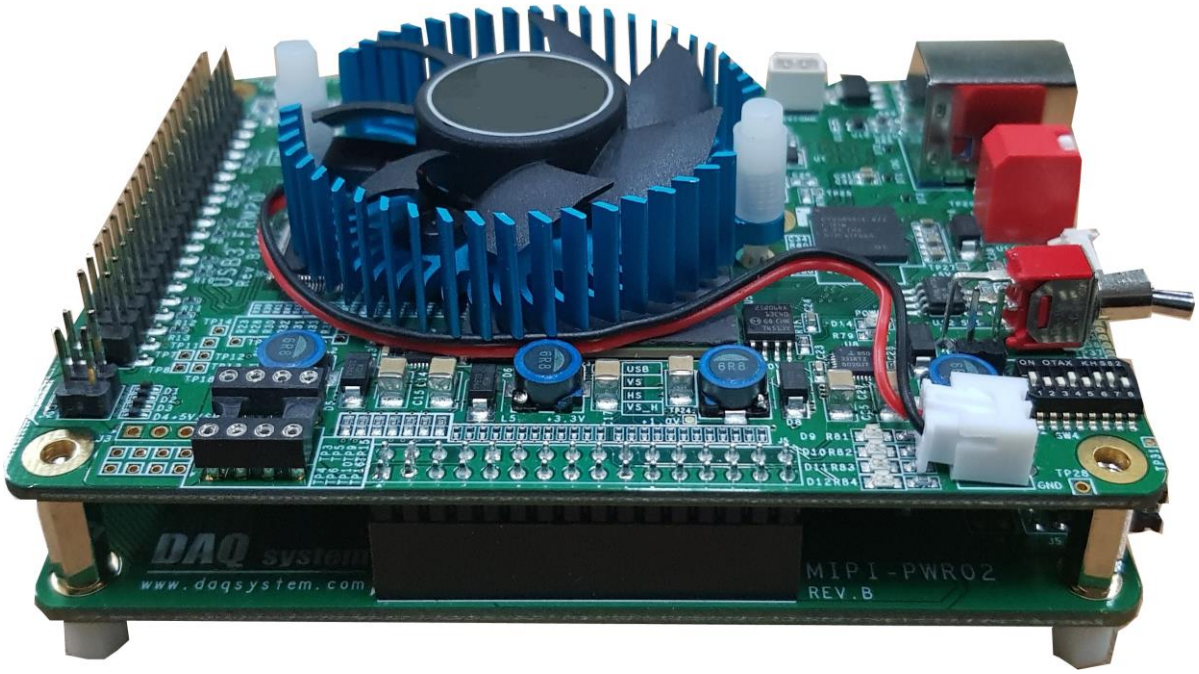
USB3-FRM20

User Manual

Version 1.1



DAQ SYSTEM
Measurement & Automation

Contents

1. Introduction

1-1. Product Specification

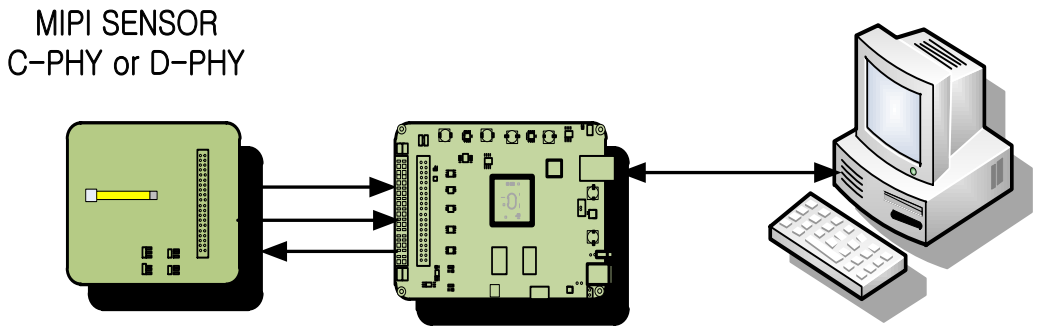
Item	Description	Remark
Hardware		
PC Interface	USB3.0	B-Type
Operation Power	+12VDC/650mA	External 12V DC Power (A6-Type : 5.5x2.1mm)
Video Interface	MIPI CSI C-PHY 3 Lane MIPI CSI D-PHY 4 Lane D-PHY Virtual Mode	2.2 ~ 2.3 Gsym / 1 Lane 2.5Gbps / 1 Lane
I/O Terminal No.	Sensor GPIO 4bit General GPIO 12bit User GPIO 12bit	 3.3V GPIO 4bit, User GPIO 8bit
On-board Memory	256MB (DDR3) x2	
Communication	I2C/SPI	
Simultaneously Use	Max. 4	
Software		
OS	Windows 2000/XP/7/8/10 (32/64bit)	
API	Windows Client DLL API	
Development	Windows Application by User Custom USB Device Firmware Custom Windows Client DLL	
Support	Sample Program	VC++ (Please contact for C#)
Environmental conditions		
Operating temperature range	0 ~ 60℃	
Storage temperature range	-20 ~ 80℃	
Humidity range	5 ~ 95%	Non-condensing
Board Size	80mm X 100mm	

1-2. Product Application

- Frame Grabber
- Test for Variable MIPI Sensor

The USB3-FRM20 board transmits the C-PHY or D-PHY MIPI (Mobile Industry Processor Interface) signal of the sensor board to the PC in the USB3.0 Super Speed (5Gbps) method. Two signals of C-PHY or D-PHY can be selected and used. The received signal is processed by the software (application) provided by the DAC system in the PC and displayed as an image.

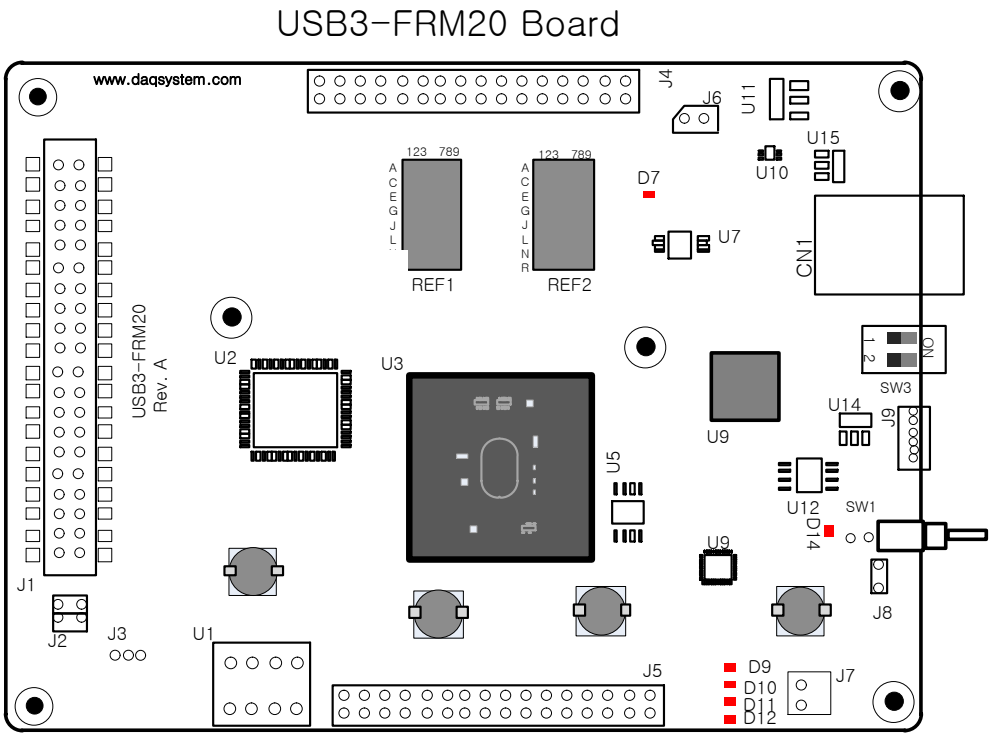
[Figure 1-1] shows an example of using the input board.



[Figure 1-1. USB3-FRM20 usage example]

2. USB3-FRM20 Description

2-1. Layout



[Figure 2-1. USB3-FRM20 Components Layout]

There are 6 important LEDs on the board, and the description of each is as follows.

D7 : Lights up when the board is configured and ready for operation.

D9 : Lights up when connected via USB3.0 (blinks).

D10 : The Vertical Synchronization signal line (Vsync) is connected.
This is a mark to visually check Vsync.

D11 : The Horizontal Synchronization signal line (Hsync) is connected.
This is a mark to visually check Hsync.

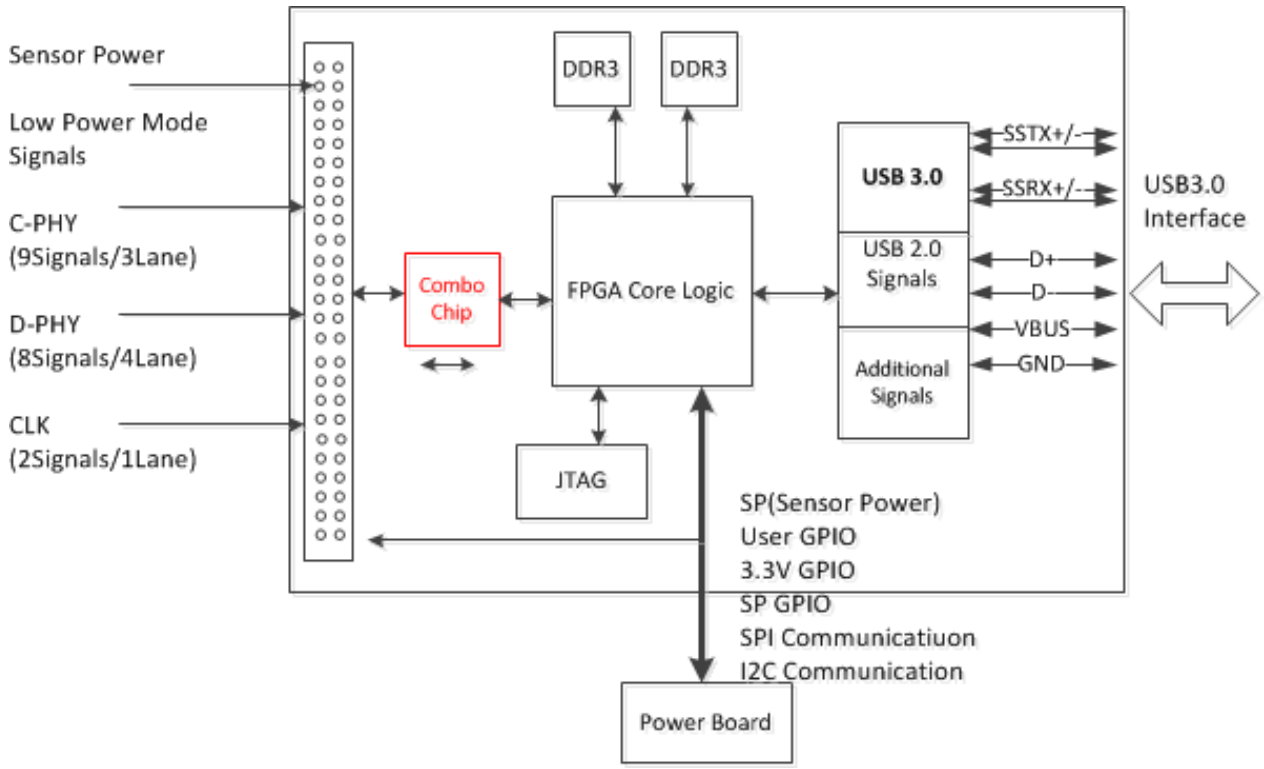
D12 : Displays Vertical Synchronization (Vsync) divided by 1/16.
This is a mark to visually check Vsync.

D14 : Lights up when 3.3V power is applied.

2-2. Board Description

As shown in the figure below, in the case of USB3-FRM20, the overall control is in charge of FPGA Core Logic. Its main function is to transmit C-PHY or D-PHY MIPI Image Frame Data signals through the External I/O connector. These functions are performed using API in PC through USB 3.0 interface.

External I/O connector uses 2x20 2.54mm Pitch Male Header connector to connect to MIPI sensor board connector, and 2x16 2.54mm Pitch Male Header connector (J4, J5) to connect with our MIPI-PWR02 power board. For detailed connector signal specifications, refer to Section 2.3 and Appendix A1.



[Figure 2-2. USB3-FRM20 Block Diagram]

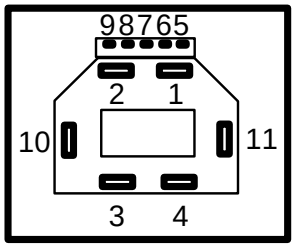
The program of the FPGA core logic uses JTAG, and functions to save the logic program in the FPGA Program Logic and download it when power is applied.

Note) In case of USB connection, USB2.0 interface, which is insufficient for high-speed image transfer, is not supported. Only the USB3.0 interface is used.

2-3. I/O Terminal Pin Map

(1) USB3.0 B type CN1 connector

When the PIN of the USB3.0 Standard Powered-B type connector of the board is viewed from the front where the cable is connected, it is as shown in [Figure 2-3].



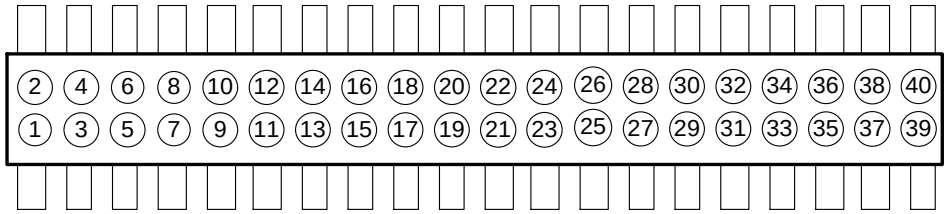
[Figure 2-3. CN1 Connector (USB3.0 Standard Powered-B type Front View)]

[Table 1. USB3.0 Standard Powered-B Connector]

No	Name	Description	Remark
1	**VBus**	+5V Power	+5V Power
2	**USB D-**	USB2.0 data (Negative)	USB2.0 Signal
3	**USB D+**	USB2.0 data (Positive)	USB2.0 Signal
4	**GND**	Ground for Power Return	USB Power GND
5	**StdA_SSTX-**	Super Speed Transmitter (Negative)	USB3.0 Signal
6	**StdA_SSTX+**	Super Speed Transmitter (Positive)	USB3.0 Signal
7	**GND_DRAIN**	Ground for Signal Return	USB Power GND
8	**StdA_SSRX+**	Super Speed Receiver (Positive)	USB3.0 Signal
9	**StdA_SSRX-**	Super Speed Receiver (Negative)	USB3.0 Signal
10	**DPWR**	Power Provided by Device	USB Power GND
11	**DGND**	Ground return for DPWR	USB Power GND

(2) J1

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



[Figure 2-4. J1 Connector (Top View)]

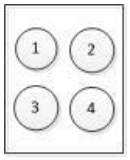
[Table 2. J1 Connector Description]

No.	Name	Description	Remark
1	**SP0**	SENSOR Power	
2	**SP1**	SENSOR Power	
3	**SP2**	SENSOR Power	
4	**SP3**	SENSOR Power	
5	**GND**	Ground	
6	**GND**	Ground	
7	**SCL**	Serial Clock	
8	**C_L0_RXA or D_L0_RXP**	C_lane0_RX_A or D_lane0_RX_P	C : C-Phy, D : D-Phy
9	**SDA**	Serial Data	
10	**C_L0_RXB or D_L0_RXN**	C_lane0_RX_B or D_lane0_RX_N	C : C-Phy, D : D-Phy
11	**GND**	Ground	
12	**GND**	Ground	
13	**ENB**	Enable	
14	**C_L0_RXC or D_L1_RXP**	C_lane0_RX_C or D_lane1_RX_P	C : C-Phy, D : D-Phy
15	**S_RESET**	Reset	
16	**C_L1_RXD or D_L1_RXN**	C_lane1_RX_D or D_lane1_RX_N	C : C-Phy, D : D-Phy
17	**GND**	Ground	
18	**GND**	Ground	
19	**CNT0**	Sensor GPIO 0	1.5 ~ 3.3V
20	**C_L2_RXA or D_L2_RXP**	C_lane2_RX_A or D_lane2_RX_P	C : C-Phy, D : D-Phy
21	**CNT1**	Sensor GPIO 1	1.5 ~ 3.3V
22	**C_L2_RXB or D_L2_RXN**	C_lane2_RX_B or D_lane2_RX_N	C : C-Phy, D : D-Phy
23	**GND**	Ground	
24	**GND**	Ground	
25	**CNT2**	Sensor GPIO 2	1.5 ~ 3.3V
26	**C_L2_RXC or D_L3_RXP**	C_lane2_RX_C or D_lane3_RX_P	C : C-Phy, D : D-Phy
27	**CNT3**	Sensor GPIO 3	1.5 ~ 3.3V
28	**C_L2_RXD or D_L3_RXN**	C_lane2_RX_D or D_lane3_RX_N	C : C-Phy, D : D-Phy
29	**GND**	Ground	
30	**GND**	Ground	
31	**GND**	Ground	
32	**C_L1_RXA or D_CLK_RXP**	C_lane1_RX_A or D_CLK_RX_P	C : C-Phy, D : D-Phy
33	**GND**	Ground	
34	**C_L1_RXB or D_CLK_RXN**	C_lane1_RX_B or D_CLK_RX_N	C : C-Phy, D : D-Phy
35	**MCLK**	Master Clock	
36	**C_L1_RXC**	C_lane2_RX_C	C : C-Phy,
37	**GND**	Ground	
38	**GND**	Ground	

39	**SP4**	SENSOR Power	
40	**SP5**	SENSOR Power	

(3) J2

It is a connector used as SPI (Serial Peripheral Interface).



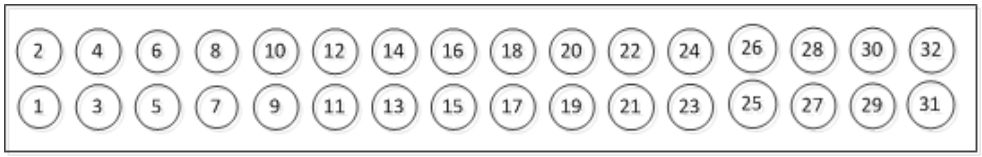
[Figure 2-5. J5 Connecter (Top View)]

[Table 3. J2 Connecter Description]

No.	Name	Description
1	**F_SPI_SCK**	Serial Clock
2	**F_SPI_SSN**	Slave Select
3	**F_SPI_MISO**	Master Input, Slave Output
4	**F_SPI_MOSI**	Master Output, Slave Input

(4) J4

It is connected to MIPI-PWR02 Power Board J2, and is a connector related to sensor power, I2C communication, and some GPIO (General Purpose In/Out).



[Figure 2-6. J4 Connector (Top View)]

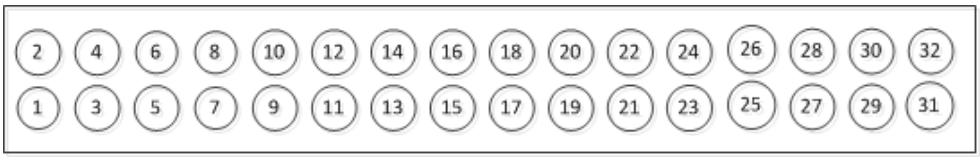
[Table 4. J4 Connector Description]

No.	Name	Description	Remark
1	**SP0**	SENSOR Power	
2	**SP1**	SENSOR Power	
3	**SP2**	SENSOR Power	
4	**SP3**	SENSOR Power	
5	**GND**	Ground	
6	**GND**	Ground	
7	**SCL**	Serial Clock	
8	**SDA**	Serial Data	
9	**PWR_SCL**	Power Serial Clock	

10	**PWR_SDA**	Power Serial Data	
11	**AD_SCL**	AD Serial Clock	To be updated
12	**AD_SDA**	AD Serial Data	To be updated
13	**GND**	Ground	
14	**GND**	Ground	
15	**OS_SCL**	OS Serial Clock	To be updated
16	**OS_SDA**	OS Serial Data	To be updated
17	**P_GPIO8**	General Purpose IO8	For Power Board
18	**P_GPIO9**	General Purpose IO9	For Power Board
19	**P_GPIO10**	General Purpose IO10	For Power Board
20	**P_GPIO11**	General Purpose IO11	For Power Board
21	**GND**	Ground	
22	**GND**	Ground	
23	**5V_IN**	5V Power	
24	**5V_IN**	5V Power	
25	**5V_IN**	5V Power	
26	**5V_IN**	5V Power	
27	**GND**	Ground	
28	**GND**	Ground	
29	**VCC2_WALL**	12V Power	
30	**VCC2_WALL**	12V Power	
31	**VCC2_WALL**	12V Power	
32	**VCC2_WALL**	12V Power	

(5) J5

It is connected to MIPI-PWR02 Power Board J3 and is a connector related to sensor power, SPI communication, and some GPIO (General Purpose In/Out).



[Figure 2-7. J5 Connector (Top View)]

[Table 5. J5 Connector Description]

No.	Name	Description	Remark
1	**SP4**	SENSOR Power	
2	**SP5**	SENSOR Power	
3	**GND**	Ground	
4	**GND**	Ground	

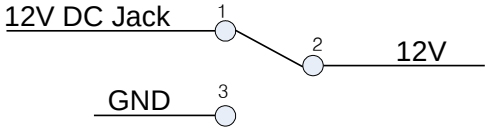
5	**SPI_CLK**	SPI Clock	To be updated
6	**SPI_MOSI**	SPI Master Out Slave In	To be updated
7	**SPI_EN**	SPI Enable	To be updated
8	**SPI_MISO**	SPI Master In Slave Out	To be updated
9	**5V_IN**	5V Power	
10	**V_IO2**	IO2 Power	
11	**P_GPIO0**	General Purpose IO0	For Power Board
12	**P_GPIO1**	General Purpose IO1	For Power Board
13	**P_GPIO2**	General Purpose IO2	For Power Board
14	**P_GPIO3**	General Purpose IO3	For Power Board
15	**P_GPIO4**	General Purpose IO4	For Power Board
16	**P_GPIO5**	General Purpose IO5	For Power Board
17	**P_GPIO6**	General Purpose IO6	For Power Board
18	**P_GPIO7**	General Purpose IO7	For Power Board
19	**GND**	Ground	
20	**GND**	Ground	
21	**U3_GPIO0**	U3 General Purpose IO0	3.3V
22	**U3_GPIO1**	U3 General Purpose IO1	3.3V
23	**U3_GPIO2**	U3 General Purpose IO2	3.3V
24	**U3_GPIO3**	U3 General Purpose IO3	3.3V
25	**U_GPIO0**	General Purpose IO0	1.5 ~ 3.3V
26	**U_GPIO1**	General Purpose IO1	1.5 ~ 3.3V
27	**U_GPIO2**	General Purpose IO2	1.5 ~ 3.3V
28	**U_GPIO3**	General Purpose IO3	1.5 ~ 3.3V
29	**U_GPIO4**	General Purpose IO4	1.5 ~ 3.3V
30	**U_GPIO5**	General Purpose IO5	1.5 ~ 3.3V
31	**U_GPIO6**	General Purpose IO6	1.5 ~ 3.3V
32	**U_GPIO7**	General Purpose IO7	1.5 ~ 3.3V

(6) J6

External input 12V power connector.

(7) SW1

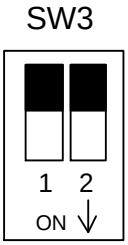
When the terminal is raised with the board power On/Off switch, the 12V power is turned on.



[Figure 2-8. SW1 switch]

(8) SW3

The USB3-FRM20 board is designed to use up to 4 USB3-FRM20 boards simultaneously in one system (PC). Classification of each board can be set through a 2-pin DIP switch in the board.



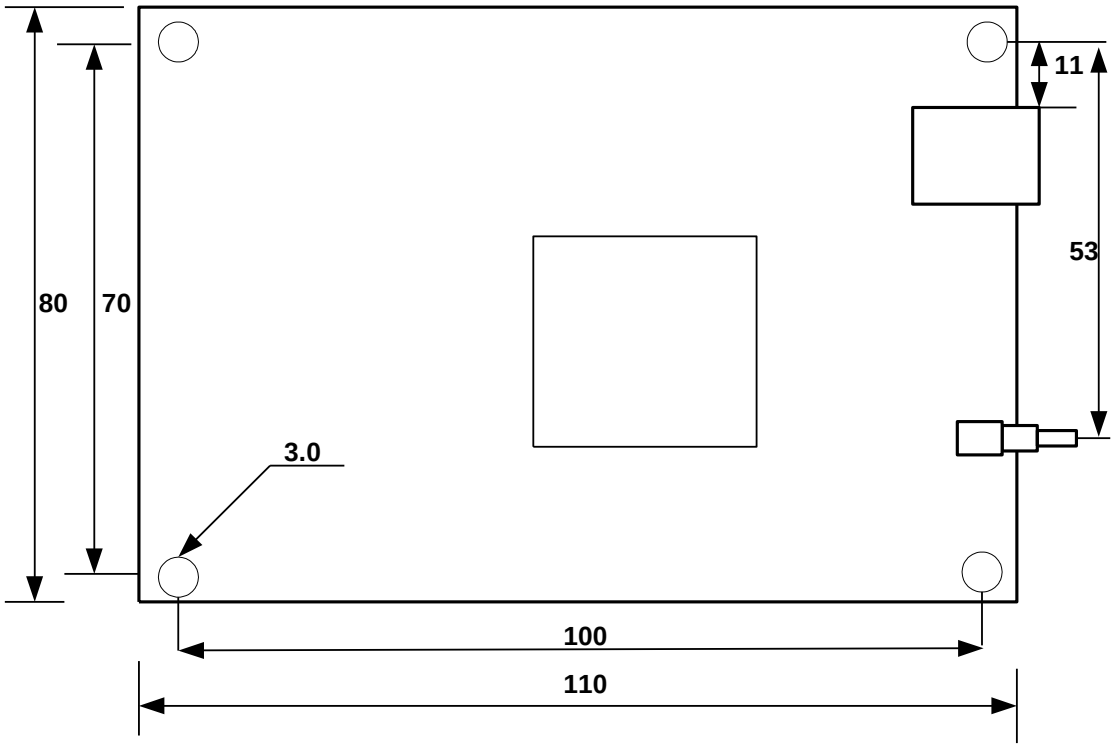
[Figure 2-9. SW3 switch (Top View)]

[Table 6. SW3 PIN-OUT Description]

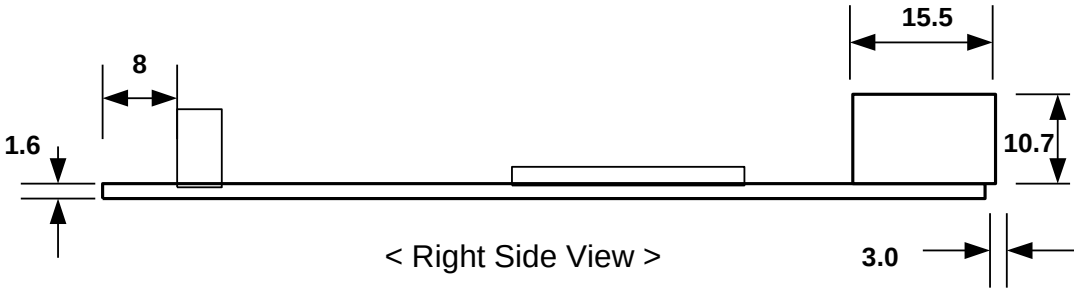
1	**2**	**Description**
OFF	OFF	Board No. 0
ON	OFF	Board No. 1
OFF	ON	Board No. 2
ON	ON	Board No. 3

2-4. Board Size

The external dimensions of the board are as follows.
(For detailed dimensions, please ask the person in charge.)



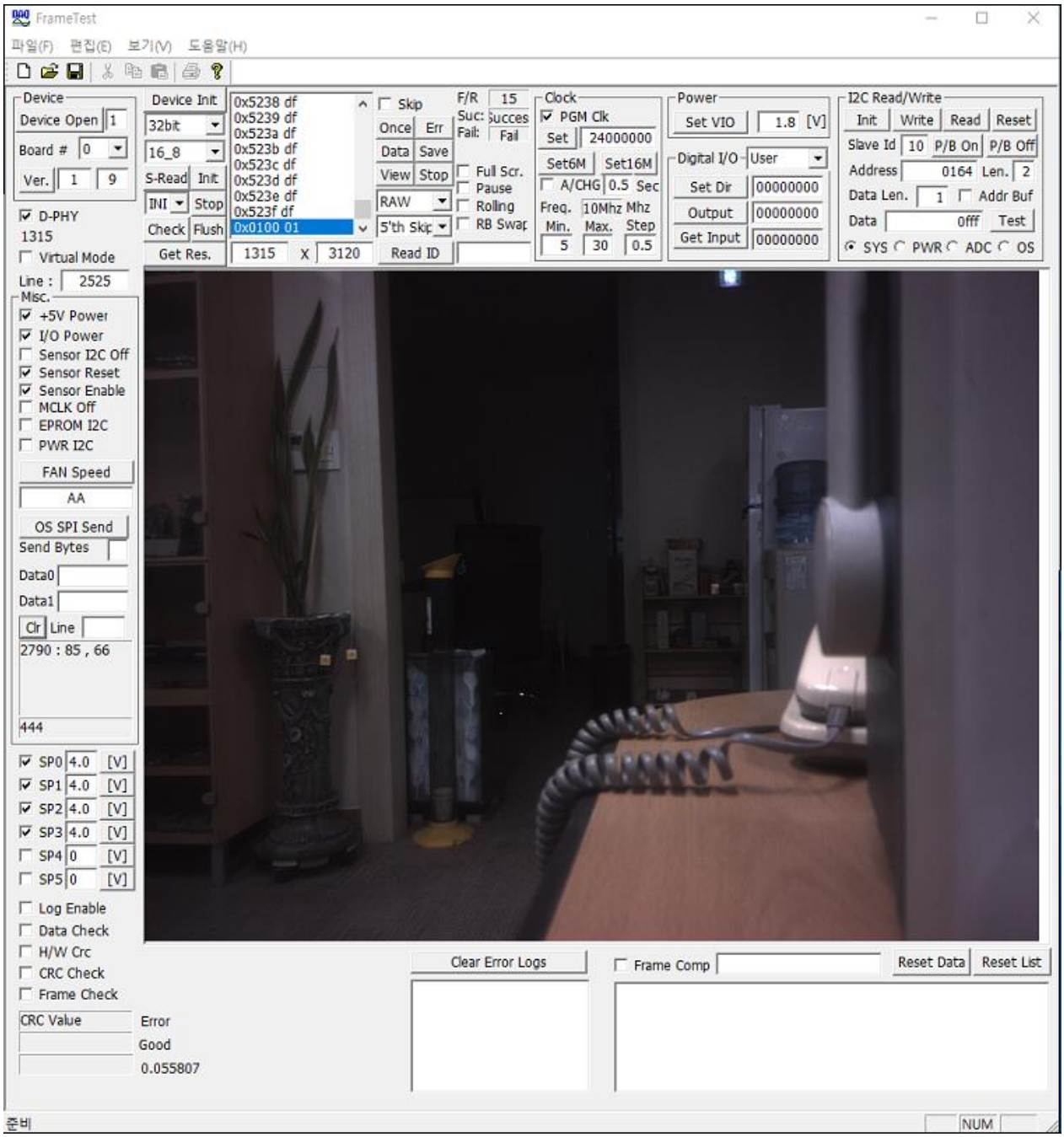
< Top View >



< Right Side View >

3. Sample Program

A sample program is provided on the CDROM provided with the board so that the board can be used easily. In order to test the sample program, the driver of the board must be installed first. The sample program is provided in the form of a source so that the API provided to use the board can be briefly tested, so the user can modify and use it.



[Figure 3-1. Sample Program Execution Screen]

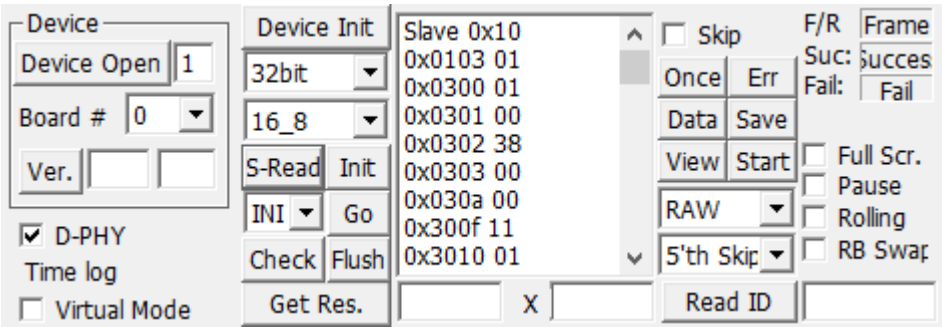
To use the sample program above, an API (Application Programming Interface) is required. API is provided in the form of "DLL", and import library and header file are required to compile.

All files specified above are included on the supplied CDROM. In order to run the sample program normally, API DLL **(USB-FRM20.DLL)** must be in the folder of the executable file, or in the Windows system folder or the folder designated by the Path environment variable.

The program execution sequence for viewing images is as follows.

① **Device "Open" click**
② **Device "Init" click**
③ **Pixel bit selection from "8, 16, 24, 32, 16bit YUV"**
④ **Select from Address_Data Bit 8_8, 16_8, 16_16 among sensor initialization file contents**
⑤ **Read the sensor initialization file saved as "S-Read" and click "Go"**
⑥ **The video comes out automatically. Check resolution with Get Res.**
⑦ **Click the "Start/Stop" toggle button to stop the video.**

3.1 Description of Image Frame Functions



(1) "Device Open" button

Start the device on the selected board.

(2) "Board#" selection

In case of multiple USB3.0 boards, 4 board numbers (0 ~ 3) are assigned.

(3) "Ver" button

The board's FPGA and Firmware version are shown.

(4) "D-PHY" toggle

Check when using D-Phy.

(5) "Virtual Mode" toggle

Select when using MIPI Virtual Mode.

(6) "Device Init" button

Initialize the image frame function. When the power is first applied, it performed only once. Select Video Data Mode from 8bit, 16bit, 24bit, 32bit, 16bit YUV.

(7) "S-Read" button

The sensor initialization file is read from the program. Depending on the address_data size (8_8, 16_8, 16_16) of the above command, it is possible to send commands to the INI file at a time or use the command line by line by I2C read/write. The structure and description of the ini file are as follows. In the following example, the address_data size is 16_8, which is an address 2-byte data 1-byte structure.

Ex) OV13850_4224x3136.ini file structure

[MISC] : Various types of (Miscellaneous) settings can be made.

5V_Power=1
IO_Power=1
SEN_Reset=1
SEN_Enable=1
COMBO_MODE=1 //D-Phy
DATA_BITS=3 //32bits
MCLK=24
[END]

[SENSOR_POWER] : Sensor power (0.9 ~ 4.1V) can be set.

SP0=4.0
SP1=4.0
SP2=4.0
SP3=4.0
SP4=0
SP5=0
[END]

[REGISTER] : Other sensor register settings

Slave 0x10 //change slave ID as Sensor

0x0103 01

0x0300 01
0x0301 00
0x0302 38
0x0303 00
0x030a 00
0x300f 11
0x3010 01
0x3011 76
……

0x5404 00

0x5405 80
0x540c 05
0x5b00 00
0x5b01 00
0x5b02 01
0x5b03 ff
0x5b04 02
[END]

(8) "Init" button

Initialize the sensor by selecting "INI, T1, T2, SPI" below. (To be added)

(9) "Go/Stop" toggle button

Initialize the sensor and read INI at once.

(10) "Check" button

Check the USB connection. In case of error, "LVDS Check Error" is displayed.

(11) "Flush" button

Initialize the LVDS buffer.

(12) "Skip" : Freeze the screen.

"F/R " : Shows the number of frames shown on the screen.

"Suc : " : Shows the number of successful image transmission. (To be added)

"Fail: " : Shows the number of failed image transmission. (To be added)

(13) "Once" button

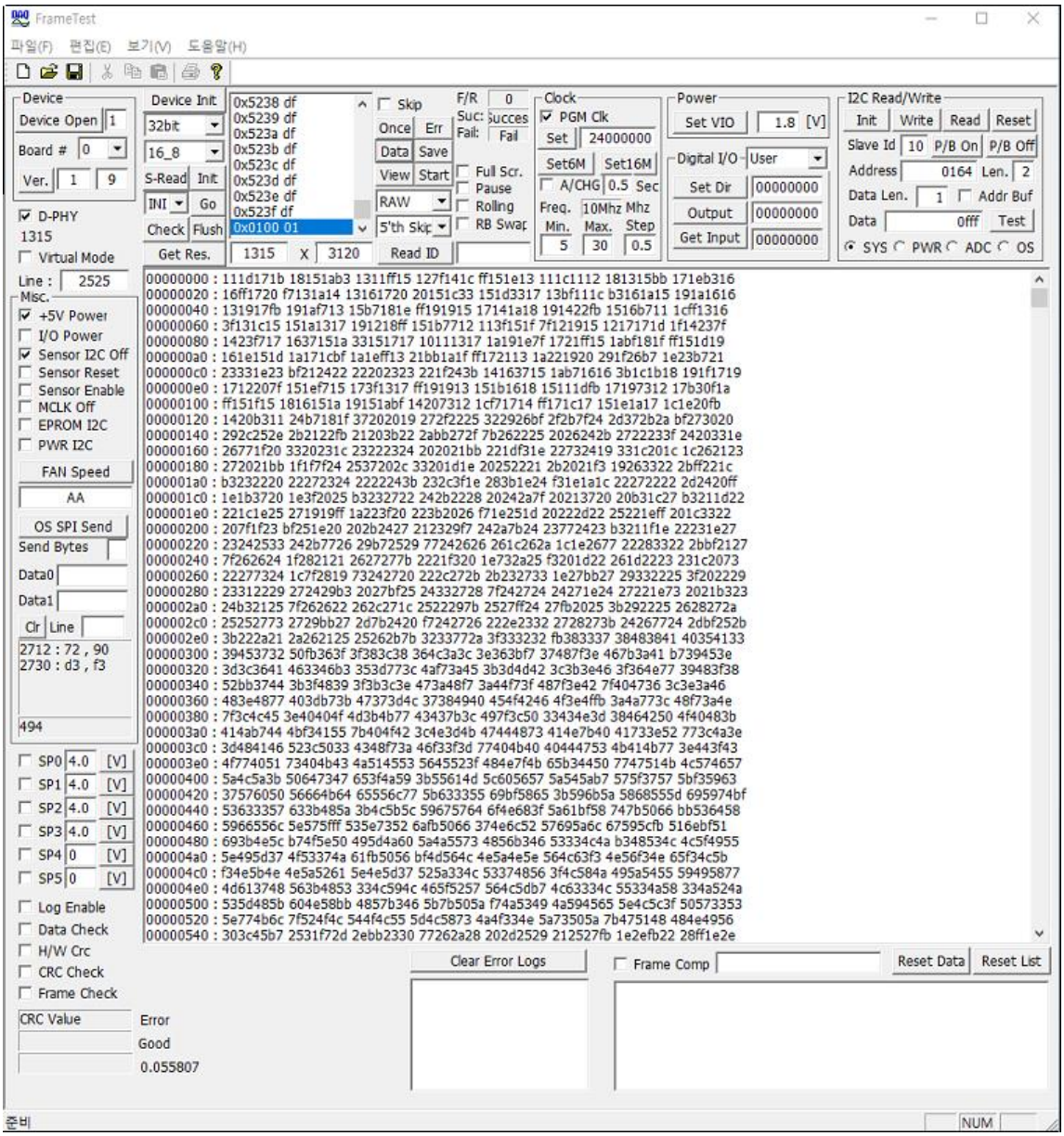
Press the Toggle button to show the screen once.

(14) "Err" button

Line CRC error is read to PC (Hexa value). It is used after freeze the screen and is displayed as a value on the screen below.

(15) "Data" button

The image frame saved on the board is read into PC (Hexa value). If the image frame is not saved on the board, you have to wait until the saving is complete. Use after freeze the screen.



(16) "Save" button

It is used when saving frame image data read from PC as binary file file.

(17) "View" button

It starts image transfer.

(18) "Start/Stop" toggle button

You can start and stop image transfer with the "Start" and "stop" Toggle buttons.

(19) "YUV; RGB; RAW; USER" : User setting or image input format selection

"No Skip" : No Skip

"5'th Skip" : When selected, the 5th byte is skipped. For example, if the input data is Bayer with 10 bits, 8 bits each is stored in the 5th byte each of the remaining 1 bit excluding RGB and 3 bytes and 1 byte. When Bayer is processed and displayed on the screen, the 5th byte is not needed, so it is used when removing it.

"3'th Skip" : When selected, the 3rd byte is skipped.

(20) "Get Res." button

It shows the image resolution.

(21) "Read ID" button

It shows MIPI I○.

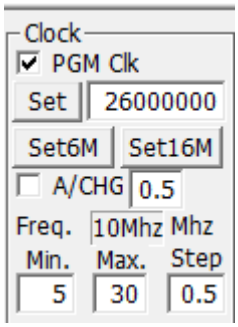
(22) "Full Scr." : It displays the screen in its original resolution size.

"Pause" : Freeze the screen.

"Rolling" : Update image data without using the GetFrame function.

"RB Swap" : Red and blue signal values are interchanged.

3.2 Description of Clock Functions



(1) "PGM Clk" toggle

You can select the frequency range of the master clock supplied to the sensor. The default is 26 MHz.

(2) "Set" button

MCLK(Master Clock) is set according to the next frequency. In the above case, it is set to 26MHz. It can be set from 1039Hz to 68Mhz.

(3) "Set 6M" button

Set MCLK(Master Clock) to 6MHz.

(4) "Set 16M" button

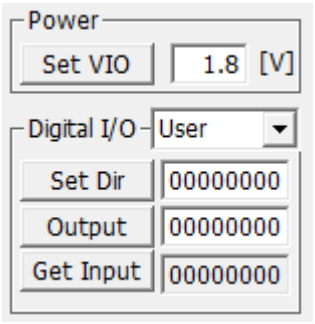
Set MCLK(Master Clock) to 16MHz.

(5) "A/CHG" toggle

If checked, the interval of the frequency set by Min. and Max. can be periodically set and tested according to the Step.

Example) In the above case, the frequency increases between 5 and 30 MHz in units of 0. 5 MHz, and the period increases by 0.5 x 1000 ms = 500 ms as the number next to A / CHG.

3.3 Description of Power/Digital I/O Functions



(1) "Set VIO" button

It set by specifying the sensor voltage value. (1.5 ~ 3.3V) The default value is 1.8V.

It set the voltage level of Sensor GPIO and User GPIO.

(2) Digital I/O(User, Sensor, User3.3) : User, Sensor, 3.3V GPIO 선택

User GPIO : J5 Connector(25..32) U_GPIO0..7

Sensor GPIO : J1 Connector CNT0..3

3.3V GPIO : J5 Connector(21..24) U3_GPIO0..3

(3) "Set Dir" button

Set whether to use each GPIO port as an input or output.

If the end bit is "0", it is an input, and if it is "1", it is an output.

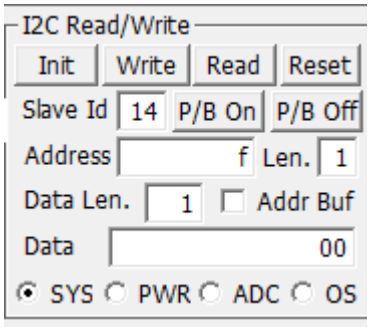
(4) "Output" button

The desired value of the selected GPIO is output to the output port.

(5) "Get Input" button

Reads the input value of the selected GPIO.

3.4 Description of I2C Read/Write Functions



(1) "Init" button

Initialize the I2C registers.

(2) "Write" Button

Send data through I2C.

(3) "Read" Button

Reads the data of the address of the selected mode among SYS, PWR, ADC, and OS modes below.

(4) "Reset" Button

Initializes the resources of the I2C system.

(5) "Slave ID" : Slave ID

"Address " : Slave Register Address

"Len. :" : Address Value (Size)

"Data Len. :" : Data Value (Size)

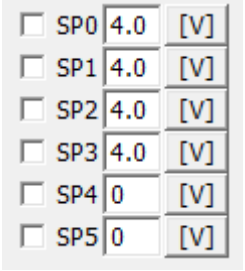
"Addr Buf" toggle : When selected, it is used in SYS mode and address buffer is used instead of address.

"Data :" : Data you want to transfer

The above values are variables used for **I2C Read** or **I2C Write**.

(6) "P/B On" or "P/B Off" button

Turns the setting On/Off according to the SP (Sensor Power) value of PB Setup.



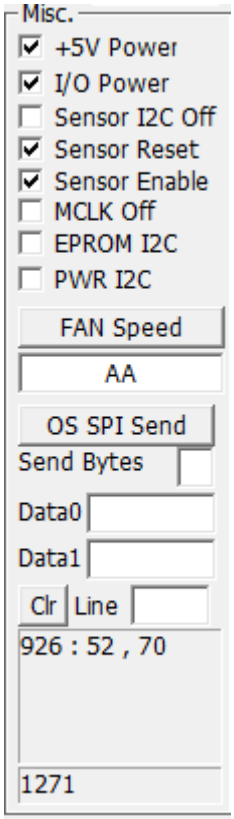
(7) "SYS" : System

"PWR" : Power

"ADC" : AD Converter

"OS" : Open Short

3.5 Description of Misc. Functions



Various types of conditions can be selected and used.

"+5V Power" : Outputs VIO power.

"I/O Power" : Turns on/off the power of external signals used for MIPI.

"Sensor I2C Off" : Sensor I2C operation On/Off.

"Sensor Reset" : Set the Reset output of the sensor to High or Low.

"Sensor Enable" : Set the Enable output of the sensor to High or Low..

"MCLK Off" : Turns the master clock output On/Off.

"EPROM I2C" : Change the address of USB3 EPROM to avoid collision with sensor I2C.

"PWR I2C" : Turns I2C output of Power board On/Off. (To be added later)

(1) "FAN Speed"

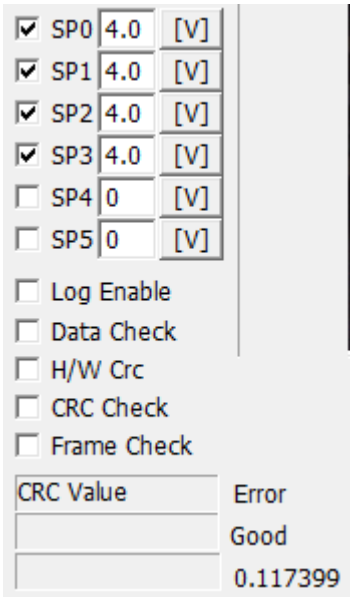
FAN speed (0 ~ 255) can be controlled.

(2) "OS SPI Send" button : To be added later

(3) "Clr" button

Initialize the log message screen below.

3.6 Description of Status Functions



"SP0..5 Setup" : SP0..3 (Sensor Power) voltage (0.9 ~ 4.1V) can be controlled.

"Log Enable" : Log On/Off

"Data Check" : If checked, the previous image data (saved image) and the current image data are compared and the value of the wrong part is displayed on the left log screen at the bottom.

"H/W CRC" : H/W ⇔ S/W CRC On/Off.

As a method of handling CRC, it is processed in hardware when checked

"CRC Check" : CRC Check On/Off.

When checked, check Sum 2Bytes data is added at each end of Frame or Line according to the selection of **"Frame Check".**

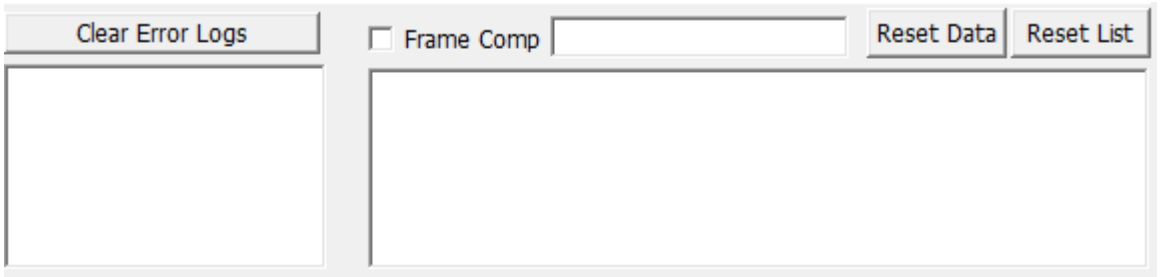
"Frame Check" : Line CRC ⇔ FRAME CRC Check Conversion.

(The line can be selected in the Edit Box at the top of Frame Check)

CRC Value : Shows CRC value when checking CRC.

CRC ERROR : Shows the number of CRC errors when checking CRC.

CRC OK : Shows the number of CRC OKs when checking CRC.



"Clear Error Logs" : Log On/Off

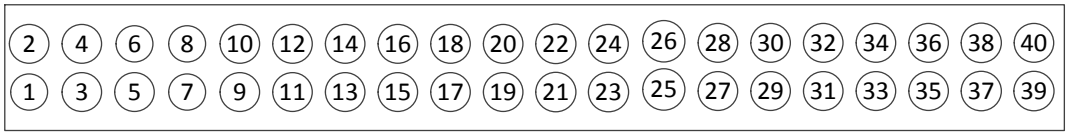
"Frame Comp" : If checked, the previous image data (saved image) and the current image data are compared and the wrong value is displayed on the log screen at the bottom right.

Appendix

A-1. MIPI-PWR02 Power Board

1. J1 Connector (2x20 Pin Right Angle Type)

It is connected to the power and the signal is as follows.



[Figure 1. J1 Connector (Top View)]

[Table 1. J1 Connector Description 설명]

No.	Name	Description	Remark
1	**GND**	Ground	
2	**+5V_IN**	Share to sensor power	5V
3	**GND**	Ground	
4	**V_IO2**	V_IO2 Power	
5	**GND**	Ground	
6	**VCC12_WALL**	12V Adapter Power	12V
7	**GND**	Ground	
8	**VCC12_WALL**	12V Adapter Power	12V
9	**SP0**	SENSOR Power	0.9 ~ 4.1V
10	**SP1**	SENSOR Power	0.9 ~ 4.1V
11	**SP2**	SENSOR Power	0.9 ~ 4.1V
12	**SP3**	SENSOR Power	0.9 ~ 4.1V
13	**SP4**	SENSOR Power	0.9 ~ 4.1V
14	**SP5**	SENSOR Power	0.9 ~ 4.1V, 5V, 12V
15	**GND**	Ground	
16	**GND**	Ground	
17	**N.C**	No Connect	
18	**N.C**	No Connect	
19	**N.C**	No Connect	
20	**N.C**	No Connect	
21	**SPI_CLK**	SPI Clock	
22	**SPI_MOSI**	SPI Master Out Slave In	
23	**SPI_EN**	SPI Enable	
24	**SPI_MISO**	SPI Master In Slave Out	
25	**OS_SCL**	OS SCL	To be update
26	**OS_SDA**	OS SDA	To be update
27	**GND**	Ground	
28	**GND**	Ground	

29	**U3_GPIO0**	U3 General Purpose IO0	3.3V
30	**U3_GPIO1**	U3 General Purpose IO1	3.3V
31	**U3_GPIO2**	U3 General Purpose IO2	3.3V
32	**U3_GPIO3**	U3 General Purpose IO3	3.3V
33	**U_GPIO0**	General Purpose IO0	V_IO2 Power
34	**U_GPIO1**	General Purpose IO1	V_IO2 Power
35	**U_GPIO2**	General Purpose IO2	V_IO2 Power
36	**U_GPIO3**	General Purpose IO3	V_IO2 Power
37	**U_GPIO4**	General Purpose IO4	V_IO2 Power
38	**U_GPIO5**	General Purpose IO5	V_IO2 Power
39	**U_GPIO6**	General Purpose IO6	V_IO2 Power
40	**U_GPIO7**	General Purpose IO7	V_IO2 Power

Caution) 1 ~ 1.5A in total of SP0 ~ SP5

2. J2 Connector

It is connected to USB3-FRM20 board J4, and is a connector related to sensor power and some GPIOs (General Purpose In/Out). (Refer to Section 2.3 J4 Connector)

3. J3 Connector

It is connected to USB3-FRM20 board J5 and is a connector related to sensor power and some GPIOs (General Purpose In/Out). (Refer to Section 2.3 J5 Connector)

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 before using the DAQSYSTEM product and follow the instructions..

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

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

(4) Even during the warranty period, repairs will be charged in the following cases.
- ① Failure or damage caused by use without following the user's manual
- ② Breakdown or damage caused by customer's negligence during product transportation after purchase
- ③ Failure or damage due to 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 (eg, high temperature, high humidity, volatile chemicals, etc.)
- ⑤ Breakdown or damage due to unfair repair or modification
- ⑥ Products whose serial number has been changed or deliberately removed
- ⑦ If DAQ SYSTEM determines that it is the customer's fault due to other reasons

(5) Customer is responsible for shipping costs for returning the repaired product to DAQSYSTEM.

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

MEMO

Contact Point

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

Email : postmaster@daqsystem.com

DAQ SYSTEM
Measurement & Automation