



1.25Gb/s RoHS Compliant Pluggable  
BiDi SFP Transceiver

## APSB43123xxL20

### Product Features

- Up to 1.25Gb/s data links
- Single LC connector
- Hot-pluggable SFP footprint
- 1490nm DFB laser transmitter
- 1310nm InGaAs PIN receiver
- RoHS compliant and Lead Free
- Up to 20km on 9/125um SMF
- Metal enclosure for lower EMI
- Single +3.3V power supply
- Low power dissipation <800mW
- Commercial and industrial operating temperature optional
- SFP MSA SFF-8074i Compliant

### Applications

- Gigabit Ethernet
- 1x Fibre Channel

### General

ATOP's APSB43123xxL20 Small Form Factor Pluggable (SFP) transceivers are compatible with the Small Form Factor Pluggable Multi-Sourcing Agreement (MSA). The SFP transceivers are high performance, cost effective modules supporting Gigabit Ethernet and 20km transmission distance with SMF. They are RoHS compliant and lead-free.

### Product Selection

| Part Number    | Operating temperature | DDMI |
|----------------|-----------------------|------|
| APSB43123CXL20 | Commercial            | No   |
| APSB43123CDL20 | Commercial            | Yes  |
| APSB43123IXL20 | Industrial            | No   |
| APSB43123IDL20 | Industrial            | Yes  |

## Regulatory Compliance

- ESD to the Electrical PINs: compatible with MIL-STD-883 Method 3015
- ESD to the LC Receptacle: compatible with IEC 61000-4-2
- Immunity compatible with IEC 61000-4-3
- EMI compatible with FCC Part 15 Class B EN55022 Class B (CISPR 22B) VCCI Class B
- Laser Eye Safety compatible with FDA 21CFR 1040.10 and 1040.11 EN60950, EN (IEC) 60825-1,2
- RoHs compliant with 2002/95/EC 4.1&4.2 2005/747/EC

## Pin Descriptions

| Pin | Symbol      | Name/Description   | Ref. |
|-----|-------------|--|------|
| 1   | VeeT        | Transmitter Ground (Common with Receiver Ground)               | 1    |
| 2   | TX Fault    | Transmitter Fault.   |      |
| 3   | TX Disable  | Transmitter Disable. Laser output disabled on high or open.    | 2    |
| 4   | MOD_DEF(2)  | Module Definition 2. Data line for Serial ID.                  | 3    |
| 5   | MOD_DEF(1)  | Module Definition 1. Clock line for Serial ID.                 | 3    |
| 6   | MOD_DEF(0)  | Module Definition 0. Grounded within the module.               | 3    |
| 7   | Rate Select | No connection required   |      |
| 8   | LOS         | Loss of Signal indication. Logic 0 indicates normal operation. | 4    |
| 9   | VeeR        | Receiver Ground (Common with Transmitter Ground)               | 1    |
| 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                         |      |
| 13  | RD+         | Receiver Non-inverted DATA out. AC Coupled                     |      |
| 14  | VeeR        | Receiver Ground (Common with Transmitter Ground)               | 1    |
| 15  | VccR        | Receiver Power Supply  |      |
| 16  | VccT        | Transmitter Power Supply                                       |      |
| 17  | VeeT        | Transmitter Ground (Common with Receiver Ground)               | 1    |
| 18  | TD+         | Transmitter Non-Inverted DATA in. AC Coupled.                  |      |
| 19  | TD-         | Transmitter Inverted DATA in. AC Coupled.                      |      |
| 20  | VeeT        | Transmitter Ground (Common with Receiver Ground)               | 1    |

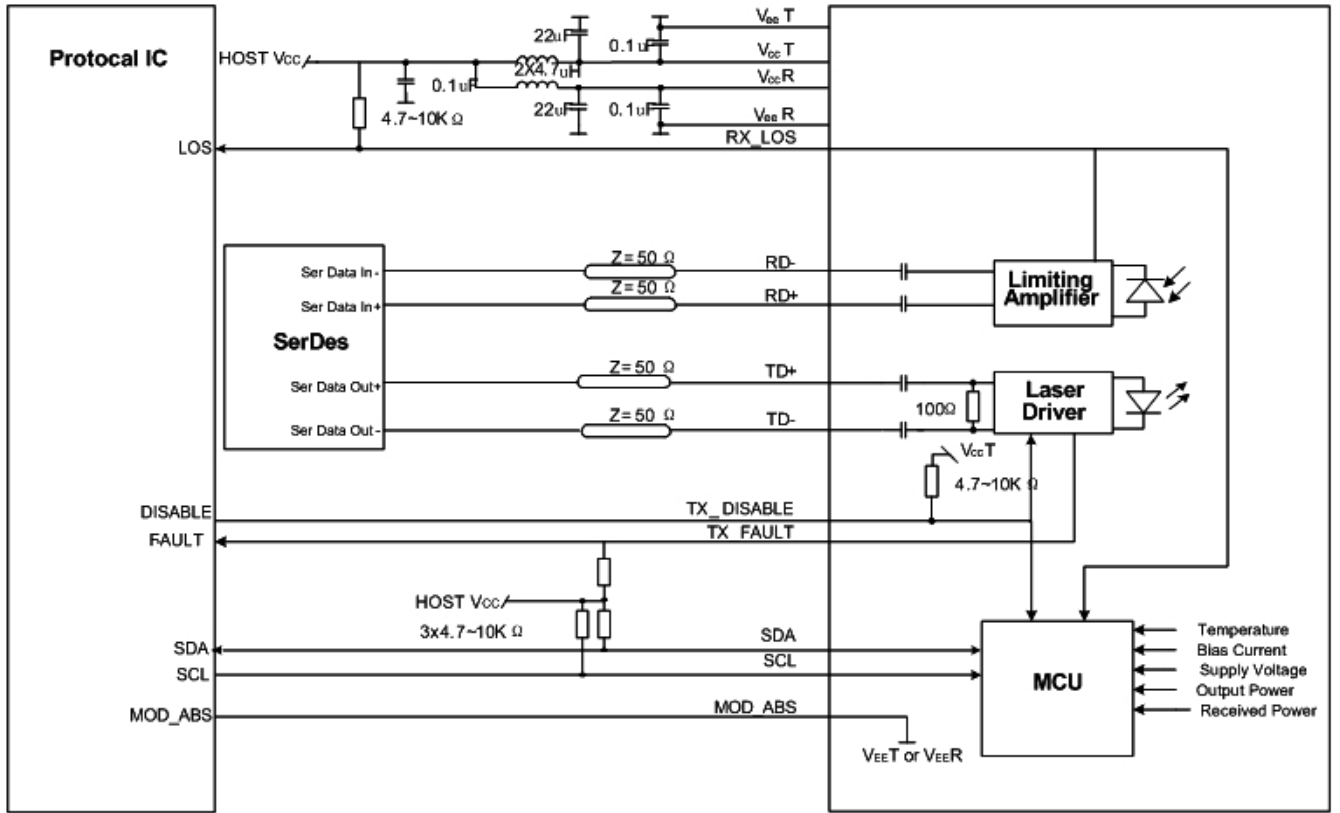
### Notes:

1. Circuit ground is internally isolated from chassis ground.
2. Laser output disabled on TX Disable >2.0V or open, enabled on TX Disable <0.8V.
3. Should be pulled up with 4.7k - 10kohms on host board to a voltage between 2.0V and 3.6V. MOD\_DEF(0) pulls line low to indicate module is plugged in.
4. 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.



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     | 5    | -   | 95   | %    |      |

## 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    | -    | -    | 250  | mA   |      |
| Case Operating Temperature  | Tc     | 0    | -    | +70  | °C   | 1    |
|                             | Ti     | -40  | -    | +85  |      | 2    |
| Data Rate(Gigabit Ethernet) | -      | -    | 1.25 | -    | Gbps |      |
| 9/125um G.652 SMF           | Lmax   | -    | -    | 20   | km   |      |

### Notes:

1. For commercial class product.
2. For industrial class product.

## Electrical Characteristics (TOP=25°C, Vcc=3.3Volts)

| Parameter                      | Symbol   | Min       | Typ | Max      | Unit | Ref. |
|--------------------------------|----------|-----------|-----|----------|------|------|
| <b>Transmitter</b>             |          |           |     |          |      |      |
| Input differential impedance   | Rin      | -         | 100 | -        | Ω    | 1    |
| Single ended data input swing  | Vin, pp  | 250       | -   | 1200     | mV   |      |
| TX Disable-High                | -        | Vcc – 1.3 | -   | Vcc      | V    |      |
| TX Disable-Low                 | -        | Vee       | -   | Vee+ 0.8 | V    |      |
| TX Fault-High                  | -        | Vcc-0.5   | -   | Vcc      | V    |      |
| TX Fault-Low                   | -        | Vee       | -   | Vee+0.5  | V    |      |
| <b>Receiver</b>                |          |           |     |          |      |      |
| Single ended data output swing | Vout, pp | 300       | 400 | 800      | mV   | 2    |
| Data output rise time          | tr       | -         | -   | 175      | ps   | 3    |
| Data output fall time          | tf       | -         | -   | 175      | ps   | 3    |
| LOS-High                       | -        | Vcc – 0.5 |     | Vcc      | V    |      |
| LOS-Low                        | -        | Vee       |     | Vee+0.5  | V    |      |

### Notes:

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

## Optical Characteristics (TOP=25°C, Vcc=3.3 Volts)

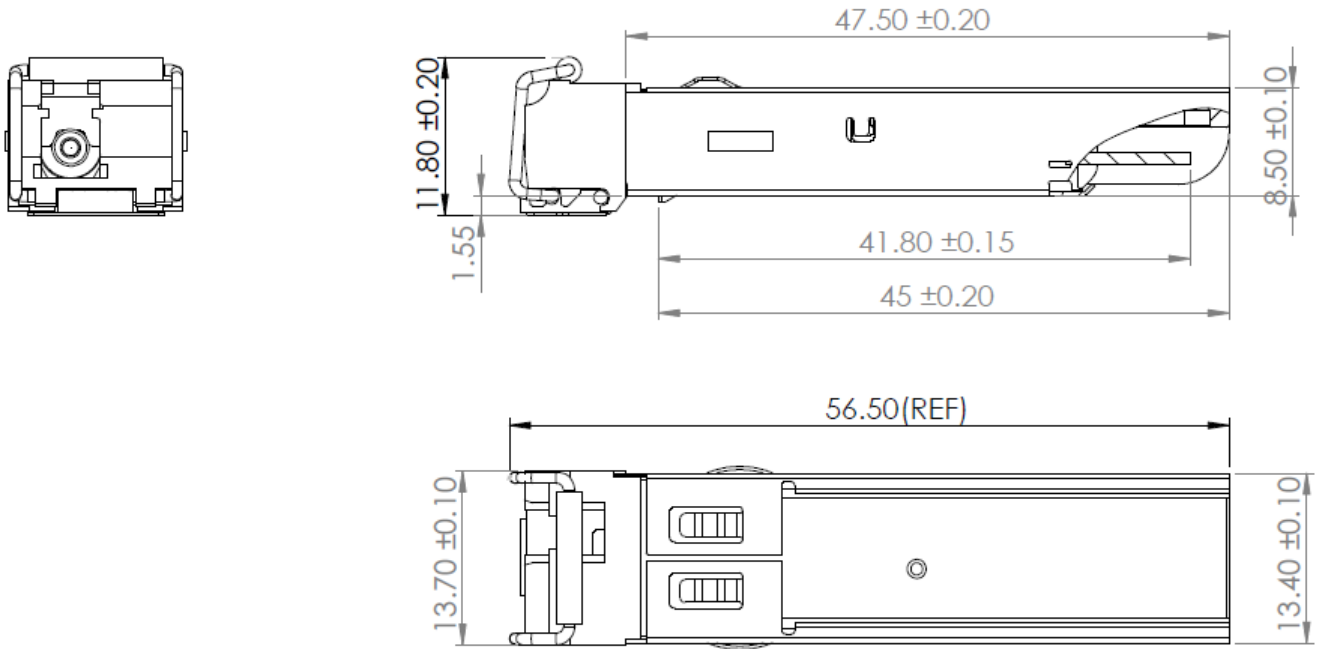
| Parameter                   | Symbol            | Min  | Typ  | Max  | Unit | Ref. |
|-----------------------------|-------------------|------|------|------|------|------|
| <b>Transmitter</b>          |                   |      |      |      |      |      |
| Output Opt. Power           | PO                | -9   | -    | -3   | dBm  | 1    |
| Optical Wavelength          | $\lambda$         | 1470 | 1490 | 1510 | nm   |      |
| Spectral Width              | $\sigma$          | -    | -    | 1    | nm   |      |
| Side Mode Suppression Ratio | SMSR              | 30   | -    | -    | dB   |      |
| Optical Rise/Fall Time      | tr/tf             | -    | -    | 260  | ps   | 2    |
| Total Jitter                | TJ                | -    | -    | 200  | ps   |      |
| Optical Extinction Ratio    | ER                | 9    | -    | -    | dB   |      |
| <b>Receiver</b>             |                   |      |      |      |      |      |
| RX Sensitivity @ 1.25 Gb/s  | RSENS             | -    | -    | -25  | dBm  | 3, 4 |
| Maximum Received Power      | RX <sub>MAX</sub> | -2   | -    | -    | dBm  |      |
| Optical Center Wavelength   | $\lambda_C$       | 1275 | 1310 | 1350 | nm   |      |
| LOS De-Assert               | LOSD              | -    | -    | -26  | dBm  |      |
| LOS Assert                  | LOSA              | -40  | -    | -    | dBm  |      |
| LOS Hysteresis              | -                 | 0.5  | -    | 5    | dB   |      |

### Notes:

1. Class 1 Laser Safety.
2. Unfiltered, 20-80%. Complies with Gigabit Ethernet eye masks when filtered.
3. Measured with conformance signals defined in FC-PI-2 Rev. 10.0 specifications.
4. Measured with PRBS 2<sup>7</sup>-1 at 10<sup>-10</sup> BER.

## Mechanical Specifications

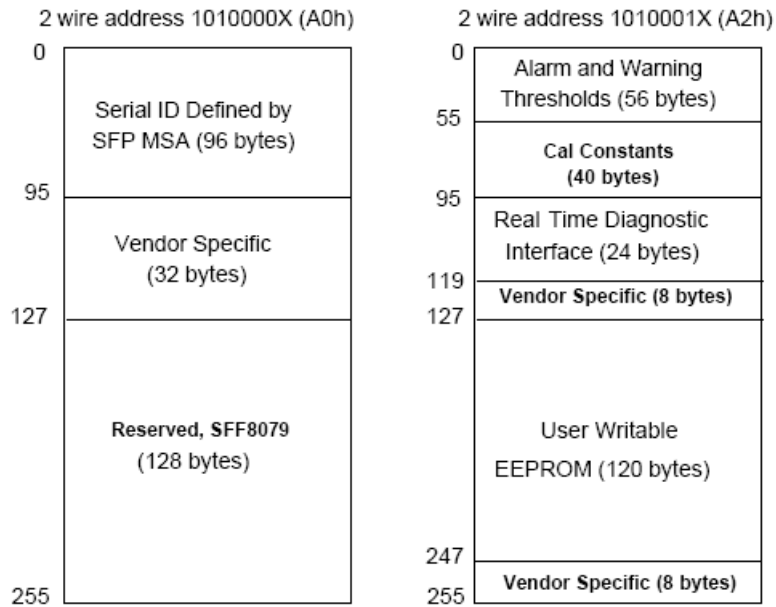
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**APSB43123xxL20**

## 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    |
|              | -40 to +85°C (I) |          |             |
| Voltage      | 2.97 to 3.63V    | ±3%      | Internal    |
| Bias Current | 0 to 100mA       | ±10%     | Internal    |
| TX Power     | -9 to -3dBm      | ±3dB     | Internal    |
| RX Power     | -25 to -2dBm     | ±3dB     | Internal    |

## For More Information

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