

100G QSFP28 LR1 BIDI Transceiver

Current Document Version V1.0



Key Feature

- Supports 100GBASE-LR1 BIDI
- Lane signaling rate 103.125Gbps~106.25Gb/s with PAM4
- Compatibility with 100G OTU4
- Up to 10km transmission on SMF
- EML Laser and PIN 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
- Support HW TX_DIS and RX_LOS for telecom application
- 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

Applications

- 100GBASE-LR1 BIDI

Ordering Information -100G QSFP28 LR1 BIDI

Part No.	Data Rate	Distance	Wavelength	Media	Connector	Temp.
LBQ0-PP14ELC	100G	10km	CWDM 1271/1331nm	SMF	Simplex LC	C
LBQ0-PP41ELC	100G	10km	CWDM 1331/1271nm	SMF	Simplex LC	C

Absolute Maximum Ratings

Parameter	Symbol	Min.	Max.	Unit	Note
Storage Temperature	TS	-40	85	°C	
Supply Voltage	Vcc	-0.5	3.6	V	
Relative Humidity	RH	5	85	%	



Recommended Operating Conditions

Parameter	Symbol	Min.	Typical	Max.	Unit	Notes
Operating Case Temperature	TC	0	-	70	°C	
Power Supply Voltage	VCC	3.13	3.3	3.47	V	
Power Supply Current	ICC	-	-	1.3	A	
Maximum Power Dissipation	PD	-	-	4.5	W	
Data Rate(optical)	DRo	-	103.125	106.25	Gb/s	
Transmission Distance	TD	-	-	10	km	Over SMF

Electrical Characteristics (Under Recommended Operating Conditions)

Transmitter (Module Input)						
Parameter	Symbol	Min.	Typical	Max.	Unit	Notes
Input Differential Impedance	Rin	-	100	-	Ohm	
Differential Data Input Amplitude	VIN,P-P	85	-	900	mVpp	
Differential termination mismatch (max)	D-mismatch	-	-	10	%	
LPMode, Reset and ModSelL / Tx dis	VIL	-0.3	-	0.8	V	
LPMode, Reset and ModSelL / Tx dis	VIH	2	-	VCC+0.3	V	
Receiver (Module Output)						
Output Differential Impedance	Rout	-	100	-	Ohm	
Differential Data Output Amplitude	VOU,P-P	200	-	900	mVpp	
Differential termination mismatch (max)	D-mismatch	-	-	10	%	
Transition time, 20% to 80%	Tr Tf	12	-		ps	
ModPrsL and IntL/ Rx los	VOL	0	-	0.4	V	
ModPrsL and IntL/ Rx los	VOH	VCC-0.5	-	VCC+0.3	V	



Optical Characteristics

Transmitter						
Parameter	Symbol	Min.	Typical	Max.	Unit	Notes
Center Wavelength	CW	1264.5	1271	1277.5	nm	
		1324.5	1331	1337.5	nm	
Average Launch Power	PTX	-1.4	-	4.5	dBm	1
Outer Optical Modulation Amplitude	OMA	0.7	-	4.7	dBm	1
Launch power in OMA minus TDECQ(min)	OMA-TDECQ	-0.7	-	-	dBm	ER≥4.5 dB
		-0.6	-	-	dBm	ER<4.5dB
Transmitter and dispersion eye closure for PAM4 (TDECQ) (max)	TDECQ	-	-	3.4	dBm	
Average Output Power (Laser Turn off)	POUT-OFF	-	-	-30	dBm	
Side Mode Suppression Ratio	SMSR	30	-	-	dB	
Extinction Ratio	ER	3.5	-	-	dB	
Transmitter reflectance	Tref	-	-	-26	dB	
Optical Return Loss Tolerance	ORLT	-	-	15.6	dB	
Receiver						
Center Wavelength	CW	1324.5	1331	1337.5	nm	
		1264.5	1271	1277.5	nm	
Damage threshold	Pdamage	5.5	-	-	dBm	2
Average Rx Power	PRX	-7.7	-	4.5	dBm	3
Receive power _OMAouter	POMA	-	-	4.7	dBm	
Receiver sensitivity _OMAouter	SEN _OMA	-	-	-6.1	dBm	4
Reflectance	Ref	-	-	-26	dB	

Notes:

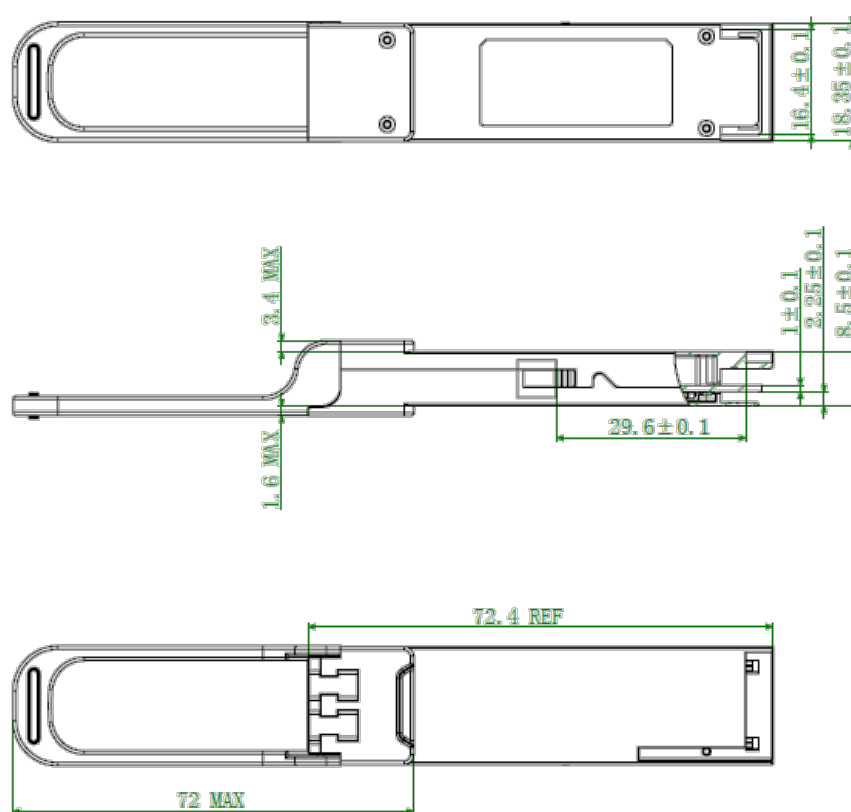
1. The optical power is launched into SMF.
2. The receiver shall be able to tolerate, without damage, continuous exposure to an optical input signal having this average power level. The receiver does not have to operate correctly at this input power.
3. Average receive power, each lane (min) is informative and not the principal indicator of signal strength.
4. Receiver sensitivity (OMAouter),each lane (max) is informative and is defined for a transmitter with SECQ up to 3.4 dB.

Digital Diagnostic Monitor Accuracy

Parameter	Range	Accuracy	Unit	Calibration
Temperature	0 to 70	±3	°C	Internal
Voltage	0 to V _{cc}	±3%	V	Internal
Tx Bias Current	0 to 100	±10%	mA	Internal
Tx Output Power	-1.4 to 4.5	±3	dB	Internal
Rx Power	-12 to 4.5	±3	dB	Internal



Mechanical Dimension





QSFP28 PIN Function Definitions

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 Input	
4		GND	Ground	1
5	CML-I	Tx4n	Transmitter Inverted Data Input	
6	CML-I	Tx4p	Transmitter Non-Inverted Data Input	
7		GND	Ground	1
8	LVTTL-I	ModSelL	Module Select	
9	LVTTL-I	ResetL	Module Reset	
10		Vcc Rx	+3.3V Power Supply Receiver	2
11	LVCMOS-I/O	SCL	2-wire serial interface clock	
12	LVCMOS-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	
25	CML-O	Rx4p	Receiver Non-Inverted Data Output	
26		GND	Ground	1
27	LVTTL-O	ModPrsL	Present	



28	LVTTL-O	IntL/RxLOSL	Interrupt/optional RxLOS	
29		Vcc Tx	+3.3 V Power supply transmitter	2
30		Vcc1	+3.3 V Power Supply	2
31	LVTTL-I	LPMode/TxDis	Low Power Mode/optional TX Disable	
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

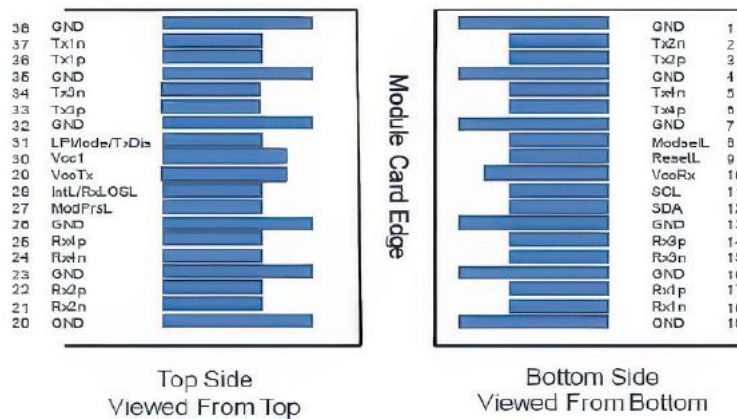
Notes:

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

VccRx, Vcc1 and VccTx shall be applied concurrently. VccRx Vcc1 and VccTx may be internally connected within the module in any combination. The connector pins are each rated for a maximum current of 1000 mA. Recommended host board power supply filtering is shown below.

QSFP28 Electrical Pad Layout

For detail mechanical information, please refer to the related document of QSFP MSA.





Laser Safety Warning

This product is classified as a Class 1 Laser Product according to IEC 60825-1.

It complies with 21 CFR 1040.10 and 1040.11 except for deviations pursuant to Laser Notice No. 50, dated June 24, 2007.

Caution: Use of optical instruments with this product will increase eye hazard. Do not view the laser beam directly with optical instruments or naked eyes.

Disclaimer

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