



3.3V 2×9 155Mbps Transceiver Module

RTXM169-408

Features

- *Integrated Single fiber bi-directional optical subassembly*
- *SC receptacle optical interface*
- *1310nm DFB laser Burst-mode Transmitter and 1490nm PIN/TIA Continuous receiver (with WDM)*
- *SFF 2x5 metallic package*
- *+3.3V single power supply*
- *Low power consumption*
- *0 to 70°C operating ambient temperature*
- *LVPECL compatible data input/output interface*
- *LVTTL transmitter burst mode control*
- *LVTTL receiver signal-detected indication*
- *Class 1 Laser eye safety*
- *RoHS compliant*

Application

- *Optical transceiver for Gigabit Ethernet Passive Optical Networks (EPON)*

Standard

- *IEEE802.3ah 1000BASE-PX20-U*
- *Small Form Factor Transceiver Multisource Agreement July 5,2000*

Description

The EPON ONU Transceiver module is designed for Gigabit Ethernet Passive Optical Network (EPON) 10km transmission. The module incorporates 1310nm burst-mode transmitter and 1490nm continuous-mode receiver.

The transmitter section uses a 1310nm DFB laser and an integrated BM laser driver which is designed to perform very small burst enable/disable delay time. The laser driver also includes digital APC and temperature compensation circuit, which are used for keeping the launch optical power and extinction ratio constant over temperature and aging.

The receiver section uses an integrated 1490nm InGaAs PIN photodiode and preamplifier mounted together. It has the function that indicates receiver signal-detected status (active high).

An integrated WDM coupler can separate 1490nm input light and 1310nm output light.

Absolute Maximum Ratings

| Parameter | Symbol | Unit | Min | Max |
|-----------------------------|-----------------|------|-----|-----------------|
| Operating Temperature Range | T _c | °C | 0 | 70 |
| Storage Temperature Range | T _s | °C | -40 | 85 |
| Relative Humidity | RH | % | 5 | 95 |
| Power Supply Voltage | V _{cc} | V | 0 | 4.6 |
| Pin Input Voltage | | V | GND | V _{cc} |
| Receiver Damage Threshold | | dBm | +4 | – |
| Lead Solder Temperature | | °C | – | 260 |
| Lead Solder Duration | | S | – | 10 |

Recommended operating conditions

| Parameter | Symbol | Unit | Min | Typ | Max |
|-----------------------------|-----------------|------|------|-------------|------|
| Operating Voltage | V _{cc} | V | 3.13 | 3.3 | 3.47 |
| Operating Temperature Range | T _{op} | °C | 0 | – | 70 |
| Operating Data Rate | | Gbps | – | 1.25±100ppm | – |

Specifications *(0°C<T_{op}<70°C and 3.13V<V_{cc}<3.47V)*

| Parameter | Symbol | Unit | Min | Typ | Max | Notes |
|-----------------------------------|-----------------|------|-----|-----|-----|-------|
| Electrical Characteristics | | | | | | |
| Supply Current | I _{cc} | mA | – | – | 300 | |

| | | | | | |
|---------------------------------------|----------|-----|-----|----------|---|
| LVPECL Single Ended Data Input Swing | mV | 100 | - | 800 | 1 |
| LVPECL Single Ended Data Output Swing | mV | 300 | - | 500 | 2 |
| Differential Data input impedance | Ω | - | 100 | - | 1 |
| Signal Level(LVTTL H) | V | 2.4 | - | V_{cc} | |
| Signal Level(LVTTL L) | V | 0 | - | 0.8 | |

Optical transmitter Characteristics

| | | | | | |
|-------------------------|-----------------|-----|------|-----|------|
| Data Rate | Mbps | - | 1250 | - | |
| Center Wavelength Range | λ_c | nm | 1280 | - | 1350 |
| Spectral Width(@-20dB) | $\Delta\lambda$ | nm | - | - | 1 |
| Launch Optical Power | P_o | dBm | -1 | - | +4 |
| Off level light | dBm | - | - | -45 | |

| | | | | | | |
|--------------------------------|---------------------------------|-------|----|---|------|---------------------------|
| Extinction Ratio | EX | dB | 10 | - | - | 4 |
| Burst turn on/off time | Ton/Toff | ns | | | 16 | 5 |
| Rise/Fall time(20%~80%) | Tr/Tf | ps | - | - | 260 | 6 |
| RIN ₁₅ OMA | | dB/Hz | - | - | -113 | |
| Optical Return Loss Tolerance | | dB | - | - | 15 | |
| Maximum reflectance | | dB | - | - | -12 | $\lambda=1.31\mu\text{m}$ |
| Transmitter dispersion penalty | TDP | dB | - | - | 1.8 | 7 |
| Eye Diagram | Compliant with IEEE Std 802.3ah | | | | | 8 |

Optical receive Characteristics

| | | | | | | |
|------------------------------|-----------------|-----|------|------|------|---------------------------|
| Data Rate | Mbps | - | 1250 | - | | |
| Receiver Sensitivity | S | dBm | - | - | -25 | 9 |
| Overload Input Optical Power | P_{in} | dBm | -3 | - | - | 9 |
| Center Wavelength Range | λ_c | nm | 1480 | 1490 | 1500 | |
| Receiver reflectance | | dB | - | - | -12 | $\lambda=1.49\mu\text{m}$ |
| SD(LVTTL) | Optical Dessert | dBm | -44 | - | - | |
| | Optical Assert | dBm | - | - | -26 | |
| LOS Hysteresis | | dB | 0.5 | - | 6 | |

Note1: DC coupled internally and terminated externally (see the recommended circuit below).

Note2: LVPECL output, AC coupled internally(see the recommended circuit below).

Note3: Coupled into 9/125 SMF

Note4: Measured with PRBS 2⁷-1 test pattern @1.25Gbps.

Note5: see Figure 1.

Note6: Measured with the Bessel-Thompson filter OFF

Note7: Transmit on 20km SMF.

Note8: See Figure 2.

Note9: Measured with PRBS 2⁷-1 test pattern @1.25Gbps with Tx on, ER=10dB,BER=10E-12.

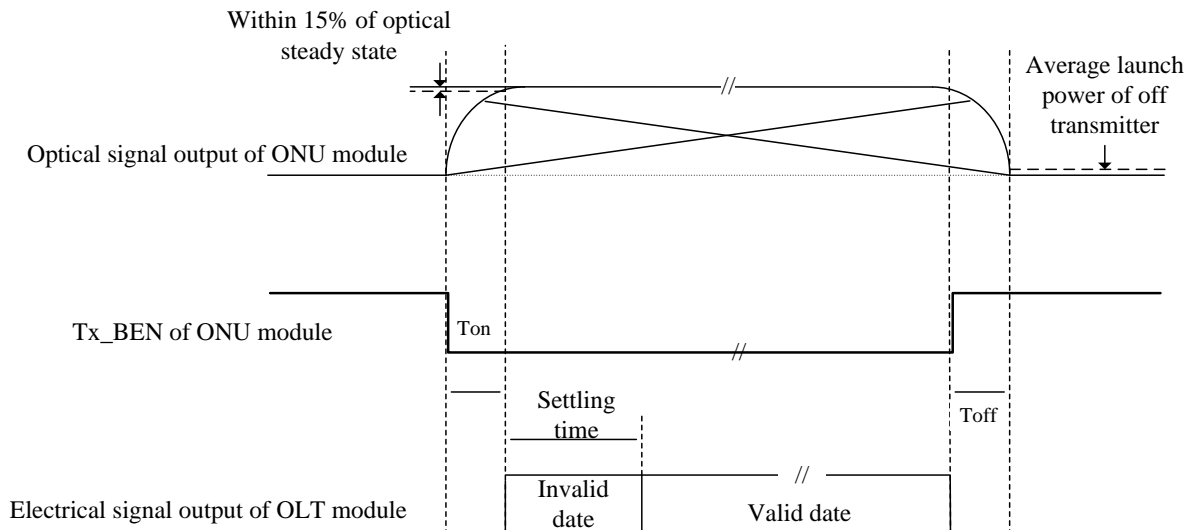
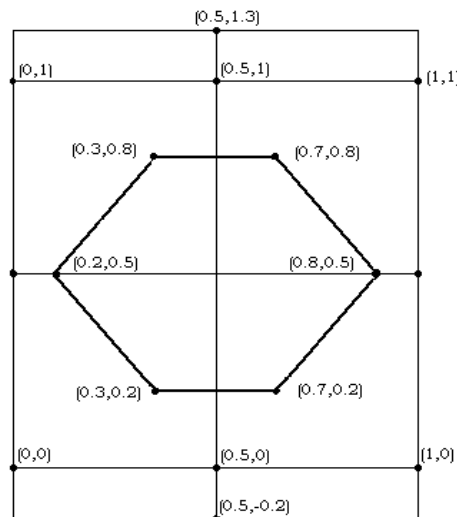


Figure 1 Burst mode Receiver Dynamic range in EPON system



Mask of diagram

Figure 2 Mask of diagram

Pin Description

| Pin | Name | Description | Pin | Name | Description |
|-----|--------------------|-----------------------------------------------|-----|--------------------|-----------------------------------------------------------------|
| 1 | Rx GND | Receiver ground | 6 | Tx V _{CC} | Transmitter power supply |
| 2 | Rx V _{CC} | Receiver power supply | 7 | Tx GND | Transmitter ground |
| 3 | SD | LVTTL Signal detect | 8 | Tx Dis | LVTTL Transmitter burst mode control, "H": Tx OFF |
| 4 | RD- | Receiver data output- (AC coupled internally) | 9 | TD+ | LVPECL Data input+ (DC coupled and external termination needed) |
| 5 | RD+ | Receiver data output+ (AC coupled internally) | 10 | TD- | LVPECL Data input- (DC coupled and external termination needed) |

Block diagram

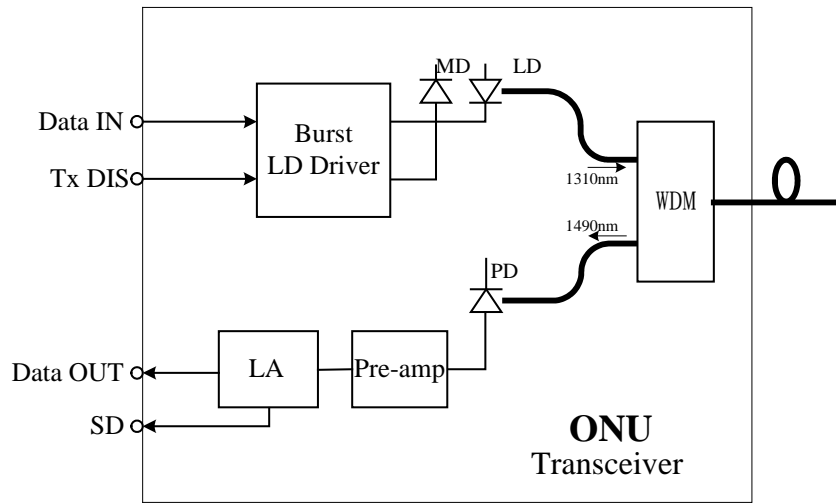
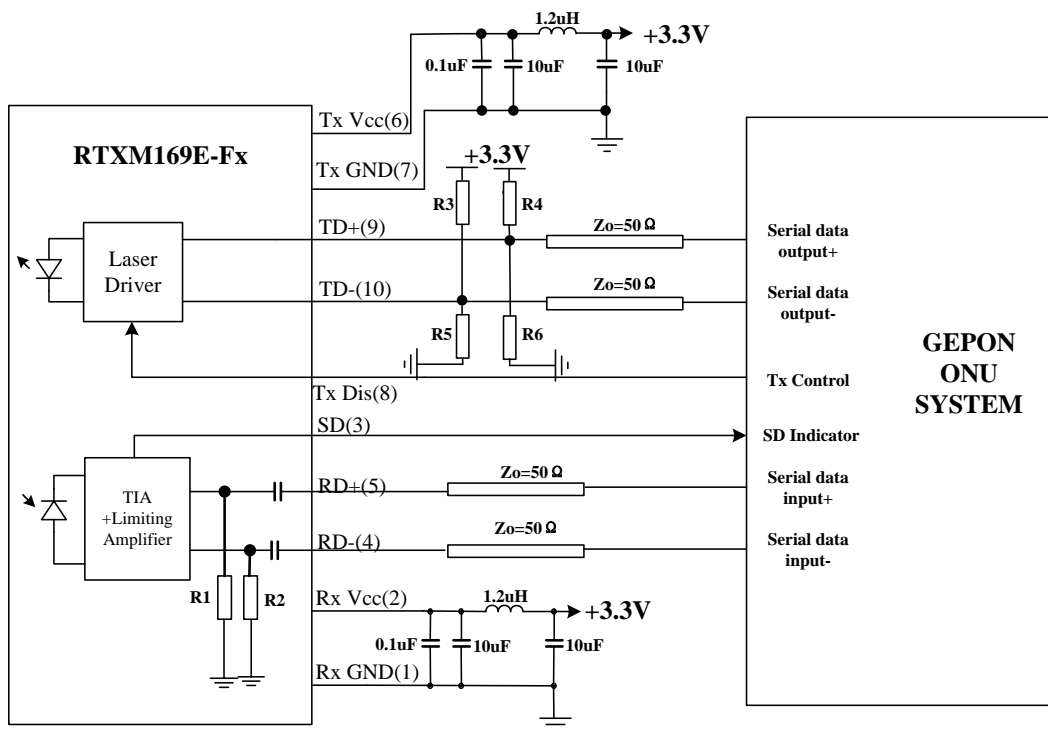


Figure 3 Functional block diagram

Typical application circuit



$$R1=R2=180\ \Omega \quad R3=R4=130\ \Omega \quad R5=R6=82\ \Omega$$

Figure 4 typical application circuits

Package outline

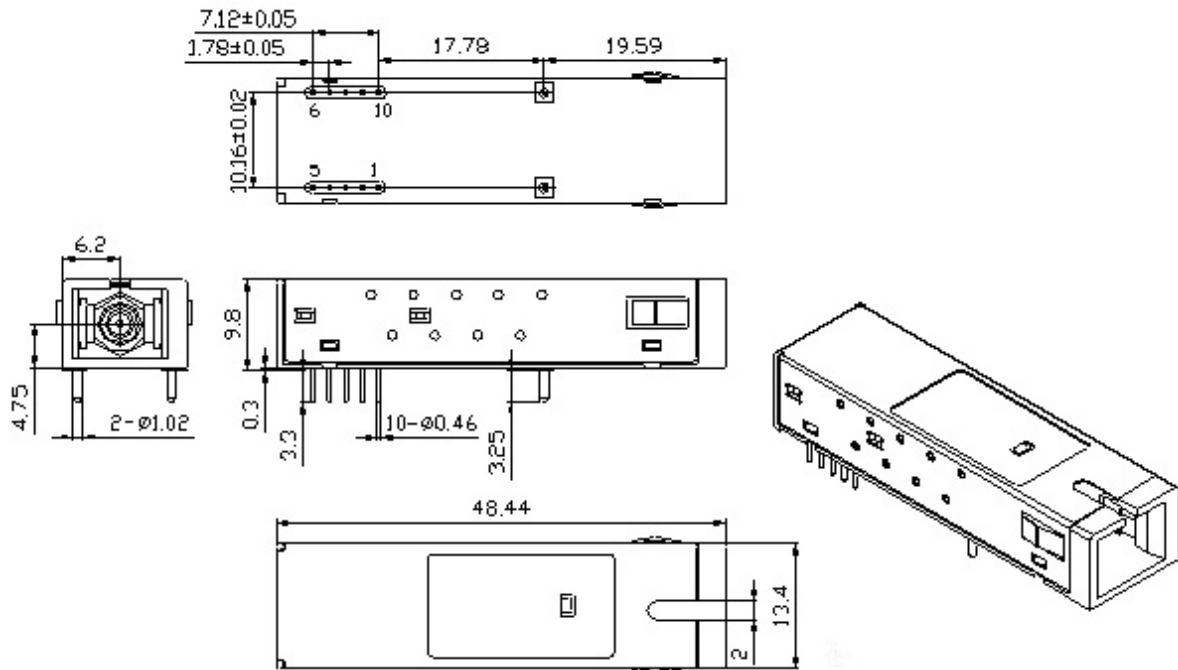


Figure 5 Package outline

Regulatory Compliance

| Feature | Test Method | Performance |
|------------------------------------------------------|--------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------|
| Electrostatic Discharge (ESD) to the Electrical Pins | MIL-STD-883E Method 3015.7 | Class 1 (>1.5kV) – Human Body Model |
| Electrostatic Discharge (ESD) Immunity | IEC61000-4-2 | Class 2(>4.0kV) |
| Electromagnetic Interference (EMI) | CISPR22 Class B EN55022 Class B | ITE Compliant with standards |
| Immunity | IEC61000-4-3 Class 2 EN55024 | Typically show no measurable effect from a 3V/m field swept from 80 to 1000MHz applied to the transceiver without a chassis enclosure. |
| Eye Safety | FDA 21 CFR 1040.10 and 1040.11 UL TUV EN 60825-1 | Compliant with Class 1 laser product |

Ordering information

| Part No. | Specifications | | | | | | | | Application |
|-------------|----------------|----------|--------------|---------------|----------|-------------|--------|--------------|----------------------------------------|
| | Package | Datarate | Laser | Optical Power | Detector | Sensitivity | Temp | Reach others | Code |
| RTXM169-408 | SFF 2x5 | 1.25Gb/s | 1310nmDFB -1 | ~ +4dBm | PIN | < -25dBm | 0~70°C | 20km | Tx DIS ¹ 1000BASE-PX20-U |

Note1: The "LVTTTL transmitter burst mode control" is set as "Tx Disable at high level"

WTD CO., LTD reserves the right to make changes to the product(s) or information contained herein without notice. No liability is assumed as a result of their use or application. No rights under any patent accompany the sale of any such product(s) or information.

Edition 2009-12-01

Published by Wuhan Telecommunication Devices Co.,Ltd.

Copyright © WTD CO.,LTD

All Rights Reserved.