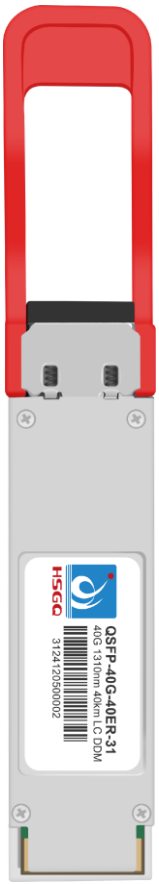
Product Features



- Support line rates for 41.25 Gb/s
- Lane bit rate 10.3125 Gb/s
- CWDM DML laser and PIN ROSA
- Up to 40km transmission on SMF
- Support Multi-Pin function with IntL/RxLOSL and LPMode/TxDIS
- I2C interface with integrated Digital Diagnostic monitoring
- Digital Diagnostics Monitoring Interface
- Compliant with QSFP+ MSA with LC connector
- Single +3.3V power supply
- Power dissipation: Commercial: < 3.5W Industrial: <4.5W
- Complies with EU Directive 2015/863/EU

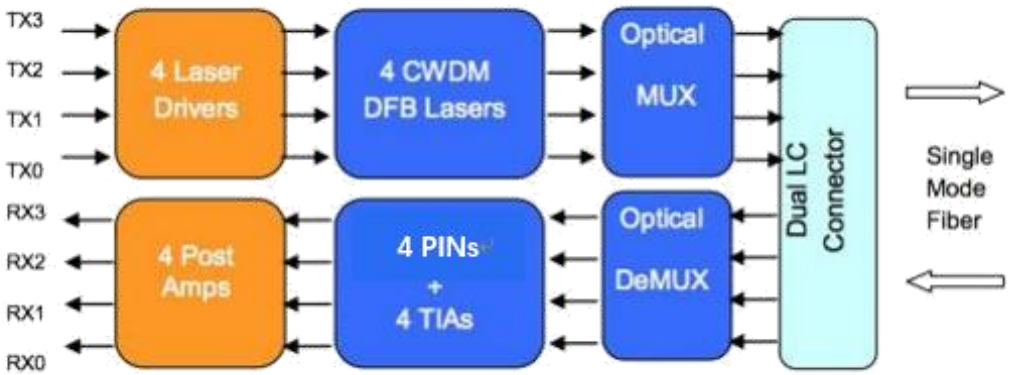
Applications

- 40G Ethernet
- InfiniBand QDR, DDR and SDR

Descriptions

40G QSFP+ ER4 Transceiver is designed for 40km optical communication applications. This module contains 4-lane optical transmitter, 4-lane optical receiver and module management block including 2 wire serial inter-face. The optical signals are multiplexed to a single-mode fiber through an industry standard LC connector.

Module Block Diagram



Product specifications

(1) Absolute Maximum Ratings

Parameter	Symbol	Min	Typ	Max	Units	Notes
Storage Temperature	TS	-40		+85	degC	
Operating Case Temperature	Top	-40		+85	degC	
Power Supply Voltage	Vcc	-0.5		+3.6	V	
RelativeHumidity(non-condensation)	RH	0 to 85% non-condensing			%	

Note:

1、Exceeding any of these values may immediately damage the device.

(2) Recommended Operating Conditions

Parameter	Symbol	Min	Typ	Max	Units	Notes
Operating Case Temperature	Top	0		+70	°C	1
		-40		+85		2
Operating Case Temperature	VCC	3.14	3.3	3.47	V	
Maximum Power Dissipation	PD			3.5	W	1
				4.5		2
Lane Bit Rate	/		10.3125		Gb/s	
Transmission Distance	TD			40	km	
Coupled fiber	Single mode fiber					3

Note:

1、The product is commercial.

2、The product is Industrial.

3、Optical fiber use 9/125um SMF.

(3) Optical and Characteristics

Parameter	Symbol	Min	Typ	Max	Unit	Notes
Transmitter						
Signaling Speed per Lane	/		10.3125		Gbps	
Center Wavelength Lane 0	λ0	1264.5	1271	1277.5	nm	
Center Wavelength Lane 1	λ1	1284.5	1291	1297.5	nm	
Center Wavelength Lane 2	λ2	1304.5	1311	1317.5	nm	
Center Wavelength Lane 3	λ3	1324.5	1331	1337.5	nm	
Total Launch Power	PT			10.5	dBm	1
Average Launch Power per Lane	Pavg	1		6	dBm	1
OMA, each Lane	POMA	1		7	dBm	1
Difference in launch power	Ptx,diff			4.7	dB	

between any two lanes (Average and OMA) between any Two Lanes (OMA)						
Average Output Power (Laser Turn off)	Poff			-30	dBm	
Side Mode Suppression Ratio	SMSR	30			dB	
Extinction Ratio	ER	5			dB	
RIN20OMA	RIN			-128	Db/Hz	
Optical Return Loss Tolerance	TOL			20	dB	
Transmitter Reflectance	RT			-12	dB	
Optical Eye Mask	{0.25,0.4, 0.45, 0.25, 0.28, 0.4}				%	2
Receiver						
Signaling rate, each lane	/		10.3125		Gbps	
Center Wavelength Lane 0	λ0	1264.5	1271	1277.5	nm	
Center Wavelength Lane 1	λ1	1284.5	1291	1297.5	nm	
Center Wavelength Lane 2	λ2	1304.5	1311	1317.5	nm	
Center Wavelength Lane 3	λ3	1324.5	1331	1337.5	nm	
Damage threshold , each lane	Pdamage	3.3			dBm	
Receiver sensitivity Average, each lane	SEN			-15	dBm	2
Los Assert	LosA	-30			dBm	
Los De-assert	LosDA			-18	dBm	

Note:

1、The optical power is launched into SMF.

2、Measured with a PRBS 231-1 test pattern @10.3125 Gb/s, PRBS 2^31-1.

(4) Electrical Characteristics

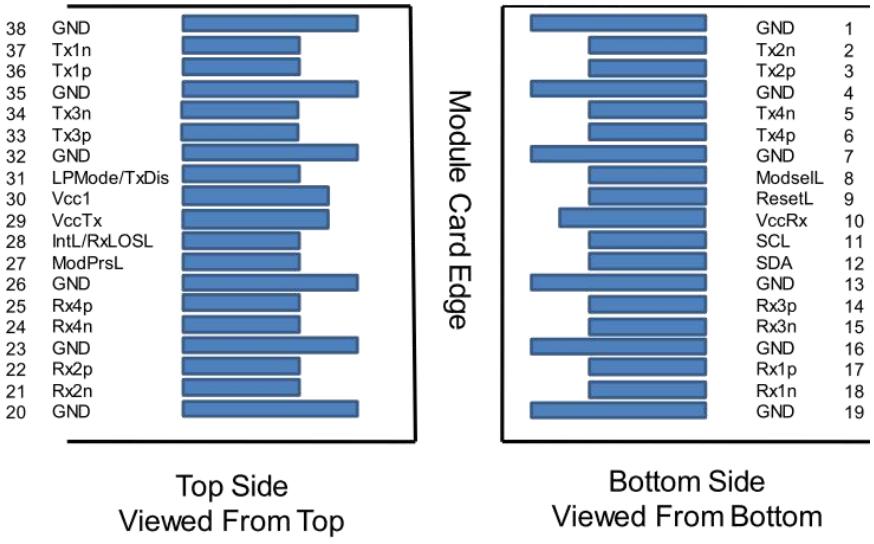
Parameter	Symbol	Min	Typ	Max	Unit	Notes
Transmitter (Module Input)						
Data Rate, each lane	/		10.3125		Gbps	
Differential Voltage pk-pk	Vpp			900	mV	1
Common Mode Voltage	Vcm	-350		2850	mV	
Transition time	Trise/Tfall	10			ps	2
Receiver (Module Output)						
Data Rate, each lane		10.3125			Gbps	
Common Mode Noise, RMS	Vrms			17.5	mV	
Differential output voltage swing	Vout, pp			900	mV	
Eye width	EW15	0.57			UI	
Eye height	EH15	228			mV	
Differential Termination Resistance Mismatch	/			10	%	1
Transition time	Trise/Tfall	12			ps	

Note: 1. At 1 MHz. 2. 20%~80%.

(5) Digital Diagnostics

Parameter	Range	Accuracy	Unit	Calibration	Notes
Temperature	-40 to +85	±3	ºC	Internal / External	
Voltage	3.0 to 3.6	±3%	V	Internal / External	
Bias Current	30 to 100	±10%	mA	Internal / External	
TX Power	1 to 6	±3dB	dB	Internal / External	
RX Power	-15 to 2.3	±3dB	dB	Internal / External	

(6) Pin Assignment and Description



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

14	CML-O	Rx3p	Receiver Non-Inverted Data Output	3	
15	CML-O	Rx3n	Receiver Inverted Data Output	3	
16		GND	Ground	1	1
17	CML-O	Rx1p	Receiver Non-Inverted Data Output	3	
18	CML-O	Rx1n	Receiver Inverted Data Output	3	
19		GND	Ground	1	1
20		GND	Ground	1	1
21	CML-O	Rx2n	Receiver Inverted Data Output	3	
22	CML-O	Rx2p	Receiver Non-Inverted Data Output	3	
23		GND	Ground	1	1
24	CML-O	Rx4n	Receiver Inverted Data Output	3	1
25	CML-O	Rx4p	Receiver Non-Inverted Data Output	3	
26		GND	Ground	1	1
27	LVTTL-O	ModPrsL	Module Present	3	
28	LVTTL-O	IntL/Rx_LOS	Interrupt/Rx_LOS	3	
29		VccTx	+3.3 V Power Supply transmitter	2	2
30		Vcc1	+3.3 V Power Supply	2	2
31	LVTTL-I	LPMode/TxDIS	Low Power Mode/Tx_Disable	3	
32		GND	Ground	1	1
33	CML-I	Tx3p	Transmitter Non-Inverted Data Input	3	
34	CML-I	Tx3n	Transmitter Inverted Data Output	3	
35		GND	Ground	1	1
36	CML-I	Tx1p	Transmitter Non-Inverted Data Input	3	
37	CML-I	Tx1n	Transmitter Inverted Data Output	3	
38		GND	Ground	1	1

Note:

1、GND is the symbol for signal and supply (power) common for the QSFP+ module. 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、Vcc Rx, Vcc1 and Vcc Tx are the receiver and transmitter power supplies and shall be applied concurrently. Requirements defined for the host side of the Host Edge Card Connector are listed in MSA. The connector pins are each rated for a maximum current of 1000 mA.

(7) Recommended Interface Circuit

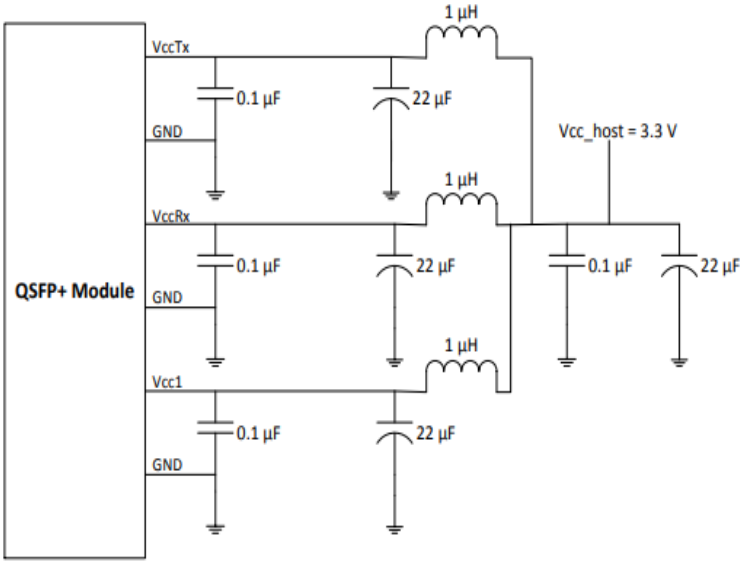
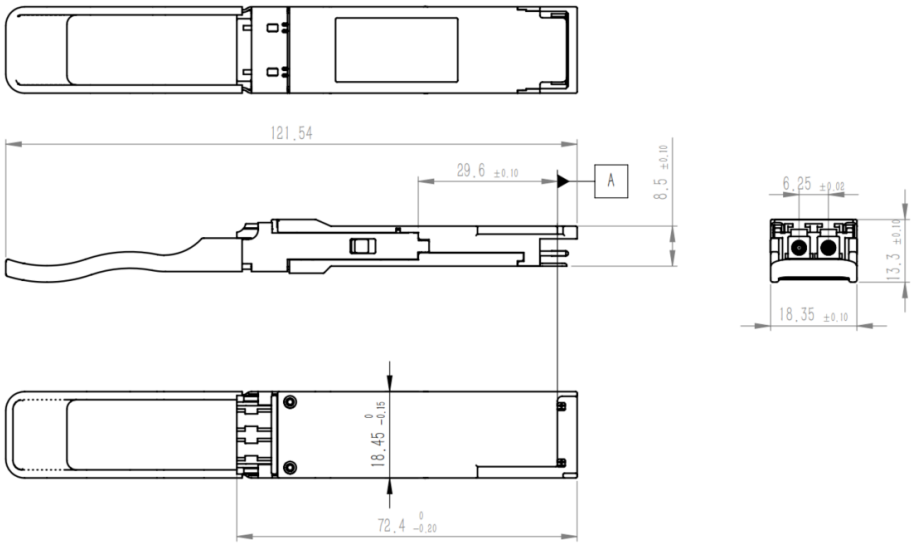


FIGURE 5-4 RECOMMENDED HOST BOARD POWER SUPPLY FILTERING

(8) Mechanical Specifications



Ordering Information

Model	Specification Description
QSFP-40G-10ER	QSFP+ 41.25G/1310nm/10km/0 ~ 70℃/LC/DDM/SMF/DML/ Blue
QSFP-40G-40ER	QSFP+ 41.25G/1310nm/40km/-40 ~ 85℃/LC/DDM/SMF/DML/Red