

### SFP-1GB-LX-I-SGMII-C-AO

Cisco® Compatible 100/1000Base-LX SFP Transceiver (SMF, 1310nm, 10km, LC, DOM, -40 to 85C, SGMII)

#### Features

- Built-In PHY Supporting SGMII Interface
- Dual-Rate of 100Base-LX/1000Base-LX Operation
- Built-In High Performance MCU Supporting Easier Configuration
- Up to 10km Transmission with SMF
- Standard Serial ID Information Compatible with SFP MSA
- 1310nm FP Laser and PIN Photo-Detector
- 3.3V Single Power Supply
- Duplex LC Connector
- RoHS Compliant and Lead-Free
- Operating Temperature: -40 to 85 Celsius



#### Applications

- 1x Fibre Channel
- 1000Base-LX Ethernet
- Access and Enterprise

#### Product Description

This Cisco® compatible SFP transceiver provides 100/1000Base-LX throughput up to 10km over single-mode fiber (SMF) using a wavelength of 1310nm via an LC connector with SGMII. It is capable of withstanding rugged environments and can operate at temperatures between -40 and 85C. Our transceiver is built to meet or exceed OEM specifications and is guaranteed to be 100% compatible with Cisco®. 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. Additional product features include Digital Optical Monitoring (DOM) support which allows 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.

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.")



## Absolute Maximum Ratings

| Parameter                  |          | Symbol           | Min. | Typ. | Max. | Unit | Notes |
|----------------------------|----------|------------------|------|------|------|------|-------|
| Supply Voltage             |          | V <sub>CC</sub>  | -0.5 |      | 3.6  | V    |       |
| Storage Temperature        |          | T <sub>stg</sub> | -40  |      | 85   | °C   |       |
| Operating Case Temperature |          | T <sub>c</sub>   | -40  |      | 85   | °C   |       |
| Relative Humidity          |          | RH               | 5    |      | 95   | %    |       |
| Data Rate                  | 1000Base |                  |      | 1250 |      | Mbps |       |
|                            | 100Base  |                  |      | 125  |      |      |       |

## Electrical Characteristics

| Parameter                      |         | Symbol            | Min.            | Typ. | Max.                 | Unit | Notes |
|--------------------------------|---------|-------------------|-----------------|------|----------------------|------|-------|
| Power Supply Voltage           |         | V <sub>CC</sub>   | 3.13            | 3.3  | 3.47                 |      |       |
| Power Supply Current           |         | I <sub>CC</sub>   |                 |      | 350                  | mA   | 1     |
| Power Dissipation              |         | P <sub>DISS</sub> |                 |      | 1.5                  | W    |       |
| Transmitter                    |         |                   |                 |      |                      |      |       |
| Differential Data Input Swing  |         | V <sub>IN</sub>   | 500             |      | 2400                 | mV   | 2     |
| Input Differential Impedance   |         | Z <sub>IN</sub>   | 80              | 100  | 120                  | Ω    |       |
| Tx_Disable                     | Disable |                   | 2.0             |      | V <sub>CC</sub>      |      |       |
|                                | Enable  |                   | V <sub>EE</sub> |      | V <sub>EE</sub> +0.8 |      |       |
| Tx_Fault                       | Fault   |                   | 2.0             |      | V <sub>CC</sub>      |      |       |
|                                | Normal  |                   | V <sub>EE</sub> |      | V <sub>EE</sub> +0.5 |      |       |
| Receiver                       |         |                   |                 |      |                      |      |       |
| Differential Data Output Swing |         | V <sub>OUT</sub>  | 370             |      | 2000                 | mV   | 2     |
| LOS                            | High    |                   | 2.0             |      | V <sub>CC</sub> +0.3 | V    |       |
|                                | Low     |                   |                 |      | V <sub>EE</sub> +0.5 |      |       |

### Notes:

1. The maximum power supply current after the module is work stable.
2. PECL logic. Internally AC coupled.

## Optical Characteristics

| Parameter                    |          | Symbol                            | Min. | Typ. | Max.  | Unit | Notes |
|------------------------------|----------|-----------------------------------|------|------|-------|------|-------|
| Transmitter                  |          |                                   |      |      |       |      |       |
| Center Wavelength            |          | λC                                | 1260 | 1310 | 1360  | nm   |       |
| Average Output Power         | 1000Base | POUT                              | -9.5 |      | -3    | dBm  | 1     |
|                              | 100Base  | POUT                              | -15  |      | -8    |      | 1     |
| POUT @Tx_Disable Asserted    |          | POUT                              |      |      | -45   | dBm  | 1     |
| Spectral Width (RMS)         | 1000Base | σ                                 |      |      | 4     | nm   |       |
|                              | 100Base  |                                   |      |      | 7.7   |      |       |
| Extinction Ratio             |          | ER                                | 9    |      |       | dB   |       |
| Rise/Fall Time (20-80%)      | 1000Base | Tr/Tf                             |      |      | 0.26  | ns   | 2     |
|                              | 100Base  |                                   |      |      | 3     |      |       |
| Total Jitter Rate TP2        | 1000Base | JT                                |      |      | 0.481 | UI   | 3     |
|                              | 100Base  |                                   |      |      | 0.4   |      |       |
| Deterministic Jitter at TP2  | 1000Base | JD                                |      |      | 0.250 | UI   | 3     |
|                              | 100Base  |                                   |      |      | 0.305 |      |       |
| Output Optical Eye           |          | Compatible with IEEE 802.3ah-2004 |      |      |       |      | 4     |
| Receiver                     |          |                                   |      |      |       |      |       |
| Center Wavelength            |          | λC                                | 1260 | 1310 | 1570  | nm   |       |
| Receiver Sensitivity         | 1000Base |                                   |      |      | -22   | dBm  | 5     |
|                              | 100Base  |                                   |      |      | -28   |      | 6     |
| Receiver Overload            | 1000Base |                                   | -3   |      |       | dBm  | 5     |
|                              | 100Base  |                                   | -8   |      |       |      | 6     |
| Return Loss                  |          |                                   | 12   |      |       | dB   |       |
| LOS De-Assert                | 1000Base | LOSD                              |      |      | -23   | dBm  |       |
|                              | 100Base  |                                   |      |      | -23   |      |       |
| LOS Assert                   | 1000Base | LOSA                              | -45  |      |       | dBm  |       |
|                              | 100Base  |                                   | -45  |      |       |      |       |
| LOS Hysteresis               |          |                                   | 0.5  |      | 4.5   | dB   |       |
| Total Jitter at TP4 (SGMII)  |          | JT                                |      |      | 0.749 | UI   | 3     |
| Deterministic at TP4 (SGMII) |          | JD                                |      |      | 0.462 | UI   |       |

### Notes:

1. The optical power is launched into 9/125 $\mu$ m SMF.
2. Unfiltered, measured with 8B/10B code for 1.25Gbps and 4B/5B code for 125Mbps.
3. Meets the specified maximum output jitter requirements if the specified maximum input jitter is present.
4. Measured with 8B/10B code for 1.25Gbps and 4B/5B code for 125Mbps.
5. Measured with 8B/10B code for 1.25Gbps, worst-case extinction ratio, and  $BER \leq 1 \times 10^{-12}$ .
6. Measured with 4B/5B code for 125Mbps, worst-case extinction ratio, and  $BER \leq 1 \times 10^{-12}$ .

## Pin Descriptions

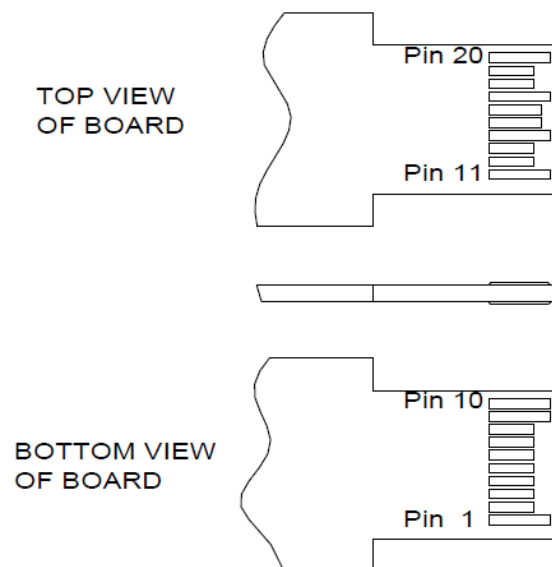
| Pin | Symbol      | Name/Description              | Plug Seq. | Notes |
|-----|-------------|-------------------------------|-----------|-------|
| 1   | VeeT        | Transmitter Ground.           | 1         |       |
| 2   | Tx_Fault    | Transmitter Fault Indication. | 3         | 1     |
| 3   | Tx_Disable  | Transmitter Disable.          | 3         | 2     |
| 4   | MOD-DEF2    | Module Definition 2.          | 3         | 3     |
| 5   | MOD-DEF1    | Module Definition 1.          | 3         | 3     |
| 6   | MOD-DEF0    | Module Definition 0.          | 3         | 3     |
| 7   | Rate Select | Not Used.                     | 3         |       |
| 8   | LOS         | Loss of Signal.               | 3         | 4     |
| 9   | VeeR        | Receiver Ground.              | 1         |       |
| 10  | VeeR        | Receiver Ground.              | 1         |       |
| 11  | VeeR        | Receiver Ground.              | 1         |       |
| 12  | RD-         | Inverse Received Data Out.    | 3         | 5     |
| 13  | RD+         | Received Data Out.            | 3         | 5     |
| 14  | VeeR        | Receiver Ground.              | 1         |       |
| 15  | VccR        | Receiver Power.               | 2         |       |
| 16  | VccT        | Transmitter Power.            | 2         |       |
| 17  | VeeT        | Transmitter Ground.           | 1         |       |
| 18  | TD+         | Transmit Data In.             | 3         | 6     |
| 19  | TD-         | Inverse Transmit Data In.     | 3         | 6     |
| 20  | VeeT        | Transmitter Ground.           | 1         |       |

## Notes:

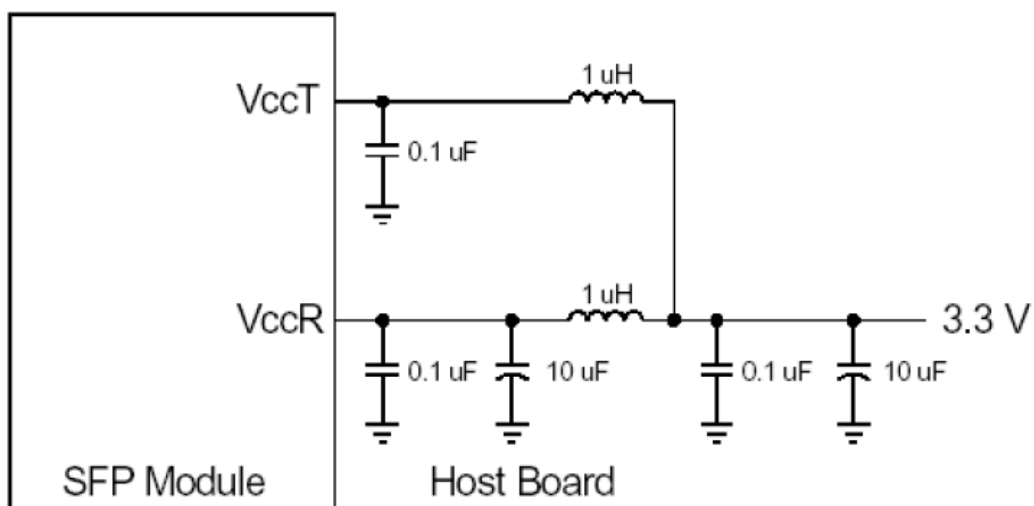
1. Tx\_Fault is an open collector output, which should be pulled up with a 4.7k $\Omega$  to 10k $\Omega$  resistor on the host board to a voltage between 2.0V and Vcc+0.3V. "Logic 0" indicates normal operation. "Logic 1" indicates a laser fault of some kind. In the "low" state, the output will be pulled to <0.8V.
2. Tx\_Disable is an input that is used to shut down the transmitter optical output. It is pulled up within the module with a 4.7k $\Omega$  to 10k $\Omega$  resistor. Its states are:
  - Low (0V to 0.8V): Transmitter On
  - (>0.8V and <2V): Undefined
  - High (2.0V to 3.465V): Transmitter Disabled
  - Open: Transmitter Disabled.
3. MOD-DEF0, 1, & 2. These are the module definition pins. They should be pulled up with a 4.7k $\Omega$  to 10k $\Omega$  resistor on the host board. The pull-up voltage shall be VccT or VccR.
  - MOD-DEF0 is grounded by the module to indicate that the module is present.
  - MOD-DEF1 is the clock line of 2-wire serial interface for optional serial ID.
  - MOD-DEF2 is the data line of 2-wire serial interface for optional serial ID.

4. LOS (Loss of Signal) is an open collector/drain output, which should be pulled up with a 4.7k $\Omega$  to 10k $\Omega$  resistor on the host board to a voltage between 2.0V and Vcc+0.3V. "Logic 0" indicates normal operation. "Logic 1" indicates loss of signal or link down with partner I. In the "low" state, the output will be pulled to less than 0.8V.
5. These are the differential receiver outputs. They are internally AC coupled 100 $\Omega$  differential lines which should be terminated with 100 $\Omega$  (differential) at host with SGMII interface.
6. These are the differential transmitter inputs. They are AC coupled, differential lines with 100 $\Omega$  differential termination inside the module.

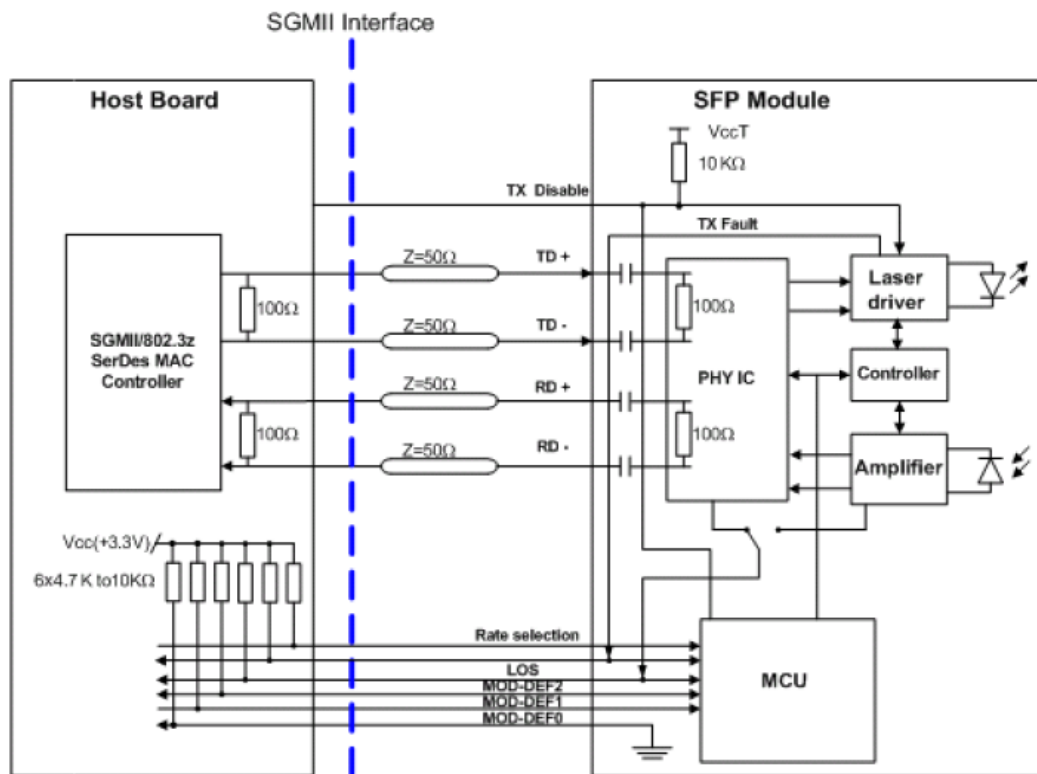
## Pin Definitions



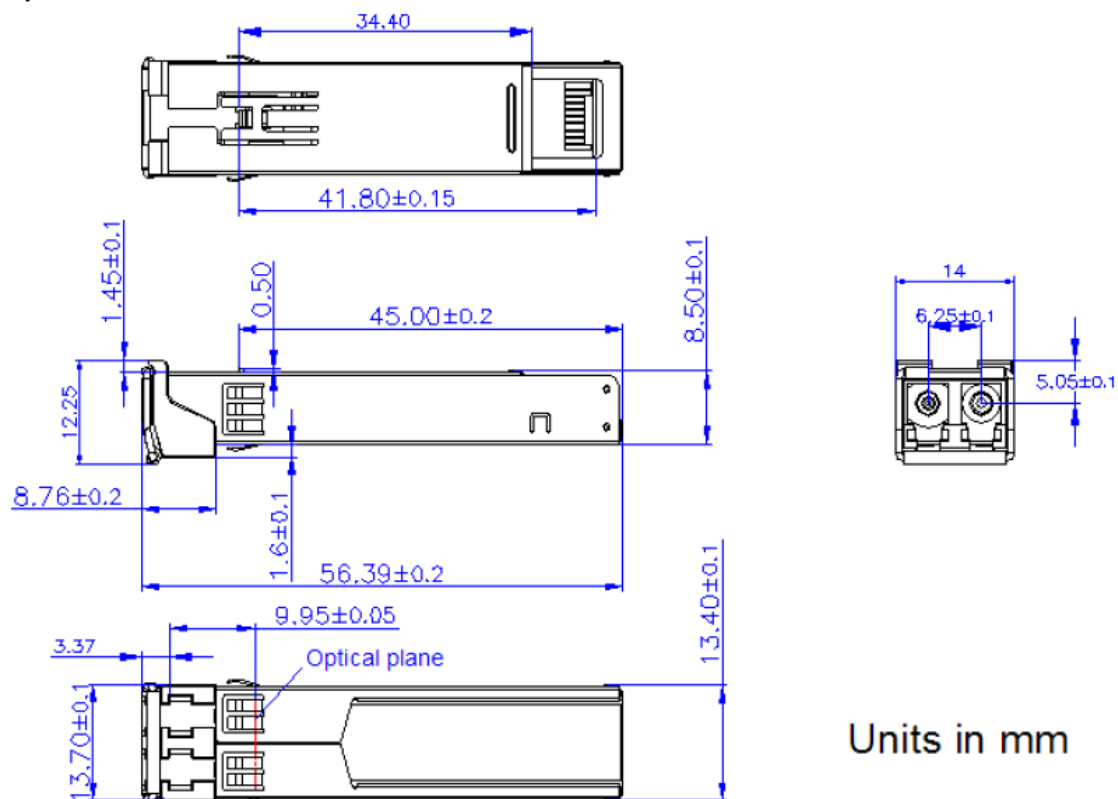
## Recommended Host Board Power Supply Circuit



## Recommended Interface Circuit



## Mechanical Specifications



Units in mm

## 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 ranging from NEBS Level 3 to ISO 9001:2015 with every new development while maintaining the signature reliability of its products.



## U.S. Headquarters

Email: [sales@addonnetworks.com](mailto:sales@addonnetworks.com)

Telephone: +1 877.292.1701

Fax: 949.266.9273

## Europe Headquarters

Email: [salesemea@addonnetworks.com](mailto:salesemea@addonnetworks.com)

Telephone: +44 1285 842070