MYD-LPC1788 User Manual

Version V1.3

Version History

Version Number	Description	**Time**
V1.0	Initial Version	2012.09.14
V1.1	Adjust the list of product configuration	2012.11.02
V1.2	Add 7.0-inch screen support)	2013.02.22
V1.3	modify the contact information	2013.03.28

Directory

Chapter 1 Product Overview

1.1 Product Description

MYIR have latest lunched MYD-LPC1788 board which is based on Cortex-M3 kernel.The Cortex-M3 is a next generation core that offers better performance than ARM7 at the same clock rate, and offers other system enhancements such as modernized debug features and a higher level of support block integration. The processor has 512KB FLASH memory, 96KB on-chip SRAM and 4KB EEPROM. It also has external SD Card interface, USB Host/Device/OTG interface, CAN interface. RS485 interface, Audio input, Ethernet MAC, LCD interface, JTAG interface, function key and so on. It has been widely used in industrial control and medical system.

1.2 Product Preview

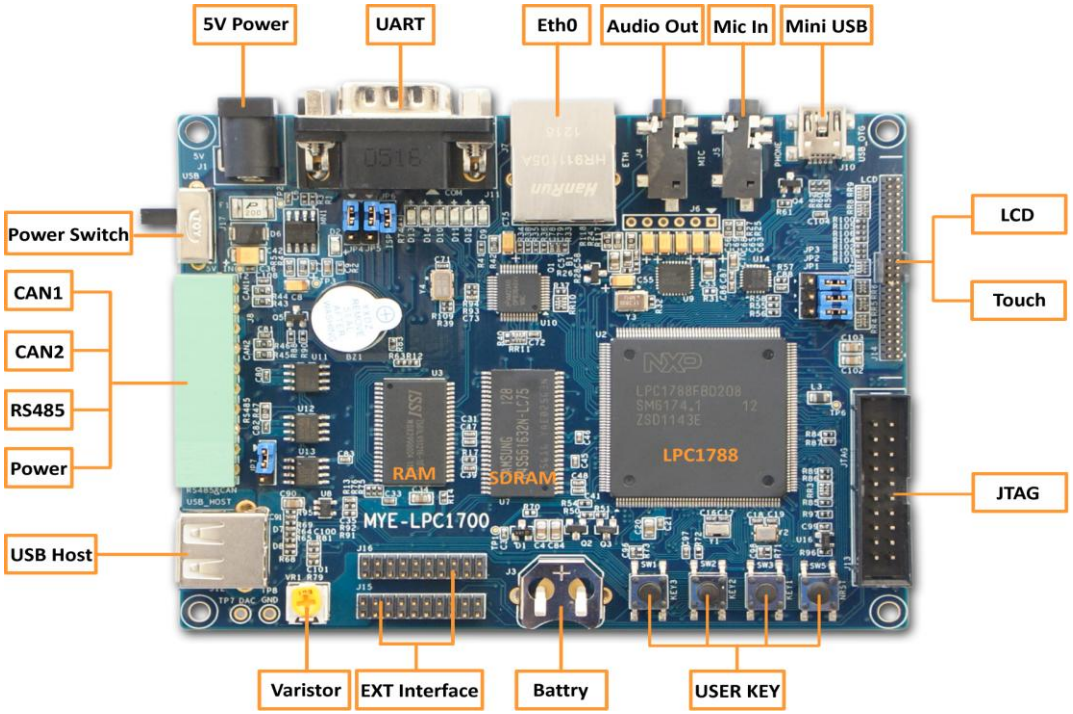


Figure 1-1

1.3 Product Features

Based on Cortex-M3 processor, MYD-LPC1788 integrates all the chip functions and features. The main features are as follows:

Electrical parameters

- Operating Temperature : -40℃~85℃
- Electrical Specifications: +5V power supply
- Mechanical Dimensions: 115mmx90mm

Processor

- LPC1788(Cortex-M3 kernel), runs at up to 120MHz
- 96KB on-chip SRAM
- 512KB on-chip ROM
- 4KB on-chip EEPROM

Memory

- 32MB SDRAM
- 1MB SRAM
- 2MB NORFLASH
- 256B EEPROM
- 4MB SPI FLASH

Audio and Video Interface

- An Audio 3.5mm Input Interface
- A Two-channel Audio 3.5mm Output Interface

LCD Touch-Screen Interface

- 24 True Color
- Resolution: Support up to 1024 x 768

Transmission Interface

- One serial(select UART0/UART2 by jumper)
- One high-speed USB HOST interface
- One mini USB interface

- One Ethernet MAC.
- Two CAN Interface
- One RS485 Interface

Input interface

- Standard JTAG Interface
- MicroSD Card Interface

LED indicator

- One system power indicator(red)

Applications

- Communications
  - Point-of-sale terminals, Web servers, multi-protocol bridges
- **Industrial/Medical**
  - Automation controllers, application control, robotic controls, HVAC, PLC, inverters, circuit breakers, medical scanning, security monitoring, motor drive, video intercom.
- **Consumer/Appliance**
  - Audio, MP3 decoders, alarm systems, displays, printers, scanners, small appliances, fitness equipment
- **Automotive**
  - Aftermarket, car alarms, GPS/Fleet Monitor

1.4 Product Configuration

NO	Name	Number	Note
1	MYD LPC1788 Development Board	1	
2	1.5 Meters Crossover Cable	1	
3	1.5 Meters high-speed Mini USB 2.0 Cable	1	
4	9Pin to 9Pin serial cable	1	
5	DVD Product	1	Include Schematic (PDF), User Manual, Source Code, etc.
6	4.3/7.0 Inch LCD Touch Screen	1	optional

Table 1-1

Chapter 2 Hardware Resource Introduction

2.1Hardware Resource Overview

MYD-LPC1788 resources are shown in table2-1:

Item	Feature		
Size	Board size:115mm x 90mm		
CPU	LPC1788(Cortex-M3 Core), Up to 120MHz		
Memory	On-chip: 96KB SRAM,512KB ROM, 4KB EEPROM External: 32MB SDRAM, 1MB SRAM, 2MB NORFLASH, 256B EEPROM, 4MB SPI FLASH		
Debug	20 Pin, 2.54mm JTAG debug interface		
Peripheral	Type	Quantity	Description
	RS485	1	Support RS485
	Ethernet	1	100Mbps,DP83848
	CAN	2	Support CAN
	USB	2	Support USB HOST/Device 2.0 USBOTG 2.0
	Audio	2	Audio in/out
	SD interface	1	SD/MMC interface
	Extension	2	Extension for customer
	JTAG	1	Standard 20 pin JTAG interface
	LCD interface	1	Support 4.3/7.0 inch touch screen
Button	User button	3	SW1, SW2, SW3
	Reset	1	SW5

Power	5V/2A

Table 2-1

2.2 Main Module Introduction

2.2.1 Main processor LPC1788

Based on ARM Cortex-M3 processor, LPC1788 is applied in high level of support block integration and low-power embedded product. The processor has LCD controller, 10/100 Mbps Ethernet MAC, high-speed USB Device/Host/OTG controller, CAN controller, SPI, SSP, IIC, IIS and external EMC. It is used in industrial control and medical system specially.

2.2.2 SDRAM Module

SDRAM chooses K4S561632H. Its characteristics are as follows:

- Auto refresh
- 64ms refresh cycles

SDRAM circuit is shown in figure 2-1:

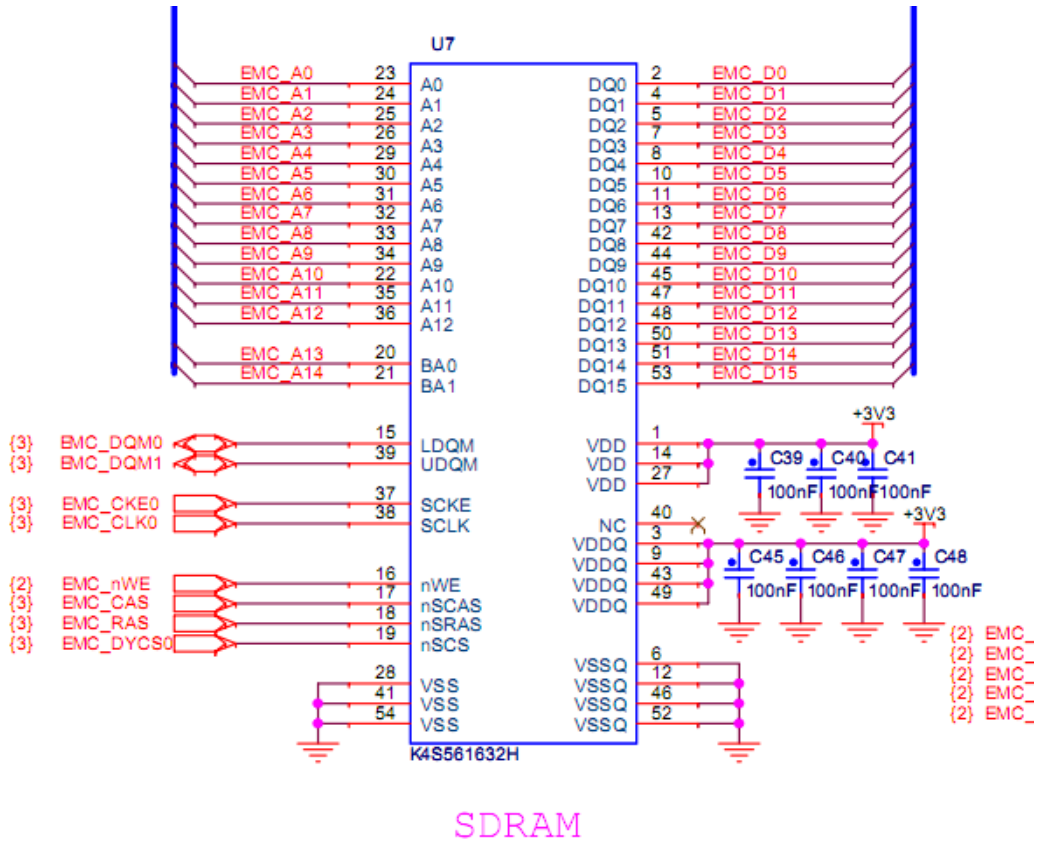


Figure 2-1

2.2.3 SRAM Module

SRAM choose IS61LV51216, Its characteristics are as follows:

- High-speed access time: 8,10, and 12ns
- CMOS low power operation
- Low stand-by power
  - Less than 5mA
- Fully compatible operation: no clock or refresh required
- Three state outputs
- Data control for upper and lower bytes
- Industrial temperature available

SRAM circuitis show in figure 2-2:

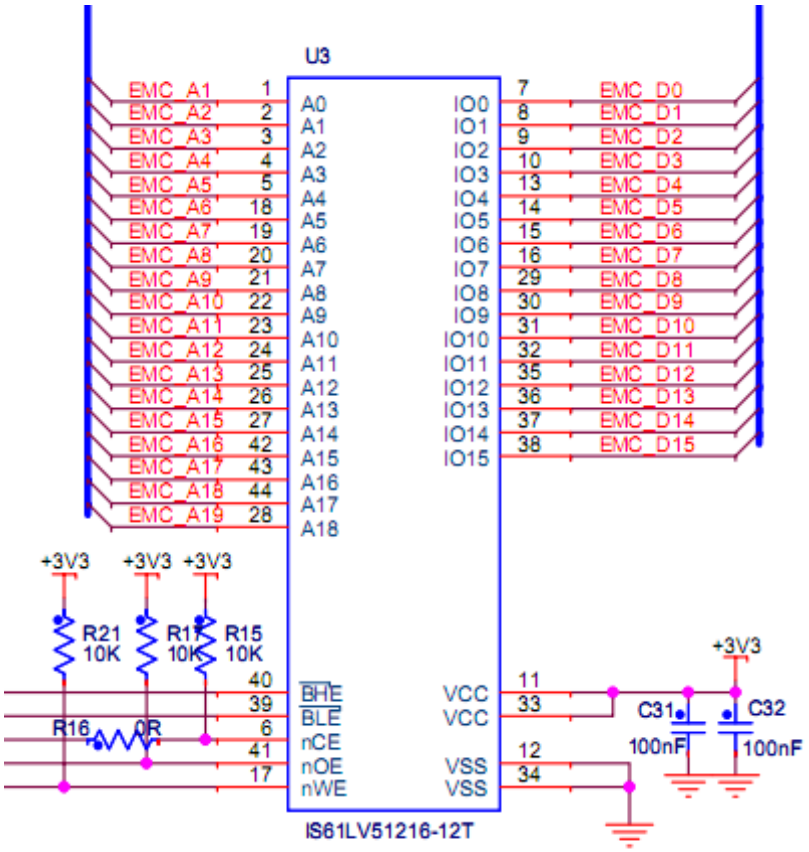


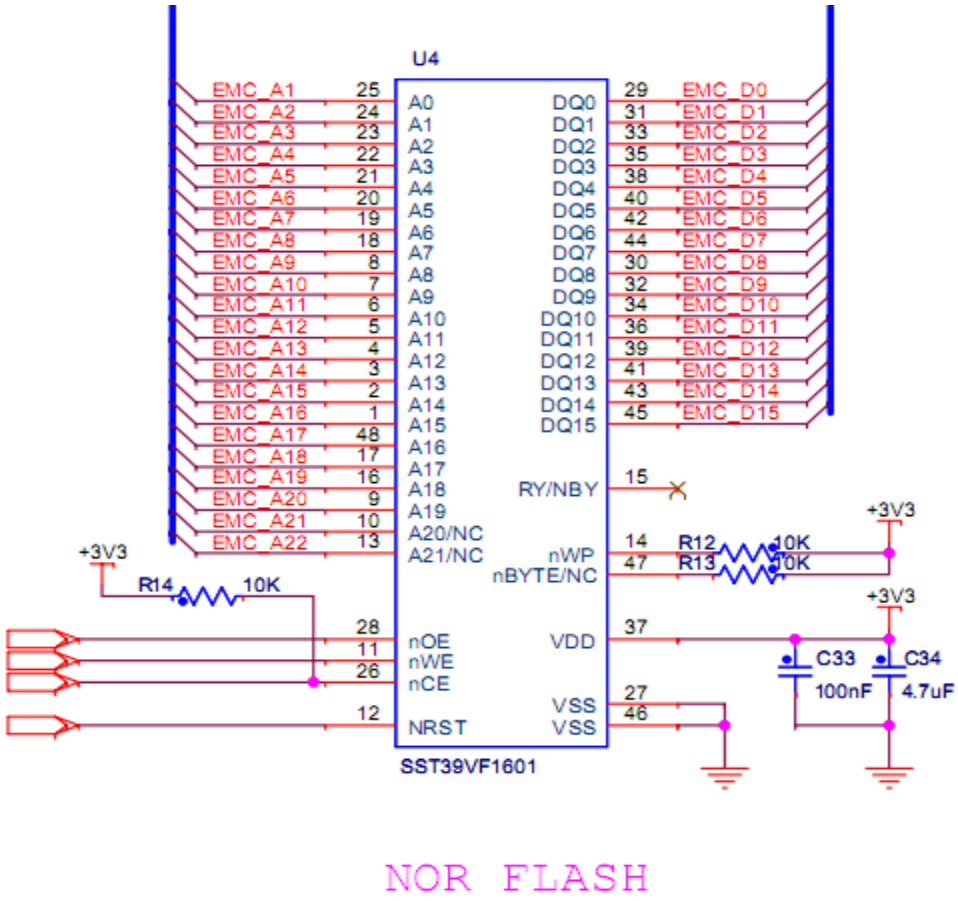
Figure 2-2

2.2.4 NORFLASH Module

NORFLASH chooses SST39VF1601. Its characteristics are as follows:

- Superior reliability
  - Endurance:100000 Cycles(Typical)
  - Greater than 100 years Data Retention
- Low Power Consumption(typical values at 5 MHz)
  - Active Current:: 9mA
  - Standby Current: 3μA
- Security-ID Feature
  - SST: 128bit; User: 128bit
- Fast Read Access Time:70ns, 90ns

NORFLASH circuit is shown in figure 2-3:



NOR FLASH

Figure 2-3

2.2.5 SPI FLASH Module

SPI FLASH chooses AT25DF321A. Its characteristics are as follows:

- Operating Frequencies: up to 85 MHz
- Flexible program: support Byte/Page program（1~256 Bytes）
- Fast program and erase times
  - 1.0ms typical page program(256 Bytes) Time
  - 50ms typical 4-Kbyte block erase time
  - 250ms typical 32-Kbyte block erase time
  - 400ms typical 64-Kbyte block erase time
- Low power dissipation
- Endurance: 100000 program/erase cycles

- Data retention: 20 years

SPI FLASH circuitis shown in figure 2-4:

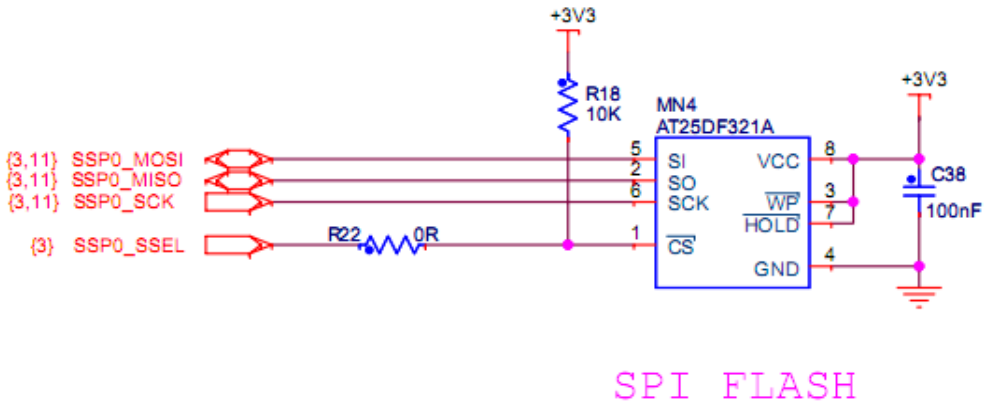


Figure 2-4

2.2.6 EEPROM Module

EEPROM chooses AT24C02. Its characteristics are as follows:

- Two-wire Serial Interface
- Bidirectional Data Transfer Protocol
- High-reliability
  - Endurance: 1 Million Write Cycles
  - Data Retention: 100 Years
- 100 kHz (1.8V) and 400 kHz (2.7V, 5V) Compatibility
- Schmitt Trigger, Filtered Inputs for Noise Suppression

EEPROM circuit is shown in figure2-5:

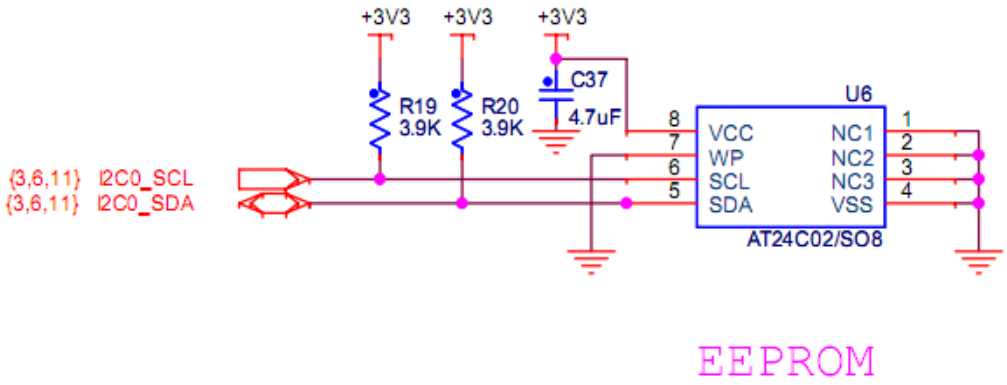


Figure 2-5

2.2.7Ethernet MAC Module

Ethernet MAC Module chooses DP83848. Its characteristics are as follows:

- Low-power 3.3V, 0.18μm CMOS technology
- MII Serial Management Interface
- IEEE 802.3u Auto-Negotiation and Parallel Detection
- IEEE 802.3u ENDEC, 10BASE-T transceivers and filters

Ethernet Mac circuit is shown in figure2-6:

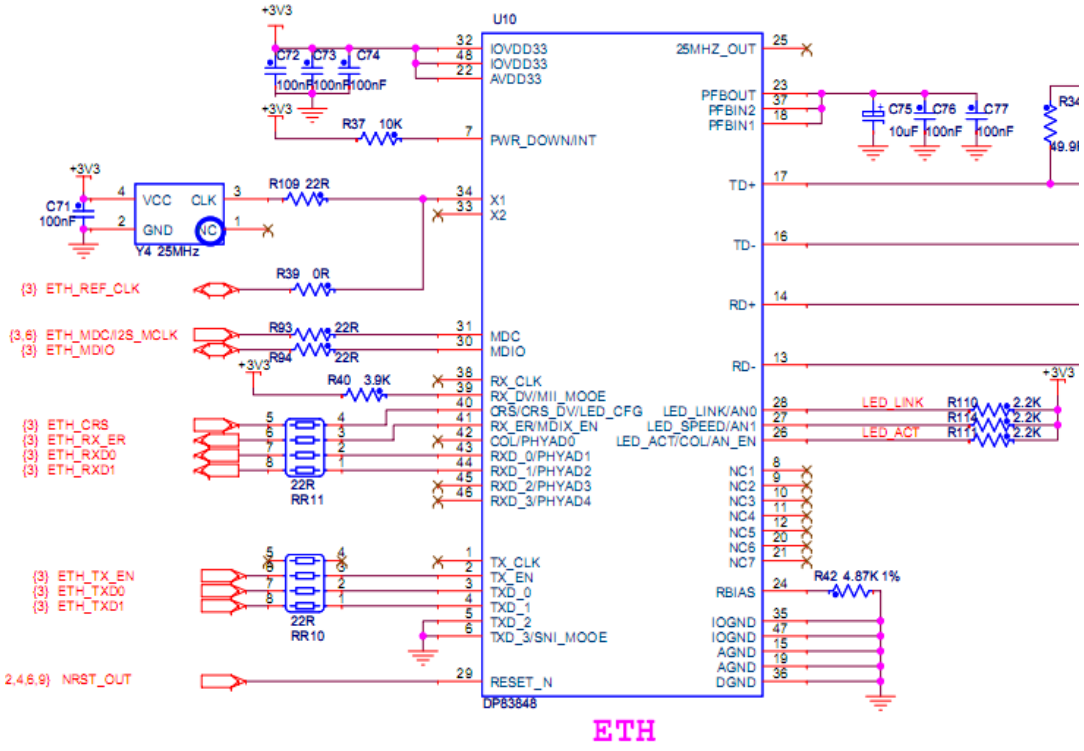


Figure 2-6

2.2.8Audio Module

Audio module chooses UDA1380. Its characteristics are as follows:

- Slave BCK and WS signals
- IIS Bus format
- Multiple format data output interface
- Multiple format data output interface
- ADC front-end features
- DAC features

UDA1380circuitis shown in figure 2-7:

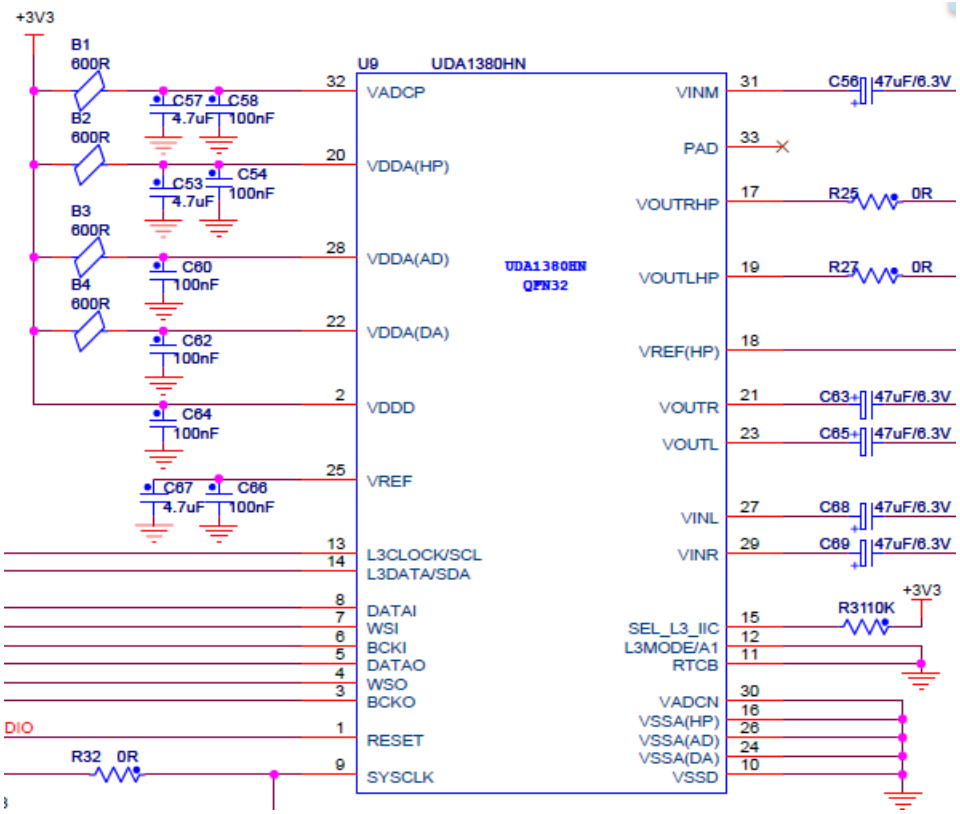


Figure 2-7

2.2.9 Touch Controller Module

Touch controller module chooses TSC2046. Its characteristics are as follows:

- Internal 2.5V reference
- Touch-pressure measurement
- Auto power down

TSC2046circuit is shown in figure 2-8:

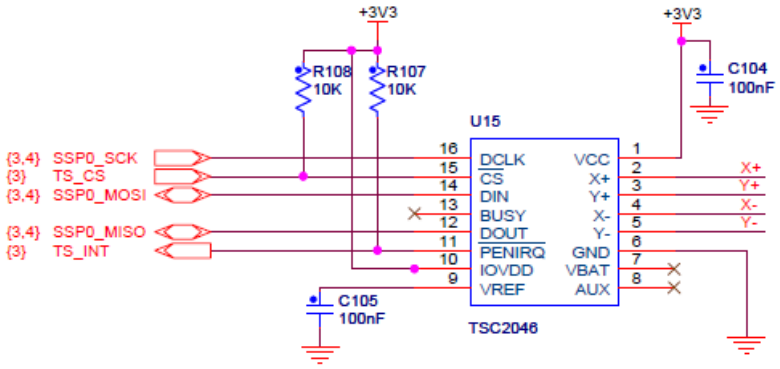


Figure 2-8

2.2.10User Key and Reset Circuit

User Key and Reset circuit is shown in figure 2-9 and 2-10:

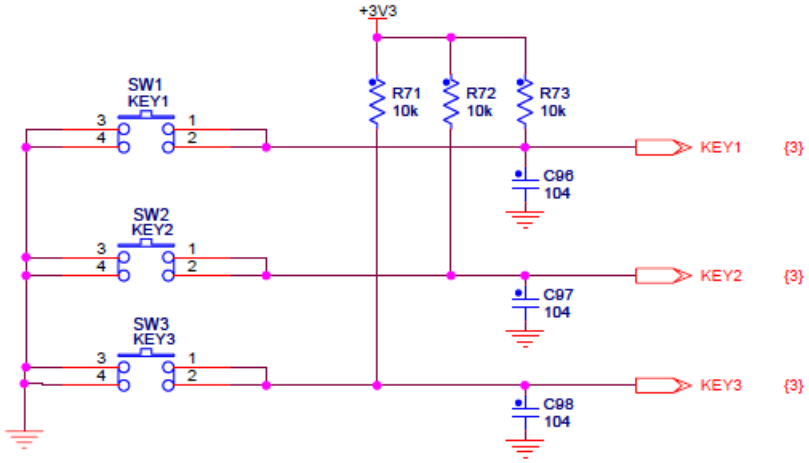


Figure 2-9

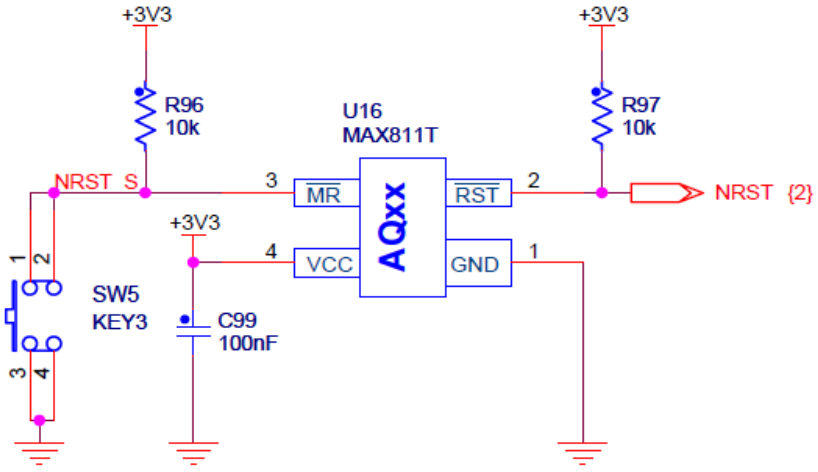


Figure 2-10

2.2.11 Buzzer

Buzzer circuit is shown in figure 2-11:

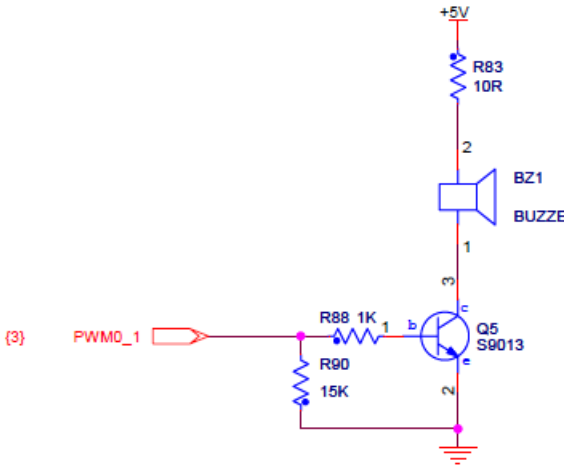


Figure 2-11

2.2.12 LED

LED circuit is shown in figure 2-12:

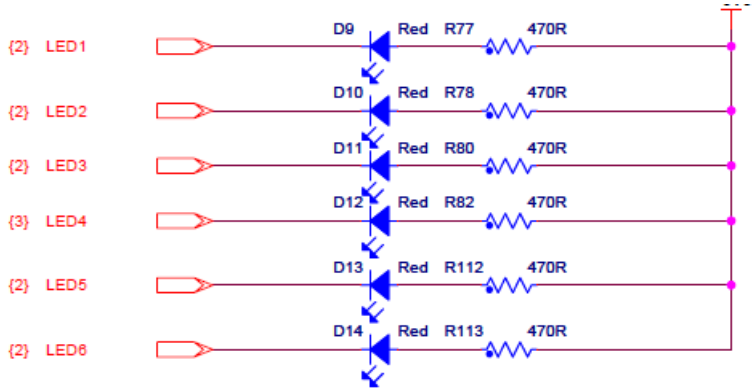


Figure 2-12

2.3 Peripheral Interface introduction

2.3.1 UART Interface

UART circuit is shown in figure 2-13:

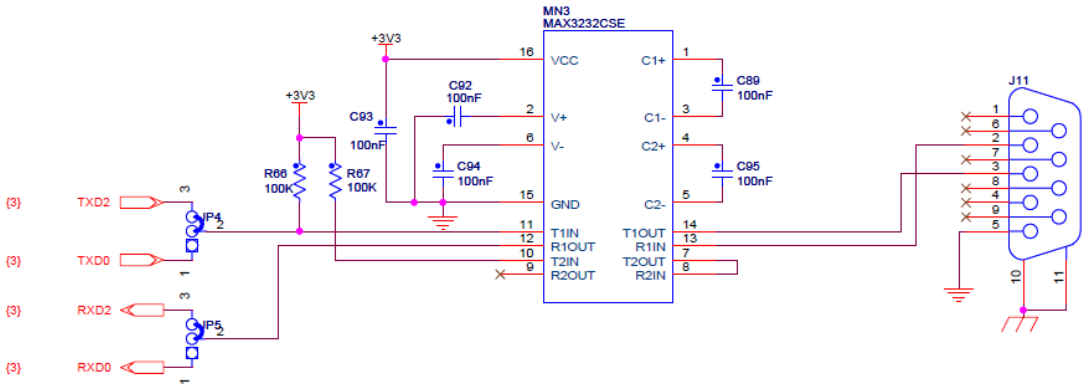


Figure 2-13

2.3.2 CAN Interface

CAN interface chooses TJA1040. Its characteristics are as follows:

- Fully compatible with the ISO 11898 standard
- High speed (up to 1 MBaud)
- Very low ElectroMagnetic Emission
- Differential receiver with high common-mode range for ElectroMagnetic Immunity (EMI)
- Input levels compatible with 3.3 V and 5 V devices
- At least 110 nodes can be connected
- Thermally protected

CAN circuit is shown in figure2-14:

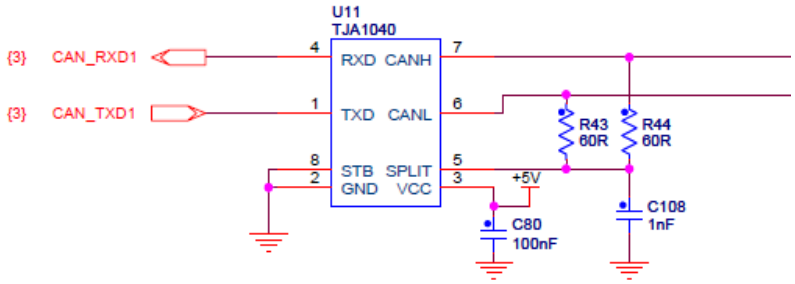


Figure 2-14

2.3.3 RS485 Interface

RS485 choose SP3485. Its characteristics are as follows:

- RS-485 and RS-422 transceivers
- Interoperable with 0.5V logic
- Driver/Receiver enable
- Low power shutdown mode
- -7V to 12V common-mode input voltage range
- Allows up to 32 transceiver on the serial bus
- Compatibility with the industry standard 75176pinout
- Driver output short-circuit protection

RS485circuit is shown in figure 2-15:

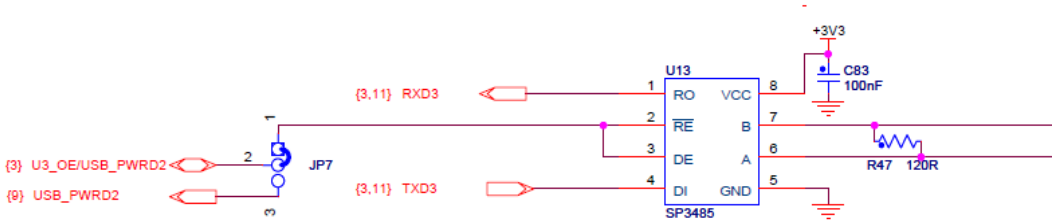


Figure 2-15

2.3.4 SDCARD Interface

SD card circuit is shown in figure 2-16:

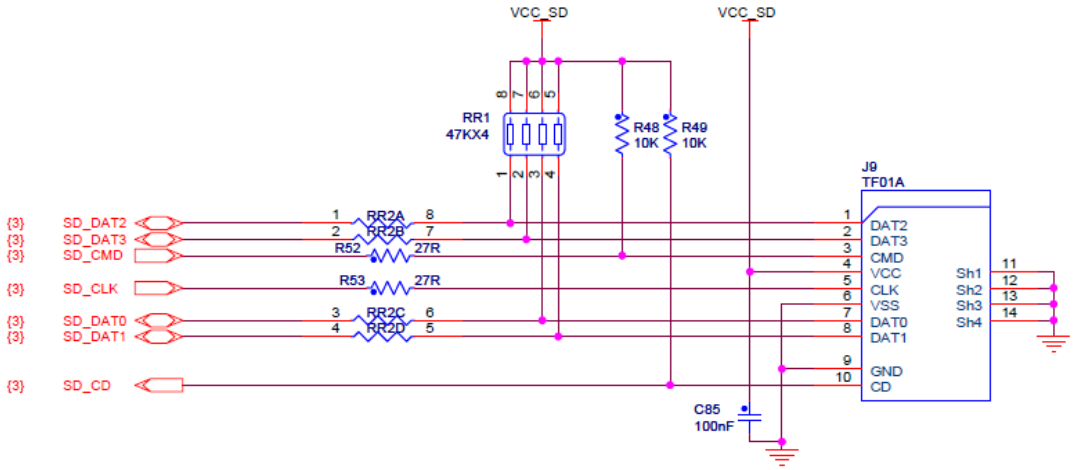


Figure 2-16

2.3.5 USB OTG/HOST interface

USB OTG chooses ISP1301. Its characteristics are as follows:

- Can transmit and receive serial data at both full-speed (12 Mbit/s) and low-speed (1.5 Mbit/s) data rates
- Supports various serial data interface protocols; transparent general-purpose buffer mode allows you to control the direction of data transfer
- Contains Host Negotiation Protocol (HNP) command and status registers
- Supports serial I2C-bus™ interface for OTG status and command controls
- Supports external charge pump
- Full industrial grade operation from 40 ℃to 85 ℃

USB OTG circuitis shown in figure 2-17:

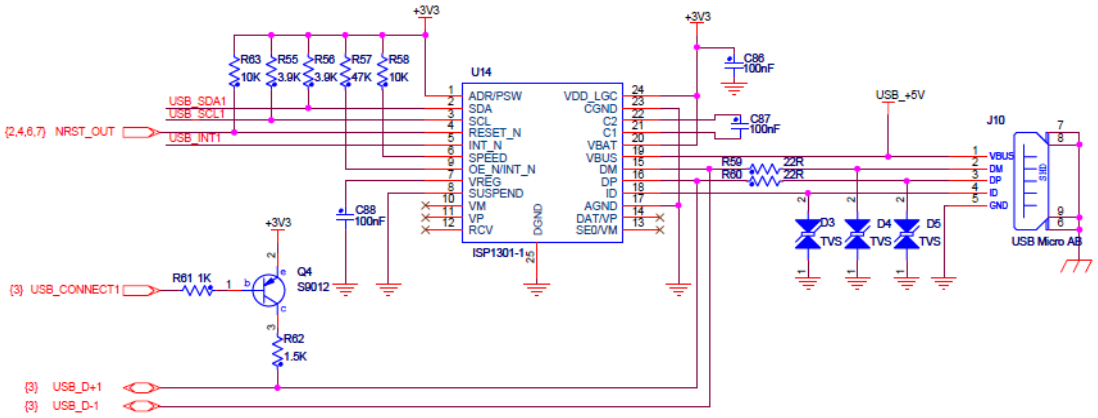


Figure 2-17

USB HOST chooses TPS2041. Its characteristics are as follows:

- 50mA continuous current
- Short-circult and thermal protection with overcurrent logic output
- Undervoltage lockout
- Maximum standby supply current: 1μA (single, Double)，or 2μA (Three, Four)
- Bidirectional switch
- Ambient temperature range: -40℃ to 85℃
- ESD protection

USB HOSTcircuitis shown in figure 2-18:

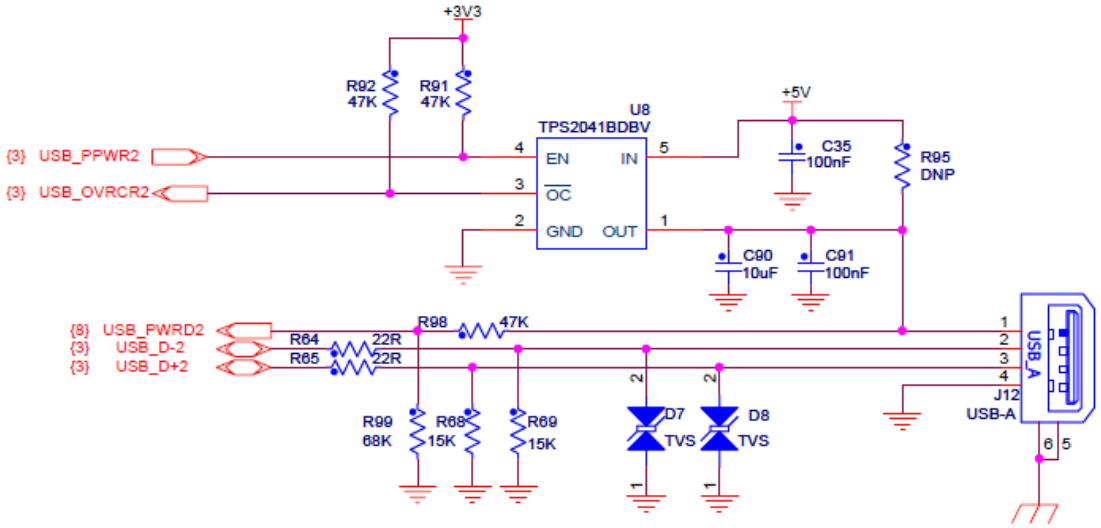


Figure 2-18

2.3.6 JTAG interface

JTAG circuit is shown in figure 2-19:

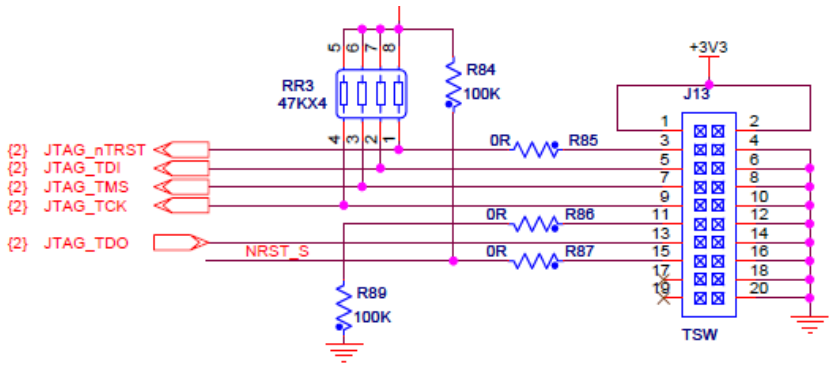


Figure 2-19

2.3.7 LCD Touch Screen Interface

LCD Interface is shown in figure 2-20:

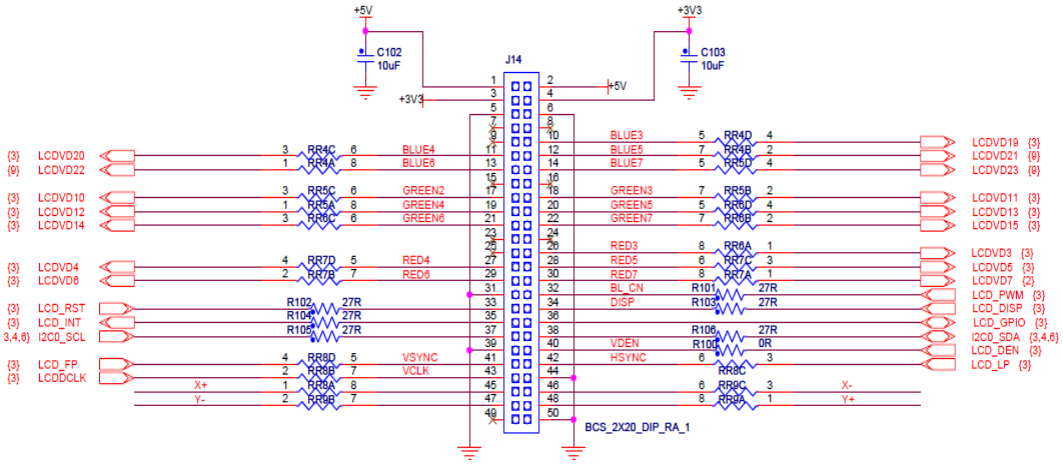


Figure 2-20

2.3.8 User Interface

User interface circuit is shown in figure 2-21:

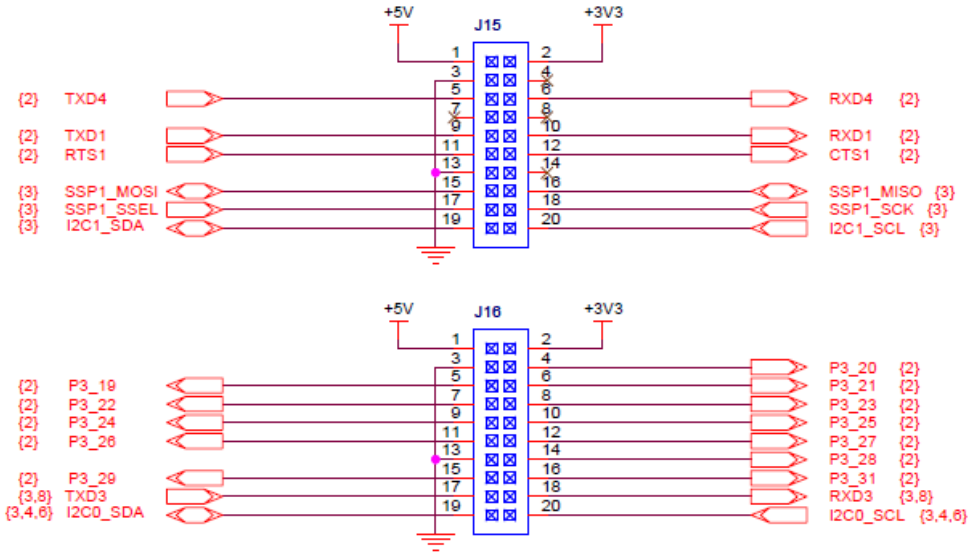


Figure 2-21

2.3.9 ADC and DAC Interface

ADC and DAC interface circuit is shown in figure 2-22:

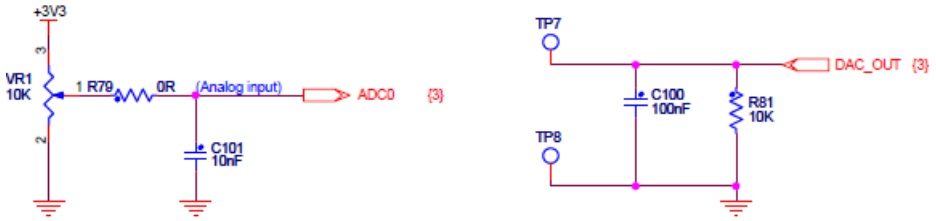


Figure 2-22

2.4Jumper setting

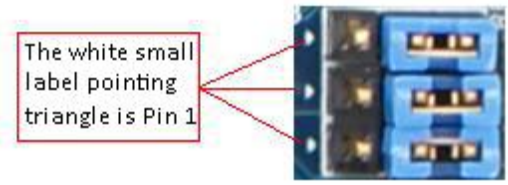


Figure 2-23

No	Function Description	
	Connect	Disconnect
JP1[1]	Connect 1-2: connect USB OTG, LCDisn't available. Disconnect 2-3: connect LCD, USB OTG isn't available.	
JP2[1]		
JP3[1]		
JP4	Connect 1-2: serial choose UART0 and output from JP11	
JP5	Connect 2-3: Serial chooses UART2 and output from JP11	
JP6[2]	ISP download module	Normal download module
JP7	Connect 1-2: Enable RS485 to write and read. When use RS485, it needs to be connected Connect 2-3: Enable USB Host power detection	

Table 2-2

Note: [1] INT,SCL,SDA in USB OTG share with LCDVD21、LCDVD22、LCDVD23 in LCD, So at the same time,it can only choose one.

[2] Connect JP6 when download program in ISP module. After download program, reset board, program start to run.

Chapter 3 MDK Routine

3.1 Overview

MDK routines are naked programs without operating system and its development tool is MDK-ARM 4.53. This chapter describes how to use and writetest procedures. The contents include:

(1) MDK development environment to be built and configured;

(2) MDK sample program debugged, compiled and downloaded;

(3) The test procedures: functions, usage and phenomenon descriptions.

MDK routines cover a wide range of programs, including DMA, ADC, LCD, Memory, Ethernet MAC and so on. User can make a second development on these examples, which can shorten developmentcycle.

3.2 Preparation

(1) Install MDK-ARM (Version 4.53) development tool and license and then Prepare for MYD-LPC1788 board.

(2) Set serial:Baud Rate: 115200; Data Bits: 8; Parity Bit: None; Stop Bit: 1. Data flow: None.

3.2.1 Configure and CompileMDK Routine

Firstly, find 05-MDK_Source\01-ADC\ADC_Interrupt\Project folder and double click project, then configure project. Steps are as follows (Noted, default project setting can made download successfully,please recheck if program compile or download):

(1) Select**“Option for target FLASH”** or press Alt + F7.The Setting window is shown in figure 3-1:

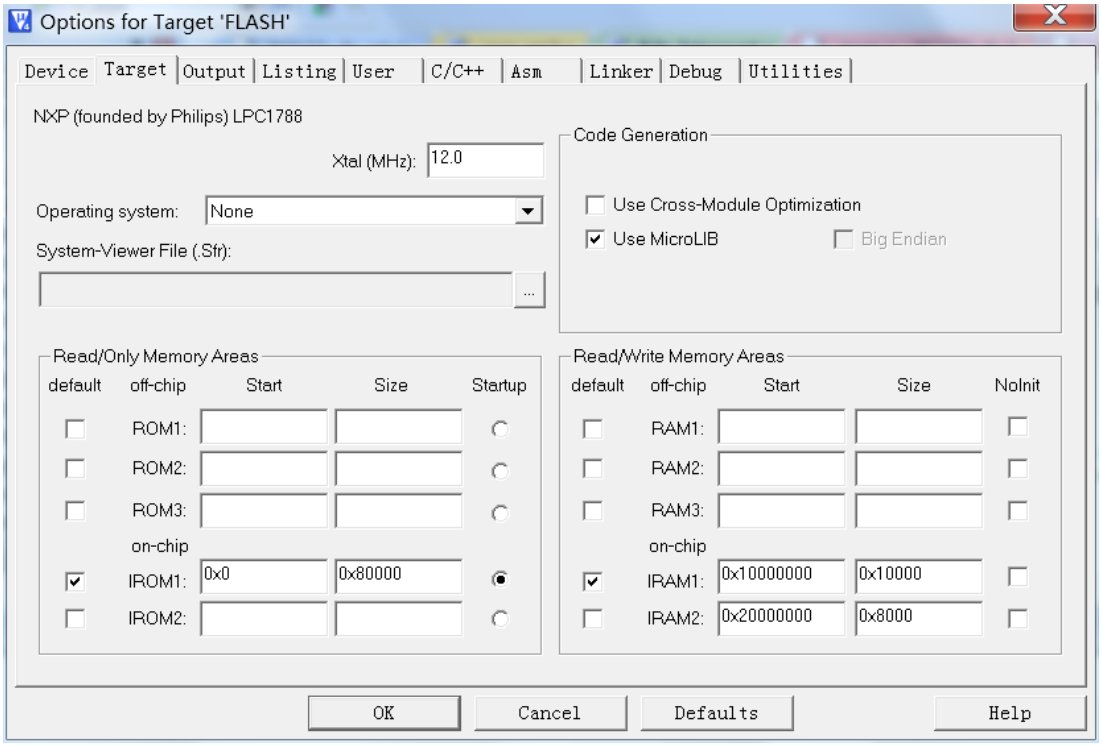


Figure 3-1

(2) Choose LPC1788 in Device. Refer to figure 3-2:

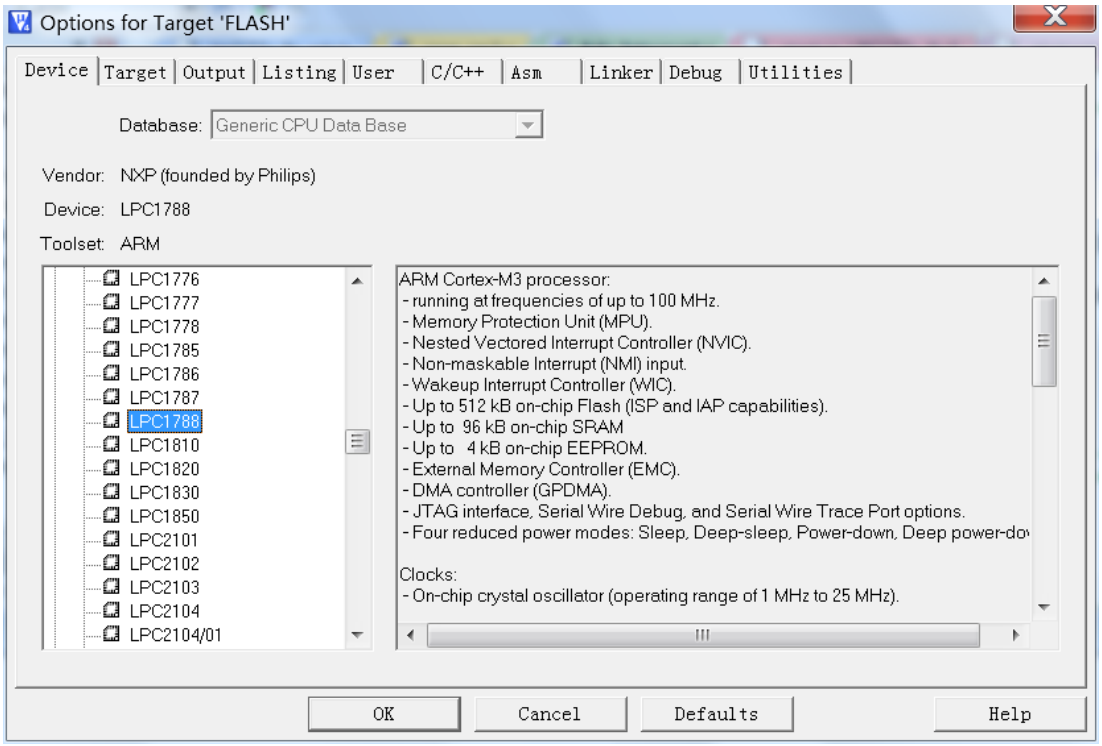


Figure 3-2

(3) Output options (include intermediate file). Refer to figure 3-3:

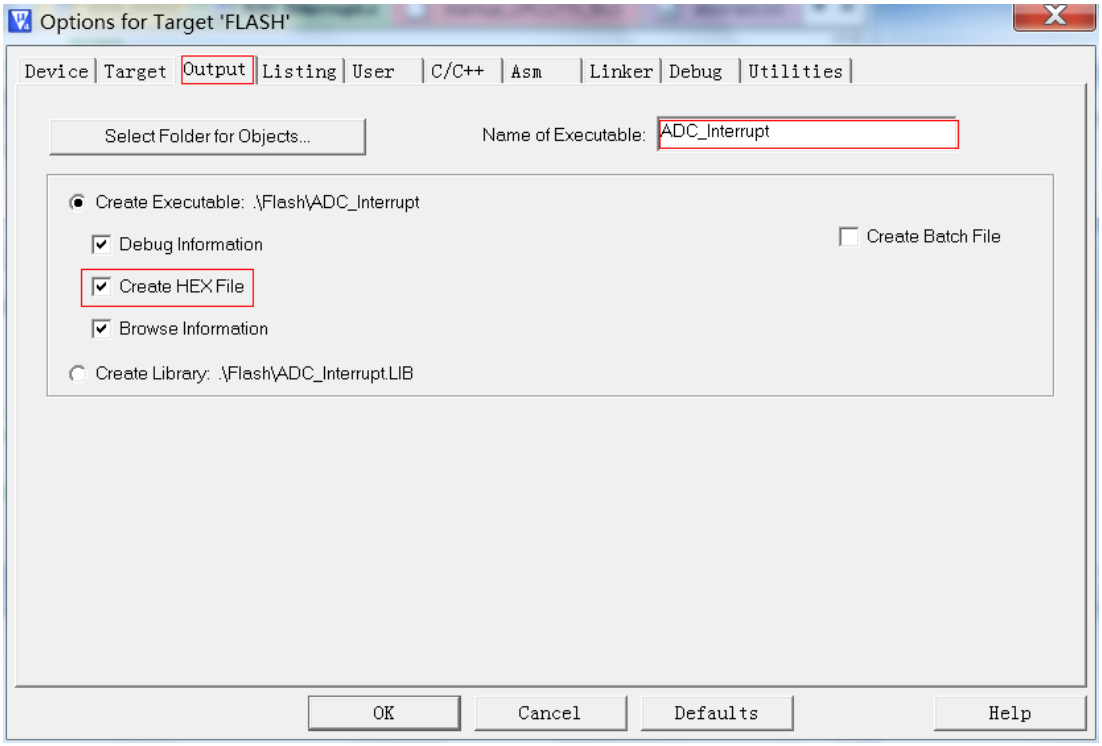


Figure 3-3

(4) Set Linker. Refer to figure 3-4:

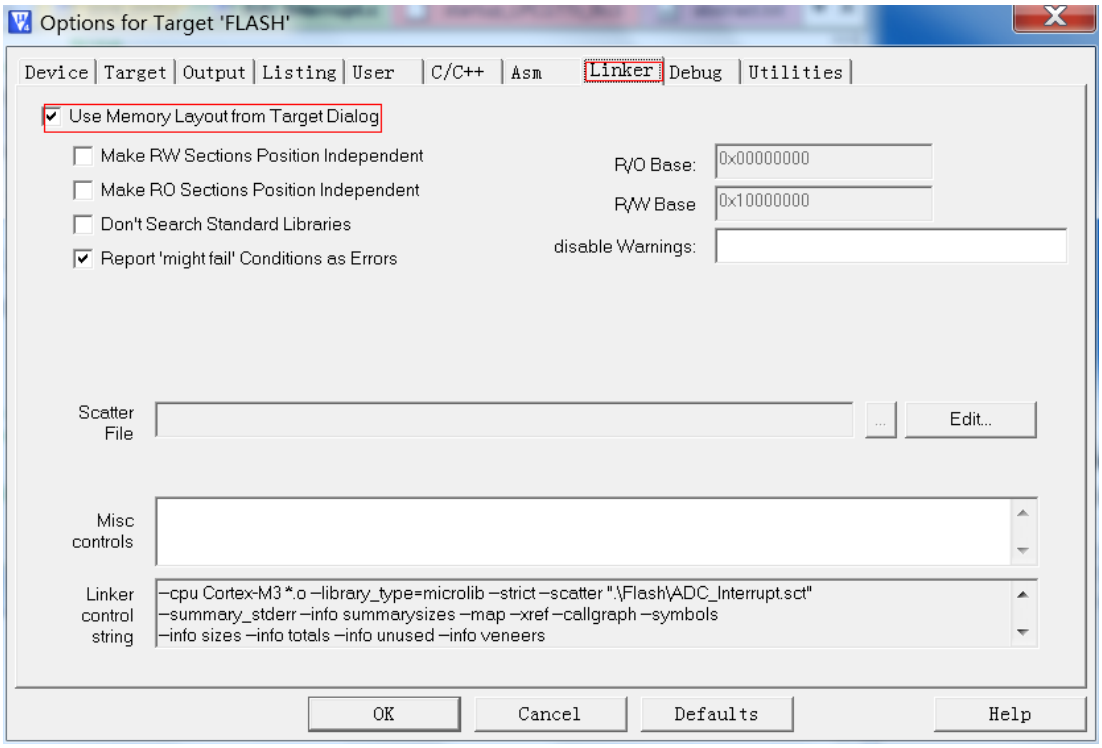


Figure 3-4

(5) Choose project->Rebuild all target files project, or click on shortcut icon to compile. Refer to figure 3-5:

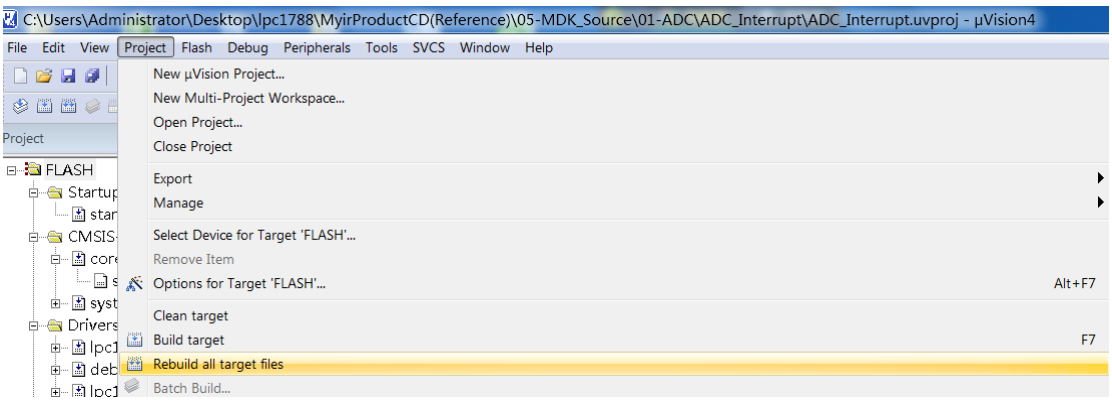


Figure 3-5

3.2.2 DebugMDK Routine

The following is MDK programconfiguration and it has a hardware emulator ULink2 in advance. (If need it, please contact the company to purchase it)

(1) After opening project, open setting dialog box and select Debug. Refer to figure 3-6:

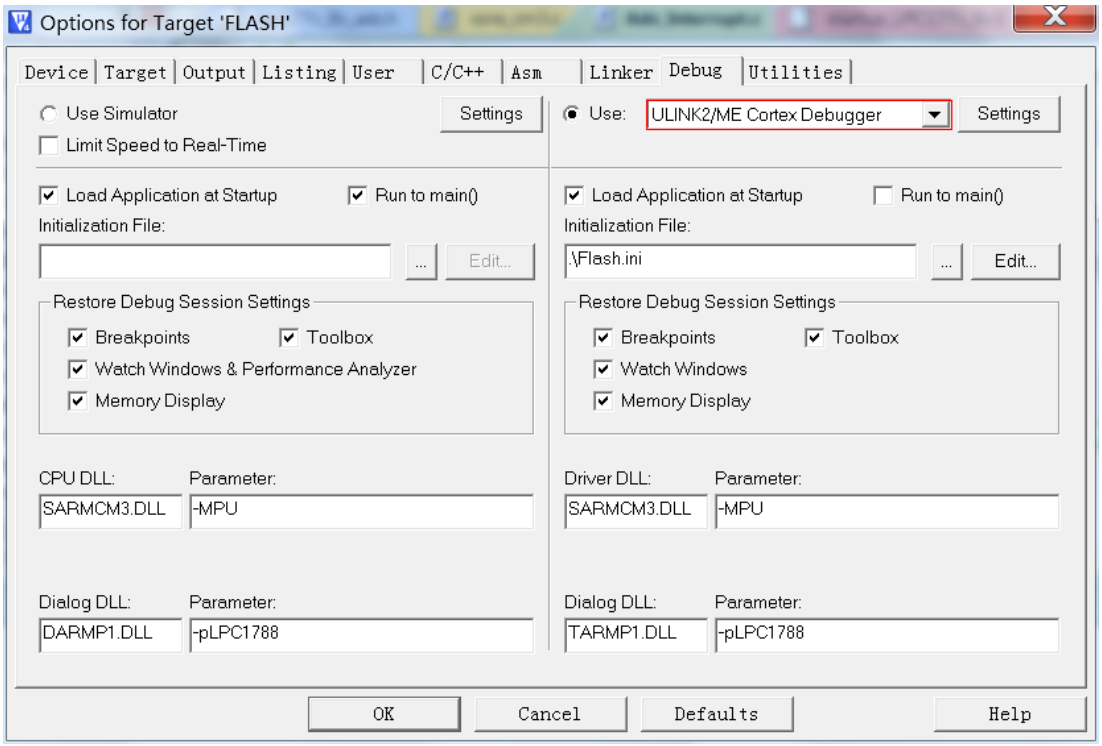


Figure 3-6

(2) Check hardware emulator ULink2

When connecting ULink2 to board, the indicator lights of RUN and COM change blue

and then turn off, while USB indicator lights change red and then remain the same. Thus, it indicates ULink2 is no problem.

(3) Clicking Setting in figure 3-6, there will be connection status of ULink2 (choose SYSRESETREQ in Reset) and development board, as well askernel identification. Refer to figure 3-7:

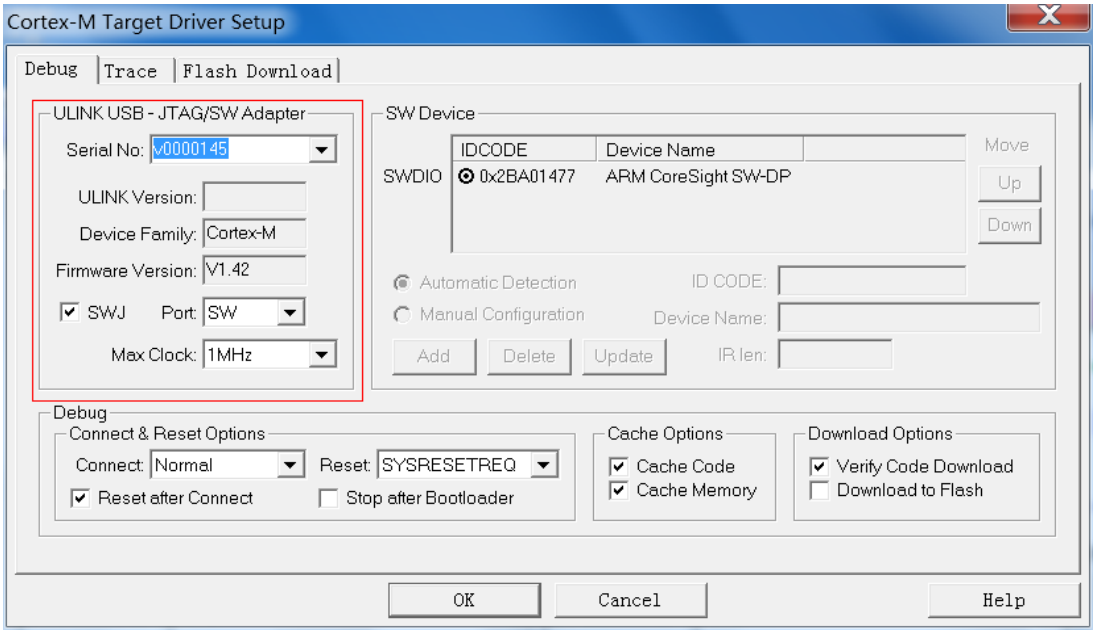


Figure 3-7

(4) Click Ctrl+F5 or shortcut icon, or select Debug->Start/Stop Debug Session to start debugging. Refer to figure 3-8:

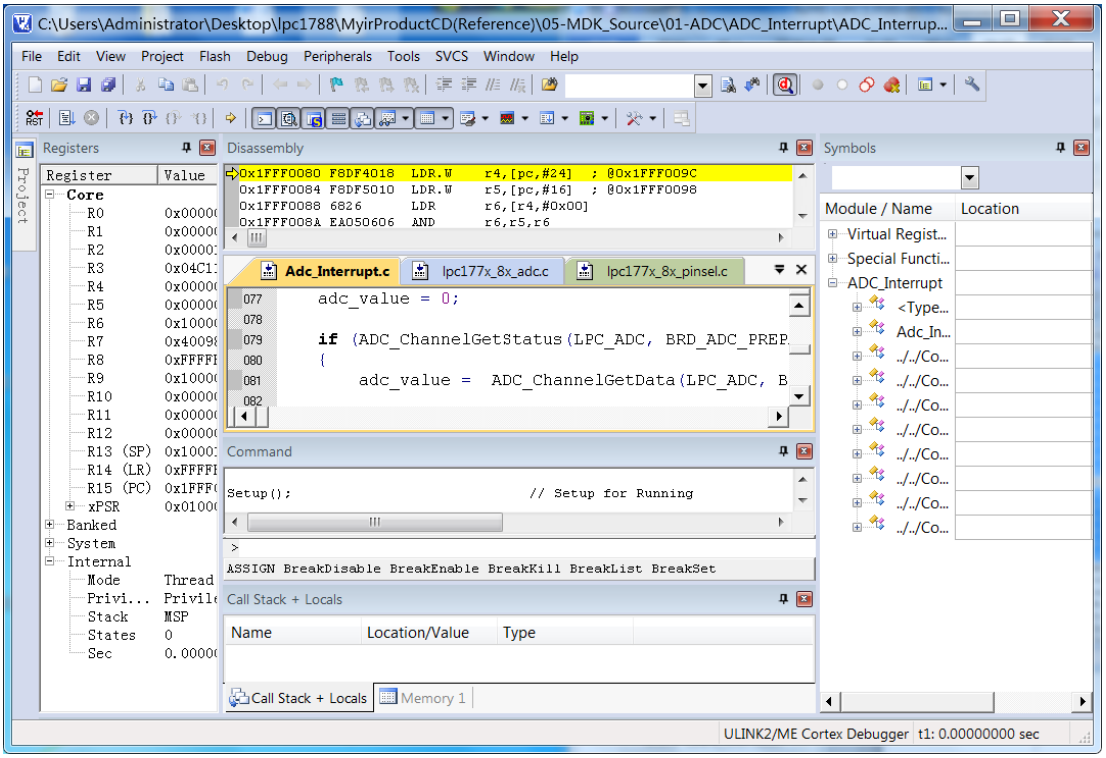


Figure 3-8

3.2.3Download programby ULINK2

Connect Ulink2 to JTAG (J13) and turn power on.

(1) Open 05 MDK_Source\01- ADC\ADC_Interrupt and configureFLASH Programming Utilities in Project-> Option for target.

Firstly, set Use Target Driver for FLASH Programming option, then select ULINK2/ME Cortex Debugger, and then select Update Target before Debugger Options, and finally click Settings button, thenpop up FLASH Download Setup dialog box.

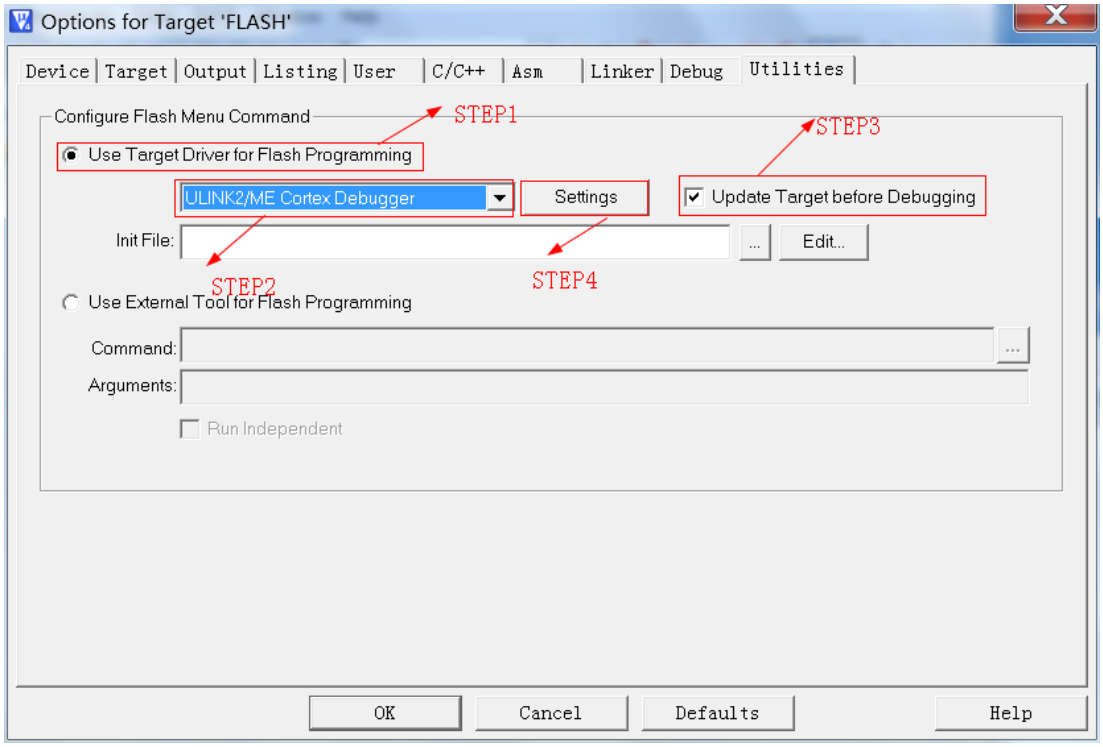


Figure 3-9

(2) Configure FLASH Download Setup

Firstly,Configure download options in Download Function as shown in figure 3-10. Then set START: 0x10000000 SIZE: 0x800in RAM for Algorithm option, last configure algorithm, if Programming Algorithm box below has no algorithm file, single hit Add button to select LPC17xxIAP512kB Flash, and finally click OK button, as shown in figure 3-11.

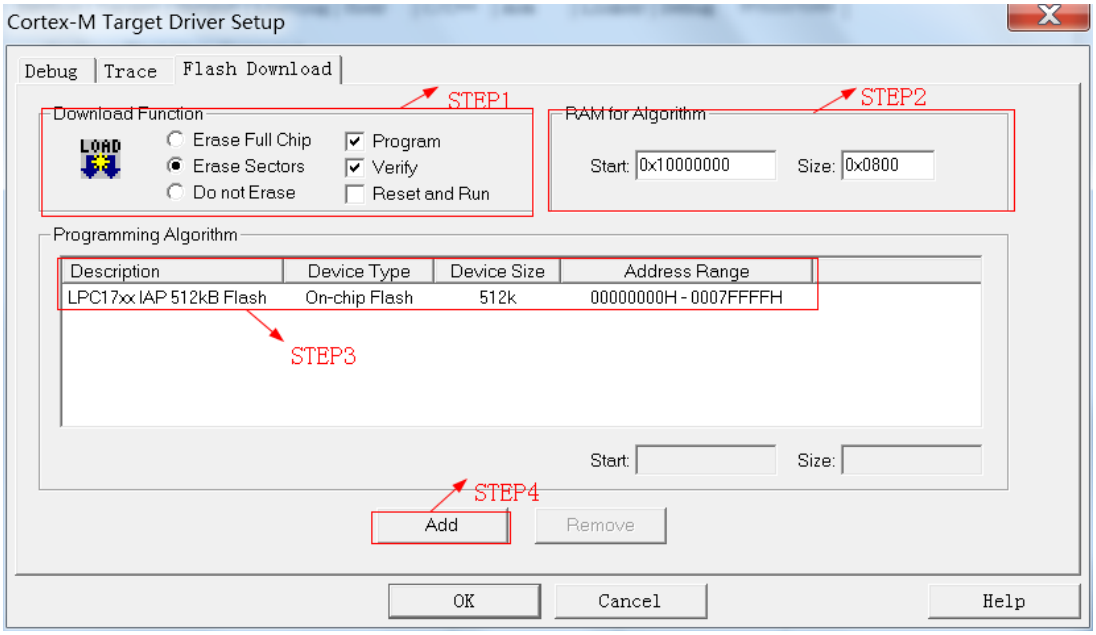


Figure 3-10

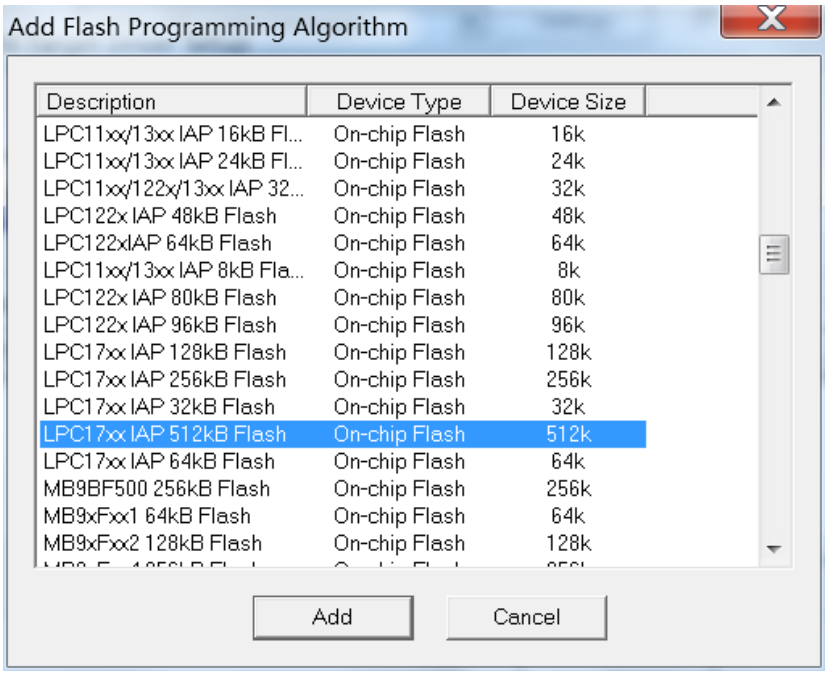


Figure 3-11

(3) Click download button, download program to FLASH in LPC1788. Refer to figure 3-12.

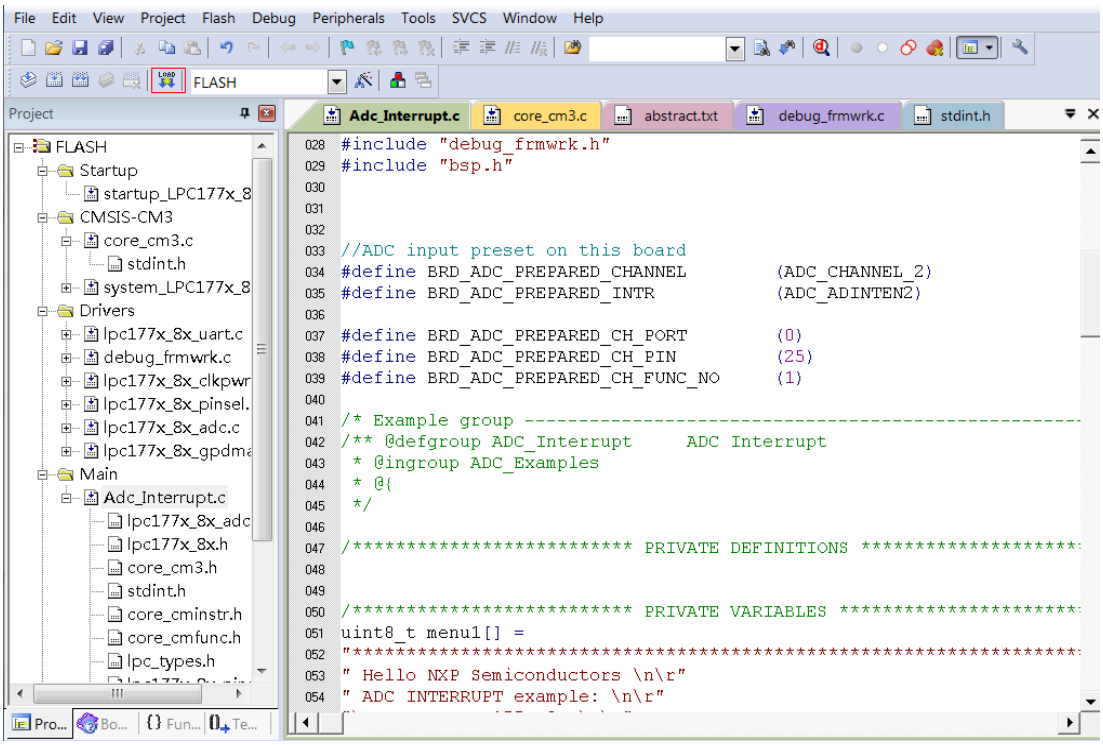


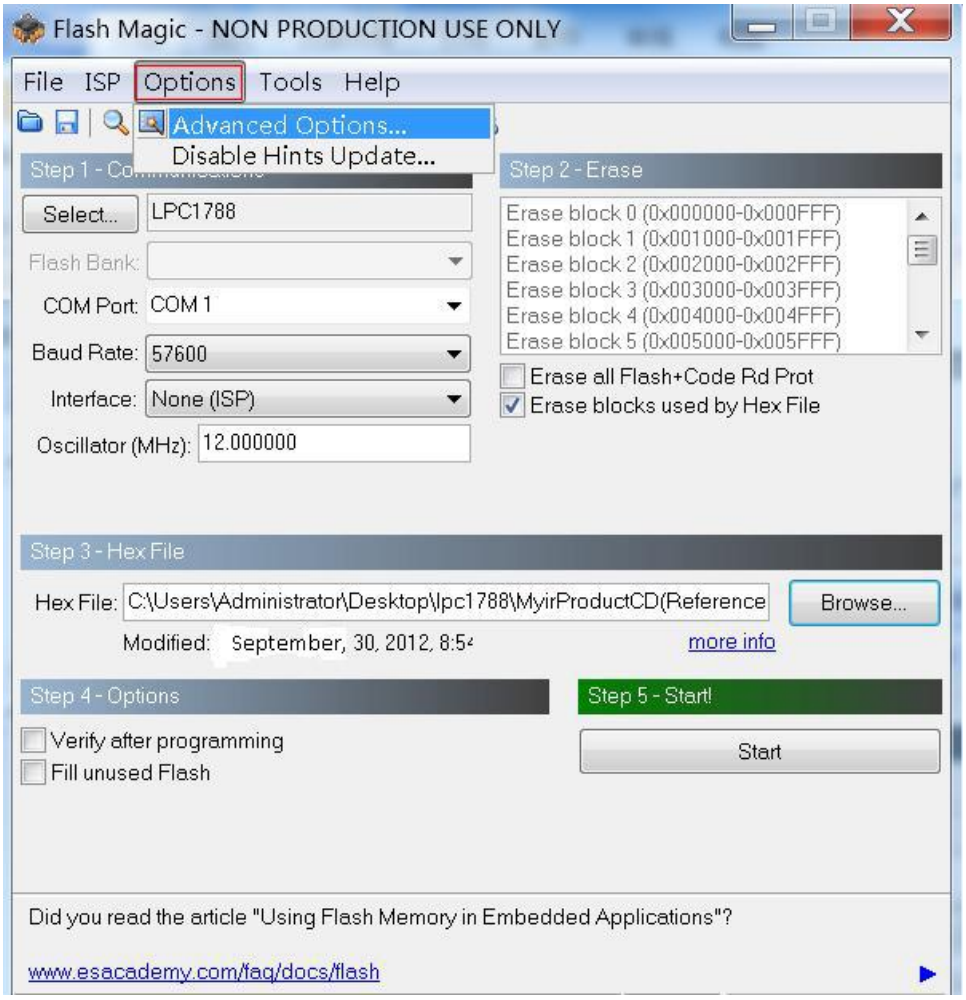
Figure 3-12

3.2.4 ISP Download

When using ISP software to download program, firstly install FLASH magic (download latest version from http://www.flashmagictool.com), then connect JP6, JP4 (PIN1), JP5 (PIN2) to enable UART0, lastly set dial switch to LOW position and restart board.

Steps:

(1) Open FLASH magic and click“Options”, then choose “Advanced Options”. Refer to figure 3-13:



Figurec3-13

(2) Choose “Use DTR and RTS to control RST and ISP pin” in “Hardware Config” in “Advanced Options”, then click “OK”. Refer to figure 3-14:

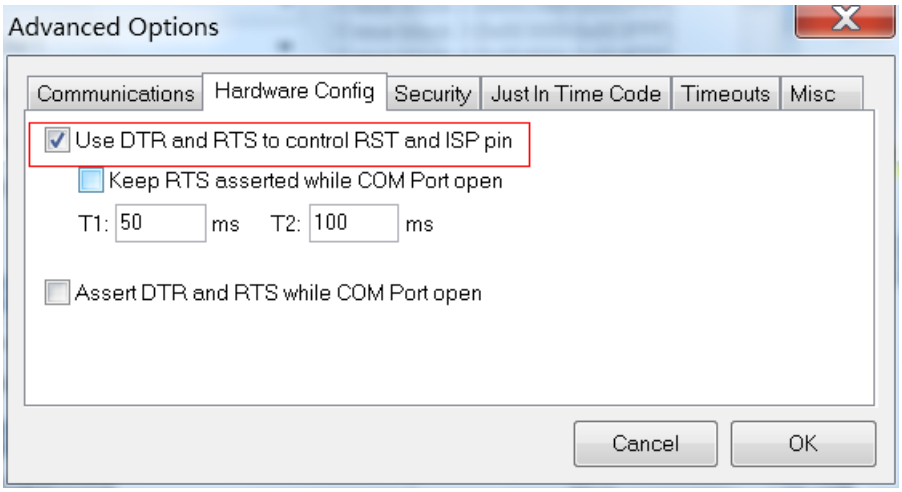


Figure 3-14

(3) Configure development environment and select LPC1788. COM Port can be saw in manger device. Baud rate choose 57600. Crystal oscillator selects 12M. Selectsend Hex File. Refer to figure 3-15 and 3-16.

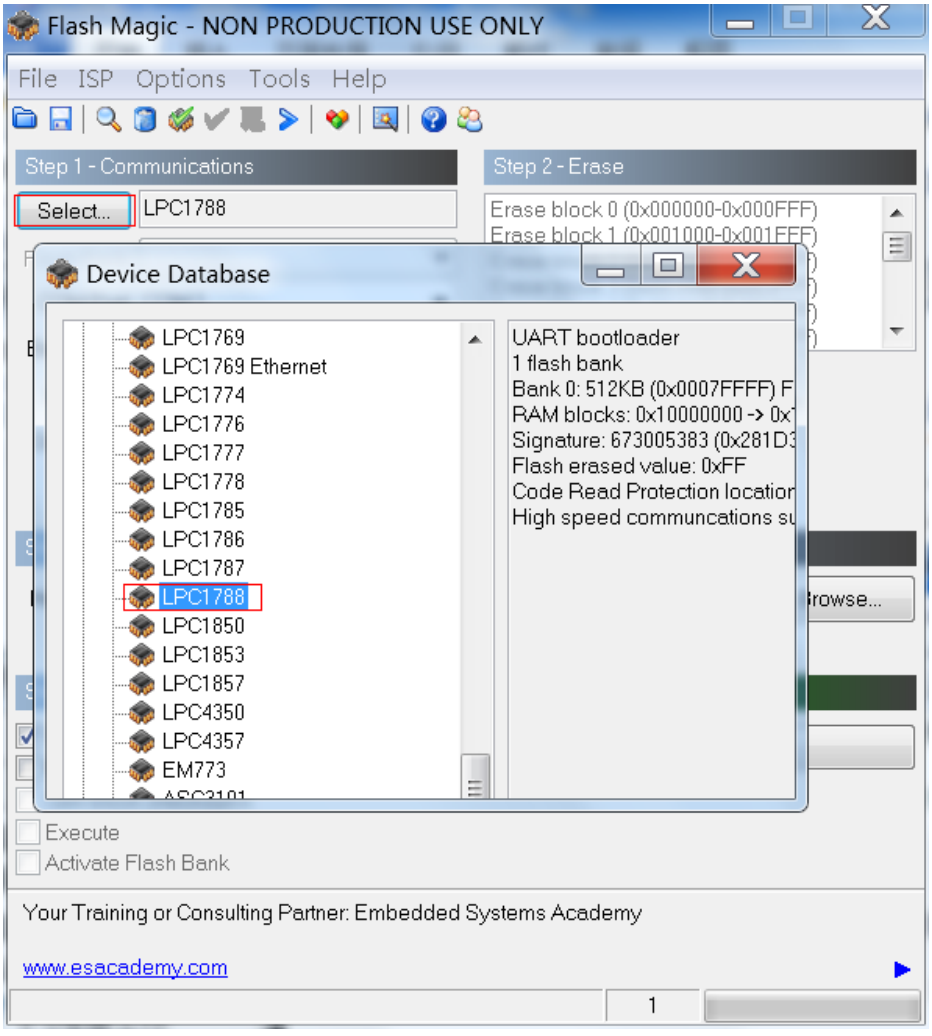


Figure 3-15

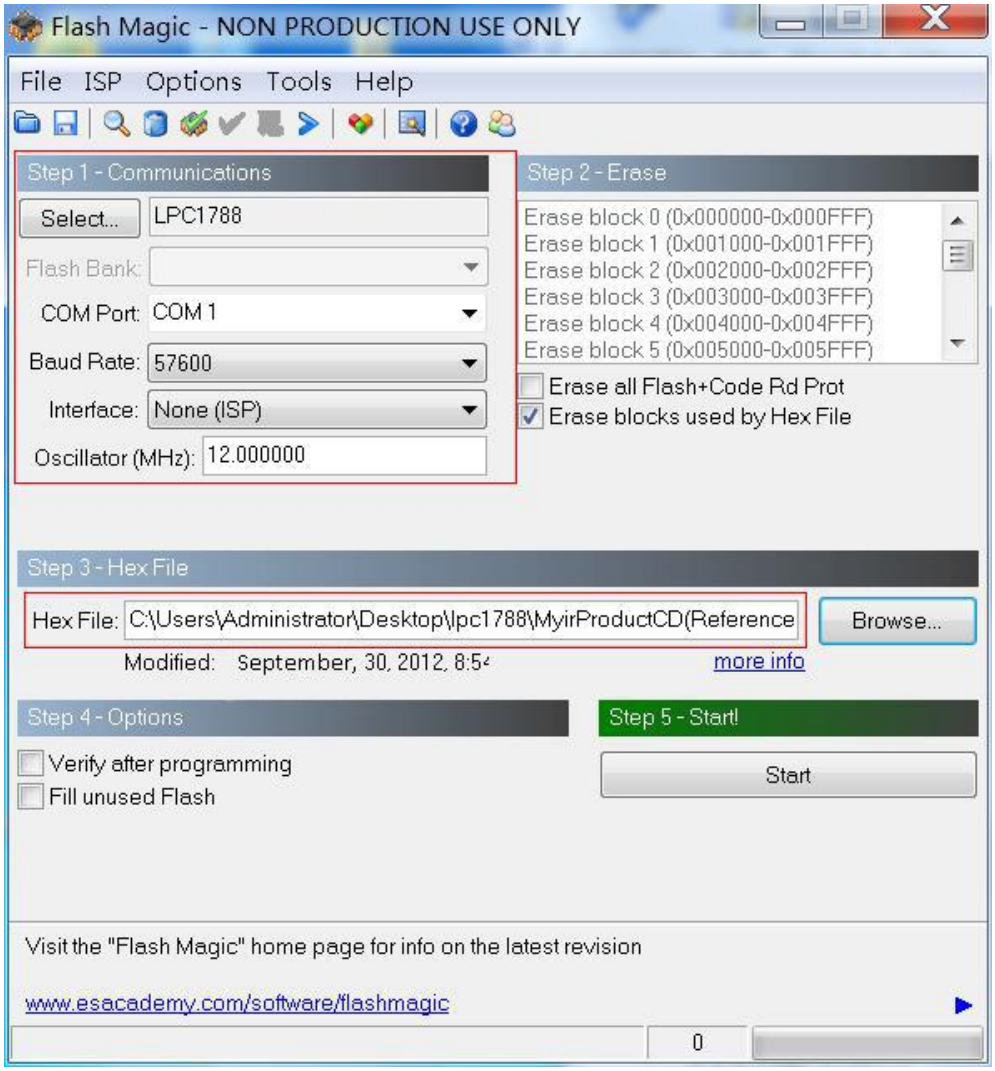


Figure 3-16

(4) Connect UART to COM and click ISP->Read Device Signature, then Flash Magic will recognize LPC1788ID. Refer to figure3-17:

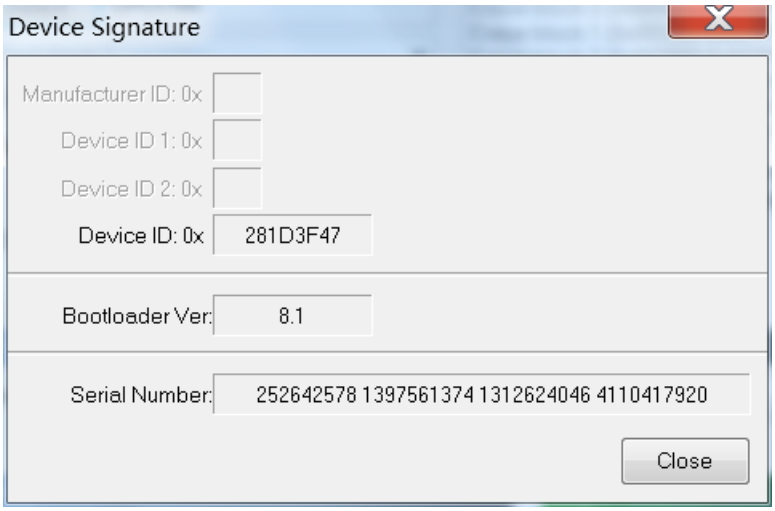


Figure 3-17

(5) Recognizing board and clicking “Start” button, program will be downloaded into board. Refer to figure 3-18:

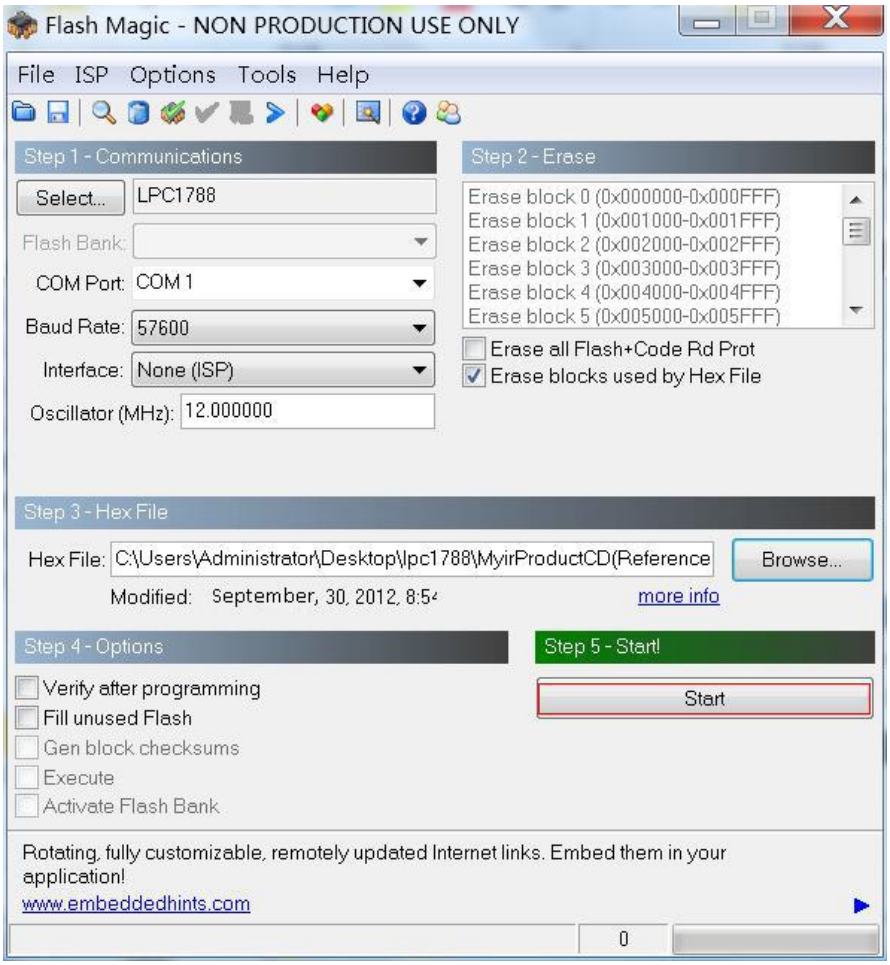


Figure 3-18

(6) After downloading program, disconnect JP3 and reset board, program starts

running. Refer to figure 3-19:

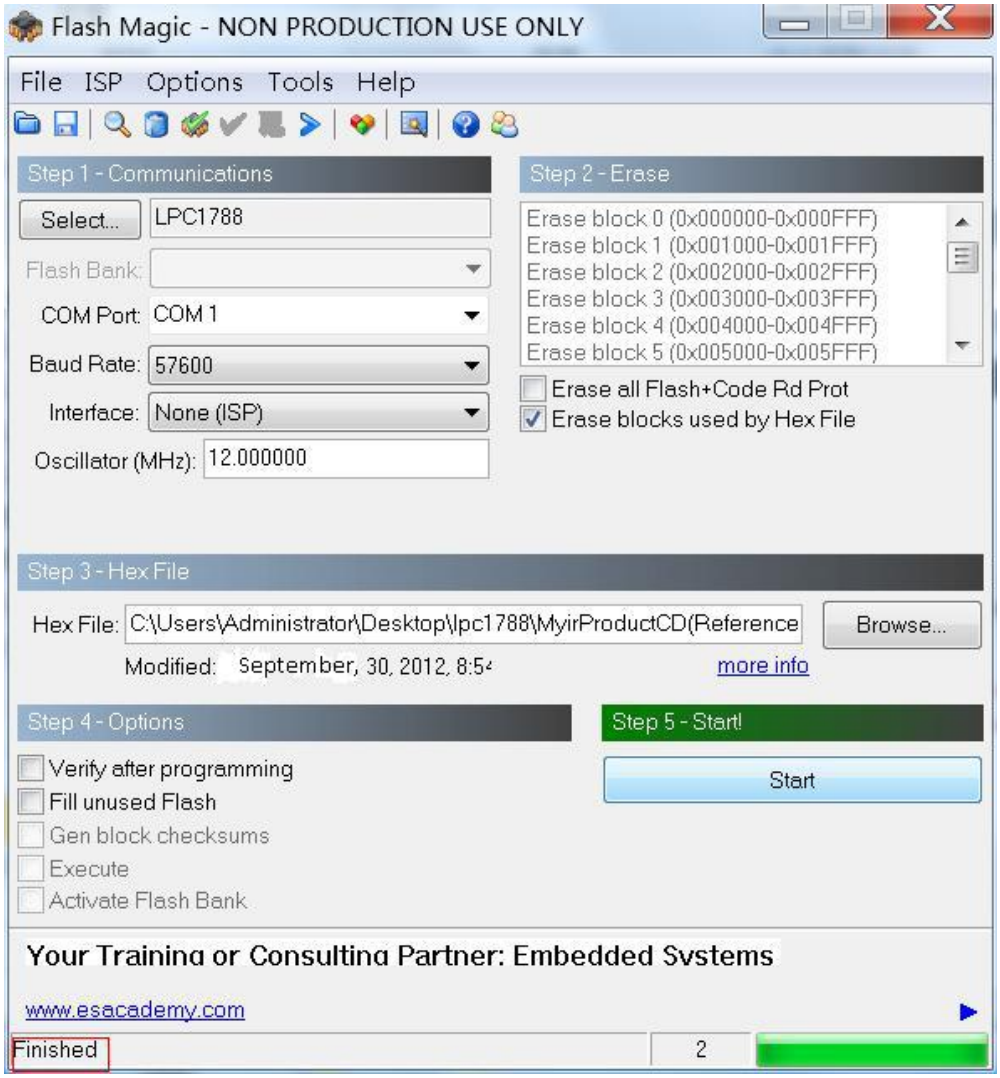


Figure 3-19

3.3MDK source use

3.3.1 Directory structure

MYD-LPC1788 MDK routines is in 05-MDK_Source of CD-ROM directory. Common folder contains MDK routine common code, including start-up, peripheral drivers, core initialization, foreign expansion chip driver. Detailed information is shown in Table 3-1:

Directory	Description
BoardSupport	External expansion chip driver onboard

CoreSupport	Macro definition of kernel function
DeviceSupport	Boot code and system initialization code
Drivers	Peripheral drivers

Table 3-1

3.3.2 Add function module

When need to test or use a function module, add .C file in module and then contain module header file in .C files, lastly call module function directly.

For example, if join timer functionin CAN_Test, then select “Add File to Group 'Drivers'” to find lpc177x_8x_timer.c files in \05-MDK_Source\common\Drivers\source and click Add button. Refer tofigure 3-20 and 3-21:

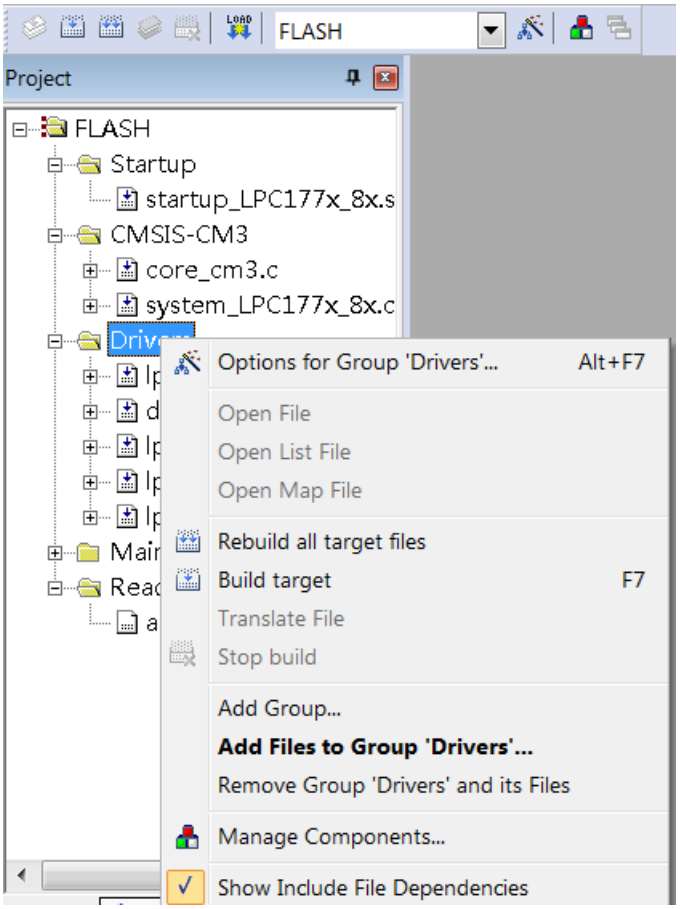


Figure 3-20

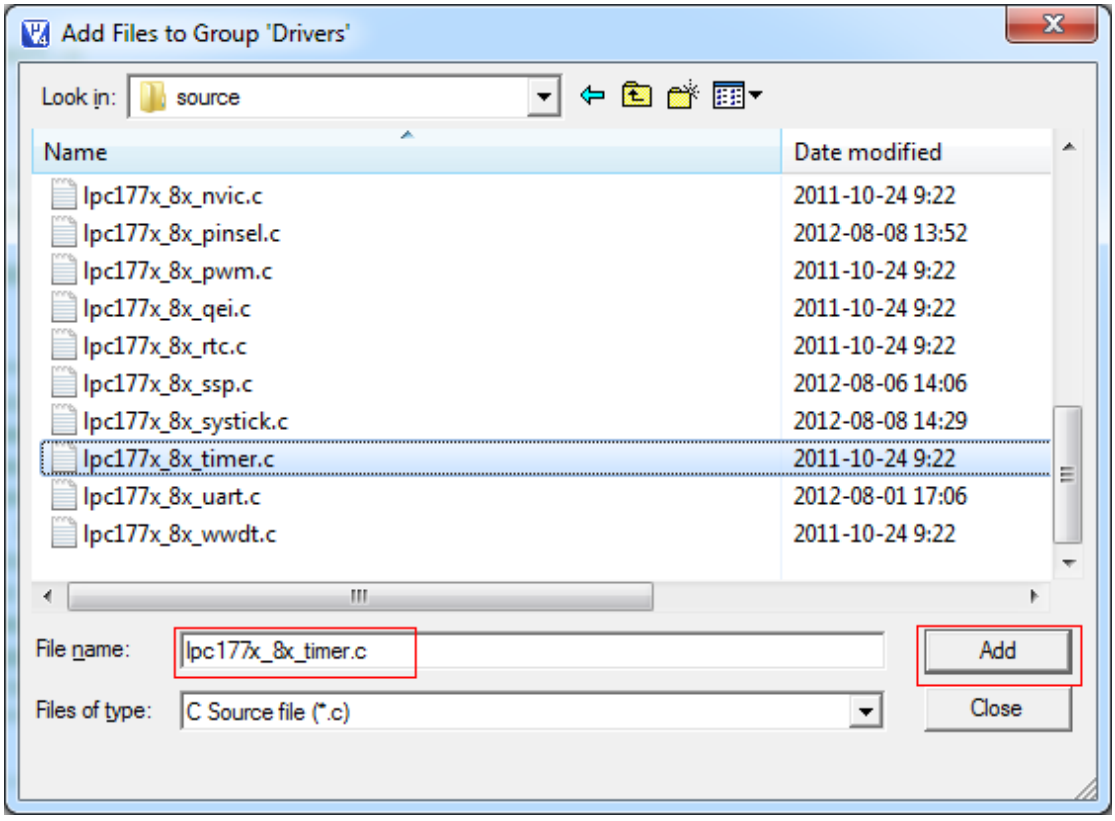


Figure 3-21

Then, .C file of timer function need include header files:

```
#include "lpc177x_8x_timer.h"
```

Timer initialization, configuration, features such as delay time can be provided by timer.

3.3.3Use Printf

Using Printf to debug serial to print run-time information is an effective debug means. But print terminal isn't serial portin default, in order to make character flow redirected to serial port, it needs a new definition of fputc function. The specific operation is as follows:

(1) Add retarget.c files to project which defines fputc function. retarget.c file in \05-MDK_Source\commmon\ CoreSupport directory. User is advised to add retarget.c file to CMSIS-CM3 group, as shown in figure 3-22:

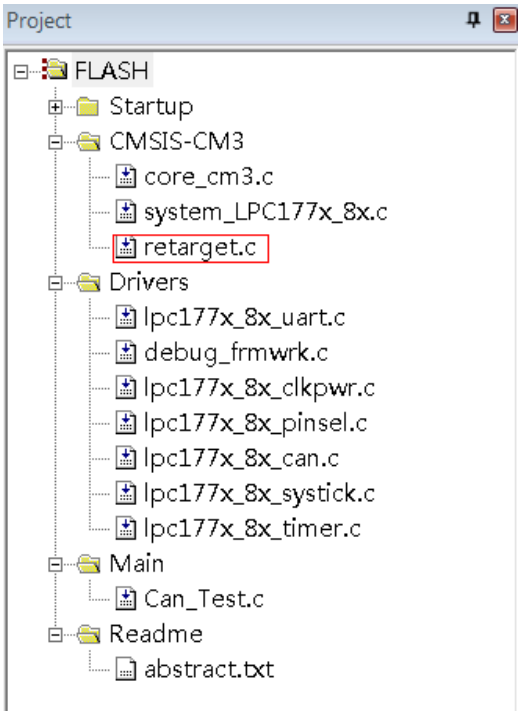


Figure 3-22

(2) Hook Use MicroLIB in engineering configuration, refer to figure 3-23:

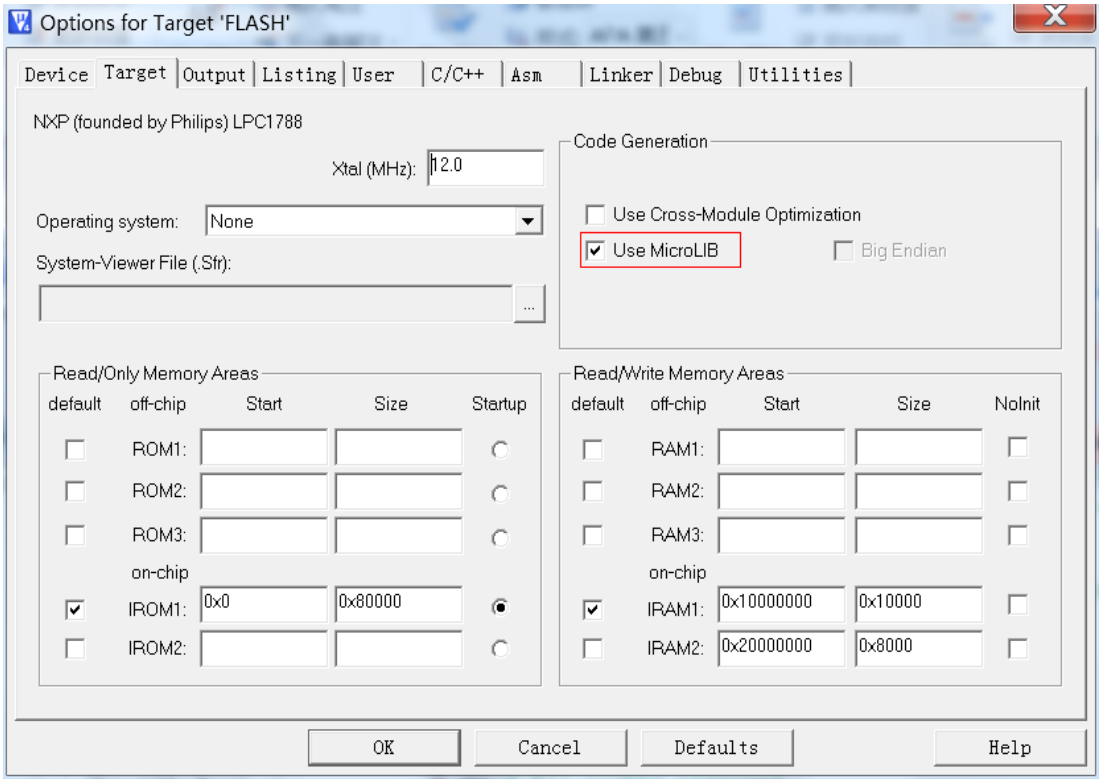


Figure 3-23

(3) .c file need to call printf function contains stdio.h header file.

So, it will be able to use printf to printdata to COM port, and thendisplayby

HyperTerminal.

3.4 The introduction of MDK routine

MDK routines use UART2 port to print debug information, so it needs to set JP4 and JP5 to enable UART2 port (PIN2 connect PIN3 in JP4 and JP5), set baud rate: 115200, 8 data bits, one stop bits, no parity bit, no control flow.

Please note that after download, it needs to disconnect JP6 and then reset board in ISP download, otherwise it may cause abnormal.

3.4.1 ADC_Interrupt

- **Functional description**

  This example describes ADC conversion in interrupt mode.

- **Procedures**

  After download program, press SW5 to reset board, ADC value displayed in terminal and changed byturning potentiometer.

- **Phenomenon Indicates**

  Terminal information:

```
Hello NXP Semiconductors
ADC INTERRUPT example:
        - MCU: LPC177x_8x
        - Core: ARM CORTEX-M3
        - Communicate via: UART2 - 115200 bps
 Use ADC with 12-bit resolution rate of 400KHz, read in INTERRUPT mode
 To get ADC channel value and display via UART interface
 Turn the potentiometer to Refer to how ADC value changes
********************************************************************************
ADC value on channel 002 is: 0000000148
ADC value on channel 002 is: 0000000145
ADC value on channel 002 is: 0000000146
ADC value on channel 002 is: 0000000144
ADC value on channel 002 is: 0000000144
ADC value on channel 002 is: 0000000144
ADC value on channel 002 is: 0000000144
```

```
ADC value on channel 002 is: 0000000146
ADC value on channel 002 is: 0000000146
ADC value on channel 002 is: 0000000146
ADC value on channel 002 is: 0000000144
ADC value on channel 002 is: 0000000144
ADC value on channel 002 is: 0000000146
ADC value on channel 002 is: 0000000146
ADC value on channel 002 is: 0000000144
ADC value on channel 002 is: 0000000146
ADC value on channel 002 is: 0000000146
ADC value on channel 002 is: 0000000146
```

3.4.2 ADC_Polling

- **Functional description**

  This example describes ADC conversion in polling mode.

- **Procedures**

  After download program, press SW5 to reset board, ADC value displayed in terminal and changed by turning potentiometer.

- **Phenomenon Indicates**

  Terminal information:

```
******************************************************************************
 Hello NXP Semiconductors
 ADC POLLING example:
          - MCU: LPC177x_8x
          - Core: ARM CORTEX-M3
         - Communicate via: UART2 - 115200 bps
 Use ADC with 12-bit resolution rate of 400KHz, read in POLLING mode
 To get ADC value and display via UART interface
 Turn the potentiometer to Refer to ADC value changes
******************************************************************************
ADC value on channel 002 is: 0000000148
ADC value on channel 002 is: 0000000145
ADC value on channel 002 is: 0000000149
ADC value on channel 002 is: 0000000149
ADC value on channel 002 is: 0000000148
ADC value on channel 002 is: 0000000149
ADC value on channel 002 is: 0000000148
ADC value on channel 002 is: 0000000147
```

```
ADC value on channel 002 is: 0000000148
ADC value on channel 002 is: 0000000148
```

3.4.3 CAN_Test

- **Functional description**

  This example describes CAN transmit and receive data.

- **Procedures**

  Firstly connect CAN1 and CAN2 (Pin1, Pin2 are respectively connected Pin4, Pin5 in J8). After download program and press SW5 to reset board, CAN1 will send a frame data to CAN2. After CAN2's reception, it will be checked and result will be printed in terminal.

- **Phenomenon Indicates**

  Terminal information:

```
********************************************************************************
Hello NXP Semiconductors
CAN Self-test example
        - MCU: LPC17xx
        - Core: ARM CORTEX-M3
        - UART Communication: 115200 bps
Use CAN1 to transmit and CAN2 for receive
********************************************************************************
Transmitted buffer:
Message ID:         0x00001234
Message length: 0x00000008 BYTES
Message type:      DATA FRAME
Message format: EXTENDED ID FRAME FORMAT
Message dataA:    0x12121212
Message dataB:    0x34343434

Received buffer:
Message ID:         0x00001234
Message length: 0x00000008 BYTES
Message type:      DATA FRAME
Message format: EXTENDED ID FRAME FORMAT
Message dataA:    0x12121212
Message dataB:    0x34343434
---------->CAN TEST Successful!!!
```

3.4.4 Crc_Demo

- **Functional description**

  This example describes CRC engine.

- **Procedures**

  After download program, press SW5 to reset board.Program calculates CRC block data firstly anddisplaycalculates result afterreceiving input.

- **Phenomenon Indicates**

  Terminal information:

```
*****************************************************************************
 Hello NXP Semiconductors
 CRC Demo example:
        - MCU: LPC177x_8x
        - Core: ARM CORTEX-M3
        - UART Communication: 115200 bps
 Use CRC engine on LPC177x_8x to calculate CRC for a 8-bit block data
 You can choose one of three polynomial type:
        - CRC-CCITT
        - CRC-16
        - CRC-32
*****************************************************************************
Block data:
0x00000000  0x00000001  0x00000002  0x00000003  0x00000004
0x00000005  0x00000006  0x00000007  0x00000008  0x00000009
0x0000000A  0x0000000B  0x0000000C  0x0000000D  0x0000000E
0x0000000F  0x00000010  0x00000011  0x00000012  0x00000013
0x00000014  0x00000015  0x00000016  0x00000017  0x00000018
0x00000019  0x0000001A  0x0000001B  0x0000001C  0x0000001D
0x0000001E  0x0000001F  0x00000020  0x00000021  0x00000022
0x00000023  0x00000024  0x00000025  0x00000026  0x00000027
0x00000028  0x00000029  0x0000002A  0x0000002B  0x0000002C
0x0000002D  0x0000002E  0x0000002F  0x00000030  0x00000031
0x00000032  0x00000033  0x00000034  0x00000035  0x00000036
0x00000037  0x00000038  0x00000039  0x0000003A  0x0000003B
0x0000003C  0x0000003D  0x0000003E  0x0000003F
 Choose what polynomial that you want to use, type:
        - '1': CRC-CCITT
        - '2': CRC-16
        - '3': CRC-32
```

```
        - 'Q': Quit
CRC-CCITT Result: 0x0000FD2F
Choose what polynomial that you want to use, type:
        - '1': CRC-CCITT
        - '2': CRC-16
        - '3': CRC-32
        - 'Q': Quit
CRC-16 Result: 0x00002799
Choose what polynomial that you want to use, type:
        - '1': CRC-CCITT
        - '2': CRC-16
        - '3': CRC-32
        - 'Q': Quit
CRC-32 Result: 0x100ECE8C
Choose what polynomial that you want to use, type:
        - '1': CRC-CCITT
        - '2': CRC-16
        - '3': CRC-32
        - 'Q': Quit
Demo terminated!!!
```

3.4.5 Dac_Dma

- **Functional description**

  This example describes DMA transfer data to DAC peripheral.

- **Procedures**

  After download program, press SW5 to reset board. DMA transfer data to DAC peripheral constantly. DACvalue changes byconstant transferring data.Use multimeter or oscilloscope to detect TP7voltage.

- **Phenomenon Indicates**

  Output voltage from 0V to 3.3V, direct jump to 0V, began to rise again in cycle. So there will be saw tooth waveform in oscilloscope. It is observed oscilloscope ("V / price" and "s / lattice" knob settings for 2.00V and 1.00S).Refer to figure 3-24:

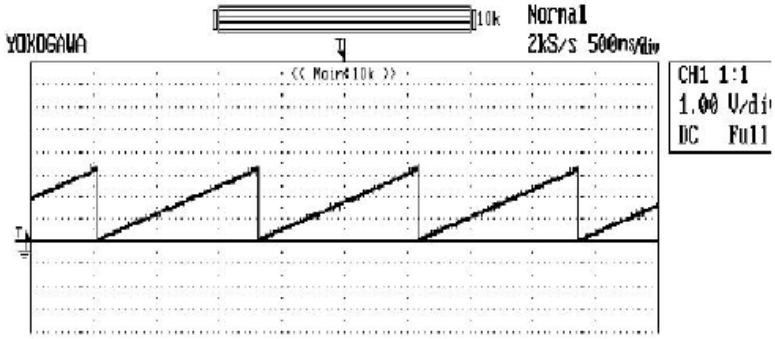


Figure 3-24

3.4.6 Dac_SineWave

- **Functional description**

  This example describes DMA generatessine wave signal.

- **Procedures**

  After download program, press SW5 to reset board.. Oscilloscope probe is connected to TP7, and thenthere will be sine wave signal.

- **Phenomenon Indicates**

  Observe waveform by oscilloscope ("V/price" and "s/lattice" knob settings for 2.00V and 2.50ms). Refer to figure 3-25:

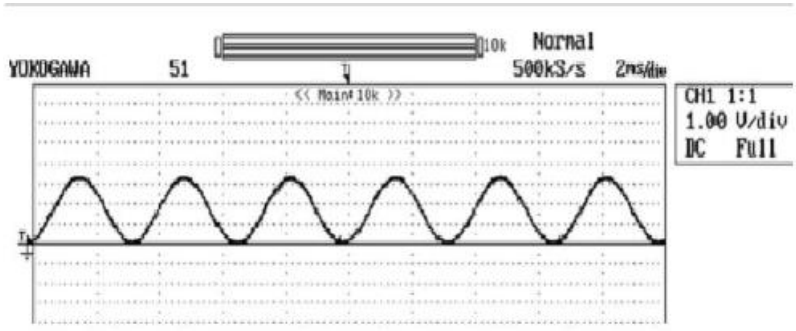


Figure 3-25

3.4.7 DMA_Flash2Ram

- **Functional description**

  This example describes GPDMA function by transferring data from Flash to Ram

memory.

- **Procedures**

After download program, press SW5 to reset board, there will be information in terminal. A block datatransferred byGPDMA from Flash to Ram is checked and the result will be outputted in the terminal.

- **Phenomenon Indicates**

Terminal information:

```
********************************************************************************
 Hello NXP Semiconductors
 GPDMA FLASH to RAM example
        - MCU: LPC177x_8x
        - Core: ARM CORTEX-M3
        - UART Communication: 115200 bps
 This example used to test GPDMA function by transfer data from Flash
to RAM memory
********************************************************************************
Start transfer...
Buffer Check success!
Demo terminated!
```

3.4.8 Eeprom_Demo

- **Functional description**

This example describes tore data in EEPROM memory.

- **Procedures**

After download program, press SW5 to reset board.Program will first write "NXP Semiconductor LPC177x_8x-CortexM3 \n\r\t--- HELLO WORLD!!! ---" into EEPROM, and then reads and displays data from corresponding location in EEPROM. When there will be "NXP Semiconductor LPC177x_8x-CortexM3 \n\r\t--- HELLO WORLD from the terminal!!!," it shows write-in and read-out is normal.

- **Phenomenon Indicates**

Terminal information:

```
********************************************************************************
 Hello NXP Semiconductors
```

```
 EEPROM demo example
            - MCU: LPC177x_8x
            - Core: ARM CORTEX-M3
            - Communicate via: UART2 - 115200 bps
 This example used to demo EEPROM operation on LPC177x_8x.
 A 'Hello' sentence will be written into EEPROM memory, then read back and check.
********************************************************************************
Write data to EEPROM
Read data from EEPROM
NXP Semiconductor LPC177x_8x-CortexM3
          --- HELLO WORLD!!!---
Demo is terminated
```

3.4.9 Emc_NorFlashDemo

- **Functional description**

  This example describesEMC read/write NOR FLASH.

  Procedures

  After download program, press SW5 to reset board. Program firstly check Manufacturer ID and Device ID of NorFlash chip(Model：SST39VF1601). Then entire Flash memory will be erased. 2K block data will be written and read back for verify.

- **Phenomenon Indicates**

  Terminal information:

```
********************************************************************************
 Hello NXP Semiconductors
 EMC NORFLASH example
- MCU: LPC177x_8x
            - Core: Cortex-M3
            - UART Comunication: 115200 bps
Write and verify data with on-board NOR FLASH
********************************************************************************
Init NOR Flash...
Read NOR Flash ID...
Erase entire NOR Flash...
Write a block of 2K data to NOR Flash...
Verify data...
Verifying complete! Testing terminated!
```

3.4.10 Emc_SdramDemo

- **Functional description**

  This example describes EMC read/write SDRAM.

- **Procedures**

  After download program, press SW5 to reset board. The process of program: clear SDRAM and write data into SDRAM in 8-bits mode and verify in 32-bits read mode. Then clear SDRAM and write data into SDRAM in 16-bits mode and verify in32-bits read mode.

- **Phenomenon Indicates**

  Terminal information:

```
*********************************************************************************
 Hello NXP Semiconductors
 Test SDRAM K4S561632J with LPC1788 EMC
- MCU: LPC177x_8x
        - Core: Cortex-M3
        - UART Comunication: 115200 kbps
Write and verify data with on-board SDRAM
*********************************************************************************
Clear content of SDRAM...
Writing in 8 bits format...
Verifying data...
Continue writing in 16 bits format...
Clear content of SRAM...
Writing in 16 bits format...
Verifying complete, testing terminated!
```

3.4.11 Emc_SramDemo

- **Functional description**

  This example describes EMC read/write SRAM.

- **Procedures**

  After download program, press SW5 to reset board.After clear data and write data into SRAM,program displays memory address.

➢ **Phenomenon Indicates**

Terminal information:

```
********************************************************************************
 Hello NXP Semiconductors
            - MCU: LPC177x_8x
            - Core: Cortex-M3
            - UART Comunication: 115200 kbps
 Clean and write data with on-board SRAM
********************************************************************************
Uartinit finished!!!
The value after clearing are:
0000000000
0000000000
0000000000
0000000000
0000000000
0000000000
0000000000
0000000000
The filling value is:0xABCDDCBA
The value after filling are:
0xABCDDCBA
0xABCDDCBA
0xABCDDCBA
0xABCDDCBA
0xABCDDCBA
0xABCDDCBA
0xABCDDCBA
0xABCDDCBA
```

3.4.12 GPIO_Interrupt

➢ **Functional description**

This example describes GPIO interrupt function.

➢ **Procedures**

After download program, press SW5 to reset board, program doesn't generate a GPIO interrupt, and D9 flashes. When user pressSW1 to generate a GPIO interrupt, program will enter interrupt process program and D10 flash 10 times, and then return.

- **Phenomenon Indicates**

  When program doesn't generate a GPIO interrupt, D10 light and D9 flash. When press SW1, D9 keep origin status and D10 flashes.

3.4.13 GPIO_LedBlinky

- **Functional description**

  This program describes GPIO drives LED.

- **Procedures**

  After download program, press SW5 to reset board, D9 flashes.

- **Phenomenon Indicates**

  Reset board, andD9 flashes.

3.4.14 Nvic_VectorTableRelocation

- **Functional description**

  This example describes relocation vector table.

- **Procedures**

  After download program, press SW5 to reset board.Vector Table will be remapped at new address 0x20001000. If remapping is successful, SysTick interrupt can driver D9 flash normally.

- **Phenomenon Indicates**

  Terminal information:

```
*********************************************************************************
 Hello NXP Semiconductors
 Privileged demo
          - MCU: LPC177x_8x
          - Core: ARM CORTEX-M3
          - UART Communication: 115200 bps
 This example used to test NVIC Vector Table Relocation function
*********************************************************************************
 Remapping Vector Table at address: 0x20001000
 If Vector Table remapping is successful, LED D9 will blink by using
```

SysTick interrupt

3.4.15 Pwm_SingleEdge

➢ **Functional description**

This example describes PWM signal on 6 Channels in single edge mode.

➢ **Procedures**

Compile program and download it into board. Reset board and observe oscilloscope.

➢ **Phenomenon Indicates**

Observe pin of PWM0.1 and PWM0.3 by oscilloscope. Refer to figure 3-26 and figure 3-27:

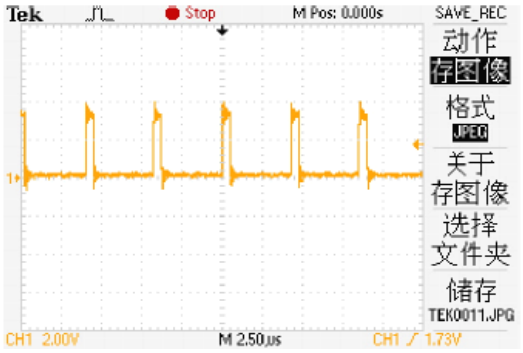


Figure 3-26

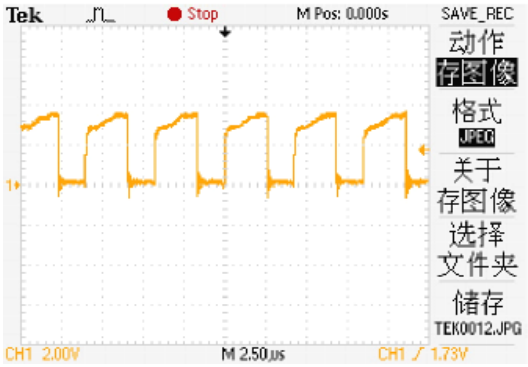


Figure 3-27

3.4.16 Pwm_DualEdge

➢ **Functional description**

This example describes generate PWM signal on 3 channels in both edge mode and

single mode.

- **Procedures**

  After download program, press SW5 to reset board,there will be information in oscilloscope.

- **Phenomenon Indicates**

  Observe pwm0.1 waveform byOscilloscope:

  :

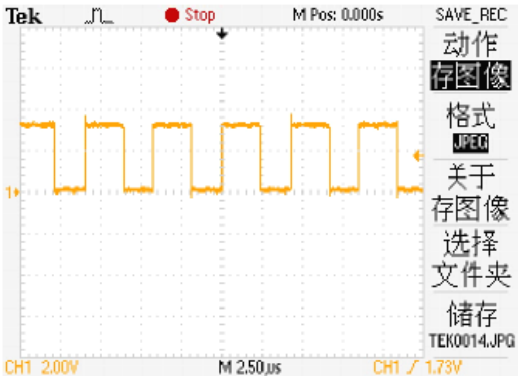


Figure 3-28

3.4.17 Pwm_MatchInerrupt

- **Functional description**

  This example describes PWM Match function in interrupt mode.

- **Procedures**

  After download program, press SW5 to reset board, there will be information in oscilloscope.

- **Phenomenon Indicates**

  Observe Waveform of PWM0.1, PWM0.3 by oscilloscope. Refer to Figure 3-29 and figure 3-30:

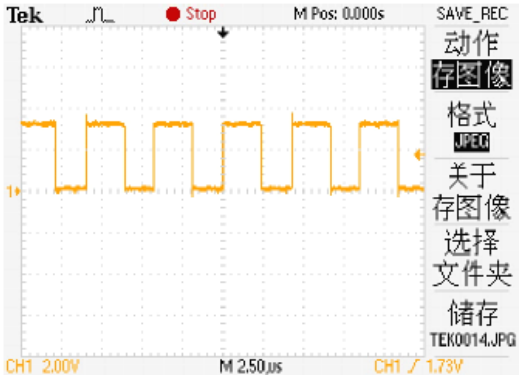


Figure 3-29

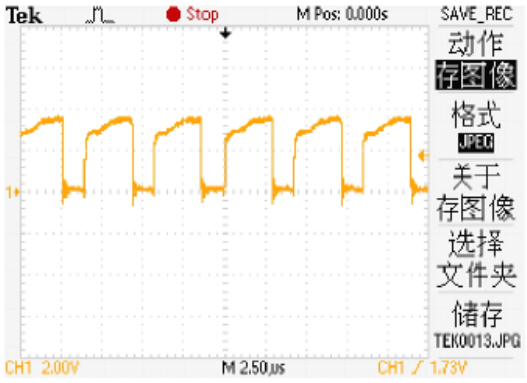


Figure 3-30

3.4.18 PWR_Sleep

- **Functional description**

  This example describes enter system in sleep mode and wake up by WWDT(Windowed Watchdog Timer) Interrupt

- **Procedures**

  After download program, press SW5 to reset board. Receive '1' from serial, system enter sleep mode. Wait 2s to generate a WWDT interrupt and wake up system.

- **Phenomenon Indicates**

  Terminal information:

```
********************************************************************************
 Hello NXP Semiconductors
 Power Sleep example:
        - MCU: LPC177x_8x
        - Core: ARM CORTEX-M3
```

```
            - UART Communication115200 bps
  This example used to enter system in sleep mode and wake up it by using
  Watchdog timer interrupt
*****************************************************************************
Press '1' to enter system in Deep Sleep mode
Enter Deep Sleep mode!
Wait 2s for WDT wake-up system...
System wake-up!
```

3.4.19 PWR_DeepSleep

- **Functional description**

  This example describes enter system in deep sleep mode and wakeup by external interrupt.

- **Procedures**

  After download program, press SW5 to reset board.Receive '1' from serial, system enter deep sleep mode. Connect JP6(A short time connection) to generate external interrupt ,it will wake up system.

  Terminal information:

```
*****************************************************************************
  Hello NXP Semiconductors
  Power - Deep Sleep example
            - MCU: LPC177x_8x
            - Core: ARM CORTEX-M3
            - UART Communication115200 bps
  This example used to enter system in deep sleep mode and wake up it by using
external interrupt
*****************************************************************************
Press '1' to enter system in deep sleep mode.
If you want to wake-up the system, press INT/WAKE-UP button.
I'm sleeping...      -------- I'm wake up! --------
```

3.4.20 Emac_EasyWeb

- **Functional description**

  This example describes implement an simple web application.

- **Procedures**

After download program, press SW5 to reset board,connectboard toPCby crosswire.Configure IP address: 192.168.2.100. Open web browser, accessaddress "http://192.168.0.100" to display webservercontent. Turn potentiometer and webdisplaysADCupdate value. Please note, webpagechange a state automatically by 5 seconds.

- **Phenomenon Indicates**

Refer to figure 3-31:

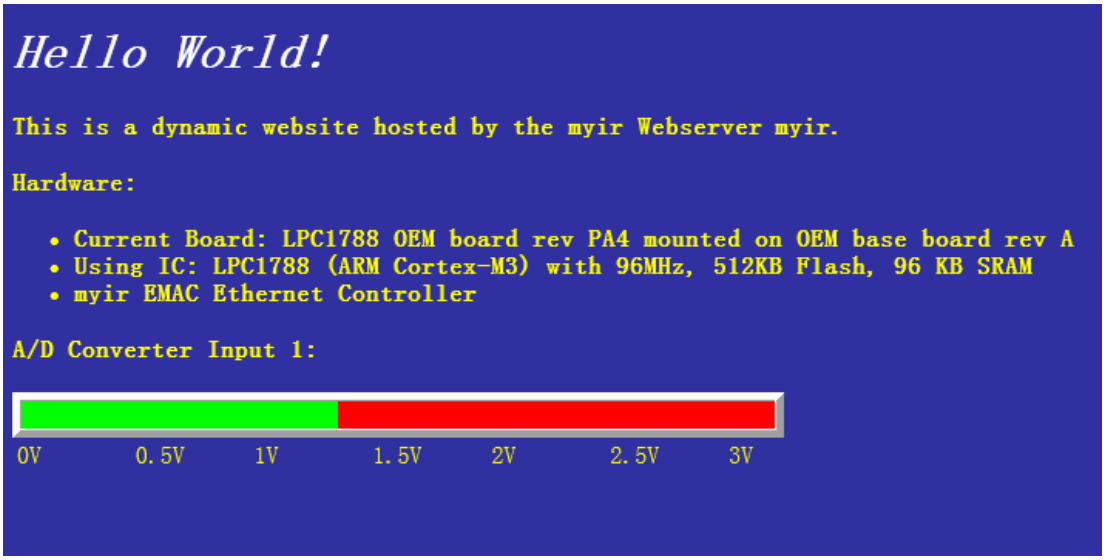


Figure 3-31

3.4.21 Rtc_Alarm

- **Functional description**

This example describes RTC generate interrupt in secondand Alarm interrupt.

- **Procedures**

After download program, press SW5 to reset board. Program set initialize time and generate interrupt by second. So alarm interrupt occursafter 10s and alarm sentence will be outputted.

- **Phenomenon Indicates**

Terminal information:

```
******************************************************************************
 Hello NXP Semiconductors
```

```
 RTC Alarm Example:
            - MCU: LPC177x_8x
            - Core: ARM CORTEX-M3
            - UART Communication: 115200 bps
A simple RTC example.
 To generate interrupt in Second Counter Increment Interrupt (1s)
and generate Alarm interrupt at 10s
******************************************************************************
Current time set to: 018:045:000    025/003/02011
Second ALARM set to 010s
Second: 001
Second: 002
Second: 003
Second: 004
Second: 005
Second: 006
Second: 007
Second: 008
Second: 009
Second: 010
ALARM 10s matched!
Second: 011
Second: 012
Second: 013
Second: 014
Second: 015
```

3.4.22 SSP_Touchscreen

- **Functional description**

  The program shows SSP interface read position x and y in touchscreen.

- **Procedures**

  After download program, press SW5 to reset board, here will becurrent position X and Y in terminal.

- **Phenomenon Indicates**

  Terminal information:

```
******************************************************************************
 Hello NXP Semiconductors
 SSP Touchscreen Example:
```

```
            - MCU: LPC177x_8x
            - Core: ARM CORTEX-M3
            - UART Communication: 115200 bps
A simple ssp-touch example.
 When you touch the screen,you will Refer to the X and Y values on the termimal.
*********************************************************************************
Channel X data is:00000
Channel Y data is:04095
Channel X data is:00000
Channel Y data is:04095
Channel X data is:00000
Channel Y data is:04095
Channel X data is:00000
Channel Y data is:04095
Channel X data is:01788
Channel Y data is:02091
Channel X data is:01785
Channel Y data is:02116
```

3.4.23 SSP_Flash

- **Functional description**

  This example describes SSP peripheral reads AT25DV321A.

- **Procedures**

  After download program, press SW5 to reset board, there will be testprocess.

- **Phenomenon Indicates**

  Terminal information:

```
*************************************************************
System Start
The SystemCoreClock is 120 MHZ
The PeripheralClock is 60 MHZ
AT25DF321A Init
        -ManID: 0x1f
        -DevID: 0x47 0x01
        -ExtStrLen: 0x00
A simple ssp flash write& read example.
*************************************************************

Testing page num : 16384/16384
```

```
############## Test finish. Error bytes: 0 ##############
```

3.4.24 Systick_100msBase

- **Functional description**

  This example describes configure System Tick timer to generate interrupt each 100ms.

- **Procedures**

  AAfter download program, press SW5 to reset board. The program configures system tick to generate interrupt at each 100ms. Generating interrupt changesD9status each time.

- **Phenomenon Indicates**

  D9 flash is at 5Hz.

3.4.25Timer_MatchInterrupt

- **Functional description**

  This example describes Timer generates specific time in interrupt mode.

- **Procedures**

  After download program, press SW5 to reset board, terminal print information by second.

- **Phenomenon Indicates**

  Terminal information:

```
********************************************************************************
 Hello NXP Semiconductors
 Timer Match Interrupt demo
        - MCU: LPC177x_8x
        - Core: ARM CORTEX-M3
        - UART Communication: 115200 bps
 Use timer x toggle MATx.0 at frequency 1Hz
********************************************************************************
Match interrupt occur...
Match interrupt occur...
Match interrupt occur...
```

```
Match interrupt occur...
Match interrupt occur...
Match interrupt occur...
Match interrupt occur...
Match interrupt occur...
Match interrupt occur...
```

3.4.26 Wdt_Interrupt

- **Functional description**

  This example describes WDT generates timeout interrupt or alarm interrupt.

- **Procedures**

  After download program, press SW5 to reset board.Print options: select "1" display timeout interrupt. When WDT counter is reduced to 0, it will cause interrupt, D13 flashes. Choice "2" display warning interrupt. When WDT counter is close to 0, it will cause interrupt and D13 flashes.

- **Phenomenon Indicates**

  Terminal information:

  (1) Time out interrupt

```
*********************************************************************************
Hello NXP Semiconductors
 Watch dog timer interrupt (test or debug mode) demo
        - MCU: LPC177x_8x
        - Core: ARM CORTEX-M3
        - UART Communication: 115200 bps
 An interrupt will be generated once WWDT is timeout (depend on configuration)
or the counter is reached the Warning Value.
 After interrupt WDT interrupt is disabled immediately!
*********************************************************************************
BEFORE WDT interrupt!
Press '1' to enable Watchdog timer Interrupt by Timeout only...
Press '2' to enable Watchdog timer Interrupt by Warning ...
Pressed '1' - Working with Normal Timeout Interrupt
The Timer Value causes the Interrupt: 0x00000000
AFTER WDT interrupt
LED is blinking...
```

  (2) Alarm interrupt

```
******************************************************************************
Hello NXP Semiconductors
 Watch dog timer interrupt (test or debug mode) demo
        - MCU: LPC177x_8x
        - Core: ARM CORTEX-M3
        - UART Communication: 115200 bps
 An interrupt will be generated once WWDT is timeout (depend on configuration)
or the counter is reached the Warning Value.
 After interrupt WDT interrupt is disabled immediately!
******************************************************************************
BEFORE WDT interrupt!
Press '1' to enable Watchdog timer Interrupt by Timeout only...
Press '2' to enable Watchdog timer Interrupt by Warning ...
Pressed '2' - Working with Warning Interrupt
The Timer Value causes the Interrupt: 0x00000268
AFTER WDT interrupt
LED is blinking...
```

3.4.27 Wdt_Reset

- **Functional description**

  This example describes WDT generates a reset event.

- **Procedures**

  After download program, press SW5 to reset board. After start, WDT counter decrease until underflow to reset chip. After reset, program will print reset reason.

- **Phenomenon Indicates**

  Terminal information:

```
******************************************************************************
This Welcome Screen below will executive after reset event
Hello NXP Semiconductors
Watch dog timer reset when timeout demo
        - MCU: LPC177x_8x
        - Core: ARM CORTEX-M3
        - UART Communication: 115200 bps
Use WDT with Internal RC OSC, reset mode, timeout = 5 seconds
To reset MCU when time out. After reset, program will determine what cause of la
st reset time (external reset or WDT time-out)
The program is currently working in FLASH mode
******************************************************************************
```

```
Last MCU reset caused by External!
********************************************************************************
This Welcome Screen below will executive after reset event
Hello NXP Semiconductors
Watch dog timer reset when timeout demo
        - MCU: LPC177x_8x
        - Core: ARM CORTEX-M3
        - UART Communication: 115200 bps
Use WDT with Internal RC OSC, reset mode, timeout = 5 seconds
To reset MCU when time out. After reset, program will determine what cause of la
st reset time (external reset or WDT time-out)
The program is currently working in FLASH mode
********************************************************************************
Last MCU reset caused by WDT TimeOut!
```

3.4.28 Lcd_LQ043T3DX0A

- **Functional description**

  This example project describes LCD module displays a static picture.

- **Procedures**

  After download program, press SW5 to reset board, picture is displayed in LCD.

- **Phenomenon Indicates**

  After download program, there is picture on LCD.

3.4.29Lcd_touch

- **Functional description**

  This example project describes how to use Touch Screen and LCD。

- **Procedures**

  After download program, press SW5 to reset board, LCD screen display different colors. Displaydifferent color on LCD screen byclicking the color block.

- **Phenomenon Indicates**

  After download program, there is picture on LCD.

3.4.30 Mci_CidCard

- **Functional description**

  This example describes Multimedia Card Interface (MCI).

- **Procedures**

  After download program, press SW5 to reset board.Insert SD Card and read SD cardinformation and print information in the terminal.

- **Phenomenon Indicates**

  Terminal information:

```
********************************************************************************
Hello NXP Semiconductors
 MCI CID Card
        - MCU: LPC177x_8x
        - Core: ARM CORTEX-M3
        - UART Communication: 115200 bps
 This example is used to test the Multimedia Card Interface (MCI) function.
 It is able to check, show the CID that retrieved from the card
********************************************************************************
Currently the SD CARD is being used
        - Manufacture ID: 0x00000003
        - OEM/Application ID: 0x00005344
        - Product Name: 0x5355303247
        - Product Revision: 0x00000080
        - Product Serial Number: 0x17915B1F
        - Manufacturing Date: 0x000000C3
```

3.4.31 Usb_MassStorage

- **Functional description**

  This example describes USB Mass Storage application

- **Procedures**

  After download program, press SW5 to reset board.Connect board (J10) to PC by Mini USB. Load “LPC1788”memory automatically and open device, there will be a README.TXT file.

- **Phenomenon Indicates**

  Refer to figure 3-32:

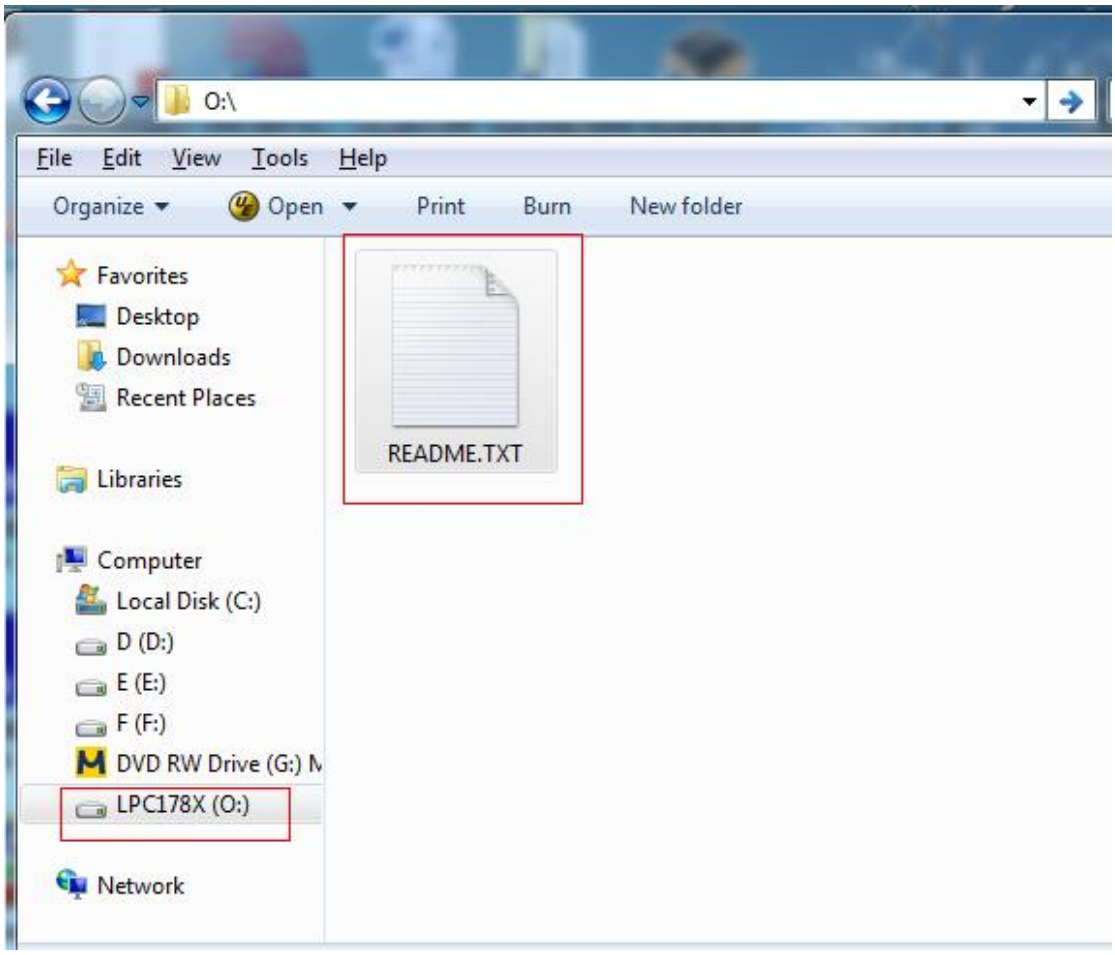


Figure 3-32

3.4.32 Usb_VirtualCom

- **Functional description**

  This example describes configure USB as virtual COM port.

- **Procedures**

  After download program and connect J10 to PC by Mini USB, press SW5 to reset board.

- **Phenomenon Indicates**

  After download program, press SW5 to reset board.There appears "new equipment" prompt. Select "install from a list or specified location andlocal project directory. After install driver, "LPC177x_8x USB VCom Port (COMx)" will appear. "X" in the "COMx" is not fixed and is changed with differentconfiguration. Refer to figure 3-33:

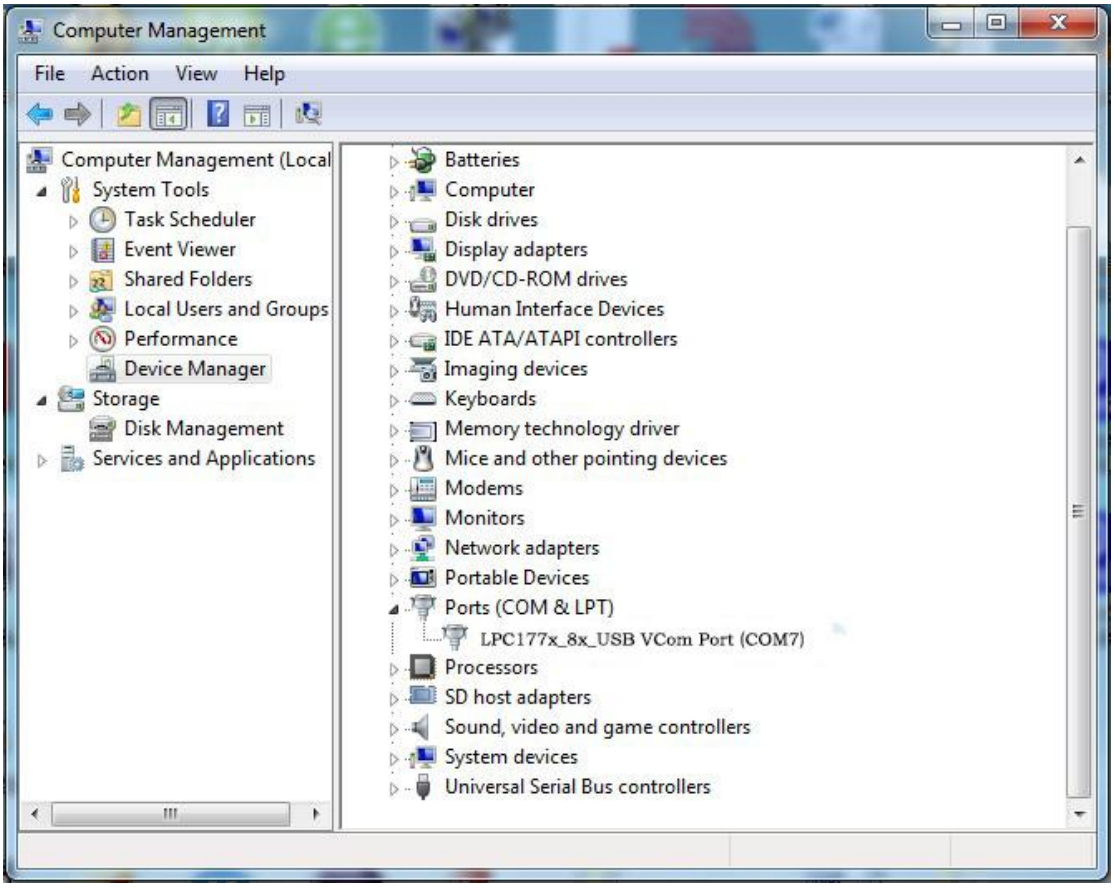


Figure 3-33

3.4.33 I2S_Audio

- **Functional description**

  This example describes I2S transfers audio data to play a short music.

- **Procedures**

  After download program, press SW5 to reset board, when insert microphoneto J5 interface, there will be sound.

- **Phenomenon Indicates**

  Terminal information:

```
********************************************************************************
Hello NXP Semiconductors
 USB MassStorage example:
        - MCU: LPC177x_8x
        - Core: ARM CORTEX-M3
        - Communicate via: UART2 - 115200 bps
```

```
******************************************************************************
Init UART2 for debug ...
UDA1380 Soft Reset OK!
Init UDA1380 registers step 1 OK!
Init UDA1380 registers step 2 OK!
Init UDA1380 registers step 3 OK!
Init UDA1380...
Init LPC_I2S...
Demo start...
```

3.4.34 I2C_Eeprom

- **Functional description**

  The program shows I2C writes and reads EEPROM.

- **Procedures**

  After download program, press SW5 to reset board. Program writes 8 bytes data and verify message. Debug information is outputted in terminal.

- **Phenomenon Indicates**

  Terminal information:

```
******************************************************************************
 Hello NXP Semiconductors
 I2C EEPROM Example:
        - MCU: LPC177x_8x
        - Core: ARM CORTEX-M3
        - UART Communication: 115200 bps
 A simple I2C EEPROM example.
 a page data will write to EEPROM and read out for verification.
******************************************************************************
Write EEPROM OK!
Read EEPROM OK!
i2c_rx_Buf[0] is 0
i2c_rx_Buf[1] is 1
i2c_rx_Buf[2] is 2
i2c_rx_Buf[3] is 3
i2c_rx_Buf[4] is 4
i2c_rx_Buf[5] is 5
i2c_rx_Buf[6] is 6
i2c_rx_Buf[7] is 7
I2C EEPROM Test Success!!
```

3.4.35 RS_485-Master&Slave

- **Functional description**

  This example describes RS485 communication.

- **Procedures**

  This test needs two MYD-LPC1788 boards. Firstly connect PIN1 to PIN2 in JP7, PIN7 to PIN8 in J8, then download programrespectivelyinto two development boards. After download program, press SW5 to reset board. Host sends data to slave A and B by turn. When the salve boardreturn ACK (slave address B) after receiving data from host, it shows communication is success.

- **Phenomenon Indicates**

  Terminal information:

  (1) Master mode:

```
Hello NXP Semiconductors
RS485 demo in Master mode
SlvAddr: 65
Dev A have NO reply
SlvAddr: 66
ACK
SlvAddr: 65
Dev A have NO reply
SlvAddr: 66
ACK
```

  (2) Slave mode:

```
Hello NXP Semiconductors
RS485 demo in Slave mode
Slave's Receiver is not always enabled - Auto Address Detection is enabled
Slave Addr detected!
Slave Addr detected!
Msg B: Hello NXP BBBBBB
Recv a Terminator and Send ACK back
Slave Addr detected!
Slave Addr detected!
Msg B: Hello NXP BBBBBB
Recv a Terminator and Send ACK back
Slave Addr detected!
```

```
Slave Addr detected!
Msg B: Hello NXP BBBBBB
Recv a Terminator and Send ACK back
```

Appendix 1sales FAQ and technical support

How to buy

We accept paypal payment and bank wire transfer

1.Paypal payment

Please select the products add into shopping cart, the checkout web page will redirect to paypal.com for you payment. Shipment fee will calculated automatically by your locationregion.

2.Bank wire transfer

Pls email or fax us with products list you want, we will send you a pro-invoice with order value total, shipping cost and bank information.

Shipping details

Please select the shipping area catalogue for you location. If you have carrier account to pay the shipment fee, please select “Freight collect” and email us the carrier account.

Please visit http://www.myirtech.com/support.asp for more details

Noted

1.The shipment will start in 3 biz days by Fedex Express, it usually take 7 days to reach regular cities or regions.

2.We will use DHL Express for West asia or middle east countries, it usually take 7 days to reach regular cities or regions.

3.The remote regions defined by Fedex/DHL may cause delay, 14 days in generally.

4.Some countries have strict import policy, we will help to make shipping invoice with you requirement, like invoice value, trade term, custom statements and H.S code etc. Please contact us with these shipment requirements if your country has strict custom affairs.

Support and maintains

MYIR provides 12 months warranty for hardware products if the defects or failures were notcaused by wrong use.

Return steps for defective products

1. Please email or call us get a Return Merchandise Authorization (RMA) by providing purchase details and reasons for return (defective, incorrect etc).
2. MYIR will make a shipping invoice (list value total, item description etc) for you return request. China have strict limit on return products, so please use MYIR’s shipping invoice to return items to avoid custom delay.

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