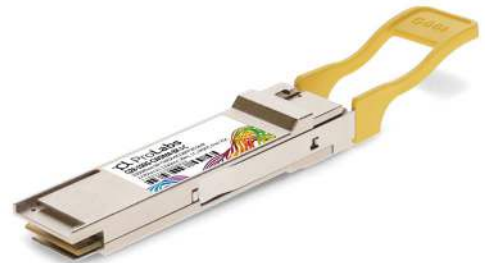


## Q28-100G-CWDM4-BX-J-C

Juniper Networks® Compatible TAA 100GBase-BX CWDM4 QSFP28 Transceiver (SMF, 1270nm to 1330nm, 2km, LC, DOM, 0 to 70C)

### Features:

- QSFP28 MSA compliant
- 4 CWDM lanes MUX/DEMUX design
- Supports 103.1Gbps aggregate bit rate
- Bidirectional optical data transmitting/receiving
- Maximum power consumption: 3.5W
- Commercial Temperature 0 to 70 Celsius
- SMF angled, polished LC simplex connector
- 4x25G electrical interface
- Hot Pluggable
- RoHS compliant and lead-free



### Applications:

- Ethernet over CWDM
- Access, Metro and Enterprise

### Product Description

This Juniper Networks® compatible QSFP28 transceiver provides 100GBase-BX CWDM4 throughput up to 2km over single-mode fiber (SMF) using wavelengths between 1270nm to 1330nm via an LC connector. It can operate at temperatures between 0 and 70C. Our transceiver is built to meet or exceed OEM specifications and is guaranteed to be 100% compatible with Juniper Networks®. It has been programmed, uniquely serialized, and tested for data-traffic and application to ensure that it will initialize and perform identically. All of our transceivers comply with Multi-Source Agreement (MSA) standards to provide seamless network integration. Additional product features include Digital Optical Monitoring (DOM) support which allows 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."



## 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.	Typ.	Max.	Unit	Notes
Maximum Supply Voltage	Vcc	-0.5		3.6	V	
Storage Temperature	Tstg	-40		85	°C	
Operating Case Temperature	Tc	0		70	°C	
Relative Humidity (Non-Condensing)	RH	0		85	%	
Damage Threshold Per Lane	THd	3.5			dBm	
Data Rate Per Lane			25.78125		Gbps	
Data Rate Accuracy		-100		100	ppm	
Link Distance With G.652	D	0.002		2	km	

## Electrical Characteristics

Parameter	Symbol/Test Point	Min.	Typ.	Max.	Unit	Notes
Power Supply Voltage	Vcc	3.135	3.3	3.465	V	
Control Input Voltage - High		2		Vcc	V	
Control Input Voltage - Low		0		0.8	V	
Power Consumption	P <sub>DISS</sub>			3.5	W	
Supply Current	I <sub>CC</sub>			1.06	A	
<b>Transmitter (Per Lane)</b>						
Overload Differential Voltage (pk-pk)	TP1a	900			mV	
Common-Mode Voltage (V <sub>cm</sub> )	TP1	-350		2850	mV	1
Differential Termination Resistance Mismatch	TP1			10	%	At 1MHz
Differential Return Loss (SDD11)	TP1			See CEI-28G-VSR Equation 13-19	dB	
Common-Mode to Differential Conversion and Differential to Common-Mode Conversion (SDC11, SCD11)	TP1			See CEI-28G-VSR Equation 13-20	dB	
Stressed Input Test	TP1a	See CEI-28G-VSR Section 13.3.11.2.1				

Receiver (Per Lane)						
Differential Voltage (pk-pk)	TP4			900	mV	
Common-Mode Voltage (Vcm)	TP4	-350		2850	mV	1
Common-Mode Noise (RMS)	TP4			17.5	mV	
Differential Termination Resistance Mismatch	TP4			10	%	At 1MHZ
Differential Return Loss (SDD22)	TP4			See CEI-28G-VSR Equation 13-19	dB	
Commo- Mode to Differential Conversion and Differential to Common-Mode Conversion (SDC22, SCD22)	TP4			See CEI-28G-VSR Equation 13-21	dB	
Common-Mode Return Loss (SCC22)	TP4			-2	dB	2
Transition Time (20-80%)	TP4	9.5			ps	
Vertical Eye Closure (VEC)	TP4			5.5	dB	
Eye Width at 10 <sup>-15</sup> Probability (EW15)	TP4	0.57			UI	
Eye Height at 10 <sup>-15</sup> Probability (EH15)	TP4	228			mV	

**Notes:**

1. Vcm is generated by the host. Specification includes effects of ground offset voltage.
2. From 250MHz to 30GHz.

## Optical Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Notes
Wavelength Assignment	L0	1264.5	1271	1277.5	nm	
	L1	1284.5	1291	1297.5	nm	
	L2	1304.5	1311	1317.5	nm	
	L3	1324.5	1331	1337.5	nm	
<b>Transmitter</b>						
Side-Mode Suppression Ratio	SMSR	30			dB	
Total Average Launch Power	Pavg			8.5	dBm	
Average Launch Power Per Lane	Pavg	-6.5		2.5	dBm	
Optical Modulation Amplitude (OMA) Per Lane	POMA	-4.0		2.5	dBm	1
Launch Power in OMA Minus Transmitter and Dispersion Penalty (TDP) Per Lane		-5.0			dBm	
TDP Per Lane	TDP			3.0	dB	
Extinction Ratio	ER	3.5			dB	
Optical Return Loss Tolerance	ORLT			20	dB	
Transmitter Reflectance				-12	dB	
Average Launch Power Off Transmitter Per Lane	Poff			-30	dBm	
Transmitter Eye Mask Definition: (X1, X2, X3, Y1, Y2, Y3)		(0.31, 0.4, 0.45, 0.34, 0.38, 0.4)				2
<b>Receiver</b>						
Damage Threshold Per Lane	THd	3.5			dBm	3
Average Receive Power Per Lane		-11.5		2.5	dBm	
Receive Power (OMA) Per Lane				2.5	dBm	
Receiver Sensitivity (OMA) Per Lane	SEN			-10	dBm	For BER=5x10 <sup>-5</sup>
Stressed Receiver Sensitivity (OMA) Per Lane				-7.3	dBm	4
Receiver Reflectance				-26	dB	
LOS Assert	LOSA	-30			dBm	
LOS De-Assert	LOSD			-15	dBm	
LOS Hysteresis	LOSH	0.5			dB	
Receiver Electrical 3dB Upper Cutoff Frequency Per Lane				31	GHz	
<b>Conditions of Stress Receiver Sensitivity Test (Note 5)</b>						
Vertical Eye Closure Penalty Per Lane			1.9		dB	
Stressed Eye J2 Jitter Per Lane			0.33		UI	
Stressed Eye J4 Jitter Per Lane			0.48		UI	
SRS Eye Mask Definition: (X1, X2, X3, Y1, Y2, Y3)		(0.39, 0.5, 0.5, 0.39, 0.39, 0.4)				

**Notes:**

1. Even if the TDP<1.0 dB, the OMA minimum must exceed the minimum value specified here.
2. Hit ratio  $5 \times 10^{-5}$ .
3. The receiver shall be able to tolerate, without damage, continuous exposure to a modulated optical input signal having this power level on one lane. The receiver does not have to operate correctly at this input power.
4. Measured with conformance test signal for BER= $5 \times 10^{-5}$ .
5. Vertical Eye Closure Penalty, Stressed Eye J2 Jitter, Stressed Eye J4 Jitter, and SRS Eye Mask Definition are test conditions for measuring Stressed Receiver Sensitivity. They are not characteristics of the receiver.

**Pin Descriptions**

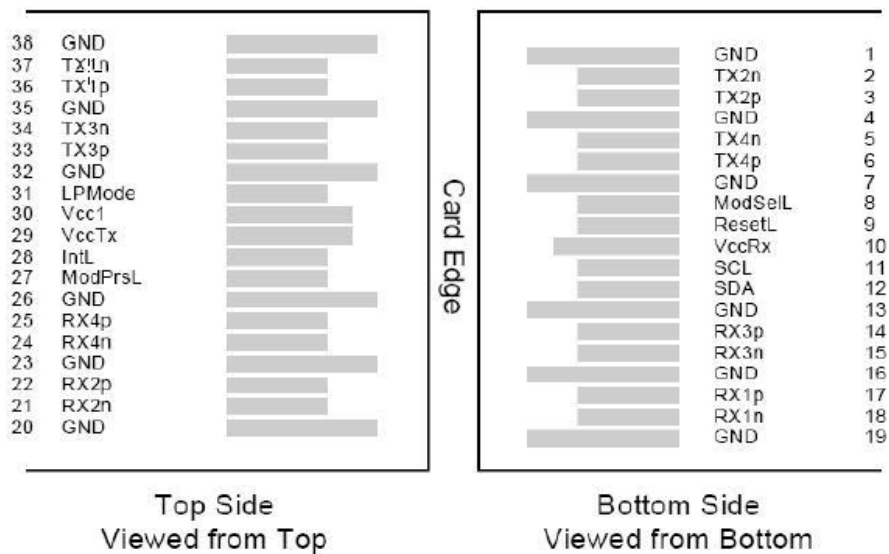
Pin	Logic	Symbol	Name/Descriptions	Notes
1		GND	Module Ground.	1
2	CML-I	Tx2-	Transmitter Inverted Data Input.	
3	CML-I	Tx2+	Transmitter Non-Inverted Data Output.	
4		GND	Module Ground.	1
5	CML-I	Tx4-	Transmitter Inverted Data Input.	
6	CML-I	Tx4+	Transmitter Non-Inverted Data Output.	
7		GND	Module Ground.	1
8	LVTTTL-I	ModSelL	Module Select.	
9	LVTTTL-I	ResetL	Module Reset.	
10		VccRx	+3.3V Receiver Power Supply.	2
11	LVCMOS-I/O	SCL	2-Wire Serial Interface Clock.	
12	LVCMOS-I/O	SDA	2-Wire Serial Interface Data.	
13		GND	Module Ground.	
14	CML-O	Rx3+	Receiver Non-Inverted Data Output.	
15	CML-O	Rx3-	Receiver Inverted Data Output.	
16		GND	Module Ground.	1
17	CML-O	Rx1+	Receiver Non-Inverted Data Output.	
18	CML-O	Rx1-	Receiver Inverted Data Output.	
19		GND	Module Ground.	1
20		GND	Module Ground.	1
21	CML-O	Rx2-	Receiver Inverted Data Output.	
22	CML-O	Rx2+	Receiver Non-Inverted Data Output.	
23		GND	Module Ground.	1
24	CML-O	Rx4-	Receiver Inverted Data Output.	1
25	CML-O	Rx4+	Receiver Non-Inverted Data Output.	

26		GND	Module Ground.	1
27	LVTTTL-O	ModPrsL	Module Present.	
28	LVTTTL-O	IntL	Interrupt.	
29		VccTx	+3.3V Transmitter Power Supply.	2
30		Vcc1	+3.3V Power Supply.	2
31	LVTTTL-I	LPMode	Low-Power Mode.	
32		GND	Module Ground.	1
33	CML-I	Tx3+	Transmitter Non-Inverted Data Input.	
34	CML-I	Tx3-	Transmitter Inverted Data Output.	
35		GND	Module Ground.	1
36	CML-I	Tx1+	Transmitter Non-Inverted Data Input.	
37	CML-I	Tx1-	Transmitter Inverted Data Output.	
38		GND	Module Ground.	1

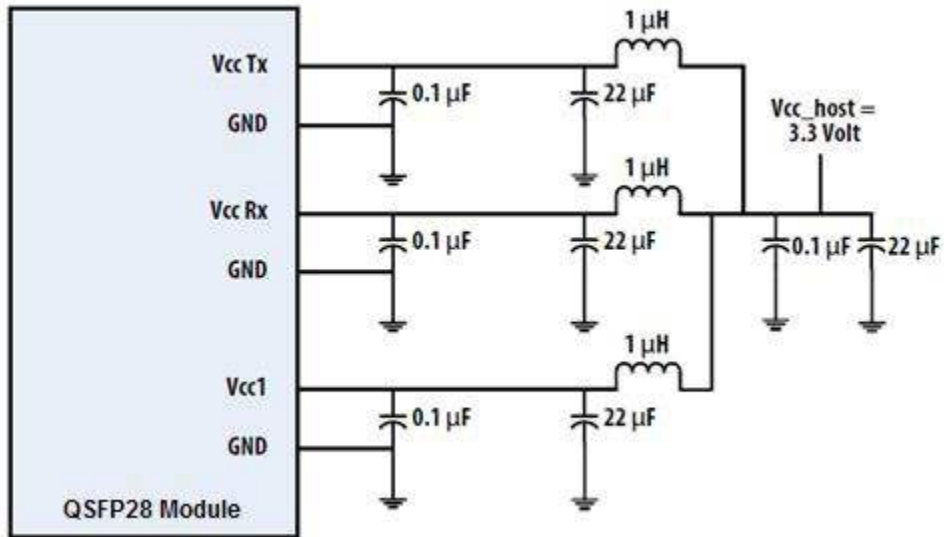
**Notes:**

1. GND is the symbol for signal and supply (power) common for QSFP28 modules. All are common within the QSFP28 module, and all module voltages are referenced to this potential unless otherwise noted. Connect these directly to the host board signal common ground plane.
2. VccRx, Vcc1, and VccTx are the receiving and transmission power suppliers and shall be applied concurrently. Recommended host board power supply filtering is shown below. VccRx, Vcc1, and VccTx may be internally connected within the QSFP28 transceiver module in any combination. The connector pins are each rated for a maximum current of 500mA.

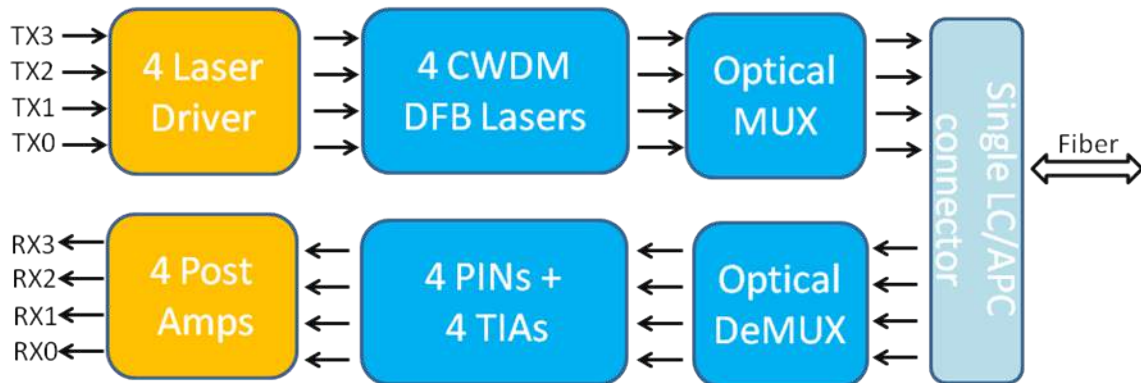
**Electrical Pin-Out Details**



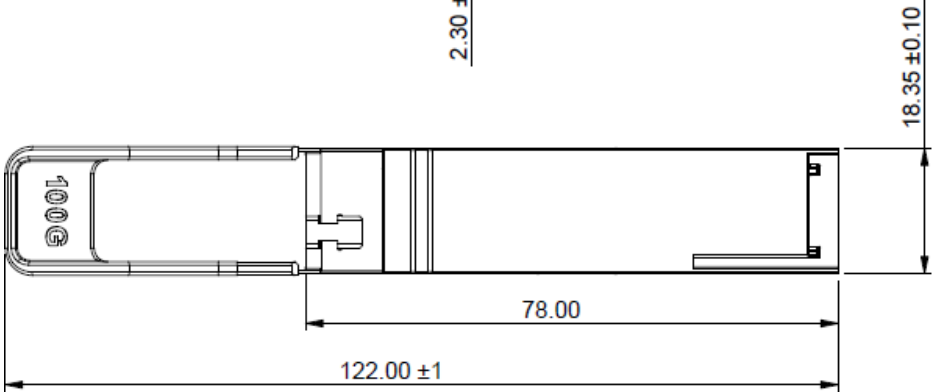
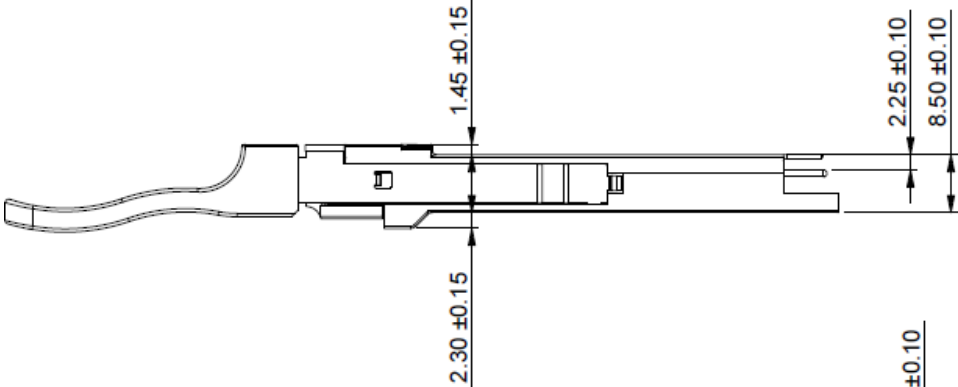
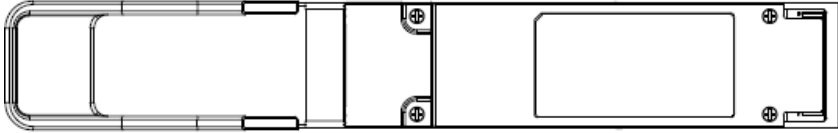
### Recommended Power Supply Filter



### Transceiver Block Diagram



**Mechanical Specifications**





**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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