

FlexOptics

10Gb/s Optical Transponder Plug-In User's Manual

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www.flexopticnetworks.com

Important Notes

On the 10Gb/s Transponder Engineering Sample

This 10Gb/s transponder engineering sample is for internal use and customer evaluation only. It is built in an FlexOptic Transport chassis and may not be fully compliant with FlexOptic product specifications.

The following precautions must be taken.

1. The transponder occupies two plug-in spaces vertically, although four separate front faceplates are installed. Due to the size of the transponder, currently it **CAN NOT** be pulled out from the chassis.
2. The optical adaptors were straight-installed for convenient use internally. Do not look into them. Avoid installing the chassis at human eye's height level for safety reason.
3. Only AC power supply, 220V or 110V, can be used for this sample.
4. The maximum optical input power of the transponder is -8dBm. Excessive power input will burn the receiver!
5. The output power of the engineering sample is set at 1.5dBm.
6. The "red" LEDs on the transponder faceplate are not implemented on this engineering sample. Red will be shown in normal condition.
7. The ports on this device are for internal debugging only, not for customer use.
8. Currently the transponder is set to SONET/SDH as default, although 10Gb/s Ethernet is also supported.

Safety Precautions

Laser Warning

STRICT ATTENTION TO THESE PRECAUTIONS IS IMPORTANT FOR YOUR PROTECTION WHEN WORKING WITH FIBER OPTIC EQUIPMENT, SOME OF WHICH HAVE LASER DIODE EMITTERS.

FlexOptic uses Class I and Class 3b lasers as fiber optic laser diode sources, which are inherently safe unless mishandled.

Use of optical measuring equipment or procedures other than those specified herein may result in hazardous radiation exposure.

The radiation from laser diodes is much more intense than other light sources radiation. This intense radiation can destroy your vision if you bypass proper safety procedures and practices.

As a general rule, do not look into the end of a fiber optic cable unless you are sure it is not connected into a system, or unless you are sure the equipment is OFF. Note that all FlexOptic equipment with lasers is labeled accordingly.

Electrical Safety

The equipment contains power supplies and other devices that are possible sources of electrical shock. Caution should be exercised when working around these components. De-energize the power supplies before working on them.

Some procedures in this manual require you to install modules in a powered-on shelf. This is typical and poses no danger to installers or technicians.

Equipment Handling

Shelf sometime can be heavy when fully-populated with plug-in cards. For your physical safety and to prevent the possibility of damage to the equipment during installation, you should exercise caution when installing the shelf. It is recommended that installers know and use proper lifting procedures as defined in the OSHA regulations.

Proper Attire

Personnel working around the equipment should not wear loose or ill-fitting clothing around the equipment. This includes ties, over-size shirts, or dangling jewelry. Clothing items of these types can catch on jumpers and disconnect them, catch on system components and cause injury to you, or damage to the equipment.

Electro-Static Discharge Precautions

When working around equipment, it is highly recommended that personnel as a minimum wear an ESD wrist strap attached to a properly grounded piece of equipment. ESD foot straps and ESD coats will provide more complete protection for your equipment and should also be used when practical.

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1. Getting Started

1.1 Introduction

This manual describes the 10Gb/s transponder plug-in for the product families and features from FlexOptic. Procedures are provided for installing the hardware and configuring the software.

1.2 Audience

This manual is designed for system administrators with a working knowledge of Telecommunication and Networking equipment, who need instructions about how to install and configure .

Warning: Only trained and qualified personnel should be allowed to install, replace, or service this equipment.

1.3 Getting Help

FlexOptic technical support will ensure that the fast and easy access that you have come to expect from your FlexOptic products will be maintained.

1.3.1 Website

<http://www.flexopticnetworks.com/>

1.3.2 E-mail

Technical requests can also be sent to the following Email:

ophil@flexopticnetworks.com Or
julian@flexopticnetworks.com

1.4 Warranty

FlexOptic may incorporate enhancements in the product and change the product specifications described in this manual at any time and without notice. Not for use or disclosure to anyone but FlexOptic customers, except under written agreement.

Contact FlexOptic using any of the methods listed above for information about the standard and extended warranties.

2. Installation and Connection

This chapter describes how to install equipment and attach them to your network.

2.1 Overview

The FlexOptic 10 Gb/s transponder plug-in is integrated into FlexOptic optical platform. The platform chassis is a 1RU

Shelf-level compact frame capable of housing 2 Type II 10Gb/s transponder plug-in cards. For central office deployment environment, with transponder plug-ins complies with NEBS level 3 requirements. Such a chassis with 1 unit transponder plug-in is shown in



Figure 1.

Current version of 10 Gb/s transponder plug-in has a built-in LED alarm array on the plug-in panel – the first LED as Power indicator, the second one as Device Fault Alarm, and the third as Signal Input Fault Alarm. The LEDs on the management card are not being used.



Figure 1 Chassis a 10Gb/s transponder plug-in

2.2 Unpacking a Chassis with 10 Gb/s transponder

The FlexOptic ships with all of the following items. Please review the list below and verify the contents. If any items are missing, please contact FlexOptic.

Package Contents

- Chassis with 10 Gb/s transponder plug-in installed
- Rack mount brackets and mounting screws

2.3 Summary of Installation Procedures

Follow the steps listed below to install your chassis with the built-in 10G/s transponder. Details for each of the steps highlighted below are provided later in this chapter.

- Ensure that the physical environment that will host the equipment has the proper cabling and ventilation.
- Connect the correct power cords and optical cables.
- Verify that the LED's on the 10Gb/s transponder plug-in are working properly after power-on of the system.

2.4 Precautions

2.4.1 General Precautions

WARNING: Do not install the equipment in an environment where the operating ambient temperature might exceed 50 °C (122 °F).

WARNING: Make sure the airflow around the front, sides, and back of the device is not restricted.

WARNING: To provide additional safety and proper airflow to the equipment, make sure that slot cover plates are installed on all chassis slots that do not have either a plug-in card.

WARNING: Never leave tools or body parts inside the chassis.

2.4.2 Lifting Precautions

WARNING: Make sure the rack or cabinet housing the equipment is adequately secured to prevent it from becoming unstable or falling over.

WARNING: Mount the equipment you install in a rack or cabinet as low as possible, placing the heaviest device at the bottom and progressively placing lighter devices above.

2.4.3 Power Precautions

WARNING: The current sample version of chassis with 10 Gb/s transponder **ONLY** uses AC power supply. Future version will use three-way redundant power supplies, two from –48VDC(A&B), a third one from 220VAC.

WARNING: To completely remove power, disconnect all power supplies.

WARNING: Make sure that the power source circuits are properly grounded.

WARNING: If the installation requires a different AC power cord than the one supplied with the equipment, make sure you use a power cord displaying the mark of the safety agency that defines the regulations for power cords in your country. The mark is your assurance that the power cord can be used safely with the device.

WARNING: Ensure that the equipment does not overload the power circuits, wiring, and over current protection. To determine the possibility of overloading the supply circuits, add the ampere (amp) ratings of all devices installed on the same circuit as the device. Compare this total with the rating limit for the circuit. The maximum ampere ratings are usually printed on the devices near the input power connectors.

WARNING: For the DC input circuit to a chassis; make sure there is a 5-amp circuit breaker on the input to the power supply.

2.5 Preparing the Installation Site

2.5.1 Cabling Infrastructure

Ensure that the proper cabling is installed in the site. AC and DC power wires should be of a heavy enough gauge to handle the maximum current draw.

2.5.2 Installation Location

Before installing the equipment, plan its location and orientation relative to other devices and equipment. Allow at least 3 inches of space at the front of the device for the twisted-pair, fiber optic, and power cabling. Also, allow a minimum of 3 inches of space between the sides and the back of the device and walls or other obstructions.

2.5.3 Rack Mount Installation

- Remove the rack mount kit from the shipping carton. The kit should include two L-shaped mounting brackets and mounting screws. A #2 Phillips-head screwdriver is needed for installation.
- Attach the mounting brackets to the sides of the device as illustrated below.
- Attach the system to the rack as illustrated in Figure 2.

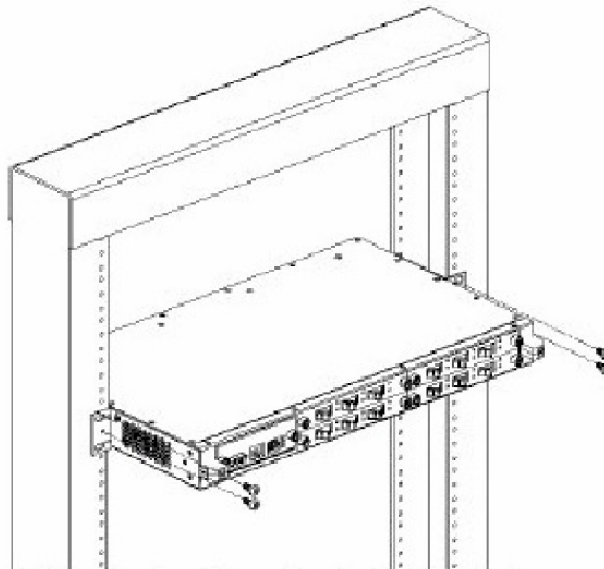


Figure 2 Mounting the chassis

2.6 Desktop Installation

Set the equipment on a flat desktop, table, or shelf. Make sure that adequate ventilation is provided for the system - a 3-inch clearance is recommended on each side.

2.7 Power Connections

Chassis is designed to provide capability of uninterrupted service even when you insert or remove cards. Therefore, the systems do not have separate on/off power switches. To turn the system off, simply disconnect the power cord(s).

NOTE: The equipment does not have power switches. They power on when you connect a power cord or cable to the equipment and to a power source.

NOTE: The two-way redundant DC power supplies are to guarantee the device will continue to operate in the event of one of them is cut off. The AC power supply is converted to DC and added as a third redundant supply together with the DCA&B. In the event of AC is cut off and at least one DC power supply is on, the device will still work. But if no DC power is supplied, the device will not operate when the AC power is cut off.

2.7.1 Installing a DC Power Supply

- Prepare the negative and ground wires by stripping about 1/4" of insulation off the end of each one. (Use at least 14 AWG wire.)
- Loosen the two screws used to hold the wires in the connectors (A and B). These are the wires under the following markings:
 - 48V and RETURN
- Slip the ground wire into the opening above the RETURN marking until the wire is fully in place, then tighten the screw to hold the wire in place.
- Repeat for the negative (-48V)
- Pull gently on each wire to make sure they are securely fastened in the connector.
- After the power supply is properly inserted, connect the power source to the wires to activate the circuit.

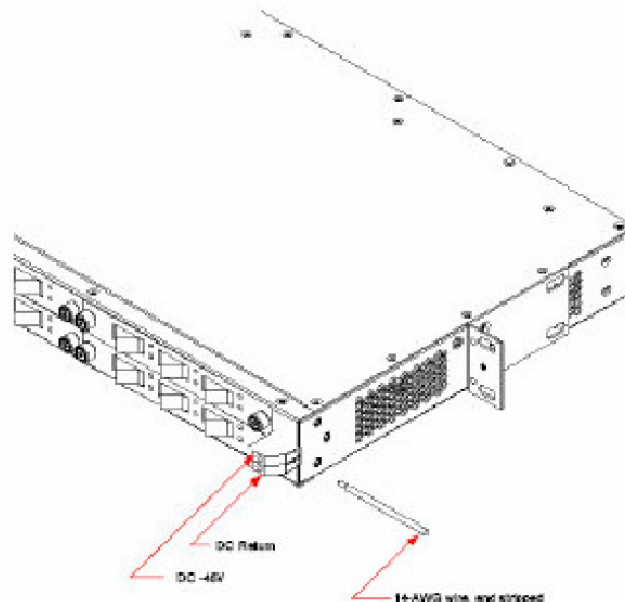


Figure 3 DC power supply installation

2.7.2 Installing an AC Power Supply

To install an AC power supply to the chassis, do the following:

- Connect the power cord to the front of the power supply.
- Connect the power plug into an outlet.

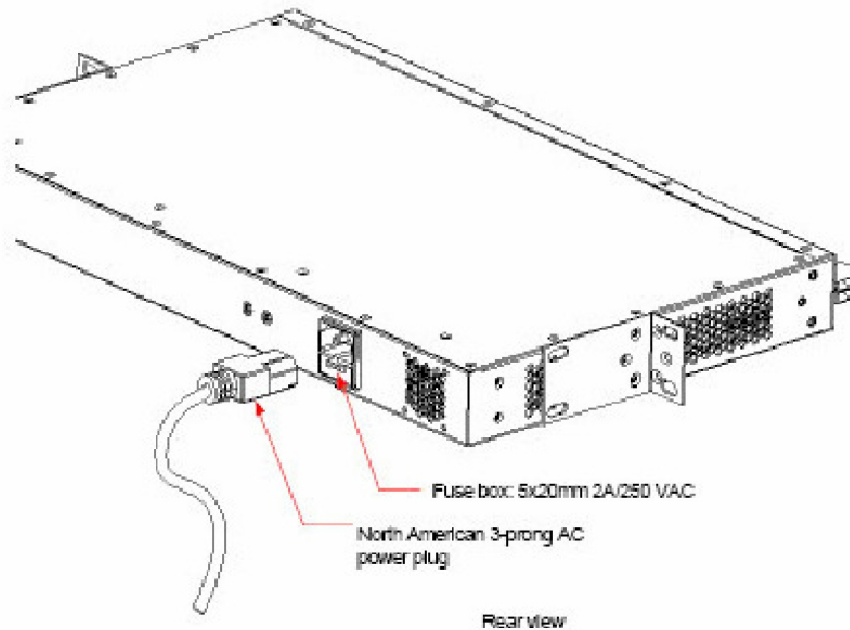


Figure 4 AC power supply installation

3. Operation

3.1 Power On

As described above, the power of the 10Gb/s transponder is on once the DC or DC power cords are connected. The “Power” LED on the transponder plug-in front faceplate should be on. The other two LEDs on the transponder faceplate “Equ. Fault” and “Sig. In Fault” should be red without input and output connection.

3.2 Connect Output Signal

Use a fiber optic cable with FC/PC connector to connect the transponder Tx to the transmission side of the network, or in the case of testing, to the input of the BERT receiver via an optical attenuator.

NOTE: Pay attention to the receiver overload/damage threshold and sensitivity. If the output power of the transponder is too high, use an optical attenuator to reduce the power.

NOTE: The optical Power is set at the factory per customer requirement.

3.3 Connect Input Signal

Use a fiber optic cable with FC/PC connector to connect the Rx of the transponder to the incoming side of the optical network. When the input signal is in the specified level range, the “Equ. Fault” and “Sig. In Fault” LEDs on the transponder faceplate should turn green, indicating the transponder is working properly.

NOTE: The maximum input power for the Rx of the transponder is -8dBm . Excessive input power will damage the receiver in the transponder.

4. Maintenance and Repair

4.1 Equipment Return and Repair

Corrective maintenance is limited to the testing and troubleshooting procedures provided in this manual. If, after contacting Customer Support, you are unable to correct any malfunction, please return the unit to FlexOptic for repair. Prior to shipping the unit to FlexOptic for repair, call Product Repair at +1 970-314-8546 and request a Return Material Authorization (RMA) number. You may furnish information on defective units to FlexOptic by telephone.

Please provide the following information:

- Unit part number and serial number
- Brief description of failure symptoms and cause
- Return shipping address (including sender's name)
- Preference of return shipping mode
- Invoice address
- Purchase Order number or letter of authorization for out of warranty units
- Person to contact for further information. Please include telephone number.

For the best equipment protection, use the original cartons and packaging material. Send the unit back to FlexOptic

4.2 Handling and Cleaning Fiber Optic Equipment

4.2.1 Handling

Fiber optic cable is designed to survive the installation environment. As with coaxial cable, fiber optic cable should never be bent at sharp angles. The most vulnerable area of the fiber is the connector. When pulling fiber, do not pull directly on the connector or on the fiber immediately behind the connector. The fiber should be pulled from a point several inches back from the connector.

When working with multi-fiber cables, it is a good idea to color code each of the fibers in a cable. A connection chart can be made to help facilitate the connection and reconnection process.

Keep connectors covered with the protective caps when not using fiber optics cables or equipment. When a connection is made use only finger tightening. Do not use tools, as excessive force may damage or misalign the connection system.

4.2.2 Cleaning Procedures

Fiber Cable Connectors

Perform the steps below each time the connector is used:

1. Remove any accumulated dust or debris from the connector by blowing off the cylindrical and endface surfaces of the connector using a canned air duster.
2. Use a pad or a wipe saturated with optical-grade isopropyl alcohol to gently wipe the cylindrical and end-face surfaces.
3. Use canned air to blow dry the connector surfaces or allow them to air dry.
4. Avoid touching the connector surfaces after cleaning. If the connector is not going to be used, it should be covered with a dust cap to prevent contamination.

Fiber Optic Receptacles

The procedures described above should not be applied routinely to fiber optic receptacles (ports), but only in instances where degraded performance of the assembly warrants cleaning (i.e., evidence of contamination).

Note: Materials used for cleaning fiber-optic devices should be consistent with the function. Wiping cloths should be made of lint-free, nonabrasive materials. Cotton swabs should have a tightly wrapped tip and be talcum-free. Pure optical-grade isopropyl alcohol (IPA) is the recommended solvent for cleaning connector tips. For removing dust from receptacles, canned compressed gas is recommended. Do not use commercial compressed air or house air because of the risk of oil contamination.

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4.3 Inspection

Decouple all optical connectors and inspect optical ports and connector tips for dirt or obstruction.

Inspect with power off only (see the safety precautions at the beginning of this manual). A 10X loupe is recommended. This inspection should be performed as needed in the event of gradual signal degradation.

5. Appendix A – General Specifications

Parameter	Min	Typ	Max	Unit
Transmitter				
Wavelength range ⁽¹⁾		DWDM ITU Grid		nm
Side Mode Suppression Ratio	30			dB
Dispersion Penalty			2	dB
Optical Output Power	0			dBm
Extinction Ratio	9	10		dB
Rise Time			40	ps
Fall Time			40	ps
Optical Isolation	27			dB
Receiver				
Sensitivity ⁽³⁾	-26			dBm
Overload	-8			dBm
Internal Optical reflectance	-27			dB
Jitter tolerance and transfer		Complaint to GR253 Issue 3		

Note: (1) See wavelength table

(2) dispersion 800ps/nm, datarate 9.953 and 10.3Gb/s

(3) pattern 2²³-1@ 1e-10 datarate 9.953 and 10.3Gb/s

6. Appendix B – Alarm Specifications

Transponder faceplate LEDs:

LED “Power”: Off – Power Off, Green – Power On, Red – Abnormal.

LED “Equ. Fault”: Off – Power Off, Green – Normal, Red – Equipment Fault.

LED “Sig. In Fault”: Off – Power Off, Green – Normal, Red – Input Signal Abnormal.