

4L-Q100ZR4-60

QSFP28 100GBASE-ZR4, 1310nm, SM, DDM, LC, 60Km



Applications

- Compliant with 100GBASE-60km Ethernet
- 4 LAN-WDM lanes MUX/DEMUX design
- Up to 103.1 Gbps Bit Rate
- Datacenter backbones
- Maximum power consumption 4.5W
- 4 x 25GBASE Ethernet
- SAN, Routers, Hubs, Load Balancer
- High-performance Computing Clusters
- Other optical links

Features

- QSFP28 100G Optical Transceiver
- QSFP28 MSA Compliant
- Up to 60Km links on SMF
- 3.3v power supply
- WDM EML TOSA laser transmitter
- APD ROSA receiver
- Duplex LC receptacles
- 4x 25Gb/s LAN-WDM
- Digital Diagnostic Monitoring
- RoHS-10 and Lead Free
- Operating temperature: 0°C ~ +70°C

Description

The 4L-Q100ZR4-60 is a QSFP28 four channel full duplex transceiver module for singlemode (SMF) 100GBASE-60km / 100 Gigabit optical data communications.

This modules are compatible with most switch/router/server brands and designed to operate with single mode fiber (SMF) and Duplex LC connectors, using 4 channels of 25Gb/s LAN-WDM with up to 60km.

Quick access to other products:

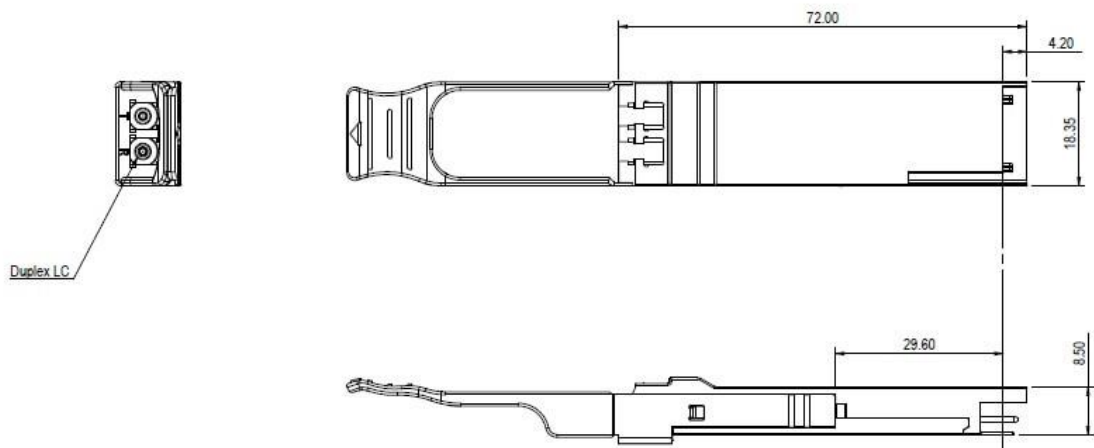
[SFP 1G](#) [SFP+10G](#) [XFP 10G](#) [QSFP40G](#) [SFP28 25G](#) [QSFP28 100G](#) [DWDM](#)

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General Specifications – Absolute Maximum Ratings

Parameter	Symbol	Min	Typ	Max
Max Link Length	Lmax			60Km on SMF
Supply Voltage	Vcc	3.135v	3.3v	3.465v
Power Consumption				4.5W
Storage Temperature	T _s	-40		85
Case Operating Temperature	T _{OP}	0°C		70
Relative Humidity	RH	15		85
Receiver Damage Threshold, per Lane	pRdmg	-3.0dBm		
Bit Rate (all wavelngths)	BR			103.1Gb/s
Bit Error Ratio – pre FEC	BER			10 ⁻¹²

Mechanical Specifications



Optical Specifications - Transmitter

OMA, each Lane	pOMA	0.5	6.5	dBm	
Signaling Speed per Lane		25.78125 ± 100 ppm			Gb/s
Wavelength Assignment	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	1310.19	nm
Side-mode Suppression Ratio	SMSR	30	-	-	dB
Total Average Launch Power	PT	8	-	12.5	dBm
Average Launch Power, each Lane	TXPx	2	-	4.5	dBm
Difference in Launch Power between any two Lanes (OMA)		-	-	3.6	dB
Extinction Ratio	ER	6	-	-	dB
Transmitter Eye Mask Definition {X1, X2, X3, Y1, Y2, Y3}		{0.25, 0.4, 0.45, 0.25, 0.28, 0.4}			
Optical Return Loss Tolerance		-	-	20	dB
Average Launch Power OFF Transmitter, each Lane	Poff			-30	dBm
Relative Intensity Noise	Rin			-130	dB/HZ
Transmitter Reflectance		-	-	-12	dB
Mask margin		5			%

Optical Specifications – Receiver

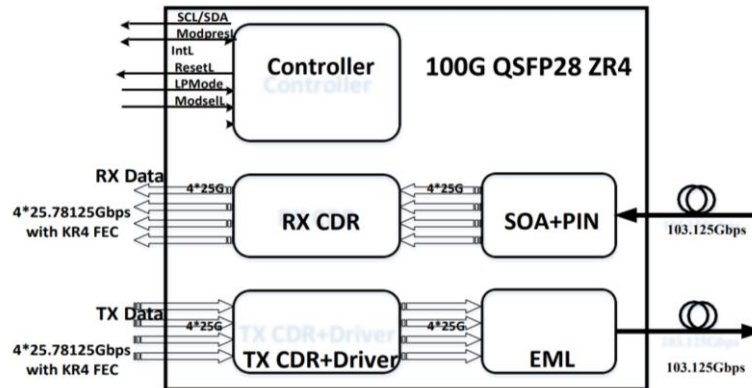
Receiver					
Signaling Speed per Lane		25.78125 ± 100 ppm			Gb/s
Wavelength Assignment	L0	1294.53	1295.56	1296.59	nm
	L1	1299.02	1300.05	1301.09	nm
	L2	1303.54	1304.58	1305.63	nm
	L3	1308.09	1309.14	1310.19	nm
Damage Threshold	THd	-3.0			dBm
Average Receive power, each lane		-22			-4.5 dBm
Receiver Power (OMA), each Lane	OMA	-	-	-1.9 dBm	
Receiver Sensitivity (OMA) per Lane	Rxsens				-21.5 dBm
Receiver 3 dB electrical upper cut off frequency, each lane					31 GHz
Receiver Reflectance	Rrx				-26 dB
LOS De-Assert	LOSD	-	-	-28 dBm	
LOS Assert	LOSA	-38	-	- dBm	
LOS Hysteresis	LOSH	0.5	-	- dB	

Note: The minimum average launch power spec is based on 60km not exceeding 9.5dB and transmitter

Electrical Specifications

Parameter	Symbol	Min	Typical	Max
Power Consumption	P			4.5 W
Supply Current	I _{cc}			1.8759 A
Transceiver Power-on Initialization Time				2000 ms
Transmitter				
Single-ended Input Voltage Tolerance		-350mV		2850mV
AC Common Mode Input Voltage Tolerance		15 mV		
Differential Input Voltage		50 mVpp		
Differential Input Voltage Swing	V _{in}			900 mVpp
Differential Input Impedance	Z _{in}	90	100	110 Ohm
Receiver				
AC Common Mode Output Voltage				7.5 mV
Differential Output Voltage Swing	V _{out}	300		900 mVpp
Differential Output Impedance	Z _{out}	90	100	110 Ohm

Transceiver Block Diagram



ModSelL : The ModSelL is an input pin. When held low by the host, the module responds to 2-wire serial communication commands. The ModSelL allows the use of multiple modules on a single 2-wire interface bus. When the ModSelL is "High", the module shall not respond to or acknowledge any 2-wire interface communication from the host. ModSelL signal input node shall be biased to the "High" state in the module. In order to avoid conflicts, the host system shall not attempt 2-wire interface communications within the ModSelL de-assert time after any modules are deselected. Similarly, the host shall wait at least for the period of the ModSelL assert time before communicating with the newly selected module. The assertion and deasserting periods of different modules may overlap as long as the above timing requirements are met.

ResetL : The ResetL pin shall be pulled to Vcc in the module. A low level on the ResetL pin for longer than the minimum pulse length (t_{Reset_init}) initiates a complete module reset, returning all user module settings to their default state. Module Reset Assert Time (t_{init}) starts on the rising edge after the low level on the ResetL pin is released. During the execution of a reset (t_{init}) the host shall disregard all status bits until the module indicates a completion of the reset interrupt. The module indicates this by asserting "low" an IntL signal with the Data_Not_Ready bit negated. Note that on power up (including hot insertion) the module should post this completion of reset interrupt without requiring a reset.

LPMODE: The LPMODE pin shall be pulled up to Vcc in the module. The pin is a hardware control used to put modules into a low power mode when high. By using the LPMODE pin and a combination of the Power override, Power_set and High_Power_Class_Enable software control bits (Address A0h, byte 93 bits 0,1,2). ModPrsL: ModPrsL is pulled up to Vcc_Host on the host board and grounded in the module. The ModPrsL is asserted "Low" when inserted and deasserted "High" when the module is physically absent from the host connector.

IntL: IntL is an output pin. When IntL is "Low", it indicates a possible module operational fault or a status critical to the host system. The host identifies the source of the interrupt using the 2-wire serial interface. The IntL pin is an open collector output and shall be pulled to host supply voltage on the host board. The INTL pin is deasserted "High" after completion of reset, when byte 2 bit 0 (Data Not Ready) is read with a value of '0' and the flag field is read (see SFF-8636)

Pin Description

Pin	Symbol	Description	Notes
1	GND	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	+3.3V Power Supply Receiver	
11	SCL	2-wire serial interface clock	
12	SDA	2-wire serial interface data	
13	GND	Ground	1
14	Rx3p	Receiver Non-Inverted Data Output	
15	Rx3n	Receiver Inverted Data Output	
16	GND	Ground	1
17	Rx1p	Receiver Non-Inverted Data Output	
18	Rx1n	Receiver Inverted Data Output	
19	GND	Ground	1
20	GND	Ground	1
21	Rx2n	Receiver Inverted Data Output	
22	Rx2p	Receiver Non-Inverted Data Output	
23	GND	Ground	1
24	Rx4n	Receiver Non-Inverted Data Output	
25	Rx4p	Receiver Inverted Data Output	
26	GND	Ground	1
27	ModPrsL	Module Present	
28	IntL	Interrupt	
29	Vcc Tx	+3.3V Power supply transmitter	
30	VccI	+3.3V Power supply	
31	LPMODE	Low Power Mode	
32	GND	Ground	1
33	Tx3p	Transmitter Non-Inverted Data Input	
34	Tx3n	Transmitter Inverted Data Input	
35	GND	Ground	1
36	Tx1p	Transmitter Non-Inverted Data Input	
37	Tx1n	Transmitter Inverted Data Input	
38	GND	Ground	1

Notes

1. Circuit ground is internally isolated from chassis ground.

Alarm and Warning Thresholds

Performance Item	Alarm Threshold Bytes(A0[03] memory)	Unit	Low threshold	High threshold
Temp Alarm	128 to 131	°C	-10	80
Temp Warning	132 to 135	°C	0	70
Voltage Alarm	144 to 147	V	2.97	3.63
Voltage Warning	148 to 151	V	3.135	3.465
TX Power Alarm	192 to 195	dBm	-4	8.2
TX Power Warning	196 to 199	dBm	-1	6.5
RX Power Alarm	176 to 179	dBm	-31	-4
RX Power Warning	180 to 183	dBm	-28	-7

4L-Q281GZR4-L80 support alarms function, indicating the values of the preceding basic performance are lower or higher than the thresholds..

Safety Specification Design

- 1) Do not look into fiber end faces without eye protection using an optical meter (such as magnifier and mi- croscope) within 100 mm, unless you ensure that the laser output is disabled. When operating an optical meter, observe the operation requirements.
- 2) The RX input optical power cannot be higher than the damage threshold. You need the optical attenuator with RX in order to meet the input optical power range if necessary.
- 3) The 4L-Q281GZR4-L80 is the customized module, it can only interconnect with the 4L-Q281GZR4-L80 module.

Alarm and Warning Thresholds

Feature	Standard	Performance
Safety		
NRTL	UL 62368-1:2014 CAN/CSA C22.2 No. 62368-1-14 IEC 60825-1:2014	UL recognized component for US and CAN
	IEC 60825-2:2014+A1:2007+A2:2010 EN 62368-1:2014+A11:2017(Second Edition)	
TUV	EN 60825-1:2014 EN 60825-1:2014+A1:2007+A2:2010 IEC 62368-1:2014(Second Edition)	TUV certificate
FDA	U.S. 21 CFR 1040.10	FDA/CDRH certified with accession number according to Laser Notice 50
Electromagnetic Compatibility		
Radiated emissions	EMC Directive 2014/30/EU	Class B digital device with a minimum -6dB margin to the limit when tested with a metal enclosure. Final margin may vary depending on system application, good system EMI design practice, ie: suitable metal enclosure and well-bonding, is required to achieve Class B margins at the system level. Tested frequency range: 30 MHz to 40 GHz or 5th harmonic (5 times the highest frequency), whichever is less.
	EN 55032	
	CISPR 32	
	FCC rules 47 CFR Part 15	
	ICES-003	
ESD	AS/NZS CISPR 32	Withstands discharges of ± 8 kV contact, ± 15 kV air.
	EN 55024	
	CISPR 24	
Radiated immunity	IEC/EN 61000-4-2	Field strength of 10 V/m from 80 MHz to 6 GHz.
	EN 55035	
	CISPR 35	
	IEC/EN 61000-4-3	

Ordering Information

Part Number	Description
4L-Q100SR4-M100	QSFP28 100GBASE-SR4, 850nm, MM, DDM, MPO/MTP, 100m
4L-Q100BSR4-100	QSFP28 100GBASE-SR4, 850/900nm, BiDi MM, DDM, LC, 150m
4L-Q100CW4-02	QSFP28 100GBASE-CWDM4, LC, DDM, SM 2km.
4L-Q100PLR4-M02	QSFP28 100GBASE-PLR4, 1310nm, SM, DDM, MPO/MTP, 2km
4L-Q100LR4-10	QSFP28 100GBASE-LR4, 1310nm, SM, DDM, Duplex LC, 10Km
4L-Q100LR4-20	QSFP28 100GBASE-LR4, 1310nm, SM, DDM, Duplex LC, 20Km
4L-Q100ER4-40	QSFP28 100GGBASE-ER4, 1310nm, SM, DDM, Duplex LC, 40Km
4L-Q100ZR4-60	QSFP28 100GGBASE-60km, 1310nm, SM, DDM, Duplex LC, 60Km
4L-Q100ZR4-80	QSFP28 100GGBASE-ZR4, 1310nm, SM, DDM, Duplex LC, 80Km

Note

This modules have been tested by 4LAN on equipment like Cisco, Juniper, Dell, HP, Mikrotik, Huawei, and other brands. The equipment brand must be informed before shipping the order, so the transceivers are reprogrammed to the corresponding brand.

Contact Information

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