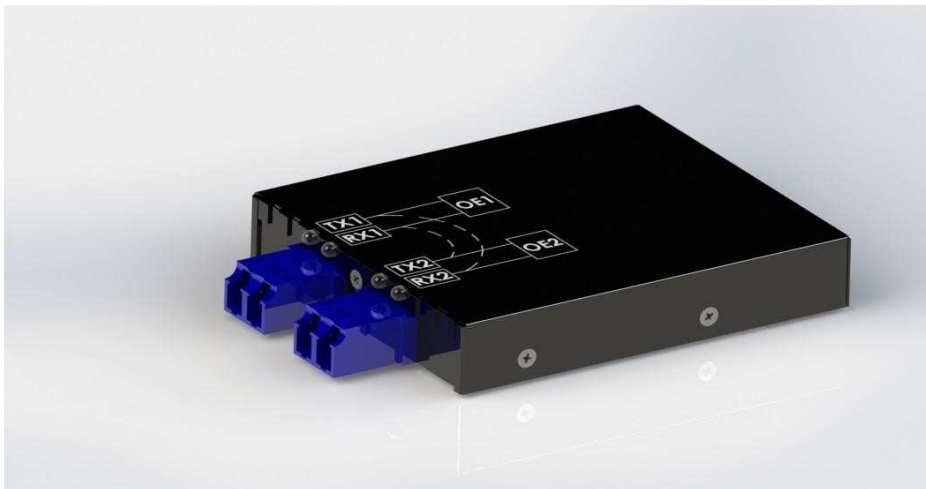


## Specification

### 1.25G Ethernet Optical Bypass Module

#### Dual Ports 1.25G Base-LX



**OBM-A3BA2-C01**

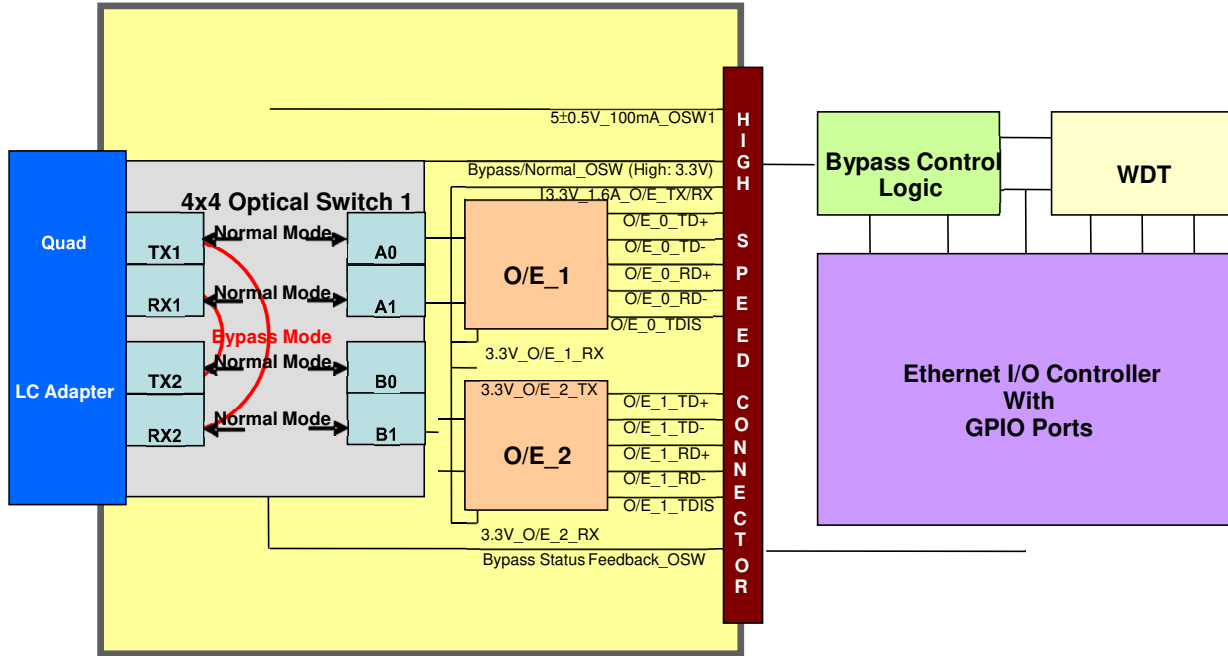
## Product Overview

FormericaOE Dual Port 1.25 Gbit/s Optical Bypass Module is a compact box that contains two 1.25 G Base-LX1310nm (10KM) ports and can be integrated with I/O ports controllers to be a Network Interface Card (NIC). The FormericaOE Dual Port 1.25 Gbit/s Optical Bypass Module is targeted to inline network system that maintains network connectivity when power failure or system fails. FormericaOE Dual Port 1.25 Gbit/s Optical Bypass Module supports Normal and Bypass modes, and can be controlled to perform the Block mode. In Normal mode, the ports are independent interfaces. In Bypass mode, all packets received from one port are transmitted to the adjacent port. In Block mode, the module blocks the route. FormericaOE Dual Port 1.25 Gbit/s Optical Bypass Module can Bypass or Block its I/O ports on a host system failure, power off, or up on software request. FormericaOE Dual Port 1.25 Gbit/s Optical Bypass Module can be integrated with any brand's Controllers CPU. It is suitable for connecting with in-line equipment's for power failure or system maintenance. When the In-Line unit is not on or is in bypass mode, the relays within the Optical Bypass Module are set to bridge the optical signals directly through the optical switch, completely bypassing the In-Line equipment. If the In-Line equipment is on and operating normally, then it supplies power to the switch through a high speed connector PIN. Compact and competitive cost, this module provides excellent performance on your network.

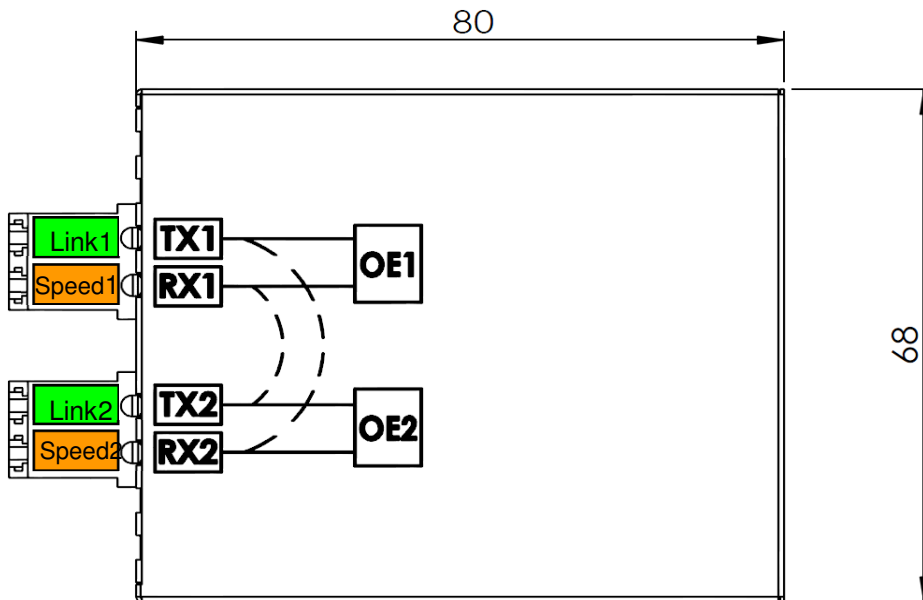
## Features

- Reliable Passive Fiber Bypass (Latching)
- Low Return Loss
- Available in 9/125µm Single mode Fiber
- PCB Mountable Type
- Fast Ethernet Standard Compliant
- Digital Diagnostic SFF-8472 Rev.10.2 Compliant
- SONET/SDH Standard Compliant
- Two Dual LC Adapter
- Class 1 Laser Product Complies with EN 60825-1
- 1.25G-BASE-LX are available
- Compliant with CE& FCC Standard
- Compact Format and ROHS Compliant

Block Diagram and Optical Paths

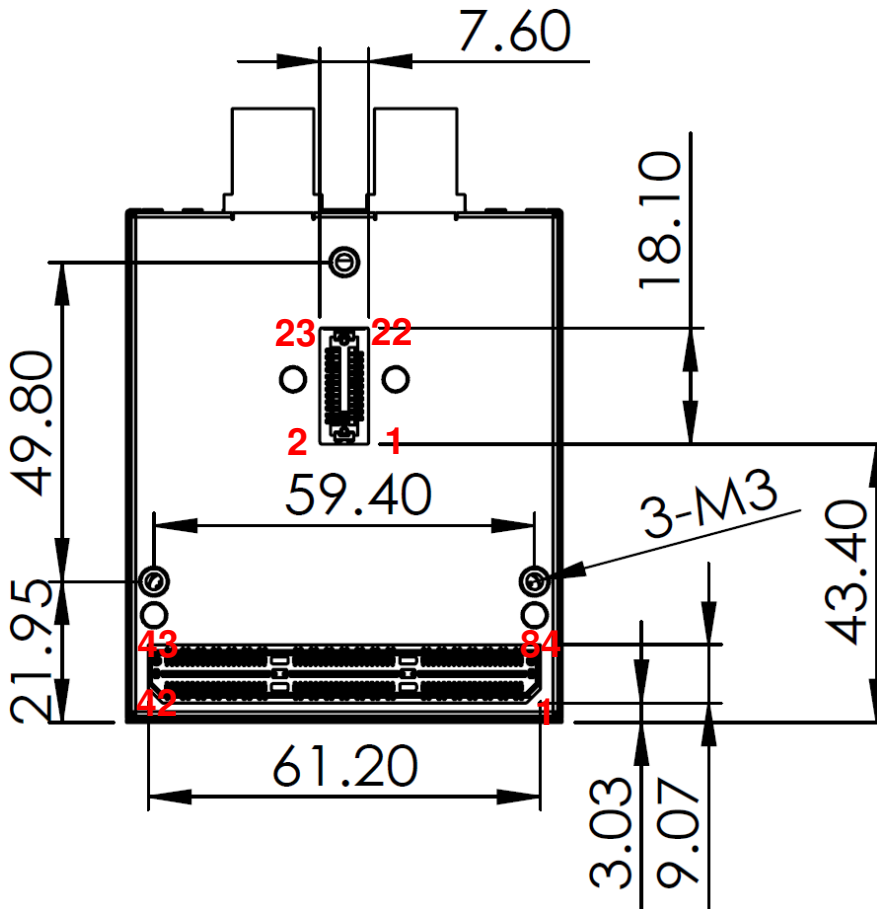


Dual Ports Optical Bypass Module



- Link1 and Link2 indications:  
Green: Link
- Speed1 and Speed2 indications:  
Orange: Data rate 1.25G

**Module Pin Out**



**84 PIN Assignments:**

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	

Pin Number	Name	I/O	Function	Note
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				

**23 PIN Assignments:**

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 switchmode for OSW
  - ◆ Normal mode:
    - OSW N1: > 3.75V and OSW B1/B2 < 0.5V and over 20ms.
  - ◆ Bypass mode:
    - OSW N1: < 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
Power Supply Voltage	V <sub>CC</sub>	0		3.6	V
Storage Temperature	T <sub>s</sub>	-40		85	°C
Supply Voltage	V <sub>CC</sub>	0		5	V
Optical Receiver Power (Damage)	P <sub>max</sub>			15	dBm

## Recommended Operating Conditions

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Case Operating Temperature	T <sub>c</sub>	0		70	°C	1
+5.0V Supply Voltage	V <sub>CC5</sub>	4.75		5.25	V	V <sub>CC5</sub>
+3.3V Supply Voltage	V <sub>CC3</sub>	3.10		3.50	V	
Relative Humidity (non condensation)		5		85	%	
Data Rate		-100ppm	1.25	+100ppm	Gbps	

Note1 : Please see order information

## Electrical Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
+5.0V Supply Current	I <sub>CC5</sub>			100	mA	
+3.3V Supply Current	I <sub>CC3</sub>			1200	mA	
<b>Transmitter</b>						
Transmitter Differential Input Voltage	V <sub>DT</sub>	180		700	mV	1
Transmitter Disable Input-High	V <sub>DISH</sub>	2		V <sub>CC</sub> +0.3	V	
Transmitter Disable Input-Low	V <sub>DISL</sub>	0		0.8	V	
<b>Receiver</b>						
Receiver Differential Output Voltage	V <sub>DR</sub>	350		850	mV	3
LOS Output Voltage-High	V <sub>LOSH</sub>	2.4		V <sub>CC</sub>	V	2
LOS Output Voltage-Low	V <sub>LOSL</sub>	0		0.5	V	2
<b>Optical Switch</b>						
Latching Voltage-High	V <sub>LATH</sub>	4.75	5	5.25	V	
Latching Voltage-Low	V <sub>LATL</sub>	0		0.8	V	
Latching Resistance	R <sub>LAT</sub>		125		Ω	

### Notes:

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

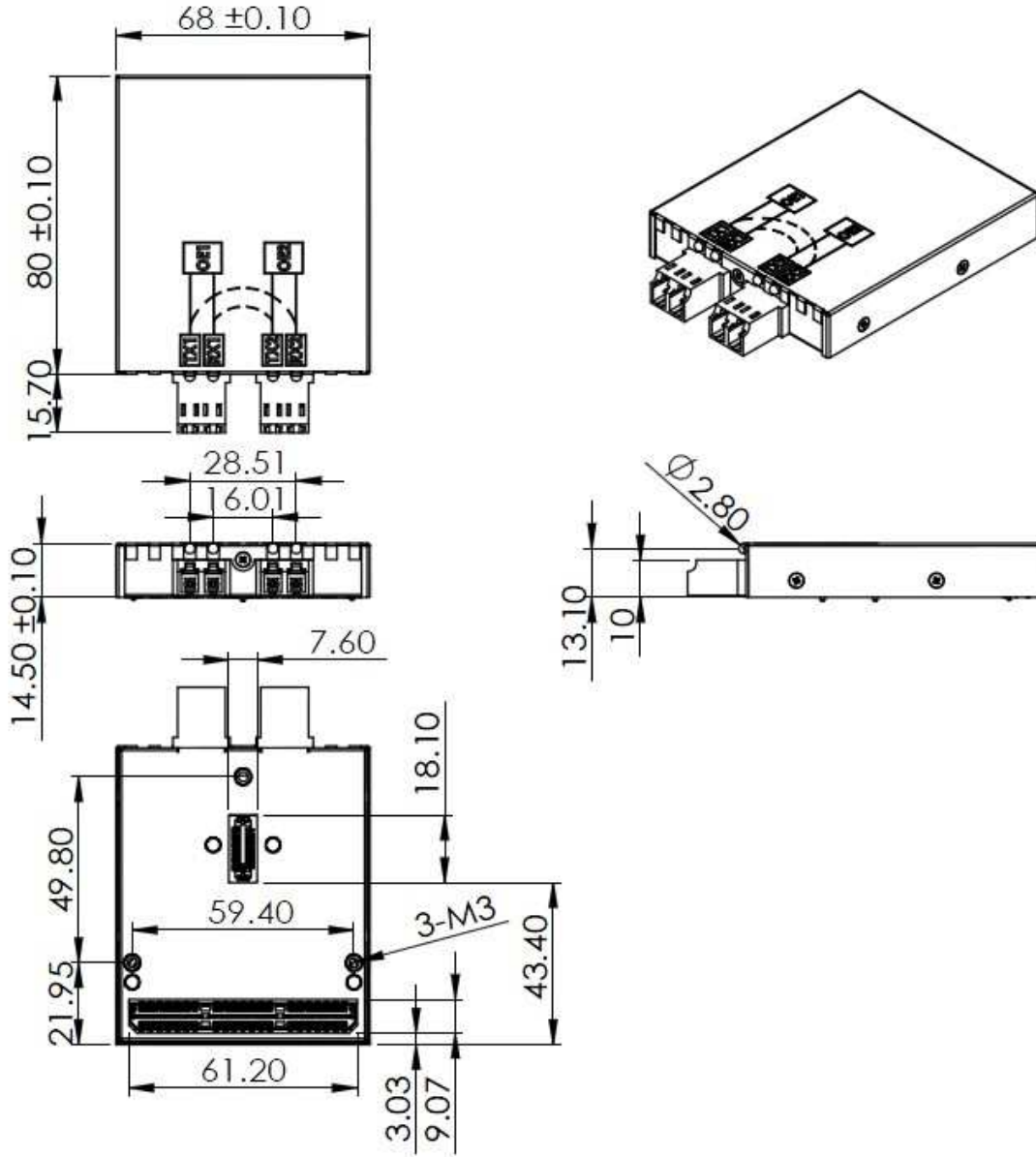
**Optical Characteristics**(Tc=0~70°C, Data Rate=1.25Gb/sec, PRBS=2<sup>7</sup>-1 NRZ)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
<b>Transmitter</b>						
Average Launch Power	P	-9		-3	dBm	
Center Wavelength	$\lambda_c$	1270		1355	nm	
Extinction Ratio	E <sub>R</sub>	9	--	--	dB	
Output eye	Compliant with IEEE802.3z eye mask					
<b>Receiver</b>						
Center Wavelength	$\lambda_c$	1260		1610	nm	
Average receiver power	P <sub>max</sub>			-3	dBm	
Receiver Sensitivity				-21	dBm	
Vertical eye closure penalty		2.2			dB	2
LOS	Assert	LOS <sub>A</sub>	-45		dBm	
	Deassert	LOS <sub>D</sub>		-21	dBm	
LOS Hysteresis	LOS <sub>H</sub>	0.5		6	dB	
<b>Optical Switch</b>						
Wavelength Range	$\lambda_R$	1260~1360 and 1510~1610			nm	
Insertion Loss	OIL		0.35	2	dB	
Return Loss	ORL	50			dB	
Switch Time				8	ms	
Lifetime			$\geq 10^7$		times	
Latching Resistance	R <sub>LAT</sub>		125		$\Omega$	

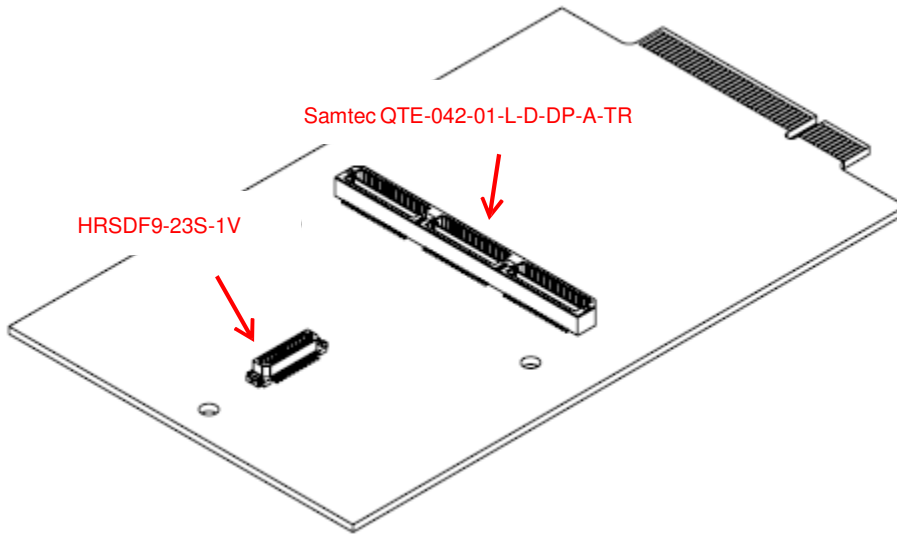
**Notes:**

1. Receiver Sensitivity is informative. Stressed receiver sensitivity shall be measured with conformance test signal for BER  $1 \times 10^{-12}$ .
2. Vertical eye closure penalty and stressed eye jitter are the test conditions for measuring stressed receiver sensitivity. They are not the required characteristic of the receiver.

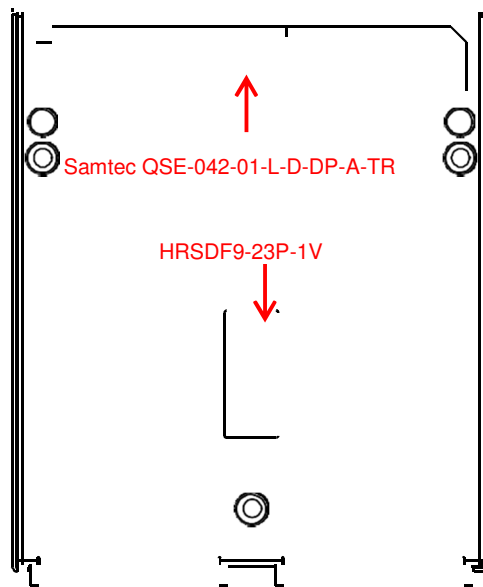
Package Outline Drawing (mm)



**Host Board B2B Connector**



**Customer Host Board Top View**



**Fiber Bypass Module: Bottom View**

**EEPROM Serial ID Memory Contents (2-Wire Address A0H)**

Address	HEX	Name of Field	Description
00	03	Identifier	SFP
01	04	Extended Identifier	SFP
02	07	Connector type	LC
03	00	Infiniband Compliance Codes	Not compliant
04	00	SONET Compliance Codes	Not compliant
05	00	SONET Compliance Codes	Not compliant
06	02	Ethernet Compliance Codes	1000BASE-LX
07	12	Fiber Channel link length	LC/Long Distance
08	00	Fiber Channel transmitter technology	N/A
09	01	Fiber Channel transmission media	Single Mode
10	01	Fiber Channel speed	100 MBytes/sec
11	01	Encoding codes:	8B/10B
12	0D	Nominal Bit Rate (units of 100Mbps)	1300Mbps
13	00	Rate identifier	Unspecified
14	0A	Link length supported for 9um fiber	10km (units of km)
15	64	Link length supported for 9um fiber	100 (units of 100m)
16	00	Link length supported for 50um,OM2	N/A (units of 10m)
17	00	Link length supported for 62.5um,OM1	N/A (units of 10m)
18	00	Link length supported for copper	N/A (units of 1m)
19	00	Link length supported for 50um,OM3	N/A (units of 10m)
20 ~ 35	46,4F,52,4D,45,52,49,43 ,41,4F,45,20,20,20,20,20	Vendor Name	FORMERICA OE
36	00	Unallocated	
37 ~ 39	00,00,00	Vendor OUI	Unspecified
40 ~ 55	54,41,53,2D,41,33,42,41,32,2D,44,30,31,20,20,20	Part Number	OBM-A3BA2-C01
56 ~ 59	00,00,00,00	Vendor Revision number	Unspecified
60 ~ 61	05,1E	Laser Wavelength	1310nm
62	00	Unallocated	
63		CC_BASE:	Check sum of byte 0 ~ 62
64	00	Options	
65	1A	Options	TX-DIS, TX_FAULT, RX-LOS
66	00	Bit Rate, max.	Unspecified
67	00	Bit Rate, min.	Unspecified
68 ~ 83	Serial Number	Serial Number	
84 ~ 89	yy/mm/dd	Date Code	
90 ~ 91	20,20	Vendor specific lot code	Unspecified
92	68	Diagnostic Monitoring Type	Internal calibration
93	B0	Enhanced Options (soft)	All flags, TX_FAULT, RX_LOS
94	03	SFF-8472 Compliance	Rev10.2
95		CC_EXT	Check sum of byte 64 ~ 94
96~127		Vendor specific	

**EEPROM Serial ID Memory Contents (2-Wire Address A2H)**

Add	Bytes	Name	Hex	Real Value
00-01	2	Temp High Alarm	5500	85°C
02-03	2	Temp Low Alarm	0000	0°C
04-05	2	Temp High Warning	5000	80°C
06-07	2	Temp Low Warning	0A00	10°C
08-09	2	Voltage High Alarm	8CA0	3.6V
10-11	2	Voltage Low Alarm	7530	3.0V
12-13	2	Voltage High Warning	88B8	3.5V
14-15	2	Voltage Low Warning	7918	3.1V
16-17	2	Bias High Alarm	AFC8	90mA
18-19	2	Bias Low Alarm	09C4	5mA
20-21	2	Bias High Warning	9C40	80mA
22-23	2	Bias Low Warning	0DAC	7mA
24-25	2	TX Power High Alarm	2710	0dBm
26-27	2	TX Power Low Alarm	0277	-12dBm
28-29	2	TX Power High Warning	18A6	-2dBm
30-31	2	TX Power Low Warning	03E8	-10dBm
32-33	2	RX Power High Alarm	1F07	-1dBm
34-35	2	RX Power Low Alarm	0032	--23dBm
36-37	2	RX Power High Warning	1394	-3dBm
38-39	2	RX Power Low Warning	004F	-21dBm
40-55	16	Reserved	00	-
56-59	4	RX_PWR(4)	00000000	0
60-63	4	RX_PWR(3)	00000000	0
64-67	4	RX_PWR(2)	00000000	0
68-71	4	RX_PWR(1)	3F800000	1
72-75	4	RX_PWR(0)	00000000	0
76-77	2	TX_I(Slope)	0100	1
78-79	2	TX_I(Offset)	0000	0
80-81	2	TX_PWR(Slope)	0100	1
82-83	2	TX_PWR(Offset)	0000	0
84-85	2	T(Slope)	0100	1
86-87	2	T(Offset)	0000	0
88-89	2	V(Slope)	0100	1
90-91	2	V(Offset)	0000	0
92-94	3	Reserved	00	-
95	1	Checksum	-	

## **ESD**

This transceiver is specified as ESD threshold 2kV for all electrical input pins, tested per MIL-STD-883, Method 3015.4 /JESD22-A114-A (HBM). However, normal ESD precautions are still 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.

## **LASER Safety**

This is a Class 1 Laser Product according to IEC 60825-1:1993:+A1:1997+A2:2001. This product complies with 21 CFR 1040.10 and 1040.11 except for deviations pursuant to Laser Notice No. 50, dated (July 26, 2001)

## Revision History

Date	Version	Description
12/25/2017	2.1	Add LED Light picture.