

RZ/V Verified Linux Package

Version 3.0.4

R01US0565EJ0104

Rev. 1.04

Release Note

Jul. 30, 2023

Introduction

This release note describes the contents, building procedures and important points of the RZ/V Verified Linux Package (hereinafter referred to as “VLP/V”).

Please refer to that Build instruction the each target device Start-up Guide, “r01us0617ej0100-rz-v(Linux Start-up Guide RZV2L).pdf”, “r01us0527ej0140-rz-v(StartUp_Guide_V2M).pdf”, or “r01us0578ej0120-rz-v(StartUp_Guide_V2MA).pdf”.

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1. Release Items

- **Name and version**

RZ/V Verified Linux Package

Version 3.0.4 (hereinafter referred to as “VLP/V v3.0.4”)

- **Distribution method**

Please visit the site below and create an account to download the packages. This site is for the entire RZ Family which includes the RZ/V series. Basic packages of VLP/V v3.0.4 which are listed in **Table 1** can be downloaded.

RZ/V2L product page:

<http://www.renesas.com/RZV2L>

RZ/V2M product page:

<http://www.renesas.com/RZV2M>

RZ/V2MA product page:

<http://www.renesas.com/RZV2MA>

RZ/V Verified Linux Package [5.10-CIP]:

<https://www.renesas.com/us/en/software-tool/rzv-verified-linux-package-510-cip>

- **Target board**

RZ/V2L Evaluation Board Kit PMIC version (*):

- RZ/V2L SMARC Module Board
- RZ SMARC Series Carrier Board

RZ/V2M Evaluation Board Kit:

- RZ/V2M EVK
- RZ SMARC Series Carrier Board

RZ/V2MA Evaluation Board Kit:

- SBEV-RZ/V2MA-KIT

(*) “RZ/V2L Evaluation Board Kit PMIC version” include the RZV2L SMARC Module Board and the RZ SMARC Series Carrier Board.

The CMOS sensor (OV5645) in the Coral camera is no longer available and should not be used for mass production. Any software support provided is for evaluation purposes only.

- **Build Environment**

Linux Host PC

OS: Ubuntu 20.04 LTS (64 bit OS must be used.)

20.04 inside a docker container also OK.

100GB free space on HDD or SSD is necessary.

- **Verified functions**

Linux BSP

- Linux Kernel
- Linux Drivers
- Graphics Libraries
- Codec Libraries

GUI Framework

- Qt (LGPL version)

- **File contents**

VLP/V is delivered by the files listed in **Table 1**.

Table 1. RZ/V Verified Linux Package

Basic packages

File	Description
RTK0EF0045Z0024AZJ-v3.0.4.zip (*1)	Verified Linux Package. This file includes the Yocto recipe packages and the necessary documents.
rzv_bsp_v304.tar.gz (*1)	Yocto recipe packages
oss_pkg_rzv_v3.0.4.7z (1.9GB) (1*)	Open source software packages See the Note below before download
r01us0565ej0104-rz-v(Release Note).pdf	This document
r01us0617ej0100-rz-v(Linux Start-up Guide RZV2L).pdf	Documents describing booting method and the required settings of bootloader for RZ/V2L .
r01us0527ej0140-rz-v(StartUp_Guide_V2M).pdf	Brief usage instructions for VLP/V on RZ/V2M.
r01us0578ej0120-rz-v(StartUp_Guide_V2MA).pdf	Brief usage instructions for VLP/V on RZ/V2MA.

(*1) Yocto recipe and Open source software packages are provided “AS IS” with no warranty and the license which is described in the source code. Please check the contents of the license, then consider the applicability to the product carefully.

Note) Open source software packages contain all source codes of OSSs except for Linux kernel. These are the same versions of OSSs used when VLP/V was verified.

If you are just evaluating VLP/V and RZ/V series, open source software packages are not mandatory to use.

Usually, all the software can be built without using these files if your build machine is connected to the Internet.

Open source software packages are required for an “offline” environment. The word “offline” means an isolated environment which does not connect to any network. VLP/V can always build images in this “offline” environment by using these packages without affected from changes of original repositories of OSSs. Also, this “offline” environment always reproduces the same images as the images which were verified by Renesas. Note that if you build without using open source software packages, there are possibilities to use different source codes than Renesas used due to the implicit changes of the repositories of OSSs.

Optional packages (*1)

File ("XX" is replaced by "EN" or "JP".)	Description
RTK0EF0045Z13001ZJ-v1.1.0_XX.zip (Evaluation version) RTK0EF0045Z14001ZJ-v1.1.0_rzv_XX.zip (Unrestricted version)	RZ MPU Graphics Library for RZ/G2L, RZ/G2LC and RZ/V2L . This provides graphics function compliant with the OpenGL ES standard. These libraries are tested with VLP/V v3.0.4.
RTK0EF0045Z15001ZJ-v1.1.0_XX.zip (Evaluation version) RTK0EF0045Z16001ZJ-v1.1.0_rzv_XX.zip (Unrestricted version)	RZ MPU Video Codec Library for RZ/G2L and RZ/V2L . These libraries are tested with VLP/V v3.0.2.
RTK0EF0131F02000SJ-v0.97.zip	Video codec package for RZ/V2MA. The VCD driver includes in this package.

(*1) Evaluation vs Unrestricted Version

There are two release versions: Evaluation and Unrestricted. Please note that both of these packages have the same exact functionality. The only difference is that when you execute an application that uses the evaluation version of the libraries, operation will automatically be stopped after a few hours. The unrestricted version does not have this time limitation. To acquire the unrestricted version, please contact Renesas to start the formal process of acquiring those releases.

Additional packages

File	Description
RTK0EF0045Z9006AZJ-v3.0.4.zip	BSP Manual Set for RZ/G2L, RZ/G2LC, RZ/G2UL, RZ/Five and RZ/V2L.
RTK0EF0112Z9000AZJ-v1.4.0.zip	BSP Manual Set for RZV2M.
RTK0EF0133Z9000AZJ-v1.2.0.zip	BSP Manual Set for RZV2MA.

Note) Detailed information regarding the configuration (Device tree) and usage of the device drivers contained in this VLP can be downloaded from Renesas.com. Please download the "BSP Manual Set".

For RZ/G2L and RZ/V2L

<https://www.renesas.com/document/oth/rzg2l-group-and-rzv2l-group-bsp-manual-set>

For RZ/V2M

<https://www.renesas.com/document/mah/rzv2m-linux-bsp-manual-set>

For RZ/V2MA

<https://www.renesas.com/document/oth/rzv2ma-linux-bsp-manual-set>

2. Components

The components which are commonly used in this release are listed in Table 2. Please also refer to the manifest file for details.

Please refer:

```
$WORK/build/tmp/deploy/images/smarc-rzv2l/core-image-<image-name>-smarc-rzv2l.manifest
```

Note: <image-name>

```
RZ/V2L      :minimal, bsp, weston, qt
RZ/V2M,MA  :minimal, bsp
```

Table 2. Versions of commonly used components

Components	VLP/V v3.0.2	VLP/V v3.0.4
Linux kernel	5.10.145-cip17	5.10.175-cip29
GCC	8.3.0 (Arm GCC 8.3-2019.03)	8.3.0 (Arm GCC 8.3-2019.03)
Glibc	2.28	2.28
Busybox	1.30.1	1.30.1
openssl	1.1.1n	1.1.1n
gstreamer1.0	1.16.3	1.16.3
wayland	1.18.0	1.18.0
weston	8.0.0	8.0.0
Python3	3.8.13	3.8.13
Qt (LGPL version)	5.6.3	5.6.3
Docker	19.03.8-ce	19.03.8-ce

3. Changes

This section describes the changes in this release from VLP/V v3.0.4, including new features and defect fixes.

3.1 RZ/V2L

- Upgrade the kernel to 5.10.175-cip29.
- Supports the Docker container.
- Supports the Watchdog Timer in U-boot

3.2 RZ/V2M

Table 3-1. Changes (RZ/V2M)

Item	Details of changes	
	Previous (V1.3.0-update1)	Current (VLP 3.0.4)
Package and this content	All required files in RZ/V2M Linux package.	Divided as follows: <ul style="list-style-type: none"> - RZ/V Verified Linux Package - RZ/V2M Bootloader Package^{*1} - RZ/V2M Software Manual^{*2} - RZ/V2M Device driver user's Manual^{*2} <p><i>*1: You must accept the software license agreement when downloading this from the Renesas website</i></p> <p><i>*2: Download this document separately from the Renesas website.</i></p>
Yocto(dunfell)	3.1.14 (dunfell)	3.1.21 (dunfell)
Linux kernel (cip kernel version)	5.10.83-cip1	5.10.175-cip29
Build procedure	The steps of building the RZ/V2M Linux package is as follows: [1] make a working directory and decompress the yocto recipe package. [2] Run the command: \$ source poky/oe-init-build-env [3] Run the command: \$ cp ../meta-renesas/docs/template/conf/rzv2m/*.conf ./conf/ [4] Run the command: \$ bitbake <core-image-target>	The build steps have changed since this release, and you can no longer run the previous build steps. See the "RZ/V Verified Linux Package Start-Up Guide for RZ/V2M" included in this package for the new build steps.
Memory map	The memory map from 0x1E000000 to 0x1FFFFFFF was defined as follow: <ul style="list-style-type: none"> • 0x1E000000 - 0x1FFBFFFFFF: Kernel area • 0x1FFC00000 - 0x1FFFFFFF: image_buf (udmabuf) 	The memory map from 0x1E000000 to 0x1FFFFFFF is defined as follow: <ul style="list-style-type: none"> • 0x1E000000 - 0x1FFBFFEFF: Kernel area • 0x1FFBFFF00 – 0x1FFFFFFEFF: image_buf (udmabuf) • 0x1FFFFFFF00 - 0x1FFFFFFF: Reserved (for PCIe)
Boot loader version	V1.30	VLP V3.0.4
U-Boot	V1.30	VLP V3.0.4
Device tree	Defined the reserved memory area in the file "r9a09g011gbg-evaluation-board.dts".	Defined the reserved memory area in the file "r9a09g011gbg_reserved-memory.dtsi".

Device driver	USB	Restriction: When booting the RZ/V2M Linux, the following message shows from the USB OTG function. But no influence on the system. "xhci-hcd : probe of 85060000.usb failed with error - 14"	No restriction.
	PCI Express	Bug: The msi resource was not released in PCIe reset processing.	Fixed the bug.
	UART	Provided the patch "0101-improved-uart-response-speed.patch" to improve the echo back response, and the user's need to apply it manually.	Supported. Already implemented as default.
	PFC	Bug: Some pins could not be correctly exported as GPIO with sysfs.	Fixed the bug.
	Timer	Bug: - Wrong setting for the offset address of Timer Interrupt Clear Register. - Incorrect timing of the interrupt may occur.	Fixed these bugs.
Flash writer		The flash writer binary is included in the package by default.	Supported to generate the flash writer binary with bitbake. Use it to write the bootloader and u-boot binaries. Note that the flash writer binary is not included in the package by default from this release onwards.

3.3 RZ/V2MA

Table 3-2. Changes (RZ/V2MA)

Item	Details of changes		
	Previous (V1.1.0-update1)	Current (VLP 3.0.4)	
Package and this content	All required files in RZ/V2MA Linux package.	Divided as follows: <ul style="list-style-type: none"> - RZ/V Verified Linux Package - RZ/V2MA Bootloader Package^{*1} - RZ/V2MA Software Manual^{*2} - RZ/V2MA Device driver user's Manual^{*2} <p><i>*1: You must accept the software license agreement when downloading this from the Renesas website</i></p> <p><i>*2: Download this document separately from the Renesas website.</i></p>	
Yocto(dunfell)	3.1.14 (dunfell)	3.1.21 (dunfell)	
Linux kernel (cip kernel version)	5.10.83-cip1	5.10.175-cip29	
Build procedure	The steps of building the RZ/V2MA Linux package is as follows: [1] make a working directory and decompress the yocto recipe package. [2] Run the command: \$ source poky/oe-init-build-env [3] Run the command: \$ cp ../meta-renesas/docs/template/conf/rzv2m/* .conf/.conf/ [4] Run the command: \$ bitbake <core-image-target>	The build steps have changed since this release, and you can no longer run the previous build steps. See the "RZ/V Verified Linux Package Start-Up Guide for RZ/V2MA" included in this package for the new build steps.	
Memory map	The memory map from 0x78000000 to 0x7FFFFFFF was defined as follow: <ul style="list-style-type: none"> • 0x78000000 - 0x7FFFFFFF: OpenCV 	The memory map from 0x78000000 to 0x7FFFFFFF was defined as follow: <ul style="list-style-type: none"> • 0x78000000 - 0x7FCFFFFFF: OpenCV • 0x7FD00000 - 0x7FFFFFFF: Codec 	
Boot loader version	V1.10	VLP V3.0.4	
U-Boot	V1.10	VLP V3.0.4	
Device tree	Defined the reserved memory area in the file "r9a09g055ma3gbg-evaluation-board.dts".	Defined the reserved memory area in the file "r9a09g055ma3gbg_reserved-memory.dtsi".	
Device driver	PCIe	Restrictions: Supported root complex mode only. Bug: The msi resource was not released in PCIe reset processing.	<ul style="list-style-type: none"> - No restrictions. Supported Root complex and Endpoint mode. - Fixed the bug.
	PFC	Bug: Some pins could not be correctly exported as GPIO with sysfs.	Fixed the bug.

	UART	Provided the patch "0101-improved-uart-response-speed.patch" to improve the echo back response, and the user's need to apply it manually.	Supported. Already implemented as default.
	Timer	Bug: Incorrect timing of the interrupt may occur.	Fixed the bug.
Flash writer		The flash writer binary is included in the package by default.	Supported to generate the flash writer binary with bitbake. Use it to write the bootloader and u-boot binaries. Note that the flash writer binary is not included in the package by default from this release onwards.

4. Restrictions

None.

5. Notes

5.1 Notes

(1) GPLv3 packages

In this release, the GPLv3 packages are disabled as default in *build/conf/local.conf*:

```
INCOMPATIBLE_LICENSE = "GPLv3 GPLv3+"
```

If you want to use GPLv3, just hide this line:

```
#INCOMPATIBLE_LICENSE = "GPLv3 GPLv3+"
```

(2) Disable libraries of GPU and video codec for RZ/V2L

When you want to disable the functions of the video codec, please add lines in *build/conf/local.conf*:

- Disable OpenGL ES library in the graphics package (*1)

```
USE_RENESAS_GLES = "0"
```

- Disable OpenCL library in the graphics package (*1)

```
USE_RENESAS_OPENCL = "0"
```

- Disable OpenMAX library for decode in the video codec package (*2)

```
USE_CODEC_DEC = "0"
```

- Disable OpenMAX library for encode in the video codec package (*2)

```
USE_CODEC_ENC = "0"
```

(*1) This library is included in RTK0EF0045Z13001ZJ-v1.*_EN.zip and RTK0EF0045Z13001ZJ-v1.*_JP.zip

(*2) This library is included in RTK0EF0045Z15001ZJ-v1.*_EN.zip and RTK0EF0045Z15001ZJ-v1.*_JP.zip

(3) Docker for RZ/V2L

Docker is disabled in the default settings of VLP/V. To enable Docker, please uncomment the below line inside the file *~/rzv_vlp_v3.0.4/build/conf/local.conf* before building images.

```
#MACHINE_FEATURES_append = "docker"
```

(4) USB Video Class

USB Video Class (UVC) driver is not installed with the default settings of VLP/V due to its big size.

In case UVC devices such as USB cameras are necessary, please install the driver by adding the line below to *local.conf*.

```
IMAGE_INSTALL_append = "kernel-module-uvccvideo"
```

(5) CIP Core Packages

VLP/V includes Debian 10 (Buster) and Debian 11 (Bullseye) based CIP Core Packages and Buster is enabled by the default settings. These packages can be replaced with other versions of packages.

Note that network access is required to start the build process when you enable these packages except for Buster (or Bullseye) which is set as the default setting.

CIP Core Packages are going to be maintained by the Civil Infrastructure Platform project. For more technical information, please contact Renesas.

1. Buster (default):

The following lines are added as default in the `local.conf`:

```
# Select CIP Core packages by switching between Buster and Bullseye.
# - Buster (default)      : build all supported Debian 10 Buster recipes
# - Bullseye              : build all supported Debian 11 Bullseye recipes
# - Not set (or different with above): not use CIP Core, use default packages
version in Yocto

CIP_MODE = "Buster"
```

2. Bullseye:

Please change "CIP_MODE" in the `local.conf` to change from Buster to Bullseye:

```
# Select CIP Core packages by switching between Buster and Bullseye.
# - Buster (default)      : build all supported Debian 10 Buster recipes
# - Bullseye              : build all supported Debian 11 Bullseye recipes
# - Not set (or different with above): not use CIP Core, use default packages
version in Yocto

CIP_MODE = "Bullseye"
```

3. No CIP Core Packages:

If the CIP Core Packages are unnecessary, comment out and add the following lines to disable CIP Core Packages in the `local.conf`:

```
# Select CIP Core packages by switching between Buster and Bullseye.
# - Buster (default)      : build all supported Debian 10 Buster recipes
# - Bullseye              : build all supported Debian 11 Bullseye recipes
# - Not set (or different with above): not use CIP Core, use default packages
version in Yocto

#CIP_MODE = "Buster"
```

Note) The above 4 settings disable GPLv3 packages as default. In case the GPLv3 packages are required, please comment out the following line in the `local.conf`.

```
# INCOMPATIBLE_LICENSE = "GPLv3 GPLv3+"
```

By building the VLP/V, the packages will be replaced as below in the table.

Table 3. Table 3. Versions of all Buster and Bullseye Debian packages

Package	Buster Debian	Bullseye Debian
Attr	2.4.48	2.4.48
Busybox	1.30.1	1.30.1
Coreutils	6.9	-
Gcc	8.3.0	-
glib-2.0	2.58.3	-
Glibc	2.28	2.31
Gnupg	1.4.7	-
Kbd	2.0.4	-
libassuan0	2.5.2	2.5.3
Libgcrypt	1.8.4	-
Libunistring	0.9.10	0.9.10
Libnss	0.14.1	-
Openssh	7.9p1	-
Perl	5.30.1	-
Pkgconfig	0.29	-
Quilt	0.65	-

Note)

(-) These packages are not supported with Bullseye Debian version. So they used No CIP CORE version.

5.2 Memory Map

5.2.1 RZ/V2L

RZ/V2L SMARC board memory map is shown in Figure 1.

Physical Address 0x00_4000_0000	Reserved Area (Size: 128MB)
0x00_47FF_FFFF 0x00_4800_0000	Kernel Area (Size: 256MB)
0x00_57FF_FFFF 0x00_5800_0000	Linux CMA (Size: 256MB)
0x00_67FF_FFFF 0x00_6800_0000	Reserved Area (Size: 128MB)
0x00_6FFF_FFFF 0x00_7000_0000	Kernel Area (Size: 256MB)
0x00_7FFF_FFFF 0x00_8000_0000	DRP-AI (*) (Size: 512MB)
0x00_9FFF_FFFF 0x00_A000_0000	Kernel Area (Size: 256MB)
0x00_AFFF_FFFF 0x00_B000_0000	udmabuf (Size: 64MB)
0x00_B3FF_FFFF 0x00_B400_0000	Simple ISP (Size: 48MB)
0x00_B6FF_FFFF 0x00_B700_0000	Kernel Area (Size: 144MB)
0x00_C000_0000	

Table 4. *: The area to store DRP-AI Object files. This area must be set to an address of 8bytes or less.

Figure 1. Memory map

5.2.2 RZ/V2M

Note that the memory map for RZ/V2M Linux is set and fixed by U-Boot. Linux should use the area from 0x1_8000_0000h to 0x1F_FFFF_FFFF.

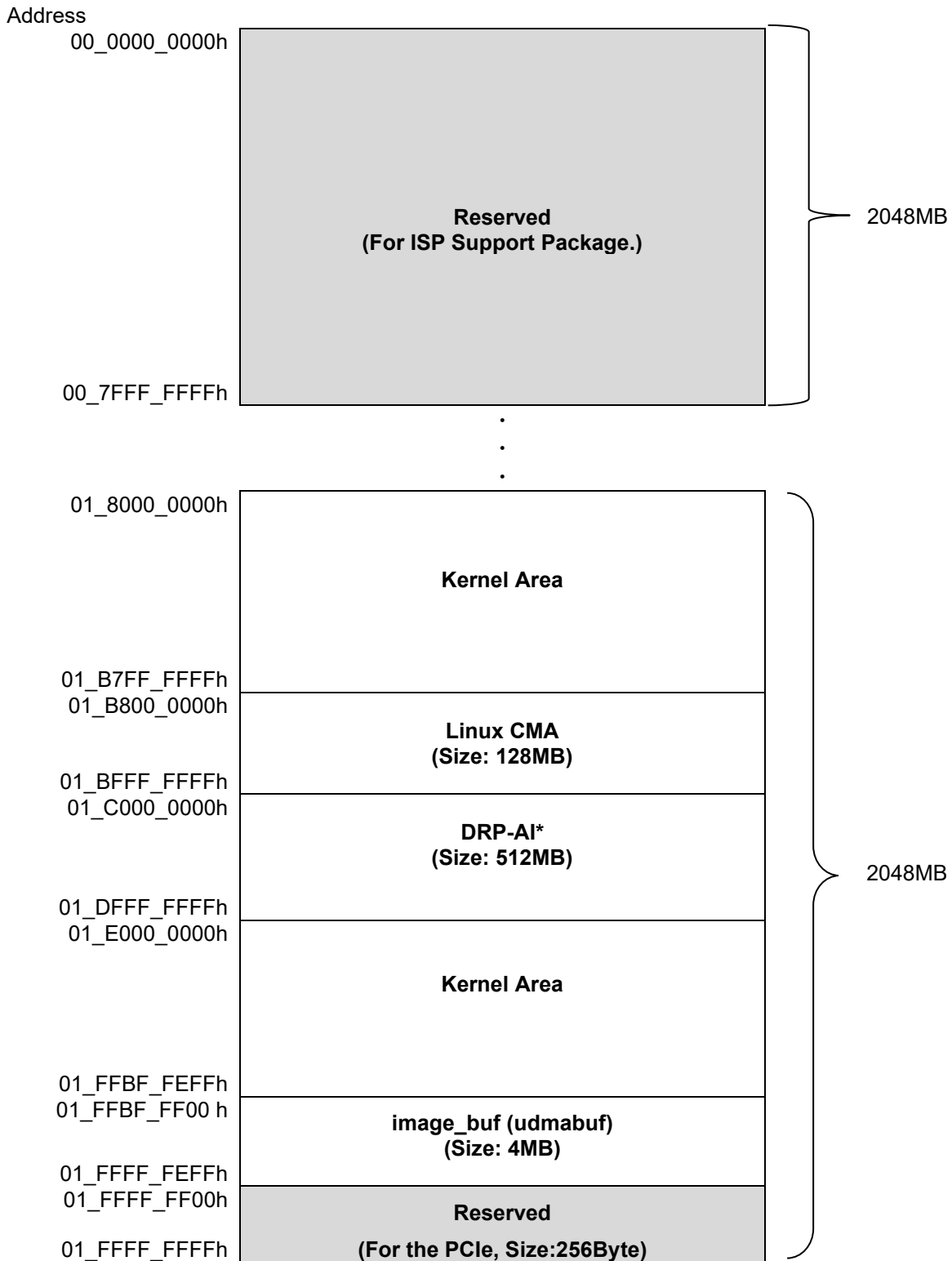


Figure 5-1. Memory map

Note

If you use the data (e.g. images) created by RZ/V2M ISP Support Package on a specific IP (*1), you need to copy the data to the Linux area by CPU. If you use DRP-AI, you should copy the data to the appropriate memory area yourself. See the RZ/V2M DRP-AI Sample Application Note for this process. The copy process with IPs other than DRP-AI is performed automatically, so there is no need to do it. Refer to RZ/V2M User Guide: Hardware for details.

*1: DRP-AI, SD, eMMC, Ethernet, USB, PCI Express

5.2.3 RZ/V2MA

The following figure shows the DDR memory map in the RZ/V2MA.

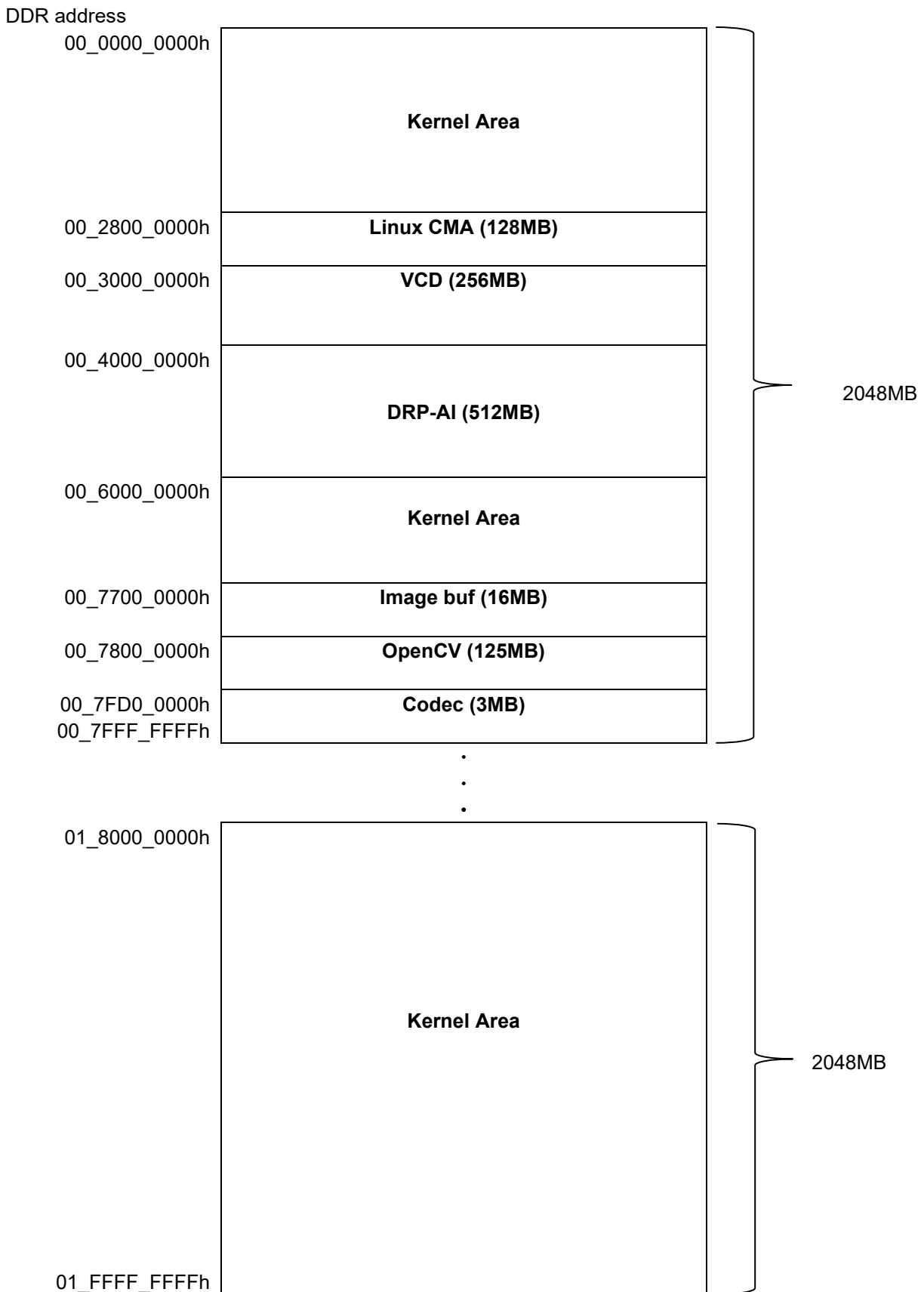


Figure 5-2. Memory map

6. Appendix

None.

7. Revision History

Rev.	Date	Description	
		Page	Summary
1.00	Jun. 30, 2022	-	First edition issued.
1.01	Jul. 6, 2022	3	Modify Optional packages to describe the information for the latest libraries of the Graphics and the Video Codec.
		6	Modify the step 3.1(2) according to the latest libraries of the Graphics and the Video Codec.
1.02	Aug. 9, 2022	15	Add the update2 information to appendix.
1.03	Dec. 27, 2022	-	Update v3.0.2 released.
		13, 14	Add Bullseye Debian 11 information
1.04	Jul. 31, 2023	-	Move to “Linux Start-up Guide” that Build Instruction section.
		-	Add “Changes” section.

Website and Support

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