

Product Features

- Compliant with IEEE Std 802.3bs on 400Gb/s Optical interfaces
- Compliant with IEEE Std 802.3ck and CEI-112G-VSR-PAM4 on 400Gb/s Electrical interfaces
- Compliant with QSFP112 MSA
- Compliant with CMIS5.0 Management interface specifications
- MPO-12 receptacles
- 1310nm CW DFB laser with silicon optical modulator
- Transmission distance up to 500m SMF
- Single +3.3V power supply
- Commercial operating temperature:0°C to +70°C
- RoHS Compliant



Applications

- 400G BASE-DR4 Ethernet and InfiniBand
- Data Center

Descriptions

XN9253CSR transceiver is designed for use in 400Gb/s network applications, the maximum transmission distance is 500m. XN9253CSR 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 QSFP112 MSA and 400GBASE-DR4 optical specifications.XN9253CSR are compliant with RoHS.

Ordering Information

Table 1. Ordering Information

Part Number	Transmitter	Average Power (each lane)	Receiver	Sensitivity (OMA each lane)	Reach	Temp	DDM	RoHS
XN9253CSR	CW DFB LD	-2.9 ~ +4.2dBm	PIN	< -4.4dBm	500m	0~ 70°C	Available	Compliant

Pin Description

Table 2. Pin Description

Pin	Name	Function/Description	Plug Sequence	Notes
1	GND	Transmitter Ground (Common with Receiver Ground)	1	1
2	Tx2-	Transmitter Inverted Data Input	3	
3	Tx2+	Transmitter Non-Inverted Data output	3	
4	GND	Transmitter Ground (Common with Receiver Ground)	1	1
5	Tx4-	Transmitter Inverted Data Input	3	
6	Tx4+	Transmitter Non-Inverted Data output	3	
7	GND	Transmitter Ground (Common with Receiver Ground)	1	1
8	ModSelL	Module Select	3	
9	ResetL	Module Reset	3	
10	VccRx	3.3V Power Supply Receiver	2	3
11	SCL	2-Wire serial Interface Clock	3	
12	SDA	2-Wire serial Interface Data	3	
13	GND	Transmitter Ground (Common with Receiver Ground)	1	1
14	Rx3+	Receiver Non-Inverted Data Output	3	
15	Rx3-	Receiver Inverted Data Output	3	
16	GND	Transmitter Ground (Common with Receiver Ground)	1	1
17	Rx1+	Receiver Non-Inverted Data Output	3	
18	Rx1-	Receiver Inverted Data Output	3	
19	GND	Transmitter Ground (Common with Receiver Ground)	1	1
20	GND	Transmitter Ground (Common with Receiver Ground)	1	1
21	Rx2-	Receiver Inverted Data Output	3	
22	Rx2+	Receiver Non-Inverted Data Output	3	
23	GND	Transmitter Ground (Common with Receiver Ground)	1	1
24	Rx4-	Receiver Inverted Data Output	3	
25	Rx4+	Receiver Non-Inverted Data Output	3	
26	GND	Transmitter Ground (Common with Receiver Ground)	1	1
27	ModPrsL	Module Present	3	
28	IntL/RxLOS	Interrupt	3	2
29	VccTx	3.3V power supply transmitter	2	3
30	Vcc1	3.3V power supply	2	3
31	LPMoDe/TxDis	Low Power Mode	3	
32	GND	Transmitter Ground (Common with Receiver Ground)	1	1
33	Tx3+	Transmitter Non-Inverted Data Input	3	
34	Tx3-	Transmitter Inverted Data Output	3	
35	GND	Transmitter Ground (Common with Receiver Ground)	1	1
36	Tx1+	Transmitter Non-Inverted Data Input	3	
37	Tx1-	Transmitter Inverted Data Output	3	
38	GND	Transmitter Ground (Common with Receiver Ground)	1	1

Notes:

1. QSFP112 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. Each connector Gnd contact is rated for a maximum current of 500 mA.
2. This is an open collector/drain output that on the host board requires a 4.7KΩ to 10KΩ pull-up resistor to VccHost.

XN9253CSR
400G 500m QSFP112 DR4
Optical Transceiver

3. VccRx, Vcc1, and VccTx shall be applied concurrently. Supply requirements defined for the host side of the Host Card Edge Connector are listed in Table 10. For power classes 4 and above the module differential loading of input voltage pads must not result in exceeding contact current limits. Each connector Vcc contact is rated for a maximum current of 1500 mA.

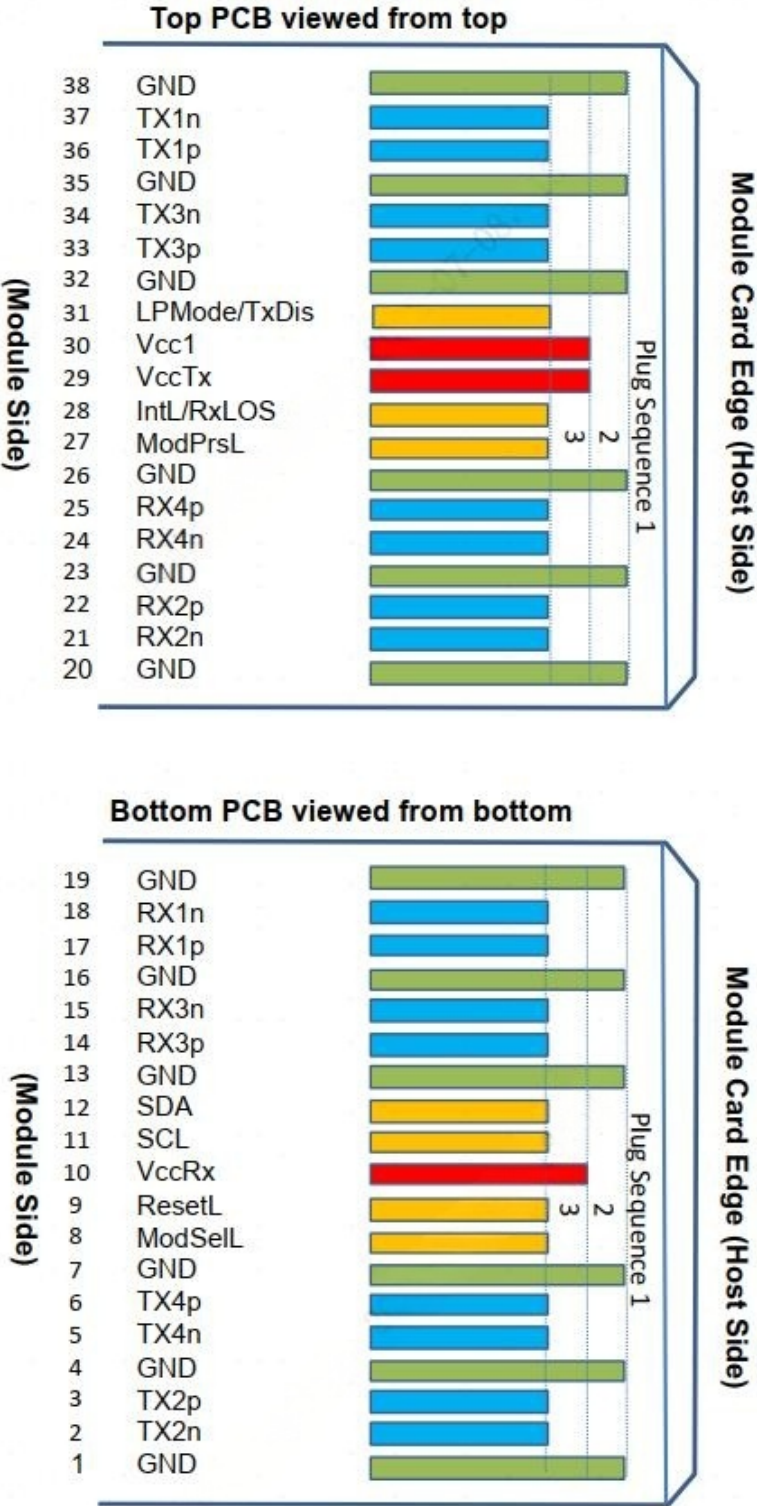


Figure 1. QSFP112 module pad assignment and layout

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	I _{CC}	-	-	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:

- 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	OMA _{outer}	max(-0.8 , TDECQ-2.2)	-	4.2	dBm	-
Transmitter and dispersion penalty eye closure for PAM4, each lane	TDECQ	-	-	3	dB	-
Launch power in OMA _{outer} minus TDECQ, each lane(min)	-	-2.2	-	-	dBm	-
Extinction Ratio	EX	3.5	-	-	dB	-
Average launch power of OFF transmitter	P _{off}	-	-	-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 (OMA _{outer})	OMA	-	-	-4.4	dBm	1
Stressed receiver sensitivity (OMA _{outer}), each lane				-1.9	dBm	2
Receiver Overload (P _{avg})	POL	4	-	-	dBm	
Damage Threshold	POL	5	-	-	dBm	
Receive power, each lane (OMA _{outer})	OMA	-	-	4.2	dBm	-
Receiver Reflectance	ORL	-	-	-26	dB	-
LOS De-Assert	LOSD	-	-	-8	dBm	-
LOS Assert	LOSA	-16	-	-	dBm	-
LOS Hysteresis	-	0.5	-	-	dB	-

Notes:

1. Measured with PRBS31Q test pattern, 53.125GBd, PAM4, BER<1E-6.
2. Measured with PRBS31Q test pattern, 53.125GBd, PAM4, BER<5E-5.

Recommended Host Board Power Supply Filter Network

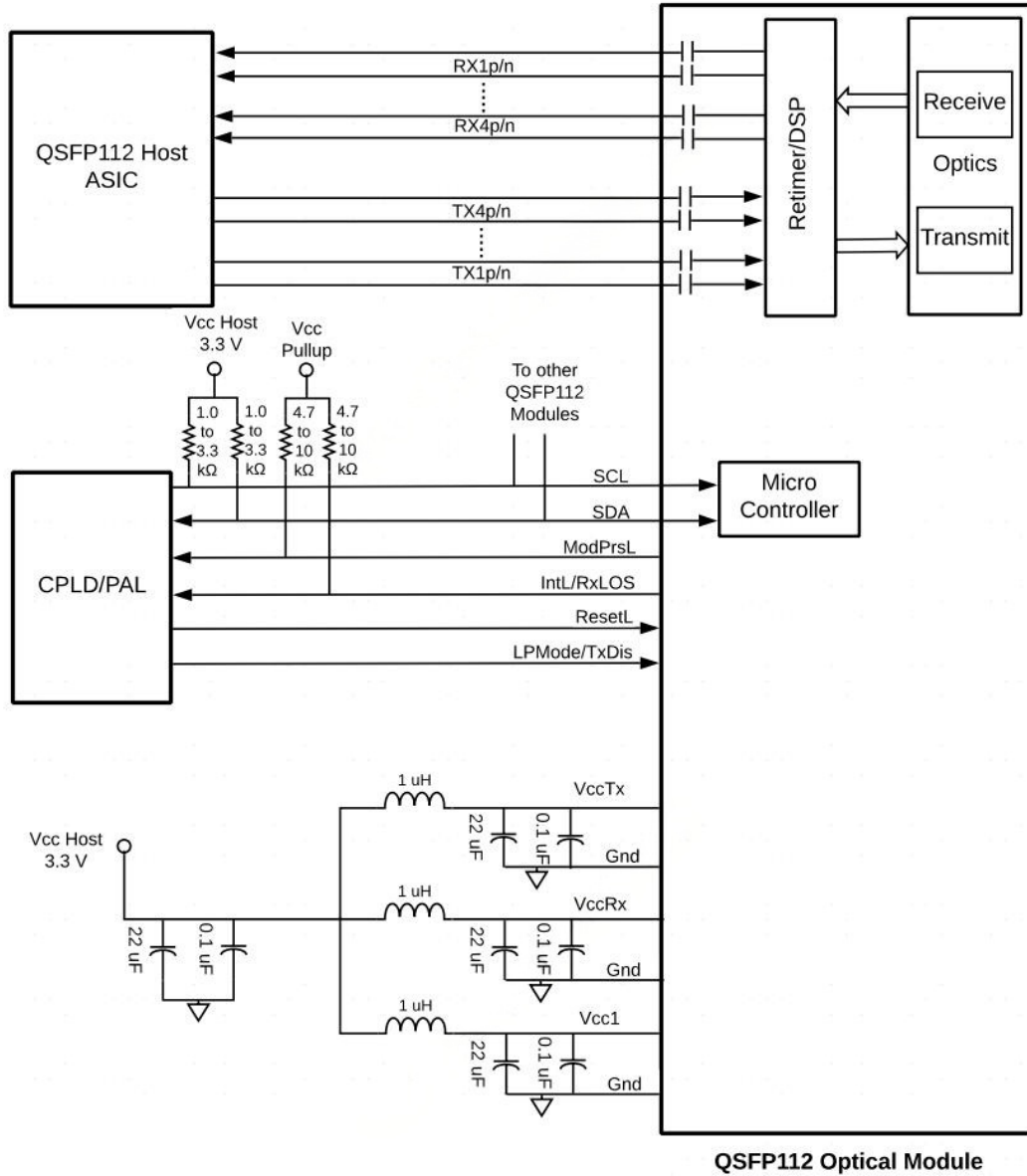


Figure 2. Recommended Host Board Power Supply Filter Network

Mechanical specifications

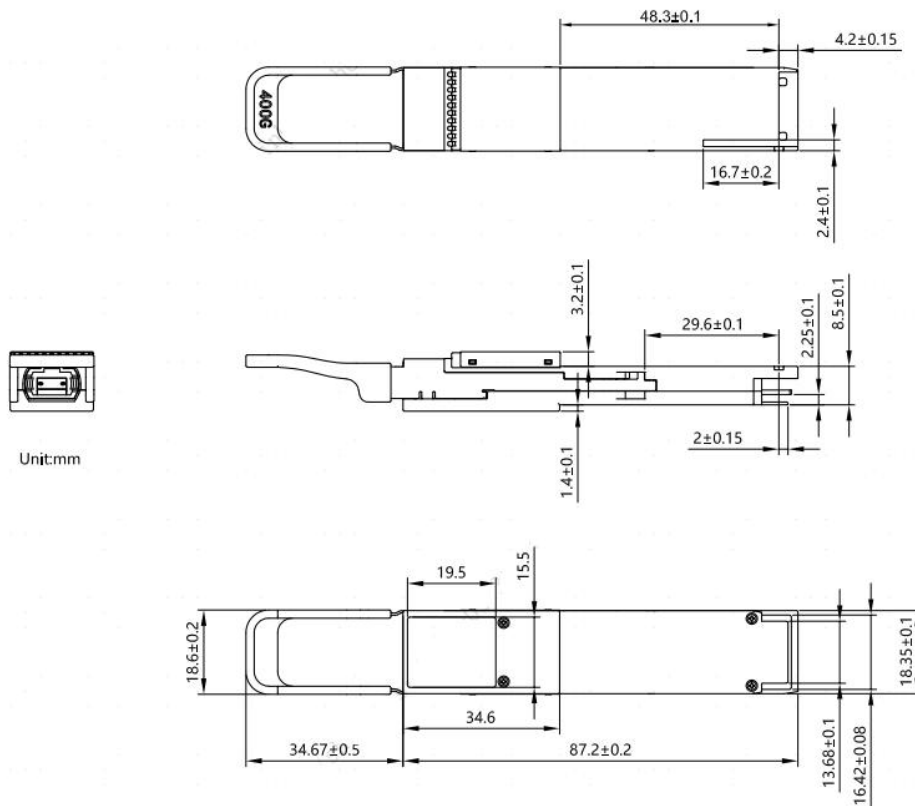


Figure 3. Outline Drawing

RoHS Compliance

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

Revision History

Date	Rev	Description	Modified By
9/9/2024	V1.0	Initial Release.	Xiaoyun Liu
3/7/2025	V1.1	Update TDECQ、OMA、OMA sensitivity Characteristics	Xiuhong Jia
4/7/2025	V1.2	UpdateLOSD Characteristics	Xiuhong Jia