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CE226423 – PSoC 6 MCU: USB HID Mouse Application

Objective

This example demonstrates how to configure the USB block in a PSoC® 6 MCU as a Human Interface Device (HID). The device enumerates as a 3-button mouse.

Requirements

Tool: PSoC Creator™ 4.2, Peripheral Driver Library (PDL) 3.1.0

Programming Language: C

Associated Parts: All PSoC 6 MCU parts with USB

Related Hardware: PSoC 6 Wi-Fi-BT Pioneer Kit

Overview

This code example demonstrates how to setup a USB HID descriptor to implement a 3-button mouse. After the device enumerates, firmware moves the mouse cursor from your computer from the right to the left, and vice-versa.

Right-click the USBFS Component in the PSoC Creator schematic of this project. Select **Launch USB Configurator** to create the USB descriptor associated with the PSoC device. In this example, the descriptor contains the 3-button mouse HID descriptor.

Hardware Setup

This example uses the kit's default configuration. Refer to the kit guide to ensure that the kit is configured correctly.

Operation

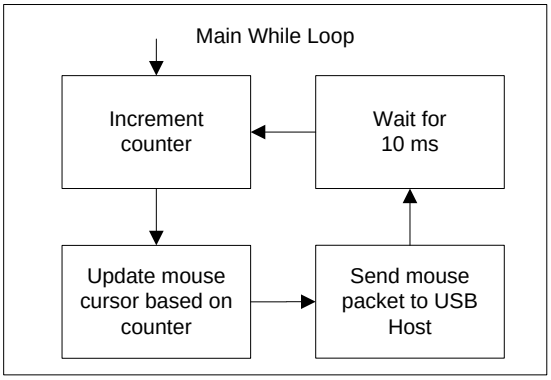
1. Connect the kit board to your PC using the provided USB cable through the USB connector [J10 for PSoC 6 WiFi-BT Pioneer kit].
2. Build the project and program it into the PSoC 6 MCU device. Choose **Debug** > **Program**. For more information on device programming, see PSoC Creator Help.
3. Connect another USB cable (or reuse the same cable used to program the kit) to the USB device connector [J28 for PSoC 6 WiFi-BT Pioneer kit].
4. On the PC, verify that a new USB device was enumerated as a mouse device. The mouse's cursor shall move from left to right, and vice-versa.

Design and Implementation

In the main firmware routine, the USBFS block is configured to use the HID Device Class. After enumeration, the device sends a packet to the host every 10 milliseconds. Each packet contains three bytes. The second and third bytes define the Y and X increments to move the mouse cursor. The first byte defines the mouse button states. In this example, only the second byte is used to move the cursor horizontally.

Figure 1 shows the firmware flowchart of this code example.

Figure 1. Firmware Flowchart



Components and Settings

Table 1 lists the PSoC Creator Components used in this example, how they are used in the design, and the non-default settings required so they function as intended.

Table 1. PSoC Creator Components

Component	Instance Name	Purpose	Non-default Settings
USBFS	USBFS	Implements the HID Device Class	All default

To see the USBFS descriptor, right-click the USBFS Component and select **Launch USB Configurator**. You can also refer to the *USBFS_cfg.h* file in the *Generated_Source* folder. For more details on how to create a HID descriptor, read the USB Configurator Guide.

To achieve the 0.25% accuracy required by the USB bus, the IMO needs to be trimmed with USB, as shown in Figure 2. The IMO is configured in the Design Wide Resources clock tab.

Figure 2. Source Clocks Configuration

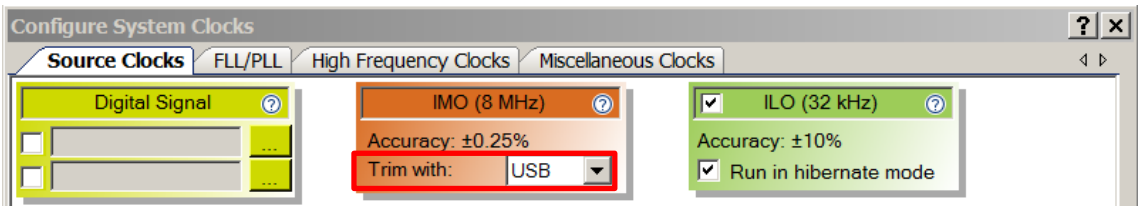


Figure 3 shows PLL/FLL configuration in the Design Wide Resources clock tab. Note that FLL and PLL are used in this application. FLL is used to clock the CPUs while PLL is used to clock the USBFS block. The reason to use the PLL to drive the USB is because it achieves the 0.25% accuracy requirement of the USB bus.

Figure 3. FLL/PLL Configuration

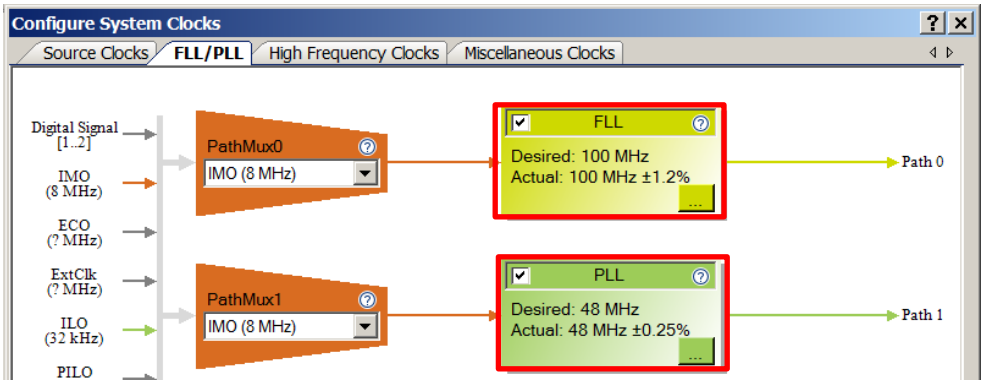
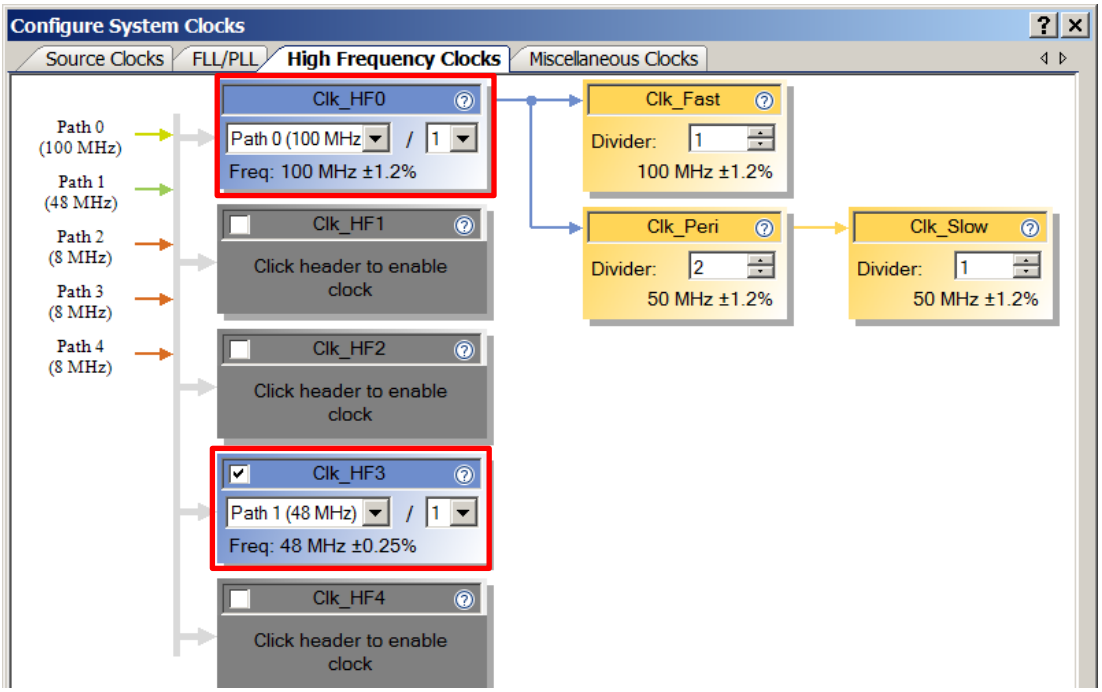


Figure 4 shows the high-frequency clock settings.

Figure 4. High Frequency Clock Configuration



For information on the hardware resources used by a Component, see the Component datasheet.

Reusing This Example

This example is designed for the CY8CKIT-062-WiFi-BT pioneer kit. To port the design to a different PSoC 6 MCU device and/or kit, change the target device using the Device Selector and update the pin assignments in the Design Wide Resources Pins settings as needed.

In some cases, a resource used by a code example is not supported on another device. In that case, the example will not work. If you build the code targeted at such a device, you will get errors. See the device datasheet for information on what a particular device supports.

Related Documents

Application Notes	
AN221774 – Getting Started with PSoC 6 MCU	Describes the PSoC 6 MCU devices and how to build your first PSoC project.
AN215656 – PSoC 6 MCU Dual-CPU System Design	Describes the dual-CPU architecture in PSoC 6 MCU, and shows how to build a simple dual-CPU design.
Code Examples	
Visit the Cypress Code Example site for a comprehensive collection of code examples using PSoC Creator IDE.	
Device Documentation	
PSoC 6 MCU Datasheets	PSoC 6 MCU Technical Reference Manuals
Development Kit Documentation	
CY8CKIT-062-WiFi-BT PSoC 6 WiFi-BT Pioneer Kit	

Document History

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**	6472562	RLOS	02/15/2019	New code example

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