

RZ/A2M Evaluation Lite H/W User's Manual

Rev 1.03 20200417

Hardware Manual

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Notices on use and handling

You should follow those remarks to use this product safely. If you are not following those remarks, you may cause electrical shock, injury, fire or trouble.



Lightning

While lightning has occurred , never installing the product or connecting cables, it may cause an electrical shock by the thunderbolt.



Handle with care

Does not either drop, hit or give a strong shock to the product.



Caution to electrostatic discharge

This product is mounted electrostatic sensitive parts.
The parts are possibly destroyed by electrostatic discharge; do not touch directly to contact area of the connectors and the parts.



Caution to connect or dis-connect cables

First turn off the power to this product to connect connectors on board and cables. If connecting or dis-connecting cables to this board without turn off the power, it may destroy this board and connected product.



Pay attention to touch this product

While the product is turned on or straight after the operation, it may cause an electrical shock or scald. (Some parts become higher temp.)



Unplug the Power source

Immediately unplug from the Power source when it smells or smokes. If continually keep supply power on while it smells or smokes, it may cause fire, an electrical shock or serious influence on this board and other equipments.



Do not use or store in the following places.

- Do not expose in direct sunlight**
- Do not place where the temperature changes rapidly and wets with dew.**
- Do not expose to rain or moisture.**
- Do not place rolled or vibrated.**
- Do not place dusty or carpet laid places cause electrostatic obstacles.**
- Do not place where corrosive gas outbreaks.**
- Do not directly place this product on the electro conductive materials (it may cause trouble)**



Remark on operation of this product

The maximum operating temperature of this board is 40 degrees Celsius on case; it has to operate under this temperature (it may need air cooling system to operate in high temp.)

Revision history

Revision	Release date	Revised contents	Remarks
1.00	2019/Oct./24	Release	
1.01	2019/Dec/16	Correction is Memory Map of Table 2-2	
1.02	2020/Apr/02	Correction is Table -3-1, Figure 5-1-1	
1.03	2020/Apr/16	Add Figure 5-1-2 and Figure 5-1-3	

Content

1.	OVERVIEW	1
2.	BOARD SPECIFICATIONS	1
2.1.	PARTS AND SPECIFICATIONS	1
2.2.	MEMORY MAP	2
3.	BOARD EXTERNAL VIEW	3
3.1.	External View	3
3.2.	Board Size	4
3.3.	Parts Allocation	6
3.3.1.	PCB TOP Side	6
3.3.2.	PCB BOTTOM side	7
4.	BLOCK DIAGRAM	8
5.	FUNCTIONS	9
5.1.	POWER SUPPLY	9
5.2.	RESET AND JTAG	10
5.3.	CLOCK	11
5.4.	SERIAL FLASH ROM	12
5.5.	MIPI	13
5.6.	USB	14
5.7.	LAN	15
5.8.	Micro SD	16
5.9.	EEPROM	17
5.10.	9-AXIS SENSOR	18
5.11.	HyperMCP	20
5.12.	LED	21
5.13.	Push SW	21
5.14.	DIP SW	22
5.15.	Serial-Servo I/F	23
5.16.	RS485 I/F	26
5.17.	CAN I/F	28
5.18.	SPI I/F	29
5.19.	ANALOG I/F	30
5.20.	FET	31
5.20.1.	Power supply FET	31
5.20.2.	Voltage mesure FET	32
5.21.	EXTERNAL CONNECTOR	33
5.21.1.	External connector (CN11)	33
5.21.2.	External connector (CN13)	34
6.	CONNECTORS	35
6.1.	CONNECTOR LIST	35
6.1.1.	CN1	36
6.1.2.	CN2	36
6.1.3.	CN3	37
6.1.4.	CN4	37
6.1.5.	CN5	38
6.1.6.	CN6	38
6.1.7.	CN7	39
6.1.8.	CN8	40
6.1.9.	CN9	41

6.1.10.	CN10	41
6.1.11.	CN11	42
6.1.12.	CN12	42
6.1.13.	CN13	42
6.1.14.	CN14	43
6.1.15.	CN15	44
6.1.16.	CN16	44
6.1.17.	CN17	44
6.1.18.	CN18	45
6.1.19.	CN19	45
6.1.20.	CN20	46
6.1.21.	CN21	46
6.1.22.	CN22	47
6.1.23.	CN23	47
6.1.24.	CN24	47
6.1.25.	CN25	47
6.1.26.	CN26	48
6.1.27.	CN27	48
6.1.28.	CN28	48
7.	SWITCH	49
7.1.	SWITCH LIST	49
8.	JUMPER	49
8.1.	JUMPER LIST	49

1. OVERVIEW

This document is the H/W User's Manual for the RZ/A2M Evaluation Lite, Robot control EV board. (Parts number: RZ/A2M Evaluation Lite, hereinafter referred to as "this board") This board is mounted Renesas RZ/A2M MPU. This Board stacks 2 boards which are RZ/A2M Evaluation Lite CPU Board and RZ/A2M Evaluation Lite Ext Board. There are the connectors for Serial- servo, analog sensors and etc. on board.

2. BOARD SPECIFICATIONS

2.1. PARTS AND SPECIFICATIONS

Parts and Specification list.

Function Module		Characteristic / Function outline
Power supply	Input voltage	DC10V to DC30V *1
	Consumption	T.B.D.
Power Connector		B2PS-VH (JST)
JTAG Connector		1.27mm pitch 10 pin
CPU		R7S921053VCBG
CPU Input Clock	Xin	24MHz
	RTC	32.768KHz
Connector	Micro SD	DM3AT-SF-PEJM5 (Hirose)
	Ether	RJ45 / 7499010211A (Würth)
	MIPI	1-84953-5 (TE)
	USB 2.0 Host	USB Type A / 1-1734775-1 (TE)
	USB2.0 Target	USB Micro B / 10118194-0001LF (Amphenol)
	LVDS	SM20B-SRSS (JST)
	Ext	BM50B-SRDS-G-TF (JST)
	Serial-Servo×3	ICS or UART / FFC-4AMEP1 (THK)
	RS-485×2	Half Duplex / B4B-EH-A (JST)
	CAN×2	CAN FD / BM03B-SRSS (JST)
	Analog×4	Input Range DC 0V to 3.3V / BM04B-SRSS (JST)
	SPI×2	BM07B-SRSS (JST)
Sensor	9 AXIS	Accel 3Axis, Gyro 3Axis, Magnet 3Axis / BMX055 (Bosch)
Memory	Serial Flash	64MByte / MX25L51245GXDI (Macronix)
	Hyper MCP	Flash 64MByte RAM 8MByte / S71KS512SC0BHV000 (Cypress)
	EEPROM	2KByte / R1EX24512BTAS0I#U0 (Renesas)
PHY		KSZ8041RNL (Microchip) RMII Address 0x1
Switch	Push SW	General Push SW 1bit NMI Push SW 1bit Reset Push SW 1bit
	Dip SW	RZ/A2M Setting Dip SW 8bit
LED		General 4bit (Green 2bit , Orange 1bit, RED 1bit) 5V Power 1bit
Operation Temp		T.B.D.
Boards External Size		50mm×80mm t=1.6mm

Table 2-1: Specification List

*1 : This could set the input range DC20V to DC50V by replacing parts (please contact maker or agent)

2.2. MEMORY MAP

This board memory MAP

Memory	Memory Address	Size
Serial Flash	H2000_0000 – H2400_0000	64MB
Hyper Flash	H3000_0000 – H3400_0000	64MB
Hyper RAM	H4000_0000 – H4080_0000	8MB
RZ/A2M Internal RAM	H8000_0000 - H8040_0000	4MB

Table 2-2 : Memory Map

3. BOARD EXTERNAL VIEW

3.1. External View

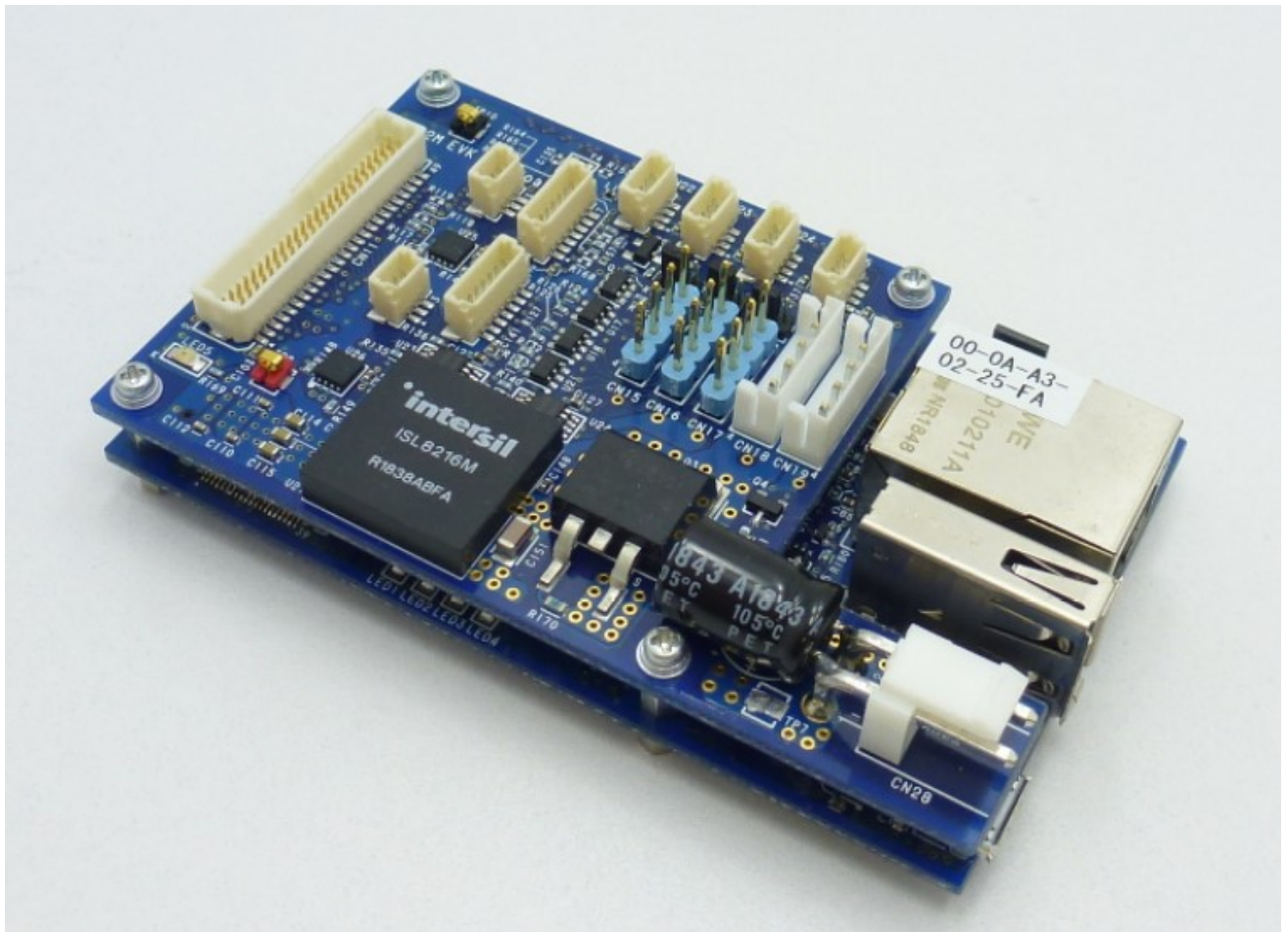


Figure 3-1 : External View

3.2. Board Size



Figure 3-2-1 : Boards Size

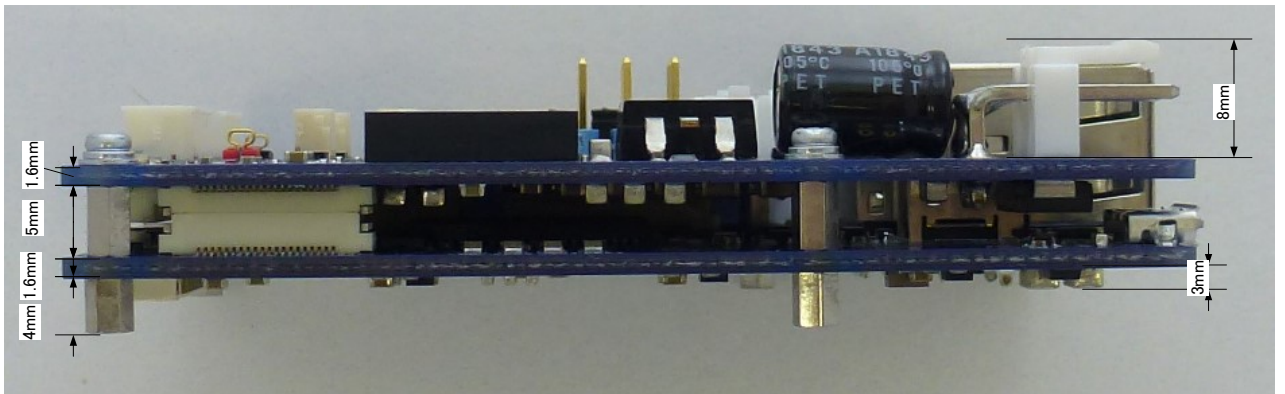


Figure 3-2-2 : Boards Size

3.3. Parts Allocation

3.3.1. PCB TOP Side

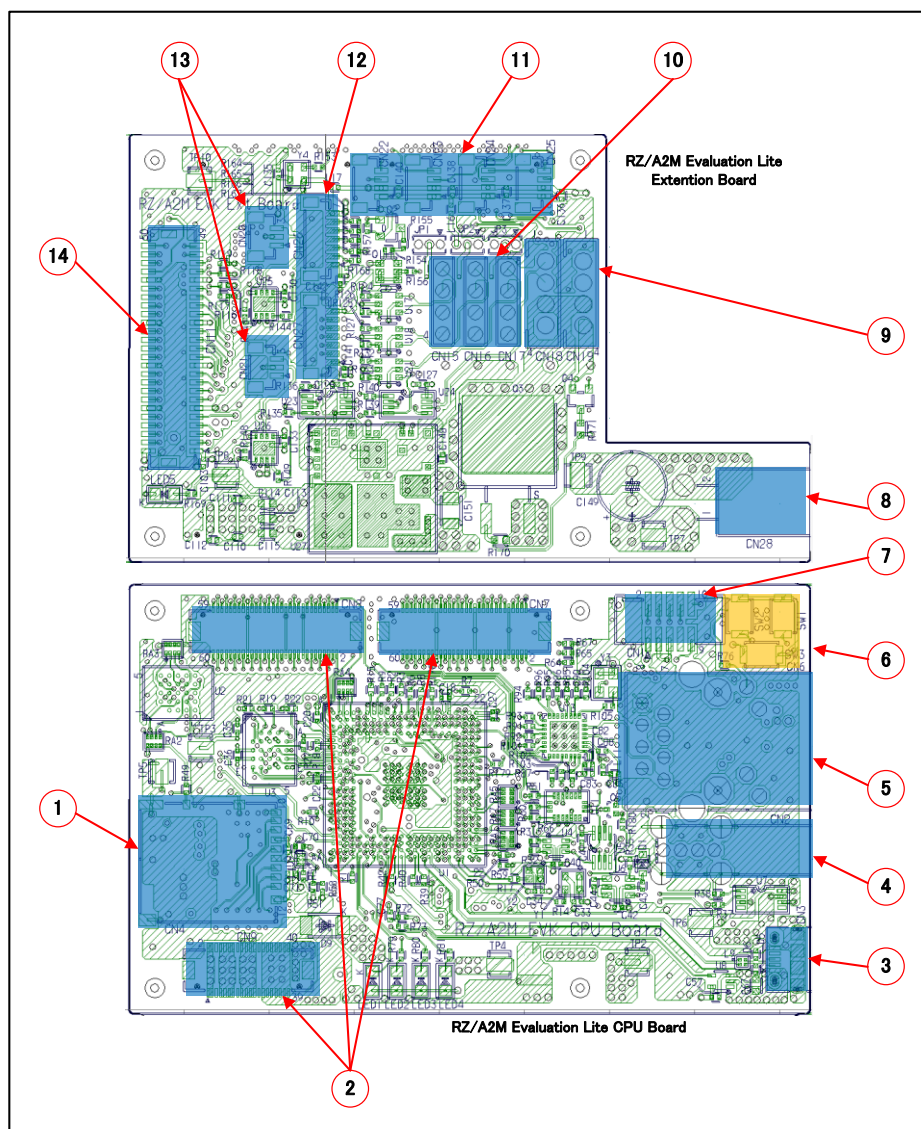


Figure 3-3-1 :Parts allocation (TOP side)

No.	Component Description	No.	Component Description
1	Micro SD Socket	8	Power Connector
2	Stack Connector	9	RS485 I/F Connector
3	USB Micro B Connector	10	Serial-Servo I/F Connector
4	USB Type A Connector	11	Analog Input Connector
5	RJ-45 Connector	12	SPI I/F Connector
6	Push SW	13	CAN I/F Connector
7	JTAG Connector	14	DRP External Connector

Table 3-3-1 : TOP side Parts

3.3.2. PCB BOTTOM side

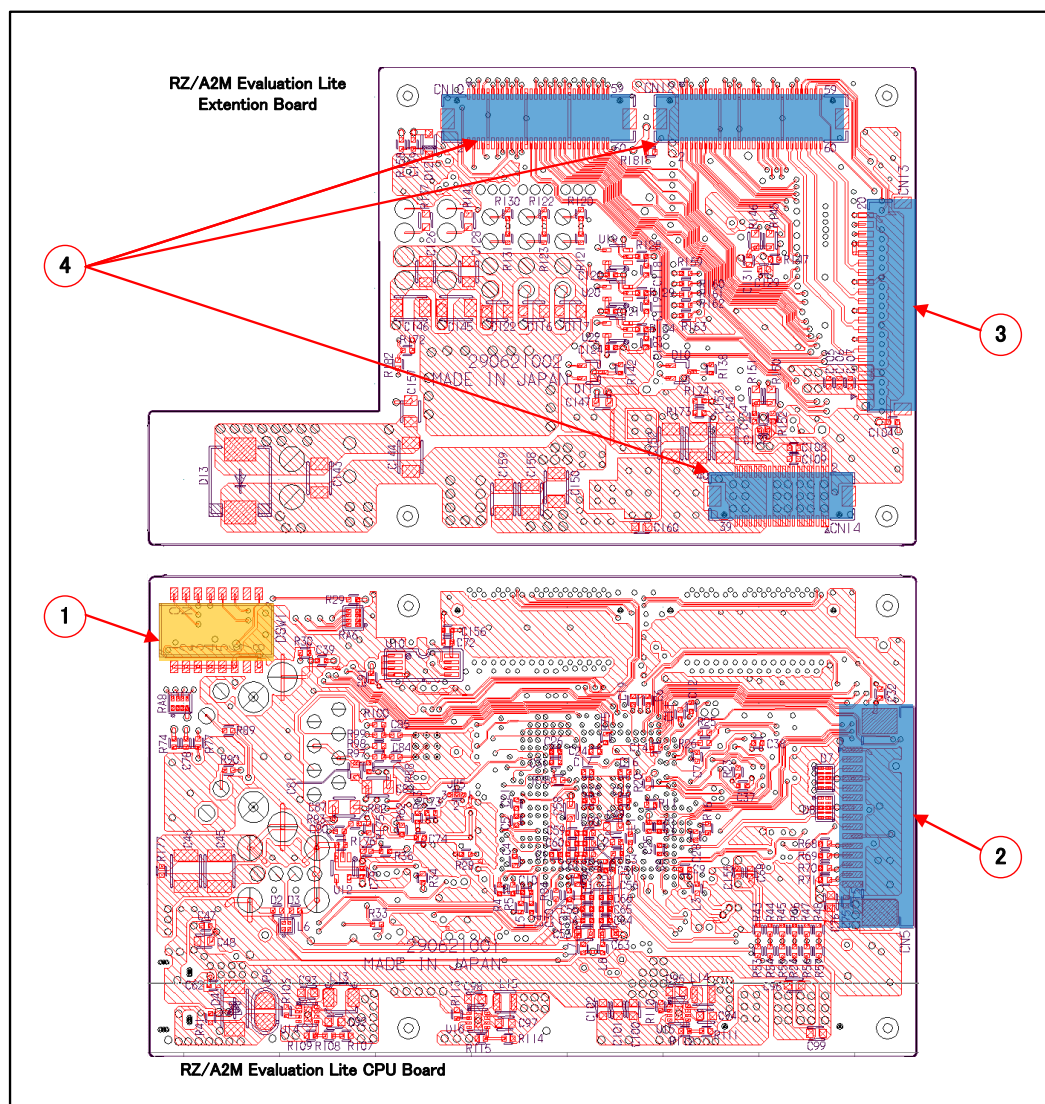


Figure 3-3-2 : Parts allocation (Bottom side)

No.	Component Description	No.	Component Description
1	Setting Dip SW	3	LVDS External Connector
2	FFC Connector	4	Stack Connector

Table 3-3-2: Bottom side Parts

4. BLOCK DIAGRAM

This board block diagram.

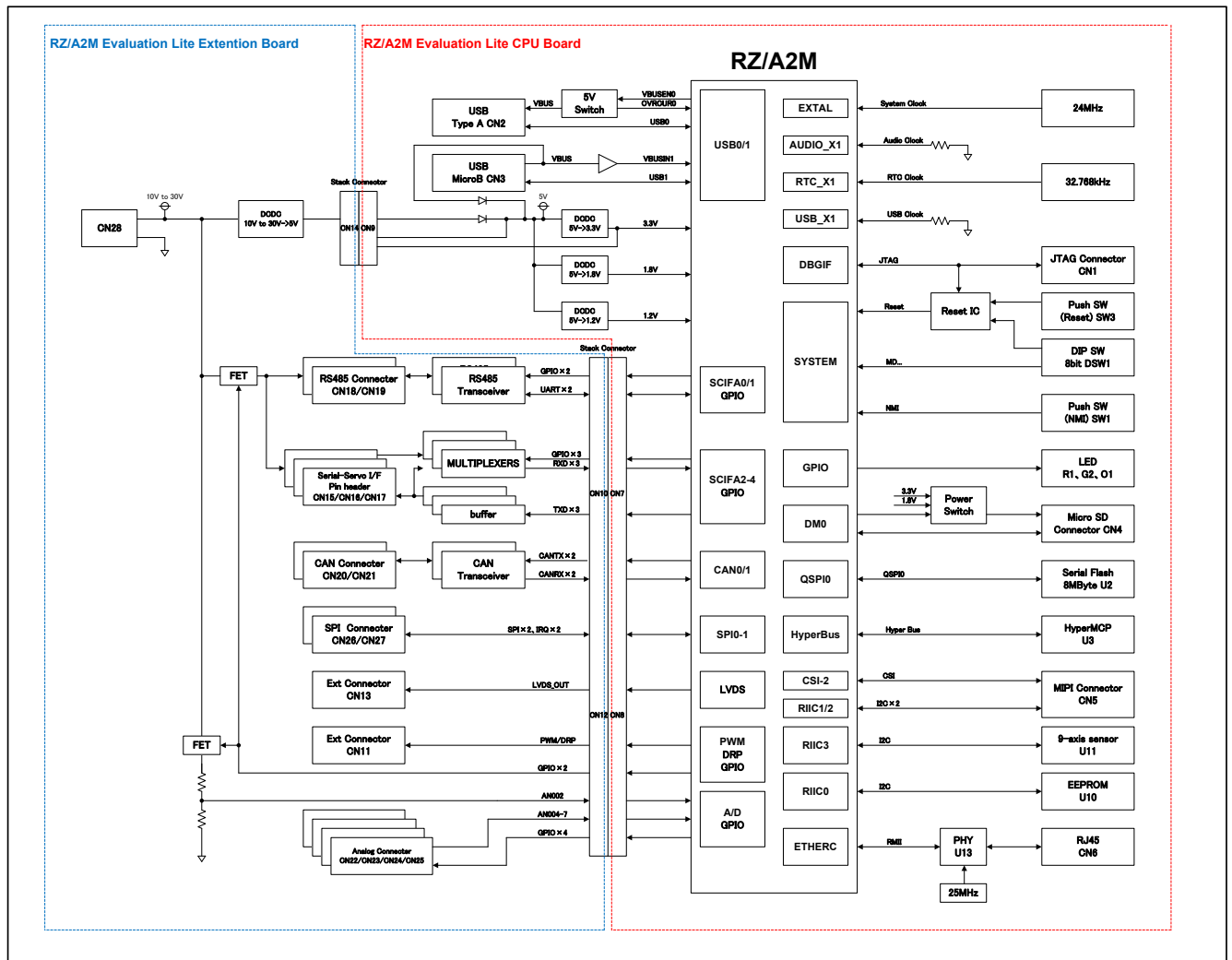


Figure 4 : Block diagram

5. FUNCTIONS

5.1. POWER SUPPLY

This board has a power input connector(CN28) to supply DC power.

The DC-DC convertor on this board generate the several power which used on this board and the LED5 illuminate when power is supplied from the power input connector (CN28).

- Input Voltage : DC10V to DC30V (Maximum rating), Max Current : T.B.D.
: DC12V to DC24V (Recommended operating voltage)
Note: It could set the input range DC24V to DC48V by replacing parts
- Connector : B2PS-VH (JST)
- Housing : VHR-2N (JST)
- Terminal : BVH-21T-P1.1 (JST)

Main power supply structure

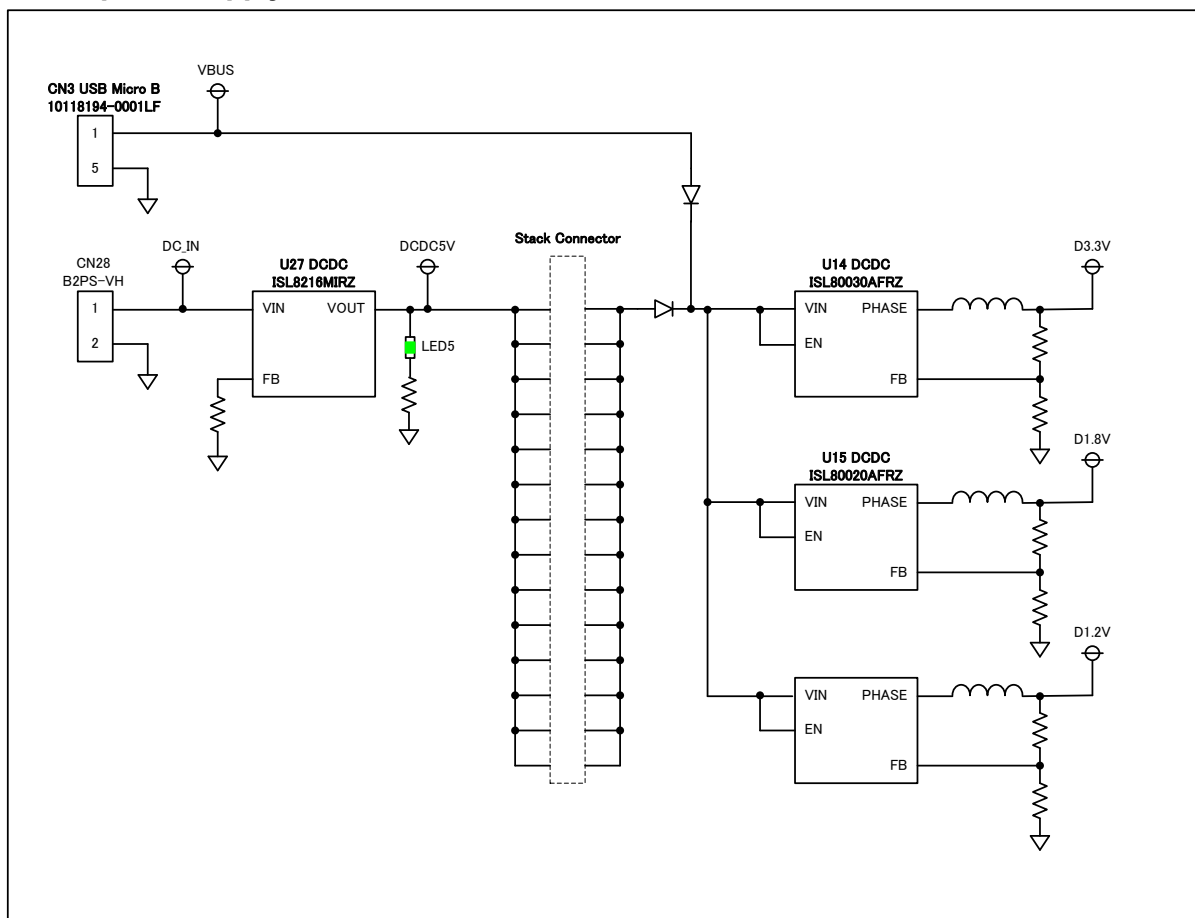


Figure 5-1-1 : Power structure

! Warning !

Check the power polarity !

If connect reverse polarity, it could destroy the board or explode the capacitor and it may cause injury.

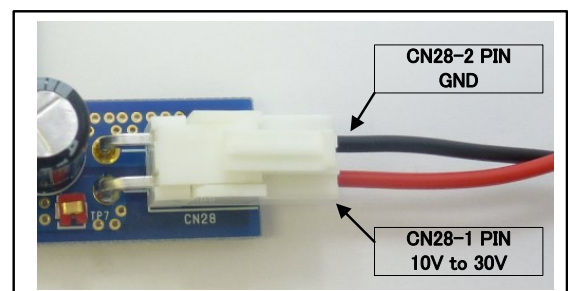


Figure 5-2-2: Power connector

5.2. RESET AND JTAG

This board is mounted a JTAG connector.

This JTAG connector is connected to debugging I/F.

- JTAG connector (CN1) : FTSH-105-01-F-DV-K (Samtec)

It may necessary to use converter adapter, because this connector is 1.27mm pitch 10 pin connector.

If use ARM20 debugger with 2.54mm pitch connector, it need to use this ARM 20-10 converter adapter.

- ARM 20-10 convert adapter : ARM-JTAG-20-10 (Olimex)

This is converter adapter to convert 2.54mm pitch 20 pin connector to 1.27mm pitch 10 pin

Reference URL

Strawberry Linux

<https://strawberry-linux.com/catalog/items?code=15079>

Digi-Key

<https://www.digikey.jp/product-detail/ja/olimex-ltd/ARM-JTAG-20-10/1188-1016-ND/3471401>

This board has 3 kind of reset method, the power on reset, ICE reset and Switch reset.

Reset and JTAG structure

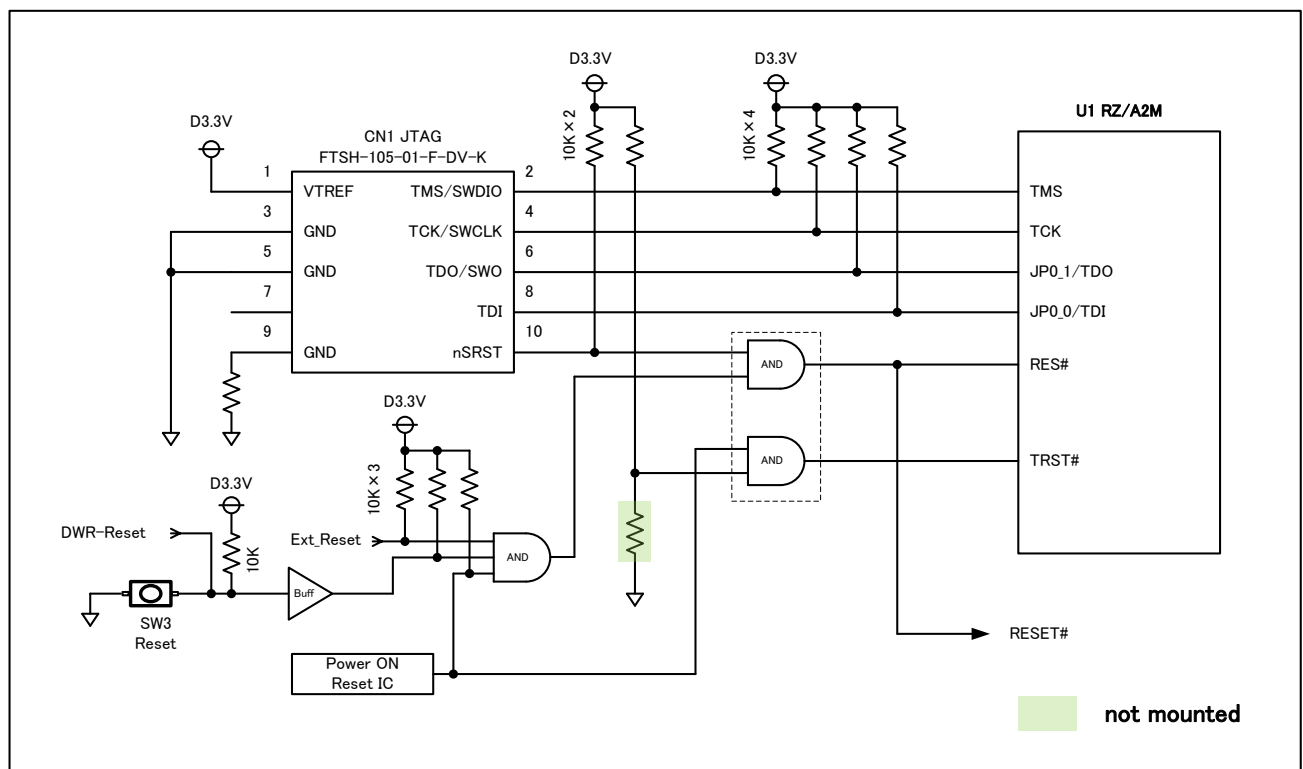


Figure 5-3 : Reset and JTAG structure

5.3. CLOCK

This board is mounted 3 kind of Oscillator for RZ/A2M CLK input.
The USB_X1 and AUDIO_X1 are pull down on the board.

This table is the clock input to RZ/A2M (U1)

Name	Ref. No.	Frequency	Remarks
EXTAL	Y1	24MHz	
RTC_X1	Y2	32.768KHz	
USB_X1	-	Pull Down	-
AUDIO_X1	-	Pull Down	-
PK_1/CAN_CLK	Y4	(32MHz)	Not Mounted

Table 5-3: CLK input

Please set the DSW1-1 and DSW1-2 Dip switches for system setting to necessary values.

* For DSW1, refer to "5.14 DIP SW".

- Oscillator (Y1) : ASDMB-24.000MHZ (Abracon)
 - Oscillator (Y2) : ASAK-32.768KHZ (Abracon)
 - Oscillator (Y4) : ASDMB-32.000MHZ (Abracon), Recommended
- Note: Oscillator (Y4) is not mounted on board from factory.

The clock structures

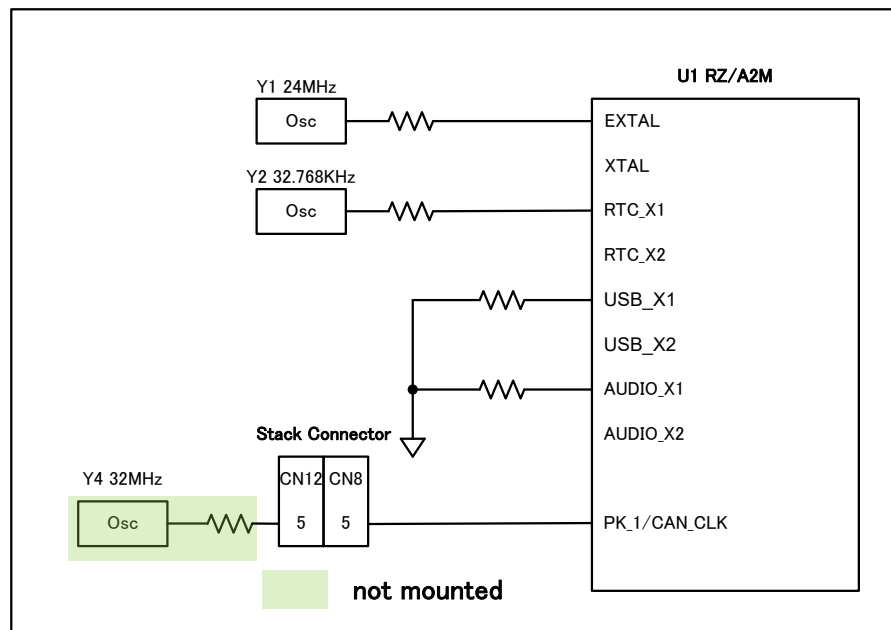


Figure 5-1 : clock structure

5.4. SERIAL FLASH ROM

This board is mounted a Serial Flash ROM (64MB) to save boot up programs.

The Serial Flash ROM is connected to multi I/O bus controller.

It needs to set DSW1 to boot mode 3, when boot up from the serial flash memory.

* For DSW1, refer to “5.14 DIP SW”.

- Serial Flash ROM (U2) : MX25L51245GXDI (Macronix)

The Serial Flash ROM structure

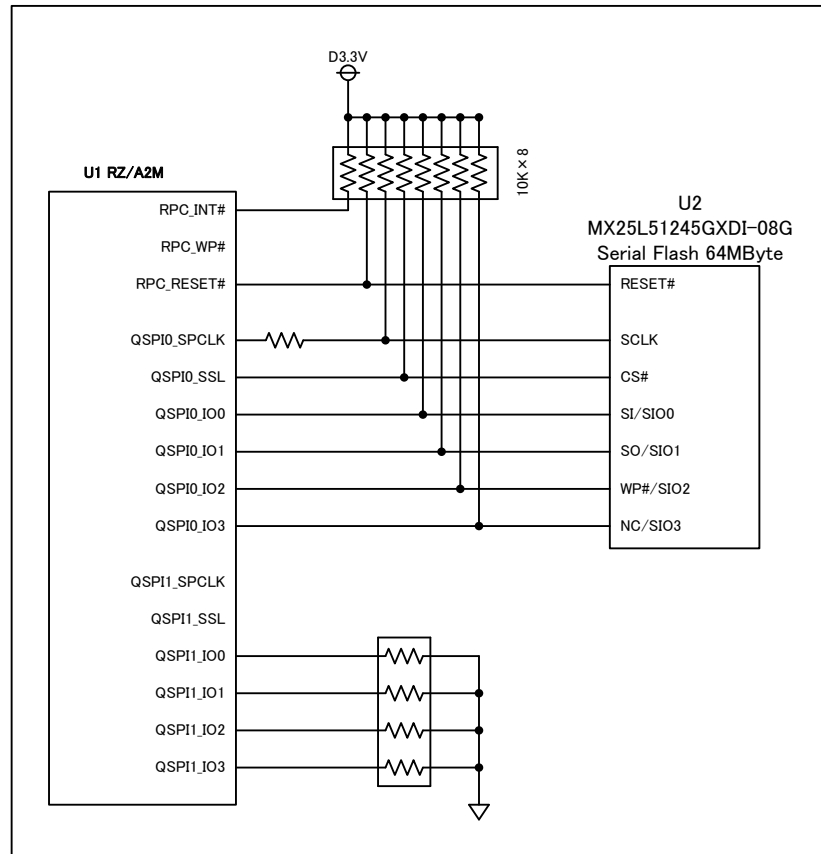


Figure 5-4 : Serial Flash ROM

5.5. MIPI

This board is mounted an FFC connector for MIPI CSI-2 I/F.

The FFC connector is connected to MIPI CSI-2 I/F.

Use 1mm pitch 15 poles flexible cable.

- FCC Connector (CN5) : 1-84953-5 (TE)
- Camera module : Raspberry Pi Camera Module V2

The MIPI connector structure

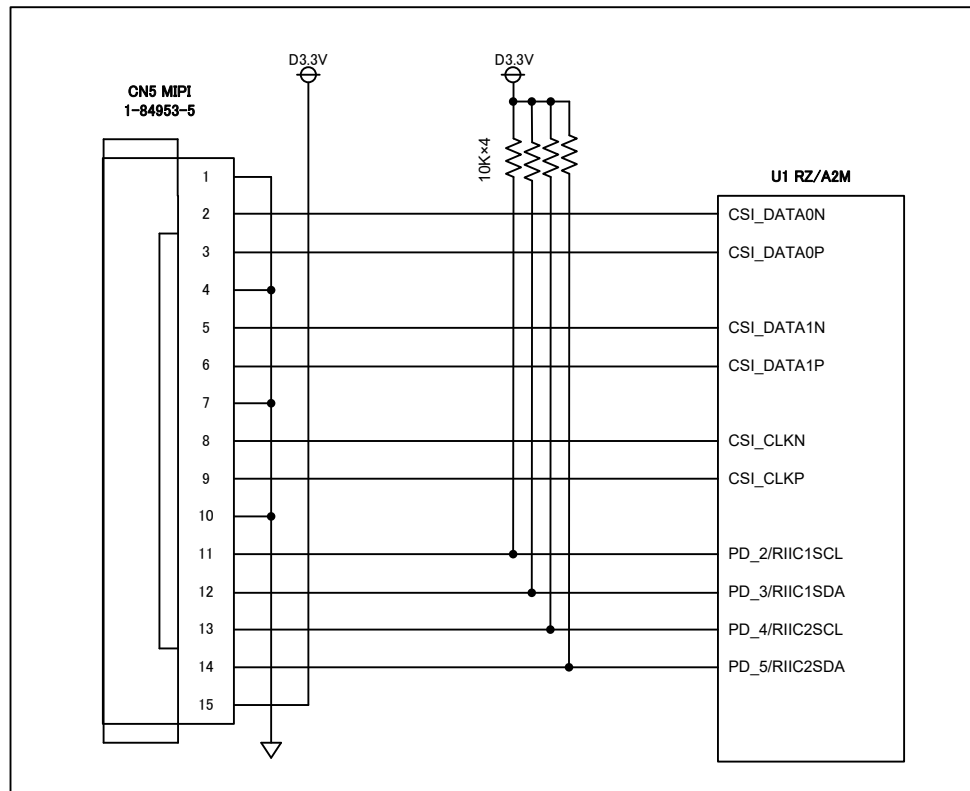


Figure 5-5-1 : MIPI connector

When inserting the flexible cable to connector, pull the knob to release the lock and then insert the flexible cable into connector. Then press the knob to lock after inserting the cable before start using.

Note : Refer below photos to the figure out when inserting the flexible cable to this connector on board.

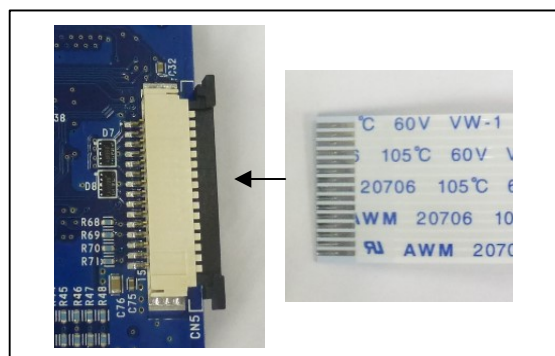


Figure 5-5-2 : MIPI connector

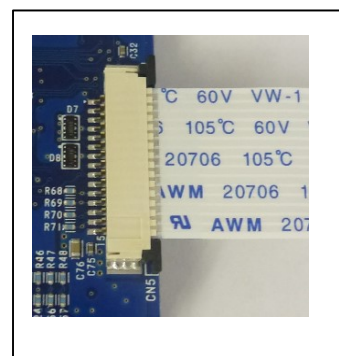


Figure 5-5-3 : MIPI connector

5.6. USB

This board is mounted a USB Type A connector and a USB Micro B connector.

The USB Type A connector is connected to USB2.0 host module ch0 .

The USB Type B connector is connected to USB2.0 function module ch1 .

- USB Type A (CN2) : 1-1734775-1 (TE)
- USB Micro B (CN3) : 10118194-0001LF(Amphenol)

The USB structures

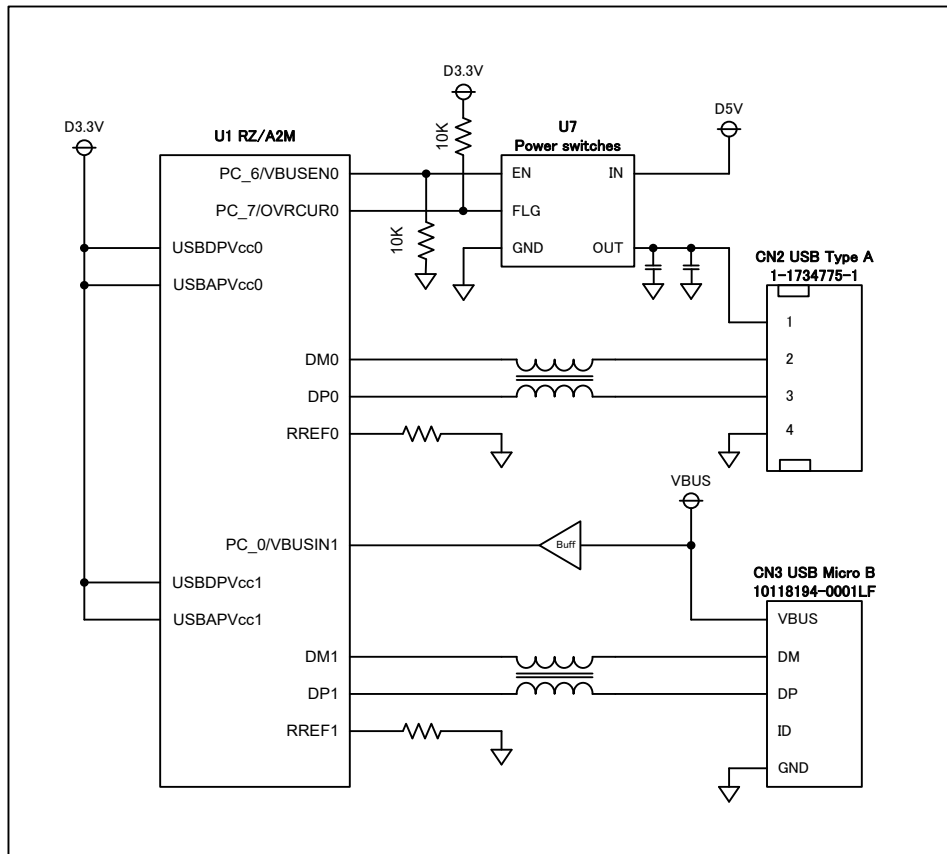


Figure 5-6-1: USB

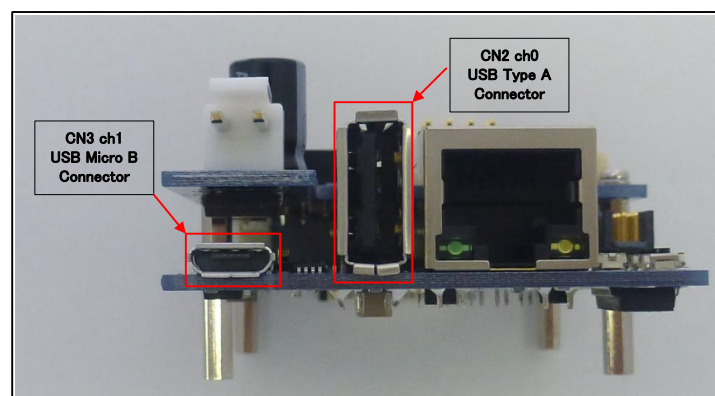


Figure 5-6-2: USB

5.7. LAN

This board is mounted a RJ45 connector.

The PHY is connected to Ethernet controller ch0 through RMII .

- PHY (U13) : KSZ8041RNL (Microchip)
- RJ-45 (CN6) : 7499010211A (WE)

The LAN structures

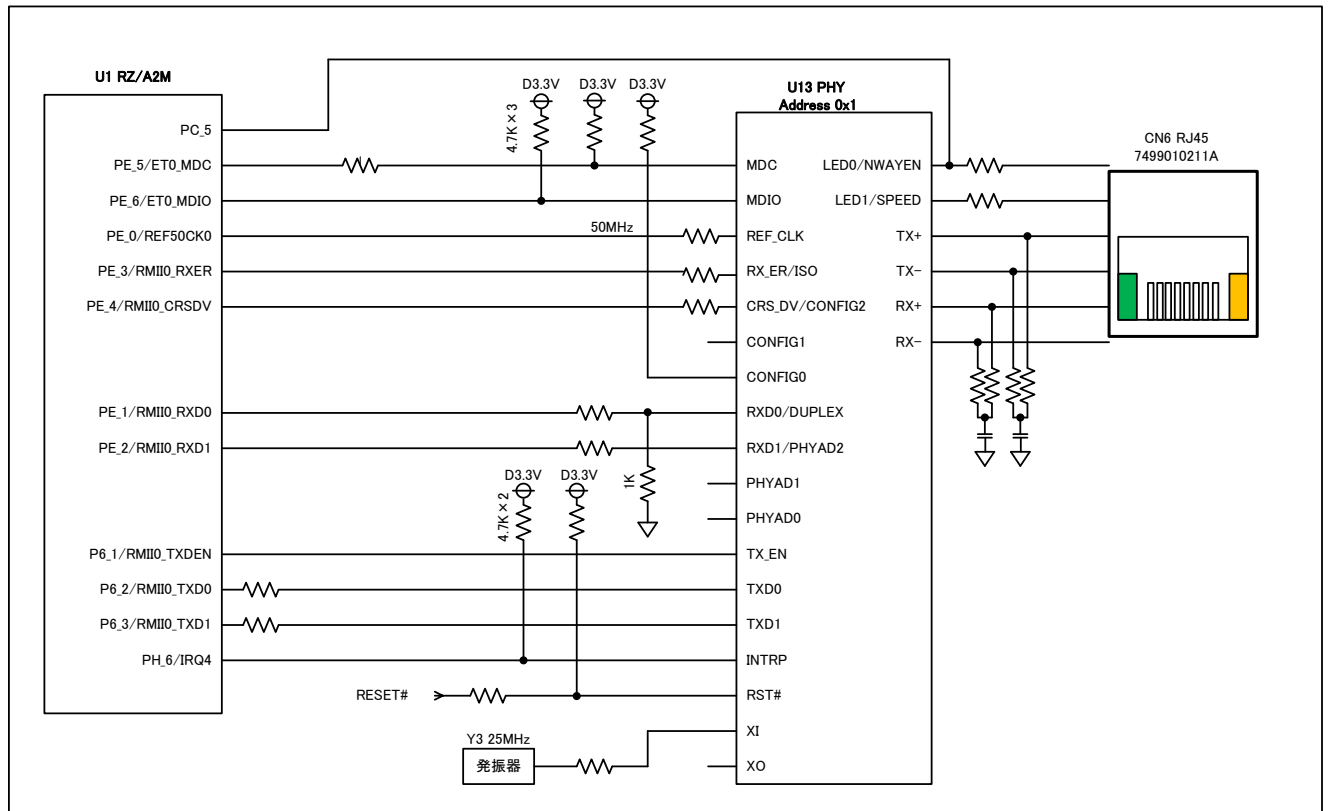


Figure 5-7 : PHY

The default value of PHY(U13) on this board.

Name	Default value	Remarks
PHY Address	001	
Mode	RMII	
ISO	Disable	
SPEED	100Mbps	
Duplex	Full-Duplex	
NWAYEN	Enable	

Table 5-7 : PHY default value

5.8. Micro SD

This board is mounted a Micro SD connector.

The Micro SD is connected to SD/MMC host I/F ch0 .

It could change the operation voltage by PJ_5 pin.

PJ_5 High : 3.3V

PJ_5 Low : 1.8V

The SD0_CD Pin become LOW when SD card in the its socket, and HIGH when there is no SD card.

- Micro SD Connector (CN4) : DM3AT-SF-PEJM5 (Hirose)

The Micro SD structures

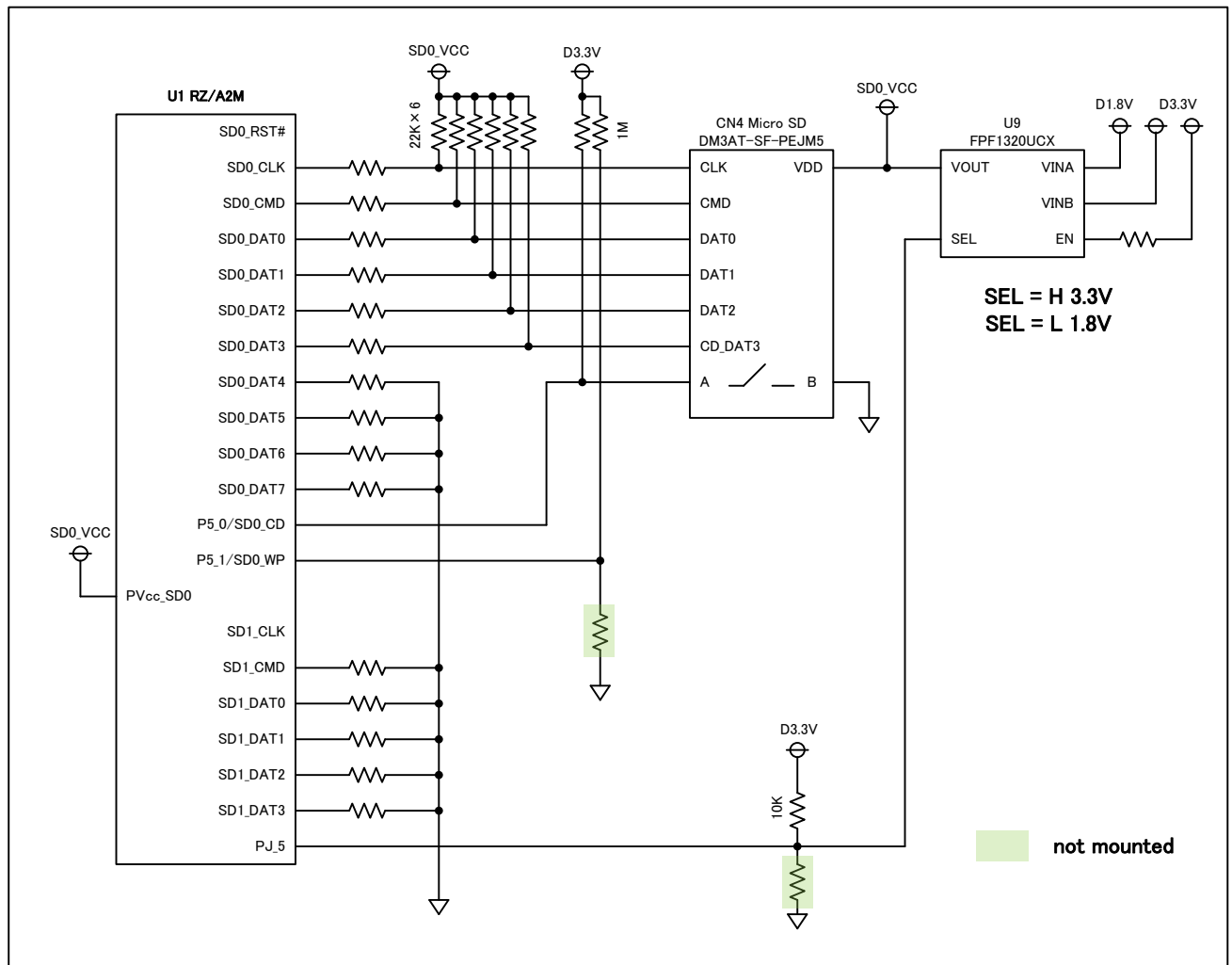


Figure 5-8 : SD CARD I/F

The default value of PHY(U13) on this board.

PIN Name	High	Low
PJ_5	Supply 3.3V to PVcc_SD0	Supply 1.8V to PVcc_SD0

Table 5-8-1 : PVcc_SD0 power select

The SD0_CD PIN function on this board.

PIN Name	High	Low
SD0_CD	No Card	Card Inserted

Table 5-8-2 : SD0_CD pin

5.9. EEPROM

This board is mounted an EEPROM (2Kbyte).

The EEPROM is connected to I2C bus I/F ch3 .

The power supply to EEPROM is set by JP5.

Shorting 1-2: power supply to GPIO from PJ-0 and Set PJ-0 high, power is supplied to EEPROM.

Shorting 2-3: power supply from D3.3V.

IMPORTANT : The JP5 1-2 is shorted as factory setting.

- EEPROM 2KByte (U10) : R1EX24512BTAS0I#U0 (Renesas)

Warning : The EEPROM might be damaged by leakage current, if the signal connected to the EEPROM become High, when power is not supplied to the EEPROM

The EEPROM structures

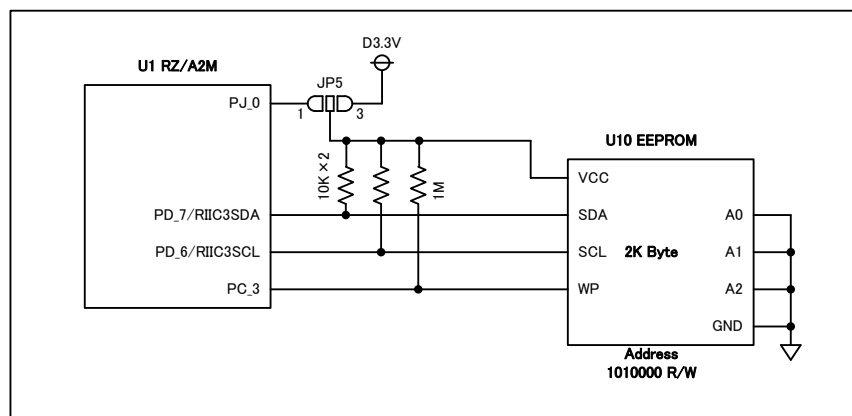


Figure 5-9 : EEPROM I/F

This table shows the EEPROM slave address of this board.

Name	SA7	SA6	SA5	SA4	SA3	SA2	SA1	R/W#	Remarks
EEPROM	1	0	1	0	0	0	0	x	

Table 5-9-1 : EEPROM slave address

This table shows the EEPROM Write Protect of this board.

Pin Name	High	Low
PC_3	Enable	Disable

Table 5-9-2 : EEPROM Write Protect

5.10. 9-AXIS SENSOR

This board is mounted a 9-axis sensor.

The 9-axis sensor is connected to I2C bus I/F ch0 .

- 9-axis sensor (U11) : BMX055 (Bosch)
(3-axis 12-bit accelerometer, 3-axis 16-bit, $\pm 2,000$ °/s gyro, 3-axis geomagnetic sensor)

Warning : The 9-axis sensor might be damaged by leakage current, if the signal connected to the 9-axis sensor become High, when power is not supplied to the 9-axis sensor.

The 9-axis sensor structures

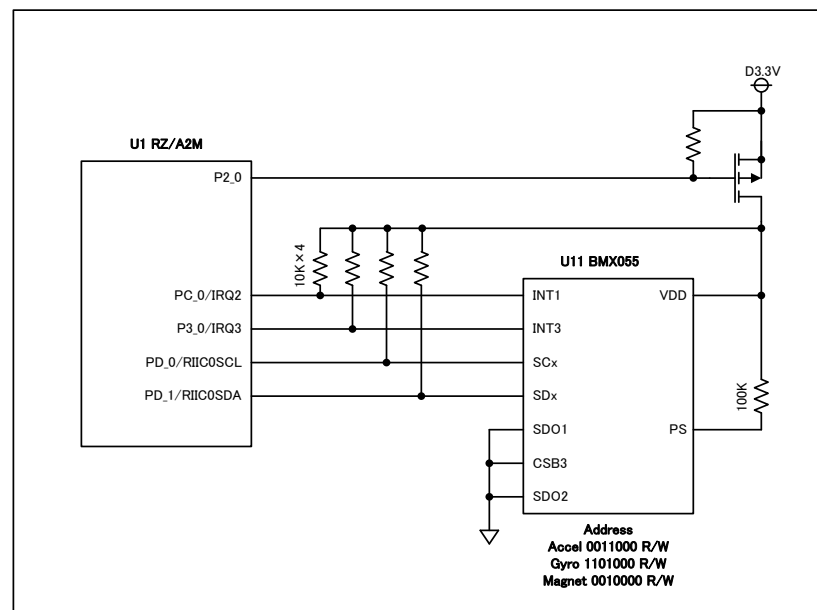


Figure 5-10-1 : 9-axis sensor 1

This table shows the 9-axis sensor slave address of this board.

Name	SA7	SA6	SA5	SA4	SA3	SA2	SA1	R/W#	Remarks
Accel	0	0	1	1	0	0	0	x	
Gyro	1	1	0	1	0	0	0	x	
Magnet	0	0	1	0	0	0	0	x	

Table 5-10 : 9-axis sensor slave address

The 9-axis sensor (U11) is located as below Figure 5-10-2 on RZ/A2M Evaluation Lite CPU Board

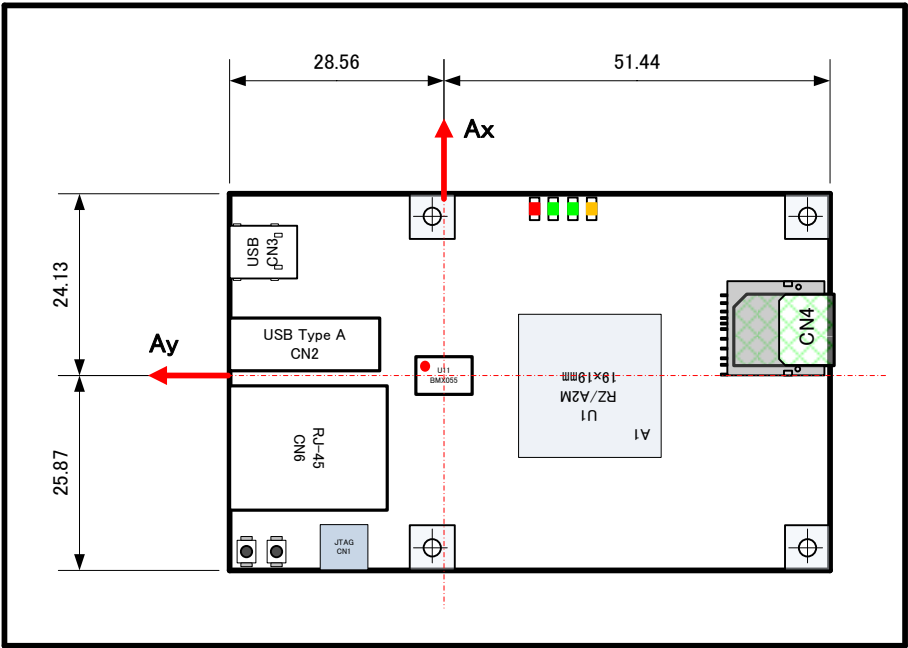


Figure 5-10-2: 9-axis sensor 2

Please refer sensor direction as below Figure 5-10-3 and BMX055 data sheet for details.

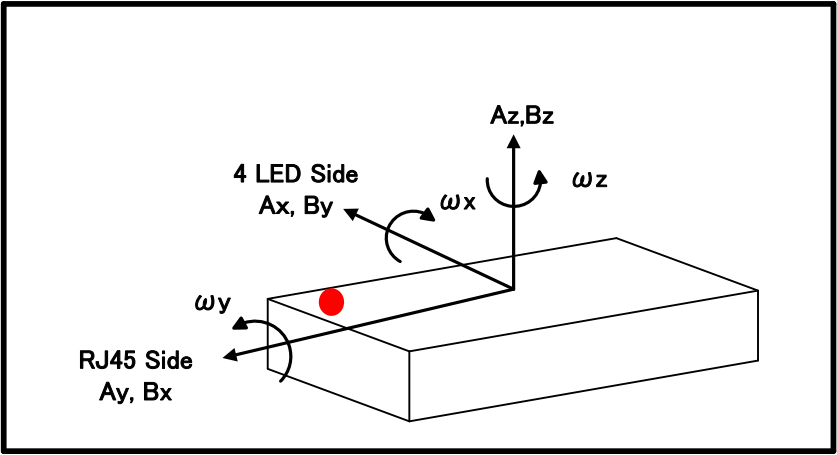


Figure 5-10-3: 9-axis sensor 3

5.11. HyperMCP

This board is mounted a HyperMCP.

The HyperMCP is connected to HyperBus controller.

It needs to set DSW1 boot setting into boot mode 7, when boot up the board from HyperMCP.

* For DSW1, refer to “5.14 DIP SW”.

Memory Capacity : HyperFlash 64MB, HyperRAM 8MB

- HyperMCP (U3) : S71KS512SC0BHV000 (CYPRESS)

The HyperMCP structures

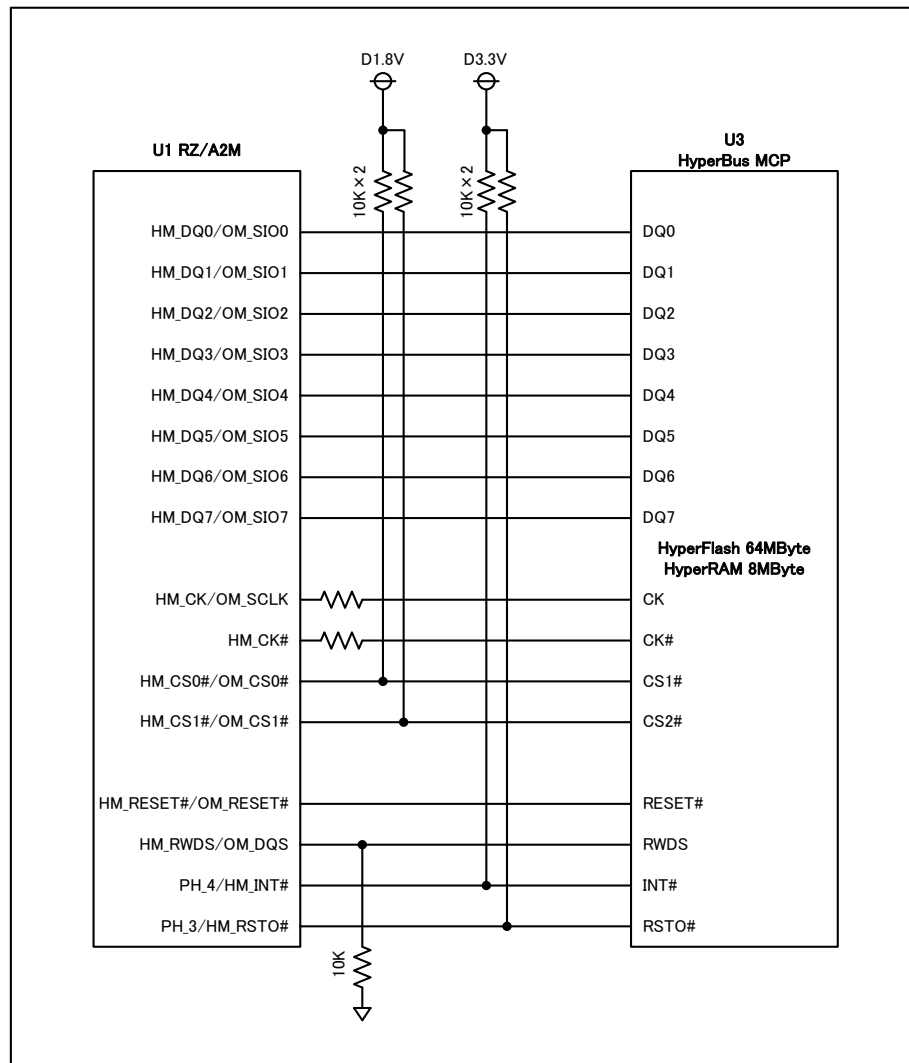


Figure 5-11 : HyperMCP

5.12. LED

This board is mounted 4 LEDs.

The LED illuminate when the pins become low.

The LED structures

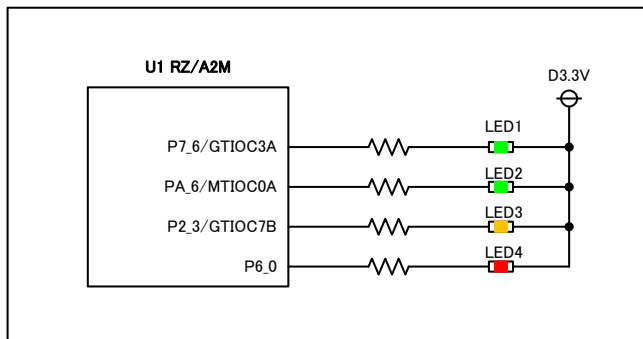


Figure 5-12 -1: LED

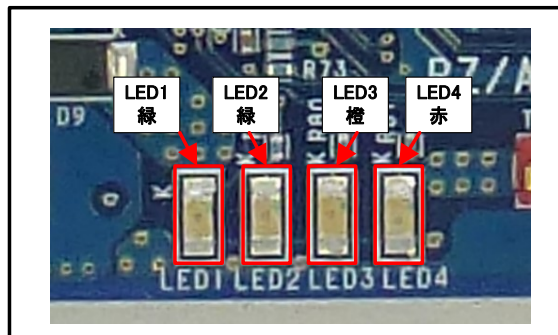


Figure 5-12 -2 : LED

5.13. Push SW

This board is mounted a general Push SW (SW2), an NMI Push SW (SW1) and a Reset SW(SW3).

The pin become low when the push switch is pressed.

The general Push SW (SW2) is connected to Interrupt controller IRQ6.

The NMI Push SW (SW1) is connected to Interrupt controller NMI.

The Reset Push SW (SW3) is connected to reset.

The Push SW structures

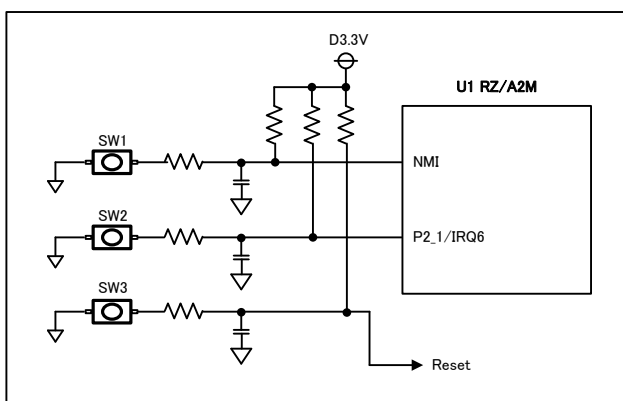


Figure 5-13-1 : Push SW

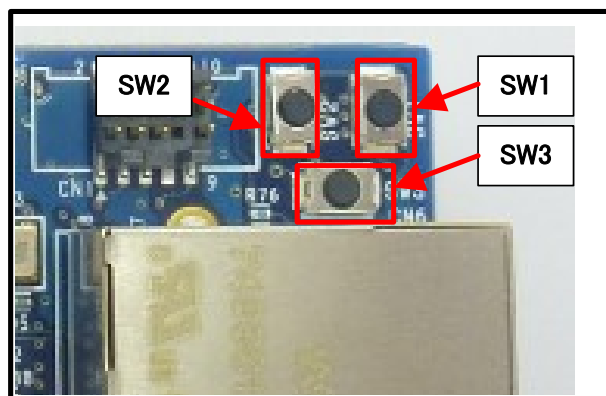


Figure 5-13-2 : Push SW

5.14. DIP SW

This board is mounted a DIP SW to set RZ/A2M system setting.

The DIP SW is connected to RZ/A2M system setting pins.

The RZ/A2M pins become LOW when turn DIP SW ON.

The DIP SW structures

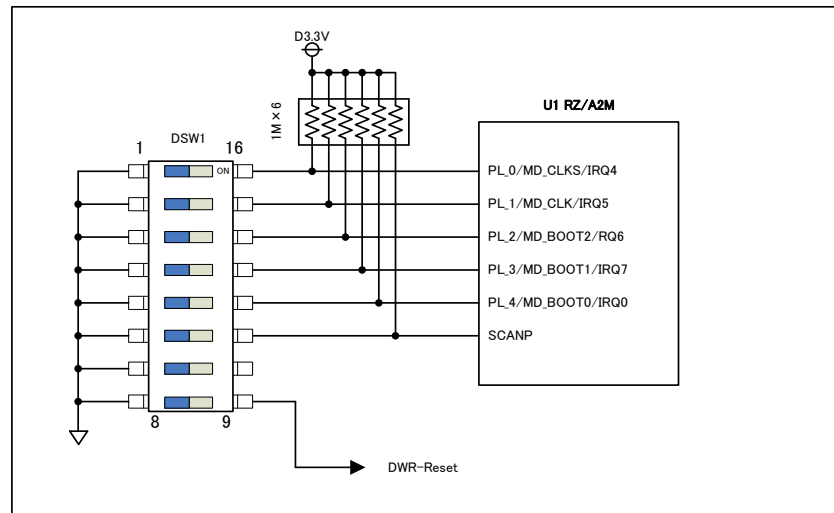


Figure 5-14 : DIP SW

This table shows each bit of DIPSW function and default value on this board.

Pin Name	DSW1	OFF(H)	ON(L)	Remarks
MD_CLKS	1	○		SSCG OFF / SSCG ON
MD_CLK	2	○		EXTAL Input 20 to 24MHz / Prohibited
MD_BOOT2	3		○	Table 5-14-2
MD_BOOT1	4	○		
MD_BOOT0	5	○		
BSCANP	6		○	Boundary Scan / Normal operation
NC	7	○		
Reset	8	○		Normal operation / Reset

Table 5-14-1 : DIP SW function and default value

This table shows MD_BOOT value on this board. (Only 2 settings as below)

Pin Name	DSW1	OFF(H)	ON(L)	OFF(H)	ON(L)
		Mode 3 Serial Flash		Mode 7 HyperMCP	
MD_BOOT2	3		○	○	
MD_BOOT1	4	○		○	
MD_BOOT0	5	○		○	

Table 5-14-2: MD_BOOT Value

5.15. Serial-Servo I/F

This board is mounted 3 Serial-Servo I/Fs.

The Serial-Servo I/F connector is connected to Serial communication I/F channel 2 to 4 which built-in FIFO.

The Serial-Servo I/F supports 1-wire (ICS method) or 2-wire (UART).

The signal level could select 3.3V or 5V (by JP switch). Set JP switch depend on connected Serial-Servo signal level.

The power supply voltage to Serial-Servo I/F is same as the power supplied voltage to this board. And the power can be turned on/off.

For details, refer to “5.20.1 Connector power supply FET”.

Warning : The reverse connection might damage to the board and Serial-Servo. Do not connect the cable reverse connection.

- Serial-Servo connector (CN15/CN16/CN17) : FFC-4AMEP1 (HONDA TSUSHIN KOGYO)
- MULTIPLEXER (U17/U18/U21) : 74LVC1G157GV,125 (Nexperia)
- Open-Drain Buffer (U19/U20/U22) : SN74LVC1G07 (TI)

The Serial-Servo I/F structures

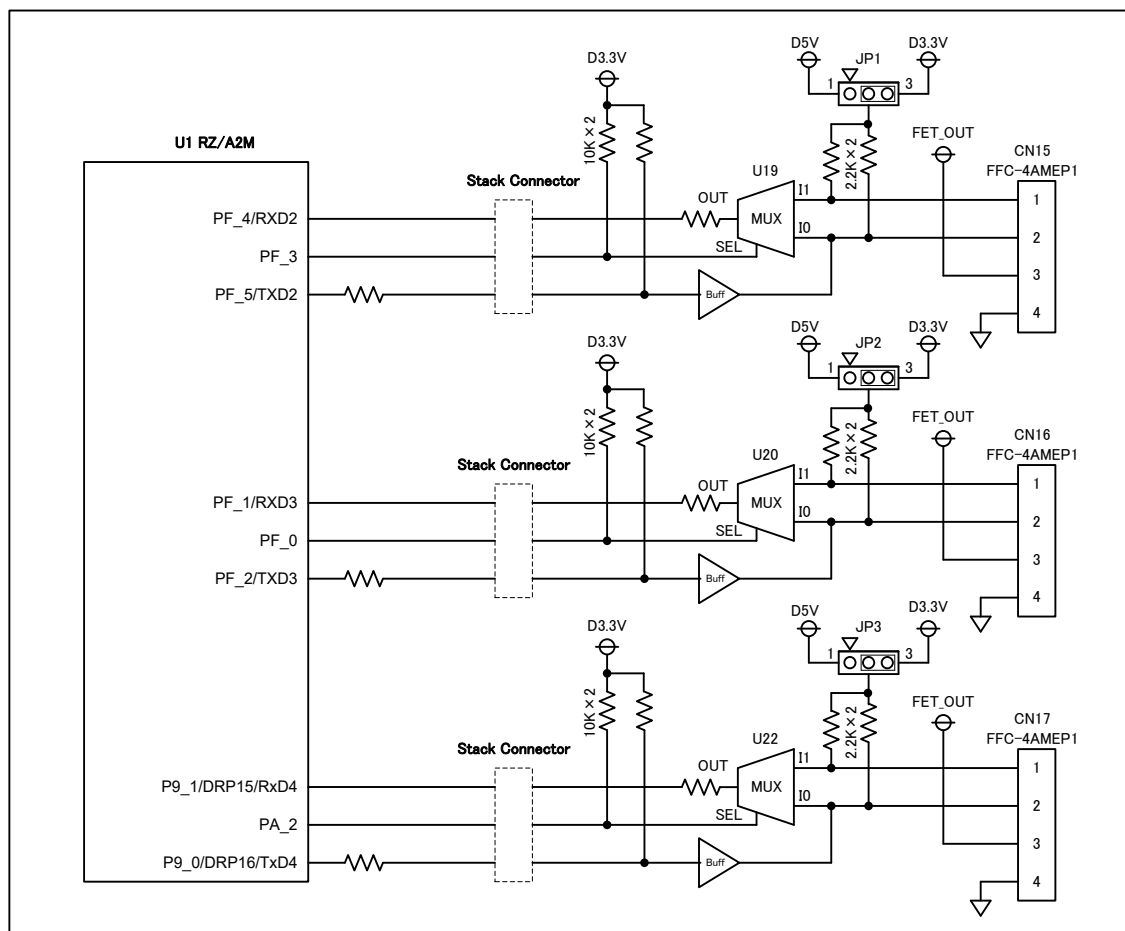


Figure 5-15-1 : Serial-Servo I/F

The JP1 to JP3 are jumper to change CN15-17 signal level.

1-2 short : 5V, 2-3short :3.3V (Factory setting 2-3 short)

It can set signal level for each connector.

JP1 to JP3's default setting table

Items	Short	Signal level	Default value
JP1	1-2	5V (CN15)	
	2-3	3.3V (CN15)	○
JP2	1-2	5V (CN16)	
	2-3	3.3V (CN16)	○
JP3	1-2	5V (CN17)	
	2-3	3.3V (CN17)	○

Table 5-15-1 :JP default value

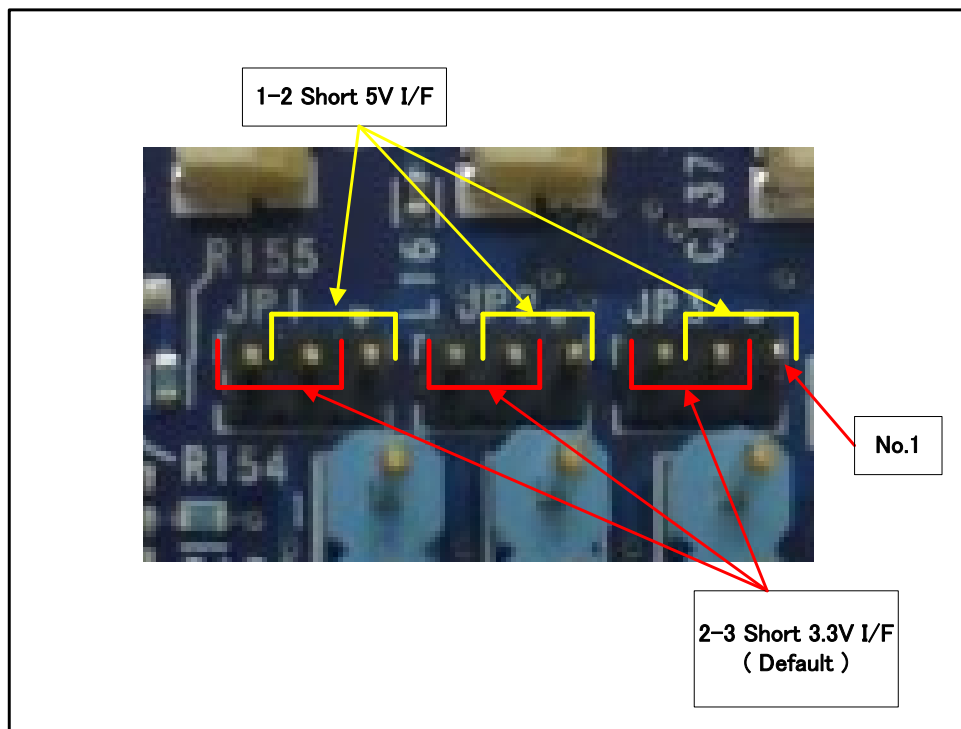


Figure 5-15-2 :JP

To select I/F CN15-17 (1-wire/2-wire system) by MULTI PLEXER (U19/U20/U22) SEL pin.

The MULTIPLEXER SEL pin operation table

Pin Name	Level	Function	Default value
PF_3	L	1 Wire (CN15)	
	H	2 Wire (CN15)	O(PU)
PF_0	L	1 Wire (CN16)	
	H	2 Wire (CN16)	O(PU)
PA_2	L	1 Wire (CN17)	
	H	2 Wire (CN17)	O(PU)

Table 5-15-2 : MULTIPLEXER SEL

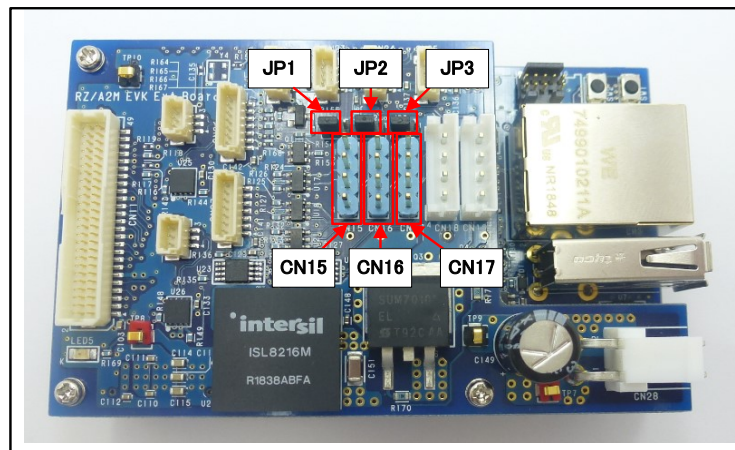


Figure 5-15-3 : Serial-Servo I/F Connector

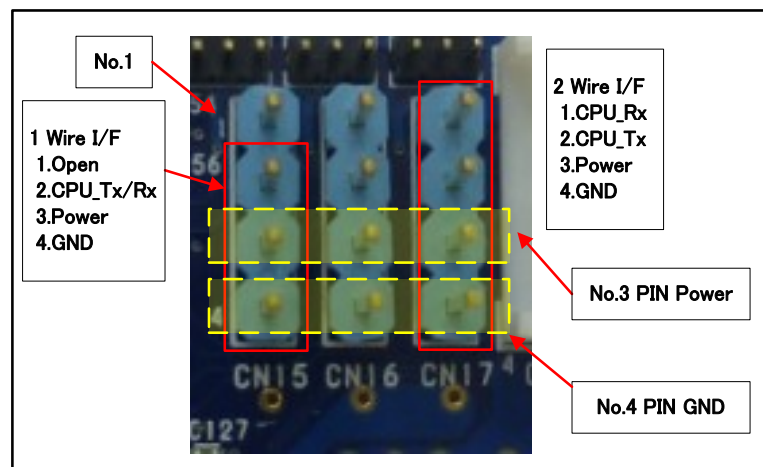


Figure 5-15-4 : Serial-Servo I/F Connector

! Warning !

Handle with care, there is power input voltage come out to CN15-17 No.3 pin (10V to 30V , 20V to 50V).

5.16. RS485 I/F

This board is mounted 2 RS485 I/F.

The RS485 I/F are connected to Serial communication I/F with built-in FIFO channel 0 to 1.

RS485 I/F is half duplex.

The RS485 I/F power is the power supply voltage supplied to this board.

This power supply can be turned on and off.

For details, refer to “5.20.1 Connector power supply FET”.

- RS485 Connector (CN18/CN19) : B4B-EH-A (JST)
- RS485 Transceiver (U23/U24) : ISL3179EIUZ (Renesas)

The RS485 I/F structures

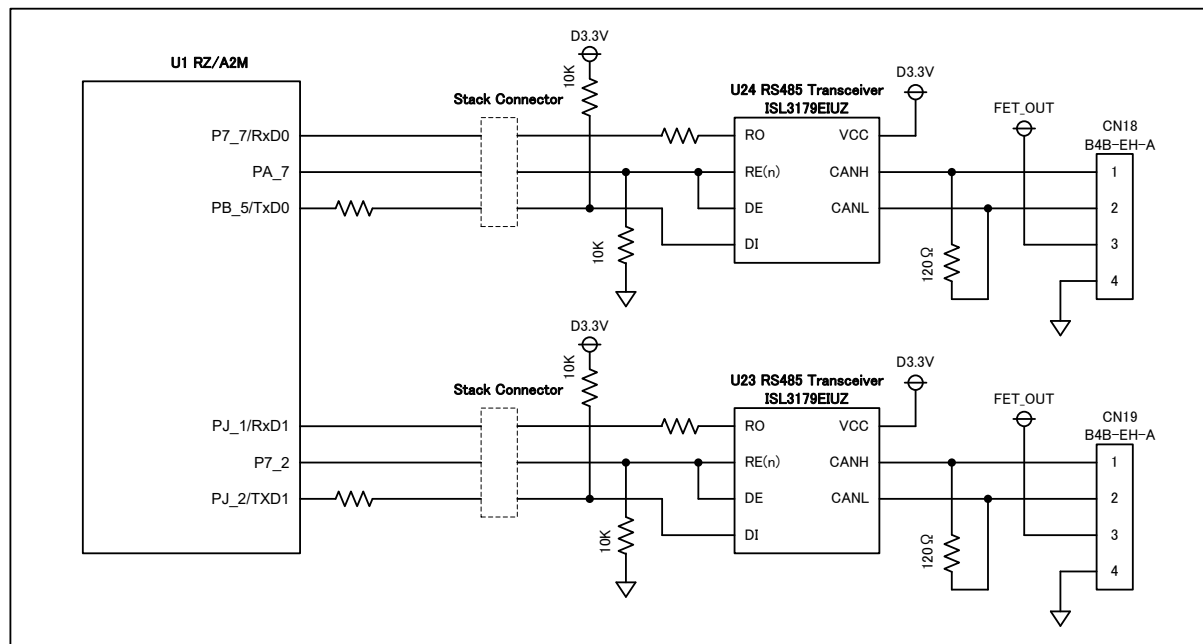


Figure 5-16-1 : RS485 I/F

Select Transmitter or Receiver is by GPIO control.

This table shows RS485 I/F Transmitter / Receiver on this board.

Pin Name	level	Function	Default value
PA_7	L	Receiver (CN18)	○
	H	Transmitter (CN18)	
P7_2	L	Receiver (CN19)	○
	H	Transmitter (CN19)	

Table 5-16-1 : RS485 I/F Transmitter / Receiver select

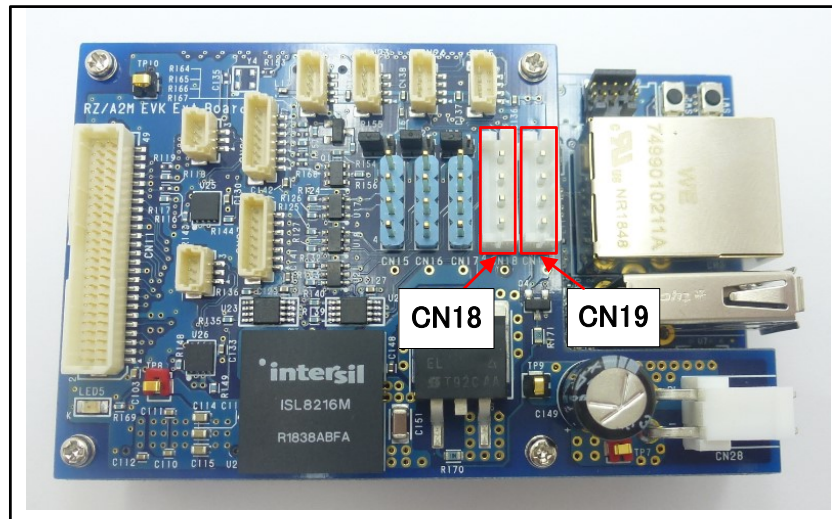


Figure 5-16-2: RS485 I/F Connector

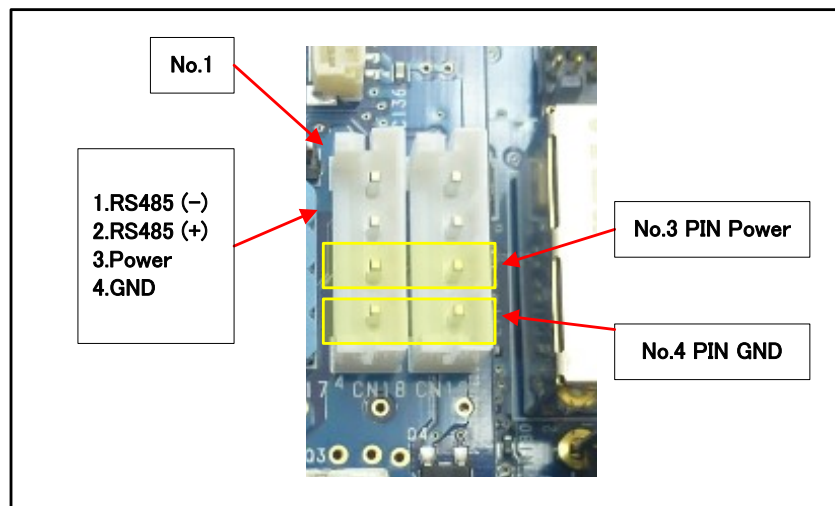


Figure 5-16-2: RS485 I/F Connector

! Warning !

Handle with care, there is power input voltage come out to CN18-19 No.3 pin (10V to 30V , 20V to 50V).

5.17. CAN I/F

This board is mounted 2 CAN I/Fs.
The CAN I/F are connected to RS-CANFD module channel 0 to 1.
The CAN transceiver is mounted with a CAN FD compatible product.

- CAN Connector (CN20/CN21) : BM03B-SRSS (JST)

The CAN I/F structures

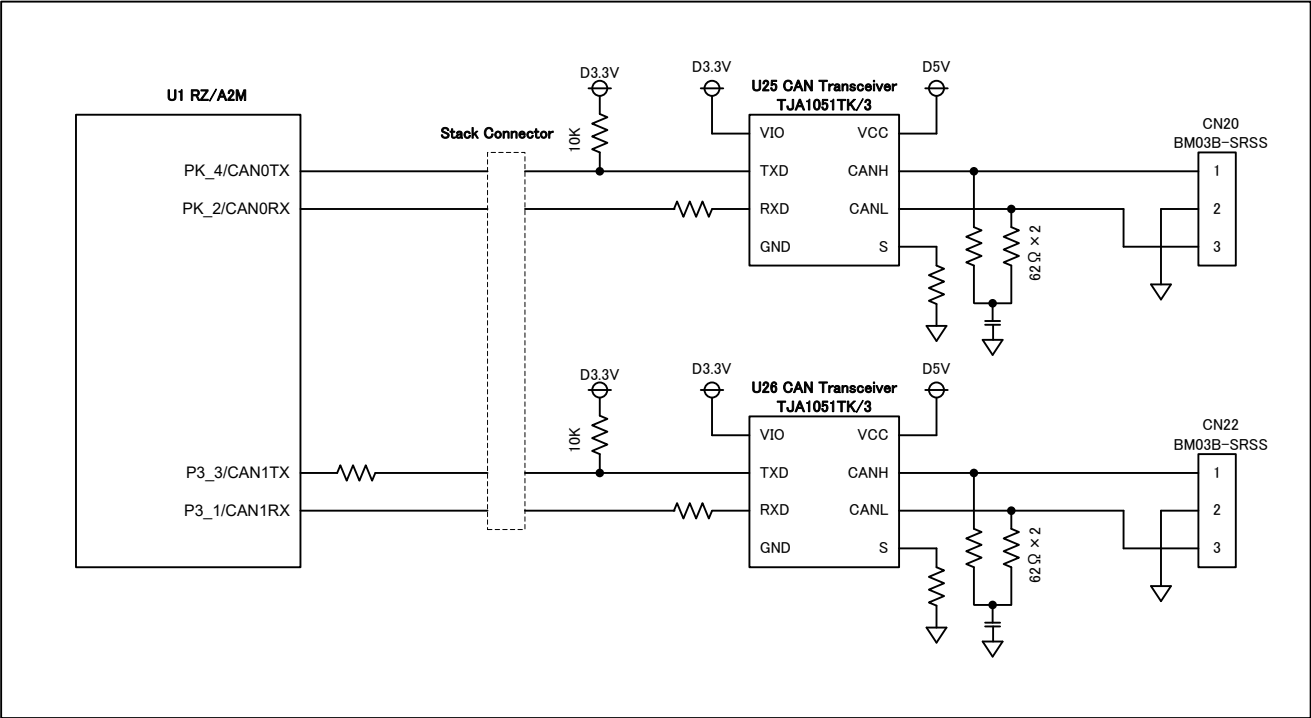


Figure 5-17-1 : CAN I/F

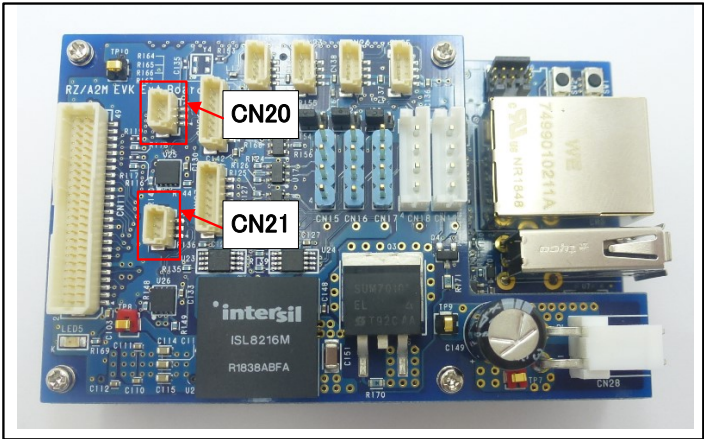


Figure 5-17-2 : CAN I/F Connector

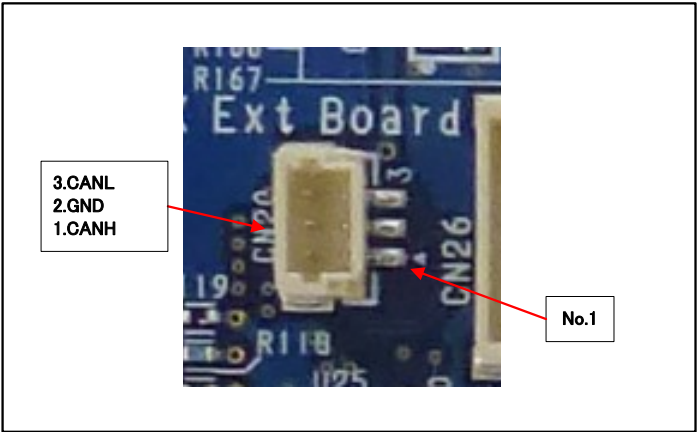


Figure 5-17-3 : CAN I/F Connector

5.18. SPI I/F

This board is mounted 2 SPI I/Fs.

The SPI I/F are connected to Serial peripheral I/F channel 0 to 1.

- SPI Connector (CN26/CN27) : BM07B-SRSS (JST)

The SPI I/F structures

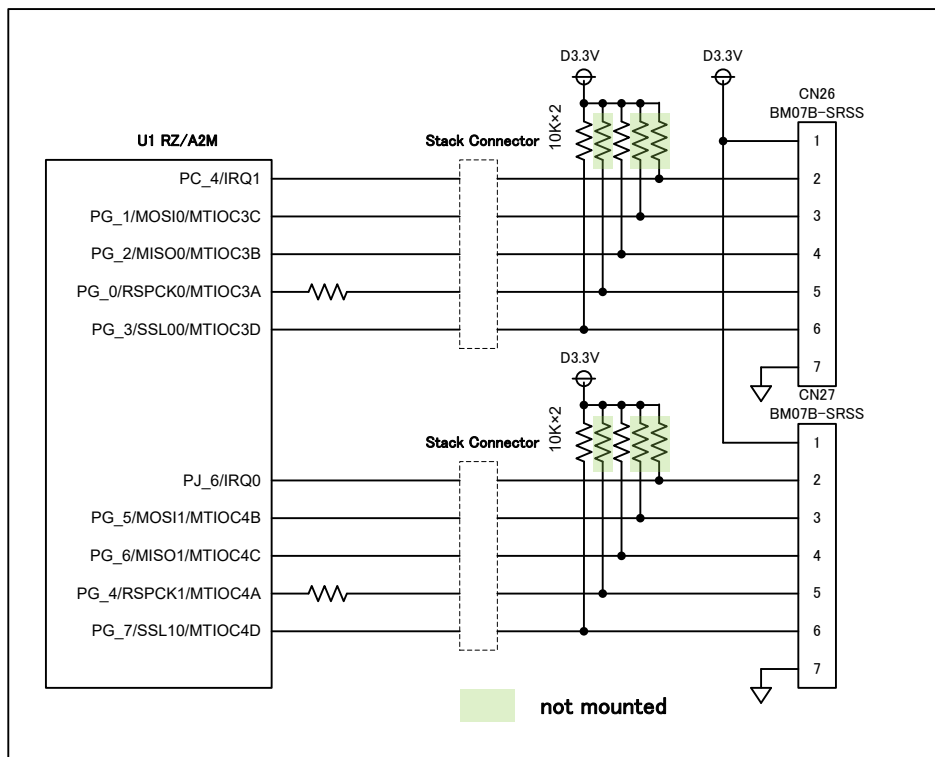


Figure 5-18-1 : SPI I/F

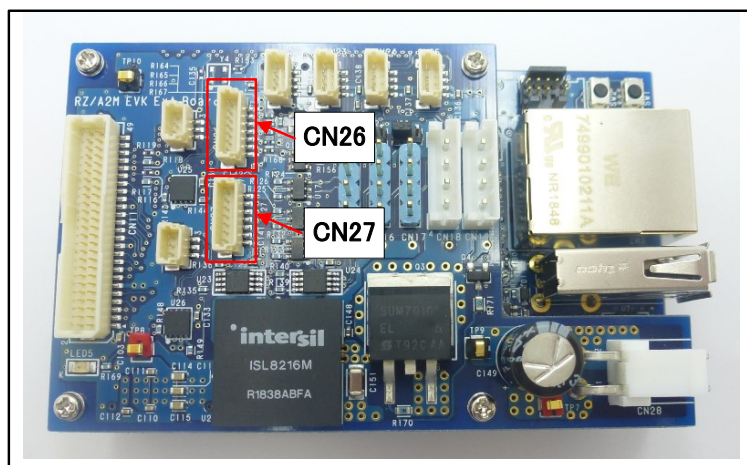


Figure 5-18-2 : SPI I/F Connector

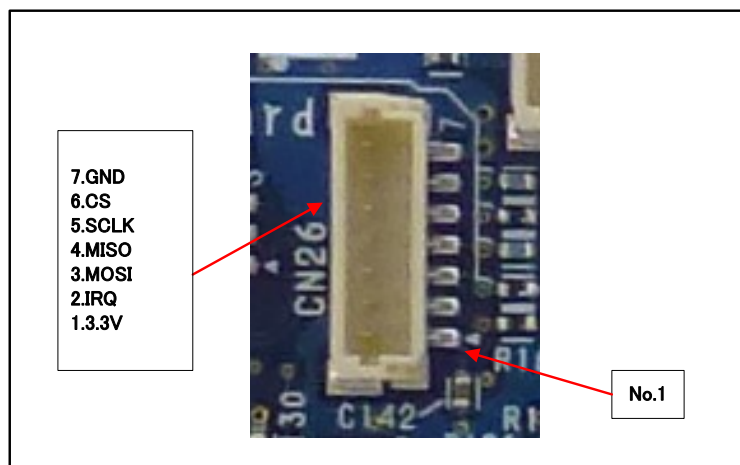


Figure 5-18-3 : SPI I/F Connector

5.19. ANALOG I/F

This board is mounted 4 Analog connectors.

The Analog connectors are connected to 12 bits A/D converter channel 0 to 1.

- Input voltage : DC0V to 3.3V
- Analog input Connector CN22/CN23/CN24/CN25 : BM04B-SRSS (JST)

The ANALOG I/F structures

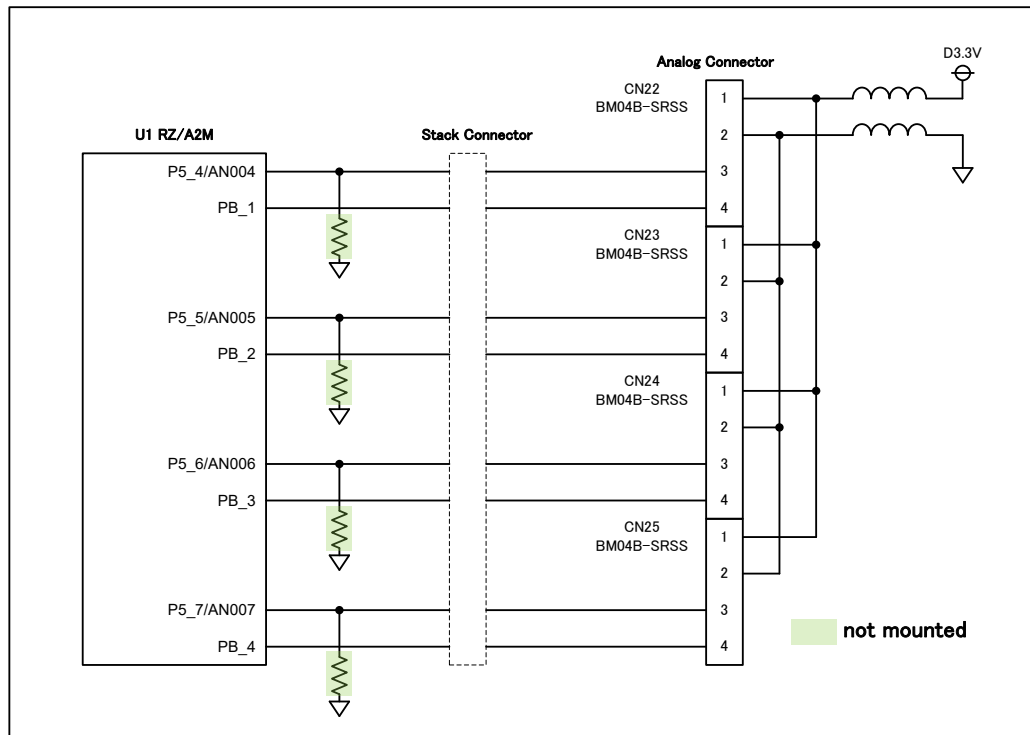


Figure 5-19-1 : Analog I/F

This table shows AD pin and AD value on this board.

Pin Name	Input Voltage	8bit AD (Hex)	10bit AD (Hex)	12bit AD (Hex)
AN004-007	0V	0x00	0x000	0x000
	1V	0x4D	0x136	0x4D9
	2V	0x9B	0x26C	0x9B2
	3.3V	0xFF	0x3FF	0xFFF

Note : This reference value calculated by AVcc=3.3V, AVss=0V.

Table 5-19: AN004-007 Analog Input value

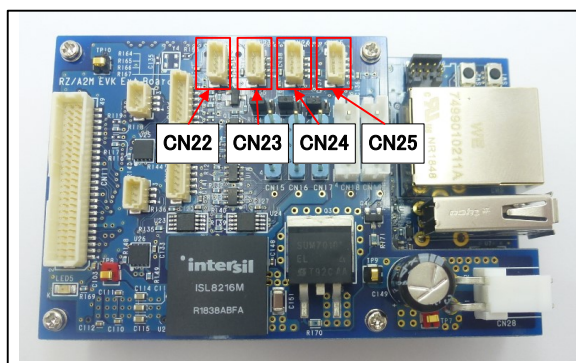


Figure 5-19-2 : Analog I/F connector

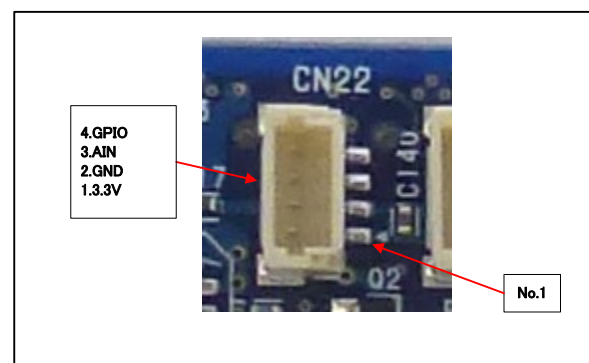


Figure 5-19-3 : Analog I/F Connector

5.20. FET

This board is mounted the FET supplying the power to CN15 to CN19 and measuring voltage.

5.20.1. Power supply FET

When PB-0 is set to High, the power supply voltage supplied to this board is supplied to the CN15 to CN19 (Serial-Servo I/F / RS485 I/F) connector.

It can't control each connector power ON/OFF individually.

It becomes ON-OFF control in CN15-CN19 unit.

(Max. 1A to each connector.)

The Power supply FET structures

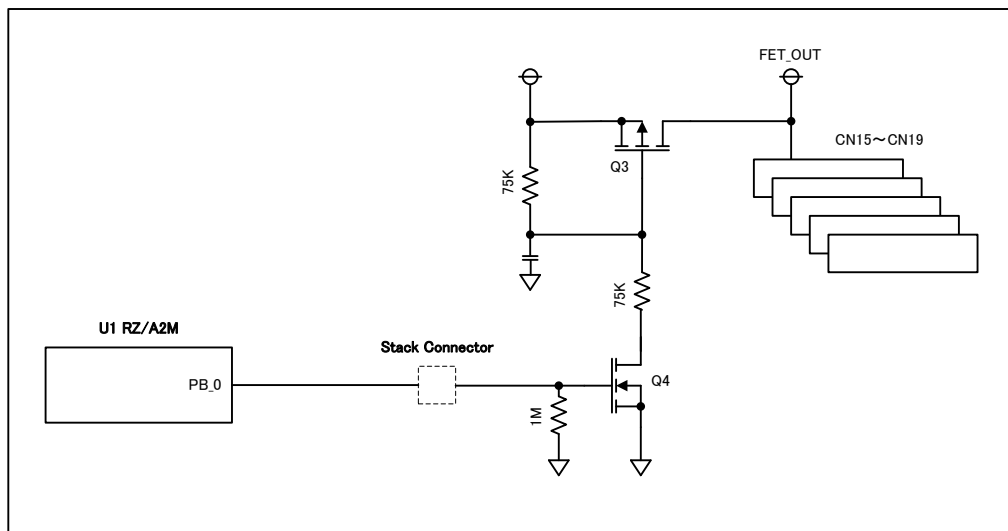


Figure 5-20-1 : Power supply FET

5.20.2. Voltage measuring FET

The divided Voltage from the power supply voltage supplied to this board is applied to AN002 when PH-2 is set to High.

The AN002 Voltage is 1.75V when input voltage is 30V, or 0.58V when input voltage is 10V.

The Voltage measuring FET structures

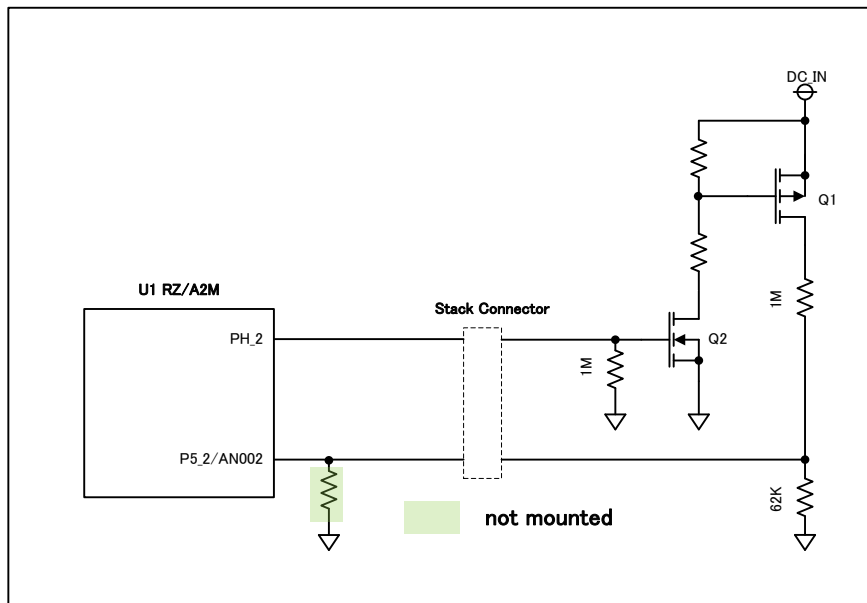


Figure 5-20-2 : Voltage measuring FET

This table shows input voltage division value and AD value on this board.

Pin Name	Input Voltage	Value	8bit AD (Hex)	10bit AD (Hex)	12bit AD(Hex)
AN002	10V	0.58V	0x2D	0xB4	0x2D0
	12V	0.7V	0x36	0xD9	0x364
	24V	1.4V	0x6C	0x1B2	0x6C9
	36V	2.1V	0xA3	0x28C	0xA2F
	48V	2.8V	0xD9	0x365	0xD93
	50V	2.92V	0xE2	0x38A	0xE28

Table 5-20-2 : AN002 Analog Input value

Note : This value calculated with those value, AVcc = 3.3 V and AVss = 0 V, for reference. The resister tolerance is not included.

5.21. EXTERNAL CONNECTOR

This board is mounted the 2 external connectors.

The external connector (CN11) is connected to DRP, and another external connector (CN13) is connect to LVDS output I/F.

- external connector (CN11) for DRP : BM50B-SRDS-G-TF (JST)
- external connector (CN13) for LVDS : SM20B-SRSS-TB (JST)

5.21.1. External connector (CN11)

The external connector (CN11) structures

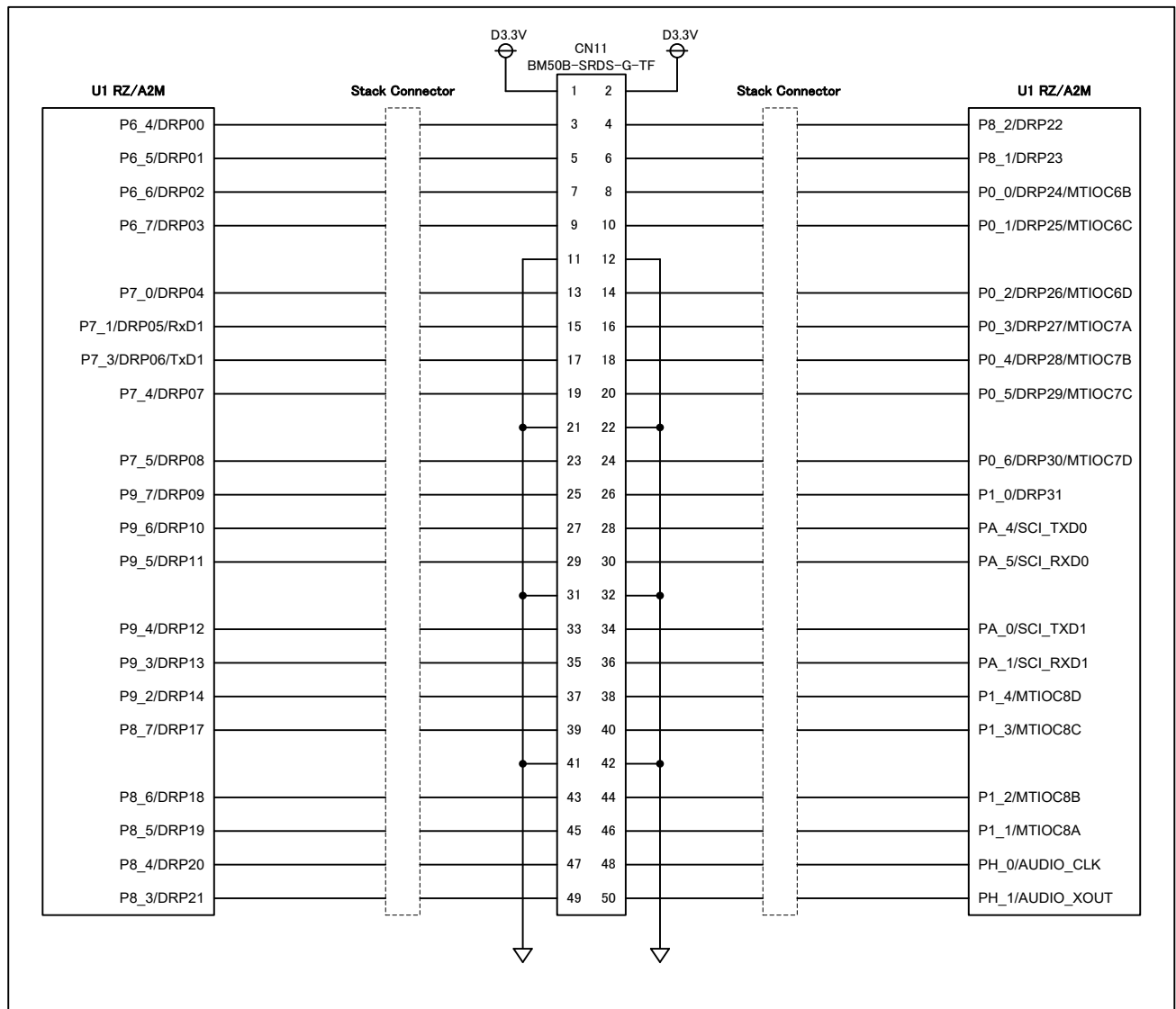


Figure 5-21-1 : External connector (CN11)

5.21.2. External connector (CN13)

The external connector (CN13) structures

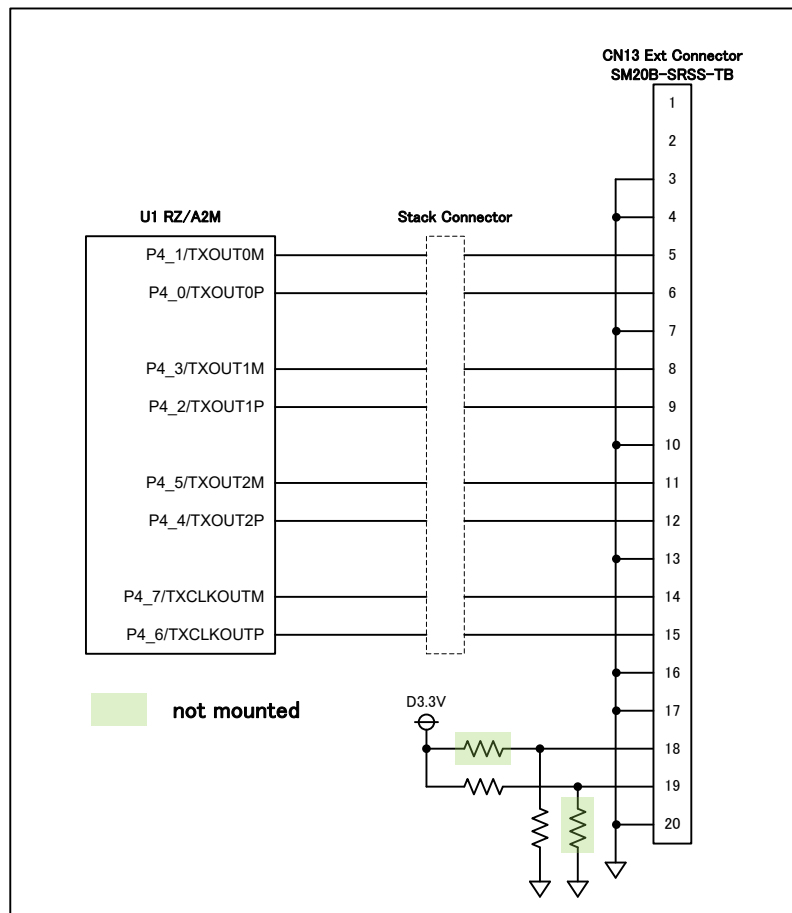


Figure 5-21-2 : External connector (CN13)

6. CONNECTORS

6.1. CONNECTOR LIST

Connector list

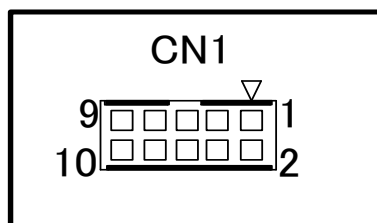
CN-No.	Connector Model Number	Remarks
CN1	FTSH-105-01-F-DV-K	JTAG Connector
CN2	1-1734775-1	USB Type A Connector
CN3	10118194-0001LF	USB Micro B Connector
CN4	DM3AT-SF-PEJM5	Micro SD Socket
CN5	1-84953-5	FFC Connector
CN6	7499010211A	RJ45
CN7	DF17(4.0)-60DS-0.5V(57)	Receptacle Connector
CN8	DF17(4.0)-60DS-0.5V(57)	Receptacle Connector
CN9	DF17(4.0)-40DS-0.5V(57)	Receptacle Connector
CN10	DF17(4.0)-60DP-0.5V(57)	Header Connector
CN11	BM50B-SRDS-G-TF(LF)(SN)	SHD Connector
CN12	DF17(4.0)-60DP-0.5V(57)	Header Connector
CN13	SM20B-SRSS-TB	SH Connector
CN14	DF17(4.0)-40DP-0.5V(57)	Header Connector
CN15	FFC-4AMEP1	Pin Header
CN16	FFC-4AMEP1	Pin Header
CN17	FFC-4AMEP1	Pin Header
CN18	B4B-EH-A(LF)(SN)	EH Connector
CN19	B4B-EH-A(LF)(SN)	EH Connector
CN20	BM03B-SRSS-TB(LF)(SN)	SH Connector
CN21	BM03B-SRSS-TB(LF)(SN)	SH Connector
CN22	BM04B-SRSS-TB(LF)(SN)	SH Connector
CN23	BM04B-SRSS-TB(LF)(SN)	SH Connector
CN24	BM04B-SRSS-TB(LF)(SN)	SH Connector
CN25	BM04B-SRSS-TB(LF)(SN)	SH Connector
CN26	BM07B-SRSS-TB(LF)(SN)	SH Connector
CN27	BM07B-SRSS-TB(LF)(SN)	SH Connector
CN28	B2PS-VH	VH Connector

Table 6-1: Connector List

6.1.1. **CN1**

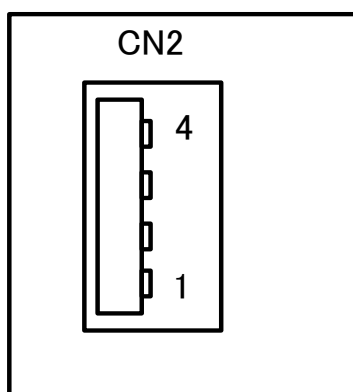
PART NO. : FTSH-105-01-F-DV-K

Pin No.	Signal Name	Remarks	Pin No.	Signal Name	Remarks
1	D3.3V		2	TMS	PU
3	GND		4	TCK	PU
5	GND		6	TDO	PU
7	Key	No pin	8	TDI	PU
9	GND		10	nSRST	PU

6.1.2. **CN2**

PART NO. : 1-1734775-1

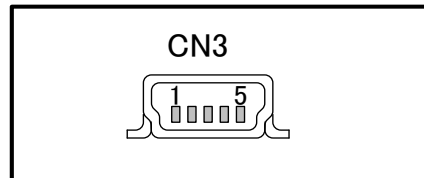
Pin No.	Signal Name	Remarks
1	D5.0V	VBUS
2	DM0	USB-
3	DP0	USB+
4	GND	GND



6.1.3. **CN3**

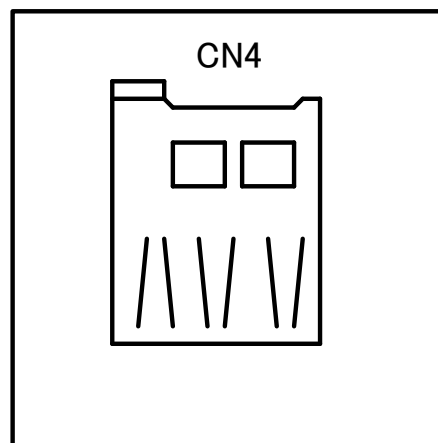
PART NO. : 10118194-0001LF

Pin No.	Signal Name	Remarks
1	D5V	VBUS
2	DM1	USB-
3	DP1	USB+
4	Open	ID
5	GND	GND

6.1.4. **CN4**

PART NO. : DM3AT-SF-PEJM5

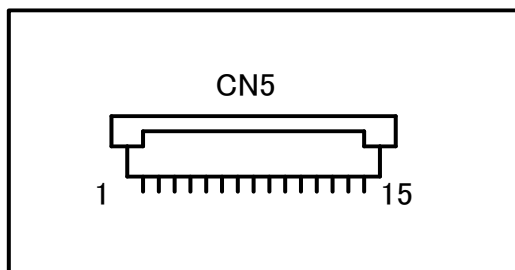
Pin No.	Signal Name	Remarks
1	SD0_DAT2	DAT2
2	SD0_DAT3	CD/DAT3CD/DAT3
3	SD0_CMD	CMD
4	1.8V/3.3V	VDD
5	SD0_CLK	CLK
6	GND	VSS
7	SD0_DAT0	DAT0
8	SD0_DAT1	DAT1
9	P5_0/SD0_CD	A
10	GND	B



6.1.5. CN5

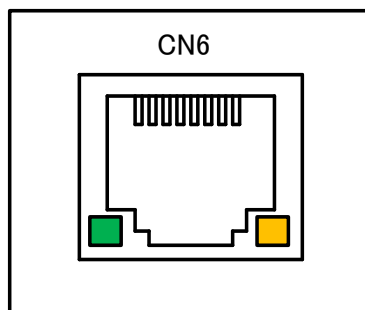
PART NO. : 1-84953-5

Pin No.	Signal Name	Remarks
1	GND	
2	CSI_DATA0N	
3	CSI_DATA0P	
4	GND	
5	CSI_DATA1N	
6	CSI_DATA1P	
7	GND	
8	CSI_CLKN	
9	CSI_CLKP	
10	GND	
11	PD 2/RIIC1SCL	PU
12	PD 3/RIIC1SDA	PU
13	PD 4/RIIC2SCL	PU
14	PD 5/RIIC2SDA	PU
15	D3.3V	

**6.1.6. CN6**

PART NO. : 7499010211A

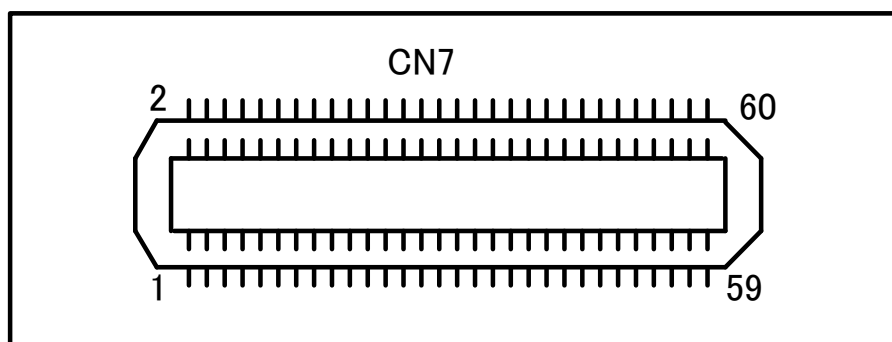
Pin No.	Signal Name	Remarks
1	TX+	
2	TX-	
3	RX+	
4	NC	
5	NC	
6	RX-	
7	NC	
8	NC	



6.1.7. **CN7**

PART NO. : DF17(4.0)-60DS-0.5V(57)

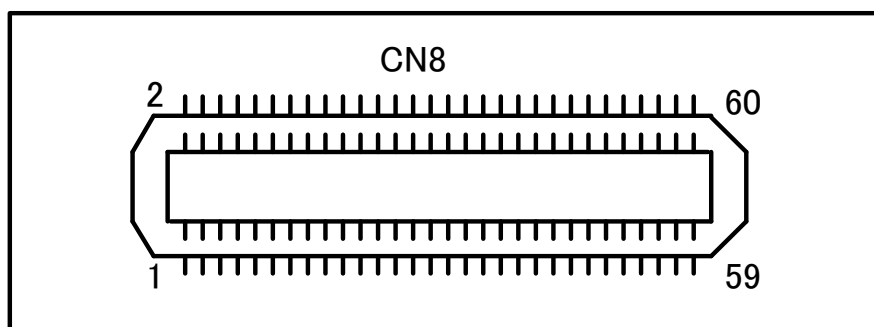
Pin No.	Signal Name	Remarks	Pin No.	Signal Name	Remarks
1	Ext_Reset		2	RESET#	
3	P5_7/AN007		4	P5_4/AN004	
5	P5_6/AN006		6	P5_3/AN003/IRQ7	
7	P5_5/AN005		8	P5_2/AN002	
9	GND		10	GND	
11	PG_1/MOSI0/MTIOC3C		12	P8_0	
13	PG_2/MISO0/MTIOC3B		14	PB_5/TxD0	
15	PG_0/RSPCK0/MTIOC3A		16	PB_4	
17	PG_3/SSL00/MTIOC3D		18	PB_3	
19	PF_0		20	PB_2	
21	PF_1/RXD3		22	PB_1	
23	PF_2/TXD3		24	PB_0	
25	GND		26	GND	
27	PK_0		28	P6_4/DRP00	
29	PC_4/IRQ1		30	P6_5/DRP01	
31	PA_7		32	P6_6/DRP02	
33	PA_4/SCI_TXD0		34	P6_7/DRP03	
35	PA_5/SCI_RXD0		36	P7_0/DRP04	
37	PA_2		38	P7_1/DRP05/RxD1	
39	PA_0/SCI_TXD1		40	P7_3/DRP06/TxD1	
41	PA_1/SCI_RXD1		42	P7_4/DRP07	
43	GND		44	GND	
45	PA_3/MTIOC0D		46	P7_5/DRP08	
47	P7_7/RxD0		48	P9_7/DRP09	
49	P9_0/DRP16/TxD4		50	P9_6/DRP10	
51	P8_7/DRP17		52	P9_5/DRP11	
53	P8_6/DRP18		54	P9_4/DRP12	
55	P8_5/DRP19		56	P9_3/DRP13	
57	P8_4/DRP20		58	P9_2/DRP14	
59	P8_3/DRP21		60	P9_1/DRP15/RxD4	



6.1.8. **CN8**

PART NO. : DF17(4.0)-60DS-0.5V(57)

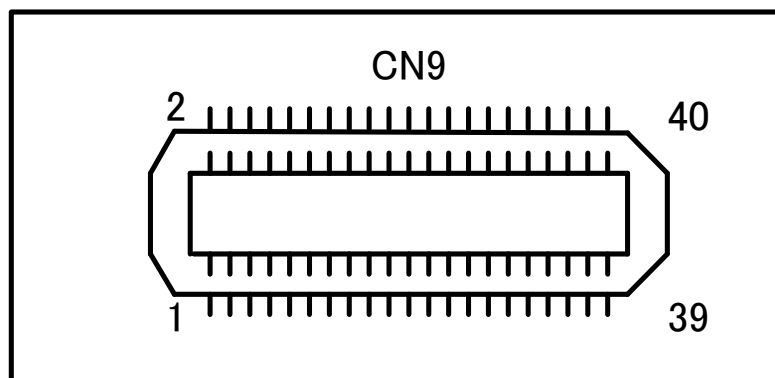
Pin No.	Signal Name	Remarks	Pin No.	Signal Name	Remarks
1	PF_5/TXD2		2	P8_2/DRP22	
3	PF_4/RXD2		4	P8_1/DRP23	
5	PK_1/CAN_CLK		6	P0_0/DRP24/MTIOC6B	
7	PJ_3		8	P0_1/DRP25/MTIOC6C	
9	PF_3		10	P0_2/DRP26/MTIOC6D	
11	PH_2		12	P0_3/DRP27/MTIOC7A	
13	PF_6		14	P0_4/DRP28/MTIOC7B	
15	PC_2		16	P0_5/DRP29/MTIOC7C	
17	GND		18	GND	
19	P7_2		20	P0_6/DRP30/MTIOC7D	
21	PJ_2/TXD1		22	P1_0/DRP31	
23	PJ_1/RxD1		24	PH_5/IRQ5	
25	GND		26	GND	
27	P3_4/CAN1TX DATARATE_EN		28	PC_1	
29	P3_2/CAN1RX DATARATE_EN		30	PK_5	
31	P3_3/CAN1TX		32	PJ_7	
33	P3_1/CAN1RX		34	PJ_6/IRQ0	
35	P3_5/CAN0TX DATARATE_EN		36	PG_5/MOSI1/MTIOC4B	
37	PK_3/CAN0RX DATARATE_EN		38	PG_6/MISO1/MTIOC4C	
39	PK_4/CAN0TX		40	PG_4/RSPCK1/MTIOC4A	
41	PK_2/CAN0RX		42	PG_7/SSL10/MTIOC4D	
43	GND		44	GND	
45	PF_7		46	P4_1/TXOUT0M	
47	P1_4/MTIOC8D		48	P4_0/TXOUT0P	
49	P1_3/MTIOC8C		50	P4_3/TXOUT1M	
51	P1_2/MTIOC8B		52	P4_2/TXOUT1P	
53	P1_1/MTIOC8A		54	P4_5/TXOUT2M	
55	PJ_4		56	P4_4/TXOUT2P	
57	PH_0/AUDIO_CLK		58	P4_7/TXCLKOUTM	
59	PH_1/AUDIO_XOUT		60	P4_6/TXCLKOUTP	



6.1.9. CN9

PART NO. : DF17(4.0)-40DS-0.5V(57)

Pin No.	Signal Name	Remarks	Pin No.	Signal Name	Remarks
1	D5V		2	D5V	
3	D5V		4	D5V	
5	-		6	-	
7	D3.3V		8	D3.3V	
9	D3.3V		10	D3.3V	
11	D3.3V		12	D3.3V	
13	D3.3V		14	D3.3V	
15	-		16	-	
17	GND		18	GND	
19	GND		20	GND	
21	GND		22	GND	
23	GND		24	GND	
25	-		26	-	
27	5V		28	5V	
29	5V		30	5V	
31	5V		32	5V	
33	5V		34	5V	
35	5V		36	5V	
37	5V		38	5V	
39	5V		40	5V	

**6.1.10. CN10**

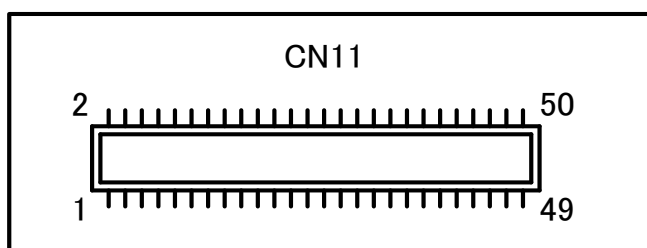
PART NO. : DF17(4.0)-60DP-0.5V(57)

Please refer "6.1.7 CN7" for connector assign

6.1.11. CN11

PART NO. : BM50B-SRDS-G-TF(LF)(SN)

Pin No.	Signal Name	Remarks	Pin No.	Signal Name	Remarks
1	D3.3V		2	D3.3V	
3	P6_4/DRP00		4	P8_2/DRP22	
5	P6_5/DRP01		6	P8_1/DRP23	
7	P6_6/DRP02		8	P0_0/DRP24/MTIOC6B	
9	P6_7/DRP03		10	P0_1/DRP25/MTIOC6C	
11	GND		12	GND	
13	P7_0/DRP04		14	P0_2/DRP26/MTIOC6D	
15	P7_1/DRP05/RxD1		16	P0_3/DRP27/MTIOC7A	
17	P7_3/DRP06/TxD1		18	P0_4/DRP28/MTIOC7B	
19	P7_4/DRP07		20	P0_5/DRP29/MTIOC7C	
21	GND		22	GND	
23	P7_5/DRP08		24	P0_6/DRP30/MTIOC7D	
25	P9_7/DRP09		26	P1_0/DRP31	
27	P9_6/DRP10		28	PA_4/SCI_TXD0	
29	P9_5/DRP11		30	PA_5/SCI_RXD0	
31	GND		32	GND	
33	P9_4/DRP12		34	PA_0/SCI_TXD1	
35	P9_3/DRP13		36	PA_1/SCI_RXD1	
37	P9_2/DRP14		38	P1_4/MTIOC8D	
39	P8_7/DRP17		40	P1_3/MTIOC8C	
41	GND		42	GND	
43	P8_6/DRP18		44	P1_2/MTIOC8B	
45	P8_5/DRP19		46	P1_1/MTIOC8A	
47	P8_4/DRP20		48	PH_0/AUDIO_CLK	
49	P8_3/DRP21		50	PH_1/AUDIO_XOUT	



6.1.12. CN12

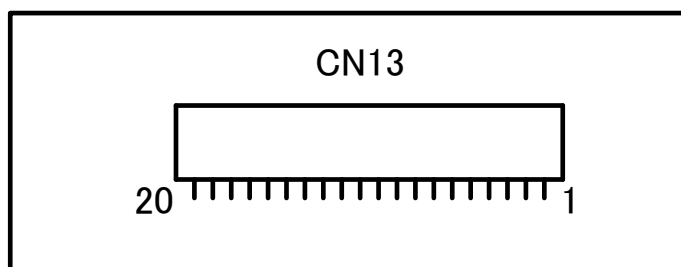
PART NO. : DF17(4.0)-60DP-0.5V(57)

Please refer "6.1.8 CN8" for connector assign

6.1.13. CN13

PART NO. : Z-220-4FD

Pin No.	Signal Name	Remarks
1	D3.3V	
2	D3.3V	
3	GND	
4	GND	
5	P4_1/TXOUT0M	
6	P4_0/TXOUT0P	
7	GND	
8	P4_3/TXOUT1M	
9	P4_2/TXOUT1P	
10	GND	
11	P4_5/TXOUT2M	
12	P4_4/TXOUT2P	
13	GND	
14	P4_7/TXCLKOUTM	
15	P4_6/TXCLKOUTP	
16	GND	
17	GND	
18	PD	
19	PU	
20	GND	



6.1.14. CN14

PART NO. : DF17(4.0)-40DP-0.5V(57)

Please refer "6.1.9 CN9" for connector assign

6.1.15. CN15

PART NO. : FFC-4AMEP1

Pin No.	Signal Name	Remarks
1	PF_4/RXD2	3.3V or 5V
2	PF_5/TXD2	3.3V or 5V
3	FET_OUT	10V or 30V
4	GND	

6.1.16. CN16

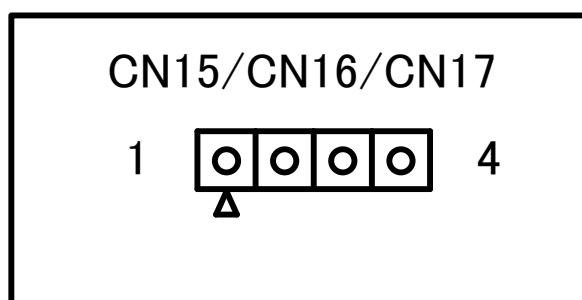
PART NO. : FFC-4AMEP1

Pin No.	Signal Name	Remarks
1	PF_1/RXD3	3.3V or 5V
2	PF_2/TXD3	3.3V or 5V
3	FET_OUT	10V or 30V
4	GND	

6.1.17. CN17

PART NO. : FFC-4AMEP1

Pin No.	Signal Name	Remarks
1	P9_1/DRP15/RxD4	3.3V or 5V
2	P9_0/DRP16/TxD4	3.3V or 5V
3	FET_OUT	10V or 30V
4	GND	



6.1.18. CN18

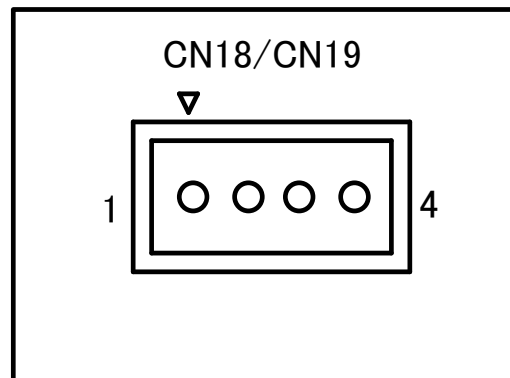
PART NO. : B4B-EH-A(LF)(SN)

Pin No.	Signal Name	Remarks
1	RS485 (-)	Via device of U24 PB_5/TxD0, P7_7/RxD0
2	RS485 (+)	
3	FET_OUT	10V to 30V
4	GND	

6.1.19. CN19

PART NO. : B4B-EH-A(LF)(SN)

Pin No.	Signal Name	Remarks
1	RS485 (-)	Via device of U23 PJ_2/TXD1, PJ_1/RxD1
2	RS485 (+)	
3	FET_OUT	10V to 30V
4	GND	



6.1.20. CN20

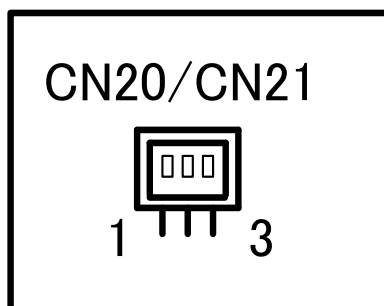
PART NO. : BM03B-SRSS-TB(LF)(SN)

Pin No.	Signal Name	Remarks
1	CANH	Via device of U25 PK_4/CAN0TX, PK_2/CAN0RX
2	GND	
3	CANL	

6.1.21. CN21

PART NO. : BM03B-SRSS-TB(LF)(SN)

Pin No.	Signal Name	Remarks
1	CANH	Via device of U26 P3_3/CAN1TX, P3_1/CAN1RX
2	GND	
3	CANL	



6.1.22. CN22

PART NO. : BM04B-SRSS-TB(LF)(SN)

Pin No.	Signal Name	Remarks
1	A3.3V	
2	AGND	
3	P5_4/AN004	
4	PB_1	

6.1.23. CN23

PART NO. : BM04B-SRSS-TB(LF)(SN)

Pin No.	Signal Name	Remarks
1	A3.3V	
2	AGND	
3	P5_5/AN005	
4	PB_2	

6.1.24. CN24

PART NO. : BM04B-SRSS-TB(LF)(SN)

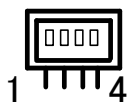
Pin No.	Signal Name	Remarks
1	A3.3V	
2	AGND	
3	P5_6/AN006	
4	PB_3	

6.1.25. CN25

PART NO. : BM04B-SRSS-TB(LF)(SN)

Pin No.	Signal Name	Remarks
1	A3.3V	
2	AGND	
3	P5_7/AN007	
4	PB_4	

CN22/CN23/CN24/CN25



6.1.26. CN26

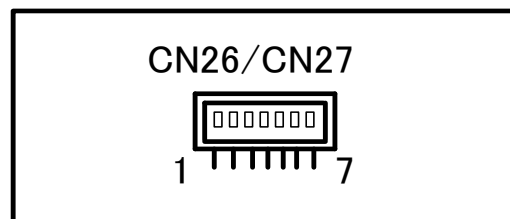
PART NO. : BM04B-SRSS-TB(LF)(SN)

Pin No.	Signal Name	Remarks
1	D3.3V	
2	PC_4/IRQ1	
3	PG_1/MOSI0/MTIOC3C	
4	PG_2/MISO0/MTIOC3B	PU
5	PG_0/RSPCK0/MTIOC3A	
6	PG_3/SSL00/MTIOC3D	PU
7	GND	

6.1.27. CN27

PART NO. : BM04B-SRSS-TB(LF)(SN)

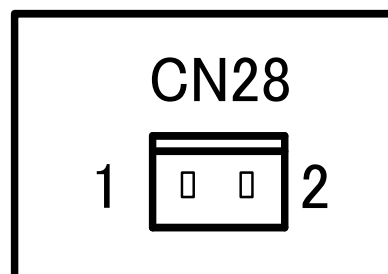
Pin No.	Signal Name	Remarks
1	D3.3V	
2	PJ_6/IRQ0	
3	PG_5/MOSI1/MTIOC4B	
4	PG_6/MISO1/MTIOC4C	PU
5	PG_4/RSPCK1/MTIOC4A	
6	PG_7/SSL10/MTIOC4D	PU
7	GND	



6.1.28. CN28

PART NO. : BM04B-SRSS-TB(LF)(SN)

Pin No.	Signal Name	Remarks
1	10V to 30V(Maximum absolute rating)	DC IN
2	GND	



7. SWITCH

7.1. SWITCH LIST

The table of switch list on this board

SW-No.	Switch model No.	Remarks
SW1	2-1437565-9	NMI
SW2	2-1437565-9	P2 1/IRQ6
SW3	2-1437565-9	Reset
DSW1	CHS-08TB	CPU setting

Table 7-1 : Switch List

8. JUMPER

8.1. JUMPER LIST

The table of jumper list on this board

JP-No.	Jumper pin model No.	Remarks
JP1	PSS-710103-03	Switch CN15 signal level
JP2	PSS-710103-03	Switch CN16 signal level
JP3	PSS-710103-03	Switch CN17 signal level
JP5	Solder pad	switch U10 power supply
JP6	Solder pad	D4 short

Table 8-1 : Jumper Pin List