



---

## ALL4771 QSFP28-LR4 100Gb/s 1310nm QSFP28 Transceiver

### 1.Features

- Supports 103.1Gb/s, each lane bit rate 25.78 Gb/s
- Up to 10km transmission on SMF
- LAN WDM DFB laser and PIN receiver
- I2C interface with integrated Digital Diagnostic monitoring
- QSFP28 MSA package with duplex LC connector
- Single +3.3V power supply
- Maximum power consumption 4 W
- Operating case temperature: 0 to +70 °C
- Complies with EU Directive 2011/65/EU (RoHS 6/6)

### 2.Application

- 100GBASE-LR4 100G Ethernet

QSFP28-LR4 QSFP28 transceiver module is designed for use in 100 Gigabit Ethernet links on up to 10km of single mode fiber. It is compliant with the QSFP28 MSA, IEEE 802.3ba 100GBASE-LR4 and IEEE 802.3bm CAUI-4. Digital diagnostics function is available via the I2C interface, as specified by the QSFP+ MSA.

### 3.Order Information



Part No.	Data Rate	Laser	Fiber Type	Distance	Optical Interface	Temp	DDMI
QSFP28-LR4	103.1Gbps	LAN WDM DFB	SMF	10km	LC	0~70°C	Y

#### 4. Absolute Maximum Ratings

Parameter	Symbol	Min.	Typical	Max.	Unit	Notes
Storage Temperature	T <sub>S</sub>	-40	-	+85	°C	
Supply Voltage	V <sub>CC</sub>	-0.5	-	+4.0	V	
Operating Relative Humidity	RH	-	-	+85	%	

#### 5. Recommended Operating Conditions

Parameter	Symbol	Min.	Typical	Max.	Unit	Notes
Operating Case Temperature	T <sub>C</sub>	0	-	+70	°C	
Power Supply Voltage	V <sub>CC</sub>	3.13	3.3	3.47	V	
Power Supply Current	I <sub>CC</sub>	-	-	1.15	A	
Maximum Power Dissipation	P <sub>D</sub>	-	-	4	W	
Aggregate Bit Rate	BR <sub>AVE</sub>	-	103.125	-	Gb/s	
Lane Bit Rate	BR <sub>LANE</sub>	-	25.78	-	Gb/s	
Transmission Distance	TD		-	10	km	Over SMF

#### 6. Optical Characteristics

Parameter	Symbol	Min.	Typical	Max.	Unit	Notes
<b>Transmitter</b>						
Center Wavelength Lane 0	λ <sub>0</sub>	1294.53	1295.56	1296.59	nm	
Center Wavelength Lane 1	λ <sub>1</sub>	1299.02	1300.05	1301.09	nm	
Center Wavelength Lane 2	λ <sub>2</sub>	1303.54	1304.58	1305.63	nm	
Center Wavelength Lane 3	λ <sub>3</sub>	1308.09	1309.14	1310.19	nm	
Total Launch Power	P <sub>ALL</sub>	-	-	10.5	dBm	1
Average Launch Power per Lane	P <sub>TX_LANE</sub>	-4.3	-	4.5	dBm	1
Transmit OMA per Lane	TxOMA	-1.3	-	4.5	dBm	1



Difference in launch power between lanes	$P_{TX\_DELTA\_LANE}$	-	-	5	dB	
Average Output Power (Laser Turn off)	$P_{OUT-OFF}$	-	-	-30	dBm	
Side Mode Suppression Ratio	SMSR	30	-	-	dB	
Extinction Ratio	ER	4	-	-	dB	
Transmitter and Dispersion Penalty	TDP	-	-	2.2	dB	2
Optical Return Loss Tolerance	ORLT	-	-	20	dB	
Optical Eye Mask	Compliant with IEEE 802.3ba					2
<b>Receiver</b>						
Center Wavelength Lane 0	$\lambda_0$	1294.53	1295.56	1296.59	nm	
Center Wavelength Lane 1	$\lambda_1$	1299.02	1300.05	1301.09	nm	
Center Wavelength Lane 2	$\lambda_2$	1303.54	1304.58	1305.63	nm	
Center Wavelength Lane 3	$\lambda_3$	1308.09	1309.14	1310.19	nm	
Average Rx Power per Lane	$P_{RX\_LANE}$	-10.6		4.5	dBm	2
OMA Sensitivity per Lane	$Sen_{OMA}$	-	-	-8.6	dBm	2
Receiver Overload	$P_{IN-OL}$	4.5	-	-	dBm	
Reflectance	Ref	-	-	-26	dB	
LOS Assert per lane	$LOS_A$	-25	-	-	dBm	
LOS De-assert	$LOS_D$	-	-	-11.6	dBm	
LOS Hysteresis	$LOS_H$	0.5	-	4.0	dB	

Notes:

1. The optical power is launched into SMF.
2. Measured with a PRBS  $2^{31}-1$  test pattern @25.78125 Gb/s.

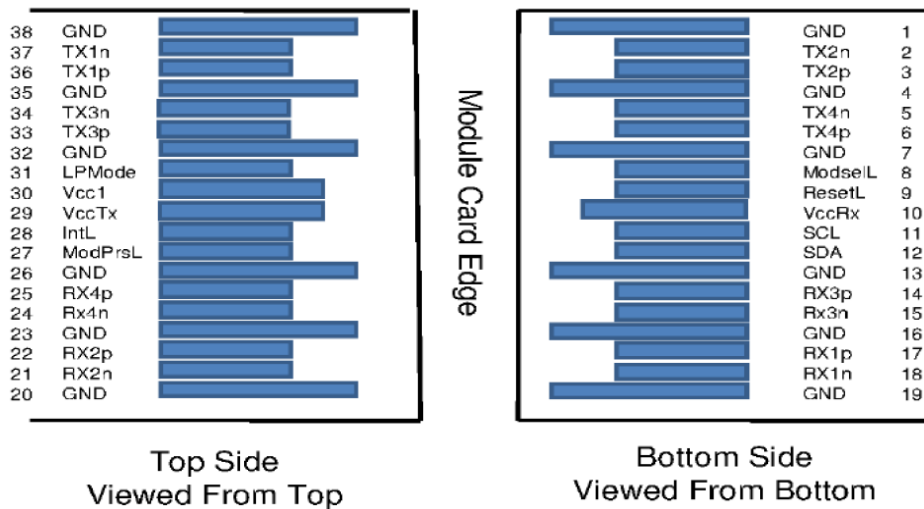
## 7. Electrical Characteristics

Parameter	Symbol	Min.	Typical	Max.	Unit	Notes
<b>ransmitter (Module Input)</b>						
Differential Data Input Amplitude	$V_{IN,P-P}$	100	-	1100	mVpp	
Input Impedance (Differential)	$Z_{IN}$	85	100	115	Ohms	
Differential Termination Mismatch		-	-	10	%	
<b>Receiver (Module Output)</b>						
Differential Data Output Amplitude	$V_{OUT,P-P}$	200	-	900	mVpp	
Output Impedance (Differential)	$Z_{OUT}$	85	100	115	Ohms	
Differential Termination Mismatch		-	-	10	%	



Output Rise/Fall Time, 20%~80%	$T_R/T_F$	12	-	-	ps	
--------------------------------	-----------	----	---	---	----	--

## 8.Pin Description



Pin	Name	Logic	Function	Plug Seq.	Notes
1	GND		Ground	1	1
2	Tx2n	CML-I	Transmitter Inverted Data Input	3	
3	Tx2p	CML-I	Transmitter Non-Inverted Data	3	
4	GND		Ground	1	1
5	Tx4n	CML-I	Transmitter Inverted Data Input	3	
6	Tx4p	CML-I	Transmitter Non-Inverted Data	3	



7	GND		Ground	1	1
8	ModSelL	LVTTTL-I	Module Select	3	
9	ResetL	LVTTTL-I	Module Reset	3	
10	VccRx		+3.3V Power Supply Receiver	2	2
11	SCL	LVCNOS-I/O	2-wire serial interface clock	3	
12	SDA	LVCNOS-I/O	2-wire serial interface data	3	
13	GND		Ground	1	
14	Rx3p	CML-O	Receiver Non-Inverted Data	3	
15	Rx3n	CML-O	Receiver Inverted Data Output	3	
16	GND		Ground	1	1
17	Rx1p	CML-O	Receiver Non-Inverted Data	3	
18	Rx1n	CML-O	Receiver Inverted Data Output	3	
19	GND		Ground	1	1
20	GND		Ground	1	1
21	Rx2n	CML-O	Receiver Inverted Data Output	3	
22	Rx2p	CML-O	Receiver Non-Inverted Data	3	
23	GND		Ground	1	1
24	Rx4n	CML-O	Receiver Inverted Data Output	3	
25	Rx4p	CML-O	Receiver Non-Inverted Data	3	
26	GND		Ground	1	1
27	ModPrsL	LVTTTL-O	Module Present	3	
28	IntL	LVTTTL-O	Interrupt	3	
29	VccTx		+3.3V Power supply transmitter	2	2
30	Vcc1		+3.3V Power supply	2	2
31	LPMMode	LVTTTL-I	Low Power Mode	3	
32	GND		Ground	1	1
33	Tx3p	CML-I	Transmitter Non-Inverted Data	3	
34	Tx3n	CML-I	Transmitter Inverted Data Input	3	
35	GND		Ground	1	1
36	Tx1p	CML-I	Transmitter Non-Inverted Data	3	
37	Tx1n	CML-I	Transmitter Inverted Data Input	3	

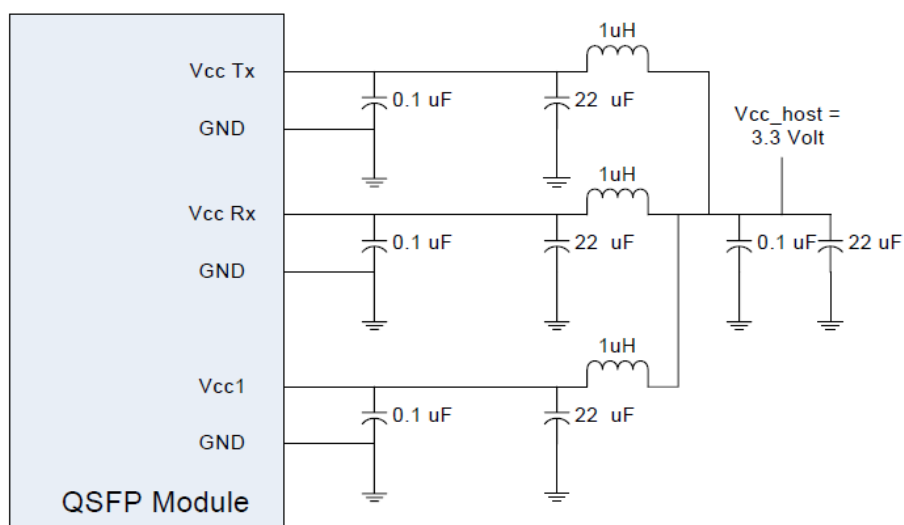


38	GND		Ground	1	1
----	-----	--	--------	---	---

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. Connected there directly to the host board signal-common ground plane.
2. VccRx, Vcc1 and VccTx are the receiver and transmitter power supplies and shall be applied concurrently. Requirements defined for the host side of the Host Edge Card Connector are listed in QSFP MSA. VccRx, Vcc1 and VccTx may be internally connected within the QSFP28 in any combination. The connector pins are each rated for a maximum current of 500mA.

### 9.Recommended Host Board Power Supply Circuit

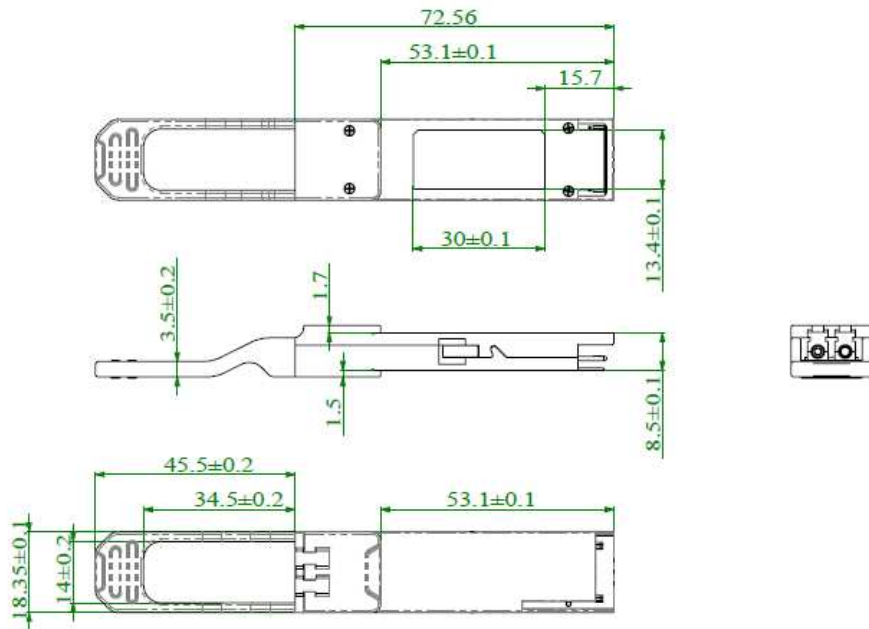


### 10.Digital Diagnostics



Parameter	Range	Accuracy	Unit	Calibration
Temperature	0 to 70	±3	°C	Internal
Voltage	0 to V <sub>CC</sub>	0.1	V	Internal
Tx Bias Current Per Lane	0 to 100	10%	mA	Internal
Tx Output Power Per Lane	to 2.9	±3	dBm	Internal
Rx Power (Each Lane)	-21 to 5	±3	dBm	Internal

## 11.Mechanical Dimension



## 12.Warnings

### Handling Precautions

This device is susceptible to damage as a result of electrostatic discharge (ESD). A static free environment is highly recommended. Follow guidelines according to proper ESD procedures.

### Laser Safety

Radiation emitted by laser devices can be dangerous to human eyes. Avoid eye exposure to direct or indirect radiation.