

## TSSLS-CBCEH7T Optical Transceiver

25G SFP28 BIDI Single-mode Transceiver, With Diagnostic Monitoring  
Duplex SFP28 40km Transceiver

### Features

- Class 1 laser safety certified
- Operating data rate up to 25.78Gbps
- High sensitivity APD photodiode and TIA
- LC single connector
- Hot pluggable 20pin connector
- Low power consumption <2W
- -40°C to 85°C operating wide temperature range
- Single +3.3V±5% power supply
- Digital Monitoring SFF-8472 compliant
- Fully RoHS Compliant 

### Applications

- 25GE LR/ER
- CPRI Option 10/e CPRI

### Product Description

The SFP28 Transceiver is designed for use in Ethernet/eCPRI/ CPRI links up to 25.78 Gb/s data rate and up to 40 km link length.

They are compliant with SFF8472, SFF-8431, SFF-8432. Digital diagnostics functions are available via a 2-wire serial interface, as specified in SFF-8472.

## Absolute Maximum Ratings

These values represent the damage threshold of the module. Stress in excess of any of the individual Absolute Maximum Ratings can cause immediate catastrophic damage to the module even if all other parameters are within Recommended Operating Conditions.

| Parameters           | Symbol | Min. | Max. | Unit |
|----------------------|--------|------|------|------|
| Power Supply Voltage | VCC    | -0.5 | +4.0 | V    |
| Storage Temperature  | Ts     | -40  | +85  | °C   |
| Relative Humidity    | RH     | 0    | 95   | %    |

## Recommended Operating Conditions

| Parameter                  | Symbol         | Min  | Typical | Max  | Unit |
|----------------------------|----------------|------|---------|------|------|
| Supply Voltage             | VCC            | 3.14 | 3.3     | 3.46 | V    |
| Operating Case Temperature | T <sub>c</sub> | -40  | -       | 85   | °C   |

### Notes:

[1] Supply current is shared between VCCTX and VCCR<sub>X</sub>.

[2] In-rush is defined as current level above steady state current requirements.

## Electrical Characteristics

| Parameter                        | Symbol             | Min.            | Typical | Max                  | Unit              | Ref. |
|----------------------------------|--------------------|-----------------|---------|----------------------|-------------------|------|
| <b>Transmitter</b>               |                    |                 |         |                      |                   |      |
| Data Rate                        | BR                 |                 | 25.78   | -                    | Gbps              |      |
| Input differential impedance     | R <sub>IN</sub>    | 90              | 100     | 110                  | Ω                 | 1    |
| Differential Data Input          | V <sub>IN</sub>    | 450             | 600     | 750                  | mV <sub>p-p</sub> |      |
| Transmit Disable Voltage         | V <sub>DIS</sub>   | 2.0             | -       | V <sub>CCHOST</sub>  | V                 |      |
| Transmit Enable Voltage          | V <sub>EN</sub>    | V <sub>EE</sub> |         | V <sub>EE</sub> +0.8 | V                 | 2    |
| Transmit Fault Assert Voltage    | V <sub>fa</sub>    | 2.0             | -       | V <sub>CCHOST</sub>  | V                 |      |
| Transmit Fault De-Assert Voltage | V <sub>FDA</sub>   | V <sub>EE</sub> |         | V <sub>EE</sub> +0.4 | V                 |      |
| <b>Receiver</b>                  |                    |                 |         |                      |                   |      |
| Data Rate                        | BR                 | -               | 25.78   | -                    | Gbps              |      |
| Output differential impedance    | R <sub>out</sub>   | 90              | 100     | 110                  | Ω                 | 1    |
| Differential Data Output         | V <sub>OD</sub>    | 450             | 600     | 750                  | mV <sub>p-p</sub> |      |
| LOS Fault                        | V <sub>LOSFT</sub> | 2.0             | -       | V <sub>CCHOST</sub>  | V                 |      |
| LOS Normal                       | V <sub>LOSNR</sub> | V <sub>EE</sub> |         | V <sub>EE</sub> +0.4 | V                 |      |

### Notes:

[1] AC coupled.

[2] Or open circuit.

**Transmitter Specifications – Optical**

| Parameter                               | Symbol           | Min  | Typical | Max  | Unit  |
|-----------------------------------------|------------------|------|---------|------|-------|
| Center Wavelength                       | $\lambda$        | 1260 | 1270    | 1280 | nm    |
| Side Mode Suppression Ratio             | SMSR             | 30   | -       | -    | dB    |
| Average Optical Power                   | P <sub>o</sub>   | 0    | -       | 6    | dBm   |
| Extinction Ratio                        | ER               | 3.5  |         |      | dB    |
| Average Launch Power of OFF Transmitter | P <sub>OFF</sub> | -    | -       | -30  | dBm   |
| Relative Intensity Noise                | R <sub>IN</sub>  |      |         | -128 | dB/Hz |

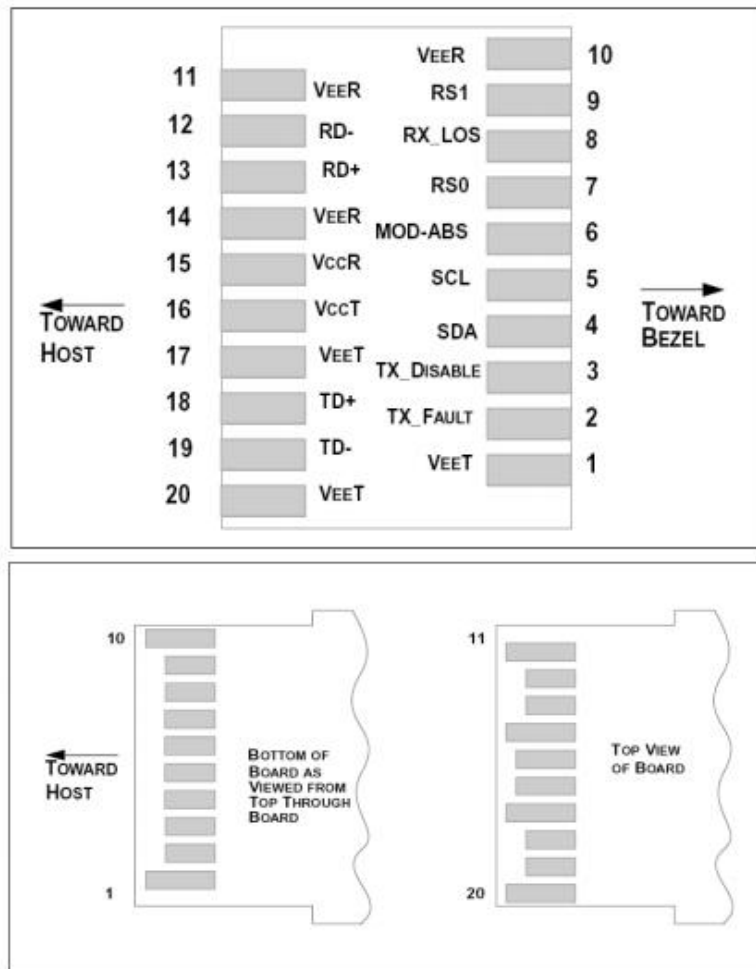
**Receiver Specifications – Optical**

| Parameter                     | Symbol           | Min  | Typical | Max  | Unit |
|-------------------------------|------------------|------|---------|------|------|
| Center Wavelength             | $\lambda$        | 1300 | 1310    | 1320 | nm   |
| Receiver sensitivity (OMA)[1] | R <sub>SEN</sub> | -    | -       | -18  | dBm  |
| Receiver Overload(OMA)        | P <sub>MAX</sub> | -5   |         |      | dBm  |
| Optical Return Loss           | R <sub>RL</sub>  | -    | -       | -26  | dB   |
| LOS Asserted                  | L <sub>SA</sub>  | -35  | -       | -    | dBm  |
| LOS De-Asserted               | L <sub>DA</sub>  | -    | -       | -24  | dBm  |
| LOS Hysteresis                | L <sub>H</sub>   | 0.5  | -       | -    | dB   |

**Notes:**

[1] Measured at 25.78125Gb/s, ER>3.5dB, PRBS 231- 1 and BER better than or equal to 5E-5

## Sfp28 Transceiver Electrical Pad Layout



## Pin Definition

| Pin | Symbol       | Name/Description                                              |
|-----|--------------|---------------------------------------------------------------|
| 1   | VEET [1]     | Transmitter Ground                                            |
| 2   | Tx_FAULT [2] | Transmitter Fault                                             |
| 3   | Tx_DIS [3]   | Transmitter Disable. Laser output disabled on high or open    |
| 4   | SDA [2]      | 2-wire Serial Interface Data Line                             |
| 5   | SCL [2]      | 2-wire Serial Interface Clock Line                            |
| 6   | MOD_ABS [4]  | Module Absent. Grounded within the module                     |
| 7   | RS0 [5]      | Rate Select 0                                                 |
| 8   | RX_LOS [2]   | Loss of Signal indication. Logic 0 indicates normal operation |
| 9   | RS1 [5]      | Rate Select 1                                                 |
| 10  | VEER [1]     | Receiver Ground                                               |
| 11  | VEER [1]     | Receiver Ground                                               |
| 12  | RD-          | Receiver Inverted DATA out. AC Coupled                        |

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|    |          |                                          |
|----|----------|------------------------------------------|
| 13 | RD+      | Receiver DATA out. AC Coupled            |
| 14 | VEER [1] | Receiver Ground                          |
| 15 | VCCR     | Receiver Power Supply                    |
| 16 | VCCT     | Transmitter Power Supply                 |
| 17 | VEET [1] | Transmitter Ground                       |
| 18 | TD+      | Transmitter DATA in. AC Coupled          |
| 19 | TD-      | Transmitter Inverted DATA in. AC Coupled |
| 20 | VEET [1] | Transmitter Ground                       |

**Notes:**

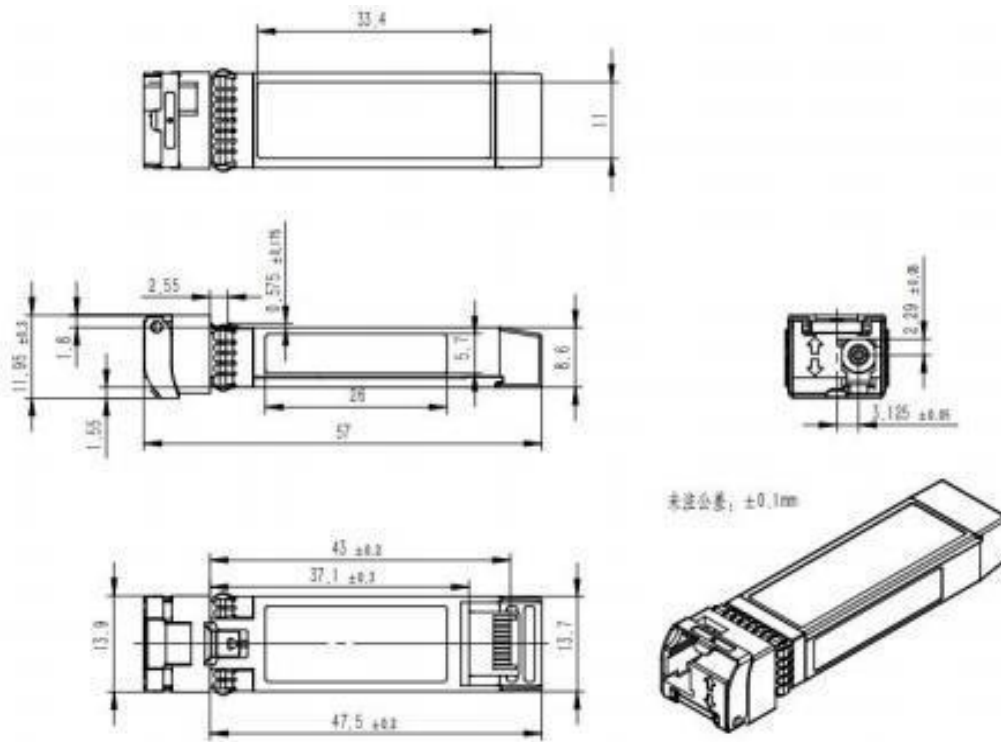
[1] Module circuit ground is isolated from module chassis ground within the module.

[2] Should be pulled up with 4.7k – 10k ohms on host board to a voltage between 3.15V and 3.6V.

[3] Tx\_Disable is an input contact with a 4.7 k $\Omega$  to 10 k $\Omega$  pullup to VCCT inside the module.

[4] Mod\_ABS is connected to VeeT or VeeR in the SFP+ module. The host may pull this contact up to VCC\_Host with a resistor in the range 4.7 k $\Omega$  to 10 k $\Omega$ . Mod\_ABS is asserted “High” when the SFP+ module is physically absent from a host slot.

[5] RS0 and RS1 are module inputs and are pulled low to VeeT with > 30 k $\Omega$  resistors in the module.

**Mechanical**

## Ordering Information

| Part Number   | Product Description                                                        |
|---------------|----------------------------------------------------------------------------|
| TSSLS-CBCEH7T | 25Gbps SFP28 40km Transceiver, -40°C ~ +85°C, 1270nm-Tx APD, 1310nm-Rx PIN |

## Important Notice

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