AT A GLANCE

E.C.I. NETWORKS's QSFP-DD transceiver module is a 400Gb/s Quad Small Form Factor Pluggable-double density (QSFP-DD) optical module designed for optical communication applications. The module converts 8 channels of 50Gb/s (PAM4) electrical input data to 4 channels of LAN-WDM optical signals and multiplexes them into a single channel for 400Gb/s optical transmission. Reversely, on the receiver side, the module optically de-multiplexes a 400Gb/s optical input into 4 channels of WDM optical signals and converts them to 8 channels of 50Gb/s (PAM4) electrical output data.

The central wavelengths of the 4 LAN WDM channels are 1295.56, 1300.05, 1304.58 and 1309.14 nm as members of the LAN WDM wavelength grid defined in IEEE802.3ba. It contains a duplex LC connector for the optical interface and a 76-pin connector for the electrical interface. To minimize the optical dispersion in the long-haul system, single-mode fiber (SMF) must be applied in this module. It can support up to 25km with 400G KP4 FEC and 30km with built-in PFEC.

Product Features

- QSFP-DD MSA compliant
- 4 LWDM lanes MUX/DEMUX design
- Up to 30km transmission on single mode fiber (SMF) with built-in PFEC
- 8x53.125Gb/s electrical interface (400GAUI-8)
- Data Rate 106.25Gbps (PAM4) per channel.
- Maximum power consumption 12W
- Duplex LC connector
- Case operating temperature
    - Commercial: 0°C to +70°C

Applications

- Data Center
- 400G Ethernet
- InfiniBand interconnects

Ordering Information

Part Number	Description	Data Rate	Wavelength	Distance	Connector
QSFP-DD ER4L (400G)					
EN-QDD-ER4L-xx	400G QSFP-DD ER4 Lite SMF Optical Transceiver, up to 25km with 400G KP4 FEC and 30km with built-in PFEC.	400G	1295.56 1300.05 1304.58 1309.14	30km	LC

Product Selection

xx: Refers to vendor compatibility
Per example:
EN-SFP10G-LR-EZ refers to Commercial Temperature, and compatible with Evertz, EN-SFP10GIDL-JREX refers to Industrial Temperature, and compatible with Juniper EX Series
** Please note pricing is same for most of the NEMs including Cisco, Juniper, F5, Fortinet, except HP, Evertz. There is an additional charge

Compatibility; Tested and Proven

- Proven Compatibility and Interoperability with; TBD

Compliance

All our products come with Built-in digital diagnostic functions DDM Compliant with SFF-8472 Rev12 and Compliant with the MSA SFF SPECIFICATIONS.

Absolute Maximum Rating

Stresses in excess of the absolute maximum ratings can cause permanent damage to the device. These are absolute stress ratings only. Functional operation of the device is not implied at these or any other conditions in excess of those given in the operational sections of the data sheet. Exposure to absolute maximum ratings for extended periods can adversely affect device reliability.

Parameter	Symbol	Conditions	Min.	Max.	Unit
Storage temperature case	Tstg	-	-40	+85	℃
Relative Humidity	RH	Non-condensing	0	85	%
Supply voltage	VCC		-0.5	3.6	V
Low-speed signal voltage range			-0.3	4.0	V
Damage threshold	Pin	Average	-5.0		dBm

Recommended Operating Conditions

Parameter	Symbol	Min.	Typical	Max.	Unit
Operating Case Temperature	Tcase	0	-	70	ºC
Supply Voltage	VCC	3.135	3.3	3.465	V
Relative Humidity	RH	0	-	85	%
Power Dissipation	PD	-	-	4.5	W
Data Rate (optical)	DRO	-	103.125	106.25	Gbps
Data Rate (Electrical)	DRE	-	26.5625	-	Gbps
Operating Link Distance	LD	-	-	30	Km
Pre-FEC Bit Error Ratio				$2.4x10^{-4}$	
Post-FEC Bit Error Ratio				**$1x10^{-12}$**	

Optical Transmit Characteristics

Parameter	Symbol	Min	Typical	Max	Units
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
Transmitter					
Data Rate, each Lane		53.125 ± 100 ppm			GBd
Modulation Format		PAM4			
Side-mode Suppression Ratio	SMSR	30			dB
Total Average Launch Power	PT			14.7	dBm
Average Launch Power, each Lane	PAVG	0.4		6.5	dBm
Outer Optical Modulation Amplitude (OMAouter), each Lane	POMA	3.4		9	dBm
Launch Power in OMAouter minus TDECQ, each Lane		2			dB
Transmitter and Dispersion Eye Closure for PAM4, each Lane	TDECQ			3.9	dB
Extinction Ratio	ER	6			dB
Difference in Launch Power between any Two Lanes (OMAouter)				4	dB
RIN15.1OMA	RIN	-132			dB/Hz
Optical Return Loss Tolerance	TOL			15.6	dB
Transmitter Reflectance	RT			-26	dB
Average Launch Power of OFF Transmitter, each Lane	Poff			-30	dBm
Receiver					

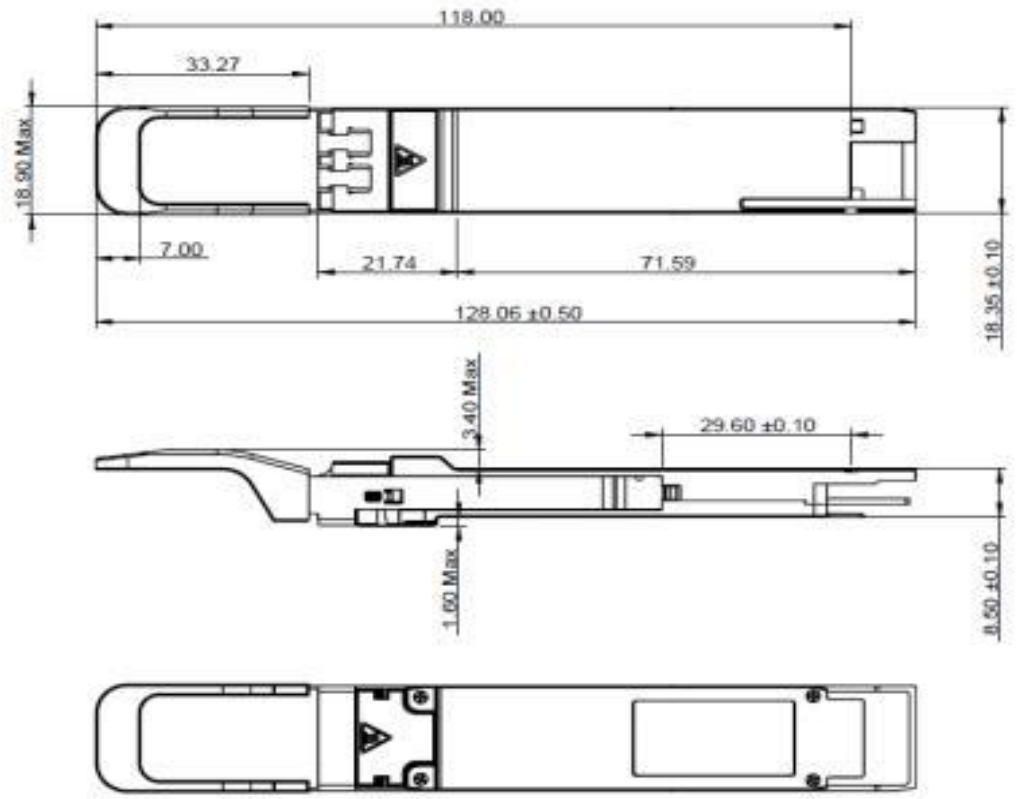
Data Rate, each Lane		53.125 ± 100 ppm			GBd
Modulation Format		PAM4			
Damage receiver power, each lane		-2.4			dBm
Receiver Saturation, each lane	overload	-3.4			
Sensitivity, each lane	Sen1	Max(-10.1, SECQ- 13.5)			dBm
Sensitivity, each lane	Sen2	Max(-12.1, SECQ- 13.5)			dBm
Stressed Eye Closure for PAM4 (SECQ), Lane under Test			3.4		dB
SECQ – 10*log10(Ceq), Lane under Test					dB
OMAouter of each Aggressor Lane			-8		dBm

Electrical Specifications

Parameter	Symbol	Min.	Typical	Max.	Units
Power Consumption				12	W
Supply Current	Icc			3.64	A
Transmitter (each Lane)					
Signaling Rate, each Lane	TP1	26.5625 ± 100 ppm			GBd
Differential pk-pk Input Voltage Tolerance	TP1a	900			mVpp
Differential Termination Mismatch	TP1			10	%
Module Stressed Input Test	TP1a	See IEEE 802.3bs 120E.3.4. 1			

Single-ended Voltage Tolerance Range (Min)	TP1a	-0.4 to 3.3			V
DC Common Mode Input Voltage	TP1	-350		2850	mV
Receiver (each Lane)					
Signaling Rate, each lane	TP4	26.5625 ± 100 ppm			GBd
Differential Peak-to-Peak Output Voltage	TP4			900	mVpp
AC Common Mode Output Voltage, RMS	TP4			17.5	mV
Differential Termination Mismatch	TP4			10	%
Transition Time, 20% to 80%	TP4	9.5			ps
Near-end Eye Symmetry Mask Width (ESMW)	TP4		0.265		UI
Near-end Eye Height, Differential	TP4	70			mV
Far-end Eye Symmetry Mask Width (ESMW)	TP4		0.2		UI
Far-end Eye Height, Differential	TP4	30			mV
Far-end Pre-cursor ISI Ratio	TP4	-4.5		2.5	%
Common Mode Output Voltage (Vcm)	TP4	-350		2850	mV

Mechanical specifications



Regulatory Compliance

Feature	Reference	Performance
Electrostatic discharge（ESD）	IEC/EN 61000-4-2	Compatible with standards
Electromagnetic Interference (EMI)	FCC Part 15 Class B EN 55022 Class B (CISPR 22A)	Compatible with standards
Laser Eye Safety	FDA 21CFR 1040.10, 1040.11 IEC/EN 60825-1, 2	Class 1 laser product
Component Recognition	IEC/EN 60950, UL	Compatible with standards
ROHS	2002/95/EC	Compatible with standards
EMC	EN61000-3	Compatible with standards

Notice:

ECI Networks reserves the right to make changes to or discontinue any optical link product or service identified in this publication, without notice, in order to improve design and/or performance. Applications that are described herein for any of the optical link products are for illustrative purposes only.

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