GPIO USB ID

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Introduction

This document mainly introduces how to use gpio usb id.
This can provide more options to avoid pin conflicts.

Case Introduction

iMX93 11x11 evk uses a peripheral circuit built with a typeC chip to perform USB role switch.
However, in many cases, the hardware design does not have the same typeC circuit as the evk, and the USB ID is needed to do switch.
The two USB IDs of the current iMX93 are muxed with the eQOS pins.
The probability of this conflict is very high.

So we need to use an alternative solution “gpio usb id” to avoid this pin allocation conflict.

MX93_PAD_ENET1_MDC__HSIOMIX_OTG_ID1
MX93_PAD_ENET1_MDC__ENET_QOS_MDC

MX93_PAD_ENET1_TD3__HSIOMIX_OTG_ID2
MX93_PAD_ENET1_TD3__ENET_QOS_RGMII_TD3

Linux Drive and Device Tree Bindings

Currently, there is a solutions in Linux that can use USB GPIO extcon as USB ID for role switching.

USB GPIO extcon

Kernel Configuration:
CONFIG_EXTCON_USB_GPIO

Binding:

linux/Documentation/devicetree/bindings/extcon/
extcon-usb-gpio.txt

Device Tree

Based on lf-6.6.52-2.2.0

imx93-11x11-evk-no-typec-gpio-usbid-conn.dts --- 2 x gpio-usb-b-connector

Remove ptn5110

```
&lpi2c3 {

        /delete-node/ tcpc@50;
        /delete-node/ tcpc@51;
};
```

/delete-node/ tcpc@50 and /delete-node/ tcpc@51 are used to remove the functions of type-C including role switching.
At this time, the two ptn5110 only provide internal power to the vbus of usb1 and usb2.
There is no external power supply through vbus as host to outside such as usb memory stick,etc.

imx93-11x11-evk-no-typec-gpio-usbid-extcon.dts

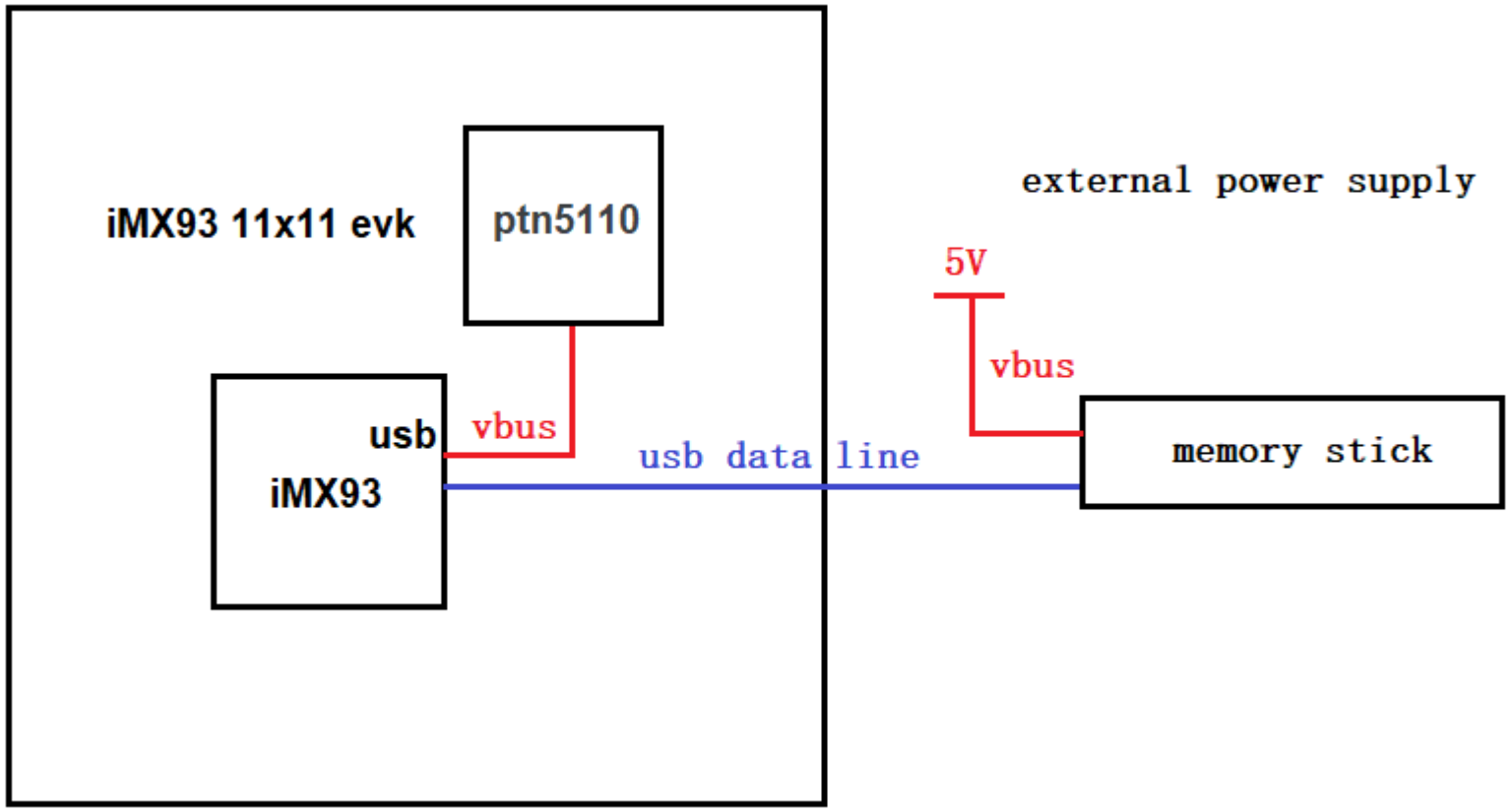
```
// SPDX-License-Identifier: (GPL-2.0+ OR MIT)
/*
 * Copyright 2019-2020 NXP
 */

/dts-v1/;


#include "imx93-11x11-evk.dts"


/*
	A special USB cable made to power VBUS externally for testing.
	usb1 id: J1001 pin 3(GPIO_IO02)
	usb2 id: J1001 pin 5(GPIO_IO03)
*/

/ {

		extcon_usb1: extcon1@1 {

			compatible = "linux,extcon-usb-gpio";
			pinctrl-names = "default";
			pinctrl-0 = <&pinctrl_usb_1_id>;
			id-gpios = <&gpio2 2 GPIO_ACTIVE_HIGH>;
		};

		extcon_usb2: extcon2@2 {

			compatible = "linux,extcon-usb-gpio";
			pinctrl-names = "default";
			pinctrl-0 = <&pinctrl_usb_2_id>;
			id-gpios = <&gpio2 3 GPIO_ACTIVE_HIGH>;
		};


};
```

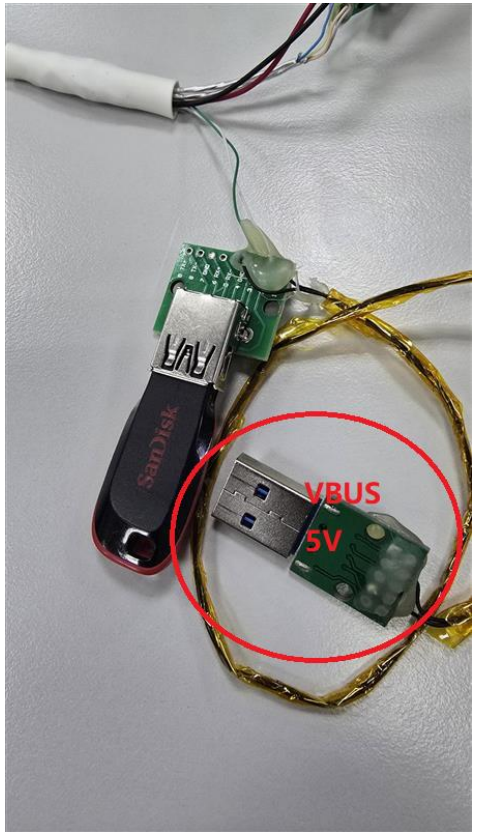
```
&lpi2c3 {

		/delete-node/ tcpc@50;
		/delete-node/ tcpc@51;
};


&usbotg1 {

		extcon = <0>, <&extcon_usb1>;
		dr_mode = "otg";
		/delete-property/ usb-role-switch;
		/delete-node/ port;

};

&usbotg2 {

		extcon = <0>, <&extcon_usb2>;
		dr_mode = "otg";
		/delete-property/ usb-role-switch;
		/delete-node/ port;

};


&iomuxc {

		pinctrl_usb_1_id: pinctrl_usb_1_id_grp {
			fsl,pins = <
				MX93_PAD_GPIO_IO02__GPIO2_IO02 0x31e
			>;
		};


		pinctrl_usb_2_id: pinctrl_usb_2_id_grp {
			fsl,pins = <
				MX93_PAD_GPIO_IO03__GPIO2_IO03 0x31e
			>;
		};


};
```

Testing extcon-usb-gpio

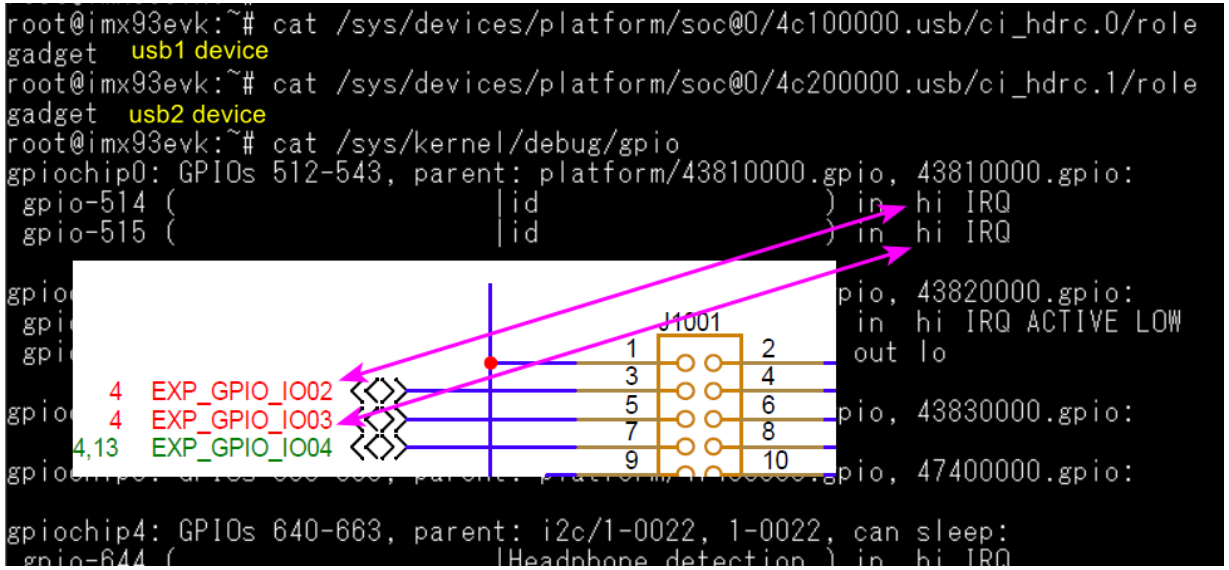
Because the ptn5110 node has been removed from the device tree i2c. Linux no longer drives ptn5110.
The ptn5110 only has the default function after power-on, which only powers the iMX93 usb vbus.
When testing the host function, a special usb cable is required, which can use an external power supply to power the memory stick vbus.

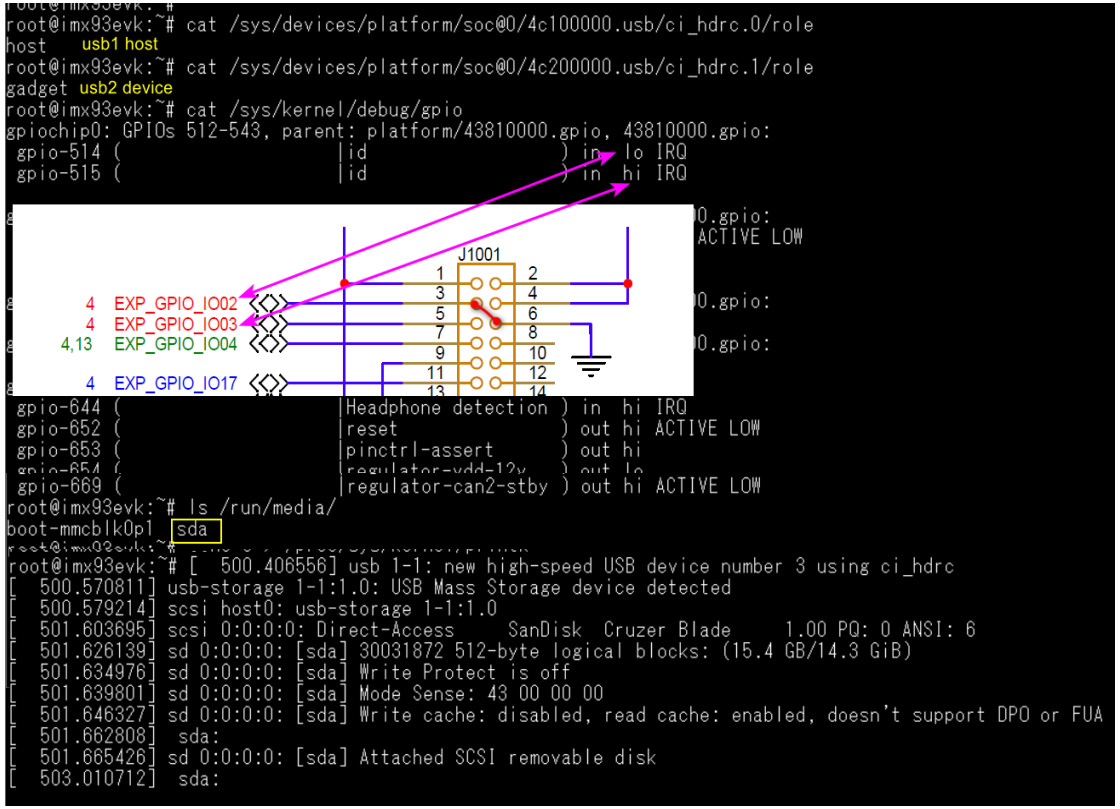
This is also done to avoid reworking the hardware on the iMX93 11x11 evk.





Testing extcon-usb-gpio(cont.)





When usb1 id (J1001, pin 3, GPIO_IO02) is shorted to ground(J1001, pin 6), usb1 switches to host mode.

You can see that the usb memory stick is mounted by linux.

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