

GPON Triplexer Optical Module

Product Features

- Support ITU-T G.984.2/G.984.5 GPON Networks with video application
- Single fiber triple directional data links with 1.244Gbps Tx, 2.488Gbps Rx and 1G bandwidth analog video Rx
- Up to 20Km reach
- 1310nm burst-mode transmitter with DFB laser
- 1490nm continuous-mode receiver with APD-TIA
- 1555nm analog video receiver with ACG operation of 47M~1003MHz bandwidth
- 2-wire interface for integrated digital diagnostic Monitoring
- 2x2 inch TRIPLEXER package with SC/APC pigtail optical interface
- Support RX_SD, TX_SD PIN definitions
- RF_out in SMB interface
- +3.3V and +12V power supply
- Operating case temperature: 0~70°C for commercial or -40~85°C for industrial
- RoHS6 compliance



Operating Condition

| Parameter | Unit | Min. | Typical | Max. |
|--------------------------------|------|------|---------|------|
| Storage Temperature | °C | -40 | | 85 |
| Operating Case Temp for C-temp | °C | 0 | | 70 |
| Operating Case Temp for I-temp | °C | -40 | | 85 |
| 3.3V Power Supply Voltage | V | 3.15 | 3.3 | 3.45 |
| 3.3V Supply Current | mA | | | 350 |
| 12V Power Supply Voltage | V | 11.4 | 12 | 13.2 |
| 12V Supply Current for Video | mA | | | 200 |
| Analog Video Bandwidth | MHz | 47 | | 1003 |
| Bit Rate for Digital Tx | MHz | | 1244.16 | |
| Bit Rate for Digital Rx | MHz | | 2488.32 | |
| Soldering Temperature (10s) | °C | | | 260 |
| HBM ESD Sensitivity | V | 1000 | | |

Characteristics

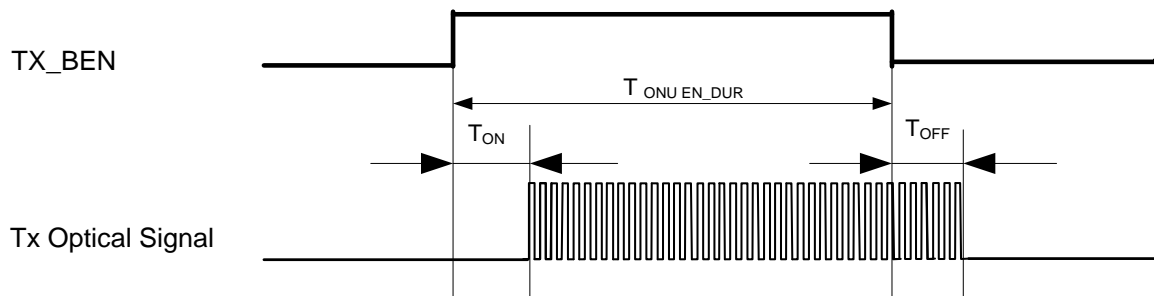
All performance is specified at whole working temperature and conditions

| Parameter | Unit | Min. | Typical | Max. |
|---|-----------------------------|------|---------|------|
| Digital Transmitter | | | | |
| TX Central Wavelength | nm | 1290 | 1310 | 1330 |
| Spectral Width (-20dB) | nm | | | 1 |
| Side Mode Suppression Ratio (SMSR) | dB | 30 | | |
| Mean Launched Power | dBm | 0.5 | | 5 |
| Mean Launched Power (TX Off) | dBm | | | -45 |
| Extinction Ratio | dB | 10 | | |
| Optical Return Loss Tolerance | dB | -15 | | |
| Transmitter and dispersion Penalty | dB | | | 1 |
| Transmitter Mask (PRBS2 ²³ -1 @ 1.244Gbps) | Compliant With ITU-T G984.2 | | | |
| Digital Receiver | | | | |
| Receive Wavelength | nm | 1480 | 1490 | 1500 |
| Sensitivity (PRBS2 ²³ -1 @ 2.488G, ER=8.2dB, BER<10 ⁻¹⁰) | dBm | | | -28 |
| Overload (PRBS2 ²³ -1 @ 2.488G, ER=8.2dB, BER<10 ⁻¹⁰) | dBm | -8 | | |
| Signal Detected Assert Level | dBm | | | -29 |
| Signal Detected De-assert Level | dBm | -45 | | |
| SD Hysteresis | dB | 0.5 | | 6 |
| Video Channel Plans | | | | |
| Frequency Range (Bandwidth) | MHz | 47 | | 1003 |
| Receiver Wavelength | | 1550 | 1555 | 1560 |
| Responsivity | A/W | 0.8 | | |
| Analog Channels (OMI = 4.3%/channel) | | | 40 | |
| Digital Channels (OMI = 2.15%/channel) | | | 63 | |
| Total OMI | | | 22.75% | |
| Channel Bandwidth | MHz | | 4 | |
| Channel Spacing | MHz | | 6 | |
| Video PD Monitor Accuracy (input -10~-2dBm) | dB | | | 1 |
| Received Average Optical Power | dBm | -8 | | 2 |
| RF Channel Output Power (at 450 MHz) | dBmV | 18 | | 23 |

| | | | | |
|--|------|-----|-----|---------|
| RF Total | dBuV | 94 | | 100 |
| RF Tilt (47M~1003M) | dB | 2 | | 7 |
| S22 Output Return Loss (75Ω) | dB | 14 | | |
| Distortions CSO | dBc | | | -55 |
| Distortions CTB | dBc | | | -55 |
| Carrier to Noise Ratio (CNR at OMI=3.5% at -5dBm) | dB | 46 | | |
| Digital Channel Plans | | | | |
| Digital Channels (OMI = 2.8%/channel) | | | 135 | |
| Total OMI | | | 23% | |
| Received Average Optical Power | dBm | -9 | | 2 |
| RF Channel Output Power (at 450 MHz) | dBmV | 13 | | 18 |
| RF total output | dBuV | 93 | | 99 |
| RF Tilt (47M~1003M) | dB | 2 | | 7 |
| S22 Output Return Loss (75Ω) | dB | 14 | | |
| Distortions CSO | dBc | | | -48 |
| Distortions CTB | dBc | | | -48 |
| Carrier to Noise Ratio (CNR at OMI=2.8%, -9dBm) | dB | 40 | | |
| Electrical Interface Characteristics | | | | |
| Data Input Swing Differential/TX | mV | 200 | - | 2000 |
| Data Output Swing Differential/RX | mV | 400 | | 1600 |
| Date Differential Impedance | Ω | 90 | 100 | 110 |
| LVTTL Output High | V | 2.4 | | Vcc |
| LVTTL Output Low | V | 0 | | 0.4 |
| LVTTL Input High | V | 2.0 | | Vcc+0.3 |
| LVTTL Input Low | V | 0 | | 0.8 |
| Timing Characteristics | | | | |
| Turn On Time at Burst mode (T _{ON}) | ns | | | 12.8 |
| Turn Off Time at Burst mode (T _{OFF}) | ns | | | 12.8 |
| TX-SD Assert Time (T _{TXSD_ON}) | ns | | | 100 |
| TX-SD De-assert Time (T _{TXSD_OFF}) | ns | | | 100 |
| RX-SD Assert Time (T _{LOSA}) | us | | | 100 |
| RX-SD De-assert Time (T _{LOSD}) | us | | | 100 |
| Isolation and Crosstalk | | | | |
| 1555nm external to 1490nm Rx Isolation | dB | 32 | | |
| 1490nm external to 1555nm Rx Isolation | dB | 32 | | |
| 1310nm external to 1555nm Rx | dB | 40 | | |

| | | | | |
|--|----|----|--|----|
| Isolation | | | | |
| 1310nm external to 1490nm data Isolation | dB | 30 | | |
| 1310nm Tx to 1490nm Rx Optical Crosstalk | dB | | | 47 |
| 1310nm Tx to 1555nm Rx Optical Crosstalk | dB | | | 47 |

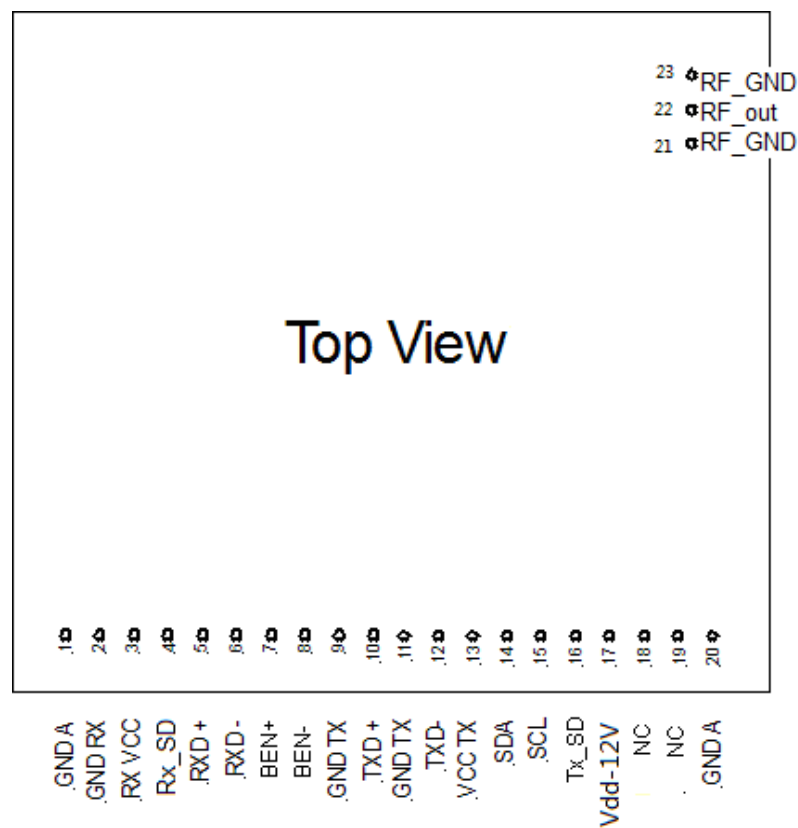
Burst Mode Transmitter Timing (transmitter on when TX_Burst high)



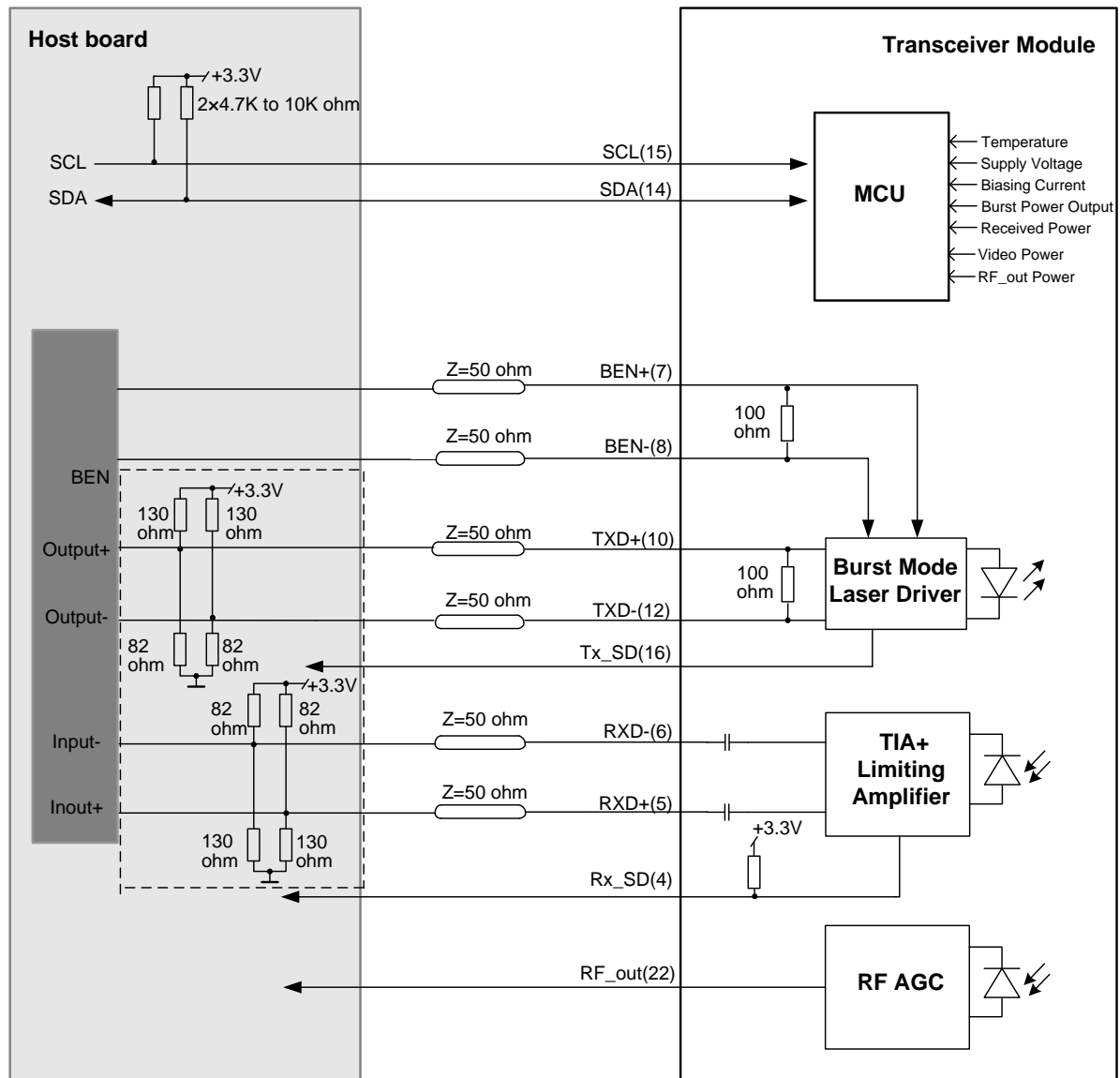
PIN Definition

| Pin No. | Symbol | Level / Logic | Description |
|---------|--------|---------------|--|
| 1 | GND_A | | Common Ground |
| 2 | GND_Rx | | Digital Rx ground |
| 3 | Vcc_Rx | | Digital Rx Vcc |
| 4 | RX_SD | LVTTTL-O | 1490nm Rx Signal Detect Indication, active high when received signal |
| 5 | RXD+ | CML-O | Receiver Non-Inverted Data Output, AC-Coupled |
| 6 | RXD- | CML-O | Receiver Inverted Data Output, AC-Coupled |
| 7 | BEN+ | LVPECL-I | Burst Non-Inverted Enable Input, AC-Coupled |
| 8 | BEN- | LVPECL-I | Burst Inverted Enable Input, AC-Coupled |
| 9 | GND_Tx | | Digital Tx ground |
| 10 | TXD+ | LVPECL-I | Transmitter Non-Inverted Data Input, DC-Coupled, 100Ω differential termination |
| 11 | GND_Tx | | |
| 12 | TXD- | LVPECL-I | Transmitter Inverted Data Input, DC-Coupled, 100Ω differential termination |
| 13 | Vcc_Tx | | Digital Tx Vcc |

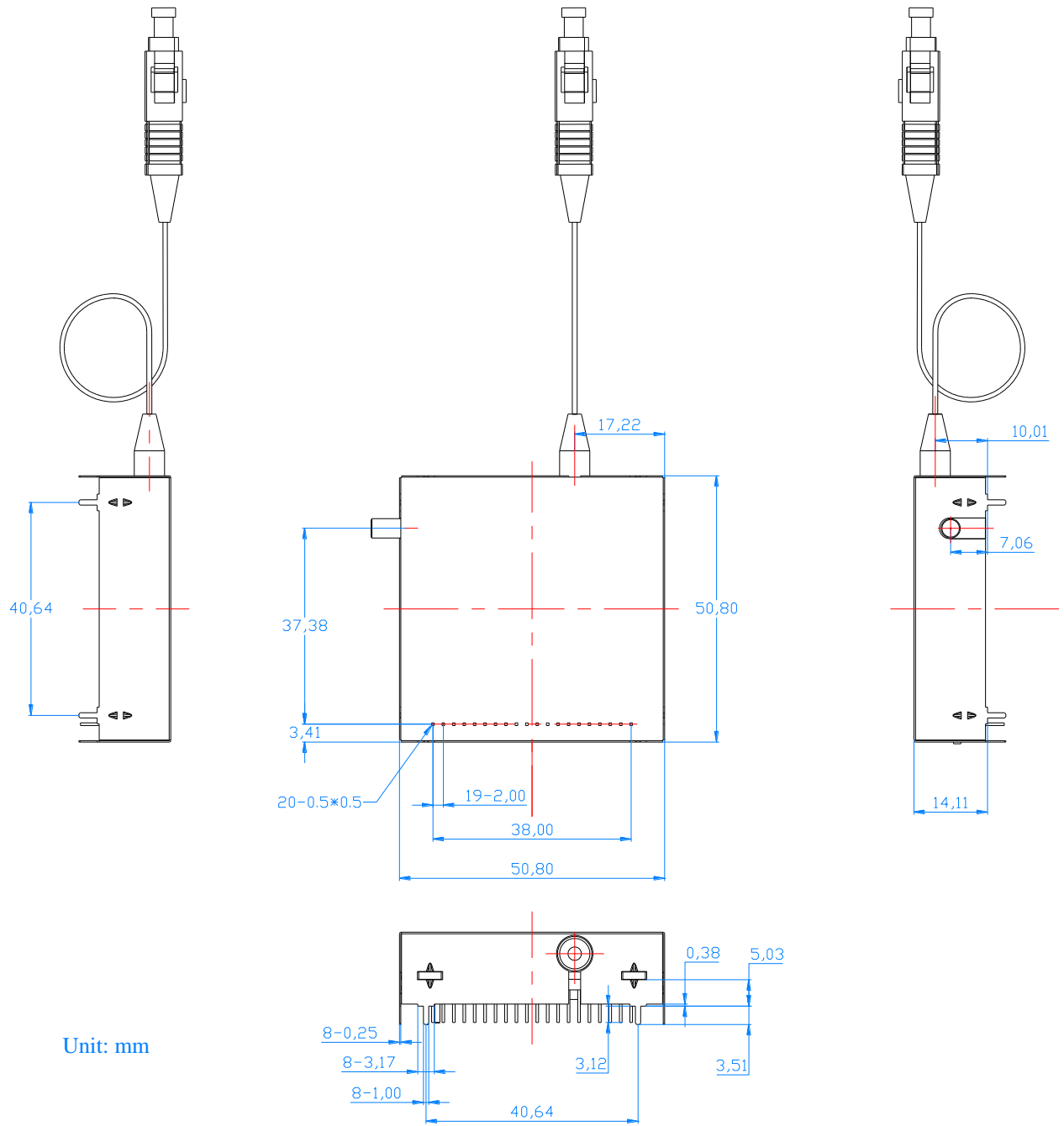
| | | | |
|----|----------|-----------|--|
| 14 | SDA | LVTTL-I/O | 2-Wire Serial Interface Data Line |
| 15 | SCL | LVTTL-I | 2-Wire Serial Interface Clock |
| 16 | TX_SD | LVTTL/O | transmitter on Indication, Active high when transmitter on |
| 17 | Vdd_+12V | | Video Rx 12V Vdd |
| 18 | NC | | Not connected |
| 19 | NC | | Not connected |
| 20 | GND_A | | Common ground |
| 21 | RF_GND | | RF ground |
| 22 | RF_OUT | | RF output signal |
| 23 | RF_GND | | RF ground |



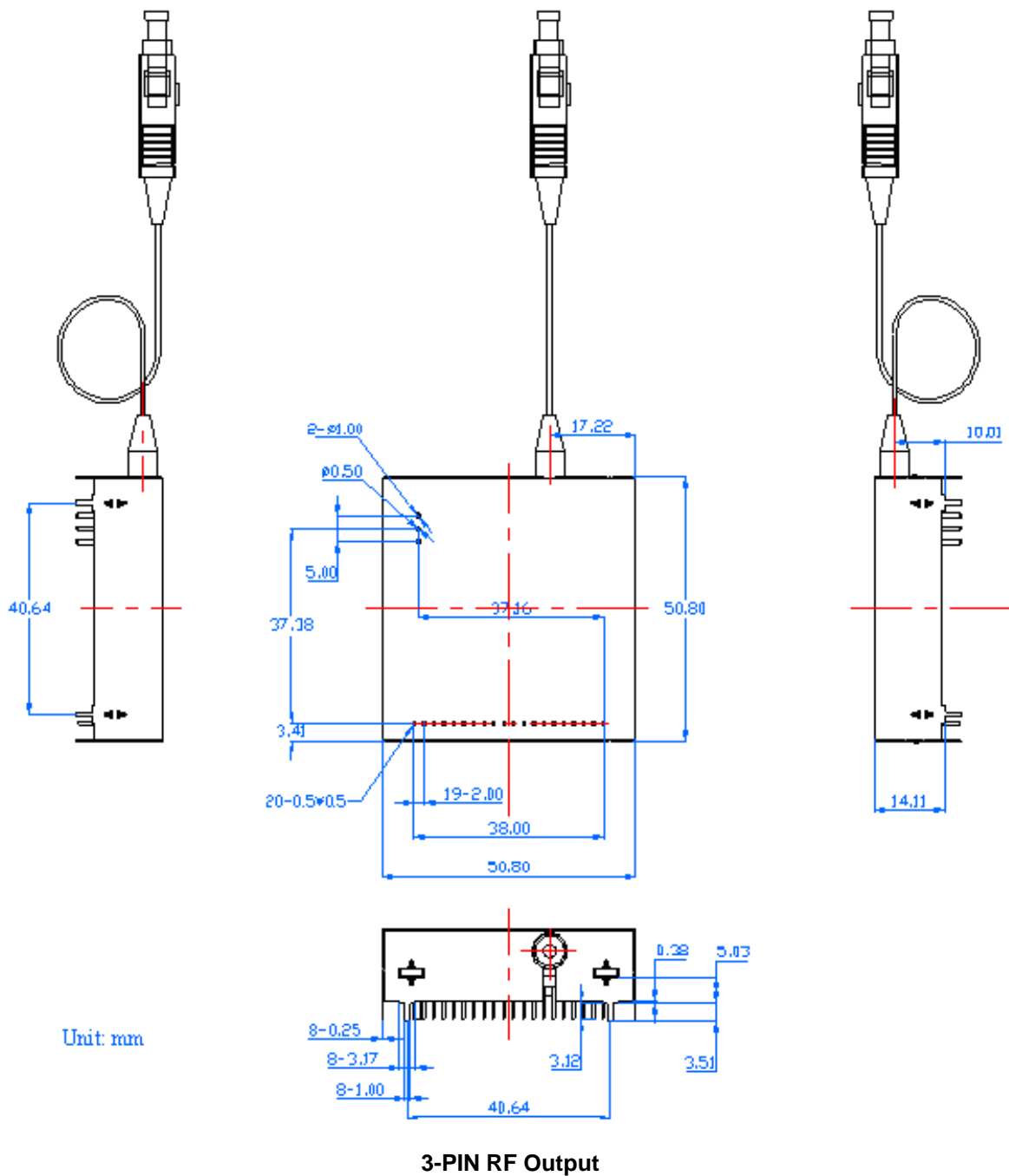
Typical Interface Circuit



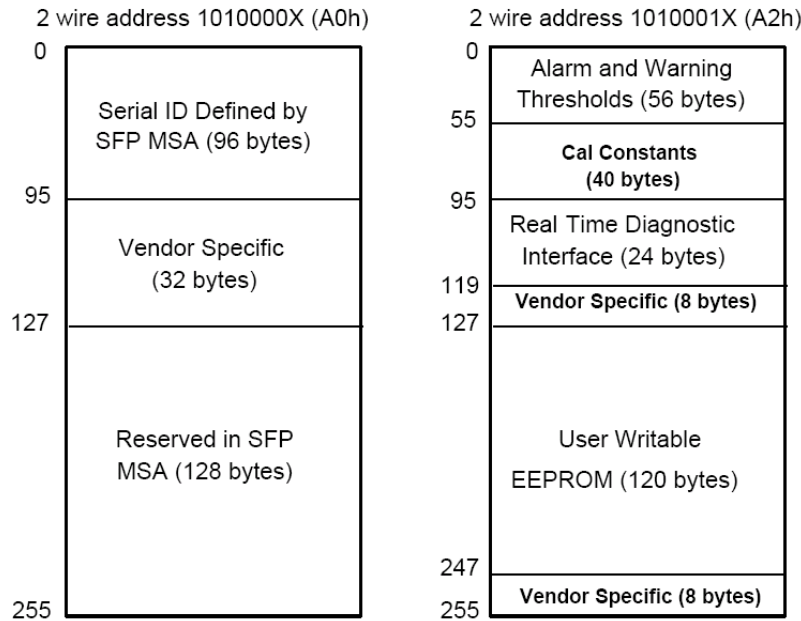
Mechanical Diagram



SMB RF Output



EEPROM Memory Map



| A2 Address | Type | Name of Field | Description |
|------------|-------|----------------|--|
| 92 | FLASH | RF_OFFSET | R/W. RF AGC control (0.1dB / LSB), 8bit signed integer, password protected, |
| 93-94 | FLASH | | reserved |
| 95 | FLASH | Checksum | Checksum of A2[0..94] |
| 96-97 | RAM | Temperature | Case temperature monitoring value (1/256°C / LSB) |
| 98-99 | RAM | Voltage | +3.3V Voltage monitoring value (0.1mV / LSB) |
| 100-101 | RAM | Bias Current | Bias Current monitoring value (2uA / LSB) |
| 102-103 | RAM | 1310nm_power | 1310nm Transmitter power monitoring value (0.1uW / LSB) |
| 104-105 | RAM | 1490nm_power | 1490nm Receiver power monitoring value (0.1uW / LSB) |
| 106-107 | RAM | 1550nm_power | 1555nm Video power monitoring value (0.1uW / LSB) |
| 108-109 | RAM | RF_out_power | RF_output power monitoring value (0.1dBuV / LSB) |
| 110 | RAM | status/control | bit7: TSSI status, high indicate the Rouge ONU has occurred once bit6: soft_TX_disable, high disable the transmitter output bit5: RF_SD, high when video signal detected |

| | | | |
|--|--|--|---|
| | | | bit4: AGC_en, high active in default, low disable the AGC loop bit3: RF_en, high active in default, low disable the RF output bit2: TX_fault status, high indicate the Tx fault bit1: RX_SD status, high indicate the 1490nm signal detected bit0: Data-Ready |
|--|--|--|---|

Ordering Information

| Ordering P/Ns | Description |
|---------------|---|
| T3420345A-CMA | GPON Triplexer, 1.244Gbps Tx 1310nm, 2.488Gbps Rx 1490nm, 1G Bandwidth Video Rx 1555nm, TX_BEN signal high active transmitter on, 2*2 inch form-factor, SC/APC pigtail connector, RF_out in SMB interface, 0~70°C Commercial temperature; ITU-T G.984.2 or G.984.5; |
| T3420345A-IMA | GPON Triplexer, 1.244Gbps Tx 1310nm, 2.488Gbps Rx 1490nm, 1G Bandwidth Video Rx 1555nm, TX_BEN signal high active transmitter on, 2*2 inch form-factor, SC/APC pigtail connector, RF_out in SMB interface, -40~85°C Industrial temperature; ITU-T G.984.2 or G.984.5; |
| T3420345A-CMB | GPON Triplexer, 1.244Gbps Tx 1310nm, 2.488Gbps Rx 1490nm, 870M Bandwidth Video Rx 1555nm, TX_BEN signal high active transmitter on, 2*2 inch form-factor, SC/APC pigtail connector, RF_out in SMB interface, 0~70°C Commercial temperature; ITU-T G.984.2 or G.984.5; |
| T3420345A-IMB | GPON Triplexer, 1.244Gbps Tx 1310nm, 2.488Gbps Rx 1490nm, 870M Bandwidth Video Rx 1555nm, TX_BEN signal high active transmitter on, 2*2 inch form-factor, SC/APC pigtail connector, RF_out in SMB interface, -40~85°C Industrial temperature; ITU-T G.984.2 or G.984.5; |