Product Features

- OSFP MSA compliant
- 2 sets of 4 CWDM lanes MUX/DEMUX design
- Compliant to IEEE 802.3bs Specification
- Up to 2km transmission on single mode fiber (SMF) with FEC
- Operating case temperature: 0° C to 70° C
- Data Rate 53.125Gbps (PAM4) per channel.
- Maximum power consumption 12W
- CS duplex connectors
- RoHS compliant

Applications

- 400G Ethernet
- Data Center Interconnect
- Enterprise Networking
- Infiniband Interconnect

Standards

- IEEE 802.3bs
- OSFP MSA
- CMIS4.0

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	℃	-40	85
Operating Case Temperature	℃	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	℃
Power Supply Voltage	3.135	3.3	3.465	V
Data Rate, each Lane		53.125		GBd
Data Rate Accuracy	-100		100	ppm
Pre-FEC Bit Error Ratio			2.3x10-4	
Post-FEC Bit Error Ratio			1x10-12	
Link Distance with G.652	2		2000	m

Notes:

1. FEC is provided by host system.
2. FEC is required on host system to support maximum distance.

Electrical Characteristics

Parameter	Units	Min	Typ	Max	Notes
Power Consumption	W			12	
Supply Current	A			3.64	
Transmitter (Each Lane)					
Signaling Rate, each Lane	GBd	53.125 ± 100 ppm			
Differential pk-pk Input Voltage Tolerance	mVpp	900			1
Differential Termination Mismatch	%			10	
Differential Input Return Loss	dB	IEEE 802.3-2015 Equation (83E-5)			
Differential to Common Mode Input Return Loss	dB	IEEE 802.3-2015 Equation (83E-6)			
Module Stressed Input Test		See IEEE 802.3bs 120E.3.4.1			2
Single-ended Voltage Tolerance Range (Min)	V	-0.4 to 3.3			
DC Common Mode Input Voltage	mV	-350		2850	3
Receiver (Each Lane)					
Signaling Rate, each lane	GBd	53.125 ± 100 ppm			
Differential Peak-to-Peak Output Voltage	mVpp			900	

AC Common Mode Output Voltage, RMS	mV			17.5	
Differential Termination Mismatch	%			10	
Differential Output Return Loss		IEEE 802.3-2015 Equation (83E-2)			
Common to Differential Mode Conversion Return Loss		IEEE 802.3-2015 Equation (83E-3)			
Transition Time, 20% to 80%	ps	9.5			
Near-end Eye Symmetry Mask Width (ESMW)	UI		0.265		
Near-end Eye Height, Differential	mV	70			
Far-end Eye Symmetry Mask Width (ESMW)	UI		0.2		
Far-end Eye Height, Differential	mV	30			
Far-end Pre-cursor ISI Ratio	%	-4.5		2.5	
Common Mode Output Voltage (Vcm)	mV	-350		2850	3

Notes:

1. With the exception to IEEE 802.3bs 120E.3.1.2 that the pattern is PRBS31Q or scrambled idle.
2. Meets BER specified in IEEE 802.3bs 120E.1.1.
3. DC common mode voltage generated by the host. Specification includes effects of ground offset voltage.

Optical Characteristics

Parameter	Unit	Min	Typ	Max	Notes
Wavelength Assignment	nm	1264.5	1271	1277.5	ITU-T CWDM4
		1284.5	1291	1297.5	
		1304.5	1311	1317.5	
		1324.5	1331	1337.5	
Transmitter					
Data Rate, each Lane	GBd	53.125 ± 100 ppm			
Modulation Format	—	PAM4			
Side Mode Suppression Ratio	dB	30			Modulated
Total Average Launch Power	dBm			10.7	
Average Launch Power, each Lane	dBm	-4.2		4.7	1

Outer Optical Modulation Amplitude (OMAouter),each Lane	dBm	-1.2		4.5	2
Launch Power in OMAouter minus TDECQ, each lane	dB	-2.6			For ER≥ 4.5dB
	dB	-2.5			For ER< 4.5dB
Transmitter and Dispersion Eye Clouser for PAM4,each Lane	dB			3.3	
Extinction Ratio	dB	3.5			
Difference in Launch Power between any Two Lanes (OMAouter)	dB			4	
RIN16.5OMA	dB/Hz			-132	
Optical Return Loss Tolerance	dB			16.5	
Transmitter Reflectance	dB			-26	3
Average Launch Power of OFF Transmitter, each Lane	dB			-30	
Receiver					
Data Rate, each Lane	GBd	53.125 ± 100 ppm			
Modulation Format	—	PAM4			
Damage Threshold, each Lane	dBm	5.7			4
Average Receive Power, each Lane	dBm	-8.2		4.7	5
Receive Power (OMAouter), each Lane	dBm			4.5	
Receiver Sensitivity (OMAouter),each Lane	dBm			-6	6
Stressed Receiver Sensitivity (OMAouter),each Lane	dBm			-3.6	7
Difference in Receive Power between any Two Lanes (OMAouter)	dB			4.1	
Receiver Reflectance	dB			-26	
LOS Assert	dBm	-30			
LOS De-assert	dBm			-16	
LOS Hysteresis	dB	0.5			
Stressed Conditions for Stress Receiver Sensitivity					Note 8
Stressed Eye Closure for PAM4 (SECQ), Lane under Test	dB		3.3		
OMAouter of each Aggressor Lane	dBm		0.5		

Notes:

1. Average launch power, each lane (min) is informative and not the principal indicator of signal strength. A transmitter with launch power below this value cannot be compliant; however, a value above this does not ensure compliance.

2. Even if the TDECQ < 1.4dB for an extinction ratio of ≥ 4.5dB or TDECQ < 1.3dB for an extinction ratio of < 4.5dB, the OMAouter (min) must exceed the minimum value specified here.

3. Transmitter reflectance is defined looking into the transmitter.

4. The receiver shall be able to tolerate, without damage, continuous exposure to an optical input signal having this average power level.

5. 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.

6. Receiver Sensitivity OMAouter, each lane (max) is informative and is defined for a transmitter with SECQ of 0.9 dB andfor the BER of 2.4x10-4.

7.Measured with conformance test signal at receiver input for the BER of 2.4x10-4.

8.These test conditions are for measuring stressed receiver sensitivity. They are not characteristics of the receiver.

Pin Definition and Description

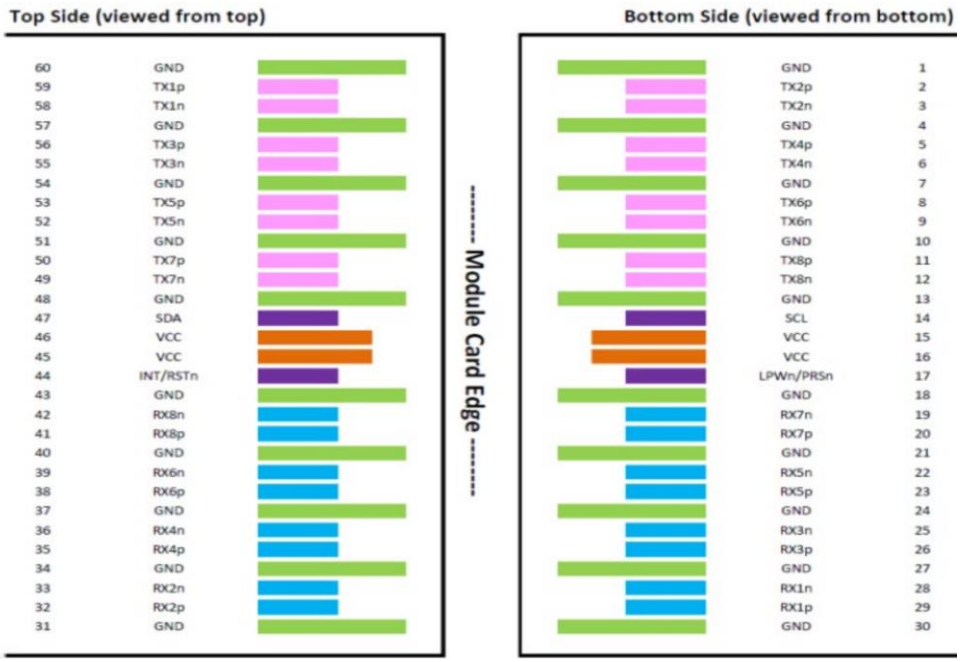


Table 1. Pin definition and descriptions

Pin	Symbol	Name/Description	Plug Sequence	Notes
1	GND	Module Ground.	1	1
2	Tx2+	Transmitter Non-Inverted Data.	3	
3	Tx2-	Transmitter Inverted Data.	3	
4	GND	Module Ground.	1	1
5	Tx4+	Transmitter Non-Inverted Data.	3	
6	Tx4-	Transmitter Inverted Data.	3	
7	GND	Module Ground.	1	1
8	Tx6+	Transmitter Non-Inverted Data.	3	
9	Tx6-	Transmitter Inverted Data.	3	
10	GND	Module Ground.	1	1
11	Tx8+	Transmitter Non-Inverted Data.	3	
12	Tx8-	Transmitter Inverted Data.	3	
13	GND	Module Ground.	1	1
14	SCL	2-Wire Serial Interface Clock.	3	2
15	Vcc	+3.3V Power Supply.	2	
16	Vcc	+3.3V Power Supply.	2	
17	LPWn/PRSn	Low-Power Mode/Module Present.	3	
18	GND	Module Ground.	1	1
19	Rx7-	Receiver Inverted Data.	3	
20	Rx7+	Receiver Non-Inverted Data.	3	
21	GND	Module Ground.	1	1
22	Rx5-	Receiver Inverted Data.	3	
23	Rx5+	Receiver Non-Inverted Data.	3	
24	GND	Module Ground.	1	1
25	Rx3-	Receiver Inverted Data.	3	
26	Rx3+	Receiver Non-Inverted Data.	3	
27	GND	Module Ground.	1	1
28	Rx1-	Receiver Inverted Data.	3	
29	Rx1+	Receiver Non-Inverted Data.	3	
30	GND	Module Ground.	1	1
31	GND	Module Ground.	1	1
32	Rx2+	Receiver Non-Inverted Data.	3	
33	Rx2-	Receiver Inverted Data.	3	
34	GND	Module Ground.	1	1
35	Rx4+	Receiver Non-Inverted Data.	3	

36	Rx4-	Receiver Inverted Data.	3	
37	GND	Module Ground.	1	1
38	Rx6+	Receiver Non-Inverted Data.	3	
39	Rx6-	Receiver Inverted Data.	3	
40	GND	Module Ground.	1	1
41	Rx8+	Receiver Non-Inverted Data.	3	
42	Rx8-	Receiver Inverted Data.	3	
43	GND	Module Ground.	1	1
44	INT/RSTn	Module Input/Module Reset.	3	
45	Vcc	+3.3V Power Supply.	2	
46	Vcc	+3.3V Power Supply.	2	
47	SDA	2-Wire Serial Interface Data.	3	2
48	GND	Module Ground.	1	1
49	Tx7-	Transmitter Inverted Data.	3	
50	Tx7+	Transmitter Non-Inverted Data.	3	
51	GND	Module Ground.	1	1
52	Tx5-	Transmitter Inverted Data.	3	
53	Tx5+	Transmitter Non-Inverted Data.	3	
54	GND	Module Ground.	1	1
55	Tx3-	Transmitter Inverted Data.	3	
56	Tx3+	Transmitter Non-Inverted Data.	3	
57	GND	Module Ground.	1	1
58	Tx1-	Transmitter Inverted Data.	3	
59	Tx1+	Transmitter Non-Inverted Data.	3	
60	GND	Module Ground.	1	1

Notes:

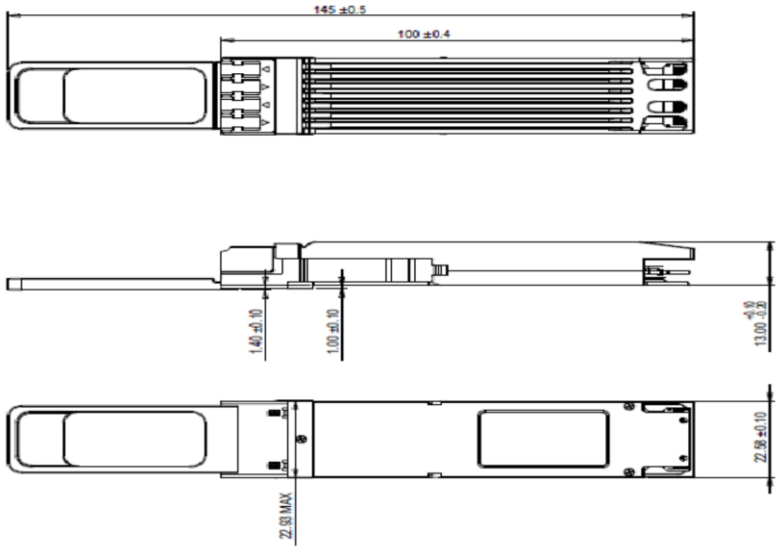
1. OSFP uses common ground (GND) for all signals and supply (power). All are common within the OSFP module, and all module voltages are referenced to this potential unless otherwise noted.

2. Open-drain with pull-up resistor on the host.

Digital Diagnostic Monitoring Functions

Parameter	Units	Error	Notes
Temperature Monitor	℃	±3	1LSB=1/256℃
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 Diagram



Note: External physical characteristics are subject to variation. This may include, but is not limited to, external case designs, pull tab colors and/or shapes, removal latch styles or colors, and label sizes and placement. These variations do not affect the function or characteristics of the transceivers.