

**SOGP3412-FAGA**  
**SOGP3412-FAIGA**  
**SOGP3412-FAGB**  
**SOGP3412-FAIGB**  
**SOGP3412-FUGA**  
**SOGP3412-FUIGA**  
**SOGP3412-FUGB**  
**SOGP3412-FUIGB**

## FEATURES

- Single fiber bi-directional data links with asymmetric 1244Mbps upstream and 2488Mbps downstream
- 1310nm DFB burst mode transmitter
- 1490nm APD-TIA continuous mode receiver
- High power 1550nm video signal rejection
- 0 to 70°C operating case temperature for C-temp class, and -40 to 85°C operating case temperature for I-temp class,
- 2×10 SFF package with SC/APC or SC/UPC pigtail connector
- Single 3.3V power supply
- LVPECL logic level data input interface
- CML logic level data output interface
- LVTTTL burst enable control
- LVTTTL receiver signal-detected indication
- TX\_SD function
- Digital diagnostic monitor interface compatible with SFF-8472
- Low EMI and excellent ESD protection
- Class I laser safety standard IEC-60825 compliant
- RoHS-6 compliance

## APPLICATIONS

- Gigabit-capable Passive Optical Networks(GPON) ONT with video-overlay

## STANDARDS

- Complies with SFF MSA(1998 version form-factor)
- Complies with ITU-T G.984.2, G.984.2 Amendment 1, G.984.2 Amendment 2
- Complies with ITU-T G.984.5
- Complies with SFF 8472
- Complies with FCC 47 CFR Part 15, Class B
- Complies with 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	For C-temp class
	T <sub>C</sub>	-40	85	°C	For I-temp class
Operating Humidity	OH	5	95	%	
Power Supply Voltage	V <sub>CC</sub>	0	4	V	
Soldering Temperature			260	°C	10 seconds
Receiver Damaged Threshold			+5	dBm	

**RECOMMENDED OPERATING CONDITION**

Parameter	Symbol	Min.	Typ.	Max.	Unit	Notes
Operating Case Temperature	T <sub>C</sub>	0		+70	°C	For C-temp class
	T <sub>C</sub>	-40		+85	°C	For I-temp class
Power Supply Voltage	V <sub>CC</sub>	3.13	3.3	3.47	V	
Power Supply Current	I <sub>CC</sub>		200	400	mA	
Date Rate			Tx 1244.16 Rx 2488.32		Mbps	
Data Rate Drift		-100		+100	PPM	

**TRANSMITTER OPTICAL CHARACTERISTICS**

Parameter	Symbol	Min.	Typ.	Max.	Unit	Notes
Centre Wavelength	λ <sub>C</sub>	1290	1310	1330	nm	
Average Output Power	P <sub>O</sub>	0.5		5	dBm	EOL, Over Temperature
Extinction Ratio	ER	10			dB	
Spectral Width (-20dB)	Δλ			1	nm	
Side Mode Suppression Ratio	SMSR	30			dB	
Burst off Average Output Power				-45	dBm	
Turn On Time at Burst mode	T <sub>on</sub>			12.8	ns	
Turn Off Time at Burst mode	T <sub>off</sub>			12.8	ns	
Transmitter Reflectance				-10	dB	
Tolerance to Tx Back Reflection		-15			dB	
Transmitter and Dispersion Penalty	TDP			1	dB	Transmit on 20km SMF.
Output Optical Eye Diagram	Compliant With ITU-T G984.2					PRBS 2 <sup>23</sup> -1 @1244.16Mbps

**TRANSMITTER ELECTRICAL CHARACTERISTICS**

Parameter	Symbol	Min.	Typ.	Max.	Unit	Notes
Data Input Differential Swing		200		1600	mV	LVPECL input, DC coupled
Input Differential Impedance		90	100	110	$\Omega$	
Transmitter burst control Voltage - Low		0		0.8	V	
Transmitter burst control Voltage - High		2.0		V <sub>CC</sub>	V	
TX_SD indicate voltage - Low		0		0.4	V	
TX_SD indicate voltage - High		2.4		V <sub>CC</sub>	V	
TX_SD turn on time at laser on	T <sub>TXSD_ON</sub>			100	ns	
TX_SD turn off time at laser off	T <sub>TXSD_OFF</sub>			100	ns	

**RECEIVER OPTICAL CHARACTERISTICS**

Parameter	Symbol	Min.	Typ.	Max.	Unit	Notes
Operating Wavelength	$\lambda_c$	1480	1490	1500	nm	
Sensitivity (EOL, Over Temperature)	SEN			-28	dBm	PRBS 2 <sup>23</sup> -1 @2488.32Mbit/s,
Saturation Optical Power	SAT	-8			dBm	BER<1E-10
Signal-Detected Assert Level	SDA			-30.5	dBm	
Signal-Detected De-assert Level	SDD	-45			dBm	
Signal-Detected Hysteresis		0.5		6	dB	
Receiver Reflectance				-20	dB	$\lambda=1490\text{nm}$
Wavelength Blocking Filter (WBF)		25			dB	1441 nm ~1450 nm, 1530 nm ~1539 nm
Isolation		36			dB	1250 nm ~1441 nm, 1539 nm~ 1625 nm

**RECEIVER ELECTRICAL CHARACTERISTICS**

Parameter	Symbol	Min.	Typ.	Max.	Unit	Notes
Data Output Differential Swing		400		1200	mV	CML output, AC coupled internally
Signal-Detected - Low		0		0.4	V	
Signal-Detected - High		2.4		V <sub>CC</sub>	V	
Signal Detect Assert Time				100	us	
Signal Detect De-assert Time				100	us	

PIN DESCRIPTION			
PIN	Name	Description	Notes
1	NC	No Function Definition	
2	NC	No Function Definition	
3	V <sub>EER</sub>	Receiver Signal Ground	
4	NC	No Function Definition	
5	NC	No Function Definition	
6	V <sub>EER</sub>	Receiver Signal Ground	
7	V <sub>CCR</sub>	Receiver Power Supply	
8	SD	Receiver Signal-Detected Indication	LVTTTL, High: signal detected; Low: loss of signal
9	RD-	Inverted Receiver Data Output	CML logic output, AC coupled
10	RD+	Non-inverted Receiver Data Output	CML logic output, AC coupled
11	V <sub>CCT</sub>	Transmitter Power Supply	
12	V <sub>EET</sub>	Transmitter Signal Ground	
13	TX_BM	Transmitter Burst Mode Control	LVTTTL, Transmitter on when TX_BM is high for SOGP3412-FA(I)GA and SOGP3412-FU(I)GA Transmitter on when TX_BM is low for SOGP3412-FA(I)GB and SOGP3412-FU(I)GB
14	TD+	Transmitter Non-inverted Data Input	LVPECL logic input, DC coupled
15	TD-	Transmitter Inverted Data Input	LVPECL logic input, DC coupled
16	V <sub>EET</sub>	Transmitter Signal Ground	
17	SCL	Clock Line of the I2C interface	The clock line of two wire serial interface
18	SDA	Data Line of the I2C interface	The data line of two wire serial interface
19	TX_Fault	Transmitter Fault	LVTTTL, internal pull-up
20	TX_SD	Transmitter State Indication, TX_SD Assert When Transmitter ON	LVTTTL, Internal pull-up
	MS	Mounting Studs	Connected to chassis ground not to signal ground

PIN OUT DRAWING (TOP VIEW)

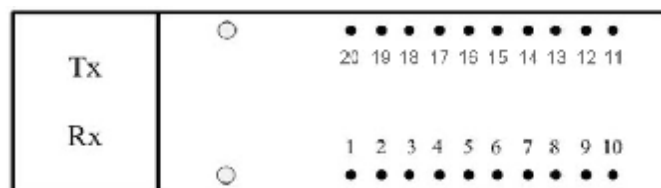
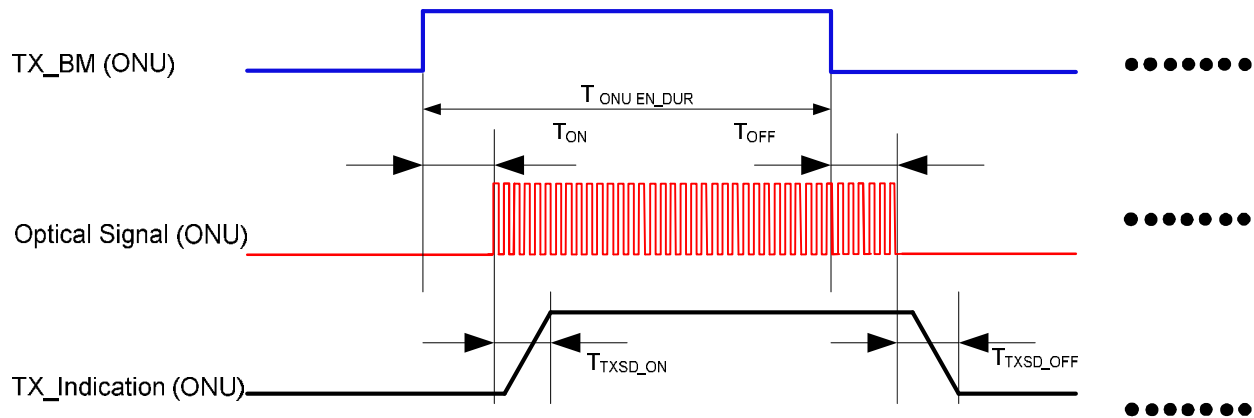


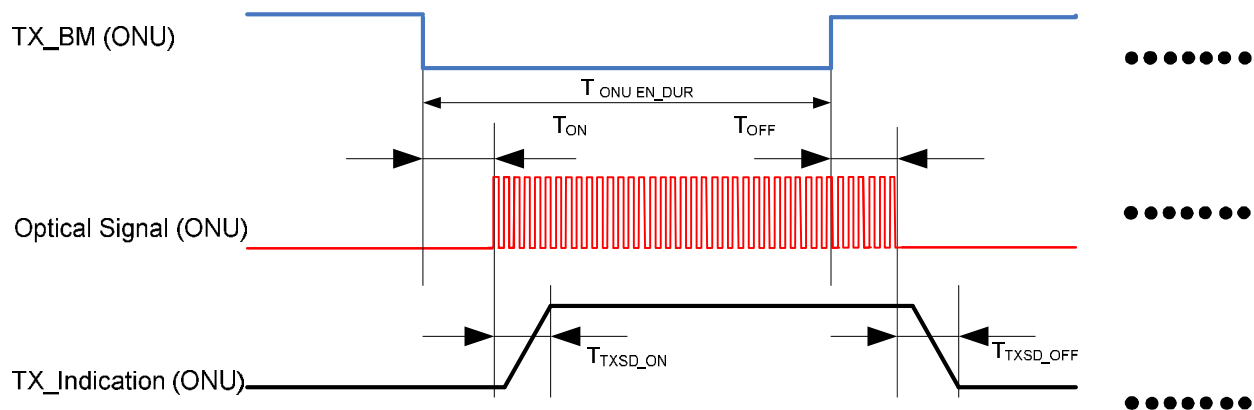
Figure 1 Pin out Drawing (Top view)

**TYPICAL ONU TIMING SEQUENCE**

For SOGP3412-FA (I) GA and SOGP3412-FU(I)GA, the TX\_BM signal is high active:



For SOGP3412-FA (I) GB and SOGP3412-FU(I)GB, the TX\_BM signal is low active:



**Figure 2 Typical ONU Timing Sequence**

TYPICAL INTERFACE CIRCUIT

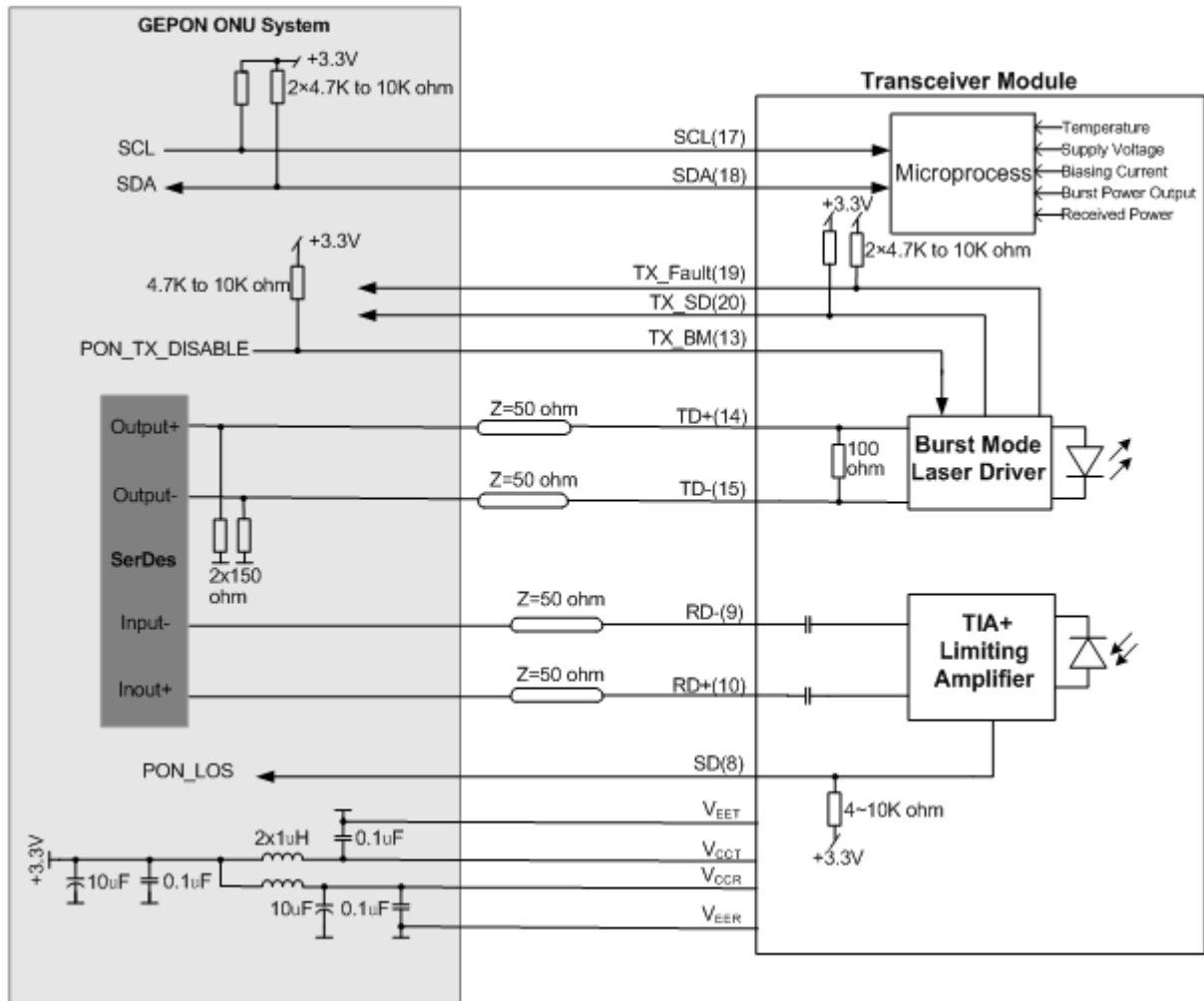


Figure 3 Typical Interface Circuit

PACKAGE OUTLINE

Unit:mm

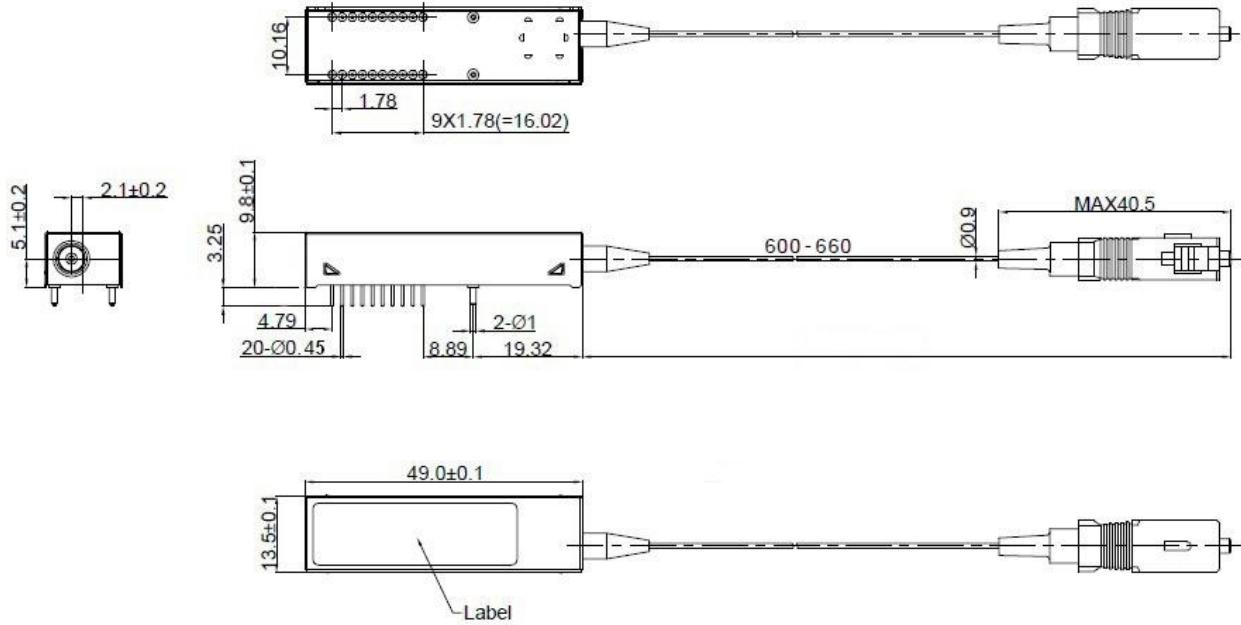
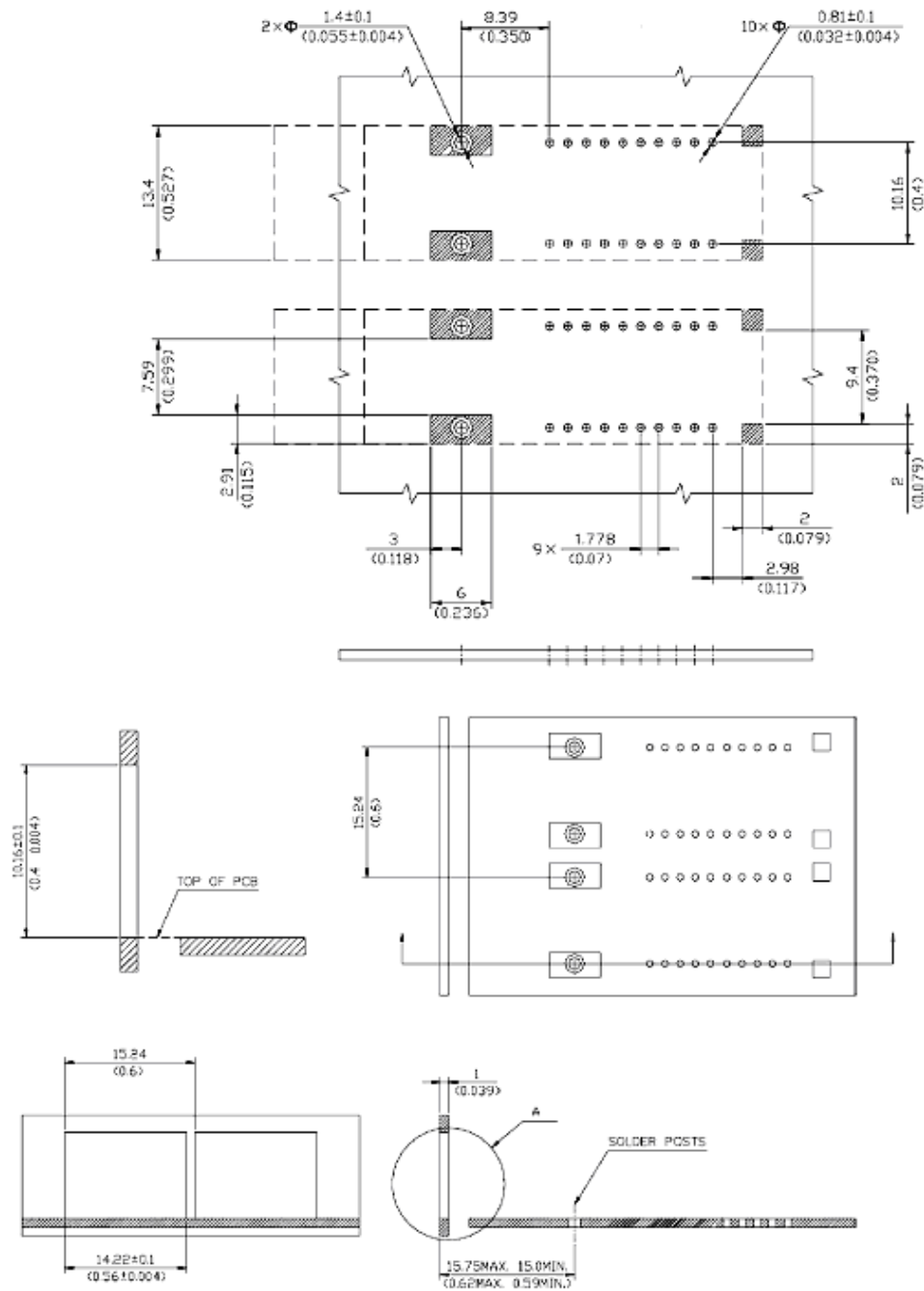


Figure 4 Package Outline (Unit: mm)

## RECOMMENDED BOARD LAYOUT HOLE PATTERN AND PANEL MOUNTING



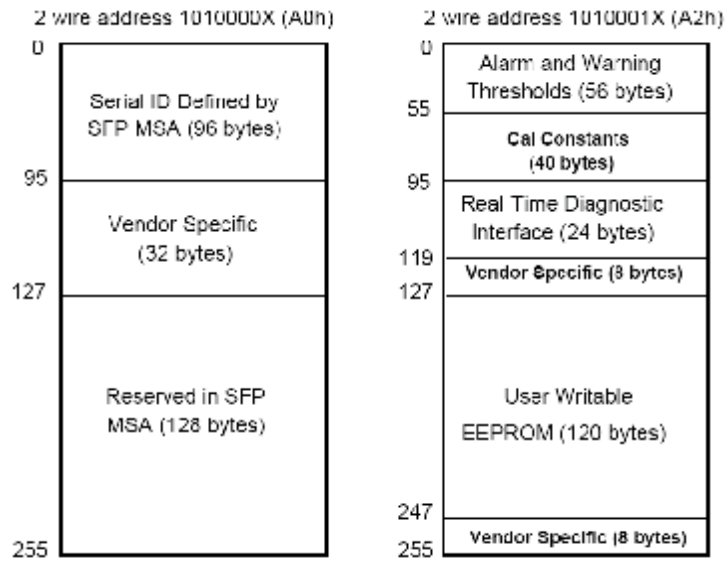
DIMENSIONS IN MILLIMETER (INCH)

NOTE1: THE HITCHED AREAS ARE KEEP OUT AREAS RESERVED FOR HOUSING STAND. AND NO METAL TRACKES OR GROUND CONNECTION IN KEEP OUT AREAS

NOTE2: SFF TRANSCEIVERS SHOULD KEEP 15.24mm MINIMUM SPACING

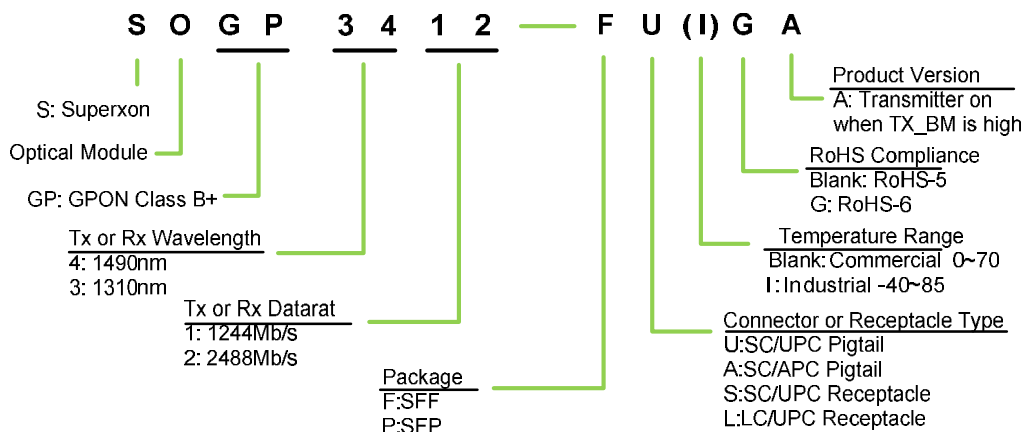
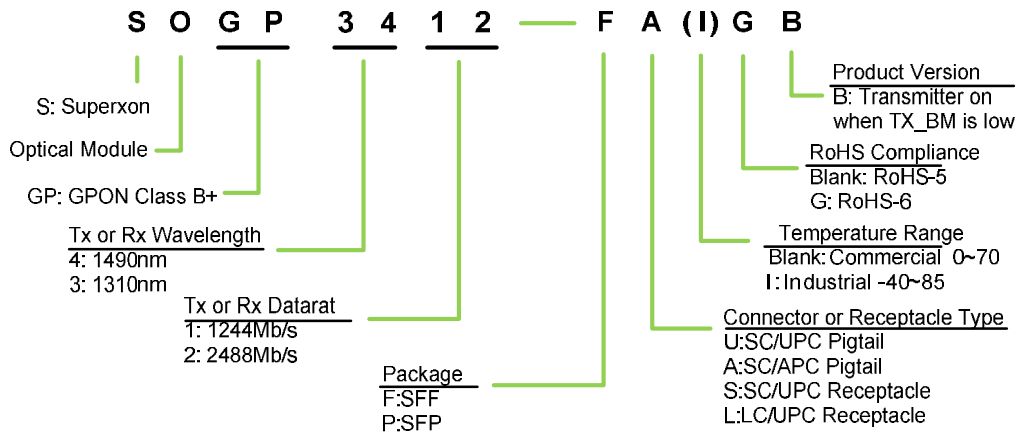
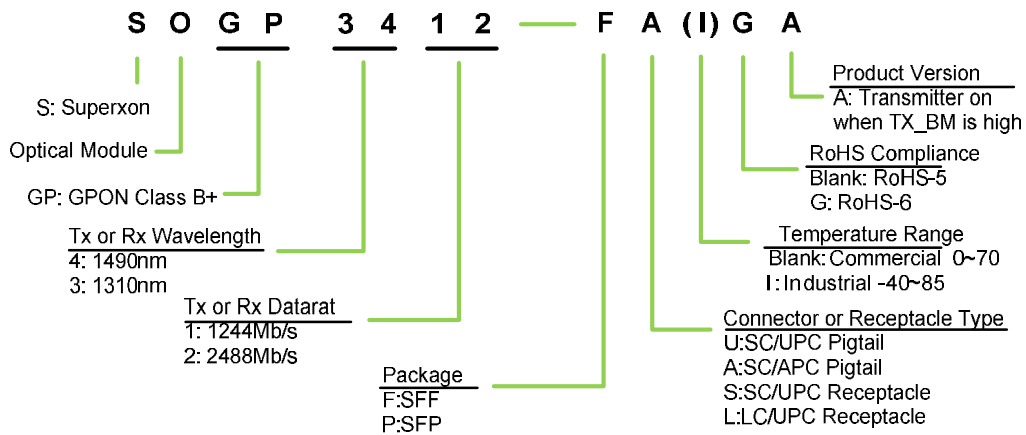
Figure 5 Recommended Board Layout Hole Pattern and Panel Mounting (Unit: mm)

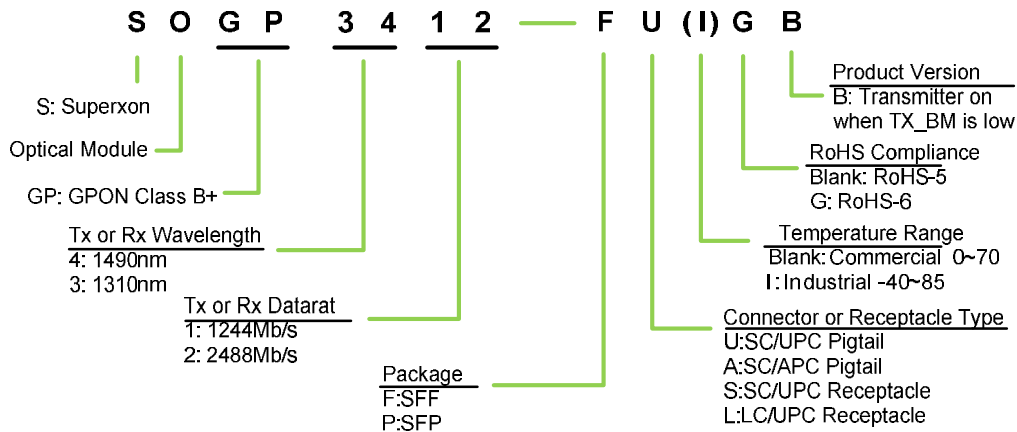


**EEPROM INFORMATION**

**Figure 6 EEPROM Memory Map Specific Data Field Descriptions**
**DIGITAL DIAGNOSTIC MONITORING INTERFACE**

Parameter	Range	Accuracy	Calibration	NOTES
Temperature	-40 to 85°C	±3°C	Internal	LSB: 1/256C
Voltage	3.0 to 3.6V	±3%	Internal	LSB: 0.1mV
Bias Current	0 to 100mA	±10%	Internal	LSB: 2uA
TX Power	-0.5 to +6dBm	±3dB	Internal	LSB: 0.1uW
RX Power	-28 to -7dBm	±3dB	Internal	LSB: 0.1uW

ORDERING INFORMATION





**WARNINGS**

- Y 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.
- Y 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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