

SPI使用PDMA传输

NuMicro® 32 位系列微控制器范例代码介绍

文件信息

代码简述	SPI 使用 PDMA 传输数据范例代码	
BSP 版本	NUC123Series_BSP_CMSIS_v3.01.001	
开发平台	NuTiny-EVB-123-LQFP64 Ver1.0	

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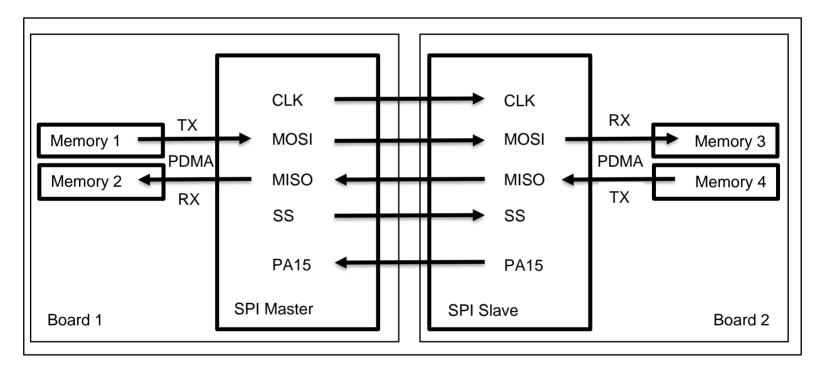
1 功能介绍

1.1 简介

使用两张板子,一张板子为SPI Master使用PDMA与另一张板子为SPI Slave使用PDMA,两张板子互相传输数据。

1.2 原理

拿一张版子当作SPI1 Master使用PDMA Basic模式搬运数据到TX并使用PDMA Basic模式将RX数据搬到内存,另一块板子做为SPI1 Slave也使用PDMA搬运数据TX与RX的数据,利用PA15作为两块板子的同步讯号,程序会比对数据正确性,并输出传输结果。



1.3 执行结果

执行结果,以及打印数据。 SPI Master传输结果如下



```
UART#1

SPI Master with PDMA Sample Code

Configure SPIl as a master.
Bit length of a transaction: 32
The I/O connection for SPIl:
SPI1_SS(PB12)
SPI1_CIK(PA11)
SPI1_MISO(PA10)
SPI1_MOSI(PD8)

SPI controller will enable FIFO mode and transfer 64 data to a off-chip slave device.
In the meanwhile the SPI controller will receive 64 data from the off-chip slave device.
Before starting the data transfer, make sure the slave device is ready. Press any key to start the transfer.

SPII Master with PDMA test [Pass]
```

SPI Slave 传输结果如下



2 代码介绍

SPI1 Master 使用 PDMA Basic 模式传输:

```
/* Set SPI TX with PDMA configuration */
PDMA_Open(1 << DMA_SPI1_TX);
PDMA_SetTransferCnt(DMA_SPI1_TX, PDMA_WIDTH_8, PDMA_TEST_LENGTH);</pre>
PDMA_SetTransferAddr(DMA_SPII_TX, (uint32_t)u8SrcArray, PDMA_SAR_INC,
(uint32_t)&SPI1->TX[0], PDMA_DAR_FIX);
PDMA_EnableInt(DMA_SPI1_TX, PDMA_IER_BLKD_IE_Msk);
PDMA\overline{2} - > CSR = (PDMA\overline{2} - > CSR \& \sim (PDMA CSR MODE SEL Msk) | (0x2 << PDMA CSR MODE SEL Pos));
/* Set SPI RX with PDMA configuration */
PDMA Open(1 << DMA_SPI1_RX);
PDMA_SetTransferCnt(DMA_SPI1_RX, PDMA_WIDTH_8, PDMA_TEST_LENGTH);
PDMA SetTransferAddr (DMA SPII RX, (uint32 t)&SPI1->RX[0], PDMA SAR FIX,
(uint32_t)u8DestArray, PDMA_DAR_INC);
PDMA_EnableInt(DMA_SPI1_RX, PDMA_IER_BLKD_IE_Msk);
PDMA3->CSR = (PDMA3->CSR & ~(PDMA_CSR_MODE_SEL_Msk) | (0x1 << PDMA_CSR_MODE_SEL_Pos));
PDMA GCR->PDSSR0 = 0x0FF2301;
NVIC EnableIRQ(PDMA IRQn);
/* Enable PDMA trigger function */
PDMA Trigger(DMA SPI1 RX);
PDMA Trigger(DMA SPI1 TX);
/* Wait for slave */
while (PA15 == 0);
/* Enable SPI master DMA function */
SPI_TRIGGER_RX_PDMA(SPI1);
SPI TRIGGER TX PDMA(SPI1);
```

SPI1 Slave 使用 PDMA Basic 模式传输:

```
/* Set SPI TX with PDMA configuration */
PDMA Open(1 << DMA_SPI1_TX);
PDMA_SetTransferCnt(DMA_SPI1_TX, PDMA_WIDTH_8, PDMA_TEST_LENGTH);
PDMA_SetTransferAddr(DMA_SPII_TX, (uint32_t)SrcArray, PDMA_SAR_INC,
(uint32_t)&SPI1->TX[0], PDMA_DAR_FIX);
PDMA_EnableInt(DMA_SPI1_TX, PDMA_IER_BLKD_IE_Msk);
PDMA2->CSR = (PDMA2->CSR & ~(PDMA_CSR_MODE_SEL_Msk) | (0x2 << PDMA_CSR_MODE_SEL_Pos));</pre>
/* Set SPI RX with PDMA configuration */
PDMA_Open(1 << DMA_SPI1_RX);</pre>
PDMA_SetTransferCnt(DMA_SPI1_RX, PDMA_WIDTH_8, PDMA_TEST_LENGTH);
PDMA_SetTransferAddr(DMA_SPI1_RX, (uint32_t)&SPI1->RX[0], PDMA_SAR_FIX,
(uint32_t)DestArray, PDMA_DAR_INC);
PDMA_EnableInt(DMA_SPI1_RX, PDMA_IER_BLKD_IE_Msk);
PDMA3->CSR = (PDMA3->CSR & ~(PDMA_CSR_MODE_SEL_Msk) | (0x1 << PDMA_CSR_MODE_SEL_Pos));
PDMA GCR->PDSSR0 = 0x0FF2301;
NVIC_EnableIRQ(PDMA_IRQn);
/* Enable PDMA trigger function */
PDMA Trigger(DMA SPI1 RX);
PDMA_Trigger(DMA_SPI1_TX);
```



```
/* Enable SPI slave PDMA function */
SPI_TRIGGER_RX_PDMA(SPI1);
SPI_TRIGGER_TX_PDMA(SPI1);

/* Sync with Master */
PA15 = 1;
```



3 软件与硬件环境

- 软件环境
 - BSP 版本
 - ♦ NUC123Series_BSP_CMSIS_v3.01.001
 - IDE 版本
 - ♦ Keil uVersion 5.26
- 硬件环境
 - 电路组件
 - ♦ NuTiny-EVB-123-LQFP64 Ver1.0



4 目录信息

EC_NUC123_SPI_WITH_PDMA_V1.00

Library Sample code header and source files

Cortex® Microcontroller Software Interface Standard

(CMSIS) by Arm[®] Corp.

Device CMSIS compliant device header file

SmartcardLib Smartcard library binary and header file

StdDriver All peripheral driver header and source files

UsbHostLib USB host library source code

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 NUC123_SPI_WITH_PDMA_Master.uvproj 与 NUC123_SPI_WITH_PDMA_Slave.uvproj。
- 2. 进入编译模式接口
 - a. 编译
 - b. 下载代码至内存
 - c. 进入/离开除错模式
- 3. 进入除错模式接口
 - a. 执行代码



6 修订纪录

Date	Revision	Description
Sep. 20, 2019	1.00	1. 初始发布.



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