

# **XGSPON ONU Stick SFP+ Transceiver 9.953Gbps Upstream / 9.953Gbps Downstream**

## **PRODUCT FEATURES**

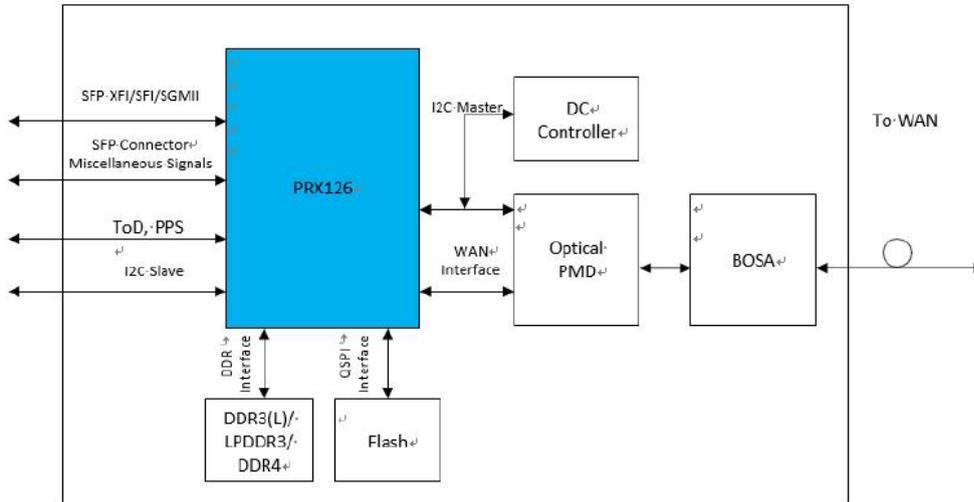
- Bi-directional 9.953Gbps Upstream/9.953Gbps Downstream
- EEPROM with Serial ID Functionality
- Compliant with ITU-T G.9807
- Built in PRX126 MAC
- Supports the OMCI standard
- Support for logical identity (LOID) authentication
- Support 1PPS+ToD
- Support PON link status indication
- Supports the abnormal light-off function of the optical module
- SFP package with SC/APC
- Support Digital Diagnostic Monitoring interface
- 1270nm Burst mode transmitter, And 1577nm Continuous Mode Receiver
- Single + 3.3V Power Supply
- ROHS-6/6 compliant
- Case Operation Temperature Ranges:
  - Industrial: -40~85°C
- Laser Class 1 Product which comply with the Requirements of IEC 60825-1 and IEC 60825-2

## **APPLICATIONS**

- Providing pluggable XGSPON ONU interface for Ethernet switches, routers, DSLAMs, home gateway and
- other customer premises equipment
- FTTx and wireless backhaul

## PRODUCT DESCRIPTION

This section shows the typical block diagram of the XGSPON ONU STICK



The STICK optical module can fully meet the requirements of the carrier-grade FTTB\ FTTH\ FTTO device. It can be hot-swapped into the SFP+ slot of the Layer 2 Ethernet switch. The whole machine can be used as an ONT or even an MDU, so that the whole device can be directly Connected to the XGSPON optical network, the central office OLT only needs to register the XGSPON ONU STICK optical module as if it were a normal optical cat. The communication device can complete the access switch from the original P2P.

It also contain a DFB laser diode is employed for upstream transmission at 9.953Gbps. The optical transmitter includes a back facet photo-detector to monitor laser power for APC control. and an APD with TIA is employed for downstream data reception at 9.953Gbps. A post amplifier is also included for CML output compatibility

### Absolute Maximum Ratings

| Parameter                 | Symbol | Min. | Typ. | Max.    | Unit | Note |
|---------------------------|--------|------|------|---------|------|------|
| Storage Temperature       | Ts     | -40  |      | 85      | °C   |      |
| Storage AmbientHumidity   | HA     | 5    |      | 85      | %    |      |
| Power Supply Voltage      | VCC    | -0.3 |      | 3.7     | V    |      |
| Signal InputVoltage       |        | -0.3 |      | Vcc+0.3 | V    |      |
| Receiver DamageThreshold  |        | +3   |      |         | dBm  |      |
| Lead SolderingTemperature | TSOLD  |      |      | 260     | °C   |      |

|                     |       |  |  |    |     |  |
|---------------------|-------|--|--|----|-----|--|
| Lead Soldering Time | TSOLD |  |  | 10 | sec |  |
|---------------------|-------|--|--|----|-----|--|

## Recommended Operating Conditions

| Parameter                    | Symbol            | Min. | Typ.        | Max. | Unit  | Note            |
|------------------------------|-------------------|------|-------------|------|-------|-----------------|
| Case Operating Temperature1  | Tcase             | -40  |             | 85   | °C    | I-TEMP          |
| Case Operating Temperature2  | Tcase             | 0    |             | 70   | °C    | C-TEMP          |
| Ambient Humidity             | HA                | 5    |             | 70   | %     | Non-condensing  |
| Power Supply Voltage         | VCC               | 3.13 | 3.3         | 3.47 | V     |                 |
| Power Supply Current         | ICC               |      |             | 900  | mA    |                 |
| Power dissipation            |                   |      |             | 3    | W     |                 |
| Power Supply Noise Rejection |                   |      |             | 100  | mVp-p | 100Hz to 1MHz   |
| Data Rate                    |                   |      | 9.953/9.953 |      | Gbps  | Tx Rate/Rx Rate |
| Transmission Distance        |                   |      |             | 20   | km    |                 |
| Coupled fiber                | Single mode fiber |      |             |      |       | 9/125um         |

## Specification of Transmitter

| Parameter                         | Symbol                       | Min. | Typ. | Max.    | Unit  | Note      |
|-----------------------------------|------------------------------|------|------|---------|-------|-----------|
| Average Launched Power            | PO                           | 4    |      | 9       | dBm   |           |
| Extinction Ratio                  | ER                           | 6    |      |         | dB    |           |
| Center Wavelength                 | $\lambda_C$                  | 1260 | 1270 | 1280    | nm    | DFB Laser |
| Side mode suppression ratio       | SMSR                         | 30   |      |         | dB    |           |
| Spectrum Bandwidth(-20dB)         |                              |      |      | 1       | nm    |           |
| Transmitter OFF Output Power      | POff                         |      |      | -45     | dBm   |           |
| Tx Burst on time                  | Ton                          |      |      | 50      | ns    |           |
| Tx Burst off time                 | Toff                         |      |      | 50      | ns    |           |
| Differential line input Impedance | RIN                          | 90   | 100  | 110     | Ohm   |           |
| Differential Data Input Swing     | VDT                          | 200  |      | 1600    | mVp-p |           |
| Input Common Mode Voltage         | VCM                          | 1.4  |      | Vcc-0.2 | V     |           |
| Output Eye Mask                   | Compliant With ITU-T G.987.2 |      |      |         |       |           |

## Specification of Receiver

| Parameter                         | Symbol           | Min. | Typ. | Max.  | Unit | Note     |
|-----------------------------------|------------------|------|------|-------|------|----------|
| Input Optical Wavelength          | $\lambda_{IN}$   | 1575 |      | 1580  | nm   | CW APD   |
| Receiver Sensitivity              | P <sub>IN</sub>  |      |      | -28.5 | dBm  | Note (1) |
| Input Saturation Power (Overload) | P <sub>SAT</sub> | -8   |      |       | dBm  |          |
| Signal Detect- Assert Power       | PA               | -42  |      |       | dBm  |          |

|                                     |       |     |  |     |       |                  |
|-------------------------------------|-------|-----|--|-----|-------|------------------|
| Signal Detect-Deassert Power        | PD    |     |  | -29 | dBm   | Note (2)         |
| Signal Detect- Hysteresis           | PA-PD | 0.5 |  | 5   | dB    |                  |
| Differential Data Output Swing      | VDR   | 350 |  | 850 | mVp-p | AC-Coupled CML   |
| Signal Detect Output Voltage-High   | VLOSH | 2.4 |  | VCC | V     | LVTTL            |
| Signal Detect Output Voltage-Low    | VLOSL | 0   |  | 0.4 | V     |                  |
| Signal Detect- Assert/Deassert Time |       |     |  | 100 | us    |                  |
| RSSI range                          |       | -29 |  | -8  | dBm   | Accuracy +/- 3dB |

Note (1): Measured with PRBS 2<sup>31</sup>-1 test pattern @9.953Gbit/s, BER ≤ 1 × 10<sup>-3</sup>.

Note (2): When SD de-asserted, the data output is signal output.

## Digital Diagnostic Monitor Interface (DDMI) Description

XGSPON ONU Stick transceivers support the 2-wire serial communication. The DDMI WARNING and ALARM memory positions and addresses are compliant with the SFF 8472 REV9.3 specification.

The standard SFP serial ID provides access to identification information that describes the transceiver's capabilities, standard interfaces, manufacturer, and other information.

The DDMI can detect TX power, RX power, Bias current, Temperature, VCC.

| DDMI        | Monitor scope | Monitor Error |
|-------------|---------------|---------------|
| TX power    | 4dBm ~9dBm    | ±2dBm         |
| RX power    | -8dBm~-29dBm  | ±3dBm         |
| Bias        | 0mA~90mA      | ±10%          |
| Temperature | -40°C~85°C    | ±3°C          |
| Vcc         | 3.0V~3.6V     | ±3%           |

## SFP Pin Function Definitions

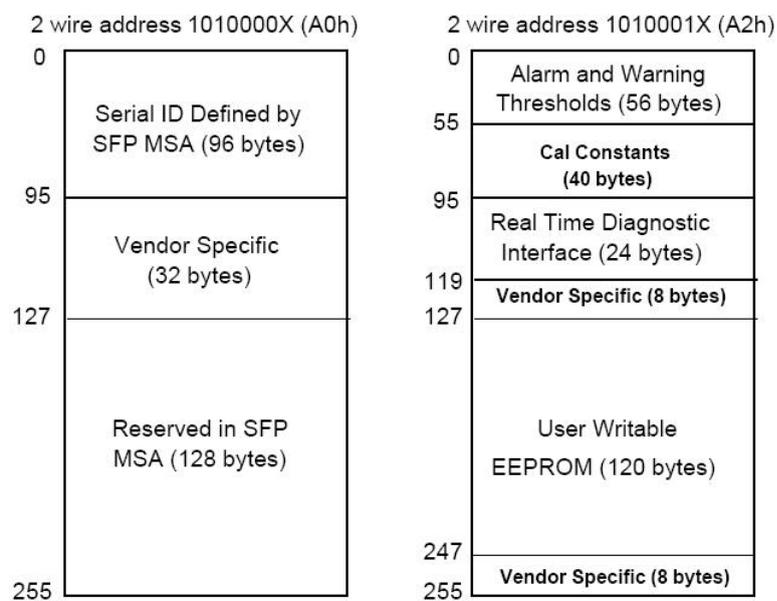
| Pin No. | Pin Name    | Description  |
|---------|-------------|--|
| 1       | VeeT        | Tx Ground  |
| 2       | SFP_Uart_Tx | SFP_Uart_Tx  |
| 3       | Tx_dis      | LVTTL input. The default setting is that laser output is disabled when this pin is asserted HIGH and laser output is enabled when this pin is LOW. |
| 4       | MOD_DEF(2)  | 2-Wire Serial Data I/O Pin.(SDA)   |
| 5       | MOD_DEF(1)  | 2-Wire Serial Clock Input.(SCL)  |
| 6       | MOD_DEF(0)  | Internally Grounded  |
| 7       | SFP_Uart_Rx | SFP_Uart_Rx  |
| 8       | LOS/SD      | Set LOS is that active high when signal is detected(LVTTL)   |
| 9       | SFP_PPS     | Plus time per second   |
| 10      | NC          | NC   |

|    |        |   |
|----|--------|---|
| 11 | VeeR   | Rx Ground   |
| 12 | RXD-   | Inverted Receiver Data Output (AC-Coupled internally)     |
| 13 | RXD+   | Non-Inverted Receiver Data Output (AC-Coupled internally) |
| 14 | VeeR   | Rx Ground   |
| 15 | Vcc_RX | Rx Vcc  |
| 16 | Vcc_TX | Tx Vcc  |
| 17 | Veet   | Tx Ground   |
| 18 | TXD+   | Non-Inverted Transmitter Data Input (AC-Coupled)          |
| 19 | TXD-   | Inverted Transmitter Data Input (AC-Coupled)              |
| 20 | Veet   | Tx Ground   |

## Regulatory Compliance

| Feature  | Reference  | Performance               |
|--|--|---------------------------|
| Electrostatic Discharge (ESD)                  | IEC/EN 61000-4-2                                 | Compatible with standards |
| Radio Frequency Electromagnetic Field Immunity | IEC/EN 61000-4-3                                 | Compatible with standards |
| Electromagnetic Interference (EMI)             | FCC Part 15 Class B EN 55022 Class B (CISPR 22A) | Compatible with standards |
| Laser Eye Safety                               | IEC/EN 60825-1 IEC/EN 60825-2                    | Class 1 laser product     |
| Component Recognition                          | IEC/EN 60950                                     | Compatible with standards |
| ROHS   | 2002/95/EC                                       | Compatible with standards |

## Digital Diagnostic Memory Map



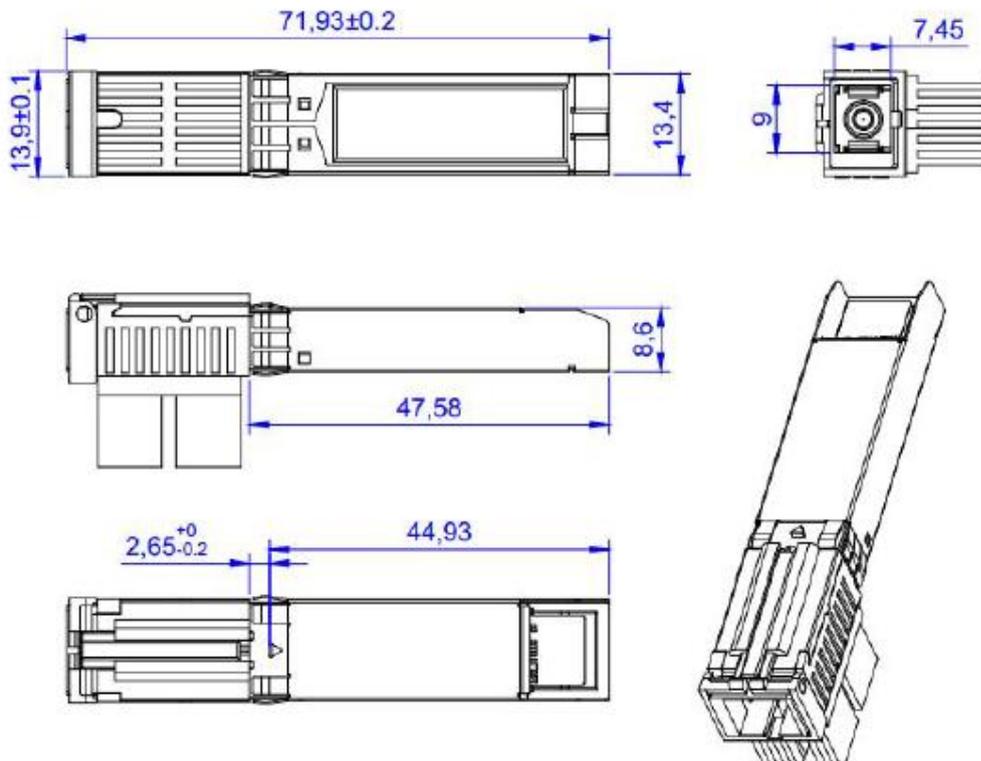


| Addr. | Field Size | Name of Field       | Hex  | Description                               |
|-------|------------|---------------------|--|---|
|       | (Bytes)    |                     |  |   |
| 0     | 1          | Identifier          | 03   | SFP                                       |
| 1     | 1          | Ext. Identifier     | 04   | SFP function is defined by serial ID only |
| 2     | 1          | Connector           | 01   | SC Connector                              |
| 3-10  | 8          | Transceiver         | 00 00 00 00 00 00 00 00                            | Transceiver Codes                         |
| 11    | 1          | Encoding            | 03   | NRZ                                       |
| 12    | 1          | BR, Nominal         | 63   | 99 *100MBd                                |
| 13    | 1          | Rate Identifier     | 00   | Unspecified                               |
| 14    | 1          | Length (9um) km     | 14   | Transceiver transmit distance             |
| 15    | 1          | Length (9um) 100m   | C8   | Transceiver transmit distance             |
| 16    | 1          | Length (50um OM2)   | 00   |   |
| 17    | 1          | Length (62.5um) 10m | 00   | Transceiver transmit distance             |
| 18    | 1          | Length (Copper)     | 00   | Not compliant                             |
| 19    | 1          | Length (50um OM3)   | 00   |   |
| 20-35 | 16         | Vendor name         | 43 5A 54 20 20 20 20 20<br>20 20 20 20 20 20 20 20 | Vendor Name(ASCII)                        |
| 36    | 1          | Reserved            | 00   |   |
| 37-39 | 3          | Vendor OUI          | 00 00 00   |   |
| 40-55 | 16         | Vendor PN           | 59 56 30 50 2D 43 33 38<br>20 20 20 20 20 20 20 20 | Part No.(ASCII)                           |
| 56-59 | 4          | Vendor rev          | 56 31 2E 30  | "V1.0" (ASCII)                            |
| 60-61 | 2          | Wavelength          | 04 F6  | 1270 nm                                   |
| 62    | 1          | Reserved            | 00   |   |

| Addr. | Field Size | Name of Field              | Hex          | Description  |
|-------|------------|----------------------------|--------------|--|
|       | (Bytes)    |                            |              |  |
| 63    | 1          | CC_BASE                    | D9           | Check code for Base ID Fields  |
| 64-65 | 2          | Options                    | 00 1A        | TX_DISABLE, TX_FAULT and Loss of Signal implemented.   |
| 66    | 1          | BR,MAX                     | 14           | Not Specified  |
| 67    | 1          | BR,MIN                     | 14           | Not Specified  |
| 68-83 | 16         | Vendor SN                  | SN(Variable) | Serial Number of transceiver(ASCII).   |
| 84-91 | 8          | Date code                  | DC(Variable) | Manufactory Date Code.   |
| 92    | 1          | Diagnostic Monitoring Type | 68           | Digital diagnostic monitoring implemented, "Internally calibrated" is implemented  |
| 93    | 1          | Enhanced Options           | F0           | Optional Soft TX_Disable control and monitoring implemented, Optional Soft TX_FAULT monitoring implemented, Optional Soft RX_LOS |

|         |     |                     |              |  |
|---------|-----|---------------------|--------------|--|
|         |     |                     |              | monitoring implemented                               |
| 94      | 1   | SFF_8472 Compliance | 03           | Includes functionality described in Rev10.2 SFF-8472 |
| 95      | 1   | CC_EXT              | CS(Variable) | Check sum for Extended ID Field.                     |
| 96-127  | 32  | Vendor Specific     | Read only    | Programmed by Factory                                |
| 128-255 | 128 | Reserved            | Read only    | Programmed by Factory                                |

## Mechanical Dimension



### Ordering information

| Part Number               | Data Rate (Mbps)                  | Wavelength Tx (Rx) | Temperature Range (C) | Rating     |
|---------------------------|-----------------------------------|--------------------|-----------------------|------------|
| <b>EN-XGSFPP-OMAC-V2</b>  | 9.953 Gbps<br>Upstream/Downstream | 1270 (1577)        | 0°C to 70°C           | Commercial |
| <b>EN-XGSFPP-OMAC-V2I</b> | 9.953 Gbps<br>Upstream/Downstream | 1270 (1577)        | -40°C to 85°C         | Industrial |