

# QSFPDD-400G-XDR4-XXW

400GBase QSFP-DD  
1310nm  
2km Reach

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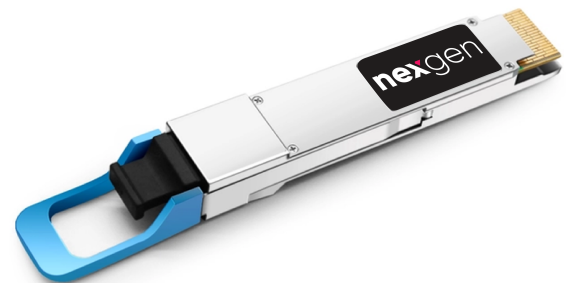


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## Features

- QSFP-DD MSA compliant
- Parallel 4 Optical Lanes
- 100G Lambda MSA 100G-FR Specification compliant
- Up to 2km transmission on single mode fiber (SMF) with FEC
- Operating case temperature: 0 to 70°C
- 8x53.125Gb/s electrical interface (400GAUI-8)
- Data Rate 106.25Gbps (PAM4) per channel.
- Maximum power consumption 12W
- MPO-12 connector
- RoHS compliant



## Applications

- Datacenter Enterprise networking
- Infiniband interconnects

Part number	Product description
QSFPDD-400G-XDR4-XXW	400GBase SMF QSFP-DD 1310nm 2km 0°C to 70°C MTP/MPO-12 DDM (12W)

## PIN Description

Pin		Function/Description	Notes
1	GND	Transmitter Ground (Common with Receiver Ground)	1
2	Tx2-	Transmitter Inverted Data Input	
3	Tx2+	Transmitter Non-Inverted Data output	
4	GND	Transmitter Ground (Common with Receiver Ground)	1
5	Tx4-	Transmitter Inverted Data Input	
6	Tx4+	Transmitter Non-Inverted Data output	
7	GND	Transmitter Ground (Common with Receiver Ground)	1
8	ModSelL	Module Select	
9	ResetL	Module Reset	
10	VccRx	3.3V Power Supply Receiver	2
11	SCL	2-Wire serial Interface Clock	
12	SDA	2-Wire serial Interface Data	
13	GND	Transmitter Ground (Common with Receiver Ground)	1
14	Rx3+	Receiver Non-Inverted Data Output	
15	Rx3-	Receiver Inverted Data Output	
16	GND	Transmitter Ground (Common with Receiver Ground)	1
17	Rx1+	Receiver Non-Inverted Data Output	
18	Rx1-	Receiver Inverted Data Output	
19	GND	Transmitter Ground (Common with Receiver Ground)	1
20	GND	Transmitter Ground (Common with Receiver Ground)	1
21	Rx2-	Receiver Inverted Data Output	
22	Rx2+	Receiver Non-Inverted Data Output	
23	GND	Transmitter Ground (Common with Receiver Ground)	1
24	Rx4-	Receiver Inverted Data Output	
25	Rx4+	Receiver Non-Inverted Data Output	
26	GND	Transmitter Ground (Common with Receiver Ground)	1
27	ModPrsL	Module Present	
28	IntL	Interrupt	
29	VccTx	3.3V power supply transmitter	2
30	Vcc1	3.3V power supply	2
31	LPMODE	Low Power Mode	
32	GND	Transmitter Ground (Common with Receiver Ground)	1
33	Tx3+	Transmitter Non-Inverted Data Input	
34	Tx3-	Transmitter Inverted Data Output	
35	GND	Transmitter Ground (Common with Receiver Ground)	1
36	Tx1+	Transmitter Non-Inverted Data Input	
37	Tx1-	Transmitter Inverted Data Output	
38	GND	Transmitter Ground (Common with Receiver Ground)	1

Pin		Function/Description	Notes
39	GND	Transmitter Ground (Common with Receiver Ground)	1
40	Tx6-	Transmitter Inverted Data Input	
41	Tx6+	Transmitter Non-Inverted Data output	
42	GND	Transmitter Ground (Common with Receiver Ground)	1
43	Tx8-	Transmitter Inverted Data Input	
44	Tx8+	Transmitter Non-Inverted Data output	
45	GND	Transmitter Ground (Common with Receiver Ground)	1
46	Reserved	For future use	3
47	VS1	Module Vendor Specific	3
48	VccRx1	3.3V Power Supply Receiver	2
49	VS2	Module Vendor Specific 2	3
50	VS3	Module Vendor Specific 3	3
51	GND	Transmitter Ground (Common with Receiver Ground)	1
52	Rx7+	Receiver Non-Inverted Data Output	
53	Rx7-	Receiver Inverted Data Output	
54	GND	Transmitter Ground (Common with Receiver Ground)	1
55	Rx5+	Receiver Non-Inverted Data Output	
56	Rx5-	Receiver Inverted Data Output	
57	GND	Transmitter Ground (Common with Receiver Ground)	1
58	GND	Transmitter Ground (Common with Receiver Ground)	1
59	Rx6-	Receiver Inverted Data Output	
60	Rx6+	Receiver Non-Inverted Data Output	
61	GND	Transmitter Ground (Common with Receiver Ground)	1
62	Rx8-	Receiver Inverted Data Output	
63	Rx8+	Receiver Non-Inverted Data Output	
64	GND	Transmitter Ground (Common with Receiver Ground)	1
65	NC	No Connect	
66	Reserved	For future use	
67	VccTx1	3.3V power supply transmitter	2
68	Vcc2	3.3V power supply	2
69	Reserved	For future use	3
70	GND	Transmitter Ground (Common with Receiver Ground)	1
71	Tx7+	Transmitter Non-Inverted Data Input	
72	Tx7-	Transmitter Inverted Data Output	
73	GND	Transmitter Ground (Common with Receiver Ground)	1
74	Tx5+	Transmitter Non-Inverted Data Input	
75	Tx5-	Transmitter Inverted Data Output	
76	GND	Transmitter Ground (Common with Receiver Ground)	1

Notes:

1. QSFP-DD uses common ground (GND) for all signals and supply (power). All are common within the QSFP-DD module and all module voltages are referenced to this potential unless otherwise noted. Connect these directly to the host board signal-common ground plane.
2. VccRx, VccRx1, Vcc1, Vcc2, VccTx and VccTx1 shall be applied concurrently. Requirements defined for the host side of the Host Card Edge Connector are listed in the table. VccRx, VccRx1, Vcc1, Vcc2, VccTx and VccTx1 may be internally connected within the module in any combination. The connector Vcc pins are each rated for a maximum current of 1000 mA.
3. All Vendor Specific, Reserved and No Connect pins may be terminated with 50  $\Omega$  to ground on the host. Pad 65 (No Connect) shall be left unconnected within the module. Vendor specific and Reserved pads shall have an impedance to GND that is greater than 10 k $\Omega$  and less than 100 pF.
4. Plug Sequence specifies the mating sequence of the host connector and module.

# Pin Assignment and Description

38	GND			GND	76
37	TX1n			TX5n	75
36	TX1p			TX5p	74
35	GND			GND	73
34	TX3n			TX7n	72
33	TX3p			TX7p	71
32	GND			GND	70
31	InitMode			Reserved	69
30	Vcc1			Vcc2	68
29	VccTx			VccTx1	67
28	IntL			Reserved	66
27	ModPrsL			NC	65
26	GND			GND	64
25	RX4p			RX8p	63
24	RX4n			RX8n	62
23	GND			GND	61
22	RX2p			RX6p	60
21	RX2n			RX6n	59
20	GND			GND	58

Card Edge

Top Side Viewed from Top

39	GND			GND	1
40	TX6n			TX2n	2
41	TX6p			TX2p	3
42	GND			GND	4
43	TX8n			TX4n	5
44	TX8p			TX4p	6
45	GND			GND	7
46	Reserved			ModSelL	8
47	VS1			ResetL	9
48	VccRx1			VccRx	10
49	VS2			SCL	11
50	VS3			SDA	12
51	GND			GND	13
52	RX7p			RX3p	14
53	RX7n			RX3n	15
54	GND			GND	16
55	RX5p			RX1p	17
56	RX5n			RX1n	18
57	GND			GND	19

Card Edge

Bottom Side Viewed from Bottom

## Absolute Maximum Ratings

Parameter	Symbol	Min	Max	Units	Notes
Storage Temperature	Ts	-40	85	°C	
Power Supply Voltage	Vcc	-0.5	4.0	V	
Relative Humidity (non-condensation)	RH	5	95	%	

Notes:

Exceeding any of these values may be harmful for the device

## Recommended Operating Conditions

Parameter	Symbol	Min	Typical	Max	Units
Operating Case Temperature	T <sub>c</sub>	0	-	70	°C
Supply Voltage	V <sub>cc</sub>	3.13	3.3	3.47	V
Data Rate each Lane	-	-	53.125	-	GBd/s
Link Distance	-	-	-	2	km

## Transceiver Electrical Characteristics

Parameter	Min	Typical	Max	Units	Notes
Power Dissipation	-	-	12	W	-
Supply Current	-	-	3.64	A	-
Transmitter					
Input Differential Impedance	-	100	-	Ω	-
Differential Data Input Swing	180	-	900	mVp-p	-
Receiver					
Output Differential Impedance	-	100	-	Ω	-
Differential Data Output Swing	300	-	850	mVp-p	1

Notes:

1. Internally AC coupled, but requires a external 100Ω differential load termination.

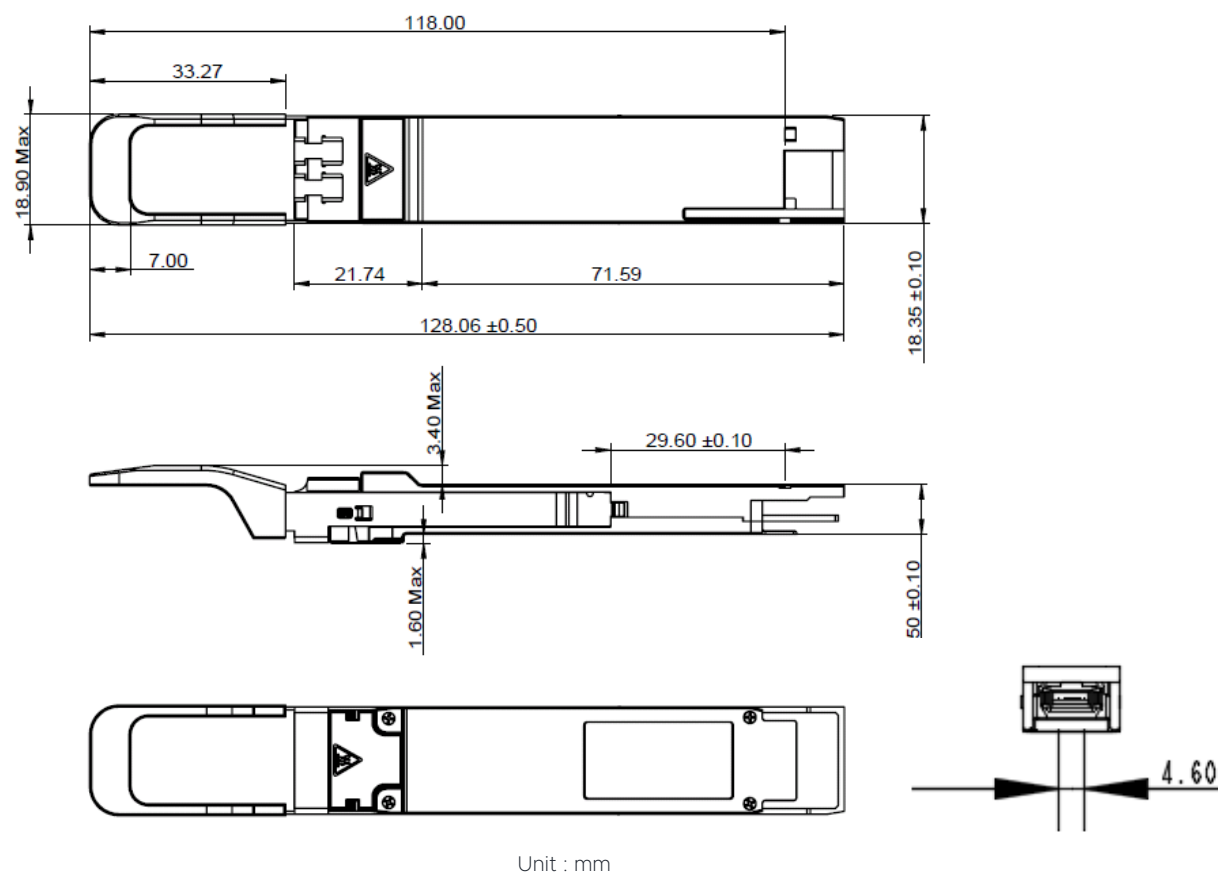
# Transceiver Optical Characteristics

Parameter	Min	Typical	Max	Units	Notes
Transmitter					
Wavelength	1304.5	1311	1317.5	nm	1
Side-mode suppression ratio	30	-	-	dB	-
Average launch power, per lane	-2.4	-	4	dBm	-
OMA per lane	-0.2	-	4.2	dBm	-
Launch power in OMA minus TDECQ, each lane (ER ≥ 4.5dB)	-1.6	-	-	dBm	-
Launch power in OMA minus TDECQ, each lane (ER < 4.5dB)	-1.5	-	-	dBm	-
Transmitter and dispersion eye closure for PAM4 (TDECQ), per lane	-	-	3.4	dB	-
Extinction Ratio	3.5	-	-	dB	-
Average launch power of OFF transmitter, per lane	-	-	-15	dBm	-
Optical Return Loss Tolerance	-	-	-17.1	dB	-
Transmitter reflectance	-	-	-26	dB	-
Receiver					
Wavelengths	1264.5	1271	1277.7	nm	-
Average Receiver Power, per lane	-6.4	-	4.5	dBm	-
Damage Threshold	5	-	-	dBm	-
Receive power, per lane (OMA outer)	-	-	4.7	dBm	-
Receiver Sensitivity per lane (OMA outer)	-	-	max(-4.5, SECQ-5.9)	dBm	2
Stressed receiver Sensitivity (OMA outer)	-	-	-2.5	dBm	3
LOS Assert	-15	-	-	dBm	-
LOS De-Assert	-	-	-8.4	dBm	-
LOS Hysteresis	0.5	-	-	dB	-

Notes:

1. The optical power is launched into SMF.
2. Receiver sensitivity (OMA outer) is informative and defined for a transmitter with a value of SECQ up to 3.4 dB
3. Measured with PRBS31Q test pattern, 53.125GBd, PAM4, BER < 2.4x10<sup>-4</sup>.

# Mechanical specifications



# Revision history

Revision	Date	Author	Description
V1.1	13-11-2023	JGN	Initial Document

Note : Nexgen A/S reserves the right to change this document without notice.