# Part Type: CFP-100GBase-LR
# CFP-100GBase-LR4-IND

## Quick Spec:

| | |
|---|---|
| Form Factor: | CFP |
| TX Wavelength: | 1310nm |
| Reach: | 10km |
| Cable Type: | SMF |
| Rate Category: | 100GBase |
| Interface Type: | LR4 |
| DDM: | Yes |
| Connector Type: | Dual-LC |
| Optical Power Budget: | 4.3 dB |
| TX Power Min/Max: | -4.3 to +4.5 dBm |
| RX Power Min/Max: | -8.6 to +5.5 dBm |

## Features:

- Hot-Pluggable CFP footprint LC duplex connector
- Supports 103Gbps and 112Gbps aggregate
- Single 3.3V power supply and power dissipation < 16W
- Up to 10km transmission on SM fiber
- Class 1 FDA and IEC60825-1 laser safety compliant
- MDIO interface with Digital Diagnostic Monitoring (DDM)
- CAUI electrical interface
- Compliant with CFP MSA specification
- RoHS6 compliant
- Operating Case Temperature
    - Standard 0 to +70 °C
    - Industrial -40 to +85 °C

## Applications:

- 100GBASE-LR4 Ethernet links
- OTU-4

## Overview

The CFP-100GBASE-LR4 is a 100G transceiver module designed for applications over single-mode (SM) fiber with transmission distances of up to 10km. The module supports both 100GBASE-LR4 and OTU4 operation. It uses 4 WDM optical signals (around 1310nm), and multiplexes them into a single channel for 100Gbps optical transmission. Reversely, on the receiver side, the module optically de-multiplexes a 100Gbps LR4 input into 4 WDM channels signals, and converts them to electrical data. The module has a Gearbox to aggregate 10x10G signals into 4x25G data-streams. The central wavelengths of the WDM channels are 1295.56nm, 1300.05nm, 1304.58nm and 1309.14nm according to the IEEE LR4 recommendation. The module contains a duplex LC connector for the optical interface and a 148-pin connector for the electrical interface. The product is designed with form factor, optical/electrical connection and digital diagnostic interface according to the CFP MSA Hardware Specification Revision 1.4.

# Specifications

## Functional Diagram

This product converts the 10-channel 10Gbps electrical input data into 4 channel WDM optical signals, using a gearbox. The WDM light signals are combined by an optical MUX to a 103 or 112 Gbps data stream. The connector interface towards the SM fiber is LC. The receiver part accepts 103 or 112Gbps WDM optical signals and de-multiplexes them into 4 individual channels. Each wavelength is received by a photo diode (PIN) and converted into an electrical signal which is then converted into 10-channel 10Gbps electrical output data. Figure 1 shows the functional block diagram of this product.

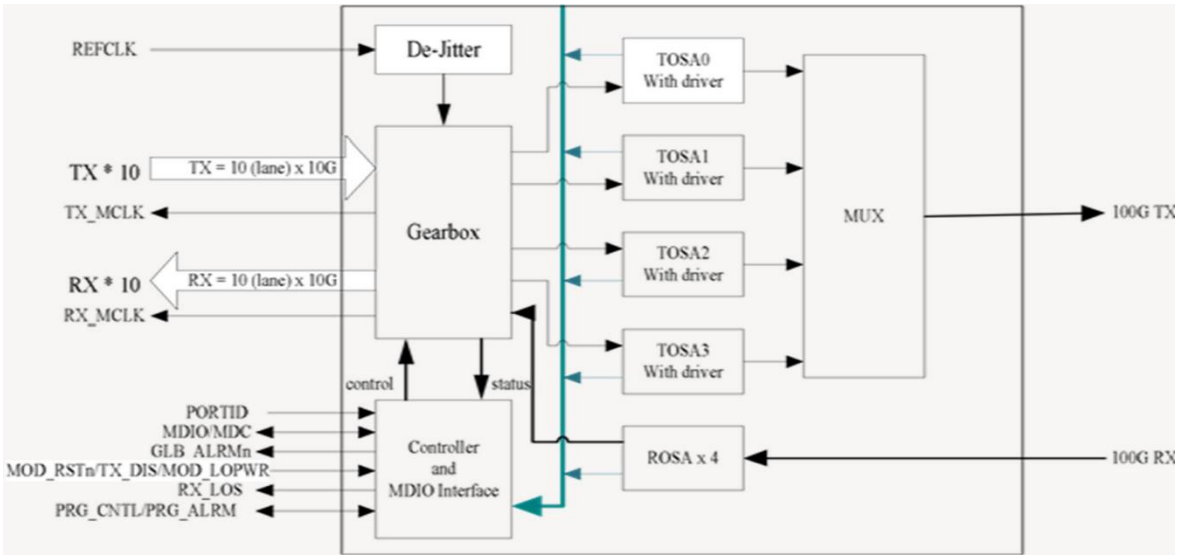


Figure 1. Functional diagram

## Absolute Maximum Ratings

| Parameter | Symbol | Min | Max | Unit |
|---|---|---|---|---|
| Storage Temperature | *Ts* | -40 | +85 | °C |
| Operating Case Temp (Standard) | TOP | 0 | 70 | °C |
| Operating Case Temp (Industrial) | TOP | -40 | 85 | °C |
| Power Supply Voltage | Vcc | -0.5 | 3.6 | V |
| Relative Humidity (non-condensation) | RH | 5 | 85 | % |

## Recommended Operating Conditions

| Parameter | Symbol | Min | Typ | Max | Unit |
|---|---|---|---|---|---|
| Power Supply Voltage | *Vcc* | 3.2 | 3.3 | 3.4 | V |
| Power Supply current | | | 4000 | | mA |
| Power consumption | P | | | 16 | W |
| Baud Rate | | | 103 | 112 | Gbps |
| Link Distance (SM fiber) | | | | 10 | km |

## Electrical Characteristics-Transmitter & Receiver (each lane)

| Parameter | Symbol | Min | Typ | Max | Unit | Notes |
|---|---|---|---|---|---|---|
| Transmitter | | | | | | |
| Input Amplitude (Differential) | *Vin* | | | 1050 | mVpp | AC coupled inputs |
| Differential Input Impedance | *Zin* | 80 | 100 | 120 | Ohm | Rin > 100kOhm @ DC |
| Receiver | | | | | | |
| Output Amplitude (Differential) | *Vout* | 360 | | 770 | mVpp | AC coupled outputs |
| Differential Output Impedance | *Zout* | 80 | 100 | 120 | Ohm | |

## MDIO Interface Specification

| Parameter | Symbol | Min | Typ | Max | Unit | Notes |
|---|---|---|---|---|---|---|
| Input Voltage | *VIH* | 0.84 | | 1.5 | V | |
| | *VIL* | -0.3 | | 0.36 | V | |
| Input Leak current | *IIN* | -100 | | 100 | µA | |
| Output Voltage | *VOH* | 1.0 | | 1.5 | V | |
| | *VOL* | -0.3 | | 0.2 | V | |
| Input Capacitance | *CI* | | | 10 | pF | |
| Input MDC Clock | *fMDC* | 0.1 | | 4 | MHz | |
| MDC Clock Period | *TMDC* | 250 | | 10000 | nsec | |
| MDIO Hold Time | *Thold* | 10 | | | nsec | |
| MDIO Setup Time | *Tsetup* | 10 | | | nsec | |
| GLB_ALM | *Tglb_alm _ass* | | | 150 | | |
| | *Tglb_alm _dea* | | | 150 | | |

## Optical Characteristics

| Parameter | Symbol | Min | Typ | Max | Unit |
|---|---|---|---|---|---|
| Lane Wavelength | *L0* | 1294.53 | 1295.56 | 1296.59 | nm |
| | *L1* | 1299.02 | 1300.05 | 1301.09 | |
| | *L2* | 1303.54 | 1304.58 | 1305.63 | |
| | *L3* | 1308.09 | 1309.1 | 1310.19 | |
| Signalling Speed per lane | | | 27.95 | | Gbps |

## Optical Characteristics-Transmitter

| Parameter | Symbol | Min | Typ | Max | Unit | Notes |
|---|---|---|---|---|---|---|
| Total Average Launch Power | *PO* | | | +8.9 | dBm | |
| Average Launch Power (each Lane) | *Peach* | -2.5 | | +2.9 | dBm | |
| Side Mode Suppression Ratio | *SMSR* | 30 | | | dB | |
| Optical Return Loss Tolerance | | | | 20 | dB | |
| Extinction Ratio | *ER* | 7 | | | dB | |
| Transmitter Eye Mask Definition {X1, X2, X3, Y1, Y2, Y3} | | G.959.1 Complaint | | | | |
| TX Disable Assert Time | *Toff* | | | 100 | µsec | |

## Optical Characteristics-Receiver

| Parameter | Symbol | Min | Typ | Max | Unit | Notes |
|---|---|---|---|---|---|---|
| Average Receive Power (each Lane) | *RPOW* | -8.8 | | 2.9 | dBm | |
| Receiver Sensitivity per Lane | *Pmin* | | | -10.3 | dB | |
| Receive Overload per Lane | *Pmax* | 4.5 | | | dBm | |
| Optical Return Loss | *ORL* | | | -26 | dB | |
| LOS Assert | *LOSA* | -21 | | | dBm | |
| LOS Deassert | *LOSD* | | | -11 | dBm | |
| LOS Hysteresis | *LOSH* | 0.5 | | | dB | |