CE215654 - FM0+ Software-Triggered ADC

The ADC reads the voltage on a pin and firmware toggles an LED at the mid-point of the voltage range.

Overview

The firmware triggers scan conversions in the ADC to read the voltage across the potentiometer. It toggles an LED at the mid-point of the voltage range.

Requirements

Tool: PSoC Creator 4.0 and Peripheral Driver Library (PDL) 2.1

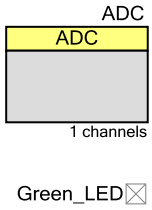
Programming Language: C (GCC 4.9.3)

Associated Parts: All S6E1 parts

Related Hardware: FM0-V48-S6E1A1and FM0-64L-S6E1C3

Design

The schematic file includes the ADC and a GPIO component, renamed as shown below.



The firmware performs following functions:

1. Initialize the LED (off) and the ADC
2. Trigger a scan and wait for it to complete
3. Read the FIFO and extract the scan data
4. Light the green LED if the voltage is above 50% of the ADC range

Design Considerations

Pin Selection

The project includes control files to automatically place the ADC channel and LED IO onto the appropriate pins for the supported kit hardware. To change the pin selections, delete the control file or over-ride the control file selections in the Design Wide Resources Pin Editor.

PDL Installation

The project assumes that you have installed the PDL in the location specified in the **Project Management** panel of the **Tools** > **Options** dialog. If that location is incorrect you will see the build error “The given PDL path is invalid. Unable to find required PDSC file.” To correct this problem in a newly-created project open the **Project** > **Properties** dialog and enter the correct path to the PDL. To avoid the problem in projects you create in the future, make sure you put the correct path in the **Tools** > **Options** dialog.

Hardware Setup

The ADC is connected on the S6E1C Starter Kit hardware to a potentiometer. On the S6E1A Evaluation Board, it is connected to a header pin and an external voltage source is required to fully exercise the application. The GPIO is connected to a green LED.

Table 1 lists the pin connections required to use this code example on FM0+ kits.

Table 1. List of Pins

Pin	FM0-V48-S6E1A1	FM0-64L-S6E1C3
ADC:CH0	P10	P10
Green_LED:GPIO	P61	P3E

Components

Table 2 lists the PSoC Creator Components used in this example, as well as the hardware resources used by each.

Table 2. List of PSoC Creator Components

Component	Version	Hardware Resources
PDL_ADC	1.0	ADC block
PDL_GPIO	1.0	GPIO pin

Parameter Settings

All Components use their default parameter settings. Only the Component instance names have been changed for readability.

Operation

For the S6E1C Starter Kit, rotating the potentiometer toggles the green LED at the mid-point of the ADC voltage range.

For the S6E1A Evaluation Board, an external voltage source is required. Tie the source's ground to pin 48 on header CN5-2 and apply the voltage to pin 25, also on CN5-2. Vary the voltage to control the green LED.

Related Documents

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

Table 3. Related Documents

PSoC Creator Component Datasheets	
PDL_ADC	Supports scan and priority conversions on multiple channels (right-click on the Component to access)
PDL_GPIO	Supports firmware access to physical pins (right-click on the Component to access)
Device Documentation	
S6E1A	FM0+ S6E1A-Series 5V Robust ARM® Cortex®-M0+ Microcontroller (MCU) Family
S6E1C	FM0+ S6E1C-Series Ultra Low Power ARM® Cortex®-M0+ Microcontroller (MCU) Family
Development Kit (DVK) Documentation	
FM0-V48-S6E1A1	ARM® Cortex®-M0+ FM0+ MCU Evaluation Board
FM0-64L-S6E1C3	ARM® Cortex®-M0+ MCU Starter Kit with USB and Digital Audio Interface

Document History

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Revision	ECN	Orig. of Change	Submission Date	Description of Change
**	5368147	YFS	08/29/16	New Code Example.
*A	5448624	YFS	9/29/16	Added workspace file.
*B	5714300	YFS	6/9/17	Added search keyword so that user can quickly find Code Examples from the component instance popup menu. Updated logo and copyright date.
*C	5987508	YFS	12/7/17	Removed S6E1B.

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