USBFS MIDI PSoC3/5LP Code Example

v1.0

Features

- 2-Inputs/2-Outputs USB MIDI Interface
- Bus-powered
- Suspend mode support

General Description

This example project demonstrates the MIDI interface device operation. The project enumerates as a USB Audio Device with the MIDI feature and does not require additional drivers. The main goal of the USB MIDI interface is to transfer and convert MIDI data between external MIDI devices that use the UART interface, and a PC through the USB bus.

Development Kit Configuration

This example project runs on the CY8CKIT-001 kit from Cypress Semiconductor. A description of the kit, along with more code examples and ordering information is at http://www.cypress.com/go/cy8ckit-001.

The project requires configuration settings changes to run on other kits from Cypress Semiconductor. Table 1 is the list of the supported kits. To switch from CY8CKIT-001 to any other kit, change the project's device with the help of Device Selector called from the project's context menu.

Table 1. Development Kits vs Parts

Development Kit	Device
CY8CKIT-001	CY8C3866AXI-040/ CY8C5868AXI_LP035
CY8CKIT-030	CY8C3866AXI-040
CY8CKIT-050	CY8C5868AXI_LP035

The pins assignment for the supported kits is in Table 2.

Table 2. Pins Assignment

Pin Name	Development Kit		
	CY8CKIT-001	CY8CKIT-030	CY8CKIT-050
\USBFS:Dm\	P15[7]	P15[7]	P15[7]
\USBFS:Dp\	P15[6]	P15[6]	P15[6]
LED_InA	P1[4]	P6[2]	P6[2]

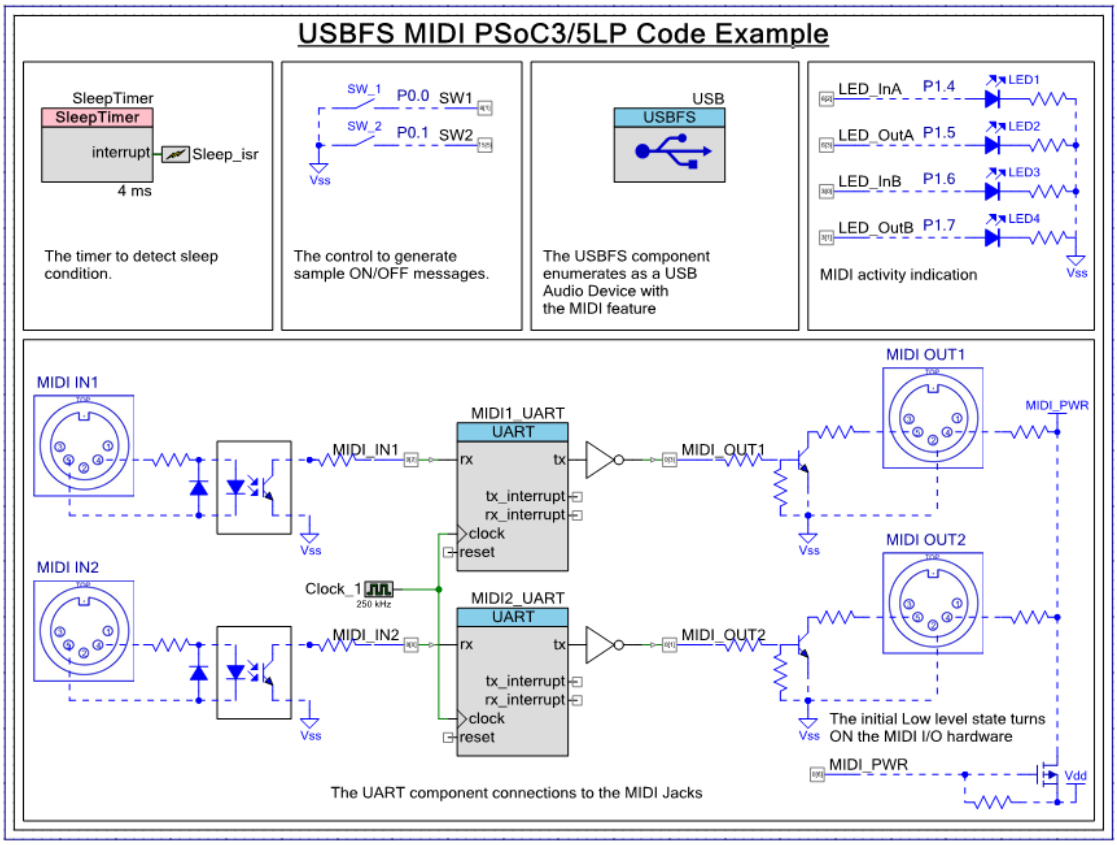
Pin Name	Development Kit		
	CY8CKIT-001	CY8CKIT-030	CY8CKIT-050
LED_InB	P1[6]	P3[0]	P3[0]
LED_OutA	P1[5]	P6[3]	P6[3]
LED_OutB	P1[7]	P3[1]	P3[1]
MIDI_IN1	P5[2]	P0[2]	P0[2]
MIDI_IN2	P5[0]	P0[0]	P0[0]
MIDI_OUT1	P5[3]	P0[3]	P0[3]
MIDI_OUT2	P5[1]	P0[1]	P0[1]
MIDI_PWR	P5[6]	P0[6]	P0[6]
SW1	P0[0]	P6[1]	P6[1]
SW2	P0[1]	P15[5]	P15[5]

Note The project control file handles the pins placement automatically according to a chosen PSoC.

Project Configuration

The example project consists of the USBFS, SleepTimer, UART, and pins components. The project schematic is in Figure 1.

Figure 1. Example Project Design Schematic PSoC3/5LP



The important USBFS component configuration Tabs are in the figures below.

Figure 2. USBFS Descriptor Root

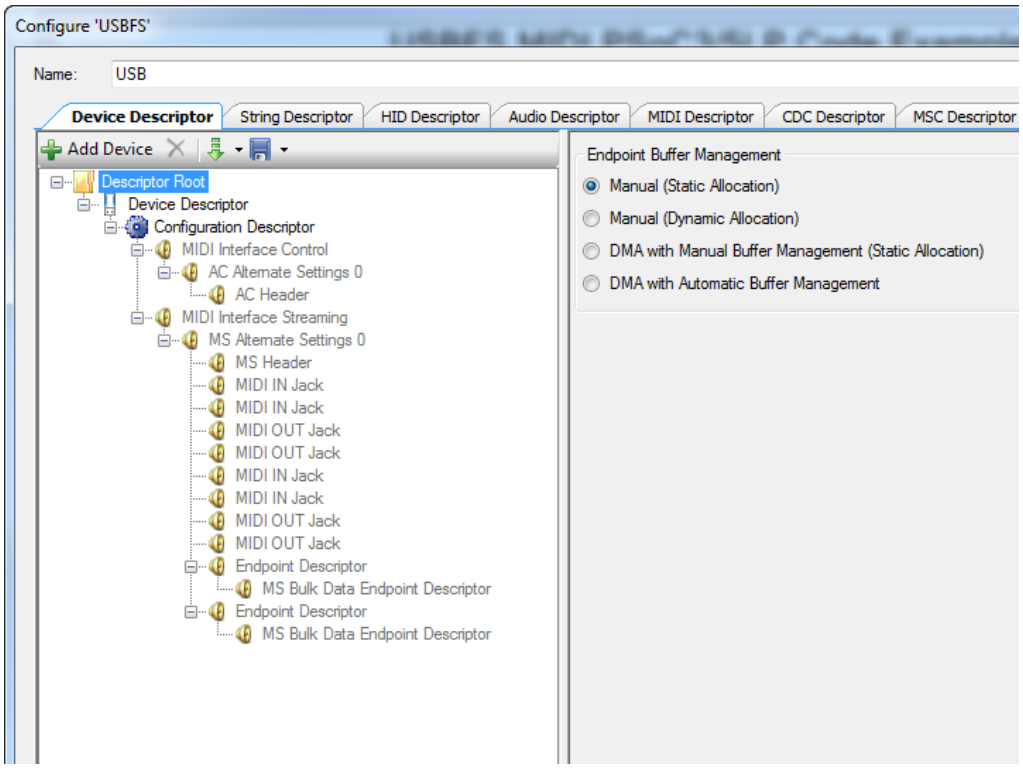


Figure 3. USBFS Device Descriptor

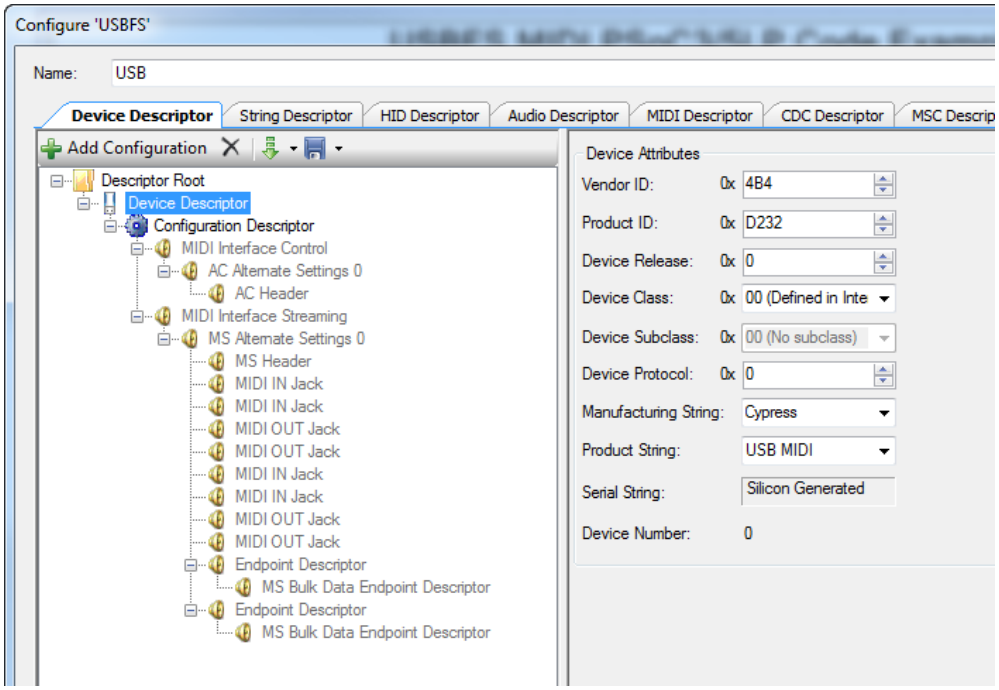


Figure 4. USBFS Configuration Descriptor

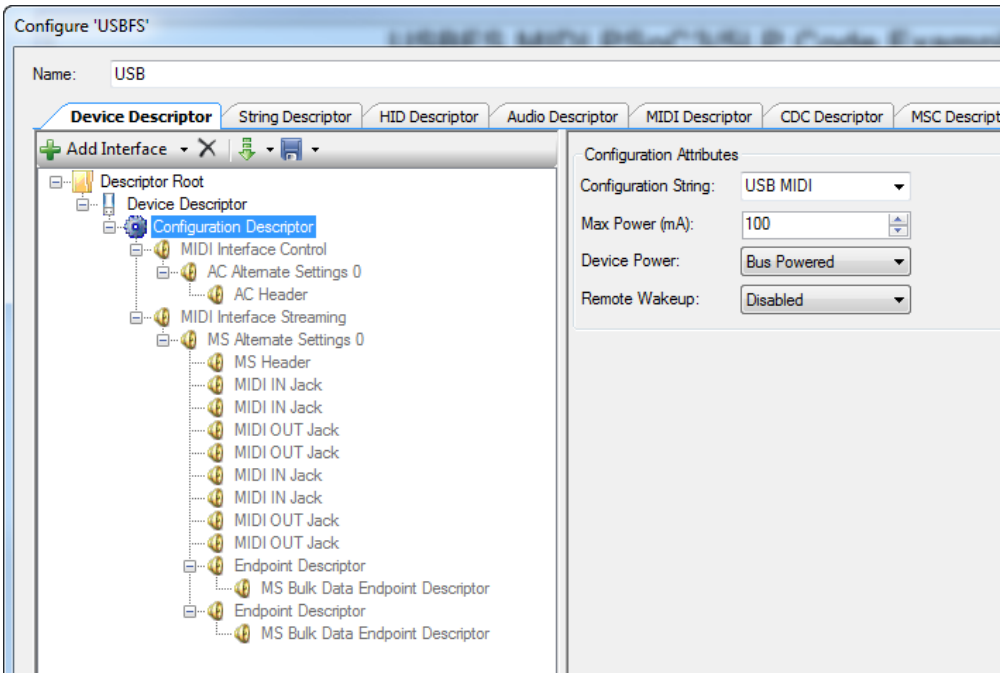


Figure 5. USBFS AC Alternate Settings Descriptor

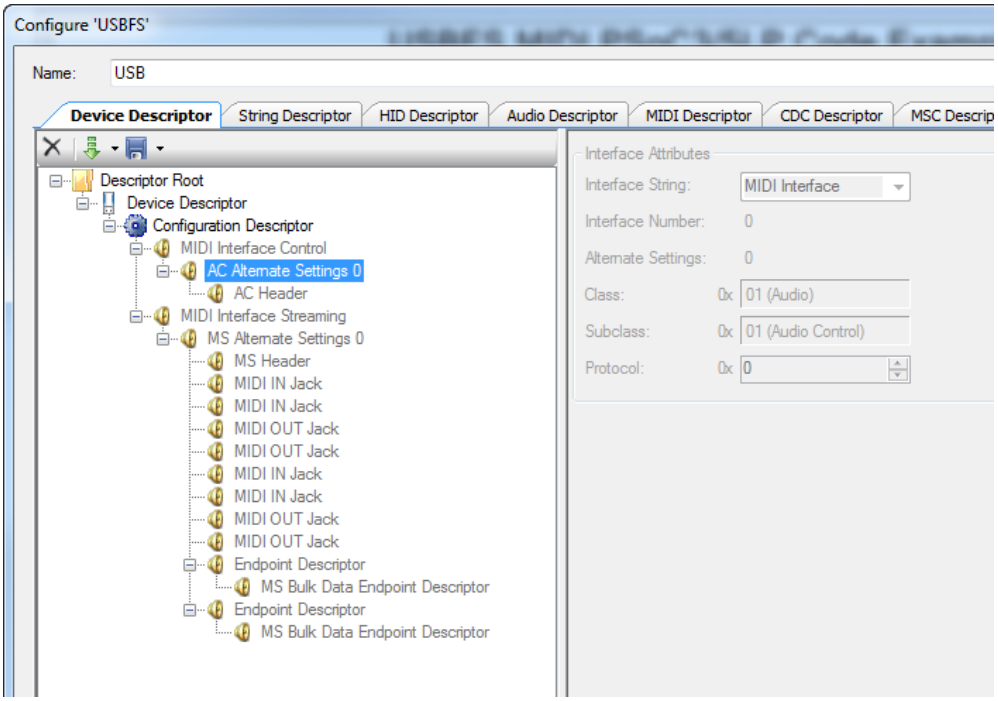


Figure 6. USBFS MS Alternate Settings Descriptor

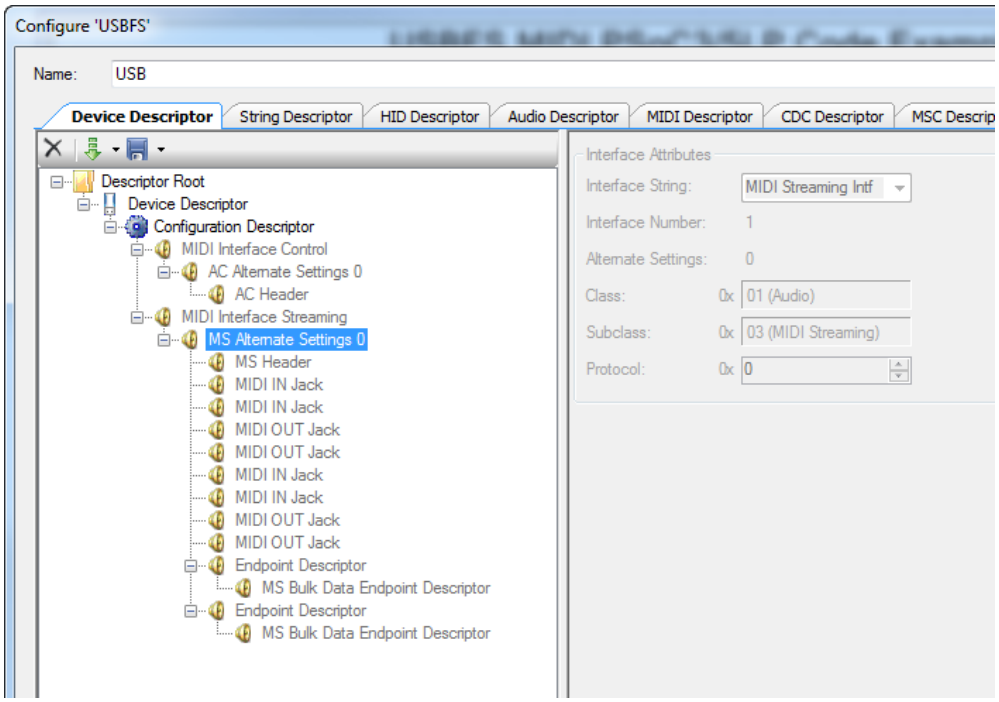


Figure 7. USBFS EP1 Descriptor

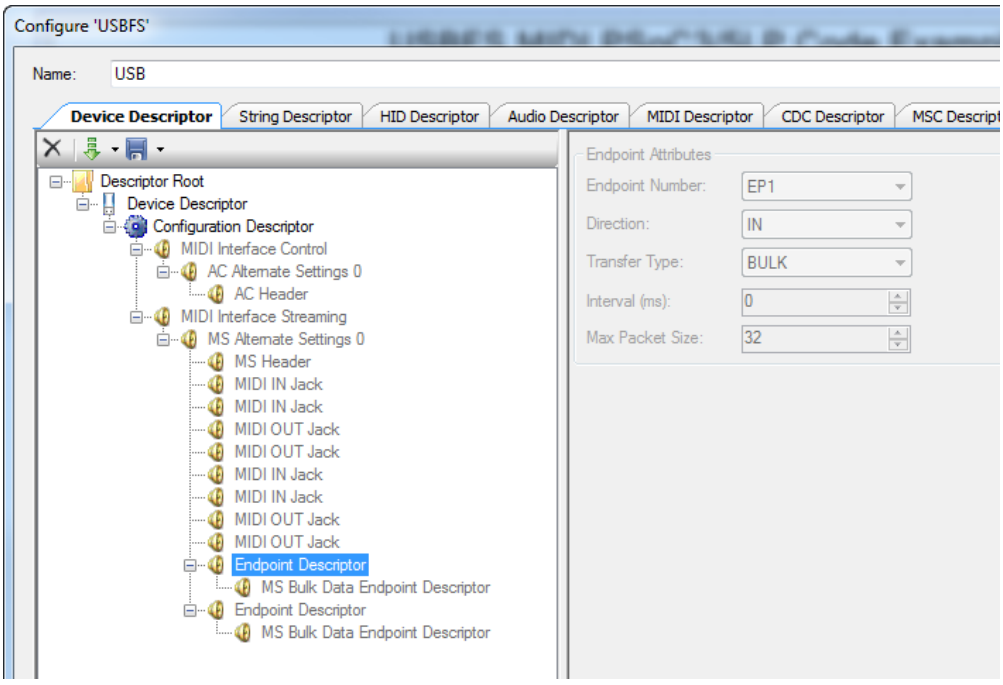
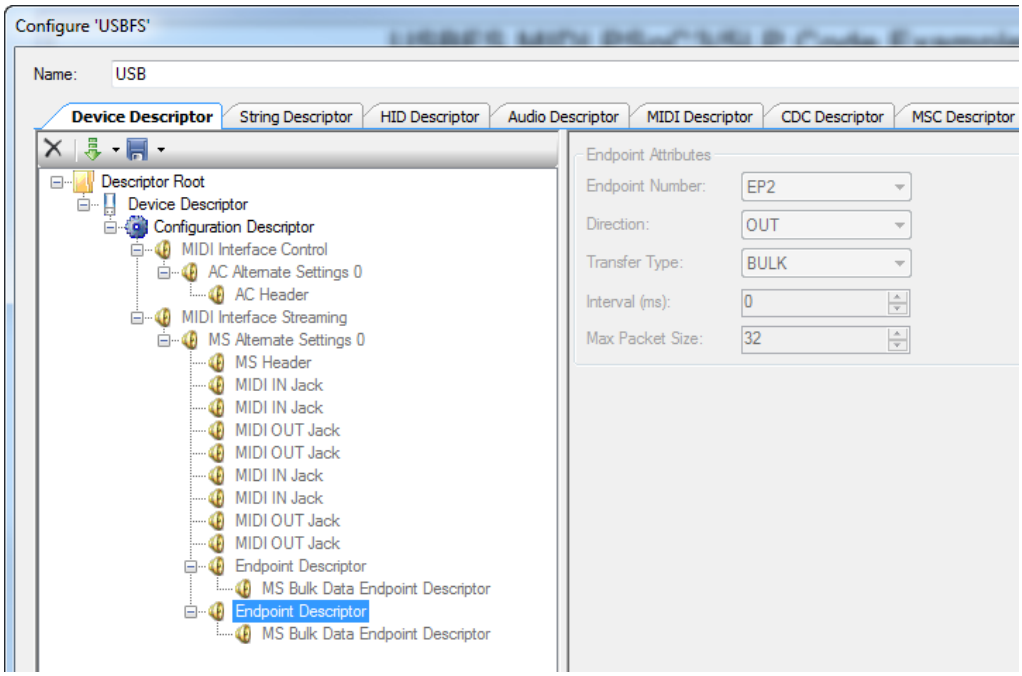


Figure 8. USBFS EP2 Descriptor



Project Description

The main firmware routine configures the USBFS component for operation and starts it. The code waits for the USBFS device enumeration and loops MIDI streams MIDI_IN1 to MIDI_OUT1 and MIDI_IN2 to MIDI_OUT2. The LED indicates data transfers for MIDI_IN/OUT_1/2. The code generates simple notes according to the state of the SW1 and SW2 buttons.

Example Project Execution Flow

To execute the USBFS component code example you need the following equipment:

- USB 3/5LP Kit (CY8CKIT-001/030/050)
- CY8CKIT-044 MIDI I/O EBK extension board
- MIDI Software MIDI-OX (on Windows), GarageBand (on Mac OS).

Follow the procedure below:

1. Make sure that PSoC 3/PSoC 5 LP DVK CY8CKIT-001 is in the default configuration.
2. Connect the CY8CKIT-044 MIDI I/O EBK extension board to CY8CKIT-001 PORT A.
3. Connect pins LED_InA, LED_OutA, LED_InB, LED_OutB to the LED1, LED2, LED3, LED4 respectively (refer to the table of pins). These LEDs indicate the MIDI input and output activity.

4. Connect pins SW1, SW2 to the SW1 and SW2 respectively (refer to the table of pins).
5. Set the JP8 jumper to the VBUS position.
6. Connect the computer USB cable to the CY8CKIT-001.
7. Build the project and program the hex file into the target device.
8. Open the Device Manager and observe that the USB Audio Device is working properly.
9. Connect the MIDI output port of your MIDI device (keyboard) to one of the MIDI input ports (MIDI_IN1/MIDI_IN2).
10. Connect one of the MIDI output ports (MIDI_OUT1/MIDI_OUT2) to the MIDI input port of your MIDI device (synthesizer, sound module, etc.)
11. Configure your MIDI capable music software to use the USB Audio Device for incoming and outgoing MIDI messages. Some applications also require selecting a specific MIDI input and output port for each track used within the software
12. (Check your software's documentation for instructions). Software examples: MIDI-OX (on Windows), GarageBand (on Mac OS)
13. Press SW1/SW2 to generate sample note ON/OFF messages.

Expected Results

The device continuously transfers data between the USB and both UARTs and indicates the activity on the LEDs. When the computer is in the sleep mode, the device also goes into the sleep mode and reduces the power consumption. The wake-up source is configured to PICU.

Note Some applications may not properly support the PC's Stand-By mode (MIDI-OX). In this case, restart the software after the PC's wake-up to continue operation.