

HQL-70792-xx

40Gb/s QSFP+ 10km LC Transceiver

Product Description

This product is a transceiver module designed for 10km optical communication applications. The design is compliant to 40GBASE-LR4 according to IEEE P802.3ba. The module converts 4 x 10Gb/s electrical data input channels to 4 λ optical signals, multiplexed into a single fiber. Reversely, on the receiver side, the module optically de-multiplexes a 40Gb/s input into 4 x 10Gb/s electrical output signal.

Features

- 4 channels full-duplex transceiver module
- Up to 11.2Gbps data links per channel
- Maximum link length of 10Km
- Hot-pluggable
- Single 3.3V power supply
- Digital Diagnostic Monitor (DDM)
- Power Consumption < 3.5W



Applications

- Switch, Router and HBA's
- 4CH SDR, DDR and QDR Infiniband
- 40GBASE-LR4 Ethernet

Absolute Maximum Ratings

Parameter	Symbol	Min	Max	Unit
Storage Temperature	Tst	-20	85	°C
Relative Humidity (non-condensation)	RH	0	85	%
Operating Case Temperature	Topc	0	70	°C
Operating Range		0.002	10	km
Supply Voltage	VCC	-0.5	3.6	V

Optical Characteristics

Parameter	Symbol	Min.	Typical	Max	Unit
Wavelength Assignment	L0	1264.5	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	-	-	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 _{in}	-	-	-128	dB/Hz
Optical Return Loss Tolerance		-	-	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	P_{off}			-30	dBm
Receiver					
Center Wavelength	λ_c	1260	1310	1360	nm
Damage Threshold	TH_d	3.3			dBm
Average Power at Receiver Input, each Lane		-13.7		2.3	dBm
Receiver Reflectance	R_R	-	-	-26	dB
Receiver Power (OMA), each Lane		-	-	3.5	dBm
Stressed Receiver Sensitivity in OMA, each Lane		-	-	-11.5	dBm
Receiver Sensitivity, each Lane	S_R	-	-	-13	dBm
Difference in Receive Power between any two Lanes (OMA)				7.5	dB
Receive Electrical 3 dB upper Cutoff Frequency, each Lane				12.3	GHz
Signal Loss Assert Threshold	LOSA	-20			dBm
Signal Loss Dessert Threshold	LOSD			-15	dBm
LOS Hysteresis	LOSH	0.5		6	dBm
Conditions of Stress Receiver Sensitivity Test²					
Vertical Eye Closure Penalty, each Lane			1.6		dB
Stressed Eye Jitter, each Lane			0.3		UI

Electrical Characteristics

Parameter	Symbol	Min	Typ	Max	Unit
Supply Voltage	Vcc1, VccTx,	3.1		3.47	V
Supply Current	Icc			1.13	A
Link turn-on time					
Transmit turn-on time				2000	ms
Transmitter (per Lane)					
Single ended input voltage tolerance	VinT	-0.3		4.0	V
Differential data input swing	Vin,pp	120		1200	mVpp
Differential input threshold			50		mV
AC common mode input voltage tolerance (RMS)		15			mV
Differential input return loss		Per IEEE P802.3ba, Section 86A.4.1.1			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		UI mV
Receiver (per Lane)					
Single-ended output voltage		-0.3		4.0	V
Differential data output swing	Vout,pp	200		400	mVpp
		300		600	
		400	550	800	
		600		1200	
AC common mode output voltage (RMS)				7.5	mV
Termination mismatch at 1 MHz				5	%
Differential output return loss		Per IEEE P802.3ba, Section 86A.4.2.1			dB
Common mode output return loss		Per IEEE P802.3ba, Section 86A.4.2.2			dB
Output transition time, 20% to 80%		28			ps
J2 Jitter output	Jo2			0.42	UI
J9 Jitter output	Jo9			0.65	UI
Eye mask coordinates #1 {X1, X2 Y1, Y2}			0.29, 0.5 150, 425		UI mV
Power Supply Ripple Tolerance	PSR	50			mVpp

Transceiver Block Diagram

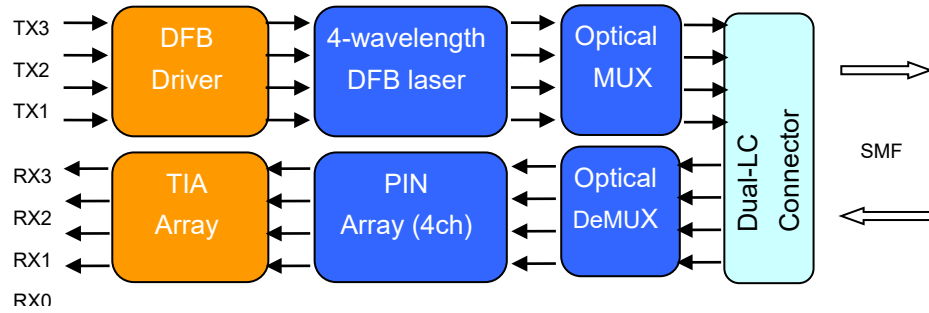
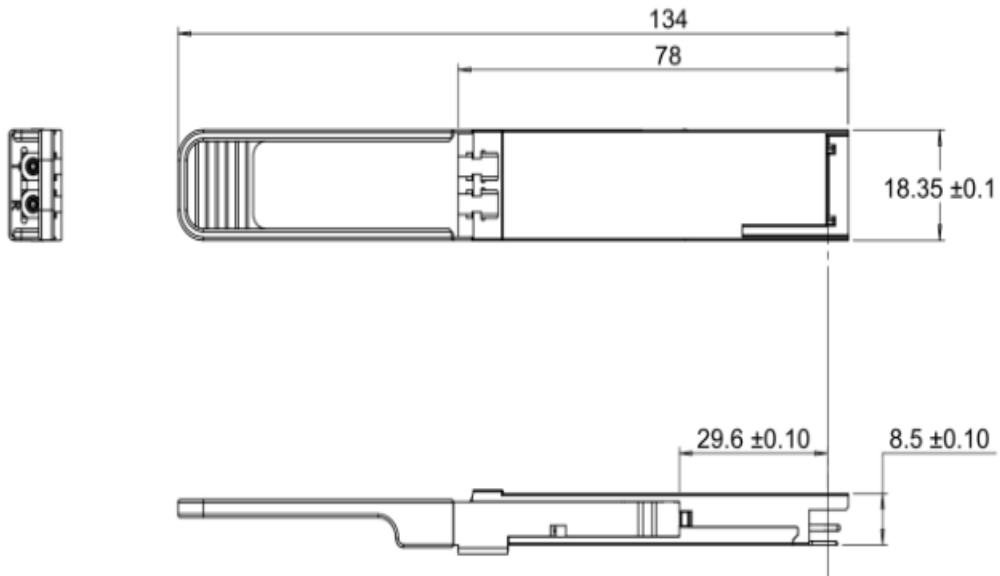


Figure 1: 40Gb/s QSFP LR4 Transceiver Block Diagram

Mechanical Design Diagram



For safety and reliability reasons, please read the following information carefully.

Light Budget is one of the key items for designing fiber optic network. In order to create a product that will meet application requirements. To adequately characterize the budget loss, the following key parameters are generally considered:

- Transmitter: Output power, temperature and aging
- Fiber connections: Active connection and splices
- Fiber Cable: fiber attenuation and temperature effect
- Receiver: Detector sensitivity
- Others: Safety margin and repairs

When one of the above-listed variables fails to meet specifications, the performance of the network can be greatly affected or worse, the degradation can lead to network failure. Unfortunately, not all the variables can be controlled with ease during the deployment of the network or the maintenance stage; however, there exists one component, the connector that is too-often overlooked, sometimes overused (test jumpers) but that can be controlled using the proper procedure.



This is a Class 1 Laser Product according to IEC 60825-1:2014 compatible with 21 CFR 1040.10 and 1040.11 except for deviations pursuant to Laser Notice No. 50, dated (June 24, 2007).



This transceiver is specified as ESD threshold 1kV for SFI pins and 2kV for all others electrical input pins, tested per MIL-STD-883G, Method 3015.4 /JESD22-A114-A (HBM). However, normal ESD precautions are still required during the handling of this module.



The optical ports of the module need to be terminated with an optical connector or with a dust plug in order to avoid contamination. In a study by NTT-Advanced Technology, 98% of installers and 80% of network owners reported that issues with connector contamination were the greatest cause of network failures.

CE EU declaration of conformity

The CE marking is mandatory for this category of products. It is the manufacturer's declaration that the product meets the requirements of the applicable EU directives required to allow free movement and sale of the product throughout the European Economic Area.

Equipment Specific part number extension

-XX*

- 51 Cisco
- 52 Ericsson
- 53 Huawei
- 54 Juniper
- 55 Generic (MSA)
- 56 HP
- 57 Extreme
- 58 3COM (HP)
- 59 Alcatel (Nokia)
- 60 Combo code
- 61 H3C (HP)
- 62 Brocade
- 63 Arista Networks
- 64 Adva
- 65 Microsens