

10GEPON-OLT-XFP

FEATURES

- Single fiber bi-directional data links TX 10.3125Gbps, Burst Mode RX 10.3125Gbps application
- Single fiber bi-directional data links TX 1.25Gbps, Burst Mode RX 1.25Gbps application
- 0 to 70°C operating case temperature
- 3.3V, 5V power supply
- XFP package with SC Receptacle connector
- Hot-pluggable capability
- High power 1577nm EML LD and High power 1490nm DFB LD
- High sensitivity 1270nm and 1310nm APD
- Support 20km transmission distance with SMF
- LOS indication
- Low EMI and excellent ESD protection
- Digital diagnostic monitor interface
- RoHS6 compliance

APPLICATIONS

- Symmetric 10GEPON OLT
- GEPON PX20+ OLT

STANDARDS

- Complies with IEC 60950-1
- Complies with IEEE 802.3av
- Complies with IEEE 802.3ah
- Complies with FCC 47 CFR Part 15, Class B
- Complies with FDA 21 CFR 1040.10 and 1040.11

ABSOLUTE MAXIMUM RATING

| Parameter | Symbol | Min. | Max. | Unit | Notes |
|-----------------------------|------------------|------|------|------|-------|
| Storage Ambient Temperature | T _{STG} | -40 | 85 | °C | |
| Operating Case Temperature | T _c | 0 | 70 | °C | |
| Operating Humidity | OH | 5 | 95 | % | |
| VCC3 Power Supply Voltage | VCC3 | -0.5 | 3.6 | V | |
| VCC5 Power Supply Voltage | VCC5 | -0.5 | 5.5 | V | |

RECOMMENDED OPERATING CONDITION

| Parameter | Symbol | Min. | Typ. | Max. | Unit | Notes |
|----------------------------|----------------|------|-----------------|------|--------------|-------|
| Operating Case Temperature | T _c | 0 | | +70 | °C | |
| VCC3 Power Supply Voltage | VCC3 | 3.13 | 3.3 | 3.47 | V | |
| VCC5 Power Supply Voltage | VCC5 | 4.75 | 5 | 5.25 | V | |
| VCC3 Power Supply Current | ICC3 | | - | 900 | mA | |
| VCC5 Power Supply Current | ICC5 | | - | 380 | mA | |
| Date Rate | | | 10.3125 1.25 | | Gbps Gbps | |
| Date Rate Drift | | -100 | | +100 | PPM | |

10GEPON TRANSMITTER OPTICAL CHARACTERISTICS

| Parameter | Symb | Min. | Typ. | Max. | Unit | Notes |
|-------------------------------------|---------------------------------|------|------|------|-------|-------------------------------------|
| Optical Center Wavelength | λ _c | 1575 | | 1580 | nm | |
| Optical Spectrum Width (-20dB) | Δλ | - | - | 1 | nm | |
| Side Mode Suppression Ratio | SMSR | 30 | | | dB | |
| Average Launch Optical Power | AOP2 | +2 | | +5 | dBm | Launched into SMF |
| Power-OFF Transmitter Optical Power | | | | -39 | dBm | Launched into SMF |
| Extinction Ratio | ER | 6 | | | dB | PRBS2 ³¹ -1 @10.3125Gbps |
| Total Jitter | TJ | | | 0.39 | UI | PRBS2 ³¹ -1 @10.3125Gbps |
| RIN ₁₅ OMA | | | | -128 | dB/Hz | |
| Transmitter Reflectance | | | | -10 | dB | |
| Transmitter and Dispersion Penalty | TDP | | | 1.5 | dB | Transmit on 20km SMF |
| Optical Waveform Diagram | Compliant with IEEE Std 802.3av | | | | | Figure 1, Mask Margin>5% |

10GEPON TRANSMITTER ELECTRICAL CHARACTERISTICS

| Parameter | Symbol | Min. | Typ. | Max. | Unit | Notes |
|------------------------------------|--------|------|------|-----------------|------|-----------------------|
| Data Input Differential Swing | | 120 | | 850 | mV | CML input, AC coupled |
| Input Differential Impedance | | 90 | 100 | 110 | Ω | |
| Transmitter Enable Voltage - Low | | 0 | | 0.8 | V | |
| Transmitter Disable Voltage - High | | 2.0 | | V _{CC} | V | |

GEPON TRANSMITTER OPTICAL CHARACTERISTICS

| Parameter | Symbol | Min. | Typ. | Max. | Unit | Notes |
|-------------------------------------|---------------------------------------|------|------|------|-------|---|
| Optical Center Wavelength | λ_c | 1480 | | 1500 | nm | |
| Optical Spectrum Width (-20dB) | $\Delta\lambda$ | | | 1 | nm | |
| Side Mode Suppression Ratio | SMSR | 30 | | | dB | |
| Average Launch Optical Power | AOP | +2 | | +7 | dBm | Launched into SMF |
| Power-OFF Transmitter Optical Power | | | | -39 | dBm | Launched into SMF |
| Extinction Ratio | ER | 9 | | | dB | PRBS 2 ⁷ -1 test pattern @1.25Gbit/s |
| Total Jitter | TJ | | | 0.43 | UI | PRBS 2 ⁷ -1 test pattern @1.25Gbit/s |
| Rise/Fall Time (20%-80%) | T _R /T _F | | | 260 | ps | Bessel-Thompson Filter OFF. |
| RIN ₁₅ OMA | | | | -115 | dB/Hz | |
| Optical Return Loss Tolerance | | | | 15 | dB | |
| Transmitter Reflectance | | | | -10 | dB | |
| Transmitter and Dispersion Penalty | TDP | | | 2.3 | dB | Transmit on 20km SMF |
| Optical Waveform Diagram | Compliant with IEEE Std 802.3ah™-2004 | | | | | Figure 2, Mask Margin>5% |

GEPON TRANSMITTER ELECTRICAL CHARACTERISTICS

| Parameter | Symbol | Min. | Typ. | Max. | Unit | Notes |
|------------------------------------|--------|------|------|-----------------|------|--------------------------|
| Data Input Differential Swing | | 200 | | 1600 | mV | LVPECL input, AC coupled |
| Input Differential Impedance | | 90 | 100 | 110 | Ω | |
| Transmitter Disable Voltage - Low | | 0 | | 0.8 | V | |
| Transmitter Disable Voltage - High | | 2.0 | | V _{CC} | V | |

TRANSMITTER EYE MASK DEFINITIONS AND TEST PROCEDURE

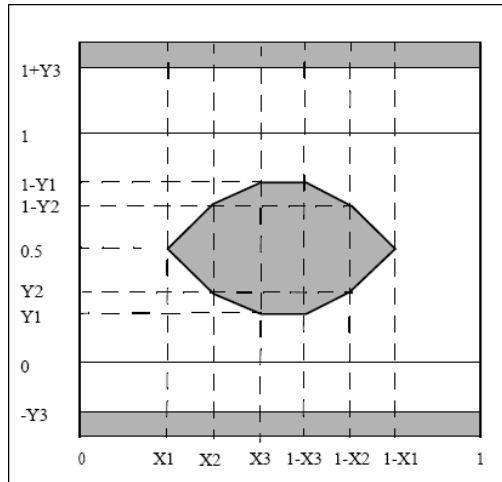


Figure 1 10GEPON Transmitter Eye Mask Definitions

| X1 | X2 | X3 | Y1 | Y2 | Y3 | Unit |
|------|------|------|------|------|------|------|
| 0.25 | 0.40 | 0.45 | 0.25 | 0.28 | 0.40 | UI |

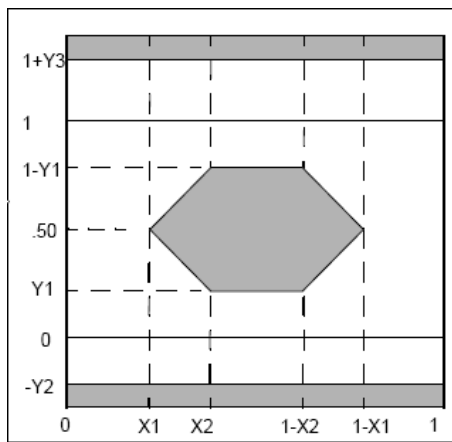


Figure 2 GEAPON Transmitter Eye Mask Definitions

| X1 | X2 | Y1 | Y2 | Y3 | Unit |
|------|-------|------|------|------|------|
| 0.22 | 0.375 | 0.20 | 0.20 | 0.30 | UI |

10GEPON RECEIVER OPTICAL CHARACTERISTICS

| Parameter | Symbol | Min. | Typ. | Max. | Unit | Notes |
|--------------------------|--------|------|------|------|------|--|
| Operating Wavelength | | 1260 | | 1280 | nm | |
| Sensitivity | SEN | | | -28 | dBm | PRBS2 ³¹ -1@10.3125Gbps BER ≤1×10 ⁻³ |
| Saturation Optical Power | SAT | -6 | | | dBm | PRBS2 ³¹ -1@10.3125Gbps BER ≤1×10 ⁻³ |
| LOS De-Assert Level | | | | -29 | dBm | |
| LOS assert Level | | -44 | | | dBm | |
| Hysteresis | | 0.5 | | 6 | dB | |
| Receiver Reflectance | | | | -12 | dB | |

10GEPON RECEIVER ELECTRICAL CHARACTERISTICS

| Parameter | Symbol | Min. | Typ. | Max. | Unit. | Notes |
|----------------------------------|-----------------------|------|------|------|-------|------------------------|
| Receiver Threshold Settling Time | T _{SETTLING} | | | 800 | ns | Figure 3 |
| Data Output Differential Swing | | 340 | | 850 | mV | CML output, DC coupled |
| LOS Assert Time | | | 0.5 | | µs | |
| LOS De-assert Time | | | 0.5 | | µs | |
| LOS Voltage - Low | | 0 | | 0.4 | V | |
| LOS Voltage - High | | 2.4 | | VCC | V | |

GEPON RECEIVER OPTICAL CHARACTERISTICS

| Parameter | Symbol | Min. | Typ. | Max. | Unit | Notes |
|--------------------------|--------|------|------|--------|------|--|
| Operating Wavelength | | 1260 | | 1360 | nm | |
| Sensitivity | SEN | | | -29.78 | dBm | PRBS 2 ⁷ -1@1.25Gbps BER ≤1×10 ⁻¹² |
| Saturation Optical Power | SAT | -6 | | | dBm | PRBS 2 ⁷ -1@1.25Gbps BER ≤1×10 ⁻¹² |
| LOS De-Assert Level | | | | -31 | dBm | |
| LOS Assert Level | | -40 | | | dBm | |
| Hysteresis | | 0.5 | | 6 | dB | |
| Receiver Reflectance | | | | -12 | dB | |

GEPON RECEIVER ELECTRICAL CHARACTERISTICS

| Parameter | Symbol | Min. | Typ. | Max. | Unit. | Notes |
|----------------------------------|-----------------------|------|------|------|-------|---------------------------|
| Receiver Threshold Settling Time | T _{SETTLING} | | | 400 | ns | Figure 3 |
| Data Output Differential Swing | | 600 | | 1600 | mV | LVPECL output, DC coupled |
| LOS Assert Time | | | 0.5 | | µs | |
| LOS De-assert Time | | | 0.5 | | µs | |
| LOS Voltage - Low | | 0 | | 0.4 | V | |
| LOS Voltage - High | | 2.4 | | VCC | V | |
| RSSI Trigger-Low | | 0 | | 0.8 | V | |
| RSSI Trigger-High | | 2.0 | | Vcc | V | |

TIMING PARAMETER DEFINITIONS IN BURST MODE SEQUENCE

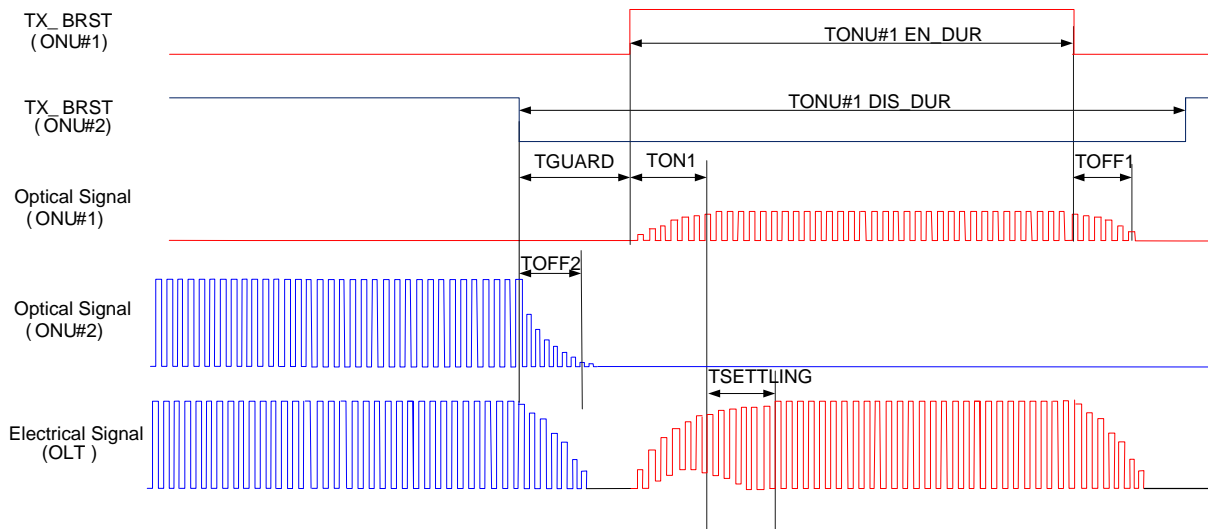


Figure 3 Timing Parameter Definitions in Burst Mode Sequence

RSSI TIMING SEQUENCE

| Parameter | Symbol | Min. | Typ. | Max. | Unit. | Notes |
|---|------------------|------|------|------|-------|-------|
| Optical Signal During Time | T _{opt} | | 1500 | | ns | |
| RSSI Trigger width | T _w | | 500 | | ns | |
| RSSI Trigger Delay | T _D | | 300 | | ns | |
| I ² C Access Prohibited Time | | 500 | | | µs | |

Digital RSSI Sample/Hold Timing Specification

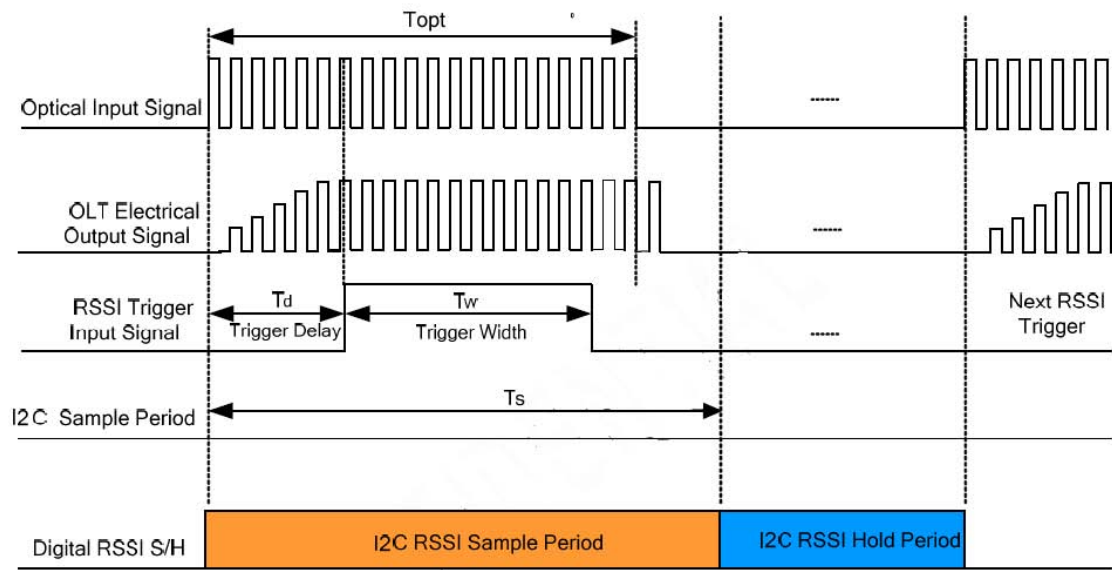


Figure 4 Timing Parameter Definitions in RSSI Trigger

PIN OUT DRAWING

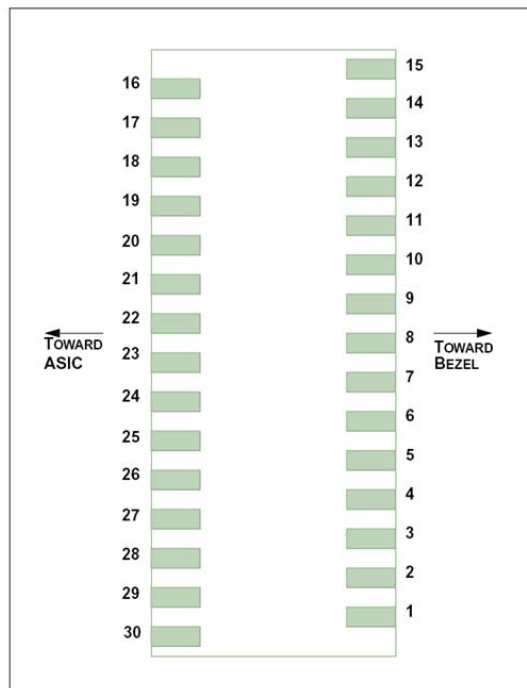


Figure 5 Pin Out Drawing

| PIN DESCRIPTION | | | |
|-----------------|-----------|-------------------------------------|--|
| PIN | Name | Description | Notes |
| 1 | GND | Module Ground | |
| 2 | TX-1G-P | Non-Inverted Transmit Data in | LVPECL input, AC coupled |
| 3 | TX-1G-N | Inverted Transmit Data in | LVPECL input, AC coupled |
| 4 | GND | Module Ground | |
| 5 | TX_DIS | Transmitter Disable | LVTTTL Input, Low : transmitter on |
| 6 | VCC5 | +5V Power Supply | |
| 7 | GND | Module Ground | |
| 8 | VCC3_TX | Transmitter 3.3V Power Supply | |
| 9 | VCC3_RX | Receiver 3.3V Power Supply | |
| 10 | SCL | The clock line | The clock line of two wire serial interface |
| 11 | SDA | The data line | The data line of two wire serial interface |
| 12 | MOD_ABS | Indicates Module is not present. | Grounded in the Module |
| 13 | NC | Not connected | |
| 14 | LOS | LOS Indication | LVTTTL output, active high when the receiver lost signal |
| 15 | GND | Module Ground | |
| 16 | GND | Module Ground | |
| 17 | RD_10G_N | Inverted 10G Received Data Out | CML output, DC coupled |
| 18 | RD_10G_P | Non-inverted 10G Received Data Out | CML output, DC coupled |
| 19 | GND | Module Ground | |
| 20 | RD_1G_N | Inverted 1G Received Data Out | LVPECL Output, DC coupled |
| 21 | RD_1G_P | Non-inverted 1G Received Data Out | LVPECL Output, DC coupled |
| 22 | N.C. | Not be Connected in the transceiver | |
| 23 | RSSI_TRIG | RSSI Trigger for Transceiver | RSSI Trigger |
| 24 | N.C. | Not be Connected in the transceiver | |
| 25 | N.C. | Not be Connected in the transceiver | |
| 26 | N.C. | Not be Connected in the transceiver | |
| 27 | GND | Module Ground | |
| 28 | TX_10G_N | Inverted Transmit Data in | CML input, AC coupled |
| 29 | TX_10G_P | Non-Inverted Transmit Data in | CML input, AC coupled |
| 30 | GND | Module Ground | |

TYPICAL INTERFACE CIRCUIT

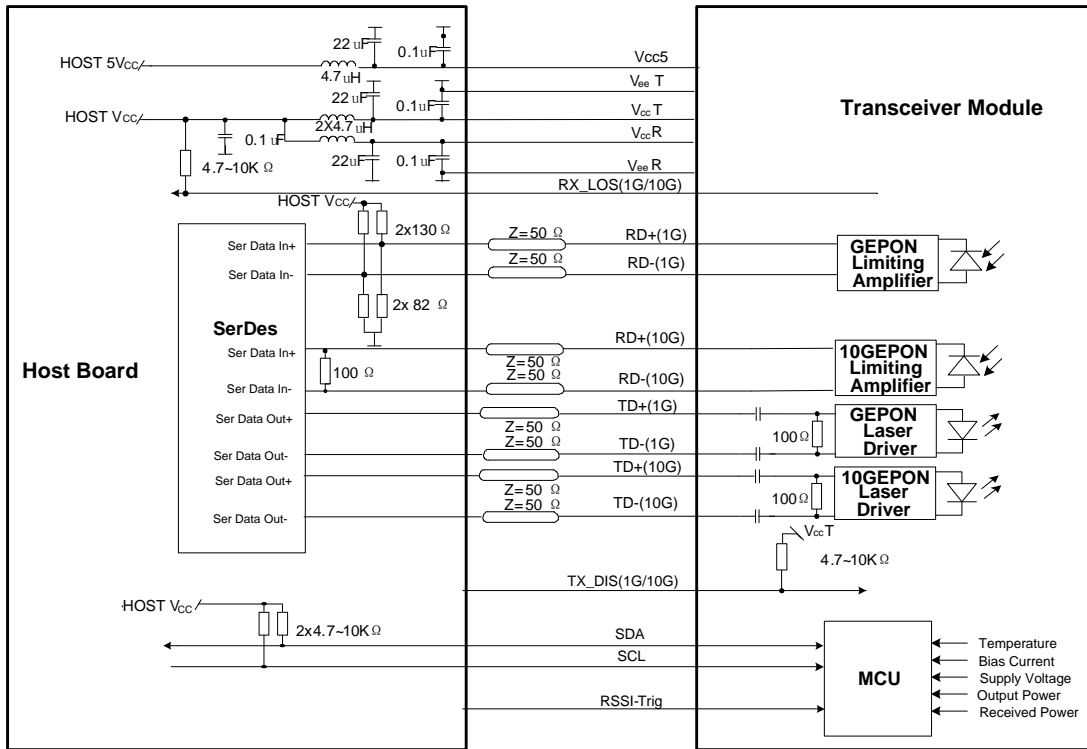


Figure 6 Typical Interface Circuit

PACKAGE OUTLINE

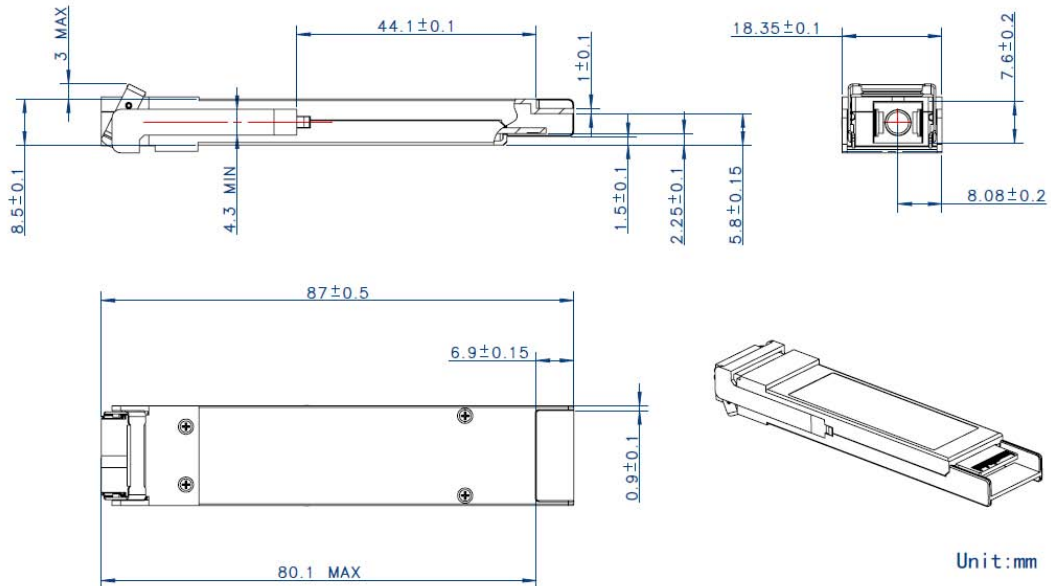


Figure 7 Package Outline

EEPROM INFORMATION

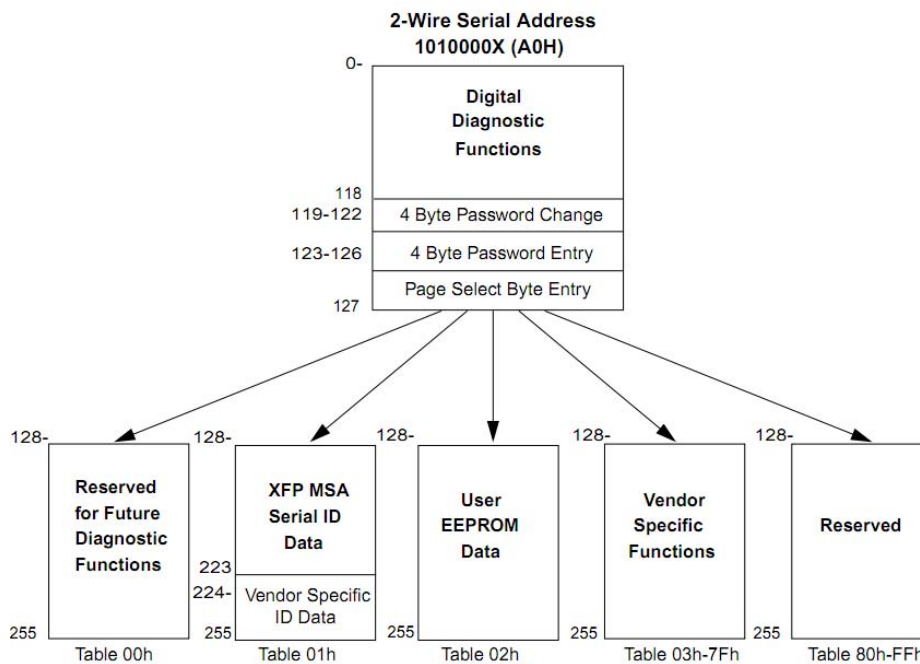


Figure 8 EEPROM Memory Map Specific Data Field Descriptions

| DIGITAL DIAGNOSTIC MONITORING INTERFACE | | | | |
|---|---------------|----------|-------------|-------------|
| Parameter | Range | Accuracy | Calibration | NOTES |
| Temperature | 0 to 70°C | ±3°C | Internal | LSB: 1/256C |
| Voltage | 2.97 to 3.63V | ±3% | Internal | LSB: 0.1mV |
| Bias Current_1G | 0 to 131mA | ±10% | Internal | LSB: 2uA |
| TX Power_1G | 2 to 7dBm | ±2dB | Internal | LSB: 0.1uW |
| Bias Current_10G | 0 to 131mA | ±10% | Internal | LSB: 2uA |
| TX Power_10G | 2 to 5dBm | ±2dB | Internal | LSB: 0.1uW |
| RX Power monitor | -31 to -6dBm | ±2dB | Internal | LSB: 0.1uW |

| ORDERING INFORMATION | | |
|----------------------|--------------------|------|
| PN | Temperature Rating | Unit |
| 10GEPON-OLT-XFP | 0 ~ 70 | °C |

WARNINGS

- Handling Precautions: This device is susceptible to damage as a result of electrostatic discharge (ESD). A static free environment is highly recommended. Follow guidelines according to proper ESD procedures.
- Laser Safety: Radiation emitted by laser devices can be dangerous to human eyes. Avoid eye exposure to direct or indirect radiation.

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