

## SGP13C50GE2D106

Cisco® Compatible 100/1000Base-FX SFP Transceiver (MMF, 1310nm, 500m, LC, DOM, -40 to 85C, SGMII)

### Product Description

This Cisco® Compatible SFP transceiver provides 100/1000Base-FX throughput up to 500m over multi-mode fiber (MMF) using a wavelength of 1310nm via an LC connector. It is also capable of withstanding rugged environments and can operate at temperatures between -40 to 85C. It is guaranteed to be 100% compatible with the equivalent Cisco® 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. 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:

- Built-In PHY Supporting SGMII Interface
- Dual-Rate of 100Base-FX/1000Base-LX Operation
- Built-In High Performance MCU Supporting Easier Configuration
- Up to 2km Transmission with MMF
- Up to 550m Transmission with MMF @1.25Gbps
- 1310nm FP Laser and PIN Photo-Detector
- Duplex LC Connector
- Standard Serial ID Information Compatible with SFP MSA
- Operating Temperature: -40 to 85 Celsius
- 3.3V Single Power Supply
- RoHS Compliant and Lead-Free



### Applications:

- 1000Base-LX 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 |
|----------------------------|----------|------------------|------|------|------|------|-------|
| 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>   | 200             |      | 2100                 | 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> |      | 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                              | -11.5 |      | -3    | dBm  | 1     |
|                              | 100Base  | POUT                              | -20   |      | -14   |      | 1     |
| POUT @Tx_Disable Asserted    |          | POUT                              |       |      | -45   | dBm  | 1     |
| Spectral Width (RMS)         | 1000Base | σ                                 |       |      | 4     | nm   |       |
|                              | 100Base  |                                   |       |      | 7.7   |      |       |
| Extinction Ratio             |          | EX                                | 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 62.5/125 $\mu$ 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

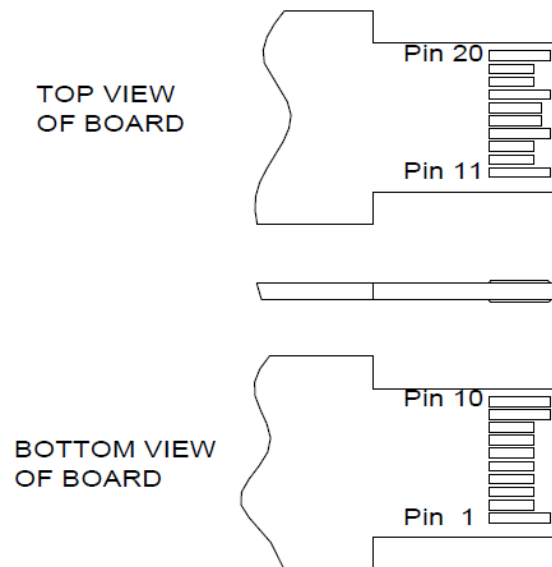
| Pin | Symbol      | Name/Description              | Plug Seq. | Notes |
|-----|-------------|-------------------------------|-----------|-------|
| 1   | VeeT        | Transmitter Ground.           | 1         |       |
| 2   | Tx_Fault    | Transmitter Fault Indication. | 3         | 1     |
| 3   | 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:

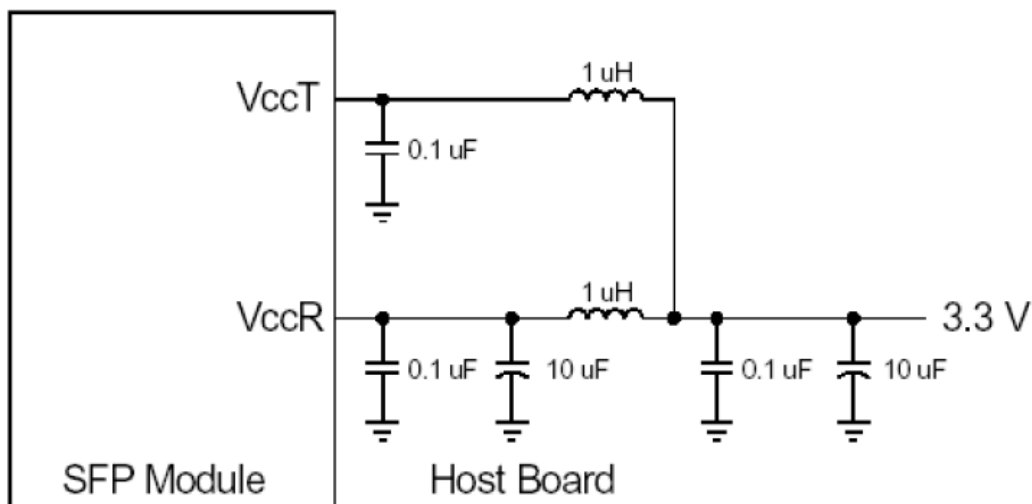
1. Tx\_Fault is an open collector output which should be pulled up with a 4.7kΩ to 10kΩ resistor on the host board to a voltage between 2.0V and Vcc+0.3V. “Logic 0” indicates normal operation. “Logic 1” indicates a laser fault of some kind. In the “low” state, the output will be pulled to <0.8V.
2. Tx\_Disable is an input that is used to shut down the transmitter optical output. It is pulled up within the module with a 4.7kΩ to 10kΩ resistor. Its states are:
  - Low (0V to 0.8V): Transmitter On
  - (>0.8 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 4.7kΩ to 10kΩ 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 the 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.

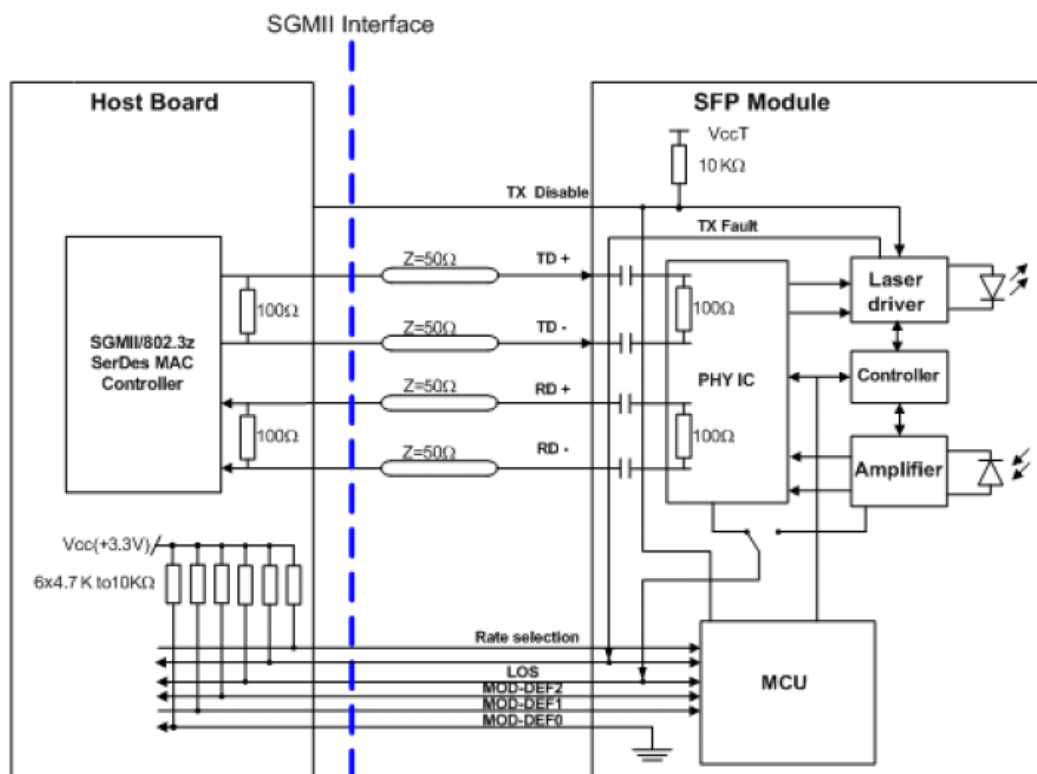
## Pin Definitions



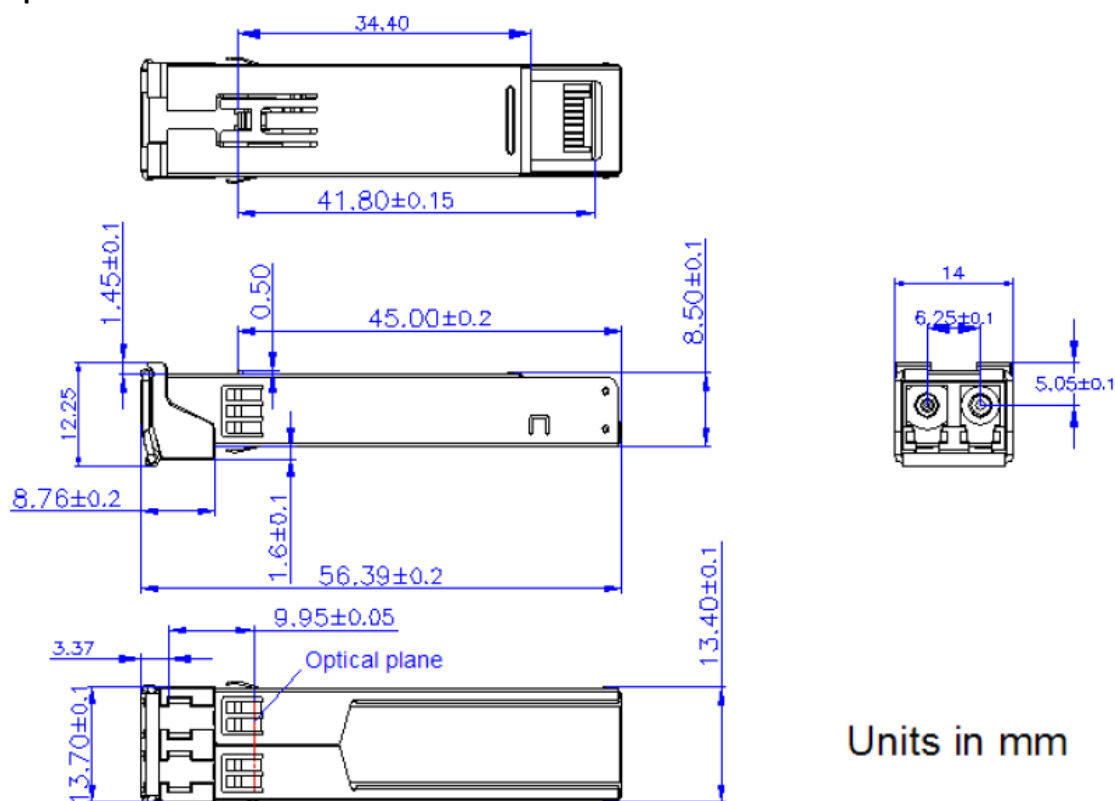
## Recommended Host Board Power Supply Circuit



### Recommended Interface Circuit



## Mechanical Specifications



# 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.

