

SPI使用PDMA傳輸

NuMicro® 32 位系列微控制器範例代碼介紹

文件資訊

代碼簡述	SPI 使用 PDMA 傳輸資料範例代碼	
BSP 版本	NUC123Series_BSP_CMSIS_v3.01.001	
開發平台	NuTiny-EVB-123-LQFP64 Ver1.0	

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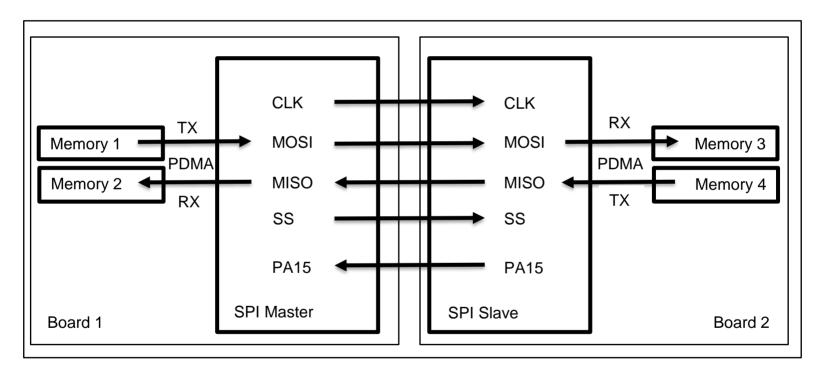
1 功能介紹

1.1 簡介

使用兩張板子,一張板子為SPI Master使用PDMA與另一張板子為SPI Slave使用PDMA,兩張板子互相傳輸資料。

1.2 原理

拿一張版子當作SPI1 Master使用PDMA Basic模式搬運資料到TX並使用PDMA Basic模式將RX 資料搬到記憶體,另一塊板子做為SPI1 Slave也使用PDMA搬運資料TX與RX的資料,利用 PA15作為兩塊板子的同步訊號,程式會比對資料正確性,並輸出傳輸結果。



1.3 執行結果

執行結果,以及打印資料。

SPI Master傳輸結果如下



```
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_CLK(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 傳輸結果如下



2 代碼介紹

SPI1 Master 使用 PDMA Basic 模式傳輸:

```
/* 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_SPI1_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_SPI1_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 模式傳輸:

```
/* 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_SPI1_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);
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);</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_INĆ);
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 軟體與硬體環境

- 軟體環境
 - BSP 版本
 - ♦ NUC123Series_BSP_CMSIS_v3.01.001
 - IDE 版本
 - ♦ Keil uVersion 5.26
- 硬體環境
 - 電路元件
 - ◆ NuTiny-EVB-123-LQFP64 Ver1.0



4 目錄資訊

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 如何執行範例程式

- 根據目錄資訊章節進入 ExampleCode 路徑中的 KEIL 資料夾,雙擊 NUC123_SPI_WITH_PDMA_Master.uvproj 與 NUC123_SPI_WITH_PDMA_Slave.uvproj。
- 2. 進入編譯模式介面
 - a. 編譯
 - b. 下載代碼至記憶體
 - c. 進入/離開除錯模式
- 3. 進入除錯模式介面
 - a. 執行代碼



6 修訂紀錄

Date	Revision	Description
Sep. 20, 2019	1.00	1. 初始發佈.



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