

AT A GLANCE

E.C.I. NETWORKS's QSFP-DD or QSFP56-DD transceiver module is designed for use in 200/400 Gigabit Ethernet links up 10km single mode fiber. QSFP-DD ports is mechanically and electrically compatible with QSFP28 and QSFP+. The module is hot pluggable when mated to a compliant 76-pin connector that delivers a supply voltage of 3.3 V.

EN-QDD-DR4 is a 400G Quad Small Form Factor Pluggable-double density (QSFP-DD) optical module designed for 500m optical communication applications. The module converts 8 channels of 50G (PAM4) electrical input data to 4 channels of parallel optical signals, each capable of 100Gb/s operation for an aggregate data rate of 400G. Reversely, on the receiver side, the module converts 4 channels of parallel optical signals of 100Gb/s each channel for an aggregate data rate of 400Gb/s into 8 channels of 50G (PAM4) electrical output data.

An optical fiber cable with an MTP/MPO-12 connector can be plugged into the QSFP-DD DR4 module receptacle.

PRODUCT FEATURES

- QSFP-DD MSA compliant
- Parallel 4 Optical Lanes
- IEEE802.3bs Specification compliant
- Up to 500m transmission on single mode fiber (SMF) with FEC
- Operating case temperature: 0 to 70oC
- 8x53.125Gb/s electrical interface (400GAUI-8)
- Data Rate 106.25Gbps (PAM4) per channel.
- Maximum power consumption 12W
- MPO-12 connector
- RoHS compliant



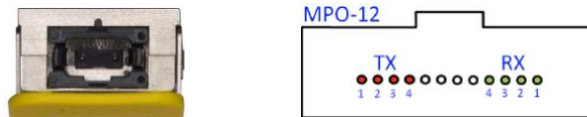
APPLICATIONS EXAMPLES

A cost optimized solution for up to 500m. Customers can use it for 400G to 400G connectivity as well as breakout 400G to 4x100G connectivity. Breakout option is often used for Leaf to ToR, in conjunction with 100G DR1 (100G DR1 is a new QSFP28 optics module used to plug into legacy 100G switches with NRZ electrical signals).



EN-QDD-LR4 Connectivity

The 400G-DR4 / XDR4 / PLR4 modules use a single row, angled (APC) MPO12 connector for use with parallel single mode fiber. Although a MPO12 cable can have up to 12 SMF fibers, only 8 out of the 12 fibers are used (4 for Tx and 4 for Rx). This is the same connector that is used on existing 100G and 40G QSFPs that use parallel SMF (e.g. 100G-PSM4, 40GPLR4 etc). An image, and drawing of an MPO12 connector are shown below.



Cabling required



EN-MTP8F-SM-FF-xxM is singlemode patch cable required for direct connectivity between QDD-DR4.

EN-MTP4LCxxSM is a Singlemode MTP to 4 Duplex LC breakout cable is required to connect to 4 x QSFP-100G-DRs (EN-QSFP28-DR1) to a single OSFP-400G-DR4 (or EN-QDD-DR4).



Ordering Information

Part Number	Description	Data Rate	Wavelength	Distance
EN-QDD-DR4-xx	400GBASE-DR4 QSFP-DD transceiver, up to 500m over parallel single mode fiber (SMF). The 400G-DR4 can break out to 4 x 100G, and interop with 4 x 100G-DR QSFPs. Parallel SMF MPO-12 Angled Connector (APC)	400G	1310nm	500M

Product Selection

xx: Refers to vendor compatibility

I: I refers to Industrial Temperature where applicable

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	Minimum	Maximum	Unit
Storage Temperature	T _s	-40	85	°C
Relative Humidity	RH	0	85	%
Supply Voltage	V _{cc}	-0.5	3.6	V

Recommended Operating Conditions

Parameter	Symbol	Min	Typ	Max	Unit
Operating Case Temperature	T _c	0	25	70	°C
Supply Voltage	V _{cc}	3.135	3.3	3.465	V
Power Dissipation	P _d	-		12	W
Data Rate, each Lane			26.5625		GBd
Data Rate Accuracy		-100		100	ppm
Pre-FEC Bit Error Ratio				2.4x10 ⁻⁴	
Post-FEC Bit Error Ratio				1x10 ⁻¹²	
Link Distance	D	0.5		500	m

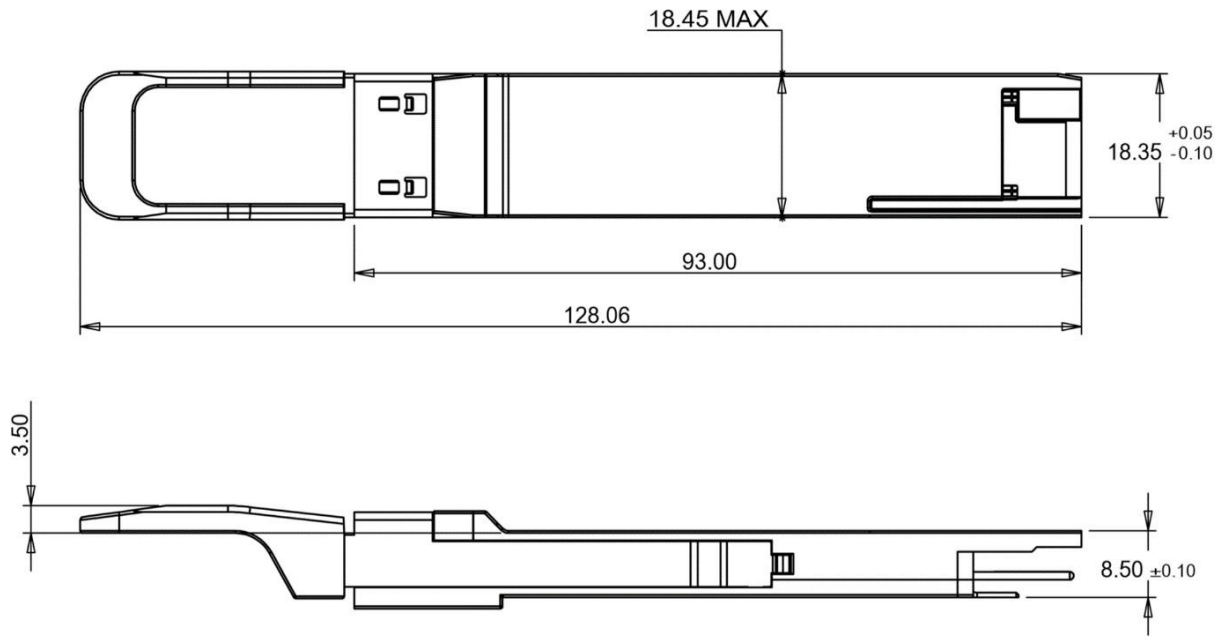
Optical Characteristics

EN-QDD-DR4

Parameter	Symbol	Min	Typical	Max	Units	Notes
Center Wavelength	λ_c	1304.5	1310	1317.5	nm	
Transmitter						
Data Rate, each Lane		53.125 ± 100 ppm			GBd	
Modulation Format		PAM4				
Side-mode Suppression Ratio	SMSR	30			dB	Modulated
Total Average Launch Power	PT			10	dBm	
Average Launch Power, each Lane	PAVG	-2.9		4	dBm	1
Outer Optical Modulation Amplitude (OMA _{outer}), each Lane	POMA	-0.8		4.2	dBm	2
Launch Power in OMA _{outer} minus TDECQ, each Lane		-2.2			dB	For ER ≥4.5dB
Transmitter and Dispersion Eye Clouser for PAM4, each Lane	TDECQ			3.4	dB	
Extinction Ratio	ER	3.5			dB	
RIN _{17.1OMA}	RIN			-136	dB/Hz	
Optical Return Loss Tolerance	TOL			21.4	dB	
Transmitter Reflectance	TR			-26	dB	
Average Launch Power of OFF Transmitter, each Lane	P _{off}			-15	dBm	
Receiver						
Data Rate, each Lane		53.125 ± 100 ppm			GBd	
Modulation Format		PAM4				
Damage Threshold, each Lane	TH _d	5			dBm	
Average Receive Power, each Lane		-5.9		4	dBm	

Receive Power (OMAouter), each Lane				4.2	dBm	
Difference in Receiver Power between any Two Lanes (OMAouter)				4.1	dB	
Receiver Sensitivity (OMAouter), each Lane	SEN			-4.4	dBm	
Receiver Reflectance	R			-26	dB	
LOS Assert	LOSA	-30			dBm	
LOS De-assert	LOSD			-12	dBm	
LOS Hysteresis	LOSH	0.5			dB	
Stressed Eye Closure for PAM4 (SECQ), Lane under Test				3.4	dB	
OMAouter of each Aggressor Lane				4.2	dBm	

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.

For further information



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