



# SFP+ 9.953G(Down)/9.953G/2.488G(Up) XGS-PON OLT E1 20km Optical Transceiver

APXGL52SEDSE1A



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ATOP's APXGL52SEDSE1A is a XGS-PON OLT in a SFP+ housing that meet ITU-T G. 9807.1 standard. XGS-PON feature supports 9.953Gbps continuous-mode transmission by 1577nm EML laser and 9.953Gbps/2.488Gbps burst-mode reception by 1270nm APD/TIA.

It has been designed to meet the harshest external operating conditions that include temperature, humidity and EMI interference. The module offers very high functionality and feature integration, accessible via a two-wire serial interface.

## Product Features

- ✓ Single-fiber bi-directional transmission
- ✓ SFP+ Package
- ✓ 2x11 SFP+ Electrical interface
- ✓ Hot pluggable
- ✓ Typical power consumption 2W
- ✓ SC receptacle optical connector
- ✓ Operating case temperature: -25 to 85°C
- ✓ 3.3V power supply
- ✓ ODN Class E1
- ✓ RoHS 2 compliant
- ✓ ITU-T G. 987.2 compliant
- ✓ ITU-T G. 9807.1 compliant

## Applications

- ✓ Gigabits Access networks
- ✓ FTTH
- ✓ FTTC
- ✓ FTTB
- ✓ XGS-PON Access networks



## Product Selection

Part Number	Operating temperature	DDMI
APXGL52SEDSE1A	Extend(-20~85°C)	Yes

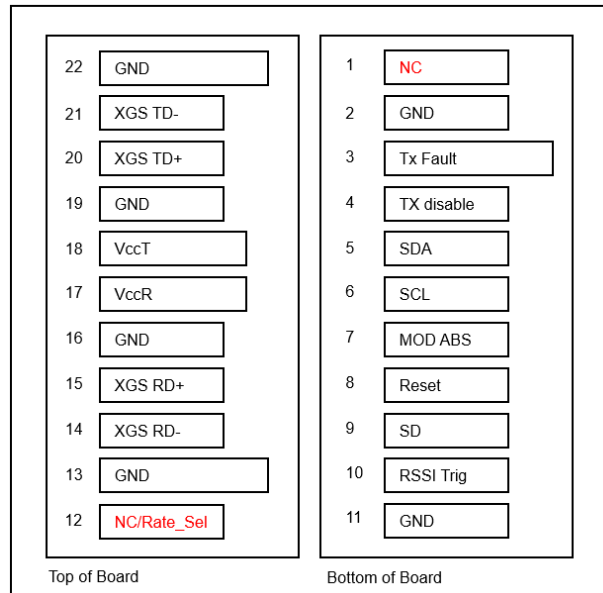
## Pin Descriptions

Pin	Symbol	Name	Ref.
1	NC	Not connected	Note1
2	NC/GND	Not connected/Ground	NC@ VER.A, Ground @ VER.B
3	Tx_Fault	Tx_Fault	Ground @ Ver.A, TxFault @ Ver.B
4	TX Disable	Transmitter Disable	
5	SDA	2 wire serial ID interface, SDA	Note2
6	SCL	2 wire serial ID interface, SCL	Note2
7	MODE_ABS	Tied to GND	
8	Reset	Reset for XGS-PON receiver	
9	SD	Signal Detect	
10	RSSI Trig	RSSI Trigger input	H-Follow; L-Hold
11	NC/GND	Not connected/Ground	NC@ Ver.A, Ground @ Ver.B
12	Rate_Sel /NC	Rate select Control input /NC	Rate_Sel@ Ver.A, NC@ Ver.B; Note 3
13	GND	Ground	
14	XGS-PON RD-	Inv. Received Data Output	CML, DC-coupling in module, coupling capacitor on board.
15	XGS-PON RD+	Received Data Output	CML, DC-coupling in module, coupling capacitor on board.
16	GND	Ground	
17	VccR	Receiver Power	3.3V± 5%
18	VccT	Transmitter Power	3.3V± 5%
19	NC/GND	Not connected/Ground	NC@ Ver.A, Ground @ Ver.B
20	XGS-PON TD+	Transmit Data Input	AC-coupled, differential lines with 100Ω differential termination inside the module
21	XGS-PON TD-	Inv. Transmit Data Input	AC-coupled, differential lines with 100Ω differential termination inside the module
22	GND	Ground	

### Note

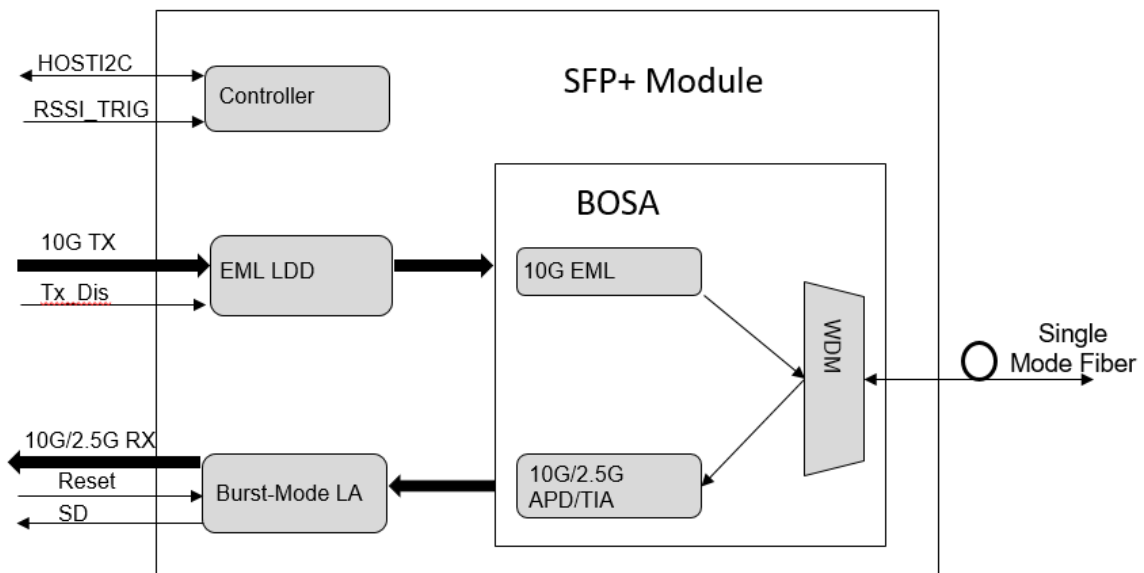
1. Ver.A is only can be used on the 22PIN system ;Ver.B can be adapted to 20 PIN or 22 PIN system.
2. Should be pulled up with a 4.7K~10Kohm resistor to VCC on the host board;
3. Use as Rate\_Sel to improve performance, H-9.953G, L-2.488G

## Pin-out Connector Block on Host Board



Pin-out of Connector Block on Host Board

## Transceiver Block Diagram



## Absolute Maximum Ratings

It has to be noted that the operation in excess of any individual absolute maximum ratings might cause permanent damage to this module.

Parameter	Symbol	Min	Typ	Max	Unit	Ref.
Maximum Supply Voltage	Vcc		3.3	3.6	V	
Maximum Input Voltage	Vin	0		3.6	V	
Storage temperature	Ts	-40		85	°C	
Relative humidity	RH	0		85	% Non-condensing	
Max Input power	Pmax	-3			dBm	

## Operating Environments

Electrical and optical characteristics below are defined under this operating environment, unless otherwise specified.

Parameter	Symbol	Min	Typ	Max	Unit	Ref.
Supply voltage	Vcc	3.135	3.3	3.465	V	
Case temperature	Top	-25		85	°C	
Data Rate			TX:9.953 RX: 9.953/2.488		Gbps	
ODN Class			E1			
Link distance with G.652		0.002		20	km	

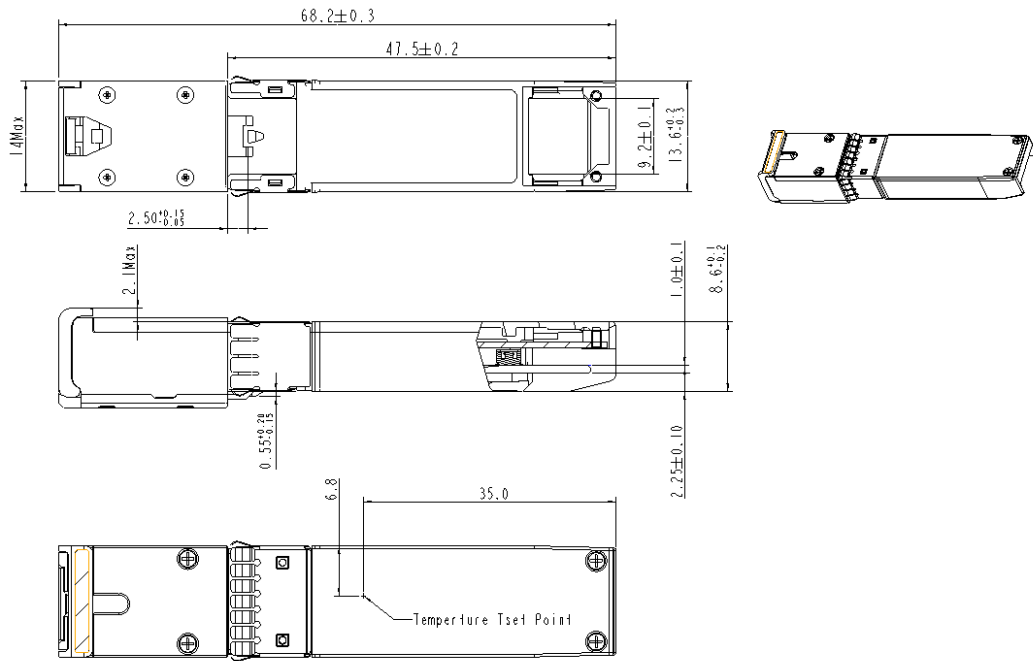
## Electrical Characteristics

Parameter	Symbol	Min	Typ	Max	Unit	Ref.
Power dissipation	P		2.0	-	W	
Supply current	Icc		-	0.79	A	Steady state
Maximum Peak Current	Ipc		-	0.95	A	
Input differential impedance	Z <sub>IN</sub>	80	100	120	Ω	
Differential data input swing	V <sub>IN</sub>	120	-	820	mV	AC Couple
Differential data output swing	V <sub>OUT</sub>	340	600	850	mV	CML
Tx Disable input Voltage	V <sub>IL</sub>	0		0.8	V	
	V <sub>IH</sub>	2		3.3	V	
SD output voltage	Fault	0	-	0.4	V	
	Normal	2	-	3.3	V	

## Optical Characteristics

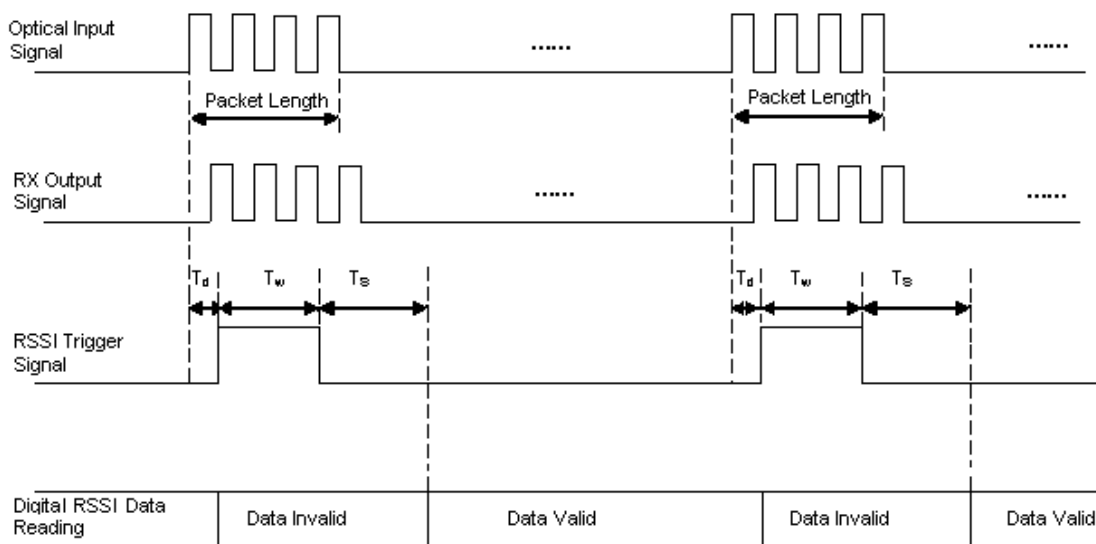
Parameter	Symbol	Min	Typ	Max	Unit	Ref.
<b>Transmitter</b>						
Laser type			EML			
Nominal bit rate			9.95328		Gbit/s	
Output average power(EOL)		+6		+9	dBm	
Center wavelength		1575	1577	1580	nm	
Spectral width (-20 dB width)		-		1.0	nm	
Extinction ratio		8.2			dB	
Eye Mask Margin (1000 consecutive snapshots at typical rate and room temperature)			5%(ITU-T G.987.2 compliant)		%	
Side-Mode Suppression Ratio		30			dB	
Optical Power at Tx_disable				-39	dBm	
<b>Receiver</b>						
Receive wavelengths		1260	1270	1280	nm	
Sensitivity @Condition (BER=1*10 <sup>-4</sup> , 2.488Gbps, PRBS 2 <sup>23</sup> -1, NRZ)				-31.5	dBm	
Saturation power(2.488Gbps, Full temperature, EOL)		-11			dBm	
Sensitivity @Condition (BER=1*10 <sup>-4</sup> , 9.953Gbps, PRBS 2 <sup>31</sup> -1, NRZ)				-30	dBm	
Saturation power(9.953Gbps, Full temperature, EOL)		-9			dBm	
Max Input power		-3			dBm	
SDA@ 9.953Gbps				-31	dBm	
SDA@2.488Gbps				-32.5	dBm	
SDD		-45			dBm	
Receiver reflectance				-20	dB	
Optical Return Loss tolerance		10			dB	

## Mechanical Specifications



APXGL52SEDSE1A

## RSSI timing requirement

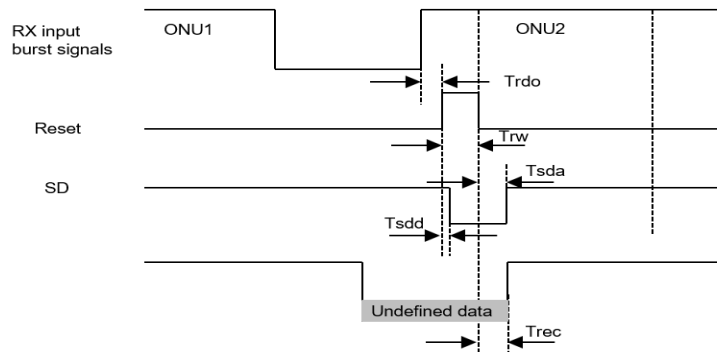


Parameter	Symbol	Min	Typ	Max	Unit	Ref.
Trigger delay	Td	1600			ns	
Trigger width	Tw	300	600	800	ns	1
I2C read time	TI2C	500			us	

**Note**

1. Higher precision at width longer than 600ns , customer can choose the width according to the accuracy requirements.

### SD timing requirement



Parameter	Symbol	Min	Typ	Max	Unit	Ref.
XGS-PON SD Assert Time	Tsda2			50	ns	
XGS-PON SD De-assert Time	Tsdd2		12.8	25.6	ns	
Data Recovery Time	Trec		25.6	50	ns	
Reset Width	Trw	25.6			ns	
Reset Delay Time during Operating	Trdo	0			ns	

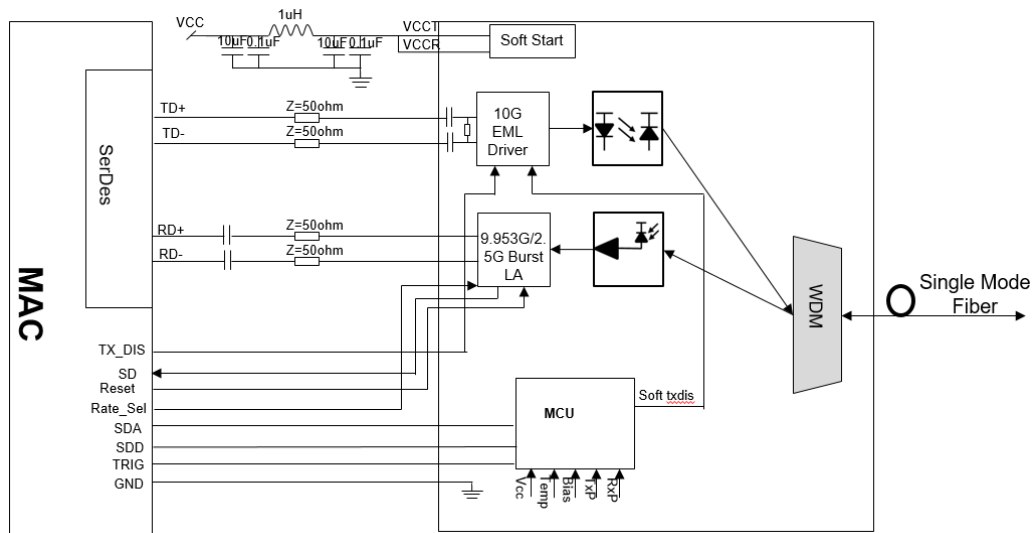
### Rate\_Sel timing requirement





Parameter	Symbol	Min	Typ	Max	Unit	Ref.
Rate_Sel Preset Time	Tpre	12.8			ns	
Rate_Sel Hold Time	Thold	12.8			ns	

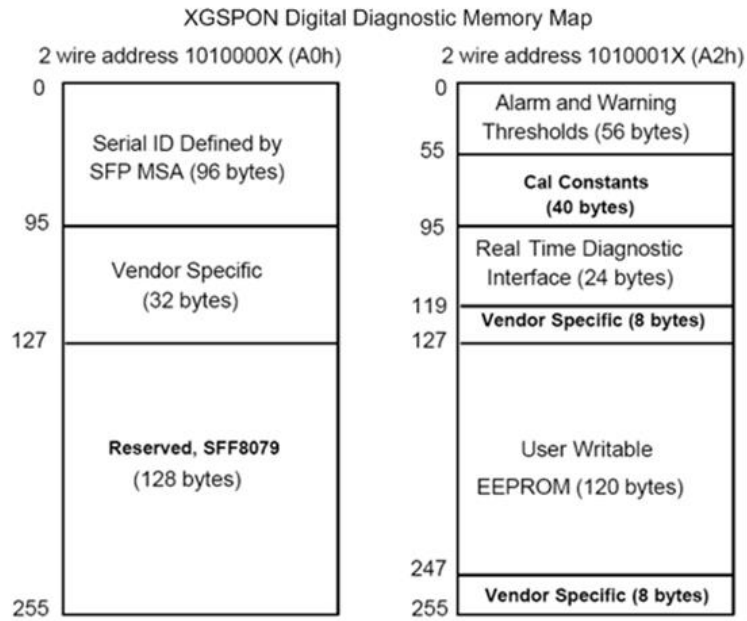
### Electrical Interface



### Timing requirement of control and status I/O

Parameter	Symbol	Min	Typ	Max	Unit	Ref.
TX Disable Assert Time	t_off			100	us	
TX Disable Negate Time	t_on			2	ms	
Time to initialize	t_init			300	ms	

## EEPROM Definitions



## Digital Diagnostic Monitoring Functions

APXGL52SEDSE1A supports the I2C-based diagnostic monitoring interface (DMI) defined in document SFF-8472. The host can access real-time performance of the transmitter and receiver optical power, temperature, supply voltage and bias current.

Parameter	Related Bytes (A2[00] Memory)	Accuracy	Ref.
Temperature	96-97	±3°C	Floating/256 Note 1,2
Vcc Voltage	98-99	<3%	Unit 1mV Note 2
Bias Current	100-101	<10%	Unit 4uA Note 2
TX Power	102-103	<3dB	Unit 0.2uW Note 2
RX Power	104-105	<3dB	Unit 0.1uW Note 2,3

### Note

1. An actual temperature test point is fixed on the module case around the laser array.
2. Full operating temperature range.
3. RSSI DDM working range is between -12 to -32dBm.



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