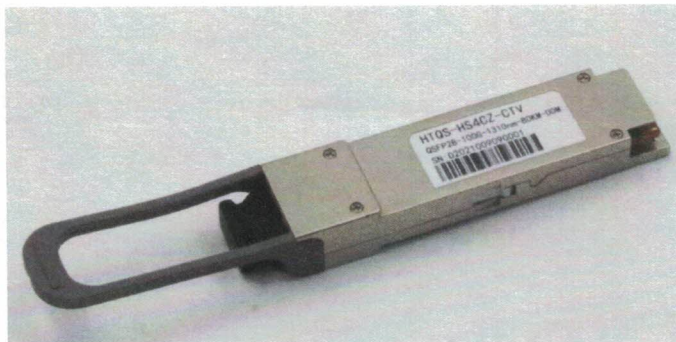


100Gb/s QSFP28 ZR4 Optical Transceiver Module HTQS-HS4CZ-CTV

Features

- Supports 100GBASE 100GE;
- Connect: Duplex LC
- Single mode Optical.
- Lane bit rate 25.78 Gb/s 100GE
- Distance: $\geq 80\text{Km}$;
- Speed: $\geq 99\text{Gbps}$;
- LAN WDM laser and PIN receiver with SOA;
- Support Multi-Pin function with IntL/RxLOSL and LPMode/TxDIS;
- High speed I/O electrical interface (CAUI-4);
- I2C interface with integrated Digital Diagnostic monitoring;
- QSFP28 MSA package with duplex LC connector;
- Support DOM (Digital Optical Monitoring) or DDM (Digital Diagnostic Monitoring);
- Support hot plug;
- Bit error rate: $\leq 5 \times 10^{-5}$
- ROHS compliant
- Wave: 1294nm-1311nm
- Total receiver capacity: from -22 dBm to -1 dBm
- Total transmit capacity: +12.5 dBm
- Receiver Sensitivity (OMA) each lane (maximum): -8.6 dBm
- Single +3.3V power supply;
- Typical power consumption 6.5 W;
- Operating case temperature: 0 to +70 °C;
- Storage temperature: -40°C to 85 °C;
- Storage humidity: 15% to 85%;
- Compliant to IEEE 802.3bm and ITU-T G.959;
- Compliant to SFF-8665 and SFF-8679;
- Complies with EU Directive 2015/863/EU;
- Fully compatible with linecard MPC7E-MRATE, MPC9E with MIC-MRATE on MX Series of Juniper (MX960, MX2010, MX2020).
- Fully compatible with linecard MPC7E-MRATE in Juniper Router MX240/MX480/MX960
- Fully compatible with linecard PMC9E with MIC-MRATE in Juniper Router MX2000 series (MX2K-MPC9E in MX2010 and MX2020)



Application

- 100GBASE-ZR4;

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Order Information

Table 1- order information

Part No.	Data Rate	Laser	Fiber Type	Distance	Optical Interface	Temp	DDMI
HTQS-HS4CZ-CTV	103.1Gbps	LWDM	SMF	80km	LC	0~70℃	Y

Absolute Maximum Ratings

Table 2-Absolute Maximum Ratings

Parameter	Symbol	Min.	Typical	Max.	Unit	Notes
Storage Temperature	T _s	-40	-	+85	℃	
Supply Voltage	V _{CC}	-0.5	-	+4.0	V	
Operating Relative Humidity	RH	-	-	+85	%	

Recommended Operating Conditions

Table 3-Recommended Operating Conditions

Parameter	Symbol	Min.	Typical	Max.	Unit	Notes
Operating Case Temperature	T _c	0	-	+70	℃	
Power Supply Voltage	V _{CC}	3.13	3.3	3.47	V	
Power Supply Current	I _{CC}	-	-	1.95	A	
Typical Power Dissipation	P _D	-	6.5	-	W	
Aggregate Bit Rate	BR _{AVE}	-	103.125	-	Gb/s	
Lane Bit Rate	BR _{LANE}	-	25.78	-	Gb/s	
Transmission Distance	TD		-	80	km	Over SMF

Optical Characteristics

Table 4-Optical Characteristics

Transmitter						
Parameter	Symbol	Min.	Typical	Max.	Unit	Notes
Center Wavelength Lane 0	λ_0	1294.53	1295.56	1296.59	nm	
Center Wavelength Lane 1	λ_1	1299.02	1300.05	1301.09	nm	
Center Wavelength Lane 2	λ_2	1303.54	1304.58	1305.63	nm	
Center Wavelength Lane 3	λ_3	1308.09	1309.14	1310.19	nm	
Total Launch Power, 100GE	P _{ALL}	-	-	12.5	dBm	1
Average Launch Power per Lane, 100GE	P _{TX_LANE}	1	-	6.5	dBm	1
Optical Modulation Amplitude (OMA), per Lane	P _{TX_OMA_LANE}	2.6	-	6.5	dBm	1
Difference in launch power between lanes	P _{TX_DELTA_LANE}	-	-	3	dB	
Average Output Power (Laser Turn off)	P _{OUT-OFF}	-	-	-30	dBm	
Side Mode Suppression Ratio	SMSR	30	-	-	dB	
Extinction Ratio, 100GE	ER	6	-	-	dB	
Optical Eye Mask	{0.25,0.4, 0.45, 0.25, 0.28, 0.4}					2
Receiver						

Center Wavelength Lane 0	λ_0	1294.53	1295.56	1296.59	nm	
Center Wavelength Lane 1	λ_1	1299.02	1300.05	1301.09	nm	
Center Wavelength Lane 2	λ_2	1303.54	1304.58	1305.63	nm	
Center Wavelength Lane 3	λ_3	1308.09	1309.14	1310.19	nm	
Damage threshold	Pdamage	5.5	-	-	dBm	
Average Rx Power per Lane, 100GE •	P _{RX_LANE}	-28	-	4.5	dBm	3
Los Assert	LosA	-40	-	-	dBm	
Los De-assert	LosDA	-	-	-28	dBm	
Los Hysteresis	LosH	0.5	-	5	dB	

Notes:

1. The optical power is launched into SMF.
2. Measured with a PRBS 2³¹-1 test pattern @25.78125 Gb/s, Hit ratio≤5E-5.
3. Measured with a PRBS 2³¹-1 test pattern @25.78125 Gb/s, BER≤5E-5.

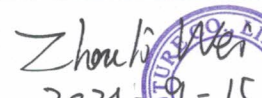
Electrical Characteristics

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

Low-Speed Signal: Compliant to SFF 8679.

Table 5-Electrical Characteristics

Transmitter (Module Input)						
Parameter	Symbol	Min.	Typical	Max.	Unit	Notes
Differential Data Input Amplitude	V _{IN,P-P}	85	-	900	mVpp	
Differential Termination Mismatch		-	-	10	%	
Differential input return loss(min)	RLd(f)	Compliance with IEEE802.3ba Equation (83A-5)			dB	
Differential to common mode input return loss (min)	RLdc(f)	Compliance with IEEE802.3ba Equation (83A-6)			dB	
LPMODE, Reset and ModSelL, V in low	V _{IL}	-0.3	-	0.8	V	
LPMODE, Reset and ModSelL, V in high	V _{IH}	2.0	-	V _{CC} +0.3	V	
Receiver (Module Output)						
Differential Data Output Amplitude	V _{OUT,P-P}	200	-	900	mVpp	
Differential Termination Mismatch (1MHZ)		-	-	10	%	
Transition time, 20% to 80%	Tr Tf	12	-	-	ps	
Differential output return loss (min)	RLd(f)	Compliance with IEEE802.3ba Equation (83A-7)			dB	
Common to differential mode conversion return loss (min)	RLdc(f)	Compliance with IEEE802.3ba Equation (83A-8)			dB	
ModPrsL and IntL, V out low	V _{OL}	0	-	0.4	V	
ModPrsL and IntL, V out high	V _{OH}	V _{CC} -0.5	-	V _{CC} +0.3	V	

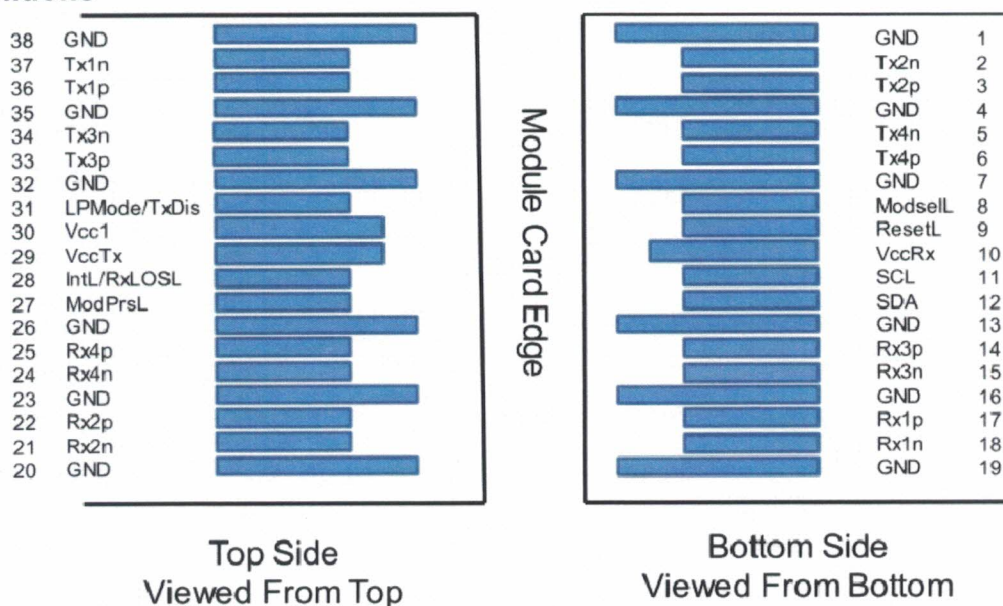

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Digital Diagnostics

Table 6-Digital Diagnostics

Parameter	Range	Accuracy	Unit	Calibration
Temperature	0 to 70	±3	°C	Internal
Voltage	0 to V _{CC}	0.1	V	Internal
Tx Bias Current Per Lane	0 to 100	10%	mA	Internal
Tx Output Power Per Lane	1.0 to 6.5	±3	dBm	Internal
Rx Power (Each Lane)	-28 to 4.5	±3	dBm	Internal

Pin Definitions



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	

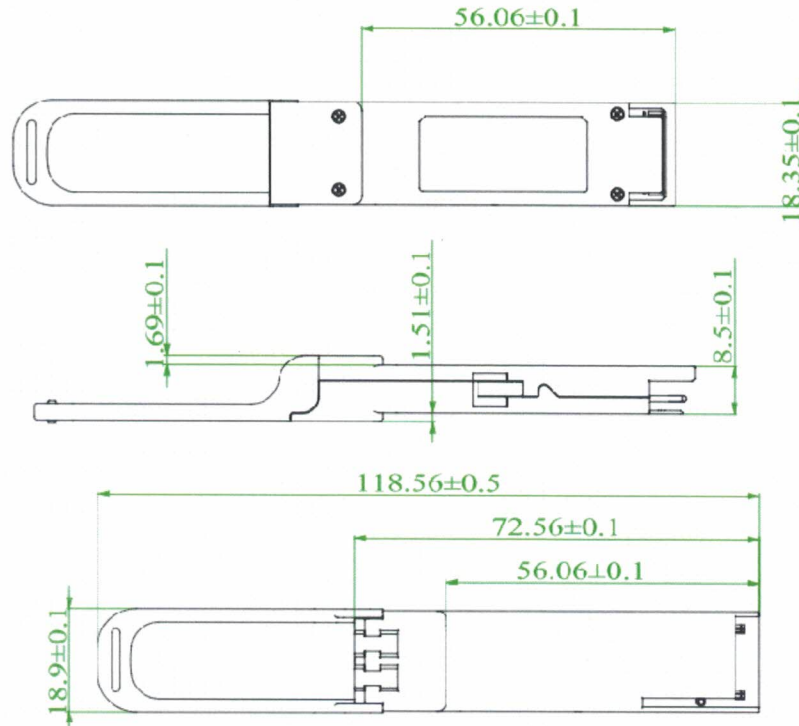
11	LVCMOS-I/O	SCL	2-Wire Serial Interface Clock	3	
12	LVCMOS-I/O	SDA	2-Wire Serial Interface Data	3	
13		GND	Ground	1	
14	CML-O	Rx3p	Receiver Non-Inverted Data Output	3	
15	CML-O	Rx3n	Receiver Inverted Data Output	3	
16		GND	Ground	1	1
17	CML-O	Rx1p	Receiver Non-Inverted Data Output	3	
18	CML-O	Rx1n	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	
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 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.

Note 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.

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Mechanical Dimension



Warnings

Handling Precautions: This device is susceptible to damage as a result of electrostatic discharge (ESD). A static free environment is highly recommended. Follow guidelines according to proper ESD procedures.

Laser Safety: HTF transceiver uses a semiconductor laser system and is a laser class1 product acc. FDA, complies with 21CFR1040.10 and 1040.11. Also this product is a laser class1 product acc. IEC 60825-1.

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