ProLabs – QSFP-40G-ER4-ARISTA-C

40GBASE--ER4 QSFP+ SMF 1271--1331NM 30KM REACH LC DOM

QSFP-40G-ER4-ARISTA-C Overview

ProLabs QSFP- - 40G - ER4 - C Quad Small Form Factor Pluggable (QSFP+) transceivers are compatible with the Small Form Factor Pluggable Multi-- - Sourcing Agreement (MSA). The QSFP+ transceivers are high performance, cost effective modules supporting 40 Gigabit Ethernet and up to 30km transmission distance with SMF.

ProLabs QSFP+ transceivers are RoHS compliant and lead- - free.

Product Features

- Compliant with 40G Ethernet IEEE802.3ba and 40GBase---ER4 standard
- Compliant with QDR/DDR Infiniband data rates
- Up to 11.2Gb/s data rate per wavelength
- 4 CWDM lands MUX/DEMUX design
- Up to 30km transmission on single mode fiber (SMF)
- Operating case temperature 0°C to 70°C
- Maximum power consumption 3.5W
- RoHS 6 compliant

Applications

- 40Gbase---ER4 Ethernet Links
- Infiniband QDR and DDR interconnects
- Client---side 40G Telecom connections

Absolute Maximum Ratings

Parameter	*Symbol*	*Min.*	*Typ.*	*Max.*	*Unit*
Power Supply Voltage	Vcc	---0.5		3.6	V
Storage Temperature	Tst	---40		85	°C
Case Operating Temperature	Top	0		70	°C
Humidity (non---condensing)	Rh	0		95	%
Damage Threshold. Each lane		THd	3.8		dBm

Recommended Operating Conditions

Parameter	*Symbol*	*Min.*	*Typ.*	*Max.*	*Unit*
Supply Voltage	Vcc	3.135	3.3	3.465	V
Operating Case Temperature	Tca	0		70	°C
Data Rate Per Lane			10.3125	11.2	Gbps
Control Input Voltage High		2		Vcc	V
Control Input Voltage Low		0		0.8	V
Link Distance with G.652	D			30	km

Electrical Characteristics

Parameter	*Symbol*	*Min.*	*Typ.*	*Max.*	*Unit*	*Notes*
Power Consumption				3.5	W	
Supply Current	Icc			1.1	A	
Transceiver Power---on Initialization Time				2000	ms	1
Transmitter						
Single---ended Input Voltage		---0.3		4.0	V	
AC Common Mode Input Voltage Tolerance		15			mV	
Differential Input Voltage Swing Threshold		50			mVpp	
Differential Input Voltage Sing	Vin, pp	190		700	mVpp	
Differential Input Impedance	Zin	90	100	110	Ohm	
Differential Input Return Loss		IEEE 802.3ba 86A.4.11			dB	
J2 Jitter Tolerance	Jt2	0.17			UI	
J9 Jitter Tolerance	Jt9	0.29			UI	
Data Dependent Pulse Width Shrinkage (DDPWS)		0.07			UI	

Eye Mask Coordinates {X1, X2, Y1, Y2}		0.11,0.31 95, 350			UI mV	
Receiver						
Single Ended Output Voltage		---0.3		4.0	V	
AC Common Mode Output Voltage				7.5	mV	
Differential Output Voltage Swing	Vout,pp	300		850	mVpp	
Differential Output Impedance	Zout	90	100	110	Ohm	
Termination Mismatch at 1MHz				5	%	
Differential Output Return Loss		IEEE 802.3ba 86A.4.2.1			dB	
Common Mode Output Return		IEEE 802.3ba 86A.4.2.2			dB	
Output Transition Time		28			ps	
J2 Jitter Output	Jo2			0.42	UI	
J9 Jitter Output	Jo9			0.65	UI	
Eye Mask Coordinates {X1, X2, Y1, Y2}		0.29, 0.5 150, 420			UI mV	

Note:

1. Power---on Initialization Time is the time from when the power supply voltages reach and remain above the minimum recommended operating supply voltages to the time when the module is fully functional.
2. The single ended input voltage tolerance is the allowable range of the instantaneous input signals.

Optical Characteristics

Parameter	***Symbol***	***Min.***	***Typ.***	***Max.***	***Unit***	***Notes***
Wavelength Assignment	L0	12694.5	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	
Transmitter						
Side Mode Suppression Ratio	SMSR	30			dB	
Total Average Launch Power	P_T			10.5	dBm	
Average Launch Power, each Lane	P_{AVG}	---3.7		4.5	dBm	
Optical Modulation Amplitude (OMA), each Lane	P_{OMA}	---.07		5	dBm	1
Difference in Launch Power between and Two Lanes	Ptx,diff			4.7	dB	

Launch Power in OMA minus Transmitter and Dispersion		1.5				
TDP, each Lane	TDP			2.6	dB	
Extinction Ratio	ER	5.5			dB	
Relative Intensity Noise	RIN			---128	dB/Hz	
Optical Return Loss Tolerance	TOL			20	dB	
Transmitter Reflectance	RT			---12	dB	
Transmitter Eye Mask Definition {X1, X2, X3, Y1, Y2, Y3}		{0.25,0.4,0.45,0.25,0.28,0.4}				
Average Launch Power OFF Transmitter, each	Poff			---30	dBm	
Receiver						
Damage Threshold, each Lane	TH_d	3.8			dBm	2
Average Receive Power, each Lane		---20.2		---1.5	dBm	
Receiver Reflectance	R_R			---26	dB	
Receiver Power (OMA), each Lane				---1	dBm	
Receiver Sensitivity (OMA), each Lane	SEN			---18	dBm	
Stressed Receiver Sensitivity (OMA), each				---15.8	dBm	3
Difference in Receiver Power between and Two Lanes	Prx,diff			7	dB	
LOS Assert	LOSA	---35			dBm	
LOS Deassert	LOSD			---20	dBm	
LOS Hysteresis	LOSH	0.5			dB	
Receiver Electrical 3 dB upper Cutoff Frequency,	Fc			12.3	GHz	
Conditions of Stress Receiver Sensitivity Test (Note 4)						
Vertical Eye Closure Penalty, each Lane			2.2		dB	
Stressed Eye J2 Jitter, each Lane			0.3		UI	
Stressed Eye J9 Jitter, each Lane			0.47		UI	

Note:

1. Even if the TDP<0.8 dB, the OMA min must exceed the minimum value specified here.
2. 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.
3. Measured with conformance test signal at receiver input for BER= 1x10---12.
4. Vertical eye closure penalty and stressed eye jitter are test conditions for measuring stressed receiver sensitivity. They are not characteristics of the receiver.

Pin Descriptions

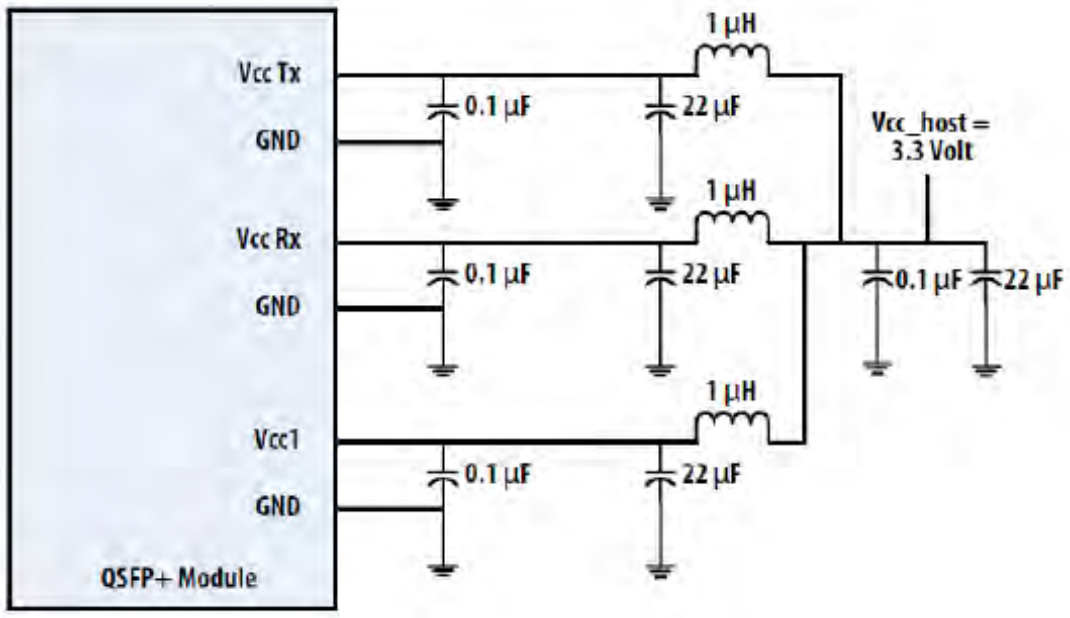
Pin	*Logic*	*Symbol*	*Name/Descriptions*	*Ref.*
1		GND	Module Ground	1
2	CML---I	Tx2---	Transmitter inverted data input	
3	CML---I	Tx2+	Transmitter non---inverted data input	
4		GND	Module Ground	1
5	CML---I	Tx4---	Transmitter inverted data input	
6	CML---I	Tx4+	Transmitter non---inverted data input	
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	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 dta 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

Note:

1. GND is the symbol for signal and supply (power) common for QSFP+ modules. All are common within the QSFP+ 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 Vxx Tx are the receiving and transmission power suppliers and shall be applied concurrently. Recommend host board power supply filtering is shown in image below. VccRx, Vcc1 and Vcc Tx may be internally connected within the QSFP+ transceiver module in any combination. The connector pins are each rated for a maximum current of 500mA

Recommended Power Supply Filter



Electrical Pin-out Details

Top Side
Viewed from Top

Bottom Side
Viewed from Bottom

Digital Diagnostic Functions

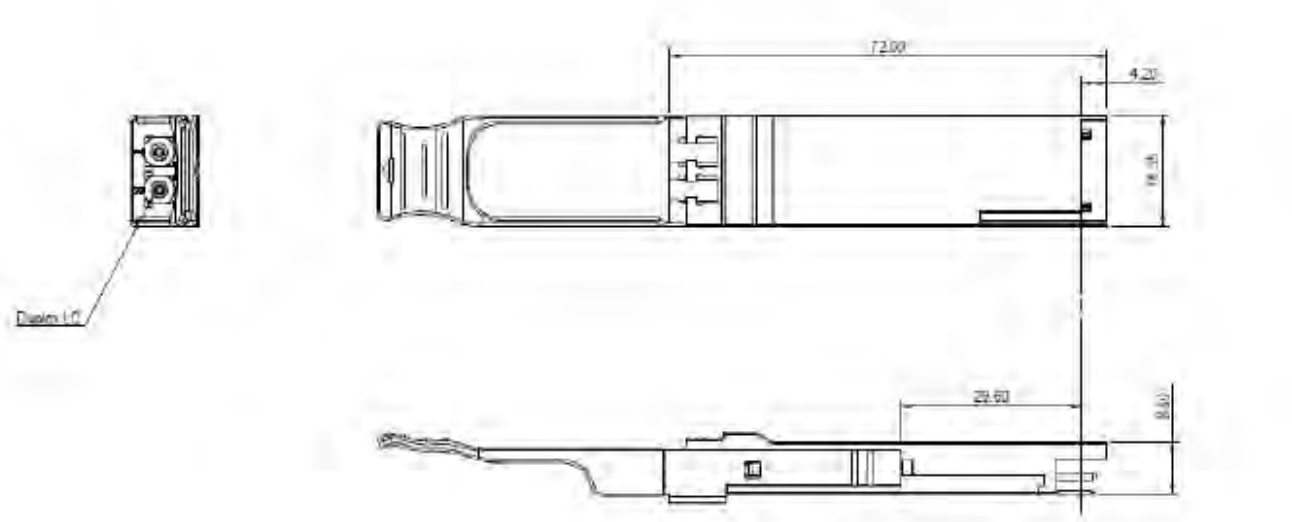
The following digital diagnostic characteristics are defined over the normal operating conditions unless otherwise specified.

Parameter	*Symbol*	*Min.*	*Max.*	*Unit*	*Notes*
Temperature monitor absolute error	DMI_Temp	-3	+3	°C	Over operating temperature range
Supply voltage monitor absolute error	DMI_VCC	-0.1	0.1	V	Over full operating range
Channel RX power monitor absolute error	DMI_RX_Ch	-2	2	dB	1
Channel Bias current monitor	DMI_ Ibias_Ch	-10%	10%	mA	
Channel TX power monitor absolute error	DMI_TX_Ch	-2	2	dB	1

Note:

1. Due to measurement accuracy of different single mode fibers, there could be an additional +/-1 dB fluctuation, or a +/- 3 dB total accuracy.

Mechanical Specifications



ESD

This transceiver is specified as ESD threshold 1kV for SFI pins and 2kV for all other electrical input pins, tested per MIL-STD-883, Method 3015.4/JESD22-A114-A (HBM). However, normal ESD precautions are still required during the handling of this module. This transceiver is shipped in ESD protective packaging. It should be removed from the packaging and handled only in an ESD protected environment.

Laser Safety

This is a Class 1 Laser Product according to IECC 60825-1:2007. This product complies with 21 CFR 1040.10 and 1040.11 except for deviations pursuant to Laser Notice No. 50, dated (June, 2007).