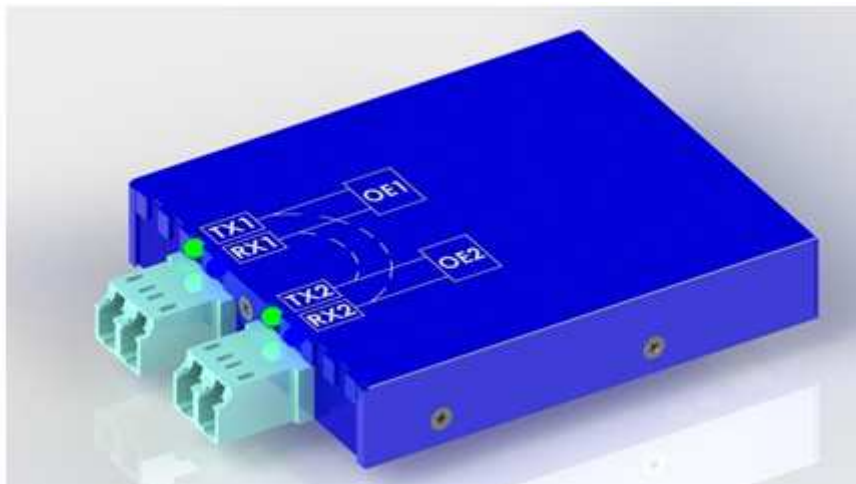


## Specification

### 10G Ethernet Optical Bypass Module

#### Dual Ports 10G Base-SR



**O B M – B 1 C H 2 – P 0 1**

## Features

- **Reliable Passive Fiber Bypass (Latching)**
- **Low Return Loss**
- **Available in 50/125µm Multimode Fiber**
- **PCB Mountable Type**
- **Fast Ethernet Standard Compliant**
- **Digital Diagnostic SFF-8472 Rev.10.2 Compliant**
- **SONET/SDH Standard Compliant**
- **Two Dual LC Adapter**
- **10G-BASE-SR are available**
- **Compliant with CE & FCC Standard**
- **Compact Format and ROHS Compliant**

## Product Overview

Formerica's Dual Port 10 Gbit/s Optical Bypass Module(OBM) is a compact module that contains four 10 G Base-SR ports and can be integrated with I/O port controllers in a Network Interface Card (NIC). This module is targeted for maintaining network connectivity when power failure or system fails in an In-Line Network System.

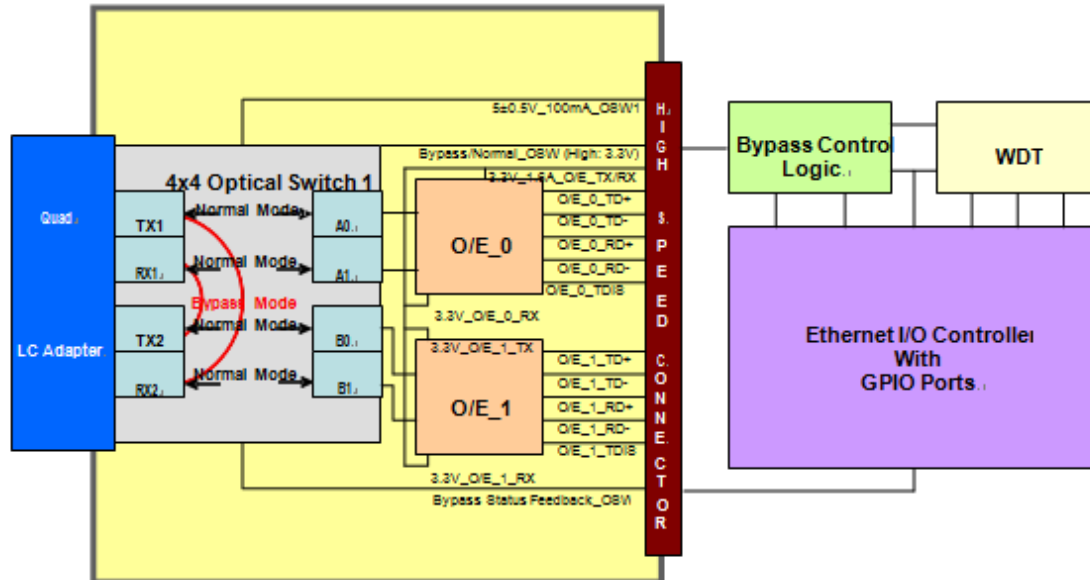
Formerica's Dual Port 10 Gbit/s Optical Bypass Module supports Normal and Bypass modes, and can be configured to perform the Block mode. In Normal mode, two ports function independently. In Bypass mode, signal packets received from one port are loop-backed to the adjacent port. In Block mode, the module blocks the route.

Formerica's Dual Port 10 Gbit/s Optical Bypass Module can Bypass or Block its I/O ports upon a host system failure, power off, or by software request. Formerica's Dual Port 10 Gbits Optical Bypass Module can be integrated with any brand's Controllers CPU. It is suitable for connecting with in-line equipment for power failure or system maintenance.

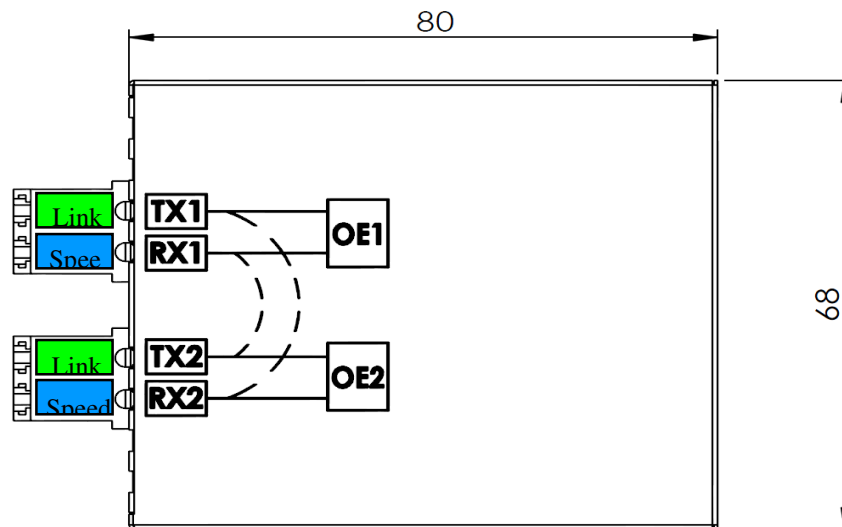
When the In-Line unit is not on or is in bypass mode, the relays within the OBM are set to bridge the optical signals directly through the optical switch, completely bypassing the In-Line equipment.

Formerica's OBM module provides excellent performance and reliable Optical Bypass and Block functions. All routing fibers, switches and electronics network are enclosed in a save and compact housing which provides save and space saving to networking equipment.

## Block Diagram and Optical Paths

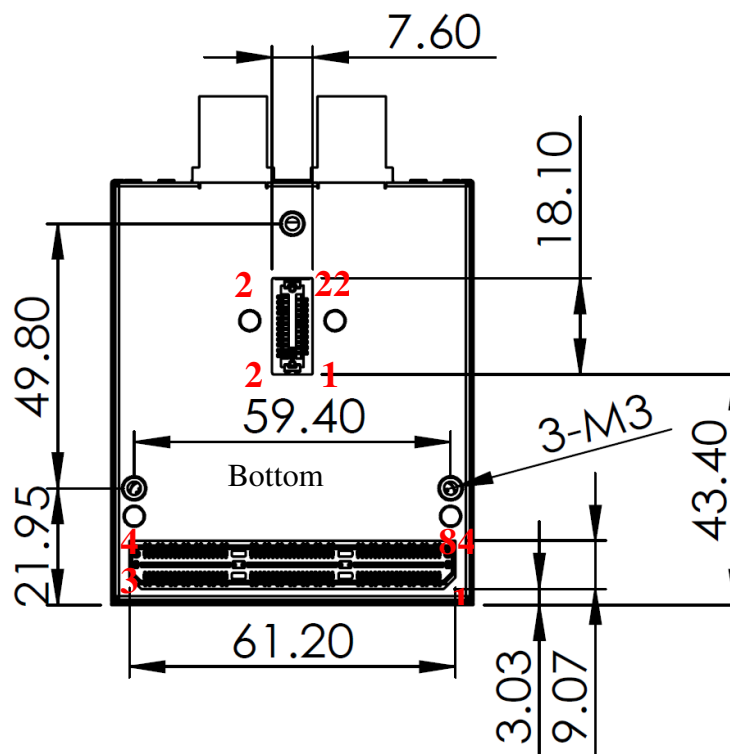


Dual Ports Optical Bypass Module



- Link1 and Link2 indications:  
Green: Link
- Speed1 and Speed2 indications:  
Blue: Data rate 10.3125G

### Module Outline Drawing (mm)



**PIN Assignments of 84 pins Connector:**

| Pin Number | Name            | I/O | Function                                               | Note |
|------------|-----------------|-----|--------------------------------------------------------|------|
| 1          |                 |     |                                                        |      |
| 2          | GND             |     |                                                        |      |
| 3          | On-Line         | O   | 1K Ohm to Ground                                       |      |
| 4          | GND             |     |                                                        |      |
| 5          | OE1 TX Disable  | I   | Transmitter Disable for OE-1                           | 2    |
| 6          | OE1 TX Fault    | O   | Transmitter Fault Indication for OE-1                  | 1    |
| 7          | OE1 MOD-DEF2    | I/O | 2 Wire Serial ID Interface (Data) for OE-1             | 3    |
| 8          | OE1 MOD-DEF1    | I   | 2 Wire Serial ID Interface (Clock) for OE-1            | 3    |
| 9          | OE1 Vcc         |     | 3.3V for Tx1 Power Supply and Rx1 Power Supply – 300mA |      |
| 10         | OE1-Link        | I   | OE1-Link LED Indicator (Voltage Low/ LED Green)        |      |
| 11         | OE1-Speed       | I   | OE1-Speed LED Indicator (Voltage Low / LED Orange)     |      |
| 12         | OE1 Rate Select | I   | NA                                                     |      |
| 13         | GND             |     |                                                        |      |
| 14         |                 |     |                                                        |      |
| 15         |                 |     |                                                        |      |
| 16         |                 |     |                                                        |      |
| 17         |                 |     |                                                        |      |
| 18         |                 |     |                                                        |      |
| 19         |                 |     |                                                        |      |
| 20         |                 |     |                                                        |      |
| 21         |                 |     |                                                        |      |
| 22         | GND             |     |                                                        |      |
| 23         | OE2 TX Disable  | I   | Transmitter Disable for OE-2                           | 2    |
| 24         | OE2 TX Fault    | O   | Transmitter Fault Indication for OE-2                  | 1    |
| 25         | OE2 MOD-DEF2    | I/O | 2 Wire Serial ID Interface (Data) for OE-2             | 3    |
| 26         | OE2 MOD-DEF1    | I   | 2 Wire Serial ID Interface (Clock) for OE-2            | 3    |
| 27         | OE2 Vcc         |     | 3.3V for Tx2 Power Supply and Rx2 Power Supply – 300mA |      |
| 28         | OE-2-Link       | I   | OE2-Link LED indicator (Voltage Low / LED Green)       |      |
| 29         | OE-2-Speed      | I   | OE2-Speed LED indicator (Voltage Low / LED Orange)     |      |
| 30         | OE2 Rate Select | I   | NA                                                     |      |

|    |                    |   |                                            |     |
|----|--------------------|---|--------------------------------------------|-----|
| 31 | GND                |   |                                            |     |
| 32 |                    |   |                                            |     |
| 33 |                    |   |                                            |     |
| 34 |                    |   |                                            |     |
| 35 |                    |   |                                            |     |
| 36 |                    |   |                                            |     |
| 37 |                    |   |                                            |     |
| 38 |                    |   |                                            |     |
| 39 |                    |   |                                            |     |
| 40 | GND                |   |                                            |     |
| 41 | GND                |   |                                            |     |
| 42 | Vcc5_1             |   | 5.0V Power Supply (OSW 1 Power)            | 8   |
| 43 | OSW 1 N1           | I | Change to Normal mode for OSW1             | 7/9 |
| 44 | OSW 1 B1           | I | Change to Bypass mode for OSW1             | 7/9 |
| 45 | OSW 1 State Output | O | High=Normal Mode, Low=Bypass Mode for OSW1 |     |
| 46 |                    |   |                                            |     |
| 47 |                    |   |                                            |     |
| 48 |                    |   |                                            |     |
| 49 |                    |   |                                            |     |
| 50 |                    |   |                                            |     |
| 51 |                    |   |                                            |     |
| 52 |                    |   |                                            |     |
| 53 |                    |   |                                            |     |
| 54 |                    |   |                                            |     |
| 55 | OE2 LOS            | O | Loss of Signal for OE-2                    | 4   |
| 56 | OE2 GND            |   | OE2 Signal Ground                          |     |
| 57 | OE2 RD-            | O | OE2 Inversed Data Output                   | 5   |
| 58 | OE2 RD+            | O | OE2 Data Output                            | 5   |
| 59 | OE2 GND            |   | OE2 Signal Ground                          |     |
| 60 | OE2 GND            |   | OE2 Signal Ground                          | 6   |
| 61 | OE2 TD+            | I | OE2 Data Input                             | 6   |
| 62 | OE2 TD-            | I | OE2 Inversed Data Input                    |     |
| 63 | OE2 GND            |   | OE2 Signal Ground                          |     |
| 64 |                    |   |                                            |     |
| 65 |                    |   |                                            |     |
| 66 |                    |   |                                            |     |

|    |         |   |                          |   |
|----|---------|---|--------------------------|---|
| 67 |         |   |                          |   |
| 68 |         |   |                          |   |
| 69 |         |   |                          |   |
| 70 |         |   |                          |   |
| 71 |         |   |                          |   |
| 72 |         |   |                          |   |
| 73 | OE1 LOS | O | Loss of Signal for OE-1  | 4 |
| 74 | OE1 GND |   | OE1 Signal Ground        |   |
| 75 | OE1 RD- | O | OE1 Inversed Data Output | 5 |
| 76 | OE1 RD+ | O | OE1 Data Output          | 5 |
| 77 | OE1 GND |   | OE1 Signal Ground        |   |
| 78 | OE1 GND |   | OE1 Signal Ground        |   |
| 79 | OE1 TD+ | I | OE1 Data Input           | 6 |
| 80 | OE1 TD- | I | OE1 Inversed Data Input  | 6 |
| 81 | OE1 GND |   | OE1 Signal Ground        |   |
| 82 |         |   |                          |   |
| 83 |         |   |                          |   |
| 84 |         |   |                          |   |

**PIN Assignments of 23 pins Connector:**

| Pin Number | Name               | I/O | Function                                           | Note |
|------------|--------------------|-----|----------------------------------------------------|------|
| 1          | Vcc5_1             |     | 5.0V Power Supper (OSW1 Power)                     |      |
| 2          | Vcc5_1             |     | 5.0V Power Supper (OSW1 Power)                     |      |
| 3          |                    |     |                                                    |      |
| 4          | OE1-Link           | I   | OE1-Link LED Indicator (Voltage Low/ LED Green)    |      |
| 5          |                    |     |                                                    |      |
| 6          | OE1-Speed          | I   | OE1-Speed LED Indicator (Voltage Low / LED Orange) |      |
| 7          |                    |     |                                                    |      |
| 8          | OE2-Link           | I   | OE2-Link LED indicator (Voltage Low / LED Green)   |      |
| 9          |                    |     |                                                    |      |
| 10         | OE2-Speed          | I   | OE2-Speed LED indicator (Voltage Low / LED Orange) |      |
| 11         |                    |     |                                                    |      |
| 12         | OSW 1 State Output | O   | High=Normal Mode, Low=Bypass Mode for OSW1         |      |
| 13         | GND                |     |                                                    |      |
| 14         | GND                |     |                                                    |      |
| 15         |                    |     |                                                    |      |
| 16         | OSW 1 B1           | I   | Change to Bypass mode for OSW1                     |      |
| 17         |                    |     |                                                    |      |
| 18         | OSW 1 N1           | I   | Change to Normal mode for OSW1                     |      |
| 19         |                    |     | No Connector                                       |      |
| 20         |                    |     | No Connector                                       |      |
| 21         |                    |     | No Connector                                       |      |
| 22         |                    |     |                                                    |      |
| 23         |                    |     |                                                    |      |



**Notes:**

1. TX Fault is an open collector/drain output, which should be pulled up with a 4.7K – 10K $\Omega$  resistor on the host board. Pull up voltage between 2.0V 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 < 0.5V.
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 4.7– 10 K  $\Omega$  resistor. Its states are:
  - Low (0 – 0.8V): Transmitter on
  - (>0.8, < 2.0V): Undefined
  - High (2.0 – 3.465V): Transmitter Disabled
  - Open: Transmitter Disabled
3. Mod-Def 1,2, These are the module definition pins. They should be pulled up with a 4.7K – 10K $\Omega$  resistor on the host board. The pull-up voltage shall be VccT or VccR (see Section IV for further details). Mod-Def 0 is grounded by the module to indicate that the module is present Mod-Def 1 is the clock line of two wire serial interface for serial ID Mod-Def 2 is the data line of two wire serial interface for serial ID
4. LOS (Loss of Signal) is an open collector/drain output, which should be pulled up with a 4.7K – 10K $\Omega$  resistor. Pull up voltage between 2.0V 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 < 0.5V.
5. RD-/+ : These are the differential receiver outputs. They are AC coupled 100 $\Omega$  differential lines which should be terminated with 100 $\Omega$  (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 350 and 850 mV differential (175 – 425 mV single ended) when properly terminated.
6. TD-/+ : These are the differential transmitter inputs. They are AC-coupled, differential lines with 100 $\Omega$  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 differential swings of 180 – 700 mV (90 – 350 mV single-ended).
7. Latching Type - The input is used to control the optical switch mode for OSW  
Normal mode: OSW N1/N2: > 3.75V and OSW B1/B2 < 0.5V and over 20ms.  
Bypass mode: OSW N1/N2: < 0.5V and OSW B1/B2 >3.75V and over 20ms
8. Non-Latching Type - High =Normal Mode, Low=Bypass Mode for OSW.
9. Non-Latching Type - Pin 43, 44, 82 and 83: Ground

**Absolute Maximum Ratings**

| Parameter           | Symbol | Min. | Typ. | Max. | Unit |
|---------------------|--------|------|------|------|------|
| Storage Temperature | Ts     | -40  |      | 85   | °C   |
| Supply Voltage      | Vcc    | 0    |      | 5    | V    |

**Recommended Operating Conditions**

| Parameter                               | Symbol | Min.    | Typ.    | Max.    | Unit | Note |
|-----------------------------------------|--------|---------|---------|---------|------|------|
| Case Operating Temperature              | Top    | 0       |         | 70      | °C   | 1    |
| +5.0V Supply Voltage                    | Vcc5   | 4.75    |         | 5.25    | V    | Vcc5 |
| +3.3V Supply Voltage                    | Vcc3   | 3.10    |         | 3.50    | V    |      |
| Relative Humidity<br>(non condensation) |        | 5       |         | 85      | %    |      |
| Data Rate                               |        | -100ppm | 10.3125 | +100ppm | Gbps |      |

**Note1 :** Please see order information

## Electrical Characteristics

| Parameter                              | Symbol       | Min. | Typ. | Max.    | Unit | Note |
|----------------------------------------|--------------|------|------|---------|------|------|
| +5.0V Supply Current                   | Icc5         |      |      | 100     | mA   |      |
| +3.3V Supply Current                   | Icc3         |      |      | 1200    | mA   |      |
| <b>Transmitter</b>                     |              |      |      |         |      |      |
| Transmitter Differential Input Voltage | VDT          | 180  |      | 700     | mV   | 1    |
| Transmitter Disable Input-High         | VDISH        | 2    |      | Vcc+0.3 | V    |      |
| Transmitter Disable Input-Low          | VDISL        | 0    |      | 0.8     | V    |      |
| Transmitter Fault Pull up Resistor     | RTX<br>FAULT | 4.7  |      | 10      | KΩ   | 2    |
| Transmitter Fault Output-High          | VTXFH        | 2.4  |      | Vcc     | V    | 2    |
| Transmitter Fault Output-Low           | VTXFL        | 0    |      | 0.5     | V    | 2    |
| <b>Receiver</b>                        |              |      |      |         |      |      |
| Receiver Differential Output Voltage   | VDR          | 350  |      | 850     | mV   | 3    |
| Receiver LOS Load                      | RRXLOS       | 4.7  |      | 10      | KΩ   | 2    |
| LOS Output Voltage-High                | VLOSH        | 2.4  |      | Vcc     | V    | 2    |
| LOS Output Voltage-Low                 | VLOSL        | 0    |      | 0.5     | V    | 2    |
| <b>Optical Switch</b>                  |              |      |      |         |      |      |
| Latching Voltage-High                  | VLATH        | 4.75 | 5    | 5.25    | V    |      |
| Latching Voltage-Low                   | VLATL        | 0    |      | 0.8     | V    |      |
| Latching Resistance                    | RLAT         |      | 125  |         | Ω    |      |

**Notes:**

1. Internally AC coupled and terminated to 100Ohm differential load
2. Pull up to Vcc on Host Board.
3. Internally AC coupled, but requires a 100Ohm differential termination at or internal to Serializer/Deserializer.

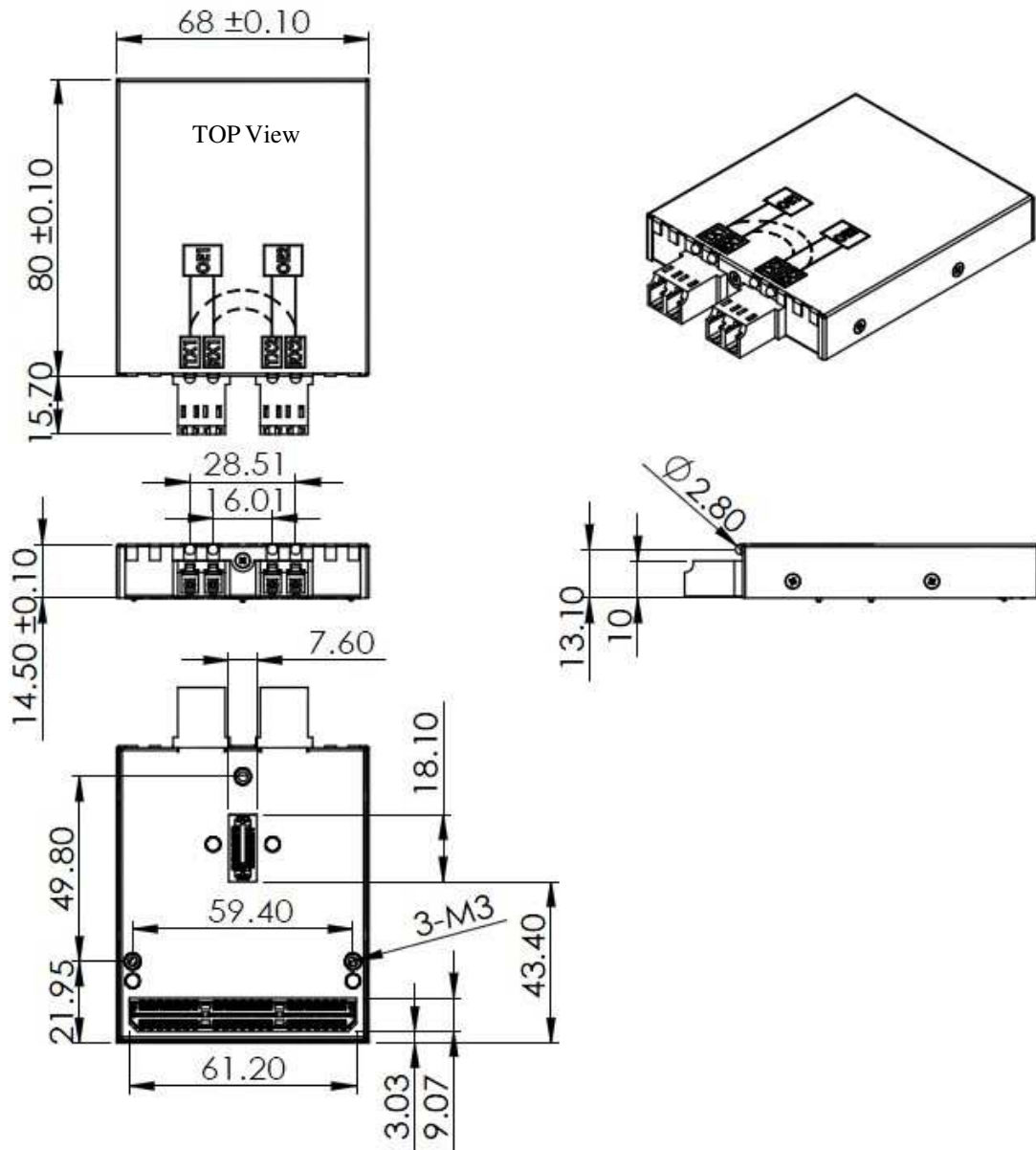
**Optical Characteristics**(Top=0~70℃, Data Rate=10.3125Gb/sec, PRBS=2<sup>31</sup>-1 NRZ)

| Parameter       | Multimode Fiber Type | Min. Modal Bandwidth (MHz*km) | Operating Range (m) | Maximum Channel Intention Loss (dB) |
|-----------------|----------------------|-------------------------------|---------------------|-------------------------------------|
| Operating Range | 62.5um MMF OM1       | 200                           | 20 to 33            | 1.6                                 |
|                 | 50um MMF OM2         | 500                           | 2 to 82             | 1.8                                 |
|                 | 50um MMF OM3         | 2000                          | 2 to 300            | 2.6                                 |

| Parameter                   | Symbol           | Min. | Typ.              | Max.  | Unit  | Note |
|-----------------------------|------------------|------|-------------------|-------|-------|------|
| <b>Transmitter</b>          |                  |      |                   |       |       |      |
| Output Optical Power (Avg.) | P <sub>O</sub>   | -7.1 |                   | -1    | dBm   | 1    |
| Optical Extinction Ratio    | ER               | 3.5  |                   |       | dB    |      |
| Center Wavelength           | λ                | 840  | 850               | 860   | nm    |      |
| Spectral Width (RMS)        | σλ               |      |                   | 0.45  | nm    |      |
| <b>Receiver</b>             |                  |      |                   |       |       |      |
| Sensitivity (OMA)           | Sens (OMA)       |      |                   | -11.1 | dBm   | 1,2  |
| Input Optical Wavelength    | λ                | 840  |                   | 860   | DBm   |      |
| Return Loss                 |                  |      |                   | -12   | dB    |      |
| LOS-Deasserted (Avg.)       | P <sub>SA</sub>  |      |                   | -14   | dBm   |      |
| LOS-Asserted (Avg.)         | P <sub>SD</sub>  | -30  |                   |       | dBm   |      |
| LOS-Hysteresis              | P <sub>SH</sub>  | 0.5  |                   |       | dB    |      |
| Overload                    | P <sub>MAX</sub> |      |                   | -1    | dBm   |      |
| <b>Optical Switch</b>       |                  |      |                   |       |       |      |
| Wavelength Range            | λ                | 670  |                   | 980   | nm    |      |
| Insertion Loss              | OIL              |      |                   | 1.8   | dB    |      |
| Return Loss                 | ORL              | 30   |                   |       | dB    |      |
| Switch Time                 |                  |      |                   | 8     | ms    |      |
| Lifetime                    |                  |      | ≥ 10 <sup>7</sup> |       | times |      |
| Latching Resistance         | RLAT             |      | 125               |       | Ω     |      |

**Notes:**

1. Normal Mode (Bypass off).
2. The sensitivity provided at a BER of 1×10<sup>-12</sup> or better with an input signal consisting of 10.3125Gb/s, 2<sup>31</sup>-1 PRBS

**Package Outline Drawing (mm)**

## **ESD**

Normal ESD precautions are required during the handling of this module. This transceiver is shipped in ESD protective packaging. It should be removed from the packaging and handled only in an ESD protected environment.

## **Contact Information**

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- Поставка специализированных компонентов военного и аэрокосмического уровня качества (Xilinx, Altera, Analog Devices, Intersil, Interpoint, Microsemi, Actel, Aeroflex, Peregrine, VPT, Syfer, Eurofarad, Texas Instruments, MS Kennedy, Miteq, Cobham, E2V, MA-COM, Hittite, Mini-Circuits, General Dynamics и др.);

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## JONHON

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«FORSTAR» (основан в 1998 г.)

ВЧ соединители, коаксиальные кабели,  
кабельные сборки и микроволновые компоненты:

(Применяются в телекоммуникациях гражданского и специального назначения, в средствах связи, РЛС, а так же военной, авиационной и аэрокосмической отраслях промышленности).



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