

<b>TITLE</b>  <b>400G QSFP112 SR4 Transceiver</b>	<b>DOC No. RFD-20231208019-002</b>	
	<b>REVISION :</b> <b>01</b>	<b>AUTHORIZED BY :</b> <b>Andy Yang</b>
	<b>DATE :</b> <b>2023.12.11</b>	<b>CLASSIFICATION :</b> <b>CONFIDENTIAL</b>

## 1.Feature

- Hot-pluggable QSFP112 form factor
- Maximum link length of 100m on OM4 fiber with FEC
- +3.3V single power supply
- Power dissipation < 8W
- Operating case temp Commercial: 0°C to +70 °C
- MPO-12 APC connector
- RoHS compliant

## 2.PRODUCT DESCRIPTION

### 2.1PRODUCT NAME AND SERIES NUMBER(S)

#### 400G QSFP112 SR4 Transceiver

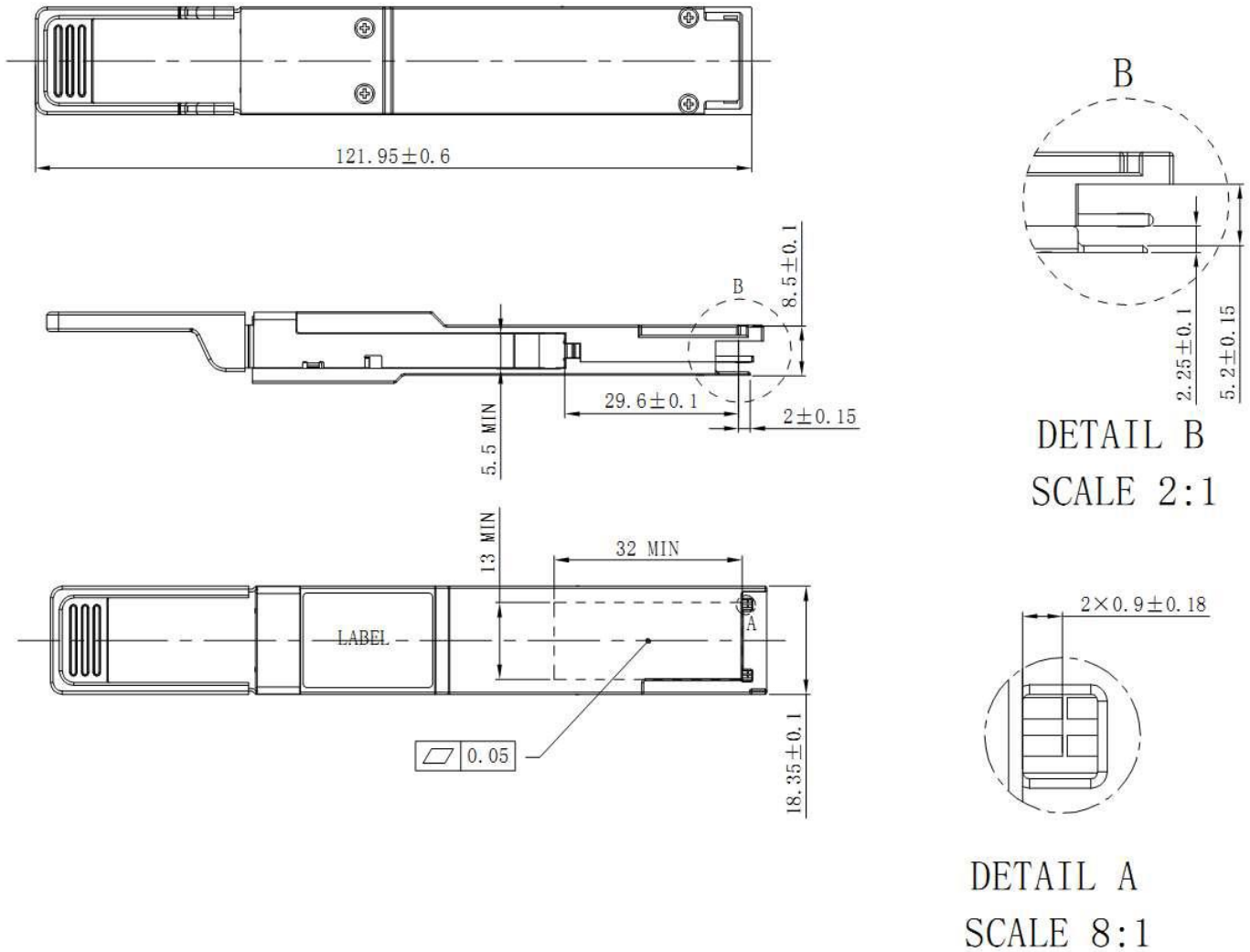
Part Number	Data Rate	Wavelength (nm)	Distance	Power (dBm)	Fiber type	Sen. (dBm)	Connector	Temp.
P59004GDCAS1-1	425G	850	60m (OM3) 100m (OM4)	-4.6~4	MMF	-4.4	MPO-12	C

## 3. DIMENSIONS ,MATERIALS, PLATINGS AND MARKING

The module is designed to meet the package outline defined in the QSFP112 specification. See the package outline for details.

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**PRODUCT SPECIFICATION**

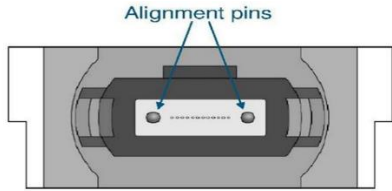
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Mechanical Package Outline (All dimensions in mm)

The optical port is a male MPO connector receptacle, with fiber lane assignments as shown in Figure 1

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Transmit Channels: 1 2 3 4  
Unused positions: x x x x  
Receive Channels: 4 3 2 1

Figure 1, Optical interface arrangement

## 4. Product Specification

### 4.1 Absolute Maximum Ratings

Parameter	Symbol	Min	Max	Units	Notes
Storage Temperature	TS	-40	85	degC	
Power Supply Voltage	VCC	-0.5	3.6	V	
Relative Humidity (non-condensation)	RH	0	85	%	1
Control Input Voltage	VI	-0.3	VCC+0.5-	V	1

Note

- No condensation

### 4.2 Recommended Operating Conditions

Parameter	Symbol	Min	Typical	Max	Units	Notes
Operating Case Temperature	TOP	0		70	degC	
Power Supply Voltage	VCC	3.135	3.3	3.465	V	
Power Dissipation	Pd	-	-	9	W	

### 4.3 General Electrical Characteristics Transmitter and Receiver

Parameter	Symbol	Unit	Min	Typ	Max	Notes
<b>Transmitter</b>						
Signaling Rate per Lane	SR	Gbd	53.125 ± 100 ppm			

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Modulation format	-	-	PAM4			
Differential pk-pk input Voltage tolerance	Vin,pp,diff	mV	750	-	-	
Differential termination mismatch	-	%	-	-	10	
Single-ended voltage tolerance range	-	V	-0.4	-	3.3	
DC common mode voltage	-	mV	-350	-	2850	
<b>Receiver</b>						
Signaling Rate per Lane	SR	Gbd	53.125 ± 100 ppm			
Modulation format	-	-	PAM4			
Differential output Voltage (Long mode)	-	mV	-	-	845	
Differential output Voltage (Short mode)	-	mV	-	-	600	
Near-end Eye height, differential	-	mV	70	-	-	
Far-end Eye height, differential	-	mV	30	-	-	
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	-	mV	-350	-	2850	

#### 4.4 Optical Characteristics of Transmitter and Receiver

Parameter	Symbol	Unit	Min	Typ	Max	Notes
<b>Transmitter</b>						
Center wavelength	CW	nm	844	850	863	
RMS Spectral Width	SW	dBm	-	-	0.6	
Average Launch Power per Lane	AOP	dBm	-4.6	-	4.0	1
Outer Optical Modulation Amplitude (OMA <sub>outer</sub> ), each lane (min)	TxOMA	dBm	-2.6	-	3.5	
Transmitter and Dispersion Eye Closure for PAM4 (TDECQ), each lane	TDECQ	dB	-	-	4.4	

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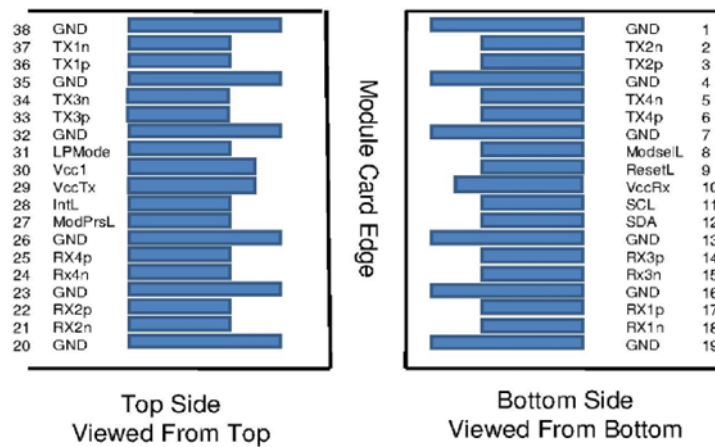
Average Launch Power of OFF Transmitter, each lane	TOFF	dBm	-	-	-30	
Extinction Ratio, each lane	ER	dB	2.5	-	-	
Optical Return Loss Tolerance	ORL	dB	-	-	12	
Transmitter Reflectance	TR	dBm	-	-	-26	2
<b>Receiver</b>						
Wavelength	W	nm	842	-	865	
Damage Threshold, average optical power, each lane	DT	dBm	5	-	-	
Average Receive Power, each lane	RXPx	dBm	-6.3	-	4	
Receive Power (OMA) per Lane	RxOMA	dBm	-	-	3.5	
Receiver Reflectance	Rfl	dB	-	-	-26	
Receiver Sensitivity (OMAouter), each lane	SOMA	dBm	-4.4	-	-	3

Note

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 (OMAouter), each lane (max) is informative and is defined for a transmitter with TDECQ<=1.8 dB

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**5.Pin Assignments**



**QSFP Pad Function Definition**

**Electrical Pin Definition(QSFP)**

Pin	Symbol	Name/Description	Notes
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	ModseL	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

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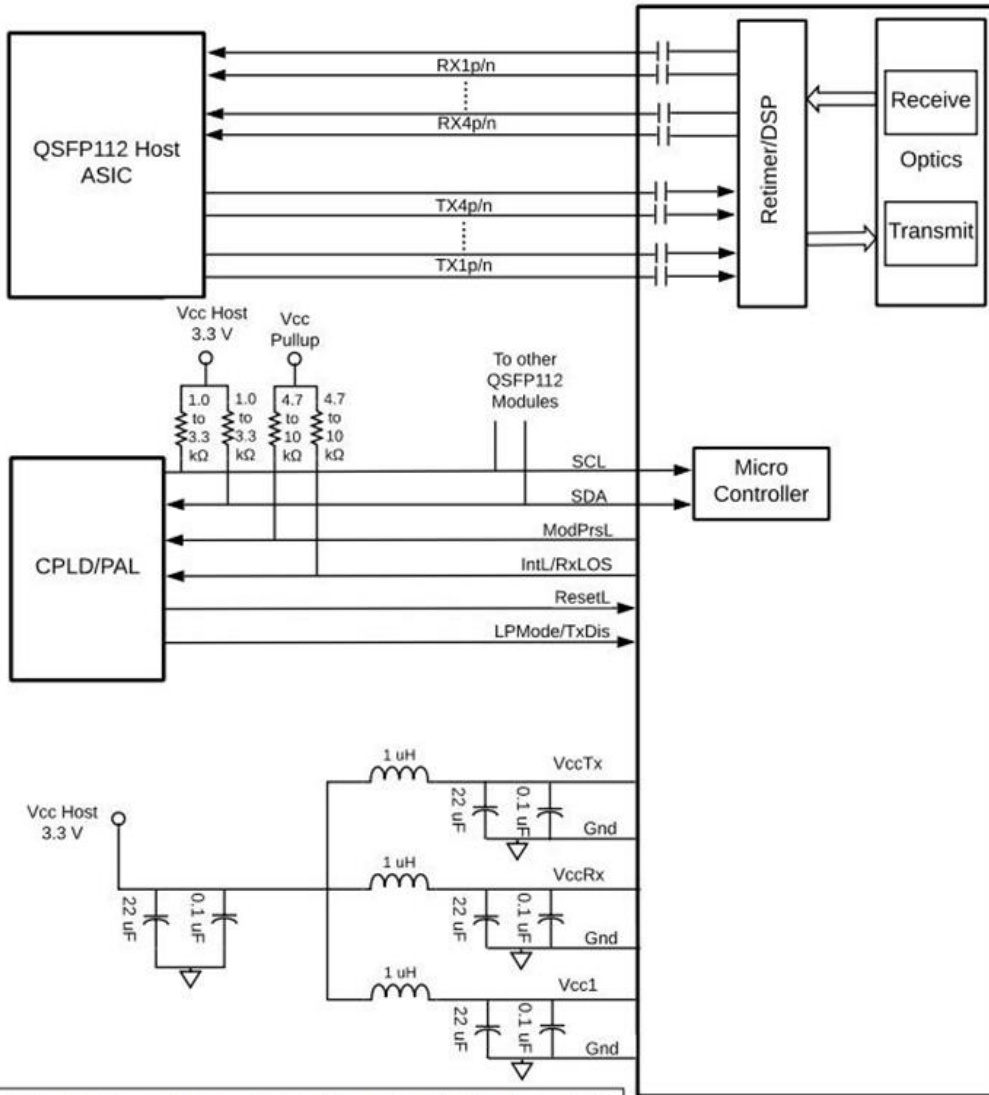
14	Rx3p	Receiver Non-Inverted Data Output	
15	Rx3n	Receiver Inverted Data Output	
16	GND	Ground	1
17	Rx1p	Receiver Non-Inverted Data Output	
18	Rx1n	Receiver Inverted Data Output	
19	GND	Ground	1
20	GND	Ground	1
21	Rx2n	Receiver Inverted Data Output	
22	Rx2p	Receiver Non-Inverted Data Output	
23	GND	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.

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**Recommended Interface**



**QSFP112 Optical Module**

Note: Filter capacitors values are informative and application dependent, 0.1 μF capacitors should be placed in close proximity to power pads and may be duplicated for individual pads to provide additional high frequency filtering.

Note: Vcc1 may be connected to VccTx or VccRx within the module provided the applicable derating of the maximum current limit is used.



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**6.Modification History**

<b>Rev.</b>	<b>Comments</b>	<b>Date</b>	<b>Originator</b>	<b>Approval</b>
01	Preliminary Draft	2023/12/11	Andy Yang	Mike Sun