

### SFP-1GB-HD1-49U-80-J-AO

Juniper Networks® Compatible TAA 1000Base-CWDM HD1 SFP Transceiver (SMF, 1490nm LTx/HRx, 80km, LC, DOM)

#### Features

- INF-8074 and SFF-8472 Compliance
- Simplex 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

- 1x Fibre Channel
- Gigabit Ethernet over CWDM
- Access, Metro and Enterprise

#### Product Description

This Juniper Networks® compatible SFP transceiver provides 1000Base-CWDM HD1 throughput up to 80km over single-mode fiber (SMF) at a bidirectional wavelength of 1490nm LTx/HRx via an LC connector. It can operate at temperatures between 0 and 70C. The listed reach has been determined using a link budget calculation and tested in a standard environment. Actual link distances achieved will be dependent upon the deployed environment. Our transceiver is built to meet or exceed OEM specifications and is guaranteed to be 100% compatible with Juniper Networks®. 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.

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

TAA refers to the Trade Agreements Act (19 U.S.C. & 2501-2581), which is intended to foster fair and open international trade. TAA requires that the U.S. Government may acquire only "U.S.-made or designated country end products.")



### CWDM Available Wavelengths

| Wavelength | Min.   | Typ. | Max.   |
|------------|--------|------|--------|
| 27         | 1264.5 | 1271 | 1277.5 |
| 29         | 1284.5 | 1291 | 1297.5 |
| 31         | 1304.5 | 1311 | 1317.5 |
| 33         | 1324.5 | 1331 | 1337.5 |
| 35         | 1344.5 | 1351 | 1357.5 |
| 37         | 1364.5 | 1371 | 1377.5 |
| 39         | 1384.5 | 1391 | 1397.5 |
| 41         | 1404.5 | 1411 | 1417.5 |
| 43         | 1424.5 | 1431 | 1437.5 |
| 45         | 1444.5 | 1451 | 1457.5 |
| 47         | 1464.5 | 1471 | 1477.5 |
| 49         | 1484.5 | 1491 | 1497.5 |
| 51         | 1504.5 | 1511 | 1517.5 |
| 53         | 1524.5 | 1531 | 1537.5 |
| 55         | 1544.5 | 1551 | 1557.5 |
| 57         | 1564.5 | 1571 | 1577.5 |
| 59         | 1584.5 | 1591 | 1597.5 |
| 61         | 1604.5 | 1611 | 1617.5 |

### Absolute Maximum Ratings

| Parameter                    | Symbol | Min.   | Typ.   | Max.   | Unit  | Notes |
|------------------------------|--------|--------|--------|--------|-------|-------|
| Power Supply Voltage         | Vcc    | +3.135 | +3.30  | +3.465 | V     |       |
| Power Supply Current         | Icc    |        |        | 500    | mA    | 1     |
| Power Supply Noise Rejection | PSNR   |        |        | 100    | mVp-p | 2     |
| Operating Temperature        | Tc     | -40    |        | +85    | °C    | 3     |
| Storage Temperature          | Tstg   | -40    |        | +85    | °C    | 4     |
| Power Supply Storage         | Vcc    |        | < +4.0 |        | V     |       |
| Ambient Humidity             | AH     | 5      |        | 95     | %     | 5     |

#### Notes:

1. Cooled type.
2. From 100Hz to 1MHz.
3. Case with airflow.
4. Ambient.

- Without dew.

## Electrical Characteristics

| Parameter                                               |                | Symbol       | Min.   | Typ. | Max.    | Unit | Notes |
|---------------------------------------------------------|----------------|--------------|--------|------|---------|------|-------|
| Transmitter                                             |                |              |        |      |         |      |       |
| Data Rate                                               |                | DRT          | 1.0625 |      | 1.25    | Gbps |       |
| Differential Input Voltage                              |                | VIN,pp       | 150    |      | 1000    | mV   |       |
| Differential Input Impedance                            |                | ZIN          | 90     | 100  | 110     | Ω    |       |
| Tx_Disable                                              | Input_Low      | VIL          | 0      |      | 0.8     | V    | 1     |
|                                                         | Input_High     | VIH          | 2.0    |      | 3.465   | V    |       |
|                                                         | Assert Time    | tOFF         |        |      | 10      | us   | 2     |
|                                                         | Negate Time    | tON          |        |      | 1       | ms   | 3     |
| Tx_Disable to Reset                                     |                | treset       | 10     |      |         | us   | 4     |
| Time to Initialize_Cooled (Including Reset of Tx_Fault) |                | tInit_cooled |        |      | 10      | sec  | 5     |
| Tx_Fault                                                | Output_Low     | VFOL         | 0      |      | 0.8     | V    | 6     |
|                                                         | Output_High    | VFOH         | 2.0    |      | Vcc+0.3 | V    |       |
| Receiver                                                |                |              |        |      |         |      |       |
| Data Rate                                               |                | DR           | 1.0625 |      | 1.25    | Gbps |       |
| Differential Output Voltage                             |                | VOUT         | 300    |      | 850     | mV   | -     |
| Differential Output Impedance                           |                | ZOUT         | 90     | 100  | 110     | Ω    | -     |
| Rx_LOS<br>(Loss of Signal)                              | Output_Low     | VLOSL        | 0      |      | 0.8     | V    | 6     |
|                                                         | Output_High    | VLOSH        | 2      |      | Vcc+0.3 | V    |       |
|                                                         | Assert Time    | tLOS-ON      |        |      | 100     | us   | 7     |
|                                                         | De-Assert Time | tLOS-OFF     |        |      | 100     | us   | 8     |

### Notes:

- LVTTTL, normal at low, high is shutdown (Poff).
- Assert time tOFF: high.
- Negate time tON: low.
- Tx\_Disable to reset treset: high.
- Cooled version, for wavelength stabilization at worst-case (low & high temperatures).
- LVTTTL, low is normal.
- Assert time tLOS-ON: low → high.
- De-assert time tLOS-OFF: high → low.

## Optical Characteristics

| Parameter                       |            | Symbol                               | Min.                                | Typ. | Max.  | Unit  | Notes |
|---------------------------------|------------|--------------------------------------|-------------------------------------|------|-------|-------|-------|
| Transmitter                     |            |                                      |                                     |      |       |       |       |
| Optical Transmit Power          |            | Pf                                   | -2.5                                |      | 2.0   | dBm   |       |
| Transmitter Disable (Off) Power |            | Poff                                 |                                     |      | -35   | dBm   | 2     |
| Peak Wavelength                 |            | $\lambda_P$                          | $\lambda_C$ -6.5 ~ $\lambda_C$ -1.5 |      |       | nm    | 1     |
| Spectral Width                  |            | $\Delta\lambda$                      |                                     |      | 1.0   | nm    | 3     |
| Side-Mode Suppression Ratio     |            | SMSR                                 | 30                                  |      |       | dB    |       |
| RIN <sub>12</sub> OMA           |            | RIN                                  |                                     |      | -117  | dB/Hz |       |
| Dispersion Penalty              |            | DP                                   |                                     |      | 1.5   | dB    |       |
| Extinction Ratio                |            | ER                                   | 8.2                                 |      |       | dB    | 4     |
| Eye Pattern Mask                |            | IEEE802.3/2008 Section 3 Figure 38-2 |                                     |      |       |       |       |
| Receiver                        |            |                                      |                                     |      |       |       |       |
| Optical Sensitivity             |            | S                                    |                                     |      | -26.5 | dBm   | 5     |
| Optical Overload                |            | OL                                   | 2.0                                 |      |       | dBm   | 5     |
| Operating Wavelength            |            | $\lambda_o$                          | $\lambda_C$ +2.0 ~ $\lambda_C$ +6.5 |      |       | nm    | 1     |
| Rx_LOS<br>(Loss of Signal)      | Assert     | PA                                   | -38.0                               |      |       | dBm   | 6     |
|                                 | De-Assert  | PD                                   |                                     |      | -26.5 | dBm   |       |
|                                 | Hysteresis | PA-PD                                | 0.5                                 | 2.0  | 5.0   | dB    |       |
| Receiver Reflectance            |            |                                      |                                     |      | -27   | dB    | 7     |
| RSSI Calibration                |            | RCAL                                 | Internally Calibrated               |      |       |       |       |

### Notes:

1. CWDM, DFB-LD,  $\lambda_C = 1271, 1291, 1311, 1331, 1351, 1371, 1391, 1411, 1431, 1451, 1471, 1491, 1511, 1531, 1551, 1571, 1591, \text{ and } 1611\text{nm}$ .
2. At Tx\_Disable = high.
3. At -20dB.
4. At 1.25Gbps, PRBS 2<sup>7</sup>-1, Figure 1.
5. PRBS2<sup>7</sup>-1, BER1x10<sup>-12</sup>, and ER=8.2dB.
6. Squelch function enabled.
7. At  $\lambda_O$ .

## Pin Descriptions

| Pin | Symbol      | Name/Description                                           | Plug Sequence | Notes |
|-----|-------------|------------------------------------------------------------|---------------|-------|
| 1   | VeeT        | Module Ground.                                             | 1             |       |
| 2   | Tx_Fault    | Status Out.                                                | 3             |       |
| 3   | Tx_Disable  | Control In.                                                | 3             |       |
| 4   | MOD_DEF(2)  | Input/Output (SDA, I <sup>2</sup> C Data).                 | 3             |       |
| 5   | MOD_DEF(1)  | Input/Output (SCL, I <sup>2</sup> C Clock).                | 3             |       |
| 6   | MOD_DEF(0)  | Indicates that the module is present. Grounded internally. | 3             |       |
| 7   | Rate Select | Rate Select In. Not Used.                                  | 3             | 1     |
| 8   | Rx_LOS      | Status Out.                                                | 3             |       |
| 9   | VeeR        | Module Ground.                                             | 3             |       |
| 10  | VeeR        | Module Ground.                                             | 1             |       |
| 11  | VeeR        | Module Ground.                                             | 1             |       |
| 12  | Rx_Data-    | Data Out Negative.                                         | 3             |       |
| 13  | Rx_Data+    | Data Out Positive.                                         | 3             |       |
| 14  | VeeR        | Module Ground.                                             | 1             |       |
| 15  | Rx_Vcc      | Power.                                                     | 2             |       |
| 16  | Tx_Vcc      | Power.                                                     | 2             |       |
| 17  | VeeT        | Module Ground.                                             | 1             |       |
| 18  | Tx_Data+    | Data In Positive.                                          | 3             |       |
| 19  | Tx_Data-    | Data In Negative.                                          | 3             |       |
| 20  | VeeT        | Module Ground.                                             | 1             |       |

### Notes:

1. Internally pulled down with >51k $\Omega$  resistor.

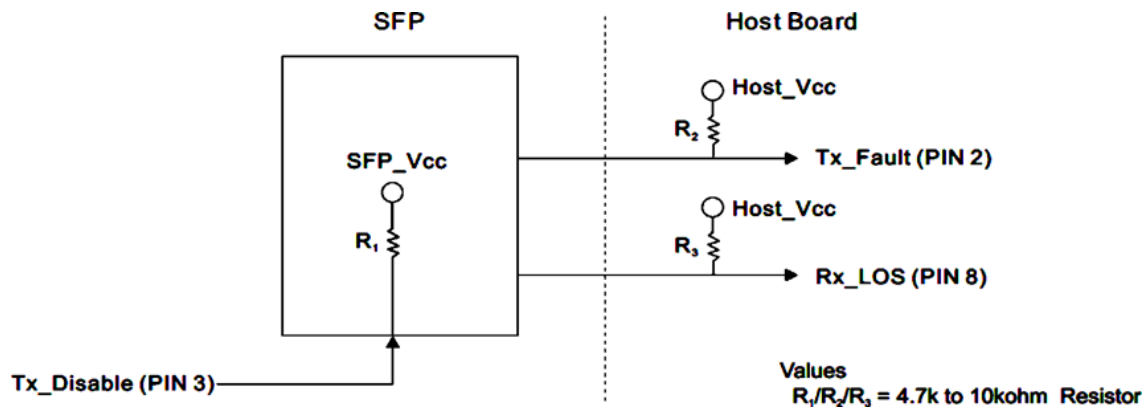
### Recommended Circuit Schematic

Tx\_Disable: Transmitter Disable, logic high, 4.7k to 10kΩ pull-up to the Vcc on the SFP.

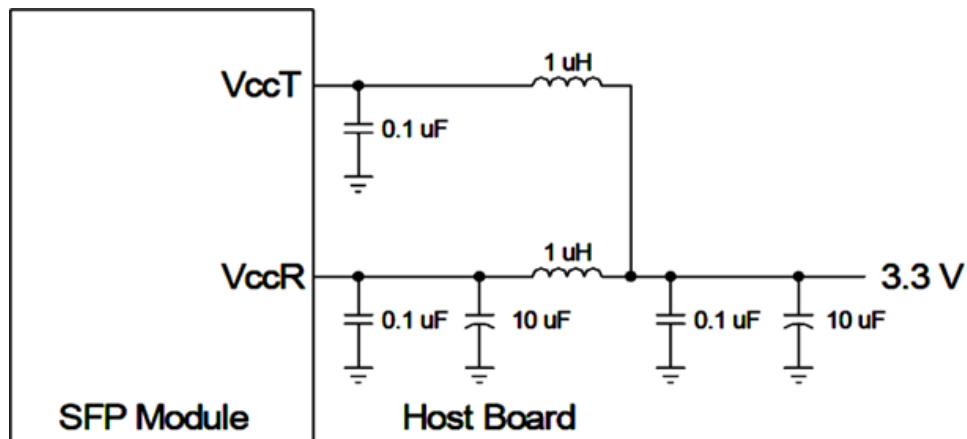
Tx\_Fault: Transmitter Fault, logic high, 4.7k to 10kΩ pull-up to the Vcc on the host.

Rx\_LOS: Receiver Loss of Signal, logic high, 4.7k to 10kΩ pull-up to the Vcc on the host.

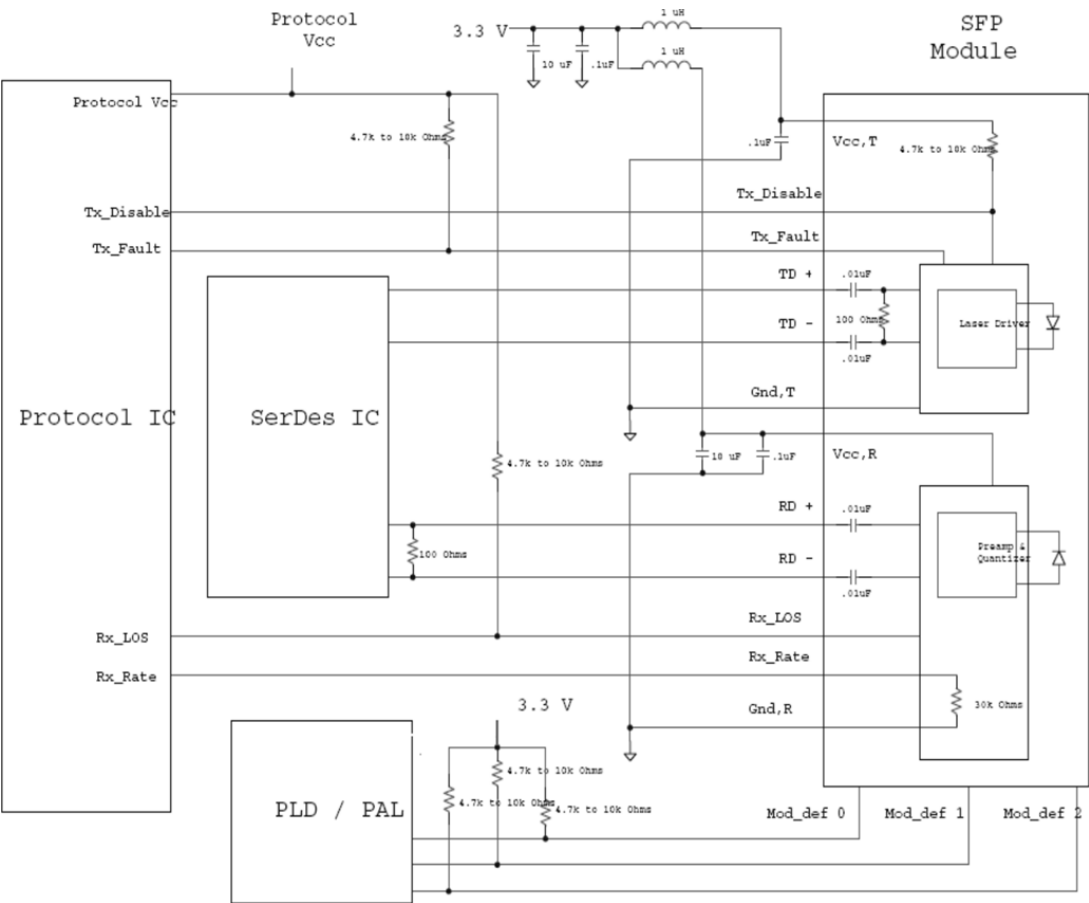
### Signal Definitions



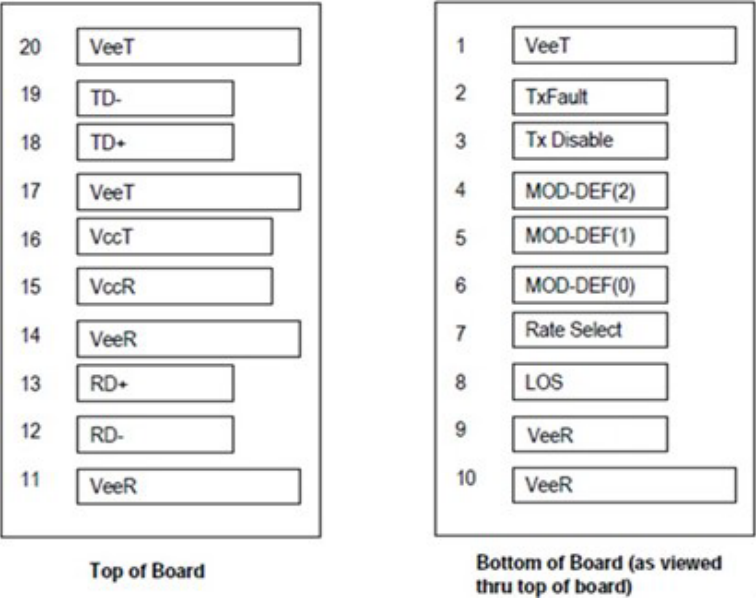
### Power Coupling



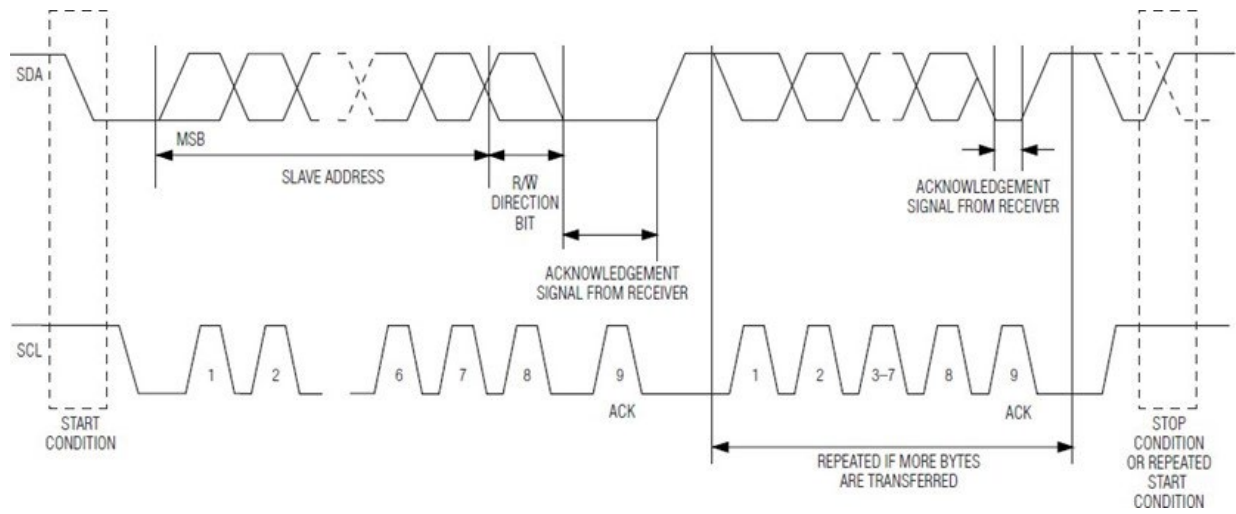
SFP Host Board Schematic



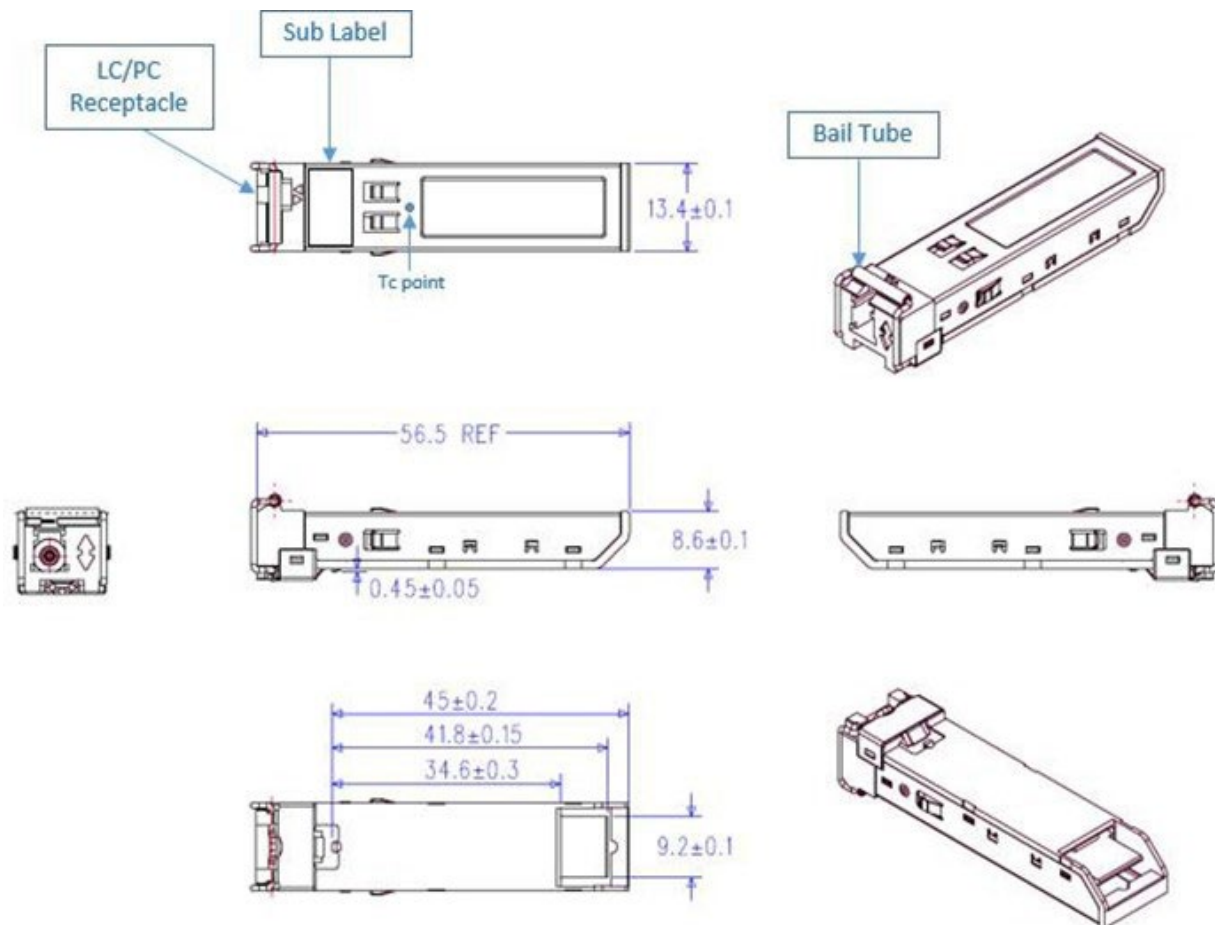
20-Pin Connector



## 2-Wire Data Transfer Protocol



## Mechanical Specifications



## About AddOn Networks

In 1999, AddOn Networks entered the market with a single product. Our founders fulfilled a severe shortage for compatible, cost-effective optical transceivers that compete at the same performance levels as leading OEM manufacturers. Adhering to the idea of redefining service and product quality not previously had in the fiber optic networking industry, AddOn invested resources in solution design, production, fulfillment, and global support.

Combining one of the most extensive and stringent testing processes in the industry, an exceptional free tech support center, and a consistent roll-out of innovative technologies, AddOn has continually set industry standards of quality and reliability throughout its history.

Reliability is the cornerstone of any optical fiber network and is ingrained in AddOn's DNA. It has played a key role in nurturing the long-term relationships developed over the years with customers. AddOn remains committed to exceeding industry standards with certifications from ranging from NEBS Level 3 to ISO 9001:2005 with every new development while maintaining the signature reliability of its products.



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