

#### 100-04651-C

Calix® 100-04651 Compatible TAA 40GBase-LR4 QSFP+ Transceiver (SMF, 1270nm to 1330nm, 10km, LC, DOM)

#### **Features:**

- SFF-8436 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:**

- 40GBase Ethernet
- Access and Enterprise

### **Product Description**

This Calix® 100-04651 compatible QSFP+ transceiver provides 40GBase-LR4 throughput up to 10km over single-mode fiber (SMF) using a wavelength of 1270nm to 1330nm via an LC connector. It is guaranteed to be 100% compatible with the equivalent Calix® 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."



## **Absolute Maximum Ratings**

Parameter	Symbol	Min.	Тур.	Max.	Unit
Storage Temperature	TS	-40		85	°C
Relative Humidity	Rh	-40		85	%
Supply Voltage	Vcc	-0.5		4.0	V
Case Operating Temperature	Тс	-5		70	°C

## **Electrical Characteristics**

Parameter	Symbol	Min.	Тур.	Max.	Unit	Notes
Power Supply Voltage	Vcc	3.13	3.3	3.47	V	
Power Consumption				1.5	W	
Supply Current	ICC		0.75	1.0	Α	
Control I/O Voltage, High	VIH	2.0		VCC	V	
Control I/O Voltage, Low	VIL	0		0.7	V	
Inter-Channel Skew	TSK			150	ps	
RESETL Duration			10		us	
RESETL De-assert time				100	ms	
Power on time				100	ms	
Transmitter						
Single Ended Output Voltage Tolerance		-0.3		4	V	
AC Common mode Voltage Tolerance (RMS)		15			mV	
Tx Input Diff Voltage	VI	90		1600	mV	
Tx Input Diff Impedance	ZIN	80	100	120	Ω	
Differential Input Return Loss	S	See IEEE 802.3ba 86A.4.11			dB	10MHz-11.1GHz
J2 Jitter tolerance	Jt2			0.18	UI	
J9 Jitter Tolerance	Jt9			0.26	UI	
Data Dependent Pulse Width Shrinkage	DDPWS			0.07	UI	
Eye Mask Coordinates: X1, X2, Y1, Y2	0.1. 0.31, 95, 350					
Receiver						
Single Ended Output Voltage Tolerance		-0.3		4	V	Preferred to TP1 signal common
AC Common mode Voltage Tolerance (RMS)				7.5	mV	
Termination Mismatch at 1MHz				5	%	
Differential Output Return Loss	See IEEE 802.3ba 86A.4.2.1			dB	10MHz-11.1GHz	
Common-mode Output Return Loss	See IEEE 802.3ba 86A.4.2.1			dB	10MHz-11.1GHz	
Rx Output Diff Voltage	Vo		600	800	mV	
Rx Output Rise and Fall Time	Tr/Tf			35	ps	20% to 80%
J2 Jitter Tolerance	Jr2			0.46	UI	
J9 Jitter Tolerance	Jr9			0.63	UI	
Eye Mask Coordinates: X1, X2, Y1, Y2		0.29, 0.5,	150, 425		UI, mV	

## **Notes:**

1. The single ended input voltage tolerance is the allowable range of the instantaneous input signals

## **Optical Characteristics**

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Parameter	Symbol	Min.	Тур.	Max.	Unit	Notes
	LO	1264.5	1271	1277.5	nm	
Wavelength	L1	1284.5	1291	1297.5	nm	
	L2	1304.5	1311	1317.5	nm	
Transmitter	L3	1324.5	1331	1337.5	nm	
Side-mode Suppression Ratio	SMSR	30			dB	
Total Average Launch Power	P <sub>T</sub>			8.3	dBm	
Average Launch Power, each Lane		-7		2.3	dBm	
Optical Modulation Amplitude, each Lane	OMA	-4		3.5	dBm	
Difference in launch Power between any two lanes (OMA)				6.5	dB	
Launch Power in OMA minus Transmitter and Dispersion Penalty (TDP), each Lane		-4.8			dBm	
TDP, each Lane	TDP			2.3	dB	
Extinction Ratio	ER	3.5			dB	
Relative Intensity Noise	R <sub>in</sub>			-128	dB/Hz	12dB reflection
Optical Return Loss Tolerance				20	dB	
Transmitter Reflectance	R <sub>T</sub>			-12	dB	
Transmitter Eye Mask Definition X1, X2, X3, Y1, Y2, Y3	Specification Values 0.25, 0.4, 0.45, 0.25, 0.28, 0.4					
Average Launch Power OFF Transmitter, each Lane	P <sub>off</sub>			-30	dBm	
Receiver						
Damage Threshold	TH <sub>d</sub>	3.3			dBm	1
Average Power at receiver Input, each Lane		-13.7		2.3	dB	
Receiver Reflectance	R <sub>R</sub>			-26	dB	
Receiver Power (OMA), each Lane				3.5	dBm	
Stressed Receiver Sensitivity in OMA, each Lane				-9.9	dBm	
Receiver Sensitivity, each Lane	S <sub>R</sub>			-11.5	dBm	
Difference in Receive Power between any Lanes (OMA)				-7.5	dBm	
Condition of Stress Receiver Sensitivity Test						
Vertical Eye Closure Penalty, each Lane			1.6		dB	
Stressed Eye Jitter, each Lane			0.3		UI	_
		_				

## Notes:

1. 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.

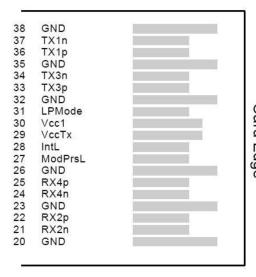
**Pin Descriptions** 

	scriptions	Cumbal	Nama / Dagwintiana	Ref.
Pin	Logic	Symbol	Name/Descriptions	Kei.
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	LVCMOS-I	SCL	2-wire Serial interface clock	2
12	LVCMOS-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, internal pulled down to GND	
28	LVTTL-O	IntL	Interrupt output should be pulled up on 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
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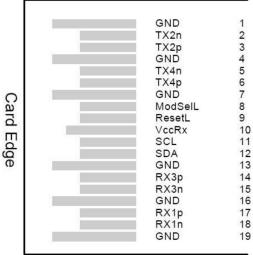
#### **Notes:**

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

### **Electrical Pin-out Details**

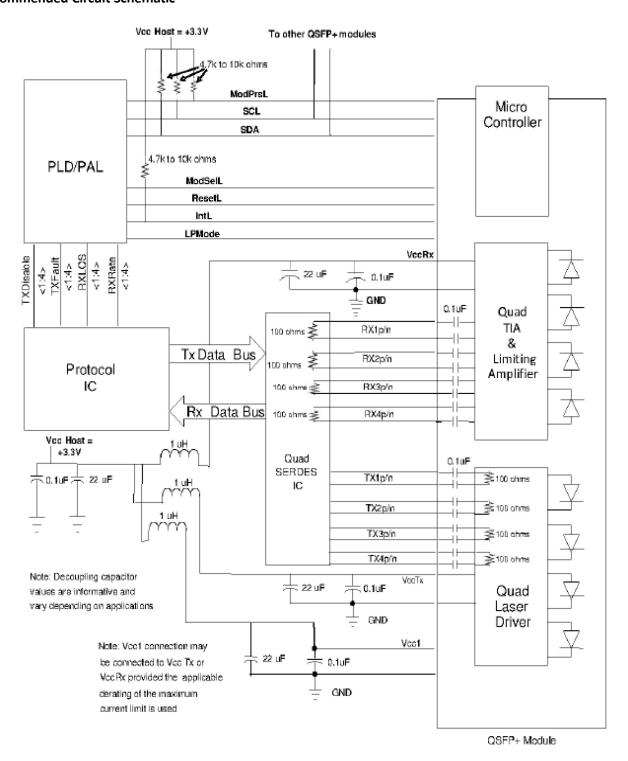


Top Side Viewed from Top



Bottom Side Viewed from Bottom

#### **Recommended Circuit Schematic**



#### **EEPROM Information** 2-Wire Serial Address: 1010000x 0 ID and status (3 Bytes) 2 Interrupt Flags (19 Bytes) 21 Module Monitors (12 Bytes) 33 Channel Monitors (48 Bytes) 81 Reserved (4 Bytes) 85 Control (12 Bytes) 97 (2 Bytes) Reserved 99 Free Side Device and (7 Bytes) Channel Mask 106 (1 Bytes) Reserved 107 Free Side Device (4 Bytes) Properties 111 Reserved (7 Bytes) 118 Password Change Entry Area (Optional) (4 Bytes) 122 Password Entry Area (4 Bytes) (Optional) 126 Page Select Byte (1 Bytes) 127 Page 00 Page 01 (Optional) Page 02 (Optional) Page 03 (Optional for Cable Assemblies) 128 128 128 128 User EEPROM Free Side Device Base ID Fields (64 Bytes) CC\_APPS (1 Byte) (128 Bytes) (48 Bytes) Data Threshold 191 128 255 175 AST Table Length (TL) Channel Extended ID (32 Bytes) (1 Byte) (48 Bytes) Threshold 129 223 223 Vender Specific Application Code (32 Bytes) (2 Bytes) Reserved (2 Bytes) ID Entry 0 255 131 225 Application Code (2 Bytes) (12 Bytes) Vender Specific Entry 1 133 237 Channel Controls (4 Bytes) other entries 241 Application Code Channel Monitor (2 Bytes) (12 Bytes)

Entry TL

255

Masks

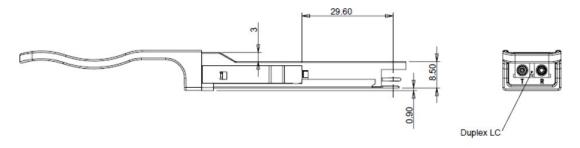
Reserved

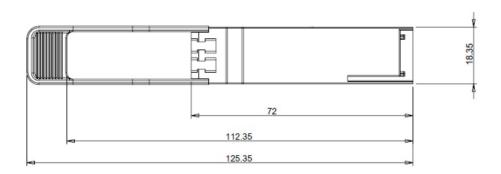
(2 Bytes)

253

255

# **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.















#### **Contact Information**

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