**产 品 规 格 书**

***Product Specification Sheet***

**TOP-BIDI-XFP-ER+-60B**

**RoHS Compliant 10Gb/s XFP Tx1330nm/Rx1270nm 60km Optical Transceiver**

**PRODUCT FEATURES**

● Hot pluggable

● Support 9.95Gb/s to 11.1Gb/s bit rates

● Below <1.8w power consumption

● XFPMSA package with LC connector

● Digital Diagnostic Monitor Interface

● Very low EMI and excellent ESD protection

● Uncooled 1330nm DFB laser

● +3.3V single power supply

● operating temperature range 0°C to 70°C

● No reference clock requirement

**APPLICATIONS**

●10GBASE-BX 10.3125Gb/s Ethernet

●10GBASE-BX 9.953Gb/s Ethernet

●SONETOC-192 &SDH STM I-64.1

**STANDARD**

● XFPMSA Compliant

● SFF-8472 reversion 9.5 compliant

● IEEE802.3-2005 compliant

● Telcordia GR-468-CORE compliant

● FCC47 CFR Part15,ClassB compliant

● FDA21 CFR1040.10 and 1040.11,class 1 compliant

● RoHS compliant

**PRODUCT DESCRIPTIONS**

● XFP 10G 60KM 1330 transceivers are designed for 10GEthernet

10GBASE-LR/LWper802.3ae and 10GSOIOC-192/SDHSTM-64,and it can support

data-rate from 9.953Gb/s to 11.1Gb/s. Digital diagnostics are available via I2C interface as specified in the XFPMSA.

● The transceiver designs are optimized for high performance and cost effective to supply customers the best solutions for data-comand telecom applications.

**FUNCTIONALDIAGRAM**

**ABSOLUTE MAXIMUMRATINGS**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Parameter** | **Symbol** | **Min.** | **Max.** | **Unit** | **Note** |
| **Supply Voltage** | Vcc | -0.5 | 4.0 | V |  |
| **Storage Temperature** |  | -40 | 85 | °C |  |
| **Relative Humidity** |  |  | 85 | % |  |

Note:Stress in excess of the maximum absolute ratings can cause permanent damage to the module

**GERERAL OPERATING CHARACTERISTICS**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | **Symbol** | **Min.** | **Typ** | **Max.** | **Unit** | **Note** |
| **Data Rate** | Ethernet |  |  | 10.3125 |  | Gb/s |  |
| Fiber Channel |  |  | 9.953 |  |  |
| **Supply Voltage** | Vcc | 3.14 | 3.3 | 3.46 | V |  |
| Vcc |  |  |  | V |  |
| **Supply Current** | Icc5 |  |  |  | mA |  |
| Icc3 |  |  | 500 | mA |  |
| **Operating Case Temp.** | Tc | 0 |  | 70 | °C |  |

**ELECTRICAL INPUT/OUTPUT CHARACTERISTICS**

 **Transmitter**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | **Symbol** | **Min.** | **Typ** | **Max.** | **Unit** | **Note** |
| **Diff. input voltage swing** |  | 120 |  | 820 | mVpp | 1 |
| **Tx Disable input** | H | VIH | 2.0 |  | Vcc+0.3 | V |  |
| L | VIL | 0 |  | 0.8 |
| **Tx Fault output** | H | VOH | 2.0 |  | Vcc+0.3 | V | 2 |
| L | VOL | 0 |  | 0.8 |
| **Input Diff. Impedance** | Zin |  | 100 |  | Ω |  |

 **Receiver**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | **Symbol** | **Min.** | **Typ** | **Max.** | **Unit** | **Note** |
| **Diff. output voltage swing** |  | 340 | 650 | 800 | M Vpp | 3 |
| **Rx LOS Output** | H | VOH | 2.0 |  | Vcc+0.3 | V | 2 |
| L | VOL | 0 |  | 0.8 |  |

Note1)TD+/-are internally AC coupled with 100Ω differential termination inside the module.

Note2)Tx Fault and Rx LOS are open collector outputs, which should be pulled up with 4.7k to10kΩ

resistors on the host board. Pull up voltage between2.0V and Vcc+0.3V.

Note3)RD+/- outputs are internally AC coupled, and should be terminated with100Ω(differential)at the user

SERDES.

**OPTICAL CHARACTERISTICS**

 **Transmitter(0~70 @10.3125Gb/s)**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | **Symbol** | **Min.** | **Typ** | **Max.** | **Unit** | **Note** |
| **Operating Wavelength** |  | 1320 | 1330 | 1340 | nm |  |
| **Ave. output****power(Enabled)** | Po | 0 |  | 5 | dBm | 1 |
| **Extinction Ratio** | ER | 3.5 |  |  | dB | 1 |
| **RMS spectral width** | Δλ |  |  | 1 | nm |  |
| **Rise/Fall time(20%~80%)** | Tr/Tf |  |  | 50 | ps | 2 |
| **Optical modulation amplitude** | OMA | -5.1 |  |  | dBm |  |
| **Dispersion penalty** |  |  |  | 2 | dB |  |
| **Output Optical Eye** | IEEE802.3-2005Compliant |

 **Receiver(0~70 @10.3125Gb/s)**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | **Symbol** | **Min.** | **Typ** | **Max.** | **Unit** | **Note** |
| **Operating Wavelength** |  | 1260 | 1270 | 1280 | nm |  |
| **Sensitivity** | Psen |  |  | -20 | dBm | 3 |
| **Min. overload** | Pimax | -7 |  |  | dBm |  |
| **LOS Assert** | Pa | -38 |  |  | dBm |  |
| **LOS De-assert** | Pd |  |  | -21 | dBm |  |
| **LOS Hysteresis** | Pd-Pa | 0.5 |  | 4 | dB |  |

Note1)Measured at10.3125b/s with PRBS231–1NRZ test pattern.

 Note2)20%~80%

Note3)Under the ER worst case, measured at 10.3125Gb/s with PRBS231 -1NRZ test pattern for BER<

1x10-12

**SERIAL INTERFACE FOR ID AND DDM**

The XFP modules implement the 2-wire serial communication protocol as defined in the XFPMSA.

The serial ID information of the XFP modules and Digital Diagnostic Monitor parameters can be accessed through the I2C interface at addressA0h and A2h. The memory is mapped in Table1. Detailed ID information(A0h) is listed in Ta-ble2. And the DDM specification (A2h) is described in Table3. For more details of the memory map and byte definitions, please refer to the SFF-8472(Rev9.3,Aug.2002), “Digital Diagnostic Monitoring Interface for Optical Transceivers”.

The DDM parameters have been internally calibrated.

Table1.DigitalDiagnosticMemoryMap(Specific Data Field Descriptions)

**PIN DEFINITIONS AND FUNCTIONS**



|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **PIN#** | **Name** | **Function** | **Name/Description** | **Notes** |
| 1 |  | GND | Module Ground | 1 |
| 2 |  | VEE5 | Optional-5.2VPowerSupply (Not required) |  |
| 3 | LVTTL-I | MOD\_DESEL | Module De- select; When held low allows the module to respond to2-wire serial interface |  |
| 4 | LVTTL-O | INTb | Interrupt; Indicates presence of an important condition which can bereadviathe2-wireserialinterface | 2 |
| 5 | LVTTL-I | TX\_DIS | Transmitter Disable; Turns off transmitter laser output |  |
| 6 |  | VCC5 | +5VPowerSupply(Not required) |  |
| 7 |  | GND | Module Ground | 1 |
| 8 |  | VCC3 | +3.3VPowerSupply |  |
| 9 |  | VCC3 | +3.3VPowerSupply |  |
| 10 | LVTTL-I/O | SCL | 2-WireSerialInterface Clock | 2 |
| 11 | LVTTL-I/O | SDA | 2-WireSerialInterface Data Line | 2 |
| 12 | LVTTL-O | MOD\_Abs | Indicates Module is not present. Grounded in the Module | 2 |
| 13 | LVTTL-O | MOD\_NR | Module Not Ready; IndicatingModuleOperationalFault | 2 |
| 14 | LVTTL-O | RX\_LOS | Receiver Loss Of Signal Indicator | 2 |
| 15 |  | GND | Module Ground | 1 |
| 16 |  | GND | Module Ground | 1 |
| 17 | CML-O | RDN | Receiver Inverted Data Output |  |
| 18 | CML-O | RDP | Receiver Non-Inverted Data Output |  |
| 19 |  | GND | Module Ground | 1 |
| 20 |  | VCC2 | +1.8VPowerSupply(Not required). | 3 |
| 21 | LVTTL-I | P\_DOWN/RST | 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. |  |
| 21 | LVTTL-I | P\_DOWN/RST | Reset; The falling edge initiates a complete reset of the module includingthe2-wire serial interface, equivalent to a power cycle. |  |
| 22 |  | VCC2 | +1.8VPowerSupply(Not required) | 3 |
| 23 |  | GND | Module Ground | 1 |
| 24 | PECL-I | REFCLKP | Not used, internallyterminatedto50ohm (100ohm diff). | 4 |
| 25 | PECL-I | REFCLKN | Not used, internallyterminatedto50ohm (100ohm diff). | 4 |
| 26 |  | GND | Module Ground | 1 |
| 27 |  | GND | Module Ground | 1 |
| 28 | CML-I | TDN | Transmitter Inverted Data Input |  |
| 29 | CML-I | TDP | Transmitter Non-Inverted Data Input |  |
| 30 |  | GND | Module Ground | 1 |

Note:

 1. Module ground pins GND are isolated from the module case and chassis ground within the module.

2.Open collector; Shall be pulled up with 4.7K-10Kohms to a voltage between3.15V and 3.6V on the host board.

3.The pins are open within module.

4.Reference Clock is not required.

**TYPICAL INTERFACE CIRCUIT**

**PACKAGE DIMENSIONS**

**ORDERING INFORMATION**

|  |  |
| --- | --- |
| **Part Number** | **Description** |
| TOP-BIDI-XFP-20A | XFP BiDi,10.3125Gbps,1270nm,20KM,0~70℃,with DDM |
| TOP-BIDI-XFP-20B | XFP BiDi,10.3125Gbps,1330nm,20KM,0~70℃,with DDM |
| TOP-BIDI-XFP-ER-40A | XFP BiDi,10.3125Gbps,1270nm,40KM,0~70℃,with DDM |
| TOP-BIDI-XFP-ER-40B | XFP BiDi,10.3125Gbps,1330nm,40KM,-5~70℃,with DDM |
| TOP-BIDI-XFP-ZR-80A | XFP BiDi,10.3125Gbps,1270nm,80KM,-5~70℃,with DDM |
| TOP-BIDI-XFP-ZR-80B | XFP BiDi,10.3125Gbps,1330nm,80KM,-5~70℃,with DDM |

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