

# RZ/Five Verified Linux Package

## Version 3.0.7-update4

R01US0608EJ0113  
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### Release Note

#### Introduction

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

Please refer to “r01us0618ej0106-rz-five(Linux Start-up Guide RZFive).pdf” that describes the instruction to build VLP/F and boot the evaluation board.

#### Contents

##### Contents

<b>1. Release Items .....</b>	<b>2</b>
<b>2. Components .....</b>	<b>4</b>
<b>3. Changes .....</b>	<b>5</b>
<b>4. Restrictions .....</b>	<b>6</b>
<b>5. Notes .....</b>	<b>7</b>
<b>5.1 Notes .....</b>	<b>7</b>
<b>5.2 Memory Map .....</b>	<b>10</b>
<b>5.2.1 RZ/Five .....</b>	<b>10</b>
<b>6. Revision History .....</b>	<b>11</b>
<b>Website and Support .....</b>	<b>12</b>

## 1. Release Items

- **Name and version**

RZ/Five Verified Linux Package

Version 3.0.7-update4 (hereinafter referred to as “VLP/F v3.0.7-update4”)

- **Distribution method**

Please visit the site below and create an account to download the packages. Basic packages of VLP/F v3.0.7-update4 which are listed in the Table 1 can be downloaded.

RZ/Five product page:

<https://www.renesas.com/us/en/products/microcontrollers-microprocessors/rz-mpus/rzfive-risc-v-general-purpose-microprocessors-risc-v-cpu-core-andes-ax45mp-single-10-ghz-2ch-gigabit-ethernet>

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

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

- **Target board**

RZ/Five reference board

- RZ/Five Evaluation board Kit (smarc-rzfive) (\*)
  - RZ/Five SMARC Module Board (P/N: RTK9743F01C01000BE)
  - RZ SMARC Series Carrier Board (P/N: RTK97X4XXXB00000BE)

(\*) “RZ/Five Evaluation board Kit” includes the RZ/Five SMARC Module Board and the RZ SMARC Series Carrier Board.

The “Evaluation board Kit for RZ/Five MPU” will be called “RZ/Five Evaluation Kit” in the next section.

- **Build Environment**

Linux Host PC

OS: Ubuntu 22.04 LTS (64-bit OS must be used.)

22.04 inside a docker container also OK.

100GB free space on HDD or SSD is necessary. (\*)

(\*) The necessary free space

Note) Please note that the build of VLP failed when Ubuntu 24.04 is used.

- **Functions**

Linux VLP

- Linux Kernel
- Linux Drivers

- **File contents**

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

**Table 1. RZ/Five Verified Linux Package****Basic packages**

File	Description
RTK0EF0045Z0025AZJ-v3.0.7-update4 (*1)	RZ/Five Verified Linux Package. This file includes the Yocto recipe packages and the necessary documents.
rzfive_vlp_v3.0.7.tar.gz (*1)	Yocto recipe packages
r01us0608ej0113-rz-five(Release Note).pdf	This document
r01us0618ej0106-rz-five(Linux Start-up Guide RZFive).pdf	Documents describing building instruction, booting methods and the required settings of bootloader for RZ/Five.
vlp_five_v3.0.7-update4_patches.zip	Patch files to update some bugs. See the "5. Notes" section. This file is optional.
oss_pkg_rzfive_v3.0.7.7z (*1)	Open source software packages. <b>See the Note below before download.</b>

(\*1) These 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. These are the same versions of OSSs used when VLP/F was verified.

If you are just evaluating VLP/F and RZ/Five 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/F 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.

**Additional packages**

File	Description
RTK0EF0045Z9006AZJ-v4.0.1.zip	BSP Manual Set for RZ/G2L, RZ/G2LC, RZ/G2UL, RZ/Five and RZ/V2L.

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".

Download URL: <https://www.renesas.com/en/document/mas/bsp-manual-set-rzg2l-rzfive-rzv2l-and-rzv2n-group-rtk0ef0045z9006azj-v401zip?r=11114011>

## 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 to:

`$WORK/build/tmp/deploy/images/smarc-rzf5/core-image-<image-name>-smarc-rzf5.manifest`

Note) [<image-name>](#) is minimal or bsp.

**Table 2. commonly used components**

Components	VLP/F v3.0.6-update3	VLP/F v3.0.7	VLP/F v3.0.7-update[2,3,4]
Linux kernel	5.10.201-cip41	5.10.229-cip54	5.10.229-cip54
GCC	8.3.0 (RISC-V GCC 8.3-2019.03)	8.3.0 (RISC-V GCC 8.3-2019.03)	8.3.0 (RISC-V GCC 8.3-2019.03)
glibc	2.28	2.28(-10+deb10u4)	2.28(-10+deb10u5) <sup>(*1)</sup>
busybox	1.30.1	1.30.1(-4)	1.30.1(-4+deb10u1) <sup>(*2)</sup>
openssl	1.1.1n	1.1.1n(-0+deb10u6)	1.1.1n(-0+deb10u7) <sup>(*2)</sup> 1.1.1n(-0+deb10u8) <sup>(*3)</sup>
python3	3.8.18	3.8.18	3.8.18
docker	20.10.17+ce	20.10.17+ce	20.10.17+ce

(\*1) Addressed security vulnerability CVE-2025-4802.

(\*2) VLP/F v3.0.7-update3.

(\*3) VLP/F v3.0.7-update4.

### 3. Changes

The following table lists the changes from the previous version.

**Table 3. Changes**

#### Changes of VLP/Fv3.0.6-update3, VLP/Fv3.0.7

Features	Description
Yocto recipes	- poky: update to dunfell v23.0.33 (previous version is v23.0.31). - meta-renesas/meta-rzfive: U-boot is updated to v2023.10, and opensbi is updated to version 1.5.
Kernel	Update the kernel version to v5.10.229-cip54 and v5.10.229-cip54-rt23.
SPI Multi Driver	Implement workaround to avoid burst read cache.
RIIC Driver	Implement slave mode support and bus recovery.
SSI Driver	Terminate DMA descriptor if stream is not running. Implement a workaround for full-duplex TX/RX alignment and add S2R implementation.
OpenSBI	Update OpenSBI to version v1.5. All the patches for I/O Coherence Port support are in this version.
u-boot	Update U-Boot to version 2023.10 for OpenSBI v1.5 compatibility and to support booting kernel v5.10.229-cip54.

#### Changes of VLP/Fv3.0.7, VLP/Fv3.0.7-update2

Features	Description
Kernel	This release includes several minor kernel fixes, as listed in 5.1 Notes "To update linux-renesas".
CVE-2024-53104	Fix out-of-bounds write by skipping UVC_VS_UNDEFINED frame parsing in uvc_parse_format (media: uvcvideo).
CVE-2025-4802	This release includes the patch for the glibc vulnerability.
glib-2.0	Updated to glib2.0_2.58.3-2+deb10u8.

#### Changes of VLP/Fv3.0.7-update2, VLP/Fv3.0.7-update3

Features	Description
attr, binutils, busybox, coreutils, gcc-8, gnupg2, gzip, kbd, libassuan, libgcrypt20, libunistring, nss, perl, pkg-config, pseudo, quilt	Switch to the ELTS mirror to prevent removal from the Debian Buster mirror: attr, coreutils, gcc-8, gnupg2, gzip, kbd, libassuan, libgcrypt20, libunistring, nss, perl, pkg-config, pseudo, quilt
attr, binutils, busybox, coreutils, gcc-8, gnupg2, gzip, kbd, libassuan, libgcrypt20, libunistring, nss, openssh, openssl, perl, pkg-config, pseudo, quilt	- Upgraded packages: binutils 2.31.1-16 -> 2.31.1-16+deb10u1 busybox 1.30.1-4 -> 1.30.1-4+deb10u1 openssh 7.9p1-10+deb10u2 -> 7.9p1-10+deb10u5 openssl 1.1.1n-0+deb10u6 -> 1.1.1n-0+deb10u7
SSI Driver	Fix random recording failures in full-duplex communication mode.

#### Changes of VLP/Fv3.0.7-update3, VLP/Fv3.0.7-update4

Features	Description
openssl, glib-2.0	- Upgraded packages: openssl 1.1.1n-0+deb10u7 -> 1.1.1n-0+deb10u8 glib-2.0 2.58.3-2+deb10u8 -> 2.58.3-2+deb10u9

#### 4. Restrictions

None.

## 5. Notes

### 5.1 Notes

Check the following patches, select, and apply to your build environment if needed. After that, build in the “**online**” environment. This step is required before executing the bitbake command. Refer to the section below in the “Linux Start-up Guide” for more information.

```
$ cd ~/rzfive_vlp_${PACKAGE_VERSION}          #(e.g., PACKAGE_VERSION=v3.0.7)
$ unzip RTK0EF0045Z0025AZJ-v3.0.7-update4.zip \
"RTK0EF0045Z0025AZJ-v3.0.7-update4/vlp_five_v3.0.7-update4_patches.zip"
$ unzip RTK0EF0045Z0025AZJ-v3.0.7-update4/vlp_five_v3.0.7-update4_patches.zip \
-d extra
```

The following files and directories will be extracted into the `~/rzfive_vlp_${PACKAGE_VERSION}/extra` folder:

```
|—— 0001-meta-rz-common-recipes-core-debian-glibc-fix-CVE-2025-4802.patch
|—— 0002-meta-rz-common-glib2.0-update-to-2.58.3-2-deb10u8.patch
|—— 0003-rz-common-recipes-debian-buster-switch-some-packages.patch
|—— 0004-rz-common-recipes-debian-buster-glib-2.0-openssl-upd.patch
|—— linux-renesas
|—— 0002-driver-i2c-busses-i2c-riic-Improve-I2C-slave-mode.patch
|—— 0003-media-uvccvideo-Skip-parsing-frames-of-type-UVC_VS_UN.patch
|—— 0004-mmc-host-renesas_sdhi_core-Fix-delayed-eMMC-boot.patch
|—— 0006-driver-i2c-busses-i2c-riic-Fix-issue-wrong-bit-in-at.patch
|—— 0008-pinctrl-renesas-rzg2l-Add-output-enable-for-remained.patch
|—— 0019-counter-rz-mtu3-cnt-Fix-warning-when-CONFIG_PM_SLEEP.patch
|—— 0023-driver-i2c-busses-i2c-riic-Fix-issue-can-t-set-value.patch
|—— 0025-Revert-sound-rz-ssi-workaround-to-set-TX-and-RX-at-t.patch
|—— 0026-sound-soc-rz-ssi-Avoid-enabling-TEN-and-REN-bits-bef.patch
|—— 0027-sound-soc-rz-ssi-Remove-checking-valid-of-sample_wid.patch
```

Note) This update includes minor fixes. It is strongly recommended to apply all patches in the specified order to avoid conflicts, unintended errors, and to achieve the best possible results.

**(1) Versions of U-Boot and OpenSBI**

Please note that the U-Boot and OpenSBI versions have been updated in this release.

Kernel 5.10.229-cip54 is incompatible with older bootloaders (U-Boot + OpenSBI). Attempting to boot with previous VLP versions (VLP/Fv3.0.6-update3) is not supported and will result in failure.

**(2) To patch CVE-2025-4802 vulnerability**

This patch addresses CVE-2025-4802, a vulnerability in glibc (v2.27–2.38) related to untrusted LD\_LIBRARY\_PATH usage in statically compiled *setuid* binaries that invoke *dlopen*.

→ Full details: <https://nvd.nist.gov/vuln/detail/CVE-2025-4802>

The patch applies to both recipes-core and recipes-debian:

For recipes-debian:

- buster: 2.28-10+deb10u5
- bullseye: 2.31-13+deb11u13

For recipes-core, the upstream patches have been backported to support Poky.

```
$ cd ~/rzfive_vlp_${PACKAGE_VERSION}/meta-renesas
$ patch -p1 < ../extra/0001-meta-rz-common-recipes-core-debian-glibc-fix-CVE-2025\
-4802.patch
```

**(3) To update Open-source software (OSS) packages**

It has been observed that Debian Mirror for Buster has recently started deprecating these packages on their mirror. As a result, this update switches to the ELTS mirror provided by <https://www.freexian.com/> to ensure the packages are successfully fetched when building the online environment. Without the Open-Source Software packages (oss\_pkg\_rzfive\_v3.0.7.7z), the build process will fail. To build successfully without them, apply the following patches.

```
$ cd ~/rzfive_vlp_${PACKAGE_VERSION}/meta-renesas
$ patch -p1 < ../extra/0002-meta-rz-common-glib2.0-update-to-2.58.3-2-deb10u8.patch
$ patch -p1 < ../extra/0003-rz-common-recipes-debian-buster-switch-some\
-packages.patch
$ patch -p1 < ../extra/0004-rz-common-recipes-debian-buster-glib-2.0-openssl\
-upd.patch
```

Note) The patch 0001-meta-rz-common-recipes-core-debian-glibc-fix-CVE-2025-4802.patch must be applied before performing this step to avoid build errors.

**(4) To update linux-renesas**

This vlp\_five\_v3.0.7-update4\_patches.zip package includes some patches to improve *linux-renesas*

Patch Name	Driver	Description
0002-driver-i2c-busses-i2c-riic-Improve-I2C-slave-mode.patch	I2C	Driver improvement.
0003-media-uvcvideo-Skip-parsing-frames-of-type-UVC_VS_UN.patch	USB	Fix CVE-2024-53104.
0004-mmc-host-renesas_sdhi_core-Fix-delayed-eMMC-boot.patch	SDHI	Driver improvement.
0006-driver-i2c-busses-i2c-riic-Fix-issue-wrong-bit-in-at.patch	I2C	Driver improvement.

0008-pinctrl-renesas-rzg2l-Add-output-enable-for-remained.patch	Pinctrl	Driver improvement.
0019-counter-rz-mtu3-cnt-Fix-warning-when-CONFIG_PM_SLEEP.patch	MTU3	Driver improvement.
0023-driver-i2c-busses-i2c-riic-Fix-issue-can-t-set-value.patch	I2C	Driver improvement.
0025-Revert-sound-rz-ssi-workaround-to-set-TX-and-RX-at-t.patch	SSI	Fixed full-duplex mode (1).
0026-sound-soc-rz-ssi-Avoid-enabling-TEN-and-REN-bits-bef.patch	SSI	Fixed full-duplex mode (2).
0027-sound-soc-rz-ssi-Remove-checking-valid-of-sample_wid.patch	SSI	Fixed full-duplex mode (3).

Note) Apply all relevant module patches in order, from the first to the selected patch, to avoid conflicts.

To apply these patches, follow the instructions below.

```
$ TEMPLATECONF=$PWD/meta-renesas/meta-rzfive/docs/template/conf/ source \
poky/oe-init-build-env build
$ MACHINE=smarc-rzfive bitbake linux-renesas -c devshell

# Apply {patch_name} at tmp/work-shared/smarc-rzfive/kernel-source
$ git am ~/rzfive_vlp_${PACKAGE_VERSION}/extra/linux-renesas/{patch_name}
$ exit
$ MACHINE=smarc-rzfive bitbake linux-renesas -C compile
```

## 5.2 Memory Map

### 5.2.1 RZ/Five

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

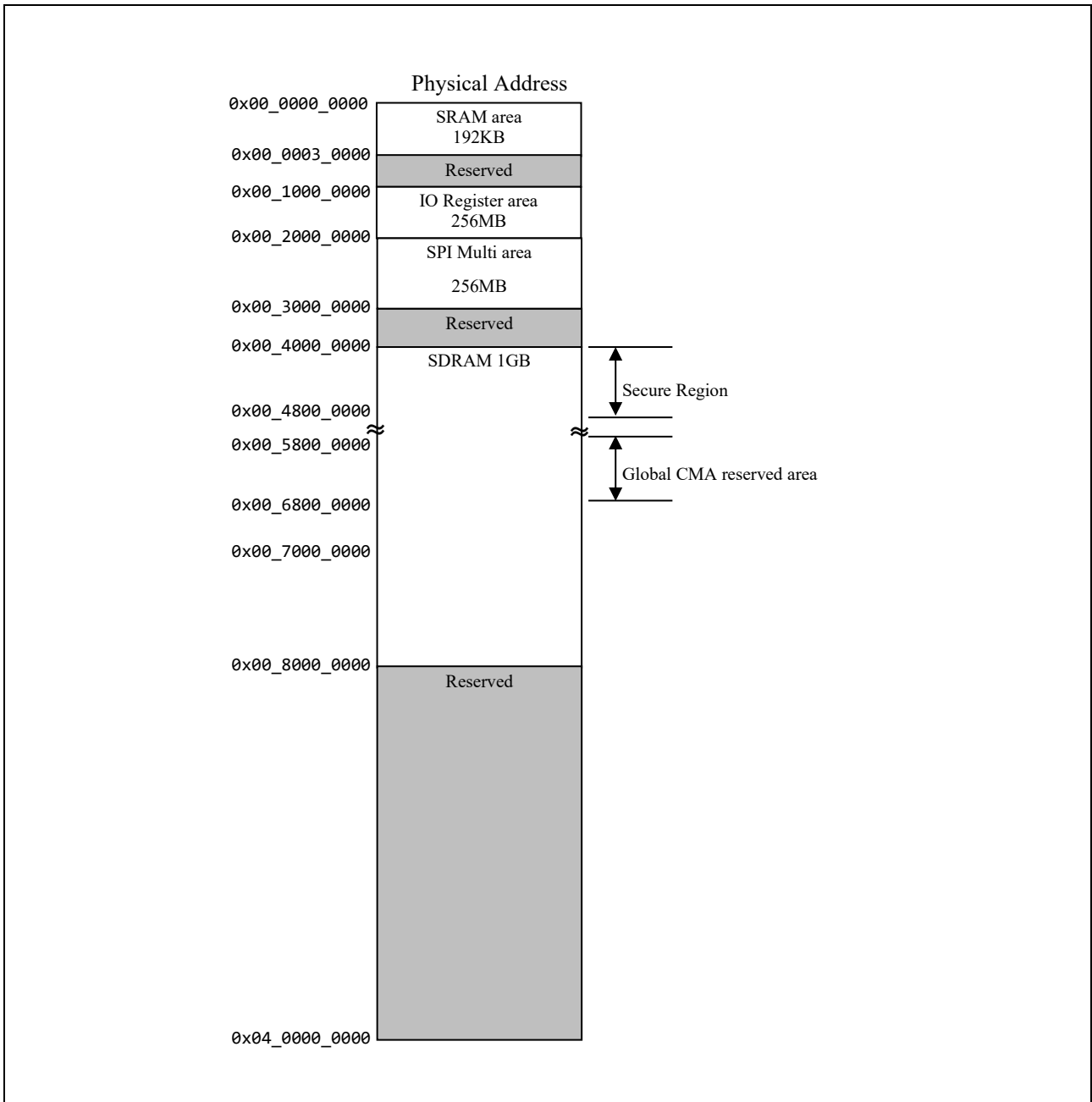


Figure 1. RZ/Five Evaluation Board Kit version memory map (Boot)

## 6. Revision History

Rev.	Date	Description	
		Page	Summary
1.00	Dec. 27, 2022	-	First edition for VLP/F v3.0.2
1.01	Feb. 10, 2023	13	Add the appendix section for VLP/F v3.0.2-update1.
1.02	Jun. 30, 2023	-	Move to “Linux Start-up Guide” that Build Instruction section.
		5	Add “Changes” section.
1.03	Oct. 31, 2023	-	First edition for VLP/F v3.0.5.
1.04	Nov. 15, 2023	-	Add the patch file of update1.
1.05	Jan. 29, 2024	-	Add the patch file of update3.
1.06	Apr. 24, 2024	-	First edition for VLP/F v3.0.6.
		6	Workaround when executing Docker command.
1.07	May 31, 2024	-	VLP/F v3.0.6-update1
1.08	Jun. 14, 2024	-	VLP/F v3.0.6-update2
1.09	Jul. 31, 2024	-	VLP/F v3.0.6-update3
1.10	Mar. 31, 2025	-	VLP/F v3.0.7
1.11	Jul. 31, 2025	-	VLP/F v3.0.7-update2
		10	Add Memory Map for RZ/Five.
1.12	Aug. 22, 2025	-	VLP/F v3.0.7-update3
1.13	Jan. 30, 2026	-	VLP/F v3.0.7-update4

## Website and Support

Renesas Electronics Website

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

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