# Use GPIO to read/write SPI Flash

Example Code Introduction for 8-bit NuMicro® Family

## Information

| | |
|---|---|
| Application | This code uses GPIO as SPI Master to read or write SPI Flash |
| BSP Version | N76E003 BSP Keil C51 v1.0.6 |
| Hardware | NuTiny-SDK-N76E003 v2.0 |

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# 1 Function Description

## 1.1 Introduction

This example is used MCU's GPIO to simulate the SPI host to read and write SPI flash. In the case that the hardware SPI of the MCU is insufficient, if you want to read and write SPI flash, you can use the software GPIO to simulate the SPI host. The speed of reading and writing SPI flash depends on the speed at which the CPU runs.

In this example, the test result is output with N76E003 serial port 0 (TX is P06), and the serial port baud rate is 9600.

## 1.2 Principle

The connection between the MCU pin and the SPI Flash pin is as follows, P1.5 is connected to /CS, P1.0 is connected to CLK, P0.0 is connected to DI, P0.1 is connected to DO.

## 1.3 Demo Result

# 2 Code Description

SPI flash usually requires three steps to write data. The first step is to enable the write function. The second step is to erase the original data in the area to be written. The third step is to write new data. Without one of these steps, new data will not be successfully written to the SPI flash. Usually we add data verification in the two steps of erase and write to ensure the correctness of the written data.

```
/* The procedure of SPI Flash at erase mode */
 SPI_Flash_WriteEnable();
 SPI_Flash_Chip_Erase();
 SPI_Flash_Wait_Busy();
 SPI_Flash_WriteDisable();
 SPI_Flash_Erase_Verify();
 /* The procedure of SPI Flash at program mode */
 SPI_Flash_WriteEnable();
 SPI_Flash_Program();
 SPI_Flash_Wait_Busy();
 SPI_Flash_WriteDisable();
 /* Program verify */
 SPI_Flash_Program_Verify();

 printf("\nFinished the SPI Flash Demo Code and test pass!!!\n");
```

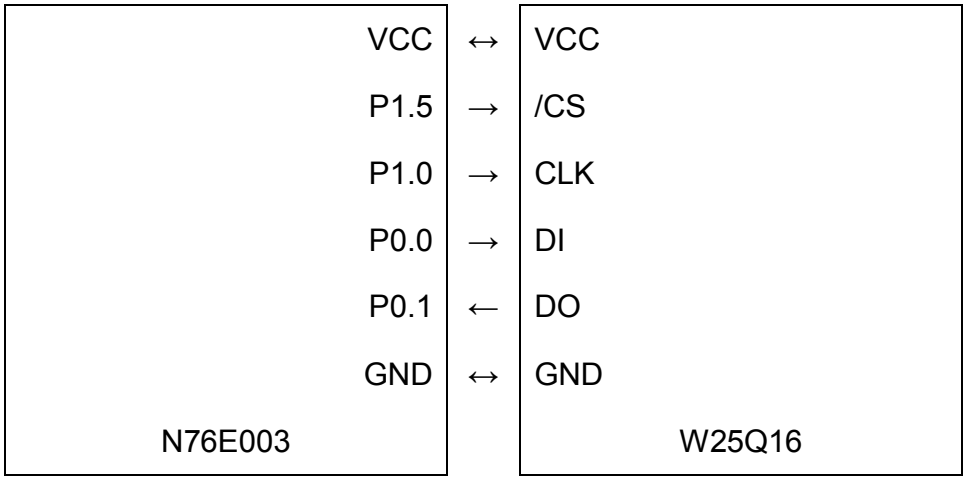
# 3 Software and Hardware Environment

## Software Environment

- BSP version
  - N76E003 BSP Keil C51 v1.0.6
- IDE version
  - Keil uVersion 5.26

## Hardware Environment

- Circuit components
  - NuTiny-SDK-N76E003
  - W25Q16
- Diagram



# 4 Directory Information

- EC_N76E003_GPIO_RW_SPI_Flash_V1.00
  - Library — Sample code header and source files
    - Device — compliant device header file
    - Startup — A51 startup file and executeable file
    - 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 N76E003_GPIO_RW_SPI_Flash.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 |
|---|---|---|
| July. 5, 2019 | 1.00 | 1. Initially issued. |

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