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APN Content Level	BASIC	INTERMEDIATE	<input checked="" type="checkbox"/> ADVANCED
Confidentiality		Public	<input checked="" type="checkbox"/> Private
Hardware Compatibility	Product Line	AirPrime	Series
		Q26xx	SL60xx
			WMPxx
Software Compatibility	Series		ALL



1 Version

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2 Introduction

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3 Overview

This Application Note describes a method to wake up an embedded module by motion detection through the use of a 3 axis accelerometer.

Generally, when an AirPrime embedded module is not needed in working mode, the best way to save energy is to enter into ALARM mode. It can then be woken up by programming an RTC interrupt. However, in specific applications, it can be useful to wake up the AirPrime module when a movement is detected. This application note shows a method to implement this mechanism.

4 Description

This wake up method is based on the use of a 3 axis Accelerometer. As soon as this device is moved, a GPIO is toggled and used to activate the ON/OFF signal of the embedded module.

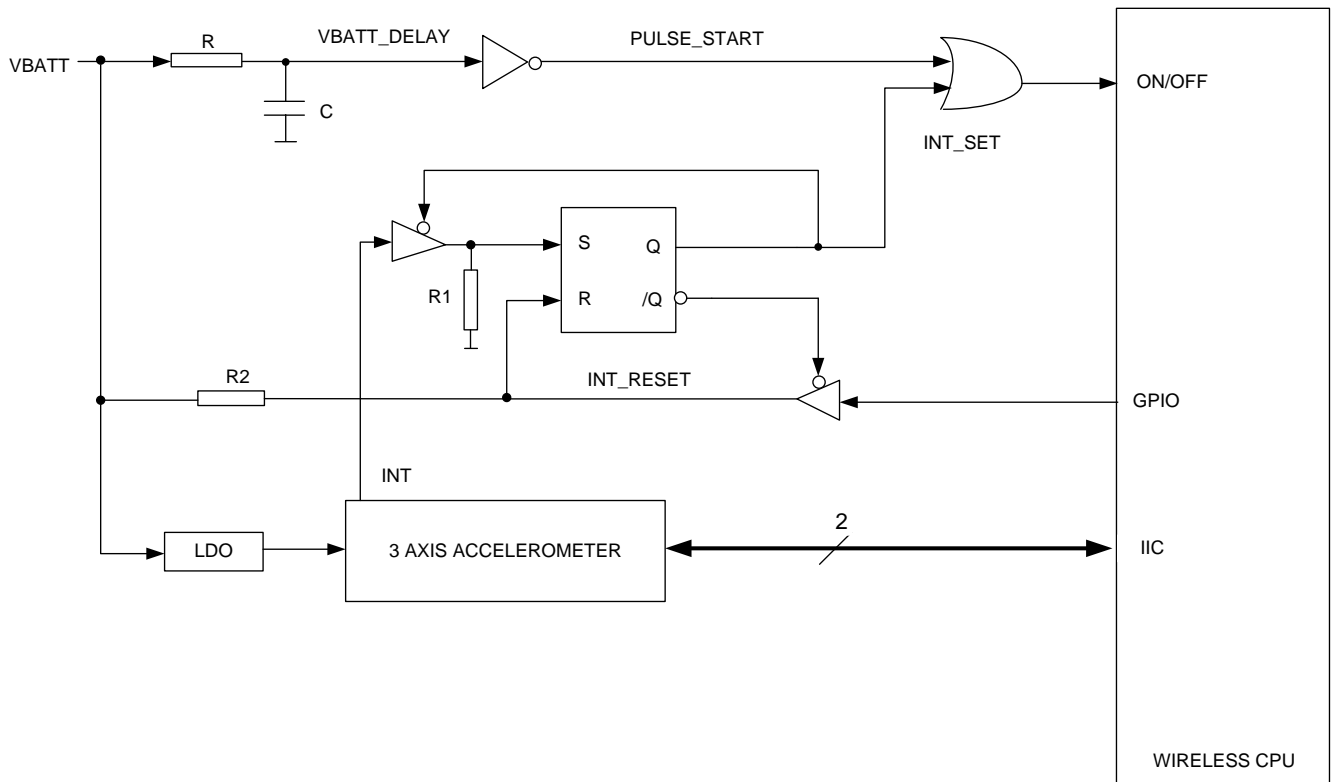
As this interrupt signal is only a pulse, in order to meet the ON/OFF signal specification, an RS FLIP FLOP is used.

The GPIO sets the RS FLIP FLOP maintaining the ON/OFF high, enabling the AirPrime module to power up normally.

Once the required task has been performed, the system can enter the ALARM mode again to save energy. To enter ALARM mode, the ON/OFF input signal should be first reset to a low level, using one of its own GPIO.

The block diagram below shows the implementation of this system.

5 Block Diagram



The RC and associated inverter are used to generate the ON/OFF signal.

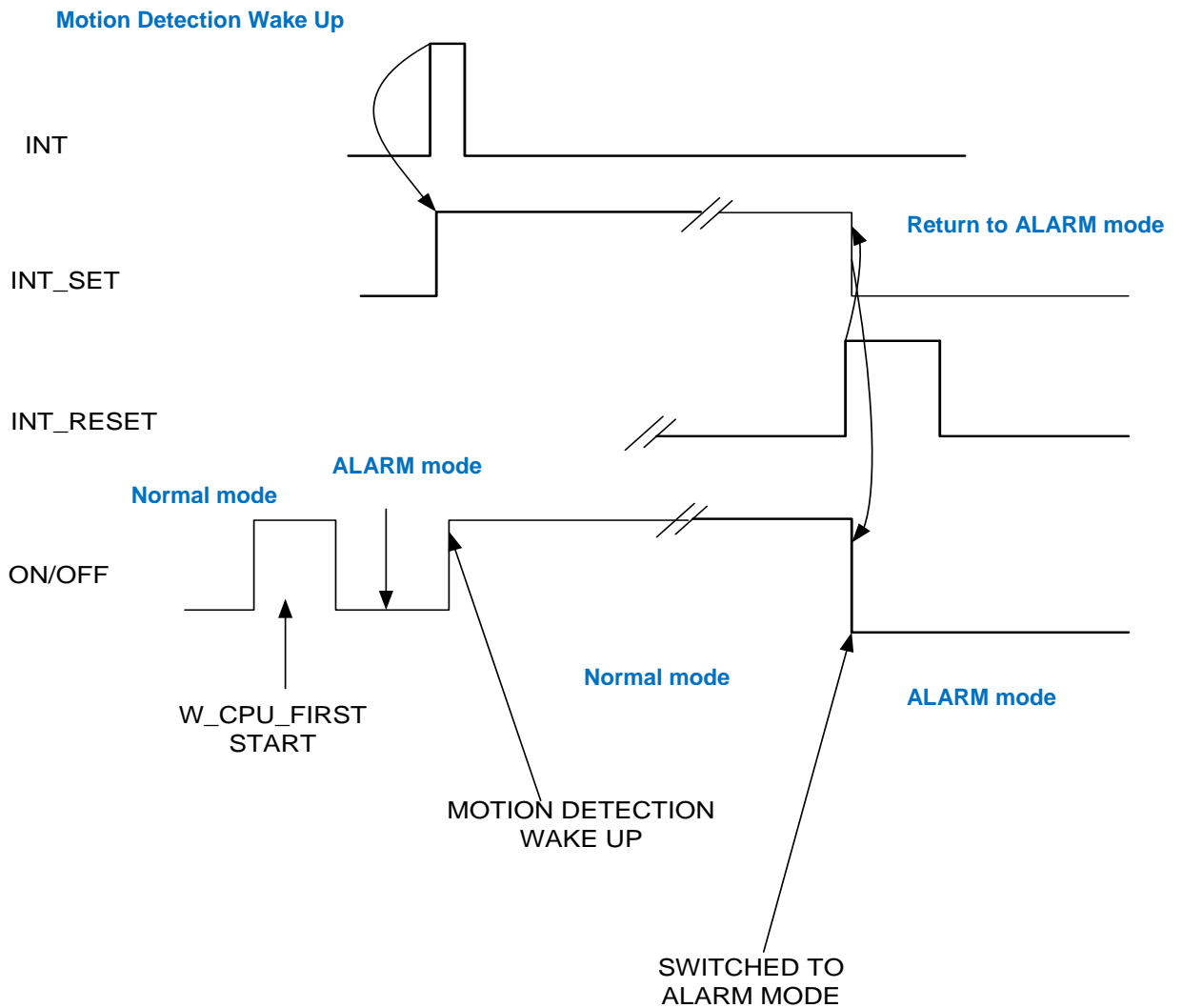
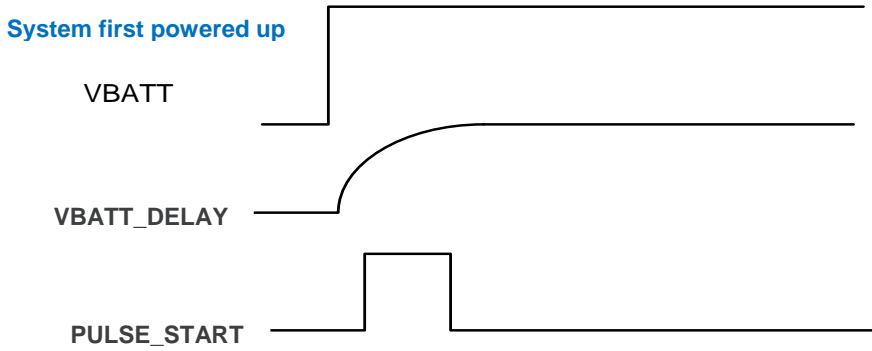
The 3 axis accelerometer needs to be programmed through I2C bus at power ON.

When the embedded module has performed the required actions task, it can then be switched to ALARM mode by AT command (AT+CPOF).

As soon as a motion is detected on the 3 axis accelerometer, an INT signal is issued from it, setting the RS FLIP FLOP (INT_SET) high. The INT_SET signal is then applied to the ON/OFF signal to restart the module which then leaves ALARM mode and power up normally. When the module needs to return to ALARM mode, to save energy, the INT_SET signal must be reset to leave the ON/OFF low. The internal GPIO is set high through an AT command (INT_RESET) to reset the INT_SET signal, after this the AT+CPOF can switch the module OFF (return to ALARM mode).

The below timing diagram shows the main signal states.

6 Signals Timing



When the user needs to program an alarm and enter alarm mode, the below steps should be followed:

1. Switch the ON/OFF signal to low by programming a pulse on GPIOXX:
 - AT command to be sent to have a pulse AT+WIOW=XX,1 ; AT+WIOW=Xx,0.
2. Enter the AT+CALA command to program the alarm.
3. Enter the AT+CPOF command to switch the module OFF (ALARM mode).

7 Document History

Level	Date	History
1.0	November 26, 2013	Creation

8 Legal Notice

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