

# PRODUCT SPECIFICATION

<b>Part No.:</b>	<b>AC-QPBL-13G100-20/AC-QPBL-31G100-20</b>	
<b>Description:</b>	100G QSFP28 Transceiver, BIDI TX1291nm/RX1311nm 20km 100G QSFP28 Transceiver, BIDI TX1311nm/RX1291nm 20km	
<b>Release Date</b>	<b>Rev.</b>	<b>Revision Change Description</b>
2022/06/07	A0	New Release
2022/12/28	A1	Template Update

## Features

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- ✧ Lane signaling rate 106.25Gb/s with PAM4
- ✧ Up to 20km transmission over SMF
- ✧ EML transmitter and PIN receiver
- ✧ 4x25.78Gb/s NRZ electrical host interface (CAUI-4)
- ✧ High speed I/O electrical interface
- ✧ Digital diagnostic monitoring (DDM) via I<sup>2</sup>C
- ✧ QSFP28 MSA compliant form factor with simplex LC receptacle
- ✧ Single +3.3V power supply
- ✧ Support HW TX\_DIS and RX\_LOS for telecom application
- ✧ Maximum power consumption < 3.5 W
- ✧ Operating temperature range:  
Commercial: 0°C~+70°C  
Industrial: -40°C~+85°C
- ✧ Complies with EU Directive 2015/863/EU

## Application

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- ✧ 100GBASE-LR1-BiDi
- ✧ Data center interconnects (DCI) with limited or expensive fiber capacity
- ✧ Metro network aggregation and backhaul
- ✧ 5G mobile x-haul networks

## Standard

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- ✧ 100G single Lambda MSA
- ✧ IEEE 802.3bm
- ✧ QSFP28 MSA
- ✧ SFF-8636

## Specification:

Absolute Maximum Ratings				
Parameter	Symbol	Min	Max	Unit
Storage Temperature	Ts	-40	+85	°C
Supply Voltage	Vcc	-0.5	+4.0	V
Operating Relative Humidity	RH		+85	%

Recommended Operating Conditions					
Parameter	Symbol	Min	Typical	Max	Unit
Operating Case Temperature (Commercial)	Tc	0		70	°C
Operating Case Temperature (Industrial)		-40		85	
Power Supply Voltage	VCC	3.13	3.3	3.47	V
Power Supply Current	ICC			1.15	A
Maximum Power Dissipation	PD			4	W
Data Rate(optical)	DRo		106.25		Gb/s
Transmission Distance	TD			20	km

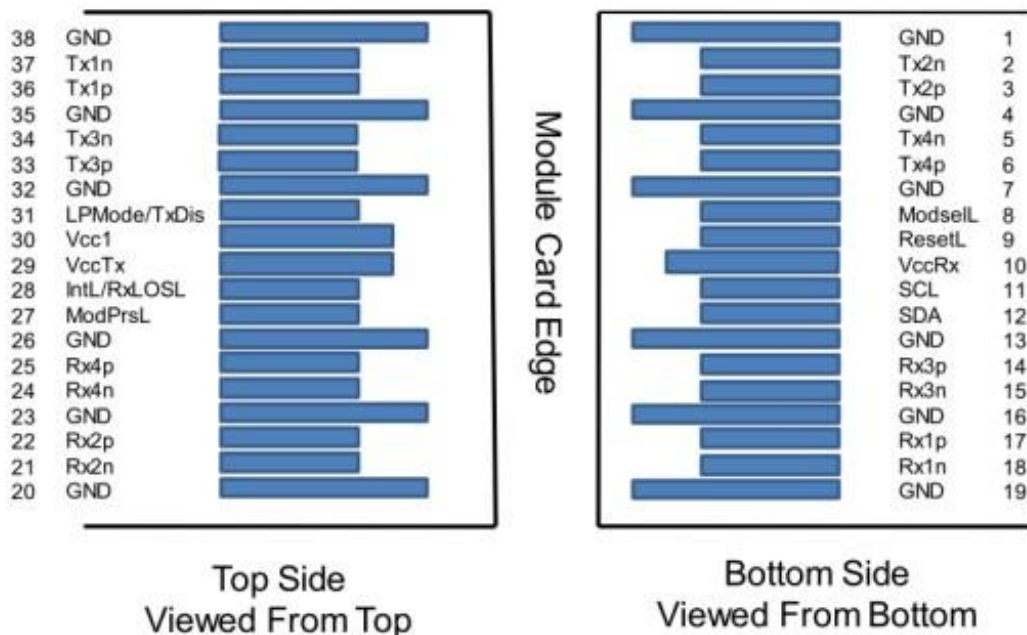
Optical transmitter Characteristics						
Parameter	Symbol	Min	Typical	Max	Unit	Notes
Center Wavelength	CW	1284.5	1291	1297.5	nm	
		1304.5	1311	1317.5	nm	
Average Launch Power	PTX	-0.5		6.6	dBm	1
Outer Optical Modulation Amplitude	OMA	2.8		6.8	dBm	TEDCQ<1.4
		1.4+TDECQ			dBm	1.4≤TDECQ
Transmitter and dispersion eye closure for PAM4 (TDECQ) (max)	TDECQ			3.4	dBm	
Transmitter eye closure for PAM4 (TECQ) (max)	TECQ			3.4	dBm	
TDECQ-TECQ  (max)				2.7	dB	
Average Output Power (Laser Turn off)	POUT-OFF			-15	dBm	
Side Mode Suppression Ratio	SMSR	30	-	-	dB	
Extinction Ratio	ER	3.5	-	-	dB	

Optical receiver Characteristics						
Parameter	Symbol	Min	Typical	Max	Unit	Notes
Center Wavelength	CW	1304.5	1311	1317.5	nm	
		1284.5	1291	1297.5	nm	
Damage threshold	Pdamage	7.6		-	dBm	2
Average Rx Power	P <sub>RX</sub>	-10		6.6	dBm	3
Receive power_OMAouter	P <sub>OMA</sub>	-		6.8	dBm	
Receiver sensitivity_OMAouter	SEN_OMA			-7.5	dBm	TECQ≤1.4 4
				-9+TECQ	dBm	1.4≤TECQ≤3.6
Los Assert	LosA	-26			dBm	
Los De-Assert	LosDA			-11	dBm	
Los Hysteresis	LosH	0.5			dB	

Notes:

- The optical power is launched into SMF. The transmitter wavelength range supports a broad range of transmitter types which may have different chirp characteristics. Compliance to the TDECQ and TECQ specifications may require a tighter wavelength range depending on the chirp characteristics of the transmitter
- 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.
- Average receive power, each lane (min) is informative and not the principal indicator of signal strength.
- Measured with conformance test signal at TP3 using the test pattern PRBS31Q or scrambled idle for stressed receiver sensitivity for the BER= 2.4x10-4..

### Pin Definition



**Figure1 QSFP MSA-compliant 38-pin connector**

Pin	Symbol	Name/Description	Notes
1	GND	Ground	1
2	Tx2n	Transmitter Inverted Data Input	
3	Tx2p	Transmitter Non-Inverted Data Input	
4	GND	Ground	1
5	Tx4n	Transmitter Inverted Data Input	
6	Tx4p	Transmitter Non-Inverted Data output	
7	GND	Ground	1
8	ModSelL	Module Select	
9	ResetL	Module Reset	
10	VccRx	+ 3.3V Power Supply Receiver	2
11	SCL	2-Wire Serial Interface Clock	
12	SDA	2-Wire Serial Interface Data	
13	GND	Ground	
14	Rx3p	Receiver Non-Inverted Data Output	
15	Rx3n	Receiver Inverted Data Output	
16	GND	Ground	1
17	Rx1p	Receiver Non-Inverted Data Output	
18	Rx1n	Receiver Inverted Data Output	
19	GND	Ground	1
20	GND	Ground	1
21	Rx2n	Receiver Inverted Data Output	
22	Rx2p	Receiver Non-Inverted Data Output	
23	GND	Ground	1
24	Rx4n	Receiver Inverted Data Output	
25	Rx4p	Receiver Non-Inverted Data Output	
26	GND	Ground	1
27	ModPrsL	Module Present	
28	IntL/Rx_LOS	Interrupt/Rx_LOS	
29	VccTx	+3.3 V Power Supply transmitter	2
30	Vcc1	+3.3 V Power Supply	2

31	LPMoDe/TxDIS	Low Power Mode/Tx_Disable	
32	GND	Ground	1
33	Tx3p	Transmitter Non-Inverted Data Input	
34	Tx3n	Transmitter Inverted Data Output	
35	GND	Ground	1
36	Tx1p	Transmitter Non-Inverted Data Input	
37	Tx1n	Transmitter Inverted Data Output	
38	GND	Ground	1

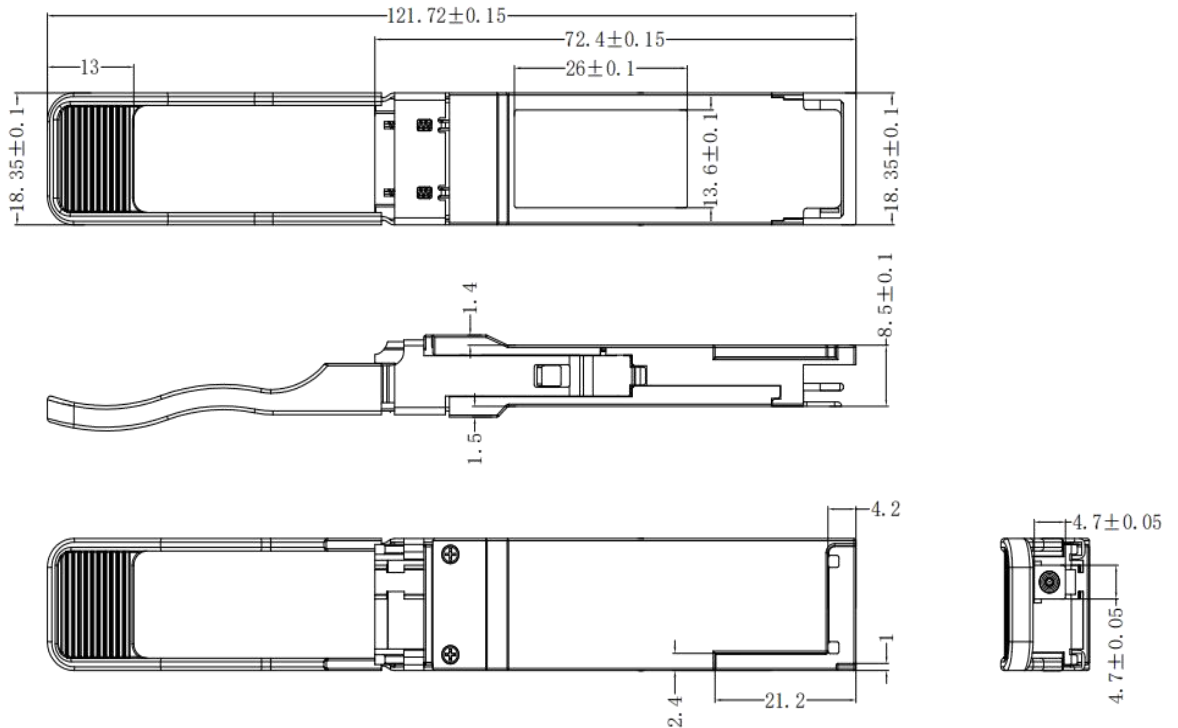
**Table 1: QSFP Module PIN Definition**

**Notes:**

- ◇ Module circuit ground is isolated from module chassis ground within the module.
- ◇ Open collector; should be pulled up with 4.7k – 10k ohms on host board to a voltage between 3.15V and 3.6V.

**Package Outline**

Dimensions are in millimeters. All dimensions are  $\pm 0.2\text{mm}$  unless otherwise specified. (Unit: mm)



## Regulatory Compliance

Feature	Test	Method
Electrostatic Discharge (ESD) to the Electrical Pins	MIL-STD-883E Method 3015.7	Class 1(>1000V for SFI pins, >2000Vfor other pins.)
Electrostatic Discharge (ESD) Immunity	IEC61000-4-2	Class 2(>4.0kV)
Electromagnetic Interference (EMI)	CISPR22 ITE Class B FCC Class B CENELEC EN55022 VCCI Class 1	Comply with standard
Immunity	IEC61000-4-3	Comply with standard
Eye Safety	FDA 21CFR 1040.10 and 1040.11 EN (IEC) 60825-1,2	Compatible with Class I laser Product

## Ordering Information

Part. No	Specifications								
	Pack	Rate (Gbps)	Tx (nm)	Po (dBm)	RX	Sen (dBm)	Temp (°C)	Reach (KM)	DDM
AC-QPBL-13G100-20	QSFP28	100G	EML 1291/1311nm	-0.5~6.6	PIN	<-7.5	0~70	20	Y
AC-QPBL-31G100-20	QSFP28	100G	EML 1311/1291nm	-0.5~6.6	PIN	<-7.5	0~70	20	Y
AC-QPBL-13G100-20F	QSFP28	100G	EML 1291/1311nm	-0.5~6.6	PIN	<-7.5	-40~85	20	Y
AC-QPBL-31G100-20F	QSFP28	100G	EML 1311/1291nm	-0.5~6.6	PIN	<-7.5	-40~85	20	Y

