



# 10.3Gb/s XFP Transceiver

APX31HM0xDL10



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ATOP's APX31HM0xDL10 Small Form Factor 10Gb/s XFP transceivers are compatible with XFP MSA Specification .It is designed for use in 10G-Gigabit links up to 10km of G.652. Digital diagnostics functions are available via a 2-wire serial interface, as specified in the XFP MSA.

### Product Features

- ✓ Duplex LC connector
- ✓ Hot-pluggable XFP footprint
- ✓ 1310nm DFB laser
- ✓ RoHS compliant and Lead Free
- ✓ Up to 10km for single mode fiber
- ✓ Metal enclosure for lower EMI
- ✓ Built-in dual CDR
- ✓ +3.3V power supply and power dissipation <1.5W
- ✓ XFP MSA INF-8077I Compliant
- ✓ Compliant with IEEE 802.3ae

### Applications

- ✓ 10GBASE-LR/LW
- ✓ 10G Fibre Channel  
SONET OC-192 /SDH STM-64



## Product Selection

| Part Number   | Operating Case temperature | DDMI |
|---------------|----------------------------|------|
| APX31HM0CDL10 | Commercial(0~70°C)         | Yes  |
| APX31HM0IDL10 | 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, IEC 60825-1,2
- RoHS compliant with RoHS 2.0(2015/863/EU)-Amending

## Pin Descriptions

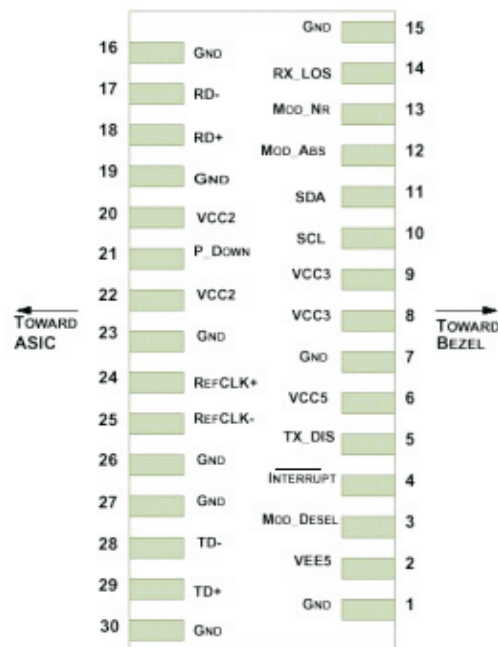
| Pin | Symbol     | Name   | Ref. |
|-----|------------|--|------|
| 1   | GND        | Module Ground  |      |
| 2   | VEE5       | Optional-5.2 Power Supply-not required   |      |
| 3   | MOD_DESEL  | Module De-select; When held low allows the module to respond to 2-wire serial interface. LVTTTL-I  |      |
| 4   | /INTERRUPT | Interrupt; Indicates presence of an important condition which can be read via the 2-wire serial interface. LVTTTL-O  | 2    |
| 5   | TX_DIS     | Transmitter Disable. Logic1 indicates laser output disabled, LVTTTL-I  |      |
| 6   | VCC5       | +5V Power Supply   |      |
| 7   | GND        | Module Ground  | 1    |
| 8   | VCC3       | +3.3V Power Supply   |      |
| 9   | VCC3       | +3.3V Power Supply   |      |
| 10  | SCL        | 2-Wire Serial Interface Clock. LVTTTL-I  | 2    |
| 11  | SDA        | 2-Wire Serial Interface Data Line. LVTTTL-I/O  | 2    |
| 12  | MOD_Abs    | Indicates Module is not present. Grounded in the Module. LVTTTL-O  | 2    |
| 13  | MOD_NR     | Module Not Ready; Indicating Module Operational Fault. Open-collector. LVTTTL-O  | 2    |
| 14  | RX_LOS     | Loss of Signal indication. Logic 1 indicates loss of Signal. Open-collector. LVTTTL-O  | 2    |
| 15  | GND        | Module Ground  | 1    |
| 16  | GND        | Module Ground  | 1    |
| 17  | RD-        | Receiver Inverted Data Output. CML-O   |      |
| 18  | RD+        | Receiver Non-Inverted Data Output. CML-O   |      |
| 19  | GND        | Module Ground  | 1    |
| 20  | VCC2       | +1.8V Power Supply (Not required).   | 3    |
| 21  | P_DOWN/RST | <p>Power down; When high, requires the module to limit power consumption to 1.5W or below. 2-Wire serial interface must be functional in the low power mode. LVTTTL-I</p> <p>Reset; The falling edge initiates a complete reset of the module including the 2-wire serial interface, equivalent to a power cycle. LVTTTL-I</p> |      |

|    |         |  |   |
|----|---------|--|---|
| 22 | VCC2    | +1.8V Power Supply (Not required)          | 3 |
| 23 | GND     | Module Ground                              | 1 |
| 24 | REFCLK+ | Reference Clock (Not required)             |   |
| 25 | REFCLK- | Reference Clock (Not required)             |   |
| 26 | GND     | Module Ground                              | 1 |
| 27 | GND     | Module Ground                              | 1 |
| 28 | TD-     | Transmitter Inverted Data Input. CML-I     |   |
| 29 | TD+     | Transmitter Non-Inverted Data Input. CML-I |   |
| 30 | GND     | Module Ground                              | 1 |

Notes:

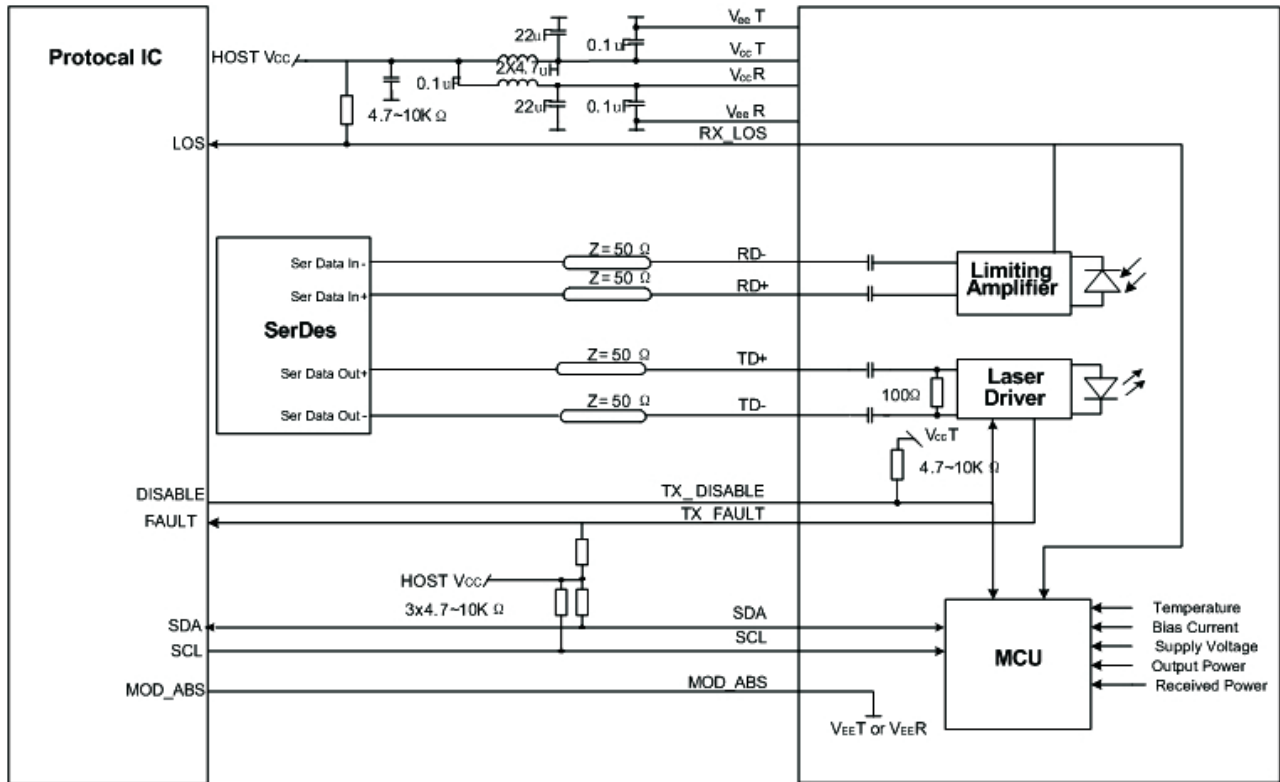
- 1.Module ground pins GND are isolated from the module case and chassis ground within the module.
- 2.Open collector, Should be pulled up with 4.7K-10Kohms to a voltage between 3.15V and 3.6V on the host board.
- 3.The pins are open within module.

### Pin-out Connector Block on Host Board



Pin-out of Connector Block on Host Board

## Recommend Circuit Schematic



## Absolute Maximum Ratings

| Parameter              | Symbol | Min  | Typ | Max  | Unit | Ref. |
|------------------------|--------|------|-----|------|------|------|
| Maximum Supply Voltage | Vcc3   | -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       | Vcc3   | 3.13 | 3.30 | 3.47 | V    |            |
| Power Supply Current       | Icc3   |      |      | 450  | mA   |            |
| Case Operating Temperature | Tc     | 0    |      | +70  | °C   | Commercial |
|                            | Tl     | -40  |      | +85  | °C   | Industrial |
| Bit Rate                   | BR     | 9.95 |      | 11.3 | Gbps |            |
| 9/125um G.652 SMF          | Lmax   |      |      | 10   | km   |            |

## Electrical Characteristics

| Parameter                      | Symbol   | Min       | Typ | Max      | Unit | Ref. |
|--------------------------------|----------|-----------|-----|----------|------|------|
| <b>Transmitter</b>             |          |           |     |          |      |      |
| 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    |      |
| <b>Receiver</b>                |          |           |     |          |      |      |
| Differential data output swing | Vout, pp | 300       |     | 850      | mV   | 2    |
| Data output rise time          | Tr       | 30        |     |          | ps   | 3    |
| Data output fall time          | Tf       | 30        |     |          | 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 %

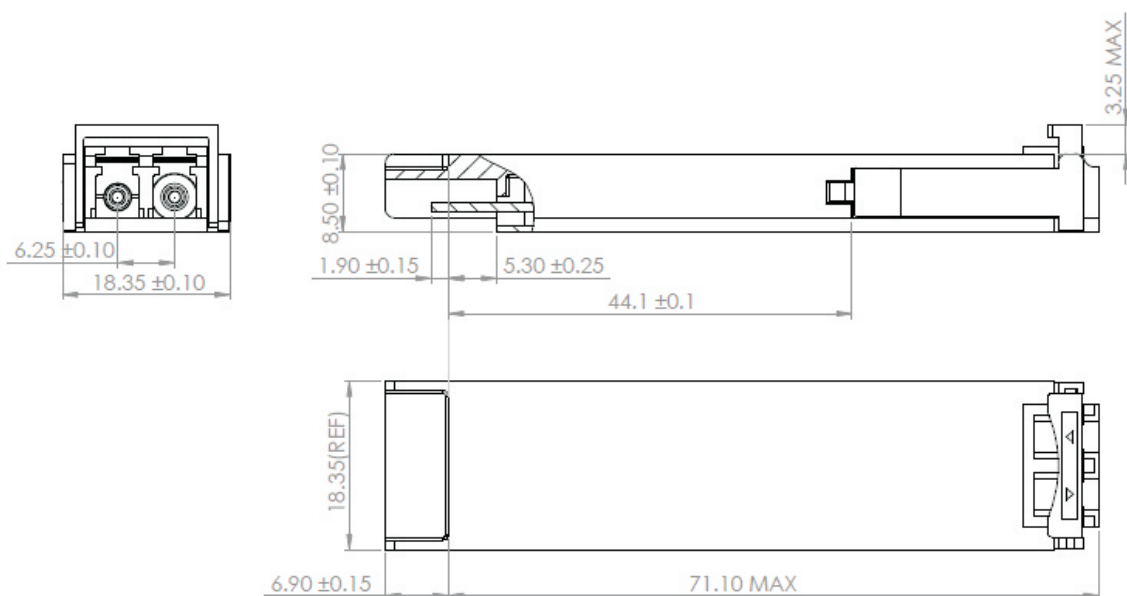
## Optical Characteristics

| Parameter                      | Symbol          | Min  | Typ | Max   | Unit | Ref. |
|--------------------------------|-----------------|------|-----|-------|------|------|
| <b>Transmitter</b>             |                 |      |     |       |      |      |
| Output Opt. Power              | PO              | -6   |     | -1    | dBm  |      |
| Optical Wavelength             | $\lambda$       | 1260 |     | 1355  | nm   |      |
| Side Mode Suppression Ratio    | SMSR            | 30   |     |       | dB   |      |
| Spectral Width (-20dB)         | $\Delta\lambda$ |      |     | 1     | nm   |      |
| Optical Extinction Ratio       | ER              | 6    |     |       | dB   |      |
| Average Launch power of OFF TX | Poff            |      |     | -40   | dBm  |      |
| <b>Receiver</b>                |                 |      |     |       |      |      |
| RX Sensitivity @10.3Gb/s       | SENS            |      |     | -14.4 | dBm  | 1,2  |
| Receiver Overload              |                 | 0.5  |     |       | dBm  |      |
| Optical Center Wavelength      | $\lambda_C$     | 1260 |     | 1610  | nm   |      |
| LOS De-Assert                  | LOSD            |      |     | -15   | dBm  |      |
| LOS Assert                     | LOSA            | -30  |     |       | 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 2<sup>31</sup>-1 at 10<sup>-12</sup> BER.

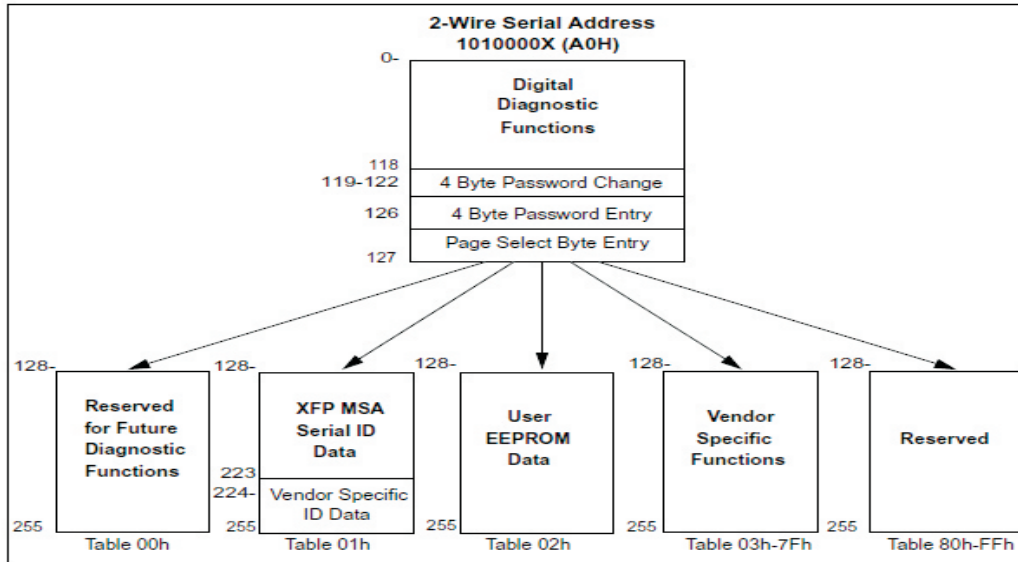
## Mechanical Specifications



APX31HM0xDL10(dimensions are in mm)

## 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     | -6 to -1dBm      | ±3dB     | Internal    |
| RX Power     | -14.4 to 0.5dBm  | ±3dB     | Internal    |

## Revision History

| Revision   | Initiated    | Reviewed   | Approved  | DCN                     | Release Date  |
|------------|--------------|------------|-----------|-------------------------|---------------|
| Version1.0 | yangpeiyun   | Sunbin     | Dingzheng | New Released.           | July 28, 2016 |
| Version1.1 | Tangzhiqiang | Yangpeiyun | Dingzheng | Update the new template | Dec 19, 2019  |





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