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## RZ/G3S Evaluation Board Kit

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This document provides quick-start instructions for how to bring up an RZ/G3S Evaluation Board Kit (EVK), and how to boot Linux by using RZ/G3S Verified Linux Package (VLP) Pre-built image.

*Important:* To ensure the RZ/G3S EVK is set up correctly, complete the steps in the order listed in “Quick Start Procedure”.

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# 1. EVK Information

## 1.1 How to Get the EVK

To obtain the RZ/G3S EVK, go to the RZ/G3S EVK [RTK9845S33S01000BE](#) product page and click on Buy/Quote under Product Options ([Buy Direct](#)).

## 1.2 EVK Contents

The RZ/G3S EVK is the most suitable board kit for RZ/G3S evaluation. RZ/G3S EVK consists of Module Board and Common carrier board.

The RZ/G3S EVK conforms to the SMARC v2.1 standard, and is comprised of the following:

- RZ/G3S Module Board (SMARC2.1)
- RZ SMARC Series Carrier Boards
- RZ SMARC Series JTAG adaptor cable
- USB Type-A to USB Micro B cable for serial debug
- Accessories: Screw and spacer



**Figure 1. RZ/G3S Evaluation Kit**

The following items must be purchased separately by customers:

- USB type C charger 65W
  - Support USB PD
  - Output specification : 5V3A,9V3A,15V3A,20V3.25A
- USB type C to type C cable
  - USB-C and USB-C 3.1 Gen2 USB-PD support 100W
- micro SD UHI-Class10 (8GB or more)

In addition, please prepare Windows PC (Windows 10 or Windows 11) for your host PC to program the root loader files to EVK.

## 2. Quick Start Procedure

Complete the following quick-start steps in the order listed.

### 2.1 Run the “Pre-built Image

After getting the RZ/G3S EVK, download the RZ/G3S VLP Pre-Built Image and try running it.

Please download the file ([RZG3S VLP3.0.6 Pre-built Images.zip](#)) from the link provided and decompress the file on your PC.

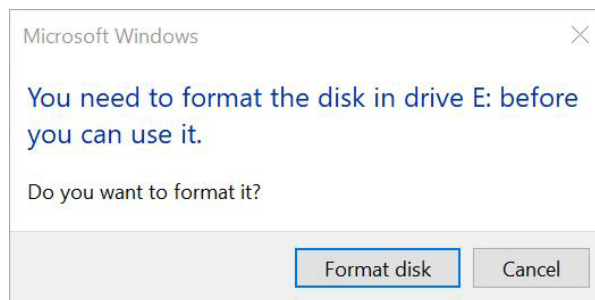
#### 2.1.1. Prepare the microSD Card

Write the “Images\_RZG3S\_v3.0.6.zip” included in “RZG3S\_VLP3.0.6\_Pre-built\_Images.zip” to your microSD card.

##### Case 1: Use Windows PC

1. Copy the “Images\_RZG3S\_v3.0.6.zip” to a Windows PC and unzip it.
2. Write the microSD card image (core-image-bsp-smarc-rzg3s.wic.gz) to the SD card which has a 2GB or more capacity by using any tool like as below:
  - Win32 Disk Imager ([Win32 Disk Imager download | SourceForge.net](#)), or
  - balenaEtcher ([balenaEtcher - Flash OS images to SD cards & USB drives](#)).

*Note:* If the following message is shown after inserting the microSD card in the Window PC, or after writing the image to the microSD card, please select “Cancel”.



##### Case 2: Use Linux Host PC

If you would like to program the image to your microSD card by Linux Host PC, see following steps.

Prepare the microSD card by entering the following commands on your Linux PC.

1. Unzip the Images\_RZG3S\_v3.0.6.zip file to get the “core-image-bsp-smarc-rzg3s.wic.gz” and “core-image-bsp-smarc-rzg3s.wic.bmap”.
2. Check the microSD Card Device Name: enter the **lsblk** command before and after inserting your microSD card.

*Note:* Be careful not to use other device names (**sdb** is used in this document).

<before inserting microSD card>

```
$ lsblk
NAME MAJ:MIN RM SIZE RO TYPE MOUNTPOINT
sda 8:0 0 30.9G 0 disk
├─sda1 8:1 0 512M 0 part /boot/efi
├─sda2 8:2 0 1K 0 part
└─sda5 8:5 0 30.3G 0 part /
sr0 11:0 1 1024M 0 rom
```

then...

<after inserting microSD card>

```
$ lsblk
NAME MAJ:MIN RM SIZE RO TYPE MOUNTPOINT
sda 8:0 0 30.9G 0 disk
├─sda1 8:1 0 512M 0 part /boot/efi
├─sda2 8:2 0 1K 0 part
└─sda5 8:5 0 30.3G 0 part /
sdb 8:16 1 29.7G 0 disk
└─sdb1 8:17 1 29.7G 0 part
sr0 11:0 1 1024M 0 rom
```

3. Unmount the SD card partitions mounted automatically.  
/dev/sdb is an example and the actual partitions path depend on your environment.

```
$ sudo umount /dev/sdb
```

4. Using the Device name found above, write the image file into the microSD card by the following commands. Put core-image-bsp-smarc-rzg3s.wic.gz and core-image-bsp-smarc-rzg3s.wic.bmap on the same working directory.

```
$ sudo apt-get install bmap-tools
$ sudo bmaptool copy core-image-bsp-smarc-rzg3s.wic.gz /dev/sdb
```

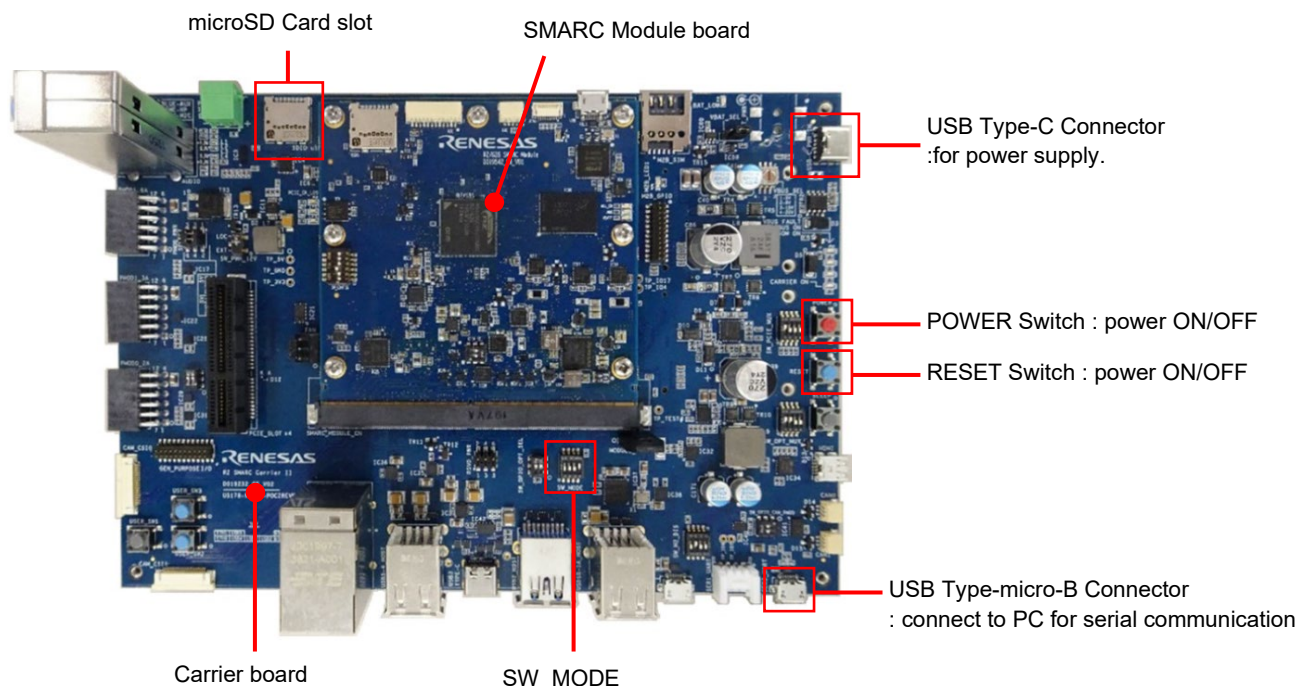
5. After that, remove and insert the microSD card again to confirm that the image file has been written to the microSD card normally.

### 2.1.2. Write the Bootloader and U-boot

Copy FlashWriter-smarc-rzg3s.mot, bl2\_bp\_spi-smarc-rzg3s.srec and fip-smarc-rzg3s.srec included in the first partition "boot" of SD card prepared by Step2-1 to your PC.

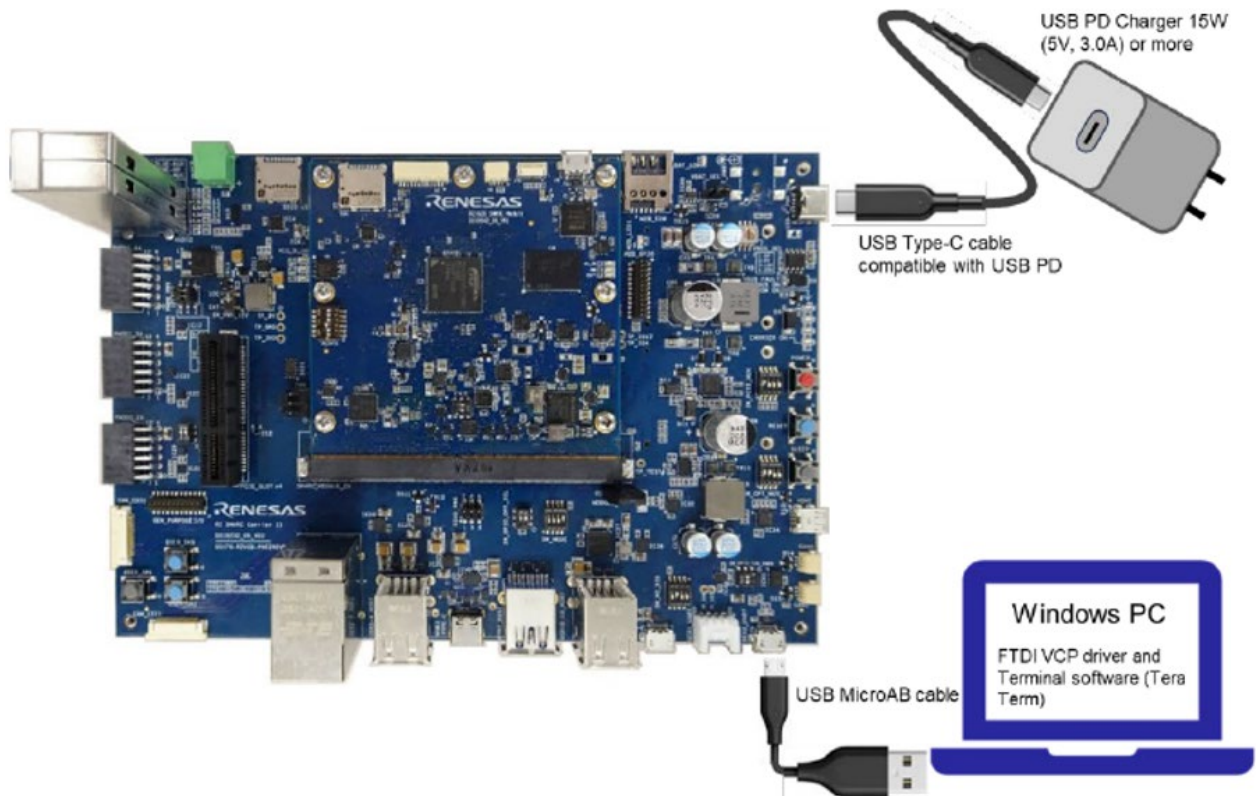
#### Main specification of the EVK

The components of the RZ/G3S EVK that are used in this step are as follows.



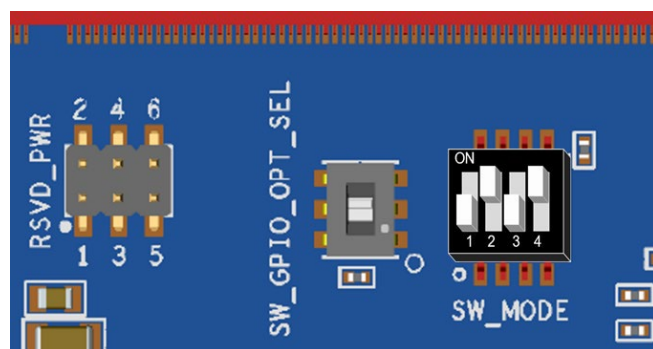
2.1.2.1. Prepare the Hardware

1. Attach the PD capable USB Type-C cable to the USB Type-C port (“USB-C\_PWR\_IN”). Then, you can see LEDs (“VBUS\_PWR\_ON” and “SOM\_PWR\_ON”) are illuminated.



2. Set the board to SCIF Download mode to write to the serial flash memory on the EVK board. Please set the SW\_MODE as below.

SW\_MODE (SCIF Download mode)

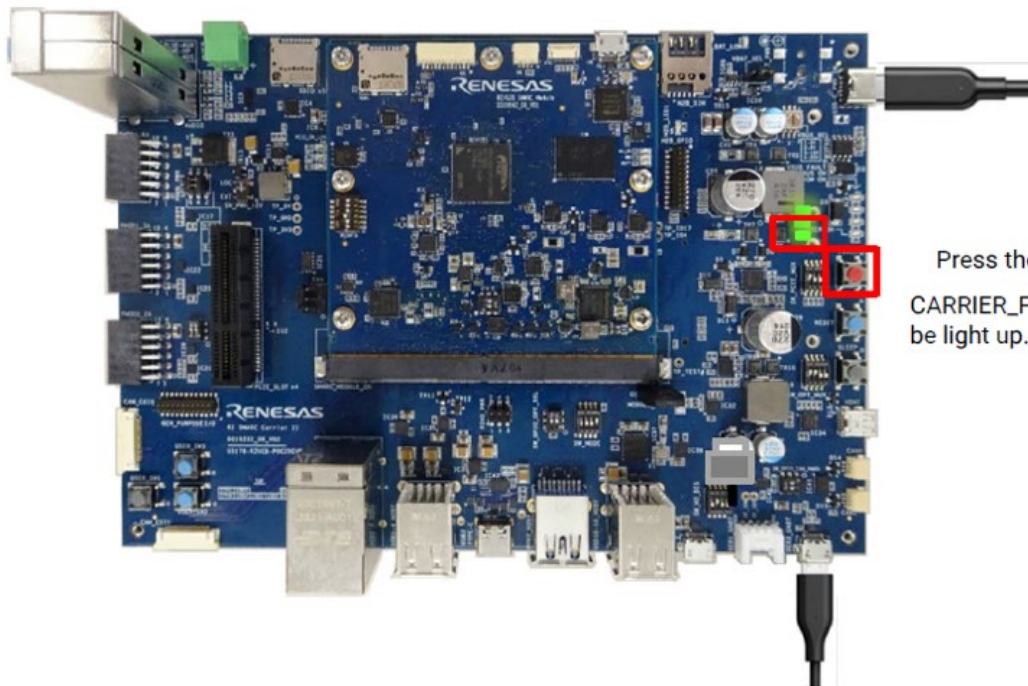


SW\_MODE

1	2	3	4
OFF	ON	OFF	ON

3. Press the red button (POWER) for 1msec to turn on the power. Then the LED(CARRIER\_PER\_BUTTON) is illuminated additionally.

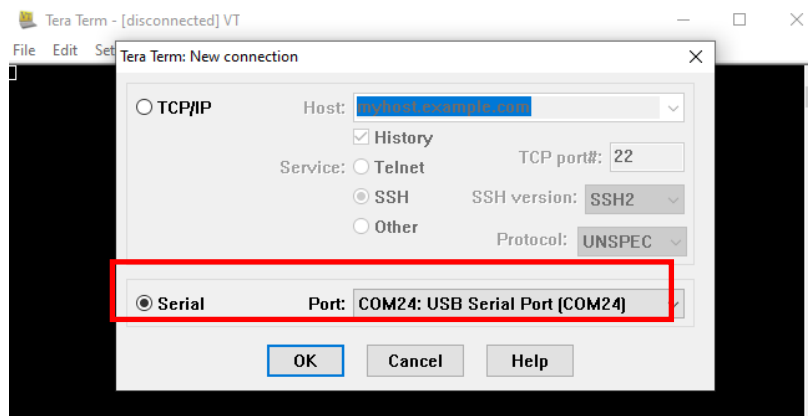
When turn off the power, press and hold the red button for 2 seconds. Then, check that LED(CARRIER\_PER\_BUTTON) is turned off.



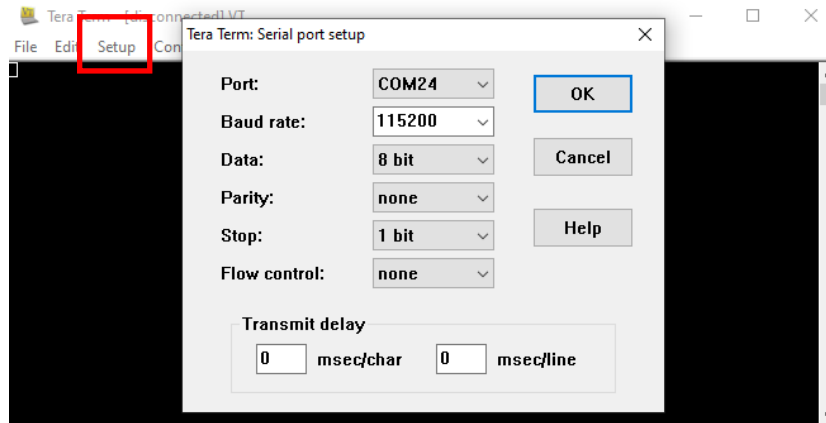
Press the Red button (PWR)  
CARRIER\_PWR\_ON LED will be light up.

### 2.1.2.2. Prepare to Serial Communication

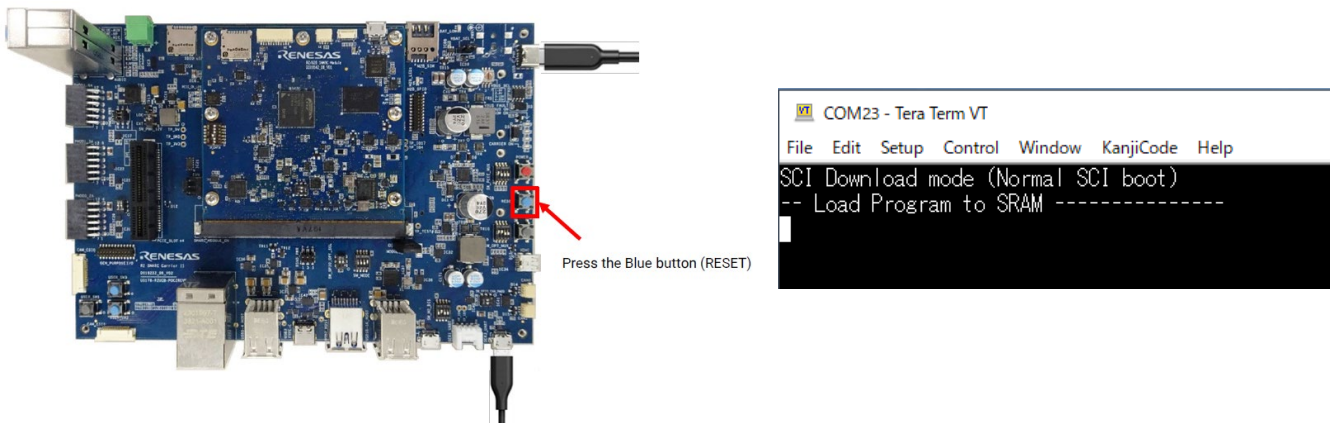
1. Bring up the terminal software on your PC. Please get the Tera Term (latest version) from the link below. Available at : [Releases TeraTermProject/teraterm \(github.com\)](https://github.com/teratermproject/teraterm).
2. Select "Serial" as shown in the following picture. "Port:" is "COM24: USB Serial Port (COM24)".



3. Select “Setup” > “Serial port” to set the settings about serial communication protocol on the software. Set each setting as below:
  - Baud rate :115200
  - Data :8 bit
  - Parity :none
  - Stop :1 bit
  - Flow control :none

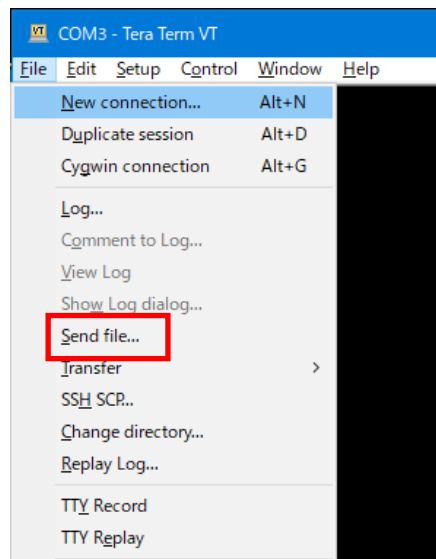
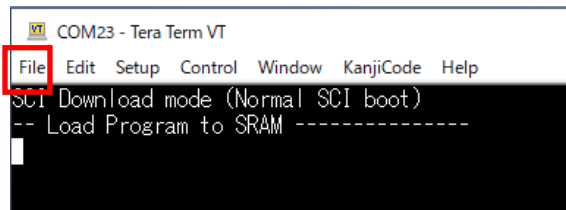


4. After serial port setting, press the blue button (RESET). Check the message below is displayed on the console.



2.1.2.3. Sending the Flash Writer

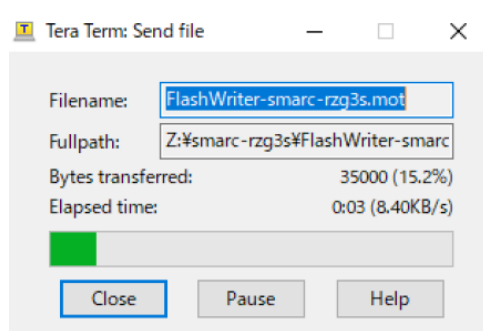
1. Send an image of Flash Writer using terminal software after the message “please send !” is shown. Select the “File” > “Send file” menu.



2. Select “FlashWriter-smarc-rzg3s.mot”, and then click “Open” button. The image will be sent to the board via serial connection.

After successfully downloading the binary, Flash Writer starts automatically and shows a message like below on the terminal.

(a) During download



(b) After a successful download

```
Flash writer for RZ/G3S Series
Product Code : RZ/G3S
>
```



### 2.1.2.4. Write the Bootloader

1. Before writing the loader files, change the Flash Writer transfer rate from default (115200bps) to high speed (921600bps) with “SUP” command of Flash Writer.

```
>SUP
Scif speed UP
Please change to 921.6Kbps baud rate setting of the terminal.
```

After “SUP” command, change the serial communication protocol speed from 115200bps to 921600bps as well by following the steps described in 2.1.2.2 step3, and push the enter key.

2. Next, two boot loader files need to be written to the target board.

Enter the following bolded commands. Send “bl2\_bp\_spi-smarc-rzg3s.srec” by the terminal software as same manner in 2-2-3 after the message “please send !” is shown.

```
>XLS2
===== Qspi writing of RZ/G3 Board Command =====
Load Program to Spiflash
Writes to any of SPI address.
Program size & Qspi Save Address
===== Please Input Program Top Address =====
Please Input : H'a1e00
===== Please Input
Qspi Save Address ===
Please Input : H'0
please send ! ( '.' & CR stop load)
```

If you get the following message, press “y”.

```
SPI Data Clear(H'FF) Check : H'00000000-0000FFFF,Clear OK?(y/n)
```

After successfully write the binary, the message like below is shown on the console.  
(The address may be different depending on the version of the boot loader used.)

```
Erase SPI Flash memory...
Erase Completed
Write to SPI Flash memory.
===== Qspi Save Information =====
SpiFlashMemory
Stat Address : H'00000000
SpiFlashMemory
End Address : H'0001BCCF
=====
```

- Next, write another loader file by using bolded commands again.

Send `fip-smarc-rzg3s.srec` by the terminal software as same manner in 2-2-4 1. after the message “please send !” is shown.

```
>XLS2
===== Qspi writing of RZ/G3 Board Command =====
Load Program to Spiflash
Writes to any of SPI address.
Program size & Qspi Save Address
===== Please Input Program Top Address =====
Please Input : H'0
===== Please Input Qspi Save Address ===
Please Input : H'64000
please send ! ( '.' & CR stop load)
```

If you get the following message, press “y”.

```
SPI Data Clear(H'FF) Check : H'00000000-0000FFFF,Clear OK?(y/n)
```

After successfully write the binary, the message like below is shown on the console.  
(The address may be different depending on the version of the boot loader used.)

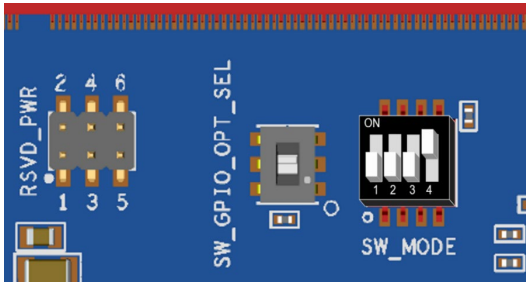
```
Erase SPI Flash memory...
Erase Completed
Write to SPI Flash memory.
===== Qspi Save Information =====
SpiFlashMemory Stat Address : H'00064000
SpiFlashMemory End Address : H'0014782E
=====
```

- After writing two loader files normally, change the serial communication protocol speed from 921600 bps to 115200 bps by following the steps described in 2.1.2.2 step3, and push the enter key again.  
At last, turn off the power of the board by pressing the red button (POWER).

### 2.1.3. Start Up Linux on the EVK

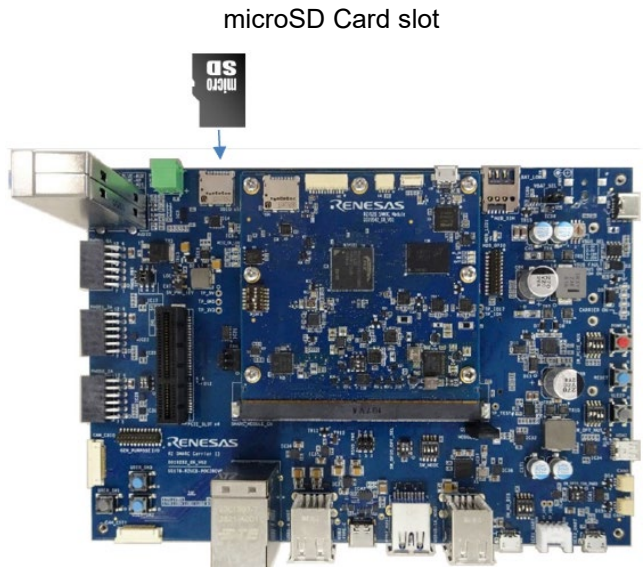
1. Set the board to SPI Boot mode to start the Bootloader.

Please change the SW\_MODE as below (SW\_MODE[2] ON→OFF). Insert your microSD card to the slot (CN10) on the carry board.



SW\_MODE

1	2	3	4
OFF	OFF	OFF	ON



2. Turn on the power of the board by pressing the power red button. The settings of Terminal in this process are the same as in 2-2-2.

Press the blue button to reset and after “Hit any key to stop autoboot:” appears, press the enter key on the PC within 3 seconds.

```
U-Boot 2021.10 (Oct 25 2023 - 08:58:16 +0000)
CPU: Renesas Electronics K rev 11.2
Model: smarc-rzg3s
DRAM: 896 MiB
MMC: sd@11c00000: 0, sd@11c10000: 1, sd@11c20000: 2
Loading Environment from MMC... OK
In: serial@1004b800
Out: serial@1004b800
Err: serial@1004b800
Net:
Error: ethernet@11c30000 address not set.
No ethernet found.
Hit any key to stop autoboot: 0
=>
```

To set the environment variables, enter the bolded commands below.

```
=> setenv sd_boot1 'mmc dev 1 ; ext4load mmc 1:2 0x48080000 /boot/Image ; ext4load
mmc 1:2 0x48000000 /boot/r9a08g045s33-smarc.dtb'
=> setenv sd_boot2 'setenv bootargs 'root=/dev/mmcblk1p2 rootwait' ; booti
0x48080000 - 0x48000000'
=> setenv bootcmd 'run sd_boot1 sd_boot2'
=> saveenv
```

3. Please turn off and on the power pressing red button again to boot up the board. When “smarc-rzg3s login:” is displayed, enter “root” to login. (No password required).

```
Version: 1.0.0
smarc-rzg3s login: root
root@smarc-rzg3s:~#
```

## 2.2 Build the Linux Environment

Section 2.1 describes how to startup the RZ/G3S by using RZ/G3S VLP Pre-built image. If you would like to configure your Linux environment from the VLP build stage, please download the file ([RZ/G3S Verified Linux Package \(RTK0EF0045Z0021AZJ-v3.0.6.zip\)](#)), and build it by following the guide [Linux Start-up Guide for RZ/G3S Verified Linux Package v3.0.6](#).

## 3. Revision History

Revision	Date	Description
1.00	Mar 7, 2024	Initial release.
1.01	Apr 24, 2024	Update for RZ/G VLP V3.0.6
1.02	May 15, 2024	Update the description in 2.1.1 and 2.1.2.4.
1.03	Jul 31, 2024	Modify the command of environment variables

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