

155Mbps CWDM SFP Optical Transceiver, 80km Reach GPC-XX03-08TD

Features

- ◆ Data-rate of 155Mbps operation
- ◆ 9 CWDM DFB wavelengths laser and PIN photodetector for 80km transmission
- ◆ Compliant with SFP MSA and SFF-8472 with duplex LC receptacle
- ◆ Digital Diagnostic Monitoring:
Internal Calibration or External Calibration
- ◆ Compatible with RoHS
- ◆ +3.3V single power supply
- ◆ Operating case temperature:
Industrial : -40 to +85°C



Applications

- ◆ Gigabit Ethernet
- ◆ Fiber Channel
- ◆ Switch to Switch interface
- ◆ Switched backplane applications
- ◆ Router/Server interface
- ◆ Other optical transmission systems

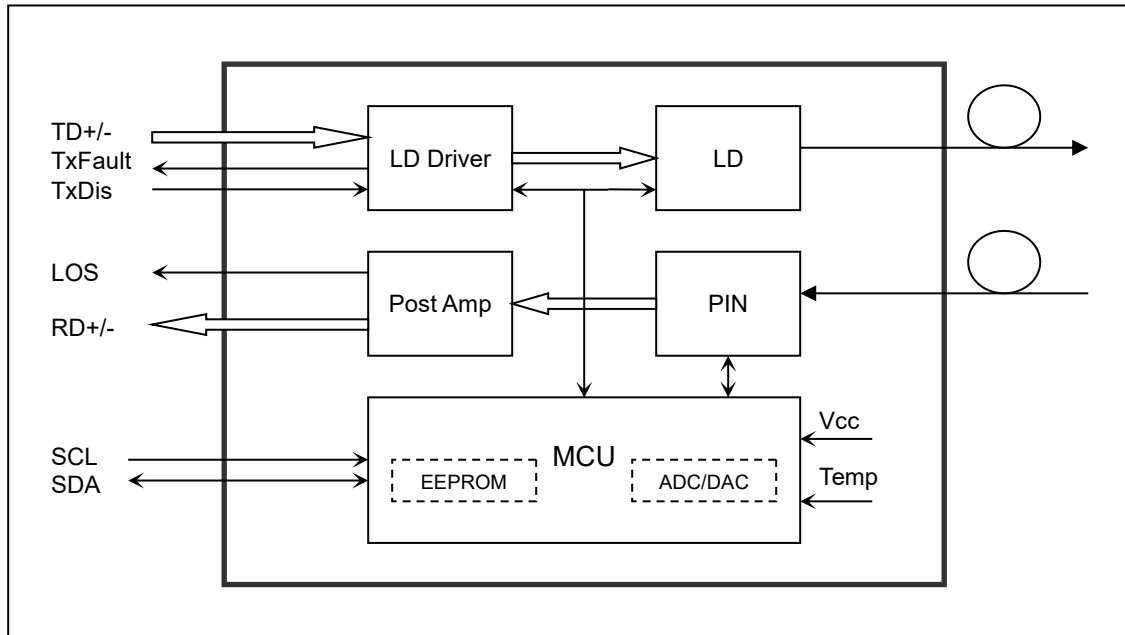
Description

The SFP transceivers are high performance, cost effective modules supporting data-rate of 155Mbps and 80km transmission distance with SMF.

The transceiver consists of three sections: an uncooled CWDM DFB laser transmitter, a PIN photodiode integrated with a trans-impedance preamplifier (TIA) and MCU control unit. All modules satisfy class I laser safety requirements.

The transceivers are compatible with SFP Multi-Source Agreement (MSA) and SFF-8472. For further information, please refer to SFP MSA.

Module Block Diagram



Absolute Maximum Ratings

Table 1 - Absolute Maximum Ratings

| Parameter | Symbol | Min | Max | Unit |
|---------------------|--------|------|-----|------|
| Supply Voltage | Vcc | -0.5 | 4.5 | V |
| Storage Temperature | Ts | -40 | +85 | °C |
| Operating Humidity | - | 5 | 95 | % |

Recommended Operating Conditions

Table 2 - Recommended Operating Conditions

| Parameter | Symbol | Min | Typical | Max | Unit |
|----------------------------|--------|------|---------|------|------|
| Operating Case Temperature | Tc | -40 | | +85 | °C |
| Power Supply Voltage | Vcc | 3.13 | 3.3 | 3.47 | V |
| Power Supply Current | Icc | | | 300 | mA |
| Data Rate | | | 155 | | Mbps |

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See table3 below for “xx” values

Table3 -λC Wavelength Guide

| λc Wavelength Guide | | | | | |
|---------------------|------|------|------|------|------|
| Code | λc | Unit | Code | λc | Unit |
| 45 | 1450 | nm | 55 | 1550 | nm |
| 47 | 1470 | nm | 57 | 1570 | nm |
| 49 | 1490 | nm | 59 | 1590 | nm |
| 51 | 1510 | nm | 61 | 1610 | nm |
| 53 | 1530 | nm | | | |

Optical and Electrical Characteristics

GPC-xx03-08TD: (CWDM and PIN, 80km Reach)

Table 4 - Optical and Electrical Characteristics

| Parameter | Symbol | Min | Typical | Max | Unit | Notes |
|----------------------------------|---|--------|---------|-----------------|------|-------|
| Transmitter | | | | | | |
| Centre Wavelength | λc | λc-6.5 | λc | λc+6.5 | nm | |
| Spectral Width (-20dB) | Δλ | | | 1 | nm | |
| Side Mode Suppression Ratio | SMSR | 30 | | | dB | |
| Average Output Power | Pout | -5 | | 0 | dBm | 1 |
| Extinction Ratio | ER | 9 | | | dB | |
| Jitter Generation (RMS) | | | | 0.01 | UI | |
| Jitter Generation (PK-PK) | | | | 0.1 | UI | |
| Output Optical Eye | Compliant Telcordia GR-253-CORE and ITU-T G.957 | | | | | |
| Optical Rise/Fall Time (20%~80%) | tr/tf | | | 0.26 | ns | |
| Data Input Swing Differential | V _{IN} | 300 | | 1860 | mV | 2 |
| Input Differential Impedance | Z _{IN} | 90 | 100 | 110 | Ω | |
| TX Disable | Disable | 2.0 | | V _{cc} | V | |
| | Enable | 0 | | 0.8 | V | |
| TX Fault | Fault | 2.0 | | V _{cc} | V | |
| | Normal | 0 | | 0.8 | V | |
| Receiver | | | | | | |
| Centre Wavelength | λc | 1260 | | 1620 | nm | |
| Receiver Sensitivity | | | | -33 | dBm | 3 |
| Receiver Overload | | -3 | | | dBm | 3 |

| | | | | | | |
|--------------------------------|------------------|-----|--|-----------------|-----|---|
| LOS De-Assert | LOS _D | | | -33 | dBm | |
| LOS Assert | LOS _A | -45 | | | dBm | |
| LOS Hysteresis | | 1 | | 4 | dB | |
| Data Output Swing Differential | V _{out} | 370 | | 1800 | mV | 4 |
| LOS | High | 2.0 | | V _{cc} | V | |
| | Low | 0 | | 0.8 | V | |

Notes:

1. The optical power is launched into SMF.
2. PECL input, internally AC-coupled and terminated.
3. Measured with a PRBS 2²³-1 test pattern @155Mbps, BER ≤1×10⁻¹².
4. Internally AC-coupled.

Timing and Electrical

Table 5 - Timing and Electrical

| Parameter | Symbol | Min | Typical | Max | Unit |
|---|---------------------------|-----|---------|-----------------|------|
| Tx Disable Negate Time | t _{on} | | | 1 | ms |
| Tx Disable Assert Time | t _{off} | | | 10 | μs |
| Time To Initialize, including Reset of Tx Fault | t _{init} | | | 300 | ms |
| Tx Fault Assert Time | t _{fault} | | | 100 | μs |
| Tx Disable To Reset | t _{reset} | 10 | | | μs |
| LOS Assert Time | t _{loss_on} | | | 100 | μs |
| LOS De-assert Time | t _{loss_off} | | | 100 | μs |
| Serial ID Clock Rate | f _{serial_clock} | | | 400 | KHz |
| MOD_DEF (0:2)-High | V _H | 2 | | V _{cc} | V |
| MOD_DEF (0:2)-Low | V _L | | | 0.8 | V |

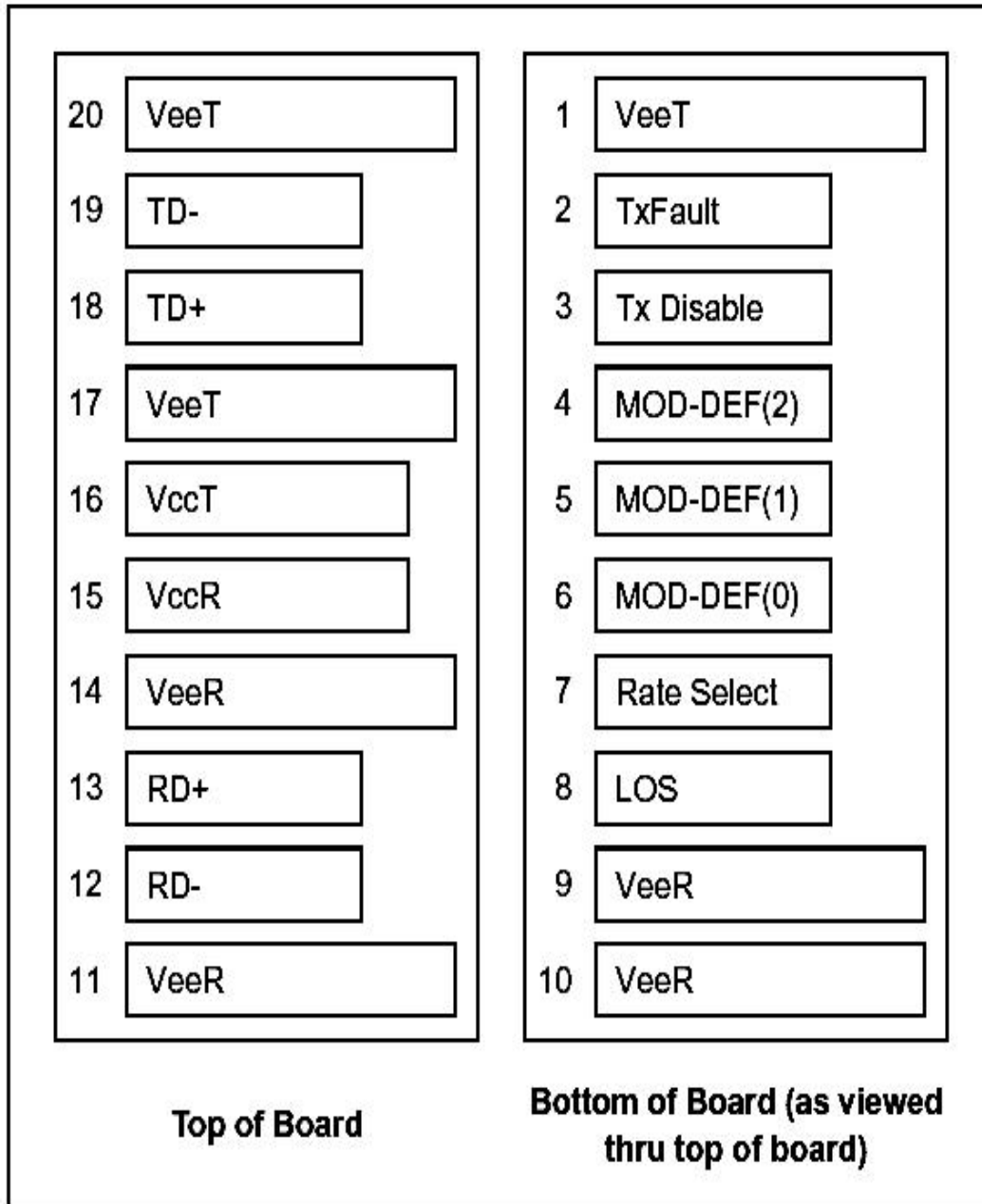
Diagnostics

Table 6 – Diagnostics Specification

| Parameter | Range | Unit | Accuracy | Calibration |
|-------------|------------|------|----------|---------------------|
| Temperature | -40 to +85 | °C | ±3°C | Internal / External |

| | | | | |
|--------------|------------|-----|------|---------------------|
| Voltage | 3.0 to 3.6 | V | ±3% | Internal / External |
| Bias Current | 0 to 100 | mA | ±10% | Internal / External |
| TX Power | -5 to 0 | dBm | ±3dB | Internal / External |
| RX Power | -30 to -9 | dBm | ±3dB | Internal / External |

Pin Definitions



Pin Descriptions

| Pin | Signal Name | Description | Plug Seq. | Notes |
|-----|------------------|------------------------------|-----------|--------|
| 1 | V _{EET} | Transmitter Ground | 1 | |
| 2 | TX FAULT | Transmitter Fault Indication | 3 | Note 1 |
| 3 | TX DISABLE | Transmitter Disable | 3 | Note 2 |
| 4 | MOD_DEF(2) | SDA Serial Data Signal | 3 | Note 3 |
| 5 | MOD_DEF(1) | SCL Serial Clock Signal | 3 | Note 3 |
| 6 | MOD_DEF(0) | TTL Low | 3 | Note 3 |
| 7 | Rate Select | Not Connected | 3 | |
| 8 | LOS | Loss of Signal | 3 | Note 4 |
| 9 | V _{EER} | Receiver ground | 1 | |
| 10 | V _{EER} | Receiver ground | 1 | |
| 11 | V _{EER} | Receiver ground | 1 | |
| 12 | RD- | Inv. Received Data Out | 3 | Note 5 |
| 13 | RD+ | Received Data Out | 3 | Note 5 |
| 14 | V _{EER} | Receiver ground | 1 | |
| 15 | V _{CCR} | Receiver Power Supply | 2 | |
| 16 | V _{CCT} | Transmitter Power Supply | 2 | |
| 17 | V _{EET} | Transmitter Ground | 1 | |
| 18 | TD+ | Transmit Data In | 3 | Note 6 |
| 19 | TD- | Inv. Transmit Data In | 3 | Note 6 |
| 20 | V _{EET} | Transmitter Ground | 1 | |

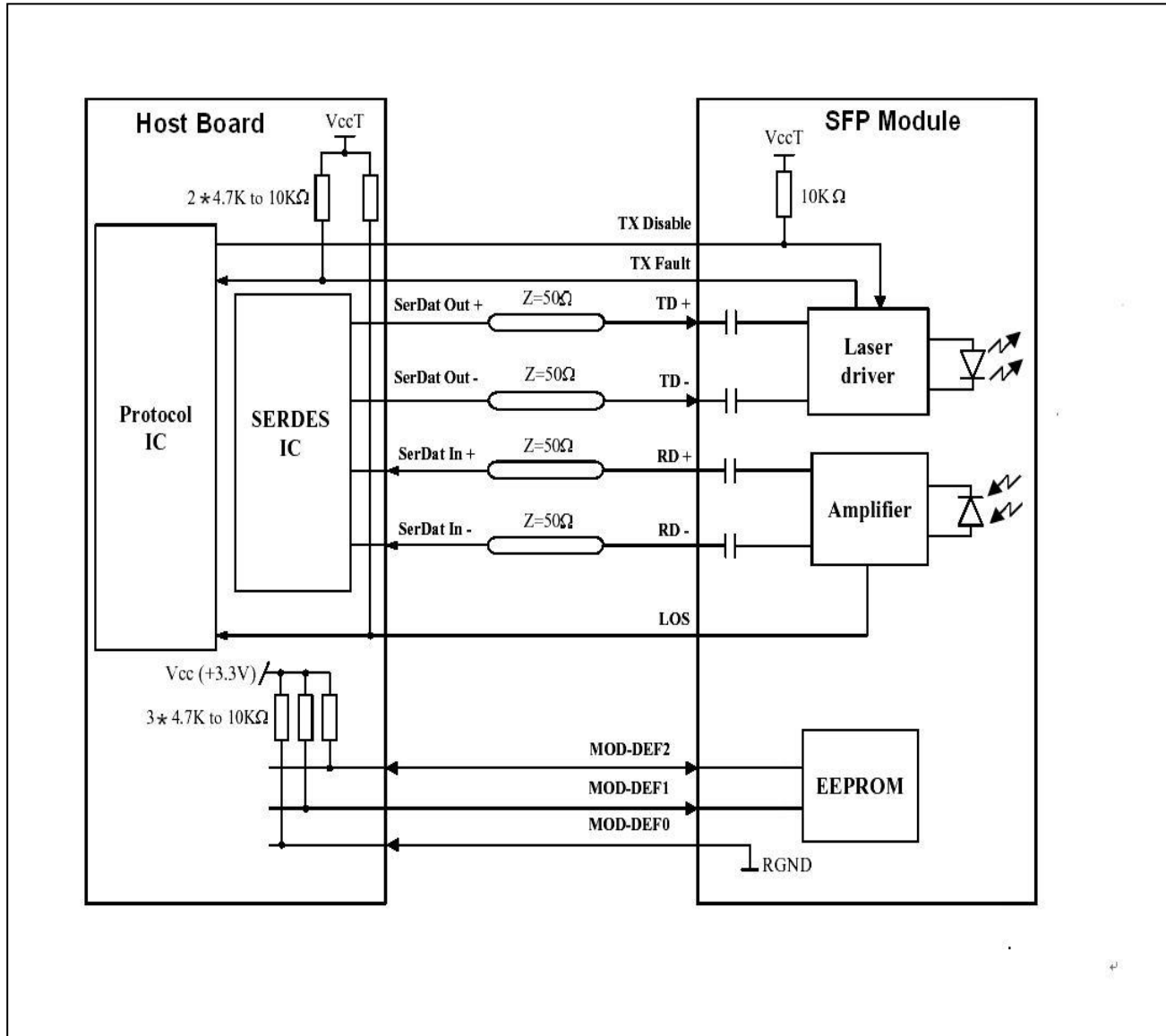
Notes:

Plug Seq.: Pin engagement sequence during hot plugging.

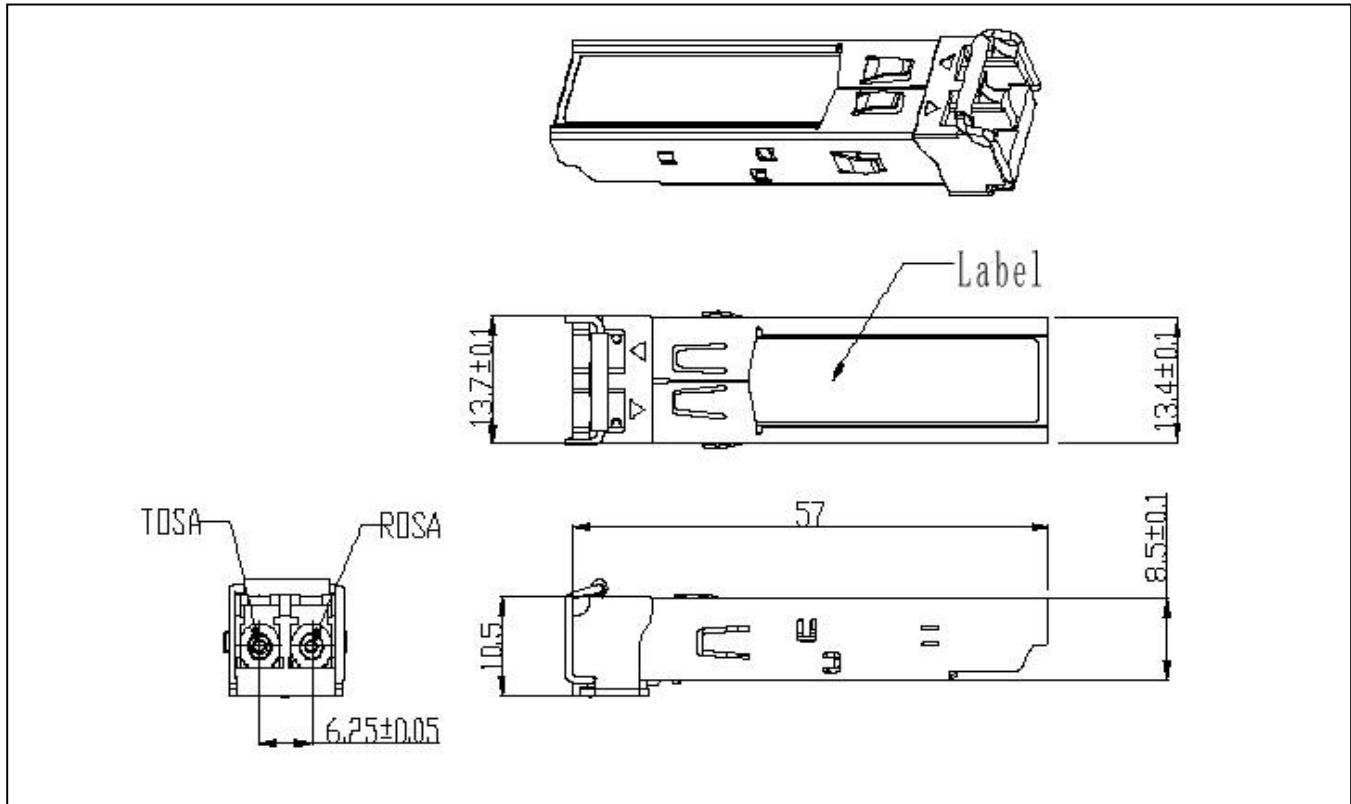
- TX Fault is an open collector output, which should be pulled up with a 4.7k~10kΩ resistor on the host board to a voltage between 2.0V and V_{cc}+0.3V. Logic 0 indicates normal operation; Logic 1 indicates a laser fault of some kind. In the low state, the output will be pulled to less than 0.8V.
- TX Disable is an input that is used to shut down the transmitter optical output. It is pulled up within the module with a 4.7k~10kΩ resistor. Its states are:

| | |
|-----------------------|----------------------|
| Low (0 to 0.8V): | Transmitter on |
| (>0.8V, < 2.0V): | Undefined |
| High (2.0 to 3.465V): | Transmitter Disabled |
| Open: | Transmitter Disabled |
- Mod-Def 0,1,2. These are the module definition pins. They should be pulled up with a 4.7k~10kΩ resistor on the host board. The pull-up voltage shall be V_{ccT} or V_{ccR}.
 Mod-Def 0 is grounded by the module to indicate that the module is present
 Mod-Def 1 is the clock line of two wire serial interface for serial ID
 Mod-Def 2 is the data line of two wire serial interface for serial ID
- LOS is an open collector output, which should be pulled up with a 4.7k~10kΩ resistor. Pull up voltage between 2.0V and V_{cc}+0.3V. Logic 1 indicates loss of signal; Logic 0 indicates normal operation. In the low state, the output will be pulled to less than 0.8V.
- RD-/+ : These are the differential receiver outputs. They are internally AC-coupled 100 differential lines which should be terminated with 100Ω (differential) at the user SERDES.
- TD-/+ : These are the differential transmitter inputs. They are internally AC-coupled, differential lines with 100Ω differential termination inside the module.

Recommended Interface Circuit



Mechanical Dimensions



Regulatory Compliance

GIGALIGHT SFP transceiver is designed to be Class I Laser safety compliant and is certified per the following standards

| Feature | Agency | Standard | Certificate / Comments |
|--------------------------|--------|---|------------------------|
| Laser Safety | FDA | CDRH 21 CFR 1040 and Laser Notice No. 50 | 1120294-000 |
| Product Safety | BST | EN 60825-1: 2007 EN 60825-2: 2004 EN 60950-1: 2006 | BT0905142002 |
| Environmental protection | SGS | RoHS Directive 2002/95/EC | GZ0902008346/CHEM |
| EMC | CCIC | EN 55022: 2006+A1: 2007 EN 55024: 1998+A1: 2001+A2: 2003 | CTE09050018 |

Ordering information

| Part Number | Product Description |
|---------------|--|
| GPC-xx03-08TD | CWDM 1450nm~1610nm, 155Mbps, 80km, -40°C ~ +85°C, With Digital Diagnostic Monitoring |

References

1. Small Form Factor Pluggable (SFP) Transceiver Multi-Source Agreement (MSA), September 2000.
2. Telcordia GR-253-CORE and ITU-T G.957 Specifications.

Important Notice

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