



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

APXGL52SCDSE1A



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ATOP's APXGL52SCDSE1A 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: 0 to 70 °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 |
|----------------|-----------------------|------|
| APXGL52SCDSE1A | Commercial | Yes |

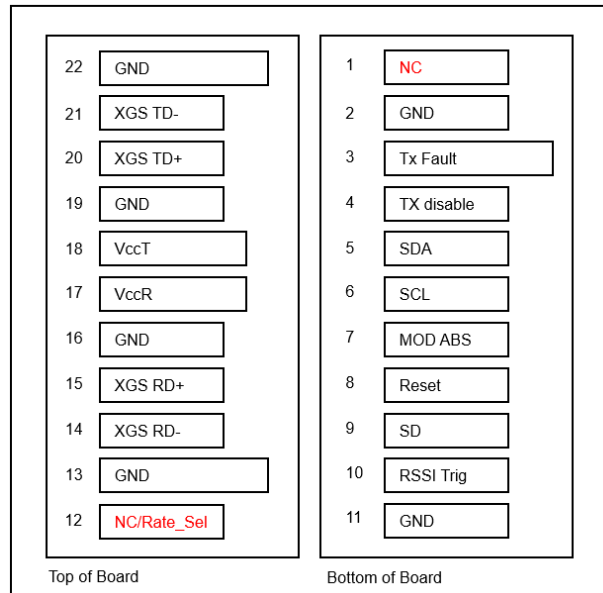
Pin Descriptions

| 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

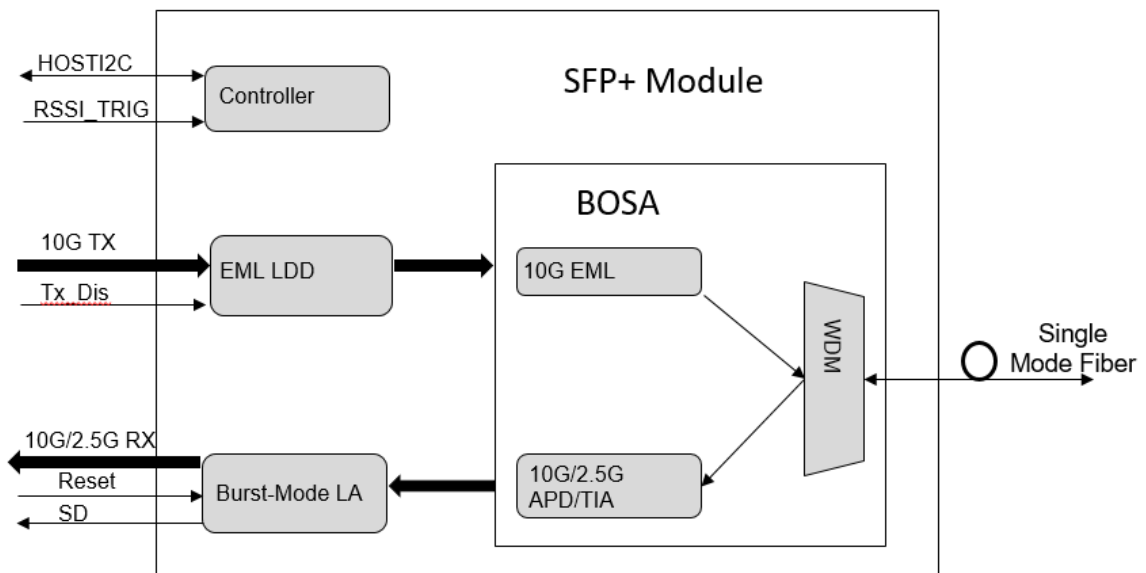
1. Ver.A is only can be used on the 22PIN system ;Ver.B can be adapted to 20 PIN or 22 PIN system.
2. Should be pulled up with a 4.7K~10Kohm resistor to VCC on the host board;
3. Use as Rate_Sel to improve performance, H-9.953G, L-2.488G

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 | 0 | | 70 | °C | |
| Data Rate | | | TX:9.953 RX: 9.953/2.488 | | Gbps | |
| ODN Class | | | E1 | | | |
| Link distance with G.652 | | 0.002 | | 20 | km | |

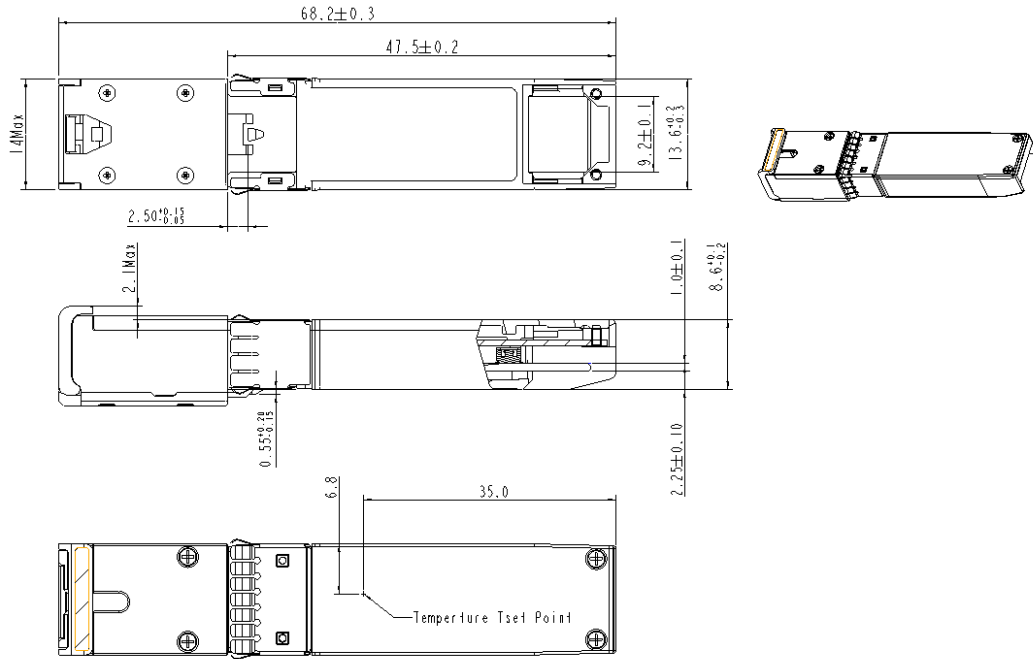
Electrical Characteristics

| 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 _{IN} | 80 | 100 | 120 | Ω | |
| Differential data input swing | V _{IN} | 120 | - | 820 | mV | AC Couple |
| Differential data output swing | V _{OUT} | 340 | 600 | 850 | mV | CML |
| Tx Disable input Voltage | V _{IL} | 0 | | 0.8 | V | |
| | V _{IH} | 2 | | 3.3 | V | |
| SD output voltage | Fault | 0 | - | 0.4 | V | |
| | Normal | 2 | - | 3.3 | V | |

Optical Characteristics

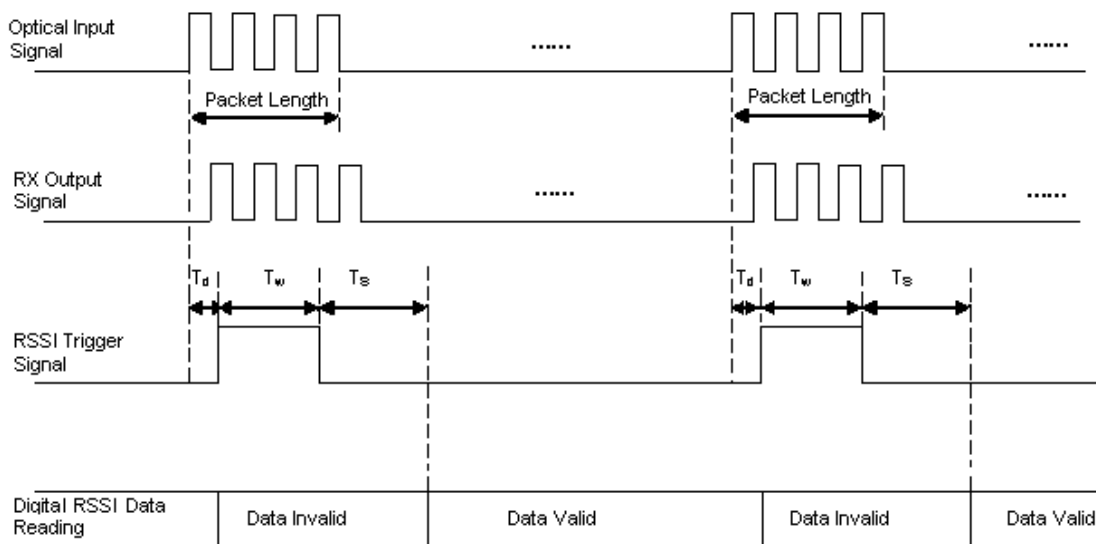
| Parameter | Symbol | Min | Typ | Max | Unit | Ref. |
|---|--------|------|-----------------------------|-------|--------|------|
| Transmitter | | | | | | |
| Laser type | | | EML | | | |
| Nominal bit rate | | | 9.95328 | | Gbit/s | |
| Output average power(EOL) | | +6 | | +9 | dBm | |
| Center wavelength | | 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 | |
| Receiver | | | | | | |
| Receive wavelengths | | 1260 | 1270 | 1280 | nm | |
| Sensitivity @Condition (BER=1*10 ⁻⁴ , 2.488Gbps, PRBS 2 ²³ -1, NRZ) | | | | -31.5 | dBm | |
| Saturation power(2.488Gbps, Full temperature, EOL) | | -11 | | | dBm | |
| Sensitivity @Condition (BER=1*10 ⁻⁴ , 9.953Gbps, PRBS 2 ³¹ -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



APXGL52SCDSE1A

RSSI timing requirement

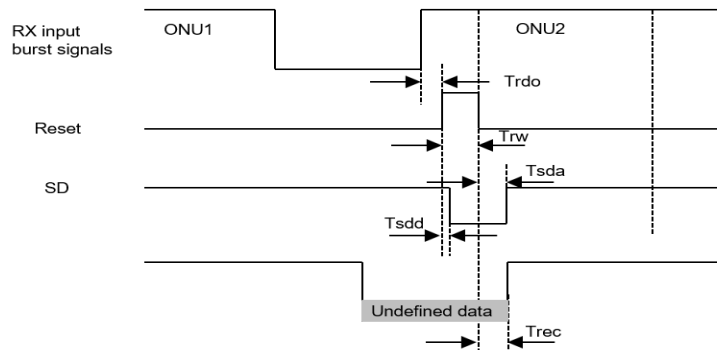


| Parameter | Symbol | Min | Typ | Max | Unit | Ref. |
|---------------|--------|------|-----|-----|------|------|
| Trigger delay | Td | 1600 | | | ns | |
| Trigger width | Tw | 300 | 600 | 800 | ns | 1 |
| I2C read time | TI2C | 500 | | | us | |

Note

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

SD timing requirement



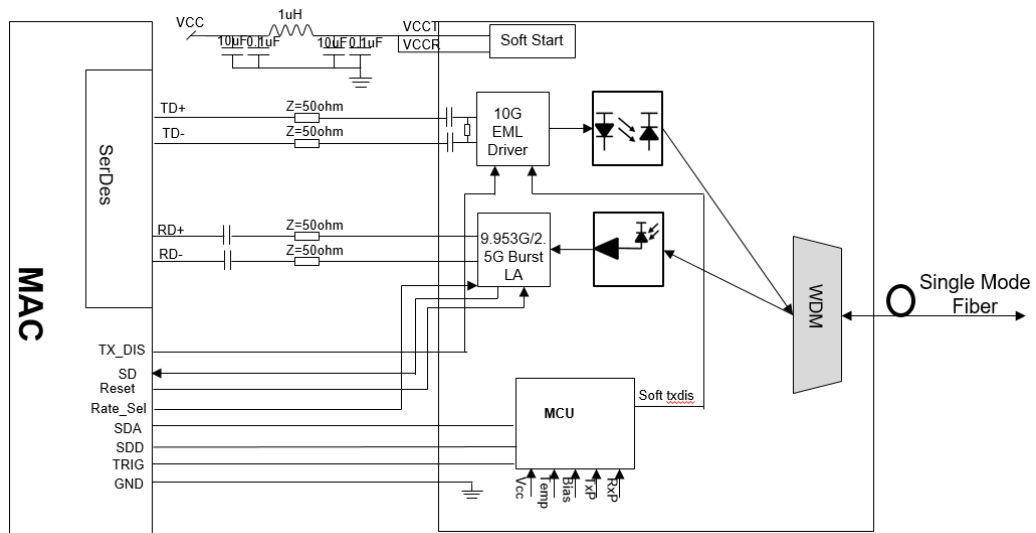
| Parameter | Symbol | Min | Typ | Max | Unit | Ref. |
|-----------------------------------|--------|------|------|------|------|------|
| XGS-PON SD Assert Time | Tsda2 | | | 50 | ns | |
| XGS-PON SD De-assert Time | Tsdd2 | | 12.8 | 25.6 | ns | |
| Data Recovery Time | Trec | | 25.6 | 50 | ns | |
| 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 | |

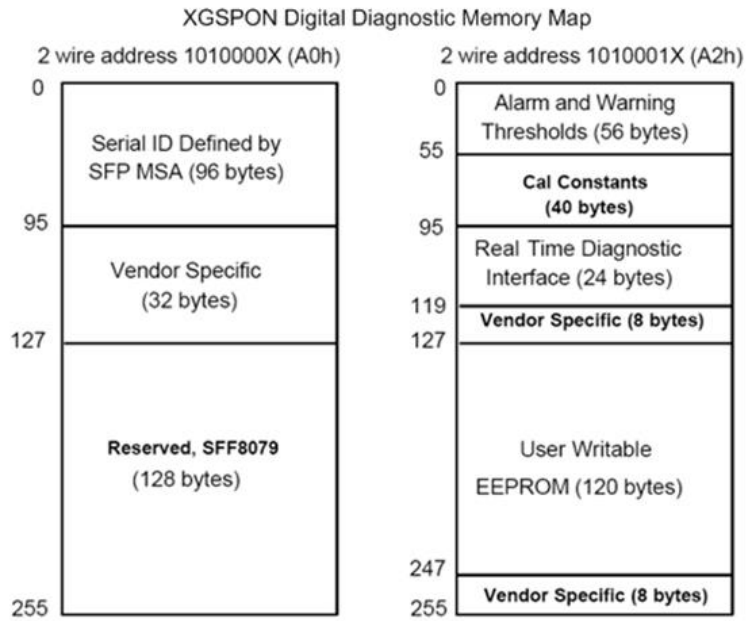
Electrical Interface



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

APXGL52SCDSE1A 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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