RZ/G Verified Linux Package
Version 3.0.7

Release Note

R01US0553EJ0116
Rev. 1.16
Mar. 31, 2025

Introduction

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

Please also refer to the following documents that describe the instruction to build VLP/G and boot the evaluation boards.

- r01us0645ej0106-rz-g(Linux Start-up Guide RZG3S).pdf
- r01us0555ej0107-rz-g(Linux Start-up Guide RZG2H,M,N,E).pdf
- r01us0616ej0106-rz-g(Linux Start-up Guide RZG2L,LC,UL).pdf
- r01us0648ej0107-rz-g(Linux Start-up Guide RZG1H,M,N,E,C).pdf

Contents

Contents

1. Release Items 2
2. Components 6
3. Changes 7
4. Restrictions 8
5. Notes 9
5.1 Memory Map 9
5.1.1 RZ/G3S 9
5.1.2 RZ/G2H, RZ/G2M, RZ/G2N, RZ/G2E 10
5.1.3 RZ/G2L Series 21
5.1.4 RZ/G1H, RZ/G1M, RZ/G1N, RZ/G1E 26
6. Revision History 31
Website and Support 32

1. Release Items

- **Name and version**
  RZ/G Verified Linux Package
  Version 3.0.7 (hereinafter referred to as “VLP/G v3.0.7”)

- **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 v3.0.7 which are listed in Table 2 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 v3.0.7 which are listed in Table 2 from the site below.

  RZ/G Verified Linux Package [5.10-CIP]:
  https://www.renesas.com/us/en/products/microcontrollers-microprocessors/rz-mpus/rzg-linux-platform/rzg-marketplace/verified-linux-package/rzg-verified-linux-package

- **Target boards**
  The target boards of this VLP are as below table.

Table 1. Target bord list

Device	Evaluation Board
RZ/G3S	RZ/G3S SMARC Evaluation Board Kit. This kit includes the boards below: - RZ/G3S SMARC Module Board v3 - RZ SMARC Series Carrier Board v2
RZ/G2L	RZ/G2L SMARC Evaluation Board Kit. This kit includes the boards below: - RZ/G2L SMARC Module Board v2.1 - RZ SMARC Series Carrier Board v4.0
RZ/G2LC	RZ/G2LC Evaluation Board Kit. This kit includes the boards below: - RZ/G2LC SMARC Module Board v1.0 - RZ SMARC Series Carrier Board v4.0
RZ/G2UL	RZ/G2UL SMARC Evaluation Board Kit. This kit includes the boards below: - RZ/G2UL SMARC Module Board v1.0 - RZ SMARC Series Carrier Board v4.0
RZ/G2H **RZ/G2M** **RZ/G2N** **RZ/G2E**	- 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 (*1) There are 2 versions of RZ/G2M LSI devices. There are versions 3.0 and 1.3. (hereinafter referred to as “RZ/G2M v3.0” and “RZ/G2M v1.3”).
RZ/G1H **RZ/G1M** **RZ/G1N** **RZ/G1E**	- iWave RZ/G1H-PF Qseven Development Platform R2.1, R4.0 - iWave RZ/G1M-PF Qseven Development Platform R2.0, R5.0 - iWave RZ/G1N-PF Qseven Development Platform R3.4 - iWave RZ/G1E-PF SODIMM Development Platform R3.1, R4.0

- **Build Environment**
  Linux Host PC
  OS: Ubuntu 22.0.4 LTS (64 bit OS must be used.)
  22.04 inside a docker container also OK.
  200GB free space on HDD or SSD is necessary. (*)
  (*) The necessary free space

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

- **Verified functions**
  Linux VLP
  - Linux Kernel
  - Linux Drivers
  - Graphics Libraries
  - Codec Libraries

  GUI Framework
  - Qt (LGPL version)

- **File contents**
  VLP/G is delivered by the files listed in Table 2.

Table 2. RZ/G Verified Linux Package

Basic files of VLP/G v3.0.7

File	Description
RTK0EF0045Z0021AZJ-v3.0.7.zip (*1)	Verified Linux Package. This file includes the **Yocto recipe packages** and the necessary documents.
rzg_vlp_v3.0.7.tar.gz	**Yocto recipe packages**
r01us0553ej0116-rz-g(Release Note).pdf	This document
r01us0645ej0106-rz-g3s(Linux Start-up Guide RZG3S).pdf	Documents describing building instruction, booting method and the required settings of bootloader for **RZ/G3S**.
r01us0555ej0107-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**.
r01us0616ej0106-rz-g(Linux Start-up Guide RZG2L,LC,UL).pdf	Documents describing booting method and the required settings of bootloader for **RZ/G2L, RZ/G2LC, and RZ/G2UL**.
r01us0648ej0107-rz-g(Linux Start-up Guide RZG1H,M,N,E).pdf	Documents describing booting method and the required settings of bootloader for **RZ/G1H, RZ/G1M, RZ/G1N, and RZ/G1/E**.
oss_pkg_rzg_v3.0.7.7z (*1)	Open source software packages See the Note below before you 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) The open source software (OSS) packages contain all the relevant source code files. These are the same versions of OSS that was used when VLP/G was verified. Downloading a using this large OSS package file (oss_pkg_rzg_xxx.7z) is not mandatory if your build PC is connected to the Internet and can directly download the individual source code packages listed in the Yocto recipes. However, if your build PC is not connected to the Internet, this OSS package file contains all the source packages required by the Yocto build.

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.
Most bootable images that VLP/G supports can be built on an “offline” environment. Please refer to the documents of “Linux_StartUp_Guide”.

Optional packages (*1)

	File (“XX” is replaced by “EN” or “JP”.)	**Description**
RZ MPU Graphics Library	RTK0EF0045Z14001ZJ-v3.1.2.3_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	RTK0EF0045Z16001ZJ-v3.1.3.0_rzg_XX.zip (Unrestricted version)	RZ MPU Video Codec Library for **RZ/G2L**.
Multimedia Packages for RZ/G2	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.
Multimedia Packages for RZ/G1	RTK0EF0045Z0026AZJ_v3.5.0.1_XX.zip (Evaluation version) RTK0EF0045Z0027AZJ_v3.5.0.1_XX.zip (Unristricte version)	Multimedia Packages for **RZ/G1H,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. This is for RZ/G2H,M,N,E and RZ/G1H,M,N,E. Please note that both 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 check the optional packages in the renesas web below.

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

https://www.renesas.com/us/en/products/microcontrollers-microprocessors/rz-mpus/rzg-linux-platform/rzg-marketplace/verified-linux-package/rzg-verified-linux-package

Additional packages

File	Description
RTK0EF0045Z96001ZJ-v3.0.1.zip	BSP Manual Set for RZ/G3S
RTK0EF0045Z9006AZJ-v3.0.7.zip	BSP Manual Set for RZ/G2L, RZ/G2LC, RZ/G2UL, RZ/Five, and RZ/V2L.
RTK0EF0045Z9002AZJ-v3.0.1.zip	BSP Manual Set for RZ/G2H, RZ/G2M, RZ/G2N, and RZ/G2E.
RTK0EF0045Z9000AZJ-v3.0.0.zip	BSP Manual Set for RZ/G1H, RZ/G1M, RZ/G1N, and RZ/G1E.

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

Download Site:

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

https://www.renesas.com/us/en/products/microcontrollers-microprocessors/rz-mpus/rzg-linux-platform/rzg-marketplace/verified-linux-package/rzg-verified-linux-package

2. Components

The components which are commonly used in this release are listed in the Table 3. Please also refer to the manifest file for details. The manifest file is created to following path after building the images:

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

Note: `<board>` is refer to Linux Start-up Guide of each device.
`<image-name>` is minimal, bsp, Weston or qt.

Please refer to the instructions in Linux Start-up Guide of each device.

Table 3. Versions of commonly used components

Components	VLP/G v3.0.6-update3 For RZ/G Series	VLP/G v3.0.7 For RZ/G Series
Linux kernel	5.10.201-cip41	5.10.229-cip54
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	3.8.18	3.8.18
qt (LGPL version)*1	5.6.3	5.6.3
docker	19.03.8-ce	19.03.8-ce

*1) New versions such as Qt6.2.4 are also known to work. Please contact The Qt Company for instructions and support.

3. Changes

The following table lists the changes from the previous version.

Table 4. Changes

Changes from VLP/Gv3.0.6-update3 to VLP/Gv3.0.7

Features	Description
Yocto reciepes	- Poky: update to dunfell v23.0.33 (previous version is v23.0.31). - meta-openembedded: update to the latest commit. - RZ/G3S WIC image: support eSD boot.
Kernel	Update the kernel version to v5.10.229-cip54 and v5.10.229-cip54-rt23.
I3C Driver	Add Suspend to RAM support.
MTU3 Driver	Enable output pins for channel 4 and 7; add Suspend to RAM support.
RIIC Driver	Add slave mode support, add bus recovery implementation for G2L Series.
SSI Driver	Terminate DMA descriptor if stream is not running, workaround for full duplex TX/RX alignment; add Suspend to RAM implementation.
SPDIF Driver	Add DMAC, full duplex, and Suspend to RAM support.
SYSC Driver	Add sysc-con for interconnection support.
Versa3-clock	Add support for 5L35023 variant.
RZ MPU Graphics Library (RZ/G2L, LC)	This release includes some specification updates.
RZ MPU Graphics Video Codec Library (RZ/G2L)	This release includes some bug fixes.

4. Restrictions

(1) USB camera 3.0

RZ/G2E cannot stream with higher resolution than Full HD when you use a camera with USB 3.0.

(2) CSI40

Disable CSI40 in RZ/G2H, N and G2M v3.0 by default due to SW limitation.

(3) Wifi and Bluetooth

Low performance while using 2.4GHz Wifi/Bluetooth and USB 3.0 device in Hihope RZ/G2H, M, and N at the same time due to noise. If using USB3.0 device, should connect to 5GHz Wifi network.

Wifi/Bluetooth function on the iWave RZ/G1E rev4.0 board has not been supported.

5. Notes

5.1 Memory Map

5.1.1 RZ/G3S

Note)

Kernel uses 4KB page size (VA_BITS=48) and 4 levels of translation tables.

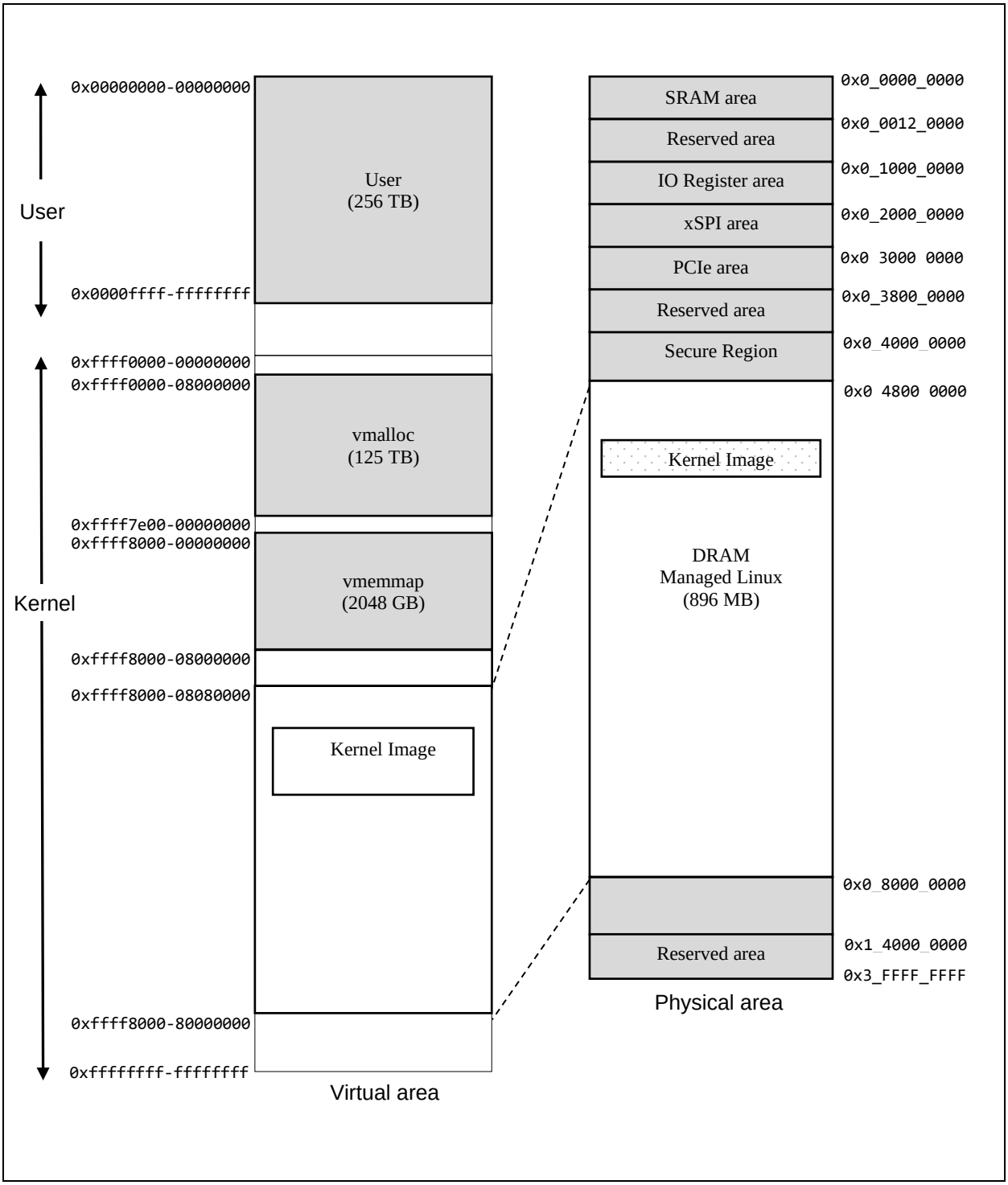

Figure 1. Memory map of kernel (RZ/G3S SMARC Evaluation Kit)

5.1.2 RZ/G2H, RZ/G2M, RZ/G2N, RZ/G2E

Following from Figure 2 to Figure 10 show memory map of RZ/G2[H/M/N/E] in this Linux BSP package.

Note)

- The volume of SDRAM is total:
  - 2GB (RZ/G2E System Evaluation Board EK874)
  - 4GB (RZ/G2M System Evaluation Board HiHope-RZG2M)
  - 4GB (RZ/G2N System Evaluation Board HiHope-RZG2N)
  - 4GB (RZ/G2H System Evaluation Board HiHope-RZG2H).
- 2GB from 0x00_4000_0000 to 0x00_BFFF_FFFF is a shadow area from 0x04_0000_0000 to 0x04_7FFF_FFFF.
- The following regions are used as a secure region. It doesn't allow U-Boot and kernel to access those regions.
  - 63MB from 0x00_43F0_0000 to 0x00_47DF_FFFF in SDRAM
  - 16KB from 0x00_E630_0000 to 0x00_E630_3FFF in System RAM
- **In case the configuration of BSP + 3D Graphics + Multimedia package, it doesn't allow to store any data in "CMA for Lossy comp" (default: 0x00_5400_0000 - 0x00_56FF_FFFF) region which is for media playback before kernel boots up. Any data stored in this region are read through the decompression module in AXI-Bus, so a normal data (not a decoded frame) will be corrupted.**

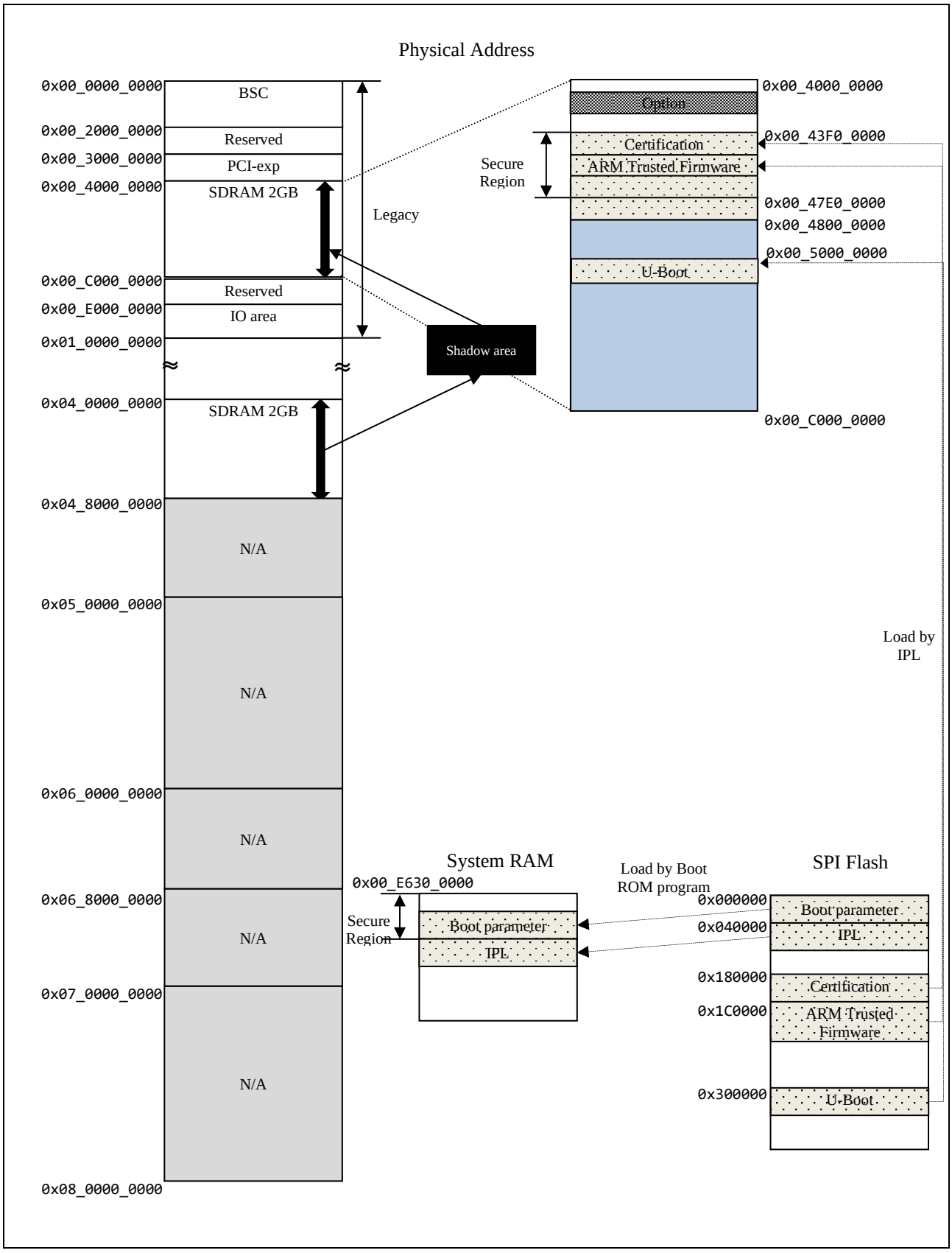

Figure 2. RZ/G2E System Evaluation Board EK874 memory map (Boot)

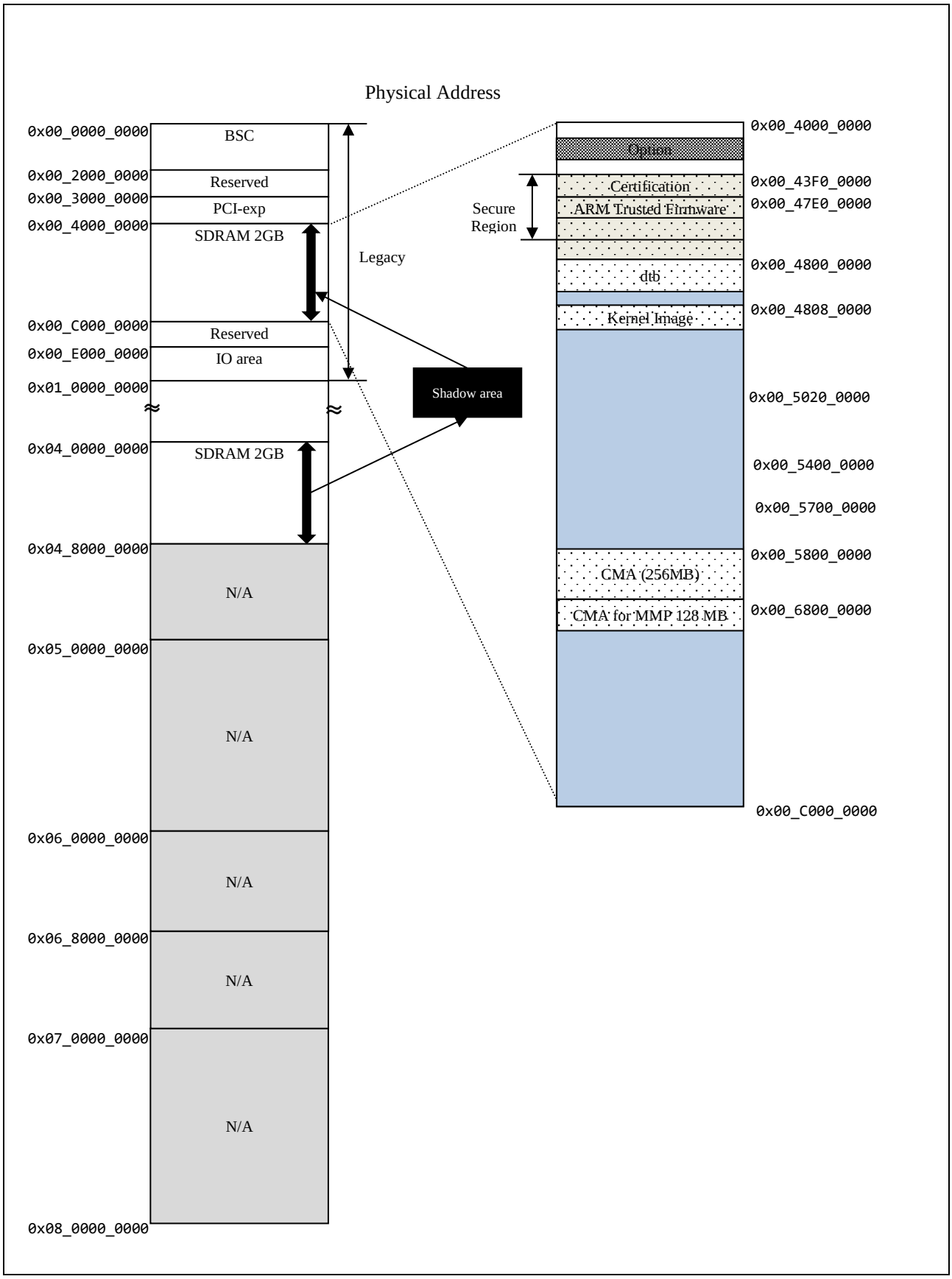

Figure 3. RZ/G2E System Evaluation Board EK874 memory map (Linux)

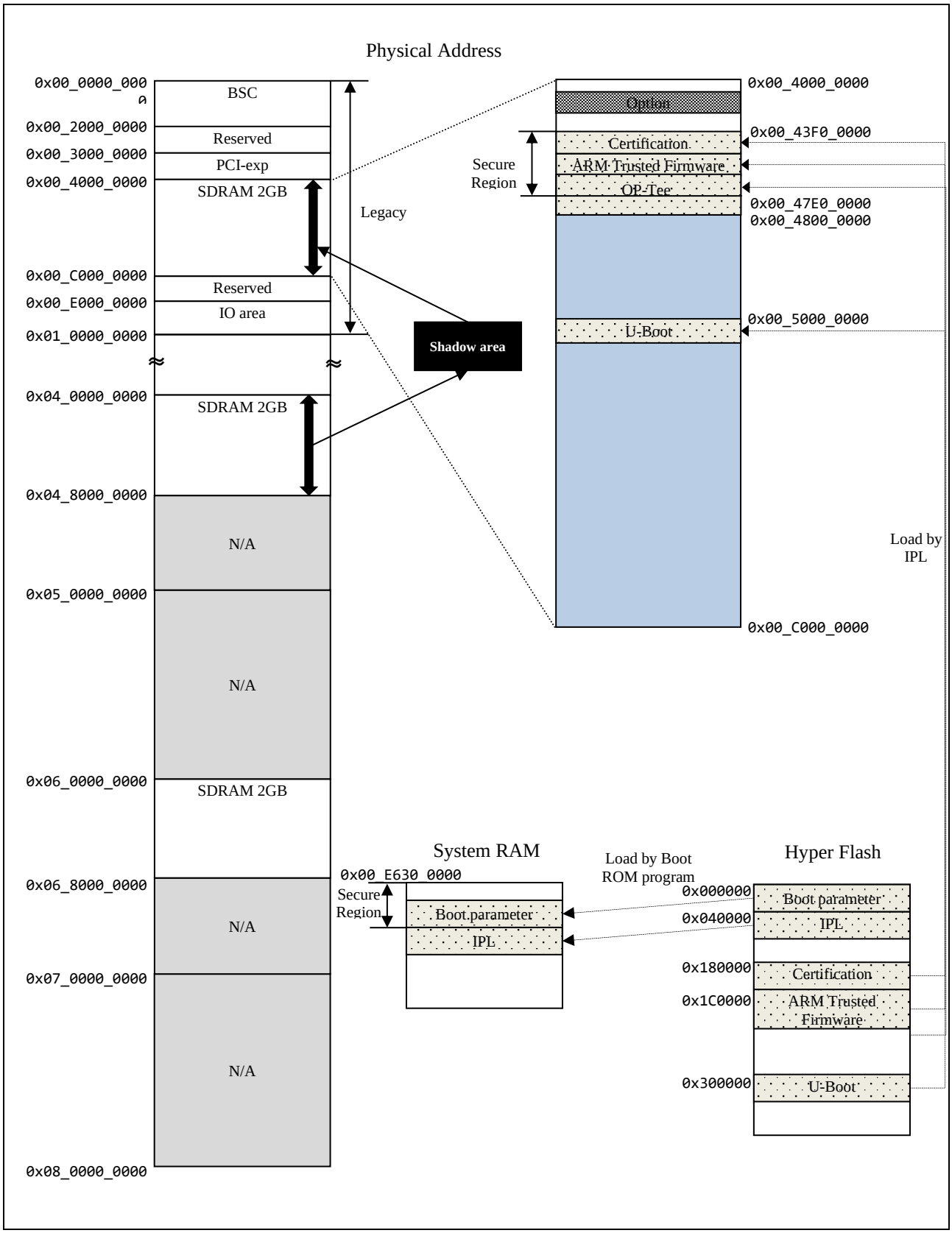

Figure 4. RZ/G2M System Evaluation Board (HIHOPE-RZG2M) memory map (Boot)

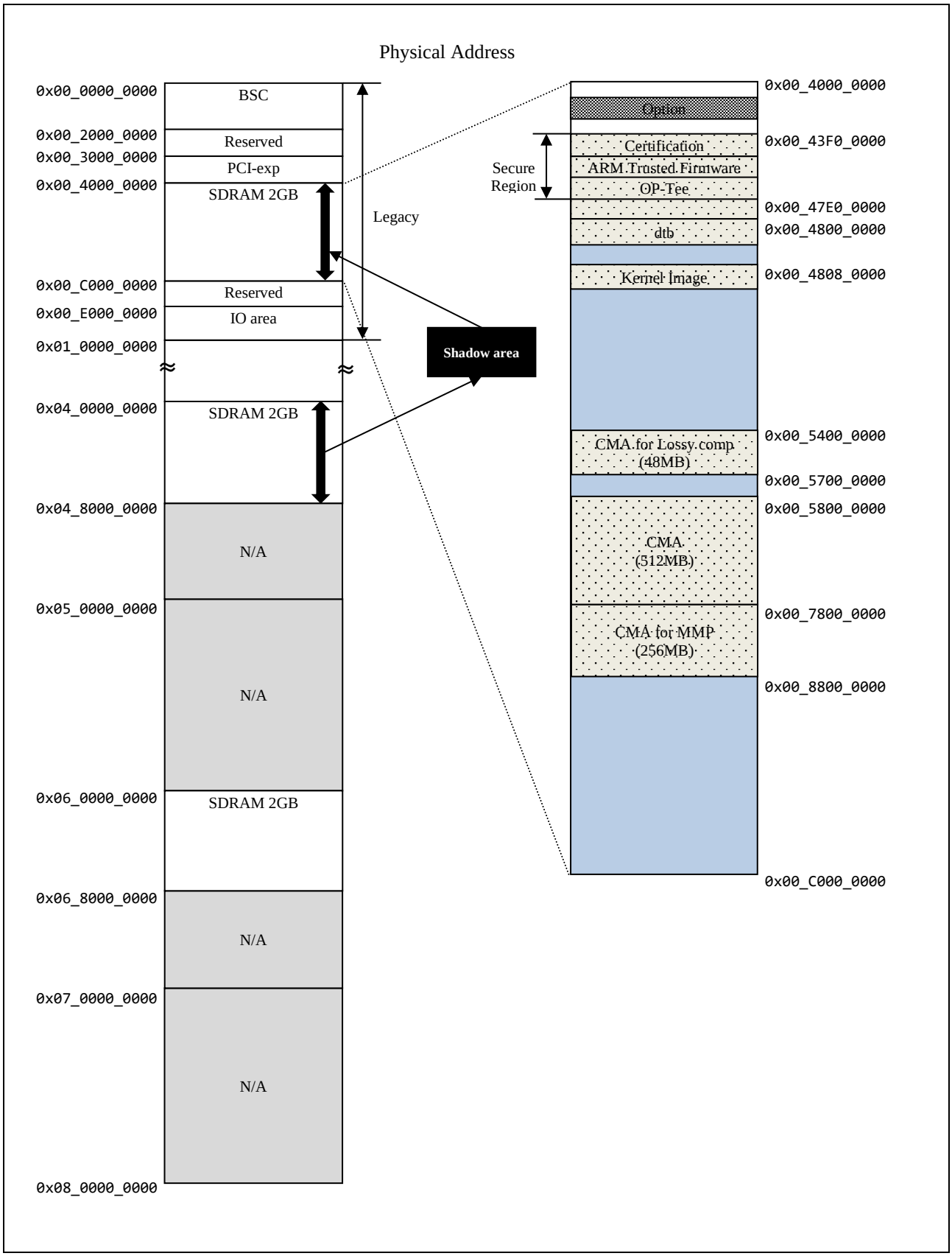

Figure 5. RZ/G2M System Evaluation Board (HiHope-RZG2M) memory map (Linux)

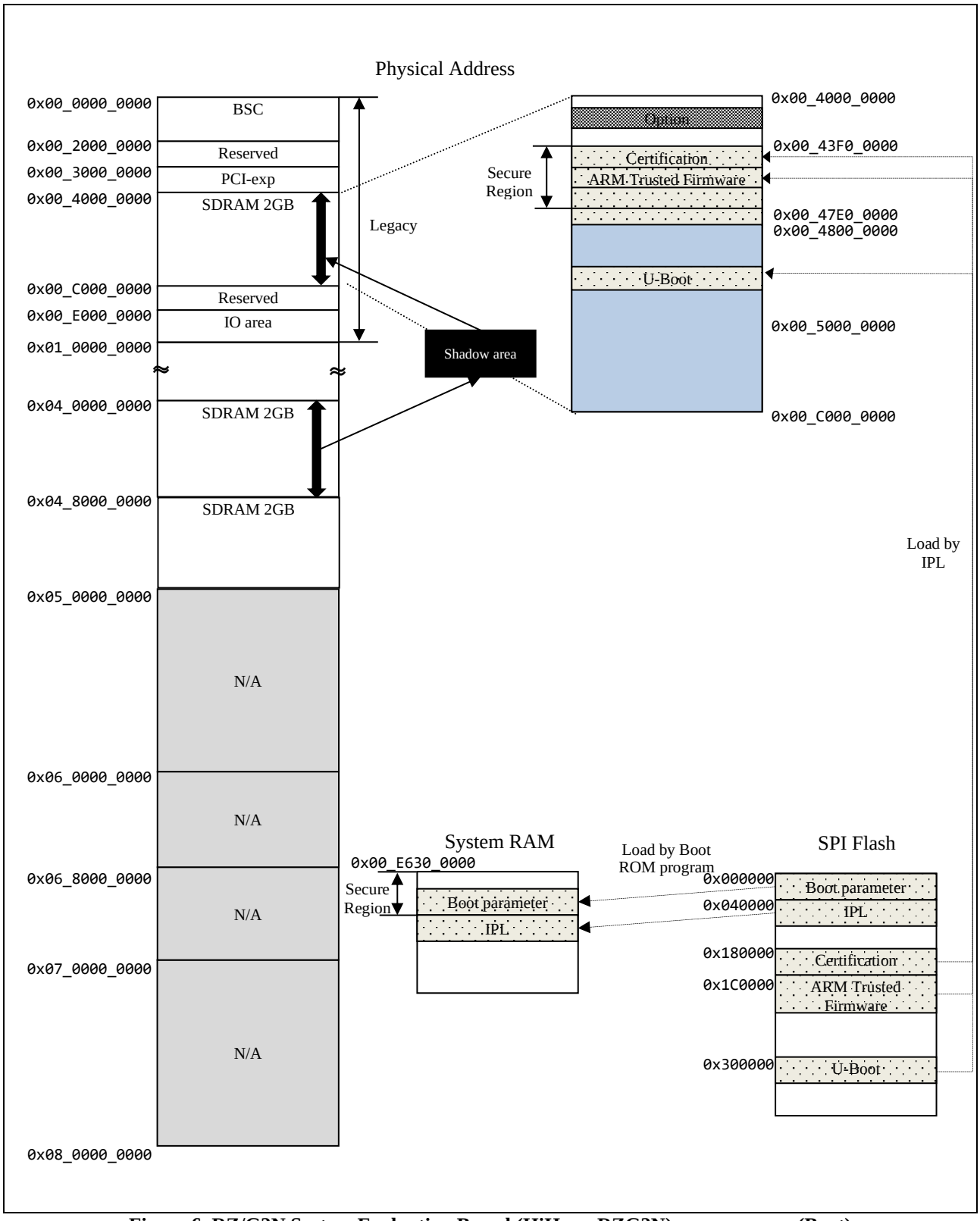

Figure 6. RZ/G2N System Evaluation Board (HiHope-RZG2N) memory map (Boot)

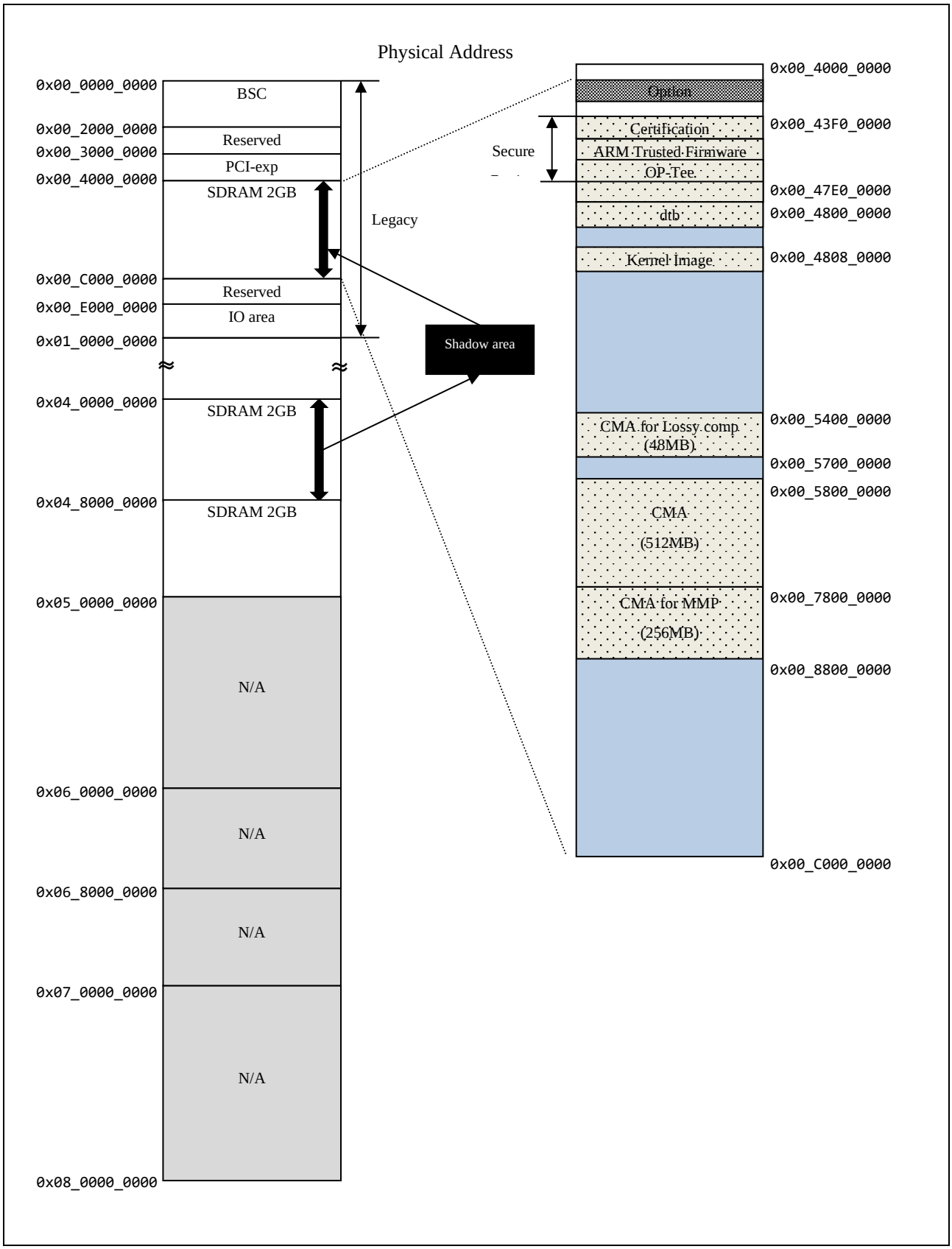

Figure 7. RZ/G2N System Evaluation Board (HiHope-RZG2N) memory map (Linux)

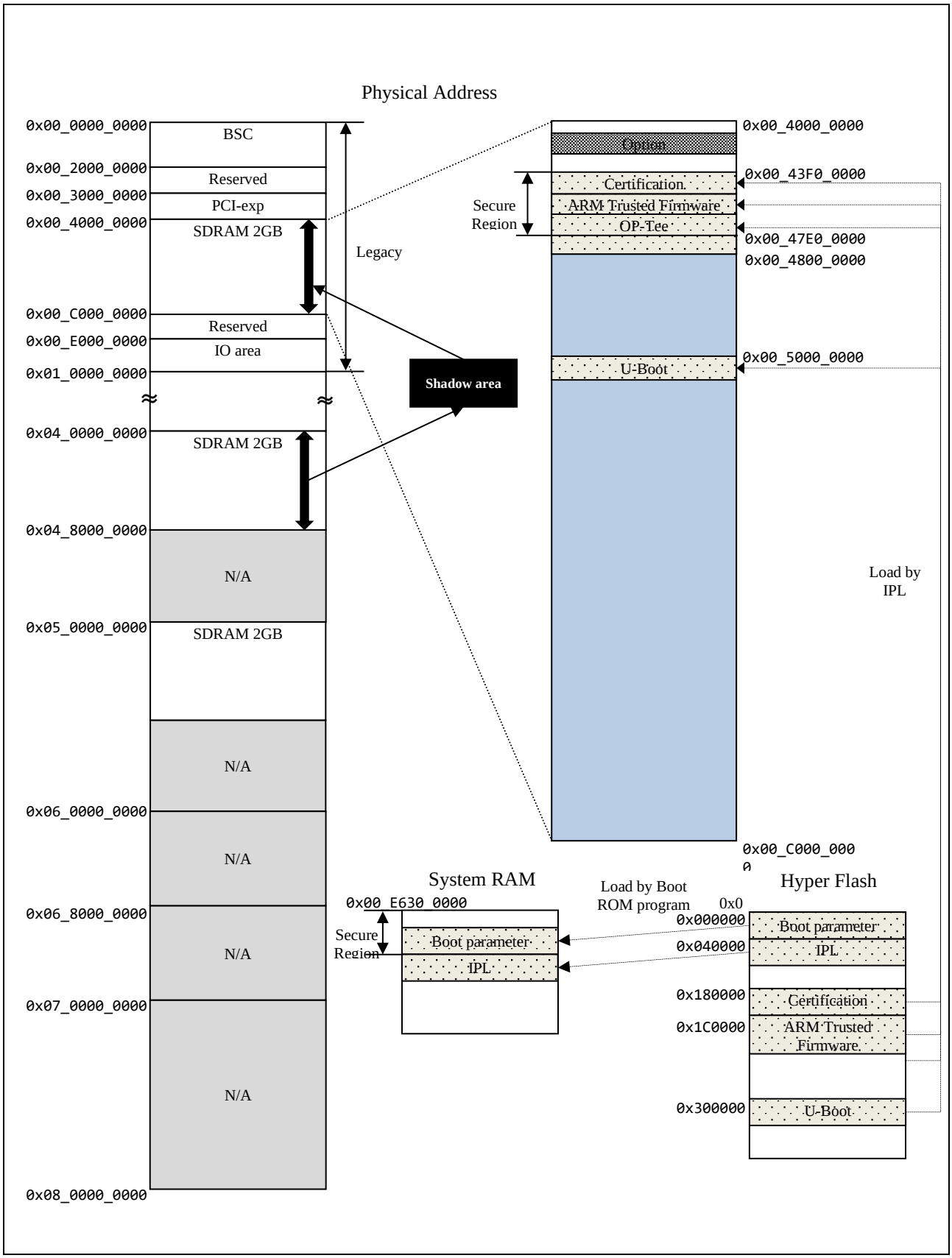

Figure 8. RZ/G2H System Evaluation Board (HIHOPE-RZG2H) memory map (Boot)

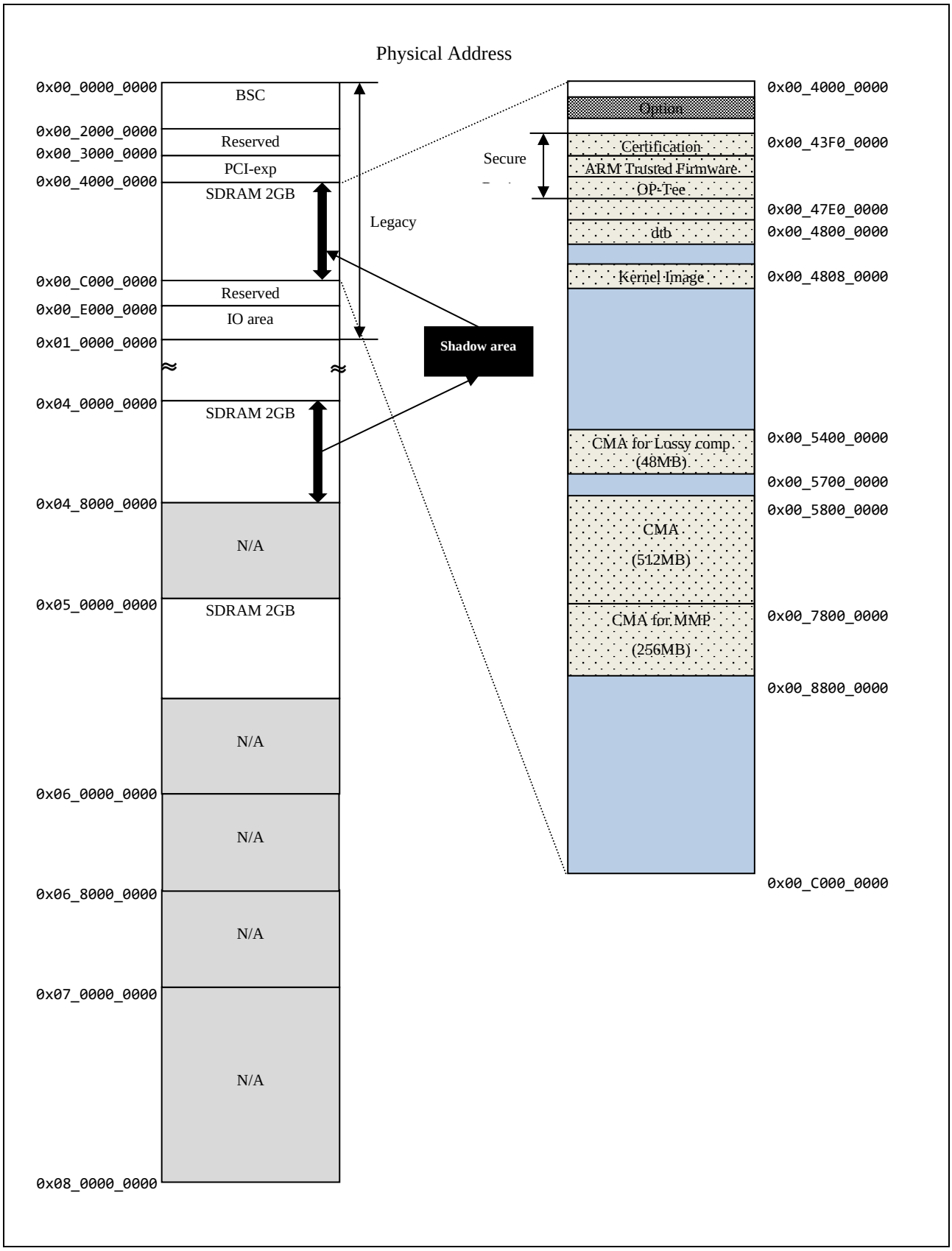

Figure 9. RZ/G2H System Evaluation Board (HiHope-RZG2H) memory map (Linux)

Note)
- Kernel region is assigned by Kernel device tree arch/arm64/boot/dts/renesas/xxx.dts and totally mapped to 1920MB (RZ/G2E System Evaluation Board EK874), 3968MB (RZ/G2M System Evaluation Board HiHope-RZG2M), 3968MB (RZ/G2N System Evaluation Board HiHope-RZG2N), 3968MB (RZ/G2H System Evaluation Board HiHope-RZG2H)

Kernel region consists of 1 part: (RZ/G2E System Evaluation Board EK874)

- 1920MB from 0x00_4800_0000 to 0x00_BFFF_FFFF

Kernel region consists of 2 part: (RZ/G2M System Evaluation Board HiHope-RZG2M)

- 1920MB from 0x00_4800_0000 to 0x00_BFFF_FFFF
- 2GB from 0x06_0000_0000 to 0x06_7FFF_FFFF

Kernel region consists of 2 part: (RZ/G2N System Evaluation Board HiHope-RZG2N)

- 1920MB from 0x00_4800_0000 to 0x00_BFFF_FFFF
- 2GB from 0x04_8000_0000 to 0x04_EFFF_FFFF

Kernel region consists of 2 part: (RZ/G2H System Evaluation Board HiHope-RZG2H)

- 1920MB from 0x00_4800_0000 to 0x00_BFFF_FFFF
- 2GB from 0x05_0000_0000 to 0x05_7FFF_FFFF

There are three types of CMA regions.

They are defined in device tree (arch/arm64/boot/dts/renesas/xxxx.dts).

- Default CMA region: It is for kernel, general drivers and multimedia package.

```
linux,cma {
    compatible = "shared-dma-pool";
    reusable;
    reg = <0x00000000 0xXXXXXXXX 0x0 0xYYYYYYYY>;
    linux,cma-default;
};

0xXXXXXXXX is start address of CMA region.
0xYYYYYYYY is size of CMA region.
```

Note)

- 128 MB in this CMA (RZ/G2M (v1.3, v3.0) |G2N|G2H 512MB, RZ/G2E 256MB) is reserved for kernel and general drivers, and the remaining RZ/G2M (v1.3, v3.0) |G2N|G2H 384 MB, RZ/G2E 128MB is reserved for multimedia package.
- The CMA region can be adjusted by changing the start address and the size.
- Should take care of the lack of memory allocated by kernel and general drivers when reducing the region size.

- CMA region for MMP: It is for multimedia package (specific H/Ws).

```
mmp_reserved: linux,multimedia {
   compatible = "shared-dma-pool";
   reusable;
   reg = <0x00000000 0xXXXXXXXX 0x0 0xYYYYYYYY>;
};

0xXXXXXXXX is start address of CMA region.
0xYYYYYYYY is size of CMA region.
```

Note)

- Refer to User's manual of Memory Manager in order to change CMA region for MMP.

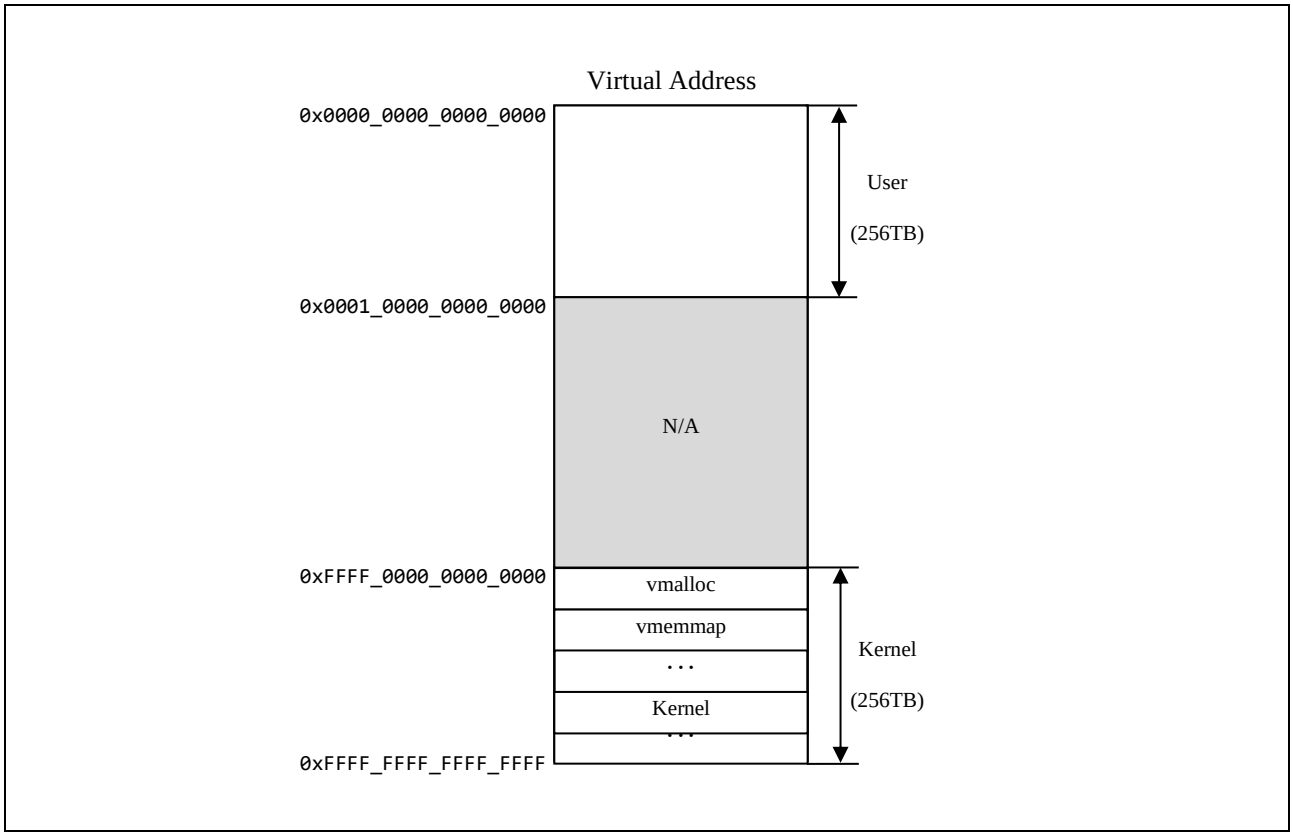

Figure 10. RZ/G2[H/M/N/E] memory map (Virtual)

Note)

- Kernel uses 4KB page size (VA_BITS=48) and 4 levels of translation tables. Both regions of User and Kernel are 256TB. Refer to Documentation/arm64/memory.txt.

- Detail information about kernel memory map in virtual address space, refer to User's manual of Kernel.

5.1.3 RZ/G2L Series

Following from Figure 11 to Figure 13 show memory map of RZ/G2L Series in this Linux BSP package.

Note)

- The volume of SDRAM is total:
  - 2GB (RZ/G2L Evaluation Board Kit PMIC version)
  - 1GB (RZ/G2LC and RZ/G2UL Evaluation Board Kit).
- The following region is used as a secure region. It doesn't allow U-Boot and kernel to access those regions.
  - 128MB from 0x00_4000_0000 to 0x00_47FF_FFFF in SDRAM

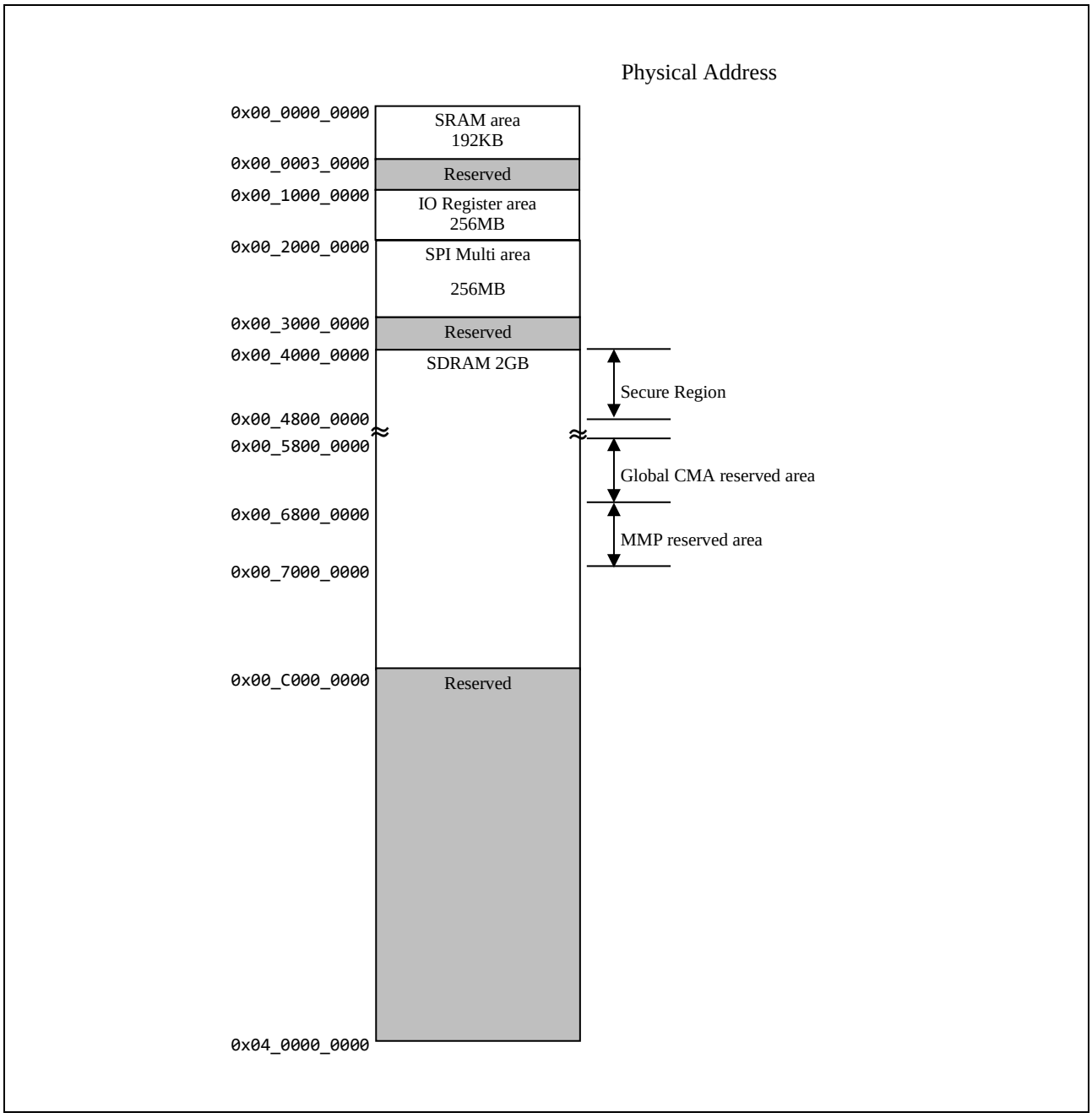

Figure 11. RZ/G2L Evaluation Board Kit PMIC version memory map (Boot)

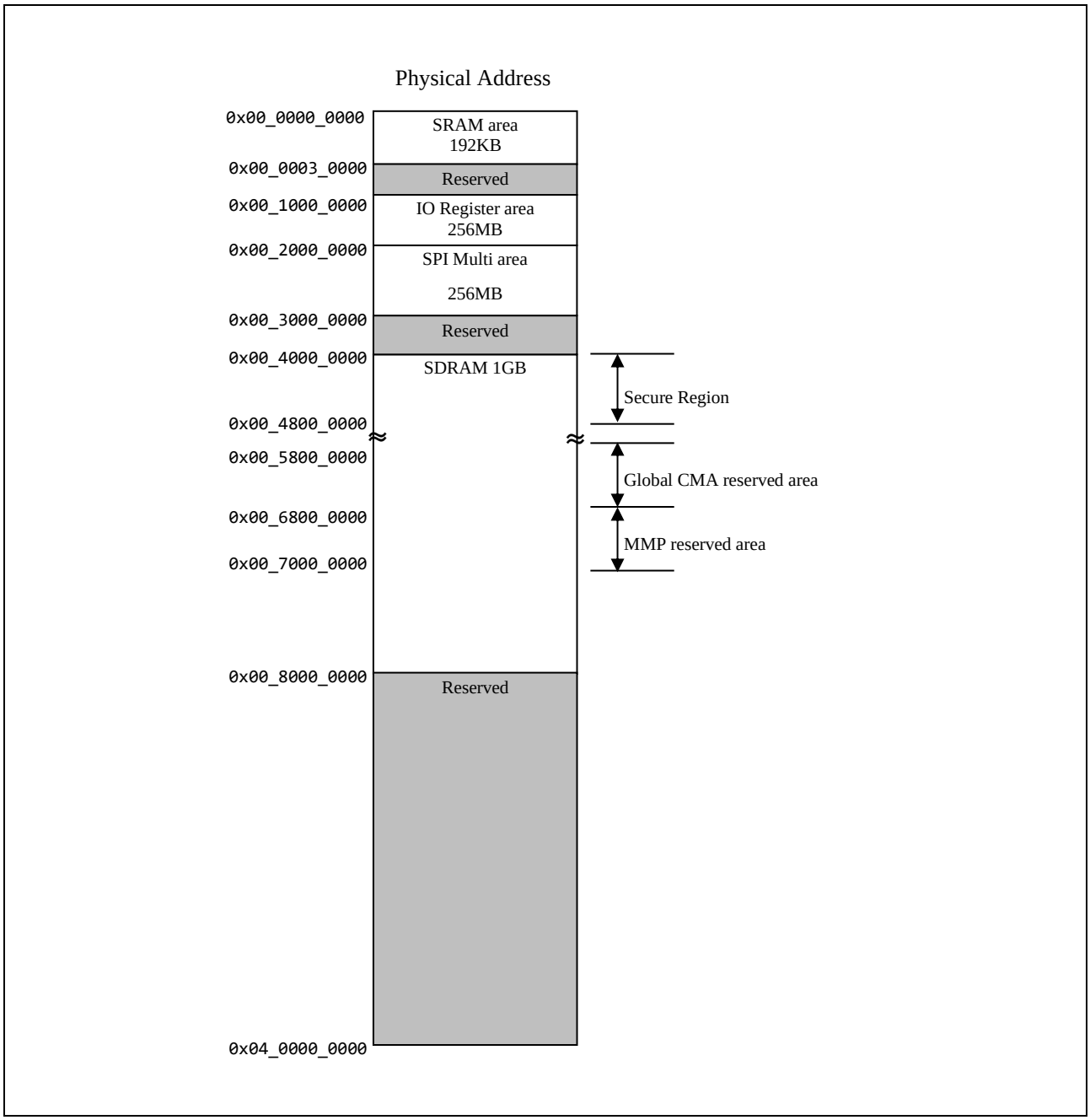

Figure 12. RZ/G2LC Evaluation Board Kit version memory map (Boot)

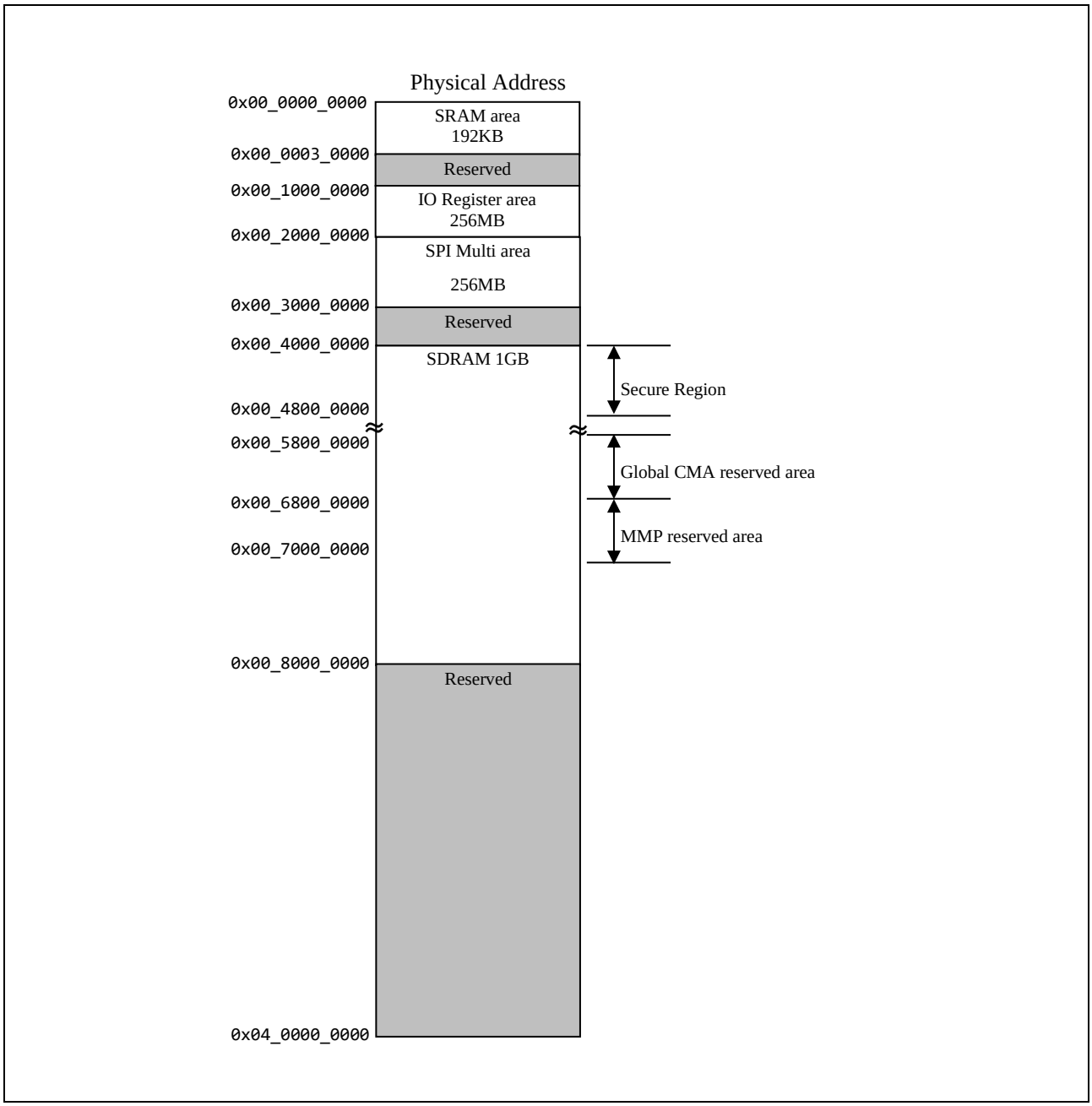

Figure 13. RZ/G2UL Evaluation Board Kit version memory map (Boot)

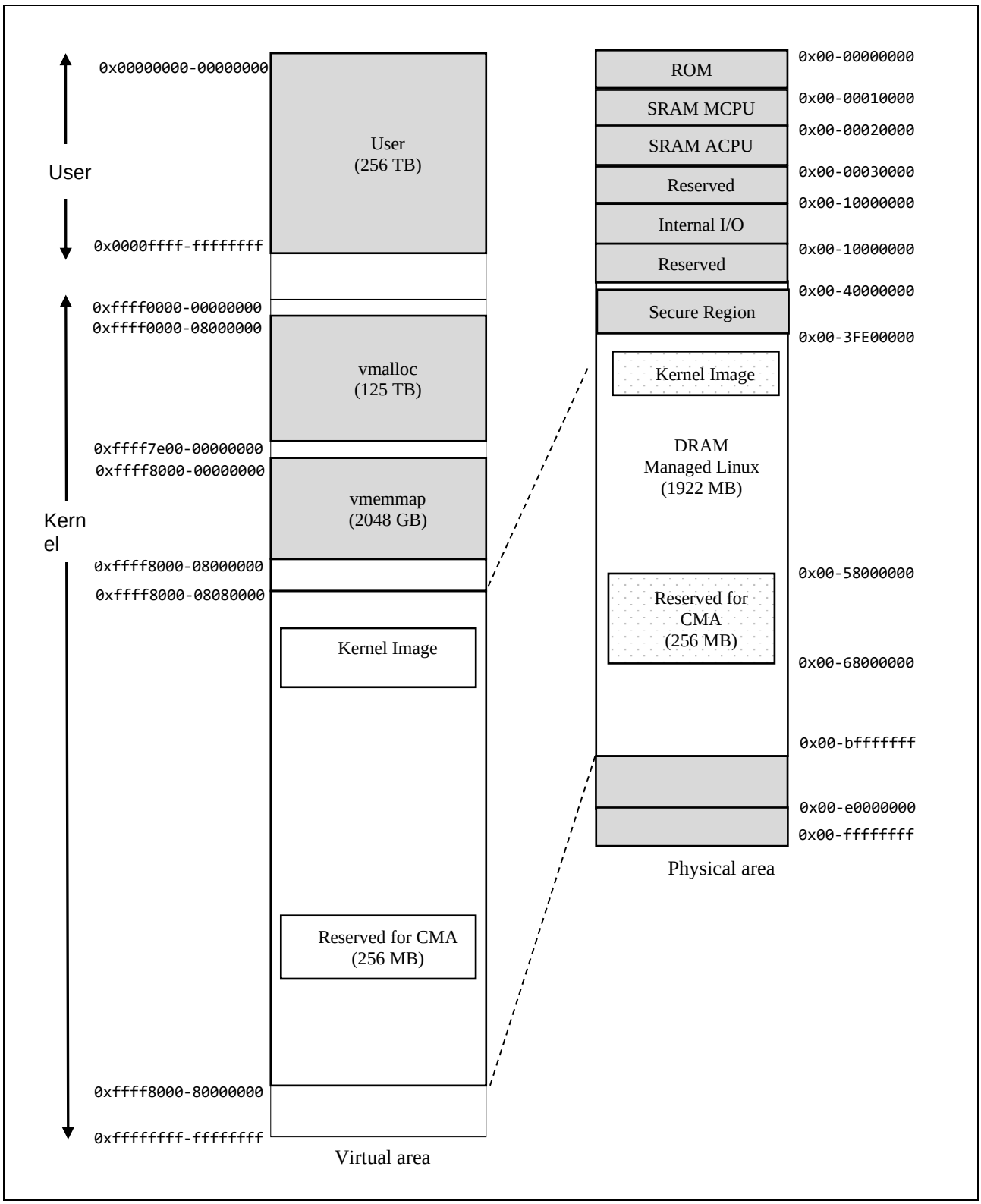

Figure 14. Memory map of kernel (RZ/G2L Evaluation Board Kit)

5.1.4 RZ/G1H, RZ/G1M, RZ/G1N, RZ/G1E

Following Figure 16, Figure 17, Figure 18, Figure 18 shows memory map of this RZ/G1H, RZ/G1M, RZ/G1N, RZ/G1E Linux VLP package.

A saving area of the environment variable of U-Boot is address 0xc0000 of SPI Flash. If you would like to return default value, please use "env default -a" command, after that save by the saveenv command.

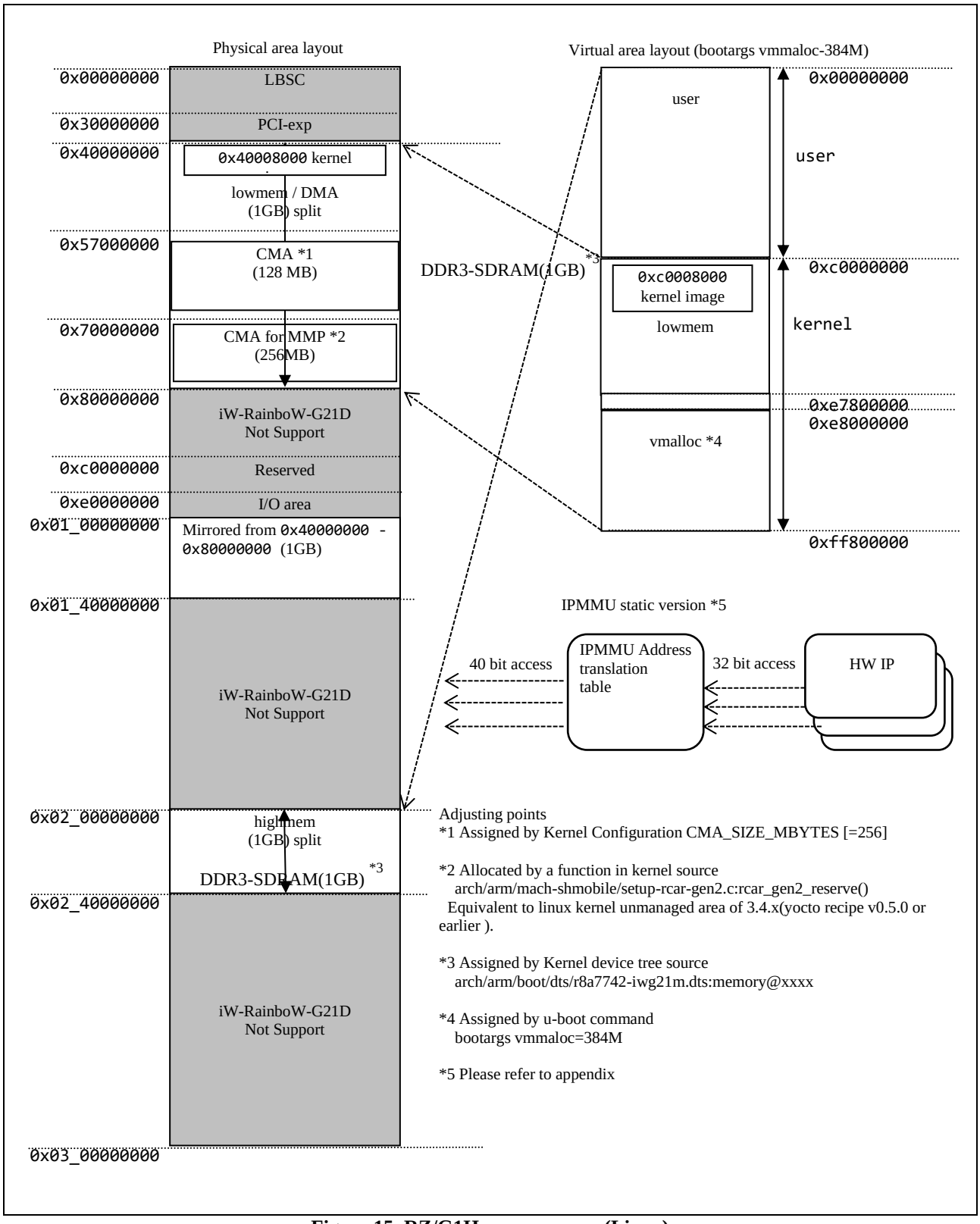

Figure 15. RZ/G1H memory map (Linux)

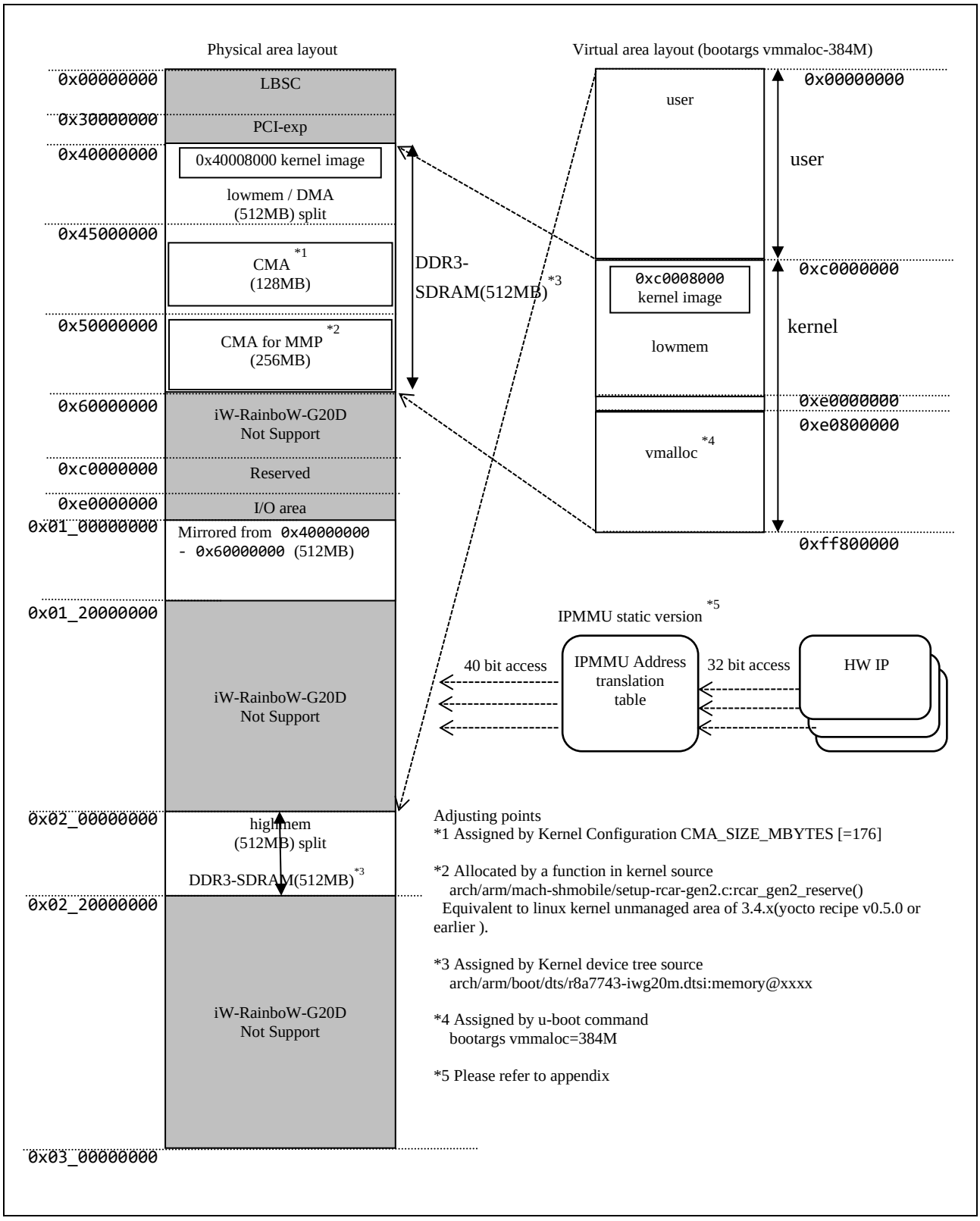

Figure 16. RZ/G1M memory map (Linux)

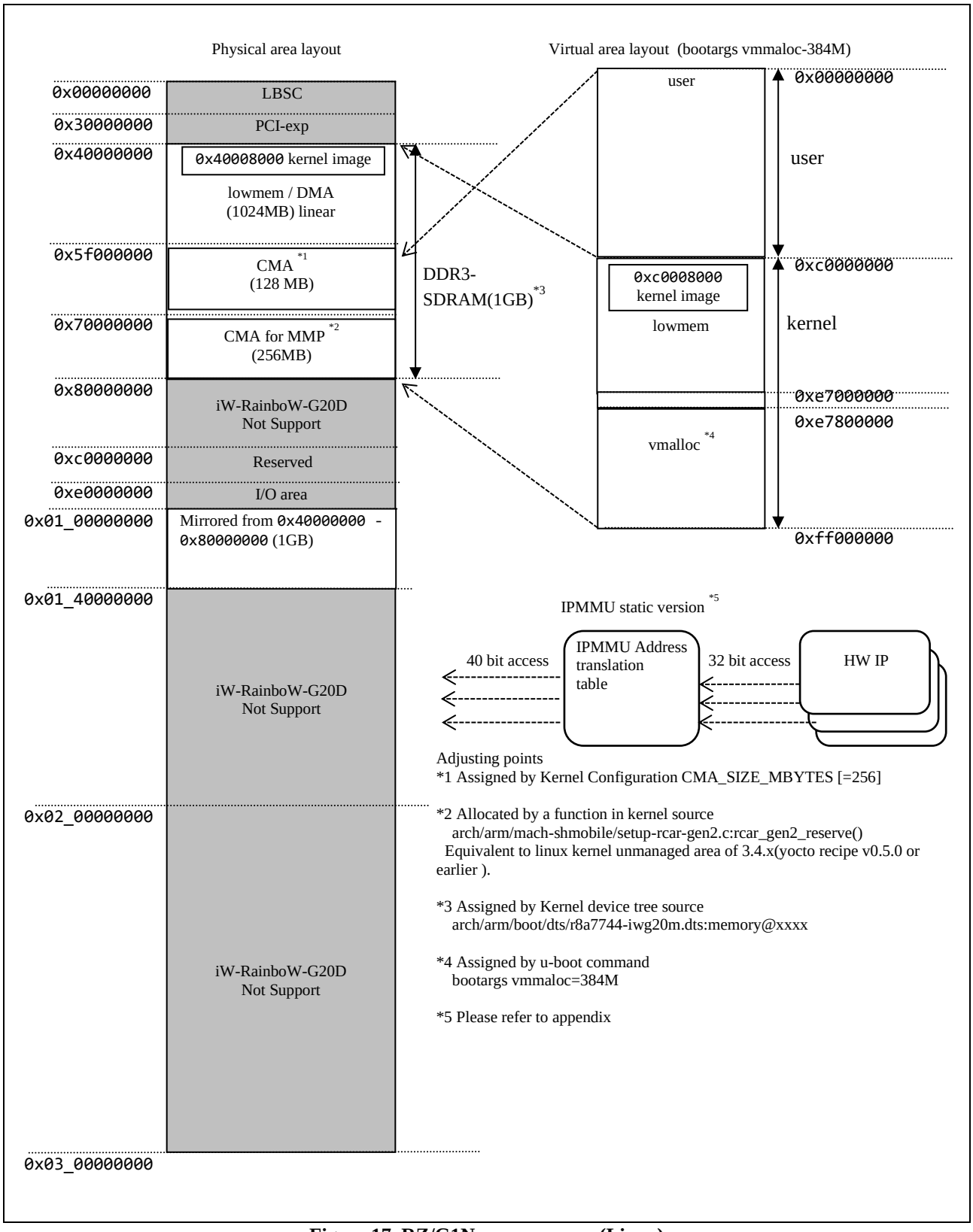

Figure 17. RZ/G1N memory map (Linux)

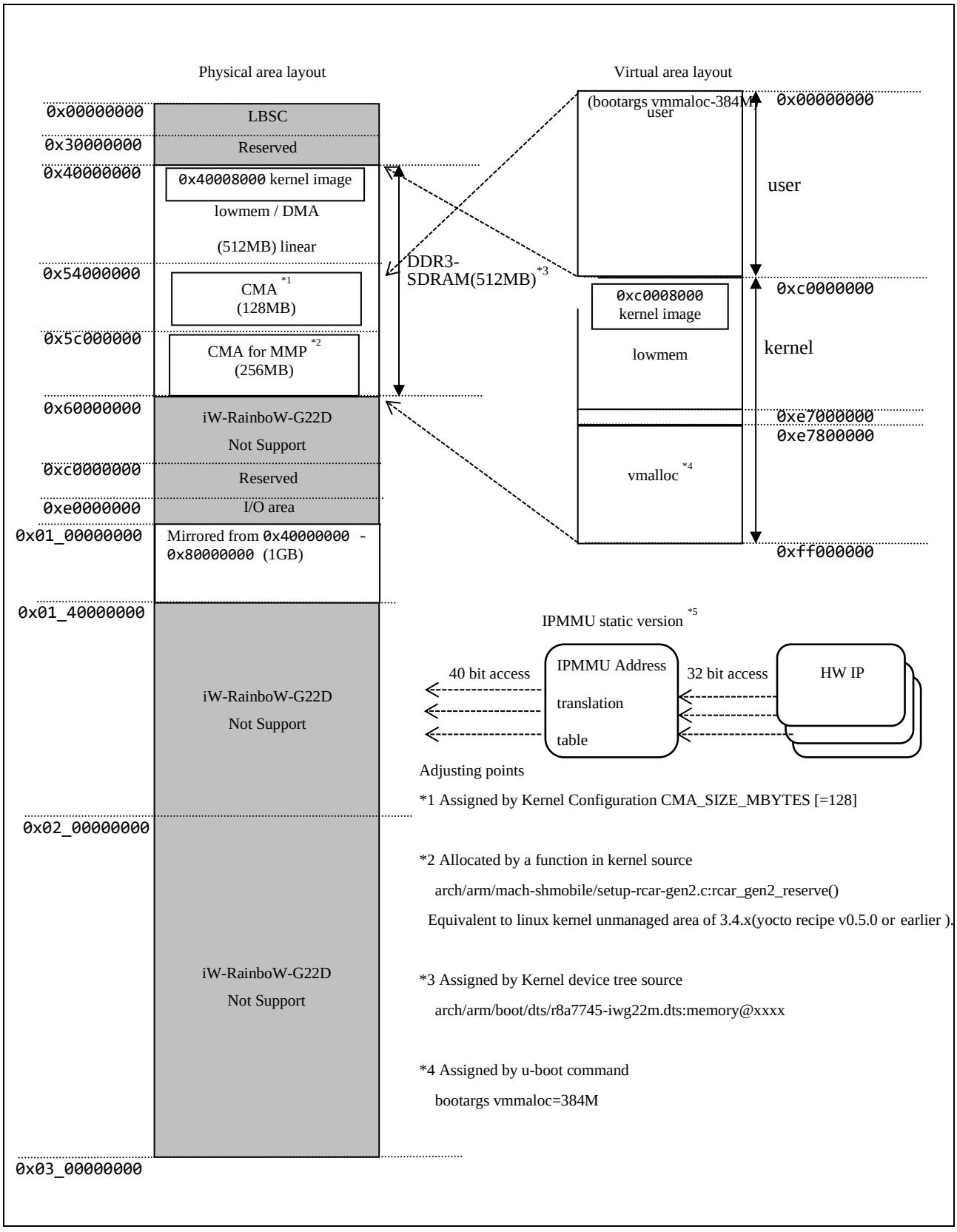

Figure 18. RZ/G1E memory map (Linux)

6. Revision History

		Description	
Rev.	**Date**	**Page**	**Summary**
1.01	Jul. 13, 2022	-	First edition for VLP/G v3.0.0-update1.
1.02	Jun. 24, 2022	11	Add the “Target devices” column to the Table 4.
		23	Fix the patch file name and the commands.
1.03	Jul. 8, 2022	5	Update the Graphics and Video codec libraries for RZ/G2L and RZ/G2L.
		15	Add additional information to table 7.
1.04	Aug. 9, 2022	-	Change some introduction about VLP/G v3.0.0-update1 to VLP/G v3.0.0-update 2.
		4	Update the Release Note and Component List. Add additional information to OSS files.
		5	Update Optional packages.
		23	Add the update points of VLP/G v3.0.0-update2.
1.05	Sep. 30, 2022	-	First edition for VLP/G v3.0.1.
1.06	Mar. 30, 2023	-	First edition for VLP/G v3.0.3.
1.07	Apr. 21, 2023	4, 8	Update the Multimedia Package revision for RZ/G2H, RZ/G2M, RZ/G2N and RZ/G2E.
1.08	Oct. 31, 2023	-	First edition for VLP/G v3.0.5.
		-	Added support RZ/G1H, RZ/G1M, RZ/G1N, and RZ/G1E.
1.09	Nov. 15, 2023	-	Add the patch file of update1.
1.10	Nov. 30, 2023	3	Change “Linux_StartUp_Guide_RZG1H, M, N, E” revision.
1.11	Jan. 22, 2024	-	Add the patch file of update3.
1.12	Apr. 24, 2024		First edition for VLP/G v3.0.6.
			Added support RZ/G3S.
		8	Workaround when executing Docker command.
		10-31	Add section 5.2 Memory maps.
1.13	May 31, 2024		VLP/G v3.0.6-update1
		8	Delete 4 (5) Docker fir RZ/G2H and RZ/G2M section.
1.14	Jun. 14, 2024	-	VLP/G v3.0.6-update2
1.15	Jul. 31, 2024	-	VLP/G v3.0.6-update3
1.16	Mar. 31, 2025	-	VLP/G v3.0.7

Website and Support

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

Inquiries
http://www.renesas.com/contact/

All trademarks and registered trademarks are the property of their respective owners.