WAVESPLITTER™
TECHNOLOGIES, INC.

Data Sheet

400G OSFP Active Optical Cable (AOC)
P/N: WS-OS4-AOCxCyy4

Features:

- 400 Gb/s nominal data rate
- 4 electrical lanes at 106.25 Gb/s PAM4
- 4 optical lanes at 106.25 Gb/s PAM4
- Maximum length of 50 m with FEC
- Hot-pluggable OSFP Open Top form factor
- Single 3.3 V power supply per end
- Maximum power consumption: 8.5 W per end
- Digital diagnostic monitoring support
- Operating case temperature: 15 °C to 70 °C
- RoHS compliant

Applications:

- 400G Ethernet or InfiniBand interconnects
- Data center interconnects
- Datacom switching and routing applications

Standards:

- IEEE 802.3db compliant
- IEEE 802.3ck compliant
- OSFP MSA compliant
- CMIS 5.0 management interface

Description

The WS-OS4-AOCxCyy4 is a 400G OSFP Active Optical Cable designed for short-reach data communication and interconnect applications. It supports a data rate of 400 Gb/s and cable lengths of up to 50 m using OM4 multimode fiber with FEC. The cable consists of two hot-pluggable OSFP Open Top active ends interconnected by a pre-terminated OM4 multimode fiber cable assembly. The MPO optical interfaces are secured with locking mechanisms to provide a secure and reliable cable assembly during normal operation.

Function Description

The cable provides four electrical lanes and four optical lanes operating at 106.25 Gb/s PAM4 per lane. Each OSFP end converts the four electrical lanes between the host interface and four parallel optical lanes through DSP-based retiming and signal processing together with VCSEL-based optical technology. The two active ends are interconnected through the secured OM4 multimode fiber cable assembly to provide bidirectional 400G Ethernet or InfiniBand connectivity.

Each OSFP end supports digital diagnostic monitoring through a CMIS 5.0 management interface and operates from a single +3.3 V power supply. Maximum power consumption is 8.5 W per end, and the operating case temperature range is 15 °C to 70 °C.

Absolute Maximum Ratings

Parameter	Symbol	Min	Max	Units	Notes
Storage Temperature	T_S	-40	85	°C	
Supply Voltage	V_{CC}	-0.5	3.6	V	
Relative Humidity	RH	5	85	%	Non-condensing

Recommended Operating Conditions

Parameter	Symbol	Min	Typ	Max	Unit	Notes
Electrical Signal Rate (per lane)		53.125 ± 100 ppm			GBd	PAM4
Supply Voltage	V_{CC}	3.135	3.3	3.465	V	
Operating Case Temperature	T_C	15		70	°C	
Power Consumption (each end)	P_C			8.5	W	

Electrical Characteristics (Under Recommended Operating Conditions)

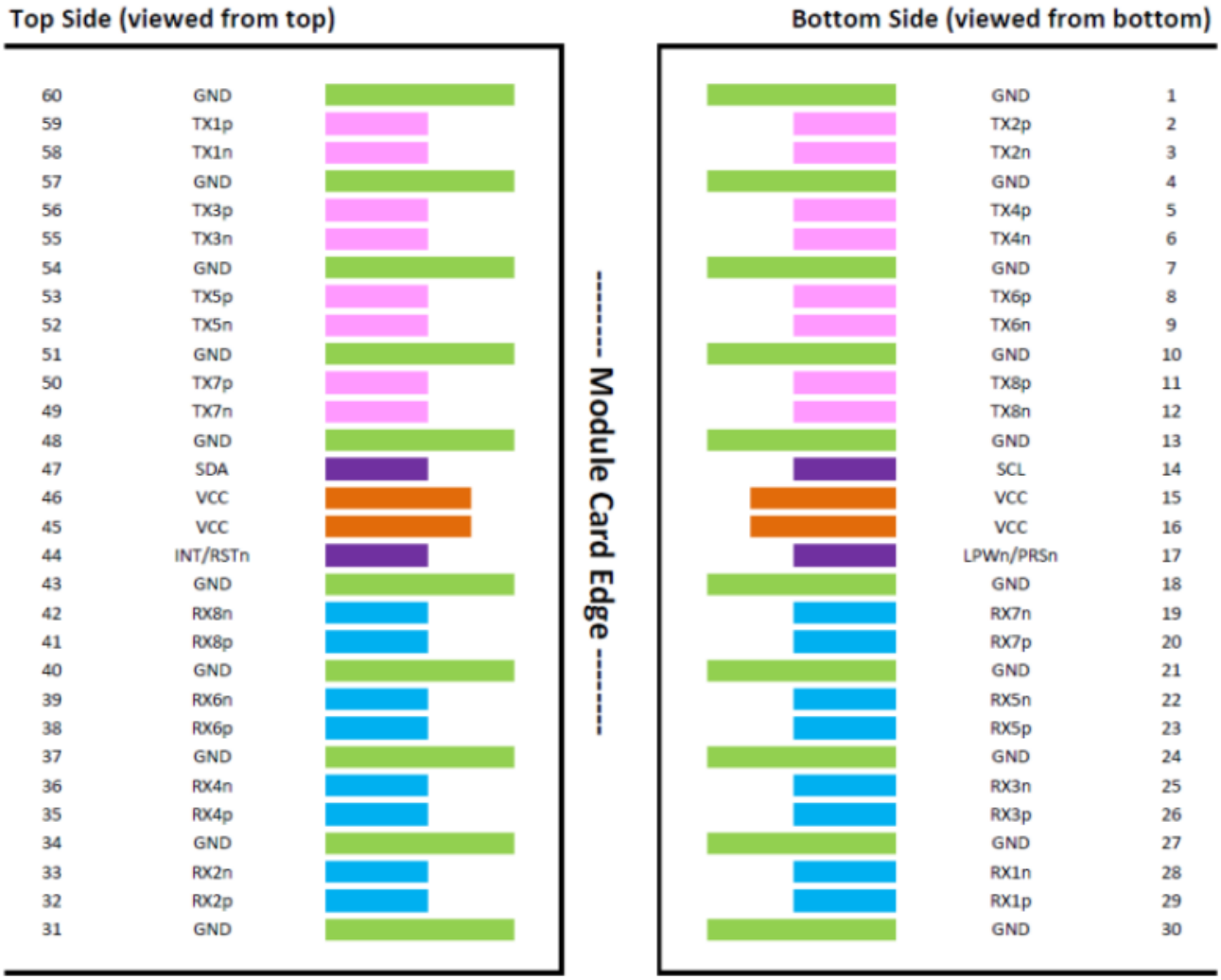
Parameter	Test Point	Min	Typ	Max	Unit	Note
High Speed Electrical Input Characteristics						
Signaling rate, each lane (PAM4 encoded)	TP1	53.125 ± 100 ppm			GBd	
Differential peak-to-peak input voltage tolerance	TP1a	750			mV	
AC common-mode RMS voltage tolerance	TP1a	25			mV	
Single-ended voltage tolerance	TP1a	-0.4		3.3	V	
DC common-mode voltage tolerance	TP1	-0.35		2.85	V	
High Speed Electrical Output Characteristics						
Signaling rate, each lane (PAM4 Encoded)	TP4	53.125 ± 100 ppm			GBd	
AC common-mode output voltage (RMS)	TP4			25	mV	
Differential peak-to-peak output voltage, short mode	TP4			600	mV	

Differential peak-to-peak output voltage, long mode	TP4			845	mV	
Eye height	TP4	15			mV	
DC common-mode voltage tolerance	TP4	-0.35		2.85	V	

Digital Diagnostic Monitor Accuracy (Under Recommended Operating Conditions)

Parameter	Accuracy	Unit	Note
Measured transceiver temperature	±3	°C	
Measured transceiver supply voltage	±3	%	
Measured Tx bias current	±10	%	
Measured Tx output power	±3	dB	
Measured Rx received average optical power	±3	dB	

Pin Assignment



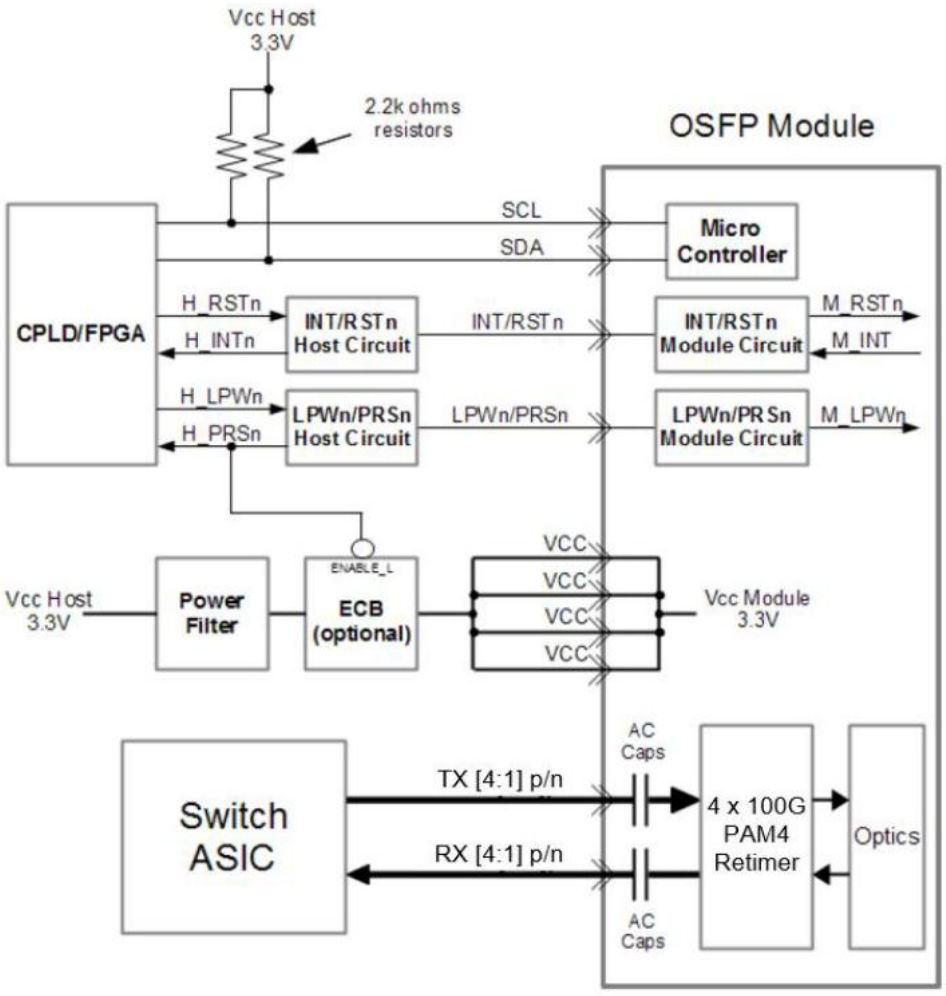
Pinout of Connector Block on Host Board

PIN	Name	Logic	Description	Direction	Notes
1	GND		Ground		
2	TX2p	CML-I	Transmitter Data Non-Inverted	Input from Host	
3	TX2n	CML-I	Transmitter Data Inverted	Input from Host	
4	GND		Ground		
5	TX4p	CML-I	Transmitter Data Non-Inverted	Input from Host	
6	TX4n	CML-I	Transmitter Data Inverted	Input from Host	
7	GND		Ground		
8	TX6p	CML-I	Transmitter Data Non-Inverted	Input from Host	Unused in 400G Mode
9	TX6n	CML-I	Transmitter Data Inverted	Input from Host	Unused in 400G Mode
10	GND		Ground		
11	TX8p	CML-I	Transmitter Data Non-Inverted	Input from Host	Unused in 400G Mode
12	TX8n	CML-I	Transmitter Data Inverted	Input from Host	Unused in 400G Mode
13	GND		Ground		
14	SCL	LVCMOS-I/O	2-wire Serial interface clock	Bi-directional	
15	VCC		+3.3V Power supply	Power from Host	
16	VCC		+3.3V Power supply	Power from Host	
17	LPWn/PRSn	Multi-Level	Low-Power Mode / Module Present	Bi-directional	
18	GND		Ground		
19	RX7n	CML-O	Receiver Data Inverted	Output to Host	Unused in 400G Mode
20	RX7p	CML-O	Receiver Data Non-Inverted	Output to Host	Unused in 400G Mode
21	GND		Ground		
22	RX5n	CML-O	Receiver Data Inverted	Output to Host	Unused in 400G Mode
23	RX5p	CML-O	Receiver Data Non-Inverted	Output to Host	Unused in 400G Mode

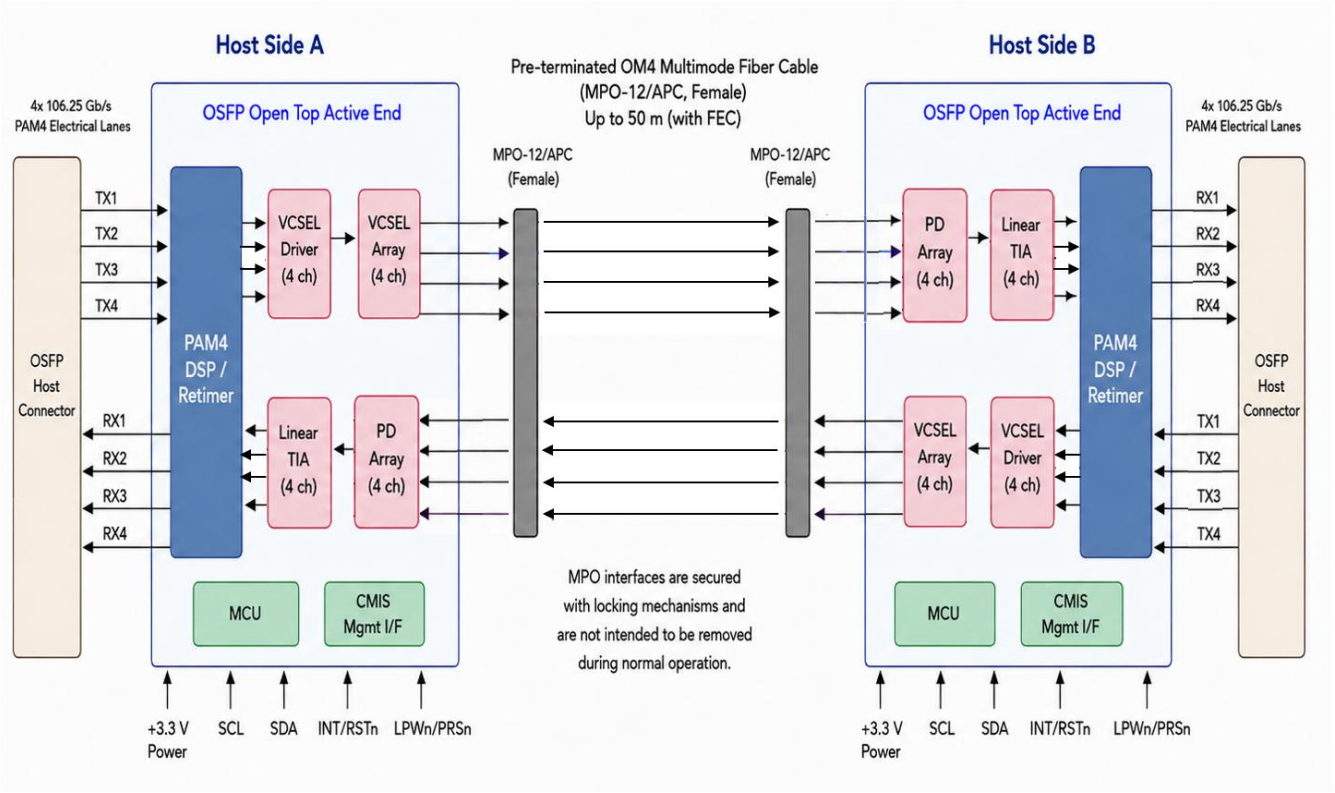
24	GND		Ground		
25	RX3n	CML-O	Receiver Data Inverted	Output to Host	
26	RX3p	CML-O	Receiver Data Non-Inverted	Output to Host	
27	GND		Ground		
28	RX1n	CML-O	Receiver Data Inverted	Output to Host	
29	RX1p	CML-O	Receiver Data Non-Inverted	Output to Host	
30	GND		Ground		
31	GND		Ground		
32	RX2p	CML-O	Receiver Data Non-Inverted	Output to Host	
33	RX2n	CML-O	Receiver Data Inverted	Output to Host	
34	GND		Ground		
35	RX4p	CML-O	Receiver Data Non-Inverted	Output to Host	
36	RX4n	CML-O	Receiver Data Inverted	Output to Host	
37	GND		Ground		
38	RX6p	CML-O	Receiver Data Non-Inverted	Output to Host	Unused in 400G Mode
39	RX6n	CML-O	Receiver Data Inverted	Output to Host	Unused in 400G Mode
40	GND		Ground		
41	RX8p	CML-O	Receiver Data Non-Inverted	Output to Host	Unused in 400G Mode
42	RX8n	CML-O	Receiver Data Inverted	Output to Host	Unused in 400G Mode
43	GND		Ground		
44	INT/RSTn	Multi-Level	Module Interrupt / Module Reset	Bi-directional	
45	VCC		+3.3V Power supply	Power from Host	
46	VCC		+3.3V Power supply	Power from Host	
47	SDA	LVCMOS-I/O	2-wire Serial interface data	Bi-directional	
48	GND		Ground		
49	TX7n	CML-I	Transmitter Data Inverted	Input from Host	Unused in 400G Mode
50	TX7p	CML-I	Transmitter Data Non-Inverted	Input from Host	Unused in 400G Mode
51	GND		Ground		

52	TX5n	CML-I	Transmitter Data Inverted	Input from Host	Unused in 400G Mode
53	TX5p	CML-I	Transmitter Data Non-Inverted	Input from Host	Unused in 400G Mode
54	GND		Ground		
55	TX3n	CML-I	Transmitter Data Inverted	Input from Host	
56	TX3p	CML-I	Transmitter Data Non-Inverted	Input from Host	
57	GND		Ground		
58	TX1n	CML-I	Transmitter Data Inverted	Input from Host	
59	TX1p	CML-I	Transmitter Data Non-Inverted	Input from Host	
60	GND		Ground		

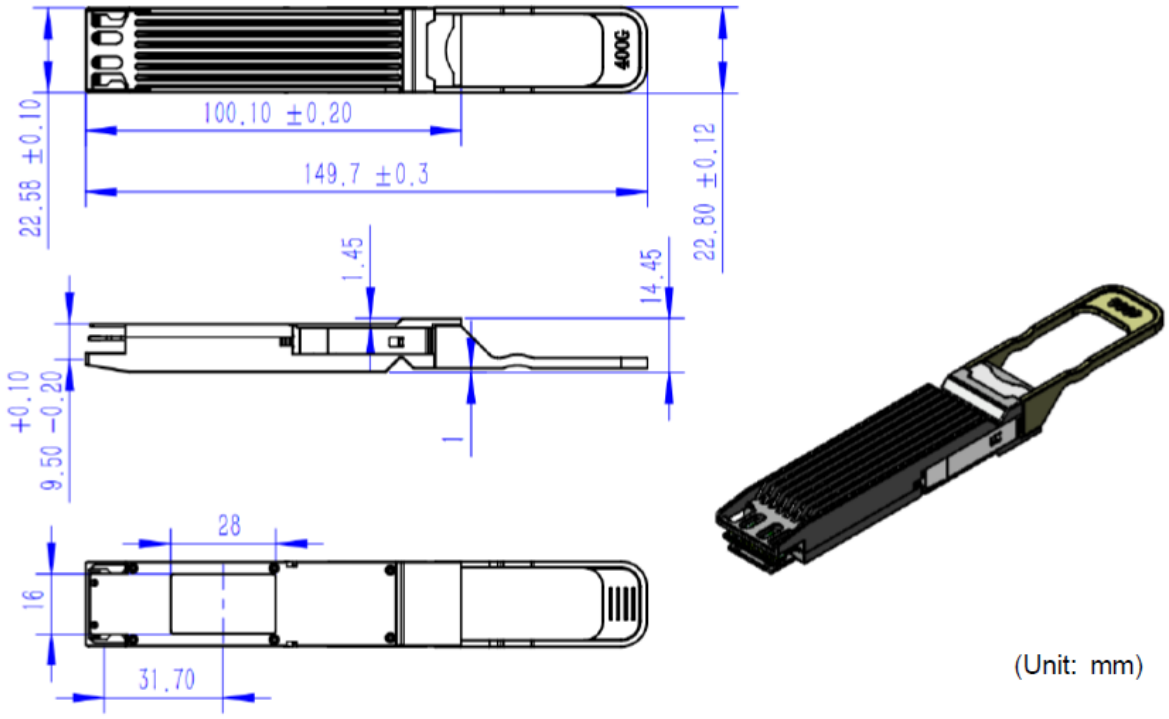
Recommended Host Connection for Each OSFP End



Block Diagram / Architecture of 400G OSFP AOC



OSFP End Mechanical Dimensions



(Unit: mm)

Cable Length (Unit: m)	Tolerance
1.0 ~ 4.5	±5 cm
5.0 ~ 14.5	±15 cm
15.0 ~ 50.0	±1.5%

Ordering Information

Part No	Package	Data rate	Laser	Fiber	Cable Length	Temperature	Applications
WS-OS4-AOCxCyy4	**OSFP**	**400 Gb/s**	**850 nm VCSEL**	**OM4**	**Up to 50 m**	**15 °C to 70 °C**	**400G Switch & Router interconnection**

Note:

Cable jacket type: x = L for LSZH, P for OFNP, R for OFNR, or X for any of the above (OFNR, OFNP, or LSZH)

Cable length: yy = length in meters; for example, 01 = 1 m, 10 = 10 m, 30 = 30 m, 50 = 50 m

Optional cable lengths and cable types may be available upon customer request. Please contact sales for detailed information.

Modification History

Revision	Date	Description	Originator	Review	Approve
V1.0	19-Oct-2023	New Issue	Jason Hou	Wayne Liao	Tom Tang

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