40G-QSFP-ER4-PRO

Brocade® (Formerly) 40G-QSFP-ER4 Compatible TAA Compliant 40GBase-ER4 QSFP+ Transceiver (SMF, 1270nm to 1330nm, 40km, DOM, 0 to 70C, LC)

Features

- SFF-8436 Compliance
- Duplex LC Connector
- Commercial Temperature 0 to 70 Celsius
- Single-mode Fiber
- Hot Pluggable
- Excellent ESD Protection
- Metal with Lower EMI
- RoHS Compliant and Lead Free

Applications:

- 40GBase Ethernet
- Access and Enterprise

Product Description

This Brocade® (Formerly) 40G-QSFP-ER4 compatible QSFP+ transceiver provides 40GBase-ER4 throughput up to 40km 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 Brocade® (Formerly) 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.

Proline'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.

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		TH_d	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	-40		85	°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			40	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) Tolerance		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 Loss		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	

Notes:

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 (OMA)	Ptx,diff			4.7	dB	
Launch Power in OMA minus Transmitter and Dispersion Penalty (TDP), each Lane		1.5			dBm	
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	R_T			-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 Lane	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 Lane				-15.8	dBm	3
Difference in Receiver Power between and Two Lanes (OMA)	Prx,diff			7	dB	
LOS Assert	LOSA	-35			dBm	
LOS De-assert	LOSD			-20	dBm	
LOS Hysteresis	LOSH	0.5			dB	
Receiver Electrical 3 dB upper Cutoff Frequency, each Lane	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	

Notes:

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

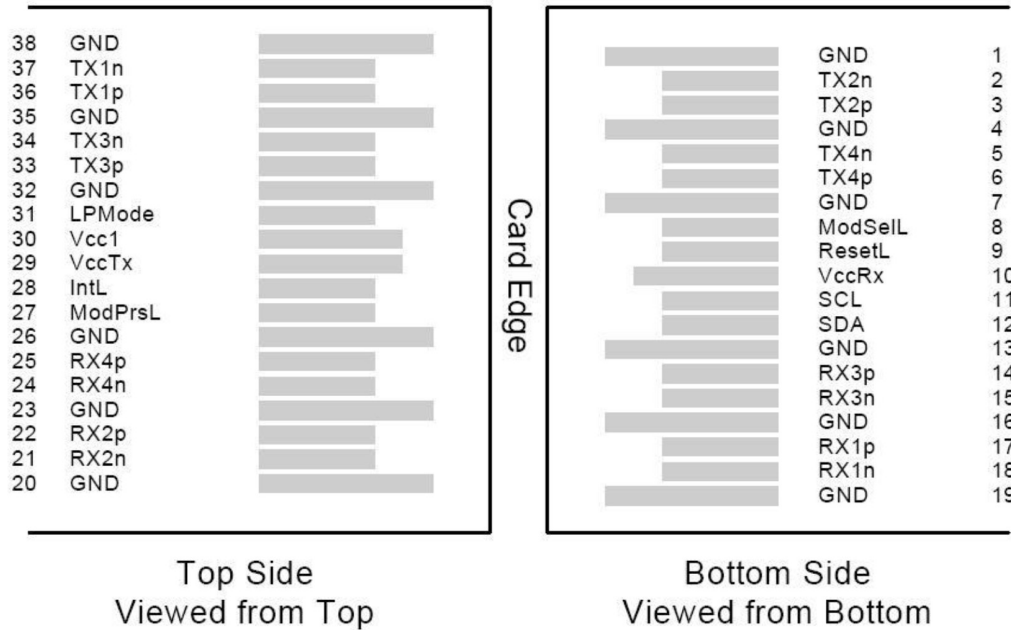| Pin	Logic	Symbol	Name/Descriptions	Ref.
1		GND	Module Ground	1
2	CML-I	Tx2-	Transmitter inverted data input	
3	CML-I	Tx2+	Transmitter non-inverted data input	
4		GND	Module Ground	1
5	CML-I	Tx4-	Transmitter inverted data input	
6	CML-I	Tx4+	Transmitter non-inverted data input	
7		GND	Module Ground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

Notes:

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
38 GND		GND 1
37 TX1n		TX2n 2
36 TX1p		TX2p 3
35 GND		GND 4
34 TX3n		TX4n 5
33 TX3p	Card Edge	TX4p 6
32 GND		GND 7
31 LPMode		ModSelL 8
30 Vcc1		ResetL 9
29 VccTx		VccRx 10
28 IntL		SCL 11
27 ModPrsL		SDA 12
26 GND		GND 13
25 RX4p		RX3p 14
24 RX4n		RX3n 15
23 GND		GND 16
22 RX2p		RX1p 17
21 RX2n		RX1n 18
20 GND		GND 19

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

Notes:

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

Duplex LC

72.00

4.20

18.35

29.60

8.50

About Us:

Proline Options is one of North America's leading providers of transceivers and high speed cabling. With a reputation for quality, tested products that cover the connectivity spectrum, Proline Options has a solution for you regardless of the specification.

At Proline Options, every product is tested in its intended application - never batch or spec tested only. We run bandwidth, distance and IOS network tests. We have documented an impressive 0.03% failure rate over the last 10 years. To continue this rate of success we invest millions annually in our own on-site testing lab.

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