



FEATURES

- Single fiber bi-directional data links symmetric 1.25Gbps application
- 1490nm continuous-mode DFB laser transmitter and 1310nm burst-mode APD-TIA receiver
- Reset-less burst-mode receiver simplifies the system design
- More than 24dB wide dynamic range
- 0 to 70°C operating case temperature,
- Single 3.3V power supply
- Digital diagnostic monitoring interface
- Digital burst RSSI function to monitor the input optical power level
- LVPECL compatible data input/output interface
- LVTTTL transmitter disable control
- LVTTTL transmitter laser fault alarm
- LVTTTL receiver loss of signal indication
- Low EMI and excellent ESD protection
- Class I laser safety standard IEC-60825 compliant
- RoHS-6 compliance

APPLICATIONS

- Gigabit Ethernet Passive Optical Networks (GEPON) 20Km 1:32 application or 10Km 1:64 application.

STANDARDS

- Complies with SFP Multi-Source Agreement (MSA) SFF-8074i
- Complies with SFF-8472
- Complies with IEEE 802.3ah™-2004
- 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_{STG}	-40	85	°C	
Operating Case Temperature	T_c	0	70	°C	
Operating Humidity	OH	5	90	%	
Power Supply Voltage	V_{CC}	0	3.6	V	
Receiver Damaged Threshold		+4		dBm	

RECOMMENDED OPERATING CONDITION

Parameter	Symbol	Min.	Typ.	Max.	Unit	Notes
Operating Case Temperature	T_c	0		70	°C	
Power Supply Voltage	V_{CC}	3.13	3.3	3.47	V	
Operating Humidity Range	OH	5		90	%	
Data Rate			1.25		Gbit/s	
Data Rate Drift		-100		+100	PPM	

TRANSMITTER OPTICAL CHARACTERISTICS

Parameter	Symbol	Min.	Typ.	Max.	Unit	Notes
Optical Center Wavelength	λ_c	1480	1490	1500	nm	
Optical Spectrum Width (-20dB)	$\Delta\lambda$			1	nm	
Side Mode Suppression Ratio	SMSR	30			dB	
Average Launch Optical Power	AOP	+2		+7	dBm	EOL, Over Temperature
Power-OFF Transmitter Optical Power				-39	dBm	Launched into SMF
Extinction Ratio	ER	9			dB	PRBS 2 ⁷ -1 test pattern @1.25Gbit/s
Total Jitter	TJ			0.43	UI	PRBS 2 ⁷ -1 test pattern @1.25Gbit/s
Rise/Fall Time (20%-80%)	T_R/T_F			260	ps	Bessel-Thompson Filter OFF.
RIN ₁₅ OMA				-115	dB/Hz	
Optical Return Loss Tolerance				15	dB	
Transmitter Reflectance				-10	dB	
Transmitter and Dispersion Penalty	TDP			2.3	dB	Transmit on 20km SMF
Optical Waveform Diagram	Compliant with IEEE Std 802.3ah™-2004					Figure 1

TRANSMITTER ELECTRICAL CHARACTERISTICS

Parameter	Symbol	Min.	Typ.	Max.	Unit	Notes
Data Input Differential Swing		200		1600	mV	LVPECL input, AC coupled
Input Differential Impedance		90	100	110	Ω	
Power Supply Current				220	mA	Load free
Transmitter Disable Voltage - Low		0		0.8	V	
Transmitter Disable Voltage - High		2.0		VCC	V	
Transmitter Fault Alarm Voltage - Low		0		0.4	V	
Transmitter Fault Alarm Voltage - High		2.4		VCC	V	

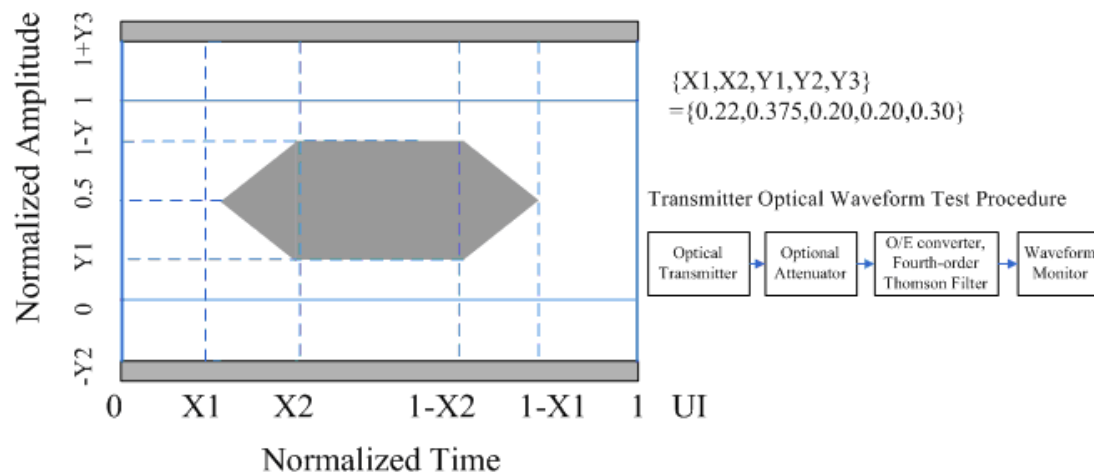
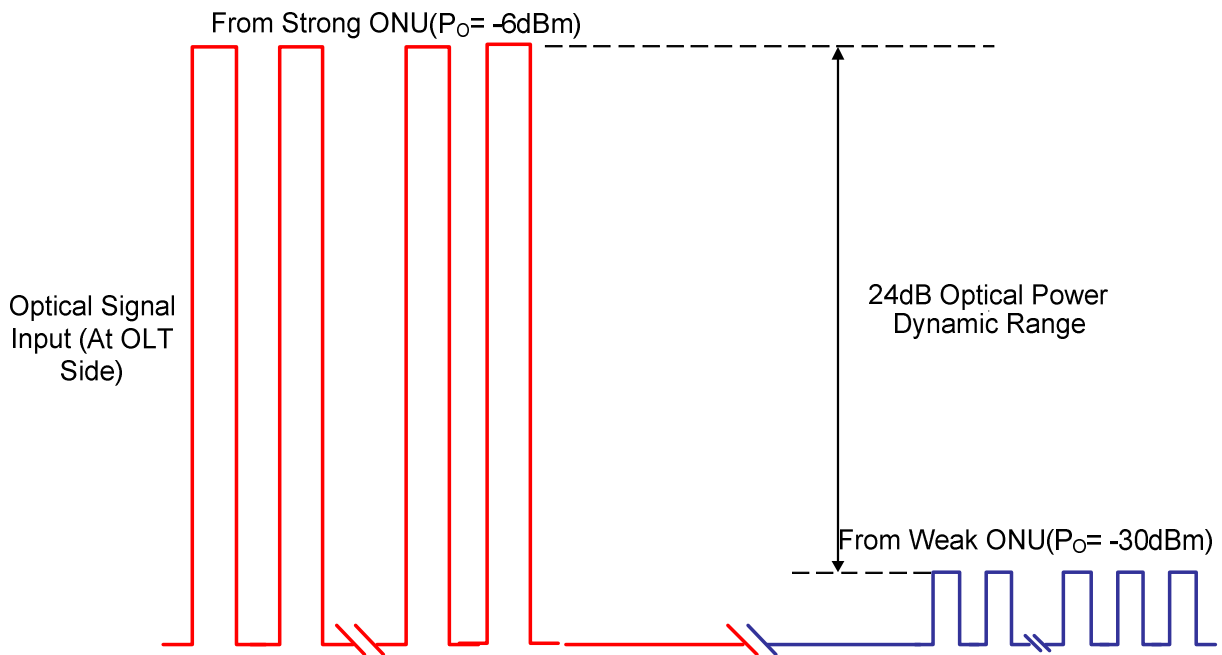
TRANSMITTER EYE MASK DEFINITIONS AND TEST PROCEDURE


Figure 1 Transmitter Eye Mask Definitions and Test Procedure

RECEIVER OPTICAL CHARACTERISTICS

Parameter	Symbol	Min.	Typ.	Max.	Unit	Notes
Operating Wavelength		1260		1360	nm	
Sensitivity	SEN			-30	dBm	PRBS 2 ⁷ -1@1.25Gbps BER ≤1×10 ⁻¹²
Saturation Optical Power	SAT	-6			dBm	PRBS 2 ⁷ -1@1.25Gbps BER ≤1×10 ⁻¹²
Loss Of Signal De-assert Level	LOSD			-31	dBm	
Loss Of Signal Assert Level	LOSA	-45			dBm	
Loss Of Signal Hysteresis		0.5		6	dB	
Receiver Reflectance				-12	dB	
Dynamic Range		-30		-6	dBm	Figure 2

BURST MODE RECEIVER DYNAMIC RANGE IN GEPON SYSTEM

Figure 2 Burst Mode Receiver Dynamic Range in GEPON System
RECEIVER ELECTRICAL CHARACTERISTICS

Parameter	Symbol	Min.	Typ.	Max.	Unit.	Notes
Power Supply Current				160	mA	Load free
Data Output Voltage – Low (-Vcc)		-1.81		-1.62	V	
Data Output Voltage – High (-Vcc)		-1.02		-0.88	V	
Data Output Differential Swing		400		1600	mV	LVPECL output, DC coupled
Loss Of Signal Assert Time			0.5		µs	
Loss Of Signal De-assert Time			0.5		µs	
Loss Of Signal Voltage - Low		0		0.4	V	
Loss Of Signal Voltage - High		2.4		VCC	V	
Receiver Threshold Settling Time	T _{SETTLING}			250	ns	Figure 3

TIMING PARAMETER DEFINITIONS IN BURST MODE SEQUENCE

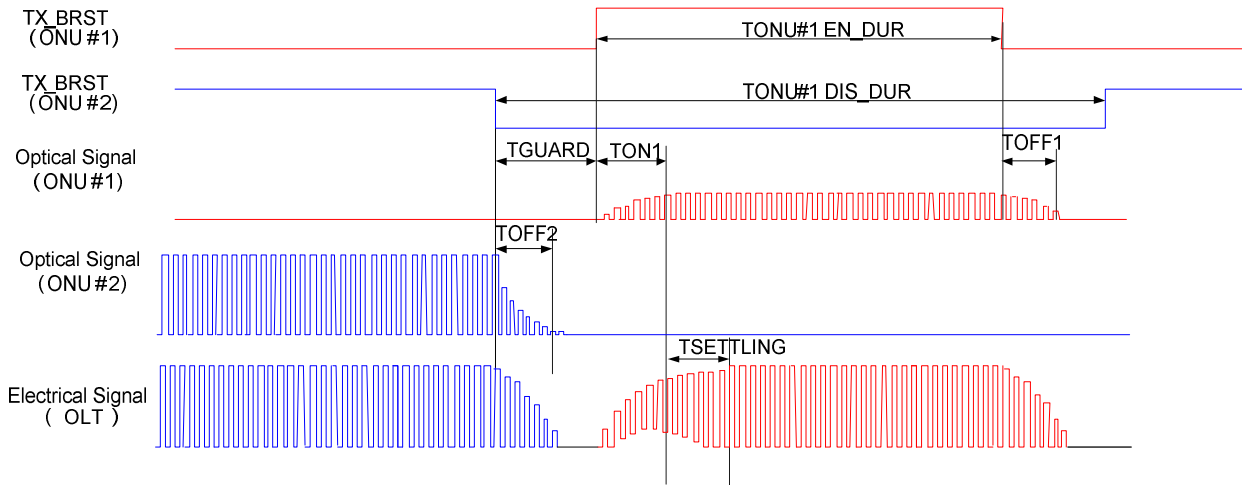


Figure 3 Timing Parameter Definitions in Burst Mode Sequence

RECEIVER ELECTRICAL CHARACTERISTICS

Parameter	Symbol	Min.	Typ.	Max.	Unit.	Notes
RSSI Trigger-Low		0		0.8	V	
RSSI Trigger-High		2.0		Vcc	V	
RSSI Trigger width	Tw	10			us	
RSSI Trigger Delay	TD		950		ns	Refer to first bit of the preamble
I2C Access Prohibited Time		150	200		μs	
Optical Signal During Time	TONU EN_DUR	1000	1200		ns	400ns CDR time

RSSI TIMING SEQUENCE

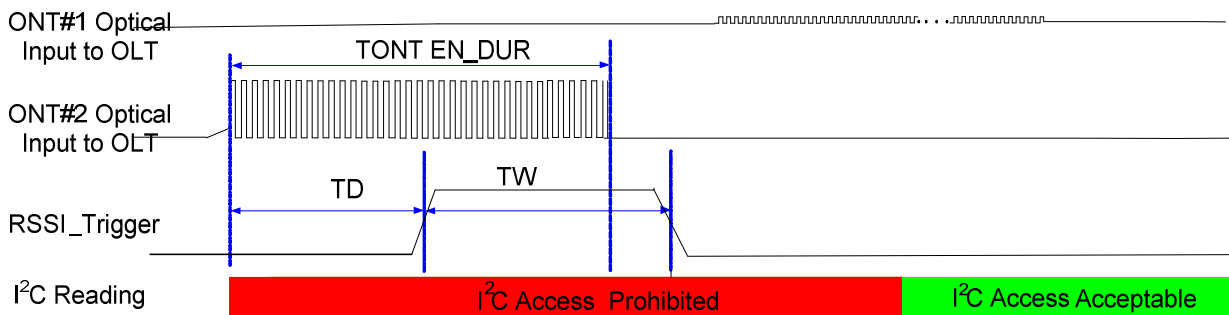
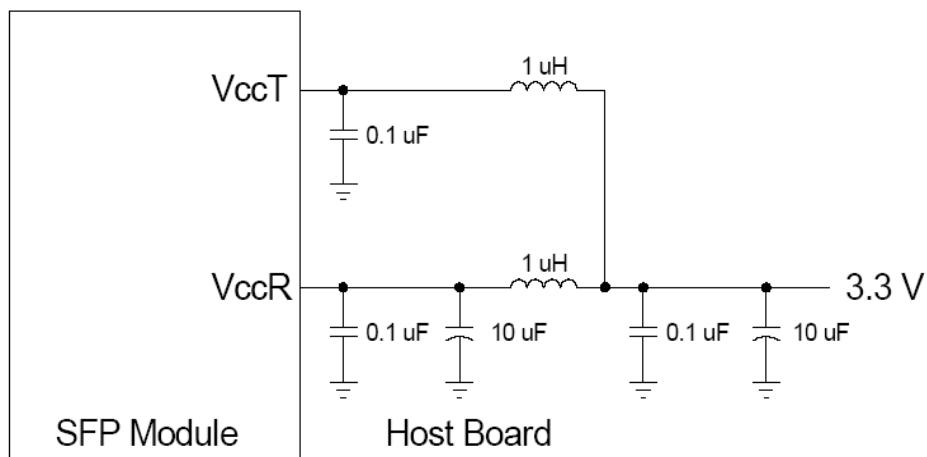


Figure 4 Timing Parameter Definitions in RSSI Trigger

PIN DESCRIPTION

PIN	Name	Description	Notes
1	V _{EE} T	Transmitter Ground	
2	TX Fault	Transmitter Fault Indication	High: abnormal; Low: normal
3	TX Disable	Transmitter Disable	High: transmitter disable; Low: transmitter enable
4	MOD-DEF2	Module Definition 2	The data line of two wire serial interface
5	MOD-DEF1	Module Definition 1	The clock line of two wire serial interface
6	MOD-DEF0	Module Definition 0	Connected to Ground in the transceiver
7	RSSI Trigger	RSSI Trigger for Transceiver	High: enable RSSI A/D conversion
8	LOS	Loss of Signal	High: Loss Of Signal; Low: Signal Detected
9	V _{EE} R	Receiver Ground	
10	V _{EE} R	Receiver Ground	
11	V _{EE} R	Receiver Ground	
12	RD-	Inv. Receiver Data Out	LVPECL logic output, DC coupled
13	RD+	Receiver Data Out	LVPECL logic output, DC coupled
14	V _{EE} R	Receiver Ground	
15	V _{CC} R	Receiver Power	
16	V _{CC} T	Transmitter Power	
17	V _{EE} T	Transmitter Ground	
18	TD+	Transmit Data In	LVPECL logic input, AC coupled
19	TD-	Inv. Transmit Data In	LVPECL logic input, AC coupled
20	V _{EE} T	Transmitter Ground	

SFP RECOMMENDED HOST BOARD POWER SUPPLY FILTERING NETWORK

Figure 5 SFP Recommended Host Board Power Supply Filtering Network

SFP PIN (GOLDEN FINGER) DRAWING

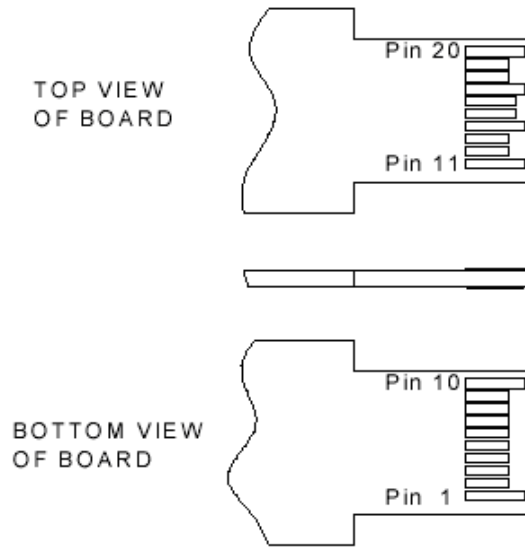


Figure 6 SFP Pin (Golden Finger) Drawing

TYPICAL INTERFACE CIRCUIT

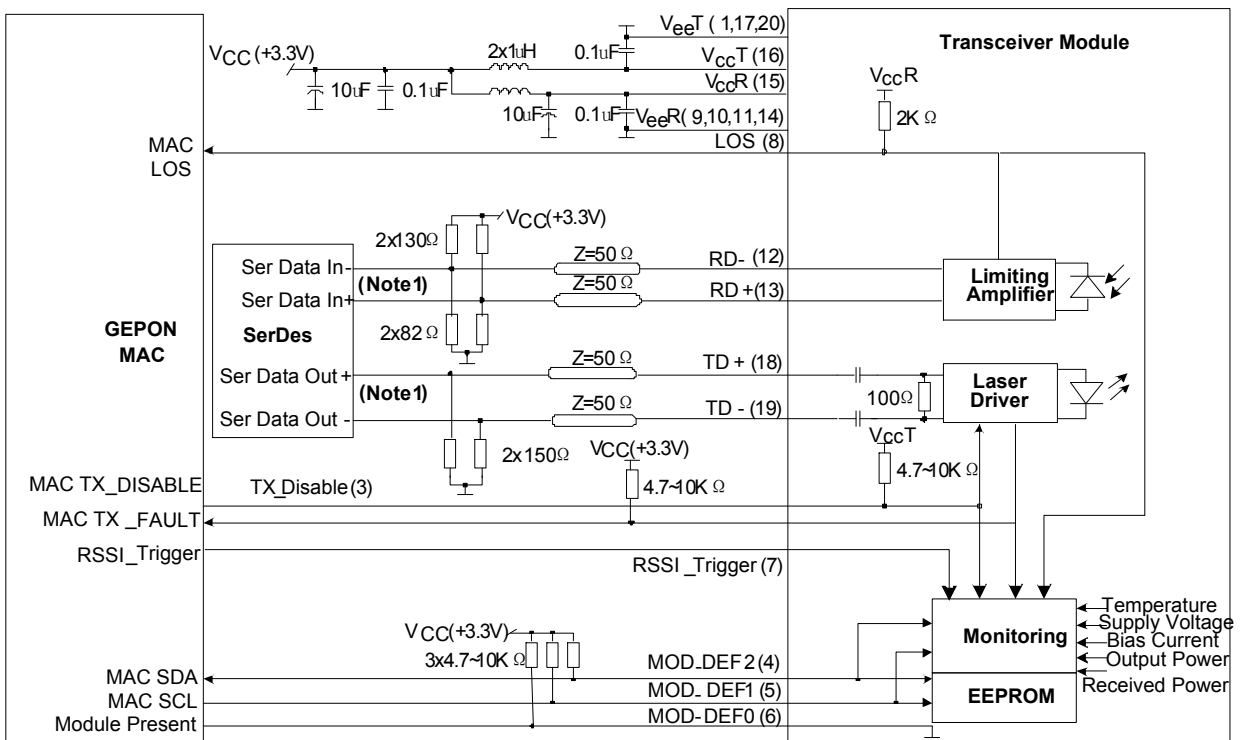


Figure 7 Typical Interface Circuit

PACKAGE OUTLINE

Unit:mm

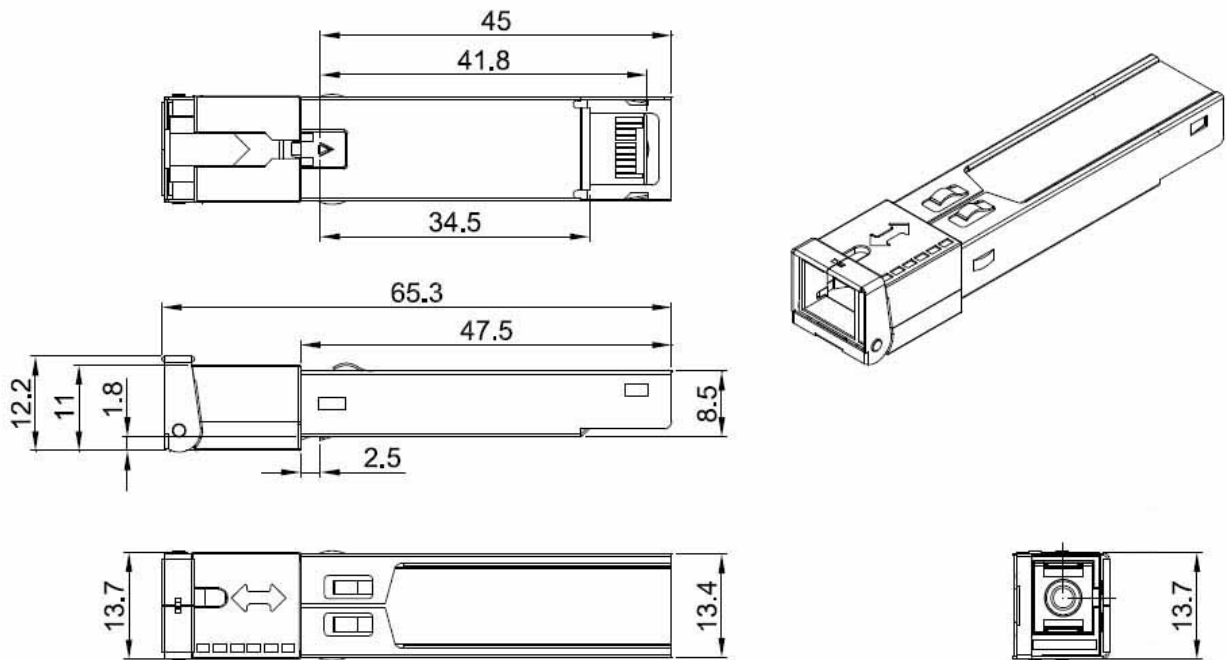


Figure 8 Package Outline

EEPROM INFORMATION

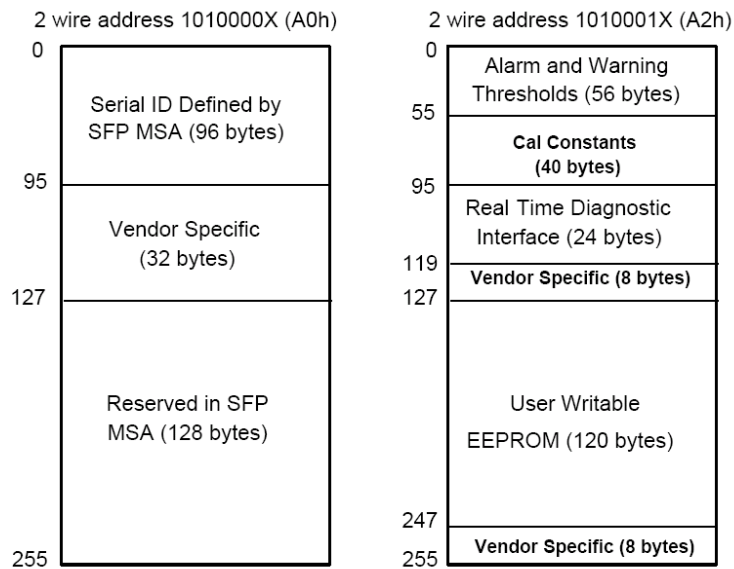
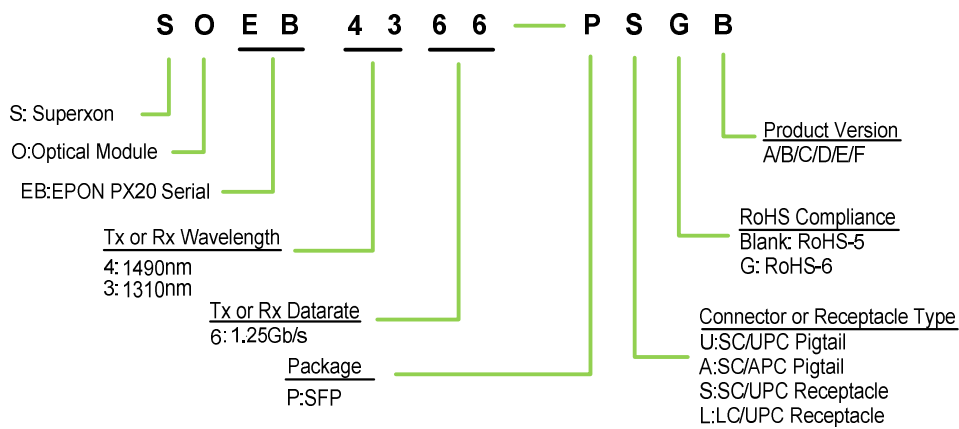


Figure 9 EEPROM Memory Map Specific Data Field Descriptions

DIGITAL DIAGNOSTIC MONITORING INTERFACE

Parameter	Range	Accuracy	Calibration	NOTES
Temperature	0 to 70°C	±3°C	Internal	LSB: 1/256C
Voltage	2.97 to 3.63V	±3%	Internal	LSB: 0.1mV
Bias Current	0 to 100mA	±10%	Internal	LSB: 2uA
TX Power	-2 to 8dBm	±3dB	Internal	LSB: 0.1uW
RX Power monitor	-30 to -6dBm	±3dB	Internal	LSB: 0.1uW

ORDERING INFORMATION



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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