

400G OSFP112 DR4 Optical Transceiver

Features

- Support 100GBASE per lane in Single mode fiber
- Hot-pluggable QSFP112 Type 2 form factor
- Data rate up to 425Gbps (4 x 106.25 Gbps)
- Reach up to 500m on SMF
- 1310nm laser and PIN receiver
- High speed I/O electrical interface (400GAUI-4)
- Single MPO-12 receptacle
- Operating case temperature: 0 to +70°C
- Compliant to RoHS 6/6
- Compliant to 400G QSFP112 MSA and CMIS4.0

Standards Compliance

- Compliant to IEEE802.3ck
- Compliant to 400G QSFP112 MSA and CMIS4.0

Applications

- 400G Ethernet and Infiniband
- Data center networks

General Description

Part No.	Specifications					
	Package	Data rate	Wavelength	Temp	Reach	Optical Interface
VD4H5-E031R	OSFP112	425Gbps	1310	0~70°C	500m	Single MPO-12 APC

1 Absolute Maximum Ratings and Operation Conditions

Table 1.1 Absolute Maximum Ratings

Parameter	Symbol	Unit	Min	Typ	Max
Supply Voltage	V _{cc}	V	-0.3	-	3.6
Storage Temperature	T _s	°C	-40	-	+85
Operating Humidity	RH	%	5	-	+85

Control Input Voltage	VI	V	-0.3	-	VCC+0.3
RX damage threshold, each Lane	-	dBm	5	-	-

Table 1.2 Operating Conditions

Parameter	Symbol	Unit	Min	Typ	Max	NOTE
Operating Case Temperature	TC	°C	0	-	70	
Power Supply Voltage	Vcc	V	3.135	3.3	3.465	
Power Dissipation	Pdiss	W	-	-	9	
Supply Current	Icc	A	-	-	2.72	
Pre-FEC Bit Error Ratio	-	-	-	-	2.4×10^{-4}	
Post-FEC Bit Error Ratio	-	-	-	-	1×10^{-12}	
Link Distance (G.652 SMF)	-	m	2	-	500	

2 QSFP112 Parameters

2.1 QSFP112 Electrical Pin Assignment

The QSFP112 module is based on a 38 pin electrical connector with pin out as specified in QSFP112 Hardware specification. The 38 electrical pins allow exchanging high speed data, control and alarm signals between module and host board. The pin-outs are summarized below:

Top Side(viewed from top)

38	GND	
37	XT1n	
36	TX1p	
35	GND	
34	TX3n	
33	TX3p	
32	GND	
31	LPMODE/TXDIS	
30	VCC1	
29	VCCTX	
28	INTL/RXLOS	
27	MODPRSL	
26	GND	
25	RX4p	
24	RX4n	
23	GND	
22	RX2p	
21	RX2n	
20	GND	

Module Card Edge

Bottom Side(viewed from bottom)

	GND	1
	TX2n	2
	TX2p	3
	GND	4
	TX4n	5
	TX4p	6
	GND	7
	MODESEL	8
	RESETL	9
	VCCRX	10
	SCL	11
	SDA	12
	GND	13
	RX3p	14
	RX3n	15
	GND	16
	RX1p	17
	RX1n	18
	GND	19

Figure 2.1 QSFP112 module pinout

Pad#	Symbol	Description	Notes
1	GND	Ground	
2	Tx2n	Transmitter Inverted Data Input	
3	Tx2p	Transmitter Non-Inverted Data Input	
4	GND	Ground	
5	Tx4n	Transmitter Inverted Data Input	
6	Tx4p	Transmitter Non-Inverted Data Input	
7	GND	Ground	
8	ModSelL	Module Select	
9	ResetL	Module Reset	
10	Vcc Rx	+3.3V Power Supply Receiver	
11	SCL	2-wire serial interface clock	
12	SDA	2-wire serial interface data	
13	GND	Ground	
14	Rx3p	Receiver Non-Inverted Data Output	
15	Rx3n	Receiver Inverted Data Output	
16	GND	Ground	
17	Rx1p	Receiver Non-Inverted Data Output	
18	Rx1n	Receiver Inverted Data Output	
19	GND	Ground	
20	GND	Ground	
21	Rx2n	Receiver Inverted Data Output	
22	Rx2p	Receiver Non-Inverted Data Output	
23	GND	Ground	
24	Rx4n	Receiver Inverted Data Output	
25	Rx4p	Receiver Non-Inverted Data Output	
26	GND	Ground	
27	ModPrsL	Module Present	

28	IntL	Interrupt	
29	Vcc Tx	+3.3V Power supply transmitter	
30	Vcc1	+3.3V Power supply	
31	LPMode	Low Power Mode	
32	GND	Ground	
33	Tx3p	Transmitter Non-Inverted Data Input	
34	Tx3n	Transmitter Inverted Data Input	
35	GND	Ground	
36	Tx1p	Transmitter Non-Inverted Data Input	
37	Tx1n	Transmitter Inverted Data Input	
38	GND	Ground	

2.2 OSFP Electric Ports Definition

Parameter	Symbol	Unit	Min	Typ	Max	Note
Transmitter						
Signaling Rate, each Lane	-	Gbaud	53.125 ± 50 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	-	mV	15	-	-	
Vertical Eye Closure	VEC	mV	-	-	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 rate, each lane	-	GBd	53.125 ± 100 ppm			
Modulation format	-	-	PAM4			
Lane wavelength (range)	λ _c	nm	1304.5	1311	1317.5	
Side-mode suppression ratio	SMSR	dB	30	-	-	
Average launch power, each lane ¹	AOPL	dBm	-2.9	-	4-	1
Outer Optical Modulation Amplitude (OMA _{outer}), each lane ²	T _{OMA}	dBm	-0.8	-	4.2	
Transmitter and dispersion eye closure for PAM4 (TDECQ), each lane	TDECQ	dB			3.4	

Average launch power of OFF transmitter, each lane	TOFF	dBm			-15	
Extinction ratio, each lane	ER	dB	3.5			
RIN21.4OMA	RIN	dB/Hz			-136	
Optical return loss tolerance	ORL	dB			21.4	
Transmitter reflectance ³	TR	dB			-26	2
Receiver						
Signaling Rate, each Lane		GBd	53.125 ± 100 ppm			
Modulation format			PAM4			
Receive Wavelength Range	λ_c	nm	1304.5	1311	1317.5	
Average Receive Power, each lane	AOP _D	dBm	5			
Receive Power (OMAouter), each Lane	AOP _R	dBm	-5.9		4.0	f
Receiver Reflectance	OMAR	dBm			4.2	g
LOS Assert	RR	dB			-26	
LOS De-assert	SOMA	dBm			-4.4	
LOS Hysteresis	SRS				-1.9	

Notes:

1. Average launch power, each lane (min) is informative and 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.
2. Transmitter reflectance is defined looking into the transmitter.

2.4 Digital Diagnostic Functions

Parameter	Symbol	Min	Max	Units	Notes
Temperature monitor absolute error	DMI_Temp	-3	3	degC	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	-3	3	dB	
Channel Bias current monitor	DMI_Ibias_Ch	-10%	10%	mA	
Channel TX power monitor absolute error	DMI_TX_Ch	-3	3	dB	

2.5 Recommended Interface

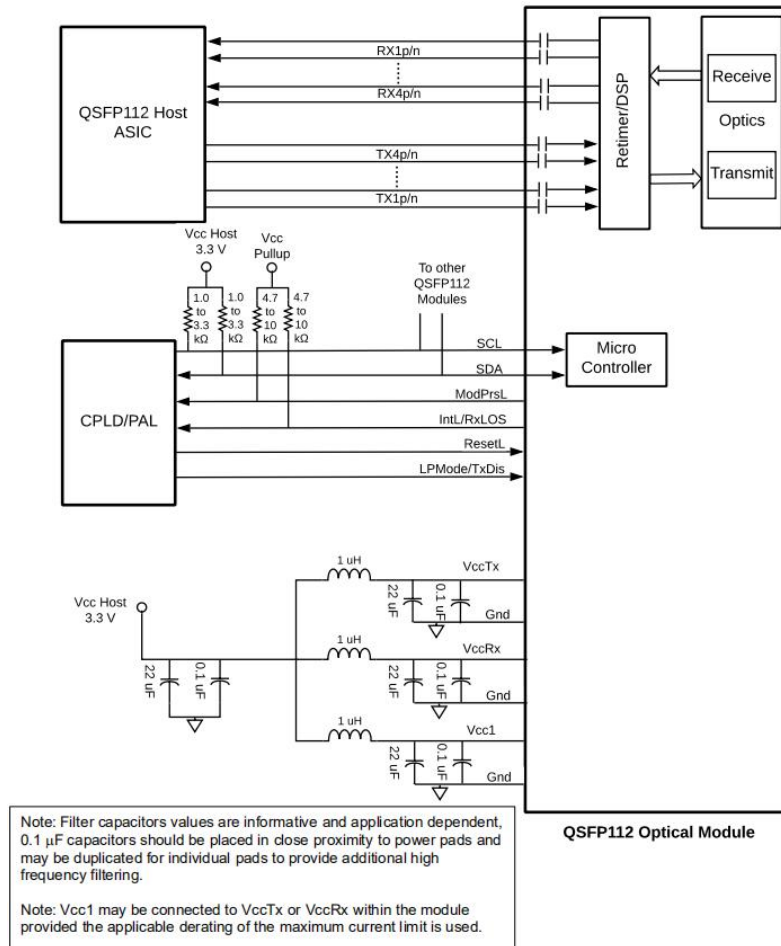


Figure 2.2 Recommended Interface Circuit

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

Performance figures, data and any illustrative material provided in this data sheet are typical and must be specifically confirmed in writing by VITAL before they become applicable to any particular order or contract. In accordance with the VITAL policy of continuous improvement specifications may change without notice.

The publication of information in this data sheet does not imply freedom from patent or other protective rights of VITAL or others. Further details are available from any VITAL sales representative.

5 Revision History

Revision	Date	Description
V1.0	2025.5.7	Advance Release.