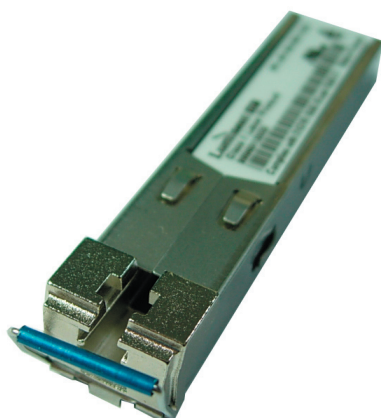


SPL-35-MR-IR1



Features

- Compatible with IEEE 802.3ah, 1000Base-BX10
- Compatible with OC-48/STM-16 Standards
- GR 253/ STM G.957 compliant
- Single 3.3V Supply
- Simplex LC Connector
- Digital Diagnostic SFF-8472 Compliant
- SFP MSA SFF-8074i Compliant
- 13dB Minimum Power Budget
- 15km Minimum Reach
- Commercial temperature available (-Cxx)
- Industrial temperature available (-Txx)
- 1310nm DFB Laser
- Telcordia GR-468 Compliant
- Color code Bail Latch : Bule
- RoHS compliant (lead free soldered)

General Operation

| Parameter | Symbol | Min. | Typ. | Max. | Unit |
|------------------------------|-----------|-------|---------|-------|-------|
| Supply Voltage | V_{cc} | 3.135 | 3.3 | 3.465 | V |
| Total Current | I_{cc} | - | - | 300 | mA |
| Power Supply Noise Rejection | | 100 | - | - | mVp-p |
| Operating Temperature (-Cxx) | T_{opr} | -5 | - | 70 | °C |
| Operating Temperature (-Txx) | T_{opr} | -40 | - | 85 | °C |
| Storage Temperature | T_{stg} | -40 | - | 85 | °C |
| Data Rate OC-48 | DR | - | 2488.32 | - | Mbps |
| Data Rate FEC | DR | - | 2700 | - | Mbps |
| Data Rate Gigabit Ethernet | DR | - | 1250 | - | Mbps |
| Data Rate FC | DR | - | 1062.5 | - | Mbps |
| Data Rate 2xFC | DR | - | 2125 | - | Mbps |

Transmitter Specifications (Optical)

| Parameter | Symbol | Min | Typical | Max | Unit |
|--|-----------------|------------------------------|---------|------|-------|
| Optical Power | P_{op} | -5 | -2.5 | 0 | dBm |
| Optical Crosstalk | XT | - | - | -45 | dB |
| Average Launch Power (Tx:Off) | P_{off} | - | - | -45 | dBm |
| Extinction Ratio | ER | 8.2 | - | - | dB |
| Eye Mask | | SONET/IEEE 802.3ah Compliant | | | |
| Optical Rise Time (20% to 80% values) | t_r | - | - | 160 | ps |
| Optical Fall Time (20% to 80% values) | t_f | - | - | 160 | ps |
| Mean Wavelength | λ | 1280 | 1310 | 1335 | nm |
| Spectral Width (20dB) | $\Delta\lambda$ | - | - | 1 | nm |
| Side Mode Suppression Ratio | SMSR | 30 | - | - | dB |
| Dispersion penalty (15km) ^a | dp | - | 0.5 | 1 | |
| Relative Intensity Noise | RIN | - | - | -120 | dB/Hz |
| Transmitter Reflectance | - | - | - | -12 | dB |
| Reflectance Tolerance | rp | -24 | - | - | dB |

a) Measured at 2.7 Gb/s, BER of 10^{-12} , PRBS of $2^{23}-1$, at eye center

SPL-35-MR-IR1

Transmitter Specifications (Electrical)

| Parameter | Symbol | Min | Typical | Max | Unit |
|------------------------------------|---------------|----------|---------|----------------|----------|
| Input Differential Impedance | 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 |
|----------------------------------|------------------|------|---------|------|------|
| Receiver Power Low ^b | $R_{sens,low}$ | - | -20 | -18 | dBm |
| Receiver Power High ^b | $R_{sens,high}$ | 0 | - | - | dBm |
| Damage Threshold for Receiver | $P_{in, damage}$ | - | - | 0 | dBm |
| Wavelength | λ | 1480 | - | 1600 | nm |
| LOS Assert | - | -28 | - | - | dBm |
| LOS De-Assert | - | - | - | -18 | dBm |
| LOS Hysteresis | - | 0.5 | - | - | dB |
| Receiver Reflectance | - | - | - | -12 | dB |

^b Measured at 10^{-10} BER, 2.7 Gb/s, 2^{23} -1 PRBS, and 10^{-12} BER, 1250 Mb/s, 2^7 -1 PRBS

Receiver Specifications (Electrical)

| Parameter | Symbol | Min | Typical | Max | Unit |
|-------------------------------------|----------------|-----|---------|-----|------|
| PECL Single-Ended Data Output Swing | $V_{out, p-p}$ | 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 | Typical | Max | Unit |
|---|---------------------|----------|---------|----------------|---------|
| Tx Disable Negate Time | t_{on} | - | - | 1 | 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} | - | - | 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) | 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 |

SPL-35-MR-IR1

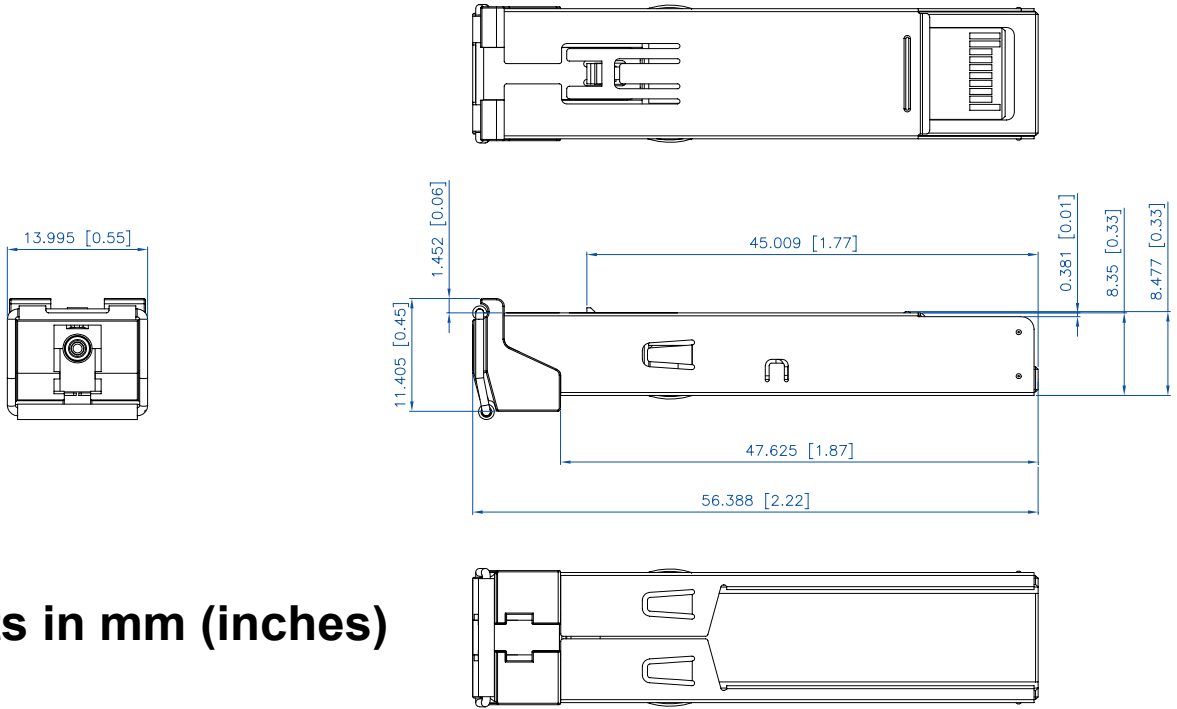
| Diagnostics | | | | | | |
|--------------------|---------------|----------|------|-------------|-------------|---|
| Parameter | Range | Accuracy | Unit | Calibration | Bit value | Formula |
| Temperature (-Cxx) | -5 to 70 | ±3 | °C | Internal | 1/256 C | $T_c(C) = T_{ad}(16 \text{ bit signed twos complement})/256$ |
| Temperature (-Txx) | -40 to 85 | ±3 | °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 μ V | $V(\text{Volts}) = V_{ad}(16 \text{ bit unsigned integer}) * 0.1$ |
| Bias current | 0 to 120 | 5 | mA | External | 0.002mA | $I(\text{mA}) = I_{slope} * I_{ad}(16 \text{ bit unsigned integer}) + I_{offset}$ |
| TX Power | -5 to 0 | ±2dB | dBm | External | 0.1 μ W | $TX_PWR(\mu W) = TX_PWR_{slope} * TX_PWR_{ad}(16 \text{ bit unsigned integer}) + TX_PWR_{offset}$ |
| RX Power | -18 to 0 | ±2dB | dBm | External | 0.1 μ W | $RX_PWR(\mu W) = A_0 + A_1 * x + A_2 * x^2 + A_3 * x^3 + A_4 * x^4$ |

| Pinout Definitions | | |
|--------------------|------------|------------------------|
| Pin | Function | Notes |
| 1 | V_{eeT} | TX GND |
| 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_{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 GND |
| 15 | V_{CCR} | RX Power |
| 16 | V_{CCT} | TX Power |
| 17 | V_{eeT} | TX GND |
| 18 | TXD+ | TX Data Positive |
| 19 | TXD- | TX Data Negative |
| 20 | V_{eeT} | TX GND |

SPL-35-MR-IR1

| 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 PN | Part number in ASCII, e.g. SPL-35-MR-IR1-CDA | 40 | 53 | S |
| | | 41 | 50 | P |
| | | 42 | 4C | L |
| | | 43 | 33 | 3 |
| | | 44 | 35 | 5 |
| | | 45 | 4D | M |
| | | 46 | 52 | R |
| | | 47 | 49 | I |
| | | 48 | 52 | R |
| | | 49 | 31 | 1 |
| | | 50 | 43 | C |
| | | 51 | 44 | D |
| 52 | 41 | A | | |

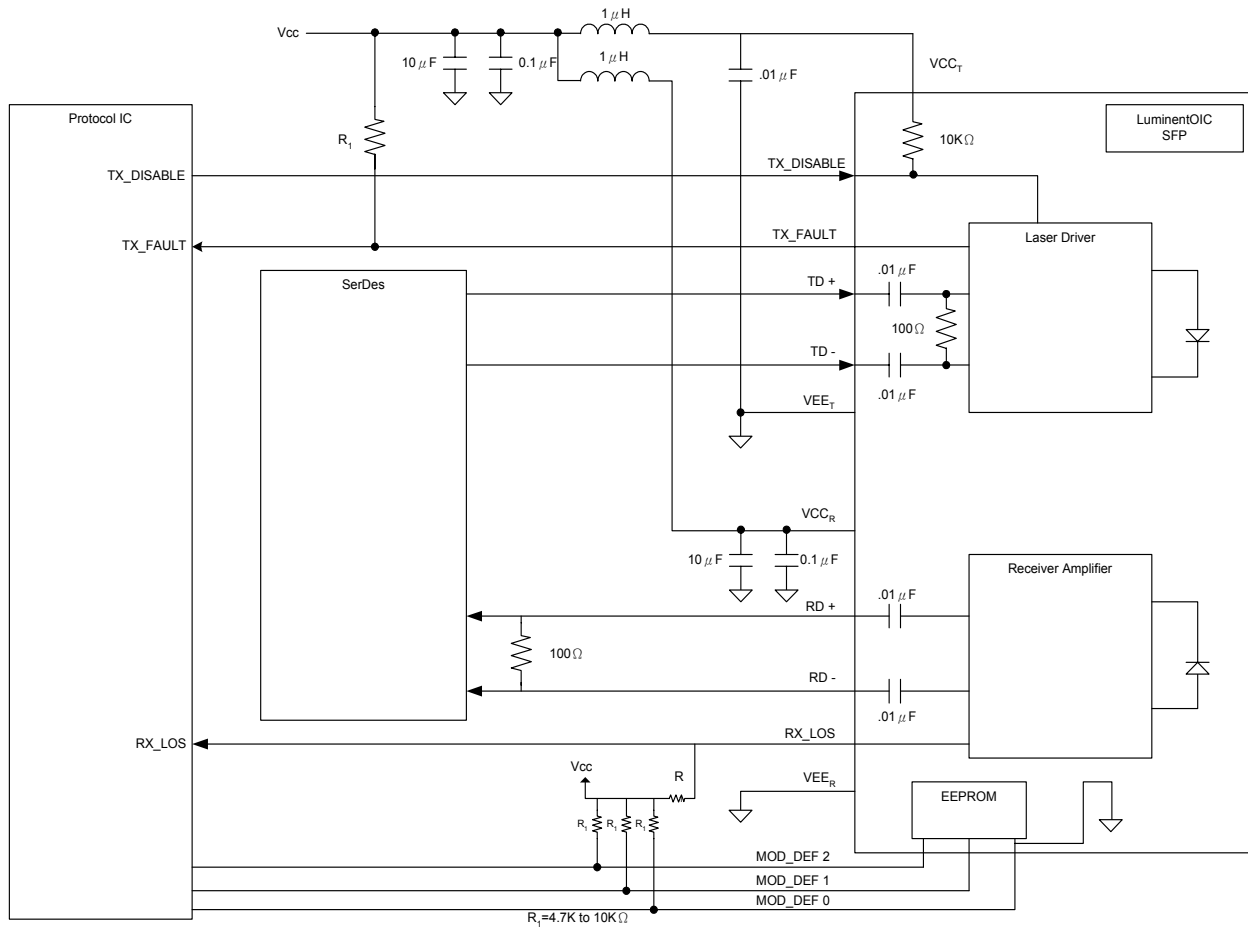
Mechanicals



Units in mm (inches)

SPL-35-MR-IR1

Suggested Transceiver Interface



Ordering Information

Available Options:
 SPL-35-MR-IR1-CDA
 SPL-35-MR-IR1-CNA
 SPL-35-MR-IR1-TDA
 SPL-35-MR-IR1-TNA

Part numbering Definition:

SPL - 35 - MR - IR1 - Temperature Diagnostic Revision

- SPL = LC connector
- 35 = Tx 1310nm/Rx 1550nm
- MR = Multi Rate
- IR1 = Reach 15 km
- Operating Temperature
 - C = Commercial temperature (-5 to 70°C)
 - T = Industrial temperature (-40 to 85°C)
- D = Digital Diagnostic (SFF-8472)
 - N = No Diagnostic
- Design Revision
 - A = RoHS compliant (lead free soldered)

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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