

100G QSFP28 LR1 BiDi (10km) Optical Transceiver

PN: VQ-1CLR1CBx-AA

Product Overview

Vitex VQ-1CLR1CBx-AA is designed for 10km optical communication applications. It is intended for the service with single mode fiber in 100Gb/s high speed data communications. The optical signals are multiplexed to a single-mode fiber through commercial standard LC connector.

Features

- Supports 100GBASE-LR BiDi
- Lane signaling rate 106.25Gb/s with PAM4
- Up to 10km transmission on SMF
- EML Laser and PIN receiver
- 4x25.78Gb/s with NRZ electrical interface (CAUI-4)
- Support KP4 FEC inside the module
- High speed I/O electrical interface
- I2C interface with integrated Digital Diagnostic monitoring
- QSFP28 MSA package with simplex LC connector
- Single +3.3V power supply
- Power consumption <3.5 W
- Operating case temperature: 0 to 70 °C
- Compliant to 802.3cu, SFF-8636&SFF-8679 standard
- Compliant to 100G Lambda MSA 100G-LR1 Optical Specifications
- Complies with EU Directive 2015/863/EU

Applications

- 100G Ethernet
- Datacom

Ordering Information

Part Number	Description
VQ-1CLR1CB1-AA	100G QSFP28 LR1 BiDi, 1271nm Tx/1331nm Rx, 10km, Simplex-LC, C-temp
VQ-1CLR1CB2-AA	100G QSFP28 LR1 BiDi, 1331nm Tx/1271nm Rx, 10km, Simplex-LC, C-temp

General Specifications

Parameter	Symbol	Min	Typical	Max	Unit	Notes
Storage Temperature	TS	-40		+85	°C	
Supply Voltage (Maximum)	VCC	-0.5		+4.0	V	
Operating Relative Humidity	RH			+85	%	
Operating Case Temperature	TC	0		+70	°C	
Power Supply Voltage (Recommended)	VCC	3.13	3.3	3.47	V	
Transmission Distance	TD			10	km	Over SMF

Optical – Transmitter

Parameter	Symbol	Min	Typical	Max	Unit	Notes
Center Wavelength	CW	1264.5	1271	1277.5	nm	
		1324.5	1331	1337.5	nm	
Signaling Rate	SR			53.125	Gbps	
Frequency Offset	Foffset	-100		100	ppm	
Average Launch Power	PTX	-1.4		4.5	dBm	1
Outer Optical Modulation Amplitude	OMA	0.7		4.7	dBm	1
Launch power in OMA minus TDECQ	ER>=4.5 dB OMA-	-0.7			dBm	
	ER<4.5 dB TDECQ	-0.6			dBm	
Transmitter and dispersion eye closure for PAM4 (TDECQ) (max)	TDECQ			3.4	dBm	
Average Output Power (Laser Turn off)	Poff			-30	dBm	
Side Mode Suppression Ratio	SMSR	30			dB	
Extinction Ratio	ER	3.5			dB	
RIN_OMA	RIN			-136	dB/Hz	
Transmitter reflectance	Tref			-26	dB	
Optical Return Loss Tolerance	ORLT			15.6	dB	

1. The optical power is launched into SMF.

Optical – Receiver

Parameter	Symbol	Min	Typical	Max	Unit	
Center Wavelength	CW	1324.5	1331	1337.5	nm	
		1264.5	1271	1277.5	nm	
Damage threshold	Pdamage	5.5			dBm	2
Average Rx Power	PRx	-7.7		4.5	dBm	3
Receive power _OMAouter	POMA			4.7	dBm	
Receiver Sensitivity, OMA	SEN_OMA	TDECQ < 1.4 dB		-6.1		
		1.4 dB ≤ TDECQ ≤ 3.4 dB		7.5+TDECQ	dBm	4
Reflectance	Ref			-26	dB	
Los Assert	LosA	-26			dBm	
Los De-Assert	LosDA			-10	dBm	
Los Hysteresis	LosH	0.5			dB	

Stressed receiver sensitivity _OMAouter	SRS			-4.1	dBm	5
Conditions of stressed receiver sensitivity test:						
Stressed eye closure for PAM4 (SECQ)				3.4	dB	6
SECQ-10*IgCeq				3.4	dB	6

2. The receiver shall be able to tolerate, without damage, continuous exposure to an optical input signal having this average power level. The receiver does not have to operate correctly with this input power.
3. Average receive power, each lane (min) is informative and not the principal indicator of signal strength.
4. Measured with conformance test signal at TP3 using the test pattern PRBS31Q or scrambled idle for stressed receiver sensitivity for the BER= 2.4x10⁻⁴.
5. Measured with conformance test signal at TP3 (see3.11) for the BER specified in IEEE Std 802.3cu
6. Ceq is a coefficient defined in IEEE Std 802.3-2022 clause 121.8.5.3 which accounts for reference equalizer noise enhancement.

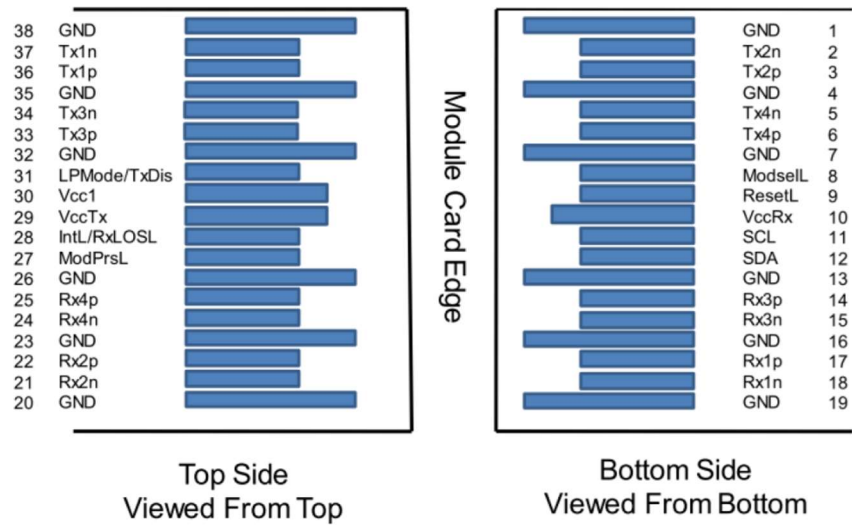
Electrical – Transmitter

Parameter	Symbol	Min	Typical	Max	Unit
Input Differential Impedance	Rin		100		Ohm
Differential Data Input Amplitude	VIN,P-P			900	mVpp
Differential termination mismatch (max)	D-mismatch			10	%
DC common-mode input voltage		-0.3		2.8	V
Transition time(20%~80%)	Tr Tf	10			ps
LPMode, Reset and ModSelL / Tx dis	VIL	-0.3		0.8	V
LPMode, Reset and ModSelL / Tx dis	VIH	2.0		V _{CC} +0.3	V

Electrical – Receiver

Parameter	Symbol	Min	Typical	Max	Unit
Output Differential Impedance	Rout		100		Ohm
Differential Data Output Amplitude	VOU _{TP} -P			900	mVpp
Differential termination mismatch (max)	D-mismatch			10	%
Transition time, 20% to 80%	Tr Tf	12			ps
ModPrsL and IntL/ Rx los	VOL	0		0.4	V
ModPrsL and IntL/ Rx los	VOH	V _{CC} -0.5		V _{CC} +0.3	V

Electrical Connector Layout



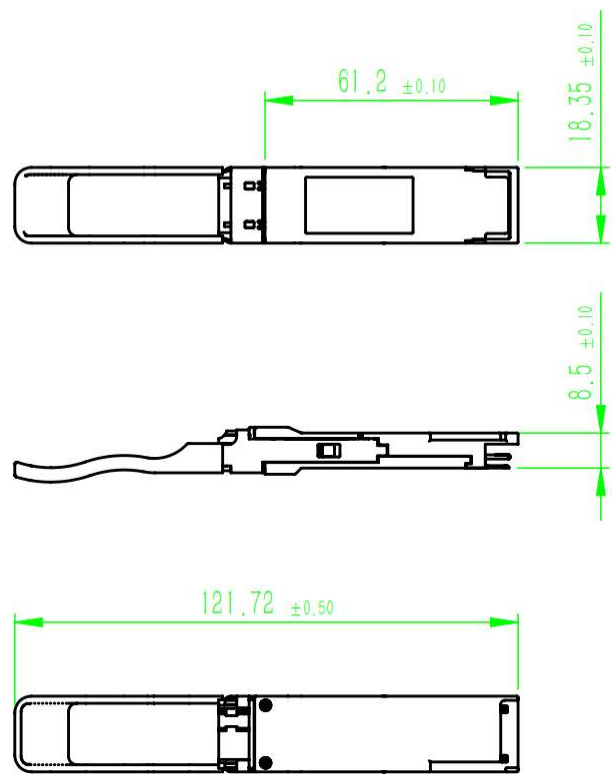
Electrical Pin Definition

PIN #	Logic	Symbol	Description	Plug Sequence	Remarks
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	LVC MOS-I/O	SCL	2-Wire Serial Interface Clock	3	
12	LVC MOS-I/O	SDA	2-Wire Serial Interface Data	3	
13		GND	Ground	1	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	Rx2n	Receiver Inverted Data Output	3	1
25	CML-O	Rx4p	Receiver Non-Inverted Data Output	3	
26		GND	Ground	1	1
27	LVTLL-O	ModPrsL	Module Present	3	
28	LVTLL-O	IntL/Rx_LOS	Interrupt/Rx_LOS	3	3
29		VccTx	+3.3V Power Supply Transmitter	2	2
30		VccI	+3.3V Power Supply	2	2
31	LVTLL-I	LPMode/TxDIS	Low Power Mode/Tx_Disable	3	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

1. GND is the symbol for signal and supply (power) common for the QSFP28 module. All are common within the QSFP28 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. VccRx, VccI and VccTx 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 500 mA.
3. Two Multi-Purpose Pin for supporting Tx_DIS and Rx_LOS function in the 100G QSFP28 LRI BIDI module.

Mechanical Dimensions



Revision History

Date	Rev	Description
09/20/2023	1.0	Release version
2/17/2025	2.0	New Branding Guidelines

For more information

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