



EPON OLT Optical Transceiver SFF Module

RTXM168-404

Features

- *Integrated Single fiber bi-directional optical subassembly*
- *1310nm Burst-mode APD/TIA receiver and 1490nm Continuous DFB laser Transmitter (with WDM)*
- *2×5 SFF metallic package*
- *+3.3V single power supply*
- *Low power consumption*
- *Resetless burst-mode receiver*
- *Wide dynamic range over 20dB*
- *Settling time less than 400ns*
- *0 to 70°C operating ambient temperature*
- *LVPECL compatible data input/output interface*
- *LVTTL transmitter laser shutdown*
- *LVTTL receiver signal-detected indication*
- *Class 1 Laser eye safety standard*
- *Excellent EMI and EMC characteristics*
- *ESD protection function*
- *RoHS compliant*

Applications

- *Optical transceiver for 20Km Gigabit Ethernet Passive Optical Networks (EPON) OLT side*

Standards

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

Description

The EPON OLT Transceiver module is designed for Gigabit Ethernet Passive Optical Network(EPON)20km transmission. The module incorporates 1490nm continuous-mode transmitter and 1310nm burst-mode receiver.

The transmitter section uses a 1490nm DFB laser and a integrated laser driver which is designed to be class1 eye safe under any single fault. The laser driver includes 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 APD and BM-preamplifier mounted together. The burst-mode receiver is resetless and wide dynamic range over 20dB can be obtained under whole operating conditions. The module has the function that indicates receiver signal-detected status (active high).

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

The metallic package guarantees excellent EMI and EMC characteristics, which totally comply with international relevant standards.

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	–	350
Lead Solder Duration		S	–	10
Fiber Yield Strength		k_gf	–	0.5
Fiber Bend Radius		mm	30	–

Recommended Operating Conditions

Parameter	Symbol	Unit	Min	Typ	Max
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Operating Voltage	V_{cc}	V	3.135	3.3	3.465
Operating Temperature Range	T_{op}	°C	0	–	70
Operating Data Rate		Gbps	–	$1.25 \pm 100\text{ppm}$	–

Specifications ($0^{\circ}\text{C} < T_{op} < 70^{\circ}\text{C}$ and $3.13\text{V} < V_{cc} < 3.47\text{V}$)

Parameter	Symbol	Unit	Min	Typ	Max	Test condition
Electrical Characteristics						
Operating Voltage	V_{op}	V	3.135	3.3	3.465	
Supply Current	I_{cc}	mA	200	–	350	
LVPECL Single Ended Data Input Swing		mV	100	–	1200	Note7
LVPECL Single Ended Data Output Swing		mV	640	–	880	Note10
Differential Data input impedance		Ω	–	100	–	Note7
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	1480	1490	1500	DFB-LD
Spectral Width(@-20dB)	$\Delta\lambda$	nm	–	–	1	
Side Mode Suppression Ratio	SMSR	dB	30	–	–	
Launch Optical Power	P_o	dBm	+2	–	+7	Note1
Off level light		dBm		–	-39	Note2
Extinction Ratio	EX	dB	9.0	–	–	Note3
Total Jitter	J_{total}		–	–	0.44UI	
Rise/Fall time(20~80%)	T_r/T_f	ps	–	–	350	Note4
RIN ₁₅ OMA		dB/Hz	–	–	-115	
Optical Return Loss Tolerance		dB	–	–	15	
Maximum reflectance		dB	–	–	-12	$\lambda=1.49\mu\text{m}$
Eye Diagram	Compliant with IEEE Std 802.3ah					Note3 Note5
Optical receive Characteristics						
Data Rate		Mbps	–	1250	–	
Receiver Sensitivity	S	dBm	–	–	-30	Note6
Overload Input Optical Power	P_{in}	dBm	-6	–	–	Note6
Center Wavelength Range	λ_c	nm	1260	1310	1360	
Receiver Settling Time	$T_{settling}$	ns	–	–	400	Note8
Receiver Dynamic range		dB	20	–	–	Note9
Receiver reflectance		dB	–	–	-12	$\lambda=1.31\mu\text{m}$
SD(LVTTL)	Optical Dessert	dBm	-45	–	–	
	Optical Assert		–	–	-31	
LOS Hysteresis		dB	0.5	–	6	

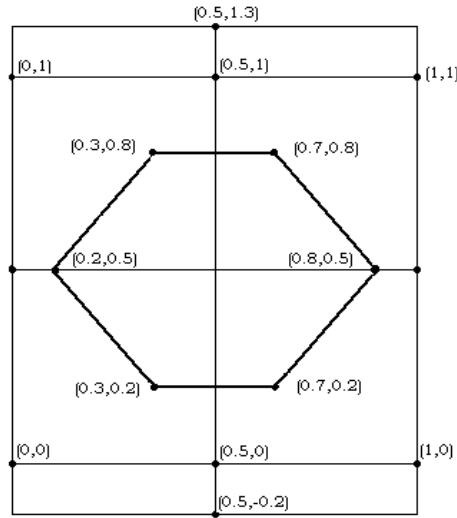
Note1: Coupled into 9/125 SMF

Note2: Measured without data input

Note3: Measured with PRBS 2^7-1 test pattern @1.25Gbps.

Note4: Measured with the Bessel-Thompson filter ON.

Note5: Mask of diagram



Mask of diagram

Note6: Measured with PRBS 2^7-1 test pattern @1.25Gbps with Tx on, ER=10dB, BER $\leq 10E-12$.

Note7: AC coupled internal(see the recommended circuit below).

Note8: Define $T_{settlng}$ as the time from the Tx_BEN assertion, minus the Ton time, to the time the electrical signal the Reciever output reaches within 15% of its steady state conditions. It is shown in the Figure 1.

Note9: See Figure 2.

Note10: LVPECL output,DC coupled internal (see the recommended circuit below).

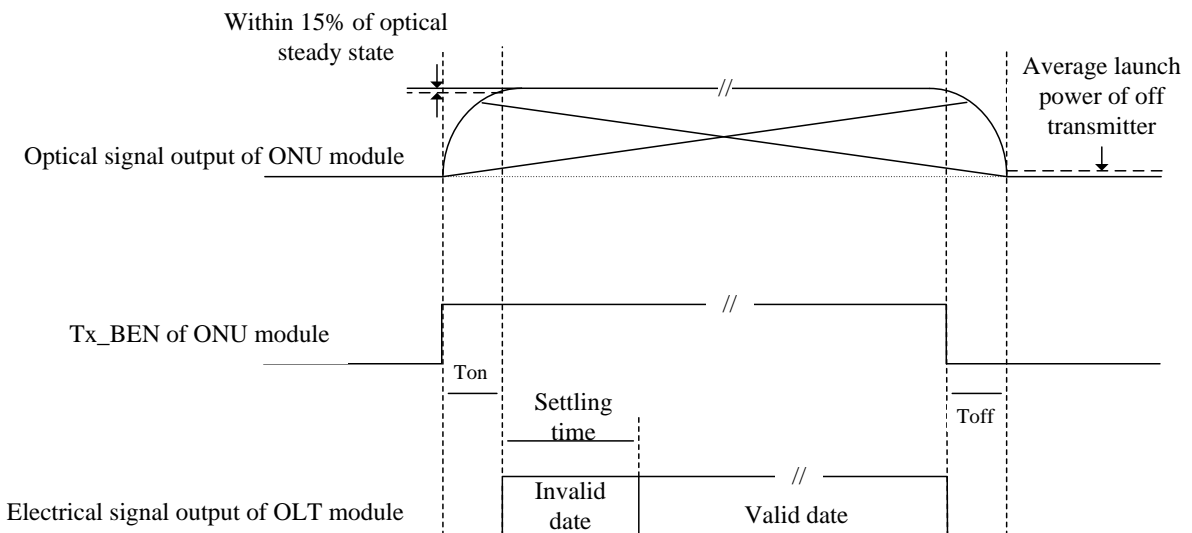


Figure1 Time parameter definition in EPON system

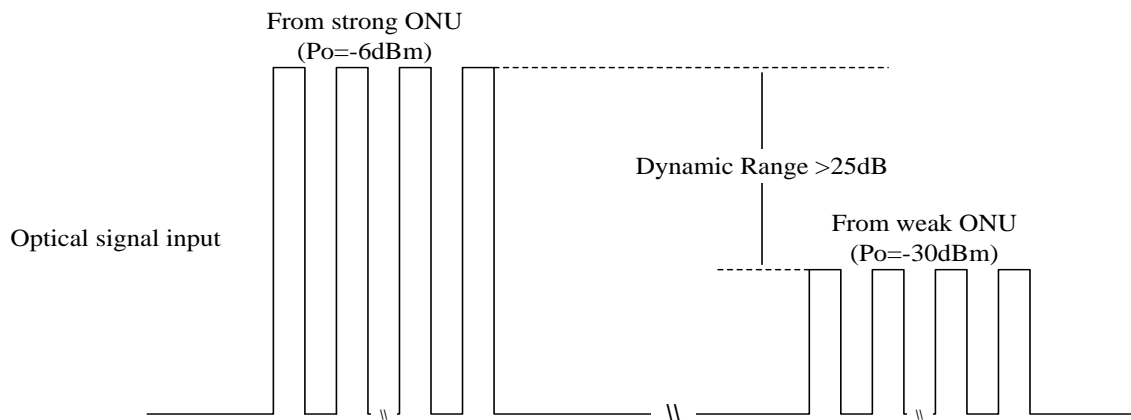
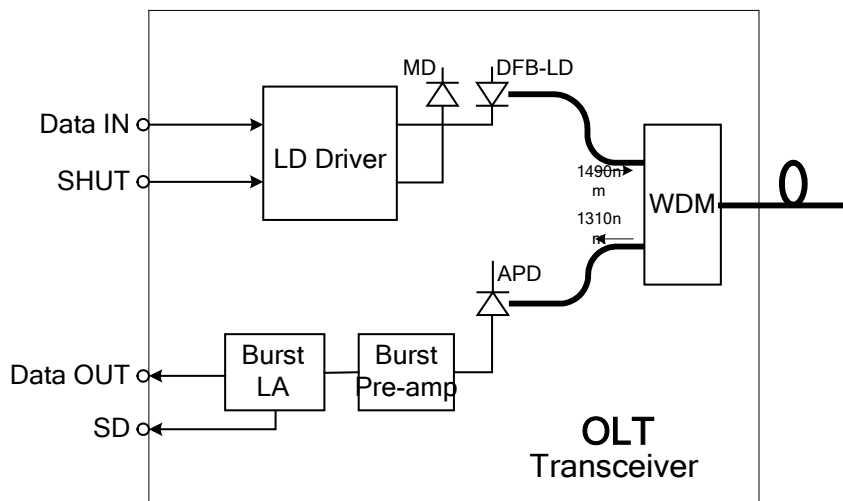


Figure2 Burst_mode Receiver Dynamic range in EPON system

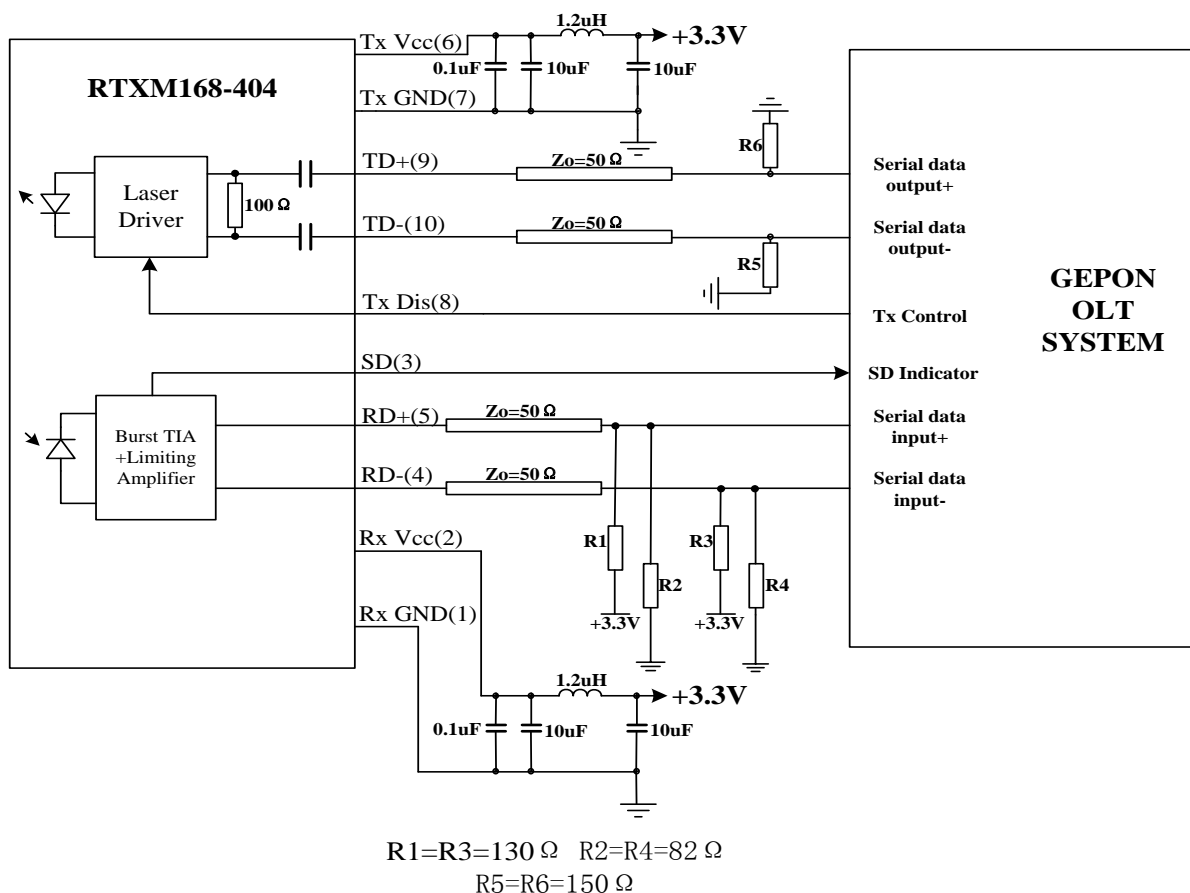
Pin Description

Pin Name	Description	Pin Name	Description
1 Rx GND	Receiver ground	6 Tx VCC	Transmitter power supply
2 Rx VCC	Receiver power supply	7 Tx GND	Transmitter ground
3 SD	LVTTTL Signal detect, H active	8 Tx SHUT	LVTTTL Transmitter shutdown, H-active
4 RD ₋	Receiver data output ₋ (DC coupled external termination needed)	9 TD ₊	LVPECL Data input ₊ (AC coupled Internal termination differential 100Ω)
5 RD ₊	Receiver data output ₊ (DC coupled external termination needed)	10 TD ₋	LVPECL Data input ₋ (AC coupled Internal termination differential 100Ω)

Block diagram

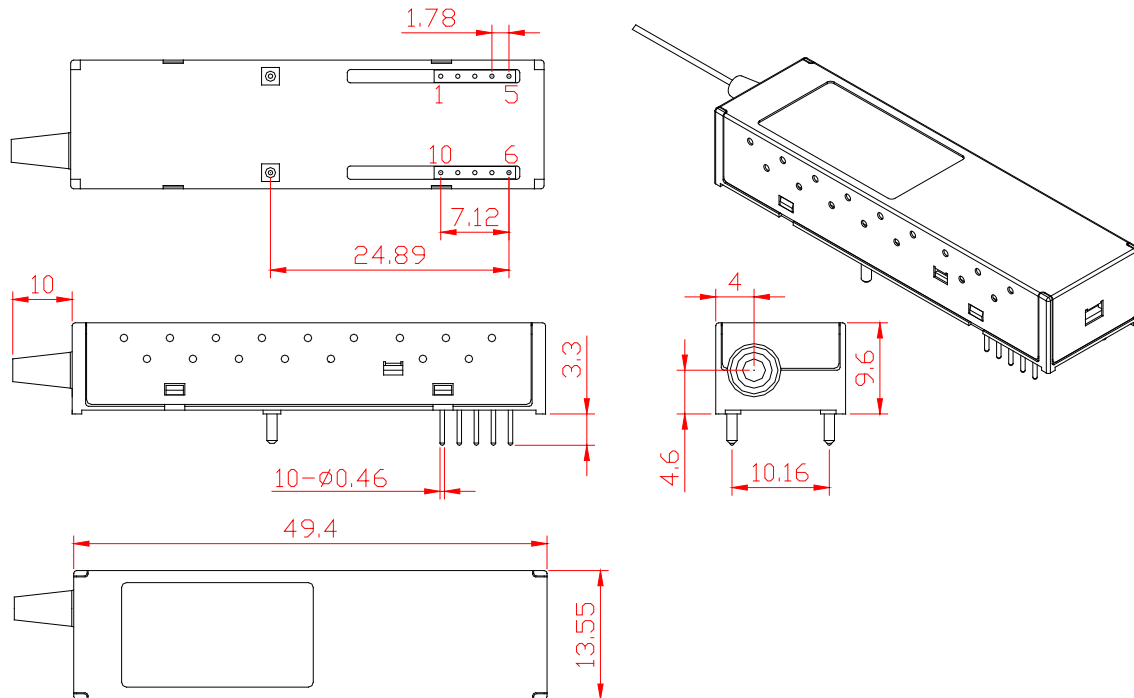


Typical application circuit



Package outline

Units in mm



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 ITE Class B EN55022 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.
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	
	Pack	Rate	Tx	Pout	Rx	S	Top	Reach	others		
RTXM 168-404	SFF 2×5	1.25G	1490nm	DFB	+2~+7 dBm	APD	< -30dBm	0~70°C	20KM	Tx DIS RoHS	GEPON OLT

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