

NPA0022-LL11-SKY

Net Insight® NPA0022-LL11 Compatible OC-48-LR SFP Transceiver (SMF, 1310nm, 40km, LC)

Product Description

This Net Insight® NPA0022-LL11 compatible SFP transceiver provides OC-48 (2488 mbs) LR transmission rates for up to 40km over single-mode fiber (SMF) using a wavelength of 1310nm via an LC connector. It can operate at temperatures between 0 and 70C. Our transceiver is built to meet or exceed OEM specifications and is guaranteed to be 100% compatible with Net Insight®. It has been programmed, uniquely serialized, and tested for data-traffic and application to ensure that it will initialize and perform identically. All of our transceivers comply with Multi-Source Agreement (MSA) standards to provide seamless network integration. 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-8074 and SFF-8472 Compliance
- Duplex LC 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:

- OC-48 Transmission
- 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.

Regulatory Compliance

- ESD to the Electrical PINs: compatible with MIL-STD-883E Method 3015.4
- ESD to the LC Receptacle: compatible with IEC 61000-4-3
- EMI/EMC compatible with FCC Part 15 Subpart B Rules, EN55022:2010
- Laser Eye Safety compatible with FDA 21CFR, EN60950-1& EN (IEC) 60825-1,2
- RoHS compliant with EU RoHS 2.0 directive 2015/863/EU

Absolute Maximum Ratings

Parameter	Symbol	Min.	Typ	Max.	Unit
Maximum Supply Voltage	Vcc	-0.5		3.6	V
Storage Temperature	TS	-40		85	°C
Operating Case Temperature	Tc	0		70	°C
Operating Relative Humidity	RH			95	%
Data Rate			2.488		Gbps

Electrical Characteristics (TOP=25°C, Vcc=3.3Volts)

Parameter		Symbol	Min.	Typ.	Max.	Unit	Notes
Power Supply Voltage		Vcc	3.13	3.3	3.45	V	
Power Supply Current		Icc			300	mA	
Transmitter							
LVPECL Inputs (Differential)		Vin	400		1600	mVp-p	1
Input Impedance (Differential)		Zin	85	100	115	ohms	2
TX Disable	Disable		2		Vcc+0.3	V	
	Enable		0		0.8	V	
TX Fault	Fault		2		Vcc+0.3	V	
	Normal		0		0.5	V	
Receiver							
LVPECL Outputs (Differential)		Vout	400	800	1200	mVp-p	2
Output Impedance (Differential)		Zout	85	100	115	ohms	
TX_Disable Assert Time		T_off			10	us	
RX_LOS	LOS		2		Vcc+0.3	V	
	Normal		0		0.8	V	
MOD_DEF (0,2)		VoH	2.5			V	3
		VoL	0		0.5	v	3

Notes:

1. AC coupled.
2. $R_{in} > 100 \text{ kohms}$ @ DC
3. With Serial ID

Optical Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Notes
9 μm Core Diameter SMF	L		40		km	
Data Rate			2.488		Gbps	
Transmitter						
Center Wavelength	λ_c	1260	1310	1360	nm	
Spectral Width (-20dB)	$\Delta\lambda$			1	nm	
Side Mode Suppression Ratio	SMSR	30			dB	
Average Output Power	P _{out}	-2		3	dBm	2
Extinction Ratio	ER	8.2			dB	3
Rise/Fall Time (20%~80%)	tr/tf			160	ps	
Total Jitter	TJ			0.07	UI	
Output Optical Eye	ITU-T G.957 Compliant					
P _{out} @TX Disable Asserted	P _{out}			-45	dBm	
Receiver						
Center Wavelength	λ_C	1260		1600	nm	
Receiver Sensitivity	P _{min}			-28	dBm	
Receiver Overload	P _{max}	-9			dBm	
LOS De-Assert	LOSD			-29	dBm	
LOS Assert	LOSA	-40			dBm	
LOS Hysteresis		0.5			dB	

Notes:

1. LVPECL logic, internally AC coupled.
2. Output power is measured by coupling into a 9/125 mm multi-mode fiber.
3. Filtered, measured with a PRBS 2²³-1 test pattern @2500Mbps.
4. Minimum average optical power is measured at BER less than 1E-12, with 2²³-1 PRBS and ER=9 dB.

Pin Descriptions

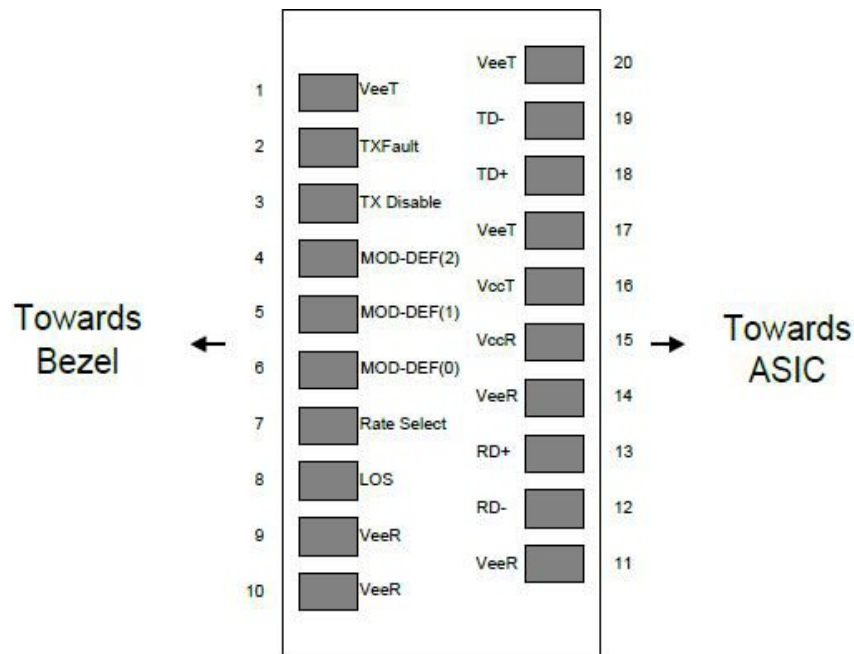
Pin	Symbol	Name/Descriptions	Plug Seq.	Notes
1	VeeT	Transmitter Ground	1	5
2	TX Fault	Transmitter Fault Indication	3	1
3	TX Disable	Transmitter Disable	3	2; Module disables on high or open
4	MOD-DEF2	Module Definition 2	3	3; 2 wire serial ID interface
5	MOD-DEF1	Module Definition 1	3	3; 2 wire serial ID interface
6	MOD-DEF0	Module Definition 0	3	3; Grounded within the module
7	Rate Select	Not Connect	3	Function no available
8	LOS	Loss of Signal	3	4
9	VeeR	Receiver Ground	1	5
10	VeeR	Receiver Ground	1	5
11	VeeR	Receiver Ground	1	5
12	RD-	Inv. Received Data Out	3	6
13	RD+	Received Data Out	3	7
14	VeeR	Receiver Ground	1	5
15	VccR	Receiver Power	2	7; $3.3 \pm 5\%$
16	VccT	Transmitter Power	2	7; $3.3 \pm 5\%$
17	VeeT	Transmitter Ground	1	5
18	TD+	Transmit Data In	3	8
19	TD-	Inv. Transmit Data In	3	8
20	VeeT	Transmitter Ground	1	5

Notes:

- TX Fault is an open collector/drain output, which should be pulled up with a 4.7K-10K resistor on the host board. Pull up voltage between 2.0V and $V_{ccT}/R+0.3V$. When high, output indicates a laser fault of some kind. Low indicates normal operation. In the low state, the output will be pulled to <0.8V.
- TX disable is an input that is used to shut down the transmitter optical output. It is pulled up withing the module with a 4.7-10K resistor. Its states are:
Low (0-0.8V): Transmitter on (>0.8, 2.0V): Undefined
High (2.0-3.465V): Transmitter Disabled: Transmitter Disabled.
- Mod-Def 0,1,2. These are the module definition pins. They should be pulled up with a 4.7K -10k resistor on the host board. The pull-up voltage shall be V_{ccT} or V_{ccR} .
Mod-Def 0 is grounded by the module to indicate that the module is present;
Mod-Def 1 is the clock line of two wire serial interface for serial ID;
Mod-Def 2 is the data line of two wire serial interface for serial ID.
- LOS (Loss if Signal) is an open collector/drain output, which should be pulled up with a 4.7K-10K resistor. Pull up voltage between 2.0V and $V_{ccT}/R+0.3V$. When high, this output indicated the received optical

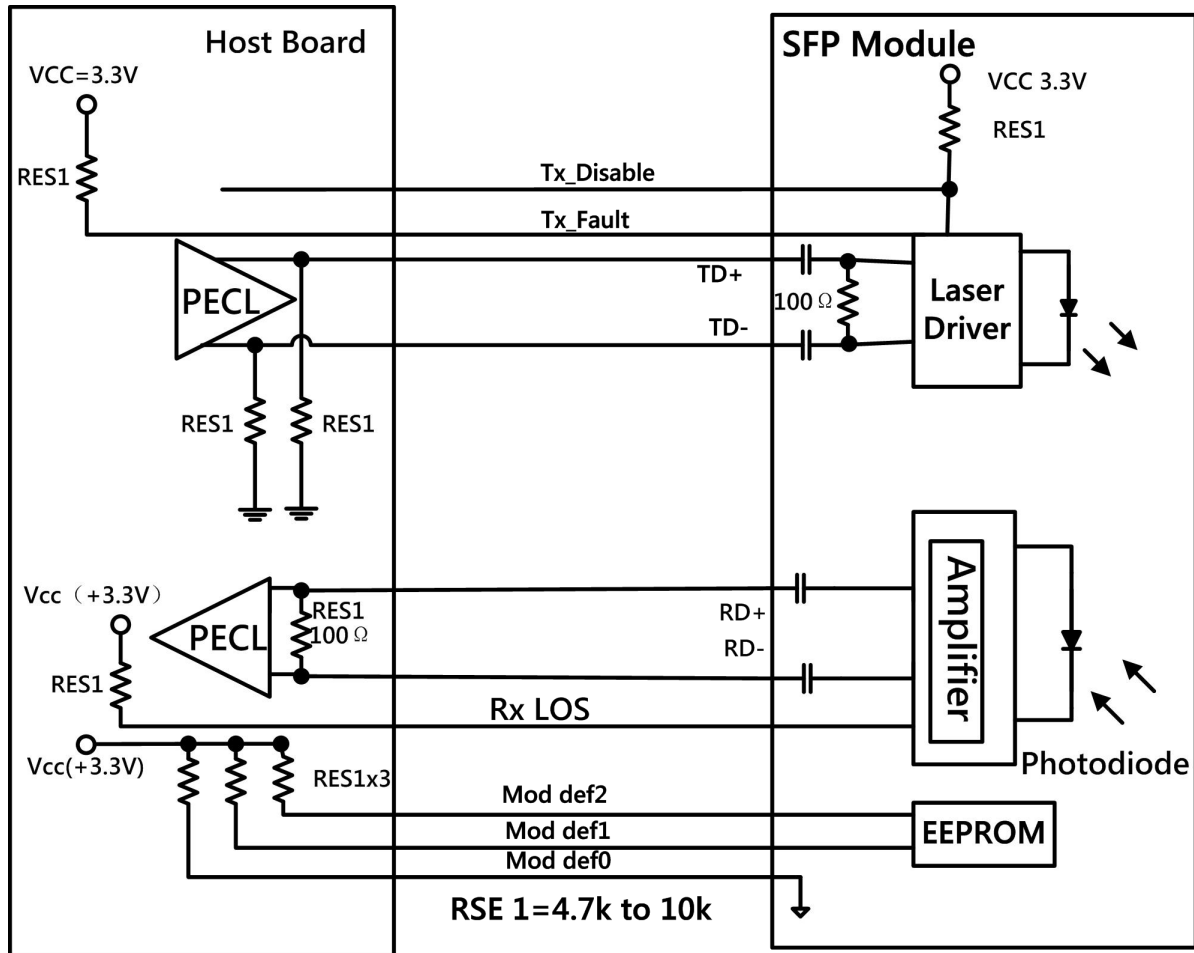
power is below the worst-case receiver sensitivity (as defined by the standard in use). Low indicated normal operation. In the low state, the output will be pulled to <0.8V.

5. VeeR and VeeT may be internally connected within the SFP module.
6. RD -/+: These are the differential receiver outputs. They are AC coupled 100 differential Lines which should be terminated with 100 (differential) at the user SERDES. The AC coupling is done inside the module and is thus not required on the host board. The voltage swing on these lines will be between 400 and 2000 mV differential (200 –1000 mV single ended) when properly terminated.
7. VccR and VccT are the receiver and transmitter power supplies. They are defined as 3.3V±5% at the SFP connector pin. Maximum supply current is 300mA. Recommended host board power supply filtering is shown below. Inductors with DC resistance of less than 1 ohm should be used in order to maintain the required voltage at the SFP input pin with 3.3V supply voltage. When the recommended supply-filtering network is used, hot plugging of the SFP transceiver module will result in an inrush current of no more than 30mA greater than the steady state value. VccR and VccT may be internally connected within the SFP transceiver module.
8. TD -/+: These are the differential transmitter inputs. They are AC-coupled, differential lines with 100 differential terminations inside the module. The AC coupling is done inside the module and is thus not required on the host board. The inputs will accept differential swings of 400-2000mV (200-1000mV single-ended)



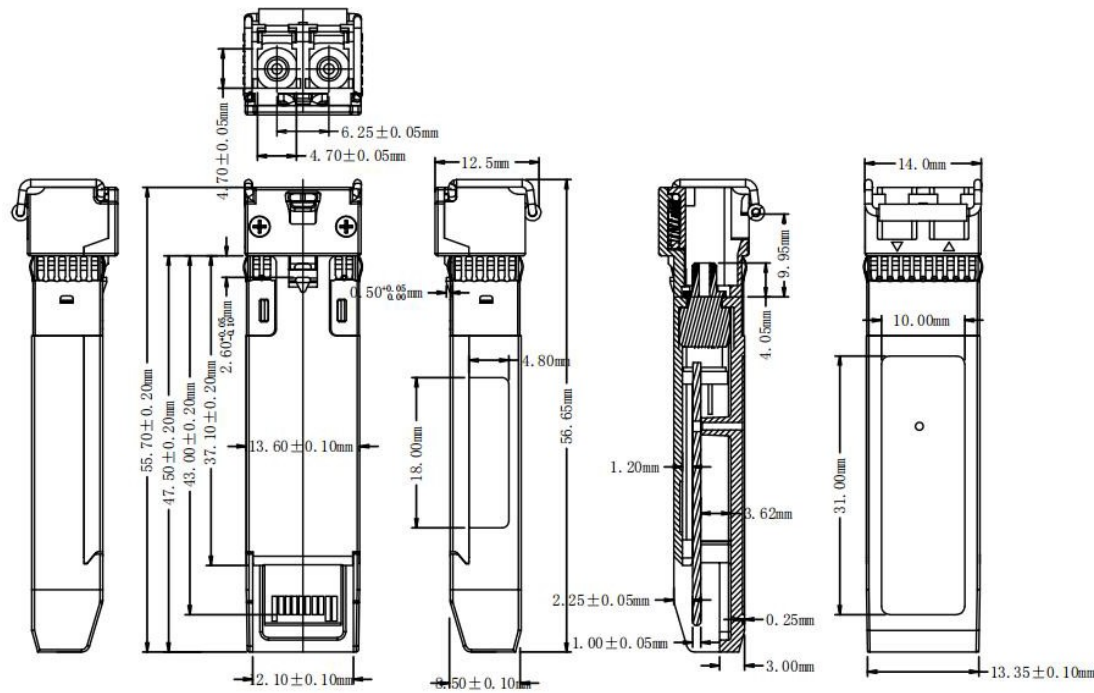
Pin-out of connector Block on Host board

Recommended Circuit Schematic



Mechanical Specifications

Small Form Factor Pluggable (SFP) transceivers are compatible with the dimensions defined by the SFP Multi-Sourcing Agreement (MSA).



EEPROM Information

EEPROM memory map specific data field description is as below:

2 wire address 1010000X(A0h)

0	Serial ID Defined by SFP MSA(96 bytes) Vendor Specific (32 bytes) Reserved (128 bytes)
95	
127	
255	

2 wire address 1010000X (A2h)

0	Alarm and warning Thresholds(56 bytes) Cal Constants (40 bytes)
55	
95	Real Time Diagnostic Interface(24 bytes) Vendor Specific(8 bytes)
119	
127	User Writable EEPROM(120 bytes) Vendor Specific(8 bytes)
247	
255	

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.

