



**CL-Q28-LR4-20-29**  
**Single-Mode QSFP28 100G BIDI 20km Transceiver**  
**RoHS 6 compliant**



### Features

- Supports 100Gbps
- 100G Lambda MSA 100G-LR1-20

### Specification Compliant

- Single 3.3V Power Supply
- Power dissipation < 4.5W
- Up to 20km over SMF with FEC
- QSFP28 MSA Compliant
- SFF-8636 Rev 2.10a Compliant
- 4x25G electrical interface
- BIDI LC receptacles
- Commercial case temperature range of

-5°C to 70°C

- I<sup>2</sup>C interface with integrated Digital Diagnostic

### Monitoring

- Safety Certification: TUV/UL/FDA<sup>\*Note1</sup>
- RoHS Compliant

### Applications

- 100G Ethernet
- Data center

PART NUMBER	Monitor	INPUT/OUTPUT	SIGNAL DETECT	TEMPERATURE
CL-Q28-LR4-20-29	X	AC/AC	TTL	-5°C to 70 °C
CL-Q28-LR4-20-29i	X	AC/AC	TTL	-40°C to 85 °C



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## Product Description

Carelink's QSFP28 BIDI transceiver module is designed for use in 100 Gigabit Ethernet links over 20km single mode fiber. The module incorporates one channel optical signal, 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\*<sup>Note3</sup>

Parameter	Symbol	Min.	Max.	Unit
Storage temperature	Ts	-40	+85	°C
Operating case temperature	Top	-5	75	°C
Supply voltage	Vcc	-0.5	3.6	V
Damage threshold	Rxdmg	7.6		dBm

Note3: Exceeding any one of these values may damage the device permanently.

## Recommended Operating Conditions

Parameter	Symbol	Min.	Typical	Max.	Unit
Operating case temperature	Tc	-5		70	°C
Power supply voltage	Vcc	3.135	3.3	3.465	V
Operating relative humidity	RH	5		85	%
Power dissipation	P <sub>D</sub>			4.5	W

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

## Electrical Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Notes
<b>Transmitter</b>						
Differential data input swing per lane		900			mV <sub>p-p</sub>	
Differential input impedance	Zin	90	100	110	ohm	
DC common mode voltage (Vcm)		-350		2850	mV	
<b>Receiver</b>						



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Differential output amplitude				900	mV <sub>p-p</sub>	
Differential output impedance	Z <sub>out</sub>	90	100	110	ohm	
Output Rise/Fall Time	t <sub>r</sub> /t <sub>f</sub>	12			ps	20%~80%
Eye width		0.57			UI	
Eye height differential		228			mV	@TP4, 1E-15
DC common mode voltage (V <sub>cm</sub> )		-350		2850	mV	1

Notes:

1. V<sub>cm</sub> is generated by the host. Specification includes effects of ground offset voltage.

### Optical Characteristics

Parameter	Symbol	Min.	Typical	Max.	Unit
<b>Transmitter</b>					
Signaling speed			53.125		Gbaud
Modulation format			PAM4		
Center wavelength	$\lambda_c$	1284.5 1304.5	1291 1311	1297.5 1317.5	nm
Side-mode suppression ratio	SMSR	30			dB
Extinction ratio	ER	3.5			dB
Transmit OMA for TDECQ<1.4dB for 1.4dB<TDECQ<TDECQ(max)	TxOMA	2.8 1.4+TDECQ		6.8	dBm
Transmit average power <sup>*(Note4)</sup>	TxAVG	-0.2		6.6	dBm
Transmitter and dispersion eye closure	TDECQ			3.6	dB
Optical return loss tolerance <sup>*(Note5)</sup>				15.6	dB
<b>Receiver</b>					
Signaling speed			53.125		Gbaud
Center wavelength	$\lambda_c$	1304.5 1284.5	1311 1291	1317.5 1297.5	nm
Damage threshold		7.6			dBm
Receive power (OMA <sub>outer</sub> )	RxOMA			6.8	dBm
Average receive power	RxAVG	-10		6.6	dBm
Receiver sensitivity (OMA <sub>outer</sub> ) <sup>*(Note6)</sup>	SenOMA			MAX(-7.6, SECQ-9)	dBm
Receiver reflectance				-26	dB
LOS assert	LOSA	-15			dBm



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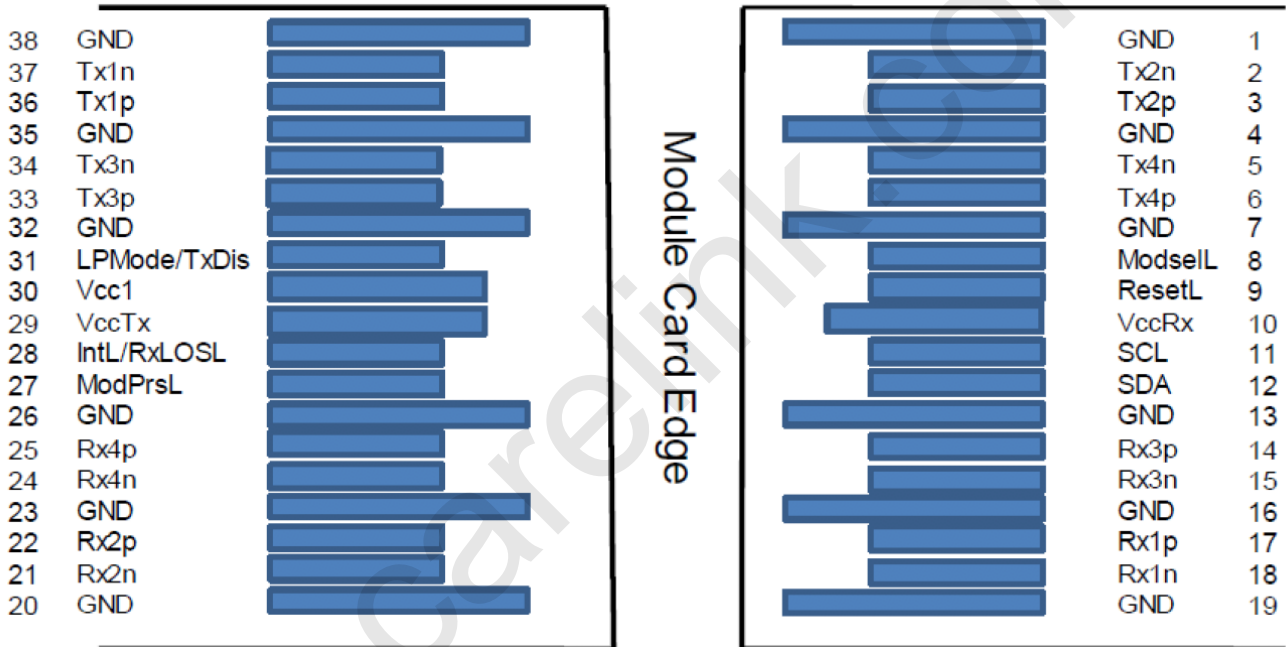
LOS De-assert	LOSD			-12	dBm
LOS hysteresis		0.5			dB

Note4: 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.

Note5: Transmitter reflectance is defined looking into the transmitter.

Note6: Sensitivity is specified at  $2.4 \times 10^{-4}$  BER.

**FP28 Transceiver Electrical Pad Layout**



Top Side  
Viewed From Top

Bottom Side  
Viewed From Bottom

**Pin Arrangement and Definition**

Pin	Logic	Symbol	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 Input	



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7		GND	Ground	1
8	LVTTL-I	ModSelL	Module Select	
9	LVTTL-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	+3.3V Power supply transmitter	2
30		Vcc1	+3.3V 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 Input	
38		GND	Ground	1

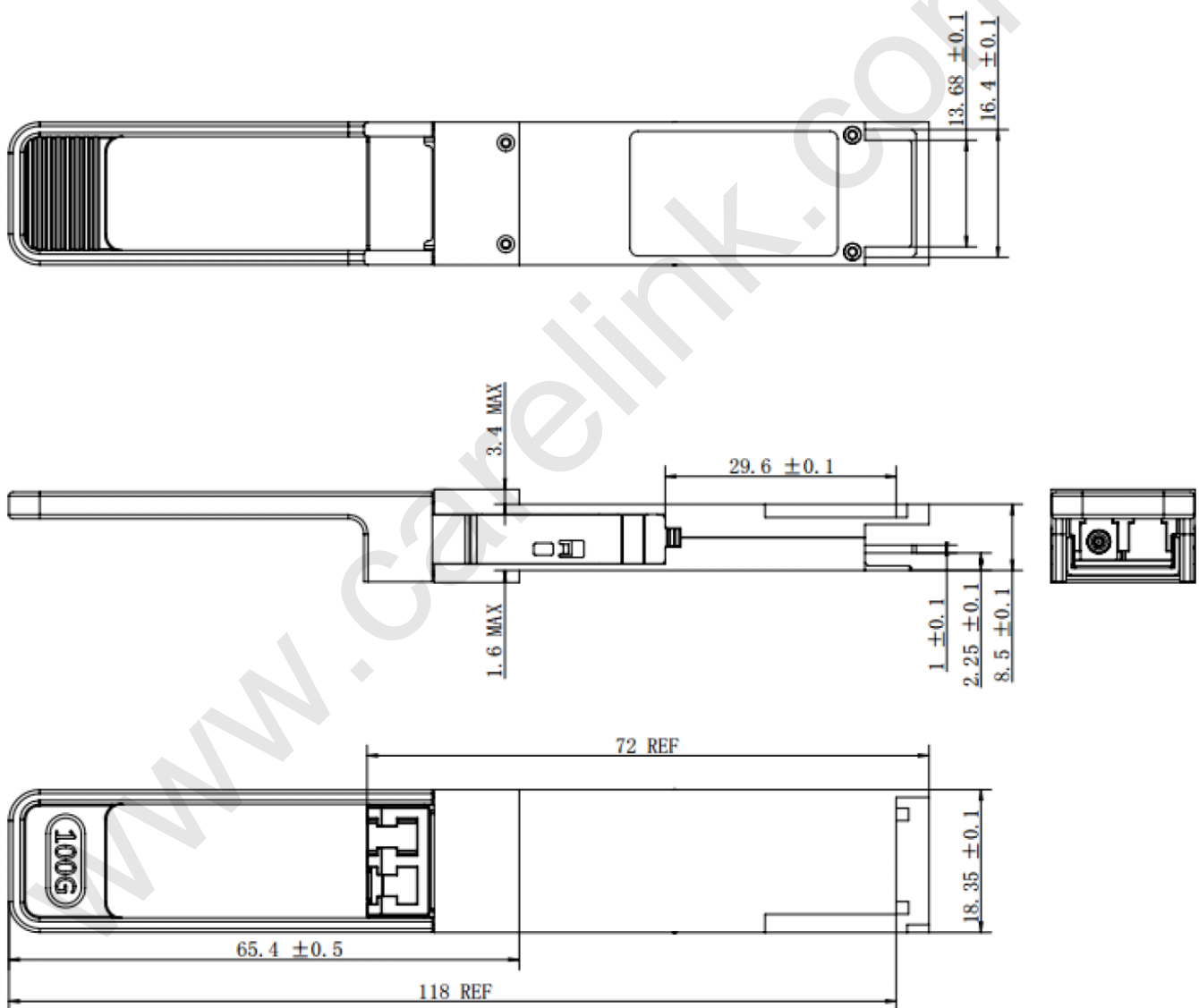
1: GND is the symbol for signal and supply (power) common for QSFP28 modules. All are common within the QSFP28 module and all module voltages are referenced to this potential unless otherwise noted. Connect these directly to the host board signal common ground plane.



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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 Specifications



\*This 2D is drawing is only for reference, please check with Carelink before ordering.



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