

OSFP112 400G SR4 Optical transceiver for(dual MPO)flat top solution

Product Specifications

This product is a 400Gb/s OSFP112 400G SR4 optical module designed for 100m optical communication applications. The module converts 4 channels of 100Gb/s (PAM4) electrical input data to 4 channels of parallel optical signals, each capable of 100Gb/s operation for an aggregate data rate of 400Gb/s.

On the receiver side, the module converts 4 channels of parallel optical signals of 100Gb/s each channel for an aggregate data rate of 400Gb/s into 4 channels of 100Gb/s (PAM4) electrical output data.

An optical fiber cable with a single MPO-12 connector can be plugged into the OSFP112 400G SR4 module receptacle. Host FEC is required to support up to 100m fiber transmission.

Features

- Up to 106.25 Gbps data rate per channel by PAM4 modulation
- Support 400GAUI-4 electrical interface
- Integrated 850nm VCSEL array and PD array
- DDM function implemented
- Hot-pluggable
- Single +3.3V power supply

Standards

- Compliant to OSFP MSA 5.0
- Compliant with CMIS 4.0
- 4x106.25Gb/s electrical interface (400GAUI-4)
- Maximum power consumption 9W
- Single +3.3V power supply
- Case temperature range: 0 ~ +70°C
- RoHS 2.0 complaint

Applications

- Data centers and Cloud Networks

Rev	Date	Modified by	Description
A	Jul 07,2022	vic	Initial Release
B	Dec 21,2023	Vic	Update CMIS

1. Absolute Maximum Ratings

Parameter	Symbol	Min	Max	Units
Storage Temperature Range	T _{STG}	-40	+85	°C
Supply Voltage	V _{CC}	-0.5	3.6	V
Relative Humidity	RH	5% to 95% non-condensing		

2. Operating Conditions

Parameter	Symbol	Min	Max	Unit
Case Temperature- Operating	T _{CASE}	0	70	°C
Supply Voltage	V _{CC}	3.135	3.465	V
Power Consumption	P _{DISS}		9	W
Pre-FEC Bit Error Ratio			2.4x10 ⁻⁴	
Link Distance over OM3		0.5	30	M
Link Distance over OM4		0.5	50	M

3. Transmitter Optical Specifications

Transmitter Parameter	Min	Typical	Max	Unit
Signaling rate each lane	53.125 ± 100ppm			GBd
Lane Wavelength Range		850		nm
RMS Spectral width			0.6	nm
Modulation Format	PAM4			
Average Optical Power per lane	-4.6		4	dBm
Outer Optical Modulation Amplitude (OMA _{outer}), each lane for TDECQ ≤ 1.8dB	-2.6		3.5	dBm
for 1.8 < TDECQ ≤ 4.4dB	-4.4 + TDECQ		3.5	
Outer Optical Modulation Amplitude (OMA _{outer}), each lane for TECQ ≤ 1.8dB	-2.6		3.5	dBm
for 1.8 < TECQ ≤ 4.4dB	-4.4 + TECQ		3.5	
Transmitter and Dispersion Eye Closure for PAM4, each Lane			4.4	dB
Transmitter Eye Closure for PAM4(TECQ), each Lane			4.4	dB
Extinction Ratio	2.5			dB
Transmitter excursion ,each lane			2	dB
Transmitter transition time,each lane			17	ps
Average Launch Power per Lane @ TX Off State			-30	dBm
Relative Intensity Noise ₁₂ (OMA)			-131	dB/Hz
Optical Return Loss Tolerance			12	dB
Encircled Flux	≥ 86% at 19um ≤ 30% at 4.5um			dB

4. Receiver Optical Specifications

Receiver Parameter	Min	Typical	Max	Unit
Signaling rate each lane	53.125 ± 100ppm			GBd
Lane Wavelength Range		850		nm
Modulation Format	PAM4			
Damage Threshold	5			dBm
Average Receive Power, each lane	-6.4		4	dBm
Receiver Power, each lane (OMA)			3.5	dBm
Receiver Sensitivity each lane (OMA _{outer}) for TECQ ≤ 1.8dB for 1.8 < TECQ ≤ 4.4dB			-4.6 -6.4+TECQ	dBm
Receiver reflectance			-12	dB
Stressed Receiver Sensitivity (OMA _{outer}), each			-2	dBm
Stressed Conditions for Stress Receiver Sensitivity				
Stressed Eye Closure for PAM4 (SECQ), Lane under Test		4.4		dB
OMA _{outer} of each Aggressor Lane		3.5		dBm

5. Receiver Thresholds for Loss of Signal (LOS)

Parameter	Min	Typical	Max	Unit
RX_LOS_Assert Min/Max	-15.0			dBm
RX_LOS_De-Assert Min/Max			-8.9	dBm
RX_LOS_Hysteresis		1.5		dB

6. Digital Diagnostic Monitoring Specifications

Parameters	Unit	Specification
Temperature Monitor absolute error	° C	± 3
Supply Voltage Monitor absolute error	%	± 5
I _{bias} Monitor absolute error	%	± 10
Received Power (Rx) Monitor absolute error	dB	± 3.0
Transmit Power (Tx) Monitor absolute error	dB	± 3.0

7. Low Speed Electrical signal

Parameter	Symbol	Min	Max	Units	Condition
SCL and SDA	VOL	0	0.4	V	IOL(max)=3.0mA for fast mode,20mA for Fast-mode plus
	VOH	Vcc-0.5	Vcc+0.3	V	
SCL and SDA	VIL	-0.3	Vcc*0.3	V	
	VIH	Vcc*0.7	Vcc +0.5	V	
Capacitance for SCL and SDA I/O pin	Ci		14	pF	
Total bus capacitive load for SCL and SDA	Cb		100	pF	3.0k Ohms Pull up resistor,max
			200	pF	1.6k Ohms Pull up resistor,max
LPMode/TxDis,Reset and ModeSeLL	VIL	-0.3	0.8	V	Iin <= 125uA for Vin < Vcc
	VIH	2	Vcc + 0.3	V	
IntL/RxLOS	VOL	0	0.4	V	IOL=2.0mA
	VOH	VCC - 0.5	VCC + 0.3	V	10k ohms pull-up to Host Vcc
ModPrsL	VOL	0	0.4	%	IOL=2.0mA
	VOH			dB	ModPrsL can be implemented as a short-circuit to GND on the module

8. High Speed Electrical signal

Parameter	Min	Typical	Max	Unit	Notes
Receiver electrical output characteristics at TP4					
Signaling rate per lane		53.125		GBd	
AC common-mode output voltage(RMS)		-	17.5	mV	
Differential peak-to-peak output voltage			900	mV	
Near-end ESMW (Eye symmetry mask width)		TBD		UI	
Near-end Eye height, differential	24			mV	
Near-end vertical eye closure			7.5	dB	
Far-end ESMW (Eye symmetry mask width)		TBD		UI	
Far-end Eye height, differential	24			mV	
Far-end vertical eye closure			7.5	dB	
Far-end pre-cursor ISI ratio		TBD		%	
Common mode to differential conversion return loss	802.3ck 120G-1			dB	
Effective return loss	TBD			dB	
Differential termination mismatch			10	%	
Transition time (min, 20% to 80%)		TBD		ps	
DC common mode voltage	-350		2850	mV	
Transmitter electrical input characteristics at TP1					
Signaling rate, per lane		53.125		GBd	
Differential pk-pk input voltage tolerance	900			mV	
Common-mode to differential return loss	802.3ck Equation(120G-1)				
Effective return loss	TBD				
Differential termination mismatch			10	%	
Module stressed input test	See 120G.3.4.1				
Single-ended voltage tolerance range	-0.4		3.3	V	
DC common-mode voltage	-350		2850	mV	

9. Module Block Diagram

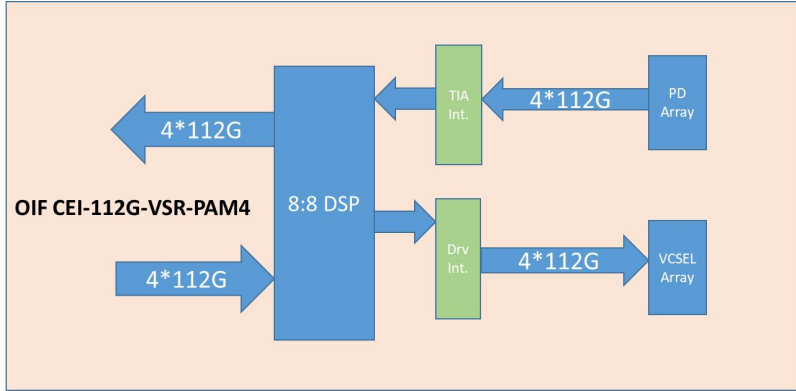


Figure 1. Module Block Diagram

10. OSFP112 400G SR4

Top Side (viewed from top)

60	GND	
59	TX1p	
58	TX1n	
57	GND	
56	TX3p	
55	TX3n	
54	GND	
53	TX5p	
52	TX5n	
51	GND	
50	TX7p	
49	TX7n	
48	GND	
47	SDA	
46	VCC	
45	VCC	
44	INT/RSTn	
43	GND	
42	RX8n	
41	RX8p	
40	GND	
39	RX6n	
38	RX6p	
37	GND	
36	RX4n	
35	RX4p	
34	GND	
33	RX2n	
32	RX2p	
31	GND	

Bottom Side (viewed from bottom)

	GND	1
	TX2p	2
	TX2n	3
	GND	4
	TX4p	5
	TX4n	6
	GND	7
	TX6p	8
	TX6n	9
	GND	10
	TX8p	11
	TX8n	12
	GND	13
	SCL	14
	VCC	15
	VCC	16
	LPWn/PRSn	17
	GND	18
	RX7n	19
	RX7p	20
	GND	21
	RX5n	22
	RX5p	23
	GND	24
	RX3n	25
	RX3p	26
	GND	27
	RX1n	28
	RX1p	29
	GND	30

Module Card Edge

Figure 2. OSFP400 400G contact assignment

Note:

For OSFP112 400G SR4 end, Only CH1~CH4 available. CH5~CH8 not connect, TX5~8p/n,RX5~8p/n not connect.

11. Module contact definition

Pin#	Symbol	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	Input from Host	3	
9	TX6n	Transmitter Data Inverted	CML-I	Input from Host	3	
10	GND	Ground			1	
11	TX8p	Transmitter Data Non-Inverted	CML-I	Input from Host	3	
12	TX8n	Transmitter Data Inverted	CML-I	Input from Host	3	
13	GND	Ground			1	
14	SCL	2-wire Serial interface clock	LVC MOS-I/O	Bi-directional	3	Open-Drain with pull-up resistor on Host
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	See pin description for required circuit
18	GND	Ground			1	
19	RX7n	Receiver Data Inverted	CML-O	Output to Host	3	
20	RX7p	Receiver Data Non-Inverted	CML-O	Output to Host	3	
21	GND	Ground			1	
22	RX5n	Receiver Data Inverted	CML-O	Output to Host	3	
23	RX5p	Receiver Data Non-Inverted	CML-O	Output to Host	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	

Pin#	Symbol	Description	Logic	Direction	Plug Sequence	Notes
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	Output to Host	3	
39	RX6n	Receiver Data Inverted	CML-O	Output to Host	3	
40	GND	Ground			1	
41	RX8p	Receiver Data Non-Inverted	CML-O	Output to Host	3	
42	RX8n	Receiver Data Inverted	CML-O	Output to Host	3	
43	GND	Ground			1	
44	INT/RSTn	Module Interrupt / Module Reset	Multi-Level	Bi-directional	3	See pin description for required circuit
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	LVC MOS-I/O	Bi-directional	3	Open-Drain with pull-up resistor on Host
48	GND	Ground			1	
49	TX7n	Transmitter Data Inverted	CML-I	Input from Host	3	
50	TX7p	Transmitter Data Non-Inverted	CML-I	Input from Host	3	
51	GND	Ground			1	
52	TX5n	Transmitter Data Inverted	CML-I	Input from Host	3	
53	TX5p	Transmitter Data Non-Inverted	CML-I	Input from Host	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	

12. Optical interface

The MPO-12 connectors for OSFP112 400G SR4.

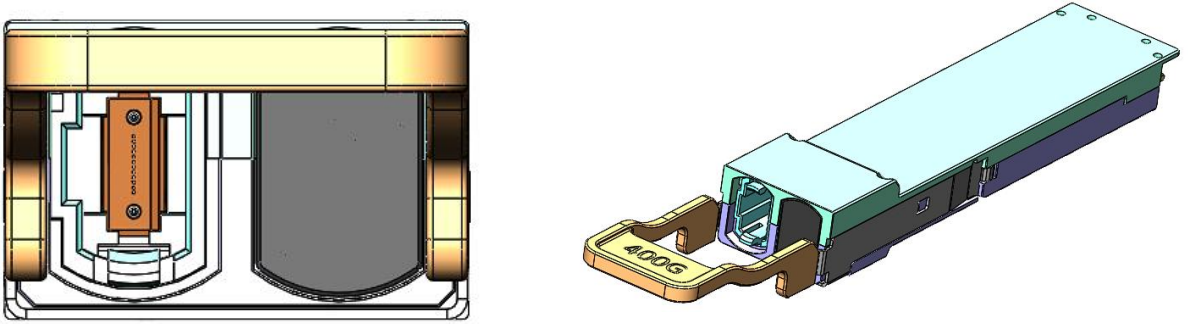


Figure 3. Optical lane assignments

13. Mechanical Specifications

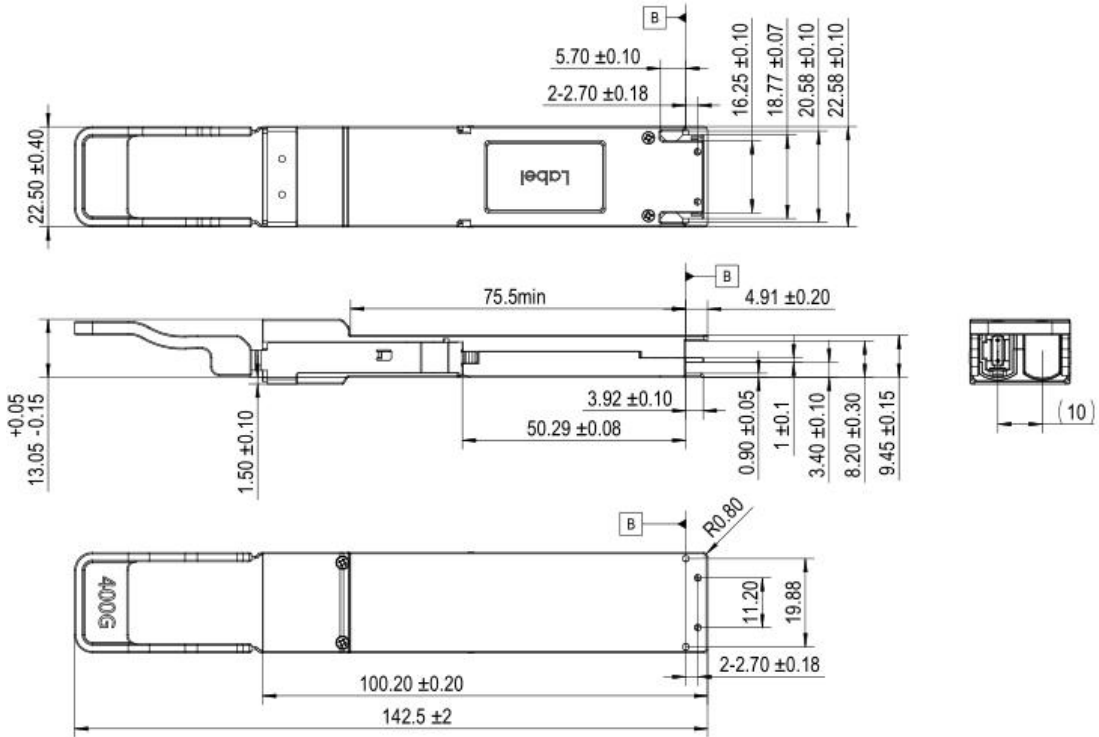


Figure 4. Mechanical Dimensions