

FPD-Link III Deserializer Board  
FPI-954-A  
(Board model number NV015-A)  
Hardware Specification

Rev. 1.0

NetVision Co., Ltd.

FPI-954A Hardware Specification  
1.0

Update History

| Revision | Date       | Note  |          |
|----------|------------|---|----------|
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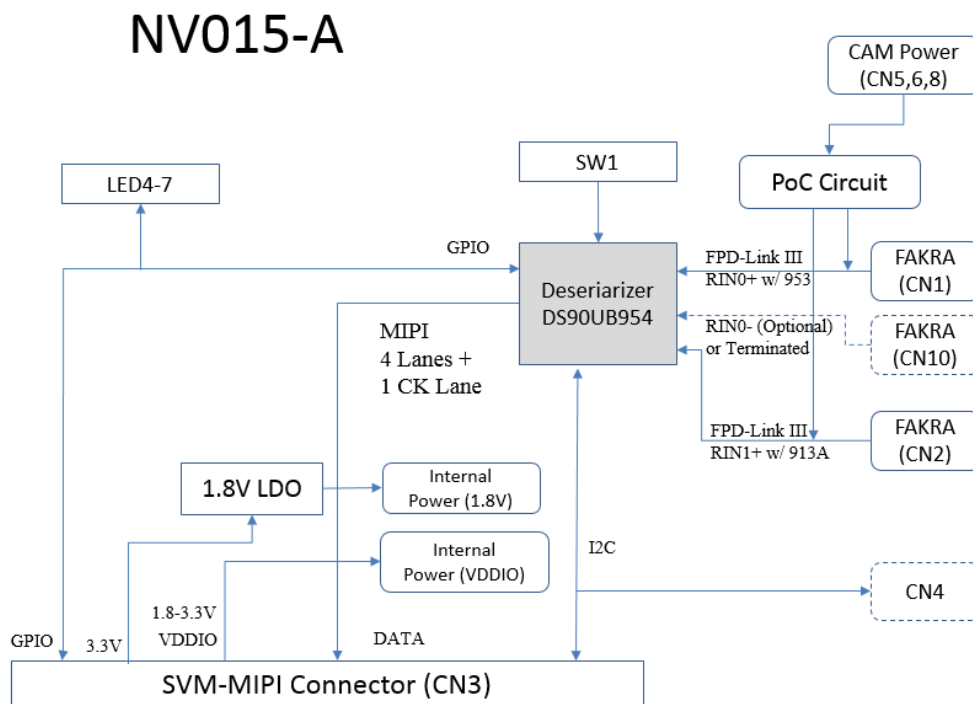
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## 1. Outline

This specification is a hardware specification of NV015-A (FPD-Link III deserializer substrate). NV015-A (hereinafter referred to as this board) is equipped with the TI company Deserializer DS90UB954 , converts the video of the serial signal transmitted by the FPD-Link III standard to MIPI signal, our SVM-MIPI This is a conversion board for connecting and using. This substrate has a coaxial input connector of the FAKRA standard and a connector to connect to our SVM-MIPI series board. Differential input with STP cables is custom supported.

Block diagram

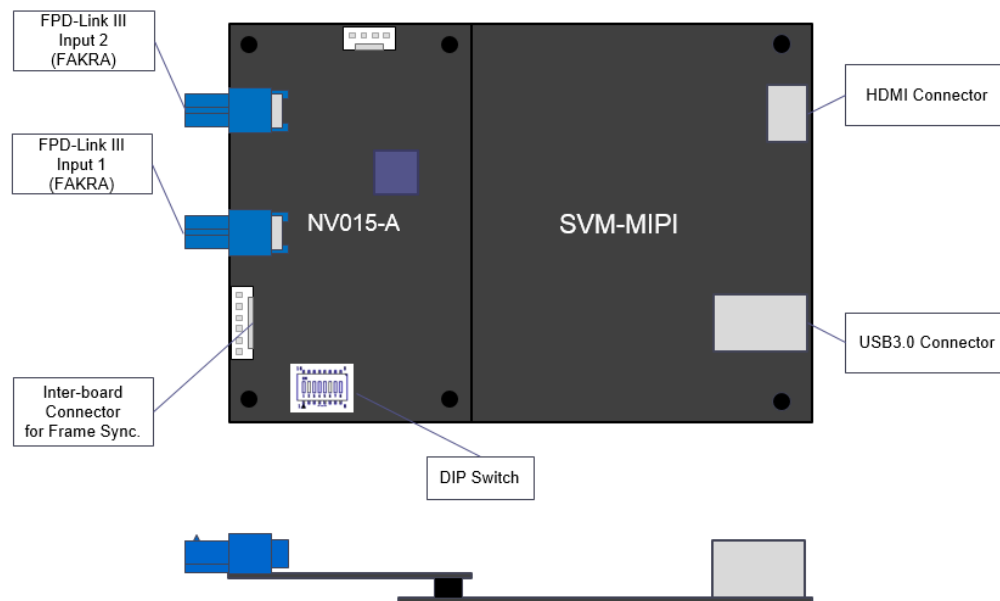


A block diagram of this board is shown in the figure above. This substrate is equipped with the TI company Deserializer IC DS90UB954 , and can receive the maximum 4Gbps FPD-Link III video signal including 1080p/60 and I2C communication through the FPD-Link III signal line. DS90UB954 's MIPI csi-2 output is connected to the connector for the MIPI capture Board of the board and can be used directly with the SVM-MIPI board. The FAKRA connector is implemented for serial signal input and is ideal for automotive camera applications. The camera power supply is supplied from either the dedicated connector CN5, CN6, and CN8, and is powered to the camera by the PoC circuit on the board. The board power supply is supplied from the SVM-MIPI and other capture boards through the connector CN3.

The figure below shows the board connection image of the board and the SVM-MIPI board. As shown in the figure, both substrates are connected via a 60-pin connector (CN3). Since the screw

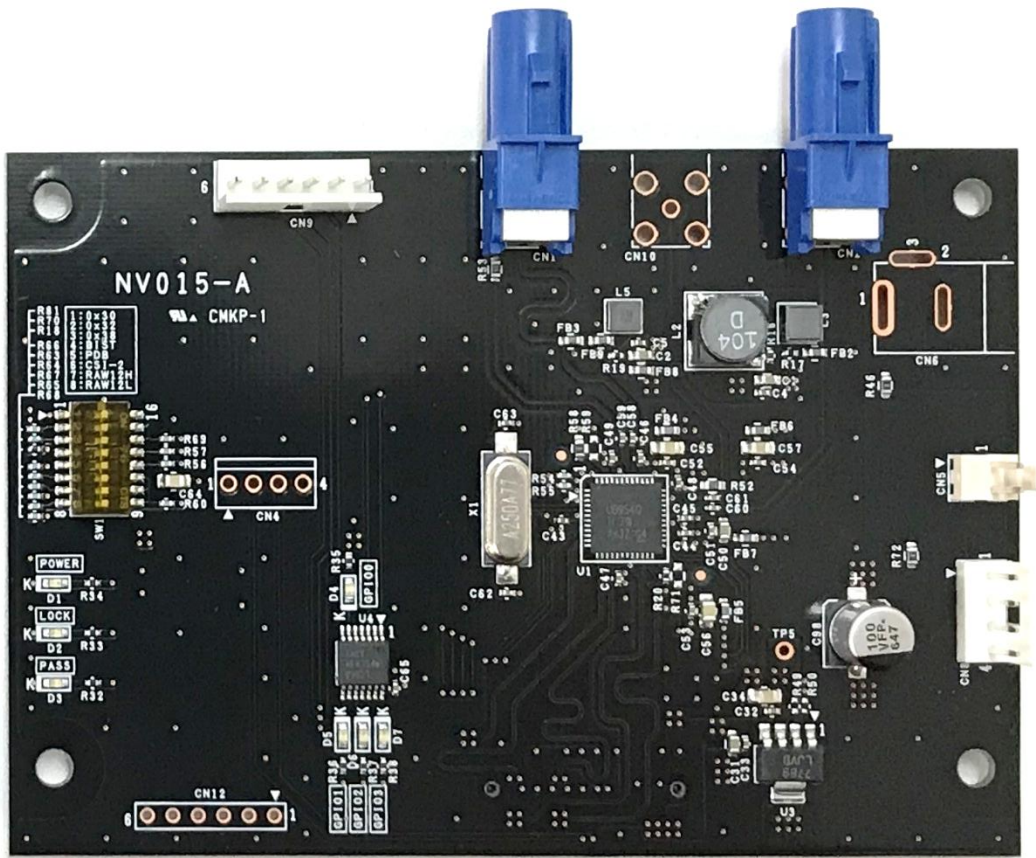
hole position is common on both substrates, it is possible to fix both substrates with a spacer or the like. This board supposes that the FPD-Link III input connectors(CN1, CN2) for connecting the camera are two, and the DS90UB953 and DS90UB913A are paired as serializers. **If you choose CN2 Input, you need to set the DS90UB954 register separately from the DIP SW setting.** The connector type number and PIN assignment are shown later in the connector Details section.

Board connection image





## 2.2. Board Photos



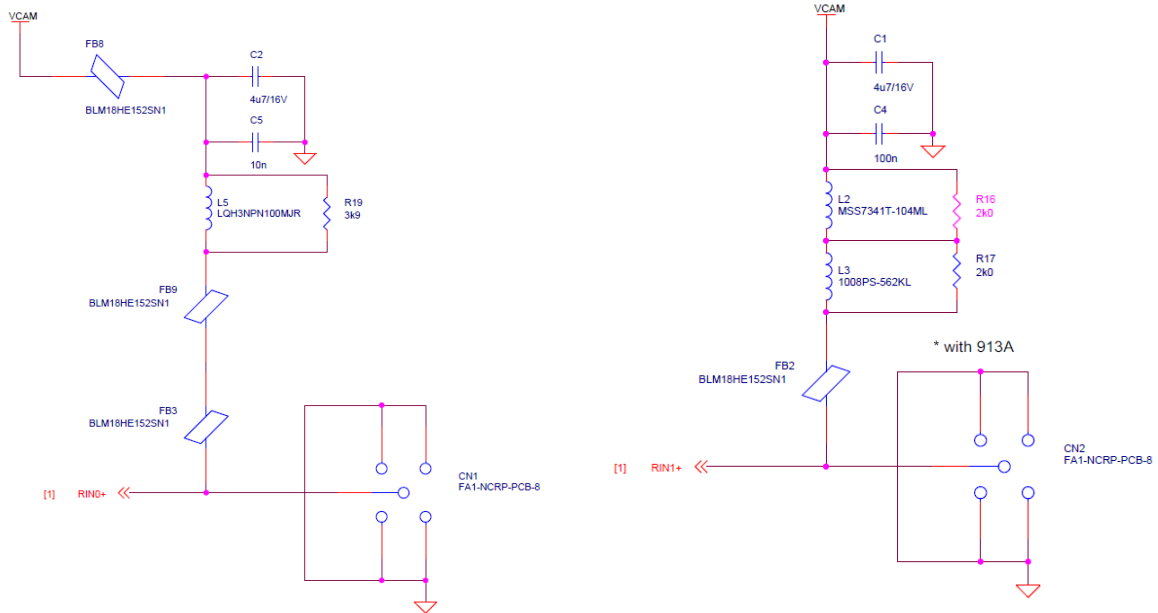
## 3. Details

### 3.1. FPD-Link III Input

The Deserializer IC DS90UB954 has two inputs (Rin0 +/-, rin1 +/-), which are assigned as shown in the table below.

| Pin   | DC coupling | Terminal      | PoC              | Connector     |
|-------|-------------|---------------|------------------|---------------|
| RIN0+ | 33nF        | Unimplemented | Implement (953)  | CN1           |
| RIN0- | 15nF        | 51 $\Omega$   | Unimplemented    | CN10          |
| RIN1+ | 100nF       | Unimplemented | Implement (913A) | CN2           |
| RIN1- | 47nF        | 51 $\Omega$   | Unimplemented    | Unimplemented |

This board is equipped with a power on coaxial (PoC) circuit for superimposing power to the coaxial cable. The PoC circuit for each input connector (CN1, CN2) is shown below. Each filter circuit is a constant paired with DS90UB953 and DS90UB913A.



- If you need to change the component constants of the PoC circuit, please contact us before ordering.

### 3.2. Power

The power supply (core power supply, IO Power) of the Deserializer IC DS90UB954 is supplied through the CN3 from the connecting board (SVM-MIPI, etc.). The core power supply is 1.8 V and the power supply is supplied to the deserializer by a 1.8 v regulator (LDO) on the substrate. The IO power supply supports 1.8 V, 3.3 V, and CN3 VDDL voltage.

This substrate can also be superimposed on the FPD-Link III cable for camera power(VCAM). This VCAM power supply is supplied from the connector CN5, CN6, or CN8 and is powered by the coaxial cable through the following POC circuit. The power supply for the camera and the NV015-A internal power supply are DC separated through the capacitor, so the input order of the internal power source and the camera power is not asked.

### 3.3. I2C Bus

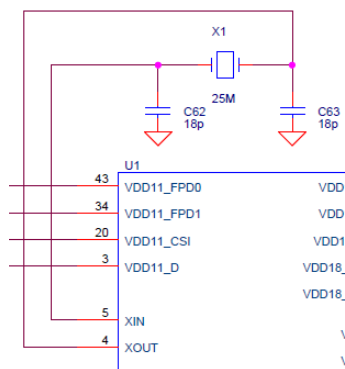
The Deserializer IC (DS90UB954) of this substrate has an I2C bus, which has an I2C communication function between the serializer and the target device through the configuration change in the IC and the FPD-Link III cable. In this board, the I2C bus of DS90UB954 is pulled up



to the IO voltage(VDDIO) at 10 k $\Omega$ , and because it is directly connected with the connector for the SVM-MIPI, I2C communication is possible by the standard function of the SVM-MIPI as it is. At the same time, the I2C bus is directly connected to the I2C input/Output connector (CN4) on the board, allowing connections to external devices and operations from external Masters.

In this board, the DS90UB954 I2C address can be changed four types by DIP switch (SW1). See the DIP Switch Settings section for more information.

### 3.4. REFCLK



The 25MHz crystal oscillator is connected to this board for the DS90UB954 Reference Clock (REFCLK).

### 3.5. Connector List

| CN#  | Implementation State | Description   | Model number       |
|------|----------------------|---|--------------------|
| CN1  |                      | FPD-Link Input<br>(FAKRA Coax, RIN0+)                     | FA1-NCRP-PCB-8     |
| CN2  |                      | FPD-Link Input<br>(FAKRA Coax, RIN1+)                     | FA1-NCRP-PCB-8     |
| CN3  |                      | SVM-MIPI Connect  | QTH-030-01-L-D-A   |
| CN4  | Unimplemented        | I2C I/O   | 171825-4           |
| CN5  |                      | Camera Power Input 1                                      | 22-04-1021         |
| CN6  | Unimplemented        | Camera Power Input 2                                      | MJ-179P, Center +  |
| CN8  |                      | Camera Power Input 3                                      | 171825-4           |
| CN9  |                      | Expansion Connector                                       | 171825-6           |
| CN10 | Unimplemented        | FPD-Link Input<br>(Used during differential input, RIN1-) | FA1-NCRP-PCB-8     |
| CN12 | Unimplemented        | GPIO I/O  | A2-6PA-2.54DSA(71) |

- Implementation states apply to NV015-A.

- The expansion connector (CN9) is a connector for inter-board communication and future expansion in a multi-channel uptake system.
- The camera Power input connector (CN5, CN6, CN8) inputs the DC power supply to the target device (camera) as needed. Depending on the application or system, enter power from one of the connectors. The camera power is only superimposed on the coaxial cable and is not used inside the NV015-A board. The required power capacity depends on the characteristics of the target device. The input voltage of the camera power should be 16v or less.
- The I2C input/Output connector (CN4) is directly connected to the I2C bus of the Deserializer IC (DS90UB954).

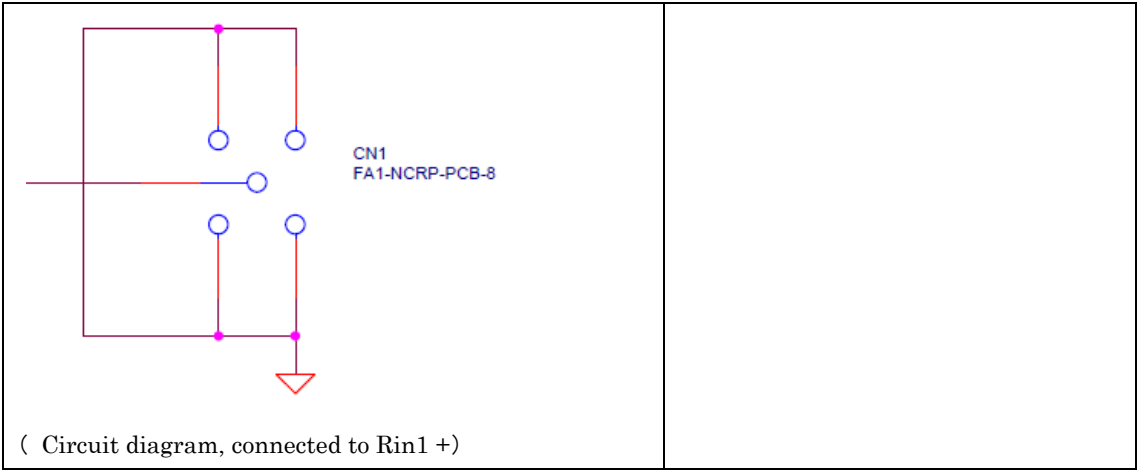
### 3.6. Connector Details

Below is a top view of the connector on this board (outline) and pin assignment (excerpts from the schematic).

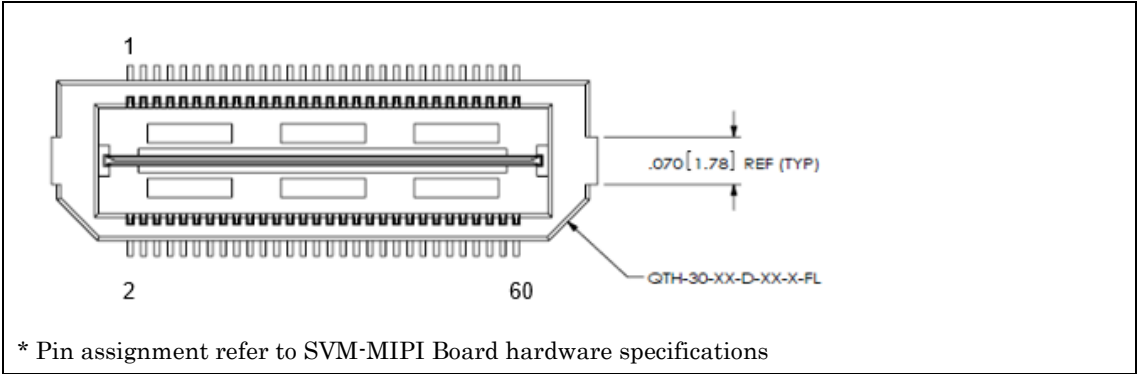
(Pin assign explanatory notes)

| name              | Description   |
|-------------------|---|
| VDDIO             | IO Power (Direct connect to CN3)  |
| VCAM              | Camera Power  |
| MIPI_GPIO0 - 3    | DS90UB954 Gpio0-3 and connected<br>(Gpio3 connected during R71 implementation)<br>Connected with 14, 16, 20, 22 pins of CN3 during R74-R77 implementation |
| CAM_SCL / CAM_SDA | I2C Signal Lines (DS90UB954 Direct connect)   |
| P0_RSTIN          | Connect with CN3 2-pin (GPIO0)  |
| P1                | Connect with CN3 4-pin (GPIO1)  |
| P3_RSTOUT         | Connect with CN3 10-pin (GPIO3)   |

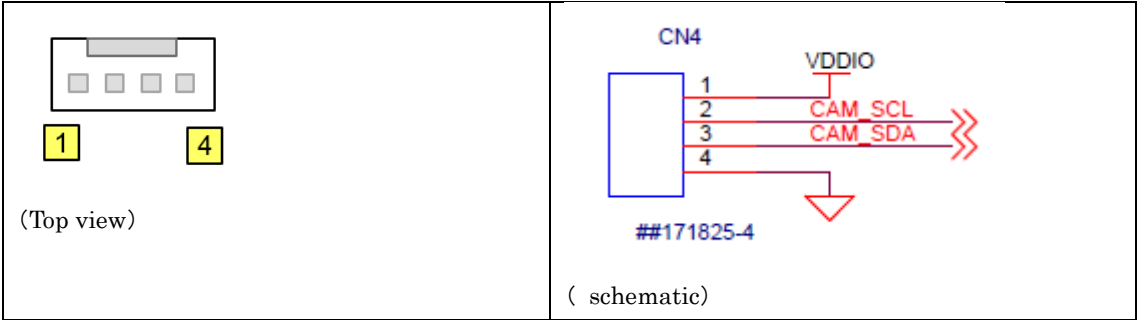
•CN1, CN2, CN10 (FA1-NCRP-PCB-8)



•CN3 (QTH-030-01-L-D-A)

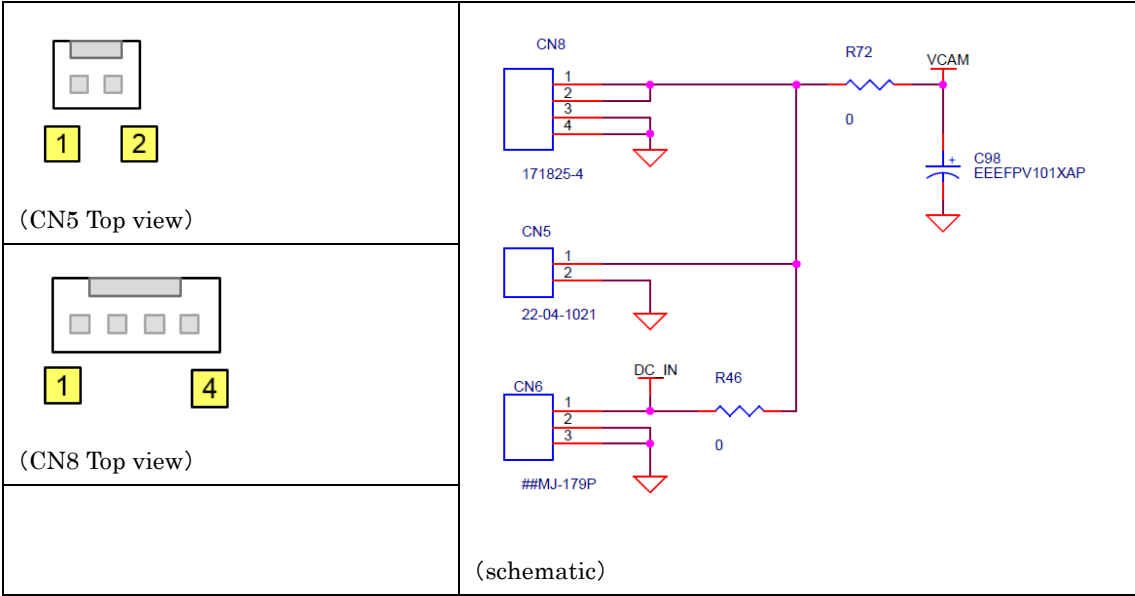


•CN4 (171825-4 / TE Connectivity)

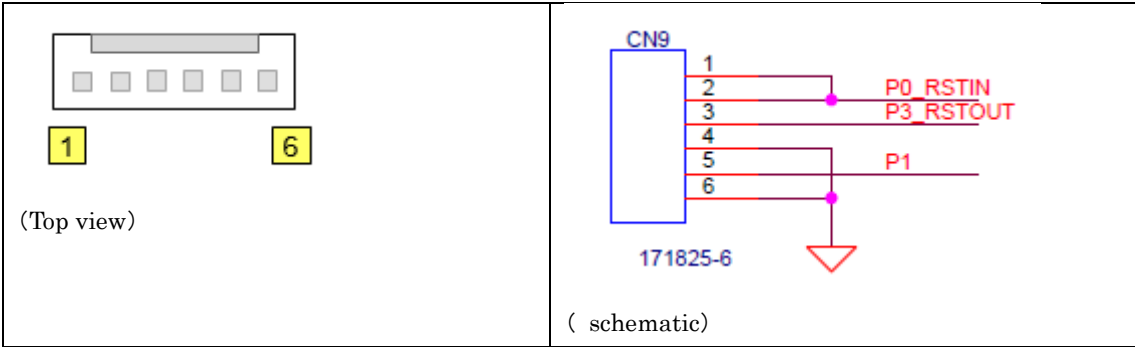


The connector is not implemented.

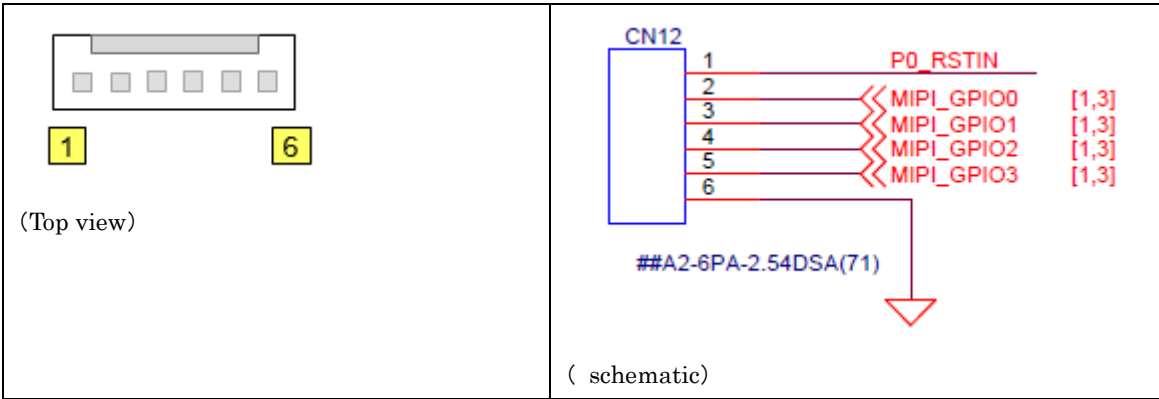
•CN5 (22-04-1021 / Molex), CN6(MJ-179P / Marushin), CN8(171825-4 / TE Connectivity)



•CN9 (171825-6 / TE Connectivity)



•CN12 (A2-6PA-2.54DSA(71) / HRS)



The connector is not implemented.

### 3.7. DIP Switch Settings

The 8-bit DIP switch (SW1) is implemented on this substrate, and it is possible to configure the Deserializer function and the I2C address.

| SW# | 名前     | 機能  |
|-----|--------|---|
| 1   | IDX0   | Specifies the I2C address of the DS90UB954.   |
| 2   | IDX1   | IDX0   IDX1   IDX2  <br>OFF   OFF   OFF   I2C Address = 0x3D<br>ON   OFF   OFF   I2C Address = 0x30<br>OFF   ON   OFF   I2C Address = 0x32<br>OFF   OFF   ON   I2C Address = 0x38   |
| 3   | IDX2   |   |
| 4   | BISTEN |   |
| 5   | PDB    |   |
| 6   | MODE0  | Select device mode.   |
| 7   | MODE1  | See DS90UB954 Data Sheet for each mode detail   |
| 8   | MODE2  |   |
|     |        | MODE0   MODE1   MODE 2  <br>OFF   OFF   OFF   10-bit Mode (COAX)<br>ON   OFF   OFF   CSI-2 Synchronous Back Channel (COAX)<br>OFF   ON   OFF   12-bit High Frequency Mode (COAX)<br>OFF   OFF   ON   12-bit Low Frequency Mode (COAX) |

- As for the default, only IDX0(1), BISTEN(4), MODE0(6) are ON.
- The COAX\_MODE setting of DS90UB954 is set COAX the start-up. If you want to operate in STP mode, you need to set the register or change the resistor R63-68.

### 3.8. LED Indicator

Seven LEDs are mounted on this board. Each function is shown in the table below.

| LED# | Name    | Description                                     |
|------|---------|---|
| D3   | PASS    | Lights up if there are no transfer errors.      |
| D2   | LOCK    | If the PLL is locked, it will be lit.           |
| D1   | POWER   | If the 3.3V is supplied, it will be lit.        |
| D4-7 | GPIO0-4 | The GPIO pin lights up when the H level output. |

### 3.9. GPIO

In this substrate, the GPIO0-6 pin of the Deserializer IC (DS90UB954) is connected via a jumper resistor to the GPIO4-11 (PIN number 14, 16, 20, 22, 26, 28, 32) of the connector CN3, It is a configuration that can be controlled from the SVM-MIPI board. However, the GPIO3 of the DS90UB954 is pullup externally by the resistor R20 and is connected with CN3 when implementing R71 (0 $\Omega$ /1005). (Because the R71 is not implemented by the standard, it is in the state that only GPIO3 is disconnected.) You can also disconnect the GPIO by making the R74-r80 un-implemented.

## 4. Procedure for use

The following procedure describes how to use the board when connected to the SVM-MIPI board.

- Ensure that the DIP SW on this board is set appropriately. Please change the setting value according to the camera etc. to connect.
- Ensure that the SVM-MIPI VDDIO selection jumper is set.
- Connect the SVM-MIPI with the board.
- Insert the USB cable into the SVM-MIPI and connect it to the PC.
- Ensure that the power indicator (D3) on this board is lit.
- Connect the camera to the CN1.
- Supply camera power in CN5 or CN8.

The above items will complete the setup of this board. After that it is the same when you connect a camera to SVM-03. Follow the instructions on how to use SVM-03.

## 5. Salient Points

| Item                   | Value           | Description   |
|------------------------|-----------------|---|
| Board Dimensions       | 71.0 x 101.6 mm | Value without connector   |
| Power for Deserializer | DC +3.3V        | Via CN3, supplied from the capture board SVM-MIPI, etc(3.3V). Buck the supplied 3.3 V voltage to 1.8 V with internal LDO. |
| IO Power               | DC +3.3V / 1.8V | Via CN3, supplied from the capture board SVM-MIPI, etc(VDDIO).  |

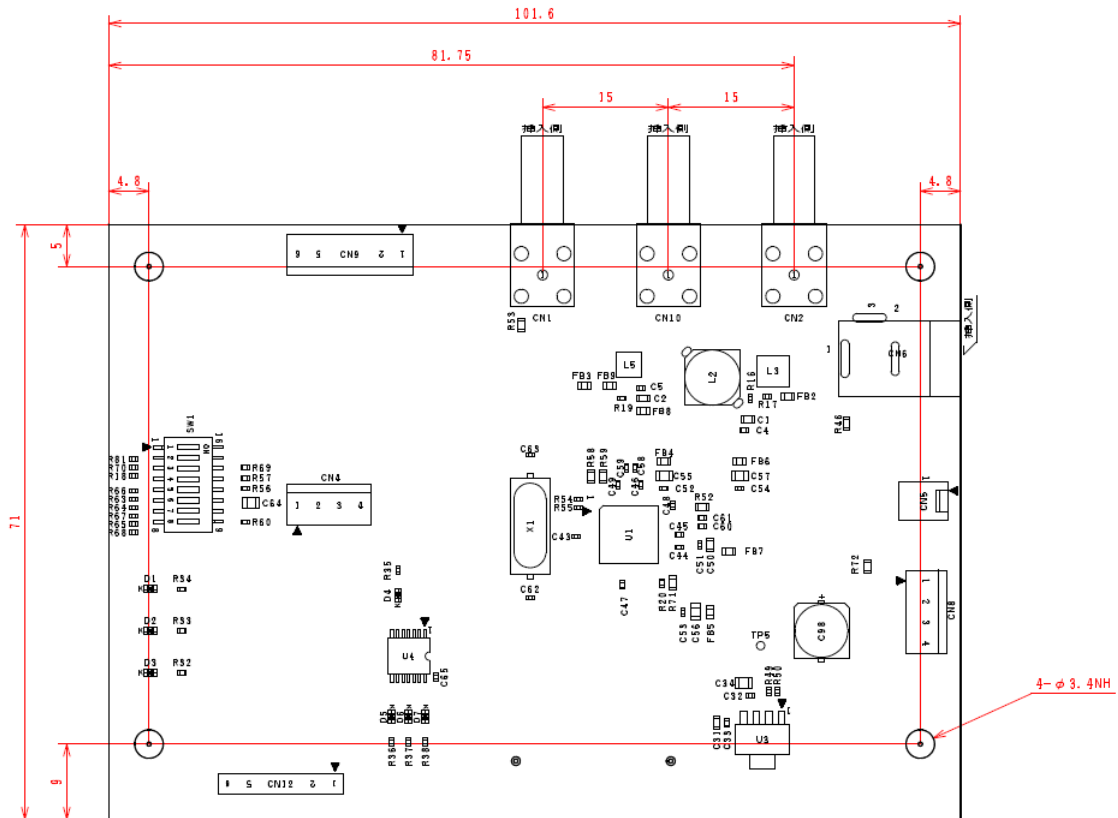
|                      |  |  |
|----------------------|--|--|
| Camera Power         | DC +16v or less.                                       | Supplied from CN5 or CN8 connector.<br>If CN6 is implemented, the AC adapter is supported.   |
| Image Input          | FPD-Link III<br>max: 4Gbps (CN1)<br>max: 1.4Gbps (CN2) | Single-ended coaxial (FAKRA Connector)<br>CN1: RIN0, CN2: RIN1<br>PoC circuits differ in CN1, CN2<br>CN10 can be used to support differential input (RIN0) |
| Image Output         | MIPI CSI-2<br>1-4 Lanes + CLK                          | CN3 output<br>Interface is compatible with SVM-MIPI etc.<br>Number of lanes 1-4 Lane can be set  |
| Serial communication | I2C  | I2C bus output to CN3 and CN4  |
|                      |  |  |

\* The above specifications apply only to model number NV015-A.

## 6. Appendix

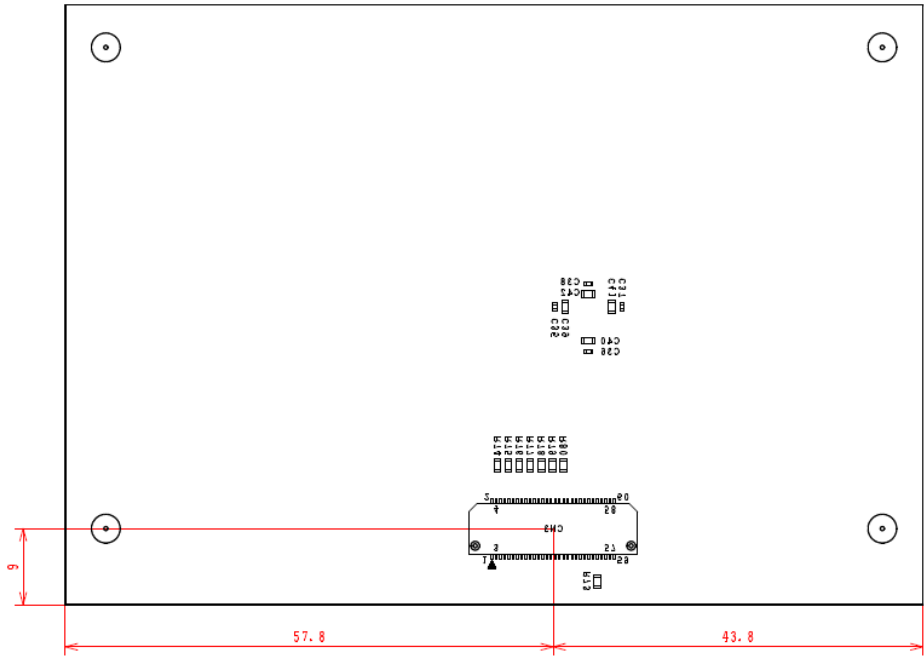
### 6.1. Figure of board dimensions

(Parts Face/Part view)





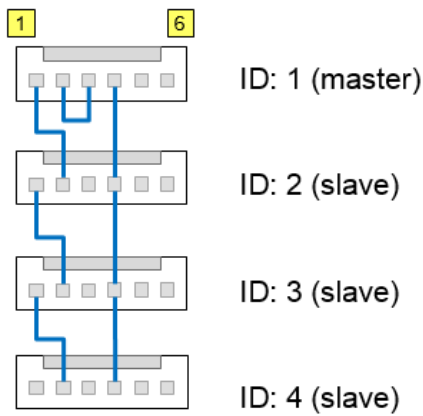
(Solder side/Part view)



6.2. Wiring diagram with 4 CH synchronous uptake system

The following is a reference material.

CN9 Board Wiring Diagram



CN8 power supply Wiring Diagram (Reference)

