400G Single-port OSFP Multimode SR4 50m Transceiver

Features

- 400G SR4 multimode
- 4-channels of 100G-PAM4 electrical and optical modulation
- Flat top OSFP connector shell
- 850nm VCSEL
- Maximum reach:30m using OM3 fiber / 50m using OM4 fiber
- Single MPO-12/APC optical connector
- Less than 9W in temperature range of 0 to 70℃
- Single 3.3V power supply
- Class 1 laser safety
- Hot pluggable, RoHS compliant
- OSFPmsa.org compliant
- CMIS 4.0 compliant
- Case temperature range 0°C to +70°C

Applications

- Used in 400G OSFP adapters linked to Twin-port transceivers in 2x400G OSFP switches

Description

OSFP-400G-SR4 is an four-Channel, Parallel, Pluggable, Fiber-Optic OSFP for 400Gigabit Ethernet applications. This transceiver is a high performance module for shortrange data communication and interconnect application. It integrates four data lanes in each direction with 4x53.125GBd. The length of OSFP SR4 is up to 30 meters over OM3 MMF or 50 meters over OM4 MMF. This module is designed to operate over multimode fiber systems using a nominal wavelength of 850nm.

The Single-port and Twin-port transceiver combinations guarantee optimal operation. Rigorous production testing ensures the best out-of-the-box installation experience, performance, and durability.

Absolute Maximum Specifications

Absolute maximum ratings are those beyond which damage to the device may occur.

Prolonged operation between the operational specifications and absolute maximum ratings is not intended and may cause permanent device degradation.

Table1-Absolute Maximum Specifications

Parameter	Min.	Typical	Max.	Unit	Note
Storage Temperature	-40		+85	°C	
Supply voltage	-0.5		3.6	V	
Relative Humidity (non- condensing)	15		85	%	
Control input voltage	-0.3		Vcc+0.5	V	
Operating Case Temperature	0		70	°C	
Receiver Damage Threshold, per Lane	5			dBm	

Recommended Operating Conditions and Power Supply Requirements

Table2-Recommended Operating Conditions and Power Supply Requirements

Parameter	Symbol	Min	Typical	Max.	Units
Operating Case Temperature	Top	0		70	℃
Relative Humidity(non-condensing)	RH	15		85	%
Power Supply Voltage	Vcc	3.135		3.465	V
Total Power Consumption	Pc			9	W
Supply Current				2.87	A
Bit Rate	BR			425	Gbps
Fiber Length on OM3 MMF				30	m
Fiber Length on OM4 MMF				50	m
I^2C Clock Frequency		0		1000	kHz

Electrical Specifications

Table3-Electrical Specifications

Parameter	Min.	Typical	Max.	Unit	Note
Pre FEC Bit Error Ratio			2.4E-4		
Post FEC Bit Error Ratio			1E-12		
Transmitter (each Lane)					
Differential pk-pk Input Voltage tolerance	750			mV	
Differential Termination Mismatch			10	%	
Eye height	10			mV	
Common-mode to differential-mode return loss	IEEE802.3ck Equation (120G-1)			dB	
Vertical eye closure			12	dB	
Effective return loss	7.3			dB	
Transition Time	10			ps	
Receiver(each Lane)					
Differential data output swing	300		900	mVpp	
Differential termination mismatch			10	%	
Eye height	15			mV	
Vertical eye closure			12	dB	
Common-mode to differential-mode return loss	IEEE802.3ck Equation (120G-1)				
Effective return loss	8.5			dB	
Transition time	8.5			ps	

Optical Specifications

Table4-Optical Specifications

Parameter		Symbol	Min.	Typical	Max.	Unit	Note
Transceiver							
Data rate per lane		DR		53.125		GBd	
Modulation format				PAM4			
Center Wavelength		λ	840	860	868	nm	1
RMS spectral width		σ			0.6	nm	
Average Launch power, each lane		P_{avg}	-1		4	dBm	
Optical Power OMA, each Lane，max		P_{OMA}		3.5		dBm	
OMAouter, each lane min	max (TECQ, TDECQ)＜1.8 dB		max [-2.6 , max(TECQ,TECQ) – 4.4]			dBm	
	1.8＜max (TECQ, TDECQ)＜4.4 dB						
Transmitter and dispersion eye closure		TDECQ			4.4	dB	

(TDECQ), each lane						
Transmitter eye closure for PAM4 (TECQ), each lane	TECQ			4.4	dB	
Extinction ratio	ER	2.5			dB	
Transmitter power excursion, each lane				2.3	dBm	
Optical Return Loss Tolerance	ORLT			14	dB	
Optical Power for TX DISABLE				-30	dBm	
Encircled fluxb			⩾86% at 19 um ⩽30% at 4.5 um			2
Receiver						
Data rate per lane	BR		53.125			Gbd
Modulation format			PAM4			
Center Wavelength	λ	842	850	863	nm	
Damage threshold		5			dBm	
Average receive power, each lane		-6.4		4	dBm	
Receive power, each lane (OMAouter)				3.5	dBm	
Receiver reflectance	Rr			-15	dB	
Receiver sensitivity, each lane		RS = max (-4.6 , TECQ – 6.4)			dBm	3
Stressed receiver sensitivity, each lane				-2	dBm	
Rx LOS	Assert		-15		dBm	
	De-assert			-7.5	dBm	
	Hysteresis		0.5	5	dB	

Notes:

[1] Defined according to the performance of the laser used.

[2] Measured into type A1a.2 or type A1a.3, or A1a.4, 50 μ s fiber, in accordance with IEC 61280-1-4.

[3] Receiver sensitivity is informative and is defined for a transmitter with a value of TECQ. Measured with conformance test signal at TP3 for BER = 2.4E-4 Pre-FEC.

Pin Description

The device is OSFP MSA Specification for OSFP Octal Small Form Factor Pluggable Module Rev. 1.12 compliant, see www.osfpmsa.org.

Table5-Pin Description

Pin	Symbol	Description	Pin	Symbol	Description
1	GND	Ground	31	GND	Ground
2	Tx2p	Transmitter Non-Inverted Data Input	32	Rx2p	Receiver Non-Inverted Data Output
3	Tx2n	Transmitter Inverted Data Input	33	Rx2n	Receiver Inverted Data Output
4	GND	Ground	34	GND	Grounds
5	Tx4p	Transmitter Non-Inverted Data Input	35	Rx4p	Receiver Non-Inverted Data Output
6	Tx4n	Transmitter Inverted Data Input	36	Rx4n	Receiver Inverted Data Output
7	GND	Ground	37	GND	Ground
8	Tx6p	Transmitter Non-Inverted Data Input	38	Rx6p	Receiver Non-Inverted Data Output
9	Tx6n	Transmitter Inverted Data Input	39	Rx6n	Receiver Inverted Data Output
10	GND	Ground	40	GND	Ground
11	Tx8p	Transmitter Non- Inverted Data input	41	Rx8p	Receiver Non-Inverted Data Output
12	Tx8n	Transmitter Inverted Data Input	42	Rx8n	Receiver Inverted Data Output
13	GND	Ground	43	GND	Ground
14	SCL	2-wire serial interface clock	44	INT / RSTn	Module Interrupt / Module Reset
15	VCC	+3.3V Power	45	VCC	+3.3V Power
16	VCC	+3.3V Power	46	VCC	+3.3V Power
17	LPWn / PRSn	Low-Power Mode / Module Present	47	SDA	2-wire Serial interface data
18	GND	Ground	48	GND	Ground
19	Rx7n	Receiver Inverted Data Output	49	Tx7n	Transmitter Inverted Data Input
20	Rx7p	Receiver Non-Inverted Data Output	50	Tx7p	Transmitter Non-Inverted Data Input
21	GND	Ground	51	GND	Ground
22	Rx5n	Receiver Inverted Data Output	52	Tx5n	Transmitter Inverted Data Input
23	Rx5p	Receiver Non-Inverted Data Output	53	Tx5p	Transmitter Non-Inverted Data Input
24	GND	Ground	54	GND	Ground
25	Rx3n	Receiver Inverted Data Output	55	Tx3n	Transmitter Inverted Data Input
26	Rx3p	Receiver Non-Inverted Data Output	56	Tx3p	Transmitter Non-Inverted Data Input

27	GND	Ground	57	GND	Ground
28	Rx1n	Receiver Inverted Data Output	58	Tx1n	Transmitter Inverted Data Input
29	Rx1p	Receiver Non-Inverted Data Output	59	Tx1p	Transmitter Non-Inverted Data Input
30	GND	Ground	60	GND	Ground

OSFP Module Pad Layout

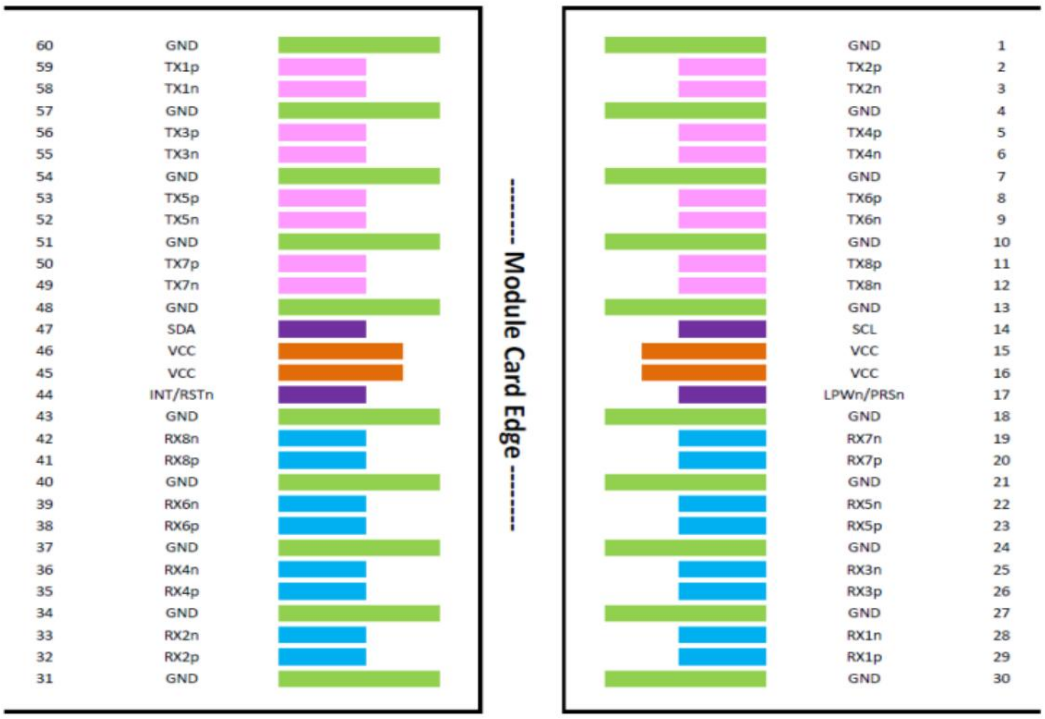

Figure 1 MSA Compliant Connector

Transceiver Block Diagram

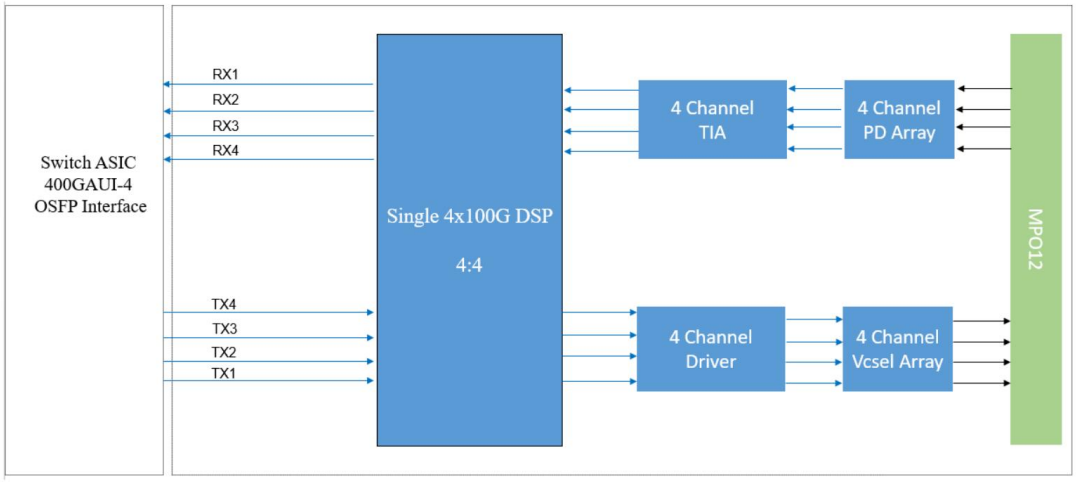

Figure 2 Transceiver Block Diagram

Management Interface

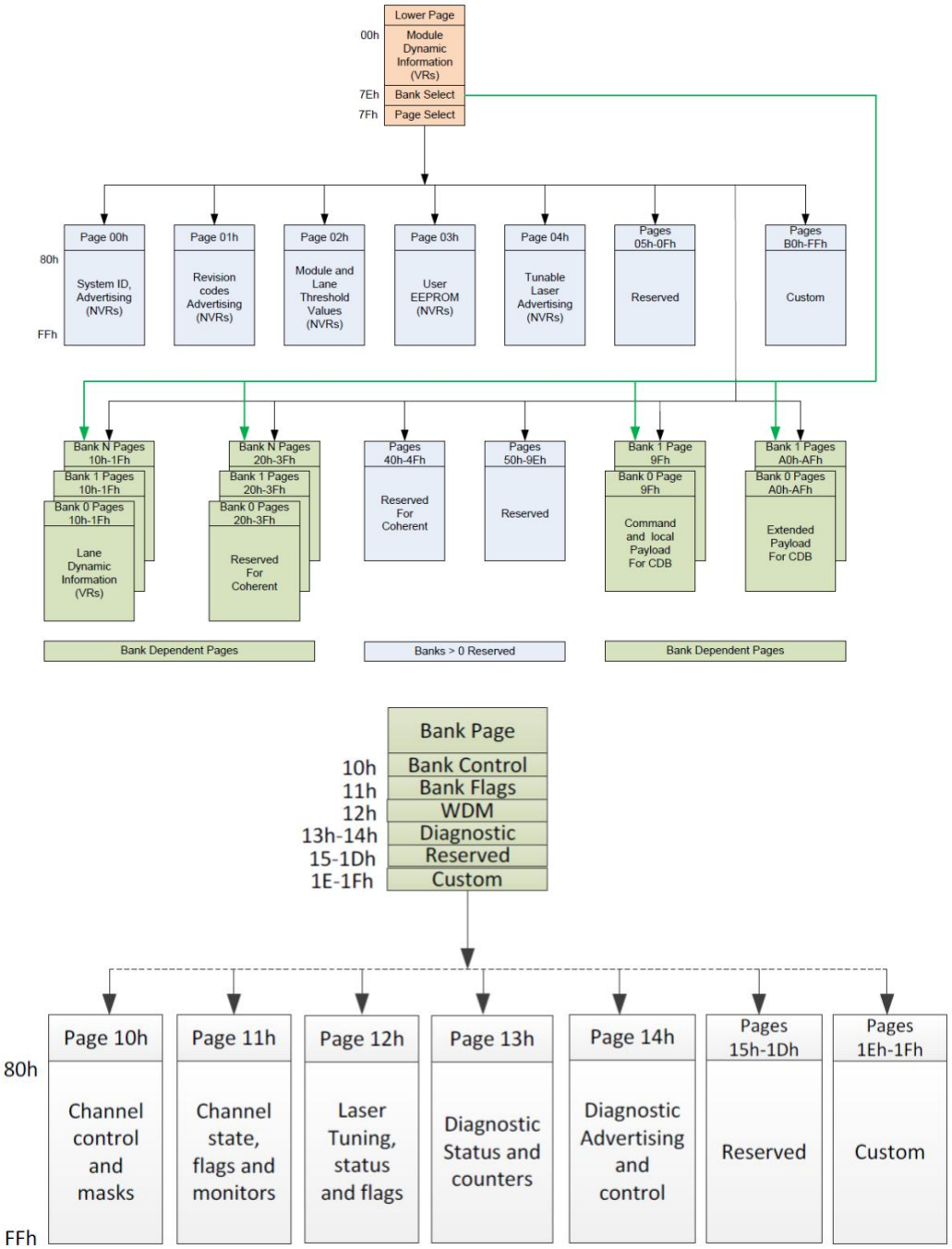

Figure 3 CMIS Module Memory Map

Optical Port Description

The optical interface port is MPO-12/APC receptacle. The transmit and receive optical lanes shall occupy the positions depicted in Figure 4 when looking into the MDI receptacle with the connector keyway feature on top.

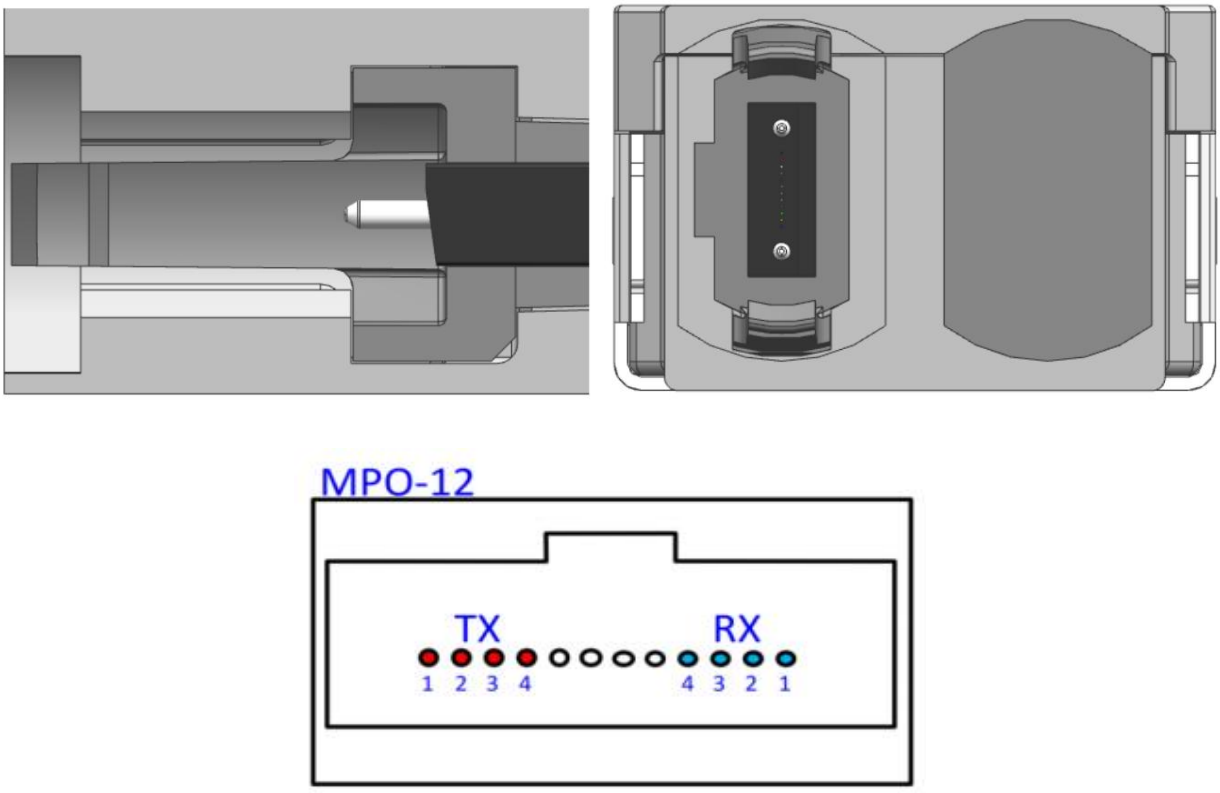

Figure 4 Optical Media Dependent Interface port assignments

Mechanical Drawing

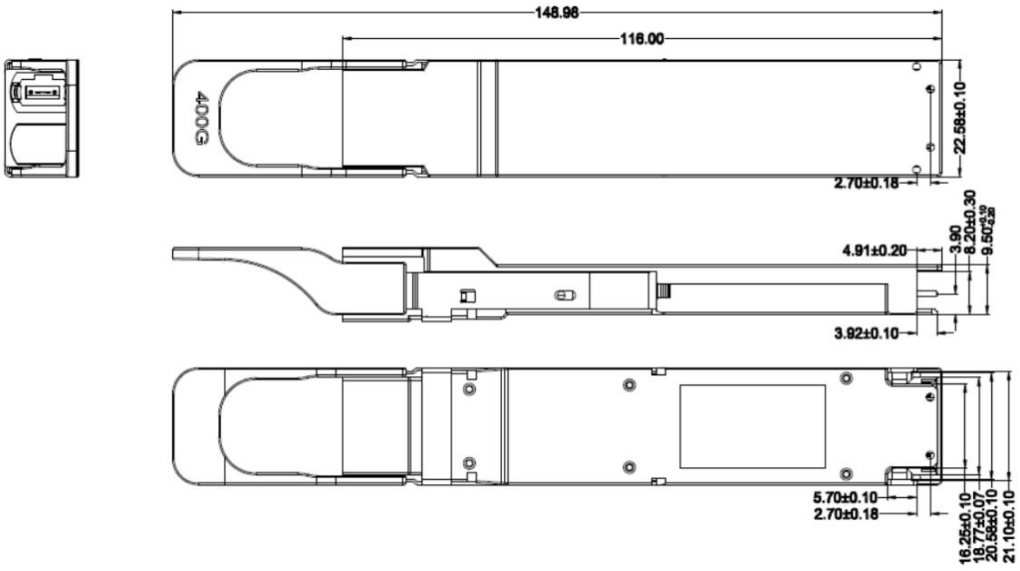

Figure 5 Mechanical Outline

Module appearance

Figure 6 Module appearance

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