

FEATURES

- Single fiber bi-directional data links with symmetric 9.95Gbps downstream/upstream
- 4-Ch (100GHz CS) Tunable C-band DWDM EML burst mode transmitter
- 4-Ch (100GHz CS) Tunable L-band APD-TIA continuous mode receiver
- Up to 40km transmission distance with SMF
- Class 3 wavelength channel tuning time
- 0 to 70°C operating case temperature
- XFP package with SC/UPC receptacle
- 3.3V power supply
- CML logic level data input and output interfaces
- Rx loss of signal indication
- TX_SD function
- Digital diagnostic monitor (DDM) function
- Hot-pluggable capability
- Low EMI and excellent ESD protection
- Class 1 laser safety standard IEC-60825 compliant
- RoHS-6 compliance

APPLICATIONS

- TWDM tunable NG-PON2 ONU

STANDARDS

- Complies with G.989.2
- Complies with SFF INF-8077i
- Complies with FCC 47 CFR Part 15, Class B
- Complies with 21 CFR 1040.10 and 1040.11

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	85	%	
Power Supply Voltage	V _{CC3}	0	3.6	V	
Receiver Damaged Threshold			+5	dBm	

RECOMMENDED OPERATING CONDITION

Parameter	Symbol	Min.	Typ.	Max.	Unit	Notes
Operating Case Temperature	T _C	0		70	°C	
Power Supply Voltage	V _{CC3}	3.13	3.3	3.47	V	
Power Supply Current	I _{CC}			1060	mA	
Date Rate			Tx 9.95 Rx 9.95		Gbps	
Power Consumption	P			3.5	W	

TRANSMITTER OPTICAL CHARACTERISTICS

Parameter	Symbol	Min.	Typ.	Max.	Unit	Notes	
Centre Wavelength	λ_{CT}	$\lambda_i-0.16$		$\lambda_i+0.16$	nm	Channel number i=1,2,3,4	
Average Output Power	P _o	4		9	dBm		
Extinction Ratio	ER	6			dB		
Data Rate			9.95		Gbps		
Side Mode Suppression Ratio	SMSR	30			dB		
Burst off Average Output Power				-44	dBm		
Turn On Time at Burst mode	T _{on}			128	ns		
Turn Off Time at Burst mode	T _{off}			128	ns		
Transmitter Reflectance				-32	dB		
Tolerance to Tx Back Reflection		-15			dB		
Transmitter Dispersion Penalty	TDP			0.5	dB	over 20km SMF	
Output Optical Eye Diagram		Compliant With G989.2					PRBS 2 ³¹ -1 @9.95Gbps
Transmitter Wavelength Channel Tuning Time				1	s		

TRANSMITTER ELECTRICAL CHARACTERISTICS

Parameter	Symbol	Min.	Typ.	Max.	Unit	Notes
Data Input Differential Swing		120		850	mV	CML input, AC coupled
Input Differential Impedance		90	100	110	Ω	
Transmitter burst control		0		0.8	V	Enable
		2.0		V_{CC3}	V	Disable
TX_SD indication		-0.3		0.4	V	Tx OFF
		2.4		V_{CC3}	V	Tx ON
TX Fault		-0.3		0.4	V	Normal
		2.4		V_{CC3}	V	Fault

TRANSMITTER EYE MASK DEFINITION

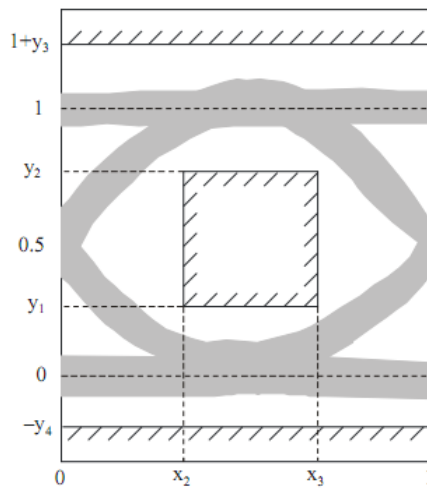


Figure 1 Mask of the eye diagram for ONU transmitter

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
Center Wavelength	λ_{CR}	$\lambda_j-0.16$		$\lambda_j+0.16$	nm	Channel number j=1,2,3,4
Sensitivity	SEN			-28	dBm	PRBS $2^{31}-1$ @9.95Gbit/s BER<1E-3
Saturation Optical Power	SAT	-7			dBm	
Loss of Signal De-Assert Level	LOSD			-30	dBm	
Loss of Signal Assert Level	LOSA	-45			dBm	
Loss of Signal Hysteresis		0.5		5	dB	
Receiver Reflectance				-20	dB	
Rx Wavelength Channel Tuning Time				1	s	

RECEIVER ELECTRICAL CHARACTERISTICS

Parameter	Symbol	Min.	Typ.	Max.	Unit	Notes
Data Output Differential Swing		100		800	mV	
Loss of Signal - Low		-0.3		0.4	V	
Loss of Signal - High		2.4		V_{CC3}	V	

PIN DESCRIPTION			
PIN	Name	Description	Notes
1	GND	Signal Ground	
2	TX_Fault	Transmitter Fault	LVTTTL, internal pull-up
3	NC	No Connection	
4	TX_SD	Transmitter State Indication, TX_SD Assert When Transmitter ON	LVTTTL, Internal pull-up
5	TX_BM	Transmitter Burst Mode Control	LVTTTL, Transmitter on when TX_BM is low
6	NC	No Connection	
7	GND	Signal Ground	
8	V _{CC3T}	Transmitter Power Supply	
9	V _{CC3R}	Receiver Power Supply	
10	SCL	Clock Line of the I2C interface	The clock line of two wire serial interface
11	SDA	Data Line of the I2C interface	The data line of two wire serial interface
12	MOD_ABS	Module Absent	Connected to GND in the module
13	NC	No Connection	
14	RX_LOS	Receiver Loss of Signal Indication	LVTTTL, Low: signal detected; High: loss of signal
15	GND	Signal Ground	
16	GND	Signal Ground	
17	RD-	Inverted Receiver Data Output	CML logic output, AC coupled
18	RD+	Non-inverted Receiver Data Output	CML logic output, AC coupled
19	GND	Signal Ground	
20	NC	No Connection	
21	MOD_DIS	High for sleep mode	
22	NC	No Connection	
23	GND	Signal Ground	
24	NC	No Connection	
25	NC	No Connection	
26	GND	Signal Ground	
27	GND	Signal Ground	
28	TD-	Transmitter Inverted Data Input	CML logic input, AC coupled
29	TD+	Transmitter Non-inverted Data Input	CML logic input, AC coupled
30	GND	Signal Ground	

PIN OUT DRAWING (TOP VIEW)

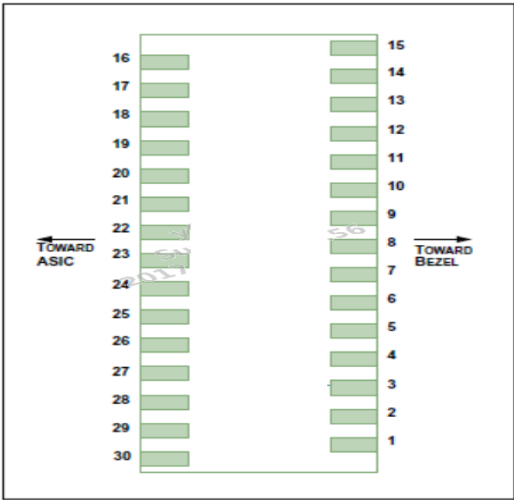


Figure 2 Pin out Drawing (Top view)

PACKAGE OUTLINE

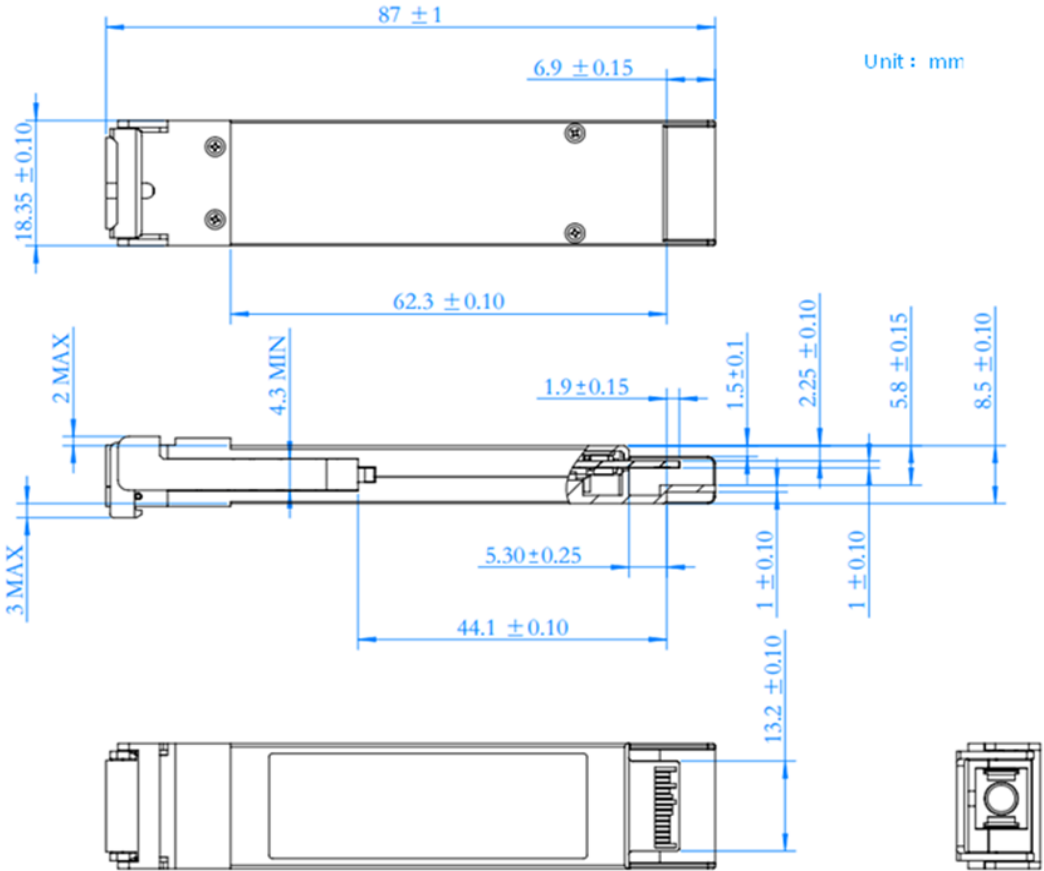


Figure 3 Package Outline (Unit: mm)

EEPROM INFORMATION

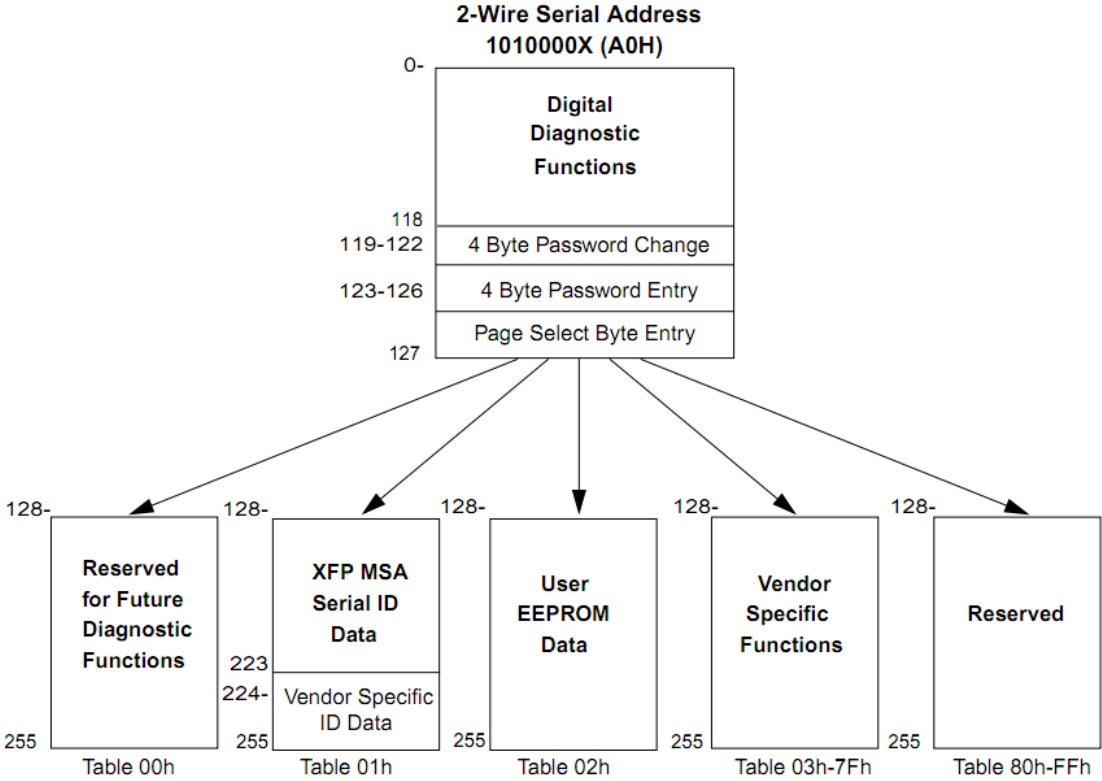


Figure 4 EEPROM Memory Map Specific Data Field Descriptions

WAVELENGTH CHANNEL DEFINITION

Transmitter wavelength channel code

A0h [112]	Channel Number	Central Frequency (THz)	Wavelength (nm)
00h	1	195.6	1532.68
01h	2	195.5	1533.47
02h	3	195.4	1534.25
03h	4	195.3	1535.04

A0h [72] (-128, 127) defines transmitter wavelength offset from its central wavelength set and default 00h

Receiver wavelength channel code

A0h [113]	Channel Number	Central Frequency (THz)	Wavelength (nm)
00h	1	187.8	1596.34
01h	2	187.7	1597.19
02h	3	187.6	1598.04
03h	4	187.5	1598.89

A0h [73] (-128, 127) defines receiver wavelength offset from its central wavelength set and default 00h

DIGITAL DIAGNOSTIC MONITORING INTERFACE

Parameter	Range	Accuracy	Calibration	NOTES
Temperature	0 to 70°C	±3°C	Internal	LSB: 1/256C
Voltage	3.0 to 3.6V	±3%	Internal	LSB: 0.1mV
Bias Current	0 to 131mA	±10%	Internal	LSB: 2uA
TX Power	0 to +9dBm	±2dB	Internal	LSB: 0.2uW
RX Power	-28 to -7dBm	±2dB	Internal	LSB: 0.1uW

ORDERING INFORMATION

PN	Temperature Rating	Unit
SOGNBA99-XTGA	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.