

400G OSFP AOC Optical Transceiver

Features

- Hot-plug OSFP-RHS and OSFP-RHS form factor
- Transmission data rate up to 106.25G per channel
- 4x106.25Gbps PAM4 transmitter and PAM4 receiver
- 4 channels 850nm VCSEL array (both End)
- 4 channels PIN photo detector array (both End)
- Power consumption <8W
- Hot Pluggable OSFP-RHS form factor and Compliant with CMIS
- Maximum link length of 30m on OM3 Multimode Fiber (MMF) and 50m on OM4 MMF FEC
- Built-in digital diagnostic functions
- Operating case temperature 0°C to +70°C
- 3.3V power supply voltage
- RoHS compliant (lead free)

Standards Compliance

- IEEE 802.3db
- OSFP MSA&QSFP-DD MSA
- CMIS 4.0

Applications

- 400GBASE-VR4 Ethernet
- Data center
- InfiniBand

General Description

Part No.	Specifications					
	Package	Data rate	Wavelength	Temp	Reach	Optical Interface
VA4Q-4QNR100	OSFP	425Gbps	850	0~70°C	100m	N/A

1 Absolute Maximum Ratings and Operation Conditions

Table 1.1 Absolute Maximum Ratings

Parameter	Symbol	Unit	Min	Max
Supply Voltage	Vcc	V	-0.3	+3.6

Input Voltage	V _{in}	V	-0.3	V _{cc} +0.3
Storage Temperature	T _s	°C	-20	+85
Case Operating Temperature	T _{op}	°C	0	70
Operating Humidity	RH	%	5	+85

Table 1.2 Operating Conditions

Parameter	Symbol	Unit	Min	Typ	Max	NOTE
Operating Case Temperature	T _C	°C	0	-	+70	
Power Supply Voltage	V _{cc}	V	3.135	3.3	3.465	
Power Dissipation per OSFP	P _d	W	-	-	8	
Power Dissipation per QSFP112	P _d	W	-	-	8	
Bit Rate		Gbps	-	425	-	

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. The 60 electrical pins allow exchanging high speed data, control and alarm signals between module and host board. The pin-outs are summarized below:

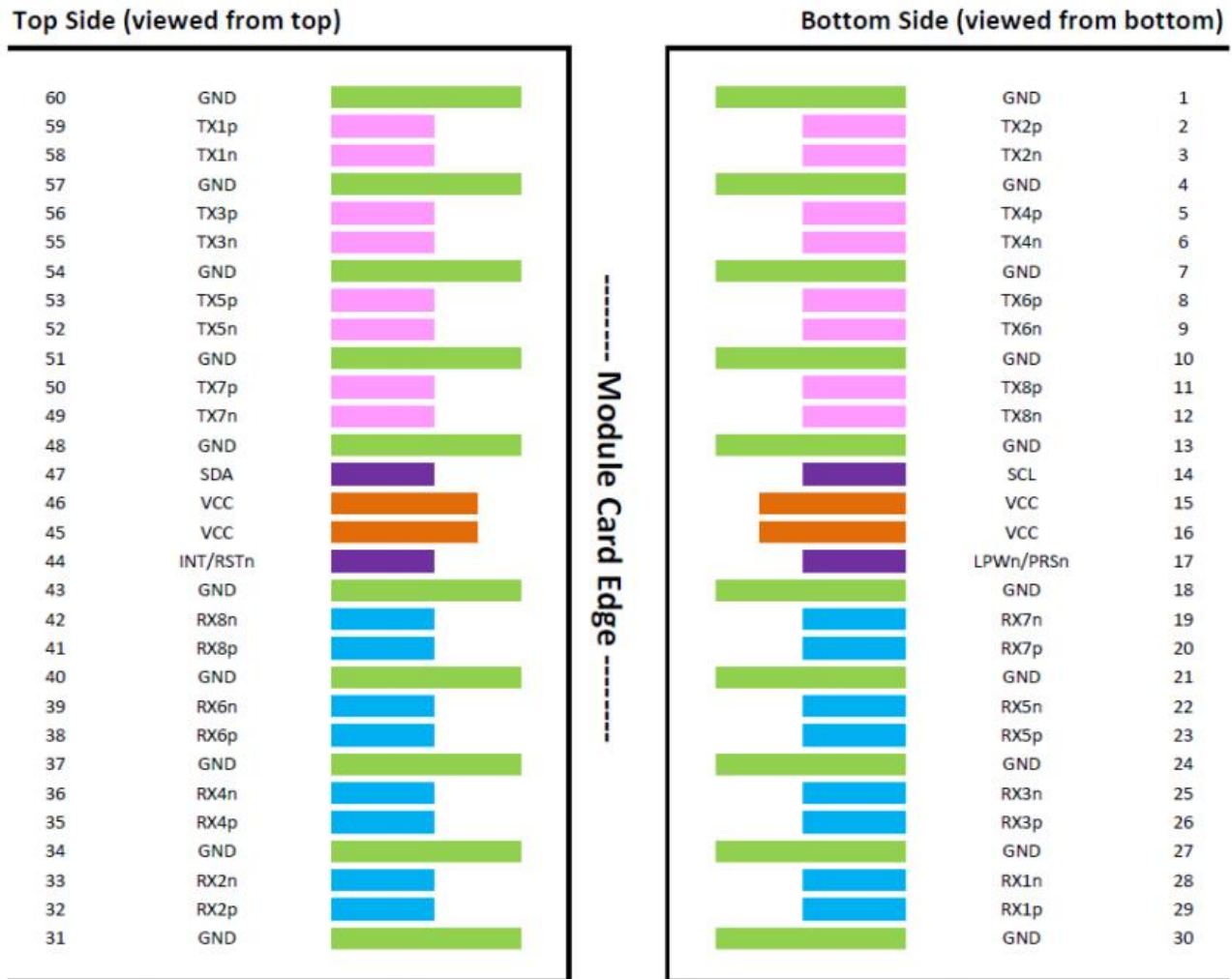


Figure 2.1 OSFP module pinout

Pad#	Symbol	Description	Logic	Notes
1	GND	Ground		
2	TX2p	Transmitter Data Non-Inverted	CML-I	
3	TX2n	Transmitter Data Inverted	CML-I	
4	GND	Ground		
5	TX4p	Transmitter Data Non-Inverted	CML-I	
6	TX4n	Transmitter Data Inverted	CML-I	
7	GND	Ground		
8	TX6p	Transmitter Data Non-Inverted	CML-I	
9	TX6n	Transmitter Data Inverted	CML-I	
10	GND	Ground		
11	TX6p	Transmitter Data Non-Inverted	CML-I	
12	TX6n	Transmitter Data Inverted	CML-I	
13	GND	Ground		
14	SCL	2-wire serial interface clock	LVC MOS-VO	
15	VCC	+3.3V Power		
16	VCC	+3.3V Power		
17	LPWn/PRSn	Low-Power Mode/Module Present	Multi-Level	
18	GND	Ground		
19	RX7n	Receiver Data Inverted	CML-O	
20	RX7p	Receiver Data Non-Inverted	CML-O	
21	GND	Ground		
22	RX5n	Receiver Data Inverted	CML-O	
23	RX5p	Receiver Data Non-Inverted	CML-O	
24	GND	Ground		
25	RX3n	Receiver Data Inverted	CML-O	
26	RX3p	Receiver Data Non-Inverted	CML-O	
27	GND	Ground		

28	RX1n	Receiver Data Inverted	CML-O	
29	RX1p	Receiver Data Non-Inverted	CML-O	
30	GND	Ground		
31	GND	Ground		
32	RX2p	Receiver Data Non-Inverted	CML-O	
33	RX2n	Receiver Data Inverted	CML-O	
34	GND	Ground		
35	RX4p	Receiver Data Non-Inverted	CML-O	
36	RX4n	Receiver Data Inverted	CML-O	
37	GND	Ground		
38	RX6p	Receiver Data Non-Inverted	CML-O	
39	RX6n	Receiver Data Inverted	CML-O	
40	GND	Ground		
41	RX8p	Receiver Data Non-Inverted	CML-O	
42	RX8n	Receiver Data Inverted	CML-O	
43	GND	Ground		
44	INT/RSTn	Module Interrupt/Module Reset	Multi-Level	
45	VCC	+3.3V Power		
46	VCC	+3.3V Power		
47	SDA	2-wire serial interface Data	LVC MOS-VO	
48	GND	Ground		
49	TX7n	Transmitter Data Inverted	CML-I	
50	TX7p	Transmitter Data Non-Inverted	CML-I	
51	GND	Ground		
52	TX5n	Transmitter Data Inverted	CML-I	
53	TX5p	Transmitter Data Non-Inverted	CML-I	
54	GND	Ground		

55	TX3n	Transmitter Data Inverted	CML-I	
56	TX3p	Transmitter Data Non-Inverted	CML-I	
57	GND	Ground		
58	TX1n	Transmitter Data Inverted	CML-I	
59	TX1p	Transmitter Data Non-Inverted	CML-1	
60	GND	Ground		

2.2 OSFP Electric Ports Definition

Parameter	Symbol	Unit	Min	Typ	Max	Note
Differential input impedance	Zin	ohm	90	100	110	
Differential Output impedance	Zout	ohm	90	100	110	
Differential input voltage amplitude	ΔV_{in}	mVp-p	400		900	
Differential output voltage	ΔV_{out}	mVp-p			850	
Bit Error Rate	BER	-			2.4E-4	
Input Logic Level High	V _{IH}	V	2.0		V _{cc}	
Input Logic Level Low	V _{IL}	V	0		0.8	
Output Logic Level High	V _{OH}	V	V _{cc} -0.5		V _{cc}	
Output Logic Level Low	V _{OL}	V	0		0.4	
Input Logic Level High	V _{IH}	V	2.0		V _{cc}	

2.3 Optical Characteristics

Parameter	Symbol	Unit	Min	Typ	Max	Note
Transmitter						
Centre Wavelength	λ_c	nm	842	850	948	
RMS spectral width	$\Delta\lambda$	nm	-	-	0.65	
Average launch power,each lane	P _{out}	dBm	-4.6	-	4	
Optical Modulation Amplitude(OMA outer), each lane	OMA	dBm	-2.6	-	4	
Transmitter and dispersion eye closure forPAM4(TDECQ), each lane	TDECQ	dB	-	-	4.4	
Extinction Ratio	ER	dB	2.5	-	-	
Average launch power of OFFtransmitter, each lane		dB			-30	
Receiver						
Lane wavelength	λ_c	GBd		53.125		
Receiver Sensitivity in OMA out	RXsen		-50		+50	
Stressed Receiver Sensitivity in OMA out	SRS		842	850	948	

Maximum Average power at receiver, each lane input, each lane		dBm			Max(4.4,TEC Q-6.2)	
Minimum Average power at receiver, each lane		dBm			-1.8	
Receiver Reflectance					5	
LOS Assert	LOSA	dBm	-6.3			
LOS De-Assert	LOSD	dBm			-15	
LOS Hysteresis	LOSH	dB	-15		-8.5	

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.

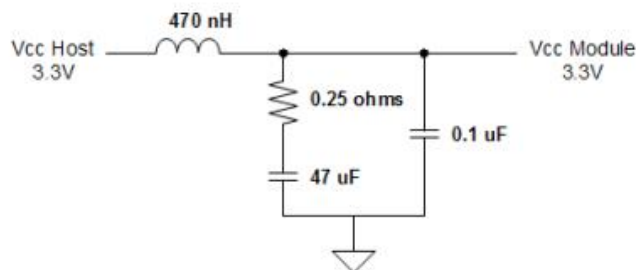


Figure 2.2 Recommended Host Board Power Supply Filtering

3 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

4 Important Notice

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5 Revision History

Revision	Date	Description
V1.0	2025.6.10	Advance Release.