User's Manual

RZ/V2H Evaluation Board Kit (Secure type)

Hardware Manual

Renesas Electronics
www.renesas.com

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SAFETY MATTERS

Definitions of Symbols

A variety of symbols are used in this document and on this product, to prevent the damage to harm and the property to you and other people beforehand by correctly using this product.

This section, Safety Matters, presents these symbols and their meanings. It also presents safety notes to assure that this produce is used safely and correctly.

This product should only be used after fully understanding the material presented in this section.

⚠ WARNING Warning items indicate things that, if not avoided, could lead to death or serious injury.

⚠ CAUTION Caution items indicate things that, if not avoided, could lead injury or damage to the house and household goods, etc.

In addition to the above two symbols, the following are displayed at the same time as required.

[Important] These indicate the points which may cause a breakdown or malfunction of equipment by the incorrect setting when setting up this product.

△ indicates WARNING or CAUTION.

Example: CAUTION AGAINST ELECTRIC SHOCK

⃠ indicates PROHIBITION.

Example: DISASSEMBLY PROHIBITED

● inidicates a COMPULSORY ACTION.

Example: COMPULSORY ACTION

WARNING

Handling Related Warnings:

Always check the jumper and switch settings before connecting a power source. An incorrect jumper or switch setting can lead to internal heat generation, rupture, ignition, or damage to this evaluation board itself or any connected equipment.

If, during either the use or storage of this product, any abnormality in the product itself (including abnormal odors, heating, color changes, or changes to the shape of the product) are observed, disconnect the power supply immediately.
The incidence of such an abnormality may result in rupture, ignition, or performance deterioration. Therefore, do not use this product in such a situation.

Installation:

Do not install this product in a location that has a high humidity or where water or other fluids could get on it. This product may be damaged if water or other fluids can get on it.

Ambient Temperature:

The ambient temperature range for using this product is from 0°C to 60°C.

⚠ CAUTION

Handling:

This product must be handled carefully. Do not cause a strong impact by dropping it, letting it fall, etc.

Do not touch this product's component pins with bare hands. Doing so may discharge static electricity that damages the Internal circuits. Eliminate static electricity before touching this product.

When connecting or disconnecting cables to or from this product, hold the parts of the cable intended to be grasped (such as the plugs) and avoid putting stress on the cable. Do not pull this product etc. while it is connected with a communications interface cable. Doing so may cause the cable to be disconnected.

When connecting a cable to a connector, do not insert the plug in the reverse direction or upside down. Incorrect insertion may damage this product or connected equipment.

Always check the jumper and switch settings before connecting a power source. An incorrect jumper or switch setting can lead to damage to this product or connected equipment.

Do not handle this product with wet hands. Doing so can lead to failure of the product.

Transport methods:

When transporting this product, use the product's packing box and cushioning materials and ship it with precision equipment handling. If the products packing is insufficient, it may be damaged during shipping.
If it must be transported by some other method, pack it carefully as precision equipment.
When packing this product, always use the antistatic pouch included with this product.
If some other pouch is used, electrostatic discharge may damage the product.

Abnormal operation:

If operation of this product becomes abnormal due to interference from external noise etc., apply the following procedure.

1. Turn off the power.
2. Wait 10 or over seconds and then turn the power back on.

Disposal:

When disposing of this product, be sure to dispose it as industrial waste according to all applicable laws.

Table of Contents

1. Overview 9
   1.1 Features 10
   1.2 Block Configuration 11
   1.3 Specifications 13
      1.3.1 V2HEVK Specifications 13
      1.3.2 V2HEVK Accessories 14
      1.3.3 Outer Appearance 14
   1.4 Usage Notes 15
      1.4.1 V2HEVK Power ON/OFF 15
      1.4.2 Note on Use of Ethernet 15

2. Operating Procedure 16
   2.1 Assembly 16
   2.2 Operation Mode Setting 17
   2.3 Power Supply 18

3. Layout
   3.1 Parts Layout 19
   3.2 Lists of Main Parts 22

4. Interface Specifications 23
   4.1 Reset 23
   4.2 LED 23
   4.3 Switches 23
   4.4 Debug Serial Interface 23
   4.5 Debugger Interface 24
   4.6 MIPI CSI-2 Interface 24
   4.7 MIPI DSI Interface 26
   4.8 USB Interface 26
   4.9 Ethernet Interface 26
   4.10 SD Card Connector 27
   4.11 PCIe Connector 27
   4.12 Pin Header 27
   4.13 Heat-sink Connector 29
   4.14 USB-PD Connector (Power only) 29
   4.15 HDMI Interface 29
   4.16 AUDIO Interface 29
   4.17 Pmod Connector 29

5. Supplementary Note 31
5.1 Power Supply ICs of V2HEVK 31
5.2 Assembly of Heat-sink 31
REVISION HISTORY 32

1. Overview

This board is an evaluation kit for the Arm®-based high-end RZ/V2H MPU from Renesas Electronics (RZ/V2H evaluation Board kit, hereafter V2HEVK). This manual describes the hardware functions of the V2HEVK.

The V2HEVK consists of the RZ/V2H Secure Evaluation Board (CPU Board), RZ/V2H EVK Expansion Board (EXP Board).

Board Name	Overview
RZ/V2H Secure Evaluation Board (CPU Board)	• The RZ/V2H is mounted. • Board on which the main functional components for the RZ/V2H are mounted.
RZ/V2H EVK Expansion Board (EXP Board)	• Connected to J1, J2 and J4 on the RZ/V2H Secure Evaluation Board. • This board has HDMI, Audio and Pmod Interface.

The following documents have been prepared for V2HEVK. Make sure to refer to the latest versions of these documents. For the development environment including software, contact a Renesas Electronics sales representative.

Document Type	Document Title	Document No.	Description
Hardware Manual	RZ/V2H Evaluation Board kit Hardware Manual	This manual	Hardware specifications of the V2HEVK
User's Manual: Hardware	RZ/V2H Group User's Manual: Hardware	R01UH1032EJ****	RZ/V2H hardware specifications (pin assignments, memory maps, peripheral specifications, electrical characteristics, and timing charts) and descriptions of operation

1.1 Features

This V2HEVK includes the following features.

- LPDDR4X: 64 Gb × 2
- NOR Flash: 512 Mb
- MIPI® CSI-2® connector: 4 ch.
- Gigabit Ethernet interface connector: 2 ch.
- USB3.2 Gen 2 Type-A: 2 ch.
- USB2.0 micro-AB: 1 ch.
- USB2.0 Type-A: 1 ch.
- Micro SD card connector: 2 ch.
- PCIe® Slot (× 4 Lanes): 1 ch.
- Debug serial interface USB micro-B: 1 ch.
- Debugger interface connector: 1 ch.
- HDMI® Type-A connector: 1 ch.
- Pmod™ interface connector: 4 ch.
- Audio MIC connector: 1 ch.
- Audio HP connector: 1 ch.
- Audio AUX connector: 1 ch.
- USB-PD Type-C (Power Supply): 1 ch.

1.2 Block Configuration

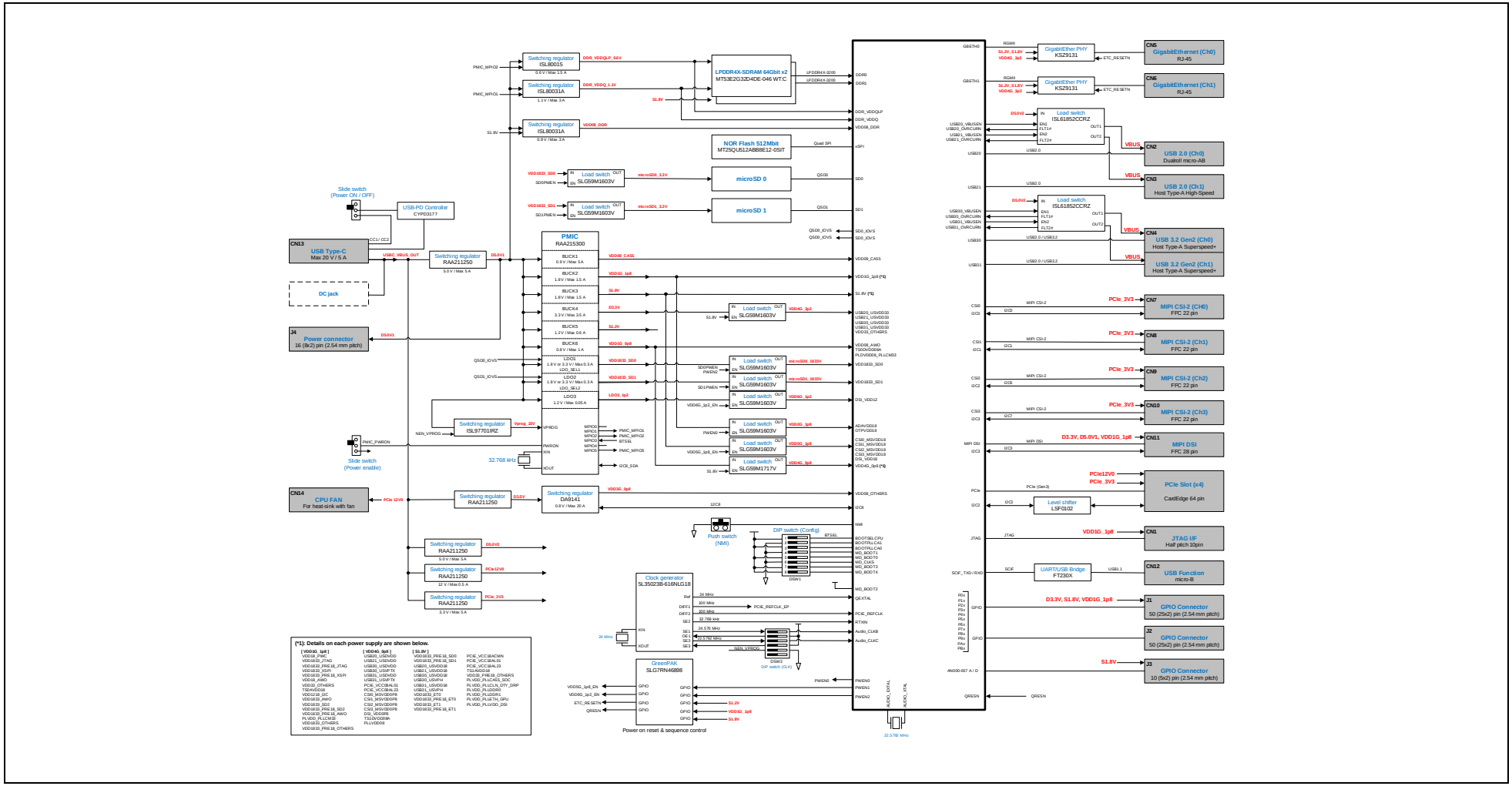

Figure 1.2-1 RZ/V2H Secure Evaluation Board Block Diagram

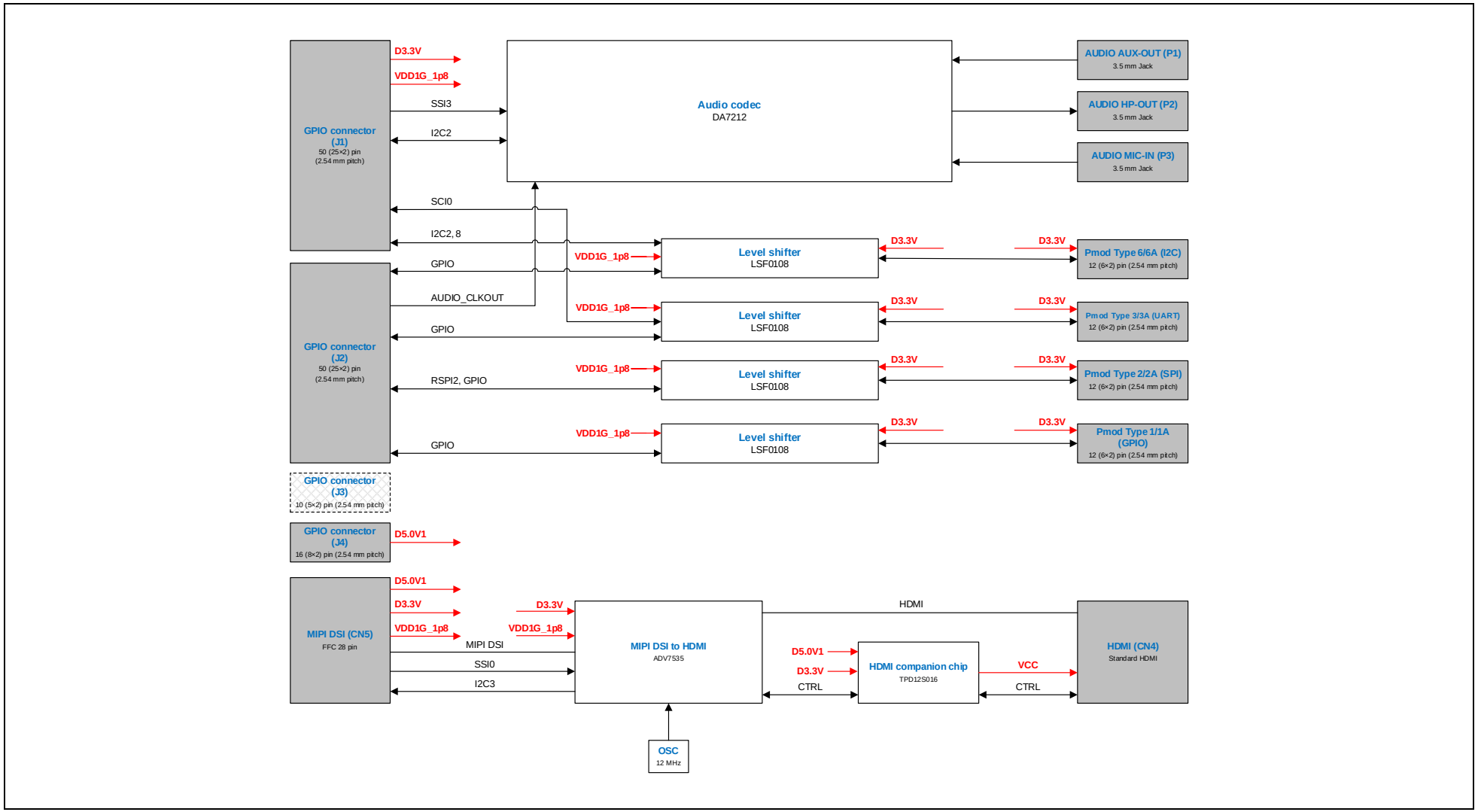

Figure 1.2-2 RZ/V2H EVK Expansion Board Block Diagram

1.3 Specifications

1.3.1 V2HEVK Specifications

Table 1.3-1 V2HEVK Specifications

Item	Specification
MPU	R9A09G057H48GBG (RZ/V2H [GE3D, Security, ISP])
Board size	CPU Board: 153 × 100 × 1.7 mm EXP Board: 153 × 100 × 1.7 mm
LPDDR4X	Micron MT53E2G32D4DE-046 64 Gb Dual-Rank
NOR Flash	Micron MT25QU512ABB8E12
HDMI I/F	Connector: Type-A (standard) MIPI® DSI® Receiver with HDMI Transmitter: ADV7535
USB I/F	Connector: USB3.2 Gen2 Type-A × 2 ch Connector: USB2.0 micro-AB Connector: USB2.0 Type-A
Ethernet I/F	Connector: RJ45 × 2 Ethernet PHY IC: KSZ9131RNXI
Audio I/F	Connector: 3.5mm Jack (MIC) Connector: 3.5mm Jack (HP) Connector: 3.5mm Jack (AUX-IN)
SD Card I/F	Connector: Micro SD Card Slot × 2 ch
PCIe I/F	Connector: PCIe Slot (× 4 lanes)
MIPI CSI-2 I/F	Connector: CF20221V0R0-NH × 4ch
Pmod I/F	Pmod Type 1A (GPIO) Pmod Type 2A (SPI) Pmod Type 3A (UART) Pmod Type 6A (I2C)
Debug I/F	Connector: USB Micro-B UART-USB bridge: FT230XS
Debugger I/F	Connector: 10 pins with 1.27 mm pitch
LED	For power enable (PMIC_PWRON): Green For power supply (D5.0V1): Green For power supply (VDD1G_1p8): Green For power supply (S1.8V): Green For power supply (USBC_VBUS_OUT): Green For monitor: Yellow × 2
Switch	For mode setting: 8bit DIP switch For audio clock select: 6bit DIP switch For power ON/OFF: Slide switch For PMIC ON/OFF: Slide switch For NMI: Push switch For MIPI CSI-2 Camera Interface voltage select: DIP switch For MIPI CSI-2 I2C Pull-Up ON/OFF: 8bit DIP switch
Power supply	USB-PD Type-C (100 W)

1.3.2 V2HEVK Accessories

Table 1.3-2 V2HEVK Accessories

Item	Specification
Flexible Flat Cable (FFC)	Length: 64.2 mm, Width: 14.5 mm, 28 pin *Used to connect CN11 on CPU Board and CN5 on EXP Board
Heat-sink	40 × 40 × 20 mm with fan
USB cable	Type-A – Micro-B Length:1 m
Rubber feet	D = 8 mm, t = 2.79 mm, Qty: 4

1.3.3 Outer Appearance

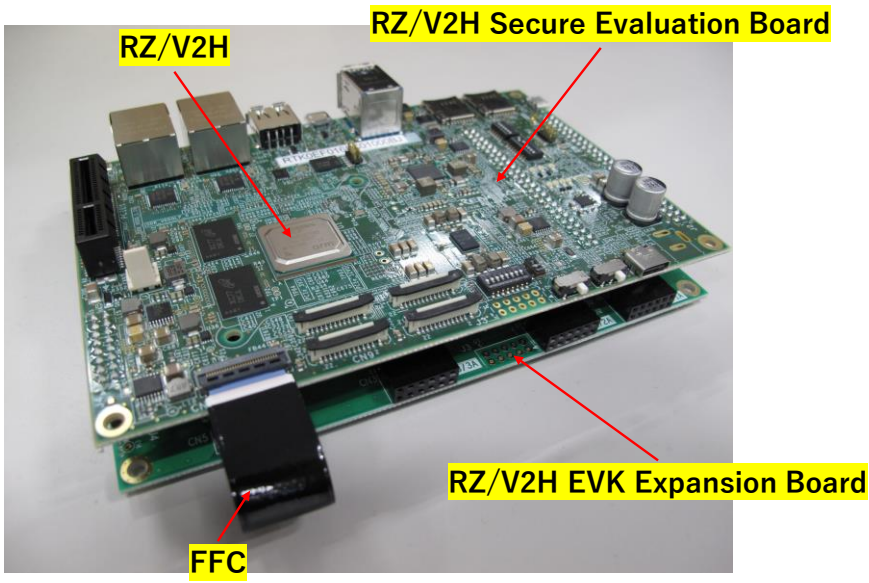

Figure 1.3-1 Outer Appearance of V2HEVK

1.4 Usage Notes

1.4.1 V2HEVK Power ON/OFF

- Take sufficient care with setting up switches on the V2HEVK. Incorrect settings may lead to damage to devices.
- The RZ/V2H has the power-on and power-off sequences. With the V2HEVK, be sure to follow the precautions below.

(1) When turning power on

Be sure to check that the power slide switch SW2 and SW3 are turned off before connecting USB Type-C cable to Type-C connector (CN13).
Connecting USB Type-C cable to Type-C connector while the power supply slide switch SW2 and SW3 are on is prohibited.

(2) When turning power off

Be sure to execute the power-off sequence by software before turning the power supply slide switch SW2 and SW3 off. After the power-off sequence by software, turn these slide switch off and remove USB Type-C cable from Type-C connector (CN13). Removing USB Type-C cable from Type-C connector while the power supply silde switch SW2 and SW3 are on is prohibited. Doing so may lead to damage to devices.

1.4.2 Note on Use of Ethernet

The gigabit Ethernet interface connector (CN5, CN6) must not be connected to a public line. Connection with a public line is not supported. Note that the MAC address is not set in this evaluation kit.

2. Operating Procedure

2.1 Assembly

CPU Board and EXP Board are connected by stacking with J1, J2 and J4. MIPI DSI interface is connected with a dedicated FFC. For safety, attach the included rubber feet to the back of EXP board.

FFC is connected with following procedure:

1. Open the FFC locking cover, align the FFC contacts to the bottom, and close the cover until it locks.
   The cover is fragile, so handle with care.

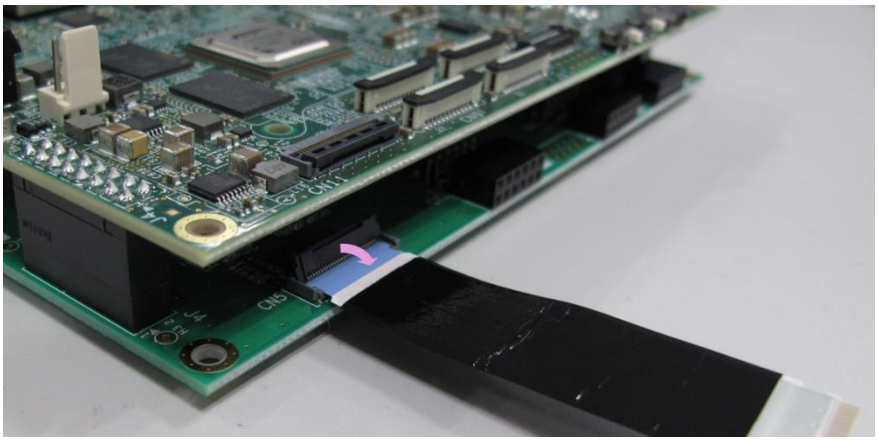

Figure 2.1-1 Connect FFC to RZ/V2H EVK Expansion Board

2. Connect the FFC to CPU Board

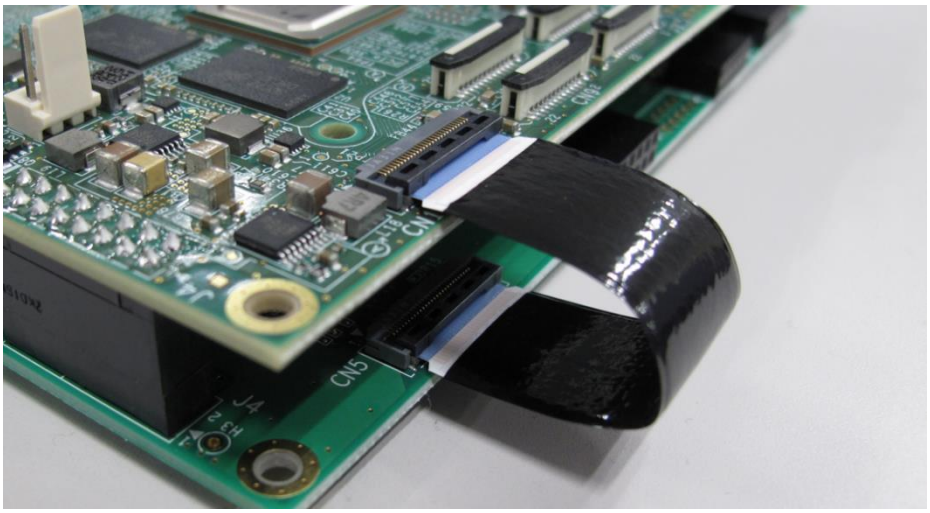

Figure 2.1-2 Connect FFC to RZ/V2H Secure Evaluation Board.

2.2 Operation Mode Setting

The tables below list the settings of the DIP switch (DSW1 on the RZ/V2H Secure Evaluation Board) and their functions.

Table 2.2-1 DSW1 Connection Destinations and Function

Switch No.	RZ/V2H Pin	Function
1	BOOTSELCPU	Select the cold boot CPU OFF: CM33 / ON: CA55
2	BOOTPLLCA1	Input the CA55 frequency at the CA55 cold boot. BOOTPLLCA [1:0] = [OFF : OFF] : 1.6GHz = [OFF : ON] : 1.7GHz [default] = [ON : OFF] : 1.1GHz = [ON : ON] : 1.5GHz
3	BOOTPLLCA0	
4	MD_BOOT1	Input the boot mode select signal MD_BOOT [1:0] = [OFF : OFF] : xSPI = [OFF : ON] : SCIF = [ON : OFF] : SD [default] = [ON : ON] : eMMC
5	MD_BOOT0	
6	MD_CLKS	OFF: SSCG OFF / ON: SSCG ON [default]
7	MD_BOOT3	OFF: Normal mode [default] / ON: Debug mode
8	MD_BOOT4	Fix OFF.

The tables below list the settings of the DIP switch (DSW2 on the RZ/V2H Secure Evaluation Board) and their functions.

Table 2.2-2 DSW2 Function

Switch No	Signal Name	Function
1	Audio_CLKB_OE	OFF: Disable Audio_CLKB output of 5L35023B [default] ON: Enable Audio_CLKB output of 5L35023B
2	Audio_CLKB	OFF: Audio_CLKB is not supplied [default] ON: Audio_CLKB is supplied to CLK
3	Audio_CLKC_OE	OFF: Disable Audio_CLKC output of 5L35023B [default] ON: Enable Audio_CLKC output of 5L35023B
4	Audio_CLKC	OFF: Audio_CLKC is not supplied [default] ON: Audio_CLKC is supplied to CLK
5	NEN_VPROG	OFF: Disable PMIC program mode [default] ON: Enable PMIC program mode
6	-	-

The tables below list the settings of the DIP switch (JSW1 on the RZ/V2H Secure Evaluation Board) and their functions.

Table 2.2-3 JSW1 Function

Switch	Function
1-2	MIPI CSI-2 Camera Interface Voltage: 1.8V
2-3	MIPI CSI-2 Camera Interface Voltage: 3.3V [default]

The tables below list the settings of the DIP switch (DSW3 on the RZ/V2H Secure Evaluation Board) and their functions.

Table 2.2-4 DSW3 Function

Switch No	Signal Name	Function
1	I2C0_SCL	OFF: MIPI CSI-2 (Ch0) SCL signal Pull-Up OFF ON: MIPI CSI-2 (Ch0) SCL signal Pull-Up ON [default]
2	I2C0_SDA	OFF: MIPI CSI-2 (Ch0) SDA signal Pull-Up OFF ON: MIPI CSI-2 (Ch0) SDA signal Pull-Up ON [default]
3	I2C1_SCL	OFF: MIPI CSI-2 (Ch1) SCL signal Pull-Up OFF ON: MIPI CSI-2 (Ch1) SCL signal Pull-Up ON [default]
4	I2C1_SDA	OFF: MIPI CSI-2 (Ch1) SDA signal Pull-Up OFF ON: MIPI CSI-2 (Ch1) SDA signal Pull-Up ON [default]
5	I2C6_SCL	OFF: MIPI CSI-2 (Ch2) SCL signal Pull-Up OFF ON: MIPI CSI-2 (Ch2) SCL signal Pull-Up ON [default]
6	I2C6_SDA	OFF: MIPI CSI-2 (Ch2) SDA signal Pull-Up OFF ON: MIPI CSI-2 (Ch2) SDA signal Pull-Up ON [default]
7	I2C7_SCL	OFF: MIPI CSI-2 (Ch3) SCL signal Pull-Up OFF ON: MIPI CSI-2 (Ch3) SCL signal Pull-Up ON [default]
8	I2C7_SDA	OFF: MIPI CSI-2 (Ch3) SDA signal Pull-Up OFF ON: MIPI CSI-2 (Ch3) SDA signal Pull-Up ON [default]

2.3 Power Supply

(1) Set up the DIP switches before supplying power.

(2) Before connecting USB Type-C cable, check that the power slide switch SW2 and SW3 are turned off.

(3) Connect USB Type-C cable to CN13 on the RZ/V2H Secure Evaluation Board.

(4) When SW3 is turned on, LD2 and LD7 light up.

(5) When SW2 is turned on, LD1, LD3 and LD4 light up and RZ/V2H start up.

Table 2.3-5 DSW3 Function

Switch No	Function		Specifications
SW2	PMIC (RAA215200)	ON / OFF	ON: Enables the PMIC output OFF: Stops disabling of PMIC output
SW3	USB-PD	ON / OFF	ON: Enables USB-PD power output OFF: Disables USB-PD power output

3. Layout

3.1 Parts Layout

Figure 3.1-1 and **Figure 3.1-2** show the pats layout diagrams of the RZ/V2H Secure Evaluation Board and **Figure 3.1-3** shows the parts layout diagram of the RZ/V2H EVK Expansion Board.

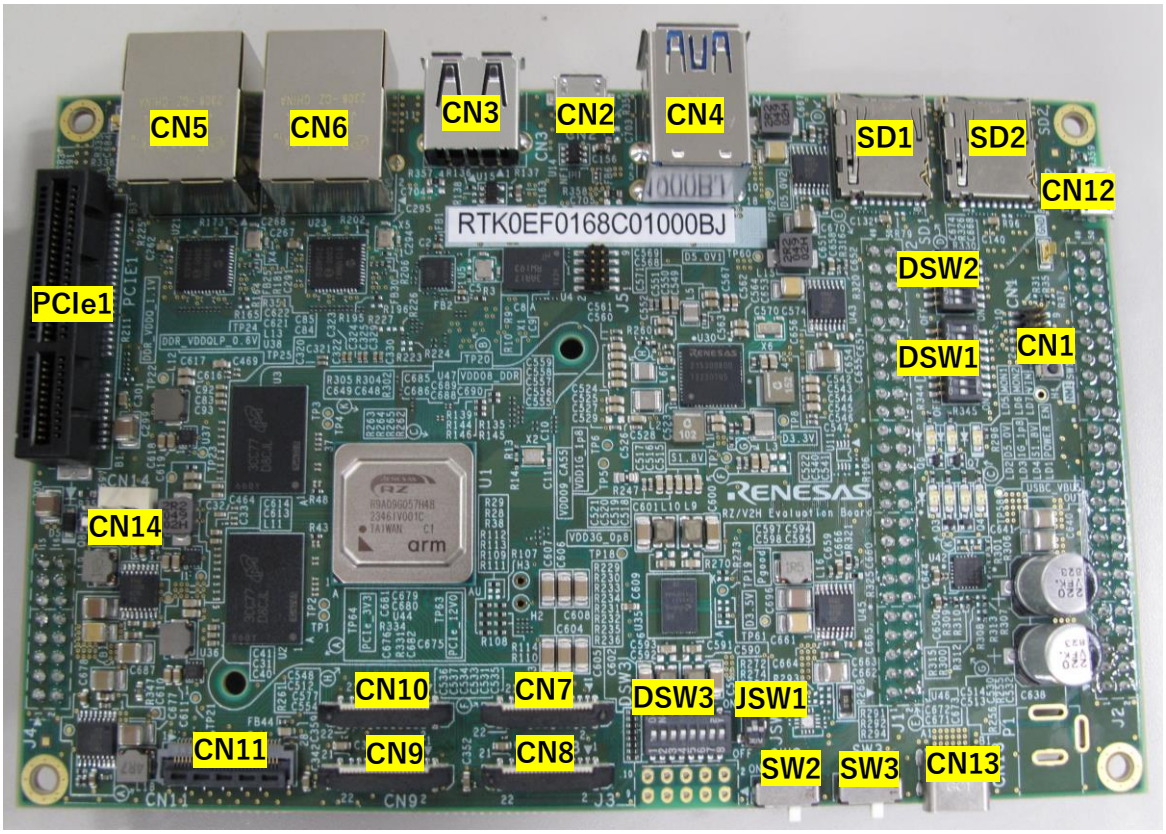

Figure 3.1-1 RZ/V2H Secure Evaluation Board Parts Layout Diagram (Parts Side)

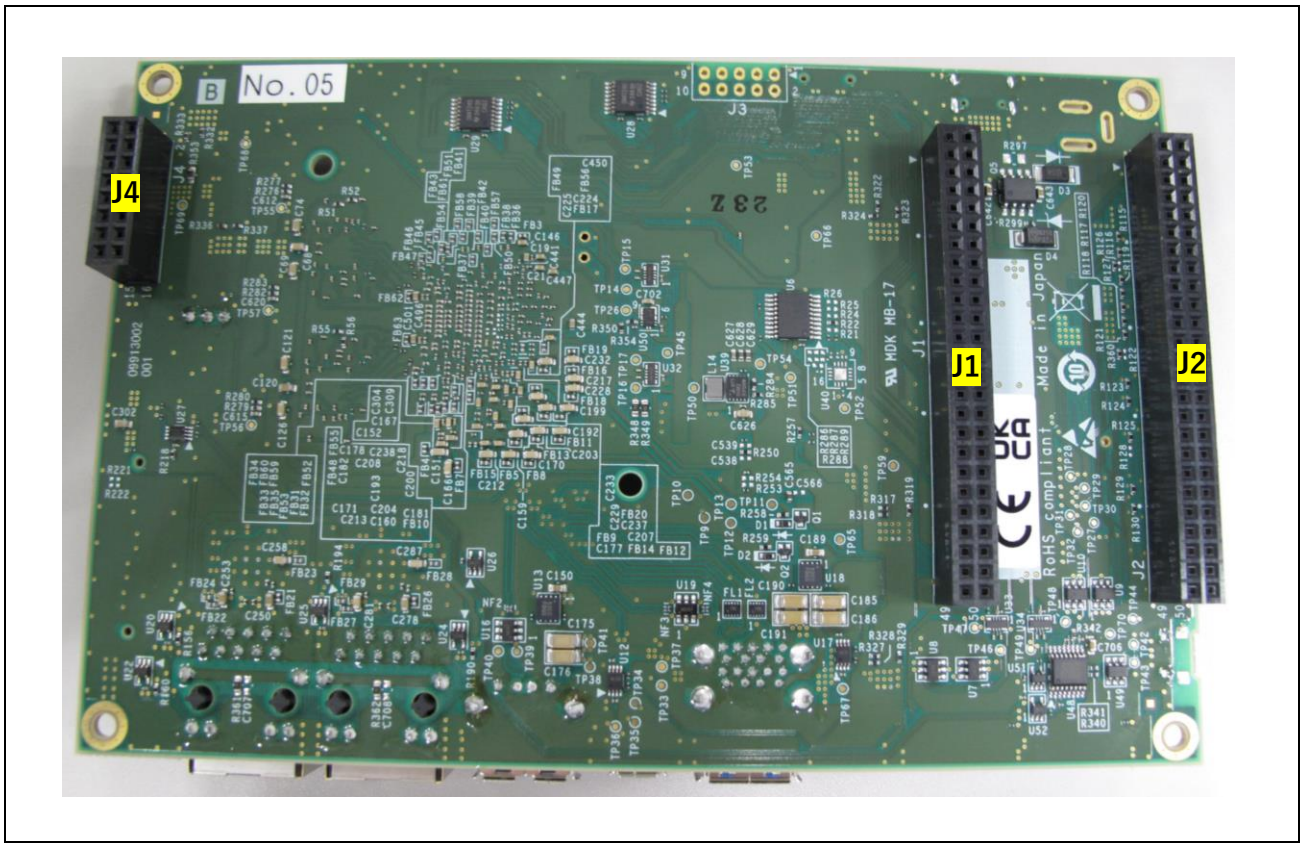

Figure 3.1-2 RZ/V2H Secure Evaluation Board Layout Diagram (Solder Side)

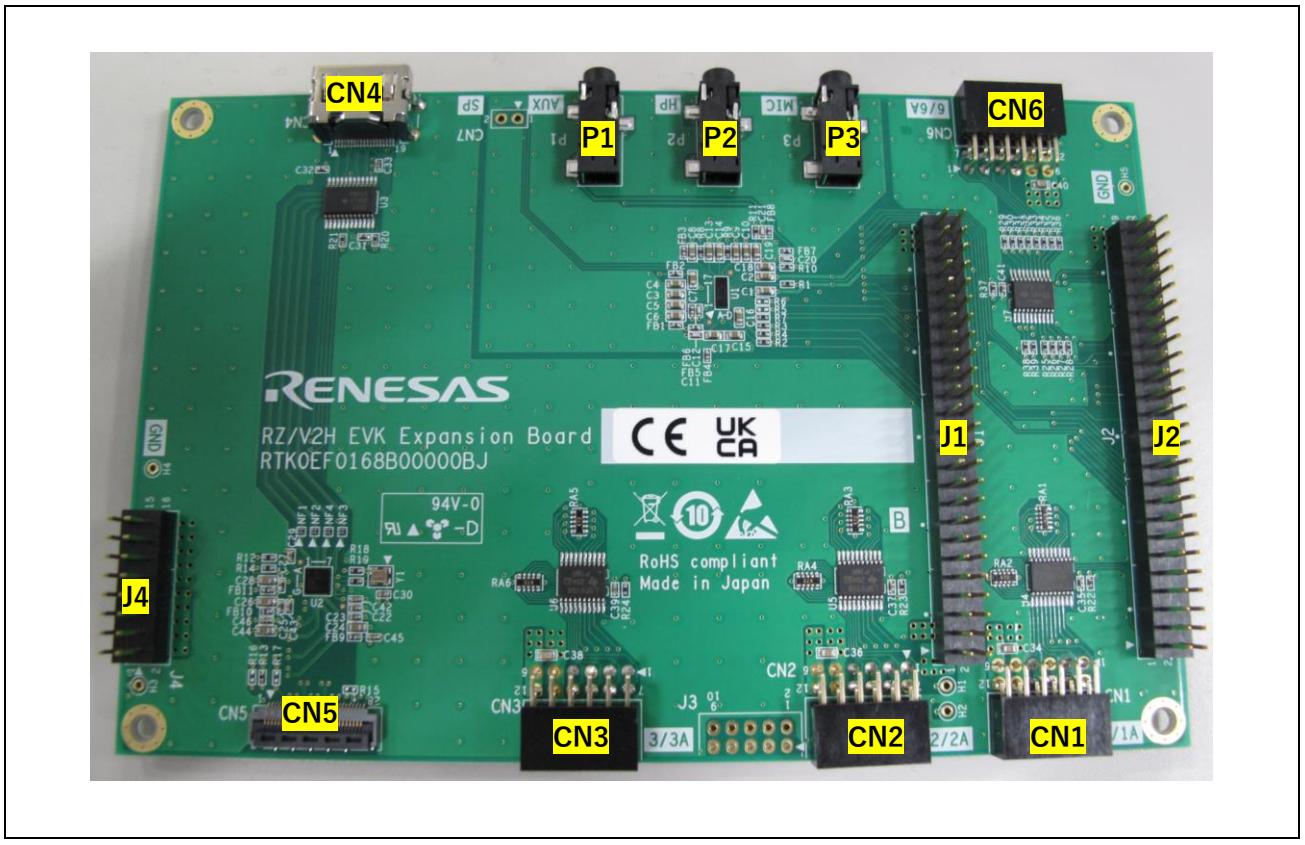

Figure 3.1-3 RZ/V2H EVK Expansion Board Parts Layout Diagram (Parts Side)

3.2 Lists of Main Parts

Table 3.2-1 and **Table 3.2-2** list the main parts of the RZ/V2H Secure Evaluation Board, RZ/V2H EVK Expansion Board, respectively.

Table 3.2-1 RZ/V2H Secure Evaluation Board Parts List

No.	Quantity	Part Symbol	Part Name	Manufacturer
1	1	U1	R9A09G057H48GBG (RZ/V2H)	Renesas Electronics
2	1	U5	5L35023B-616NLGI8	Renesas Electronics
3	1	U6	SLG7RN46898	Renesas Electronics
4	2	U13,U18	ISL61852CCRZ	Renesas Electronics
5	1	U30	RAA215300A2GNP#HA2	Renesas Electronics
6	4	U31,U32,U33,U34	SLG59M1603V	Renesas Electronics
7	1	U50	SLG59M1717V	Renesas Electronics
8	1	U35	DA9141-08F72	Renesas Electronics
9	2	U36,U37	ISL80031A	Renesas Electronics
10	1	U38	ISL80015	Renesas Electronics
11	1	U39	ISL97701IRZ-T7	Renesas Electronics
12	5	U43,U44,U45,U46,U47	RAA211250GSP#HA0	Renesas Electronics

Table 3.2-2 RZ/V2H EVK Expansion Board Parts List

No.	Quantity	Part Symbol	Part Name	Manufacturer
1	1	U1	DA7212-01UM	Renesas Electronics

4. Interface Specifications

This section describes the interface specifications of the V2HEVK.

4.1 Reset

When resetting V2HEVK, control by using the power control switches (SW2, SW3) and software.

4.2 LED

The V2HEVK has seven LEDs. **Table 4.2-1** list the colors and functions of these LEDs.

Table 4.2-1 RZ/V2H Secure Evaluation Board LED

LED	Color	Function/Usage
LD1	green	PMIC_PWRON indicator
LD2	green	Power D5.0V1 (5V) indicator
LD3	green	Power VDD1G_1p8 (1.8V) indicator
LD4	green	Power S1.8V (1.8V) indicator
LD5	yellow	Signal monitor
LD6	yellow	Signal monitor
LD7	green	Power USBC_VBUS_OUT (20V) indicator

4.3 Switches

The V2HEVK has seven switches. **Table 4.3-1** list the functions of the respective switches.

Table 4.3-1 RZ/V2H Secure Evaluation Board Switch

Switch	Shape	Usage
DSW1	DIP switch	Operation mode setting (see section **2.2 Operation Mode Setting**)
DSW2	DIP switch	Operation mode setting (see section **2.2 Operation Mode Setting**)
DSW3	DIP switch	Operation mode setting (see section **2.2 Operation Mode Setting**)
JSW1	DIP switch	Operation mode setting (see section **2.2 Operation Mode Setting**)
SW1	Push switch	NMI
SW2	Slide switch	Power Switch (USBC VBUS OUT 20V ON/OFF)
SW3	Slide switch	Power Switch (PMIC_RAA215300 ON/OFF)

4.4 Debug Serial Interface

The debugging port (micro USB Type-B connector (CN12)) is connected to the SCIF interface of the RZ/V2H via the USB-UART conversion IC. This port is for use in debugging.

4.5 Debugger Interface

Connect the ICE to the Arm JTAG connector (CN1). For the ICE having confirmed the connection, contact a Renesas Electronics sales representative.

Note: The emulator connector has 10 pins with 1.27-mm pitch.

Table 4.5-1 Arm JTAG Connector (CN1)

Pin No.	V2HEVK Connection Destination	Pin No.	V2HEVK Connection Destination
1	+1.8 V (VDD1G_1p8)	2	RZ/V2H (TMS_SWDIO)
3	GND	4	RZ/V2H (TCK_SWCLK)
5	GND	6	RZ/V2H (TDO)
7	NC	8	RZ/V2H (TDI)
9	RZ/V2H (TRSTN)	10	RZ/V2H (QRESN)

4.6 MIPI CSI-2 Interface

The V2HEVK has four MIPI CSI-2 interfaces.

Caution

It is different from the Raspberry Pi camera interface. When connecting the Raspberry Pi camera module, carefully confirm each signal connection. Incorrect connections may damage the board or module.

Table 4.6-1 MIPI CSI-2 Connector (CN7)

Pin No.	V2HEVK Connection Destination	Pin No.	V2HEVK Connection Destination
1	GND	12	RZ/V2H (CSI0_DATA2P)
2	RZ/V2H (CSI0_DATA0N)	13	GND
3	RZ/V2H (CSI0_DATA0P)	14	RZ/V2H (CSI0_DATA3N)
4	GND	15	RZ/V2H (CSI0_DATA3P)
5	RZ/V2H (CSI0_DATA1N)	16	GND
6	RZ/V2H (CSI0_DATA1P)	17	RZ/V2H (PB2)
7	GND	18	RZ/V2H (P64)
8	RZ/V2H (CSI0_CLKN)	19	GND
9	RZ/V2H (CSI0_CLKP)	20	RZ/V2H (I2C0_SCL)
10	GND	21	RZ/V2H (I2C0_SDA)
11	RZ/V2H (CSI0_DATA2N)	22	+3.3V (PCIe_3V3)

Table 4.6-2 MIPI CSI-2 Connector (CN8)

Pin No.	V2HEVK Connection Destination	Pin No.	V2HEVK Connection Destination
1	GND	12	RZ/V2H (CSI1_DATA2P)
2	RZ/V2H (CSI1_DATA0N)	13	GND
3	RZ/V2H (CSI1_DATA0P)	14	RZ/V2H (CSI1_DATA3N)
4	GND	15	RZ/V2H (CSI1_DATA3P)
5	RZ/V2H (CSI1_DATA1N)	16	GND
6	RZ/V2H (CSI1_DATA1P)	17	RZ/V2H (PB2)
7	GND	18	RZ/V2H (P65)
8	RZ/V2H (CSI1_CLKN)	19	GND
9	RZ/V2H (CSI1_CLKP)	20	RZ/V2H (I2C1_SCL)
10	GND	21	RZ/V2H (I2C1_SDA)
11	RZ/V2H (CSI1_DATA2N)	22	+3.3V (PCIe_3V3)

Table 4.6-3 MIPI CSI-2 Connector (CN9)

Pin No.	V2HEVK Connection Destination	Pin No.	V2HEVK Connection Destination
1	GND	12	RZ/V2H (CSI2_DATA2P)
2	RZ/V2H (CSI2_DATA0N)	13	GND
3	RZ/V2H (CSI2_DATA0P)	14	RZ/V2H (CSI2_DATA3N)
4	GND	15	RZ/V2H (CSI2_DATA3P)
5	RZ/V2H (CSI2_DATA1N)	16	GND
6	RZ/V2H (CSI2_DATA1P)	17	RZ/V2H (P61)
7	GND	18	RZ/V2H (P92)
8	RZ/V2H (CSI2_CLKN)	19	GND
9	RZ/V2H (CSI2_CLKP)	20	RZ/V2H (I2C6_SCL)
10	GND	21	RZ/V2H (I2C6_SDA)
11	RZ/V2H (CSI2_DATA2N)	22	+3.3V (PCIe_3V3)

Table 4.6-4 MIPI CSI-2 Connector (CN10)

Pin No.	V2HEVK Connection Destination	Pin No.	V2HEVK Connection Destination
1	GND	12	RZ/V2H (CSI3_DATA2P)
2	RZ/V2H (CSI3_DATA0N)	13	GND
3	RZ/V2H (CSI3_DATA0P)	14	RZ/V2H (CSI3_DATA3N)
4	GND	15	RZ/V2H (CSI3_DATA3P)
5	RZ/V2H (CSI3_DATA1N)	16	GND
6	RZ/V2H (CSI3_DATA1P)	17	RZ/V2H (P60)
7	GND	18	RZ/V2H (P93)
8	RZ/V2H (CSI3_CLKN)	19	GND
9	RZ/V2H (CSI3_CLKP)	20	RZ/V2H (I2C7_SCL)
10	GND	21	RZ/V2H (I2C7_SDA)
11	RZ/V2H (CSI3_DATA2N)	22	+3.3V (PCIe_3V3)

4.7 MIPI DSI Interface

The V2HEVK has a MIPI DSI interface. This interface is connected from RZ/V2H of the CPU board to CN11 and is connected to CN5 of the EXP board with a dedicated FFC. The EXP board converts MIPI DSI to an HDMI signal and outputs it to the CN4 HDMI connector.

Table 4.7-5 MIPI DSI Connector (CN11)

Pin No.	V2HEVK Connection Destination	Pin No.	V2HEVK Connection Destination
1	RZ/V2H (P37)	16	RZ/V2H (DSI_DNDATA0)
2	RZ/V2H (P41)	17	RZ/V2H (DSI_DPDATA0)
3	RZ/V2H (P40)	18	GND
4	RZ/V2H (P42)	19	RZ/V2H (DSI_DNCLK)
5	RZ/V2H (P36)	20	RZ/V2H (DSI_DPCLK)
6	GND	21	GND
7	RZ/V2H (DSI_DNDATA3)	22	RZ/V2H (P71)
8	RZ/V2H (DSI_DPDATA3)	23	GND
9	GND	24	+1.8 V (VDD1G_1p8)
10	RZ/V2H (DSI_DNDATA2)	25	GND
11	RZ/V2H (DSI_DPDATA2)	26	+3.3 V (D3.3V)
12	GND	27	GND
13	RZ/V2H (DSI_DNDATA1)	28	+5.0 V
14	RZ/V2H (DSI_DPDATA1)	G1-5	GND
15	GND	F1-2	GND

4.8 USB Interface

The V2HEVK CPU board has the following USB connectors.

- USB3.2 Gen2 HOST interface.
  The USB Type-A connector (CN4) is connected to the USB 3.2 Gen2 interface of the RZ/V2H.
- USB2.0 HOST interface.
  The USB Type-A connector (CN3) is connected to the USB 2.0 (Ch1) interface of the RZ/V2H.
- USB2.0 DRD interface.
  The USB micro-AB connector (CN2) is connected to the USB 2.0 (Ch0) interface of the RZ/V2H.

4.9 Ethernet Interface

The V2HEVK has two Ethernet interfaces. The RJ-45 connectors (CN5 and CN6) are connected to the Ethernet interface of the RZ/V2H via the Ethernet PHY IC. Connecting this interface to a public line is prohibited.

4.10 SD Card Connector

The V2HEVK has two micro SD card connector (SD1 and SD2). These connectors are connected to the SD interface of the RZ/V2H.

SD1 is connected to the SD0 interface of RZ/V2H and can be used as a boot device.

SD2 is set to RZ/V2H SD1 interface.

4.11 PCIe Connector

The V2HEVK has a PCIe ×4 connector (PCIe1). This connector is connected to the PCIe interface of the RZ/V2H.

4.12 Pin Header

The V2HEVK has five pin headers. The specifications are listed below.

Table 4.12-6 GPIO CN (J1) (Stacking connection to EXP board)

Pin No.	V2HEVK Connection Destination	Pin No.	V2HEVK Connection Destination
1	+3.3 V (D3.3V)	2	GND
3	+1.8 V (VDD_1G_1p8)	4	GND
5	+1.8 V (S1.8V)	6	GND
7	RZ/V2H (P00)	8	P00_LED
9	RZ/V2H (P01)	10	P01_LED
11	RZ/V2H (P02)	12	RZ/V2H (P33)
13	RZ/V2H (P03)	14	RZ/V2H (P34)
15	RZ/V2H (P04)	16	RZ/V2H (P35)
17	RZ/V2H (P05)	18	RZ/V2H (P36)
19	RZ/V2H (P06)	20	RZ/V2H (P37)
21	RZ/V2H (P07)	22	RZ/V2H (P40)
23	RZ/V2H (P10)	24	RZ/V2H (P41)
25	RZ/V2H (P11)	26	RZ/V2H (P11)
27	RZ/V2H (P12)	28	RZ/V2H (P43)
29	RZ/V2H (P13)	30	RZ/V2H (P44)
31	RZ/V2H (P14)	32	RZ/V2H (P45)
33	RZ/V2H (P15)	34	RZ/V2H (P46)
35	RZ/V2H (P20)	36	RZ/V2H (P47)
37	RZ/V2H (P21)	38	RZ/V2H (P50)
39	RZ/V2H (P30)	40	RZ/V2H (P51)
41	RZ/V2H (P31)	42	RZ/V2H (P52)
43	RZ/V2H (P32)	44	RZ/V2H (P53)
45	RZ/V2H (QRESN)	46	RZ/V2H (P54)
47	PMIC_PWRON	48	RZ/V2H (P55)
49	GND	50	GND

Table 4.12-7 GPIO CN (J2) (Stacking connection to EXP board)

Pin No.	V2HEVK Connection Destination	Pin No.	V2HEVK Destination
1	RZ/V2H (P56)	2	RZ/V2H (P86)
3	RZ/V2H (P57)	4	RZ/V2H (P87)
5	RZ/V2H (P60)	6	RZ/V2H (P90)
7	RZ/V2H (P61)	8	RZ/V2H (P91)
9	RZ/V2H (P62)	10	RZ/V2H (P92)
11	RZ/V2H (P63)	12	RZ/V2H (P93)
13	RZ/V2H (P64)	14	RZ/V2H (P94)
15	RZ/V2H (P65)	16	RZ/V2H (P95)
17	RZ/V2H (P66)	18	RZ/V2H (P96)
19	RZ/V2H (P67)	20	RZ/V2H (P97)
21	RZ/V2H (P70)	22	RZ/V2H (PA0)
23	RZ/V2H (P71)	24	RZ/V2H (PA1)
25	RZ/V2H (P72)	26	RZ/V2H (P72)
27	RZ/V2H (P73)	28	RZ/V2H (PA3)
29	RZ/V2H (P74)	30	RZ/V2H (PA4)
31	RZ/V2H (P75)	32	RZ/V2H (PA5)
33	RZ/V2H (P76)	34	RZ/V2H (PA6)
35	RZ/V2H (P77)	36	RZ/V2H (PA7)
37	RZ/V2H (P80)	38	RZ/V2H (PB0)
39	RZ/V2H (P81)	40	RZ/V2H (PB1)
41	RZ/V2H (P82)	42	RZ/V2H (PB2)
43	RZ/V2H (P83)	44	RZ/V2H (PB3)
45	RZ/V2H (P84)	46	RZ/V2H (PB4)
47	RZ/V2H (P85)	48	RZ/V2H (PB5)
49	GND	50	GND

Table 4.12-8 AD input CN (J3)

Pin No.	V2HEVK Connection Destination	Pin No.	V2HEVK Connection Destination
1	+1.8 V (S1.8V)	2	GND
3	RZ/V2H (ANI000)	4	RZ/V2H (ANI004)
5	RZ/V2H (ANI001)	6	RZ/V2H (ANI005)
7	RZ/V2H (ANI002)	8	RZ/V2H (ANI006)
9	RZ/V2H (ANI003)	10	RZ/V2H (ANI007)

Table 4.12-7 Power CN (J4) (Stacking connection to EXP board)

Pin No.	V2HEVK Connection Destination	Pin No.	V2HEVK Connection Destination
1	+5.0 V	2	+5.0 V
3	+5.0 V	4	+5.0 V
5	+5.0 V	6	+5.0 V
7	+5.0 V	8	+5.0 V
9	GND	10	GND
11	GND	12	GND
13	GND	14	GND
15	GND	16	GND

4.13 Heat-sink Connector

The V2HEVK has a heat-sink. When using a heat-sink, connect the FAN power supply to CN14.

Table 4.13-1 Heat-sink FAN Connector (CN14)

Pin No.	Connection
1	N.C
2	+12 V
3	GND

4.14 USB-PD Connector (Power only)

The V2HEVK operates with power supplied from USB-PD (CN13). A USB-PD controller is connected to CN13 and supplies 20 V (maximum 5 A) from the USB-PD power supply.

4.15 HDMI Interface

The EXP Board has an HDMI interface. The HDMI Type-A connector (CN4) is connected to the RZ/V2H MIPI DSI interface via a DSI-HDMI conversion IC.

4.16 AUDIO Interface

The EXP Board has three audio connectors. Three audio 3.5 mm jacks (P1: AUX, P2: HP, P3: MIC) are connected to the RZ/V2H SSI interface via an audio CODEC IC.

4.17 Pmod Connector

The EXP Board has four Pmod connectors. The specifications are listed below.

Table 4.17-2 Pmod Type 1A GPIO (CN1)

Pin No.	Pmod Pin Spec.	V2HEVK Connection Destination
1	IO1	RZ/V2H (P80) via level shifter U4
2	IO2	RZ/V2H (P81) via level shifter U4
3	IO3	RZ/V2H (P82) via level shifter U4
4	IO4	RZ/V2H (P83) via level shifter U4
5	GND	GND
6	VCC	+3.3 V (D3.3V)
7	IO5	RZ/V2H (P84) via level shifter U4
8	IO6	RZ/V2H (P85) via level shifter U4
9	IO7	RZ/V2H (P86) via level shifter U4
10	IO8	RZ/V2H (P87) via level shifter U4
11	GND	GND
12	VCC	+3.3 V (D3.3V)

Table 4.17-3 Pmod Type 2A SPI (CN2)

Pin No.	Pmod Pin Spec.	V2HEVK Connection Destination
1	SSLA	RZ/V2H (PA7) via level shifter U5
2	MOSI	RZ/V2H (PB4) via level shifter U5
3	MISO	RZ/V2H (PB3) via level shifter U5
4	SCK	RZ/V2H (PB5) via level shifter U5
5	GND	GND
6	VCC	+3.3 V (D3.3V)
7	IO1	RZ/V2H (P74) via level shifter U5
8	IO2	RZ/V2H (P75) via level shifter U5
9	IO3	RZ/V2H (PA6) via level shifter U5
10	IO4	RZ/V2H (PA4) via level shifter U5
11	GND	GND
12	VCC	+3.3 V (D3.3V)

Table 4.17-4 Pmod Type 3A UART (CN3)

Pin No.	Pmod Pin Spec.	V2HEVK Connection Destination
1	CTS	RZ/V2H (PA7) via level shifter U6
2	TXD	RZ/V2H (PB4) via level shifter U6
3	RXD	RZ/V2H (PB3) via level shifter U6
4	RTS	RZ/V2H (PB5) via level shifter U6
5	GND	GND
6	VCC	+3.3 V (D3.3V)
7	IO1	RZ/V2H (P57) via level shifter U6
8	IO2	RZ/V2H (P73) via level shifter U6
9	IO3	RZ/V2H (P76) via level shifter U6
10	IO4	RZ/V2H (P77) via level shifter U6
11	GND	GND
12	VCC	+3.3 V (D3.3V)

Table 4.17-5 Pmod Type 6A I2C (CN6)

Pin No.	Pmod Pin Spec.	V2HEVK Connection Destination
1	IO1	RZ/V2H (P55) via level shifter U7
2	IO2	RZ/V2H (P54) via level shifter U7
3	SCL	RZ/V2H (P21) via level shifter U7
4	SDA	RZ/V2H (P20) via level shifter U7
5	GND	GND
6	VCC	+3.3 V (D3.3V)
7	IO3	RZ/V2H (P70) via level shifter U7
8	IO4	RZ/V2H (P72) via level shifter U7
9	IO5	RZ/V2H (P90) via level shifter U7
10	IO6	RZ/V2H (P91) via level shifter U7
11	GND	GND
12	VCC	+3.3 V (D3.3V)

5. Supplementary Note

5.1 Power Supply ICs of V2HEVK

In consideration of the evaluation usage, the power supply ICs of V2HEVK are selected with a margin. The power supply ICs that suits the user circuit are recommended. For inquiries about power supply ICs, contact a Renesas Electronics sales representative.

5.2 Assembly of Heat-sink

- Remove the protective seal on the back of the heat-sink.
- Connect Heat-sink to RZ/V2H Secure Evaluation Board.

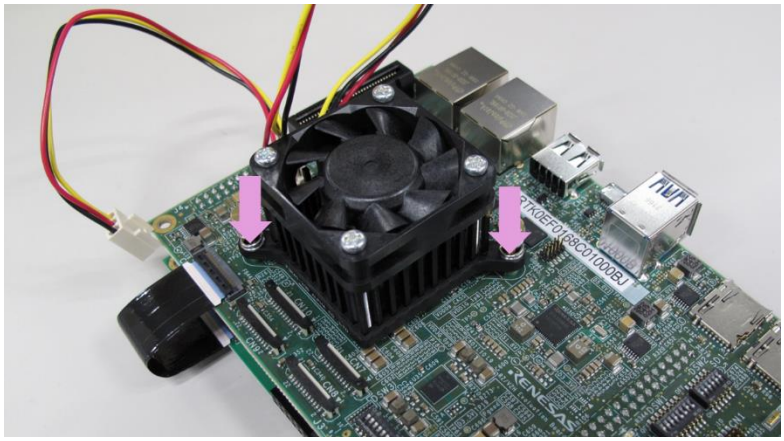

Figure 5.2-1 Connecting Heat-sink to RZ/V2H Secure Evaluation Board

- Connect Heat-sink FAN Power.

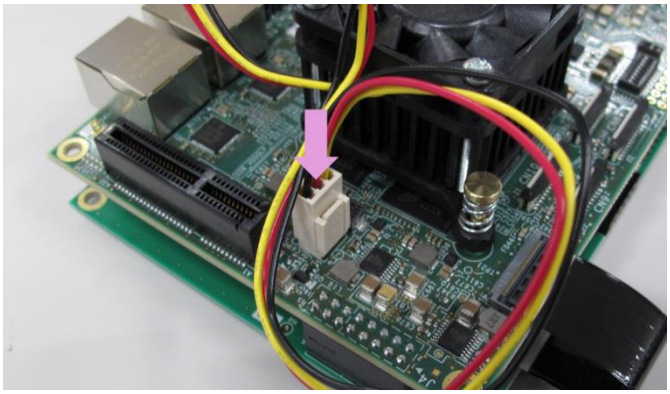

Figure 5.2-2 Connecting Heat-sink FAN Power

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