SOEB4366-PSIGB

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 simply the system design
- More than 24dB wide dynamic range
- -40 to 85°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
- LVTTL transmitter disable control
- LVTTL transmitter laser fault alarm
- LVTTL 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	-40	85	°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	-40		85	°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	+3.5		+7	dBm	BOL, Normal Temperature
Average Launch Optical Power	AOP	+2.5		+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

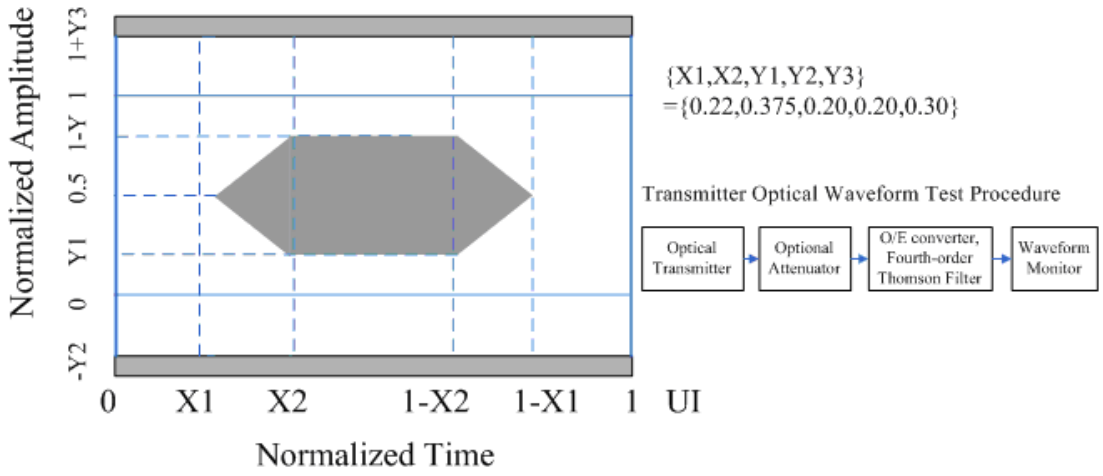

Figure 1 Transmitter Eye Mask Definitions and Test Procedure

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

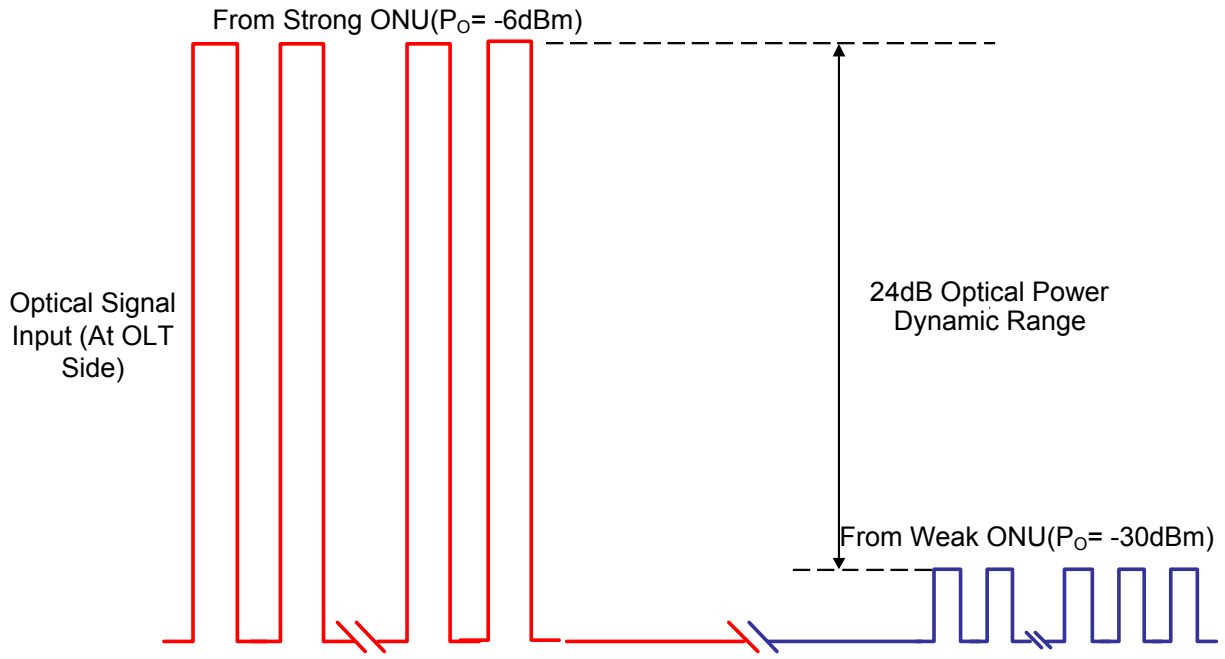

Figure 2 Burst Mode Receiver Dynamic Range in GEPON System

RECEIVER OPTICAL CHARACTERISTICS

Parameter	Symbol	Min.	Typ.	Max.	Unit	Notes
Operating Wavelength		1260		1360	nm	
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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

TIMING PARAMETER DEFINITIONS IN BURST MODE SEQUENCE

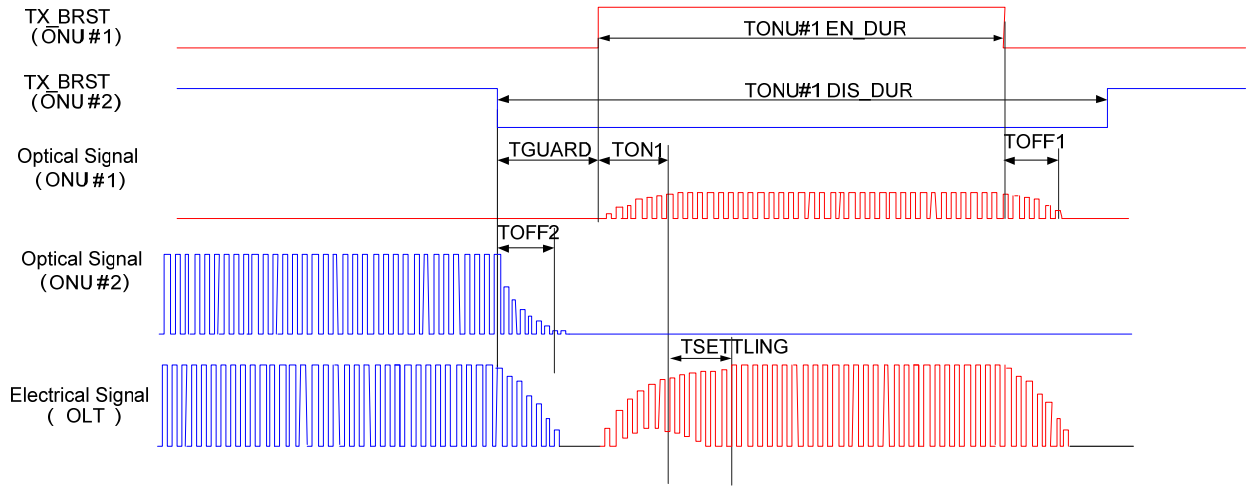


Figure 3 Timing Parameter Definitions in Burst Mode Sequence

RECEIVER ELECTRIAL 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	584	600	616	ns	
RSSI Trigger Delay	TD	496	512	528	ns	Refer to first bit of the preamble
I2C Access Prohibited Time		100		500	μs	
Optical Signal During Time	TONU EN_DUR	1184	1200	1216	ns	400ns CDR time

RSSI TIMING SEQUENCE

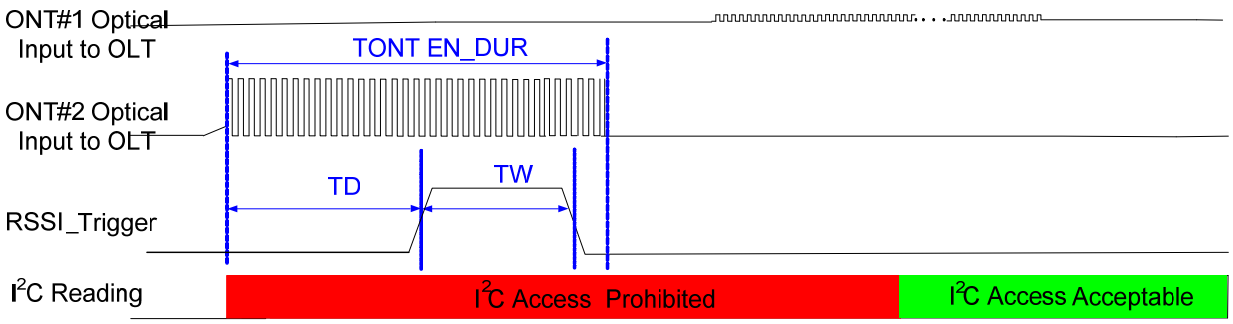


Figure 4 Timing Parameter Definitions in RSSI Trigger

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

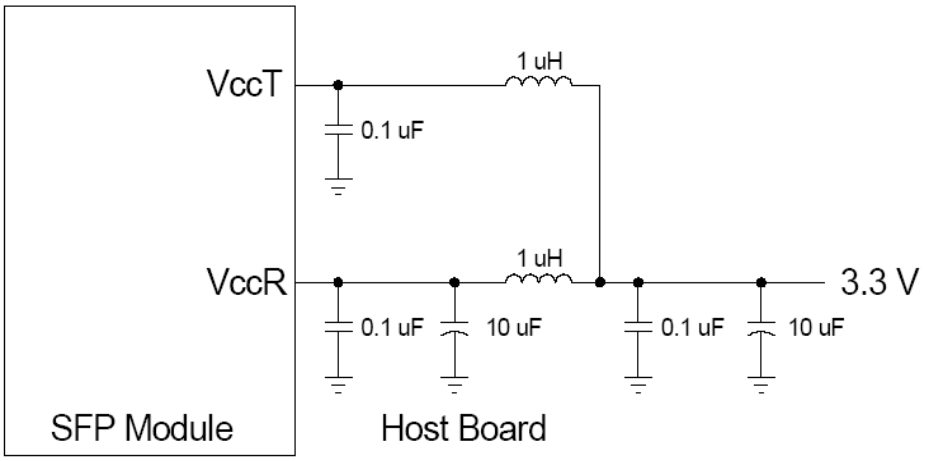


Figure 5 SFP Recommended Host Board Power Supply Filtering Network

SFP PIN (GOLDEN FINGER) DRAWING

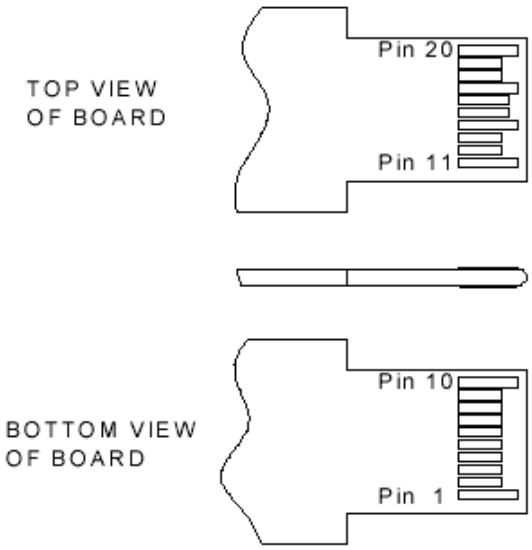


Figure 6 SFP Pin (Golden Finger) Drawing

TYPICALINTERFACE CIRCUIT

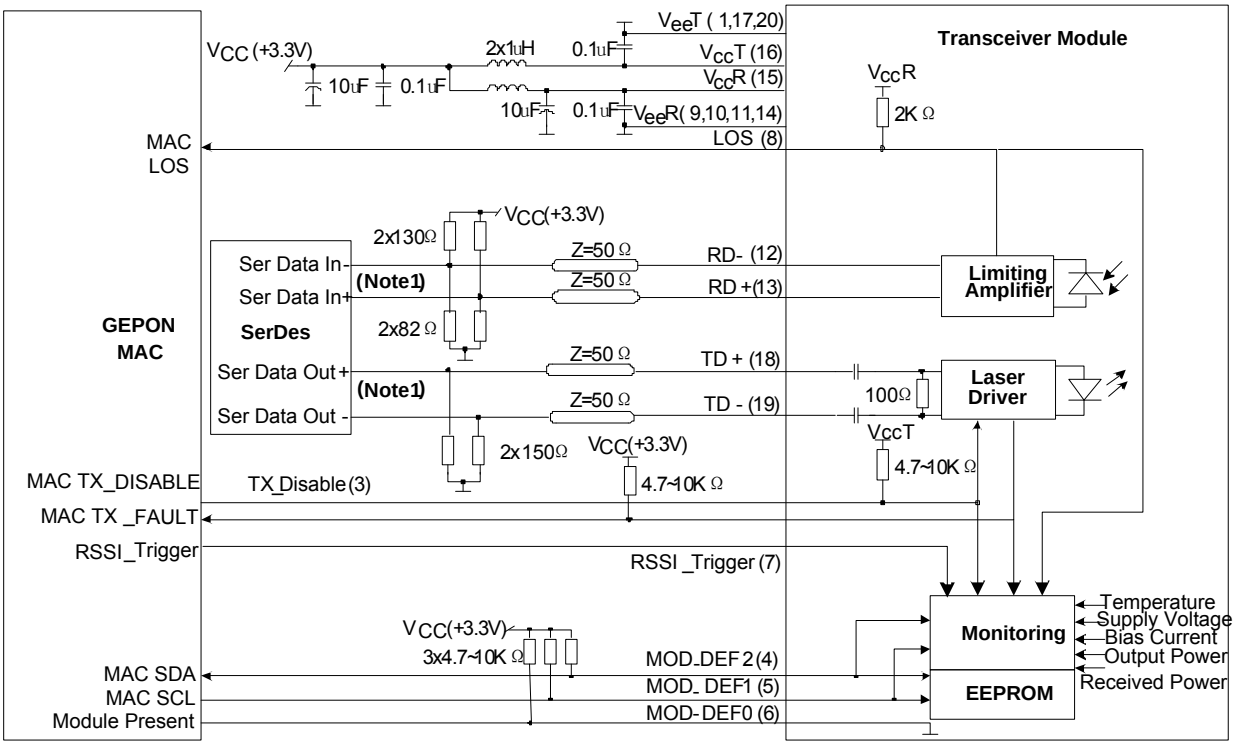


Figure 7 Typical Interface Circuit

PACKAGE OUTLINE

Unit:mm

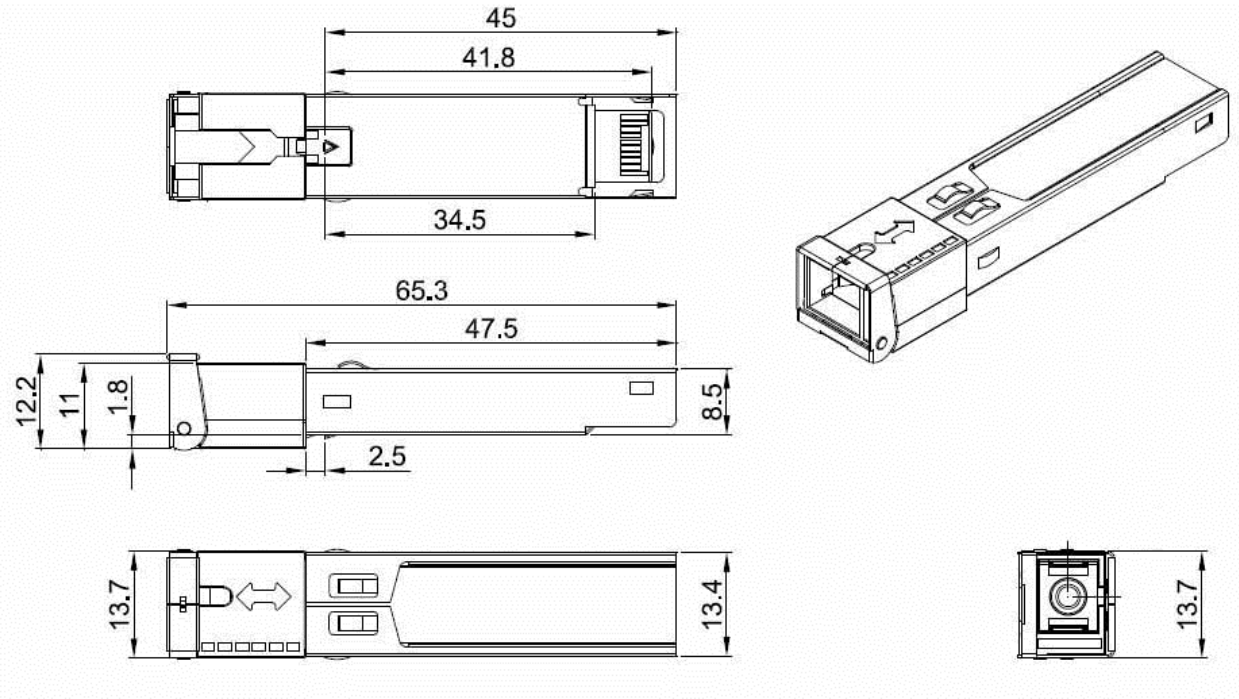


Figure 8 Package Outline

EEPROM INFORMATION

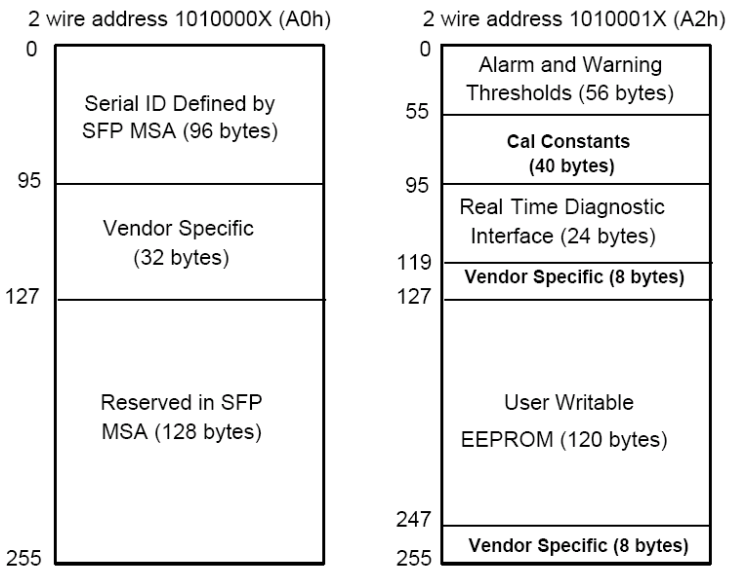


Figure 9 EEPROM Memory Map Specific Data Field Descriptions

A0 EEPROM Definition					
Data Addr	**Field Size (Byte)**	**Name Of filed**	**Description of field**	**Coded value**	**Hex**
BASE ID FIELDS					
0	1	Identifier	Type of serial transceiver	SFP	3
1	1	Ext.Identifier	Extended identifier of Type of serial transceiver	MOD4	4
2	1	Connector	Code for connector type	SC	1
3	8	Transceiver	Infiniband Compliance Codes		0
4			Part of SONET Compliance Codes		0
5			SONET Compliance Codes		0
6			Gigabit Ethernet Compliance Codes	BASE-PX	80
7			Fiber Channel link length & part of transmitter technology		0
8			Part of Fiber Channel transmitter technology		0
9			Fiber Channel Transmission media		0
10			Fiber Channel speed		0
11	1	Encoding	Code for serial encoding algorithm	8B10B	1
12	1	BR, Nominal	Nominal bit rate,units of 100 Mbits/sec.	1.25GHz	0D
13	1	Reserved			0
14	1	Length (9m)	Link length supported for 9/125 um fiber, units of k	20(km)	14
15	1	Length (9m)	Link length supported for 9/125 um fiber,units of 100 m	200(100m)	C8
16	1	Length (50um)	Link length supported for 50/125 um fiber,units of 10 m		0

17	1	Length (62.5um)	Link length supported for 62.5/125 um fiber,units of 10 m		0
18	1	Length (Copper)	Link length supported for copper, units of meters		0
19	1	Reserved			0
20	16	Vendor name	Vendor name (ASCII)	S	53
21				U	55
22				P	50
23				E	45
24				R	52
25				X	58
26				O	4F
27				N	4E
28				<space>	20
29				L	4C
30				T	54
31				D	44
32				.	2E
33				<space>	20
34				<space>	20
35				<space>	20
36	1	Reserved			0
37	3	Vendor OUI	SFP vendor IEEE company ID		0
38					0
39					0
40	16	Vendor PN	Part number provided by vendor (ASCII)	S	53
41				O	4F
42				E	45
43				B	42
44				4	34
45				3	33
46				6	36
47				6	36
48				-	2D
49				P	50
50				S	53
51				G	47
52				B	42
53				<space>	20
54				<space>	20

55				<space>	20
56	4	Vendor rev	Revision level for part number provided by vendor (ASCII)	1	31
57				0	30
58				<space>	20
59				<space>	20
60	2	Wavelength	Laser Wavelength	1490nm	5
61					D2
62	1	Reserved			0
63	1	CC_BASE	Check code for Base ID Fields (addresses 0 to 62)	Note1	
64	2	Options	Indicates which optional transceiver signals are implemented	TX_DISABLE, TX_FAULT, LOS	0
65					1A
66	1	BR, max	Upper bit rate margin, units of %		0
67	1	BR, min	Lower bit rate margin, units of %		0
68	16	Vendor SN	Serial number provided by vendor (ASCII)		
69					
70					
71					
72					
73					
74					
75					
76					
77					
78					
79					
80					
81					
82					
83					
84	8	Date code	Vendor’s manufacturing date code	Year	
85				Year	
86				Month	
87				Month	
88				Day	
89				Day	
90				<Space>	20

91				<Space>	20
92	1	Diagnostic Monitoring Type	Type of diagnostic monitoring is implemented	DD Implemented; Externally Calibrated; Average Power	58
93	1	Enhanced Options	Optional enhanced features are implemented	Optional Alarm/warning Flags Implemented;TX_Fault;RX_LOS	B0
94	1	SFF-8472 Compliance	Revision of SFF-8472 the transceiver complies with	SFF-8472.	2
95	1	CC_EXT	Check code for the Extended ID Fields (addresses 64 to 94)	Note 2	

A2 EEPROM Definition					
Data Addr	**Field Size (Byte)**	**Name Of filed**	**Description of field**	**Coded value**	**Hex**
BASE ID FIELDS					
0	2	Temp High Alarm	unit=℃ LSB=1/256℃	75	4B
1					00
2	2	Temp Low Alarm		-5	FB
3					00
4	2	Temp High Warning		70	46
5					00
6	2	Temp Low Warning		0	0
7					0
8	2	Voltage High Alarm	unit=V LSB=0.1mV	3.6	8C
9					A0
10	2	Voltage Low Alarm		3	75
11					30
12	2	Voltage High Warning		3.5	88
13					B8
14	2	Voltage Low Warning		3.1	79
15					18
16	2	Bias High Alarm	unit=mA LSB=2uA	60	75
17					30
18	2	Bias Low Alarm		3	05
19					DC
20	2	Bias High Warning		50	61
21					A8
22	2	Bias Low		4	07

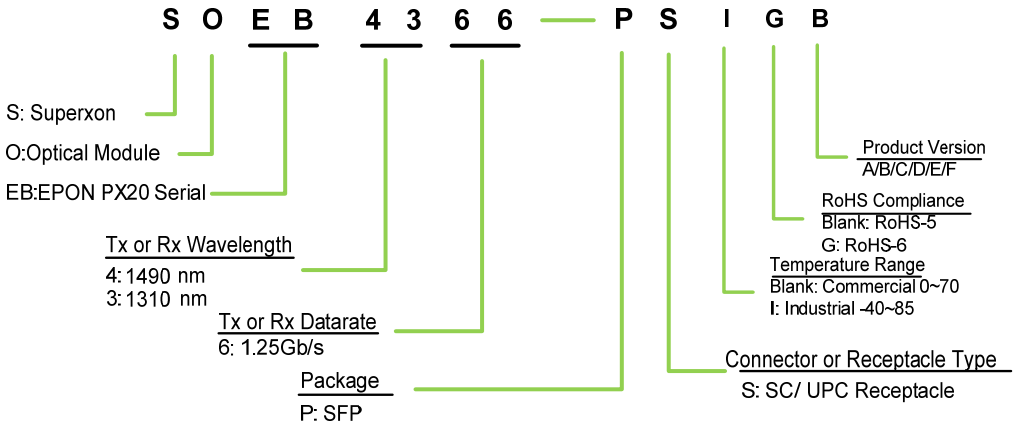
23		Warning			D0
24	2	TX Power High Alarm	unit=dBm LSB=0.1uW	8	F6
25					78
26	2	TX Power Low Alarm		1	31
27					2D
28	2	TX Power High Warning		7	C3
29					C7
30	2	TX Power Low Warning		2	3D
31					E9
32	2	RX Power High Alarm	unit=dBm LSB=0.1uW	-5	0C
33					5A
34	2	RX Power Low Alarm		-32	00
35					06
36	2	RX Power High Warning		-6	09
37					D0
38	2	RX Power Low Warning		-31	00
39					08
40	16	Reserved			0
41					0
42					0
43					0
44					0
45					0
46					0
47					0
48					0
49					0
50					0
51					0
52					0
53					0
54					0
55					0
56	4	Rx_PWR(4)	Polynomial Fit Coefficient of Order 4 for Rx Optical Power Calibartion.	0	0
57					0
58					0
59					0
60	4	Rx_PWR(3)	Polynomial Fit Coefficient of Order 3 for Rx Optical Power Calibartion.	0	0
61					0
62					0
63					0
64	4	Rx_PWR(2)	Polynomial Fit Coefficient of Order 3 for Rx	0	0

65			Optical Power Calibartion.		0
66					0
67					0
68	4	Rx_PWR(1)	Polynomial Fit Coefficient of Order 3 for Rx Optical Power Calibartion.	1	3F
69					80
70					0
71					0
72	4	Rx_PWR(0)	Polynomial Fit Coefficient of Order 3 for Rx Optical Power Calibartion.	0	0
73					0
74					0
75					0
76	2	Tx_I(Slope)	Slope of Laser Bias Current Linear Calibartion	1	1
77					0
78	2	Tx_I(Offset)	Offset of Laser Bias Current Linear Calibartion	0	0
79					0
80	2	Tx_PWR(Slope)	Slope of Transmitter Coupled Output Power Linear Calibartion	1	1
81					0
82	2	Tx_PWR(Offset)	Offset of Transmitter Coupled Output Power Linear Calibartion	0	0
83					0
84	2	T (Slope)	Slope of Temperature Linear Calibartion	1	1
85					0
86	2	T (Offset)	Offset of Temperature Linear Calibartion	0	0
87					0
88	2	V (Slope)	Slope of Supply Voltage Linear Calibartion	1	1
89					0
90	2	V (Offset)	Offset of Supply Voltage Linear Calibartion	0	0
91					0
92	3	Reserved			0
93					0
94					0
95	1	CC_EXT	Check code for the Extended ID Fields (addresses 0 to 94)	Note 1	

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	-6 to -30dBm	±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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