

SO-SFP-MR80D-Dxxxx

SFP, 100Mbps-2.7Gbps, Multirate, DWDM 100GHz, SM, DDM, 29dB, 80km

OVERVIEW

The SO-SFP-MR80D-Dxxxx series single mode transceiver is small form factor pluggable module for duplex optical data communications. This module is designed for single mode fiber and operates at a nominal DWDM wavelength from 1528.77nm to 1565.50nm (C band) and 1578.69nm to 1610.06nm (L band) as specified by the ITU-T. It is designed to deploy in the DWDM networking equipment in metropolitan access and core networks. And they are designed to be compliant with SFF-8472 Multi-Source Agreement (MSA). It is with the SFP 20-pin connector to allow hot plug capability. The transmitter section uses a DWDM multiple quantum well DFB laser and is a class 1 laser compliant according to International Safety Standard IEC-60825.

PRODUCT FEATURES

- Operating data rate up to 2.67Gbps
- Available in all C-Band and L-Band Wavelengths on the 100GHz DWDM ITU Grid
- Single 3.3V power supply and TTL logic interface
- Hot-Pluggable SFP footprint duplex LC connector interface
- Compliant with Class 1 FDA and IEC60825-1 laser safety
- Compliant with SFP MSA
- Compliant with SFF-8472
- Operating case temperature:
 - 0°C to 70°C standard
 - 5°C to 70°C extended

APPLICATIONS

- Sonet / SDH
- Ethernet / Fibre Channel
- DWDM, SAN, WAN networking
- Equipment connectivity

ORDERING INFORMATION

| Part Number | Description |
|----------------------|--|
| SO-SFP-MR80D-Dxxxx | SFP, 100Mbps-2.7Gbps, Multirate, DWDM 100GHz, SM, DDM, 29dB, 80km |
| SO-SFP-MR80D-Dxxxx-E | SFP, 100Mbps-2.7Gbps, Multirate, DWDM 100GHz, SM, DDM, 29dB, 80k, Ext.temp |

Subject to change without notice.

For more information, visit smaroptics.com.

ABSOLUTE MAXIMUM RATINGS

| Parameter | Symbol | Min | Max | Unit |
|-----------------------------|--------|------|-----|------|
| Storage Temperature | TS | -40 | +85 | °C |
| Supply Voltage | VCC | -0.5 | 3.6 | V |
| Operating Relative Humidity | | | 95 | % |

RECOMMENDED OPERATING CONDITIONS

| Parameter | Symbol | Min | Typ | Max | Unit | |
|----------------------------|------------------|----------------------|-------|------|------|----|
| Case Operating Temperature | T_c | SO-SFP-MR80D-Dxxxx | 0 | | +70 | °C |
| | | SO-SFP-MR80D-DXXXX-I | -5 | | +70 | |
| Power Supply Voltage | Vcc | 3.15 | 3.3 | 3.45 | V | |
| Power Supply Current | Icc | | | 450 | mA | |
| Power dissipation | PW | | | 1.5 | W | |
| Data rate | OC-48/STM-16 FEC | | 2.67 | | Gbps | |
| | OC-48/STM-16 | | 2.488 | | | |
| | 2FC | | 2.125 | | | |
| | GBE | | 1.25 | | | |
| | FC | | 1.063 | | Mbps | |
| | OC-12/STM-4 | | 622 | | | |
| | OC-3/STM-1 | | 155 | | | |
| | FE | | 100 | | | |

PERFORMANCE SPECIFICATIONS – ELECTRICAL TRANSMITTER

| Parameter | Symbol | Min | Typ | Max | Unit | Notes |
|--------------------------------|----------|-----|-----|---------|------|---------------------------|
| CML Inputs(Differential) | V_{IN} | 400 | | 1600 | mVpp | AC coupled inputs |
| Input Impedance (Differential) | Z_{IN} | 85 | 100 | 115 | ohms | $R_{in} > 100$ kohms @ DC |
| TX Disable | Disable | 2 | | Vcc | V | |
| | Enable | 0 | | 0.8 | | |
| TX FAULT | Fault | 2 | | Vcc+0.3 | V | |
| | Normal | 0 | | 0.8 | | |

PERFORMANCE SPECIFICATIONS – ELECTRICAL RECEIVER

| Parameter | Symbol | Min | Typ | Max | Unit | Notes |
|---------------------------------|--------|-----|-----|------|------|--------------------|
| CML Outputs (Differential) | Vout | 400 | 800 | 1200 | mVpp | AC coupled outputs |
| Output Impedance (Differential) | Zout | 85 | 100 | 115 | ohms | |
| Rx_LOS Output Voltage – High | | 2 | | Vcc | V | |
| Rx_LOS Output Voltage – Low | | 0 | | 0.8 | V | |
| MOD_DEF (2:0) | VoH | 2.5 | | | V | With Serial ID |
| | VoL | 0 | | 0.8 | V | |

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PERFORMANCE SPECIFICATIONS – OPTICAL

| Parameter | Symbol | Min | Typ | Max | Unit |
|-----------|--------|-----|-----|-----|------|
| Data Rate | | | 2.5 | | Gbps |

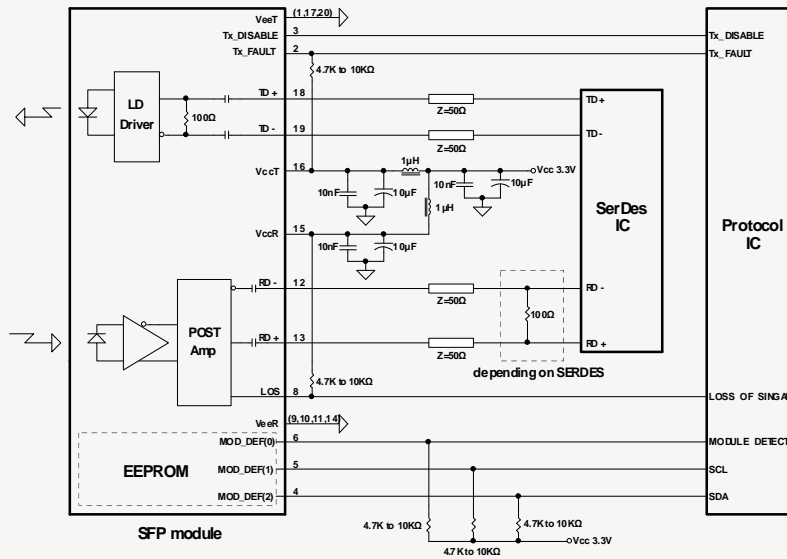
PERFORMANCE SPECIFICATIONS – OPTICAL TRANSMITTER

| Parameter | Symbol | Min | Typ | Max | Unit |
|--------------------------------------|-----------------|----------------------------|------|------|-------|
| Centre Wavelength | λ_c | 1528 | | 1610 | nm |
| Spectral Width (RMS) | $\Delta\lambda$ | | | 0.3 | nm |
| Side Mode Suppression Ratio | <i>SMSR</i> | 30 | | | dB |
| Channel Spacing | Δf | | 100 | | GHz |
| Deviation From Central Frequency@EOL | | -12 | | 12 | Ghz |
| Average Output Power | <i>Pout</i> | 2 | | 5 | dBm |
| Average Launch Power (Tx: OFF) | <i>Poff</i> | | | -45 | dBm |
| Extinction Ratio | <i>ER</i> | 8.2 | | | dB |
| Rise/Fall Time(20%~80%) | <i>tr/ff</i> | | | 150 | ps |
| Output Optical Eye | | Compatible with IEEE 802.3 | | | |
| TX Disable Assert Time | <i>t_off</i> | | | 10 | us |
| Pout@TX Disable Asserted | <i>Pout</i> | | | -45 | dBm |
| Optical Signal Noise Ratio@0.1nm | <i>OSNR</i> | | 40 | | dB |
| Relative Intensity Noise | <i>RIN</i> | | | -135 | dB/Hz |
| Dispersion Tolerance | <i>DT</i> | | 2400 | | ps/nm |

PERFORMANCE SPECIFICATIONS – OPTICAL RECEIVER

| Parameter | Symbol | Min | Typ | Max | Unit |
|----------------------|--------------------------|------|-----|------|------|
| Centre Wavelength | λ | 1528 | | 1620 | nm |
| Receiver Sensitivity | Multirate <i>Pmin</i> | | | -29 | dBm |
| Receiver Overload | <i>Pmax</i> | -9 | | | dBm |
| LOS De-Assert | <i>LOSD</i> | | | -31 | dBm |
| LOS Assert | <i>LOSA</i> | -43 | | | dBm |
| LOS Hysteresis | | 0.5 | | | dB |

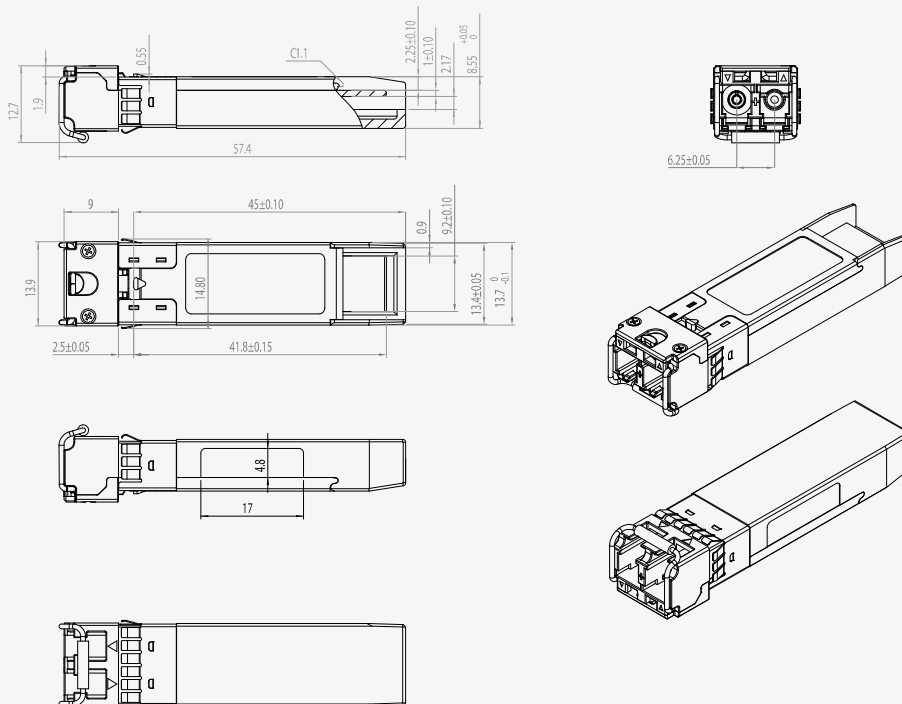
RECOMMENDED CIRCUIT SCHEMATIC



PIN ASSIGNMENT ACCORDING TO MSA

| PIN | Signal Name | Description | PIN | Signal Name | Description |
|-----|-------------------|---|-----|-------------------|-----------------------------|
| 1 | V _{EE} T | Transmitter Signal Ground | 11 | V _{EE} R | Receiver Signal Ground |
| 2 | TX_Fault | Transmitter Fault Indication. Logic "1" Output = Laser Fault. Logic "0" Output = Normal Operation | 12 | RD- | Inverse Receiver Data Out |
| 3 | TX_Disable | Logic "1" Input (or no connection) = Laser off, Logic "0" = Laser on. | 13 | RD+ | Receiver Data Out |
| 4 | SDA | Modulation Definition 2 – Two wires serial ID Interface | 14 | V _{EE} R | Receiver Signal Ground |
| 5 | SDL | Modulation Definition 1 – Two wires serial ID Interface | 15 | V _{CC} R | Receiver Power – 3.3V±5% |
| 6 | MOD_ABS | Modulation Definition 0 – Ground in Module | 16 | V _{CC} T | Transmitter Power – 3.3V±5% |
| 7 | RS0 | RX Rate Select (LVTTTL). This pin has an internal 30k pull-down to ground. A signal on this pin will not affect module performance. | 17 | V _{EE} T | Transmitter Signal Ground |
| 8 | RX_LOS | Loss of Signal Out (OC). | 18 | TD+ | Transmitter Data In |
| 9 | RS1 | TX Rate Select (LVTTTL). This pin has an internal 30k pull-down to ground. A signal on this pin will not affect module performance. | 19 | TD- | Inverse Transmitter Data In |
| 10 | V _{EE} R | Receiver Signal Ground | 20 | V _{EE} T | Transmitter Signal Ground |

MECHANICAL DIMENSIONS



EXTENDED ORDERING INFORMATION

| Part Number | ITU channel no. | Frequency (THz) | Center Wavelength (nm) |
|-------------------|-----------------|-----------------|------------------------|
| SO-SFP-MR80D D862 | 62 | 186.2 | 1610.06 |
| SO-SFP-MR80D D863 | 63 | 186.3 | 1609.19 |
| SO-SFP-MR80D D864 | 64 | 186.4 | 1608.33 |
| SO-SFP-MR80D D865 | 65 | 186.5 | 1607.47 |
| SO-SFP-MR80D D866 | 66 | 186.6 | 1606.60 |
| SO-SFP-MR80D D867 | 67 | 186.7 | 1605.74 |
| SO-SFP-MR80D D868 | 68 | 186.8 | 1604.88 |
| SO-SFP-MR80D D869 | 69 | 186.9 | 1604.03 |
| SO-SFP-MR80D D870 | 70 | 187.0 | 1603.17 |
| SO-SFP-MR80D D871 | 71 | 187.1 | 1602.31 |
| SO-SFP-MR80D D872 | 72 | 187.2 | 1601.46 |
| SO-SFP-MR80D D873 | 73 | 187.3 | 1600.60 |
| SO-SFP-MR80D D874 | 74 | 187.4 | 1599.75 |
| SO-SFP-MR80D D875 | 75 | 187.5 | 1598.89 |
| SO-SFP-MR80D D876 | 76 | 187.6 | 1598.04 |
| SO-SFP-MR80D D877 | 77 | 187.7 | 1597.19 |
| SO-SFP-MR80D D878 | 78 | 187.8 | 1596.34 |
| SO-SFP-MR80D D879 | 79 | 187.9 | 1595.49 |
| SO-SFP-MR80D D880 | 80 | 188.0 | 1594.64 |
| SO-SFP-MR80D D881 | 81 | 188.1 | 1593.79 |
| SO-SFP-MR80D D882 | 82 | 188.2 | 1592.95 |
| SO-SFP-MR80D D883 | 83 | 188.3 | 1592.10 |
| SO-SFP-MR80D D884 | 84 | 188.4 | 1591.26 |
| SO-SFP-MR80D D885 | 85 | 188.5 | 1590.41 |

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| SO-SFP-MR80D D886 | 86 | 188.6 | 1589.57 |
| SO-SFP-MR80D D887 | 87 | 188.7 | 1588.73 |
| SO-SFP-MR80D D888 | 88 | 188.8 | 1587.88 |
| SO-SFP-MR80D D889 | 89 | 188.9 | 1587.04 |
| SO-SFP-MR80D D890 | 90 | 189.0 | 1586.20 |
| SO-SFP-MR80D D891 | 91 | 189.1 | 1585.36 |
| SO-SFP-MR80D D892 | 92 | 189.2 | 1584.53 |
| SO-SFP-MR80D D893 | 93 | 189.3 | 1583.69 |
| SO-SFP-MR80D D894 | 94 | 189.4 | 1582.85 |
| SO-SFP-MR80D D895 | 95 | 189.5 | 1582.02 |
| SO-SFP-MR80D D896 | 96 | 189.6 | 1581.18 |
| SO-SFP-MR80D D897 | 97 | 189.7 | 1580.35 |
| SO-SFP-MR80D D898 | 98 | 189.8 | 1579.52 |
| SO-SFP-MR80D D899 | 99 | 189.9 | 1578.69 |
| SO-SFP-MR80D D900 | 0 | 190.0 | 1577.86 |
| SO-SFP-MR80D D901 | 1 | 190.1 | 1577.03 |
| SO-SFP-MR80D D902 | 2 | 190.2 | 1576.20 |
| SO-SFP-MR80D D903 | 3 | 190.3 | 1575.37 |
| SO-SFP-MR80D D904 | 4 | 190.4 | 1574.54 |
| SO-SFP-MR80D D905 | 5 | 190.5 | 1573.71 |
| SO-SFP-MR80D D906 | 6 | 190.6 | 1572.89 |
| SO-SFP-MR80D D907 | 7 | 190.7 | 1572.06 |
| SO-SFP-MR80D D908 | 8 | 190.8 | 1571.24 |
| SO-SFP-MR80D D909 | 9 | 190.9 | 1570.42 |
| SO-SFP-MR80D D910 | 10 | 191.0 | 1569.59 |
| SO-SFP-MR80D D911 | 11 | 191.1 | 1568.77 |
| SO-SFP-MR80D D912 | 12 | 191.2 | 1567.95 |
| SO-SFP-MR80D D913 | 13 | 191.3 | 1567.13 |
| SO-SFP-MR80D D914 | 14 | 191.4 | 1566.31 |
| SO-SFP-MR80D D915 | 15 | 191.5 | 1565.50 |
| SO-SFP-MR80D-D916 | 16 | 191.6 | 1564.68 |
| SO-SFP-MR80D-D917 | 17 | 191.7 | 1563.86 |
| SO-SFP-MR80D-D918 | 18 | 191.8 | 1563.05 |
| SO-SFP-MR80D-D919 | 19 | 191.9 | 1562.23 |
| SO-SFP-MR80D-D920 | 20 | 192.0 | 1561.42 |
| SO-SFP-MR80D-D921 | 21 | 192.1 | 1560.61 |
| SO-SFP-MR80D-D922 | 22 | 192.2 | 1559.79 |
| SO-SFP-MR80D-D923 | 23 | 192.3 | 1558.98 |
| SO-SFP-MR80D-D924 | 24 | 192.4 | 1558.17 |
| SO-SFP-MR80D-D925 | 25 | 192.5 | 1557.36 |
| SO-SFP-MR80D-D926 | 26 | 192.6 | 1556.55 |
| SO-SFP-MR80D-D927 | 27 | 192.7 | 1555.75 |
| SO-SFP-MR80D-D928 | 28 | 192.8 | 1554.94 |
| SO-SFP-MR80D-D929 | 29 | 192.9 | 1554.13 |
| SO-SFP-MR80D-D930 | 30 | 193.0 | 1553.33 |
| SO-SFP-MR80D-D931 | 31 | 193.1 | 1552.52 |
| SO-SFP-MR80D-D932 | 32 | 193.2 | 1551.72 |
| SO-SFP-MR80D-D933 | 33 | 193.3 | 1550.92 |
| SO-SFP-MR80D-D934 | 34 | 193.4 | 1550.12 |
| SO-SFP-MR80D-D935 | 35 | 193.5 | 1549.32 |

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| SO-SFP-MR80D-D936 | 36 | 193.6 | 1548.51 |
| SO-SFP-MR80D-D937 | 37 | 193.7 | 1547.72 |
| SO-SFP-MR80D-D938 | 38 | 193.8 | 1546.92 |
| SO-SFP-MR80D-D939 | 39 | 193.9 | 1546.12 |
| SO-SFP-MR80D-D940 | 40 | 194.0 | 1545.32 |
| SO-SFP-MR80D-D941 | 41 | 194.1 | 1544.53 |
| SO-SFP-MR80D-D942 | 42 | 194.2 | 1543.73 |
| SO-SFP-MR80D-D943 | 43 | 194.3 | 1542.94 |
| SO-SFP-MR80D-D944 | 44 | 194.4 | 1542.14 |
| SO-SFP-MR80D-D945 | 45 | 194.5 | 1541.35 |
| SO-SFP-MR80D-D946 | 46 | 194.6 | 1540.56 |
| SO-SFP-MR80D-D947 | 47 | 194.7 | 1539.77 |
| SO-SFP-MR80D-D948 | 48 | 194.8 | 1538.98 |
| SO-SFP-MR80D-D949 | 49 | 194.9 | 1538.19 |
| SO-SFP-MR80D-D950 | 50 | 195.0 | 1537.40 |
| SO-SFP-MR80D-D951 | 51 | 195.1 | 1536.61 |
| SO-SFP-MR80D-D952 | 52 | 195.2 | 1535.82 |
| SO-SFP-MR80D-D953 | 53 | 195.3 | 1535.04 |
| SO-SFP-MR80D-D954 | 54 | 195.4 | 1534.25 |
| SO-SFP-MR80D-D955 | 55 | 195.5 | 1533.47 |
| SO-SFP-MR80D-D956 | 56 | 195.6 | 1532.68 |
| SO-SFP-MR80D-D957 | 57 | 195.7 | 1531.90 |
| SO-SFP-MR80D-D958 | 58 | 195.8 | 1531.12 |
| SO-SFP-MR80D-D959 | 59 | 195.9 | 1530.33 |
| SO-SFP-MR80D-D960 | 60 | 196.0 | 1529.55 |
| SO-SFP-MR80D-D961 | 61 | 196.1 | 1528.77 |