# **OptiCin**

## SFP, 1.25Gbps, LC, 3.3V, sm, 1310nm, DDM, 0-20km

#### Особенности:

- возможность горячей замены
- двойной LC разъем
- детальная информация о модули в EEPROM Digital diagnostic monitor interface (DDMI)
- соответствие спецификации SFP MSA и SFF-8472

#### Области применения:

- Gigabit Ethernet 1000Base-LX
- ATM
- SONT/SDH/PDH
- FDDI
- Fiber Channel

#### **Absolute maximum ratings**

| Parameter                | Symbol | Min. | Max. | Unit |
|--------------------------|--------|------|------|------|
| Storage Temperature      | Ts     | -40  | +85  | °C   |
| Operating Temperature    | Top    | -5   | +70  | °C   |
| Supply Voltage           | Vcc    | -0.5 | +4.0 | V    |
| Voltage at any Input Pin | VIN    | 0    | Vcc  | V    |
| Power supply current     | Icc    | -    | 300  | mA   |

#### **Operating Conditions**

### Transmitter (T=0 to +70°C, Vcc =3.1~3.5V)

| Parameter                  | Symbol    | Min. | Тур. | Max. | Unit |
|----------------------------|-----------|------|------|------|------|
| Central Wavelength         | λc        | 1270 | 1310 | 1350 | nm   |
| Spectral Width             | Δλ        | -    | -    | 3    | nm   |
| Output Power               | Po        | -8   | -    | -3   | dBm  |
| Extinction Ratio           | ER        | 9    | -    | -    | dB   |
| Optical Rise/Fall Time     | Tr / Tf   | -    | -    | 260  | ps   |
| Total Jitter               | TJ        | -    | -    | 227  | ps   |
| Pout @TX Disable Asserted  | Poff      | -    | -    | -45  | dBm  |
| Differential Input Voltage | VDIFF     | 500  | -    | 2400 | mV   |
| Transmit Fault Output-Low  | TX_FAULTL | 0    | -    | 0.8  | V    |
| Transmit Fault Output-High | TX_FAULTH | 2.0  | -    | Vcc  | V    |
| TX_DISABLE Assert Time     | t_off     | -    | -    | 10   | μs   |
| TX_DISABLE Negate Time     | t_on      | -    | -    | 1    | ms   |



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| Time to Initialize, Include Reset of TX_FAULT | t_init  | -  | - | 300 | ms |
|---|---------|----|---|-----|----|
| TX_FAULT From Fault to Assertion              | t_fault | -  | - | 100 | μs |
| TX_DISABLE Time to Start Reset                | t_reset | 10 | - | -   | μs |

#### **Receiver** (T=0 to +70°C, Vcc=3.1~3.5V)

| Parameter                                      | Symbol     | Min. | Тур. | Max. | Unit |
|--|------------|------|------|------|------|
| Wavelength Range                               | λ          | 1270 | -    | 1620 | nm   |
| MIN. Input Power (Sensitivity)                 | PMIN       | -    | -    | -21  | dBm  |
| MAX. Input Power (Saturation)                  | PMAX       | -3   | -    | -    | dBm  |
| Signal Detect-Asserted                         | РА         | -    | -    | -21  | dBm  |
| Signal Detect-De-Asserted                      | PD         | -35  | -    | -    | dBm  |
| Signal Detect Hysteresis                       | Phys       | 0.5  | -    | 5    | dB   |
| Receiver Loss of Signal Output<br>Voltage-Low  | RX_LOSL    | 0    | -    | 0.8  | V    |
| Receiver Loss of Signal Output<br>Voltage-High | RX_LOSH    | 2.0  | -    | Vcc  | V    |
| LOS Assert Time                                | t_loss_on  | -    | -    | 100  | μs   |
| LOS De-Assert Time                             | t_loss_off | -    | -    | 100  | μs   |

#### **Block Diagram of Transceiver**



#### **EEPROM Description**

The SFP serial ID provides access to sophisticated identification information that describes the transceiver's capabilities, standard interfaces, manufacturer, and other information. The serial interface uses the 2-wire serial CMOS E2PROM protocol defined for the ATMEL



AT24C01A/02/04 family of components.

When the serial protocol is activated, the host generates the serial clock signal (SCL, Mod Def 1). The positive edge clocks data into those segments of the E2PROM that are not write-protected within the SFP transceiver. The negative edge clocks data from the SFP transceiver.

The serial data signal (SDA, Mod Def 2) 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.

#### **Monitoring Interface**

The interface is an extension of the serial ID interface defined in the SFP MSA specification. The specifications define a 256 byte memory map in EEPROM which is accessible over a 2 wire serial interface at the 8 bit address 1010000X (A0h). The digital diagnostic monitoring interface makes use of the 8 bit address 1010001X (A2h), so the originally defined serial ID memory map remains unchanged. The interface is backward compatible with both the GBIC specification and the SFP MSA. Please see Figure 1.





#### **D** Pin Assignment and Function Definitions



It is the responsibility of the system integrator to assure that no thermal, energy, or voltage hazard exists during the hot-plug-unplug sequence. It is also the responsibility of the system integrator and end-user to minimize static electricity and the probability of ESD events by careful design.

### **Pins Assignment**



#### **I** Function definition

| Pin<br>No. | Name       | Function                     | Plug Seq. | Notes  |
|------------|------------|------------------------------|-----------|--------|
| 1          | VeeT       | Transmitter Ground           | 1         |        |
| 2          | TX Fault   | Transmitter Fault Indication | 3         | Note 1 |
| 3          | TX Disable | Transmitter Disable          | 3         | Note 2 |
| 4          | MOD-DEF2   | Module Definition 2          | 3         | Note 3 |

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| 5  | MOD-DEF1    | Module Definition 1    | 3 | Note 3 |
|----|-------------|------------------------|---|--------|
| 6  | MOD-DEF0    | Module Definition 0    | 3 | Note 3 |
| 7  | Rate Select | Not Connected          | 3 |        |
| 8  | LOS         | Loss of Signal         | 3 | Note 4 |
| 9  | VeeR        | Receiver Ground        | 1 |        |
| 10 | VeeR        | Receiver Ground        | 1 |        |
| 11 | VeeR        | Receiver Ground        | 1 |        |
| 12 | RD-         | Inv. Received Data Out | 3 | Note 5 |
| 13 | RD+         | Received Data Out      | 3 | Note 5 |
| 14 | VeeR        | Receiver Ground        | 1 |        |
| 15 | VccR        | Receiver Power         | 2 |        |
| 16 | VccT        | Transmitter Power      | 2 |        |
| 17 | VeeT        | Transmitter Ground     | 1 |        |
| 18 | TD+         | Transmit Data In       | 3 | Note 6 |
| 19 | TD-         | Inv Transmit Data In   | 3 | Note 6 |
| 20 | VeeT        | Transmitter Ground     | 1 |        |

Notes:

1. TX Fault is an open collector output, which should be pulled up with a  $4.7K \sim 10K$ . resistor on the host board to a voltage between 2.0V and Vcc+0.3V. Logic 0 indicates normal operation; logic 1 indicates a laser fault of some kind. In the low state, the output will be pulled to less than 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  $4.7K \sim 10K$  resistor. Its states are:

Low (0~0.8V): Transmitter on

(>0.8V, <2.0V): Undefined

High (2.0~3.465V): Transmitter Disabled

Open: Transmitter Disabled.

3. MOD-DEF 0,1,2 are the module definition pins. They should be pulled up with a  $4.7K \sim 10K$  resistor on the host board. The pull-up voltage shall be VccT or VccR.

MOD-DEF 0 is grounded by the module to indicate that the module is present.

MOD-DEF 1 is the clock line of two wire serial interface for serial ID.

MOD-DEF 2 is the data line of two wire serial interface for serial ID.

4. LOS is an open collector output, which should be pulled up with a  $4.7K \sim 10K$  resistor on the host board to a voltage between 2.0V and Vcc+0.3V. Logic 0 indicates normal operation; logic 1 indicates loss of signal. In the low state, the output will be pulled to less than 0.8V.

5. These are the differential receiver outputs. They are AC coupled 100.differential lines which should be terminated with 100. (differential) at the user SERDES.

6. These are the differential transmitter inputs. They are AC-coupled, differential lines with 100.differential termination inside the module.

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### **B** Recommended Host Board Supply Filtering Network





### **Example SFP Host Board Schematic SFP**

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