



Product Specification

800G OSFP 2xDR4 Optical Transceiver

Features

- Dual MPO-12 APC receptacles
- 8x106.25Gbps (53.125GBd PAM4) electrical interface
- 8x106.25Gbps (53.125GBd PAM4) optical interface
- Up to 500m over SMF
- Power dissipation $\leq 16W$
- Operating case temperature: 0°C to 70°C
- Built-in digital diagnostic functions
- 3.3V power supply voltage
- RoHS compliant

Standards Compliance

- IEEE802.3ck and IEEE 802.3df compliant
- OSFP MSA 5.0 and CMIS 5.1 compliant
- OSFP MSA

Applications

- 800G Ethernet
- Data center networks
- InfiniBand NDR

General Description

The 800G OSFP 2XDR4 Optical Transceiver is designed for 800G Ethernet and InfiniBand communication application links over 500m of single-mode fiber(SMF), and it is compliant with OSFP MSA, 800G Pluggable MSA, CMIS 5.1, IEEE802.3ck and IEEE 802.3df standards. The optical signal is transmitted over eight parallel channels at a central wavelength of 1310nm. The module contains 8 parallel channels on the transmitter and receiver, each operating at 106.25Gbps. It is suitable for 800G Ethernet, Data Center, InfiniBand, Breakout 2x400G DR4 or 8x100G DR Application. The optical interface is 2*MPO-12/APC connector.

Part No.	Specifications					
	Package	Data rate	Wavelength	Temp	Reach	optical interface
	OSFP-IHS	850Gbps	1311±6.5nm	0~70°C	500m	2*MPO12
	OSFP-RHS	850Gbps	1311±6.5nm	0~70°C	500m	2*MPO12

1. Absolute Maximum Ratings and Operation Conditions

Absolute Maximum Ratings

Table 1.1 Absolute Maximum Ratings

Parameter	Symbol	Min.	Typical	Max.	Unit	Notes
Supply Voltage	V _{cc}	-0.3	-	3.6	V	
Storage Temperature	T _s	-40	-	+85	°C	
Operating Humidity	RH	5	-	+85	%	1
Control Input Voltage	V _I	-0.3	-	V _C +0.3	V	
RX damage threshold, each Lane	-	5	-	-	d Bm	

Note:1 No condensation

Recommended operating Conditions

Table 1.2 Operating Conditions

Parameter	Symbol	Min.	Typical	Max.	Unit	Notes
Operating Case Temperature	T _C	0	-	70	°C	
Power Supply Voltage	V _{cc}	3.135	3.3	3.465	V	
Power Dissipation	P _{diss}	-	-	16	W	
Supply Current	I _{cc}	-	-	5.1	A	
Pre-FEC Bit Error Ratio	-	-	-	2.4x10 ⁻⁴	-	
Post-FEC Bit Error Ratio	-	-	-	1x10 ⁻¹²	-	1
Link Distance (G.652 SMF)	-	2	-	500	m	2

Note:

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

2. OSFP Parameters

2.1 OSFP Electrical Pin Assignment

The OSFP module is based on a 60 pin electrical connector with pin out as specified in OSFP Hardware specification.

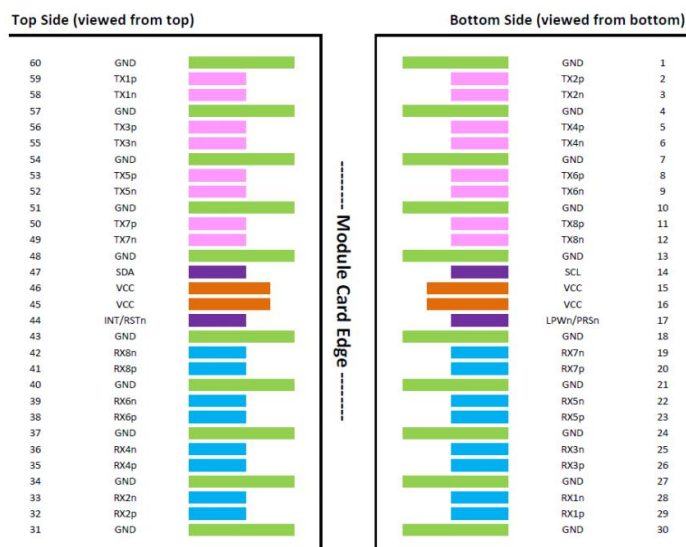


Figure 2.1 OSFP module pinout

Pad #	Symbol	Description	Logic	Direction	Plug Sequence	Notes
1	GND	Ground				
2	TX2p	Transmitter Data Non-Inverted	CML-I	Input from Host	3	
3	TX2n	Transmitter Data Inverted	CML-I	nput from Host	3	
4	GND	Ground			1	
5	TX4p	Transmitter Data Non-Inverted	CML-I	nput 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	nput from Host	3	
9	TX6n	Transmitter Data Irverted	CML-I	nput from Host	3	
10	GND	Grounc			1	

11	TX6p	Transmitter Data Non-Inverted	CML-I	Input from Host	3	
12	TX6n	Transmitter Data Inverted	CML-I	Input from Host	3	
13	GND	Ground				
14	SCL	2-wire serial interface clock	LVC MOS-VO	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				
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				
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				
31	GND	Ground				

32	RX2p	Receiver Data Non-Inverted	CML-O	Output to Host	3	
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				
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				
44	INT/RSTn	Module Interrupt/Module Reset	Multi-Level	Bi-directional	3	See pin description for required circuit
45	VCC	+33V Power		Power from Host	2	
46	VCC	+3.3V Power		Power from Host	2	
47	SDA	2-wire serial interface Data	LVC MOS-VO	Bi-directional	3	Open-Drain with pull-up resistor on Host
48	GND	Ground				
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				
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				
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				
58	TX1n	Transmitter Data Inverted	CML-I	Input from Host	3	
59	TX1p	Transmitter Data Non- Inverted	CML-1	Input from Host	3	
60	GND	Ground				

2.2 OSFP Electric Ports Definition

Parameter	Symbol	Unit	Min	Typ	Max	Notes
Transmitter						
Signaling Rate,each Lane	-	Gbaud	53.125±100 ppm			
Modulation Format	-	-	PAM4			
Differential Input Voltage Amplitude	V _{in,ppd}	mV	400	-	900	
Differential Termination Mismatch	-	%	-	-	10	
DC Common-mode Voltage Tolerance	-	mV	350	-	2850	
Receiver						
Signaling Rate,each Lane	-	Gbaud	53.125±100 ppm			
Modulation Format	-	-	PAM4			
Differential Output Voltage (Long mode)	V _{out,ppd}	mV	-	-	845	
Differential Output Voltage (Short mode)	V _{out,ppd}	mV	-	-	600	
Eye Height	-	$\frac{m}{V}$	15	-	-	
Vertical Eye Closure	VEC	$\frac{m}{V}$	-	-	12	
Differential Termination Mismatch	-	%	-	-	10	
DC Common-mode Voltage Tolerance	-	mV	-350	-	2850	

2.3 Optical Characteristics

Parameter	Symbol	Unit	Min	Typ	Max	Note
Transmitter						
Signaling Speed		GBd		53.125		
Signaling Speed Tolerance		ppm	-100		+100	
Modulation Format		PAM4				
Lane Wavelength		nm	1304.5	1311	1317.5	
Side Mode Suppression Ratio	SMSR	dB	30			
Average TX Power	P _{avg}	dBm	-2.9		4	a,b

Outer Optical Modulation Amplitude for $TDECQ < 1.4\text{dB}$ for $1.4\text{dB} \leq TDECQ \leq 3.4\text{dB}$	OMA _{outer}	dBm	-0.8 - 2.2+TDECQ		4.2	c
Extinction Ratio	ER	dB	3.5			
Average launch power of OFF transmitter, each lane	P _{off}	dBm			-15	
Transmitter and dispersion eye closure for PAM4	TDECQ	dB			3.4	
Transmitter eye closure for PAM4	TECQ	dB			3.4	
TDECQ - TECQ		dB			2.5	
Transmitter overshoot and undershoot					22%	
Transmitter power excursion		dBm			5	
Transmitter transition time		ps			17	
Relative Intensity Noise	RIN	dB/Hz			-136	
Optical return loss tolerance	ORTL	dB			21.4	
Transmitter reflectance		dB			-26	d
Receiver						
Signaling Speed		GBd		53.125		
Signaling Speed Tolerance			-100		+100	
Modulation Format		PAM4				
Lane Wavelength			1304.5	1311	1317.5	
Damage Threshold			5			f
Average RX Power		dBm	-5.9		4	g
RX Power (OMA _{outer})		dBm			4.2	
RX Reflectance		dBm			-26	

RX Sensitivity (OMA _{outer}) for TECQ < 1.4dB for 1.4dB ≤ TECQ ≤ 3.4dB		dBm			-3.9 - 5.3+TECQ	e
Stressed RX Sensitivity (OMA _{outer})		dBm			-1.9	
Conditions of Stressed RX Sensitivity Test (note i)						
Stressed eye closure for PAM4 (SECQ), lane under test	SECQ	dB		3.4		h
OMA _{outer} of Each Aggressor Lane				4.2		

Notes:

- a. Average launch power, each lane (min) is 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.
- b. Average launch power of -2.9 dBm corresponds to an OMA of -0.8 dBm with an extinction ratio of approximately 10 dB or an OMA of -0.1 dBm with an extinction ratio of approximately 16 dB.
- c. For 400GBASE-DR4, the requirement on the OMA_{outer} (min) applies even in the cases where TDECQ < 1.4 dB.
- d. Transmitter reflectance is defined looking into the transmitter.
- e. Measured with conformance test signal at TP3 for BER=2.4x10⁻⁴.
- f. The receiver shall be able to tolerate, without damage, continuous exposure to an optical input signal having this average power level. The receiver does not have to operate correctly at this input power.
- g. Average receive power, each lane (min) is 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
- h. Measured with conformance test signal at TP3 (see 124.8.10) for the BER specified in 124.1.1.
- i. These test conditions are for measuring stressed receiver sensitivity. They are not characteristics of the receiver.

2.4 Digital Diagnostic Functions

Parameter	Symbol	Min	Max	Units	Notes
Temperature monitor absolute error	DMI_Temp	-3	3	°C	Over operating temperature range
Supply voltage monitor absolute error	DMI_VCC	-0.1	0.1	V	Over full operating range
Channel RX power monitor absolute error	DMI_RX_Ch	-2	2	dB	
Channel Bias current monitor	DMI_Ibias_Ch	-10%	10%	mA	
Channel TX power monitor absolute error	DMI_TX_Ch	-2	2	dB	

2.5 Recommended Power Supply Filter

Figure 2.2 provides an example implementation for a 3.3V power filter on the host board. If an alternate circuit is used for power filtering then the same filter characteristics as this example filter shall be met.

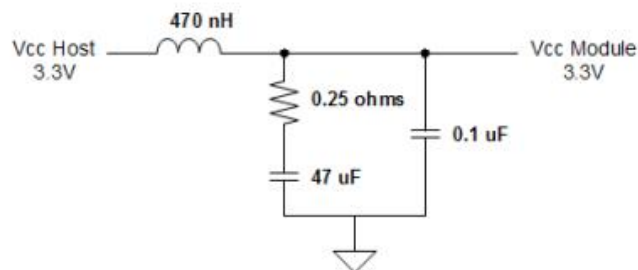


Figure 2.2 Recommended Host Board Power Supply Filtering

2.6 OSFP Host Board and Module Block Diagram

Figure 2.3 is an example block diagram of the host board's connections to the OSFP module.

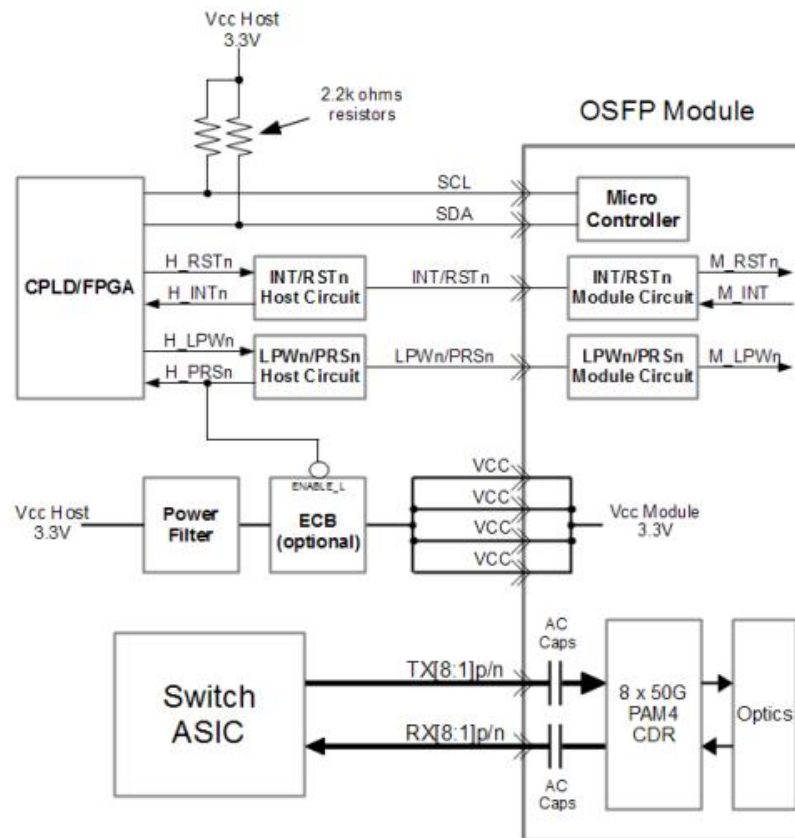


Figure 2.3 OSFP Host Board and Module Block Diagram

3 Module Memory Map

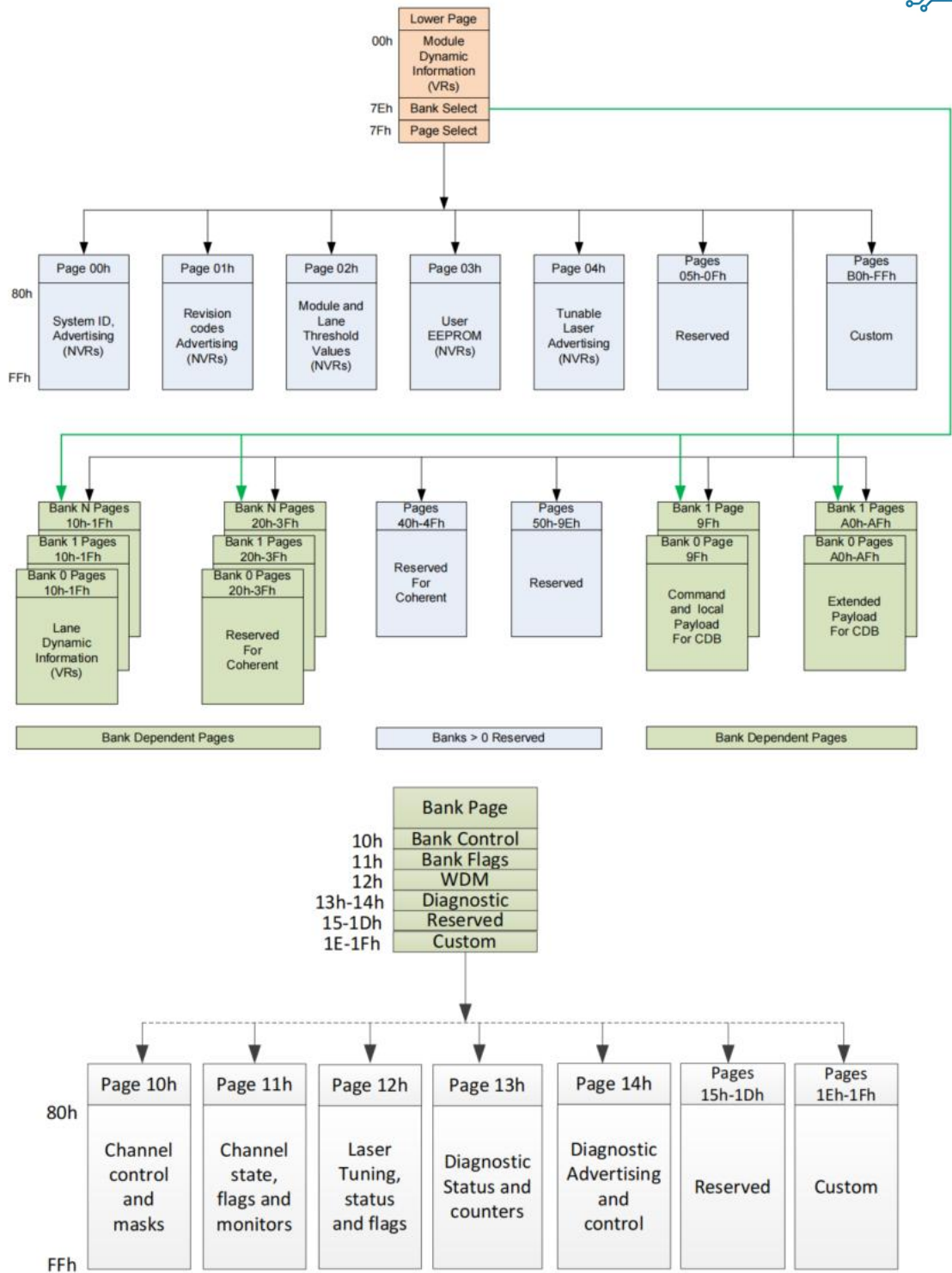


Figure 2.4 Digital Diagnostic Memory Map

4 Mechanical dimensions

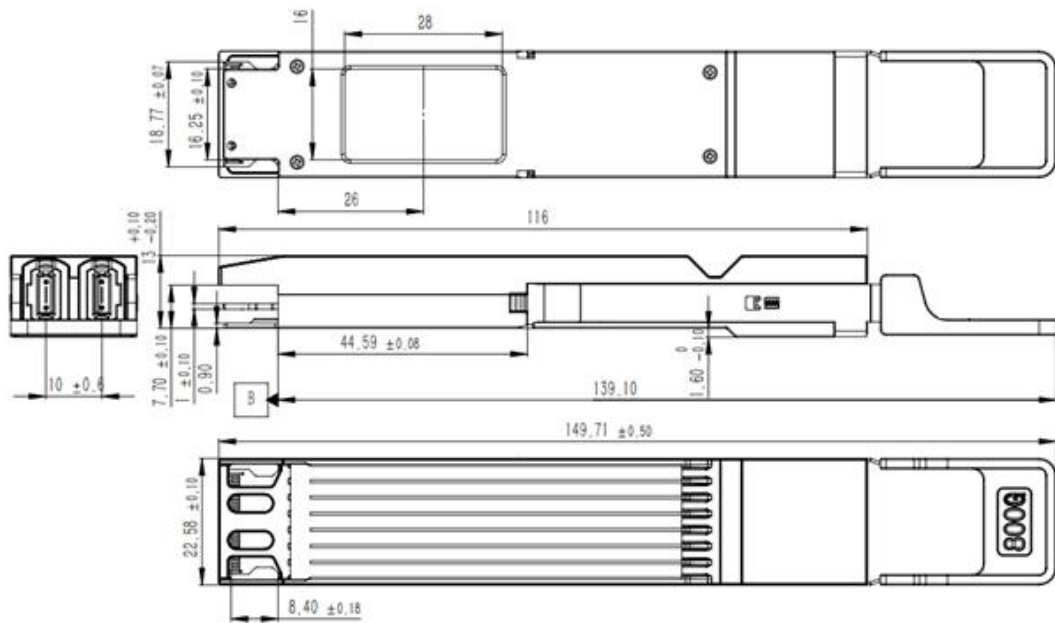


Figure 3.1a Package Outline(IHS)

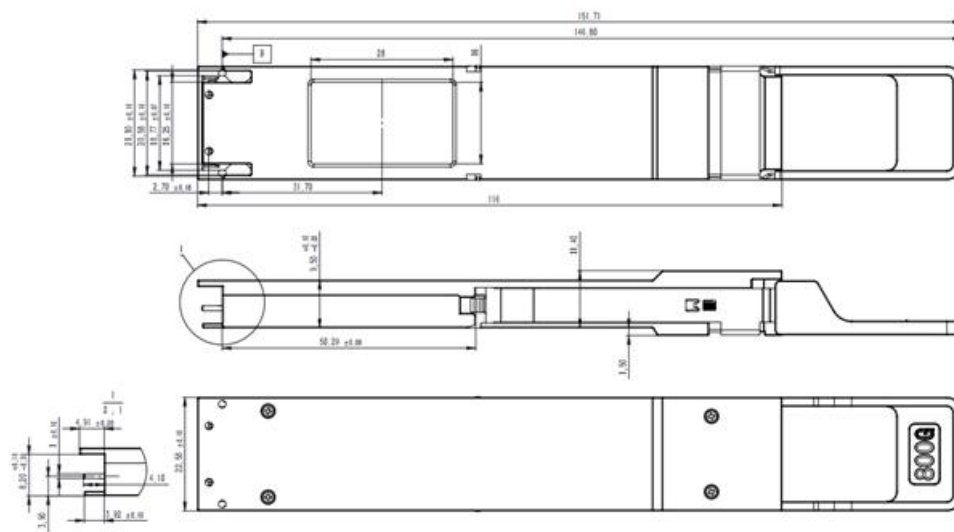


Figure 3.1b Package Outline(RHS)

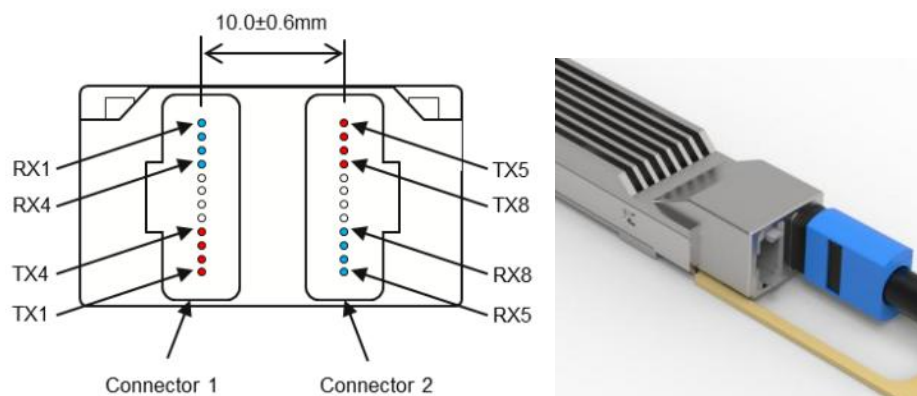


Figure 3.2 Module Optical Interfaces

5 Environment Regulation Compliance and product Safety

Category	Standard
Radiated Emissions	EN 55032 Class B CISPR 32 Class B FCC rules 47 CFR Part15
Radiated Immunity	EN 55035 CISPR 35 IEC/EN 61000-4-3
RoHS	EU RoHS 2.0 (2011/65/EU) REACH (EC 1907/2006) China RoHS SJ/T 11363
Laser Safety	IEC 60825-1:2014+A11:2021 FDA/CDRH Class 1 Laser Product, 21 CFR 1040.10 & 1040.11
ESD	IEC 61000-4-2; ANSI/ESDA/JEDEC JS-001; MIL-STD-883C Contact $\pm 8 \text{ kV}$, Air $\pm 15 \text{ kV}$
Flammability (PCB)	UL Class 94 V-0
Reliability	GR-468-CORE、IEC 61300-2