

### 10G-SFPP-LR-CW27-C

Brocade® 10G-SFPP-LR-CW27 Compatible TAA 10GBase-CWDM SFP+ Transceiver (SMF, 1270nm, 10km, LC, DOM)

#### Features:

- SFF-8432 and SFF-8472 Compliance
- Duplex LC Connector
- Temperature-stabilized EML transmitter and PIN receiver
- 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 Brocade® 10G-SFPP-LR-CW27 compatible SFP+ transceiver provides 10GBase-CWDM throughput up to 10km over single-mode fiber (SMF) using a wavelength of 1270nm via an LC connector. It is guaranteed to be 100% compatible with the equivalent Brocade® 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

Band	Nomenclature	Wavelength		
		Min.	Typ.	Max
O-band Original	A	1264	1270	1277.5
	B	1284	1290	1297.5
	C	1304	1310	1317.5
	D	1324	1330	1337.5
	E	1344	1350	1357.5
E-band Extended	F	1364	1370	1377.5
	G	1384	1390	1397.5
	H	1404	1410	1417.5
	I	1424	1430	1437.5
	J	1444	1450	1457.5
S-band Short Wavelength	K	1464	1470	1477.5
	L	1484	1490	1497.5
	M	1504	1510	1517.5
	N	1524	1530	1537.5
C-band Conventional	O	1544	1550	1557.5
L-band Long Wavelength	P	1564	1570	1577.5
	Q	1584	1590	1597.5
	R	1604	1610	1617.5

## Absolute Maximum Ratings

Parameter	Symbol		Min.	Typ.	Max.	Unit
Maximum Supply Voltage	Vcc		-0.5		4.0	V
Storage Temperature	TS		-40		85	°C
Operating Case Temperature	Tc	Standard	-5		+70	°C
		Extended	-20		+75	°C
Data Rate	DR		0.614		11.3	Gb/s

**Electrical Characteristics** ( $V_{CC}=3.14V$  to  $3.46V$ ,  $T_C$ )

Parameter		Symbol	Min.	Typ.	Max.	Unit	Notes
Power Supply Voltage		Vcc	3.13	3.3	3.45	V	
Power Supply Current		Icc			350	mA	
Transmitter							
Input impedance (Differential)		Zin	85	100	115	ohm	
CML Inputs (Differential)		Vin	150		1200	mVpp	1
Tx_DISABLE Input Voltage	High		2		Vcc+0.3	V	
	Low		0		0.8	V	
Tx_FAULT Output Voltage	High		2		Vcc+0.3	V	
	Low		0		0.8	V	
Receiver							
CML Outputs (Differential)		Vout	350		700	mVpp	1
Output Impedance (Differential)		Zout	85	100	115	ohms	
Rx_LOS Output Voltage	High		2		Vcc+0.3	V	
	Low		0		0.8	V	
MOD_DEF (0:2)		VoH	2.5			V	2
		VoL	0		0.5	V	2

**Notes:**

1. After internal AC coupling.
2. Reference the SFF-8472 MSA.

## Optical Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Notes
Transmitter						
Output Optical Power	P <sub>out</sub>	-5		0	dBm	1
Optical Extinction Ratio	ER	3.5			dB	
Optical Wavelength	$\lambda$	$\lambda_c - 6$	$\lambda_c$	$\lambda_c + 7.5$	nm	2
Spectral Width (-20dB)	$\Delta\lambda$			1	nm	
Side Mode Suppression Ratio	SMSR	30			dB	
Transmitter Dispersion Penalty	TDP			2	dB	
Average Launch Power of OFF Transmitter	P <sub>OFF</sub>			-30	dBm	
TX Jitter Generation (Peak-to-Peak)	TXi			0.1	UI	1
TX Jitter Generation (RMS)				0.01		
Receiver						
Receiver Sensitivity @ 10.7Gb/s	P <sub>min</sub>			-15	dBm	3
Maximum Input Power	P <sub>max</sub>	+0.5			dBm	
Optical Center Wavelength	$\lambda$	1260		1620	nm	
Receiver Reflectance	R <sub>rf</sub>			-27	dB	
LOS De-Assert	LOS <sub>D</sub>			-16	dBm	
LOS Assert	LOS <sub>A</sub>	-28			dBm	
LOS Hysteresis		1			dB	

### Notes:

1. Output power is coupled into a 9/125  $\mu\text{m}$  SMF.
2. ITU-T G. 694.2 CWDM wavelength from 1270nm to 1610nm, each step 20nm.
3. Average received power; BER less than 1E-12 and PRBS 2<sup>31</sup>-1 test pattern.

## Pin Descriptions

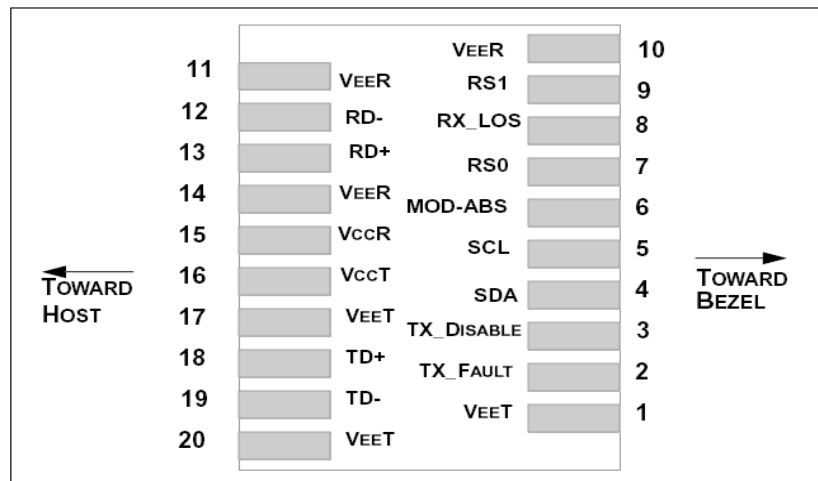
Pin	Symbol	Name/Descriptions	Plug Seq.	Ref.
1	VeeT	Transmitter Ground	1	Note 5
2	TX Fault	Transmitter Fault Indication	3	Note 1
3	TX Disable	Transmitter Disable	3	Note 2, Module disables on high
4	SDA	Module Definition 2	3	Data line for Serial ID
5	SCL	Module Definition 1	3	Clock line for Serial ID
6	MOD_ABS	Module Definition 0	3	Note 3
7	RS0	RX Rate Select (LVTTTL)	3	No Function Implement
8	LOS	Loss of Signal	3	Note 4
9	RS1	TX Rate Select (LVTTTL)	1	No Function Implement
10	VeeR	Receiver Ground	1	Note 5
11	VeeR	Receiver Ground	1	Note 5
12	RD-	Inv. Received Data Out	3	Note 6
13	RD+	Received Data Out	3	Note 6
14	VeeR	Receiver Ground	1	Note 5
15	VccR	Receiver Power	2	3.3V $\pm$ 5%, Note 7
16	VccT	Transmitter Power	2	3.3V $\pm$ 5%, Note 7
17	VeeT	Transmitter Ground	1	Note 5
18	TD+	Transmit Data In	3	Note 8
19	TD-	Inv. Transmit Data In	3	Note 8
20	VeeT	Transmitter Ground	1	Note 5

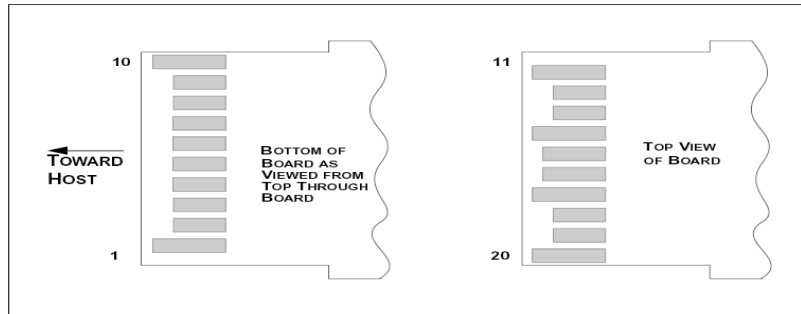
## Notes:

- TX Fault is an open collector/drain output, which should be pulled up with a 4.7K-10K $\Omega$  resistor on the host board. Pull up voltage between 2.0V and VccT/R+0.3V. When high, output indicates a laser fault of some kind. Low indicates normal operation. In the low state, the output will be pulled to <0.8V.
- TX disable is an input that is used to shut down the transmitter optical output. It is pulled up within the module with a 4.7K ~ 10 K $\Omega$  resistor. Its states are;
  - Low (0-0.8V): Transmitter on
  - (>0.8, <2.0V): Undefined
  - High (2.0-3.465V): Transmitter disabled
  - Open: Transmitter Disabled
- Module Absent, connected to VeeT or VeeR in the module.
- LOS (Loss of Signal) is an open collector/drain output, which should be pulled up with a 4.7K-10K $\Omega$  resistor. Pull up voltage between 2.0V and VccT/R+0.3V. When high, this output indicated the received optical power is below the worst-case receiver sensitivity (as defined by the standard in use). Low

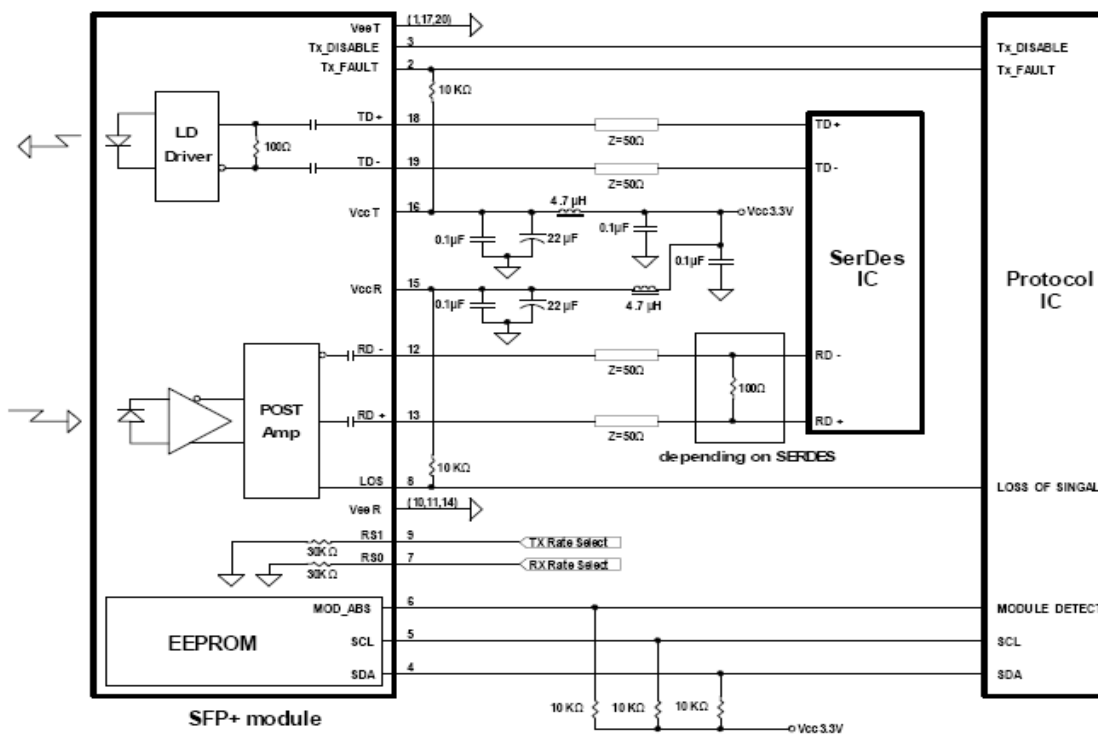
indicates normal operation. In the low state, the output will be pulled to <0.8V.

5. VeeR and VeeT may be internally connected within the SFP+ module.
6. RD-/+: These are the differential receiver outputs. They are AC coupled 100Ω differential lines which should be terminated with 100 Ω (differential) at the user SERDES. The AC coupling is done inside the module and is thus not required on the host board. The voltage swing on these lines will be between 350 and 700mV differential (175-350mV single ended) when properly terminated.
7. VccR and VccT are the receiver and transmitter power supplies. They are defined as 3.3V±5% at the SFP+ connector pin. Maximum supply current is 350mA. Recommended host board power supply filtering is shown below. Inductors with DC resistance of less than 1 ohm should be used in order to maintain the required voltage at the SFP+ input pin with 3.3V supply voltage. When the recommended supply-filtering network is used, hot plugging of the SFP+ transceiver module will result in an inrush current of no more than 30mA greater than the steady state value. VccR and VccT may be internally connected within the SFP+ transceiver module.
8. TD-/+: These are the differential transmitter inputs. They are AC-coupled, differential lines with 100Ω differential termination inside the module. The AC coupling is done inside the module and is thus not required on the host board. The inputs will accept differential swings of 150 -1200mV (75-600mV single ended), though it is recommended that values between 150 and 1200mV differential (75-600mV single ended) be used for best EMI performance.



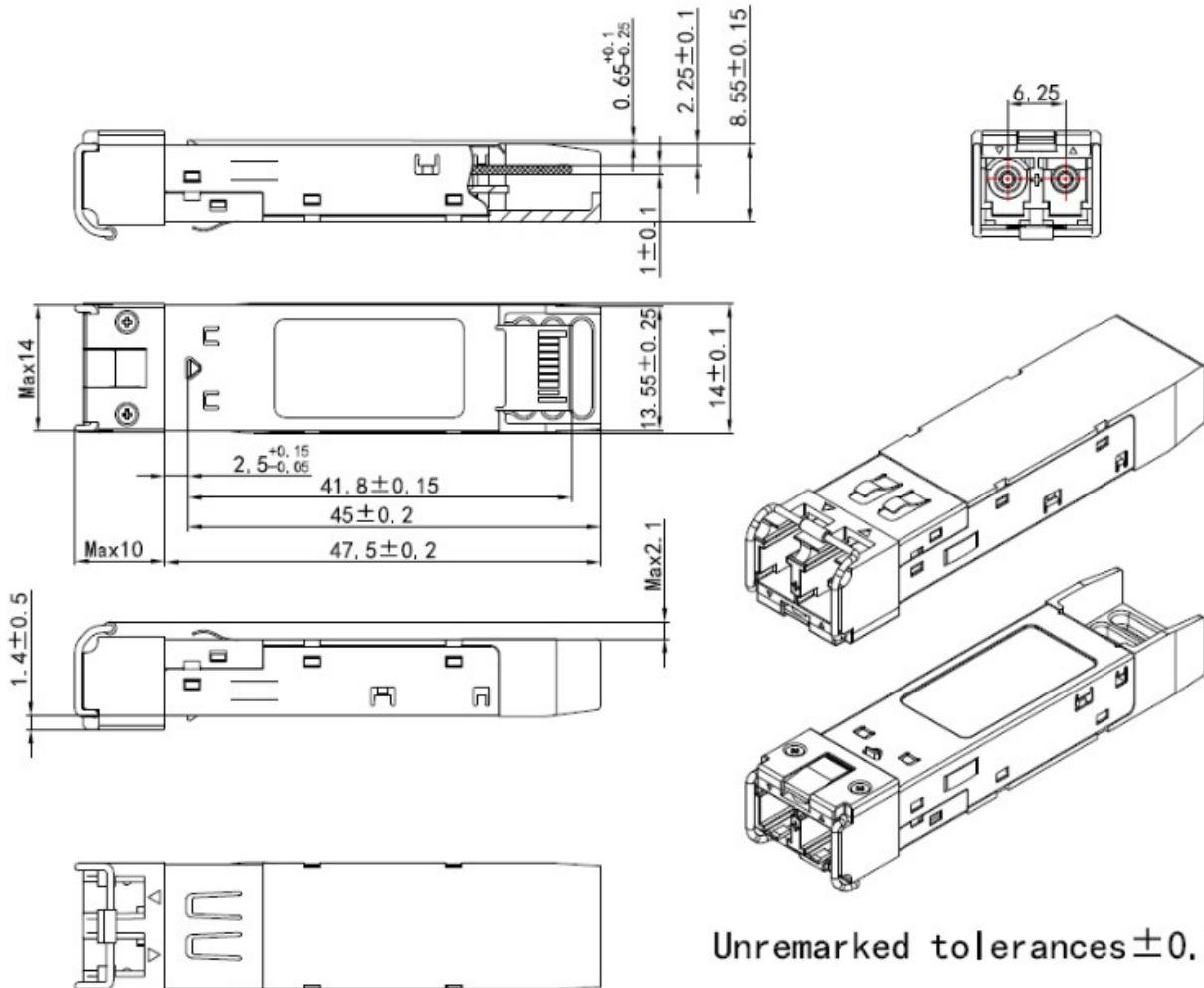


## Recommended Circuit Schematic



## Mechanical Specifications

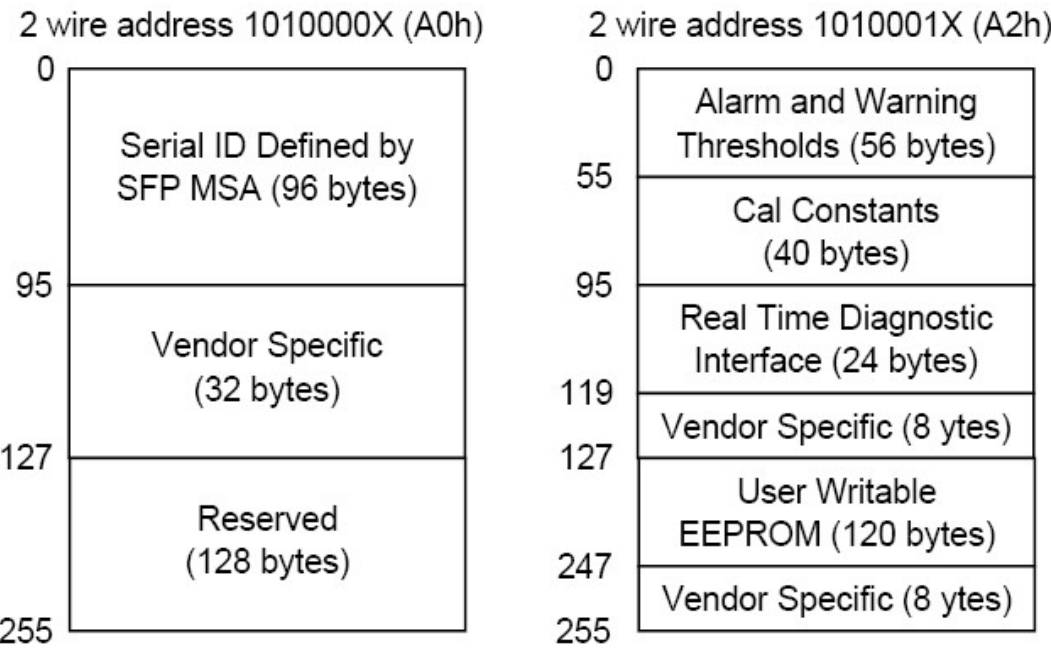
Small Form Factor Pluggable (SFP) transceivers are compatible with the dimensions defined by the SFP Multi-Sourcing Agreement (MSA).





**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.

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