

# 100Gbps QSFP28 BIDI ZR4 80 Km SIDE A

## QSFP28-100G-BIDI-ZR4-A

### Features

- Compliant with QSFP28 Standard:
- SFF-8661 Rev 2.5, SFF-8636 Rev 2.10a
- High speed I/O electrical interface (CAUI-4) compliant with IEEE 802.3bm-2015
- 100GBASE-ZR4 103.125G 80km point-to-point Ethernet links
- Rx sensitivity of -28dBm 5E-5 with enabled KR4 FEC in host for up to 80km SMF
- Single 3.3V Supply Voltage
- Power Dissipation 4.5W at 55°C, 6.5W at 70°C Case Operating Temperature
- 0°C is environment temp; 70°C is Case Operating Temperature
- LAN WDM EML cooled laser and PIN Receiver
- Universal QSFP28 MSA package with Simplex LC connector
- Two Wire Serial Interface with Digital Diagnostic Monitoring
- Complies with EU Directive 2011/65/EU (RoHS compliant)
- LPMoDe, ModPrsL, ModSeIL and ResetL are supported
- Telecom networking
- Class 1 Laser



### Applications

- Commercial 100GBASE-ZR4 100G Ethernet
- Telecom networking

### Description

QSFP28-100G-BIDI-ZR4-A is designed for commercial level 40km optical communication applications. This module contains 4-lane optical transmitter, 4-lane optical receiver and module management block including 2 wire serial I/O. The optical signals are multiplexed to a single-mode fiber through an industry standard LC connector.

### Absolute Maximum Ratings

Parameter	Symbol	Min.	Max.	Unit	Notes
Storage Temperature	TS	-40	85	°C	
Supply Voltage	VCC	0	3.6	V	
Relative Humidity (non-condensing)	RH	5	85	%	
Data Input Voltage Differential	IVDIP-VDINI	-	1	V	

### Recommended Operating Conditions

Parameter	Symbol	Min.	Typical	Max.	Unit	Notes
Operating Temperature	T <sub>OPR</sub>	0	-	70	°C	1
Power Supply Voltage	VCC	3.1	3.3	3.47	V	
Maximum Power Dissipation	PD	-	4.5	6.5	W	2
Aggregate Bit Rate	ABR	-	103.125	-	Gb/s	
Data Rate per Lane	DRL	-	25.78	-	Gb/s	
Link Distance with G.652		1	40		km	
Two Wire Serial Interface Clock Rate	-	-	-	400	kHz	

1. 0°C is operating environment temperature, +70°C is case temperature
2. Power dissipation 4.5W at 55 °C ,6.5W at 70 °C Case Operating Temperature

## Electrical Specifications

**High-Speed Signal: Compliant to IEEE802.3 CAUI-4 C2M**

**Low-Speed Signal: Compliant to SFF-8679**

Parameter	Symbol	Min.	Typical	Max.	Unit	Notes
Power Dissipation			4.5	6.5	W	
Supply Current	I <sub>CC</sub>		1.4	2.3	A	
<b>Receiver (Module Output)</b>						
Parameter	Symbol	Min.	Typical	Max.	Unit	Notes
Differential Data Input Amplitude	V <sub>IN,P-P</sub>	-	-	900	mV	
Differential Termination Mismatch		-	-	10	%	
Output Rise/Fall Time, 20%~80%	T <sub>R</sub>	12	-	-	ps	
LPMode, Reset and ModSelL	V <sub>IL</sub>	-0.3	-	0.8	V	
	V <sub>IH</sub>	2	-	V <sub>CC</sub> +0.3	V	
<b>Transmitter (Module Input)</b>						
Parameter	Symbol	Min.	Typical	Max.	Unit	Notes
Differential Data Output Amplitude	V <sub>OUT,P-P</sub>	-	-	900	mV	
Differential Termination Mismatch		-	-	10	%	
Output Rise/Fall Time, 20%~80%	T <sub>R</sub>	12	-	-	ps	

## Optical Characteristics

### Transmitter Optical Specifications

Parameter	Symbol	Min.	Typical	Max.	Unit	Notes
Wavelength L0	λC0	1272.51	1273	1274.58	nm	
Wavelength L1	λC1	1276.86	1277	1278.93	nm	
Wavelength L2	λC2	1281.21	1282	1283.31	nm	
Wavelength L3	λC3	1285.61	1286	1287.71	nm	

Side-mode suppression ratio	SMSR	30				dB
Total Average Optical Launch Power	POUT	-	-	12.5		dBm
Average Launch Power Tx_Off (Each Lane)	POUT_OF F	-	-	-30		dBm
Average Optical Launch Power (Each Lane)	POUTL	2	-	5		dBm
Extinction Ratio	ER	8	-	-		dB
Spectral Width	$\Delta\lambda$	-	-	1		nm
Optical Modulation Amplitude (Each Lane)	OMA	0	-	6.5		dBm
Launch Power in OMA minus TDP (Each Lane)	OMA-TDP	0	-	-		dBm
Difference in launch power between any two lanes (OMA)	DT_OMA	-	-	2.5		dB
Optical Return Loss Tolerance	ORLT	-	-	20		dB
RIN20OMA	RIN	-	-	-130		dB/Hz
Transmitter Reflectance	TR	-	-	-12		dB
Transmitter Eye Mask Definition	-	IEEE 802.3bs-2010 {0.25, 0.4, 0.45, 0.25, 0.28, 0.4}				

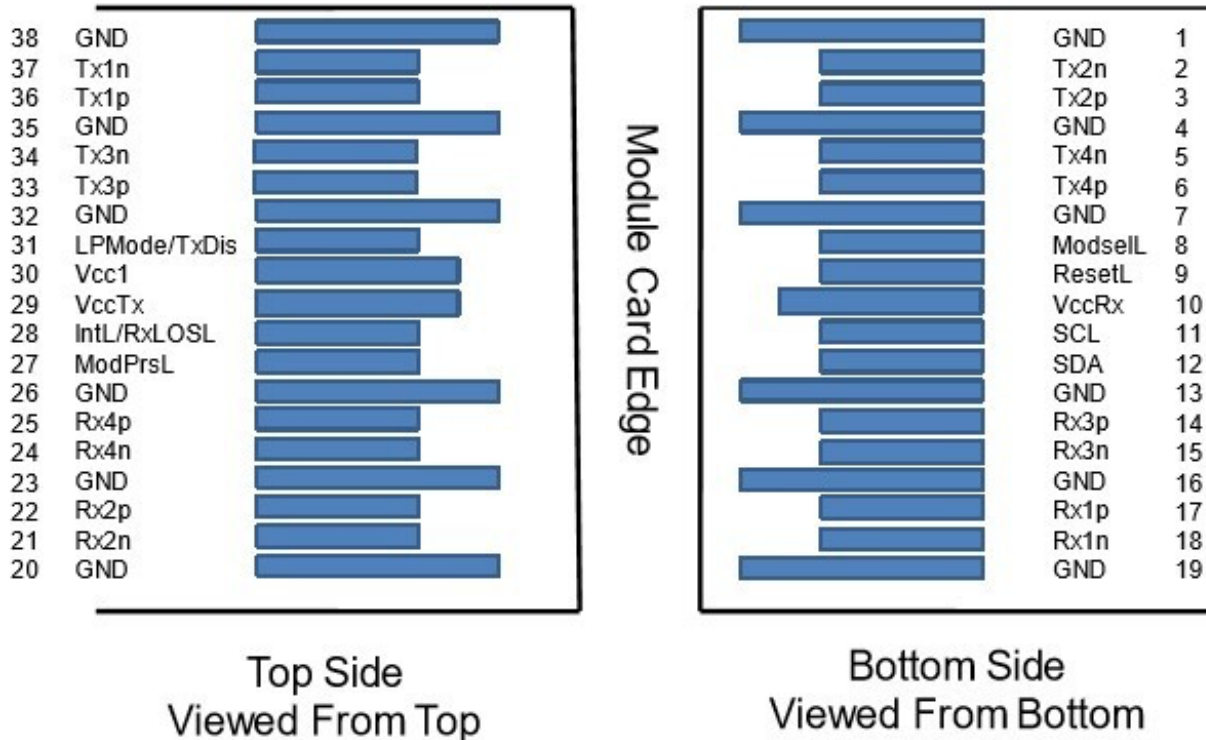
## Receiver Optical Specifications

Parameter	Symbol	Min.	Typical	Max.	Unit	Notes
Wavelength L0	$\lambda_{C0}$	1294.80	1295	1296.49	nm	
Wavelength L1	$\lambda_{C1}$	1299.29	1300	1300.09	nm	
Wavelength L2	$\lambda_{C2}$	1303.81	1304	1305.53	nm	
Wavelength L3	$\lambda_{C3}$	1308.36	1309	1310.09	nm	
Receiver Sensitivity (OMA) per Lane				-18	dBm	1
Stressed Receiver Sensitivity in OMA (Each Lane)	-	-	-	-17	dBm	1
Saturation Power, each lane	SP	0			dBm	
Damage Threshold for Receiver	Pin, damage	0	-	-	dBm	
Average Receive Power (Each Lane)	-	-26	-	-4.5	dBm	
Receive Power in OMA (Each Lane), Overload	OMA	-	-	-4.5	dBm	
LOS Assert	LOSA	-40	-	-	dBm	
LOS De-assert	LOSD	-	-	-30	dBm	
LOS hysteresis	LOSH	0.5	-	-	dB	

1. Sensitivity is measured @ BER5E-5

## Pin Descriptions

### Pinout definitions of QSFP28 module input/output



Pin	Logic	Symbol	Description	Plug Sequence	Note
1		GND	Ground	1	
2	CML-I	Tx2n	Transmitter Inverted Data Input	3	
3	CML-I	Tx2p	Transmitter Non-Inverted Data Input	3	
4		GND	Ground	1	
5	CML-I	Tx4n	Transmitter Inverted Data Input	3	
6	CML-I	Tx4p	Transmitter Non-Inverted Data Input	3	
7		GND	Ground	1	
8	LVTTL-I	Modsell	Module Select	3	
9	LVTTL-I	ResetL	Module Reset	3	
10		Vcc Rx	+3.3V Power Supply Receiver	2	
11	LVTTL-I	SCL	2-wire serial interface clock	3	
12	LVTTL-I	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	
17	CML-O	Rx1p	Receiver Non-Inverted Data Output	3	
18	CML-O	Rx1n	Receiver Inverted Data Output	3	
19		GND	Ground	1	
20		GND	Ground	1	

21	CML-O	Rx2n	Receiver Inverted Data Output	3	
22	CML-O	Rx2p	Receiver Non-Inverted Data Output	3	
23		GND	Ground	1	
24	CML-O	Rx4n	Receiver Inverted Data Output	3	
25	CML-O	Rx4p	Receiver Non-Inverted Data Output	3	
26		GND	Ground	1	
27	LVTTL-O	ModPrsL	Module Present	3	
28	LVTTL-O	IntL/RxL O S L	Interrupt. Optionally configurable as RxLOSL via the management interface (SFF-8636). Interrupt. Optionally configurable as RxLOSL via the management interface (SFF-8636).	3	
29		Vcc Tx	+3.3V Power supply transmitter	2	
30		Vcc1	+3.3V Power supply	2	
31	LVTTL-I	LPMoDe/ T xD is	Low Power Mode. Optionally configurable as TxDis via the management interface (SFF-8636).	3	
32		GND	Ground	1	
33	CML-I	Tx3p	Transmitter Non-Inverted Data Input	3	
34	CML-I	Tx3n	Transmitter Inverted Data Input	3	
35		GND	Ground	1	
36	CML-I	Tx1p	Transmitter Non-Inverted Data Input	3	
37	CML-I	Tx1n	Transmitter Inverted Data Input	3	
38		GND	Ground	1	

## Threshold

Parameter	Alarm-H	Warn-H	Warn-L	Alarm-L
Temperature °C	75	70	0	-5
Voltage V	3.6	3.5	3.1	3
Tx Bias Current mA	110	100	30	20
Tx Output Power dBm	7.5	6.5	-3.5	-4.5
Rx Receive Power dBm	-4.5	-6	-32	-33

## Digital Diagnostics

Parameter	Range	Accuracy	Unit	Calibration
Temperature	-40 to 85	±3	°C	Internal
Voltage	0 to VCC	±3%	V	Internal
Tx Bias Current (Each Lane)	0 to 100	10%	mA	Internal
Tx Output Power (Each Lane)	2 to +6.5	±3	dB	Internal
Rx Receive Power (Each Lane)	-28 to -5	±3	dB	Internal

## Mechanical Dimensions

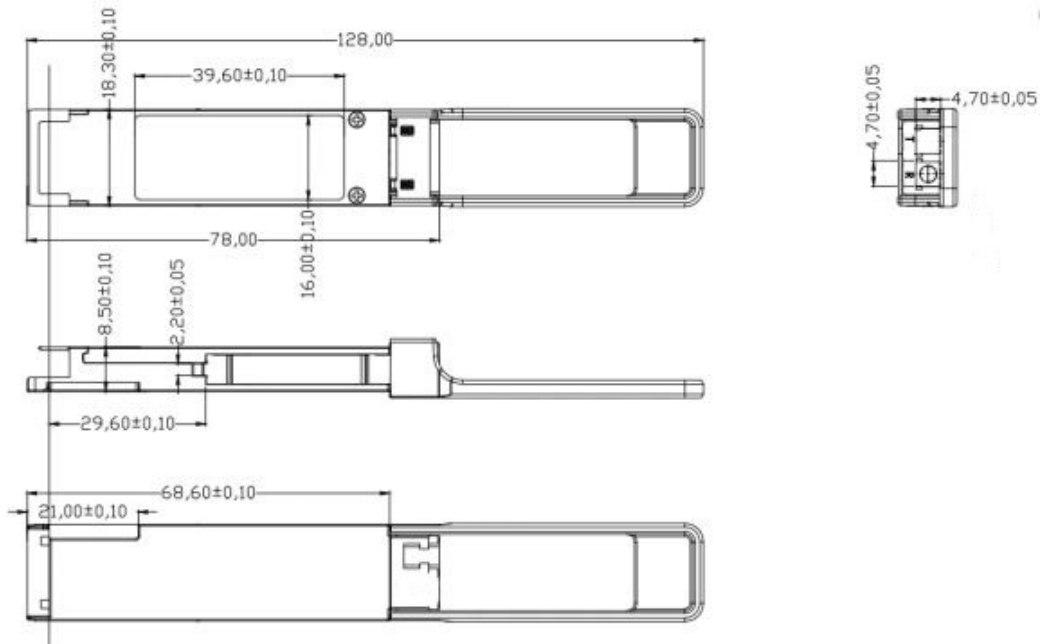


Figure10.Mechanical Specifications

## Ordering Information

Part Number	Product Description
QSFP28-100G-BIDI-ZR4-A	QSFP28ZR4 BIDI 80km with FEC, default data rate 100GE SIDE A

## 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:** Radiation emitted by laser devices can be dangerous to human eyes. Avoid eye exposure to direct or indirect radiation.



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