

## **FEATURES**

- Single fiber bi-directional data links TX 9.953Gbps/ Burst Mode RX 2.488Gbps application
- 0 to 70°C operating case temperature
- 3.3V power supply
- SFP+ package with SC/UPC Receptacle connector
- Hot-pluggable capability
- High power 1577nm EML DFB LD
- High sensitivity 1270nm APD
- Support 20km transmission distance with SMF
- Low EMI and excellent ESD protection
- Digital diagnostic monitor interface
- RoHS6 compliance

## **APPLICATIONS**

- XG-PON OLT SFP+ N2a

## **STANDARDS**

- Complies with SFF-8431
- Complies with SFF-8432
- Complies with SFF-8472
- Complies with ITU-T G.987.2
- Complies with FCC 47 CFR Part 15, Class B
- Complies with FDA 21 CFR 1040.10 and 1040.11 except for deviations pursuant to Laser Notice No. 50, dated June 24, 2007

**ABSOLUTE MAXIMUM RATING**

Parameter	Symbol	Min.	Max.	Unit	Notes
Storage Ambient Temperature	T <sub>STG</sub>	-40	85	°C	
Operating Case Temperature	T <sub>C</sub>	0	70	°C	
Operating Humidity	OH	5	85	%	
VCC3 Power Supply Voltage	VCC	0	3.6	V	

**RECOMMENDED OPERATING CONDITION**

Parameter	Symbol	Min.	Typ.	Max.	Unit	Notes
Operating Case Temperature	T <sub>C</sub>	0		+70	°C	
VCC3 Power Supply Voltage	V <sub>CC</sub>	3.13	3.3	3.47	V	
VCC3 Power Supply Current	I <sub>CC</sub>		600	700	mA	
Power Dissipation				2.5	W	
Date Rate			9.953/2.488		Gbps	
Date Rate Drift		-100		+100	PPM	

**TRANSMITTER OPTICAL CHARACTERISTICS**

Parameter	Symbol	Min.	Typ.	Max.	Unit	Notes	
Optical Center Wavelength	$\lambda_c$	1575		1580	nm		
Optical Spectrum Width (-20dB)	$\Delta\lambda$	-	-	1	nm		
Side Mode Suppression Ratio	SMSR	30			dB		
Average Launch Optical Power (BOL)	AOP	+4.5		+6.5	dBm	Launched into SMF @ Room Temperature	
Average Launch Optical Power (EOL)	AOP	+4		+8	dBm	Launched into SMF @ 0~70°C	
Power-OFF Transmitter Optical Power				-39	dBm	Launched into SMF	
Extinction Ratio	ER	8.2			dB	PRBS2 <sup>31</sup> -1	
Transmitter Reflectance				-10	dB		
Transmitter tolerance to reflected optical power		-15			dB		
Transmitter and Dispersion Penalty	TDP			1	dB	Transmit on 20km SMF	
Optical Waveform Diagram		Compliant with ITU-T 987.2					Figure 1, Mask Margin>5%

**TRANSMITTER ELECTRICAL CHARACTERISTICS**

Parameter	Symbol	Min.	Typ.	Max.	Unit	Notes
Data Input Differential Swing		120		820	mV	CML input, ACcoupled
Input Differential Impedance		80	100	120	$\Omega$	
Transmitter Disable Voltage - Low		0		0.8	V	Transmitter On
Transmitter Disable Voltage - High		2.0		$V_{CC}$	V	Transmitter Off
Transmitter Fault Voltage - Low		0		0.4	V	Transmitter On
Transmitter Fault Voltage - High		2.4		$V_{CC}$	V	Transmitter Fault

**TRANSMITTER EYE MASK DEFINITIONS AND TEST PROCEDURE**

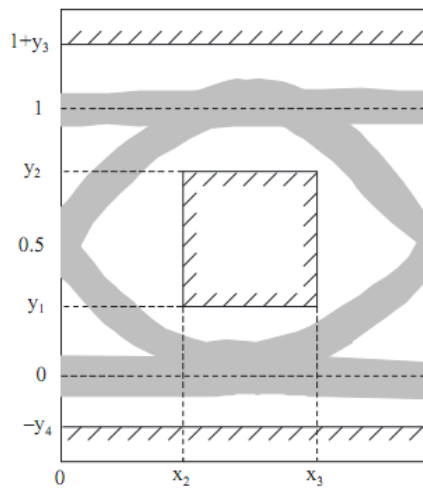


Figure 1 XGPON Transmitter Eye Mask Definitions

X3-X2	Y1	Y2	Y3	Y4	Unit
0.2	0.25	0.75	0.25	0.25	UI

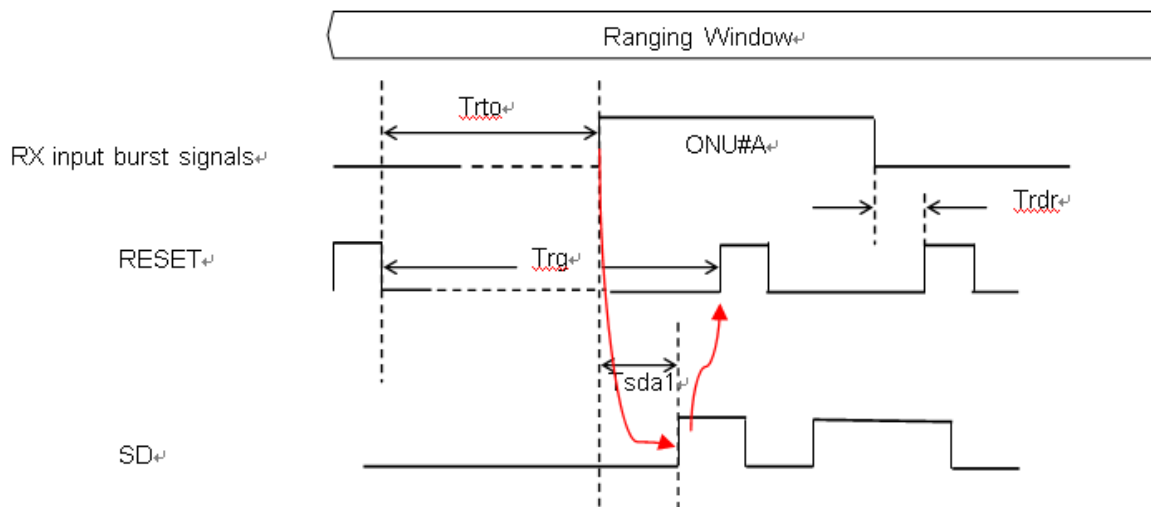
**RECEIVER OPTICAL CHARACTERISTICS**

Parameter	Symbol	Min.	Typ.	Max.	Unit	Notes
Operating Wavelength		1260		1280	nm	
Sensitivity	SEN(BOL)			-30.0	dBm	PRBS 2 <sup>23</sup> -1@2.488Gbps BER ≤1×10 <sup>-4</sup>
	SEN(EOL)			-29.5	dBm	PRBS 2 <sup>23</sup> -1@2.488Gbps BER ≤1×10 <sup>-4</sup>
Saturation Optical Power	SAT	-9			dBm	PRBS 2 <sup>23</sup> -1@2.488Gbps BER ≤1×10 <sup>-10</sup>
Burst Dynamic Range		15			dB	
Signal Detect Assert	SDA			-30.5	dBm	
Signal Detect De-assert	SDD	-45			dBm	
Signal Detect Hysteresis		0.5		7.5	dB	

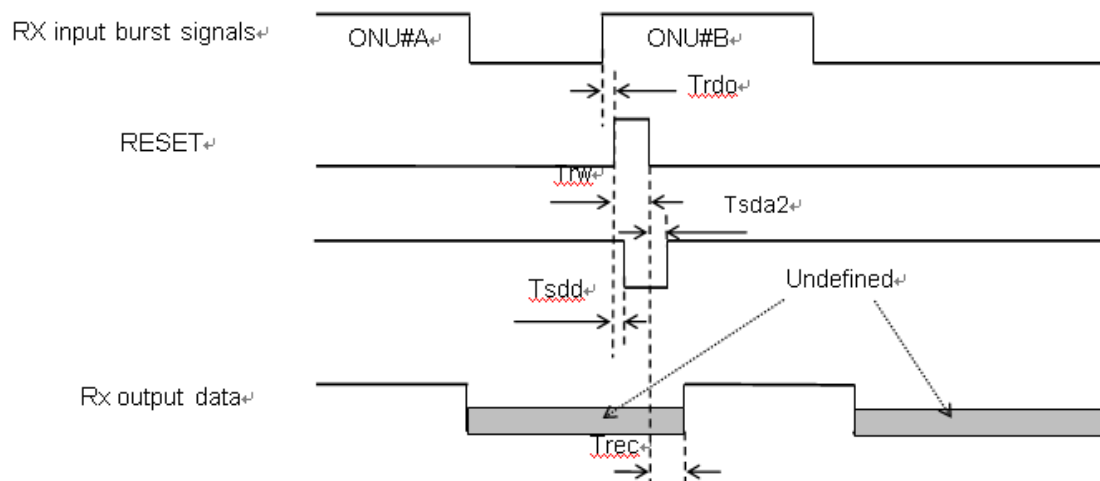
Receiver Reflectance				-20	dB	
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RECEIVER ELECTRICAL CHARACTERISTICS						
Parameter	Symbol	Min.	Typ.	Max.	Unit.	Notes
Data Output Differential Swing		340		850	mV	CML output, AC coupled
Reset width	Trw	25.6			ns	Figure 2
Signal Detect Assert Time	Tsda1			50	ns	Figure 2
Signal Detect Assert Time	Tsda2			50	ns	Figure 2
Signal Detect De-assert Time	Tsdd			12.8	ns	Figure 2
Data recovery time	Trec			25.6	ns	Figure 2
Reset To ONU Optical Time	Trto	0	-	250	us	Figure 2
Reset Guard Time	Trg	0	-	250	us	Figure 2
Reset-Low		0		0.8	V	
Reset-High		2.0		Vcc	V	
Signal Detect Voltage-Low		0		0.6	V	
Signal Detect Voltage-High		2.4		Vcc	V	
RSSI Trigger-Low		0		0.8	V	
RSSI Trigger-High		2.0		Vcc	V	
Upstream Signal Width	T <sub>ONT</sub>	550			ns	Figure 4
RSSI Trigger Delay	T <sub>D</sub>	25			ns	Figure 4
RSSI Trigger Width	T <sub>W</sub>	500			ns	Figure 4
PC Access Prohibited Time	T <sub>P</sub>	500			µs	Figure 4

TIMING PARAMETER DEFINITIONS IN BURST MODE SEQUENCE



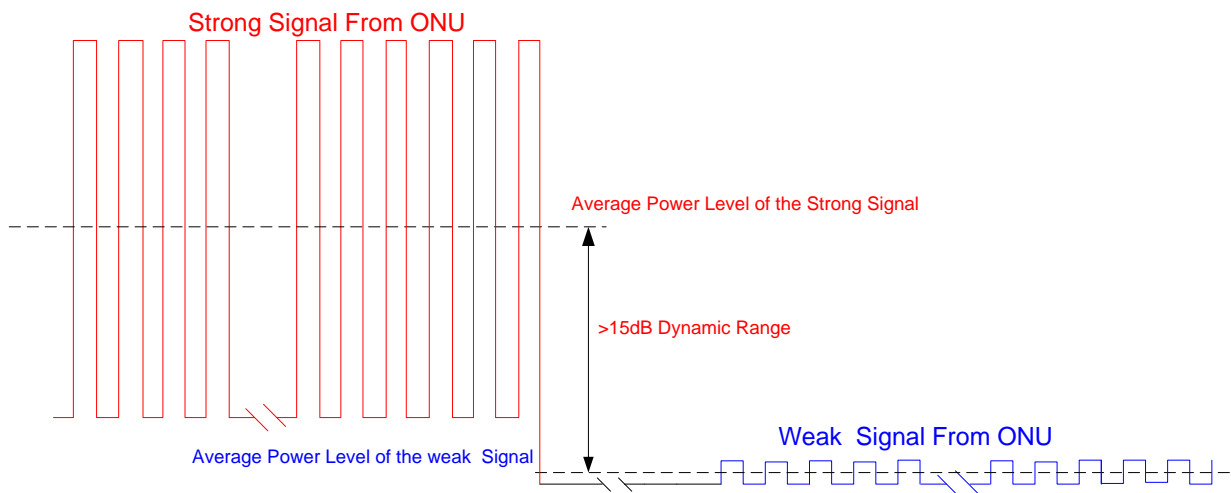
Timing requirements of ranging period



Timing requirements of normal operating

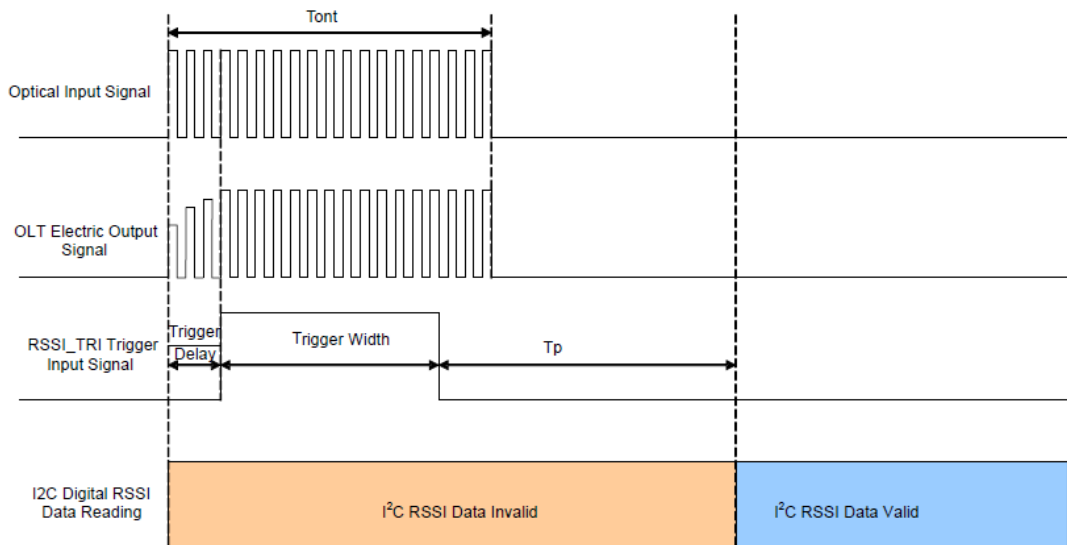
Figure 2 Timing Parameter Definitions in Burst Mode Sequence

**BURST MODE RECEIVER DYNAMIC RANGE**



**Figure 3 Burst Mode Receiver Dynamic Range in XGPON System**

**TIMING PARAMETER DEFINITIONS IN RSSI TRIGGER**



**Figure 4 Timing Parameter Definitions in RSSI Trigger**

PIN DESCRIPTION			
PIN	Name	Description	Notes
1	VEET	Transmitter Ground	
2	TX Fault	Transmitter Fault Indication	LVTTTL, High Indicates TX Laser Fault
3	TX Disable	Transmitter Disable	LVTTTL, Low : transmitter on
4	SDA	The data line	The data line of two wire serial interface
5	SCL	The clock line	The clock line of two wire serial interface
6	MOD-DEF0	Module definition 0	Grounded in module
7	RESET	Burst Receiver Reset	LVTTTL, High level Reset
8	SD	SD output	LVTTTL, High active
9	RSSL_TRIG	RSSI trigger for Transceiver A/D converter	LVTTTL, High active
10	VEER	Receiver Ground	
11	VEER	Receiver Ground	
12	RD-	inverted Received Data Out	CML Output, AC coupled
13	RD+	Non-inverted Received Data Out	CML Output, AC coupled
14	VEER	Receiver Ground	
15	VCCR	Receiver 3.3V Power Supply	
16	VCCT	Transmitter 3.3V Power Supply	
17	VEET	Transmitter Ground	
18	TD+	Non-Inverted Transmit Data in	CML input, AC coupled
19	TD-	Inverted Transmit Data in	CML input, AC coupled
20	VEET	Transmitter Ground	

PIN OUT DRAWING

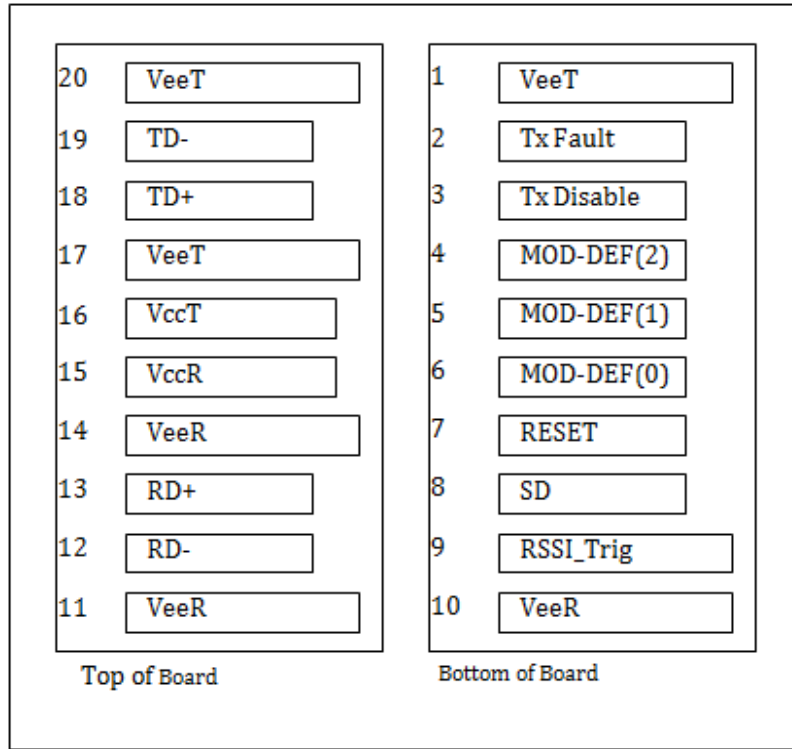


Figure 5 Pin Out Drawing

TYPICAL INTERFACE CIRCUIT

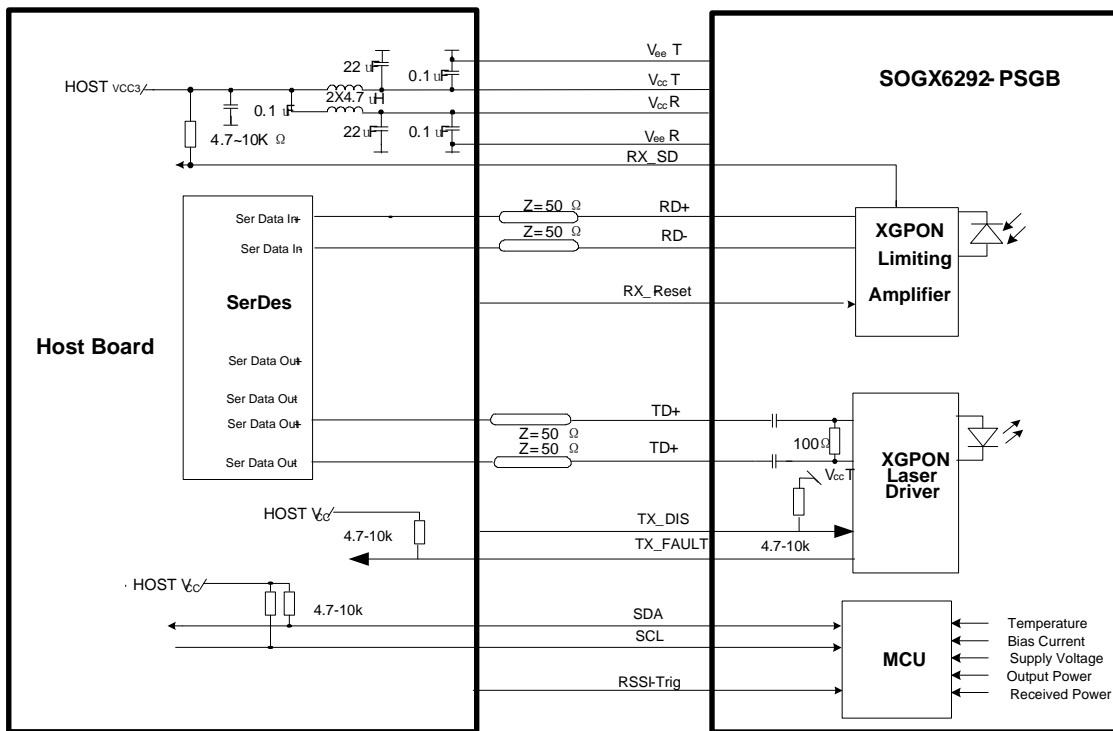


Figure 6 Typical Interface Circuit



## PACKAGE OUTLINE

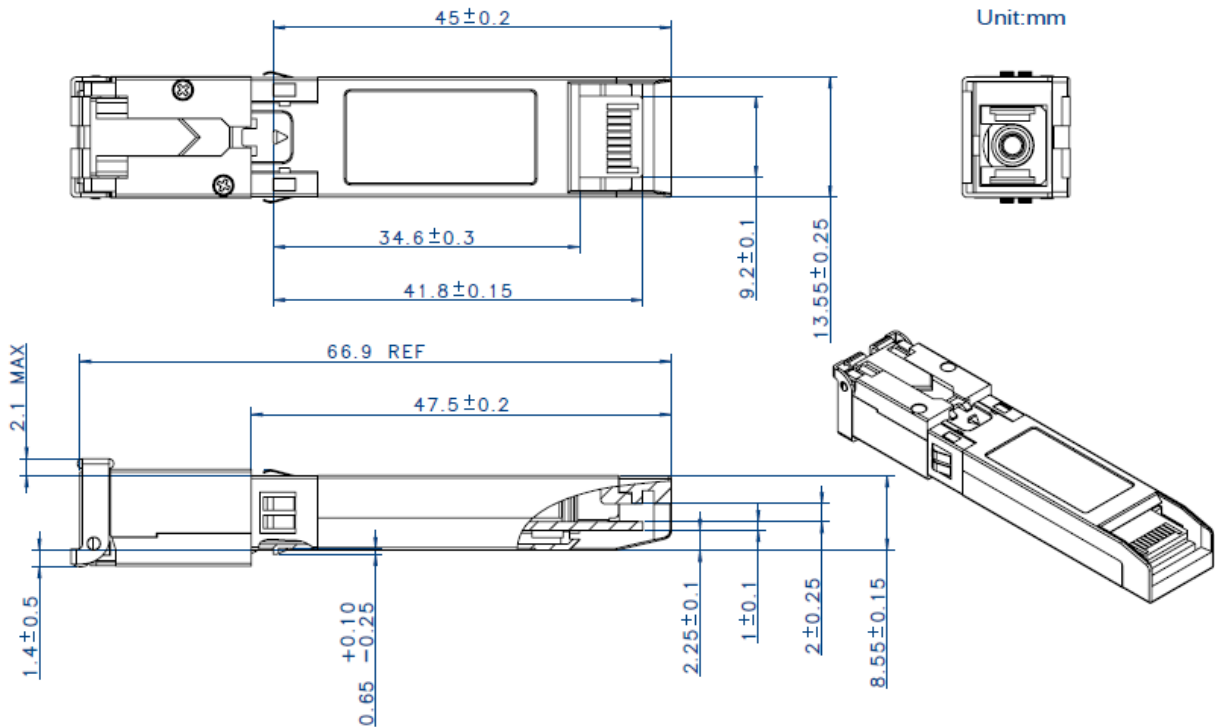


Figure 7 Package Outline

## EEPROM INFORMATION

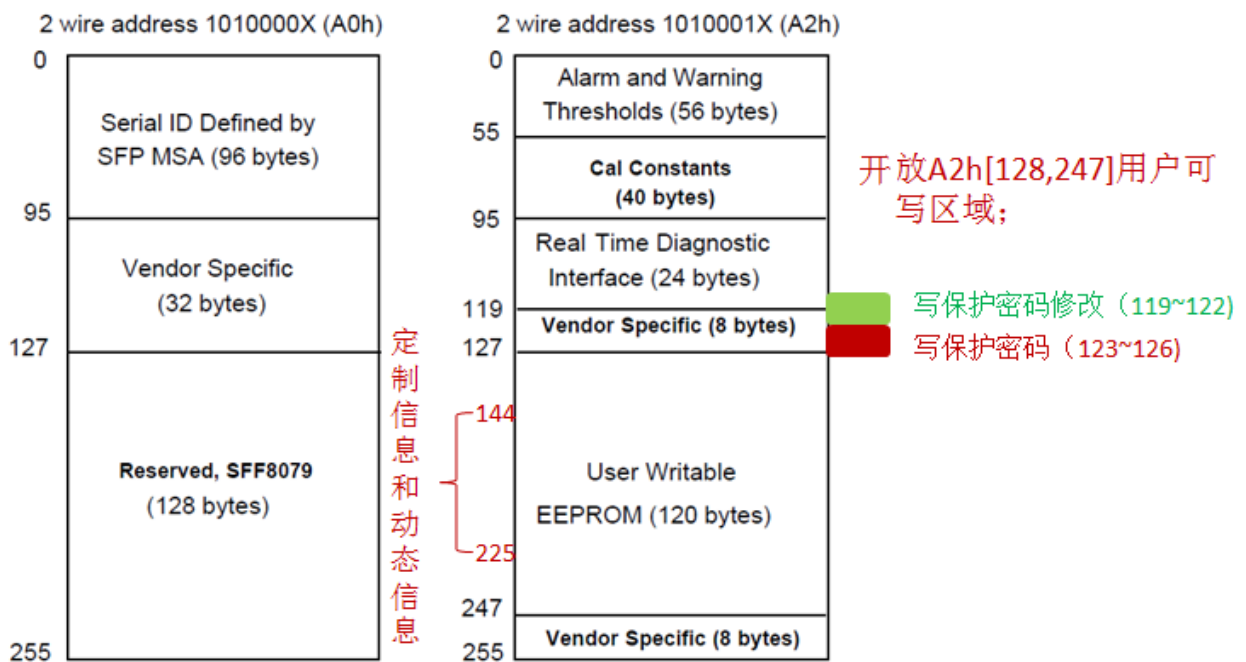


Figure 8 EEPROM Memory Map Specific Data Field Descriptions

**DIGITAL DIAGNOSTIC MONITORING INTERFACE**

Parameter	Range	Accuracy	Calibration	Notes
Temperature	-5 to 75°C	±3°C	Internal	1LSB = 1/256°C
Voltage	3.0 to 3.6V	±3%	Internal	1LSB = 0.1mV
Bias Current	0 to 262mA	±10%	Internal	1LSB = 4uA
TX Power	2 to 10dBm	±3dB	Internal	1LSB = 0.2uW
RX Power monitor	-30 to -9dBm	±3dB	Internal	1LSB = 0.1uW

**ORDERING INFORMATION**

PN	Temperature Rating	Unit
SOGX6292-PSGB	0 ~ 70	°C

**WARNINGS**

- Handling Precautions: This device is susceptible to damage as a result of electrostatic discharge (ESD). A static free environment is highly recommended. Follow guidelines according to proper ESD procedures.
- Laser Safety: Radiation emitted by laser devices can be dangerous to human eyes. Avoid eye exposure to direct or indirect radiation.

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