

NV022-E
FPO-935-F
[FPD-Link III Serializer Board]
Hardware Specification

Rev.1.0

NetVision Co., Ltd.

History

	Date	Note	
1.0	28 Jun. 2021	Translated from Japanese specification Rev.1	H. Suzuki

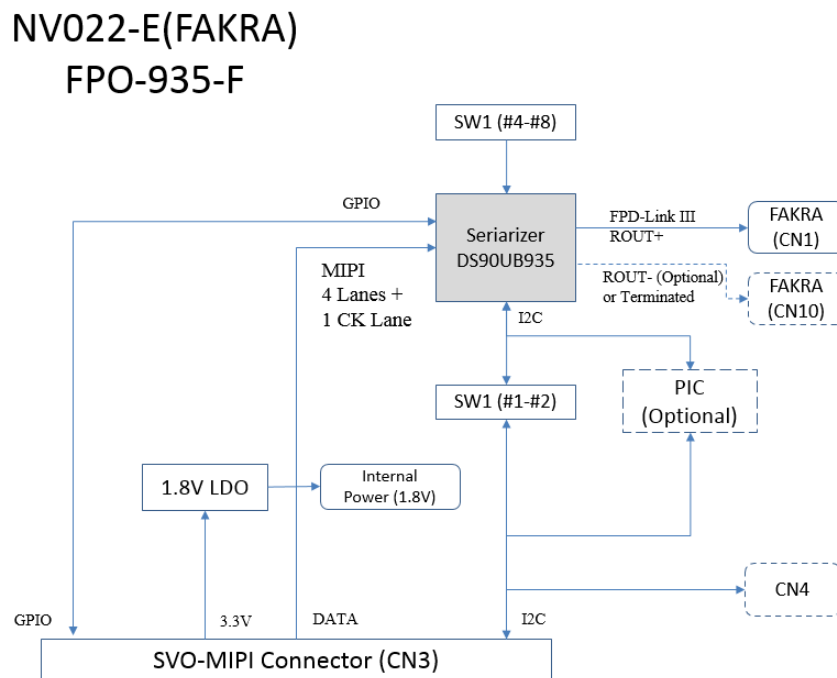
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1. Overview

This document is the hardware specification of NV022-E / FPO-935-F (FPD-Link III Serializer board). This board is equipped with TI company's serializer DS90UB935, and is for converting the video signals input from MIPI to FPD-Link III signals. This board has a system of FPD-Link III output and a connector for connecting to our SVO-03-MIPI board. It can be applied to the emulation of the FPD-Link III camera combined with the SVO-03-MIPI.

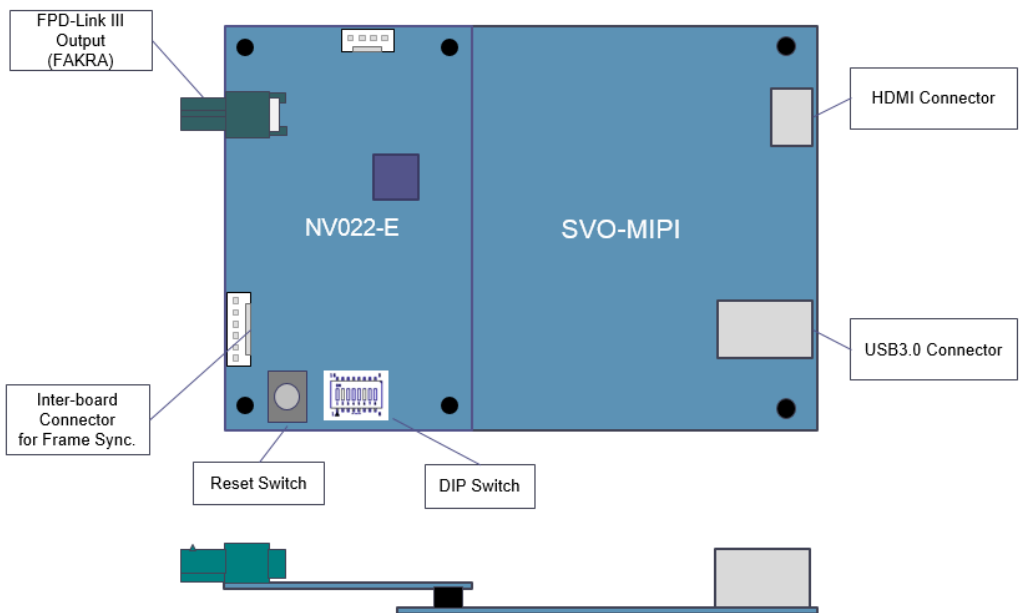
Block Diagram



The block diagram of this board is shown in the figure above. For FPO-935-F, the FPD-Link III output is connected to a FAKRA connector, so an HSD connector is not mounted and cannot be used. The MIPI signal input connector (CN3) is intended to be connected to our video output board SVO-03-MIPI and can be directly connected and used. As an option, this board has the pattern that can implement the PIC microcontroller for I2C slave emulation. The board power is supplied from SVO-03-MIPI through the connector CN3. (It does not support PoC.)

The figure below shows the connection image between this board and SVO-03-MIPI. Since the screw hole positions are common to both boards, they can be fixed with spacers.

Connection Image

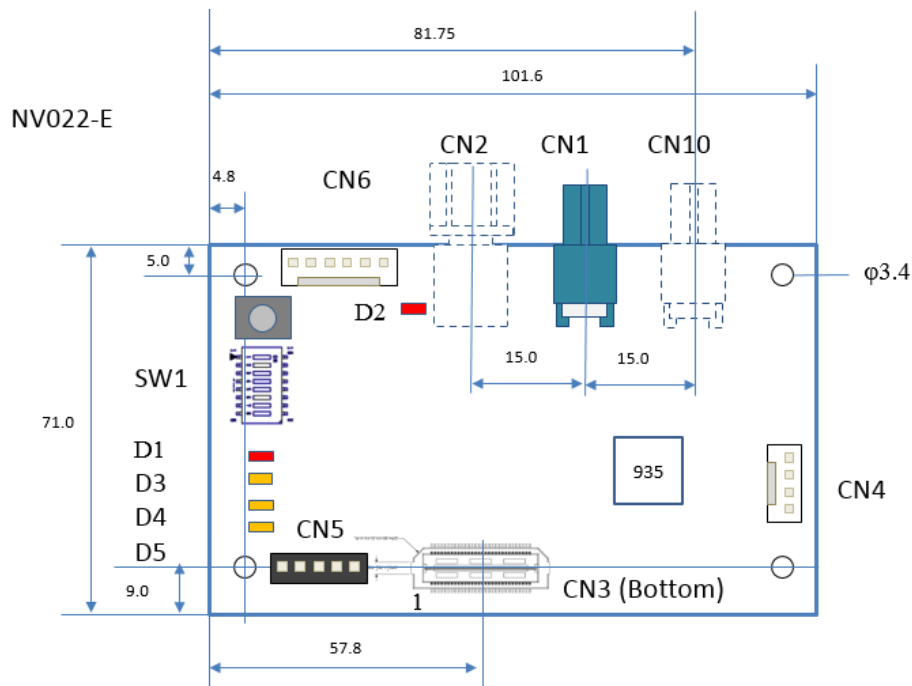


2. Shape of Board

2.1. Connector Layout

The figure below shows the arrangement of the main connectors on this board. PIN numbers and pin assignments of connectors are shown in “Connector Details” section.

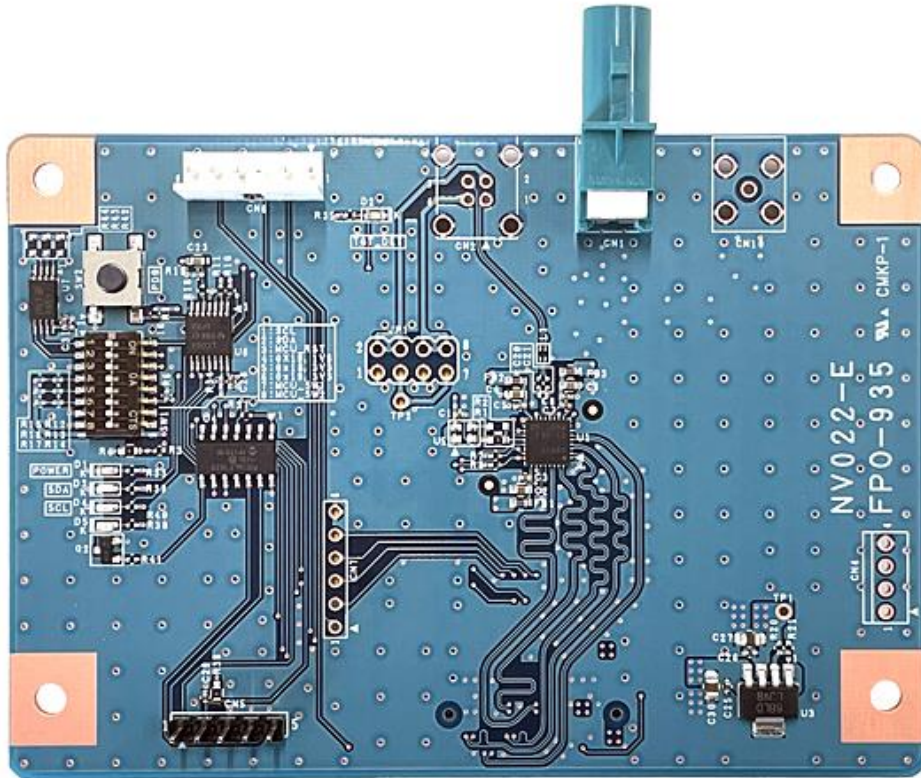
Main Connectors Layout Diagram



* Only main connectors are shown.

* CN2, CN4, CN10 are not mounted

2.2. Photo of Board



3. Details

3.1. FPD-Link III Output

Output of serializer IC DS90UB935 (DOUT +/-) are assigned as shown in the table below.

Pin	DC Coupling	Terminal	PoC	Connector
DOUT+	33nF	-	-	CN1
DOUT-	15nF	51Ω	-	CN10

This board does not have a Power on Coaxial (PoC) circuit because it supplies power from SVO-03-MIPI connected to CN3.

3.2. Connector List

CN#	Mounted State	Description	Model Number
CN1		FPD-Link III output (+)	FA1-NZRP-PCB-8
CN2	Unmounted	FPD-Link III output (Differential)	D4S20L-40MA5-Z
CN3		For connection to SVO-03-MIPI	QTH-030-01-L-D-A
CN4	Unmounted	I2C I/O connector	171825-4
CN5		ICSP connector for PIC implement	M20-9990545
CN6	Unmounted	Expansion connector	171825-6
CN7	Unmounted	GPIO I/O connector	A2-6PA-2.54DSA(71)
CN10	Unmounted	FPD-Link III output (-)	FA1-NZRP-PCB-8

- Mounted state applies to FPO-935-F (NV022-E)

- Expansion connector (CN6) is for board-to-board communication in the output system using multiple boards and for future expansion.

- I2C I/O connector (CN4) is directly connected to the I2C bus of the serializer IC (DS90UB935).

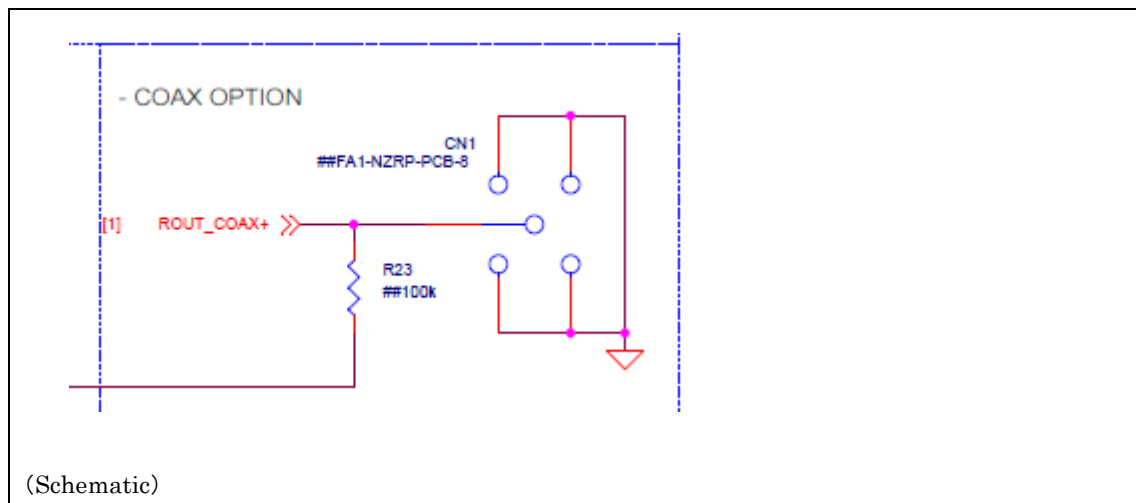
3.3. Connector Details

The following are the top view of the connectors on this board (overview) and the pin assignments (taken from the schematic).

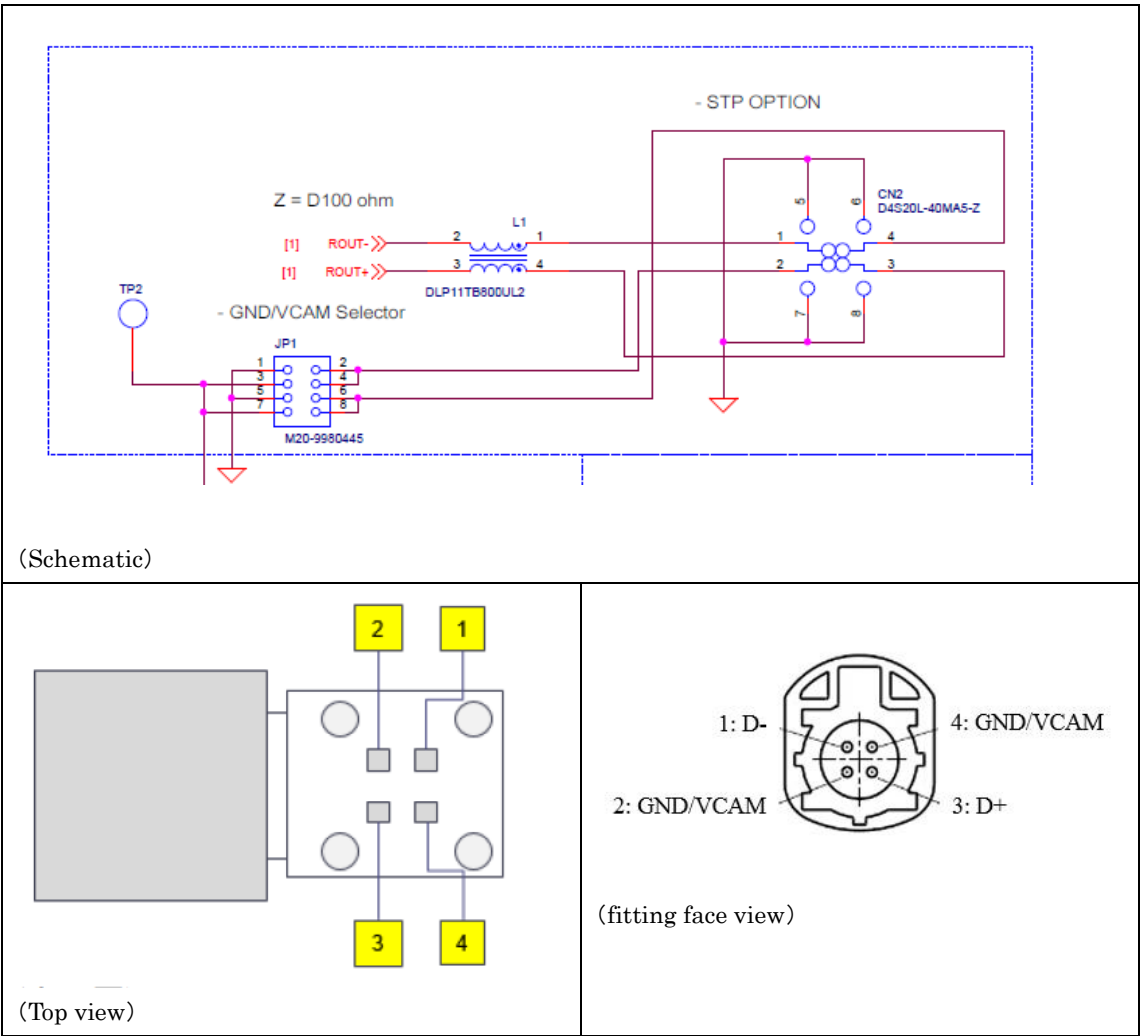
(Meaning of Signal Line)

Signal Line	Meaning
VDDIO	IO power supply (Directly connected to CN3)
VCAM	Power supply for camera
MIPI_GPIO0 - 3	Connected to GPIO0-3 of DS90UB935 Connected to pins #14,#16,#20,#22 of CN3 when implementing R59-R63
CAM_SCL / CAM_SDA	I2C signal line (connect with DS90UB935 through DIP SW)
P0_FSYNCOUT	Connected to pin #2 (GPIO0) of CN3
P3	Connected to pin #10 (GPIO3) of CN3
P4_FSYNCIN	Connected to pin #14 (GPIO4) of CN3

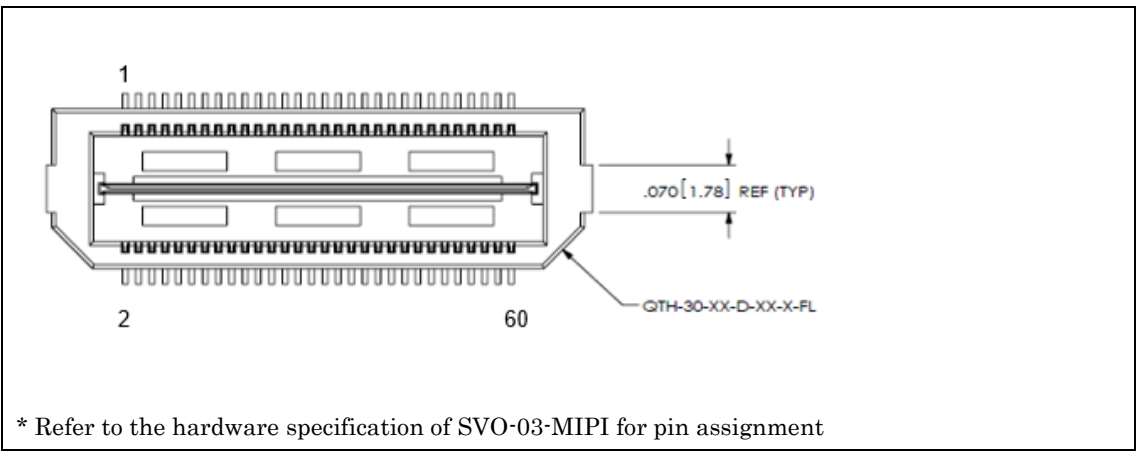
•CN1 (FA1-NZRP-PCB-8)



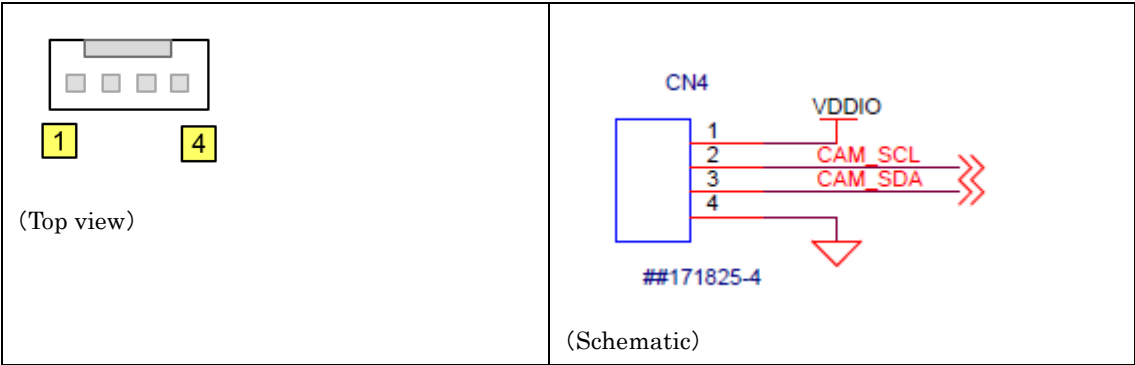
•CN2 (D4S20L-40MA5-Z)



•CN3 (QTH-030-01-L-D-A)

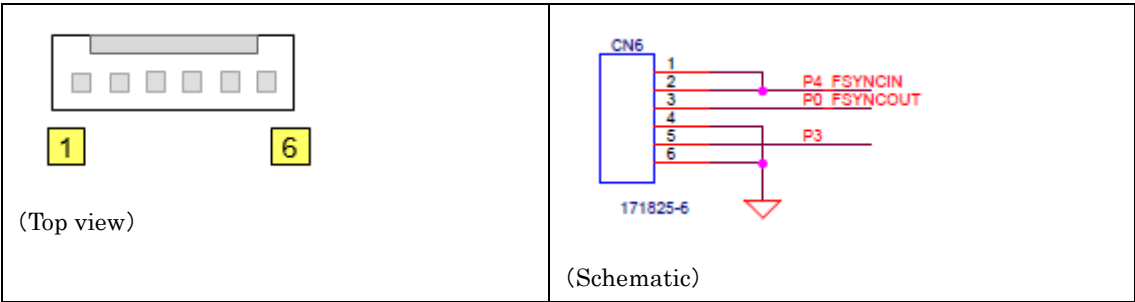


•CN4 (171825-4 / TE Connectivity)



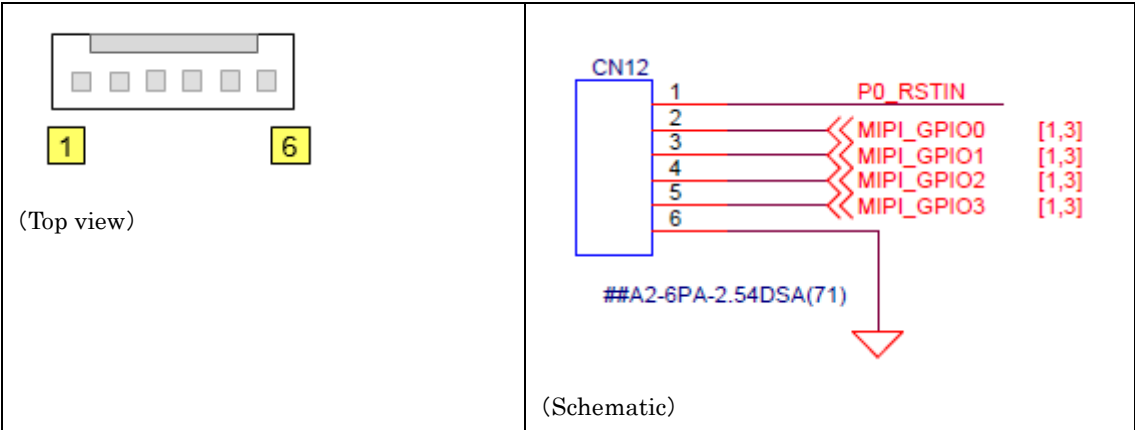
- Directly connected with the DS90UB935 I2C bus.
- This connector is not mounted.

•CN9 (171825-6 / TE Connectivity)



- It is assumed that synchronous wiring is performed via this connector when frame synchronization is required between multiple SVO-03-MIPI boards. The function of frame synchronization is custom.

•CN12 (A2-6PA-2.54DSA(71) / HRS)



- This connector is not mounted.

3.4. DIP Switch Settings

This board has an 8-bit DIP switch (SW1) and a reset switch (SW2) for the initial settings of the serializer DS90UB935, the setting of the I2C address, and the disconnection of the I2C bus.

3.4.1. SW1 (for DS90UB935 setting / I2C setting)

SW#	Name	Description
1	I2C_SCL	ON: The I2C bus output to CN3 (SVO side) and the I2C bus of the DS90UB935 and the microcontroller are connected. OFF: I2C buses above are disconnected.
2	I2C_SDA	
3	MCU_RST	ON: The microcontroller is reset and all the microcontroller IO ports including the I2C bus are Hi-Z. OFF: The microcontroller is in normal operation.
4	IDX0	The I2C address of the DS90UB935 and the IO voltage of the I2C bus are specified. <div> <div>IDX0 IDX1 IDX 2 </div> <div>OFF OFF OFF I2C Address = 0x18, 1.8V</div> <div>ON OFF OFF I2C Address = 0x19, 1.8V</div> <div>OFF ON OFF I2C Address = 0x18, 3.3V</div> <div>OFF OFF ON I2C Address = 0x19, 3.3V</div> </div>
5	IDX1	
6	IDX2	
7	MCU_SW1	(Reserved) Normally set to OFF.
8	MCU_SW2	(Reserved) Normally set to OFF.

- Only SW #1 and #2 are ON by default.

3.4.2. SW2 (Reset Switch)

While pushed, DS90UB935 is in power-down mode (PDB = L).

3.5. LED Indicator

LED#	Name	Description
D1	POWER	Lights when the board power (3.3V) is supplied
D2	TGT_DET	Lights when camera power is detected.
D3	SDA	Lights when the SDA pin of I2C bus of DS90UB935 is L.
D4	SCL	Lights when the SCL pin of I2C bus of DS90UB935 is L.
D5		Lights according to the operating status of the MCU.

3.6. I2C Bus

This board has one system of I2C bus, but it is possible to disconnect the I2C bus between the serializer and the SVO-03-MIPI (CN3 side) to prevent I2C address conflict. By setting SW1 switch #1 and #2 to ON, the I2C buses of SVO board and the serializer are connected. The I2C bus of the serializer DS90UB935 is also connected to the I2C I/O connector CN4.

The I2C address of the DS90UB935 can be switched between 2 types with the DIP switch (SW1). Refer to "DIP Switch Settings" section for details.

This board has a pattern for mounting a PIC microcontroller and ISP connector, in case the board is required initial setting at startup or an I2C slave. Normally, this PIC microcontroller is not mounted.

3.7. Power

Power for the serializer IC DS90UB935 is supplied from the connected board (SVO-03-MIPI, etc.) via CN3. The core power supply and IO power supply are 1.8V, and the 1.8V regulator (LDO) on this board supplies power to the serializer. The IO power supply is fixed at 1.8V, so it is necessary to set the IO voltage of SVO-03-MIPI to 1.8V.

3.8. GPIO

GPIO pins # 0-3 of the serializer IC (DS90UB935) are connected to GPIO pins # 8-11 (pin number: # 22, 26, 32, 34) of connector CN3 via 4.7k Ω resistor. Therefore, control from SVO-03-MIPI is possible. GPIO can be disconnected by not mounting R28-31.

4. Specifications

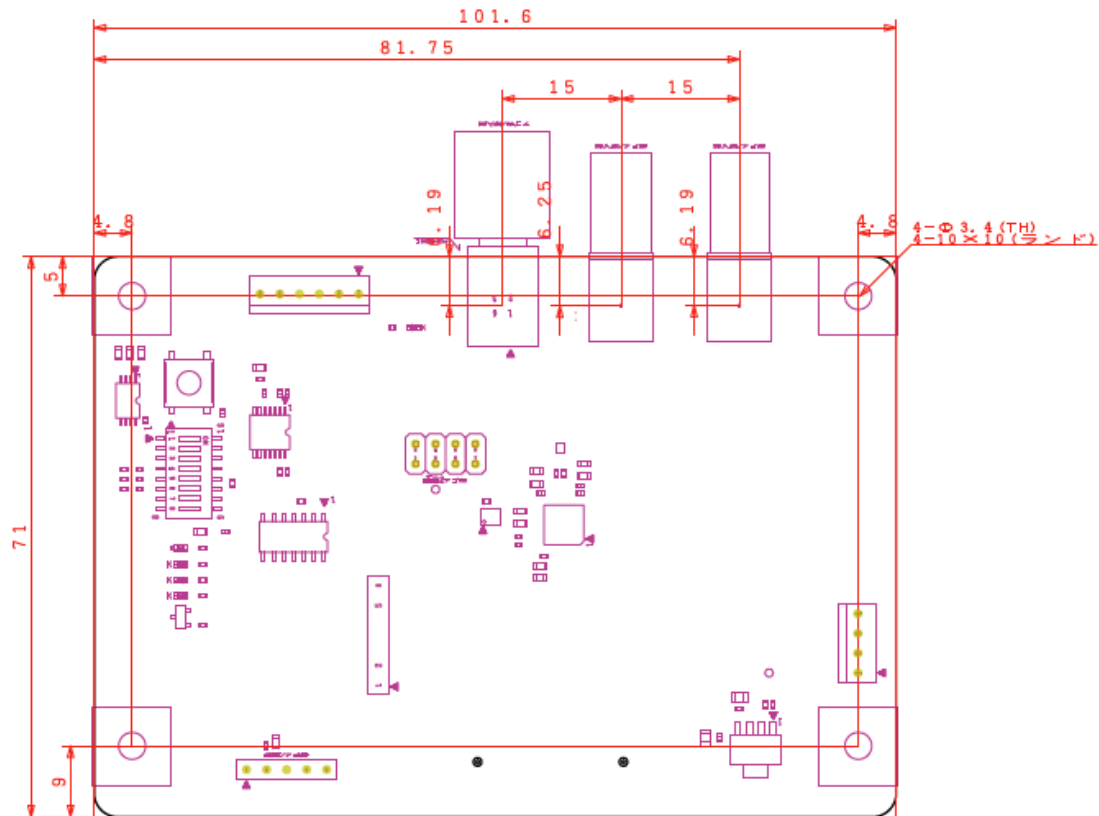
Item	Value	Description
Board Dimensions	101.6 x 71.0 mm	Value without connector
Power for Serializer	DC +3.3V	Supplied from the power supply (3.3V) of SVO-03-MIPI via CN3, and stepped down to 1.8V with internal LDO.
IO Power (I2C bus)	DC +1.8V or +3.3V	When set to +3.3V, GPIO cannot be read from SVO-03-MIPI. Set to +3.3V for PIC program
Image Input	MIPI CSI-2 1-4 Lanes + CLK	Input from CN3 Refer to the DS90UB935 standard for details on supported formats. Connector interface depends on SVO-03-MIPI.
Image Output	FPD-Link III max: 4Gbps	Output from FAKRA connector CN1
Serial communication	I2C	I2C bus outputs to CN3 and CN4. There is a pattern in which a PIC microcontroller (PIC16F1825T) can be implemented to emulate the I2C communication response of the camera.

* The above specifications apply only to model number FPO-935-F/ NV022-E.

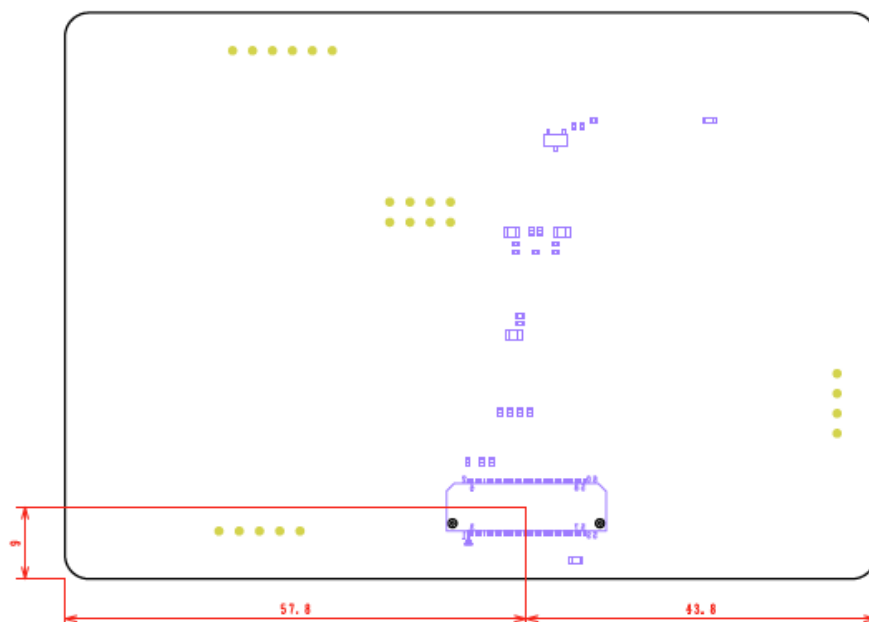
5. Appendix

5.1. Figure of Board Dimensions

(Top Side / Part View)



(Bottom Side / Part View)



5.2. PIC Microcontroller Peripheral Schematic

