

### 160-9401-900-ER4L-40-I-C

Ciena® 160-9401-900-ER4L-40-I Compatible TAA 100GBase-ER4L QSFP28 Transceiver (SMF, 1310nm, LC, DOM, 40km, -40 to 85C)

#### Features:

- SFF-8665 Compliance
- Duplex LC Connector
- Single-mode Fiber
- Industrial Temperature -40 to 85 Celsius
- Hot Pluggable
- Metal with Lower EMI
- Excellent ESD Protection
- RoHS Compliant and Lead Free



#### Applications:

- 100GBase Ethernet
- Access and Enterprise

#### Product Description

This Ciena® 160-9401-900-ER4L-40-I compatible QSFP28 transceiver provides 100GBase-ER4L throughput up to 40km over single-mode fiber (SMF) using a wavelength of 1295nm to 1309nm via an LC connector. It is guaranteed to be 100% compatible with the equivalent Ciena® 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

## Absolute Maximum Ratings

Parameter	Symbol	Min.	Typ.	Max.	Unit
Storage Temperature	Tstg	-40		85	°C
Operating Case Temperature	Tc	-40	25	85	°C
Power Supply Voltage	Vcc	-0.5		4.0	V
Relative Humidity	RH	5		95	%
Data Rate Per Channel			25.78125		Gbps

## Electrical Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Notes
Supply Voltage	Vcc	3.135	3.3	3.465	V	
Module Supply Current	Icc			1350	mA	
Power Dissipation	P <sub>DISS</sub>			4500	mW	
<b>Transmitter</b>						
Single-Ended Input Voltage Tolerance		-0.3		4.0	V	
Input Differential Impedance	Z <sub>IN</sub>		100		Ω	
Differential Data Input Swing	V <sub>IN,pp</sub>	190		700	mVp-p	
AC Common-Mode Input Voltage Tolerance		15			mVp-p	
Differential Input Voltage Swing Threshold			50		mVp-p	
<b>Receiver</b>						
Single-Ended Output Voltage		-0.3		4.0	V	
Output Differential Impedance	Z <sub>OUT</sub>	90	100	110	Ω	
Differential Data Output Swing	V <sub>OUT,pp</sub>	300		850	mVp-p	
AC Common-Mode Output Voltage				7.5	mVp-p	

## Optical Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Notes
<b>Transmitter</b>						
Launch Optical Power Per Lane	Po	-2.9		+2.9	dBm	1
Total Launch Optical Power	Po			+8.9	dBm	1
Center Wavelength Range	L1	1294.53	1295.56	1296.59	nm	
	L2	1299.02	1300.05	1301.09	nm	
	L3	1303.54	1304.58	1305.63	nm	
	L4	1308.09	1309.14	1310.19	nm	
Extinction Ratio	ER	8.0			dB	2
Spectral Width (-20dB)	$\Delta\lambda$			1	nm	
Side-Mode Suppression Ratio	SMSR	30			dB	
Optical Return Loss Tolerance	ORLT			20	dB	
Pout @Tx_Disable Asserted	Poff			-30	dBm	1
Eye Mask: (X1, X2, X3, Y1, Y2, Y3)		(0.25, 0.4, 0.45, 0.25, 0.28, 0.4)				
<b>Receiver</b>						
Center Wavelength	L1	1294.53	1295.56	1296.59	nm	
	L2	1299.02	1300.05	1301.09	nm	
	L3	1303.54	1304.58	1305.63	nm	
	L4	1308.09	1309.14	1310.19	nm	
Sensitivity Per Channel (OMA)	S			-16.6	dBm	3
	S			-20.5	dBm	4
Overload Per Channel	P <sub>max</sub>	-4.9			dBm	3
Damage Threshold Per Channel	THd	-3.5			dBm	
Receiver Reflectance	RL			-26	dB	
LOS De-Assert	LOSD			-21.0	dBm	
LOS Assert	LOSA	-26.0			dBm	
LOS Hysteresis	LOSH	0.5			dB	

### Notes:

1. The optical power is launched into a single-mode fiber.
2. Measured with a PRBS 2<sup>31</sup>-1 test pattern @25.78125Gbps.
3. Without FEC, measured with PRBS 2<sup>31</sup>-1 test pattern, 25.78125Gbps, and BER 1.0E<sup>-12</sup>.
4. With FEC, measured with PRBS 2<sup>31</sup>-1 test pattern, 25.78125Gb/s, and BER 5.0E<sup>-5</sup>.

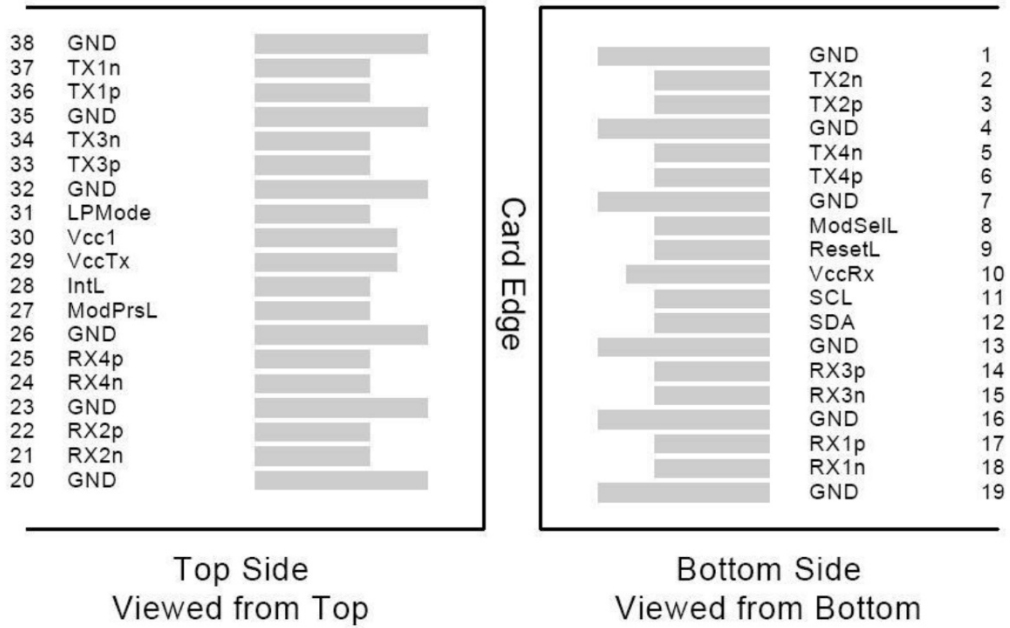
## Pin Descriptions

Pin	Logic	Symbol	Name/Descriptions	Ref.
1		GND	Module Ground.	1
2	CML-I	Tx2-	Transmitter Inverted Data Input.	
3	CML-I	Tx2+	Transmitter Non-Inverted Data Input.	
4		GND	Module Ground.	1
5	CML-I	Tx4-	Transmitter Inverted Data Input.	
6	CML-I	Tx4+	Transmitter Non-Inverted Data Input.	
7		GND	Module Ground.	1
8	LVTTL-I	MODSEIL	Module Select.	2
9	LVTTL-I	ResetL	Module Reset.	2
10		VccRx	+3.3V Receiver Power Supply.	
11	LVC MOS-I	SCL	2-Wire Serial Interface Clock.	2
12	LVC MOS-I/O	SDA	2-Wire Serial Interface Data.	2
13		GND	Module Ground.	1
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.	
25	CML-O	Rx4+	Receiver Non-Inverted Data Output.	
26		GND	Module Ground.	1
27	LVTTL-O	ModPrsL	Module Present. Internally pulled down to GND.	
28	LVTTL-O	IntL	Interrupt output. Should be pulled up on the host board.	2
29		VccTx	+3.3V Transmitter Power Supply.	
30		Vcc1	+3.3V Power Supply.	
31	LVTTL-I	LPMoDe	Low-Power Mode.	2
32		GND	Module Ground.	1
33	CML-I	Tx3+	Transmitter Non-Inverted Data Input.	
34	CML-I	Tx3-	Transmitter Inverted Data Input.	
35		GND	Module Ground.	1
36	CML-I	Tx1+	Transmitter Non-Inverted Data Input.	
37	CML-I	Tx1-	Transmitter Inverted Data Input.	
38		GND	Module Ground.	1

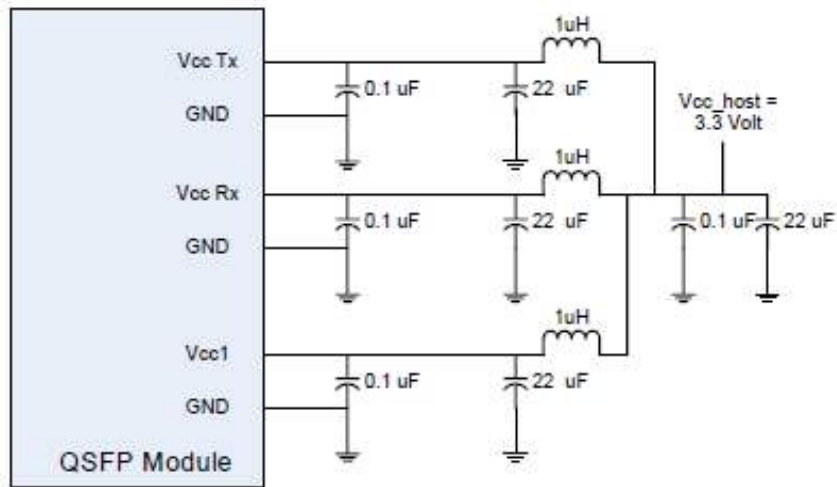
**Notes:**

1. Module circuit ground is isolated from the module chassis ground within the module.
2. Open collector. Should be pulled up with 4.7kΩ-10kΩ on the host board to a voltage between 3.15V and 3.6V.

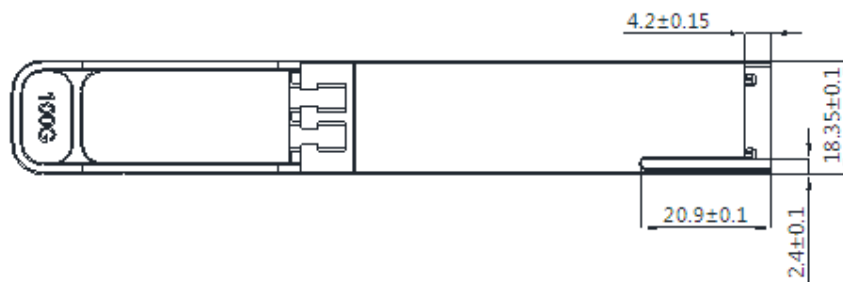
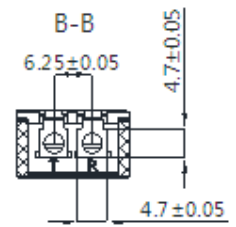
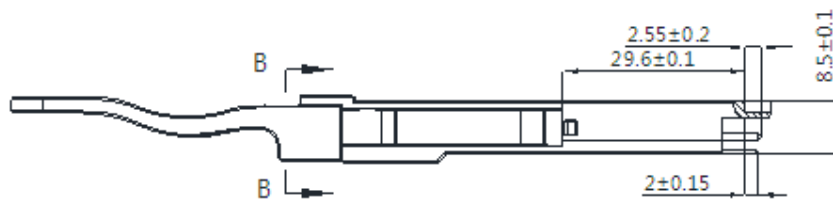
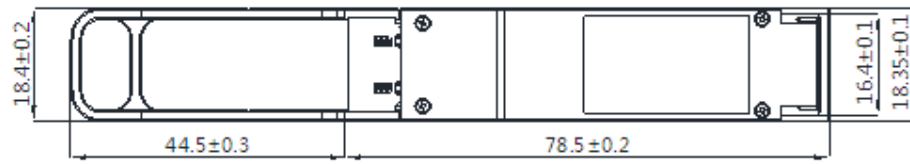
**Electrical Pin-Out Details**



**Recommended Host Board Power Supply Filter Network**



## 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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