

25G SFP28 SR 300m Industrial Optical Transceiver CLR-SFP28-CSRTA

Features

- Hot-pluggable SFP28 form factor
- Full-duplex transceiver module
- 850nm VCSEL laser and PIN photo-detector
- Internal CDR on both transmitter and receiver channels
- Compliant with SFP28 MSA and IEEE 802.3by 25GBASE-SR
- Compliant with CPRI/eCPRI specifications
- Data rate up to 25.78125Gbps
- Reach up to 300m over OM4 MMF
- Power consumption < 1W
- Duplex LC receptacles
- Digital diagnostics functions available via I²C interface
- Operating case temperature range from -40°C to +85°C
- 3.3V power supply voltage
- RoHS compliant (lead free)



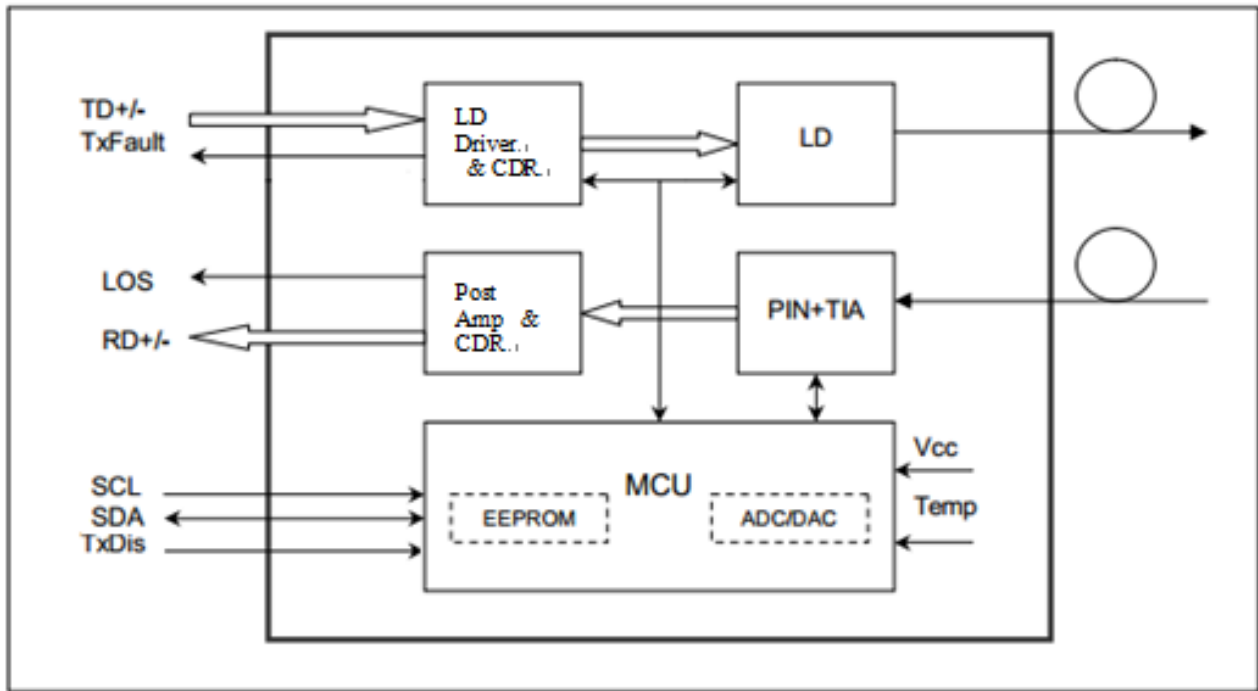
Applications

- 25GBASE-SR Ethernet
- CPRI Option 10
- eCPRI

Description

CLR Networks 25G SFP28 SR 300m industrial optical transceiver CLR-SFP28-CSRTA is designed for 25GBASE-SR Ethernet and CPRI/eCPRI links reach up to 300m over OM4 Multi-Mode Fiber (MMF). This high-performance module operates at 24.33Gbps or 25.78125Gbps using a nominal wavelength of 850nm. The electrical interface uses a 20-contact edge type connector. The optical interface uses duplex LC receptacles. The 25G SFP28 SR module incorporates CLR Networks proven circuit and VCSEL technology to provide reliable long life, high performance, and consistent service.

Block Diagram



Absolute Maximum Ratings

| Parameter | Symbol | Min | Max | Unit |
|---------------------|----------|-----|-----|------|
| Supply Voltage | V_{CC} | 0 | 3.6 | V |
| Storage Temperature | T_S | -40 | +85 | °C |
| Operating Humidity | - | 5 | 85 | % |

Recommended Operating Conditions

| Parameter | Symbol | Min | Typical | Max | Unit |
|----------------------------|----------|------|---------|------|------|
| Operating Case Temperature | T_c | -40 | | 85 | °C |
| Power Supply Voltage | V_{CC} | 3.13 | 3.3 | 3.47 | V |
| Power Supply Current | I_{CC} | | | 300 | mA |
| Fiber Length on OM4 MMF | | | | 300 | m |

Optical and Electrical Characteristics

| Parameter | Symbol | Min | Typical | Max | Unit | Notes |
|--------------------------------|--------------|------|---------|----------|----------|-------|
| Transmitter | | | | | | |
| Data rate | BR | | 24.33 | 25.78125 | Gbps | |
| Center Wavelength | λ_c | 840 | 850 | 860 | nm | |
| Spectral Width (-20dB) | σ | | | 0.6 | nm | |
| Average Output Power | P_{avg} | -8.4 | | 3.4 | dBm | |
| Optical Power OMA | P_{OMA} | -6.4 | | 3 | dBm | |
| Extinction Ratio | ER | 2 | | | dB | |
| Differential data input swing | $V_{IN,PP}$ | 40 | | 1000 | mV | |
| 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 | | | | | | |
| Data rate | BR | | 24.33 | 25.78125 | Gbps | |
| Center Wavelength | λ_c | 840 | 850 | 860 | nm | |
| Receiver Sensitivity (OMA) | P_{sens} | - | - | -10 | dBm | 1 |
| Stressed Sensitivity (OMA) | | - | - | -5.2 | dBm | |
| Receiver Power (OMA) | | | | 3 | dBm | |
| LOS De-Assert | LOS_D | | | -13 | dBm | |
| LOS Assert | LOS_A | -30 | | | dBm | |
| LOS Hysteresis | | 0.5 | | | dB | |
| Differential data output swing | $V_{out,PP}$ | 300 | | 850 | mV | |
| LOS | High | | 2.0 | | V_{cc} | V |
| | Low | | | | 0.8 | V |

Timing and Electrical

| <i>Parameter</i> | <i>Symbol</i> | <i>Min.</i> | <i>Max.</i> | <i>Unit</i> | <i>Conditions</i> |
|-----------------------------------------------------------------------------------------|-----------------------|-------------|-------------|-------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Tx_Disable assert time | t_off | | 100 | μs | Rising edge of Tx_Disable to fall of output signal below 10% of nominal |
| Tx_Disable negate time | t_on | | 2 | ms | Falling edge of Tx_Disable to rise of output signal above 90% of nominal. This only applies in normal operation, not during start up or fault recovery. |
| Time to initialize 2-wire interface | t_2w_start_up | | 300 | ms | From power on or hot plug after the supply meeting Table 8 . |
| Time to initialize | t_start_up | | 300 | ms | From power supplies meeting Table 8 or hot plug or Tx disable negated during power up, or Tx_Fault recovery, until non-cooled power level I part (or non-cooled power level II part already enabled at power level II for Tx_Fault recovery) is fully operational. |
| Time to initialize cooled module and time to power up a cooled module to Power Level II | t_start_up_cooled | | 90 | s | From power supplies meeting Table 8 or hot plug, or Tx disable negated during power up or Tx_Fault recovery, until cooled power level I part (or cooled power level II part during fault recovery) is fully operational. Also, from stop bit low-to-high SDA transition enabling Power Level II until cooled module is fully operational |
| Time to Power Up to Level II | t_power_level2 | | 300 | ms | From stop bit low-to-high SDA transition enabling power level II until non-cooled module is fully operational |
| Time to Power Down from Level II | t_power_down | | 300 | ms | From stop bit low-to-high SDA transition disabling power level II until module is within power level I requirements |
| Tx_Fault assert | Tx_Fault_on | | 1 | ms | From occurrence of fault to assertion of Tx_Fault |
| Tx_Fault assert for cooled module | Tx_Fault_on_cooled | | 50 | ms | From occurrence of fault to assertion of Tx_Fault |
| Tx_Fault Reset | t_reset | 10 | | μs | Time Tx_Disable must be held high to reset Tx_Fault |
| RS0, RS1 rate select timing for FC | t_RS0_FC, t_RS1_FC | | 500 | μs | From assertion till stable output |
| RS0, RS1 rate select timing non FC | t_RS0, t_RS1 | | 24 | ms | From assertion till stable output |
| Rx_LOS assert delay | t_los_on | | 100 | μs | From occurrence of loss of signal to assertion of Rx_LOS |
| Rx_LOS negate delay | t_los_off | | 100 | μs | From occurrence of presence of signal to negation of Rx_LOS |

Diagnostics Specification

| Parameter | Range | Unit | Accuracy | Calibration |
|--------------|------------|------|----------|---------------------|
| Temperature | -40 to +85 | °C | ±3°C | Internal / External |
| Voltage | 3.0 to 3.6 | V | ±3% | Internal / External |
| Bias Current | 0 to 20 | mA | ±10% | Internal / External |
| TX Power | -8 to 3 | dBm | ±3dB | Internal / External |
| RX Power | -14 to 0 | dBm | ±3dB | Internal / External |

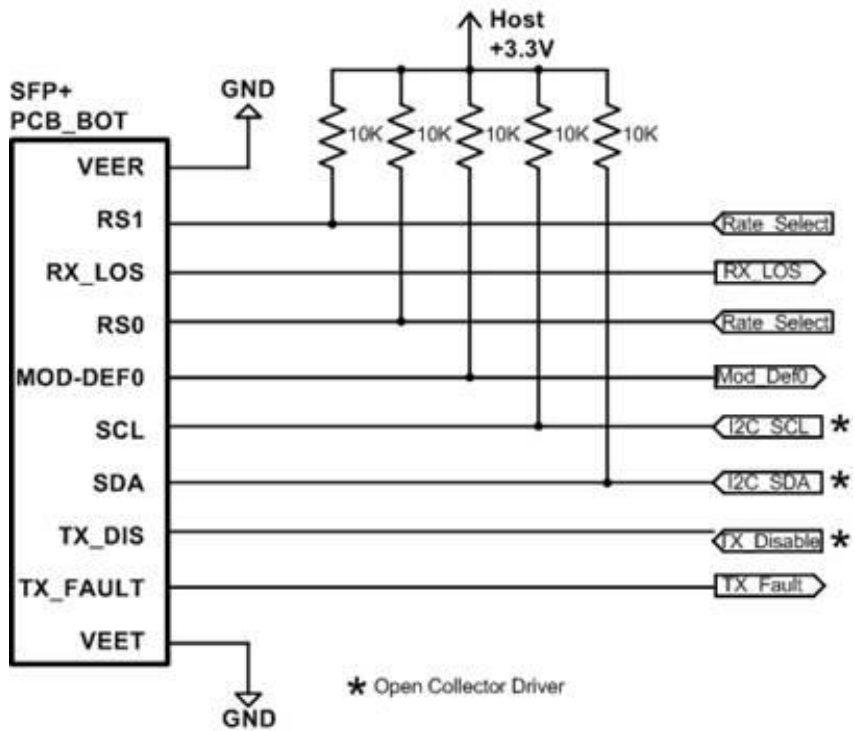
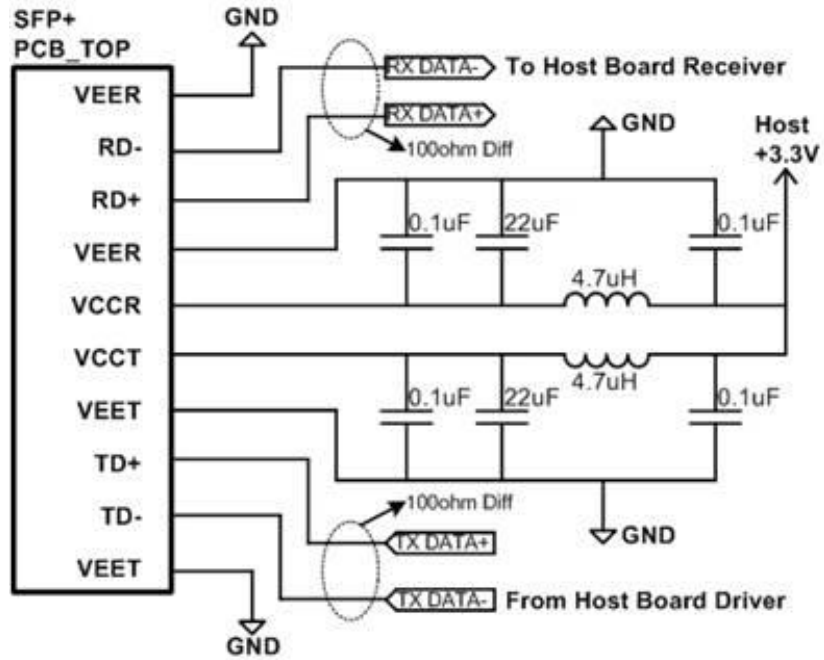
Digital Diagnostic Memory Map

| PIN | Logic | Symbol | Name / Description | Note |
|-----|-----------|----------|---------------------------------------------------------|------|
| 1 | | VeeT | Module Transmitter Ground | 1 |
| 2 | LVTTL-O | TX_Fault | Module Transmitter Fault | 2 |
| 3 | LVTTL-I | TX_Dis | Transmitter Disable; Turns off transmitter laser output | |
| 4 | LVTTL-I/O | SDA | 2-Wire Serial Interface Data Line | 2 |
| 5 | LVTTL-I | SCL | 2-Wire Serial Interface Clock | 2 |
| 6 | | MOD_ABS | Module Definition, Grounded in the module | |
| 7 | LVTTL-I | RS0 | Receiver Rate Select | |
| 8 | LVTTL-O | RX_LOS | Receiver Loss of Signal Indication Active LOW | |
| 9 | LVTTL-I | RS1 | Transmitter Rate Select (not used) | |
| 10 | | VeeR | Module Receiver Ground | 1 |
| 11 | | VeeR | Module Receiver Ground | 1 |
| 12 | CML-O | RD- | Receiver Inverted Data Output | |
| 13 | CML-O | RD+ | Receiver Data Output | |
| 14 | | VeeR | Module Receiver Ground | 1 |
| 15 | | VccR | Module Receiver 3.3 V Supply | |
| 16 | | VccT | Module Receiver 3.3 V Supply | |
| 17 | | VeeT | Module Transmitter Ground | 1 |
| 18 | CML-I | TD+ | Transmitter Non-Inverted Data Input | |
| 19 | CML-I | TD- | Transmitter Inverted Data Input | |
| 20 | | VeeT | Module Transmitter Ground | 1 |

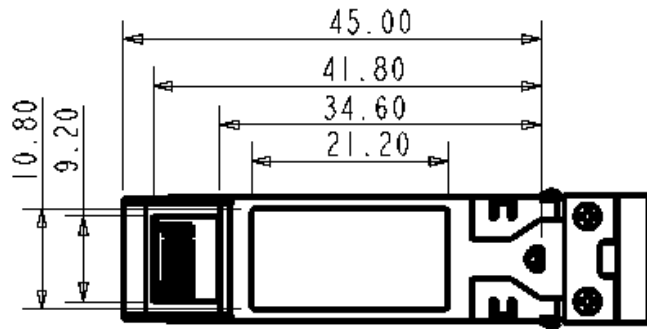
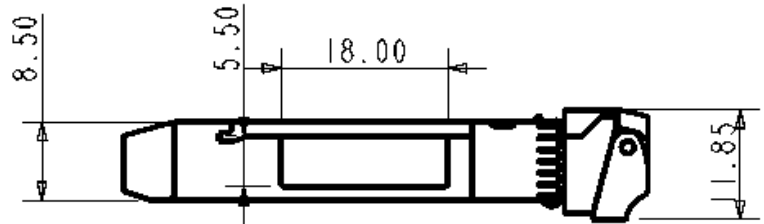
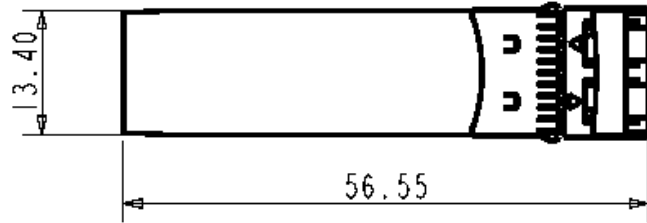
Notes:

1. Module ground pins GND are isolated from the module case.
2. Shall be pulled up with 4.7K-10K ohms to a voltage between 3.15V and 3.45V on the host board

Recommended Interface Circuit



Mechanical Dimensions



Regulatory Compliance

| Feature | Agency | Standard |
|-------------------|----------|----------------------------------------------------------------------------------|
| Laser Eye Safety | FDA/CDRH | CDRH 21 CFR 1040 and Laser Notice 50 |
| Laser Eye Safety | TÜV | IEC 60825-1:2014 EN 60825-1:2014 EN 60825-2:2004+A1+A2 |
| Electrical Safety | TÜV | EN 60950-1:2006+A11+A1+A12+A2 |
| Electrical Safety | UL/CSA | UL 60950-1 & CAN/CSA C22.2 No.60950-1 CLASS 3862.07 CLASS 3862.87 |
| EMC | FCC | 47 CFR FCC Part 15 Subpart B |
| EMC | CE-EMC | EN 55032:2015 EN 55024:2010+A1:2015 EN 61000-3-2:2014 EN 61000-3-3:2013 |

Complies with FDA performance standards for laser products except for deviations pursuant to Laser Notice No. 50, dated June 24, 2007.

References

1. SFP28 MSA
2. CPRI/eCPRI specifications
3. Directive 2011/65/EU of the European Parliament and of the Council, "on the restriction of the use of certain hazardous substances in electrical and electronic equipment," July 1, 2011.