CE216670 – FM0+ DMA Flash to SRAM

This application uses DMA to transfer a block of data in flash to SRAM. The firmware interprets the data as Morse code and copies the message to the green LED.

Overview

The flash memory contains an array of Morse code instructions (DOT, DASH, SPACE, etc.). The DMA copies the array (about 100 bytes) into SRAM. In the main loop the Morse code is repeatedly output to the green LED.

Requirements

Tool: PSoC Creator 4.0

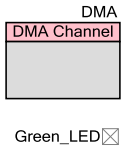
Programming Language: C (GCC 4.9.3)

Associated Parts: All S6E1A parts

Related Hardware: FM0-V48-S6E1A1

Design

The schematic file includes DMA and GPIO Components, renamed as shown below.



The firmware performs following functions:

1. Initialize the LED GPIO (off)
2. Initialize the DMA channel to copy from flash to SRAM
3. Start the transfer and wait for it to complete
4. Repeatedly output the Morse code message to the LED

Design Considerations

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.

Pin Selection

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

Hardware Setup

The GPIO is connected to the green LED.

Table 1 lists the pin connections required to use this code example on FM0-V48-S6E1A1 kits.

Table 1. List of Pins

Pin	FM0-V48-S6E1A1
Green_LED:GPIO	P61

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_DMA	1.0	DMA channel
PDL_GPIO	1.0	GPIO pin

Parameter Settings

The GPIO Component uses the default parameter settings. Only the Component instance name has been changed for readability.

The DMA Component uses mostly default parameter settings, with the following modifications.

Table 3: Component Settings

Tab	Setting	Value
None	Name	DT
Basic	bFixedSource	false
	bFixedDestination	false
	u8BlockCount	1
	bEnableBitMask	false
Interrupts	bCompleteIrq	true
	bTouchNvic	true

The bFixedSource and bFixedDestination parameters are set to false so that the DMA transfers a byte and increments both the source and destination addresses before transferring the next byte.

Disabling the bEnableBitMask parameter disables the DMA channel automatically when the transfer is complete.

The u8BlockCount is the number of memory blocks that the DMA transfer can span.

Operation

Program the kit and observe the Morse code message on the green LED.

Related Documents

Table 4 lists all relevant application notes, code examples, knowledge base articles, device datasheets, and Component datasheets.

Table 4. Related Documents

PSoC Creator Component Datasheets	
PDL_DMA	Supports DMA transactions between flash, SRAM and peripherals (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
Development Kit (DVK) Documentation	
FM0-V48-S6E1A1	ARM® Cortex®-M0+ FM0+ MCU Evaluation Board

Document History

Document Title: CE216670 - FM0+ DMA Flash to SRAM

Document Number: 002-16670

Revision	ECN	Orig. of Change	Submission Date	Description of Change
**	5439838	YFS	09/16/16	New Code Example.
*A	5453472	YFS	09/29/16	Changed the workspace folder name. Renamed the PDF file. Moved the PDF file. Corrected the Documentation entry in XML file.
*B	5776647	YFS	6/16/17	Added search keyword so that user can quickly find Code Examples from the component instance popup menu. Updated logo and copyright date.

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