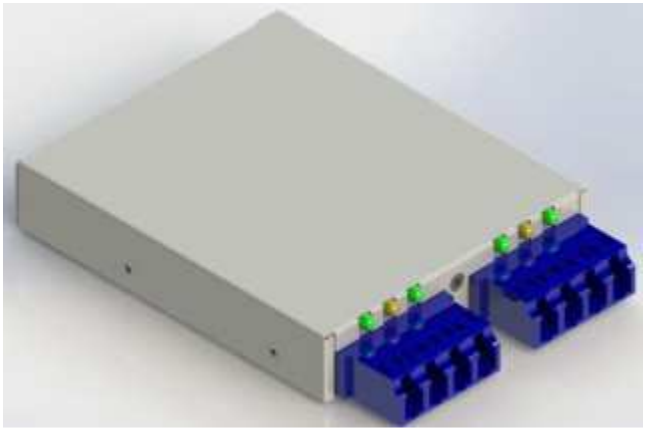
Specification

1.25G Ethernet Optical Bypass Module

Quad Ports 1.25G Base-LX



O B M – A 3 B A 4 – C 0 6_V4

FormericaOptoelectronics Inc.
5F,- 11, No. 38, Taiyuan, Zhubei City,
HsinchuCounty 302, Taiwan
Ph: +886- 3- 5600286 Fax: +886 - 3- 5600239

Downloaded from Arrow.com.

Product Overview

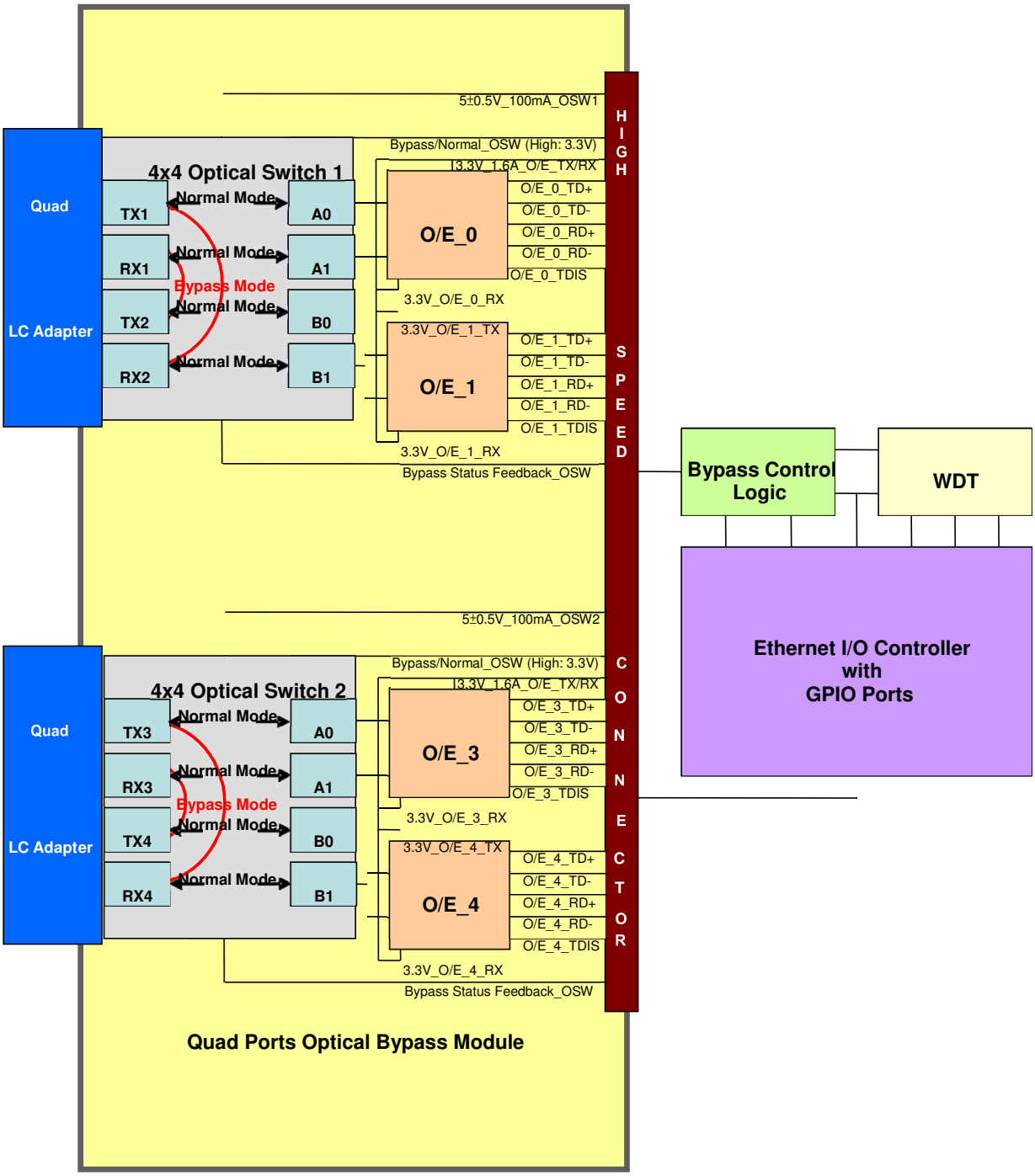
FormericaOE Quad Port 1.25Gbit/s Optical Bypass Module is a compact box that contains four 1.25 G Base-LX1310nm (10KM) ports and can integrated with I/O ports controllers to be a Network Interface Card (NIC). The FormericaOE Quad Port 1.25Gbit/s Optical Bypass Module is targeted to inline network system that maintains network connectivity when power failure or system fails. FormericaOE Quad Port 1.25Gbit/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 moduleblocks the route. FormericaOE Quad Port 1.25Gbit/s Optical Bypass Module can Bypass or Block its I/O ports on a host system failure, power off, or uponsoftware request. FormericaOE Quad Port 1.25Gbit/s Optical Bypass Modulecan be integrated withany 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

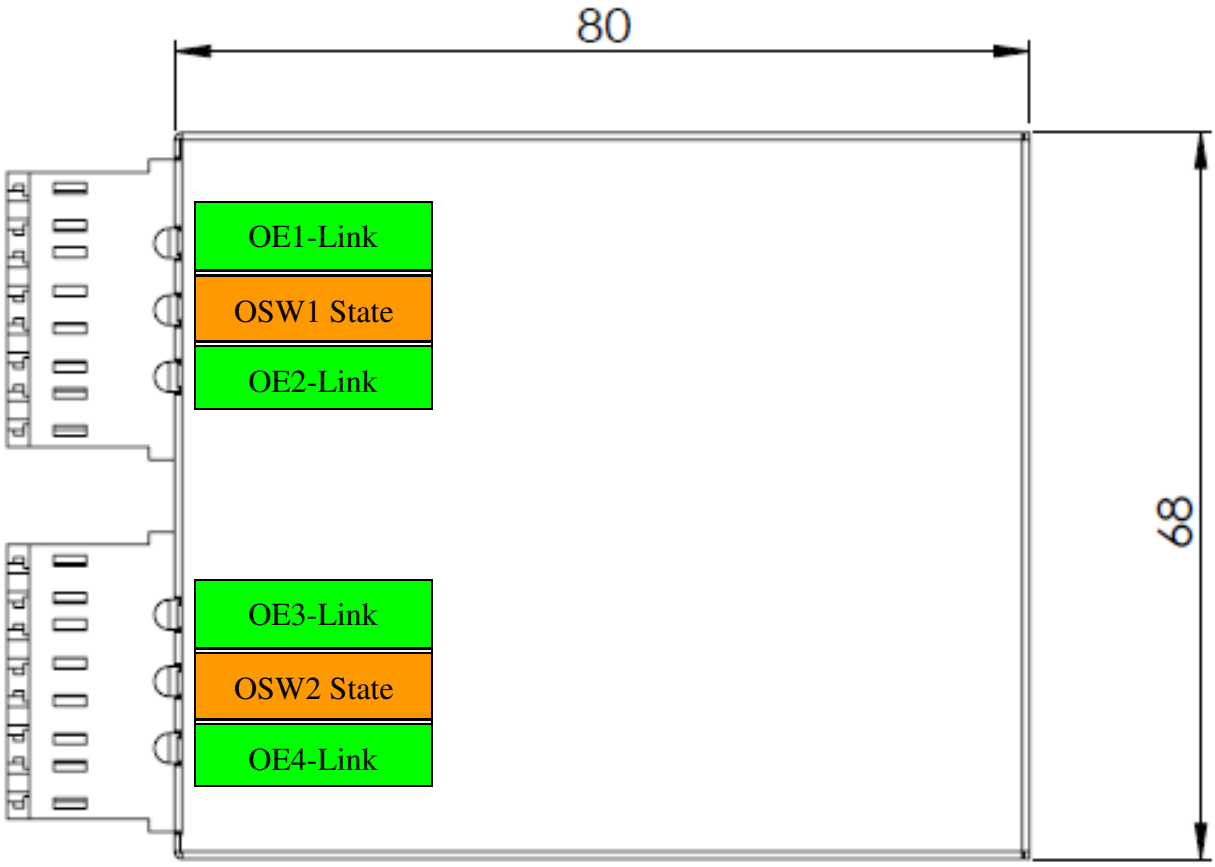
- Reliable Passive Fiber Bypass (Latching)
- Low Return Loss
- Available in 9/125μm Single mode Fiber
- PCB Mountable Type
- Fast Ethernet Standard Compliant
- Digital Diagnostic SFF-8472 Rev.10.2 Compliant
- SONET/SDH Standard Compliant
- Two Quad LC Adapter
- Class 1 Laser Product Complies with EN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

Downloaded from Arrow.com.

Block Diagram and Optical Paths



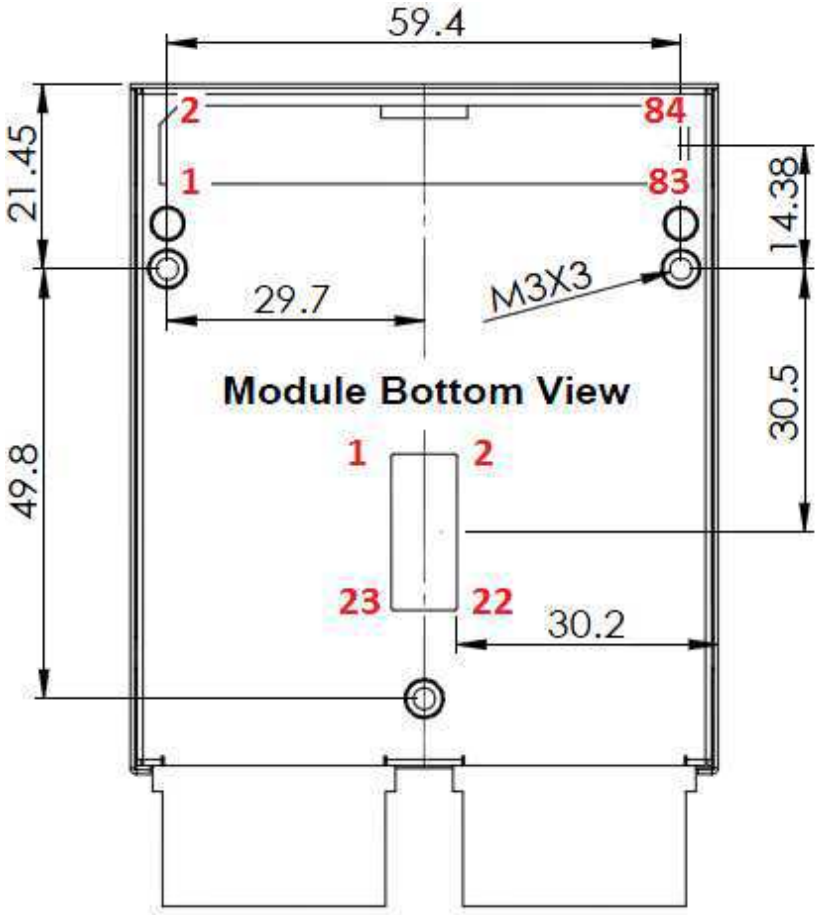
Downloaded from Arrow.com.



- OE1-Link, OE2-Link, OE3-Link and OE4-Link indications:
  Green: Link
- OSW1 State and OSW2 State indications:
  Amber: Optical Switch State

Downloaded from Arrow.com.

Module Pin Out



Downloaded from Arrow.com.

84 PIN Assignments:

Pin Number	Name	I/O	Function	Note
1	OSW 2 State Output	O	High=Normal mode, Low=Bypass mode for OSW2	
2	Vcc5_2		5.0V Power Supper (OSW2 Power)	
3	OSW 2 B2	I	Change to Bypass mode for OSW2	7/9
4	GND			
5	OSW 2 N2	I	Change to Normal mode for OSW2	7/9
6	On-Line	O	1K Ohm to Ground	
7	OE1 GND		OE1 Signal Ground	
8	GND			
9	OE1 TD-	I	OE1 Inversed Data Input	6
10	OE1 TX Disable	I	Transmitter Disable for OE-1	2
11	OE1 TD+	I	OE1 Data Input	6
12	OE1 TX Fault	O	Transmitter Fault Indication for OE-1	1
13	OE1 GND		OE1 Signal Ground	
14	OE1 MOD-DEF2	I/O	2 Wire Serial ID Interface (Data) for OE-1	3
15	OE1 GND		OE1 Signal Ground	
16	OE1 MOD-DEF1	I	2 Wire Serial ID Interface (Clock) for OE-1	3
17	OE1 RD+	O	OE1 Data Output	5
18	OE1 Vcc		3.3V for Tx1 Power Supply and Rx1 Power Supply – 300mA	
19	OE1 RD-	O	OE1 Inversed Data Output	5
20	OE1-Link	I	OE1-Link LED Indicator (Anode/ LED Green)	
21	OE1 GND		OE1 Signal Ground	
22	OSW 1 State	I	OSW 1 State LED Indicator (Anode / LED Amber)	
23	OE1 LOS	O	Loss of Signal for OE-1	4
24	OE1 Rate Select	I	NA	
25	OE3 LOS	O	Loss of Signal for OE-3	4
26	GND			
27	OE3 GND		OE3 Signal Ground	
28	OE3 TX Disable	I	Transmitter Disable for OE-3	2
29	OE3 TD-	I	OE3 Inversed Data Input	6
30	OE3 TX Fault	O	Transmitter Fault Indication for OE-3	1
31	OE3 TD+	I	OE3 Data Input	6
32	OE3 MOD-DEF2	I/O	2 Wire Serial ID Interface (Data) for OE-3	3
33	OE3 GND		OE3 Signal Ground	
34	OE3 MOD-DEF1	I	2 Wire Serial ID Interface (Clock) for OE-3	3
35	OE3 GND		OE3 Signal Ground	
36	OE3 Vcc		3.3V for Tx3 Power Supply and Rx3 Power Supply – 300mA	
37	OE3 RD+	O	OE3 Data Output	5
38	OE3-Link	I	OE3-Link LED Indicator (Anode / LED Green)	
39	OE3 RD-	O	OE3 Inversed Data Output	5
40	OSW 2 State	I	OSW 2 State LED Indicator (Anode / LED Amber)	
41	OE3 GND		OE3 Signal Ground	
42	OE3 Rate Select	I	NA	
43	OE2 GND		OE2 Signal Ground	
44	GND			
45	OE2 TD-	I	OE2 Inversed Data Input	
46	OE2 TX Disable	I	Transmitter Disable for OE-2	2
47	OE2 TD+	I	OE2 Data Input	6
48	OE2 TX Fault	O	Transmitter Fault Indication for OE-2	1
49	OE2 GND		OE2 Signal Ground	6
50	OE2 MOD-DEF2	I/O	2 Wire Serial ID Interface (Data) for OE-2	3

Downloaded from Arrow.com.

Pin Number	Name	I/O	Function	Note
51	OE2 GND		OE2 Signal Ground	
52	OE2 MOD-DEF1	I	2 Wire Serial ID Interface (Clock) for OE-2	3
53	OE2 RD+	O	OE2 Data Output	5
54	OE2 Vcc		3.3V for Tx2 Power Supply and Rx2 Power Supply – 300mA	
55	OE2 RD-	O	OE2 Inversed Data Output	5
56	OE2-Link	I	OE2-Link LED indicator (Anode / LED Green)	
57	OE2 GND		OE2 Signal Ground	
58	LED-pair1 common	I	LED-pair1 common Cathode	
59	OE2 LOS	O	Loss of Signal for OE-2	4
60	OE2 Rate Select	I	NA	
61	OE4 LOS	O	Loss of Signal for OE-4	4
62	GND			
63	OE4 GND		OE4 Signal Ground	
64	OE4 TX Disable	I	Transmitter Disable for OE-4	2
65	OE4 TD-	I	OE4 Data Input	6
66	OE4 TX Fault	O	Transmitter Fault indication for OE-4	1
67	OE4 TD+	I	OE4 Data Input	6
68	OE4 MOD-DEF2	I/O	2 Wire Serial ID Interface (Data) for OE-4	3
69	OE4 GND		OE4 Signal Ground	
70	OE4 MOD-DEF1	O	2 Wire Serial ID Interface (Clock) for OE-4	3
71	OE4 GND		OE4 Signal Ground	
72	OE4 Vcc4		3.3V for Tx4 Power Supply and Rx4 Power Supply – 300mA	
73	OE4 RD+	O	OE4 Data Output	5
74	OE4-Link	I	OE4-Link LED Indicator (Anode / LED Green)	
75	OE4 RD-	O	OE4 Inversed Data Output	5
76	LED-pair2 common	I	LED-pair2 common Cathode	
77	OE4 GND		OE4 Signal Ground	
78	OE4 Rate Select	I	NA	
79	OSW 1 State Output	O	High=Normal Mode, Low=Bypass Mode for OSW1	
80	GND			
81	OSW 1 B1	I	Change to Bypass mode for OSW1	7/9
82	GND			
83	OSW 1 N1	I	Change to Normal mode for OSW1	7/9
84	Vcc5_1		5.0V Power Supply (OSW 1 Power)	8

Downloaded from Arrow.com.

23PIN 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	LED-pair2 common	I	LED-pair2 common Cathode	
4	OE1-Link	I	OE1-Link LED Indicator (Anode/ LED Green)	
5	OE4-Link	I	OE4-Link LED Indicator (Anode / LED Green)	
6	OSW 1 State	I	OSW 1 State LED Indicator (Anode / LED Amber)	
7	OSW 2 State	I	OSW 2 State LED Indicator (Anode / LED Amber)	
8	OE2-Link	I	OE2-Link LED indicator (Anode / LED Green)	
9	OE3-Link	I	OE3-Link LED Indicator (Anode/ LED Green)	
10	LED-pair1 common	I	LED-pair1 common Cathode	
11	OSW 2 State Output	O	High=Normal mode, Low=Bypass mode for OSW2	
12	OSW 1 State Output	O	High=Normal Mode, Low=Bypass Mode for OSW1	
13	GND			
14	GND			
15	OSW 2 B2	I	Change to Bypass mode for OSW2	
16	OSW 1 B1	I	Change to Bypass mode for OSW1	
17	OSW 2 N2	I	Change to Normal mode for OSW2	
18	OSW 1 N1	I	Change to Normal mode for OSW1	
19			No Connector	
20			No Connector	
21			No Connector	
22	Vcc5_2		5.0V Power Supper (OSW2 Power)	
23	Vcc5_2		5.0V Power Supper (OSW2 Power)	

Notes:

1. TX Fault is an open collector/drain output, which should be pulled up with a 4.7K – 10KΩ resistor on the hostboard. 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 modulewith a 4.7 – 10 K Ω 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 – 10KΩ resistor on thehost board. The pull-up voltage shall be VccT or VccR (see Section IV for further details). Mod-Def 0 is groundedby the module to indicate that the module is present Mod-Def 1 is the clock line of two wire serial interface forserial 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 – 10KΩ resistor.Pull up voltage between 2.0V and VccT, R+0.3V. When high, this output indicates the received optical power isbelow the

Downloaded from Arrow.com.

worst-case receiver sensitivity (as defined by the standard in use). Low indicates normal operation. Inthe low state, the output will be pulled to < 0.5V.

5. RD-/+: These are the differential receiver outputs. They are AC coupled 100Ω differential lines which should beterminated with 100Ω (differential) at the user SERDES. The AC coupling is done inside the module and is thusnot 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 100Ω differentialtermination 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 mVsingle-ended).
7. Latching Type - The input is used to control the optical switchmode 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

Downloaded from Arrow.com.

Absolute Maximum Ratings

Parameter	Symbol	Min.	Typ.	Max.	Unit
Power Supply Voltage	Vcc	0		3.6	V
Storage Temperature	Ts	-40		85	℃
Supply Voltage	Vcc	0		5	V
Optical Receiver Power (Damage)	Pmax			15	dBm

Recommended Operating Conditions

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Case Operating Temperature	Tc	0		70	℃	1
+5.0V Supply Voltage	Vcc5	4.75		5.25	V	Vcc5
+3.3V Supply Voltage	Vcc3	3.10		3.50	V	
Relative Hunidity (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	Icc5			100	mA	
+3.3V Supply Current	Icc3			1200	mA	
Transmitter						
Transmitter Differential Input Voltage	V_{DT}	180		700	mV	1
Transmitter Disable Input-High	V_{DISH}	2		Vcc+0.3	V	
Transmitter Disable Input-Low	V_{DISL}	0		0.8	V	
Receiver						
Receiver Differential Output Voltage	V_{DR}	350		850	mV	3
LOS Output Voltage-High	V_{LOSH}	2.4		Vcc	V	2
LOS Output Voltage-Low	V_{LOSL}	0		0.5	V	2
Optical Switch						
Latching Voltage-High	V_{LATH}	4.75	5	5.25	V	
Latching Voltage-Low	V_{LATL}	0		0.8	V	
Latching Resistance	R_{LAT}		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 requies a 100Ohm differential termination at or internal to Serializer/Deserializer.

Downloaded from Arrow.com.

Optical Characteristics(Tc=0~70℃, Data Rate=1.25Gb/sec, PRBS=2^{31}-1 NRZ)

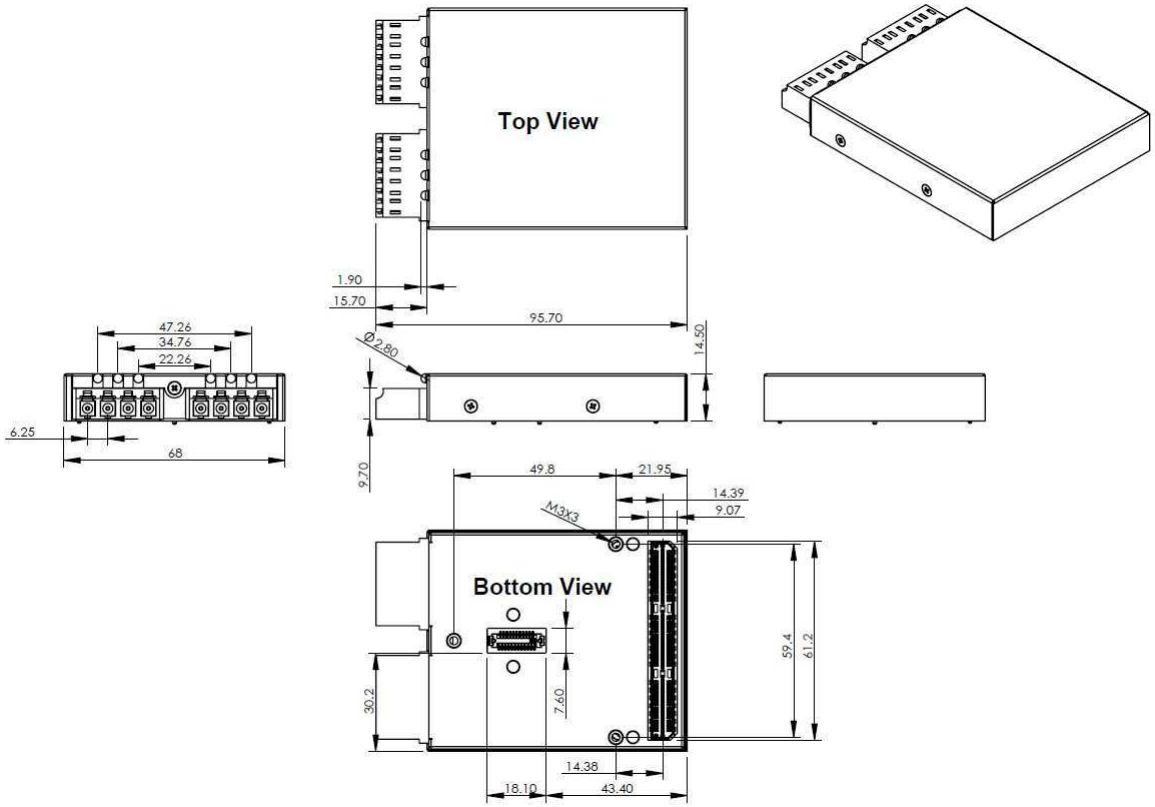
Parameter		Symbol	Min.	Typ.	Max.	Unit	Note
Transmitter							
Average Launch Power		P	-9		-3	dBm	
Center Wavelength		λ_C	1270		1355	nm	
Extinction Ratio		E_R	9	--	--	dB	
Output eye		Compliant with IEEE802.3z eye mask					
Receiver							
Center Wavelength		λ_C	1260		1610	Nm	
Average receiver power		P_{max}			-3	dBm	
Receiver Sensitivity					-21	dBm	
Vertical eye closure penalty			2.2			dB	2
LOS	Assert	LOS_A	-45			dBm	
	Deassert	LOS_D			-21	dBm	
LOS Hysteresis		LOS_H	0.5		6	dB	
Optical Switch							
Wavelength Range		λR	1260~1360 and 1510~1610			nm	
Insertion Loss		OIL		0.35	2	dB	
Return Loss		ORL	50			dB	
Switch Time					8	ms	
Lifetime				$\geqq 10^7$		times	
Latching Resistance		R_{LAT}		125		Ω	

Notes:

1. Receiver Sensitivity is informative. Stressed receiver sensitivity shall be measured with conformance test signal for BER $1\times10^{-12.}$
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.

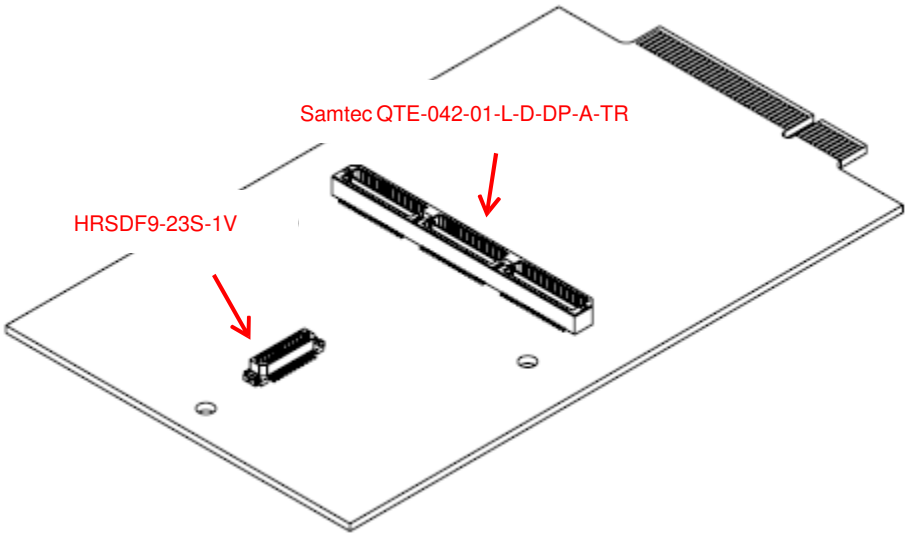
Downloaded from Arrow.com.

Package Outline Drawing (mm)

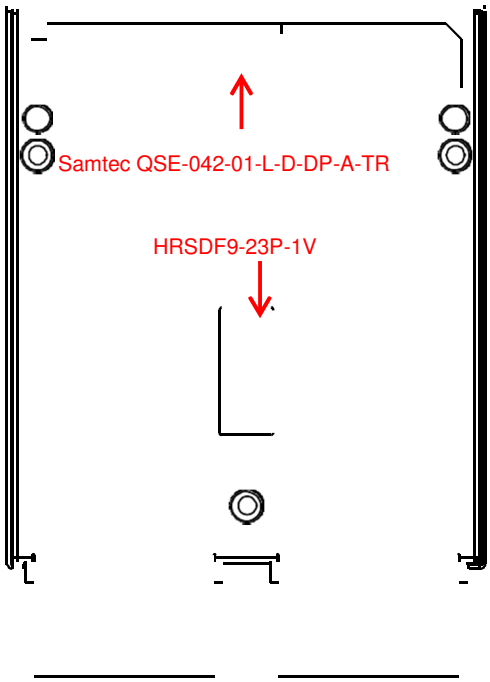


Downloaded from Arrow.com.

Host Board B2B Connector



Customer Host Board Top View



Fiber Bypass Module: Bottom View

Downloaded from Arrow.com.

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	FORMERICAOE
36	00	Unallocated	
37 ~ 39	00,00,00	Vendor OUI	Unspecified
40 ~ 55	4F,42,4D,2D,41,33,42,41,34,2D,43 ,30,36,5F,56,34	Part Number	OBM-A3BA4-C06_V4
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	

Downloaded from Arrow.com.

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

Add	Bytes	Name	Hex	Real Value
00-01	2	Temp High Alarm	5500	85℃
02-03	2	Temp Low Alarm	0000	0℃
04-05	2	Temp High Warning	5000	80℃
06-07	2	Temp Low Warning	0A00	10℃
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	-	

Downloaded from Arrow.com.

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 a nd 1040.11 except for deviations pursuant to Laser Notice No. 50, dated (July 26, 2001)

Downloaded from Arrow.com.

Revision History

Date	Version	Description of Changes	Author
08/29/2017	Version 2.2	Correct 2-Wire Address A0H (40~55) “4F,42,4D,2D,41,33,42,41,34,2D,43,30,36,5F,56,34” on page 14.	Jack.Wang

Downloaded from Arrow.com.