



# QorIQ Linux GPIO enable

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# Scenario



Customer wants to control QorIQ T1023 GPIO for LEDs turn on/off in Linux Kernel, They do not know how to enable this function on SDK 1.7 Linux Kernel.

# Implementation 1 - condition

- Based on FSL SDK1.7, T1023 example
- Enable GPIO1-13, GPIO2-13 and GPIO2-14 as output to turn on/off LEDs

# Implementation 2 – Kernel config

```
CONFIG_GENERIC_GPIO=y  
CONFIG_GPIO_MPC8XXX=y  
CONFIG_OF_GPIO=y  
CONFIG_ARCH_WANT_OPTIONAL_GPIOLIB=y  
CONFIG_ARCH_REQUIRE_GPIOLIB=y  
CONFIG_GPIOLIB=y  
CONFIG_GPIO_SYSFS=Y
```

# Implementation 3 – Device tree

Please check device tree to include GPIOs setting, In default, the GPIOs are included into device tree on QorIQ parts.

Refer to “qorIQ-gpio-0.dtsi”, “qorIQ-gpio-1.dtsi”  
“qorIQ-gpio-2.dtsi” and “qorIQ-gpio-3.dtsi”

# Implementation 4 – RCW setting

- Set signal ASLEEP/GPIO1 -13 as GPIO, need to set RCW bit 369 as 1.

0 ASLEEP

1 GPO1[13]

- Set signals IFC\_GRP\_D\_BASEs as GPIO, need to set RCW bit 407 as 1

0 {IFC\_PAR[0:1], IFC\_PERR\_B}

1 {GPIO2[13:15]}

# Implementation 5 – Kernel GPIO information

After following above step to build up linux image,  
please check Kernel GPIO information as below:

```
root@t1023rdb:~# ls /sys/class/gpio/  
export      gpiochip128/ gpiochip160/ gpiochip192/  
gpiochip224/ unexport
```

# Implementation 6 – Physical T1023 GPIO registers mapping

Offset 0x13\_0000 - GPIO1 32 bits

Offset 0x13\_1000 - GPIO2 32 bits

Offset 0x13\_2000 - GPIO3 32 bits

Offset 0x13\_3000 - GPIO4 32 bits

x000 GPIOx\_GPDIR (output/input)

x004 GPIOx\_GPODR (Active high/open drain)

x008 GPIO1\_GPDAT (value for high/low)

others- refer to T series RM



# Implementation 7 – Kernel and Physical GPIO mapping

## Kernel

gpiochip224

gpiochip192

gpiochip160

gpiochip128

## Physical

GPIO1, register address – 13\_0000

GPIO2, register address – 13\_1000

GPIO3, register address – 13\_2000

GPIO4, register address – 13\_3000

# Implementation 8 – T1023 GPIO enable example

- Enable GPIO1 – 13:  $\text{GPIO224} + 13 = 237$ , command and check –

blue text - command

```
root@t1023rdb:~# ls /sys/class/gpio/  
export gpiochip128 gpiochip160 gpiochip192 gpiochip224 unexport  
root@t1023rdb:~# echo 237 > /sys/class/gpio/export  
root@t1023rdb:~# ls /sys/class/gpio/gpio  
gpio237/  gpiochip128/ gpiochip160/ gpiochip192/ gpiochip224/  
root@t1023rdb:~# ls /sys/class/gpio/gpio237  
active_low direction edge power subsystem uevent value  
root@t1023rdb:~# cat /sys/class/gpio/gpio237/direction  
in  
root@t1023rdb:~# echo "out" > /sys/class/gpio/gpio237/direction  
root@t1023rdb:~# cat /sys/class/gpio/gpio237/direction  
out  
root@t1023rdb:~# cat /sys/class/gpio/gpio237/value  
0  
root@t1023rdb:~# echo 1 > /sys/class/gpio/gpio237/value  
root@t1023rdb:~# cat /sys/class/gpio/gpio237/value  
1
```

# Implementation 9 – T1023 GPIO enable example 2

- Enable GPIO2 – 13:  $\text{GPIO192} + 13 = 205$ , command –  
blue text – command

```
root@t1023rdb:~# echo 205 > /sys/class/gpio/export
```

```
root@t1023rdb:~# echo "out" > /sys/class/gpio/gpio205/direction
```

```
root@t1023rdb:~# echo 1 > /sys/class/gpio/gpio205/value
```

- Enable GPIO2 – 14:  $\text{GPIO192} + 14 = 206$ , command –  
blue text – command

```
root@t1023rdb:~# echo 206 > /sys/class/gpio/export
```

```
root@t1023rdb:~# echo "out" > /sys/class/gpio/gpio206/direction
```

```
root@t1023rdb:~# echo 1 > /sys/class/gpio/gpio206/value
```



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