Single Wire UART Communication

Example Code Introduction for 32-bit NuMicro® Family

Information

Application	Simulate Single Wire Communication Transmission Using UART TX and RX Short Circuit
BSP Version	M480 Series BSP CMSIS v3.03.001
Hardware	NuMaker-PFM-M487 v3.0

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1 Function Description

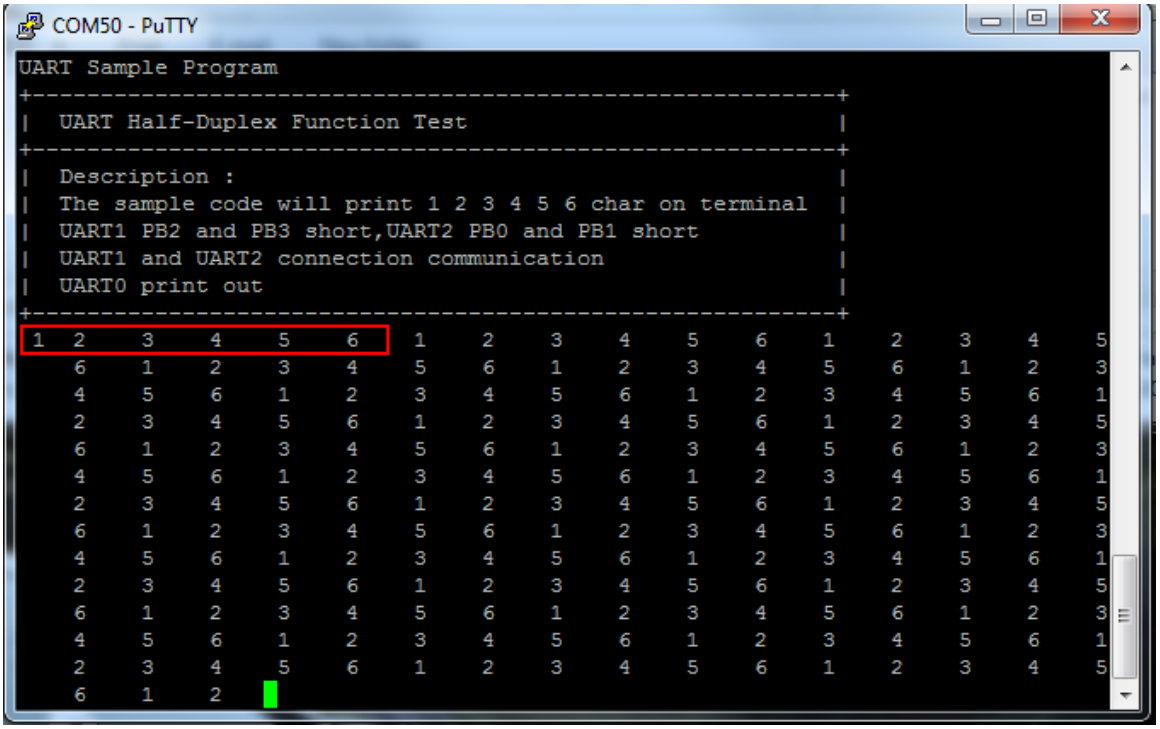
1.1 Introduction

This example simulates a UART Single Wire communication transmission by shorting the UART TX terminal and the UART RX.

1.2 Principle

In this example, the TX and RX terminals of the two UART ports are short-circuited, and the two UART short-circuit terminals are connected to simulate the single-wire communication mode. For the TX transfer data function, user needs to change the MFP (Multi-function pin) setting of RX on the short-circuit side to GPIO mode and set IO to Input mode. Similarly, the RX receive data function requires changing the MFP (multi-function pin) setting of the short-circuit TX to GPIO mode and setting the IO to the input mode. After that, the implementation of UART half-duplex single-wire transmission has been completely.

1.3 Demo Result



2 Code Description

2.1.1 UART Initial setting

```
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 Setting

```
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 Setting

```
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);
}
```

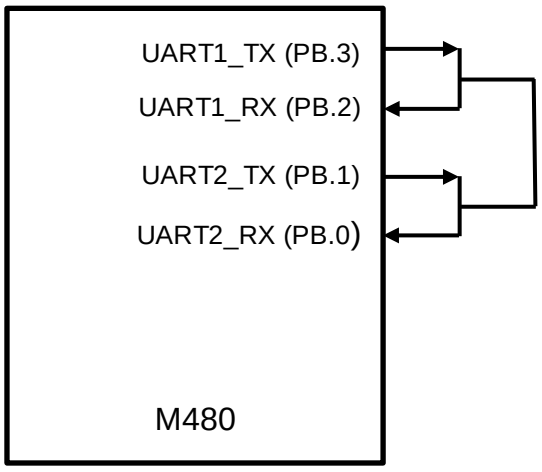
3 Software and Hardware Environment

Software Environment

- BSP version
  - M480 Series BSP CMSIS v3.03.001
- IDE version
  - Keil uVersion 5.24

Hardware Environment

- Circuit components
  - NuMaker-PFM-M487 v3.0
  - Micro USB
- Diagram



4 Directory Information

- 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 How to Execute Example Code

1. Browsing into sample code folder by Directory Information (section 4) and double click UART_SingleWire.uvproj.
2. Enter Keil compile mode
   a. Build
   b. Download
   c. Start/Stop debug session
3. Enter debug mode
   a. Run

6 Revision History

Date	Revision	Description
Jul. 11, 2019	1.00	1. Initially issued.

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