

## RQ-100GBD40-T1304/ RQ-100GBD40-T1309

100Gbps QSFP28 BIDI Single Lambda Transceiver, 1304nm/1309nm Single Mode, 40km Reach



### Features

- ◆ Supports 100GBASE-ER1-40 BIDI
- ◆ Lane signaling rate 106.25Gb/s with PAM4
- ◆ Up to 40km transmission on SMF
- ◆ EML laser and APD receiver
- ◆ 4x25.78Gb/s with NRZ electrical interface (CAUI-4)
- ◆ High speed I/O electrical interface
- ◆ I2C interface with integrated Digital Diagnostic monitoring
- ◆ QSFP28 MSA package with simplex LC connector
- ◆ Single +3.3V power supply
- ◆ Maximum power consumption 4.5 W
- ◆ Operating case temperature: 0 to +70 °C
- ◆ Compliant to 802.3cu, SFF-8636&SFF-8679 standard
- ◆ Complies with EU Directive 2015/863/EU

### Application

- ◆ 100GBASE-ER1-40 BIDI

### Absolute Maximum Ratings

Table 1- Absolute Maximum Ratings

Parameter	Symbol	Min	Typical	Max	Units	Notes
Storage Temperature	T <sub>s</sub>	-40		+85	degC	
Supply Voltage	V <sub>cc</sub>	-0.5	-	+4.0	V	
Operating Relative Humidity	RH	-	-	+85	%	

### Recommended Operating Environment

Table 2 - Recommended Operating Environment

Parameter	Symbol	Min	Typical	Max	Units	Notes
Operating Case Temperature	T <sub>c</sub>	0		70	°C	
Power Supply Voltage	V <sub>cc</sub>	3.13	3.3	3.47	V	
Power Supply Current	I <sub>cc</sub>	-	-	1.3	A	
Maximum Power Dissipation	P <sub>D</sub>	-	-	4.5	W	
Data Rate(optical)	DR <sub>o</sub>	-	106.25	-	Gb/s	
Transmission Distance	TD	-	-	40	km	Over SMF

### Optical Characteristics

Table 3- Optical Characteristics

Transmitter							
Parameter	Symbol	Min.	Typical	Max.	Unit	Notes	
Center Wavelength	RQ-100GBD40-T1304	CW	1303.54	1304.58	1305.63	nm	
	RQ-100GBD40-T1309	CW	1308.09	1309.14	1310.19		
Average Launch Power	PTX	1.7	-	7.1	dBm	1	
Outer Optical Modulation Amplitude	OMA	4.5	-	7.9	dBm	TDECQ<1.4	
		3.3+TDECQ	-		dBm	TDECQ>1.4	
Transmitter and dispersion eye closure for PAM4 (TDECQ) (max)	TDECQ	-	-	3.9	dBm		
TDECQ-TECQ  (max)	-	-	-	2.7	dB		
Average Output Power (Laser Turn off)	P0UT-OFF	-	-	-15	dBm		
Side Mode Suppression Ratio	SMSR	30	-	-	dB		
Extinction Ratio	ER	6	-	-	dB		

Receiver							
Center Wavelength	RQ-100GBD40-T1304	CW	1308.09	1309.14	1310.19	nm	
	RQ-100GBD40-T1309		1303.54	1304.58	1305.63		
Damage threshold		P <sub>damage</sub>	-2.4	-	-	dBm	2
Average Rx Power		P <sub>RX</sub>	-16.0	-	-3.4	dBm	3
Receive power_OMaouter		P <sub>OMA</sub>	-	-	-2.6	dBm	
Receiver sensitivity_OMaouter		SEN_OMA	-	-	-13.8	dBm	4
Los Assert		LosA	-26	-	-	dBm	
Los De-Assert		LosDA	-	-	-15	dBm	
Los Hysteresis		LosH	0.5	-	-	dB	

**Notes:**

1. The optical power is launched into SMF.
2. The receiver shall be able to tolerate, without damage, continuous exposure to an optical input signal having this average power level. The receiver does not have to operate correctly at this input power.
3. Average receive power, each lane (min) is informative and not the principal indicator of signal strength.
4. Measured with conformance test signal at TP3 using the test pattern PRBS31Q or scrambled idle for stressed receiver sensitivity for the BER= 2.4x10<sup>-4</sup>.

**Electrical Characteristics**
**Table 4- Electrical Characteristics**

Transmitter (Module Input)						
Parameter	Symbol	Min.	Typical	Max.	Unit	Notes
Input Differential Impedance	R <sub>in</sub>	-	100	-	Ohm	
Differential Data Input Amplitude	V <sub>IN,P-P</sub>	80	-	900	mVpp	
Differential termination mismatch (max)	D-mismatch	-	-	10	%	
DC common-mode input voltage		-0.3	-	2.8	V	
Transition time(20%~80%)	Tr Tf	10	-	-	ps	
LPMoDe, Reset and ModSelL / Tx dis	V <sub>IL</sub>	-0.3	-	0.8	V	
LPMoDe, Reset and ModSelL / Tx dis	V <sub>IH</sub>	2.0	-	V <sub>CC</sub> +0.3	V	
Receiver (Module Output)						
Output Differential Impedance	R <sub>out</sub>	-	100	-	Ohm	
Differential Data Output Amplitude	V <sub>OUT,P-P</sub>	-	-	900	mVpp	
Differential termination mismatch (max)	D-mismatch	-	-	10	%	
Transition time, 20% to 80%	Tr Tf	12	-		ps	
ModPrsL and IntL/ Rx los	V <sub>OL</sub>	0	-	0.4	V	
ModPrsL and IntL/ Rx los	V <sub>OH</sub>	V <sub>CC</sub> -0.5	-	V <sub>CC</sub> +0.3	V	

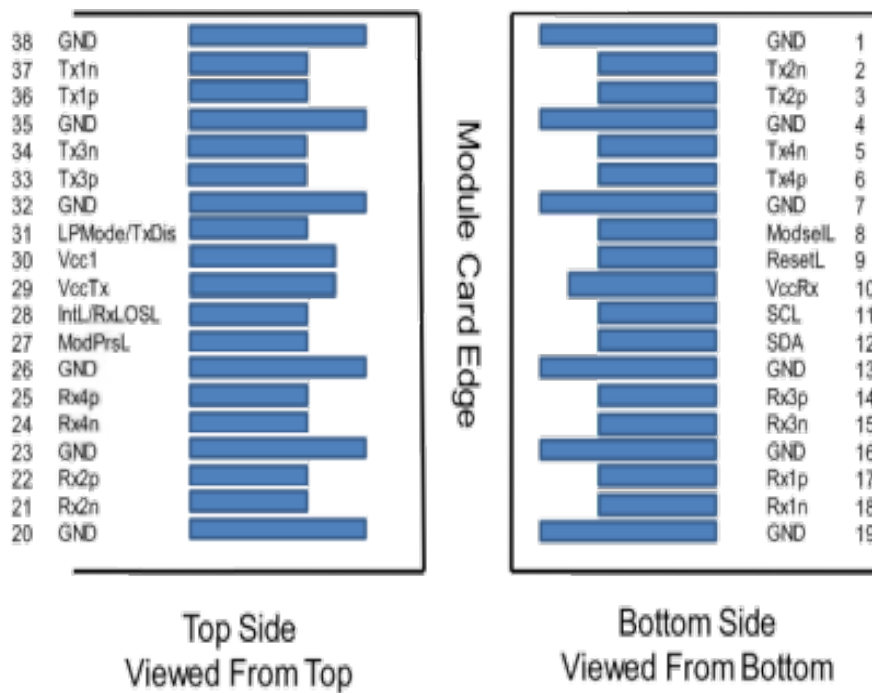
### Digital Diagnostics

Table 5- Digital Diagnostics

Parameter	Range	Accuracy	Unit	Calibration
Temperature	0 to 70	±3	°C	Internal
Voltage	0 to VCC	0.1	V	Internal
Tx Bias Current	0 to 100	10%	mA	Internal
Tx Output Power	1.7 to 7.1	±3	dBm	Internal
Rx Power	-16.0 to -3.4	±3	dBm	Internal

### Pin Assignment

Pin Diagram



### Pin Descriptions

Table 6- Pin Descriptions

PIN	Logic	Symbol	Description	Plug Seq.	Notes
1		GND	Ground	1	1
2	CML-I	Tx2n	Transmitter Inverted Data Input	3	
3	CML-I	Tx2p	Transmitter Non-Inverted Data output	3	
4		GND	Ground	1	1
5		NC		3	
6		NC		3	
7		GND	Ground	1	1
8	LVTLL-I	ModSelL	Module Select	3	
9	LVTLL-I	ResetL	Module Reset	3	
10		VccRx	+3.3V Power Supply Receiver	2	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		NC		3	
15		NC		3	
16		GND	Ground	1	1
17	CML-O	Rx1p	Receiver Non-Inverted Data Output	3	
18	CML-O	Rx1n	Receiver Inverted Data Output	3	
19		GND	Ground	1	1
20		GND	Ground	1	1
21	CML-O	Rx2n	Receiver Inverted Data Output	3	
22	CML-O	Rx2p	Receiver Non-Inverted Data Output	3	
23		GND	Ground	1	1
24		NC		3	
25		NC		3	
26		GND	Ground	1	1
27	LV TTL-O	ModPrsL	Module Present	3	
28	LV TTL-O	IntL	Interrupt	3	
29		VccTx	+3.3 V Power Supply transmitter	2	2
30		Vcc1	+3.3 V Power Supply	2	2
31	LV TTL-I	LPMode	Low Power Mode	3	
32		GND	Ground	1	1
33		NC		3	
34		NC		3	
35		GND	Ground	1	1
36	CML-I	Tx1p	Transmitter Non-Inverted Data Input	3	

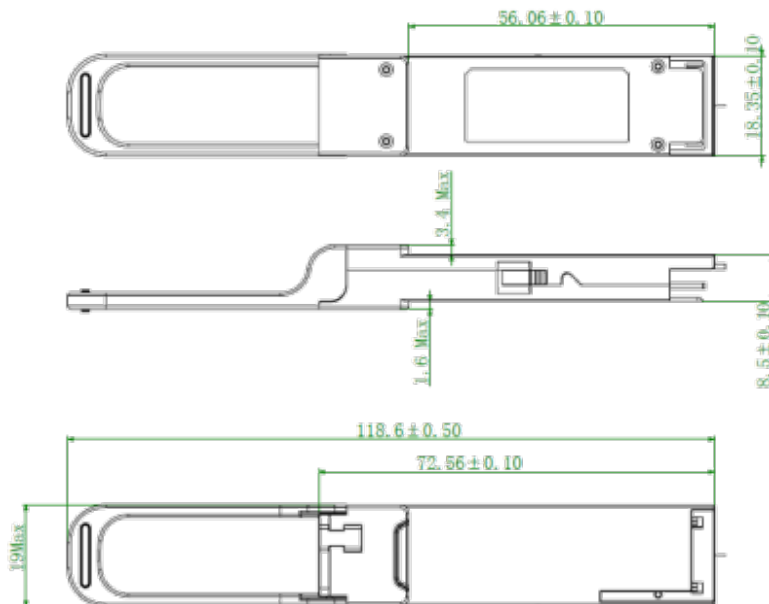
37	CML-I	Tx1n	Transmitter Inverted Data Output	3	
38		GND	Ground	1	1

**Note :**

1.GND is the symbol for signal and supply (power) common for the QSFP28 module. 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.Vcc Rx, Vcc1 and Vcc Tx are the receiver and transmitter power supplies and shall be applied concurrently. Requirements defined for the host side of the Host Edge Card Connector are listed in MSA. The connector pins are each rated for a maximum current of 1000 mA.

**Mechanical Dimension**



**Ordering information**

Table 7- Ordering information

Part Number	Product Description
RQ-100GBD40-T1304	100G QSFP28 BIDI Transceiver, TX1304nm/RX1309nm, Simplex LC, 40km, 0~+70°C, with DDM
RQ-100GBD40-T1309	100G QSFP28 BIDI Transceiver, TX1309nm/RX1304nm, Simplex LC, 40km, 0~+70°C, with DDM

