



Q12QL002E00F000

MSA Compliant 400GBase-FR4 QSFP112 Transceiver (SMF, 1310nm, 2km, LC, DOM, CMIS 5.0)

Product Description

This MSA compliant QSFP112 transceiver provides 400GBase-FR4 throughput up to 2km over single-mode fiber (SMF) using a wavelength of 1310nm via an LC 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:

- Compliant with 400GBASE-FR4
- Compliant with QSFP-DD MSA
- Compliant with IEEE802.3ck Standard 400GAUI-4 C2M Electrical Interface
- CMIS 5.0
- Class 1 Laser
- Duplex LC Connector
- Operating Temperature: 0 to 70 Celsius
- 2-Wire Interface with Digital Diagnostic Monitoring
- RoHS Compliant and Lead-Free



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.	Typ.	Max.	Unit	Notes
Storage Temperature	Tstg	-40		85	°C	
Operating Case Temperature	Tc	0		70	°C	
Relative Humidity	RH	5		89	%	
Supply Voltage	Vcc	-0.5		3.6	V	
Signaling Rate Per Lane			53.125 ± 100ppm		Gbd	PAM4
Operating Distance		2		2000	m	

Electrical Characteristics

Parameter		Symbol	Min.	Typ.	Max.	Unit	Notes
Power Supply Voltage		Vcc	3.135	3.3	3.465	V	
Instantaneous Peak Current at Hot Plug		Icc_IP			4000	mA	
Sustained Peak Current at Hot Plug		Icc_SP			3300	mA	
Maximum Power Dissipation		PD			10	W	
Maximum Power Dissipation (Low-Power Mode)		PD _{LP}			1.5	W	
2-Wire Serial Interface Clock Rate					400	kHz	
Module Sinusoidal Power Supply Noise Tolerance 1kHz - 1MHz (Pk-Pk)					66	mVp-p	
Rx Differential Data Output Load				100		Ω	
Transmitter							
Differential Pk-Pk Input Voltage Tolerance (TP1a)			750			mV	
Pk-Pk AC Common-Mode Voltage Tolerance	Low-Frequency (VCMLF)				32	mV	
	Full-Band (VCMFB)				80		
Effective Return Loss		ERL	8.5			dB	
Differential Termination Mismatch					10	%	
Single-Ended Voltage Tolerance Range			-0.4		3.3	V	
DC Common-Mode Voltage Tolerance			-0.35		2.85	V	
Differential-Mode to Common-Mode Return Loss		RLcd	802.3ck 120G-2			dB	
Receiver							
Pk-Pk AC Common-Mode Voltage	Low-Frequency (VCMLF)				32	mV	
	Full-Band (VCMFB)				80		
Differential Pk-Pk Output Voltage	Short-Mode				600	mV	
	Long-Mode				845		

Eye Height	EH	15			mV	
Vertical Eye Closure	VEC			12	dB	
Effective Return Loss	ERL	8.5			dB	
Differential Termination Mismatch				10	%	
Transition Time		8.5			ps	
DC Common-Mode Voltage Tolerance		-0.35		2.85	V	
Common-Mode to Differential-Mode Return Loss	RLDc	802.3ck 120G-1			dB	
Low-Speed Signal						
Module Output SCL and SDA	VOL	0		0.4	V	
Module Input SCL and SDA	VIL	-0.3		Vcc*0.3	V	
	VIH	Vcc*0.7		Vcc+0.5	V	
LPMode/TxDis, ResetL, and ModSelL	VIL	-0.3		0.8	V	
	VIH	2		Vcc+0.3	V	
IntL/RxLOS	VOL	0		0.4	V	
	VOH	Vcc-0.5		Vcc+0.3	V	

Optical Characteristics

Parameter		Symbol	Min.	Typ.	Max.	Unit	Notes
Transmitter							
Center Wavelength	λ_C		1264.5	1271	1277.5	nm	
			1284.5	1291	1297.5		
			1304.5	1311	1317.5		
			1324.5	1331	1337.5		
Side-Mode Suppression Ratio		SMSR	30			dB	
Average Launch Power Per Lane		AOP _L	-3.2		4.4	dBm	1
Outer Optical Modulation Amplitude (OMA _{outer}) Per Lane		T _{OMA}			3.7	dBm	
Outer Optical Modulation Amplitude (OMA _{outer}) Per Lane	TDECQ<1.4dB	T _{OMA}	-0.2				
	1.4≤TDECQ≤3.4dB		-1.6+TDECQ				
Difference in Launch Power Between Any Two Lanes (OMA _{outer})		DP			3.9	dB	
Transmitter and Dispersion Eye Closure for PAM4 (TDECQ) Per Lane		TDECQ			3.4	dB	
Transmitter Eye Closure for PAM4 (TECQ)		TECQ			3.4	dB	
TDECQ - TECQ					2.5	dB	
Over/Under-Shoot					22	%	
Transmitter Power Excursion					1.8	dBm	

Average Launch Power of Off Transmitter Per Lane		Toff			-16	dBm	
Extinction Ratio Per Lane		ER	3.5			dB	
Transmitter Transition Time					17	ps	
RIN _{17.1} OMA		RIN			-136	dB/Hz	
Optical Return Loss Tolerance		ORL			17.1	dB	
Transmitter Reflectance		TR			-26	dB	
Receiver							
Center Wavelength		λ_C	1264.5	1271	1277.5	nm	
			1284.5	1291	1297.5		
			1304.5	1311	1317.5		
			1324.5	1331	1337.5		
Damage Threshold Per Lane		AOP _D	5.4			dBm	
Average Receive Power Per Lane		AOP _R	-7.2		4.4	dBm	2
Receive Power (OMAouter) Per Lane		OMA _R			3.7	dBm	
Difference in Receive Power Between Any Two Lanes (OMAouter)		DR			4.1	dB	
Receiver Reflectance		RR			-26	dB	
Receiver Sensitivity (OMAouter) Per Lane	TECQ<1.4dB	SOMA			-4.6	dBm	
	1.4≤TECQ≤3.4dB				-6+TECQ		
Stressed Receiver Sensitivity (OMAouter) Per Lane		SRS			-2.6	dBm	3
Stressed Eye Closure for PAM4 (SECQ)				3.4		dB	
OMAouter of Each Aggressor Lane				1.4		dBm	

Notes:

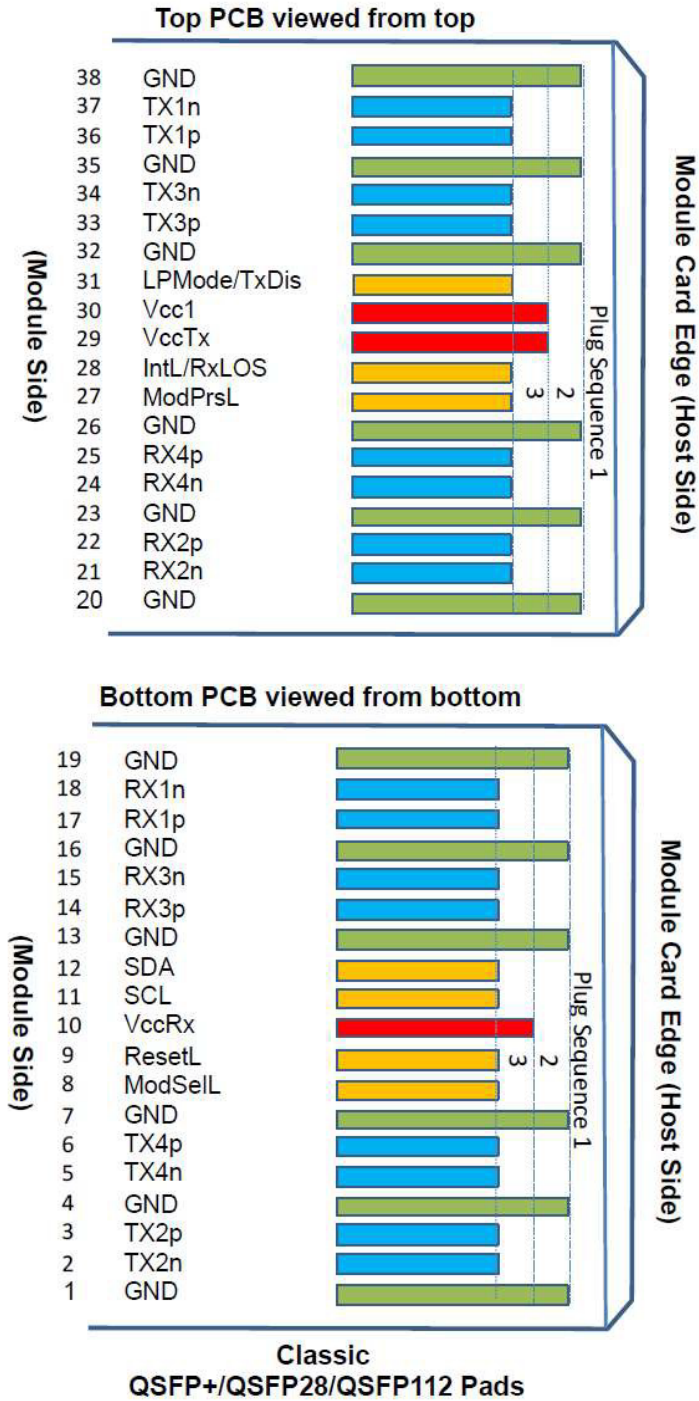
1. Average launch power, per lane (minimum), is informative and not the principal indicator of signal strength.
2. Average receive power, per lane (minimum), is informative and not the principal indicator of signal strength.
3. Measured with conformance test signal at TP3 for the BER=2.4x10⁻⁴.

Pin Descriptions

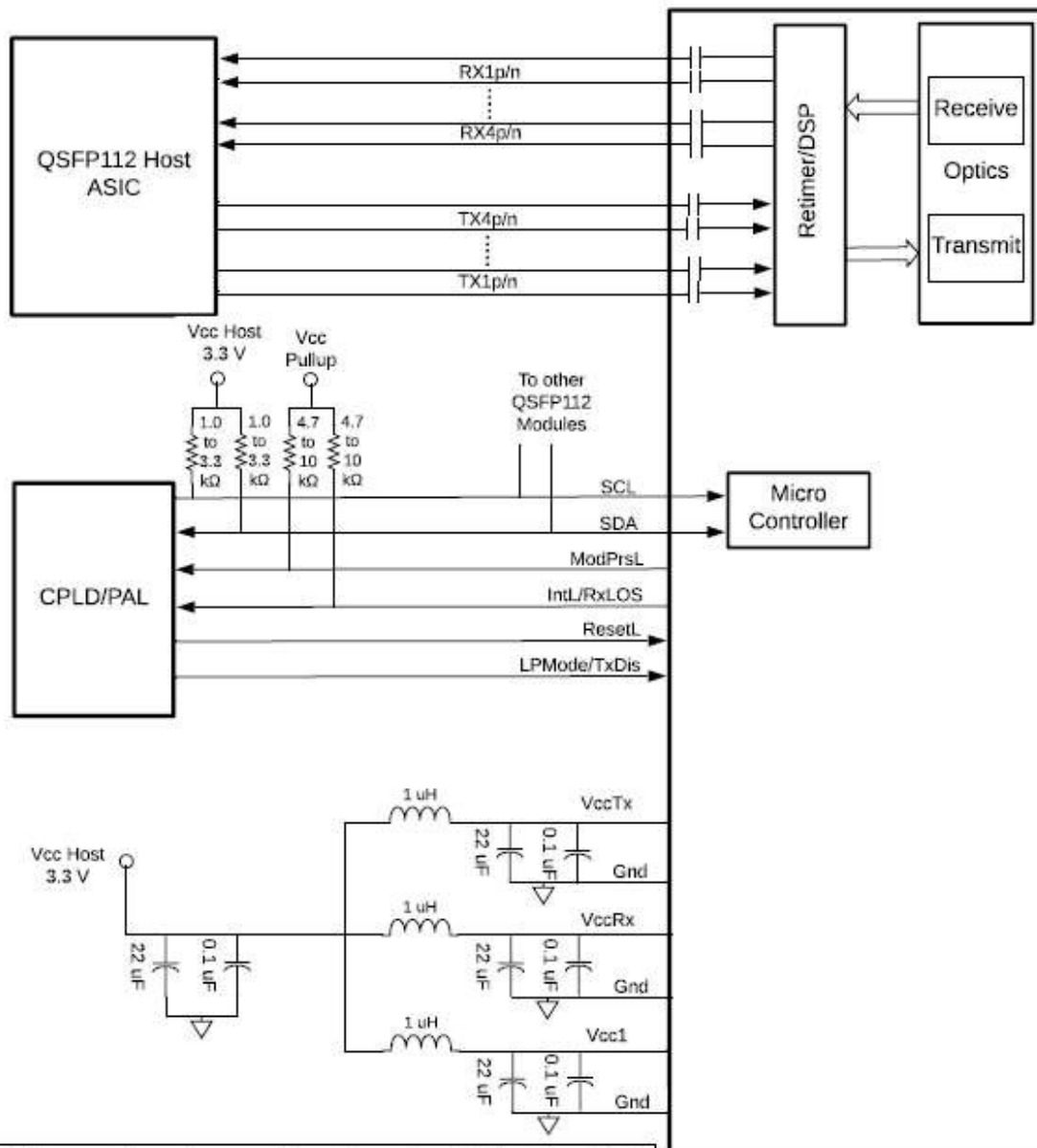
Pin	Symbol	Logic	Name/Description	Notes
1	GND		Module Ground.	1
2	Tx2-	CML-I	Transmitter Inverted Data Input.	
3	Tx2+	CML-I	Transmitter Non-Inverted Data Input.	
4	GND		Module Ground.	1
5	Tx4-	CML-I	Transmitter Inverted Data Input.	
6	Tx4+	CML-I	Transmitter Non-Inverted Data Input.	
7	GND		Module Ground.	1
8	ModSelL	LVTTL-I	Module Select.	
9	ResetL	LVTTL-I	Module Reset.	
10	VccRx		+3.3V Receiver Power Supply.	2
11	SCL	LVC MOS-I/O	2-Wire Serial Interface Clock.	
12	SDA	LVC MOS-I/O	2-Wire Serial Interface Data.	
13	GND		Module Ground.	1
14	Rx3+	CML-O	Receiver Non-Inverted Data Output.	
15	Rx3-	CML-O	Receiver Inverted Data Output.	
16	GND		Module Ground.	1
17	Rx1+	CML-O	Receiver Non-Inverted Data Output.	
18	Rx1-	CML-O	Receiver Inverted Data Output.	
19	GND		Module Ground.	1
20	GND		Module Ground.	1
21	Rx2-	CML-O	Receiver Inverted Data Output.	
22	Rx2+	CML-O	Receiver Non-Inverted Data Output.	
23	GND		Module Ground.	1
24	Rx4-	CML-O	Receiver Inverted Data Output.	
25	Rx4+	CML-O	Receiver Non-Inverted Data Output.	
26	GND		Module Ground.	1
27	ModPrsL	LVTTL- O	Module Present.	
28	IntL/RxLOS	LVTTL- O	Interrupt/Optional RxLOS.	
29	VccTx		+3.3V Transmitter Power Supply.	2
30	Vcc1		+3.3V Power Supply.	2
31	LPMMode/TxDis	LVTTL- I	Low-Power Mode/Optional Tx_Disable.	
32	GND		Module Ground.	1
33	Tx1+	CML-I	Transmitter Non-Inverted Data Input.	
34	Tx1-	CML-I	Transmitter Inverted Data Input.	
35	GND		Module Ground.	1

36	Tx1+	CML-I	Transmitter Non-Inverted Data Input.	
37	Tx1-	CML-I	Transmitter Inverted Data Input.	
38	GND		Module Ground.	1

Pin-Out Details



Recommended Host Board Schematic

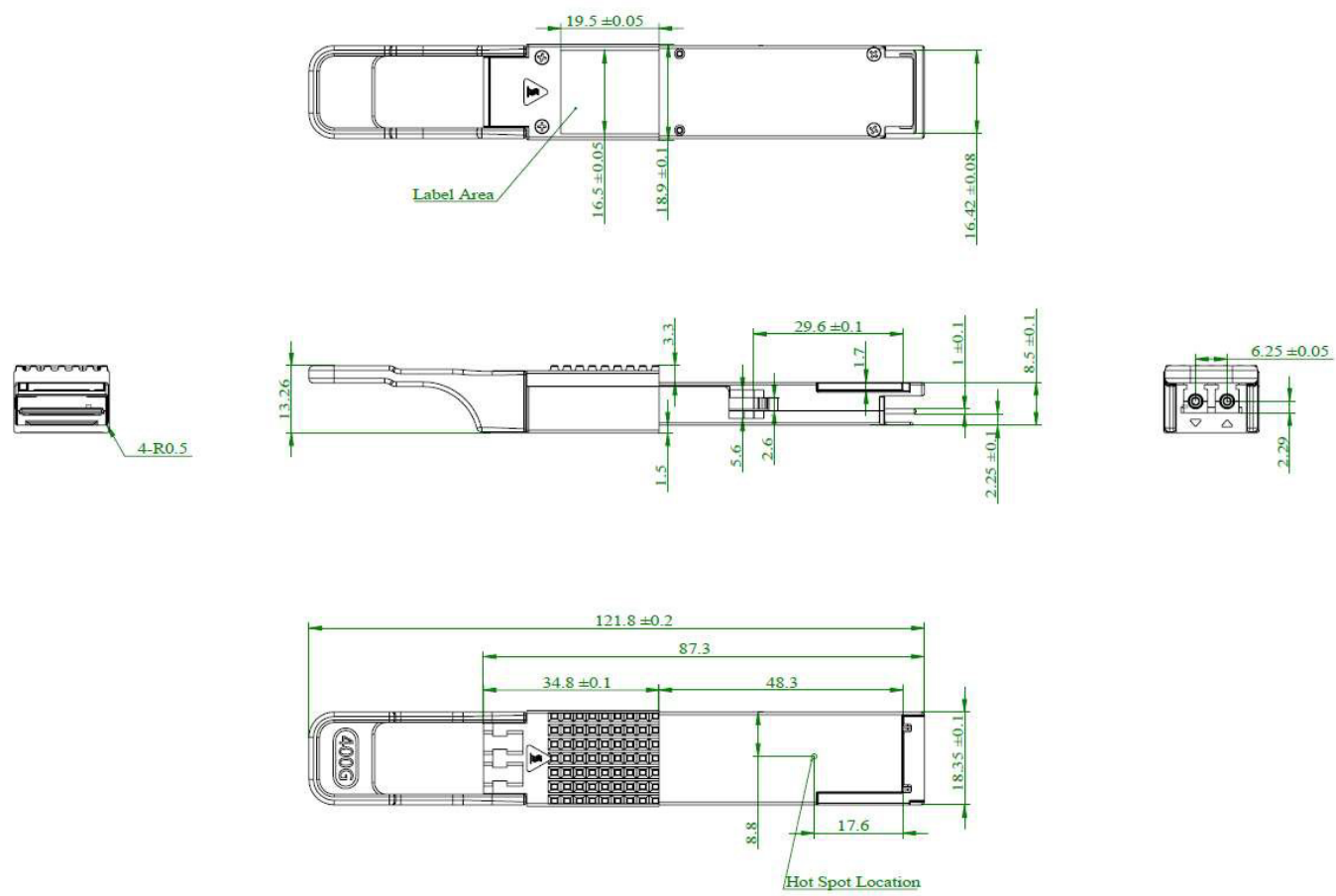


Note: Filter capacitors values are informative and application dependent, 0.1 μF capacitors should be placed in close proximity to power pads and may be duplicated for individual pads to provide additional high frequency filtering.

Note: Vcc1 may be connected to VccTx or VccRx within the module provided the applicable derating of the maximum current limit is used.

QSFP112 Optical Module

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.

