RZ/Five Verified Linux Package
Version 3.0.6-update3

R01US0608EJ0109
Rev. 1.09
Jul. 31, 2024

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 ”r01us0618ej0104-rz-five(Linux Start-up Guide RZFive).pdf” that describes the instruction to build VLP/F and boot the evaluation board.

Contents

1. Release Items

- **Name and version**
  RZ/Five Verified Linux Package
  Version 3.0.6-update3 (hereinafter referred to as “VLP/F v3.0.6-update3”)

- **Distribution method**
  Please visit the site below and create an account to download the packages. Basic packages of VLP/F v3.0.6-update3 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 20.0.4 LTS (64 bit OS must be used.)
  20.04 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 is failed when Ubuntu 22.04 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-v3.0.6-update3.zip (*1)	RZ/Five Verified Linux Package. This file includes the Yocto recipe packages and the necessary documents.
rzfive_vlp_v3.0.6.tar.gz (*1)	Yocto recipe packages
vlpf306-to-vlpf306update3.patch	Patch file to update VLP/Fv3.0.6 to VLP/Fv3.0.6-update3. See the “5. Note” section. This file is optional.
r01us0608ej0108-rz-five(Release Note).pdf	This document
r01us0618ej0103-rz-five(Linux Start-up Guide RZFive).pdf	Documents describing building instruction, booting method and the required settings of bootloader for RZ/Five.
oss_pkg_rzfive_v3.0.6.7z (*1)	Open source software packages See the Note below before download

(*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-v3.0.6.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/document/oth/rzg2l-group-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 to:

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

Note: `<image-name>` is minimal or bsp.

Table 2. commonly used components

Components	VLP/F v3.0.6 For RZ/Five	VLP/F v3.0.6-update1 For RZ/Five	VLP/F v3.0.6-update2 For RZ/Five	VLP/F v3.0.6-update3 For RZ/Five
Linux kernel	5.10.201-cip41	5.10.201-cip41	5.10.201-cip41	5.10.201-cip41
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)	8.3.0 (RISC-V GCC 8.3-2019.03)
glibc	2.28	2.28	2.28	2.28
busybox	1.30.1	1.30.1	1.30.1	1.30.1
openssl	1.1.1n	1.1.1n	1.1.1n	1.1.1n
python3	3.8.18	3.8.18	3.8.18	3.8.18
docker	20.10.17+ce	20.10.17+ce	20.10.17+ce	20.10.17+ce

3. Changes

The following table lists the changes from the previous version.

Table 3. Changes

Changes of VLP/Fv3.0.5, VLP/Fv3.0.6

Features	Description
Package	No update
Yocto reciepes	- Poky: update to dunfell v23.0.31 (previous version is v23.0.26). - meta-openembedded: update to the latest commit. - Merge RZ/G3S recipes to “meta-renesas/meta-rzg3s”. - Correct the typo in the name of the WIC image file for eSD boot. Apply bug fix for kernel-module-mmngr: fix user memory access error when flushing cache.
Yocto recipes Optee	Remove all source code related Optee from meta-renesas and prepare the Optee recipes (optee-os, optee-client, optee-test) as meta-rz-features/meta-rz-security. If you need Optee and the detail information, check the renesas web site to download the security package including it.
Kernel	Update the kernel version to v5.10.201-cip41 and v5.10.201-cip41-rt17.
MTU3 Driver	Add the bellow features: - PWM mode 1 - PWM complementary mode - Counting function - Clock source support (Add timer usage)
USB Function Driver	Fix the drive to use 10 pipes for USBF of RZ/G2L Series, RZ/V2L, RZ/Five and RZ/G3S.
Ethernet Driver	Add TX/RX checksum offload support to improve Ethernet performance. TOE (TCP Offload Engine) provides hardware support for calculating IP header and TCP/UDP/ICMP checksums for both IPv4 and IPv6.
SCIF Driver	Use modulation extended mode for baud-rate higher than 115200 to make the clock more precise.
GPIO	Add set_config function for gpio controller to set pin configuration setting such as pull up and pull down.

Changes from VLP/Fv3.0.6 to VLP/F v3.0.6-update2

Features	Description
glibc	Update glibc from v2.28-10+deb10u2 to v2.28-10+deb10u3 because v2.28-10+deb10u2 was removed from the network by the developer. The build fails without this fix.
Audio	The current audio master clock (MCLK) utilizes a fixed frequency of 11.2896 MHz, which is a multiple of the commonly used 44.1 kHz sampling rate. Replace the current fixed clock with the programmable Versa3 clock. This will enable support for both 44.1 kHz sampling rate (using an 11.2896 MHz clock) and 48 kHz sampling rate (using a 12.2880 MHz clock), based on the audio sampling rate required for playback and recording.

Changes from VLP/Fv3.0.6-update2 to VLP/F v3.0.6-update3

Features	Description
glibc	Update glibc from v2.28-10+deb10u3 to v2.28-10+deb10u4 because v2.28-10+deb10u3 was removed from the network by the developer. The build fails without this fix.
Ethernet	We've implemented some fixes to improve Ethernet performance.
OpenSBI	Update OpenSBI to the latest commit. We identified a kernel freeze issue that occurred when running sustained load tests with iperf. We've updated OpenSBI to address this problem.

4. Restrictions

None

5. Note

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.

2.1 Building images to run on the board:

- **"Decompress OSS files to "build" directory (Optional)"**
- **"Start a build"**

First, apply the patch to create the patches for VLP/F v3.0.6-update3 in the "~/rzfive_vlp_<package version>/extra" directory as follows.

```
$ cd ~/rzfive_vlp_<package version>
$ patch -p1 < ./RTK0EF0045Z0025AZJ-v3.0.6-update3/vlpf306-to-vlpf306update3.patch
```

Once the patches are generated in the "extra" directory, select and apply them to your build environment. The following steps outline how to apply the patches.

(1) For updating glibc to v2.28-10+deb10u4

This patch updates glibc from v2.28-10+deb10u2 to v2.28-10+deb10u4 because v2.28-10+deb10u2 was removed from the network by the developer. The build fails without this fix.

```
$ cd ~/rzfive_vlp_<package version>/meta-renesas
$ patch -p1 < ../extra/0001-rz-common-recipes-debian-buster-glibc-update-to-v2.2.\
patch
```

(2) For 48Khz rate audio sound

This patch replaces the current fixed clock. The current audio master clock (MCLK) utilizes a fixed frequency of 11.2896 MHz, which is a multiple of the commonly used 44.1 kHz sampling rate.

This step will replace the current fixed clock with the programmable Versa3 clock. This will enable support for both 44.1 kHz sampling rate (using an 11.2896 MHz clock) and 48 kHz sampling rate (using a 12.2880 MHz clock), based on the audio sampling rate required for playback and recording.

```
$ cd ~/rzfive_vlp_<package version>/meta-renesas
$ patch -p1 < ../extra/0001-rz-common-linux-update-linux-kernel-to-the-latest-re.\
patch
```

(3) For improving Ethernet

We've implemented some fixes to improve Ethernet performance.

```
$ cd ~/rzfive_vlp_<package version>/meta-renesas
$ patch -p1 < ../extra/0001-Add-patches-to-improve-Ethernet-performance.patch
```

(4) For updating OpenSBI

This is to update OpenSBI to the latest commit. We identified a kernel freeze issue that occurred when running sustained load tests with iperf. We've updated OpenSBI to address this problem.

```
$ cd ~/rzfive_vlp_<package version>/meta-renesas
$ patch -p1 < ../extra/0001-rzfive-opensbi-update-to-the-latest-commit-revision.pa\
tch
```

Note) If you build in the “online” environment, all source codes will be downloaded from the repositories of each OSS via the internet when running bitbake command.

6. Revision History

		Description	
Rev.	**Date**	**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

Website and Support

Renesas Electronics Website
http://www.renesas.com/

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