GEO GW5410/5210 ISP Board
(NV065-A)
Hardware Specification

Rev. 2.0

NetVision Co., Ltd.

Update History

Revision	Date	Description	
1.0	25. Apr., 2022	New File (Equivalent to Japanese version Rev.1)	K. Orikasa
2.0	21. Jun., 2022	Description Correction (Equivalent to Japanese version Rev.2)	R. Sugo

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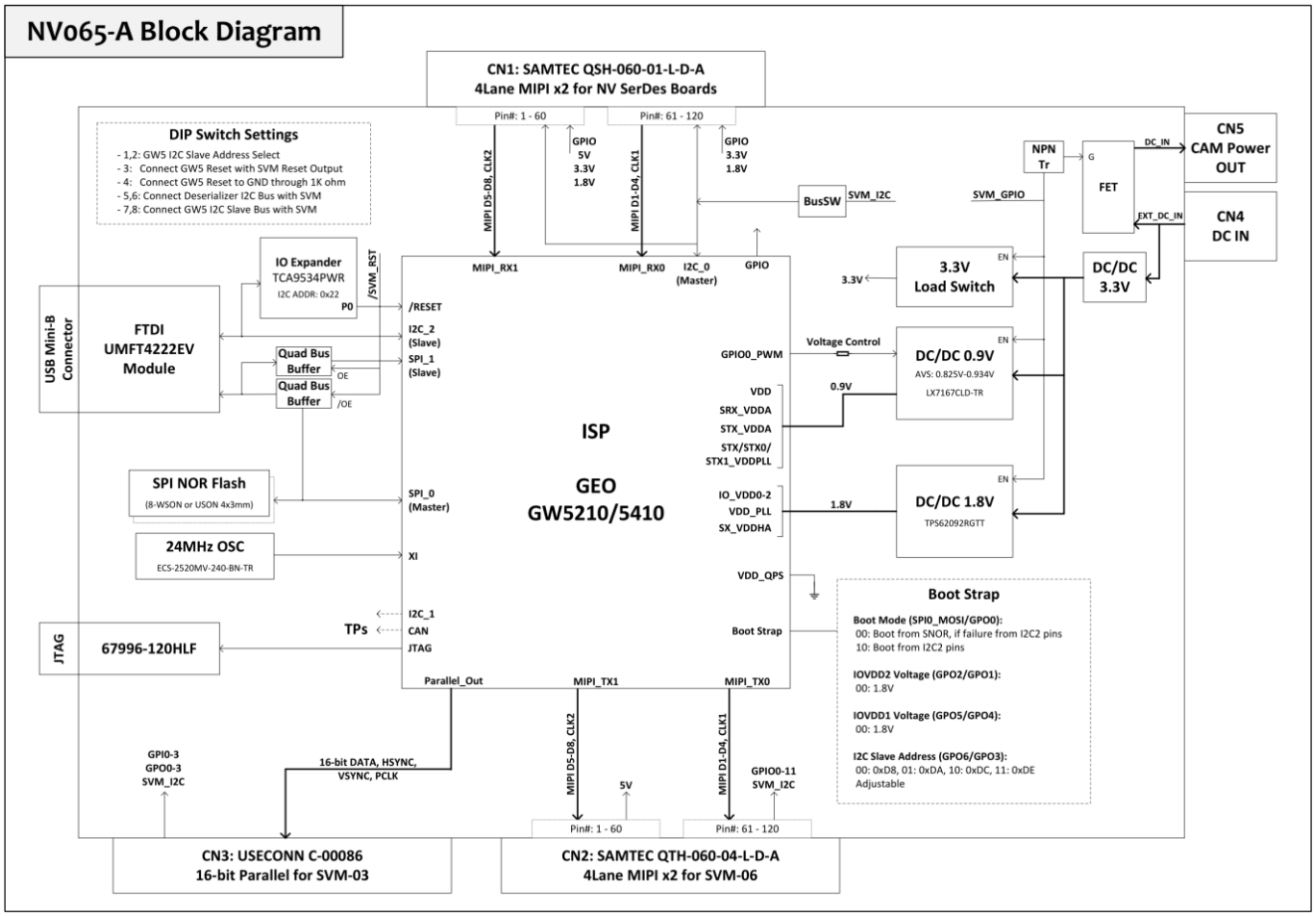
1. Overview

This document is a hardware specification of NV065-A board, which has MIPI input/output and parallel output, and processes the input video through GEO GW5 ISP for output. This board has two types of configurations, NV065-A-E (GW5210-Board) has GW5210 as ISP, while NV065-A-G (GW5410-Board) has GW5410.

Block Diagram



This board has two MIPI inputs as video input sources, each of which is connected to the ISP. The MIPI input connector (CN1) connects to our various Deserializer boards. Two video outputs, MIPI and 16-bit parallel, are provided. The MIPI output connector (CN2) is connected to our SVM-06 board, and the 16-bit parallel output connector (CN3) is connected to our SVM-03 board. Both connectors are exclusively connected.

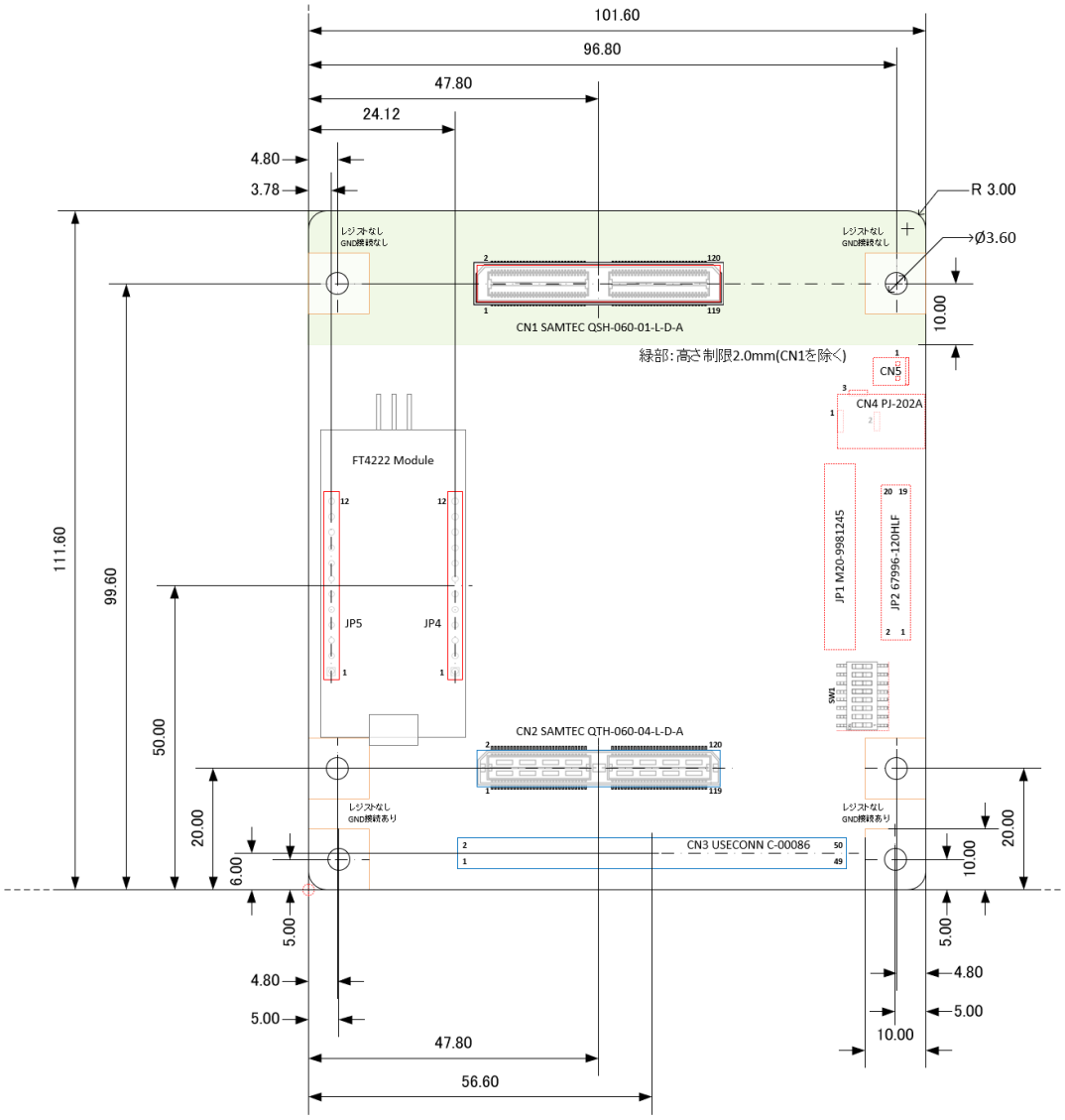
The operating power supply for this board is supplied from the DC jack (CN4) and is supplied to the various ICs via an internal step-down circuit. At the same time, the voltage input from CN4 is output to CN5 via a FET to power the camera on the Deserializer board connected to CN1. The gate of the FET is controlled by the SVM board. ISP settings, FW updates, etc. are done from a PC connected to the FTDI FT4222 module mounted on the board via a USB cable.

2. Substrate Shape

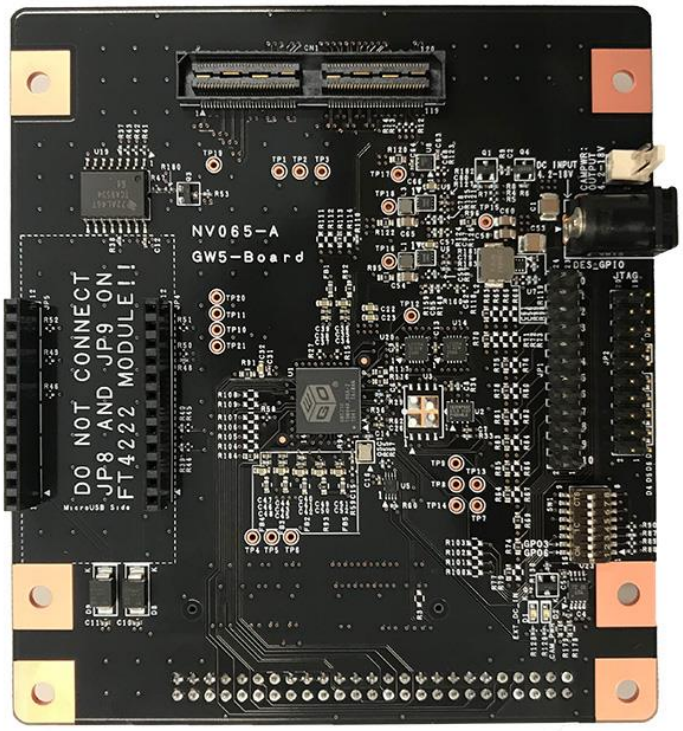
2.1. Substrate dimensions

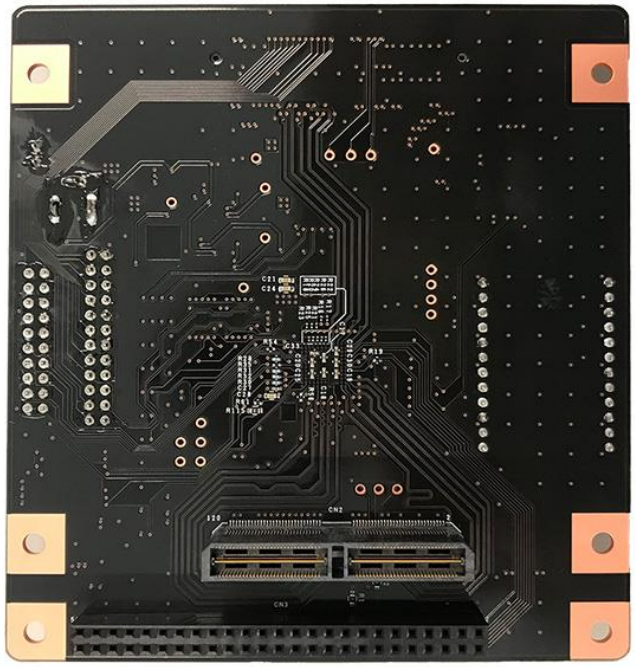
The board dimensions and main component layout are shown in the figure below. Connector pin numbers and pin assignments are shown in the "Connector Details" section.

Main Parts Arrangement Diagram



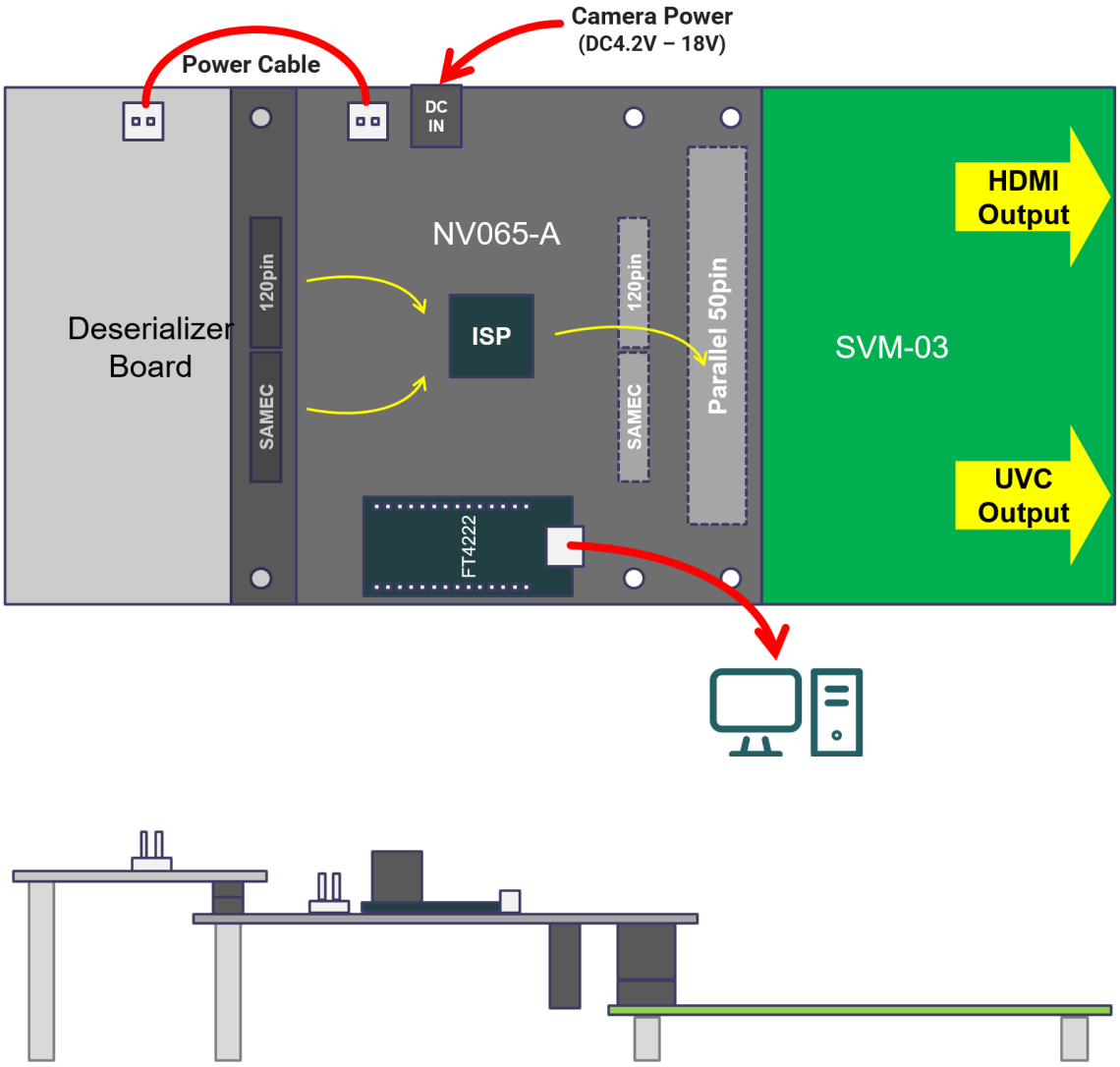
2.2. Photographs





3. Substrate Details

3.1. Board Connection Diagram (Parallel connection)

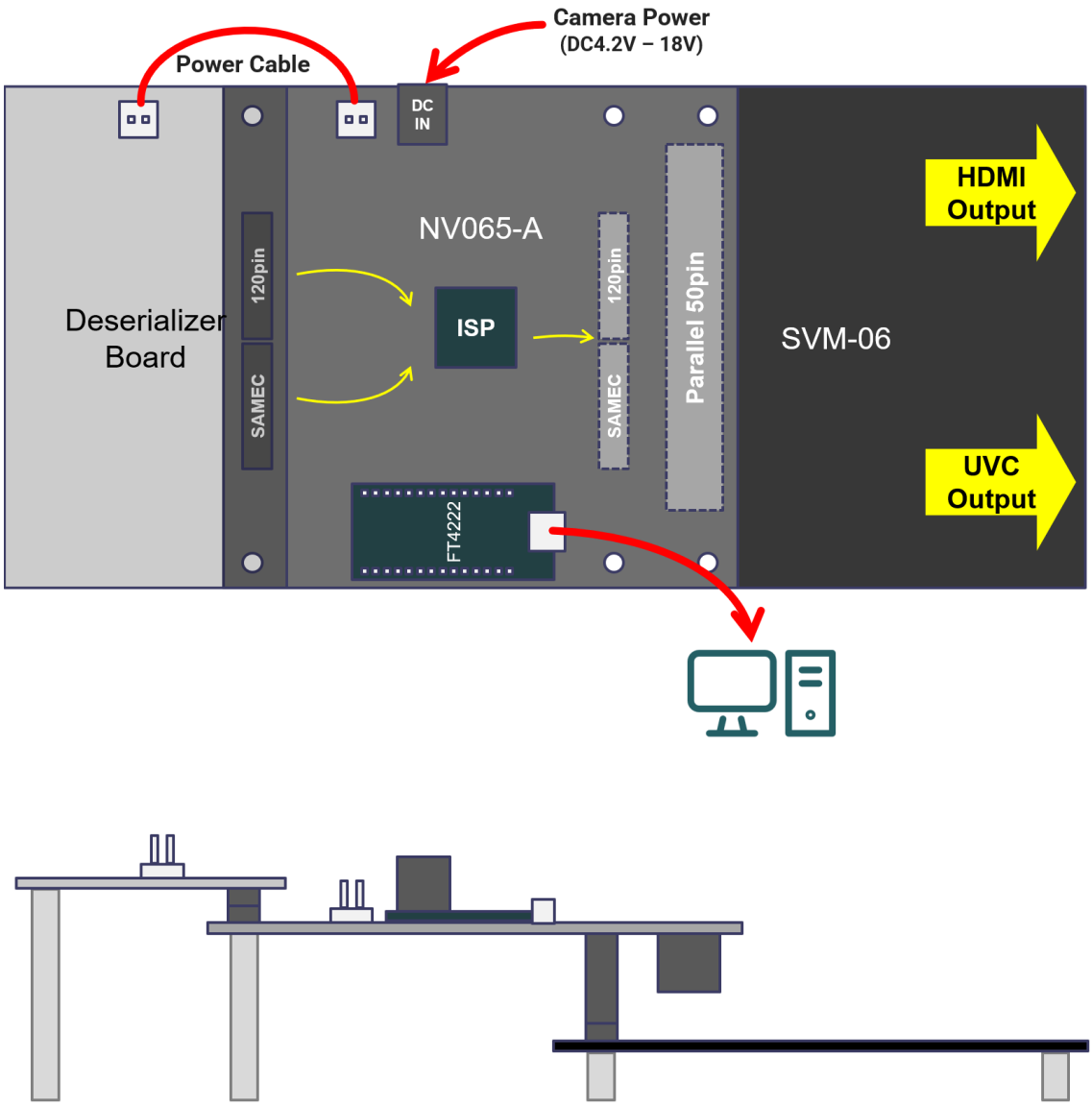


The above shows the connection diagram when connected to SVM-03 and using 16-bit Parallel as the video output interface.

Connect an AC adapter to the DC jack (CN4) as power supply for this board. The input power is connected to the camera power connector on the deserializer board through CN5 via FET. Therefore, the input voltage must match the camera power supply voltage. The input voltage should be between 4.2V and 18V. The 16-bit Parallel output connector (CN3) is connected to SVM-03 and outputs video signals to SVM-03. The FT4222 module and PC are connected via a Micro USB cable, and GEO tools are used for writing FW and adjusting image quality.

Either HDMI output or UVC output is selected for video output from SVM-03 with the DIPSW (SW2) on SVM-03 board. #1, 8 ON -> UVC Mode, #1 ON -> HDMI Mode

3.2. Board Connection Diagram (MIPI connection)



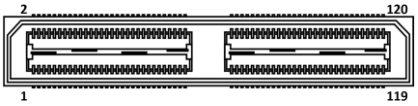
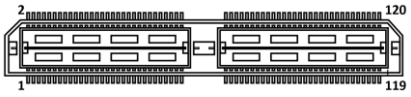
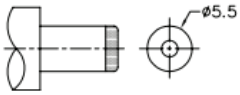
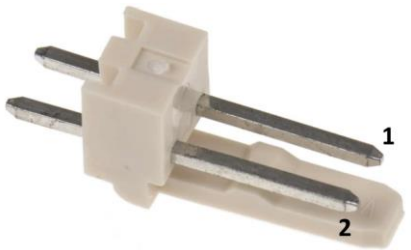
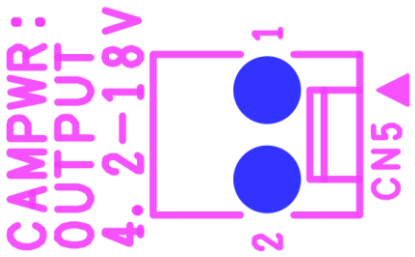
The above shows the connection diagram when connecting to SVM-06 and using MIPI as the video output interface. Connect an AC adapter to the DC jack (CN4) as power supply for this board. The input power is connected to the camera power connector on the deserializer board through CN5 via FET. Therefore, the input voltage must match the camera power supply voltage. The input voltage should be between 4.2V and 18V.

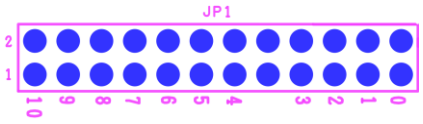
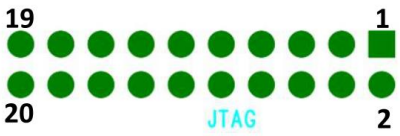
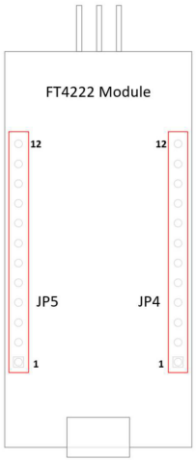
The MIPI output connector (CN2) is connected to SVM-06 and outputs video signals to SVM-06.

The FT4222 module and PC are connected via a Micro USB cable, and GEO tools are used for writing FW and adjusting image quality.

Video output from SVM-06 supports simultaneous UVC output in HDMI Mode. (SW2: ALL OFF)

3.3. Connector List

CN#	Use	Model Number	Pin-out
CN1	MIPI 4-Lane Dual Input	SAMTEC QSH-060-01-L-D-A	
CN2	MIPI 4-Lane Dual Output	SAMTEC QTH-060-04-L-D-A	 Top view
CN3	16-bit Parallel Output	USECONN C-00086 or equivalent	 Top view
CN4	Power Input	CUI Devices PJ-202A	 Φ2.1mm, Center Plus  MATING PLUG Jack Insertion Depth: 9.0 mm
CN5	Power Output	Molex 22-04-1021	 

CN#	Use	Model Number	Pin-out
JP1	GPIO Connection Selection	HARWIN M20-9981245 or equivalent	
JP2	JTAG	Amphenol 67996-120HLF	
JP4, JP5	FT4222 Module	USECONN FH-1x12SG/RH	

3.4. Switch Settings

The ISP setting switch SW1 is mounted on this board.

SW#	Name	Default Setting	Function
1	W5_GPO6	OFF	Switch Bootstrap Hi/Lo, which sets the I2C Slave Address when booting in SNOR Recovery Mode. ON: Hi, OFF: Lo [W5_GPO6] - [W5_GPO3] Lo - Lo : 0xD8 (default) Lo - Hi : 0xDA Hi - Lo : 0xDC Hi - Hi : 0xDE
2	W5_GPO3	OFF	
3	1V8_REG_PG	ON	Connect the ISP reset pin to /SVM_RST. This setting allows the SVM board to put the ISP into reset state. The default setting is ON to release the ISP reset after power is supplied to the ISP and the camera. ON: ISP can be reset from SVM board OFF: ISP cannot be reset from SVM board
4		OFF	Pull down the reset pin of the ISP with 1kΩ. This setting ensures that the ISP is always in the reset state. ON: ISP is always in reset state OFF: Normal state
5	DES_I2C0_SCL	OFF	Connect the I2C bus of the deserializer board to the SVM board. *This is usually not used because the deserializer is normally set from the ISP. ON: I2C bus is connected to SVM board OFF: I2C bus is disconnected from SVM board
6	DES_I2C0_SDA	OFF	
7	FT_I2C_SCL	OFF	Connect the I2C Slave bus of ISP to SVM board. *The ISP settings are made from the FT4222 module and are not normally used. ON: I2C bus is connected to SVM board OFF: I2C bus is disconnected from SVM board
8	FT_I2C_SDA	OFF	

3.5. LED Indicator

LED#	Name	Function
D1	EXT_DC_IN	Lights up when power is supplied to the DC jack.
D2	CAM_PWR	Lights up when the camera power supply is enabled from the SVM GPIO.

3.6. FT4222 Module

FTDI FT4222 module (UMFT4222EV) is inserted into JP4 and JP5 on this board. Since there is an orientation for insertion, it is necessary to insert the module so that the Micro USB connector is on the "Micro USB Side" of the board silk.

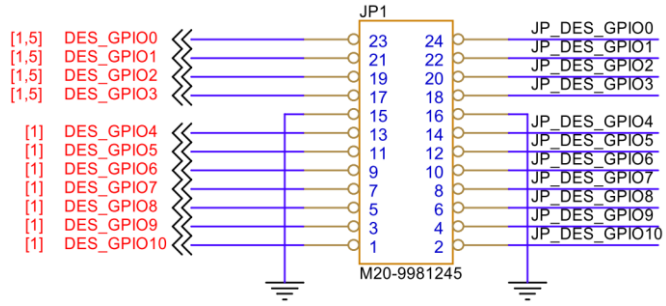
The FT4222 module has a built-in 1.8V voltage regulator for IO voltage, but since the IO voltage of this board is 1.8V, it is not used when connecting to this board. 3.3V is also supplied from this board as the VCC power supply for FT4222. Therefore, JP8 and JP9 on the module must be removed before use. JP2 and JP3 are jumper pins for setting the operation mode. When we ship the FT4222 module together with the FT4222 module, the above settings are reflected in the module.

3.7. GPIO

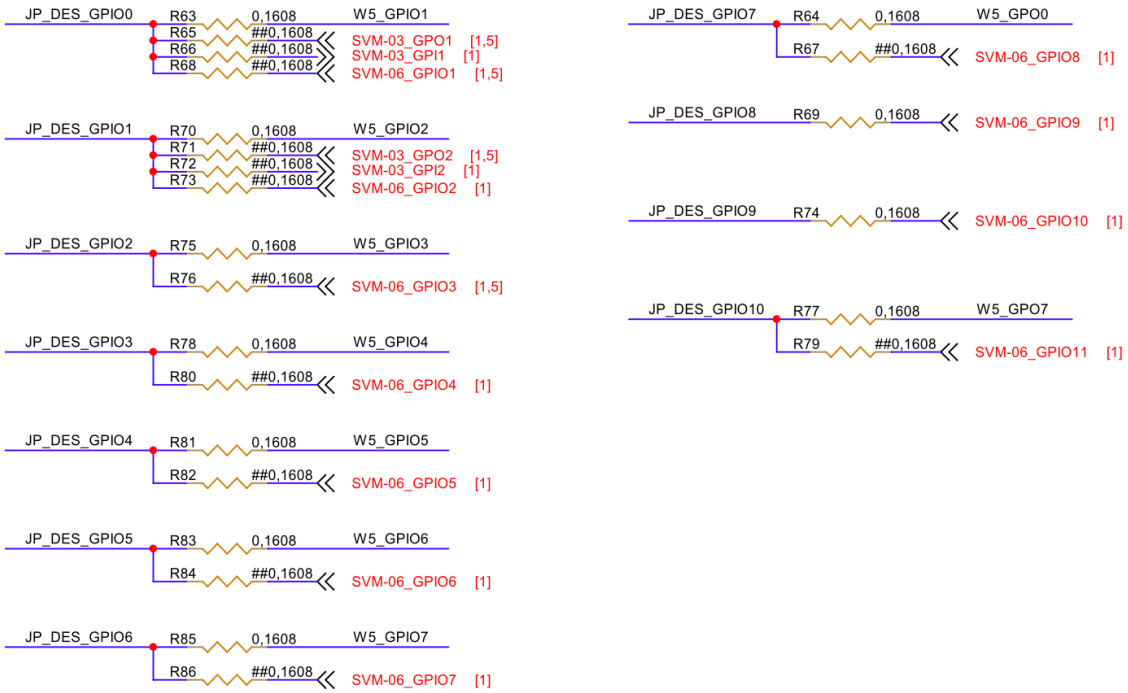
This board has a circuit configuration that allows the connection destination of the deserializer IC on the deserializer board to the GPIO to be selected from each GPIO pin on the ISP or each GPIO pin on the SVM board. There are two connection paths: one is via a 0Ω resistor to the GPIO (DES_GPIO[0:10]) connected to the deserializer board, and the other is via JP1. The path connected through JP1 is in a disconnected state because all jumper pins are removed as shipped.

◆Connection path: via JP1

The GPIOs (DES_GPIO[0:10]) leading to the deserializer board are connected to JP_DES_GPIO[0:10] through JP1. All jumper pins on JP1 are removed and disconnected between DES_GPIO* and JP_DES_GPIO* when shipped.



JP_DES_GPIO[0:10] is connected to each GPIO pin of ISP and GPIO of SVM board via 0Ω resistor. This is a 1608 size resistor, so it is used by replacing it appropriately as needed.

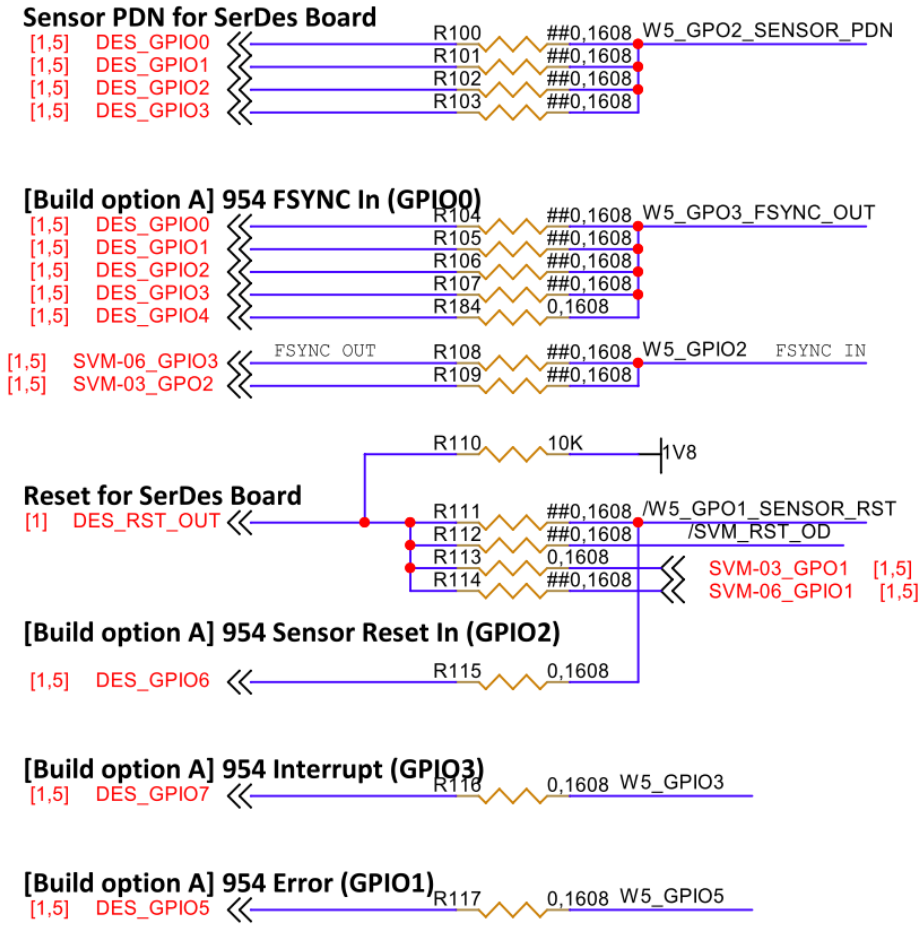


◆Connection path: via 0Ω resistor

The path directly connected by the 0Ω resistor is configured differently for NV065-A-E and NV065-A-G.

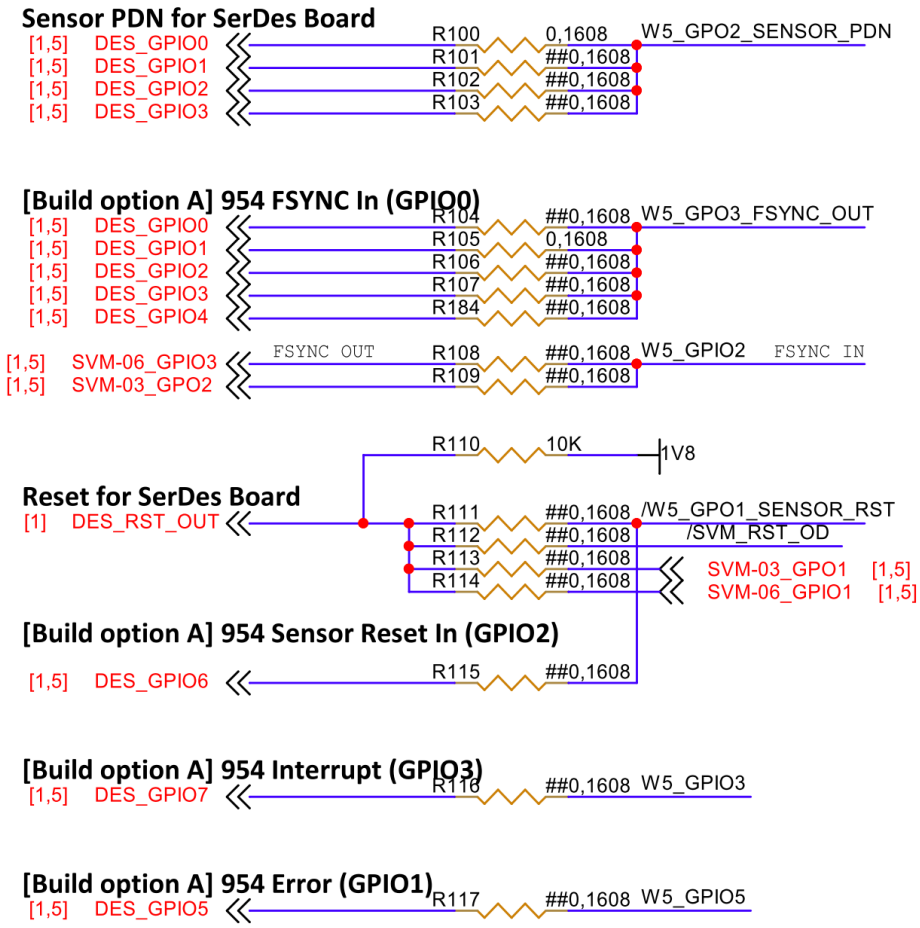
- The NV065-A-E board has a circuit configuration designed for connection to our FPI-954-HF board (with FPD Link III DS90UB954 deserializer).

Deserializer Side	ISP Board Side	Note
DES_GPIO4	W5_GPO3_FSYNC_OUT	To 954 FSYNC Input
DES_GPIO5	W5_GPIO5	To 954 Error Output
DES_GPIO6	/W5_GPO1_SENSOR_RST	To 954 Sensor Reset Input
DES_GPIO7	W5_GPIO3	To 954 Interrupt Input



- The NV065-A-G board has a circuit configuration similar to GEO's Evaluation Board.

Deserializer Side	ISP Board Side	Note
DES_GPIO0	W5_GPO2_SENSOR_PDN	
DES_GPIO1	W5_GPO3_FSYNC_OUT	



3.8. ISP Firmware

In order to use this board, the ISP firmware must be written in advance. When writing the firmware, connect the FT4222 module to a PC and use GEO's writing tool. For more information about the tool and how to use it, please refer to the official GEO documentation. Since this board has the same configuration as GEO's Evaluation Board, the reset to ISP is automatically performed from FT4222 when writing firmware. Therefore, no special settings with DIPSW or jumper pins are required.

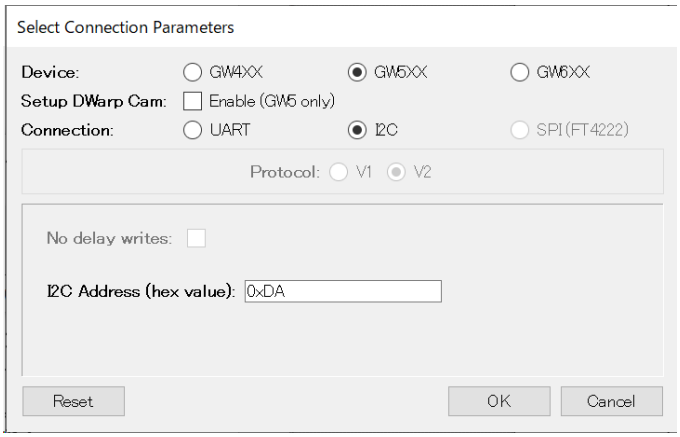
[Reference] We use the following command when writing. (as of 2022/04/18)

. ¥flash_util.exe -w0 -tw5 <file path of firmware>.

3.9. I2C Slave Address

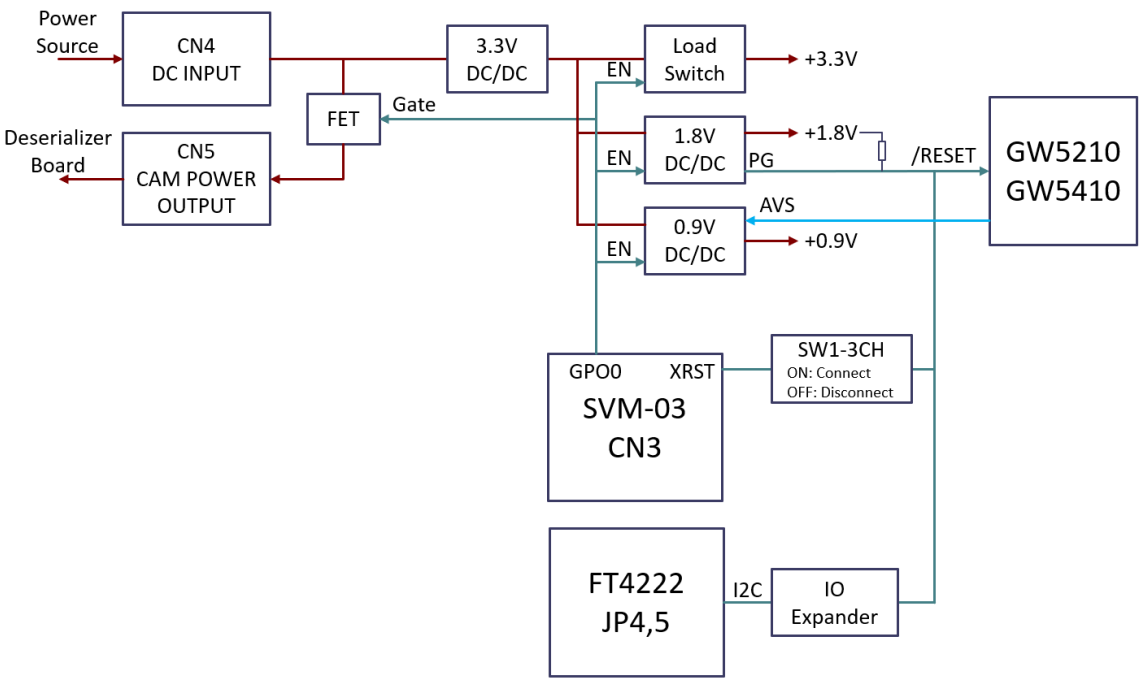
The I2C Slave Address for control from the ISP Host is 0xDA (8bit).

We confirmed that control is possible using GEO ISPTune with the parameter settings shown in the figure below.

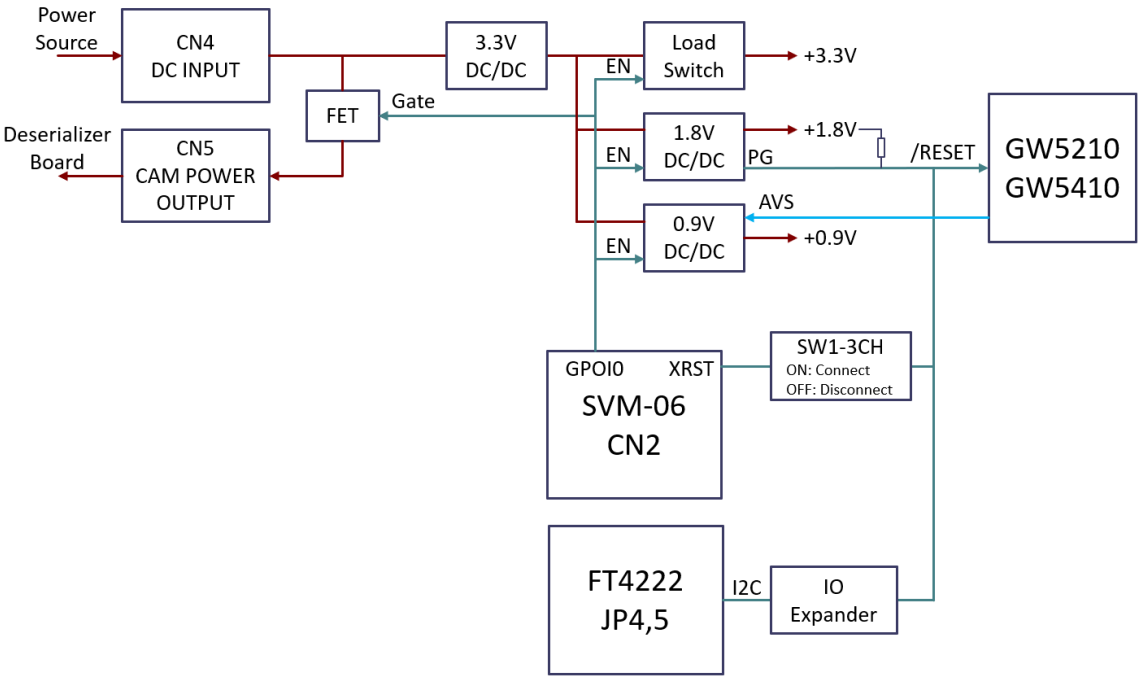


3.10. Power supply circuit configuration

◆SVM-03 (Parallel Output from ISP)



◆SVM-06 (MIPI Output from ISP)



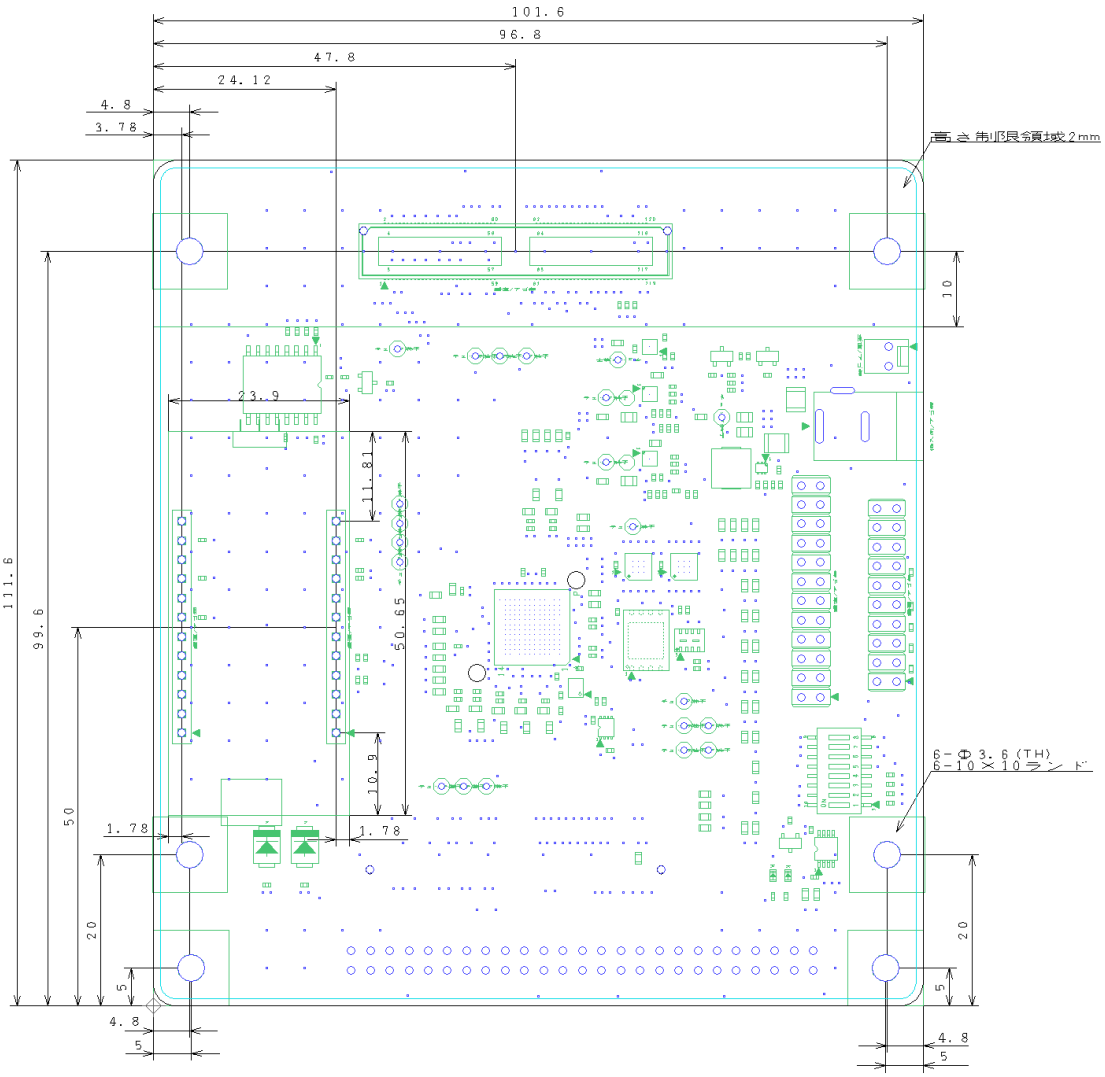
4. Specifications

Item	Value	Description
Dimensions	101.6 x 111.6 mm	
Power supply	DC 4.2-18V Center Plus, Φ2.1mm / 5.5mm Plug	Also serves as camera power supply via CN5 Internal power supply is generated by a regulator on-board
ISP core power supply	DC +0.9V	Voltage dynamic control from ISP with AVS circuitry
IO voltage	DC +1.8V	
Image input	2x MIPI CSI-2 4-lane 1.5Gbps/lane	Input from CN1
Image output	MIPI: 2x MIPI CSI-2 4-lane 1.5Gbps/lane Parallel: 1x 16-bit parallel 150MHz Interface Clock	MIPI: Output from CN2 Parallel: Output from CN3
Serial communication	I2C SPI	Refer to the schematic for internal wiring

5. Appendix

5.1. Dimensions

(Top side / Part view)



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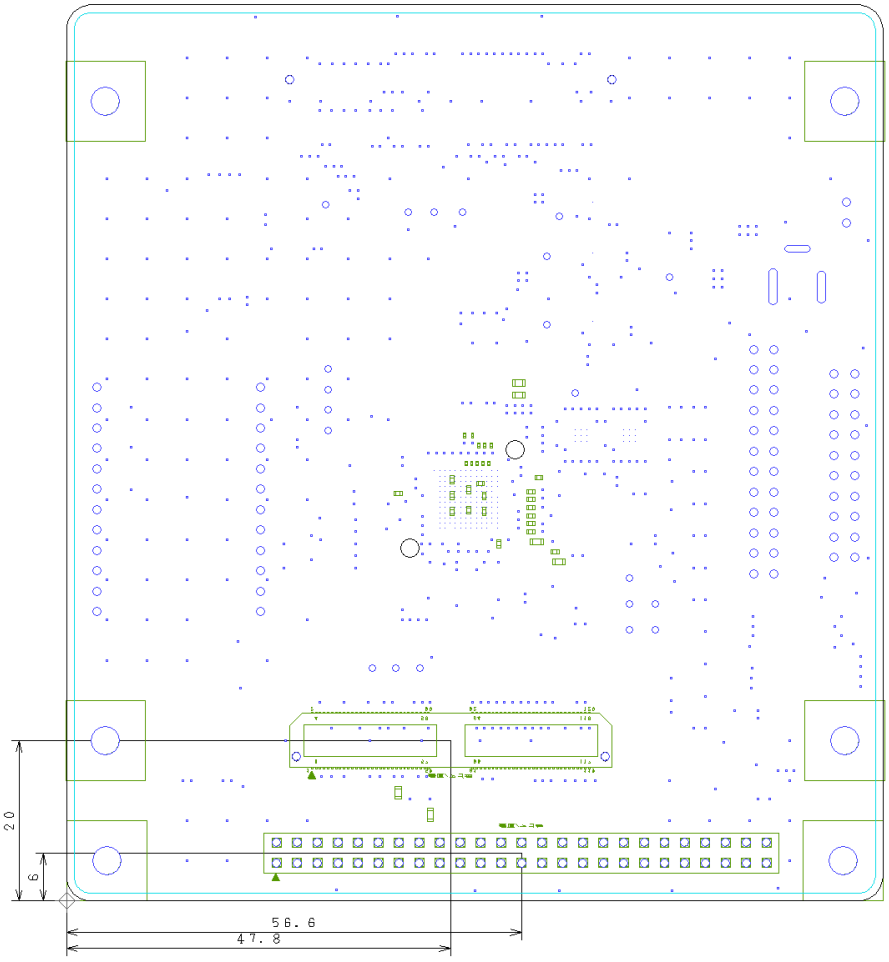
(Bottom side / Part view)



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