

### **FG-TRAN-SFP+EX-C**

Fortinet® FG-TRAN-SFP+EX Compatible TAA Compliant 8GBase-LW Fibre Channel SFP+ Transceiver (SMF, 1310nm, 40km, LC)

#### **Features:**

- SFF-8432 and SFF-8472 Compliance
- Duplex LC Connector
- Single-mode Fiber
- Commercial Temperature 0 to 70 Celsius
- Hot Pluggable
- Metal with Lower EMI
- Excellent ESD Protection
- RoHS Compliant and Lead Free



## **Applications:**

- Fibre Channel
- Access and Enterprise

### **Product Description**

This Fortinet® FG-TRAN-SFP+EX compatible SFP+ transceiver provides 8GBase-LW Fibre Channel throughput up to 40km over single-mode fiber (SMF) using a wavelength of 1310nm via an LC connector. It is guaranteed to be 100% compatible with the equivalent Fortinet® transceiver. This easy to install, hot swappable transceiver has been programmed, uniquely serialized and data-traffic and application tested to ensure that it will initialize and perform identically. It is built to meet or exceed the specifications of Fortinet®, as well as to comply with MSA (Multi-Source Agreement) standards to ensure seamless network integration. This transceiver is Trade Agreements Act (TAA) compliant. We stand behind the quality of our products and proudly offer a limited lifetime warranty.

ProLabs's transceivers are RoHS compliant and lead-free.

TAA refers to the Trade Agreements Act (19 U.S.C. & 2501-2581), which is intended to foster fair and open international trade. TAA requires that the U.S. Government may acquire only "U.S. – made or designated country end products."



## **Regulatory Compliance**

- ESD to the Electrical PINs: compatible with MIL-STD-883E Method 3015.4
- ESD to the LC Receptacle: compatible with IEC 61000-4-3
- EMI/EMC compatible with FCC Part 15 Subpart B Rules, EN55022:2010
- Laser Eye Safety compatible with FDA 21CFR, EN60950-1& EN (IEC) 60825-1,2
- RoHS compliant with EU RoHS 2.0 directive 2015/863/EU

# **Absolute Maximum Ratings**

Parameter	Symbol	Min.	Тур.	Max.	Unit
Maximum Supply Voltage	Vcc	-0.5		4.0	V
Storage Temperature	TS	-40		85	°C
Operating Case Temperature	Ti	0	25	70	°C
Data Rate			10.3125		Gbps

# Electrical Characteristics (TOP=25°C, Vcc=3.3Volts)

Parameter		Symbol	Min.	Тур.	Max.	Unit	Notes	
Power Supply Voltage		Vcc	3.135	3.3	3.465	V		
Power Supply Current		Icc			300	mA		
Power Dissipation		PD			1000	mW		
Transmitter								
Input Differe	ntial Impedance	Zin		100		Ω		
Differential Data Input Swing		Vin,p-p	180		700	mVp-p		
TX_FAULT	Transmitter Fault	Vон	2.0		VccHOST	V		
	Normal Operation	VOL	0		0.8	V		
TX_DISABLE	Transmitter Disable	VIH	2.0		VCCHOST	V		
	Transmitter Enable	VIL	0		0.8	V		
Receiver								
Output Differential Impedance		Zo		100		Ω		
Differential Data Output Swing		VOUT, P-P	300		850	mVp-p	1	
Data Output Rise Time, Fall Time		t <sub>r</sub> , t <sub>f</sub>	28			ps	2	
RX_LOS	Loss of signal (LOS)	Vон	2.0		VCCHOST	V	3	
	Normal Operation	VOL	0		0.8	V	3	

## Notes:

- 1. Internally AC coupled, but requires an external  $100\Omega$  differential load termination.
- 2. 20-80%.
- 3. LOS is an open collector output. Should be pulled up with  $4.7k\Omega$  on the host board.

**Optical Characteristics** 

Parameter	Symbol	Min.	Тур.	Max.	Unit	Notes	
Transmitter							
Launch Optical Power	Ро	0		+5	dBm	1	
Center Wavelength Range	λς	1260	1310	1355	nm		
Extinction Ratio	ER	3.5			dB	2	
Optical Modulation Amplitude	OMA	-5.2			dBm		
Spectral Width (-20dB)	Δλ			1	nm		
Side Mode Suppression Ratio	SMSR	30			dB		
Transmitter and Dispersion Penalty	TDP			3.2	dB		
Optical Return Loss Tolerance	ORLT			12	dB		
Pout @TX_Disable Asserted	Poff			-30	dBm	1	
Eye Diagram	IEEE Std 802.	IEEE Std 802.3-2005 10Gb Ethernet 10GBASE-ER compatible					
Receiver							
Center Wavelength	λς	1260	1310	1355	nm		
Receiver Sensitivity (Pavg)	S			-15	dBm	3	
Receiver Overload (Pavg)	POL	0.5			dBm	3	
Stressed Sensitivity (OMA)				-10.3	dBm	4	
Optical Return Loss	ORL	12			dB		
LOS De-Assert	LOS <sub>D</sub>			-16	dBm		
LOS Assert	LOS <sub>A</sub>	-30			dBm		
LOS Hysteresis		0.5		4.5	dB		

# Notes:

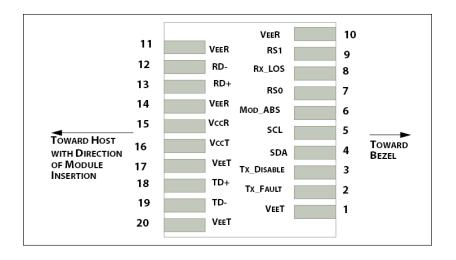
- 1. The optical power is launched into  $9/125\mu m$  SMF.
- 2. Measured with a PRBS 2<sup>31</sup>-1 test pattern @10.3125Gbps
- 3. Measured with PRBS  $2^{31}$ -1 test pattern, 10.3125 Gb/s, BER<10<sup>-12</sup>.
- 4. Comply with IEEE 802.3-2005.

# **Pin Descriptions**

Pin	Symbol	Name/Descriptions	Ref.
1	VeeT	Transmitter Ground	1
2	TX_Fault	Transmitter Fault (LVTTL-O) - High indicates a fault condition	2
3	TX_Disable	Transmitter Disable (LVTTL-I) – High or open disables the transmitter	3
4	SDA	Two wire serial interface Data Line (LVCMOS-I/O) (MOD-DEF2)	4
5	SCL	Two wire serial interface Clock Line (LVCMOS-I/O) (MOD-DEF1)	4
6	MOD_ABS	Module Absent (Output), connected to VeeT or VeeR in the module	5
7	RS0	Rate Select 0 – Not used, Presents high input impedance	
8	RX_LOS	Receiver Loss of Signal (LVTTL-O)	2
9	RS1	Rate Select 1 – Not used, Presents high input impedance	
10	VeeR	Receiver Ground	1
11	VeeR	Receiver Ground	1
12	RD-	Inverse Received Data out (CML-O)	
13	RD+	Received Data out (CML-O)	
14	VeeR	Receiver Ground	
15	VccR	Receiver Power - +3.3V	
16	VccT	Transmitter Power - +3.3 V	
17	VeeT	Transmitter Ground	1
18	TD+	Transmitter Data In (CML-I)	
19	TD-	Inverse Transmitter Data In (CML-I)	
20	VeeT	Transmitter Ground	1

## **Notes:**

- 1. The module signal grounds are isolated from the module case.
- 2. This is an open collector/drain output that on the host board requires a 4.7K $\Omega$  to 10K $\Omega$  pull-up resistor to VccHost.
- 3. This input is internally biased high with a 4.7K $\Omega$  to 10K $\Omega$  pull-up resistor to VccT.
- 4. Two-Wire Serial interface clock and data lines require an external pull-up resistor dependent on the capacitance load.
- 5. This is a ground return that on the host board requires a 4.7K $\Omega$  to 10K $\Omega$  pull-up resistor to VccHost.



# **Recommended Host Board Power Supply Filter Network**

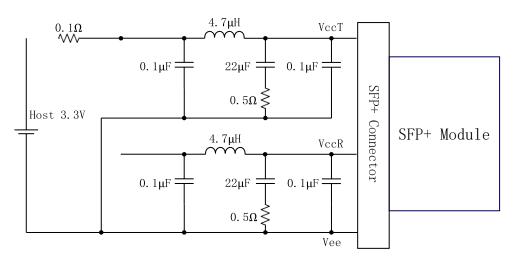
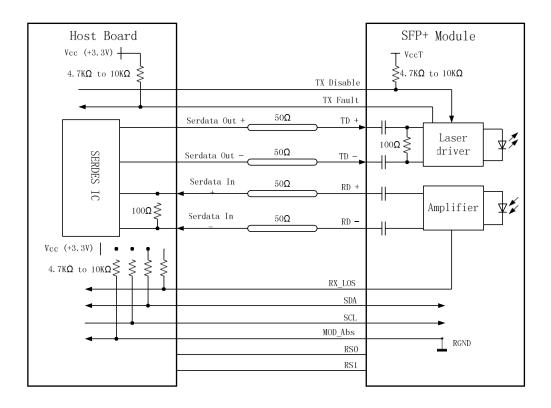


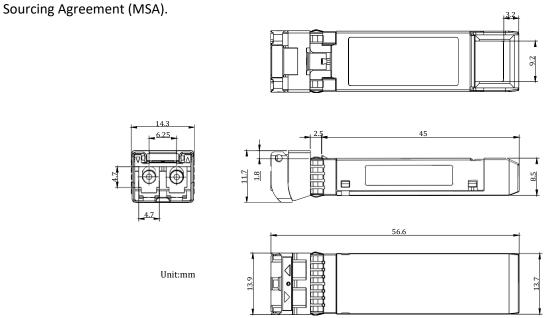
Figure 2. Recommended Host Board Power Supply Filter Network

# **Recommended Application Interface Block Diagram**



# **Mechanical Specifications**

Small Form Factor Pluggable (SFP) transceivers are compatible with the dimensions defined by the SFP Multi-



#### **About ProLabs**

Our experience comes as standard; for over 15 years ProLabs has delivered optical connectivity solutions that give our customers freedom and choice through our ability to provide seamless interoperability. At the heart of our company is the ability to provide state-of-the-art optical transport and connectivity solutions that are compatible with over 90 optical switching and transport platforms.

## **Complete Portfolio of Network Solutions**

ProLabs is focused on innovations in optical transport and connectivity. The combination of our knowledge of optics and networking equipment enables ProLabs to be your single source for optical transport and connectivity solutions from 100Mb to 400G while providing innovative solutions that increase network efficiency. We provide the optical connectivity expertise that is compatible with and enhances your switching and transport equipment.

### **Trusted Partner**

Customer service is our number one value. ProLabs has invested in people, labs and manufacturing capacity to ensure that you get immediate answers to your questions and compatible product when needed. With Engineering and Manufacturing offices in the U.K. and U.S. augmented by field offices throughout the U.S., U.K. and Asia, ProLabs is able to be our customers best advocate 24 hours a day.

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