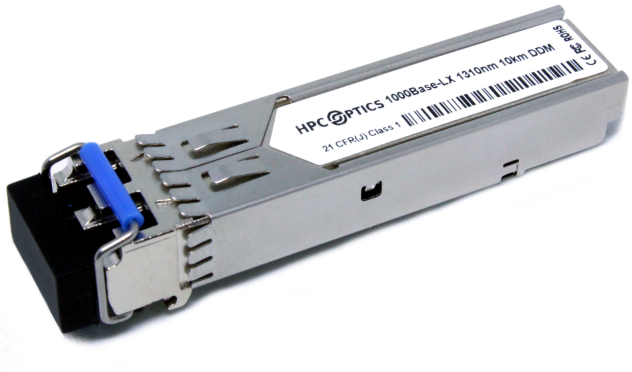
PRODUCT FEATURES

- 100% Fortinet Compatible FG-TRAN-LX
- Up to 1.25 Gb/s data links
- Hot-pluggable SFP form factor
- 1000BASE-LX Gigabit Ethernet
- 1x Fibre Channel
- 1310nm FP laser transmitter
- RoHS compliant and Lead Free
- Up to 10km on 9/125um SMF
- Metal enclosure for lower EMI
- Duplex LC Connector
- Single +3.3V power supply
- Low power dissipation <800mW
- Commercial Temperature Range
- SFP MSA SFF-8074i Compliant



GENERAL

FG-TRAN-LX-HPC 1000BASE-LX Small Form Factor Pluggable (SFP) transceivers are compatible with the Small Form Factor Pluggable Multi-Sourcing Agreement (MSA). The Fortinet compatible 1000BASE-LX SFP transceivers are high performance, cost effective modules supporting dual data-rate of 1.25Gbps/1.063Gbps and 10km transmission distance over Singlemode Fiber.

REGULATORY COMPLIANCE

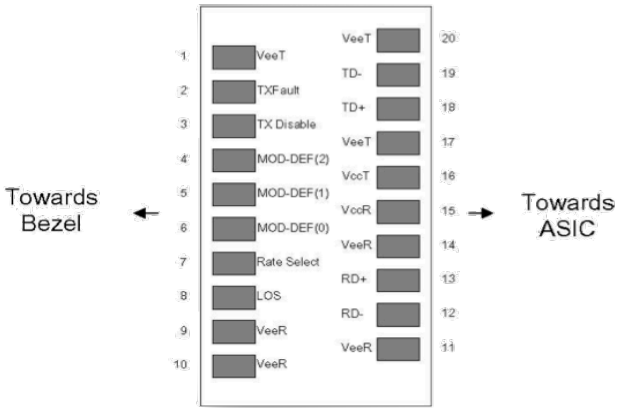
- ESD to the Electrical PINs: compatible with MIL-STD-883 Method 3015
- ESD to the Duplex LC Receptacle: compatible with IEC 61000-4-2
- Immunity compatible with IEC 61000-4-3
- EMI compatible with FCC Part 15 Class B EN10k22 Class B (CISPR 22B)
- Laser Eye Safety compatible with FDA 21CFR 1040.10 and 1040.11 EN60950, EN (IEC) 60825-1,2
- RoHS compliant with 2002/95/EC 4.1&4.2 2005/747/EC

PIN DESCRIPTIONS

Pin	Symbol	Name/Description	Ref.
1	VeeT	Transmitter Ground (Common with Receiver Ground)	1
2	TX Fault	Transmitter Fault	
3	TX Disable	Transmitter Disable. Laser output disabled on high or open	2
4	MOD_DEF(2)	Module Definition 2. Data line for Serial ID	3
5	MOD_DEF(1)	Module Definition 1. Clock line for Serial ID	3
6	MOD_DEF(0)	Module Definition 0. Grounded within the module	3
7	Rate Select	No connection required	
8	LOS	Loss of Signal indication. Logic 0 indicates normal operation	4
9	VeeR	Receiver Ground (Common with Transmitter Ground)	1
10	VeeR	Receiver Ground (Common with Transmitter Ground)	1
11	VeeR	Receiver Ground (Common with Transmitter Ground)	1
12	RD-	Receiver Inverted DATA out. AC Coupled	
13	RD+	Receiver Non-Inverted DATA out. AC Coupled	
14	VeeR	Receiver Ground (Common with Transmitter Ground)	1
15	VccR	Receiver Power Supply	
16	VccT	Transmitter Power Supply	
17	VeeT	Transceiver Ground (Common with Transmitter Ground)	1
18	TD+	Transceiver Non-Inverted DATA in. AC Coupled	
19	TD-	Transmitter Inverted DATA in. AC Coupled	
20	VeeT	Transmitter Ground (Common with Receiver Ground)	1

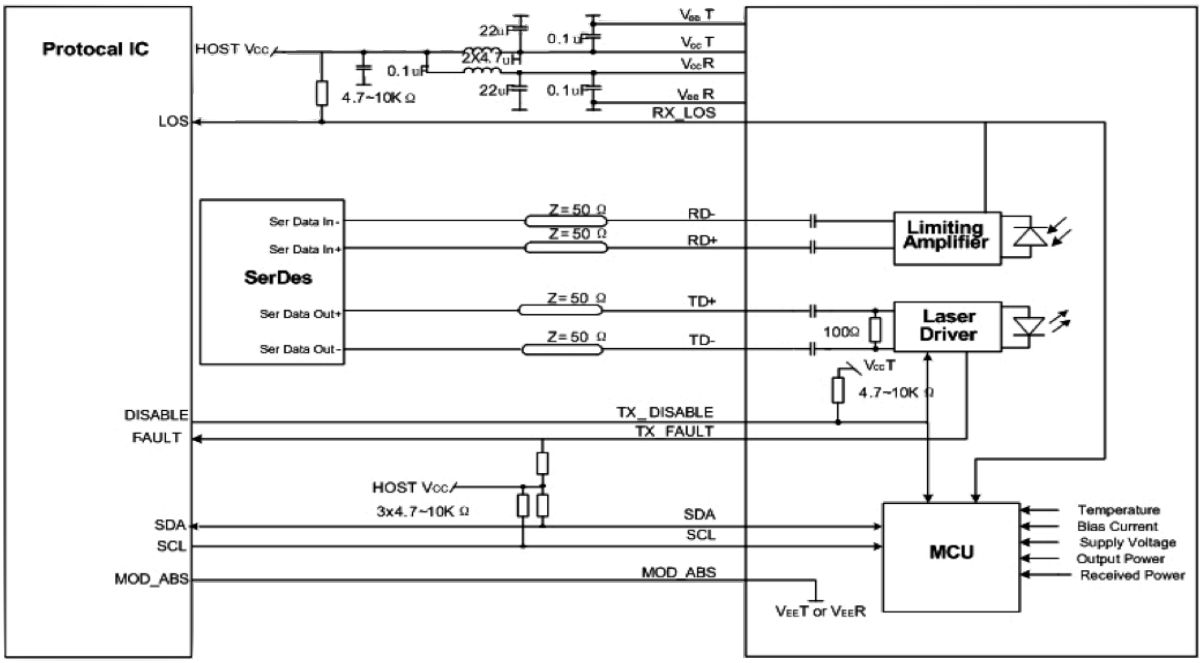
Notes:

1. Circuit ground is internally isolated from chassis ground.
2. Laser output disabled on TX Disable >2.0V or open, enabled on TX Disable<0.8V.
3. Should be pulled up with 4.7k - 10kohms on host board to a voltage between 2.0V and 3.6V. MOD_DEF(0) pulls line low to indicate module is plugged in.
4. LOS is open collector output. Should be pulled up with 4.7k – 10kohms on host board to a voltage between 2.0V and 3.6V. Logic 0 indicates normal operation; logic 1 indicates loss of signal.



Pin-out of Connector Block on Host Board

RECOMMENDED CIRCUIT SCHEMATIC



ABSOLUTE MAXIMUM RATING

Parameter	Symbol	Min	Typ	Max	Unit	Ref.
Maximum Supply Voltage	Vcc	-0.5	-	+4.0	V	
Storage Temperature	TS	-40	-	+85	°C	
Operating Humidity	RH	5	-	95	%	

RECOMMENDED OPERATING CONDITIONS

Parameter	Symbol	Min	Typ	Max	Unit	Ref.
Power Supply Voltage	Vcc	3.13	3.30	3.47	V	
Power Supply Current	Icc	-	-	250	mA	
Case Operating Temperature	Tc	0	-	+70	°C	
Data Rate (Gigabit Ethernet)	-	-	1.25	-	Gbps	
Data Rate (Fibre Channel)	-	-	1.063	-	Gbps	
50/125um SMF	Lmax	-	-	10k	m	

ELECTRICAL CHARACTERISTICS (TOP=25°C, VCC=3.3Volts)

Parameter	Symbol	Min	Typ	Max	Unit	Ref.
Transmitter						
Input differential impedance	Rin	-	100	-	Ω	1
Single ended data input swing	Vin, pp	250	-	1200	mV	
TX Disable-High	-	Vcc - 1.3	-	Vcc	V	
TX Disable-Low	-	Vee	-	Vee + 0.8	V	
TX Fault-High	-	Vcc - 0.5	-	Vcc	V	
TX Fault-Low	-	Vee	-	Vee + 0.5	V	
Receiver						
Single ended data output swing	Vout, pp	300	400	800	mV	2
Data output rise time	tr	-	-	175	ps	3
Data output fall time	tr	-	-	175	ps	3
LOS-High	-	Vcc - 0.5	-	Vcc	V	
LOS-Low	-	Vee	-	Vee + 0.5	V	

Notes:
1. AC Coupled
2. Into 100 ohm differential termination
3. 20% to 80%

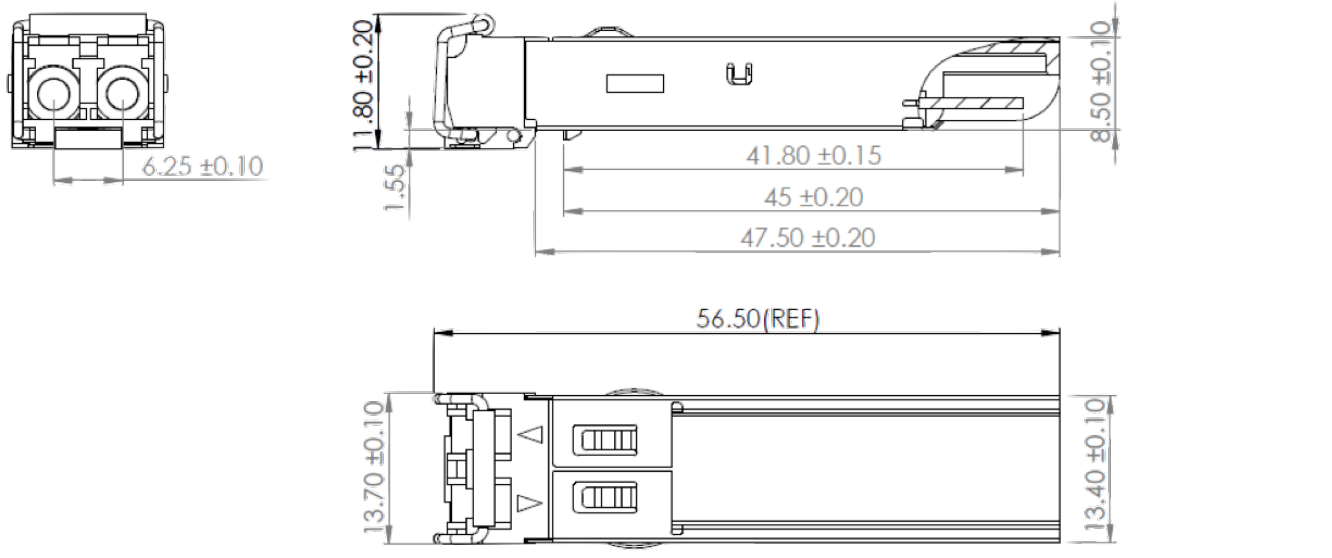
OPTICAL CHARACTERISTICS (TOP=25°C, VCC=3.3Volts)

Parameter	Symbol	Min	Typ	Max	Unit	Ref.
Transmitter						
Output Opt. Power	PO	-9	-	-4	dBm	1
Optical Wavelength	λ	1275	1310	1350	nm	
Spectral Width	σ	-	-	3	nm	
Optical Rise/Fall Time	tr/tf	-	-	260	ps	2
Total Jitter	TJ	-	-	200	ps	
Optical Extinction Ratio	ER	9	-	-	dB	
Receiver						
RX Sensitivity @ 1.25Gb/s	RSENS	-	-	-25	dBm	3
Maximum Received Power	RXMax	-2	-	-	dBm	
Optical Center Wavelength	λC	1270	-	1600	nm	
LOS De-Assert	LOSD	-	-	-26	dBm	
LOS Assert	LOSA	-40	-	-	dBm	
LOS Hysteresis	-	0.5	-	5	dB	

Notes:
1. Class 1 Laser Safety
2. Unfiltered, 20-80%. Complies with GE and 1x FC eye masks when filtered,.
3. Measured with conformance signals defined in FC-PI-2 Rev. 10.0 specifications.

MECHANICAL SPECIFICATIONS

HPC Optics' Small Form Factor Pluggable (SFP) transceivers are compatible with the dimensions defined by the SFP Multi-Sourcing Agreement (MSA).

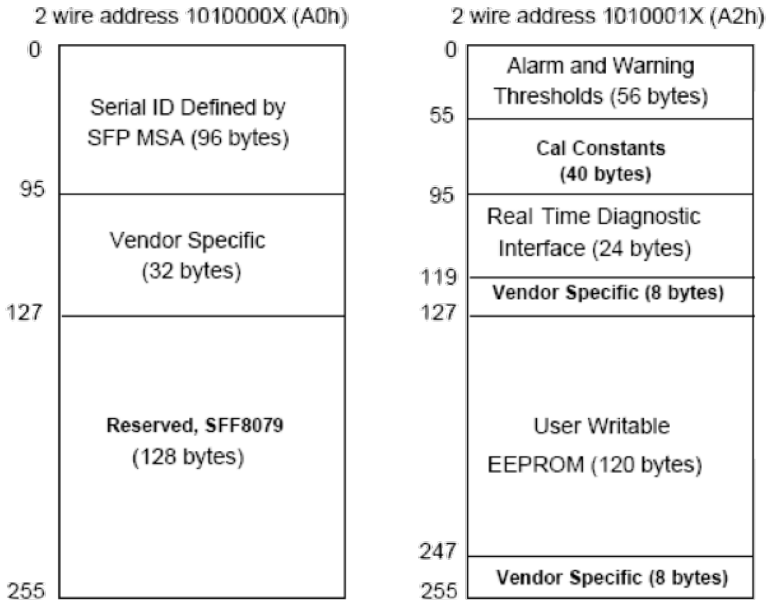


DIMENSIONS IN MILLIMETERS

FG-TRAN-LX-HPC

EEPROM INFORMATION

EEPROM memory map specific data field description is as below:



DIGITAL DIAGNOSTIC MONITORING INTERFACE

Five transceiver parameter values are monitored. The following table defines the monitored parameter's accuracy.

Parameter	Range	Accuracy	Calibration
Temperature	0°C to 70°C	±3°C	Internal
Voltage	2.97 to 3.63V	±3%	Internal
Bias Current	0 to 100mA	±10%	Internal
TX Power	-9 to -3dBm	±3dB	Internal
RX Power	-25 to -2dBm	±3dB	Internal

ORDERING INFORMATION

Part Number	Product Description
FG-TRAN-LX-HPC	Fortinet Compatible 1GB LX SMF 1310nm SFP Transceiver