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# Linux Interface Specification Device Driver RWDT

User's Manual: Software

R-Car H3/M3/M3N/E3/D3/V3U/V3H Series

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# How to Use This Manual

- **[Readers]**

This manual is intended for engineers who develop products which use the R-Car H3/M3/M3N/E3/D3/V3U/V3H processor.

- **[Purpose]**

This manual is intended to give users an understanding of the functions of the R-Car H3/M3/M3N/E3/D3/V3U/V3H processor device driver and to serve as a reference for developing hardware and software for systems that use this driver.

- **[How to Read This Manual]**

It is assumed that the readers of this manual have general knowledge in the fields of electrical

— engineering, logic circuits, microcontrollers, and Linux.

→ Read this manual in the order of the CONTENTS.

— To understand the functions of a multimedia processor for R-Car H3/M3/M3N/E3/D3/V3U/V3H

→ See the R-Car H3/M3/M3N/E3/D3/V3U/V3H User's Manual.

— To know the electrical specifications of the multimedia processor for R-Car H3/M3/M3N/E3/D3/V3U/V3H

→ See the R-Car H3/M3/M3N/E3/D3/V3U/V3H Data Sheet.

- **[Conventions]**

The following symbols are used in this manual.

Data significance: Higher digits on the left and lower digits on the right

**Note:** Footnote for item marked with Note in the text

**Caution:** Information requiring particular attention

**Remark:** Supplementary information

Numeric representation: Binary ... xxxx, 0bxxxx, or xxxxB

Decimal ... xxxx

Hexadecimal ... 0xxxxx or xxxxH

Data type: Double word ... 64 bit

Word ... 32 bits

Half word ... 16 bits

Byte ... 8 bits

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# 1. Overview

## 1.1 Overview

This manual explains the driver module that controls the RCLK watchdog timer (RWDT) on R-Car H3/M3/M3N/E3/D3/V3U/V3H.

## 1.2 Function

This device driver supports the following functions:

- Timer start and stop support.
- Periodic count clear support.

The following table (Table 1-1) provides a list of hardware functions and support status in software.

**Table 1-1. Hardware functions and software support status**

Hardware function	Support status in software (R-Car H3/M3/M3N/E3/D3/V3U/V3H)
Counter input clock selection	Unsupported (Fixed value)
Control of system runaway	Supported
Module stop	Supported

## 1.3 Reference

### 1.3.1 Standard

There is no reference document on standards.

### 1.3.2 Related documents

The following table (Table 1-2) shows the document related to this module.

**Table 1-2. Related documents (R-Car H3/M3/M3N/E3/D3/V3U/V3H)**

Number	Issue	Title	Edition	Date
-	Renesas Electronics	R-CarH3-Sip System Evaluation Board Salvator-X Hardware Manual RTP0RC7795SIPB0011S	Rev.1.03	Jul.19, 2016
-	Renesas Electronics	R-CarM3-Sip System Evaluation Board Salvator-X Hardware Manual RTP0RC7796SIPB0011S	Rev.0.03	Jul.19, 2016
-	Renesas Electronics	R-CarH3-SiP/M3-SiP/M3N-SiP System Evaluation Board Salvator-XS Hardware Manual RTP0RC7795SIPB0012S	Rev.2.04	Jul. 17, 2018
-	Renesas Electronics	R-CarE3 System Evaluation Board Ebisu Hardware Manual RTP0RC77990SEB0010S	Rev.0.01	Mar. 9, 2018
-	Renesas Electronics	R-CarE3 System Evaluation Board Ebisu-4D (E3 board 4xDRAM) Hardware Manual	Rev.1.01	Jul. 19, 2018
-	Renesas Electronics	R-Car Series, 3rd Generation User's Manual: Hardware	Rev.2.20	Jun. 30, 2020
-	Renesas Electronics	R-CarV3U System Evaluation Board Falcon Hardware Manual	Rev.0.01	Sep. 11, 2020
-	Renesas Electronics	R-Car V3U Series User's Manual	Rev.0.5	Jul. 31, 2020
-	Renesas Electronics	R-Car V3H_2, Additional Document for User's Manual: Hardware	Rev.0.50	Jul. 31, 2020
-	Renesas Electronics	R-CarV3H System Evaluation Board Condor-I Hardware Manual	Rev.0.02	Nov. 11, 2019
-	Renesas Electronics	R-CarD3 System Evaluation Board Hardware Manual RTP0RC77995SEB0010S	Rev.1.20	Jul. 25, 2017

## 1.4 Restrictions

There is no restriction in this module.

## 1.5 Notice

There is no notice in this module.

## 2. Terminology

The following table (Table 2-1) shows the terminology related to this module.

**Table 2-1. Terminology**

Terms	Explanation
SoC	<u>S</u> ystem <u>o</u> n <u>C</u> hip
RWDT	<u>R</u> CLK <u>W</u> atch <u>d</u> og <u>T</u> imer



## 3. Operating Environment

### 3.1 Hardware Environment

The following table (Table 3-1) shows the hardware needed to use this module.

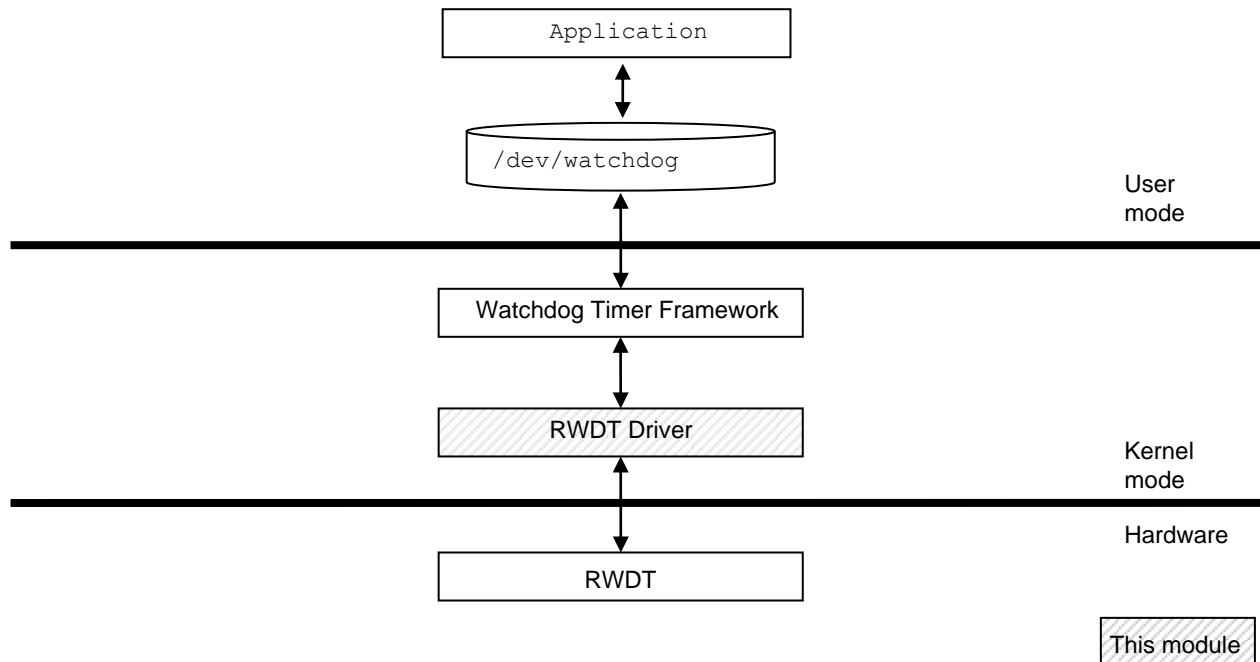
**Table 3-1. Hardware environment (R-Car H3/M3/M3N/E3/D3/V3U/V3H)**

Name	Version	Manufacturer
R-CarH3-SiP System Evaluation Board Salvator-X	-	Renesas Electronics
R-CarM3-SiP System Evaluation Board Salvator-X	-	Renesas Electronics
R-CarH3-SiP/M3-SiP/M3N-SiP System Evaluation Board Salvator-XS	-	Renesas Electronics
R-CarE3 System Evaluation Board Ebisu	-	Renesas Electronics
R-CarE3 System Evaluation Board Ebisu-4D	-	Renesas Electronics
R-CarV3U-SiP System Evaluation Board Falcon	-	Renesas Electronics
R-CarV3H System Evaluation Board Condor-I	-	Renesas Electronics
R-CarD3 System Evaluation Board Draak	-	Renesas Electronics

Note: In R-CarH3-SiP Ver.2.0, R-CarM3-SiP Ver.1.1/Ver.1.2, R-CarM3N-SiP Ver.1.1 or later on System Evaluation Board Salvator-XS, please set up pin 8 of SW12 off.

### 3.2 Module Configuration

The following figure (Figure 3-1) shows the configuration of this module.



**Figure 3-1. Module Configuration (R-Car H3/M3/M3N/E3/D3/V3U/V3H)**

### 3.3 State Transition Diagram

The timer state transition is controlled by Watchdog Timer Framework. Figure 3-2 below illustrates the state transition diagram of the RWDT module.

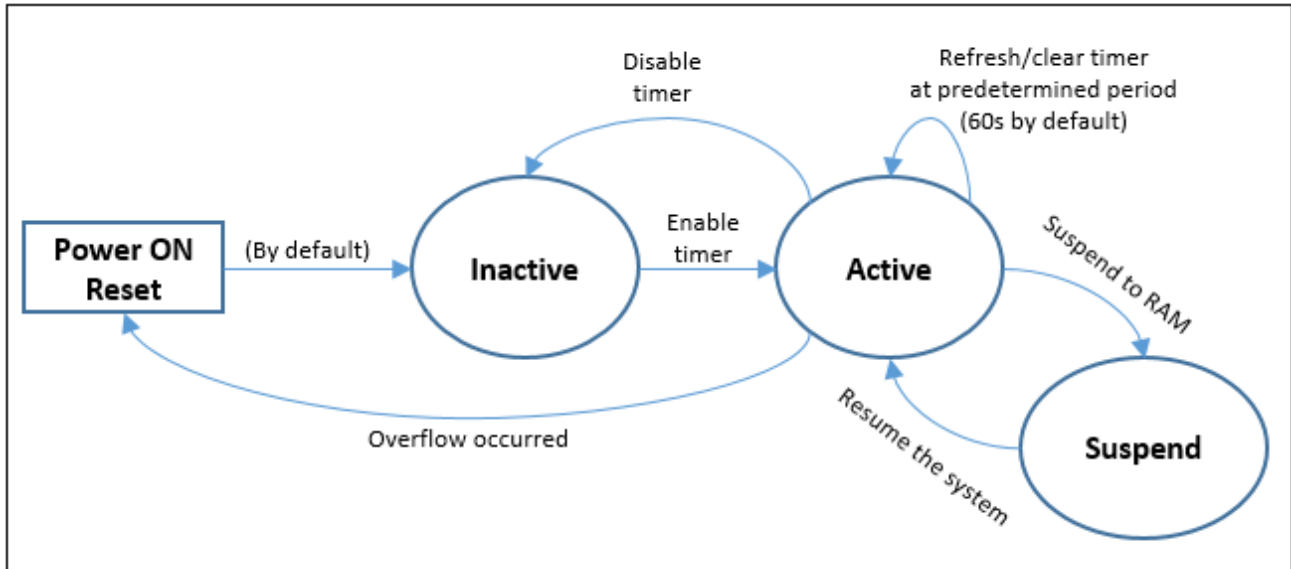


Figure 3-2. State Transition Diagram (R-Car H3/M3/M3N/E3/D3/V3U/V3H)

### 3.4 State Transition Table

State transition table for the driver is demonstrated in Table 3-2.

Table 3-2. State transition table for RCLK Watchdog Timer driver

Current State	Event	Next State	Remark
[System OFF]	Power ON	Inactive	Watchdog is disabled after boot up.
Inactive	Activate the watchdog	Active	Open /dev/watchdog. Example: # echo "@" > /dev/watchdog
Active	Ping the watchdog	Active	The watchdog should be pinged within a certain time (timeout).
Active	Counter overflows	Inactive	Causing a reboot.
Active	Disable the watchdog	Inactive	Close /dev/watchdog. Example: # echo "V" > /dev/watchdog
Active	Suspend to RAM	Suspend	Watchdog timer stops counting up.
Suspend	Resume the system	Active	The counter is reset so it starts counting up from initial set value.

## 4. Processing Sequence

### 4.1 Probe and remove

Processing sequence of this driver when being probed and removed are illustrated in figure 4-1 and figure 4-2 respectively.

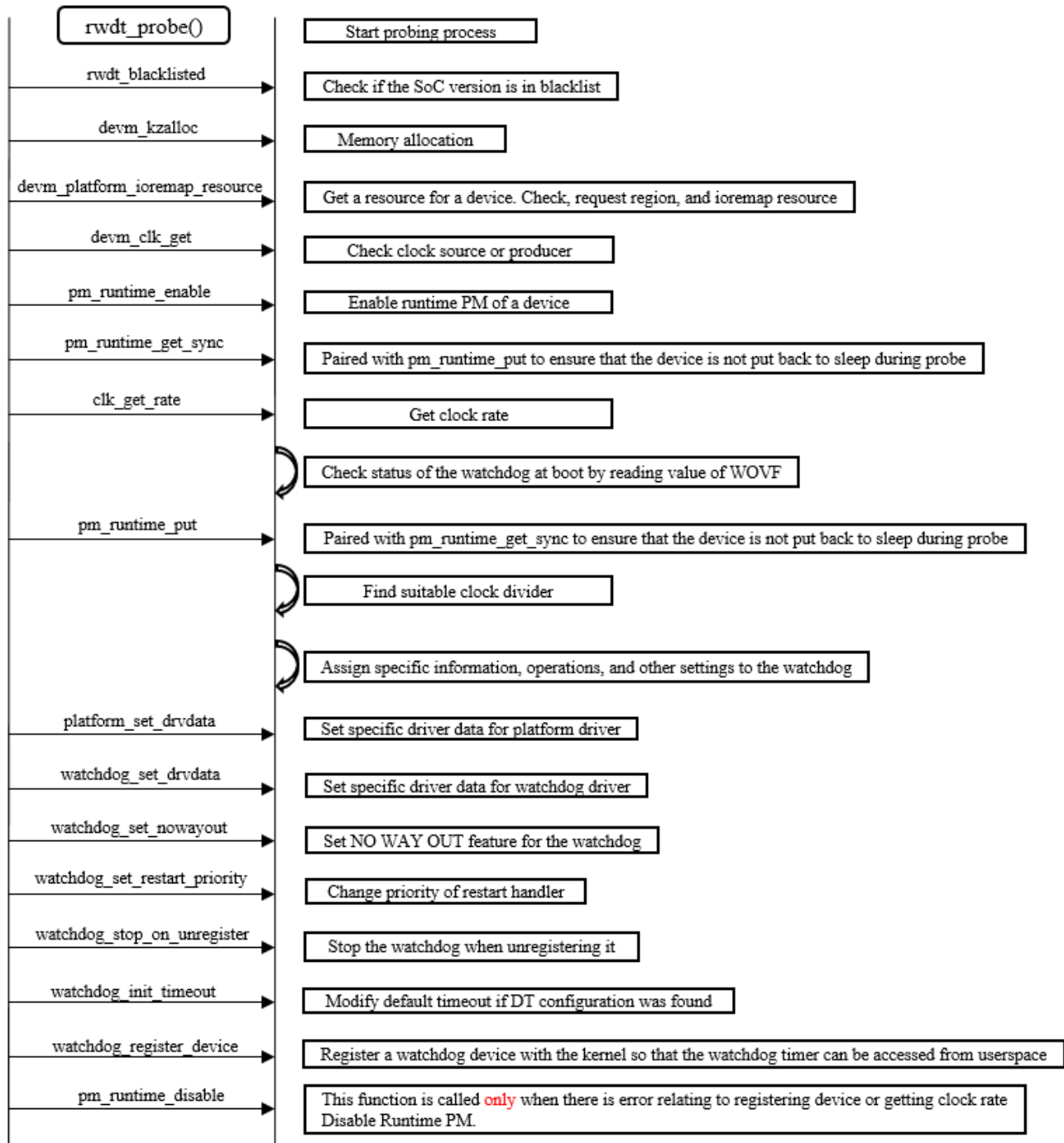
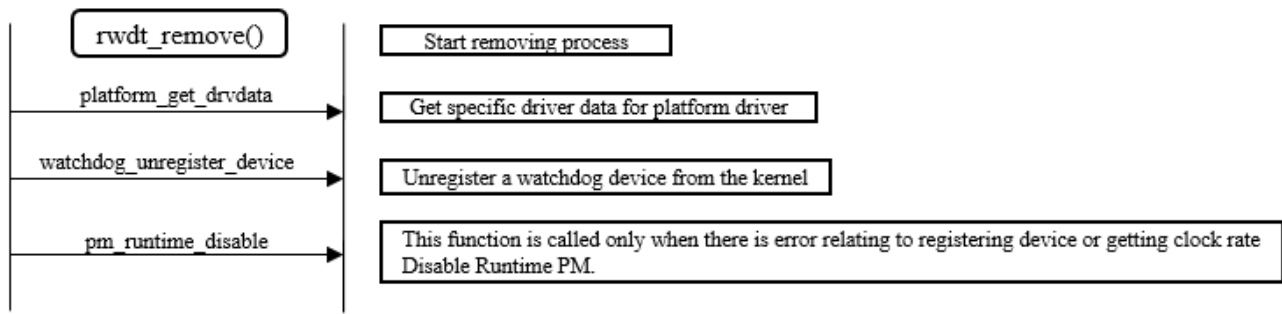


Figure 4-1. Processing sequence diagram of probe function



**Figure 4-2. Processing sequence diagram of remove function**

## 4.2 Start, stop, and periodic ping operations

The following diagram (Figure 4-3) describes processing sequence of start, stop, and periodic ping operations.

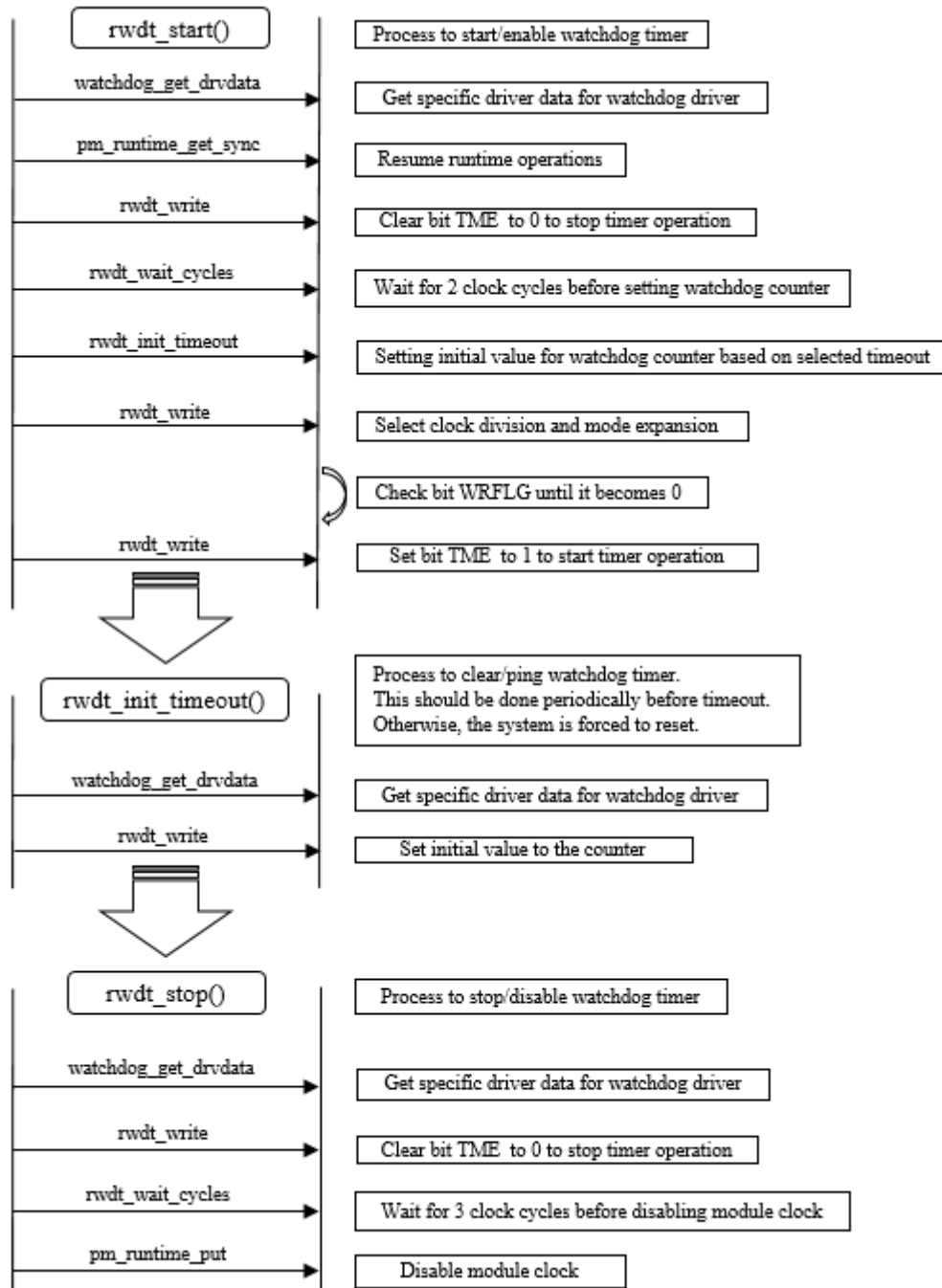


Figure 4-3. Processing sequence of start, stop, and ping functions

### 4.3 Suspend and Resume

Please noting that R-Car D3/V3U/V3H does not support suspend and resume.

For processing sequence of suspend and resume operations, please refer to figure 4-4 below.

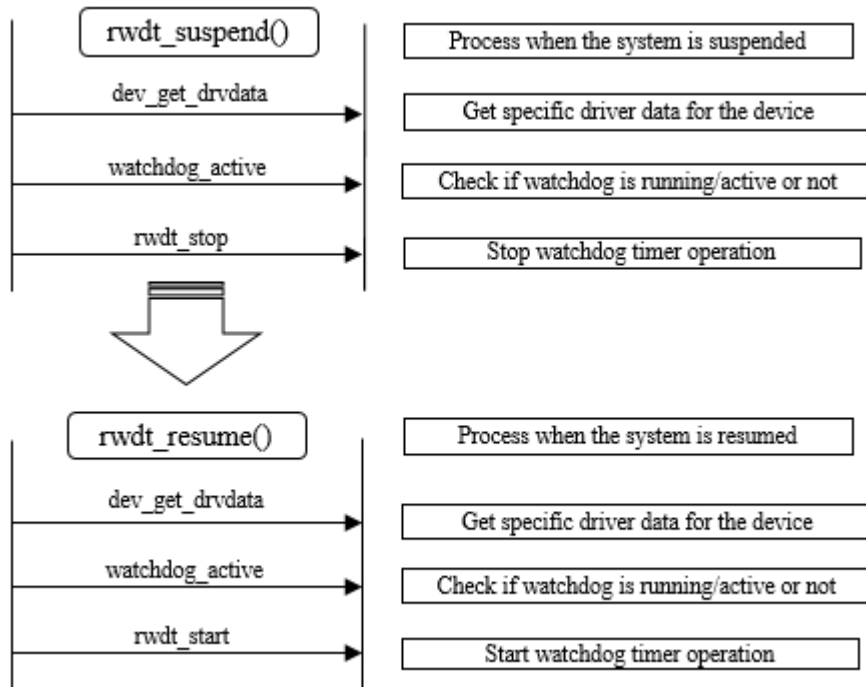


Figure 4-4. Processing sequence of suspend and resume functions

## 5. Flowchart

The following flowchart (Figure 5-1) demonstrates operation of RWDT module implementing in software.

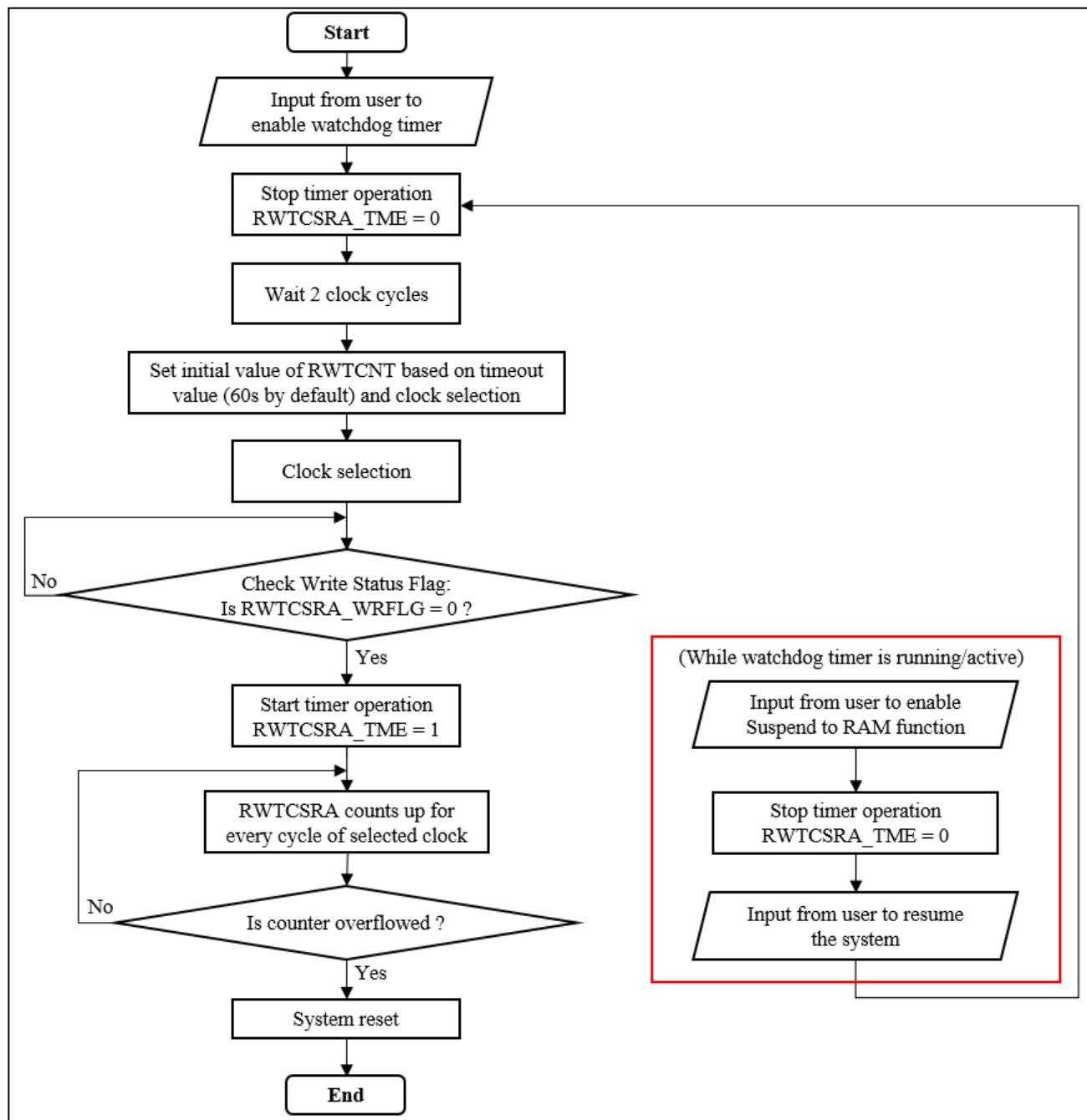


Figure 5-1. Flowchart of RWDT module

## **6. Target Performance**

There is no target performance for RWDT module.



## 7. External Interface

Instead, the user interface is offered by Watchdog timer framework.

User application can control RWDT device via /dev/watchdog by using ioctl system call.

### 7.1 Device node

The following table shows the device node of this module.

**Table 7-1. RWDT device node**

Channel	Device node	Major number	Minor number
RWDT	/dev/watchdog	10	130

### 7.2 Interface specification

The following table lists Watchdog timer framework's system call interface and the driver interface functions.

**Table 7-2. System call interface**

Chapter	Function name	Description
7.2.1	open	Open RWDT device file and start counting.
7.2.2	close	Close RWDT device file.
7.2.3	write	Simple operation of the Watchdog Timer framework.
7.2.4	ioctl(WDIOC_KEEPALIVE)	Refresh the RWDT counter.
7.2.5	ioctl(WDIOC_SETTIMEOUT)	Set timeout (in seconds).
7.2.6	ioctl(WDIOC_GETTIMEOUT)	Get current timeout settings (in seconds).
7.2.7	ioctl(WDIOC_GETSUPPORT)	Get device supported features.
7.2.8	ioctl(WDIOC_SETOPTIONS)	Set/clear module standby.

**7.2.1 open**

[Overview]	Watchdog Timer initialization and start counting.	
[Function Name]	open	
[Calling format]	int open(const char *device_name, int flags)	
[Arguments]	device_name	: Device name to open (/dev/watchdog)
	flags	: Open mode (O_RDONLY / O_WRONLY / O_RDWR)
[Returns]	Greater than 0	: File descriptor (Operation success)
	Negative value	: Error
[Feature]	Watchdog Timer is initialized and start counting.	
[Remark]	System reset will be occurred if timer is not refreshed after a default timeout duration (default timeout is 60 seconds).	
	Trigger an ioctl system call with WDIOC_KEEPALIVE argument to refresh the timer.	

**7.2.2 close**

[Overview]	Watchdog Timer de-initialization	
[Function Name]	close	
[Calling format]	int close(int fd)	
[Arguments]	fd	: File descriptor
[Returns]	0	: Success
	Negative value	: Error
[Feature]	Control of Watchdog Timer is ended.	
	RWDT operation is stopped, driver resources are released.	
[Remark]	-	

### 7.2.3 write

[Overview]	Simple operation of the Watchdog Timer framework		
[Function Name]	write		
[Calling format]	ssize_t write(int fd, const void *buf, size_t count)		
[Arguments]	fd	:	File descriptor
	buf	:	Write data stock area
			‘V’: magic close character handling.
			Other: keep alive ping reply.
	count	:	Write size
[Returns]	Positive value	:	Success (Write size)
	-1	:	Error
[Feature]	<p>Writing the magic 'V' sequence allows the next close to turn off the watchdog.</p> <p>Other write to a watchdog device is defined as a keep alive ping.</p> <p>Refer to section 7.2.4 ioctl(WDIOC_KEEPALIVE) for 'keep alive ping'.</p>		
[Remark]	-		

### 7.2.4 ioctl(WDIOC\_KEEPALIVE)

[Overview]	Refresh the RWDT counter.		
[Function Name]	ioctl(WDIOC_KEEPALIVE)		
[Calling Format]	int ioctl (int fd, WDIOC_KEEPALIVE, 0)		
[Arguments]	fd	:	File descriptor
[Returns]	0	:	Success
	Negative value	:	Error
[Feature]	Clear the counter to initialized value.		
[Remark]	The third argument is ignored.		

**7.2.5 ioctl(WDIOC\_SETTIMEOUT)**

[Overview]	Set timeout (in seconds).	
[Function Name]	ioctl(WDIOC_SETTIMEOUT)	
[Calling Format]	int ioctl (int fd, WDIOC_SETTIMEOUT, unsigned int *timeout)	
[Arguments]	fd	: File descriptor
	timeout	: Timeout duration [sec]
[Returns]	0	: Success
	Negative value	: Error
[Feature]	Update timeout setting with value in timeout argument.	
	The range of the timeout input value depends on the evaluation board.	
	Salvator-X: 1 - 8246	
	Salvator-XS (SW12-8:OFF) : 1 - 8192	
[Remark]	-	

**7.2.6 ioctl(WDIOC\_GETTIMEOUT)**

[Overview]	Get current timeout settings (in seconds).	
[Function Name]	ioctl(WDIOC_GETTIMEOUT)	
[Calling Format]	int ioctl (int fd, WDIOC_GETTIMEOUT, unsigned int *timeout)	
[Arguments]	fd	: File descriptor
	timeout	: To store current timeout setting [sec]
[Returns]	0	: Success
	Negative value	: Error
[Feature]	Retrieve current timeout setting and store into timeout argument.	
[Remark]	-	

### 7.2.7 ioctl(WDIOC\_GETSUPPORT)

[Overview]	Get device supported features.	
[Function Name]	ioctl(WDIOC_GETSUPPORT)	
[Calling Format]	int ioctl (int fd, WDIOC_GETSUPPORT, struct watchdog_info *ident)	
[Arguments]	fd	: File descriptor
	ident	: To store the watchdog_info structure information
[Returns]	0	: Success
	Negative value	: Error
[Feature]	Retrieve the watchdog_info internal structure and store into ident argument. Refer to section 7.3.1 watchdog_info for details.	
[Remark]	-	

### 7.2.8 ioctl(WDIOC\_SETOPTIONS)

[Overview]	Set/clear module standby.	
[Function Name]	ioctl(WDIOC_SETOPTIONS)	
[Calling Format]	int ioctl (int fd, WDIOC_SETOPTIONS, int *mode)	
[Arguments]	fd	: File Descriptor
	mode	: Operation mode (WDIOS_DISABLECARD: Enter module standby mode or WDIOS_ENABLECARD: Exit module standby mode)
[Returns]	0	: Success
	Negative value	: Error
[Feature]	Change operation mode of RWDT device based on value of mode argument. Refer to Table 7-3 for option information.	
[Remark]	-	

## 7.3 Structure

The structures definitions required of this module are shown as follows.

### 7.3.1 watchdog\_info

This watchdog\_info structure is defined in “include/uapi/linux/watchdog.h”.

```
struct watchdog_info {
    __u32 options;
    __u32 firmware_version;
    __u8 identity[32];
};
```

options:

Supported options. Refer to Table 7-3 for option information.

identity[32]:

Driver ID is fixed as "Renesas WDT Watchdog".

firmware\_version:

Note: undefined in this module.

## 7.4 Global Variables and Constants

### 7.4.1 Global Variables

There are no global variables for this module.

### 7.4.2 Global Constants

The global constants are showed below.

**Table 7-3. Global Constants for supported options**

Global Constant Name	Value	Remark
WDIOF_CARDRESET	0x0020	Card previously reset the CPU.
WDIOF_SETTIMEOUT	0x0080	Set timeout (in seconds).
WDIOF_MAGICCLOSE	0x0100	Supports magic close char.
WDIOF_KEEPAWAKEPING	0x8000	Keep alive ping reply.

**Table 7-4. Global Constants for ioctl system call**

Global Constant Name	Value	Remark
WDIOS_DISABLECARD	0x0001	Turn off the watchdog timer (module standby).
WDIOS_ENABLECARD	0x0002	Turn on the watchdog timer (exit module standby).

## 7.5 Definitions

### 7.5.1 Device information in Device Tree

There are required properties and optional properties in this device.

The RWDT device properties for R-Car H3 are showed below (arch/arm64/boot/dts/renesas/r8a7795.dtsi).

```
rwdt: watchdog@e6020000 {
    compatible = "renesas,r8a7795-wdt", "renesas,rcar-gen3-wdt";
    reg = <0xe6020000 0 0x0c>;
    clocks = <&cpg CPG_MOD 402>;
    power-domains = <&sysc R8A7795_PD_ALWAYS_ON>;
    resets = <&cpg 402>;
    status = "disabled";
};
```

To be specific, the RWDT device required properties consist of:

**compatible:**

Must be set to: "renesas,r8a7795-wdt" for R8A7795 (R-Car H3) or  
 "renesas,r8a7796-wdt" for R8A7796 (R-Car M3) or  
 "renesas,r8a77965-wdt" for R8A77965 (R-Car M3N) or  
 "renesas,r8a77990-wdt" for R8A77990 (R-Car E3) or  
 "renesas,r8a77995-wdt" for R8A77995 (R-Car D3) or  
 "renesas,r8a779a0-wdt" for R8A779A0 (R-Car V3U) or  
 "renesas,r8a77980-wdt" for R8A77980 (R-Car V3H) and  
 "renesas,rcar-gen3-wdt" as a fallback.

**reg:**

Base address and length of the memory resource used by the RCLK Watchdog Timer.

**clocks:**

The 1st cell is a node or label of CPG clock to be used.

The 2nd cell must be set to CPG\_MOD.

The 3rd cell must be set to appropriate value that depends on each SoC/SiP (402 for R-Car H3/M3/M3N/E3/D3/V3H, or 907 for R-Car V3U).

**power domain:**

Must be set to always on.

**status:**

By default, the RWDT device is disabled after power-on reset.

For other SoC family versions such as R-Car M3, R-Car M3N, R-Car E3, R-Car D3, R-Car V3U, and R-Car V3H, please refer to the following table (Table 7-5) for location of files that define above required properties.

**Table 7-5. Location of files that define required properties for different SoC family versions**

SoC family	Location
R-Car H3	arch/arm64/boot/dts/renesas/r8a7795.dtsi
R-Car M3	arch/arm64/boot/dts/renesas/r8a7796.dtsi
R-Car M3N	arch/arm64/boot/dts/renesas/r8a77965.dtsi
R-Car E3	arch/arm64/boot/dts/renesas/r8a77990.dtsi
R-Car D3	arch/arm64/boot/dts/renesas/r8a77995.dtsi
R-Car V3U	arch/arm64/boot/dts/renesas/r8a779a0.dtsi
R-Car V3H	arch/arm64/boot/dts/renesas/r8a77980.dtsi

On the other hand, RWDT device optional properties include configuration of default timeout value.

`timeout-sec:`

Contains the watchdog timeout in seconds. A default value is 60 seconds.

For R-Car H3, M3, and M3N, this property can be found in “arch/arm64/boot/dts/renesas/salvator-common.dtsi”.

For R-Car E3, this property can be found in “arch/arm64/boot/dts/renesas/r8a77990-ebisu.dts”.

For R-Car D3, this property can be found in “arch/arm64/boot/dts/renesas/r8a77995-draak.dts”.

For R-Car V3U, this property can be found in “arch/arm64/boot/dts/renesas/r8a779a0-falcon.dts”.

For R-Car V3H, this property can be found in “arch/arm64/boot/dts/renesas/r8a77980-condor.dts”.

```
&rwtd {
    timeout-sec = <60>;
    status = "okay";
};
```



## **8. Integration**

### **8.1 Directory Configuration**

The directory configuration is shows below (Figure 8-1).

```

_____ drivers/watchdog/ _____ renesas_wdt.c: RCLK Watchdog Timer source file
    
```

**Figure 8-1. Directory Configuration**

### **8.2 Integration Procedure**

To enable the function of this module, make the following setting with kernel configuration.

```

Device Drivers --->
  [*] Watchdog Timer Support --->
    <*> Renesas WDT Watchdog
    
```

### **8.3 Option Setting**

#### **8.3.1 Module parameters**

There are no module parameters.

#### **8.3.2 Kernel parameters**

There are no kernel parameters.

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REVISION HISTORY	Linux Interface Specification RWDT User's Manual: Software
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Rev.	Date	Description	
		Page	Summary
0.1	Nov. 20, 2015	—	New creation.
0.2	Apr. 15, 2016	All	Add R-Car M3 support
		1	1.3.2 Related document Update Table 1-3 of Hardware User's Manual and System Evaluation Board Salvator-X Hardware Manual
		8	4.2.5 ioctl(WDIOC_SETTIMEOUT) Change timeout value range from 1~459000 to 1~2114.
		12	5.3.1 Module parameters Add that there was no parameter.
0.3	Aug. 5, 2016	1	1.3.2 Related document Update Table 1-3 of Hardware User's Manual and System Evaluation Board Salvator-X Hardware Manual
		3	3.1 Hardware Environment Update Table 3-1 of Hardware evaluation
		8	4.2.5 ioctl(WDIOC_SETTIMEOUT) Change timeout value range from 1~2144 to 1~2048.
		10	4.3.1 watchdog_info Update identity[32] From "Renesas RWDT Watchdog" to "Renesas WDT Watchdog"
		11	4.5.1 Device information in Device Tree Update compatible names from "renesas,wdt-r8a7795" to "renesas,wdt-r8a7795", from "renesas,wdt-r8a7796" to "renesas,wdt-r8a7796", and from "renesas,wdt" to "renesas,wdt"
		12	5.1 Directory Configuration Update Figure 5-1 Directory Configuration from "renesas_rwdt.c" to "renesas_wdt.c"
		12	5.2 Integration Procedure Update kernel configuration graph from "Renesas RWDT Watchdog" to "Renesas WDT Watchdog"
0.4	Dec. 16, 2016	11	4.5.1 Device information in Device Tree Update compatible names from "renesas,wdt-r8a7795" to "renesas,r8a7795-wdt", from "renesas,wdt-r8a7796" to "renesas,r8a7796-wdt", and from "renesas,wdt" to "renesas,rcar-gen3-wdt"
0.5	Mar. 15, 2017	1	1.3.2 Related document Update Table 1-3 of Hardware User's Manual and System Evaluation Board Salvator-XS Hardware Manual.
		4	3.1 Hardware Environment Update Table 3-1 of Hardware evaluation.
		4	3.1 Hardware Environment Add description of DIP switch setting for using R-Car H3-SiP WS2.0 on System Evaluation Board Salvator-XS.

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0.6	Apr. 14, 2017	4	3.1 Hardware Environment Add description of DIP switch setting for using R-Car M3-SiP WS1.1 on System Evaluation Board Salvator-XS.
0.7	Jun. 14, 2017	-	Fix H/W revision notation from WS to Ver.
		1	1.3.2 Related document Update Table 1-1 of Hardware User's Manual.
1.00	Aug. 8, 2017	All	Update document format.
1.01	Oct. 24, 2017	All	Add R-Car M3N support.
1.50	Jan. 29, 2018	1	1.3.2 Related document Update Table 1-1 of Hardware User's Manual.
		8	4.2.5 ioctl(WDIOC_SETTIMEOUT) Change timeout value range to 1 - 8246 (Salvator-X) or 1 - 8192 (Salvator-XS)
		10	4.4.2 Global Constants Add WDIOF_CARDRESET to support option in Table 4-3
1.51	Mar. 28, 2018	All	Add R-Car E3 support.
		11	4.5.1 Device information in Device Tree Update device required properties.
1.52	Jun. 27, 2018	3	Add R-Car M3 Ver.1.2 support.
1.53	Oct. 29, 2018	1	1.3.2 Related document Update Hardware User's Manual of Table 1-1.
2.00	Dec. 25, 2018	-	Update AddressList
		1	1.3.2 Related Documents Update related documents. Board Salvator-XS: Refer Rev 2.04. Board Ebisu: Update Date. Board Eibsu-4D: Add related document.
		4	3.1 Hardware Environment Add M3N-SiP System Evaluation Board Salvator-XS. Add R-CarE3 System Evaluation Board Ebisu-4D.
2.01	Apr. 17, 2019	-	Update AddressList
		1	1.3.2 Related Documents Update related documents (R-Car Series, 3rd Generation User's Manual: Refer Rev 1.50).
2.50	Apr. 24, 2020	All	Add R-Car V3U support
		1	1.3.2 Related Documents Update related documents table: R-Car Series, 3rd Generation User's Manual: Hardware (Rev.2.00). R-CarV3U System Evaluation Board Falcon Hardware Manual (Rev. T.B.D). R-CarV3U Target Specification (Rev.0.45). 1.2 Function Add Table 1-1 Hardware functions and software support status.
		3	2. Terminology Table 2-1 Terminology Remove the term RCLK and its explanation from the table.
		4	3.1 Hardware Environment Update hardware environment table: R-CarV3U-SiP System Evaluation Board Falcon.
		5	3.3 State Transition Diagram Add Figure 3-2 State Transition Diagram (R-Car H3/M3/M3N/E3/V3U).

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			Add 3.4 State Transition Table Add Table 3-2 State transition table for RCLK Watchdog Timer driver
		6-9	Add 4. Processing Sequence Add 4.1 Probe and remove Add Figure 4-1 Processing sequence diagram of probe function Add Figure 4-2 Processing sequence diagram of remove function Add 4.2 Start, stop, and periodic ping operations Add Figure 4-3 Processing sequence of start, stop, and ping functions Add 4.3 Suspend and resume Add Figure 4-4 Processing sequence of suspend and resume functions
		10	Add 5. Flowchart Add Figure 5-1 Flowchart of RWDT module
		11	Add 6. Target Performance
		12-19	Update section number (4->7) for External Interface part
		20	Update section number (5->8) for Integration Procedure part
2.51	Dec. 1, 2020	-	Update Address List
		2	1.3.2 Related documents Update Table 1-2. R-CarV3U System Evaluation Board Falcon Hardware Manual (Rev.0.01). R-Car V3U Series User's Manual (Rev.0.5).
		19	7.5.1 Device information in Device Tree Update Table 7-5. Add location of device tree file of R-Car V3U. Add file location to change timeout value for R-Car V3U.
2.52	Jan. 29, 2021	All	Add R-Car V3H support.
2.53	Apr. 21, 2021	All	Add R-Car D3 support.
3.00	Dec. 10, 2021	-	Add Kernel v5.10.41 support.

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