單線串列傳輸通訊

NuMicro® 32 位系列微控制器範例代碼介紹

文件資訊

代碼簡述	使用 UART TX 和 RX 短路模擬 Single Wire 通訊傳輸
BSP 版本	M480 Series BSP CMSIS v3.03.001
開發平台	NuMaker-PFM-M487 v3.0

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1 功能介紹

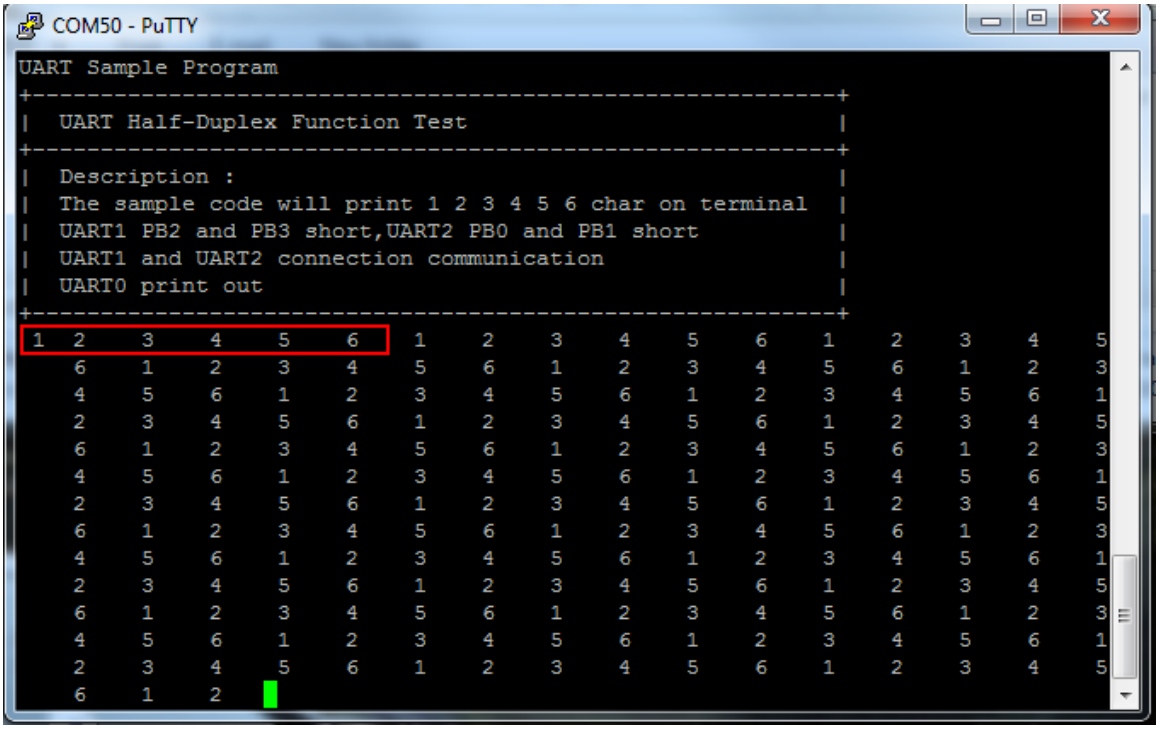
1.1 簡介

此範例是利用將UART TX端和UART RX短路起來，來模擬UART Single Wire 通訊傳輸。

1.2 原理

本範例是分別是利用將兩個 UART Port 的 TX 跟 RX 端短路(Short)，再將兩個UART短路端對接起來，來模擬單線的通訊模式。其中若要做 TX 傳送數據的功能，需要將短路端的 RX 的 MFP(Multi-function pin)設定變為GPIO mode 將 IO 設定為 Input mode，同理若要做 RX 接收數據功能，需要將短路端的 TX 的 MFP(Multi-function pin)設定變為GPIO mode，將 IO 設定為Input mode，來達成在UART半雙功的單線傳輸模式。

1.3 執行結果


COM50 - PuTTY
UART Sample Program
+--+
| UART Half-Duplex Function Test |
+--+
| Description : |
| The sample code will print 1 2 3 4 5 6 char on terminal |
| UART1 PB2 and PB3 short,UART2 PB0 and PB1 short |
| UART1 and UART2 connection communication |
| UART0 print out |
+--+
1 2 3 4 5 6 1 2 3 4 5 6 1 2 3 4 5
6 1 2 3 4 5 6 1 2 3 4 5 6 1 2 3
4 5 6 1 2 3 4 5 6 1 2 3 4 5 6 1
2 3 4 5 6 1 2 3 4 5 6 1 2 3 4 5
6 1 2 3 4 5 6 1 2 3 4 5 6 1 2 3
4 5 6 1 2 3 4 5 6 1 2 3 4 5 6 1
2 3 4 5 6 1 2 3 4 5 6 1 2 3 4 5
6 1 2 3 4 5 6 1 2 3 4 5 6 1 2 3
4 5 6 1 2 3 4 5 6 1 2 3 4 5 6 1
2 3 4 5 6 1 2 3 4 5 6 1 2 3 4 5
6 1 2 3 4 5 6 1 2 3 4 5 6 1 2 3
4 5 6 1 2 3 4 5 6 1 2 3 4 5 6 1
2 3 4 5 6 1 2 3 4 5 6 1 2 3 4 5
6 1 2

2 代碼介紹

2.1.1 UART 初始化設定

```
void UART_Init()
{


       /* Reset UART0 IP */
       SYS_ResetModule(UART0_RST);
      /* Configure UART0 and set UART0 baud rate */
       UART_Open(UART0, 115200);
      /* Reset UART1 IP */
       SYS_ResetModule(UART1_RST);
      /* Configure UART1 and set UART1 baud rate */
       UART_Open(UART1, 115200);
      /* Reset UART2 IP */
       SYS_ResetModule(UART2_RST);
      /* Configure UART2 and set UART2 baud rate */
       UART_Open(UART2, 115200);


}
```

2.1.2 UART2 TX and UART1 RX Single Wire 設定

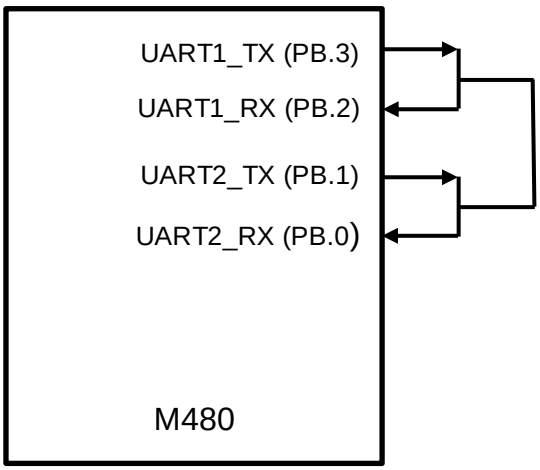
```
void UART2TX_UART1RX()
{

      /* Set input mode for UART2 RX  */
       GPIO_SetMode(PB, BIT0, GPIO_MODE_INPUT);
      /* Set input mode for UART1 TX  */
       GPIO_SetMode(PB, BIT3, GPIO_MODE_INPUT);
      /* Set PB1 multi-function pins for UART2 TXD*/
       SYS->GPB_MFPL &= ~(SYS_GPB_MFPL_PB1MFP_Msk|SYS_GPB_MFPL_PB0MFP_Msk);
       SYS->GPB_MFPL |= (SYS_GPB_MFPL_PB1MFP_UART2_TXD);
      /* Set PB2 multi-function pins for UART1 RXD*/
       SYS->GPB_MFPL &= ~(SYS_GPB_MFPL_PB2MFP_Msk | SYS_GPB_MFPL_PB3MFP_Msk);
       SYS->GPB_MFPL |= (SYS_GPB_MFPL_PB2MFP_UART1_RXD);

}
```

2.1.3 UART1 TX and UART2 RX Single Wire 設定

```
void UART2RX_UART1TX()
{
      /* Set input mode for UART1 RX  */
       GPIO_SetMode(PB, BIT2, GPIO_MODE_INPUT);
      /* Set input mode for UART2 TX  */
       GPIO_SetMode(PB, BIT1, GPIO_MODE_INPUT);
      /* Set PB0 multi-function pins for UART2 RXD*/
       SYS->GPB_MFPL &= ~(SYS_GPB_MFPL_PB1MFP_Msk|SYS_GPB_MFPL_PB0MFP_Msk);
       SYS->GPB_MFPL |= (SYS_GPB_MFPL_PB0MFP_UART2_RXD);
     /* Set PB3 multi-function pins for UART1 TXD*/
       SYS->GPB_MFPL &= ~(SYS_GPB_MFPL_PB2MFP_Msk | SYS_GPB_MFPL_PB3MFP_Msk);
       SYS->GPB_MFPL |= (SYS_GPB_MFPL_PB3MFP_UART1_TXD);
}
```

3 軟體與硬體環境

- **軟體環境**
  - BSP 版本
    - M480 Series BSP CMSIS v3.03.001
  - IDE 版本
    - Keil uVersion 5.24
- **硬體環境**
  - 電路元件
    - NuMaker-PFM-M487 v3.0
    - Micro USB
  - 示意圖



4 目錄資訊

- EC_M480_UART_SingleWire_V1.00
  - Library — Sample code header and source files
    - CMSIS — Cortex® Microcontroller Software Interface Standard (CMSIS) 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 資料夾，雙擊 UART_SingleWire.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
Jul. 11, 2019	1.00	1. 初始發佈.

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