

## 1.25 Gb/s 3km SFP Transceiver

Hot Pluggable, BiDi LC, +3.3V, 1310nm/1550nm, FP-LD, Single-mode

### Overview

This transceiver is a high-performance, cost-effective BiDi module with a simplex LC optical interface. It adopts standard AC-coupled CML for high-speed signals and LVTTTL control & monitoring signals. It integrates a WDM filter; the receiver uses a PIN photodiode, and the transmitter is equipped with an FP laser. A link budget up to 5 dB enables this module to be used for 1000BASE Ethernet 3km single-fiber transmission.



### Features

- Up to 1.25 Gb/s Data Links
- Hot-pluggable
- BiDi simplex LC connector
- Up to 3km on 9/125μm SMF
- Single +3.3V Power Supply
- Typical power consumption < 1 W
- Maximum power consumption < 1.5 W
- Industrial /Extended/ Commercial operating temperature range: -20°C to 70°C/-5°C to 70°C/-0°C to 70°C Version available
- ROHS compliant and Lead Free

### Working Environment

| Parameter           | Symbol          | Min. | Typical | Max. | Unit |
|---------------------|-----------------|------|---------|------|------|
| Storage Temperature | T <sub>s</sub>  | -40  |         | +85  | °C   |
| Supply Voltage      | V <sub>cc</sub> | -0.5 |         | 4    | V    |
| Relative Humidity   | RH              | 0    |         | 85   | %    |

|                            |            |             |     |  |             |    |
|----------------------------|------------|-------------|-----|--|-------------|----|
| Case operating Temperature | Industrial | $T_c$       | -20 |  | 70          | °C |
|                            | Extended   |             | -5  |  | 70          | °C |
|                            | Commercial |             | 0   |  | 70          | °C |
| Supply Current             |            | $I_{cc}$    |     |  | 300         | mA |
| Inrush Current             |            | $I_{surge}$ |     |  | $I_{cc+30}$ | mA |
| Maximum Power              |            | $P_{max}$   |     |  | 1           | W  |

## Electrical Characteristics

| Parameter                      | Symbol          | Min          | Typ | Max           | Unit              | Note |
|--------------------------------|-----------------|--------------|-----|---------------|-------------------|------|
| <b>Transmitter:</b>            |                 |              |     |               |                   |      |
| Input Differential Impedance   | $R_{in}$        | 90           | 100 | 110           | $\Omega$          |      |
| Single ended data input swing  | $V_{in\ pp}$    | 250          |     | 1200          | mV <sub>p-p</sub> | 2    |
| Transmit Disable Voltage       | $V_D$           | $V_{CC}-1.3$ |     | $V_{CC}$      | V                 | 2    |
| Transmit Enable Voltage        | $V_{EN}$        | $V_{EE}$     |     | $V_{EE}+0.8$  | V                 |      |
| Transmit Disable Assert Time   | $V_{dessert}$   |              |     | 10            | $\mu s$           |      |
| <b>Receiver</b>                |                 |              |     |               |                   |      |
| Single ended data output swing | $V_{out,pp}$    | 250          |     | 800           | mV                | 3    |
| LOS Fault                      | $V_{losfault}$  | $V_{CC}-0.5$ |     | $V_{CC}-host$ | V                 | 5    |
| LOS Normal                     | $V_{los\ norm}$ | $V_{EE}$     |     | $V_{EE}+0.8$  | V                 | 5    |
| Power Supply Rejection         | PSR             | 100          |     |               | mV <sub>p-p</sub> | 6    |

### Notes:

1. AC coupled or open circuit.
2. Terminated with 100  $\Omega$  differential resistance.
3. LOS signal level is LVTTTL. Logic 0 = normal signal; Logic 1 = no optical signal detected.
4. This single-fiber BiDi module integrates an internal WDM filter for wavelength separation of transmit and receive signals.
5. All transceiver parameters remain valid under sinusoidal power supply noise from 20 Hz to 1.5 MHz, with amplitude limited to the rated value after passing through the power filter network.

## Optical Characteristics

### Port A: Tx 1310nm / Rx 1550nm

| Parameter                   | Symbol                                            | Min  | Typical | Max  | Unit  | Note |
|-----------------------------|---------------------------------------------------|------|---------|------|-------|------|
| <b>Transmitter Section:</b> |                                                   |      |         |      |       |      |
| Center Wavelength           | $\lambda_c$                                       | 1290 | 1310    | 1330 | nm    |      |
| Spectral Width(RMS)         | $\sigma_{RMS}$                                    |      |         | 3    | nm    |      |
| Optical Output Power        | $P_{out}$                                         | -6   |         | 0    | dBm   | 1    |
| Extinction Ratio            | ER                                                | 9    |         |      | dB    |      |
| Optical Rise/Fall Time      | $t_r/t_f$                                         |      |         | 260  | ps    | 2    |
| Relative Intensity Noise    | RIN                                               |      |         | -120 | dB/Hz |      |
| Output Eye Mask             | Compliant with IEEE802.3 z (class 1 laser safety) |      |         |      |       |      |

|                                                             |             |      |      |            |      |   |
|-------------------------------------------------------------|-------------|------|------|------------|------|---|
| <b>Receiver Section:</b>                                    |             |      |      |            |      |   |
| Optical Input Wavelength                                    | $\lambda_c$ | 1530 | 1550 | 1565       | nm   |   |
| Receiver Overload                                           | $P_{ol}$    | -3   |      |            | dBm  | 4 |
| RX Sensitivity                                              | $Sen$       |      |      | -18        | dBm  | 4 |
| RX_LOS Assert                                               | $LOS_A$     | -30  |      |            | dBm  |   |
| RX_LOS De-assert                                            | $LOS_D$     |      |      | -19        | dBm  |   |
| RX_LOS Hysteresis                                           | $LOS_H$     | 0.5  |      |            | dB   |   |
| <b>General Specifications:</b>                              |             |      |      |            |      |   |
| Data Rate                                                   | BR          |      | 1.25 |            | Gb/s |   |
| Bit Error Rate                                              | BER         |      |      | $10^{-12}$ |      |   |
| Max. Supported Link Length<br>on 9/125 $\mu$ m SMF@1.25Gb/s | $L_{MAX}$   |      | 3    |            | Km   |   |
| Total System Budget                                         | LB          | 5    |      |            | dB   |   |

#### Port B: Tx 1550nm / Rx 1310nm

| Parameter                                                   | Symbol                                            | Min  | Typical | Max        | Unit  | Note |
|-------------------------------------------------------------|---------------------------------------------------|------|---------|------------|-------|------|
| Transmitter Section:                                        |                                                   |      |         |            |       |      |
| Center Wavelength                                           | $\lambda_C$                                       | 1530 | 1550    | 1565       | nm    |      |
| Spectral Width(RMS)                                         | $\sigma_{RMS}$                                    |      |         | 3          | nm    |      |
| Optical Output Power                                        | $P_{out}$                                         | -6   |         | 0          | dBm   | 1    |
| Extinction Ratio                                            | ER                                                | 9    |         |            | dB    |      |
| Optical Rise/Fall Time                                      | $t_r/t_f$                                         |      |         | 260        | ps    | 2    |
| Relative Intensity Noise                                    | RIN                                               |      |         | -120       | dB/Hz |      |
| Output Eye Mask                                             | Compliant with IEEE802.3 z (class 1 laser safety) |      |         |            |       |      |
| Receiver Section:                                           |                                                   |      |         |            |       |      |
| Optical Input Wavelength                                    | $\lambda_C$                                       | 1290 | 1310    | 1330       | nm    |      |
| Receiver Overload                                           | $P_{ol}$                                          | -3   |         |            | dBm   | 4    |
| RX Sensitivity                                              | $Sen$                                             |      |         | -18        | dBm   | 4    |
| RX_LOS Assert                                               | $LOS_A$                                           | -30  |         |            | dBm   |      |
| RX_LOS De-assert                                            | $LOS_D$                                           |      |         | -19        | dBm   |      |
| RX_LOS Hysteresis                                           | $LOS_H$                                           | 0.5  |         |            | dB    |      |
| General Specifications:                                     |                                                   |      |         |            |       |      |
| Data Rate                                                   | BR                                                |      | 1.25    |            | Gb/s  |      |
| Bit Error Rate                                              | BER                                               |      |         | $10^{-12}$ |       |      |
| Max. Supported Link Length<br>on 9/125 $\mu$ m SMF@1.25Gb/s | $L_{MAX}$                                         |      | 3       |            | Km    |      |
| Total System Budget                                         | LB                                                | 5    |         |            | dB    |      |

#### Notes:

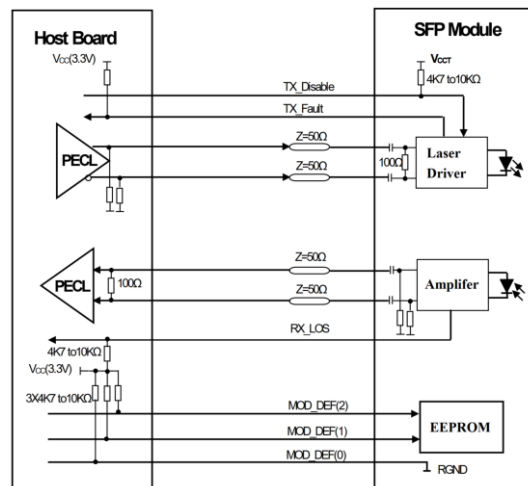
1. The optical power is launched into SMF.
2. Jitter measurements are taken using the Agilent OMNIBERT 718 in accordance with GR-253.
3. Measured with PRBS  $2^7-1$  at a BER of  $10^{-12}$ .
4. This is a single-fiber BiDi module with a built-in WDM filter; transmit and receive wavelengths operate on separate wavebands.

## Regulatory Compliance

This complies with international Electromagnetic Compatibility (EMC) and international safety requirements and standards (see details in Table following).

|                                                           |                                                                    |                                       |
|-----------------------------------------------------------|--------------------------------------------------------------------|---------------------------------------|
| Electrostatic Discharge (ESD) to the Electrical Pins      | MIL-STD-883E<br>Method 3015.7                                      | Class 1(>1000 V)                      |
| Electrostatic Discharge (ESD) to the Single LC Receptacle | IEC 61000-4-2<br>GR-1089-CORE                                      | Compatible with standards             |
| Electromagnetic Interference (EMI)                        | FCC Part 15 Class B<br>EN55022 Class B (CISPR 22B)<br>VCCI Class B | Compatible with standards             |
| Laser Eye Safety                                          | FDA 21CFR 1040.10 and 1040.11<br>EN60950, EN (IEC)60825-1,2        | Compatible with Class 1 laser product |

## Recommended Circuit



SFP Host Recommended Circuit

\*\* Subject to change without notice \*\*