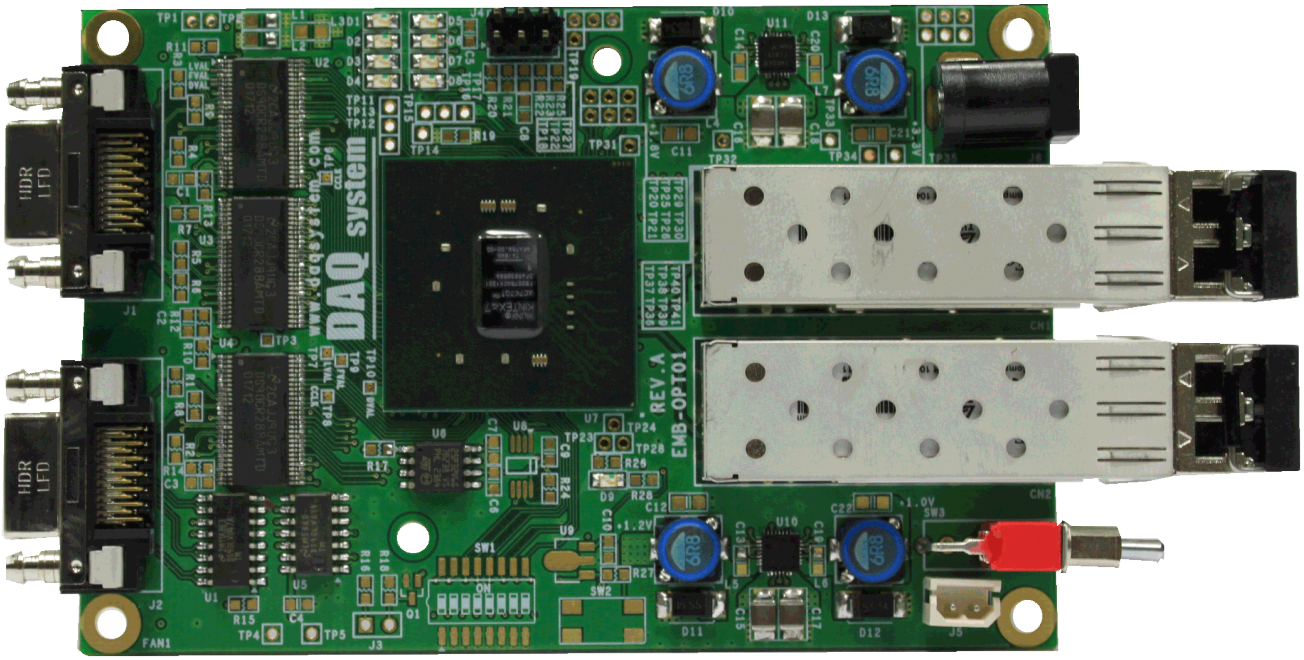
EMB-OPT01

User Manual

Version 1.1

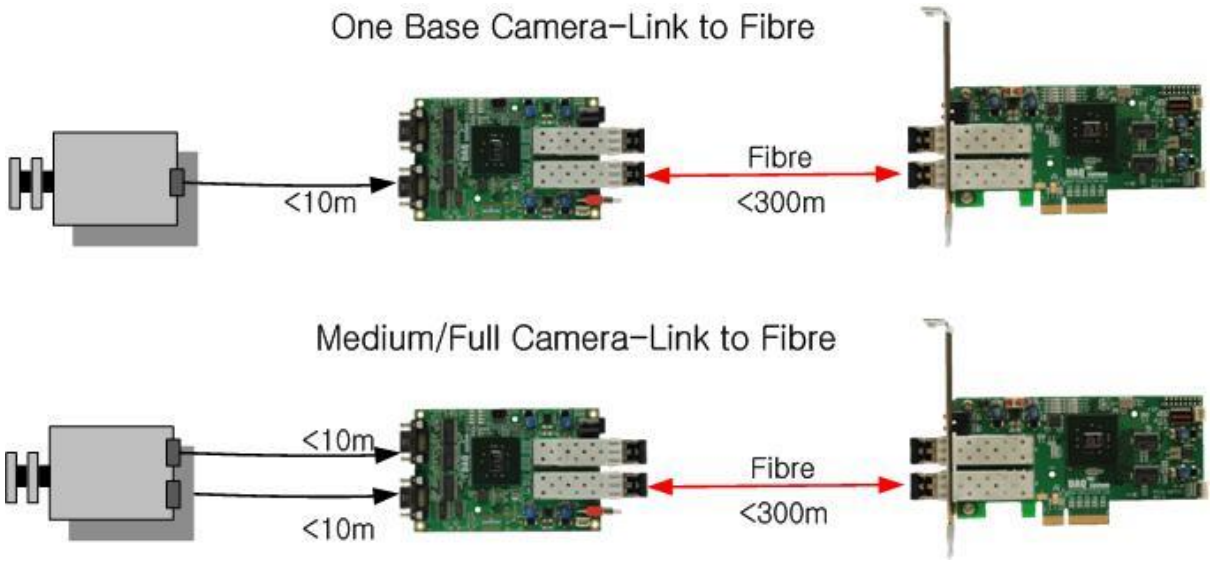


DAQ SYSTEM
Measurement & Automation

Contents

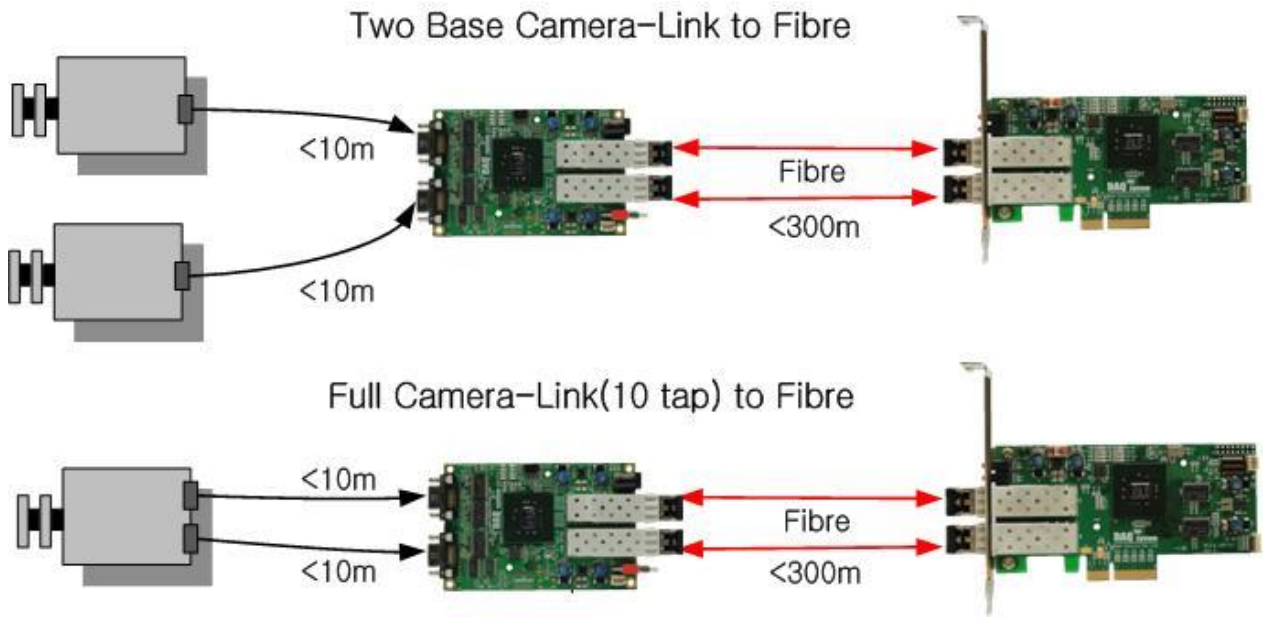
1. EMB-OPT01 Introduction

The EMB-OPT01 board converts the image signal from the Camera Link camera into light and transmits it to the PCIe-OPT01 board, which is the light receiving board. Depending on the camera link connection, 1 Base or 1 Full Camera Link configuration is supported.

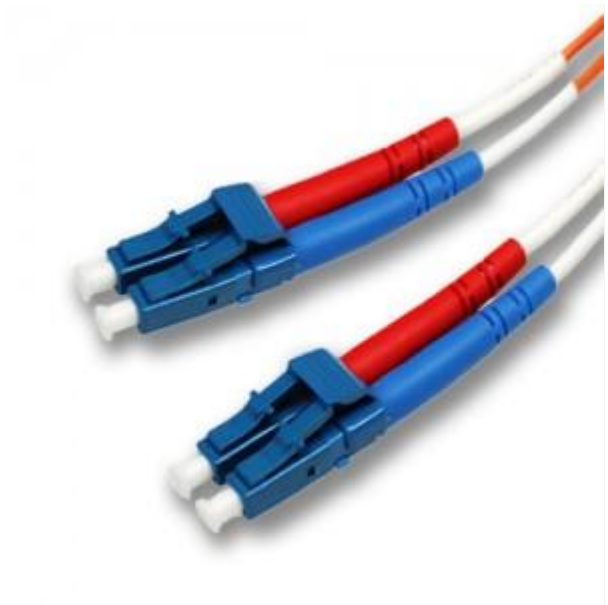


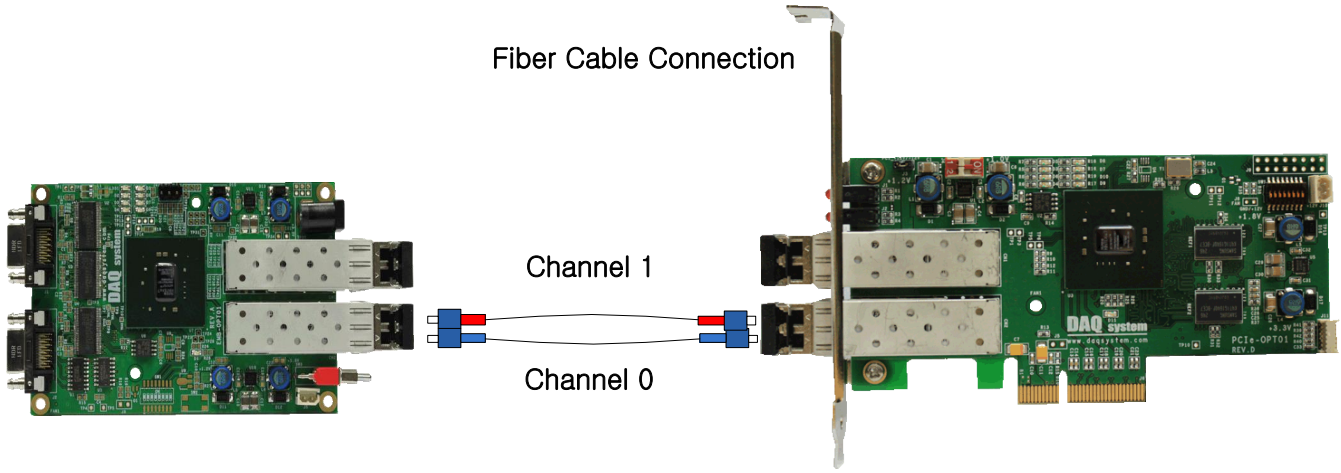
[Figure 1-1. EMB-OPT01와 PCIe-OPT01 Connection]

Note) Two Base Camera and 10Tap support are planned in the future.



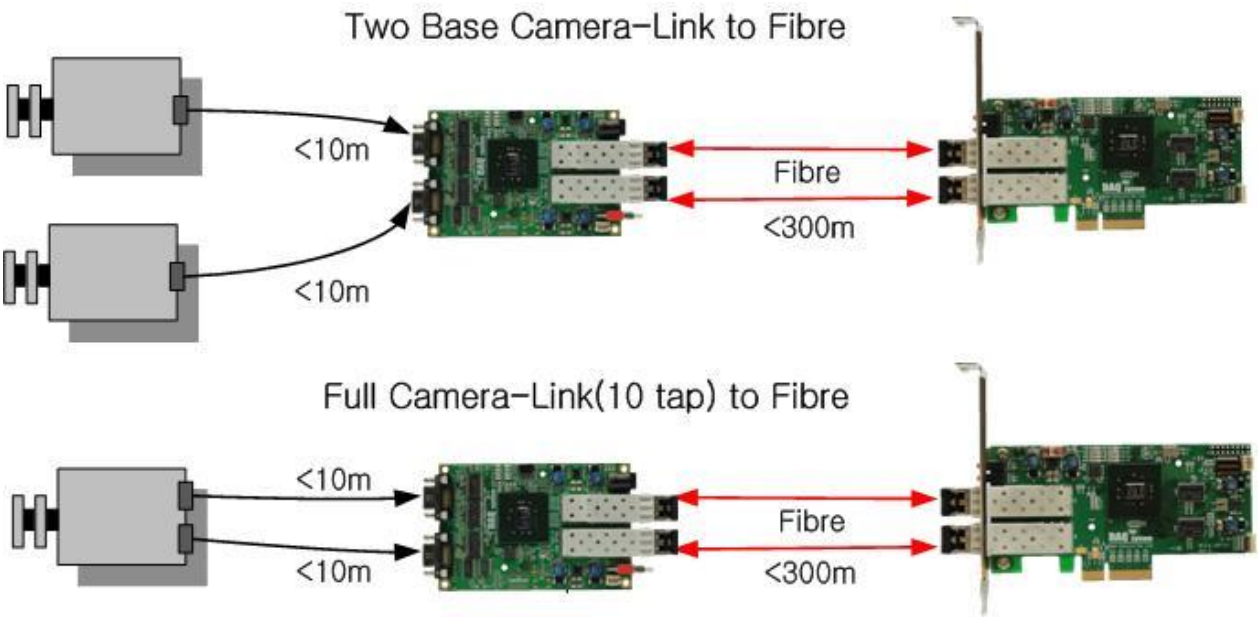
Reference) The most important factor in selecting an optical cable is the communication distance. A multimode cable provides a maximum transmission distance of 2Km, and a single-mode cable basically provides a transmission distance depending on the type of equipment. Communication using light basically 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.





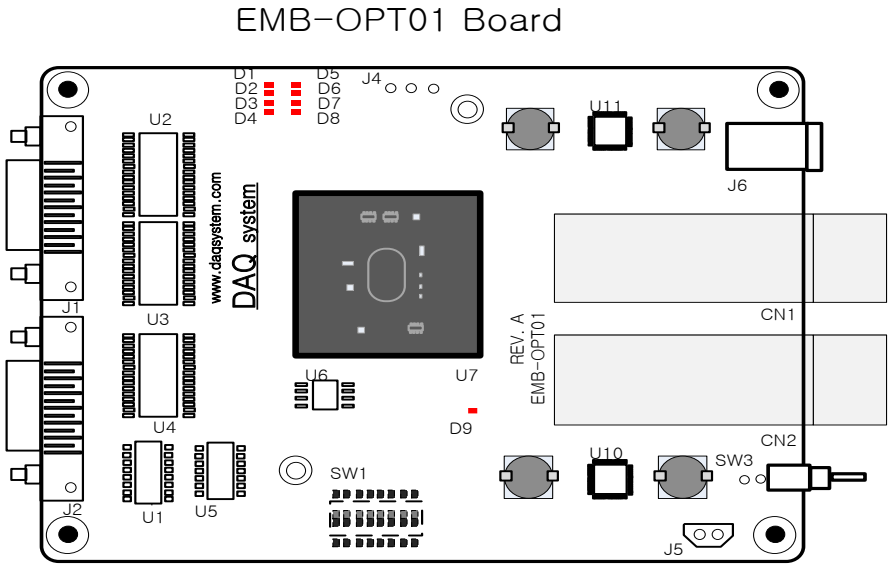
Caution) Be careful not to twist the cable when connecting it to the SFP cage.
The upper SFP cage (CN1) is channel 1, and the lower SFP cage (CN2) is recognized as channel 0.

Note) Two Base Camera and 10Tap support are planned in the future.



2. EMB-OPT01 Function

Each name and function description of EMB-OPT1 is as follows.



[Figure 2-1. EMB-OPT01 Layout]

[Table 1. EMB-OPT01 main function description]

No.	Name	Description
1	**J1, J2**	Mini-MDR26 Camera Link Connector
2	**U1**	LVDS Differential Line Driver
3	**U2, U3, U4**	LVDS Channel Link
4	**U5**	LVDS Differential Line Driver/Receiver
5	**U7**	FPGA
6	**CN1, CN2**	SFP(Small Form Factor Pluggable) Connector CN1 : Channel 1, CN2 : Channel 0
7	**U8, U10, U11**	1.3V, 2.5V, 3.3 Output
8	**J5**	Fan Power Connector (12V)
8	**J6**	12V DC Jack
9	**SW1**	Connection mode selection switch
10	**SW3**	12V Power Switch

The LED shows the inner workings.

LED D1 turns on when the optical channel (#0) vertical sync signal (Vsync) is detected.

LED D2 turns on when the optical channel (#0) horizontal sync signal (Hsync) is detected.

LED D3 shows the value divided by Vsync /4 to know the operation of the optical channel (#0) vertical sync signal.

LED D4 turns off when the optical channel (#0) is connected.

LED D5 turns on when the optical channel (#1) vertical sync signal (Vsync) is detected.

LED D6 turns on when the optical channel (#1) horizontal sync signal (Hsync) is detected.

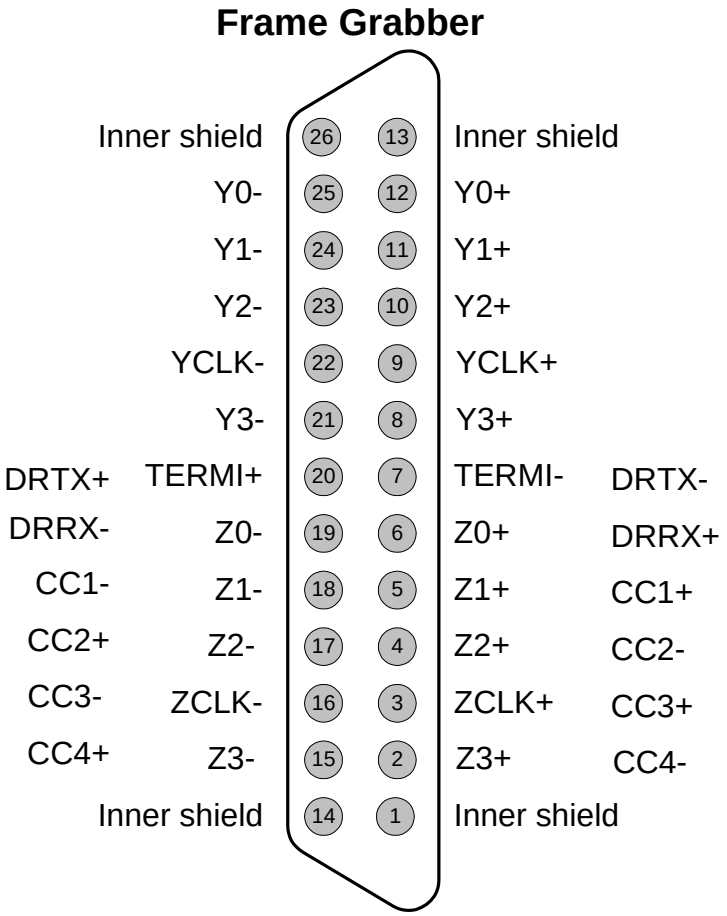
LED D7 shows the value divided by Vsync /4 to know the operation of the optical channel (#1) vertical sync signal.

LED D8 turns off when the optical channel (#1) is connected.

LED D9 turns on when power is supplied to the board and initialization is complete..

2-1 J1 Connector (Mini MDR-26)

The figure below shows the pin map of the J1 connector of the board used when using Base or Medium/Full Configuration Camera Link. All pin specifications are input/output based on the Camera Link standard, so please refer to the Camera Link standard document for details.



[Figure 2-2. EMB-OPT01 J1 Connector Pin-out]

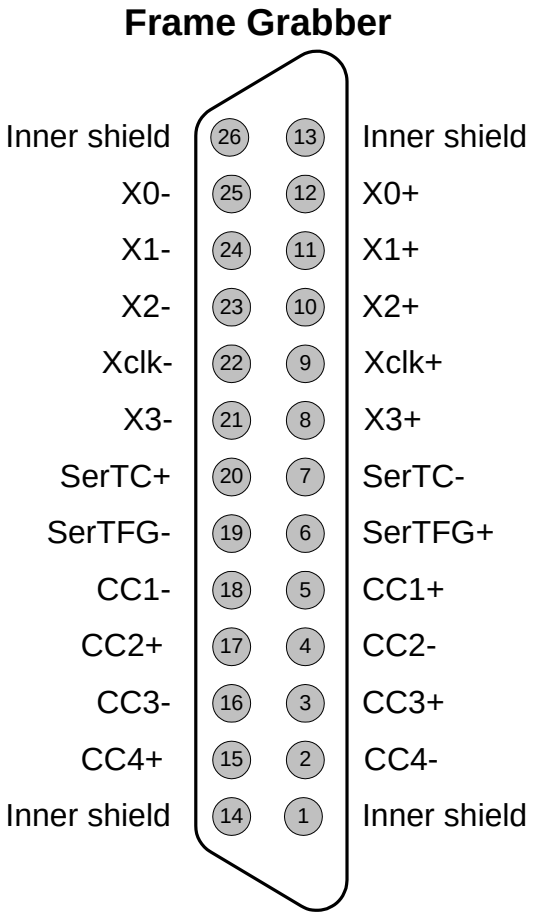
[Table 2. J1 Connector]

No.	Name	Description	Remark
1	**Inner Shield**	Cable shield	
2	**Z3+/CC4-**	Camera link LVDS receive data11+ / CC4-	
3	**ZCLK+/CC3+**	Camera link LVDS receive clock+ / CC3+	
4	**Z2+/CC2-**	Camera link LVDS receive data10+ / CC2-	
5	**Z1-/CC1+**	Camera link LVDS receive data9+ / CC1+	
6	**Z0+/DRRX+**	Camera link LVDS receive data8+ / SerTFG+	
7	**TERMI-/DRTX-**	Serial to Camera- / SerTC-	
8	**Y3+**	Camera link LVDS receive data7+ / data3+	
9	**YCLK+**	Camera link LVDS receive clock+ / clock+	
10	**Y2+**	Camera link LVDS receive data6+ / data2+	
11	**Y1+**	Camera link LVDS receive data5+ / data1+	
12	**Y0+**	Camera link LVDS receive data4+ / data0+	
13	**Inner Shield**		
14	**Inner Shield**		
15	**Z3-/CC4+**	Camera link LVDS receive data11- / CC4+	
16	**ZCLK-/CC3-**	Camera link LVDS receive clock- / CC3-	
17	**Z2-/CC2+**	Camera link LVDS receive data10- / CC2+	
18	**Z1-/CC1-**	Camera link LVDS receive data9- / CC1-	
19	**Z0-/DRRX-**	Camera link LVDS receive data8- / SerTFG-	
20	**TERMI+/DRTX+**	Serial to Camera+ / SerTC+	
21	**Y3-**	Camera link LVDS receive data7- / data3-	
22	**YCLK-**	Camera link LVDS receive clock- / clock-	
23	**Y2-**	Camera link LVDS receive data6- / data2-	
24	**Y1-**	Camera link LVDS receive data5- / data1-	
25	**Y0-**	Camera link LVDS receive data4- /data0-	
26	**Inner Shield**		

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

2-2 J2 Connector (Mini MDR-26)

The figure below shows the pin map of the J2 connector of the board used when using the Base Configuration Camera Link. All pin specifications are input/output based on the Camera Link standard, so please refer to the Camera Link standard document for details.



[Figure 2-3. EMB-OPT01 J2 Connector Pin-out]

[Table 3. J2 Connector]

No.	Name	Description	Remark
1	**Inner Shield**	Cable shield	
2	**CC4-**	Camera Control output 4-	
3	**CC3+**	Camera Control output 3+	
4	**CC2--**	Camera Control output 2-	
5	**CC1+**	Camera Control output 1+	
6	**SerTFG+**	Serial to Frame grabber +	
7	**SerTC-**	Serial to Camera-	
8	**X3+**	Camera link LVDS receive data3 +	
9	**Xclk+**	Camera link LVDS receive clock +	
10	**X2+**	Camera link LVDS receive data2 +	
11	**X1+**	Camera link LVDS receive data1 +	
12	**X0+**	Camera link LVDS receive data0 +	
13	**Inner Shield**		
14	**Inner Shield**		
15	**CC4+**	Camera Control output 4+	
16	**CC3-**	Camera Control output 3-	
17	**CC2+**	Camera Control output 2+	
18	**CC1-**	Camera Control output 1-	
19	**SerTFG-**	Serial to Frame grabber-	
20	**SerTC+**	Serial to Camera+	
21	**X3-**	Camera link LVDS receive data3-	
22	**Xclk-**	Camera link LVDS receive clock-	
23	**X2-**	Camera link LVDS receive data2-	
24	**X1-**	Camera link LVDS receive data1-	
25	**X0-**	Camera link LVDS receive data0-	
26	**Inner Shield**		

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

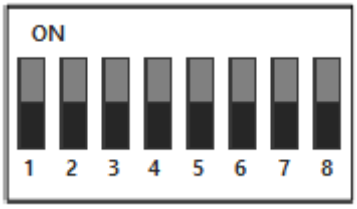
2-3 J4 Connector

12V DC External Power CONNECTER (DC-005(2.0))

[Figure 2-4. J4 Connector]

2-4 SW1 Switch

It is a camera setup mode selection switch.



[Figure 2-5. SW1]

Switch #1 : Tap Setup.

ON : 8 Tap (Over 40bit)

OFF : 1/2/3/4 Tap (Under 32bit)

Switch #2 : (VSync : Vertical Synchronization) signal polarity

ON : Inverse

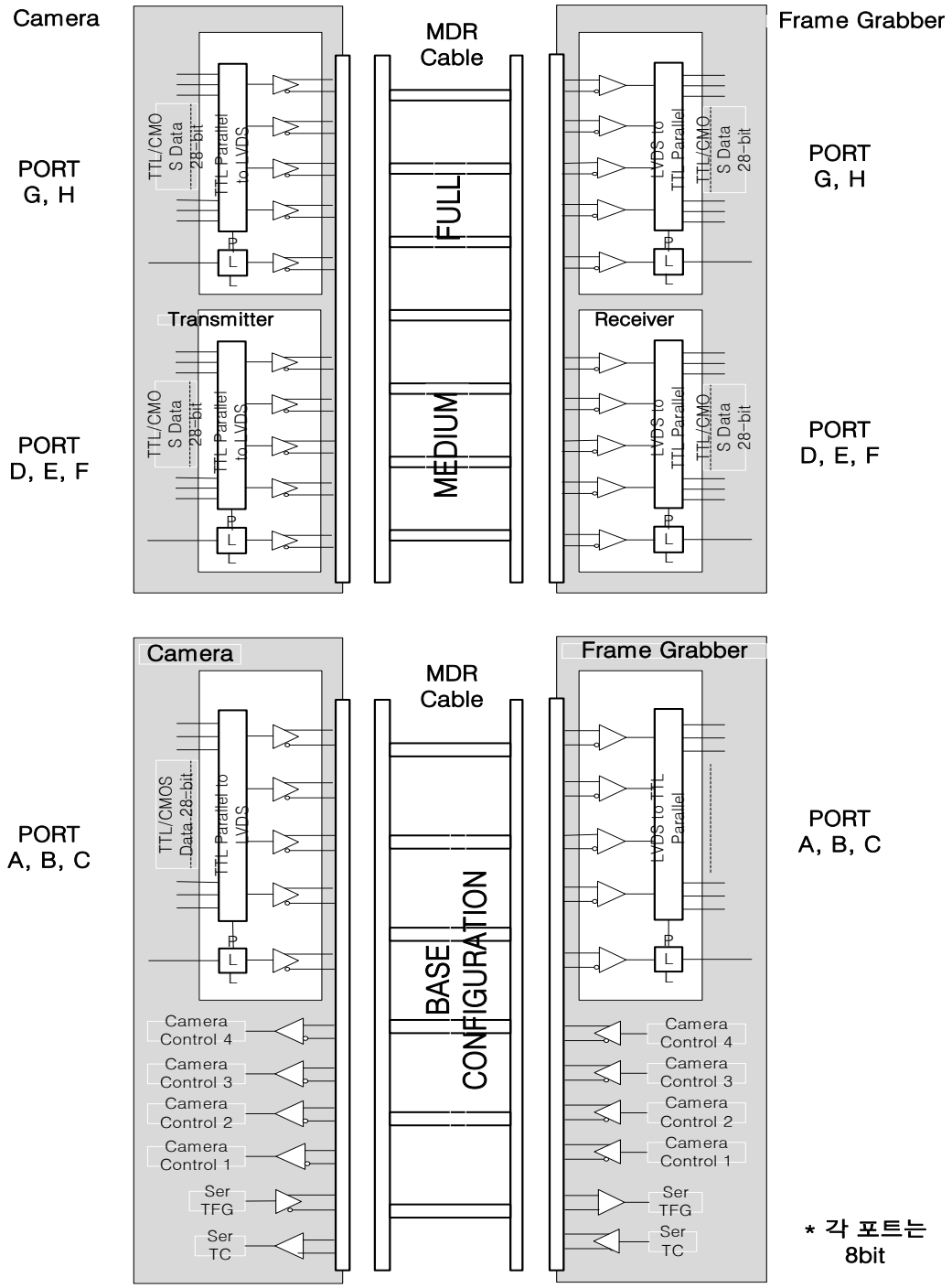
OFF : Normal

Switch #3 : DVAL : Decide whether to use Data Validation.

ON : DVAL Use

OFF : DVAL No Use

Switch #2, #4 ~ #8 : Reserved



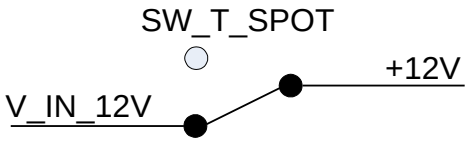
[Figure 2-6. Base, Medium, and Full Configuration Block Diagram]

[Table 4. Different Port Assignment to Camera Link Specification]

Configuration	Port Supported	Number of Connectors
Base	A, B, C	1
Medium	A, B, C, D, E, F	2
Full	A, B, C, D, E, F, G, H	2

2-5 SW3 Switch

It is a 12V DV external power switch.



[Figure 2-7. SW3]

2-6 CN1, CN2 (SFP) Connector

In the case of EMB-OPT01, 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 2-8. SFP & SFP Cage]

[Table 4. CN1/CN2 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.

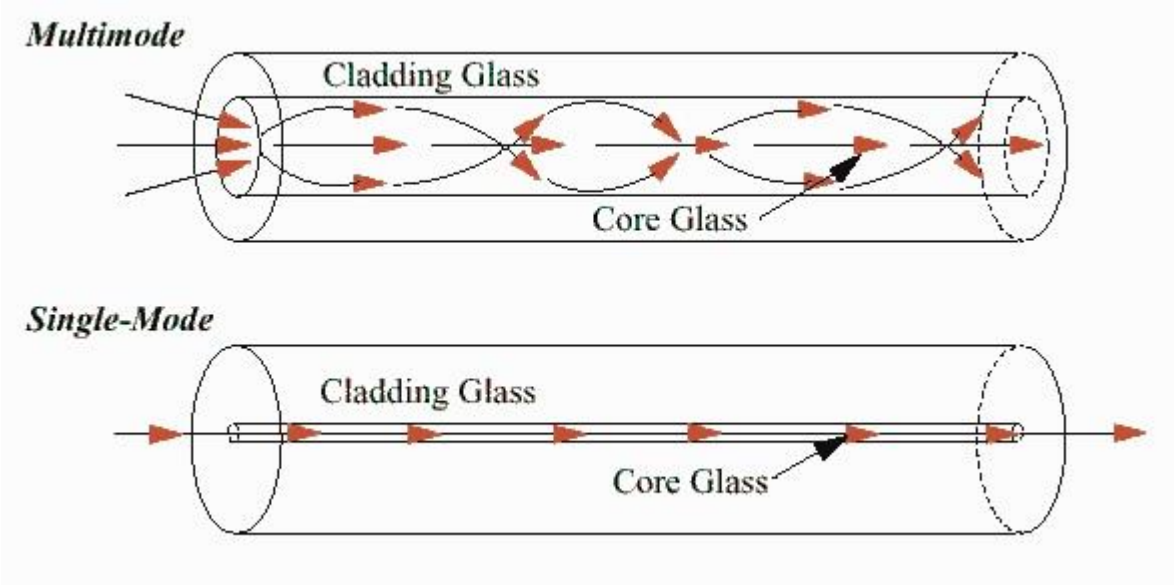
2-7 Fiber Cable

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

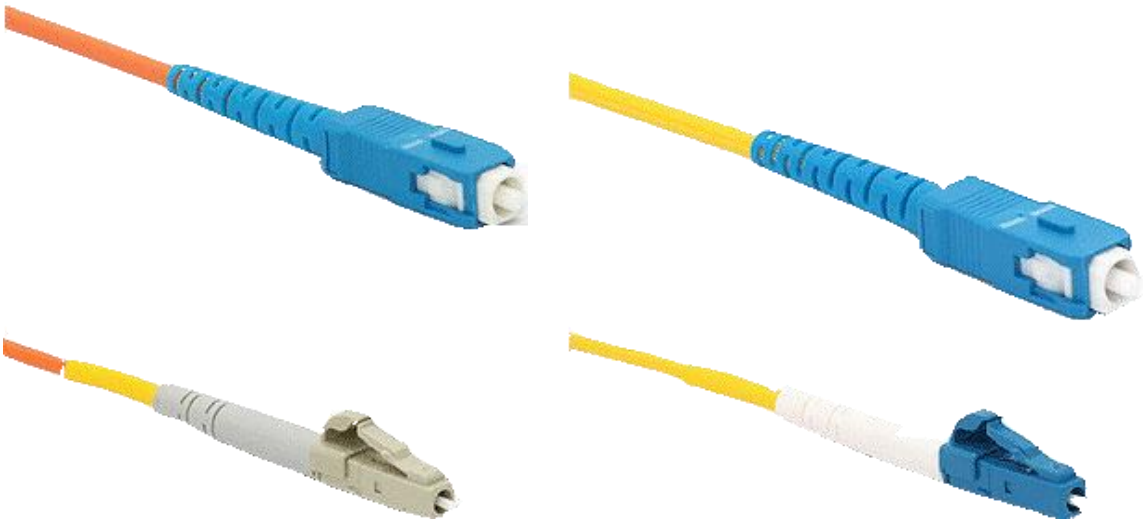
Single Mode : It is used for broadband and long-distance transmission with a core diameter of 9 ㎛, and it is possible to transmit without relay up to about 50Km. In the case of single-mode with a small core diameter, it is difficult to transmit a large amount of information because the cable passage 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 ㎛, 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-OPT01 mainly uses multimode LC type as shown in [Figure 2-10].



[Figure 2-9. Signal transmission method according to transmission mode]



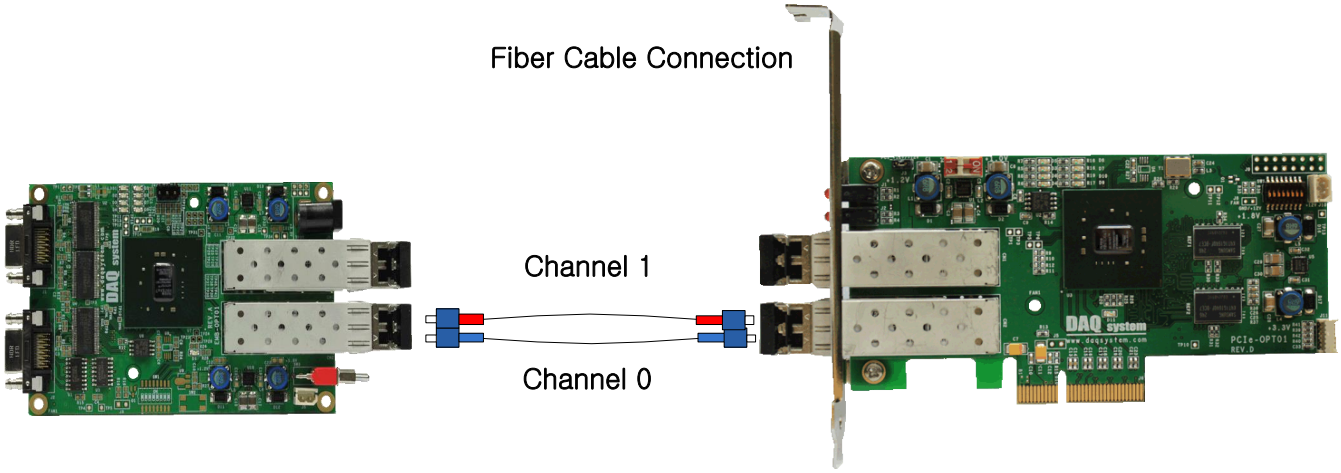
(1) Single Mode LC Type (2) Multi Mode LC Type

[Figure 2-10. Cable type according to transmission mode]

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 2Core optical cable as shown in the figure below.

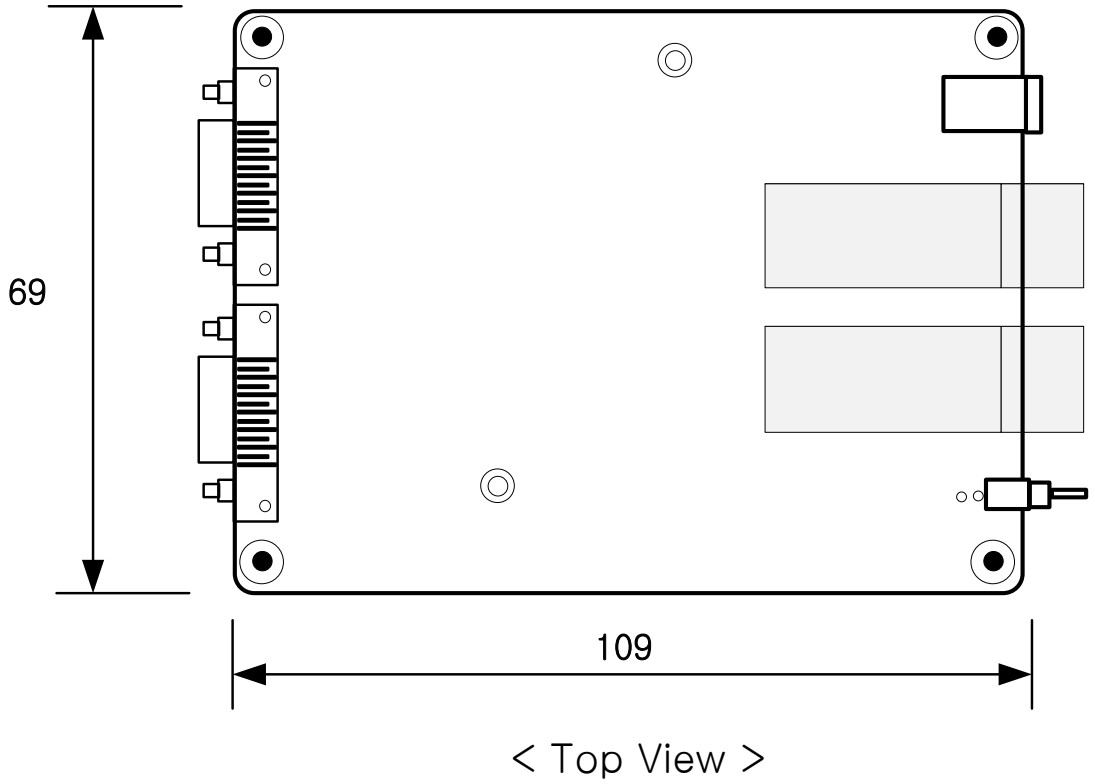


Caution) Be careful not to twist the cable when connecting it to the SFP cage.

Appendix

A-1 Board Size

The external sizes of the board are as follows. (109 x 69mm)



< 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