

SFPD-4F-04-xx-A



Features

- Available in all 100 GHz C-Band Wavelengths on the DWDM ITU Grid
- DWDM SFP MSA Compliant
- Cold Start Up Wavelength Compliance
- Low Power Dissipation <1.5W Maximum
- -5°C to 70°C Operating Case Temperature
- Supports 1.06/2.125/4.25Gb/s Fibre Channel Operation
- Compatible with 1.25Gb/s Ethernet
- Pluggable Into Existing Standard SFP Cages
- Diagnostic Performance Monitoring of Transmit Power, Receive Power, Laser Bias, Module Temperature, Laser Temperature, APD Bias Voltage, TEC Current
- APD Based Receiver Sensitivity of -24dBm at 4.25Gb/s
- 40km Reach

General Operation

| Parameter | Symbol | Min. | Typical | Max. | Unit |
|---|----------|-------|---------|-------|-------------------|
| Supply Voltage | V_{cc} | 3.135 | 3.3 | 3.465 | V |
| Total Current (BOL) | I_{cc} | - | - | 375 | mA |
| Power Supply Noise Rejection ^a | PSR | 100 | - | - | mV _{p-p} |
| Operating Case Temperature | T_{op} | -5 | - | 70 | °C |
| Storage Temperature | T_{st} | -40 | - | 85 | °C |
| Data Rate Multirate | MR | - | 4.25 | - | Gb/s |

a) 20Hz to 155MHz

Transmitter Specifications (Optical)

| Parameter | Symbol | Min | Typical | Max | Unit |
|---|------------------|-----|---------|----------|-------|
| Optical Power | P_{op} | 0 | 2 | 4 | dBm |
| Average Launch Power (Tx:Off) | P_{off} | - | - | -30 | dBm |
| Channel Spacing | Δf | - | 100 | - | GHz |
| Deviation From Central Frequency, EOL | | | | ± 12 | GHz |
| Spectral Width (20dB) | $\Delta \lambda$ | - | - | 0.3 | nm |
| Side Mode Suppression Ratio | SMSR | 30 | - | - | dB |
| Dispersion Penalty at specified distance ^c | dp | - | - | 2 | dB |
| Relative Intensity Noise | RIN | - | - | -135 | dB/Hz |
| Reflection Tolerance ^d | rp | -24 | - | - | dB |

b) 20%-80% values

c) Measured at BER of 10^{-12} , PRBS of 2^7-1 , at eye center, 4.25Gb/s, 40km (800ps/nm) fiber.

d) 2dB degradation of receiver sensitivity

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Transmitter Specifications (Electrical)

| Parameter | Symbol | Min | Typical | Max | Unit |
|------------------------------------|--------------|----------|---------|--------------|----------|
| Input Differential Impedence | R_{in} | 80 | 100 | 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 (Optical)

| Parameter | Symbol | Min | Typical | Max | Unit |
|---------------------------------|-----------------|------|---------|------|------|
| Receive Power Low ^e | $R_{sens,low}$ | - | -26 | -24 | dBm |
| Receive Power High | $R_{sens,high}$ | -6 | - | - | dBm |
| Damage Threshold For Receiver | $P_{in,damage}$ | 4 | - | - | dBm |
| Wavelength | λ | 1528 | - | 1564 | nm |
| Maximum Reflectance Of Receiver | RX_r | - | - | -27 | dB |

e) at 10^{-12} BER, PRBS 2⁷-1, 4.25Gb/s

Receiver Specifications (Electrical)

| Parameter | Symbol | Min | Typical | Max | Unit |
|--------------------------|---------------|-----|---------|-----|------|
| Single-Ended Data Output | $V_{out,p-p}$ | 185 | - | 800 | mV |

Timing and Electrical

| Parameter | Symbol | Min | Typical | Max | Unit |
|--|---------------------|----------|---------|---------------|---------|
| 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 | $V_{LOSnormal}$ | 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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λ Wavelength Ordering

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See table below for "XX" values

λc Wavelength Guide

| ITU Channel/Product Code | Frequency (THz) | Wavelength (nm) | ITU Channel/Product Code | Frequency (THz) | Wavelength (nm) |
|--------------------------|-----------------|-----------------|--------------------------|-----------------|-----------------|
| 15 | 191.5 | 1565.495 | 39 | 193.9 | 1546.119 |
| 16 | 191.6 | 1564.678 | 40 | 194.0 | 1545.322 |
| 17 | 191.7 | 1563.863 | 41 | 194.1 | 1544.526 |
| 18 | 191.8 | 1563.047 | 42 | 194.2 | 1543.730 |
| 19 | 191.9 | 1562.233 | 43 | 194.3 | 1542.936 |
| 20 | 192.0 | 1561.419 | 44 | 194.4 | 1542.142 |
| 21 | 192.1 | 1560.606 | 45 | 194.5 | 1541.349 |
| 22 | 192.2 | 1559.794 | 46 | 194.6 | 1540.557 |
| 23 | 192.3 | 1558.983 | 47 | 194.7 | 1539.766 |
| 24 | 192.4 | 1558.173 | 48 | 194.8 | 1538.976 |
| 25 | 192.5 | 1557.363 | 49 | 194.9 | 1538.186 |
| 26 | 192.6 | 1556.555 | 50 | 195.0 | 1537.397 |
| 27 | 192.7 | 1555.747 | 51 | 195.1 | 1536.609 |
| 28 | 192.8 | 1554.940 | 52 | 195.2 | 1535.822 |
| 29 | 192.9 | 1554.134 | 53 | 195.3 | 1535.036 |
| 30 | 193.0 | 1553.329 | 54 | 195.4 | 1534.250 |
| 31 | 193.1 | 1552.524 | 55 | 195.5 | 1533.465 |
| 32 | 193.2 | 1551.721 | 56 | 195.6 | 1532.681 |
| 33 | 193.3 | 1550.918 | 57 | 195.7 | 1531.898 |
| 34 | 193.4 | 1550.116 | 58 | 195.8 | 1531.116 |
| 35 | 193.5 | 1549.315 | 59 | 195.9 | 1530.334 |
| 36 | 193.6 | 1548.515 | 60 | 196.0 | 1529.553 |
| 37 | 193.7 | 1547.715 | 61 | 196.1 | 1528.773 |
| 38 | 193.8 | 1546.917 | | | |

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| Diagnostics | | | |
|------------------------------|----------------------|----------|------|
| Parameter | Range | Accuracy | Unit |
| Temperature | -40 to 102 | ± 3 | ° C |
| Voltage | 0 to V _{CC} | 0.1 | V |
| Bias Current | 0 to 120 | 5 | mA |
| TX Power | 0 to 4 | ±2 | dBm |
| RX Power | -24 to -6 | ±2 | dBm |
| TEC Current | -1200 to 1200 | ±60 | mA |
| TEC Temperature ^f | 20 to 70 | ±0.25 | °C |

f) Relative accuracy. Absolute accuracy is +/-3°C

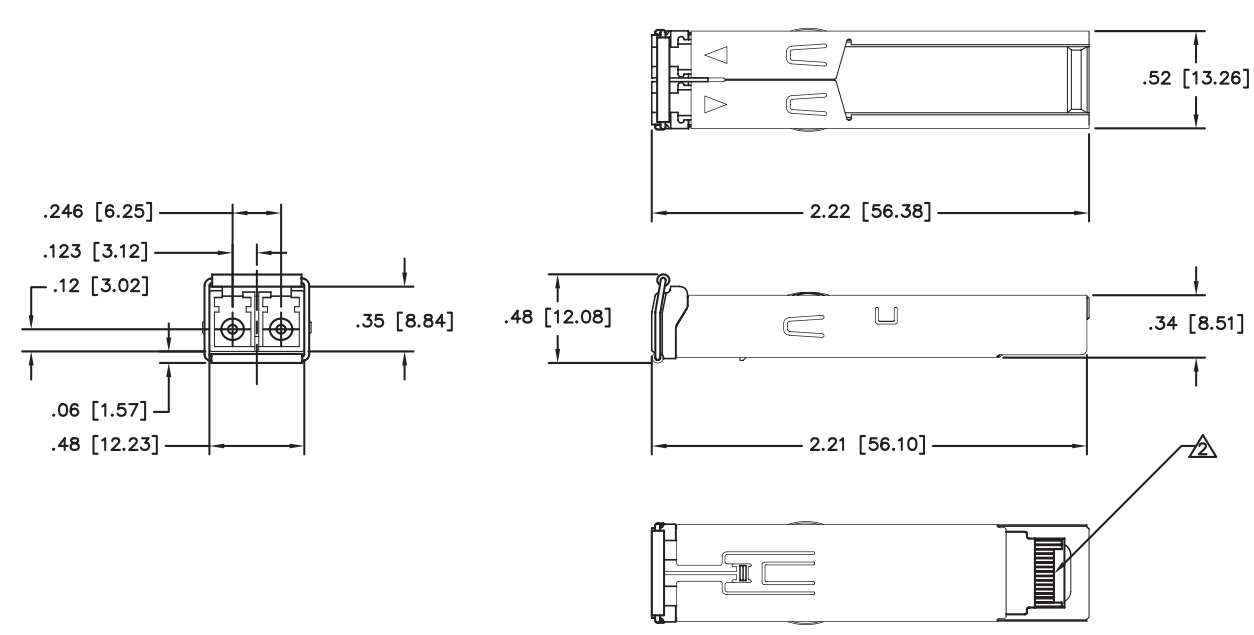
| EEPROM Serial ID | | | | |
|------------------|--|---------|-----|-------|
| Name of Field | Description of Field | Address | Hex | ASCII |
| Vendor Name | SFP Vendor Name(ASCII) | 20 | 4C | L |
| | | 21 | 55 | U |
| | | 22 | 4D | M |
| | | 23 | 49 | I |
| | | 24 | 4E | N |
| | | 25 | 45 | E |
| | | 26 | 4E | N |
| | | 27 | 54 | T |
| | | 28 | 4F | O |
| | | 29 | 49 | I |
| | | 30 | 43 | C |
| Vendor OUI | IEEE Vendor OUI Code For LuminentOIC Inc. | 37 | 00 | |
| | | 38 | 06 | |
| | | 39 | B5 | |
| Vendor P/N | Part Number in ASCII, e.g. SFPD-4F-04-xx-A | 40 | 53 | S |
| | | 41 | 46 | F |
| | | 42 | 50 | P |
| | | 43 | 44 | D |
| | | 44 | 34 | 4 |
| | | 45 | 46 | F |
| | | 46 | 30 | 0 |
| | | 47 | 34 | 4 |
| | | 48 | x | x |
| | | 49 | x | x |
| | | 50 | 41 | A |

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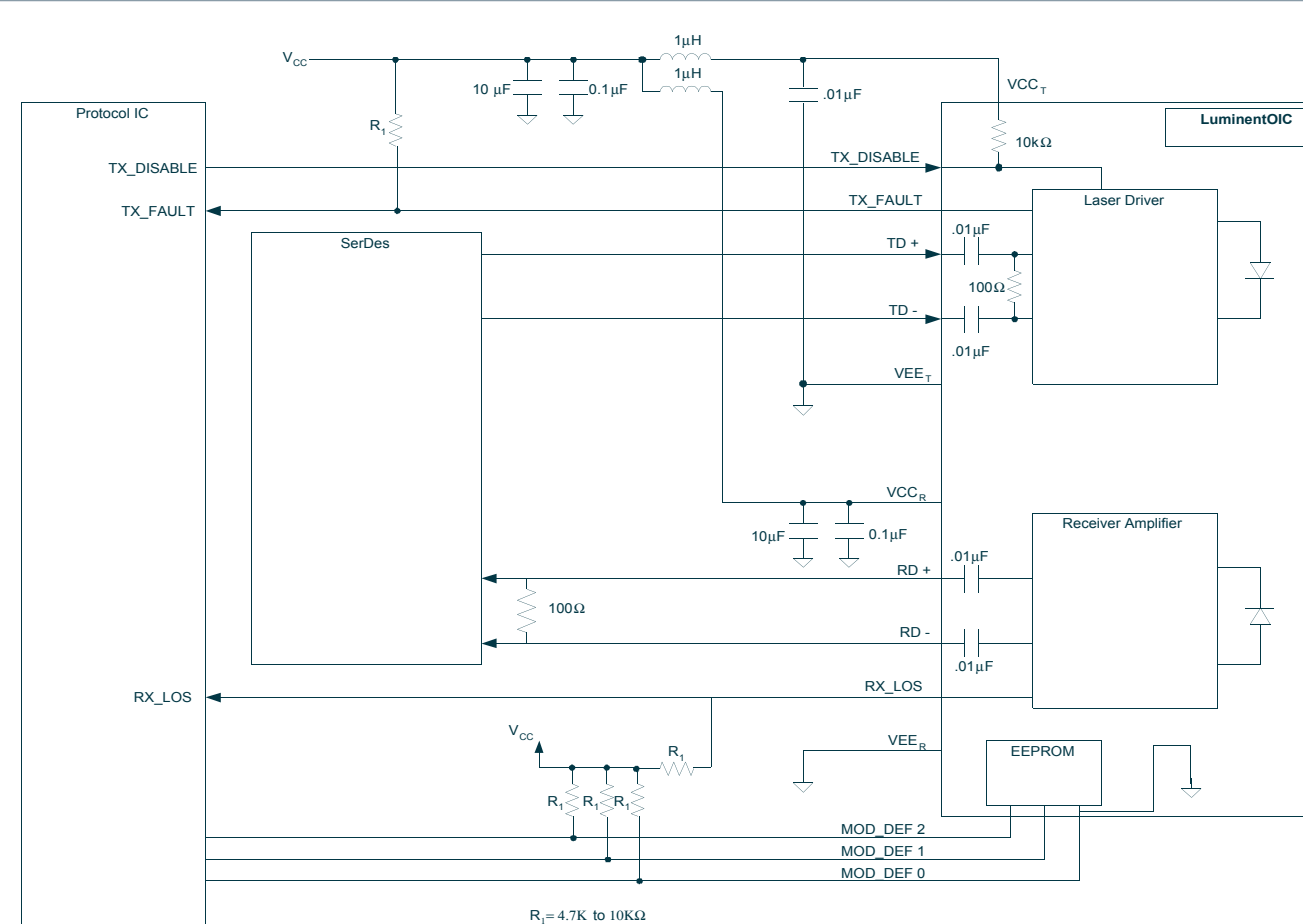
| Pin | Function | Notes |
|-----|------------------|------------------------|
| 1 | V _{eeT} | TX Ground |
| 2 | TX_FAULT/INT | Open Collector |
| 3 | TX_DISABLE | Internally Pulled High |
| 4 | MOD_DEF2 | Serial Data Input |
| 5 | MOD_DEF1 | Serial Clock Input |
| 6 | MOD_DEF0 | Internally Grounded |
| 7 | NC | Not Connected |
| 8 | LOS | Open Collector |
| 9 | V _{eeR} | RX Ground |
| 10 | V _{eeR} | RX Ground |
| 11 | V _{eeR} | RX Ground |
| 12 | RXD- | RX Data Negative |
| 13 | RXD+ | RX Data Positive |
| 14 | V _{eeR} | RX Ground |
| 15 | V _{ccR} | RX Power |
| 16 | V _{ccT} | TX Power |
| 17 | V _{eeT} | TX Ground |
| 18 | TXD+ | TX Data Positive |
| 19 | TXD- | TX Data Negative |
| 20 | V _{eeT} | TX Ground |

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Outline Drawing



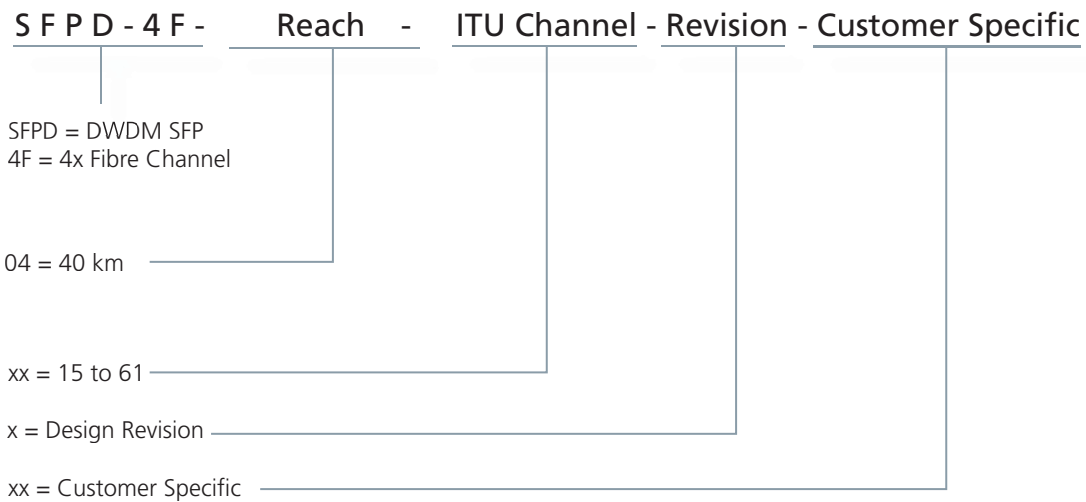
Suggested Transceiver Interface



Ordering Information

Available Options:
SFPD-4F-04-xx-A

Part Numbering Definition:



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.

Legal Notes:

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