



CL-SFP28-WDM_20-33

Tx: 1330nm/Rx: 1270nm BIDI SFP28 Transceiver for 25GbE/CPRI Option 10
With DDM and Dual CDR, RoHS Compliant



Features:

- Operating Data Rate Support 24.33Gbps and 25.78Gbps with CDR Engaged Mode
- Operating Data Rate Support 9.95Gbps and 10.31Gbps with CDR Bypassed Mode
- Two Types:
 - A: 1270nm DFB Transmitter/ 1330nm Receiver
 - B: 1330nm DFB Transmitter/ 1270nm Receiver
- Up to 20km over SMF
- Single 3.3V Power Supply
- Power Dissipation < 1.5W (Industrial)
- LC Connector Interface, Hot Pluggable
- Built-in Dual CDR
- Compliant with Specification SFF-8402
- Built-in Digital Diagnostic Functions
- Operating Case Temperature:
 - Industrial: -40°C ~ +85°C
 - Safety Certification: TUV/UL/FDA *Note 1
- RoHS Compliant

Applications

- CPRI Option 10
- 25GbE
- 10GbE Optical Link

| PART NUMBER | Monitor | INPUT/OUTPUT | SIGNAL DETECT | TEMPERATURE |
|---------------------|---------|--------------|---------------|----------------|
| CL-SFP28-WDM_20-33 | X | AC/AC | TTL | -5°C to 70 °C |
| CL-SFP28-WDM_20-33i | X | AC/AC | TTL | -40°C to 85 °C |



CL-SFP28-WDM_20-33

Tx: 1330nm/Rx: 1270nm BIDI SFP28 Transceiver for 25GbE/CPRI Option 10
With DDM and Dual CDR, RoHS Compliant

Product Description

The CL-SFP28-WDM_20-33 optical transceiver is designed for fiber communications support 24.33Gbps and 25.78Gbps with CDR engaged, while, 10G Ethernet optical data communication can be supported when CDR is bypassed. It is with the SFP+ 20-pin connector to allow hot plug capability.

The CL-SFP28-WDM_20-33 module is designed for single mode fiber and operates at a nominal wavelength of TX-1270nm/RX-1330nm. The CL-SFP28-WDM_20-33 module is designed for single mode fiber and operates at a nominal wavelength of TX-1330nm/RX-1270nm. It can communicate over single mode fibers(SMF) of length up to 10km.

The transmitter section uses a multiple quantum well DFB, which is class 1 laser compliant according to International Safety Standard IEC-60825.

The receiver section uses an integrated InGaAs detector preamplifier (IDP) mounted in an optical header and a limiting post-amplifier IC.

Absolute Maximum Ratings^{*Note3}

| Parameter | Symbol | Min. | Max. | Unit |
|---|-----------------|------|------|------|
| Storage Temperature | T _s | -40 | +85 | °C |
| Supply Voltage | V _{CC} | -0.5 | +3.6 | V |
| Operating Relative Humidity ^{*Note4} | RH | 5 | 95 | % |

Note3: Exceeding any one of these values may destroy the device permanently.

Note4: Non-Condensing.

Recommended Operating Conditions

| Parameter | Symbol | Min. | Typ. | Max. | Unit | Notes |
|---------------------------------|------------------|------|------|----------------------|------|-------------------------------|
| Transmitter | | | | | | |
| CML Inputs (Differential) | V _{in} | | | 900 | mVpp | AC coupled inputs |
| Input Impedance (Differential) | Z _{in} | | 100 | | ohms | Connected directly to TX pins |
| Tx_DISABLE Input Voltage – High | | 2 | | V _{CC} +0.3 | V | |
| Tx_DISABLE Input Voltage – Low | | -0.3 | | 0.8 | V | |
| Receiver | | | | | | |
| CML Outputs (Differential) | V _{out} | 300 | | 1000 | mVpp | AC coupled outputs |
| Rx_LOS Output Voltage – High | | 2.4 | | V _{CC} +0.3 | V | |



CL-SFP28-WDM_20-33

Tx: 1330nm/Rx: 1270nm BIDI SFP28 Transceiver for 25GbE/CPRI Option 10
With DDM and Dual CDR, RoHS Compliant

| | | | | | | |
|-----------------------------|--|------|--|-----|---|--|
| Rx_LOS Output Voltage – Low | | -0.3 | | 0.4 | V | |
|-----------------------------|--|------|--|-----|---|--|

Optical and Electrical Characteristics

(1330nm DFB & 1270nm PIN/TIA)

| Parameter | Symbol | Min. | Typ. | Max. | Unit |
|--|-----------------|---------------------------------|------|-------|------|
| 9um Core Diameter SMF | | | | 20 | Km |
| Data Rate | | | | 25.78 | Gbps |
| Transmitter | | | | | |
| Optical Center Wavelength | λ | 1320 | 1330 | 1340 | nm |
| Spectral Width (-20dB) | $\Delta\lambda$ | | | 1 | nm |
| Average Output Power@25.78Gb/s | P_{AVG} | -7 | | +2 | dBm |
| Output Power(OMA) | P_{OMA} | -4 | | 2.2 | dBm |
| OMA minus TDP | | -5 | | | dBm |
| Extinction Ratio | ER | 3 | | | dB |
| Transmitter Dispersion Penalty | TDP | | | 2.7 | dB |
| Transmitter Reflectance | | | | -26 | dB |
| Side Mode Suppression Ratio | SMSR | 30 | | | dB |
| Average Launch Power of OFF Transmitter | P_{OFF} | | | -30 | dBm |
| Transmitter Eye Mask Definition {X1, X2, X3, Y1, Y2, Y3}@ 5E-5 Hit Ratio | TEM | {0.31,0.40,0.45,0.34,0.38,0.40} | | | |
| Receiver | | | | | |
| Center Wavelength | λ_c | 1260 | | 1280 | nm |
| Average Receive Power | P_{min} | -13.3 | | | dBm |
| Stressed Receiver Sensitivity(OMA) | $Sens_{SRS}$ | | | -9.5 | dBm |
| OMA Receiver Sensitivity* ^{Note6} | $Sens_{OMA}$ | | | -12 | dBm |
| Receiver Reflectance | RL | | | -26 | dB |
| Receiver Overload | P_{max} | 2.5 | | | dBm |
| LOS De-Assert | LOS_D | | | -14 | dBm |
| LOS Assert | LOS_A | -30 | | | dBm |
| LOS Hysteresis | HY | 0.5 | | | dB |

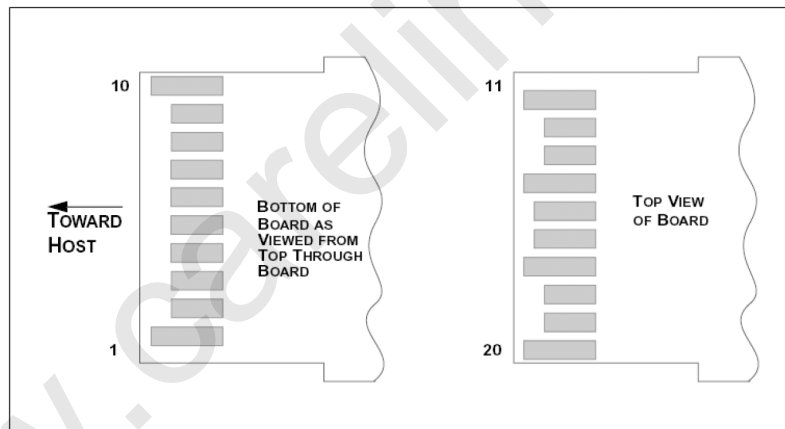
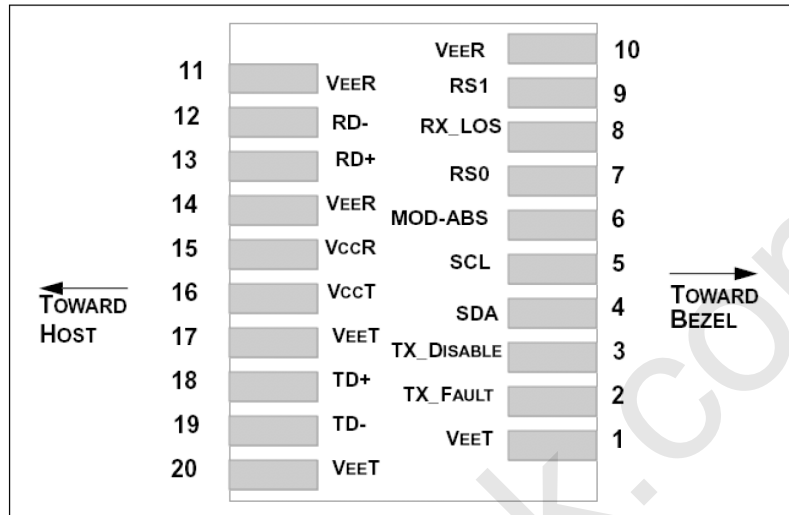
Note6: Measured with data rate at 25.78Gb/s, BER less than 5E-5 and PRBS 231-1.



CL-SFP28-WDM_20-33

Tx: 1330nm/Rx: 1270nm BIDI SFP28 Transceiver for 25GbE/CPRI Option 10
With DDM and Dual CDR, RoHS Compliant

SFP28 Transceiver Electrical Pad Layout



Pin Function Definitions

| Pin Num. | Name | Function | Plug Seq. | Notes |
|----------|------------|------------------------------|-----------|--|
| 1 | VeeT | Transmitter Ground | 1 | Note 5) |
| 2 | TX Fault | Transmitter Fault Indication | 3 | Note 1) |
| 3 | TX Disable | Transmitter Disable | 3 | Note 2), Module disables on high or open |
| 4 | SDA | Module Definition 2 | 3 | Data line for Serial ID. |
| 5 | SCL | Module Definition 1 | 3 | Clock line for Serial ID. |



CL-SFP28-WDM_20-33

Tx: 1330nm/Rx: 1270nm BIDI SFP28 Transceiver for 25GbE/CPRI Option 10
With DDM and Dual CDR, RoHS Compliant

| | | | | |
|----|---------|--------------------------|---|---|
| 6 | MOD-ABS | Module Definition 0 | 3 | Note 3) |
| 7 | RS0 | RX Rate Select (LVTTTL). | 3 | Rate Select 0, optionally controls SFP28 module receiver. This pin is pulled low to VeeT with a >30K resistor. |
| 8 | RX LOS | Loss of Signal | 3 | Note 4) |
| 9 | RS1 | TX Rate Select (LVTTTL). | 1 | Rate Select 1, optionally controls SFP28 module transmitter. This pin is pulled low to VeeT with a >30K resistor. |
| 10 | VeeR | Receiver Ground | 1 | Note 5) |
| 11 | VeeR | Receiver Ground | 1 | Note 5) |
| 12 | RD- | Inv. Received Data Out | 3 | Note 6) |
| 13 | RD+ | Received Data Out | 3 | Note 6) |
| 14 | VeeR | Receiver Ground | 1 | Note 5) |
| 15 | VccR | Receiver Power | 2 | 3.3V ± 5%, Note 7) |
| 16 | VccT | Transmitter Power | 2 | 3.3V ± 5%, Note 7) |
| 17 | VeeT | Transmitter Ground | 1 | Note 5) |
| 18 | TD+ | Transmit Data In | 3 | Note 8) |
| 19 | TD- | Inv. Transmit Data In | 3 | Note 8) |
| 20 | VeeT | Transmitter Ground | 1 | Note 5) |

Notes:

Note 1) TX Fault is an open collector/drain output, which should be pulled up with a 4.7K – 10KΩ resistor on the host board. Pull up voltage between 2.4V and VccT/R+0.3V. When high, output indicates a laser fault of some kind. Low indicates normal operation. In the low state, the output will be pulled to < 0.4V.

Note 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~10 K Ω resistor. Its states are:

Low (-0.3 – 0.8V): Transmitter on

(>0.8, < 2.0V): Undefined

High (2.0 – VccT/R+0.3V): Transmitter Disabled

Open: Transmitter Disabled

Note 3) Module Absent, connected to VeeT or VeeR in the module.

Note 4) RX LOS (Loss of Signal) is an open collector/drain output, which should be pulled up with a 4.7K – 10KΩ resistor. Pull up voltage between 2.4V and VccT/R+0.3V. When high, this output indicates the received optical power is below the worst-case receiver sensitivity (as defined by the standard in use). Low indicates normal operation. In the low state, the output will be pulled to < 0.4V.

Note 5) VeeR and VeeT may be internally connected within the SFP28 module.

Note 6) RD-/+ : These are the differential receiver outputs. They are AC coupled 100Ω differential lines which should be terminated with 100Ω (differential) at the user SERDES. The AC coupling is done inside the module and is thus not required on the host board. The voltage swing on these lines will be between 150mV and 500mV single-ended when properly terminated.



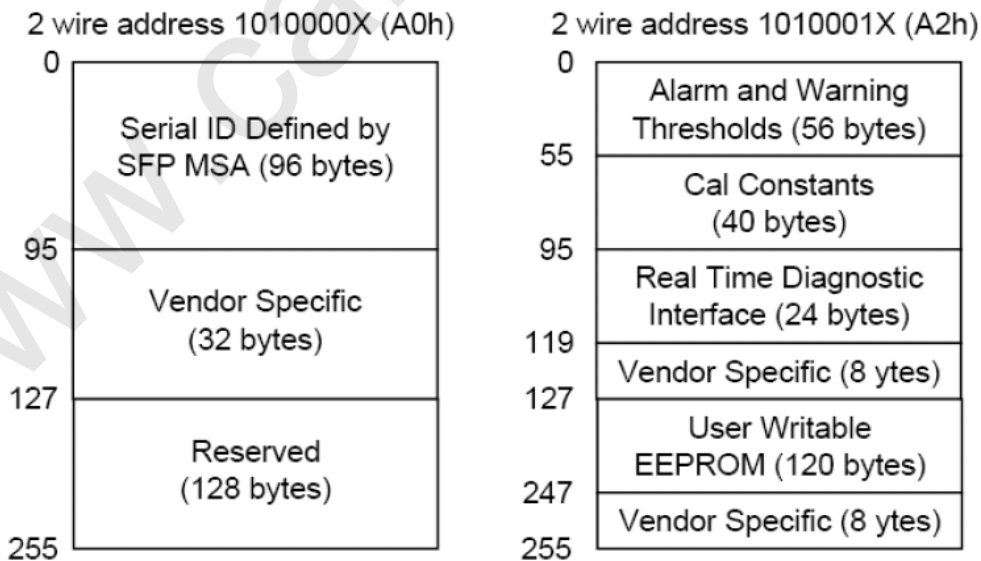
Note 7) VccR and VccT are the receiver and transmitter power supplies. They are defined as 3.3V ±5% at the SFP+ connector pin. Maximum supply current is 455mA. Inductors with DC resistance of less than 1 ohm should be used in order to maintain the required voltage at the SFP28 input pin with 3.3V supply voltage. When the recommended supply-filtering network is used, hot plugging of the SFP28 transceiver module will result in an inrush current of no more than 30mA greater than the steady state value. VccR and VccT may be internally connected within the SFP28 transceiver module.

Note 8) TD-/+ : These are the differential transmitter inputs. They are AC-coupled, differential lines with 100Ω differential termination inside the module. The AC coupling is done inside the module and is thus not required on the host board. The inputs will accept swings less than 450mV single-ended, though it is recommended that values between 90mV-900mV in differential be used for best EMI performance.

EEPROM

The serial interface uses the 2-wire serial CMOS EEPROM protocol. When the serial protocol is activated, the host generates the serial clock signal (SCL). The positive edge clocks data into those segments of the EEPROM that are not writing protected within the SFP28 transceiver. The negative edge clocks data from the SFP28 transceiver. The serial data signal (SDA) 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.

The Module provides diagnostic information about the present operating conditions. The transceiver generates this diagnostic data by digitization of internal analog signals. Calibration and alarm/warning threshold data is written during device manufacture. Received power monitoring, transmitted power monitoring, bias current monitoring, supply voltage monitoring and temperature monitoring all are implemented. If the module is defined as external calibrated, the diagnostic data are raw A/D values and must be converted to real world units using calibration constants stored in EEPROM locations 56 – 95 at wire serial bus address A2H. The digital diagnostic memory map specific data field define as following. For detail EEPROM information, please refer to the related document of SFF 8472 Rev 12.2.





CL-SFP28-WDM_20-33

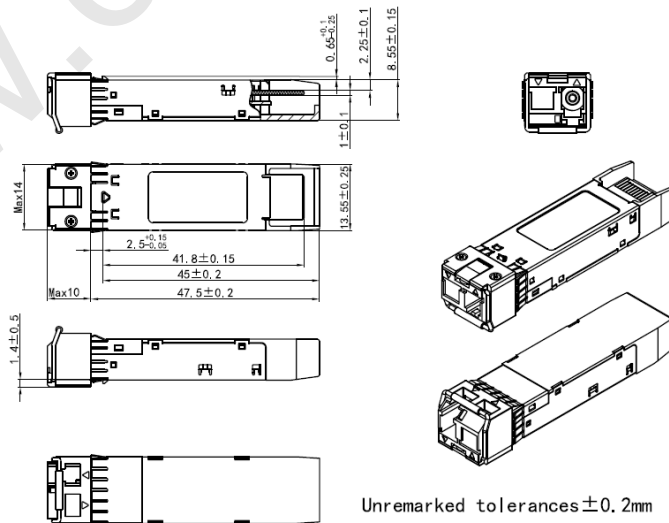
Tx: 1330nm/Rx: 1270nm BIDI SFP28 Transceiver for 25GbE/CPRI Option 10
With DDM and Dual CDR, RoHS Compliant

Operations about Retimer/CDR Rate Select Logic

The CL-SFP28-WDM_20-33 supports high data rates 24.33G/25.78G (CPRI options 10 /25GbE) and Low data rates 9.95G/10.31G(10GbE). For more details, please contact Carelink.

| Logic OR of RS0 Pin and Bit110.3 of A2H | Logic OR of RS1 Pin and Bit118.3 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 Engaged | CDR Engaged |
| High/1 | Low/0 | 24.33G/25.78G | 9.95G/10.31G | CDR Engaged | CDR Bypassed |
| Low/0 | High/1 | 9.95G/10.31G | 24.33G/25.78G | CDR Bypassed | CDR Engaged |
| Low/0 | Low/0 | 9.95G/10.31G | 9.95G/10.31G | CDR Bypassed | CDR Bypassed |

Mechanical Specifications



*This 2D drawing only for reference, please check with Carelink before ordering.



CL-SFP28-WDM_20-33

Tx: 1330nm/Rx: 1270nm BIDI SFP28 Transceiver for 25GbE/CPRI Option 10
With DDM and Dual CDR, RoHS Compliant

Eye Safety

This single-mode transceiver is a Class 1 laser product. It complies with IEC-60825 and FDA 21 CFR 1040.10 and 1040.11. The transceiver must be operated within the specified temperature and voltage limits. The optical ports of the module shall be terminated with an optical connector or with a dust plug.

Notice:

Carelink reserves the right to make changes or discontinue any optical link product or service identified in this publication, without notice, in order to improve design and/or performance.

Applications that are described herein for any of the optical link products are for illustrative purposes only. Carelink makes no representation or warranty that such applications will be suitable for the specified use without further testing or modification.

www.carelink.com.hk