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User Guide

10GE-TX / TS Fiber Media Converters
FRM220-10GE-TX, FRM220-10GE-TS

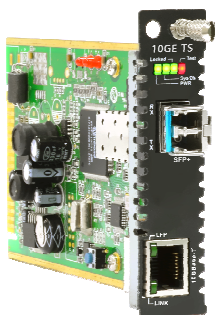


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Introduction

FRM220-10GE-TX(S) are 10G Ethernet electrical to optical media converters for either XFP or SFP+ based optical modules. These converters are designed to extend the electrical signals of a new generation of 'copper' 10G Ethernet by converting to optical signals transmitted through fiber optical cables. The **10GE-TX** supports pluggable 10G XFP modules while the **10GE-TS** supports pluggable 10G SFP+ modules. When placed in a chassis with DB9 console port, these converters can be locally managed with an easy to use menu driven user interface. When the 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 ports, reset the card, provide diagnostic loopback, Link Fault Forwarding, and read the installed optical module's information.

The XFP and/or SFP+ sockets support a wide range of optical modules to address any 10 Gigabit Ethernet network application, including Single-mode, Multi-mode, Single fiber bi-directional, Coarse and Dense Wave Division Multiplexing (CWDM and DWDM).

WARNING: Fiber optic equipment may emit laser or infrared light that can injure your eyes. Never look into an optical fiber or connector port. Always assume that fiber optic cables are connected to a laser light source.

Management Features

FRM220-10GE-TX(S) has an embedded processor which can be used to configure the device for stand-alone operation. When placed in a stand-alone chassis with DB9 console port, these devices support a text based serial terminal with an easy to use menu system for configuration. When placed in a managed chassis, the card is configured and monitored through the chassis NMC (network management controller) via local console or remote Telnet, Web HTTP or SNMP.

1. Stand-alone - with serial console, menu driven
2. Rack management - When placed in NMC managed rack, all other settings are overridden by the NMC management.
3. Due to their power requirements and high heat dissipation, CTC Union recommends placing no more than 10 cards in CH20 rack with empty space between each card.

Features

- TP port Auto MDI-X
- TP cable length detection
- Chip temperature indication
- Supports ALS, LFP, Loopback and DDMI

Specifications

Optical Interface

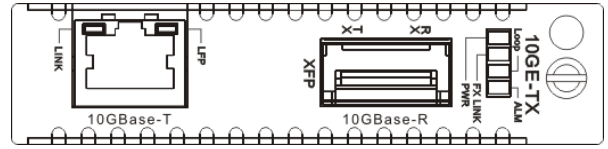
- **Connector** 1 - XFP or 1 - SFP+ cage (depending on model)
- **Data rate** 10.3125 Gb/s
- **Duplex mode** Full duplex
- **Fiber** Depends on XFP/SFP+
- **Distance** Depends on XFP/SFP+
- **Wavelength** Depends on XFP/SFP+
- **Voltage** 3.3V for SFP+ / 5V, -5.2V, 3.3V, 1.8V for XFP
- **Clock** SFP+ requires no reference clock
XFP with or without reference clock

Electrical Interface

- **Connector** 1 - RJ-45
- **Data rate** 100M/1G/10G Auto or Forced
- **Cable** Cat 5e (100M/1G) / Cat 7 (10G)
- **Indications** LED (PWR, FX Link, Loop, ALM, 10GBase-T Link and LFP)
- **Power** (Card supports hot-swapping)
Card : 12VDC, Standalone : AC, DC options
- **Consumption** <12W
- **Dimensions** 155 x 88 x 23mm (D x W x H)
- **Weight** 150g
- **Temperature** 0 ~ 50°C (Operating), 0 ~ 70°C (Storage)
- **Humidity** 10 ~ 90% non-condensing
- **Certification** CE, FCC, LVD, RoHS
- **MTBF** 75000 hrs (25°C)
- **Test Loops** Both FX and TP Loopback

Panel

▪ Figure 1. Front Panel of FRM220-10GE-TX(S)



Operation

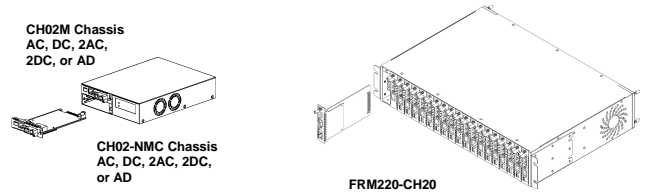
10GE-TX(S) is constructed with two ports, one 10GBase-T electrical port with RJ-45 physical connector and one 10GBase-R optical port with cage for either XFP or SFP+ modules. The RJ-45 electrical port supports connecting CAT 7 cable with lengths of up to 30 or 100 meters depending on transmit power settings. When distance is under 30 meters, setting to short reach will reduce power consumption and heat dissipation. Short reach mode is the default setting.

10GE-TX(S) also supports enabling the LFP (link fault pass through) function to propagate fiber link loss to TP (twisted pair). In addition, full digital diagnostic monitoring (DDMI) of optical modules is supported and well as diagnostic loop back and auto laser shutdown (ALS) functions.

Installation

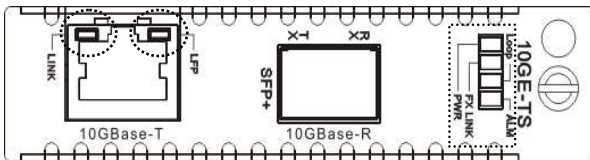
▪ Figure 2. Slide-in Card mounting of FRM220-10GE

Note: Due to higher current requirements and excessive heat dissipation, this converter card can only be placed in CH-02M, CH02-NMC or the CH-20 chassis.



Follow all ESD precautions when handling the card and XFP/SFP+ modules.

LED Indicators



LED	State	Status
PWR	(Green)	On Power on
		Flash Device disabled
		Off No Power
FX Link	(Green)	On Fiber (XFP/SFP+) has link
		Off Fiber has no link
Loop	(Green)	On Device is in diagnostic loop
		Off Device is normal
ALM	(Red)	On Over temp or FX Tx Fault
		Off Device is normal
Link	(Red)	On TP has link, speed is 100M
	(Amber)	On TP has link, speed is 1G
	(Green)	On TP has link, speed is 10G
(Base-T)		Off TP has no link
LFP	(Amber)	On Link Fault Pass through enabled
	(Base-T)	Off LFP disabled or link is down

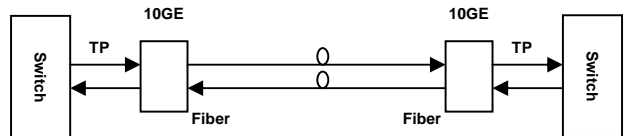
Auto Laser Shutdown

Automatic Laser Shutdown (ALS) is a technique used to automatically shut down the output power of the transmitter in case of fiber break according to ITU-T G.664. This is a safety feature that prevents dangerous levels of laser light from leaking out of a broken fiber, provided ALS is provisioned on both ends of the fiber pair. The sequence of events is as follows. If a fiber is cut, the receiver will detect a Loss Of Signal (LOS). The ALS agent will turn off the transmitter. The receiver at the far end will then detect an LOS and its ALS agent will turn off the transmitter. In this way the entire fiber will go dark.

Link Fault Pass-through

Link Fault Pass-through or LFP is a method of forwarding a link loss from one media to the other over the converter. It is disabled by default, but it can be enabled under the "device status and configuration" menu. For the **FRM220-10GE-TX(S)**, LFP is only supported from fiber to copper.

LFP is a troubleshooting feature that forwards FX Link Loss from both the local and remote devices. This feature, when enabled, will pass a fiber link fault through the converter to the TP segment. Therefore, if a link fails on the fiber side of the media converter, the media converter will force the TP link down on its other port. When LFP is enabled, the LFP LED glows amber; when a fiber fault, the TP link and LFP LEDs will be off.



If a fault should occur on the fiber link without LFP enabled, both managed switches would remain linked to the media converters even though a link has failed between the 10GE media converters. Since neither switch would sense a failed link they would not send out any traps.

When LFP is enabled and a fault occurs on the fiber link, both media converters would pass that fault through to the TP ports. This would force the links down on the TP ports of the managed switches and they would then send trap messages.

Since LFP in this device only propagates link failure from fiber to copper, a loss of TP link will not affect the normal fiber link.

An administrator would be able to take appropriate action after network management receives traps from the switches that have suffered link loss on their ports. A check of the 10GE Media Converter would reveal the fiber link loss and corrective action could be performed.

Console Management

When placed in the 2-slot CH02M chassis, this card can be locally managed by connecting a simple serial terminal such as a notebook computer that has an RS232 port or via a commonly available USB to RS232 adapter. In Windows® XP, HyperTerminal™ is an application available for emulating a serial terminal. You can also search for TeraTerm or PuTTY which are free alternatives, especially if your operating system is Vista or Win7.

Settings

Baud Rate: 38,400
 Data bits: 8
 Parity bits: none
 Stop bits: 1
 Handshaking: none
 Emulation: VT-100
 Default username/password: admin/admin

Connect the serial cable to CH02M's DB9. Run the terminal emulation program. About 3 seconds after being powered on, the 10GE-TX(S) will display the login menu as shown in the following example.

```

*****
*** CTC UNION TECHNOLOGIES CO.,LTD. ***
*** FRM220-10GE-TX Manager ***
*****
Ver:[1.000-1.000-0.000-1.001] [CH-02M S1]

User Name : admin
Password :
```

Example of Login Menu Console Screen, FRM220-10GE-TX(S)

Notice: All settings done by console menu are ignored if the card is placed in FRM220-CH20 with NMC/SNMP management. The card will follow the settings done via the chassis management. (Refer to NMC Operation Manual for details on managing all cards.)

Main Menu Operation

Select any of the menu items by keying in the menu item number or letter. Use the [ESC] key to **Logout**. Any setting is immediately applied to the converter's circuitry. After all of the parameter settings have been selected, go to the "Device" menu page and press "6" to store the settings in non-volatile RAM (NVR).

```

Ver:[1.000-1.000-0.000-1.001] [CH-02M S1]

Device Temperature : 55 C
10GBase-R : [ Down ]
10GBase-T : [ UP ] [ 100Base-TX ]

<1> 10GBase-R Status and Configure
<2> 10GBase-T Status and Configure
<3> Device Status and Configure
<4> Diagnostic

<P> Password change

<ESC> Logout
```

Explanation of Settings

<1> **10GBase-R Status and Configure**: Enter this menu to gain configuration access to the optical section of the converter. Under this menu the fiber port can be enabled or disabled and the ALS (auto laser shutdown) function can be enabled or disabled.

<2> **10GBase-T Status and Configure**: Enter this menu to gain configuration access to the TP (twisted pair) section of the converter. Under this menu the port can be enabled or disabled. The port can be set to auto-negotiation or to forced mode (100M/1G/10G). The cable drive distance for 10GE can be extended from 30 meters to full 100 meters by a setting here.

<3> **Device Status and Configure**: Enter this menu to gain access to device specific settings. See page 8 for more detailed explanation of device settings.

<4> **Diagnostic**: Enter this menu to view the TP cable length or to enable/disable loopback functions for the FX and TP ports.

<P> **Password change**: Enter this menu to change the login password. The old password must be keyed in followed by the new password twice. If the password is ever forgotten, please contact customer support for details on resetting the password.

Device Menu Operation

```

Ver:[1.000-1.000-0.000-1.001] [CH-02M S1]

<< Device Status and Configuration >>
Device Temperature : 55 C

<1> Device Active [ Enable ]
<2> Link Fault Pass-Through [ Disable ]
<3> Thermal Protect [ 80 C ]
<4> Device Reset
<5> Factory Default
<6> Store Parameters

<ESC> Go to previous menu.
```

<1> **Device Active**: Use this menu item to toggle the device between active and inactive. While in inactive state, all traffic will be blocked and all links brought down.

<2> **Link Fault Pass through**: Use this menu item to enable or disable the LFP function. When enabled, the front panel LFP LED will light.

<3> **Thermal Protect**: The default temperature threshold for automatically shutting down the converter is 80C. This threshold may be set higher to 90, 100 or 110C. Note that running at higher temperature will reduce the MTBF of the converter but may be unavoidable in some applications.

In the event the converter is automatically shutdown due to an over temperature condition, the card can be returned to normal operation either by:

a. Do a 'Device Reset' (see below) and then increase temperature threshold.

b. Physically pull the card and reseal. This will perform a hard reboot. Either improve the thermal dissipation or increase temperature threshold.

<4> **Device Reset**: This will cause the soft reboot of the device and parameters settings in NVR to be reloaded.

<5> **Factory Default**: Restores all settings to factory default. The save operation must still be performed.

<6> **Store Parameters**: Saves the setting parameters into non-volatile RAM (NVR).

Note: Settings stored in NVR are ignored if the card is placed in a managed chassis. The management in chassis takes priority.

Diagnostic Menu Operation

```

<< Device Diagnostic >>

Cable Length : 11 meters (Accuracy : +/-5m)

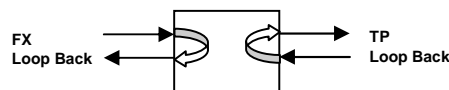
<1> 10GBase-R Loopback [ Disable ]
<2> 10GBase-T Loopback [ Disable ]

<ESC> Go to previous menu.
```

<1> **10GBase-R Loopback**: Use this menu item to enable the loop back function for the optical port. Use this only in an environment that supports Ethernet loopback to avoid a broadcast storm situation.

<2> **10GBase-T Loopback**: Use this menu item to enable the loop back function for the TP port. Use this only in an environment that supports Ethernet loopback to avoid a broadcast storm situation.

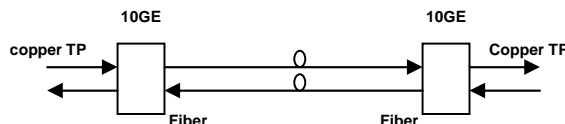
10GE Fiber and Twisted Pair Loop Back



Application

FRM220-10GE works as a media converter between 10G Ethernet equipment with fiber and electrical ports or in point-to-point applications, either as a stand-alone unit or when placed in FRM220-CH20 managed rack.

Media Converter, Point-to-Point



Digital Optical Monitoring

Modern optical SFP transceivers support digital diagnostics monitoring (DDM) functions according to the industry-standard SFF-8472. This feature is also known as digital optical monitoring (DOM) and gives the end user the ability to monitor real-time parameters of the SFP, such as optical output power, optical input power, temperature, etc.

Example of reading Digital Diagnostics in XFP

```
*****
*** CTC UNION TECHNOLOGIES CO.,LTD. ***
*** FRM220-10GE-TX Manager ***
*****
Ver:[1.000-1.000-0.000-1.001] [CH-02M S1]

<< 10GBase-R Status and Configuration >>
10GBase-R Link [ Down ]
XFP [ Exist ] D/D Function [ Yes ]

<1> 10GBase-R Port Active [ Enable ]
<2> Auto Laser Shutdown [ Enable ]
<3> XFP Digital Diagnostics

<ESC> Go to previous menu..
```

From the main menu, go to the "10GBase-R Status and Configure" menu. If a supported XFP (SFP+) module is installed, the "Digital Diagnostics" menu item can be selected by pressing "3".

```
<< Fiber D/D Function Status >>

Vendor Name :[ AIBAOTECH ]
Vendor Part Number :[ AB-XFP-SR ]
Fiber Type :[ Multi ]
Wave Length :[ 0850 nm ]
Link Length :[ 0082 m ]
Tx Power :[-03 dBm]
Rx Power :[-30 dBm]
Rx Sensitivity :[-00 dBm]
Temperature :[ 045 C ]

<ESC> Go to previous menu..
```

Upgrading

The FRM220-10GE card may be firmware upgraded when it is placed in the FRM220 with NMC management card. The user may use a local console connection to the NMC, a remote Telnet (IP) connection, or a Web based (HTTP) connection with any available browser. The NMC communicates to all cards through a serial TTL control bus. The upgrade code is transferred to the NMC by way of TFTP server.

Quick Procedure

Place the line card's upgrade code on the TFTP server. Make sure you know the case sensitive file name. Connect to the FRM220-NMC by local console or by remote Telnet connection. From the main menu choose:

<L> SNMP System Configuration Setup

Then:

<U> Upgrade Line Card Menu

```
*****
*** CTC UNION TECHNOLOGIES CO., LTD. ***
*** FRM220 NMC VER. 3.45 ***
*****

<< Upgrade Line Card Menu >>
Target IP : 59.125.162.252
Target Gateway : 59.125.162.241
TFTP Server IP : 59.125.162.243

Please select a card type:
<1> : FRM220-10/100I and FMC-10/100I <3> : FRM220-SERIAL
<2> : FRM220-FXO/FXS <4> : FRM220-155MS
<5> : FRM220-DATAPORT <6> : FRM220-E1/T1
<7> : FRM220-1000EDS/1000ES-2F <8> : FRM220-1000ES-1/1000E-1/2F
<9> : FRM220-10/100IS-2 <A> : FRM220-1000TS/1000T
<B> : FRM220-3R-2.7G-2S/3S <C> : FRM220-5E1/ET100T
<D> : FRM220-5E1/ET100S <E> : FRM220-Eoel
<F> : FRM220-3R-10G/SS/SX/XX <G> : FRM220-3R-10G/SS/SX/XX CDR
%< Snip ...
<X> : FRM220-16E1/ET100T <Y> : FRM220-16E1/ET100S
<Z> : FRM220-10GE-T(S)
<ESC>: Previous Menu
```

Select the line card type (10GE-T(S)) and local unit. Enter filename. The upgrade should complete in only a couple of minutes. DO NOT disconnect or pullout/insert any other cards during the upgrade process.

About XFP/SFP+ Units

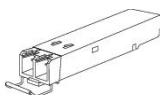
The FRM220-10GE accepts any XFP or SFP+ unit that complies with the MSA standard. It will also accept "multiple voltage" XFPs and should not be a problem for any new XFP. Follow all ESD precautions when handling the card and pluggable modules. Fiber optic components and cables are very sensitive to dirt, dust and mishandling, especially in high-speed networks. Dirty or mistreated fiber may cause errors and an unwanted degradation of signal quality. Remove the dust caps on XFP/SFP+ and patch cables only when ready to plug in optical cables.

When selecting XFP/SFP+ optical modules, make sure the modules are able to support the required data rates. A 10G XFP/SFP+ should be able to support 10G Ethernet, OC-192/STM-64, or 10G Fiber Channel.

Installation

CTC Union supplied XFP/SFP+ modules are of the Bale Clasp type. The bale clasp pluggable module has a bale clasp that secures the module into the XFP/SFP+ cage.

- Inserting a Bale Clasp XFP/SFP+ Module into the cage
 - Step 1 Close the bale clasp upward before inserting the pluggable module.
 - Step 2 Line up the XFP/SFP+ module with the port, and slide it into the cage.
- Removing a Bale Clasp XFP/SFP+ Module
 - Step 1 Open the bale clasp on the XFP/SFP+ module. Press the clasp downward with your index finger.
 - Step 2 Grasp the XFP/SFP+ module between your thumb and index finger and carefully remove it from the XFP/SFP+ cage.



Bale Clasp type SFP+ with bale open

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