

## SFPP-XGS-OLT-N2C+-AO

MSA and TAA Compliant 1G/10GBase-N2/C+ SFP+ OLT Transceiver (SMF, 1577nmTx/1270nmRx and 1490nmTx/1310nmRx, 20km, SC, DOM)

### Features

- Hot Pluggable SFP+
- 3.3V DC Power Supply
- 4 Lambda
- SC receptacle optical connector
- 2x10 SFP+ Electrical Interface
- ITU-T G.9807.1 Class N1/N2 compliant
- ITU-T G.987.2 Class N1/N2a compliant
- ITU-T G.984.2 Class B+/C+ compliant
- Optical Transmitter:
  - 1577nm CW Mode EML
  - 9.95328Gb/s data rate
  - LVCML AC Coupled input
  - 1490nm CW Mode DFB Laser
  - 2.48832Gb/s data rate
  - LVPECL AC Coupled input
- Optical Receiver:
  - 1270nm Burst Mode APD/TIA receiver
  - 9.95328 or 2.48832Gb/s data rate
  - LVCML DC Coupled output
  - 1310nm Burst Mode APD/TIA receiver
  - 1.24416Gb/s data rate
  - LVPECL DC Coupled output
- I<sup>2</sup>C Serial Data
  - SCL Serial Clock Input
  - SDA Serial Data I/O
- Operating Temperature: 0°C to 70°C
- RoHS compliant and Lead Free



### Applications:

- 10 Gigabits Access networks
- FTTH
- FTTB
- FTTC

### Product Description:

This MSA compliant SFP+ OLT transceiver provides 1G/10GBase-N2/C+ throughput up to 20km over single-mode fiber (SMF) using a wavelength of 1577nmTx/1270nmRx and 1490nmTx/1310nmRx via a SC connector. It is built to MSA standards and is uniquely serialized and data-traffic and application tested to ensure that they will integrate into your network seamlessly. Digital optical monitoring (DOM) support is also present to allow access to real-time operating parameters. This transceiver is Trade Agreements Act (TAA) compliant. We stand behind the quality of our products and proudly offer a limited lifetime warranty.

AddOn's transceivers are RoHS compliant and lead-free.

TAA refers to the Trade Agreements Act (19 U.S.C. & 2501-2581), which is intended to foster fair and open international trade. TAA requires that the U.S. Government may acquire only "U.S. – made or designated country end products."



## Regulatory Compliance

- ESD to the Electrical PINs: compatible with MIL-STD-883E Method 3015.4
- ESD to the LC Receptacle: compatible with IEC 61000-4-3
- EMI/EMC compatible with FCC Part 15 Subpart B Rules, EN55022:2010
- Laser Eye Safety compatible with FDA 21CFR, EN60950-1& EN (IEC) 60825-1,2
- RoHS compliant with EU RoHS 2.0 directive 2015/863/EU

## Absolute Maximum Ratings

Parameter	Symbol	Min.	Max.	Unit
Maximum Supply Voltage	VCC3	0	3.6	V
Storage Ambient Temperature	T <sub>stg</sub>	-40	+85	°C
Operating Case Temperature	T <sub>c</sub>	0	+70	°C
Relative Humidity Storage	RH <sub>s</sub>	5	90	%
Relative Humidity Operating	RH <sub>o</sub>	5	85	%

### Note:

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.

## Absolute Maximum Ratings: Control Function Logic Levels

Parameter	Symbol	Min.	Max.	Unit	Notes
Tx_DISABLE	Tx_Dis	0	V <sub>CC3</sub> +0.5	V	LVTTTL
Burst Mode SIGNAL Detect	Rx_SD	0	V <sub>CC3</sub> +0.5	V	LVTTTL
Rx_Reset	Rx_Reset	0	V <sub>CC3</sub> +0.5	V	1
Digital Rx_RSSI_Trigger Input	TRI	0	V <sub>CC3</sub> +0.5	V	1
I <sup>2</sup> C Serial Data	SDA	0	V <sub>CC3</sub> +0.5	V	2
I <sup>2</sup> C Serial Clock	SCL	0	V <sub>CC3</sub> +0.5	V	1

### Notes:

1. Signal Ended LVTTTL input
2. Single Ended LVTTTL I/O

## Electrical Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Notes
Power Supply Voltage	V <sub>CC3</sub>	3.135	3.30	3.465	V	
Power Supply Current	I <sub>CC3</sub>		750		mA	
Power Consumption	P			3.5	W	
<b>Transmitter</b>						
Tx Differential Input Impedance	Z <sub>IN</sub>	90	100	110	Ω	
10Gb/s Tx Differential Input Amplitude	V <sub>IN10</sub>	120		800	mV	
2.5Gb/s Tx Differential Input Amplitude	V <sub>IN1</sub>	120		800	mV	
Tx_Dis = HIGH (Transmitter OFF / DISABLED)	V <sub>TDH</sub>	0.7*V <sub>CC3</sub>		V <sub>CC3</sub>	V	1
Tx_Dis = LOW (Transmitter ON / ENABLED)	V <sub>TDL</sub>	0		0.8	V	1
<b>Receiver</b>						
Rx Differential Output Impedance	Z <sub>OUT</sub>	90	100	110	Ω	
10Gb/s Rx_Data Differential Output Voltage Amplitude	V <sub>OUT10</sub>	300		850	mV	LVCML
10Gb/s Output HIGH Voltage	V <sub>OH10</sub>	V <sub>CC3</sub> -20	V <sub>CC3</sub> -5	V <sub>CC3</sub>	mV	LVCML
10Gb/s Output LOW Voltage	V <sub>OL10</sub>	V <sub>CC3</sub> -400	V <sub>CC3</sub> -350	V <sub>CC3</sub> -300	mV	LVCML
1.25Gb/s Rx_Data Differential Output Voltage Amplitude	V <sub>OUT1</sub>	600		1600	mV	LVPECL
1.25Gb/s Output HIGH Voltage	V <sub>OH1</sub>	V <sub>CC3</sub> -1085	V <sub>CC3</sub> -955	V <sub>CC3</sub> -880	mV	LVPECL
1.25Gb/s Output LOW Voltage	V <sub>OL1</sub>	V <sub>CC3</sub> -1850	V <sub>CC3</sub> -1705	V <sub>CC3</sub> -1555	mV	LVPECL
Rx_SD = HIGH (Receiver ON)	V <sub>OH</sub>	2.0		V <sub>CC3</sub>	V	2
Rx_SD = LOW (Receiver OFF)	V <sub>OL</sub>	0		0.8	V	2
Ratesel/Reset=HIGH	V <sub>IH</sub>	1.9		V <sub>CC3</sub>	V	3
Ratesel/Reset=Middle	V <sub>IM</sub>	1.2		1.6	V	3
Ratesel/Reset=LOW	V <sub>IL</sub>	0		0.9	V	3
TRI=HIGH	V <sub>IH</sub>	0.7*V <sub>CC3</sub>		V <sub>CC3</sub>	V	1
TRI=LOW	V <sub>IL</sub>	0		0.8	V	1

### Notes:

1. LVTTTL (Control INPUT)
2. LVTTTL (Monitor OUTPUT)
3. Tri-level (Control INPUT)

### 9.95328Gb/s Transmitter Optical Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Notes
Laser Type		1577nm CW EML				
Downstream Signal Rate		9.95328			Gb/s	
Average Launch Power	P <sub>OUT10</sub>	4		7	dBm	
Optical Center Wavelength	$\lambda_{10}$	1575		1580	nm	
Spectral Width	$\Delta\lambda_{10}$			1.0	nm	
Side Mode Suppression Ratio	SMSR <sub>10</sub>	30			dB	
Extinction Ratio	ER <sub>10</sub>	8.2			dB	
Output Eye Diagram	Compliant with ITU-T G.987.2 & ITU-T G.9807.1					

### 2.48832Gb/s Transmitter Optical Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Notes
Laser Type		1490nm CW DFB Laser				
Downstream Signal Rate		2.48832			Gb/s	
Average Launch Power	P <sub>OUT2</sub>	3		7	dBm	
Optical Rise and Fall Time	T <sub>r</sub> / T <sub>f</sub>			200	ps	20% to 80%
Optical Center Wavelength	$\lambda_1$	1480	1490	1500	nm	
Spectral Width	$\Delta\lambda_1$			1.0	nm	
Side Mode Suppression Ratio	SMSR <sub>1</sub>	30			dB	
Extinction Ratio	ER <sub>1</sub>	8.2			dB	
Output Eye Diagram	Compliant with ITU-T G.984.2					

### 9.95328/2.48832Gb/s Receiver Optical Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Notes
Receiver Type		1270nm APD/TIA Receiver				
Upstream Signal Rate		9.95328/2.48832			Gb/s	
Optical Center Wavelength	$\lambda$	1260	1270	1280	nm	
XGS-PON Receiver Sensitivity	$P_{IN}$			-28	dBm	1
XG-PON Receiver Sensitivity	$P_{IN}$			-29.5	dBm	2
XGS-PON Receiver Optical Overload	$P_{IN(SAT)}$	-7			dBm	3
XG-PON Receiver Optical Overload	$P_{IN(SAT)}$	-9			dBm	3
Damaged Input Optical Power	$P_d$			-5	dBm	
Rx_SD Assert	$P_A$	-45		-29.5	dBm	
Rx_SD De Assert	$P_D$	-45		-29.5	dBm	
Rx_SD Hysteresis	PHy	0		7	dBm	

#### Notes:

1. BER@ $10^{-3}$  \*: Test Condition: PRBS:  $2^{31}-1$ , ER=8.2 dB
2. BER@ $10^{-4}$  \*: Test Condition: PRBS:  $2^{23}-1$ , ER=8.2 dB
3. Test Condition: BER@ $10^{-10}$ , PRBS  $2^{23}-1$ , ER=10dB

### 1.24416Gb/s Receiver Optical Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Notes
Receiver Type		1310nm Burst APD/TIA Receiver				
Upstream Signal Rate		1.24416			Gb/s	
Optical Center Wavelength	$\lambda$	1290	1310	1330	nm	
Receiver Sensitivity	$P_{IN}$			-30	dBm	1
Receiver Optical Overload	$P_{IN(SAT)}$	-7			dBm	
Damaged Input Optical Power	$P_d$			-5	dBm	
Receiver Settling Time	Trx			51.2	ns	
Rx_SD Assert	$P_A$	-45		-30	dBm	
Rx_SD De Assert	$P_D$	-45		-30	dBm	
Rx_SD Hysteresis	PHY	0		7	dB	

#### Notes:

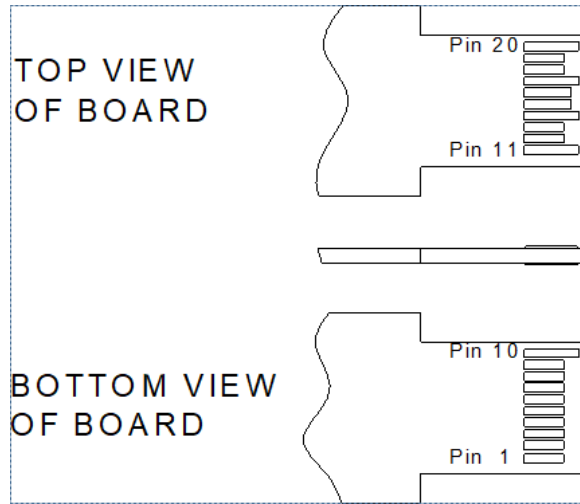
1. Test Condition: BER@ $10^{-10}$ , PRBS  $2^{23}-1$ , ER=10dB

## Pin Descriptions

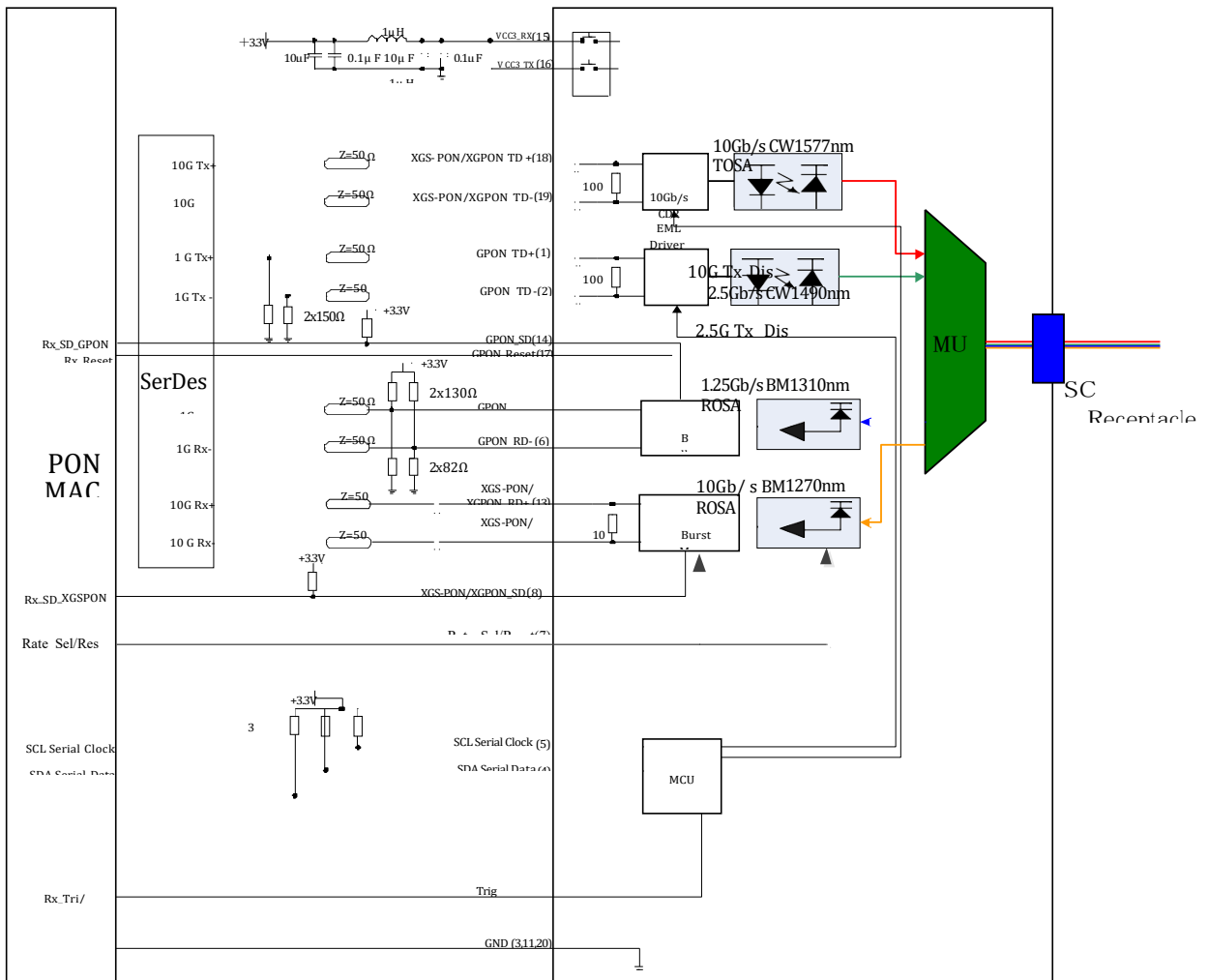
Pin	Symbol	Name/Descriptions	Ref.
1	GPON_TD+	Transmit Non-Inverted 2.48832Gb/s Data Input; AC coupled inside the module.	
2	GPON_TD-	Transmit Inverted 2.48832Gb/s Data Input; AC coupled inside the module.	
3	GND	Module Ground.	
4	SDA	2-Wire Serial Interface Data Line, with the pull-up resistance: 4.7kΩ~10kΩ.	
5	SCL	2-Wire Serial Interface Clock, with the pull-up resistance: 4.7kΩ~10kΩ.	
6	GPON_RD-	Receive Burst Mode Inverted 1.2488Gb/s Data Output; DC coupled inside the module.	1
7	Ratesel/Reset	Three-level input combining “Rate Select” and “Reset” information. Set high level to reset TIA/LA. Middle level indicates 2.5G data rate. Low level indicates 10G data rate.	
8	XGS-PON_SD	Receiver Signal Detect Indicator for XGS-PON/XGPON Receiver, when Low, indicates insufficient optical input power to the module; when High, means in normal.	
9	Trig/Txdis	Two signals multiplex, which selected by the register. Receiver signal strength indication trigger for Digital RSSI. As TXdisable, when Low level, the transceiver port work in normal; when High level, both 10Gb/s and 2.5Gb/s are disabled.	
10	GPON_RD+	Receive Burst Mode Non-Inverted 1.2488Gb/s Data Output; DC coupled inside the module.	1
11	GND	Module Ground.	
12	XGS-PON_RD-	Receive Burst Mode Inverted 9.953 or 2.48832Gb/s Data Output. DC coupled inside the module.	
13	XGS-PON_RD+	Receive Burst Mode Non-Inverted 9.953 or 2.48832Gb/s Data Output. DC coupled inside the module.	
14	GPON_SD	Receiver Signal Detect Indicator for G-PON Receiver. When Low, indicates insufficient optical input power to the module. When High, means in normal.	
15	VCC3_RX	+3.3V power supply for RX. Tolerance: 3.3V±5%.	
16	VCC3_TX	+3.3V power supply for TX. Tolerance: 3.3V±5%.	
17	GPON_Reset	Burst Mode Receiver Reset for GPON Receiver. When HIGH, indicates the receiver is OFF/being reset.	
18	XGS-PON_TD+	Transmit Non-Inverted 9.95328Gb/s Data Input; AC coupled inside the module.	
19	XGS-PON/_TD-	Transmit Inverted 9.95328Gb/s Data Input; AC coupled inside the module.	
20	GND	Module Ground.	

### Notes:

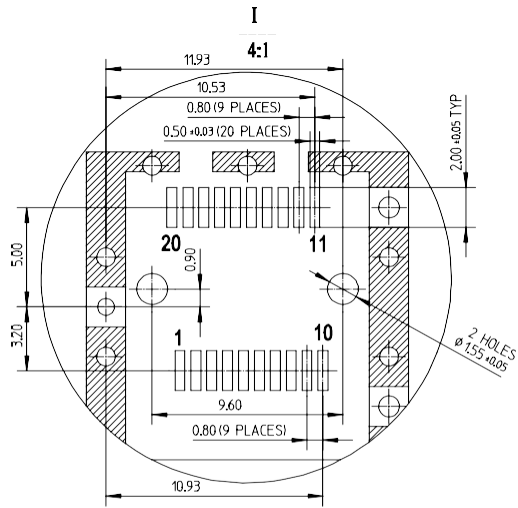
1. When GPON\_RD+/- set as LVPECL, and the module without the pull-down resistances. The differential signal amplitude must be satisfied with the Electrical Characteristics.



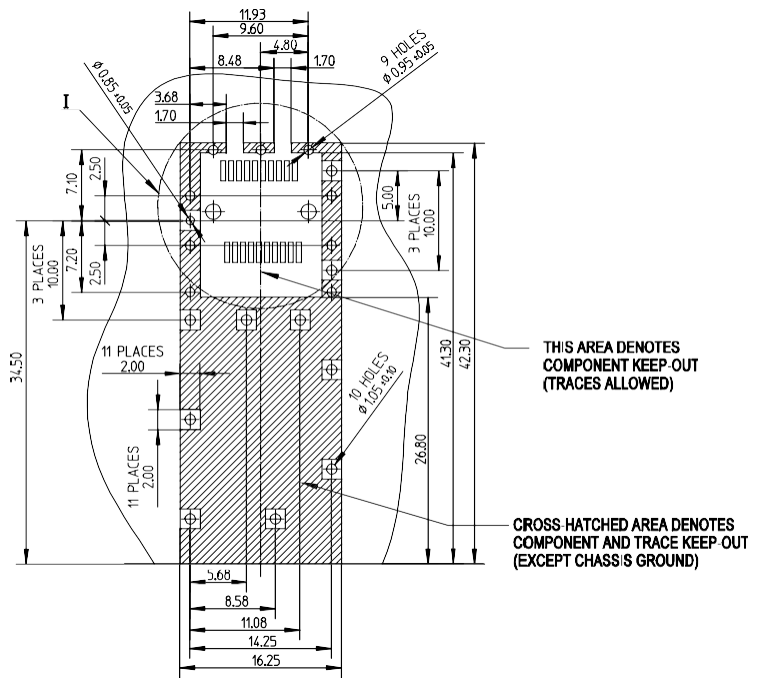
**Electrical Interface**



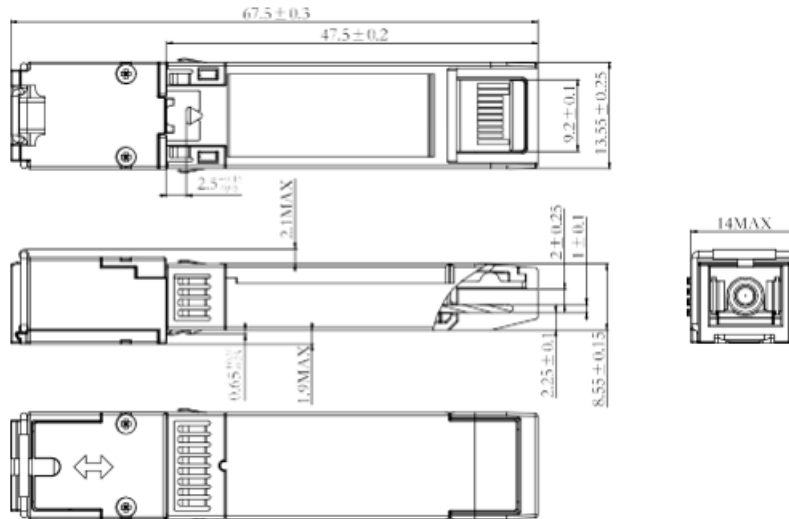
## SFP+ Connector Dimensions



- Notes:**
1. Datum and basic dimensions established by customer
  2. Pads and vias are chassis ground, 11 places
  3. Thru holes, plating optional



## Mechanical Specifications

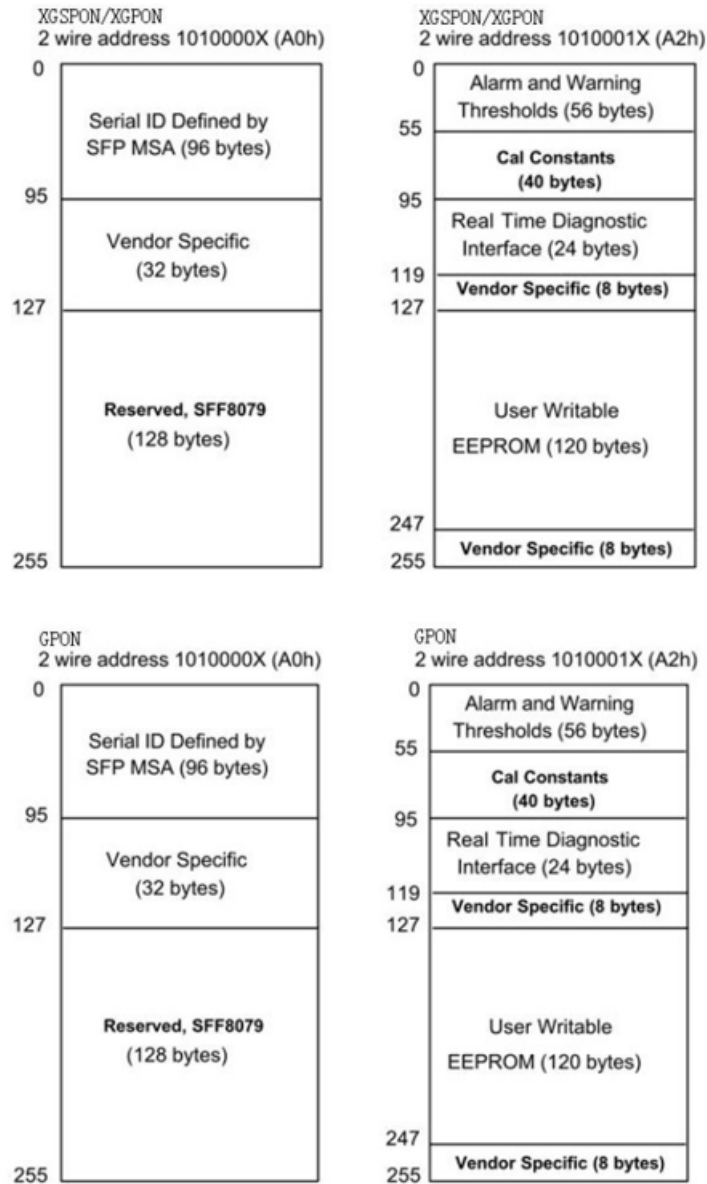


- NOTES:**
1. TOLERANCE: ± 0.1MM;
  2. OTHERS ACCORDING WITH SFP-8074/SFP-8452 OR CUSTOMER SPEC;
  3. LIGHT PORT ACCORDING WITH FIBER CONNECTOR SPEC.



## EEPROM Information

EEPROM memory map specific data field description is as below:



## Contact Information

Founded in 1999, AddOn Networks is North America's leading provider of transceivers and high speed cabling. With a reputation for high quality products as well as an extensive custom design portfolio, AddOn has the connectivity solution regardless of the requirement.

At AddOn, 100% of the products we ship every day are tested in the specific application for which they are intended—never batch or spec tested only. We run bandwidth, distance and IOS network tests. We have documented an impressive 0.03% failure rate over the last 10 years. To continue this rate of success we invest millions annually in our own on-site testing lab.

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