



QDD4-400GB-SR8-SKY

MSA Compliant 400GBase-SR8 QSFP-DD Transceiver (MMF, 850nm, 70m, MPO-16, DOM, CMIS 4.0)

Product Description

This MSA compliant QSFP-DD transceiver provides 400GBase-SR8 throughput up to 70m over multi-mode fiber (MMF) using a wavelength of 850nm via an MPO-16 connector. It is capable of withstanding rugged environments and can operate at temperatures between 0 and 70C. All of our transceivers are built to comply with Multi-Source Agreement (MSA) standards and are uniquely serialized and tested for data-traffic and application to ensure seamless network integration. Additional product features include Digital Optical Monitoring (DOM) support which allows access to real-time operating parameters. We stand behind the quality of our products and proudly offer a limited lifetime warranty.

Skylane's transceivers are RoHS compliant and lead-free.

Features:

- Hot-Pluggable QSFP-DD Form Factor
- 8x50G PAM4 Retimed 400GUA1-8 Electrical Interface Aligned with IEEE 802.3bs
- 8x50G PAM4 VCSEL Transmitter
- Power Dissipation: 9W
- Maximum Link Length of 100M on OM4 Fiber with KP4 FEC
- I2C Management Interface
- Single 3.3V Power Supply
- MPO-16 APC Connector
- RoHS Compliant and Lead-Free
- Operating Temperature: 0 to 70 Celsius



Applications:

- 400GBase Ethernet
- Access and Enterprise

For your product safety, please read the following information carefully before any manipulation of the transceiver:



ESD

This transceiver is specified as ESD threshold 1kV for SFI pins and 2kV for all others electrical input pins, tested per MIL-STD-883G, Method 3015.4 / JESD22-A114-A (HBM). However, normal ESD precautions are still required during the handling of this module.



LASER SAFETY

This is a Class1 Laser Product according to IEC 60825-1:2007. This product complies with 21 CFR 1040.10 and 1040.11 except for deviations pursuant to Laser Notice No. 50, dated (June 24, 2007).

The optical ports of the module need to be terminated with an optical connector or with a dust plug in order to avoid contamination.

Absolute Maximum Ratings

Parameter	Symbol	Min.	Max.	Unit	Notes
Power Supply Voltage	V _{cc}	-0.5	4.0	V	
Storage Temperature	T _{stg}	-40	85	°C	
Operating Temperature	T _c	0	70	°C	
Relative Humidity	RH	15	85	%	1
Receiver Damage Threshold Per Lane	TH _d	5		dBm	
Bit Error Ratio	BER		2.4E ⁻⁴		2
Bit Rate (All Wavelengths Combined)	BR		425	Gbps	3

Notes:

1. Non-condensing.
2. As defined by IEEE P802.3cm.
3. Supports 400GBase-SR8 per IEEE P802.3cm.

Electrical Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Notes
Supply Voltage	V _{cc}	3.135	3.3	3.465	V	
Supply Current	I _{cc}			2.87	A	
Module Total Power	P			9	W	1
Transmitter (Per Lane)						
Signaling Rate Per Lane	TP1	26.5625 ± 100ppm			GBd	
Differential Data Input Voltage Per Lane	V _{IN,pp}	900			mV	2
Differential Input Return Loss		Per Equation (83E-5) IEEE802.3bm				
Differential- to Common-Mode Input Return Loss		Per Equation (83E-6) IEEE802.3bm				
Differential Termination Mismatch				10		
Module Stressed Input Test		Per 120E.3.4.1 IEEE802.3bs				3
Single-Ended Voltage Tolerance Range		-0.4		3.3		
DC Common-Mode Voltage		-350		2850	mV	4
Receiver (Per Lane)						
Signaling Rate Per Lane		26.5625 ± 100ppm			Gbd	
AC Common-Mode Output Voltage (RMS)				17.5	mV	
Differential Output Voltage				900	mV	
Near-End ESMW (Eye Symmetry Mask Width)		0.265			UI	
Differential Near-End Eye Height (Minimum)		30			mV	
Far-End Pre-Cursor ISI Ratio		-4.5		2.5	%	
Differential Output Return Loss		Per Equation (83E-2) IEEE802.3bm				

Common- to Differential-Mode Conversion Return Loss		Per Equation (83E-3) IEEE802.3bm				
Differential Termination Mismatch				10	%	
Transition Time (20-80%)		9.5			ps	
DC Common-Mode Voltage Minimum		-350		2850	mV	

Notes:

1. The maximum total power value is specified across the full temperature and voltage range.
2. With the exception to 120E.3.1.2 that the pattern is PRBS31Q or scrambled idle.
3. Meets specified BER.
4. DC common-mode voltage is generated by the host. Specification includes the effects of ground offset voltage.

Optical Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Notes
Transmitter						
Center Wavelength	λ_C	840	850	860	nm	
Data Rate Per Lane		26.5625 ± 100ppm			GBd	
Modulation Format		PAM4				
RMS Spectral Width				0.6	nm	1
Average Launch Power Per Lane		-6.5		4	dBm	
Outer Optical Modulation Amplitude (OMA _{outer}) Per Lane		-4.5			dBm	2
Launch Power in OMA _{outer} Minus TDECQ Per Lane		-5.9			dBm	
Transmitter and Dispersion Eye Closure for PAM4 (TDECQ) Per Lane				4.5	dB	
TDECQ -10Log ₁₀ (Ceq) Per Lane				4.5	dB	3
Average Launch Power of Off Transmitter Per Lane				-30	dBm	
Extinction Ratio		3			dB	
Transmitter Transition Time Per Lane				34	ps	
RIN _{12OMA}				-128	dB/Hz	
Optical Return Loss Tolerance				12	dB	
Encircle Flux		≥86% at 19μm ≤30% at 4.5μm				4
Receiver						
Center Wavelength	λ_C	840	850	860	nm	
Data Rate Per Lane		26.5625 ± 100ppm			GBd	
Modulation Format		PAM4				
Damage Threshold Per Lane		5			dBm	1
Average Receive Power Per Lane		-8.4		4	dBm	2
Receive Power (OMA _{outer}) Per Lane				3	dBm	

Receiver Reflectance				-12	dBm	
Receiver Sensitivity (OMA _{outer}) Per Lane				-3	dBm	3
Stressed Receiver Sensitivity (OMA _{outer}) Per Lane				-12	dB	4
Stressed Eye Closure for PAM4 (SECQ) Per Lane Under Test			4.5			5
SECQ-10Log ₁₀ (Ceq)f Per Lane (Maximum)			4.5			5
OMA _{outer} of Each Aggressor Lane			3			
LOS De-Assert				-9	dBm	
LOS Assert		-30		-10	dBm	
LOS Hysteresis		0.5			dB	
Conditions of Stressed Receiver Sensitivity Test						6

Notes:

1. The receiver shall be able to tolerate, without damage, continuous exposure to an optical input signal having this average power level on one lane. The receiver does not have to operate correctly at this input power.
2. Average receive power, each lane (minimum), is informative and not the principal indicator of signal strength.
3. Receiver sensitivity is informative and is defined for a transmitter with a value of SECQ up to 4.5dB.
4. Measured with conformance test signal at TP3 (see 138.8.10) for the BER specified in 138.1.1.
5. Ceq is a coefficient defined in 121.8.5.3, which accounts for the reference equalizer noise enhancement.
6. These test conditions are for measuring stressed receiver sensitivity. They are not characteristics of the receiver.

Pin Descriptions

Pin	Logic	Symbol	Name/Description	Plug Sequence	Notes
1		GND	Module Ground.	1B	1
2	CML-I	Tx2-	Transmitter Inverted Data Input.	3B	
3	CML-I	Tx2+	Transmitter Non-Inverted Data Input.	3B	
4		GND	Module Ground.	1B	1
5	CML-I	Tx4-	Transmitter Inverted Data Input.	3B	
6	CML-I	Tx4+	Transmitter Non-Inverted Data Input.	3B	
7		GND	Module Ground.	1B	1
8	LVTTL-I	ModSelL	Module Select.	3B	
9	LVTTL-I	ResetL	Module Reset.	3B	
10		VccRx	+3.3V Receiver Power Supply.	2B	2
11	LVC MOS-I/O	SCL	2-Wire Serial Interface Clock.	3B	
12	LVC MOS-I/O	SDA	2-Wire Serial Interface Data.	3B	
13		GND	Module Ground.	1B	1
14	CML-O	Rx3+	Receiver Non-Inverted Data Output.	3B	
15	CML-O	Rx3-	Receiver Inverted Data Output.	3B	
16		GND	Module Ground.	1B	1
17	CML-O	Rx1+	Receiver Non-Inverted Data Output.	3B	
18	CML-O	Rx1-	Receiver Inverted Data Output.	3B	
19		GND	Module Ground.	1B	1
20		GND	Module Ground.	1B	1
21	CML-O	Rx2-	Receiver Inverted Data Output.	3B	
22	CML-O	Rx2+	Receiver Non-Inverted Data Output.	3B	
23		GND	Module Ground.	1B	1
24	CML-O	Rx4-	Receiver Inverted Data Output.	3B	
25	CML-O	Rx4+	Receiver Non-Inverted Data Output.	3B	
26		GND	Module Ground.	1B	1
27	LVTTL-O	ModPrsL	Module Present.	3B	
28	LVTTL-O	IntL	Interrupt.	3B	
29		VccTx	+3.3V Transmitter Power Supply.	2B	2
30		Vcc1	+3.3V Power Supply.	2B	2
31	LVTTL-I	InitMode	Initialization Mode. In legacy QSFP applications, the InitMode pad is called LPMODE.	3B	
32		GND	Module Ground.	1B	1
33	CML-I	Tx3+	Transmitter Non-Inverted Data Input.	3B	
34	CML-I	Tx3-	Transmitter Inverted Data Input.	3B	
35		GND	Module Ground.	1B	1
36	CML-I	Tx1+	Transmitter Non-Inverted Data Input.	3B	
37	CML-I	Tx1-	Transmitter Inverted Data Input.	3B	
38		GND	Module Ground.	1B	1
39		GND	Module Ground.	1A	1

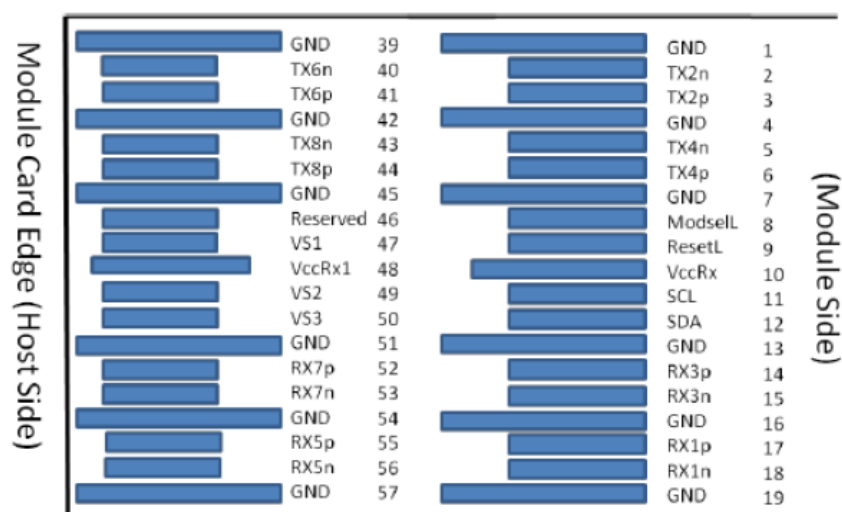
40	CML-I	Tx6-	Transmitter Inverted Data Input.	3A	
41	CML-I	Tx6+	Transmitter Non-Inverted Data Input.	3A	
42		GND	Module Ground.	1A	1
43	CML-I	Tx8-	Transmitter Inverted Data Input.	3A	
44	CML-I	Tx8+	Transmitter Non-Inverted Data Input.	3A	
45		GND	Module Ground.	1A	1
46		Reserved	For Future Use.	3A	3
47		VS1	Module Vendor-Specific 1.	3A	3
48		VccRx1	+3.3V Receiver Power Supply.	2A	2
49		VS2	Module Vendor-Specific 2.	3A	3
50		VS3	Module Vendor-Specific 3.	3A	3
51		GND	Module Ground.	1A	1
52	CML-O	Rx7+	Receiver Non-Inverted Data Output.	3A	
53	CML-O	Rx7-	Receiver Inverted Data Output.	3A	
54		GND	Module Ground.	1A	1
55	CML-O	Rx5+	Receiver Non-Inverted Data Output.	3A	
56	CML-O	Rx5-	Receiver Inverted Data Output.	3A	
57		GND	Module Ground.	1A	1
58		GND	Module Ground.	1A	1
59	CML-O	Rx6-	Receiver Inverted Data Output.	3A	
60	CML-O	Rx6+	Receiver Non-Inverted Data Output.	3A	
61		GND	Module Ground.	1A	1
62	CML-O	Rx8-	Receiver Inverted Data Output.	3A	
63	CML-O	Rx8+	Receiver Non-Inverted Data Output.	3A	
64		GND	Module Ground.	1A	1
65		NC	Not Connected.	3A	3
66		Reserved	For Future Use.	3A	3
67		VccTx1	+3.3V Transmitter Power Supply.	2A	2
68		Vcc2	+3.3V Power Supply.	2A	2
69		Reserved	For Future Use.	3A	3
70		GND	Module Ground.	1A	1
71	CML-I	Tx7+	Transmitter Non-Inverted Data Input.	3A	
72	CML-I	Tx7-	Transmitter Inverted Data Input.	3A	
73		GND	Module Ground.	1A	1
74	CML-I	Tx5+	Transmitter Non-Inverted Data Input.	3A	
75	CML-I	Tx5-	Transmitter Inverted Data Input.	3A	
76		GND	Module Ground.	1A	1

Notes:

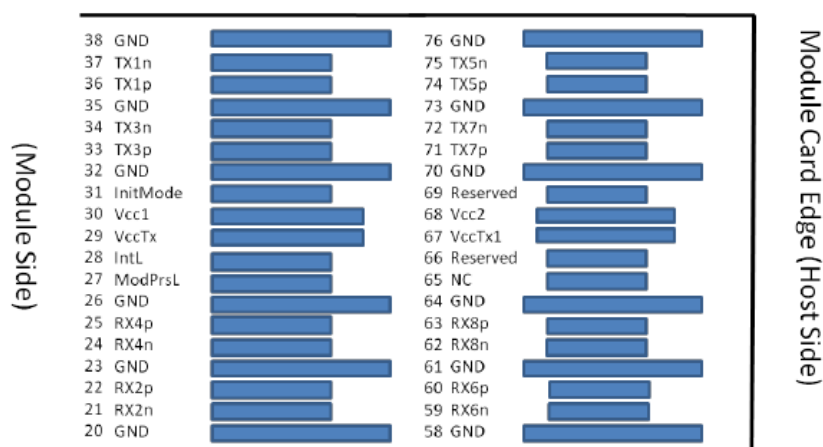
1. QSF-P-DD uses common ground (GND) for all signals and supply power. All are common within the QSF-P-DD module, and all module voltages are referenced to this potential unless otherwise noted. Connect these directly to the host board signal common ground plane.

2. VccRx, VccRx1, Vcc1, Vcc2, VccTx, and VccTx1 shall be applied concurrently. Requirements defined for the host side of the Host Card Edge Connector are listed in the Optical Characteristics. VccRx, VccRx1, Vcc1, Vcc2, VccTx, and VccTx1 may be internally connected within the module in any combination. The connector Vcc pins are each rated for a maximum current of 1000mA.
3. All Vendor-Specific, Reserved, and Not Connected pins may be terminated with 50Ω to ground on the host. Pad 65 (Not Connected) shall be left unconnected within the module. Vendor-Specific and Reserved pads shall have an impedance to GND that is greater than 10kΩ and less than 100pF.
4. Plug Sequence specifies the mating sequence of the host connector and module. The sequence is 1A, 2A, 3A, 1B, 2B, and 3B. Contact sequence A will make, then break contact with additional QSFP-DD pads. Sequence 1A, 1B will then occur simultaneously, followed by 2A, 2B, followed by 3A, 3B.

Pin-Out Details

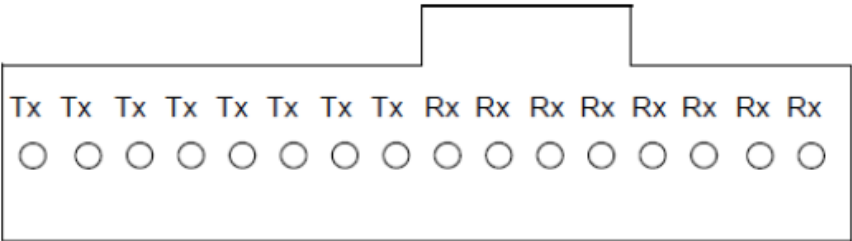


Bottom side viewed from bottom

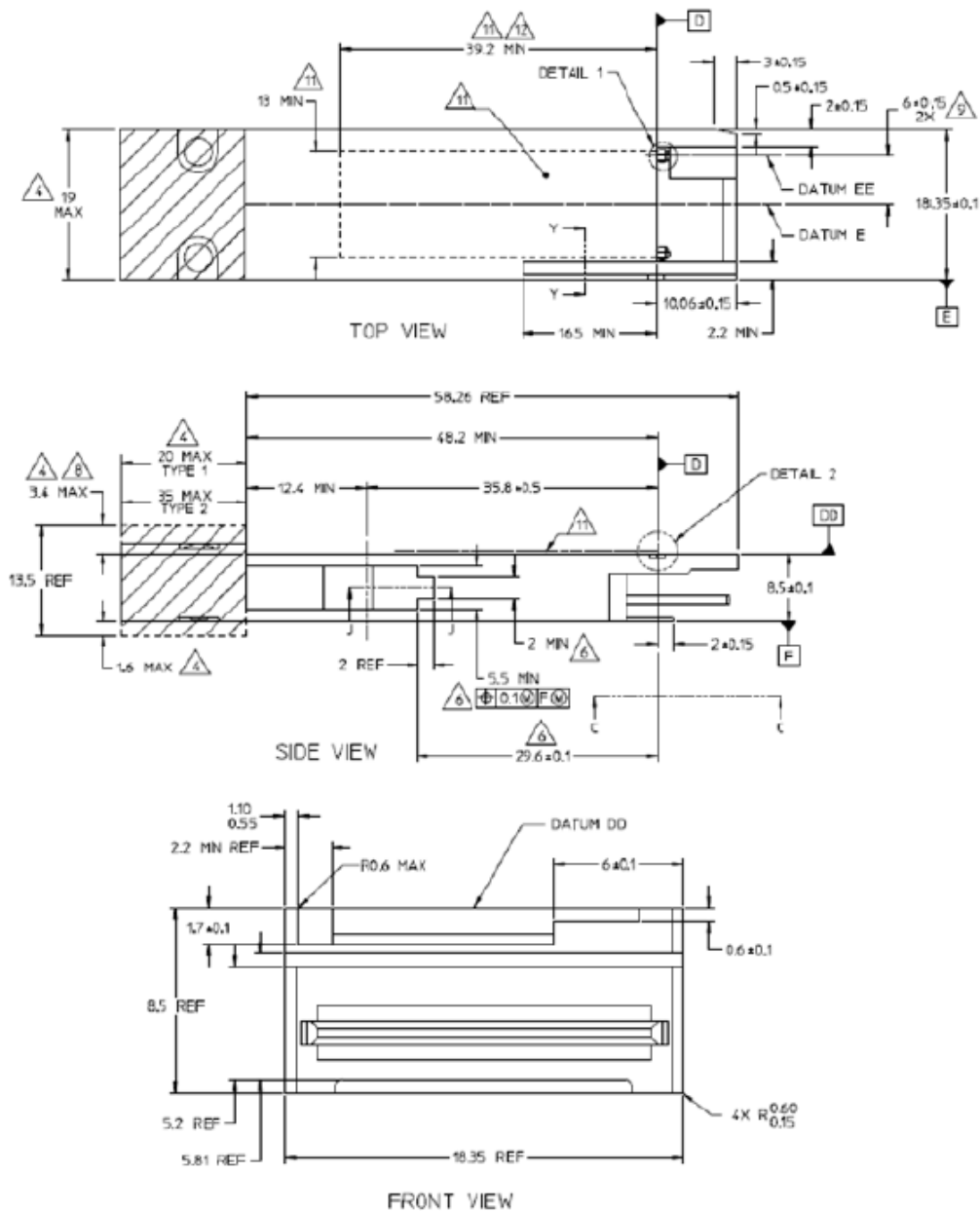


Top side viewed from top

MPO Connector Receptacle



Mechanical Specifications



About Skylane Optics

Skylane is a leading provider of transceivers for optical communication.

We offer an extensive portfolio for the enterprise, access, datacenter and metropolitan fiber optical market as well as for smart home applications and home networks.

We cover the European, South American and North American market with a strong partner network and have offices in Belgium, Brazil, Sweden and USA.

Our offerings are characterized by high quality and performance. In combination with our strong technical support, we enable our customers to build cost optimized network solutions.

We offer an extensive range of high-quality products including transceivers (Optical and copper), Active Optical Cable (AOC), Direct Attach Cable (DAC), Mux/Demux, Coding Box.

