

**Infotainment Carrier Board
For R-Car Starter Kit (Kingfisher)
SBEV-RCAR-KF-M06
Rev. 1.3**

Preliminary Hardware Manual

-DRAFT VERSION -

All information contained in these materials, including products and product specifications, represents information on the product at the time of publication and is subject to change by Shimafuji Electric Inc. without notice. Please review the latest information published by Shimafuji Electric Inc. website (<http://www.shimafuji.co.jp/DL/EN/InfotainmentCarrierBoard/>).

Document No. 270298001E

Date Published Jan, 2018

Shimafuji Electric Inc.

Printed in Japan

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 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
Alpha	2017/Apr./21	Draft version created	
1.0	2017/Jul./7	Modify for SBEV-RCAR-KF-M05/S03	
1.1	2017/Sep./4	Modify for SBEV-RCAR-KF-M05/S04	
1.11	2018/Jan./16	Delete 2. Specification SD card 1.8V Modify 4.13 HDMI 1980x1080 => 1920x1080 <i>i</i>	
1.20	2018/Jan./30	Modify for SBEV-RCAR-KF-M05	
1.30	2018/Aug../01	Modify for SBEV-RCAR-KF-M06	

Content

1.	OVERVIEW	1
2.	SPRCIFICATIONS	1
3.	BLOCK DIAGRAM	3
4.	FUNCTIONS	4
4.1.	POWER SUPPLY	4
4.2.	RESET	6
4.3.	CLOCK	7
4.4.	USB 3.0	8
4.5.	USB 2.0	9
4.6.	Mini PCI-Express	10
4.7.	M.2 INTERFACE	11
4.8.	WIFI / BLUETOOTH	12
4.9.	SD CARD	13
4.10.	SERIAL	14
4.11.	CAMERA SERIAL INTERFACE (CSI)	15
4.12.	VIDEO IN	17
4.13.	HDMI	18
4.14.	FLAT PANEL	19
4.15.	AUDIO	20
4.16.	CAN	21
4.17.	MOST	22
4.18.	GPS	23
4.19.	RADIO	24
4.20.	9 AXIS SENSOR	25
4.21.	I2C	26
5.	SWITCH LIST	29
6.	JUMPER LIST	29
7.	LED LIST	30
8.	CONECTOR LIST	31
8.1.	CN1 : R-Car Starter kit CONNECTOR	32
8.2.	CN2 : USB 3.0	37
8.3.	CN4 : SERIAL	37
8.4.	CN5 : M2	38
8.5.	CN7 : LVDS OUT	39
8.6.	CN8 : PANEL POWER	39
8.7.	CN9 : PANEL CONTROL	40
8.8.	CN10 : CSI	40
8.9.	CN11 : CSI	41
8.10.	CN12 : LINE	42
8.11.	CN13 : USB 2.0	42
8.12.	CN15 : Mini PCI-Express	43
8.13.	CN16 : GPS	43
8.14.	CN17 : CAN	44
8.15.	CN18 : CAN	44
8.16.	CN22 : MOST	44
8.17.	CN23 : BOARD POWER	45

8.18.	CN28 : MIC	45
8.19.	CN29 : VIDEO IN	46
8.20.	CN32 : HEADPHONE	46
8.21.	CN33 : HEADPHONE	47
8.22.	CN42 : RADIO	47
8.23.	CN43 : RADIO	47
8.24.	CN45 : WIFI/BLUETOOTH	47
8.25.	CN46 : WIFI	48
8.26.	CN47 : SD CARD	48
8.27.	CN48 : CSI	49
8.28.	CN49 : HDMI	49
8.29.	CN52 : SIM	50
9.	BOARD EXTERNAL VIEW	51

1. OVERVIEW

This document is the Manual for the Infotainment Carrier Board called “KINGFISHER” . (Parts number: SBEV-RCAR-KF-M06, hereinafter referred to as “this board”)

This board is extending the function of R-Car Starter kit (hereinafter referred to as “CPU board”), Option, Renesas).

2. SPECIFICATIONS

Specification list.

Function Module	Characteristic / Function outline
Connector for R-Car Starter Kit	R-Car Starter kit (Option) Connector: 402-51501-51 x2 (CN1)
USB2.0	Direct connect to R-Car Starter Kit, OTG USB2.0-HOST / FUNCTION (TypeAB connector 1port) (CN13)
USB3.0	HUB : USB5534B-5000JZX (microchip) USB3.0-HOST (TypeA connector 2port) (CN2)
SD CARD	3.3V SDHC/SDXC Connector: 693063020911 (CN47)
WIFI	WL1837MODGIMOCT (TI IEEE802.11a/11b/11g/11n) Antenna : W3006(CHIP)(L39)
BLUETOOTH	WL1837MODGIMOCT (TI Ver4.1LE) Antenna : W3006(CHIP)(L38)
M.2 interface	PCI Express x1LANE KEY M Connector (CN5)
AUDIO	PCM3168APAP (TI) MICin x6ch (CN28) HPout x8ch (CN32) LINEout x8ch (CN12)
FLAT PANEL	LVDS connector: DF14A-20P-1.25H (25) (CN7) CONTROL connector: 0530480710(CN9) POWER connector: S7B-PH-SM4-TB(LF)(SN)(CN8)
CSI	FPDLinkIII board or GCML Input port board (option) Connector: FX23-60P x2 (CN10, CN11) CSI camera interface 1-1734248-5 (CN48)
VIDEO IN	8bit Parallel Video Connector 5535512-2 (CN29)
HDMI	ADV7513BSWZ (Analog Devices HDMI 1.4a) Connector: 0471510001 (CN49)
Mini PCI-Express	PCI Express(Gen2) x1LANE Connector: 2041119-1 (CN15) SIM Slot: 78800-0001 (CN52)
SERIAL	Up 3Mbps Connector: 535676-5 (CN4)
CAN-FD	TCAN332GDCNT(TI) Connector: S3B-PH-SM4-TB (LF)(SN) x2(CN17, CN18)
MOST	11023H52531 board (Option)

	Connector: QSH-020-01-L-D-DP-A (CN22)
GPS	MAX-M8Q-0 (ublox) Connector: PE44651C (CN16)
9 axis sensors	LSM9DS0(STmicro)
RADIO	Si4689-A10-GM (Silicon Lab) LOOP Antenna: PTSA15235Z (CN43) RF Antenna: CONSMA001-G (CN42)
Power supply input	DC12V \pm 10%
board size	180mm \times 198mm
Operating temperature	0 to 45 Celsius

Table 2: Specification List

3. BLOCK DIAGRAM

The board block diagram.

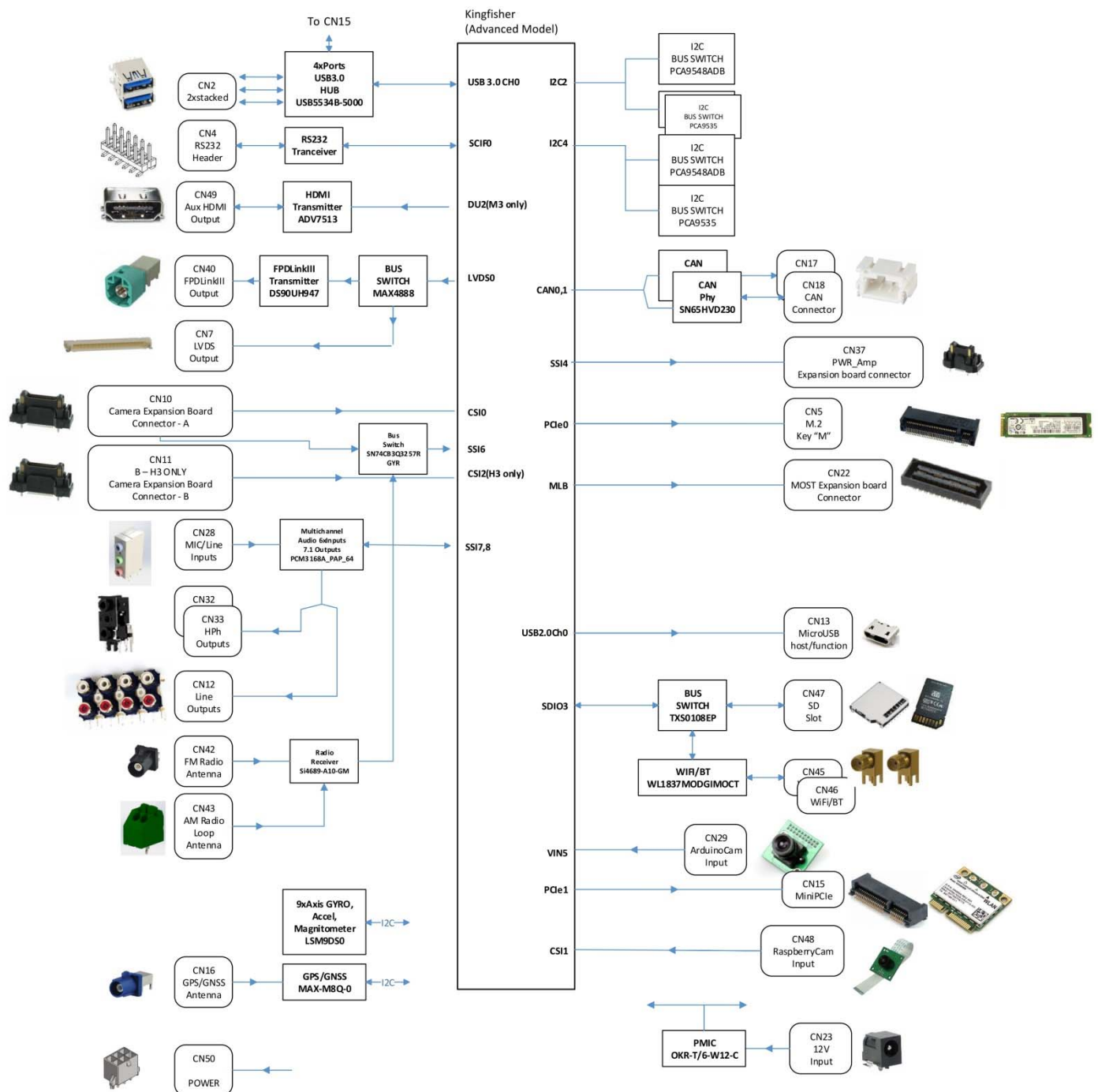


Figure 3: Block diagram

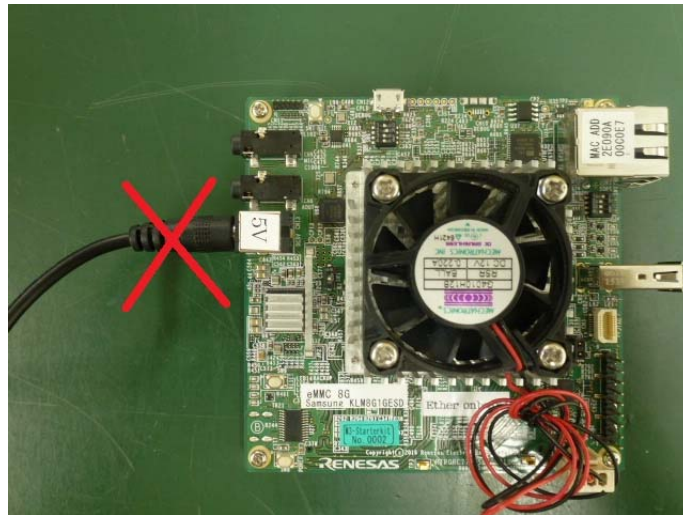
4. FUNCTIONS

4.1. POWER SUPPLY

The main power supply domain must be connected to an external AC adapter. The voltage is +12V DC.

! Warning !

DO NOT USE R-Car Starter kit AC adapter to connect this board or this board AC adapter to connect R-Car Starter kit. If connect wrong AC adapter then it has serious damage to the board.

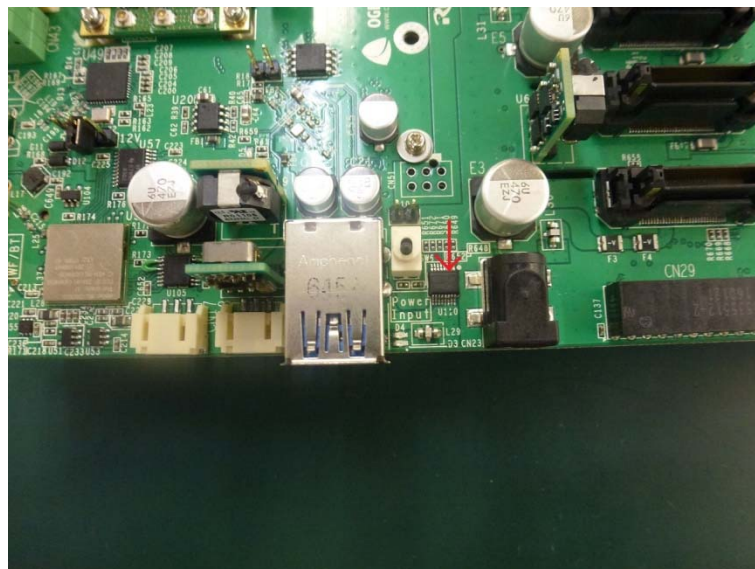


•AC adapter +12V specification

- Output volt : +12VDC $\pm 10\%$
- Output Current : Max. 5A
- Connector : PJ-002AH-SMT-TR (CN23)

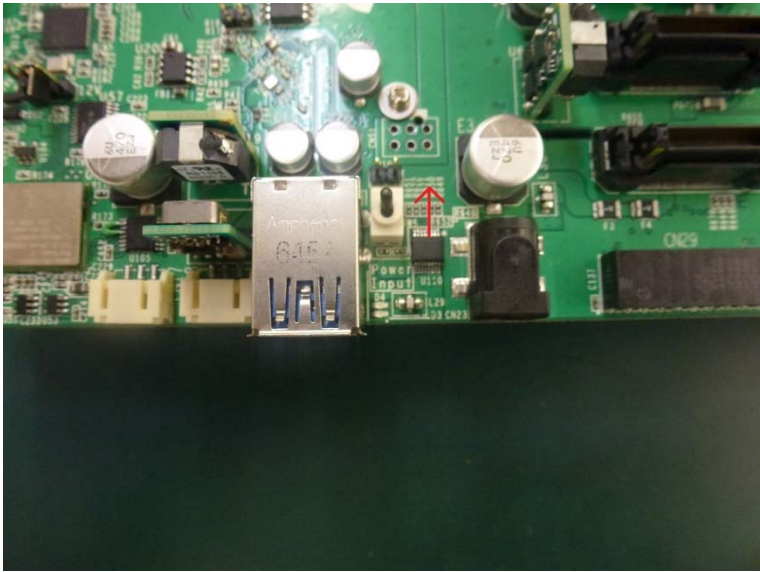
•POWER ON / OFF

- POWER ON
- SW6 to ON position



- POWER OFF

SW6 to OFF position



Main power supply structure

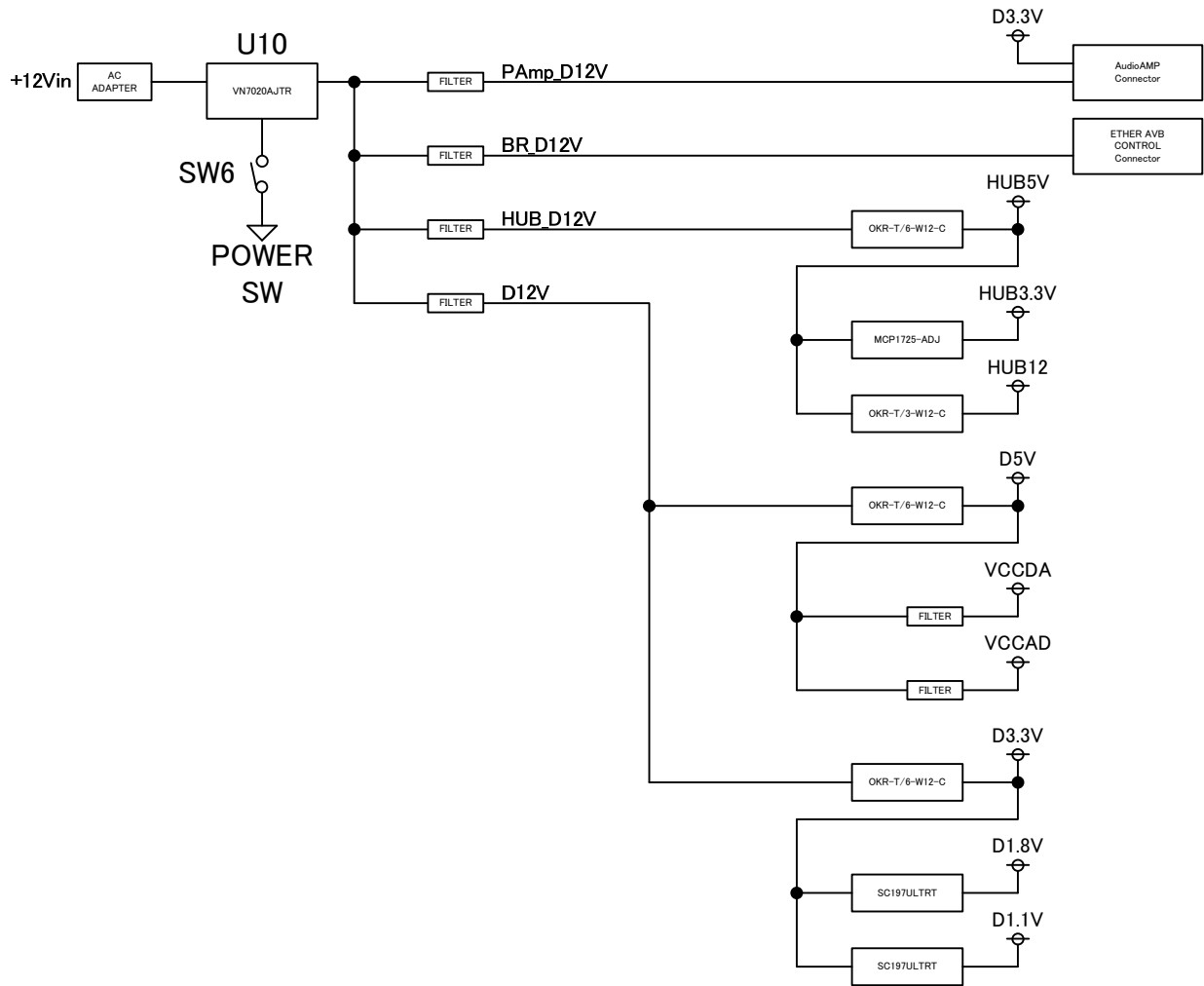


Figure 4-1 : Power structure

4.2. RESET

The reset signal to each device.

All reset signal is controlled by R-Car Starter Kit to this board.

The reset structures

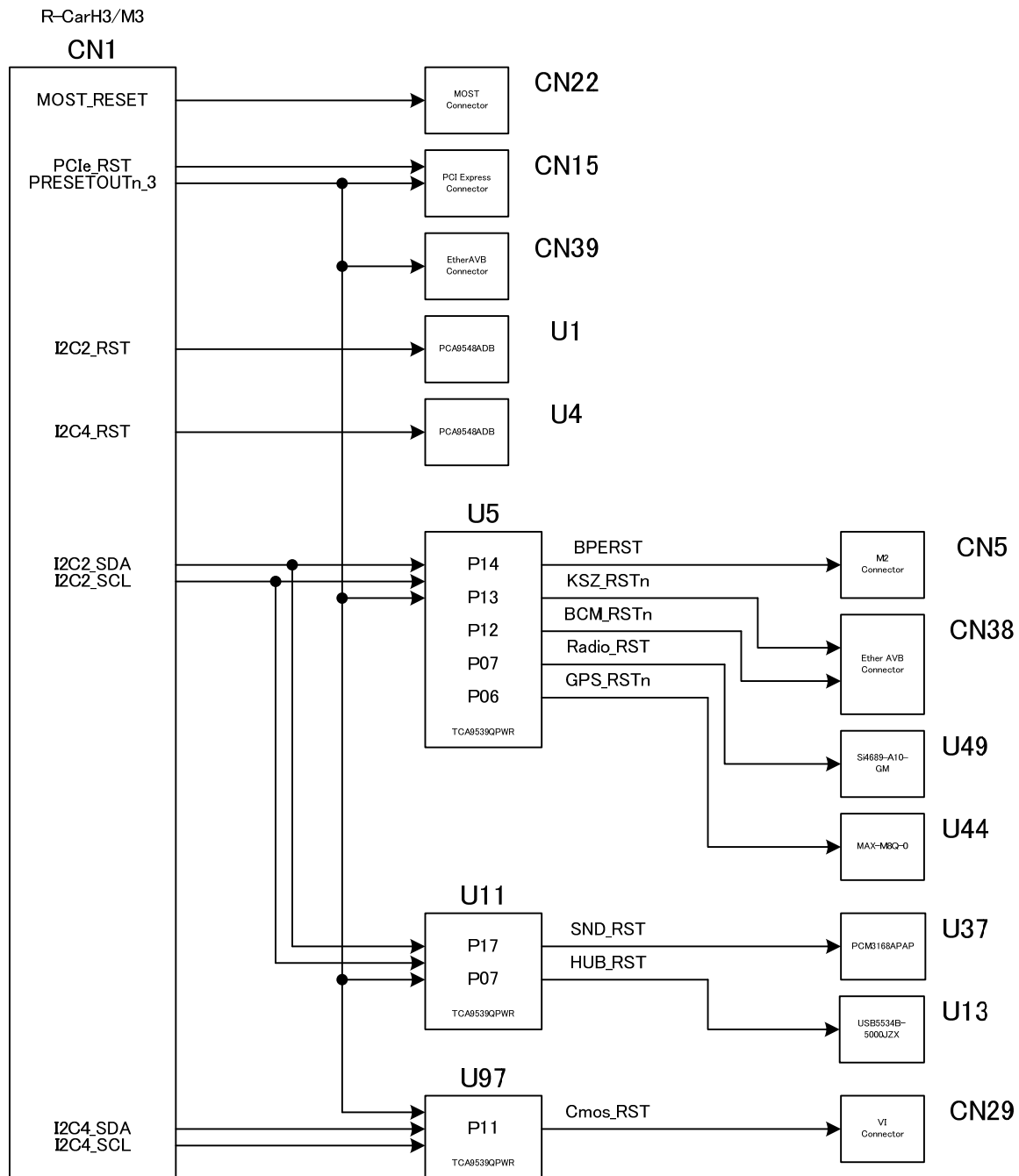


Figure 4-2 : Reset structure

4.3. CLOCK

The clock structures

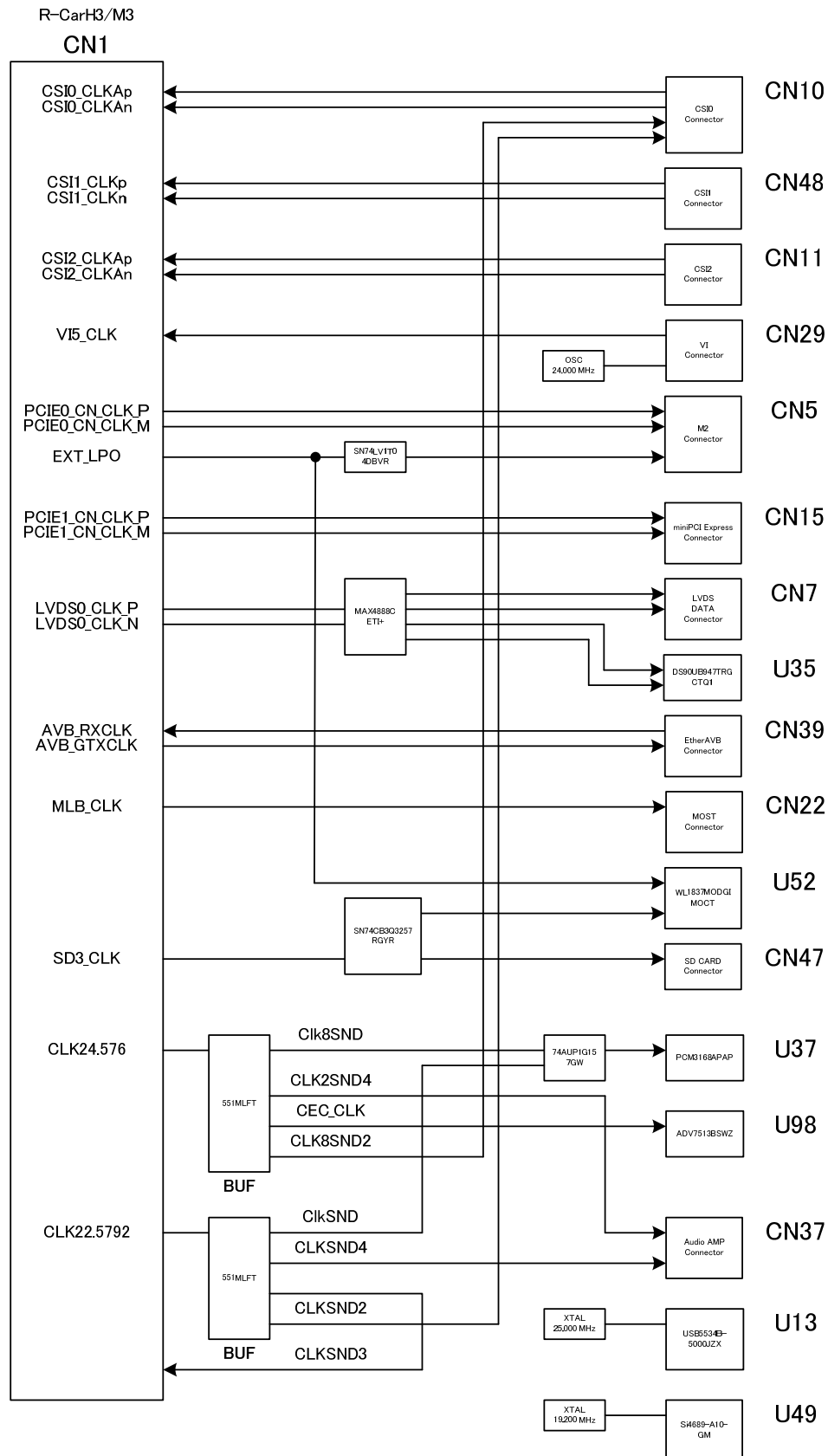


Figure 4-3 : clock structure

4.4. USB 3.0

The USB3.0 x1LANE (ch0) on the R-Car Starter Kit is connected to USB3.0 HUB (USB5534B-5000JZX) on this board and connect to USB3.0 Type-A 2Port connector via USB3.0 HUB.

The connector is connected the current protection power switch (max. 5v 3.7A)

The USB 3.0 interface structure.

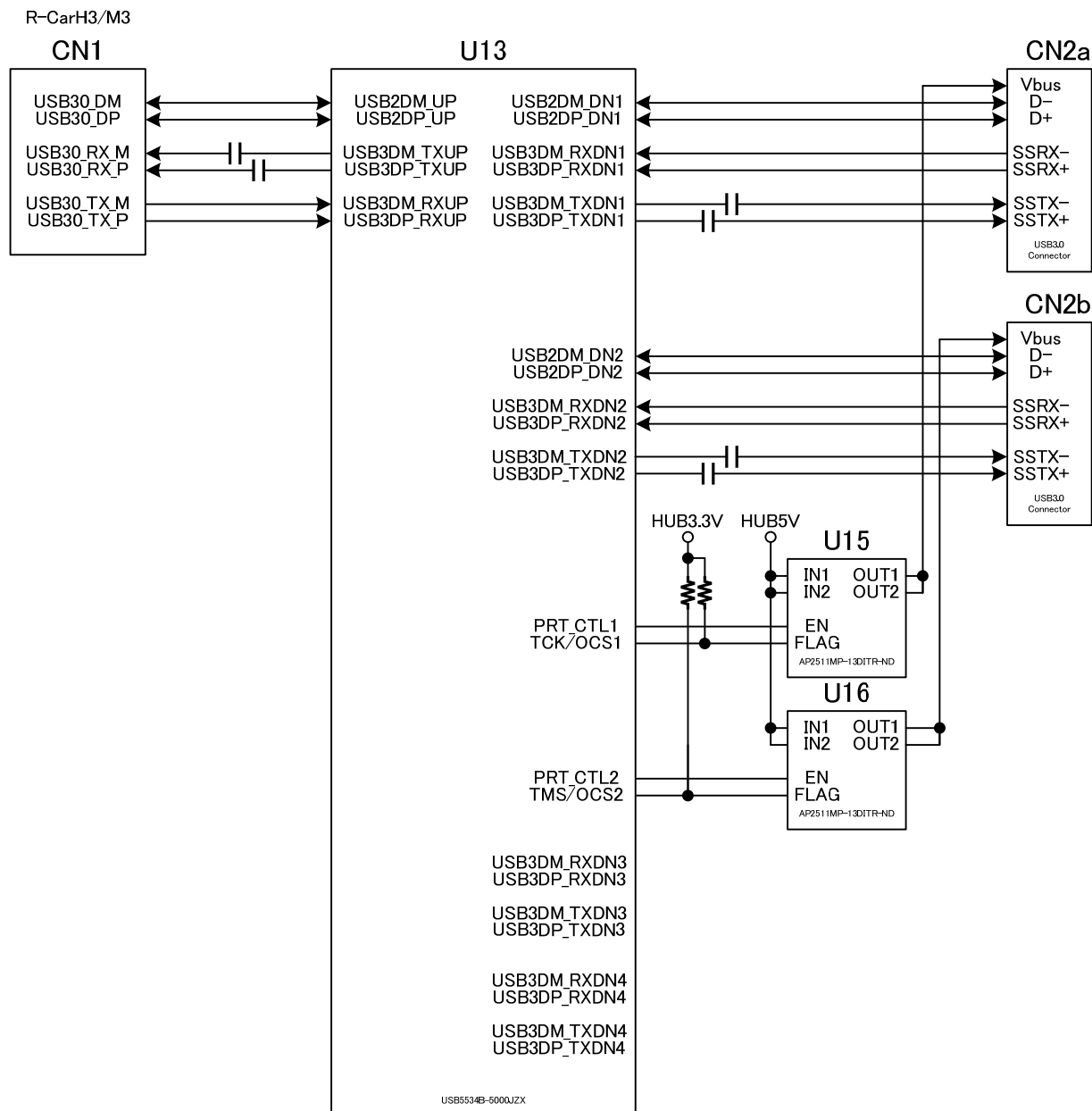


Figure 4-4 : USB 3.0 I/F

4.5. USB 2.0

This board equipped with a USB2.0 (Type-AB) connector.

The R-Car Starter Kit controlled USB2.0 interface (Ch. 0) HOST/FUNCTION.

The USB 2.0 structure.

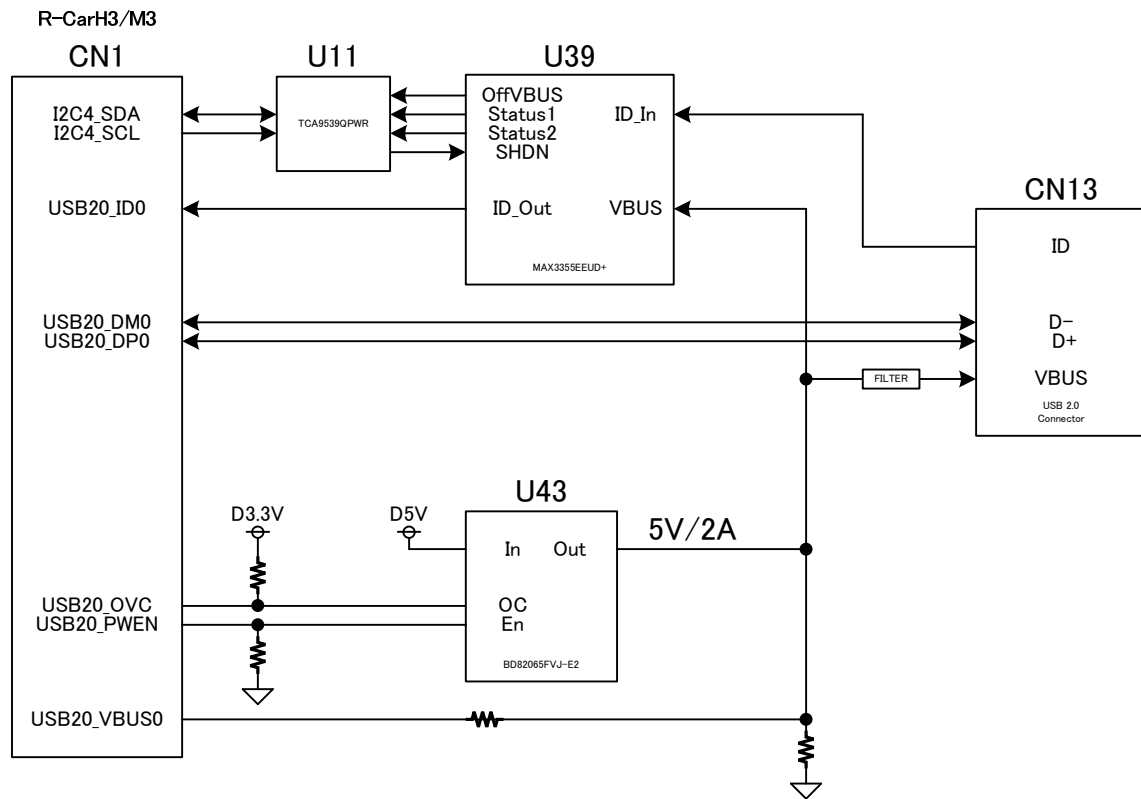


Figure 4-5 : USB 2.0 I/F

4.6. Mini PCI-Express

This board equipped with a Mini PCI Express connector.

The card size of Mini PCI Express is capable for Full size board (50.95x30).

The Mini PCI-Express structure.

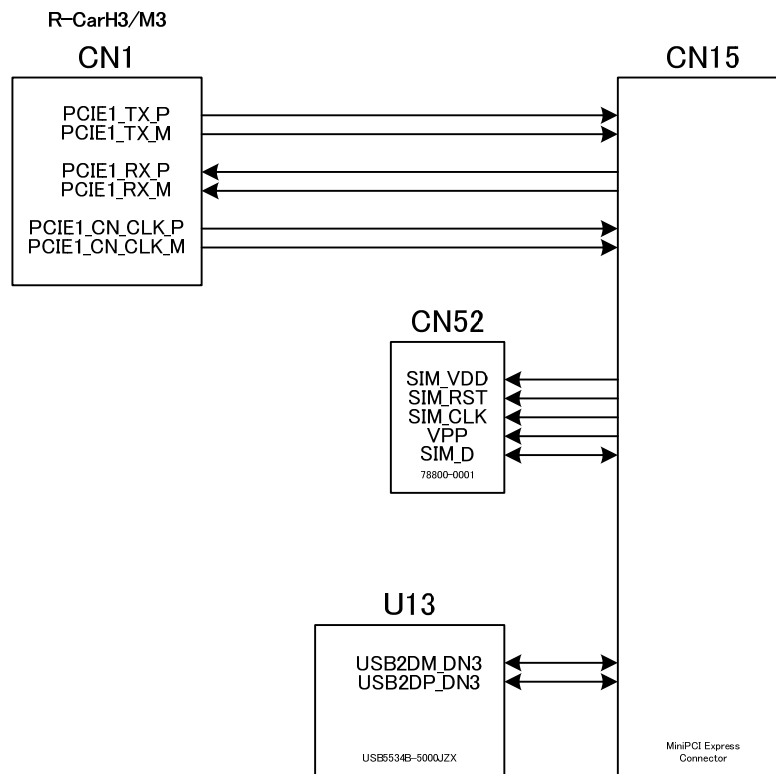


Figure 4-6 : Mini PCI-Express I/F

4.7. M.2 INTERFACE

This board equipped with a M.2 interface connector (KEY M).

The card size of M.2 interface is capable for 2230~2280.

The M.2 interface structure.

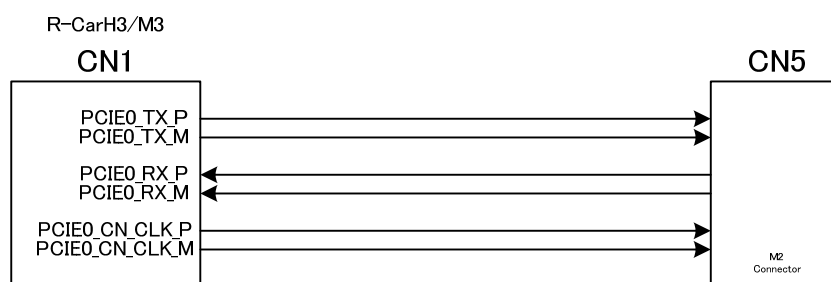


Figure 4-7: M2 I/F

4.8. WIFI / BLUETOOTH

This board equipped with a module (WL1837MODGIMOOT) for IEEE802.11a/11b/11g/11n and BLUETOOTH Ver4.1. Wi-Fi use SD3 interface, and BLUETOOTH use HSCIF0 interface to R-Car Starter Kit. The Wifi and SD CARD cannot use simultaneously through SD3 interface and it controlled by U11P05 (SD_WF) to switch this function.

- P05[H] : SD CARD
- P05[L] : WIFI

This board installes chip antenna x2 (L38, L39) and connector x2 (CN45, CN46). It cannot use chip antenna and connector simultaneously.

This is the antenna select table.

- R685(Install), R686(uninstall) → chip antenna(L38) enable, external antenna(CN45) disable
- R685(uninstall), R686(Install) → chip antenna(L38) disable, external antenna(CN45) enable
- R687(Install), R688(uninstall) → chip antenna(L39) enable, external antenna(CN46) disable
- R687(uninstall), R688(Install) → chip antenna(L39) disable, external antenna(CN46) enable

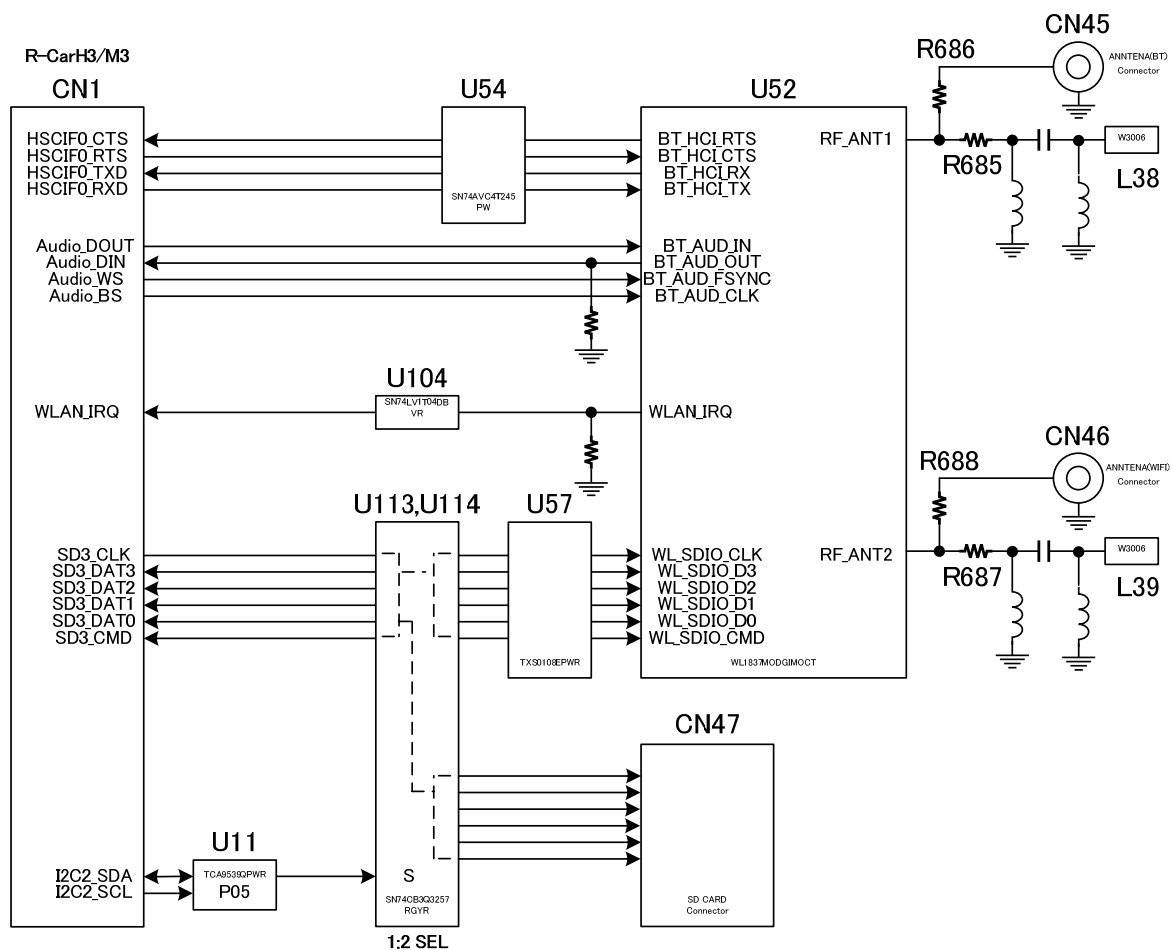


Figure 4-8: WIFI / BLUETOOTH I/F

4.9. SD CARD

This board equipped with a normal size SD CARD slot. It assigned SD3 interface to R-Car Starter Kit.

The Wi-Fi and SD CARD cannot use simultaneously through SD3 interface and it controlled by U11P05 (SD_WF) to switch this function.

- P05[H] : SD CARD
- P05[L] : WIFI

This board support SDHC/SDXC card.

The power voltage for SD card switch 1.8V and 3.3V by VLDO_SD3 voltage controll on R-Car Starter Kit.

- VLDO_SD3=1.8V : U106 Out 1.8V
- VLDO_SD3=3.3V : U106 Out 3.3V

This board ONLY SUPPORT 3.3V SD card.

The SD CARD structure.

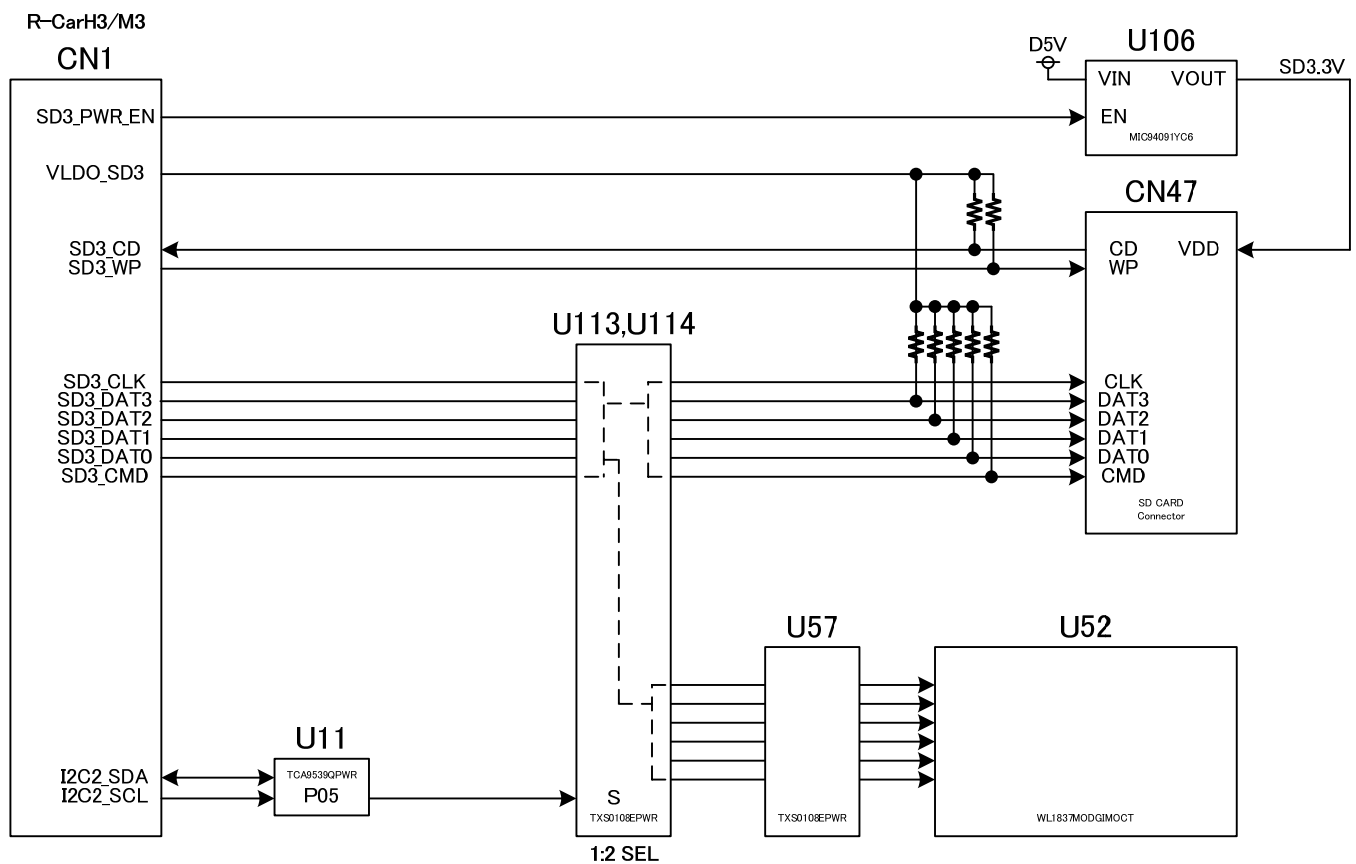


Figure 4-9 : SD CARD I/F

4.10. SERIAL

This board equipped with a SERIAL connector (10pin) for debuggging.

The SERIAL connector is connected to SCIF1 on R-Car Starter Kit.

The SERIAL structures.

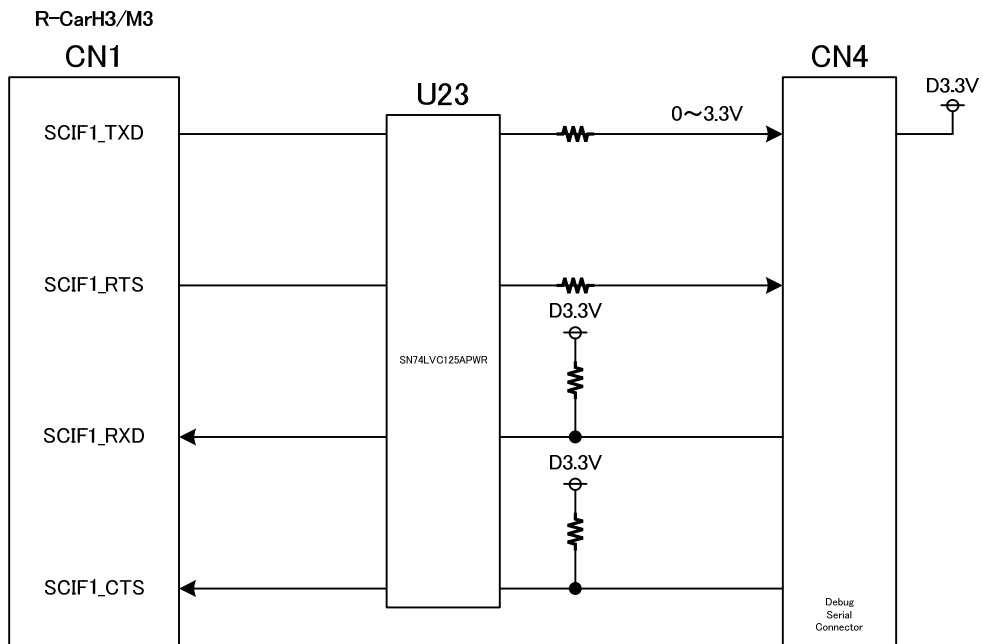


Figure 4-10 : SERIAL I/F

4.11. CAMERA SERIAL INTERFACE (CSI)

This board equipped three CAMERA SERIAL INTERFACES (CSI).

Those are assigned CSI channel

- CN10(CSI0) : option board, FPDLinkIII or GMSL
- CN11(CSI2) : option board, FPDLinkIII or GMSL
- CN48(CSI1) : CSI camera direct connection (30pin FPC)

The SSI signal is switch between the camera serial interface (CSI0) SSI signal and radio devices SSI signal to use, and it controlled by U11 P15(HDMI_Radio) to switch this function.

It could access to CN11(CSI2) is only for R-CarH3(Starter Kit Premier)

- P15[H] : RADIO
- P15[L] : CSI

The CSI structures.

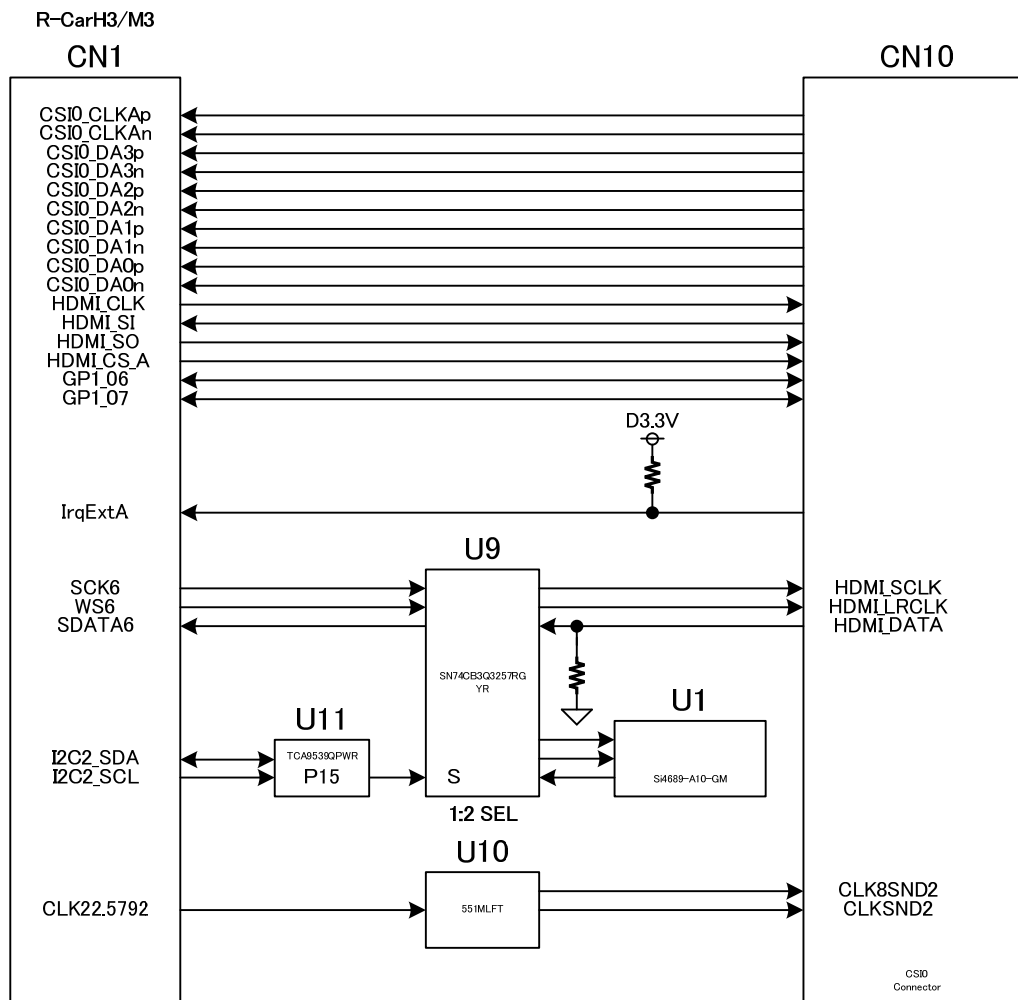


Figure 4-11a : camera SERIAL interface (CSI0) I/F

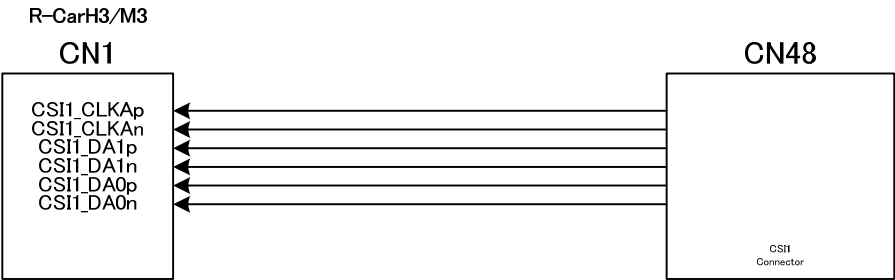


Figure 4-11b : camera SERIAL interface (CSI1) I/F

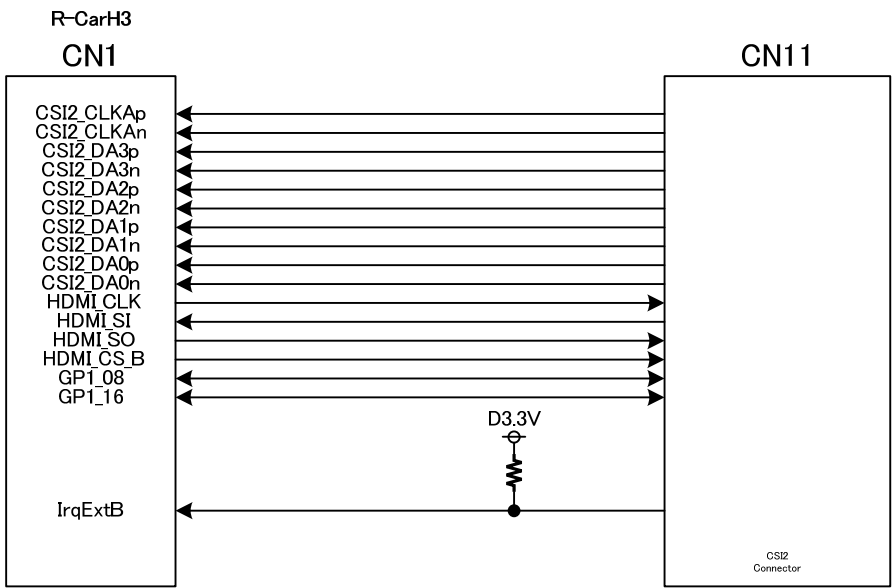


Figure 4-11c : camera SERIAL interface (CSI2) I/F

4.12. VIDEO IN

This board equipped with an 8bit Parallel Video input connector (20pin).

It supports ITU-R BT.601, BT.656, BT.709 formats.

The Parallel Video IN structure.

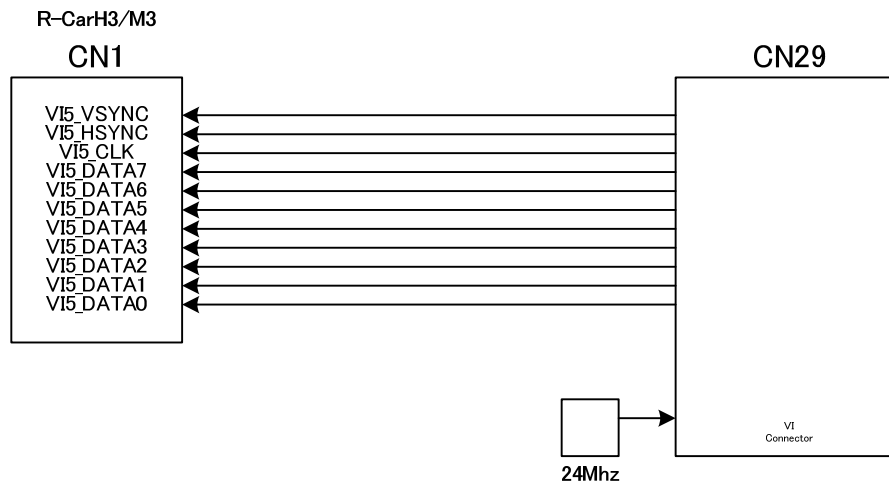


Figure 4-12 : VIDEO IN (VI5) I/F

4.13. HDMI

This board equipped with a HDMI transmitter (ADV7513BSWZ) which support HDMI1.4a.

The maximum resolution is 1920x1080/ and it connected Digital output port (RGB888) on R-Car Starter Kit .

The HDMI structures.

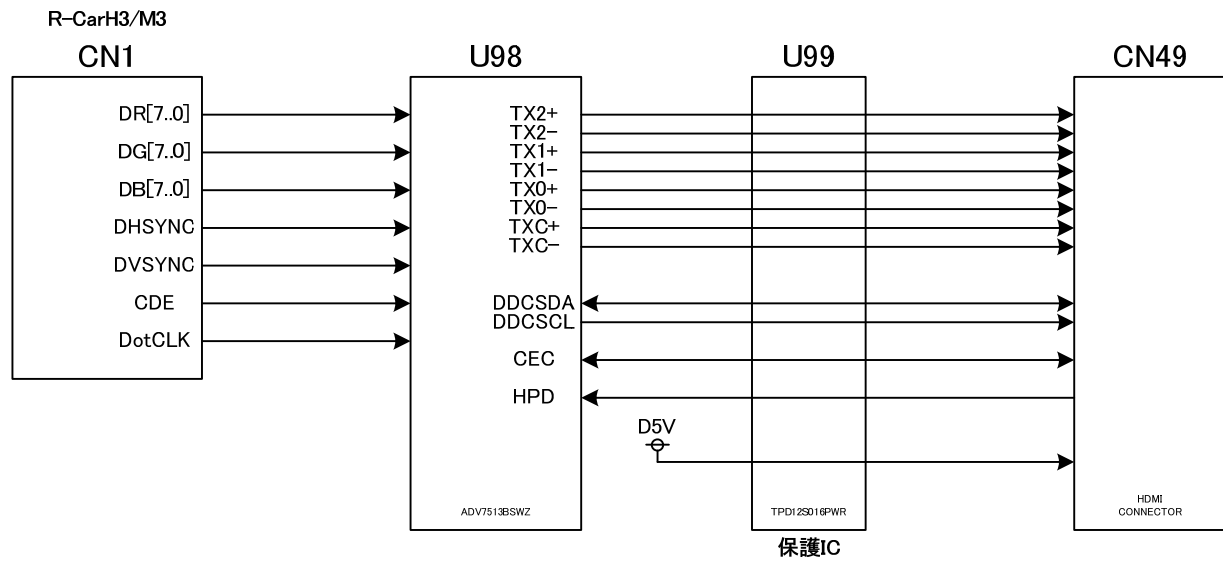


Figure 4-13 HDMI I/F

4.14. FLAT PANEL

This board equipped connectors for LVDS PANEL and FPD-LINK.

Those are connected LVDS output on R-Car Starter Kit and select the output by setting.

- CN7 : LVDS PANEL

CN9 connector for LVDS PANEL DDC and CN8 for Power.

The FLAT PANEL structures.

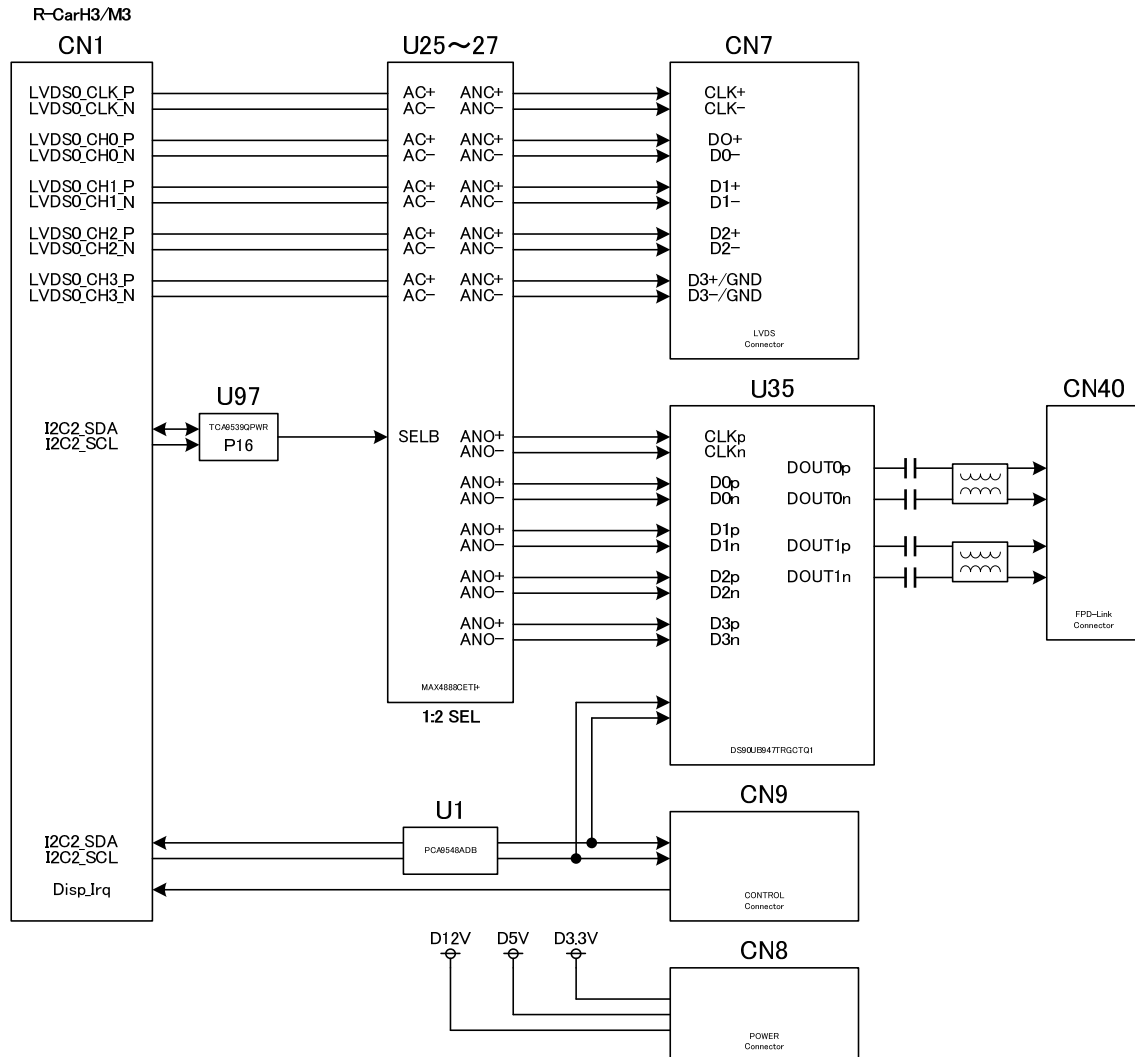


Figure 4-14 : FLAT PANEL I/F

4.15. AUDIO

This board equipped with a 24-Bit 6ch IN / 8ch OUT AUDIO CODEC (PCM3168A) and there are three $\phi 3.5$ mini jacks input and $\phi 3.5$ mini jack x4, RCA jack x4 output.

The TDM mode SSI between CODEC and R-Car Starter Kit connection.

The AUDIO structures.

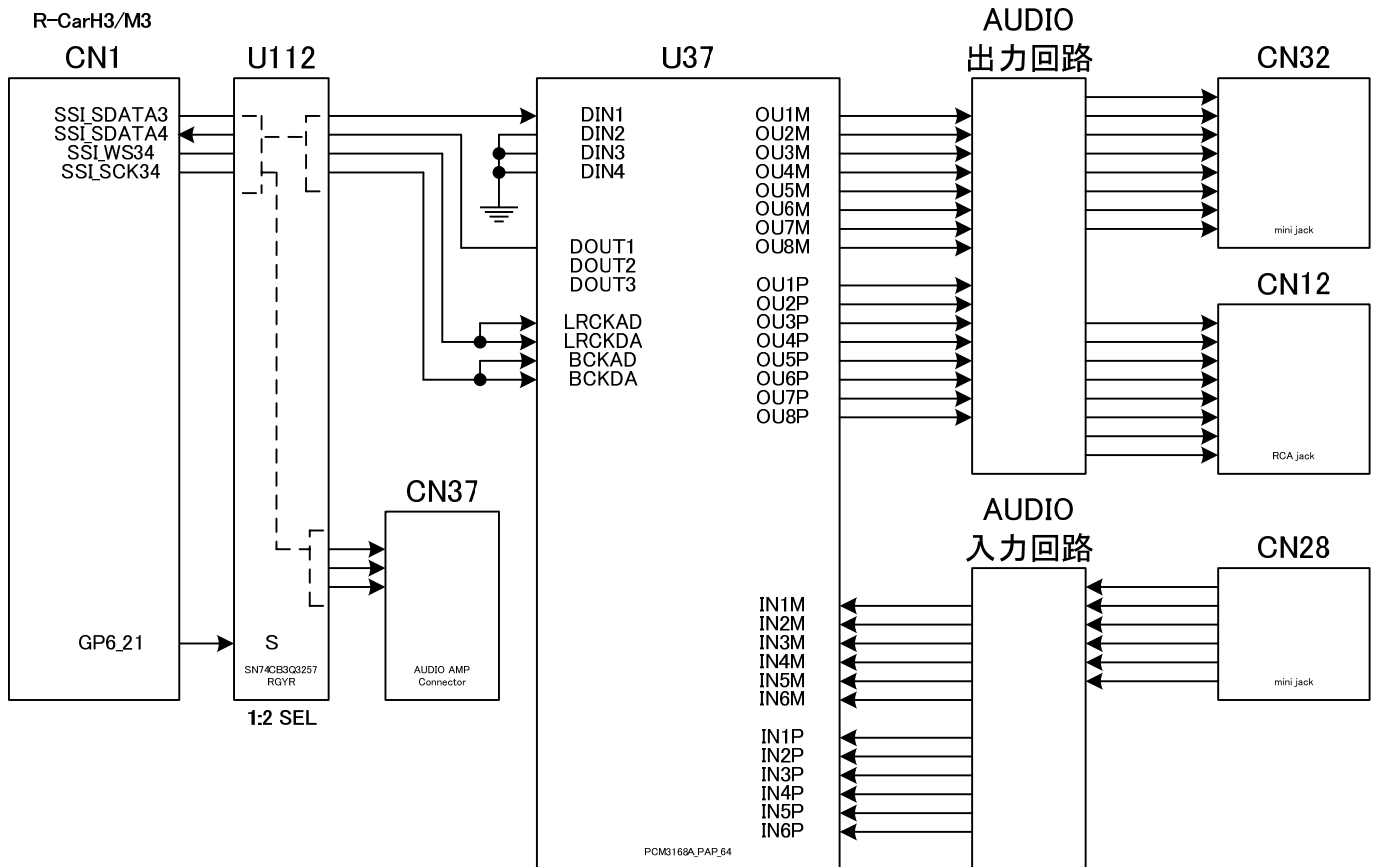


Figure 4-15 AUDIO I/F

4.16. CAN

This board equipped with a transceiver (TCAN332GDCNT) and two connector (3pin).

There are the switch (SW2) to terminate register for each channel.

- SW2[ON] : Enable terminate register
- SW2[OFF] : Disable terminate register

The CAN structures.

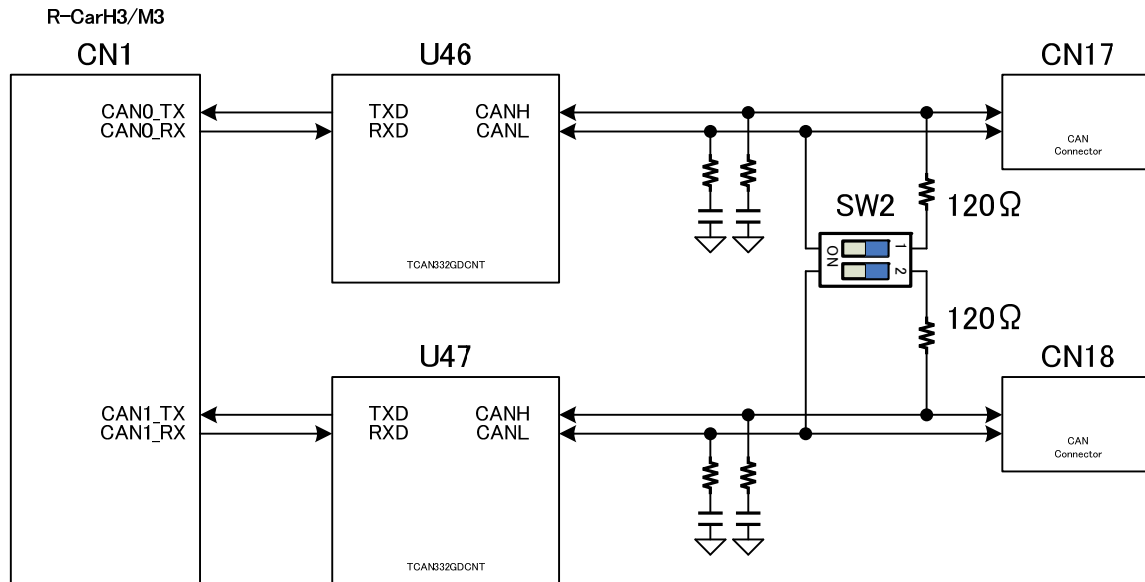


Figure 4-17 CAN I/F

4.17. MOST

This board could have equipped with a MOST function to install option board(TBD) to connect CN22 which allocate back of this board.

The MLB_SIG, MLB_DAT signal of MOST can switch the GPS (U44) RXD, TXD signal.

It switches this function by SW7.

- Sw7 turned to MOST : Enable MOST
- Sw7 turned to GPS : Disable MOST

The MOST structures.

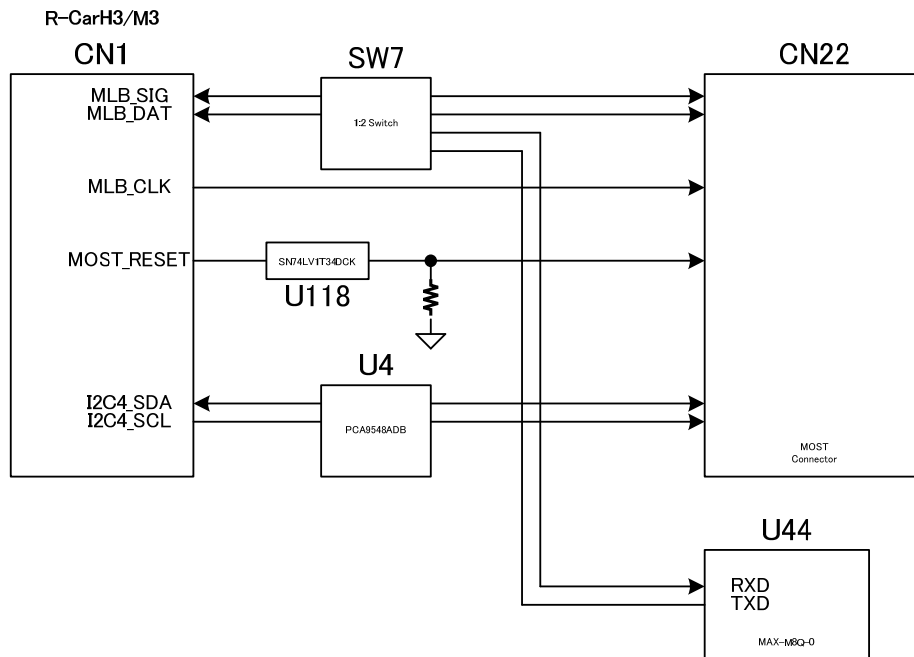


Figure 4-18 : MOST I/F

4.18. GPS

This board equipped with a GPS device (MAX-M8Q-0) and external antenna connect to FAKRA connector (CN16).

The GPS(U44) RXD, TXD signal can switch the MLB_SIG, MLB_DAT signal of MOST signal.

It switches this function by SW7.

- Sw7 turned to GPS : Enable GPS
- Sw7 turned to MOST : Disable GPS

The GPS structures.

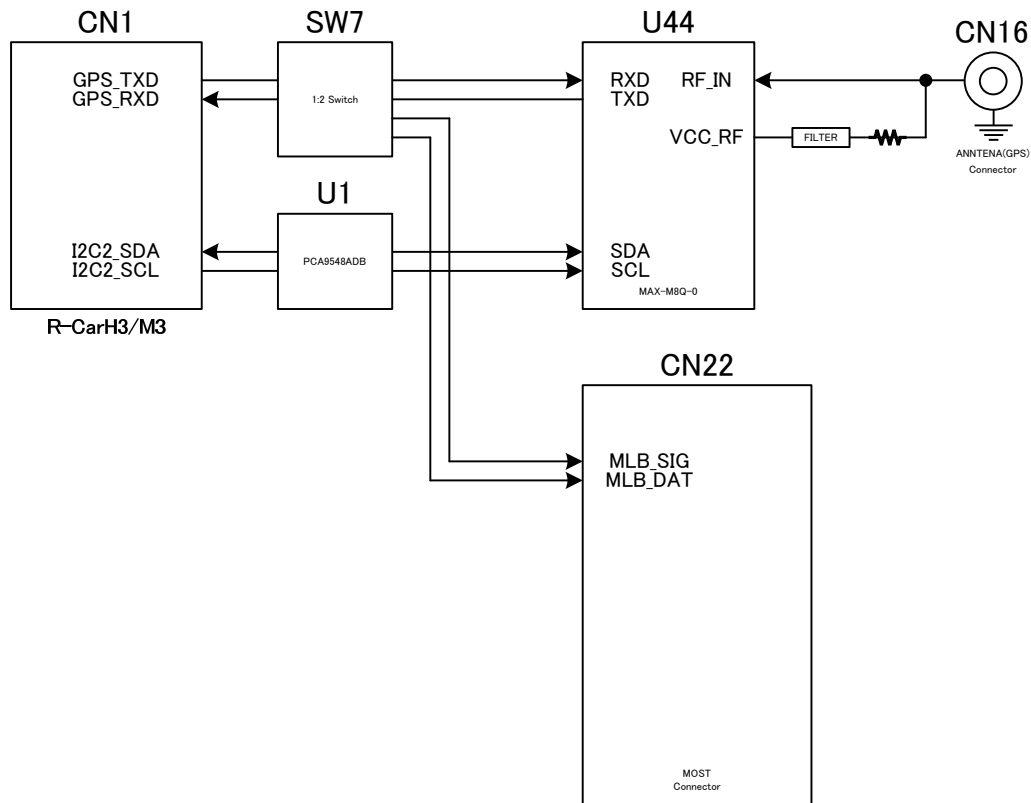


Figure 4-19: GPS I/F

4.19. RADIO

This board equipped with a Digital Radio device (Si4689-A10-GM) and connect R-Car Starter Kit via SSI6 interface. The external antenna connects to SMA connector (CN42) and loop antenna connect to terminal block (CN43). The SSI signal is switch between the radio devices SSI signal and camera serial interface (CSI0) SSI signal to use, and it controlled by U11 P15(HDMI_Radio) to switch this function.

- P15[H] : RADIO
- P15[L] : CSI

The RADIO structures.

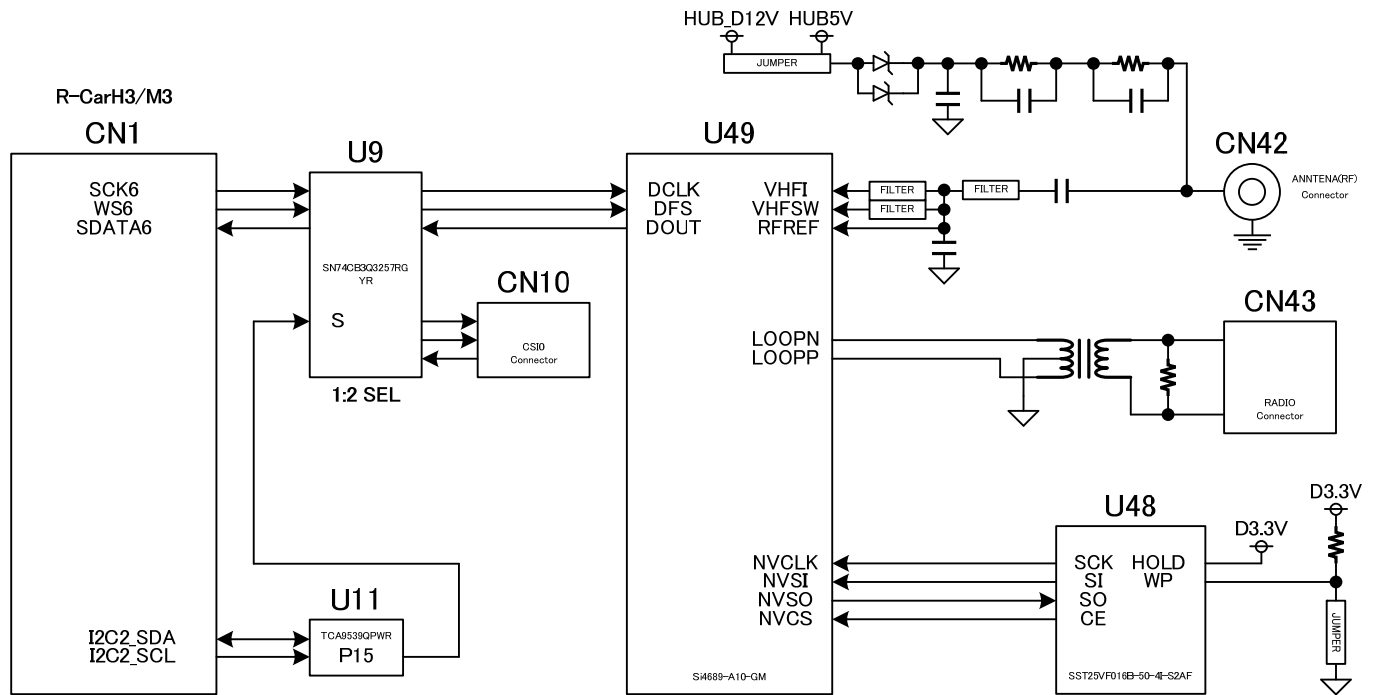


Figure 4-20 : RADIO I/F

4.20. 9 AXIS SENSOR

This board equipped with a 9 axis sensor device (LSM9DS0) which is acceleration, gyroscope, electronic compass and the R-Car Starter Kit can read sensor value via I2C interface.

The 9 axis sensor device structure.

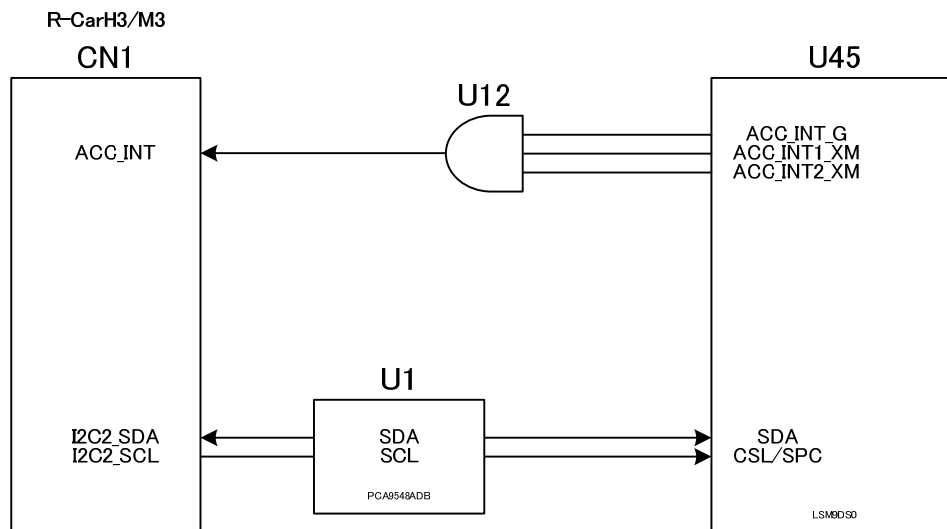


Figure 4-21 : 9 axis sensor I/F

4.21. I2C

The table of I2C device list on this board

Ch	Device			A7	A6	A5	A4	A3	A2	A1	R/W	Remarks
I2C2	U1	TCA9548APW	I2C MUX	1	1	1	0	0	0	1	X	
I2C2	U5	TCA9539QPWRQ1	GPIO	1	1	1	0	1	1	0	X	
I2C2	U11	TCA9539QPWRQ1	GPIO	1	1	1	0	1	0	0	X	
I2C2	U13	USB5534B-5000JZX	USB 3.0	0	1	0	1	1	0	0	X	
I2C2	U49	Si4689-A10-GM	RADIO	1	1	0	0	1	0	1	X	
I2C2	U98	ADV7513BSWZ	HDMI	0	1	1	1	1	0	1	X	
I2C2	CN15	2041119-1	MiniPCI-Express	-	-	-	-	-	-	-	-	
I2C2	CN9	0530480710	LVDS	-	-	-	-	-	-	-	-	
I2C2	U37	PCM3168A	AUDIO	1	0	0	0	1	0	0	X	
I2C2	U45	LSM9DS0	9 axis sensor	0	0	1	1	1	0	1	X	
I2C2	U44	MAX-M8Q-0	GPS	0	1	0	0	0	1	1	X	
I2C4	U4	TCA9548APW	I2C MUX	1	1	1	0	0	0	1	X	
I2C4	U97	TCA9539QPWRQ1	GPIO	1	1	1	0	1	1	0	X	
I2C4	U107	TCA9539QPWRQ1	GPIO	1	1	1	0	1	1	1	X	
I2C4	CN10	FX23-60P	CSI0	-	-	-	-	-	-	-	-	
I2C4	CN11	FX23-60P	CSI2	-	-	-	-	-	-	-	-	
I2C4	CN22	QSH-020-01-L-D-DP-A	MOST	-	-	-	-	-	-	-	-	
I2C4	CN48	1-1734248-5	CSI1	-	-	-	-	-	-	-	-	
I2C4	CN29	5535512-2	Parallel Video	-	-	-	-	-	-	-	-	

Table 4-23 : I2C list

The I2C(ch2) structure.

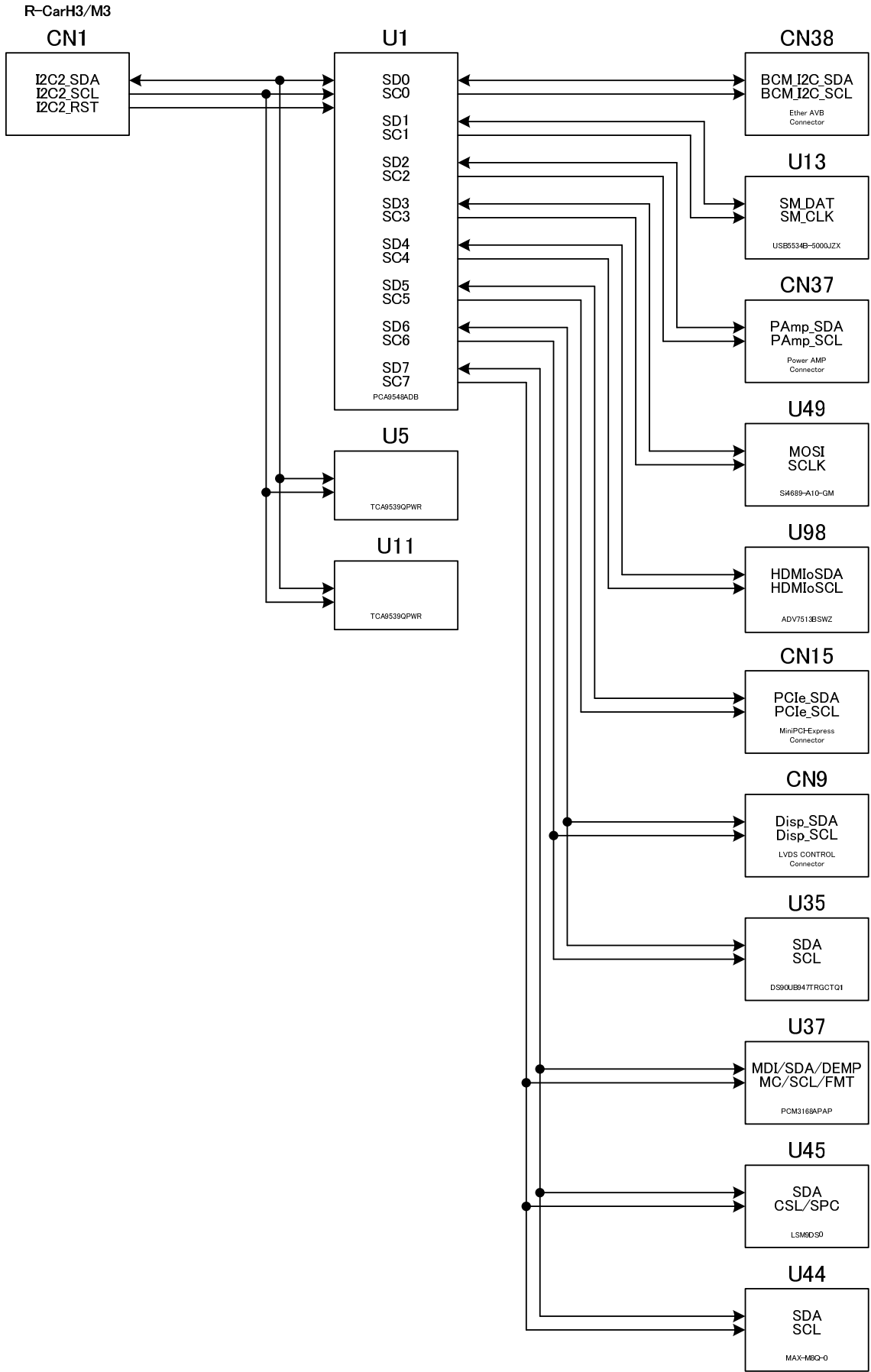


Figure 4-23a : I2C I/F

The I2C(ch4) structure.

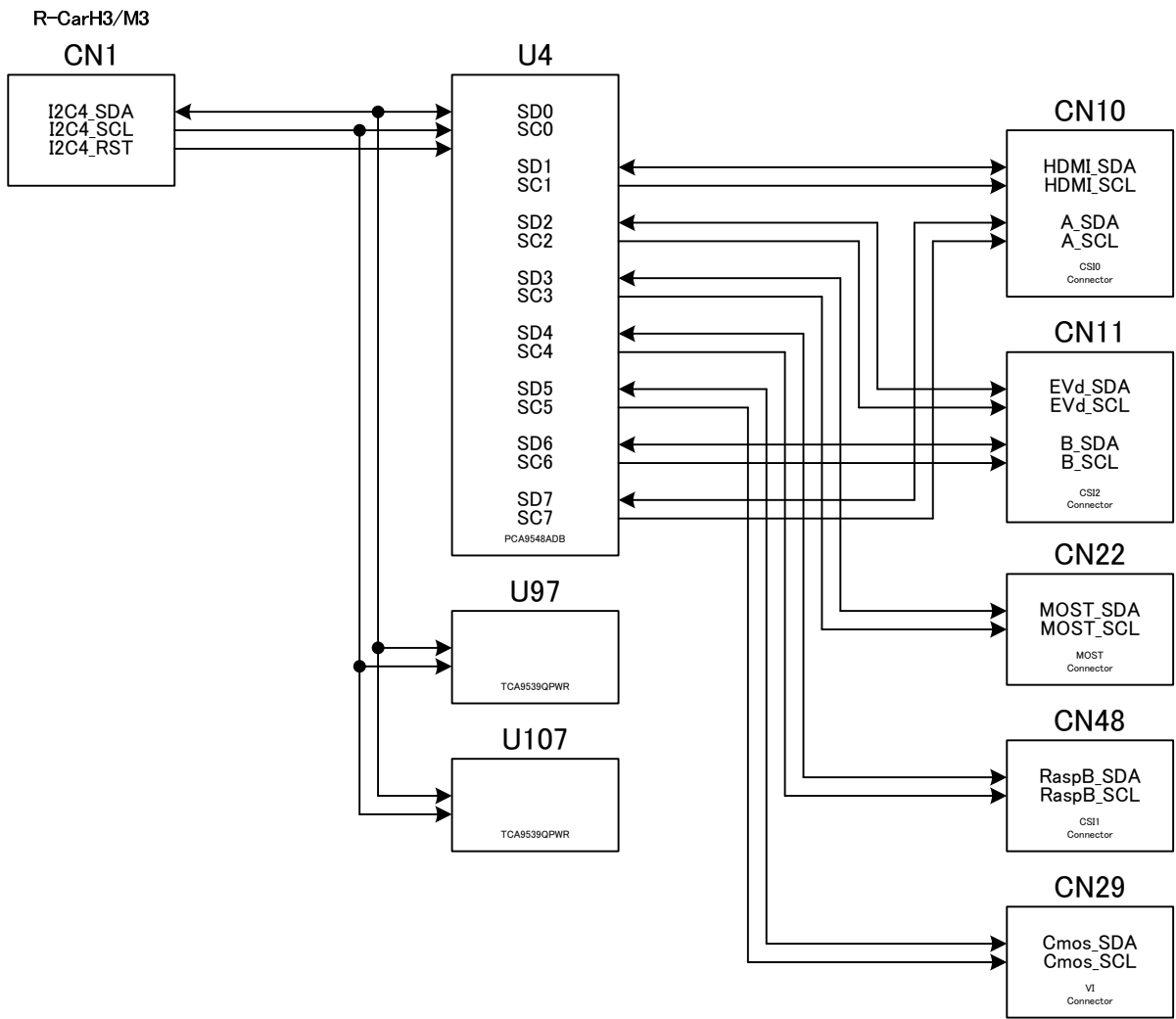


Figure 4-23b : I2C I/F

5. SWITCH LIST

The table of switch list on this board

REF.No	Function	Remarks
SW2	CAN Terminate Register enable/disable ON→enable OFF→disable	Default value: OFF
SW3	AUDIO input 1 GAIN setting ON→+20db OFF→0db	Default value: OFF
SW4	AUDIO input 2 GAIN setting ON→+20db OFF→0db	Default value: OFF
SW5	AUDIO input 3 GAIN setting ON→+20db OFF→0db	Default value: OFF
SW6	Power switch ON/OFF	

Table 5 : Switch list

6. JUMPER LIST

The table of jumper list on this board

REF.No	Function	Remarks
J1	Select USB3.0 HUB(U13) SMBus enable/disable SHORT→enable、 OPEN→disable	Default value: SHORT
J3	Select SERIAL flash (U48) write protect SHORT→protect 、 OPEN→Write enable	Default value: OPEN
J4	Select RADIO IC(U49) antenna power 1-2 SHORT→5V、 2-3 SHORT→12V	Default value: OPEN
J8	Select R-CAR STARTER KIT PMIC RSTBMODE SHORT→LEVEL、 OPEN→PULSE	Default value: SHORT
J9	Select SERIAL flash (U14) write protect SHORT→ protect 、 OPEN→Write enable	Default value: OPEN
J10	Reserved to OPEN	Default value: OPEN
J11	Reserved to SHORT	Default value: SHORT

Table 6 : Jumper list

7. LED LIST

The table of LED list on this board

REF.No	Color	Details	Remarks
D3	Green	Illuminate when USB3.0 (CN2 port2 low) POWER ON	
D4	Green	Illuminate when USB3.0 (CN2 port1 up) POWER ON	
D5	Red	Illuminate when board POWER ON	
LED1	Orange	SSD_LED(CN5 M.2 connector) Illuminate when when drive SSD	
LED2	Orange	A_LED(CN10 CSI0 connector) Illuminate when when drive camera board	
LED3	Orange	B_LED(CN11 CSI2 connector) Illuminate when when drive camera board	
LED4	Orange	Cmos_PDWN (CN29 Parallel Video connector) Illuminate when when drive camera	

Table 7 : LED list

8. CONECTOR LIST

The table of connector list on this board

CN.No	Function	Connector	Remarks
CN1	Connect R-Car Starter kit	402-51501-51	
CN2	USB 3.0	GSB311231HR	
CN4	Debug Serial	535676-5	
CN5	M2	10130616-067R2LF	Only SBEV-RCAR-KF-M05
CN7	LVDS OUT	DF14A-20P-1.25H(25)	
CN8	PANELPower	S7B-PH-SM4-TB(LF)(SN)	
CN9	PANEL control	0530480710	
CN10	CSI	FX23-60P	Only SBEV-RCAR-KF-M05
CN11	CSI	FX23-60P	Only SBEV-RCAR-KF-M05
CN12	LINE	PJRS4X2U01X	
CN13	USB 2.0	ZX62D-AB-5P8(30)	
CN15	Mini PCI Express	2041119-1	
CN16	GPS	PE44651C	Only SBEV-RCAR-KF-M05
CN17	CAN	S3B-PH-SM4-TB(LF)(SN)	
CN18	CAN	S3B-PH-SM4-TB(LF)(SN)	
CN22	MOST	QSH-020-01-L-D-DP-A	
CN23	board Power	2DC-G213-D42	Only SBEV-RCAR-KF-M05
CN28	MIC	STX-4335-5BGP	
CN29	Parallel VIDEO	5535512-2	
CN32	HEADPHONE	STX-4235-3/3-N	
CN33	HEADPHONE	STX-4235-3/3-N	
CN42	RADIO	CONSMA001-G	Only SBEV-RCAR-KF-M05
CN43	RADIO	PTSA15235Z	Only SBEV-RCAR-KF-M05
CN45	WIFI/BLUETOOTH	5-1814400-1	
CN46	WIFI	5-1814400-1	
CN47	SD CARD	693063020911	
CN48	CSI	1-1734248-5	
CN49	HDMI	0471510001	
CN51	MISC	105310-1206	
CN52	SIM	78800-0001	

Table 8 : Connector list

8.1. CN1 : R-Car Starter kit CONNECTOR

Pin No.	Signal	Remarks	Pin No.	Signal	Remarks
A001	GND		A056	USB30_VBUS	
A002	CSI2_DA0p		A057	GND	
A003	CSI2_DA0n		A058	BCM_RS232_TXD	
A004	NC		A059	BCM_RS232_RXD	
A005	NC		A060	GND	
A006	NC		A061	USB31_ID	
A007	CSI2_CLKAn		A062	USB30_ID	
A008	CSI2_CLKAp		A063	PA_M_SEL	
A009	CSI2_DA1p		A064	PCIE1_TX_P	
A010	CSI2_DA1n		A065	PCIE1_TX_M	
A011	GND		A066	GND	
A012	NC		A067	SSI_WS34	
A013	NC		A068	PCIE0_TX_P	
A014	NC		A069	PCIE0_TX_M	
A015	SK_RESET		A070	GND	
A016	NC		A071	Audio_DIN	
A017	NC		A072	Audio_BS	
A018	J8		A073	Audio_WS	
A019	LVDS0_CLK_P		A074	Audio_DOUT	
A020	LVDS0_CLK_N		A075	BCM_SCK	
A021	GND		A076	HSCIF0_RTS	
A022	CSI1_D1n		A077	SCK6	
A023	CSI1_D1p		A078	I2C4_RST	
A024	CSI1_CLKp		A079		
A025	CSI1_CLKn		A080	GND	
A026	CSI1_D0n		A081	NC	
A027	CSI1_D0p		A082	NC	
A028	NC		A083	USB30_DM	
A029	LVDS0_CH1_P		A084	USB30_DP	
A030	LVDS0_CH1_N		A085	D5V	
A031	GND		A086	D5V	
A032	LVDS0_CH3_P		A087	CLK22.5792	
A033	LVDS0_CH3_N		A088	PCIE0_CLK_P	
A034	LVDS0_CH0_P		A089	PCIE0_CLK_N	
A035	LVDS0_CH0_N		A090	GND	
A036	LVDS0_CH2_P		A091	D5V	
A037	LVDS0_CH2_N		A092	D5V	
A038	IrqEXT0xEC		A093	D5V	
A039	NC		A094	D5V	
A040	NC		A095	D5V	
A041	GND		A096	NC	
A042	NC		A097	HDMI_CS_A	
A043	NC		A098	HDMI_CS_B	
A044	NC		A099	USB20_VBUS0	
A045	NC		A100	GND	
A046	NC		A101	USB20_ID0	
A047	NC		A102	USB20_DM0	
A048	NC		A103	USB20_DP0	
A049	NC		A104	NC	
A050	SSI_SDATA3		A105	NC	
A051	GND		A106	NC	
A052	BCM_SO		A107	NC	
A053	NC		A108	NC	

A054			A109	NC	
A055	USB31_VBUS		A110	GND	

Table 8-1a : CN1 pin assignment (402-51501-51 : Ept)

Pin No.	Signal	Remarks	Pin No.	Signal	Remarks
B001	GND		B056	MLB_SIG	*share
B002	AVB_PHY_INT		B057	MLB_DAT	*share
B003	AVB_RXD0		B058	EhVDDIO	
B004	AVB_RXD1		B059	EhVDDIO	
B005	AVB_RXD2		B060	GND	
B006	AVB_RXD3		B061	NC	
B007	AVB_RXCLK		B062	PWM4	
B008	AVB_RXDV		B063	NC	
B009	AVB_TXD0		B064	PCIE1_RX_P	
B010	AVB_TXD1		B065	PCIE1_RX_M	
B011	GND		B066	VI5_CLK	
B012	AVB_TXD2		B067	CLKSND3	
B013	AVB_TXD3		B068	PCIE0_RX_P	
B014	AVB_GTXCLK		B069	PCIE0_RX_M	
B015	AVB_TXEN		B070	GND	
B016	AVB_MDIO		B071	SATA_RX_M	
B017	AVB_MDC		B072	SATA_RX_P	
B018	NC		B073	IrqEXT0xEE	
B019	CAN1_TX		B074	SCIF1_TXD	
B020	CAN1_RX		B075	SATA_TX_P	
B021	GND		B076	SATA_TX_N	
B022	VI5_DATA7		B077	SSI_SCK34	
B023	VI5_DATA4		B078	SSI_SDATA4	
B024	VI5_DATA5		B079	SCIF1_RXD	
B025	VI5_DATA0		B080	GND	
B026	VI5_DATA3		B081	HSCIF0_CTS	
B027	VI5_DATA2		B082	NC	
B028	VI5_DATA1		B083	NC	
B029	MOST_RESET		B084	NC	
B030	NC		B085	NC	
B031	GND		B086	NC	
B032	NC		B087	NC	
B033	NC		B088	HSCIF0_TXD	
B034	NC		B089	HSCIF0_RXD	
B035	NC		B090	GND	
B036	NC		B091	D5V	
B037	BCM_SI		B092	D5V	
B038	NC		B093	D5V	
B039	I2C2_SDA		B094	D5V	
B040	EL_FRC		B095	D5V	
B041	GND		B096	D5V	
B042	WLAN_IRQ		B097	I2C2_RST	
B043	BCM_SS		B098	CAN0_TX	
B044	uVI_FRSYNCA		B099	CAN0_RX	
B045	SD3_DAT1		B100	GND	
B046	NC		B101	D5V	
B047	SD3_PWR_EN		B102	D5V	
B048	uVI_FRSYNCB		B103	D5V	
B049	NC		B104	NC	

B050	PRESETOUTn_3		B105	NC	
B051	GND		B106	NC	
B052	SD3_CLK		B107	NC	
B053	NC		B108	NC	
B054	HDMIoINT		B109	NC	
B055	IrqEXT0xE8		B110	GND	

Table 8-1b : CN1 pin assignment (402-51501-51: Ept)

Pin No.	Signal	Remarks	Pin No.	Signal	Remarks
C001	GND		C056	NC	
C002	GND		C057	SD3_DAT0	
C003	CSI2_DA2n		C058	SD3_CD	
C004	CSI2_DA2p		C059	SD3_DAT2	
C005	GND		C060	GND	
C006	CSI2_DA3n		C061	CSI0_CLKAp	
C007	CSI2_DA3p		C062	CSI0_CLKAn	
C008	GND		C063	SD3_WP	
C009	NC		C064	SD3_CMD	
C010	I2C4_SDA		C065	CSI0_DA0p	
C011	GND		C066	CSI0_DA0n	
C012	NC		C067	NC	
C013	I2C4_SCL		C068	CSI0_DA1p	
C014	GND		C069	NC	
C015	NC		C070	GND	
C016	NC		C071	CSI0_DA1n	
C017	NC		C072	CSI0_DA2p	
C018	I2C2_SCL		C073	GND	
C019	NC		C074	CSI0_DA2n	
C020	NC		C075	CSI0_DA3p	
C021	GND		C076	GND	
C022	SDATA6		C077	USB20_OVC	
C023	NC		C078	CSI0_DA3n	
C024	IrqEXT0xEA		C079	USB20_PWEN	
C025	NC		C080	GND	
C026	NC		C081	ACC_INT	
C027	NC		C082	DR0	
C028	NC		C083	DR1	
C029	NC		C084	GND	
C030	VI5_DATA6		C085	DR2	
C031	GND		C086	DR3	
C032	NC		C087	GND	
C033	EXT_LPO		C088	DR4	
C034	NC		C089	DR5	
C035	NC		C090	GND	
C036	NC		C091	DR6	
C037	NC		C092	DR7	
C038	NC		C093	GND	
C039	NC		C094	DB0	
C040	NC		C095	DB1	
C041	GND		C096	GND	
C042	NC		C097	DB2	
C043	NC		C098	DB3	
C044	NC		C099	DB4	
C045	NC		C100	GND	

C046	NC		C101	DB5	
C047	NC		C102	VI5_HSYNC	
C048	CLK24.576		C103	GND	
C049	NC		C104	NC	
C050	SD3_DAT3		C105	NC	
C051	GND		C106	NC	
C052	VLDO_SD3		C107	NC	
C053	VLDO_SD3		C108	NC	
C054	VLDO_SD3		C109	NC	
C055	VLDO_SD3		C110	GND	

Table 8-1c : CN1 pin assignment (402-51501-51 : Ept)

Pin No.	Signal	Remarks	Pin No.	Signal	Remarks
D001	GND		D056	WS6	
D002	GND		D057	NC	
D003	NC		D058	NC	
D004	NC		D059	NC	
D005	GND		D060	GND	
D006	NC		D061	NC	
D007	NC		D062	NC	
D008	GND		D063	NC	
D009	NC		D064	NC	
D010	NC		D065	NC	
D011	GND		D066	NC	
D012	NC		D067	GND	
D013	NC		D068	USB30_TX_P	
D014	GND		D069	USB30_TX_M	
D015	NC		D070	GND	
D016	NC		D071	USB30_RX_P	
D017	NC		D072	USB30_RX_M	
D018	NC		D073	GND	
D019	NC		D074	NC	
D020	NC		D075	NC	
D021	GND		D076	GND	
D022	NC		D077	SCIF1_CTS	
D023	NC		D078	PCIE1_CN_CLK_P	
D024	NC		D079	PCIE1_CN_CLK_M	
D025	NC		D080	GND	
D026	NC		D081	SCIF1_RTS	
D027	NC		D082	DB6	
D028	NC		D083	DB7	
D029	NC		D084	GND	
D030	NC		D085	DG0	
D031	GND		D086	DG1	
D032	NC		D087	GND	
D033	NC		D088	DG2	
D034	NC		D089	DG3	
D035	NC		D090	GND	
D036	NC		D091	DG4	
D037	NC		D092	DG5	
D038	NC		D093	GND	
D039	NC		D094	DG6	
D040	NC		D095	DG7	
D041	GND		D096	GND	

D042	NC		D097	DHSYNC	
D043	NC		D098	DVSYNC	
D044	NC		D099	DU_DISP	
D045	NC		D100	GND	
D046	NC		D101	DotCLK	
D047	NC		D102	MLB_CLK	
D048	NC		D103	GND	
D049	NC		D104	D12V	
D050	VI5_VSYNC		D105	D12V	
D051	GND		D106	D12V	
D052	NC		D107	D12V	
D053	NC		D108	D12V	
D054	NC		D109	D12V	
D055	NC		D110	GND	

Table 8-1d : CN1 pin assignment (402-51501-51 : Ept)

8.2. CN2 : USB 3.0

Pin No.	Signal	Remarks	Pin No.	Signal	Remarks
1	PWR2		10	PWR1	
2	USBDN_DM2		11	USBDN_DM1	
3	USBDN_DP2		12	USBDN_DP1	
4	GND		13	GND	
5	USB_SSRXM_DN2		14	USB_SSRXM_DN1	
6	USB_SSRXP_DN2		15	USB_SSRXP_DN1	
7	GND		16	GND	
8	USB_SSTXM_DN2		17	USB_SSTXM_DN1	
9	USB_SSTXP_DN2		18	USB_SSTXP_DN1	

Table 8-2 : CN2 pin assignment (GSB311231HR : Amphenol)

8.3. CN4 : SERIAL

Pin No.	Signal	Remarks	Pin No.	Signal	Remarks
1	SerRTS		7	NC	
2	SerTXD		8	NC	
3	SerCTS		9	NC	
4	SerRXD		10	NC	
5	D3.3V		11	NC	
6	GND		12	NC	

Table 8-3 : CN4 pin assignment (71764-0010 : Molex)

8.4. CN5 : M2

Pin No.	Signal	Remarks	Pin No.	Signal	Remarks
1	M2BE		2	D3.3V	
3	GND		4	D3.3V	
5	GND		6	NC	
7	NC		8	NC	
9	GND	KEY.B	10	SSD_LED	
11	NC		12	D3.3V	
13	NC		14	D3.3V	
15	GND		16	D3.3V	
17	NC		18	D3.3V	
19	NC		20	NC	
21	SSDIND1		22	NC	
23	NC		24	NC	
25	NC		26	NC	
27	GND		28	NC	
29	NC		30	NC	
31	NC		32	NC	
33	GND		34	NC	
35	NC		36	NC	
37	NC		38	BDevSlp	
39	GND		40	NC	
41	PCIE0_TX_M		42	NC	
43	PCIE0_TX_P		44	NC	
45	GND		46	NC	
47	PCIE0_RX_M		48	NC	
49	PCIE0_RX_P		50	BPERST	
51	GND		52	BClkReq	
53	PCIE0_CLK_N		54	BPEWake	
55	PCIE0_CLK_P		56	NC	
57	GND		58	NC	
59	NC		60	NC	
61	NC		62	NC	
63	NC		64	NC	
65	NC		66	NC	
67	NC		68	SUSCLK	
69	PCIe_SATA		70	D3.3V	
71	GND		72	D3.3V	
73	GND		74	D3.3V	
75	USB30_used				

Table 8-4 : CN5 pin (10130616-067R2LF:FCI 製)

8.5. CN7 : LVDS OUT

Pin No.	Signal	Remarks
1	D3.3V	
2	D3.3V	
3	GND	
4	GND	
5	EL_D0n	
6	EL_D0p	
7	GND	
8	EL_D1n	
9	EL_D1p	
10	GND	
11	EL_D2n	
12	EL_D2p	
13	GND	
14	EL_CLKn	
15	EL_CLKp	
16	GND	
17	EL_D3n	
18	EL_D3p	
19	DISP_CONTRAST	
20	PWM4	

Table 8-5 : CN7 pin assignment (DF14A-20P-1.25H(25) : Hirose)

8.6. CN8 : PANEL POWER

Pin No.	Signal	Remarks
1	D12V	
2	GND	
3	D5V	
4	NC	
5	GND	
6	D3.3V	
7	D3.3V	

Table 8-6 : CN8 pin assignment (S7B-PH-SM4-TB(LF)(SN) : JST)

8.7. CN9 : PANEL CONTROL

Pin No.	Signal	Remarks
1	D5V	
2	D5V	
3	D5V	
4	Disp_Irq	
5	Disp_SDA	
6	Disp_SCL	
7	GND	

Table 8-7 : CN9 pin assignment (0530480710 : Molex)

8.8. CN10 : CSI

Pin No.	Signal	Remarks	Pin No.	Signal	Remarks
1	GND		31	GND	
2	CSI0_DA3n		32	NC	
3	CSI0_DA3p		33	NC	
4	GND		34	uVI_FRSYNCA	
5	CSI0_DA2n		35	TP5	
6	CSI0_DA2p		36	TP10	
7	GND		37	TP7	
8	CSI0_CLKAn		38	NC	
9	CSI0_CLKAp		39	NC	
10	GND		40	GND	
11	CSI0_DA1n		41	HDMI_SCL	
12	CSI0_DA1p		42	HDMI_SDA	
13	GND		43	GND	
14	CSI0_DA0n		44	NC	
15	CSI0_DA0p		45	NC	
16	GND		46	NC	
17	RA0		47	NC	
18	RA1		48	NC	
19	GND		49	NC	
20	BCM_SO		50	NC	
21	HDMI_CS_A		51	A_LED	
22	BCM_CLK		52	GND	
23	BCM_SI		53	CLK8SND2	
24	GND		54	GND	
25	GND		55	CLKSND2	
26	GND		56	GND	
27	A_SDA		57	HDMI_SCLK	
28	A_SCL		58	HDMI_LRCLK	
29	IrqExtA		59	HDMI_DATA	
30	nVRST		60	GND	

Table 8-8 : CN10 pin assignment (FX23-60P-0.5SV15 : Hirose)

8.9. CN11 : CSI

Pin No.	Signal	Remarks	Pin No.	Signal	Remarks
31	GND		31	GND	
32	CSI2_DA3n		32	NC	
33	CSI2_DA3p		33	NC	
34	GND		34	uVI_FRSYNCB	
35	CSI2_DA2n		35	TP6	
36	CSI2_DA2p		36	TP11	
37	GND		37	TP12	
38	CSI2_CLKAn		38	NC	
39	CSI2_CLKAp		39	NC	
40	GND		40	GND	
41	CSI2_DA1n		41	EVd_SCL	
42	CSI2_DA1p		42	EVd_SDA	
43	GND		43	GND	
44	CSI2_DA0n		44	NC	
45	CSI2_DA0p		45	NC	
46	GND		46	NC	
47	RB0		47	NC	
48	RB1		48	NC	
49	GND		49	NC	
50	BCM_SO		50	NC	
51	HDMI_CS_B		51	B_LED	
52	BCM_CLK		52	GND	
53	BCM_SI		53	NC	
54	GND		54	GND	
55	NC		55	NC	
56	GND		56	GND	
57	B_SDA		57	NC	
58	B_SCL		58	NC	
59	IrqExtB		59	NC	
60	nVRST		60	GND	

Table 8-9 : CN11 pin assignment (FX23-60P-0.5SV15 : Hirose)

8.10. CN12 : LINE

Pin No.	Signal	Remarks
1	LL1	
2	LR1	
3	GND	
4	LL2	
5	LR2	
6	GND	
7	LL3	
8	LR3	
9	GND	
10	LL4	
11	LR4	
12	GND	

Table 8-10 : CN12 pin assignment (PJRAS4X2U01X : Switchcraft)

8.11. CN13 : USB 2.0

Pin No.	Signal	Remarks
1	VBUS	
2	USB20_DM0	
3	USB20_DP0	
4	ID	
5	GND	

Table 8-11 : CN13 pin assignment (ZX62D-AB-5P8(30) : Hirose)

8.12. CN15 : Mini PCI-Express

Pin No.	Signal	Remarks	Pin No.	Signal	Remarks
1	MPCleWake		2	MPCI3.3V	
3	NC		4	GND	
5	NC		6	MiniPCle1.5V	
7	MiniPCleClkRQ		8	umPWR	
9	GND		10	umDATA	
11	PCIE1_CN_CLK_M		12	umCLK	
13	PCIE1_CN_CLK_P		14	umRST	
15	GND		16	umVPP	
17	NC		18	GND	
19	NC		20	MiniPCleW_DSBL	
21	GND		22	PRESETOUTn_3	
23	PCIE1_RX_M		24	MPCI3.3V	
25	PCIE1_RX_P		26	GND	
27	GND		28	MiniPCle1.5V	
29	GND		30	PCle_SCL	
31	PCIE1_TX_M		32	PCle_SDA	
33	PCIE1_TX_P		34	GND	
35	GND		36	DM3	
37	GND		38	DP3	
39	MPCI3.3V		40	GND	
41	MPCI3.3V		42	NC	
43	GND		44	NC	
45	NC		46	NC	
47	NC		48	MiniPCle1.5V	
49	NC		50	GND	
51	NC		52	MPCI3.3V	

Table 8-12 : CN15 pin assignment (2041119-1 : AMP)

8.13. CN16 : GPS

Pin No.	Signal	Remarks
1	RF_IN	
2	GND	
3	GND	
4	GND	
5	GND	

Table 8-13 : CN16 pin assignment (PE44651C : FAKRA)

8.14. CN17 : CAN

Pin No.	Signal	Remarks
1	CAN0H	
2	CAN0L	
3	GND	

Table 8-14 : CN17 pin assignment (S3B-PH-SM4-TB(LF)(SN) : JST)

8.15. CN18 : CAN

Pin No.	Signal	Remarks
1	CAN1H	
2	CAN1L	
3	GND	

Table 8-15 : CN18 pin assignment (S3B-PH-SM4-TB(LF)(SN) : JST)

8.16. CN22 : MOST

Pin No.	Signal	Remarks	Pin No.	Signal	Remarks
51	NC		52	MLB_CLK	
53	NC		54	NC	
55	NC		56	MLB_SIG	
57	NC		58	NC	
59	NC		60	MLB_DAT	
61	NC		62	NC	
63	NC		64	NC	
65	NC		66	NC	
67	NC		68	NC	
69	NC		70	NC	
71	NC		72	NC	
73	NC		74	NC	
75	MOST_RESET		76	NC	
77	NC		78	NC	
79	NC		80	NC	
81	NC		82	NC	
83	MOST_SCL		84	NC	
85	MOST_SDA		86	NC	
87	D3.3V		88	D3.3V	
39	D3.3V		40	D12V	

Table 8-16 : CN22 pin assignment (QSH-020-01-L-D-DP-A : Samtec)

8.17. CN23 : BOARD POWER

Pin No.	Signal	Remarks
1	VCC	
2	GND	
3	GND	

Table 8-17 : CN23 pin assignment (2DC-G213-D42:SIGRATRON)

8.18. CN28 : MIC

Pin No.	Signal	Remarks
1	GND	
2	Right_In	
3	NC	
4	Key	
5	Left_In	
22	Right_In	
23	NC	
24	Key	
25	Left_In	
32	Right_In	
33	NC	
34	Key	
35	Left_In	

Table 8-18 : CN28 pin assignment (STX-4335-5BGP-S1 : Kycon)

8.19. CN29 : VIDEO IN

Pin No.	Signal	Remarks
1	D3.3V	
2	GND	
3	Cmos_SCL	
4	Cmos_SDA	
5	VI5_VSYNC	
6	VI5_HSYNC	
7	VI5_CLK	
8	Cmos_Clk24	
9	VI5_DATA7	
10	VI5_DATA6	
11	VI5_DATA5	
12	VI5_DATA4	
13	VI5_DATA3	
14	VI5_DATA2	
15	VI5_DATA1	
16	VI5_DATA0	
17	RSV	
18	RSV	
19	Cmos_RST	
20	Cmos_PWDN	

Table 8-19 : CN29 pin assignment (5535512-2 : TE)

8.20. CN32 : HEADPHONE

Pin No.	Signal	Remarks
A1	GND	
A2	HPR1	
A5	HPL1	
B1	GND	
B2	HPR2	
B5	HPL2	

Table 8-20 : CN32 pin assignment (STX-4235-3/3-N : Kycon)

8.21. CN33 : HEADPHONE

Pin No.	Signal	Remarks
A1	GND	
A2	HPR3	
A5	HPL3	
B1	GND	
B2	HPR4	
B5	HPL4	

Table 8-21 : CN33pin assignment (STX-4235-3/3-N : Kycon)

8.22. CN42 : RADIO

Pin No.	Signal	Remarks
1	RF_IN	
2	GND	
3	GND	
4	GND	
5	GND	

Table 8-26 :CN42 pin assignment (CONSMA001-G:LINX)

8.23. CN43 : RADIO

Pin No.	Signal	Remarks
1	LOOPP	
2	LOOPN	

Table 8-27 : CN43 pin assignment (PTSA15235Z : Phoenix Contact)

8.24. CN45 : WIFI/BLUETOOTH

Pin No.	Signal	Remarks
1	RF_ANT1	
2	GND	
3	GND	
4	GND	
5	GND	

Table 8-28 : CN45 pin assignment (B040420A:YRT)

8.25. CN46 : WIFI

Pin No.	Signal	Remarks
1	RF_ANT2	
2	GND	
3	GND	
4	GND	
5	GND	

Table 8-29 : CN46 pin assignment (B040420A:YRT)

8.26. CN47 : SD CARD

Pin No.	Signal	Remarks
1	L_D3	
2	L_CMD	
3	GND	
4	VDD	
5	L_CLK	
6	GND	
7	L_D0	
8	L_D1	
9	L_D2	
10	SD3_CD	
11	SD3_WP	
12	GND	
13	GND	
14	GND	
15	GND	

Table 8-30 : CN47 pin assignment (693063020911 : Wurth)

8.27. CN48 : CSI

Pin No.	Signal	Remarks	Pin No.	Signal	Remarks
61	GND		16	NC	
62	CSI1_D0n		17	NC	
63	CSI1_D0p		18	NC	
64	GND		19	NC	
65	CSI1_D1n		20	NC	
66	CSI1_D1p		21	NC	
67	GND		22	NC	
68	CSI1_CLKn		23	NC	
69	CSI1_CLKp		24	NC	
70	GND		25	NC	
71	RaspB_IO0		26	NC	
72	RaspB_IO1		27	NC	
73	RaspB_SCL		28	NC	
74	RaspB_SDA		29	NC	
15	D3.3V		30	NC	

Table 8-31 : CN48 pin assignment (1-1734248-5 : TE)

8.28. CN49 : HDMI

Pin No.	Signal	Remarks
1	TX2+	
2	GND	
3	TX2-	
4	TX1+	
5	GND	
6	TX1-	
7	TX0+	
8	GND	
9	TX0-	
10	TXC+	
11	GND	
12	TXC-	
13	CEC	
14	NC	
15	DDCSCL	
16	DDCSDA	
17	GND	
18	L_5VOUT_0	
19	HPD	

Table 8-32 : CN49 pin assignment (0471510001 : Molex)

8.29. CN52 : SIM

Pin No.	Signal	Remarks
C1	umPWR	
C2	umRST	
C3	umCLK	
C5	GND	
C6	umVPP	
C7	umDATA	

Table 8-33 : CN52 pin assignment (78800-0001 : Molex)

9. BOARD EXTERNAL VIEW

Board external view

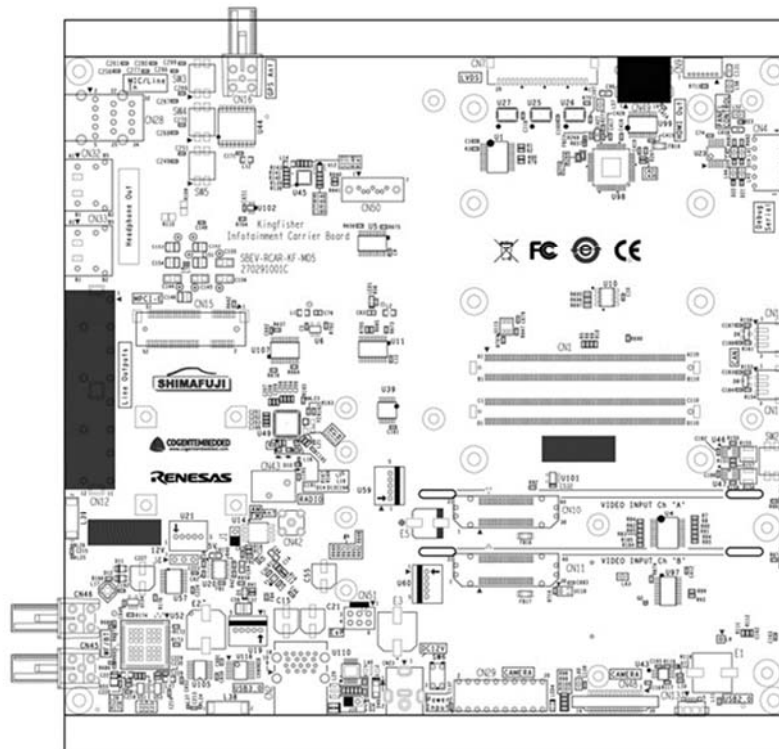


Figure 9a : PCB TOP side

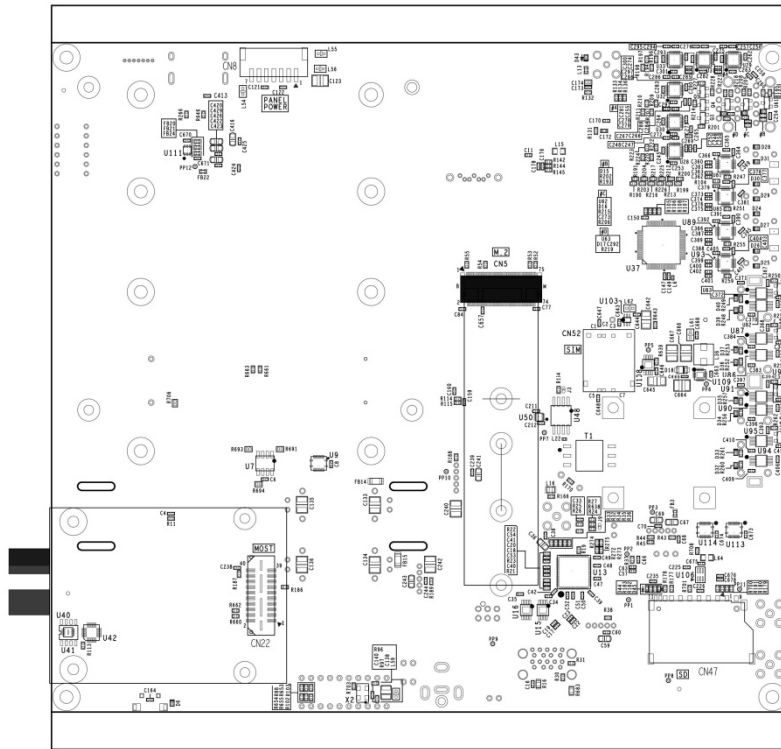


Figure 9b : PCB BOTTOM side