Use M0516 to Drive TM1812 LED Strip

Example Code Introduction for 32-bit NuMicro®Family

Information

Application	This sample code uses M0516 to drive TM1812 through SPI
BSP Version	M051SeriesBSP_CMSIS_Rev3.01.001
Hardware	NuTiny-EVB-M051_V3.0

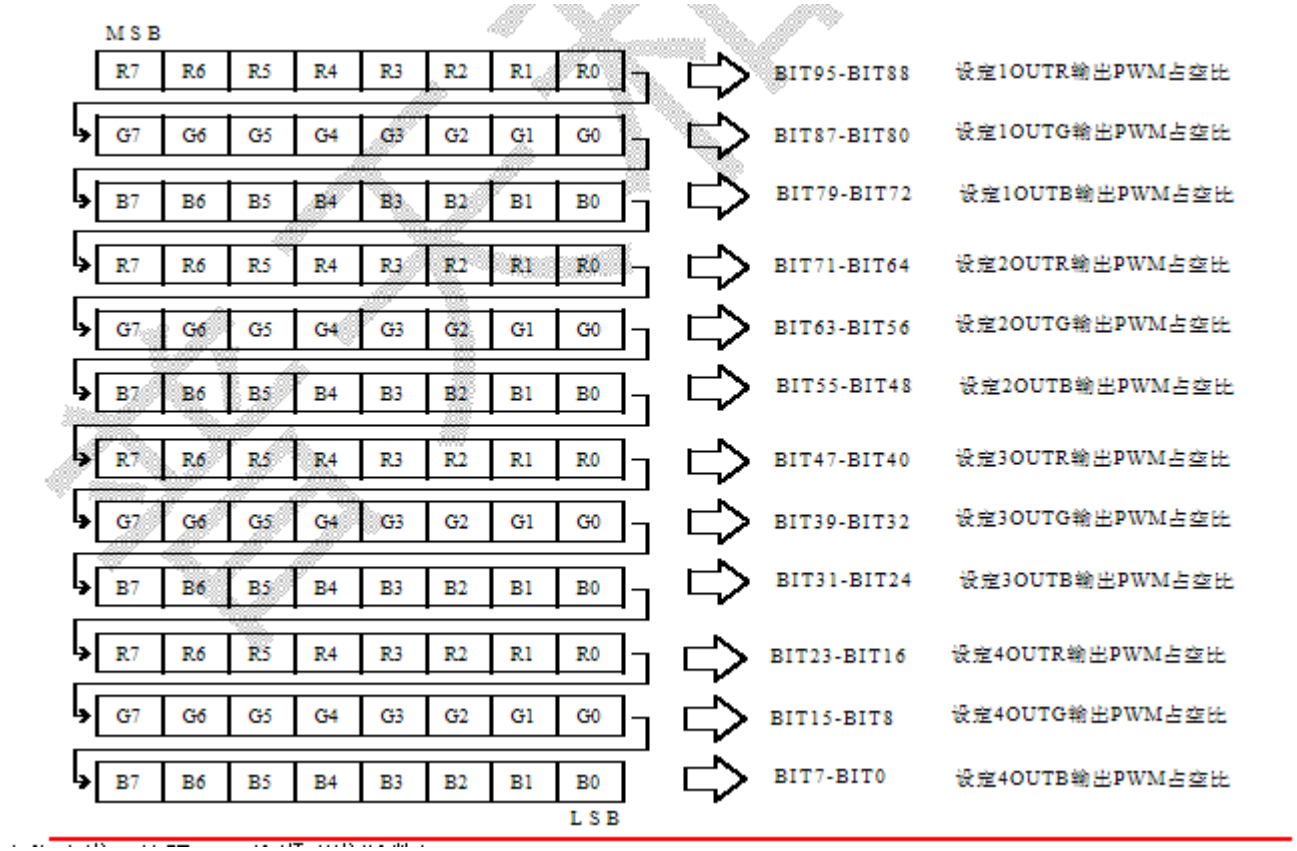
1 Function Description

1.1 Introduction

This sample code uses M0516 to drive TM1812 through MOSI of SPI0 to light RGB-LED strip.

1.2 Principal

TM1812 adopts the single-line communication mode and sends signals by NRZ(Non Return Zero). After power on and reset, the chip receives data from DIN, After receiving 4 sets of 24bit, the DO port begins to forward data to provide input data for the next chip. Before forwarding, the DOUT port keeps pulling down. At this time, the chip will not receive new data. According to the data received, the four groups output ports of OUTR, OUTG and OUTB will send corresponding signals with different duty cycle. The signal cycle is 1.3ms.If the input signal at the DIN is a RESET signal, the chip will send the received data to the display. The chip will re-receive new data after the end of the signal, and forward the data through the DOUT port after receiving the begin 4 sets of 24bit data.



2 Code Description

Initialize SPI0:

```
    void SPI_Init(void)
    {
        /* Init SPI */
        /* Configure as a master, clock idle low, 24-bit transaction, drive output on
falling clock edge and latch input on rising edge. */
        /* Set IP clock divider. SPI clock rate = 2.5MHz */
        SPI_Open(SPI0, SPI_MASTER, SPI_MODE_0, 24, 2500000);
        /* Enable the automatic hardware slave select function. Select the SS pin and
configure as low-active. */
        SPI_DisableAutoSS(SPI0);
    }
```

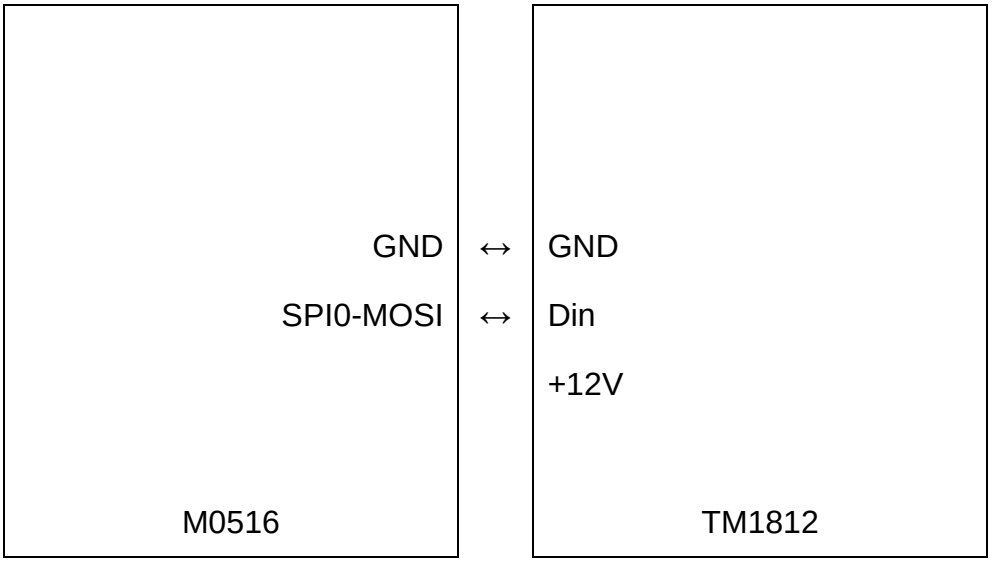
SPI0 write data to TM1812:

```
    /*
    The SPI clock is set at 2.5mhz, or 400NS, and a data bit is represented by a 3-bit SPI
waveform
    This expands a data byte to a 24-bit SPI waveform word length
    Converting logic 0 into binary 100 is 0x04, which means 400nS high and 800nS low
    Converting logic 1 into binary 110 is 0x06, which means 800nS high and 400nS low
    so SPI MOSI data to drive TM1812 DIN
    */
    void tm1812_write_byte(uint8_t byte)
    {
            uint32_t tmp,data=0;
            uint8_t i;
            for(i=0;i<8;i++)
            {
              tmp=(byte&1)?0x06:0x04;
              data|=tmp<<(i*3);
              byte>>=1;
            }
            spi0_write(data);
    }
```

3 Software and Hardware Environment

- **Software Environment**
  - BSP Version
    - M051SeriesBSP_CMSIS_Rev3.01.001
  - IDE Version
    - Keil uVersion4.74
- **Hardware Environment**
  - Circuit Components
    - NuTiny-EVB-M051_V3.0
    - TM1812 and RGB-LED Strip
  - Diagram

M0516 uses MOSI of spi0 to drive TM1812



4 Directory Information

EC_M0516_SPI_TM1812_V1.00	
Library	Sample code header and source files
CMSIS	Cortex®Microcontroller Software Interface Standard (CMSIS) V4.5.0 definitions by ARM® Corp.
Device	CMSIS compliant device header file
StdDriver	All peripheral driver header and source files
SampleCode	
ExampleCode	Source file of example code

5 How to Execute Example Code

1. According to Directory Information, enter the KEIL folder in path ExampleCode and double click “M0516_SPI_TM1812.uvproj”
2. Enter the compilation mode interface
   a. Compilation
   b. Download code to Flash
   c. Enter/leave debugging mode
3. Enter the debugging mode interface
   a. Execution code

6 Revision History

Date	Revision	Description
Apr. 24, 2019	1.00	1. Initially issued.

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