

# RZ/V2M Evaluation Board Kit Start-Up Guide

User's Manual

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# How to Use This Manual

## 1. Objective and Target Users

This manual sets out initial procedures for operating the RZ/V2M evaluation board kit. Note that this manual is not intended for use in software development.

This document shows the installation and startup procedure of the first boot loader, second boot loader, and U-Boot on the RZ/V2M evaluation board kit. For details and notes on the RZ/V2M evaluation board kit, refer to *the RZ/V2M Evaluation Board Kit Hardware Manual*.

# Table of Contents

Introduction .....	6
Related Documents .....	6
1. Operating Environment .....	7
2. Startup Procedure .....	8
2.1 Flash Writer Writing Procedure (using SD Card Forced Write Function) .....	8
2.1.1 Preparing the SD Card.....	8
2.1.2 Writing Flash Writer Software (SD Card Forced Write Execution) .....	9
2.2 Writing Procedure for First Boot Loader, Second Boot Loader, and U-Boot (Using Flash Writer Writing Function) .....	10
2.2.1 Starting Flash Writer .....	10
2.2.2 Erasing the Area to be Written in eMMC .....	12
2.2.3 Writing the First Boot Loader, Second Boot Loader, and U-Boot.....	13
2.3 Startup with Written Information .....	15

## Introduction

This document shows the startup procedure of the first boot loader, second boot loader, and U-Boot on the RZ/V2M evaluation board kit (V2MEVK).

For details on the procedure, refer to *the RZ/V2M Linux Package Manual*. Descriptions in this document are based on *the RZ/V2M Linux Package Rev1.2*. When referring to the different package version, follow the descriptions in that document.

## Related Documents

The following documents have been prepared for this V2MEVK. Make sure to refer to the latest versions of these documents.

Document Type	Document Title	Document No.	Description
Startup guide	V2MEVK Startup Guide	This document	Startup procedure of the V2MEVK
User's manual: Hardware	RZ/V2M User's Manual: Hardware	R01UH0940EJ0120	RZ/V2M hardware specifications (pin assignments, memory maps, peripheral specifications, electrical characteristics, and timing charts) and descriptions of operation
Linux startup guide	RZ/V2M Linux Package Startup Guide	R01US0527EJ0120	Startup procedure of the RZ/V2M Linux package

# 1. Operating Environment

**Table 2.1-1** lists the recommended environment for V2MEVK operation and **Figure 2.1-1** shows the connection method.

Table 2.1-1 Recommended Environment

Equipment	Details
RZ/V2M evaluation board kit	Evaluation board kit for RZ/V2M
Windows PC	For controlling the target board with terminal software
OS	Windows 10 recommended
Terminal software	Control serial console of the target board. Tera Term is recommended and available at " <a href="https://osdn.jp">Tera Term Open Source Project (osdn.jp)</a> ".
VCP driver	Virtual COM port driver to enable communications between the Windows PC and the target board via USB. This is virtually used as a serial port and available at " <a href="https://silabs.com">CP210x USB to UART Bridge VCP Drivers - Silicon Labs (silabs.com)</a> ". Install "CP210x VCP Windows" at the above web site.
Serial to micro-USB cable (USB cable: Standard-A-Micro-B)	Serial communications (UART) between the RZ/V2M evaluation board kit and Windows PC
Micro-SD card	Used to write the flash writer software to the V2MEVK. Use it as SDHC, formatted as FAT32, with one partition.
AC adapter	12 V, 5 A (Plug: Inner diameter 2.1 mm, outer diameter 5.5 mm)

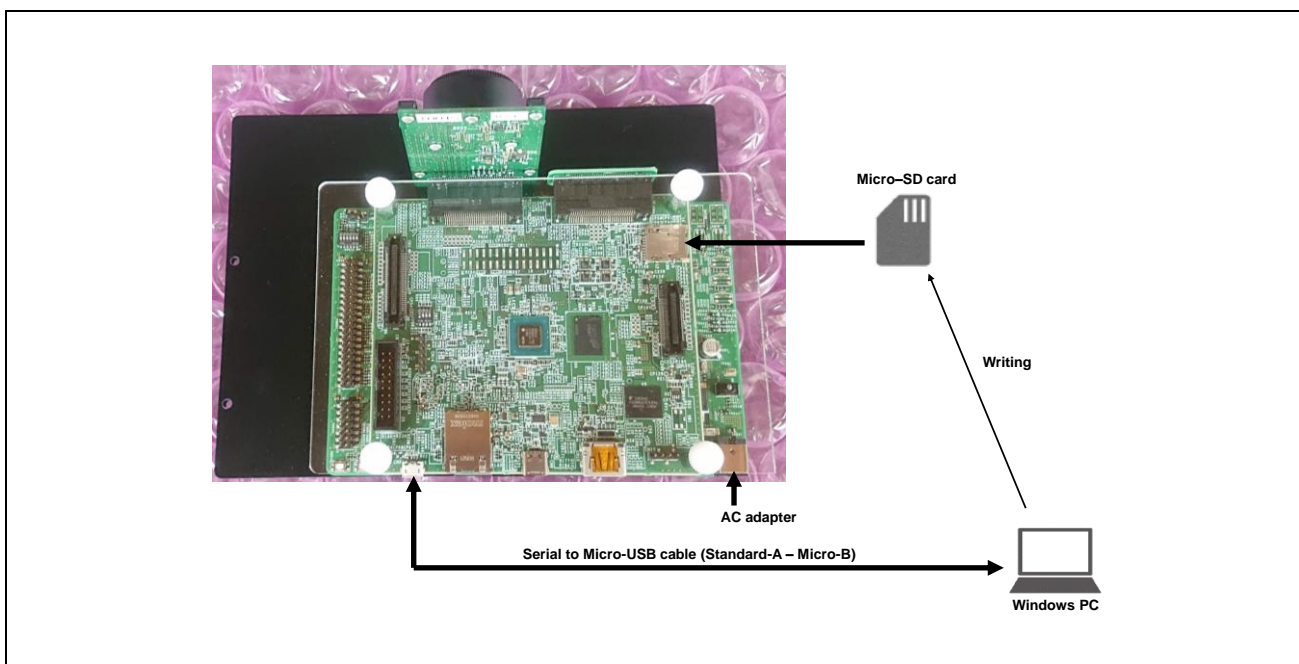


Figure 2.1-1 Connection Method

## 2. Startup Procedure

This section describes the procedure for writing the first boot loader, second boot loader, and U-Boot required to boot the Linux kernel. This procedure is accomplished by executing the following two functions in order.

1. SD card forced write function
2. Flash writer write function

For details, see *section 7, Flash Writer*, in the *RZ/V2M Linux Package Startup Guide*.

Download the latest version of the following software package from the Renesas Web site.

Software Package	Description
RZ/V2M Linux Package	Linux package for the RZ/V2M

RZ/V2M — AI-only Accelerator (DRP-AI), 4K-compatible Image Signal Processor (ISP), Vision-AI ASSP for Real-time Human and Object Recognition (2022.4)

<https://www.renesas.com/jp/en/products/microcontrollers-microprocessors/rz-cortex-a-mpus/rzv2m-dual-cortex-a53-lpddr4x32bit-ai-accelerator-isp-4k-video-codec-4k-camera-input-fhd-display-output>

### 2.1 Flash Writer Writing Procedure (using SD Card Forced Write Function)

#### 2.1.1 Preparing the SD Card

Store the files included in the RZ/V2M Linux package on an SD card.

1. SD card format specifications
  - FAT32
  - 1 partition
  - SDHC
2. Store the flash writer software on SD card

The files to be stored are included in the following directory of the Linux package.

```
r01an5971ej0<xxx>-rzv2m-linux (<xxx>: Package version)
├─ option
│   └─ flash_writer
│       └─ B2_intSW.bin
```



### 2.1.2 Writing Flash Writer Software (SD Card Forced Write Execution)

Write the prepared file (Flash writer, file name: B2\_intSW.bin) to eMMC™ on the board by using the forced write function of RZ/V2M.

1. With the V2MEVK board power turned off, insert the prepared SD card into the V2MEVK's CN6 connector and set SW2 (see **Figure 2.1-1** for the SW2 setting method)
2. Turn on SW501 of V2MEVK
3. The RZ/V2M automatically acquires data from the SD card and writes the data to eMMC. LED2 lights up when writing is successfully completed.

SUPPLEMENTARY EXPLANATION

If LED2 is blinking, the write operation has failed and an error may have occurred on the SD card. Check whether the SD card is inserted and formatted correctly.

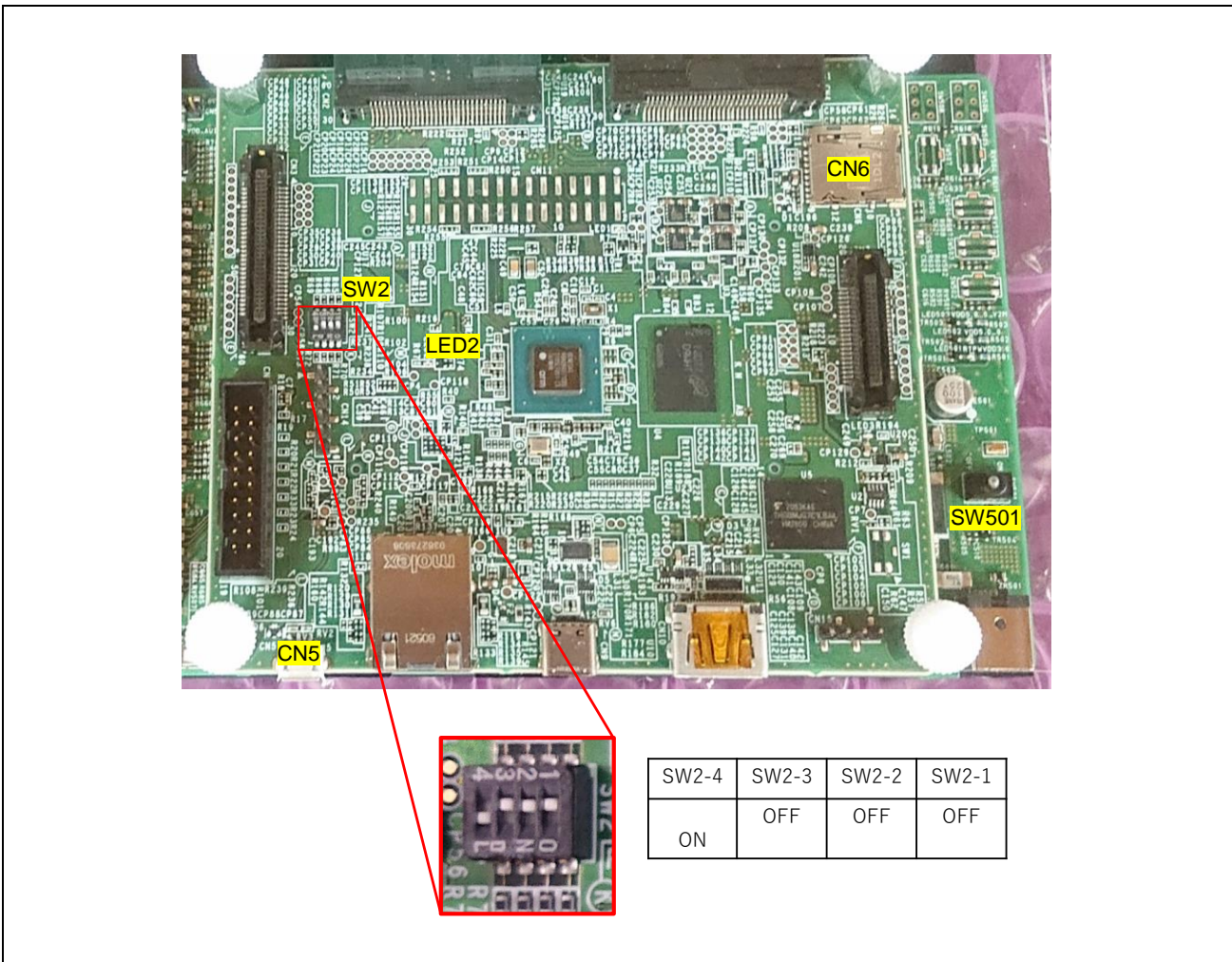


Figure 2.1-1 SW2 Settings

## 2.2 Writing Procedure for First Boot Loader, Second Boot Loader, and U-Boot (Using Flash Writer Writing Function)

### 2.2.1 Starting Flash Writer

Start the flash writer written in section 2.1 Flash Writer Writing Procedure (using SD Card Forced Write Function).

1. Turn off SW501 of V2MEVK
2. Turn off all SW2 switches (SW2-1, SW2-2, SW2-3, and SW2-4) of V2MEVK
3. Connect CN5 of V2MEVK and the Windows PC with a USB cable (standard-A-micro-B) and start Tera Term. See **Figure 2.2-1** for Tera Term settings.
4. Turn on SW501 of V2MEVK  
Check that the display is as shown in **Figure 2.2-2**.

*Note: Figure 2.2-1 shows the configuration for RZ/V2M Linux Package Ver1.2. If you will be using a different version, refer to the RZ/V2M Linux Package Startup Guide for that version.*

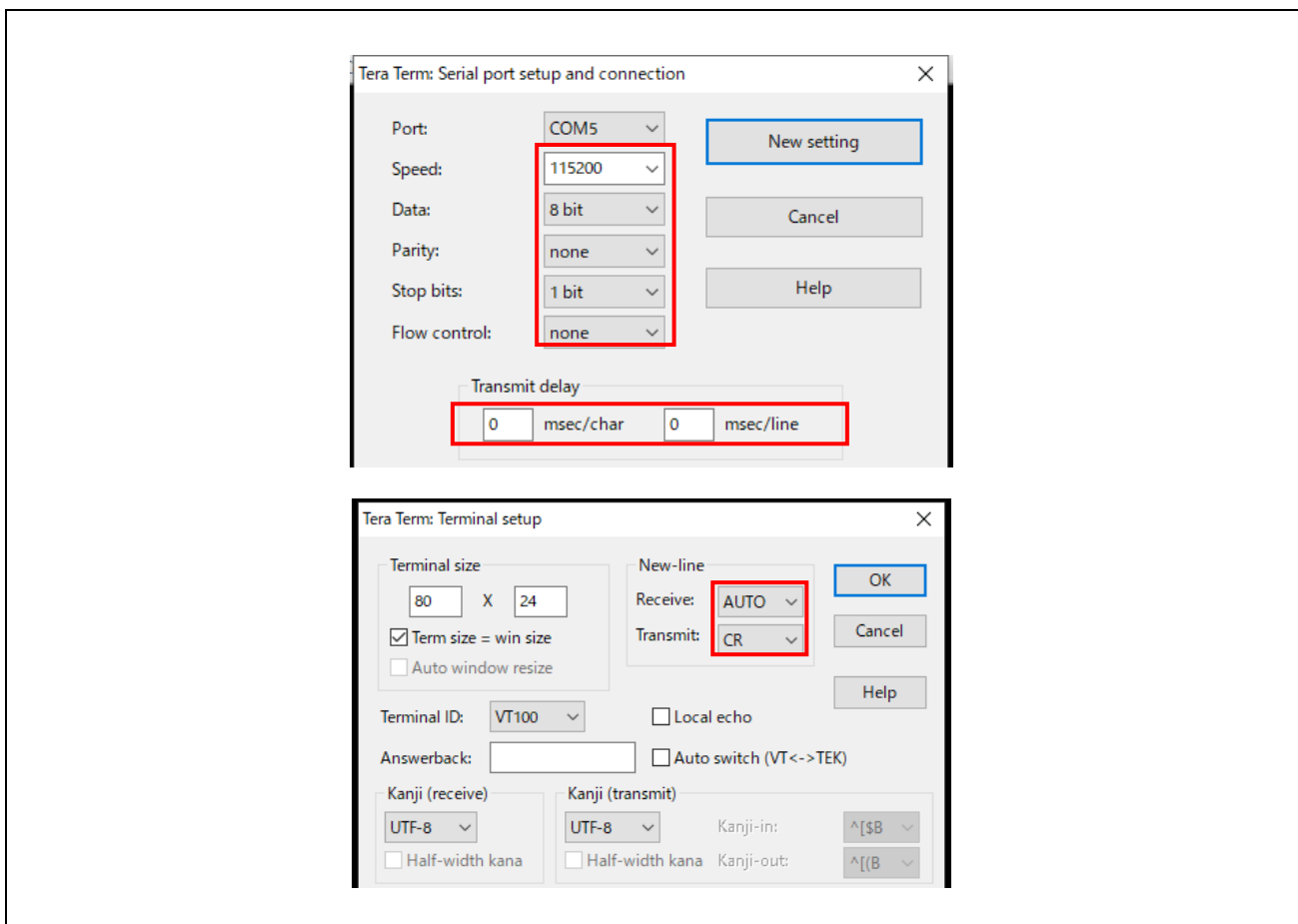


Figure 2.2-1 Settings of Tera Term

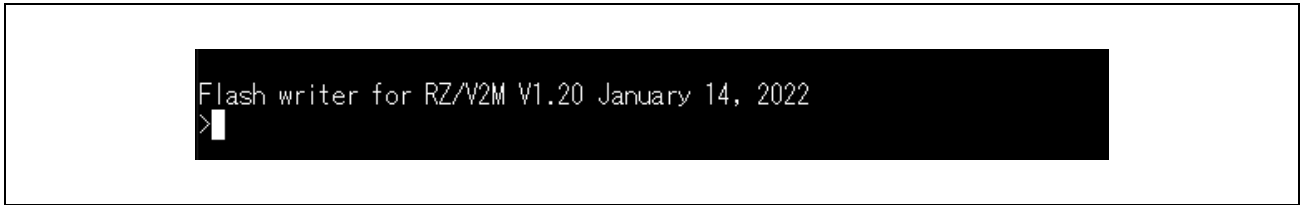


Figure 2.2-2 Starting the Flash Writer

## 2.2.2 Erasing the Area to be Written in eMMC

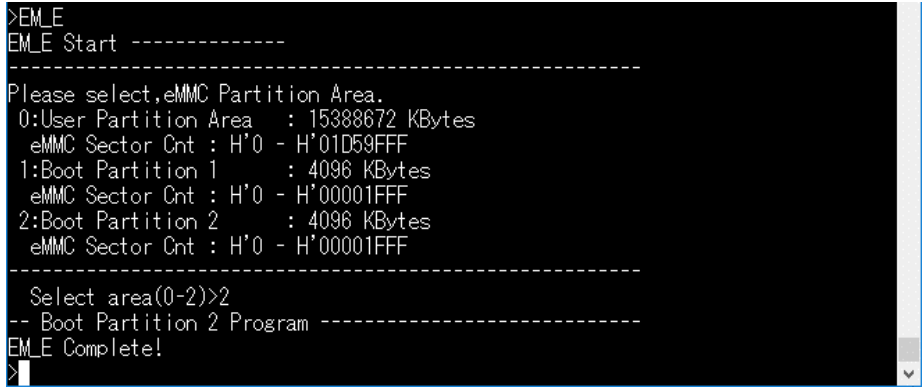
Erase the area in the eMMC for storing (writing) the first and second boot loaders and U-Boot.

1. Refer to **Table 2.2-1** and enter the contents of the input column with Tera Term.

Table 2.2-1 Procedure of eMMC Initialization

Step	Tera Term Display	Input	Supplemental Information
1	>	EM_E	The first and second boot loaders and U-Boot are stored in boot partition 1. For the sector number of boot partition 1 that first and second boot loaders and U-Boot are stored, refer to <b>Figure 2.2-5</b> .
2	Select area(0-2)>	1	
3	EM_E Complete!	—	

**Figure 2.2-3** shows an example of the screen display when the above procedure is successfully executed.



```

>EM_E
EM_E Start -----
-----
Please select,eMMC Partition Area.
0:User Partition Area : 15388672 KBytes
  eMMC Sector Cnt : H'0 - H'01D53FFF
1:Boot Partition 1   : 4096 KBytes
  eMMC Sector Cnt : H'0 - H'00001FFF
2:Boot Partition 2   : 4096 KBytes
  eMMC Sector Cnt : H'0 - H'00001FFF
-----
Select area(0-2)>2
-- Boot Partition 2 Program -----
EM_E Complete!
>

```

Figure 2.2-3 EM\_E Command

## 2.2.3 Writing the First Boot Loader, Second Boot Loader, and U-Boot

Write first boot loader, second boot loader, and U-Boot, respectively, to eMMC.

### 1. Storage location of sample first boot loader, second boot loader, and U-Boot

The files to be written are included in the following directory of the Linux package.

r01an5971ej0<xxx>-rztv2m-linux (<xxx>: Package version)

```
└─ bin
    ├── loader_1st_128kb.bin
    ├── loader_2nd.bin
    ├── loader_2nd_param.bin
    ├── u-boot.bin
    └── u-boot_param.bin
```

### 2. Execute writing of first boot loader

Use the flash writer function for writing.

### 3. Refer to **Table 2.2-2** and enter the contents of the input column with Tera Term.

The following is an example of the first boot loader (file name to be written: loader\_1st\_128kb.bin).

Table 2.2-2 Procedure of Writing the Binary File

Step	Tera Term Display	Input	Supplemental Information
1	>	EM_WB	—
2	Select area(0-2)>	1	See <b>Figure 2.2-5</b> for details on specifying parameters.
3	Please Input Start Address in sector:	000	(For details, see <i>Table 7-3, Boot loader data stored in the eMMC in the RZ/V2M Linux Package Startup Guide.</i> )
4	Please Input File size(byte):	20000	
5	Please send binary file!	—	This control should be executed by the file transfer function, not by Tera Term command input. <ol style="list-style-type: none"> <li>1. Click "File" and "Send file..."</li> <li>2. Select "loader_1st_128kb.bin"</li> <li>3. Check "Binary" in "Option". (see <b>Figure 2.2-4</b>)</li> <li>4. Click "Open".</li> </ol>
6	EM_WB Complete!	—	—

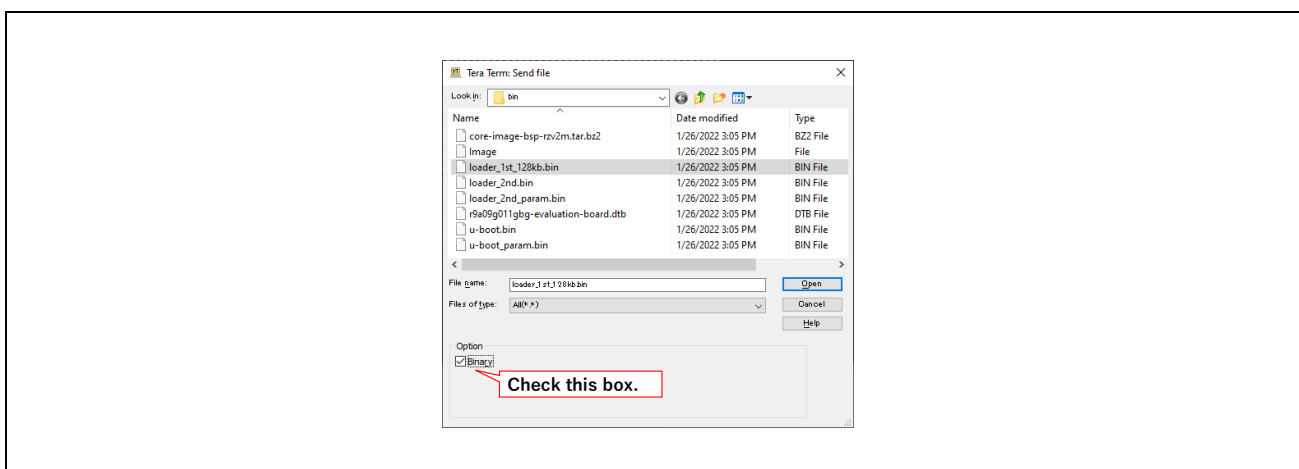


Figure 2.2-4 File Transmission

Table 7-3. Boot loader data stored in the eMMC

File name	Program top address	eMMC save partition	eMMC save sectors <sup>1</sup>	File size(byte) <sup>2</sup>	Description
loader_1st_128kb.bin	H'80100000	Boot partition 1	H'000000	H'20000	1 <sup>st</sup> loader binary
loader_2nd_param.bin	On RAMA area <sup>3</sup>	Boot partition 1	H'000100	H'8	Boot parameter for 2nd loader
loader_2nd.bin	H'B6000000	Boot partition 1	H'000101	H'30BD8	2 <sup>nd</sup> loader binary
u-boot_param.bin	On RAMB area <sup>3</sup>	Boot partition 1	H'000901	H'8	Boot parameter for u-boot
u-boot.bin	H'57F00000	Boot partition 1	H'000902	H'7EE01	U-Boot binary

```

>EM_WB
EM_WB Start -----
-----
Please select,eMMC Partition Area.
0:User Partition Area : 15388672 KBytes
  eMMC Sector Cnt : H'0 - H'01D59FFF
1:Boot Partition 1 : 4096 KBytes
  eMMC Sector Cnt : H'0 - H'00001FFF
2:Boot Partition 2 : 4096 KBytes
  eMMC Sector Cnt : H'0 - H'00001FFF
-----
Select area(0-2) >1
-- Boot Partition 1 Program -----
Please Input Start Address in sector :000
Work RAM(H'B6000000-H'B60FFFFFF) Clear...
Please Input File size(byte) : 20000
please send binary file!
    
```

Figure 2.2-5 EM\_WB Command (Determining the Specified Parameters)

4. Execution of writing second boot loader and U-Boot

Writing the second boot loader and U-Boot also requires use of the functions of the flash writer. Change the following from the procedure for the first boot loader (file name to be written: loader\_1st\_128kb.bin) and write it.

4-1) Change the parameters specified in STEP 2 to 4.

4-2) Change the name of the file to be sent

Second boot loader: “loader\_2nd.bin”, “loader\_2nd\_param.bin”

U-Boot: “u-boot.bin”, “u-boot\_param.bin”

## 2.3 Startup with Written Information

Boot V2MEVK with the respective data for the first boot loader, second boot loader, and U-Boot that have been written to eMMC.

1. Turn off SW501 of V2MEVK
2. Turn on SW501 of V2MEVK
3. Restart V2MEVK and if the display is as shows in **Figure 2.3-1**, startup is complete.

```
[BL1] Boot Loader Version 1.20
[BL1] eMMC initialized
[BL1] Loaded the boot parameter for 2nd boot
[BL1] Loaded the 2nd boot loader
[BL1] Kick the 2nd boot loader
[BL2] 2nd boot loader entered
[BL2] DDR initialization completed_M
[BL2] Loaded the boot parameter for U-Boot
[BL2] Loaded the U-Boot
[BL2] the U-Boot start

U-Boot 2018.09 (Jan 12 2022 - 10:07:36 +0000)

Model: RZ/V2M
DRAM: 4 GiB
MMC: sd@85000000: 0, sd@85020000: 1
Loading Environment from MMC... *** Warning - bad CRC, using default environment

In: serial
Out: serial
Err: serial
Net: eth0: ethernet@a3300000
Hit any key to stop autoboot: 0
** Unable to read file Image **
** Unable to read file r9a09g011gbg-evaluation-board.dtb **
Bad Linux ARM64 Image magic!
=> █
```

Figure 2.3-1 U-Boot Startup Display

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