

40Gb/s QSFP+ ER4 Optical Transceiver

Product Features

- Duplex LC connector
- Hot-pluggable QSFP+ form factor
- Operating data rate up to 11.3Gbps per Lane
- Up to 40km transmission
- Maximum 3.5W operation power
- Compliant with IEEE 802.3ba
- Compliant with SFF 8436
- Digital Diagnostic Monitoring (DDM)
- Complies with RoHS directive (2002/95/EC)

Applications

- 40GBASE-ER4 Ethernet Links

This product is a high performance 40Gbps transceiver module designed for optical communication applications. It converts 4 channels of 10Gb/s electrical input data to 4 CWDM optical signals, and multiplexes them into a single channel for 40Gb/s optical transmission. On the receiver side, the module optically de-multiplexes a 40Gb/s input into 4 CWDM channels signals, and converts them to 4 channel output electrical data.

Ordering Information

Part Number	Description
AC-B-Q40ER4-xx	QSFP+ ER4 40km optical transceiver with full real-time digital diagnostic monitoring and pull tab

Regulatory Compliance

Feature	Standard	Performance
Electromagnetic Interference (EMI)	FCC Part 15 Class B	Compatible with standards
	EN 55022:2010, Class B	
Electromagnetic susceptibility (EMS)	EN 55024:2010	Compatible with standards
Laser Eye Safety	FDA 21CFR 1040.10 and 1040.11	Compatible with Class I laser product
	EN60950, EN (IEC) 60825-1,2	

Absolute Maximum Ratings

It has to be noted that the operation in excess of any individual absolute maximum ratings might cause permanent damage to this module.

Parameter	Symbol	Min	Max	Unit	Notes
Storage Temperature	Tst	-40	+85	°C	
Operating relative humidity (Non- condensing)	RH	5	90	%	
Input Voltage	-	GND	Vcc	V	
Power Supply Voltage	Vcc	0	3.6	V	

Recommended Operating Environment

Parameter	Symbol	Min	Typical	Max	Unit	Notes
Power Supply Voltage	Vcc	+3.14	+3.3	+3.46	V	
Power Supply Current	Icc	-	-	1130	mA	
Data rate per lane		-	10.3125	11.3	Gbps	
Operating relative humidity (Non- condensing)	RH	5		85	%	
Case Temperature (Operating)	TC	0	-	70	°C	
I2C clock frequency	-	-	100	400	KHz	
Power consumption Max	-	-	-	3.5	W	

Characteristics

Parameter	Test Point	Min	Typical	Max	Unit	Notes
Transmitter (each Lane)						
Signal Speed per lane	Sp		10.3125		Gbps	
Center Wavelength	λ	1264.5	1271	1277.5	nm	Lane0
		1284.5	1291	1297.5	nm	Lane1
		1304.5	1311	1317.5	nm	Lane2
		1324.5	1331	1337.5	nm	Lane3
Spectral Width (-20dB)	$\Delta\lambda$	-	-	1	nm	
Side Mode Suppression Ratio	SMSR	30	-	-	dB	
Total Output Optical Power	Pot			10.5	dBm	
Average Optical Output Power	Po	-2.7	-	4.5	dBm	
Optical Modulation Amplitude, Each Lane	OMA	0.3		5	dBm	
Extinction Ratio	Er	5.5	-	-	dB	
Differential Input Impedance	-	80	100	120	Ω	
Differential Data Input Swing	VINPP	120		1000	mV	
Receiver (each Lane)						
Wavelength of Operation	λ	1264.5	1271	1277.5	nm	Lane0
		1284.5	1291	1297.5	nm	Lane1
		1304.5	1311	1317.5	nm	Lane2
		1324.5	1331	1337.5	nm	Lane3
Optical Input Power, each lane	Pin	-21.2	-	-4.5	dBm	1
Damage Threshold	Pmax	-	-	3.8	dBm	
Receiver Sensitivity (OMA), each Lane	Rxsen			-19	dBm	
LOS Asserted	T_loss_on	-35			dBm	-

LOS De-Asserted	T_loss_off			-22	dBm	-
LOS Hysteresis	T_loss_Hs	0.5		-	dB	
Differential Data Output Swing	VOUTPP	350		800	mV	

Notes:

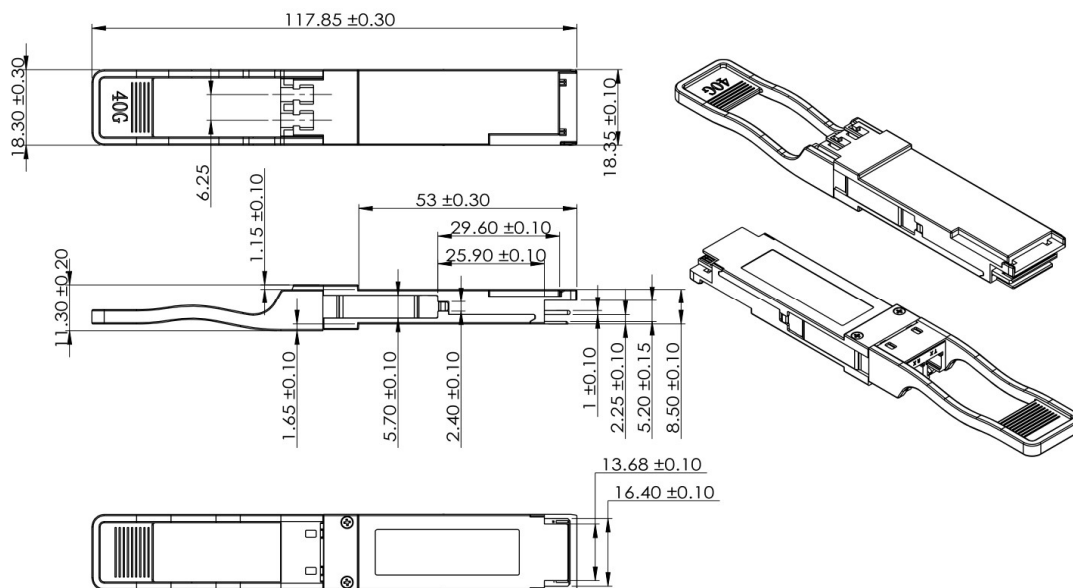
1. Measured with 10.3125Gbps, BER=1x10⁻¹²

Digital Diagnostic Functions

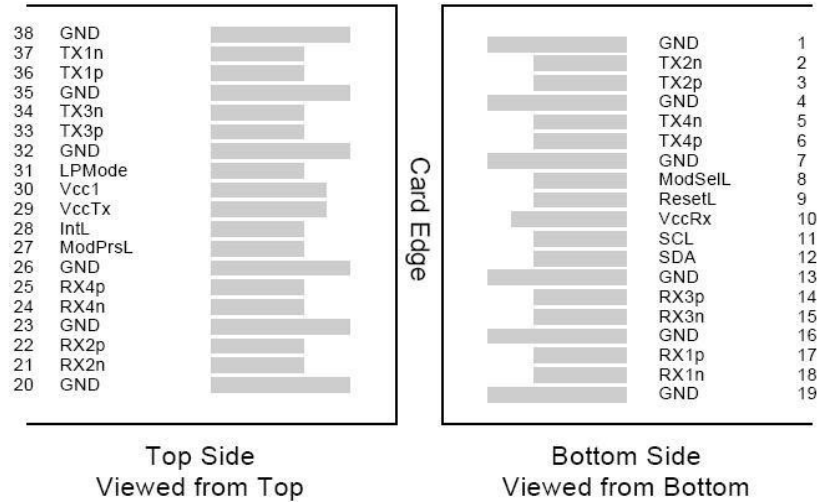
The following digital diagnostic characteristics are defined over the normal operating conditions unless otherwise specified.

Parameter	Symbol	Min	Max	Unit	Notes
Temperature monitor absolute error	DMI_Temp	-3	+3	°C	
Supply voltage monitor absolute error	DMI_VCC	-0.1	+0.1	V	
Channel RX power monitor absolute error	DMI_RX_Ch	-3	+3	dB	
Channel Bias current monitor	DMI_Ibias_Ch	-10%	+10%	mA	
Channel TX power monitor absolute error	DMI_TX_Ch	-3	+3	dB	

Mechanical Dimensions



(Unit: mm [inch])

Pin Assignment and Description

Pin Assignment

PIN #	Logic	Symbol	Description	Notes
1		GND	Ground	
2	CML-I	Tx2n	Transmitter Inverted Data Input	
3	CML-I	Tx2p	Transmitter Non-Inverted Data output	
4		GND	Ground	
5	CML-I	Tx4n	Transmitter Inverted Data Input	
6	CML-I	Tx4p	Transmitter Non-Inverted Data output	
7		GND	Ground	
8	LVTTLL-I	ModSelL	Module Select	
9	LVTTLL-I	ResetL	Module Reset	
10		VccRx	+3.3V Power Supply Receiver	
11	LVC MOS-I/O	SCL	2-Wire Serial Interface Clock	
12	LVC MOS-I/O	SDA	2-Wire Serial Interface Data	
13		GND	Ground	

14	CML-O	Rx3p	Receiver Non-Inverted Data Output
15	CML-O	Rx3n	Receiver Inverted Data Output
16		GND	Ground
17	CML-O	Rx1p	Receiver Non-Inverted Data Output
18	CML-O	Rx1n	Receiver Inverted Data Output
19		GND	Ground
20		GND	Ground
21	CML-O	Rx2n	Receiver Inverted Data Output
22	CML-O	Rx2p	Receiver Non-Inverted Data Output
23		GND	Ground
24	CML-O	Rx4n	Receiver Inverted Data Output
25	CML-O	Rx4p	Receiver Non-Inverted Data Output
26		GND	Ground
27	LVTTTL-O	ModPrsL	Module Present
28	LVTTTL-O	IntL	Interrupt
29		VccTx	+3.3 V Power Supply transmitter
30		Vcc1	+3.3 V Power Supply
31	LVTTTL-I	LPMODE	Low Power Mode
32		GND	Ground
33	CML-I	Tx3p	Transmitter Non-Inverted Data Input
34	CML-I	Tx3n	Transmitter Inverted Data Output
35		GND	Ground
36	CML-I	Tx1p	Transmitter Non-Inverted Data Input
37	CML-I	Tx1n	Transmitter Inverted Data Output
38		GND	Ground