# MAIPU
## MAKE IT INTELLIGENT

# MP-S85123-3CDLM
## RoHS Compliant 1.25Gbps 850nm Optical Transceiver 550m Reach

## Product Features

- Supports 1.25Gbps/1.0625Gbps bit rates
- Duplex LC connector
- Hot pluggable SFP footprint
- 850nm VSCEL laser transmitter and PIN photo-detector
- Applicable for 550m on 50/125μm, 300m on 62.5/125μm MMF connection
- Low power consumption, < 0.8W
- Digital Diagnostic Monitor Interface
- Compliant with SFP MSA and SFF-8472
- Very low EMI and excellent ESD protection
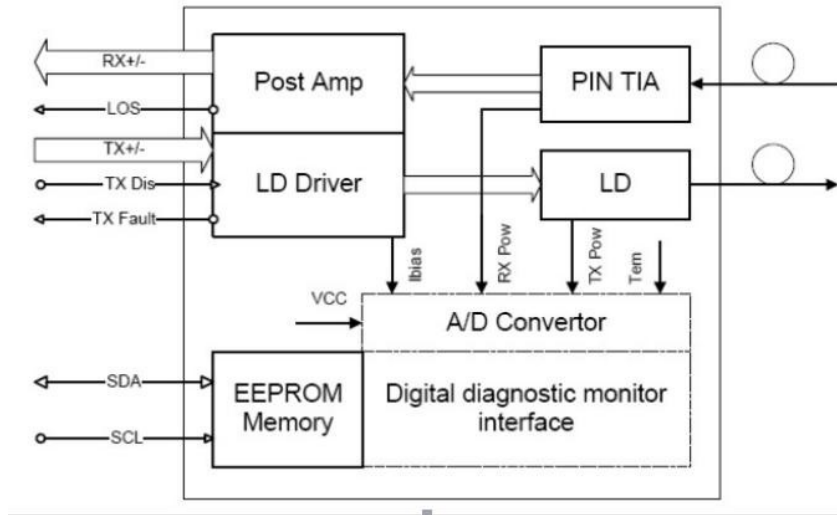- Operating case temperature:
    Commercial:0 to 70 °C

## Applications

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

# Product Descriptions

MP-S85123-3CDLM transceivers are high performance, cost effective modules supporting data-rate of 1.25Gbps and 550m transmission distance with MMF. The transceiver consists of three sections: a VCSEL 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.

# Functional Diagram



# Absolute Maximum Ratings

| Parameter | Symbol | Min. | Max. | Unit | Note |
|---|---|---|---|---|---|
| Supply Voltage | Vcc | -0.5 | 4.0 | V | |
| Storage Temperature | Ts | -40 | 85 | °C | |
| Relative Humidity | RH | 0 | 85 | % | |

*Note:* Stress in excess of the maximum absolute ratings can cause permanent damage to the transceiver.

# General Operating Characteristics

| Parameter | Symbol | Min. | Typ | Max. | Unit | Note |
|---|---|---|---|---|---|---|
| Data Rate | DR | | 1.25 | | Gb/s | |
| Supply Voltage | Vcc | 3.13 | 3.3 | 3.47 | V | |
| Supply Current | $Icc_5$ | | | 220 | mA | |
| Operating Case Temp. | Tc | 0 | | 70 | °C | |
| | $T_I$ | -40 | | 85 | | |

# Electrical Characteristics (VCC = 3.13 to 3.47 V)

| Parameter | Symbol | Min. | Typ | Max. | Unit | Note |
|---|---|---|---|---|---|---|
| **Transmitter** | | | | | | |
| Differential data input swing | $V_{IN,PP}$ | 250 | | 1200 | mVpp | 1 |
| Tx Disable Input-High | $V_{IH}$ | 2.0 | | Vcc+0.3 | V | |
| Tx Disable Input-Low | $V_{IL}$ | 0 | | 0.8 | V | |
| Tx Fault Output-High | $V_{OH}$ | 2.0 | | Vcc+0.3 | V | 2 |
| Tx Fault Output-Low | $V_{OL}$ | 0 | | 0.8 | V | 2 |
| Input differential impedance | $R_{in}$ | | 100 | | Ω | |
| **Receiver** | | | | | | |
| Differential data output swing | $V_{out,pp}$ | 250 | | 550 | mVpp | 3 |
| Rx LOS Output-High | $V_{ROH}$ | 2.0 | | Vcc+0.3 | V | 2 |
| Rx LOS Output-Low | $V_{ROL}$ | 0 | | 0.8 | V | 2 |

**Notes:**

1. TD+/- are internally AC coupled with 100Ω differential termination inside the module.

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.

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

# Optical Characteristics (VCC = 3.13 to 3.47 V)

| Parameter | Symbol | Min. | Typ | Max. | Unit | Note |
|---|---|---|---|---|---|---|
| **Transmitter** | | | | | | |
| Operating Wavelength | λ | 840 | 850 | 860 | nm | |
| Ave. output power (Enabled) | $P_{AVE}$ | -10 | | 0 | dBm | 1 |
| Extinction Ratio | ER | 9 | | | dB | 1 |
| RMS spectral width | Δλ | | | 0.65 | nm | |
| Rise/Fall time (20%~80%) | $T_r/T_f$ | | | 0.25 | ps | 2 |
| Output Optical Eye | Compliant with IEEE802.3 z &ITU G.957 Compliant (class 1 aser safety) | | | | | |
| **Receiver** | | | | | | |
| Operating Wavelength | λ | 840 | 850 | 860 | nm | |
| Receiver Sensitivity | $P_{SEN1}$ | | | -18 | dBm | 3 |
| Overload | $P_{AVE}$ | -3 | | | dBm | 3 |
| LOS Assert | Pa | -35 | | | dBm | |
| LOS De-assert | Pd | | | -20 | dBm | |
| LOS Hysteresis | Pd-Pa | 0.5 | | | dB | |

**Notes:**

1. Measured at 1.25Gb/s with PRBS $2^{23-1}$ NRZ test pattern.

2.Unfiltered, measured with a PRBS $2^{23-1}$ test pattern @1.25Gbps

3.Measured at 1.25Gb/s with PRBS $2^{23-1}$ NRZ test pattern for BER < $1\times10^{-10}$

# Pin Definition And Functions
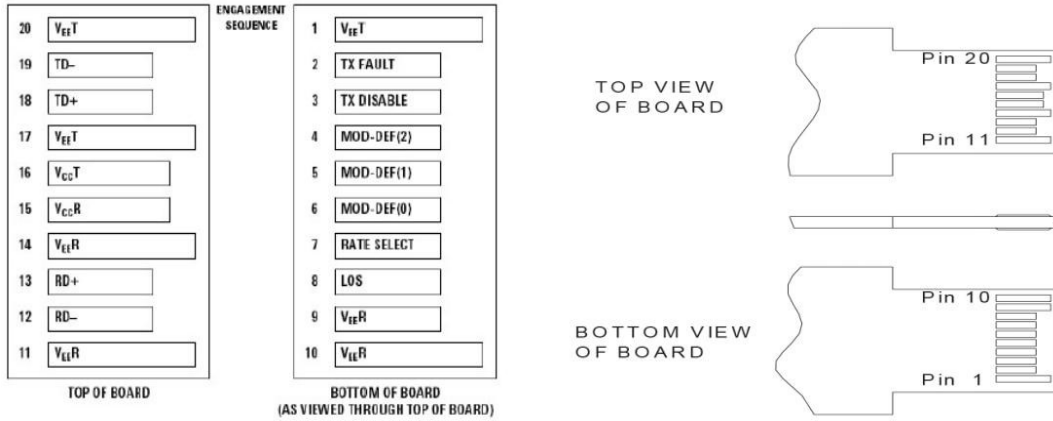


| Pin | Symbol | Name/Description | Notes |
|-----|--------|------------------|-------|
| 1 | VeeT | Tx ground | |
| 2 | Tx Fault | Tx fault indication, Open Collector Output, active "H" | 1 |
| 3 | Tx Disable | LVTTL Input, internal pull-up, Tx disabled on "H" | 2 |
| 4 | MOD-DEF2 | 2 wire serial interface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

**Notes:**

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

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 $4.7 – 10K\Omega$ 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

3. Mod-Def 0,1,2. These are the module definition pins. They should be pulled up with a $4.7K – 10K\Omega$ 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

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

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.

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.
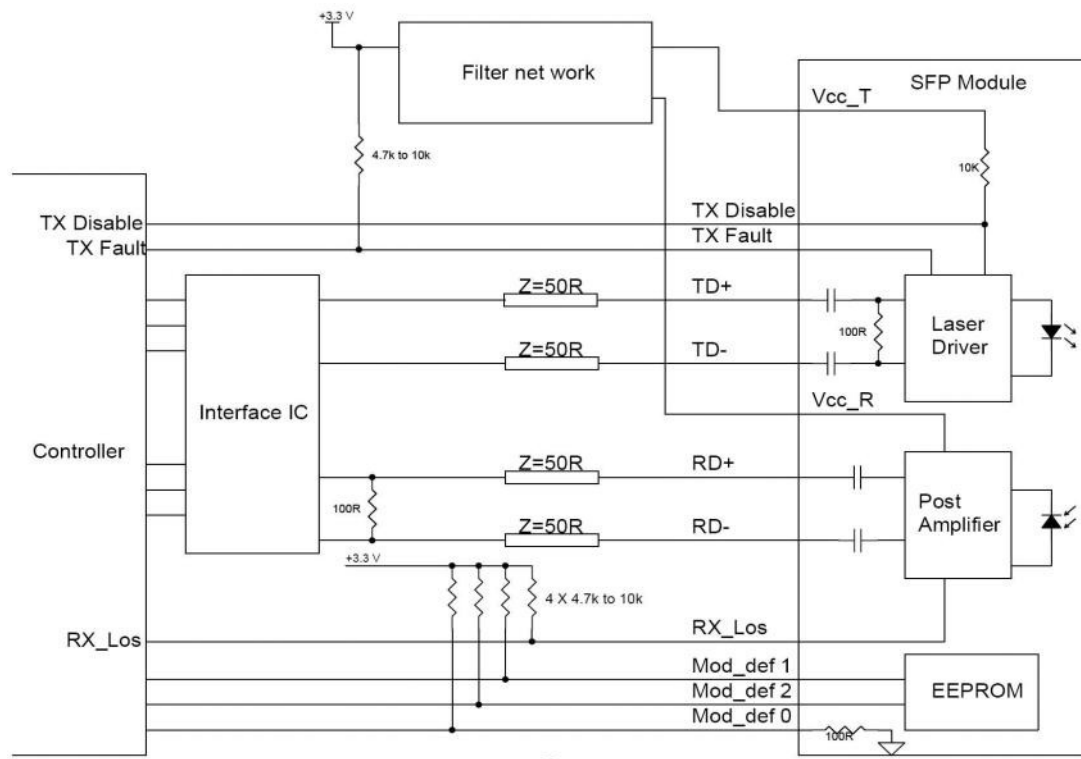
# Digital Diagnostic Specifications

The MP-S85123-3CDLM transceivers can be used in host systems that require either internally or externally calibrated digital diagnostics.

| Parameter | Symbol | Units | Min. | Max. | Accuracy | Note |
|---|---|---|---|---|---|---|
| Transceiver temperature | $D_{Temp-E}$ | ºC | -45 | +90 | ±5ºC | 1 |
| Transceiver supply voltage | $D_{Voltage}$ | V | 2.8 | 4.0 | ±3% | |
| Transmitter bias current | $D_{Bias}$ | mA | 2 | 15 | ±10% | 2 |
| Transmitter output power | $D_{Tx-Power}$ | dBm | -11 | 1 | ±3dB | |
| Receiver average input power | $D_{Rx-Power}$ | dBm | -21 | 0 | ±3dB | |

*Notes:*

1. When Operating temp.=0~70 ºC,the range will be min=-5,Max=+75
2. The accuracy of the Tx bias current is 10% of the actual current from the laser driver to the laser
3. Internal/ External Calibration compatible.

# Typical Interface Circuit

# Package Dimensions



Units: mm
Tolerance without indication is ±0.1mm
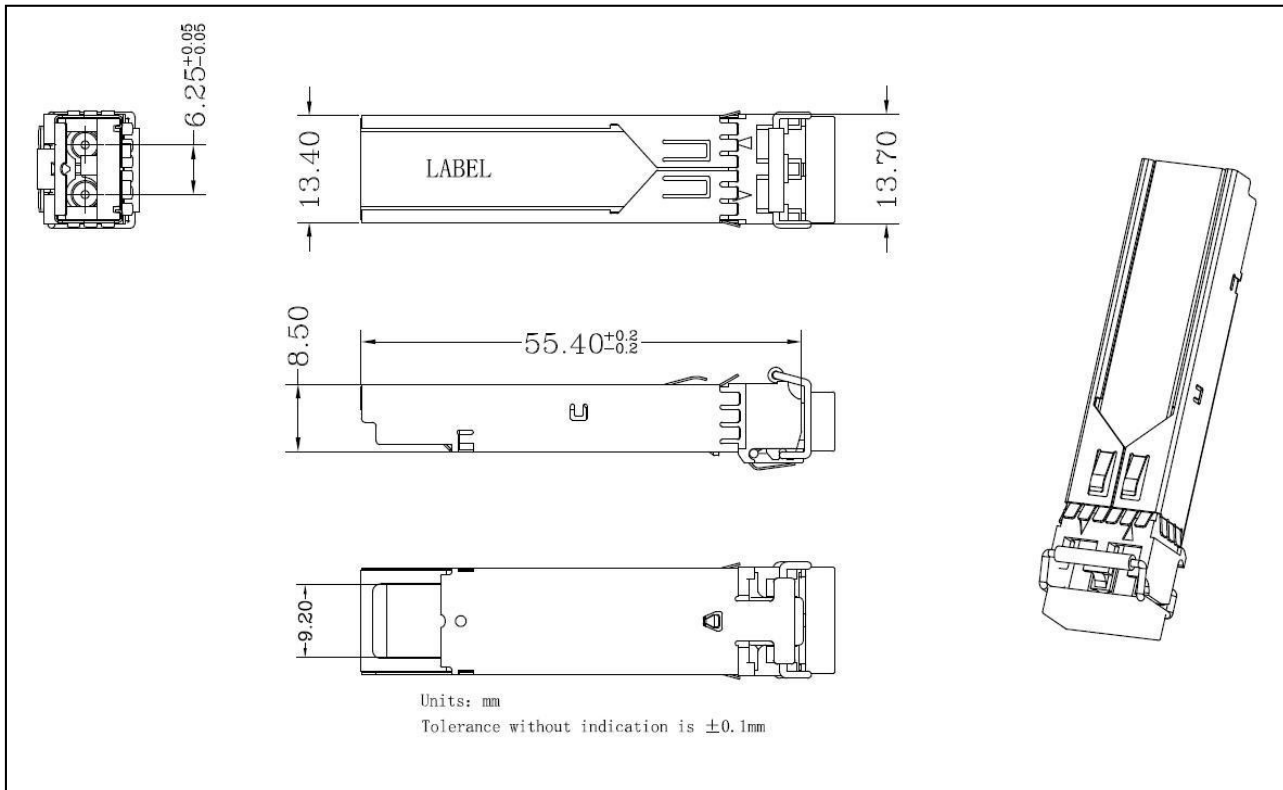
# Ordering Information

| Part Number | Description |
|---|---|
| MP-S85123-3CDLM | SFP,1.25Gbps, 850nm, Multimode,550m, 0~70℃, with Digital Diagnostic Monitor |