

QSFPDD-400G-LR4-XXO

400GBase QSFP-DD
CWDM4
10km Reach

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Features

- QSFP DD MSA rev5.0 compliant with CMIS Management
- Compliant with 400G-LR4-10 optical specifications
- Compliant to 802.3cd
- 4 CWDM lanes MUX/DEMUX design
- 53.125GBd PAM4x4 Transmitter
- Supports 425 Gb/s aggregate bit rate
- Maximum power consumption 8 W
- LC duplex connector
- Up to 10 km transmission on single mode fiber
- Single 3.3 V power supply
- RoHS 2 compliant



Applications

- 400G BASE-LR4 Ethernet

Part number	Product description
QSFPDD-400G-LR4-XXO	400GBase SMF QSFP-DD CWDM4 10km 0°C to 70°C LC Duplex DDM (8W)

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 Ω 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 Ω 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	Card Edge
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	

Top Side Viewed from Top

Card Edge	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

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	Tc	0	-	70	°C
Supply Voltage	Vcc	3.13	3.3	3.47	V
Data Rate each Lane	-	-	53.125	-	GBd/s
Link Distance	-	-	-	10	km

Transceiver Electrical Characteristics

Parameter	Min	Typical	Max	Units	Notes
Power Dissipation	-	-	8.0	W	-
Supply Current	-	-	2.60	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 100 Ω differential load termination.

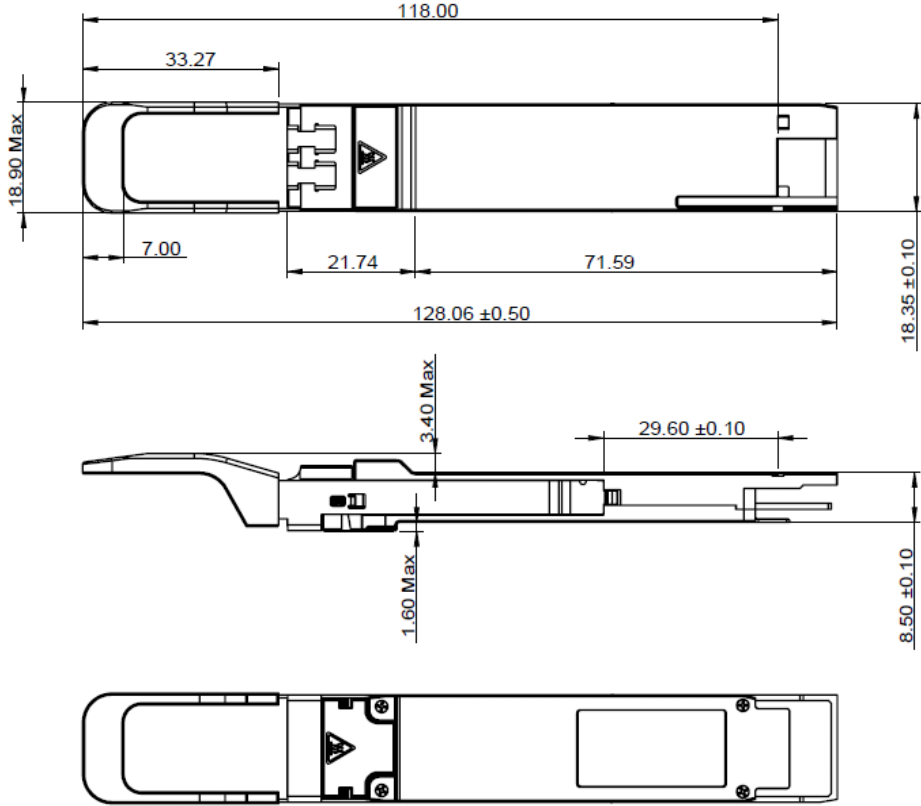
Transceiver Optical Characteristics

Parameter	Min	Typical	Max	Units	Notes	
Transmitter						
Wavelengths	λ_0	1264.5	1271	1277.7	nm	1
	λ_1	1284.5	1291	1297.5	nm	1
	λ_2	1304.5	1311	1317.5	nm	1
	λ_3	1324.5	1331	1337.5	nm	1
Side-mode suppression ratio	30	-	-	dB	-	
Total average launch power	-	-	10	dBm	-	
Average launch power, per lane	-1.4	-	4.5	dBm	-	
OMA per lane (min) (TDECQ<1.4dB)	0.3	-	4.4	dBm	-	
OMA per lane (min) (1.4<TDECQ<3.9dB)	-1,1+TDECQ	-	4.4	dBm	-	
Difference in launch power between any two lanes (OMA outer)	-	-	4	dB	-	
Transmitter and dispersion eye closure for PAM4 (TDECQ), per lane	-	-	3.9	dB	-	
Transmitter eye closure for PAM4 (TECQ), per lane	-	-	3.9	dB	-	
TDECQ-TECQ	-	-	2.5	dB	-	
Extinction Ratio	3.5	-	-	dB	-	
Average launch power of OFF transmitter, per lane	-	-	-30	dBm	-	
Optical Return Loss Tolerance	-	-	15.6	dB	-	
Transmitter reflectance	-	-	-26	dB	-	
Receiver						
Wavelengths	λ_0	1264.5	1271	1277.7	nm	-
	λ_1	1284.5	1291	1297.5	nm	-
	λ_2	1304.5	1311	1317.5	nm	-
	λ_3	1324.5	1331	1337.5	nm	-
Average Receiver Power, per lane	-9	-	5.1	dBm	-	
Receiver Overload	5.1	-	-	dBm	-	
Damage Threshold	6.1	-	-	dBm	-	
Receive power, per lane (OMA outer)	-	-	4.4	dBm	-	
Receiver Sensitivity per lane (OMA outer) (TECQ<1.4dB)	-	-	-6.8	dBm	2	
Receiver Sensitivity per lane (OMA outer) (<1.4dBTECQ<3.9dB)	-	-	-8.2+TECQ	dBm	2	
LOS Assert	-16	-	-	dBm	-	
LOS De-Assert	-	-	-10	dBm	-	
LOS Hysteresis	0.5	-	-	dB	-	

Notes:

1. The typical wavelengths compliant with 1310nm CWDM wavelength grids.
2. Measured with PRBS31Q test pattern, 53.125GBd, PAM4, BER < 2.4x10⁻⁴.

Mechanical specifications



Unit : mm

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.