EVK407I User Manual

1. Overview

1.1. What's on board

[MCU]

1. **STM32F407IGT6**
   Core：Cortex-M4 32-bit RISC；
   Feature：a full set of single-cycle DSP instructions；
   Operating Frequency：168MHz，210 DMIPS/1.25 DMIPS/MHz；
   Operating Voltage：1.8V-3.6V；
   Package：LQFP176；
   Memories：1024kB Flash，192+4kB SRAM；
   MCU communication Interfaces：3 x SPI，4 x USART，2 x UART，2 x I2S，3 x I2C；1 x FSMC，

[Others]

8. **5Vin or USB power supply switch**
9. **BOOT Mode Selection**
   BOOT0 can be configured
   （BOOT1 can be changed mode by controlling the pins as it is seldom used）
10. **Power LED**
11. **USB FS LED**
12. **USB HS LED**
13. **Reset button**
14. **8M crystal oscillator**
    MCU clock enables the MCU run at higher

1 x SDIO, 2 x CAN；

1 x USB 2.0 FS/HS controller with dedicated DMA;

1 x USB HS ULPI;（for connecting outboard USB HS PHY）

1 x 10/100 Ethernet MAC；1 x 8 to 14-bit parallel camera interface；3 x AD（12-bit, 1μs, shares 24 channels），2 x DA（12-bit）；

Debugging/Programming: supports JTAG/SWD (serial wire debug) interfaces, supports IAP.

2. **MIC2075-2**
   onboard USB FS power management device.

3. **AMS1117-3.3**
   3.3V voltage regulator

4. **K9F1G08U0D**
   1G Bit NandFlash

5. **DP83848**
   Ethernet PHY。

6. **MIC2075-1**
   onboard USB HS power management device.

7. **USB3300**
   USB HS PHY

speed by frequency multiplication.

15. **24M crystal oscillator**
    USB3300 clock

16. **50M crystal oscillator**
    DP83848 clock

17. **32.768K crystal oscillator**
    for internal RTC with calibration

18. **Ethernet connector**

19. **USB FS mini connector**

20. **USB HS mini connector**

21. **USB HS type A connector**

22. **MCU pins expander**
    VCC, GND and all the idle I/O ports are accessible on expansion connectors for further expansion.

23. **USB OTG/HOST jumper**

24. **VREF/VBAT jumper**

25. **Ethernet I/O selection solder joint**

26. **USB HS I/O selection solder joint**

27. **PDR selection solder joint**
    1.8-3.6V, -40～105℃ OR 1.7-3.6V, 0～70℃
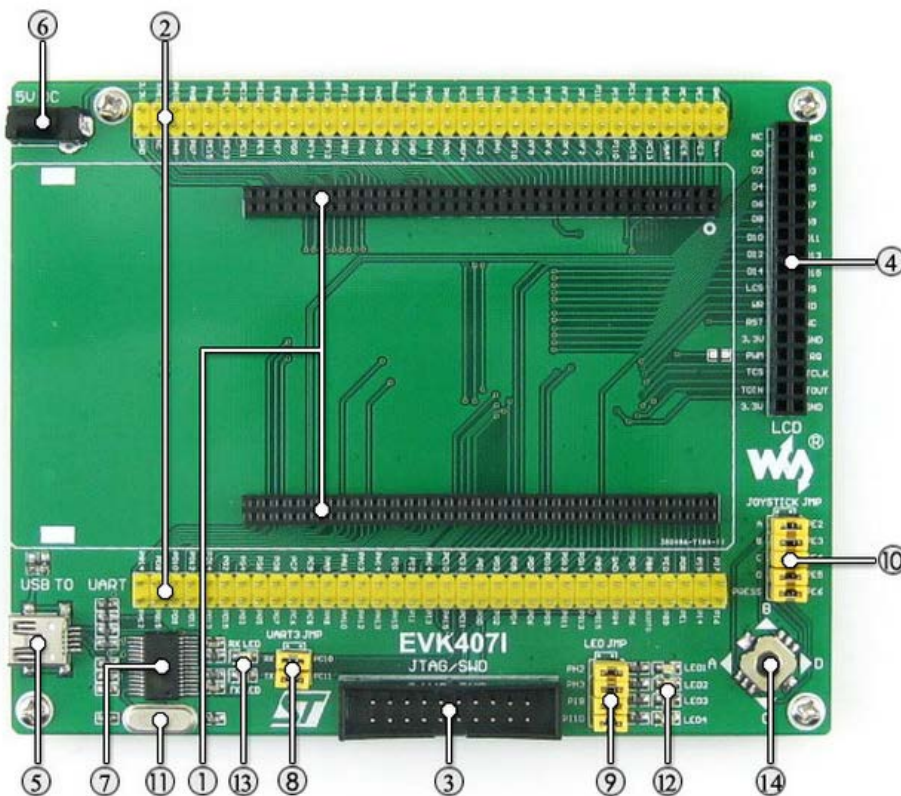
[Connector]

1. **MCU core board connector**

   for easily connecting core boards

2. **XCore407I MCU pins expander**
   convenient for testing
3. **JTAG/SWD interface**
   for debugging/programming
4. **LCD interface**
   for connecting touch screen LCD
5. **USB connector**
   USB TO UART
6. **5V DC jack**

[MCU]

7. **PL2303TA**
   onboard USB TO UART controller

[Jumper]

8. **PL2303 jumper**
9. **User LED jumper**
10. **Joystick jumper**
    short the jumper to connect the joystick to
    default I/Os used in example code;

    short the jumper to connect the joystick to
    default I/Os used in example code

[Component]

11. **12M crystal oscillator**
    PL2303 clock
12. **User LED**
    convenient for indicating I/O status and/or
    program running state.
13. **UART LED**
    UART TX/RX indicator.
14. **Joystick**
    five positions.

2. Demos

➢ KEIL MDK version: 4.7

➢ Debugger/programmer:**Ulink2**

➢ Programming Interface: SWD

➢ Connect PC to USB TO UART connector via USB cable

➢ Serial port settings:

Select a proper COM port	
Baud rate	115200
Data bits	8
Stop bits	1
Parity bits	None
Flow control	None

2.1.　GPIO_Key

2.1.1 Overview

　　LED, push button, joystick demo

2.1.2 Hardware connection

　　Short LED JMP、JOYSTICK JMP.

2.1.3 Operation and result

　　Push the button or joystick, the LED status should keep changing accordingly.

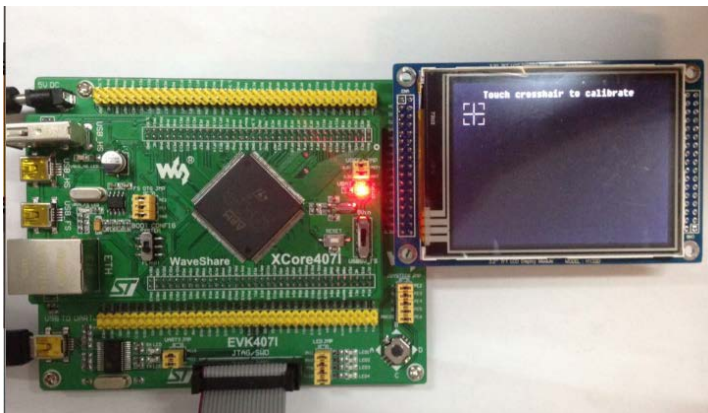## 2.2.　LCD

2.2.1 Overview

　　LCD demo

2.2.2 Hardware connection

➢ Connect the 3.2inch 320x240 Touch LCD (A) board to the board

2.2.3 Operation result

➢ Info/messages displayed on the LCD.

2.3. NandFlash_SCB0

2.3.1 Overview

NandFlash demo

2.3.2 Hardware connection

2.3.3 Operation result

➢ The following information will be printed on the serial debugging assistant:

2.4. RTC

2.4.1 Overview

RTC demo

2.4.2 Hardware connection

2.4.3 Operation and result

Info/messages will be printed on the serial debugging assistant

```
*********************** RTC Time Stamp Example ***********************
==============Time Settings==============================

 Please Set Hours:  10
 Please Set Minutes:  15
 Please Set Seconds:  10
>> !! RTC Set Time success. !! <<


============== Current Time Display ===========================

 The current time (Hour-Minute-Second) is :  10:15:10
==============Date Settings==============================

 Please Set WeekDay (01-07)|
```

2.5.   TouchPanel

2.5.1 Overview
    LCD touch screen demo
2.5.2 Hardware connection

➢ Connect the 3.2inch 320x240 Touch LCD (A) board to the on board LCD connector

2.5.3 Operation and result
    ➢ It allows to draw any lines on the LCD.

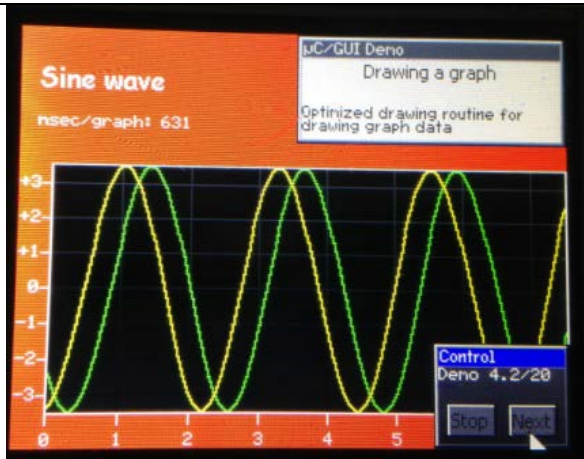# 2.6.   uCOSII2.91+UCGUI3.90A

2.6.1 Overview
    UcosII+GUI demo
2.6.2 Hardware connection
    Connect the 3.2inch 320x240 Touch LCD (A) to the board.
2.6.3 Operation and result
    ➢ Info/messages displayed on the LCD.

2.7. USARTx_pritf

2.7.1 Overview

USART serial port demo

2.7.2 Hardware connection

2.7.3 Operation and result

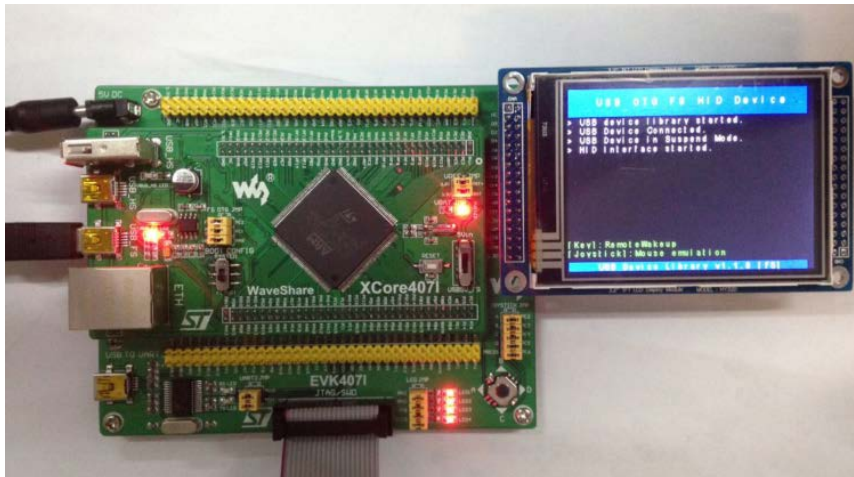Info/messages will be printed on the serial debugging assistant.

2.8. USB FS

2.8.1. USB FS Examples（USB_Device_Examples-HID）

◆ Overview

USB Device HID example
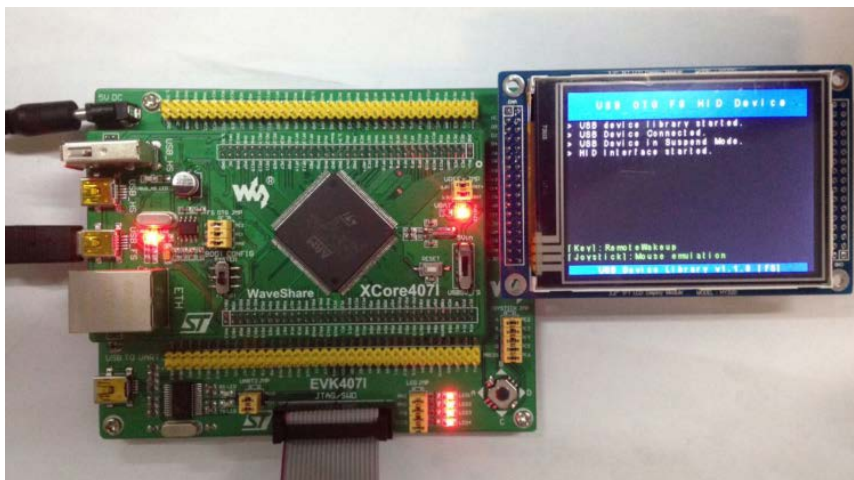
◆ Hardware connection

> ➢ Connect the onboard FS USB interface and PC USB port through a USB cable
> ➢ Connect the 3.2inch 320x240 Touch LCD (A) to the board.

2.8.2. Operation and result

The USB device will be appeared on the computer device manager; control the computer cursor by joystick

2.8.3. USB FS Examples（USB_Device_Examples-VCP）

◆ Overview

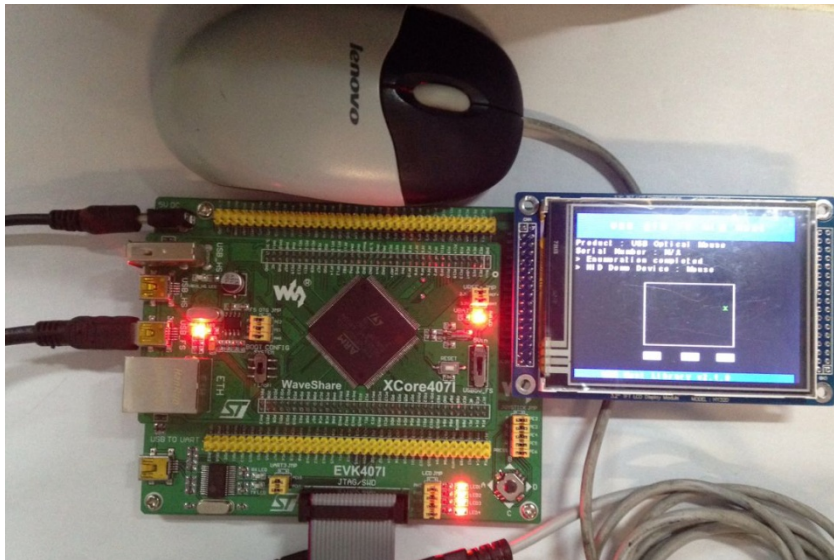USB Device VCP (Virtual Com Port) example

◆ Hardware connection

> ➢ Connect the onboard FS USB interface and PC USB port through a USB cable
> ➢ Connect 3.2inch 320x240 Touch LCD (A) to the board.

2.8.4. Operation and result

STMicroelectronics Virtual COM Port (COM3) appear on the computer device manager.

2.8.5. USB FS Examples（USB_Host_Examples-HID）

◆ Overview

USB Host HID example

◆ Hardware connection

> ➤ Connect a USB mouse to the onboard FS USB interface through a USB OTG cable
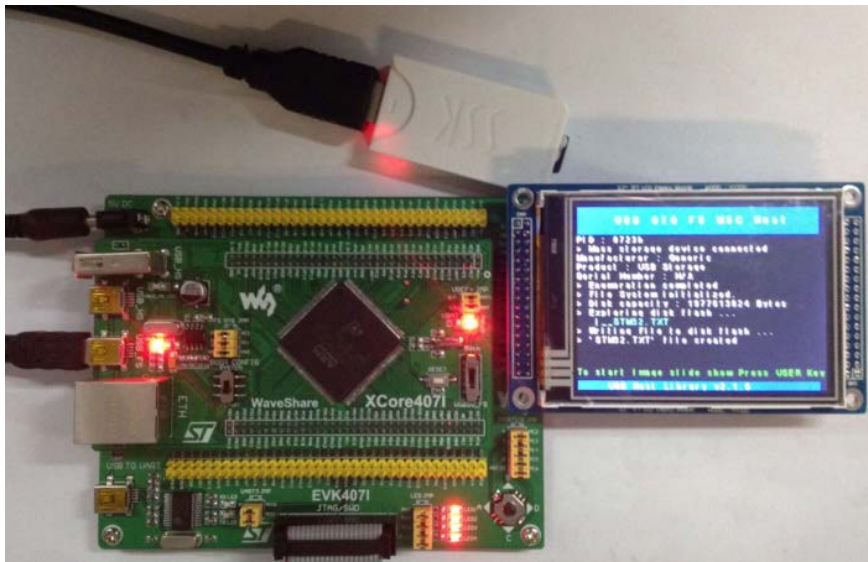> ➤ Connect the 3.2inch 320x240 Touch LCD (A) to the board

◆ Operation and result

The green dot on the LCD will move following the mouse.

2.8.6.　USB FS Examples（USB_Host_Examples-MSC）

◆ Overview

USB Host MSC example

◆ Hardware connection

> ➤ Connect a USB mouse to the onboard FS USB interface through a USB OTG cable
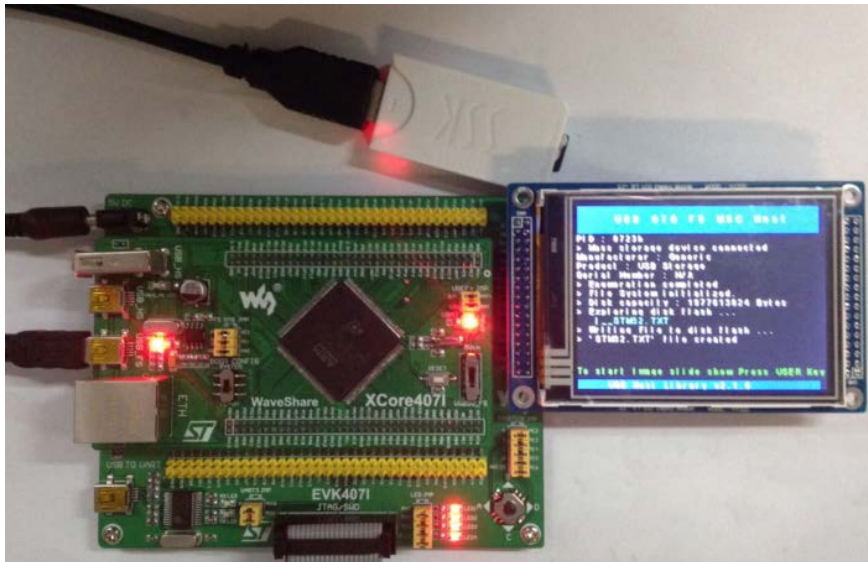> ➤ Connect the 3.2inch 320x240 Touch LCD (A) to the board.

◆ Operation and result

The LCD will display the file list in the USB flash drive

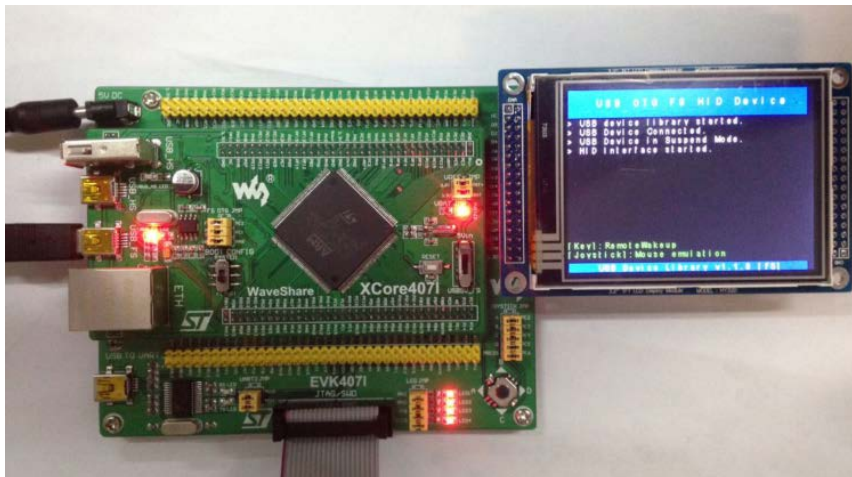2.8.7.　USB FS Examples（USB_Host_Device_Examples-DRD）

◆ Overview

USB_Host_Device_Examples

　◆ Host mode

> ➢ Open FS OTG JMP
> ➢ Connect a USB Flash drive to the onboard USB-FS interface.
> ➢ Connect the 3.2inch 320x240 Touch LCD (A) to the board.

◆ Operation and result
   The LCD will display the file list in the USB flash drive
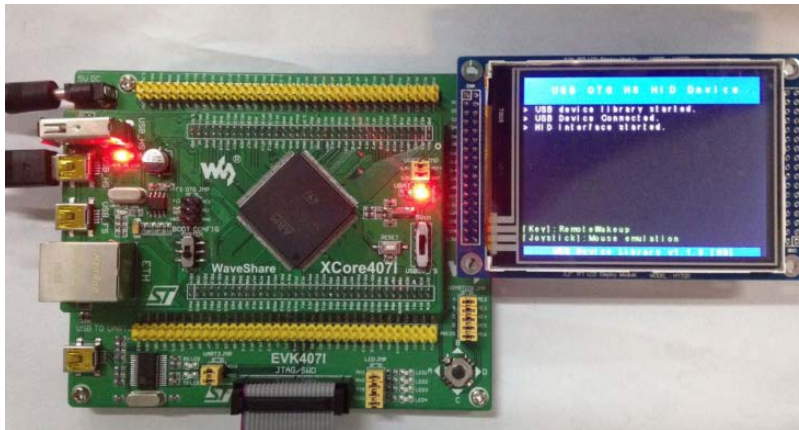◆ Device Mode
◆ Hardware connection

> ➢ Open FS OTG JMP
> ➢ Connect the onboard USB-FS interface and the PC USB port via a USB cable.
> ➢ Connect the 3.2inch 320x240 Touch LCD (A) to the board.

◆ Operation and result

"USB Mass storage device" will appeared on the computer device manager.

Connect the Micro SD Storage Board to pinheaders below (insert the SD card):

D0:PC8,CMD:PD2,CLK:PC12,D3:PC11,D2:PC10,D1:PC9,CD:PG8. The USB flash disk can be opened in "My computer".

2.9. USB HS

2.9.1. USB HS Examples（USB_Device_Examples-HID）

◆ Overview
   USB Device HID (Joystick) example
◆ Hardware connection

> ➤ Open FS OTG JMP
> ➤ Connect the onboard USB_HS interface and the PC USB port through an USB wire.
> ➤ Connect the 3.2inch 320x240 Touch LCD (A) to the board.
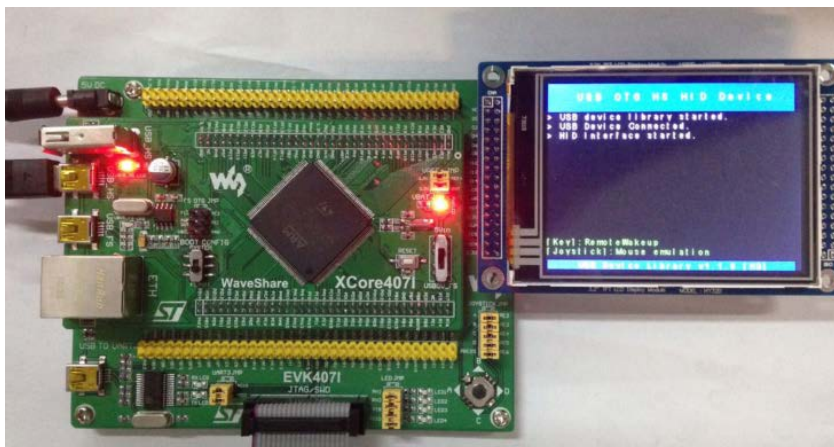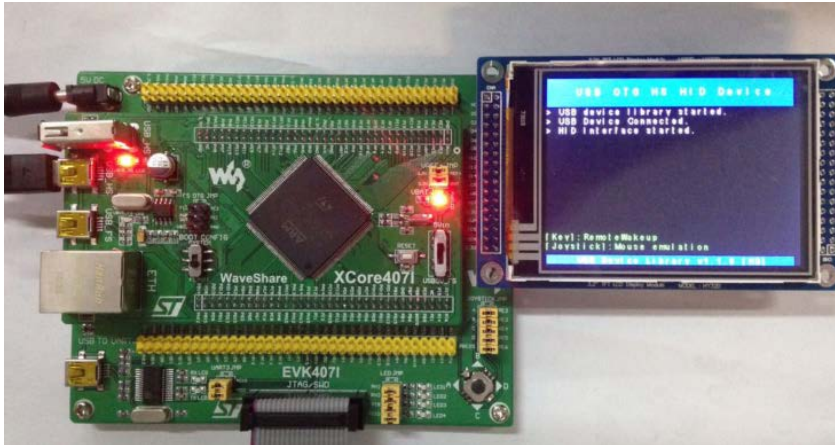
◆ Operation and result

The USB device will appear on the computer device manager; Control the computer cursor by joystick.

2.9.2. USB HS Examples（USB_Device_Examples-VCP）

◆ Overview

USB Device VCP (Virtual Com Port) example

◆ Hardware connection

> ➤ Open FS OTG JMP;
> ➤ Connect the onboard USB_HS interface and the PC USB port through an USB wire.
> ➤ Connect the 3.2inch 320x240 Touch LCD (A) to the board.

◆ Operation and result

STMicroelectronics Virtual COM Port (COM3)   Appear on the computer device manager.

2.9.3. USB HS Examples（USB_Device_Examples- DualCore）

◆ Overview

USB Device Dual Core example

◆ HS USB MSC hardware connection

➢ Connect the onboard USB_HS interface and the PC USB port through an USB wire.
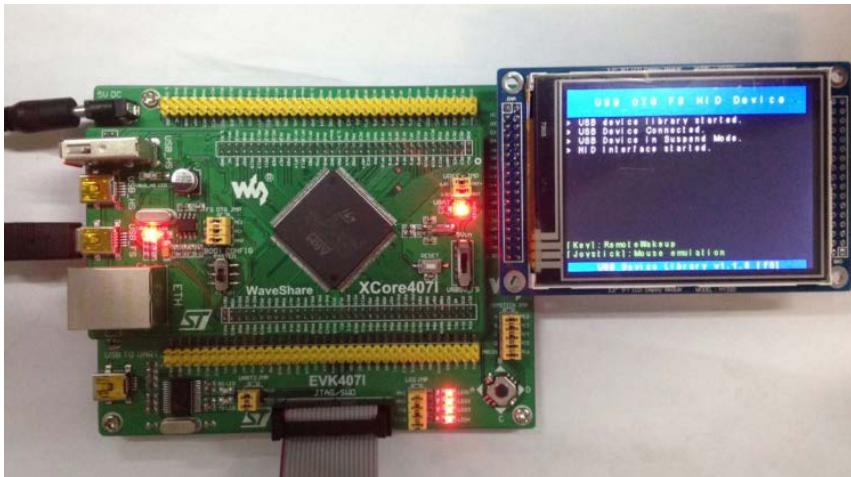➢ Connect the 3.2inch 320x240 Touch LCD (A) to the board.
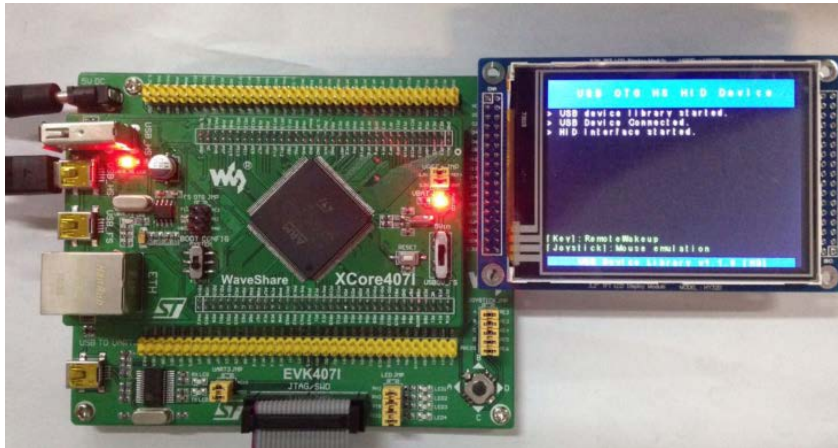
◆ Operation and result

"USB Mass storage device" will appeared on the computer mouse manager.

Connect the Micro SD Storage Board to pin headers below (insert the SD card):

D0:PC8,CMD:PD2,CLK:PC12,D3:PC11,D2:PC10,D1:PC9,CD:PG8. The USB flash disk can be opened in "My computer".

◆ FS USB HID hardware connection

➢ Short FS OTG JMP
➢ Connect the onboard USB_HS interface and the PC USB port through an USB wire.
➢ Connect the 3.2inch 320x240 Touch LCD (A) to the board.

◆ Operation and result

The USB device will appear on the computer device manager; Control the computer cursor by joystick.

2.9.4. USB HS Examples（USB_Host_Examples-HID）
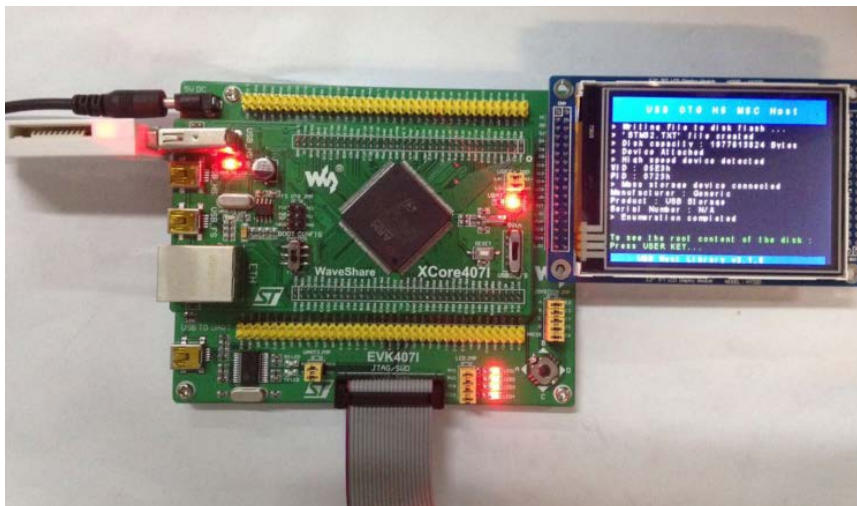
◆ Overview
USB Host HID example
◆ Hardware connection

> Open FS OTG JMP
> Connect a USB mouse to the onboard FS USB interface through a USB OTG cable
> Connect the 3.2inch 320x240 Touch LCD (A) to the board.

◆ Operation and result
The green dot on the LCD will move following the mouse.

2.9.5. USB HS Examples（USB_Host_Examples-MSC）
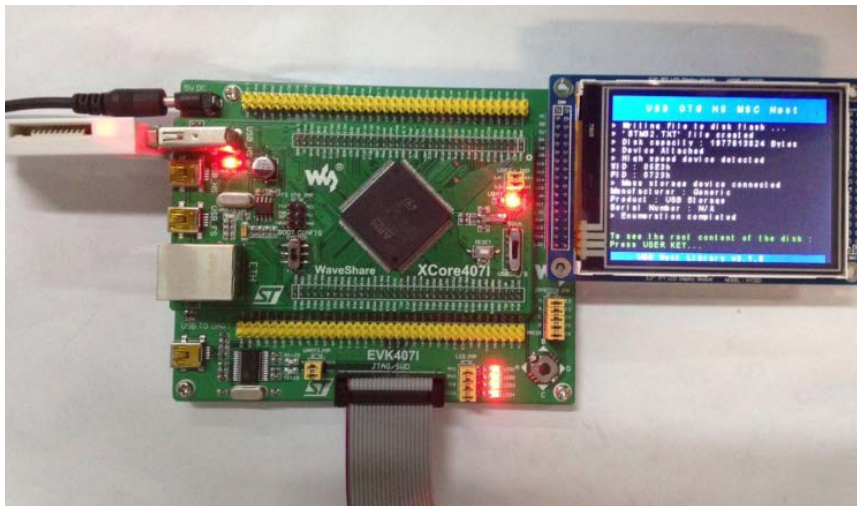
◆ Overview
USB Host MSC example
◆ Hardware connection

> Open FS OTG JMP
> Connect a USB flash drive to the onboard USB_HS interface.
> Connect the 3.2inch 320x240 Touch LCD (A) to the board.

◆ Operation and result
The LCD will display the file list in the USB flash drive

2.9.6. USB HS Examples（USB_Host_Device_Examples-DRD）

◆ Overview
USB_Host_Device_Examples
  ◆ Host Mode

- ➢ Open FS OTG JMP
- ➢ Connect a USB flash drive to the onboard USB_HS interface.
- ➢ Connect the 3.2inch 320x240 Touch LCD (A) to the board.

◆ Operation and result
The LCD will display the file list in the USB flash drive
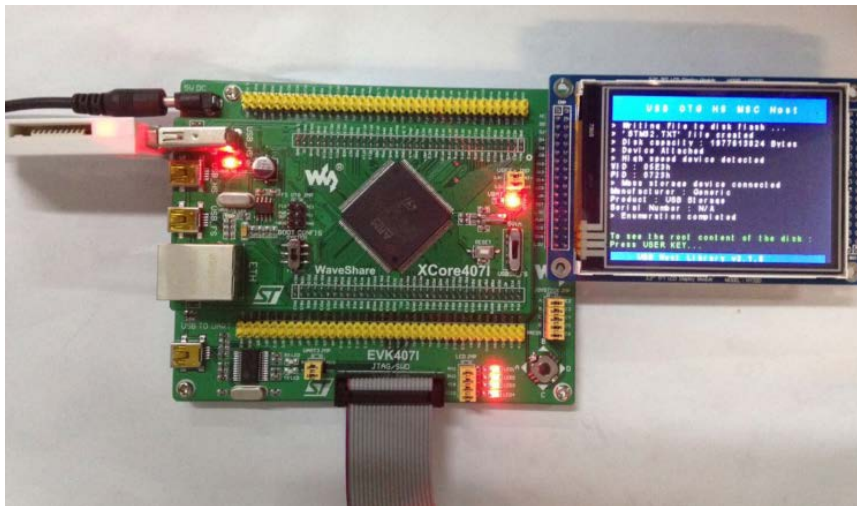
◆ Device Mode
◆ Hardware connection

- ➢ Open FS OTG JMP
- ➢ Connect the onboard USB_HS interface and the PC USB port through an USB wire.
- ➢ Connect the 3.2inch 320x240 Touch LCD (A) to the board.

◆ Operation and result
"USB Mass storage device" will appeared on the computer mouse manager.
Connect the Micro SD Storage Board to pinheaders below (insert the SD card):
D0:PC8,CMD:PD2,CLK:PC12,D3:PC11,D2:PC10,D1:PC9,CD:PG8. The USB flash disk can be opened in "My computer".

2.9.7. USB HS Examples（USB_Host_Examples-DualCore）

◆ Overview
USB Host Dual Core example
◆ Hardware connection

➢ Open FS OTG JMP
➢ Connect a USB flash drive to the onboard USB_HS interface.
➢ Connect the 3.2inch 320x240 Touch LCD (A) to the board.

◆ Operation and result
The LCD will display the file list in the USB flash drive
◆ Hardware connection

➢ Connect a USB mouse to the onboard FS USB interface through a USB OTG cable
➢ Connect the 3.2inch 320x240 Touch LCD (A) to the board.

◆ Operation and result
The green dot on the LCD will move following the mouse.

2.10. ETH Examples

◆ Overview
Ethernet demo
◆ Hardware connection

> ➢ Connect the PC to the onboard ETH connector via an Ethernet wire.

◆ PC IP configuration

Configuring IP of both the PC and the module on the same network：

Right click the 【Internet】-》【Attribute】-》Click【Local connection】-》Click【Attribute】-》Find Internet Protocol Version4（TCP/IP V4, the following dialog box will pop up, set the appropriate IP address, subnet mask, and default gateway：

IP addresses :   192.168.1.11
Subnet Mask: 255.255.255.0
Default Gateway: 192.168.1.1

◆ Operation and result

2.10.1. Http server

Download the program path：
ETH\STM32F4x7_ETH_LwIP_V1.0.0\Project\Standalone\httpserver\MDK-ARM
Operation and result：

Control the onboard LED by clicking "LED control".

2.10.2. tcp_echo_client

Download the program path：
ETH\STM32F4x7_ETH_LwIP_V1.0.0\Project\Standalone\tcp_echo_client\MDK-ARM
Enter "C:\>echotool /p tcp /s" on command prompt window（cmd.exe）, the PC will answer when press the "PRESS" key on the board.

2.10.3. tcp_echo_server

Download the program path：

ETH\STM32F4x7_ETH_LwIP_V1.0.0\Project\Standalone\tcp_echo_server\MDK-ARM

Enter "C:\>echotool IP_address /p udp /r 7 /l 7 /n 15 /t 2 /d Testing LwIP UDP echo server" on command prompt window（cmd.exe）, press "enter", the PC will answer(IP_address 192.168.1.10)

2.10.4. udp_echo_client

Download the program path ： ETH\STM32F4x7_ETH_LwIP_V1.0.0\Project\Standalone\ udp_echo_client\MDK-ARM

Input "C:\>echotool /p udp /s" on command prompt window（cmd.exe）, press the USER KEY on the board, the PC will answer.

2.10.5. udp_echo_server

Download the program path： ETH\STM32F4x7_ETH_LwIP_V1.0.0\Project\Standalone\udp_echo_server\MDK-ARM

Input "C:\>echotool IP_address /p udp /r 7 /l 7 /n 15 /t 2 /d Testing LwIP UDP echo server" on command prompt window（cmd.exe）, then press "Enter", PC will have answer(IP_address: 192.168.1.10)

2.10.6. httpserver_netconn

Download the program path：
ETH\STM32F4x7_ETH_LwIP_V1.0.0\Project\FreeRTOS\httpserver_netconn\MDK-ARM
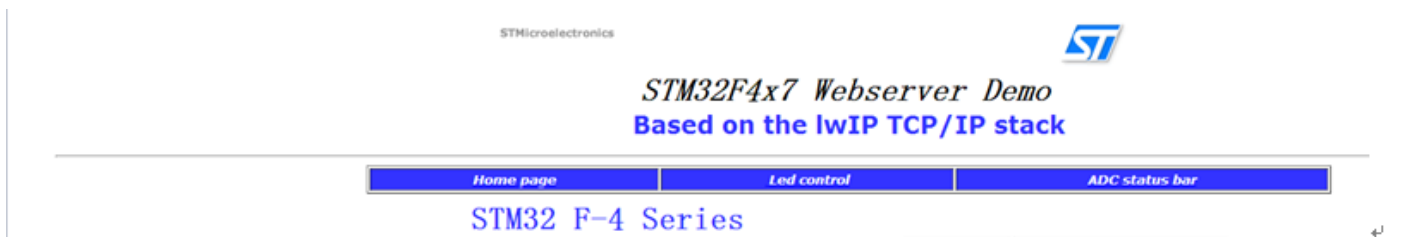Input 192.168.1.10 on the internet explorer

2.10.7. http server_socket

Download the program path ： ETH\STM32F4x7_ETH_LwIP_V1.0.0\Project\FreeRTOS\httpserver_socket\MDK-ARM

Input 192.168.1.10 on the internet explorer

2.10.8. udptcp_echo_server_netconn

Download the program path:
ETH\STM32F4x7_ETH_LwIP_V1.0.0\Project\FreeRTOS\udptcp_echo_server_netconn\MDK-ARM

Input 192.168.1.10 on the internet explorer

3. Revision history

Version	Description	Date	Author
V1.0	Initial revision	2014/05/17	Waveshare team