# GPON ONU SFP Transceiver

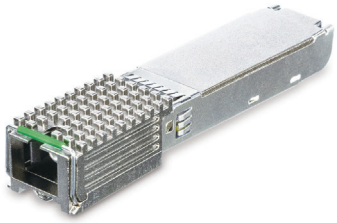
## GPN-SFP

User's Manual

# Table of Contents

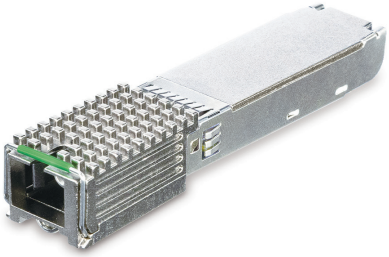
# 1. Package Contents

Thank you for choosing PLANET GPON ONU. Before installing the GPN-SFP module, please verify the contents inside the package box.

| GPN-SFP x 1 | SFP Dust Cap x 1 |
| --- | --- |
|  |  |

| | |
| --- | --- |
| Note | If there is any item missing or damaged, please contact the seller immediately. |

## 2. Physical Introduction

| Top View | Bottom View |
| --- | --- |
|  |  |

# 3. Hardware Installation

## 3.1 Safety Requirements

- Never look directly into the ends of PON modules. The emitted light could cause damage to the eye.
- Insert the GPN-SFP module into the SFP slot of a compatible network device.
- Ensure that the GPON service is properly configured on the OLT.
- Ensure that the optical fiber is long enough to achieve the desired installation place.
- Do not attempt to disassemble the GPN-SFP module.
- If removal is required, gently pull the module using the built-in handle or latch.
- Ensure proper airflow around the network device where the GPN-SFP module is installed.

## 3.2 Installation and Removal of GPN-SFP Module

### 3.2.1 Installing the GPN-SFP Module

Please follow these steps to install the GPN-SFP module:

- Power on the Switch and place the Switch on a flat surface. Install the new GPN-SFP module by inserting it into the slot and sliding it in until it stops (See Figure 1). Press it firmly until you hear the module snap into place. Never force, twist or bend the GPN-SFP module. The GPN-SFP module slides in smoothly and the Switch will automatically detect the new module.
- After the Fiber connection is made successfully, the LED will light up in about 30 seconds to verify the module is connected to the port.

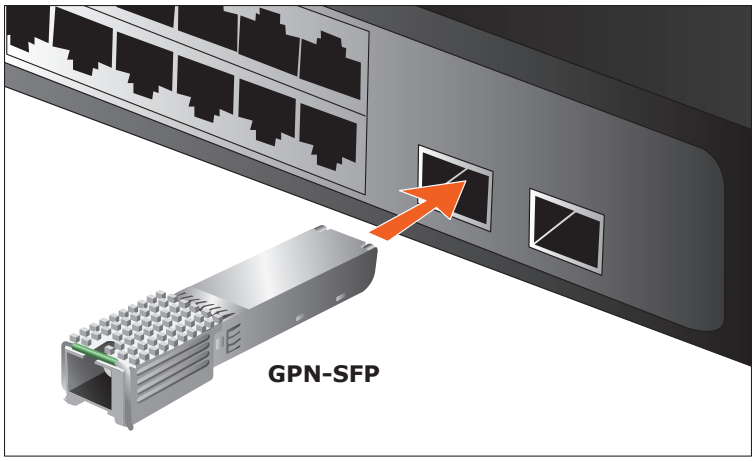



**Figure 1:** Inserting the GPN-SFP Module

Please refer to the user's manual for more details about the Switch or module's management.

### 3.2.2 Connecting the Fiber Cable

- Remove the protective cap of the optical fiber.

Remove the protective cap of the ONT optical interface (PON interface). Insert the fiber into the PON interface.

Note

1. Keep the optical connector and the optical fiber clean.
2. Make sure the bending diameter of the fiber is more than 6cm. Otherwise, the optical signal loss may be increased.
3. Cover a protective cap to guard against dust and water when the fiber is not used.

### 3.2.3 Removing the GPN-SFP Module

- Make sure there is no network activity by consulting or checking with the network administrator.
- Remove the Fiber Optic Cable gently (See Figure 2).
- Turn the handle of the GPN-SFP module to the horizontal level
- Pull out the GPN-SFP module gently through the handle.

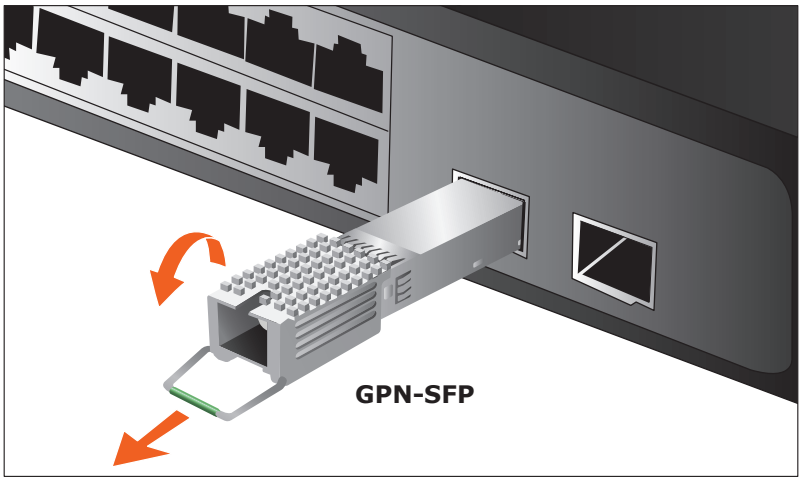



**Figure 2:** Removing the GPN-SFP Module

Warning

Never pull out the GPN-SFP module without pulling the handle or the push bolts on the module. Directly pulling out the GPN-SFP module would damage the GPN-SFP module of the device.

## 4. Specifications

| Product | GPN-SFP |
|---|---|
| Hardware Specifications | |
| UNI | 2.5G and 1G Ethernet UNI modes |
| Transmission Speed | GPON:<br>Downstream: 2.5 Gbps<br>Upstream: 1.25 Gbps |
| Port Type | SC/APC connector |
| Fiber Maximum Distance | 20km |
| Dimensions (W x D x H) | 75 x 13.55 x 14 mm |
| Weight | 31g |
| Power Input | SFP feed 3.3V |
| Power Consumption | Less than 2.5W |
| Optical Receive Sensitivity | -28 dBm |
| Optical TX Power | 0~5 dBm |
| Functions | |
| Multicast | Internet Group Management Protocol (IGMP)<br>IGMP snooping<br>CTC defined dynamic multicast<br>MLD snooping |
| QoS | Back pressure flow control (half duplex)<br>IEEE 802.3x flow control (full duplex)<br>Head of Line (HoL) mechanism<br>IEEE 802.1p, CoS<br>4 priority queues per port<br>WR, SP and FIFO<br>Rate limit |
| Reliability | Loop detect<br>Dying-Gasp |
| Security | Limitation to the MAC addresses on the port(1K) |
| Heat Dissipation | Supports 24/7 continuous operation;<br>the device can operate continuously without performance degradation due to heat. |

| | |
|---|---|
| Management | Received Signal Strength Indication (RSSI)<br>Multiple Source Agreement (MSA)<br>Full Service Access Network (FSAN)<br>Dying gasp notification<br>ONU Management and Control Interface (OMCI) specification<br>Digital Diagnostics Monitoring (DDM) |
| Standards Conformance | |
| Laser Classification | IEC60825 Class 1 Laser Product |
| Standards Compliance | GPON network Class B+<br>IEEE 802.3x flow control and back pressure<br>IEEE 802.1Q, VLAN<br>IEEE 802.1p Class of Service<br>ITU-T G.984.x (1/2/3/4/5)/G.988<br>GBT33845-2017<br>YD/T 1475-2006 |
| Environment | |
| Operating | Temperature: -40 ~ 85 degrees C<br>Relative Humidity: 5 ~ 80% (non-condensing) |
| Storage | Temperature: -40 ~ 85 degrees C<br>Relative Humidity: 0 ~ 95% (non-condensing) |

## 4.1 Absolute Maximum Ratings

| Absolute Maximum Ratings | | | | | |
|---|---|---|---|---|---|
| Parameter | Symbol | Min | Max | Units | Note |
| Storage Ambient Temperature | Tstg | -40 | +85 | ºC | Exceeding the Absolute Maximum Ratings may cause irreversible damage to the device.<br>The device is not intended to be operated under the condition of simultaneous Absolute Maximum Ratings, a condition which may cause irreversible damage to the device. |
| Relative Humidity - Storage | RHS | 0 | 95 | % | |
| Relative Humidity - Operating | RHO | 5 | 80 | % | |
| Module Supply Voltage | VCC | GND | 3.6 | V | |

| | | | | | |
|---|---|---|---|---|---|
| Tx_DIS Logic HIGH State | Tx_DISH | 2.0 | VCC | V | LVTTL |
| Tx_DIS Logic LOW State | Tx_DISL | 0 | 0.8 | V | |
| Tx_FAULT Logic HIGH State | Tx_FaultH | 2.4 | - | V | LVTTL (Open Collector/Drain) |
| Tx_FAULT Logic LOW State | Tx_FaultL | - | 0.4 | V | |
| Rx_LOS Logic HIGH State | Rx_LOSH | 2.4 | - | V | LVTTL (Open Collector/Drain) |
| Rx_LOS Logic LOW State | Rx_LOSL | - | 0.4 | V | |

## 4.2 Recommended Operating Conditions

| Recommended Operating Conditions | | | | | | |
|---|---|---|---|---|---|---|
| Parameter | Symbol | Min | Typ. | Max | Units | Note |
| Operating Case Temperature | TCASE | -40 | 25 | 85 | ºC | For industry temp |
| Operating Case Temperature | TCASE | 0 | 25 | 75 | ºC | For commercial temp |
| Module Supply Voltage | VCC | 3.135 | 3.3 | 3.465 | V | |
| Module Supply Current (Tx and Rx) | IIN | - | 750 | - | mA | |
| 9/125um G.652 SMF | Lmax | - | | 20 | km | |
| Optical upstream Data Rate | BR | - | 1244 | - | Mbps | |
| Optical downstream Data Rate | BR | - | 2488 | - | Mbps | |

## 4.3 Electrical Characteristics

| Parameter | Symbol | Unit | Min | Typ. | Max | Note |
|---|---|---|---|---|---|---|
| Electrical Characteristics | | | | | | |
| Bit Rate (Tx) | BRtx | Mbps | | 1250 | | |
| Tx Differential Input Voltage | Vdtx | mV | 200 | | 1200 | |
| Transmit Disable Voltage | Vd | V | 2 | | Vcc | |
| Transmit Enable Voltage | Ven | V | Vee | | 0.8 | |
| Receiver | | | | | | |
| Supply current | Icc | mA | | | 150 | |
| RX Differential Output Voltage | Vdrx | MV | 600 | | 1200 | 1250Mbps |
| RX Differential Output Voltage | Vdrx | MV | 600 | | 1200 | 2500Mbps |
| Rx_LOS logic HIGH State | Vlos, H | V | 2.4 | | | LVTTL (Open-collector) |
| Rx_LOS logic LOW State | Vlos, L | V | | | 0.8 | |

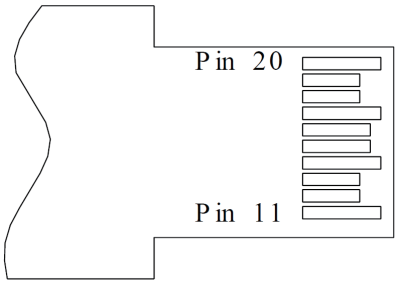
## 4.4 Optical Characteristics

| Transmitter Optical Characteristics | | | | | | |
|---|---|---|---|---|---|---|
| Parameter | Symbol | Min | Typ. | Max | Units | Conditions/Note |
| Transmitter Type | | 1310 nm DFB Burst Mode | | | | |
| Upstream Signaling Speed | Sup | - | 1244 | - | Mb/s | |
| Average Output Power | Pout | 0 | - | 5.0 | dBm | Measured with 9/125um G.652 SMF |
| Optical Output with Tx OFF | Pout | - | - | -40 | dBm | |
| Tx Wavelength | λ | 1290 | 1310 | 1330 | nm | |

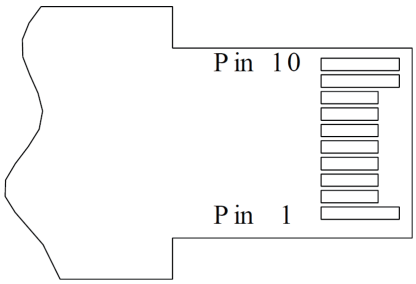
| | | | | | | |
|---|---|---|---|---|---|---|
| Spectral Line Width @-20dB | Δλ | - | - | 1.0 | nm | |
| Extinction Ratio | ER | 10 | - | - | dB | Measured using Ethernet packets with random payload. |
| Side Mode Suppression Ratio | SMSR | 30 | - | - | dB | |

| Receiver Optical Characteristics | | | | | | |
|---|---|---|---|---|---|---|
| Parameter | Symbol | Min | Typ. | Max | Units | Conditions/Note |
| Receiver Type | | 1490nm CW Mode | | | | |
| Downstream Signaling Speed | Sdown | - | 2488 | - | Mb/s | |
| Optical Center Wavelength | λ | 1480 | 1490 | 1500 | nm | |
| Receiver Sensitivity | PIN | - | - | -28.0 | dBm | BER<10-10, 2488 Mb/s, PRBS 223-1, ER=11dB |
| Receiver Optical Overload | PIN (SAT) | -8 | - | - | dBm | |
| Rx_LOS of Signal Asserted | PA | -45 | - | - | dBm | |
| Rx_LOS of Signal Deasserted | PD | - | - | -28.5 | dBm | |
| Rx_LOS of Signal Hysteresis | PHy | 0.5 | - | 6.0 | dB | |

## 4.5 Pin Descriptions




TOP VIEW OF BOARD




BOTTOM VIEW OF BOARD

| PIN Assignment | | | |
|---|---|---|---|
| Pin | Symbol | Description | Note |
| 1 | VEET | Transmitter Ground | |
| 2 | Tx_FAULT | Transmitter Fault: LOW = Normal Operation, HIGH = Fault Indication | 1 |
| 3 | Tx_DIS | Transmit Disable: LOW = Normal Operation, HIGH = Disables Module | 1 |
| 4 | MOD_DEF 2 | Module Definition 2 - Two-Wire Interface - Serial Data | 1 |
| 5 | MOD_DEF 1 | Module Definition 1 - Two-Wire Interface - Clock Signal | 1 |
| 6 | MOD_DEF 0 | Module Definition 0 - Presence Pin: The MOD_DEF0 signal is set to a low level after the initialization of the µC and power-up of the I²C interface. | |
| 7 | Dying Gasp | Dying Gasp Indication: “high” indicates normal operation; “low” indicates power fail | 4 |
| 8 | LOS | Loss of Signal: “high” indicates no optical power; “low” indicates normal operation | 1 |
| 9 | VEER | Receiver Ground | |
| 10 | VEER | Receiver Ground | |
| 11 | VEER | Receiver Ground | |
| 12 | RD- | Rx_Data Output (Inverted) | 2 |
| 13 | RD+ | Rx_Data Output (Non Inverted) | 2 |
| 14 | VEER | Receiver Ground | |
| 15 | VCCR | Receiver DC Power | 3.3 V +/- 5% |
| 16 | VCCT | Transmitter DC Power | 3.3 V +/- 5% |
| 17 | VEET | Transmitter Ground | |
| 18 | TD+ | Tx_Data Input (Non Inverted) | 3 |
| 19 | TD- | Tx_Data Input (Inverted) | 3 |
| 20 | VEET | Transmitter Ground | |

Note

1. The uncommitted Tx_FAULT, Tx_DIS, MOD_DEF2, MOD_DEF1, and LOS monitor and control pins each require a pull-up resistor of 4.7kΩ to 10kΩ. The pull-up voltage must be 3.3V.
2. The 100Ω differential Rx data output is internally AC-coupled, supporting both 1000BASE-X and SGMII interfaces.
3. The 100Ω differential Tx data input is internally AC-coupled, supporting both 1000BASE-X and SGMII interfaces.
4. Voltage Detect Input for Dying Gasp: When the voltage on this pin drops below 1.23V ±5%, a dying gasp event is triggered. A 4.7kΩ resistor is used to pull up to DC power in the module.

## 4.6 Electrical Interface

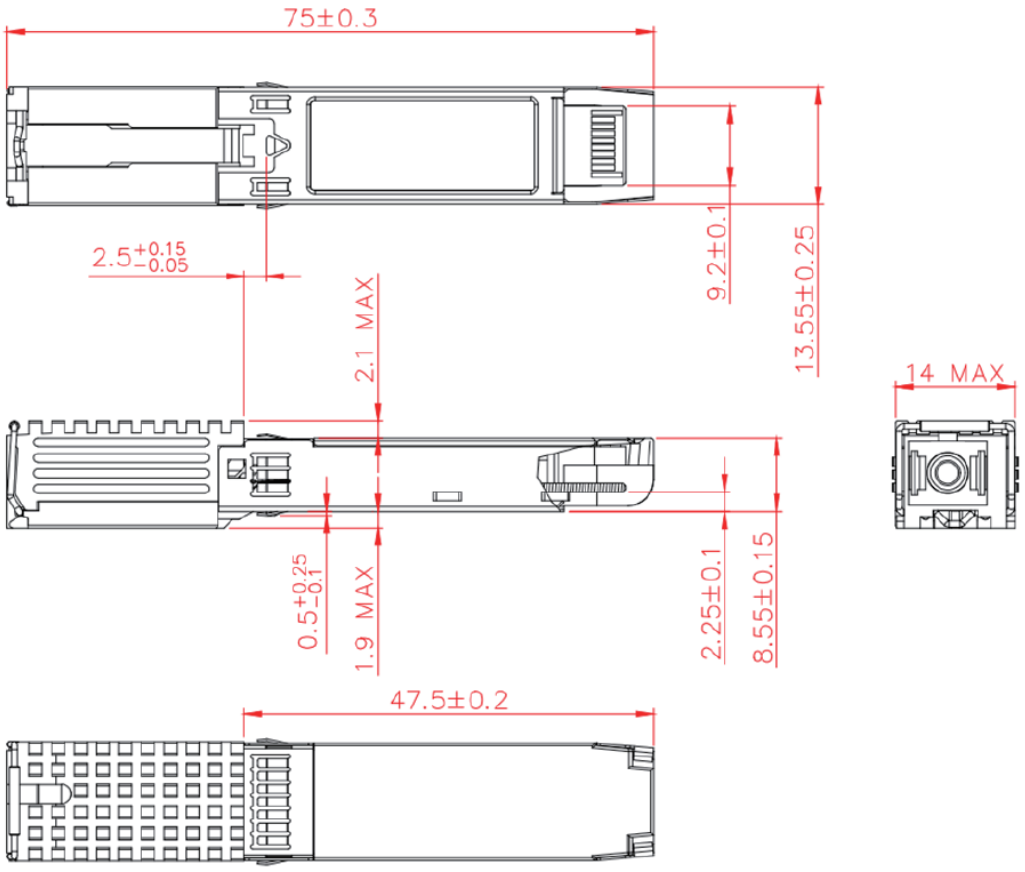
| Memory Map (Page 0xA0 HEX, Unlisted Fields are Blank/Empty, Memory is WRITE PROTECTED, SDA Communications is READ ONLY) | | | | |
|---|---|---|---|---|
| IIC Addr | Size | Name | Description | Values (HEX) |
| 0 | 1 | Identifier | SFP transceiver | 03 |
| 1 | 1 | Extended Identifier | MOD4 | 04 |
| 2 | 1 | Connector | SC | 01 |
| 3-10 | 8 | Transceiver | 1000Base-L | 00 00 00 02 00 00 00 00 |
| 11 | 1 | Encoding | Encoding Type = NRZ | 03 |
| 12 | 1 | BR, Nominal | Nominal Bit Rate 1244 Mb/s | 0D |
| 13 | 1 | Reserved | Reserved | 00 |
| 14 | 1 | Length (9µm) - km | 20km Link Length in Kilometers/SMF | 14 |
| 15 | 1 | Length (9µm) - 100m | 20km Link Length in Hundreds of Meters/SMF | C8 |
| 16 | 1 | Length (50µm) - 10m | 50-micron MMF Link Length = N/A | 00 |
| 17 | 1 | Length (62.5µm) - 10m | 62.5-micron MMF Link Length = N/A | 00 |

| | | | | |
|---|---|---|---|---|
| 18 | 1 | Length (Copper) | Copper Link Length = N/A | 00 |
| 19 | 1 | Reserved | Reserved | 00 |
| 20-35 | 16 | Vendor Name | ASCII Format | PLANET |
| 36 | 1 | Reserved | Reserved | 00 |
| 37-39 | 3 | Vendor OUI | SFP Vendor IEEE Company ID | A8 F7 E0 |
| 40-55 | 16 | Vendor PN | The Part Number in the ordering information | GPN-SFP |
| 56-59 | 4 | Vendor Revision Number | Programmed by Factory | T1.0 |
| 60-61 | 2 | Wavelength | Laser Wavelength = 1310nm | 05 1E |
| 62 | 1 | Reserved | Reserved | 00 |
| 64-65 | 2 | Transceiver Options | 65.1: Rx_LOS: Tx_FAULT: Tx_DISABLE | 00 1A |
| 66 | 1 | BR, max | 14 | 14 |
| 67 | 1 | BR, min | 14 | 14 |
| 68-83 | 16 | Vendor SN | Serial number provided by vendor | Programmed by Factory |
| 84-91 | 8 | Date code | Vendor's manufacturing date code | Programmed by Factory |
| 92 | 1 | Diagnostic Monitoring Type | Digital Diagnostic Monitoring Implemented Address Change Required | 68 |
| 93 | 1 | Enhanced Options | 95.7: Optional Alarm/Warning Flags Implemented<br>95.6: Soft Tx_DISABLE Monitor and Implemented<br>95.4: Soft Rx_LOS Monitor<br>95.5: Soft Tx_FAULT Monitor | B0 |
| 94 | 1 | SFF-8472 Compliance | Revision Implemented | 05 |
| 95 | 1 | CC_EXT | Check_Sum (64 to 94) | Programmed by Factory |

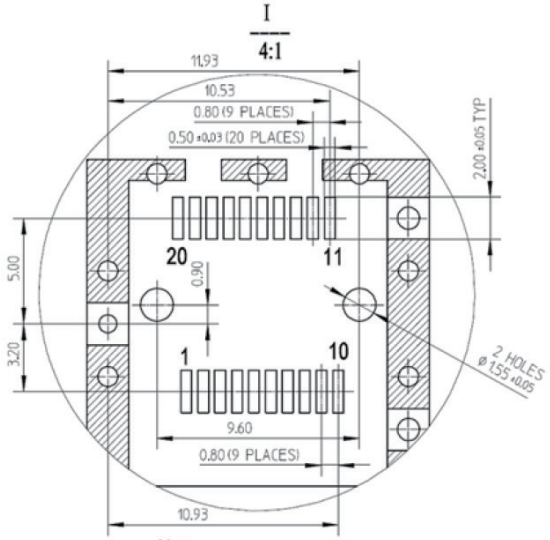
| | | | | |
|---|---|---|---|---|
| 96-127 | 32 | Vendor Specific | Vendor Specific EEPROM | Programmed by Factory |
| 128-255 | 128 | Vendor Specific | Vendor Specific EEPROM | Programmed by Factory |
| 128~143 | | User EEPROM | Reserved | 00 |
| 144~159 | | BOM SN | Reserved | 00 |
| 160~168 | | User EEPROM | Reserved | 00 |
| 169~178 | | GPON PW | Reserved | 00 |
| 179 | | BN | Reserved | 00 |
| 180~187 | | MAC ADDR | Reserved | Programmed by Factory |
| 188 | | Operator ID | Reserved | 00 |
| 189 | | Module type | Reserved | 02 |
| 190 | | Module capabilities | Reserved | 01 |
| 191-226 | | LOID | Reserved | 00 |
| 227 | | Reset Control | Reserved | 00 |
| 228 | | Link Failure Indication | Reserved | 00 |
| 229 | | Reboot | Reserved | 00 |
| 230 | | Network Synchronization PIN set | Reserved | 00 |
| 231 | | Network Synchronization Data Tunnel Set | Reserved | 00 |
| 232 | | Logic type | Reserved | 01 |
| 233~240 | | GPON SN | Reserved | Programmed by Factory |
| 241~247 | | Reserved | Reserved | |
| 248~255 | | Vendor Control | Reserved | |

## 4.7 Mechanical Specifications

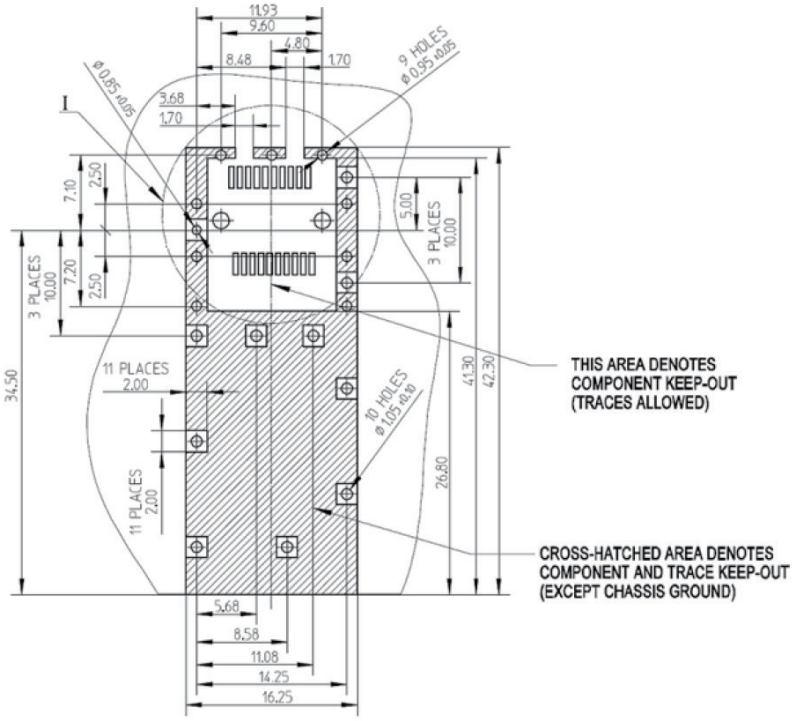
PLANET GPN-SFP is compatible with the dimensions defined by the SFP Multi-Sourcing Agreement (MSA). Dimensions are in mm.




**SFP+ Connector Dimensions**




Notes:
1.Datum and basic dimensions established by customer
2.Pads and vias are chassis ground, 11 places
3.Thru holes,plating optional



## *5. Customer Support*

Thank you for purchasing PLANET product. You can browse our online FAQ resource on PLANET website first to check if it could solve your issue. If you need more support information, please contact PLANET support team.

PLANET online FAQs:
https://www.planet.com.tw/en/support/faq

Support team mail address:
support@planet.com.tw

## Trademarks



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If you find information in this manual that is incorrect, misleading, or incomplete, we would appreciate your comments and suggestions.

## FCC Warning

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the Instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at whose own expense.

## CE Mark Warning

This device is compliant with Class A of CISPR 32. In a residential environment this equipment may cause radio interference.

## WEEE Warning

To avoid the potential effects on the environment and human health as a result of the presence of hazardous substances in electrical and electronic equipment, end users of electrical and electronic equipment should understand the meaning of the crossed-out wheeled bin symbol. Do not dispose of WEEE as unsorted municipal waste and have to collect such WEEE separately.

## Energy Saving Note of the Device

This power required device does not support Standby mode operation. For energy savings, please remove the DC plug or slide the hardware-based Power Switch to the OFF position to disconnect the device from the power circuit. Without removing the DC plug from or switching off the device, the device will still consume power from the power source. In view of Saving the Energy and reducing the unnecessary power consumption, it is strongly suggested to power off or to remove the DC plug from the device if this device is not intended to be active.