

## QSFP+-40Gb/s SR4 300M DDM

### NNQ-40G-SR-02

#### Overview:

This **NETRO NN-QSFP-40G-SR4** are designed for use in 40 Gigabit per second links over multimode fiber. They are compliant with the QSFP+ MSA and IEEE 802.3ba 40GBASE-SR4. Module-level digital diagnostic functions are available via an I<sup>2</sup>C interface, as specified by the QSFP+ MSA. The optical transceiver is compliant per the RoHS Directive 2011/65/EU.



#### Features:

- Multirate capability: 1.06Gb/s to 10.5Gb/s per channel
- Reliable VCSEL array technology
- Maximum link length of 300m on OM3 Multimode Fiber (MMF) and 400m ON OM4 MMF
- Hot-pluggable QSFP+ footprint
- Single 1x12 MPO receptacle
- Maximum power dissipation <1W
- Four-channel full-duplex transceiver module
- RoHS-6 compliant and lead-free
- Support Digital Diagnostic Monitor interface
- Unretired XLPPI electrical interface
- Case operating temperature Commercial: 0°C to +70°C

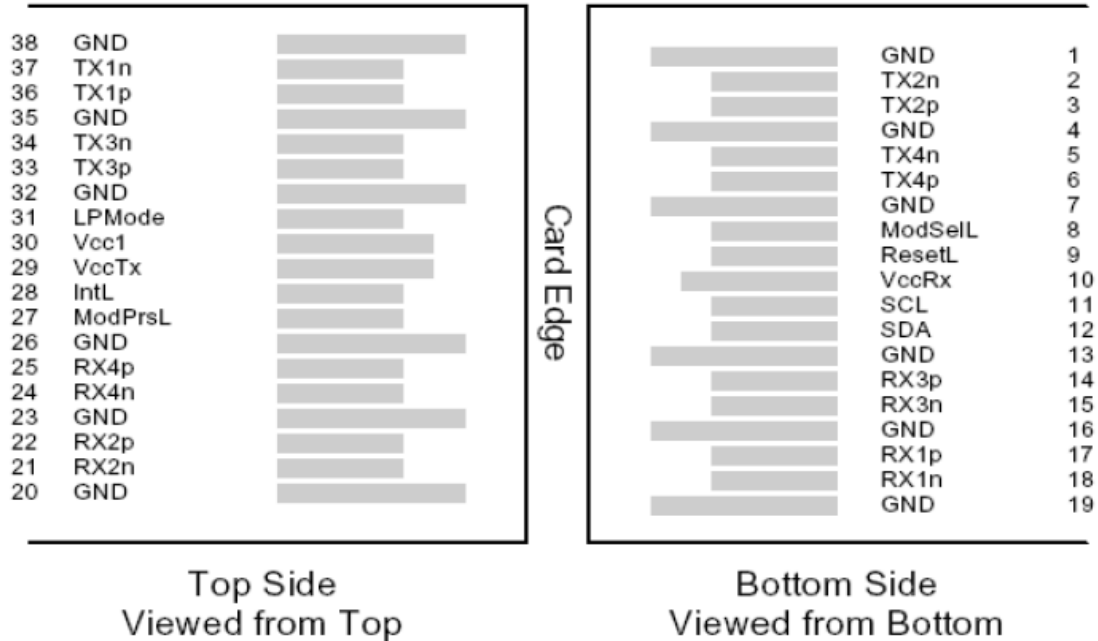
#### Application

- 40GBASE-SR4 40G Ethernet
- Breakout to 10GBASE-SR Ethernet
- Proprietary interconnections

#### Compliance

- QSFP+ MSA
- IEEE 802.3ba
- SFF-8436

## Pin definition



## QSFP+ MSA-compliant 38-pin connector

## Pin Description

Pin	Symbol	Name/Description	Ref.
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	ModSe1L	Module Select	
9	ResetL	Module Reset	
Pin	Symbol	Name/Description	Ref.
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	VccTx	+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.

**Absolute Maximum Ratings**

Parameter	Symbol	Min.	Typ.	Max.	Unit	Ref.
Storage Temperature	T <sub>S</sub>	-40		85	°C	
Storage Ambient Humidity	H <sub>A</sub>	5		95	%	
Maximum Supply Voltage	V <sub>CC1</sub> , V <sub>CCTx</sub> , V <sub>CCRx</sub>	-0.5		3.6	V	
Signal Input Voltage		V <sub>CC</sub> -0.3		V <sub>CC</sub> +0.3	V	
Receiver Damage Threshold		+3.4			dBm	
Lead Soldering Temperature/Time	TSOLD			260/10	°C/sec	1
Lead Soldering Temperature/Time	TSOLD			360/10	°C/sec	2

**Note:**

1. Suitable for wave soldering.
2. Only for soldering by iron.

## General Product Characteristics

Parameter	Value	Unit	Ref.
Module Form Factor	QSFP+		
Number of Lanes	4 Tx and 4 Rx		
Maximum Aggregate Data Rate	42.0	Gb/s	
Maximum Data Rate per Lane	10.5	Gb/s	Higher bit rates may be supported. Please contact Inphilight
Protocols Supported	Typical applications include 40G Ethernet, InfiniBand, Fiber Channel, SATA/SAS3		
Management Interface	Serial, I2c-based, 400kHz maximum frequency		As defined by the QSFP+ MSA

Data Rate Specifications	Symbol	Min.	Typ.	Max.	Unit	Ref.
Bit Rate per Lane	BR	1062		10500	Mb/s	1
Bit Error Ratio	BER			$10^{-12}$		2
Link distance on OM3 MMF	D			300	meters	3
Link distance on OM4 MMF	D			400	meters	3

### Notes:

1. Compliant with 40G Ethernet. Compatible with 1/10 Gigabit Ethernet and 1/2/4/8/10G Fiber Channel.
2. Tested with a PRBS  $2^{31}-1$  test pattern.
3. Per 40GBASE-SR4, IEEE 802.3ba

## Optical Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Ref.
<b>Transmitter (per Lane)</b>						
Average Output Power	POUT	-7.6		2.4	dBm	
Transmit OMA per Lane	TxOMA	-5.6		3.0	dBm	1
Extinction Ratio	ER	3.0			dB	
Center Wavelength	$\lambda_C$	840	850	860	nm	
RMS Spectral Width	$\sigma$			0.65	nm	
Transmitter and Dispersion Penalty	TDP			3.5	dB	
Transmitter OFF Output Power	POff			-30	dBm	
Relative Intensity Noise	RIN			-128	dB/Hz	
Transmitter eye mask definition {X1, X2, X3, Y1, Y2, Y3}		0.23,0.34,0.43,0.27,0.35,0.4				

Receiver (per Lane)						
Input Optical Wavelength	$\lambda_{IN}$	840	850	860	nm	
Rx Sensitivity per lane	RSENS			-9.5	dBm	
Input Saturation Power (Overload)	PSAT	+2.4			dBm	
Receiver Reflectance	Rfl			-12	dBm	
Loss of Signal Assert	PA	-30			dBm	
Loss of Signal De-assert	PD			-12	dBm	
LOS Hysteresis	PD - PA	0.5		6	dB	

**Note:** Even if TDP is <0.9dB, the OMA min must exceed this value.

## Memory Map and Control Registers

Compatible with SFF-8436Rev.4.8(QSFP+).

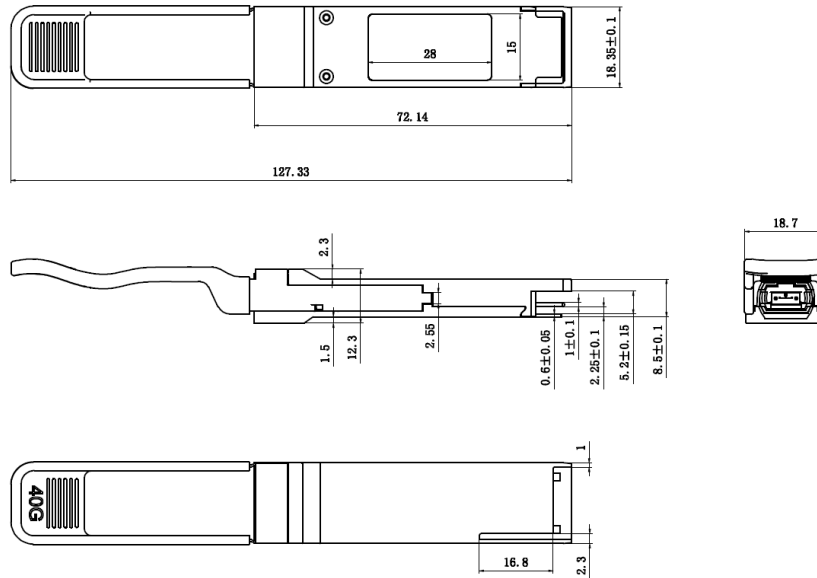
## Electrical Interface Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Ref.
Supply Voltage	VCC1, VCCTX, VCCR <sub>X</sub>	3.15		3.45	V	
Supply Current	ICC			300	mA	
Transmitter (per Lane)						
Input different impedance	R <sub>in</sub>	90	100	110	$\Omega$	1
Single ended input voltage tolerance	V <sub>inT</sub>	-0.3		4.0	V	
Single ended data input swing	V <sub>in, pp</sub>	180		1200	mV	2
Receiver (per Lane)						
Output different impedance	R <sub>out</sub>	90	100	110	$\Omega$	1
Single ended data output swing	V <sub>out, pp</sub>	0		800	mV	3
Single-ended output voltage		-0.3		4.0	V	
Power Supply Rejection	PSR	50			mVpp	

**Note:**

1. Connected directly to TX data input pins. AC coupled thereafter.
2. After internal AC coupling. Self-biasing 100 $\Omega$  differential input
3. Into 100 $\Omega$ differential termination.

## Mechanical Specifications (Unit: mm)



## QSFP-40G-SR4

### Regulatory Compliance

QSFP-40G-SR4 transceiver are RoHS-6 Compliant.

QSFP-40G-SR4 transceiver modules are Class 1 laser eye safety compliant per IEC 60825-1, which means that they are eye safe under normal “unaided” viewing conditions. Laser radiation may be hazardous if viewed with magnifying optics.

### Ordering Information:

Package	Product part NO.	Data Rate (Gbps)	Media	Wavelength( nm)	Transmission Distance(m)	Temperature Range ( °C )	
QSFP+	QSFP-40G-SR4	42.0	multi-mode fiber	850	100~400	0~70	QSFP+

Model	Description
NNQ-100G-SR-02	QSFP28-100G-850nm, 150M, Multi Mode