

## QSFP+ IR PSM Optical Transceiver

### Part Number - VQ-40IR4CP-BA

**VQ-40IR4CP-BA** is an optical transceiver designed for use in 40Gb/s links over single mode fiber. They integrate four independent transmit and receive channels. Each channel operates at 10.3125G/s, the module can operate at 40Gb/s up to 2km using 9/125um SMF. They are compliant with QSFP+ MSA and IEEE 802.3ba 40GBASE -IR4 and the optical fiber ribbon cable with the MPO (MTP) connector. The transceiver is compliant with RoHS.

### Features

- 4 Parallel lanes design
- Compliant with QSFP+ MSA
- Management interface specifications per SFF-8436
- 4 channels PIN photo detector
- Up to 11.1 Gb/s per channel data links
- Single +3.3V power supply
- Class 1 laser safety certified
- Up to 2km on SMF
- RoHS Compliant
- Operating temperature range (Case temperature): C Grade 0°C to 70°C

### Applications

- 40GBASE-IR4 Ethernet
- Infiniband QDR, DDR, and SDR
- Data center

### Ordering Information

Part Number	Description	Bail Color
VQ-40IR4CP-BA	40G QSFP+ IR 1310nm, Up to 2km	yellow

### General Specifications

Parameter	Symbol	Min	Typ	Max	Unit	Remarks
Storage Temperature	T <sub>s</sub>	-40		85	C	
Relative Humidity	RH	5		95	%	
Supply Voltage	V <sub>cc</sub>	-0.5		4	V	

Stresses in excesses of the absolute maximum ratings can cause permanent damage to the device. These are absolute stress ratings only. Functional operation of the device is not implied at these or any other conditions in excesses of those given in the operational sections of the data sheet. Exposure to absolute maximum ratings for extended periods can adversely affect device reliability.

### Recommended Operating Conditions

Parameter	Symbol	Min	Typ	Max	Unit	Remarks
Operating Case Temperature	T <sub>c</sub>	0	25	70	C	
Supply Voltage	V <sub>cc</sub>	3.135	3.3	3.465	V	
Data Rate PER Channel			10.3125	11.2	Gb/s	

### Optical – Transmitter

Parameter	Symbol	Min	Typ	Max	Unit	Remarks
Launch Optical Power per lane	P <sub>o</sub>	-5.2		0.5	dBm	1
Center Wavelength Range	λ <sub>0</sub>	1260	1310	1360	nm	
Extinction Ratio	EX	3.5			dB	2
Spectral width (RMS)	Δλ			3.5	nm	
Optical Return Loss Tolerance	ORLT			12	dB	
P <sub>out</sub> @TX-Disable Asserted	P <sub>off</sub>			-30	dBm	1
Eye Diagram	IEEE Std 802.3 ba compatible					

1. The optical power is launched into SMF.
2. Measured with a PRBS 2<sup>31</sup>-1 test pattern @10.3125Gbps.

### Optical – Receiver

Parameter	Symbol	Min	Typ	Max	Unit	Remarks
Center Wavelength	λ <sub>c</sub>	1260		1360	nm	
Receiver Sensitivity (OMA)	S			-12.6	dBm	1
Damage Threshold	P <sub>OL</sub>	0.5			dBm	1
LOS De-Assert	LOS <sub>D</sub>			-15	dBm	
LOS Assert	LOSA	-30			dBm	
LOS Hysteresis		0.5			dB	

1. Measured with PRBS 2<sup>31</sup>-1 test pattern, 10.3125Gb/s, BER<10<sup>-12</sup>

### Electrical- Transmitter

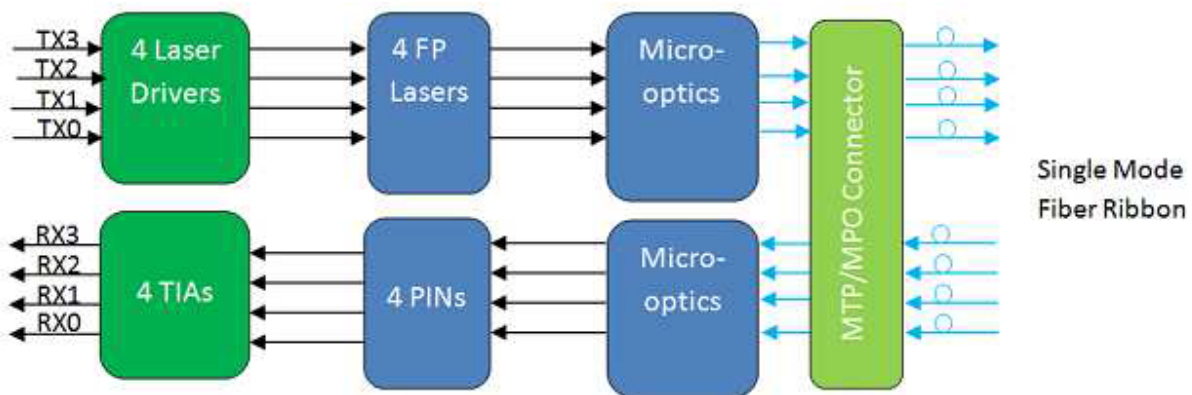
Parameter	Symbol	Min	Typ	Max	Unit	Remarks
Module Supply Current	I <sub>cc</sub>			1100	mA	
Power Dissipation	PD			3500	mW	
Input Differential Impedance	Z <sub>IN</sub>		100			
Differential Data Input Swing	V <sub>IN</sub> , P-P	180		900	mVP-P	
TX Fault - Transmitter Fault	V <sub>OH</sub>	2.0		V <sub>CCHOST</sub>	V	
TX Fault - Normal Operation	V <sub>OL</sub>	0		0.8	V	
TX Disable - Transmitter Disable	V <sub>IH</sub>	2.0		V <sub>CCHOST</sub>	V	
TX Disable - Transmitter Enable	V <sub>IL</sub>	0		0.8	V	

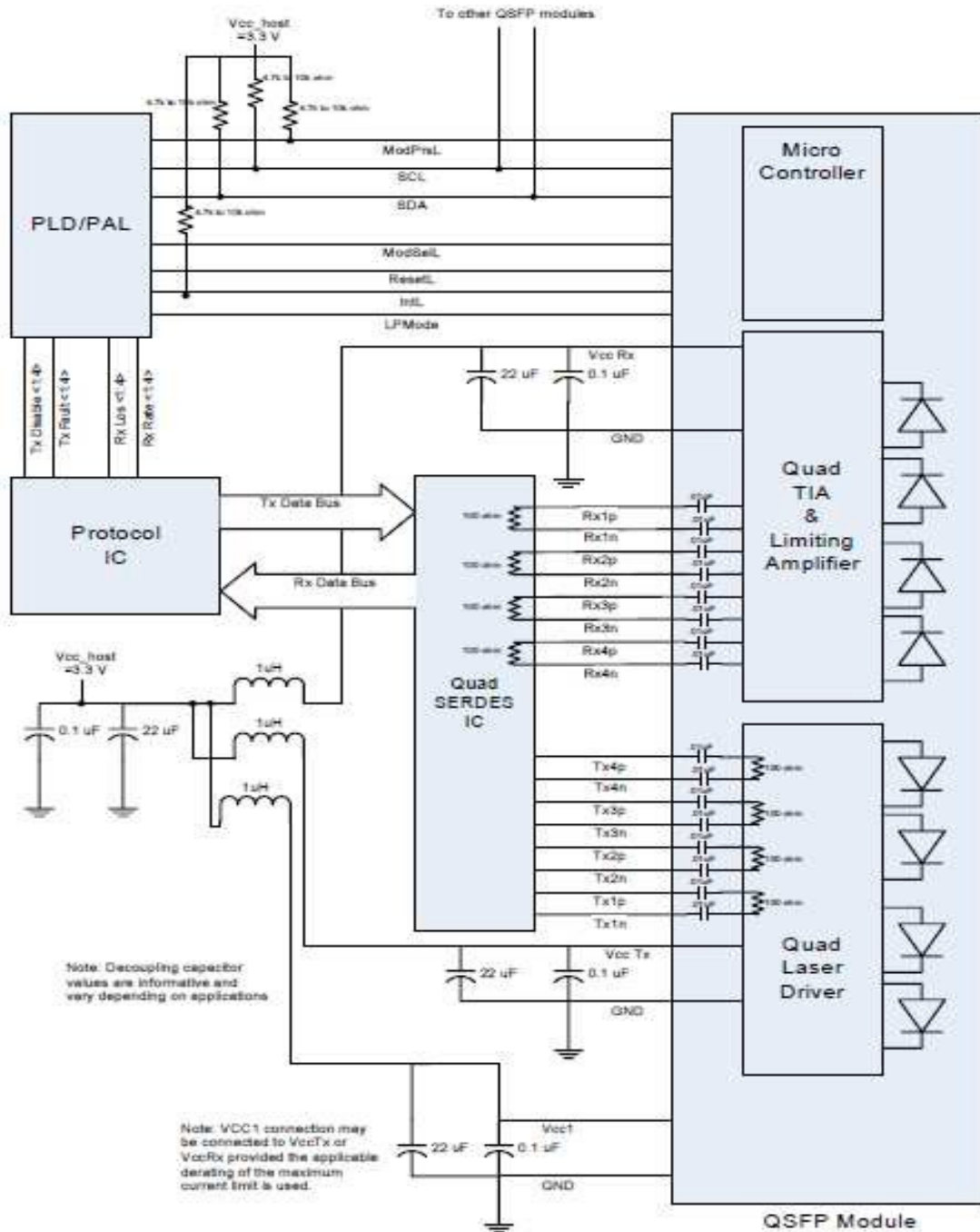
### Electrical – Receiver

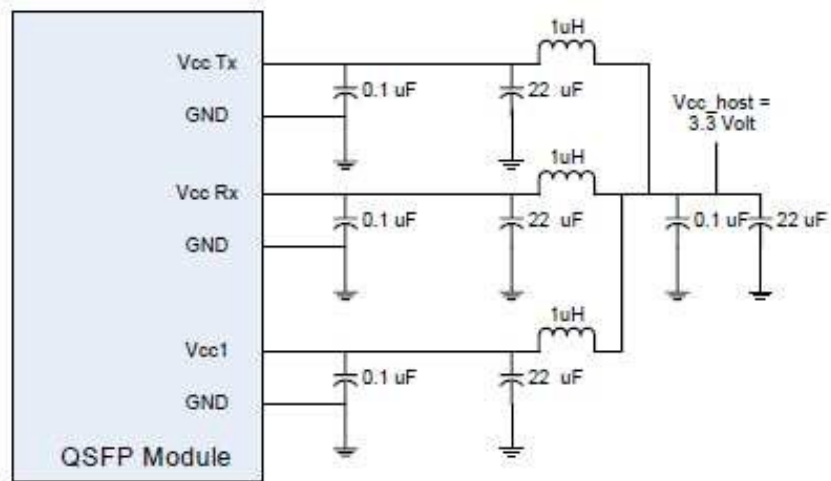
Parameter	Symbol	Min	Typ	Max	Unit	Remarks
Output Differential Impedance	Z <sub>O</sub>		100			
Differential Data Output Swing	V <sub>OUT</sub> , P-P	300		850	mVP-P	1
Data Output Rise Time, Fall Time	t <sub>r</sub> , t <sub>f</sub>	28			Ps	2
RX_LOS Loss of signal (LOS)	V <sub>OH</sub>	2.0		V <sub>CCHOST</sub>	V	3
RX_LOS Normal Operation	V <sub>OL</sub>			0.8	V	3

1. Internally AC coupled but requires an external 100 differential load termination.
2. 20 - 80%
3. LOS is an open collector output. Should be pulled up with 4.7k on the host board.

### Block Diagram

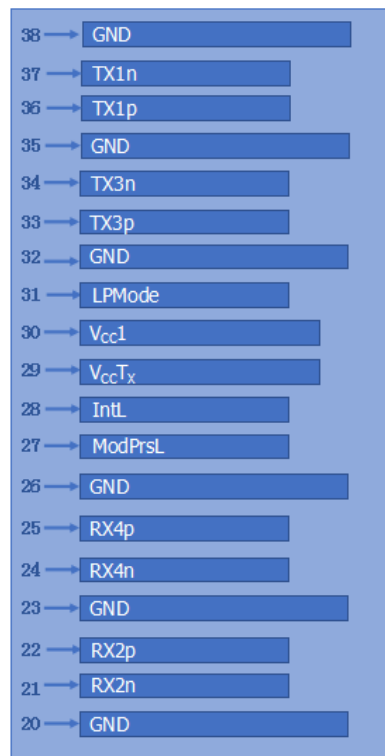




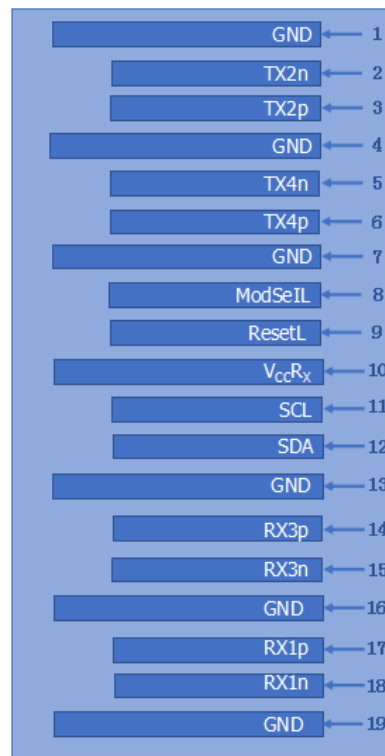


Host Board Power Supply Filter Network

### Electrical Connector Layout



Top Board



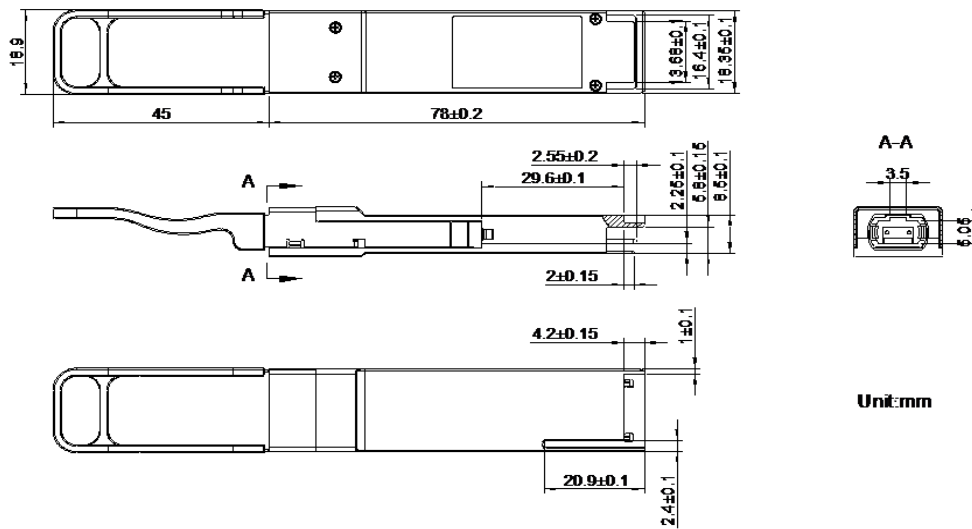
Bottom Board

### Electrical Pin Definition

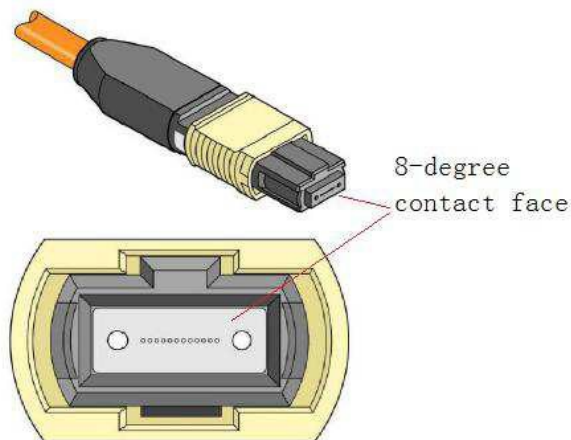
PIN #	Symbol	Description	Remarks
1	GND	Transmitter Ground (Common with Receiver Ground)	1
2	Tx2n	Transmitter Inverted Data Input, LAN2	
3	Tx2p	Transmitter Non-Inverted Data Input, LAN2	
4	GND	Transmitter Ground (Common with Receiver Ground)	1
5	Tx4n	Transmitter Inverted Data Input, LAN4	
6	Tx4p	Transmitter Non-Inverted Data Input, LAN4	
7	GND	Transmitter Ground (Common with Receiver Ground)	1
8	ModSelL	Module select	2
9	ResetL	Module Reset	2
10	V <sub>ccRX</sub>	+3.3V Power Supply Receiver	
11	SCL	2-wire serial interface clock	2
12	SDA	2-wire serial interface data	2
13	GND	Transmitter Ground (Common with Receiver Ground)	1
14	Rx3p	Receiver Non-Inverted Data Output, LAN3	
15	Rx3n	Receiver Inverted Data Output, LAN3	
16	GND	Transmitter Ground (Common with Receiver Ground)	1
17	Rx1p	Receiver Non-Inverted Data Output, LAN1	
18	Rx1n	Receiver Inverted Data Output, LAN1	
19	GND	Transmitter Ground (Common with Receiver Ground)	1
20	GND	Transmitter Ground (Common with Receiver Ground)	1
21	Rx2n	Receiver Inverted Data Output, LAN2	
22	Rx2p	Receiver Non-Inverted Data Output, LAN2	
23	GND	Transmitter Ground (Common with Receiver Ground)	1
24	Rx4n	Receiver Inverted Data Output, LAN4	1
25	Rx4p	Receiver Non-Inverted Data Output, LAN4	
26	GND	Transmitter Ground (Common with Receiver Ground)	1
27	ModPrsL	Module Present	
29	IntL	Interrupt	2
29	V <sub>ccTX</sub>	+3.3V Power Supply transmitter	
30	V <sub>cc1</sub>	+3.3V Power Supply	
31	LPMODE	Low Power Mode	2
32	GND	Transmitter Ground (Common with Receiver Ground)	1
33	Tx3p	Transmitter Non-Inverted Data Input, LAN3	
34	Tx3n	Transmitter Inverted Data Input, LAN3	
35	GND	Transmitter Ground (Common with Receiver Ground)	1
36	Tx1p	Transmitter Non-Inverted Data Input, LAN1	
37	Tx1n	Transmitter Inverted Data Input, LAN1	
38	GND	Transmitter Ground (Common with Receiver Ground)	1

1. The module signal grounds are isolated from the module case.
2. This is an open collector/drain output that on the host board requires a 4.7K to 10K pull-up resistor to VccHost.

### Mechanical Dimensions



ALL DIMENSIONS ARE  $\pm 0.2$ mm UNLESS OTHERWISE SPECIFIED  
UNIT: mm



To minimize MPO connection induced reflections, a female MPO receptacle with 8-degree angled end-face is utilized for this product as illustrated above.

## Contact Information

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