MIPI-ADP03

User Manual

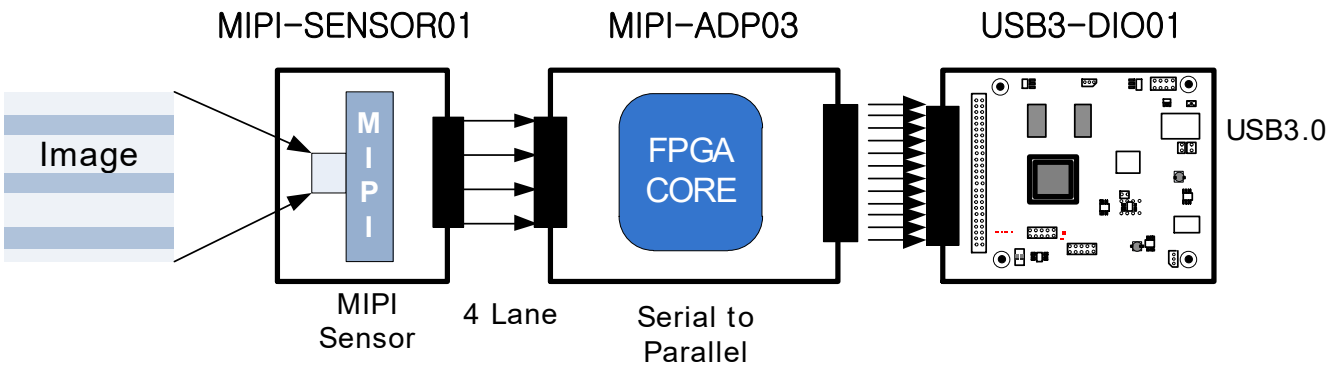
Version 1.1

DAQ SYSTEM
Measurement & Automation

Contents

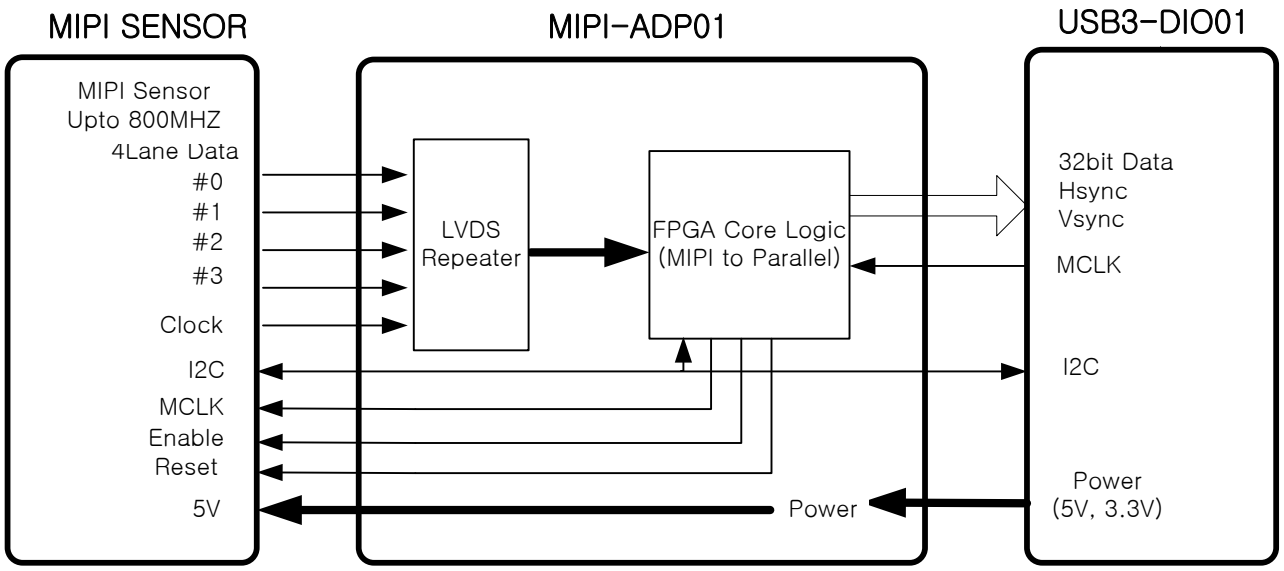
1. MIPI-ADP03 Introduction

MIPI-ADP03 board is a function of transferring to the USB-DIO01 board after being converted into parallel signals received from the MIPI serial signal through MIPI SENSOR. The maximum transmission speed is about 1.2Gbps/Lane.



[Figure 1-1. MIP-ADP03 Connection]

The block diagram of MIPI-ADP03 is in Figure 1-2. All functions are controlled by the FPGA, and also, the power received from USB3-DIO01 supply to MIPI sensor board.

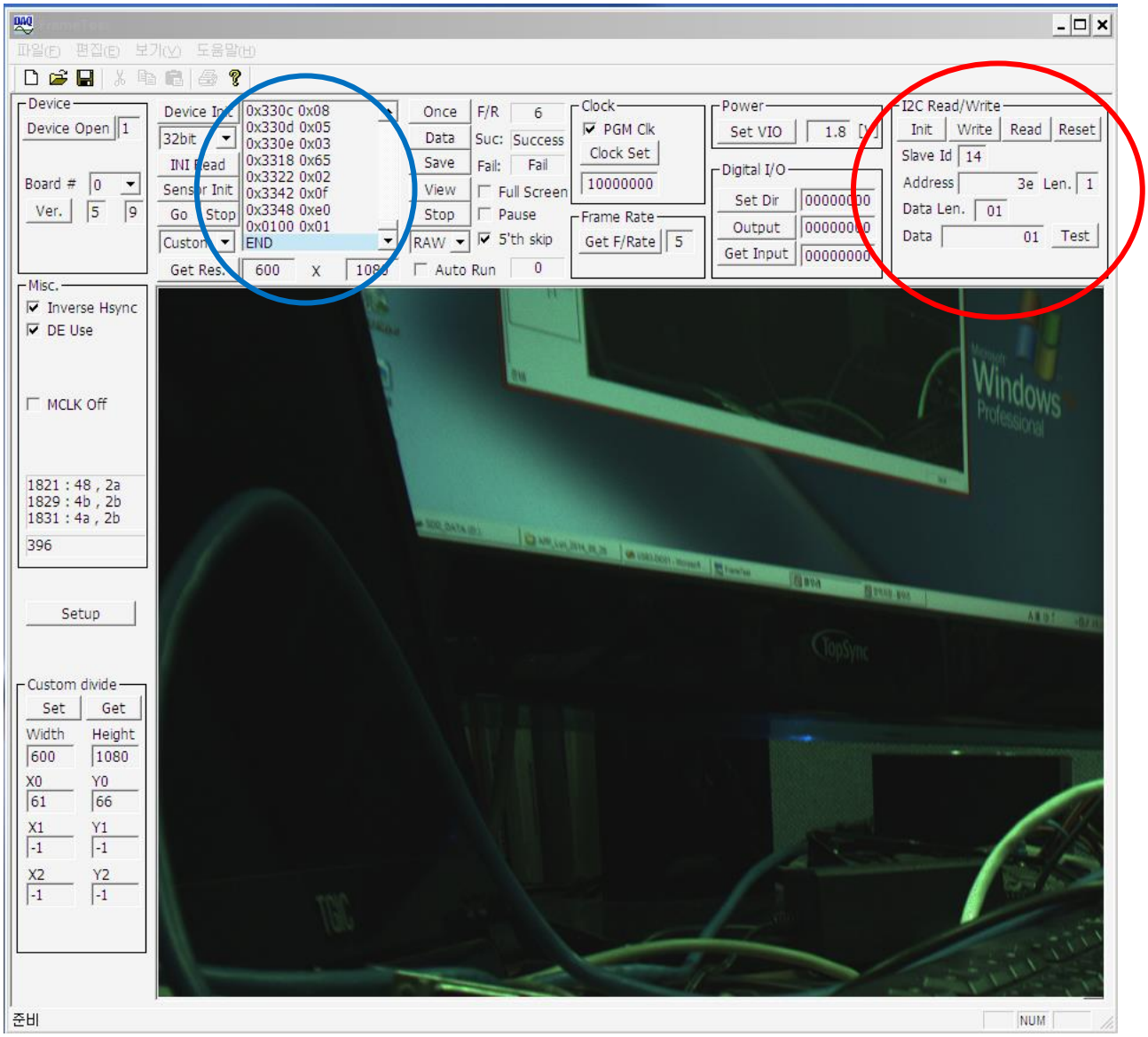


P.S) I2C : Sensor Setting or Lane Information (from USB3-DIO01 to MIPI sensor)
MCLK : Variable Clock 1 ~ 68MHz

[Figure 1-2. MIPI-ADP03 Block Diagram]

The USB3-DIO01 can be communicated with the MIPI sensor through I2C as like [Figure 1-2]. Also, it can be controlled the FPGA of MIPI-ADP03 via I2C.

Some of the features of the I2C-related and USB3-DIO01 sensor INI files, they are as follows: This will be described with reference to the USB3-DIO01 sample program.
(We have been promoting integration of Input/Output function, so the sample program may be changed.)



The part of blue circle shows a value that MIPI sensor initialization file. It can be read in "INI read". This initialization file is different for each sensor, there are Slave ID and Address and Data between [REGISTER] and [END] command.

The initialization file will be read all at once at "INI read" button. You can be written an address and data one by one in part of red circle (I2C Read/Write part). In this case, sensor address should be used to a Slave ID. It is fixed to 0x3c.

Example 1) OV5640(5M).ini File Structure

```
[REGISTER]
Slave     0x3C   //change slave ID as Sensor

SLEEP     100

0x3103 0x11
0x3008 0x82
0x3008 0x42
0x3103 0x03
0x3017 0x00
0x3018 0x00
0x3034 0x1a
0x3035 0x12
0x3036 0x69
0x3037 0x13
0x3108 0x01
0x3630 0x36
0x3631 0x0e
0x3632 0xe2

.....

0x501f 0x03
0x440e 0x00
0x4837 0x16
0x5000 0x06
0x5001 0x00
0x3a0f 0x36
0x3a10 0x2e
0x3a1b 0x38
0x3a1e 0x2c
0x3a11 0x70
0x3a1f 0x18
0x3008 0x02
[END]
```

Note) The SLAVE ADDRESS should be represented 7bit in the above *. Ini files.**
For example, if slave address is 0x40, this value is 0x20 that shifted one bit to the right.

When you want to control the FPGA of MIPI-ADP03, Slave Address will be fixed to 0x14. The MIPI control signals that you want have to be written the data to the corresponding address register.

Example 2) When the FPGA controls, SLAVE ADDRESS(7bit) is fixed to 0x14.

Register Address

Address Data

0x12 : 0x01 : Virtual Channel On

0x00 : Virtual Channel Off

0x1D : 0x03 : MIPI 4 Lane

0x01 : MIPI 2 Lane

0x00: MIPI 1 Lane

0x3D : It determines the GPIO In or Out direction.

"0" : Output

"1" : Input

0x3E : S_RESET, ENB, CNT0,1,2,3 Control of J5 Connector (Refer to [Table 1])

bit0 : S_RESET

bit1 : ENB

bit4 : CNT0

bit5 : CNT1

bit6 : CNT2

bit7 : CNT3

0x3F : Read a bit on the set. (Read Only)

Reading order as bit7..bit0.

0x40 : Operates when High (default).

Bit 0 : Whether or not to use VIO

Bit 1 : Whether or not to use I2C

0x41 : setting VIO

(Used for conflicted prevention between address(0x20) and sensor address)

Bit 0 : LTC1668 Address ➔ Default : Law (0x20)

When conflict Address ➔ High (0x22)

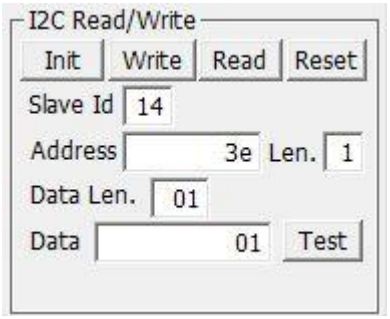
0x20 : VIO(J10) Level Setting (When AD1 = High, change 0x22)

EX) In case of 3.3V

Data = Vref/1024 = 3.3 / 1024 = 0.00322

3.3V - 1.25V(Ref) / 0.00322 = 636.12121212 = 0x27C

Address	Command	Data(7-0)	Data(1-0)
20	00	7C	02



I2C Read / Write block is composed of a function associated with the transmission of the I2C

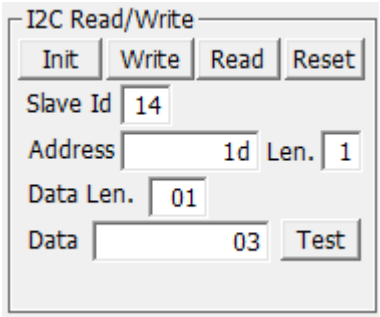
(1) **"Init"** Button

It will initiate the resources for the I2C system.

(2) **"Write"** Button

Transmit the data through I2C for control to MIPI or CMOS camera.

For example, if you are using our own MIPI-SENSOR03



On the first screen, write (reset to sensor)

MIPI 4lane is used when data 0x03 is written to Address 1d.

MIPI 2lane is used when data 0x01 is written to Address 1d.

MIPI 1lane is used when data 0x00 is written to Address 1d.

(3) **"Read"** Button

Receive the data through I2C.

(4) **"Reset"** Button

There is Initialization resource of I2C system.

(5) **"Slave ID " :** Slave Address

"Address " : Slave Register Address

"Len." : Address Value(Length)

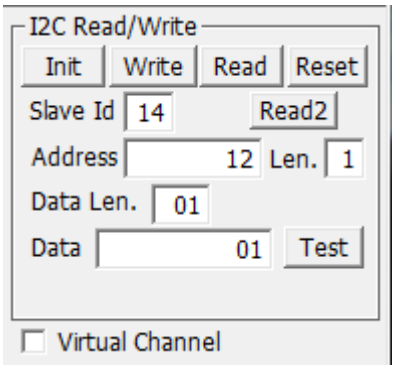
"Data Len :" : Data Value(Length)

"Data :" : Data that will transmit

(6) **"Reset" Button**

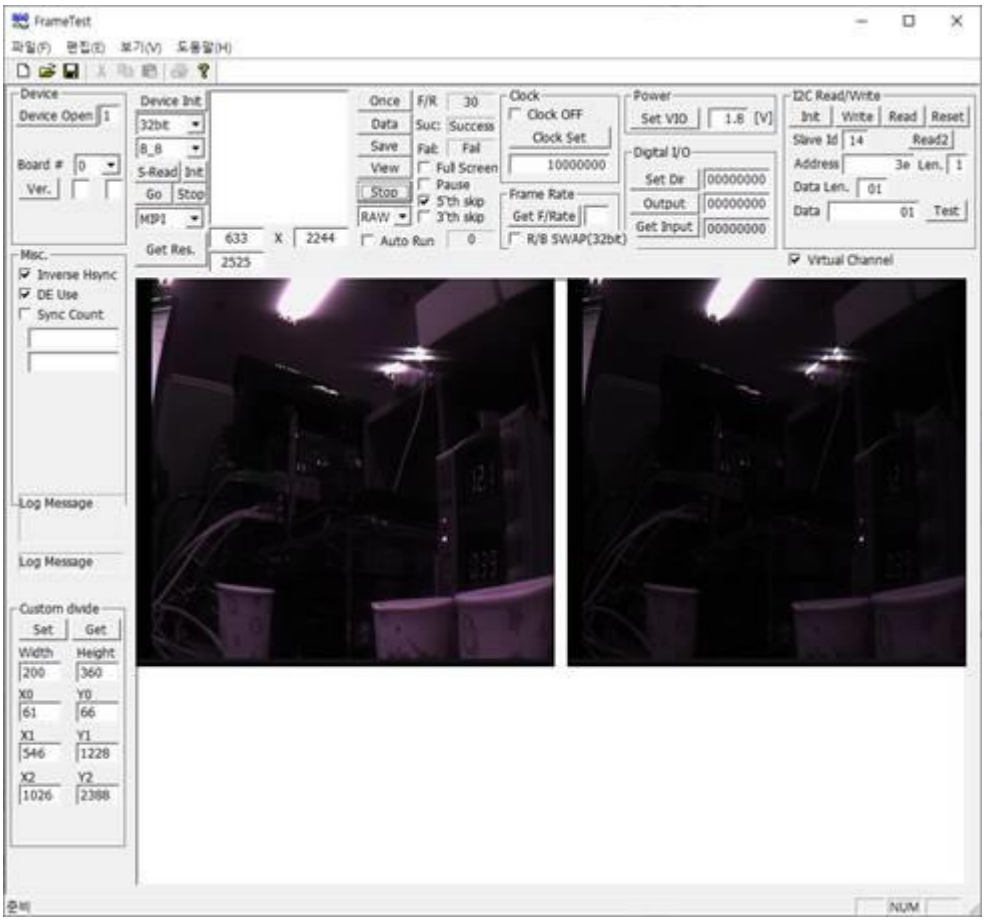
Re-initialize the resources of the I2C system.

(6) **"Virtual Channel" Button :** How to use the I2C Reae/Write box is as follows.



In the sample program, you can click "Virtual Channel" item without I2C setting.

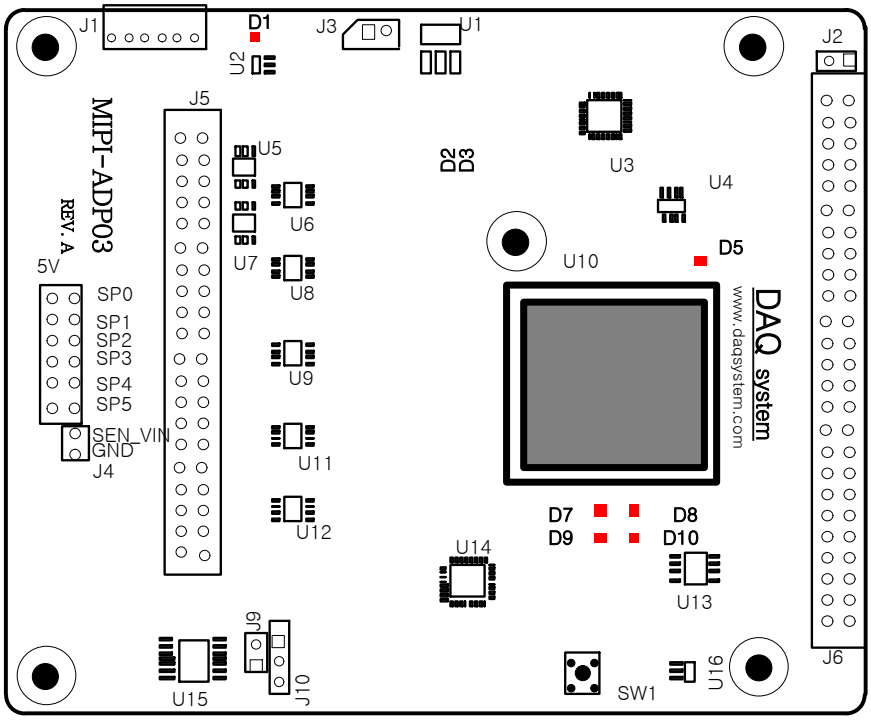
Device Open -> Device Init -> S-Read(Ini File Read) -> Virtual Channel(checkbox) -> Init -> Get Res -> Start.



2. MIPI-ADP03 Function

MIPI-ADP03 names and functions of each are described below.

MIPI-ADP03 Board



No.	Name	Description
1	**U1, U3, U14**	1.0V, 1.8V, 3.3V
2	**U4**	Low Voltage Level Translator
3	**U6, U8, U9, U11, U12**	Differential Translator/Repeater
4	**U10**	FPGA
5	**U15, U18**	Voltage Level Translator
6	**J1**	JPEG Header
7	**J2**	12V (J6 Pin 45 connection)
8	**J3**	External Power Connector (12V)
9	**J4**	Sensor Power Selection Jumper
10	**J5**	MIPI Board Connection Connector (For MIPI signals)
11	**J6**	USB3-DIO01 Connection Connector (For Parallel signals)
12	**J9, J10**	Selection VIO
13	**SW1**	3.3V Reset Switch

LED is also to check for internal operations.
LED D1 turns on when power 3.3V is applied to the board.
LED D5 turns on when power is applied to the board and the initialization ends up.
LED D7 turns on when MIPI signal detects.
LED D8 turns on when data enable signal detects. (Data Enable)
LED D9 turns on when vertical synchronization signal detects. (Vertical Sync)
LED D10 turns on when the horizontal synchronization signal detects. (Horizontal Sync).

2-1 J2 Connector

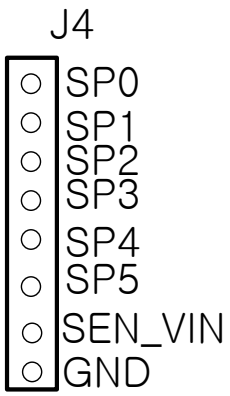
When J2 jumper connection, 12V power supply receive from the USB3-DIO01 (Rev E) board. (From J6 #45 pin)

2-2 J4 Connector

J4 connector is used to supply power to the sensor from outside of the MIPI. It is connected by a 5V line and the jumper next to the time of product shipment.

SEN_VIN determines the levels (1.8 ~ 3.3V) of the SCL / SDA / S_RESET / CNT0 ~ 3 / MCLK signal. (See J6 connector description)

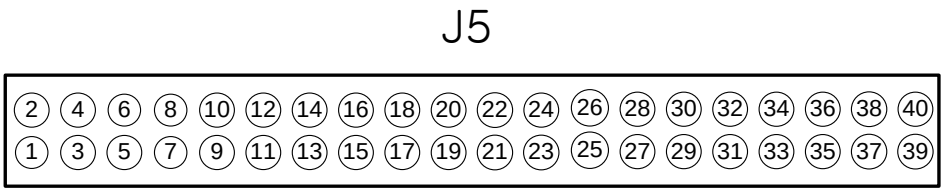
Note) In the case SEN_VIN, prohibited more 3.3V



[Figure 2-1. J4 Connector (Top View)]

2-3 J5 Connector

It is connected to the MIPI SENSOR board, signals are as follows.



[Figure 2-2. J5 Connector (Top View)]

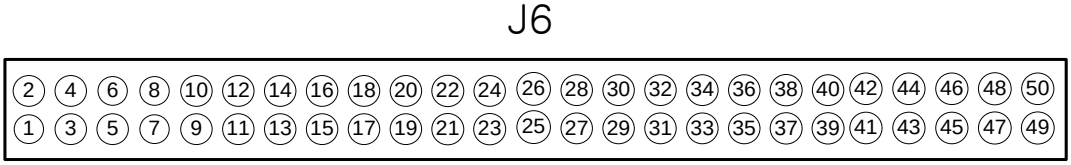
[Table 1. J5 Connector Description]

No.	Name	Description	Remark
1	**SP0**	User Defined Power	Connected SP0 of J4
2	**SP1**	User Defined Power	Connected SP1 of J4
3	**SP2**	User Defined Power	Connected SP2 of J4
4	**SP3**	User Defined Power	Connected SP3 of J4
5	**GND**	Ground	
6	**GND**	Ground	
7	**SCL**	Serial Clock	
8	**DATAP_0**	MIPI 1 Lane Positive	
9	**SDA**	Serial Data	
10	**DATAN_0**	MIPI 1 Lane Negative	
11	**GND**	Ground	
12	**GND**	Ground	
13	**ENB**	Enable	
14	**DATAP_1**	MIPI 2 Lane Positive	
15	**S_RESET**	Reset	
16	**DATAN_1**	MIPI 2 Lane Negative	
17	**GND**	Ground	
18	**GND**	Ground	
19	**CNT0**	Control 0	
20	**DATAP_2**	MIPI 3 Lane Positive	
21	**CNT1**	Control 1	
22	**DATAN_2**	MIPI 3 Lane Negative	
23	**GND**	Ground	
24	**GND**	Ground	
25	**CNT2**	Control 2	
26	**DATAP_3**	MIPI 4 Lane Positive	
27	**CNT3**	Control 3	

28	**DATAN_3**	MIPI 4 Lane Negative	
29	**GND**	Ground	
30	**GND**	Ground	
31	**GND**	Ground	
32	**CLKP**	MIPI Clock Positive	
33	**GND**	Ground	
34	**CLKN**	MIPI Clock Negative	
35	**MCLK**	Master Clock	
36	**GND**	Ground	
37	**GND**	Ground	
38	**GND**	Ground	
39	**SP4**	User Defined Power	Connected SP4 of J4
40	**SP5**	User Defined Power	Connected SP5 of J4

2-4 J6 Connector

The following figure shows the external input and output board of J6 connector pin map. It is used to the Image Control Signlas (Hsync, Vsync, Data Enable, Clock).



[Figure 2-3. J6 Connector (Top View)]

[Table 2. J6 Connector Description]

No.	Name	Description	Remark
1	**+3.3V**	+3.3V Power	
2	**+5V**	+5V Power	
3	**DIO_0**	Digital Input/Output 0	
4	**DIO_1**	Digital Input/Output 1	
5	**DIO_2**	Digital Input/Output 2	
6	**DIO_3**	Digital Input/Output 3	
7	**DIO_4**	Digital Input/Output 4	
8	**DIO_5**	Digital Input/Output 5	
9	**DIO_6**	Digital Input/Output 6	
10	**DIO_7**	Digital Input/Output 7	
11	**DIO_8**	Digital Input/Output 8	
12	**DIO_9**	Digital Input/Output 9	

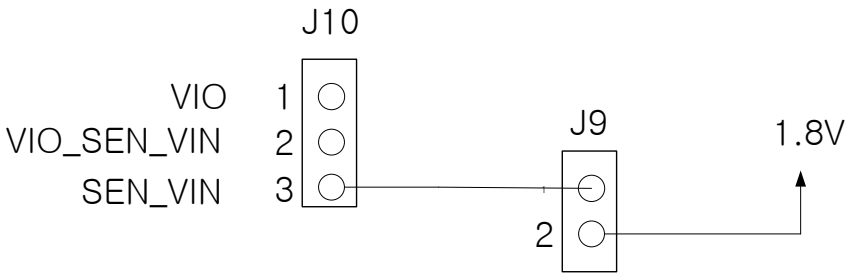
13	**DIO_10**	Digital Input/Output 10	
14	**DIO_11**	Digital Input/Output 11	
15	**DIO_12**	Digital Input/Output 12	
16	**DIO_13**	Digital Input/Output 13	
17	**DIO_14**	Digital Input/Output 14	
18	**DIO_15**	Digital Input/Output 15	
19	**GND**	Ground	
20	**GND**	Ground	
21	**DIO_16**	Digital Input/Output 16	
22	**DIO_17**	Digital Input/Output 17	
23	**DIO_18**	Digital Input/Output 18	
24	**DIO_19**	Digital Input/Output 19	
25	**DIO_20**	Digital Input/Output 20	
26	**DIO_21**	Digital Input/Output 21	
27	**DIO_22**	Digital Input/Output 22	
28	**DIO_23**	Digital Input/Output 23	
29	**DIO_24**	Digital Input/Output 24	
30	**DIO_25**	Digital Input/Output 25	
31	**DIO_26**	Digital Input/Output 26	
32	**DIO_27**	Digital Input/Output 27	
33	**DIO_28**	Digital Input/Output 28	
34	**DIO_29**	Digital Input/Output 29	
35	**DIO_30**	Digital Input/Output 30	
36	**DIO_31**	Digital Input/Output 31	
37	**DIO_32**	Digital Input/Output 32	PCLK(Pixel Clock)
38	**DIO_33**	Digital Input/Output 33	Vsync
39	**DIO_34**	Digital Input/Output 34	Hsync
40	**DIO_35**	Digital Input/Output 35	DE(Data Enable)
41	**DIO_36**	Digital Input/Output 36	
42	**DIO_37**	Digital Input/Output 37	
43	**DIO_38**	Digital Input/Output 38	
44	**DIO_39**	Digital Input/Output 39	
45	**REV1**	Reserved 1	12V
46	**U_SDA**	Serial Data	SDA
47	**REV0**	Reserved 0	MCLK(Master Clock)
48	**U_SCL**	Serail Clock	SCL
49	**GND**	Ground	
50	**GND**	Ground	

Note) No connection 12V(Pin #45) under USB3-DIO01 Rev C.

2-5 J9/J10 Connector

When you connect J9, 1.8V is connected to SEN_VIN. At this time, if the pin 2-3 connect at J10, SENSOR control signals became the level 1.8V (mclk, control, enc, reset).

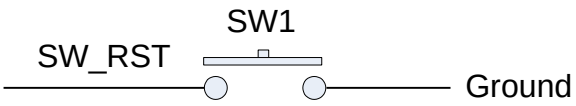
VIO of J10 is an option for power settings from internal. When 1..2 connection, I2C can control with the DIO board.



[Figure 2-4. J9/J10 Connector (Top View)]

2-6 SW1

It is 3.3V Power Reset Switch (Low Active).

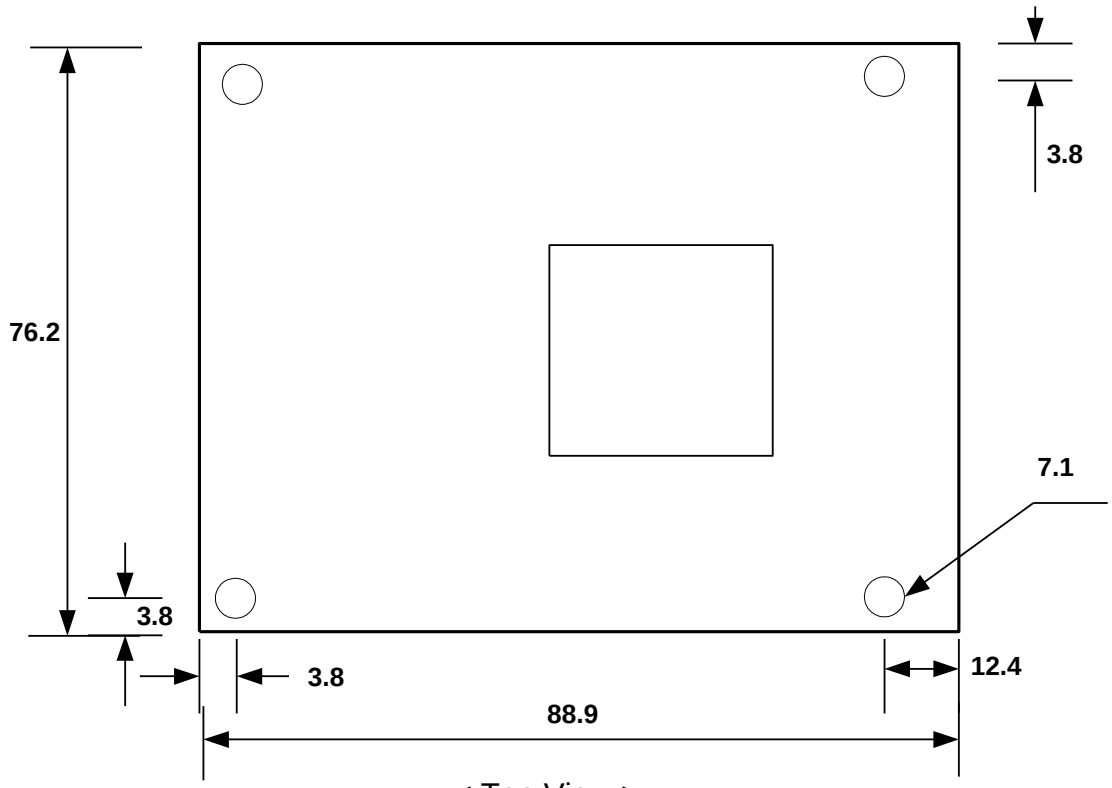


[Figure 2-5. SW1 switch]

Appendix

A-1 Board Size

The external sizes of the board are as follows.



< Top View >

A-2 Repair Regulations

Thank you for purchasing a DAQSYSTEM product. Please refer to the following regarding Customer Service regulated by DAQSYSTEM.

(1) Read the user manual and follow the instructions before using the DAQSYSTEM product.

(2) When returning the product to be repaired, please write down the symptoms of the failure and send it to the head office.

(3) All DAQSYSTEM products have a 1-year warranty.
- -. Warranty period counts from the date the product is shipped from DAQSYSTEM.
- -. Peripherals and third-party products not manufactured by DAQSYSTEM are covered by the manufacturer's warranty..
- -. If you need repairs, please contact the Contact Point below..

(4) Even during the warranty period, repairs are charged in the following cases..
- ① Failure or damage caused by use without following the user's manual
- ② Failure or damage caused by customer's negligence during product transportation after purchase
- ③ Failure or damage caused by natural phenomena such as fire, earthquake, flood, lightning, pollution, or power supply exceeding the recommended range
- ④ Failure or damage caused by inappropriate storage environment (e.g. high temperature, high humidity, volatile chemicals, etc.)
- ⑤ Breakdown or damage due to unreasonable repair or modification
- ⑥ Products whose serial number has been changed or removed intentionally
- ⑦ If DAQSYSTEM determines that it is the customer's fault for other reasons

(5) Shipping costs for returning the repaired product to DAQSYSTEM are the responsibility of the customer.

(6) The manufacturer is not responsible for any problems caused by misuse, regardless of our warranty terms.

MEMO

Contact Point

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

Email : postmaster@daqsystem.com

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Measurement & Automation