

100G QSFP28 10km Optical Transceiver Module

HC-Q28-C31L-10D

Features

- Supports 100GBASE-CWDM4(103.1Gb/s);
- Lane bit rate 25.78 Gb/s;
- Up to 10km transmission on SMF;
- CWDM DML laser and PIN receiver;
- High speed I/O electrical interface (CAUI-4);
- I2C interface with integrated Digital Diagnostic monitoring;
- QSFP28 MSA package with duplex LC connector;
- Single +3.3V power supply;
- Maximum power consumption 3.5 W;
- Operating case temperature: 0 to +70 °C;
- Compliant to 100G CWDM4 MSA;
- Compliant to IEEE802.3bm;
- Compliant to SFF-8665 and SFF-8679;
- Complies with EU Directive 2011/65/EU (RoHS 6);

Application

- 100GBASE-CWDM4 application with FEC;

Absolute Maximum Ratings

Table 2-Absolute Maximum Ratings

Parameter	Symbol	Min.	Typical	Max.	Unit	Notes
Storage Temperature	T _s	-40	-	+85	°C	
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	°C	
Power Supply Voltage	V _{CC}	3.13	3.3	3.47	V	
Power Supply Current	I _{CC}	-	-	1.1	A	
Maximum Power Dissipation	P _D	-	-	3.5	W	
Aggregate Bit Rate	BR _{AVE}	-	103.125	-	Gb/s	
Lane Bit Rate	BR _{LANE}	-	25.78	-	Gb/s	
Transmission Distance	TD		-	10	km	Over SMF

Optical Characteristics

Table 4-Optical Characteristics

Transmitter						
Parameter	Symbol	Min.	Typical	Max.	Unit	Notes
Center Wavelength Lane 0	λ_0	1264.5	1271	1277.5	nm	
Center Wavelength Lane 1	λ_1	1284.5	1291	1297.5	nm	
Center Wavelength Lane 2	λ_2	1304.5	1311	1317.5	nm	
Center Wavelength Lane 3	λ_3	1324.5	1331	1337.5	nm	
Total Launch Power, 100GE	P _{ALL}	-	-	8.5	dBm	1
Average Launch Power per Lane, 100GE	P _{TX_LANE}	-6.5	-	2.5	dBm	1
OMA per Lane, 100GE	OMA	-4	-	2.5	dBm	1
OMA–TDP per Lane, 100GE	OMA_TDP	-5.0	-	-	dBm	
Difference in launch power between lanes	P _{TX_DELTA_LANE}	-	-	6.0	dB	
Average Output Power (Laser Turn off)	P _{OUT-OFF}	-	-	-30	dBm	
Side Mode Suppression Ratio	SMSR	30	-	-	dB	
Extinction Ratio, 100GE	ER	3.5	-	-	dB	
Transmitter and Dispersion Penalty	TDP	-	-	3.0	dB	2
Optical Return Loss Tolerance	ORLT	-	-	20	dB	
Optical Eye Mask, 100GE {X1,X2,X3,Y1,Y2,Y3}	Compliant with 100G CWDM4 MSA {0.31,0.4,0.45,0.34,0.38,0.4}					2
Receiver						
Parameter	Symbol	Min.	Typical	Max.	Unit	Notes
Center Wavelength Lane 0	λ_0	1264.5	1271.0	1277.5	nm	
Center Wavelength Lane 1	λ_1	1284.5	1291.0	1297.5	nm	
Center Wavelength Lane 2	λ_2	1304.5	1311.0	1317.5	nm	

Center Wavelength Lane 3	λ_3	1324.5	1331.0	1337.5	nm	
OMA Sensitivity per Lane, 100GE	Rxsens	-	-	-12	dBm	3
Stressed receiver sensitivity (OMA), per lane	SRS_OMA	-	-	-7.8	dBm	3
SRS eye mask definition, 100GE {X1,X2,X3,Y1,Y2,Y3}	Compliant with 100G CWDM4 MSA {0.39,0.5,0.5,0.39,0.39,0.4}					
Damage threshold	Pdamage	3.5	-	-	dBm	
Receive Saturation (OMA) per Lane	Rmax	2.5	-	-	dBm	
Reflectance	Ref	-	-	-26	dB	
LOS Assert per lane	LOS _A	-25	-	-	dBm	
LOS De-assert	LOS _D	-	-	-13	dBm	
LOS Hysteresis	LOS _H	0.5	-	6	dB	

Notes:

1. The optical power is launched into SMF.
2. Measured with a PRBS 2³¹-1 test pattern @25.78125Gb/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 QSFP-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	%	
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	

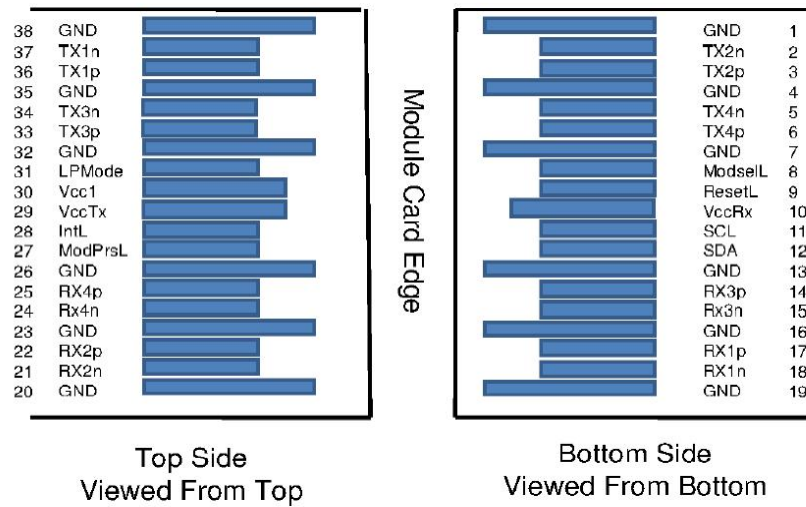
Receiver (Module Output)						
Parameter	Symbol	Min.	Typical	Max.	Unit	Notes
Differential Data Output Amplitude	$V_{OUT,P-P}$	200	-	900	mVpp	
Differential Termination Mismatch (1MHZ)		-	-	10	%	
Output Rise/Fall Time, 20%~80%	T_R	12	-	-	ps	
ModPrsL and IntL, V out low	V_{OL}	0	-	0.4	V	
ModPrsL and IntL, V out high	V_{OH}	$V_{CC}-0.5$	-	$V_{CC}+0.3$	V	

Digital Diagnostics

Table 6-Digital Diagnostics

Parameter	Range	Accuracy	Unit	Calibration
Temperature	0 to 70	± 3	$^{\circ}\text{C}$	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	-6.5 to 3	± 3	dBm	Internal
Rx Power (Each Lane)	-11.5 to 3	± 3	dBm	Internal

Pin Definitions

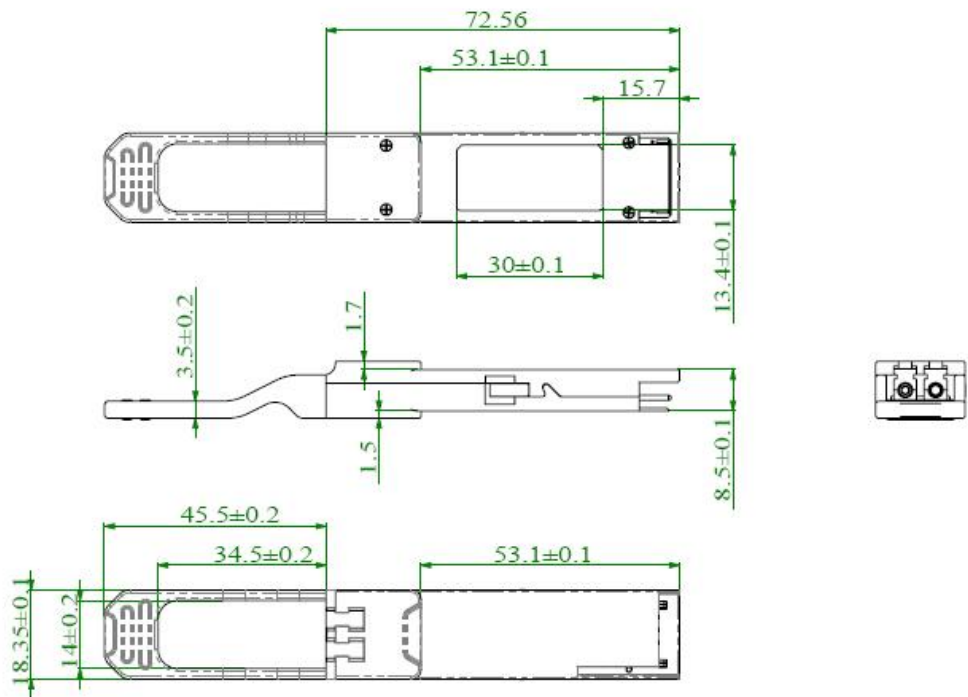


PIN	Logic	Symbol	Description	Plug Seq.	Notes
1		GND	Ground	1	1
2	CML-I	Tx2n	Transmitter Inverted Data Input	3	
3	CML-I	Tx2p	Transmitter Non-Inverted Data output	3	
4		GND	Ground	1	1
5	CML-I	Tx4n	Transmitter Inverted Data Input	3	
6	CML-I	Tx4p	Transmitter Non-Inverted Data output	3	
7		GND	Ground	1	1
8	LVTLL-I	ModSelL	Module Select	3	
9	LVTLL-I	ResetL	Module Reset	3	
10		VccRx	+ 3.3V Power Supply Receiver	2	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	

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	Interrupt	3	
29		VccTx	+3.3 V Power Supply transmitter	2	2
30		Vcc1	+3.3 V Power Supply	2	2
31	LVTTL-I	LPMode	Low Power Mode	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.					

Mechanical Dimension



Order Information

Table 1- order information

Part No.	Data Rate	Laser	Fiber Type	Distance	Optical Interface	Temp	DDMI
HC-Q28-C31L-10D	103.1Gbps	CWDM DML	SMF	10km	LC	0~70C	Y