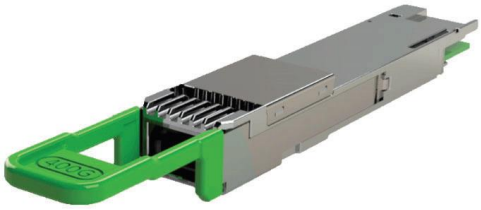
AT A GLANCE

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-XDR4 (or DR4+) is a is a 4x 100G QSFP-DD FR1 optical transceiver that provides 4 parallel 100GE links over 4 single mode fiber (SMF) pairs via its MPO-12 connector. Each fiber pair link is compliant to 100GBASE-FR1 and thus can support a 400GE to 4x 100GE breakout over 2 km. It combines 8x 26.5625 GBd PAM4 electrical lanes into 4x 53.125 GBd PAM4 optical lanes. Superior performance and reliability is achieved through advanced transmitter and receiver design using cooled EA-DFB-LDs each at a CWDM 1.3 µm wavelength and 4x PIN PDs.

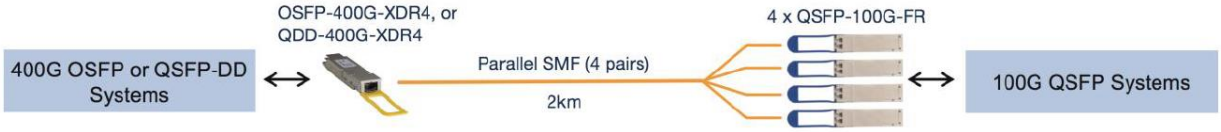
PRODUCT FEATURES

- QSFP-DD MSA compliant
- Parallel 4 Optical Lanes
- Breakout Mode
  - 4x 100GBASE-FR1 compliant 53.125GBd PAM4
  - 100GAUI-2 compliant 2x 26.5625 GBd PAM4
- Aggregation Mode
  - 400 Gb/s Ethernet Protocol 4x 53.125GBd PAM4
  - 400GAUI-8 compliant 8x 26.5625 GBd PAM4
- QSFP-DD MSA compliant
- MPO-12 connector with 8° angled end-face
- Power consumption <12 W
- Operating case temperature 0 to 70 ºC
- CMIS 4.0 management interface
- Up to 2km transmission on single mode fiber (SMF)
- RoHS compliant



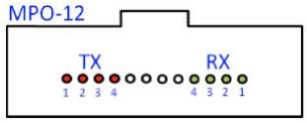
APPLICATIONS EXAMPLES

A cost optimized solution for up to 2km. 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 FR1 (100G FR1 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-XDR4.

EN-MTP4LCxxSM is a Singlemode MTP to 4 Duplex LC breakout cable is required to connect to 4 x QSFP-100G-FRs (EN-QSFP28-FR1) to a single OSFP-400G-DR4 (or EN-QDD-XDR4).

Ordering Information

Part Number	Description	Data Rate	Wavelength	Distance
EN-QDD-XDR4-xx	400GBASE-DR4 QSFP-DD transceiver, up to 2km over parallel single mode fiber (SMF). The 400G-xDR4 can break out to 4 x 100G, and interop with 4 x 100G-FR QSFPs. Parallel SMF MPO-12 Angled Connector (APC)	400G or 4x100G-FR	1310nm	2KM

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; Nokia 72xx, 77xx, 79xx series. Juniper. Viavi, etc.

Compliance

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

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	Pd	-		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		2000	m

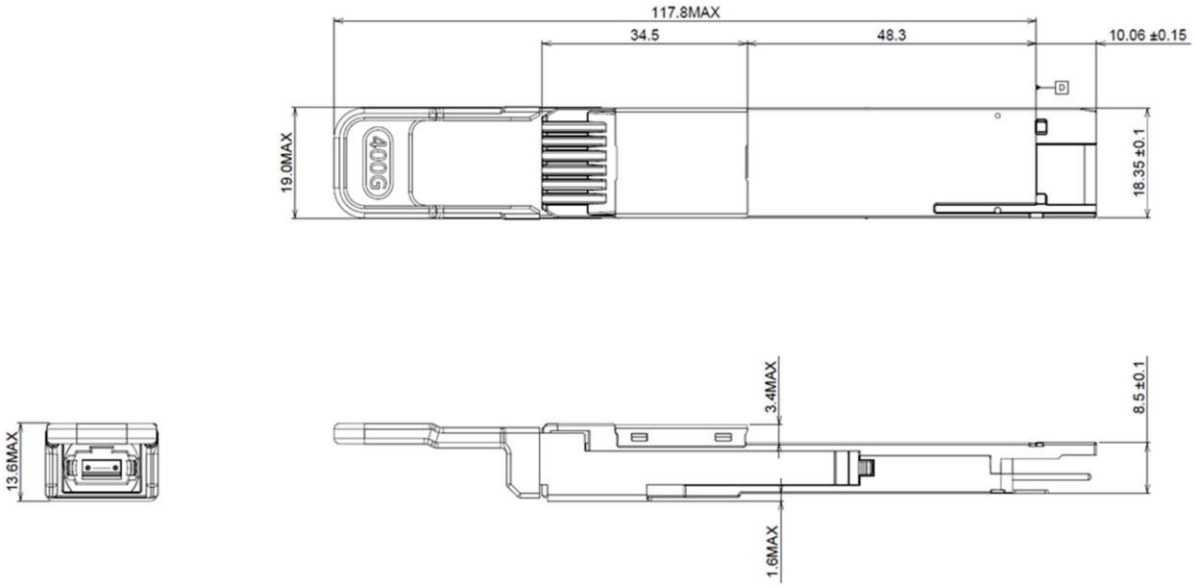
Optical Characteristics

EN-QDD-XDR4

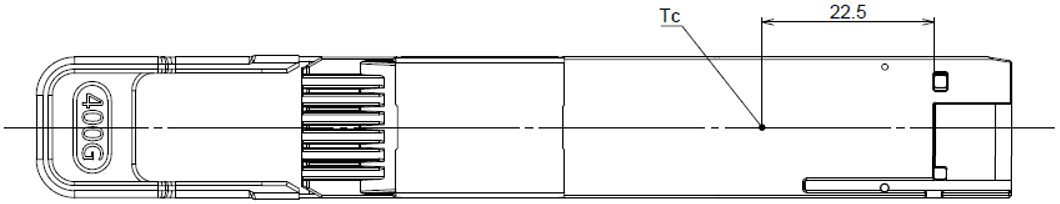
Parameter	Symbol	Min	Typical	Max	Units	Notes
Center Wavelength	λ c	1304.5	1310	1317.5	nm	
Transmitter						
Data Rate, each Lane		53.125 ± 100 ppm			GBd	
Modulation Format		PAM4				
Side-mode Suppression Ratio	SMSR	30			dB	Modulated
Total Average Launch Power	PT			10	dBm	
Average Launch Power, each Lane	PAVG	-3.1		4.0	dBm	1
Outer Optical Modulation Amplitude (OMAouter), each Lane	POMA	-0.1		4.2	dBm	2
Launch Power in OMAouter minus TDECQ, each Lane		-1.5		4.2	dB	For ER ≥4.5dB
Transmitter and Dispersion Eye Clouser for PAM4, each Lane	TDECQ			3.4	dB	
Extinction Ratio	ER	3.5			dB	
RIN17.1OMA	RIN			-136	dB/Hz	
Optical Return Loss Tolerance	TOL			17.1	dB	
Transmitter Reflectance	TR			-26	dB	
Average Launch Power of OFF Transmitter, each Lane	Poff			-15	dBm	
Receiver						
Data Rate, each Lane		53.125 ± 100 ppm			GBd	
Modulation Format		PAM4				
Damage Threshold, each Lane	THd	5			dBm	
Average Receive Power, each Lane		-7.1		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			-4.5	dBm	
Receiver Reflectance	R			-26	dB	
LOS Assert	LOSA	-15		-8.0	dBm	
LOS De-assert	LOSD			-7.5	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 (unit mm)



Case temperature measurement point



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

Office: 1-800-967-1672
Fax : 1-855-201-7283
mailto:sales@ecin.ca