GigaDevice Semiconductor Inc.

GD32350R-EVAL
User Manual
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1. **Summary**

GD32350R-EVAL evaluation board uses GD32F350RBT6 as the main controller. As a complete development platform of GD32F3x0 powered by ARM® Cortex™-M4 core, the board supports full range of peripherals. It uses mini-USB interface or AC/DC adapter to supply 5V power. SWD, Reset, Boot, User button key, LED, I2C, I2S, USART, RS485, TFT-LCD, HDMI-CEC, LDR, TSI, IFRP LED, IR Receiver, RTC, SPI, USB, ADC, DAC and Extension Pin are also included. This document details its hardware schematic and the relevant applications.

2. **Function Pin Assign**

<table>
<thead>
<tr>
<th>Function</th>
<th>Pin</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>LED</td>
<td>PC10</td>
<td>LED1</td>
</tr>
<tr>
<td></td>
<td>PC11</td>
<td>LED2</td>
</tr>
<tr>
<td></td>
<td>PC12</td>
<td>LED3</td>
</tr>
<tr>
<td></td>
<td>PD2</td>
<td>LED4</td>
</tr>
<tr>
<td></td>
<td>PA0</td>
<td>K1-Reset</td>
</tr>
<tr>
<td></td>
<td>PC13</td>
<td>K4-Temper</td>
</tr>
<tr>
<td></td>
<td>PF7</td>
<td>K3-User Key</td>
</tr>
<tr>
<td>USB</td>
<td>PA11</td>
<td>USBDM</td>
</tr>
<tr>
<td></td>
<td>PA12</td>
<td>USBDP</td>
</tr>
<tr>
<td></td>
<td>PA9</td>
<td>USB VBUS</td>
</tr>
<tr>
<td>IR</td>
<td>PC6</td>
<td>IR_RX</td>
</tr>
<tr>
<td></td>
<td>PB9</td>
<td>IR_TX</td>
</tr>
<tr>
<td>I2C</td>
<td>PB6</td>
<td>I2C0_SCL</td>
</tr>
<tr>
<td></td>
<td>PB7</td>
<td>I2C0_SDA</td>
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<tr>
<td>I2S</td>
<td>PA4</td>
<td>I2S_WS</td>
</tr>
<tr>
<td></td>
<td>PA5</td>
<td>I2S_CK</td>
</tr>
<tr>
<td></td>
<td>PA7</td>
<td>I2S_DIN</td>
</tr>
<tr>
<td></td>
<td>PA15</td>
<td>MSEL</td>
</tr>
<tr>
<td></td>
<td>PB3</td>
<td>MCLK</td>
</tr>
<tr>
<td></td>
<td>PB5</td>
<td>MDIN</td>
</tr>
<tr>
<td></td>
<td>PA6</td>
<td>I2S_MCK</td>
</tr>
<tr>
<td>USART0</td>
<td>PA9</td>
<td>USART0_TX</td>
</tr>
<tr>
<td></td>
<td>PA10</td>
<td>USART0_RX</td>
</tr>
<tr>
<td>RS485</td>
<td>PA2</td>
<td>RS485_TX</td>
</tr>
<tr>
<td></td>
<td>PA3</td>
<td>RS485_RX</td>
</tr>
<tr>
<td></td>
<td>PA1</td>
<td>RS485_DIR</td>
</tr>
<tr>
<td>TSI</td>
<td>PB11</td>
<td>TSI_G5_IO0</td>
</tr>
</tbody>
</table>
### 3. Getting started

The EVAL Board uses mini-USB connector or AC/DC adapter to get power, the hardware system power is +3.3V. A mini-USB cable and a J-Link tool are necessary to download programs. Select the correct boot mode and then power on, the LED6 will turn on, which indicates the power supply is ready.

### 4. Hardware layout overview

#### 4.1. Power supply

![Schematic diagram of power supply](image)
4.2. **Boot option**

Figure 4-2 Schematic diagram of boot option

Table 4-1 Boot configuration

<table>
<thead>
<tr>
<th>BOOT1</th>
<th>BOOT0</th>
<th>Boot Mode</th>
</tr>
</thead>
<tbody>
<tr>
<td>Default</td>
<td>2-3</td>
<td>User memory</td>
</tr>
<tr>
<td></td>
<td>1-2</td>
<td>System memory</td>
</tr>
<tr>
<td>Changed by ISP</td>
<td>1-2</td>
<td>SRAM memory</td>
</tr>
</tbody>
</table>

4.3. **LED**

Figure 4-3 Schematic diagram of LED function

4.4. **KEY**

Figure 4-4 Schematic diagram of Key function
4.5. USART0

Figure 4-5 Schematic diagram of USART0 function

4.6. RS485

Figure 4-6 Schematic diagram of RS485 function
4.7. ADC/DAC

Figure 4-7 Schematic diagram of ADC/DAC function

4.8. I2S

Figure 4-8 Schematic diagram of I2S function
4.9. I2C

Figure 4-9 Schematic diagram of I2C function

4.10. SPI-TF CARD

Figure 4-10 Schematic diagram of SPI-TF CARD function
4.11. SPI-TFT LCD

Figure 4-11 Schematic diagram of SPI-TFT LCD function

4.12. USBFS

Figure 4-12 Schematic diagram of USBFS function
4.13. **CMP**

Figure 4-13 Schematic diagram of CMP function

![CMP Schematic Diagram](image)

4.14. **HDMI-CEC**

Figure 4-14 Schematic diagram of HDMI-CEC function

![HDMI-CEC Schematic Diagram](image)

4.15. **TSI**

Figure 4-15 Schematic diagram of TSI function

![TSI Schematic Diagram](image)
4.16. IFRP

Figure 4-16 Schematic diagram of IFRP function

4.17. RTC

Figure 4-17 Schematic diagram of RTC function
4.18. GD-Link

Figure 4-18 Schematic diagram of GD-Link function
4.19. Extension

Figure 4-19 Schematic diagram of Extension Pin
5. Routine use guide

5.1. GPIO_Runing_Led

5.1.1. DEMO Purpose

This Demo includes the following functions of GD32 MCU:
- Learn to use GPIO for controlling the LED
- Learn to use SysTick to generate 1ms delay

GD32350R-EVAL 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_Runing_Led> to the EVAL board, four LEDs will turn on one by one from LED1 to LED4 every 200ms, and then turn off together. 200ms later,
the four LEDs work like previous again.

5.2. **GPIO_KeyBoard_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

GD32350R-EVAL board has four keys and four LEDs. The four keys are Reset key, Tamper key, User key and Wakeup key. The LED1, LED2, LED3 and LED4 are controlled by GPIO.

This demo will show how to use the Tamper key to control the LED2. When press down the User Key, it will check the input value of the IO port. If the value is 0, wait for 50ms. Then check the input value of the IO port again. If the value is still 0, indicates that the button is pressed down successfully, and light the four LED2.

5.2.2. **DEMO Running Result**

Download the program `<02_GPIO_KeyBoard_Polling_mode>` to the EVAL board, first of all, all the LEDs will be flashed once for test. Then press down the Tamper Key, LED2 will be turned on. Press down the Tamper Key again, LED2 will be turned off.

5.3. **GPIO_KeyBoard_Interrupt_mode**

5.3.1. **DEMO Purpose**

This Demo includes the following functions of GD32 MCU:
- Learn to use GPIO to control the LED and the KEY
- Learn to use EXTI to generate external interrupt

GD32350R-EVAL board has four keys and four LEDs. The four keys are Reset key, Wakeup key, User key and Tamper key. The LED1, LED2, LED3 and LED4 are controlled by GPIO.

This demo will show how to use EXTI interrupt line to control the LED2. When press down the Tamper Key, it will produce an interrupt. In the interrupt service function, the demo will toggle LED2.

5.3.2. **DEMO Running Result**

Download the program `<03_GPIO_KeyBoard_Interrupt_mode>` to the EVAL board, first of all, all the LEDs will be flashed once for test. Then press down the Tamper Key, LED2
will be turned on. Press down the Tamper Key again, LED2 will be turned off.

5.4. **USART_Printf**

5.4.1. **DEMO Purpose**

This Demo includes the following functions of GD32 MCU:

- Learn to use GPIO: the Tamper key control the LED
- Learn to retarget the C library printf function to the USART

5.4.2. **DEMO Running Result**

Jump JP13 to USART, then download the program `<04_USART_Printf>` to the EVAL board and run. This implementation outputs “USART printf example: please press the Tamper Key” on the hyperterminal using COM. Press the Tamper key, serial port will output “USART Printf Example”. The information via a serial port output as following:

```
USART printf example: please press the Tamper key
USART printf example
```

5.5. **USART_HyperTerminal_Interrupt**

5.5.1. **DEMO Purpose**

This Demo includes the following functions of GD32 MCU:

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

5.5.2. **DEMO Running Result**

Jump JP13 to USART, then download the program `<05_USART_HyperTerminal_Interrupt>` to the EVAL board and run. Firstly, all the LEDs are turned on and off for test. Then, the COM sends the `tx_buffer` array (from 0x00 to 0xFF) 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 `rx_buffer` array. The receive buffer have a `BUFFER_SIZE` bytes as maximum. After that, compare `tx_buffer` with `rx_buffer`. If `tx_buffer` is same with `rx_buffer`, LED1 and LED2 are turned on, LED3 and LED4 are turned off. Otherwise, LED1 and LED2 are turned off, LED3 and LED4 are turned on. The information via a serial port output as following:
5.6. **USART_DMA**

5.6.1. **DEMO Purpose**

This Demo includes the following functions of GD32 MCU:

- Learn to use the COM transmit and receive using DMA

5.6.2. **DEMO Running Result**

Jump JP13 to USART, then download the program < 06_USART_DMA > to the EVAL board and run. Firstly, all the LEDs are turned on and off for test. Then, the COM sends the tx_buffer array 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 rx_buffer array. The receive buffer have a BUFFER_SIZE bytes as maximum. After that, compare tx_buffer with rx_buffer. If tx_buffer is same with rx_buffer, LED1 and LED2 are turned on, LED3 and LED4 are turned off. Otherwise, LED1 and LED2 are turned off, LED3 and LED4 are turned on.

The information via a serial port output as following:

```
00 01 02 03 04 05 06 07 08 09 0A 0B 0C 0D 0E 0F 10 11 12 13 14 15 16 17 18 19
1A 1B 1C 1D 1E 17 20 21 22 23 24 25 26 27 28 29 2A 2B 2C 2D 2E 2F 30 31 32 33
34 35 36 37 38 39 3A 3B 3C 3D 3E 3F 40 41 42 43 44 45 46 47 48 49 4A 4B 4C 4D
4E 4F 50 51 52 53 54 55 56 57 58 59 5A 5B 5C 5D 5E 5F 60 61 62 63 64 65 66 67
68 69 6A 6B 6C 6D 6E 6F 70 71 72 73 74 75 76 77 78 79 7A 7B 7C 7D 7E 7F 80 81
82 83 84 85 86 87 88 89 8A 8B 8C 8D 8E 8F 90 91 92 93 94 95 96 97 98 99 9A 9B 9C
9D 9E 9F A0 A1 A2 A3 A4 A5 A6 A7 A8 A9 AA AB AC AD AE AF B0 B1 B2 B3 B4 B5
B6 B7 B8 B9 BA BB BC BD BE BF C0 C1 C2 C3 C4 C5 C6 C7 C8 C9 CA CB CC CD CE CF
```

5.7. **RS485_Test**

5.7.1. **DEMO Purpose**

This Demo includes the following functions of GD32 MCU:

- Learn to use the USART RS485
5.7.2. DEMO Running Result

Jump the JP12 to RS485 and JP13 to USART with the jumper cap. This routines need to prepare two GD32F350R_EVAL boards, one board as a sender, the other as a receiver. First connect two GD32350R-EVAL boards through RS485 line A and B, and then download the program < 07_RS485_Test > to the board for running. When press the Wakeup key on one board, the board is set as RS485 transmitter and LED2 is on and when press the Tamper key on one board, the board is set as RS485 receiver and LED3 is on.

Download the program < 07_RS485_Test > to the EVAL board and run, the information via a serial port output as following:

```
GD32F350R_EVAL_Rs485_Test
--> Press down KEY_WAKEUP to set GD32F350R_EVAL as RS485 transmitter
--> Press down KEY_TAMPER to set GD32F350R_EVAL as RS485 receiver
```

According to the tips, press down Wakeup key to set one board as a transmitter and press down Tamper key to the other as a receiver. The transmitter output as following.

RS485 transmitter is enabled

Data is being transmitted: GD32MCU
Data is being transmitted: GD32MCU
Data is being transmitted: GD32MCU
Data is being transmitted: GD32MCU

The receiver output as following.

RS485 receiver is enabled

Waiting for received data

The received data: [GD32MCU]
The received data: [GD32MCU]
The received data: [GD32MCU]
The received data: [GD32MCU]

5.8. ADC_Conversion_Triggered_By_Timer

5.8.1. DEMO Purpose

This Demo includes the following functions of GD32 MCU:

- Learn to use ADC to convert analog to digital
- Learn to use TIMER to generate a CC event
Learn to use LCD to show the ADC converted result
TIMER1 CH1 event triggers ADC conversion, the value displayed on the LCD corresponds to the ADC analog input, and changes with it. The converted data are moved to SRAM through DMA continuously.

5.8.2. DEMO Running Result
Download the program <08_ADC_conversion_triggered_by_timer> to the GD32350R-EVAL board, adjust the adjustable potentiometer knob to change the analog input. The ADC, which is triggered by TIMER1 CH1 event, will convert the analog input, and you will see the result, a voltage curve, on the LCD. The curve adjusts with the analog input.

5.9. DAC_Output_Voltage_Value

5.9.1. DEMO Purpose
This Demo includes the following functions of GD32 MCU:
- Learn to use DAC channel to generate different voltages on DAC output

5.9.2. DEMO Running Result
Download the program <09_DAC_Output_Voltage_Value> to the EVAL board, the digital value is 0x7ff0, its converted analog voltage should be VREF/2, using the voltmeter to measure PA4, its value is 1.648V.

5.10. Comparator_Obtain_Brightness

5.10.1. DEMO Purpose
This Demo includes the following functions of GD32 MCU:
- Learn to use comparator output compare result
There are two comparators on EVAL board and each comparator has two inputs. In this demo, one input is 3.3V, and the other one is the 1/4 reference voltage. Compare the two input voltages, the output is a high or low level, and the LED2 will performs the corresponding action.

5.10.2. DEMO Running Result
Download the program <10_Comparator_obtain_brightness> to the EVAL board, comparing two input voltage, if output level is high, LED2 is off, otherwise LED2 is off.
5.11. I2C_EEPROM

5.11.1. DEMO Purpose

This Demo includes the following functions of GD32 MCU:
- Learn how to use the master transmitting mode of the I2C module
- Learn how to use the master receiving mode of the I2C module
- Learn to read and write the EEPROM with the I2C interface

5.11.2. DEMO Running Result

Jump JP13 to USART, then download the program <11_I2C_EEPROM> to the EVAL board and run. Connect serial cable to COM, and open the HyperTerminal to show the print message.

Firstly, the data of 256 bytes will be written to the EEPROM from the address 0x00 and printed by the serial port. Then, reading the EEPROM from address 0x00 for 256 bytes and the result will be printed. Finally, compare the data that were written to the EEPROM and the data that were read from the EEPROM. If they are the same, the serial port will output "I2C-AT24C02 test passed!" and the four LEDs light flashing, otherwise the serial port will output "Err: data read and write aren't matching." and all the four LEDs light.

The output information via the serial port is as following.
5.12. SPI_TF_Card_Block_Operation

5.12.1. DEMO Purpose

This Demo includes the following function of GD32 MCU:

- Learn how to use SPI to block read and write from TF card

In this demo, the SPI interface is used for reading from and writing to TF card. Write to TF card with 0 to 255, a total of 2048 bytes directly. Then read data from the original address, check the correctness of the written and read data. Note that, the FATFS is not used in this demo and in the absence of FATFS, read and write to the TF card will destroy the file system, please make a backup before testing.

5.12.2. DEMO Running Result

Firstly, JP10 and JP11 must be fitted to SPI and then download the program `<12_SPI_TF_Card_Block_Operation>` to the EVAL board. All the LEDs are turned on and then turned off for test. Insert the TF card to the board, the test results will be displayed on the LCD screen.
5.13. **SPI_TF_Card_FATFS_Operation**

5.13.1. **DEMO Purpose**

This Demo includes the following function of GD32 MCU:

- Learn how to use SPI to read and write from TF card with FATFS

In this demo, the SPI interface is used for reading from and writing to TF card. Make sure the TF card has FAT file system. If not, some information will be displayed on the LCD screen.

5.13.2. **DEMO Running Result**

Firstly, JP10 and JP11 must be fitted to SPI and then download the program `<13_SPI_TF_Card_FATFS_Operation>` to the EVAL board. All the LEDs are turned on and then turned off for test. Insert a formatted TF card, a text file will be created in this TF card. When the screen appears "FATFS FILE Create Success", you can remove the TF card and check whether the file is successfully created in the TF card with a card reader. When the exception occurs, operate follow the screen prompts.
5.14. **SPI_TFT_LCD_Driver**

5.14.1. **DEMO Purpose**

This Demo includes the following function of GD32 MCU:
- Learn how to use SPI to drive TFT LCD screen and display

GD32350R-EVAL board has a TFT LCD screen which supports SPI interface. In this demo, tests of font, number, draw and color are displayed on the LCD screen respectively.

5.14.2. **DEMO Running Result**

Firstly, JP10 and JP11 must be fitted to SPI port and then download the program `<14_SPI_TFT_LCD_Driver>` to the EVAL board. All the LEDs are turned on and then turned off for test. After that, the LCD screen on the board will display the GUI tests in infinite loop.
5.15. **HDMI-CEC_HostSlaveCommunication**

5.15.1. **DEMO Purpose**

This Demo includes the following functions of GD32 MCU:
- Learn the communication function of HDMI-CEC

In the process of communication, the sender sends data to receiver through the key interrupt, the receiver for receiving data in the CEC interrupt. The entire communication process does not make the error processing.

5.15.2. **DEMO Running Result**

This routines need to prepare two GD32F350_EVAL board, one board as a sender, the other as a receiver. First use the DuPont to connect CEC bus (PB8) and ground wire (GND) pins in the two board, and then download the program `<15_HDMI_CEC_HostSlaveCommunication>` to the board for running. When the program runs, the first development board of the LCD display is data 0, press one of the development board TAMPER key, the other piece of the development board LCD number will increase, which shows the end of a data transmission. Each it increases to 9, it will clear to 0 to re-increase; press the WAKEUP key, the number will decline, which also shows the end of a data transmission. Every time it decreases to 0, it will return to the number 9 to re-decrease.
5.16. I2S_Audio_Player

5.16.1. DEMO Purpose

This Demo includes the following functions of GD32 MCU:

- Learn to use I2S module to output audio file

GD32350R-EVAL board integrates the I2S (Inter-IC Sound) module, and the module can communicate with external devices using the I2S audio protocol. This Demo mainly shows how to use the I2S interface of the board for audio output.

5.16.2. DEMO Running Result

Download the program <16_I2S_Audio_Player>. After downloading the program, insert the earphone into the audio port J1, then listen to the audio file.

5.17. RCU_Clock_Out

5.17.1. DEMO Purpose

This Demo includes the following functions of GD32 MCU:

- Learn to use GPIO control the LED
- Learn to use the clock output function of RCU
- Learn to communicate with PC by USART

5.17.2. DEMO Running Result

Download the program <17_RCU_Clock_Out> to the EVAL board and run. Connect serial cable to EVAL_COM, open the HyperTerminal. When the program is running, HyperTerminal will display the initial information. Then user can choose the type of the output clock by pressing the USER button. After pressing, the corresponding LED will be turned on and HyperTerminal will display which mode be selected. The frequency of the output clock can be observed through the oscilloscope by PA8 pin.

Information via a serial port output as following:

```
/================ Gigadevice Clock output Demo ===============\npress user key to select clock output source
CK_OUT: IRC28M, DIV:1
CK_OUT: IRC40K, DIV:1
CK_OUT: LXTAL, DIV:1
CK_OUT: CKSYS, DIV:4
CK_OUT: IRC3M, DIV:1
```
5.18. PMU_sleep_wakeup

5.18.1. DEMO Purpose

This Demo includes the following functions of GD32 MCU:
- Learn to use the USART receive interrupt to wake up the PMU from sleep mode

5.18.2. DEMO Running Result

Download the program <18_PMU_sleep_wakeup> to the EVAL board, connect serial cable to EVAL_COM. After power-on, all the LEDs are off. The MCU will enter sleep mode and the software stop running. When the USART0 receives a byte of data from the HyperTerminal, the MCU will wake up from a receive interrupt. And all the LEDs will flash together.

5.19. RTC_Calendar

5.19.1. DEMO Purpose

This Demo includes the following functions of GD32 MCU:
- Learn to use RTC module to implement calendar function
- Learn to use LCD module to display the time of calendar

5.19.2. DEMO Running Result

Download the program <19_RTC_Calendar> to the EVAL board and run. When the program is running, the four LEDs, LED1 to LED4 turn on, then turn off. And then the LCD prints out the information of the board, and the calendar. When you press the Wakeup key, the time will be configured to 2016-05-13, 12:00:00.
If place a battery on GD32F350R_EVAL board, it can realize no losing of time when power down. In this case, notice that JP5 jump to the VBAT.

5.20. IRInfrared_Transceiver

5.20.1. DEMO Purpose

This Demo includes the following functions of GD32 MCU:
- Learn to use general timer output PWM wave
- Learn to use general timer generated update interrupt
- Learn to use general timer capture interrupt
- Learn to use general timer TIMER15 and TIMER16 implement Infrared function
5.20.2. DEMO Running Result
Download the program <20_IRInfrared_Transceiver> to the EVAL board and run. When the program is running, if the infrared receiver received data is correct, LED1, LED2, LED3, LED4 light in turn, otherwise LED1, LED2, LED3, LED4 toggle together.

5.21. TIMER_Breath_LED

5.21.1. DEMO Purpose
This Demo includes the following functions of GD32 MCU:
- Learn to use Timer output PWM wave
- Learn to update channel value

5.21.2. DEMO Running Result
Use the DuPont line to connect the TIMER0.CH0 (PA8) and LED1 (PC10), and then download the program <21_TIMER_Breath_LED> to the GD32350R-EVAL board and run. PA8 should not be reused by other peripherals. When the program is running, you can see LED1 lighting from dark to bright gradually and then gradually darken, ad infinitum, just like breathing as rhythm.

5.22. TSI_TouchKey_leds

5.22.1. DEMO Purpose
This Demo includes the following functions of GD32 MCU:
- Learn to use TSI module implement Touch Key function

5.22.2. DEMO Running Result
Download the program <22_TSI_TouchKey_leds> to the EVAL board and run. When the program is running, you can use a finger slide the Touch Sensor (A-1, B, C or A-2) on the EVAL board, and then the associated LED is light.

5.23. USB_Device

5.23.1. USBD_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

EVAL board has one USBFS interface. In this demo, the EVAL 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 `<23_USB_Device\CDC_ACM>` to the EVAL 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.

5.23.2. USBD_Keyboard

DEMO Purpose

This demo includes the following functions of GD32 MCU:

- Learn how to use the USBFS peripheral mode
- Learn how to implement USB HID(human interface) device

EVAL board has four keys and one USB_FS interface. The five keys are Reset key, Wakeup key, Tamper key and User key. In this demo, the EVAL board is enumerated as an USB Keyboard, which uses the native PC Host HID driver, as shown below. The USB Keyboard uses three keys(wakeup key, tamper key and user key) to output three
characters (‘b’, ‘a’ and ‘c’). In addition, the demo also supports remote wakeup which is the ability of a USB device to bring a suspended bus back to the active condition, and the wakeup key is used as the remote wakeup source.

DEM0 Running Result

Before running the demo, please ensure that jumper JP13 jump to USB. After doing this, download the program <23_USB_Device\HID_Keyboard> to the EVAL board and run. If you press the Wakeup key, will output ‘b’. If you press the User key, will output ‘c’. If you press the Tamper key, will output ‘a’.

If you want to test USB remote wakeup function, you can do as follows:
- Manually switch PC to standby mode
- Wait for PC to fully enter the standby mode
- Push the Wakeup key
- If PC is ON, remote wakeup is OK, else failed.

5.24. USB_Host

5.24.1. USBH_HID_Host

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

EVAL evaluation board integrates the USBFS module, and the module can be used as a USBFS device, a USBFS host or OTG device. This demo mainly shows how to use the USBFS as a USB HID host to communicate with external USB HID device.

DEMO Running Result

Jump the JP13 to USB. Then download the program <24_USB_Host\USBH_HID> to the EVAL board and run.
If a mouse has been attached, the user will see the information of mouse enumeration. First pressing the user key will see the inserted device is mouse, and then moving the mouse will show the position of mouse and the state of button in the screen.

If a keyboard has been attached, the user will see the information of keyboard enumeration. First pressing the user key will see the inserted device is keyboard, and then pressing the keyboard will show the data which keyboard inserted in the screen.

5.24.2. **USBH_MSC_Host**

**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

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

**DEMO Running Result**

Jump the JP13 to USB. Then insert the OTG cable to the USB port, download the program `<24_USB_Host\USBH_MSC >` to the EVAL board and run.

If an Udisk has been attached, the user will see the information of Udisk enumeration. First pressing the user key will see the Udisk information, next pressing the tamper key will see the root content of the Udisk, then press the wakeup key will write file to the Udisk, finally the user will see information that the MSC host demo is end.

6. **Revision history**

**Table 6-1 Revision history**

<table>
<thead>
<tr>
<th>Revision No.</th>
<th>Description</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.0</td>
<td>Initial Release</td>
<td>Jun.28, 2017</td>
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</tbody>
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