



## General

FH-SB3512CDS20 The SFP-BIDI transceivers are high performance, cost effective modules supporting dual data-rate of 1.25Gbps/1.0625Gbps and 20km transmission distance with SMF.

The transceiver consists of three sections: a DFB 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.

## Absolute Maximum Ratings

| Parameter           | Symbol          | Min. | Max. | Unit | Note |
|---------------------|-----------------|------|------|------|------|
| Supply Voltage      | V <sub>cc</sub> | -0.5 | 4.0  | V    |      |
| Storage Temperature |                 | -40  | 85   | °C   |      |
| Relative Humidity   |                 |      | 85   | %    |      |

Note: Stress in excess of the maximum absolute ratings can cause permanent damage to the module

## General Operating Characteristics

| Parameter            | Symbol           | Min. | Typ  | Max. | Unit | Note |
|----------------------|------------------|------|------|------|------|------|
| Data Rate            |                  |      | 1250 |      | Gb/s |      |
| Supply Voltage       | V <sub>cc</sub>  | 3.13 | 3.3  | 3.47 | V    |      |
| Supply Current       | I <sub>cc5</sub> |      |      | 220  | mA   |      |
| Operating Case Temp. | T <sub>c</sub>   | 0    |      | 70   | °C   |      |

### Electrical Input/Output Characteristics

| Parameter                  |   | Symbol | Min. | Typ | Max.    | Unit | Note |
|----------------------------|---|--------|------|-----|---------|------|------|
| Transmitter                |   |        |      |     |         |      |      |
| Diff. input voltage swing  |   |        | 120  |     | 820     | mVpp | 1    |
| Tx Disable input           | H | VIH    | 2.0  |     | Vcc+0.3 | V    |      |
|                            | L | VIL    | 0    |     | 0.8     |      |      |
| Tx Fault output            | H | VOH    | 2.0  |     | Vcc+0.3 | V    | 2    |
|                            | L | VOL    | 0    |     | 0.8     |      |      |
| Input Diff. Impedance      |   | Zin    |      | 100 |         | Ω    |      |
| Receiver                   |   |        |      |     |         |      |      |
| Diff. output voltage swing |   |        | 340  | 650 | 800     | mVpp | 3    |
| Rx LOS Output              | H | VOH    | 2.0  |     | Vcc+0.3 | V    | 2    |
|                            | L | VOL    | 0    |     | 0.8     |      |      |

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

Note 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.

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

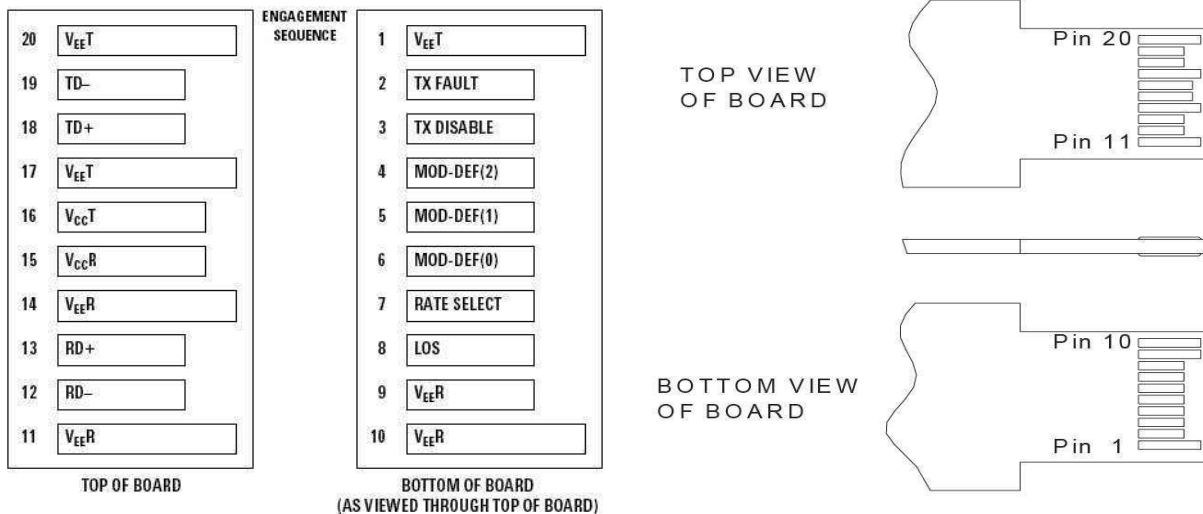
### Optical Characteristics

| Parameter                   |  | Symbol | Min. | Typ  | Max. | Unit | Note |
|-----------------------------|--|--------|------|------|------|------|------|
| Transmitter                 |  |        |      |      |      |      |      |
| Operating Wavelength        |  | λC     | 1270 | 1310 | 1350 | nm   |      |
| Ave. output power (Enabled) |  | Po     | -9   |      | -3   | dBm  | 1    |
| Extinction Ratio            |  | ER     | 9    |      |      | dB   | 1    |
| RMS spectral width          |  | Δλ     |      |      | 4    | nm   |      |
| Rise/Fall time (20%~80%)    |  | Tr/Tf  |      |      | 0.26 | ps   | 2    |

| Output Eye Mask      | Compliant with IEEE802.3 z (class 1 laser safety) |      |      |      |     |   |
|----------------------|---|------|------|------|-----|---|
| Receiver             |   |      |      |      |     |   |
| Operating Wavelength |   | 1530 | 1550 | 1570 | nm  |   |
| Sensitivity          | Psen  |      |      | -24  | dBm | 3 |
| Min. overload        | Pimax   | -3   |      |      | dBm |   |
| LOS Assert           | Pa  | -35  |      |      | dBm |   |
| LOS De-assert        | Pd  |      |      | -23  | dBm | 4 |
| LOS Hysteresis       | Pd-Pa   | 0.5  |      | 6    | dB  |   |

- Note
- 1) Measure at 2<sup>23</sup>-1 NRZ PRBS pattern
  - 2) Transmitter eye mask definition
  - 3) Measured with Light source 1550nm(1310nm), ER=9dB; BER =<10<sup>-12</sup> @PRBS=2<sup>23</sup>-1 NRZ.
  - 4) When LOS de-asserted, the RX data+/- output is signal output.

## Pin Definitions And Functions





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.

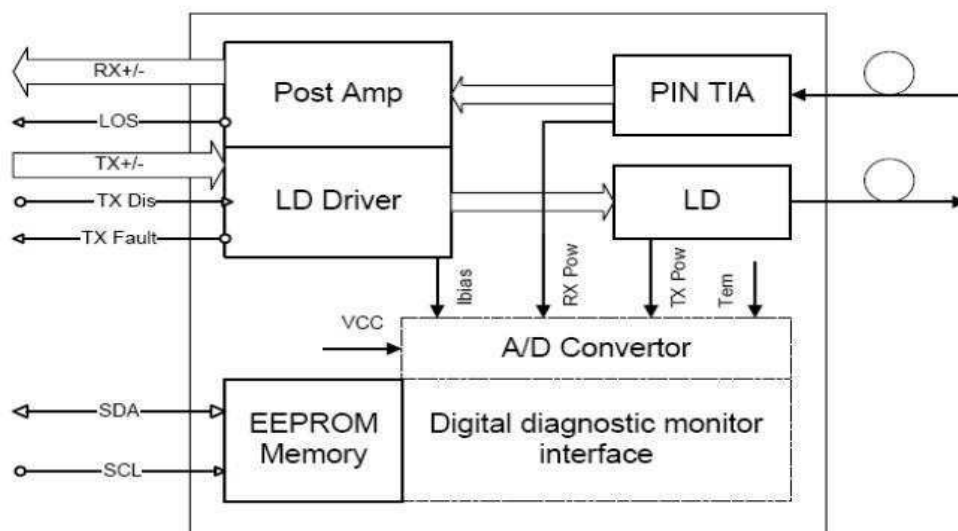
5) RD+/-: These are the differential receiver outputs. They are AC coupled 100Ω differential lines which should be terminated with 100Ω (differential) at the user SERDES. The AC coupling is done inside the module and is thus not required on the host board.

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.

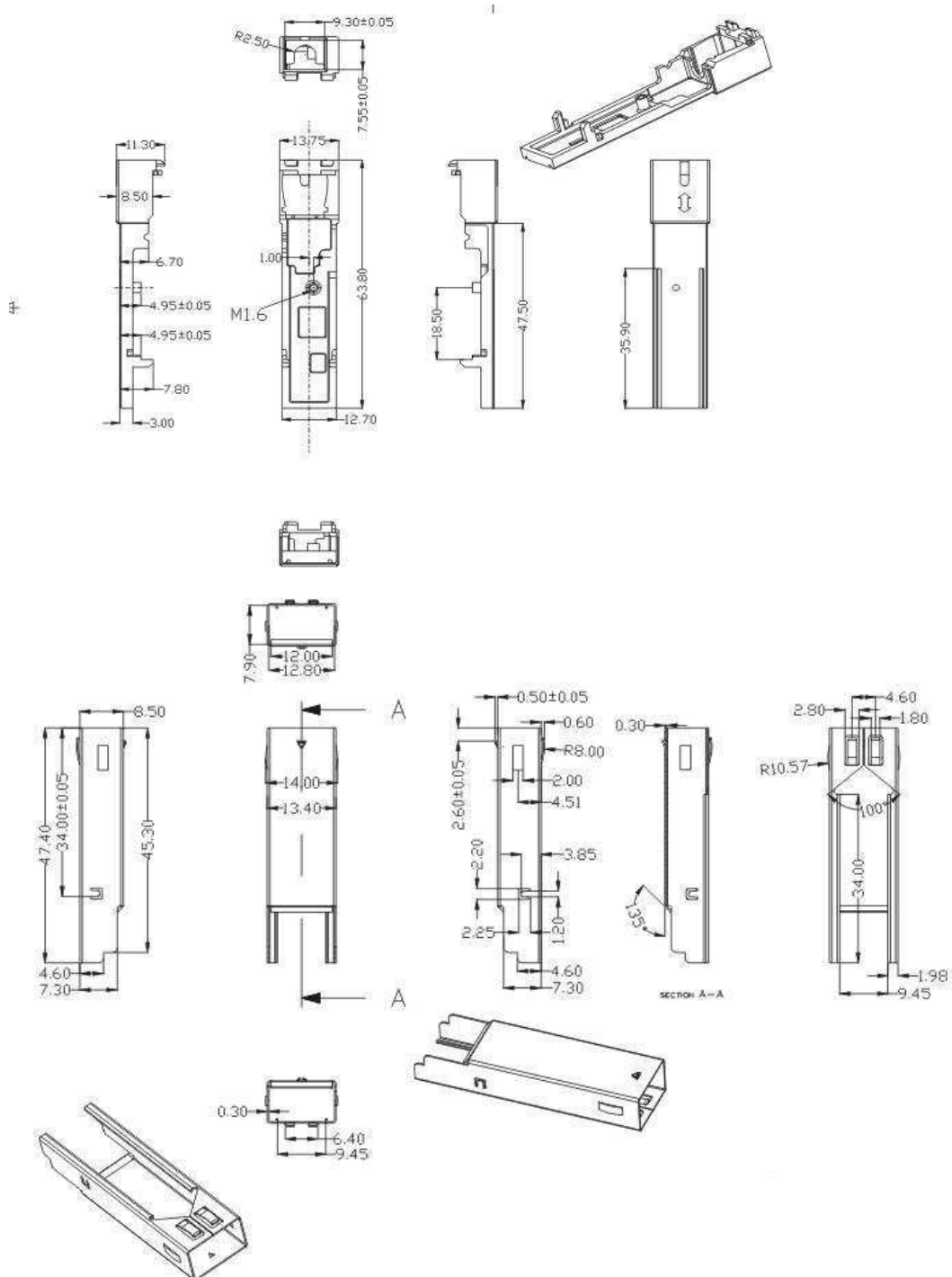
## Diagnostics

| Parameter    | Range               | Unit | Accuracy | Calibration        |
|--------------|---------------------|------|----------|--------------------|
| Temperature  | 0 to +70 -40 to +85 | °C   | ±3°C     | Internal/ External |
| Voltage      | 3.0 to 3.6          | V    | ±3%      | Internal/ External |
| Bias Current | 2 to 80             | mA   | ±10%     | Internal/ External |
| TX Power     | -11 to -1           | dBm  | ±3dB     | Internal/ External |
| RX Power     | -25 to 0            | dBm  | ±3dB     | Internal/ External |

## Functional Diagram



## Package Dimensions



## **For More Information**

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