

## EX-SFP-10GE-LR-1610-C

Juniper Networks® EX-SFP-10GE-CWL61 Compatible TAA 10GBase-CWDM SFP+ Transceiver (SMF, 1610nm, 10km, LC, DOM)

### Features:

- Single 3.3V Power Supply Voltage
- CWDM DFB Laser Transmitter
- Compliant with IEEE 802.3ae 10GBASE-LR/LW
- Up to 10.7Gbps Bi-Directional Data Links
- Single-Mode Fiber
- Hot-Pluggable
- Duplex LC Connector
- Operating Temperature: 0 to 70 Celsius
- 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 Juniper Networks® compatible SFP+ transceiver provides 10GBase-CWDM throughput up to 10km over single-mode fiber (SMF) using a wavelength of 1610nm via an LC connector. It is guaranteed to be 100% compatible with the equivalent Juniper 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' 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.")



## CWDM Available Wavelengths

Wavelengths	Min.	Typ.	Max.
27	1264.5	1271	1277.5
29	1284.5	1291	1297.5
31	1304.5	1311	1317.5
33	1324.5	1331	1337.5
35	1344.5	1351	1357.5
37	1364.5	1371	1377.5
39	1384.5	1391	1397.5
41	1404.5	1411	1417.5
43	1424.5	1431	1437.5
45	1444.5	1451	1457.5
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.	Typ.	Max.	Unit	Notes
Maximum Supply Voltage	Vcc	-0.5		4.0	V	1
Storage Temperature	Tstg	-40		90	°C	2
Operating Case Temperature	Tc	0		70	°C	3
Maximum Bitrate	BER			$10^{-12}$		
Data Rate	DR		10.3125		Gbps	4

### Notes:

1. For the electrical power interface.
2. Ambient temperature.
3. Case temperature.

## Electrical Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Notes
Power Supply Voltage	V <sub>cc</sub>	3.14	3.30	3.46	V	
Power Supply Current	I <sub>cc</sub>		200	310	mA	1
Power Consumption	PC		0.65	1.0	W	
<b>Transmitter</b>						
Differential Data Input Swing	V <sub>IN,pp</sub>	180		700	mV	
Input Differential Impedance	R <sub>IN</sub>		100		Ω	
Transmit Disable Voltage	V <sub>D</sub>	2		V <sub>cc</sub>	V	
Transmit Enable Voltage	V <sub>EN</sub>	V <sub>ee</sub>		V <sub>ee</sub> +0.8	V	
<b>Receiver</b>						
Differential Data Output Swing	V <sub>OUT,pp</sub>	300		850	mV	
Output Differential Impedance	T <sub>r</sub> /T <sub>f</sub>	28			ps	
LOS Assert	V <sub>LOSA</sub>	2		Host_V <sub>cc</sub>	V	
LOS De-Assert	V <sub>LOSD</sub>	V <sub>ee</sub>		V <sub>ee</sub> +0.5	V	

### Notes:

1. For the electrical power interface.

## Optical Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Notes
<b>Transmitter</b>						
Optical Power (Average)	$P_{TX}$	2		7	dBm	1
Transmitter Dispersion Penalty	TDP			5	dB	
Optical Extinction Ratio	ER	3.5			dB	
Optical Wavelength	$\lambda_C$	$\lambda-6.5$	$\lambda$	$\lambda+6.5$	nm	
Side-Mode Suppression Ratio	SMSR	30			dB	
Relative Intensity Noise	RIN			-128	dB/Hz	
Launch Power of Off Transmitter	$P_{off}$			-30	dBm	1
<b>Receiver</b>						
Receiver Sensitivity @10.3Gbps	$R_{X\_SEN}$			-14.4	dBm	2
Receiver Overload	$P_{OL}$	2			dBm	
Receiver Wavelength	$\lambda_C$	1260		1620	nm	
Receiver Reflectance	$TR_{RX}$			-12	dB	
LOS Assert	LOSA	-30			dBm	
LOS De-Assert	LOSD			-17	dBm	
LOS Hysteresis	LOSH	0.5			dB	

### Notes:

1. Average.
2. Average. Measured with worst ER,  $BER < 10^{-12}$ , and  $2^{31}-1$  PRBS.

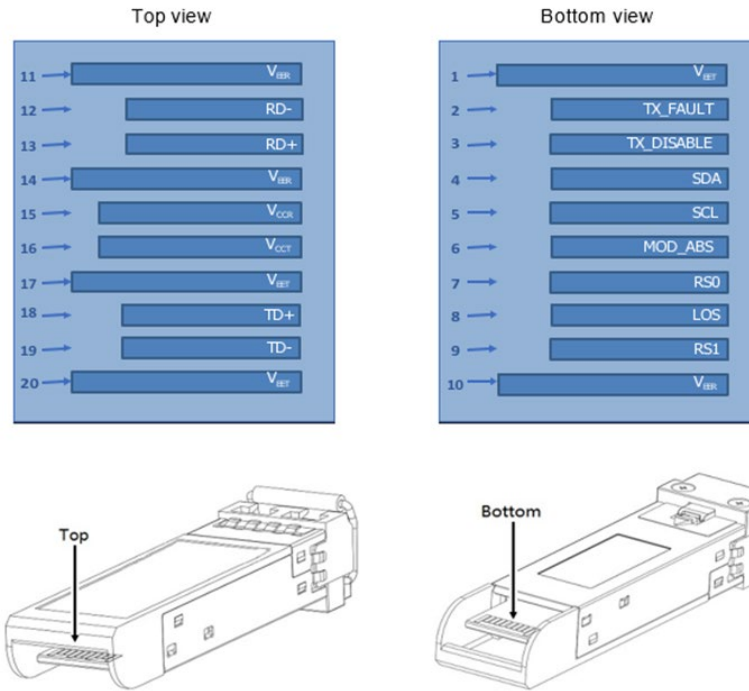
## Pin Descriptions

Pin	Symbol	Name/Description	Notes
1	VeeT	Transmitter Ground (Common with Receiver Ground).	1
2	Tx_Fault	Transmitter Fault.	2
3	Tx_Disable	Transmitter Disable. Laser output disabled on “high” or “open.”	3
4	SDA	2-Wire Serial Interface Data.	4
5	SCL	2-Wire Serial Interface Clock.	4
6	MOD_ABS	Module Absent. Grounded within the module.	4
7	RS0	No Connection Required.	
8	Rx_LOS	Loss of Signal Indication. “Logic 0” indicates normal operation.	5
9	RS1	No Connection Required.	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	Transmitter Ground (Common with Receiver Ground).	1
18	TD+	Transmitter Non-Inverted Data In. AC Coupled.	
19	TD-	Transmitter Inverted Data In. AC Coupled.	
20	VeeT	Transmitter Ground (Common with Receiver Ground).	1

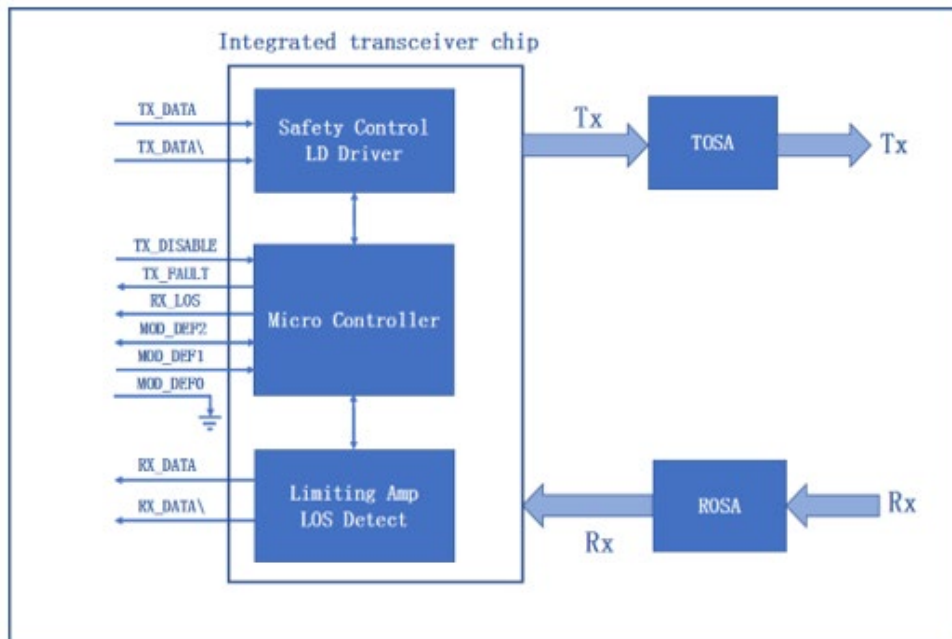
### Notes:

1. The circuit ground is isolated from the chassis ground.
2. Tx\_Fault is the open collector output and should be pulled up with 4.7kΩ to 10kΩ on the host board to a voltage between 2V and Vcc+0.3V.
3. Disabled: T<sub>DIS</sub>>2V or open, enabled: T<sub>DIS</sub><0.8V.
4. Should be pulled up with 4.7kΩ to 10kΩ on the host board to a voltage between 2V and Vcc+0.3V.
5. LOS is an open collector output and should be pulled up with 4.7kΩ to 10kΩ on the host board to a voltage between 2V and Vcc+ 0.3V. The “logic 0” indicates normal operation. “Logic 1” indicates that the receiver signal is lost.

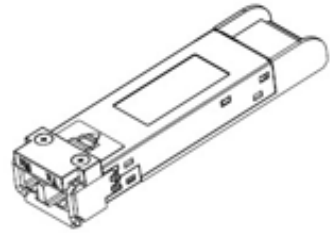
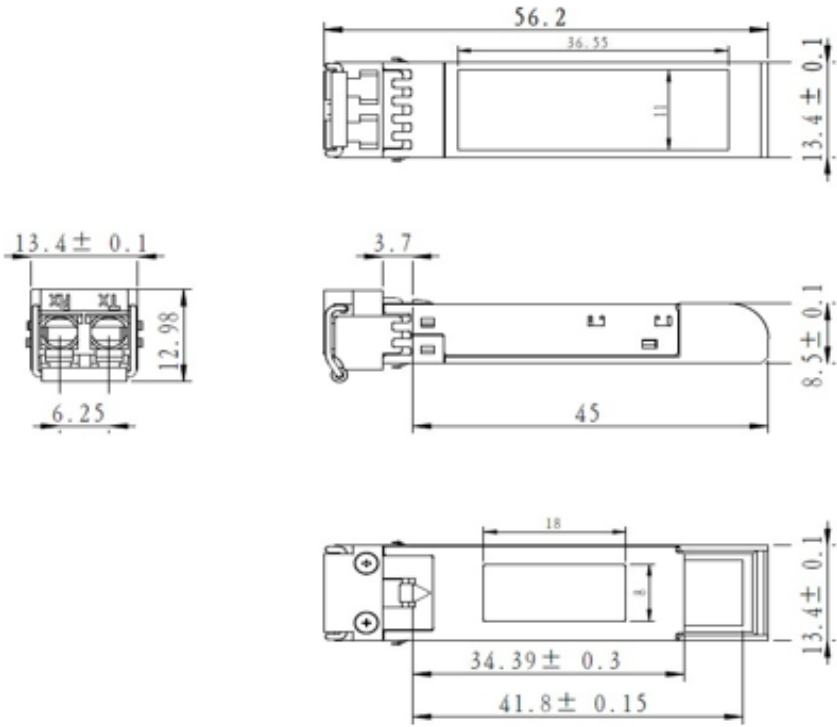
## Electrical Pad Layout



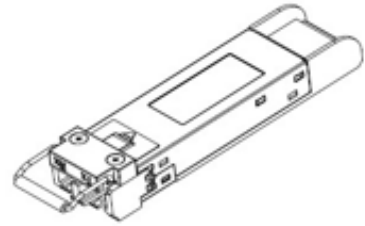
## Block Diagram of Transceiver



# Mechanical Specifications



LATCHED



UNLATCHED

## 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

ProLabs US

Email: [sales@prolabs.com](mailto:sales@prolabs.com)

Telephone: 952-852-0252

ProLabs UK

Email: [salessupport@prolabs.com](mailto:salessupport@prolabs.com)

Telephone: +44 1285 719 600