

## **Specification**

### **Small Form Factor Pluggable**

Duplex LC Receptacle – SFP28

### **Optical Transceivers**

**(Preliminary)**



## **Ordering Information**

**TAS-A1EB1-F11**

| Model Name    | Voltage | Category  | Device type | Interface           | LOS    | Temperature | Distance |
|---------------|---------|-----------|-------------|---------------------|--------|-------------|----------|
| TAS-A1EB1-F11 | 3.3V    | With DDMI | 1310 nm DFB | AC / AC<br>Coupling | LVTTTL | 0°C ~ +70°C | 10km     |

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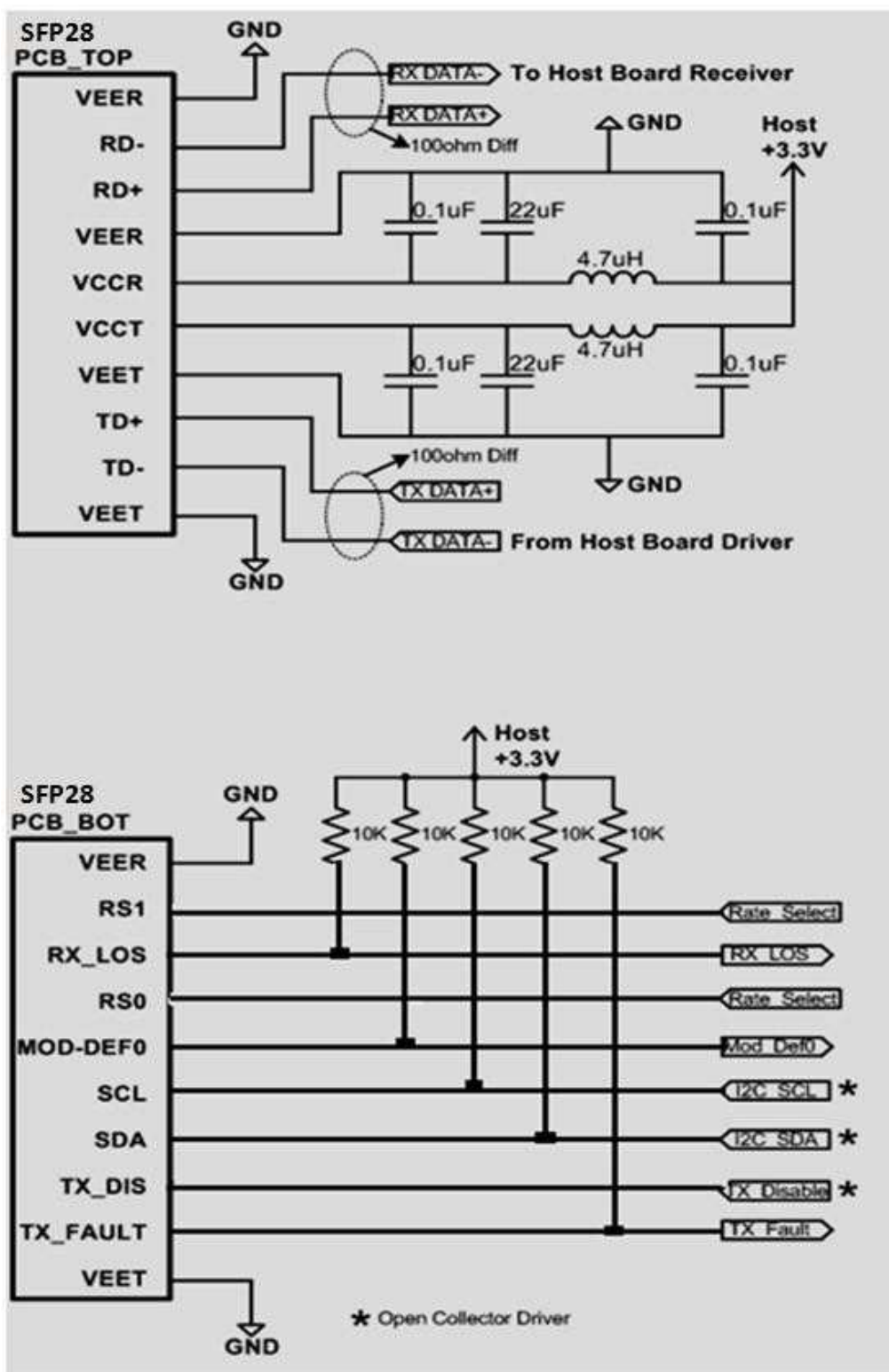
## **Features**

- **25Gb/s serial optical interface**
- **1310nm DFB transmitter, PIN photo- detector**
- **2-wire interface for management specifications compliant with SFF 8472 digital diagnostic monitoring interface for optical transceivers**
- **Operating case temperature: 0 to 70°C**
- **Advanced firmware allow customer system encryption information to be stored in transceiver**
- **Cost effective SFP28 solution, enables higher port densities and greater bandwidth**
- **RoHS compliant**

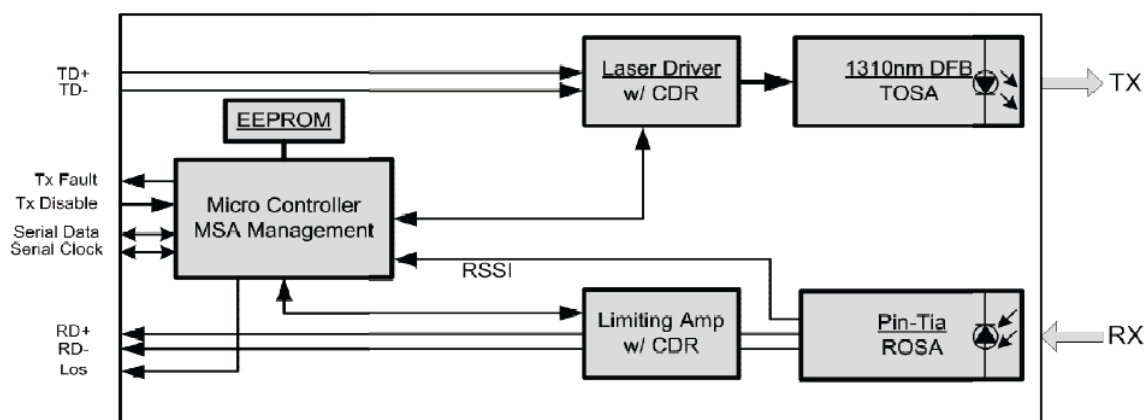
## **Applications**

- **High-speed storage area networks**
- **Computer cluster cross-connect**
- **Custom high-speed data pipes**

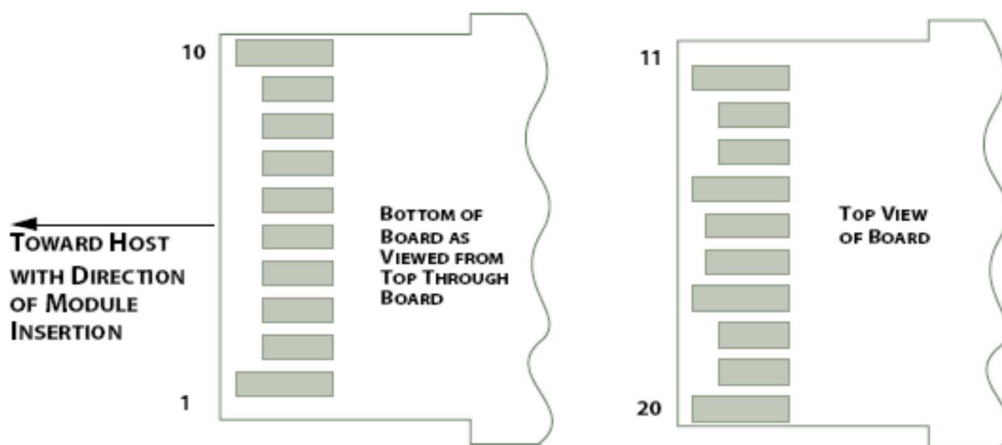
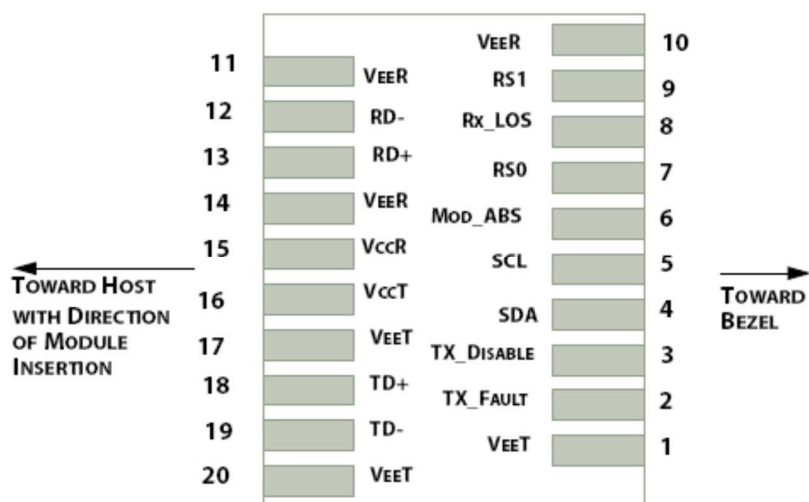
## Proposed Application Schematics



## Transceiver Block Diagram



## Pin Definition and Descriptions



| PIN | Logic     | Symbol   | Name / Description                                                                                                                                                                                           | Note |
|-----|-----------|----------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|
| 1   |           | VeeT     | Module Transmitter Ground                                                                                                                                                                                    | 1    |
| 2   | LVTTL-O   | TX_Fault | Module Transmitter Fault                                                                                                                                                                                     |      |
| 3   | LVTTL-I   | TX_Dis   | Transmitter Disable; Turns off transmitter laser output                                                                                                                                                      |      |
| 4   | LVTTL-I/O | SDA      | 2-Wire Serial Interface Data Line                                                                                                                                                                            | 2    |
| 5   | LVTTL-I   | SCL      | 2-Wire Serial Interface Clock                                                                                                                                                                                | 2    |
| 6   |           | MOD_DEF0 | Module Definition, Grounded in the module                                                                                                                                                                    |      |
| 7   | LVTTL-I   | RS0      | Receiver Rate Select, default is high for 8G/10G application, when set to low by system, transceiver will set the bandwidth to under 4.25G to improve the sensitivity at low data rate                       |      |
| 8   | LVTTL-O   | RX_LOS   | Receiver Loss of Signal Indication Active LOW                                                                                                                                                                |      |
| 9   | LVTTL-I   | RS1      | Transmitter Rate Select, default input is high for 8G/10G application, when set to low by system, transceiver will set the TX optical output to be compliant with low data rate fiber channel specifications |      |
| 10  |           | VeeR     | Module Receiver Ground                                                                                                                                                                                       | 1    |
| 11  |           | VeeR     | Module Receiver Ground                                                                                                                                                                                       | 1    |
| 12  | CML-O     | RD-      | Receiver Inverted Data Output                                                                                                                                                                                |      |
| 13  | CML-O     | RD+      | Receiver Data Output                                                                                                                                                                                         |      |
| 14  |           | VeeR     | Module Receiver Ground                                                                                                                                                                                       | 1    |
| 15  |           | VccR     | Module Receiver 3.3 V Supply                                                                                                                                                                                 |      |
| 16  |           | VccT     | Module Transmitter 3.3 V Supply                                                                                                                                                                              |      |
| 17  |           | VeeT     | Module Transmitter Ground                                                                                                                                                                                    | 1    |
| 18  | CML-I     | TD+      | Transmitter Non-Inverted Data Input                                                                                                                                                                          |      |
| 19  | CML-I     | TD-      | Transmitter Inverted Data Input                                                                                                                                                                              |      |
| 20  |           | VeeT     | Module Transmitter Ground                                                                                                                                                                                    | 1    |

**Note:**

1. Module ground pins GND are isolated from the module case.
2. Shall be pulled up with 4.7K-10Kohms to a voltage between 3.15V and 3.45V on the host board.

## Absolute Maximum Ratings

| Parameters                 | Symbol | Min. | Max. | Unit   |
|----------------------------|--------|------|------|--------|
| Power Supply Voltage       | VCC    | -0.5 | 3.6  | V      |
| Storage Temperature        | Ts     | -40  | 85   | °C     |
| ESD Tolerance on all pins  |        |      | 1    | KV HBM |
| Operating Case Temperature | Top    | 0    | 70   | °C     |
| Relative Humidity          | RH     | 5    | 95   | %      |

## Recommended Operating Environment

Recommended Operating Environment specifies parameters for which the electrical and optical characteristics hold unless otherwise noted.

| Parameters                 | Symbol          | Min. | Typical | Max  | Unit |
|----------------------------|-----------------|------|---------|------|------|
| Power Supply Voltage       | V <sub>CC</sub> | 3.13 | 3.3     | 3.47 | V    |
| Power Supply Current       | I <sub>CC</sub> |      | 240     | 350  | mA   |
| Operating Case Temperature | Top             | 0    | 25      | 70   | °C   |
| Data Rate, each Lane       |                 |      | 25.78   |      | Gb/s |

## Optical Characteristics

The following optical characteristics are defined over the Recommended Operating Environment unless otherwise specified.

| Parameter                                                 | Symbol     | Min.                                                          | Typical | Max   | Unit | Notes                       |
|-----------------------------------------------------------|------------|---------------------------------------------------------------|---------|-------|------|-----------------------------|
| Transmitter                                               |            |                                                               |         |       |      |                             |
| Center Wavelength                                         | $\lambda$  | 1260                                                          | 1310    | 1360  | nm   |                             |
| Side Mode Suppression Ratio                               | SMSR       | 30                                                            |         |       | dB   |                             |
| Average Optical Power                                     | POavg      | -5                                                            |         | 1     | dBm  |                             |
| Extinction Ratio                                          | ER         | 3.5                                                           |         |       | dB   |                             |
| Transmitter eye mask definition                           |            | (X1, X2, X3, Y1, Y2, Y3) = (0.31, 0.4, 0.45, 0.34, 0.38, 0.4) |         |       |      | 1                           |
| Receiver                                                  |            |                                                               |         |       |      |                             |
| Center Wavelength                                         | $\lambda$  | 1260                                                          |         | 1620  | nm   |                             |
| Receiver Sensitivity (OMA)                                | Sens (OMA) |                                                               |         | -10.4 | dBm  | for BER =5x10 <sup>-5</sup> |
| LOS Assert                                                | LOSA       | -20                                                           |         |       | dBm  |                             |
| LOS Deassert                                              | LOSD       |                                                               |         | 11    | dBm  |                             |
| LOS Hysteresis                                            | LOSH       |                                                               |         | 6     | dB   |                             |
| Conditions of Stressed Receiver Sensitivity Test (Note 5) |            |                                                               |         |       |      |                             |
| Vertical Eye Closure Penalty, each Lane                   |            |                                                               | 1.9     |       | dB   |                             |
| Stressed Eye J2 Jitter                                    |            |                                                               | 0.27    |       | UI   |                             |
| Stressed Eye J4 Jitter                                    |            |                                                               | 0.39    |       | UI   |                             |
| SRS Eye Mask Definition                                   |            | (X1,X2, X3, Y1, Y2, Y3)= (0.24, 0.5, 0.5, 0.24, 0.24, 0.4)    |         |       |      | 1                           |

### Notes:

1. Hit ratio 5x10<sup>-5</sup> per sample.

## Digital Diagnostic Functions

The following digital diagnostic characteristics are defined over the Recommended Operating Environment unless otherwise specified. It is compliant to SFF8472 Rev10.2 with internal calibration mode. For external calibration mode please contact our sales staff.

| Parameter                                | Symbol    | Min. | Max | Unit | Notes      |
|------------------------------------------|-----------|------|-----|------|------------|
| Temperature monitor<br>absolute error    | DMI_Temp  | -3   | 3   | °C   | Over temp  |
| Laser power monitor<br>absolute error    | DMI_TX    | -2   | 2   | dB   | 1          |
| RX power monitor<br>absolute error       | DMI_RX    | -2   | 2   | dB   | 1          |
| Supply voltage monitor<br>absolute error | DMI_VCC   | -0.1 | 0.1 | V    | Full range |
| Bias current monitor                     | DMI_Ibias | -10% | 10% | mA   |            |

**Notes:**

1. Due to measurement accuracy of different single mode fibers, there could be an additional +/-1 dB fluctuation, or a +/- 3 dB total accuracy.

## Electrical Characteristics

The following electrical characteristics are defined over the Recommended Operating Environment unless otherwise specified.

| Parameter           | Symbol    | Min. | Typical | Max     | Unit  | Notes |
|---------------------|-----------|------|---------|---------|-------|-------|
| <b>Transmitter</b>  |           |      |         |         |       |       |
| Differential Input  | VIH - VIL | 200  |         | 1000    | mVp-p |       |
| Input Voltage -Low  | VTDIS,L   | 0    |         | 0.8     | V     |       |
| Input Voltage -High | VTDIS,H   | 2.0  |         | Vcc     | V     |       |
| Out Voltage - Low   | VOL       | 0    |         | 0.4     | dB    |       |
| Out Voltage - High  | VOH       | 2.0  |         | Vcc     | dB    |       |
| SCL, SDA--High      |           | 2.5  |         | Vcc+0.3 |       |       |

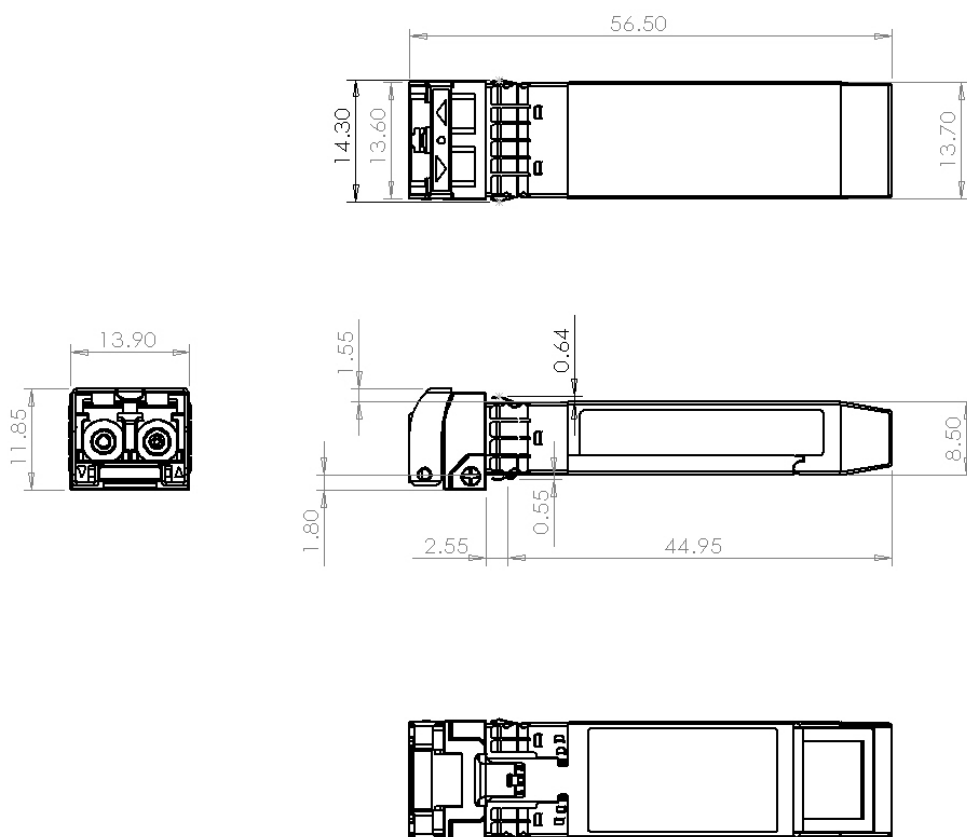
|                    |           |     |     |      |       |  |
|--------------------|-----------|-----|-----|------|-------|--|
| SCL, SDA--Low      |           | 0   |     | 0.5  |       |  |
| <b>Receiver</b>    |           |     |     |      |       |  |
| Differential Input | VIH - VIL | 500 | 800 | 1000 | mVp-p |  |
| Out Voltage - Low  | VOL       | 0   |     | 0.4  | dB    |  |
| Out Voltage - High | VOH       | 2.4 |     | Vcc  | dB    |  |

**Notes:**

1. Vcm is generated by the host. Specification includes effects of ground offset voltage.
2. From 250MHz to 30GHz.

## Mechanical

Comply with SFF-8432 rev. 5.0, the improved Pluggable form factor specification.



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## ESD

Normal ESD precautions are required during the handling of this module. This transceiver is shipped in ESD protective packaging. It should be removed from the packaging and handled only in an ESD protected environment.

## LASER Safety

This is a laser class 1 product according to IEC/EN60825-1:2014 (Third Edition). This product complies with 21 CFR 1040.10 and 1040.11 except for deviations pursuant to Laser Notice No. 50, dated June 24, 2007.

## Contact Information

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