9), LAN 10/100Base-TX RJ45 | |
| **Physical Specifications** | Dimensions (D x W x H) | 303 x 438 x 88 mm (CH20) |
| | | 310 x 440 x 44 mm (CH08) |
| | | 170 x 310 x 44.7 mm (CH04A) |
| | Weight | 5.2kg (CH20), 3.5kg (CH08) (w/o Power) |
| | | 1.9kg (CH04AD), 1.5kg (CH04AC/DC) |
| **Temperatures** | Operating 0~60°C, Storage -10~70°C | |
| **Power** | AC | 100~240VAC (CH20/CH08) |

| | | |
|---|---|---|
| **Power** | DC24 | 18~36VDC (CH20/CH08) |
| | DC48 | 36~75VDC (CH20/CH08) |
| | AC | 100~240V (CH04A) |
| | DC | 18~75VDC (CH04A) |
| **Humidity** | 5%~90% non-condensing | |
| **MTBF** | 65,000 hrs | |
| **Certification** | FCC Class A, VCCI Class A, CE | |
| **Safety** | UL 60950-1 (FRM220-CH20) | |

## iAccess Platform Solutions

iAsccess™ Multi-Service Platform solutions offer a full range of solutions for service provider and enterprise, including high density 40G/16G connectivity, DWDM, CWDM, distance extension, Ethernet Switch/NID, Fiber Modem, Fiber Multiplexer and Media Converter. It is a fully modular product series that integrates a wide range of optical transport modules for any interface or protocol hosted in selection of Chassis size for simple and flexible operations.





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## Main Features

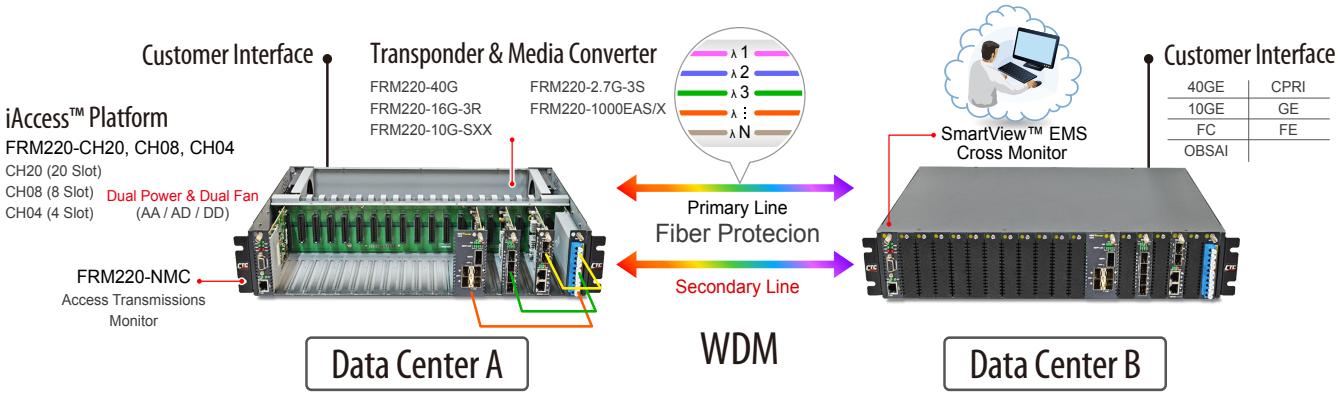
### ▪ Module Cards for Deployment Scenarios

The FRM220-CH20, FRM220-CH08 and FRM220-CH04A have been designed as a Multi-service platform. This allows network administrators to deploy the chassis in a wide range of networks.
Technologies supported by the chassis include Fast/Gigabit Ethernet, E1/T1, V35/X21/RS-530, Serial RS-485/RS-422, Voice FXO/FXS, Repeater, Fiber Multiplexer, E1 Inverse Multiplexer, CWDM Mux/DeMUX and 10G/16G 3R Transponder

### ▪ Network Management

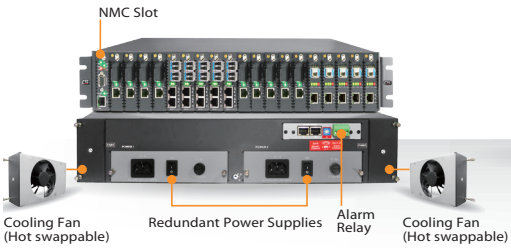
The FRM220-CH20, FRM220-CH08 and FRM220-CH04A require a NMC (Network Management Controller FRM220-NMC page: 2-3) card which must be installed into the first slot of chassis. The NMC card allows a network administrator the ability to configure and monitor the status of the blades. Management can be achieved locally over RS232, or over the network by Telnet, Web or SNMP. If the blades support Ethernet in the First Mile (IEEE 802.3ah), then the management module can also be monitored the status of a remote CPE.

## Access Transmission Application

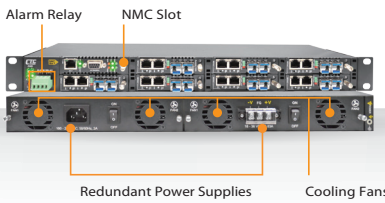



## Chassis Overview

▪ ***FRM220-CH20*** (2U 19" 20 Slots)




▪ ***FRM220-CH08*** (1U 19" 8 Slots)




▪ ***FRM220-CH04A*** (1U 4 Slots)


## Ordering Information

| Model Name | Type | Description |
|---|---|---|
| FRM220-CH20 | Chassis | 2U 20-Slot rack mount chassis with 20 line card blank plate |
| CH20-AC | Power | Chassis power module 100 ~ 240 VAC, IEC connector |
| CH20-DC24 | Power | Chassis power module 18 ~ 36 VDC, 3 pin terminal block, 200W |
| CH20-DC48 | Power | Chassis power module 36 ~ 72 VDC, 3 pin terminal block, 200W |
| FRM220-CH08 | Chassis | 1U 8 slots rack mount chassis with 8 line card blank plate, 200W |
| CH08-AC | Power | Chassis power module 100 ~ 240 VAC, IEC connector, 120W |
| CH08-DC24 | Power | Chassis power module 18 ~ 36 VDC, 3 pin terminal block, 200W |
| CH08-DC48 | Power | Chassis power module 36 ~ 72 VDC, 3 pin terminal block, 200W |
| CH04A-AC | Power | Four slot chassis with built-in AC power, 65W |
| CH04A-DC | Power | Four slot chassis with built-in DC power, 50W |
| CH04A-AD | Power | Four slot chassis with built-in AC+DC power (65W/50W) |

# FRM220-NMC

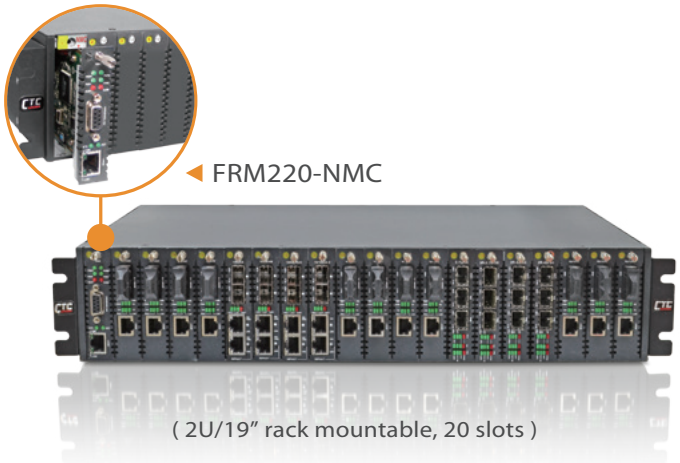
## Network Management Controller

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

## Feature

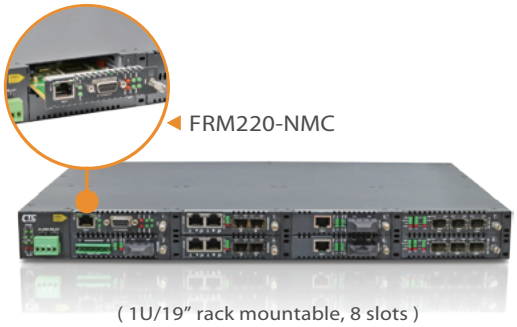
NMC provides central management for FRM220-CH20, FRM220-CH08, FRM220-CH04A and CH02-NMC

- User interfaces for serial console, Telnet & Web
- Configure, monitor and provide fault management for all installed line cards
- Monitor power and fan status in chassis
- Provides upgrade feature for most line card types
- SNMP agent for complete management by enterprise software
- Running System log with time stamping for SNTP (time server)
- Parameter management for quick configuration, configuration copy/backup/restore
- Card alias and inventory by type and serial number
- Linux Kernel based for high stability and reliability

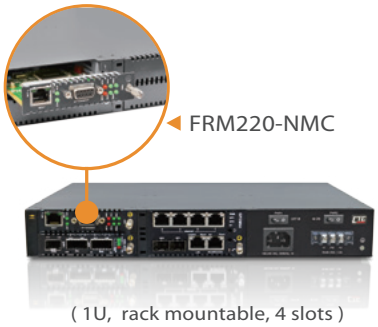



( 2U/19" rack mountable, 20 slots )

- FRM220-NMC must be installed in to the first slot of chassis.




( 1U/19" rack mountable, 8 slots )




( 1U, rack mountable, 4 slots )



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## Web GUI

The local area screen (Figure 1) is also the home page for the Web management of the NMC. An overview of all installed network interface cards (NIC) is shown with real-time status of LEDs. To enter the configuration screen for a NIC, simply click on the card.

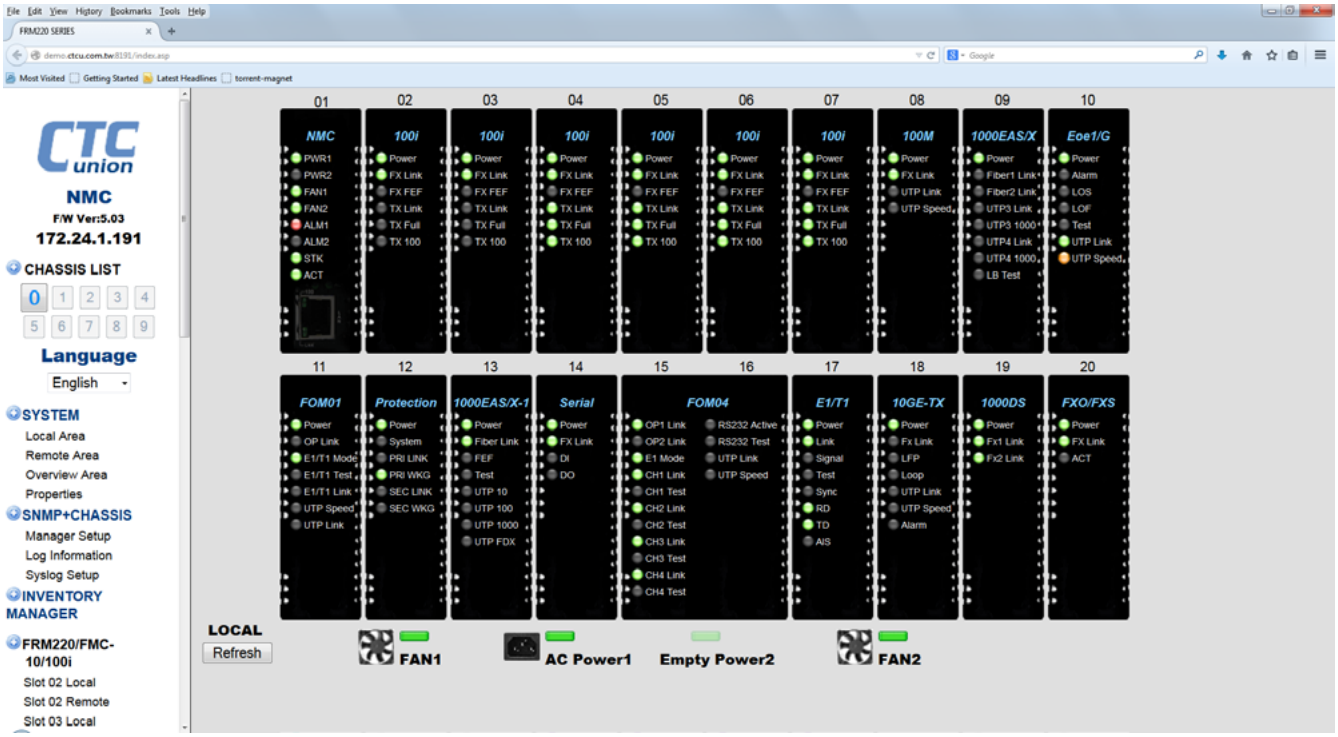



Figure 1

The SNMP+CHASSIS screen (Figure 2) gives a quick overview of the power and fan status in the chassis. This page is also used to assign the alarm conditions for the two programmable alarms. These alarms activate the electrical relays, display messages in the system log and can generate SNMP traps when a trap receiver is configured.


Figure 2

The system setting screen (Figure 3) has the functions for NMC upgrade, line card upgrade, system time and card parameter management.

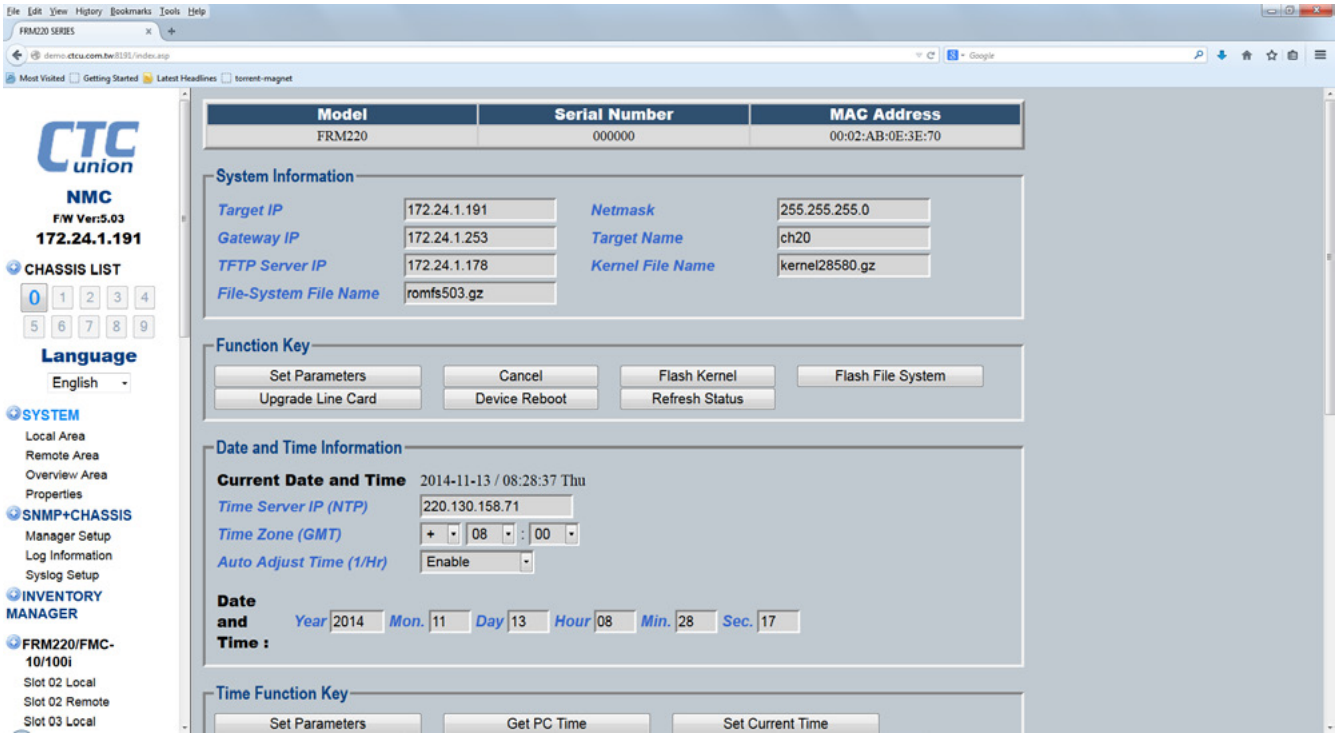



Figure 3

The management (Figure 4) can call up each line card to view detailed status and to make configuration changes to the card. By using a Web GUI, the settings can be made with simple mouse point and click actions.

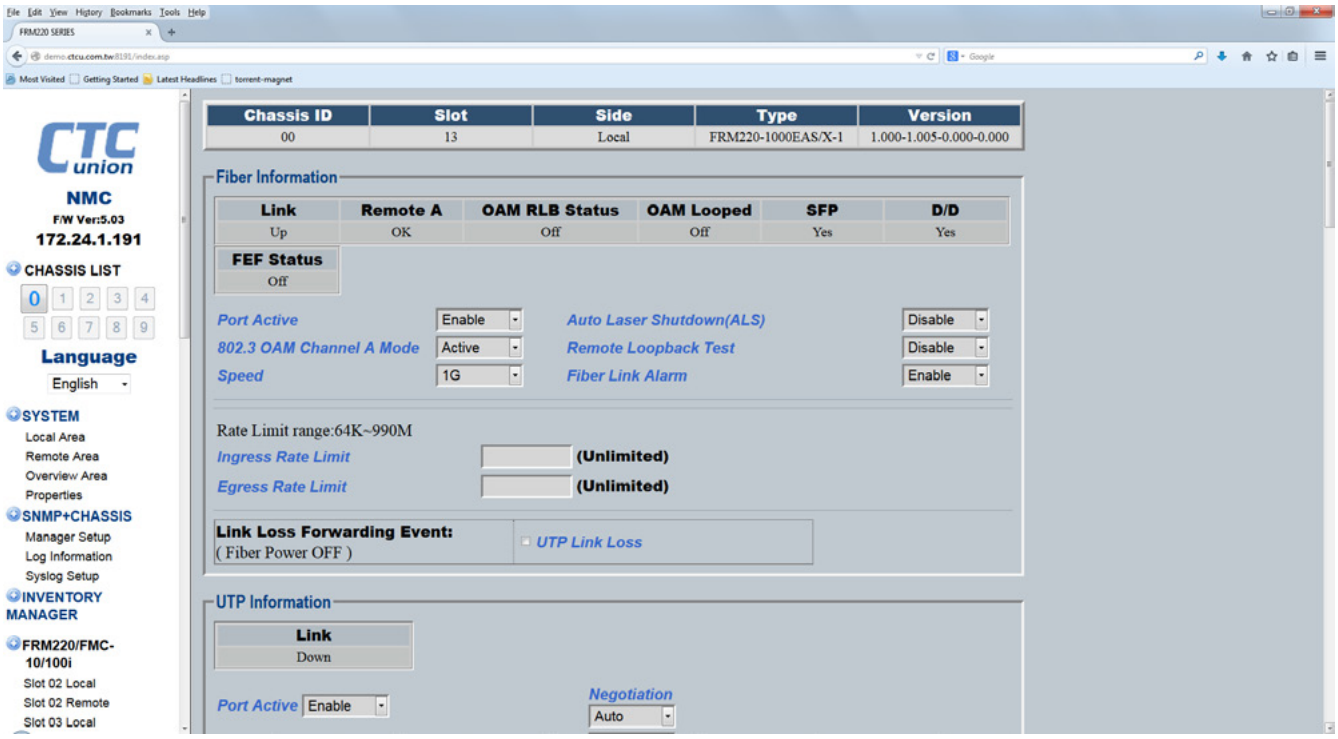



Figure 4

## Ordering Information

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

# Standalone Chassis for FRM220 Series



All of FRM220 series rack mount cards are hot-swappable and can be installed in a 20 slots (2U), or 8 slots (1U) rack-mountable chassis with any combination of redundant hot swappable AC, 24VDC or 48VDC power supplies, providing a scalable solution that is space-efficient and cost-effective. The rack mount cards can also be mounted in 4 slots, 2 slots, or 1 slot standalone housing with fixed AC/DC powered chassis.

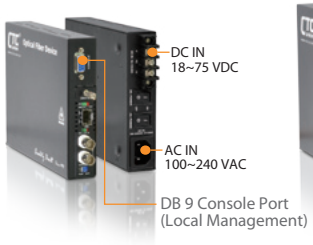
The rack mount cards of FRM220 series provide telecommunication solutions for most applications. CTC union offers a universal and cost-efficient transmission series for a variety of fiber optic technologies (Multimode, Single mode, WDM, CWDM) starting from converters and switches, to modems and extending to intelligent voice/data multiplexer systems. The products are designed as rack mount cards in combination with various chassis types. The concept is to ensure an extremely variable mixture of products at low storage costs for spares.

## Power Build-in Type

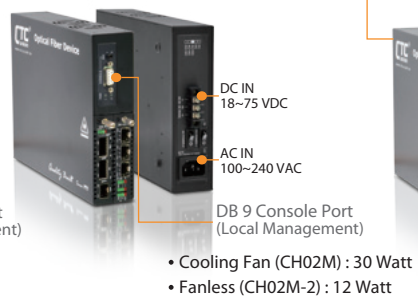
### Power Build-in Type

**FRM220-CH01**


**FRM220-CH01M**




**FRM220-CH02M & CH02M-2**




- Cooling Fan (CH02M) : 30 Watt
- Fanless (CH02M-2) : 12 Watt

**FRM220-CH02/NMC**


### Adapter Type

**FRM220-CH01**


**FRM220-CH02**


## Feature

- Fanless (CH01, CH01M, CH02, CH02M-2)
- Cooling Fan (CH02M, CH02/NMC)
- Supports DB9 console port for local management (CH01M, CH02M, CH02M-2)
- Telnet, Web, Console, SNMP management via NMC Card (CH02/NMC)

**Power Type:**

- External Power: DC12
- Internal Power: AC, DC, AD, AA or DD redundant power (option)

## Specifications

| | | |
|---|---|---|
| Power Input (Option) | External Adapter | Input Voltage 100~240VAC 50/60Hz |
| | | Output Voltage 120VDC 1A |
| | Internal Power | AC: 100~240VAC |
| | | DC: 18~75VDC |
| Weight | 0.5~0.8kg (CH01) , 0.9kg (CH01M) | |
| | 0.8kg (CH02), 1.3kg (CH02M), 1.2kg (CH02M-2), 1kg (CH02/NMC) | |

| | | |
|---|---|---|
| Dimensions (D x W x H) | External Adapter | 139x 23.2x 88mm (CH01) |
| | | 139x 44.5x 88mm (CH02) |
| | Internal Power | 180x 30x 135mm (CH01) |
| | | 185x 30x 135mm (CH01M) |
| | | 222.7x 45.5x 167.4mm (CH02M, CH02M-2, CH02/NMC) |

## FRM220 Slide-In Card Chassis Order Information

| Model Name | Description |
|---|---|
| CH01 | 1 Slot Chassis with 100 ~240VAC to 12VDC Adapter, Fanless |
| CH01-AC, DC, AD | 1 Slot Chassis with AC: 100 ~240VAC DC: 18 ~72VDC or Dual Power (AC+DC), Fanless |
| CH01M-AC, DC, AD | 1 Slot Chassis with Console port and AC: 100 ~240VAC, DC: 18 ~72VDC or Dual Power (AC+DC), Fanless |
| CH02 | 2 Slots Chassis with 100 ~240VAC to 12VDC Adapter, Fanless |
| CH02M-AC, DC, AD | 2 Slots Chassis with Console port and AC: 30W 100 ~240VAC, DC:30W 18 ~72VDC or Dual Power (AC+DC), with Cooling Fan |
| CH02M-2-AC, DC, AD | 2 Slots Chassis with Console port and AC:12W 100 ~240VAC, DC:12W 18 ~72VDC or Dual Power (AC+DC), Fanless |
| CH02/NMC(S)-AC, DC, AD | 2 Slots Chassis with NMC card and AC:100 ~240VAC, DC:18 ~72VDC or Dual Power (AC+DC), with Cooling Fan |

**FRM220 – □□□□ – □□**

Example: FRM220 – CH01–AD



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NEW

# FRM220-40G-1Q4S

## 40G QSFP to 4x 10G SFP+ Transponder



The FRM220-40G-1Q4S is a 40G QSFP to 4x 10G SFP+ transponder that provides media conversion and distance extension for 40G over 10G links. The FRM220-40G-1Q4S meets the growing need for more bandwidth for data centers and enterprises. The emergence of high-end servers and Ethernet switches with 40G Ethernet interfaces increases the need for media conversion (multi-mode to single-mode) and link range extension. The FRM220-40G-1Q4S is hot-swappable with one QSFP slot for QSFP 40G transceiver and four SFP+ slots for SFP+ 10G transceiver. The installation and setup is simple plug and play. The FRM220-40G-1Q4S can be inserted into any powered FRM220-CH20 chassis with QSFP and SFP+ transceivers required for the application.

## Feature

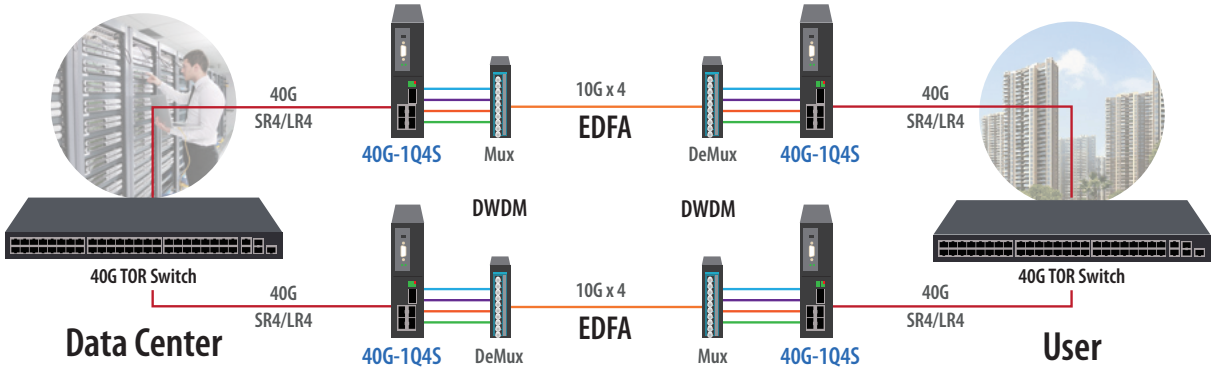
- Network Management via FRM220 Chassis
- Multiple functions in one module: 40G converter/repeater and Quad 10G optical multiplexer
- 40G link interface --Ethernet/IEEE: 802.3ba 40GE-LR4
- 40G multi-link (fiber) interfaces --Ethernet/IEEE: 802.3ba XLAUI and OIF: CEI-11G
- Aggregate Data Rate: 10G x 4
- Data Rate per Lane: 8 ~ 14.2G
- QSFP ports for flexibility and scalability
- Hot-swap support (module and interfaces)
- Supports 1x 40G Mode and 4x 10G Modes
- Supports DMI function for QSFP fiber module
- Supports Loopback test function
- 3R function.

## Specifications

| | | |
|---|---|---|
| **Equipment function** | 3R Transponder, Regenerator, Reshaper, Retimer | |
| **Protocol** | Multiple functions in one module: 40G converter/ repeater—Quad 10G optical multiplexer 40G link interface | |
| | Aggregate Data Rate | 32 - 56.8 Gbps |
| | Data Rate per Lane | 8 - 14.2 Gbps |
| | Ethernet/IEEE | 802.3ba 40GBASE-LR4/SR4 |
| | CPRI | x16 |
| | STM | 64 |
| | OC | 192 |
| | FC | 8G, 10G, 16G |

| | | |
|---|---|---|
| **Protocol** | Ethernet 10G | |
| **Interface Type** | 40Gbps : QSFP (1 port), 10Gbps : SFP+ ( 4 ports) | |
| **Transmission Distance** | Up to QSFP module | |
| **Power requirement** | Power input 12VDC | |
| | Power consumption: ≤12W | |
| **Work Environment** | Operating Temperature | 0 ~ 50°C |
| | Storage Temperature | -10 ~ 70°C |
| | Humidity | 10 ~ 90% (non-condensing) |
| **Dimension** | Card: 155 x 23 x 88mm (D x W x H) | |

## Application




## Ordering Information

| Model Name | Description |
|---|---|
| FRM220-40G-1Q4S | 40G converter/repeater, Quad 10G Optical Multiplexer module with QSFP Interfaces |

***Accessories***

10G SFP+ Transceiver Module

| | |
|---|---|
| SFM-1000-SR85 | 10G SFP+ SR/SW MMF 300m, 850nm VCSEL, 10G Ethernet/FC/SDH/SONET |
| SFS-1010-LR31 | 10G SFP+ LR/LW SMF 10km, 1310nm DFB DML, 10G Ethernet/FC/SDH/SONET |
| SFS-1040-ER55 | 10G SFP+ ER/EW SMF 40km, 1550nm DFB EML, 10G Ethernet/FC/SDH/SONET |
| SFS-1080-ZR55 | 10G SFP+ ZR/EW SMF 80km, 1550nm DFB EML, 10G Ethernet/FC/SDH/SONET |

# FRM220-16G-3R

## 16G 3R Multi-rate Transponder

The FRM220-16G-3R has 4 SFP+ slots that can be configured as a dual channel 16G 3R multi-rate transponder or in a 1-to-2 port protection mode. The device provides a flexible transmission of various protocols, such as 1G/10G Ethernet, SDH STM16/STM64, OTU1/OTU1e/OTU2/OTU2e, Fiber Channel 1/2/4/8/10/16, ODU, OBSAI, CPRI, etc. Using SFP+ ports with dedicated CWDM or DWDM wavelengths, the 16G transponder supports multi-rate functionality with optical data rates from 1Gbps up to 14Gbps. With its functionality the FRM220-16G-3R transponder is also suitable as a repeater for transmission over extended distances. In addition, the use of state of the art components greatly reduces the power requirements and heat dissipation factors over our previous transponders.

## Feature

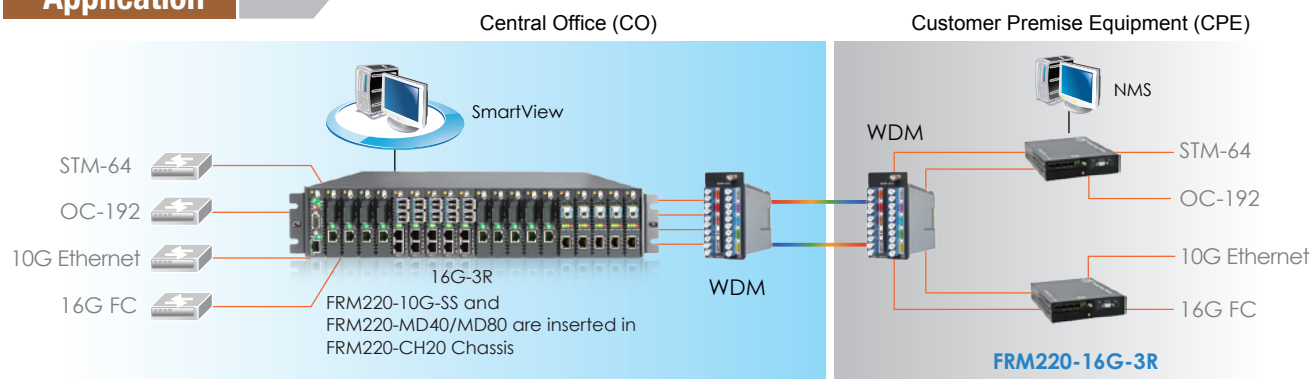
- Multi-rate supports 1Gbps ~ 14Gbps
- Protocol Transparent 3R fiber Media Transponder / Repeater
- Supports 1+1 Optical Line Protection
- Supports 2 channels with different bit rate.
- Supports Loopback Test.
- SFP DDM Information
- Firmware Upgrade
- Setting from DIP Switch, Console, NMC
- Supports FRM220 -CH01M, CH02M, CH04A, CH08, CH20
- FRM220-CH20, Full Load (19 Slots)

## Specifications

| | | |
|---|---|---|
| **Optical Interface** | Connector | LC (SFP+, SFP) |
| | Wavelength | CWDM 1271 ~ 1611nm<br>DWDM 1529.5~1565.50nm |
| **Operation mode** | Dual channel mode : Ch 1 SFP1 line / SFP2 client.<br>Ch2 SFP3 line/ SFP4 client.<br>Protection mode : SFP1 line / SFP2, SFP3 client | |
| **Protocol** | SONET | OC-24, OC-48, OC-192 |
| | SDH | STM-16, STM-64 |
| | Ethernet | 1G, 2.5G, 10G |
| | OTU | OTU1, OTU1e, OTU2, OTU2e |
| | ODU | ODU1, ODU1e, ODU2, ODU2e |
| | OBSAI | OBSAI x1, x2, x4, x8 |
| | CPRI | CPRI x1, x2, x4, x5, x8, x10, x16 |
| | Fiber Channel | 1/ 2/4/8/10/16 GFC |
| | Regeneration | Re-Amplification, Re-Shaping, Re-Timing |

| | | |
|---|---|---|
| **Indication** | LED | Power, System, Mode, Test, FX1 Link, FX2 Link, FX3 Link, FX4 Link |
| **Power** | Input | 12V / 1A |
| | Power Consumption | < 8W |
| **Size** | Dimensions | Card: 155 x 20.8 x 88mm (D x W x H) |
| | Weight | 150g |
| **Environment** | Operating Temperature | 0 ~ 50°C |
| | Storage Temperature | -10 ~ 70°C |
| | Humidity | 10 ~ 90% |
| | Certification | CE, FCC |
| | MTBF | 65000 hrs |

## Application




## Ordering Information

| Model Name | Description |
|---|---|
| FRM220-16G-3R | 2 Channels 16Gbps 3R multi-rate transponder (optional SFP+) |

***Accessories***

10G SFP+ Transceiver Module

| | |
|---|---|
| SFM-1000-SR85 | 10G SFP+ SR/SW MMF 300m, 850nm VCSEL, 10G Ethernet/FC/SDH/SONET |
| SFS-1010-LR31 | 10G SFP+ LR/LW SMF 10km, 1310nm DFB DML, 10G Ethernet/FC/SDH/SONET |
| SFS-1040-ER55 | 10G SFP+ ER/EW SMF 40km, 1550nm DFB EML, 10G Ethernet/FC/SDH/SONET |
| SFS-1080-ZR55 | 10G SFP+ ZR/EW SMF 80km, 1550nm DFB EML, 10G Ethernet/FC/SDH/SONET |

**Note:** This card may be placed in CH02M, CH01M or CH04A chassis with fan. For SNMP management, place this card in CH02/NMC or CH04A Chassis.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NEW

# FRM220-10G-FEC

## 10G Ethernet FEC Multi-rate Transponder



FRM220-10G-FEC is a conversion module suitable for high-speed 10G signals with Forward-Error-Correction (FEC). The module supports four flexible SFP+ ports suitable for wavelength conversion and the transferring application for 10GbE and STM-64. The main field of FRM220-10G-FEC application is cost-optimized CWDM and DWDM networks. As an intelligent transponder module, the FRM220-10G-FEC converts a transparent data channel to a corresponding CWDM/DWDM wavelength. By means of the implemented 3R functionality (re-amplification, re-shaping, re-timing) for signal processing, the module is also suited for the use as a repeater. The data rates between 9.95Gbps and 11.32Gbps can be provided. Two types of housings are available for installation in a 19" FRM220 chassis. 20 slots are provided by using the FRM220-CH20 chassis 2U while the FRM220-CH08 1U supports up to 8 modules. Both housings can be monitored and configured through SNMP, Web GUI or Telnet using a NMC management module.

## Feature

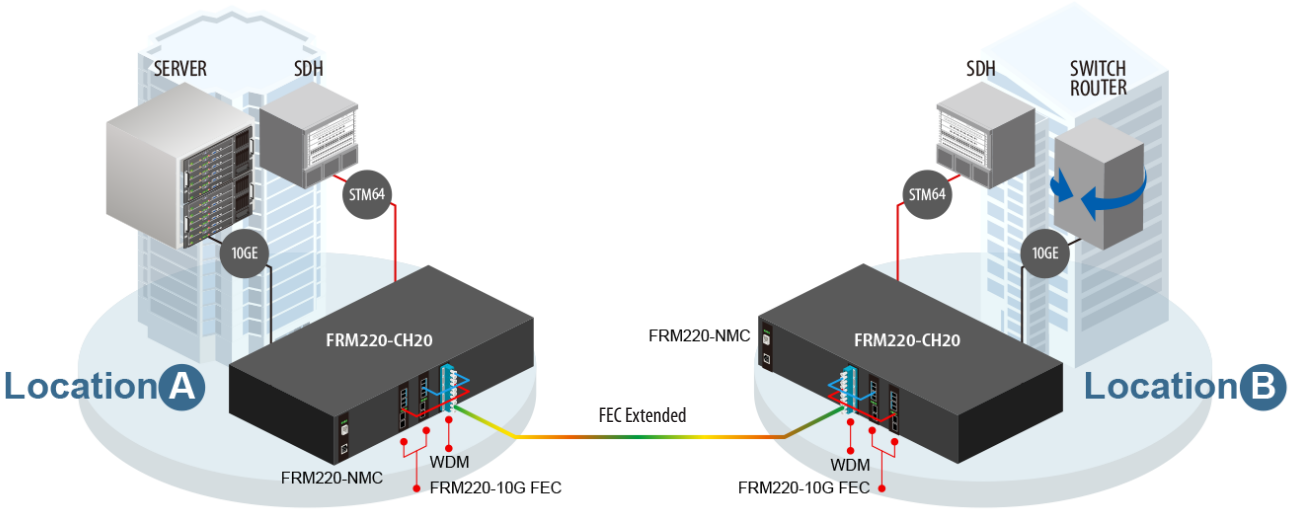
- Protocol transparent (9.95 – 11.32Gbps)
- 10Gbps signal repeating for 10GbE and STM-64
- 10Gbps conversion: Multimode, Single mode, CWDM, DWDM
- Future-proof and flexible SFP+ technology
- 3R functionality (Re-amplification, Re-shaping and Re-clocking)
- Low power consumption
- Wide range of applications
  -Dual OTN transponder or OTN repeater
  -Lambda conversion with FEC exchange
- Multiple clients data rate support
  -10G Ethernet LAN/WAN PHY
  -10G OC-192/ STM-64 SONET/SDH*
- Non OTN/FEC
  -10G Ethernet LAN-PHY to LAN-PHY
  -10G Ethernet LAN-PHY to WAN-PHY
- Per interface Forward Error Correction (FEC) encoding selection:
  -ITU-T G.709 Standard RS(255,239) (GFEC) – 6.2 dB
  -ITU-T G.975.1 Section I.7 Ultra-strong FEC
  with scaled - overhead (UFEC 7%) – 8.1 dB
  ITU-T G.975.1 Section I.4 Ultra-strong FEC
  with scaled - overhead (UFEC 10%) – 8.3 dB
  Zero FEC (wrapper done, FEC is zero)
  No FEC (wrapper done, FEC is disabled)
- Comprehensive access performance monitoring
  -10G Ethernet, 10G SONET/SDH*
- Comprehensive G.709 line and service performance monitoring
- Connection testing tools
  -Loopback
  -Notification or fault propagation
- SNMP management through NMC management module
- SFP+ transceivers for flexible configuration including DWDM
- SFP+ Digital Diagnostics

## Specifications

| | | |
|---|---|---|
| **General** | 1-slot module for integration in a FRM220 platform | |
| | Operating temperature: 0°C – 40°C | |
| | Dimensions (D x W x H): 155 x 88 x 23mm | |
| **Interfaces** | 4x SFP+ ports (1 x line, 1 x client) | |
| | Protocol : STM-64, 10G Ethernet | |
| | Data rate: 9.92Gbps –11.32Gbps depending on SFP+ type and application used | |
| **SFP+ Types** | Optical (LC) | 10Gigabit Ethernet (with or without FEC)<br>STM-64 (with or without FEC)<br>Multi-rate for 10Gigabit, STM-64<br>Wavelengths: 850nm, 1310nm, 1550nm, DWDM or tunable optics |

| | |
|---|---|
| **Management** | SNMP, Telnet and Web management using a NMC management module |
| | SFP+ management information provided by integrated DMI functions: input/output power, wavelength, bit rate, status, supported protocols, temperature |
| **Housing Types** | FRM220-CH08 1U 8-slot chassis |
| | FRM220-CH20 2U 20-slot chassis |
| | FRM220-CH02M, FRM220-CH02/NMC, 2-slot chassis |

## Application




## Ordering Information

| Model Name | Description |
|---|---|
| FRM220-10G-FEC | 10G Ethernet FEC Transponder |

**Note:** This card MUST be placed in CH02M chassis with fan.
For SNMP management, place this card in CH02/NMC or CH04A Chassis.

# FRM220-10G-SXX

## 10G 3R Multi-rate Transponder with Optical Line Protection



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

## Feature

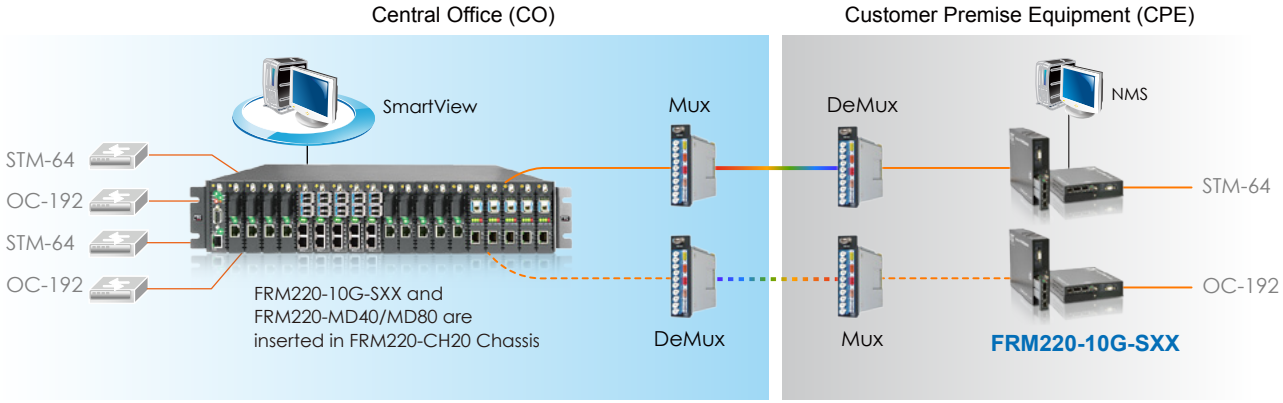
- Protocols Transparent at discrete bit rates of 1Gbps to 10Gbps
- Network management via Web, Telnet, SNMP in central FRM220-CH20 chassis (10 cards in chassis max.)
- Protocol transparent 3R fiber media transponder / repeater
- (Re-amplification, Re-shaping and Re-clocking)
- Promotes flexibility and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

## Specifications

| | | |
|---|---|---|
| **Optical Interface** | Connector | LC |
| | | 1x Line SFP+ to 2x Client XFP |
| | | 1x Line SFP+ to 1x Client XFP |
| | | 1x Line XFP to 1x Client XFP |
| | Protocol | OC-192/STM-64 (9.95328Gbps) |
| | | 1 Gigabit Ethernet (1.25Gbps) |
| | | 10 Gigabit Ethernet LAN(10.3125Gbps) |
| | | G.709 OTU2 (10.709225Gbps) |
| | | Fiber Channel |
| | | 1x FC(1.062 Gbps); 2x FC(2.125 Gbps); |
| | | 4x FC(4.25 Gbps); 8x FC(8.5 Gbps); |
| | | 10xFC(10 Gbps) |
| | Regeneration | Re-amplification |
| | | Re-shaping, Re-timing |
| **Power** | Loopback | Line / Client |
| | Fiber | SM 9/125µm |
| | | MM 50/125µm or 62.5/125µm |
| | Wavelength | Depends on SFP+ or XFP |
| **Indications** | LED (Power, Line Link, Client Link, Test, Loop back, Port Active, Alarm) | |

| | |
|---|---|
| **Power Input** | 12VDC |
| **Power Consumption** | < 12W |
| **Dimensions** | Card: 155 x 20.8 x 88mm (D x W x H) |
| **Weight** | 150g |
| **Temperature** | 0 ~ 50°C (Operating), -10 ~ 70°C (Storage) |
| **Humidity** | 10 ~ 90% non-condensing |
| **Certification** | CE, FCC |
| **MTBF** | 65,000 hrs |

## Application




## Ordering Information

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

***Accessories***

10G XFP Transceiver Module

| | |
|---|---|
| XFM-1000-SR85 | 10G XFP SR/SW MMF 300m, 850nm VCSEL, Ethernet / Fiber Channel only |
| XFS-1010-LR31 | 10G XFP LR/LW SMF 10km, 1310nm DFB DML, Ethernet/Fiber Channel/SDH/SONET |
| XFS-1040-ER55 | 10G XFP ER/EW SMF 40km, 1550nm DFB EML, Ethernet/Fiber Channel/SDH/SONET |
| XFS-1080-ZR55 | 10G XFP ZR/ZW SMF 80km, 1550nm DFB EML APD, Ethernet/Fiber Channel/SDH/SONET |

10G SFP+ Transceiver Module

| | |
|---|---|
| SFM-1000-SR85 | 10G SFP+ SR/SW MMF 300m, 850nm VCSEL, 10G Ethernet/FC/SDH/SONET |
| SFS-1010-LR31 | 10G SFP+ LR/LW SMF 10km, 1310nm DFB DML, 10G Ethernet/FC/SDH/SONET |
| SFS-1040-ER55 | 10G SFP+ ER/EW SMF 40km, 1550nm DFB EML, 10G Ethernet/FC/SDH/SONET |
| SFS-1080-ZR55 | 10G SFP+ ZR/EW SMF 80km, 1550nm DFB EML, 10G Ethernet/FC/SDH/SONET |

**Note:** This card may be placed in CH02M or CH04A chassis with fan.
For standalone SNMP management, place this card in CH02/NMC or CH04A chassis.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# FRM220-10G-SS

## 10G 3R Multi-rate Transponder



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

## Feature

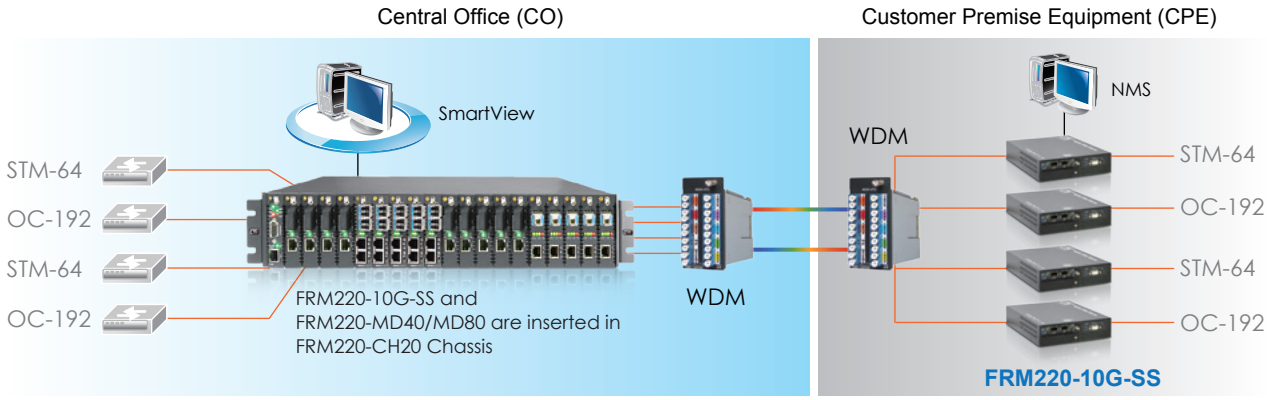
- Protocols Transparent at discrete bit rates of 1Gbps to 10Gbps
- Network management via Web, Telnet, SNMP in central FRM220 chassis(10 cards in chassis max.)
- Protocol transparent 3R fiber media transponder / repeater (Re-amplification, Re-shaping and Re-clocking)
- Promotes flexibility and eases management with pluggable SFP+ transceiver
- Features two 10G ports offering multiservice 10G transponder and regenerator function
- Provides superior optics capabilities resulting in extended transport distances for regional application.
- Extend 10G Ethernet transmission over fiber
- Useful as a 'Transponder' in CWDM or DWDM systems for 10G Ethernet/Fiber Channel/STM-64
- Supports Client / Line loop back tests
- Serial console for stand-alone management when inserted in CH02M Single Slot Chassis
- SFP+ power supplies: +3.3V

## Specifications

| | | |
|---|---|---|
| **Optical Interface** | Connector | LC, 1x Line SFP+ to 1x Client SFP+ |
| | Protocol | OC-192/STM-64 (9.95328Gbps) |
| | | 10 Gigabit Ethernet LAN(10.3125Gbps) |
| | | G.709 OTU2 (10.709225Gbps) |
| | | Fiber Channel |
| | | 1xFC (1.062 Gbps); 2xFC (2.125 Gbps) |
| | | 4xFC (4.25 Gbps); 8xFC (8.5 Gbps) |
| | | 10xFC (10.51875 Gbps) |
| | Regeneration | Re-amplification |
| | | Re-shaping, Re-timing |
| | Loopback | Line / Client |
| | Fiber | SM 9/125µm |
| | | MM 50/125µm or 62.5/125µm |
| **Optical Interface** | Wavelength | CWDM 1470 ~ 1610nm |
| | | DWDM 1529.55 ~ 1565.50nm |
| **Indications** | LED (Power, Line Link, Client Link, Test, Loop back, Port Active, Alarm) | |

| | |
|---|---|
| **Power Input** | 12VDC |
| **Power Consumption** | < 12W |
| **Dimensions** | Card: 155 x 20.8 x 88mm (D x W x H) |
| **Weight** | 150g |
| **Temperature** | 0 ~ 50°C (Operating), -10 ~ 70°C (Storage) |
| **Humidity** | 10 ~ 90% non-condensing |
| **Certification** | CE, FCC |
| **MTBF** | 65,000 hrs |

## Application




## Ordering Information

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

***Accessories***

10G SFP+ Transceiver Module

| | |
|---|---|
| SFM-1000-SR85 | 10G SFP+ SR/SW MMF 300m, 850nm VCSEL, 10G Ethernet/FC/SDH/SONET |
| SFS-1010-LR31 | 10G SFP+ LR/LW SMF 10km, 1310nm DFB DML, 10G Ethernet/FC/SDH/SONET |
| SFS-1040-ER55 | 10G SFP+ ER/EW SMF 40km, 1550nm DFB EML, 10G Ethernet/FC/SDH/SONET |
| SFS-1080-ZR55 | 10G SFP+ ZR/EW SMF 80km, 1550nm DFB EML, 10G Ethernet/FC/SDH/SONET |

**Note:** This card may be set by DIP switch or console, but MUST be placed in CH02M chassis with fan
For SNMP management, place this card in CH02/NMC or CH04A Chassis.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# FRM220-4G-3S

## 4G 2R Multi-rate Transponder with Optical Line Protection



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

## Feature

- Multi-rate supports 28Mbps to 4.25Gbps
- Network management via Web, Telnet, SNMP in central FRM220 chassis
- Local configuration via DB9 console port (when placed in CH01M or CH02M)
- Digital diagnostic monitoring of SFP module
- Perform optical repeater function (Re-amplification, Re-shaping)
- Facility loopback on both Client / Line sides
- 1+1 optic fiber protection
- Link Fault Pass-Through (LFPT)
- Auto Laser Shutdown (ALS)
- Detect transceiver transmitter error alarm

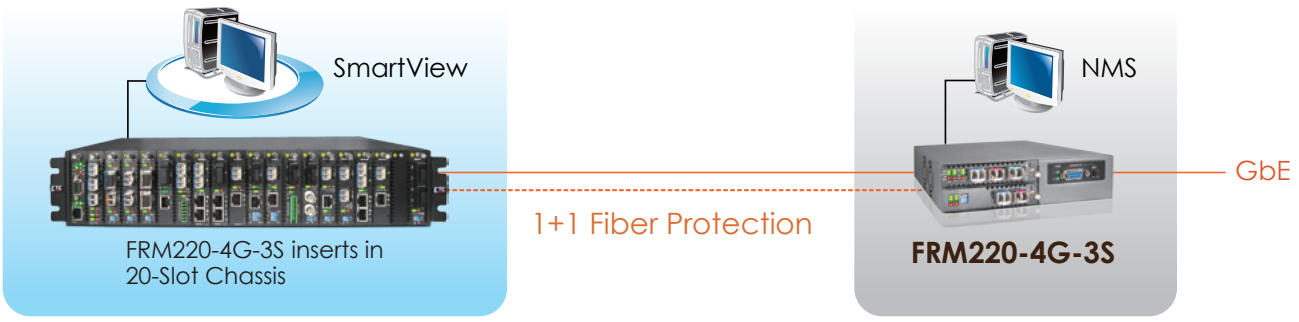
## Specifications

| | | |
|---|---|---|
| **Optical Interface** | Connector | SFP LC |
| | Protocol | OC -3, OC -6, OC -12, STM-1, STM-4, STM-16, FC -1, FC -2, FC -4 |
| | Regeneration | Re-amplification |
| | | Re-shaping |
| | Loop back | Line/Client |
| | Fiber | MM 62.2/125µm, 50/125µm. |
| | | SM 9/125µm |
| | Wavelength | MM 850, 1310nm |
| | | SM 1310, 1550nm |
| | | WDM 1310T/1550R, 1550T/1310R |
| | | CWDM 1470 ~ 1610nm |
| **Indications** | LED (PWR, Line Link, Client Link, Test, Loop back, Port Active, Alarm) | |
| **Power Input** | 12VDC | |
| **Power Consumption** | < 12W | |

| | |
|---|---|
| **Dimensions** | Card: 155 x 20.8 x 88mm (D x W x H) |
| **Weight** | 120g |
| **Temperature** | 0 ~ 50°C (Operating), -10 ~ 70°C (Storage) |
| **Humidity** | 10 ~ 90% non-condensing |
| **Certification** | CE, FCC |
| **MTBF** | 65,000 hrs |

## Application

### Managed 4G 2R Transponder with Fiber Protection




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

## Ordering Information

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

***Accessories***

Multi-Mode 1.25Gbps SFP

| | |
|---|---|
| SFM-7000-S85 | 1.25G SX, MM, 550m, 850nm, 8.5dB, 3.3V, LC |
| SFM-7000-S85-DD | 1.25G SX, MM, 550m, 850nm, 8.5dB, 3.3V, LC, DD |
| SFM-7000-L31 | 1.25G LX, MM, 2km, 1310nm, 10dB, 3.3V, LC |
| SFM-7000-L31-DD | 1.25G LX, MM, 2km, 1310nm, 10dB, 3.3V, LC, DD |

Single-Mode 1.25Gbps SFP

| | |
|---|---|
| SFS-7020-L31 | 1.25G LX, SM, 20km, 1310nm, 15dB, 3.3V, LC |
| SFS-7020-L31-DD | 1.25G LX, SM, 20km, 1310nm, 15dB, 3.3V, LC, DD |
| SFS-7040-L31 | 1.25G LX, SM, 40km, 1310nm, 20dB, 3.3V, LC, DFB LD |
| SFS-7040-L31-DD | 1.25G LX, SM, 40km, 1310nm, 20dB, 3.3V, LC, DFB LD, DD |

Single Fiber 1.25Gbps SFP

| | |
|---|---|
| SFS-7020-WA | 1.25G WDM, 20km, Tx1310nm / Rx1550nm (A type), 3.3V, LC |
| SFS-7020-WA-DD | 1.25G WDM, 20km, Tx1310nm / Rx1550nm (A type), 3.3V, LC, DD |
| SFS-7020-WB | 1.25G WDM, 20km, Tx1550nm / Rx1310nm (B type), 3.3V, LC |
| SFS-7020-WB-DD | 1.25G WDM, 20km, Tx1550nm / Rx1310nm (B type), 3.3V, LC, DD |
| SFS-7040-WA | 1.25G WDM, 40km, Tx1310nm / Rx1550nm (A type), 3.3V, LC |
| SFS-7040-WA-DD | 1.25G WDM, 40km, Tx1310nm / Rx1550nm (A type), 3.3V, LC, DD |
| SFS-7040-WB | 1.25G WDM, 40km, Tx1550nm / Rx1310nm (B type), 3.3V, LC |
| SFS-7040-WB-DD | 1.25G WDM, 40km, Tx1550nm / Rx1310nm (B type), 3.3V, LC, DD |

**Note:** This card may be set by DIP switch and placed in CH02M chassis with fan, or set by serial console if placed in CH01M chassis

# FRM220-2.7G-3S

## 2.7G Transponder (3R) with Optical Line Protection



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

## Feature

- Multi-rate supports 34.3Mbps to 2.7Gbps
- Network management via Web, Telnet, SNMP in central FRM220 chassis
- Link Fault Pass-Through (LFPT)
- Auto Laser Shutdown (ALS)
- Local configuration via DB9 craft port In Stand-alone
- Digital diagnostic monitoring of SFP module
- Perform optical repeater function (Re-amplification, Re-shaping, and Re-clocking)
- Facility loopback on both Client / Line sides
- 1+1 optic fiber protection
- Dip switch setting data rate
- Detect transceiver transmitter error alarm

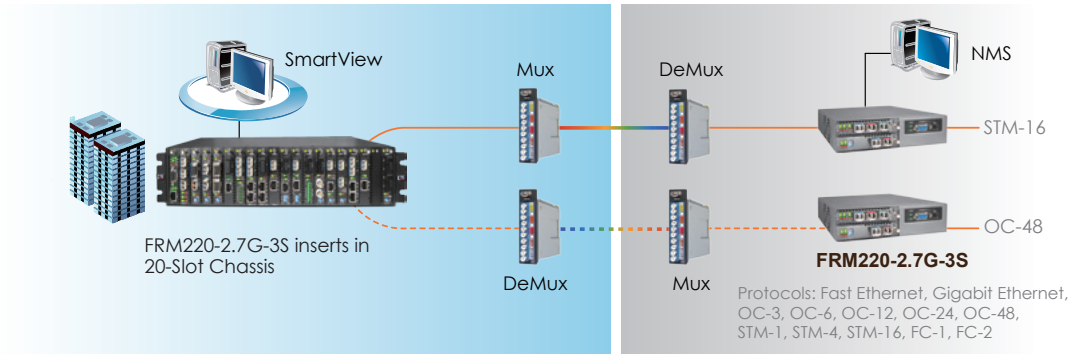
## Specifications

| | | |
|---|---|---|
| **Optical Interface** | Connector | SFP LC |
| | Protocol | OC -3, OC -6, OC -12, OC-24. OC-48, STM-1, STM-4, STM-16, FC -1, FC -2 |
| | Regeneration | Re-amplification |
| | | Re-shaping |
| | | Re-clocking |
| | Loop back | Line/Client |
| | Fiber | MM 62.2/125μm, 50/125μm |
| | | SM 9/125μm |
| | Wavelength | MM 850, 1310nm |
| | | SM 1310, 1550nm |
| | | WDM 1310T/1550R, 1550T/1310R |
| | | CWDM 1470 ~ 1610nm |

| | |
|---|---|
| **Indications** | LED (PWR, Line Link, Client Link, Test, Loop back, Port Active, Alarm) |
| **Power Input** | 12VDC |
| **Power Consumption** | < 12W |
| **Dimensions** | Card: 155 x 20.8 x 88mm (D x W x H) |
| **Weight** | 120g |
| **Temperature** | 0 ~ 50°C (Operating), -10 ~ 70°C (Storage) |
| **Humidity** | 10 ~ 90% non-condensing |
| **Certification** | CE, FCC |
| **MTBF** | 65,000 hrs |

## Application

**Managed 2.7G 3R Transponder with Fiber Protection**




## Ordering Information

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

### Multi-Rate 2.67G SFP Module

| | |
|---|---|
| SFM-9000-S85-DD | 2.67G SX, MM, 300m, 850nm, 3.3V, LC, VCSEL (DD) |
| SFS-9002-L31-DD | 2.67G LX, SM, 2km, 1310nm, 11dB, 3.3V, LC, FP (DD) |
| SFS-9015-L31-DD | 2.67G LX, SM, 15km, 1310nm, 15dB, 3.3V, LC, DFB (DD) |
| SFS-9030-Z55-DD | 2.67G ZX, SM, 30km, 1550nm, 15dB, 3.3V, LC, DFB (DD) |
| SFS-9050-Z55-DD | 2.67G ZX, SM, 50km, 1550nm, 20dB, 3.3V, LC, DFB (DD) |
| SFS-9080-Z55-DD | 1.25G WDM, 40km, Tx1310nm / Rx1550nm (A type), 3.3V, LC, DD |
| SFS-9100-Z55-DD | 2.67G ZX, SM, 100km, 1550nm, 30dB, 3.3V, DFB (DD) |

**Note:** This card may be set by DIP switch or console, but MUST be placed in CH02M chassis with fan.
For SNMP management, place this card in CH02/NMC or CH04A Chassis.

NEW

# FRM220-OAB15

## Single Channel EDFA Booster NIC

The FRM220-OAB15 is a FRM220 chassis rack managed single channel Erbium Doped Fiber Amplifier (EDFA) booster line card for C-band. It has a large dynamic range while providing excellent broadband noise performance. It provides Automatic constant output Power Control (APC) and Automatic Constant Current (ACC) via rack management or RS-232 console interface. Its fast transient suppression feature allowing the output power to be kept constant level when there are fast changes in input power.

## Feature

- Single channel EDFA with FRM220 chassis rack management
- Up to 15 dBm output power
- Output level constant control mode
- Output current constant control mode
- Low noise figure
- Low power dissipation

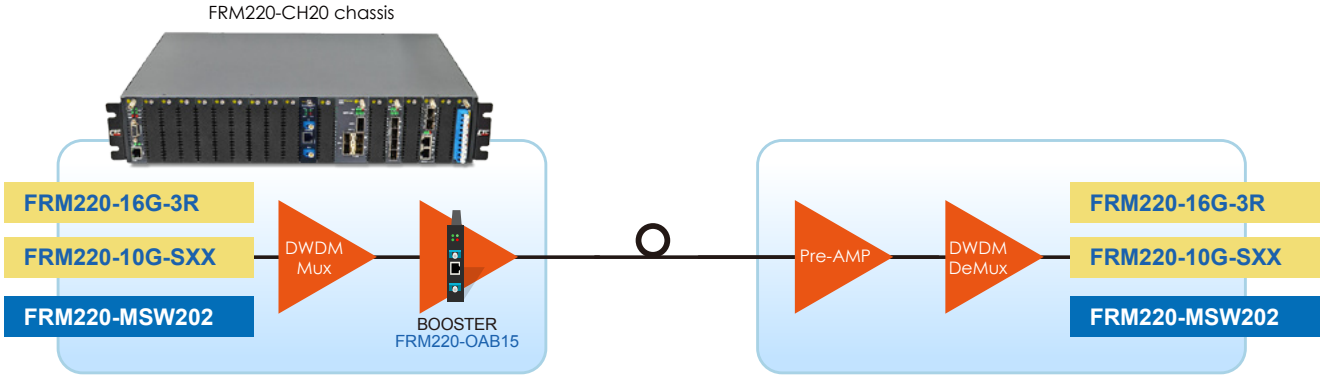
### Applications

Booster Amplifier for 10Gbps, 40Gbps, and 100Gbps applications
Long haul C-band DWDM applications

## Specifications

| Parameter | Specifications | | | Remarks |
|---|---|---|---|---|
| | Units | Min. | Max. | |
| Wavelength Bandwidth | nm | 1528 | 1562 | |
| Input Power Range | dBm | -10 | 0 | |
| Output Power Range | dBm | | +15 | @ Input Power = -6~0dBm |
| Noise Figure | dB | | 7.0 | @ -6dBm input with 16dB gain |
| PDG | dB | | 0.5 | |
| PMD | ps | | 0.5 | |
| Power Consumption | W | | 2 | |
| Operation Temperature | Degree C | -5 | +70 | |
| Storage Temperature | Degree C | -20 | +70 | |
| Transportation Temperature | Degree C | -40 | +85 | 72 hrs max. |
| Dimensions | mm | 155 x 88 x 23mm | | |

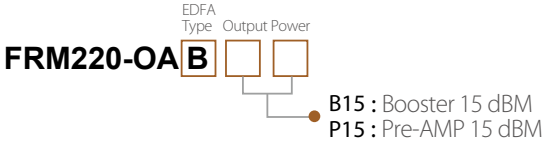
## Application




## Ordering Information

| Model Name | Description |
|---|---|
| FRM220-OAB15 | FRM220 Chassis Single Channel EDFA Booster NIC |

Naming Rule



# FRM220-DWDM

## DWDM Mux/DeMUX



CTC Union DWDM MUX DEMUX Modules, with 100GHz channel spacing, can be used to combine or separate wavelength channels at standard ITU grid. We supply the common configuration including 4, 8, 16 channels. These DWDM modules passively multiplex the optical signal outputs from 4 or more electronic devices, and send them over a single optical fiber and then de-multiplex the signals into separate, distinct signals for input into electronic devices at the other end of the fiber optic link. All the DWDM MUX DEMUX modules provide excellent optical performance and high reliability to ease of fiber handling and power saving solution.

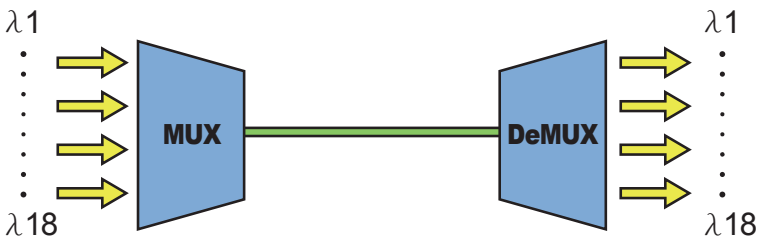
## Feature

- Low Optical Insertion Loss
- High channel isolation
- Low PDL
- Good channel-to-channel uniformity
- Exceptional reliability and stability
- Reliable passive WDM optical technology
- Scales easily for ring networks
- Compliance with RoHS

## Specifications

| Item | 100GHz DWDM | |
|---|---|---|
| Type | **Mux** | **DeMux** |
| Channel No. | 4 / 8 / 16 | |
| Center Wavelength, nm | Ch 21~60 or ITU Standard (specity) | |
| Channel Spacing, nm | 0.8 | |
| Channel Spacing, GHz | 100 | |
| Passband @0.5dB, nm | ITU ± 0.1 | |
| Insertion Loss, dB for 4 channel | ≤2.0 | |
| Insertion Loss, dB for 8 channel | ≤3.5 | |
| Insertion Loss, dB for 16 channel | ≤4.5 | |
| Adjacent Channel Isolation, dB | N/A | ≥25 |
| Non-adjacent Channel Isolation, dB | N/A | ≥35 |
| Uniformity, dB | ≤1.5 (Mux-DeMux Pair only) | |
| Directivity, dB | ≥45 | |
| Optical Input Return Loss, dB | ≥45 | |
| Polarization Dependent Loss, dB | ≤0.15 | |
| Polarization Mode Dispersion (PMD), ps | ≤0.1 | |
| Thermal Stability Drift, pm/˚C | ≤1 | |
| Max. Optical Power, mW | 300 | |
| Max. Tensile Load, N | 5 | |
| Storage Temperature, ˚C | -40~85 | |
| Operating Temperature, ˚C | 0~70 | |

## Application




DWDM MUX must be used with DEDMUX on the other side

- Access networks
- Metro WDM systems
- Long haul WDM systems
- Enterprise networks
- Telecommunication
- Cellular Application
- Fiber optical amplifier
- Metro Network /Access Network/FTTH
- CATV fiber optic links

## Ordering Information

**FRM220-DW□□-□□-□□□-□□□**

- DX : DeMux
- MX : Mux
- Channel: 4 : 4ch, 8 : 8ch, H : 16ch
- Spacing: 1 : 100GHz
- Grid Wavelength

| Model Name | Description |
|---|---|
| FRM220-DWab-cd-xxx-xxx | ab → DX : DeMux, MX : Mux |
| | c → 4 : 4ch, 8 : 8ch, H : 16ch |
| | d → 1 : 100GHz |
| | xxx → Grid wavelength |

Please select all that apply from below list

### 100Ghz Grid Wavelength

☐ D21 ☐ D22 ☐ D23 ☐ D24 ☐ D25 ☐ D26 ☐ D27 ☐ D28 ☐ D29 ☐ D30
☐ D31 ☐ D32 ☐ D33 ☐ D34 ☐ D35 ☐ D36 ☐ D37 ☐ D38 ☐ D39 ☐ D40
☐ D41 ☐ D42 ☐ D43 ☐ D44 ☐ D45 ☐ D46 ☐ D47 ☐ D48 ☐ D49 ☐ D50
☐ D51 ☐ D52 ☐ D53 ☐ D54 ☐ D55 ☐ D56 ☐ D57 ☐ D58 ☐ D59 ☐ D60

### 100GHz Grid Wavelength

| Label | Frequency (THz) | Center Wavelength (nm) |
|---|---|---|
| D21 | 192.1 | 1560.61 |
| D22 | 192.2 | 1559.79 |
| D23 | 192.3 | 1558.98 |
| D24 | 192.4 | 1558.17 |
| D25 | 192.5 | 1557.36 |
| D26 | 192.6 | 1556.55 |
| D27 | 192.7 | 1555.75 |
| D28 | 192.8 | 1554.94 |
| D29 | 192.9 | 1554.13 |
| D30 | 193.0 | 1553.33 |
| D31 | 193.1 | 1552.52 |
| D32 | 193.2 | 1551.72 |
| D33 | 193.3 | 1550.92 |
| D34 | 193.4 | 1550.12 |
| D35 | 193.5 | 1549.32 |
| D36 | 193.6 | 1548.51 |
| D37 | 193.7 | 1547.72 |
| D38 | 193.8 | 1546.92 |
| D39 | 193.9 | 1546.12 |
| D40 | 194.0 | 1545.32 |
| D41 | 194.1 | 1544.53 |
| D42 | 194.2 | 1543.73 |
| D43 | 194.3 | 1542.94 |
| D44 | 194.4 | 1542.14 |
| D45 | 194.5 | 1541.35 |
| D46 | 194.6 | 1540.56 |
| D47 | 194.7 | 1539.77 |
| D48 | 194.8 | 1538.98 |
| D49 | 194.9 | 1538.19 |
| D50 | 195.0 | 1537.40 |
| D51 | 195.1 | 1536.61 |
| D52 | 195.2 | 1635.82 |
| D53 | 195.3 | 1535.04 |
| D54 | 195.4 | 1534.25 |
| D55 | 195.5 | 1533.47 |
| D56 | 195.6 | 1532.68 |
| D57 | 195.7 | 1531.90 |
| D58 | 195.8 | 1531.12 |
| D59 | 195.9 | 1530.33 |
| D60 | 196.0 | 1529.55 |

## Order Form

Example:

**FRM220-DW M X - 4 1 - D 2 1 - D 2 4**

→ DWDM, Mux, 4 channels, 100GHz, 1560.61, 1559.79, 1558.98, 1558.17 Grid Wavelength

**FRM220-DW□□-□□-□□□-□□□**

# FRM220-CWDM

## CWDM Mux/DeMUX



The FRM220 CWDM Mux/DeMux are modular design cards that support ITU-T G.694.2 wavelengths between 1271nm to 1611nm in 20nm increments. The FRM220 CWDM modules are protocol and rate transparent allowing different services such as 10G Ethernet, 10GFC, STM-64, OC-192 to be transported across the same fiber link. The passive FRM220 CWDM Mux/DeMux modules are available in 4,8 and 16-Channel (wavelength) models, supporting a variety of wavelength combinations and port configurations. The small and compact size of the CWDM modules yields one of the highest port densities in the industry. A 2U high 19-module FRM220 chassis populated with modules can yield up to 120 channels of capacity. FRM220 CWDM modules are passive devices that require no external power. They can also be installed in an FRM220 powered chassis with a NMC management module[1] and can be managed using SmartView EMS device management software, third-party SNMP software, Telnet or a serial console port. The modules can be installed in any FRM220 chassis equipped with other FRM220 media converters and transponders to provide a multi-service platform capable of delivering Ethernet, TDM, Voice and other services across a CWDM fiber common link.

## Feature

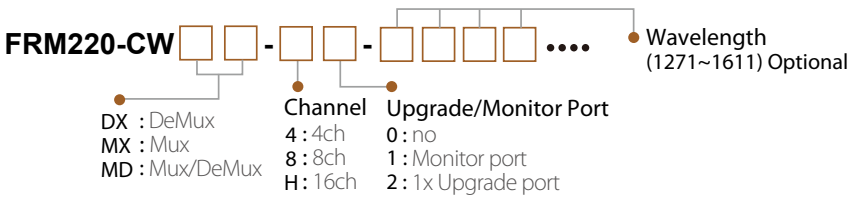
- Full native mode performance
- Passive model requires no power
- Protocol transparent, no limitation
- Utilizes industry standard ITU CWDM wavelength
- Standard LC connectors
- Passive device that can be installed in a powered chassis for managed applications
- Integration with Transponder in FRM220 chassis for CWDM application

## Specifications

| | |
|---|---|
| **Channel** | 4, 8 or 16 channels |
| **Standards** | ITU-T G.694.2 |
| **Wavelength** | 1271 ~ 1611nm |
| **Insertion Loss** | 4ch < 1.8dB, 8ch < 2.8dB, 16ch < 3.6dB |
| **Return Loss** | >45dB |
| **Option** | Upgrade port |
| | Wide 1310 ± 50 nm |
| **Line Link** | Single fiber or two fiber |
| **Connector** | LC / UPC |
| **Dimension** | 4ch : 155x 23 x88 mm (D x W x H) |
| | 8/16ch : 155x 42 x88 mm (D x W x H) |
| **Weight** | 4ch : 200g |
| | 8/16ch : 380g |

| | |
|---|---|
| **Temperature** | 0 ~ 50°C (Operating) |
| | -40 ~ 70°C (Storage) |
| **Humidity** | 0 ~95% (non-condensing) |
| **Certification** | CE, FCC |

## Ordering Information




| Model Name | Description |
|---|---|
| FRM220-CWab-cd-xxxx | ab → DX : DeMux, MX : Mux, MD : Mux/DeMux |
| | c → 4 : 4ch, 8 : 8ch, H : 16ch |
| | d → 0 : no, 1 : Monitor port, 2 : 1x Upgrade Port |
| | xxxx → Wavelength optional (1271~1611) |

## Order Form

Example:

4ch:

**FRM220-CW[M][D]-[4][2]-[A][B][C][D]**

└► CWDM, Mux/DeMux, 4 channels, 1x upgrade port, 1271, 1291, 1311, 1331 Wavelength

**FRM220-CW☐☐-☐☐-☐☐☐☐**

8ch:

**FRM220-CW[D][X]-[8][0]-[A][B][C][D][I][J][K][L]**

└► CWDM, DeMux, 8 channels, Dual Fiber, 1271, 1291, 1311, 1331, 1471, 1491, 1511, 1531 Wavelength

**FRM220-CW☐☐-☐☐-☐☐☐☐☐☐☐☐**

16ch:

**FRM220-CW[M][X]-[H][1]-[Z]**

└► CWDM, Mux, 16 channels, monitor port, 1271~1611 Wavelength

**FRM220-CW☐☐-☐☐-☐**

Please select all that apply from below list

| | | | |
|---|---|---|---|
| ☐ A 1271 | ☐ B 1291 | ☐ C 1311 | ☐ D 1331 |
| ☐ E 1351 | ☐ F 1371 | ☐ G 1431 | ☐ H 1451 |
| ☐ I 1471 | ☐ J 1491 | ☐ K 1511 | ☐ L 1531 |
| ☐ M 1551 | ☐ N 1571 | ☐ O 1591 | ☐ P 1611 |

☐ Z All Wavelengths

NEW

# FRM220-OPS51
# FRM220-OPS52

## Fiber Optical Protection Switch

FRM220-OPS Series are able to provide fiber path redundancy on a channel by channel basis. These units are particularly well suited for protection in any type of fiber data transmission. This solution includes monitoring capabilities for both the working and protected path fibers. In case of a fiber cut in the active path, traffic will be switched over to the protected path in less than 50ms (FRM220-OPS51) or 20ms (FRM220-OPS52). Monitoring is available through SNMP Management when both card is placed in FRM220 rack with SNMP management. The management can view the converter card's status, type, version, fiber link status and alarms. The card can be configured to enable or disable the port, reset the port, and configure receive threshold levels for path switching.

## Feature

- Latch feature, if power is lost the switch remains in its current state
- Protection transition < 50 ms (FRM220-OPS51)
- Protection transition < 20 ms (FRM220-OPS52)
- Works with any combination of 1 ~16 wavelengths
- Traffic is switched in one of three modes : revertive,non-revertive, manual
- Programmable Rx threshold setting for switch-over
- Optical Interface Type : LC connectors
- Working and protected lines are physically separated fiber

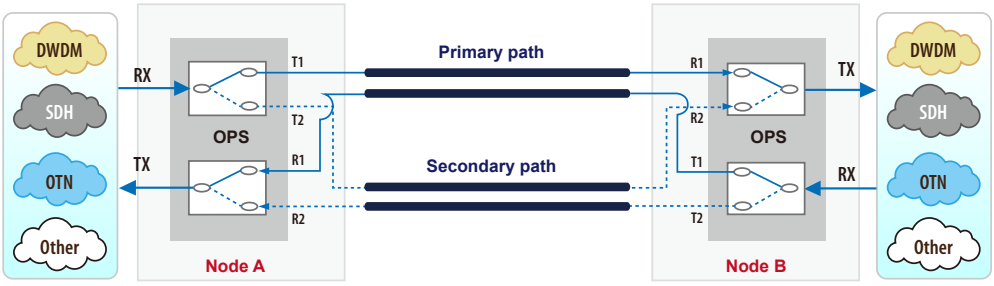
## Specifications

| | |
|---|---|
| Connecter | LC |
| LEDs | Power System, Working Path, Protection Path, Work mode |
| Power | DC 12V In |
| Operating Wavelength | 1260 ~ 1620 |
| Switch Type | 2x1 / Latching |
| Input Power (Optical) | -35~5dBm |
| Accuracy | ≤ 0.5dBm |
| Insertion Loss | ≤ 2.5 (Pair) (FRM220-OPS51), ≤ 5.5dB (FRM220-OPS52) |
| Return Loss | ≥ 45dB |
| Cross-talk | ≥ 60dB |

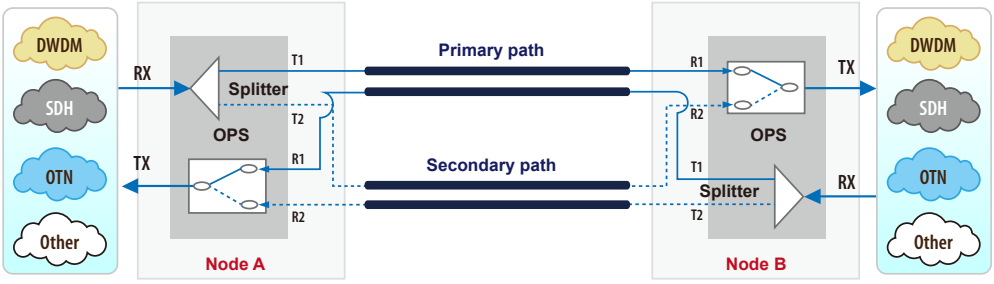
| | |
|---|---|
| Polarization Dependent Loss (PDL) | ≤ 0.15dB |
| Input Power Sensitivity | -35dBm |
| Restoration Time | ≤20ms |
| Power Consumption | < 6W |
| Dimensions | Card: 155 x 20.8 x 88mm (D x W x H) |
| Weight | 130g |
| Temperature | 0 ~ 50°C (Operating), -10 ~ 70°C (Storage) |
| Humidity | 10 ~ 90% non-condensing |
| Certification | CE, FCC |
| MTBF | 65,000 hours |

## Application

FRM220-OPS51▶ Working Theory




FRM220-OPS52▶ Working Theory




## Ordering Information

| Model Name | Description |
|---|---|
| FRM220-OPS51 | Fiber Optical Protection Switch with LC/PC connector, OPS module inside |
| FRM220-OPS52 | Fiber Optical Protection Switch with LC/PC connector, splitter inside |

**Note:** This card must use CH01M, with serial console, to configure standalone settings. For SNMP management, place this card in CH02/NMC or CH04A Chassis.

Naming Rule

**FRM220-OPS5** □

- Optical Switch Mode
  - 1 : Splitter Inside
  - 2 : OPS module inside

# FRM220-10GC-TS

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

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

## Feature

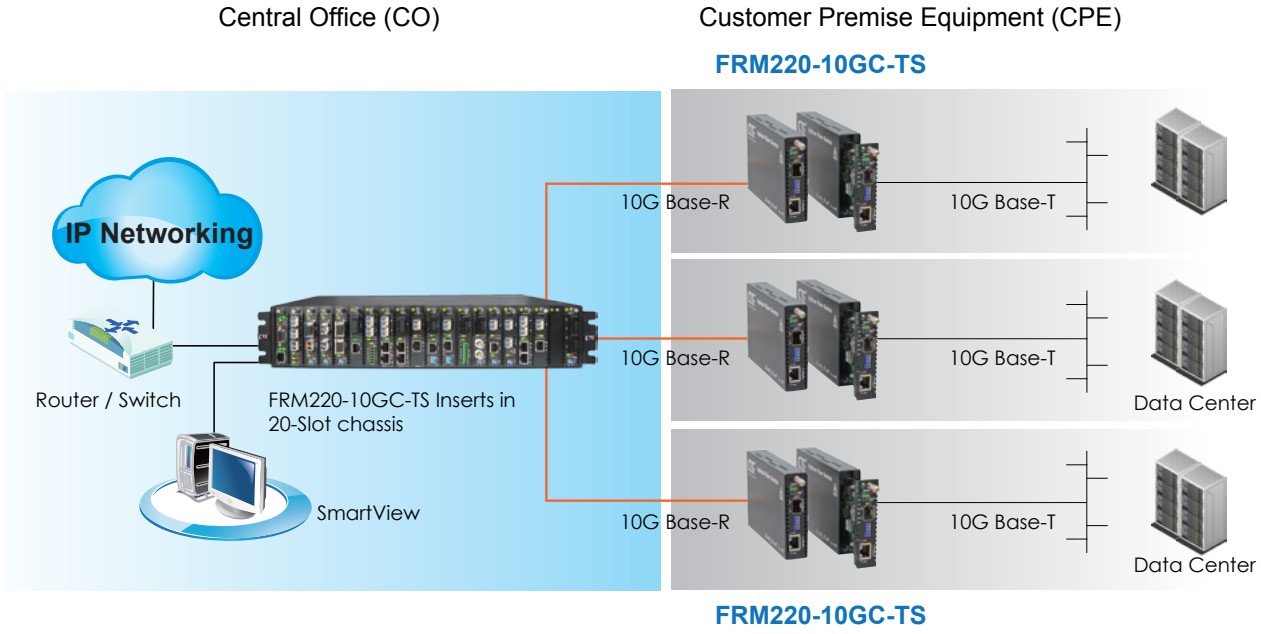
- Network Management via FRM220 Chassis
- Complies with IEEE802.3an 10GBase-T and IEEE802.3ae 10GBase-R
- Real-Time conversion between 10GBase-T and 10GBase-R
- Common used SFP+ fiber interface and RJ45 connector
- Full duplex wire speed forwarding
- Forwarding l8k bytes jumbo packet
- Loopback Test
- Link Fault Pass Through
- Fiber Fault Alert
- IEEE 802.1q VLAN pass through
- Supports manual Dip Switch for quick set up

## Specifications

| | | |
|---|---|---|
| **Optical Interface** | Connector | SFP+ LC |
| | Data rate | 10.3125Gbps |
| | Distance | 300m, 10km, 40km, 80km |
| | Wavelength | 1550nm, 1310nm, 850nm, WDM |
| **Electrical Interface** | Connector | RJ45 |
| | Data rate | 10Gbps |
| | Cable type | Cat.6a, 7 |
| | Distance | 95 meters (Cat.7) |
| **Management** | Console port | RS-232 via CH01M, DIP Switch with CH01 |
| **Standards** | IEEE 802.3an, IEEE 802.3ae | |

| | |
|---|---|
| **LEDs** | SFP+, LR, Link/Act, LBK A/B, SYS |
| **Power** | 12VDC |
| **Power Consumption** | < 12W |
| **Dimensions** | Card: 155 x 20.8 x 88mm (D x W x H) |
| **Weight** | 130g |
| **Temperature** | 0 ~ 50°C (Operating), -10 ~ 70°C (Storage) |
| **Humidity** | 0 ~ 85% non-condensing |
| **Certification** | CE, FCC |
| **MTBF** | 57,000 hrs |

## Application




## Ordering Information

| Model Name | Description |
|---|---|
| FRM220-10GC-TS | 10G Base-T RJ45 to 10G Base-R SFP+, with DIP switch (optional SFP+) |

# FRM220-MSW404

## 4x 10/100/1000Base-T + 4x 100/1000Base-X L2+ Gigabit Carrier Ethernet Switch (NID)



The CTC Union's FRM220-MSW404 is the new generation of carrier grade Ethernet demarcation device for business connection and mobile backhaul transportation service delivered by carriers. The FRM220-MSW404 is equipped 4 SFP slots in dual rate 100/1000Base-X and 4 ports 10/100/1000Base-T RJ45 network interfaces. It is designed to enable E-Line, E-LAN, E-Tree services which are CE (Carrier Ethernet) 2.0 compliant for Metro Ethernet network deployments.

The FRM220-MSW404 device enables carriers and service providers to delivered SLA-based network service with extensive fault detection and diagnostic capabilities which are compliant with the latest Ethernet OAM standards such as IEEE 802.3ah, IEEE 802.1ag and ITU-T Y.1731. With built-in RFC2544 feature sets, The FRM220-MSW404 also enables the service providers to perform the SLA verification anytime to ensure the quantitative latency, jitter and throughput delivery performance indexes. The CE2.0 compliant functions support EVCs and 3 colors marker QoS traffic management to enable service providers managing bandwidth and enforce SLA guaranteed. This card may be controlled and monitored via an NMC in a managed chassis or used as a completely manageable device when used stand-alone. Stand-alone management supports Telnet/SSH, HTTP/HTTPS and SNMP v1, v2C or v3.

## Feature

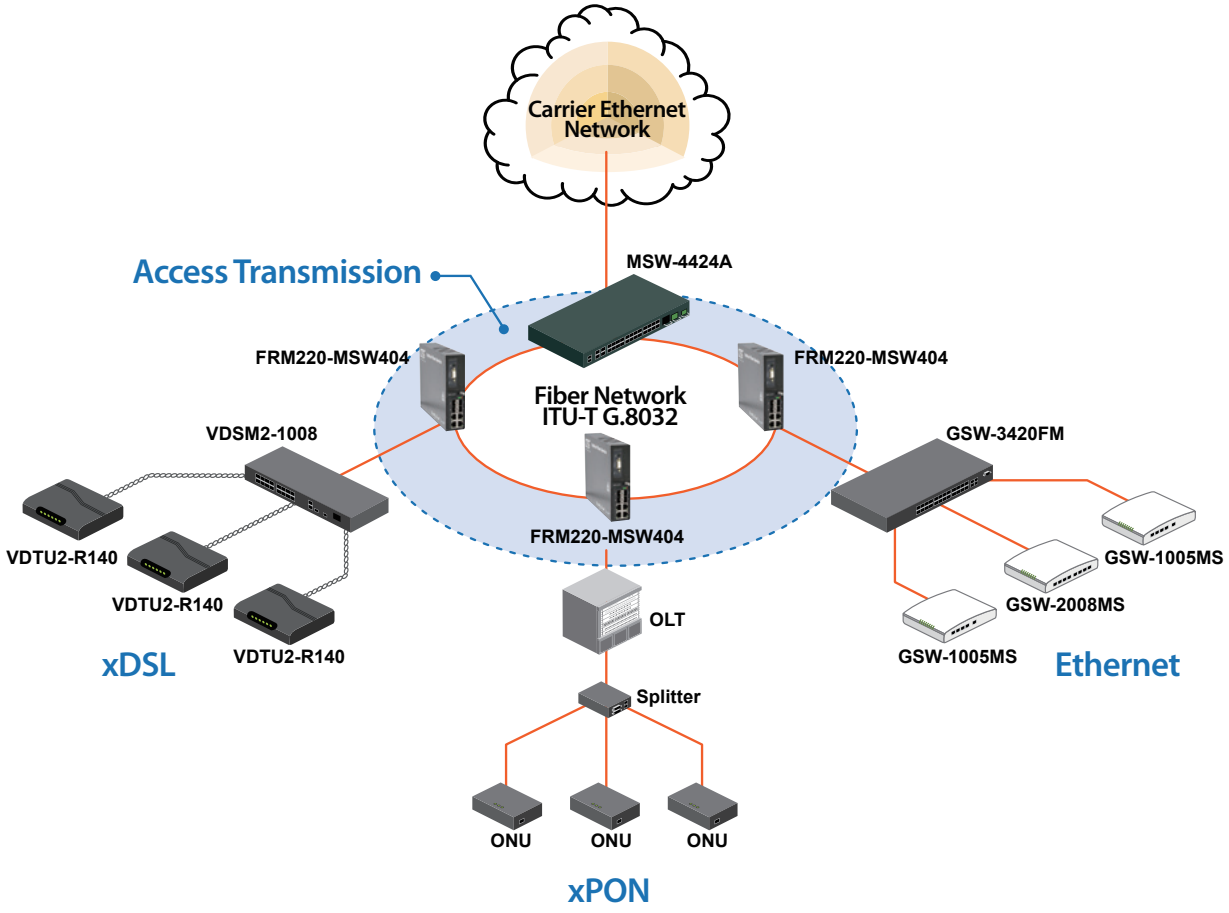
- The next generation of Ethernet demarcation device, at customer premise, fulfilling the large-scale carrier Ethernet deployment for intelligent business connection and mobile backhaul services complied to CE 2.0 standard.
- CE2.0 standards compliant product guarantees the fully interoperability with other MEF certified equipment and reduces the risks and cost of Carrier Ethernet network deployment for operators and service providers.

## Specifications

| | |
|---|---|
| **Interface** | 100/1000Mbps SFP slots x 4 + 10/100/1000Base-T RJ45 x 4 |
| **Filter & Forward Rate** | 14880pps at 10Mbps, 148800pps at 100Mbps, 1488000pps at 1Gbps |
| **Switching Fabric Capacity** | 16Gbps |
| **Transmission Method** | Store and Forward Switching |
| **Standard** | IEEE 802.3u, IEEE 802.3z, IEEE 802.3ae, IEEE 802.3x, IEEE 802.1p, IEEE 802.1Q, IEEE 802.1ad, IEEE 802.1D, IEEE 802.1w, IEEE 802.1s, IEEE 802.1x, IEEE 802.3ad |
| **Packet Buffer** | 8M bits |
| **MAC Table Size** | 8K |
| **Max. Packet Size** | 10K Bytes |
| **VLAN Feature** | IEEE 802.1Q tagged VLAN(Max. 4K VLAN groups), port based VLAN, MAC based VLAN, protocol based VLAN, private VLAN, IEEE 802.1ad Q-in-Q, VLAN Translation, GVRP |
| **QoS Feature** | IEEE 802.1p 8 priority queues per port, CoS based on switch port; VLAN ID; DSCP; TCP/UDP port,<br>IEEE 802.1p priority tag remarking, DSCP remarking,<br>Port based ingress/egress rate limit<br>3 colors marker-CIR/EIR/Burst bandwidth control |
| **L2 switching protection** | STP, RSTP, MSTP, ITU-T G.8031/G.8032 Ethernet ring protection |
| **Trunking** | IEEE 802.3ad LACP(Max. 4 trunking group, Max. 8 ports per trunking group) |
| **Security** | IEEE 802.1x port based access control, MAC based access control authentication, RADIUS authentication, limited MAC address learning, IP/MAC binding, ACL rule based filtering, TACACS+, IP source guard, DHCP snooping/relay option 82, ARP inspection |
| **IP Multicasting** | IGMP throttling, IGMP filtering, IGMP fast leave, IGMP snooping v1/v2/v3, MVR, MLD snooping v1/v2 |
| **Storm Control** | Unicast/Broadcast/Multicast storm suppression |
| **Management** | Web/Telnet CLI/SNMP/console interface, Web/CLI authentication, SSH v2, HTTPs, port mirroring, syslog, IPv6 management, NTP, SNTP |

| | |
|---|---|
| **SNMP Agent** | SNMP v1/v2c/v3, RMON Group 1,2,3 and 9 |
| **Software Upgrade** | TFTP/HTTP |
| **Ethernet OAM** | IEEE 802.3ah, IEEE 802.1ag, ITU-T Y.1731, RFC2544 |
| **LED Display** | Power, System, Console, Link, Speed/Act |
| **Power Input** | 100V ~ 240VAC, -18 ~ -72VDC |
| **Power Consumption** | < 20W |
| **Operating Temperature** | 0 ~ 50°C |
| **Humidity** | 5% ~ 90% (non-condensing) |
| **Dimensions** | Card: 155 x 42.1 x 88 mm (D x W x H) |
| **Regulatory** | FCC, CE |

## Application




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

## Ordering Information

| Model Name | Description |
|---|---|
| FRM220-MSW404 | 4 x SFP Slots in Dual Rate 100/1000Base-X and 4x 10/100/1000Base-T RJ45 OAM Managed Carrier Ethernet Switch |

**FRM220 – MSW404** ☐
Example: FRM220 – MSW404

**Note:** To Support Console Interface managed, this card must be placed in CH02M chassis.

- Standalone type is available. Please refer to page :


www.ctcu.com
sales@ctcu.com

# FRM220-MSW202

## 2x 10/100/1000Base-T + 2x 100/1000Base-X L2+ Gigabit Carrier Ethernet Switch (EDD)



FRM220-MSW202 is a carrier class Ethernet Demarcation Device (EDD) with 2 x 10/100/1000Base-T Ethernet ports and 2 x 100/1000Base-X dual rate SFP fiber ports which enables EPL (Ethernet Private Line) & EVPL (Ethernet Virtual Private Line) services with advanced carrier Ethernet features per the Metro Ethernet Forum (MEF 9 and 14). By supporting link and service Ethernet OAM schemes, the FRM220-MSW202 also provides extensive fault detection and diagnostic capabilities to ensure that actual network use complies with pre-agreed service level agreements (SLAs). This card may be controlled and monitored via an NMC in a managed chassis or used as a completely manageable device when used stand-alone. Stand-alone management is supported by Telnet/SSH, HTTP/HTTPS and SNMP v1, v2C or v3.

## Feature

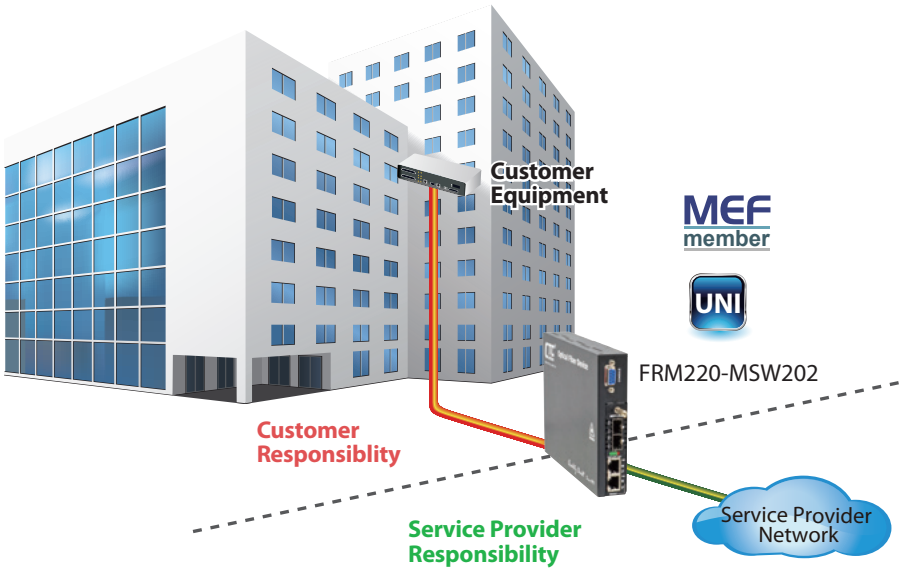
- Complies with MEF CE1.0
- Supports 8K MAC
- Spanning Tree 802.1D, 802.1s, 802.1w
- Supports 802.1Q / 4K active VLANs
- Double VLAN Tagging (C-tag/S-tag) (IEEE 802.1ad) support for ISP application
- Various QoS capability (MAC/port/802.1p/Diffserv)
- Port-based rate limiting
- DHCP Snooping
- IGMP Snooping
- IPv6 support
- IEEE 802.3x and IEEE 802.1x support
- Jumbo frame for up to 9.6K
- Extensive Ethernet OAM support
- IEEE 802.3ah, IEEE 802.1ag, ITU-T Y.1731
- SNMP v1/v2c/v3, Telnet, Web GUI
- IEEE 1588 V2 aware (Optional)

## Specifications

| | |
|---|---|
| **Interface** | 100/1000Mbps SFP slots x 2 + 10/100/1000Base-T RJ45 x 2 |
| **Filter & Forward Rate** | 14880pps at 10Mbps, 148800pps at 100Mbps, 1488000pps at 1Gbps |
| **Switching Fabric Capacity** | 8Gbps |
| **Transmission Method** | Store and Forward Switching |
| **Standard** | IEEE 802.3u, IEEE 802.3z, IEEE 802.3ab, IEEE 802.3x, IEEE 802.1p, IEEE 802.1Q, IEEE 802.1ad, IEEE 802.1D, IEEE 802.1w, IEEE 802.1s, IEEE 802.1x, IEEE 802.3ad, IEEE802.3ah, IEEE802.1ag<br>ITU-T Y.1731, ITU-T G.8031, ITU-T G.8032 |
| **Packet Buffer** | 4M bits |
| **MAC Table Size** | 8K |
| **Max. Packet Size** | 9.6K Bytes |
| **VLAN Feature** | IEEE 802.1Q tagged VLAN(Max. 4K VLAN groups), port based VLAN, MAC based VLAN, protocol based VLAN, private VLAN, IEEE 802.1ad Q-in-Q, VLAN translation, GVRP |
| **QoS Feature** | IEEE 802.1p 8 priority queues per port, CoS based on switch port; VLAN ID; DSCP; TCP/UDP port,<br>IEEE 802.1p priority tag remarking, DSCP remarking,<br>Port based ingress/egress rate limit<br>3 colors marker-CIR/EIR/Burst bandwidth control |
| **L2 switching protection** | STP, RSTP, MSTP, ITU-T G.8031/G.8032 Ethernet ring protection |
| **Trunking** | IEEE 802.3ad LACP(Max. 2 trunking group, Max. 4 ports per trunking group) |
| **Security** | IEEE 802.1x port based access control, MAC based access control authentication, RADIUS authentication, limited MAC address learning, IP/MAC binding, ACL rule based filtering, TACACS+, IP source guard, DHCP snooping/relay option 82, ARP inspection |
| **IP Multicasting** | IGMP throttling, IGMP filtering, IGMP fast leave, IGMP snooping v1/v2/v3, MVR, MLD snooping v1/v2 |
| **Storm Control** | Unicast/Broadcast/Multicast storm suppression |

| | |
|---|---|
| **Management** | Web/Telnet CLI/SNMP/console interface, Web/CLI authentication, SSH v2, HTTPs, port mirroring, syslog, IPv6 management, NTP, SNTP, sFlow |
| **SNMP Agent** | SNMP v1/v2c/v3, RMON Group 1,2,3 and 9 |
| **Software Upgrade** | TFTP/HTTP |
| **Ethernet OAM** | IEEE 802.3ah, IEEE 802.1ag, ITU-T Y.1731 |
| **LED Display** | Power, System, Console, Link, Speed/Act |
| **Power Input** | 100V ~ 240VAC, -18 ~ -72VDC |
| **Power Consumption** | < 12W |
| **Operating Temperature** | 0 ~ 50°C |
| **Humidity** | 5% ~ 90% (non-condensing) |
| **Dimensions** | Card: 201 x 135 x 35 mm (D x W x H) |
| **Regulatory** | FCC, CE |

## Application




## Ordering Information

| Model Name | Description |
|---|---|
| FRM220-MSW202 | 2x 10/100/1000Base-T + 2x 100/1000Base-X OAM Managed Switch |

**Note:** To Support Console Interface managed, this card must be placed in CH01M chassis.

# FRM220-MX210

## 10/100/1000Base-T + 2x 100/1000/2500Base-X and 100/1000Base-X L2+ Gigabit Carrier Ethernet Switch (EDD)



FRM220-MX210 is a carrier class Ethernet Demarcation Device (EDD) with 10/100/1000Base-T Ethernet ports + 2x 100/1000/2500Base-X and 100/1000Base-X SFP fiber ports which enables EPL (Ethernet Private Line) & EVPL (Ethernet Virtual Private Line) services with advanced carrier Ethernet features per the Metro Ethernet Forum (MEF 9 and 14). By supporting link and service Ethernet OAM schemes, the FRM220-MX210 also provides extensive fault detection and diagnostic capabilities to ensure that actual network use complies with pre-agreed service level agreements (SLAs).

## Feature

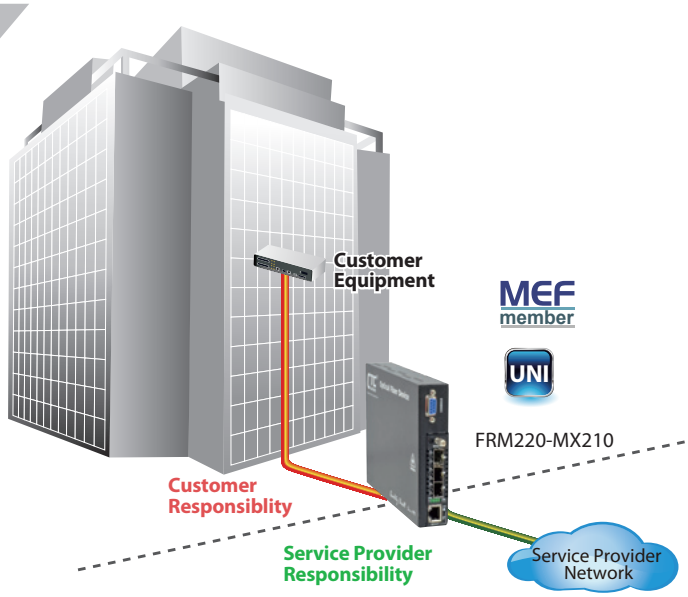
- Complies with MEF CE1.0
- Supports 8K MAC
- Spanning Tree 802.1D, 802.1s, 802.1w
- Supports 802.1Q / 256 active VLANs
- Double VLAN Tagging (C-tag/S-tag) (IEEE 802.1ad) support for ISP application
- Various QoS capability (MAC/port/802.1p/Diffserv)
- Port-based rate limiting
- DHCP Snooping
- IGMP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

## Specifications

| | | |
|---|---|---|
| **Optical Interface** | Port1/Port2 | 100Base-FX, 1000Base-X or 2500Base-X SFP-LC |
| | Port3 | 1000Base-FX or 1000Base-X SFP-LC |
| **Electrical Interface** | Port4 | 10/100/1000Base-T RJ45 |
| | | MDI/MDIX auto crossover |
| | | IEEE802.3x flow control |
| | (Supports manual 10,100,1000Base-T, Full, Half duplex, or n-way (Auto-Negotiation) each channel) | |
| **Standards** | IEEE 802.3 10Base-T, IEEE 802.3u, 100Base-TX, 100Base-FX, IEEE 802.3z 1000Base-X, IEEE 802.3ab, 1000Base-T | |
| **LEDs** | PWR, Link (Port1, Port2, Port3)<br>Port4: Link/Speed | |
| **VLAN Feature** | IEEE 802.1Q tagged VLAN, port based VLAN, | |
| | MAC based VLAN, protocol based VLAN, | |
| | private VLAN, IEEE 802.1ad Q-in-Q | |
| **Qos Feature** | IEEE 802.1p 8 priority queues per port, Cos based on switch port; VLAN ID; TCP/UDP port. | |

| | |
|---|---|
| **Qos Feature** | IEEE802.1p priority tag remarking, DSCP remarking, Port based ingress/egress rate limit |
| **L2 switching Protection** | STP, RSTP, MSTP, ITU-T G8031/G.8032 |
| **Trunking** | IEEE 802.3ad LACP |
| **Power** | 12VDC |
| **Power Consumption** | < 12W |
| **Dimensions** | Card: 155 x 20.8 x 88mm (D x W x H) |
| **Weight** | 120g |
| **Temperature** | 0 ~ 50°C (Operating), -10 ~ 70°C (Storage) |
| **Humidity** | 20 ~ 80% non-condensing (Operating);<br>10 ~ 90% (Storage) |
| **Certification** | CE, FCC |
| **MTBF** | 65,000 hrs |

## Application




## Ordering Information

| Model Name | Description |
|---|---|
| FRM220-MX210 | 10/100/1000Base-T + 2x 100/1000/2500Base-X + 100/1000Base-X OAM Managed Switch |

**Note:** To Support Console Interface managed, this card must be placed in CH01M chassis.

# FRM220A-1002ES

## 2x 10/100/1000Base-T + 2x 100/1000Base-X SFP GbE Switch

The FRM220A-1002ES is a dual copper and dual fiber Gigabit Ethernet switch designed to make conversion between 10/100/1000Base-T and 100/1000Base-SX/LX with SFP connector. With SNMP and Web-based management in the FRM220 or FRM220A chassis the network administrator can monitor, configure and control the activity of each FRM220A-1002ES switch card locally via the chassis management. Based on a powerful L2 switch architecture, this converter supports bandwidth control, duplex and speed configuration, VLAN tagging, Q-in-Q, QoS, jumbo frames as well as auto laser shutdown, and link fault pass through. When placed stand-alone, this card may only be managed via local serial console when placed in a CH01M single slot type chassis.

## Feature

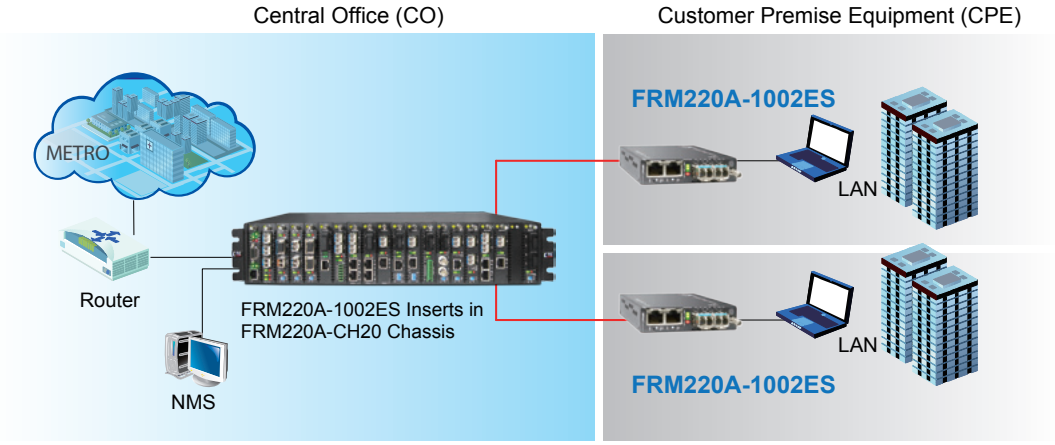
- 2-Port 10/100/1000Base-T and 2-Port 100/1000Base-X Switch
- Auto-Cross over for MDI/MDIX in TP port
- Auto-Negotiation or manual mode in TP port
- Supports flow control Enable or Disable
- Supports Jumbo Frame 10K Bytes
- Supports 16 Tag VLAN Group
- Supports Double VLAN tag (Q-in-Q)
- Supports Bandwidth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

## Specifications

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

| | | |
|---|---|---|
| **Certification** | FCC Part 15 Class A, CE Mark | |
| **Electrical Interface** | Connector | RJ45 |
| | Data rate | 10Mbps, 100Mbps, 1000Mbps |
| | Cable | 10Base-T Cat.3, 4, 5, UTP |
| | | 100Base-TX Cat.5, 5e or higher |
| | | 1000Base-X Cat.5e or higher |
| **Power** | 12VDC | |
| **Power Consumption** | < 12W | |
| **Dimensions** | Card: 155 x 20.8 x 88mm (DxWxH) | |
| **Weight** | 130g | |
| **Temperature** | 0~50°C (Operating), -10~70°C (Storage) | |
| **Humidity** | 0 ~ 95% non-condensing | |

## Application




## Ordering Information

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

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

# FRM220A-1000EAS/X

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



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

## Feature

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

## Specifications

| | | |
|---|---|---|
| **Optical Interface** | Connector | SFP LC |
| | Data rate | 125/1250Mbps |
| | Duplex mode | Full duplex |
| | Fiber | MM 50/125μm, 62.5/125μm. |
| | | SM 9/125μm |
| | Distance | MM 550m, 2km, SM 15/30/50/80/120km |
| | | WDM 20/40/60km |
| | Wavelength | MM 1310nm, SM 1310,1550nm |
| | | WDM 1310Tx/1550Rx (type A) |
| | | 1550Tx/1310Rx (type B) |
| **Power Consumption** | < 12W | |
| **Dimensions** | Card: 155 x 20.8 x 88mm (DxWxH) | |
| **Weight** | 130g | |

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

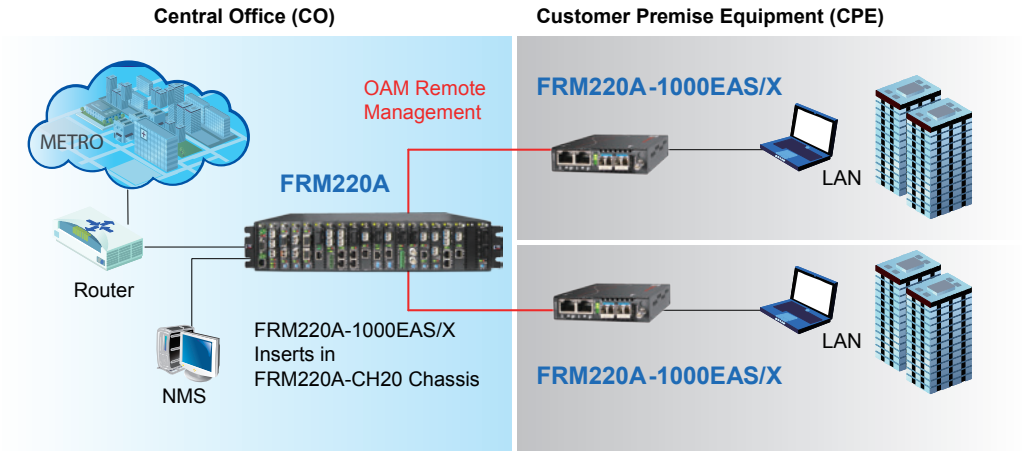
## Ordering Information

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

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

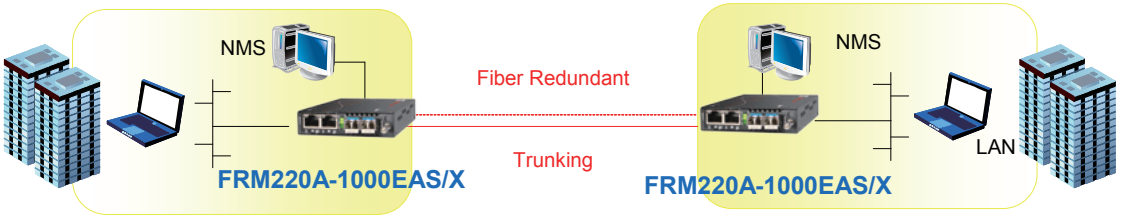
### FRM220A-1000EAS/X Application

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



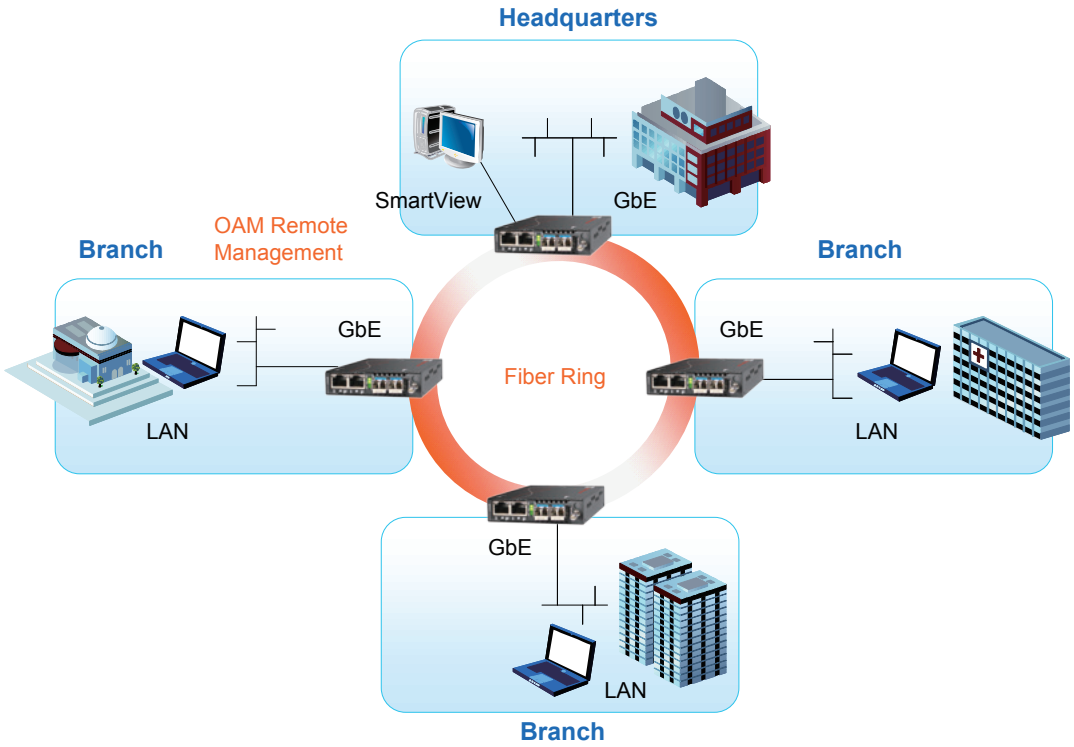

### Fiber Redundant / Trunking Application

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




### Fiber Ring Application

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



# FRM220-10/100

## 10/100Base-TX to 100Base-FX Unmanaged Media Converter



FRM220-10/100 is a Fast Ethernet 10/100Base-TX to 100Base-FX non-managed stand-alone media converter, which gives 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 core. 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 non-managed stand-alone converters may also be concentrated into either the FRM220-CH20 or FRM220-CH08 managed chassis.

## Feature

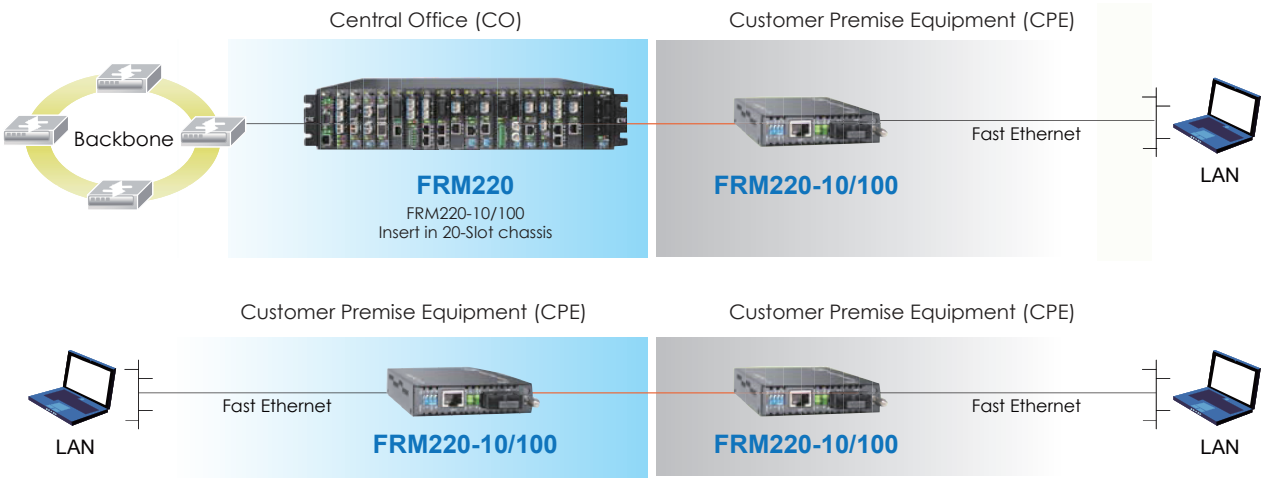
- 10/100Base-TX to 100Base-FX Converter
- Auto-Negotiation or forced mode
- Auto MDI/MDIX
- Forward 1600 bytes (Max.) packets
- Supports Q in Q double tagged frame transparent
- Supports IEEE 802.1q Tag VLAN pass thru
- Support flow control (Pause)
- Supports Link Fault Pass through (LFP)
- Forward 9K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

## Specifications

| | | |
|---|---|---|
| **Optical Interface** | Connector | 1x9 (SC, ST, FC) |
| | Data rate | 100Mbps |
| | Duplex mode | Full duplex |
| | Fiber | MM 50/125μm, 62.5/125μm |
| | | SM 9/125μm |
| | Distance | MM 2km, SM 15/30/50/80/120km |
| | | WDM 20/40/60/80km |
| | Wavelength | MM 1310nm, SM 1310,1550nm |
| | | WDM 1310Tx/1550Rx (type A) |
| | | 1550Tx/1310Rx (type B) |
| **Standards** | IEEE 802.3, IEEE 802.3u | |
| **Indications** | LED (Power, FX Link, TX SPD, TX Link, TX Duplex, FEF) | |
| **Certification** | CE, FCC, RoHS | |

| | | |
|---|---|---|
| **Electrical Interface** | Connector | RJ-45 |
| | Data rate | 10Mbps, 100Mpbs |
| | Cable | 10Base-T Cat.3, 4, 5, UTP, |
| | | 100Base-TX Cat.5, 5e or higher |
| **Power** | 12VDC | |
| **Power Consumption** | < 4W | |
| **Dimensions** | Card: 155 x 20.8 x 88mm (D x W x H) | |
| **Weight** | 120g | |
| **Temperature** | 0 ~ 60°C (Operating), -10 ~ 70°C (Storage) | |
| **Humidity** | 10 ~ 90% non-condensing | |
| **MTBF** | 65,000 hrs | |

## Application




## Ordering Information

| Model Name | Description |
|---|---|
| FRM220-10/100 | 10/100Base-TX to 100Base-FX unmanaged media converter |

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

Connector Type / Connectivity Distance

**FRM220 – 10/100 – □□□□□**

Example: FRM220 – 10/100 – SC002

# FRM220-1000DS

## 1000Base-X to 1000Base-X Media Converter

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

## Feature

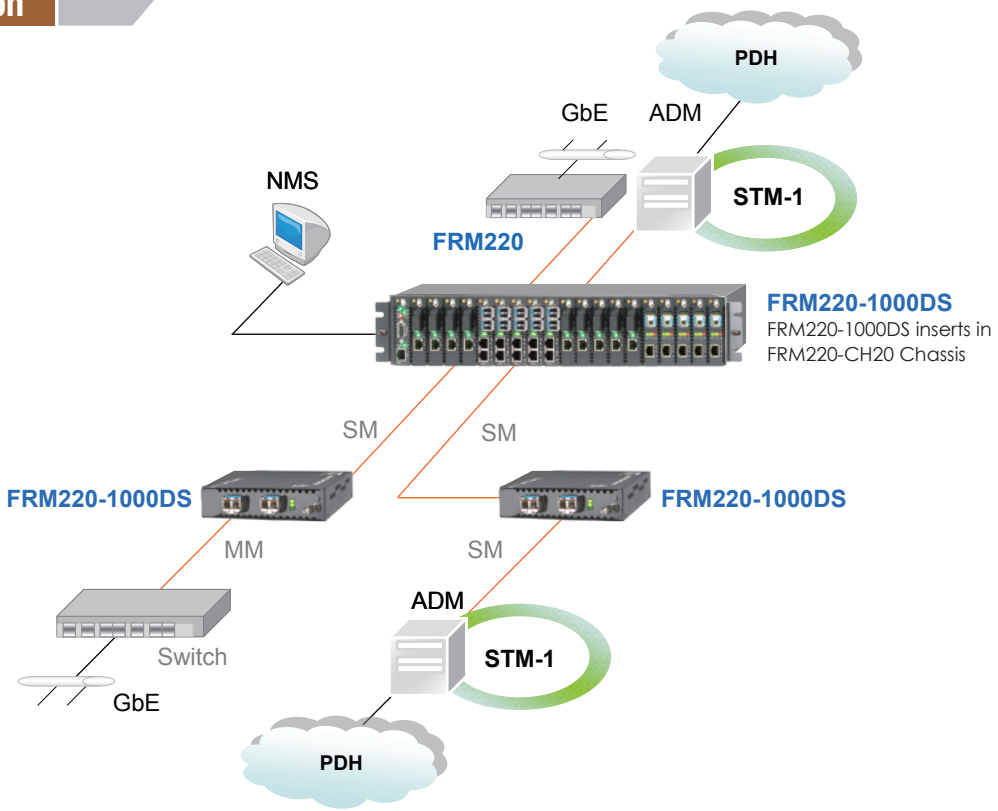
- Transparent FE or GbE fiber media converter / repeater
- Data rate up to 1G
- Network management via terminal or SNMP in FRM220 chassis
- Extend transmission from 2km to 120km over fiber
- Perform optical repeater function (Re-amplification & Reshaping)
- Digital diagnostic monitoring of SFP modules

## Specifications

| | | |
|---|---|---|
| **Optical Interface** | Connector | SFP LC x 2 |
| | Data rate | Up to 1G |
| | Duplex mode | Full duplex |
| | Fiber | MM 50/125μm, 62.5/125μm. |
| | | SM 9/125μm |
| | Distance | MM 550m, 2km, SM 15/30/50/80/120km |
| | | WDM 20/40/60km |
| | Wavelength | MM 1310nm, SM 1310,1550nm |
| | | WDM 1310Tx/1550Rx (type A) |
| | | 1550Tx/1310Rx (type B) |
| **Indications** | LED (Power, FX-Link1, FX-Link2) | |
| **Power Input** | 12VDC | |

| | |
|---|---|
| **Power Consumption** | < 6W |
| **Dimensions** | Card: 155 x 20.8 x 88 mm (D x W x H) |
| **Weight** | 130g |
| **Temperature** | 0 ~ 50°C (Operating), -10 ~ 70°C (Storage) |
| **Humidity** | 10 ~ 90% non-condensing |
| **Certification** | CE, FCC |
| **MTBF** | 65,000 hrs |

## Application






www.ctcu.com
sales@ctcu.com

## Ordering Information

| Model Name | Description |
|---|---|
| FRM220-1000DS | 1000Base-X SFP to 1000Base-X SFP Media Converter (Optional SFP) |

***Accessories***

### Multi-Mode 1.25Gbps SFP

| | |
|---|---|
| SFM-7000-S85 | 1.25G SX, MM, 550m, 850nm, 8.5dB, 3.3V, LC |
| SFM-7000-S85-DD | 1.25G SX, MM, 550m, 850nm, 8.5dB, 3.3V, LC, DD |
| SFM-7000-L31 | 1.25G LX, MM, 2km, 1310nm, 10dB, 3.3V, LC |
| SFM-7000-L31-DD | 1.25G LX, MM, 2km, 1310nm, 10dB, 3.3V, LC, DD |

### Single-Mode 1.25Gbps SFP

| | |
|---|---|
| SFS-7020-L31 | 1.25G LX, SM, 20km, 1310nm, 15dB, 3.3V, LC |
| SFS-7020-L31-DD | 1.25G LX, SM, 20km, 1310nm, 15dB, 3.3V, LC, DD |
| SFS-7040-L31 | 1.25G LX, SM, 40km, 1310nm, 20dB, 3.3V, LC, DFB LD |
| SFS-7040-L31-DD | 1.25G LX, SM, 40km, 1310nm, 20dB, 3.3V, LC, DFB LD, DD |

### Single Fiber 1.25Gbps SFP

| | |
|---|---|
| SFS-7020-WA | 1.25G WDM, 20km, Tx1310nm / Rx1550nm (A type), 3.3V, LC |
| SFS-7020-WA-DD | 1.25G WDM, 20km, Tx1310nm / Rx1550nm (A type), 3.3V, LC, DD |
| SFS-7020-WB | 1.25G WDM, 20km, Tx1550nm / Rx1310nm (B type), 3.3V, LC |
| SFS-7020-WB-DD | 1.25G WDM, 20km, Tx1550nm / Rx1310nm (B type), 3.3V, LC, DD |
| SFS-7040-WA | 1.25G WDM, 40km, Tx1310nm / Rx1550nm (A type), 3.3V, LC |
| SFS-7040-WA-DD | 1.25G WDM, 40km, Tx1310nm / Rx1550nm (A type), 3.3V, LC, DD |
| SFS-7040-WB | 1.25G WDM, 40km, Tx1550nm / Rx1310nm (B type), 3.3V, LC |
| SFS-7040-WB-DD | 1.25G WDM, 40km, Tx1550nm / Rx1310nm (B type), 3.3V, LC, DD |

# FRM220-1000TS

## 1000Base-T to 1000Base-X SFP Media Converter

The FRM220-1000TS is a transparent Gigabit Ethernet 1000Base-T to 1000Base-SX/LX SFP converter with very low latency. They are managed (when installed in FRM220 with NMC) 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 types 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.

## Feature

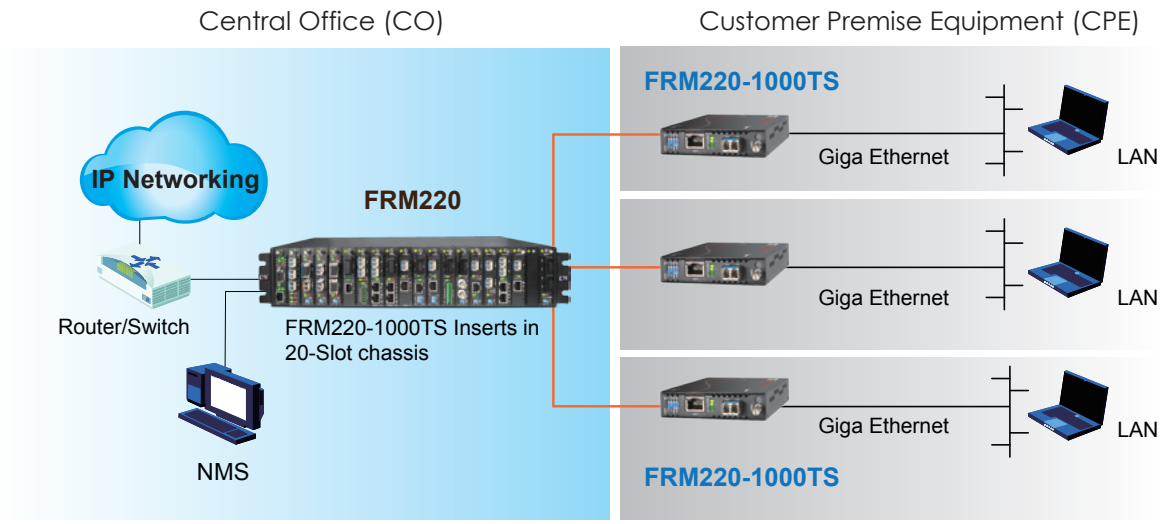
- 1000Base-T to 1000Base-SX/LX
- Network management via terminal or SNMP in FRM220 chassis
- Auto-negotiation or force mode
- Auto MDI/MDIX
- Forward > 9K bytes packets
- Supports Link Fault Pass Through (LFP) function
- Auto Laser Shutdown (ALS)
- Protocol Transparent

## Specifications

| | | |
|---|---|---|
| **Optical Interface** | Connector | SFP LC |
| | Data rate | 1000Mbps |
| | Duplex mode | Full duplex |
| | Fiber | MM 50/125μm, 62.5/125μm |
| | | SM 9/125μm |
| | Distance | MM 550m, 2km, SM15/30/50/80/120km |
| | | WDM 20/40/60km |
| | Wavelength | MM 1310nm, SM 1310,1550nm |
| | | WDM 1310Tx/1550Rx (type A) |
| | | 1550Tx/1310Rx (type B) |
| **Electrical Interface** | Connector | RJ45 |
| | Data rate | 1000Mbps |
| | Duplex mode | Full duplex |
| | Cable | 10Base-T Cat.3, 4, 5, UTP |

| | |
|---|---|
| **Standard** | IEEE 802.3ab |
| **Indications** | LED (Power, FX-Link, FX Duplex, TX-SPD, TX-Duplex, TX-Link) |
| **Power Input** | Card : 12VDC |
| | Standalone : AC, DC options |
| **Power Consumption** | < 12W |
| **Dimensions** | Card: 155 x 20.8 x 88mm (D x W x H) |
| **Weight** | 120g |
| **Temperature** | 0 ~ 50°C (Operating), -10 ~ 70°C (Storage) |
| **Humidity** | 10 ~ 90% non-condensing |
| **Certification** | CE, FCC, LVD |
| **MTBF** | 65,000 hrs (25°C) |

## Application




## Ordering Information

| Model Name | Description |
|---|---|
| FRM220-1000TS | 1000Base-T to 1000Base-X SFP media converter (Optional SFP) |

# FRM220-1000M

## Web Smart OAM Managed 10/100/1000Base–T to 1000Base–X GbE Media Converter



The FRM220-1000M is an IEEE802.3ah OAM compliant copper to fiber Gigabit Ethernet solution designed to make conversion between 10/100/1000Base-T and 100M/1000Base-X with SC, FC or ST connectors. With SNMP and Web-based management in the FRM220, the network administrator can monitor, configure and control the activity of each 802.3ah series card and remotely connected OAM compliant converter. Converter settings include band-width control, duplex, and speed configuration, VLAN tagging and limited Q-in-Q support. When used as stand-alone converters, the 1000M can be managed by a friendly WebSmart user interface via any web browser.

## Feature

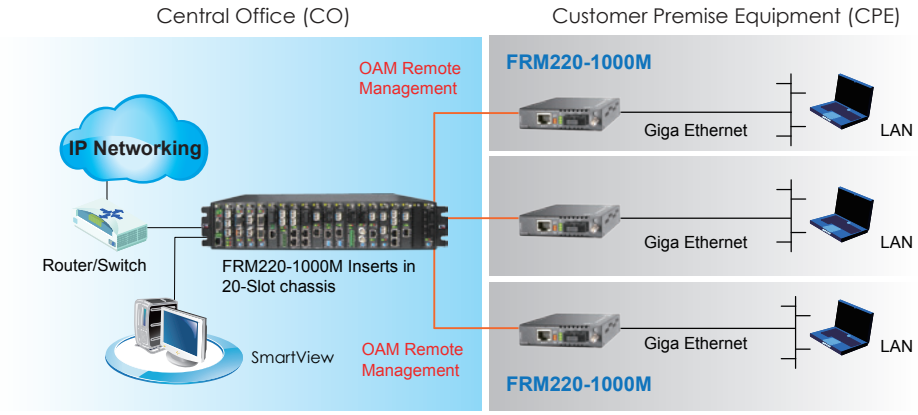
- 10/100/1000Base-T to 1000Base-X Converter
- Auto-Cross over for MDI/MDIX in TP port
- Auto-Negotiation or manual mode in TP port
- Supports flow control Enable or Disable
- Supports Jumbo Frame 9K Bite
- Ingress / Egress bandwidth control
- Supports IEEE 802.3ah OAM in-band management
- Firmware upgrade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

## Specifications

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

| | |
|---|---|
| **Standards** | IEEE 802.3, IEEE 802.3u IEEE 802.3ab, 802.3z, 802.3ah, 802.1Q |
| **Indications** | LED (Power, FX-Link, LAN Speed, LAN Link) |
| **Power Input** | 12VDC |
| **Power Consumption** | < 6W |
| **Dimensions** | Card: 155 x 20.8 x 88mm (D x W x H) |
| **Weight** | 120g |
| **Temperature** | 0 ~ 50°C (Operating), -10 ~ 70°C (Storage) |
| **Humidity** | 10 ~ 90% non-condensing |
| **Certification** | CE, FCC |
| **MTBF** | 65,000 hrs |

## Application




## Ordering Information

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

| Connector Type | Connectivity Distance |
|---|---|
| SC | 002: 2km 015: 15km 030: 30km 050: 50km<br>20A: WDM 20km A type 20B: WDM 20km B type 40A: WDM 40km A type 40B: WDM 40km B type |

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

# FRM220-1000MS

## Web Smart OAM Managed 10/100/1000Base–T to 100/1000Base–X SFP GbE Media Converter

The FRM220-1000MS is an IEEE802.3ah OAM compliant copper to fiber Gigabit Ethernet solution designed to make conversion between 10/100/1000Base-T and 100/1000Base-X with SFP modules. With SNMP and Web-based management in the FRM220, the network administrator can monitor, configure and control the activity of each 802.3ah series card and remotely connected OAM compliant converter. Converter settings include bandwidth control, duplex, and speed configuration, VLAN tagging, limited Q-in-Q support and SFP DDMI. When used as stand-alone converters, the 1000M can be managed by a friendly WebSmart user interface via any web browser.

## Feature

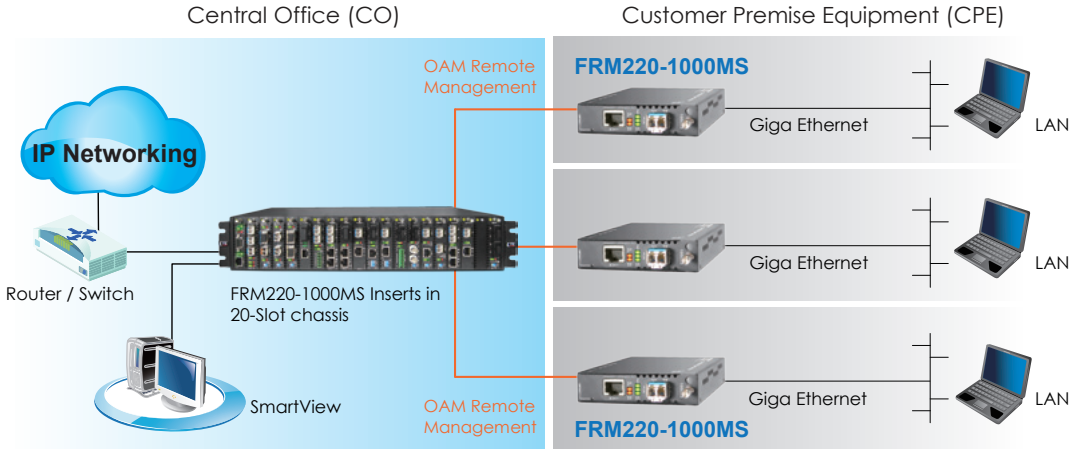
- 1-Port 10/100/1000Base-T to 100/1000Base-X Converter
- Auto-Cross over for MDI/MDIX in TP port
- Auto-Negotiation or manual mode in TP port
- Supports flow control Enable or Disable
- Supports Jumbo Frame 9K Packet
- Ingress / Egress bandwidth control
- Supports 802.3ah-OAM in-band management
- Firmware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

## Specifications

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

| | |
|---|---|
| **Standards** | IEEE 802.3, 802.3u, 802.3ab, 802.3z, 802.3ah, 802.1Q |
| **Indications** | LED (Power, FX-Link, LAN Speed, LAN Link ) |
| **Power Input** | 12VDC |
| **Power Consumption** | < 6W |
| **Dimensions** | Card: 155 x 20.8 x 88mm (D x W x H) |
| **Weight** | 120g |
| **Temperature** | 0 ~ 50°C (Operating), -10 ~ 70°C (Storage) |
| **Humidity** | 10 ~ 90% non-condensing |
| **Certification** | CE, FCC |
| **MTBF** | 65,000 hrs |

## Application




## Ordering Information

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

**Note:** This card may use CH01M to provide console for initial TCP/IP settings, or use CH01 with default IP.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# FRM220-1000EAS/X-1

## OAM/IP Managed 10/100/1000Base–T to 100/1000Base–X SFP GbE Media Converter



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

## Feature

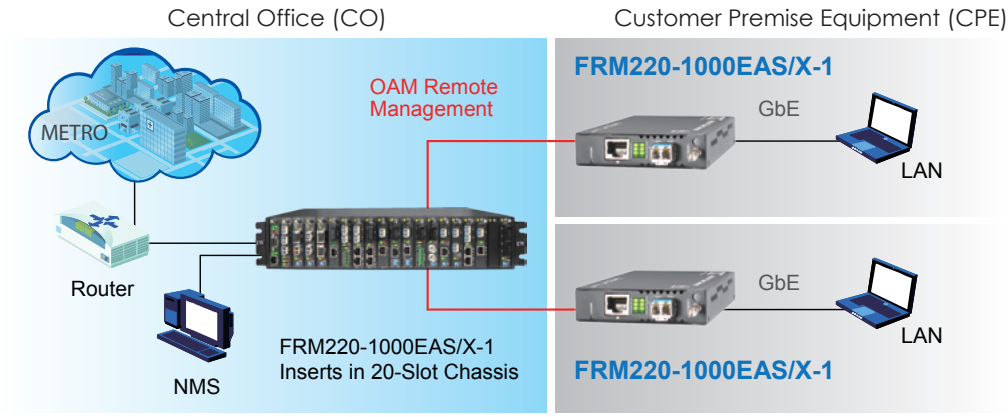
- 10/100/1000Base-T to 100/1000Base-X SFP
- Supports local / remote IEEE802.3ah OAM/ IP In-band management
- Stand-alone IP Based, Web GUI, Telnet, SNMP management
- Auto-Negotiation or forced mode
- Auto MDI/MDIX
- Supports IEEE 802.1Q Tagging
- Supports Q in Q double tagging
- Forward 10K bytes Jumbo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

## Specifications

| | | |
|---|---|---|
| **Optical Interface** | Connector | SFP LC |
| | Data rate | 100/1000Mbps |
| | Duplex mode | Full duplex |
| | Fiber | MM 50/125μm, 62.5/125μm. |
| | | SM 9/125μm |
| | Distance | MM 550m, 2km, SM 15/30/50/80/120km |
| | | WDM 20/40/60km |
| | Wavelength | MM 1310nm, SM 1310, 1550nm |
| | | WDM 1310Tx/1550Rx (type A) |
| | | 1550Tx/1310Rx (type B) |
| **Power Consumption** | < 8W | |
| **Dimensions** | Card: 155 x 20.8 x 88mm (D x W x H) | |
| **Weight** | 120g | |

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

## Application




## Ordering Information

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

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

# FRM220-100EAS/X-1

(Order Name - **FRM220-100AS-1**)

## OAM/IP Managed 10/100Base–TX to 100Base–FX FE Media Converter

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

## Feature

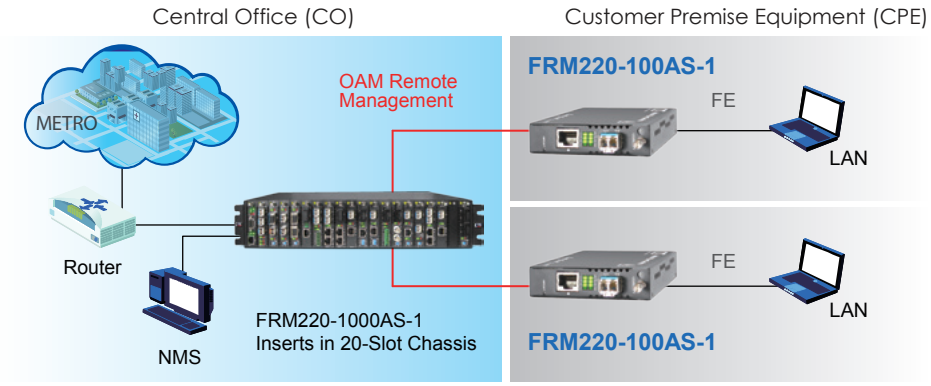
- 10/100Base-TX to 100Base-FX SFP
- Supports local / remote IEEE802.3ah OAM/ IP In-band management
- Stand-alone IP Based, Web GUI, Telnet, SNMP management
- Auto-Negotiation or forced mode
- Auto MDI/MDIX
- Supports IEEE 802.1Q Tagging
- Supports Q in Q double tagging
- Max. MTU size 10K bytes
- Supports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

## Specifications

| | | |
|---|---|---|
| **Optical Interface** | Connector | SFP LC |
| | Data rate | 100Mbps |
| | Duplex mode | Full duplex |
| | Fiber | MM 50/125µm, 62.5/125µm.<br>SM 9/125µm |
| | Distance | MM 550m, 2km, SM15/30/50/80/120km<br>WDM 20/40/60km |
| | Wavelength | MM 1310nm, SM 1310, 1550nm<br>WDM 1310Tx/1550Rx (type A)<br>1550Tx/1310Rx (type B) |
| **Power Consumption** | < 12W | |
| **Dimensions** | Card: 155 x 20.8 x 88mm (D x W x H) | |
| **Weight** | 120g | |
| **Electrical Interface** | Connector | RJ45 |
| | Data rate | 10Mbps, 100Mbps |
| | Duplex mode | Half / Full duplex |

| | |
|---|---|
| **Electrical Interface** | Cable: 10Base-T Cat.3, 4, 5, UTP<br>100Base-TX Cat.5, 5e or higher |
| **Standards** | IEEE 802.3, IEEE 802.3u, IEEE 802.1Q, ITU-T G.664 |
| **Indications** | LED : Power, FX-Link, FEF, TEST, Speed(10,100), FULL |
| **Power Input** | Card : 12VDC<br>Standalone : AC, DC options |
| **Temperature** | Storage conditions<br>Temperature range : -5~+45°C<br>Relative Humidity : 5~95% Rh<br>Absolute Humidity : 1~25g H2O/$m^3$<br>Operation conditions<br>Temperature range : -5~+45°C<br>Relative Humidity : 5~95% Rh<br>Exist conditions for condensation and icing<br>Absolute Humidity : 1~29g H2O/$m^3$ |
| **Certification** | CE, FCC, EN60950 LVD compliant |
| **MTBF** | 65,000 hrs |

## Application




## Ordering Information

| Model Name | Description |
|---|---|
| FRM220-100AS-1 | 10/100Base-TX to 100Base-FX with OAM/IP-Based managed FE Media Converter (optional SFP) |

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

# FRM220-10/100i

## In–Band Management 10/100Base–TX to 100Base–FX Media Converter



The FRM220-10/100i is a 10/100Base Ethernet to 100Base-FX fiber slide-in card converter designed for central and remote applications. With advanced features like bandwidth control, this media converter is targeted for customer premises equipment in metro LAN, campus, enterprise and FTTx applications. By offering in-band management, this converter can be completely controlled and monitored from a centrally located managed rack controlling all converter settings including bandwidth control, duplex, and speed configuration. This media converter is completely transparent to Layer 2 and Layer 3 protocols including IEEE 802.1q, VLAN tag, Q in Q, STP, IPX, IP, etc. When used stand-alone, this converter has no access to management functions except to force Ethernet connection and apply Link Fault Pass-thru via setting of a 4-pole DIP switch.

## Feature

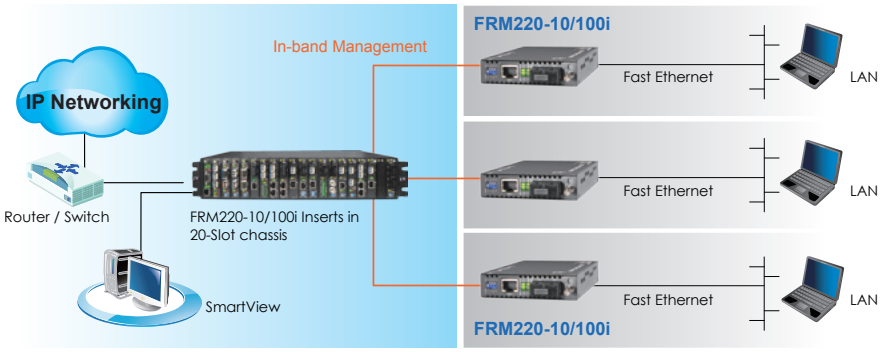
- 1-Port 10/100Base-TX to 100Base-FX Converter
- Auto-Negotiation or forced mode
- Supports remote CPE power fail detect (dying gasp)
- Supports Far End Fault Indication (FEFI)
- Supports Link Fault Pass-Through (LFPT)
- Supports Loop Back Test
- Supports RMON counter
- Auto Laser Shutdown (ALS)
- Auto MDI/MDIX
- Forward 2046 bytes (max.) packets in switch mode
- Forward 9K jumbo packets in converter mode
- Supports Q in Q double tagged frame transparent
- Supports IEEE 802.1q Tag VLAN pass thru
- Supports local / remote In-band management (Monitor and Configure) by the SNMP manager.
- Bandwidth control (Nx32Kbps or Nx512Kbps)
- Supports IEEE 802.3x flow control (Pause)
- Fiber Hardware Reset (FHR)
- Online local / remote f/w upgrade

## Specifications

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

| | |
|---|---|
| **Standards** | IEEE 802.3, IEEE 802.3u,TS-1000 |
| **Indications** | LED (Power, FEF, FX-Link, TX-SPD, TX-Duplex, TX-Link) |
| **Power Input** | 12VDC |
| **Power Consumption** | < 6W |
| **Dimensions** | Card: 155 x 20.8 x 88mm (D x W x H) |
| **Weight** | 120g |
| **Temperature** | 0 ~ 50°C (Operating), -10 ~ 70°C (Storage) |
| **Humidity** | 10 ~ 90% non-condensing |
| **Certification** | CE, FCC |
| **MTBF** | 65,000 hrs |

## Application




## Ordering Information

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

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

Connector Type / Connectivity Distance

**FRM220 – 10/100i – □□□□□**

Example: FRM220 – 10/100i – SC002

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

# FRM220-10/100iS-2

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

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

## Feature

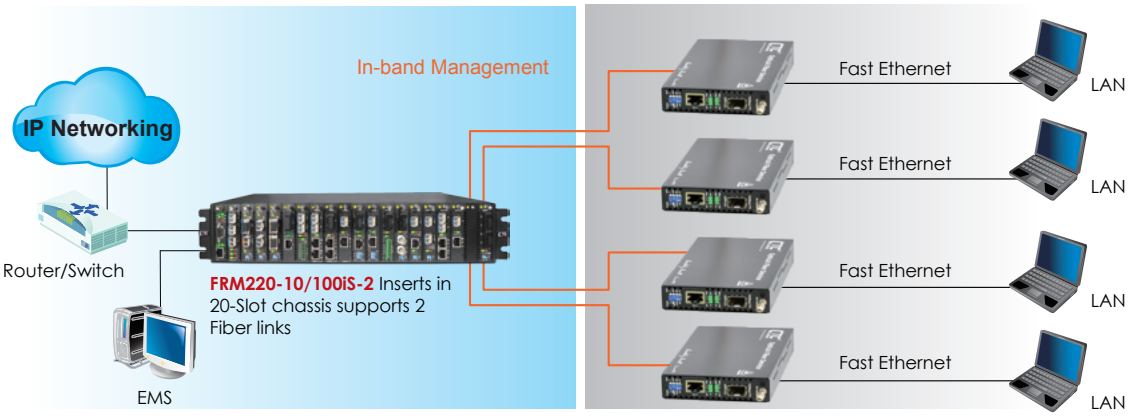
- Dual independent converters 10/100Base-TX to 100Base-FX
- Auto-Negotiation or forced mode
- Auto MDI/MDIX
- Forward 2046 bytes (max.) packets in switch mode
- Supports IEEE 802.1Q Tag VLAN pass thru
- Supports Q in Q double tagged frame transparent
- Forward 9K jumbo packets in converter mode
- Supports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

## Specifications

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

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

## Application




FRM220-10/100iS

## Ordering Information

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

**Note:** The Card is suitable use in CH01 standalone chassis.

# FRM220-FXO-4
## 4x FXO over Fiber
# FRM220-FXS-4
## 4x FXS over Fiber



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

## Feature

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

## Specifications

| | | |
|---|---|---|
| **Optical Interface** | Connector | SFP-LC |
| | Fiber | MM 62.2/125μm, 50/125μm, SM 9/125μm |
| | | Rate: 155Mbps |
| | Distance | MM 2km, SM 15/30/50km, WDM 20/40km |
| | Wavelength | MM 1310nm, SM 1310, 1550nm |
| | | WDM 1310Tx/1550Rx (type A) |
| | | 1550Tx/1310Rx (type B) |
| **Indications** | LED (Power, FX Link, Phone Act, Test) | |
| **Power Input** | 12VDC | |
| **Power Consumption** | < 6W (FRM220-FXO-4) | |
| | < 12W (FRM220-FXS-4) | |
| **Dimensions** | Card: 155 x 20.8 x 88mm (D x W x H) | |
| **Weight** | 120g | |
| **Temperature** | 0 ~ 50°C (Operating), -10 ~ 70°C (Storage) | |
| **Humidity** | 10 ~ 90% non-condensing | |
| **Certification** | CE, FCC | |
| **MTBF** | 65,000 hrs | |

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

## Application

**Figure 1** : Automatic Ring down hotline

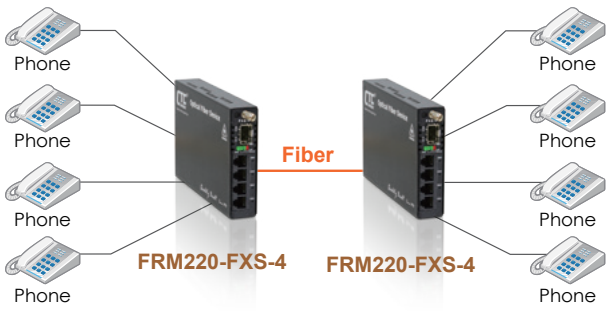
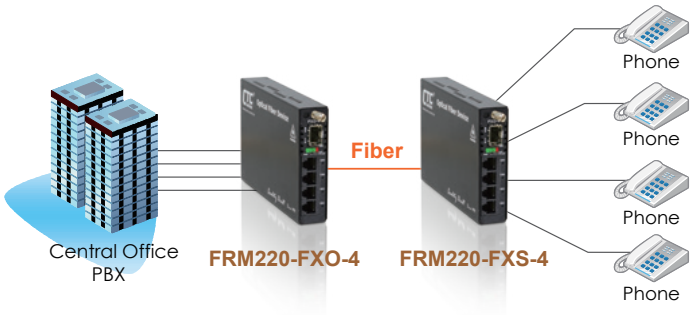



**Figure 2** : Voice transmission from 2km to 120km over fiber




## Ordering Information

| Model Name | Description |
|---|---|
| FRM220-FXO-4 | 4-port FXO fiber converter SFP-LC |
| FRM220-FXS-4 | 4-port FXS fiber converter SFP-LC |

Connector Type / Connectivity Distance

**FRM220 – FXO-4 –** □□□□□

Example: FRM220 – FXO-4 – SC002

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

# FRM220-FXO/FXS

## FXO/FXS over Fiber

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

## Feature

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

## Specifications

| | | |
|---|---|---|
| **Optical Interface** | Connector | 1x9 (SC) |
| | Fiber | MM 62.2/125μm, 50/125μm, SM 9/125μm |
| | | Rate: 155Mbps |
| | Distance | MM 2km, SM 15/30/50km, WDM 20/40km |
| | Wavelength | MM 1310nm, SM 1310, 1550nm |
| | | WDM 1310Tx/1550Rx (type A) |
| | | 1550Tx/1310Rx (type B) |
| **Indications** | LED (Power, FX Link, Phone Act, Test) | |
| **Power Input** | 12VDC | |
| **Power Consumption** | < 6W | |
| **Dimensions** | Card: 155 x 20.8 x 88mm (D x W x H) | |
| **Weight** | 120g | |
| **Temperature** | 0 ~ 50°C (Operating), -10 ~ 70°C (Storage) | |
| **Humidity** | 10 ~ 90% non-condensing | |
| **Certification** | CE, FCC | |
| **MTBF** | 65,000 hrs | |

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

## Application

**Figure 1** : Automatic Ring down hotline


**Figure 2** : Voice Transmission from 2km to 120km over fiber


**Figure 3** : Selectable FXO or FXS mode


## Ordering Information

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

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

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



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# FRM220A-iMux

## Ethernet over Bonded E1 NTU



The FRM220A-iMux is an E1 inverse multiplexer capable of bundling 4E1/ 8E1/16E1 lines for cost-effective connection of 10/100Base-TX LANs over multiple E1 transports. The FRM220A- iMux transmits 7.93Mbps (iMUX4)/ 15.87Mbps(iMUX8)/ 31.74Mbps(iMUX16) Ethernet bridge channel (GFP-F encapsulated) over multiple E1 links. The FRM220A-iMux bridges the gap between E1 and E3, allowing bridges to operate at faster rates. It also provides high speed access to SDH/SONET backbones where the only access services available are E1 lines. The FRM220A-iMux supports E1 attenuation of up to 43 dB on twisted pair or coax cable. This provides an approximate operating range up to 2km (using 22AWG). The FRM220A-iMUX fully comply the E1 specifications including ITU-T G.703 and G.823. The FRM220A-iMux features diagnostic capabilities for performing remote loopback The operator at either end of the line may test both FRM220A-iMux NTU and the line in the digital loopback mode. The Ethernet copper interface supports auto-negotiation and auto MDI/MDIX, allowing plug-and-play Ethernet connection without any additional configuration.

## Feature

- The FRM220A - iMUX connects one Fast Ethernet over 1-4 E1 links (1.984Mbps to 7.93Mbps) for iMUX4, over 1- 8 E1 links (1.984Mbps to 15.87Mbps) for iMUX8, over 1- 16 E1 links (1.984Mbps to 31.74Mbps) for iMUX16
- Built-in GFP bridge operates at WAN rate
- Maximum 220ms delay variance between E1 link
- Unbalanced E1/BNC or balanced E1/RJ45
- Fully compatible with FRM220A chassis
- SNMP management with FRM220A chassis
- LED Alarm indication & Auto-Negotiation
- Standalone RS232 console management via CH01M for iMUX4/iMUX8, CH02M for iMUX16
- Support MTU 1916 bytes

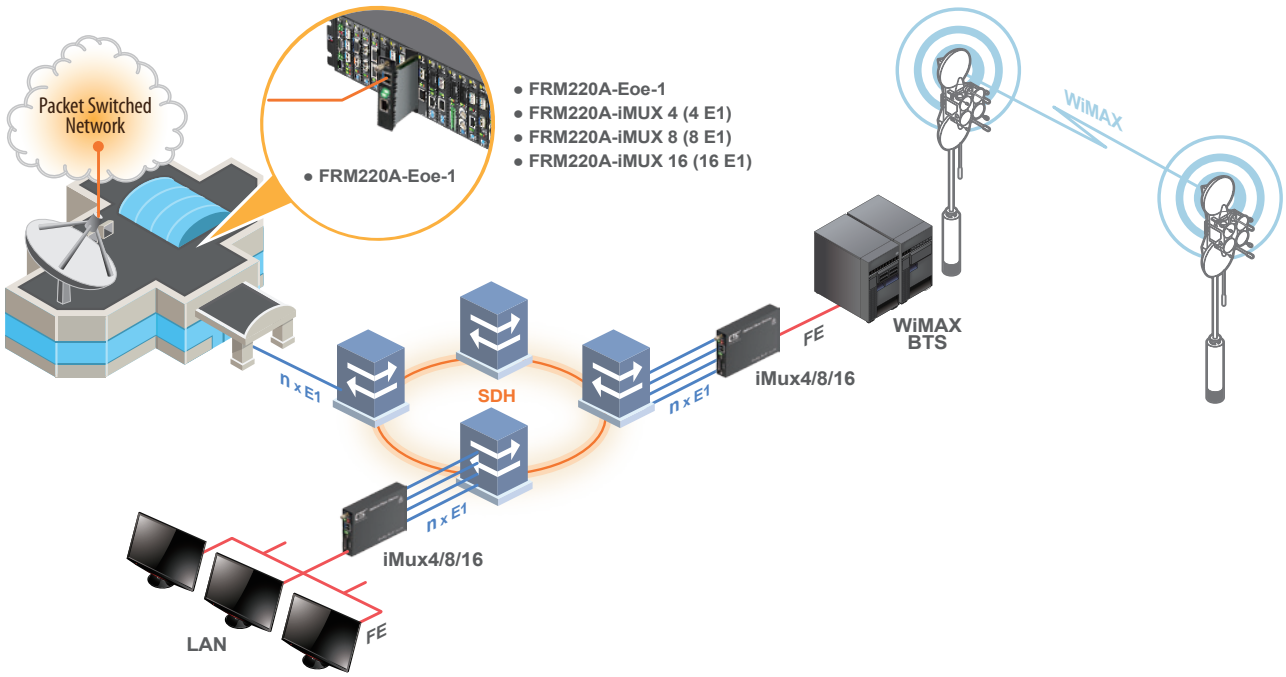
## Specifications

| | | |
|---|---|---|
| **E1 Interface** | Framing | CCS+CRC (Framed) |
| | Standard | ITU-T G.703/G.704/G.706 & G.732, G.823 |
| | Bit rate | 2.048Mbps± 50ppm (up to 5E1) |
| | Line code | HDB3 |
| | Clock setting | Internal OSC or recovery clock |
| | Receive level | -43dB |
| | Line impedance | 75 ohm (BNC) / 120 ohm (RJ45) |
| | Jitter Performance | Complies with ITU-T G.823 |
| | Pulse Mask | Complies with ITU-T G.703 |
| | Pulse amplitude | Nominal 2.37V ± 10% |
| | Delay Variance | 220ms |
| | Connector | RJ45, BNC |
| | Diagnostics | Digital remote loopback |
| **Ethernet Interface** | Standards | IEEE 802.3, 802.3u |
| **Ethernet Interface** | Data rate | 10/100Base-TX, Half/Full duplex |
| | Connector | RJ45 10/100Base-TX |
| | | Power, ALM, E1 signal loss |
| **Indications** | Power, ALM, E1 signal loss, E1 Alarm(AIS, LOF, RAI, LOMF), LAN link /ACT, 10/100M, SD (100Base-FX) | |
| **Power Input** | 12VDC | |
| **Power Consumption** | < 12W | |

| | |
|---|---|
| **Dimensions** | Card: 155 x 42.1 x 88mm (D x W x H) |
| **Weight** | 130g |
| **Temperature** | 0 ~ 50°C (Operating), -10 ~ 70°C (Storage) |
| **Humidity** | 10 ~ 90% RH (non-condensing) |
| **Certifications** | CE, FCC |
| **MTBF** | 65,000 hrs |

## Application

Fiber
Ethernet
E1




## Ordering Information

| Model Name | Description |
|---|---|
| FRM220A-iMux16T-R | 10/100Base-TX to 16 E1 mux card with 16E1 RJ45 cable |
| FRM220A-iMux16T-B | 10/100Base-TX to 16 E1 mux card with 16E1 BNC cable |
| FRM220A-iMux8T-R | 10/100Base-TX to 8 E1 mux card with 8 E1 RJ45 cable |
| FRM220A-iMux8T-B | 10/100Base-TX to 8 E1 mux card with 8 E1 BNC cable |
| FRM220A-iMux4T-R | 10/100Base-TX to 4 E1 mux card with 4E1 RJ45 cable |
| FRM220A-iMux4T-B | 10/100Base-TX to 4 E1 mux card with 4E1 BNC cable |

## Cable Type


RJ45 Cable


BNC Cable

**FRM220A – iMux16T – ☐**
Example: FRM220A – iMux16T – R

**Note:** This card may be locally configured by its own console when placed in CH02M with fan.
When connected as a remote to a managed central chassis, this card supports in-band management and only needs a CH02 chassis.

# FRM220-GFOM08

## 8x E1/T1+ GbE Fiber Multiplexer

The FRM220-GFOM08 is an 8 channel E1/T1 fiber multiplexer with an additional Gigabit Ethernet trunk, plus order wire and clear channel RS-232, constructed as a two slot wide card for the FRM220 series. When the FRM220-GFOM08 card is placed in the FRM220 rack with NMC, the management can view the converter card's status, type, version, fiber link status and alarms. Remote, fiber connected standalone card, can also be managed through in-band management via the chassis NMC. The card can be configured to enable or disable the port, reset the port, and provide local or remote diagnostic loopback. The 1+1 redundant optical aggregate of this multiplexer employs industry standard pluggable optics (SFP) operating at 1.25Gbps data rates. The SFP modules can be chosen to support single-mode, multi-mode, single fiber bi-directional or Coarse and Dense Wave Division Multiplexing (CWDM).

## Feature

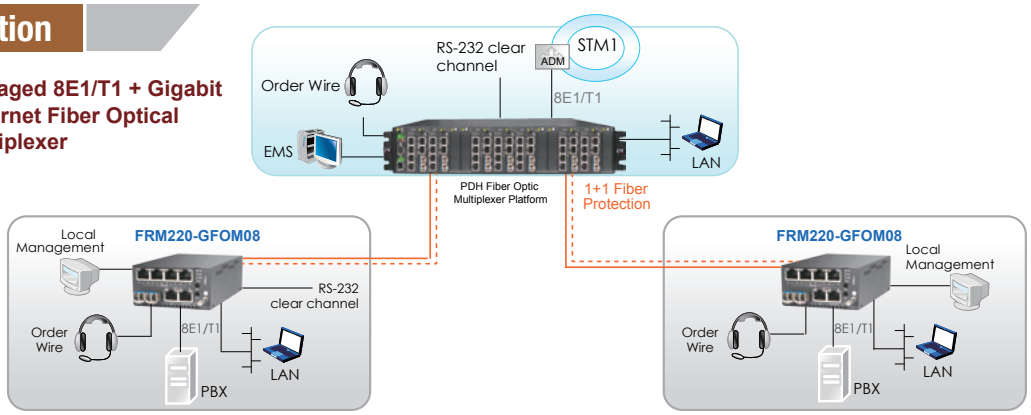
- 8 channels unframed E1/T1 (transparent)
- 10/100/1000Base-T Ethernet
- Auto MDI/MDIX & Auto-Negotiation or Force Mode
- Supports flow control 802.3x & 9K jumbo packets
- Supports link fault Pass-Through for Ethernet
- One clear channel RS232 up to 250Kbps(Async)
- 1+1 fiber protection, less than 50ms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

## Specifications

| | | |
|---|---|---|
| **E1/T1 ports** | Framing | Unframed (transparent) |
| | Bit Rate | E1:2.048 Mb/s , T1: 1.544Mb/s |
| | Line Code | E1:AMI/HDB3, T1: AMI/B8ZS |
| | Line Impedance | E1: Unbalanced 75 ohms (BNC) |
| | | E1: Balanced 120 ohms (RJ-45) |
| | | T1: Balanced 100 ohms (RJ-45) |
| | Receiver sensitivity | Short haul |
| | "Pulse" Amplitude | Nominal 2.37V+/-10% for 75 ohms |
| | | Nominal 3.00V+/-10% for 120 ohms |
| | "Zero" Amplitude | +/-0.3V |
| | Internal Timing | +/-30 ppm |
| | Jitter Performance | According to ITU-T G.823 |
| | Performance monitoring | According to ITU-T G.821 |
| | Standards | ITU-T G.703, G.704, G.706 and G.732 |
| | Interface Connectors | RJ-45 |
| **E1/T1 ports** | Test Loops | LLB (Local Loop Back) |
| | | NELB (Near End Loop Back) |
| **E1/T1 ports** | Test Loops | RLB (Remote Loop Back) |
| | | RRLB (Request Remote Loop Back) |
| **Fiber** | Connector | SFP LC |
| | Data Rate | 1.25 Gbps |
| **Ethernet** | Interface Type | 10/100/1000Base-T |
| | Connector | RJ-45 |
| | Standards | IEEE 802.3, 802.3u, 802.3ab |
| | Duplex modes | full/half |
| **Indications** | FX1 Link, FX2 link, E1/T1 Mode/Link/Loopback test, Order wire phone indicator, LAN Link/Speed. | |
| **Power Input** | 12VDC | |
| **Power Consumption** | < 12W | |
| **Dimensions** | Card: 155 x 42.1 x 88mm (D x W x H) | |
| **Weight** | 200g | |
| **Temperature** | 0 ~ 50°C (Operating), -10 ~ 70°C (Storage) | |
| **Humidity** | 10 ~ 90% RH (non-condensing) | |
| **Certifications** | CE, FCC | |

## Application

**Managed 8E1/T1 + Gigabit Ethernet Fiber Optical Multiplexer**




## Ordering Information

| Model Name | Description |
|---|---|
| FRM220-GFOM08-SR | 8x E1/T1 RJ45 and 1000Mbps Ethernet Fiber Mux with 4x2E1 RJ45 cable, optional SFP module (Model : SFS-70xx-xx) |
| FRM220-GFOM08-SB | 8x E1 BNC and 1000Mbps Ethernet Fiber Mux with 4x2E1 BNC cable, optional SFP module (Model : SFS-70xx-xx) |

2E1 RJ45 cable

**Note:** This card may be locally configured by its own console when placed in CH02M with fan.
When connected as a remote to a managed central chassis, this card supports in-band management and only needs a CH02M chassis.

# FRM220-GFOM04

## 4X E1/T1 + GbE Fiber Multiplexer

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

## Feature

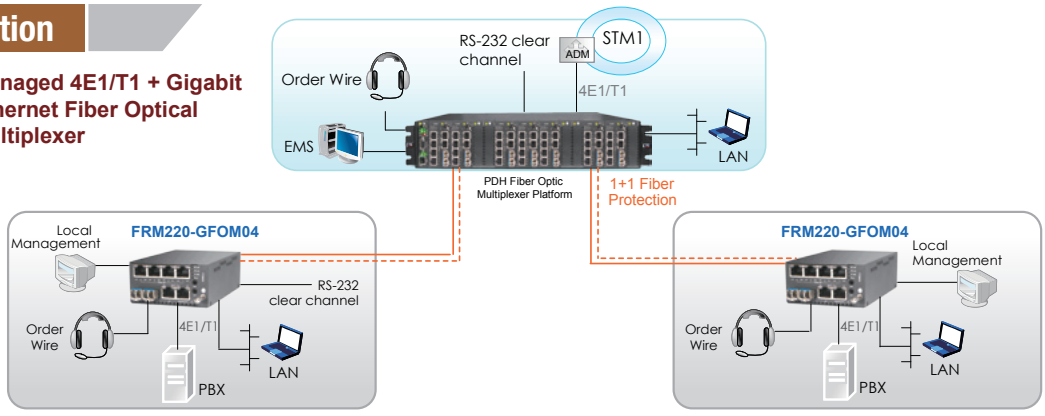
- 4 channels unframed E1/T1 (transparent)
- 10/100/1000Base-T Ethernet
- Auto MDI/MDIX & Auto-Negotiation or Force Mode
- Supports flow control 802.3x & 9K jumbo packets
- Supports link fault Pass-Through for Ethernet
- One clear channel RS232 up to 250Kbps(Async)
- 1+1 fiber protection, less than 50ms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

## Specifications

| | | |
|---|---|---|
| **E1/T1 ports** | Framing | Unframed (transparent) |
| | Bit Rate | E1:2.048 Mb/s , T1: 1.544Mb/s |
| | Line Code | E1:AMI/HDB3, T1: AMI/B8ZS |
| | Line Impedance | E1: Unbalanced 75 ohms (BNC) |
| | | E1: Balanced 120 ohms (RJ-45) |
| | | T1: Balanced 100 ohms (RJ-45) |
| | Receiver sensitivity | Short haul |
| | "Pulse" Amplitude | Nominal 2.37V+/-10% for 75 ohms |
| | | Nominal 3.00V+/-10% for 120 ohms |
| | "Zero" Amplitude | +/-0.3V |
| | Internal Timing | +/-30 ppm |
| | Jitter Performance | According to ITU-T G.823 |
| | Performance monitoring | According to ITU-T G.821 |
| | Standards | ITU-T G.703, G.704, G.706 and G.732 |
| | Interface Connectors | RJ-45 |
| **E1/T1 ports** | Test Loops | LLB (Local Loop Back) |
| | | NELB (Near End Loop Back) |
| **E1/T1 ports** | Test Loops | RLB (Remote Loop Back) |
| | | RRLB (Request Remote Loop Back) |
| **Fiber** | Connector | SFP LC |
| | Data Rate | 1.25 Gbps |
| **Ethernet** | Interface Type | 10/100/1000Base-T |
| | Connector | RJ-45 |
| | Standards | IEEE 802.3, 802.3u, 802.3ab |
| | Duplex modes | full/half |
| **Indications** | FX1 Link, FX2 link, E1/T1 Mode/Link/Loopback test, Order wire phone indicator, LAN Link/Speed. | |
| **Power Input** | 12VDC | |
| **Power Consumption** | < 12W | |
| **Dimensions** | Card: 155 x 42.1 x 88mm (D x W x H) | |
| **Weight** | 200g | |
| **Temperature** | 0 ~ 50°C (Operating), -10 ~ 70°C (Storage) | |
| **Humidity** | 10 ~ 90% RH (non-condensing) | |
| **Certifications** | CE, FCC | |

## Application

**Managed 4E1/T1 + Gigabit Ethernet Fiber Optical Multiplexer**




## Ordering Information

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

Connector Type

**FRM220 – GFOM04 – ☐☐**

Example: FRM220 – GFOM04 – SR

**Note:** This card may be locally configured by its own console when placed in CH02M with fan.
When connected as a remote to a managed central chassis, this card supports in-band management and only needs a CH02M chassis.



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# FRM220-FOM04

## 4x E1/T1+ FE Fiber Multiplexer

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

## Feature

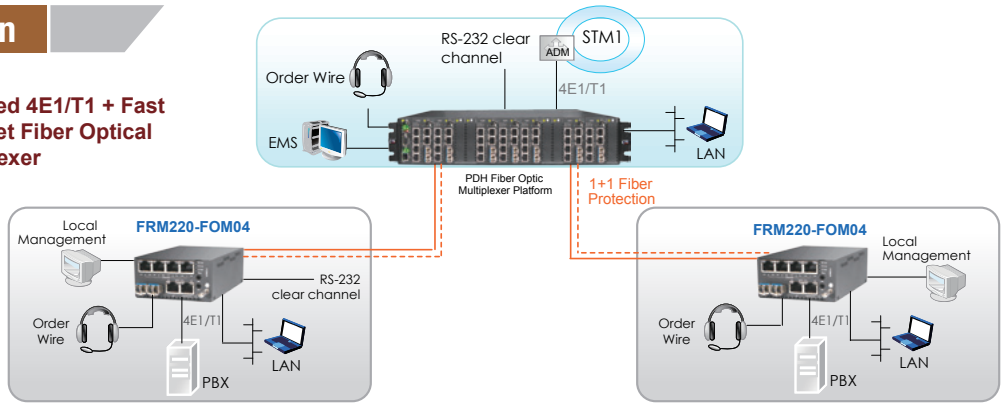
- 4 channels unframed E1/T1 (transparent)
- 10/100Base-TX Ethernet (100M wirespeed)
- Auto MDI/MDIX & Auto-Negotiation or Force Mode
- Supports flow control 802.3x & 9K jumbo packets
- Supports link fault Pass-Through for Ethernet
- One clear channel RS232 up to 250Kbps(Async)
- 1+1 fiber protection,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

## Specifications

| | | |
|---|---|---|
| **E1/T1 ports** | Framing | Unframed (transparent) |
| | Bit Rate | E1:2.048 Mb/s , T1: 1.544Mb/s |
| | Line Code | E1:AMI/HDB3, T1: AMI/B8ZS |
| | Line Impedance | E1: Unbalanced 75 ohms (BNC cable) |
| | | E1: Balanced 120 ohms (RJ-45) |
| | | T1: Balanced 100 ohms (RJ-45) |
| | Receiver sensitivity | Short haul |
| | "Pulse" Amplitude | Nominal 2.37V+/-10% for 75 ohms |
| | | Nominal 3.00V+/-10% for 120 ohms |
| | "Zero" Amplitude | +/-0.3V |
| | Internal Timing | +/-30 ppm |
| | Jitter Performance | According to ITU-T G.823 |
| | Performance monitoring | According to ITU-T G.821 |
| | Standards | ITU-T G.703, G.704, G.706 and G.732 |
| | Interface Connectors | RJ-45 |
| **E1/T1 ports** | Test Loops | LLB (Local Loop Back) |
| | | NELB (Near End Loop Back) |
| **E1/T1 ports** | Test Loops | RLB (Remote Loop Back) |
| | | RRLB (Request Remote Loop Back) |
| **Fiber** | Connector | SFP LC |
| | Data Rate | 155 Mbps |
| **Ethernet** | Interface Type | 10/100Base-TX |
| | Connector | RJ-45 |
| | Standards | IEEE 802.3, 802.3u |
| | Duplex modes | full/half |
| **Indications** | FX1 Link, FX2 link, E1/T1 Mode/Link/Loopback test, Order wire phone indicator, LAN Link/Speed. | |
| **Power Input** | 12VDC | |
| **Power Consumption** | < 7W | |
| **Dimensions** | Card: 155 x 42.1 x 88mm (D x W x H) | |
| **Weight** | 200g | |
| **Temperature** | 0 ~ 50°C (Operating), -10 ~ 70°C (Storage) | |
| **Humidity** | 10 ~ 90% RH (non-condensing) | |
| **Certifications** | CE, FCC | |

## Application

**Managed 4E1/T1 + Fast Ethernet Fiber Optical Multiplexer**




## Ordering Information

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

**FRM220 – FOM04 – □□**

Example: FRM220 – FOM04 – SR

**Note:** This card may be locally configured by its own console when placed in CH02M with fan.
When connected as a remote to a managed central chassis, this card supports in-band management and only needs a CH02M chassis.

# FRM220-FOM01

## E1/T1 + FE Fiber Multiplexer

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

## Feature

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

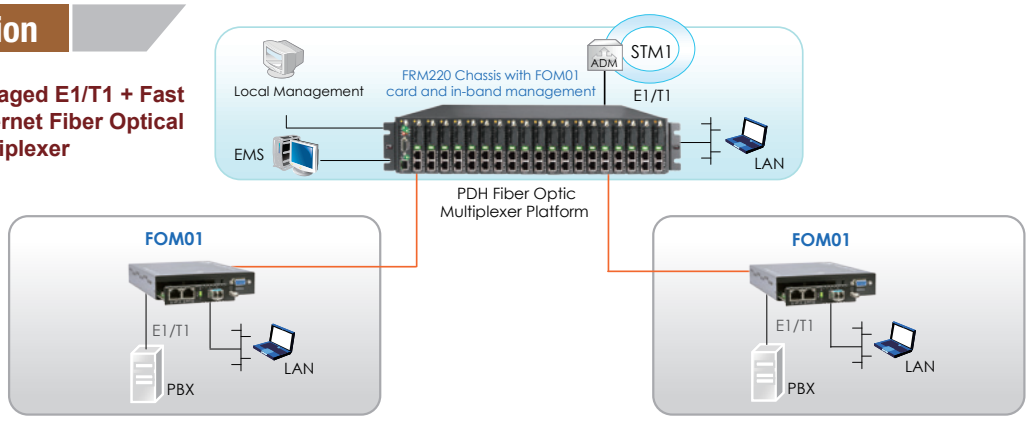
## Specifications

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

| | | |
|---|---|---|
| **Fiber** | Connector | SFP LC |
| | Data Rate | 155 Mbps |
| **Ethernet** | Interface Type | 10/100Base-TX |
| | Connector | RJ-45 |
| | Standards | IEEE 802.3, 802.3u |
| | Duplex modes | full/half |
| **Indications** | Power FX Link, E1/T1 Mode/Link/Loopback test, LAN Link/ Speed | |
| **Power Input** | 12VDC | |
| **Power Consumption** | < 4W | |
| **Dimensions** | Card: 155 x 20.8 x 88mm (D x W x H) | |
| **Weight** | 130g | |
| **Temperature** | 0 ~ 50°C (Operating), -10 ~ 70°C (Storage) | |
| **Humidity** | 10 ~ 90% RH (non-condensing) | |
| **Certifications** | CE, FCC | |

## Application

**Managed E1/T1 + Fast Ethernet Fiber Optical Multiplexer**




## Ordering Information

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

Connector Type / Connectivity Distance

**FMC220 – FOM01 – □□ – □□□□□**

Example: FMC220 – FOM01 – SR – SC002

**Note:** This card must use CH01M with serial console, to configure standalone settings.
When connected as a remote to a managed central chassis, this card supports in-band management and only needs a CH01 chassis.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# FRM220-DS3/E3

## DS3/E3 over Fiber

The FRM220-DS3/E3 is a fiber modem that works in pairs to transparently extend DS3, E3 or STS-1 transmissions over optical fiber. By utilizing pluggable SFP transceivers (155Mbps), these converters may be easily deployed on multimode or single mode fiber, at a distance up to 120km, or over a single core fiber using BiDi (WDM) SFP modules. The DS3/E3 connections utilize industry standard BNC connections for transmit and receive via coaxial cables. When the FRM220-DS3/E3 card is used standalone in a single slot chassis, DIP switches may be used for configuration and loopback control. When placed in a single slot chassis with console port, an easy to maneuver user menu is available via terminal to configure, monitor, and run diagnostic loop back functions. The EOC (embedded operations channel) allows in-band management to control the remotely connected modem over a working fiber link. When the FRM220-DS3/E3 card is placed in the FRM220 rack with SNMP management, the management can configure and view the local and remote converter cards' status, type, version, fiber link status and alarms.

## Feature

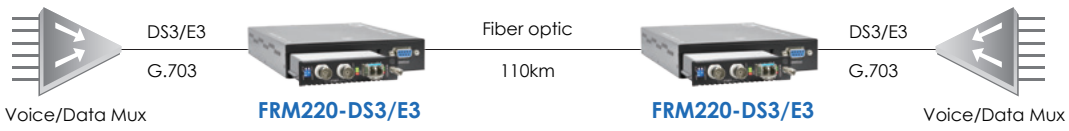
- In-band network Managed via Terminal, web or SNMP in FRM220 chassis
- DS3/E3 Coax (BNC) to Fiber SFP fiber modem
- Supports AIS (Alarm Indication Signal)
- User selectable E3 or DS3 setting
- Electrical and optical Loop back tests
- Standalone RS232 console management via CH01M

## Specifications

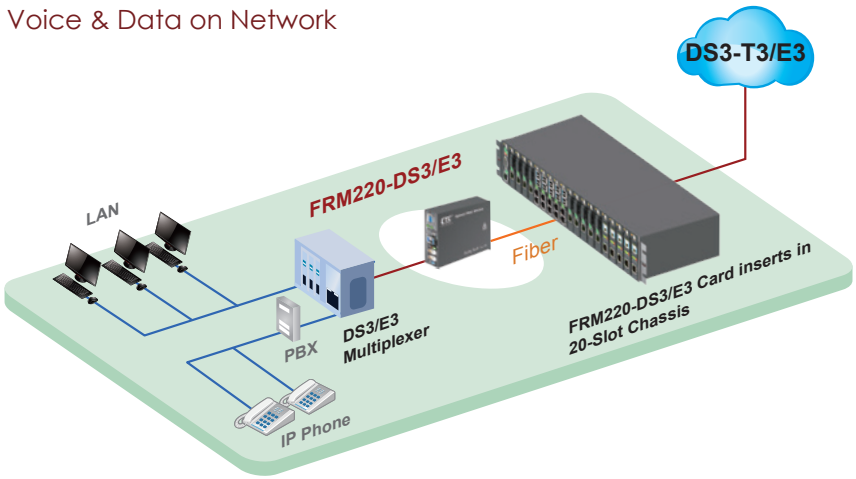
| | | |
|---|---|---|
| **Optical Interface** | Connector | SFP : LC (Uses standard 100Base-X/OC-3 SFP) |
| | Data Rate | DS3/T3 = 44.7 Mbps; E3 = 34.4 Mbps |
| **Line Coding** | Distance | MM 2km, SM 15/30/50/80/120km, WDM 20/40/60/80km |
| | Wavelength | 1310nm, 1550nm, CWDM 1471nm ~ 1611nm |
| **Dimensions** | Card: 155 x 20.8 x 88mm (D x W x H) | |
| **Weight** | 120g | |
| **Temperature** | 0 ~ 50°C (Operating), -10 ~ 70°C (Storage) | |
| **Certification** | CE, FCC | |

| | | |
|---|---|---|
| **Electrical Interface** | Connector | 75 ohm Coax, TX output min: +2.5dBm max : +9.1dBm |
| | | RX input min: -9.7dBm, max +10.5dBm |
| | Standards | ANSI, ITU-TS, ETSI, AT&T, G.703, G.921 & G.955 |
| | Indications | Power, Coax link, coax loop-back, AIS on coax link; FX link, fiber loop-back ,AIS on FX link |
| **Power Input** | 12VDC | |
| **Power Consumption** | < 6W | |

## Application




Integrate Voice & Data on Network




## Ordering Information

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

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

# FRM220-Serial

## RS232/485 over Fiber

The FRM220-Serial provides a fiber modem solution to extend asynchronous RS-232, RS-422 or RS-485 transmission distance up to 2km over multimode fiber or up to 120km over single mode fiber. The converter is equipped with multiple interface circuits for connection to RS-232 or RS485/422 (2 or 4 wire, full or half duplex). The FRM220-Serial secures data transmission over EMI resistant fiber at speeds up to 256kbps for RS-232 or up to 1024kbps for RS485/422. When the FRM220-Serial/485 card is placed in the FRM220 rack with SNMP management, in-band management allows configuring and viewing the card and remote converter's status, type, version, fiber link status, data link status and alarms. When placed in a single slot chassis and used standalone without management, the card may be configured by DIP switches.

## Feature

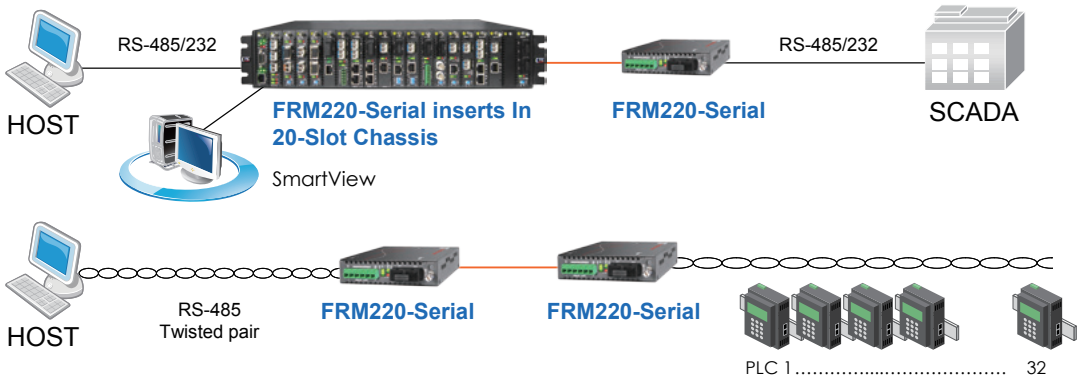
- Extend asynchronous serial transmission up to 120km over fiber
- In-band network management via terminal, Web or SNMP in FRM220-CH20 chassis
- Software selectable data interface for RS-232/ 485
- Software selectable three or five wires RS-232
- Speeds up to 256kbps for RS-232 (Async. mode)
- Speeds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

## Specifications

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

| | | |
|---|---|---|
| **Electrical Interface** | Connector | 6 pins Terminal block |
| | Data Signal Formats | RS-485 2-wire |
| | | RS-232 RTS/CTS 5-wire |
| | | RS-232 3-wire |
| | Baud Rate | RS-422, RS-485 up to 1024kbps |
| | | RS-232 up to 256kbps |
| | Bit Error Rate | Less than 10-10 |
| **Power Consumption** | < 6W | |
| **Dimensions** | Card: 155 x 20.8 x 88mm (D x W x H) | |
| **Weight** | 130g | |
| **Temperature** | 0 ~ 50°C (Operating), -10 ~ 70°C (Storage) | |
| **Humidity** | 10 ~ 90% non-condensing | |
| **Certification** | CE, FCC | |
| **MTBF** | 65,000 hrs | |

## Application




## Ordering Information

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

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

Connector Type / Connectivity Distance

**FRM220 – Serial –** □□□□□

Example: FRM220 – E1/T1R – SC002

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

# FRM220-FTEC

## E1/T1 Cross Rate Converter



The FRM220-FTEC is a T1 (US Standard) /E1 (European Standard) converter and timeslot cross connect which enables conversion between one T1 signal and one E1 signal. T1 and E1 signals with framing employ u-Law and A-Law compander encoding principles respectively and encode those analog (voice) signals into 64kbits digital data. The T1 interface supports D4(SF) or ESF frame formats with B8ZS or AMI line code. The E1 interface supports CCS (PCM31) or CAS (PCM30) framing without CRC-4 and framing with CRC-4. The line coding is HDB3.
Tests and diagnostics can easily be performed from the local console interface or via Web based management of the FRM220. Diagnostics include T1 local/remote and E1 local/remote loop back. When placed in a single slot chassis and used standalone without management, the card may be configured by DIP switches.

## Feature

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

## Specifications

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

| | |
|---|---|
| **LEDs** | PWR, Sys, Test, T1/E1 |
| **Standard** | ITU-T G.703, G.704, G.706, G.823, G.824, ANSI T1.403 |
| **Power** | 12VDC |
| **Power Consumption** | < 6W |
| **Dimensions** | Card: 155 x 20.8 x 88mm (D x W x H) |
| **Weight** | 130g |
| **Temperature** | 0 ~ 50°C (Operating), -10 ~ 70°C (Storage) |
| **Humidity** | 10 ~ 90% non-condensing |
| **Certification** | CE, FCC |
| **MTBF** | 57,000 hrs |

## Application


## Ordering Information

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

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

# FRM220-E1/DATA

## E1 to Data

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

## Feature

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

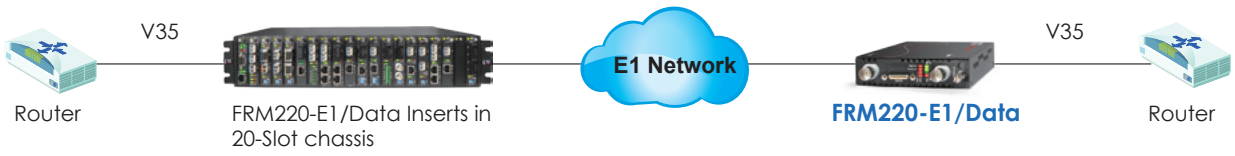
## Specifications

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

| | | |
|---|---|---|
| **Serial Interface** | Standards | ITU-T, E1A |
| | Data rate | Nx56 / Nx64 |
| | Connector | HDB26F w/ adapter cable for Data |
| **LEDs** | Power, TD, RD, RTS, DCD, TX Clock loss, Signal loss, Sync loss, Alarm, test error | |
| **Power** | 12VDC | |
| **Power Consumption** | < 6W | |
| **Dimensions** | Card: 155 x 20.8 x 88mm (D x W x H) | |
| **Weight** | 130g | |
| **Temperature** | 0 ~ 50°C (Operating), -10 ~ 70 °C (Storage) | |
| **Humidity** | 10 ~ 90% RH (non-condensing) | |
| **Certifications** | CE, FCC | |
| **MTBF** | 65,000 hrs | |

## Application

**Managed E1 Access Unit**




## Ordering Information

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

**FRM220 – □□ / □□□ – □**

Example: FRM220 – E1/V35 – R

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



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# FRM220A-Eoe1

## Ethernet Bridge over E1

- HDLC
- MTU 1522bytes
- Framed / Unframed E1



The FRM220A-Eoe1 is an Ethernet over E1 Bridge for cost-effective connection of 10/100Base-TX or 100Base-FX LANs over a single E1 transport. By using standard HDLC encapsulation, the FRM220A-Eoe1 is able to transmit up to a 2M bits Ethernet over an E1 link. The FRM220A-Eoe1 supports an E1 attenuation of up to 43 dB on twisted pair or coax cable, which provides an approximate operating range up to 2km (using 22AWG). The FRM220A-Eoe1 fully meets E1 specifications including ITU-T G.703 and G.823. The FRM220A-Eoe1 features diagnostic capabilities for performing remote loopback. The operator at either end of the line may test both the FRM220A-Eoe1 and the line in the digital loopback mode. The Ethernet copper interface supports auto-negotiation and auto MDI/MDIX, allowing plug-and-play Ethernet connection without any additional configuration. When placed in FRM220A system, the Ethernet may be aggregated to the chassis's built in Ethernet switch. When placed in a single slot chassis and used standalone without management, the card may be configured by DIP switch.

## Feature

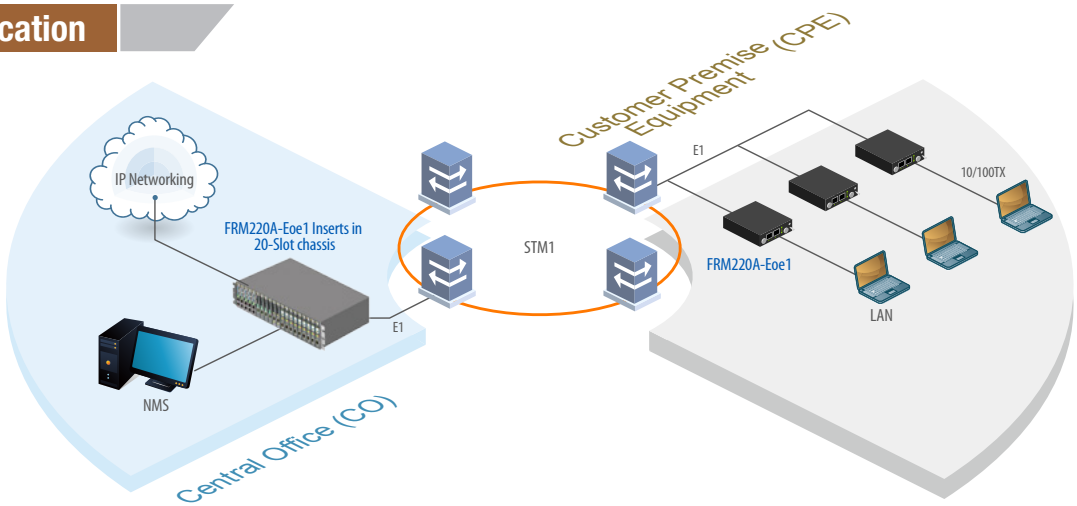
- Connects one Fast Ethernet over E1 links (64k~2048Kbps)
- Built-in HDLC bridge operates at WAN rate
- Auto-Negotiation
- Unbalanced E1/BNC or balanced E1/RJ45
- Fully compatible with FRM220A and FRM220 chassis
- SNMP management with FRM220A and FRM220 chassis
- LED Alarm indication
- Standalone RS232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

## Specifications

| | | |
|---|---|---|
| **Optical Interface** | Connector | 1x9 (SC) |
| | Fiber | MM 62.2/125μm, 50/125μm, SM 9/125μm |
| | | Rate: 155Mbps |
| | Distance | MM 2km, SM 15/30/50km, WDM 20/40km |
| | Wavelength | MM 1310nm, SM 1310, 1550nm |
| | | WDM 1310Tx/1550Rx (type A) |
| | | 1550Tx/1310Rx (type B) |
| **Indications** | LED (Power, FX Link, Phone Act, Test) | |
| **Power Input** | 12VDC | |
| **Power Consumption** | < 6W | |
| **Dimensions** | Card: 155 x 20.8 x 88mm (D x W x H) | |
| **Weight** | 120g | |
| **Temperature** | 0 ~ 50°C (Operating), -10 ~ 70°C (Storage) | |
| **Humidity** | 10 ~ 90% non-condensing | |
| **Certification** | CE, FCC | |
| **MTBF** | 65,000 hrs | |

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

## Application




## Ordering Information

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

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

# FRM220-E1/T1

## E1/T1 over Fiber

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

## Feature

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

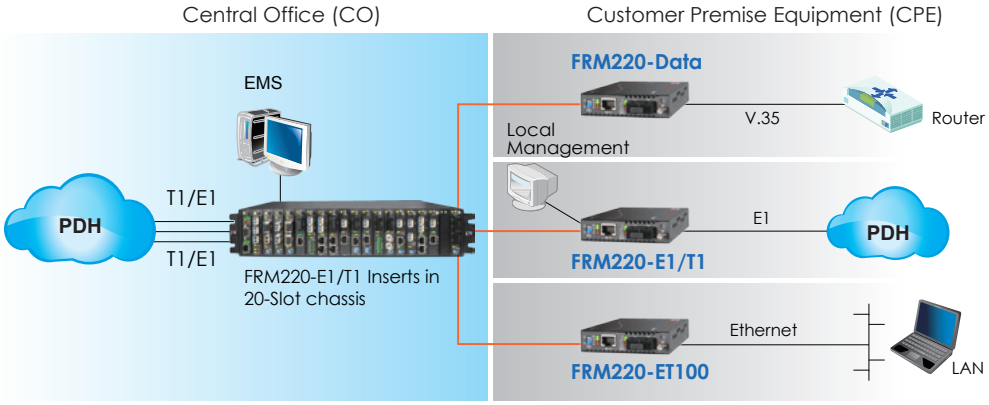
## Specifications

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

| | |
|---|---|
| **Indications** | Power, FX-Link, E1/T1 SIG, Test, SYN, RD, TD, AIS<br>(E1/T1R) Power, FX-Link, E1 SIG, Test(E1B) |
| **Power Input** | 12VDC |
| **Power Consumption** | < 6W |
| **Dimensions** | Card: 155 x 20.8 x 88mm (D x W x H) |
| **Weight** | 120g |
| **Temperature** | 0 ~ 50°C (Operating), -10 ~ 70°C (Storage) |
| **Humidity** | 10 ~ 90% non-condensing |
| **Certification** | CE, FCC |
| **MTBF** | 65,000 hrs |

## Application

### In-band Managed PDH Fiber Modem




## Ordering Information

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

Connector Type / Connectivity Distance

**FRM220 – □□ / □□□ – □□□□□**

Example: FRM220 – E1/T1R – SC002

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

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

# FRM220-DATA

## RS232/530/V35 over Fiber



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

## Feature

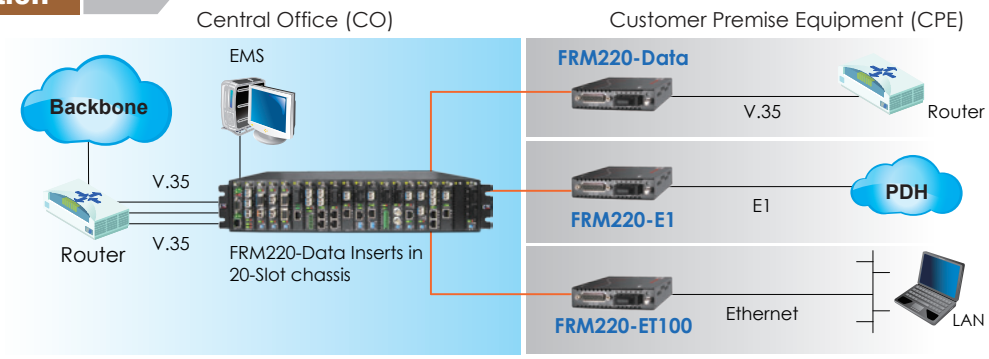
- Synchronous or Asynchronous data over fiber
- In-band network management via terminal, web or SNMP in FRM220 chassis
- Software selectable interface, V.35, X.21, RS-530, RS-449, RS-232 (sync mode)
- Software selectable DCE or DTE mode
- User selectable data rate n x 64kbps, up to 9Mbps
- Independent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

## Specifications

| | | |
|---|---|---|
| **Optical Interface** | Connector | SFP LC |
| | Data rate | 36.864Mbps |
| | Line coding | Scrambled NRZ |
| | Bit Error Rate | Less than 10-10 |
| | Distance | MM 2km, SM 15/30km, WDM 20/40km |
| | Wavelength | 1310nm, 1550nm |
| **Dimensions** | Card: 155 x 20.8 x 88mm (D x W x H) | |
| **Weight** | 130g | |
| **Temperature** | 0 ~ 50°C (Operating), -10 ~ 70°C (Storage) | |
| **Humidity** | 10 ~ 90% non-condensing | |
| **Certification** | CE, FCC | |
| **MTBF** | 65,000 hrs | |

| | | |
|---|---|---|
| **Electrical Interface** | Connector | HDB26F w/ adapter cable for V35 |
| | | X21, RS530, RS449,RS232 |
| | Line Code | NRZ |
| | Baud Rate | RS-232 up to 384K async |
| | | V.35/RS-530 up to 9152k sync |
| | | where n=1 to 143 (64K ~ 9152KKbps) |
| | Clock source | Internal, Recovery, External |
| **Standard** | ITU-T | |
| **Indications** | LED (Power, FX Link, RTS, Test , TD, RD, CTS, DCD) | |
| **Power Input** | 12VDC | |
| **Power Consumption** | < 6W | |

## Application




## Ordering Information

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

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

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

Interface Type / Connector Type / Connectivity Distance

**FRM220 – □□□ – □□□□□**

Example: FRM220 – V35 – SC002

# FRM220-ET100

## 10/100Base-TX Ethernet over E1 Fiber

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

## Feature

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

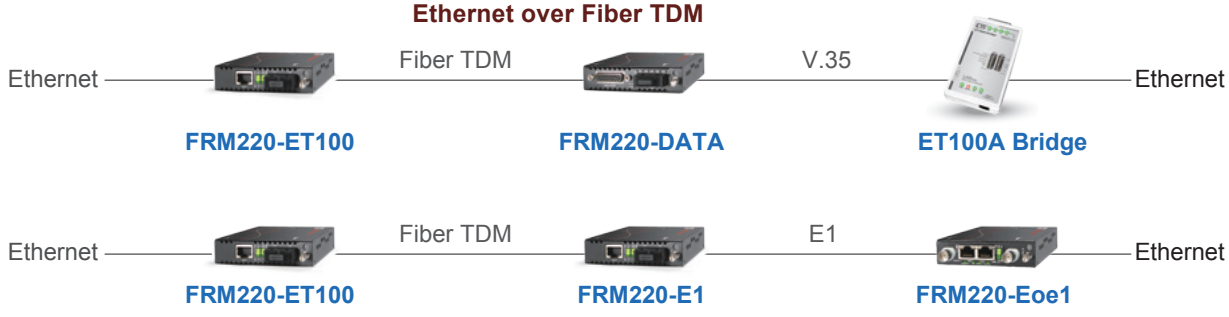
## Specifications

| | | |
|---|---|---|
| **TDM (fiber) Interface** | Connector | 1 x 9 (SC, ST, FC) |
| | Data rate | 64~2048kb/s(nx64) |
| | Distance | MM 2km, SM 15/30/50km |
| | | WDM 20/40km |
| | Wavelength | MM 1310nm, SM 1310, 1550nm |
| | | WDM 1310Tx/1550Rx (type A) |
| | | 1550Tx/1310Rx (type B) |
| **Ethernet Interface** | Standards | IEEE 802.3u, IEEE 802.3 |
| | Data rate | 10Mbps, 100Mbps |
| | Duplex mode | Half / Full duplex |
| | Connector | RJ-45 |
| **Tests** | E1 Loops | Remote Loop back |

| | |
|---|---|
| **Indications** | PWR, TD/RD Act, Test, Sys, Alarm, Error |
| **Power Input** | 12VDC |
| **Power Consumption** | < 6W |
| **Dimensions** | Card: 155 x 20.8 x 88mm (D x W x H) |
| **Weight** | 130g |
| **Temperature** | 0 ~ 50°C (Operating), -10 ~ 70°C (Storage) |
| **Humidity** | 10 ~ 90% RH (non-condensing) |
| **Certifications** | CE, FCC |
| **MTBF** | 75,000 hrs |

## Application

**Ethernet over Fiber TDM**




## Ordering Information

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

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

Connector Type / Connectivity Distance

**FRM220 – ET100 – □□□□□**

Example: FRM220 – ET100 – SC002

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