NV070-B
(MIPI-Uni-Conn)
Hardware Specification

Rev. 1

NetVision Co., Ltd.

Revision History

Rev.	Date	Description	Author
Rev. 1	2026/05/18	Initial release (Translated from Japanese Rev.2)	Kimura

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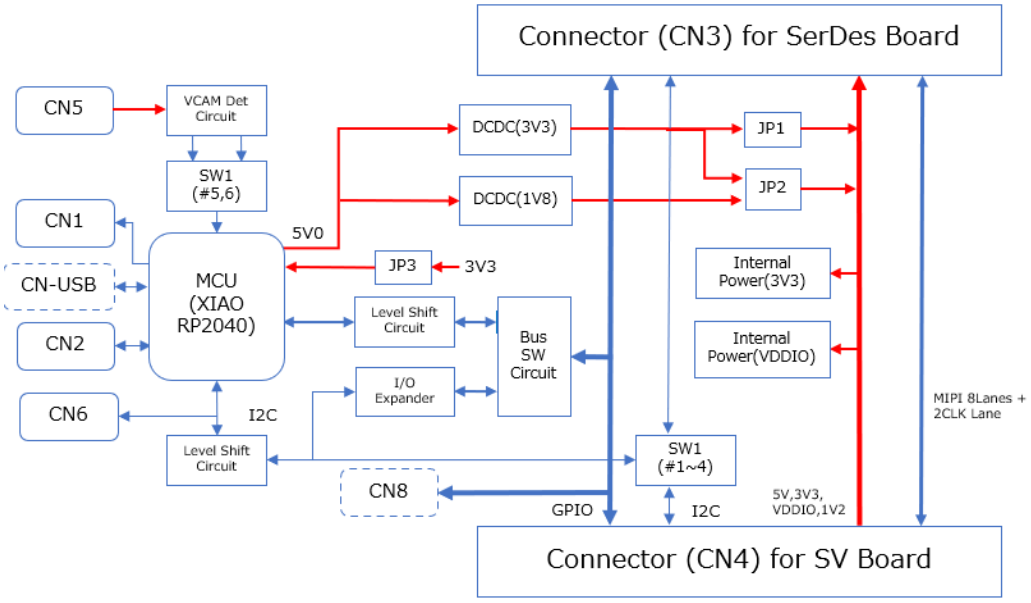
1. Overview

This document is the hardware specification for the NV070-B MIPI-Uni-Conn. The NV070-B board (hereafter referred to as "this board") is equipped with a XIAO RP2040 microcontroller. By connecting to our SV boards and SerDes boards, it can add various functions such as I2C Slave response to the target and use in EMC testing under standalone operation.

For development-related information, the Raspberry Pi Pico, which uses the same microcontroller, can be used as a reference, making firmware customization easy.

- Block Diagram

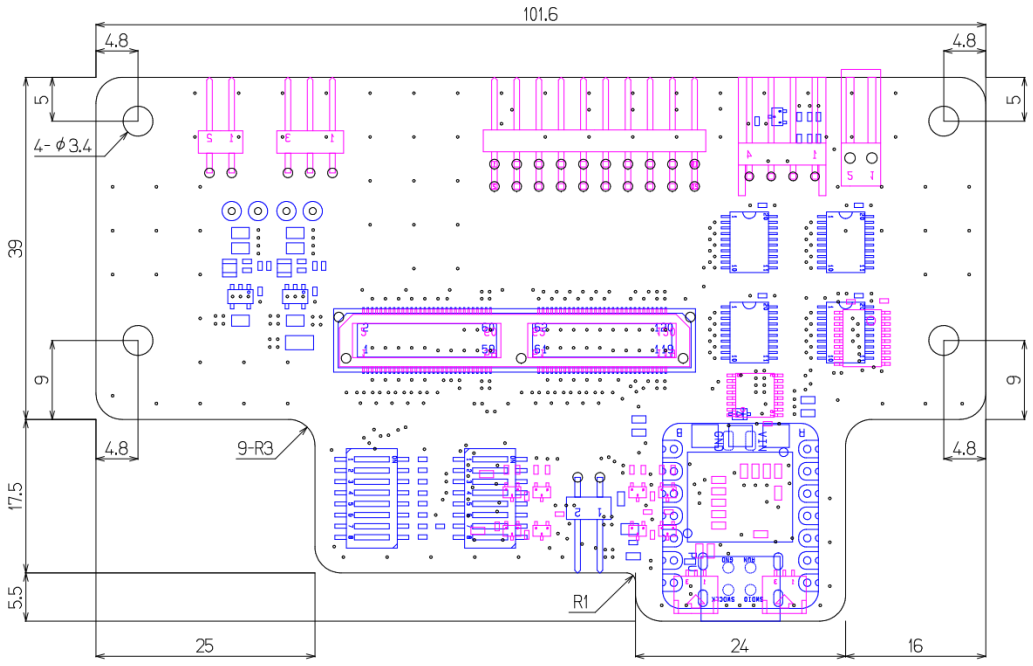


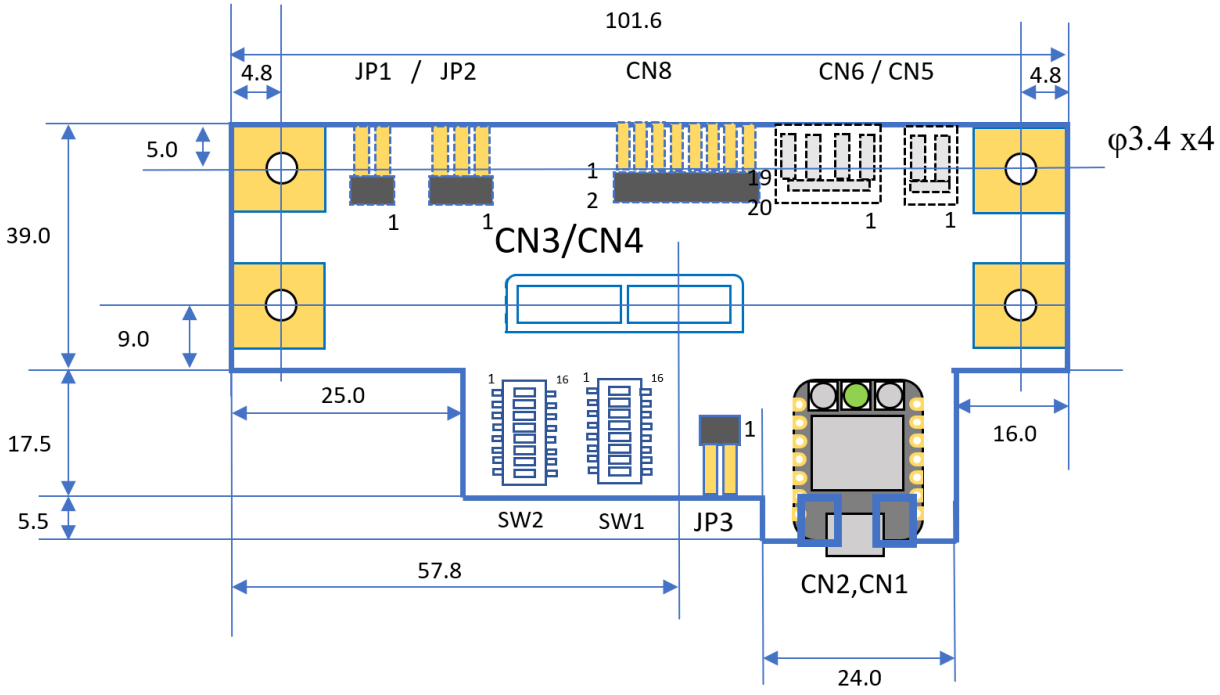
The figure above shows the block diagram of this board. The GPIO and I2C connections to the XIAO RP2040 are made via the on-board bus switch IC, level shifter IC, and I/O expander. For standalone operation, disconnect this board from the SV board, open JP3, and short JP1 and JP2.

2. Board Layout

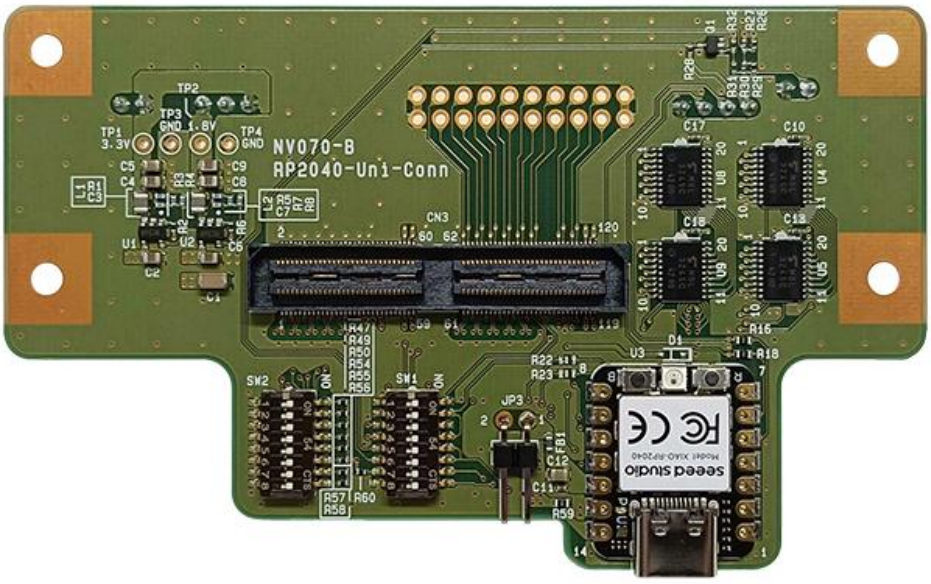
2.1 Connector Placement

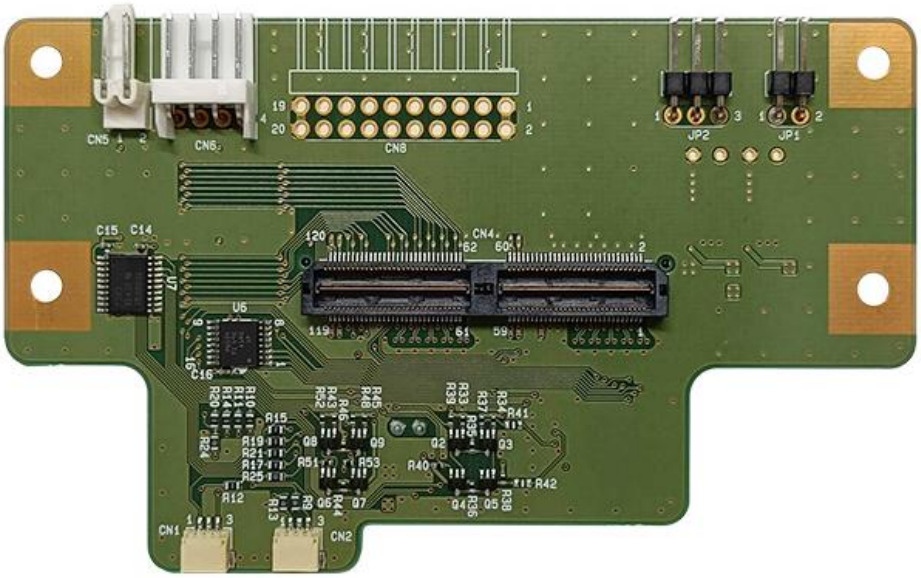
The figure below shows the placement of the main connectors on this board. For connector pin numbers and pin assignments, refer to "Connector List" and "Connector Details".





2.2 Board Photos

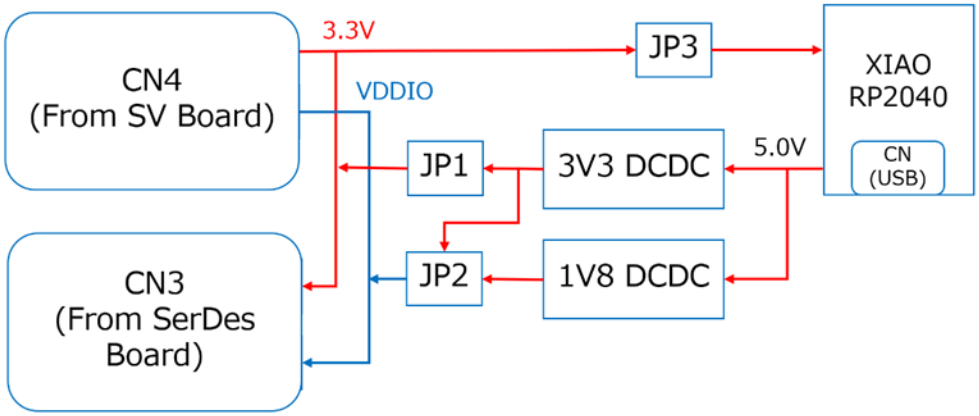




3. Details

3.1 Power Supply

- Power Block Diagram



When used in connection with the SV board, this board is powered through CN4. For standalone operation, disconnect this board from the SV board, open JP3, and short JP1 and JP2. When USB is connected to the XIAO RP2040, the on-board DCDC generates 3.3V and 1.8V for the target.

3.2 Serial (I2C) Communication

The I2C bus on this board is connected to both the target and the SV board, and can be used for I2C response emulation. Because the I/O of the XIAO RP2040 operates at 3.3V, the I2C bus is connected via an on-board level shifter circuit. The I2C bus connection is configured by the DIP SW settings. For details, refer to the Block Diagram, Switch Settings, GPIO Connection Table, and circuit diagram.

3.3 Connector List

The table below lists the connectors on this board.

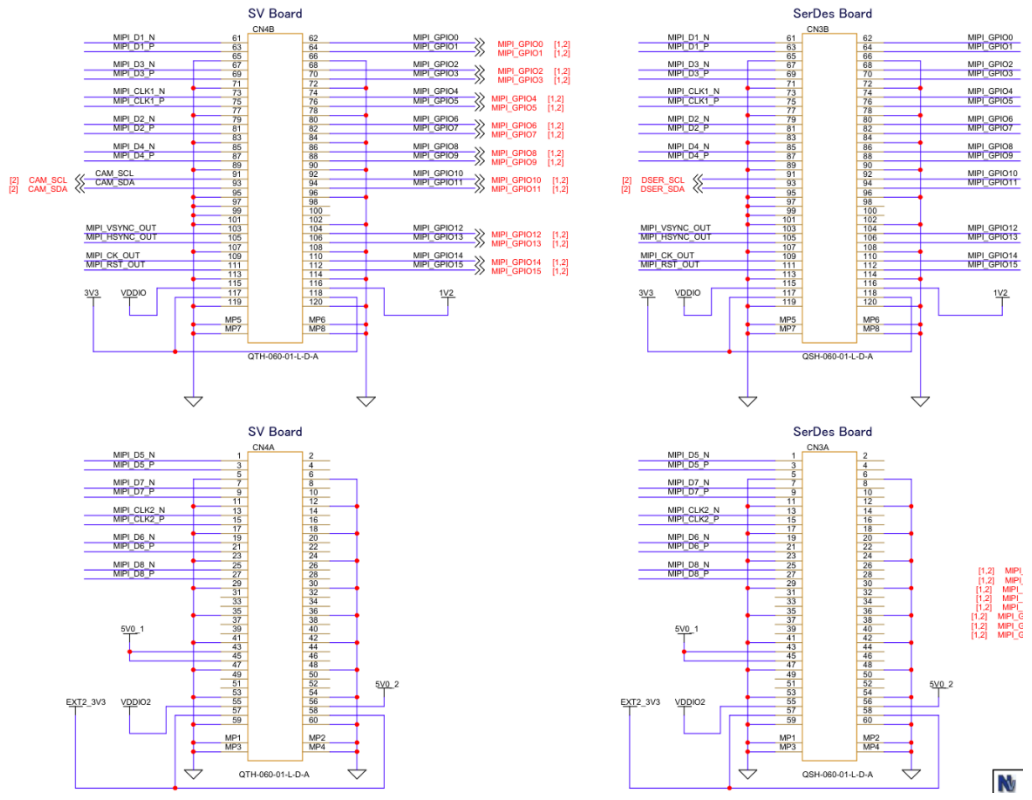
- Connector List

CN#	Mounting	Use	Part Number
CN1		MCU debug UART port	SM03B-SRSS-TB
CN2		MCU debug SWD port	SM03B-SRSS-TB
CN3		For target board connection	QSH-060-01-L-D-A
CN4		For SV board connection	QTH-060-01-L-D-A
CN5		Camera power detection connector	0022051022
CN6		I2C I/O connector	171826-4
CN8	Not mounted	GPIO I/O connector	PH2RA-20-UA

3.4 Connector Details

This section describes the pin assignments and uses of the connectors on this board.

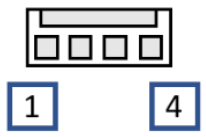
- CN4/3 (QTH-060-01-L-D-A/QSH-060-01-L-D-A)



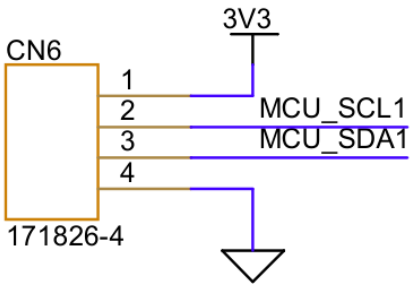
(Circuit diagram)

– For pin assignments, refer to the circuit diagram of this board and the SV board hardware manual.

- CN6 (171826-4)



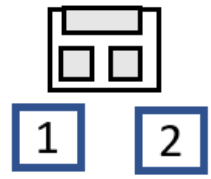
(Top view)



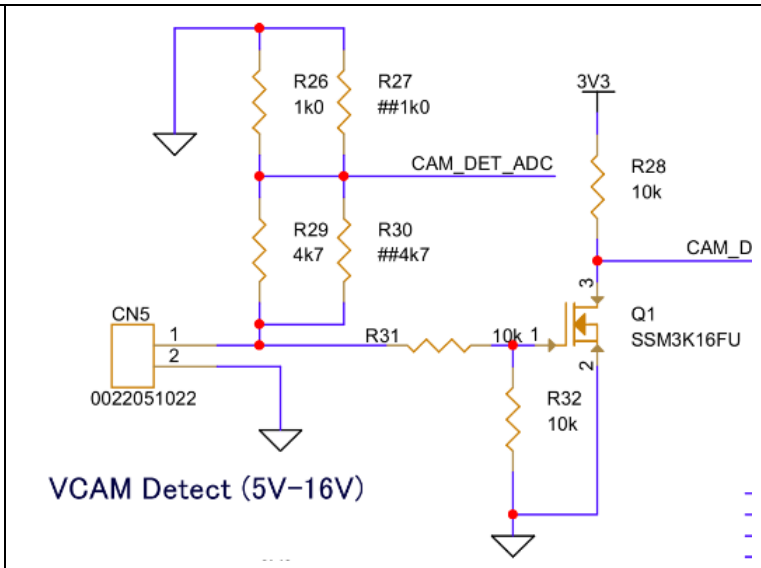
(Circuit diagram)

– The I/O voltage of MCU_SCL1/SDA1 is 3.3V.

- CN5 (0022051022)



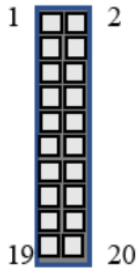
(Top view)

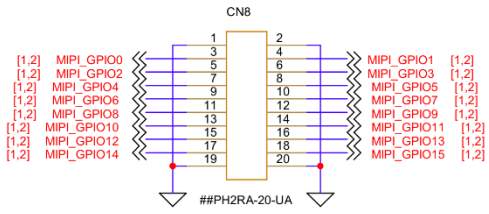


(Circuit diagram)

- A connector for camera power detection. Used when implementing camera power ON/OFF detection on the MCU.
- Input voltage range is 5V to 16V.
- Either the voltage divided by the on-board voltage divider circuit, or an H/L digital signal from the FET, can be input to the MCU. When inputting the voltage from the divider circuit, use the ADC function of the MCU.
- The signal input to the MCU can be switched by the DIP SW settings.

- CN8 (PH2RA-20-UA)





(Circuit diagram)

- Directly wired to the GPIO pins of CN3 and CN4.
- MIPI_GPIO0-15 operate at the I/O voltage configured on the SV board.

3.5 Switch Settings

This board has two DIP SWs (SW1 and SW2) for board configuration. They are used to configure GPIO connections and the external bus switch IC, among others. The tables below show the functions of SW1 and SW2.

- SW1 Functions

SW#	Name	Function
1	MCU_SCL	ON: Connects the MCU I2C bus to the CN3 I2C bus.

2	MCU_SDA	OFF: Disconnects the I2C bus.
3	SCL	ON: Connects the CN4 I2C bus to the CN3 I2C bus.
4	SDA	OFF: Disconnects the I2C bus.
5	MCU_CAM_DET_B	SW#5 | SW#6
6	MCU_CAM_DET_ADC	OFF | OFF | Disconnects the detection circuit from MCU_P28. ON | OFF | Connects the digital camera-power-detection signal to MCU_P28. OFF | ON | Connects the analog camera-power-detection signal to MCU_P28. ON | ON | Reserved (do not set)
7	TCA9554_INT	ON: Connects the TCA9554_INT interrupt pin to MCU_P27 via the level shifter. OFF: Disconnects.
8	MCU_P3	ON: Connects MCU_P3 to GND. OFF: Disconnects.

- If not specified at time of order, the default is #1, 2, 3, 4 ON.

- SW2 Functions

SW#	Name	Function
1	BUSSW1_OE_B	Configures the connection between CN3/CN4 MIPI_GPIO and MCU GPIO. The connection is switched in 8-bit units. SW#1 | SW#2 OFF | OFF | Disconnects. ON | OFF | Connects GPIO0-7 to the MCU GPIO. OFF | ON | Connects GPIO8-15 to the MCU GPIO. ON | ON | Reserved (do not set)
2	BUSSW2_OE_B	
3	BUSSW3_OE_B	Configures the connection between CN3/CN4 MIPI_GPIO and the I/O expander. The connection is switched in 8-bit units. SW#3 | SW#4 OFF | OFF | Disconnects. ON | OFF | Connects GPIO0-7 to pins P0-P7 of the I/O expander. OFF | ON | Connects GPIO8-15 to pins P0-P7 of the I/O expander. ON | ON | Reserved (do not set)
4	BUSSW4_OE_B	
5	TXS0108_OE	ON: Disabled. OFF: Enables the external level shifter circuit.
6	TCA9554_A0	Sets the address of the serial-to-parallel converter IC. Can be set from

7	TCA9554_A1	0x20 to 0x27 in 3-bit units. SW#6 | SW#7 | SW#8 OFF | OFF | OFF | 0x27 ON | OFF | OFF | 0x26 OFF | ON | OFF | 0x25 ON | ON | OFF | 0x24 … ON | ON | ON | 0x20
8	TCA9554_A2	

- If not specified at time of order, the default is ALL OFF.
- For parallel pin connection assignments, refer to the circuit diagram or the GPIO Connection Table.

3.6 Jumper Settings

This board has three jumper pins. The table below shows the functions of the jumpers.

- JP1-JP3

JP#	Name	Function
JP1	EXT_3V3	1-2 Short: Uses the on-board generated 3.3V as the power source. 1-2 Open: Disconnected. (Default)
JP2	EXT_VDDIO	1-2 Short: Uses the on-board generated 3.3V as VDDIO. 2-3 Short: Uses the on-board generated 1.8V as VDDIO. 1-2-3 Open: Disconnected. (Default)
JP3	MCU_POWER	1-2 Short: Connects the MCU module 3.3V supply to the board 3.3V supply. (Default) 1-2 Open: Disconnects the MCU module 3.3V supply from the board 3.3V supply. Open this jumper when writing firmware via USB.

- JP1 and JP2 are shorted when operating in standalone mode without connecting to the SV board.
- Do not short JP1 or JP2 while the SV board is connected.
- Do not short JP1 or JP2 while JP3 is shorted.

3.7 GPIO Connection Table

The GPIO and I2C between the MCU and CN3/4 are connected via the external bus switch IC, level shifter, I/O expander, and DIP SW. The I/O expander is used when controlling target-board GPIO from the MCU through I2C serial communication. The table below shows the GPIO connection table.

- GPIO Connection Table

SV Board	MCU	Remarks
MIPI_GPIO0 / MIPI_GPIO8	P26 (Module Pin 1)	Connection switched in 8-bit units by the bus switch; connected via a level shifter, or via the I/O expander.
MIPI_GPIO1 / MIPI_GPIO9	P27 (Module Pin 2)	Same as above
MIPI_GPIO2 / MIPI_GPIO10	P29 (Module Pin 4)	Same as above
MIPI_GPIO3 / MIPI_GPIO11	P0 (Module Pin 7)	Same as above
MIPI_GPIO4 / MIPI_GPIO12	P4 (Module Pin 10)	Same as above
MIPI_GPIO5 / MIPI_GPIO13	P1 (Module Pin 8)	Same as above
MIPI_GPIO6 / MIPI_GPIO14	P2 (Module Pin 9)	Same as above
MIPI_GPIO7 / MIPI_GPIO15	P3 (Module Pin 11)	Same as above
	P28 (Module Pin 3)	Connected to the external camera-power-detection circuit
CAM_SCL / DSER_SDA	P6 (Module Pin 5)	Connected via DIP SW and level shifter
CAM_SDA / DSER_SCL	P7 (Module Pin 6)	Connected via DIP SW and level shifter

4. MCU

4.1 MCU Factory Default Behavior

The firmware is not written (Flash-ROM is erased). When firmware is not written, all I/O pins are in High-Z with a weak Pull-down (approximately 50k to 80kΩ).

4.2 MCU Programming Procedure

When writing firmware via USB connection, always open JP3 on the board. Writing is performed via Type-C or JTAG. For the procedure to write to the MCU Flash-ROM, refer to the XIAO RP2040 web page.

5. Main Specifications

Item	Value	Remarks
Board dimensions	101.6 x 62.0 mm	Excludes connectors.
I/O voltage	DC +1.8V to 3.3V	Match the I/O voltage with the target.
Camera power detection voltage	DC +5.0 to 16V	

- The specifications above apply only to model NV070-B MIPI-Uni-Conn.
- Hot-plugging is not supported. Do not connect or disconnect connectors while the SV board is powered ON.
- When writing firmware to the MCU via USB, open JP3.