CE95394 - USB HID Mouse with PSoC® 3/PSoC 5LP

Objective

This code example implements a standard USB HID mouse with a single button. The mouse cursor will move in the shape of a box on the screen.

Overview

This project demonstrates the use of the USBFS Component to implement a HID mouse. Using the standard HID mouse descriptor the PSoC enumerates as a mouse on the PC. When the enumeration is complete, the PSoC sends data about the relative movement of the mouse to the PC. A single button is also implemented in the project to emulate the left button, or button 1, on a standard mouse. You can hold down the button on the kit and watch the cursor highlight text or select items on a desktop while it draws the box.

PSoC Resources

Cypress provides a wealth of data at www.cypress.com to help you to select the right PSoC device for your design, and quickly and effectively integrate the device into your design. For a comprehensive list of resources, see KBA86521, How to Design with PSoC 3, PSoC 4, and PSoC 5LP. The following is an abbreviated list for PSoC 5LP:

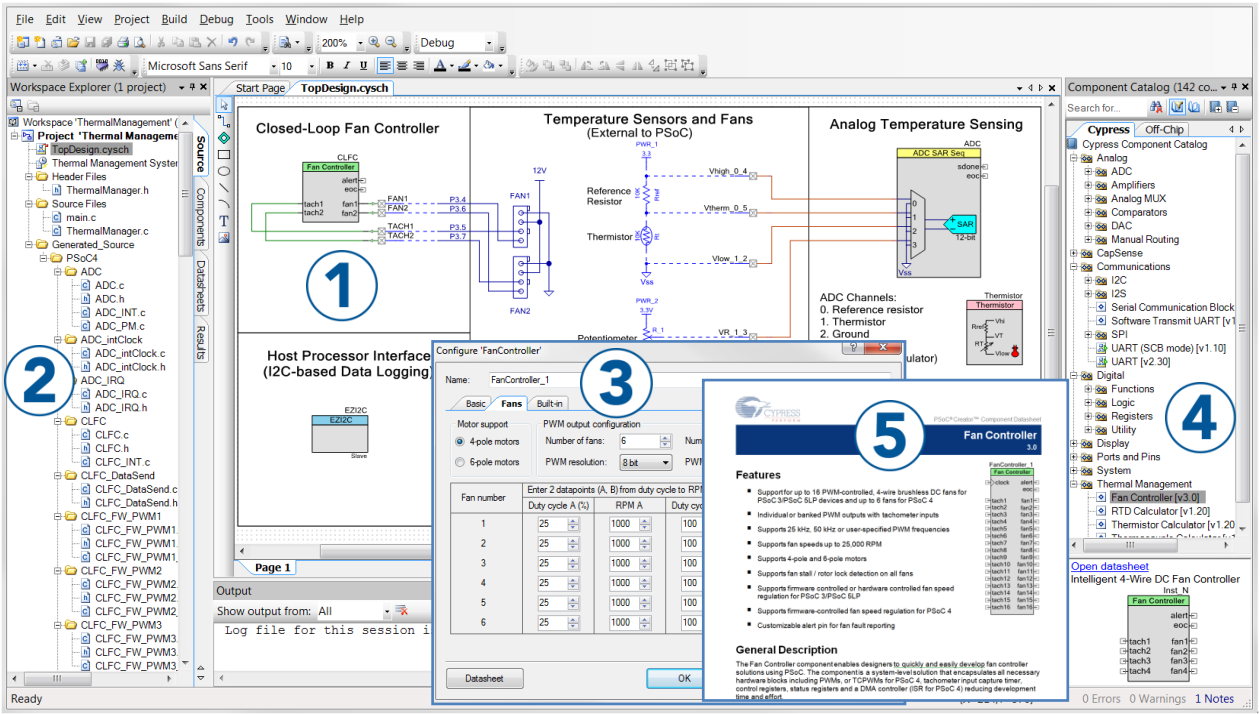
- **Overview:** PSoC Portfolio, PSoC Roadmap
- **Product Selectors:** PSoC 1, PSoC 3, PSoC 4, or PSoC 5LP. In addition, PSoC Creator includes a device selection tool.
- **Datasheets**: Describe and provide electrical specifications for the PSoC 5LP device family.
- **CapSense Design Guide:** Learn how to design capacitive touch-sensing applications with the PSoC 5LP family of devices.
- **Application Notes and Code Examples:** Cover a broad range of topics, from basic to advanced level. Many of the application notes include code examples.
- **Technical Reference Manuals (TRM):** Provide detailed descriptions of the architecture and registers in each PSoC 5LP device family.
- **Development Kits:**
  - CY8CKIT-001 is a common development platform for all PSoC family devices.
  - CY8CKIT-050 is a development platform targeted at analog intensive designs for PSoC 5LP.
- The MiniProg3 device provides an interface for flash programming and debug.

PSoC Creator

PSoC Creator is a free Windows-based Integrated Design Environment (IDE). It enables concurrent hardware and firmware design of systems based on PSoC 3, PSoC 4, and PSoC 5LP. See Figure 1 – with PSoC Creator, you can:

1. Drag and drop Components to build your hardware system design in the main design workspace
2. Codesign your application firmware with the PSoC hardware
3. Configure Components using configuration tools
4. Explore the library of 100+ Components
5. Review Component datasheets

Figure 1. PSoC Creator Features



Requirements

Tool: PSoC Creator 3.1 CP1

Programming Language: C (GCC 4.8.4)

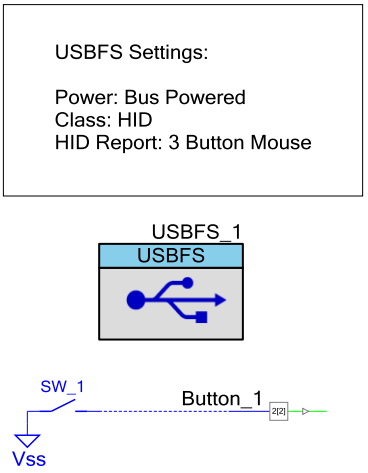
Associated Parts: All PSoC 3 and PSoC 5LP parts

Related Hardware: CY8CKIT-059, CY8CKIT-001, CY8CKIT-050, and CY8CKIT-030

Design

Figure 2 shows the PSoC Creator schematic for the code example.

Figure 2. USB HID Mouse Code Example Schematic



Test Setup and Procedure:

1) Connect the CY8CKIT-059 to a PC via a USB cable plugged into the USB mini connector.

2) After enumeration observe the mouse cursor moving in a square pattern.

3) Press SW1 on the CY8CKIT-059 to emulate a left click on a mouse.

The code example uses the USBFS Component to implement the HID mouse and a digital input pin configured in resistive pull-up mode to implement the mouse button.

All of the firmware for the code example is implemented in main.c. The firmware performs the following functions:

- Enumerates the PSoC as a HID mouse.
- Sends a packet of data with the mouse movement and button status to the PC.
- Waits for the last packet to be acknowledged by the PC.
- Updates the position data and button data after a brief delay.
- Loads the new mouse data into the USB end to be sent to the PC.

Design Considerations

The design can be extended to implement a functional mouse by adding real user input to load the X and Y position data with. This can be a joystick or a trackball fed into the ADC.

Hardware Setup

Plug in a USB cable to the USB connector on your kit.

Software Setup

There is no special software setup to use this project. HID drivers come standard on most operating systems, which is the benefit of creating a HID device.

Components

Table 1 lists the PSoC Creator Components used in this example, as well as the hardware resources used by each.

Table 1. List of PSoC Creator Components

Component or User Module	Hardware Resources
USBFS	USB
Pin	One pin for the mouse button

Parameter Settings

Table 2. Parameter Settings

Component	Non-default Parameter Settings
USBFS	HID Class Descriptor
Pin	Resistive Pull-up, Show External Terminal

Design-Wide Resources

Figure 3 and Figure 4 show the pin selections and the required clock settings for USB operation.

Figure 3. Pin Selections

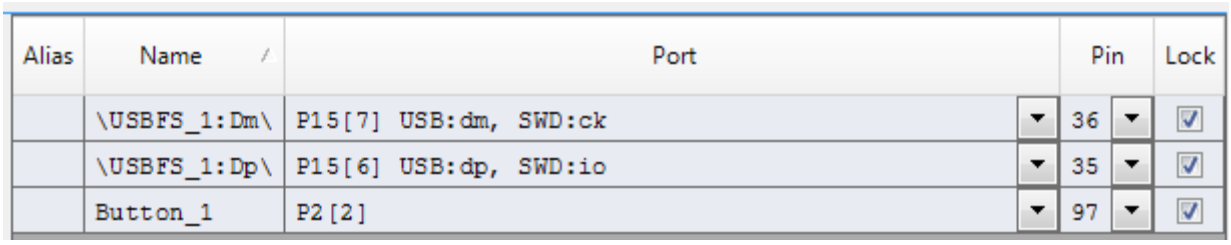
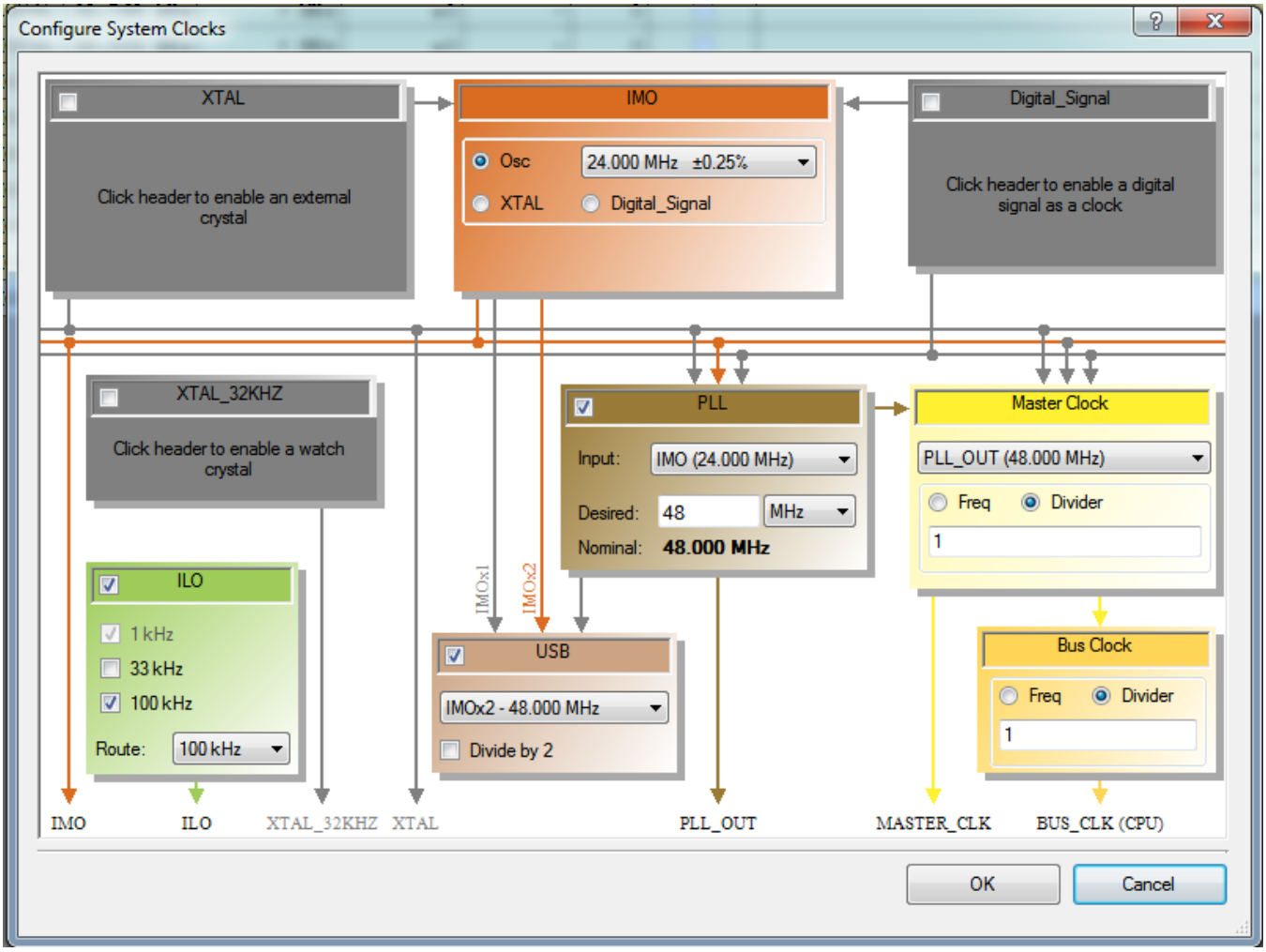


Figure 4. Clock Settings for USB Operation



Operation

Program your kit with the code example and plug in a USB cable from your PC to the USB connection on the kit (not the programming connection). Press the associated button to emulate a left click on the mouse.

Related Documents

Table 3 lists all relevant application notes, code examples, knowledge base articles, device datasheets, and Component datasheets.

Table 3. Related Resources

Application Notes		
AN57473	USB HID Basics with PSoC® 3 and PSoC 5LP	Introduction to USB HID with PSoC
AN58726	PSoC® 3 / PSoC 5LP USB HID Intermediate (with Keyboard and Composite Device)	Intermediate level USB HID with PSoC
AN82072	PSoC® 3 and PSoC 5LP USB General Data Transfer with Standard HID Drivers	General data transfer using HID drivers with PSoC
AN57294	USB 101: An Introduction to Universal Serial Bus 2.0	Introduction to USB
AN56377	PSoC® 3 and PSoC 5LP - Introduction to Implementing USB Data Transfers	Introduction to USB transfer types
Code Examples		
CE95390	USB Audio with PSoC 3/5LP	
CE95393	USB Bulk Transfer with PSoC 3/5LP	
CE95395	USB MIDI with PSoC 3/5LP	
CE95396	USB UART with PSoC 3/5LP	
PSoC Creator Component Datasheets		
USBFS	Details use of the USBFS Component	
Device Documentation		
PSoC 3 Datasheets	PSoC 3 Technical Reference Manuals	
PSoC 4 Datasheets	PSoC 4 Technical Reference Manuals	
PSoC 5LP Datasheets	PSoC 5LP Technical Reference Manuals	
Development Kit (DVK) Documentation		
PSoC 3 and PSoC 5LP Kits		
PSoC 4 Kits		

Document History

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**	4675951	KLMZ	03/04/2015	New code example

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Cypress Semiconductor
198 Champion Court
San Jose, CA 95134-1709

Phone : 408-943-2600
Fax : 408-943-4730
Website : www.cypress.com

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