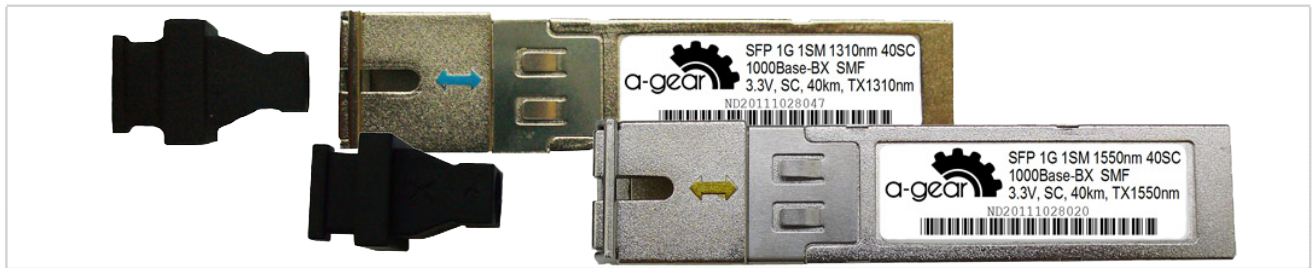


Product Specification

SFP WDM 1G 40km SC Transceiver



1. Product features

- Up to 1.25 Gb/s bi-directional data links
- Hot-pluggable SFP footprint
- 1310nm DFB Transmitter and 1550nm PIN Receiver for SFP-1SM-1310nm-40SC
- 1550nm DFB Transmitter and 1310nm PIN Receiver for SFP-1SM-1550nm-40SC
- Single SC connector
- Low power dissipation
- Built-in digital diagnostic functions
- Metal enclosure, for lower EMI
- Up to 40km point to point transmission
- Single 3.3 V power supply
- Operating temperature range: -40°C to 85°C

2. Applications

- Ethernet
- Point-to-point FTTX Application

3. Absolute Maximum Ratings

| Rating | Symbol | Min. | Max. | Units |
|----------------------------|--------|------|------|-------|
| Maximum Supply Voltage | Vcc | -0.5 | 4.7 | V |
| Storage Temperature | TS | -40 | 85 | °C |
| Case Operating Temperature | TOP | -40 | 85 | °C |

4. Electrical Characteristics

(TOP = -40 to 85°C, VCC = 3.15 to 3.60Volts)

| Parameter | Symbol | Min. | Typical | Max. | Unit |
|--------------------------------|------------|---------|---------|----------|-------------------------|
| Supply Voltage | Vcc | 3.15 | 3.3 | 3.6 | V |
| Supply Current | Icc | | 185 | 250 | mA |
| Transmitter | | | | | |
| Input differential impedance | Rin | | 100 | | Ω ^[1] |
| Single ended data input swing | Vin,pp | 250 | | 1200 | mV |
| Transmit Disable Voltage | VD | Vcc-1.3 | | Vcc | V |
| Transmit Enable Voltage | VEN | Vee | | Vee+ 0.8 | V ^[2] |
| Transmit Disable Assert Time | | | | 10 | us |
| Receiver | | | | | |
| Single ended data output swing | Vout,pp | 250 | | 800 | mV ^[3] |
| Data output rise time | tr | | 100 | 175 | ps ^[4] |
| Data output fall time | tf | | 100 | 175 | ps ^[4] |
| LOS Fault | VLOS fault | Vcc-0.5 | | VccHOST | V ^[5] |
| LOS Normal | VLOS norm | Vee | | Vee+0.5 | V ^[5] |
| Power Supply Rejection | PSR | 100 | | | mVpp ^[6] |

Notes:

- [1] Connected directly to TX data input pins. AC coupled thereafter.
- [2] Or open circuit.
- [3] Into 100 ohms differential termination.
- [4] 20 - 80 %
- [5] Loss Of Signal is LVTTTL. Logic 0 indicates normal operation; logic 1 indicates no signal detected.
- [6] Receiver sensitivity is compliant with power supply sinusoidal modulation of 20 Hz to 1.5 MHz up to specified value applied through the recommended power supply filtering network.

5. Optical Characteristics

(TOP = -40 to 85°C, VCC = 3.15 to 3.60 Volts)

5.1 SFP-15M-1310nm-40SC

| Parameter | Symbol | Min. | Typical | Max. | Unit |
|-----------------------------------|-----------|------|---------|-------|--------------------|
| Transmitter | | | | | |
| Output Opt. Pwr (End of Life) | POUT | -5.0 | | 0 | dBm ^[1] |
| Optical Wavelength | λ | 1270 | 1310 | 1360 | nm |
| Wavelength Temperature Dependence | | | 0.08 | 0.125 | nm/°C |
| Spectral Width (-20dB) | σ | | | 3.0 | nm |
| Optical Extinction Ratio | ER | 8 | | | dB |
| Sidemode Suppression ratio | SSRmin | 30 | | | dB |

| Parameter | Symbol | Min. | Typical | Max. | Unit |
|--------------------------------------|--------|------|---------|-------|--------------------|
| Optical Rise/Fall Time | tr/ tf | | 100 | 160 | ps |
| RIN | RIN | | | -120 | dB/Hz |
| Transmitter Jitter (peak to peak) | | | | 100 | ps |
| Receiver | | | | | |
| Average Rx Sensitivity @ 1.25G | RSENS3 | | | -25.0 | dBm ^[2] |
| Maximum Input Power | PMAX | -3.0 | | | dBm |
| Optical Center Wavelength | iC | 1530 | 1550 | 1570 | nm |
| LOS De -Assert | LOSD | | | -30 | dBm |
| LOS Assert | LOSA | -35 | | | dBm |
| LOS Hysteresis | | 0.5 | | 4 | dB |
| Receiver Jitter Generation @1.25Gbps | | | | 160 | ps ^[3] |

5.2. SFP-1SM-1550nm-40SC

| Parameter | Symbol | Min. | Typical | Max. | Unit |
|--------------------------------------|-----------|------|---------|-------|--------------------|
| Transmitter | | | | | |
| Output Opt. Pwr (End of Life) | POUT | -5.0 | | 0 | dBm ^[1] |
| Optical Wavelength | λ | 1540 | 1550 | 1560 | nm |
| Wavelength Temperature Dependence | | | 0.08 | 0.125 | nm/°C |
| Spectral Width (-20dB) | σ | | | 3.0 | nm |
| Optical Extinction Ratio | ER | 8 | | | dB |
| Sidemode Suppression ratio | SSRmin | 30 | | | dB |
| Optical Rise/Fall Time | tr/ tf | | 100 | 160 | ps |
| RIN | RIN | | | -120 | dB/Hz |
| Transmitter Jitter (peak to peak) | | | | 100 | ps |
| Receiver | | | | | |
| Average Rx Sensitivity @1.25G | RSENS3 | | | -25.0 | dBm ^[2] |
| Maximum Input Power | PMAX | -3.0 | | | dBm |
| Optical Center Wavelength | XC | 1260 | 1310 | 1360 | nm |
| LOS De -Assert | LOSD | | | -30 | dBm |
| LOS Assert | LOSA | -35 | | | dBm |
| LOS Hysteresis | | 0.5 | | 4 | dB |
| Receiver Jitter Generation @1.25Gbps | | | | 160 | ps ^[3] |

Notes:

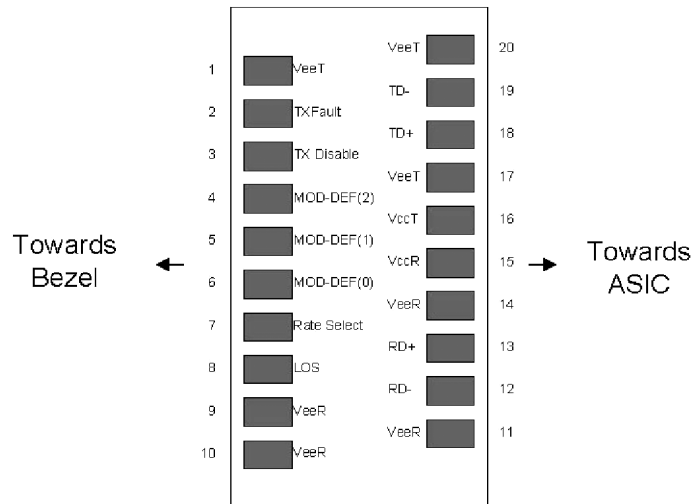
- [1] Class 1 Laser Safety per FDA/CDRH and IEC-825-1 regulations.
- [2] With worst-case extinction ratio. Measured with a PRBS 2⁷-1 test pattern, @1.25Gb/s, BER<10⁻¹².
- [3] Jitter added by receiver (peak to peak). Measured at -18.0dBm average Rx sensitivity, PRBS 2⁷-1 test pattern.

6. Pin Descriptions

| Pin | Symbol | Name/Description |
|-----|--------------------|---|
| 1 | V _{EET} | Transmitter Ground (Common with Receiver Ground) ^[1] |
| 2 | T _{FAULT} | Transmitter Fault. ^[2] |
| 3 | T _{DIS} | Transmitter Disable. Laser output disabled on high or open. ^[3] |
| 4 | MOD_DEF(2) | Module Definition 2. Data line for Serial ID. ^[4] |
| 5 | MOD_DEF(1) | Module Definition 1. Clock line for Serial ID. ^[4] |
| 6 | MOD_DEF(0) | Module Definition 0. Grounded within the module. ^[4] |
| 7 | Rate Select | No connection required |
| 8 | LOS | Loss of Signal indication. Logic 0 indicates normal operation. ^[5] |
| 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 |
| 13 | RD+ | Receiver Non-inverted DATA out. AC Coupled |
| 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. |
| 19 | TD- | Transmitter Inverted DATA in. AC Coupled. |
| 20 | V _{EET} | Transmitter Ground (Common with Receiver Ground) ^[1] |

Notes:

- [1] Circuit ground is internally isolated from chassis ground.
- [2] T_{FAULT} is an open collector/drain output, which should be pulled up with a 4.7k - 10k Ohms resistor on the host board if intended for use. Pull up voltage should be between 2.0V to Vcc + 0.3 V. A high output indicates a transmitter fault caused by either the TX bias current or the TX output power exceeding the preset alarm thresholds. A low output indicates normal operation. In the low state, the output is pulled to <0.8V.
- [3] Laser output disabled on T_{DIS} >2.0V or open, enabled on T_{DIS} <0.8V.
- [4] Should be pulled up with 4.7k - 10 kohms on host board to a voltage between 2.0V and 3.6V. MOD_DEF(0) pulls line low to indicate module is plugged in.
- [5] LOS is open collector output. Should be pulled up with 4.7k - 10 kohms on host board to a voltage between 2.0V and 3.6V. Logic 0 indicates normal operation; logic 1 indicates loss of signal.



Pinout of Connector Block on Host Board

7.

8. Digital Diagnostic Functions

SFP WDM 1G 1310(1550)nm 40km SC transceivers support the 2-wire serial communication protocol as defined in the SFP MSA1. It is very closely related to the EEPROM defined in the GBIC standard, with the same electrical specifications.

The standard SFP serial ID provides access to identification information that describes the transceiver's capabilities, standard interfaces, manufacturer, and other information. Additionally, A-GEAR SFP transceivers provide a unique enhanced digital diagnostic monitoring interface, which allows real-time access to device operating parameters such as transceiver temperature, laser bias current, transmitted optical power, received optical power and transceiver supply voltage. It also defines a sophisticated system of alarm and warning flags, which alerts end-users when particular operating parameters are outside of a factory set normal range.

The SFP MSA defines a 256-byte memory map in EEPROM that is accessible over a 2-wire serial interface at the 8 bit address 1010000X (A0h). The digital diagnostic monitoring interface makes use of the 8 bit address 1010001X (A2h), so the originally defined serial ID memory map remains unchanged. The interface is identical to, and is thus fully backward compatible with both the GBIC Specification and the SFP Multi Source Agreement.

The operating and diagnostics information is monitored and reported by a Digital Diagnostics Transceiver Controller (DDTC) inside the transceiver, which is accessed through a 2-wire serial interface. When the serial protocol is activated, the serial clock signal (SCL, Mod Def 1) is generated by the host. The positive edge clocks data into the SFP transceiver into those segments of the E2PROM that are not write-protected. The negative edge clocks data from the SFP transceiver. The serial data signal (SDA, Mod Def 2) is bi-directional for serial data transfer. The host uses SDA in conjunction with SCL to mark the start and end of

serial protocol activation. The memories are organized as a series of 8-bit data words that can be addressed individually or sequentially.

Digital diagnostics for the SFP WDM 1G 1310(1550)nm 40km SC are Internally calibrated by default.

9. Mechanical Dimensions

