

gpio-poweroff demo

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EXTERNAL USE



SECURE CONNECTIONS
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Case Description

Some case need configure the GPIO as power off button.

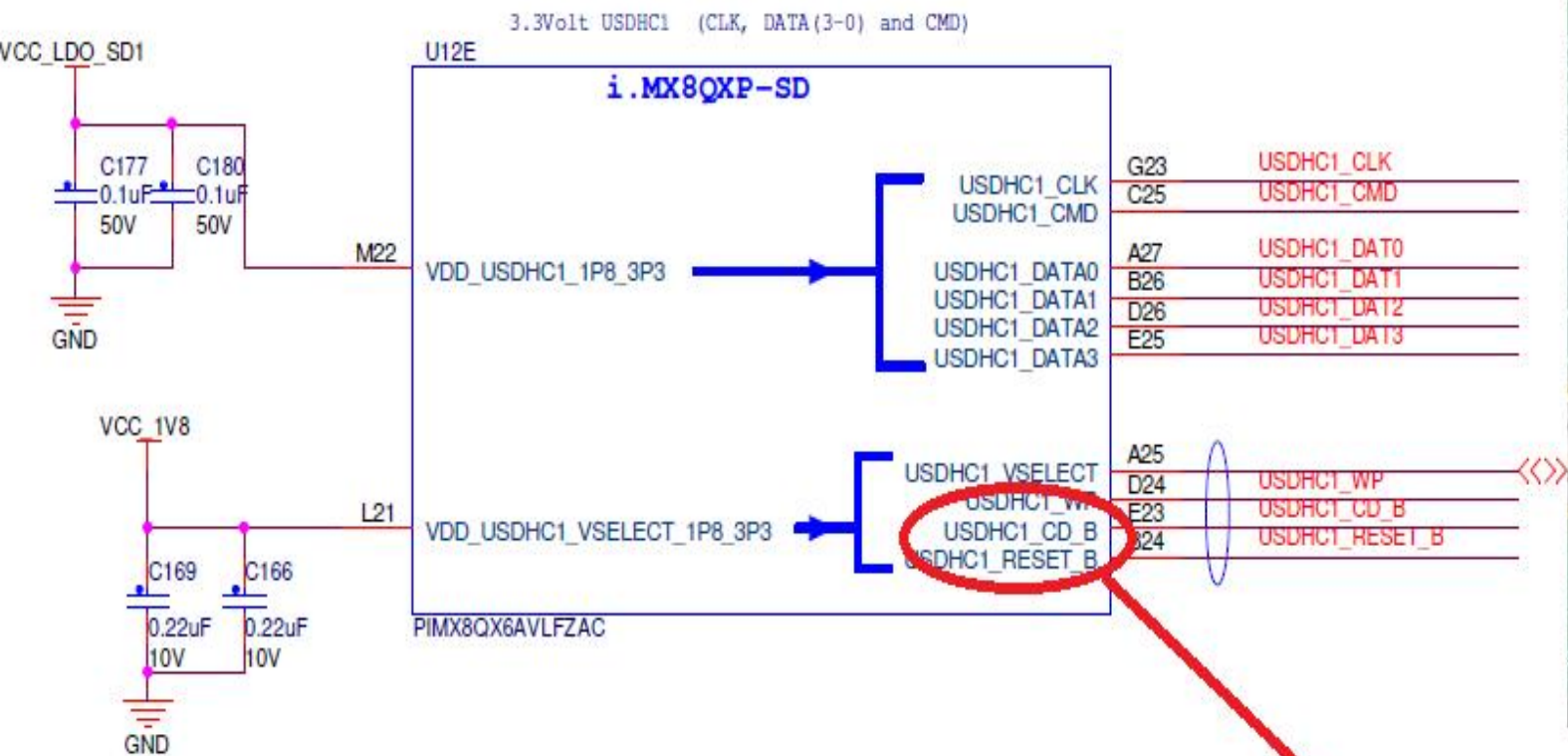
One solution is to use “gpio-keys” to send the “KEY_POWER” event to the system.
Co-work with systemd, system gets power off.

Demo Environment

HW: i.MX8QXP LPDDR4 MEK
SW: LF5.10.9_1.0.0



GPIO4_IO22



IMX8QXP_USDHC1_CD_B_LSIO_GPIO4_IO22

Device Tree

imx8qxp-mek-gpio-poweroff.dts

```
{
    gpio-keys {
        compatible = "gpio-keys";
        pinctrl-names = "default";
        pinctrl-0 = <&pinctrl_gpio_keys>;

        power {
            label = "GPIO Key Power";
            linux,code = <KEY_POWER>;
            gpios = <&lsio_gpio4 22 GPIO_ACTIVE_LOW>;
            debounce-interval = <50>;
        };
    };
};
```

```
&iomuxc {
    /delete-node/ pinctrl_usdhc2;
    /delete-node/ pinctrl_usdhc2_gpio;

    pinctrl_gpio_keys: gpio_keys_grp {
        fsl,pins = <
            IMX8QXP_USDHC1_CD_B_LSIO_GPIO4_IO22 0x00000021
        >;
    };
};

&usdhc2 {
    status = "disabled";
};
```

Confirm changes

```
root@imx8qxpcomek:~#  
root@imx8qxpcomek:~#  
root@imx8qxpcomek:~# cat /sys/kernel/debug/gpio  
gpiochip0: GPIOs 0-31, parent: platform/5d080000.gpio, 5d080000.gpio:  
  
gpiochip1: GPIOs 32-63, parent: platform/5d090000.gpio, 5d090000.gpio:  
  gpio-32 ( |Headphone detection ) in lo IRQ  
  gpio-33 ( |reset ) out hi ACTIVE LOW  
  gpio-41 ( |sda ) in lo  
  gpio-42 ( |scl ) out lo  
  
gpiochip2: GPIOs 64-95, parent: platform/5d0a0000.gpio, 5d0a0000.gpio:  
  
gpiochip3: GPIOs 96-127, parent: platform/5d0b0000.gpio, 5d0b0000.gpio:  
  
gpiochip4: GPIOs 128-159, parent: platform/5d0c0000.gpio, 5d0c0000.gpio:  
  gpio-129 ( |enable ) out hi ACTIVE LOW  
  gpio-147 ( |usdhc2-vmmc ) out lo  
  gpio-150 ( |GPIO Key Power ) in hi IRQ ACTIVE LOW  
  gpio-155 ( |enable ) out hi ACTIVE LOW  
  
gpiochip5: GPIOs 160-191, parent: platform/5d0d0000.gpio, 5d0d0000.gpio:  
  gpio-169 ( |switch ) out hi ACTIVE LOW
```



Event check

plugin sdcard to trigger the pin(sdcard CD, now it is USDHC1_CD_B_LSIO_GPIO4_IO22)

```
root@imx8qxp0mek: #
root@imx8qxp0mek: ~#
root@imx8qxp0mek: ~#
root@imx8qxp0mek: ~#
root@imx8qxp0mek: ~# evtest /dev/input/event5
Input driver version is 1.0.1
Input device ID: bus 0x19 vendor 0x1 product 0x1 version 0x100
Input device name: "gpio-keys"
Supported events:
  Event type 0 (EV_SYN)
  Event type 1 (EV_KEY)
    Event code 116 (KEY_POWER)
Properties:
Testing ... (interrupt to exit)
Event: time 1600596986.1600596986, type 1 (EV_KEY), code 116 (KEY_POWER), value 1
Event: time 1600596986.1600596986, ----- SYN_REPORT -----
Event: time 1600596987.1600596987, type 1 (EV_KEY), code 116 (KEY_POWER), value 0
Event: time 1600596987.1600596987, ----- SYN_REPORT -----
Event: time 1600596988.1600596988, type 1 (EV_KEY), code 116 (KEY_POWER), value 1
Event: time 1600596988.1600596988, ----- SYN_REPORT -----
Event: time 1600596989.1600596989, type 1 (EV_KEY), code 116 (KEY_POWER), value 0
Event: time 1600596989.1600596989, ----- SYN_REPORT -----
```

logind.conf

Modify the logind.conf, let systemd to handle the KEY_POWER event.

/etc/systemd/logind.conf

uncomment **HandlePowerKey=poweroff** and comment **#HandlePowerKey=ignore**

```
--- /etc/systemd/logind.conf.orig      2020-09-20 10:21:04.052000000 +0000
+++ /etc/systemd/logind.conf          2020-09-20 10:20:39.788000000 +0000
@@ -18,9 +18,9 @@
 #KillOnlyUsers=
 #KillExcludeUsers=root
 #InhibitDelayMaxSec=5
-#HandlePowerKey=poweroff
+HandlePowerKey=poweroff
 # i.MX-specific
-HandlePowerKey=ignore
+#HandlePowerKey=ignore
 #HandleSuspendKey=suspend
 #HandleHibernateKey=hibernate
 #HandleLidSwitch=suspend
```



Power off check

After modify the logind.conf, reboot the board.

plugin sdcard to trigger the pin(sdcard CD, now it is USDHC1_CD_B_LSIO_GPIO4_IO22)

```
OK ] Stopped target Local File Systems (Pre).
OK ] Stopped Remount Root and Kernel File Systems.
OK ] Stopped Create Static Device Nodes in /dev.
OK ] Reached target Shutdown.
OK ] Reached target Final Step.
OK ] Finished Power-Off.
OK ] Reached target Power-Off.
15.237830] systemd-shutdown[1]: Syncing filesystems and block devices.
15.244880] systemd-shutdown[1]: Sending SIGTERM to remaining processes...
15.271297] audit: type=1335 audit(1600596975.204:4): pid=214 uid=0 auid=4294967295 tty=(none) ses=4
md/systemd-journald" nl-mcgrp=1 op=disconnect res=1
15.292234] systemd-shutdown[1]: Sending SIGKILL to remaining processes...
15.315079] systemd-shutdown[1]: Unmounting file systems.
15.323423] [593]: Remounting '/' read-only in with options '(null)'.
15.344755] EXT4-fs (mmcblk0p2): re-mounted. Opts: (null)
15.357392] systemd-shutdown[1]: All filesystems unmounted.
15.363025] systemd-shutdown[1]: Deactivating swaps.
15.368303] systemd-shutdown[1]: All swaps deactivated.
15.373560] systemd-shutdown[1]: Detaching loop devices.
15.382970] systemd-shutdown[1]: All loop devices detached.
15.388656] systemd-shutdown[1]: Detaching DM devices.
15.394218] systemd-shutdown[1]: All DM devices detached.
15.399736] systemd-shutdown[1]: All filesystems, swaps, loop devices and DM devices detached.
15.413395] systemd-shutdown[1]: Syncing filesystems and block devices.
15.420249] systemd-shutdown[1]: Powering off.
15.424736] kvm: exiting hardware virtualization
15.474410] reboot: Power down
```

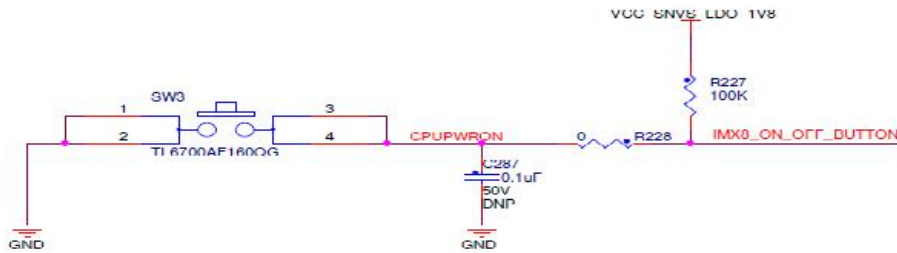
ONOFF Button

OnOff button already map to KEY_POWER. Only modify logind.conf is enough.

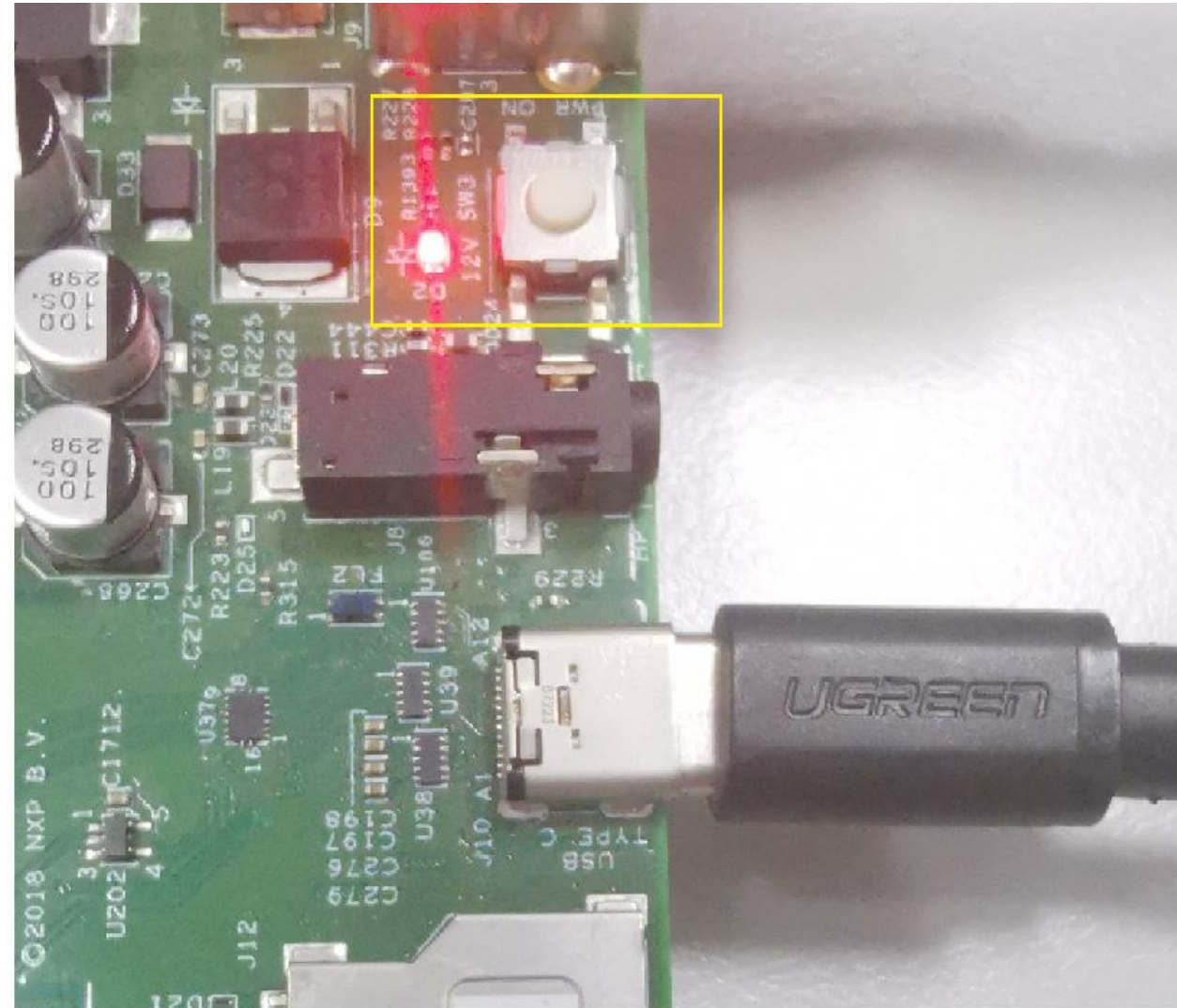
```
imx8qxp.dtsi
```

```
*/  
mbox-names = "tx", "rx", "rxdb";  
};  
sc_pwrkey: sc-powerkey {  
    compatible = "fsl,imx8-pwrkey";  
    linux,keycode = <KEY_POWER>;  
    wakeup-source;  
};
```

Power On Switch



Note: Hold for 5 sec for force off.
Hold for 0.5 sec to turn on



ONOFF Button(Cont.)

You can map OnOff button to KEY_RESERVED. It still has wakeup function. But do not send KEY_POWER.

```
&sc_pwrkey {  
    linux,keycode = <KEY_RESERVED> ;  
};
```

Could not use

```
&sc_pwrkey {  
    /delete-property/ linux,keycode;  
};
```

Because

```
linux/drivers/input/keyboard/imx_sc_pwrkey.c  
    if (of_property_read_u32(np, "linux,keycode", &pdata->keycode)) {  
        pdata->keycode = KEY_POWER;  
        dev_warn(&pdev->dev, "KEY_POWER without setting in dts\n");  
    }
```

logind.conf

You can add key co-work with systemd to handle other actions

<https://www.freedesktop.org/software/systemd/man/logind.conf.html>

HandlePowerKey=, HandleSuspendKey=, HandleHibernateKey=, HandleLidSwitch=, HandleLidSwitchExternalPower=, HandleLidSwitchDocked=, HandleRebootKey=

Controls how logind shall handle the system power, reboot and sleep keys and the lid switch to trigger actions such as system power-off, reboot or suspend. Can be "suspend", "hibernate", "hybrid-sleep", "suspend-then-hibernate", and "lock". If "ignore", logind will never handle these keys. If "lock", all running sessions will be terminated in the respective event. Only input devices with the "power-switch" udev tag will be watched for key/lid switch events. HandlePowerKey= defaults to "poweroff", HandleSuspendKey= default to "suspend". HandleLidSwitchExternalPower= is completely ignored by default (for backwards compatibility) — an explicit value must be provided. HandleLidSwitchDocked= defaults to "ignore". HandleHibernateKey= defaults to "hibernate". If the system is inserted in a docking station, or if more than one display is connected, the action specified by HandleLidSwitchExternalPower= occurs; if the system is on external power the action (if any) specified by HandleLidSwitchExternalPower= occurs; otherwise the HandleLidSwitch= action occurs.

A different application may disable logind's handling of system power and sleep keys and the lid switch by taking a low-level inhibitor lock ("handle-power-key", "handle-suspend-key", "handle-hibernate-key", "handle-lid-switch", "handle-reboot-key"). This is most commonly used by graphical desktop environments to take over suspend and hibernation handling, and to use the lock. If a lock is taken, logind will not take any action when that key or switch is triggered and the Handle*= settings are irrelevant.

PowerKeyIgnoreInhibited=, SuspendKeyIgnoreInhibited=, HibernateKeyIgnoreInhibited=, LidSwitchIgnoreInhibited=, RebootKeyIgnoreInhibited=

Controls whether actions that **systemd-logind** takes when the power, reboot and sleep keys and the lid switch are triggered are subject to high-level inhibitor locks ("handle-power-key", "handle-suspend-key", "handle-hibernate-key", "handle-lid-switch", "handle-reboot-key"), are always honored, irrespective of this setting.

These settings take boolean arguments. If "no", the inhibitor locks taken by applications are respected. If "yes", "shutdown", "reboot", "sleep", and "idle" inhibitor locks are always honored. SuspendKeyIgnoreInhibited=, HibernateKeyIgnoreInhibited= and RebootKeyIgnoreInhibited= default to "no". LidSwitchIgnoreInhibited= defaults to "yes". This setting is only relevant if a high level inhibitor lock is taken by another application, the lid switch does not respect suspend blockers by default, but the power and sleep keys do.

HoldoffTimeoutSec=



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