

#### PAN-SFP-PLUS-ER-CW59-C

Palo Alto Networks® PAN-SFP-PLUS-ER-CW59 Compatible TAA Compliant 10GBase-CWDM SFP+ Transceiver (SMF, 1590nm, 40km, LC, DOM)

#### **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:**

- 10x Gigabit Ethernet over CWDM
- 8x/10x Fibre Channel
- Access, Metro and Enterprise
- Mobile Fronthaul CPRI/OBSAI

#### **Product Description**

This Palo Alto Networks® PAN-SFP-PLUS-ER-CW59 compatible SFP+ transceiver provides 10GBase-CWDM throughput up to 40km over single-mode fiber (SMF) using a wavelength of 1590nm via an LC connector. It is guaranteed to be 100% compatible with the equivalent Palo Alto Networks® 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. Digital optical monitoring (DOM) support is also present to allow access to real-time operating parameters. 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

## **CWDM Available Wavelengths**

Wavelengths	Min.	Тур.	Max.
47	1464.5	1471	1477.5
49	1484.5	1491	1497.5
51	1504.5	1511	1517.5
53	1524.5	1531	1537.5
55	1544.5	1551	1557.5
57	1564.5	1571	1577.5
59	1584.5	1591	1597.5
61	1604.5	1611	1617.5

## **Absolute Maximum Ratings**

Parameter	Symbol	Min.	Тур.	Max.	Unit	Notes
Maximum Supply Voltage	Vcc	-0.5		4.0	V	1
Storage Temperature	TS	-40		85	°C	2
Operating Case Temperature	Тс	0		70	°C	
Data Rate	DR	1.2		11.3	Gb/s	3
Bit Error Rate	BER			10 <sup>-12</sup>		

## Notes:

- 1. For electrical power interface
- 2. Ambient temperature
- 3. IEEE 802.3ae

# Electrical Characteristics (V $_{CC} = 3.14 V \ to \ 3.46 V, \ T_C)$

Parameter	Symbol	Min.	Тур.	Max.	Unit	Notes	
Power Supply Voltage	Vcc	3.14	3.3	3.46	V		
Power Supply Current	Icc		400	450	mA		
Transmitter							
Input differential impedance	RIN		100		Ω		
Differential data input swing	VIN PP	120		850	mV		
Transmit Disable Voltage	V <sub>D</sub>	2		VCC	V		
Transmit Enable Voltage	VEN	VEE		V <sub>EE</sub> +0.8	V		
Receiver							
Differential data output swing	VOUT PP	300		850	mV		
Data output rise time/fall time (20%-80%)	t <sub>r</sub> /t <sub>f</sub>	28			ps		
LOS Fault	VLOS A	2		VCC HOST	V		
LOS Normal	VLOS D	VEE		V <sub>EE</sub> +0.5	V		

**Optical Characteristics** 

Parameter	Symbol	Min.	Тур.	Max.	Unit	Notes	
Transmitter							
Output Optical Power	PTX	-1		4	dBm	1	
Optical Center Wavelength	λ <sub>C</sub>	λ-6	λ	λ+6	nm		
Optical Modulation Amplitude	OMA	-5.2				2	
Extinction Ratio	ER	8.2			dB		
Spectral Width (-20dB)	Δλ			0.6	nm		
Side Mode Suppression Ratio	SMSR	30			dB		
Relative Intensity Noise	RIN			-128	dB/Hz		
Transmitter Dispersion Penalty	TDP			2	dB		
Launch Power of OFF Transmitter	POUT_OFF			-30	dBm	1	
Transmitter Jitter	According to IEEE 802.3ae requirement						
Receiver							
Optical Center Wavelength	λ <sub>C</sub>	1260		1620	nm		
Average Receive Power	P <sub>RX</sub>	-16		-1	dBm		
Receiver Sensitivity @10.3Gb/s	RX_SEN			-16	dBm	3	
Receiver Reflectance	TR <sub>RX</sub>			-27	dB		
LOS Assert	LOS <sub>A</sub>	-25			dBm		

LOS De-Assert	LOS <sub>D</sub>		-18	dBm	
LOS Hysteresis	LOS <sub>H</sub>	0.5		dB	

#### Notes:

- 1. Average
- 2. Per IEEE 802.3ae
- 3. Measured with worst ER: BER<10<sup>-12</sup>; 2<sup>31</sup>-1 PRBS

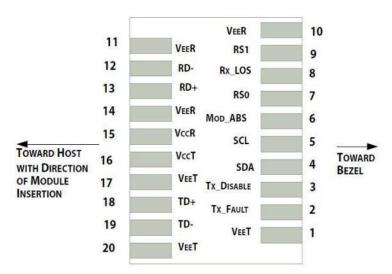
**Pin Descriptions** 

Pin	Symbol	Name/Descriptions	Ref.
1	VeeT	Transmitter Ground (Common with Receiver Ground).	1
2	TX Fault	Transmitter Fault. LVTTL-O	2
3	TX Disable	Transmitter Disable. Laser output disabled on high or open. LVTT-I.	3
4	SDA	2-Wire Serial Interface Data Line (Same as MOD-DEF2 in INF-8074i). LVTTL-I/O.	
5	SCL	2-Wire Serial Interface Data Line (Same as MOD-DEF2 in INF-8074i). LVTTL-I.	
6	MOD_ABS	Module Absent, Connect to VeeT or VeeR in Module.	4
7	RS0	Rate Select 0. Not used	5
8	LOS	Loss of Signal indication. Logic 0 indicates normal operation. LVTTL-O.	2
9	RS1	Rate Select 1. Not used	5
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. CML-O.	
13	RD+	Receiver Non-inverted DATA out. AC Coupled. CML-O.	
14	VeeR	Receiver Ground (Common with Transmitter Ground).	1
15	VccR	Receiver Power Supply.	
16	VccT	Transmitter Power Supply.	
17	VeeT	Transmitter Ground (Common with Receiver Ground).	1
18	TD+	Transmitter Non-Inverted DATA in. AC Coupled. CML-I.	
19	TD-	Transmitter Inverted DATA in. AC Coupled. CML-O.	
20	VeeT	Transmitter Ground (Common with Receiver Ground).	1

## **Notes:**

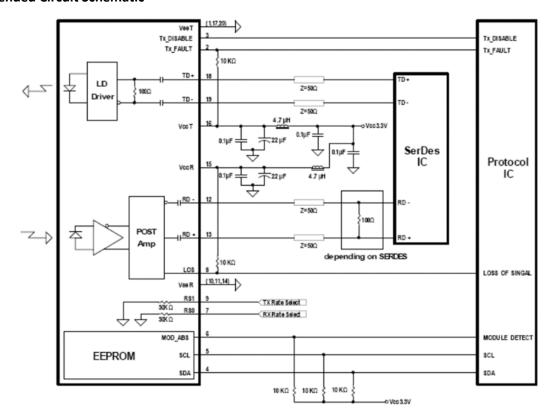
- 1. The module signal ground contacts, VeeR and VeeT, should be isolated from the module case.
- 2. This contact is an open collector/drain output and should be pulled up to the Vcc\_Host with resister in the range  $4.7K\Omega$  to  $10K\Omega$ . Pull ups can be connected to one or several power supplies, however the host board design shall ensure that no module contract has voltage exceeding module VccT/R +0.5.V.
- 3. Tx\_Disable is an input contact with a  $4.7K\Omega$  to  $10K\Omega$  pull-up resistor to VccT inside module.

- 4. Mod\_ABS is connected to VeeT or VeeR in the SFP+ module. The host may pull the contract up to Vcc\_Host with a resistor in the range from  $4.7K\Omega$  to  $10K\Omega$ . Mod\_ABS is asserted "High" when the SFP+ module is physically absent from a host slot.
- 5. Internally pulled down per SFF-8431



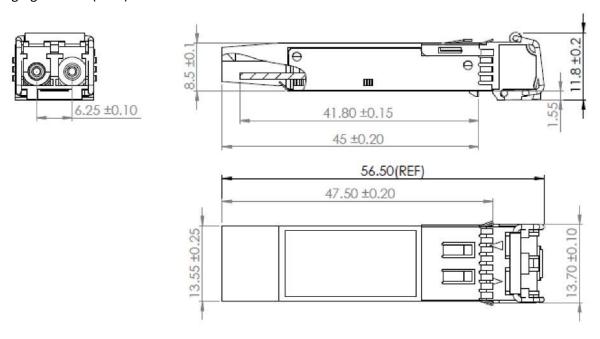
Pin-out of connector Block on Host board

## **Recommended Circuit Schematic**



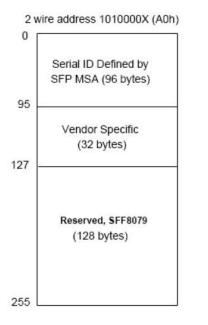
## **Mechanical Specifications**

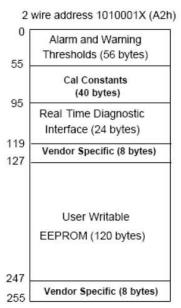
Small Form Factor Pluggable (SFP) transceivers are compatible with the dimensions defined by the SFP Multi-Sourcing Agreement (MSA).



## **EEPROM Information**

EEPROM memory map specific data field description is as below:





#### **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.

#### **Contact Information**

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