

# 100Gbps QSFP28 BIDI ER4 40 Km SIDE A

## QSFP28-100G-BIDI-ER4-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-ER4 103.125G 40km point-to-point Ethernet links
- Rx sensitivity of -18dBm 5E-5 with enabled KR4 FEC in host for up to 40km 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, ModSelL and ResetL are supported
- Telecom networking
- Class 1 Laser



### Applications

- Commercial 100GBASE-ER4 BiDi 100G Ethernet
- Telecom networking

### Description

QSFP28-100G-BIDI-ER4-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	-	VCC+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	$\lambda_{C2}$	1281.21	1282	1283.31	nm	
Wavelength L3	$\lambda_{C3}$	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}				

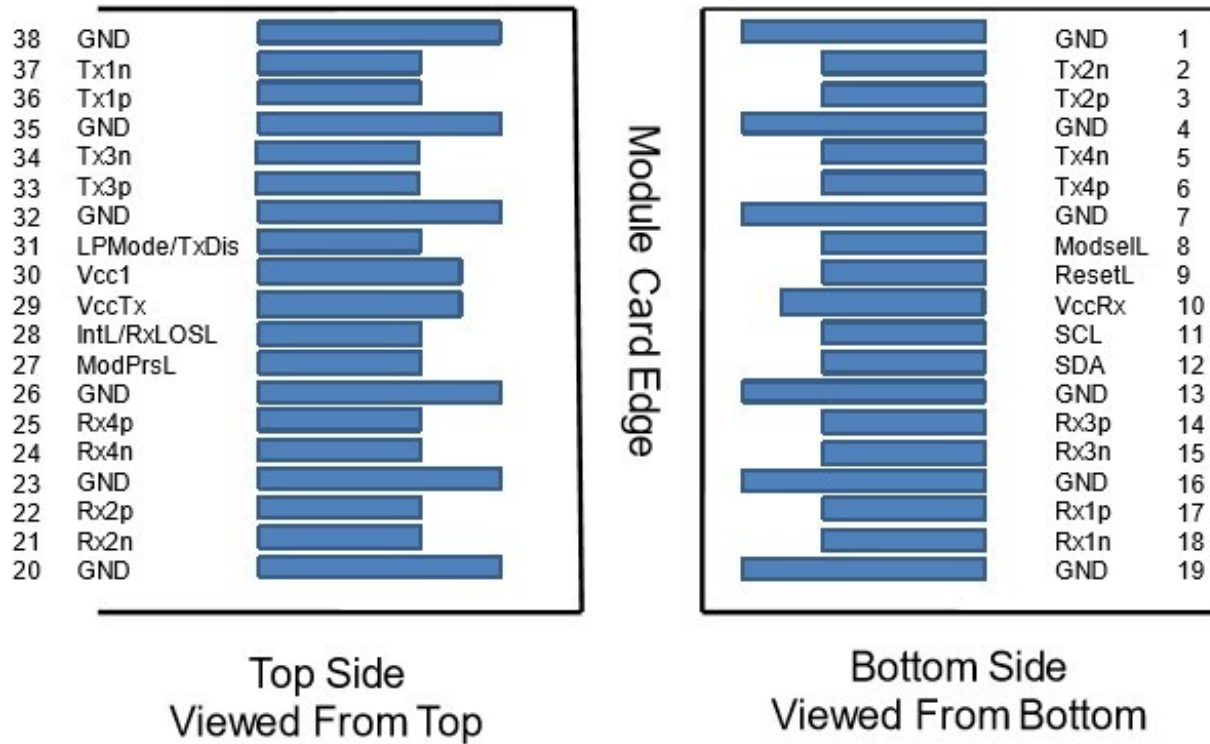
## Receiver Optical Specifications

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	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	
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

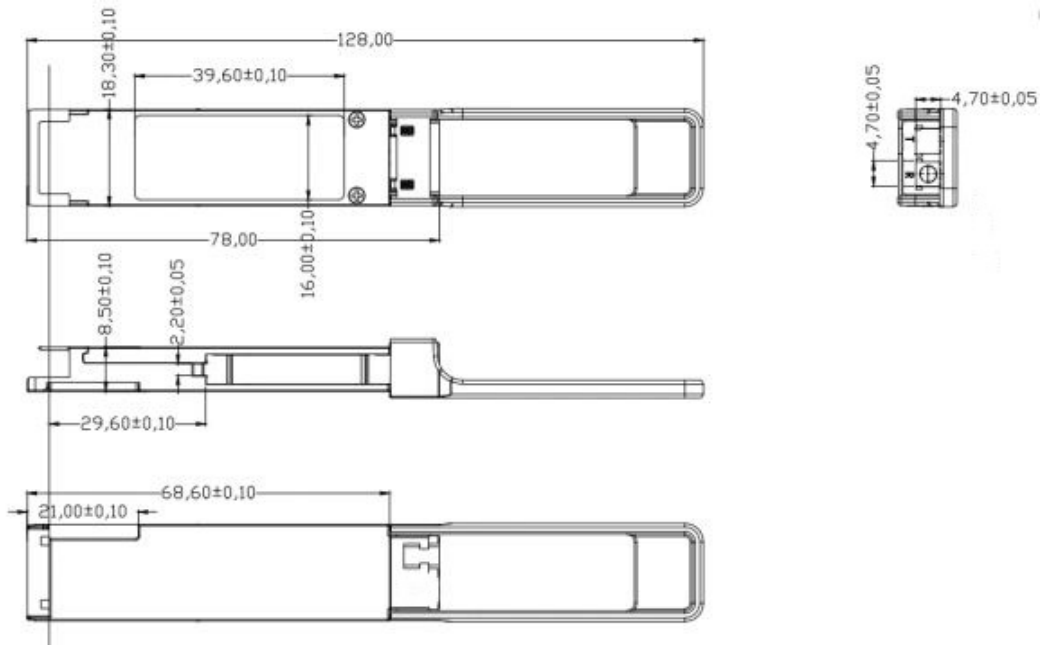


Figure10.Mechanical Specifications

## Ordering Information

Part Number	Product Description
QSFP28-100G-BIDI-ER4-A	QSFP28ER4 BIDI 40km 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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