

## GIGALIGHT 100G CFP Optical Transceiver Module GCF-M101-SR10C/GCF-M101-CSR10C

### Features

- ◆ Transmission data rate up to 11.2Gbit/s per channel
- ◆ CFP MSA compliant
- ◆ Compliant to IEEE 802.3ba specification for 100GBASE-SR10 links
- ◆ Up to 11.2 Gbps per channel bandwidth,
- ◆ OTU4 compatible
- ◆ 10 channels 850nm VCSEL array
- ◆ 10 channels PIN photo detector array
- ◆ OM3 Multimode Fiber cable of up to 300m and OM4 Multimode Fiber cable of up to 400m
- ◆ MDIO digital diagnostic and control capabilities.
- ◆ compliant to CFP MSA Management Interface Specification, Draft 1.4
- ◆ TX input and RX output CDR retiming
- ◆ Hot pluggable electrical interface
- ◆ Power class 1 (<8W max)
- ◆ Operating case temperature 0°C to +70°C
- ◆ 3.3V power supply
- ◆ RoHS 6 compliant(lead free)



### Applications

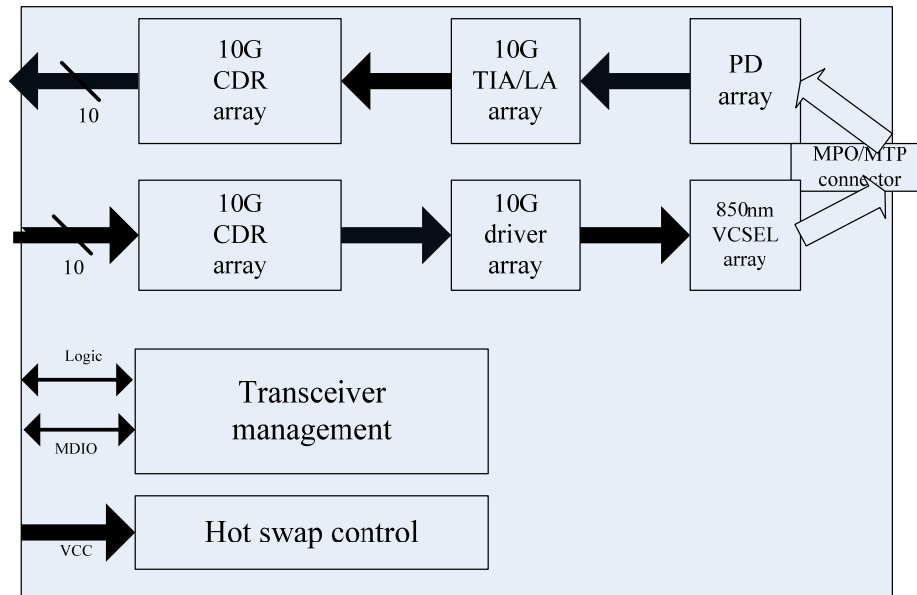
- ◆ High-speed core router interlinks and data center aggregation
- ◆ Test equipment

### Description

The CFP optical transceiver module are a high performance, low power consumption, short reach(1m to 100m) interconnect solution supporting 100G Ethernet and PCIe. It is compliant with the CFP MSA and IEEE P802.3ba 100GBASE-SR10. Gigalight CFP SR10 modules offer 10 transmit and 10 receive asynchronous channels operating at up to 11.2Gbps per channel.

As shown in Figure 1, the transmitter side of the module consists of an array of VCSELs (Vertical Cavity Surface Emitting Lasers) and associated circuitry, which converts 10 parallel electrical data inputs to 10

parallel optical data output signals and also converts 10 parallel optical signals into 10 parallel electrical signals through an array of PIN photodiodes and associated circuitry.



**Figure1. Module Block Diagram**

### Absolute Maximum Ratings

| Parameter                  | Symbol | Min  | Max     | Unit |
|----------------------------|--------|------|---------|------|
| Supply Voltage             | Vcc    | -0.3 | 3.6     | V    |
| Input Voltage              | Vin    | -0.3 | Vcc+0.3 | V    |
| Storage Temperature        | Tst    | -20  | 85      | °C   |
| Case Operating Temperature | Top    | 0    | 70      | °C   |
| Humidity(non-condensing)   | Rh     | 5    | 95      | %    |

### Recommended Operating Conditions

| Parameter                  | Symbol | Min  | Typical | Max  | Unit |
|----------------------------|--------|------|---------|------|------|
| Supply Voltage             | Vcc    | 3.13 | 3.3     | 3.47 | V    |
| Operating Case temperature | Tca    | 0    |         | 70   | °C   |
| Data Rate Per Lane         | fd     | -    |         | 11.2 | Gbps |
| Humidity                   | Rh     | 5    |         | 85   | %    |
| Power Dissipation          | Pm     |      |         | 8    | W    |

## Electrical Characteristics

| Parameter                             | Symbol           | Min     | Typical | Max | Unit  |
|---------------------------------------|------------------|---------|---------|-----|-------|
| Differential input impedance          | Zin              | 90      | 100     | 110 | ohm   |
| Differential Output impedance         | Zout             | 90      | 100     | 110 | ohm   |
| Differential input voltage amplitude  | $\Delta V_{in}$  | 120     |         | 820 | mVp-p |
| Differential output voltage amplitude | $\Delta V_{out}$ | 300     |         | 820 | mVp-p |
| Input Logic Level High                | V <sub>IH</sub>  | 2.0     |         | VCC | V     |
| Input Logic Level Low                 | V <sub>IL</sub>  | 0       |         | 0.8 | V     |
| Output Logic Level High               | V <sub>OH</sub>  | VCC-0.5 |         | VCC | V     |
| Output Logic Level Low                | V <sub>OL</sub>  | 0       |         | 0.4 | V     |

### Note:

1. Differential input voltage amplitude is measured between TxnP and TxnN.
2. Differential output voltage amplitude is measured between RxnP and RxnN.

## Optical Characteristics

### Transmitter Optical Specifications (T = 25°C, VCC = 3.3V +/- 5%)

| Parameter                                     | Symbol                                          | Min | Typical | Max  | Unit |
|-----------------------------------------------|-------------------------------------------------|-----|---------|------|------|
| Average Optical Power(per channel)            | P <sub>out</sub>                                | -8  | -2.5    | +1   | dBm  |
| Average Optical Power(per channel) - Disabled | P <sub>off</sub>                                |     |         | -30  | dBm  |
| Optical Return Loss Tolerance                 |                                                 |     |         | 12   | dB   |
| Extinction Ratio                              | ER                                              | 3   |         |      | dB   |
| Center Wavelength                             | $\lambda_c$                                     | 840 | 850     | 860  | nm   |
| RMS Spectral Width                            | $\lambda$                                       |     | 0.5     | 0.65 | nm   |
| Transmitter eye mask                          | Compliant to IEEE802.3ba eye mask specification |     |         |      |      |

### Note:

1. Average optical power is measured at the output of the modules optical interface.

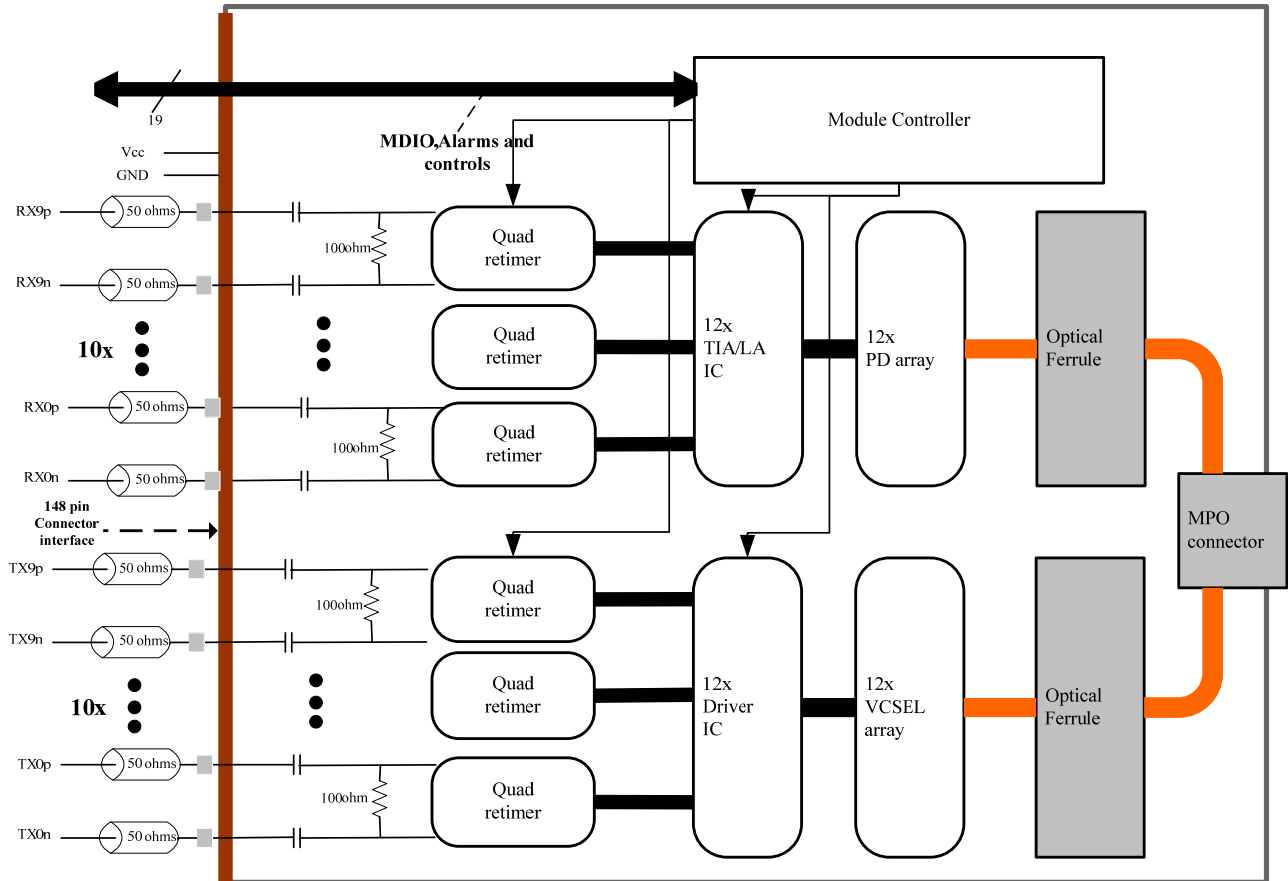
### Receiver Optical Specifications (T = 25°C, VCC = 3.3V +/- 5%)

| Parameter                              | Symbol              | Min | Typical | Max  | Unit |
|----------------------------------------|---------------------|-----|---------|------|------|
| Optical Power Sensitivity(per channel) | P <sub>in min</sub> |     | -12     | -9.9 | dBm  |
| Optical Power Saturation(per channel)  | P <sub>in max</sub> | +1  |         |      | dBm  |
| Stressed Receiver Sensitivity          | P <sub>s</sub>      |     |         | -5.4 | dBm  |
| Center Wavelength                      | $\lambda_c$         | 840 | 850     | 860  | nm   |
| RMS Spectral Width                     | $\lambda$           |     | 0.5     | 0.65 | nm   |
| Optical Return Loss                    | RI                  | 12  |         |      | dB   |

### Note:

1. Optical power sensitivity is measured with BER@10<sup>-12</sup> at 10.3125Gbps per channel.
- 2.

## CFP module functional block diagram



## Pin Descriptions

### Part A: Bottom Row Pin Function Definition

| Pin | Symbol   | Type | I/O | Description                                                                                   |
|-----|----------|------|-----|-----------------------------------------------------------------------------------------------|
| 1   | 3.3V_GND | GND  |     | 3.3V Module Supply Voltage Return Ground, can be separate or tied together with Signal Ground |
| 2   | 3.3V_GND | GND  |     |                                                                                               |
| 3   | 3.3V_GND | GND  |     |                                                                                               |
| 4   | 3.3V_GND | GND  |     |                                                                                               |
| 5   | 3.3V_GND | GND  |     |                                                                                               |
| 6   | 3.3V     | VCC  |     | 3.3V Module Supply                                                                            |
| 7   | 3.3V     | VCC  |     |                                                                                               |
| 8   | 3.3V     | VCC  |     |                                                                                               |
| 9   | 3.3V     | VCC  |     |                                                                                               |
| 10  | 3.3V     | VCC  |     |                                                                                               |
| 11  | 3.3V     | VCC  |     |                                                                                               |
| 12  | 3.3V     | VCC  |     |                                                                                               |
| 13  | 3.3V     | VCC  |     |                                                                                               |

|    |               |                 |     |                                                                                                                                                                |
|----|---------------|-----------------|-----|----------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 14 | 3.3V          | VCC             |     |                                                                                                                                                                |
| 15 | 3.3V          | VCC             |     |                                                                                                                                                                |
| 16 | 3.3V_GND      | GND             |     |                                                                                                                                                                |
| 17 | 3.3V_GND      | GND             |     |                                                                                                                                                                |
| 18 | 3.3V_GND      | GND             |     |                                                                                                                                                                |
| 19 | 3.3V_GND      | GND             |     |                                                                                                                                                                |
| 20 | 3.3V_GND      | GND             |     |                                                                                                                                                                |
| 21 | NC            |                 | I/O | Gigalight internal, do not connect                                                                                                                             |
| 22 | NC            |                 | I/O | Gigalight internal, do not connect                                                                                                                             |
| 23 | GND           | GND             |     |                                                                                                                                                                |
| 24 | (TX_MCLKn)    | CML             | O   | CML For optical waveform testing. Not used.                                                                                                                    |
| 25 | (TX_MCLKp)    | CML             | O   | CML For optical waveform testing. Not used.                                                                                                                    |
| 26 | GND           | GND             |     |                                                                                                                                                                |
| 27 | NC            |                 | I/O | Gigalight internal, do not connect                                                                                                                             |
| 28 | NC            |                 | I/O | Gigalight internal, do not connect                                                                                                                             |
| 29 | NC            |                 | I/O | Gigalight internal, do not connect                                                                                                                             |
| 30 | PRG_CNTL1     | LVC MOS<br>w/PU | I   | Programmable Control 1 set via MDIO, MSA default: TRXIC_RSTn – TX & RX IC reset. “0” = reset, “1” or NC = enabled or not used                                  |
| 31 | PRG_CNTL2     | LVC MOS<br>w/PU | I   | Programmable Control 2 set via MDIO, MSA default: Hardware power Interlock LSB, “00” = <8W, “01” = <16W, “10” < 24W, “11” or NC = >24W or not used             |
| 32 | PRG_CNTL3     | LVC MOS<br>w/PU | I   | Programmable Control 3 set via MDIO, MSA default: Hardware power Interlock MSB, “00” = <8W, “01” = <16W, “10” < 24W, “11” or NC = >24W or not used             |
| 33 | PRG_ALARM1    | LVC MOS         | O   | Programmable Alarm 1 set via MDIO, Reflex default: HIPWR_ON, Module power on indicator. “1” = Module high power up completed, “0” = Module not high powered up |
| 34 | PRG_ALARM2    | LVC MOS         | O   | Programmable Alarm 2 set via MDIO, Reflex default: MOD_READY, module initialization complete, “1” = complete, “0” = not complete                               |
| 35 | PRG_ALARM3    | LVC MOS         | O   | Programmable Alarm 3 set via MDIO, Reflex default: MOD_FAULT, module fault detected, “1” = fault, “0” = no fault                                               |
| 36 | TX_DIS        | LVC MOS<br>w/PU | I   | Transmitter Disable for all channels, “1” or NC = transmitter disabled, “0” = transmitter enabled                                                              |
| 37 | MOD_LOPW<br>R | LVC MOS<br>w/PU | I   | Module low power mode. “1” or NC = module in low power (safe) mode, “0” = power-on enabled                                                                     |
| 38 | MOD_ABS       | GND             | O   | Module Absent. “1” or NC = Module absent, “0” = module present. Pull-up resistor on Host                                                                       |
| 39 | MOD_RSTn      | LVC MOS<br>w/PD | I   | Module Reset. “0” = reset the module, “1” or NC = module enabled, Pull Down resistor in module                                                                 |
| 40 | RX_LOS        | LVC MOS         | O   | Receiver loss of optical signal on any channel, “1” = loss of signal, “0” = normal condition                                                                   |
| 41 | GLB_ALRMn     | LVC MOS         | O   | Global Alarm. “0” = alarm condition in any MDIO alarm register, “1” = no alarm                                                                                 |
| 42 | PRTADR4       | 1.2V CMOS       | I   | MDIO port address bit 4                                                                                                                                        |
| 43 | PRTADR3       | 1.2V CMOS       | I   | MDIO port address bit 3                                                                                                                                        |
| 44 | PRTADR2       | 1.2V CMOS       | I   | MDIO port address bit 2                                                                                                                                        |
| 45 | PRTADR1       | 1.2V CMOS       | I   | MDIO port address bit 1                                                                                                                                        |
| 46 | PRTADR0       | 1.2V CMOS       | I   | MDIO port address bit 0                                                                                                                                        |

|    |          |           |     |                                                                                               |
|----|----------|-----------|-----|-----------------------------------------------------------------------------------------------|
| 47 | MDIO     | 1.2V CMOS | I/O | Management Data I/O bi-directional data (electrical specs as per 802.3ae)                     |
| 48 | MDC      | 1.2V CMOS | I   | Management data clock (electrical specs as per 802.3ae)                                       |
| 49 | GND      | GND       |     |                                                                                               |
| 50 | NC       |           | I/O | Gigalight internal, do not connect                                                            |
| 51 | NC       |           | I/O | Gigalight internal, do not connect                                                            |
| 52 | GND      | GND       |     |                                                                                               |
| 53 | NC       |           | I/O | Gigalight internal, do not connect                                                            |
| 54 | NC       |           | I/O | Gigalight internal, do not connect                                                            |
| 55 | 3.3V_GND | GND       |     | 3.3V Module Supply Voltage Return Ground, can be separate or tied together with Signal Ground |
| 56 | 3.3V_GND | GND       |     |                                                                                               |
| 57 | 3.3V_GND | GND       |     |                                                                                               |
| 58 | 3.3V_GND | GND       |     |                                                                                               |
| 59 | 3.3V_GND | GND       |     |                                                                                               |
| 60 | 3.3V     | VCC       |     | 3.3V Module Supply                                                                            |
| 61 | 3.3V     | VCC       |     |                                                                                               |
| 62 | 3.3V     | VCC       |     |                                                                                               |
| 63 | 3.3V     | VCC       |     |                                                                                               |
| 64 | 3.3V     | VCC       |     |                                                                                               |
| 65 | 3.3V     | VCC       |     |                                                                                               |
| 66 | 3.3V     | VCC       |     |                                                                                               |
| 67 | 3.3V     | VCC       |     |                                                                                               |
| 68 | 3.3V     | VCC       |     |                                                                                               |
| 69 | 3.3V     | VCC       |     |                                                                                               |
| 70 | 3.3V_GND | GND       |     |                                                                                               |
| 71 | 3.3V_GND | GND       |     |                                                                                               |
| 72 | 3.3V_GND | GND       |     |                                                                                               |
| 73 | 3.3V_GND | GND       |     |                                                                                               |
| 74 | 3.3V_GND | GND       |     |                                                                                               |

#### Part b:Top Row Pin Function Definition

| Pin | Symbol   |  | Pin | Symbol   |
|-----|----------|--|-----|----------|
| 148 | GND      |  | 111 | GND      |
| 147 | Not used |  | 110 | Not used |
| 146 | Not used |  | 109 | Not used |
| 145 | GND      |  | 108 | GND      |
| 144 | Not used |  | 107 | RX9n     |
| 143 | Not used |  | 106 | RX9p     |
| 142 | GND      |  | 105 | GND      |
| 141 | TX9n     |  | 104 | RX8n     |
| 140 | TX9p     |  | 103 | RX8p     |

|     |      |  |     |          |
|-----|------|--|-----|----------|
| 139 | GND  |  | 102 | GND      |
| 138 | TX8n |  | 101 | RX7n     |
| 137 | TX8p |  | 100 | RX7p     |
| 136 | GND  |  | 99  | GND      |
| 135 | TX7n |  | 98  | RX6n     |
| 134 | TX7p |  | 97  | RX6p     |
| 133 | GND  |  | 96  | GND      |
| 132 | TX6n |  | 95  | RX5n     |
| 131 | TX6p |  | 94  | RX5p     |
| 130 | GND  |  | 93  | GND      |
| 129 | TX5n |  | 92  | RX4n     |
| 128 | TX5p |  | 91  | RX4p     |
| 127 | GND  |  | 90  | GND      |
| 126 | TX4n |  | 89  | RX3n     |
| 125 | TX4p |  | 88  | RX3p     |
| 124 | GND  |  | 87  | GND      |
| 123 | TX3n |  | 86  | RX2n     |
| 122 | TX3p |  | 85  | RX2p     |
| 121 | GND  |  | 84  | GND      |
| 120 | TX2n |  | 83  | RX1n     |
| 119 | TX2p |  | 82  | RX1p     |
| 118 | GND  |  | 81  | GND      |
| 117 | TX1n |  | 80  | RX0n     |
| 116 | TX1p |  | 79  | RX0p     |
| 115 | GND  |  | 78  | GND      |
| 114 | TX0n |  | 77  | Not used |
| 113 | TX0p |  | 76  | Not used |
| 112 | GND  |  | 75  | GND      |

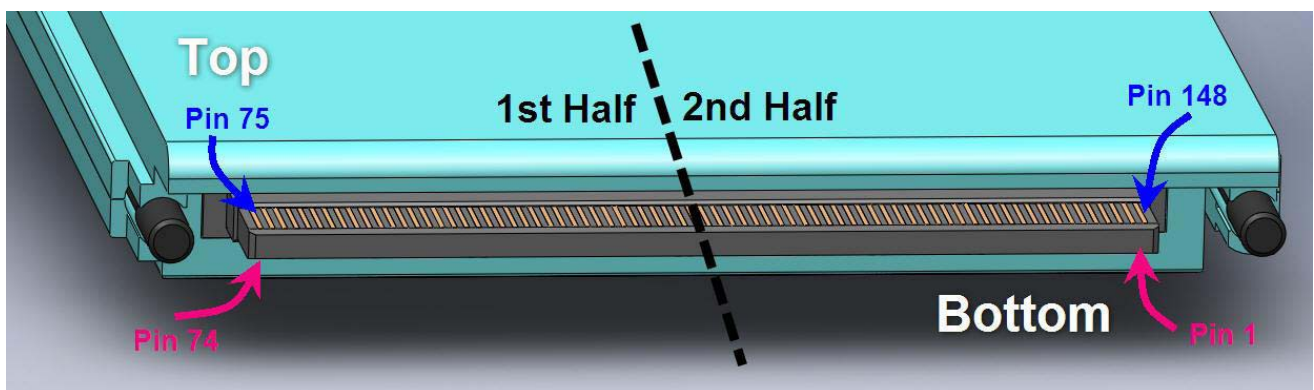


Figure2. Pad Layout of the CFP module

## CFP Optical Interface lanes and Assignment

Figure 3 shows the orientation of the multimode fiber facets of the optical connector.

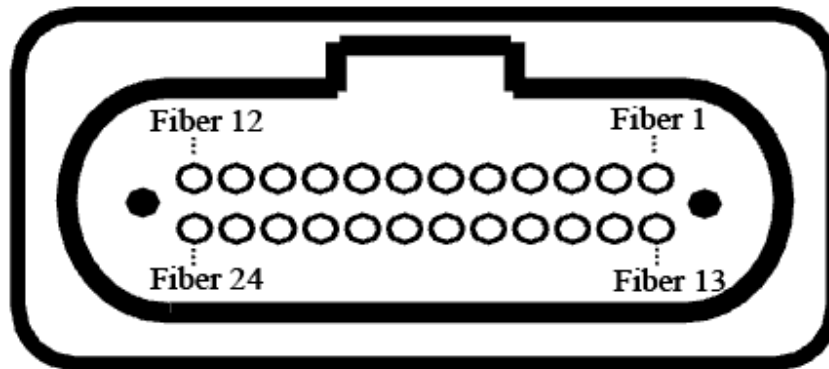


Figure3. Outside view of the CFP module MPO receptacle

## Lane Assignment

| Fiber | Symbol | Corresponding Electrical pins | Fiber | Symbol | Corresponding Electrical pins |
|-------|--------|-------------------------------|-------|--------|-------------------------------|
| 1     | Unused |                               | 13    | Unused |                               |
| 2     | RX0    | 79,80                         | 14    | TX0    | 113,114                       |
| 3     | RX1    | 82,83                         | 15    | TX1    | 116,117                       |
| 4     | RX2    | 85,86                         | 16    | TX2    | 119,120                       |
| 5     | RX3    | 88,89                         | 17    | TX3    | 122,123                       |
| 6     | RX4    | 91,92                         | 18    | TX4    | 125,126                       |
| 7     | RX5    | 94,95                         | 19    | TX5    | 128,129                       |
| 8     | RX6    | 97,98                         | 20    | TX6    | 131,132                       |
| 9     | RX7    | 100,101                       | 21    | TX7    | 134,135                       |
| 10    | RX8    | 103,104                       | 22    | TX8    | 137,138                       |
| 11    | RX9    | 106,107                       | 23    | TX9    | 140,141                       |
| 12    | Unused |                               | 24    | Unused |                               |

## Mechanical Dimensions

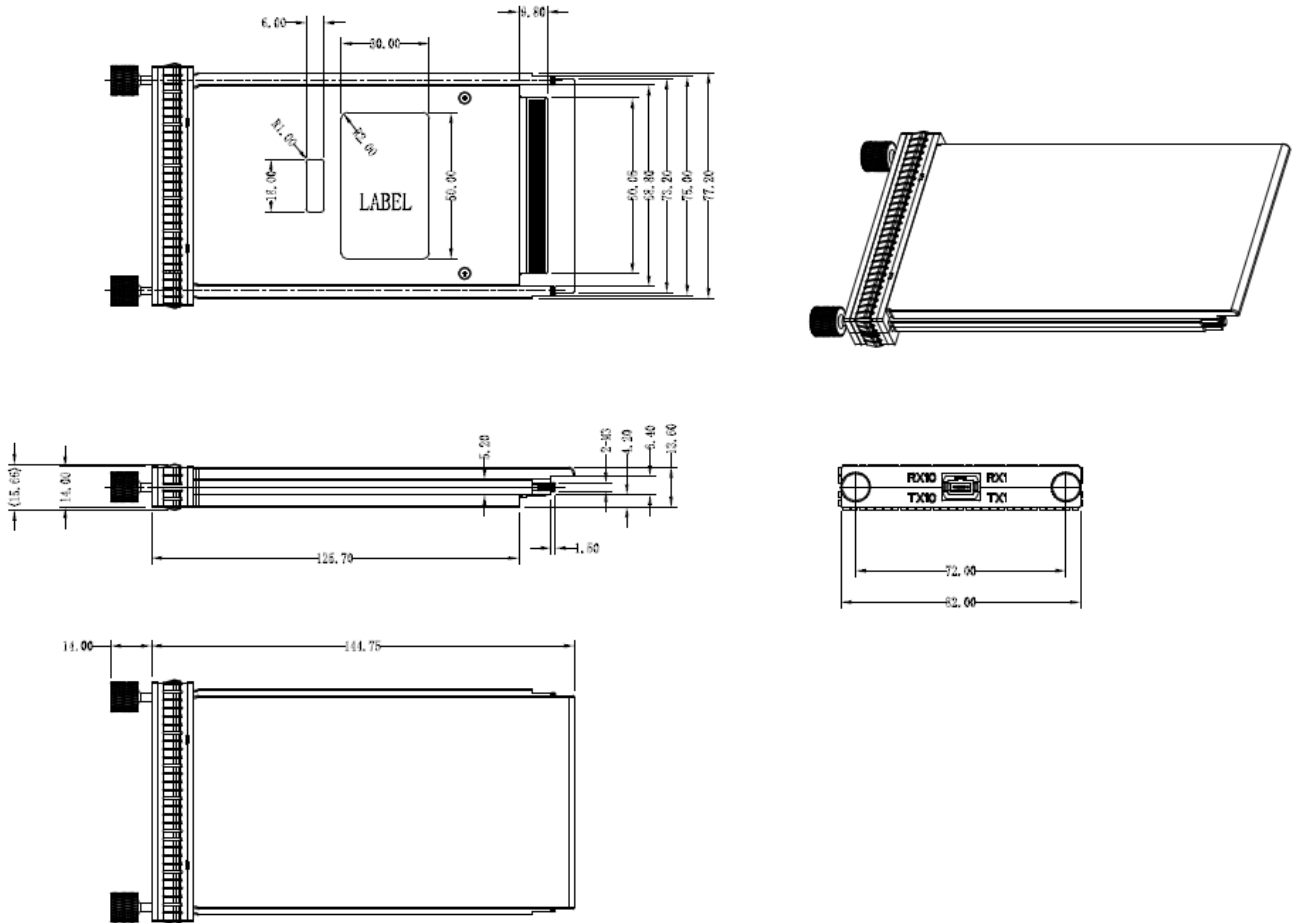


Figure9. Mechanical Specifications

## Ordering information

| Part Number     | Product Description                                |
|-----------------|----------------------------------------------------|
| GCF-M101-SR10C  | CFP 100G SR10, 100m on OM3 MMF and 150m on OM4 MMF |
| GCF-M101-CSR10C | CFP 100G SR10, 300m on OM3 MMF and 400m on OM4 MMF |

1. 100G Ethernet
2. 100G OUT4

## Important Notice

Performance figures, data and any illustrative material provided in this data sheet are typical and must be specifically confirmed in writing by GIGALIGHT before they become applicable to any particular order or contract. In accordance with the GIGALIGHT policy of continuous improvement specifications may change without notice.



深圳市易飞扬通信技术有限公司  
SHENZHEN GIGALIGHT TECHNOLOGY CO.,LTD

[Http:// www.gigalight.com.cn](http://www.gigalight.com.cn)

Optical Network Transceiver Innovator

The publication of information in this data sheet does not imply freedom from patent or other protective rights of GIGALIGHT or others. Further details are available from any GIGALIGHT sales representative.

E-mail: [sales@gigalight.com.cn](mailto:sales@gigalight.com.cn)

Web : <http://www.gigalight.com.cn>