

# PRODUCT SPECIFICATION

<b>Part No.:</b>	AC-QPBL89-G100-01	
<b>Description:</b>	100G QSFP28 Transceiver, BIDI TX850nm/RX900nm 100m 100G QSFP28 Transceiver, BIDI TX900nm/RX850nm 100m	
<b>Release Date</b>	<b>Rev.</b>	<b>Revision Change Description</b>
2015/06/07	A0	New Release
2020/12/28	A1	Template Update

## Features

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- ◇ QSFP28 MSA compliant
- ◇ Support 100GE dual aggregate bit rates
- ◇ Compliant to IEEE 802.3bm 100GBASE-SR4
- ◇ Four independent full-duplex channels
- ◇ Up to 100m OM4 MMF transmission
- ◇ Operating case temperature:-0 to 70C@100G
- ◇ Single 3.3V power supply
- ◇ Maximum power consumption 3.5W
- ◇ LC optical connector
- ◇ RoHS-6 compliant

## Application

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- ◇ Data Center
- ◇ Infiniband QDR, DDR and SDR
- ◇ 100G Ethernet

## Standard

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- ◇ CEI-28G-VSR
- ◇ QSFP28 MSA
- ◇ SFF-8636

## Specification

Absolute Maximum Ratings				
Parameter	Symbol	Min	Max	Unit
Storage Temperature	Ts	-40	+85	degC
Operating Case Temperature	Top	0	70	degC
Power Supply Voltage	Vcc	-0.5	+3.6	V
Relative Humidity (non- condensation)	RH	0	+85	%
Damage Threshold	THd	+5		dBm

Recommended Operating Conditions					
Parameter	Symbol	Min	Typical	Max	Unit
Operating Case Temperature	TOP	0		+70	degC
Power Supply Voltage	Vcc	3.135	3.3	3.465	V
Data Rate Accuracy		-100		100	ppm
Pre-FEC Bit Error Ratio(@100G)				2.4x10 <sup>-4</sup>	
Post-FEC Bit Error Ratio(@100G)				1x10 <sup>-12</sup>	
Control Input Voltage High		2		Vcc	V
Control Input Voltage Low		0		0.8	V
Link Distanc (@100G )	OM3	D1		70	m
	OM4	D2		100	m
	OM5	D3		150	m

**Notes:**

1. FEC provided by host system.
2. FEC required on host system to support maximum distance.

Optical transmitter Characteristics						
Parameter	Symbol	Min	Typical	Max	Unit	Notes
Transmitter						
Center Wavelength Line0	$\lambda_c$	844		863	nm	
Center Wavelength Line1	$\lambda_c$	900		918	nm	

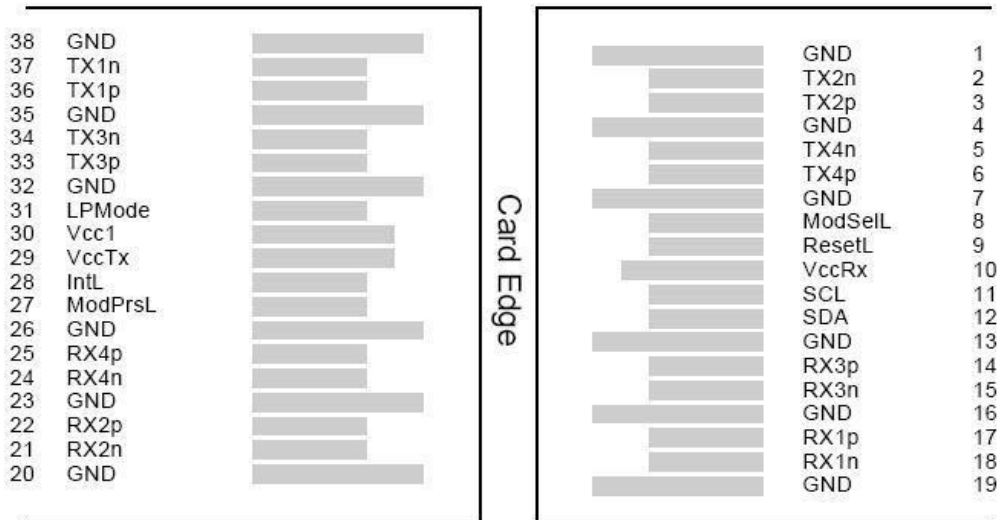
RMS Spectral Width	$\Delta\lambda_{rms}$			$\lambda_1: 0.6$ $\lambda_2: 0.65$	nm	
Average Launch Power, each Lane	$P_{AVG}$	-6.2		4	dBm	
Optical Modulation Amplitude (OMA), each Lane	$P_{OMA}$	-4.2		3	dBm	
Launch power in OMA minus TDP, each lane		-5.6			dBm	
TDECQ, each lane				4.5	dB	
Extinction Ratio	ER	3.0				
Transmitter transition time, each lane (max)				31	Ps	
RIN12 OMA				-128	dB/Hz	
Optical Return Loss Tolerance	TOL			12	dB	
Average Launch Power OFF Transmitter, each Lane	$P_{off}$			-30	dBm	
Encircled Flux				$\geq 86\%$ at $19\ \mu m$ $\leq 30\%$ at $4.5\ \mu m$		2
Signaling rate, each lane				$26.5625 \pm 100ppm$	Gbps	
Center Wavelength Line0	$\lambda_c$	844	850	863	nm	
Center Wavelength Line1	$\lambda_c$	900	910	918	nm	
Damage Threshold, each Lane	$TH_d$	5			dBm	3
Average Receive Power, each lane					dBm	4
Average power at receiver input, each lane (overload)				4	dBm	
Receiver Reflectance	RR			-12	dB	
Stressed receiver sensitivity in OMA, Lane2				-3.5	dBm	5
Receiver sensitivity(OMA outer), each lane				Max (-6.6, SECQ - 8) as per IEEE cl 150	dBm	
<b>Transmitter (each Lane)</b>						
Overload Differential Voltage pk-pk	TP1a	900			mV	
Common Mode Voltage (Vcm)	TP1	-350		2850	mV	1
Differential Termination Resistance Mismatch	TP1			10	%	At 1MHz
Differential Return Loss (SDD11)	TP1			See CEI- 28G-VSR Equation 13-19	dB	
Common Mode to Differential conversion and Differential to Common Mode conversion (SDC11, SCD11)	TP1			See CEI- 28G-VSR Equation 13-20	dB	

Stressed Input Test	TP1a	See CEI-28G-VSR Section 13.3.11.2.1				
Optical receiver Characteristics						
Parameter	Test point	Min	Typical	Max	Unit	Notes
Differential Voltage, pk-pk	TP4			900	mV	
Common Mode Voltage (Vcm)	TP4	-350		2850	mV	
Common Mode Noise, RMS	TP4			17.5	mV	
Differential Termination Resistance Mismatch	TP4			10	%	
Differential Return Loss (SDD22)	TP4			See CEI-28G-VSR Equation 13-19	dB	
Common Mode to Differential conversion and Differential to Common Mode conversion (SDC22, SCD22)	TP4			See CEI-28G-VSR Equation 13-21	dB	
Common Mode Return Loss (SCC22)	TP4			-2	dB	
Transition Time, 20 to 80%	TP4	9.5			ps	
Vertical Eye Closure (VEC)	TP4			5.5	dB	
Eye Width at 10 <sup>-15</sup> probability (EW15)	TP4	0.57			UI	
Eye Height at 10 <sup>-15</sup> probability (EH15)	TP4	228			mV	

**Notes:**

1. Vcm is generated by the host. Specification includes effects of ground offset voltage.
2. From 250MHz to 30GHz.

**Pin Definition**



Top Side

Viewed from Top

Bottom Side

Viewed from Bottom

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 Input	
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	1
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	Interrupt	
29	VccTx	+3.3 V Power Supply transmitter	2
30	Vcc1	+3.3 V Power Supply	2
31	LPMMode	Low Power Mode	
32	GND	Ground	1
33	Tx3p	Transmitter Non-Inverted Data Input	
34	Tx3n	Transmitter Inverted Data Input	
35	GND	Ground	1
36	Tx1p	Transmitter Non-Inverted Data Input	
37	Tx1n	Transmitter Inverted Data Input	

38	GND	Ground	1
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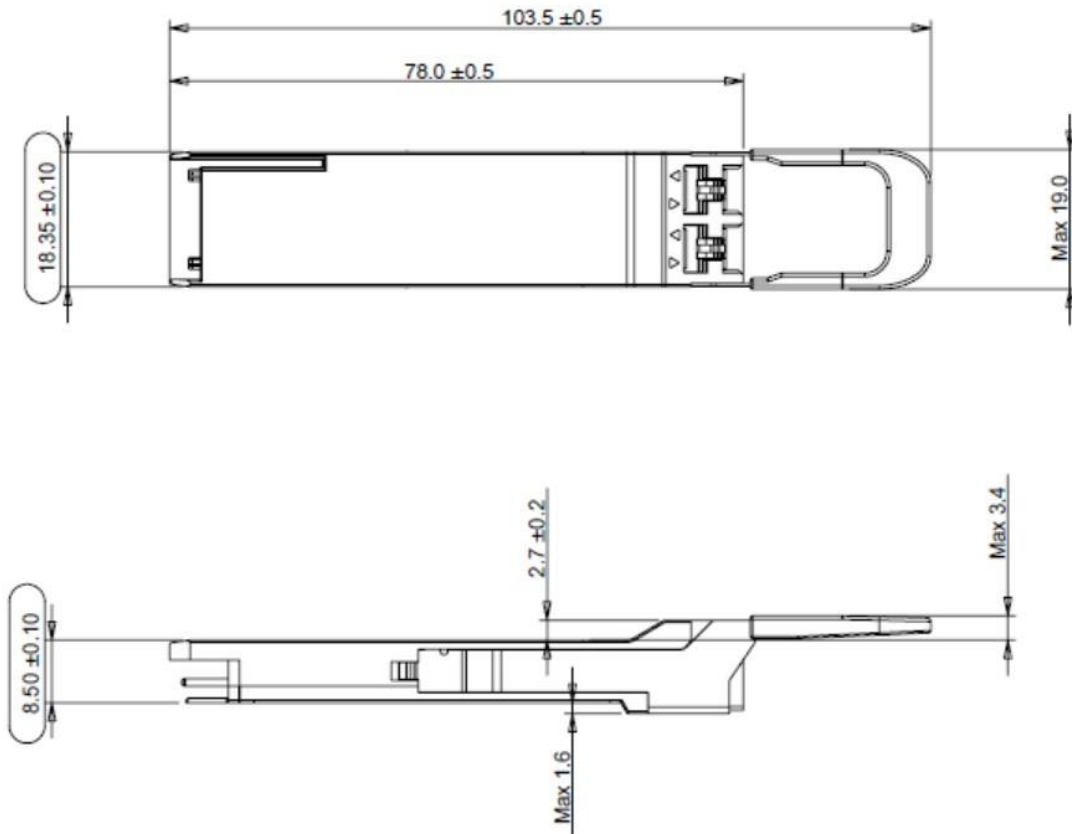
**Table 1: QSFP Module PIN Definition**

**Notes:**

1. GND is the symbol for signal and supply (power) common for QSFP28 modules. 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. VccRx, Vcc1 and VccTx are the receiver and transmitter power suppliers and shall be applied concurrently. Recommended host board power supply filtering is shown in Figure 4 below. Vcc Rx, Vcc1 and Vcc Tx may be internally connected within the QSFP28 transceiver module in any combination. The connector pins are each rated for a maximum current of 1000mA.

**Package Outline**

Dimensions are in millimeters. All dimensions are ±0.2mm 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 SF1 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 (M)	DDM
AC-QPBL8-G100-01	QSFP 28	100G	Tx850nm VCSEL	-6.2-4	Pin	-6.6	0~70	100	Y
AC-QPBL9-G100-01	QSFP 28	100G	Tx900nm VCSEL	-6.2-4	Pin	-6.6	0~70	100	Y