

# QSFP28-100G-B40

## Optical SFP Module

100Gbps QSFP28 Transceiver, Bi-di, 1304/1309nm, 40KM



### Features

- Supports 106.25Gb/s PAM4.
- Built-in 100G PAM4 DSP
- High Sensitivity APD Receiver
- LC BIDI single receptacle
- Up to 10km reach for SMF
- Hot-pluggable QSFP28 form factor
- Digital Diagnostics Monitoring Interface
- Power dissipation < 4.5 W
- Compatible with RoHS
- Commercial operating case temperature: 0 to +70° C

### Application

- 100G Ethernet
- Data center
- Infiniband QDR
- Fiber channel

## Standard

- 100G Lambda MSA
- QSFP MSA compliant
- Compliant to SFF-8636

## Absolute Maximum Ratings

Parameter	Symbol	Min	Max	Unit
Power Supply Voltage	Vcc	0	3.6	V
Damage Threshold	THd	2.4		dBm
Storage Temperature	Ts	-20	+85	°C
Operating Humidity	-	0	85	%

## Recommended Operating Conditions

Parameter	Symbol	Min	Typical	Max	Unit
Operating Case Temperature	Tc	0		70	°C
Power Supply Voltage	Vcc	3.13	3.3	3.47	V
Supply Current	ICC		1.2	1.36	A
Power Consumption			4	4.5	W
Fiber Length 9/125µm core SMF		-	-	40	km

## Optical and Electrical Characteristics

Optical Transmitter Characteristics						
Parameter	Symbol	Min	Typical	Max	Unit	Notes
Data Rate (each Lane)		53.125±100 ppm(CAUI-4)			GBd	
Modulation Format		PAM4				
Wavelength	UP-LINK	1304.58+/- 1.0			nm	
	DOWN-LINK	1309.14+/- 1.0				
Side-mode Suppression ratio	SMSR	30			dB	
Average launch power <sup>1</sup>	PAVG	1.7		7.1	dBm	
Outer Optical Modulation Amplitude (OMA <sub>outer</sub> )	POMA	4.7			dBm	
TDECQ<1.4dB		3.3+TDECQ		7.9		
TDECQ>1.4dB						
Transmitter and Dispersion penalty <sup>2</sup>	TDECQ			3.9	dB	
TECQ	TECQ			3.9	dB	
TDECQ-TECQ  (max)				2.7	dB	
Extinction Ratio		5.0			dB	
Optical Return Loss Tolerance				15	dB	
Transmitter Reflectance <sup>3</sup>	RL			-26	dB	
Average Launch Power OFF Transmitter	P <sub>off</sub>			- 15	dBm	
RIN <sup>15.6 OMA</sup>	RIN			- 136	dB/Hz	
Transmitter (each Lane)						
Signaling rate	Rate	25.78 (CAUI-4)			Gbps	
Differential Input Impedance	Z <sub>d</sub>		100		Ω	
Differential Input Voltage per lane				900	mV	
Input impedance mismatch				10	%	
Input High Voltage	V <sub>IH</sub>	2		V <sub>CC</sub> +0.3	V	
Input LOW Voltage	V <sub>IL</sub>	-0.3		0.8	V	

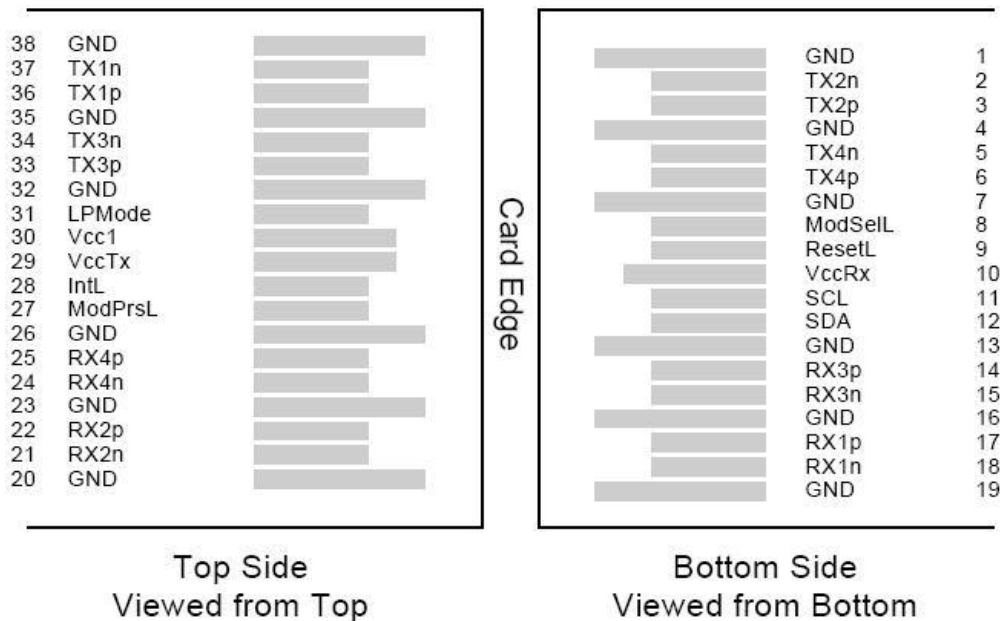
Optical Receiver Characteristics						
Parameter	Symbol	Min	Typical	Max	Unit	Notes
Data Rate (each Lane)		53.125 ± 100 ppm(CAUI-4)			GBd	
Modulation Format		PAM4				
Lane Wavelength	UP-LINK	1309.14+/- 1.0			nm	
	DOWN-LINK	1304.58+/- 1.0				
Damage Threshold <sup>3</sup>		-2.4			dBm	
Average receive power <sup>4</sup>		- 16		-3.4	dBm	
Receive Power(OMA <sub>outer</sub> )				-2.6	dBm	
Receiver Reflectance				-26	dB	
Receiver sensitivity(OMA <sub>outer</sub> ) <sup>5</sup>				Max(- 13.8, TECQ- 15.2)	dBm	
Stressed receiver sensitivity (OMA <sub>outer</sub> ), each laned (max) <sup>6</sup>	SRS			- 10	dBm	
Transmitter Reflectance				-26	dB	
LOS Assert	LOSA	-30		- 19.5	dBm	
LOS De-assert	LOSD			- 16.5	dBm	
LOS Hysteresis	LOSH	0.5			dB	
Transmitter (each Lane)						
Signaling rate	Rate	25.78 (CAUI-4)			Gbps	
Common mode voltage	V <sub>cm</sub>	-350		2850	Ω	
Common Mode Noise, rms				17.5	mV	
Differential Termination Resistance Mismatch (at 1 MHz)				10	%	
Differential Return Loss (SDD <sub>22</sub> )				Per CEI- 28G-VSR	dB	
Common Mode to Differential conversion and Differential to Common Mode Conversion (SDC <sub>22</sub> ,SCD <sub>22</sub> )				Per CEI- 28G-VSR	dB	
Common Mode Return Loss(SCC <sub>22</sub> )-from 250 MHz to 30 GHz				-2		
Transition Time: 20/80%		9.5			ps	
Vertical Eye Closure	VEC			6.5	dB	
Eye width at 10- 15probability	EW <sub>15</sub>	0.57			UI	
Eye height at 10- 15probability	EH <sub>15</sub>	228			mV	

**Notes:**

1. Average launch power (min) is informative and not the principal indicator of signal strength. A transmitter with launch power below this value cannot be compliant; however, a value above this does not ensure compliance.
2. Transmitter Reflectance is defined looking into the transmitter.
3. The receiver shall be able to tolerate, without damage, continuous exposure to a modulated optical input signal having this power level on one lane.
4. Average receive power (min) is informative and not the principal indicator of signal strength. A received power below this value cannot be compliant; however, a value above this does not ensure compliance.
5. CAUI4 mode,the Pre-FEC BER level is 2E-4.
6. Measured with conformance test signal at TP3 for the BER specified in IEEE Std 802.3cd.

**Pin Definitions**

**Pin Diagram**



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

Pin	Symbol	Name/Description	Notes
1	GND	Transmitter Ground (Common with Receiver 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	Vcc Rx	+3.3 V Power supply receiver	2
11	SCL	2-wire serial interface clock	
12	SDA	2-wire serial interface data	
13	GND	Ground	
14	RX3P	Transmitter Inverted Data Input	
15	RX3N	Transmitter Non-Inverted Data Input	
16	GND	Ground	1
17	RX1P	Transmitter Inverted Data Input	
18	RX1N	Transmitter Non-Inverted Data Input	
19	GND	Ground	1
20	GND	Ground	1
21	RX2N	Transmitter Inverted Data Input	
22	RX2P	Transmitter Non-Inverted Data Input	
23	GND	Ground	1
24	RX4N	Transmitter Inverted Data Input	1
25	RX4P	Transmitter Non-Inverted Data Input	
26	GND	Ground	1
27	ModPrsL	Module Present	
28	IntL	Interrupt	
29	Vcc Tx	+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 Inverted Data Input	
34	TX3N	Transmitter Non-Inverted Data Input	
35	GND	Ground	1
36	TX1P	Transmitter Inverted Data Input	
37	TX1N	Transmitter Non-Inverted Data Input	
38	GND	Ground	1

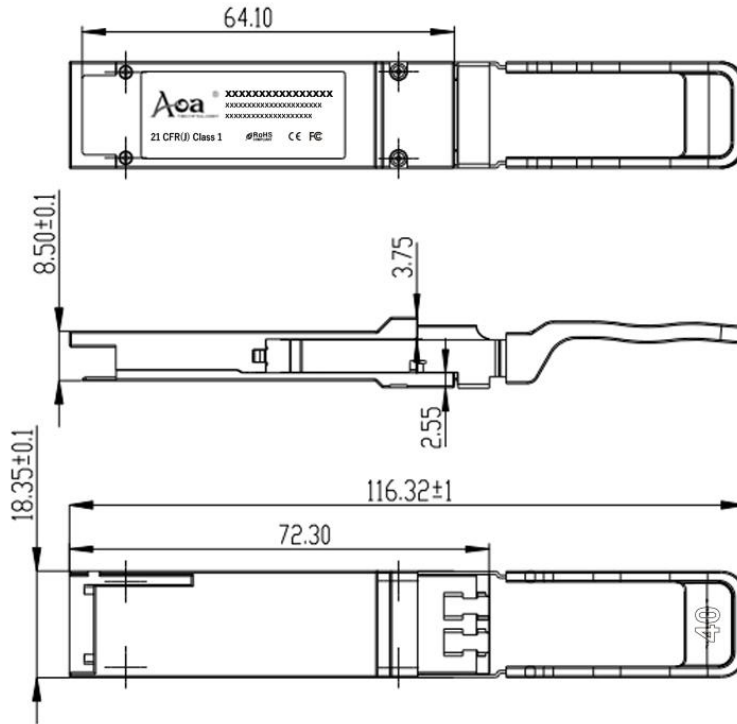
### QSFP Module PIN Definition

**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 receiving and transmission power suppliers and shall be applied

concurrently. Recommended host board power supply filtering is shown in Figure 3 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 500mA.

## Mechanical Dimensions



## Ordering information

Part. No	Specifications								
	Pack	Rate (Gbps)	Tx (nm)	Po (dBm)	RX	Sen (dBm)	Temp (°C)	Reach (km)	DDM
QSFP28-100G-B40 Tx1304nm/Rx1309nm	QSFP28	100G	EML 1304nm	1.7-7.1	APD	<-13.8	0~70	40	Y
QSFP28-100G-B40 Tx1309nm/Rx1304nm	QSFP28	100G	EML 1309nm	1.7-7.1	APD	<-13.8	0~70	40	Y



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