The driver of MMA7455 by using I²C

Example Code Introduction for 32-bit NuMicro® Family

Information

Application	The example is the driver of MMA7455 based on NUC240
BSP Version	NUC230_240 Series BSP CMSIS v3.01.001
Hardware	NuEdu-EVB-NUC240 v1.0

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1 Function Description

1.1 Introduction

The example is the driver of MMA7455 based on NUC240 series. NUC240 reads 3-axis accelerometer data from MMA7455 via I^2C interface and display data in the terminal.

API	Function
Init_MMA7455_Reg()	Initialize MMA7455 register
READ_MMA7455_ACCEL()	Get the accelerometer value

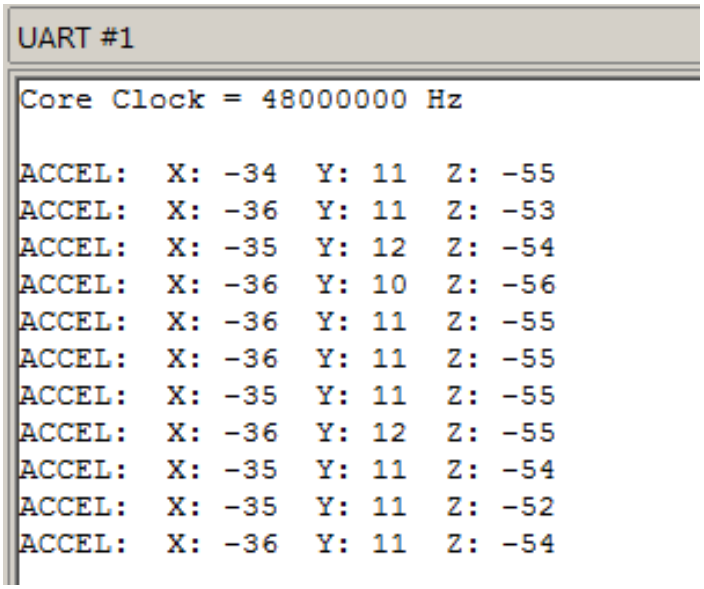
1.2 Principle

MMA7455 features:

- Low power 3-Axis Accelerometer
- Support 2.4 V ~3.6 V input
- Selectable sensitivity (±2 g, ±4 g, ±8 g) for 8-bit mode
- Sensitivity (64 LSB/g @ 2 g and @ 8 g in 10-bit mode)
- Maximum acceleration 5000 g
- Digital output (SPI/I^2C)
- Single or double pulse detection and motion level detection with interrupt output
- Operating temperature: -40°C to +85 °C

1.3 Demo Result

MMA7455 is capable of measuring acceleration along its X-, Y-, and Z-axes. Use NUC240 to control MMA7455 and read 3-axis accelerometer data via I^2C interface. Compile the project and enter debug mode, the serial window UART #1 will show the 3-axis accelerometer data continuously.


UART #1
Core Clock = 48000000 Hz
ACCEL: X: -34 Y: 11 Z: -55
ACCEL: X: -36 Y: 11 Z: -53
ACCEL: X: -35 Y: 12 Z: -54
ACCEL: X: -36 Y: 10 Z: -56
ACCEL: X: -36 Y: 11 Z: -55
ACCEL: X: -36 Y: 11 Z: -55
ACCEL: X: -35 Y: 11 Z: -55
ACCEL: X: -36 Y: 12 Z: -55
ACCEL: X: -35 Y: 11 Z: -54
ACCEL: X: -35 Y: 11 Z: -52
ACCEL: X: -36 Y: 11 Z: -54

2 Code Description

2.1 Initialize MMA7455

Use Init_MMA7455_Reg() function to initialize the MMA7455, and set the offset. Please refer to MMA7455 specification for more details.

```
void Init_MMA7455_Reg(void)
{
    MMA7455_Write(MMA7455,MMA7455_MCTL, 0x05);
    MMA7455_Write(MMA7455,MMA7455_XOFFL, 0xF8);
    MMA7455_Write(MMA7455,MMA7455_XOFFH, 0xFF);
    MMA7455_Write(MMA7455,MMA7455_YOFFL, 0x26);
    MMA7455_Write(MMA7455,MMA7455_YOFFH, 0x00);
    MMA7455_Write(MMA7455,MMA7455_ZOFFL, 0xD8);
    MMA7455_Write(MMA7455,MMA7455_ZOFFH, 0xFF);
}
```

2.2 Read accelerometer values from MMA7455

Use READ_MMA7455_ACCEL() to get the accelerometer values from MMA7455. It will update and print the data on the terminal continuously. For more details, please refer to MMA7455 specification.

```
void READ_MMA7455_ACCEL(void)
{
    MMA7455_X=(int8_t)MMA7455_Read(MMA7455,MMA7455_XOUT8);
    MMA7455_Y=(int8_t)MMA7455_Read(MMA7455,MMA7455_YOUT8);
    MMA7455_Z=(int8_t)MMA7455_Read(MMA7455,MMA7455_ZOUT8);
}
```

3 Software and Hardware Environment

Software Environment

- BSP version
  - NUC230_240 Series BSP CMSIS v3.01.001
- IDE version
  - Keil uVersion 4.74

Hardware Environment

- Circuit components
  - NuEdu-EVB-NUC240 V1.0
  - MMA7455
- Diagram

  The pin connections between NuEdu-SDK-NUC240 and MMA7455 are listed below.

NuEdu-SDK-NUC240		MMA7455
I2C1_SCL (PA.11)	↔	SCL (Pin 14)
I2C1_DAT (PA.10)	↔	SDA (Pin 13)

4 Directory Information

- EC_NUC240_I2C_MMA7455_V1.00
  - Library — Sample code header and source files
    - CMSIS — Cortex® Microcontroller Software Interface Standard (CMSIS) by Arm® Corp.
    - Device — CMSIS compliant device header file
    - NuEdu — Library for NuEdu-SDK-NUC240 board
    - StdDriver — All peripheral driver header and source files
  - SampleCode
    - ExampleCode — Source file of example code

5 How to Execute Example Code

1. Browsing into sample code folder by Directory Information (section 4) and double click NUC240_I2C_MMA7455.uvproj.
2. Enter Keil compile mode
   a. Build
   b. Download
   c. Start/Stop debug session
3. Enter debug mode
   a. Run

6 Revision History

Date	Revision	Description
Nov. 1, 2019	1.00	1. Initially issued.

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