

## Product Features

- Data Rate 106.25Gbps (PAM4) per channel
- 4 × 100G PAM4 EML CWDM lasers
- Duplex LC connector
- Single 3.3V power supply
- DDM function implemented
- Hot-pluggable QSFP112 form factor
- Maximum link length of 10km on Single
- Operating temperature range: 0° C to 70° C
- Maximum power consumption 10W
- RoHS complaint

## Applications

- 400GBASE-LR4 Ethernet
- Switch & Router Connections
- Data Centers
- Other 400G Interconnect Requirements

## Description

The 400G QSFP112 LR4 Transceiver is designed to transmit and receive serial optical data links up to 106.25 Gb/s data rate (per channel) by PAM4 modulation format over single-mode fiber. It is a small-form-factor hot pluggable transceiver module integrated with high performance EML laser. It is compliant with 400G Ethernet specs; QSFP112 MSA.

## Absolute Maximum Ratings

Module performance is not guaranteed and reliability is not implied for any condition that beyond the operating range. Exceeding the limits below may damage the transceiver module permanently.

Parameter	Units	Min	Max
Storage Temperature	°C	-40	85
Operating Case Temperature	°C	0	70

Power Supply Voltage	V	-0.5	3.6
Relative Humidity (non-condensation)	%	0	85

### Recommended Operating Conditions:

Parameter	Min	Typ	Max	Units
Operating Case Temperature	0		70	°C
Power Supply Voltage	3.135	3.3	3.465	V
Data Rate, each Lane		53.125		GBd
Data Rate Accuracy	-100		100	ppm
Link Distance with G.652 Fiber	0		10	km

### Electrical Characteristics

Parameter	Unit	Min	Typ	Max	Notes
Supply Voltage	V	3.135	3.3	3.465	
Supply Current	mA			4000	
Transceiver Power-on Initialize Time	ms			2000	
<b>Transmitter</b>					
PAM4 Signaling Rate Per Lane	GBd		53.125		PAM4
Differential Peak-to-peak Input Voltage Tolerance	mV	900			
Differential Termination Mismatch	%			10	
<b>Receiver</b>					
PAM4 Signaling Rate Per Lane	GBd		53.125		PAM4
Differential Data Output Swing	mV			900	
DC Common Mode Voltage	mV	-0.35		2.85	
Common Mode Noise (RMS)	mV			17.5	
Differential Termination Mismatch	%			10	

## Optical Characteristics

Parameter	Unit	Min	Typ.	Max
<b>Transmitter(Per Lane)</b>				
Signaling Speed Per Lane	GBd	53.125±100 ppm		
Modulation Format	PAM4			
Lane Wavelength (Range)	nm	1264.5	1271	1277.5
	nm	1284.5	1291	1297.5
	nm	1304.5	1311	1317.5
	nm	1324.5	1331	1337.5
Side-mode Suppression Ratio	dB	30	-	-
Average Launch Power, Each Lane	dBm	-2.7		5.1
Outer Optical Modulation Amplitude, Per Lane	dBm			4.4
Launch Power in OMA <sub>outer</sub> Minus TDECQ Each Lane for ER≥4.5dB for ER<4.5dB	dBm	0.3 -1.1+TDECQ		
Transmitter and Dispersion Eye Closure for PAM4, Each Lane	dB	-		3.4
Average Launch Power of Off Transmitter, Each Lane	dB			-16
Optical Extinction Ratio	dB	3.5	-	
Transmitter transition time(max)	dB/HZ	-	-	17
Transmitter over/under-shoot(max)	%			25
Transmitter peak-to-peak power	dBm			5.2
RIN <sub>15.6OMA</sub>				-136
Optical Return Loss Tolerance	dB			15.6
Transmitter Reflectance	dB			-26
<b>Receiver(Per Lane)</b>				
Modulation Format		PAM4		
Signaling Speed Per Lane	GBd	53.125±100 ppm		

Lane Wavelength (Range)	nm	1264.5	1271	1277.5
	nm	1284.5	1291	1297.5
	nm	1304.5	1311	1317.5
	nm	1324.5	1331	1337.5
Damage Threshold, Each Lane	dBm			6.1
Average Receive Power, Each Lane	dBm	-9		5.1
Receive Power (OMAouter), Each Lane	dB	-		4.4
Stressed Receiver Sensitivity (OMAouter), Each Lane	dBm	-		-4.3
Receiver Reflectance	dBm	-		-26
Receiver Sensitivity (OMAouter), Each Lane	dBm	-		-6.8 -8.2+TECQ
Stressed eye closure for PAM4(OMAouter),each lane(max)	dB			3.9
OMAouter of each aggressor lane	dBm			-0.4

## Pin Definition and Description

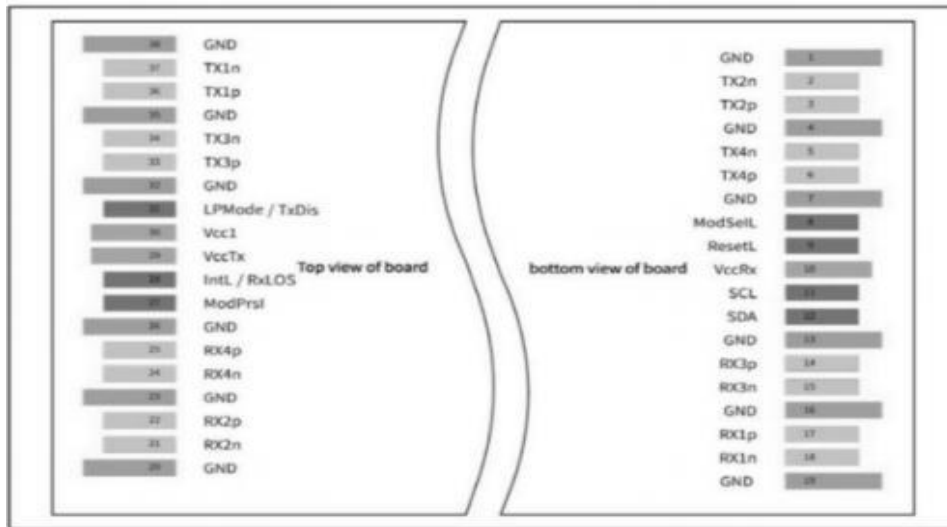


Table 1. Pin definition and descriptions

Pin	Symbol	Description	Plug Sequence	Note
1	GND	Ground	1	1

2	TX2n	Transmitted Inverted Data Input	3	
3	TX2p	Transmitted Non-Inverted Data Input	3	
4	GND	Ground	1	1
5	TX4n	Transmitted Inverted Data Input	3	
6	TX4p	Transmitted Non-Inverted Data Input	3	
7	GND	Ground	1	1
8	ModSel	Module Select	3	
9	ResetL	Module Reset	3	
10	VCC Rx	+3 .3 VDC Receiver Power Supply	2	2
11	SCL	Serial Clock for I2C Interface	3	
12	SDA	Serial Data for I2C Interface	3	
13	GND	Ground	1	1
14	RX3p	Receiver Non-Inverted Data Output	3	
15	RX3n	Receiver Inverted Data Output	3	
16	GND	Ground	1	1
17	RX1p	Receiver Non-Inverted Data Output	3	
18	RX1n	Receiver Inverted Data Output	3	
19	GND	Ground	1	1
20	GND	Ground	1	1
21	RX2n	Receiver Inverted Data Output	3	
22	RX2p	Receiver Non-Inverted Data Output	3	
23	GND	Ground	1	1
24	RX4n	Receiver Inverted Data Output	3	
25	RX4p	Receiver Non-Inverted Data Output	3	
26	GND	Ground	1	1
27	Mod PrsL	Module Present	3	
28	IntL/Rx LOS	Interrupt/optional Rx LOS	3	
29	VCCTx	+3 .3 VDC Transmitter Power Supply	2	2
30	VCC1	+3 .3 VDC Power Supply	2	2
31	LPMoDe/Tx d is	Low Power Mode/optioan ITx Disable	3	
32	GND	Ground	1	1
33	TX3p	Transmitted Non-Inverted Data Input	3	
34	TX3n	Transmitted Inverted Data Input	3	
35	GND	Ground	1	1
36	TX1p	Transmitted Non-Inverted Data Input	3	
37	TX1n	Transmitted Inverted Data Input	3	

38	GND	Ground	1	1
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**Notes:**

1. GND is the symbol for signal and supply (power) common for the QSFP 112 module. All are common within the QSFP 112 module and all voltages are referenced to this potential unless otherwise noted. Connect these directly to the host board signal-common ground plane.

2. VCC Rx, VCC 1 and VCC Tx are the receiver and transmitter power supplies and shall be applied concurrently. Requirements, defined for the host side of the Host Edge Card Connector, are listed in Table 3 .Optical Characteristics. Recommended host board power supply filtering is shown in Figure 3. VCC Rx, VCC 1 and VCC Tx may be internally connected within the QSFP 112 module in any combination . The connector pins are each rated for a maximum current of 1.5A (max. current of 2.0 A is required for high module power of 15-20W).

### Digital Diagnostic Monitoring Functions

Parameter	Units	Error	Notes
Temperature Monitor	°C	±3	1LSB= 1/256 °C
Supply Voltage Monitor	V	±0.1	1LSB= 100uV
Bias Current Monitor	mA	±10%	1LSB=2uA
TX Power Monitor	dBm	±3	1LSB=0. 1uW
RX Power Monitor	dBm	±3	1LSB=0. 1uW

### Mechanical Specifications

