CE216708 – FM0+ Low Power Mode NMI

This application demonstrates how to exit low power mode with an NMI event.

Overview

This application goes into a low power mode when the user presses the user switch (SW3). When the user presses the NMIX switch (SW2) the low power mode is exited and the green LED is lit.

Requirements

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

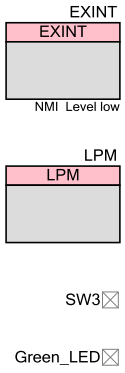
Programming Language: C (GCC 4.9.3)

Associated Parts: All S6E1A parts

Related Hardware: FM0-V48-S6E1A1

Design

The schematic file includes the EXINT, LPM, and two GPIO Components, renamed as shown below.



The firmware performs following functions:

1. Initialize the green LED (on)
2. Initialize the SW3 switch (up)
3. Select the pin for the EXINT NMI interrupt
4. Set up the EXINT NMI
5. Wait for user to press SW3
6. Turn off the LED
7. Go into low power mode
8. When NMI fires, light 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.

Hardware Setup

The LED GPIO is connected to a green LED. The SW3 GPIO is connected to the SW3 switch.

The EXINT NMIX pin is connected to the SW2 (NMIX) switch. Note that P0F is the only legal NMI pin on the device and PSoC Creator automatically maps the signal to the correct pin.

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
EXINT:NMIX	P0F
Green_LED:GPIO	P61
SW3:GPIO	P04

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_ LPM	1.0	None
PDL_EXINT	1.0	NMI signal
PDL_GPIO	1.0	GPIO pin

Parameter Settings

The GPIO and LPM Components use their default parameter settings. Only the component instance names have been changed for readability.

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

Table 3: EXINT Component Settings

Tab	Setting	Value
None	Name	EXINT
Basic	NMI	true

Operation

After programming, power up, or reset, the application lights the green LED and waits for the user to press the SW3 switch.

Press the switch to enter low power mode. The application turns off the LED to indicate that it is in the low power mode.

Press the NMIX switch to exit low power mode and turn on the LED. The application turns on the LED to indicate that it is in run mode.

Note: The device is not programmable via CMSIS-DAP in low power mode. Always press either reset or NMIX to exit that state and enable the programmer/debugger to gain control. If you modify this project such that your device cannot exit low power mode use the Cypress Flash MCU Programmer to re-program the device.

Related Documents

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

Table 4. Related Documents

PSoC Creator Component Datasheets	
PDL_LPM	Includes the low power mode API (right-click on the Component to access)
PDL_EXINT	Configures the NMI and/or external interrupt signals (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 5 V 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: CE216708 – FM0+ Low Power Mode NMI

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Revision	ECN	Orig. of Change	Submission Date	Description of Change
**	5442793	YFS	09/20/16	New Code Example.
*A	5453495	YFS	09/28/16	Changed the workspace folder name. Moved the PDF file.
*B	5776648	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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