800G Twin-port NDR OSFP 2x400Gb/s Multimode 2xSR4 50m Transceiver

Features

- InfiniBand and Ethernet
- 800G 2xSR4 multimode transceiver
- 8-channels of 100G-PAM4 electrical modulation
- Two ports of 4-channel 100G-PAM4 optical modulation
- Supports two straight 400Gb/s or two 1:2 splitter fiber cables for 200Gb/s
- Finned-top OSFP for air-cooled switches
- Flat-top OSFP for DGX- H100 or liquid- cooled
- 850nm VCSEL
- Maximum reach: 30m using OM3 fiber / 50m using OM4 fiber
- Two MPO-12/APC optical connectors
- 17 Watts max power
- 1.5 Watt low-power sleep mode
- Single 3.3V power supply
- Class 1 laser safety
- Hot pluggable, RoHS compliant
- CMIS 4.0 compliant
- Case temperature range 0°C to +70°C

Description

The OSFP-800G-2xSR4H is an InfiniBand and Ethernet 800Gb/s 2x400Gb/s Twin-port OSFP, 2xSR4 multimode, parallel, 8-channel transceiver using two, 4-channel MPO-12/APC optical connectors at 400Gb/s each. The parallel multimode, short reach 8-channel (2xSR4) uses 100G-PAM4 modulation and has a maximum fiber reach of 50-meters using 8 multimode fibers. The 50-meter length assumes two optical patch panels in the link.

The Twin-port 2xSR4 transceiver is a key innovation with two internal transceiver engines enabling 64-ports of 400Gb/s in a 32-OSFP cage Quantum-2 switch. Spectrum-4 switches have 32 or 64 cages and enable 64-128 400G ports. The transceiver firmware supports both InfiniBand and Ethernet and is automatically enabled based on the switch protocol.

The Quantum-2 and Spectrum-4 switches require finned-top OSFP shells for extra transceiver cooling. The main application is linking two switches together with up to 50-meter transceivers (marked blue). A flat-top version offered for liquid-cooled and DGX H100 Cedar7 systems links.

The transceiver combinations guarantee optimal operation. Rigorous production testing ensures the best out-of-the-box installation experience, performance, and durability

Absolute Maximum Specifications

Absolute maximum ratings are those beyond which damage to the device may occur.

Prolonged operation between the operational specifications and absolute maximum ratings is not intended and may cause permanent device degradation.

Table1-Absolute Maximum Specifications

Parameter	Min.	Typical	Max.	Unit	Note
Storage Temperature	-40		+85	°C	
Supply voltage	-0.5		3.6	V	
Relative Humidity (non- condensing)	5		95	%	
Control input voltage	-0.3		Vcc+0.5	V	
Operating Case Temperature	0		70	°C	

Recommended Operating Conditions and Power Supply Requirements

Table2-Recommended Operating Conditions and Power Supply Requirements

Parameter	Symbol	Min	Typical	Max.	Units
Power Supply Voltage	VCC	3.135	3.3	3.465	V
Instantaneous peak current at hot plug	ICC_IP	-	-	6800	mA
Sustained peak current at hot plug	ICC_SP	-	-	5670	mA

Maximum Power Dissipation	PD	-	15	17	W
Maximum Power Dissipation, Low Power Mode	PDLP	-	-	1.5	W
Signaling Rate per Lane	SRL	-	53.125	-	GBd
Two Wire Serial Interface Clock Rate	-	100	-	1000	kHz
Power Supply Noise Tolerance (10Hz - 10MHz)	-	66	-		mV
Rx Differential Data Output Load	-	-	100	-	Ohm
Operating Distance (OM3)	-	2	-	30	m
Operating Distance (OM4)	-	2	-	50	m

Electrical Specifications

Table3-Electrical Specifications

Parameter	Min.	Typical	Max.	Unit	Note
Receiver					
AC common-mode output Voltage (RMS)	-	-	25	mV	
Differential output Voltage (Long mode)	-	-	845	mV	
Differential output Voltage (Short mode)	-	-	600	mV	
Near-end Eye height, differential	70	-	-	mV	
Far-end Eye height, differential	30	-	-	mV	
Far end pre-cursor ratio	-4.5	-	2.5	%	
Differential Termination Mismatch	-	-	10	%	
Transition Time (min, 20% to 80%)	9.5	-	-	ps	
DC common mode Voltage	-350	-	2850	mV	
Transceiver					
Differential pk-pk input Voltage tolerance	750	-	-	mV	
Differential termination mismatch	-	-	10	%	
Single-ended voltage tolerance range	-0.4	-	3.3	V	
DC common mode Voltage	-350	-	2850	mV	

Electrical Specification for Low Speed Signal

Table4-Electrical Specification for Low Speed Signal

Parameter	Symbol	Min.	Max	Units
Module output SCL and SDA	VOL	0	0.4	V

	VOH	VCC-0.5	VCC+0.3	V
Module Input SCL and SDA	VIL	-0.3	VCC*0.3	V
	VIH	VCC*0.7	VCC+0.5	V

Optical Specifications

Table5-Optical Specifications

Parameter	Symbol	Min.	Typical	Max.	Unit	Note
			Transceiver			
Wavelength	yC	844	850	863	nm	
RMS spectral width	Dl			0.6		
Average Launch Power, each lane	AOPL	-1.0	-	3.0	dBm	1
Outer Optical Modulation Amplitude (OMAouter), each lane (min)	TOMA	-2.1		3.5	dBm	2
Transmitter and Dispersion Eye Closure for PAM4 (TDECQ), each lane	TDECQ	-	-	4.4	dB	
Average Launch Power of OFF Transmitter, each lane	TOFF	-	-	-30	dBm	
Extinction Ratio, each lane	ER	2.5		3.5	dB	
RIN14OMA	RIN	-	-148		dB/Hz	
Optical Return Loss Tolerance	ORLT		-	14	dB	
Transmitter Reflectance	TR	-	-	-26	dB	3
			Receiver			
Wavelength	λ C	842	850	863	nm	
Damage Threshold, average optical power, each lane	AOPD	5	-	-	dBm	
Average Receive Power, each lane	AOPR	-6.3	-	4.0	dBm	6
Receive Power (OMAouter), each lane	OMA-R	-	-	3.5	dBm	
Receiver Reflectance	RR	-	-	-20	dB	
Receiver Sensitivity (OMAouter), each lane	SOMA	-	-	-4.6	dBm	4
Stressed Receiver Sensitivity (OMAouter), each lane	SRS	-	-	-2.0	dBm	5
Conditions of stressed receiver sensitivity test						
Stressed eye closure for PAM4	SECQ		4.4		dB	
OMAouter of each aggressor lane	OMAouter		3.5		dBm	

Notes:

[1] Average launch power, each lane (min) is informative and not the principal indicator signal strength.

[2] Even if max(TECQ,TDECQ) ← 1.8dB, OMAouter (min) must exceed this value.

[3] Transmitter reflectance is defined looking into the transmitter.

[4] Receiver sensitivity (OMAouter), each lane (max) is informative and is defined for a transmitter with TDECQ←=1.8 dB

[5] Measured with conformance test signal at TP3 for the BER = 2.4x10-4

Minimum power is informative. AOP above the minimum does not ensure compliance

Overview

The twin-port transceiver is a key innovation for expanding the 400G NDR InfiniBand Quantum-2 and 400GbE Spectrum-4 Ethernet (400G IB/EN) switch capabilities. The line rate is 400Gb/s for both 400GbE Ethernet and NDR InfiniBand based on the 100G-PAM4 modulation. The switches use Twin port OSFP cages supporting two transceiver engines in a single OSFP form-factor plug creating 800Gb/s electrical to the switch and 2x400G optics using two MPO/-12/APC optical connectors. Both switches use the same Twin port, 2x400G OSFP plugs for transceivers, copper DACs and ACCs, and are only used in Quantum-2 and Spectrum-4 OSFP air-cooled switches. Twin-port devices enable several unique configurations to connect switches, adapters and DPUs. Switches maintain separate protocols. The transceiver includes both InfiniBand and Ethernet protocols which is activated depending on the switch protocol the transceiver used.

Twin-port Transceiver Connectivity Scenarios

The twin-ports enable several unique configurations to connect switches to switches, ConnectX-7 adapters, and BlueField-3 DPUs.

The Twin port OSFP uses two, 4-channel MPO-12/APC optical connectors with two 4-channel fiber cables. These can link to a single port 400G OSFP or QSFP112 transceivers used in ConnectX-7 adapters and/or BlueField-3 DPUs.

The electronics, optics and optical connectors are the same for both single port OSFP and QSFP112. Both ConnectX-7 and BlueField-3 devices can be used with Twin port OSFP transceivers at the same time with their respective form-factor type.

• Twin-port multimode OSFP transceivers remain at 15 Watts for all configurations linking OSFP switches, OSFP and QSFP112 adapters, and DPUs simultaneously.

• Linking Twin-port transceivers with 1:2 fiber splitter cables to 400G transceivers utomatically creates 200Gb/s transceivers by activating only 2-channels and automatically reduces power consumption in the 400G transceiver from 8 to 5.5 Watts.

• Twin-Port transceivers require ordering two fibers at specific lengths required

• Each fiber cable can each be different lengths. Both fibers need to be same type: both straight or both splitters, and not mixed.

• Both fibers should be the approximately same length to avoid inducing different latency delays in the fibers (4.5ns/meter).

• Straight and splitter fibers cannot be used at the same time in Twin port OSFP transceivers.

• NADDOD supplies multimode, crossover, straight fiber cables up to 100-meters straight and 50- meters for splitters that enable linking transceivers directly together.

All combinations of Twin port 2x400G OSFP, 400G single port OSFP/QSFP112, ConnectX-7 and BlueField-3 contains both InfiniBand and Ethernet protocols which is activated upon inserting into an InfiniBand or Ethernet switch. This enables one set of cables, transceivers, adapters and DPUs to have multiple uses in a network – especially in DGX systems where low-latency InfiniBand switching may be used for GPU-to-GPU networking and Ethernet switching systems for storage and cluster communication.

Pin Description

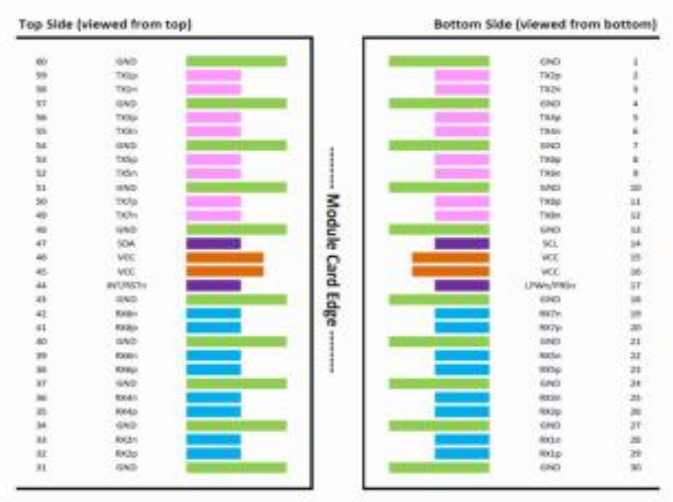
The device is OSFP MSA Specification for OSFP Octal Small Form Factor Pluggable Module Rev. 1.12 compliant, see www.osfpmsa.org.

Table6-Pin Description

Pin	Symbol	Description	Pin	Symbol	Description
1	GND	Ground	31	GND	Ground
2	Tx2p	Transmitter Non-Inverted Data Input	32	Rx2p	Receiver Non-Inverted Data Output
3	Tx2n	Transmitter Inverted Data Input	33	Rx2n	Receiver Inverted Data Output
4	GND	Ground	34	GND	Grounds
5	Tx4p	Transmitter Non-Inverted Data Input	35	Rx4p	Receiver Non-Inverted Data Output
6	Tx4n	Transmitter Inverted Data Input	36	Rx4n	Receiver Inverted Data Output
7	GND	Ground	37	GND	Ground
8	Tx6p	Transmitter Non-Inverted Data Input	38	Rx6p	Receiver Non-Inverted Data Output
9	Tx6n	Transmitter Inverted Data Input	39	Rx6n	Receiver Inverted Data Output
10	GND	Ground	40	GND	Ground
11	Tx8p	Transmitter Non- Inverted Data input	41	Rx8p	Receiver Non-Inverted Data Output
12	Tx8n	Transmitter Inverted Data Input	42	Rx8n	Receiver Inverted Data Output
13	GND	Ground	43	GND	Ground
14	SCL	2-wire serial interface clock	44	INT / RSTn	Module Interrupt / Module Reset
15	VCC	+3.3V Power	45	VCC	+3.3V Power
16	VCC	+3.3V Power	46	VCC	+3.3V Power
17	LPWn / PRSn	Low- Power Mode / Module Present	47	SDA	2-wire Serial interface data
18	GND	Ground	48	GND	Ground
19	Rx7n	Receiver Inverted Data Output	49	Tx7n	Transmitter Inverted Data Input
20	Rx7p	Receiver Non-Inverted Data Output	50	Tx7p	Transmitter Non-Inverted Data Input
21	GND	Ground	51	GND	Ground
22	Rx5n	Receiver Inverted Data Output	52	Tx5n	Transmitter Inverted Data Input
23	Rx5p	Receiver Non-Inverted Data Output	53	Tx5p	Transmitter Non-Inverted Data Input
24	GND	Ground	54	GND	Ground
25	Rx3n	Receiver Inverted Data Output	55	Tx3n	Transmitter Inverted Data Input
26	Rx3p	Receiver Non-Inverted Data Output	56	Tx3p	Transmitter Non-Inverted Data

					Input
27	GND	Ground	57	GND	Ground
28	Rx1n	Receiver Inverted Data Output	58	Tx1n	Transmitter Inverted Data Input
29	Rx1p	Receiver Non-Inverted Data Output	59	Tx1p	Transmitter Non-Inverted Data Input
30	GND	Ground	60	GND	Ground

OSFP Module Pad Layout



Notice

This document is provided for information purposes only and shall not be regarded as a warranty of a certain functionality, condition, or quality of a product. Neither NADDOD make any representations or warranties, expressed or implied, as to the accuracy or completeness of the information contained in this document and assumes no responsibility for any errors contained herein. NADDOD shall have no liability for the consequences or use of such information or for any infringement of patents or other rights of third parties that may result from its use. This document is not a commitment to develop, release, or deliver any material (defined below), code, or functionality.

NADDOD reserves the right to make corrections, modifications, enhancements, improvements, and any other changes to this document, at any time without notice. Customer should obtain the latest relevant information before placing orders and should verify that such information is current and complete.

NADDOD makes no representation or warranty that products based on this document will be suitable for any specified use. Testing of all parameters of each product is not necessarily performed by NADDOD. It is customer's sole responsibility to evaluate and determine the applicability of any information contained in this document, ensure the product is suitable and fit for the application planned by customer, and perform the necessary testing for the application in order to avoid a default of the application or the product.

NADDOD products are sold subject to the NADDOD standard terms and conditions of sale supplied at the time of order acknowledgement, unless otherwise agreed in an individual sales agreement signed by authorized representatives of NADDOD and customer ("Terms of Sale"). NADDOD hereby expressly objects to applying any customer general terms and conditions with regards to the purchase of the NADDOD product referenced in this document. No contractual obligations are formed either directly or indirectly by this document.

Further Information:

Web www.naddod.com

Email For order requirements: sales@naddod.com

For customer service: support@naddod.com

For technical support: tech@naddod.com

For cooperation: agency@naddod.com

For other informations: info@naddod.com

Disclaimer

1. We are committed to continuous product improvement and feature upgrades, and the contents contained in this manual are subject to change without notice.

2. Nothing herein should be construed as constituting an additional warranty.

3. NADDOD assumes no responsibility for the use or reliability of equipment or software not provided by NADDOD.