

DATA SHEET

MODULETEK: SFP-SGMII-GE-100FX-C10

100M 1310nm Multi Mode SFP Optical Transceiver for SGMII port

SFP-SGMII-GE-100FX-C10 Overview

ModuleTek's SFP-SGMII-GE-100FX-C10 100Mb/s optical transceiver is used with Gigabit switches which support SGMII ports. The module has a PHY chip inside and can be used to support FE optical interfaces on gigabit switches. The product implements digital diagnostics via a 2-wire serial interface and is compliant with the SFP Multi-Source Agreement (MSA) standard.

Product Features

- 100Mb/s transmission rate
- Compliant with IEEE 802.3, 100BASE-FX standard
- Compliant with SFP MSA
- For SGMII ports
- 1310nm FP laser
- Standard bail mechanism for consistent installation and removal
- Built-in digital diagnostic functions
- Hot-Pluggable SFP footprint
- Duplex LC Connectors
- Low power consumption (Module work consumption <0.7W)
- Up to 2km on MMF
- Power supply 3.3V
- RoHS Compliant
- Operating temperature range: 0°C to 70°C

Applications

- 100BASE-FX

Ordering Information

| Part Number | Description | Color on Clasp |
|---|---|----------------|
| SFP-SGMII-GE-100FX-C10 | SGMII 100M SFP Transceiver, LC Connectors, 1310nm laser, 2km on MMF | Black |
| For More Information: ModuleTek Limited Web: www.moduletek.com Email: sales@moduletek.com | | |

Absolute Maximum Ratings

| Parameter | Symbol | Min | Typ | Max | Unit | Remarks |
|-----------------------------|-----------------|------|-----|-----|------|---------|
| Storage Ambient Temperature | T _S | -40 | | 85 | °C | |
| Supply Voltage | V _{CC} | -0.5 | | 4 | V | |

General Specifications

| Parameter | Symbol | Min | Typ | Max | Unit | Remarks |
|-------------------------|-----------------|------|-----|-------------------|------|---------|
| Data Rate | DR | | 125 | | Mb/s | |
| Bit Error Rate | BER | | | 10 ⁻¹² | | |
| Total Power Consumption | P | | | 0.7 | W | |
| Supply Current | I _{CC} | | | 300 | mA | |
| Supply Voltage | V _{CC} | 3.15 | 3.3 | 3.45 | V | 1 |
| Operating Temperature | T _C | 0 | | 70 | °C | 2 |

Notes:

1. The voltage required for the module to work normally
2. Case temperature

Link Distances

| Data Rate | Fiber Type | Distance Range (km) |
|-----------|------------|---------------------|
| 125 Mb/s | MMF | 2 |

Optical – Characteristics – Transmitter

$V_{CC}=3.15V$ to $3.45V$, $T_C=0^{\circ}C$ to $70^{\circ}C$

| Parameter | Symbol | Min | Typ | Max | Unit | Remarks |
|---------------------------|-------------------------------------|------|------|------|-------|---------|
| Output Optical Power | P_{TX} | -20 | | -14 | dBm | 1 |
| Optical Center Wavelength | λ_C | 1260 | 1310 | 1360 | nm | |
| Extinction Ratio | ER | 9 | 11 | 15 | dB | |
| Spectral Width | $\Delta\lambda$ | | | 2.5 | nm | |
| Relative Intensity Noise | RIN | | | -120 | dB/Hz | |
| Transmitter Jitter | According to IEEE 802.3 requirement | | | | | |

Notes:

1. Average

Optical – Characteristics – Receiver

$V_{CC}=3.15V$ to $3.45V$, $T_C=0^{\circ}C$ to $70^{\circ}C$

| Parameter | Symbol | Min | Typ | Max | Unit | Remarks |
|-------------------------|--------------|------|------|------|------|---------|
| Center Wavelength Range | λ_C | 1260 | 1310 | 1360 | nm | |
| Receiver Sensitivity | R_{X_SEN} | -31 | | -14 | dBm | 1 |
| LOS Assert | LOS_A | -40 | | | dBm | |
| LOS De-Assert | LOS_D | | | -31 | dBm | |
| LOS Hysteresis | LOS_H | 0.5 | | 4.5 | dB | |

Notes:

1. Measured with worst ER: $BER < 10^{-12}$; $2^{31} - 1$ PRBS

Electrical – Characteristics – Transmitter

$V_{CC}=3.15V$ to $3.45V$, $T_C=0^{\circ}C$ to $70^{\circ}C$

| Parameter | Symbol | Min | Typ | Max | Unit | Remarks |
|-------------------------------|--------------|-----|-----|-----------|----------|---------|
| Input differential impedance | R_{IN} | | 100 | | Ω | |
| Differential data input swing | V_{IN_PP} | 250 | | 1200 | mV | |
| Transmit Disable Voltage | V_D | 2 | | V_{CC} | V | |
| Transmit Enable Voltage | V_{EN} | GND | | $GND+0.8$ | V | |
| Transmit Disable Assert Time | | | | 10 | us | |

Electrical – Characteristics – Receiver

$V_{CC}=3.15V$ to $3.45V$, $T_C=0^{\circ}C$ to $70^{\circ}C$

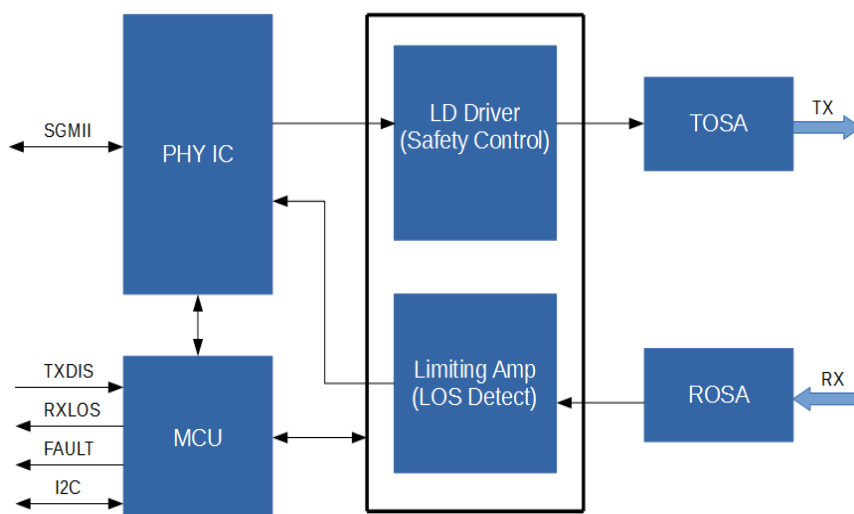
| Parameter | Symbol | Min | Typ | Max | Unit | Remarks |
|---------------------------------|---------------|--------------|-----|----------------|------|---------|
| Differential data output swing | V_{OUT_PP} | 300 | 500 | 800 | mV | |
| Data output rise time (20%-80%) | t_r | | | 300 | ps | |
| Data output fall time (20%-80%) | t_f | | | 300 | ps | |
| LOS Fault | V_{LOS_A} | $V_{CC}-0.5$ | | V_{CC_HOST} | V | |
| LOS Normal | V_{LOS_D} | GND | | $GND+0.5$ | V | |

Digital Diagnostic Functions

The SFP-SGMII-GE-100FX-C10 optical Transceiver has digital diagnostics. The product supports the 2-wire serial communication protocol defined in the SFP MSA and accesses digital diagnostic information via a 2-wire interface at address 0xA2. The digital diagnosis defaults to internal calibration. The micro control unit inside the module can access the module's operating parameters in real time, including operating temperature, bias current, output optical power, received optical power, and operating voltage. The module implements the alarm function of the SFP MSA.

| Parameter | Symbol | Accuracy | Units | Report Range | | Unit | Remarks |
|--------------|-------------------|-----------|-------------|--------------|-----|-------------|----------------------|
| Temperature | Temp | ± 3 | $^{\circ}C$ | -40 | 95 | $^{\circ}C$ | Internal Calibration |
| Voltage | V_{CC} | ± 0.1 | V | 2.7 | 3.9 | V | Internal Calibration |
| Bias Current | I _{bias} | ± 10 | % | 0 | 80 | mA | Internal Calibration |
| Tx Power | P _{TX} | ± 3 | dB | -22 | -12 | dBm | Internal Calibration |
| Rx Power | P _{RX} | ± 3 | dB | -33 | -12 | dBm | Internal Calibration |

Block-Diagram-of-Transceiver



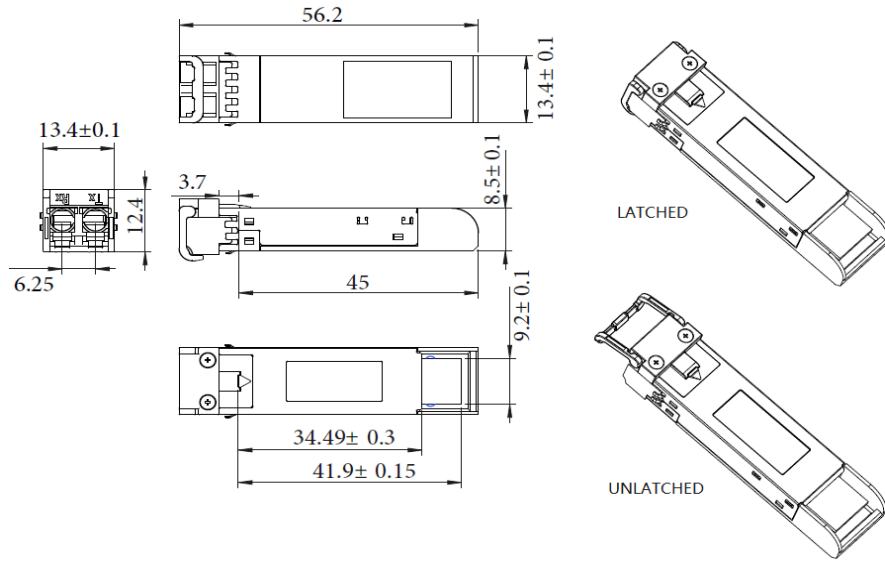
Functions Description

The SFP-SGMII-GE-100FX-C10 is a 100M optical module that can be used in a Gigabit switch. The module integrates a PHY chip that supports the SGMII interface. The module is interconnected to the host's Gigabit interface via the SGMII interface. Through the SGMII protocol, an optical interface conforming to the 100FX standard is provided. The product meets SFP specifications and supports digital diagnostics to help Gigabit switch ports interconnect with 100M legacy optical interface devices.

The transmitter of the module consists of a laser driver and a TOSA (light-emitting component). The TOSA uses a FP laser with a wavelength of 1310 nm. When the module is working, the PHY chip output signal is sent to the laser driver section. At this time, the laser driver supplies the bias current and the modulation current to the laser. The laser driver simultaneously uses an automatic optical power control (APC) feedback loop to maintain a constant average optical power of the laser output.

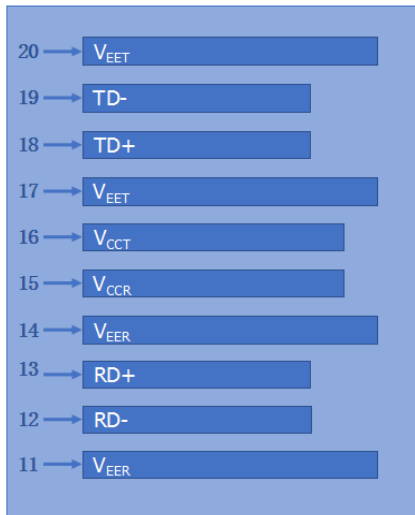
The receiver of the module consists of a limiting amplifier and a ROSA (light receiving component). ROSA uses a PIN with a wavelength of 1310 nm. When ROSA detects the incident light signal, the PIN converts the optical signal into a photo-generated current. The photo-generated current is amplified by a TIA (transimpedance amplifier) and converted into an electrical signal. The electrical signal is further amplified by the limiting amplifier, then outputs a fixed-amplitude electrical signal to the host.

Dimensions

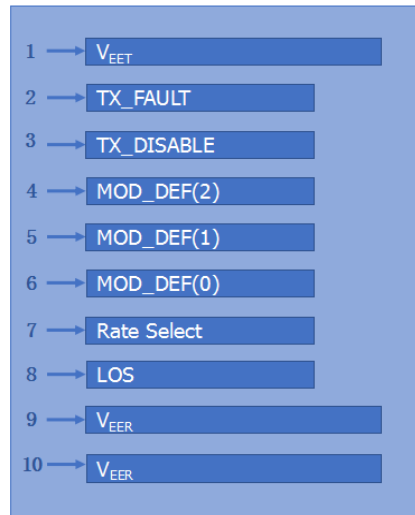


ALL DIMENSIONS ARE ±0.2mm UNLESS OTHERWISE SPECIFIED
UNIT: mm

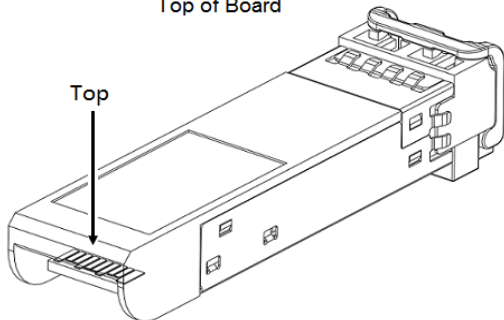
Electrical Pad Layout



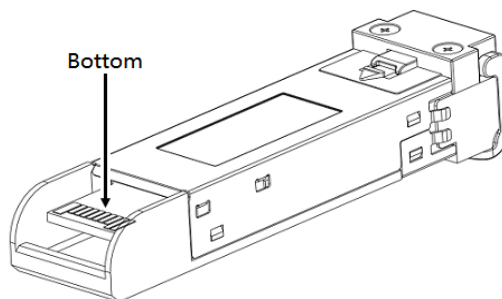
Top of Board



Bottom of Board



Top



Bottom

Pin Assignment

| PIN # | Symbol | Description | Remarks |
|-------|------------------|---|---------|
| 1 | V _{EET} | Transmitter ground (common with receiver ground) | 1 |
| 2 | TX_FAULT | Transmitter Fault. Not supported | |
| 3 | TX_DISABLE | Transmitter Disable. Laser output disabled on high or open | 2 |
| 4 | MOD_DEF(2) | Module Definition 2. Data line for serial ID | 3 |
| 5 | MOD_DEF(1) | Module Definition 1. Clock line for serial ID | 3 |
| 6 | MOD_DEF(0) | Module Definition 0. Grounded within the module | 3 |
| 7 | Rate Select | No connection required | |
| 8 | LOS | Loss of Signal indication. Logic 0 indicates normal operation | 4 |
| 9 | V _{EER} | Receiver ground (common with transmitter ground) | 1 |
| 10 | V _{EER} | Receiver ground (common with transmitter ground) | 1 |
| 11 | V _{EER} | Receiver ground (common with transmitter ground) | 1 |
| 12 | RD- | Receiver Inverted DATA out. AC coupled. SGMII interface | |
| 13 | RD+ | Receiver Non-inverted DATA out. AC coupled. SGMII interface | |
| 14 | V _{EER} | Receiver ground (common with transmitter ground) | 1 |
| 15 | V _{CCR} | Receiver power supply | |
| 16 | V _{CCT} | Transmitter power supply | |
| 17 | V _{EET} | Transmitter ground (common with receiver ground) | 1 |
| 18 | TD+ | Transmitter Non-Inverted DATA in. AC coupled. SGMII interface | |
| 19 | TD- | Transmitter Inverted DATA in. AC coupled. SGMII interface | |
| 20 | V _{EET} | Transmitter ground (common with receiver ground) | 1 |

Notes:

1. Circuit ground is isolated from chassis ground
2. Disabled: T_{DIS}>2V or open, Enabled: T_{DIS}<0.8V
3. Should Be pulled up with 4.7k –10k ohm on host board to a voltage between 2V and 3.6V
4. LOS is open collector output

References

1. [IEEE standard 802.3. IEEE Standard Department.](#)
2. [Small Form Factor Pluggable \(SFP\) Transceiver Multi-Source Agreement \(MSA\), INF-8074i.](#)
3. [Digital Diagnostics Monitoring Interface for Optical Transceivers –SFF-8472.](#)
4. [Serial-GMII Specification.](#)