

100G QSFP28 ER4 Optical Transceiver, I-Temp

Part Number - VQ-1CER4IS-BA

VQ-1CER4IS-BA is a high performance QSFP28 industrial temperature transceiver module for 100 Gigabit Ethernet data links over single mode fiber.

Features

- Hot pluggable QSFP28 MSA form factor
- Compliant with IEEE 802.3ba 100GBASE-ER4L
- Supports 103.1Gb/s aggregate bit rate
- Integrated 4x25Gb/s LANWDM EML TOSA and APD ROSA
- LANWDM wavelengths of 1295.56, 1300.05, 1304.58 and 1309.14nm
- Up to 30km reach without FEC for G.652 SMF
- 4x25G electrical interface (OIF CEI-28G-VSR)
- Operating case temperature range of -40°C to 85°C
- Power dissipation < 5.5 W
- Single +3.3V power supply
- RoHS-6 compliant

Applications

- IEEE 802.3ba 100GBASE-ER4

Ordering Information

Part Number	Data Rate	Link Length	Laser	Detector	Fiber Type	Temperature
VQ-1CER4IS-BA	100G	30km	1310nm EML	1310nm APD	SMF	-40 – 85C

Product Overview

Vitex **VQ-1CER4IS-BA** transceivers are designed for use in 100Gb/s links up to 30km of 9 μm Single Mode Fiber without FEC. The QSFP48 module supports applications for Ethernet

Switches and IP Routers optical interfaces. Digital Optical Monitoring interfaces are provided via the SFP+ standards compliant I2C interface.

General Specifications

Parameter	Symbol	Min	Typ	Max	Unit	Remarks
Operating Temperature	Tc	-40		85	C	1
Storage Temperature	Tsto	-40		85	C	2
Input Voltage	Vcc	3.14	3.3	3.46	V	
Maximum Voltage	Vmax	-0.5		3.6	V	3
Module total power	Pt			5.5	W	
Module Low Power Mode	Plp			1.5	W	

1. Case temperature
2. Ambient temperature
3. For electrical power interface

Optical – Transmitter

Parameter	Symbol	Min	Typ	Max	Unit	Remarks
Signal Speed per lane		25.78125+/-100ppm			Gbps	
Total Output Optical power	Pt			12.5	dBm	1
Average Launch Power (ea lane)	Pavg	-2.9		4.5	dBm	
Optical Center Wavelength (L0)	λ_c	1294.53	1295.56	1296.59	nm	
Optical Center Wavelength (L1)	λ_c	1299.02	1300.06	1301.09	nm	
Optical Center Wavelength (L3)	λ_c	1303.54	1304.59	1305.63	nm	
Optical Center Wavelength (L4)	λ_c	1308.09	1309.14	1310.19	nm	
Optical Modulation Amplitude(ea lane)	OMA	-1.3		4.5	dBm	
Extinction Ratio	ER	7			dB	
Side Mode Suppression Ration	SMSR	30			dB	
Relative Intensity Noise	RIN			-130	dB/Hz	
Optical Return Loss Tolerance	ORLT			20	dB	
Transmitter Eye Mask {X1, X2, X3, Y1, Y2, Y3}	EM	{0.25, 0.4, 0.45, 0.25, 0.28, 0.4}				

- 1.Average

Optical- Receiver

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Optical Center Wavelength (L0)	λ_c	1294.53	1295.56	1296.59	nm	
Optical Center Wavelength (L1)	λ_c	1299.02	1300.06	1301.09	nm	
Optical Center Wavelength (L3)	λ_c	1303.54	1304.59	1305.63	nm	
Optical Center Wavelength (L4)	λ_c	1308.09	1309.14	1310.19	nm	
Damage Threshold Input Power	P_{DT}	-2.5				1
Optical Input Power (ea Lane)	P_{avg}	-16.65		-3.5	dBm	
Receiver Sensitivity (OMA), ea lane	S_{OMA}			-14.65	dB	2
Stressed Receiver Sensitivity (OMA)	SRS			-12.65	dBm	
LOS Assert	LOSa		-26		dBm	
LOS De-assert	LOSd		-24		dBm	
LOS Hysteresis	LOSh	0.5			dB	
Receiver Reflectance	Rxr			-26	dB	

1. Average
2. Measured with PRBS2³¹⁻¹ test pattern @ 25.78125Gbps, BER<1e-12

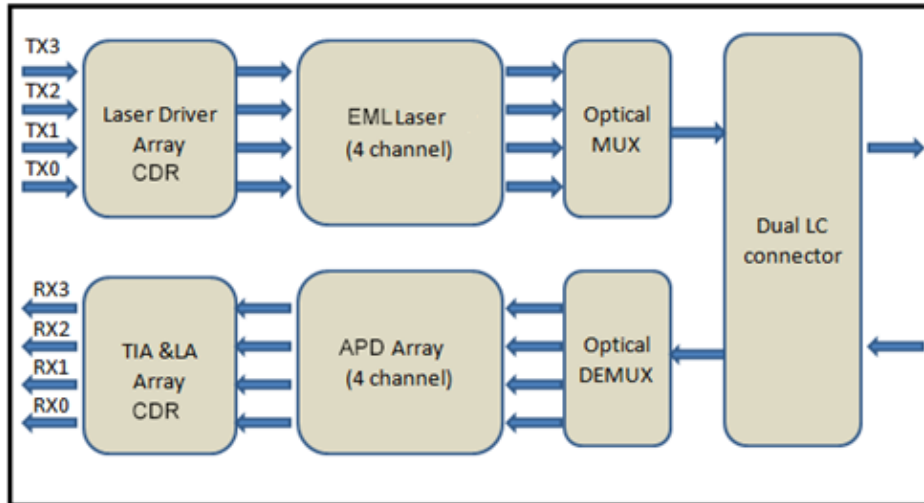
Electrical – Transmitter

Parameter	Symbol	Min	Typ	Max	Unit	Remarks
Signal Rate per lane		25.78125+/-100ppm			Gbps	
Differential Data input swing	Vin_pp			1000	mV	
Transmit disable voltage	Vd	Vcc-1.3		Vcc	V	
Transmit enable voltage	Ve	Vee		Vee+/-0.8		

Electrical – Receiver

Parameter	Symbol	Min	Typ	Max	Unit	Remark
Signal Rate per lane		25.78125+/-100ppm			Gbps	
Differential Data output swing	Vout_pp	300		900	mV	
Data output rise time (20%-80%)	tr		12		ps	
Data output fall time (20%-80%)	tf		12		ps	
LOS Fault	LOSa	Vcc-1.3		Vcc_host	V	
LOS Normal	LOSd	Vee		Vee+0.5	V	

Block Diagram



Functional Description

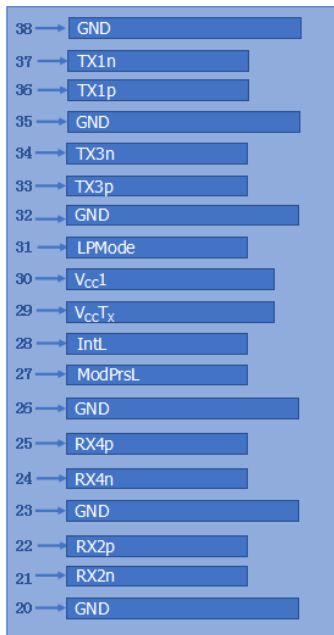
This product converts the 4-channel 25Gb/s electrical input data into LAN WDM optical signals (light), by a driven 4 wavelength EML lasers. The light is combined by the MUX parts as a 100Gb/s data, propagating out of the transmitter module from the SMF. The receiver module accepts the 100Gb/s LAN WDM optical signals input, and de-multiplexes it into 4 individual 25Gb/s channels with different wavelength. Each wavelength light is collected by a discrete APD photo diode, and then outputted as electric data after amplification by a TIA.

Electrical Signal Specifications

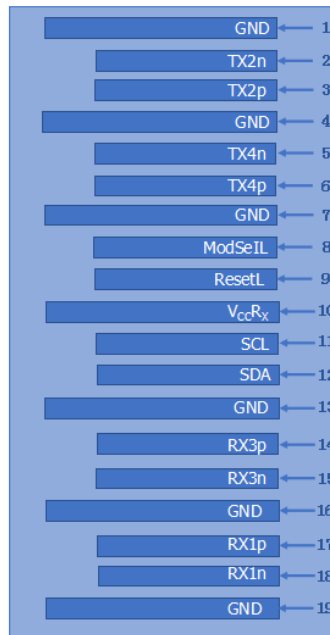
High-Speed Signal: Compliant to CAUI-4 (IEEE 802.3ba)

Low-Speed Signal: Compliant to SFF-8679

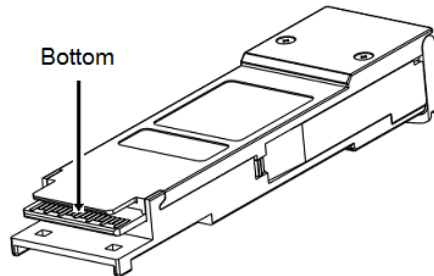
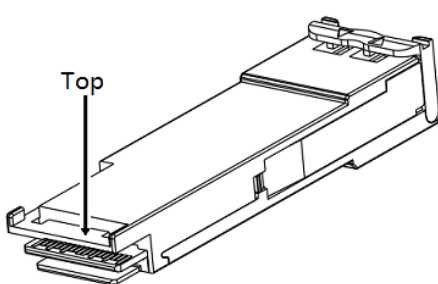
Electrical Connector Layout



Top of Board



Bottom of Board



Electrical Pin Definition

PIN #	Symbol	Description	Remarks
1	GND	Ground	5
2	Tx2n	Transmitter Inverted Data Input, LAN2	
3	Tx2p	Transmitter Non-Inverted Data Input, LAN2	
4	GND	Ground	5
5	Tx4n	Transmitter Inverted Data Input, LAN4	
6	Tx4p	Transmitter Non-Inverted Data Input, LAN4	
7	GND	Ground	5
8	ModSelL	Module select pin, the module responds to two-wire serial communication when low level	1
9	ResetL	Module Reset	2
10	V _{cc} ^R X	+3.3V Power Supply Receiver	
11	SCL	2-wire serial interface clock	
12	SDA	2-wire serial interface data	
13	GND	Ground	5
14	Rx3p	Receiver Non-Inverted Data Output, LAN3	
15	Rx3n	Receiver Inverted Data Output, LAN3	
16	GND	Ground	5
17	Rx1p	Receiver Non-Inverted Data Output, LAN1	
18	Rx1n	Receiver Inverted Data Output, LAN1	
19	GND	Ground	5
20	GND	Ground	5
21	Rx2n	Receiver Inverted Data Output, LAN2	
22	Rx2p	Receiver Non-Inverted Data Output, LAN2	
23	GND	Ground	5
24	Rx4n	Receiver Inverted Data Output, LAN4	
25	Rx4p	Receiver Non-Inverted Data Output, LAN4	
26	GND	Ground	5
27	ModPrsL	The module is inserted into the indicate pin and grounded in the module.	3
28	IntL	Interrupt	4
29	V _{cc} ^T X	+3.3V Power Supply transmitter	
30	V _{cc} 1	+3.3V Power Supply	
31	LPMoDe	Low Power Mode	5
32	GND	Ground	5
33	Tx3p	Transmitter Non-Inverted Data Input, LAN3	
34	Tx3n	Transmitter Inverted Data Input, LAN3	
35	GND	Ground	5
36	Tx1p	Transmitter Non-Inverted Data Input, LAN1	
37	Tx1n	Transmitter Inverted Data Input, LAN1	
38	GND	Ground	5

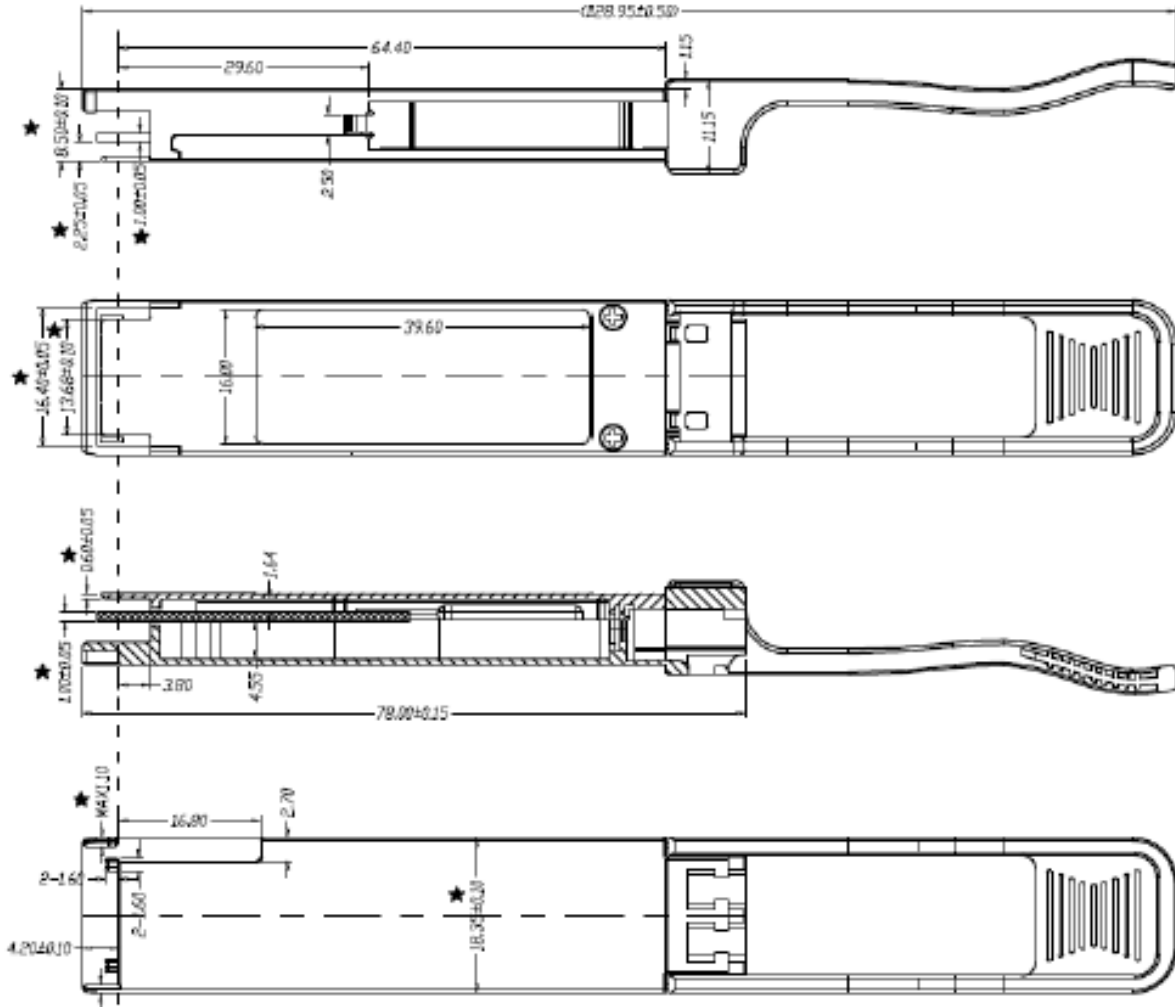
Notes:

1. ModSelL is the input pin. The module responds to 2-wire serial communication commands when it is held low by the host. ModSelL allows multiple QSFP modules to be used on a single 2-wire interface bus. If ModSelL is High, the module will not respond to any 2-wire interface communication from the host. ModSelL has internal pull-up resistors in the module
2. The module restart pin, when the low level on the ResetL pin lasts longer than the minimum pulse length, resets the module and restores all user modules to their default state. When performing reset device, the host should ignore all status bits. Until the module reset interrupt is completed, please note that during hot plugging, the module will issue this information to complete the reset interrupt without resetting
3. This pin is active high, indicating that the module is running under a low power module.
4. IntL is the output pin, which is the open collector output and must be pulled up to Vcc on the motherboard. When it is low, it indicates that the module may malfunction. The host uses a 2-wire serial interface to identify the interrupt source
5. Circuit ground is internally isolated from chassis ground.

References

1. IEEE standard 802.3ba. IEEE Standard Department.
2. QSFP28 4X PLUGGABLE TRANSCEIVER –SFF-8665

Mechanical Dimensions



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