

Product 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-APC Receptacle Type
- Compliant to RoHS 6/6
- Compliant to 400G OSFP MSA and CMIS4.0
- Operating case temperature: 0 to 70°C

Application

- Networks
- Data Centers and Cloud

Description

The 400GBASE-SR4 OSFP Optical Transceiver Module is designed for use in 400Gb/s systems throughput up to 30m over OM3 or 50m over OM4 multimode fiber (MMF) using a wavelength of 850nm via MPO-12 connectors. Digital diagnostics functions are also available via the I2C interface, as specified by the OSFP MSA, to allow access to real time operating parameters. With these features, this easy to install, hot swappable transceiver is suitable to be used in various applications, such as data centers, high-performance computing networks, enterprise core and distribution layer applications.

Absolute Maximum Ratings

Parameter	Unit	Min	Max
Storage Temperature	°C	-40	+85
Supply Voltage	V	-0.5	+3.6
Operating Relative Humidity	%	5	+85
Case Operating Temperature	°C	0	70

Notes:

1. Absolute Maximum Ratings are those beyond which damage to the device may occur.

2. Between the Recommended Operating conditions and Absolute Maximum ratings, prolonged operation is not intended, and permanent device degradation may occur.

Recommended Operating Conditions:

Parameter	Unit	Min.	Typ	Max.
Operating Case Temperature	°C	0		70
Power Supply Voltage	V	3.135	3.3	3.465
Power Consumption	W			8
Pre-FEC Bit Error Ratio			2.4E-4	
Post-FEC Bit Error Ratio			1E-12	
Link Distance (SR4)	m	2		100

Notes:

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

Optical Specification(General)

Parameter	400GBASE-SR4
Application code	400G-SR4
Standard	IEEE Std 802.3db&IEEE Std 802.3ck
Data rate(Gb/s)	425Gb/s

Electrical Specifications

Parameter	Reference	Value	Unit	Note
Receiver				
Signaling rate, each lane (nominal)		53.1251	GBd	1
AC common-mode output Voltage (max,RMS)	120G.5.1	17.5	mV	
Differential peak-to-peak output voltage (max) (Short mode)	120G.5.1	600	mV	
Differential peak-to-peak output voltage (max) (Long mode)	120G.5.1	900	mV	

Eye height (min)	120G.3.2.2	15	mV	
Vertical eye closure, VEC (max)	120G.3.2.2	12	dB	
Common-mode to differential return loss (min)	120G.3.1.1	Equation (120G-1)	dB	
Effective return loss, ERL (min)	120G.3.2.3	8.5	dB	
Differential termination mismatch (max)	120G.3.1.3	10	%	
Transition time (min)	120G.3.1.4	8.5	ps	
DC common-mode voltage (min)	120G.5.1	-350	mV	2
DC common-mode voltage (max)	120G.5.1	2850	mV	2
Transmitter				
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	
Transition time (min)	120G.3.1.4	8.5	ps	
Differential termination mismatch(max)	120G.3.1.3	10	%	
Module stressed input test	120G.3.4.2	See 120G.3.4.2		3
Single-ended voltage tolerance range (min)	120G.5.1	-0.4 to 3.3	V	
DC common mode voltage (min)	120G.5.1	-350	mV	2
DC common mode Voltage(max)	120G.5.1	2850	mV	2

Notes:

1. The signaling rate range is derived from the PMD receiver input.
2. DC common-mode voltage is generated by the host. Specification includes effects of ground offset voltage.
3. Meets BER specified in 120G.1.1 References are from IEEE 802.3ck

Electrical Power Supply Characteristics

Parameter	Units	Min	Typ.	Max
Power Supply Voltage	V	3.13	3.30	3.47
Power Consumption	W	-	-	8
Power Consumption-LP mode	W	-	-	1.5

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.

Optical Characteristics

Parameter	400GBaSE-SR4	Unit	Note
Transmitter			
Signaling rate, each lane (range)	53.125 ± 100 ppm	GBd	
Wavelength	840~860	nm	
Modulation format	PAM4	-	
RMS spectral width (max)	0.6	nm	1
Average Launch Power (max)	4	dBm	
Average launch power, each lane (min)	-4.6	dBm	
Outer Optical Modulation Amplitude (OMA _{outer}), Each Lane (max)	3.5	dBm	
Outer Optical Modulation Amplitude (OMA _{outer}), each lane (min)for max(TECQ, TDECQ)≤1.8 dBor 1.8 < max(TECQ, TDECQ)≤4.4 dB	- 2.6 -4.4+max (TECQ,TDECQ)	dBm	
Transmitter eye closure for PAM4 (TECQ), each lane (max)	4.4	dB	
Transmitter and Dispersion Eye Closure for PAM4 (TDECQ), 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 _{12OMA} (max)	-132	dB/Hz	
Optical Return Loss Tolerance	14	dB	
Encircled flux	≥86% at 19 nm ≤30% at 4.5um	-	2
Receiver			
Wavelength	840~860	nm	
Signaling rate, each lane (range)	53.125 ± 100 ppm	GBd	
Modulation Format	PAM4	-	
Damage Threshold (min)	5	dBm	3
Average Receive Power,each lane(max)	4	dBm	
Average Receive Power,each lane(min)	-6.4	dBm	4

Receiver Power (OMA) ,each lane(max)	3.5	dBm	
Receiver Reflectance(max)	-12	dB	
Receiver Sensitivity (OMA _{outer}), each lane (max) for TECQ≤1.8 dBfor 1.8<TECQ≤4.4 dB	-4.6 -6.4+TECQ	dBm	
Stressed Receiver Sensitivity (OMA _{outer}), each lane(max)	-2	dBm	5
Stressed eye closure for PAM4 (SECQ)	4.4	dB	
OMA _{outer} of each aggressor lane	3.5	dBm	

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 μ m fiber, in accordance with IEC 61280- 1-4
- 3.The receiver shall be able to tolerate, without damage, continuous exposure to an optical input signal having this average power level onone lane. The receiver does not have to operate correctly at this input power.
- 4.Average receive power, each lane (min) is informative and not the principal indicator of signal strength. A received power belowthis valuecannot be compliant; however, a value above this does not ensure compliance.
- 5.Measured with conformance test signal at TP3 (see 167.8.13) for the BER specified in 167.1.1.

Pin Definition and Description



Table 1. Pin definition and descriptions

Pin	Logic	Symbol	Name/Description	Plug Sequence
1		GND	Ground	1
2	CML-I	TX2p	Transmitter Data	3
3	CML-I	TX2n	Transmitter Data Inverted	3
4		GND	Ground	1
5	CML-I	TX4p	Transmitter Data	3
6	CML-I	TX4n	Transmitter Data Inverted	3
7		GND	Ground	1
8	CML-I	TX6p	Underfined	3
9	CML-I	TX6n	Underfined	3
10		GND	Ground	1
11	CML-I	TX8p	Underfined	3
12	CML-I	TX8n	Underfined	3
13		GND	Ground	1
14	LVC MOS-	SCL	2-wire Serial interface clock	3
15		VCC	+3.3V Power	2
16		VCC	+3.3V Power	2
17	Multi-	LPWn/PRSn	Low-Power Mode /	3
18		GND	Ground	1
19	CML-O	RX7n	Underfined	3
20	CML-O	RX7p	Underfined	3
21		GND	Ground	1
22	CML-O	RX5n	Underfined	3
23	CML-O	RX5p	Underfined	3
24		GND	Ground	1
25	CML-O	RX3n	Receiver Data Inverted	3
26	CML-O	RX3p	Receiver Data Non-Inverted	3
27		GND	Ground	1
28	CML-O	RX1n	Receiver Data Inverted	3
29	CML-O	RX1p	Receiver Data Non-Inverted	3
30		GND	Ground	1
31		GND	Ground	1
32	CML-O	RX2p	Receiver Data Non-Inverted	3
33	CML-O	RX2n	Receiver Data Inverted	3
34		GND	Ground	1
35	CML-O	RX4p	Receiver Data Non-Inverted	3
36	CML-O	RX4n	Receiver Data Inverted	3
37		GND	Ground	1
38	CML-O	RX6p	Underfined	3

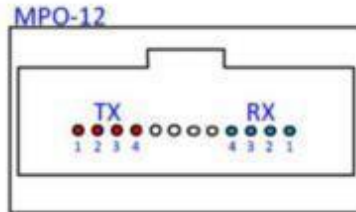
39	CML-O	RX6n	Underfined	3
40		GND	Ground	1
41	CML-O	RX8p	Underfined	3
42	CML-O	RX8n	Underfined	3
43		GND	Ground	1
44	Multi-Level	INT/RSTn	Module Interrupt / Module	3
45		VCC	+3.3V Power	2
46		VCC	+3.3V Power	2
47	LVC MOS-	SDA	2-wire Serial interface data	3
48		GND	Ground	1
49	CML-I	TX7n	Transmitter Data Inverted	3
50	CML-I	TX7p	Transmitter Data	3
51		GND	Ground	1
52	CML-I	TX5n	Underfined	3
53	CML-I	TX5p	Underfined	3
54		GND	Ground	1
55	CML-I	TX3n	Transmitter Data Inverted	3
56	CML-I	TX3p	Transmitter Data	3
57		GND	Ground	1
58	CML-I	TX1n	Transmitter Data Inverted	3
59	CML-I	TX1p	Transmitter Data	3
60		GND	Ground	1

Digital Diagnostic Specification

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

OPTICAL INTERFACE LANES AND ASSIGNMENT

The recommended location and numbering of the optical ports for 3 Media Dependent Interfaces (MDI) are shown in Figure 4. 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.



Mechanical Dimensions

