LQ-M31100-LR4C

100G QSFP28 PSM 10KM Optical Transceiver

Features

- Four-channel full-duplex Receiver modules
- Up to 10km Receiver of single mode fiber
- Low power consumption <1.5W
- 3.3V power supply voltage
- RoHS 6 compliant
- Hot Pluggable QSFP28 form factor
- Single MPO connector receptacle
- Built-in digital diagnostic function
- Operating case temperature

  Standard: 0 to +70°C

  Industrial: -40 to +85°C

Applications

- 100G Ethernet Receiver monitor
- Proprietary High Speed Interconnections
- Data center

Description

The LQ-M31100-LR4 is a Four-Channel, Pluggable, Parallel, Fiber-Optic QSFP28 Transceiver for 100G Receiver Applications. The QSFP28 full-duplex optical module offers4 independent receive channels, each capable of 26Gbps operation for an aggregate data rate of 104Gbps 10km using single mode fiber. An optical fiber ribbon cable with an MPO/MTP TM connector can be plugged into the QSFP28 module receptacle. QSFP28 PSM4 is one kind of parallel Receiver which provides increased port density and total system cost savings.

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	Units	Notes
Operating Case Temperature		TOP	0	70	degC	
Operating Case Temperature	Standard	Tc	0		+70	°C
	Industrial		-40		+85	°C
Power Supply Voltage		Vcc	-0.5	3.6	V	
Relative Humidity (non-condensation)		RH	0	85	%	
InputVoltage		Vin	-0.3	Vcc+0.3	V	

Recommended Operating Conditions and Power Supply Requirements

Parameter	Symbol	Min	Typical	Max	Units
Operating Case Temperature Standard	TOP	0		70	degC
Operating Case Temperature Industrial	TOP	-40		+85	degC
Power Supply Voltage	VCC	3.135	3.3	3.465	V
Power Consumption		-		3.5	W
Data Rate	DR		25.78125		Gbps
Data Speed Tolerance	ΔDR	-100		+100	ppm
Link Distance with G.652	D	0		10	km

Electrical Characteristics

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

Parameter	Symbol	Min	Typical	Max	Units	Notes
Power Consumption				3.5	W	
Supply Current	Icc			1.1	A	
Transceiver Power-on Initialization Time				2000	ms	1
Transmitter (each Lane)						
Single-ended Input Voltage Tolerance (Note 2)		-0.3		4.0	V	Referred to TP1 signal common
AC Common Mode Input Voltage Tolerance		15			mV	RMS
Differential Input Voltage Swing Threshold		50			mVpp	LOSA Threshold
Differential Input Voltage Swing	Vin,pp	190		700	mVpp	
Differential Input Impedance	Zin	90	100	110	Ohm	
Receiver (each Lane)						
Single-ended Output Voltage		-0.3		4.0	V	Referred to signal common
AC Common Mode Output Voltage				7.5	mV	RMS
Differential Output Voltage Swing	Vout,pp	300		850	mVpp	

Differential Output Impedance	Zout	90	100	110	Ohm	

Notes:
1.Power-on Initialization Time is the time from when the power supply voltages reach and remain above the minimum recommended operating supply voltages to the time when the module is fully functional.
2.The single ended input voltage tolerance is the allowable range of the instantaneous input signals.

Optical Characteristics

QSFP28 100GBASE-LR4						
Parameter	**Symbol**	**Min**	**Typical**	**Max**	**Unit**	**Notes**
Lane Wavelength	λC	1295		1325	nm	
Transmitter						
Side Mode Suppression Ratio	SMSR	30			dB	
Average Launch Power, each Lane	PAVG	-4.3		4	dBm	
OMA, each Lane	POMA	-1.3		4	dBm	1
Differencein Launch Power between any Two Lanes (OMA)	Ptx,diff			5	dB	
Launch Power in OMA minus Transmitter and Dispersion		-2.3			dBm	
Penalty (TDP), each Lane						
TDP, each Lane	TDP			2.2	dB	
Extinction Ratio	ER	4			dB	
RIN20OMA	RIN			-130	dB/Hz	
Optical Return Loss Tolerance	TOL			20	dB	
Transmitter Reflectance	RT			-12	dB	
Average Launch Power OFF Transmitter, each Lane	Poff			-30	dBm	
Receiver						
Center Wavelength	λC	1295		1325	nm	
Average Receive Power, each Lane		-10.6		4.5	dBm	
Receive Power (OMA), each Lane				4.5	dBm	

Receiver Sensitivity (OMA), each Lane	SEN			-11.35	dBm	
Stressed Receiver Sensitivity (OMA), each Lane				-6.8	dBm	4
Receiver Reflectance	RR			-26	dB	
Differencein Receive Power between any Two Lanes (OMA)	Prx,diff			5.5	dB	
Signal Loss Assert Threshold	LOSA	-30			dBm	
Signal Loss Deassert Threshold	LOSD			-12	dBm	
LOS Hysteresis	LOSH	0.5			dB	
Optical Return Loss	ORL			-12	GHz	

Notes:
1.Even if the TDP < 1 dB, the OMA min must exceed the minimum value specified here.
2.See Figure 2 below.
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. The receiver does not have to operate correctly at this input power.
4.Measured with a PRBS 231 -1 test pattern, @25.78Gb/s, BER<5*10 -5
5.Vertical eye closure penalty and stressed eye jitter are test conditions for measuring stressed receiver sensitivity. They are not characteristics of the receiver.

Digital Diagnostic Functions

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

Parameter	Symbol	Min	Max	Units	Notes
Temperature monitor absolute error	DMI_Temp	-3	+3	degC	Over operating temperature range
Supply voltage monitor absolute error	DMI _VCC	-0.1	0.1	V	Over full operating range
Channel RX power monitor absolute error	DMI_RX_Ch	-2	2	dB	1
Channel Bias current monitor	DMI_Ibias_Ch	-10%	10%	mA	
Channel TX power monitor absolute error	DMI_TX_Ch	-2	2	dB	1

Notes:
Due to measurement accuracy of different single mode fibers, there could be an additional +/-1 dB fluctuation, or a +/- 3 dB total accuracy.

QSFP28 Connector and Pinout Description

The electrical interface to the transceiver is a 38 pins edge connector. The 38 pins provide high speed data, low speed monitoring and control signals, I2C communication, power and ground connectivity. The top and bottom views of the connector are provided below, as well as a table outlining the contact numbering, symbol and full description.

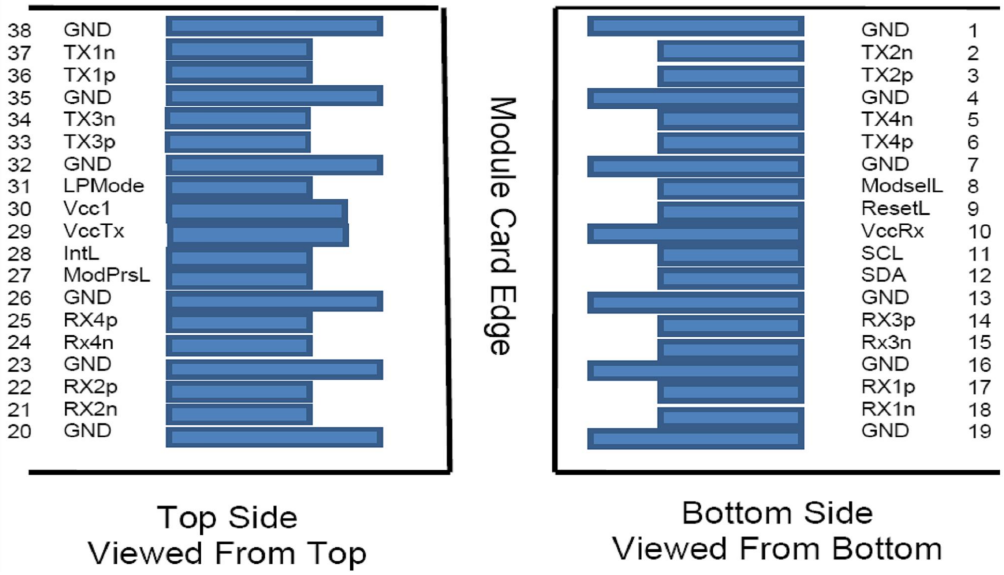


Figure 1. QSFP28-compliant 38-pin connector

PIN	Logic	Symbol	Name/Description	Notes
1		GND	Ground	1
2	CML-I	Tx2n	Transmitter Inverted Data Input	
3	CML-I	Tx2p	Transmitter Non-Inverted Data output	
4		GND	Ground	1
5	CML-I	Tx4n	Transmitter Inverted Data Input	
6	CML-I	Tx4p	Transmitter Non-Inverted Data output	
7		GND	Ground	1
8	LVTLL-I	ModSelL	Module Select	
9	LVTLL-I	ResetL	Module Reset	
10		VccRx	+3.3V Power Supply Receiver	2
11	LVCMOS-I/O	SCL	2-Wire Serial Interface Clock	

12	LVCMOS-I/O	SDA	2-Wire Serial Interface Data	
13		GND	Ground	
14	CML-O	Rx3p	Receiver Non-Inverted Data Output	
15	CML-O	Rx3n	Receiver Inverted Data Output	
16		GND	Ground	1
17	CML-O	Rx1p	Receiver Non-Inverted Data Output	
18	CML-O	Rx1n	Receiver Inverted Data Output	
19		GND	Ground	1
20		GND	Ground	1
21	CML-O	Rx2n	Receiver Inverted Data Output	
22	CML-O	Rx2p	Receiver Non-Inverted Data Output	
23		GND	Ground	1
24	CML-O	Rx4n	Receiver Inverted Data Output	1
25	CML-O	Rx4p	Receiver Non-Inverted Data Output	
26		GND	Ground	1
27	LVTTL-O	ModPrsL	Module Present	
28	LVTTL-O	IntL	Interrupt	
29		VccTx	+3.3 V Power Supply transmitter	2
30		Vcc1	+3.3 V Power Supply	2
31	LVTTL-I	LPMode	Low Power Mode	
32		GND	Ground	1
33	CML-I	Tx3p	Transmitter Non-Inverted Data Input	
34	CML-I	Tx3n	Transmitter Inverted Data Output	
35		GND	Ground	1
36	CML-I	Tx1p	Transmitter Non-Inverted Data Input	
37	CML-I	Tx1n	Transmitter Inverted Data Output	
38		GND	Ground	1

Notes:

1. GND is the symbol for signal and supply (power) common for the QSFP28 module. All are common within the 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 module in any combination. The connector pins are each rated for a maximum current of 1000mA.

Recommended Power Supply Filter

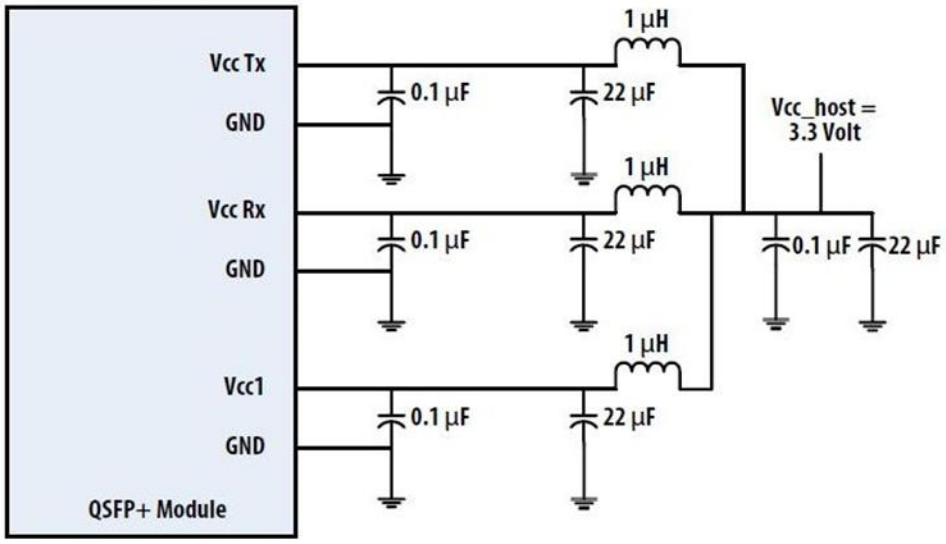


Figure 2. Recommended Power Supply Filter

Optical Interface Lanes and Assignment

The optical interface port is a male MPO connector. The four fiber positions on the left as shown in Figure 2, with the key up, are used for the optical transmit signals (Channel1 through4). The fiber positions on the right are used for the optical receive signals (Channel4through1). The central four fibers are physically present.

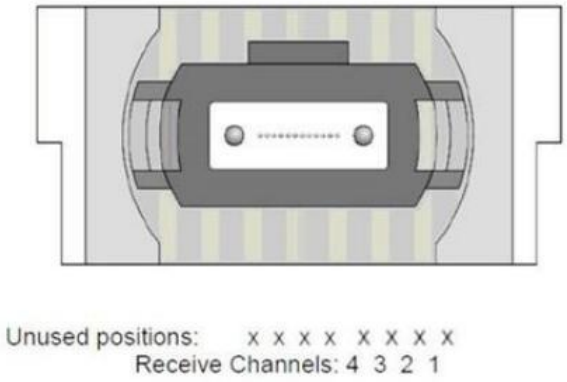
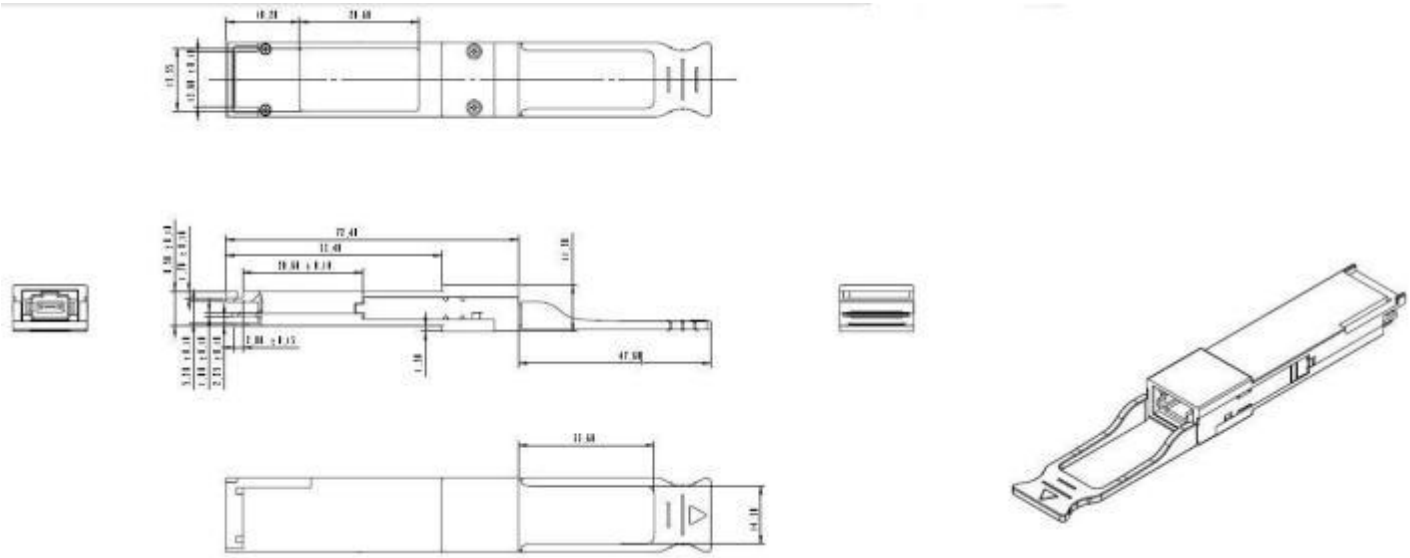
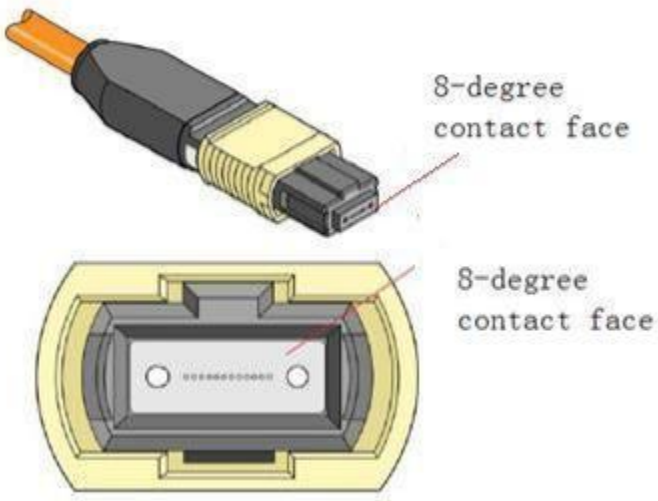


Figure3. Optical Receptacle and Channel Orientation

MechanicalDimensions



Attention:To minimize MPO connection induded reflections, an MPO receptacle with 8-degree angled end-face is utilized forth is male MPO connector with 8-degree end-face should be used with this product as illustrated in below Figure.



Ordering Information

Part Number	Product Description
LQ-M31100-LR4C	4X25.78125G QSFP28 PSM4, MPO connector, 10km over single modefiber , 0°C~+70°C, with DDM
LQ-M31100-LR4I	4X25.78125G QSFP28 PSM4, MPO connector, 10km over single modefiber -40°C~+85°C, with DDM