

QBP13002E0PF000

MSA and 400GBase-DR4 QSFP-DD Transceiver (SMF, 1310nm, 2km, MPO, DOM)

Product Description

This MSA Compliant QSFP-DD transceiver provides 400GBase-DR4 throughput up to 2km over single-mode fiber (SMF) using a wavelength of 1310nm via an MPO connector. It is built to MSA standards and is uniquely serialized and data-traffic and application tested to ensure that they will integrate into your network seamlessly. Digital optical monitoring (DOM) support is also present to allow 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:

- INF-8628 Compliance
- MPO Connector
- Commercial Temperature 0 to 70 Celsius
- Single-mode Fiber
- Hot Pluggable
- Excellent ESD Protection
- Metal with Lower EMI
- RoHS Compliant and Lead Free



Applications:

- 400G Ethernet

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
Maximum Power Supply Voltage	Vcc	-0.5	3.6	V
Storage Temperature	Tstg	-40	85	°C
Case Operating Temperature	Tc	0	70	°C
Relative Humidity	RH	15	85	%
Receiver Damage Threshold per lane	Thdmg	5		dBm

Optical Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Notes
Transmitter						
PAM4 Signaling Rate		53.125 ± 100 ppm			GBaud	
Lane wavelength (Range)		1304.5	1311	1317.5	nm	
Side Mode Suppression Ratio	SMSR	30			dB	
Total Average Launch Power				9.3	dBm	
Average Launch Power		-3.3		3.5	dBm	1
Outer Optical Modulation Amplitude	OMAouter	-0.3		3.7	dBm	2
Difference in Launch Power Between Any Two Lanes (OMAouter)				4	dB	
Launch Power in OMAouter Minus TDECQ for ER ≥4.5dB	OMAouter-TDECQ	-1.7			dBm	
Launch Power in OMAouter Minus TDECQ for ER <4.5dB	OMAouter-TDECQ	-1.6			dBm	
Transmitter and Dispersion Penalty Eye Closure for PAM4	TDECQ			3.4	dB	
TDECQ – 10*log10 (Ceq) Per lane				3.4	dB	3
Extinction Ratio	ER	3.5			dB	
Average Launch Power of OFF Transmitter Per Lane				-20	dBm	
Transmitter Transition Time				17	ps	
RIN17.1 OMA	RIN			-136	dB/Hz	
Optical Return Loss Tolerance				17.1	dB	
Transmitter Reflectance				-26	dB	4
Receiver						
PAM4 Signaling Rate (Range)		53.125 ± 100 ppm			GBaud	
Lane Wavelength (Range)		1304.5	1311	1317.5	nm	
Damage Threshold		5			dBm	5
Average Receive Power		-7.3		3.5	dBm	6
Receive Power (OMAouter)	RxOMAouter			3.7	dBm	
Difference in Receive Power Between Any Two Lanes (OMAouter)				4.1	dB	

Receiver Reflectance				-26	dB	
Receiver Sensitivity (OMA _{outer})				$\max(-4.6, S_{SECCQ} - 6.0)$	dBm	7
Stressed Receiver Sensitivity (OMA _{outer})				-2.6	dBm	8
Stressed Conditions for Stress Receiver Sensitivity						
Stressed Eye Closure for PAM4 (SECQ) Lane Under Test				3.4	dB	
SECQ – $10 \cdot \log_{10}(\text{Ceq})$ Per Lane Under Test (Maximum)				3.4	dB	9
OMA _{outer} of Each Aggressor Lane		1.5			dBm	
LOS Assert		-30		-7.5	dBm	
LOS De-Assert		-29.5		-7.0	dBm	
LOS Hysteresis		0.5			dB	

Notes:

1. Average launch power (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. Even if the TDECQ < 1.4 dB for an extinction ratio of ≥ 4.5 dB, or TDECQ < 1.3 dB for an extinction ratio of < 4.5 dB, the OMA_{outer} (minimum) must exceed this value.
3. "Ceq" is a coefficient defined in IEEE Std 802.3-2018 clause 121.8.5.3 which accounts for reference equalizer noise enhancement.
4. Transmitter reflectance is to look into the transmitter.
5. The receiver shall be able to tolerate, without damage, continuous exposure to an optical signal having this average power level. The receiver does not have to operate correctly at this input power.
6. Average receive power (min.) is informative and not the principal indicator of signal strength. A received power below this value cannot be compliant; however, a value above this does not ensure compliance.
7. Receiver sensitivity is informative and is defined for a transmitter with a value of SECQ up to 3.4 dB. Receiver sensitivity should meet Equation:

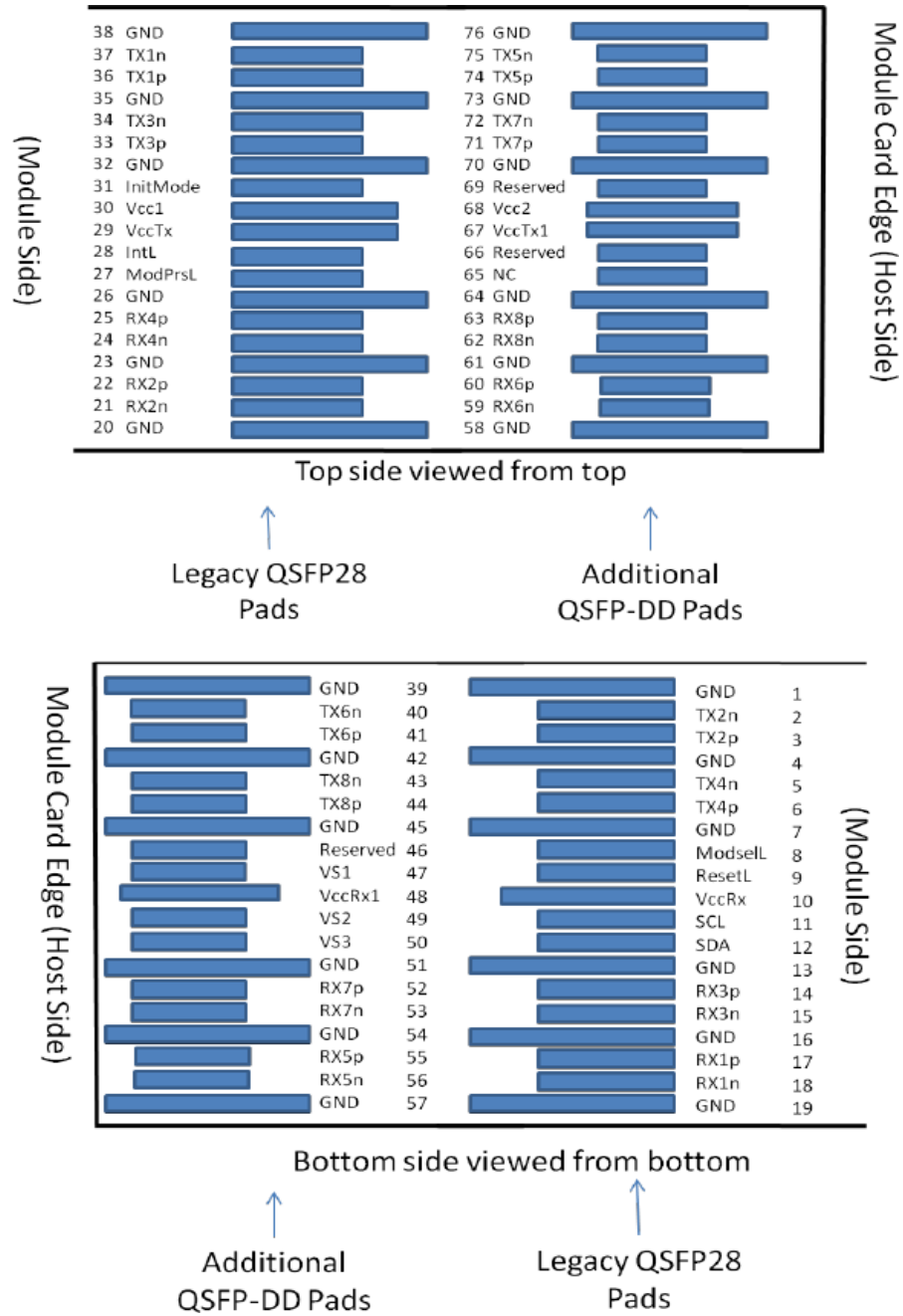
$$RRRRRRRRSSSSSSSS = \max(-4.6, SSSSSSSSEEEEEEECCCCCCCQQQQQQQ - 6.0),$$
Where:
RS is the receiver sensitivity, and
SECQ is the SECQ of the transmitter used to measure the receiver sensitivity. The normative requirement for receivers is stressed receiver sensitivity.
8. Measured with conformance test signal at TP3 for BER specified in IEEE Std 802.3-2018 clause 124.1.1
9. Ceq is a coefficient defined in IEEE Std 802.3-2018 clause 121.8.5.3 which accounts for reference equalizer noise enhancement.

Pin Descriptions

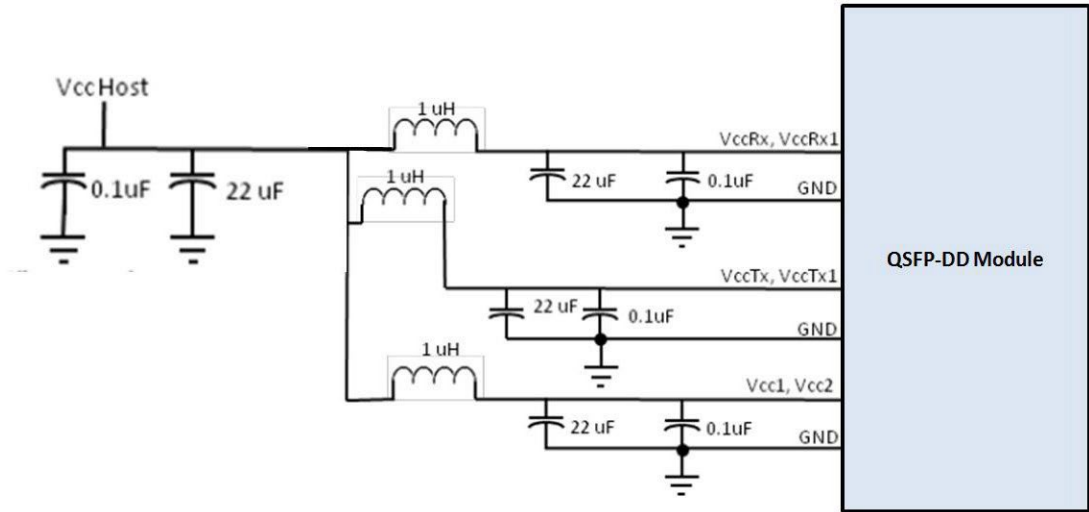
Pin	Logic	Symbol	Name/Descriptions	Plug Sequence
1		GND	Ground	1B
2	CML-I	Tx2n	Transmitter Inverted Data Input	3B
3	CML-I	Tx2p	Transmitter Non-Inverted Data Input	3B
4		GND	Ground	1B
5	CML-I	Tx4n	Transmitter Inverted Data Input	3B
6	CML-I	Tx4p	Transmitter Non-Inverted Data Input	3B
7		GND	Ground	1B
8	LVTTL-I	ModSelL	Module Select	3B
9	LVTTL-I	ResetL	Module Reset	3B
10		VccRx	+3.3V Power Supply Receiver	2B
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	Ground	1B
14	CML-O	Rx3p	Receiver Non-Inverted Data Output	3B
15	CML-O	Rx3n	Receiver Inverted Data Output	3B
16	GND	Ground	1B	
17	CML-O	Rx1p	Receiver Non-Inverted Data Output	3B
18	CML-O	Rx1n	Receiver Inverted Data Output	3B
19		GND	Ground	1B
20		GND	Ground	1B
21	CML-O	Rx2n	Receiver Inverted Data Output	3B
22	CML-O	Rx2p	Receiver Non-Inverted Data Output	3B
23		GND	Ground	1B
24	CML-O	Rx4n	Receiver Inverted Data Output	3B
25	CML-O	Rx4p	Receiver Non-Inverted Data Output	3B
26		GND	Ground	1B
27	LVTTL-O	ModPrsL	Module Present	3B
28	LVTTL-O	IntL	Interrupt	3B
29		VccTx	+3.3V Power supply transmitter	2B
30		Vcc1	+3.3V Power supply	2B
31	LVTTL-I	InitMode	Initialization mode; In legacy QSFP applications, the InitMode pad is called LPMODE	3B
32		GND	Ground	1B
33	CML-I	Tx3p	Transmitter Non-Inverted Data Input	3B
34	CML-I	Tx3n	Transmitter Inverted Data Input	3B
35		GND	Ground	1B
36	CML-I	Tx1p	Transmitter Non-Inverted Data Input	3B
37	CML-I	Tx1n	Transmitter Inverted Data Input	3B
38		GND	Ground	1B

39		GND	Ground	1A
40	CML-I	Tx6n	Transmitter Inverted Data Input	3A
41	CML-I	Tx6p	Transmitter Non-Inverted Data Input	3A
42		GND	Ground	1A
43	CML-I	Tx8n	Transmitter Inverted Data Input	3A
44	CML-I	Tx8p	Transmitter Non-Inverted Data Input	3A
45		GND	Ground	1A
46		Reserved	For future use	3A
47		VS1	Module Vendor Specific 1	3A
48		VccRx1	3.3V Power Supply	2A
49		VS2	Module Vendor Specific 2	3A
50		VS3	Module Vendor Specific 3	3A
51		GND	Ground	1A
52	CML-O	Rx7p	Receiver Non-Inverted Data Output	3A
53	CML-O	Rx7n	Receiver Inverted Data Output	3A
54		GND	Ground	1A
55	CML-O	Rx5p	Receiver Non-Inverted Data Output	3A
56	CML-O	Rx5n	Receiver Inverted Data Output	3A
57		GND	Ground	1A
58		GND	Ground	1A
59	CML-O	Rx6n	Receiver Inverted Data Output	3A
60	CML-O	Rx6p	Receiver Non-Inverted Data Output	3A
61		GND	Ground	1A
62	CML-O	Rx8n	Receiver Inverted Data Output	3A
63	CML-O	Rx8p	Receiver Non-Inverted Data Output	3A
67		GND	Ground	1A
68		NC	No Connect	3A
69		Reserved	For future use	3A
70		VccTx1	3.3V Power Supply	2A
71		Vcc2	3.3V Power Supply	2A
72		Reserved	For Future Use	3A
73		GND	Ground	1A
74	CML-I	Tx7p	Transmitter Non-Inverted Data Input	3A
75	CML-I	Tx7n	Transmitter Inverted Data Input	3A
76		GND	Ground	1A

QSFPDD Connector Pin Definition



Recommended Power Supply Filter

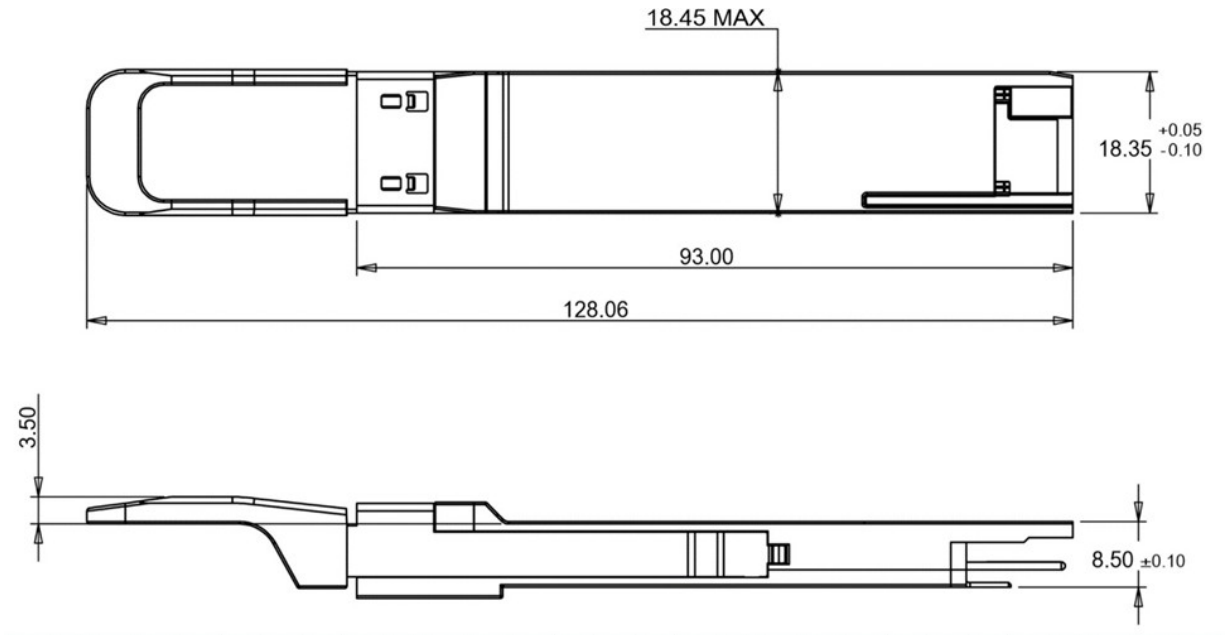


Digital Diagnostic Functions

The following digital diagnostic characteristics are defined over the normal operating conditions unless otherwise specified.

Parameter	Symbol	Min	Max	Units	Notes
Temperature Monitor	DMI_Temp	-3	3	oC	0-70°C
Supply Voltage Monitor	DMI_Vcc	-0.1	0.1	V	Over a full operating range.
Channel RX Power Monitor	DMI_Rx_Ch	-2	2	dB	
Channel Bias Current Monitor	DMI_Ibias_Ch	-10%	10%	mA	
Channel TX Power Monitor	DMI_Tx_Ch	-2	2	dB	

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.

