# Overview

## Overview

This manual explains the driver module (this module) that controls the GPIO on R-Car H3/M3/M3N/D3/E3/V3U/V3H.

## Function

This module controls GPIO on R-Car H3/M3/M3N/D3/E3/V3U/V3H, Support following function.

* Support selection of input/output in GPIO pin.
* Support reading state of high/low in Input pin.
* Support setting high/low value in Output pin.
* Support detection of interrupt (high level, low level, rising edge, falling edge, both edge).

### Supported pin

GPIO supported pin on R-Car H3/M3/M3N/E3/V3U device are shown in Table 1‑1, and R-Car V3H/D3 device is shown in Table 1-2.

Table 1‑1 GPIO supported pin (R-Car H3/M3/M3N/E3/V3U)

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | R-Car H3 Ver.2.0/ Ver.3.0  [Total: 156 pins] | | R-Car M3/M3N  **[Total: 156 pins]** | | R-Car E3  **[Total: 132 pins]** | | R-Car V3U  **[Total: 233 pins]** | |
| GPIO bank | Number of bank | Pin range | Number of bank | Pin range | Number of bank | Pin range | Number of bank | Pin range |
| GPIO-0 | 16 | GP-0-0  …  GP-0-15 | 16 | GP-0-0  …  GP-0-15 | 18 | GP-0-0  …  GP-0-17 | 28 | GP-0-0  …  GP-0-27 |
| GPIO-1 | 29 | GP-1-0  …  GP-1-28 | 29 | GP-1-0  …  GP-1-28 | 23 | GP-1-0  …  GP-1-22 | 31 | GP-1-0  …  GP-1-30 |
| GPIO-2 | 15 | GP-2-0  …  GP-2-14 | 15 | GP-2-0  …  GP-2-14 | 26 | GP-2-0  …  GP-2-25 | 25 | GP-2-0  …  GP-2-24 |
| GPIO-3 | 16 | GP-3-0  …  GP-3-15 | 16 | GP-3-0  …  GP-3-15 | 16 | GP-3-0  …  GP-3-15 | 17 | GP-3-0  …  GP-3-16 |
| GPIO-4 | 18 | GP-4-0  …  GP-4-17 | 18 | GP-4-0  …  GP-4-17 | 11 | GP-4-0  …  GP-4-10 | 27 | GP-4-0  …  GP-4-26 |
| GPIO-5 | 26 | GP-5-0  …  GP-5-26 | 26 | GP-5-0  …  GP-5-26 | 20 | GP-5-0  …  GP-5-19 | 21 | GP-5-0  …  GP-5-20 |
| GPIO-6 | 32 | GP-6-0  …  GP-6-31 | 32 | GP-6-0  …  GP-6-31 | 18 | GP-6-0  …  GP-6-17 | 21 | GP-6-0  …  GP-6-20 |
| GPIO-7 | 4 | GP-7-0  …  GP-7-3 | 4 | GP-7-0  …  GP-7-3 | - | - | 21 | GP-7-0  …  GP-7-20 |

Table 1‑1 GPIO supported pin (R-Car H3/M3/M3N/E3/V3U) (cont.)

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | R-Car H3 Ver.2.0/ Ver.3.0 | | R-Car M3/M3N | | R-Car E3 | | R-Car V3U | |
| GPIO bank | Number of bank | Pin range | Number of bank | Pin range | Number of bank | Pin range | Number of bank | Pin range |
| GPIO-8 | - | - | - | - | - | - | 21 | GP-8-0  …  GP-8-20 |
| GPIO-9 | - | - | - | - | - | - | 21 | GP-9-0  …  GP-9-20 |

**Table 1-2 GPIO supported pin (R-Car V3H/D3)**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **R-Car V3H**  **[Total: 137 pins]** | | **R-Car D3**  **[Total: 150 pins]** | |
| **GPIO bank** | **number of bank** | **Pin range** | **number of bank** | **Pin range** |
| GPIO-0 | 22 | GP-0-0  …  GP-0-21 | 9 | GP-0-0  …  GP-0-8 |
| GPIO-1 | 28 | GP-1-0  …  GP-1-27 | 32 | GP-1-0  …  GP-1-31 |
| GPIO-2 | 30 | GP-2-0  …  GP-2-29 | 32 | GP-2-0  …  GP-2-31 |
| GPIO-3 | 17 | GP-3-0  …  GP-3-16 | 10 | GP-3-0  …  GP-3-9 |
| GPIO-4 | 25 | GP-4-0  …  GP-4-24 | 32 | GP-4-0  …  GP-4-31 |
| GPIO-5 | 15 | GP-5-0  …  GP-5-14 | 21 | GP-5-0  …  GP-5-20 |
| GPIO-6 | - | - | 14 | GP-6-0  …  GP-6-13 |

### Connected device

GPIO connected device on R-Car H3/M3/M3N/D3/E3/V3U/V3H System Evaluation Board are shown in below tables.

Table 1‑3 GPIO connected device (R-Car H3/M3/M3N)

|  |  |
| --- | --- |
| GPIO pin | device/method |
| GP-5-23  GP-5-22  GP-5-20  GP-5-17 | Software Switches |
| GP-6-13  GP-6-12  GP-6-11 | Tact Switches or LEDs  (Tactile Switches are shared with LEDs) |

Table 1‑4 GPIO connected device (R-Car E3)

|  |  |
| --- | --- |
| GPIO pin | device/method |
| GP-5-13  GP-5-12  GP-5-11  GP-5-10 | Software Switches |
| GP-5-05  GP-5-06  GP-5-19 | Tact Switches or LEDs  (Tactile Switches are shared with LEDs) |

Table 1‑5 GPIO connected device (R-Car V3U)

|  |  |
| --- | --- |
| GPIO pin | device/method |
| GP-6-18  GP-6-19  GP-6-20 | Push Switches |
| GP-4-18  GP-4-19  GP-4-20 | LEDs |

Table 1‑6 GPIO Connected device (R-Car V3H)

|  |  |
| --- | --- |
| GPIO pin | device/method |
| GP-2-08  GP-2-06  GP-2-02  GP-2-01 | Software Switches  (4 bits of software switch SW2) |
| GP-5-14  GP-5-13  GP-5-12 | Push Switches or LEDs  (Push Switches are shared with LEDs) |

Table 1‑7 GPIO Connected device (R-Car D3)

|  |  |
| --- | --- |
| GPIO pin | device/method |
| GP-4-15  GP-4-14  GP-4-13  GP-4-12 | Software Switches |
| GP-4-25  GP-4-07  GP-1-30 | Tact Switches or LEDs  (Tactile Switches are shared with LEDs) |

## Reference

### Standard

There is no supported standard in this module.

### Related document

The related document to this module are shown in Table 1‑7.

Table 1‑7 Reference document (R-Car H3/M3/M3N/D3/E3/V3U/V3H)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Number | Issue | Title | Edition | Data |
| - | Renesas Electronics | R-Car Series, 3rd Generation User’s Manual:Hardware | Rev.2.20 | Jun. 30, 2020 |
| - | Renesas Electronics | R-CarH3-SiP System Evaluation Board Salvator-X Hardware Manual RTP0RC7795SIPB0011S | Rev.1.09 | May. 11, 2017 |
| - | Renesas Electronics | R-CarH3-Sip System Evaluation Board Salvator-X Hardware Manual RTP0RC7796SIPB0011S | Rev.0.04 | Oct. 3, 2016 |
| - | Renesas Electronics | R-CarH3-SiP/M3-SiP/M3N-SiP System Evaluation Board Salvator-XS Hardware Manual | Rev.2.04 | Jul. 17, 2018 |
| - | Renesas Electronics | R-CarE3 System Evaluation Board Ebisu Hardware Manual RTP0RC77990SEB0010S | Rev.0.03 | Apr. 11, 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 V3U Series User’s Manual | Rev.0.5 | Jul. 31, 2020 |
| - | Renesas Electronics | R-CarV3U System Evaluation Board Falcon Hardware Manual | Rev.0.01 | Sep. 11, 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 |

## Restrictions

There is no restriction in this module.

# Terminology

The following table shows the terminology related to this module.

Table 2‑1 Terminology

|  |  |
| --- | --- |
| Terms | Explanation |
| GPIO | General Purpose Input/Output interface |

# Operating Environment

## Hardware Environment

The following table lists the hardware needed to use this module.

Table 3‑1 Hardware specification (R-Car H3/M3/M3N/D3/E3/V3U/V3H)

| Name | Version | Manufacture |
| --- | --- | --- |
| 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 System Evaluation Board Falcon | - | Renesas Electronics |
| R-CarV3H System Evaluation Board Condor-I | - | Renesas Electronics |
| R-CarD3 System Evaluation Board Draak | - | Renesas Electronics |

## Module Configuration

The following figure shows the configuration of this module.

Linux Kernel

User mode

Linux Kernel Modules (GPIO sysfs, gpiolib)

GPIO driver (This module)

Kernel mode

GPIO\_0/1/2/3/4/5/6/7

Hardware

Interrupt controller

AP

/sys/class/gpio/gpio356-511

Figure 3‑1 Module configuration (R-Car H3 / M3 / M3N)

Linux Kernel

User mode

Linux Kernel Modules (GPIO sysfs, gpiolib)

GPIO driver (This module)

Kernel mode

GPIO\_0/1/2/3/4/5/6

Hardware

Interrupt controller

AP

/sys/class/gpio/gpio380-511

Figure 3‑2 Module configuration (R-Car E3)

Linux Kernel

User mode

Linux Kernel Modules (GPIO sysfs, gpiolib)

GPIO driver (This module)

Kernel mode

GPIO\_0/1/2/3/4/5/6/7/8/9

Hardware

Interrupt controller

AP

/sys/class/gpio/gpio279-511

Figure 3‑3 Module configuration (R-Car V3U)

Linux Kernel

User mode

Linux Kernel Modules (GPIO sysfs, gpiolib)

GPIO driver (This module)

Kernel mode

GPIO\_0/1/2/3/4/5

Hardware

Interrupt controller

AP

/sys/class/gpio/gpio375-511

**Figure 3-4 Module configuration (R-Car V3H)**

Linux Kernel

User mode

Linux Kernel Modules (GPIO sysfs, gpiolib)

GPIO driver (This module)

Kernel mode

GPIO\_0/1/2/3/4/5/6

Hardware

Interrupt controller

AP

/sys/class/gpio/gpio362-511

**Figure 3-5 Module configuration (R-Car D3)**

## State Transition Diagram

There is no state transition diagram for this module.

# External Interface

## sysfs interface

The external interface of this module is based on Linux. The interface for operating GPIO pin from a userland is GPIO sysfs. Device node of this module is shown below.

Table 4‑1 GPIO device node (R-Car H3 Ver.2.0/H3 Ver3.0/M3/M3N)

|  |  |  |
| --- | --- | --- |
| GPIO bank | Name of pin | device node |
| GPIO-0 | GP-0-0  :  GP-0-15 | /sys/class/gpio/gpio496  :  /sys/class/gpio/gpio511 |
| GPIO-1 | GP-1-0  :  GP-1-28 | /sys/class/gpio/gpio467  :  /sys/class/gpio/gpio495 |
| GPIO-2 | GP-2-0  :  GP-2-14 | /sys/class/gpio/gpio452  :  /sys/class/gpio/gpio466 |
| GPIO-3 | GP-3-0  :  GP-3-15 | /sys/class/gpio/gpio436  :  /sys/class/gpio/gpio451 |
| GPIO-4 | GP-4-0  :  GP-4-17 | /sys/class/gpio/gpio418  :  /sys/class/gpio/gpio435 |
| GPIO-5 | GP-5-0  :  GP-5-25 | /sys/class/gpio/gpio392  :  /sys/class/gpio/gpio417 |
| GPIO-6 | GP-6-0  :  GP-6-31 | /sys/class/gpio/gpio360  :  /sys/class/gpio/gpio391 |
| GPIO-7 | GP-7-0  :  GP-7-3 | /sys/class/gpio/gpio356  :  /sys/class/gpio/gpio359 |

Table 4‑2 GPIO device node (R-Car E3)

|  |  |  |
| --- | --- | --- |
| GPIO bank | Name of pin | device node |
| GPIO-0 | GP-0-0  :  GP-0-17 | /sys/class/gpio/gpio494  :  /sys/class/gpio/gpio511 |
| GPIO-1 | GP-1-0  :  GP-1-22 | /sys/class/gpio/gpio471  :  /sys/class/gpio/gpio493 |
| GPIO-2 | GP-2-0  :  GP-2-25 | /sys/class/gpio/gpio445  :  /sys/class/gpio/gpio470 |
| GPIO-3 | GP-3-0  :  GP-3-15 | /sys/class/gpio/gpio429  :  /sys/class/gpio/gpio444 |
| GPIO-4 | GP-4-0  :  GP-4-10 | /sys/class/gpio/gpio418  :  /sys/class/gpio/gpio428 |
| GPIO-5 | GP-5-0  :  GP-5-19 | /sys/class/gpio/gpio398  :  /sys/class/gpio/gpio417 |
| GPIO-6 | GP-6-0  :  GP-6-17 | /sys/class/gpio/gpio380  :  /sys/class/gpio/gpio397 |

Table 4‑3 GPIO device node (R-Car V3U)

|  |  |  |
| --- | --- | --- |
| GPIO bank | Name of pin | device node |
| GPIO-1 | GP-1-0  :  GP-1-30 | /sys/class/gpio/gpio481  :  /sys/class/gpio/gpio511 |
| GPIO-2 | GP-2-0  :  GP-2-24 | /sys/class/gpio/gpio456  :  /sys/class/gpio/gpio480 |
| GPIO-0 | GP-0-0  :  GP-0-27 | /sys/class/gpio/gpio428  :  /sys/class/gpio/gpio455 |
| GPIO-3 | GP-3-0  :  GP-3-16 | /sys/class/gpio/gpio411  :  /sys/class/gpio/gpio427 |
| GPIO-4 | GP-4-0  :  GP-4-26 | /sys/class/gpio/gpio384  :  /sys/class/gpio/gpio410 |
| GPIO-5 | GP-5-0  :  GP-5-20 | /sys/class/gpio/gpio363  :  /sys/class/gpio/gpio383 |
| GPIO-6 | GP-6-0  :  GP-6-20 | /sys/class/gpio/gpio342  :  /sys/class/gpio/gpio362 |
| GPIO-7 | GP-7-0  :  GP-7-20 | /sys/class/gpio/gpio321  :  /sys/class/gpio/gpio341 |
| GPIO-8 | GP-8-0  :  GP-8-20 | /sys/class/gpio/gpio300  :  /sys/class/gpio/gpio320 |
| GPIO-9 | GP-9-0  :  GP-9-20 | /sys/class/gpio/gpio279  :  /sys/class/gpio/gpio299 |

Table 4‑4 GPIO device node (R-Car V3H)

|  |  |  |
| --- | --- | --- |
| GPIO bank | Name of pin | device node |
| GPIO-0 | GP-0-0  :  GP-0-21 | /sys/class/gpio/gpio490  :  /sys/class/gpio/gpio511 |
| GPIO-1 | GP-1-0  :  GP-1-27 | /sys/class/gpio/gpio462  :  /sys/class/gpio/gpio489 |
| GPIO-2 | GP-2-0  :  GP-2-29 | /sys/class/gpio/gpio432  :  /sys/class/gpio/gpio461 |
| GPIO-3 | GP-3-0  :  GP-3-16 | /sys/class/gpio/gpio415  :  /sys/class/gpio/gpio431 |
| GPIO-4 | GP-4-0  :  GP-4-24 | /sys/class/gpio/gpio390  :  /sys/class/gpio/gpio414 |
| GPIO-5 | GP-5-0  :  GP-5-14 | /sys/class/gpio/gpio375  :  /sys/class/gpio/gpio389 |

Table 4‑5 GPIO device node (R-Car D3)

|  |  |  |
| --- | --- | --- |
| GPIO bank | Name of pin | device node |
| GPIO-0 | GP-0-0  :  GP-0-8 | /sys/class/gpio/gpio503  :  /sys/class/gpio/gpio511 |
| GPIO-1 | GP-1-0  :  GP-1-31 | /sys/class/gpio/gpio471  :  /sys/class/gpio/gpio502 |
| GPIO-2 | GP-2-0  :  GP-2-31 | /sys/class/gpio/gpio439  :  /sys/class/gpio/gpio470 |
| GPIO-3 | GP-3-0  :  GP-3-9 | /sys/class/gpio/gpio429  :  /sys/class/gpio/gpio438 |
| GPIO-4 | GP-4-0  :  GP-4-31 | /sys/class/gpio/gpio397  :  /sys/class/gpio/gpio428 |
| GPIO-5 | GP-5-0  :  GP-5-20 | /sys/class/gpio/gpio376  :  /sys/class/gpio/gpio396 |
| GPIO-6 | GP-6-0  :  GP-6-13 | /sys/class/gpio/gpio362  :  /sys/class/gpio/gpio375 |

## Interface specification

This section explains in the following format about the functions this module supplies.

|  |  |
| --- | --- |
| [Overview] | Presents an overview of a function. |
|  |  |
| [Function Name] | Explains the name of the function. |
|  |  |
| [Calling format] | Explains the format for calling the function. |
|  |  |
| [Argument] | Explains the argument(s) of the function. |
|  |  |
| [Return value] | Explains the return value(s) of the function. |
|  |  |
| [Feature] | Explains the features of the function. |
|  |  |
| [Remark] | Explains points to be noted when using the function. |
|  |  |

Table 4‑6 List of interface specification

|  |  |  |
| --- | --- | --- |
| Chapter | Function Name | Description |
| 4.2.1 | gpio\_request | Setting GPIO pin. |
| 4.2.2 | gpio\_direction\_input | GPIO pin is set as input pin |
| 4.2.3 | gpio\_direction\_output | GPIO pin is set as output pin |
| 4.2.4 | gpio\_get\_value | The state of GPIO pin get high or low. |
| 4.2.5 | gpio\_set\_value | The state of GPIO pin is set as high or low. |
| 4.2.6 | gpio\_to\_irq | Get number of irq in GPIO pin |

Please include the following headers, when you use these functions.

#include <linux/gpio.h>

### Setting GPIO pin

|  |  |
| --- | --- |
| [Overview] | Setting GPIO pin |
|  |  |
| [Function Name] | gpio\_request |
|  |  |
| [Calling format] | int gpio\_request(unsigned gpio, const char \*label); |
|  |  |
| [Argument] | gpio: Set GPIO pin number (refer to 4.3 Definitions)  label: Set NULL |
|  |  |
| [Return value] | 0 : success  -EPROBE\_DEFER : Driver requests probe retry  -EINVAL : Invalid argument |
|  |  |
| [Feature] | GPIO pin specified by gpio of the first argument is set up. |
|  |  |
| [Remark] |  |
|  |  |

### GPIO pin is set as input pin

|  |  |
| --- | --- |
| [Overview] | GPIO pin is set as input pin |
|  |  |
| [Function Name] | gpio\_direction\_input |
|  |  |
| [Calling format] | int gpio\_direction\_input(unsigned gpio) |
|  |  |
| [Argument] | gpio: Set GPIO pin number(refer to 4.3 Definitions) |
|  |  |
| [Return value] | 0 : success |
|  |  |
| [Feature] | Specified GPIO pin is set as the input pin. |
|  |  |
| [Remark] |  |
|  |  |

### GPIO pin is set as output pin

|  |  |
| --- | --- |
| [Overview] | GPIO pin is set as output pin |
|  |  |
| [Function Name] | gpio\_direction\_output |
|  |  |
| [Calling format] | int gpio\_direction\_output(unsigned gpio, int value); |
|  |  |
| [Argument] | gpio: Set GPIO pin number(refer to 4.3 Definitions)  value: Output value of specified GPIO pin(0 or 1) |
|  |  |
| [Return value] | 0 : success |
|  |  |
| [Feature] | Specified GPIO pin is set as the output pin, and output setting of value |
|  |  |
| [Remark] |  |
|  |  |

### The state of GPIO pin get high or low

|  |  |
| --- | --- |
| [Overview] | The state of GPIO pin get high or low |
|  |  |
| [Function Name] | gpio\_get\_value |
|  |  |
| [Calling format] | int gpio\_get\_value(unsigned gpio) |
|  |  |
| [Argument] | gpio: Set GPIO pin number(refer to 4.3 Definitions) |
|  |  |
| [Return value] | 0 : state of GPIO pin is low  non-zero : state of GPIO pin is high |
|  |  |
| [Feature] | The state of GPIO pin get high or low. |
|  |  |
| [Remark] |  |
|  |  |

### The state of GPIO pin is set as high or low

|  |  |
| --- | --- |
| [Overview] | The state of GPIO pin is set as high or low |
|  |  |
| [Function Name] | gpio\_set\_value |
|  |  |
| [Calling format] | void gpio\_set\_value(unsigned gpio, int value) |
|  |  |
| [Argument] | gpio: Set GPIO pin number(refer to 4.3 Definitions)  value: Output value of specified GPIO pin(0 or 1) |
|  |  |
| [Return value] | None. |
|  |  |
| [Feature] | The state of GPIO pin is set as high or low |
|  |  |
| [Remark] |  |
|  |  |

### Get number of irq in GPIO pin

|  |  |
| --- | --- |
| [Overview] | Get number of irq in GPIO pin |
|  |  |
| [Function Name] | gpio\_to\_irq |
|  |  |
| [Calling format] | int gpio\_to\_irq(unsigned gpio) |
|  |  |
| [Argument] | gpio: Set GPIO pin number(refer to 4.3 Definitions) |
|  |  |
| [Return value] | integer value : number of irq  -ENXIO : No such device or address |
|  |  |
| [Feature] | Get number of irq in GPIO pin |
|  |  |
| [Remark] |  |
|  |  |

## Definitions

A definitions of the GPIO Pins is described on device tree. The example of device tree is as follows.

### Definitions of the GPIO Pins (R-Car H3/M3/M3N)

|  |
| --- |
| gpio-ports {  gpios = <&gpio5 23 0>, /\* SOFTSW3 \*/  <&gpio5 22 0>, /\* SOFTSW2 \*/  <&gpio5 20 0>, /\* SOFTSW1 \*/  <&gpio5 17 0>, /\* SOFTSW0 \*/  <&gpio6 13 0>, /\* LED6 / TactSW23 \*/  <&gpio6 12 0>, /\* LED5 / TactSW22 \*/  <&gpio6 11 0>; /\* LED4 / TactSW21 \*/  }; |

### Definitions of the GPIO Pins (R-Car E3)

|  |
| --- |
| gpio-ports {  gpios = <&gpio5 13 0>, /\* SOFTSW3 \*/  <&gpio5 12 0>, /\* SOFTSW2 \*/  <&gpio5 11 0>, /\* SOFTSW1 \*/  <&gpio5 10 0>, /\* SOFTSW0 \*/  <&gpio5 05 0>, /\* LED4 / TactSW20 \*/  <&gpio5 06 0>, /\* LED5 / TactSW21 \*/  <&gpio5 19 0>; /\* LED6 / TactSW22 \*/  }; |

### Definitions of the GPIO Pins (R-Car V3U)

|  |
| --- |
| gpio-ports {  gpios = <&gpio6 18 0>, /\* PUSH SW1 \*/  <&gpio6 19 0>, /\* PUSH SW2 \*/  <&gpio6 20 0>, /\* PUSH SW3 \*/  <&gpio4 18 0>, /\* LED1 \*/  <&gpio4 19 0>, /\* LED2 \*/  <&gpio4 20 0>; /\* LED3 \*/  }; |

### Definitions of the GPIO Pins (R-Car V3H)

|  |
| --- |
| gpio-ports {  gpios = <&gpio2 08 0>, /\* SOFTSW2 (Bit4) \*/  <&gpio2 06 0>, /\* SOFTSW2 (Bit3) \*/  <&gpio2 02 0>, /\* SOFTSW2 (Bit2) \*/  <&gpio2 01 0>, /\* SOFTSW2 (Bit1) \*/  <&gpio5 14 0>, /\* LED5 / Push SW17 (Bit2) \*/  <&gpio5 13 0>, /\* LED4 / Push SW16 (Bit1) \*/  <&gpio5 12 0>; /\* LED3 / Push SW15 (Bit0) \*/  }; |

### Definitions of the GPIO Pins (R-Car D3)

|  |
| --- |
| gpio-ports {  gpios = <&gpio4 15 0>, /\* SOFTSW56 (Bit4) \*/  <&gpio4 14 0>, /\* SOFTSW56 (Bit3) \*/  <&gpio4 13 0>, /\* SOFTSW56 (Bit2) \*/  <&gpio4 12 0>, /\* SOFTSW56 (Bit1) \*/  <&gpio4 25 0>, /\* LED14 / TactSW57 (Bit2) \*/  <&gpio4 07 0>, /\* LED13 / TactSW59 (Bit1) \*/  <&gpio1 30 0>; /\* LED12 / TactSW58 (Bit0) \*/  }; |

The format of a "gpios" property is as follows.

The 1st cell is a node or label of GPIO device to be used.

The 2nd cell contains the identifying number for the GPIO Pin in the node.

The 3rd cell is the flags, encoded as follows:

0 (GPIO\_ACTIVE\_HIGH) = active high level-sensitive

1 (GPIO\_ACTIVE\_LOW) = active low level-sensitive

### Get definitions of the GPIO Pins

|  |
| --- |
| struct device\_node \*np;  int port;    np = of\_find\_node\_by\_path("/gpio-ports");  port = of\_get\_gpio(np, 2); |

# Integration

## Directory Configuration

The directory configuration is shown below.

gpio-rcar.c : source file (device dependence)

gpio.h : header file

drivers/gpio/

include/linux/

## Integration Procedure

### Kernel configuration

To enable the function of this module, make the following setting with Kernel Configuration.

|  |
| --- |
| -\*- GPIO Support --->  Memory mapped GPIO drivers --->  <\*> Renesas R-Car GPIO |

When using GPIO sysfs, make the following setting with Kernel Configuration.

|  |
| --- |
| -\*- GPIO Support --->  [\*] /sys/class/gpio/... (sysfs interface) |

## Option Setting

### Module parameters

There are no module parameters.

### Kernel parameters

There are no kernel parameters.