

25G SFP28 Active Optical Cable

CC-PMMAOCX-SD

Features

- Hot-pluggable SFP28 form factor
- Supports 25.78125Gb/s bit rate
- Maximum link length of 70m on OM3 MMF and 100m on OM4 MMF
- 850nm VCSEL laser and PIN photo detector
- Internal CDR on both Transmitter and Receiver channel
- Operating environment temperature range: 0 ~ +70°C
- Single 3.3V power supply
- Low power dissipation: < 1.0W

Applications

- Data Center
- 25GBASE-SR Ethernet
- Infiniband EDR Applications
- 32G Fiber Channel Applications

Standards

- Compliant with SFF-8024、SFF-8431
- Compliant with IEEE802.3by
- Compliant with SFF-8472
- RoHS complaint

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Absolute Maximum Ratings

| Parameter | Symbol | Min | Max | Unit |
|-----------------------------|--------|-----|------|------|
| Storage Ambient Temperature | TSTG | -40 | 85 | °C |
| Storage Humidity | HS | 5 | 90 | % |
| Operating Humidity | HO | 5 | 85 | % |
| Power Supply Voltage | VCC | 0 | +3.6 | V |
| Receiver Damaged Threshold | | +3 | | dBm |

Recommended Operating Conditions

| Parameter | Symbol | Min | Typical | Max | Unit |
|----------------------------|--------|-------|----------|-------|------|
| Operating Case Temperature | TC | 0 | | 70 | °C |
| Power Supply Voltage | VCC | 3.135 | 3.3 | 3.465 | V |
| Supply Current | ICC | | | 300 | mA |
| Power Consumption | PW | | | 1 | W |
| Data Rate | | | 25.78125 | | Gbps |

Electrical Characteristics

| Parameter | Symbol | Min | Typical | Max | Unit | Notes |
|--|------------------|------|---------|----------------------|------|--------|
| Transmitter Differential Input Voltage | | 95 | | 900 | mV | |
| Receiver Differential Output Voltage | | 300 | | 900 | mV | |
| Transmit Fault Alarm Voltage | V _{OH} | 2.4 | | V _{CC} | V | LVTTTL |
| | V _{OL} | 0 | | 0.4 | V | LVTTTL |
| Transmit Disable Voltage | V _{OH} | 2 | | V _{CC} +0.3 | V | LVTTTL |
| | V _{OL} | 0 | | 0.8 | V | LVTTTL |
| Input Differential Impedance | | | 100 | | Ω | |
| Transmit Disable Assert Time | T _{OFF} | | | 100 | us | |
| LOS Assert Voltage | | 2.0 | | V _{CC} +0.3 | V | LVTTTL |
| LOS Deassert Voltage | | -0.3 | | +0.4 | V | LVTTTL |

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Digital Diagnostic Monitoring Information

| Parameter | Units | Min | Max | Accuracy | Calibration | Note |
|--------------|-------|-------|-------|----------|-------------|------|
| Temperature | °C | 0 | +70 | ±3°C | Internal | |
| Voltage | V | 3.135 | 3.465 | ±3% | Internal | |
| Bias Current | mA | 0 | 15 | ±10% | Internal | 1 |
| TX Power | dBm | -8.4 | 2.4 | ±3dB | Internal | |
| RX Power | dBm | -10.3 | 3 | ±3dB | Internal | |

Notes:

- Accuracy of Measured Tx Bias Current is 10% of the actual Bias Current from the laser driver to the laser

Pin Definition

The SFP28 modules are hot-pluggable. Hot pluggable refers to plugging in or unplugging a module while the host board is powered. The SFP28 host connector is a 0.8 mm pitch 20 position right angle improved connector specified by SFF-8431, or stacked connector with equivalent electrical performance. SFP28 module contacts mates with the host in the order of ground, power, followed by signal as illustrated by Figure 1 and the contact sequence order listed in Table 1.

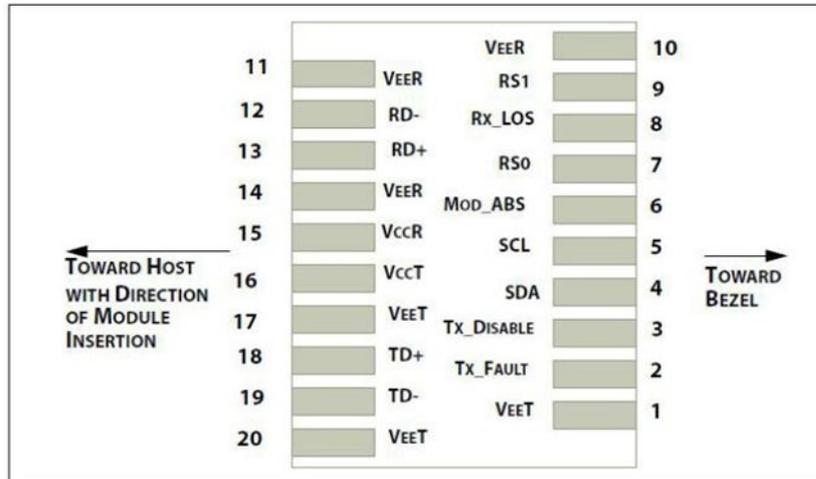


Figure 1 SFP28 Pad Assignment Top View

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| Pin No | Symbol | Name/Description | Power Seq. | Note |
|--------|------------|---|------------|------|
| 1 | VeeT | Transmitter Ground | 1st | 1 |
| 2 | TX_Fault | Transmitter Fault | 3rd | 2 |
| 3 | TX_Disable | Transmitter Disable | 3rd | 3 |
| 4 | SDA | 2-Wire Serial Interface Data Line | 3rd | 4 |
| 5 | SCL | 2-Wire Serial Interface Data Line | 3rd | 4 |
| 6 | Mod_ABS | Module Absent, Connect to VeeT or VeeR in Module | 3rd | 5 |
| 7 | RS0 | No connection required | 3rd | 6 |
| 8 | RX_LOS | Receiver Loss of Signal indication | 3rd | 7 |
| 9 | RS1 | No connection required | 3rd | 8 |
| 10 | VeeR | Receiver Ground | 1st | 1 |
| 11 | VeeR | Receiver Ground | 1st | 1 |
| 12 | RD- | Receiver Inverted DATA out. AC Coupled. CML-O | 3rd | 9 |
| 13 | RD+ | Receiver Non-inverted DATA out. AC Coupled. CML-O | 3rd | 9 |
| 14 | VeeR | Receiver Ground | 1st | 1 |
| 15 | VccR | Receiver Power Supply | 2nd | 10 |
| 16 | VccT | Transmitter Power Supply | 2nd | 10 |
| 17 | VeeT | Transmitter Ground | 1st | 1 |
| 18 | TD+ | Transmitter Non-Inverted DATA in. AC Coupled. CML-I | 3rd | 11 |
| 19 | TD- | Transmitter Inverted DATA in. AC Coupled. CML-I | 3rd | 11 |
| 20 | VeeT | Transmitter Ground | 1st | 1 |

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Power Seq.: Pin engagement sequence during hot plugging.

Notes:

1. The module signal ground contacts.
2. This pin is an open drain/collector and should be pulled up to Vcc-host in the host with a 4.7k~10k Ohm resistor.
3. This pin should be pulled up to VccT with a 4.7k~10k Ohm resistor in modules.
4. SDA&SCL (IIC) are needed pull up 4.7k~10k Ohm resistors on host board.
5. Mod_ABS is connected to VeeT or VeeR in the SFP28 module.
6. Rate Select 0, no connection required.
7. Module RX_Los of signal indication need pull up 4.7k~10k Ohm resistor on host board.
8. Rate Select 1, no connection required.
9. RD -/+: These are the differential receiver outputs. They are CML AC-coupled with 100 Ohm terminal resistor matching internal.
10. VccR and VccT are the receiver and transmitter power supplies.
11. TD-/+ : These are the differential transmitter inputs. They are CML AC-coupled with 100 Ohm terminal resistor matching internal.

Typical application Circuit

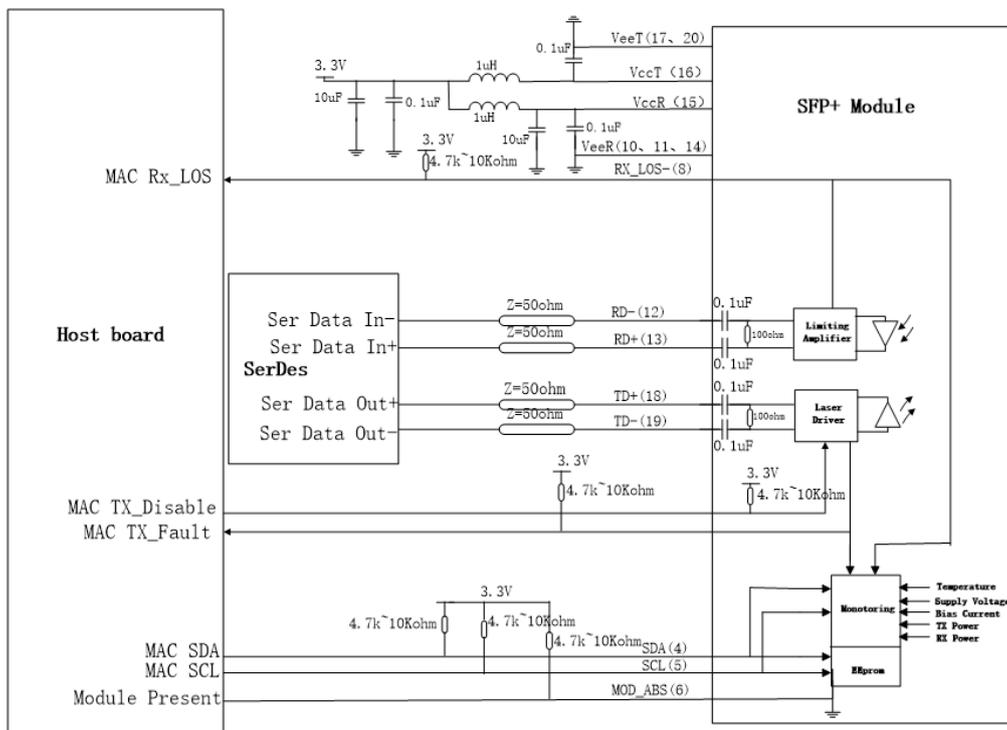


Figure 2 Typical Interface Circuit

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EEPROM Memory Map

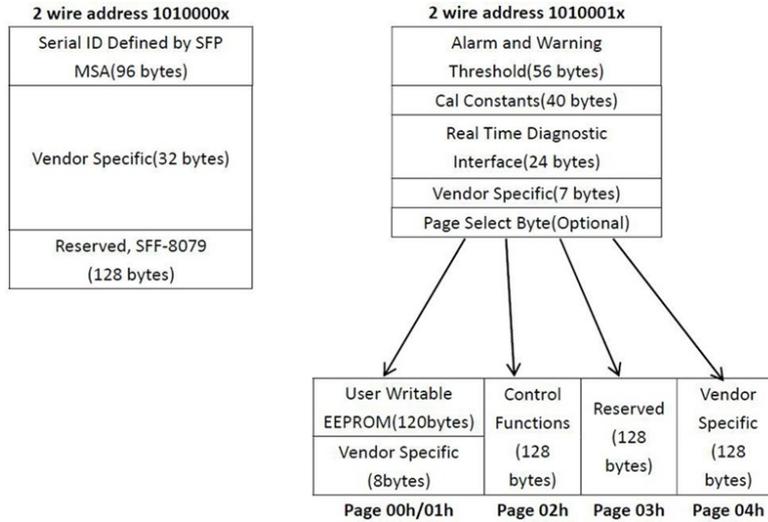


Figure 3 EEPROM Memory Map Specific Data Field Descriptions

EEPROM Serial ID Memory Contents (2-Wire Address A0h)

| Address | Name of field | Hex | Description |
|-----------------------|-------------------|----------|------------------------------------|
| BASE ID Fields | | | |
| 00 | Identifier | 03 | SFP transceiver |
| 01 | Ext. Identifier | 04 | Serial ID module supported for SFP |
| 02 | Connector | 07 | LC |
| 03-05 | Transceiver Codes | 10 00 00 | Not defined |
| 06 | Transceiver Codes | 00 | Not defined |
| 07-10 | Transceiver Codes | 00 00 00 | Not defined |
| 11 | Encoding | 03 | Encoding codes |
| 12 | BR, Nominal | FF | |
| 13 | Rate Identifier | 00 | Not defined |
| 14 | Length(9um)-km | 00 | Transceiver transmit distance |
| 15 | Length(9um)-m | 00 | |
| 16 | Length(50um) | 00 | |
| 17 | Length(62.5um) | 00 | |
| 18 | Length(cable) | 0A | |
| 19 | Length(OM3) | 07 | |
| 20-35 | Vendor Name | 00 00 00 | “OEM”(ASCII character) |
| 36 | Reserved | 02 | |
| 37-39 | Vendor OUI | 00 00 00 | Not defined |

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| | | | |
|---------------------------------|----------------------------|-------------|---|
| 40-55 | Vendor P/N | | "SFP28-25G-AOC"(ASCII character) |
| 56-59 | Vendor P/N Rev. | 41 30 20 20 | "A0"(ASCII character) |
| 60-61 | Laser Wavelength | 03 52 | 850nm |
| 62 | Reserved | 00 | Not defined |
| 63 | CC_BASE | xx | Check sum of bytes 0-62 |
| Extended ID Fields | | | |
| 64-65 | Options | 00 1A | TX_Disable、TX_Fault and RX_SD are implemented |
| 66 | BR, max | 67 | Upper bit rate margin, units of % |
| 67 | BR, min | 00 | Lower bit rate margin, units of % |
| 68-83 | Vendor SN | | Vendor Serial Number in ASCII character |
| 84-91 | Date Code | | Vendor Date Code in ASCII character |
| 92 | Diagnostic Monitoring Type | 68 | Digital Diagnostic monitoring implemented "Internally calibrated" is implemented, RX measurement type is "Average Power" |
| 93 | Enhanced options | F0 | Optional Alarm/warning flags, soft Tx_Disable control and monitoring, soft Tx_Fault monitoring are implemented |
| 94 | SFF-8472 compliant | 08 | SFF-8472 compliant with revision 10.2 |
| 95 | CC-EXT | xx | Check sum of bytes 64-94 |
| Vendor Specific ID Field | | | |
| 96-127 | Vendor Specific | 00 | Vendor specific EEPROM |
| 128-255 | Reserved | FF | Reserved for future use |

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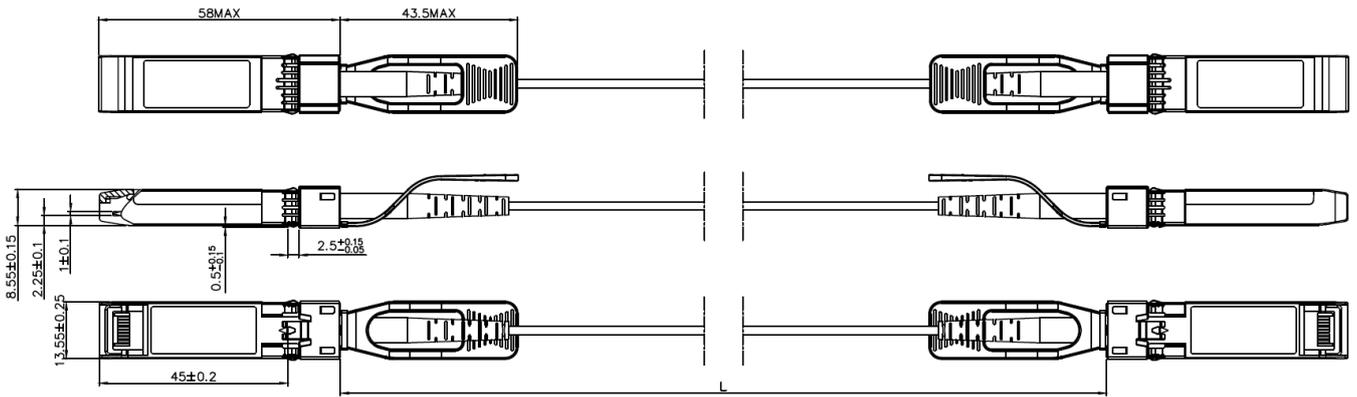
Digital Diagnostic Monitoring Interface: Alarm and Warning Thresholds (2-Wire Address A2h)

| Address | #Bytes | Name | Real Value | Unit | Hex |
|---------|--------|-----------------------|------------|------|-----|
| 00-01 | 2 | X' | 80 | °C | |
| 02-03 | 2 | Temp Low Alarm | -10 | °C | |
| 04-05 | 2 | Temp High Warning | 70 | °C | |
| 06-07 | 2 | Temp Low Warning | 0 | °C | |
| 08-09 | 2 | Voltage High Alarm | 3.63 | V | |
| 10-11 | 2 | Voltage Low Alarm | 2.97 | V | |
| 12-13 | 2 | Voltage High Warning | 3.46 | V | |
| 14-15 | 2 | Voltage Low Warning | 3.13 | V | |
| 16-17 | 2 | Bias High Alarm | 15 | mA | |
| 18-19 | 2 | Bias Low Alarm | 0 | mA | |
| 20-21 | 2 | Bias High Warning | 12 | mA | |
| 22-23 | 2 | Bias Low Warning | 2 | mA | |
| 24-25 | 2 | TX Power High Alarm | 3.5 | dBm | |
| 26-27 | 2 | TX Power Low Alarm | -9 | dBm | |
| 28-29 | 2 | TX Power High Warning | 3.01 | dBm | |
| 30-31 | 2 | TX Power Low Warning | -6 | dBm | |
| 32-33 | 2 | RX Power High Alarm | 3.5 | dBm | |
| 34-35 | 2 | RX Power Low Alarm | -13 | dBm | |
| 36-37 | 2 | RX Power High Warning | 3.01 | dBm | |
| 38-39 | 2 | RX Power Low Warning | -10 | dBm | |
| 40-55 | 16 | Reserved | Reserved | | |

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Package Outline



(Unit:mm)

Figure 4 Package Outline (Unit: mm)

Information

| Part. No | Specifications | | | | | | | | |
|---------------|----------------|-------------|---------|-----|-----------|-----------|------------|-----------------|--------|
| | Pack | Rate (Gbps) | Tx (nm) | Rx | Temp (°C) | Reach (m) | Fiber Type | Pull Tab Color | Others |
| CC-PMMAOC3-SD | SFP28 | 25.78125 | VCSEL | PIN | 0~+70 | 3 | OM3 | PANTONE Black C | RoHS |
| CC-PMMAOC5-SD | SFP28 | 25.78125 | VCSEL | PIN | 0~+70 | 5 | OM3 | PANTONE Black C | RoHS |
| CC-PMMAOC7-SD | SFP28 | 25.78125 | VCSEL | PIN | 0~+70 | 7 | OM3 | PANTONE Black C | RoHS |

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