使用M0516来驱动TM1812 LED灯条

NuMicro® 32 位系列微控制器范例代码介绍

文件信息

代码简述	此范例代码为 M0516 通过 SPI 接口 MOSI 驱动 TM1812
BSP 版本	M051SeriesBSP_CMSIS_Rev3.01.001
开发平台	NuTiny-EVB-M051_V3.0

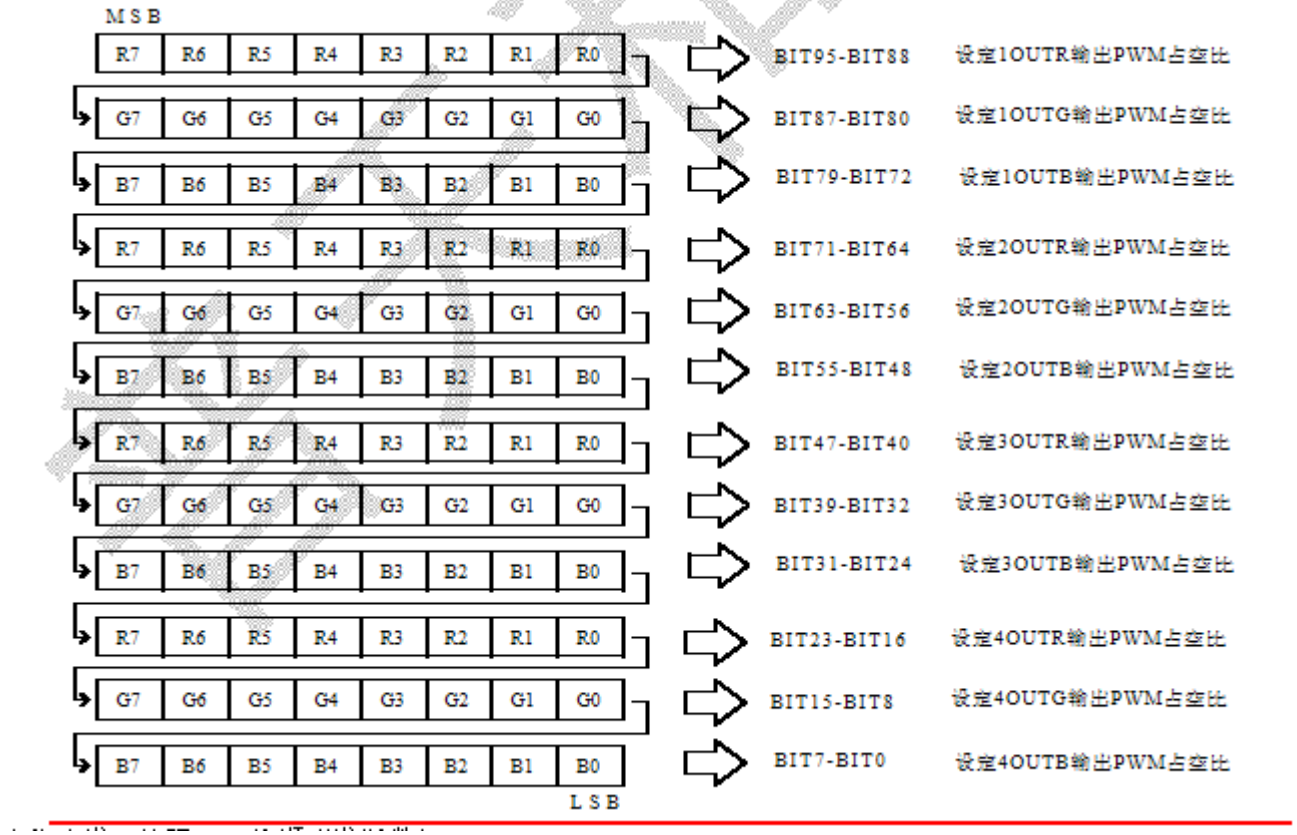
1 功能介绍

1.1 简介

此范例代码为 M0516 通过 SPI0 接口 MOSI 去驱动 TM1812 来点亮 RGB-LED 灯条。

1.2 原理

TM1812采用单线通讯方式，采用归零码的方式发送信号。芯片在上电复位以后，接收DIN端接收的数据，接收够4组24位后，DO端口开始转发数据，为下一个芯片提供输入数据。在转发之前，DOUT口一直拉低。此时芯片将不接收新的数据，芯片4组OUTR、OUTG、OUTB输出口根据接收到的数据，发出相应的不同占空比的信号，该信号周期为1.3毫秒。如果DIN端输入信号为RESET信号，芯片将接收到的数据送显示，芯片将在该信号结束后重新接收新的数据，在接收完开始的4组24位数据后，通过DOUT口转发数据。



2 代码介绍

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);
    }
```

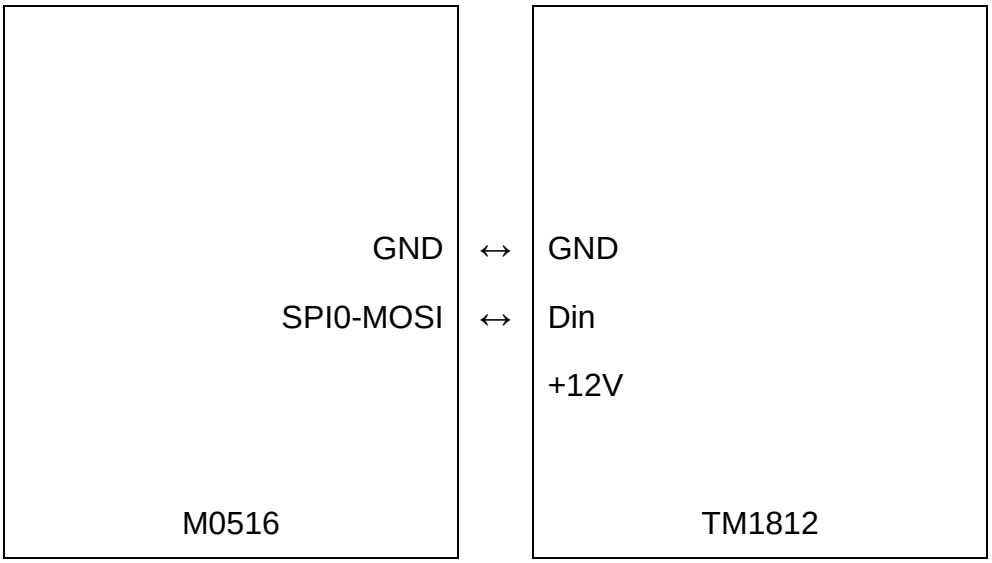
SPI0 写 RGB 数据到 TM1812：

```
    /*
    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 软件与硬件环境

- 软件环境
  - BSP 版本
    - M051SeriesBSP_CMSIS_Rev3.01.001
  - IDE 版本
    - Keil uVersion4.74
- 硬件环境
  - 电路组成
    - NuTiny-EVB-M051_V3.0
    - TM1812 和 RGB-LED 灯条
  - 框图

M5016 通过 SPI0 的 MOSI 来驱动 TM1812



4 目录信息

- 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 如何执行范例程序

1. 根据目录信息章节进入 ExampleCode 路径中的 KEIL 文件夹，双击“M0516_SPI_TM1812.uvproj”
2. 进入编译模式接口
   a. 编译
   b. 下载代码至内存
   c. 进入 / 离开仿真模式
3. 进入仿真模式接口
   a. 执行代码

6 修订纪录

Date	Revision	Description
Apr. 24, 2019	1.00	1. 初始发布.

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