

## **EPON ONU Triplexer Transceiver**

### **RTXM170-501**

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### **Features**

- *Single Fiber Triplexer*
- *1.25Gbps data upstream and downstream /45~1000MHz CATV analog signal downstream*
- *Burst mode transmission with 1310nm FP laser*
- *Continuous mode digital receiver with 1490nm PIN-TIA*
- *Analog CATV receiver with 1550nm InGaAs PIN detector*
- *+3.3V / +12V power supply*
- *LVPECL compatible data input*
- *CML compatible data output*
- *LVPECL transmitter burst-mode control*
- *LVTTL I2C DDM interface*
- *LVTTL TX\_SD/RX\_SD/Video\_SD*
- *Soft Enable/Disable TX and Video*
- *Fully RoHS Compliant*
- *All metal housing for superior EMI performance*
- *Excellent ESD/TVS protection*
- *0°C to 70°C operating ambient temperature*
- *1×20 Pin and 2"×2" Package*
- *3PIN RF output connector*
- *Real time monitoring of:*
  - *Temperature*
  - *Supply voltage*
  - *Laser bias current*
  - *Transmitted optical power*
  - *Received optical power*
  - *Video Received optical power*
  - *RF Output level*

## Applications

- *GEAPON ONU Side*
- *Voice/Data/Video FTTx*

## Standards

- *IEEE Std 802.3 ah<sup>TM</sup> -2004  
1000 BASE-PX20-U*
- *SFF-8472 Rev 9.5*
- *RoHS 6*

## Descriptions

RTXM170-501 GEAPON ONU Triplexer Transceiver is designed for Gigabit Ethernet Passive Optical Network (GEAPON). The Triplexer comprise of a Burst Mode optical transmitter, a Continuous Mode optical receiver and an Analog CATV receiver.

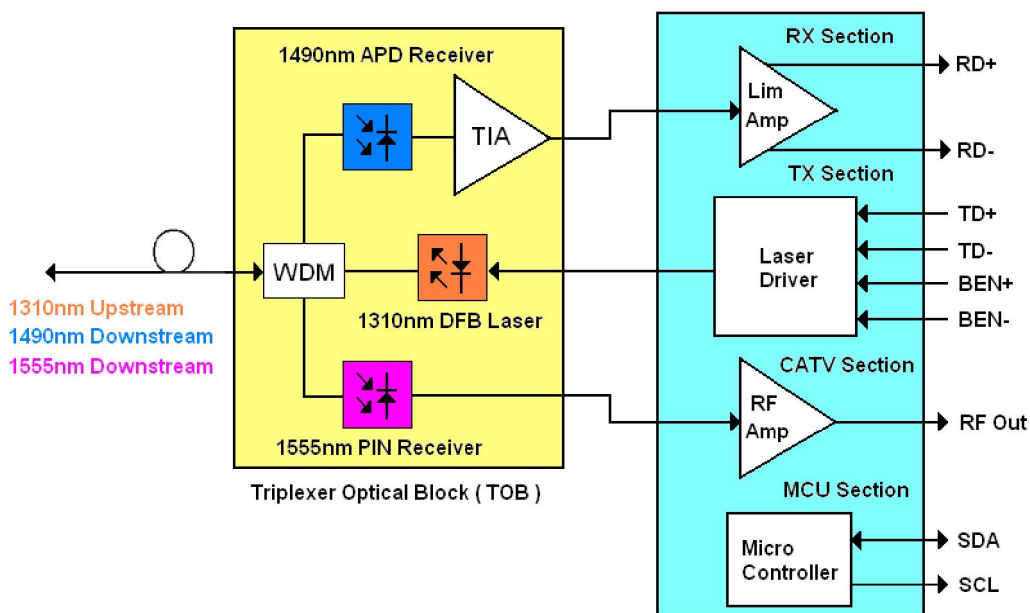
The Digital transmitter uses a 1310nm FP laser diode and an integrated Burst Mode laser driver which designed to perform very small burst enable/disable delay time. The transmitter also incorporates an Automatic Power Control(APC) circuit and an Automatic Temperature Control(ATC) circuit to keep the launch optical power and extinction ratio over an operating temperature of 0~+70°C.

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

The Analog CATV receiver uses a 1550nm PIN photodiode and a high performance RF amplifier. It contains an Automatic Gain Control(AGC) circuit to keep the output effective voltage level over an input optical power range of -6dBm~+2dBm and contains a Spectrum Balance Network(SBN) circuit to keep the output tilt over a wideband of 45MHz~1000MHz.

The Triplexer features a digital diagnostic and control function through a digital serial I2C interface.

## Block diagram



**Figure 1** Transceiver Functional Diagram

**Optical and Electrical Characteristics** ( $T_o = 0\text{ }^{\circ}\text{C to } 70\text{ }^{\circ}\text{C}$ )

Parameter	Symbol	Unit	Min	Typ	Max	Note
<b>Digital Transmitter</b>						
Supply Voltage	$V_{CC\_T}$	V	3.13	3.3	3.47	-
Supply Current	$I_{CC\_T}$	mA	-	-	200	-
Bit Rate	-	Gbps	-	1.25	-	-
Operation Wavelength	$\lambda_p$	nm	1270	1310	1350	-
Spectral Width	$\Delta\lambda$	nm	-	-	3	-
Launch Optical Power	$P_O$	dBm	-1	-	4	1
Off Level Light	$P_{OFF}$	dBm	-	-	-45	-
Extinction ratio	ER	dB	10	-	-	2
Burst turn on Time	$T_{ON}$	ns	-	-	32	3
Burst turn off Time	$T_{OFF}$	ns	-	-	32	3
Rise/Fall time	-	ps	-	-	260	1,4
Input Differential Voltage	-	mv	300	-	1200	5
Input Differential Impedance	$Z_i$	$\Omega$	90	100	110	-
Transmitter Eye Diagram	Compliant with IEEE Std 802.3 <i>ah</i> <sup>TM</sup> -2004					6
<b>Digital Receiver</b>						
Supply Voltage	$V_{CC\_R}$	V	3.13	3.3	3.47	-
Supply Current	$I_{CC\_R}$	mA	-	-	120	-
Bit Rate	-	Gbps	-	1.25	-	-
Operation Wavelength	$\lambda_p$	nm	1480	1490	1500	-
Sensitivity	$P_{Sen}$	dBm	-	-	-26	7
Overload Input Optical Power	$P_{Over}$	dBm	-3	-	-	-
Damage Input Optical Power	$P_{Dam}$	dBm	-	-	+5	-
Signal Detect Assert Level	$P_{as}$	dBm	-	-	-26	8
Signal Detect De-assert Level	$P_{das}$	dBm	-40	-	-	9
Signal Detect Hysteresis	$P_{as} - P_{das}$	dB	0.5	-	6	-
Signal Detect Assert Time	$T_{Sda}$	us	-	-	10	-
Signal Detect De-assert Time	$T_{Sdd}$	us	-	-	10	-
Output Differential Voltage	-	mv	300	-	1200	10
Output Differential Impedance	$Z_O$	$\Omega$	90	100	110	-
<b>Analog Receiver</b>						
Supply Voltage	$V_{DD}$	V	+10.8	+12	+13.2	-
Supply Current	$I_{DD}$	mA	-	130	180	-
Operation Wavelength	$\lambda_p$	nm	1546	1550	1554	-
Frequency Range	$F_{op}$	MHz	45	-	1000	-
Input Optical Power Dynamic Range	$P_{in}$	dBm	-6	-	+2	-
Damage Input Optical Power	$P_{Dam}$	dBm	-	-	+5	-

Optical Return loss	ORL	dB	45	-	-	-
Video Signal Detect Assert Level	P <sub>Vas</sub>	dBm	-13	-12	-11	-
RF output tilt	L <sub>T</sub>	dB	2	5	7	11
RF output level	L <sub>O</sub>	dBmV	18	22	25	12
CNR	CNR	dB	46	-	-	13
C/CSO	CSO	dBc	58	60	-	14
C/CTB	CTB	dBc	58	60	-	14
Output Return Loss	L <sub>O</sub>	dB	14	-	-	15
Output Impedance	Z <sub>O</sub>	Ω	-	75	-	-

**Note 1:** Coupled into 9/125um.

**Note 2:** Measured with PRBS 2<sup>7</sup>-1 test pattern @ 1.25Gbps.

**Note 3:** Refer to Timing Parameter Definition in Burst Mode Sequence, See Figure 4.

**Note 4:** Measured with the Bessel-Thompson filter ON.

**Note 5:** DC coupled internally and terminated internally (see the recommended circuit below).

**Note 6:** See Figure 5.

**Note 7:** Measured with PRBS 2<sup>7</sup>-1 test pattern @ 1.25Gbps with TX on, ER=10dB, BER=10E-12.

**Note 8:** An increase in optical power above the level will cause the Signal Detect output to switch from a low state to a high state, Refer to Timing Parameter Definition of RX ALM Assert/Dessert time, see Figure 6.

**Note 9:** A decrease in optical power below the level will cause the Signal Detect output to switch from a high state to a low state, Refer to Timing Parameter Definition of RX ALM Assert/Dessert time, see Figure 7.

**Note 10:** AC coupled internally (see the recommended circuit below).

**Note 11:** Test from 45MHz to 1000MHz.

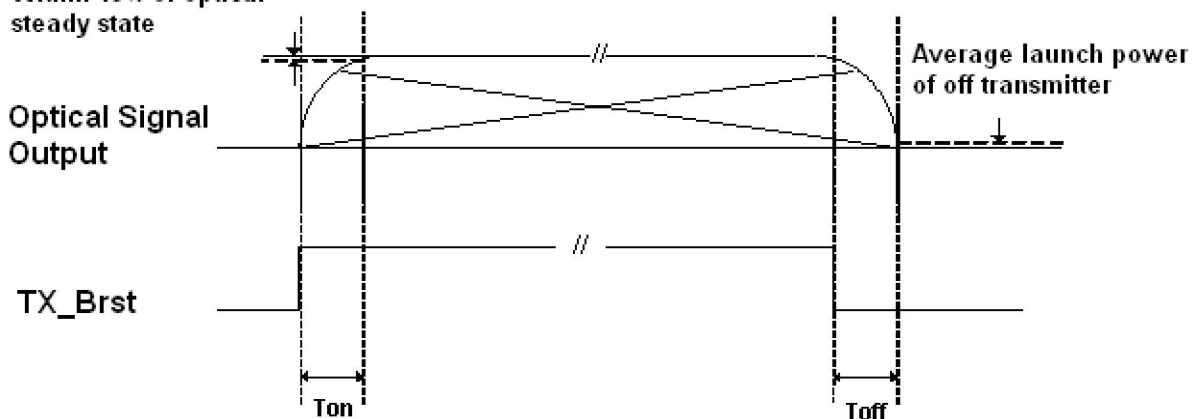
**Note 12:** Test at -6~+2dBm Optical Input Power. The 79 analog(NTSC) channels (OMI4.3%) and 79 digital(64 or 256 QAM) channels (OMI2.15%). The equivalent value of the digital channels' RF level is 6dB lower than the analog channels'.

**Note 13:** Test at -6dBm Optical Input Power, The 79 analog(NTSC) channels (OMI4.3%) and 79 digital(64 or 256 QAM) channels (OMI2.15%). The equivalent value of the digital channels' RF level is 6dB lower than the analog channels'.

**Note 14:** Test at +2dBm Optical Input Power, The 79 analog(NTSC) channels (OMI4.3%) and 79 digital(64 or 256 QAM) channels (OMI2.15%). The equivalent value of the digital channels' RF level is 6dB lower than the analog channels'.

**Note 15:** Test from 45MHz to 1000MHz.

Within 15% of optical steady state



**Figure 4** Timing Parameter Definitions in Burst Mode Sequence

## Regulatory Compliance

Feature	Test Method	Performance
Electrostatic Discharge (ESD) Immunity	IEC61000-4-2	LV4(Air discharge 15kV,Contact discharge 8kV) Performance criterion B
Electromagnetic Interference (EMI)	CISPR22 ITE Class B EN55022 Class B FCC Part15 Class B	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.
Laser Eye Safety	FDA 21 CFR 1040.10 And 1040.11 EN60950 TUV EN60825-1,2	Compliant with Class 1 laser product
RoHS	2002/95/EC 4.1&4.2	Compliant with standards

## Ordering Information

Part No.	Specifications											Application
	Package	Data rate Bandwidth	Laser	Optical Power	Detector Sensitivity	Video Detector	AGC Range	RFcon	Top	Reach	Other	
RTXM170-501	1×20	TX:1.25Gb/S	1310nm	0~	1490nm	1550nm	-6~	3PIN	0~	10Km	DDM	GEPON ONU
	SFF	RX1:1.25 Gb/s										
			RX2:45~1000Mhz									

**Note :** *The length of pigtail is normal 255mm ±20mm (the length of connector is included).*

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