



## **NPA0022-LL11-OPC**

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

### **Features**

- INF-8074 and SFF-8472 Compliance
- Duplex LC Connector
- Single-mode Fiber
- Commercial Temperature 0 to 70 Celsius
- Hot Pluggable
- Metal with Lower EMI
- Excellent ESD Protection
- RoHS Compliant and Lead Free



### **Applications:**

- OC-48 Transmission
- Access and Enterprise

### **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. This transceiver is Trade Agreements Act (TAA) compliant. We stand behind the quality of our products and proudly offer a limited lifetime warranty.

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

## 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 |
|---------------------------------------|-----------------------|------|-------|------|------|-------|
| 9μm Core Diameter SMF                 | L                     |      | 40    |      | km   |       |
| Data Rate                             |                       |      | 2.488 |      | Gbps |       |
| Transmitter                           |                       |      |       |      |      |       |
| Center Wavelength                     | $\lambda_c$           | 1260 | 1310  | 1360 | nm   |       |
| Spectral Width (-20dB)                | $\Delta\lambda$       |      |       | 1    | nm   |       |
| Side Mode Suppression Ratio           | SMSR                  | 30   |       |      | dB   |       |
| Average Output Power                  | P <sub>out</sub>      | -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 <sub>out</sub> @TX Disable Asserted | P <sub>out</sub>      |      |       | -45  | dBm  |       |
| Receiver                              |                       |      |       |      |      |       |
| Center Wavelength                     | $\lambda_C$           | 1260 |       | 1600 | nm   |       |
| Receiver Sensitivity                  | P <sub>min</sub>      |      |       | -28  | dBm  |       |
| Receiver Overload                     | P <sub>max</sub>      | -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 2<sup>23</sup>-1 test pattern @2500Mbps.
4. Minimum average optical power is measured at BER less than 1E-12, with 2<sup>23</sup>-1 PRBS and ER=9 dB.

## Pin Descriptions

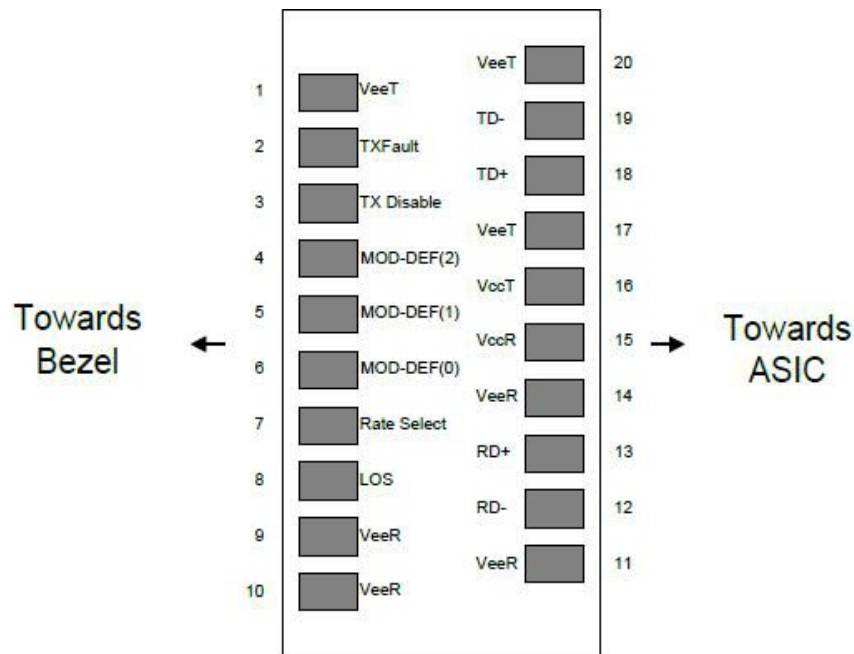
| Pin | Symbol      | Name/Descriptions            | Plug Seq. | Notes                              |
|-----|-------------|------------------------------|-----------|------------------------------------|
| 1   | VeeT        | Transmitter Ground           | 1         | 5                                  |
| 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

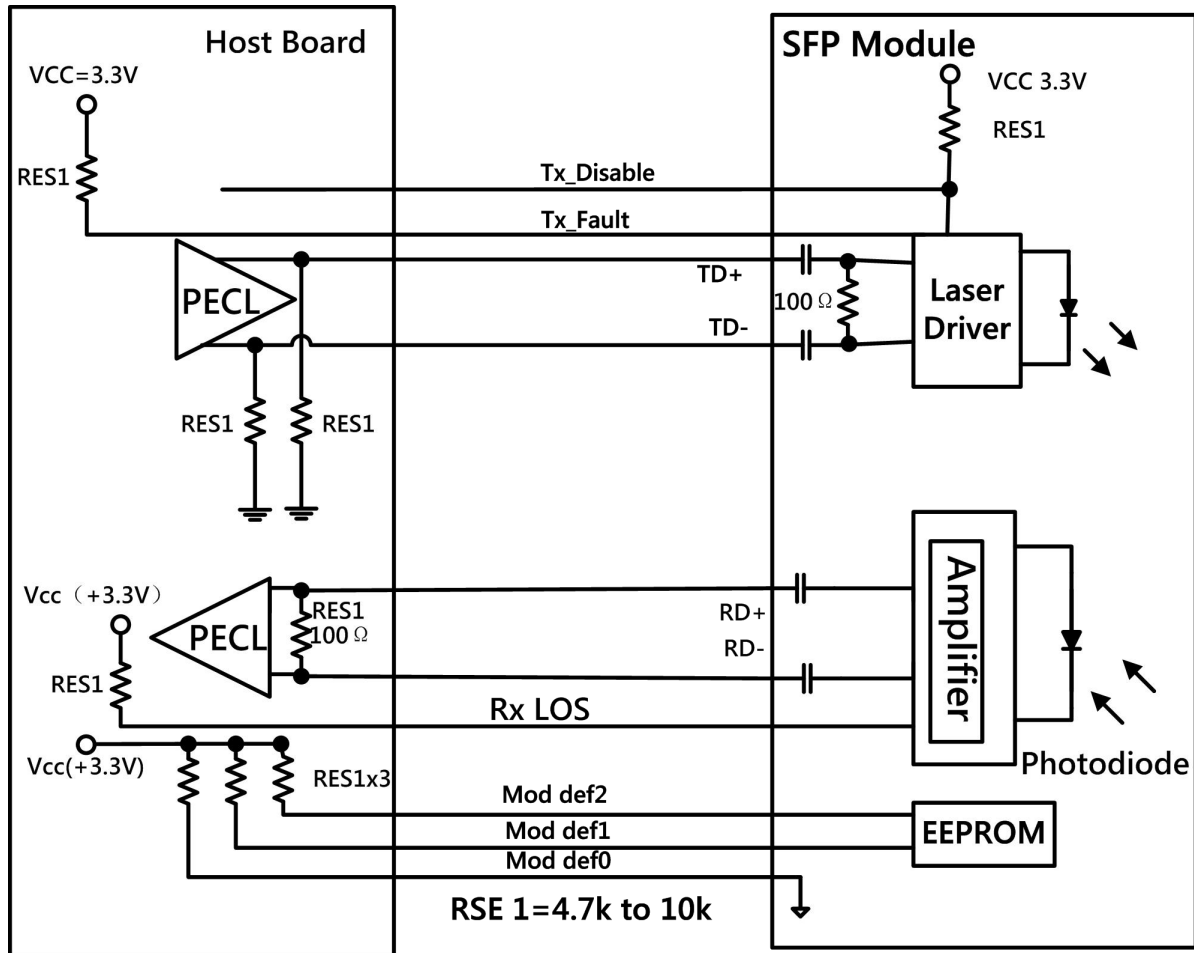
power is below the worst-case receiver sensitivity (as defined by the standard in use). Low indicated normal operation. In the low state, the output will be pulled to <0.8V.

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)



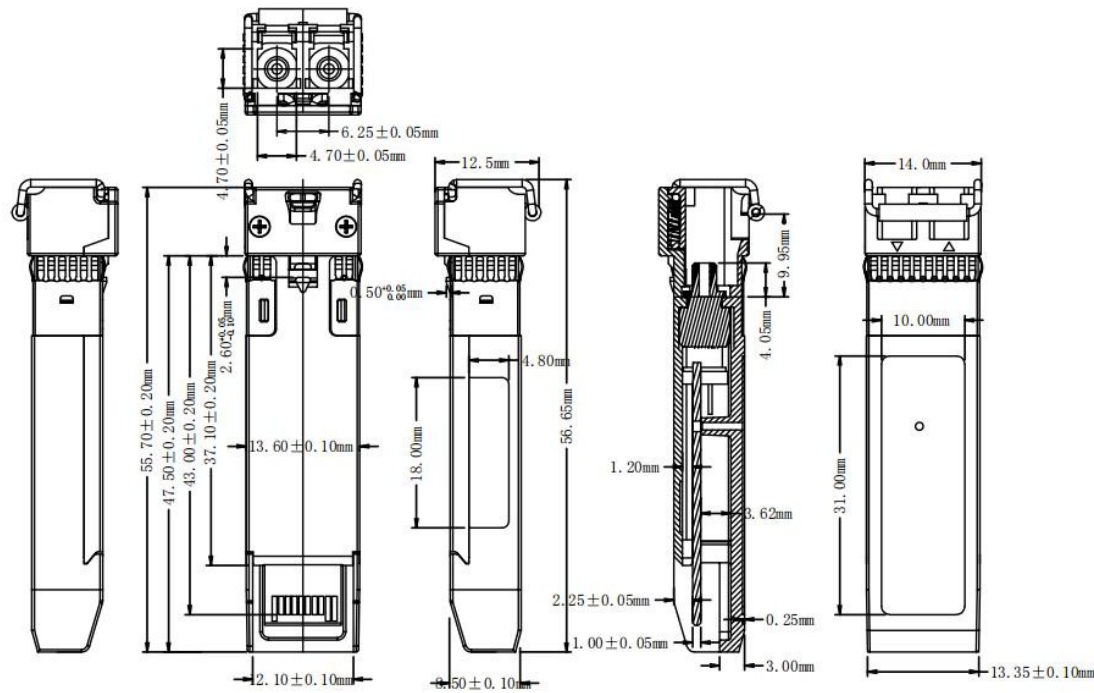
Pin-out of connector Block on Host board

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) |
| 95  |                                        |
| 127 |                                        |
| 127 | Vendor Specific (32 bytes)             |
| 255 |                                        |
| 255 | Reserved (128 bytes)                   |

2 wire address 1010000X (A2h)

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

## **OptioConnect**

### **Innovation for the Future of High-Speed Networking**

#### **Who We Are**

OptioConnect is reshaping the landscape of communication and high-speed networking through intelligent technology. With a core focus on cutting edge technology, we deliver smarter fiber optic solutions for enterprise networks, data centers, and next-gen telecom infrastructures.

#### **What We Do**

At OptioConnect, we fuse advanced engineering with intelligent automation to drive the future of networking. Our AI-integrated solutions are designed to optimize performance and streamline operations with:

- Superior Performance
- Network and traffic optimization
- Intelligent energy management
- Seamless OEM compatibility
- Scalable cost-efficiency

#### **Smarter Networks by Design**

Innovation isn't just a goal—it's our process. We embed AI and machine learning across our R&D and product lines, enabling adaptive performance, automated tuning, and faster deployment cycles. The result? Networks that don't just work—they learn, evolve, and outperform.

#### **Our Team**

Our engineers, data scientists, and network architects bring decades of experience and a future-focused mindset. We provide hands-on support with intelligent insights that turn complex challenges into simple solutions.

#### **Our Mission**

To deliver AI-enhanced connectivity that reduces cost, increases speed, and maximizes efficiency—empowering our partners to operate at the forefront of a rapidly evolving digital world.

#### **Let's Connect**

Discover how OptioConnect's intelligent infrastructure solutions can power your network's next leap forward.

[www.optioconnect.com](http://www.optioconnect.com) | [info@optioconnect.com](mailto:info@optioconnect.com)

