

### QSFP28-100GB-ZR4-LP-AO

MSA and TAA Compliant 100GBase-ZR4 QSFP28 Transceiver (SMF, 1295nm to 1309nm, 80km, LC, DOM)

#### Features:

- Supports 103Gbps
- QSFP28 MSA Compliant
- Single 3.3V power supply
- 100GBASE-ZR4 point-to-point Ethernet links  
Rx sensitivity of -28dBm with enabled KR4 FEC  
in host for up to 80km SMF
- LAN WDM EML laser and SOA+PIN Receiver
- Maximum power consumption 5W
- Commercial Temperature 0 to 70 Celsius
- Class 1 Laser
- Duplex LC receptacle
- Hot Pluggable
- Two Wire Serial Interface Digital Diagnostic Monitoring
- RoHS Compliant and Lead Free



#### Applications:

- 100GBase Ethernet
- Access and Enterprise

#### Product Description

This MSA compliant QSFP28 transceiver provides 100GBase-ZR4 throughput up to 80km over single-mode fiber (SMF) using a wavelength of 1295nm to 1309nm via an LC connector. It is built to MSA standards and is uniquely serialized and data-traffic and application tested to ensure that they will integrate into your network seamlessly. Digital optical monitoring (DOM) support is also present to allow access to real-time operating parameters. This transceiver is Trade Agreements Act (TAA) compliant. We stand behind the quality of our products and proudly offer a limited lifetime warranty.

AddOn's Transceivers are RoHS compliant and lead-free.

TAA refers to the Trade Agreements Act (19 U.S.C. & 2501-2581), which is intended to foster fair and open international trade. TAA requires that the U.S. Government may acquire only "U.S. – made or designated country end products."



## Regulatory Compliance

- ESD to the Electrical PINs: compatible with MIL-STD-883E Method 3015.4.
- ESD to the LC Receptacle: compatible with IEC 61000-4-3.
- EMI/EMC: compatible with FCC Part 15 Subpart B Rules, EN55022:2010.
- Laser Eye Safety: compatible with FDA 21CFR, EN60950-1& EN (IEC) 60825-1, 2.
- RoHS: compliant with EU RoHS 2.0 directive 2015/863/EU.

## Absolute Maximum Ratings

Parameter	Symbol	Min.	Typ.	Max.	Unit	Notes
Maximum Supply Voltage	Vcc	-0.5		3.6	V	
Data Input Voltage Differential	VIN			1	V	
Control Input Voltage	V <sub>I</sub>	-0.3		Vcc+0.5	V	
Control Output Current	I <sub>o</sub>	-20		20	mA	
Storage Temperature	Tstg	-40		+85	°C	
Operating Case Temperature	Tc	0		70	°C	
Relative Humidity (Non-Condensing)	RH	5		95	%	
Aggregate Bit Rate	ABR		103.125		Gbps	
Data Rate Per Lane	BR		25.78		Gbps	
Operating Distance		2		80,000	m	1

## Notes:

1. 40km without FEC and 80km with FEC.

## Electrical Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Notes
Power Supply Voltage	V <sub>CC</sub>	3.135	3.3	3.465	V	
Maximum Power Dissipation	P <sub>D</sub>			5	W	
Maximum Power Dissipation (Low-Power Mode)	P <sub>DLP</sub>			1.5	W	
Instantaneous Peak Current at Hot Plug	I <sub>CC_IP</sub>			2000	mA	
Sustained Peak Current at Hot Plug	I <sub>CC_SP</sub>			1650	mA	
Control Input Voltage High	V <sub>I</sub>	V <sub>CC</sub> *0.7		V <sub>CC</sub> +0.3	V	
Control Input Voltage Low	V <sub>I</sub>	-0.3		V <sub>CC</sub> *0.3	V	
2-Wire Serial Interface Clock Rate				400	kHz	
Module Power Supply Noise Tolerance 10Hz-10MHz (Peak-to-Peak)				66	mVp-p	
Rx Differential Data Output Load			100		Ω	
<b>Transmitter (Module Input)</b>						
Differential Data Output Amplitude	V <sub>OUT,pp</sub>			900	mVp-p	
Differential Termination Mismatch				10	%	
Output Rise/Fall Time (20-80%)	T <sub>r</sub> /T <sub>f</sub>	12			ps	
ModPrsL and IntL	V <sub>OL</sub>	0		0.4	V	I <sub>OL</sub> =4mA
	V <sub>OH</sub>	V <sub>CC</sub> -0.5		V <sub>CC</sub> +0.3	V	I <sub>OL</sub> =-4mA
<b>Receiver (Module Output)</b>						
Differential Data Input Amplitude	V <sub>IN,pp</sub>	95		900	mVp-p	
Differential Termination Mismatch				10	%	
LPMode, Reset, and ModSelL	V <sub>IL</sub>	-0.3		0.8	V	
	V <sub>IH</sub>	2		V <sub>CC</sub> +0.3	V	

### Notes:

1. High-Speed Signal: compliant to IEEE802.3 CAUI-4 C2M.
2. Low-Speed Signal: compliant to SFF-8679.

## Optical Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Notes
<b>Transmitter</b>						
Wavelength L0	$\lambda_{C0}$	1294.53	1295.56	1296.59	nm	
Wavelength L1	$\lambda_{C1}$	1299.02	1300.05	1301.09	nm	
Wavelength L2	$\lambda_{C2}$	1303.54	1304.58	1305.63	nm	
Wavelength L3	$\lambda_{C3}$	1308.09	1309.14	1310.19	nm	
Side-Mode Suppression Ratio	SMSR	30			dB	
Total Average Optical Launch Power	POUT			12.5	dBm	
Average Launch Power Tx Off (Per Lane)	Poff			-30	dBm	
Average Optical Launch Power (Per Lane)	POUTL	2		6.5	dBm	
Extinction Ratio	ER	6			dB	
Spectral Width	$\Delta\lambda$			1	nm	
Optical Modulation Amplitude (Per Lane)	OMA	2.5		7	dBm	
Transmitter and Dispersion Penalty (Per Lane)	TDP			2.2	dB	
Launch Power in OMA Minus TDP (Per Lane)	OMA-TDP	1.5			dBm	
Difference in Launch Power Between Any Two Lanes (OMA)	DT_OMA			4	dB	
Optical Return Loss Tolerance	ORLT			20	dB	
RIN <sub>20OMA</sub>	RIN			-130	dB/Hz	
Transmitter Reflectance	RL			-26	dB	
Transmitter Eye Mask Definition	IEEE 802.3bs-2010 (0.25, 0.4, 0.45, 0.25, 0.28, 0.4)					
<b>Receiver</b>						
Wavelength L0	$\lambda_{C0}$	1294.53	1295.56	1296.59	nm	
Wavelength L1	$\lambda_{C1}$	1299.02	1300.05	1301.09	nm	
Wavelength L2	$\lambda_{C2}$	1303.54	1304.58	1305.63	nm	
Wavelength L3	$\lambda_{C3}$	1308.09	1309.14	1310.19	nm	
Receiver Sensitivity (OMA) Per Lane				-27.5	dBm	1
Stressed Receiver Sensitivity in OMA (Per Lane)				TBD	dBm	
<b>Stressed Receiver Sensitivity Test Conditions</b>						
Stressed Eye J2 Jitter (Per Lane)			0.33		UI	
Stressed Eye J9 Jitter (Per Lane)			0.48		UI	
Vertical Eye Closure Penalty			2		dB	
Damage Threshold for Receiver	THd	TBD			dBm	
Average Receive Power (Per Lane)		-28		-5	dBm	1
Receive Power in OMA (Per Lane) Overload	OMA			-4.5	dBm	
Receiver Reflectance	RL			-26	dB	

LOS Assert	LOSA	-40			dBm	
LOS De-Assert	LOSD			-30	dBm	
LOS Hysteresis	LOSH	0.5			dB	

**Notes:**

1. Measured with conformance test signal at TP3 for the BER=5x10<sup>-5</sup>.

**Pin Descriptions**

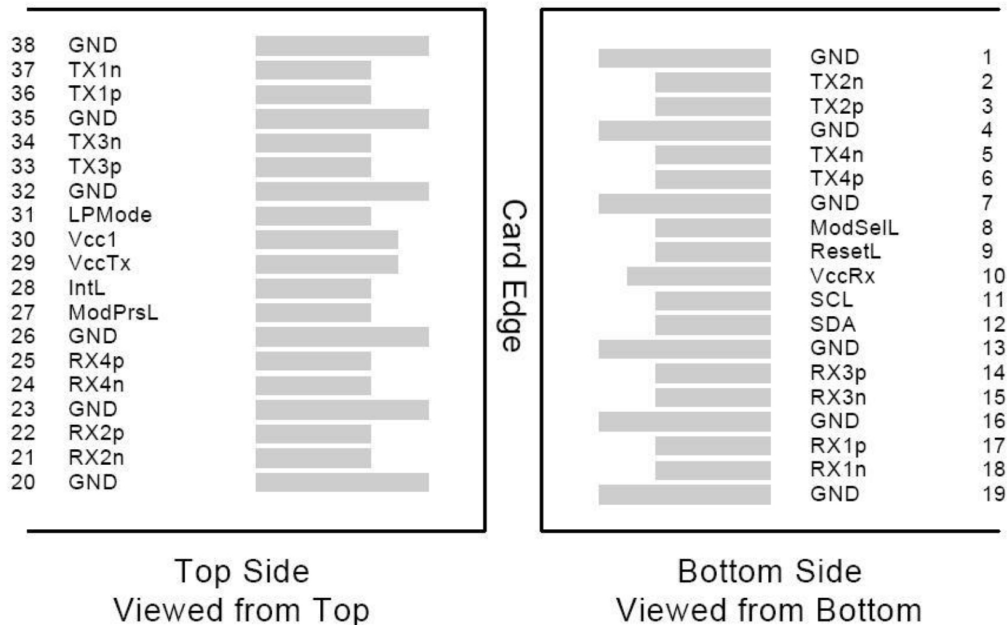
Pin	Logic	Symbol	Name/Descriptions	Ref.
1		GND	Module Ground.	1
2	CML-I	Tx2-	Transmitter Inverted Data Input.	
3	CML-I	Tx2+	Transmitter Non-Inverted Data Input.	
4		GND	Module Ground.	1
5	CML-I	Tx4-	Transmitter Inverted Data Input.	
6	CML-I	Tx4+	Transmitter Non-Inverted Data Input.	
7		GND	Module Ground.	1
8	LVTTTL-I	MODSEIL	Module Select.	
9	LVTTTL-I	ResetL	Module Reset.	
10		VccRx	+3.3v Receiver Power Supply.	2
11	LVC MOS-I	SCL	2-Wire Serial Interface Clock.	
12	LVC MOS-I/O	SDA	2-Wire Serial Interface Data.	
13		GND	Module Ground.	1
14	CML-O	Rx3+	Receiver Non-Inverted Data Output.	
15	CML-O	Rx3-	Receiver Inverted Data Output.	
16		GND	Module Ground.	1
17	CML-O	Rx1+	Receiver Non-Inverted Data Output.	
18	CML-O	Rx1-	Receiver Inverted Data Output.	
19		GND	Module Ground.	1
20		GND	Module Ground.	1
21	CML-O	Rx2-	Receiver Inverted Data Output.	
22	CML-O	Rx2+	Receiver Non-Inverted Data Output.	
23		GND	Module Ground.	1
24	CML-O	Rx4-	Receiver Inverted Data Output.	
25	CML-O	Rx4+	Receiver Non-Inverted Data Output.	
26		GND	Module Ground.	1
27	LVTTTL-O	ModPrsL	Module Present. Internally pulled down to GND.	
28	LVTTTL-O	IntL	Interrupt output. Should be pulled up on the host board.	
29		VccTx	+3.3v Transmitter Power Supply.	2
30		Vcc1	+3.3v Power Supply.	2

31	LVTTTL-I	LPMoDe	Low-Power Mode.	
32		GND	Module Ground.	1
33	CML-I	Tx3+	Transmitter Non-Inverted Data Input.	
34	CML-I	Tx3-	Transmitter Inverted Data Input.	
35		GND	Module Ground.	1
36	CML-I	Tx1+	Transmitter Non-Inverted Data Input.	
37	CML-I	Tx1-	Transmitter Inverted Data Input.	
38		GND	Module Ground.	1

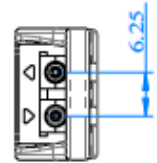
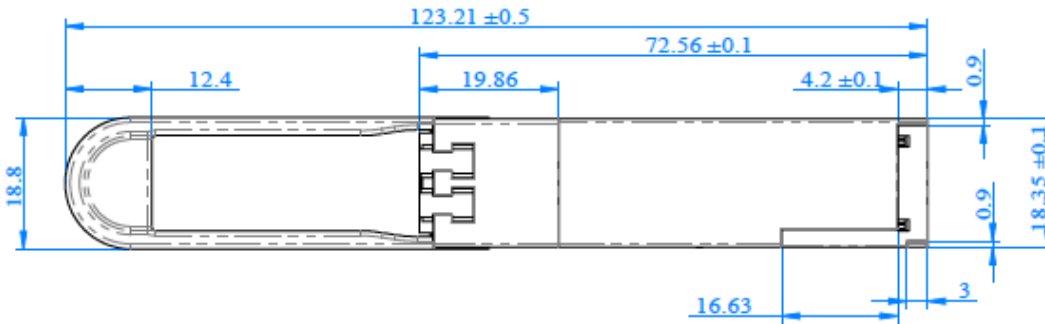
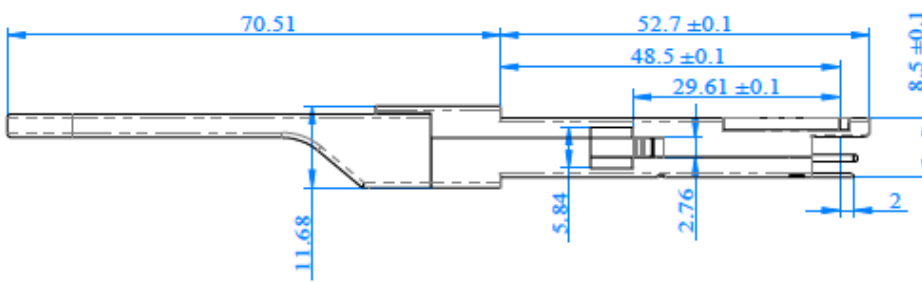
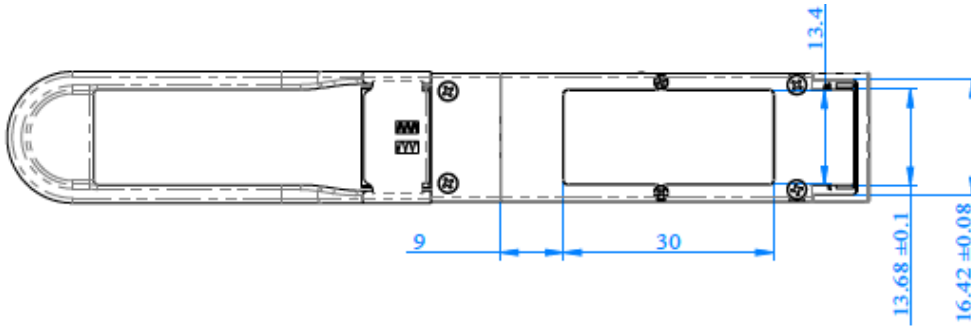
**Notes:**

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. Open collector. Should be pulled up with 4.7kΩ-10kΩ on the host board to a voltage between 3.15V and 3.6V.
2. VccRx, Vcc1, and VccTx are the receiver and transmitter power supplies and shall be applied concurrently. VccRx, Vcc1, and VccTx may be internally connected within the QSFP28 module in any combination. The connector pins are each rated for a maximum current of 1000mA.

**Electrical Pin-Out Details**



# Mechanical Specifications



## **About AddOn Networks**

In 1999, AddOn Networks entered the market with a single product. Our founders fulfilled a severe shortage for compatible, cost-effective optical transceivers that compete at the same performance levels as leading OEM manufacturers. Adhering to the idea of redefining service and product quality not previously had in the fiber optic networking industry, AddOn invested resources in solution design, production, fulfillment, and global support.

Combining one of the most extensive and stringent testing processes in the industry, an exceptional free tech support center, and a consistent roll-out of innovative technologies, AddOn has continually set industry standards of quality and reliability throughout its history.

Reliability is the cornerstone of any optical fiber network and is engrained in AddOn's DNA. It has played a key role in nurturing the long-term relationships developed over the years with customers. AddOn remains committed to exceeding industry standards with certifications from ranging from NEBS Level 3 to ISO 9001:2005 with every new development while maintaining the signature reliability of its products.

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