

100G Product Specification

QSFP28 100GE LR4 10Km

CL100GQSFP4LR4

Product Features

- Hot-pluggable QSFP28 form factor
- Supports 103.1Gb/s
- Power dissipation < 3.5W
- RoHS-6 compliant
- Commercial case temperature range of 0°C to 70°C
- Single 3.3V power supply
- Maximum link length of 10km on Single Mode Fiber (SMF)
- 4x25Gb/s **EML**-based LAN-WDM transmitter
- 4x25G retimed electrical interface
- Duplex LC receptacles
- I2C management interface



APPLICATIONS

- √ 100GBASE-LR4 100G Ethernet

1. Product Description

C-Light's CL100QSFPLR4 QSFP28 transceiver modules are designed for use in 100 Gigabit Ethernet and 4x25 G ethernet client interfaces over single mode fiber. They are compliant with the QSFP28 MSA1, IEEE 802.3ba 100GBASE-LR42 requirements specified in ITU-T Recommendations G.959. 1/G.709 and Supplement 39 (G.sup39). Digital diagnostic functions are available via the I2C interface, as specified by the QSFP28 MSA the transceiver is RoHS-6 compliant per Directive 2011/65/EC3.

2. Absolute Maximum Ratings

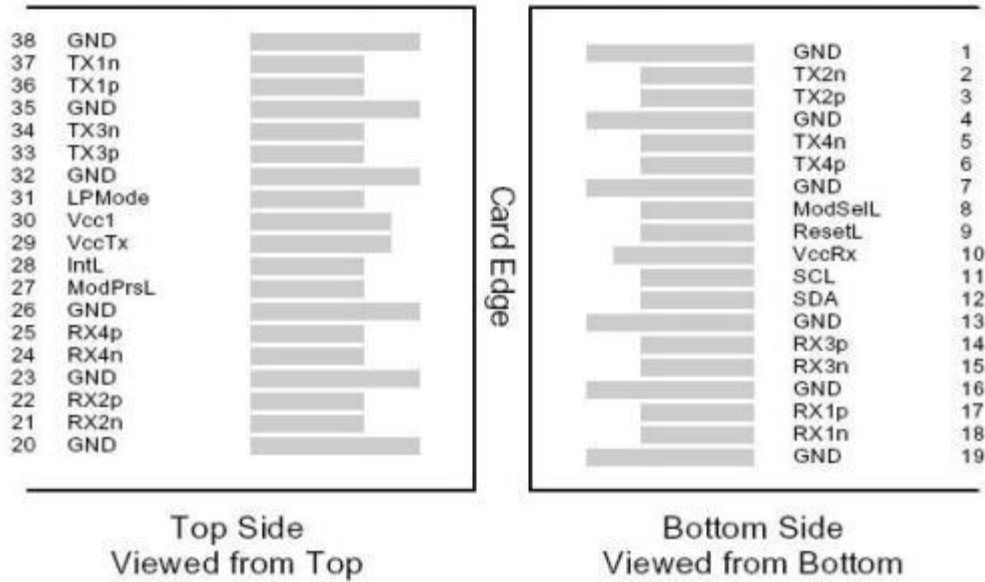
It has to be noted that the operation in excess of any individual absolute maximum ratings might cause permanent damage to this module.

Parameter	Symbol	Min	Max	Unit	Note
Storage Temperature Tst	Tst	40	+85	degC	
Relative Humidity (non-condensation)	RH	5	90	%	
Operating Case Temperature	Topc	-5	+75	degC	
Supply Voltage	VCC	-0.5	3.6	V	

3. Recommended Operating Conditions

Parameter	Symbol	Min.	Typical	Max.	Unit
Supply Voltage	Vcc	3.1	3.3	3.5	V
Case Operating Temperature	Tca	0	25	75	°C
Data Rate Per Lane			25.78		Gbps
Operating Distance			10		km
Humidity	Rh	5		85	%

4. Pin Descriptions



Pin	Symbol	Name/ Description	Notes
1	GND	Ground	1
2	Tx2n	Transmitter Inverted Data Input	
3	Tx2p	Transmitter Non-Inverted Data Input	
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	
9	ResetL	Module Reset	
10	Vcc Rx	+3.3 V Power supply receiver	
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	
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	Interrupt	
29	Vcc Tx	+3.3 V Power supply transmitter	
30	Vcc1	+3.3 V Power Supply	
31	LPMODE	Low Power Mode	
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

5. Electrical Characteristics (EOL, TOP = 0 to +70 ° C, VCC = 3.135 to 3.465 Volts)

Parameter	Symbol	Min	Typ	Max	Unit	Ref.
Supply Voltage	Vcc	3.135		3.465	V	
Supply Current	Icc			1.12	A	
Module total power	P			3.5	W	1
Transmitter						
Signaling rate per lane		25.78125 ± 100 ppm			Gb/s	
Differential data input swing per lane	V _{in,pp}			900	mV	
Differential input return loss (min) at LR4	RL _d (f)	9.5 - 0.37f, 0.01 ≤ f < 8 4.75 - 7.4log ₁₀ (f/14), 8 ≤ f < 19			dB	
Differential to common mode input return loss (min) at LR4	RL _{dc} (f)	22-20(f/25.78), 0.01 ≤ f < 12.89 15-6(f/25.78), 12.89 ≤ f < 19			dB	
Differential termination mismatch				10	%	
Stressed input parameters						
Eye width			0.46		UI	
Applied pk-pk sinusoidal jitter		Per IEEE 802.3bm Table 88- 13				

Eye height			95		mV	
DC common mode voltage		-350		2850	mV	
Receiver						
Signaling rate per lane		25.78125 ± 100 ppm			GBd	
Differential data output swing	Vout, pp	100		400	mVpp	2
		300		600		
		400		800		
		600		1200		
Eye width	EW15	0.57			UI	3
Eye height	WH15	228			mV	3
Vertical eye closure				5.5	dB	
Differential output return loss (min)	RLd(f)	9.5 – 0.37f, 0.01 ≤ f < 8 4.75 – 7.4log ₁₀ (f/14), 8 ≤ f < 19			dB	
Common to differential mode conversion return loss (min)	RLdc(f)	22-20(f/25.78), 0.01 ≤ f < 12.89 15-6(f/25.78), 12.89 ≤ f < 19			dB	
Differential termination mismatch				10	%	
Transition time, 20% to 80%	tr tf	12			ps	

Notes:

1. Maximum total power value is specified across the full temperature and voltage range.
2. Output voltage is settable in 4 discrete ranges via I2C. Default range is 400 – 800 mV.
3. Defined at 10- 15 probability.

6. Optical Characteristics (EOL, TOP = 0 to +70 ° C, VCC = 3.135 to 3.465 Volts)

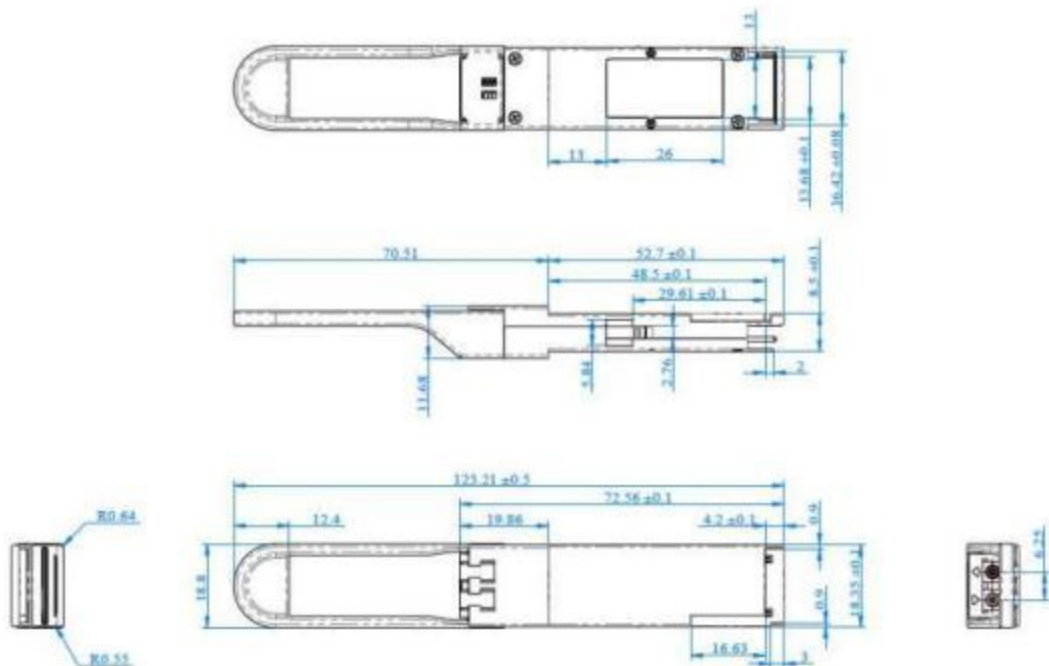
Transmitter						
Parameter	Symbol	Min.	Typical	Max.	Unit	Notes
Signaling Speed per Chanel		25.78± 100 ppm			Gb/s	1
Center Wavelength	λ_0	1294.53	1295.56	1296.59	nm	
Center Wavelength	λ_1	1299.02	1300.05	1301.09	nm	
Center Wavelength	λ_2	1303.54	1304.58	1305.63	nm	
Center Wavelength	λ_3	1308.09	1309.14	1310.19	nm	
Total Launch Power,	Pout	-	-	10.5	dBm	
Average Launch Power per Lane,	PTX_LANE	0.1	-	4.5	dBm	5
OMA per Lane,	OMA	0.1	-	4.5	dBm	
Difference in launch power between lanes	PTX_DELTA_LANE	-	-	5	dB	
Average Output Power (Laser Turn	Pout- OFF	-	-	-30	dBm	
Side Mode	SMSR	30	-	-	dB	
Receiver						
Parameter	Symbol	Min			Typ	Max
Signaling Speed per Lane		25.78± 100 ppm			Gb/s	3
Lane center wavelengths (range)		1294.53 – 1296.59 1299.02 – 1301.09 1303.54 – 1305.63 1308.09 – 1310.19			nm	
Average Receive Power per Lane	RXPx	-15		4.5	dBm	4,5
Receiver Sensitivity (OMA) per Lane	Rxsens			-9	dBm	2
Return Loss	RL	-26			dB	
Stressed Receiver Sensitivity (OMA) per Lane	SRS			-7	dBm	2
Receive electrical 3 dB upper cutoff frequency, per lane				31	GHz	

LOS De- Assert	LOSD			- 11.6	dBm	
LOS Assert	LOSA	-24		- 13.6	dBm	
LOS Hysteresis			1.5		dBm	

Notes:

1. Transmitter consists of 4 lasers operating at 27.95Gb/s each.
2. Hit ratio 5×10^{-5} .
3. Receiver consists of 4 photodetectors operating at 27.95Gb/s each.
4. Specified at a BER of 10^{-6} (pre-FEC), per ITU-T G.sup39.
5. Power value and power accuracy are with all channels on.

7. Mechanical Specifications



8. ESD

This transceiver is specified as ESD threshold 1 kV for all electrical input pins, tested per MIL-STD-883, Method 3015.4 /JESD22-A114-A (HBM). However, normal ESD precautions are still required during the handling of this module. This transceiver is shipped in ESD protective packaging. It should be removed from the packaging and handled only in an ESD protected environment.

9. Laser Safety

This is a Class 1 Laser Product according to IEC 60825- 1:1993:+A1:1997+A2:2001. This product complies with 21 CFR 1040. 10 and 1040. 11 except for deviations pursuant to Laser Notice No. 50, dated (July 24, 2007)

Ordering Information

Part Number	Product Description
CL100GQSFPLR4	100Gbps Ethernet QSFP28 LR4, 10Km, 0C~+70C

VERSION UPDATE:

VERSION NO.	DATE	UPDATED INFORMATION
V20161101	20161101	1. NEW PUBLISHED

NOTICE:

C-LIGHT reserves the right to make changes to this product in this specification without notice, in order to improve product performance.

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