GigaDevice Semiconductor Inc.

GD32C113C-START
Arm® Cortex®-M4 32-bit MCU

User Guide

Revision 1.0

(Aug. 2022)

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1. Summary

GD32C113C-START uses GD32C113CBT6 as the main controller. It uses Mini USB interface to supply 5V power. Reset, Boot, Wakeup key, LED, USB, GD-Link and Ardunio are also included. For more details, please refer to GD32C113C-START_Rev1.0 schematic.

2. Function Pin Assign

Table 2-1. Function pin assignment

Function	Pin	Description
LED	PA7	LED1
RESET		K1-Reset
KEY	PA0	K2-User key
USART	PA9	USART0_TX
	PA10	USART0_RX
USB	PA9	USB_VBUS
	PA11	USB_DM
	PA12	USB_DP
	PA8	USB pull up control

3. Getting started

The START 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.

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 GigaDevice_GD32C11x_AddOn.1.0.0.exe to load the associated files.

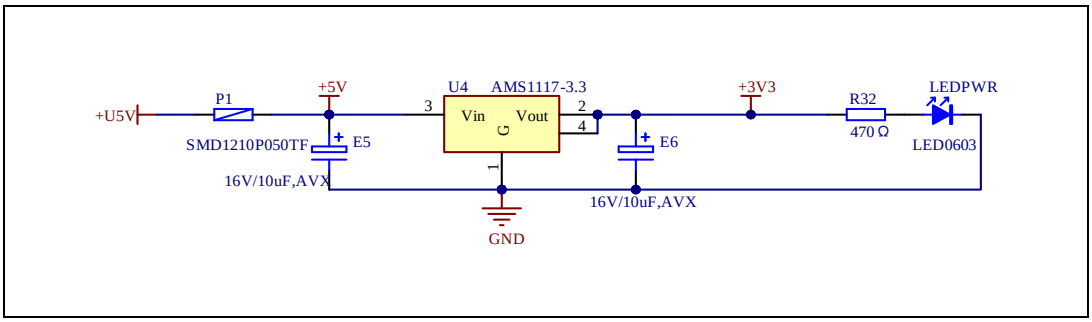
2. If you use Keil uVision5 to open the project, there are two ways to solve the "Device Missing (s)" problem. One is to install GigaDevice.GD32C11x_DFP.1.0.0.pack. In Project menu, select the Manage sub menu, click on the “Version Migrate 5 Format...” menu, the Keil uVision4 project will be converted 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_GD32C11x_ADDON_1.0.0.exe to load the associated files.

4. Hardware layout overview

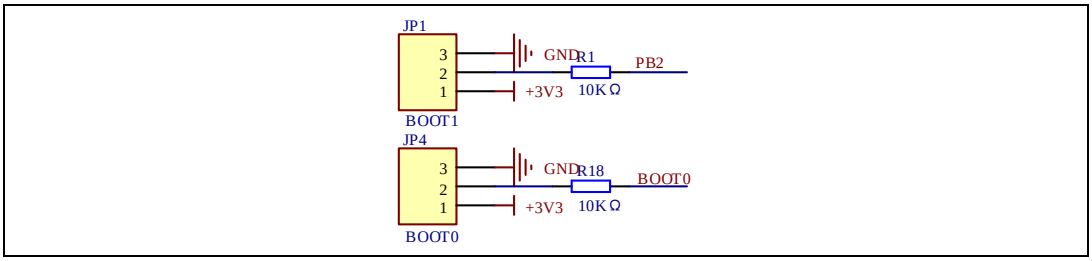
4.1. Power supply

Figure 4-1. Schematic diagram of power supply



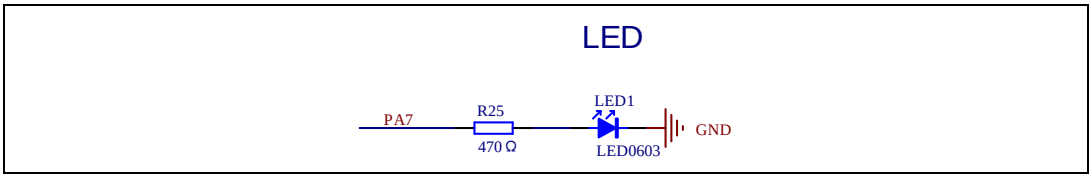
4.2. Boot option

Figure 4-2. Schematic diagram of boot option



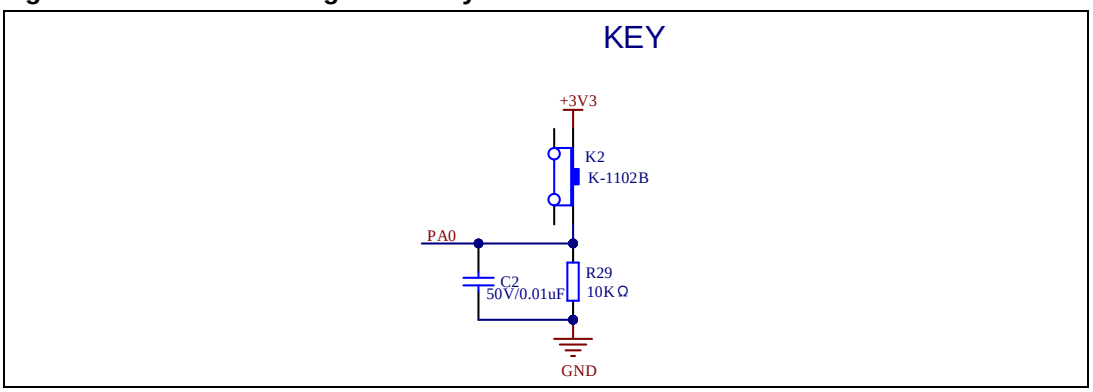
4.3. LED

Figure 4-3. Schematic diagram of LED function



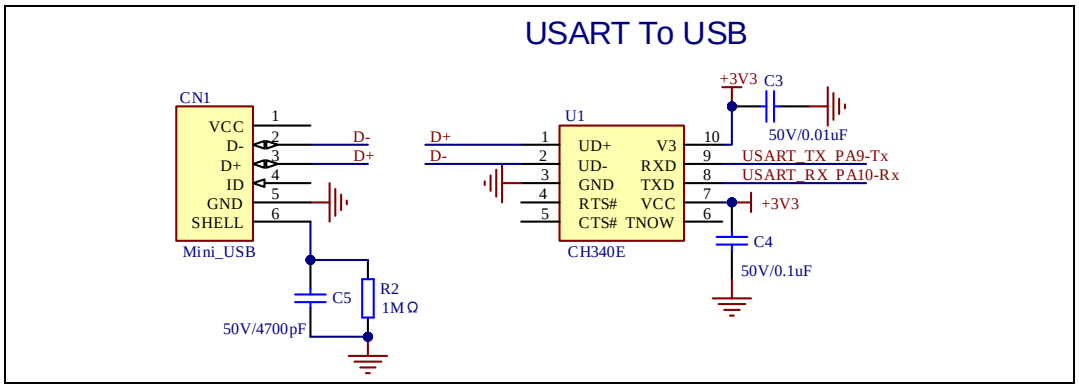
4.4. KEY

Figure 4-4. Schematic diagram of Key function



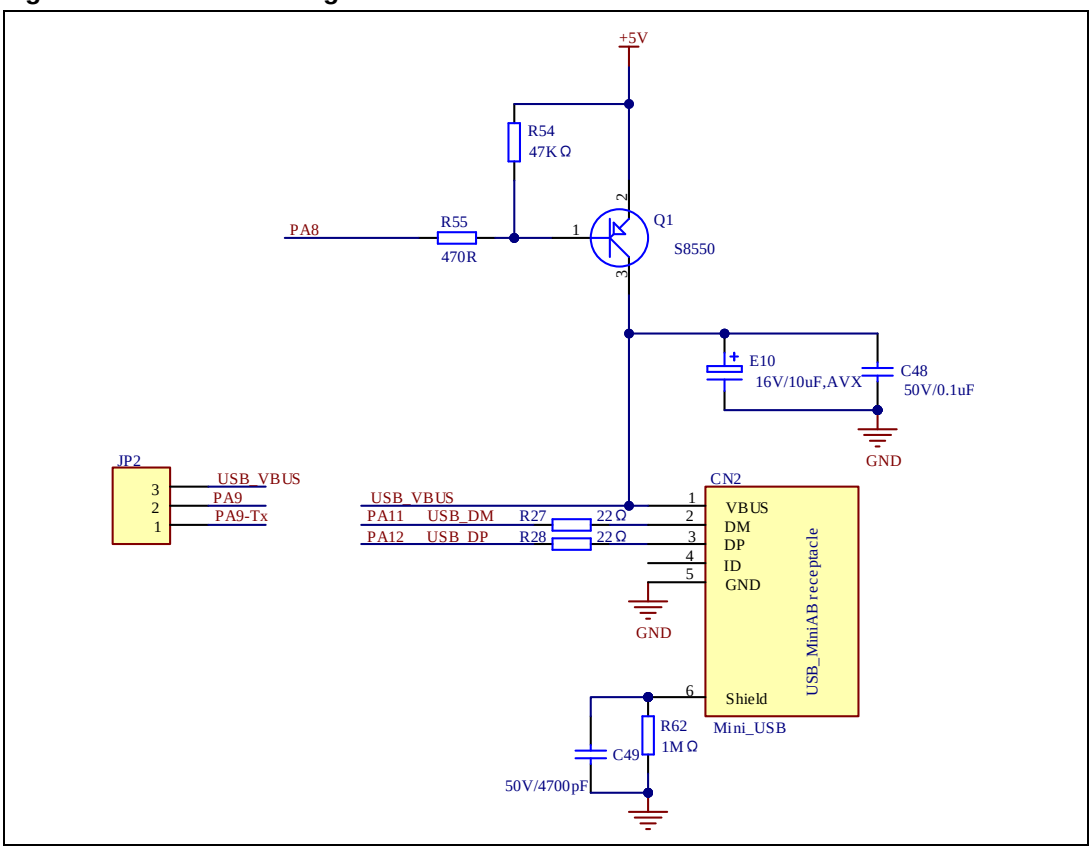
4.5. USART

Figure 4-5. Schematic diagram of USART to USB



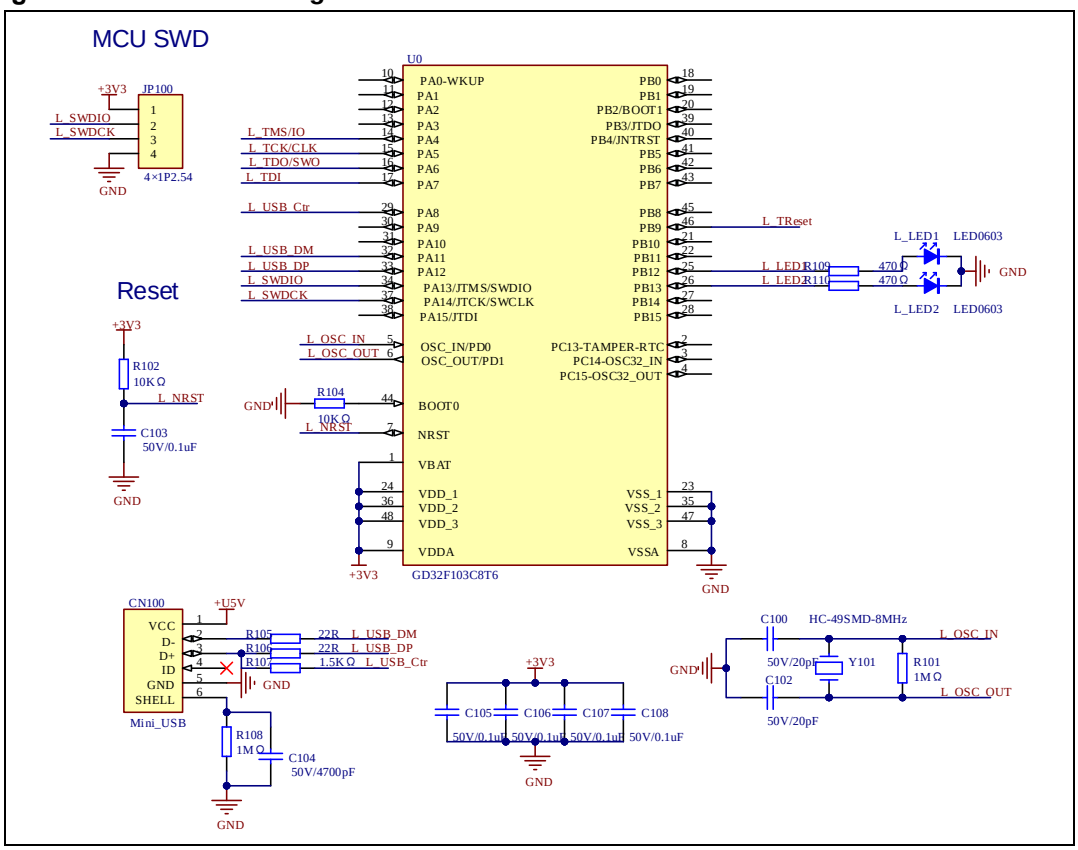
4.6. USB

Figure 4-6. Schematic diagram of USB



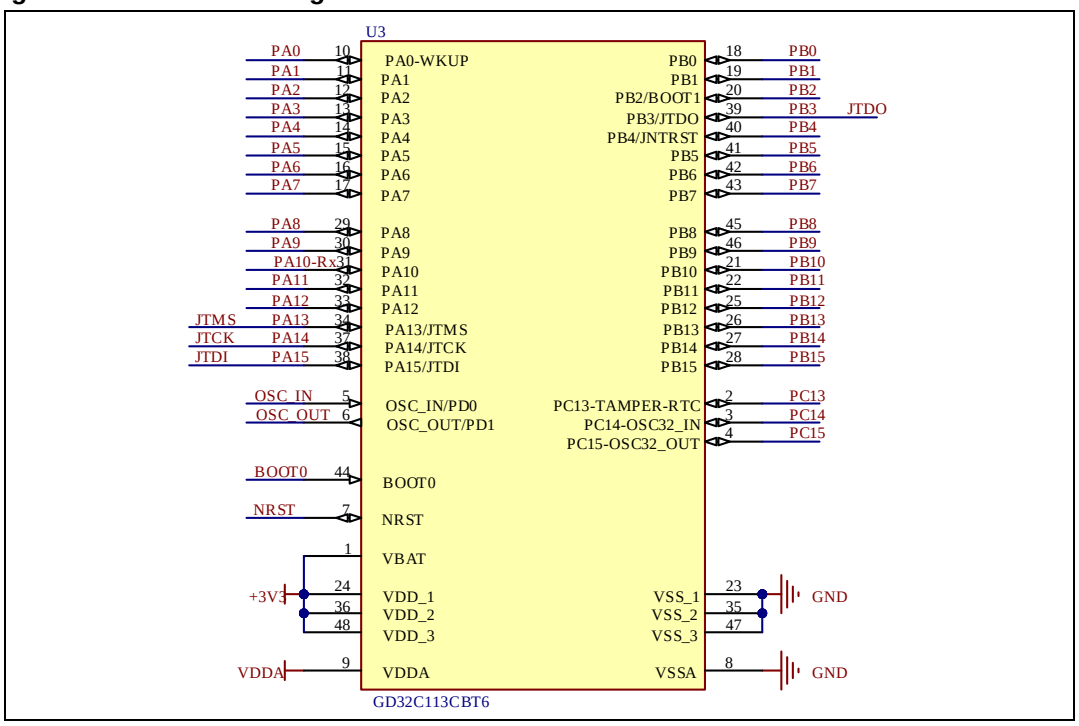
4.7. GD-Link

Figure 4-7. Schematic diagram of GD-Link



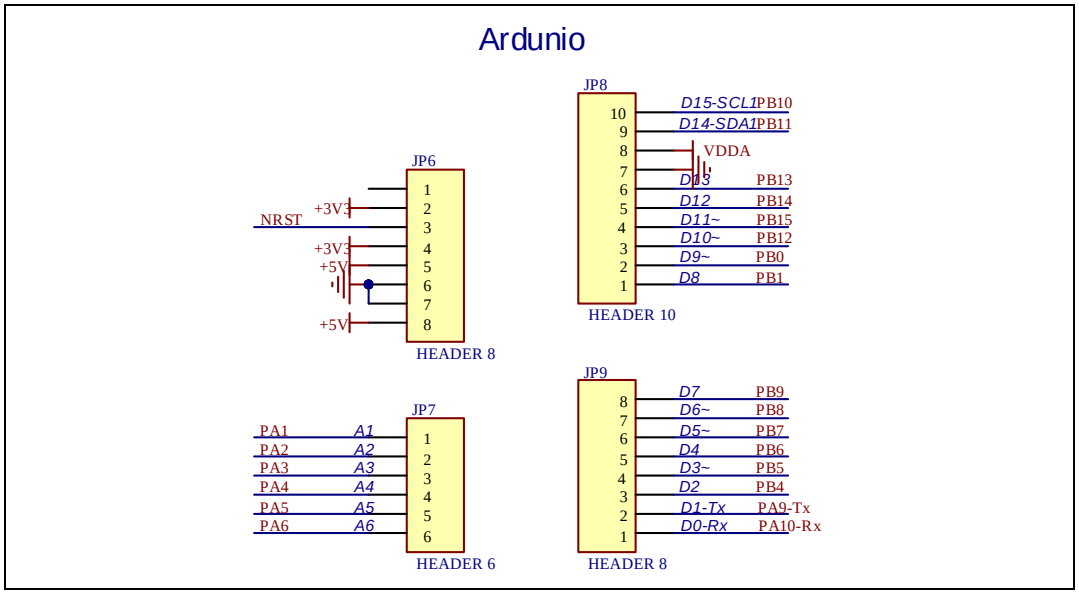
4.8. MCU

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

GD32C113C-START board has two keys and one LED. The two keys are Reset key and Wakeup key. The LED1 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, LED1 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

GD32C113C-START board has two keys and one LED. The two keys are Reset key and Wakeup key. The LED1 is controlled by GPIO.

This demo will show how to use the Wakeup key to control the LED1. When press down the Wakeup Key, it will check the input value of the IO port. If the value is 1 and will wait for 100ms. 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 START board, press down the Wakeup Key, LED1 will be turned on. Press down the Wakeup 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

GD32C113C-START board has two keys and one LED. The two keys are Reset key and Wakeup key. The LED1 is controlled by GPIO.

This demo will show how to use the EXTI interrupt line to control the LED1.When press down the Wakeup 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. Press down the Wakeup Key, LED1 will be turned on. Press down the Wakeup Key again, LED1 will be turned off.

5.4. USART_Hyperterminal_Interrupt

5.4.1. DEMO purpose

This demo includes the following functions of GD32 MCU:

- Learn to use the USART transmit and receive interrupts to communicate with the hyperterminal

5.4.2. DEMO running result

Download the program <04_USART_HyperTerminal_Interrupt> to the START board and run. Firstly, the COM sends the “USART interrupt test” to the hyperterminal and waits for receiving data from the hyperterminal that you must send. The string that you have sent is stored in the receiver_buffer array. The receive buffer have a receivesize=32 bytes as maximum. After that, compare rxcount with receivesize. If rxcount is same with receivesize, the COM sends the “USART receive successfully!” to the hyperterminal.

The information via a serial port output as following:

```
USART interrupt test


USART receive successfully!
```

5.5. TIMER_Key_EXTI

5.5.1. 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

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.

5.5.2. DEMO running result

Download the program < 05_TIMER_Key_EXTI > to the START board, LED1 is flashed once for test, press down the Wakeup Key, LED1 will be turned on. Press down the Wakeup Key again, LED1 will be turned off. Connect PA6 (TIMER2_CH0) and PA4 with DuPont line. The LED1 will be toggled every 500ms.

5.6. USB_MSC_Device

5.6.1. 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 flash 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.

5.6.2. DEMO running result

Download the program < 06_USB_MSC_Device > to the START board and run. When the EV-board connect to the PC, user will find a USB large capacity storage device is in the universal serial bus controller, and there is one more disk drives in the device 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.

5.7. USB_HID_Host

5.7.1. DEMO purpose

This demo includes the following functions of GD32 MCU:

- Learn to use the USBFS as a HID host
- Learn the operation between the HID host and the mouse device
- Learn the operation between the HID host and the keyboard device

GD32C113C-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 HID host to communicate with external USB HID device.

5.7.2. DEMO running result

Download the program < 07_USB_HID_Host > to the START board and run.

If a mouse has been attached, the user will see the information of mouse enumeration. First pressing the Wakeup key will see the inserted device is mouse, and then moving the mouse will show the position of mouse in the HyperTerminal.

If a keyboard has been attached, the user will see the information of keyboard enumeration. First pressing the Wakeup key will see the inserted device is keyboard, and then pressing the keyboard will show the state of the button in the HyperTerminal.

6. Revision history

Table 6-1. Revision history

Revision No.	Description	Date
1.0	Initial Release	Aug.19, 2022

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