GigaDevice Semiconductor Inc.

GD32VF103R-START
User Guide
V1.0

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1. Summary

GD32VF103R-START uses GD32VF103RBT6 as the main controller. It uses Mini USB interface to supply 5V power. Reset, Boot, Wakeup key, LED, GD-Link and Ardunio are also included.

2. Function Pin Assign

Table 2-1 Function pin assignment

Function	Pin	Description
LED	PA7	LED1
	PA8	LED2
	PA10	LED3
	PC13	LED4
RESET		K1-Reset
KEY	PA0	K2-User key
USB	PA11	USB_DM
	PA12	USB_DP
	PA9	USB_VBUS

3. Getting started

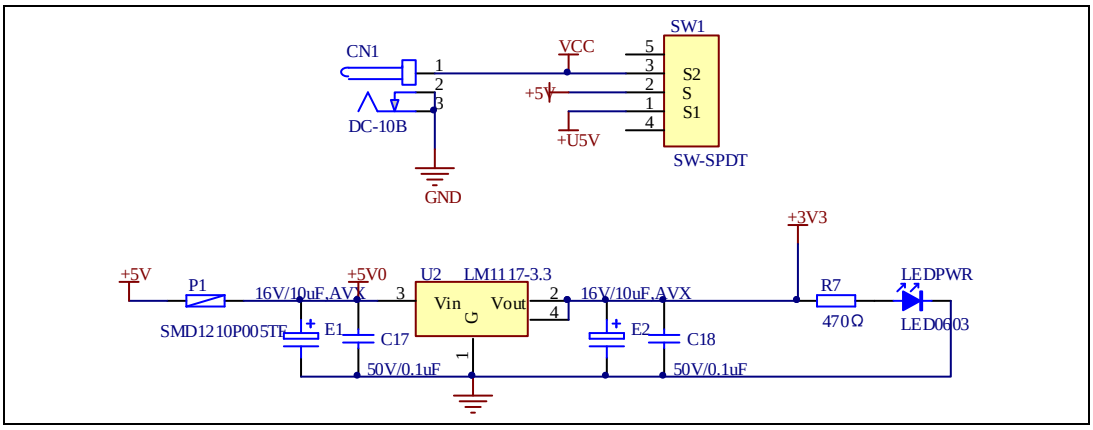
The EVAL board uses Mini USB connecter to get power DC +5V, which is the hardware system normal work voltage. A GD-Link on board is necessary in order to download and debug programs. Select the correct boot mode and then power on, the LEDPWR will turn on, which indicates that the power supply is OK.

The projects are created based on eclipse 4.7.2. Note that to configure the “Debug Configurations” before debug and download.

4. Hardware layout overview

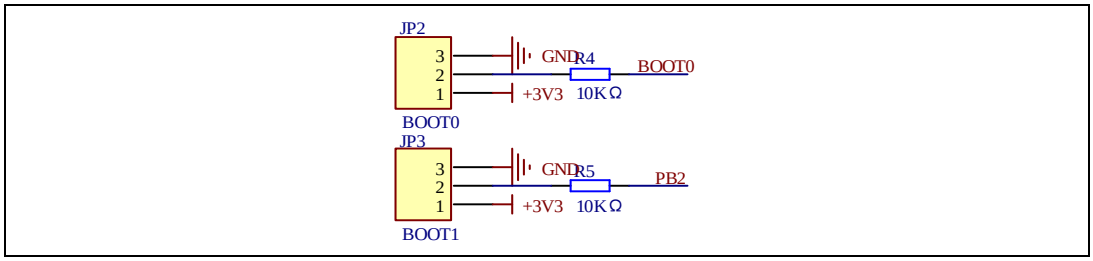
4.1. Power supply

Figure 4-1 Schematic diagram of power supply



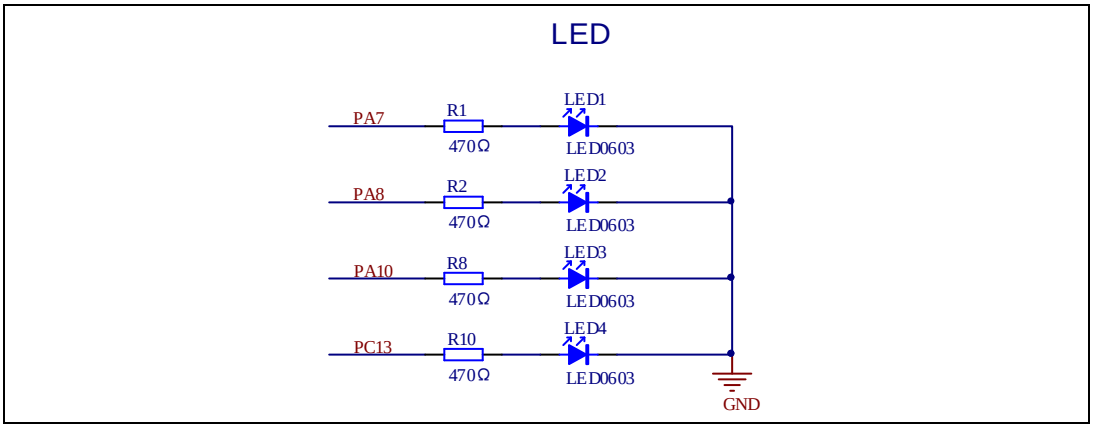
4.2. Boot option

Figure 4-2 Schematic diagram of boot option



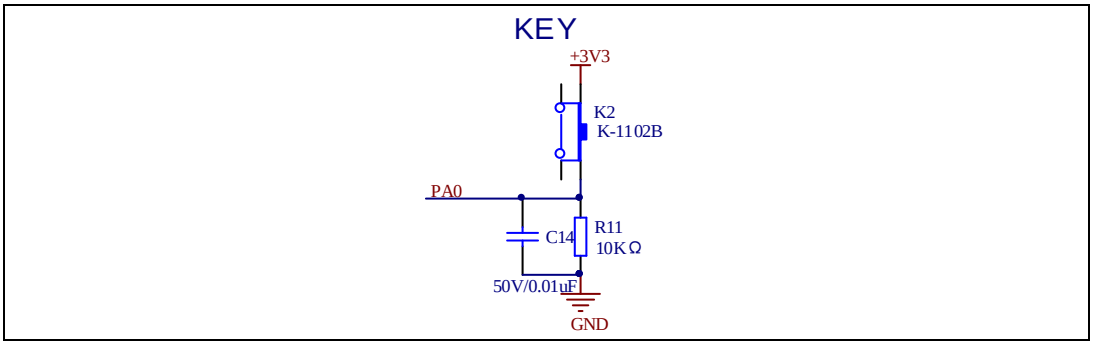
4.3. LED

Figure 4-3 Schematic diagram of LED function



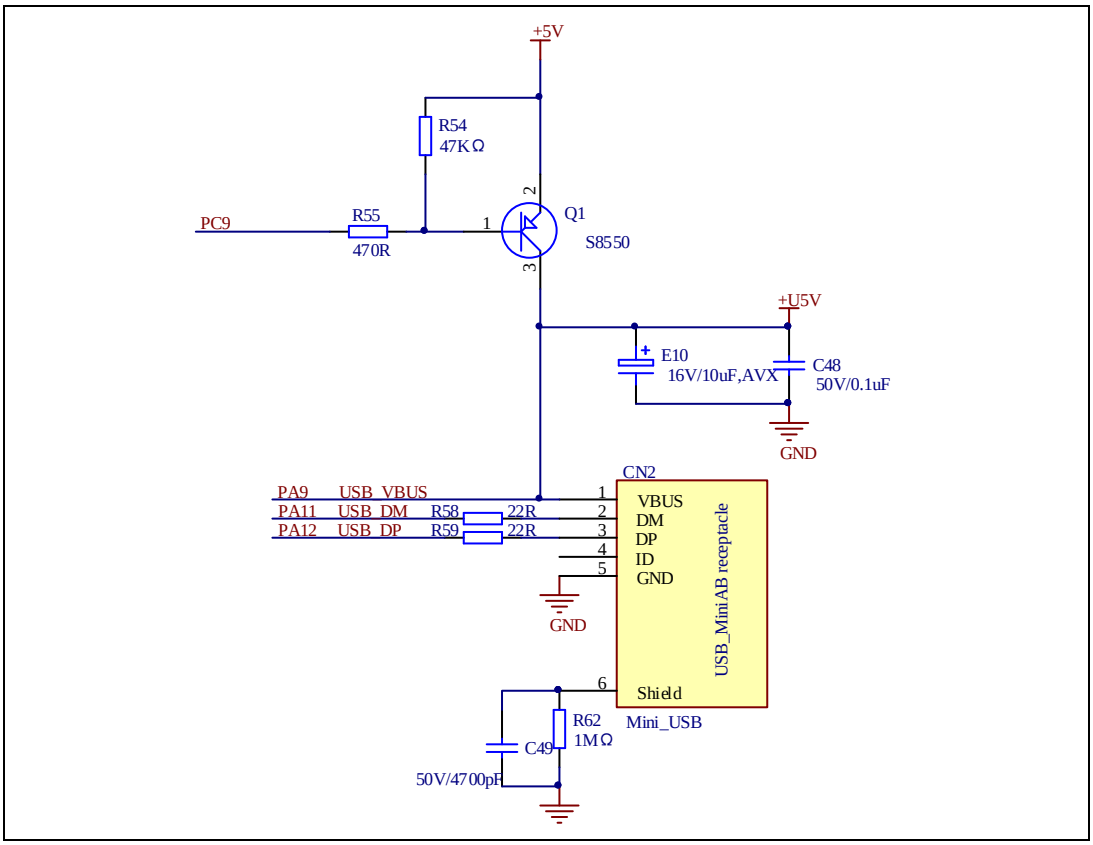
4.4. KEY

Figure 4-4 Schematic diagram of Key function



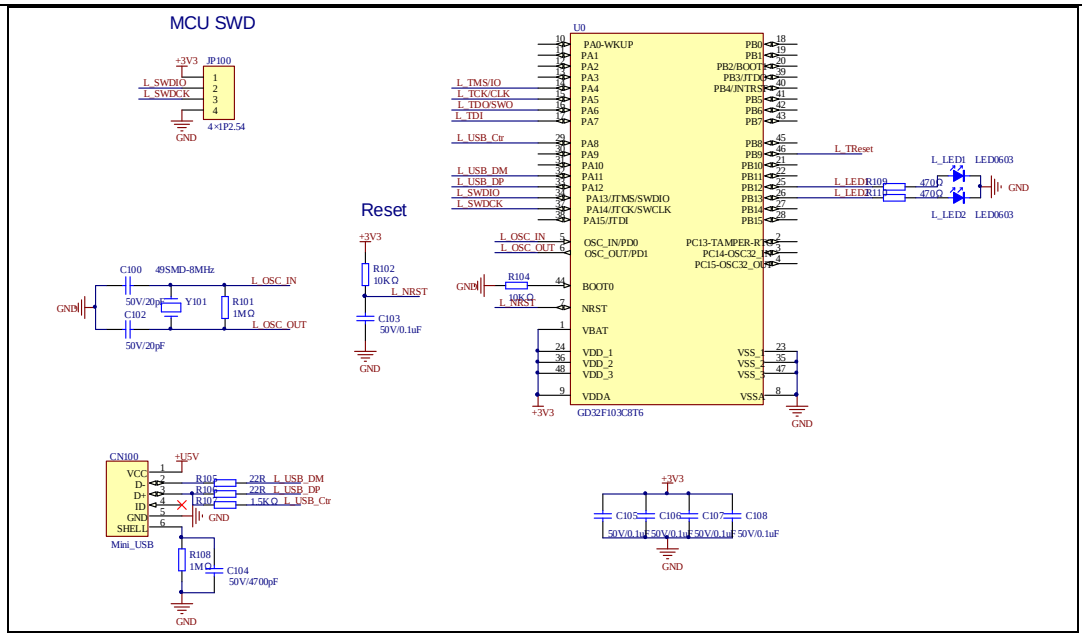
4.5. USBFS

Figure 4-5 Schematic diagram of USBFS



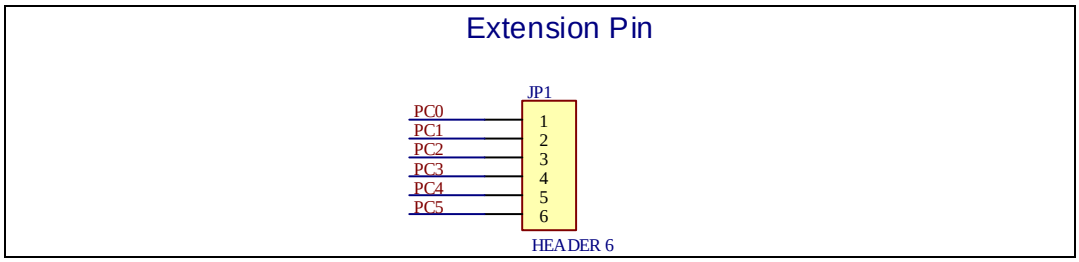
4.6. GD-Link

Figure 4-6 Schematic diagram of GD-Link



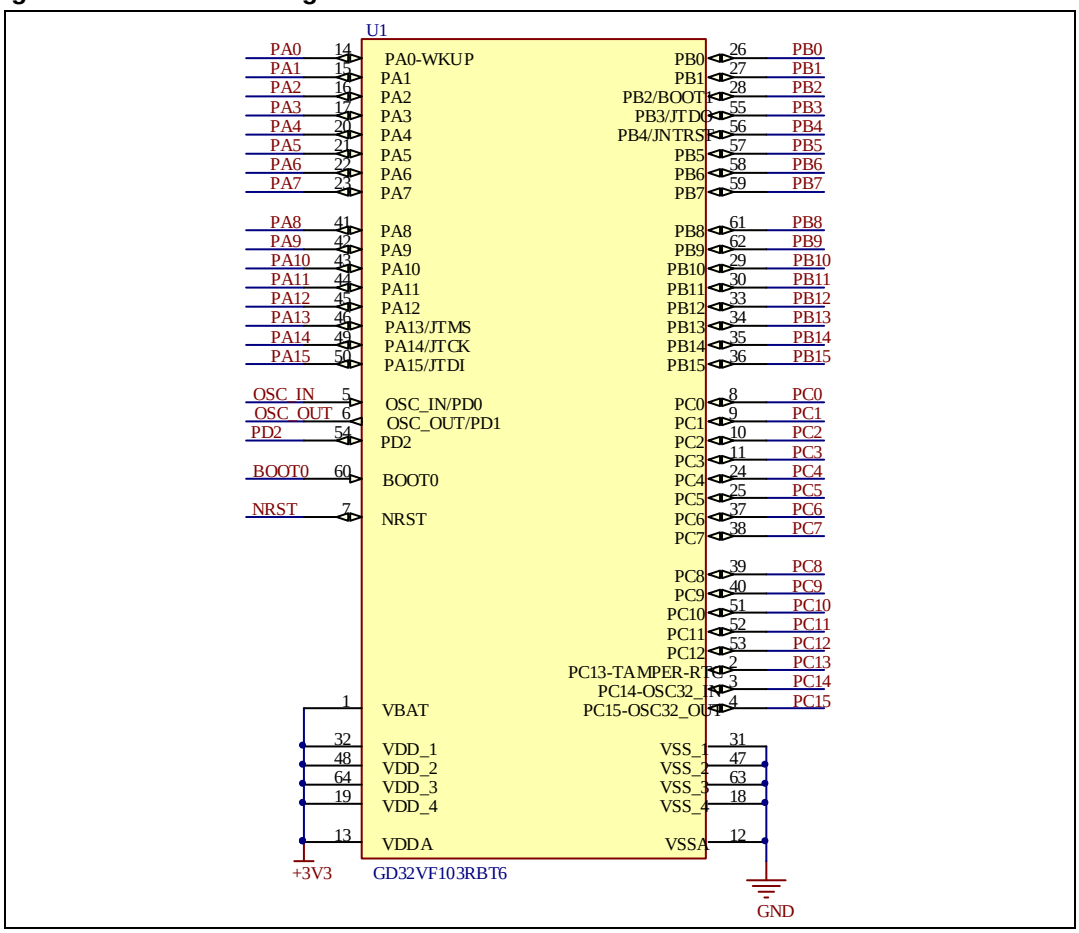
4.7. Extension

Figure 4-7 Schematic diagram of Extension Pin



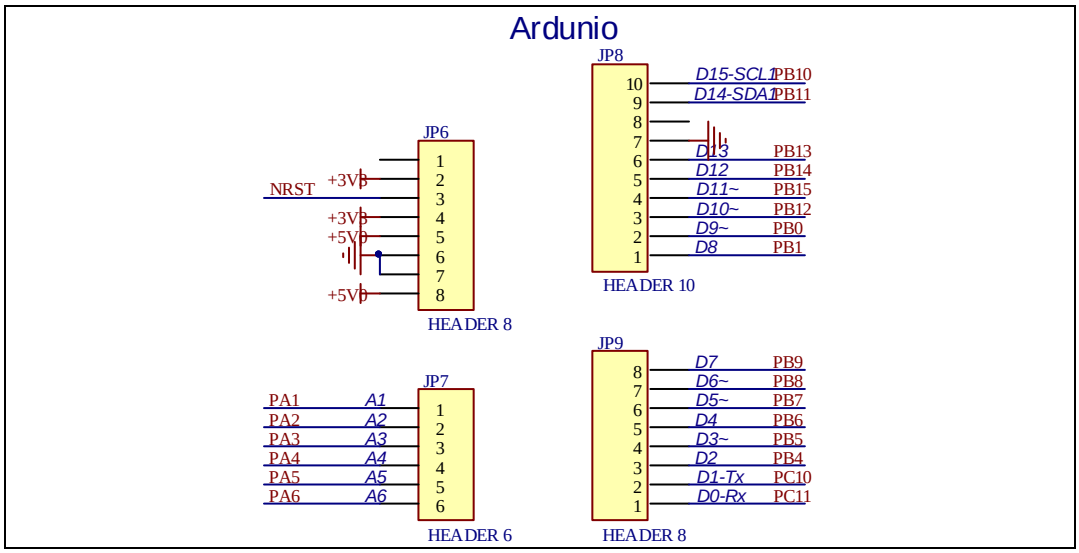
4.8. MCU

Figure 4-8 Schematic diagram of MCU



4.9. Ardunio

Figure 4-9 Schematic diagram of Ardunio



5. Routine use guide

5.1. GPIO_Running_LED

5.1.1. DEMO purpose

This demo includes the following functions of GD32 MCU:

- Learn to use GPIO control the LED
- Learn to use SysTick to generate 1ms delay

GD32VF103R-START board has four LEDs. The LED1, LED2, LED3 and LED4 are controlled by GPIO. This demo will show how to light the LEDs.

5.1.2. DEMO running result

Download the program < 01_GPIO_Running_LED > to the EVAL board, LED1, LED2, LED3 and LED4 will turn on and off in sequence with interval of 1000ms, repeat the process.

5.2. GPIO_Key_Polling_mode

5.2.1. DEMO purpose

This demo includes the following functions of GD32 MCU:

- Learn to use GPIO control the LED and the KEY
- Learn to use SysTick to generate 1ms delay

GD32VF103R-START board has two keys and four LEDs. The two keys are Reset key and User key. The LED1, LED2, LED3 and LED4 are controlled by GPIO.

This demo will show how to use the User key to control the LED1. When press down the User Key, it will check the input value of the IO port. If the value is 1 and will wait for 50ms. Check the input value of the IO port again. If the value still is 1, it indicates that the button is pressed successfully and toggle LED1.

5.2.2. DEMO running result

Download the program < 02_GPIO_Key_Polling_mode > to the EVAL board, all the LEDs are flashed once for test, press down the User Key, LED1 will be turned on. Press down the User Key again, LED1 will be turned off.

5.3. GPIO_Key_Interrupt_mode

5.3.1. DEMO purpose

This demo includes the following functions of GD32 MCU:

- Learn to use GPIO control the LED and the KEY
- Learn to use EXTI to generate external interrupt

GD32VF103R-START board has two keys and four LEDs. The two keys are Reset key and User key. The LED1, LED2, LED3 and LED4 are controlled by GPIO.

This demo will show how to use the EXTI interrupt line to control the LED1.When press down the User Key, it will produce an interrupt. In the interrupt service function, the demo will toggle LED1.

5.3.2. DEMO running result

Download the program < 03_EXTI_Key_Interrupt_mode > to the EVAL board, all the LEDs are flashed once for test, press down the User Key, LED1 will be turned on. Press down the User Key again, LED1 will be turned off.

5.4. TIMER_Key_EXTI

5.4.1. DEMO purpose

This demo includes the following functions of GD32 MCU:

- Learn to use GPIO control the LED and the KEY
- Learn to use EXTI to generate external interrupt
- Learn to use TIMER to generate PWM

GD32VF103R-START board has two keys and four LEDs. The two keys are Reset key and User key. The LED1, LED2, LED3 and LED4 are controlled by GPIO.

This demo will show how to use the TIMER PWM to trigger EXTI interrupt to toggle the state of LED2 and EXTI interrupt line to control the LED1. When press down the User Key, it will produce an interrupt. In the interrupt service function, the demo will toggle LED1.

5.4.2. DEMO running result

Download the program < 04_TIMER_Key_EXTI > to the START board, LED1 and LED2 are flashed once for test, press down the User Key, LED1 will be turned on. Press down the User Key again, LED1 will be turned off. Connect PA6 (TIMER2_CH0) and PB11 with DuPont line. The LED2 will be toggled every 500ms.

5.5. USBFS_Device

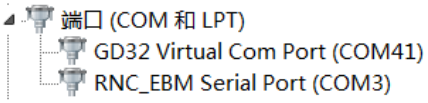
5.5.1. CDC_ACM

DEMO purpose

This demo includes the following functions of GD32 MCU:

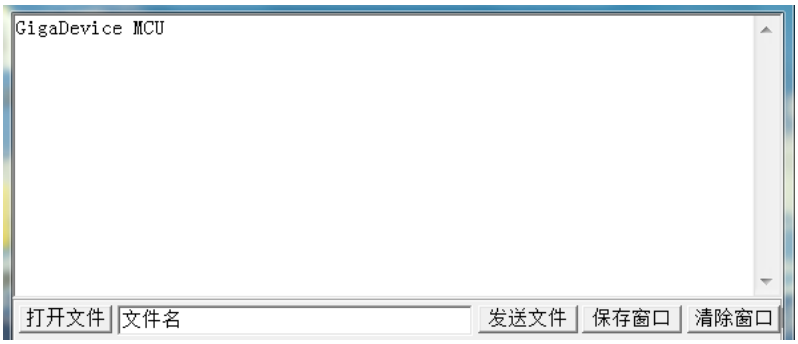
- Learn how to use the USBFS peripheral
- Learn how to implement USB CDC device

START board has one USBFS interface. In this demo, the START board is enumerated as an USB virtual COM port, which was shown in device manager of PC as below. This demo makes the USB device look like a serial port, and loops back the contents of a text file over USB port. To run the demo, input a message using the PC's keyboard. Any data that shows in HyperTerminal is received from the device.



DEMO running result

Download the program <05_USBFS\Device\CDC_ACM> to the START board and run. When you input message through computer keyboard, the HyperTerminal will receive and shown the message. For example, when you input “GigaDevice MCU”, the HyperTerminal will get and show it as below.



5.5.2. MSC_internal_flash

DEMO Purpose

This demo includes the following functions of GD32 MCU:

- Learn how to use the USBFS
- Learn how to implement USB MSC(mass storage) device

This demo mainly implements a U disk. U disk is currently very widely used removable MSC devices. MSC, the Mass Storage device Class, is a transport protocol between a computer and mobile devices, which allow a universal serial bus (USB) equipment to access a host computing device, file transfer between them, mainly including mobile hard disk, mobile U disk drive, etc. The MSC device must have a storage medium, and this demo uses the MCU's internal SRAM as the storage medium. For more details of the MSC protocol please refer to the MSC protocol standard.

MSC device will use a variety of transport protocols and command formats for communication, so it need to choose the appropriate protocol and command format in the realization of the application. This demo selects the BOT (bulk only transport) protocol and the required SCSI (small computer interface) command, and is compatible with a wide variety of Window operating systems. Specific BOT protocol and SCSI command specification please refer to the standard of their agreement.

DEMO Running Result

Download the program <05_USBFS\Device\MSC > to the START board and run. When the EV-board connect to the PC, you will find a USB large capacity storage device is in the universal serial bus controller, and there is 1 more disk drives in the equipment manager of PC.

Then, after opening the resource manager, you will see more of the 1 disk, as shown in the following diagram:

At this point, the write/read/formatting operation can be performed as the other mobile devices.

5.6. USBFS_Host

5.6.1. DEMO Purpose

This demo includes the following functions of GD32 MCU:

- Learn to use the USBFS as a MSC host
- Learn the operation between the MSC host and the Udisk

GD32VF103R-START board integrates the USBFS module, and the module can be used as a USB device, a USB host or an OTG device. This demo mainly shows how to use the USBFS as a USB MSC host to communicate with external Udisk.

5.6.2. DEMO Running Result

Insert the OTG cable to the USB port, download the program <05_USBFS\Host\MSC_Host> to the START board and run.

If an Udisk has been attached, the LED4 will be light on, indicating that the U disk is successfully connected. And the LED 2 flickers slowly, indicating that the U disk has been successfully enumerated.

First pressing the User key, LED2 will flickers quickly, indicating that the host has identified the U disk.

Then pressing the User key again, LED2 will flickers slowly, indicating that the contents of the U disk have been read correctly.

The third press of the User button will write files to the U disk and the user will see both the LED 1 and the LED 2 light up, indicating the end of the MSC host example.

Finally, pull out the U disk and you can see that the LED 4 is out.

6. Revision history

Table 6-1 Revision history

Revision No.	Description	Date
1.0	Initial Release	Jun.05, 2019

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