EMB-OPT02

User Manual

Version 1.0

DAQ SYSTEM
Measurement & Automation

Contents

## Appendix

1. EMB-OPT02 Introduction

The EMB-OPT02 board converts the parallel (D0..D47) data signal of the J1 connector into an optical signal and outputs it.

[Figure 1-1] shows an example of using the EMB-OPT02 board, which converts the image signal from the Camera Link camera into light and transmits it to the PCIe-OPT02 board, which is the light receiving board. 1 Base Camera Link configuration is supported.
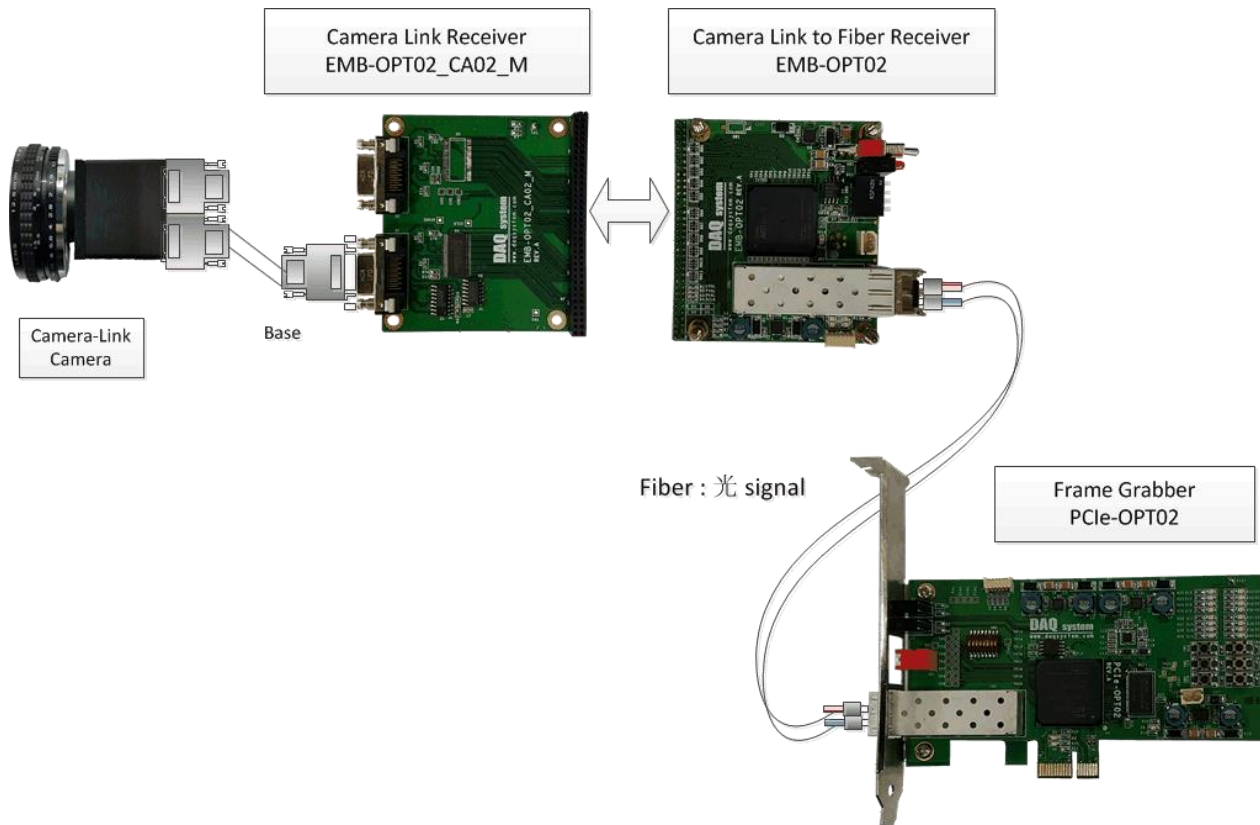
[Figure 1-1.   EMB-OPT02와 PCIe-OPT02 Connection]

Reference) The most important factor in selecting an optical cable is the communication distance. A multimode cable provides a maximum transmission distance of 2Km, and a single-mode cable basically provides a transmission distance depending on the type of equipment. Communication using light basically uses 2Core. (RX-1 CORE, TX-1 CORE) Therefore, be careful when connecting the board with a 2 core optical cable as shown in the figure below.

Fiber Cable
Connection
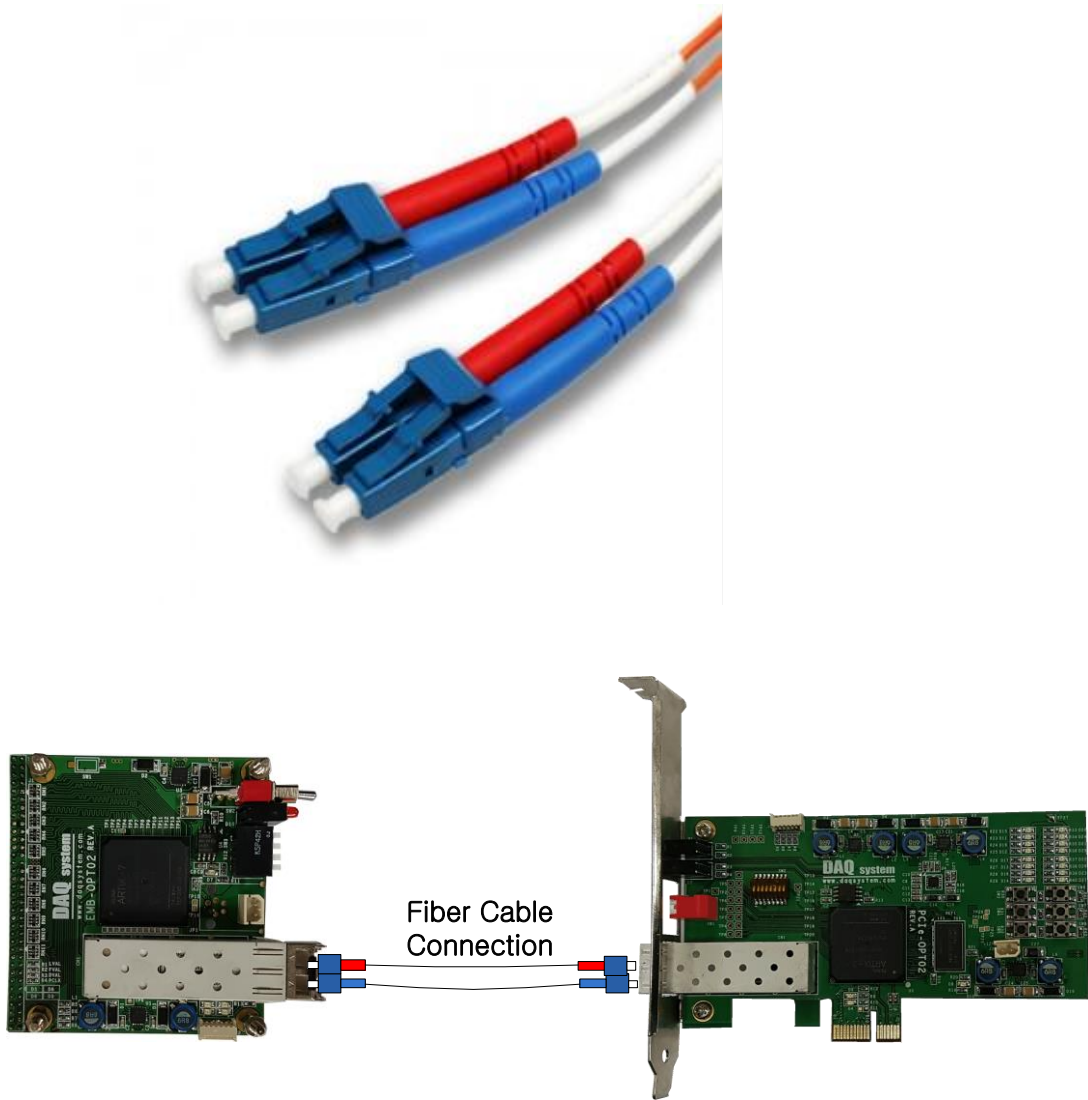
Caution) Be careful not to twist the cable when connecting it to the SFP cage.

2. EMB-OPT02 Function

Each name and function description of EMB-OPT2 is as follows.

EMB-OPT02 Board
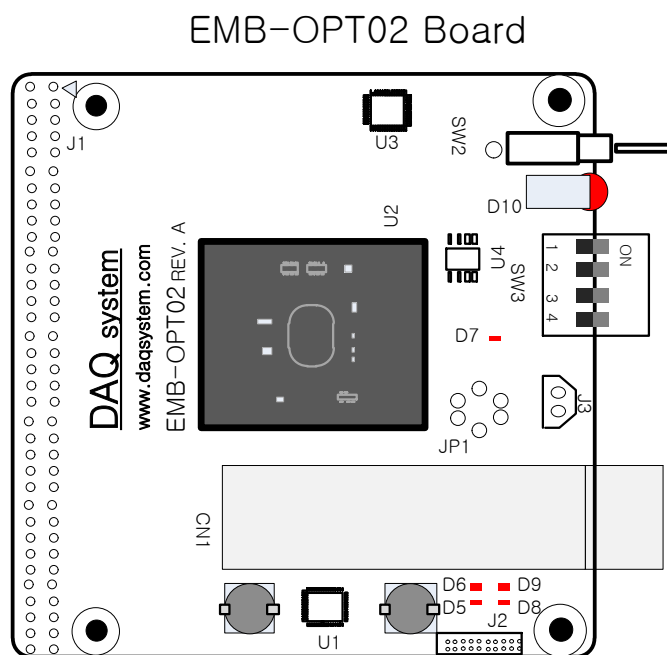
[그림 2-1. EMB-OPT01 Layout]

[Table 1. EMB-OPT02 main function description]

No.	Name	Description
1	J1	Camera Link / DIO_IN0..47 Connector
2	U1, U3	1.2V, 1.8V, 3.3V Output
3	U2	FPGA
4	CN1	SFP(Small Form Factor Pluggable) Connector
5	U4	Serial Memory
6	JP1	12V Circular DC Jack
7	SW2	12V Power Switch
8	SW3	Connection mode selection switch

The LED shows the inner workings.

LED D5 : Detects Pclk (Pixel Clock) signal.

LED D6 : Detects Lval (Line Valid) signal.

LED D7 : Lights up when power is supplied to the board and initialization is completed.
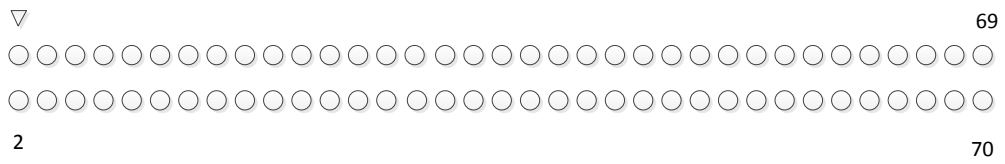
LDE D8 : Detects Dval (Data Valid) signal.

LED D9 : Vsync (Vertical Sync.) /16 division signal

LED D10 Red is On when optical is connected.

LED D10 Green turns on when the optical channel (#0) horizontal sync signal (Hsync) is detected.

2-1   J1 Connector

The figure below shows the pin map of the J1 connector.

[Figure 2-2.   EMB-OPT02 J1 Connector Pin-out]

[Table 2.   J1 Connector]

No.	Name	Description	Remark
1	**3.3V**	3.3V Power	
2	**12V**	12V Power	
3	**DIO_IN0**	Digital In/Out Data 0	
4	**DIO_IN1**	Digital In/Out Data 1	
5	**DIO_IN2**	Digital In/Out Data 2	
6	**DIO_IN3**	Digital In/Out Data 3	
7	**DIO_IN4**	Digital In/Out Data 4	
8	**DIO_IN5**	Digital In/Out Data 5	
9	**DIO_IN6**	Digital In/Out Data 6	
10	**DIO_IN7**	Digital In/Out Data 7	
11	**DIO_IN8**	Digital In/Out Data 8	
12	**DIO_IN9**	Digital In/Out Data 9	
13	**DIO_IN10**	Digital In/Out Data 10	
14	**DIO_IN11**	Digital In/Out Data 11	
15	**DIO_IN12**	Digital In/Out Data 12	
16	**DIO_IN13**	Digital In/Out Data 13	
17	**DIO_IN14**	Digital In/Out Data 14	
18	**DIO_IN15**	Digital In/Out Data 15	
19	**DIO_IN16**	Digital In/Out Data 16	
20	**DIO_IN17**	Digital In/Out Data 17	
21	**DIO_IN18**	Digital In/Out Data 18	
22	**DIO_IN18**	Digital In/Out Data 19	
23	**DIO_IN20**	Digital In/Out Data 20	
24	**DIO_IN21**	Digital In/Out Data 21	
25	**DIO_IN22**	Digital In/Out Data 22	
26	**DIO_IN23**	Digital In/Out Data 23	
27	**Ground**		
28	**Ground**		

29	**DIO_IN24**	Digital In/Out 24	
30	**DIO_IN25**	Digital In/Out 25	
31	**DIO_IN26**	Digital In/Out 26	
32	**DIO_IN27**	Digital In/Out 27	
33	**DIO_IN28**	Digital In/Out 28	
34	**DIO_IN29**	Digital In/Out 29	
35	**DIO_IN30**	Digital In/Out 30	
36	**DIO_IN31**	Digital In/Out 31	
37	**DIO_IN32**	GPIO00	
38	**DIO_IN33**	GPIO01	
39	**DIO_IN34**	GPIO02	
40	**DIO_IN35**	GPIO03	
41	**DIO_IN36**	GPIO04	
42	**DIO_IN37**	GPIO05	
43	**DIO_IN38**	GPIO06	
44	**DIO_IN39**	GPIO07	
45	**DIO_IN40**	GPIO08	
46	**DIO_IN41**	GPIO09	
47	**DIO_IN42**	GPIO10	
48	**DIO_IN43**	GPIO11	
49	**DIO_IN44**	GPIO12	
50	**DIO_IN45**	GPIO13	
51	**DIO_IN46**	GPIO14	
52	**DIO_IN47**	GPIO15	
53	**Ground**		
54	**Ground**		
55	**LVAL**	Line Valid	
56	**FVAL**	Frame Valid	
57	**DVAL**	Data Valid	
58	**PCLK**	Pixel Clock	
59	**Ground**		
60	**Ground**		
61	**CC_D0**	Camera Control output 0	
62	**CC_D1**	Camera Control output 1	
63	**CC_D2**	Camera Control output 2	
64	**CC_D3**	Camera Control output 3	
65	**Ground**		
66	**Ground**		
67	**DTX**	Serial to Frame grabber-	
68	**DRX**	Serial to Camera+	

69	**I2C_SDA**	I2C Serial Data	
70	**I2C_SCL**	I2C Serial Clock	

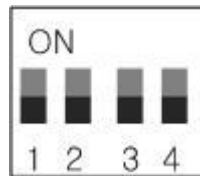## 2-2 JP1 Connector

This is an external 12V DC Jack power connector. (HR10-7R-6S-RA)
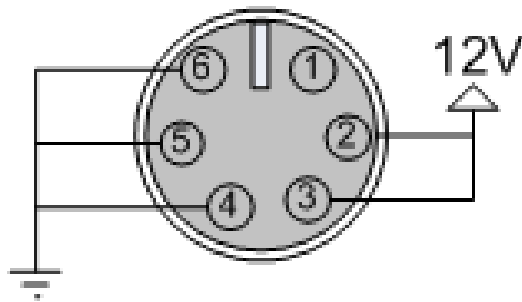
[Figure 2-3.   Rated power]

2-3 SW1 Switch

It is an option select switch.

SWITCH 3
    OFF : Vsync
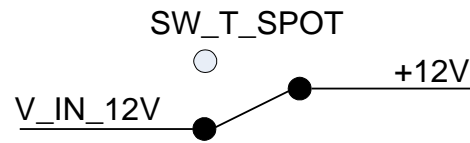   ON : Reverse Vsync

SWITCH 4
    OFF : Dval Use
    ON : Dval not use

SWITCH #2, #4 ~ #8 : Reserved

2-4 SW3 Switch

It is a 12V DV external power switch.

SW_T_SPOT

○   +12V

V_IN_12V ●

[Figure 2-4. SW3]

2-5 CN1(SFP) Connector

In the case of EMB-OPT02, an SFP (Small Form Factor Pluggable) connector is used as a Fiber-Transmission Transceiver device. The SFP transceiver is designed to support various optical transmissions such as SONET, Gigabit Ethernet, and Fiber Channel. It supports hot-pluggable transceiver and can be connected to network device motherboard with fiber or copper networking cable.

SFP is connected to the module that connects to the cage and connector, and there are Tx (Transceiver) and Rx (Receiver) together.

[Figure 2-5. SFP & SFP Cage]

[Table 3.　CN1 SFP Connector]

No.	Name	Description	Remark
1	VeeT	Transmitter Ground	
2	TxFault	Transmitter Fault	
3	TxDisable	Transmitter Disable	
4	SDA	Serial Interface Data Line	
5	SCL	Serial Interface Clock	
6	MOD-ABS	Module Absent, connected to VeeT or VeeR	
7	RS0	Rx Rate Select Open or Low = 2.125 or 4.25 Gb/s Fibre Channel (Low Bandwidth) High = 8.5 Gb/s Fibre Channel (High Bandwidth)	
8	LOS	When high, indicates received optical power below worst-case receiver sensitivity.	
9	RS1	Tx Rate Select Open or Low = 2.125 or 4.25 Gb/s Fibre Channel (Low Bandwidth) High = 8.5 Gb/s Fibre Channel (High Bandwidth)	
10	VeeR	Receiver Ground	
11	VeeR	Receiver Ground	
12	RD-	Receiver Data	
13	RD+	Receiver Inverted Data	
14	VeeR	Receiver Ground	
15	VccR	Receiver Power(3.3V)	
16	VccT	Transmitter Power(3.3V)	
17	VeeT	Transmitter Ground	
18	TD+	Transmitter Data	
19	TD-	Transmitter Inverted Data	
20	VeeT	Transmitter Ground	

(Note) For detailed specifications, refer to the Camera Link standard document.

2-6　Fiber Cable

An optical cable is a transmission cable made to transmit the converted laser signal to a long distance and uses two transmission modes.

Single Mode : It is used for broadband and long-distance transmission with a core diameter of 9 μm, and it is possible to transmit without relay up to about 50Km. In the case of single-mode with a small core diameter, it is difficult to transmit a large amount of information because the cable passage is narrow, but instead it can be transmitted over a long distance. The cable color is mainly yellow.

Multi Mode : The core diameter is 50~100 μm, so it is often used in short distances. In the case of multimode with a large core diameter, a large amount of information can be transmitted because the passage of the cable is wide, and the color of the cable is mainly orange.

Optical connectors include LC, ST, MTRJ, SC, FC, and MU types, but EMB-OPT02 mainly uses multimode LC type as shown in [Figure 2-7].
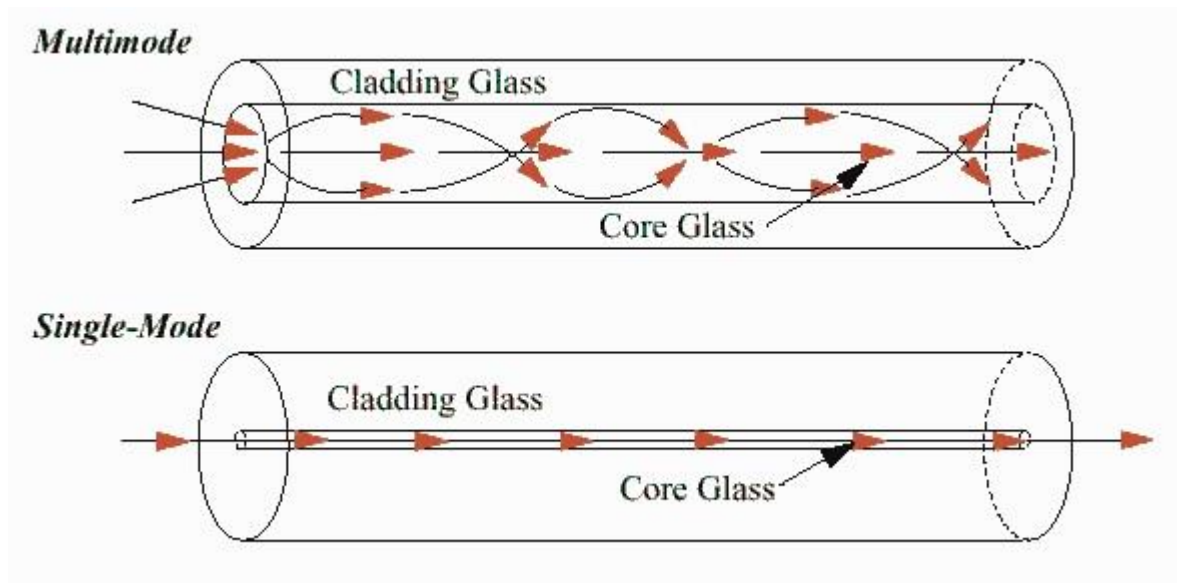
[Figure 2-6.　Signal transmission method according to transmission mode]
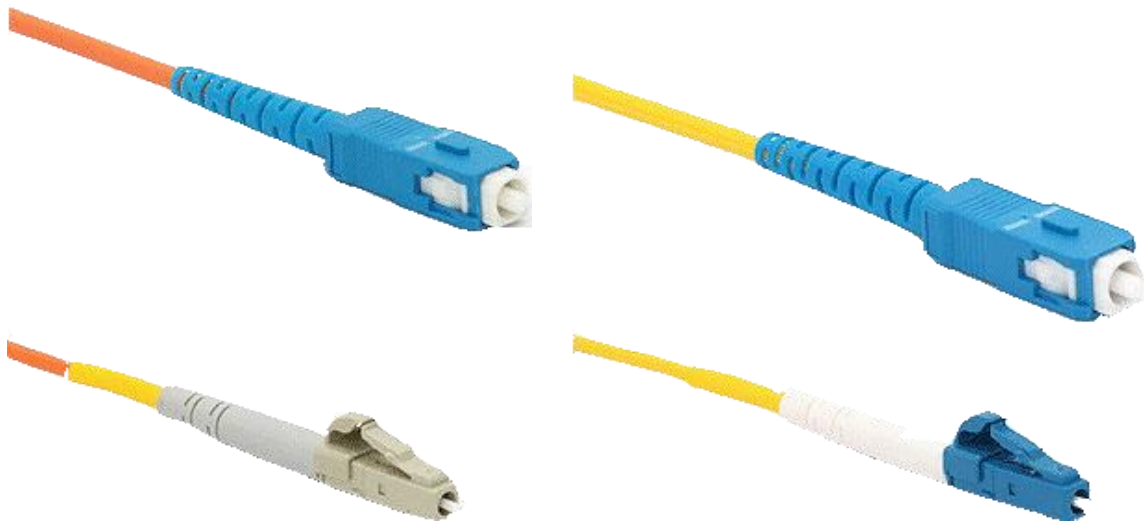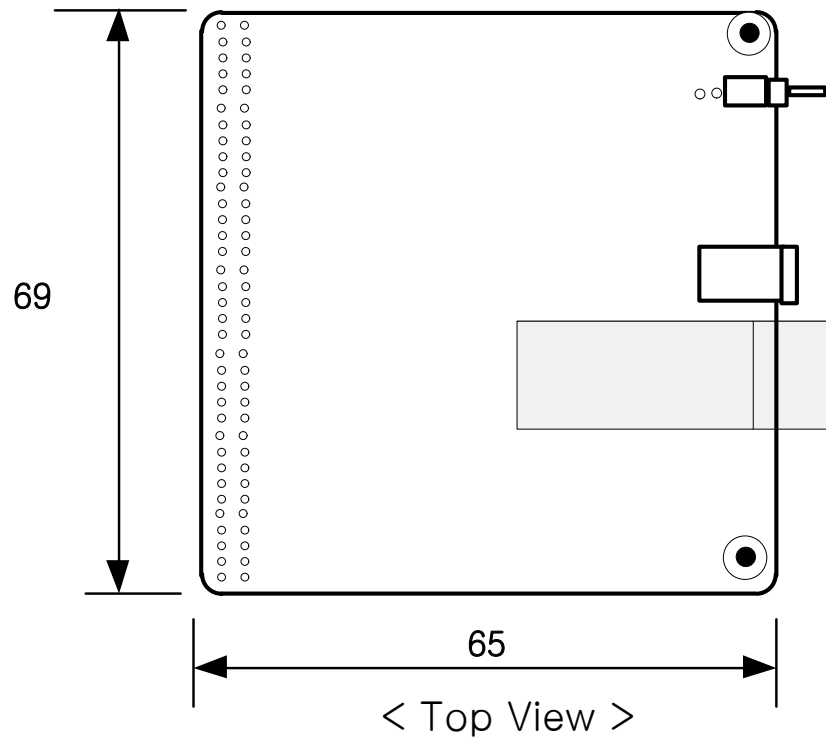
(1) Single Mode LC Type   (2) Multi Mode LC Type

[Figure 2-7. Cable type according to transmission mode]

Appendix

A-1   Board Size

The external sizes of the board are as follows. (65 x 69mm)

69

65

< Top View >

A-2   Repair Regulations

Thank you for purchasing DAQ SYSTEM's product. Please refer to the following regarding Customer Service stipulated by DAQ SYSTEM.

(1) Please read the user's manual and follow the instructions before using the DAQ SYSTEM product.

(2) When returning the product to be repaired, please send it to the head office with the symptoms of the malfunction as well.

(3) All DAQ SYSTEM products have a one-year warranty.
   -. The warranty period is counted from the date the product is shipped from DAQ SYSTEM.
   -. Peripherals and third-party products not manufactured by DAQ SYSTEM are covered by the manufacturer's warranty.
   -. If repair is required, please contact the contact points below.

(4) Even during the free repair warranty period, paid repairs are made in the following cases.
   ① Failure or damage caused by not following the user's manual
   ② Failure or damage caused by customer negligence during product transportation after purchase
   ③ Natural phenomena such as fire, earthquake, flood, lightning, pollution, etc. or power supply exceeding the recommended range malfunction or damage
   ④ Failures caused by inappropriate storage environment (eg, high temperature, high humidity, volatile chemicals, etc.) damaged
   ⑤ Failure or damage due to unreasonable repair or modification
   ⑥ Products whose serial number has been changed or intentionally removed
   ⑦ In the event that DAQ SYSTEM determines that it is the customer's negligence for other reasons

(5) The customer must bear the shipping cost of returning the repaired product to DAQ SYSTEM.

(6) The manufacturer is not responsible for any problems caused by incorrect use regardless of our warranty provisions.

MEMO

Contact Point

Web sit : https://www.daqsystem.com

Email : postmaster@daqsystem.com

DAQ SYSTEM
Measurement & Automation