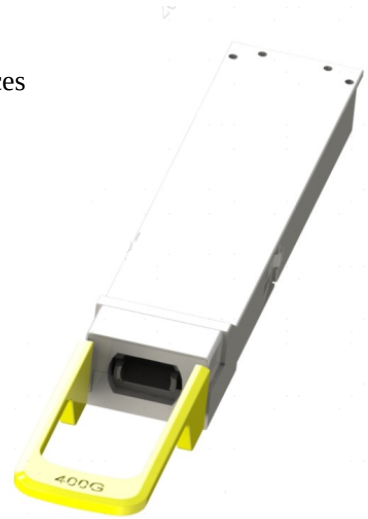
Product Features



- Compliant with IEEE Std 802.3bs on 400Gb/s Optical interfaces
- Compliant with IEEE Std 802.3ck on 400Gb/s Electrical interfaces
- Compliant with OSFP Module Specification
- Compliant with CMIS5.0 Management interface specifications
- MPO-12 receptacle
- 1310nm EML laser
- 4*53.125GBd PAM4 electrical interface
- Transmission distance up to 500m SMF
- Single +3.3V power supply
- Commercial operating temperature:0ºC to +70ºC
- RoHS Compliant

Applications

- 400G BASE-DR4 Ethernet
- Data Center

Descriptions

XN9153CDR transceiver is designed for use in 400Gb/s network applications, the maximum transmission distance is 500m. XN9153CDR is a fully integrated optical transceiver modulated using 4-level pulse amplitude modulation (PAM4) format that transmits and receives optical signals with aggregated data rate of 425Gbps over 4 lanes 1310nm each running at 106.25Gbps . They are compliant with the OSFP Module Specification and only use four electrical channels. XN9153CDR are compliant with RoHS.

Ordering Information

Table 1. Ordering Information

Part Number	Transmitter	Output Power (OMA each lane)	Receiver	Sensitivity (OMA each lane)	Reach	Temp	DDM	RoHS
XN9153CDR	EML	-0.8 ~ +4.2dBm	PIN	< -4.4dBm	500m	0~ 70 ºC	Available	Compliant

Pin Description

Table 2. Pin Description

Pin	Name	Function/Description	Logic	Direction	Plug Sequence	Notes
1	GND	Ground			1	
2	TX2p	Transmitter Data Non-Inverted	CML-I	Input from Host	3	
3	TX2n	Transmitter Data Inverted	CML-I	Input from Host	3	
4	GND	Ground			1	
5	TX4p	Transmitter Data Non-Inverted	CML-I	Input from Host	3	
6	TX4n	Transmitter Data Inverted	CML-I	Input from Host	3	
7	GND	Ground			1	
8	TX6p	Transmitter Data Non-Inverted	CML-I	Not used	3	3
9	TX6n	Transmitter Data Inverted	CML-I	Not used	3	3
10	GND	Ground			1	
11	TX8p	Transmitter Data Non-Inverted	CML-I	Not used	3	3
12	TX8n	Transmitter Data Inverted	CML-I	Not used	3	3
13	GND	Ground			1	
14	SCL	2-wire Serial interface clock	LVCMOS-I/O	Bi-directional	3	1
15	VCC	+3.3V Power		Power from Host	2	
16	VCC	+3.3V Power		Power from Host	2	
17	LPWn/PRSn	Low-Power Mode / Module Present	Multi-Level	Bi-directional	3	2
18	GND	Ground			1	
19	RX7n	Receiver Data Inverted	CML-O	Not used	3	3
20	RX7p	Receiver Data Non-Inverted	CML-O	Not used	3	3
21	GND	Ground			1	
22	RX5n	Receiver Data Inverted	CML-O	Not used	3	3
23	RX5p	Receiver Data Non-Inverted	CML-O	Not used	3	3
24	GND	Ground			1	
25	RX3n	Receiver Data Inverted	CML-O	Output to Host	3	
26	RX3p	Receiver Data Non-Inverted	CML-O	Output to Host	3	
27	GND	Ground			1	
28	RX1n	Receiver Data Inverted	CML-O	Output to Host	3	
29	RX1p	Receiver Data Non-Inverted	CML-O	Output to Host	3	
30	GND	Ground			1	
31	GND	Ground			1	
32	RX2p	Receiver Data Non-Inverted	CML-O	Output to Host	3	
33	RX2n	Receiver Data Inverted	CML-O	Output to Host	3	
34	GND	Ground			1	

35	RX4p	Receiver Data Non-Inverted	CML-O	Output to Host	3	
36	RX4n	Receiver Data Inverted	CML-O	Output to Host	3	
37	GND	Ground			1	
38	RX6p	Receiver Data Non-Inverted	CML-O	Not used	3	3
39	RX6n	Receiver Data Inverted	CML-O	Not used	3	3
40	GND	Ground			1	
41	RX8p	Receiver Data Non-Inverted	CML-O	Not used	3	3
42	RX8n	Receiver Data Inverted	CML-O	Not used	3	3
43	GND	Ground			1	
44	INT/RSTn	Module Interrupt / Module Reset	Multi-Level	Bi-directional	3	2
45	VCC	+3.3V Power		Power from Host	2	
46	VCC	+3.3V Power		Power from Host	2	
47	SDA	2-wire Serial interface data	LVCMOS-I/O	Bi-directional	3	1
48	GND	Ground			1	
49	TX7n	Transmitter Data Inverted	CML-I	Not used	3	3
50	TX7p	Transmitter Data Non-Inverted	CML-I	Not used	3	3
51	GND	Ground			1	
52	TX5n	Transmitter Data Inverted	CML-I	Not used	3	3
53	TX5p	Transmitter Data Non-Inverted	CML-I	Not used	3	3
54	GND	Ground			1	
55	TX3n	Transmitter Data Inverted	CML-I	Input from Host	3	
56	TX3p	Transmitter Data Non-Inverted	CML-I	Input from Host	3	
57	GND	Ground			1	
58	TX1n	Transmitter Data Inverted	CML-I	Input from Host	3	
59	TX1p	Transmitter Data Non-Inverted	CML-I	Input from Host	3	
60	GND	Ground			1	

Notes:

1. Open-Drain with pull-up resistor on host.
2. See pin description of OSFP MSA for required circuit.
3. TX5-TX8、RX5-RX8 not used.

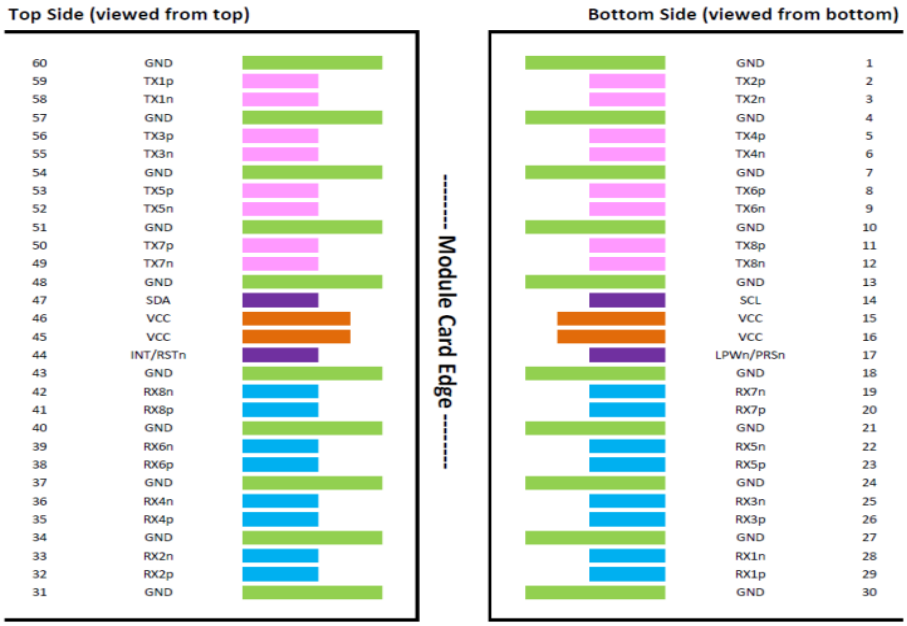


Figure 1. Host PCB OSFP pad assignment

Absolute Maximum Ratings

Stresses in excess of the absolute maximum ratings can cause permanent damage to the device. These are absolute stress ratings only. Functional operation of the device is not implied at these or any other conditions in excess of those given in the operational sections of the data sheet. Exposure to absolute maximum ratings for extended periods can adversely affect device reliability.

Table 3. Absolute Maximum Ratings

Parameter	Symbol	Minimum	Maximum	Unit
Storage Temperature	T_S	-40	85	°C
Relative Humidity	RH	15	85	%
Supply Voltage	V_{CC}	-0.5	3.6	V

Recommended Operating Conditions

Table 4. Recommended Operating Conditions

Parameter	Symbol	Min	Typ	Max	Unit
Operating Case Temperature	T_C	0	25	70	°C
Supply Voltage	V_{CC}	3.135	3.3	3.465	V
Data Rate PER Channel	-	-	53.125	-	GBd
Modulation format			PAM4		

Transceiver Electrical Characteristics

Table 5. Transceiver Electrical Characteristics

Parameter	Symbol	Minimum	Typical	Maximum	Unit	Notes
Module Supply Current	Icc	-	-	2.87	A	-
Power Dissipation	P_D	-	-	9	W	-
Transmitter						
Input Differential Impedance	Z_{IN}	-	100	-	Ω	-
Differential Data Input Swing	$V_{IN, P-P}$	180	-	900	mV_{P-P}	-
Receiver						
Output Differential Impedance	Z_O	-	100	-	Ω	-
Differential Data Output Swing	$V_{OUT, P-P}$	300	-	850	mV_{P-P}	1

Notes:
1. Internally AC coupled, but requires a external 100Ω differential load termination.

Transmitter Optical Characteristics

Table 6. Transmitter Optical Characteristics

Parameter	Symbol	Minimum	Typical	Maximum	Unit	Notes
Lane wavelengths	λ	1304.5	-	1317.5	nm	-
Side-mode suppression ratio	SMSR	30	-	-	dB	-
Average launch power, each lane	P	-2.9	-	4	dBm	-
Outer Optical Modulation Amplitude, each lane	OMAouter	-0.8	-	4.2	dBm	-
Transmitter and dispersion penalty eye closure for PAM4, each lane	TDECQ	-	-	3.4	dB	-
Launch power in OMAouter minus TDECQ, each lane(min)	-	-2.2	-	-	dBm	-
Extinction Ratio	EX	3.5	-	-	dB	-
Average launch power of OFF transmitter	Poff	-	-	-15	dBm	-
Optical Return Loss Tolerance	ORLT	-	-	21.4	dB	-
Transmitter reflectance	-	-	-	-26	dB	-

Receiver Optical Characteristics

Table 7. Receiver Optical Characteristics

Parameter	Symbol	Minimum	Typical	Maximum	Unit	Notes
Lane wavelengths	λ	1304.5	-	1317.5	nm	-
Receiver Sensitivity each lane (OMAouter)	OMA	-	-	-4.4	dBm	1
Stressed receiver sensitivity (OMA outer), each lane		-	-	-1.9	dBm	1
Receiver Overload (P_{avg})	POL	4	-	-	dBm	-

Damage Threshold	POL	5	-	-	dBm	-
Receive power, each lane (OMAouter)	OMA	-	-	4.2	dBm	-
Receiver Reflectance	ORL	-	-	-26	dB	-
LOS De-Assert	LOSD	-	-	-10	dBm	-
LOS Assert	LOSA	-16	-	-	dBm	-
LOS Hysteresis	-	0.5	-	-	dB	-

Notes:
1. Measured with PRBS31Q test pattern, 53.125GBd, PAM4, BER<2.4E^{-4}.

Recommended Host Board Power Supply Filter Network

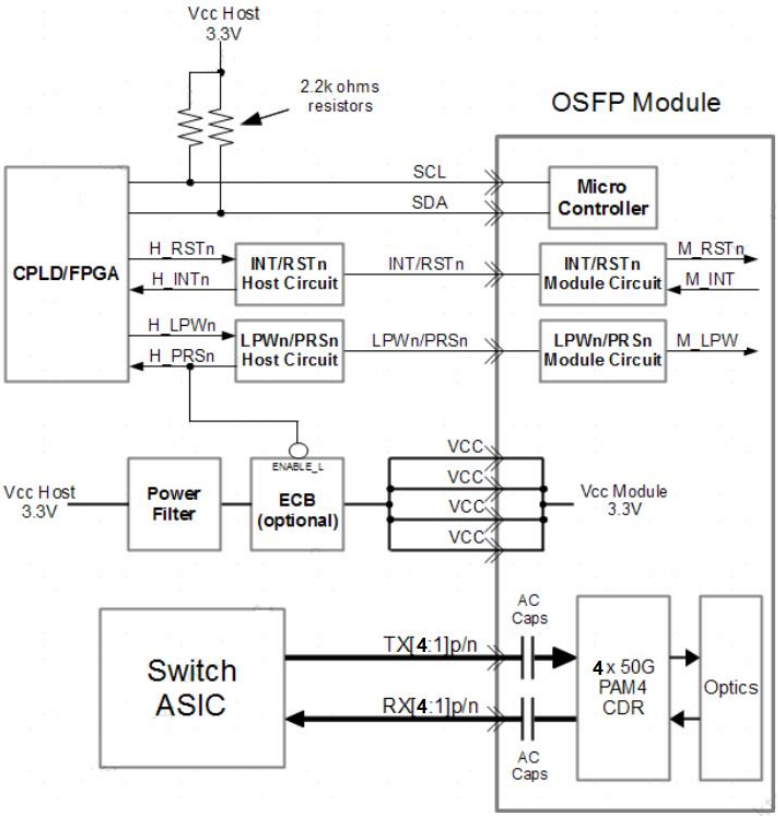


Figure 2. Recommended Host Board Power Supply Filter Network

Mechanical specifications

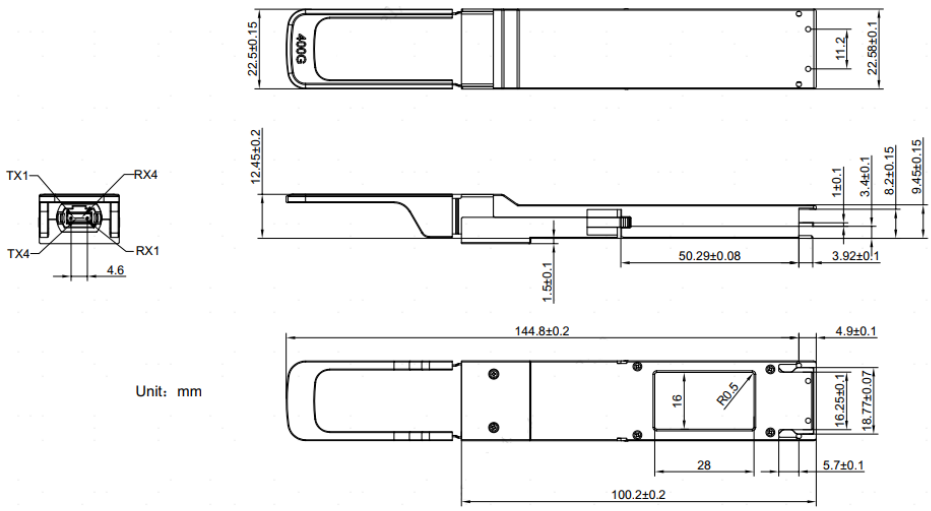


Figure 3. Outline Drawing

RoHS Compliance

RoHS Certificate Number: BST13080782Y-1RC-4, compliance with the council RoHS directive-2011/65/EU.

Revision History

Date	Rev	Description	Modified By
2/5/2024	V1.0	First Release	Stellan Shen
2/22/2024	V1.1	Add pin description, note TX5-TX8、RX5-RX8 not used	Xiuhong Jia