QSFPDD-400G-ZR-XX5

400GBase QSFP-DD
Coherent
120km Reach

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Features

- QSFP DD MSA Compliant
- Hot pluggable QSFP-DD footprint
- Supports 425Gbps Data Rate
- Support 400G-AUI-8 C2M; 8 x CEI-56G-VSR PAM-4 electrical interface
- 400G 16QAM modulation formats @ 60GBd/s
- Dual LC Optical Interface
- Tunable C-band Transmitter
- Coherent Receivers
- Up to 120km Point-to-Point Transmission on Single Mode Fibre
- Operating temperature range: 0°C to 70°C
- Power Dissipation < 16.5W
- Single +3.3V Power Supply

Applications

- 400GBase-ZR

Part number	Product description
QSFPDD-400G-ZR-XX5	400GBase SMF QSFP-DD Tunable DWDM Coherent 120km 0°C to 70°C LC Duplex DDM (16.5W)

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 (C ommon 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 (C ommon 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.
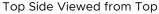2.   VccRx, VccRx1, Vcc1, Vcc2, VccTx and VccTx1 shall be applied concurrently. Requirements defined for the host side of the Host Card Edge Connector are listed in the table. VccRx, VccRx1, Vcc1, Vcc2, VccTx and VccTx1 may be internally connected within the module in any combination. The connector Vcc 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 kΩ 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		TX2n	75
36	TX1p		TX2p	74
35	GND		GND	73
34	TX3n		TX4n	72
33	TX3p		TX4p	71
32	GND		GND	70
31	LPMode		ModSelL	69
30	Vcc1		ResetL	68
29	VccTx		VccRx	67
28	IntL		SCL	66
27	ModPrsL		SDA	65
26	GND		GND	64
25	RX4p		RX3p	63
24	RX4n		RX3n	62
23	GND		GND	61
22	RX2p		RX1p	60
21	RX2n		RX1n	59
20	GND		GND	58

Card Edge

Top Side Viewed from Top

38	GND		GND	1
37	TX1n		TX2n	2
36	TX1p		TX2p	3
35	GND		GND	4
34	TX3n		TX4n	5
33	TX3p		TX4p	6
32	GND		GND	7
31	LPMode		ModSelL	8
30	Vcc1		ResetL	9
29	VccTx		VccRx	10
28	IntL		SCL	11
27	ModPrsL		SDA	12
26	GND		GND	13
25	RX4p		RX3p	14
24	RX4n		RX3n	15
23	GND		GND	16
22	RX2p		RX1p	17
21	RX2n		RX1n	18
20	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	3.6	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	3.2	3.3	3.4	V
Power Supply Noise	Vrip	-	-	2	%
Data Rate, each lane	-	-	26.5625	-	GBd
Link Distance	-	80	120	-	Km

Transceiver Optical Characteristics

Parameter	Min	Typical	Max	Units	Notes
Transmitter					
Wavelength Range	1528.77	1547.72	1567.13	nm	-
Frequency Range	191.30	193.70	196.10	THz	1
Channel Spacing (Option A)	100	100	-	GHz	2
Channel Spacing (Option B)	75	75	-	GHz	2
Output Power	-10	-	-6	dBm	3
Output Power during λ switching	-	-	-20	dBm	-
Transmitter reflectance	-	-	-20	dB	4
Laser Frequency Stability	-1.8	-	1.8	GHz	5
Receiver					
Wavelength Range	1528.77	1547.72	1567.13	nm	-
Input Power Range	-12	-	0	dBm	-
Sensitivity	-	-	-20	dBm	-
OSNR Tolerance	-	-	26	dB/0.1nm	6
Optical Return Loss	20	-	-	dB	7
Chormatic Dispersion Tolerance	-	-	2400	ps/nm	-
Optical path power penalty	-	-	0.5	dB	8
Polarization Mode Dispersion Tolerance	10	-	-	ps	9
Polarization-Dependent Loss Tolerance	3.5	-	-	dB	10

Notes:
1. Per ITU-T 100Ghz Grid
2. Per ITU-T G694.1 Section 6
3. Extinction ratio ≥ 4.5dB
4. Loss of power in the returned / reflected optical signal
5. Offset from channel frequency set point. The receiver local oscillator has the same frequency accuracy
6. The OSNR tolerance is referenced to an optical bandwidth of 0.1nm @193.70 THz or 12.5 GHz
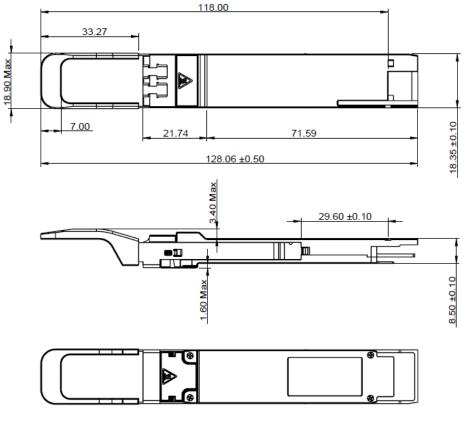7. Optical reflectance at connector input
8. OSNR penalty tolerance due to -35 dB interferometric crosstalk and 2400 ps/nm chromatic dispersion
9. Tolerance to PMD with < 0.5 dB penalty to OSNR sensitivity. 10ps of PMD corresponds to max 30 ps of DGD and max 500 ps2 of SOPMD
10. Tolerance to PDL with < 1.3 dB penalty to OSNR sensitivity When change in PSP is ≤ 1 rad/ms

Mechanical specifications

Unit : mm

Revision history

Revision	Date	Author	Description
V1.0	04-11-2021	JGN	Initial Document

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