

Features

- Supports 425Gb/s PAM4
- Digital Diagnostics Monitoring Interface
- Built-in 400G PAM4 DSP
- Maximum link length of 10km over SMF with KP-FEC
- Hot-pluggable QSFP-DD form factor
- Cooled 4 channels CWDM EML TOSA
- 4 channels PIN ROSA
- Commercial operating case temperature range:
0~ 70°C
- RoHS compliant
- Power dissipation< 12W
- TDECQ< 3.9dB
- Duplex LC optical receptacle



Application

- 400GBASE Ethernet
- Data center networks
- InfiniBand NDR applications

Ordering Information

Part. No	Specifications								
	Pack	Rate (Gbps)	Tx (nm)	Po (dBm)	RX	Sen (dBm)	Temp (°C)	Reach (KM)	DDM
ELOM400G-QSDD-LR4-S	QSFP-DD	400G	CWDM EML	-2.8~4	PIN	<-8	0~70	10	Y

Absolute Maximum Ratings

Parameter	Symbol	Min	Max	Unit
Storage Ambient Temperature	T _{STG}	-40	85	°C
Operating Humidity	H ₀	5	85	%
Power Supply Voltage	V _{cc}	-0.3	3.6	V
Signal Input Voltage		V _{cc} -0.3	V _{cc} +0.3	V

Recommended Operating Conditions

Parameter	Symbol	Min	Typical	Max	Unit
Operating Case Temperature	T _c	0		70	°C
Power Supply Voltage	V _{cc}	3.13	3.3	3.47	V
Data Rate, each Lane (PAM4)			106.25		Gbps
Fiber Length 09/125μm core SMF		-	-	10	km

Electrical Characteristics

Parameter	Min	Typical	Max	Unit	Notes
Power dissipation			9	W	W
Supply current			2.86	A	A
Receiver (module input)					
Data rate, each lane	26.5625 ± 100 ppm			Gbd	
Overload differential voltage pk-pk	900		-	mV	
Common mode voltage	-350		2850	mV	
Differential termination resistance mismatch	-		10	%	%
Differential return loss (SDD11)	Equation (16-1)			dB	OIF-CEI-56 G-VSR-PA M4
Common mode to differential mode conversion (SCD11)	Equation (16-2)			dB	OIF-CEI-56 G-VSR-PA M4
Stressed input test	See OIF-CEI-56G-VSR-PAM4 Section 16.3.10.3				
Transmitter (module output)					

Data rate, each lane	26.5625 ± 100 ppm			Gbd	
Differential voltage, pk-pk			900	mV	
Common mode voltage (Vcm)	-350		2850	mV	
Common mode noise, RMS			17.5	mV	
Differential termination resistance mismatch			10	%	At 1 MHz
Differential return loss (SDD22)			Equation (16-1)	dB	
Common mode to differential mode conversion (SDC22)			Equation (16-3)	dB	
Common mode return loss (SCC22)			-2	dB	From 250 MHz to fb GHz
Transition time	9.5			ps	
Near-ende eye width at 10-6 probability (EW6)	0.265			UI	
Near-ende eye height at 10-6 probability (EH6)	70			mV	
Far-end eye width at 10-6 probability (EW6)	0.20			UI	
Far-end eye height at 10-6 probability (EH6)	30			mV	
Near-end eye linearity	0.85				

Optical Characteristics

Optical transmitter Characteristics						
Parameter	Symbol	Min	Typical	Max	Unit	Notes
Launched Power (avg.) Per Lane	Pavg	-2.8		4	dBm	
Wavelength Range	L1	1264.5	1271	1277.5	nm	
Wavelength Range	L2	1284.5	1291	1397.5	nm	
Wavelength Range	L3	1304.5	1311	1317.5	nm	
Wavelength Range	L4	1324.5	1331	1337.5	nm	
Spectral Width(-20dB)	$\Delta\lambda$			0.6	nm	
Extinction Ratio	ER	3.5			dB	
Transmitter OFF Output Power	POff			-30	dBm	
Optical Modulation Amplitude(OMA outer)	OMA	-1.6		5	dBm	
Transmitter and dispersion eye closure(TDECQ)	TDECQ			3.9	dB	

Optical receiver Characteristics						
Parameter	Symbol	Min	Typical	Max	Unit	Notes
Receiver Wavelength Range	L1	1264.5	1271	1277.5	nm	
Receiver Wavelength Range	L2	1284.5	1291	1397.5	nm	
Receiver Wavelength Range	L3	1304.5	1311	1317.5	nm	
Receiver Wavelength Range	L4	1324.5	1331	1337.5	nm	
Average Receiver Power Per Lane		-9.1		4	dBm	
Receiver Sensitivity Per Lane	Sen			-8	dBm	
Optical Power Input Overload	P _{in-max}	5.3			dBm	
Receiver Reflectance	R _r			-26	dB	

Pin Definition

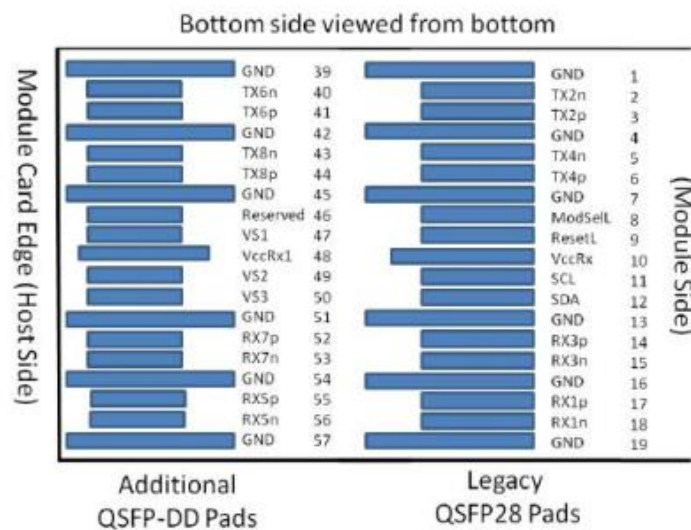
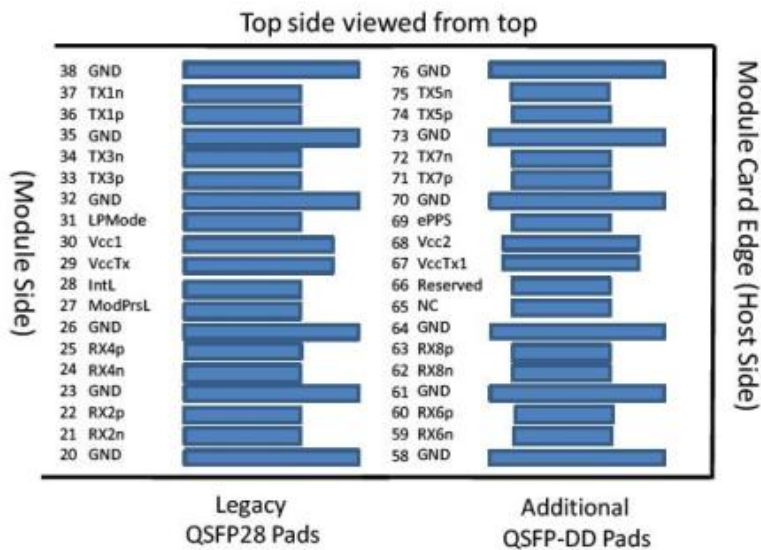


Figure1 QSFP-DD MSA-compliant 76-pin connector

Pin	Symbol	Name/Description	Notes
1	GND	Ground	1
2	Tx2n	Transmitter Inverted Data Input	
3	Tx2p	Transmitter Non-Inverted Data Input	
4	GND	Ground	1
5	Tx4n	Transmitter Inverted Data Input	
6	Tx4p	Transmitter Non-Inverted Data Input	
7	GND	Ground	1
8	ModSelL	Module Select	
9	ResetL	Module Reset	
10	VccRx	+3.3V Power Supply Receiver	2
11	SCL	2-wire serial interface clock	
12	SDA	2-wire serial interface data	
13	GND	Ground	1
14	Rx3p	Receiver Non-Inverted Data Output	
15	Rx3n	Receiver Inverted Data Output	
16	GND	Ground	1
17	Rx1p	Receiver Non-Inverted Data Output	
18	Rx1n	Receiver Inverted Data Output	
19	GND	Ground	1
20	GND	Ground	1
21	Rx2n	Receiver Inverted Data Output	
22	Rx2p	Receiver Non-Inverted Data Output	
23	GND	Ground	1
24	Rx4n	Receiver Inverted Data Output	
25	Rx4p	Receiver Non-Inverted Data Output	
26	Ground	Ground	1
27	ModPrsL	Module Present	
28	IntL	Interrupt	
29	Vcc Tx	+3.3V Power supply transmitter	2
30	Vcc1	+3.3V Power supply	2
31	InitMode	Initialization mode; In legacy QSFP applications, the InitMode pad is called LPMODE	
32	GND	Ground	1
33	Tx3p	Transmitter Non-Inverted Data Input	
34	Tx3n	Transmitter Inverted Data Input	

35	GND	Ground	1
36	Tx1p	Transmitter Non-Inverted Data Input	
37	Tx1n	Transmitter Inverted Data Input	
38	GND	Ground	1
39	GND	Ground	1
40	Tx6n	Transmitter Inverted Data Input	
41	Tx6p	Transmitter Non-Inverted Data Input	
42	GND	Ground	1
43	Tx8n	Transmitter Inverted Data Input	
44	Tx8p	Transmitter Non-Inverted Data Input	
45	GND	Ground	1
46	Reserved	For Future Use	
47	VS1	Module Vendor Specific 1	
48	Vcc Rx1	+3.3V Power Supply Receiver	2
49	VS2	Module Vendor Specific 2	
50	VS3	Module Vendor Specific 3	
51	GND	Ground	1
52	Rx7p	Receiver Non-Inverted Data Output	
53	Rx7n	Receiver Inverted Data Output	
54	Ground	Ground	1
55	Rx5p	Receiver Non-Inverted Data Output	
56	Rx5n	Receiver Inverted Data Output	
57	GND	Ground	1
58	GND	Ground	1
59	Rx6n	Receiver Inverted Data Output	
60	Rx6p	Receiver Non-Inverted Data Output	
61	GND	Ground	1
62	Rx8n	Receiver Inverted Data Output	
63	Rx8p	Receiver Non-Inverted Data Output t	
64	GND	Ground	1
65	NC	For Future Use	
66	Reserved	Interrupt	
67	Vcc Tx1	+3.3V Power supply transmitter	2
68	Vcc2	+3.3V Power supply	2
69	Reserved	For Future Use	
70	GND	Ground	1
71	Tx7p	Transmitter Non-Inverted Data Input	

72	Tx7n	Transmitter Inverted Data Input	
73	GND	Ground	1
74	Tx5p	Transmitter Non-Inverted Data Input	
75	Tx5n	Transmitter Inverted Data Input	
76	GND	Ground	1

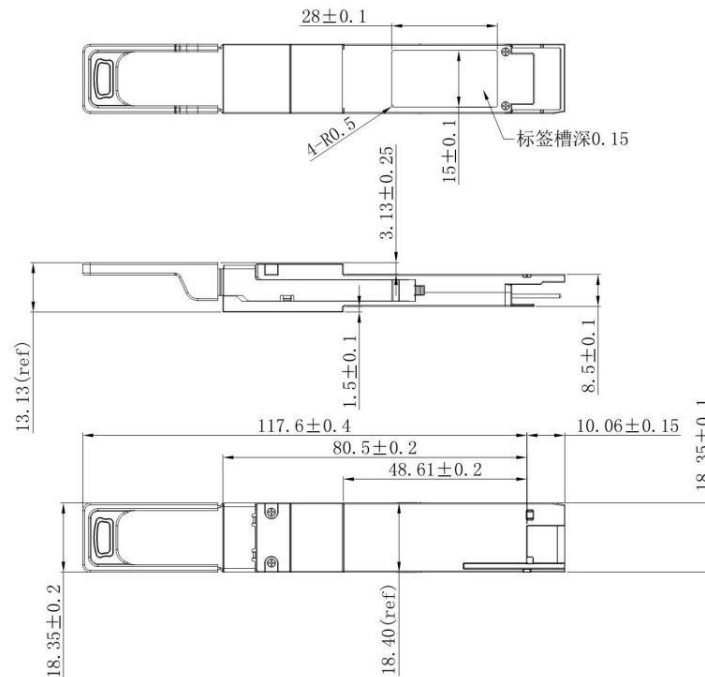
Table 1: QSFP-DD Module PIN Definition

Notes:

1. QSFP-DD uses common ground (GND) for all signals and supply (power). All are common within the QSFP-DD module and all module voltages are referred to this potential unless otherwise noted. Connect these directly to the host board signal-common ground plane.
2. VccRx, VccRx1, Vcc1, Vcc2, VccTx and VccTx1 shall be applied concurrently. VccRx, VccRx1, Vcc1, Vcc2, VccTx and VccTx1 may be internally connected within the module in any combination. Each con- nector Vcc pin is rated for a maximum current of 1000 mA.

Package Outline

Dimensions are in millimeters. All dimensions are $\pm 0.2\text{mm}$ unless otherwise specified. (Unit: mm)



Regulatory Compliance

Feature	Test	Method
Electrostatic Discharge (ESD) to the Electrical Pins	MIL-STD-883E Method 3015.7	Class 1(>1000V for SFI pins, >2000V for other pins.)
Electrostatic Discharge (ESD) Immunity	IEC61000-4-2	Class 2(>4.0kV)
Electromagnetic Interference (EMI)	CISPR22 ITE Class B FCC Class B CENELEC EN55022 VCCI Class 1	Comply with standard
Immunity	IEC61000-4-3	Comply with standard
Eye Safety	FDA 21CFR 1040.10 and 1040.11 EN (IEC) 60825-1,2	Compatible with Class I laser Product