

## QSP-100C1xx-02CL

100Gbps QSFP28 CWDM Transceiver, Single Mode, 2km Reach

### Features

- Supports 100Gbps
- 100G Lambda MSA 100G-FR Specification Compliant
- Single 3.3V Power Supply
- Power Dissipation < 4.5W
- Up to 2km over SMF with FEC
- 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
- I<sup>2</sup>C Interface With Integrated Digital Diagnostic Monitoring
- Safety Certification: TUV/UL/FDA
- RoHS Compliant



### Applications

- Data Center Interconnect
- 100G Ethernet

### Description

This CWDM Single Lambda QSFP28 transceiver module is designed for use in 100 Gigabit Ethernet links over 2km single mode fiber. The module incorporates one channel optical signal, on 1271, 1291, 1311 or 1331nm center wavelength, operating at 50Gbaud data rate. The electrical interface of the module is compliant with the OIF CEI-28G-VSR and compliant with QSFP28 MSA.

## 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.

**Table 1 - Absolute Maximum Ratings**

Parameter	Symbol	Min	Typical	Max	Units
Storage Temperature	T <sub>s</sub>	-40		85	degC
Power Supply Voltage	V <sub>CC</sub>	-0.5		3.6	V
Damage Threshold, each Lane	Rxdmg	5.5			dBm

## Operating Environments

Power Supply specifications, Instantaneous, sustained and steady state current are compliant with QSFP28 MSA Power Classification.

**Table 2- Operating Environments**

Parameter	Symbol	Min	Typical	Max	Units	Notes
Operating Case Temperature	T <sub>OP</sub>	0		70	degC	
Power Supply Voltage	V <sub>CC</sub>	3.135	3.3	3.465	V	
Operating Relative Humidity	RH	5		85	%	
Power Dissipation	P <sub>D</sub>			4.5	W	

## Electrical Characteristics

**Table 3- Electrical Characteristics**

Parameter	Symbol	Min	Typical	Max	Units	Notes
<b>Transmitter</b>						
Differential Data Input Swing Per Lane		900			mV p-p	
Differential Input Impedance	Z <sub>in</sub>	90	100	110	ohm	
DC common Mode Voltage (V <sub>cm</sub> )		-350			mV	
<b>Receiver</b>						
Differential Output Amplitude				900	mV p-p	
Differential Output Impedance	Z <sub>out</sub>	90	100	110	ohm	
Output Rise/Fall Time	t <sub>r</sub> / t <sub>f</sub>	9.5			ps	1
Eye Width		0.57			UI	

Eye Height Differential		228			mV	2
DC Common Mode Voltage (Vcm)		-350		2850	mV	3

**Notes:**

1. 20%~80%
2. @TP4, 1E-15
3. Vcm is generated by the host. Specification includes effects of ground offset voltage

## Optical Characteristics

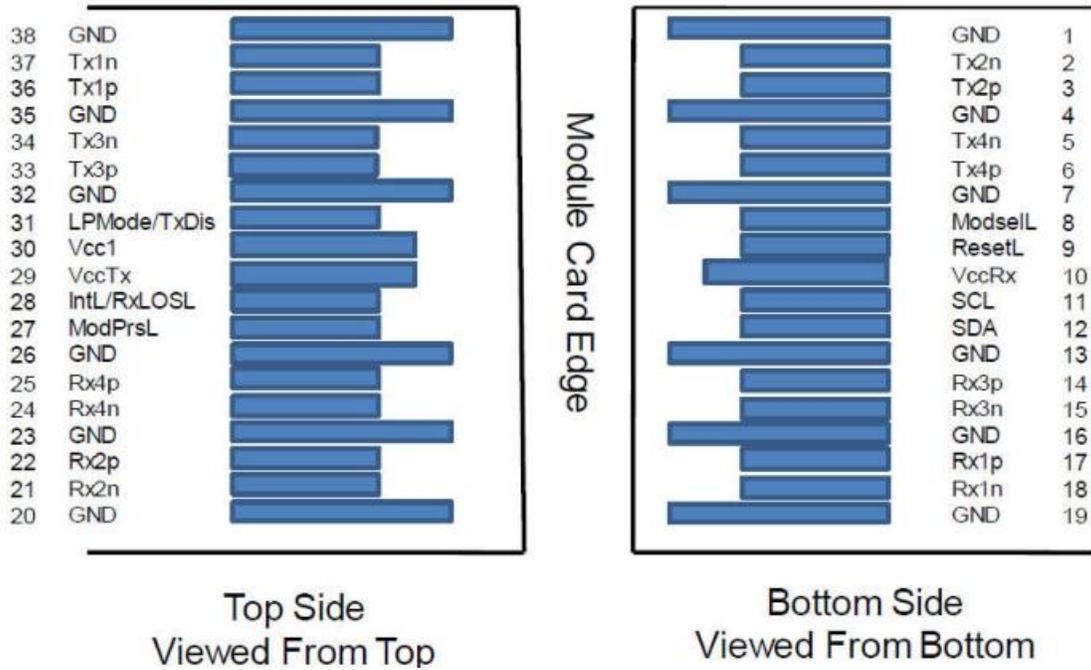
**Table 4- Optical Characteristics**

Parameter	Symbol	Min	Typical	Max	Units	Notes
<b>Transmitter</b>						
Signaling Speed			53.125		Gbaud	
Modulation Format		PAM4				
Optical Center Wavelength	$\lambda$	$\lambda_c - 6.5$	$\lambda_c$	$\lambda_c + 6.5$	nm	
Side-Mode Suppression Ratio	SMSR	30			dB	
Extinction Ratio	ER	3.5			dB	
Transmit OMA	TxOMA	-0.2		4.2	dBm	
Transmit Average	TxAVG	-2.4		4	dBm	1
Launch Power In OMA <sub>outer</sub> Minus TDECQ		-1.6			dBm	2
Launch Power In OMA <sub>outer</sub> Minus TDECQ		-1.5			dBm	3
Transmitter And Dispersion Eye Closure	TDECQ			3.4	dB	
Optical Return Loss Tolerance				17.1	dB	4
<b>Receiver</b>						
Signaling Speed			53.125		Gbaud	
Damage Threshold		5.5			dBm	
Receive Power (OMA <sub>outer</sub> )	RxOMA			4.7	dBm	
Average Receive Power	RxAVG	-6.4		4.5	dBm	
Receiver Sensitivity (OMA <sub>outer</sub> )	SenOMA			Max(-4.5, SECQ-5.9)	dBm	5
Receiver Reflectance				-26	dB	
LOS Assert	LOSA	-15			dBm	
LOS De-assert	LOSD			-12	dBm	
LOS Hysteresis		0.5			dB	

**Notes:**

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.
5. Sensitivity is specified at  $2.4 \times 10^{-4}$  BER.

## Pin Description



### MSA Compliant Connector

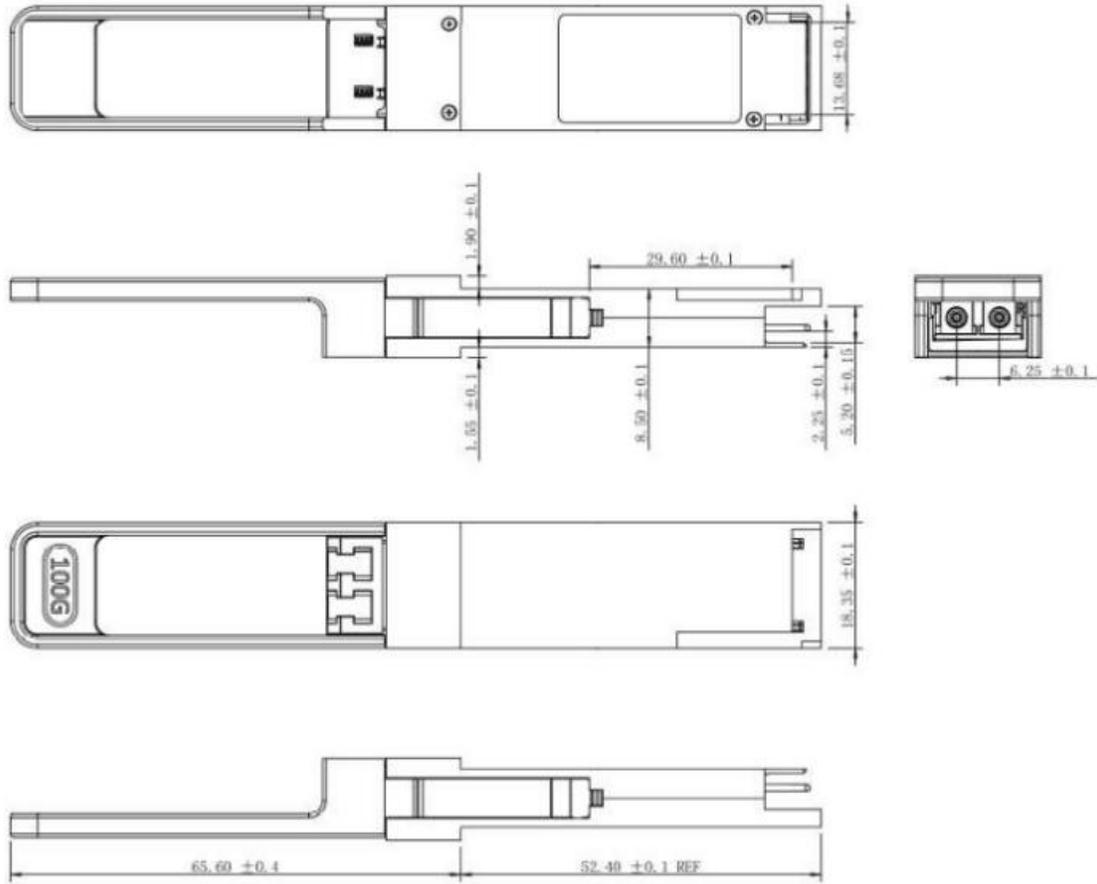
PIN	Logic	Symbol	Name/Description	Notes
1		GND	Ground	1
2	CML-I	Tx2n	Transmitter Inverted Data Input	
3	CML-I	Tx2p	Transmitter Non-Inverted Data output	
4		GND	Ground	1
5	CML-I	Tx4n	Transmitter Inverted Data Input	
6	CML-I	Tx4p	Transmitter Non-Inverted Data output	
7		GND	Ground	1
8	LVTLL-I	ModSelL	Module Select	
9	LVTLL-I	ResetL	Module Reset	
10		VccRx	+3.3V Power Supply Receiver	2
11	LVC MOS-I/O	SCL	2-Wire Serial Interface Clock	
12	LVC MOS-I/O	SDA	2-Wire Serial Interface Data	
13		GND	Ground	1
14	CML-O	Rx3p	Receiver Non-Inverted Data Output	
15	CML-O	Rx3n	Receiver Inverted Data Output	

16		GND	Ground	1
17	CML-O	Rx1p	Receiver Non-Inverted Data Output	
18	CML-O	Rx1n	Receiver Inverted Data Output	
19		GND	Ground	1
20		GND	Ground	1
21	CML-O	Rx2n	Receiver Inverted Data Output	
22	CML-O	Rx2p	Receiver Non-Inverted Data Output	
23		GND	Ground	1
24	CML-O	Rx4n	Receiver Inverted Data Output	1
25	CML-O	Rx4p	Receiver Non-Inverted Data Output	
26		GND	Ground	1
27	LVTTL-O	ModPrsL	Module Present	
28	LVTTL-O	IntL/ RxLOSL	Interrupt. Optionally configurable as RxLOSL via the management interface (SFF-8636).	
29		VccTx	+3.3 V Power Supply transmitter	2
30		Vcc1	+3.3 V Power Supply	2
31	LVTTL-I	LPMoDe/ TxDis	Low Power Mode. Optionally configurable as TxDis via the management interface (SFF-8636).	
32		GND	Ground	1
33	CML-I	Tx3p	Transmitter Non-Inverted Data Input	
34	CML-I	Tx3n	Transmitter Inverted Data Input	
35		GND	Ground	1
36	CML-I	Tx1p	Transmitter Non-Inverted Data Input	
37	CML-I	Tx1n	Transmitter Inverted Data Output	
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 otherwise noted. Connect these directly to the host board signal common ground plane.
2. VccRx, Vcc1 and VccTx are the receiving and transmission power suppliers and shall be applied concurrently. Vcc Rx, Vcc1 and Vcc Tx 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 Dimensions



## Ordering Information

Table 5- Ordering Information

Part Number	Product Description
QSP-100C127-02CL	100Gbps QSFP28 Single Lambda, 1271nm, Duplex LC, 2km, with DDM
QSP-100C129-02CL	100Gbps QSFP28 Single Lambda, 1291nm, Duplex LC, 2km, with DDM
QSP-100C131-02CL	100Gbps QSFP28 Single Lambda, 1311nm, Duplex LC, 2km, with DDM
QSP-100C133-02CL	100Gbps QSFP28 Single Lambda, 1331nm, Duplex LC, 2km, with DDM

## ESD

This transceiver is specified as ESD threshold 1kV for high speed data pins and 2kV for all other 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.

## Laser Safety

Do not look into fiber end faces without eye protection using an optical meter (such as magnifier and microscope) within 100 mm, unless you ensure that the laser output is disabled. When operating an optical meter, observe the operation requirements.

Caution: Use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure.

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