**SFP-WDM.1310-1490.LC.20**

**OptiCin**

**Особенности:**
- Industrial:-40°C ~ +85°C
- 1310nm FP лазер + PIN фотоприемник
- возможность горячей замены
- LC разъем
- Digital diagnostic monitor interface (DDMI)
- соответствие спецификации SFP MSA и SFF-8472

**Области применения:**
- Gigabit Ethernet 10000Base-LX
- ATM
- SONT/SDH/PDH
- FDDI
- Fiber Channel

## Performance Specifications - Electrical

| Parameter | | Symbol | Min. | Typ. | Max | Unit | Notes |
|---|---|---|---|---|---|---|---|
| **Transmitter** | | | | | | | |
| LVPECL Inputs(Differential) | | Vin | 400 | | 2000 | mVpp | AC coupled inputs*(note5) |
| Input Impedance (Differential) | | Zin | 85 | 100 | 115 | ohm | Rin > 100 kohm @ DC |
| TX_Dis | Disable | | 2 | | Vcc+0.3 | V | |
| | Enable | | 0 | | 0.8 | | |
| TX_FAULT | Fault | | 2 | | Vcc+0.3 | V | |
| | Normal | | 0 | | 0.5 | | |
| **Receiver** | | | | | | | |
| LVPECL Outputs (Differential) | | Vout | 400 | | 2000 | mVpp | AC coupled outputs*(note5) |
| Output Impedance (Differential) | | Zout | 85 | 100 | 115 | ohm | |
| RX_LOS | LOS | | 2 | | Vcc+0.3 | V | |
| | Normal | | 0 | | 0.8 | V | |
| MOD_DEF ( 0:2 ) | VoH | 2.5 | | | V | | With Serial ID |
| | VoL | 0 | | 0.5 | V | | |

## Optical and Electrical Characteristics

| Parameter | Symbol | Min. | Typical | Max. | Unit |
|---|---|---|---|---|---|
| 9µm Core Diameter SMF | L | | 20 | | km |
| Data Rate | | | 1063/1250 | | Mbps |
| **Transmitter** | | | | | |
| Center Wavelength | $\lambda_C$ | 1270 | 1310 | 1350 | nm |
| Spectral Width (RMS) | Δλ | | | 3.5 | nm |
| Average Output Power*(note3) | Pout | **-8** | | -3 | dBm |
| Extinction Ratio @ 1250Mbps | ER | 6 | 9 | | dB |
| Rise/Fall Time(20% ~ 80%) | tr/tf | | | 0.26 | ns |
| Total Jitter | TJ | | | 260 | ps |

| Output Optical Eye*[note4] | Compliant with IEEE 802.3z*[note7] | | | | |
|---|---|---|---|---|---|
| TX_Disable Assert Time | t_off | | | 10 | us |
| Pout@TX Disable Asserted | Pout | | | -45 | dBm |
| **Receiver** | | | | | |
| Center Wavelength | $\lambda_C$ | 1450 | 1490 | 1530 | nm |
| Receiver Sensitivity*[note6]@1250Mbps | Pmin | | | **-22** | dBm |
| Receiver Overload | Pmax | -3 | | | dBm |
| LOS De-Assert@1250Mbps | LOSD | | | -23 | dBm |
| LOS Assert | LOSA | -45 | | | dBm |
| LOS Hysteresis*[note8] | | 0.5 | | | dB |

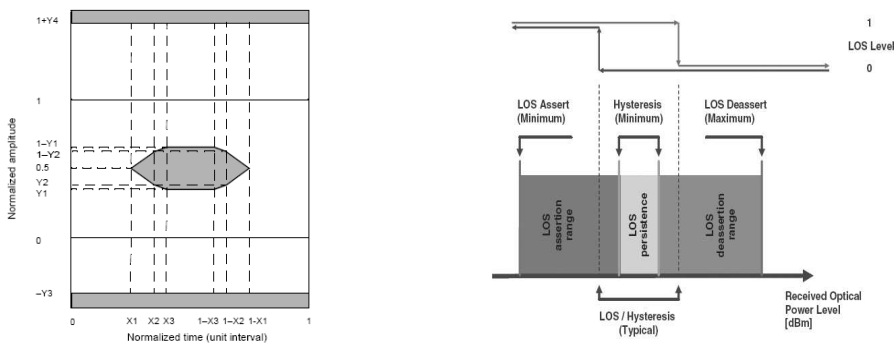Note3: Output is coupled into a 9/125μm single-mode fiber.
Note4: Filtered, measured with a PRBS $2^7$-1.
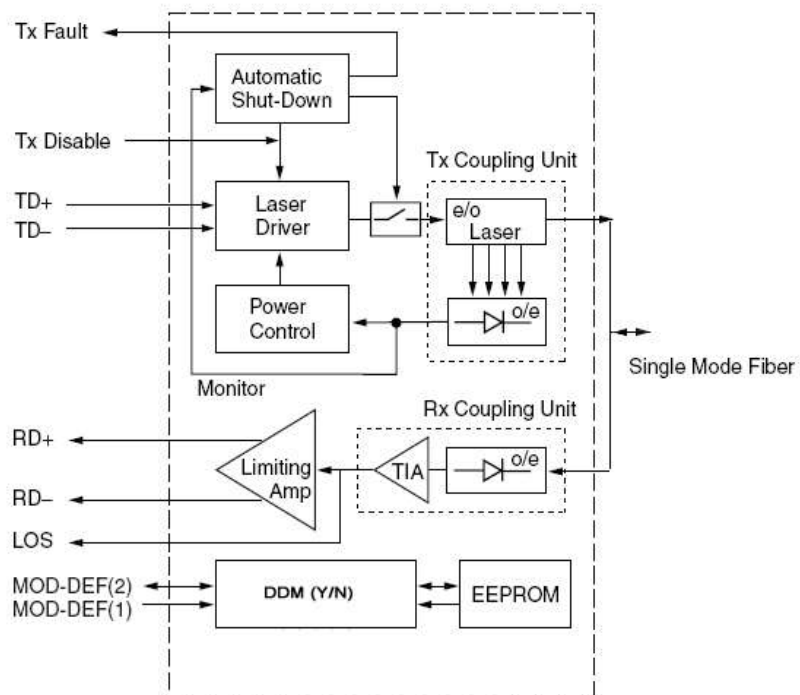Note5: LVPECL logic, internally AC coupled.
Note6: Measured at all data rates specified in Data Rate table with ER=9 dB, $2^7$-1 PRBS data pattern, BER <1E-12.
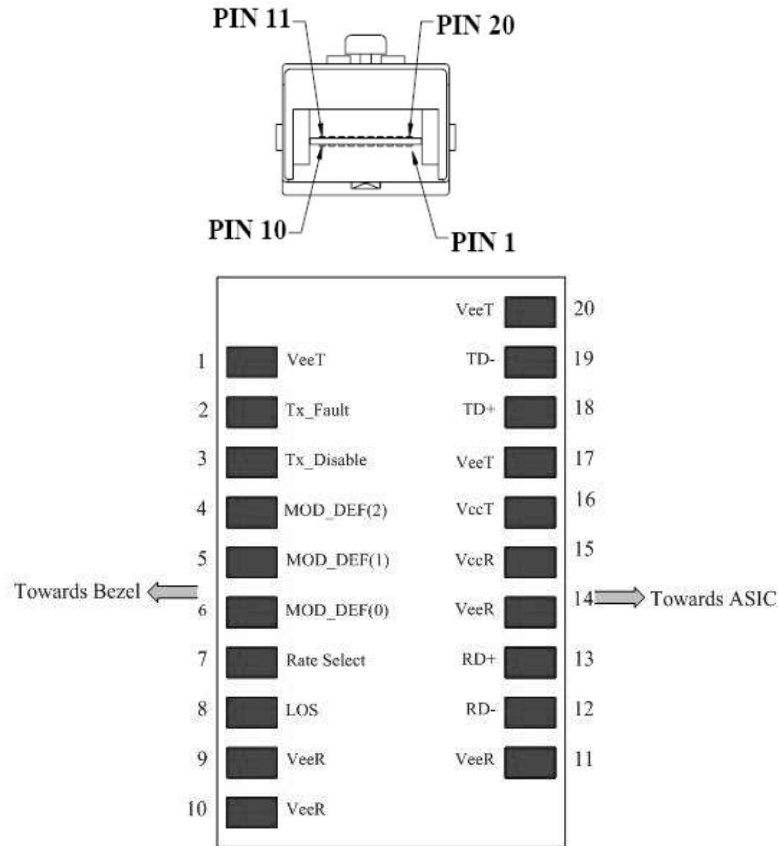Note7: Eye Pattern Mask
Note8: LOS Hysteresis



## Functional Description of Transceiver

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**SFP Transceiver Electrical Pad Layout**



**Pin Function Definitions**

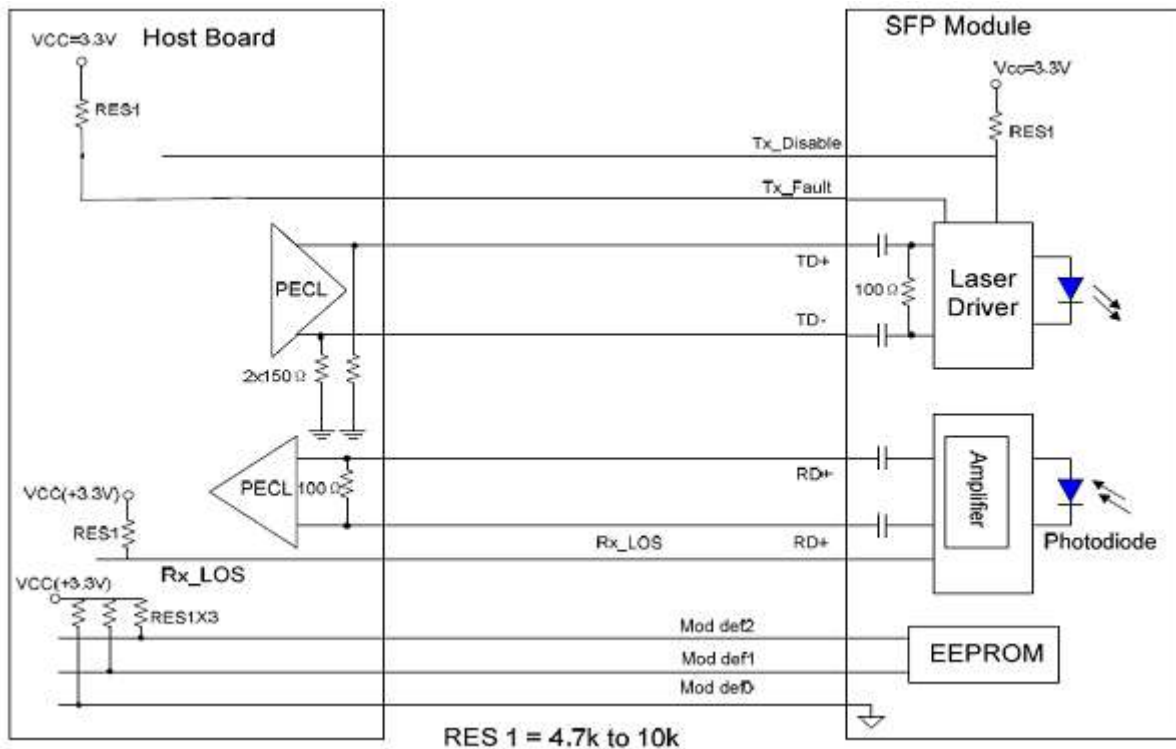| Pin NO. | Name | Function | Plug Seq. | Notes |
|---|---|---|---|---|
| 1 | VeeT | Transmitter Ground | 1 | 5) |
| 2 | TX Fault | Transmitter Fault Indication | 3 | 1) |
| 3 | TX Disable | Transmitter Disable | 3 | 2) Module disables on high or open |
| 4 | MOD-DEF2 | Module Definition 2 | 3 | 3) Data line for Serial ID. |
| 5 | MOD-DEF1 | Module Definition 1 | 3 | 3) Clock line for Serial ID. |
| 6 | MOD-DEF0 | Module Definition 0 | 3 | 3) Grounded within the module. |
| 7 | Rate Select | Not Connect | 3 | Function not available |
| 8 | LOS | Loss of Signal | 3 | 4) |
| 9 | VeeR | Receiver Ground | 1 | 5) |
| 10 | VeeR | Receiver Ground | 1 | 5) |
| 11 | VeeR | Receiver Ground | 1 | 5) |
| 12 | RD- | Inv. Received Data Out | 3 | 6) |
| 13 | RD+ | Received Data Out | 3 | 6) |
| 14 | VeeR | Receiver Ground | 1 | 5) |
| 15 | VccR | Receiver Power | 2 | 7) 3.3 ± 5% |
| 16 | VccT | Transmitter Power | 2 | 7) 3.3 ± 5% |
| 17 | VeeT | Transmitter Ground | 1 | 5) |
| 18 | TD+ | Transmit Data In | 3 | 8) |
| 19 | TD- | Inv. Transmit Data In | 3 | 8) |
| 20 | VeeT | Transmitter Ground | 1 | 5) |

1) TX Fault is an open collector/drain output, which should be pulled up with a 4.7K – 10KΩ resistor on the host board. Pull up voltage between 2.0V and VccT, R+0.3V. When high, output indicates a laser fault of some kind. Low indicates normal operation. In the low state, the output will be pulled to < 0.8V.

2) TX disable is an input that is used to shut down the transmitter optical output. It is pulled up within the module with a 4.7 – 10 KΩ resistor. Its states are:
Low (0 – 0.8V): Transmitter on
(>0.8, < 2.0V): Undefined
High (2.0 – 3.465V): Transmitter Disabled
Open: Transmitter Disabled

3) Modulation Absent, connected to VEET or VEER in the module.

4) LOS (Loss of Signal) is an open collector/drain output, which should be pulled up with a 4.7K – 10KΩ resistor. Pull up voltage between 2.0V and VccT, R+0.3V. When high, this output indicates the received optical power is below the worst-case receiver sensitivity (as defined by the standard in use). Low indicates normal operation. In the low state, the output will be pulled to < 0.8V.

5) VeeR and VeeT may be internally connected within the SFP module.

6) RD-/+: These are the differential receiver outputs. They are AC coupled 100Ω differential lines which should be terminated with 100Ω (differential) at the user SERDES. The AC coupling is done inside the module and is thus not required on the host board.

7) VccR and VccT are the receiver and transmitter power supplies. They are defined as 3.3V ±5% at the SFP connector pin. Maximum supply current is 300mA. Recommended host board power supply filtering is shown below. Inductors with DC resistance of less than 1 ohm should be used in order to maintain the required voltage at the SFP input pin with 3.3V supply voltage. When the recommended supply-filtering network is used, hot plugging of the SFP transceiver module will result in an inrush current of no more than 30mA greater than the steady state value. VccR and VccT may be internally connected within the SFP transceiver module.

8) TD-/+: These are the differential transmitter inputs. They are AC-coupled, differential lines with 100Ω differential termination inside the module. The AC coupling is done inside the module and is thus not required on the host board.

The serial interface uses the 2-wire serial CMOS EEPROM protocol defined for the ATMEL AT24C02/04 family of components. When the serial protocol is activated, the host generates the serial clock signal (SCL).

the

) is bi-directional for serial data transfer. The host uses SDA in conjunction with SCL to mark the start and end of serial protocol activation. The memories are organized as a series of 8-bit data words that can be addressed individually or sequentially.

The Module provides diagnostic information about the present operating conditions. The transceiver generates this diagnostic data by digitization of internal analog signals. Calibration and alarm/warning threshold data is written during device manufacture. Received power monitoring, transmitted power monitoring, bias current monitoring, supply voltage monitoring and temperature monitoring all are implemented. If the module is defined as external calibrated, the diagnostic data are raw A/D values and must be converted to real world units using calibration constants stored in EEPROM locations 56 – 95 at wire serial bus address A2H. The digital diagnostic memory map specific data field define as following .For detail EEPROM information, please refer to the related document of SFF 8472 Rev 9.3.

2 wire address 1010000X (A0h)

| | |
|---|---|
| 0 | |
| | Serial ID Defined by SFP MSA (96 bytes) |
| 95 | |
| | Vendor Specific (32 bytes) |
| 127 | |
| | Reserved (128 bytes) |
| 255 | |

2 wire address 1010001X (A2h)

| | |
|---|---|
| 0 | |
| | Alarm and Warning Thresholds (56 bytes) |
| 55 | |
| | Cal Constants (40 bytes) |
| 95 | |
| | Real Time Diagnostic Interface (24 bytes) |
| 119 | |
| | Vendor Specific (8 ytes) |
| 127 | |
| | User Writable EEPROM (120 bytes) |
| 247 | |
| | Vendor Specific (8 ytes) |
| 255 | |
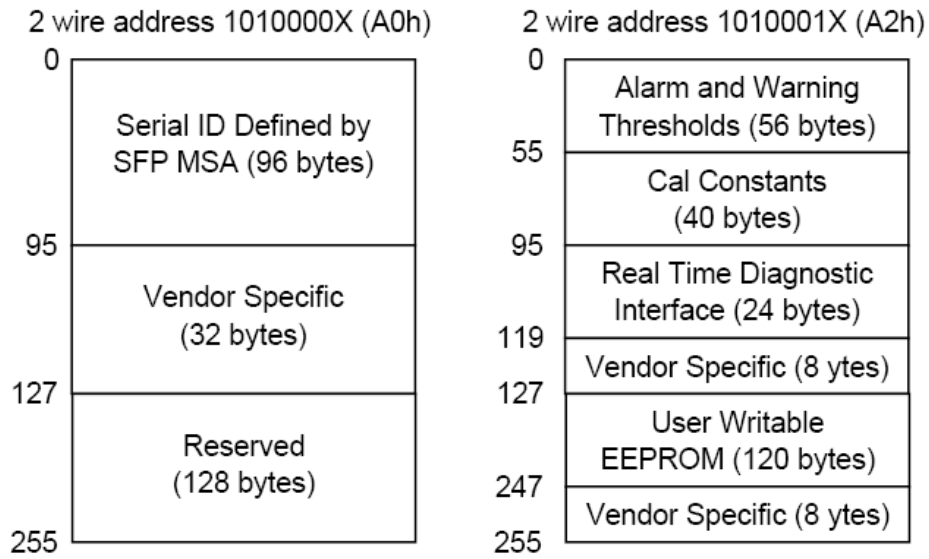
**Recommended Circuit Schematic**

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## Mechanical Specifications