

Datasheet

100 to 155 Mbps Single Fiber Bidirectional 40 km SFP Transceivers

SFP-FD-BD35 and SFP-FD-BD53



Highlights

- SFP transceiver
- Data Rates: 100 to 155 Mbps
- Protocols:
 - Fast Ethernet
 - OC-3/STM-1
- Single-mode fiber
- Single fiber, bi-directional
- Two wavelength options:
 - Tx 1310 nm and Rx 1550 nm
 - Tx 1550 nm and Rx 1310 nm
- 16 to 40 km
- Simplex LC connector
- Digital Diagnostics (SFF-8472)
- Hot-swap
- Industrial temperature models available

Overview

Small Form-Factor Pluggable (SFP) interfaces from MRV Communications provide flexible high speed links in a small industry standard package. They deliver the deployment options and inventory control that network administrators demand for growing networks.

SFPs are designed to Multi-Source Agreement (MSA) standards to ensure network equipment compatibility. They are a perfect addition to MRV’s extensive lines of networking equipment.

Visit the MRV website at www.mrv.com or contact your nearest authorized MRV Communications dealer for more information.

Specifications Overview

| | |
|---|-----------------|
| Data Rate | 100 - 155 Mbps |
| Tx Wavelength for SFP-FD-BD35 | 1310 nm |
| Tx Wavelength for SFP-FD-BD53 | 1550 nm |
| Tx Power (Minimum) | -5 dBm |
| Extinction Ratio | 6.6 dBm |
| Tx Disable | Yes |
| Rx Wavelength for SFP-FD-BD35 | 1480 to 1580 nm |
| Rx Wavelength for SFP-FD-BD53 | 1260 to 1360 nm |
| Rx Sensitivity | -28 dBm |
| Rx Saturation | -8 dBm |
| Operating Temperature Range | -5 to 70 °C |
| Operating Temperature Range (TH Models) | -40 to 85 °C |
| Damage Threshold | 4 dBm |
| Power Consumption | 1 Watt |

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Transmitter Specifications (Optical)

| Parameter | Symbol | Min | Max | Unit | Notes |
|--|----------------------------------|------|------|-------|-------|
| Optical Power | P_{op} | -5 | 0 | dBm | - |
| Optical Crosstalk | XT | - | -40 | dB | - |
| Average Launch Power Of Off Tx | P_{off} | - | -45 | dBm | - |
| Extinction Ratio | ER | 6.6 | - | dB | - |
| Eye Mask | IEEE 802.3Z, SONET/SDH compliant | | | | - |
| Optical Rise Time (20% to 80% values) | t_r | - | 2 | ns | - |
| Optical Fall Time (20% to 80% values) | t_f | - | 2 | ns | - |
| Mean Wavelength for SFP-FD-BD35 | λ | 1260 | 1360 | nm | - |
| Mean Wavelength for SFP-FD-BD53 | λ | 1500 | 1600 | nm | - |
| RMS Width (σ) for SFP-FD-BD35 | σ | - | 1 | nm | - |
| RMS Width (σ) for SFP-FD-BD53 | σ | - | 3 | nm | - |
| Relative Intensity Noise | RIN | - | -120 | dB/Hz | - |
| Optical Return Loss Tolerance | ORLT | - | 12 | dB | - |

Receiver Specifications (Optical)

| Parameter | Symbol | Min | Max | Unit | Notes |
|----------------------------|---------------------|------|------|------|-------|
| Receive Power | $R_{sens,low/high}$ | -28 | -8 | dBm | 1 |
| Damage Threshold | $P_{in,damage}$ | 4 | - | dBm | - |
| Wavelength for SFP-FD-BD35 | λ | 1480 | 1580 | nm | - |
| Wavelength for SFP-FD-BD53 | λ | 1260 | 1360 | nm | - |
| LOS Assert | - | -45 | - | dBm | - |
| LOS De-assert | - | - | -28 | dBm | - |
| LOS Hysteresis | - | 0.5 | - | dB | - |

Notes: 1. Measured at 10^{-12} BER, PRBS 27-1

Digital Diagnostics

| Parameter | Range | Accuracy | Unit | Calibration | Bit Value | Formula |
|-------------------------|---------------|-----------|--------------------|-------------|-------------------|---|
| Temperature | -5 to 70 | ± 3 | $^{\circ}\text{C}$ | Internal | 1/256 C | $T_c(C) = T_{ad}(16 \text{ bit signed twos complement})/256$ |
| Temperature (TH Models) | -40 to 85 | ± 3 | $^{\circ}\text{C}$ | Internal | 1/256 C | $T_c(C) = T_{ad}(16 \text{ bit signed twos complement})/256$ |
| Voltage | 0 to V_{CC} | ± 0.1 | V | Internal | 100 μV | $V(\text{Volts}) = V_{ad}(16 \text{ bit unsigned integer}) * 0.1$ |
| Bias Current | 0 to 120 | ± 5 | mA | External | - | $I(\text{mA}) = I_{slope} * I_{ad}(16 \text{ bit unsigned integer}) + I_{offset}$ |
| TX Power | -5 to 0 | ± 3 | dBm | External | - | $TX_PWR(\mu\text{W}) = TX_PWR_{slope} * TX_PWR_{ad}(16 \text{ bit unsigned integer}) + TX_PWR_{offset}$ |
| RX Power | -28 to -8 | ± 3 | dBm | External | - | $RX_PWR(\mu\text{W}) = A0 + A1 * x + A2 * x^2 + A3 * x^3 + A4 * x^4$ |

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General Operations

| Parameter | Symbol | Min | Max | Unit | Notes |
|-----------------------------------|-----------|-------|-------|-------------------|-------|
| Supply Voltage | V_{cc} | 3.135 | 3.465 | V | - |
| Total Current | I_{cc} | - | 300 | mA | - |
| Power Supply Noise Rejection | PSR | 100 | - | mV _{p-p} | - |
| Operating Temperature of SFP Case | T_{opr} | -5 | 70 | °C | 1 |
| Operating Temperature (TH Models) | T_{opr} | -40 | 85 | °C | 1 |
| Storage Temperature | T_{stg} | -40 | 85 | °C | - |
| Data Rate | DR | 100 | 155 | Mbps | - |

Notes: 1. Maximum Relative Humidity is 85%, non-condensing

Transmitter Specifications (Electrical)

| Parameter | Symbol | Min | Max | Unit | Notes |
|------------------------------------|--------------|----------|--------------|----------|-------|
| Input Differential Impedance | R_{in} | 80 | 120 | Ω | - |
| PECL Single Ended Data Input Swing | $V_{in,p-p}$ | 250 | 1200 | mV | - |
| TxFault_Fault | V_{fault} | 2 | V_{cc} | V | - |
| TxFault_Normal | V_{normal} | V_{ee} | $V_{ee}+0.5$ | V | - |
| TxDisable_Disable | V_d | 2 | V_{cc} | V | - |
| TxDisable_Enable | V_{en} | V_{ee} | $V_{ee}+0.8$ | V | - |

Receiver Specifications (Electrical)

| Parameter | Symbol | Min | Max | Unit | Notes |
|-------------------------------------|---------------|-----|-----|------|-------|
| PECL Single Ended Data Output Swing | $V_{out,p-p}$ | 185 | 800 | mV | - |
| Data Output Rise Time | t_r | - | 2 | ns | - |
| Data Output Fall Time | t_f | - | 2 | ns | - |

Electrical Specifications and Timing

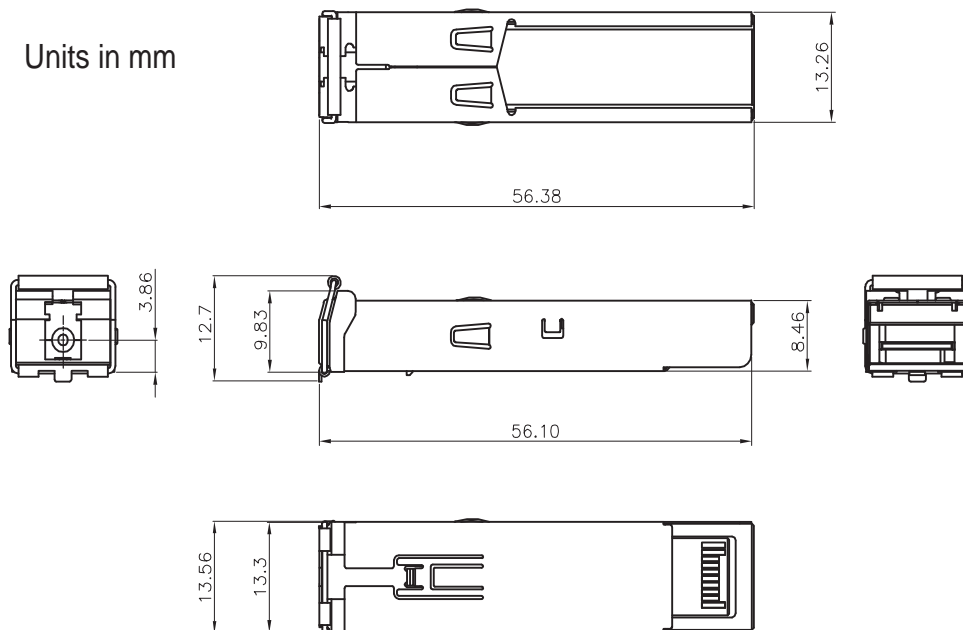
| Parameter | Symbol | Min | Max | Unit | Notes |
|---|---------------------|----------|--------------|---------|-------|
| Tx Disable Negate Time | t_{on} | - | 25 | ms | - |
| Tx Disable Assert Time | t_{off} | - | 10 | μ s | - |
| Time to Initialize, Including Reset of Tx Fault | t_{init} | - | 300 | ms | - |
| Tx Fault Assert Time | t_{fault} | - | 100 | μ s | - |
| Tx Disable To Reset | t_{reset} | 10 | - | μ s | - |
| LOS Assert Time | $t_{loss_{on}}$ | - | 300 | μ s | - |
| LOS De-assert Time | $t_{loss_{off}}$ | - | 100 | μ s | - |
| Serial ID Clock Rate | f_{serial_clock} | - | 100 | KHz | - |
| RX_LOS Voltage (High) | RX_LOS_H | 2 | - | V | - |
| RX_LOS Voltage (Low) | RX_LOS_L | - | 0.8 | V | - |
| LOS Output Voltage-Fault | $V_{LOS\ fault}$ | 2 | V_{cc} | V | - |
| LOS Output Voltage-Normal | $V_{LOS\ normal}$ | V_{ee} | $V_{ee}+0.5$ | V | - |
| MOD_DEF (0:2)-High | V_H | 2 | V_{cc} | V | - |
| MOD_DEF (0:2)-Low | V_L | V_{ee} | $V_{ee}+0.5$ | V | - |

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| Pin | Function | Name / Description | Notes |
|-----|-------------------|---------------------------------|-------|
| 1 | V _{ee} T | Module Transmitter Ground | - |
| 2 | TX_FAULT | Open Collector | - |
| 3 | TX_DISABLE | Internally Pulled High | - |
| 4 | MOD_DEF2 | Serial Data Input | - |
| 5 | MOD_DEF1 | Serial Clock Input | - |
| 6 | MOD_DEF0 | Internally Grounded | - |
| 7 | NC | Not Connected | - |
| 8 | LOS | Open Collector | - |
| 9 | V _{ee} R | Module Receiver Ground | - |
| 10 | V _{ee} R | Module Receiver Ground | - |
| 11 | V _{ee} R | Module Receiver Ground | - |
| 12 | RXD- | Receiver Data Negative | - |
| 13 | RXD+ | Receiver Data Positive | - |
| 14 | V _{ee} R | Module Receiver Ground | - |
| 15 | V _{cc} R | Module Receiver Power Supply | - |
| 16 | V _{cc} T | Module Transmitter Power Supply | - |
| 17 | V _{ee} T | Module Transmitter Ground | - |
| 18 | TXD+ | Transmitter Data Positive | - |
| 19 | TXD- | Transmitter Data Negative | - |
| 20 | V _{ee} T | Module Transmitter Ground | - |

Outline Drawing

Units in mm





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Ordering Information

| Model | Description | Data Rate (Mbps) | Wavelength (nm) | | Connector Type | Digital Diagnostics | Bail Latch Color | Distance Range (km) |
|----------------------|---|------------------|-----------------|------|----------------|---------------------|------------------|---------------------|
| | | | Tx | Rx | | | | |
| SFP-FD-BD35 | SFP Bidirectional Transceiver | 100 - 155 | 1310 | 1490 | LC | Yes | Blue | 16 - 40 |
| SFP-FD-BD53 | SFP Bidirectional Transceiver | 100 - 155 | 1490 | 1310 | LC | Yes | Yellow | 16 - 40 |
| SFP-FD-BD35TH | SFP Bidirectional Transceiver (Temperature Hardened) | 100 - 155 | 1310 | 1490 | LC | Yes | Blue | 16 - 40 |
| SFP-FD-BD53TH | SFP Bidirectional Transceiver (Temperature Hardened) | 100 - 155 | 1490 | 1310 | LC | Yes | Yellow | 16 - 40 |

Regulatory and Industry Compliances

Class 1 Laser Product, complies with EN 60825-1 and 21 CFR 1040.10 except for deviations pursuant to Laser Notice No. 50. dated June 24, 2007
MSA SFF-8074i; Telcordia GR-468, Digital Diagnostic SFF-8472;

Certified by one or more of the following agencies: TÜV, UL, CSA

RoHS Directive; China RoHS; California RoHS Law, REACH Directive SVHC; WEEE Directive

The Quality Management System is certified to ISO 9001 by QMI-SAI Global

The Environmental Management System is in compliance with ISO 14001

Warnings

Handling Precautions: This device is susceptible to damage as a result of electrostatic discharge (ESD). A static free environment is highly recommended. Follow guidelines according to proper ESD procedures.

Laser Safety: Radiation emitted by laser devices can be dangerous to human eyes. Avoid eye exposure to direct or indirect radiation.

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