

46C3447-LEG
IBM 10GBASE-SR SFP+ MMF
850NM 300M REACH LC DOM



46C3447-LEG

10Gbs SFP+ Transceiver

Features

- Duplex LC connector
- Support hot-pluggable
- Metal with lower EMI
- Excellent ESD protection
- VCSEL Transmitter and PIN Receiver
- Distance up to 300m on 50/125um MMF (OM3)
- Single 3.3V power supply and Low power dissipation <0.8W
- GR-253-CORE compliant
- RoHS Compliant and Lead-Free
- Compliant with IEEE 802.3ae
- Compliant with SFP+ MSA: SFF-8431 Rev4.1
- Compliant with SFF-8472 Rev.11.0
- Digital diagnostic compatible with SFF-847 Rev11.0

Applications

- 10GBASE-SR/SW
- 10G Fibre Channel
- Other optical link

Product Description

Legrand's 46C3447-LEG Small Form Factor Pluggable (SFP) transceivers are compatible with the Small Form Factor Pluggable Multi-Sourcing Agreement (MSA). The SFP+ transceivers are high performance, cost effective modules supporting dual data-rate of 10Gbps and support distance up to 300m with MMF.

Legrand's SFP+ transceivers are RoHS compliant and lead-free

Regulatory Compliance

- ESD to the Electrical PINs: compatible with MIL-STD-883E Method 3015.7.
- ESD to the Duplex LC Receptacle: compatible with IEC 61000-4-2 GR-1089-CORE.
- Immunity compatible with IEC 61000-4-3.
- EMI compatible with FCC Part 15 Class B EN55022 Class B (CISPR 22B) VCCI Class B.
- Laser Eye Safety compatible with FDA 21CFR 1040.10 and 1040.11 EN60950, EN (IEC) 60825-1,2.
- RoHS compliant with 2002/95/EC 4.1&4.2 2005/747/EC.

Pin Descriptions



| Pin | Symbol | Name/Descriptions | Ref. |
|-----|------------|--|------|
| 1 | VeeT | Transmitter Ground (Common with Receiver Ground). | 1 |
| 2 | TX Fault | Transmitter Fault. LVTTTL-O | 2 |
| 3 | TX Disable | Transmitter Disable. Laser output disabled on high or open. LVTTTL-I. | 3 |
| 4 | SDA | 2-Wire Serial Interface Data Line (Same as MOD-DEF2 in INF-8074i). LVTTTL-I/O. | |
| 5 | SCL | 2-Wire Serial Interface Data Line (Same as MOD-DEF2 in INF-8074i). LVTTTL-I. | |
| 6 | MOD_ABS | Module Absent, Connect to VeeT or VeeR in Module. | 4 |
| 7 | RS0 | Rate Select 0, optionally controls SFP+ module receiver LVTTTL-I. | 5 |
| 8 | LOS | Loss of Signal indication. Logic 0 indicates normal operation. LVTTTL-O. | 2 |
| 9 | RS1 | Rate Select 1, optionally controls SFP+ module transmitter. LVTTTL-I. | 5 |
| 10 | VeeR | Receiver Ground (Common with Transmitter Ground). | 1 |
| 11 | VeeR | Receiver Ground (Common with Transmitter Ground). | 1 |
| 12 | RD- | Receiver Inverted DATA out. AC Coupled. CML-O. | |
| 13 | RD+ | Receiver Non-inverted DATA out. AC Coupled. CML-O. | |
| 14 | VeeR | Receiver Ground (Common with Transmitter Ground). | 1 |
| 15 | VccR | Receiver Power Supply. | |
| 16 | VccT | Transmitter Power Supply. | |
| 17 | VeeT | Transmitter Ground (Common with Receiver Ground). | 1 |
| 18 | TD+ | Transmitter Non-Inverted DATA in. AC Coupled. CML-I. | |
| 19 | TD- | Transmitter Inverted DATA in. AC Coupled. CML-O. | |
| 20 | VeeT | Transmitter Ground (Common with Receiver Ground). | 1 |

Notes:

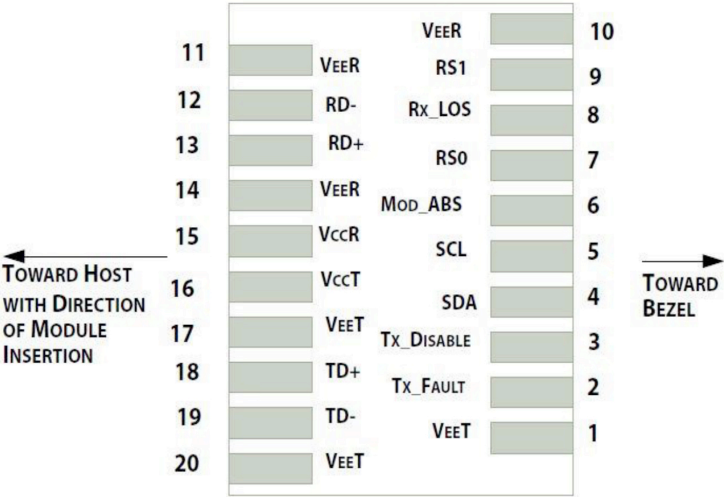
1. The module signal ground contacts, VeeR and VeeT, should be isolated from the module case.
2. This contact is an open collector/drain output and should be pulled up to the Vcc_Host with resistor in the range 4.7KΩ to 10KΩ. Pull ups can be connected to one or several power supplies, however the host board design shall ensure that no module contract has voltage exceeding module VccT/R +0.5.V.
3. Tx_Disable is an input contact with a 4.7KΩ to 10KΩ pull-up resistor to VccT inside module.
4. Mod_ABS is connected to VeeT or VeeR in the SFP+ module. The host may pull the contract up to Vcc_Host with a resistor in the range from 4.7KΩ to 10KΩ. 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 >30K resistors in the module. RS0 optionally selects the optical receive signaling rate coverage. RS1 optionally selects the optical transmit signaling rate coverage.

These contacts can also be used for RS0 and RS1 if implementing SFF8079. See SFF8079 for details. RS1 is commonly connected to VeeT or VeeR in the classic SFP modules. The host needs to ensure that it will not be damaged if this contact is connected to VeeT or VeeR in the module.

The SFP+ module provides two inputs RS0 and RS1 that can optionally be used for rate selection. RS0 controls the receive path signaling rate compatibility, and RS1 controls the transmit path signaling rate compatibility. The host and module may choose to use either, both, or none of these functions. Because contact 9 in the classic SFP INF-8074i is connected to VeeR, and SFP+ host utilizing RS1 must provide short circuit protection.

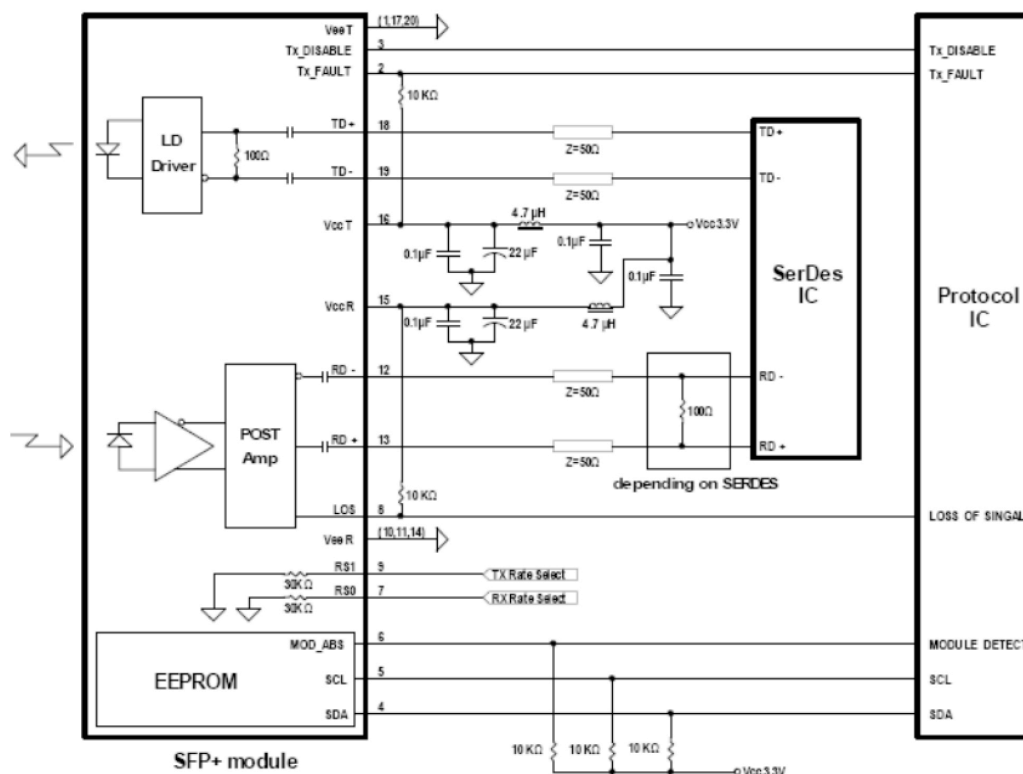
This rate select functionality can also be controlled by software as defined by SFF-8472. Optionally the rate select methods of Part 2 SFF-8079 may be used instead of the method described here by setting the management declaration bit (A0h byte 93 bit 2) to 1, see SFF-8472.

| Parameter | State | Conditions |
|-----------|-------|---|
| RS0 | Low | Rx signally rate less than or equal to 4.25GBd. |
| | High | Rx signally rate great than 4.25GBd. |
| RS1 | Low | Tx signally rate less than or equal to 4.25GBd. |
| | High | Tx signally rate great than 4.25GBd. |



Pin-out of connector Block on Host board

Recommend Circuit Schematic



Absolute Maximum Ratings

| Parameter | Symbol | Min. | Max. | Unit |
|------------------------|--------|------|------|------|
| Maximum Supply Voltage | Vcc | -0.5 | 4.0 | V |
| Storage Temperature | TS | -40 | 85 | °C |
| Operating Humidity | RH | 5 | 95 | % |

Recommended Operating Conditions

| Parameter | Symbol | Min. | Typ. | Max. | Unit |
|---|--------|------|------|------|------|
| Power Supply Voltage | Vcc | 3.13 | 3.30 | 3.47 | V |
| Power Supply Current | Icc | | | 300 | mA |
| Case Operating Temperature – Commercial | Tc | -5 | | 70 | °C |
| Case Operating Temperature – Industrial | Tc | -40 | | 85 | °C |
| Data Rate | | 9.95 | 10.3 | 10.5 | GBps |
| 50/125µm G.652 MMF (OM3) | Lmax | | | 300 | m |

Electrical Characteristics

| Parameter | Symbol | Min. | Typ. | Max. | Unit | Notes |
|--------------------------------|-----------------------|----------------------|------|----------------------|------|-------|
| Transmitter | | | | | | |
| Differential data input swing | V _{in} , pp | 120 | 600 | 850 | mV | |
| Input differential impedance | Z _{in} | 90 | 100 | 110 | Ω | |
| TX Disable-High | | 2.0 | | V _{cc} +0.3 | V | |
| TX Disable-Low | | V _{ee} -0.3 | | 0.8 | V | |
| TX Fault-High | | 2.0 | | V _{cc} +0.3 | V | |
| TX Fault-Low | | V _{ee} -0.3 | | 0.8 | V | |
| Receiver | | | | | | |
| Differential data output swing | V _{out} , pp | 300 | 600 | 850 | mV | |
| Output Differential Impedance | Z _{in} | 90 | 100 | 110 | Ω | |
| LOS-High | | 2.0 | | V _{cc} +0.3 | V | |
| LOS-Low | | V _{ee} -0.3 | | 0.8 | V | |

Optical Characteristics

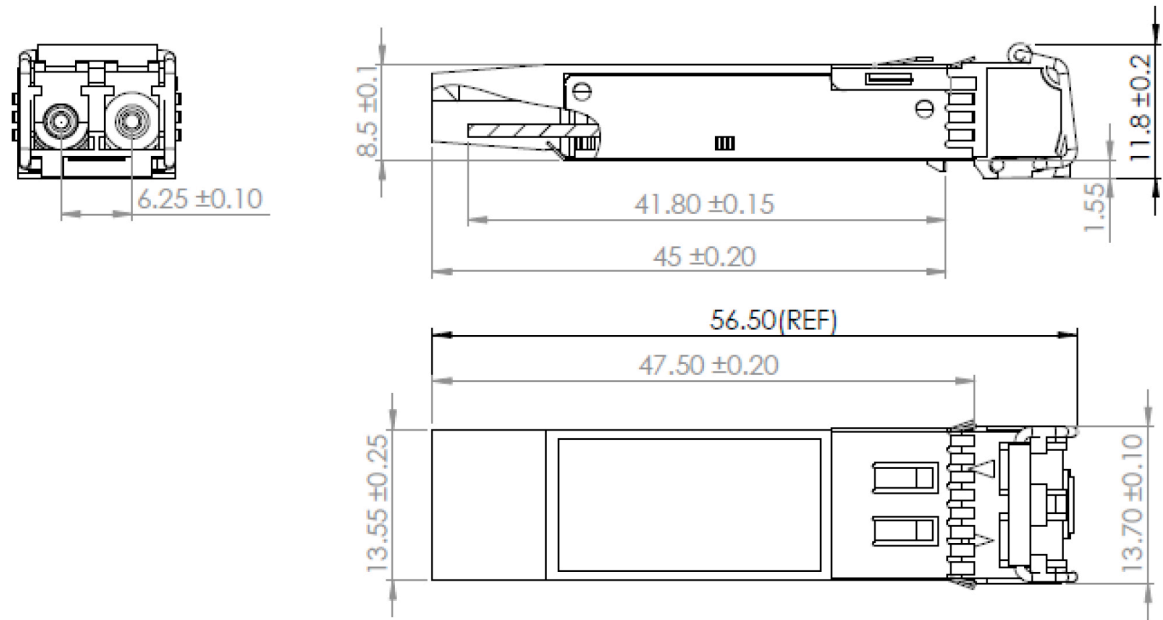
| Parameter | Symbol | Min. | Typ. | Max. | Unit | Notes |
|------------------------------------|---------------------------------|------|------|------|-------|-------|
| Transmitter | | | | | | |
| Output Opt. Power | | -7.3 | | -1 | dBm | 1 |
| Optical modulation amplitude | P(OMA) | -4.3 | -2 | | dBm | |
| Extinction Ratio | ER | 3 | | | dB | |
| Transmitter and Dispersion Penalty | TDP | | | 3.9 | dB | |
| Average Launch power OFF TX | P _{off} | | | -30 | dBm | |
| Optical Wavelength | λλ | 840 | | 860 | nm | |
| Optical Return Loss Tolerance | ORLT | | | 12 | dB | |
| Relative Intensity Noise | RIN | | | -128 | dB/Hz | |
| Eye Diagram | Compatible with IEEE 802.3-2005 | | | | | |
| Receiver | | | | | | |
| Overload | PO | -1 | | | dBm | 1 |
| Optical Center Wavelength | λ _C | 840 | | 860 | nm | 1 |
| LOS De-Assert | LOSD | | | -13 | dBm | 1 |
| LOS Assert | LOSA | -30 | | | dBm | |
| LOS Hysteresis | | 0.5 | | | dB | |

| | | | | | | |
|---------------------------------|---------|--|--|-------|-----|--|
| Receiver Sensitivity | PIN | | | -9.9 | dBm | |
| Receiver Sensitivity @ FEC rate | PIN-OMA | | | -11.1 | dBm | |

Notes:

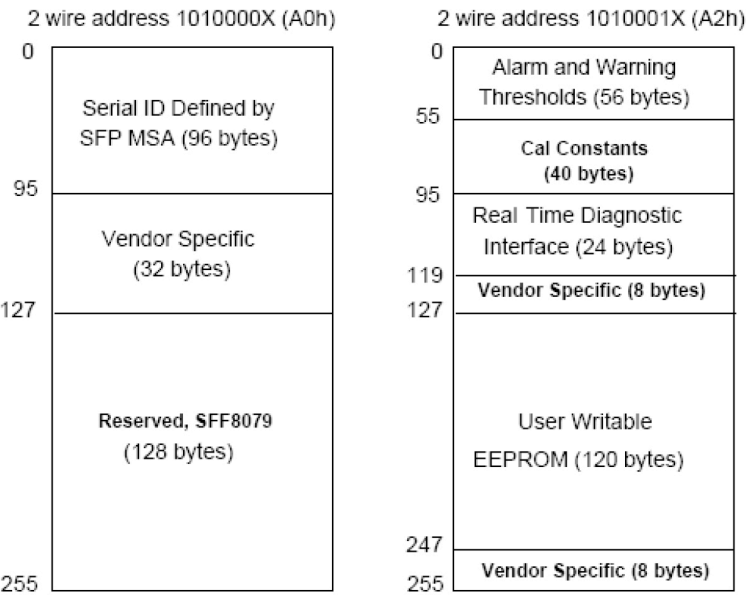
- 1. BER ≤ 10⁻¹²@PRBS231-1 at 10.3125Gb/s.

Mechanical Specifications



EEPROM Information

EEPROM memory map specific data field description is as below:



Digital Diagnostic Monitoring Interface

The digital diagnostic monitoring interface also defines another 256-byte memory map in EEPROM, which makes use of the 8 bi address 1010001X (A2h). The monitoring specification of this product is described in this table.

| Parameter | Range | Accuracy | Calibration |
|--------------|------------------|----------|-------------|
| Temperature | -5°C to 85°C | ±3°C | Internal |
| Voltage | 2.97V to 3.63V | ±3% | Internal |
| Bias Current | 0mA to 100mA | ±10% | Internal |
| TX Power | -7.3dBm to -1dBm | ±2dB | Internal |
| RX Power | -12dBm to -1dBm | ±2dB | Internal |



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