

SP-FE-LX



Features

- Compliant with OC3/STM-1, IEEE 802.3ah, 100BASE-LX10
- Single 3.3 V Supply
- 10 dB Minimum Link Budget
- 15 km Minimum Reach
- 1310nm FP Laser
- Commercial Temperature Available (-Cxx)
- Industrial Temperature Available (-Txx)
- SFP MSA SFF-8074i Compliant
- Telcordia GR-468 Compliant
- Digital Diagnostic SFF-8472 Compliant
- Color coded bail latch tube: Grey
- RoHS-5/6 compliant product (lead exemption) (-xxA)
- RoHS-6/6 compliant product (lead free soldering) (-xxC)

General operating

| Parameter | Symbol | Min. | Typical | Max. | Unit |
|-------------------------------------------|----------|-------|---------|-------|-------------------|
| Supply Voltage | V_{CC} | 3.135 | 3.3 | 3.465 | V |
| Total Current | I_{CC} | - | - | 300 | mA |
| Power Supply Noise Rejection ^a | PSR | 100 | - | - | mV _{p-p} |
| Operating Temperature (-Cxx) | T_{op} | -5 | - | 70 | °C |
| Operating Temperature (-Txx) | T_{op} | -40 | - | 85 | °C |
| Storage Temperature | T_{st} | -40 | - | 85 | °C |
| Data Rate | DR | 10 | 125 | 155 | Mbps |

a) 20 Hz to 155 MHz

Transmitter Specifications

| Parameter | Symbol | Min | Typical | Max | Unit |
|--------------------------------|--------------------------------------|------|---------|------|------|
| Optical Power | P_{OP} | -15 | -11 | -8 | dBm |
| Average Launch Power Of Off Tx | P_{Off} | - | - | -45 | dBm |
| Extinction Ratio | ER | 6.6 | - | - | dB |
| Eye Mask | IEEE 802.3ah and SONET/SDH Compliant | | | | |
| Optical Rise Time ^b | t_r | - | - | 2 | ns |
| Optical Fall Time ^b | t_f | - | - | 2 | ns |
| Mean Wavelength | λ | 1260 | 1310 | 1360 | nm |
| Spectral Width (RMS) | $\Delta\lambda$ | - | - | 7.7 | nm |
| Optical Return Loss Tolerance | ORLT | - | - | 12 | dB |

b) 20%-80% values

SP-FE-LX

Transmitter Specifications (Electical)

| 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

| Parameter | Symbol | Min | Typical | Max | Unit |
|--------------------------------|-----------------|------|---------|------|------|
| Receive Power Low ^c | $R_{sens,low}$ | - | -34 | -25 | dBm |
| Receive Power High | $R_{sens,high}$ | -8 | - | - | dBm |
| Damage Threshold For Receiver | $P_{in,damage}$ | 0 | - | - | dBm |
| Wavelength ^d | λ | 1260 | 1310 | 1360 | nm |
| Los Assert | | -44 | - | - | dBm |
| Los De-assert | | - | - | -25 | dBm |
| Los Hysteresis | | 0.5 | - | - | dB |

c) 27-1 PRBS, BER 10^{-12}

d) Operational over 1200 to 1625 nm range

Electrical Output

| 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 | - | - | 2 | ns |
| Data Output Fall Time | t_f | - | - | 2 | ns |

Timing and Electrical

| Parameter | Symbol | Min | Typical | Max | Unit |
|-------------------------------------------------|---------------------|----------|---------|--------------|---------|
| 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) | | 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} | - | $V_{ee}+0.5$ | 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 |

SP-FE-LX

Digital Diagnostics

| Parameter | Range | Accuracy | Unit | Calibration | Bit Value | Formula |
|--------------------|-----------|----------|------|-------------|-----------|-------------------------------------------------------------------------------------------------------|
| Temperature (-CDx) | -5 to 70 | ±3 | °C | Internal | 1/256 C | $T_c(C) = T_{ad}(16 \text{ bit signed twos complement})/256$ |
| Temperature (-TDx) | -40 to 85 | ±3 | °C | Internal | 1/256 C | $T_c(C) = T_{ad}(16 \text{ bit signed twos complement})/256$ |
| Voltage | 0 to Vcc | 0.1 | V | Internal | 100µV | $V(\text{Volts}) = V_{ad}(16 \text{ bit unsigned integer}) * 0.1$ |
| Bias Current | 0 to 120 | 5 | mA | External | - | $I(\text{mA}) = I_{slope} * I_{ad}(16 \text{ bit unsigned integer}) + I_{offset}$ |
| Tx Power | -15 to -8 | ±3 | dBm | External | - | $Tx_PWR(\mu W) = Tx_PWR_{slope} * Tx_PWR_{ad}(16 \text{ bit unsigned integer}) + Tx_PWR_{offset}$ |
| Rx Power | -25 to -8 | ±3 | dBm | External | - | $Rx_PWR(\mu W) = A0 + A1 * x + A2 * x^2 + A3 * x^3 + A4 * x^4$ |

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. SP-FE-LX-CDA | 40 | 53 | S |
| | | 41 | 50 | P |
| | | 42 | 46 | F |
| | | 43 | 45 | E |
| | | 44 | 4C | L |
| | | 45 | 58 | X |
| | | 46 | 43 | C |
| | | 47 | 44 | D |
| 48 | 41 | A | | |

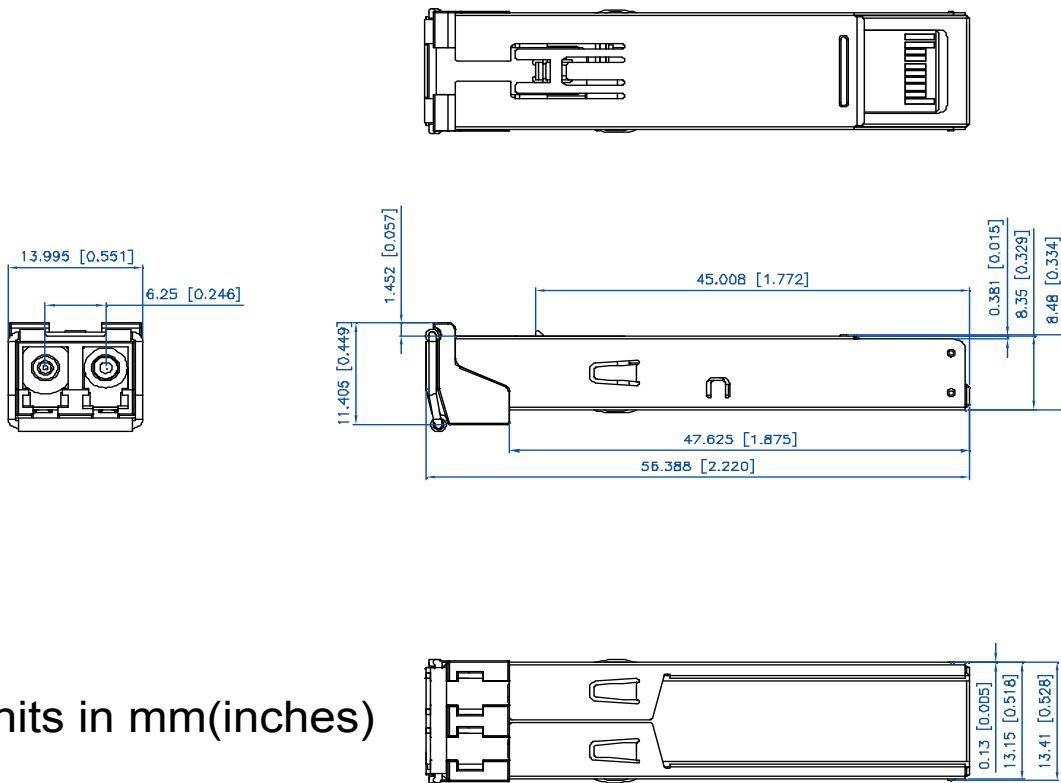
SP-FE-LX

Pinout Definitions

| Pin | Function | Notes |
|-----|-------------------|------------------------|
| 1 | V _{ee} T | 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 _{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 GND |
| 15 | V _{cc} R | RX Power |
| 16 | V _{cc} T | TX Power |
| 17 | V _{ee} T | TX GND |
| 18 | TXD+ | TX Data Positive |
| 19 | TXD- | TX Data Negative |
| 20 | V _{ee} T | TX GND |

SP-FE-LX

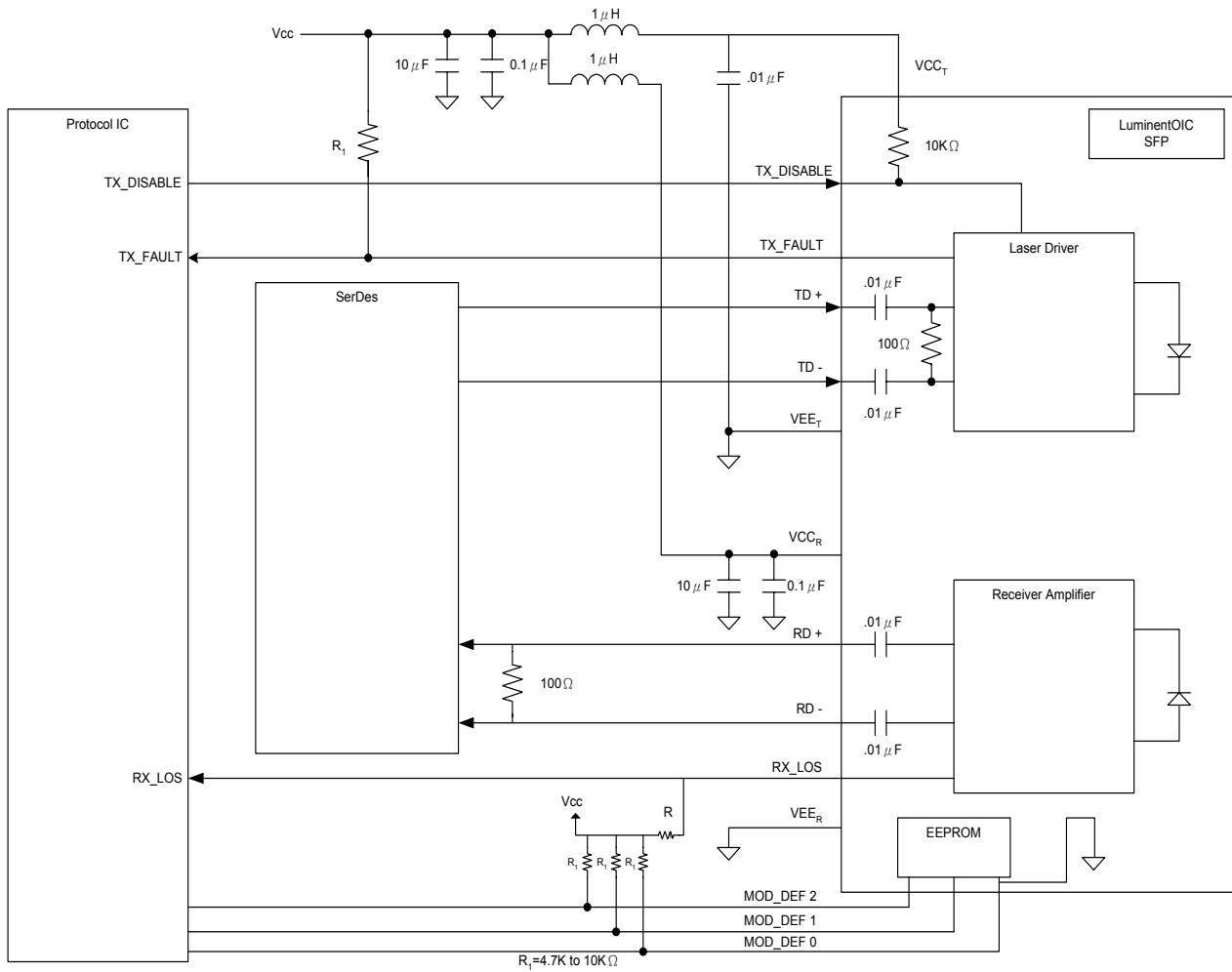
Outline drawing



Units in mm(inches)

SP-FE-LX

Suggested Transceiver Interface



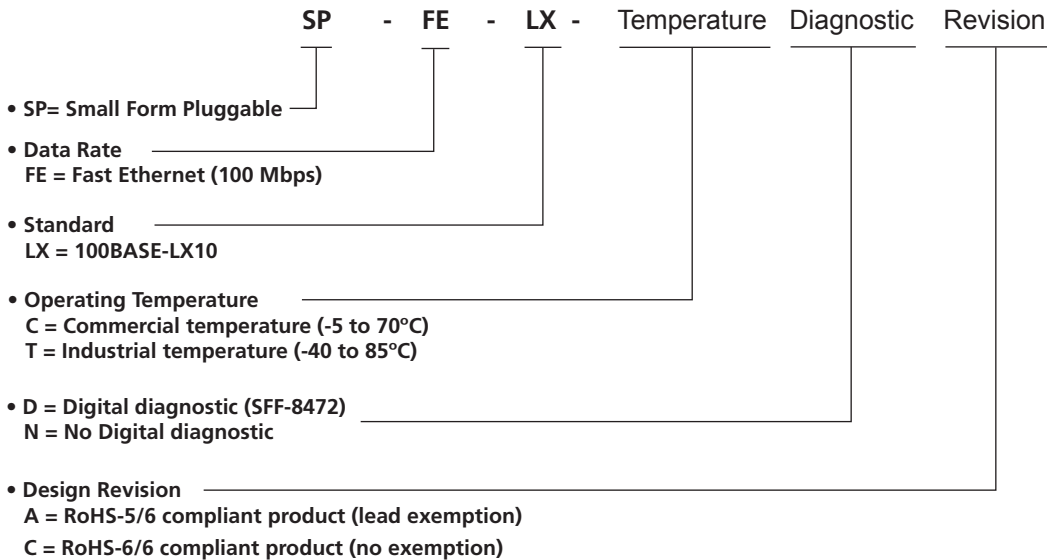
SP-FE-LX

Ordering Information

Available Options:

| | |
|--------------|--------------|
| SP-FE-LX-CDA | SP-FE-LX-CDC |
| SP-FE-LX-CNA | SP-FE-LX-CNC |
| SP-FE-LX-TDA | SP-FE-LX-TDC |
| SP-FE-LX-TNA | SP-FE-LX-TNC |

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:

IMPORTANT NOTICE!

All information contained in this document is subject to change without notice, at LuminentOIC's sole and absolute discretion. LuminentOIC warrants performance of its products to current specifications only in accordance with the company's standard one-year warranty; however, specifications designated as "preliminary" are given to describe components only, and LuminentOIC expressly disclaims any and all warranties for said products, including express, implied, and statutory warranties, warranties of merchantability, fitness for a particular purpose, and non-infringement of proprietary rights. Please refer to the company's Terms and Conditions of Sale for further warranty information.

LuminentOIC assumes no liability for applications assistance, customer product design, software performance, or infringement of patents, services, or intellectual property described herein. No license, either express or implied, is granted under any patent right, copyright, or intellectual property right, and LuminentOIC makes no representations or warranties that the product(s) described herein are free from patent, copyright, or intellectual property rights. Products described in this document are NOT intended for use in implantation or other life support applications where malfunction may result in injury or death to persons. LuminentOIC customers using or selling products for use in such applications do so at their own risk and agree to fully defend and indemnify LuminentOIC for any damages resulting from such use or sale.

THE INFORMATION CONTAINED IN THIS DOCUMENT IS PROVIDED ON AN "AS IS" BASIS. Customer agrees that LuminentOIC is not liable for any actual, consequential, exemplary, or other damages arising directly or indirectly from any use of the information contained in this document. Customer must contact LuminentOIC to obtain the latest version of this publication to verify, before placing any order, that the information contained herein is current.

© LuminentOIC, Inc. 2003
All rights reserved