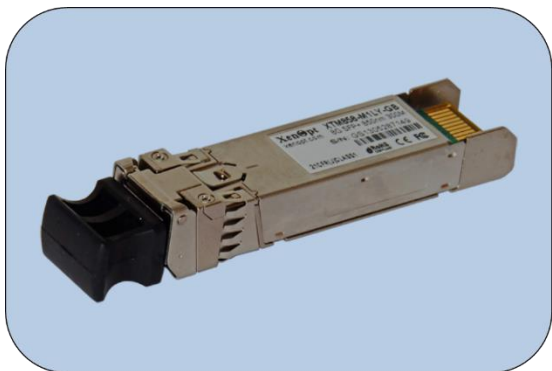




XTM85B-M1LY

14.025 Gbps, LC, 150 m, 850 nm, DDM
SFP+ Optical Transceiver



Features

- Optical interface compliant to IEEE 802.3ae
- Electrical interface compliant to SFF-8431
- Hot Pluggable
- 850nm VCSEL transmitter, PIN photo-detector
- Maximum link length of 150 m on 2000 MHz/km MMF
- Low power consumption
- All-metal housing for superior EMI performance
- Advanced firmware allow customer system encryption information to be stored in transceiver
- Cost effective SFP+ solution, enables higher port densities and greater bandwidth
- Operating case temperature: Standard: 0 to +70°C
- RoHS6 compliant (lead free)

Applications

- 14.025 Gbps Fibre Channel
- Other optical links

Description

This 850 nm VCSEL 14 Gigabit SFP+ transceiver is designed to transmit and receive optical data over 50/125 μm or 62.5/125 μm multimode optical fiber (Table 1).

| Fiber type | Minimum modal band width@850nm (MHx.km) | Operating range (meters) |
|------------------------|---|--------------------------|
| 62.5 μm MMF | 160 | 2 to 26 |
| | 200 | 2 to 33 |
| 50 μm MMF | 400 | 2 to 66 |
| | 500 | 2 to 82 |
| | 2000 | 2 to 100 |



The SFP+ SR module electrical interface is compliant to SFI electrical specifications. The transmitter input and receiver output impedance is 100 Ohms differential. Data lines are internally AC coupled. The module provides differential termination and reduce differential to common mode conversion for quality signal termination and low EMI. SFI typically operates over 200 mm of improved FR4 material or up to about 150mm of standard FR4 with one connector.

The transmitter converts 14.025Gbit/s serial PECL or CML electrical data into serial optical data compliant with the FC standard. An open collector compatible Transmit Disable (Tx_Dis) is provided. A logic "1," or no connection on this pin will disable the laser from transmitting. A logic "0" on this pin provides normal operation. The transmitter has an internal automatic power control loop (APC) to ensure constant optical power output across supply voltage and temperature variations. An open collector compatible Transmit Fault (TFault) is provided. TX_Fault is a module output contact that when high, indicates that the module transmitter has detected a fault condition related to laser operation or safety. The TX_Fault output contact is an open drain/collector and shall be pulled up to the Vcc_Host in the host with a resistor in the range 4.7-10 kΩ. TX_Disable is a module input contact. When TX_Disable is asserted high or left open, the SFP+ module transmitter output shall be turned off. This contact shall be pulled up to VccT with a 4.7 kΩ to 10 kΩ resistor. The receiver converts 14.025Gbit/s serial optical data into serial PECL/CML electrical data. An open collector compatible Loss of Signal is provided. Rx_LOS when high indicates an optical signal level below that specified in the relevant standard. The Rx_LOS contact is an open drain/collector output and shall be pulled up to Vcc_Host in the host with a resistor in the range 4.7-10 kΩ, or with an active termination. Power supply filtering is recommended for both the transmitter and receiver. The Rx_LOS signal is intended as a preliminary indication to the system in which the SFP+ is installed that the received signal strength is below the specified range. Such an indication typically points to non-installed cables, broken cables, or a disabled, failing or a powered off transmitter at the far end of the cable.

Absolute maximum rating

These values represent the damage threshold of the module. Stress in excess of any of the individual Absolute Maximum Ratings can cause immediate catastrophic damage to the module even if all other parameters are within Recommended Operating Conditions.

| Parameter | Symbol | Min | Typical | Max | Unit |
|----------------------------|--------|-----|---------|------|------|
| Power Supply Voltage | VCC | 0 | +3.3 | +3.6 | V |
| Storage Temperature | TC | 5 | +25 | +85 | °C |
| Operating Case Temperature | TC | 0 | +25 | +70 | °C |
| Relative Humidity | RH | 5 | 50 | 95 | % |
| RX Input Average Power | Pmax | - | - | 0 | dBm |

Recommended operating environment

Recommended Operating Environment specifies parameters for which the electrical and optical characteristics hold unless otherwise noted.

| Parameter | Symbol | Min | Typical | Max | Unit |
|----------------------------|--------|--------|---------|--------|------|
| Power Supply Voltage | VCC | +3.135 | +3.3 | +3.465 | V |
| Operating Case Temperature | TC | 0 | +25 | +70 | °C |

Low Speed Characteristics

| Parameter | Symbol | Min | Typical | Max | Unit |
|-------------------|--------|--------------|---------|--------------|------|
| Power Consumption | | | | 1.2 | W |
| TX_Fault, RX_LOS | VOL | 0 | | 0.4 | V |
| | VOH | Host_VCC-0.5 | | Host_VCC+0.3 | V |
| TX_DIS | VIL | -0.3 | | 0.8 | V |
| | VIH | 2.0 | | VCCT+0.3 | V |
| RS0, RS1 | VIL | -0.3 | | 0.8 | V |
| | VIH | 2.0 | | VCCT+0.3 | V |

Optical characteristics

The following optical characteristics are defined over the Recommended Operating Environment unless otherwise specified.

| Parameter | Symbol | Min | Typical | Max | Unit | Notes |
|--------------------------------|-------------|------|---------|-------|-------|------------------|
| Transmitter | | | | | | |
| Center Wavelength | λ_t | 840 | 850 | 860 | nm | |
| RMS spectral width | Pm | - | - | Note1 | nm | |
| Average Optical Power | Pavg | -6.5 | - | | dBm | 2 |
| Extinction Ratio | ER | 3.5 | - | - | dB | 3 |
| Transmitter Dispersion Penalty | TDP | - | - | 3.9 | dB | |
| Relative Intensity Noise | Rin | - | - | -128 | dB/Hz | 12 dB reflection |
| Optical Return Loss Tolerance | | - | - | 12 | dB | |
| Receiver | | | | | | |
| Center Wavelength | λ_r | 840 | 850 | 860 | nm | |
| Receiver Sensitivity | P sens | - | - | -10.5 | dBm | 4 |
| Stressed Sensitivity in OMA | | - | - | -7.5 | dBm | 4 |
| Los function | Los | -30 | - | -12 | dBm | |
| Overload | P in | - | - | -1.0 | dBm | 4 |
| Receiver Reflectance | | - | - | -12 | dB | |

Note:

1. Trade-offs are available between spectral width, center wavelength and minimum OMA, as shown in table 6.
2. The optical power is launched into MMF
3. Measured with a PRBS 231-1 test pattern @14.025 Gbps
4. Measured with a PRBS 231-1 test pattern @14.025 Gbps, BER≤10-12.

| Center Wavelength (nm) | RMS Spectral width (nm) | | | | | | | | |
|------------------------|-------------------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| | Up to 0,05 | 0,05 to 0,1 | 0,1 to 0,15 | 0,15 to 0,2 | 0,2 to 0,25 | 0,25 to 0,3 | 0,3 to 0,35 | 0,35 to 0,4 | 0,4 to 0,45 |
| 840 to 842 | -4,2 | -4,2 | -4,1 | -4,1 | -3,9 | -3,8 | -3,5 | -3,2 | -2,8 |
| 842 to 844 | -4,2 | -4,2 | -4,2 | -4,1 | -3,9 | -3,8 | -3,6 | -3,3 | -2,9 |
| 844 to 846 | -4,2 | -4,2 | -4,2 | -4,1 | -4,0 | -3,8 | -3,6 | -3,3 | -2,9 |
| 846 to 848 | -4,3 | -4,2 | -4,2 | -4,1 | -4,0 | -3,8 | -3,6 | -3,3 | -2,9 |
| 848 to 850 | -4,3 | -4,2 | -4,2 | -4,1 | -4,0 | -3,8 | -3,6 | -3,3 | -3,0 |
| 850 to 852 | -4,3 | -4,2 | -4,2 | -4,1 | -4,0 | -3,8 | -3,6 | -3,4 | -3,0 |
| 852 to 854 | -4,3 | -4,2 | -4,2 | -4,1 | -4,0 | -3,9 | -3,7 | -3,4 | -3,1 |
| 854 to 856 | -4,3 | -4,3 | -4,2 | -4,1 | -4,0 | -3,9 | -3,7 | -3,4 | -3,1 |
| 856 to 858 | -4,3 | -4,3 | -4,2 | -4,1 | -4,0 | -3,9 | -3,7 | -3,5 | -3,1 |
| 858 to 860 | -4,3 | -4,3 | -4,2 | -4,2 | -4,1 | -3,9 | -3,7 | -3,5 | -3,2 |

Electrical characteristics

The following electrical characteristics are defined over the Recommended Operating Environment unless otherwise specified.

| Parameter | Symbol | Min | Typical | Max | Unit | Notes |
|---------------------------------------|--------|------|---------|------|------|------------|
| Data Rate | | - | - | 8.5 | Gbps | |
| Power Consumption | | - | - | 800 | mW | |
| Transmitter | | | | | | |
| Single Ended Output Voltage Tolerance | | -0.3 | - | 4.0 | V | |
| Common Mode Voltage Tolerance | | 15 | - | - | mV | |
| Tx Input Diff Voltage | VI | 400 | - | 1600 | mV | |
| Tx Fault | VoL | -0.3 | - | 0.4 | V | At 0.7 mA |
| Data Dependent Input Jitter | DDJ | - | - | 0.10 | UI | |
| Data Input Total Jitter | TJ | - | - | 0.28 | UI | |
| Receiver | | | | | | |
| Single Ended Output Voltage Tolerance | | -0.3 | - | 4.0 | V | |
| Rx Output Diff Voltage | Vo | 300 | | 850 | mV | |
| Rx Output Rise and Fall Time | Tr/Tf | 30 | | | ps | 20% to 80% |
| Total Jitter | TJ | | - | 0.70 | UI | |
| Deterministic Jitter | DJ | | - | 0.42 | UI | |

Rate Select Control

RX and TX rates can be independently controlled by hardware input pins RS0 and RS1. Module electrical input pins 7 (RS0) and 9 (RS1) are used to select RX and TX rate respectively. The following table shows the way how to select rate by RS0 and RS1.

| RS0 Control Input | RX Operation | Rate Selected | RS1Control Input | TX Operation | Rate Selected |
|-------------------|-----------------|---------------|------------------|-----------------|---------------|
| 1 | RX CDR Enabled | 14.025 Gbps | 1 | TX CDR Enabled | 14.025Gbps |
| 0 | RX CDR Disabled | 8 GFC, 4 GFC | 0 | TX CDR Disabled | 8GFC, 4GFC |

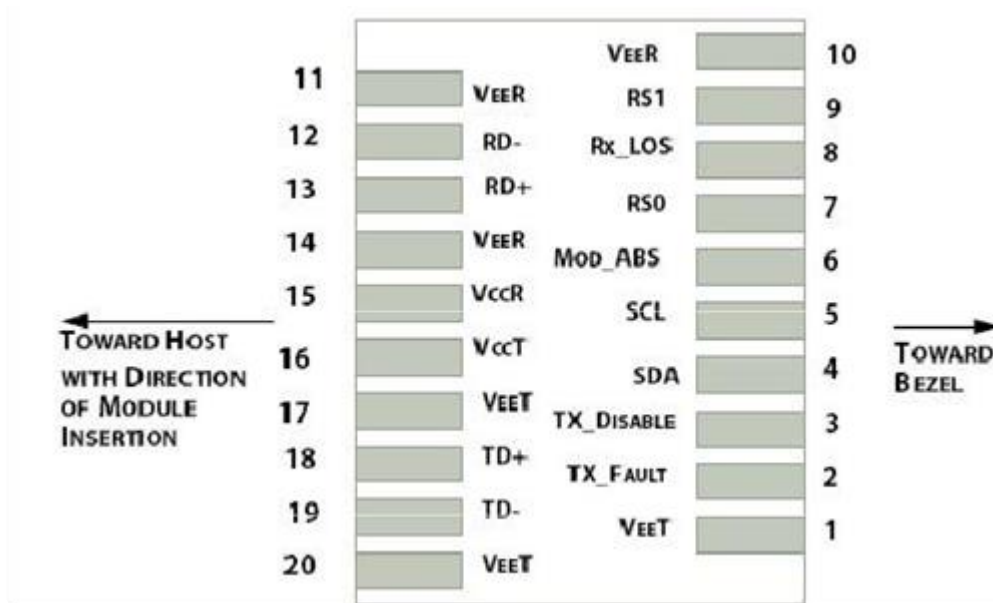


Figure 1: Interface to Host PCB

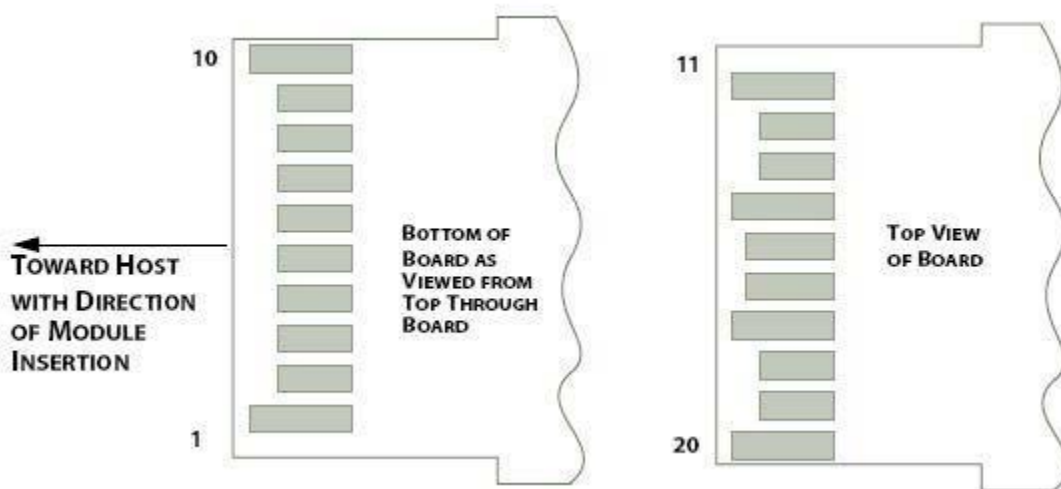


Figure 2: Module Contact Assignment

Pin definition

| Pin | Symbol | Name/Description |
|-----|--------------|---|
| 1 | VEET [1] | Transmitter Ground |
| 2 | Tx_FAULT [2] | Transmitter Fault |
| 3 | Tx_DIS [3] | Transmitter Disable. Laser output disabled on high or open |
| 4 | SDA [2] | 2-wire Serial Interface Data Line |
| 5 | SCL [2] | 2-wire Serial Interface Clock Line |
| 6 | MOD_ABS [4] | Module Absent. Grounded within the module |
| 7 | RS0 [5] | Rate Select 0 |
| 8 | RX-LOS [2] | Loss of Signal Indication. Logic 0 indicates normal operation |
| 9 | RS1 [5] | Rate Select 1 |
| 10 | VEER [1] | Receiver Ground |
| 11 | VEER [1] | Receiver Ground |
| 12 | RD- | Receiver Inverted DATA out. AC Coupled |
| 13 | RD+ | Receiver DATA out. AC Coupled |
| 14 | VEER [1] | Receiver Ground |
| 15 | VCCR | Receiver Power Supply |
| 16 | VCCT | Transmitter Power Supply |
| 17 | VEET [1] | Transmitter Ground |
| 18 | TD+ | Transmitter DATA in. AC Coupled |
| 19 | TD- | Transmitter Inverted DATA in. AC Coupled |
| 20 | VEET [1] | Transmitter Ground |

Notes:

[1] Module circuit ground is isolated from module chassis ground within the module.

[2] Should be pulled up with 4.7 k – 10 k ohms on host board to a voltage between 3.15 V and 3.6 V.

[3] Tx_Disable is an input contact with a 4.7 kΩ to 10 kΩ pullup to VccT inside the module.

[4] Mod_ABS is connected to VeeT or VeeR in the SFP+ module. The host may pull this contact up to Vcc_Host with a resistor in the range 4.7 kΩ to 10 kΩ. Mod_ABS is asserted “High” when the SFP+ module is physically absent from a host slot.

[5] RS0 and RS1 are module inputs and are pulled low to VeeT with > 30 kΩ resistors in the module.

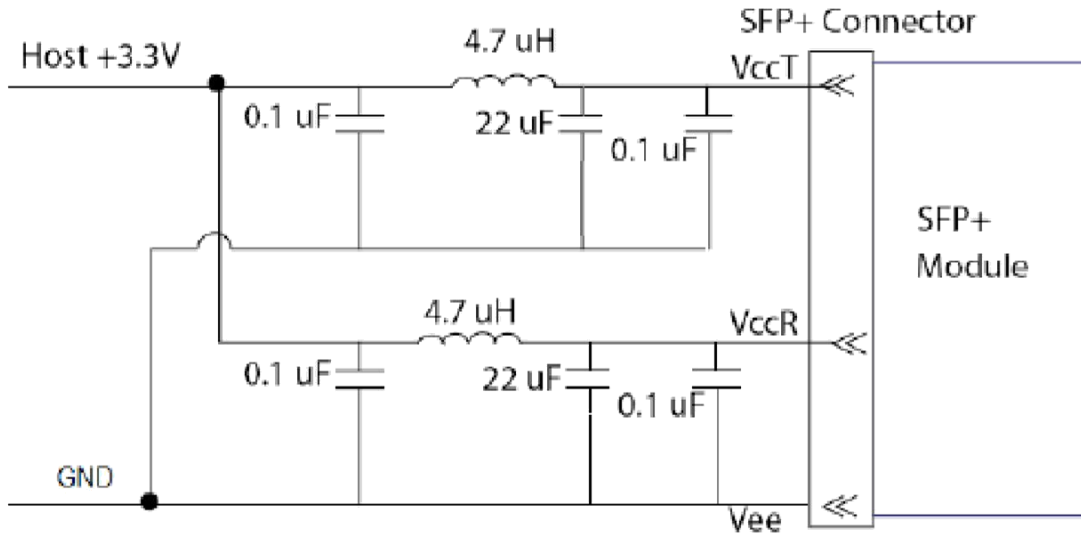


Figure 3. Host Board Power Supply Filters Circuit

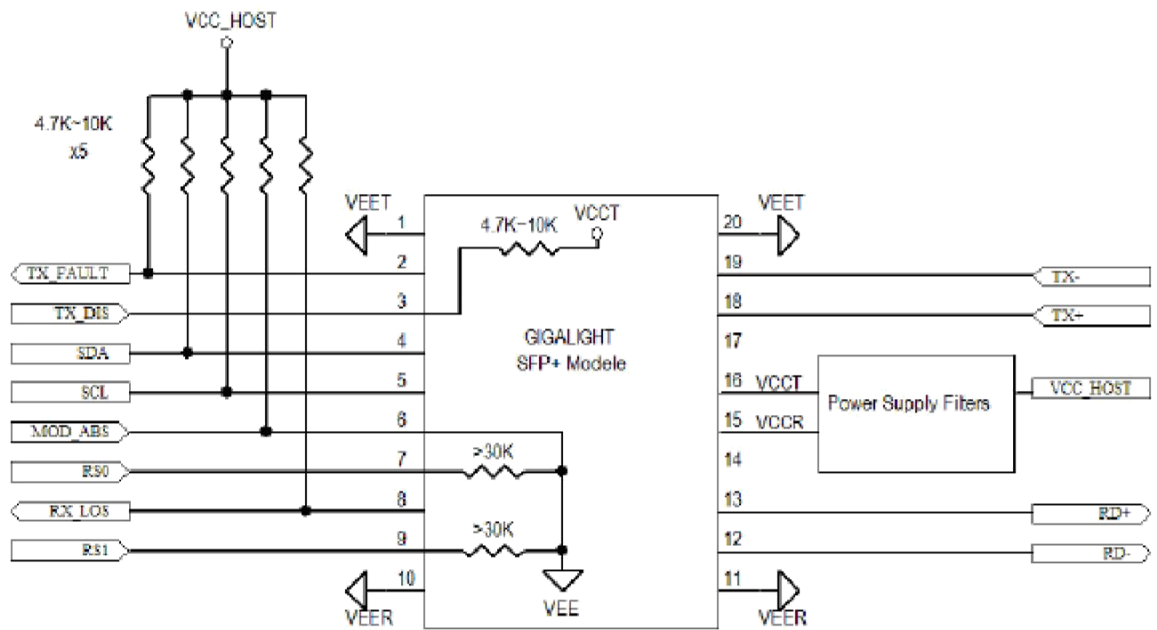


Figure 4. Host-Module Interface

Mechanical Specifications

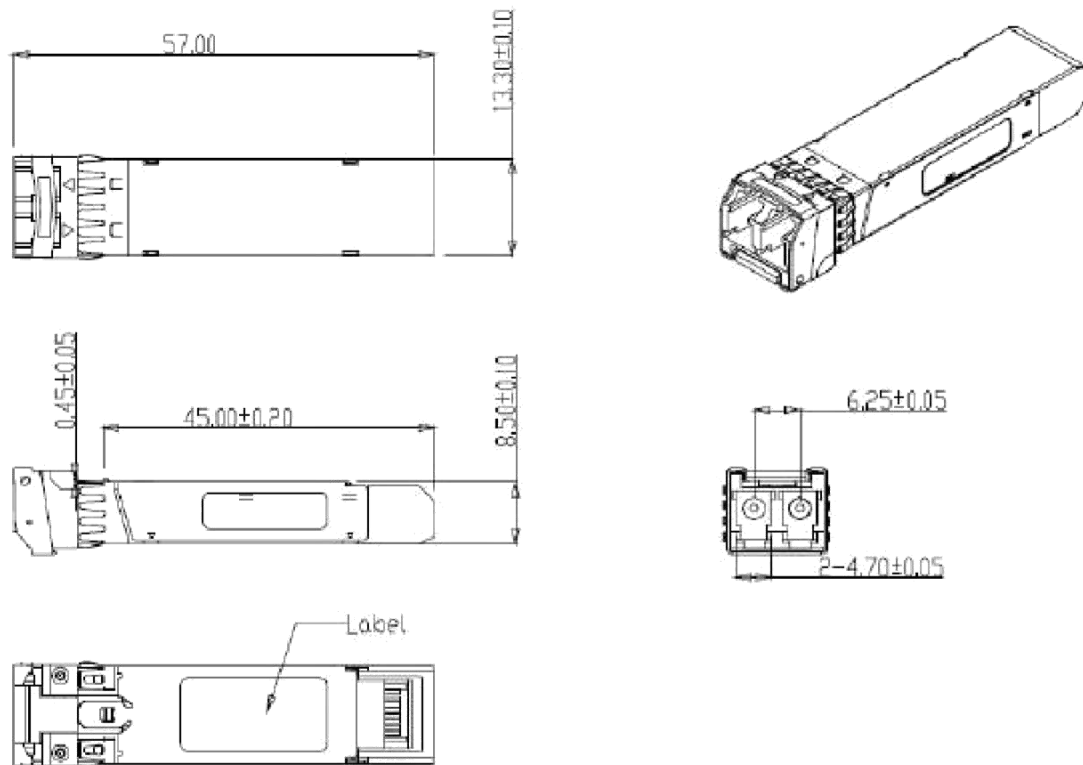


Figure 5. Mechanical specifications

Regulatory Compliance

XenOpt 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 | 1120292-000 |
| Product Safety | UL | UL and CUL EN60950-2:2007 | E347511 |
| Environmental Protection | SGS | RoHS Directive 2002/95/EC | GZ1001008918/CHEM |
| EMC | WALTEK | EN 55022:2006+A1:2007 EN 5524:1998+A1+A2:2003 | WT10093759-D-E-E |

Ordering information¹

| PN | Description |
|-------------|--|
| XTM85B-M1LY | SFP+, 14 Gbps, 850 nm, 150* m, -0°C ~ +70°C, DDM |

*: 35 m for OM2 MMF, 100 m for OM3 MMF and 150 m for OM4 MMF. All tested at 14.025 Gbps.

Notes:

¹ For accurate order specification please contact Xenopt reseller before placing an order. The content of this document is subject to change without notice. Xenopt does not guarantee errorless or outdated information. Please specify any compatibility requirements at time of ordering. Standard MSA compatible pluggable components may not work or some function of these components may not be available in devices that require customized compatible devices. Pluggable components compatible with one type of communications equipment may not work in other type of communications equipment.

References

1. "Specifications for Enhanced Small Form Factor Pluggable Module SFP+", SFF-8431, Rev 4.1, July 6, 2009.
2. "Improved Pluggable Formfactor", SFF-8432, Rev 4.2, Apr 18, 2007
3. IEEE802.3ae-2002
4. "Diagnostic Monitoring Interface for Optical Transceivers" SFF-8472, Rev 10.3, Dec 1, 2007

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