REVISION HISTORY	Linux Interface Specification Power Management User's Manual: Software

Rev.	Date	Description	
		Page	Summary
0.1	Nov. 20, 2015	—	New creation.
0.2	Mar. 18, 2016	1,6,8,11,14	- Remove some restrictions.
		33,34,35	- Add RuntimePM API guideline.
		4	- Add IPA to System Software Configuration.
		22,23,36,37	- Add Thermal Management content.
		14	- Update Table 4-5: ADVFS table.
		30	- Update DT of CPUFreq to match with current source file.
0.3	Apr. 15, 2016	All	- Add R-Car M3 support. - Correct typos.
		1	- Table 1-1: Update HWM version.
		14	- Table 4-5: Add 2.0GHz support. - Figure 4-7: Update the arrow showing CPU Freq read ADVFS value
		24	- Correct IPA starting temperature.
		30	- Figure 5-4: Update OPP in device tree source file.
		38	- Figure 6-1: Add DT file for R-Car M3. - Figure 6-1: Add EMS info.
0.4	Aug. 5, 2016	All	- Update revision to Rev0.4, Jun.2016; Update Table of contents. - Replace "CPU Hot-plug" by "CPU Hotplug" - Replace "Apps" by "Applications" and replace "Over drive" by "Boost" - Replace "Suspend to RAM" by "System Suspend to RAM" - Remove all T.B.D
		1	- Chapter 1.4: Remove restrictions of EMS, System Suspend to RAM - Chapter 1.5: Add notice about CPU Idle is disabled by default
		4	- Figure 3-1: Add EMS block into block diagram
		6	- Figure 4-2: Change arrow at (4) to Linux block
		11	- Chapter 4.3.1: Table 4-4: Add performance governor as default mode. And add description of schedutil governor.
		13	- Chapter 4.3.1: Unify the name of "on-demand" by "Ondemand"
		14	- Chapter 4.3.2: Remove "DVFS0.8V" in description of AVS
		14	- Chapter 4.3.2:Table 4-5: Remove OPP column & add Operating mode column. And remove 1.8GHz->2.0GHz.
		14	- Chapter 4.3.2:Add Table 4-6: ADVFS table of M3
		15	- Add description for Figure 4-7
		15	- Add chapter: 4.3.3Required PMIC features
		20	- Figure 4-11: Add "CPU Hotplug Framework" add arrow 3, replace GPIO by I2C.
		22	- Table 4-7: Update EMS description
		23	- Figure 4-13: Update relationship of EMS and CPU Hotplug, CPUFreq Framework
		24	- Figure 4-14: Add CPU Hotplug framework
		25	- Figure 4-15:Update relationship of EMS and CPU Hotplug, CPUFreq Framework
		25	- Chapter 4.6.2:Update and explain relationship of EMS and CPUFreq Framework
		26	- Figure 4-16: Add CPU Hotplug Framework
		27	- Table 5-1: Add /sys/devices/system/cpu/cpufreq/boost for CPUFreq
		29	- Chapter 5.2.1: Update description for Figure 5-2: CPUIdle parameters are just reference value and need to be tuned in customer environment. - Figure 5-2: Add ' status = "disabled" '
		29-30	- Chapter 5.2.2: Add "Enable CPU Idle at boot time by default" and "Enable/disable CPU Idle at Runtime".

Rev.	Date	Description	
		Page	Summary
0.4	Aug. 5, 2016	31	- Figure 5.6: Change label and name of opp tables, and remove opps for 1.8Ghz-2.0Ghz.
		33	- Figure 5-7: Update command to change the frequency of CPU
		34	- Figure 5-10: Update necessary steps for Suspend to RAM
		35	- Add chapter 5.4.3: Support Suspend to RAM in device driver code
		37	- Update power domains' id in table 5-2 and figure 5-12.
		40	- Chapter 5.6.1: Update description for IPA/EMS and update figure 5-14
		41	- Add chapter 5.6.3: Disabling thermal management (IPA/EMS) operation
		42	- Figure 6-1: Update directory configuration
		44	- Table 7-1: Add CPUFreq column and update notes, merit and demerit - Update definition of Boost. - Remove chapter 7.1.1 The time management for Over Drive.
		46-47	- Add chapter: 7.2 System Suspend To RAM implementation on Salvator-X
0.5	Oct. 14, 2016	All	- Change header version to v0.5 and Oct.2016
		30	- Figure 5-5: Modify example of disable/enable of CPUIdle
		30	- Chapter 5.2.2: Change "WFI" to "Sleep mode", "Core Standby" to "Core Standby mode".
		35-37	- Chapter 5.4.3: Update new APIs name and methods for mapping memory
0.6	Dec. 16, 2016	45	- Figure 6.1 Directory configuration: Add r8a7795-es1.dtsi: H3 Ver.1.x device file
0.7	Mar. 15, 2017	All	- Terminology replacing: "Non-secure world" by "Normal world", "CPU plug-in" by "CPU online", "CPU plug-out" by "CPU offline", "secure firmware" by "ARM Trusted Firmware".
		1	- Add Table 1-1 about power management function overview.
		2	- Table 1-2. Add R-Car Series, 3rd Generation LSI hardware manual Rev0.53 and R-CarH3-SiP/M3-SiP System Evaluation Board Salvator-XS Hardware Manual Rev2.00.
		2	- Chapter 1.5 Notice: Remove all notices about CPUIdle is disabled by default and ADVFS table might be change in future.
		4	- Table 3-1. Add R-CarH3-SiP/M3-SiP System Evaluation Board Salvator-XS
		9	- Add Table 4-1 CPU Idle configuration. And in Table 4-2 CPU Idle state, swapping "Power domain" and "clock" location.
		10	- Table 4-3: Add description: "Menu" governor is default governor in current BSP, also it have only evaluate on this governor.
		12	- Chapter 4.3.1. Add description for Figure 4-5: The following figure shows the processing flow of DVFS as an example of Ondemand/Conservative governor.
		16	- Remove chapter 4.3.3. Required PMIC features.
		21	- Add Figure 4-11: HW configuration of System Suspend to RAM.
		23	- Chapter 4.5: About the "Note", please refer to section Figure 7-1 System Suspend to RAM implementation on Salvator-X/XS.
		29	- Add:Table 5-2 Linux document of power management
		31	Description of Figure 5-2: - Remove description about CPUIdle is possible to disable and parameters are tentative. - Add: In R-Car Series, 3rd Generation BSP kernel, these reference parameters (entry-latency-us, exit-latency-us and min-residency-us) are set for Salvator-X/XS board.
		33	- Figure 5-3: Update for confirming number of times each state was entered.
		33	- Figure 5-5: Add note: The CPU Idle status is shared between all CPUs in current BSP. Therefore, if CPU Idle status in CPU0 is disabled, CPU Idle status of other CPUs are also disabled.
		36	- Figure 5-7: Add "Checking the available frequency"
		36	- Add Note: The CPU Freq configuration is shared between the same kind of CPUs in current BSP. Therefore, if the frequency in CPU0 is changed, the frequency of other CPUs are also changed as same frequency.
		37	- Figure 5-10: Update description: The parameters of sysfs (/sys/power/state) excluding "mem" is not supported in current BSP.
		41	- Chapter 5.4.3: Add Note : The currently order of callback is based on BSP implementation for Salvator-X/XS board. If you change the registration order of

			some driver or you add a new driver, please note the dependency for each driver.
		47	- Figure 6-1: Use 'WS' instead of 'ES' in file name description.
		50	- Add chapter 7.1 Design Note for System Suspend to RAM support and update Figure 7-1.
		53	- Add Chapter 7.2: Power management function depend on PMIC.
0.8	Apr. 14, 2017	8	- Figure 4-2: Update capture as: Processing flow of CPU Online
		9	- Update explanation: ”Menu” governor is default governor in current BSP, also it have only evaluate on this governor” to “Menu” governor is default governor in current BSP, also BSP is only evaluated on this governor.
		15	- Remove "The following table values are tentative".
		23	- Replace: “7.1 System Suspend to RAM implementation on Salvator-X/XS.” to “7.1 Design Notes for System Suspend To RAM”.
		23	- Add Note: In case of system resumes and CPUFreq is being run with “userspace” governor, please set the frequency after resume same as frequency before suspend. (This is based on current implementation of upstream kernel.)
		31-32	- Change CPUIdle parameters in example in new values.
		32	- Remove "Currently, the CPU Idle is disabled at boot time by default."
		43-45	- Change all "clock(s)" -> to "clock"
0.9	Jun.14, 2017	2	- Table 1-2: Change HWM version from “Rev.0.53 Dec.31,2016” to “Rev.0.54 Apr.14, 2017.”
		15	- Update ADVFS table in Table 4-6 and Table 4-7
		33	- Update voltage in chapter 5.3.1
		48	- Figure 6-1: Change H3 Ver1.1 to H3 Ver.1.1 and H3 Ver2.0 to H3 Ver.2.0.
1.00	Aug. 8, 2017	All	-Update document format
		15, 34	-Figure4-6, Figure4-7 and Figure5-6: Add AVS7
		27	-Chapter 4.6.2. EMS: Add “Note: The CPU offline/online is overwritten by EMS even if it has been changed by user application via CPU Hotplug.”
1.01	Oct. 24, 2017	All	- Add support for M3N (change M3 to M3/M3N.)
		48	- Figure 6-1: Add file directory for M3N.
1.50	Jan. 29, 2018	All	- Change “ARM” -> to “Arm” (e.g. ARM Trusted Firmware -> Arm Trusted Firmware) - Change number of CPU support for CPUHotplug as: R-Car H3: Y = 1/2/3/4/5/6/7; R-Car M3: Y=1/2/3/4/5, M3N: Y = 1. - Change number of CPU support for CPUIdle and CPUFreq as: R-Car H3: Y = 0/1/2/3/4/5/6/7; R-Car M3: Y=0/1/2/3/4/5, M3N: Y = 0/1.
		All	- Notice: use version 2017
		All	- Address list: use version 2018
		1	- Add Table 1-2: Detailed support of power management functions each R-Car Series, 3rd Generation platform
		2	- Table 1-2: Remove reference “R-Car Series, 3rd Generation User’s Manual: Hardware - Rev.0.51”.
		5	- Figure 3-1: Change CA57 -> CA57/CA53(*) - Add “(*) Note: Support for CA53 only on H3/M3.”
		9	- Table 4-1: Add support Core Standby mode for CA53.
		12	- Change: "About the change of voltage and frequency, CA57 supports change of voltage and frequency only, CA53 is not supported." -> to: "About the change, CA57 supports change of voltage and frequency, CA53 supports change of frequency only."
		15	- Add “Table 4-8 CA57 frequency and voltage table of M3N, Table 4-9 CA53 frequency table of H3, Table 4-10 CA53 frequency table of M3”
		16	- Change: ADVFS by AVS.
		27	- Chapter 4.6.2. EMS: Remove “Note: The CPU offline/online is overwritten by EMS even if it has been changed by user application via CPU Hotplug.”
		31	- Figure 5-2: Update CA53 CPUIdle support on dts.
		32	- Change: "The CPU Idle status is shared between all CPUs in current BSP." -> to: "The CPU Idle status is shared between all CPUs on same cluster (CA57 or CA53) in current BSP." -Change: "CPU Idle status of other CPUs are also disabled."

			-> to: "CPU Idle status of other CPUs on same cluster (CA57) are also disabled."
		33-34	Figure 5-6: Update CA53 CPUFreq support on dts.
		36	- Remove chapter: 5.4.3 Support System Suspend To RAM in device driver code - Figure 5-10: Add “echo deep > /sys/power/mem_sleep # this is default (*)” (*) Note: The initial value of /sys/power/mem_sleep is "deep", so in default environment this step can be skipped.
		41	- Figure 5-17 : Update EMS target CPU as: target_cpus = <&a57_1>, <&a57_2>, <&a57_3>, <&a53_0>, <&a53_1>, <&a53_2>, <&a53_3>;
		42	- Add details description EMS operation: “About detail processing of EMS, when the temperature exceeds the EMS trip point,…” - Add Table 5 5 Example about details EMS operation (on H3)
		44	- Figure 6-1, remove: s2ram_ddr_backup.c : System Suspend to RAM source file s2ram_ddr_backup.h : System Suspend to RAM header file
1.51	Mar. 28, 2018	1	- Chapter 1.1: Add “R-Car E3 System Evaluation Board” is supported. - Table 1-2: Add supported functions for E3.
		2	- Table 1-3: Add “R-CarE3 System Evaluation Board Ebisu Hardware Manual RTP0RC77990SEB0010S”
		4	- Table 3-1: Add “R-CarE3 System Evaluation Board Ebisu”
		5	- Figure 3-1: Add “(*) Note: Support for CA57 only on H3/M3/M3N, support for CA53 only on H3/M3/E3.”
		All	- Chapter 4 and chapter 5: Add number of supported CPU on E3 for CPUHotplug is 1 (as E3: X = 1), CPUIdle is 0/1 (as E3: X = 0/1.)
		16	- Chapter 4.3.2: Add “Table 4 11 CA53 frequency table of E3”
		21	- Chapter 4.5: Revise “In addition, the backup targets are devices of Salvator-X/XS and Ebisu standard”
		24	- Chapter 4.6: Add footnode 1 as below: “- On R-Car H3/M3/M3N, thermal module has three channels (THS1/THS2/THS3). On R-Car E3, thermal module has only one channel (THS1). - For temperature to control IPA, it is got from THS3 channel on H3/M3/M3N; and is got from THS1 on E3. - On E3, IPA controls only DFS (so, it does not control PMIC). And for EMS and System Shutdown, they read temperature from THS1 only.” - Table 4-12: Add “Note: Temperature is read from THS3 on H3/M3/M3N; and from THS1 on E3. (1)”
		25-26, 28	- Figure 4-14 and figure 4-15: Add " Current temperature only from THS3 (on H3/M3/M3N)/THS1 (on E3) (1)” - And in description of figures 4-14, 4-15, 4-16 and 4-17: add cross-referrence to footnode 1.
		32	- In explanation of figure 5-2: Add “Ebisu board”.
		38	- Table 5-3: Add support for E3.
		41-42	- Figure 5-13: Add description for “a53_0: cpu@100” - Figure 5-13: Add description for cooling-maps “map1”.
		43	- Table 5-4: Add “sustainable-power” (for E3) and “contribution” parameters.
		45	- Figure 6-1: Add support for r8a77990 and update the format of description.
		49	- Chapter 7.2: Add description for depending on “R-CarE3 System Evaluation Board Ebisu (on E3).”
		25-28, 43	- Figure 4.14, Figure 4.15, Figure 4.16, Figure 4.17: Remove GPU support for EMS. - Chapter 5.6.2: Remove GPU description.
1.52	Apr. 25, 2018	36	- Add: Figure 5-9 Example of disabling AVS function
		45	- Chapter 6.1: Add new dts files: r8a7795-salvator-xs-4x2g.dts and r8a7795-salvator-xs-2x2g.dts
1.53	Jun. 27, 2018	2	- Table 1-3: Add “Initial Program Loader User’s Manual: Software R-Car H3/M3/M3N/E3 Series”
		36	- Chapter 3.5.2: Add “Note: For disabling AVS function in Initial Program Loader, please refer to Initial Program Loader User’s Manual (as in Table 1 3), Chapter 5.3 Option setting, RCAR_AVS_SETTING_ENABLE part.”
1.54	Sep. 26, 2018	2	- Table 1-3: Change version of R-Car Series, 3rd Generation User’s Manual:

			Hardware from Rev.0.80 : Oct. 31, 2017 to Rev.1.00 : Apr. 30, 2018
2.00	Dec. 25, 2018	-	- Update AddressList
		2	- Table 1-3: Change Salvator-XS board information as: ・R-CarH3-SiP/M3-SiP/M3N-SiP System Evaluation Board Salvator-XS Hardware Manual ・Rev.2.04 ・Jul. 17, 2018 ・R-CarH3-SiP System Evaluation Board Salvator-X Hardware Manual RTP0RC7795SIPB0011S ・Rev.1.09 ・May. 11, 2017 R-CarM3-SiP System Evaluation Board Salvator-X Hardware Manual RTP0RC7796SIPB0011S ・Rev.0.04 ・Oct. 3, 2016 R-CarE3 System Evaluation Board Ebisu Hardware Manual RTP0RC77990SEB0010S ・Rev.0.03 ・Apr. 11, 2018
		4	- Table 3-1: + Change Salvator-XS board name as “R-CarH3-SiP/M3-SiP/M3N-SiP System Evaluation Board Salvator-XS” + Append Ebisu-4D board to Ebisu board type as below: R-CarE3 System Evaluation Board Ebisu R-CarE3 System Evaluation Board Ebisu-4D
		44	Figure 5-14: + Change from threshold: trip-point@0 to threshold: trip-point0 + Change from target: trip-point@1 to target: trip-point1
2.01	Apr. 17, 2019	2	- Update Related documents
		-	- Update Address List
2.02	Jun. 26, 2019	15	- Describe Table 4-9, Table 4-10 and Table 4-11 in a line.
		24, 38, 39, 40, 41	- Correct the Table, Figure number.
		-	- Correct Figure 5-9 to Figure 5-10 at Rev 0.4, 0.7, 1.50. - Change WS1.x to Ver.1.x at Rev 0.6. - Change Table 4-11 to Table 4-12, Figure 5-12 to 5-13 at Rev 1.51.
2.03	Jan. 29, 2021	All	- Add R-Car V3H support.
2.54	May 20, 2021	All	- Merge R-Car V3U and add R-Car V3M support.
2.55	Aug. 16, 2021	All	- Update default governor and add performance governor switching - Merge R-Car D3
3.00	Dec. 10, 2021	-	Add Kernel v5.10.41 support
3.1.0	Dec. 25, 2023	-	Add Kernel v5.19.194 support for H3, M3, M3N, E3