

<b>TITLE</b>  <b>400G OSFP SR4 flat top Transceiver</b>	<b>DOC No. RFD-20240112002-001</b>	
	<b>REVISION :</b> <b>02</b>	<b>AUTHORIZED BY :</b> <b>Andy Yang</b>
	<b>DATE :</b> <b>2024.01.31</b>	<b>CLASSIFICATION :</b> <b>CONFIDENTIAL</b>

## 1.Introduction

This module is a hot pluggable fiber optic transceiver in the OSFP form factor with digital diagnostics monitoring functionality (DDM) and control function. The 400G OSFP SR4 module has four identical and independent lanes which provides a point-to-point 400Gb/s link over OM4 multimode fiber up to 100m. This makes it an ideal low-cost solution for short reach data center optical interconnects.

The central wavelength of each lane is at 850nm wavelength. The low power consumption and excellent EMI performance enable system design with high port density. The product is designed and tested in accordance with industry safety standards. The transceiver is Class 1 Laser product per U.S. FDA/CDRH and IEC 60825-1:2007 & IEC 60825-2:2004+A1+A2standards.

The transceiver can be conveniently assembled into and released from the host system through the latch.

The transceiver operates from a single +3.3V power supply over an operating case temperature range of 0oC to +70oC. The housing is made of metal for EMI immunity.

## 2.Features

- Support 100GBASE per lane in multimode fiber
- Hot-pluggable OSFP Type form factor
- Data rate up to 425Gbps (4x 106.25Gbps )
- Reach up to 100m on MMF(OM4)
- 850nm VCSEL laser and PIN receiver
- High speed I/O electrical interface (400GAUI-4)
- Single MPO-12 receptacle
- Operating case temperature: 0 to +70°C
- Compliant to RoHS 6/6
- Compliant to 400G OSFP MSA and CMIS5.0

<b>TITLE</b>  <b>400G OSFP SR4 flat top Transceiver</b>	<b>DOC No. RFD-20240112002-001</b>	
	<b>REVISION : 02</b>	<b>AUTHORIZED BY : Andy Yang</b>
	<b>DATE : 2024.01.31</b>	<b>CLASSIFICATION : CONFIDENTIAL</b>

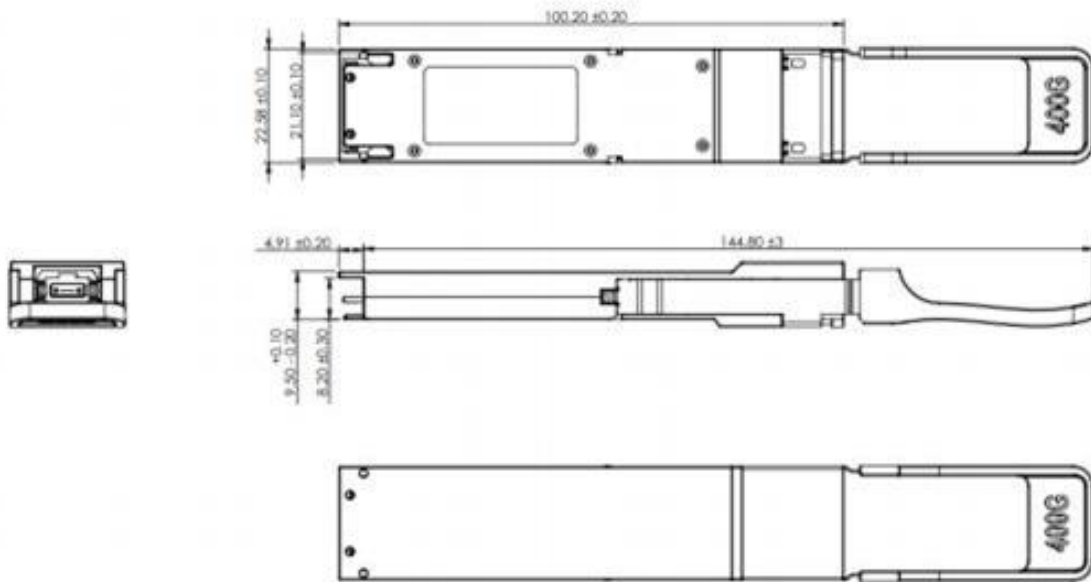
### 3.PRODUCT DESCRIPTION

#### 3.1PRODUCT NAME

#### 400G OSFP SR4 flat top Transceiver

Data Rate	Wavelength (nm)	Distance	Power (dBm)	Sen. (dBm)	Connector	Temp.
400G	850	100m (om4/om5)	-4.6~4	-4.6	MPO-12	C

#### 3.2 DIMENSIONS, MATERIALS, PLATINGS AND MARKING

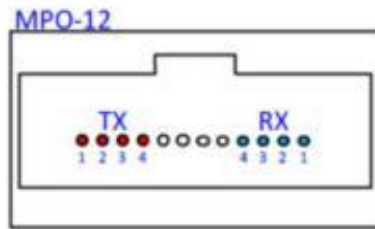


Mechanical Package Outline (All dimensions in mm)

The recommended location and numbering of the optical ports for 3 Media Dependent Interfaces (MDI) are shown in Figure. The transmit and receive optical lanes shall occupy the positions depicted in Figure 4 when looking into the MDI receptacle with the

<b>TITLE</b>  <b>400G OSFP SR4 flat top Transceiver</b>	<b>DOC No. RFD-20240112002-001</b>	
	<b>REVISION : 02</b>	<b>AUTHORIZED BY : Andy Yang</b>
	<b>DATE : 2024.01.31</b>	<b>CLASSIFICATION : CONFIDENTIAL</b>

connector keyway feature on top.



## 4. Product Specification

### 4.1 Absolute Maximum Ratings

Parameter	Symbol	Min	Typical	Max	Unit	Notes
Storage Temperature	Tstg	-40		85	°C	
Operating Relative Humidity	RH	5		85	%	Note1
Supply Voltage	VCC	-0.5		3.6	V	

Note:

1. Non-condensing

### 4.2 Recommended Operating Conditions

Parameter	Symbol	Min	Typical	Max	Unit	Notes
Case temperature	Tcase	0		70	°C	
Supply Voltage	VCC	3.135	3.3	3.465	V	
Module Power Dissipation	P			9	W	

Notes: The specified characteristics are met within the recommended range of operation. Unless otherwise noted typical data are quoted at nominal voltage and +25°C ambient temperature.

<b>TITLE</b>  <b>400G OSFP SR4 flat top Transceiver</b>	<b>DOC No. RFD-20240112002-001</b>	
	<b>REVISION : 02</b>	<b>AUTHORIZED BY : Andy Yang</b>
	<b>DATE : 2024.01.31</b>	<b>CLASSIFICATION : CONFIDENTIAL</b>

### 4.3 General Optical Characteristics of Transmitter

Parameter	400GBASE-SR4	Unit
Signaling rate, each lane (range)	53.125 ± 100 ppm	GBd
Modulation format	PAM4	-
Center wavelength (range)	844~863	nm
RMS spectral width1 (Max)	0.6	nm
Average launch power, each lane (Max)	4	dBm
Average launch power, each lane (Min)	-4.6	
Outer Optical Modulation Amplitude (OMA <sub>outer</sub> ), each lane (Max)	3.5	dBm
Outer Optical Modulation Amplitude (OMA <sub>outer</sub> ), each lane (Min)	- 2.6	dBm
for max(TECQ, TDECQ) ≤ 1.8 dB	-4.4+max (TECQ,TDECQ)	dBm
or 1.8 < max(TECQ, TDECQ) ≤ 4.4 dB		
Transmitter and dispersion eye closure for PAM4 (TDECQ), each lane (max)	4.4	dB
Transmitter eye closure for PAM4 (TECQ), each lane (Max)	4.4	dB
Overshoot/undershoot (Max)	29	%
Transmitter power excursion, each lane (Max)	2.3	dBm
Extinction Ratio	2.5	dB
Transmitter transition time, each lane (Max)	17	ps
Average launch power of OFF transmitter, each lane (Max)	-30	dBm
RIN <sub>12OMA</sub> (Max)	- 132	dB/Hz
Optical return loss tolerance (Max)	14	dB
Encircled flux <sub>2</sub>	≥86% at 19 nm ≤30% at 4.5um	-

Notes:

1.RMS spectral width is the standard deviation of the spectrum

2.If measured into type A1a.2 or type A1a.3, or A1a.4, 50 μm fiber, in accordance with IEC 61280- 1-4

<b>TITLE</b>  <b>400G OSFP SR4 flat top Transceiver</b>	<b>DOC No. RFD-20240112002-001</b>	
	<b>REVISION : 02</b>	<b>AUTHORIZED BY : Andy Yang</b>
	<b>DATE : 2024.01.31</b>	<b>CLASSIFICATION : CONFIDENTIAL</b>

#### 4.4 General Optical & Characteristics of Receiver

Parameter	400GBASE-SR4	Unit
Signaling rate, each lane (range)	53.125 ± 100 ppm	GBd
Modulation format	PAM4	-
Center wavelength (range)	842~948	nm
Damage threshold1 (Min)	5	dBm
Average receive power, each lane (Max)	4	dBm
Average receive power, each lane2 (Min)	-6.4	dBm
Receive power, each lane (OMAouter) (Max)	3.5	dBm
Receiver reflectance (Max)	- 12	dB
Receiver sensitivity (OMAouter), each lane (Max) for TECQ≤1.8 dB	-4.6	dBm
(Min) for 1.8 < TECQ≤4.4 dB	-6.4+TECQ	dBm
Stressed receiver sensitivity (OMAouter), each lane3 (Max)	-2	dBm
Conditions of stressed receiver sensitivity test:4		
Stressed eye closure for PAM4 (SECQ), lane under test	4.4	dB
OMAouter of each aggressor lane	3.5	dBm

**Notes:**

- 1.The receiver shall be able to tolerate, without damage, continuous exposure to an optical input signal having this average power level on one lane. The receiver does not have to operate correctly at this input power.
- 2.Average receive power, each lane (min) is informative and not the principal indicator of signal strength. A received power below this value cannot be compliant; however, a value above this does not ensure compliance.
- 3.Measured with conformance test signal at TP3 (see 167.8.13) for the BER specified in 167.1.1.
- 4.These test conditions are for measuring stressed receiver sensitivity. They are not characteristics of the receiver.

#### 4.5 General Electrical Characteristics of Transmitter

<b>TITLE</b>  <b>400G OSFP SR4 flat top Transceiver</b>	<b>DOC No. RFD-20240112002-001</b>	
	<b>REVISION : 02</b>	<b>AUTHORIZED BY : Andy Yang</b>
	<b>DATE : 2024.01.31</b>	<b>CLASSIFICATION : CONFIDENTIAL</b>

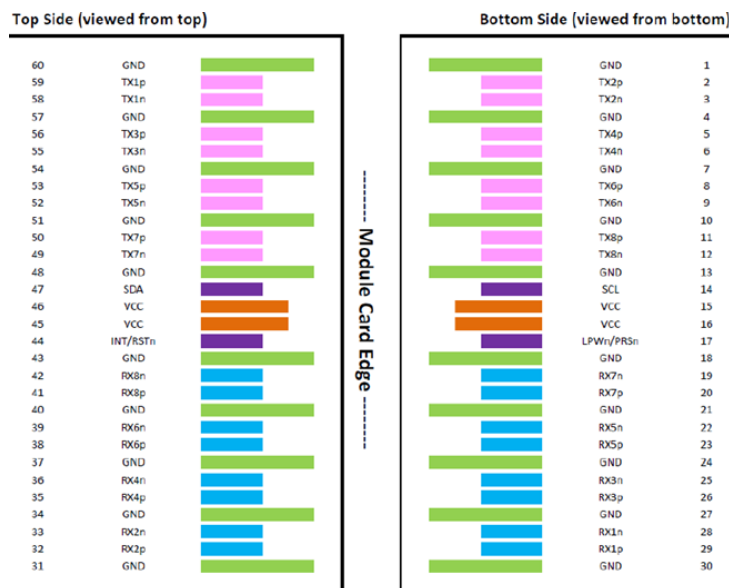
Parameter	Reference	Value	Unit
Signaling rate, each lane (range)	120G.3.4.1	53.125 ± 50 ppm	GBd
Differential pk-pk input voltage tolerance (Min)	120G.5.1	900	mV
Differential to common-mode return loss (Min)	120G.3.3.2	Equation(120G-2)	dB
Effective return loss, ERL (Min)	120G.3.4.3	8.5	dB
Differential termination mismatch (Max)	120G.3.1.3	10	%
Module stressed input test1	120G.3.4.2	See 120G.3.4.2	
Single-ended voltage tolerance range (Min)	120G.5.1	-0.4 to 3.3	V
DC common-mode voltage (Min)2	120G.5.1	-350	mV
DC common-mode voltage (Max)2	120G.5.1	2850	mV

Notes:

1.Meets BER specified in 120G.1.1 .

2.DC common-mode voltage generated by the host. Specification includes effects of ground offset voltage.

## 5.Pin Assignments



**QSFP Pad Function Definition**

<b>TITLE</b>  <b>400G OSFP SR4 flat top Transceiver</b>	<b>DOC No. RFD-20240112002-001</b>	
	<b>REVISION : 02</b>	<b>AUTHORIZED BY : Andy Yang</b>
	<b>DATE : 2024.01.31</b>	<b>CLASSIFICATION : CONFIDENTIAL</b>

**Electrical Pin Definition (OSFP)**

Pad	Logic	Symbol	Name/Description	Plug Sequence	Note
1		GND	Ground	1	
2	CML-I	TX2p	Transmitter Non-Inverted Data Output	3	
3	CML-I	TX2n	Transmitter Inverted Data Output	3	
4		GND	Ground	1	
5	CML-I	TX4p	Transmitter Non-Inverted Data Output	3	
6	CML-I	TX4n	Transmitter Inverted Data Output	3	
7		GND	Ground	1	
8	CML-I	TX6p	Transmitter Non-Inverted Data Output	3	
9	CML-I	TX6n	Transmitter Inverted Data Output	3	
10		GND	Ground	1	
11	CML-I	TX8p	Transmitter Non-Inverted Data Output	3	
12	CML-I	TX8n	Transmitter Inverted Data Output	3	
13		GND	Ground	1	
14	LVCMOS-I/O	SCL	2-wire Serial interface clock	3	
15		VCC	+3.3V Power	2	
16		VCC	+3.3V Power	2	
17	Multi-Level	LPWn/PRSn	Low-Power Mode / Module Present	3	
18		GND	Ground	1	
19	CML-O	RX7n	Receiver Inverted Data Input	3	
20	CML-O	RX7p	Receiver Non-Inverted Data Input	3	
21		GND	Ground	1	
22	CML-O	RX5n	Receiver Inverted Data Input	3	
23	CML-O	RX5p	Receiver Non-Inverted Data Input	3	

JESS-LINK PRODUCTS CO., LTD  
**PRODUCT SPECIFICATION**

<b>TITLE</b>  <b>400G OSFP SR4 flat top Transceiver</b>	<b>DOC No. RFD-20240112002-001</b>	
	<b>REVISION : 02</b>	<b>AUTHORIZED BY : Andy Yang</b>
	<b>DATE : 2024.01.31</b>	<b>CLASSIFICATION : CONFIDENTIAL</b>

24		GND	Ground	1	
25	CML-O	RX3n	Receiver Inverted Data Input	3	
26	CML-O	RX3p	Receiver Non-Inverted Data Input	3	
27		GND	Ground	1	
28	CML-O	RX1n	Receiver Inverted Data Input	3	
29	CML-O	RX1p	Receiver Non-Inverted Data Input	3	
30		GND	Ground	1	
31		GND	Ground	1	
32	CML-I	RX2p	Receiver Non-Inverted Data Input	3	
33	CML-I	RX2n	Receiver Inverted Data Input	3	
34		GND	Ground	1	
35	CML-I	RX4p	Receiver Non-Inverted Data Input	3	
36	CML-I	RX4n	Receiver Inverted Data Input	3	
37		GND	Ground	1	
38	CML-I	RX6p	Receiver Non-Inverted Data Input	3	
39	CML-I	RX6n	Receiver Inverted Data Input	3	
40		GND	Ground	1	
41	CML-I	RX8p	Receiver Non-Inverted Data Input	3	
42	CML-I	RX8n	Receiver Inverted Data Input	3	
43		GND	Ground	1	
44	Multi-Level	INT/RSTn	Module Interrupt / Module Reset	3	
45		VCC	+3.3V Power	2	
46		VCC	+3.3V Power	2	
47	LVC MOS-I/O	SDA	2 wire serial interface data	3	
48		GND	Ground	1	
49	CML-I	TX7n	Transmitter Inverted Data Output	3	
50	CML-I	TX7p	Transmitter Non-Inverted Data Output	3	
51		GND	Ground	1	
52	CML-I	TX5n	Transmitter Inverted Data Output	3	



<b>TITLE</b>  <b>400G OSFP SR4 flat top Transceiver</b>	<b>DOC No. RFD-20240112002-001</b>	
	<b>REVISION : 02</b>	<b>AUTHORIZED BY : Andy Yang</b>
	<b>DATE : 2024.01.31</b>	<b>CLASSIFICATION : CONFIDENTIAL</b>

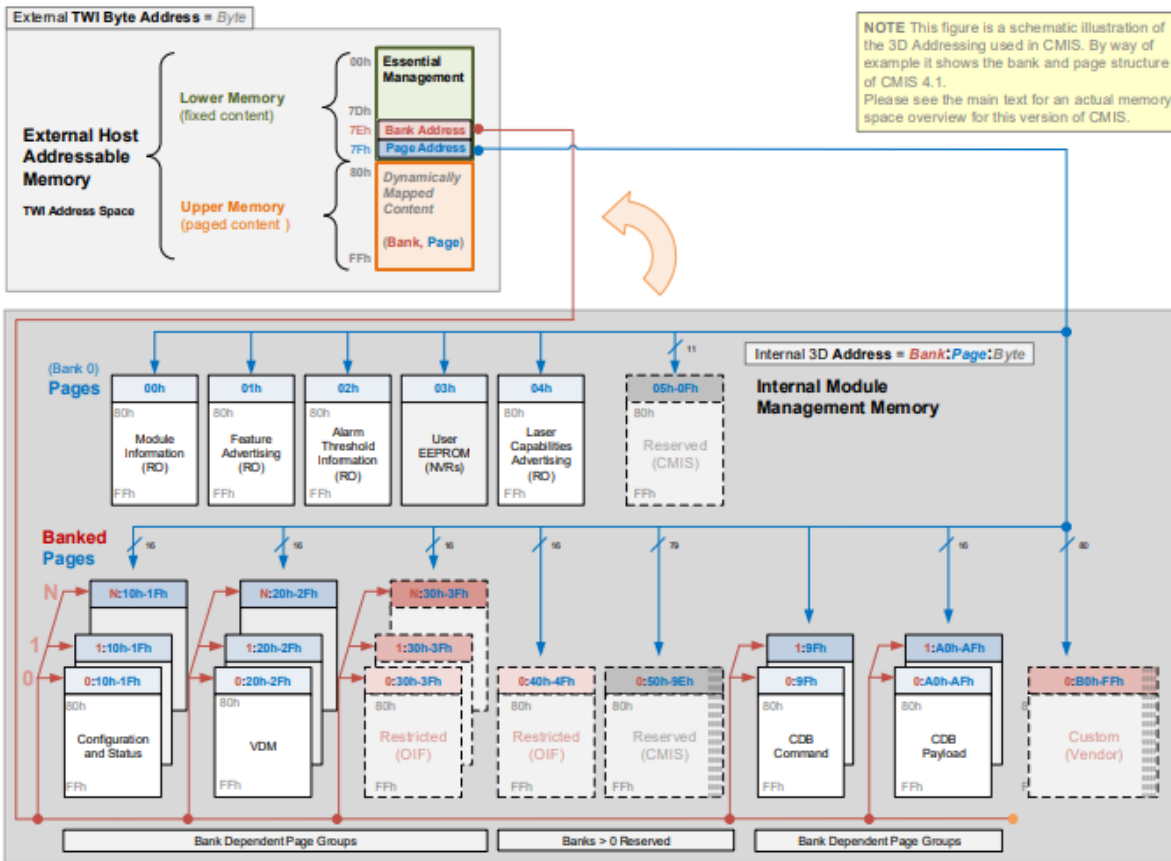
53	CML-I	TX5p	Transmitter Non-Inverted Data Output	3	
54		GND	Ground	1	
55	CML-I	TX3n	Transmitter Inverted Data Output	3	
56	CML-I	TX3p	Transmitter Non-Inverted Data Output	3	
57		GND	Ground	1	
58	CML-I	TX1n	Transmitter Inverted Data Output	3	
59	CML-I	TX1p	Transmitter Non-Inverted Data Output	3	
60		GND	Ground	1	

### Digital Diagnostic Functions

Parameter	Symbol	Min	Typical	Max	Units	Notes
Transceiver Case Temperature	DMI_Temp	-3		+3	°C	Over operating temp
Supply voltage monitor absolute error	DMI_VCC	-3%		+3%	V	Full operating range
Channel RX power monitor absolute error	DMI_RX	-3		+3	dB	Per channel
Channel Bias current monitor	DMI_Ibias	- 10%		+10%	mA	Per channel
Channel TX power monitor absolute error	DMI_TX	-3		+3	dB	Per channel

<b>TITLE</b>  <b>400G OSFP SR4 flat top Transceiver</b>	<b>DOC No. RFD-20240112002-001</b>	
	<b>REVISION :</b> <b>02</b>	<b>AUTHORIZED BY :</b> <b>Andy Yang</b>
	<b>DATE :</b> <b>2024.01.31</b>	<b>CLASSIFICATION :</b> <b>CONFIDENTIAL</b>

**Memory Map 5.0**



**6.Modification History**

Rev.	Comments	Date	Originator	Approval
01	Preliminary Draft	2024/1/12	Andy Yang	Mike Sun
02	Update Document	2024/1/25	Andy Yang	Mike Sun