使用M0516來驅動TM1812 LED燈條

NuMicro® 32 位系列微控制器範例代碼介紹

文件資訊

代碼簡述	此範例代碼為 M0516 通過 SPI 接口 MOSI 去驅動 TM1812
BSP 版本	M051SeriesBSP_CMSIS_Rev3.01.001
開發平台	NuTiny-EVB-M051_V3.0

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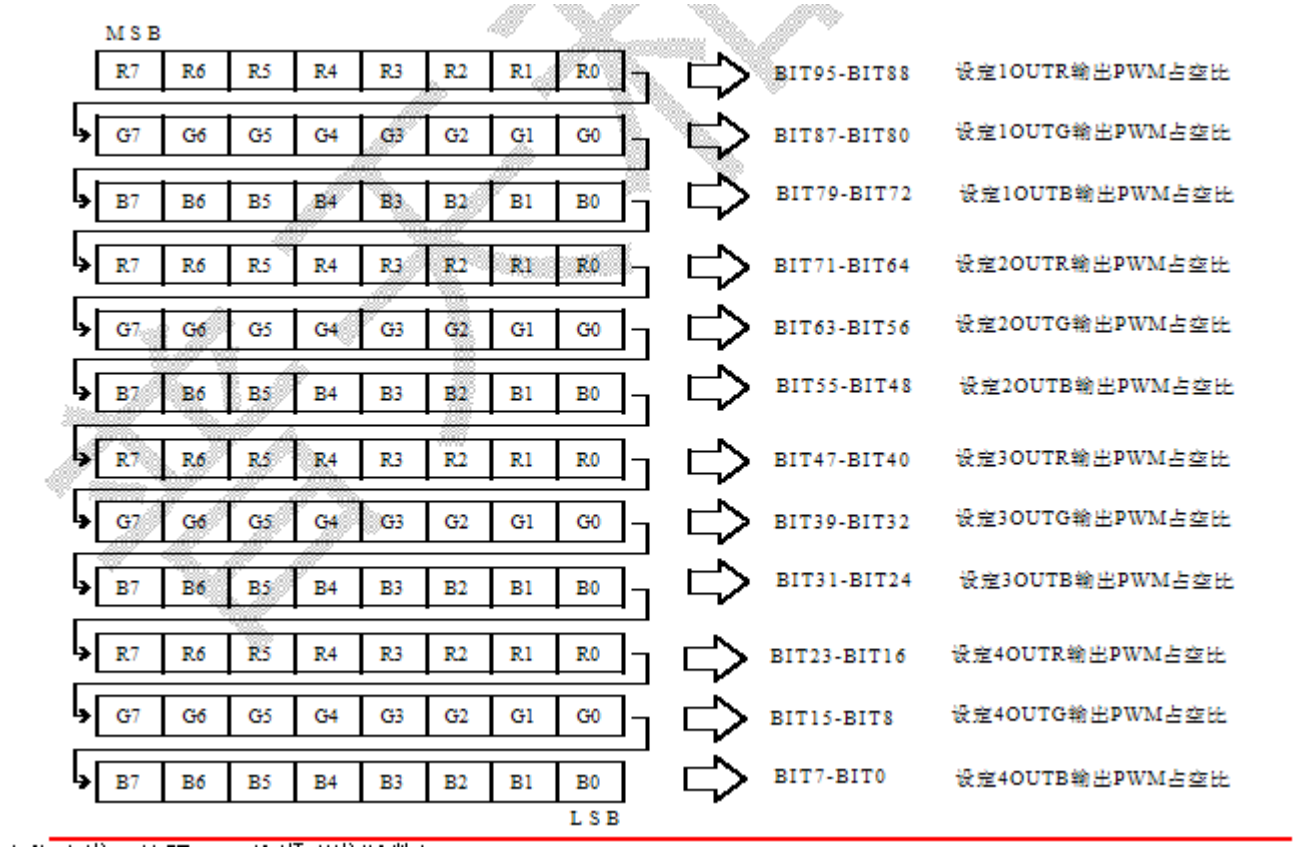
1 功能介紹

1.1 簡介

此範例代碼為 M0516 通過 SPI0 接口的 MOSI 去驅動 TM1812 來點亮 RGB-LED 燈條。

1.2 原理

TM1812採用單線通訊方式，採用歸零碼的方式發送信號。芯片在上電覆位以後，接收DIN端接收的數據，接收夠4組24位後，DO端口開始轉發數據，爲下一個芯片提供輸入數據。在轉發之前，DOUT口一直拉低。此時芯片將不接收新的數據，芯片4組OUTR、OUTG、OUTB輸出口根據接收到的數據，發出相應的不同佔空比的信號，該信號週期爲1.3毫秒。如果DIN端輸入信號爲RESET信號，芯片將接收到的數據送顯示。芯片將在該信號結束後重新接收新的數據，在接收完開始的4組24位數據後，通過DOUT口轉發數據。



2 代碼介紹

初始化 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);
    }
```

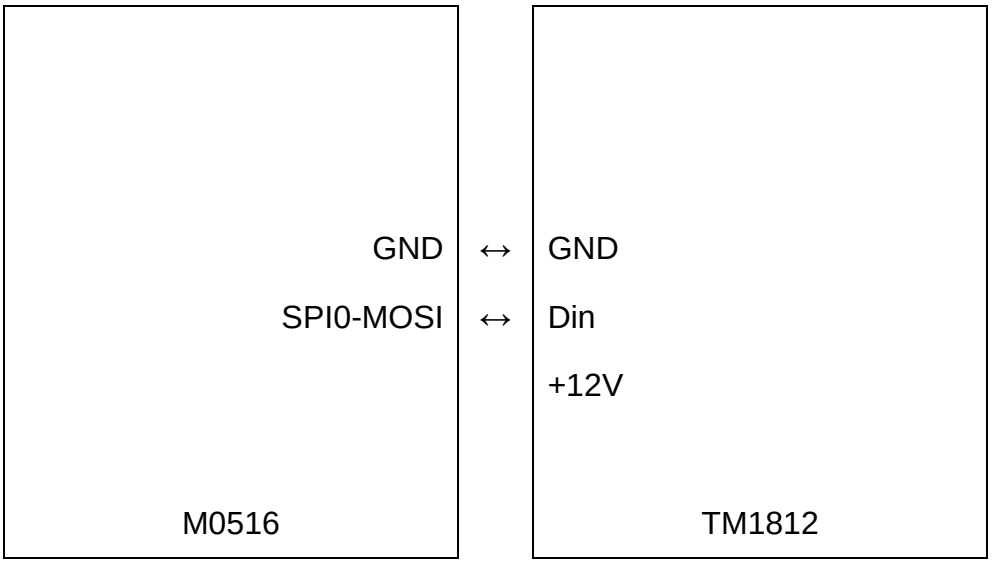
SPI0 寫 RGB 數據到 TM1812：

```
    /*
    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 軟體與硬體環境

- 軟件環境
  - BSP 版本
    - M051SeriesBSP_CMSIS_Rev3.01.001
  - IDE 版本
    - Keil uVersion4.74
- 硬件環境
  - 電路組成
    - NuTiny-EVB-M051_V3.0
    - TM1812 和 RGB-LED 燈條
  - 框圖

M5016 通過 SPI0 的 MOSI 來驅動 TM1812



4 目錄資訊

- 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 如何執行範例程式

1. 根據目錄資訊章節進入 ExampleCode 路徑中的 KEIL 文件夾，雙擊“M0516_SPI_TM1812.uvproj”
2. 進入編譯模式接口
   a. 編譯
   b. 下載代碼至內存
   c. 進入/離開仿真模式
3. 進入仿真模式接口
   a. 執行代碼

6 修訂紀錄

Date	Revision	Description
Apr. 24, 2019	1.00	1. 初始發布.

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