

RZ MPU HTML5 (Gecko102.15) Package V2.1.1 for Verified Linux Package V3.0.6

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Gecko Start-up Guide

Introduction

This release note describes the contents, building procedures for HTML5 (Gecko102.15) and important points of the RZ MPU HTML5 (Gecko102.15) Package V2.1.1 for Verified Linux Package (hereinafter referred to as “VLP/G”).

If you need information to build Linux BSPs without a GUI Framework of HTML5, please refer to “RZ/G Verified Linux Package Version 3.0.6 Release Note” (r01us0553ej0112-rz-gRelease Note).pdf).

Contents

1. Release Items	2
2. Build Instructions	5
2.1 Build VLP without HTML5	5
2.2 Building images enabling HTML5.....	6
2.3 Browser application	9
2.3.1 Launch the browser application on the evaluation board	9
2.3.2 Tips of the browser application	10
3. Restriction	11
4. Note	11
5. Revision History	11

1. Release Items

- **Name and version**

RZ MPU HTML5 (Gecko102.15) Package V2.1.1 for RZ/G Verified Linux Package Version 3.0.6 (hereinafter referred to as “HTML5 (Gecko102.15) Package v2.1.1” and “VLP/G v3.0.6”)

- **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/G series. Basic packages of VLP/G v3.0.6 which are listed in Table1 can be downloaded.

RZ Family:

<https://www.renesas.com/products/microcontrollers-microprocessors/rz-arm-based-high-end-32-64-bit-mpus>

You can also download the basic packages of VLP/G v3.0.6 which are listed in Table1 from the site below.

RZ/G Marketplace:

<https://www.renesas.com/products/microcontrollers-microprocessors/rz-cortex-a-mpus/rzg-linux-platform>

- **Target board for HTML5 (Gecko102.15)**

Hoperun Technology HiHope RZ/G2H platform (hihope-rzg2h) Rev 4.0

Hoperun Technology HiHope RZ/G2M platform (hihope-rzg2m) Rev 4.0 (*1)

Hoperun Technology HiHope RZ/G2N platform (hihope-rzg2n) Rev 4.0

Silicon Linux RZ/G2E evaluation kit (ek874) Rev E

RZ/G2L Evaluation Board Kit PMIC version (*2):

- RZ/G2L SMARC Module Board v2.1
- RZ SMARC Series Carrier Board v4.0

RZ/G2LC Evaluation Board Kit (*3):

- RZ/G2LC SMARC Module Board v1.0
- RZ SMARC Series Carrier Board v4.0

(*1) There are 2 versions of RZ/G2M LSI devices. There are version 3.0 and 1.3 (hereinafter referred to as “RZ/G2M v3.0” and “RZ/G2M v1.3”).

(*2) “RZ/G2L Evaluation Board Kit” and “RZG2L Evaluation Board Kit PMIC version” includes the RZ/G2L SMARC Module Board and the RZ SMARC Series Carrier Board.

(*3) “RZG2LC Evaluation Board Kit” includes the RZ/G2LC SMARC Module Board and the RZ SMARC Series Carrier Board.

- **Verified functions**

Linux BSP

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

- **File contents**

VLP/G is delivered by the files listed in Table1.

RZ MPU HTML5 (Gecko102.15) Package V2.1.1 for Verified Linux Package v3.0.6 Gecko Start-up Guide

Table 1. RZ/G Verified Linux Package

Basic files of VLP/G v3.0.6

File	Description
RTK0EF0045Z0021AZJ-v3.0.6.zip (*)	Verified Linux Package. This file includes the Yocto recipe packages and the necessary documents.
rzg_vlp_v3.0.6.tar.gz	Yocto recipe packages
r01us0553ej0112-rz-g(Release Note).pdf	Release Note of VLP without a GUI Framework of HTML5.
r01us0555ej0103-rz-g(Linux Start-up Guide RZG2H,M,N,E).pdf	Documents describing booting method and the required settings of bootloader for RZ/G2H, RZ/G2M, RZ/G2N, and RZ/G2E .
r01us0616ej0102-rz-g(Linux Start-up Guide RZG2L,LC,UL).pdf	Documents describing booting method and the required settings of bootloader for RZ/G2L and RZ/G2LC .
oss_pkg_rzg_v3.0.6.7z (*)	Open source software packages See the Note below before you download.

Basic files of HTML5 (Gecko102.15) Package v2.1.1

File	Description
RTK0EF0045Z40001ZJ_v2.1.1.zip (*)	Verified Linux Package for HTML5 (Gecko102.15). This file includes the Yocto recipe packages for HTML5 (Gecko102.15) and the necessary documents.
rzg_bsp_gecko102.15_v2.1.1.tar.gz	Yocto recipe packages
r01us0606ej0105-rz-g(Gecko Start-up Guide).pdf	This document
0001-rz-common-recipes-debian-buster-glibc-update-to-v2.2.patch	Use it for “online” builds, if you need it. Please refer to the 2.1 “Note” for more information.
oss_pkg_gecko102.15_v2.1.1_forVLPv3.0.6.7z (*)	Open source software packages for HTML5 (Gecko102.15). Please use this file instead of oss_pkg_v3.0.6.7z when building HTML5 (Gecko102.15). See the Note below before download.

(*) 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/G was verified.
If you are just evaluating VLP/G and RZ/G 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/G 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, 2)

	File ("XX" is replaced by "EN" or "JP".)	Description
RZ MPU Graphics Library	RTK0EF0045Z13001ZJ-v1.2.2_XX.zip (Evaluation version) RTK0EF0045Z14001ZJ-v1.2.2_rzg_XX.zip (Unrestricted version)	For RZ/G2L and RZ/G2LC . This provides graphics function compliant with the OpenGL ES standard.
RZ MPU Video Codec Library	RTK0EF0045Z15001ZJ-v1.2.1_XX.zip (Evaluation version) RTK0EF0045Z16001ZJ-v1.2.1_rzg_XX.zip (Unrestricted version)	RZ MPU Video Codec Library for RZ/G2L .
Multimedia Packages	RTK0EF0045Z0022AZJ-v1.0.2_XX.zip (Evaluation version) RTK0EF0045Z0023AZJ-v1.0.2_XX.zip (Unrestricted version)	Multimedia Packages for RZ/G2H,M,N,E . This includes the graphics library and the video codec library.

(*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.

(*2) HTML5 (Gecko102.15) Package v2.1.1 supports the below combination:

- Evaluation version:
 - [RZ/G2L]
rzg_vlp_v3.0.6.tar.gz + rzg_bsp_gecko102.15_v2.1.1.tar.gz + RTK0EF0045Z13001ZJ-v1.2.2_XX.zip + RTK0EF0045Z15001ZJ-v1.2.1_XX.zip
 - [RZ/G2LC]
rzg_vlp_v3.0.6.tar.gz + rzg_bsp_gecko102.15_v2.1.1.tar.gz + RTK0EF0045Z13001ZJ-v1.2.2_XX.zip
 - [RZ/G2H,M,N,E]
rzg_vlp_v3.0.6.tar.gz + rzg_bsp_gecko102.15_v2.1.1.tar.gz + RTK0EF0045Z0022AZJ-v1.0.2_XX.zip
- Unrestricted version :
 - [RZ/G2L]
rzg_vlp_v3.0.6.tar.gz + rzg_bsp_gecko102.15_v2.1.1.tar.gz + RTK0EF0045Z14001ZJ-v1.2.2_rzg_XX.zip + RTK0EF0045Z16001ZJ-v1.2.1_rzg_XX.zip
 - [RZ/G2LC]
rzg_vlp_v3.0.6.tar.gz + rzg_bsp_gecko102.15_v2.1.1.tar.gz + RTK0EF0045Z14001ZJ-v1.2.2_rzg_XX.zip
 - [RZ/G2H,M,N,E]
rzg_vlp_v3.0.6.tar.gz + rzg_bsp_gecko102.15_v2.1.1.tar.gz + RTK0EF0045Z0023AZJ-v1.0.2_XX.zip

2. Build Instructions

2.1 Build VLP without HTML5

Please follow the below documents and build the VLP firstly. You can read the release note and check the release items. You can build VLP by following the chapter 1 and 2 of the Linux Start-up guide.

Table 2. Documents for the first step

r01us0553ej0112-rz-g(Release Note).pdf	Release Note of VLP without a GUI Framework of HTML5. You can check the release items.
r01us0555ej0103-rz-g(Linux Start-up Guide RZG2H,M,N,E).pdf	Documents describing booting method and the required settings of bootloader for RZ/G2H, RZ/G2M, RZ/G2N, and RZ/G2E . Please refer to the chapter 1 and 2 for building VLP.
r01us0616ej0102-rz-g(Linux Start-up Guide RZG2L,LC,UL).pdf	Documents describing booting method and the required settings of bootloader for RZ/G2L and RZ/G2LC . Please refer to the chapter 1 and 2 for building VLP.

Please note that it is necessary to run the below command in the step 2.2(6) of the Linux Start-up guide:

```
$ MACHINE=<board> bitbake core-image-weston
```

HTML5 (Gecko102.15) supports only core-image-weston for the build image.

Note) When you don't use the OSS package, if you get an error about glibc, please apply the patch (0001-rz-common-recipes-debian-buster-glibcupdate-to-v2.2.patch) included in "RTK0EF0045Z40001ZJ_v2.1.1.zip". This is a patch to rewrite to use "glibc_2.28-10+deb10u3".

```
$ cd ~/rzg_vlp_v3.0.6/meta-renesas
$ patch -p1 < path/to/RTK0EF0045Z40001ZJ_v2.1.1/ 0001-rz-common-recipes-debian-buster-glibcupdate-to-v2.2.patch
$ cd ..
```

And VLP has some additional packages and options, so users can select the combination themselves and build. Please note that HTML5 (Gecko102.15) packages are tested with the below combination, so please build with the below combination for HTML5 (Gecko102.15).

Example) RZ/G2L is tested using both the graphics library and the codec library, but it is not tested using Security, MultiOS, and Docker.

Table 3. Combinations of HTML5

		Packages and Option				
		Graphics	Codec	Security	MultiOS	Docker
Devices	RZ/G2H,M,N,E	O		-	-	-
	RZ/G2L	O		-	-	-
	RZ/G2LC	O	-	-	-	-

(*) "-" means that the packages and the option are not tested with HTML5.

After you complete the build, please move to the section 2.2 in this document and enable HTML5 (Gecko102.15).

2.2 Building images enabling HTML5

This section describes the instructions to enable HTML5 (Gecko102.15) to the build images.

Copy all files obtained from Renesas into your Linux Host PC prior to the steps below. The directory which you put the files in is described as <package download directory> in the build instructions.

(1) Move to a working directory at your home directory, and decompress Yocto recipe package

Run the commands below. The name and the place of the working directory can be changed as necessary.

```
$ cd ~/rzg_vlp_v3.0.6
$ cp ../<package download directory>/*.zip .
$ unzip ./RTK0EF0045Z40001ZJ_v2.1.1.zip
$ tar zxvf ./RTK0EF0045Z40001ZJ_v2.1.1/rzg_bsp_gecko102.15_v2.1.1.tar.gz
$ touch ./meta-browser/classes/{distutils,pythonnative,setuptools}.bbclass
```

(2) Apply the patches

Run the commands below. These patches are for launching the browser application.

```
$ cd ~/rzg_vlp_v3.0.6/meta-renesas
$ patch -p1 < ../extra/0001-Add-dummy-input-package-1.patch
$ patch -p1 < ../extra/0001-Add-default-environment-variables-for-firefox-1.patch
$ cd ..
```

Note)

“0001-Add-dummy-input-package-1.patch” is a patch required when a mouse or keyboard is not connected. It adds a dummy input device, and this patch can also be used when a mouse or keyboard is connected.

“0001-Add-default-environment-variables-for-firefox-1.patch” sets the environment variables for starting firefox. It is not necessary if you set them yourself.

(3) Setup a build environment

Initialize a build using the 'oe-init-build-env' script in Poky and point TEMPLATECONF to platform conf path.

```
$ TEMPLATECONF=$PWD/meta-renesas/meta-<platform>/docs/template/conf/ source \
poky/oe-init-build-env build
```

<platform> and <board> can be selected in the below table.

Table 4. List of the platforms and the boards

Renesas MPU	Platform	Board
RZ/G2H	rzg2h	hihope-rzg2h
RZ/G2M	rzg2h	hihope-rzg2m
RZ/G2N	rzg2h	hihope-rzg2n
RZ/G2E	rzg2h	ek874
RZ/G2L	rzg2l	smarc-rzg2l
RZ/G2LC	rzg2l	smarc-rzg2lc

RZ MPU HTML5 (Gecko102.15) Package V2.1.1 for Verified Linux Package v3.0.6 Gecko Start-up Guide

(4) Add layers

Please follow the below steps to add the layers you need. The steps add the settings to bblayers.conf.

```
$ bitbake-layers add-layer ../meta-rz-features/meta-rz-graphics
$ bitbake-layers add-layer ../meta-rz-features/meta-rz-codecs
$ bitbake-layers add-layer ../meta-rust
$ bitbake-layers add-layer ../meta-clang
$ bitbake-layers add-layer ../meta-browser
$ bitbake-layers add-layer ../meta-rz-browser
```

(5) Enable HTML5 (Gecko102.15)

Please follow the following instructions to edit the configuration file and enable HTML5 (Gecko102.15).

- Add the below lines to "`~/rzg_vlp_v3.0.6/build/conf/local.conf`".

```
IMAGE_INSTALL_append = " firefox "
IMAGE_INSTALL_append = " ttf-sazanami-gothic ttf-sazanami-mincho "
IMAGE_INSTALL_append = " pulseaudio-server "
IMAGE_INSTALL_append = " adwaita-icon-theme adwaita-icon-theme-cursors "
PACKAGECONFIG_append_pn-firefox = " openmax "
PACKAGECONFIG_append_pn-firefox = " webgl "
PACKAGECONFIG_append_pn-firefox = " gpu "

TARGET_CXXFLAGS_remove_toolchain-clang = " --stdlib=libc++"
TUNE_CCARGS_remove_toolchain-clang = " --rtlib=compiler-rt --unwindlib=libunwind --stdlib=libc++"
TUNE_FEATURES_remove_toolchain-clang = "cortexa57-cortexa53"

DISTRO_FEATURES_append = " x11"
PACKAGECONFIG_remove = " libedit "
PACKAGECONFIG_remove_pn-xserver-xorg = " dri3 glamor "
IMAGE_INSTALL_remove = " matchbox-terminal "
IMAGE_INSTALL_append = " dummy-input "
```

- Comment out a line by the below command.

```
$ sed -i -e '/^DISTRO_FEATURES_remove = " x11"/ s/^/#/' conf/local.conf
```

- **Additional setting only for RZ/G2H, RZ/G2M, RZ/G2N, RZ/G2E**

Comment out the line of "`meta-rz-features/meta-rz-graphics/include/rzg2h-graphics.inc`" as below.

```
//BBMASK_append_rzg2h = " ${@bb.utils.contains('COMBINED_FEATURES', 'opengles', 'mesa', 'gles-user-module|kernel-module-gles|wayland-kms|libgbm|libegl', d)}"
```

RZ MPU HTML5 (Gecko102.15) Package V2.1.1 for Verified Linux Package v3.0.6 Gecko Start-up Guide

(6) Decompress OSS files to “build” directory (Optional)

Run the commands below. This step is not mandatory and able to go to the step (7) in case the “offline” environment is not required. All OSS packages will be decompressed with this '7z' command.

If this step is omitted and BB_NO_NETWORK is set to “0” in the step (7), all source codes will be downloaded from the repositories of each OSS via the internet when running bitbake command. Please note that if you do not use an “offline” environment, a build may fail due to the implicit changes of the repositories of OSS.

```
$ cp ../../<package download directory>/*.7z .  
$ 7z x ~/oss_pkg_gecko102.15_v2.1.1_forVLPV3.0.6.7z
```

When you run the 7z command, you may see the bellow message. Please select “A” at that time.

```
Would you like to replace the existing file:  
Path:      ./downloads/git2_github.com.gorilla.context.git.tar.gz.done  
Size:      0 bytes  
Modified: 2023-09-28 17:37:20  
with the file from archive:  
Path:      downloads/git2_github.com.gorilla.context.git.tar.gz.done  
Size:      0 bytes  
Modified: 2023-10-28 00:36:19  
? (Y)es / (N)o / (A)lways / (S)kip all / A(u)to rename all / (Q)uit? A
```

After the above procedure is finished, the “offline” environment is ready. If you want to prevent network access, please change the line in the “~/rzg_vlp_v3.0.6/build/conf/local.conf” as below:

```
BB_NO_NETWORK = "1"
```

To change BB_NO_NETWORK from “0” to “1”.

(7) Start a build

Run the commands below to start a build. Building an image can take up to a few hours depending on the user’s host system performance.

Build the target file system image using bitbake

```
$ MACHINE=<board> bitbake core-image-weston
```

<board> can be selected by referring to the **Table 4**.

Example: MACHINE=smarc-rzg2l

After the build is successfully completed, a similar output will be seen, and the command prompt will return.

```
NOTE: Tasks Summary: Attempted 7427 tasks of which 16 didn't need to be rerun and all succeeded.
```

All necessary will be generated by the bitbake command and will be located in the **build/tmp/depoy/images** directory.

2.3 Browser application

This section describes how to launch and configure the browser application after building VLP.

2.3.1 Launch the browser application on the evaluation board

(1) Prepare the SD card and boot the evaluation board

Please follow the below documents again to boot the evaluation board. You can prepare the SD card and boot the evaluation board by following the chapter 3 and 4 of the Linux Start-up guide.

After booting the target board, please move to the next section 2.3.1(2) in this document.

Table 5. Documents for the first step

r01us0555ej0103-rz-g(Linux Start-up Guide RZG2H,M,N,E).pdf	Documents describing booting method and the required settings of bootloader for RZ/G2H, RZ/G2M, RZ/G2N, and RZ/G2E . Please refer to the chapter 3 and 4.
r01us0616ej0102-rz-g(Linux Start-up Guide RZG2L,LC,UL).pdf	Documents describing booting method and the required settings of bootloader for RZ/G2L and RZ/G2LC . Please refer to the chapter 3 and 4.

(2) Launch the browser application on the evaluation board

Please connect an USB hub, a mouse, and a keyboard to your evaluation board. Then please run the below command on the **Weston terminal instead of Tera Term**.

“[https://~~~](#)” means a website URL, so please enter the URL of the site you want to open. “[/home/root/xxx.html](#)” means a html content in the root file system, so please enter the path of the file you want to open.

```
$ firefox --width 250 --height 250 https://~~~
$ firefox --width 250 --height 250 /home/root/xxx.html
```

Note) The browser application “Firefox” can be used on the evaluation boards as "reference". Please note that it cannot be used on your own products to be launched in the market. This is the policy of Mozilla. Please also refer to the section 2.3.2(1) which describes the sample browser application.

2.3.2 Tips of the browser application

(1) Sample browser application “Web Viewer”

Web Viewer is a sample browser application and is developed on OSS. (<https://github.com/webdino/amethyst>)
You can customize it as you want and can use on your own products to be launched in the market according to the OSS license. When you want to evaluate it, please edit “~/rzg_v1p_v3.0.x/build/conf/local.conf” after the step (5) in the section 2.2:

From:

```
PACKAGECONFIG_append_pn-firefox = " openmax "  
PACKAGECONFIG_append_pn-firefox = " webgl "  
PACKAGECONFIG_append_pn-firefox = " gpu "
```

To:

```
IMAGE_INSTALL_append = " webviewer "  
PACKAGECONFIG_append_pn-webviewer = " openmax "  
PACKAGECONFIG_append_pn-webviewer = " webgl "  
PACKAGECONFIG_append_pn-webviewer = " gpu "
```

After that, please start the build with the step (7) in the section 2.2

After the build is completed, please connect an USB hub, a mouse, and a keyboard to your evaluation board. Then please refer to the documents listed in the Table 5 to boot your boards.

After booting your board, please run the “webviewer” command instead of the “firefox” command on **the Weston terminal instead of Tera Term**.

“<https://www.iana.org/>” means a website URL, so please enter the URL of the site you want to open. “/home/root/xxx.html” means a html content in the root file system, so please enter the path of the file you want to open.

```
$ webviewer https://www.iana.org/  
$ webviewer /home/root/xxx.html
```

(2) Configure the browser application

There are a lot of settings in the browser application. Please refer to the below settings as references. When you want to change some settings, please run the command below. After that, the setting list is displayed, so please change the settings.

```
$ firefox about:config
```

Settings:

- Setting to improve the performance of pinch zoom (*)

```
webrender.low-quality-pinch-zoom = true
```

- Display “FPS” on the browser application

```
gfx.webrender.debug.profiler = true  
gfx.webrender.debug.profiler-ui = "FPS"
```

(*) This feature is currently under development by Mozilla, so please test it carefully.

3. Restriction

(1) Video Playback

The performance of the video playback is very low, so the function is limitation in this release. Renesas has been investigating. You can try the video playback, but you may find that the video playback is slow and the frames flicker.

4. Note

(1) Test Status of the HTML5 (Gecko102.15) package

The HTML5 (Gecko102.15) package is tested. Two types of tests are conducted.

- web-platform-tests:
This is to test all functions which the browser application have in detail.
- Performance tests:
This is to test the performance of the browser application with the test benches in <https://github.com/webdino/gecko-embedded/wiki/QA>.

web-platform-tests is run on the RZ/G2L evaluation board.

5. Revision History

Rev.	Date	Description	
		Page	Summary
1.00	Jun. 30, 2022	-	First edition for VLP/G v3.0.0.
1.01	Feb. 28, 2023	-	Newly support the board of RZ/G2H.
1.02	Apr. 7, 2023	-	Newly support the boards of RZ/G2M, RZ/G2N, and RZ/G2E.
1.03	Jul. 7, 2023	-	The build steps are updated. RZ/G2LC is newly supported.
1.04	Oct. 31, 2023	-	First edition for VLP/G v3.0.5.
1.05	Jun. 14, 2024	-	First edition for VLP/G v3.0.6.

Website and Support

Renesas Electronics Website

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