

## 25G SFP28 15km BIDI Transceivers

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### CC-PMM56(65)1L-XD

#### Features

- Operating data rate up to 25.78Gbps
- Up to 15km transmission distance
- High sensitivity Pin photodiode and TIA
- Rate Adaptation
- LC single connector
- Hot pluggable 20pin connector
- Low power consumption <1.4W
- Single +3.3V±5% power supply
- Compliant with SFF-8472
- Fully RoHS Compliant
- Operating temperature range:
  - Commercial: 0°C to +70°C
  - Industrial: -40°C to +85°C

#### Applications

- Data Center Backbone
- Ethernet Switches
- High-speed Servers
- High-performance Computing

#### Description

The CCM-PMM56(65)1L-XD Transceiver is intended for 15km reach service from 24.33Gb/s to 25.78Gb/s Bi-direction single mode high-speed communications equipment where low-cost, extraordinary performance and reliability are essential. It consumes low power, operates base on 3.3V DC power supply and is offered in the industrial temperature range. They are compliant with SFP28 MSA, SFF-8431 and SFF-8432.

The low jitter and low bit error rate optical assembly features a DML laser transmitter and PIN/TIA receiver. It utilizes internal clock and data recovery (CDR) units on transmitter and the receiver chains for low jitter compliance. The differential AC coupled Tx and Rx data interfaces are CML compatible. The device is Class I laser safety compliant.

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#### Absolute Maximum Ratings

| Parameter                 | Symbol | Unit | Min | Max |
|---------------------------|--------|------|-----|-----|
| Storage Temperature Range | Ts     | °C   | -40 | 85  |
| Relative Humidity         | RH     | %    | 0   | 85  |

#### Recommended Operating Conditions

| Parameter                        | Sym-<br>bol | Unit | Min      | Typ   | Max                |
|----------------------------------|-------------|------|----------|-------|--------------------|
| Operating Case Temperature Range | Tc          | °C   | 0<br>-40 |       | 70<br>85           |
| Power Supply Voltage             | Vcc         | V    | 3.14     | 3.3   | 3.46               |
| Bit Rate                         | BR          | Gb/s |          | 25.78 |                    |
| Bit Error Ratio                  | BER         |      |          |       | 5*10 <sup>-5</sup> |
| Max Supported Link Length        | L           | Km   |          |       | 15                 |

#### Transmitter characteristics

| Parameter                               | Symbol           | Unit | Min  | Typ  | Max  |
|---|------------------|------|------|------|------|
| Center Wavelength (PMM561L-XD)          | $\lambda$        | nm   | 1260 | 1270 | 1280 |
| Center Wavelength (PMM651L-XD)          | $\lambda$        | nm   | 1320 | 1330 | 1340 |
| Side-mode Suppression Ratio             | SMSR             | dB   | 30   |      |      |
| Spectral Width (-20dB)                  | $\sigma$         | nm   |      |      | 1    |
| Average Optical Power                   | P <sub>avg</sub> | dBm  | -5   |      | 2    |
| TX OMA                                  |                  | dBm  | -2.5 |      | 2.2  |
| Extinction Ratio                        | ER               | dB   | 4    |      |      |
| Mask margin@5E-5                        | Mask             | %    | 5    |      |      |
| Transmitter and Dispersion Penalty      | TDP              | dB   |      |      | 3    |
| TX_OMA minus TDP                        | TDP              | dBm  | -5   |      |      |
| Average Launch Power of OFF Transmitter | P <sub>off</sub> | dBm  |      |      | -30  |

#### Receiver characteristics

| Parameter                               | Symbol    | Unit | Min  | Typ  | Max  |
|---|-----------|------|------|------|------|
| Center Wavelength (PMM561L-XD)          | $\lambda$ | nm   | 1320 | 1330 | 1340 |
| Center Wavelength (PMM651L-XD)          | $\lambda$ | nm   | 1260 | 1270 | 1280 |
| Receive Power Overload                  |           | dBm  | 2.2  |      |      |
| Receiver Sensitivity (5E-5)             |           | dBm  |      |      | -14  |
| Receiver Sensitivity (1E-12)            |           | dBm  |      |      | -11  |
| Receiver Sensitivity (1E-12@15km fiber) |           | dBm  |      |      | -11  |

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### CC-PMM56(65)1L-XD

| Parameter      | Symbol | Unit | Min | Typ | Max |
|----------------|--------|------|-----|-----|-----|
| LOS Assert     | LOSA   | dBm  | -30 |     |     |
| LOS De-Assert  | LOSD   | dBm  |     |     | -16 |
| LOS Hysteresis |        | dBm  | 0.5 |     |     |

### Electric Ports Definition

| Parameter                        | Symbol             | Unit  | Min             | Typ | Max                  |
|----------------------------------|--------------------|-------|-----------------|-----|----------------------|
| <b>Transmitter</b>               |                    |       |                 |     |                      |
| Input Differential Impedance     | R <sub>IN</sub>    | Ω     |                 | 100 |                      |
| Single-ended Data Input Swing    | V <sub>IN</sub>    | mVp-p | 90              |     | 450                  |
| Transmit Disable Voltage         | V <sub>DIS</sub>   | V     | 2               |     | V <sub>CCHOST</sub>  |
| Transmit Enable Voltage          | V <sub>EN</sub>    | V     | V <sub>EE</sub> |     | V <sub>EE</sub> +0.8 |
| Transmit Fault Assert Voltage    | V <sub>FA</sub>    | V     | 2               |     | V <sub>CCHOST</sub>  |
| Transmit Fault De-Assert Voltage | V <sub>FDA</sub>   | V     | V <sub>EE</sub> |     | V <sub>EE</sub> +0.4 |
| <b>Receiver</b>                  |                    |       |                 |     |                      |
| Single-ended Data Output Swing   | V <sub>OD</sub>    | mVp-p | 200             |     | 450                  |
| LOS Fault                        | V <sub>LOSFT</sub> | V     | 2               |     | V <sub>CCHOST</sub>  |
| LOS Normal                       | V <sub>LOSNR</sub> | V     | V <sub>EE</sub> |     | V <sub>EE</sub> +0.4 |

### PIN Assignment

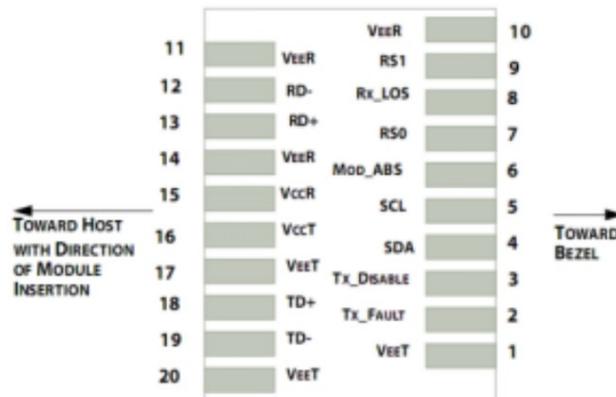


Figure 1.Pin function definitions

## 25G SFP28 15km BIDI Transceivers

### CC-PMM56(65)1L-XD

| Pin Number | Symbol     | Name  | Description   |
|------------|------------|---|---|
| 1,17,20    | VeeT       | Transmitter Signal Ground                                       | Connected to signal ground on the host board.   |
| 2          | TX Fault   | Transmitter Fault Out (OC)                                      | Module transmitter fault output.  |
| 3          | TX Disable | Transmitter Disable In (LVTTL)                                  | Module transmitter disable control.   |
| 4          | SDA        | Module Definition Identifiers                                   | Serial ID with SFF 8472 Diagnostics<br>Module Definition pins should be pulled up to Host Vcc with 10 kΩ resistors. |
| 5          | SCL        |   |   |
| 6          | MOD-ABS    |   |   |
| 7          | RS0        | Receiver Rate Select (LVTTL)<br>Transmitter Rate Select (LVTTL) | Rate select 0(Rx):Low=CDR Bypass ; High=CDR Select<br>Rate select 1(Tx):Low=CDR Bypass ; High=CDR Select            |
| 9          | RS1        |   |   |
| 8          | LOS        | Loss of Signal Out (OC)   | Receiver loss of signal.  |
| 10,11,14   | VeeR       | Receiver Signal Ground  | Connected to signal ground on the host board.   |
| 12         | RD-        | Receiver Negative DATA Out (CML)                                | Receiver inverted data output, internally AC coupled and terminated   |
| 13         | RD+        | Receiver Positive DATA Out (CML)                                | Receiver non-inverted data output, internally AC coupled and terminated.  |
| 15         | VccR       | Receiver Power Supply   | Receiver Power 3.3V Supply.   |
| 16         | VccT       | Transmitter Power Supply  | Transmitter Power 3.3V Supply.  |
| 18         | TD+        | Transmitter Positive DATA In (CML)                              | Transmitter non-inverted data input, internally AC coupled and terminated.  |
| 19         | TD-        | Transmitter Negative DATA In (CML)                              | Transmitter inverted data Input, internally AC coupled and terminated.  |

## 25G SFP28 15km BIDI Transceivers CC-PMM56(65)1L-XD

### Recommended Interface Circuit

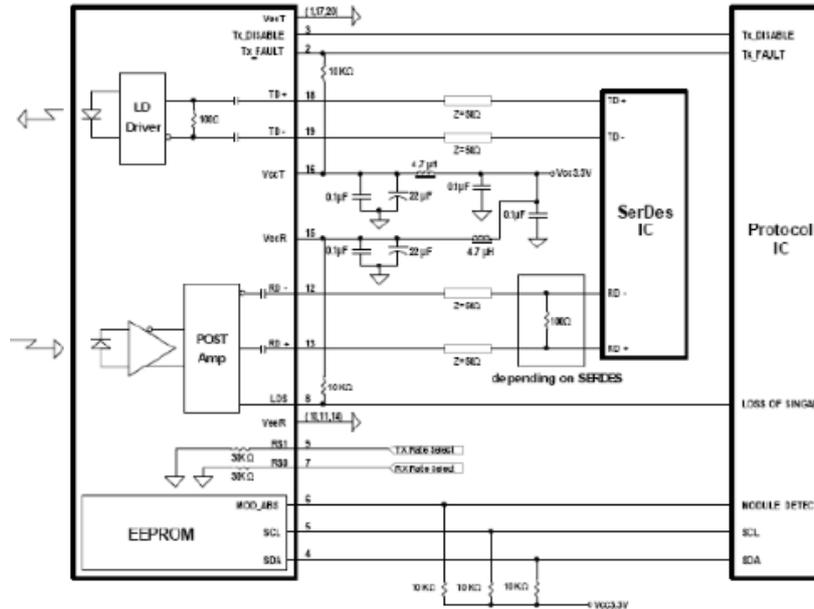


Figure 2. Typical application circuit

### Mechanical Dimensions

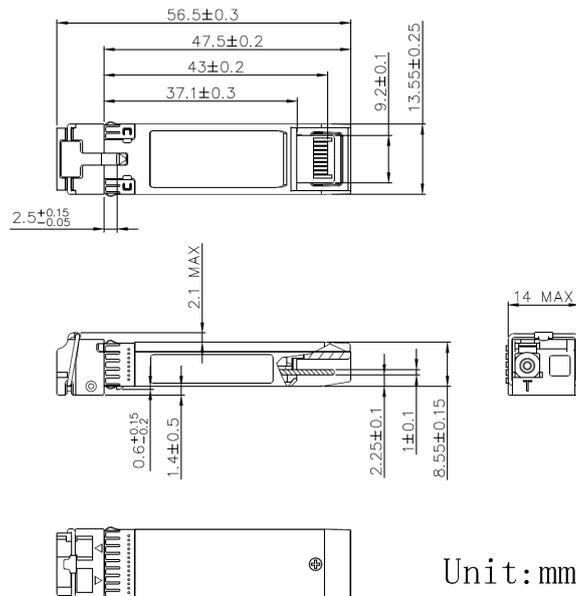


Figure 3. Module Mechanical Dimensions

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## 25G SFP28 15km BIDI Transceivers

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#### Digital Diagnostics Functions

As defined by the SFF-8472, Our SFP28 transceivers provide digital diagnostic functions via a 2-wire serial interface, which allows real-time access to the following operating parameters:

- .Transceiver temperature
- .Laser bias current
- .Transmitted optical power
- .Received optical power
- .Transceiver supply voltage

It also provides a sophisticated system of alarm and warning flags, which may be used to alert end-users when particular operating parameters are outside of a factory-set normal range. The operating and diagnostics information is monitored and reported by a Digital Diagnostics Transceiver Controller (DDTC) inside the transceiver, which is accessed through the 2-wire serial interface. The memories are organized as a series of 8-bit data words that can be addressed individually or sequentially. The 2-wire serial interface provides sequential or random access to the 8 bit parameters, addressed from 0x00h to the maximum address of the memory. For more detailed information, including memory map definitions, please refer the SFF-8472 documentation.

#### Digital Diagnostic Monitor Accuracy

The following characteristics are defined over recommended operating conditions

| Parameter                                      | Accuracy | Unit |
|--|----------|------|
| Internally measured transceiver temperature    | +/-3     | °C   |
| Internally measured transceiver supply voltage | +/-3     | %    |
| Measured Tx bias current                       | +/-10    | %    |
| Measured Tx output power                       | +/-3     | dB   |
| Measured Rx received average optical power     | +/-3     | dB   |

#### Ordering information

| Part Number      | Product Description                                     |
|------------------|---|
| CC-PMM56(65)L-SD | SFP28, 25.78Gbps, BIDI, SM, 10km, 0°C~+70°C, With DDM   |
| CC-PMM56(65)L-ID | SFP28, 25.78Gbps, BIDI, SM, 10km, -40°C~+85°C, With DDM |

#### BOM

| Material      | Supplier | Model                   |
|---------------|----------|-------------------------|
| DRIVER+LA+CDR | Macom    | MACOM 37030B            |
| MCU           | 贝岭       | BL32F3202NP             |
| LD            | 源杰       | YJT-25DXXW10-CB2075-I20 |
| PIN           | 敏芯       | P2565-I0-002-00         |
| TIA           | Macom    | macom m03013btia        |

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