
XGSPON ONU SFP+ Transceiver TSP-9220-25DCS

FEATURES

- ◆ Single fiber bi-directional data links with Symmetric 9.95328Gbps upstream and downstream
- ◆ 0 to 70°C Operating Case Temperature for TSP-9220-25DCS
- ◆ -40 to 85°C Operating Case Temperature for TSP-9220-25DIS
- ◆ SFP+ Package with SC Receptacle
- ◆ Hot-pluggable capability
- ◆ Single +3.3V Power Supply
- ◆ 9.95328Gbps / 1270nm Burst-Mode Transmitter with DFB Laser
- ◆ 9.95328Gbps / 1577nm High Sensitivity Continuous-Mode APD-TIA Receiver
- ◆ LVTTTL burst enable control, active low
- ◆ LVTTTL TX_SD, TX_Fault, RX_LOS
- ◆ LVTTTL Sleep Mode for Power Consumption
- ◆ Digital diagnostic monitor interface compatible with SFF-8472
- ◆ Class 1 Laser eye safety standard IEC-60825 compliant
- ◆ Low EMI and excellent ESD protection
- ◆ RoHS-6 compliance

APPLICATIONS

- ◆ XGSPON

STANDARDS

- ◆ Complies with SFP+ MSA (SFF-8431)
- ◆ Compliant with SFF-8472 MSA
- ◆ Complies with ITU-TG.987.2
- ◆ Complies with ITU-TG.9807.1
- ◆ Complies with FCC 47 CFR Part 15, Class B
- ◆ Complies with 21 CFR 1040.10 and 1040.11 except for deviations pursuant to Laser Notice No. 50, dated June 24, 2007

ABSOLUTE MAXIMUM RATINGS

Parameter	Symbol	Min	Max	Units	Notes
Storage Temperature	T_{stg}	-40	+85	°C	Exceeding the Absolute Maximum Ratings may cause irreversible damage to the device. The device is not intended to be operated under the condition of simultaneous Absolute Maximum Ratings, a condition which may cause irreversible damage to the device.
Operating Case Temperature(Commercial)	T_{case}	0	+70	°C	
Operating Case Temperature(Industrial)	T_{case}	-40	+85	°C	
DC Supply Voltage	V_{CC}	0	4	V	
Relative Humidity - Operating	RH_o	5	90	%	

RECOMMENDED OPERATING CONDITION

Parameter	Symbol	Min	Typical	Max	Units	Notes
Operating Case Temperature(Commercial)	T_{case}	0		+70	°C	
Operating Case Temperature(Industrial)	T_{case}	-40		+85	°C	
Power Supply Voltage	V_{CC}	3.14	3.3	3.46	V	
Power Supply Current	I_{CC}			450	mA	
Data Rate	@Tx		9.95328		Gbps	
	@Rx		9.95328			

TRANSMITTER ELECTRICAL CHARACTERISTICS

Parameter	Symbol	Min	Typical	Max	Units	Notes
Tx_Data Differential Input Voltage	$V_{IH}-V_{IL}$	100		1000	mV	AC coupled
InputDifferential Impedance	R_{in}	90	100	110	Ω	
Transmitter burst control Voltage - Low	V_{IL}	0		0.8	V	LVTTTL
Transmitter burst control Voltage - High	V_{IH}	2.0		V_{CC}	V	
TX_SD indicate voltage - Low	V_{OL}	0		0.4	V	
TX_SD indicate voltage - High	V_{OH}	2.4		V_{CC}	V	
TX_Fault indicate voltage - Low	V_{OL}	0		0.4	V	
TX_Fault indicate voltage - High	V_{OH}	2.4		V_{CC}	V	
P_Downcontrol Voltage - Low	V_{IL}	0		0.8	V	
P_Downcontrol Voltage - High	V_{IH}	2.0		V_{CC}	V	

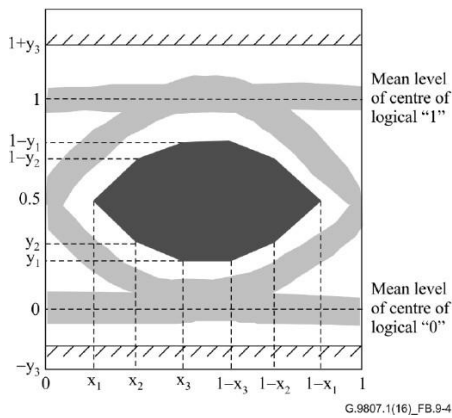
RECEIVER ELECTRICAL CHARACTERISTICS

Parameter	Symbol	Min	Typical	Max	Units	Notes
Rx_Data Differential Output Voltage	$V_{OH}-V_{OL}$	600		900	mV	CML, AC coupled
Output Differential Impedance	R_{out}		100		Ω	
RX_LOS indicate voltage - Low	V_{OL}	0		0.4	V	LVTTTL
RX_LOS indicate voltage - High	V_{OH}	2.4		V_{CC}	V	

Upstream Burst Mode Transmitter Optical Specification

Parameter	Symbol	Min	Typ	Max	Unit	Notes
Transmitter Type		1270			nm	DFB Laser
Upstream Signaling Speed	Stx		9.95328		Gbps	
Centre Wavelength	λ_c	1260	-	1280	nm	
Side Mode Suppression Ration	SMSR	30			dB	
-20dB Spectral Width				1	nm	
Average Output Power	Pout_e	4		9	dBm	
Optical Output with TX OFF	Pout			-45	dBm	
Extinction Ratio	ER	6			dB	
Transmitter Turn ON / Turn OFF Time	Ton /Toff		256	512	bits	
Optical Rise and Fall Time	t_r/t_f			38	ps	20% to 80%
Total Jitter	TJ			0.35	UI	
Transmitter and Dispersion Penalty	TDP			1.5	dB	.
Transmitter tolerance to reflected optical power		-15			dB	
Eye Diagram(PRBS 2 ³¹ -1 @2.488Gbps)		ITU-T G.9807 Compliant				Note1

Note1: Eye pattern mask



	9.95328 Gbit/s
x1	0.25
x2	0.4
x3	0.45
y1	0.25
y2	0.28
y3	0.4
Max hit ratio	5×10^{-5}

NOTE – The values are taken from clause 7.2.2.14 of [ITU-T G.959.1], "NRZ 10G Ratio small.". The "Hit ratio" is the acceptable ratio of samples inside to outside the hatched area.

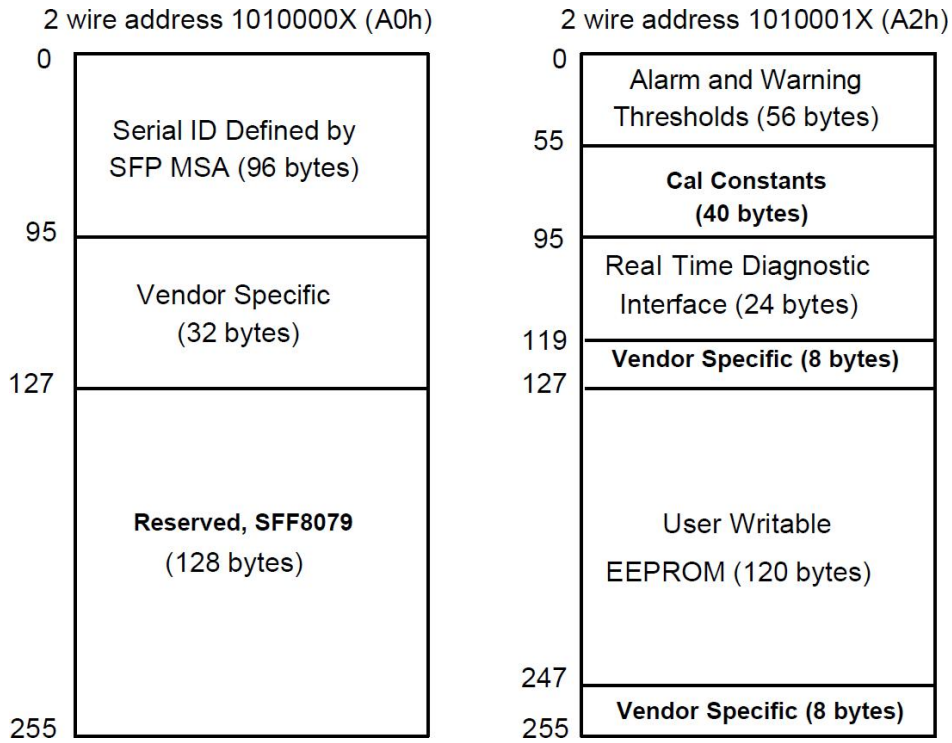
Downstream CW Mode Receiver Optical Specifications

Parameter	Symbol	Min	Typ	Max	Unit	Notes
Receiver Type		1577			nm	APD CW Mode
Downstream Signaling Speed	Stx		9.95328		Gbps	
Wavelength	λ_c	1575		1580	nm	
Sensitivity BOL	SEN			-28.5	dBm	Note1
Sensitivity				-28	dBm	Note 2
Saturation Optical Power	SAT	-9			dBm	
LOSDe-assert Level	LOS _D			-29	dBm	
LOS Assert Level	LOS _A	-39			dBm	
LOS Hysteresis		0.5		5	dB	

WDM filter isolation	35			dB	1560nm
	35			dB	1600nm

Note1, Measured with a PRBS 2³¹ -1 test pattern @9.95328Gbps and ER=8.2dB, BER is less than 10⁻³. Test at BOL and room temperature. Note2, Measured with a PRBS 2³¹ -1 test pattern @9.95328Gbps and ER=8.2dB, BER is less than 10⁻³. Test at EOL or high low temperature.

EEPROM INFORMATION



DIGITAL DIAGNOSTIC MONITORING INTERFACE

Parameter	Range	Accuracy	Calibration
Temperature	Commercial:0 to 70°C	±3°C	Internal
	Industrial:-45 to 90°C		
Voltage	3.0 to 3.6V	±5%	Internal
Bias Current	1 to 100mA	±10%	Internal
TX Power	3 to 9dBm	±2dB	Internal
RX Power monitor	-30to -7dBm	±3dB	Internal

Pin Function Definitions			
Pin	Symbol	Description	Note
1	VeeT	Transmitter Ground	Note1
2	TX_Fault	Transmitter FaultIndication	Note2
3	TX_Burst	Burst Enable, active low	Note3
4	SDA	Module Definition 2	Note4
5	SCL	Module Definition 1	Note4
6	MOD_ABS	Module Definition 0	Note4
7	TX_SD	TX signal detector	Note5
8	RX_LOS	RX Loss of Signal	Note6
9	P_Down	Power down	Note7
10	VeeR	Receiver Ground	Note1
11	VeeR	Receiver Ground	Note1
12	RD-	Inverting Receiver data output	Note8
13	RD+	Non-inverting Receiver data output	Note8
14	VeeR	Receiver Ground	Note1
15	VccR	Receiver Power	Note9
16	VccT	Transmitter Power	Note9
17	VeeT	Transmitter Ground	Note1
18	TD+	Non-inverting Transmitter data input	Note10
19	TD-	Inverting Transmitter data input	Note10
20	VeeT	Transmitter Ground	Note1

Note1: VeeR and VeeT may be internally connected within the SFP+ module.

Note2: TX Fault is an open collector/drain output, which should be pulled up with a 4.7K~10KΩ resistor on the host board. Pull up voltage between 2.0V and VccT, R+0.3V. When high, output indicates a laser fault of some kind. Low indicates normal operation. In the low state, the output will be pulled to <0.8V.

Note3:TX_Burst is an input that is used to open the transmitter burst optical output. It is pulled up with in the module with a 4.7~10 KΩ resistor.

It's states are:

Low (0~0.8V): Default Transmitter burst on (>0.8, <

2.0V): Undefined

High (2.0~3.3V): Default Transmitter burst off

Note4:SDA/SCL is the 2 wire serial interface, which should be pulled up with a 4.7K~10KΩ resistor on the host board. MOD_ABS is GND internal, which should be pulled up with a 4.7K~10KΩ resistor on the host board, high indicates module is absence.

Note5:TX_SD is the indicator of TX signal. High indicates laser on, low indicates laser off.

Note6:RX_LOS (Loss of Signal) is an open collector/drain output, which should be pulled up with a4.7K~10KΩ resistor. Assert high when the input optical power below the threshold.

Note7:Internalpulled up with a 4.7K~10KΩ resistor internal. P_Down is a controller PIN for saving power consumption. If not use this feature, main board connection should be NC.

Low (0~0.8V): TX power saving is on and transmitter will be set to sleep mode. (>0.8, <

2.0V): Undefined

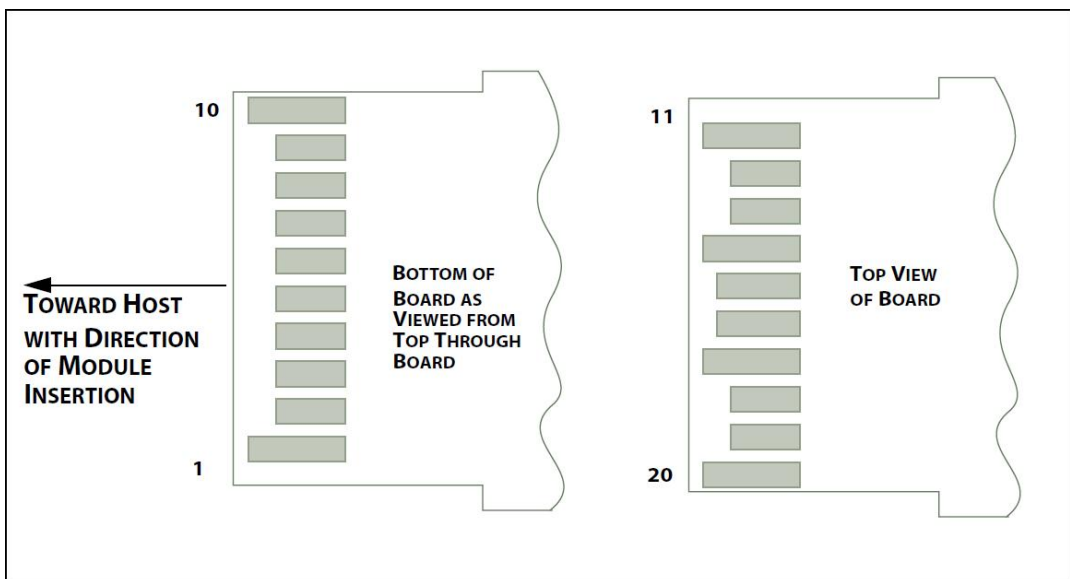
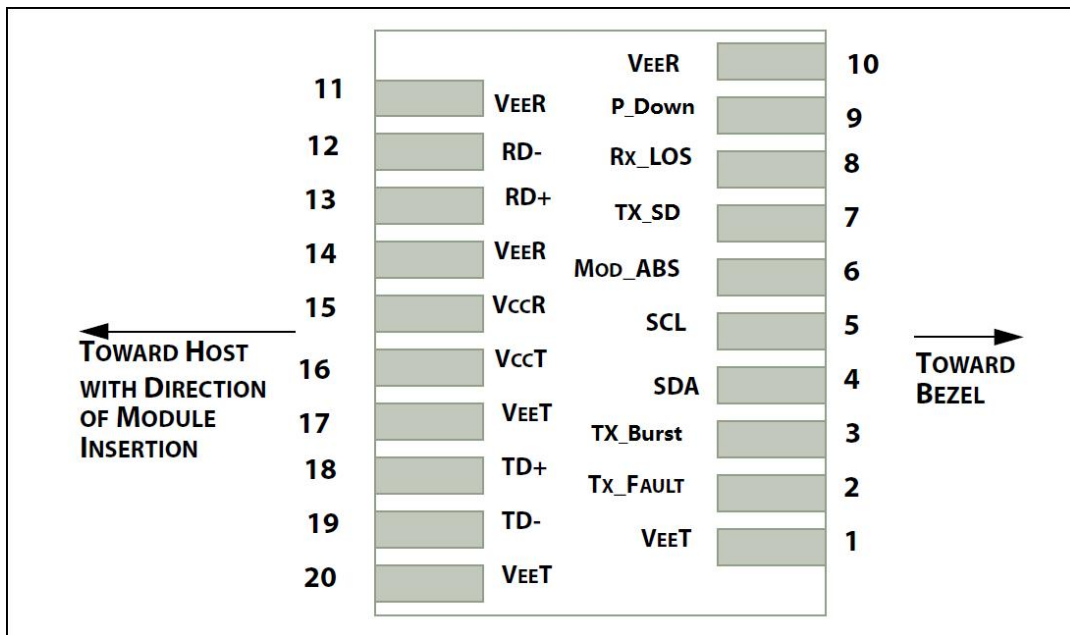
High (2.0~3.3V) or NC: TX power saving off

Note8: AC coupled internal.

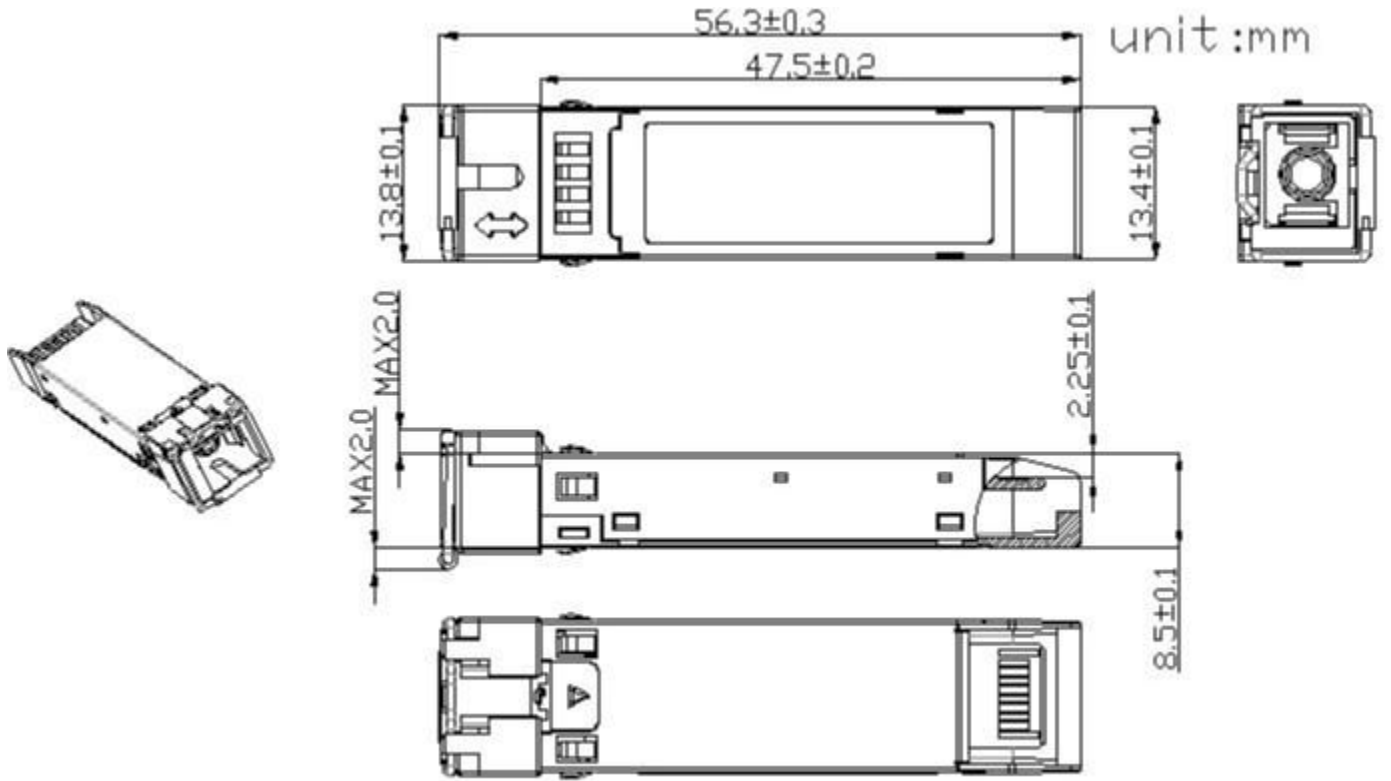
Note9: VccR and VccT are the receiver and transmitter power supplies. They are defined as 3.3V ±5% at the SFP+ connector pin. Maximum supply current is 600mA. Recommended host board power supply filtering is shown below. Inductors with DC resistance of less than 1 ohm should be used in order to maintain the required voltage at the SFP+ input pin with 3.3V supply voltage. When the recommended supply-filtering network is used, hot plugging of the SFP+ transceiver module will result in an inrush current of no more than 30mA greater than the steady state value. VccR and VccT may be internally connected within the SFP+ transceiver module.

Note10: AC coupled internal.

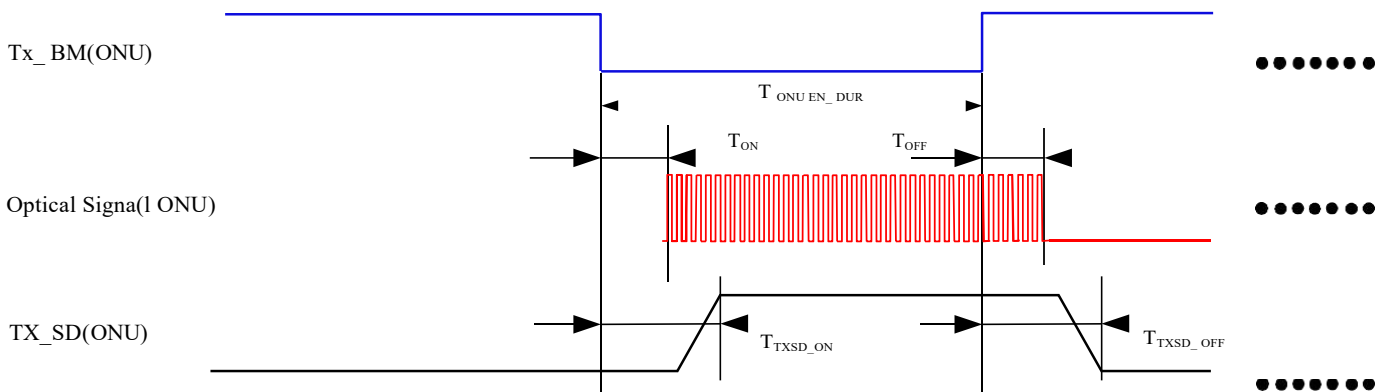
PIN OUT DRAWING



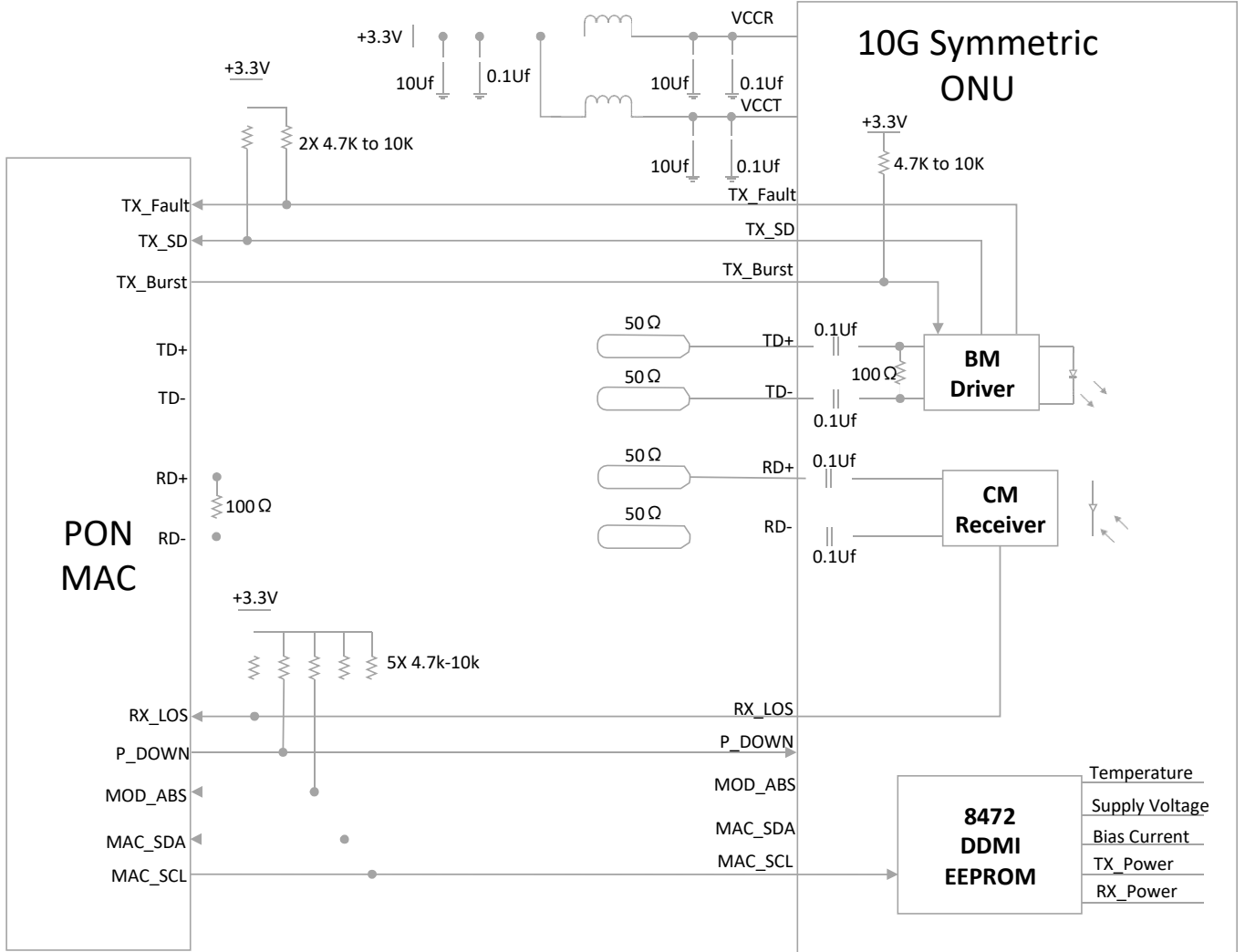
Specifications Mechanical (Unit:mm)



TYPICAL ONU TIMING SEQUENCE



Recommend Circuit Schematic



Order Information

Part Number	Product Description
TSP-9220-25DCS	1270nm9.95328Gb/s(TX)/1577nm9.95328Gb/s(RX), XGSPON ONU, active low, SFP Plus SC/UPC receptacle connector,0~70°C
TSP-9220-25DIS	1270nm9.95328Gb/s(TX)/1577nm9.95328Gb/s(RX), XGSPON ONU, active low, SFP Plus SC/UPC receptacle connector,-40~85°C

Eye Safety

This single-mode transceiver is a Class 1 laser product. It complies with IEC-60825 and FDA 21 CFR 1040.10 and 1040.11. The transceiver must be operated within the specified temperature and voltage limits. The optical ports of the module shall be terminated with an optical connector or with a dust plug.

Obtaining Document

You can visit our website: <http://www.trixontech.com>

Or contact Trixon Inc. listed at the end of the documentation to get the latest document.

Notice

Trixon reserves the right to make changes to or discontinue any optical link product or service identified in this publication, without notice, in order to improve design and/or performance.

Applications that are described herein for any of the optical link products are for illustrative purposes only. Trixon makes no representation or warranty that such applications will be suitable for the specified use without further testing or modification.

Add: # 202, Section A, Building 1 No.209, Sanshe Road, Jinjiang District Industry Park Chengdu

610063. SichuanP.R. CHINA

Tel: (+86) 028-85925400/Fax: (+86) 028-85925445

E-mail: info@trixontech.com

<http://www.trixontech.com>

© Copyright Trixon 2014all rights reserved.