# SFPTURKIYE(X)MM05GD - 1.25Gb/s 550m SFP Transceiver Hot Pluggable, Duplex LC, +3.3V, 850nm, VCSEL, Multi-mode, DDM

## Features :


- Up to 1.25Gb/s Data Links
- Hot-Pluggable
- Duplex LC connector
- Up to 550m on 50/125μm MMF
- 850nm VCSEL laser transmitter
- Single +3.3V Power Supply
- Monitoring Interface Compliant with SFF-8472
- Maximum Power <1W
- Industrial /Extended/ Commercial operating temperature range: -40°C to 85°C/-5°C to 85°C/-0°C to 70°C Version available
- RoHS compliant and Lead Free

## Applications:

- Metro/Access Networks
- 1.25 Gb/s 1000Base-SX Ethernet
- 1×Fibre Channel
- Other Optical Links

## Description:

SFPTURKIYE(X)MM05GD Transceiver is a high performance, cost effective module which have a duplex LC optics interface. Standard AC coupled CML for high speed signal and LVTTL control and monitor signals. The receiver section uses a PIN receiver and the transmitter uses a 850 nm VCSEL laser, up to 9dB link budge ensure this module 1000Base Ethernet 550m application.

## Absolute Maximum Ratings

| Parameter | Symbol | Min. | Typical | Max. | Unit |
|---|---|---|---|---|---|
| Storage Temperature | $T_S$ | -40 | | +85 | °C |
| Supply Voltage | $V_{CC}$ | -0.5 | | 4 | V |
| Relative Humidity | RH | 0 | | 85 | % |

## Recommended Operating Environment:

| Parameter | | Symbol | Min. | Typical | Max. | Unit |
|---|---|---|---|---|---|---|
| Case operating Temperature | Industrial | $T_C$ | -40 | | 85 | °C |
| | Extended | | -5 | | 85 | °C |
| | Commercial | | 0 | | +70 | °C |
| Supply Voltage | | $V_{CC}$ | 3.135 | | 3.465 | V |
| Supply Current | | Icc | | | 300 | mA |
| Inrush Current | | $I_{surge}$ | | | Icc+30 | mA |
| Maximum Power | | $P_{max}$ | | | 1 | W |

## Electrical Characteristics (TOP = -40 to 85°C, VCC = 3.135 to 3.465 Volts)

| Parameter | Symbol | Min. | Typical | Max. | Unit | Note |
|---|---|---|---|---|---|---|
| **Transmitter Section:** | | | | | | |
| Input differential impedance | $R_{in}$ | 90 | 100 | 110 | □ | □ |
| Single ended data input swing | $V_{in\ PP}$ | 250 | | 1200 | mVp-p | |
| Transmit Disable Voltage | $V_D$ | Vcc – 1.3 | | Vcc | V | 2 |
| Transmit Enable Voltage | $V_{EN}$ | Vee | | Vee+ 0.8 | V | |
| Transmit Disable Assert Time | $T_{dessert}$ | | | 10 | us | |
| **Receiver Section:** | | | | | | |
| Single ended data output swing | Vout,pp | 250 | | 800 | mv | 3 |
| LOS Fault | $V_{losfault}$ | Vcc – 0.5 | | $V_{CC\_host}$ | V | 5 |
| LOS Normal | $V_{los\ norm}$ | $V_{ee}$ | | $V_{ee}$+0.5 | V | 5 |
| Power Supply Rejection | PSR | 100 | | | mVpp | 6 |

Note:
1. AC coupled.
2. Or open circuit.
3. Into 100 ohm differential termination.
4. 20 – 80 %
5. LOS is LVTTL. Logic 0 indicates normal operation; logic 1 indicates no signal detected.
6. All transceiver specifications are compliant with a power supply sinusoidal modulation of 20 Hz to 1.5MHz up to specified value applied through the power supply filtering network shown on page 23 of the Small Form-factor Pluggable (SFP) Transceiver Multi-Source Agreement (MSA), September 14, 2000.

## ● Optical Parameters (TOP = -40 to 85°C, VCC = 3.135 to 3.465 Volts)

| Parameter | Symbol | Min. | Typical | Max. | Unit | Note |
|---|---|---|---|---|---|---|
| **Transmitter Section:** | | | | | | |
| Center Wavelength | $\lambda_c$ | 840 | 850 | 860 | nm | |
| Spectral Width(RMS) | $\sigma_{RMS}$ | | | 0.85 | nm | |
| Optical Output Power | $P_{out}$ | -9 | | -3 | dBm | 1 |
| Extinction Ratio | ER | 8.2 | | | dB | |
| Optical Rise/Fall Time | $t_r$ / $t_f$ | | | 260 | ps | 2 |
| Relative Intensity Noise | RIN | | | -120 | dB/Hz | |
| Output Eye Mask | Compliant with IEEE802.3z (class 1 laser safety) | | | | | |
| **Receiver Section:** | | | | | | |
| Optical Input Wavelength | $\lambda_c$ | 770 | | 860 | nm | |
| Receiver Overload | $P_{ol}$ | 0 | | | dBm | 4 |
| RX Sensitivity | Sen | | | -18 | dBm | 4 |
| RX_LOS Assert | $LOS_A$ | -29 | | | dBm | |
| RX_LOS De-assert | $LOS_D$ | | | -19 | dBm | |
| RX_LOS Hysteresis | $LOS_H$ | 0.5 | | | dB | |
| **General Specifications:** | | | | | | |
| Data Rate | BR | | 1.25 | | Gb/s | |
| Bit Error Rate | BER | | | $10^{-12}$ | | |
| Max. Supported Link Length on 50/125μm MMF@1.25Gb/s | $L_{MAX}$ | | 550 | | m | |
| Total System Budget | LB | 8 | | | dB | |

Note

1. The optical power is launched into MMF.
2. 20-80%.
3. Jitter measurements taken using Agilent OMNIBERT 718 in accordance with GR-253.
4. Measured with PRBS $2^{7-1}$ at $10^{-12}$ BER

## Pin Assignment

Diagram of Host Board Connector Block Pin Numbers and Name

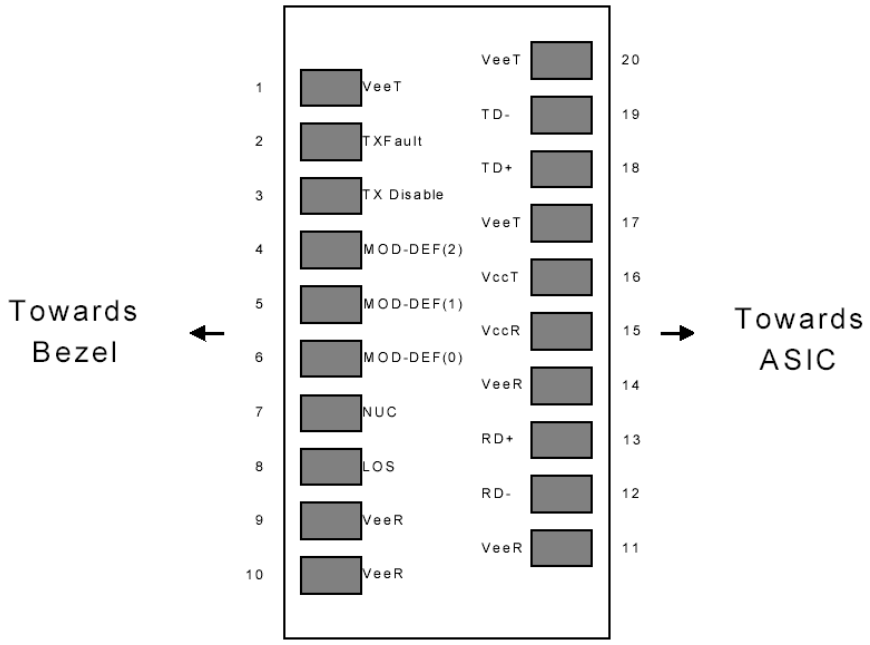



**Diagram of Host Board Connector Block Pin Numbers and Names**

## Pin Function Definitions

| Pin No | Name | Function | Plug Seq | Notes |
|---|---|---|---|---|
| **1** | VeeT | Transmitter Ground | **1** | **1** |
| **2** | TX Fault | Transmitter Fault Indication | **3** | |
| **3** | TX Disable | Transmitter Disable | **3** | 2 |
| **4** | MOD-DEF2 | Module Definition | **2** | 3 |
| **5** | MOD-DEF1 | Module Definition 1 | **3** | 3 |
| **6** | MOD-DEF0 | Module Definition 0 | **3** | 3 |
| **7** | Rate Select | Not Connected | **3** | **4** |
| **8** | LOS | Loss of Signal | **3** | 5 |
| **9** | VeeR | Receiver Ground | **1** | **1** |
| **10** | VeeR | Receiver Ground | **1** | **1** |
| **11** | VeeR | Receiver Ground | | **1** |
| **12** | RD- | Inv. Received Data Out | **3** | **6** |
| **13** | RD+ | Received Data Out | **3** | **6** |
| **14** | VeeR | Receiver Ground | **3** | **1** |
| **15** | VccR | Receiver Power | **2** | **1** |
| **16** | VccT | Transmitter Power | **2** | |
| **17** | VeeT | Transmitter Ground | **1** | |
| **18** | TD+ | Transmit Data In | **3** | 6 |
| **19** | TD- | Inv. Transmit In | **3** | 6 |
| **20** | VeeT | Transmitter Ground | **1** | |

**Notes:**

1. Circuit ground is internally isolated from chassis ground.

2. Laser output disabled on TDIS >2.0V or open, enabled on TDIS <0.8V.
3. Should be pulled up with 4.7k - 10 kohms 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. Rate select is not used
5. LOS is open collector output. Should be pulled up with 4.7k – 10 kohms on host board to a voltage between 2.0V and 3.6V. Logic 0 indicates normal operation; logic 1 indicates loss of signal.
6. AC Coupled

## SFP Module EEPROM Information and Management

The SFP modules implement the 2-wire serial communication protocol as defined in the SFF-8472. The serial ID information of the SFP modules and Digital Diagnostic Monitor parameters can be accessed through the $I^2C$ interface at address A0h and A2h. The memory is mapped in Table 1. Detailed ID information (A0h) is listed in Table 2. And the DDM specification at address A2h. For more details of the memory map and byte definitions, please refer to the SFF-8472, “Digital Diagnostic Monitoring Interface for Optical Transceivers”. The DDM parameters have been internally calibrated.

**Table 1.** Digital Diagnostic Memory Map (Specific Data Field Descriptions)

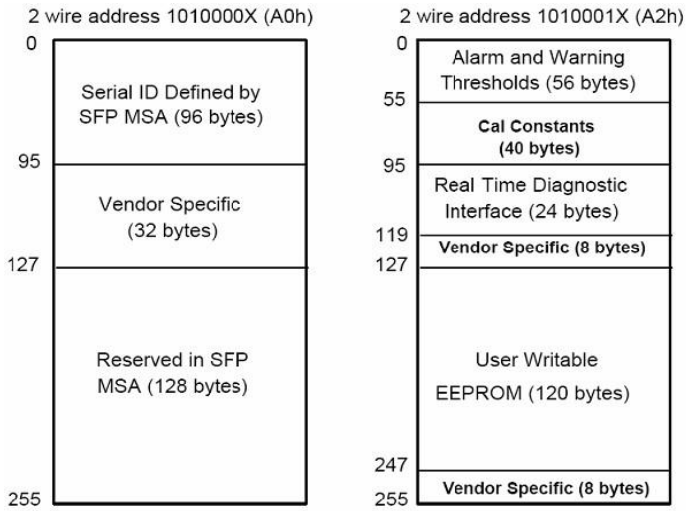



**Table 2** - EEPROM Serial ID Memory Contents (**A0h**)

| Data Address | Length (Byte) | Name of Length | Description and Contents |
|---|---|---|---|
| Base ID Fields | | | |
| 0 | 1 | Identifier | Type of Serial transceiver (03h=SFP) |
| 1 | 1 | Reserved | Extended identifier of type serial transceiver (04h) |
| 2 | 1 | Connector | Code of optical connector type (07=LC) |
| 3-10 | 8 | Transceiver | |
| 11 | 1 | Encoding | NRZ(03h) |
| 12 | 1 | BR, Nominal | Nominal baud rate, unit of 100Mbps |
| 13-14 | 2 | Reserved | (0000h) |
| 15 | 1 | Length(9um) | Link length supported for 9/125um fiber, units of 100m |
| 16 | 1 | Length(50um) | Link length supported for 50/125um fiber, units of |

| | | | |
|---|---|---|---|
| | | | 10m |
| 17 | 1 | Length(62.5um) | Link length supported for 62.5/125um fiber, units of 10m |
| 18 | 1 | Length(Copper) | Link length supported for copper, units of meters |
| 19 | 1 | Reserved | |
| 20-35 | 16 | Vendor Name | SFP vendor name: SFPTURKEY |
| 36 | 1 | Reserved | |
| 37-39 | 3 | Vendor OUI | SFP transceiver vendor OUI ID |
| 40-55 | 16 | Vendor PN | Part Number: “SFPTURKIYE(X)MM05G(X)” (ASCII) |
| 56-59 | 4 | Vendor rev | Revision level for part number |
| 60-62 | 3 | Reserved | |
| 63 | 1 | CCID | Least significant byte of sum of data in address 0-62 |
| Extended ID Fields | | | |
| 64-65 | 2 | Option | Indicates which optical SFP signals are implemented (001Ah = LOS, TX_FAULT, TX_DISABLE all supported) |
| 66 | 1 | BR, max | Upper bit rate margin, units of % |
| 67 | 1 | BR, min | Lower bit rate margin, units of % |
| 68-83 | 16 | Vendor SN | Serial number (ASCII) |
| 84-91 | 8 | Date code | Manufacturing date code |
| 92-94 | 3 | Reserved | |
| 95 | 1 | CCEX | Check code for the extended ID Fields (addresses 64 to 94) |
| Vendor Specific ID Fields | | | |
| 96-127 | 32 | Readable | Sfpturkey specific date, read only |
| 128-255 | 128 | Reserved | Reserved for SFF-8079 |

## Digital Diagnostic Monitor Characteristics

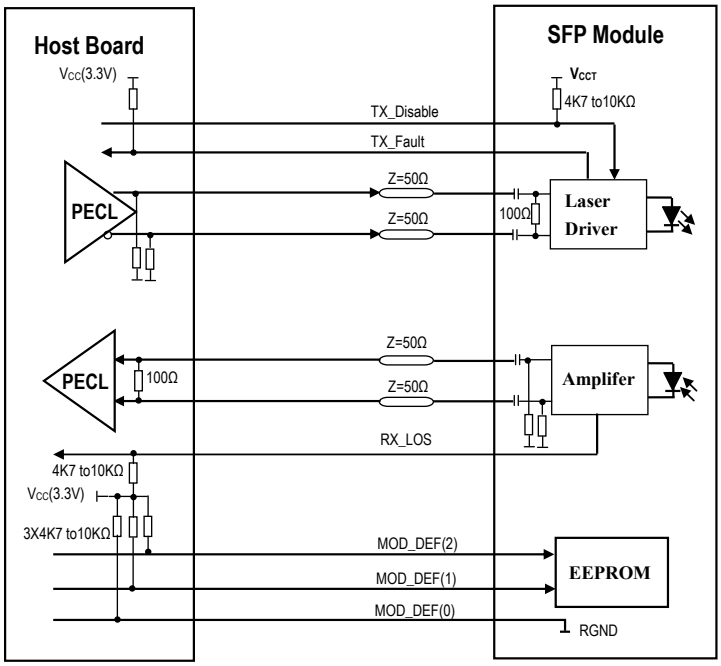
| Data Address | Parameter | Accuracy | Unit |
|---|---|---|---|
| 96-97 | Transceiver Internal Temperature | ±3.0 | °C |
| 100-101 | Laser Bias Current | ±10 | % |
| 100-101 | Tx Output Power | ±3.0 | dBm |
| 100-101 | Rx Input Power | ±3.0 | dBm |
| 100-101 | VCC3 Internal Supply Voltage | ±3.0 | % |

## Regulatory Compliance

SFPTURKIYE(X)MM05G(X) complies with international Electromagnetic Compatibility (EMC) and international safety requirements and standards (see details in Table following).

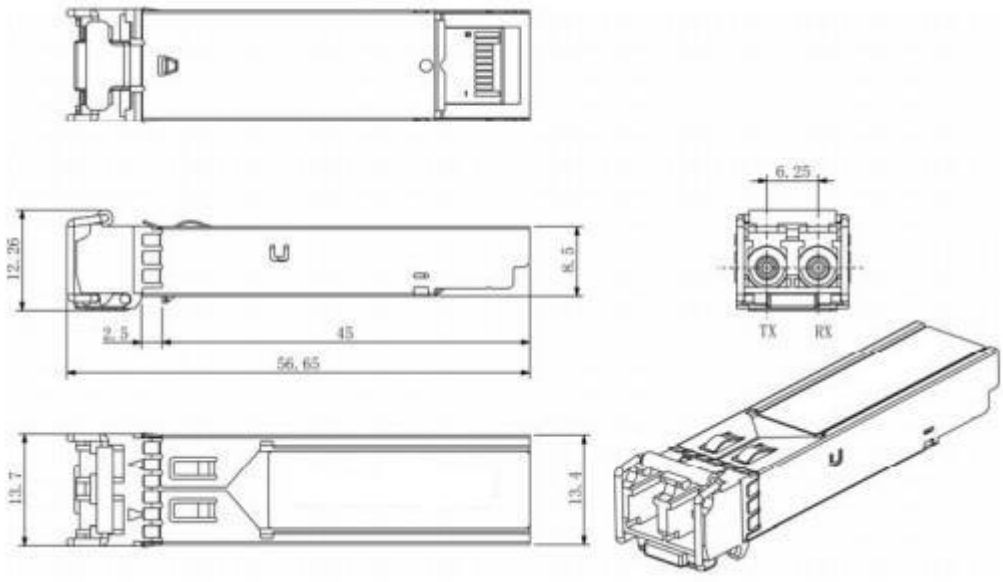
| | | |
|---|---|---|
| Electrostatic Discharge (ESD) to the Electrical Pins | MIL-STD-883E, Method 3015.7 | Class 1(>1000 V) |
| Electrostatic Discharge (ESD), to the Duplex LC Receptacle | IEC61000-4-2,GR-1089-CORE | Compatible with standards |
| Electromagnetic, Interference (EMI) | FCC Part 15 Class B, EN55022 Class B (CISPR 22B), VCCI Class B | Compatible with standards |
| Laser Eye Safety | FDA 21CFR 1040.10 and 1040.11, EN60950, EN (IEC) 60825-1,2 | Compatible with Class 1 laser product. |

## Recommended Circuit




**SFP Host Recommended Circuit**

## Mechanical drawing:




**Mechanical Dimensions of Transceiver**

# Order Information

### Table 6-Order Information

| Part No. | Data Rate(Mbps) |
|---|---|
| **SFPTURKIYESMM05GD** | 1.25Gb/s 550m SFP Transceiver Hot Pluggable, Duplex LC, +3.3V, 850nm, VCSEL, Multi-mode, DDM |
| **SFPTURKIYEIMM05GD** | 1.25Gb/s 550m SFP Transceiver Hot Pluggable, Duplex LC, +3.3V, 850nm, VCSEL, Multi-mode, Industrial Grade DDM |

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E-mail: info@sfpturkey.com.tr

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