

25GE 300m SFP28 Transceiver (KW3003D / KW3003DI)
Hot Pluggable, Duplex LC, +3.3V, 1310nm DFB, Single mode



Features:

- ✧ UP to 25.78Gb/s bit rates
- ✧ Hot-Pluggable SFP28 footprint
- ✧ Duplex LC connector
- ✧ 1310nm DFB transmitter, PIN photo-detector
- ✧ Up to 300m on SMF

- ✧ 2-wire interface for management specifications compliant with SFF 8472 digital diagnostic monitoring interface for optical transceivers
- ✧ Cost effective SFP28 solution, enables higher port densities and greater bandwidth
- ✧ Power Supply :+3.3V
- ✧ Low Power consumption<1.3W
- ✧ Operating case temperature Range:
 - Commercial: 0~ 70°C
 - Industrial:-40~ 85°C
- ✧ RoHS compliant

Applications:

- ✧ 25GE 300m
- ✧ eCPRI & CPRI

Part Number Ordering Information

| | |
|----------|---|
| KW3003D | SFP28 300m optical transceiver with full real-time digital diagnostic monitoring , 0~70C°, 25GE |
| KW3003DI | SFP28 300m optical transceiver with full real-time digital diagnostic monitoring , -40~85C°, 25GE |

Description:

KEWEI's KW3003D/KW3003DI is a very compact optical transceiver module converts 25Gbit/s serial PECL or CML electrical data into serial optical data. The SFP28 module electrical interface is compliant to SFI electrical specifications. The DFB transmitter and PIN receiver provide superior performance for Ethernet applications at up to 300m links on SMF.

The SFP28 Module compliant with SFF-8431, SFF-8432. Digital diagnostics functions are available via a 2-wire serial interface, as specified in SFF-8472.

The fully SFP28 compliant form factor provides hot pluggability, easy optical port upgrades and low EMI emission.

● **Absolute Maximum Ratings**

| Parameter | Symbol | Min. | Typical | Max. | Unit | |
|---------------------|----------------|------|---------|------|------|------------|
| Storage Temperature | T _s | -40 | | +85 | °C | |
| Case Operating | T _c | 0 | | 70 | °C | Commercial |

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| | | | | | | |
|------------------------|-----|-----|--|-----|----|------------|
| Temperature | Tc | -40 | | 85 | °C | Industrial |
| Maximum Supply Voltage | Vcc | 0 | | 3.6 | V | |
| Relative Humidity | RH | 5 | | 95 | % | |

● **Electrical Characteristics**

| Parameter | Symbol | Min. | Typical | Max. | Unit | Note |
|---|------------------------|-------|---------|---------------------|------|------|
| Supply Voltage | Vcc | 3.135 | | 3.465 | V | |
| Supply Current | Icc | | | 400 | mA | |
| Power Consumption | P | | | 1.3 | W | |
| Data Rate | R | - | 25.78 | | Gb/s | |
| Transmitter Section: | | | | | | |
| Input differential impedance | R _{in} | | 100 | | Ω | 1 |
| Tx Input Single Ended DC Voltage Tolerance (Ref VeeT) | V | -0.3 | | 4 | V | |
| Differential input voltage swing | V _{in,pp} | 180 | | 450 | mV | 2 |
| Transmit Disable Voltage | V _D | 2 | | Vcc | V | 3 |
| Transmit Enable Voltage | V _{EN} | Vee | | Vee+0.8 | V | |
| Receiver Section: | | | | | | |
| Single Ended Output Voltage Tolerance | V | -0.3 | | 4 | V | |
| Rx Output Diff Voltage | V _O | 180 | | 450 | mV | |
| LOS Fault | V _{LOS fault} | 2 | | Vcc _{HOST} | V | 4 |
| LOS Normal | V _{LOS norm} | Vee | | Vee+0.8 | V | 4 |

Note:

1. Connected directly to TX data input pins. AC coupling from pins into laser driver IC.
2. Per SFF-8431 Rev 3.0
3. Into 100 ohms differential termination.
4. LOS is an open collector output. Should be pulled up with 4.7k – 10kΩ on the host board. Normal operation is logic 0; loss of signal is logic 1. Maximum pull-up voltage is 5.5V

● **Optical Characteristics**

| Parameter | Symbol | Min. | Typical | Max. | Uni | N |
|----------------------------|------------------|------|---------|-------|-----|---|
| Tranmitter Section: | | | | | | |
| Center Wavelength | λ _t | 1290 | 1310 | 1330 | nm | |
| spectral width | Δλ | | | 1 | nm | |
| Average Optical Power | P _{avg} | -6.8 | | +2.0 | dBm | |
| Laser Off Power | P _{off} | | | -30 | dBm | |
| Extinction Ratio | ER | 3.5 | | | dB | |
| Receiver Section: | | | | | | |
| Center Wavelength | λ _r | 1270 | | 1360 | nm | |
| Receiver Sensitivity(OMA) | Sen | | | -10.5 | dBm | 1 |
| Los Assert | LOS _A | -30 | | | dBm | |
| Los Dessert | LOS _D | | | -12.5 | dBm | |
| Los Hysteresis | LOS _H | 0.5 | | 5 | dB | |
| Overload | Sat | +2 | | | dBm | |

Note:

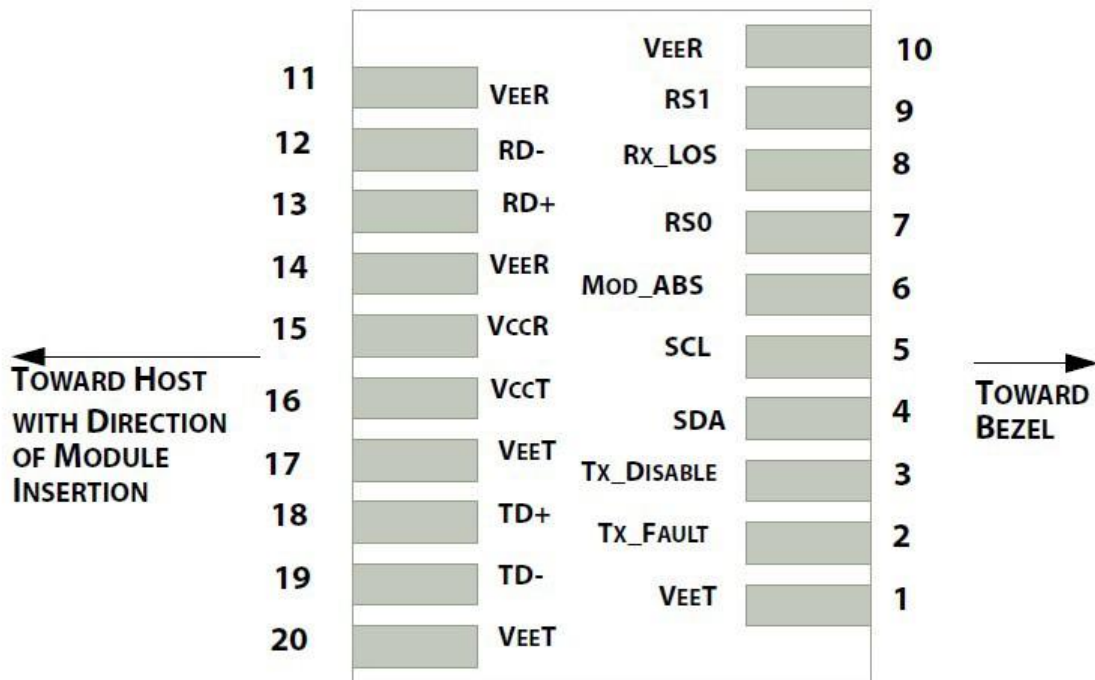
1. Measured with a PRBS 2³¹-1 test pattern, @25.78Gb/s, BER<5E-5.

● **Timing Characteristics**

| Paramet | Symbol | Min. | Typical | Max. | Unit |
|---|--------------------|------|---------|------|------|
| TX_Disable Assert Time | t_off | | | 100 | us |
| TX_Disable Negate Time | t_on | | | 2 | ms |
| Time to Initialize 2-wire interface | t_2w_start_up | | | 300 | ms |
| Time to Initialize | t_start_up | | | 300 | ms |
| Time to Initialize cooled module and time to power up a cooled module to Power level II | t_start_up_cooled | | | 90 | s |
| Time to Power Up to Level II | t_power_level2 | | | 300 | ms |
| Time to Power Down from Level II | t_power_down | | | 300 | ms |
| Tx_Fault assert | Tx_Fault_on | | | 1 | ms |
| Tx_Fault assert for cooled module | Tx_Fault_on_cooled | | | 50 | ms |
| TX_FAULT Reset | t_reset | 10 | | | us |
| Rx_LOS assert delay | t_los_on | | | 100 | us |
| Rx_LOS negate delay | t_los_off | | | 100 | us |

● **Pin Assignment:**

Diagram of Host Board Connector Block Pin Numbers and Name



● **Pin Function Definitions**

| PIN # | Name | Function | Notes |
|-------|------------|---|-------|
| 1 | VeeT | Module transmitter ground | 1 |
| 2 | Tx Fault | Module transmitter fault | 2 |
| 3 | Tx Disable | Transmitter Disable; Turns off transmitter laser output | 3 |
| 4 | SDL | 2 wire serial interface data input/output (SDA) | 4 |

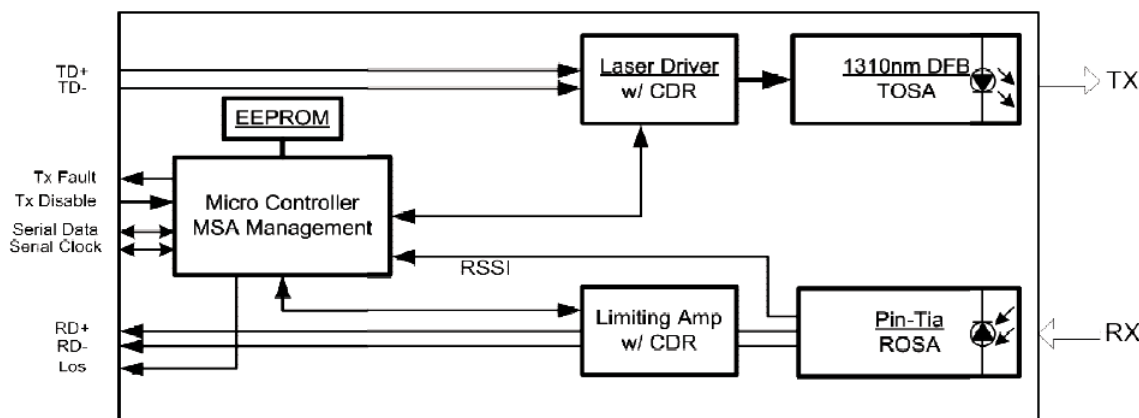
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| | | | |
|----|---------|--|---|
| 5 | SCL | 2 wire serial interface clock input (SCL) | 4 |
| 6 | MOD-ABS | Module Absent, connect to VeeR or VeeT in the module | 2 |
| 7 | RS0 | Rate select0: module inputs and are pulled low to VeeT with > 30 kΩ resistors in the module. | |
| 8 | LOS | Receiver Loss of Signal Indication | |
| 9 | RS1 | Rate select1: module inputs and are pulled low to VeeT with > 30 kΩ resistors in the module. | |
| 10 | VeeR | Module receiver ground | 1 |
| 11 | VeeR | Module receiver ground | 1 |
| 12 | RD- | Receiver inverted data out put | |
| 13 | RD+ | Receiver non-inverted data out put | |
| 14 | VeeR | Module receiver ground | 1 |
| 15 | VccR | Module receiver 3.3V supply | |
| 16 | VccT | Module transmitter 3.3V supply | |
| 17 | VeeT | Module transmitter ground | 1 |
| 18 | TD+ | Transmitter non-inverted data out put | |
| 19 | TD- | Transmitter inverted data out put | |
| 20 | VeeT | Module transmitter ground | 1 |

Note:

1. The module ground pins shall be isolated from the module case.
2. This pin is an open collector/drain output pin and shall be pulled up with 4.7K-10Kohms to Host_Vcc on the host board.
3. This pin shall be pulled up with 4.7K-10Kohms to VccT in the module.
4. This pin is an open collector/drain output pin and shall be pulled up with 4.7K-10Kohms to Host_Vcc on the host board.

● **Transceiver Block Diagram**



● **SFP Module EEPROM Information and Management**

The SFP modules implement the 2-wire serial communication protocol as defined in the SFP -8472. The serial ID information of the SFP modules and Digital Diagnostic Monitor parameters can be accessed through the I²C 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

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Diagnostic Monitoring Interface for Optical Transceivers”. The DDM parameters have been internally calibrated.

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

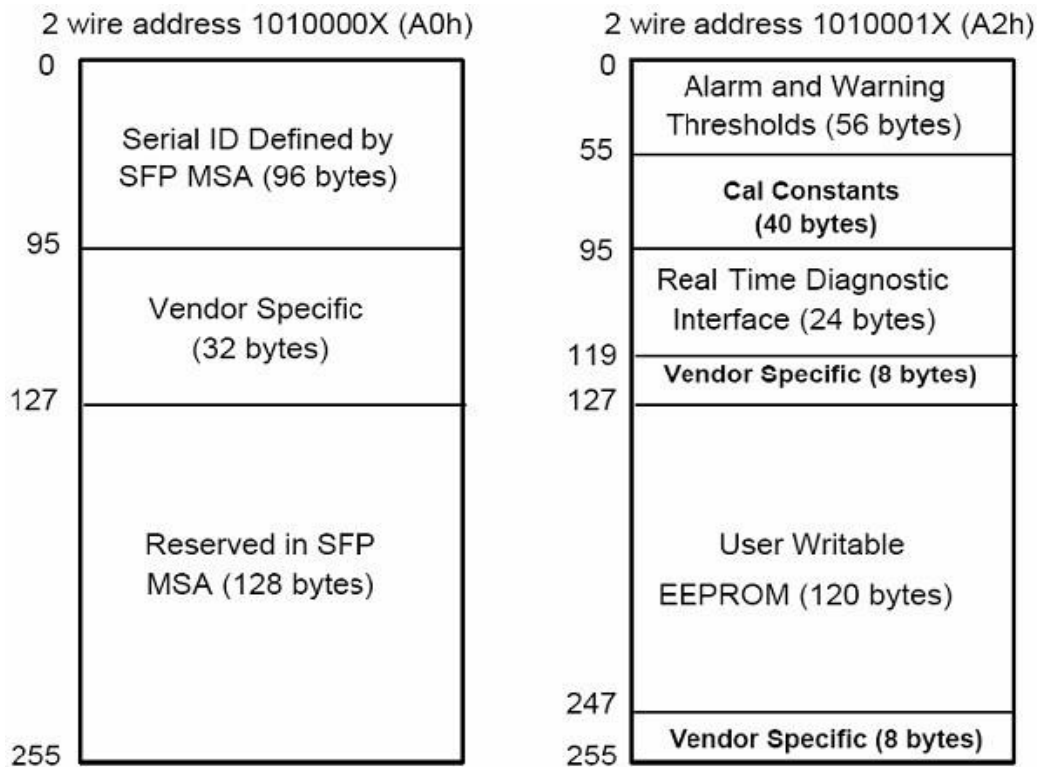


Table 2 - EEPROM Serial ID Memory Contents (A0h)

| 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 | 25G Base-LR |
| 11 | 1 | Encoding | 64B/66B |
| 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: KEWEI |
| 36 | 1 | Reserved | |
| 37-39 | 3 | Vendor OUI | SFP transceiver vendor OUI ID |
| 40-55 | 16 | Vendor PN | Part Number: “KWXXXX” (ASCII) |
| 56-59 | 4 | Vendor rev | Revision level for part number |
| 60-62 | 3 | Reserved | |

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| | | | |
|---------------------------|-----|-----------|---|
| 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 | KEWEI's 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 | KEWEI specific date, read only |
| 128-255 | 128 | Reserved | Reserved for SFF-8079 |

● **Digital Diagnostic Monitor Characteristics**

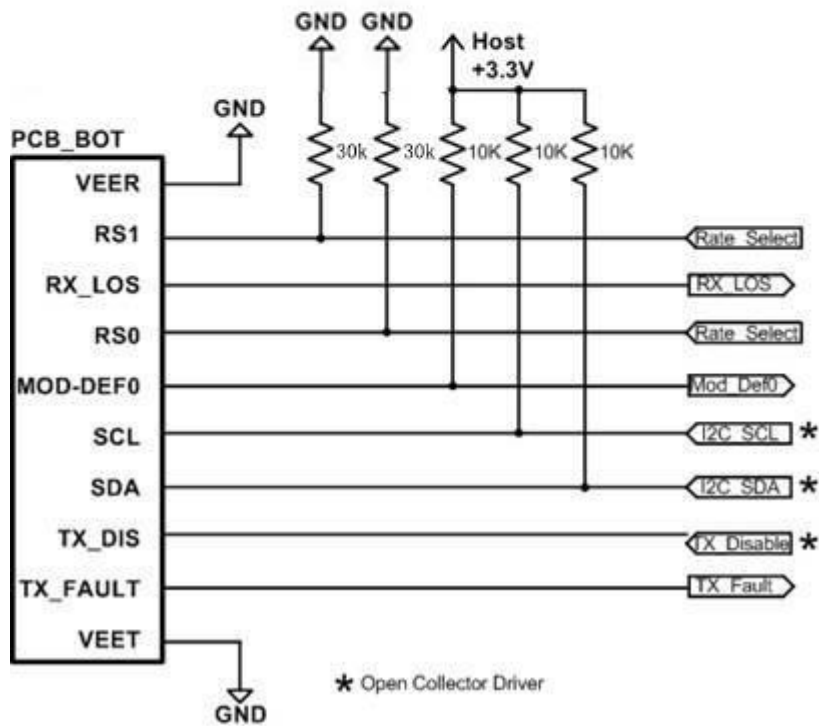
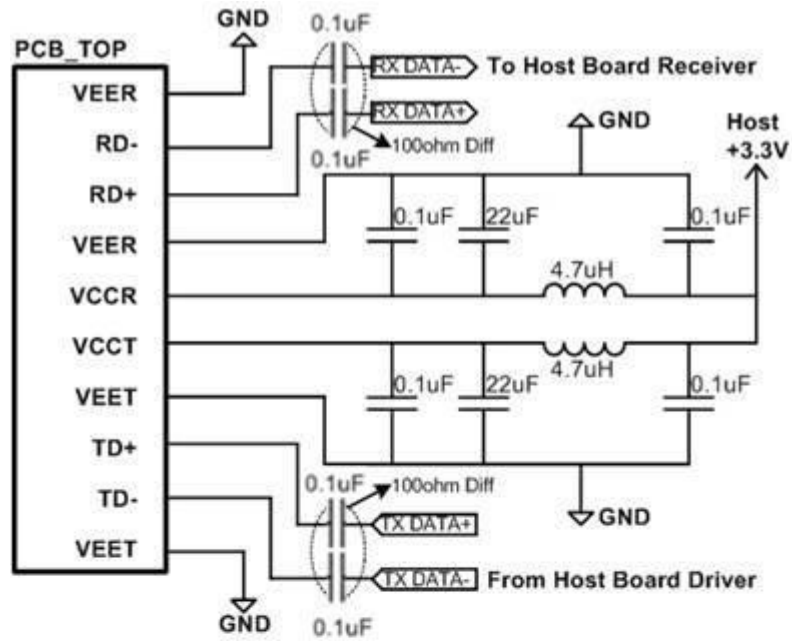
| Data Address | Parameter | Accuracy | Unit |
|--------------|----------------------------------|----------|------|
| 96-97 | Transceiver Internal Temperature | ±5.0 | °C |
| 98-99 | VCC3 Internal Supply Voltage | ±3.0 | % |
| 100-101 | Laser Bias Current | ±10 | % |
| 102-103 | Tx Output Power | ±3.0 | dBm |
| 104-105 | Rx Input Power | ±3.0* | dBm |

● **Regulatory Compliance**

The KW3003D/KW3003DI 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 | IEC 61000-4-2 | Compatible with standards |
| Electromagnetic Interference (EMI) | FCC Part 15 Class B EN55022 Class B (CISPR 22A) 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. |

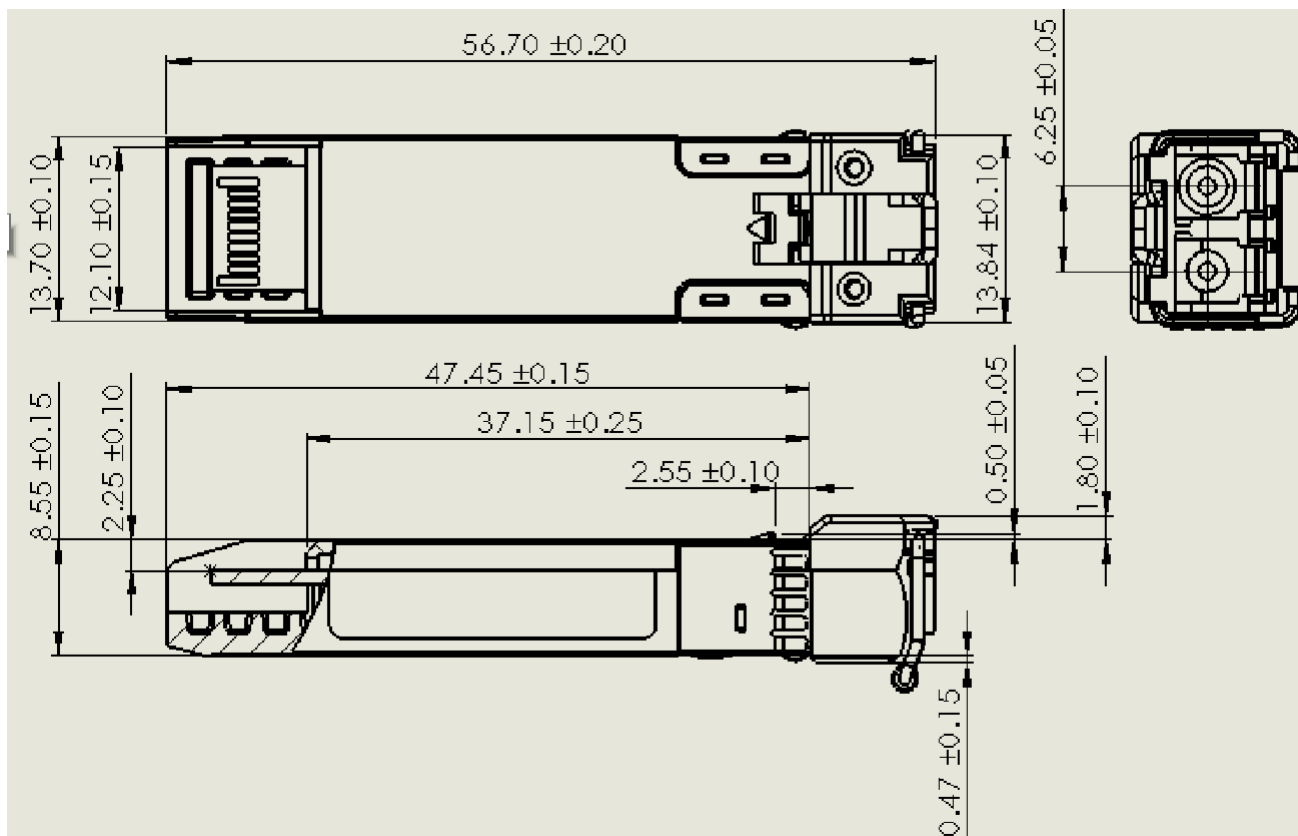
● Recommended Circuit:



* Open Collector Driver

Recommended High-speed Interface Circuit

● Mechanical Dimensions:



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