GigaDevice Semiconductor Inc.

GD32407R-START
User Guide
V1.0

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1. Summary

GD32407R-START uses GD32407RKT6 as the main controller. It uses GD-Link Mini USB interface to supply 5V power. Reset, Boot, K1-User Key, LED, USB are included. For more details please refer to GD32407R-START-Rev1.1 schematic.

2. Function Pin Assign

Table 2-1. Function pin assignment

Function	Pin	Description
LED	PC6	LED1
RESET		K2-Reset
KEY	PA0	K1-User Key
USB_FS	PA9	USBFS_VBUS
	PA11	USBFS_DM
	PA12	USBFS_DP
	PA10	USBFS_ID
USB_HS	PC3	USB_HS_ULPI_NXT
	PC2	USB_HS_ULPI_DIR
	PC0	USB_HS_ULPI_STP
	PA5	USB_HS_ULPI_CK
	PB5	USB_HS_ULPI_D7
	PB13	USB_HS_ULPI_D6
	PB12	USB_HS_ULPI_D5
	PB11	USB_HS_ULPI_D4
	PB10	USB_HS_ULPI_D3
	PB1	USB_HS_ULPI_D2
	PB0	USB_HS_ULPI_D1
	PA3	USB_HS_ULPI_D0

3. Getting started

The START board uses GD-Link 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 the power supply is OK.

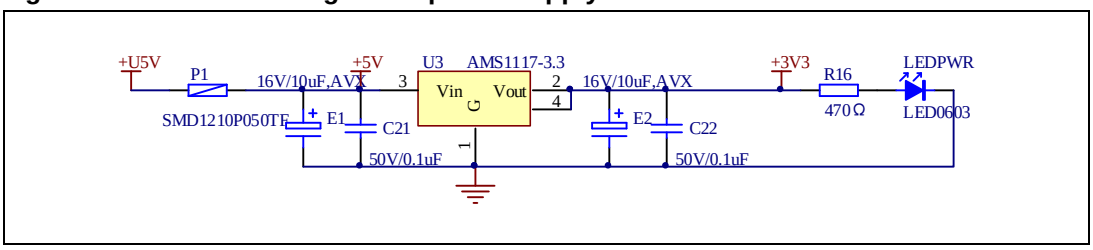
There are Keil version and IAR version of all projects. Keil version of the projects are created based on Keil MDK-ARM 4.74 uVision4. IAR version of the projects are created based on IAR Embedded Workbench for ARM 7.40.2. In Firmware folder, Addon and Software Pack are used to add the devices, peripherals and others to IDE. During use, the following points should be noted:

1. If you use Keil uVision4 to open the project, install the GD32F4xx_Addon.1.0.2.exe which is in \Library\Firmware to load the associated files.
2. If you use Keil uVision5 to open the project, there are two ways to solve the "Device Missing (s)" problem. One is to install GigaDevice.GD32F4xx_DFP.1.0.4.pack which is in \Library\Firmware. In Project menu, select the Manage sub menu, click on the “Version Migrate 5 Format...” menu, the Keil uVision4 project will be converted to Keil uVision5 project. Then add “C:\Keil_v5\ARM\Pack\ARM\CMSIS\4.2.0\CMSIS\Include” to C/C++ in Option for Target. The other is to install Addon directly. Select the installation directory of Keil uVision5 software, such as C:\Keil_v5, in Destination Folder of Folder Selection. Select the corresponding device in Device of Option for Target and add “C:\Keil_v5\ARM\Pack\ARM\CMSIS\4.2.0\CMSIS\Include” to C/C++ in Option for Target.
3. If you use IAR to open the project, install IAR_GD32F4xx_ADDON.1.0.1.exe which is in \Library\Firmware to load the associated files.

4. Hardware layout overview

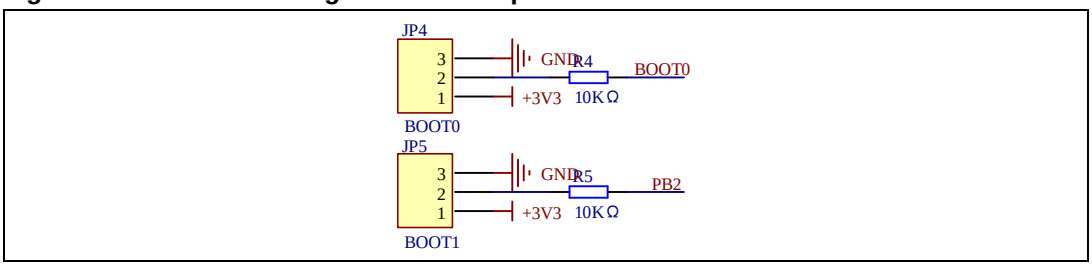
4.1. Power supply

Figure 4-1. Schematic diagram of power supply



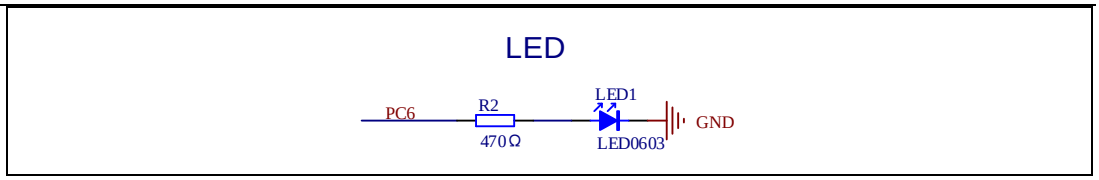
4.2. Boot option

Figure 4-2. Schematic diagram of boot option



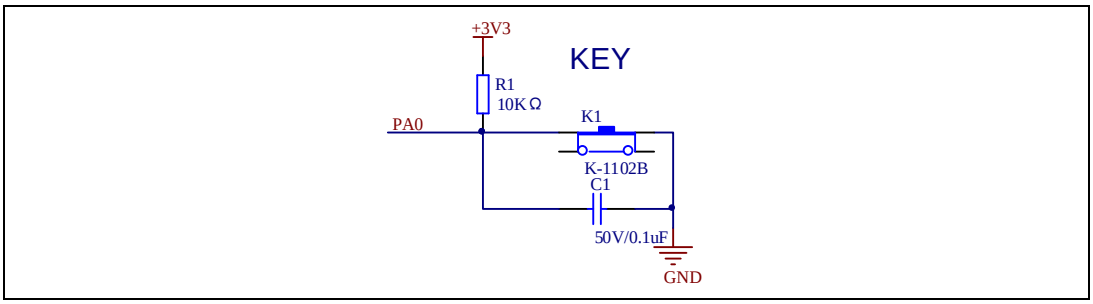
4.3. LED

Figure 4-3. Schematic diagram of LED function



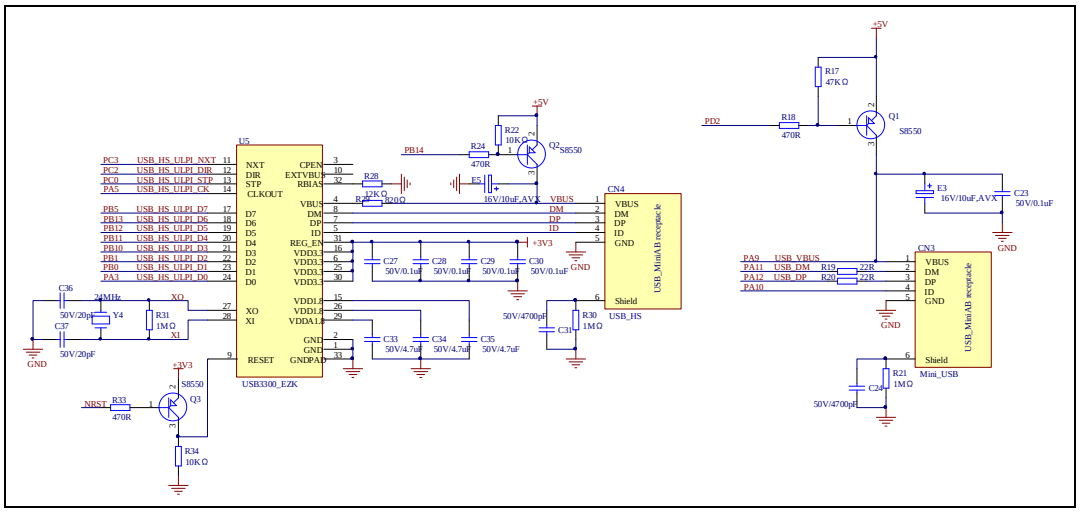
4.4. KEY

Figure 4-4. Schematic diagram of Key function



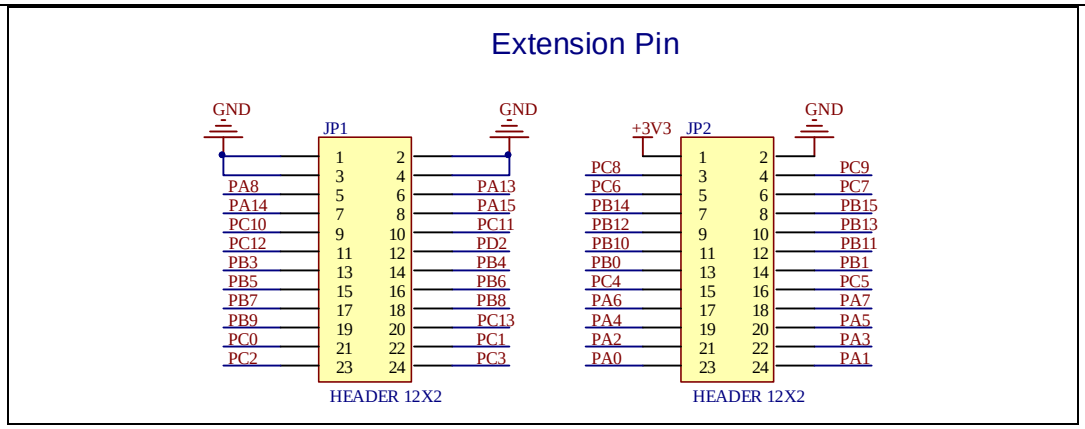
4.5. USB

Figure 4-5. Schematic diagram of USB



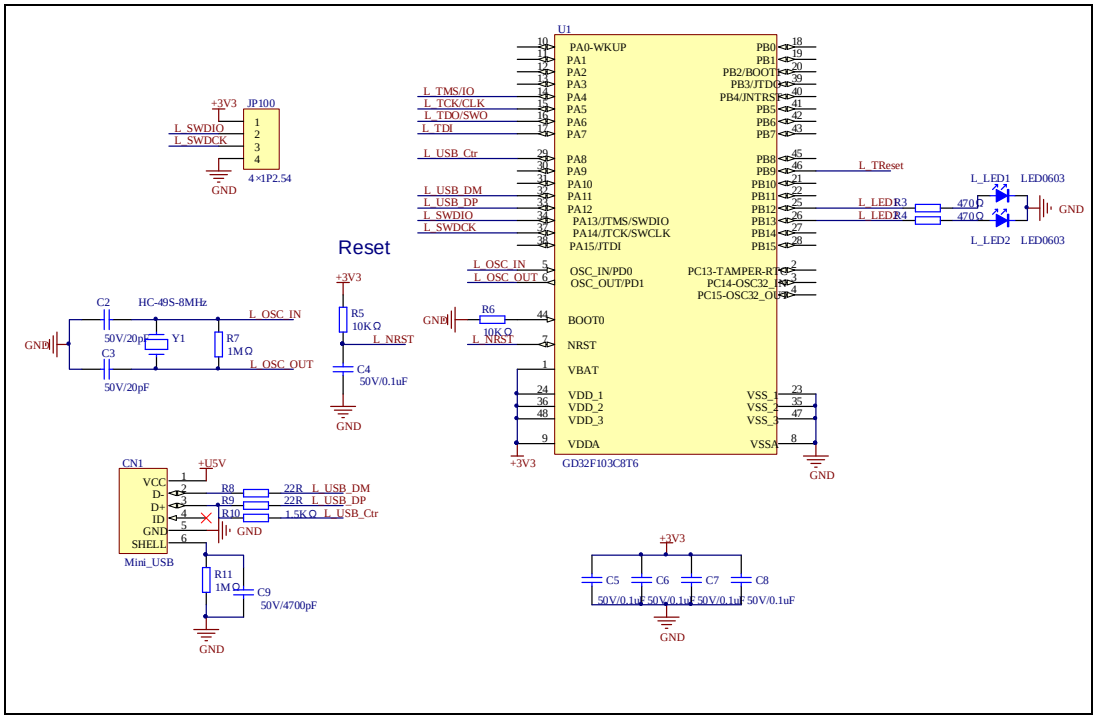
4.6. Extension

Figure 4-6. Schematic diagram of Extension



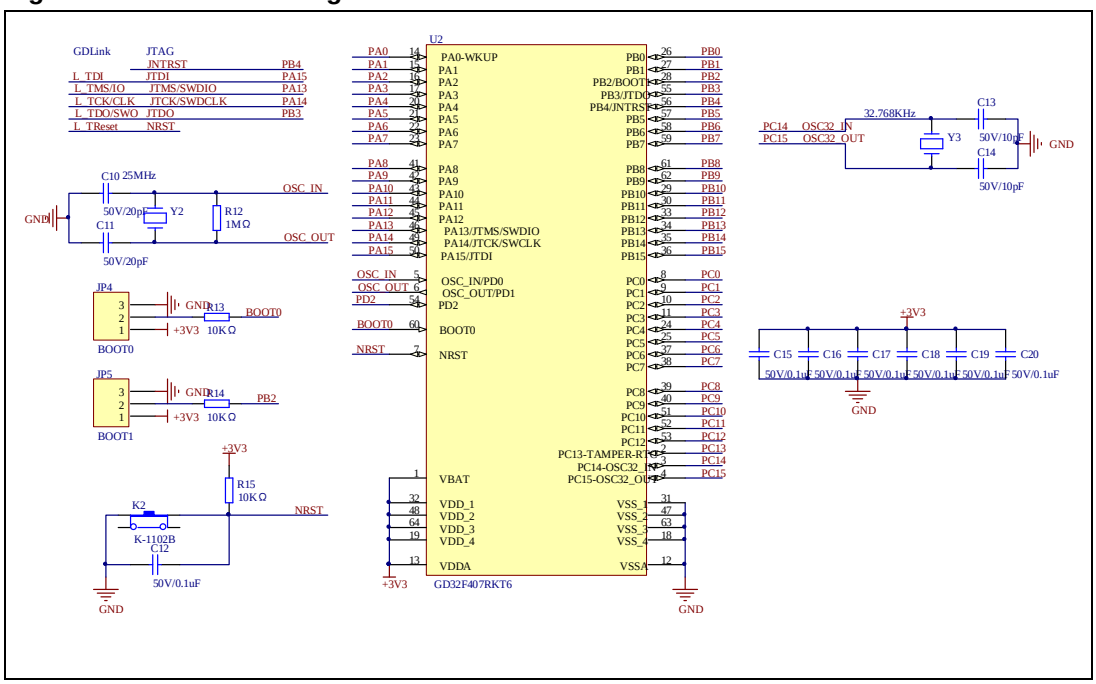
4.7. GD-Link

Figure 4-7. Schematic diagram of GD-Link



4.8. MCU

Figure 4-8. Schematic diagram of MCU



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

GD32407R-START-V1.1 board has 1 keys and 1 LED. The key is User Key. The LED is controlled by GPIO.

This demo will show how to light the LED.

5.1.2. DEMO running result

Download the program < 01_GPIO_Running_LED > to the START board, LED can light cycles.

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

GD32407R-START-V1.1 board has 1 key and 1 LED. The keys are User Key(K1). The LED is 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 0 and will wait for 100ms. Check the input value of the IO port again. If the value still is 0, 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 START board, press down the User Key, LED1 will be turned on. Press down the User Key again, LED1 will be turned off.

5.3. EXTI_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

GD32407R-START-V1.1 board has 1 key and 1 LED. The key is User Key(K1). The LED is 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 START board, LED1 is turned on and off for test. When 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

GD32407R-START-V1.1 board has 2 keys and 1 LED. The keys are User Key and Reset Key. The LED are controlled by GPIO.

This demo will show how to use the TIMER PWM to trigger EXTI interrupt to toggle the state of LED1 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 < 05_TIMER_Key_EXTI > to the START board, the LED1 is 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 PA4 with DuPont line. The LED1 will be toggled every 500ms.

5.5. USB MSC Device

5.5.1. DEMO purpose

This demo includes the following functions of GD32 MCU:

- Learn how to use the USBFS/USBHS
- 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.

5.5.2. DEMO Running Result

Download the program < 05_USB_MSC_Device > to the START board and run. When the start board is connected 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. USB MSC Host

5.6.1. DEMO Purpose

This demo includes the following functions of GD32 MCU:

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

GD32407R-START board integrates the USBFS/USBHS 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/USBHS 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 < 06_USB_MSC_Host > to the board and run.

When an Udisk has been attached, pressing the USER key. The routine will go to the Udisk information stage, next go to the root content of the Udisk stage, then write file to the Udisk and the LED1 is on, finally the msc host demo is end.

6. Revision history

Table 6-1. Revision history

Revision No.	Description	Date
1.0	Initial Release	Sep.4, 2020

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