

## QSFP-100G-LR4-S-COM

### 100Gb/s QSFP28 LR4 10km Optical Transceiver Module

#### Features

- Compliant with 100GBASE-LR4
- Support line rates from 103.125 Gb/s to 111.81 Gb/s
- Integrated LAN WDM TOSA / ROSA for up to 10 km reach over SMF
- CAUI(10x10G) Electrical Interface and 4-lane 25.78Gb/s optical interface
- Duplex LC optical receptacle
- Support Digital Diagnostic Monitoring interface
- No external reference clock
- RoHS-6 compliant and lead-free
- Compliant with QSFP28 MSA with LC connector
- Single +3.3V power supply
- Maximum power consumption 3.5W
- All-metal housing for superior EMI performance
- Case operating temperature Commercial: 0 ~ +70oC



#### Applications

- Data Center
  - Local Area Network (LAN)
  - Ethernet switches and router applications
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## Part Number Ordering Information

Part Number	Data Rate (Gb/s)	Wavelength (nm)	Transmission Distance(km)	Temperature (°C) (Operating Case)
QSFP-100G-LR4-S-COM	100	1296, 1300 1305, 1309	10km SMF	0~70 commercial

## Absolute Maximum Ratings

It has to be noted that the operation in excess of any individual absolute maximum ratings might cause permanent damage to this module.

Parameter	Symbol	Min	Max	Unit	Notes
Storage Temperature	T <sub>s</sub>	-40	85	°C	
Power Supply Voltage	VCC	-0.3	4.0	V	
Relative Humidity (non-condensation)	RH	5	95	%	
Damage Threshold	TH <sub>d</sub>		5.0	dBm	

## Recommended Operating Conditions and Power Supply Requirements

Parameter	Symbol	Min	Typical	Max	Unit	Notes
Operating Case Temperature	TOP	0		70	°C	commercial
Power Supply Voltage	VCC	3.13 5	3.3	3.465	V	
Data Rate			100		Gb/s	
Control Input Voltage High		2		Vcc	V	
Control Input Voltage Low		0		0.8	V	
Link Distance (SMF)	D			10	km	9/125um

## General Description

Arpers 100G QSFP28 LR4 optical Transceiver integrates receiver and transmitter path on one module. In the transmit side, four lanes of serial data streams are recovered, retimed, and passed to four laser drivers. The laser drivers control 4- Distributed Feedback Laser (DFB) with center wavelength of 1296 nm, 1300nm, 1305nm and 1309 nm. The optical signals are multiplexed to a single –mode fiber through an industry standard LC connector. In the receive side, the four lanes of optical data streams are optically de-multiplexed by the integrated optical de-multiplexer. Each data stream is recovered by a PIN photo-detector and trans-impedance amplifier, retimed. This module features a hot-pluggable electrical interface, low power consumption and MDIO management interface.

The product is designed with form factor, optical/electrical connection and digital diagnostic interface according to the QSFP28 Multi-Source Agreement (MSA) and compliant to IEEE 802.3bm.

## Pin Assignment and Pin Description

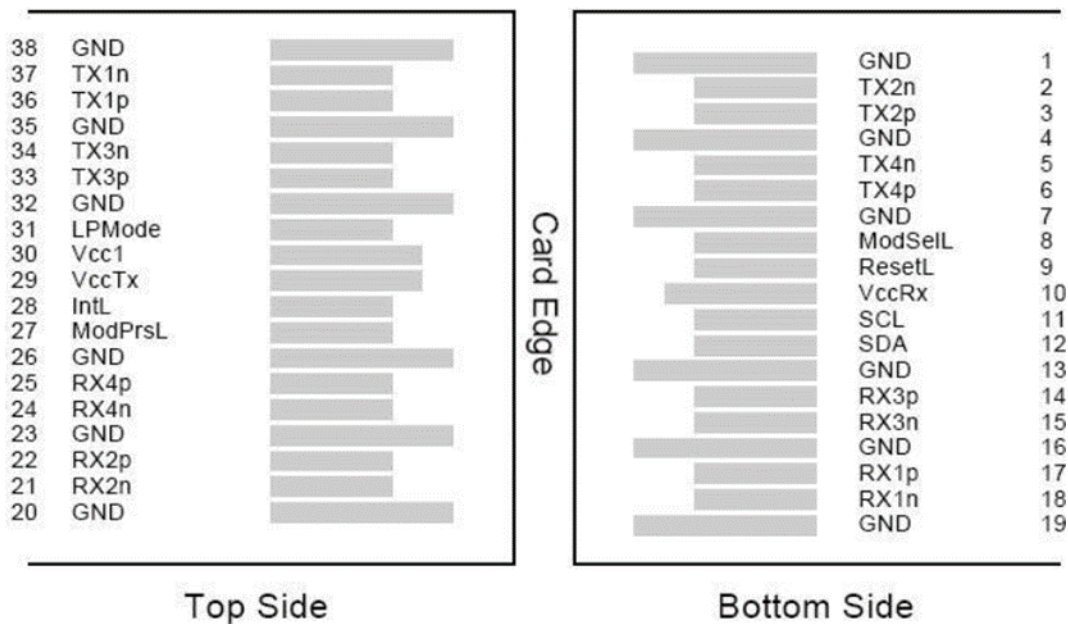


Figure1. Diagram of host board connector block pin numbers and names

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 output	
4	GND	Transmitter Ground (Common with Receiver Ground)	1
5	Tx4n	Transmitter Inverted Data Input	
6	Tx4p	Transmitter Non-Inverted Data output	
7	GND	Transmitter Ground (Common with Receiver 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	Transmitter Ground (Common with Receiver Ground)	
14	Rx3p	Receiver Non-Inverted Data Output	
15	Rx3n	Receiver Inverted Data Output	
16	GND	Transmitter Ground (Common with Receiver Ground)	1
17	Rx1p	Receiver Non-Inverted Data Output	
18	Rx1n	Receiver Inverted Data Output	
19	GND	Transmitter Ground (Common with Receiver Ground)	1
20	GND	Transmitter Ground (Common with Receiver Ground)	1
21	Rx2n	Receiver Inverted Data Output	
22	Rx2p	Receiver Non-Inverted Data Output	

23	GND	Transmitter Ground (Common with Receiver Ground)	1
24	Rx4n	Receiver Inverted Data Output	1
25	Rx4p	Receiver Non-Inverted Data Output	
29	VccTx	3.3V power supply transmitter	2
30	Vcc1	3.3V power supply	2
31	LPMode	Low Power Mode	
32	GND	Transmitter Ground (Common with Receiver Ground)	1
33	Tx3p	Transmitter Non-Inverted Data Input	
34	Tx3n	Transmitter Inverted Data Output	
35	GND	Transmitter Ground (Common with Receiver Ground)	1
36	Tx1p	Transmitter Non-Inverted Data Input	
37	Tx1n	Transmitter Inverted Data Output	
38	GND	Transmitter Ground (Common with Receiver Ground)	1

**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 hostboard 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 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.

## Electrical Characteristics

The following electrical characteristics are defined over the Recommended Operating Environment unless otherwise specified.

Parameter	Symbol	Min.	Typ.	Max	Unit	Notes
Power Consumption	p			3.5	W	
Supply Current	I <sub>cc</sub>			1060	mA	
<b>Transmitter</b>						
Single-ended Input Voltage Tolerance	V <sub>cc</sub>	-0.3		4.0	V	
Differential Input Voltage Swing	V <sub>in,pp</sub>	180		1000	mV <sub>pp</sub>	
Differential Input Impedance	Z <sub>in</sub>	90	100	110	Ohm	1
Transmit Disable Assert Time				10	us	
Transmit Disable Voltage	V <sub>dis</sub>	V <sub>cc</sub> -1.3		V <sub>cc</sub>	V	
Transmit Enable Voltage	V <sub>en</sub>	V <sub>ee</sub>		V <sub>ee</sub> +0.8	V	2
<b>Receiver</b>						
Differential Output Voltage Swing	V <sub>out,pp</sub>	300		850	mV <sub>pp</sub>	
Differential Output Impedance	Z <sub>out</sub>	90	100	110	Ohm	3
Data output rise/fall time	T <sub>r</sub> /T <sub>f</sub>	28			ps	4
LOS Assert Voltage	V <sub>losH</sub>	V <sub>cc</sub> -1.3		V <sub>cc</sub>	V	5
LOS De-assert Voltage	V <sub>losL</sub>	V <sub>ee</sub>		V <sub>ee</sub> +0.8	V	5

**Notes:**

- 1.Connected directly to TX data input pins. AC coupled thereafter.
- 2.Or open circuit.
- 3.Input 100 ohms differential termination.
- 4.These are unfiltered 20-80% values.
- 5.Loss of Signal is LVTTTL. Logic 0 indicates normal operation; logic 1 indicates no signal detected.

## Optical Characteristics

The following optical characteristics are defined over the Recommended Operating Environment unless otherwise specified.

Parameter	Symbol	Min.	Typical	Max	Unit	Notes
<b>Transmitter</b>						
Lane wavelength ( range )	L0	1294.53	1295.56	1296.59	nm	
	L1	1299.02	1300.05	1301.09	nm	
	L2	1303.54	1304.58	1305.63	nm	
	L3	1308.09	1309.14	1310.09	nm	
Signaling rate, each lane			25.78125		GBd	
Side-mode suppression ratio	SMSR	30				
Total launch power				10.5	dB m	
Average launch power, eachlane	Pavg	-4.3		4.5	dB m	
Extinction Ratio	ER	4			dB	
Transmitter and Dispersion Penalty, each lane	TDP			2.2	dB	

OMA minus TDP, each lane	OMA -TDP	-2.3			dB m	
Average launch power of OFF transmitter, each lane				-30	dB m	
Transmitter reflectance				-12	dB	
Transmitter eye mask {X1, X2,X3, Y1, Y2, Y3}		{0.25, 0.4, 0.45, 0.25, 0.28, 0.4}				
<b>Receiver</b>						
Signaling rate, each lane			25.78125		GBd	
Receiver Sensitivity per lane	Rsen			-10.6	dB m	1
Input Saturation Power (overload)	Psat			4.5	dB m	
LOS Assert	LOSA	-30			dB m	
LOS De-assert	LOSD			-12		
Receiver reflectance	Rr			-26		
LOS Hysteresis		0.5		4	dB	

**Notes:**

1. Measured with a PRBS 231-1 test pattern, @25.78Gb/s, BER<10<sup>-12</sup>.

### Digital Diagnostic Functions

The following digital diagnostic characteristics are defined over the normal operating conditions unless otherwise specified



Parameter	Symbol	Min.	Max	Unit	Notes
Temperature monitor absolute error	DMI_Temp	-3	3	degC	Over operating temp
Supply voltage monitor absolute error	DMI_VCC	-0.15	0.15	V	Full operating range
RX power monitor absolute error	DMI_RX	-2	2	dB	
Bias current monitor	DMI_bias	-10%	10%	mA	
TX power monitor absolute error	DMI_TX	-2	2	dB	

## Mechanical Dimensions

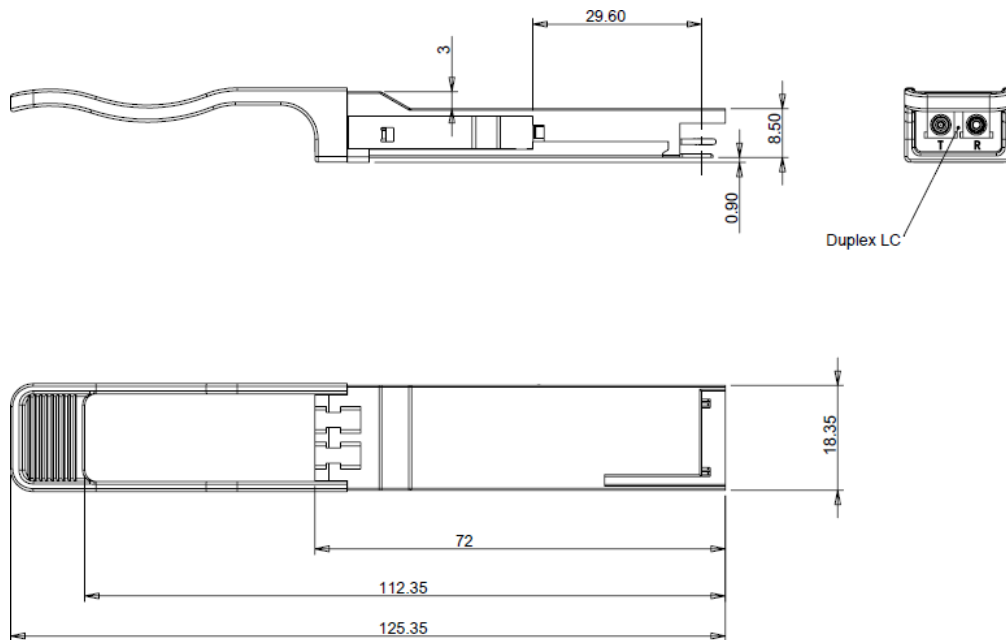


Figure3. Mechanical Outline