

# 400G Single-port NDR QSFP112 Multimode SR4 50m Transceiver

## Features

- Hot-pluggable QSFP112 form factor
- Maximum link length of 50m on OM4 fiber with FEC
- +3.3V single power supply
- Power dissipation < 9W
- Operating case temp Commercial: 0°C to +70 °C
- MPO-12 APC connector
- RoHS compliant

## Applications

- 400GBASE-SR4 per IEEE 802.3db
- 400GAUI-4

## Description

Q112-400G-SR4H is an InfiniBand and Ethernet 400Gb/s, Single-port, QSFP112, SR4 multimode parallel transceiver using a single, 4-channel MPO-12/APC optical connector. The Short Reach 4-channel (SR4) design uses 100G-PAM4 modulation and has a maximum fiber reach of 50-meters using OM4 multimode fiber and assumes two optical patch panels in the link. It has identical design and internals as the OSFP version, only with different connector shells.

The transceiver firmware supports both InfiniBand and Ethernet and is automatically enabled depending on the protocol of the switch attached to. The QSFP112 shell has a flat-top and utilizes the riding heat sink (cooling fins) on the ConnectX-7 or BlueField-3 connector cage. The small bumps near the pull tab provide additional cooling and remains outside the host connector cage.

When linked to 1:2 splitter fiber cable split end has only 2 channels and will activate only 2-channels in the 400G transceiver automatically creating a 200G speed and reducing power.

NADDOD's Single-port and Twin-port transceiver combinations guarantee optimal operation in NVIDIA end-to-end InfiniBand systems and a rigorous production tested to ensure the best out-of-the-box installation experience, performance, and durability.

## Absolute Maximum Ratings

Table1-Absolute Maximum Ratings					
Parameter	Symbols	Min.	Max.	Unit	Notes
Storage Temperature	T <sub>S</sub>	-40	85	°C	
Control Input Voltage	V <sub>I</sub>	-0.3	V <sub>CC</sub> +0.5	V	1
Power Supply Voltage	V <sub>CC3</sub>	-0.5	3.6	V	
Relative Humidity (non-condensation)	RH	5	85	%	1

Note:

[1] No condensation

## Recommended Operating Conditions

Table2-Recommended Operating Conditions						
Parameter	Symbols	Min.	Typical	Max.	Unit	Notes
Operating Case Temperature	T <sub>C</sub>	0		+70	°C	
Power Supply Voltage	V <sub>CC</sub>	3.135	3.3	3.465	V	
Power Dissipation	P <sub>d</sub>	-	-	9	W	PAM4

## Electrical Characteristic

Table3-Electrical Characteristic						
Parameter	Symbol	Min.	Typical	Max.	Unit	Notes
Transmitter						
Signaling Rate per Lane	SR	53.125 ± 100 ppm			Gbd	
Modulation format	-	PAM4				
Differential pk-pk input Voltage tolerance	V <sub>in,pp,diff</sub>	750	-	-	mV	
Differential termination mismatch	-	-	-	10	%	
Single-ended voltage tolerance range	-	-0.4	-	3.3	V	
DC common mode voltage	-	-350	-	2850	mV	
Receiver (each Lane)						
Signaling Rate per Lane	SR	53.125 ± 100 ppm			Gbd	
Modulation format	-	PAM4			-	
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			%	
DC common mode Voltage	-	-350	-	2850	mV	

## Optical Characteristics

Table4-Optical Characteristics						
Parameter	Symbols	Min.	Typical	Max.	Unit	Notes
Transmitter						
Center wavelength	CW	844	850	863	nm	
RMS Spectral Width	SW	-	-	0.6	dBm	
Average Launch Power per Lane	AOP	-4.6	-	4.0	dBm	1
Outer Optical Modulation Amplitude (OMA <sub>outer</sub> ), each lane (min)	TxOMA	-2.6	-	3.5	dBm	
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	-	-	dB	

Optical Return Loss Tolerance	ORL	-	-	12	dB	
Transmitter Reflectance	TR	-	-	-26	dBm	2
<b>Receiver</b>						
Wavelength	W	842	-	865	nm	
Damage Threshold, average optical power, each lane	DT	5	-	-	dBm	
Average Receive Power, each lane	RxPx	-6.3	-	4	dBm	
Receive Power (OMA) per Lane	RxOMA	-	-	3.5	dBm	
Receiver Reflectance	RfI	-	-	-26	dB	
Receiver Sensitivity (OMOuter), each lane	SOMA	-4.4	-	-	dBm	3

**Notes:**

[1] Minimum value is informative only and not the principal indicator of signal strength.

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

[3] Receiver sensitivity (OMOuter), each lane (max) is informative and is defined for a transmitter with TDECQ ≤ 1.8 dB

## Pin Function Definitions

<b>Table5-Pin Function Definitions</b>			
<b>Pin</b>	<b>Symbol</b>	<b>Description</b>	<b>Notes</b>
1	GND	Ground	1
2	TX2n	Transmitter Inverted Data Input	
3	TX2p	Transmitter Non-Inverted Data Input	
4	GND	Ground	1
5	TX4n	Transmitter Inverted Data Input	
6	TX4p	Transmitter Non-Inverted Data Input	
7	GND	Ground	1
8	ModeSelL	Module Select	
9	ResetL	Module Reset	
10	Vcc Rx	+3.3V Power Supply Receiver	
11	SCL	2-wire serial interface clock	
12	SDA	2-wire serial interface data	
13	GND	Ground	1
14	Rx3p	Receiver Non-Inverted Data Output	
15	Rx3n	Receiver Inverted Data Output	
16	GND	Ground	1
17	Rx1p	Receiver Non-Inverted Data Output	

18	Rx1n	Receiver Inverted Data Output	
19	GND	Ground	1
20	GND	Ground	1
21	Rx2n	Receiver Inverted Data Output	
22	Rx2p	Receiver Non-Inverted Data Output	
23	GND	Ground	1
24	Rx4n	Receiver Inverted Data Output	
25	Rx4p	Receiver Non-Inverted Data Output	
26	GND	Ground	1
27	ModPrsL	Module Present	
28	IntL	Interrupt	
29	Vcc Tx	+3.3V Power supply transmitter	
30	Vcc1	+3.3V Power supply	
31	LPMODE	Low Power Mode	
32	GND	Ground	1
33	Tx3p	Transmitter Non-Inverted Data Input	
34	Tx3n	Transmitter Inverted Data Input	
35	GND	Ground	1
36	Tx1p	Transmitter Non-Inverted Data Input	
37	Tx1n	Transmitter Inverted Data Input	
38	GND	Ground	1

Note:

[1] Circuit ground is internally isolated from chassis ground.

## Pin arrangement

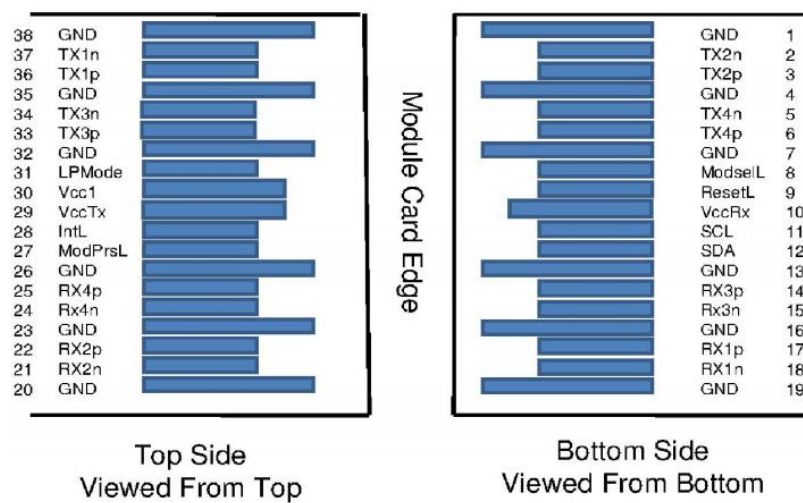


Figure 1 Pin View

## Recommended Interface

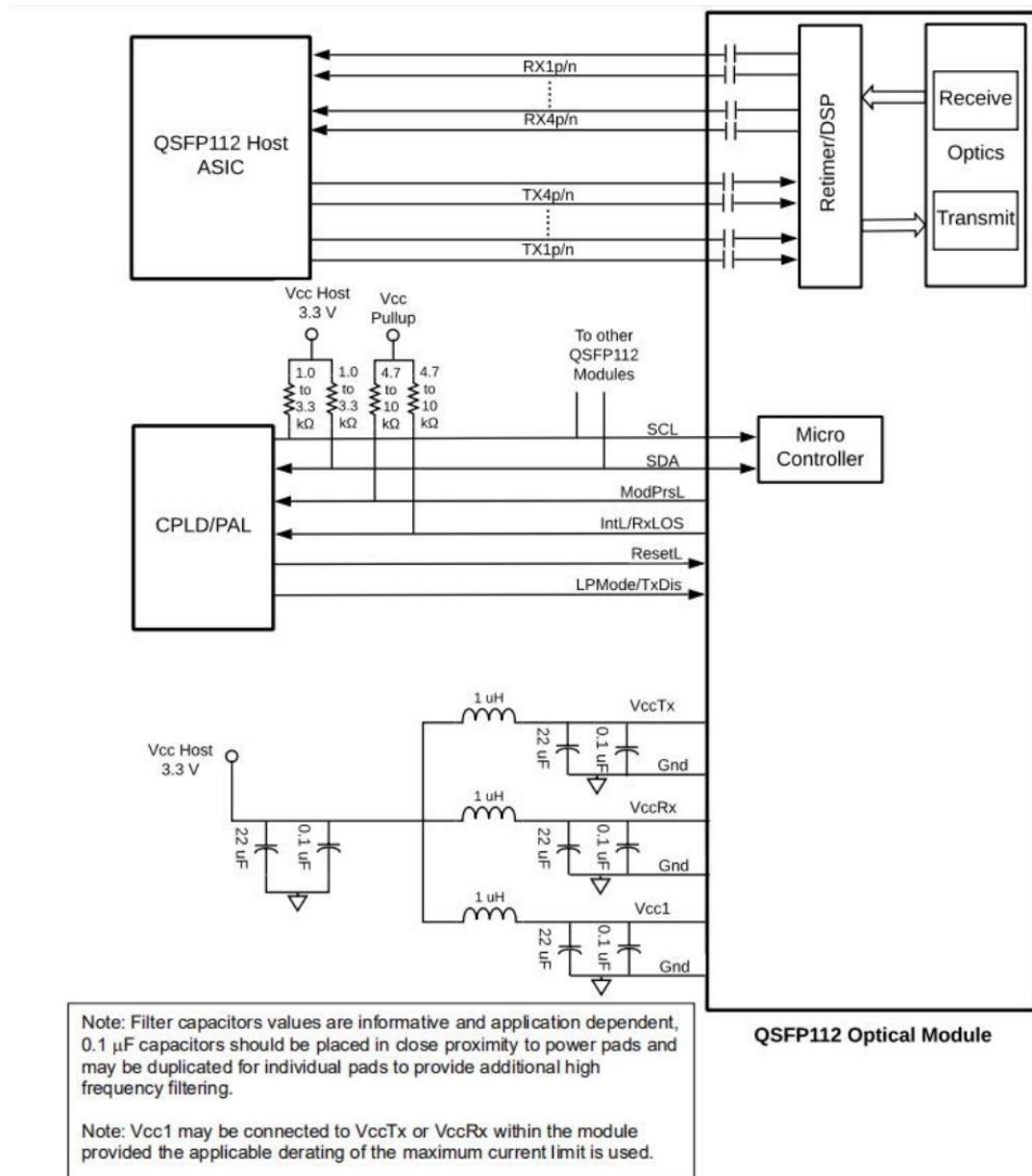


Figure 2 Recommended Interface Circuit

## Optical Interface Arrangement

The optical port is a male MPO connector receptacle, with fiber lane assignments as shown in Figure 3

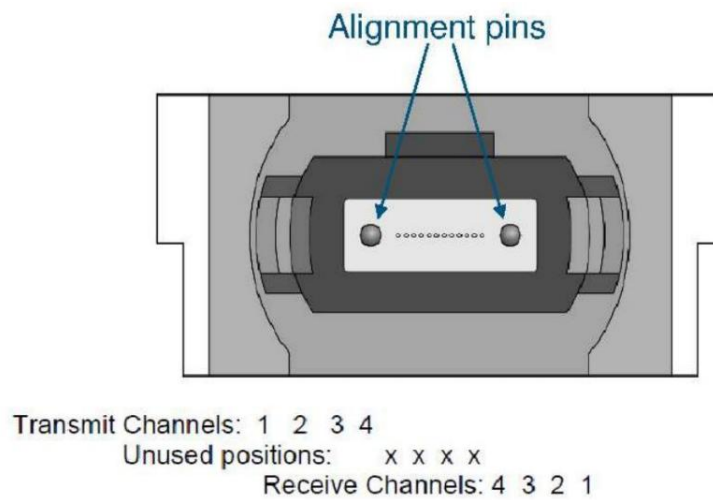


Figure 3 Transceiver Block Diagram

## Mechanical

400G SR4 QSFP112 transceivers are compatible with QSFP112 MSA Specification Rev1.0 for pluggable form factor module.

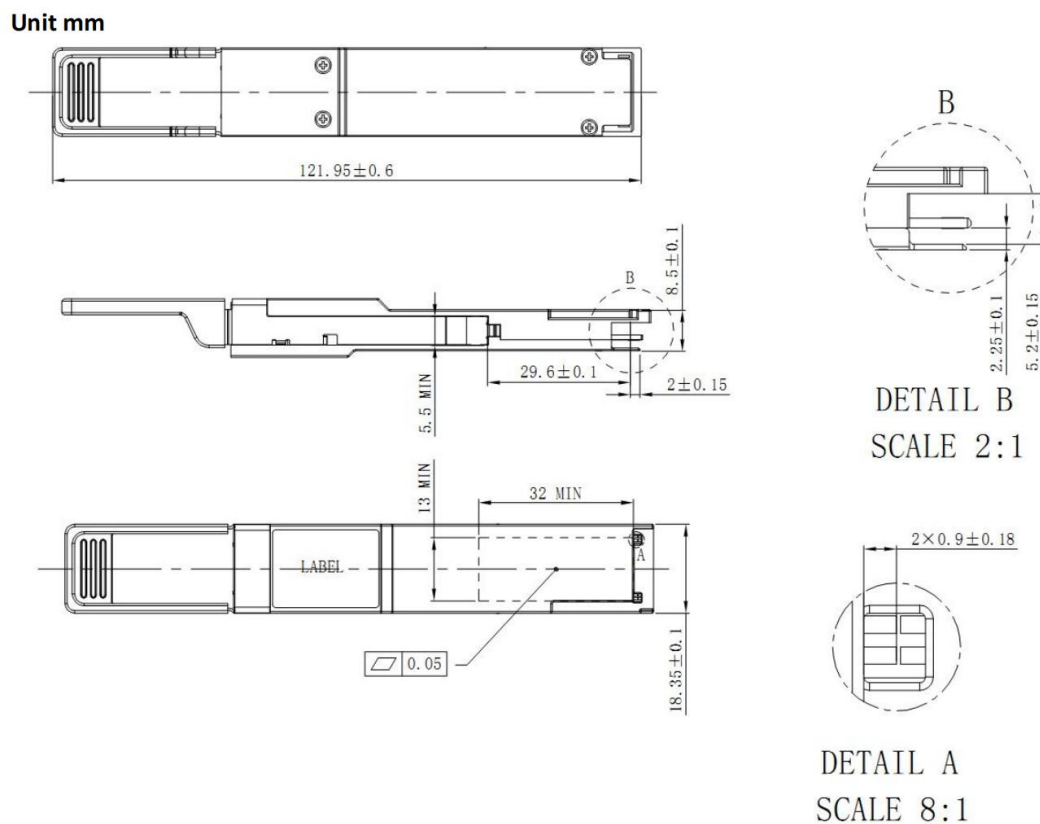


Figure 4 Mechanical Diagram

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Email For order requirements: [sales@naddod.com](mailto:sales@naddod.com)  
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For technical support: [tech@naddod.com](mailto:tech@naddod.com)

For cooperation: [agency@naddod.com](mailto:agency@naddod.com)

For other informations: [info@naddod.com](mailto:info@naddod.com)

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PNY Technologies Europe  
9 rue Joseph Cugnot  
33708 Mérignac cedex | France  
T +33 (0)5 40 240 240 | [pnyprom@pny.eu](mailto:pnyprom@pny.eu)