

ESP852X-01DI

25Gb/s SFP28 100m DDM Transceiver

PRODUCT FEATURES

- Supports up to 25.78Gbps bit rates
- Hot-pluggable SFP+ footprint
- 850nm VCSEL laser and PIN photodiode
- 100m over M5F MMF (50/125 um OM4)
- 70m over M5E MMF (50/125um OM3)
- 20m on MMF (50/125um OM2)
- Compliant with SFP+ MSA and SFF-8472 with duplex LC receptacle
- Compatible with RoHS
- Single +3.3V power supply
- Real Time Digital Diagnostic Monitoring
- Operating case temperature:
Industrial: -40 to +85°C



APPLICATIONS

- 25GBASE-SR Ethernet
- CPRI option 10, 7, 8
- 100GE SR fan out to 4x25GE SR

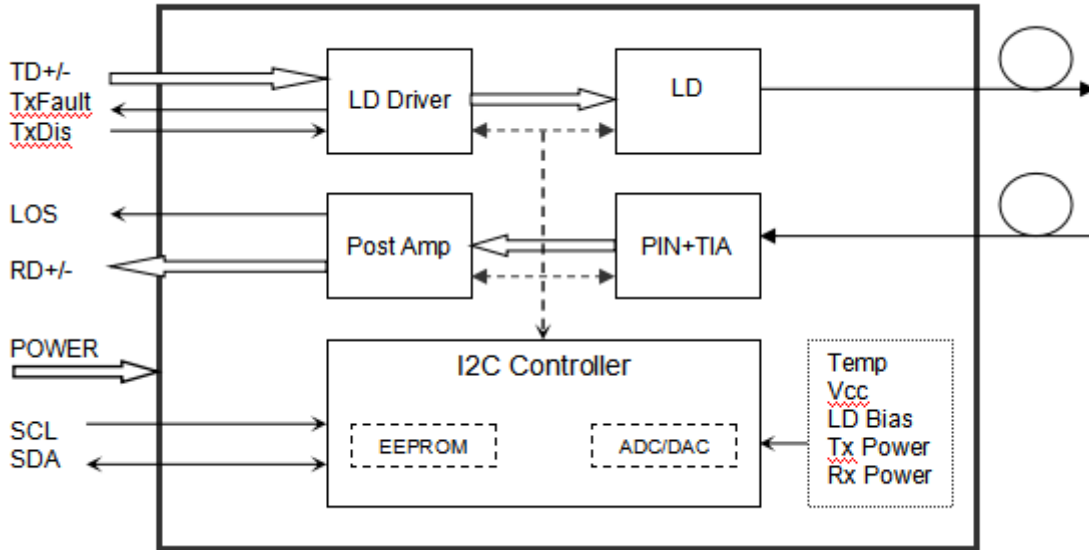
DESCRIPTIONS

The SFP28 transceivers are high performance, cost effective modules supporting data rate of 25.78Gbps over multimode fiber.

The transceiver consists of three sections: a VCSEL laser transmitter, a PIN photodiode integrated with a transimpedance preamplifier (TIA) and MCU control unit. All modules satisfy class I laser safety requirements.

The transceivers are compatible with SFP Multi-Source Agreement and SFF-8472 digital diagnostics functions.

Block Diagram



Ordering Information

| Part No. | Data Rate(optical) | Laser | Fiber Type | Distance | Optical Interface | Temp | DDMI | Latch Color |
|--------------|--------------------|-------|------------|----------|-------------------|-------------|------|-------------|
| ESP852X-01DI | 25.78Gbps | VCSEL | MMF | 100m | LC | -40°C~+85°C | Y | Black |

Absolute Maximum Ratings

| Parameter | Symbol | Min. | Typical | Max. | Unit | Notes |
|---------------------|--------|------|---------|------|------|-------|
| Supply Voltage | Vcc | -0.5 | | 3.6 | V | |
| Storage Temperature | Ts | -40 | | +85 | °C | |
| Operating Humidity | - | 5 | | 85 | % | |

Recommended Operating Conditions

| Parameter | Symbol | Min. | Typical | Max. | Unit | Notes |
|----------------------------|--------|-------|---------|-------|------|-------|
| Operating Case Temperature | Tc | -40 | | +85 | °C | |
| Power Supply Voltage | Vcc | 3.135 | 3.30 | 3.465 | V | |
| Power Supply Current | Icc | | | 300 | mA | |

| | | | | | | |
|-----------|--|--|---------------|--|------|--|
| Data Rate | | | 25.75 10.3 | | Gbps | |
|-----------|--|--|---------------|--|------|--|

Electrical Characteristics

High-Speed Signal: Compliant to CEI-25G-VSR

Low-Speed Signal: Compliant to SFF-8419

| Parameter | Symbol | Min. | Typical | Max. | Unit | Notes |
|--|--------------------|-----------------|---------|------|----------------------|-------|
| Transmitter (Module Input) | | | | | | |
| Differential Input Resistance | R _{Rdin} | 90 | 100 | 110 | Ω | |
| Input Differential Voltage | R _{Vdiff} | - | - | 900 | mVpp | |
| Tx_Disable | Normal Operation | V _{IL} | -0.3 | - | 0.8 | V |
| | Laser Disable | V _{IH} | 2.0 | - | V _{CC} +0.3 | V |
| Receiver (Module Output) | | | | | | |
| Differential Resistance | T _{Rd} | 90 | 100 | 110 | Ohm | |
| Output Differential Voltage | T _{Vdiff} | - | - | 900 | mVpp | |
| Differential Termination Resistance Mismatch | T _{Rdm} | - | - | 10 | % | |
| Rx los | Normal Operation | V _{OL} | -0.3 | - | 0.4 | V |
| | Loss Signal | V _{OH} | 2 | - | V _{CC} HOST | V |

Optical and Characteristics

| Parameter | Symbol | Min | Typical | Max | Unit | Notes |
|---|------------------|------|---------|-----------------|------|-------|
| Transmitter | | | | | | |
| Centre Wavelength | λ _c | 840 | 850 | 860 | nm | |
| Spectral Width (RMS) | Δλ | | | 0.6 | nm | |
| Side-Mode Suppression Ratio | SMSR | - | - | - | dB | |
| Average Output Power @25.78Gbps and @10.3Gbps | P _{out} | -8.4 | | 2.4 | dBm | 1 |
| Extinction Ratio | ER | 2.0 | | | dB | |
| Data Input Swing Differential | V _{IN} | 180 | | 950 | mV | 2 |
| Input Differential Impedance | Z _{IN} | 90 | 100 | 110 | Ω | |
| TX Disable | Disable | 2.0 | | V _{cc} | V | |
| | Enable | 0 | | 0.8 | V | |
| TX Fault | Fault | 2.0 | | V _{cc} | V | |
| | Normal | 0 | | 0.8 | V | |
| Receiver | | | | | | |

| | | | | | | |
|--------------------------------|------------------|-----|-----|-----------------|-----|---|
| Centre Wavelength | λ_c | 840 | 850 | 860 | nm | |
| Receiver Sensitivity@25.78Gbps | | | | -10.3 | dBm | 3 |
| Receiver Sensitivity@10.3Gbps | | | | -12.5 | dBm | 4 |
| Receiver Overload | | 2.4 | | | dBm | 3 |
| LOS De-Assert | LOS _D | | | -13 | dBm | |
| LOS Assert | LOS _A | -30 | | | dBm | |
| LOS Hysteresis | | 0.5 | | 4 | dB | |
| Data Output Swing Differential | V _{out} | 500 | | 900 | mV | 5 |
| LOS | High | 2.0 | | V _{cc} | V | |
| | Low | | | 0.8 | V | |

Notes:

1. The optical power is launched into MMF.
2. PECL input, internally AC-coupled and terminated.
3. Measured with a PRBS 2³¹-1 test pattern @25.78Gbps, BER ≤5E-5..
4. Measured with a PRBS 2³¹-1 test pattern @10.3Gbps, BER ≤1E-12.
5. Internally AC-coupled.
6. Bits 110.3 and bits 118.3 control the locking modes of the internal retimer or CDR, default Value is "1".

| Bit 110.3 of A2h | Bit 118.3 of A2h | RX Data Rate | TX Data Rate | Status of RX CDR | Status of TX CDR |
|------------------|------------------|---------------|---------------|------------------|------------------|
| High/1 | High/1 | 24.33G/25.78G | 24.33G/25.78G | CDR select | CDR select |
| High/1 | Low/0 | 24.33G/25.78G | 9.95G/10.31G | CDR select | CDR bypass |
| Low/0 | High/1 | 9.95G/10.31G | 24.33G/25.78G | CDR bypass | CDR select |
| Low/0 | Low/0 | 9.95G/10.31G | 9.95G/10.31G | CDR bypass | CDR bypass |

Digital Diagnostics

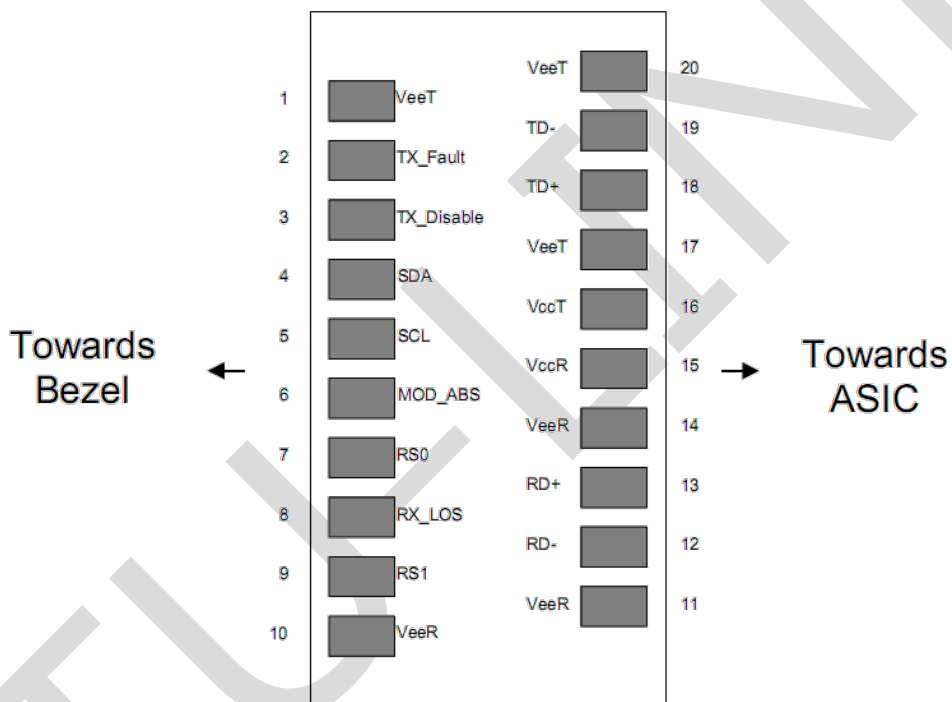
| Parameter | Range | Accuracy | Unit | Calibration |
|--------------|---------------|----------|------|-------------|
| Temperature | -40 to +85 | ±3°C | °C | Internal |
| Voltage | 3.0 to 3.6 | ±3% | V | Internal |
| Bias Current | 0 to 15 | ±10% | mA | Internal |
| TX Power | -8.4.0 to 2.4 | ±3dB | dBm | Internal |
| RX Power | -12 to 2.4 | ±3dB | dBm | Internal |

Communication Interface Timing Characteristics

| Parameter | Symbol | Min. | Typical | Max. | Unit | Notes |
|---|-------------------|------|---------|------|------|-------|
| Tx Disable Negate Time | t _{on} | | | 2 | ms | |
| Tx Disable Assert Time | t _{off} | | | 100 | µs | |
| Time To Initialize, including Reset of Tx Fault | t _{init} | | | 300 | ms | |

| | | | | | | |
|----------------------|----------------|----|-----|-----------------|-----|--|
| Tx Fault Assert Time | t_fault | | | 100 | μs | |
| Tx Disable To Reset | t_reset | 10 | | | μs | |
| LOS Assert Time | t_loss_on | | | 100 | μs | |
| LOS De-assert Time | t_loss_off | | | 100 | μs | |
| Serial ID Clock Rate | f_serial_clock | | 100 | 400 | KHz | |
| MOD_DEF (0:2)-High | V _H | 2 | | V _{cc} | V | |
| MOD_DEF (0:2)-Low | V _L | | | 0.8 | V | |

Pin Diagram



Pin Definitions

| PIN # | Name | Function | Notes |
|-------|------------------|---|--------|
| 1 | V _{EET} | Transmitter Ground | |
| 2 | TX FAULT | Transmitter Fault Indication | Note 1 |
| 3 | TX DISABLE | Transmitter Disable | Note 2 |
| 4 | SDA | SDA Serial Data Signal | |
| 5 | SCL | SCL Serial Clock Signal | |
| 6 | MOD_ABS | Module Absent. Grounded within the module | |
| 7 | RS0 | Not Connected | |
| 8 | LOS | Loss of Signal | Note 3 |
| 9 | RS1 | Not Connected | |

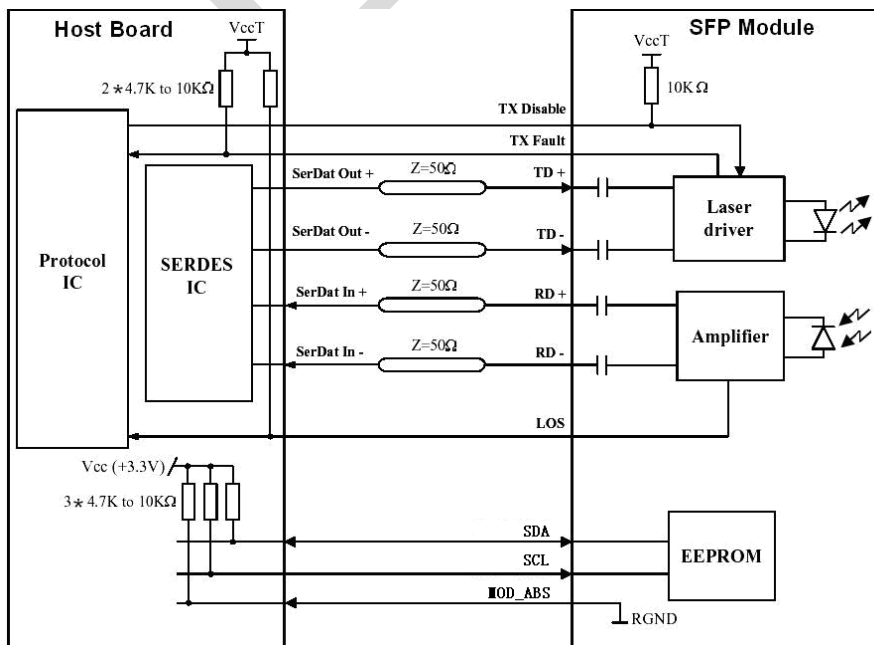
| | | | |
|----|------------------|--------------------------|--------|
| 10 | V _{EER} | Receiver ground | |
| 11 | V _{EER} | Receiver ground | |
| 12 | RD- | Inv. Received Data Out | Note 4 |
| 13 | RD+ | Received Data Out | Note 4 |
| 14 | V _{EER} | Receiver ground | |
| 15 | V _{CCR} | Receiver Power Supply | |
| 16 | V _{CCT} | Transmitter Power Supply | |
| 17 | V _{EET} | Transmitter Ground | |
| 18 | TD+ | Transmit Data In | Note 5 |
| 19 | TD- | Inv. Transmit Data In | Note 5 |
| 20 | V _{EET} | Transmitter Ground | |

Notes:

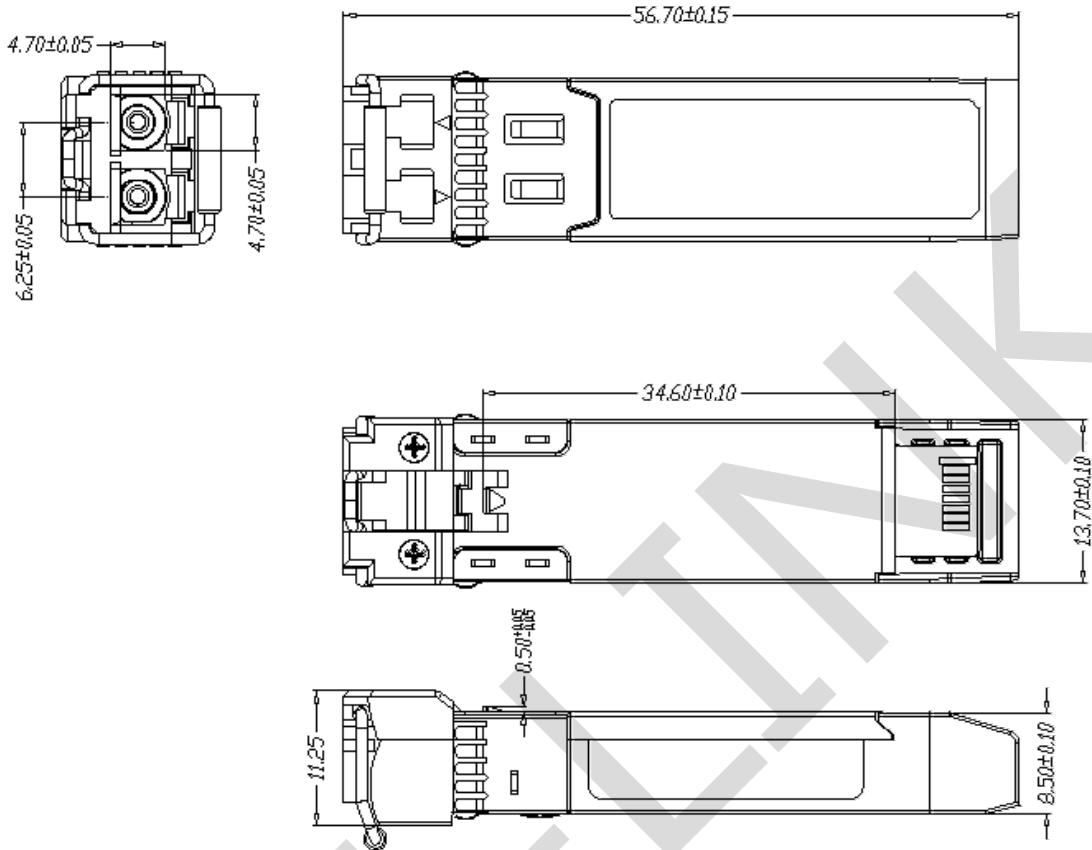
Plug Seq.: Pin engagement sequence during hot plugging.

1. TX Fault is an open collector output, which should be pulled up with a 4.7k~10kΩ resistor on the host board to a voltage between 2.0V and V_{cc}+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. Laser output disabled on TDIS >2.0V or open, enabled on TDIS <0.8V.
3. LOS is open collector output. Should be pulled up with 4.7k~10kΩ on host board to a voltage between 2.0V and 3.6V. Logic 0 indicates normal operation; logic 1 indicates loss of signal.
4. RD-/+: These are the differential receiver outputs. They are internally AC-coupled 100 differential lines which should be terminated with 100Ω (differential) at the user SERDES.
5. TD-/+: These are the differential transmitter inputs. They are internally AC-coupled, differential lines with 100Ω differential termination inside the module.

Recommended Interface Circuit



Mechanical Diagram



Revision History

| Version No. | Date | Description |
|-------------|--------------|-----------------------|
| 1.0 | May 08, 2018 | Preliminary datasheet |
| 2.0 | Aug 27, 2024 | Format change |

Company: ETU-Link Technology Co., LTD

Production base: Right side of 3rd floor, No. 102 building, Longguan expressway, Dalang street, Longhua District, Shenzhen city, Guangdong Province, China 518109

R&D base: Floor 4, Building 4, Nanshan Yungu Phase LI, Taoyuan Community, Xili Street, Nanshan District, Shenzhen

Tel: +86-755 2328 4603

Addresses and phone number also have been listed at www.etulinktechnology.com.

Please e-mail us at sales@etulinktechnology.com or call us for assistance.