

Datasheet

2.7 Gbps Multi-Rate 200 km DWDM SFP Transceivers

SFP27DWLR20-xx



Features

- SFP transceiver
- C-band (standard 100 GHz DWDM ITU grid)*
- Data Rates: 100 Mbps to 2.7 Gbps
- Protocols:
 - Fast Ethernet
 - Gigabit Ethernet
 - 1 Gbps Fibre Channel
 - 2 Gbps Fibre Channel
 - Digital Video
 - OC-3/STM-1 to OC-48/STM-16 and OC-48 with FEC
- Single-mode fiber
- 1-channel DWDM Tx
- Full-band Rx
- 40 - 200 km**
- Duplex LC connector
- Digital Diagnostics (SFF-8472)
- Hot-swap

* L-band channels are available by request

** EDFA is required for full distance reach

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 - 2700 Mbps |
| Tx Wavelength | 1-channel C-Band DWDM Tx (channel 17 – 61) |
| Tx Power (Minimum) | 0 dBm |
| Tx Dispersion Penalty | < 2 dB |
| Tx Dispersion Tolerance | 4000 ps/nm |
| Tx Disable | Yes |
| Rx Wavelength Range | 1528 - 1564 nm |
| Rx Sensitivity | -28 dBm |
| Rx Saturation | -6 dBm |
| Damage Threshold | 4 dBm |
| Operating Temperature Range | -5 to 70 °C |
| Power Consumption | 1 Watt |

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Optical Transmitter Specifications

| Parameter | Symbol | Min | Max | Unit | Notes |
|--|----------------------------------|-----|----------|-------|-------|
| Optical Power | P_{OP} | 0 | 4 | dBm | - |
| Average Launch Power (Tx: Off) | P_{Off} | - | -30 | dBm | - |
| Extinction Ratio | ER | 8.2 | - | dB | - |
| Eye Mask | IEEE 802.3z, SONET/SDH compliant | | | | - |
| Optical Jitter Generation | $J_{gen}(pk-pk)$ | - | 0.07 | UI | - |
| Optical Rise Time | t_r | - | 160 | ps | 1 |
| Optical Fall Time | t_f | - | 160 | ps | 1 |
| Channel Spacing | Δf | 100 | | GHz | - |
| Deviation From Central Frequency, EOL | - | - | ± 12 | GHz | - |
| Spectral Width (20 dB) | $\Delta \lambda$ | - | 0.3 | nm | - |
| Side Mode Suppression Ratio | SMSR | 30 | - | dB | - |
| Dispersion Penalty at specified distance | dp | - | <2 | dB | 2 |
| Relative Intensity Noise | RIN | - | -135 | dB/Hz | - |
| Reflection Tolerance | rp | -24 | - | dB | 3 |

- Notes:**
1. 20%-80% values
 2. Measured at BER of 10^{-12} , PRBS of $2^{23}-1$, at eye center, OC-48.
 3. 2 dB degradation of receiver sensitivity

Optical Receiver Specifications

| Parameter | Symbol | Min | Max | Unit | Notes |
|--|---------------------|------|------|------|-------|
| Receive Power | $R_{sens,low/high}$ | -28 | -6 | dBm | 1 |
| Receive Power at Specified Distance and 20 dB OSNR | $R_{sens,OSNR}$ | - | -24 | dBm | 1 |
| Damage Threshold for Receiver | $P_{in,damage}$ | 4 | - | dBm | - |
| Wavelength | λ | 1528 | 1564 | nm | - |
| Maximum Reflectance of Receiver | RX_r | - | -27 | dB | - |
| LOS Assert | - | -40 | - | dBm | - |
| LOS De-assert | - | - | -28 | dBm | - |
| LOS Hysteresis | - | 0.5 | - | dB | - |

- Notes:**
1. At 10^{-12} BER, PRS $2^{23}-1$, OC-48

Digital Diagnostics

| Parameter | Range | Accuracy | Unit | Notes |
|-----------------|---------------|------------|-------------|-------|
| Temperature | -40 to 102 | ± 3 | $^{\circ}C$ | - |
| Voltage | 0 to V_{CC} | ± 0.1 | V | - |
| Bias Current | 0 to 120 | ± 5 | mA | - |
| TX Power | 0 to 4 | ± 3 | dBm | - |
| RX Power | -32 to -9 | ± 3 | dBm | - |
| TEC Current | -1200 to 1200 | ± 60 | mA | - |
| TEC Temperature | 20 to 70 | ± 0.25 | $^{\circ}C$ | 1 |

- Notes:**
1. Relative accuracy. Absolute accuracy is $\pm 3^{\circ}C$

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General Operating

| Parameter | Symbol | Min. | Max. | Unit | Notes |
|---|----------|-------|-------|-------------------|-------|
| Supply Voltage | V_{CC} | 3.135 | 3.465 | V | - |
| Total Current (BOL) | I_{CC} | - | 375 | mA | - |
| Power Supply Noise Rejection ^a | PSR | 100 | - | mV _{p-p} | 1 |
| Operating Temperature (case) | T_{op} | -5 | 70 | °C | - |
| Storage Temperature | T_{st} | -40 | 85 | °C | - |
| Data Rate Multirate | MR | 100 | 2700 | Mbps | - |

Notes: 1. 20 Hz to 155 MHz

Electrical Transmitter Specifications

| 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 | - |

Electrical Output

| Parameter | Symbol | Min | Max | Unit | Notes |
|--------------------------|---------------|-----|-----|------|-------|
| Single-Ended Data Output | $V_{out,p-p}$ | 185 | 800 | mV | - |
| Data Output Rise Time | t_r | - | 175 | ps | - |
| Data Output Fall Time | t_f | - | 175 | ps | - |

Timing and Electrical

| Parameter | Symbol | Min | Max | Unit | Notes |
|---|---------------------|----------|---------------|---------|-------|
| Tx Disable Negate Time | t_{on} | - | 20 | ms | - |
| Tx Disable Assert Time | t_{off} | - | 20 | ms | - |
| Time to Initialize, after Reset of Tx_Fault/INT in Normal Operation | t_{init} | - | 300 | ms | - |
| Start-up Time | $t_{startup}$ | - | 90 | secs | - |
| Tx Fault/INT Assert Time | t_{fault} | - | 50 | ms | - |
| Tx Disable to Reset | t_{reset} | 10 | - | μ s | - |
| LOS Assert Time | $t_{loss_{on}}$ | - | 100 | 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) | - | 2 | - | V | - |
| RX_LOS Voltage (Low) | - | - | 0.8 | V | - |
| LOS Output Voltage-Fault | $V_{LOS\ fault}$ | 2 | V_{CC} | V | - |
| LOS Output Voltage-Normal | $V_{LOS\ normal}$ | V_{EE} | $V_{EE}+0.55$ | 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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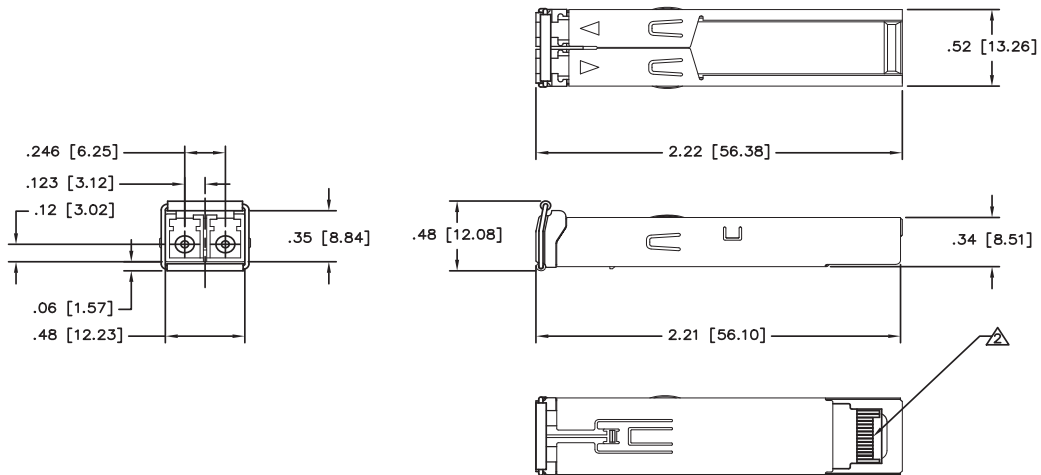
| Pin | Function | Notes |
|-----|-------------------|------------------------|
| 1 | V _{ee} T | TX Ground |
| 2 | TX_FAULT/INT | Open Collector |
| 3 | TX_DISABLE | Internally Pulled High |
| 4 | MOD_DEF2 | Serial Data Input |
| 5 | MOD_DEF1 | Serial Clock Input |
| 6 | MOD_DEF0 | Internally Grounded |
| 7 | NC | Not Connected |
| 8 | LOS | Open Collector |
| 9 | V _{ee} R | RX Ground |
| 10 | V _{ee} R | RX Ground |
| 11 | V _{ee} R | RX Ground |
| 12 | RXD- | RX Data Negative |
| 13 | RXD+ | RX Data Positive |
| 14 | V _{ee} R | RX Ground |
| 15 | V _{cc} R | RX Power |
| 16 | V _{cc} T | TX Power |
| 17 | V _{ee} T | TX Ground |
| 18 | TXD+ | TX Data Positive |
| 19 | TXD- | TX Data Negative |
| 20 | V _{ee} T | TX Ground |

DWDM Channel Guide (ITU C-Band)

| ITU Channel (xx) | Frequency (THz) | Wavelength (nm) | ITU Channel (xx) | Frequency (THz) | Wavelength (nm) |
|------------------|-----------------|-----------------|------------------|-----------------|-----------------|
| 17 | 191.7 | 1563.86 | 40 | 194.0 | 1545.32 |
| 18 | 191.8 | 1563.05 | 41 | 194.1 | 1544.53 |
| 19 | 191.9 | 1562.23 | 42 | 194.2 | 1543.73 |
| 20 | 192.0 | 1561.42 | 43 | 194.3 | 1542.94 |
| 21 | 192.1 | 1560.61 | 44 | 194.4 | 1542.14 |
| 22 | 192.2 | 1559.79 | 45 | 194.5 | 1541.35 |
| 23 | 192.3 | 1558.98 | 46 | 194.6 | 1540.56 |
| 24 | 192.4 | 1558.17 | 47 | 194.7 | 1539.77 |
| 25 | 192.5 | 1557.36 | 48 | 194.8 | 1538.98 |
| 26 | 192.6 | 1556.55 | 49 | 194.9 | 1538.19 |
| 27 | 192.7 | 1555.75 | 50 | 195.0 | 1537.40 |
| 28 | 192.8 | 1554.94 | 51 | 195.1 | 1536.61 |
| 29 | 192.9 | 1554.13 | 52 | 195.2 | 1535.82 |
| 30 | 193.0 | 1553.33 | 53 | 195.3 | 1535.04 |
| 31 | 193.1 | 1552.52 | 54 | 195.4 | 1534.25 |
| 32 | 193.2 | 1551.72 | 55 | 195.5 | 1533.47 |
| 33 | 193.3 | 1550.92 | 56 | 195.6 | 1532.68 |
| 34 | 193.4 | 1550.12 | 57 | 195.7 | 1531.90 |
| 35 | 193.5 | 1549.32 | 58 | 195.8 | 1531.12 |
| 36 | 193.6 | 1548.51 | 59 | 195.9 | 1530.33 |
| 37 | 193.7 | 1547.72 | 60 | 196.0 | 1529.55 |
| 38 | 193.8 | 1546.92 | 61 | 196.1 | 1528.77 |
| 39 | 193.9 | 1546.12 | - | - | - |

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Outline Drawing



Ordering Information

| Model | Description | Data Rate (Mbps) | Dispersion | Tx Channel | Distance Range (km) |
|-----------------|--------------------------------|------------------|----------------------|------------|---------------------|
| SFP27DWLR20-xx* | SFP Multirate DWDM Transceiver | 100 - 2700 | <2 dB (@ 4000 ps/nm) | xx* | 40 - 200** |

* See DWDM C-band ITU grid for "xx" channels, wavelengths, and frequencies. L-band wavelengths are available by special order.

** EDFA is required for full distance reach

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; 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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