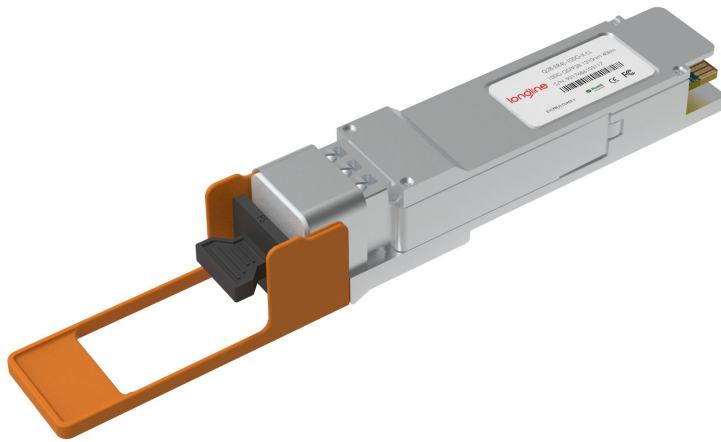


100GBASE-ER4L QSFP28 1310nm 40km Extended Temperature DOM Transceiver

Q28-ER4L-100G-X-LL



Application

- Data Center

Features

- Maximum Link Length: 40km(with Host FEC), 30km(without Host FEC)
- 103.125Gbps(4x 25.78125 Gb/s) CAUI-4 Compliant
- Single 3.3V Power Supply
- Supports KR4 FEC
- Operating Case Temperature Range: -20 to +85°C
- Transmitter: Cooled 4x LAN-WDM EML-based TOSA
- Receiver: 4x APD-based ROSA
- Hot Pluggable QSFP28 MSA Compliant
- SFF-8636 Management Interface
- Class 1 Laser Safety

Description

The Longline’s 100GBASE-ER4L QSFP28 Optical Transceiver Module is designed for use in 100GBASE Ethernet throughput up to 40km over LC duplex SMF using a wavelength of 1310nm. Full 40km reach requires the use of FEC on the host platform. Without FEC, the reach is 30km. Designed for outside plant applications with an extended temperature range (-20°C to +85°C), this transceiver is compliant with SFF-8636 and 4WDM MSA standards. The built-in digital diagnostics monitoring (DDM) allows access to real-time operating parameters. With these features, this easy to install, hot swappable transceiver is suitable for Data Center applications.

Products Specifications

I. Absolute Maximum Ratings

Parameter	Symbol	Min.	Max.	Unit	Notes
Storage Temperature Range	T_S	-40	85	°C	
Supply Voltage	V_{CC}	0	+3.6	V	+3.3 V
Optical Receiver Input			-2.5	dBm	Average

II. Recommended Operating Conditions

Parameter	Symbol	Min.	Typical	Max.	Unit	Notes
Operating Case Temperature	T_{OPR}	-20	25	85	°C	Cold start - 40degC
Power Supply Voltage	V_{CC}	3.135	3.3	3.465	V	
Supply Current				1754	mA	Steady State
Supply Voltage Noise Tolerance	PSNR			66	mV	10Hz-10MHz
Power Consumption				5.5	W	Target

III. Optical Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Ref.
Channel Data Rate	f_{DC}		25.78125		Gb/s	
Aggregate Data Rate	f_D		103.125		Gb/s	Note 1
Signal Speed Variation from Nominal	Δf_D	-100		100	ppm	
Transmitter(Each Lane)						
Wavelength L0	λ_1	1294.53		1296.59	nm	
Wavelength L1	λ_2	1299.02		1301.09	nm	
Wavelength L2	λ_3	1303.54		1305.63	nm	
Wavelength L3	λ_4	1308.09		1310.19	nm	
Optical Output Power in OMA	OMA	0.5		6.5	dBm	Note 2
Average Launch Power		-2.5		6.5	dBm	Note4
Launch Power in OMA Minus TDP, each Lane	OMA	-0.5				
Average Launch Power Tx_Off	P_{OFF}			-30	dBm	
Transmitter and Dispersion Penalty (TDP), each Lane				3.0	dB	
Extinction Ratio	ER	4.5			dB	

Parameter	Symbol	Min.	Typ.	Max.	Unit	Ref.
Receiver(Each Lane)						
Receiver Sensitivity(OMA), each Lane at 5x10⁻⁵BER	P _{min} OMA			-18.5	dBm	Note3
Max. Receive Power in OMA				-3.5	dBm	
Average Receive Power		-20.5		-3.5	dBm	Note5
Stressed Receiver Sensitivity(OMA), each Lane at 5 x 10⁻⁵BER	P _{min} SOMA			-16.0	dBm	
Vertical Eye Closure Penalty, each Lane			2.5		dB	Condition for SRS
Receive Reflectance	RF			-26		

Note1: Data Rate; NRZ, Mark Ratio 50%, PRBS=231-1 unless otherwise specified.

Note2: $OMA = 10 \log_{10} [2P \{ (A-1)/(A+1) \}]$, $A = 10^{(ER/10)}$, $P = 10^{(Pf/10)}$

Note3: Receiver sensitivity, which is defined for an ideal input signal, is informative and compliance is not required. If measured, the test signal should have negligible impairments such as inter-symbol interference (ISI), rise/fall times, jitter and RIN.

Note4: Average launch power, each lane (min) is informative and not the principal indicator of signal strength. A transmitter with launch power below this value cannot be compliant; however, a value above this does not ensure compliance.

Note5: Average receive power, each lane (min) is informative and not the principal indicator of signal strength. A received power below this value cannot be compliant; however, a value above this does not ensure compliance.

IV. RX_LOS Alarm Characteristics

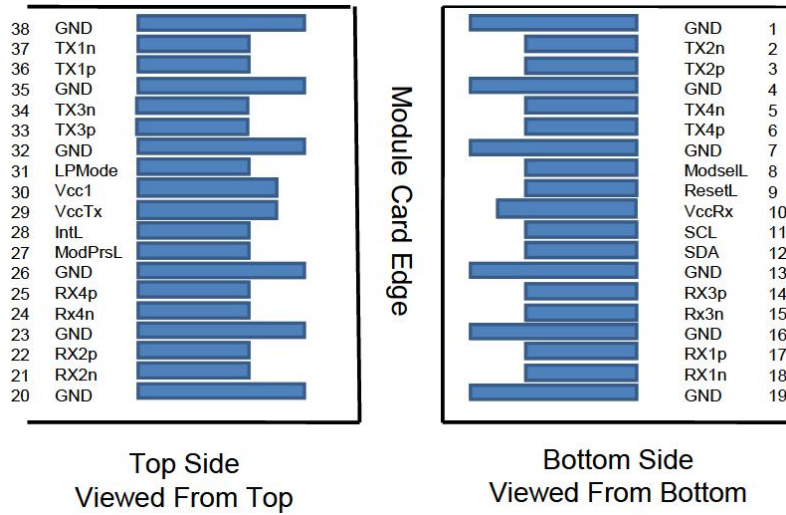
Parameter	Symbol	Min.	Typ.	Max.	Unit	Ref.
Receiver Loss of Signal Indicator Assert Level	RX_LOS			-20.5	dBm	OMA
Receiver Loss of Signal Indicator De-assert Level				-19.0	dBm	OMA
LOS Hysteresis		0.5			dB	

V. Electrical Characteristics

Parameter	Min.	Typ.	Max.	Unit	Ref.
Transmitter (Each Lane)					
Differential Pk-Pk Input Voltage Tolerance	900			mV	at TP1a
Differential Termination Mismatch			10	%	at TP1
Single-ended Input Voltage Tolerance Range	-0.4		3.3	V	at TP1a
DC Common Mode Voltage	-350		2850	mV	at TP1
Receiver (Each Lane, at TP4)					
AC Common Mode Output Voltage (RMS)			17.5	mV	
Differential Output Voltage			900	mV	
Eye Width	0.57			UI	
Eye Height, Differential	228			mV	
Vertical Eye Closure			5.5	dB	
Differential Termination Mismatch			10	%	
Transition Time(20% to 80%)	12			ps	
DC Common Mode Voltage	-350		2850	mV	

Note: Electrical Rx output is squelched for loss of optical input signal.

VI. Pin Descriptions



Pin	Logic	Symbol	Description	Plug Sequence	Notes
1		GND	Module Ground	1	1
2	CML-I	Tx2n	Transmitter Inverted Data Input	3	
3	CML-I	Tx2p	Transmitter Non-inverted Data Input	3	
4		GND	Module Ground	1	1
5	CML-I	Tx4n	Transmitter Inverted Data Input	3	
6	CML-I	Tx4p	Transmitter Non-Inverted Data Input	3	
7		GND	Module Ground	1	1
8	LVTTTL-I	ModSelL	Module Select	3	
9	LVTTTL-I	ResetL	Module Reset	3	
10		Vcc Rx	+3.3V Power Supply for Receiver	2	2
11	LVTTTL-I/O	SCL	2-wire Serial Interface Clock	3	

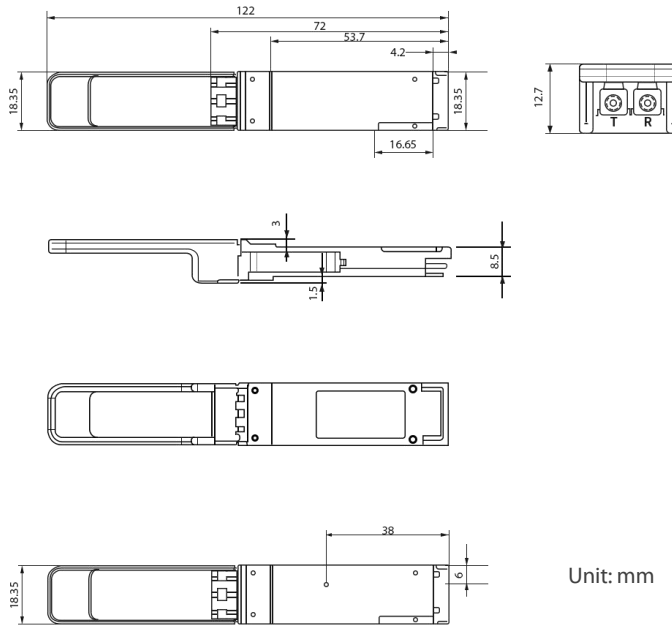
Pin	Logic	Symbol	Description	Plug Sequence	Notes
12	LVTTTL-I/O	SDA	2-wire Serial Interface Data Line	3	
13		GND	Module Ground	1	1
14	CML-O	Rx3p	Receiver Non-Inverted Data Output	3	
15	CML-O	Rx3n	Receiver Inverted Data Output	3	
16		GND	Module Ground	1	1
17	CML-O	Rx1p	Receiver Non-Inverted Data Output	3	
18	CML-O	Rx1n	Receiver Inverted Data Output	3	
19		GND	Module Ground	1	1
20		GND	Module Ground	1	1
21	CML-O	Rx2n	Receiver Inverted Data Output	3	
22	CML-O	Rx2p	Receiver Non-Inverted Data Output	3	
23		GND	Module Ground	1	1
24	CML-O	Rx4n	Receiver Inverted Data Output	3	
25	CML-O	Rx4p	Receiver Non-Inverted Data Output	3	
26		GND	Module Ground	1	1
27	LVTTTL-O	ModPrsL	Module Present	3	
28	LVTTTL-O	IntL	Interrupt.	3	
29		Vcc Tx	+3.3v Power Supply For Transmitter	2	2

Pin	Logic	Symbol	Description	Plug Sequence	Notes
30		Vcc1	+3.3v Power Supply	2	2
31	LVTTTL-I	LPMODE	Low Power Mode	3	
32		GND	Module Ground	1	1
33	CML-I	Tx3p	Transmitter Non-Inverted Data Input	3	
34	CML-I	Tx3n	Transmitter Inverted Data Input	3	
35		GND	Module Ground	1	1
36	CML-I	Tx1p	Transmitter Non-Inverted Data Input	3	
37	CML-I	Tx1n	Transmitter Inverted Data Input	3	
38		GND	Module Ground	1	1

Note1: GND is the symbol for signal and supply (power) common for the 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.

Note2: Vcc Rx, Vcc1 and Vcc Tx are the receiver and transmitter power supplies and shall be applied concurrently.

VII. Diagram Mechanical Drawing



VIII. Regulatory Compliance

Certification	Standard
EMC/EMI	FCC Part 15, Subpart B (Class B) EN55032 (Class B)
ESD	EN61000-4-2, criterion B JEDEC JESD22-A114-B Human Body Model
Laser Safety	Complies with 21 CFR 1040.10 and 1040.11 Except for Conformance with IEC 60825-1 Ed. 3. Described in Laser Notice No. 56, Dated May 8, 2019.
Environmental	RoHS 10 (2011/65/EU + 2015/863) ISA S71.04 G2