

Product Features

- ✧ data rate of 2.5Gbps operation
- ✧ DWDM DFB wavelengths laser and APD photo-detector for 80km transmission
- ✧ Compliant with SFP MSA and SFF-8472 with duplex LC receptacle
Hot-pluggable SFP footprint
- ✧ Duplex LC/UPC type pluggable optical interface
- ✧ RoHS compliant and lead-free
- ✧ Single +3.3V power supply
- ✧ Support Digital Diagnostic Monitoring interface
- ✧ Case operating temperature: 0°C to +70°C



Applications

- ✧ C-Band DWDM networks
- ✧ Fiber Channel
- ✧ SONET/SDH networks
- ✧ Gigabit Ethernet

Ordering Information

| Part Number | Output Power | Rec. Sens | Data Rate | Wavelength | Distance |
|----------------|--------------|-----------|-----------|------------|----------|
| FH-SDxx25CDL80 | 0~ +4dBm | -28dBm | 2.5G | xxnm | 80km |

General

FH-SDxx25CDL80 SFP transceivers are compatible with the Small Form Factor Pluggable Multi-Sourcing Agreement (MSA) and SFF-8472. The transceiver consists of five sections: the LD driver, the limiting amplifier, the digital diagnostic monitor, the DFB laser and the APD. The module data link up to 80KM in 9/125um single mode fiber. It offers a simple and convenient way to interface PCBs to single mode fiber optic cables in Dense Wavelength Division Multiplexing (DWDM) applications. It is a high performance, cost effective module for serial optical data communication applications.

The optical output can be disabled by a TTL logic high-level input of Tx Disable, and the system also can disable the module via I2C. Tx Fault is provided to indicate that degradation of the laser. Loss of signal (LOS) output is provided to indicate the loss of an input optical signal of receiver or the link status with partner. The system can also get the LOS (or Link)/Disable/Fault information via I2C register access.

Absolute Maximum Ratings

| Parameter | Symbol | Min. | Max. | Unit | Note |
|---------------------|--------|------|------|------|------|
| Supply Voltage | Vcc | -0.5 | 4.0 | V | |
| Storage Temperature | | -40 | 85 | °C | |
| Relative Humidity | | 5 | 85 | % | |

Note: Stress in excess of the maximum absolute ratings can cause permanent damage to the module

General Operating Characteristics

| Parameter | Symbol | Min. | Typ | Max. | Unit | Note |
|----------------------|--------|------|-----|------|------|------|
| Data Rate | | | 2.5 | | Gb/s | |
| Supply Voltage | Vcc | 3.13 | 3.3 | 3.47 | V | |
| Supply Current | Icc | | | 220 | mA | |
| Operating Case Temp. | Tc | 0 | | 70 | °C | |

Electrical Input/Output Characteristics

| Parameter | | Symbol | Min. | Typical | Max. | Unit | Notes |
|----------------------------|---|--------|------|---------|---------|------|-------|
| Transmitter | | | | | | | |
| Diff. input voltage swing | | | 120 | | 820 | mVpp | 1 |
| Tx Disable input | H | VIH | 2.0 | | Vcc+0.3 | V | |
| | L | VIL | 0 | | 0.8 | | |
| Tx Fault output | H | VOH | 2.0 | | Vcc+0.3 | V | 2 |
| | L | VOL | 0 | | 0.8 | | |
| Input Diff. Impedance | | Zin | | 100 | | Ω | |
| Receiver | | | | | | | |
| Diff. output voltage swing | | | 340 | 650 | 800 | mVpp | 3 |
| Rx LOS Output | H | VOH | 2.0 | | Vcc+0.3 | V | 2 |
| | L | VOL | 0 | | 0.8 | | |

Note 1) AC-Coupled CML logic family.

Note 2) Tx Fault and Rx LOS are open collector outputs, which should be pulled up with 4.7k to 10kΩ resistors on the host board. Pull up voltage between 2.0V and Vcc+0.3V.

Note 3) RD+/- outputs are internally AC coupled, and should be terminated with 100Ω (differential) at the user SERDES.

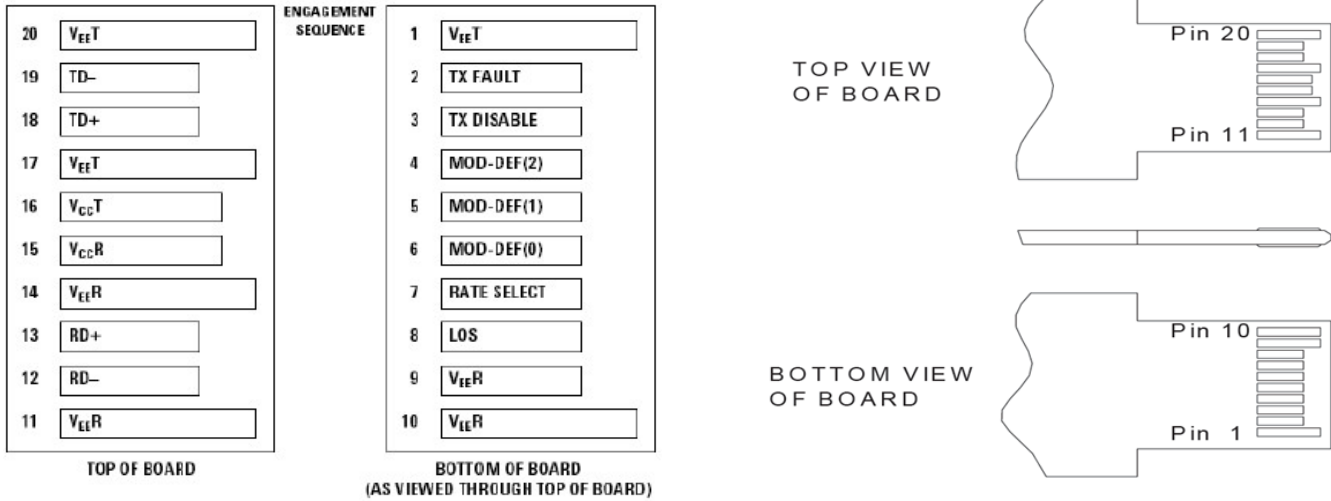
Optical Characteristics

| Parameter | Symbol | Min. | Typ | Max. | Unit | Note |
|-----------------------------|---|------|-----|------|------|------|
| Transmitter | | | | | | |
| Operating Wavelength | | | xx | | nm | 3 |
| Ave. output power (Enabled) | Po | 0 | | +4 | dBm | 1 |
| Extinction Ratio | ER | 9 | | | dB | 1 |
| RMS spectral width | $\Delta\lambda$ | | | 4 | nm | |
| Rise/Fall Time (20%-80%) | Tr-Tf | | | 0.26 | ns | 2 |
| Output Optical Eye | Compliant with G.957 (class 1 laser safety) | | | | | |
| Receiver | | | | | | |
| Operating Wavelength | | 1270 | | 1610 | nm | |
| Sensitivity | Psen | | | -28 | dBm | 4 |
| Min. overload | Pimax | -9 | | | dBm | |
| LOS Assert | Pa | -40 | | | dBm | |
| LOS De-assert | Pd | | | -29 | dBm | 5 |
| LOS Hysteresis | Pd-Pa | 0.5 | | 6 | dB | |

Note

- 1 Measure at 2⁷-1 NRZ PRBS pattern
- 2 Transmitter eye mask definition
- 3 “XX” is:27,29,31,33,35,37,39,41,43,45,47,49,51,53,55,57,59 and 61; “ $\Delta\lambda$ ” is 7.5
- 4 Measured with Light source 1XX0 nm, ER=8.5dB; BER = 10^{-12} @PRBS=2⁷-1 NRZ
- 5 When LOS de-asserted, the RX data+/- output is High-level (fixed)

Pin Definitions And Functions



| PIN # | Name | Function | Notes |
|-------|-------------|--|--------|
| 1 | VeeT | Tx ground | |
| 2 | Tx Fault | Tx fault indication, Open Collector Output, active "H" | Note 1 |
| 3 | Tx Disable | LVTTL Input, internal pull-up, Tx disabled on "H" | Note 2 |
| 4 | MOD-DEF2 | 2 wire serial interface data input/output (SDA) | Note 3 |
| 5 | MOD-DEF1 | 2 wire serial interface clock input (SCL) | Note 3 |
| 6 | MOD-DEF0 | Model present indication | Note 3 |
| 7 | Rate select | No connection | |
| 8 | LOS | Rx loss of signal, Open Collector Output, active "H" | Note 4 |
| 9 | VeeR | Rx ground | |
| 10 | VeeR | Rx ground | |
| 11 | VeeR | Rx ground | |
| 12 | RD- | Inverse received data out | Note 5 |
| 13 | RD+ | Received data out | Note 5 |
| 14 | VeeR | Rx ground | |
| 15 | VccR | Rx power supply | |
| 16 | VccT | Tx power supply | |
| 17 | VeeT | Tx ground | |
| 18 | TD+ | Transmit data in | Note 6 |
| 19 | TD- | Inverse transmit data in | Note 6 |
| 20 | VeeT | Tx ground | |

Note 1) When high, this output indicates a laser fault of some kind. Low indicates normal operation. And should be pulled up with a 4.7 – 10KΩ resistor on the host board.

Note 2) TX disable is an input that is used to shut down the transmitter optical output. It is pulled up within the module with a 4.7 – 10KΩ resistor. Its states are:

Low (0 – 0.8V): Transmitter on (>0.8, < 2.0V): Undefined

High (2.0V~Vcc+0.3V): Transmitter Disabled Open: Transmitter Disabled

Note 3) 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 between 2.0V~Vcc+0.3V.

Mod-Def 0 has been 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

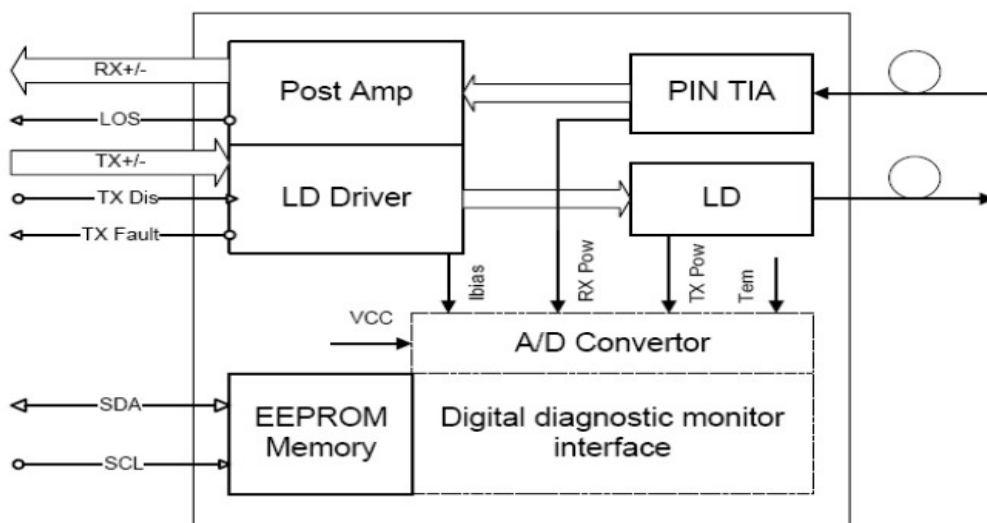
Mod-Def 2 is the data line of two wire serial interface for serial ID

Note 4) When high, this output indicates loss of signal (LOS). Low indicates normal operation.

Note 5) RD+/-: These are the differential receiver outputs. They are AC coupled 100Ω differential lines which should be terminated with 100Ω (differential) at the user SERDES. The AC coupling is done inside the module and is thus not required on the host board.

Note 6) TD+/-: These are the differential transmitter inputs. They are AC-coupled, differential lines with 100Ω differential termination inside the module. The AC coupling is done inside the module and is thus not required on the host board.

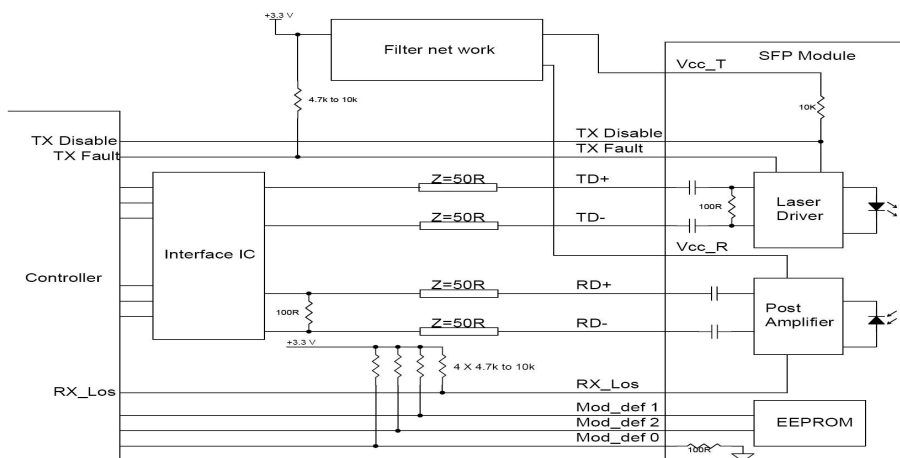
Functional Diagram



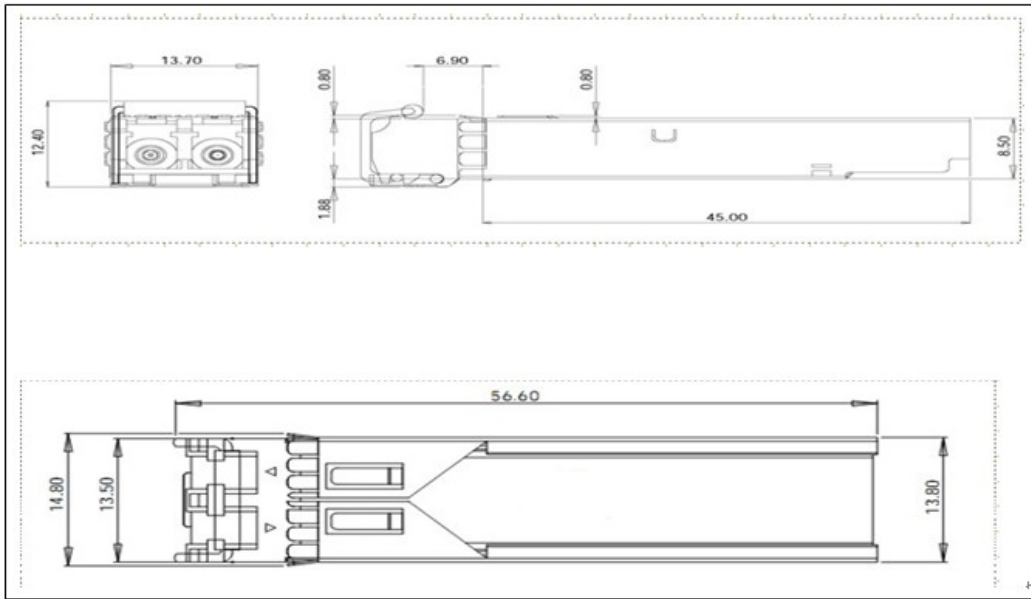
Product Selection

| Code | Frequency (THz) | Center Wavelength(nm) | Code | Frequency (THz) | Center Wavelength(nm) |
|------|-----------------|-----------------------|------|-----------------|-----------------------|
| C17 | 191.7 | 1563.86 | C40 | 194.0 | 1545.32 |
| C18 | 191.8 | 1563.05 | C41 | 194.1 | 1544.53 |
| C19 | 191.9 | 1562.23 | C42 | 194.2 | 1543.73 |
| C20 | 192.0 | 1561.42 | C43 | 194.3 | 1542.94 |
| C21 | 192.1 | 1560.61 | C44 | 194.4 | 1542.14 |
| C22 | 192.2 | 1559.79 | C45 | 194.5 | 1541.35 |
| C23 | 192.3 | 1558.98 | C46 | 194.6 | 1540.56 |
| C24 | 192.4 | 1558.17 | C47 | 194.7 | 1539.77 |
| C25 | 192.5 | 1557.36 | C48 | 194.8 | 1538.98 |
| C26 | 192.6 | 1556.55 | C49 | 194.9 | 1538.19 |
| C27 | 192.7 | 1555.75 | C50 | 195.0 | 1537.40 |
| C28 | 192.8 | 1554.94 | C51 | 195.1 | 1536.61 |
| C29 | 192.9 | 1554.13 | C52 | 195.2 | 1535.82 |
| C30 | 193.0 | 1553.33 | C53 | 195.3 | 1535.04 |
| C31 | 193.1 | 1552.52 | C54 | 195.4 | 1534.25 |
| C32 | 193.2 | 1551.72 | C55 | 195.5 | 1533.47 |
| C33 | 193.3 | 1550.92 | C56 | 195.6 | 1532.68 |
| C34 | 193.4 | 1550.12 | C57 | 195.7 | 1531.90 |
| C35 | 193.5 | 1549.32 | C58 | 195.8 | 1531.12 |
| C36 | 193.6 | 1548.51 | C59 | 195.9 | 1530.33 |
| C37 | 193.7 | 1547.72 | C60 | 196.0 | 1529.55 |
| C38 | 193.8 | 1546.92 | C61 | 196.1 | 1528.77 |
| C39 | 193.9 | 1546.12 | | | |

Typical Interface Circuit



Package Dimensions



Diagnostics

Diagnostics Specification

| Parameter | Range | Unit | Accuracy | Calibration |
|--------------|---------------------|------|----------|--------------------|
| Temperature | 0 to +70 -40 to +85 | °C | ±3°C | Internal/ External |
| Voltage | 3.0 to 3.6 | V | ±3% | Internal/ External |
| Bias Current | 2 to 80 | mA | ±10% | Internal/ External |
| TX Power | -1 to 5 | dBm | ±3dB | Internal/ External |
| RX Power | -27 to 0 | dBm | ±3dB | Internal/ External |



*FH-SDxx25CDL80
2.5G SFP DWDM xxnm LC 80km DDMI*

For More Information

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