100G QSFP28 DWDM ZR4 Optical Transceiver

Part Number - VQ-1CZR4Cxx-AA

VQ-1CZR4Cxx-AA is a high performance QSFP28 transceiver module for 100 Gigabit Ethernet data links over single mode fiber.

Features

- Supports 100Gbps
- Available in all C-Band Wavelengths on the 100GHz DWDM ITU Grid
- Single 3.3V Power Supply
- Power dissipation < 5.5W
- 80km reach over SMF with EDFA & DCM (dispersion compensation modules)
- QSFP28 MSA Compliant
- SFF-8636 Rev 2.10a Compliant
- 4x25G electrical interface
- LC duplex connector
- Commercial case temperature range of 0°C to 70°C
- I2C interface with integrated Digital Diagnostic Monitoring
- Safety Certification: TUV/UL/FDA
- RoHS Compliant

Applications

- 100G Amplified DWDM networks
- Data center interconnects

Ordering Information

Part Number	Description
VQ-1CZR4Cxx-AA	QSFP28 ZR4, C-Band DWDM, maximum distance 80km on SMF with EDFA & DCM, 100 Gigabit Ethernet, dual LC connector, pull-tab, <5.5W, 0°C to 70°C, DDM

xx-channel refers to the following table:

Channel (xx)	Part Number	Frequency (THz)	Center Wavelength (nm)
15	VQ-1CZR4C15-AA	191.5	1565.50
16	VQ-1CZR4C16-AA	191.6	1564.68
17	VQ-1CZR4C17-AA	191.7	1563.86
18	VQ-1CZR4C18-AA	191.8	1563.05
19	VQ-1CZR4C19-AA	191.9	1562.23
20	VQ-1CZR4C20-AA	192.0	1561.42
21	VQ-1CZR4C21-AA	192.1	1560.61
22	VQ-1CZR4C22-AA	192.2	1559.79
23	VQ-1CZR4C23-AA	192.3	1558.98
24	VQ-1CZR4C24-AA	192.4	1558.17
25	VQ-1CZR4C25-AA	192.5	1557.36
26	VQ-1CZR4C26-AA	192.6	1556.55
27	VQ-1CZR4C27-AA	192.7	1555.75
28	VQ-1CZR4C28-AA	192.8	1554.94
29	VQ-1CZR4C29-AA	192.9	1554.13
30	VQ-1CZR4C30-AA	193.0	1553.33
31	VQ-1CZR4C31-AA	193.1	1552.52
32	VQ-1CZR4C32-AA	193.2	1551.72
33	VQ-1CZR4C33-AA	193.3	1550.92
34	VQ-1CZR4C34-AA	193.4	1550.12
35	VQ-1CZR4C35-AA	193.5	1549.32
36	VQ-1CZR4C36-AA	193.6	1548.51
37	VQ-1CZR4C37-AA	193.7	1547.72
38	VQ-1CZR4C38-AA	193.8	1546.92
39	VQ-1CZR4C39-AA	193.9	1546.12
40	VQ-1CZR4C40-AA	194.0	1545.32
41	VQ-1CZR4C41-AA	194.1	1544.53
42	VQ-1CZR4C42-AA	194.2	1543.73
43	VQ-1CZR4C43-AA	194.3	1542.94
44	VQ-1CZR4C44-AA	194.4	1542.14
45	VQ-1CZR4C45-AA	194.5	1541.35
46	VQ-1CZR4C46-AA	194.6	1540.56
47	VQ-1CZR4C47-AA	194.7	1539.77
48	VQ-1CZR4C48-AA	194.8	1538.98
49	VQ-1CZR4C49-AA	194.9	1538.19
50	VQ-1CZR4C50-AA	195.0	1537.40
51	VQ-1CZR4C51-AA	195.1	1536.61
52	VQ-1CZR4C52-AA	195.2	1535.82
53	VQ-1CZR4C53-AA	195.3	1535.04
54	VQ-1CZR4C54-AA	195.4	1534.25
55	VQ-1CZR4C55-AA	195.5	1533.47
56	VQ-1CZR4C56-AA	195.6	1532.68
57	VQ-1CZR4C57-AA	195.7	1531.90
58	VQ-1CZR4C58-AA	195.8	1531.12
59	VQ-1CZR4C59-AA	195.9	1530.33
60	VQ-1CZR4C60-AA	196.0	1529.55
61	VQ-1CZR4C61-AA	196.1	1528.77

Product Overview

This transceiver is a high performance QSFP28 transceiver module for 100 Gigabit Ethernet data links over a single mode fiber pair. The maximum reach is 80km.

This module is compliant with the QSFP28 Multisource Agreement (MSA) and is hot pluggable.

Absolute Maximum Ratings

Parameter	Symbol	Min	Max	Unit
Storage Temperature	T_S	-40	85	°C
Supply voltage	V_{CC}	-0.5	3.6	V
Damage threshold	Rxdmg	5.5		dBm

Recommended Operating Conditions

Parameter	Symbol	Min	Typ	Max	Unit
Operating case temperature	T_C	0		70	°C
Power supply voltage	V_{CC}	3.135	3.3	3.465	V
Operating relative humidity	RH	5		85	%
Power dissipation	P_D			5.5	W

Optical – Transmitter

Parameter	Symbol	Min	Typ	Max	Unit
Signaling speed			53.125		Gbaud
Center wavelength spacing			100		GHz
			0.8		nm
Spectral width (-20dB)	Δλ			0.3	nm
Deviation from Central Frequency @EOL		-12.5		12.5	GHz
Side-mode suppression ratio	SMSR	30			dB
Extinction ratio	ER	3.5			dB
Transmit OMA	TxOMA	-0.2		4.2	dBm
Transmit Average [1]	TxAVG	-2.4		4	dBm

Launch Power in OMA_{outer} minus TDECQ [2]		-1.6			dBm
Launch Power in OMA_{outer} minus TDECQ [3]		-1.5			dBm
Transmitter and Dispersion Eye Closure	TDECQ			3.4	dB
Dispersion Tolerance	DT		40		ps/nm
Optical Return Loss Tolerance [4]				17.1	dB

1. Average launch power (min) is informative and not the principal indicator of signal strength. A transmitter with launch power below this value cannot be compliant; however, a value above this does not ensure compliance.
2. For ER ≥ 4.5dB
3. For ER < 4.5dB
4. Transmitter reflectance is defined looking into the transmitter

Optical- Receiver

Parameter	Symbol	Min	Typ	Max	Unit
Signaling speed			53.125		Gbaud
Center wavelength	λ_C	1528		1566	nm
Damage threshold		5.5			dBm
Receive Power (OMA_{outer})	RxOMA			4.7	dBm
Average Receive Power	RxAVG	-6.4		4.5	dBm
Receiver sensitivity (OMA_{outer}) [1]	SenOMA			Max (-4.5, SECQ–5.9)	dBm
Receiver reflectance				-26	dB
LOS Assert	LOSA	-15			dBm
LOS De-Assert	LOSD			-12	dBm
LOS Hysteresis		0.5			dB

1. Sensitivity is specified at 2.4 x 10^{-4} BER

Electrical – Transmitter

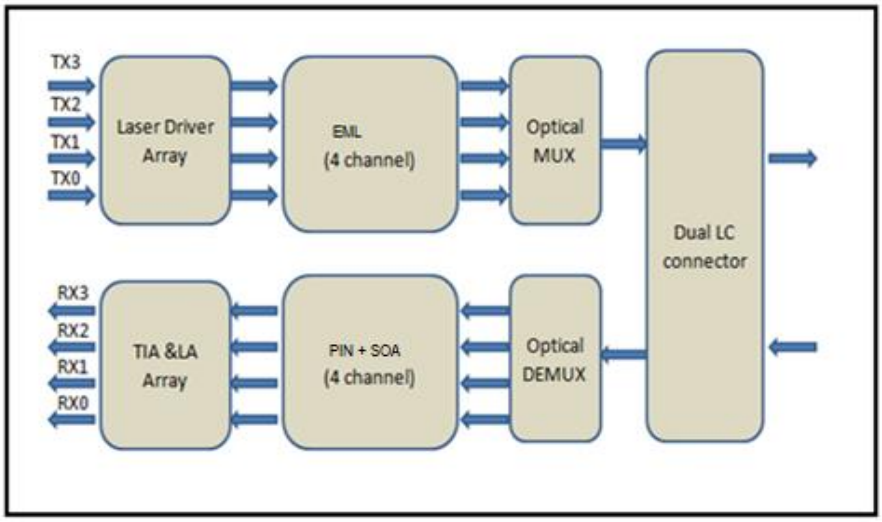
Parameter	Symbol	Min	Typ	Max	Unit
Differential data input swing per lane		900			mV_{p-p}
Differential input impedance	Z_{in}	90	100	110	ohm
DC common mode voltage	V_{cm}	-350		2850	mV

Electrical – Receiver

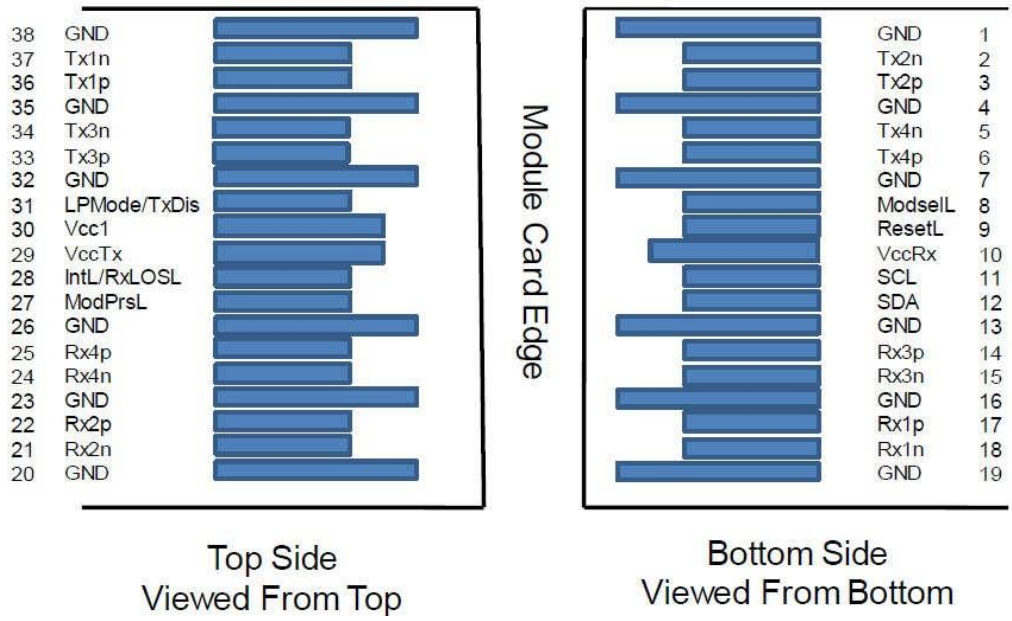
Parameter	Symbol	Min	Typ	Max	Unit
Differential output amplitude				900	mV_{p-p}
Differential output impedance	Z_{out}	90	100	110	ohm
Output Rise/Fall time (20% - 80%)	t_r/t_f	12			ps
Eye width		0.57			UI
Eye height differential (@TP4, 1E-15)		228			mV
DC common mode voltage (V_{cm}) [1]		-350		2850	mV

1. V_{cm} is generated by the host. Specification includes effects of ground offset voltage

Transceiver Block Diagram



Electrical Connector Layout



Electrical Pin Definition

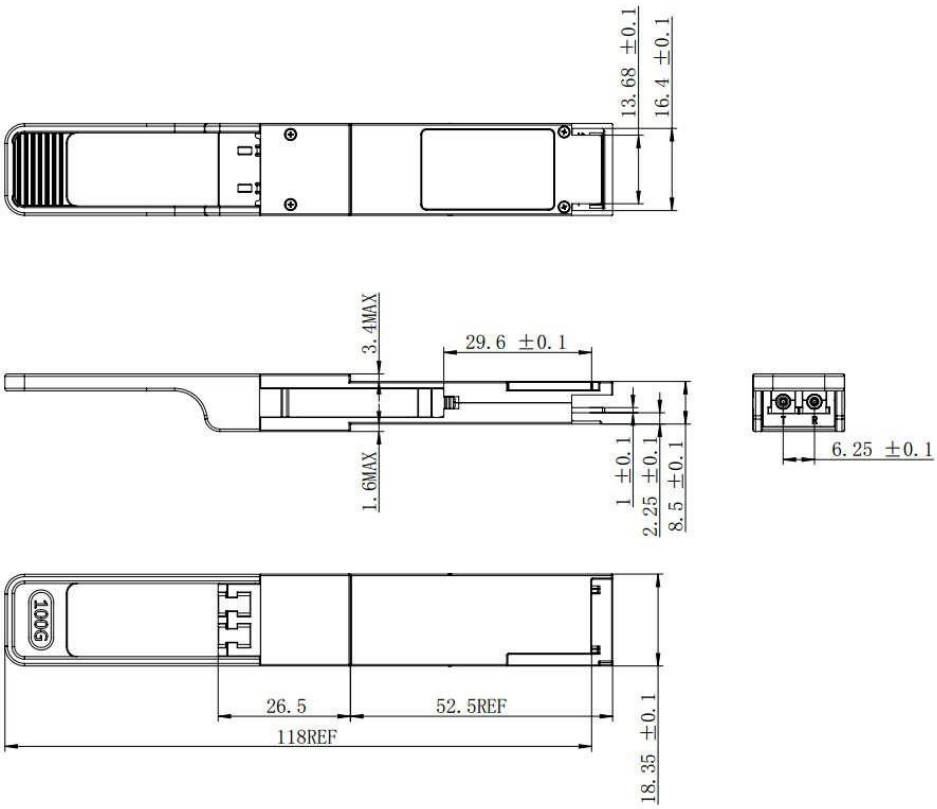
PIN #	Symbol	Description	Remarks
1	GND	Ground	1
2	Tx2n	Transmitter Inverted Data Input	
3	Tx2p	Transmitter Non-Inverted Data output	
4	GND	Ground	1
5	Tx4n	Transmitter Inverted Data Input	
6	Tx4p	Transmitter Non-Inverted Data Input	
7	GND	Ground	1
8	ModSelL	Module Select	1
9	ResetL	Module Reset	
10	VccRx	+3.3V Power Supply Receiver	2
11	SCL	2-wire serial interface clock	
12	SDA	2-wire serial interface data	

13	GND	Ground	1
14	Rx3p	Receiver Non-Inverted Data Output	
15	Rx3n	Receiver Inverted Data Output	
16	GND	Ground	1
17	Rx1p	Receiver Non-Inverted Data Output	
18	Rx1n	Receiver Inverted Data Output	
19	GND	Ground	1
20	GND	Ground	1
21	Rx2n	Receiver Inverted Data Output	
22	Rx2p	Receiver Non-Inverted Data Output	
23	GND	Ground	1
24	Rx4n	Receiver Inverted Data Output	
25	Rx4p	Receiver Non-Inverted Data Output	
26	GND	Ground	1
27	ModPrsL	Module Present	
28	IntL/ RxLOSL	Interrupt. Optionally Configurable as RxLOSL via the Management Interface (SFF-8636).	
29	VccTx	+3.3V Power supply transmitter	2
30	Vcc1	+3.3V Power supply	2
31	LPMode/ TxDis	Low Power Mode. Optionally Configurable as TxDis via the Management Interface (SFF-8636).	
32	GND	Ground	1
33	Tx3p	Transmitter Non-Inverted Data Input	
34	Tx3n	Transmitter Inverted Data Input	
35	GND	Ground	1
36	Tx1p	Transmitter Non-Inverted Data Input	
37	Tx1n	Transmitter Inverted Data Input	
38	GND	Ground	1

Notes:

1. GND is the symbol for signal and supply (power) common for QSFP28 modules. All are common within the QSFP28 module and all module voltages are referenced to this potential unless 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. VccRx1, Vcc1 and VccTx are the receiving and transmission power suppliers and shall be applied concurrently. VccRx, Vcc1 and VccTx may be internally connected within the QSFP28 transceiver module in any combination. The connector pins are each rated for a maximum current of 1000mA.

Mechanical Specifications



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