



10.3Gb/s SFP+ Transceiver

APSP55HM3xDL40



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ATOP's APSP55HM3xDL40 Small Form Factor Pluggable (SFP+) transceivers are compatible with SFF-8431, SFF-8432 and support 10G Ethernet ER and 10G Fibre Channel . It is designed for use in 10G-Gigabit multi-rate links up to 40km of G.652 . Digital diagnostics functions are available via a 2-wire serial interface as specified in SFF-8472.

Product Features

- ✓ Supports 9.95 to 11.3Gb/s
- ✓ Duplex LC connector
- ✓ Hot-pluggable SFP footprint
- ✓ Cooled 1550nm EML laser
- ✓ RoHS compliant and Lead Free
- ✓ 40km link length
- ✓ Metal enclosure for lower EMI
- ✓ Built-in dual CDR
- ✓ Power dissipation
- ✓ <2.0W (0~70 °C), <2.3W(0~85 °C) , <2.3W(-40~85 °C)
- ✓ Commercial and industrial operating temperature optional
- ✓ SFP MSA SFF-8472 SFF-8431 SFF-8432 IEEE 802.3 Compliant

Applications

- ✓ 10G Ethernet ER and 10G Fibre Channel
- ✓ OTN G.709 OTU1e/2/2e FEC bit rates
- ✓ SDH STM-64



Product Selection

| Part Number | Operating Case temperature | DDMI |
|----------------|----------------------------|------|
| APSP55HM3CDL40 | Commercial(0~+70 °C) | Yes |
| APSP55HM3EDL40 | Extend(0~+85 °C) | Yes |
| APSP55HM3IDL40 | Industrial(-40~85 °C) | Yes |

Regulatory Compliance

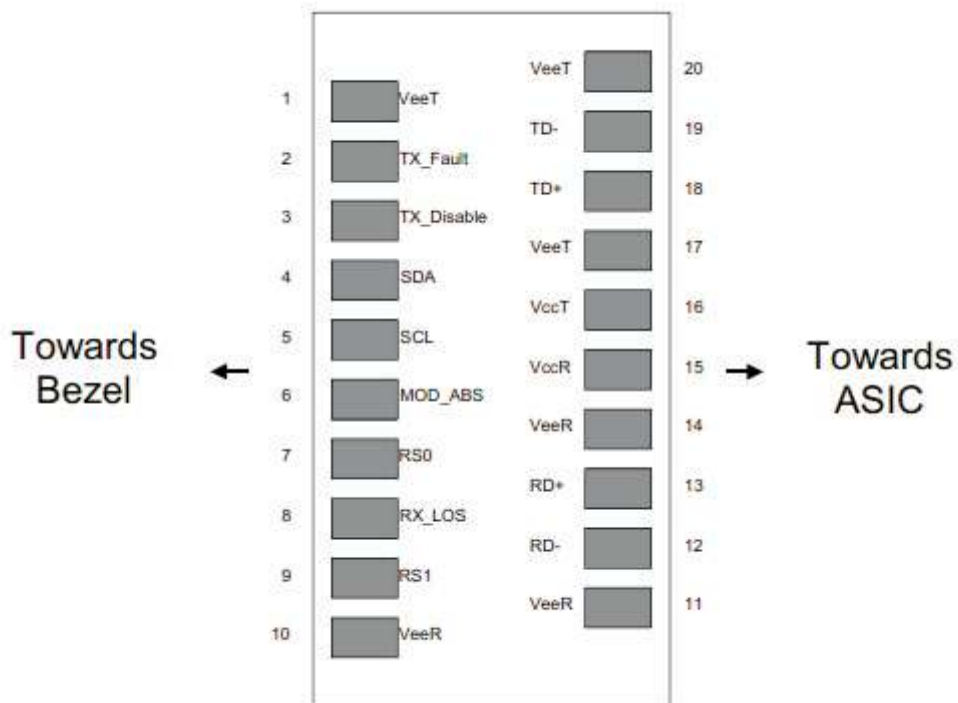
- ESD to the Electrical PINs: compatible with MIL-STD-883 Method 3015
- ESD to the Duplex LC Receptacle: compatible with EN 61000-4-2
- Immunity compatible with EN 61000-4-3
- EMI compatible with FCC Part 15 Class B
- Laser Eye Safety compatible with FDA 21CFR 1040.10 and 1040.11 IEC 60950, IEC60825-1,2
- RoHS compliant with RoHS 2.0(2015/863/EU)-amending.

Pin Descriptions

| Pin | Symbol | Name | Ref. |
|-----|------------|---|------|
| 1 | VeeT | Transmitter Ground (Common with Receiver Ground) | 1 |
| 2 | TX Fault | Transmitter Fault. LVTTTL-O | 2 |
| 3 | TX Disable | Transmitter Disable. Laser output disabled on high or open. LVTTTL-I | 3 |
| 4 | SDA | 2-Wire Serial Interface Data Line (Same as MOD-DEF2 in INF-8074i). LVTTTL-I/O | 2 |
| 5 | SCL | 2-Wire Serial Interface Data Line (Same as MOD-DEF2 in INF-8074i). LVTTTL-I | 2 |
| 6 | Mod_ABS | Module Absent, Connect to VeeT or VeeR in Module. | 2 |
| 7 | RS0 | Rate Select 0, optionally controls SFP+ module receiver LVTTTL-I | 4 |
| 8 | LOS | Loss of Signal indication. Logic 0 indicates normal operation. LVTTTL-O | 5 |
| 9 | RS1 | Rate Select 1, optionally controls SFP+ module transmitter. LVTTTL-I | 4 |
| 10 | VeeR | Receiver Ground (Common with Transmitter Ground) | 1 |
| 11 | VeeR | Receiver Ground (Common with Transmitter Ground) | 1 |
| 12 | RD- | Receiver Inverted DATA out. AC Coupled. CML-O | |
| 13 | RD+ | Receiver Non-inverted DATA out. AC Coupled. CML-O | |
| 14 | VeeR | Receiver Ground (Common with Transmitter Ground) | 1 |
| 15 | VccR | Receiver Power Supply | 6 |
| 16 | VccT | Transmitter Power Supply | 6 |
| 17 | VeeT | Transmitter Ground (Common with Receiver Ground) | 1 |
| 18 | TD+ | Transmitter Non-Inverted DATA in. AC Coupled. CML- I | |
| 19 | TD- | Transmitter Inverted DATA in. AC Coupled. CML- I | |
| 20 | VeeT | Transmitter Ground (Common with Receiver Ground) | 1 |

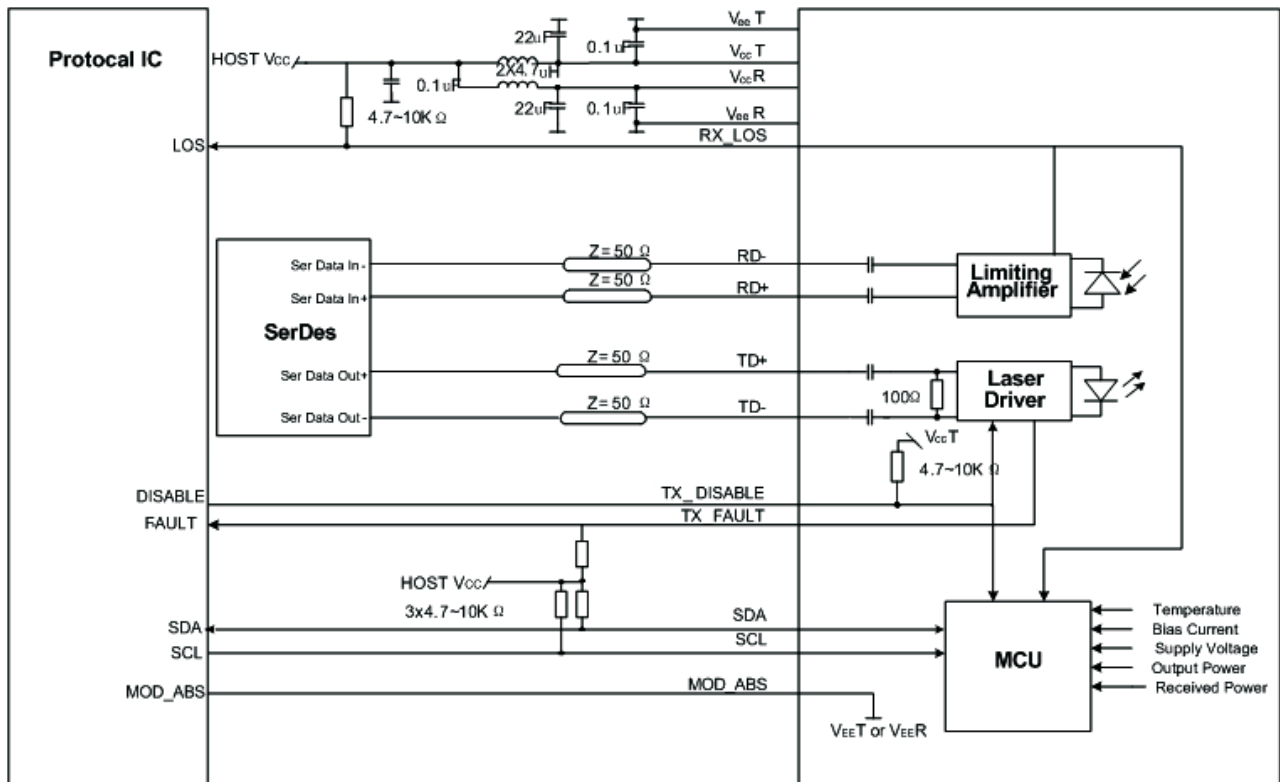
Note

1. Circuit ground is internally isolated from chassis ground.
2. TX Fault is an open collector/drain output .Which should be pulled up with a 4.7K – 10K Ohms resistor on the host board if intended for use. Pull up voltage should be between 2.0V to Vcc+0.3V.A high output indicates a transmitter fault caused by either the tx bias current or the tx output power exceeding the preset alarm thresholds. A low output indicates normal operation .In the low state, the output is pulled to <math><0.8V</math>.
3. Laser output disabled on TX Disable >2.0V or open, enabled on TX Disable<math><0.8V</math>.
4. Internally pulled down per SFF-8431 Rev4.1.
5. LOS is open collector output. Should be pulled up with 4.7k – 10kohms on host board to a voltage between 2.0V and 3.6V. Logic 0 indicates normal operation; logic 1 indicates loss of signal.
6. Internally connected



Pin-out of Connector Block on Host Board

Recommend Circuit Schematic



Absolute Maximum Ratings

| Parameter | Symbol | Min | Typ | Max | Unit | Ref. |
|------------------------|--------|------|-----|------|------|------|
| Maximum Supply Voltage | Vcc | -0.5 | | +4.0 | V | |
| Storage Temperature | TS | -40 | | +85 | °C | |
| Operating Humidity | RH | 0 | | 85 | % | |

Recommended Operating Conditions

| Parameter | Symbol | Min | Typ | Max | Unit | Ref. |
|----------------------------|--------|------|------|------|------|------------|
| Power Supply Voltage | Vcc | 3.13 | 3.30 | 3.47 | V | |
| Power Supply Current | Icc | | | 600 | mA | Commercial |
| | Icc | | | 700 | mA | Extend |
| | Icc | | | 700 | mA | Industrial |
| Case Operating Temperature | Tc | 0 | | +70 | °C | Commercial |
| | Te | 0 | | +85 | °C | Extend |
| | Tl | -40 | | +85 | °C | Industrial |
| Bit Rate | Br | 9.95 | | 11.3 | Gbps | |
| 9/125um G.652 SMF | Lmax | | | 40 | km | |

Electrical Characteristics

| Parameter | Symbol | Min | Typ | Max | Unit | Ref. |
|--------------------------------|----------|-----------|-----|----------|------|------|
| Transmitter | | | | | | |
| Input differential impedance | Rin | 80 | 100 | 120 | Ω | 1 |
| Differential data input swing | Vin, pp | 120 | | 850 | mV | |
| TX Disable-High | | Vcc – 0.8 | | Vcc | V | |
| TX Disable-Low | | Vee | | Vee+ 0.8 | V | |
| TX Fault-High | | Vcc-0.8 | | Vcc | V | |
| TX Fault-Low | | Vee | | Vee+0.8 | V | |
| Receiver | | | | | | |
| Differential data output swing | Vout, pp | 300 | | 850 | mV | 2 |
| Data output rise time | Tr | 28 | | | ps | 3 |
| Data output fall time | Tf | 28 | | | ps | 3 |
| LOS-High | | Vcc – 0.8 | | Vcc | V | |
| LOS-Low | | Vee | | Vee+0.8 | V | |

Notes:

1. AC coupled.
2. Into 100 ohm differential termination.
3. 20 – 80 %

Optical Characteristics

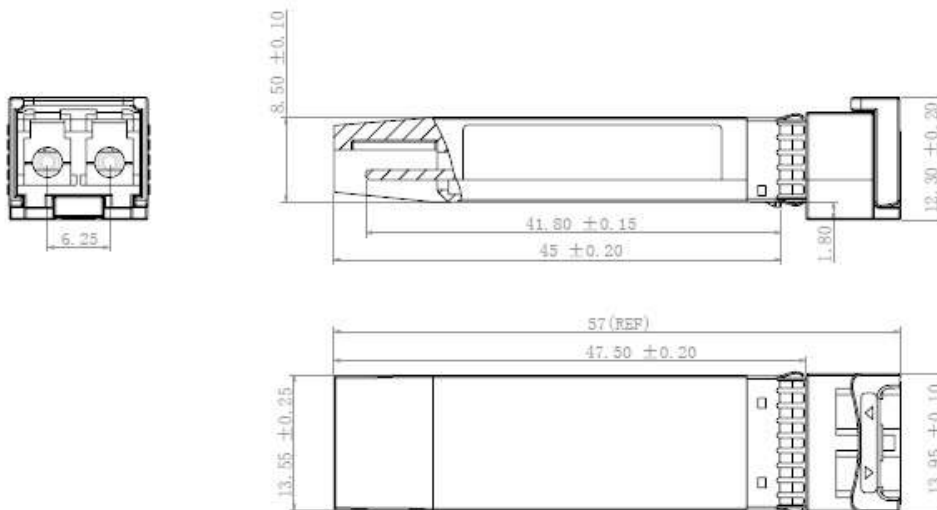
| Parameter | Symbol | Min | Typ | Max | Unit | Ref. |
|-----------------------------------|-------------|------|-----|-------|-------|------|
| Transmitter | | | | | | |
| Output Opt. Power | PO | -3 | | +4 | dBm | |
| Optical Wavelength | λ | 1530 | | 1565 | nm | |
| Side-Mode Suppression Ratio | SMSR | 30 | | | dB | |
| RMS Spectral Width(-20dB) | σ | | | 1 | nm | |
| Relative Intensity Noise | RIN | | | -128 | dB/Hz | |
| Path penalty at 800ps/nm@9.95Gb/s | | | | 2 | dB | |
| Optical Extinction Ratio | ER | 8.2 | | | dB | |
| Receiver | | | | | | |
| RX Sensitivity @10.3Gb/s | SENS | | | -15.8 | dBm | 1,2 |
| Receiver Overload | | -1 | | | dBm | |
| Optical Center Wavelength | λ_C | 1260 | | 1600 | nm | |
| LOS De-Assert | LOSD | | | -20 | dBm | |
| LOS Assert | LOSA | -34 | | | dBm | |
| LOS Hysteresis | | 0.5 | | | dB | |

Notes:

- 1.Measured with conformance signals defined in FC-PI-2 Rev. 10.0 specifications.
- 2.Measured with PRBS 2³¹-1 at 10⁻¹²BER.

Mechanical Specifications

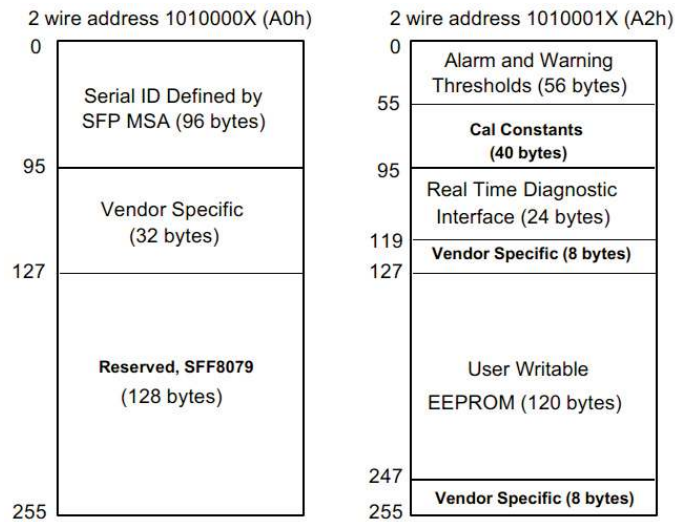
- ATOP's Small Form Factor Pluggable (SFP+) transceivers are compatible with the dimensions defined by the SFP Multi-Sourcing Agreement (MSA) .



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EEPROM Information

- EEPROM memory map specific data field description is as below:



Digital Diagnostic Monitoring Interface

Five transceiver parameter values are monitored. The following table defines the monitored parameter's accuracy.

| Parameter | Range | Accuracy | Calibration |
|--------------|------------------|----------|-------------|
| Temperature | 0 to +70°C (C) | ±3°C | Internal |
| | 0 to +85°C (E) | | |
| | -40 to +85°C (I) | | |
| Voltage | 2.97 to 3.63V | ±3% | Internal |
| Bias Current | 0 to 100mA | ±10% | Internal |
| TX Power | -1 to 4dBm | ±3dB | Internal |
| RX Power | -16 to -1dBm | ±3dB | Internal |

Revision History

| Revision | Initiated | Reviewed | Approved | DCN | Release Date |
|------------|--------------|------------|-----------|----------------------------------|---------------|
| Version1.0 | Xiaoiyou | Sunbin | Dingzheng | New Released. | July 28, 2016 |
| Version1.1 | Tangzhiqiang | Yangpeiyun | Dingzheng | Update the new template | Dec 19, 2019 |
| Version1.2 | Tangrong | Yangpeiyun | Dingzheng | Update the regulatory compliance | June 4, 2020 |



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