



## OFR85P05E1AD41P

Mellanox® MMA4Z00-NS400 Compatible TAA 400GBase-SR4 PAM4 OSFP112 RHS Transceiver (MMF, 850nm, 50m, MPO, DOM, CMIS 5.0)

### Product Description

This Mellanox® MMA4Z00-NS400 compatible OSFP112 RHS transceiver provides 400GBase-SR4 throughput up to 50m over multi-mode fiber (MMF) using a wavelength of 850nm via an MPO connector. It is guaranteed to be 100% compatible with the equivalent Mellanox® transceiver. This easy to install, hot swappable transceiver has been programmed, uniquely serialized and data-traffic and application tested to ensure that it will initialize and perform identically. Digital optical monitoring (DOM) support is also present to allow access to real-time operating parameters. This transceiver is Trade Agreements Act (TAA) compliant. 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:

- OSFP MSA Compliant
- Bi-directional operation: 4x Tx, and 4x Rx at 106.25Gbps with 53.125GBd PAM4 modulation scheme
- Compliant with IEEE 802.3db 400GBASE-SR4
- Commercial Temperature: 0 to 70 Celsius
- VCSEL Transmitter
- Single MPO-12 Connector
- Hot Pluggable
- Built in DSP
- RoHS Compliant and Lead-Free



### Applications:

- 400GBase Ethernet
- Access and Enterprise
- 1x Fibre Channel

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*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.*

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## Absolute Maximum Ratings

Parameter	Symbol	Min.	Typ.	Max.	Unit	Notes
Power Supply Voltage	Vcc	-0.3		3.6	V	
Storage Temperature	Tstg	-40		+85	°C	
Operating Case Temperature	Tc	0		70	°C	1
Relative Humidity (non-condensing)	RH	5		85	%	
Data rate	DR		106.25		Gbps	
ESD		-1000		+1000	V	High speed
		-2000		+2000	V	Others

### Notes:

- Exceeding the Absolute Maximum Ratings table may cause permanent damage to the device. This is just an emphasized rating and does not involve the functional operation of the device that exceeds the specifications of this technical specification under these or other conditions. Long-term operation under Absolute Maximum Ratings will affect the reliability of the device.

## Electrical Characteristics

Parameter	Symbol / Test Point	Min.	Typ.	Max.	Unit	Notes
Power Supply Voltage	Vcc	3.135	3.3	3.465	V	
Transceiver Power Consumption	TD			8.5	W	
<b>Transmitter Input Specifications</b>						
RX Signaling Rate	TP1a				GBd	
Single-Ended Voltage Tolerance Range	TP1a	-0.4		3.3	V	
DC Common-Mode Voltage	TP1a	-0.3		2.8	V	
AC Common Mode Output Voltage (rms)	TP1a			32 (LF) 80 (Full Band)	mV	
Eye Height	TP1a	10			mV	
Vertical Eye Closure (VEC)				12	dB	
Effective Return Loss		7.3			dB	
Differential Pk-Pk Input Voltage		35		750	mV	
Rx Differential Termination Mismatch	TP1			10	%	
<b>Receiver Output Specifications</b>						
AC Common Mode Output Voltage (rms)	TP4			32 (LF) 80 (Full Band)	mV	
Differential Pk-Pk Output Voltage	TP4			600 (short mode) 845 (long mode)	mV	
Eye Height, Differential	TP4	15			mV	
Effective Return Loss, ERL	TP4	8.5			dB	
Differential Termination Mismatch	TP4			10	%	

Transition Time (min, 20% to 80%)	TP4	8.5			ps	
DC Common Mode Voltage	TP4	-350		2850	mV	

## Optical Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Notes
<b>Transmitter (@TP2 Test Point)</b>						
Tx Optical Power	TxP	-4.6		4	dBm	
Extinction Ratio	ER	2.5			dB	
Outer Optical Modulation Amplitude (OMA <sub>outer</sub> )	POMA	-2.6dBm max (TECQ, TDECQ) <1.8dB  -4.4dBm + max (TECQ, TDECQ) 1.8<max (TECQ, TDE CQ)<=4.4dB		3.5	dBm	
Average Launch Power of OFF Transmitter, each Lane	Poff			-30	dBm	
Wavelength Range	$\lambda$	840		868	nm	
Spectral Width	RMS			0.6	nm	
RIN <sub>12</sub> OMA	RIN <sub>12</sub> OMA			-132	dB/Hz	
Optical Return Loss Tolerance	ORL			14	dB	
Transmitter and Dispersion Eye Closure for PAM4 (TDECQ)				4.4	dB	
<b>Receiver (@TP3 Test Point)</b>						
Damage Threshold		5			dBm	1
Average Receiver Power		-6.4		4	dBm	
Average Receiver Power, each Lane	OMA <sub>outer</sub>			3.5	dBm	
Center Wavelength	$\lambda$	840		868	nm	
Receiver Reflectance				-15	dB	
Receiver Sensitivity (OMA <sub>outer</sub> ) @2 <sup>10</sup> <sup>-4</sup>	SEN			Max (-4.6, SECQ-6.4)	dBm	
Stressed Receiver Sensitivity (OMA <sub>outer</sub> )				-2	dBm	
SECQ		4.4			dB	
OMA <sub>outer</sub> of each aggressor lane		3.5			dBm	

### 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.

## Pin Descriptions

Pin	Logic	Symbol	Name/Description	Plug Sequence	Notes
1		GND	Module Ground.	1	1
2	CML-I	Tx2+	Transmitter Non-Inverted Data.	3	
3	CML-I	Tx2-	Transmitter Inverted Data.	3	
4		GND	Module Ground.	1	1
5	CML-I	Tx4+	Transmitter Non-Inverted Data.	3	
6	CML-I	Tx4-	Transmitter Inverted Data.	3	
7		GND	Module Ground.	1	1
8	CML-I	Tx6+	Transmitter Non-Inverted Data.	3	
9	CML-I	Tx6-	Transmitter Inverted Data.	3	
10		GND	Module Ground.	1	1
11	CML-I	Tx8+	Transmitter Non-Inverted Data.	3	
12	CML-I	Tx8-	Transmitter Inverted Data.	3	
13		GND	Module Ground.	1	1
14	LVC MOS-I/O	SCL	2-Wire Serial Interface Clock.	3	2
15		Vcc	+3.3V Power Supply.	2	
16		Vcc	+3.3V Power Supply.	2	
17	Multi-Level	LPWn/PRSn	Low-Power Mode/Module Present.	3	
18		GND	Module Ground.	1	1
19	CML-O	Rx7-	Receiver Inverted Data.	3	
20	CML-O	Rx7+	Receiver Non-Inverted Data.	3	
21		GND	Module Ground.	1	1
22	CML-O	Rx5-	Receiver Inverted Data.	3	
23	CML-O	Rx5+	Receiver Non-Inverted Data.	3	
24		GND	Module Ground.	1	1
25	CML-O	Rx3-	Receiver Inverted Data.	3	
26	CML-O	Rx3+	Receiver Non-Inverted Data.	3	
27		GND	Module Ground.	1	1
28	CML-O	Rx1-	Receiver Inverted Data.	3	
29	CML-O	Rx1+	Receiver Non-Inverted Data.	3	
30		GND	Module Ground.	1	1
31		GND	Module Ground.	1	1
32	CML-O	Rx2+	Receiver Non-Inverted Data.	3	
33	CML-O	Rx2-	Receiver Inverted Data.	3	
34		GND	Module Ground.	1	1
35	CML-O	Rx4+	Receiver Non-Inverted Data.	3	

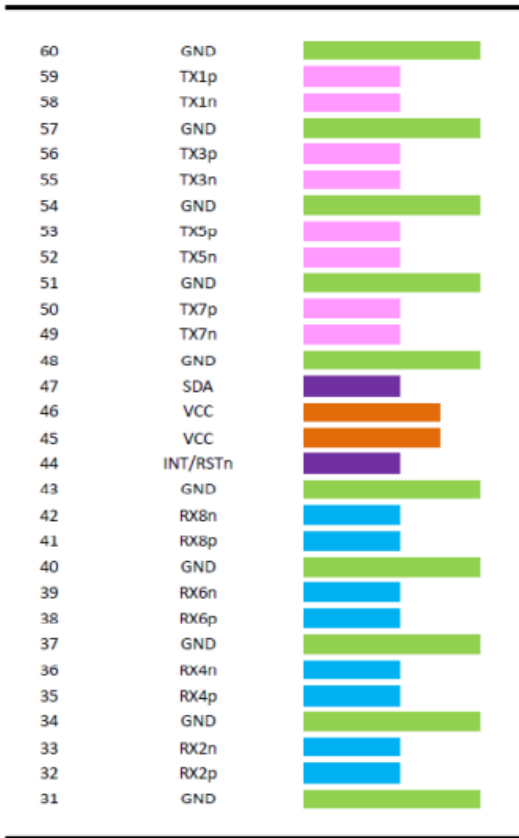
36	CML-O	Rx4-	Receiver Inverted Data.	3	
37		GND	Module Ground.	1	1
38	CML-O	Rx6+	Receiver Non-Inverted Data.	3	
39	CML-O	Rx6-	Receiver Inverted Data.	3	
40		GND	Module Ground.	1	1
41	CML-O	Rx8+	Receiver Non-Inverted Data.	3	
42	CML-O	Rx8-	Receiver Inverted Data.	3	
43		GND	Module Ground.	1	1
44	Multi-Level	INT/RSTn	Module Input/Module Reset.	3	
45		Vcc	+3.3V Power Supply.	2	
46		Vcc	+3.3V Power Supply.	2	
47	LVC MOS-I/O	SDA	2-Wire Serial Interface Data.	3	2
48		GND	Module Ground.	1	1
49	CML-I	Tx7-	Transmitter Inverted Data.	3	
50	CML-I	Tx7+	Transmitter Non-Inverted Data.	3	
51		GND	Module Ground.	1	1
52	CML-I	Tx5-	Transmitter Inverted Data.	3	
53	CML-I	Tx5+	Transmitter Non-Inverted Data.	3	
54		GND	Module Ground.	1	1
55	CML-I	Tx3-	Transmitter Inverted Data.	3	
56	CML-I	Tx3+	Transmitter Non-Inverted Data.	3	
57		GND	Module Ground.	1	1
58	CML-I	Tx1-	Transmitter Inverted Data.	3	
59	CML-I	Tx1+	Transmitter Non-Inverted Data.	3	
60		GND	Module Ground.	1	1

**Notes:**

1. OSFP uses common ground (GND) for all signals and supply (power). All are common within the OSFP module, and all module voltages are referenced to this potential unless otherwise noted.
2. Open-Drain with pull-up resistor on the host.

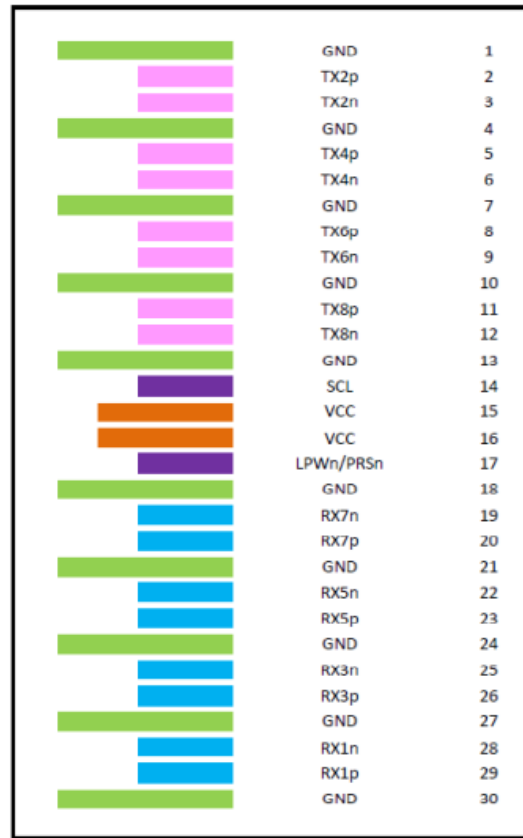
## Electrical Pad Layout

Top Side (viewed from top)



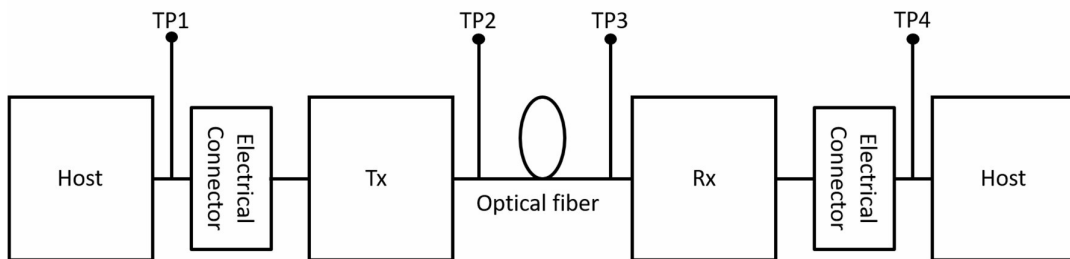
----- Module Card Edge -----

Bottom Side (viewed from bottom)

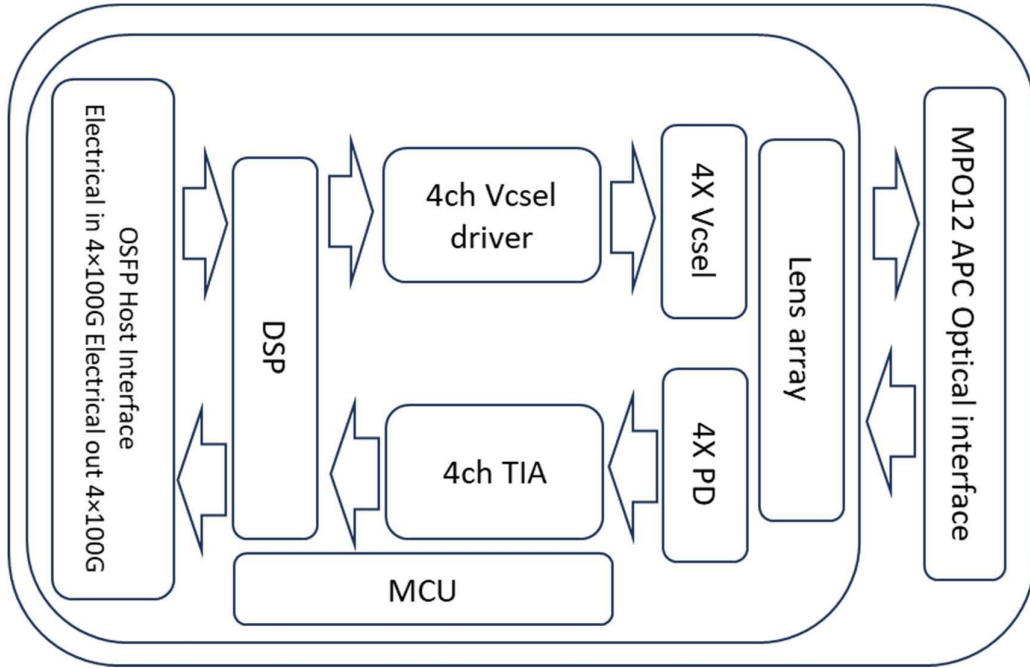


## Test Compliance Points

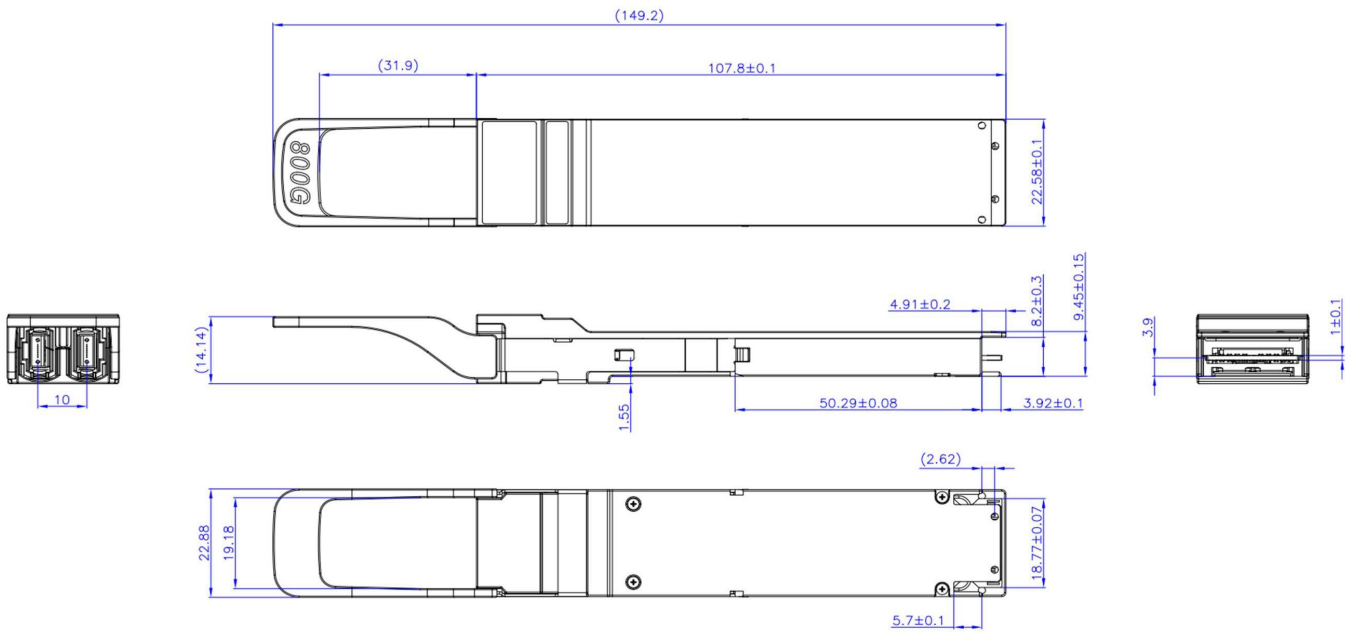
Reference link model and test compliance points used in product specifications are illustrated as follows.



## Transceiver Block Diagram



## 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 (SKYGATE).

