MAX96706 GMSL Deserializer Board

[GMI-96706]

(Board Model Number: NV013-C)

Hardware Specification

Rev. 1.0

NetVision Corporation

Update History

Revision	Date	Note	
1.0	1 Oct. 2020	New File(Equivalent to Japanese version 4)	H. Suzuki

Index

1.　　Overview

　　This document is a hardware specification of GMI-96706 / NV013-C (MAX96706 GMSL Deserializer board). This board converts serial signals video transmitted in Maxim company's GMSL standard to parallel signals, and used by connecting to our SV series board such as SVM-03 or SVI-09. This board NV013-C is an improved version of existing NV013-B board with some circuits modified. Note that Although the product name of this board is "GMI-96706", referred it its model number NV013-C in the specification.
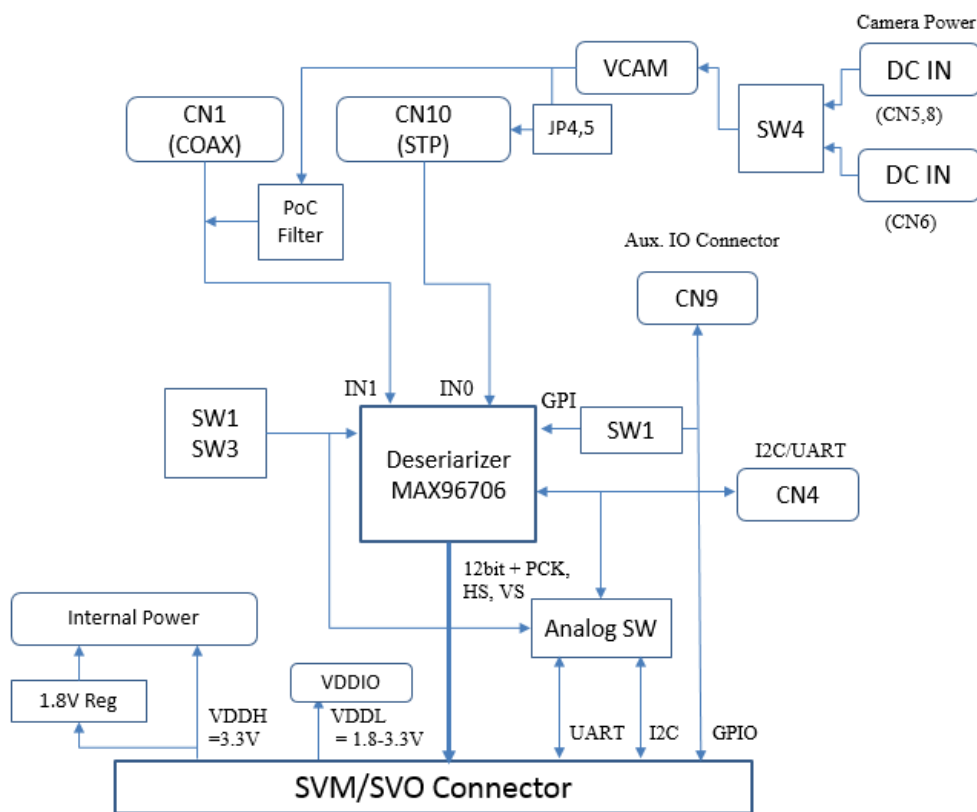
【Figure 1】 Block Diagram

　　Fig. 1 shows the block diagram of this board. This board is mounted Maxim company's Deserializer IC MAX96706, and is capable of serial-to-parallel conversion of GMSL video signals up to 116MHz pixel clock, capable of Register setting of MAX96706 in combination with the SVM-03 board, and I2C/GPIO communication through the GMSL signal line. Output connector for parallel signal is a common interface of our SV series, and can be used by directly connecting to SVM-03. FAKRA-standard connectors (single-ended transfer) and LVDS connectors (differential transfer) are mounted as serial signal input, making it ideal for connecting to in-vehicle cameras.

　　FAKRA (CN1) and HSD (CN10) can be mounted as input connectors, and Specify which connector you use when ordering. CN10 is connected to IN0+/- on MAX96706 and CN1 to IN1+. Therefore, when using CN1 side, the I2C

setting from the capture board is required. Unmounted connector CN11 is connected to IN1-.

The GPI pin of the MAX96706 can be connected to an external IO connector or the GPIO of the SV series boards, thus it is possible to configure a camera synchronization function using multiple NV013-C boards simultaneously.

Fig. 2 shows the boards connection image of this board and SVM-03. As shown in the figure, two boards are connected with a 50-pin socket (CN2). Since the screw hole positions are common, they can be fixed with a spacer or the like. The layout of the connectors on this board is shown in Fig. 3. The pin numbers and pin assignments of the connectors are shown later in the "Connector Details" section.

【Figure 2】 Boards Connection Image
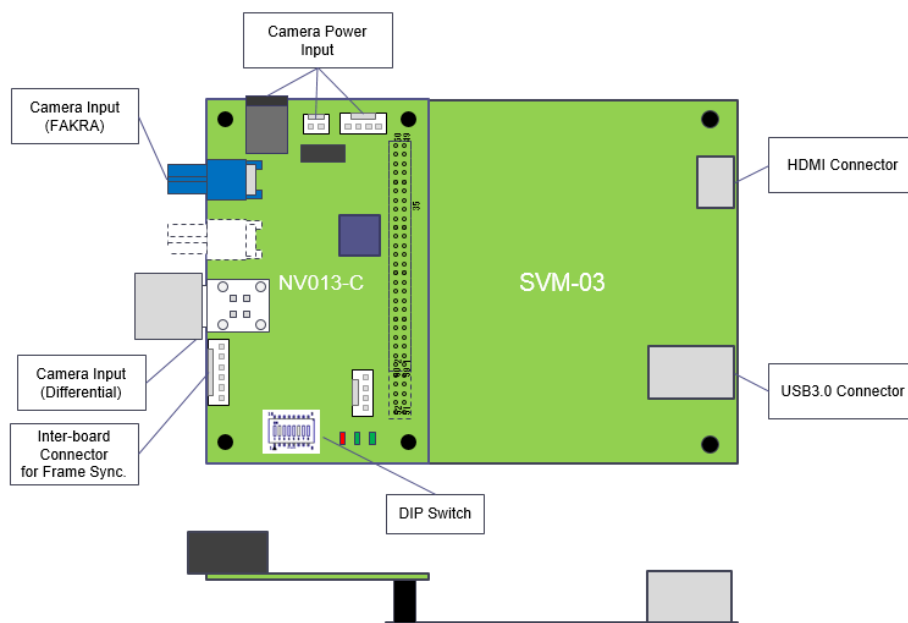
【Figure 3】 The layout of the connectors
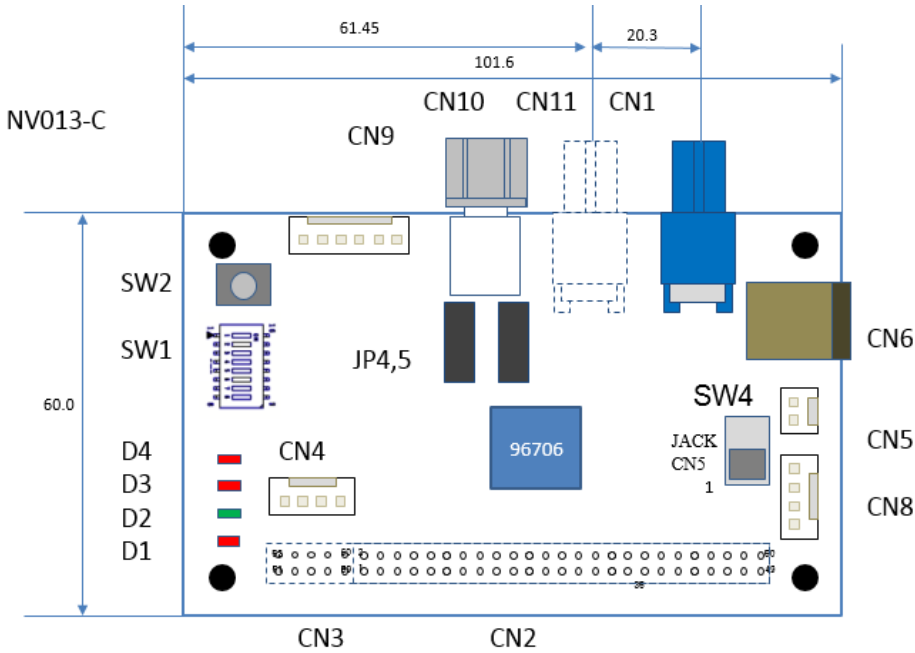
* By default, CN3, CN8, CN9, CN10, CN11 and D4 are not mounted

1.1.   Changes from the NV013-B board

The changes from the NV013-B board to this board are as follows.

(1) The jumper for power connector selection has been replaced with a slide switch (SW4).

(2) The reset switch (SW3) for the deserializer has been added.

(3) The PoC circuit has been changed.
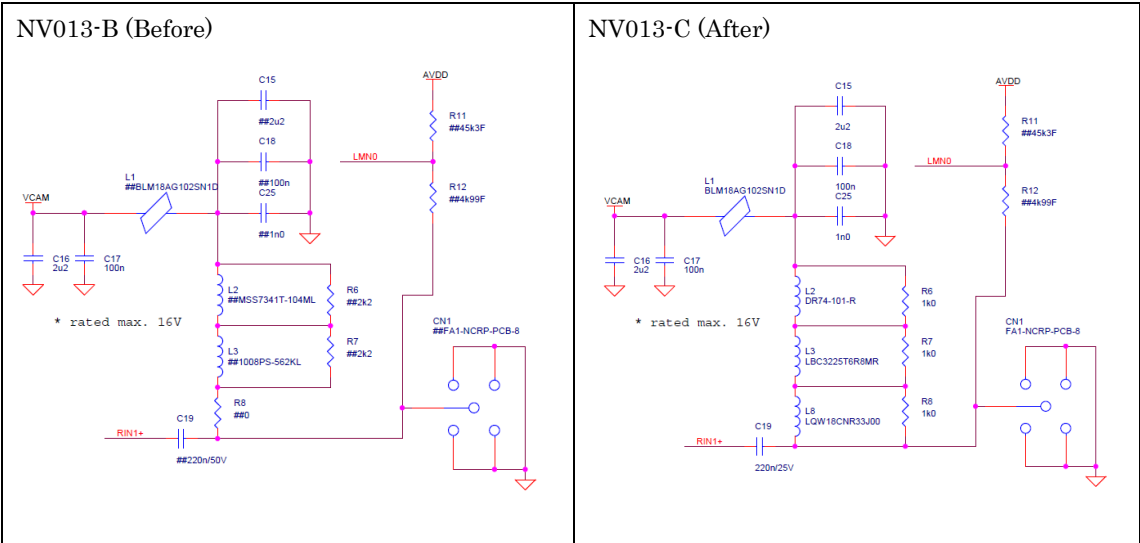
(4) A capacitor (100uF) has been added to the camera power input.

(5) The mounted status of Some connectors has been changed. CN4 has mounted by default.

(6) The treatment of the board fixing holes has been changed.

(7) The silk notation of SW1 has been added.

2.　　Details

2.1.　　Power System

a 1.8V regulator (LDO) is mounted on this board, which supplies power to the core voltage of the deserializer IC. The IC power supply (core voltage and IO voltage) is supplied from an capture board such as SVM-03 via the connector CN2. The capture board power supply VDDH and VDDL correspond to the core voltage and IO voltage of this board, respectively. By default, both VDDH and VDDL are set to 3.3V.

In addition, the power supply for the camera can be output to the GMSL cable (in case of using a differential connector) or can be superimposed to the GMSL cable (in case of using FAKRA connector; part mounting change required). This power is supplied from CN5, CN6, or CN8. The camera power supply and the IC are separated from each other by a capacitor, so the order in which the IC power supply and the camera power supply are turned on does not matter.

The block diagram of the power system of this board is shown in [Figure 4].

【Figure 4】Power System Diagram
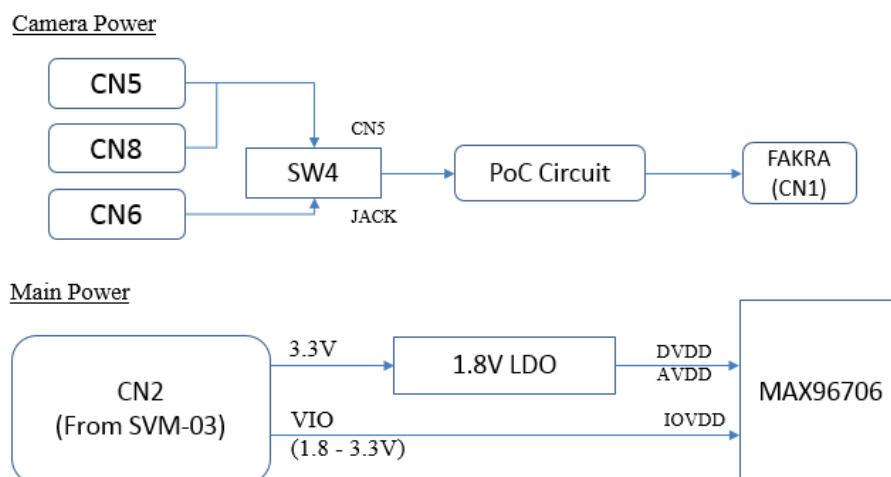
2.2.　　Serial (UART / I2C) Communication

　　The deserializer IC (MAX96706) on this board has UART / I2C bus, which allows you to change the register settings of IC and perform UART communication with the serializer and target devices through a GMSL cable. Because UART/I2C cannot be used at the same time, UART/I2C is selected by DIP SW on this board.
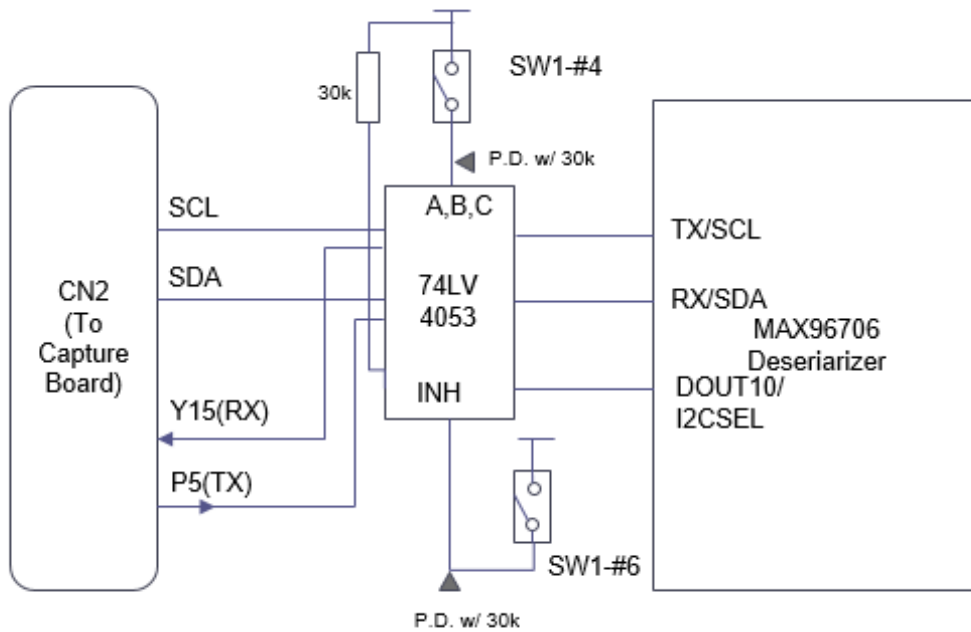
【Figure 5】Serial Bus Part Block Diagram

　　Fig. 6 shows a block diagram of the serial bus part on this board NV013-C. UART / I2C of MAX96706 has the same pin assigned as a dual-purpose pin. Since the I2C and UART pins of the SV series connector are assigned separately due to the specifications of the capture board, the bus is switched with the analog switch 4053 (SN74LV4053A) as shown in the figure. When serial communication is performed from the capture board side, the DIP SW need to be set properly.

2.3.　　Connector List

CN#	Mounted State	Description	Model Number
CN1		GMSL input（Coax）	FA1-NCRP-PCB-8（FAKRA）
CN2		Parallel output	C-00086
CN3	Un-mounted	(Un-used)	N/A
CN4		I2C / UART input and output	171825-4
CN5		Camera power input 1	22-04-1021

CN6		Camera power input 2	PJ-202A Center +, 2.1mm
CN8	Un-mounted	Camera power input 3	171825-4
CN9	Un-mounted	Expansion connector	171825-6
CN10	Un-mounted	GMSL Input (Differential)	2286546 (HSD)
CN11	Un-mounted	(Un-used)	FA1-NCRP-PCB-8

*Mounted State apply to GMI-96706-F.

The expansion connector (CN9) is for board-to-board communication in multi-channel capture system and for future expansion. I2C I/O connector (CN4) is directly connected to the serial bus of MAX96706.

2.4.　　Connector Details

The top view of the connector and pin assignments (excerpted from the circuit diagram) are shown below. Parts starting with ## in the circuit diagram indicate are un-mounted parts.

(Signal Name Example)

Name	Description
VDDIO	IO Power
VCAM	Camera Power
TX_SCL / RX_SDA	Serial Signal Lines
P0 - P5	GPIO port of SV board (Directly connected to CN2)
FSYNC_IN	Connected to P3 (CN2.9)
FSYNC_OUT	Connected to CLKOUT (CN2.39)
RIN0+/-	GMSL Signal Lines

・CN1, CN11 (FA1-NZRP-PCB-8)

(Schematic)
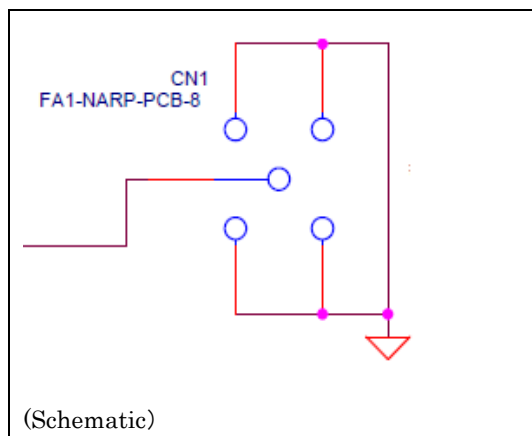
・CN2（C-00086 ; Right part of figure below），CN3（Left part of figure below）
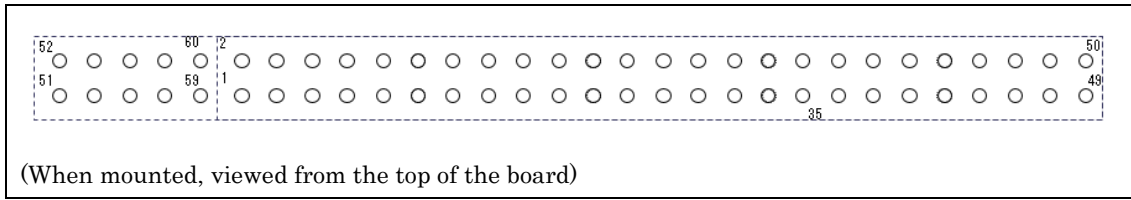
(When mounted, viewed from the top of the board)

Connector			C-00086				
Pin#	Name	DIR	Description	Pin#	Name	DIR	Description
1	VDDL	POWER	I/O level power supply (1.8V or 3.3V)	2	GND	-	-
3	P0	OUT	NC	4	GND	-	-
5	P1	OUT	DOUT11/CXTP/DE (DE	6	GND	-	-
7	P2	OUT	NC	8	GND	-	-
9	P3	IN	NC	10	GND	-	-
11	P4	IN	NC	12	HSYNC	OUT	DOUT12/HS
13	VSYNC	OUT	DOUT13/VS	14	XRST	IN	/PWDN (MAX96706 reset signal)
15	VDDH	POWER	Target power supply (3.3V)	16	GND	-	-
17	SDA	IO	SDA	18	GND	-	-
19	SCL	IO	SCL	20	GND	-	-
21	DCK	OUT	PCLKOUT (Pixel clock output)	22	GND	-	-
23	Y0	OUT	DOUT0	24	GND	-	-
25	Y1	OUT	DOUT1	26	GND	-	-
27	Y2	OUT	DOUT2	28	GND	-	-
29	Y3	OUT	DOUT3	30	GND	-	-
31	Y4	OUT	DOUT4	32	GND	-	-
33	Y5	OUT	DOUT5	34	GND	-	-
35	Y6	OUT	DOUT5	36	GND	-	-
37	Y7	OUT	DOUT7	38	GND	-	-
39	CLKOU	IN	FSYNC_OUT (Optional)	40	GND	-	-
41	Y8	OUT	DOUT8	42	Y9	OUT	DOUT9
43	Y10	OUT	DOUT10/I2CSEL	44	Y11	OUT	DOUT11/CXTP/DE
45	Y12	OUT	DOUT12/HS	46	Y13	OUT	DOUT13/VS

47	Y14	OUT	NC	48	Y15	OUT	TX
49	+3.3V	-	NC	50	P5	IN	RX

- DIR: Shows IN/OUT as viewed from NV013-C.

・CN4 (171825-4 / TE Connectivity)

（Top view）

（Schematic）
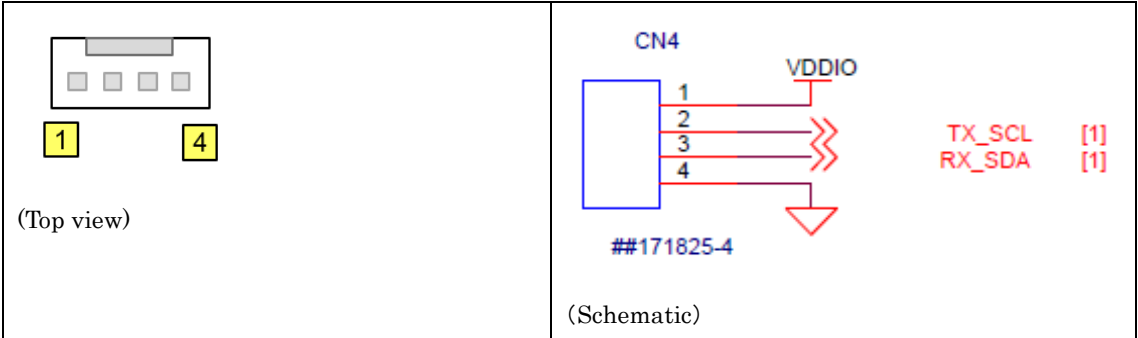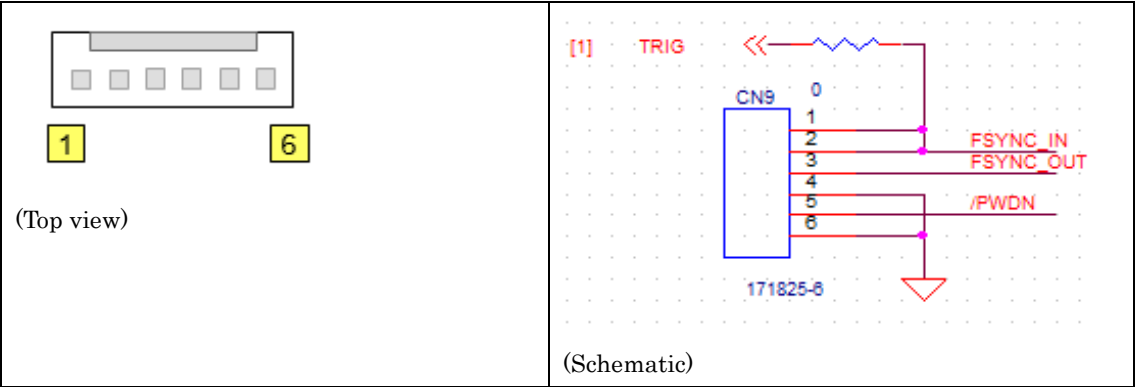
- CN4 is directly connected to the terminal of MAX96706.

・CN5 (22-04-1021 / Molex), CN6(PJ-202A), CN8(171825-4 / TE Connectivity)

（CN5 Top view）

（CN8 Top view）

（Schematic）
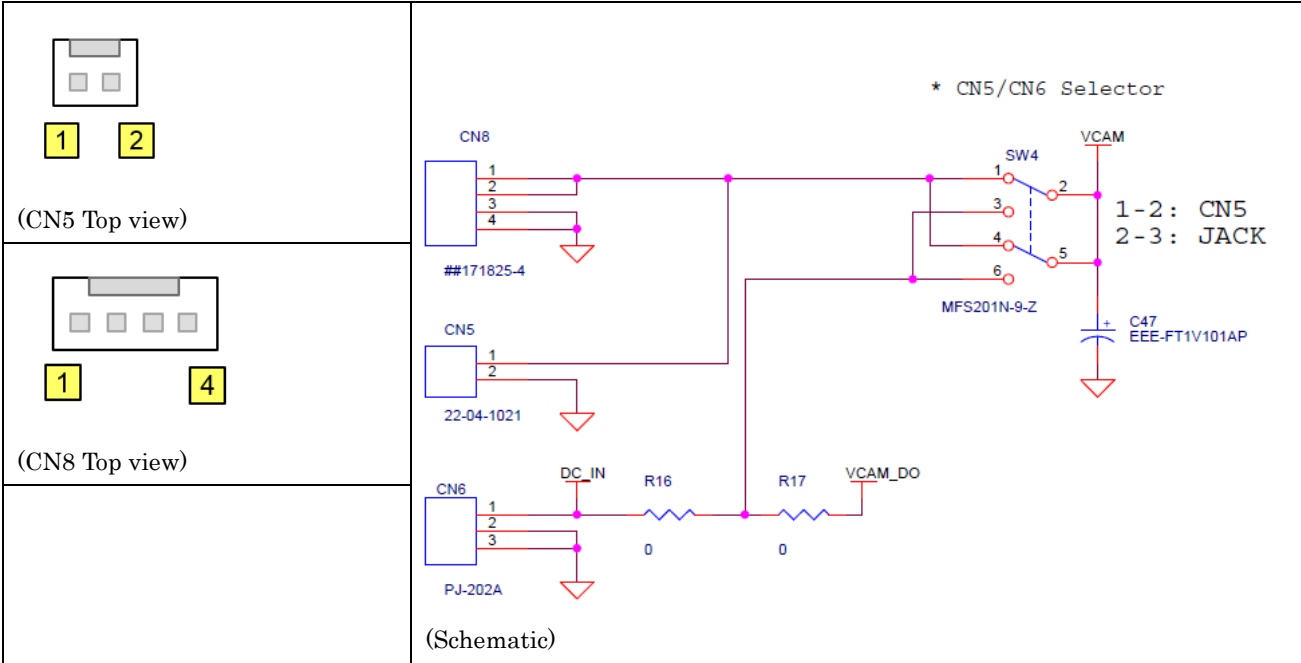
・CN9 (171825-6 / TE Connectivity)

(Top view)

(Schematic)

・CN10 (2286546 / TE Connectivity)

(Top view)

* Differential Input (HSD Connector)
* Z = 100 ohm, differential

(Schematic)
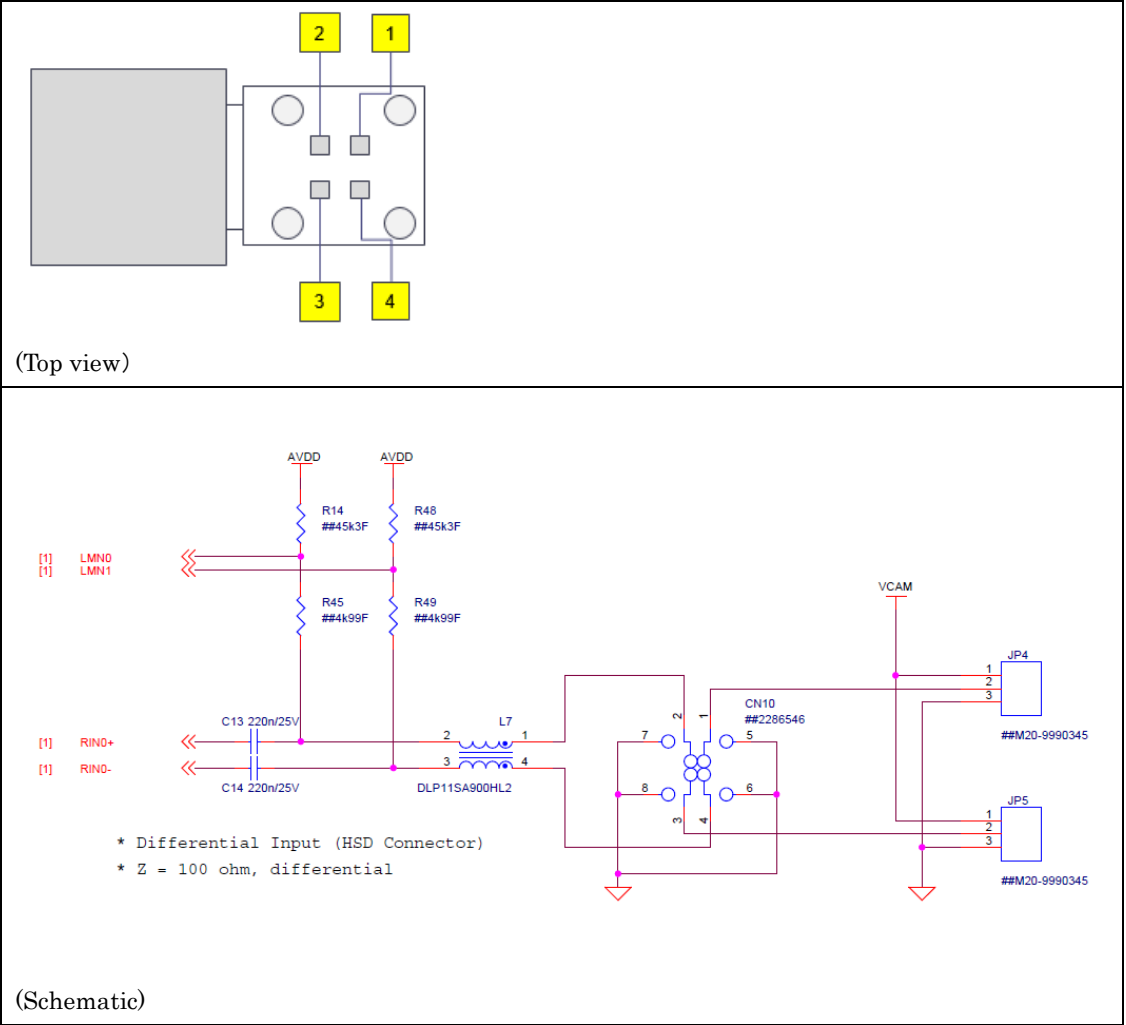
2.5.　　Switch Settings

8-bit DIP switch (SW1) and a reset switch (SW3) are mounted on this board. The deserializer function and I2C address can be set with these switches. While SW3 is pushed, the PWDN pin of MAX96706 is set to L level.

The operation details of SW1 are described below. Refer to data sheet of MAX96706 for details on each function.

SW#	Name	Description
1	ADD0	Set the device address.
2	ADD1	ADD1, ADD0 = {OFF, OFF} -> Address 58h ADD1, ADD0 = {OFF, ON} -> Address 5Ah ADD1, ADD0 = {ON, OFF} -> Address 5Ch ADD1, ADD0 = {ON, ON} -> Address 5Eh
3	CX/TP	Select the input signal specification. ON: Coaxial Input (CX/TP = H) OFF: Differential Input (CX/TP = L) - When inputting from the CN1 side, GMSL_IN_SEL bit of MAX96706 register must be switched.
4	I2CSEL	Select I2C / UART function. ON: I2C interface (I2CSEL = H) OFF: UART interface (I2CSEL = L)
5	I2C_INH	ON: Disconnect the I2C / UART connection between CN2 and MAX96706. OFF: Connect the I2C / UART signals between CN2 and MAX96706. - Turn it on when you want to I2C / UART communicate with the outside directly via CN4.
6	HIM	Set High Immunity Mode. ON: High Immunity Mode (HIM = H) OFF: Legacy Reverse Control Mode (HIM = L)
7	MS	ON: Bypass Mode OFF: Base Mode
8	GPI	Select the GPI pin input. ON: External Trigger input (FSYNC_IN signal input from CN9) OFF: L input (30k pull-down)

- By default, only SW #4 is ON.

- The operating mode of MAX96706 by DIP switches is the same as at power-up.

SW4 is a switch to select the camera power connector. This is used for setting the connection between CN6 or CN5/CN8 connectors and the camera power supply. It can also be used as a camera power switch.

SW4 status	Camera power supply (VCAM)
"JACK" side	Connect with CN6
"CN5" side	Connect with CN5, CN8

2.6.   LED Indicator

3 LEDs are mounted and by option another LED can be mounted on this board. Each function is shown in the table below.

| LED#	Name	Description
D1	ERR	When there is a transfer error, lights up.
D2	LOCK	When PLL is locked, lights up.
D3	POWER	When power (VDDH) is supplied, lights up.
D4	LFLT	When it is Line Fault status, lights up. (Optional function; ask for it when you order.)

2.7.   Power Selection Jumper

JP4 and JP5 are the jumpers to select the power supply output polarity of the HSD connector. When outputting power to the target through the HSD connector, set the jumpers as shown below.

Output to HSD	Jumper setting
Pin 1: GND Pin 3: GND (No power output)	JP4: 2-3 short circuit JP5: 2-3 short circuit
Pin 1: VCAM Pin 3: GND	JP4: 1-2 short circuit JP5: 2-3 short circuit
Pin 1: GND Pin 3: VCAM	JP4: 2-3 short circuit JP5: 1-2 short circuit

2.8.　　　Wiring for GPI pins

　　　The GPI pins of MAX96706 can be connected to external IO connectors and the GPIO of our SV series boards. Therefore, it is possible to configure a camera synchronization function using multiple NV013-C boards simultaneously.The wiring around the GPI pins is as follows. "P3" is at pin #9 of CN2 and "CLK_OUT" is at pin #39 of CN2.
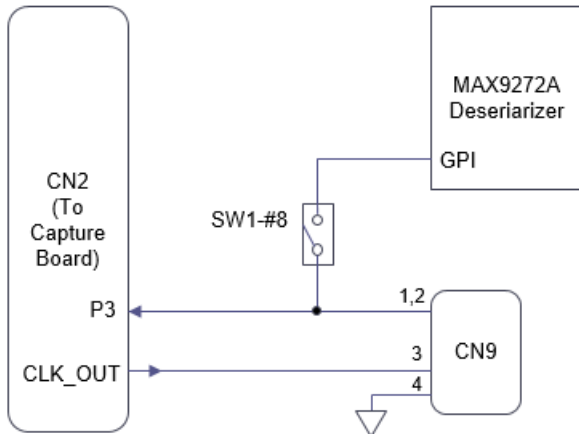
3.　　　Usage Procedure

　　　The procedure for using this board when connecting with SVM-03 board is explained below.

- Check that the DIP SW on this board is set appropriately.
- Check that the target power supply (VDDH, VDDL) of SVM-03 is set to 3.3V.
- Connect this board and SVM-03.
- Insert the USB cable into SVM-03 and connect it to your PC.
- Check that the power indicator (D3) on this board is lit.
- Connect the camera to CN1.
- (If necessary) Supply the camera power from CN5 or CN6.

　　　This completes the setup of this board. The subsequent steps are the same as when connecting the camera to SVM-03, so follow the instructions for using SVM-03.
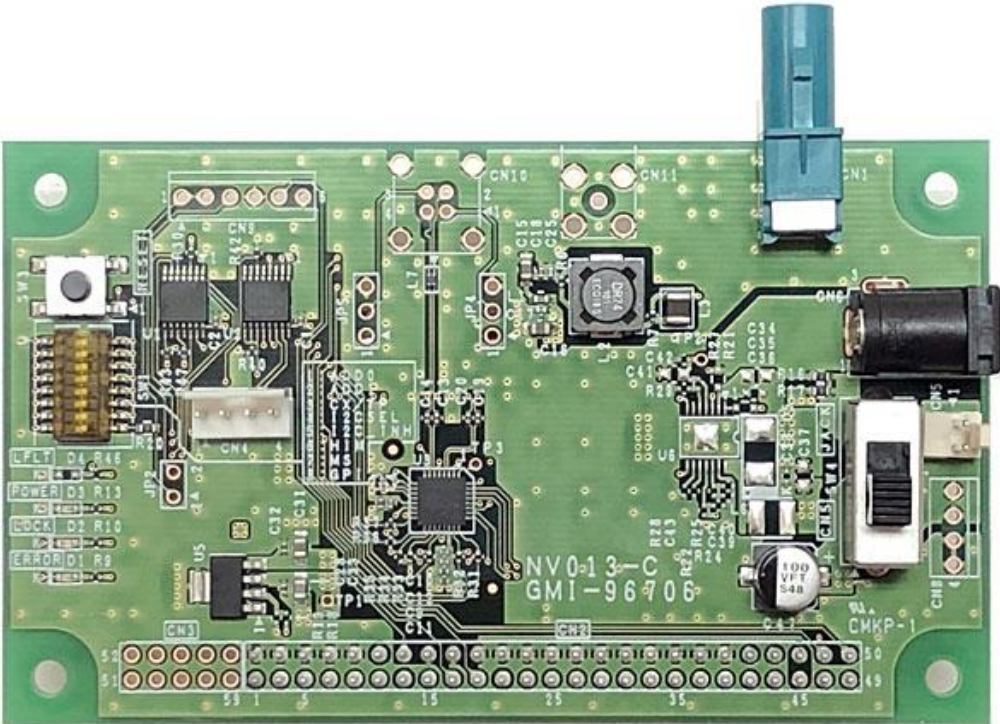
4.   Specifications

Item	Value	Description
Board dimensions	60.0 x 101.6 mm	Value without connector
Power for deserializer	DC +3.3V	Via CN2, supplied from a capture board SVM-03 (VDDH) etc.
IO power	DC +3.3V or 1.8V	Via CN2, supplied from a capture board SVM-03 (VDDL) etc.
Camera power	DC +5 - +16V	Supplied from the connector CN5 or CN8 PoC output from FAKRA connector Power supply voltage depends on connected camera.
Image input	GMSL single-ended input or differential input	Supports serializer MAX96705 / MAX96707. FAKRA connector CN1 is available as a single-ended input (IN1+). HSD connector CN10 is available as a differential input (IN0+ / IN0-). When CN11 and peripheral components are mounted, FAKRA x2 differential input (IN1+/IN1-) is available. Register operation is required when enabling IN1.
Image output	Parallel signal Max 12bit + VSYNC + HSYNC +PCK The format follows the setting of MAX96706	Interface follows SVM-03
Serial communication	I2C / UART (selectable)	DIP SW operation is required when it works in Bypass mode.

5.　　　Appendix

5.1.　　　Figure of Board Dimensions

（Top side / Part view）

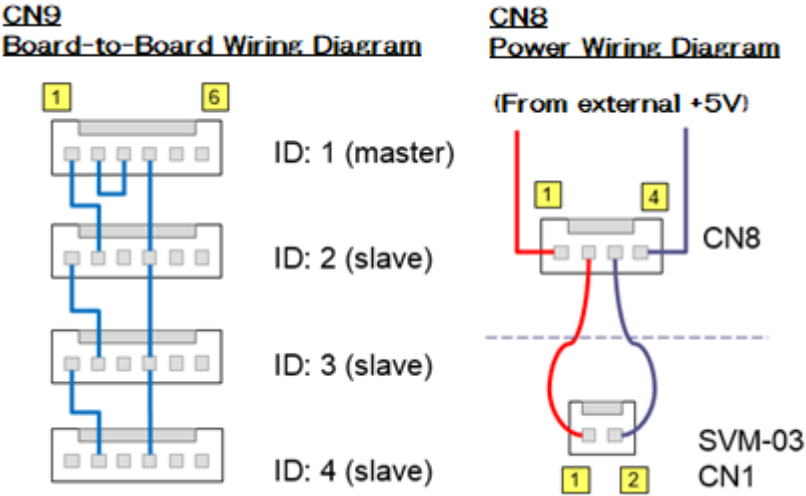
（Bottom side / Part view）

5.2.　　Board Photo

5.3.　　Wiring Example for 4CH Synchronous Capture System

By wiring via CN9, the GPI pin signals can be shared by multiple boards. By inputting frame synchronization signals to the GPI pins and using the corresponding cameras, a multi-channel synchronized capture system can be constructed. The following is an example of wiring.

5.4.　Modification of Differential Input with FAKRA Connector