

# Readme

## APM32 USB SDK

**Rev: V1.1**

# 1 Introduction

The Geehy Semiconductor APM32 USB software development kit includes a series driver library, a group of example applications that demonstrate key peripheral functionality, and other development files.

Software development kit have a hierarchy as follows:

- SDK directory
  - \* [Boards](#)
  - \* [Documents](#)
  - \* [Examples](#)
  - \* [Libraries](#)
  - \* [Middlewares](#)

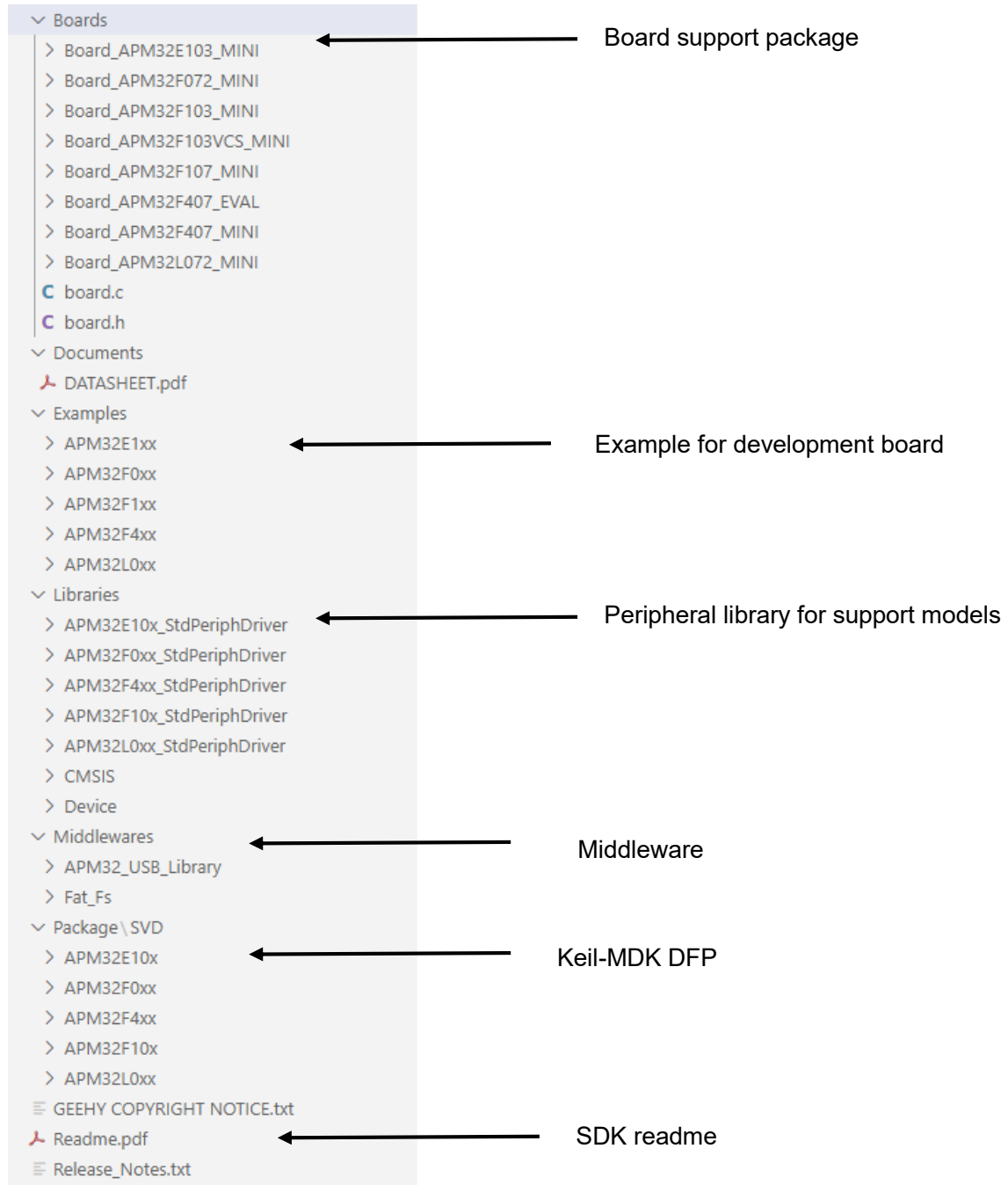
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## 2 About SDK

### 2.1 USB SDK files

The complete SDK directory:



## 2.2 Devices supported USB Class

CLASS	APM32F4XX	APM32F10X	APM32E10X	APM32F0XX	APM32L0XX	NA	NA	NA
OTGD_CDC	√	√						
OTGD_CDC_HS2	√							
OTGD_CUSTOM_HID	√	√						
OTGD_Custom_HID_HS2	√							
OTGD_CUSTOM_HID_Keyboard	√	√						
OTGD_Custom_HID_Keyboard_HS2	√							
OTGD_HID	√	√						
OTGD_HID_HS2	√							
OTGD_HID_HS2_LowPower	√							
OTGD_HID_Keyboard	√	√						
OTGD_HID_Keyboard_HS2	√							
OTGD_HID_WakeUp_LowPower	√	√						
OTGD_MSC	√	√						
OTGD_MSC_HS_IN_FS	√							
OTGD_MSC_HS1	√							
OTGD_MSC_HS2	√							
OTGD_MSC_LowPower	√	√						
OTGD_MSC_NorFlash	√							
OTGD_MSC_NorFlash_HS2	√							
OTGD_MSC_SDCard	√							
OTGD_MSC_SDCard_HS2	√							
OTGD_WINUSB	√	√						
OTGD_WINUSB_HS2	√							
OTGD_Composite_CDC	√	√						
OTGD_Composite_CDC_HID	√	√						
OTGD_Composite_CDC_MSC	√	√						
OTGD_Composite_CDC_WINUSB	√	√						
OTGD_Composite_HID_MSC	√	√						
OTGD_Composite_HID_WINUSB	√	√						
OTGD_Composite_MSC_WINUSB	√	√						
OTGD_Composite_WINUSB	√	√						
OTGD_CDC_DualCore	√							

CLASS	APM32F4XX	APM32F10X	APM32E10X	APM32F0XX	APM32L0XX	NA	NA	NA
USBD_CDC		√	√	√	√			
USBD_CUSTOM_HID		√	√	√	√			
USBD_CUSTOM_HID_Keyboard		√	√	√	√			
USBD_HID		√	√	√	√			
USBD_HID_WakeUp_LowPower		√	√					
USBD_MSC		√	√	√	√			
USBD_MSC_LowPower		√	√					
USBD_WINUSB		√	√	√	√			
USBD_Composite_CDC		√	√					
USBD_Composite_CDC_HID		√	√					
USBD_Composite_CDC_MSC		√	√					
USBD_Composite_CDC_WINUSB		√	√					
USBD_Composite_HID_MSC		√	√					
USBD_Composite_HID_WINUSB		√	√					
USBD_Composite_MSC_WINUSB		√	√					
USBD_Composite_WINUSB		√	√					
OTGH_CDC	√	√						
OTGH_CDC_HS2	√							
OTGH_HID	√	√						
OTGH_HID_HS_IN_FS	√							
OTGH_HID_HS2	√							
OTGH_MSC	√	√						
OTGH_MSC_FWUpgrade	√							
OTGH_MSC_HS1	√							
OTGH_MSC_HS2	√							
OTGH_MSC_DualCore	√							
DRD_MSC_CDC_DualCore	√	√						
MSC_CDC_DualCore	√							

### 3 About boards

The boards folder includes a board support package for APM32 MINI or EVAL board. It can help drive the peripheral circuit or components on the board quickly. The BSP can be found in the [~/Boards](#) directory.

The BSP provided are built for APM32 MINI or EVAL board compatibility. For other user development board use, some minor modifications may be required.

Boards have a hierarchy as follows:

- Boards folder
  - \* Board folder
    - inc
    - src
  - \* board.c
  - \* board.h

Board APM32XXX\_XXX include following board support package:

- Board\_APM32XXX\_XXX src folder
  - \* board\_apm32xxx\_xxx
  - \* bsp\_delay

## 4     **About documents**

The documents folder includes a link file that can be redirected to the technical support center of Geehy semiconductor. The BSP can be found in the [~/Documents](#) directory.



## 5 About examples

The example applications can be found in the [~/Examples](#) directory.

The examples provided are built for APM32 MINI or EVAL board compatibility. For other user development board use, some minor modifications may be required.

Example projects have a hierarchy as follows:

- Example folder
  - \* Include
  - \* Project
    - MDK
    - IAR
    - Eclipse
  - \* Source

All example applications tested with:

**APM32E1xx StdPeriphDriver v1.0.2,**

**APM32F0xx StdPeriphDriver v1.0.3,**

**APM32F4xx StdPeriphDriver v1.0.3,**

**APM32F10x StdPeriphDriver v1.0.4,**

**APM32L0xx StdPeriphDriver v1.0.0,**

include the following examples:

- Examples
  - \* APM32E1xx
    - Device\_Examples
      - [USBD\\_CDC](#)
      - [USBD\\_Composite\\_CDC](#)
      - [USBD\\_Composite\\_CDC\\_HID](#)
      - [USBD\\_Composite\\_CDC\\_MSC](#)
      - [USBD\\_Composite\\_CDC\\_WINUSB](#)
      - [USBD\\_Composite\\_HID\\_MSC](#)

- [USBD\\_Composite\\_HID\\_WINUSB](#)
- [USBD\\_Composite\\_MSC\\_WINUSB](#)
- [USBD\\_Composite\\_WINUSB](#)
- [USBD\\_CUSTOM\\_HID](#)
- [USBD\\_CUSTOM\\_HID\\_Keyboard](#)
- [USBD\\_HID](#)
- [USBD\\_HID\\_WakeUp\\_LowPower](#)
- [USBD\\_MSC](#)
- [USBD\\_MSC\\_LowPower](#)
- [USBD\\_WINUSB](#)

\* APM32F0xx

- Device\_Examples

- [USBD\\_CDC](#)
- [USBD\\_CUSTOM\\_HID](#)
- [USBD\\_CUSTOM\\_HID\\_Keyboard](#)
- [USBD\\_HID](#)
- [USBD\\_MSC](#)
- [USBD\\_WINUSB](#)

\* APM32F1xx

- Device\_Examples

- [OTGD\\_CDC](#)
- [OTGD\\_Composite\\_CDC](#)
- [OTGD\\_Composite\\_CDC\\_HID](#)
- [OTGD\\_Composite\\_CDC\\_MSC](#)
- [OTGD\\_Composite\\_CDC\\_WINUSB](#)
- [OTGD\\_Composite\\_HID\\_MSC](#)
- [OTGD\\_Composite\\_HID\\_WINUSB](#)
- [OTGD\\_Composite\\_MSC\\_WINUSB](#)

- [OTGD\\_Composite\\_WINUSB](#)
- [OTGD\\_CUSTOM\\_HID](#)
- [OTGD\\_CUSTOM\\_HID\\_Keyboard](#)
- [OTGD\\_HID](#)
- [OTGD\\_HID\\_WakeUp\\_LowPower](#)
- [OTGD\\_MSC](#)
- [OTGD\\_MSC\\_LowPower](#)
- [OTGD\\_WINUSB](#)
- [USBD\\_CDC](#)
- [USBD\\_Composite\\_CDC](#)
- [USBD\\_Composite\\_CDC\\_HID](#)
- [USBD\\_Composite\\_CDC\\_MSC](#)
- [USBD\\_Composite\\_CDC\\_WINUSB](#)
- [USBD\\_Composite\\_HID\\_MSC](#)
- [USBD\\_Composite\\_HID\\_WINUSB](#)
- [USBD\\_Composite\\_MSC\\_WINUSB](#)
- [USBD\\_Composite\\_WINUSB](#)
- [USBD\\_CUSTOM\\_HID](#)
- [USBD\\_CUSTOM\\_HID\\_Keyboard](#)
- [USBD\\_HID](#)
- [USBD\\_HID\\_WakeUp\\_LowPower](#)
- [USBD\\_MSC](#)
- [USBD\\_MSC\\_LowPower](#)
- [USBD\\_WINUSB](#)
- Host\_Examples
  - [OTGH\\_CDC](#)
  - [OTGH\\_HID](#)
  - [OTGH\\_MSC](#)

- Host\_Device\_Examples
  - [DRD\\_MSC\\_CDC\\_DualCore](#)
- \* APM32F4xx
  - Device\_Examples
    - [OTGD\\_CDC](#)
    - [OTGD\\_CDC\\_DualCore](#)
    - [OTGD\\_CDC\\_HS2](#)
    - [OTGD\\_Composite\\_CDC](#)
    - [OTGD\\_Composite\\_CDC\\_HID](#)
    - [OTGD\\_Composite\\_CDC\\_MSC](#)
    - [OTGD\\_Composite\\_CDC\\_WINUSB](#)
    - [OTGD\\_Composite\\_HID\\_MSC](#)
    - [OTGD\\_Composite\\_HID\\_WINUSB](#)
    - [OTGD\\_Composite\\_MSC\\_WINUSB](#)
    - [OTGD\\_Composite\\_WINUSB](#)
    - [OTGD\\_HID](#)
    - [OTGD\\_Custom\\_HID](#)
    - [OTGD\\_Custom\\_HID\\_HS2](#)
    - [OTGD\\_Custom\\_HID\\_Keyboard](#)
    - [OTGD\\_Custom\\_HID\\_Keyboard\\_HS2](#)
    - [OTGD\\_HID\\_HS2](#)
    - [OTGD\\_HID\\_HS2\\_LowPower](#)
    - [OTGD\\_HID\\_Keyboard](#)
    - [OTGD\\_HID\\_Keyboard\\_HS2](#)
    - [OTGD\\_HID\\_WakeUp\\_LowPower](#)
    - [OTGD\\_MSC](#)
    - [OTGD\\_MSC\\_HS\\_IN\\_FS](#)
    - [OTGD\\_MSC\\_HS1](#)

- [OTGD\\_MSC\\_HS2](#)
- [OTGD\\_MSC\\_LowPower](#)
- [OTGD\\_MSC\\_NorFlash](#)
- [OTGD\\_MSC\\_NorFlash\\_HS2](#)
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  - [OTGH\\_HID\\_HS2](#)
  - [OTGH\\_MSC](#)
  - [OTGH\\_MSC\\_DualCore](#)
  - [OTGH\\_MSC\\_FWUpgrade](#)
  - [OTGH\\_MSC\\_HS1](#)
  - [OTGH\\_MSC\\_HS2](#)
- Host\_Device\_Examples
  - [DRD\\_MSC\\_CDC\\_DualCore](#)
  - [MSC\\_CDC\\_DualCore](#)
- \* APM32L0xx
  - Device\_Examples
    - [USBD\\_CDC](#)
    - [USBD\\_CUSTOM\\_HID](#)
    - [USBD\\_CUSTOM\\_HID\\_Keyboard](#)
    - [USBD\\_HID](#)

- [USBD\\_MSC](#)
- [USBD\\_WINUSB](#)

## 5.1 APM32E1xx

### 5.1.1 USBD\_CDC

#### 5.1.1.1 Example Description

This example describes how to use USBD to simulate a CDC device. Program will send hello + num string to USB host. And when CDC device receive data will send back the same data to USB host.

#### 5.1.1.2 Directory contents

This example can be found in the [~ \Examples\APM32E1xx\Device\\_Examples\USBD\\_CDC](#) directory.

### 5.1.2 USBD\_Composite\_CDC

#### 5.1.2.1 Example Description

This example describes how to use USBD to simulate two CDC devices.

When CDC device receive data will send back the same data to USB host.

#### 5.1.2.2 Directory contents

This example can be found in the [~ \Examples\APM32E1xx\Device\\_Examples\USBD\\_Composite\\_CDC](#) directory.

### 5.1.3 USBD\_Composite\_CDC\_HID

#### 5.1.3.1 Example Description

This example describes how to use OTG to implement a composite device with CDC and HID functional interfaces.

#### 5.1.3.2 Directory contents

This example can be found in the [~ \Examples\APM32E1xx\Device\\_Examples\USBD\\_Composite\\_CDC\\_HID](#) directory.

## **5.1.4 USBD\_Composite\_CDC\_MSC**

### **5.1.4.1 Example Description**

This example describes how to use USB to implement a composite device with CDC and MSC functional interfaces.

### **5.1.4.2 Directory contents**

This example can be found in the [~ \Examples\APM32E1xx\Device\\_Examples\USBD\\_Composite\\_CDC\\_MSC](#) directory.

## **5.1.5 USBD\_Composite\_CDC\_WINUSB**

### **5.1.5.1 Example Description**

This example describes how to use USB to implement a composite device with CDC and WINUSB functional interfaces.

### **5.1.5.2 Directory contents**

This example can be found in the [~ \Examples\APM32E1xx\Device\\_Examples\USBD\\_Composite\\_CDC\\_WINUSB](#) directory.

## **5.1.6 USBD\_Composite\_HID\_MSC**

### **5.1.6.1 Example Description**

This example describes how to use OTG to implement a composite device with HID and MSC functional interfaces.



### 5.1.6.2 Directory contents

This example can be found in the [~ \Examples\APM32E1xx\Device\\_Examples\USBD\\_Composite\\_HID\\_MSC](#) directory.

## 5.1.7 USBD\_Composite\_HID\_WINUSB

### 5.1.7.1 Example Description

This example describes how to use USB to implement a composite device with WINUSB and HID functional interfaces.

### 5.1.7.2 Directory contents

This example can be found in the [~ \Examples\APM32E1xx\Device\\_Examples\USBD\\_Composite\\_HID\\_WINUSB](#) directory.

## 5.1.8 USBD\_Composite\_MSC\_WINUSB

### 5.1.8.1 Example Description

This example describes how to use USB to implement a composite device with WINUSB and MSC functional interfaces.

### 5.1.8.2 Directory contents

This example can be found in the [~ \Examples\APM32E1xx\Device\\_Examples\USBD\\_Composite\\_MSC\\_WINUSB](#) directory.

## 5.1.9 USBD\_Composite\_WINUSB

### 5.1.9.1 Example Description

This example describes how to use USB to implement a composite device with two WINUSB functional interfaces.

### 5.1.9.2 Directory contents

This example can be found in the [~ \Examples\APM32E1xx\Device\\_Examples\USBD\\_Composite\\_WINUSB](#) directory.

## 5.1.10 USBD\_CUSTOM\_HID

### 5.1.10.1 Example Description

This example describes how to use USBD to simulate a custom hid.

This is a template example.

User can customize HID reports to implement the desired functionality.

### 5.1.10.2 Directory contents

This example can be found in the [~ \Examples\APM32E1xx\Device\\_Examples\USBD\\_CUSTOM\\_HID](#) directory.

## 5.1.11 USBD\_CUSTOM\_HID\_Keyboard

### 5.1.11.1 Example Description

This example describes how to use USBD to simulate a custom HID keyboard.

Press KEY1 will send the report descriptor of a - z or Enter to the USB host.

The state of Capslock and numlock determine whether LED2 and LED3 are on or off.

### 5.1.11.2 Directory contents

This example can be found in the [~ \Examples\APM32E1xx\Device\\_Examples\USBD\\_CUSTOM\\_HID\\_Keyboard](#) directory.

## 5.1.12 USBD\_HID

### 5.1.12.1 Example Description

This example describes how to use USB to simulate a HID mouse.

Press KEY1 will move the cursor to the left.

Press KEY2 will move the cursor to the right.

### 5.1.12.2 Directory contents

This example can be found in the [~ \Examples\APM32E1xx\Device\\_Examples\USBD\\_HID](#) directory.

## 5.1.13 USBD\_HID\_WakeUp\_LowPower

### 5.1.13.1 Example Description

This example describes how to use USB to simulate a HID mouse.

When PC enter sleep mode, device will enter low power mode.

You can wake up the PC and the device at the same time by using another keyboard and mouse device on the PC or by pressing the KEY1.

Press KEY2 will move the cursor to the right.

### 5.1.13.2 Directory contents

This example can be found in the [~ \Examples\APM32E1xx\Device\\_Examples\USBD\\_HID\\_WakeUp\\_LowPower](#) directory.

## 5.1.14 USBD\_MSC

### 5.1.14.1 Example Description

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This example describes how to use sram array to simulate a fake U disk.

### 5.1.14.2 Directory contents

This example can be found in the [~ \Examples\APM32E1xx\Device\\_Examples\USBD\\_MSC](#) directory.

### 5.1.15 USBD\_MSC\_LowPower

#### 5.1.15.1 Example Description

This example describes how to use sram array to simulate a fake U disk.

When PC enter or exit sleep mode, the U disk device will enter or exit low power mode.

#### 5.1.15.2 Directory contents

This example can be found in the [~ \Examples\APM32E1xx\Device\\_Examples\USBD\\_MSC\\_LowPower](#) directory.

### 5.1.16 USBD\_WINUSB

#### 5.1.16.1 Example Description

This example describes how to use USBD to simulate a WINUSB device. Program will send hello + num string to USB host. And when WINUSB device receive data will send back the same data to USB host.

#### 5.1.16.2 Directory contents

This example can be found in the [~ \Examples\APM32E1xx\Device\\_Examples\USBD\\_WINUSB](#) directory.

## 5.2 APM32F0xx

### 5.2.1 USBD\_CDC

#### 5.2.1.1 Example Description

This example describes how to use USBD to simulate a CDC device. Program will send hello + num string to USB host. And when CDC device receive data will send back the same data to USB host.

#### 5.2.1.2 Directory contents

This example can be found in the [~ \Examples\APM32F0xx\Device\\_Examples\USBD\\_CDC](#) directory.

### 5.2.2 USBD\_CUSTOM\_HID

#### 5.2.2.1 Example Description

This example describes how to use USBD to simulate a custom hid.

This is a template example.

User can customize HID reports to implement the desired functionality.

#### 5.2.2.2 Directory contents

This example can be found in the [~ \Examples\APM32F0xx\Device\\_Examples\USBD\\_CUSTOM\\_HID](#) directory.

### 5.2.3 USBD\_CUSTOM\_HID\_Keyboard

#### 5.2.3.1 Example Description

This example describes how to use USBD to simulate a custom HID keyboard.

Press KEY1 will send the report descriptor of a - z or Enter to the USB host.

---

The state of Caps lock and num lock determine whether LED2 and LED3 are on or off.

### 5.2.3.2 Directory contents

This example can be found in the [~ \Examples\APM32F0xx\Device\\_Examples\USBD\\_CUS TOM\\_HID\\_Keyboard](#) directory.

## 5.2.4 USBD\_HID

### 5.2.4.1 Example Description

This example describes how to use USB to simulate a HID mouse.

Press KEY1 will move the cursor to the left.

Press KEY2 will move the cursor to the right.

### 5.2.4.2 Directory contents

This example can be found in the [~ \Examples\APM32F0xx\Device\\_Examples\USBD\\_HID](#) directory.

## 5.2.5 USBD\_MSC

### 5.2.5.1 Example Description

This example describes how to use sram array to simulate a fake U disk.

### 5.2.5.2 Directory contents

This example can be found in the [~ \Examples\APM32F0xx\Device\\_Examples\USBD\\_MSC](#) directory.

## 5.2.6 USBD\_WINUSB

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### 5.2.6.1 Example Description

This example describes how to use USBD to simulate a WINUSB device. Program will send hello + num string to USB host. And when WINUSB device receive data will send back the same data to USB host.

### 5.2.6.2 Directory contents

This example can be found in the [~ \Examples\APM32F0xx\Device\\_Examples\USBD\\_WINUSB](#) directory.

## **5.3 APM32F1xx**

### **5.3.1 OTGD\_CDC**

#### **5.3.1.1 Example Description**

This example describes how to use OTG to simulate a CDC device. When CDC device receive data will send back the same data to USB host.

#### **5.3.1.2 Directory contents**

This example can be found in the [~ \Examples\APM32F1xx\Device\\_Examples\OTGD\\_CDC](#) directory.

### **5.3.2 OTGD\_Composite\_CDC**

#### **5.3.2.1 Example Description**

This example describes how to use OTG to implement a composite device with two CDC functional interfaces.

#### **5.3.2.2 Directory contents**

This example can be found in the [~ \Examples\APM32F1xx\Device\\_Examples\OTGD\\_Composite\\_CDC](#) directory.

### **5.3.3 OTGD\_Composite\_CDC\_HID**

#### **5.3.3.1 Example Description**

This example describes how to use OTG to implement a composite device with CDC and HID functional interfaces.

#### **5.3.3.2 Directory contents**



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This example can be found in the [~ \Examples\APM32F1xx\Device\\_Examples\OTGD\\_Composite\\_CDC\\_HID](#) directory.

## **5.3.4 OTGD\_Composite\_CDC\_MSC**

### **5.3.4.1 Example Description**

This example describes how to use OTG to implement a composite device with CDC and MSC functional interfaces.

### **5.3.4.2 Directory contents**

This example can be found in the [~ \Examples\APM32F1xx\Device\\_Examples\OTGD\\_Composite\\_CDC\\_MSC](#) directory.

## **5.3.5 OTGD\_Composite\_CDC\_WINUSB**

### **5.3.5.1 Example Description**

This example describes how to use OTG to implement a composite device with CDC and WINUSB functional interfaces.

### **5.3.5.2 Directory contents**

This example can be found in the [~ \Examples\APM32F1xx\Device\\_Examples\OTGD\\_Composite\\_CDC\\_WINUSB](#) directory.

## **5.3.6 OTGD\_Composite\_HID\_MSC**

### **5.3.6.1 Example Description**

This example describes how to use OTG to implement a composite device with HID and MSC functional interfaces.

### 5.3.6.2 Directory contents

This example can be found in the [~ \Examples\APM32F1xx\Device\\_Examples\OTGD\\_Composite\\_HID\\_MSC](#) directory.

### 5.3.7 OTGD\_Composite\_HID\_WINUSB

#### 5.3.7.1 Example Description

This example describes how to use OTG to implement a composite device with HID and WINUSB functional interfaces.

#### 5.3.7.2 Directory contents

This example can be found in the [~ \Examples\APM32F1xx\Device\\_Examples\OTGD\\_Composite\\_HID\\_WINUSB](#) directory.

### 5.3.8 OTGD\_Composite\_MSC\_WINUSB

#### 5.3.8.1 Example Description

This example describes how to use OTG to implement a composite device with WINUSB and MSC functional interfaces.

#### 5.3.8.2 Directory contents

This example can be found in the [~ \Examples\APM32F1xx\Device\\_Examples\OTGD\\_Composite\\_MSC\\_WINUSB](#) directory.

### 5.3.9 OTGD\_Composite\_WINUSB

#### 5.3.9.1 Example Description

This example describes how to use OTG to implement a composite device with two WINUSB functional interfaces.

### 5.3.9.2 Directory contents

This example can be found in the [~ \Examples\APM32F1xx\Device\\_Examples\OTGD\\_Composite\\_WINUSB](#) directory.

## 5.3.10 OTGD\_CUSTOM\_HID

### 5.3.10.1 Example Description

This example describes how to use OTG to simulate a custom hid.

This is a template example.

User can customize HID reports to implement the desired functionality.

### 5.3.10.2 Directory contents

This example can be found in the [~ \Examples\APM32F1xx\Device\\_Examples\OTGD\\_CUSTOM\\_HID](#) directory.

## 5.3.11 OTGD\_CUSTOM\_HID\_Keyboard

### 5.3.11.1 Example Description

This example describes how to use OTG to simulate a custom HID keyboard.

Press KEY1 will send the report descriptor of a - z or Enter to the USB host.

The state of Caps lock and num lock determine whether LED2 and LED3 are on or off.

### 5.3.11.2 Directory contents

This example can be found in the [~ \Examples\APM32F1xx\Device\\_Examples\OTGD\\_CUSTOM\\_HID\\_Keyboard](#) directory.

## 5.3.12 OTGD\_HID

### 5.3.12.1 Example Description

This example describes how to use OTG to simulate a HID mouse.

Press KEY1 will move the cursor to the left.

Press KEY2 will move the cursor to the right.

### 5.3.12.2 Directory contents

This example can be found in the [~ \Examples\APM32F1xx\Device\\_Examples\OTGD\\_HID](#) directory.

## 5.3.13 OTGD\_HID\_WakeUp\_LowPower

### 5.3.13.1 Example Description

This example describes how to use OTG to simulate a HID mouse.

When PC enter sleep mode, device will enter low power mode.

You can wake up the PC and the device at the same time by using another keyboard and mouse device on the PC or by pressing the KEY1.

### 5.3.13.2 Directory contents

This example can be found in the [~ \Examples\APM32F1xx\Device\\_Examples\OTGD\\_HID\\_WakeUp\\_LowPower](#) directory.

## 5.3.14 OTGD\_MSC

### 5.3.14.1 Example Description

This example describes how to use sram array to simulate a fake U disk.

### 5.3.14.2 Directory contents

This example can be found in the [~ \Examples\APM32F1xx\Device\\_Examples\OTGD\\_MSC](#) directory.

### 5.3.15 OTGD\_MSC\_LowPower

#### 5.3.15.1 Example Description

This example describes how to use sram array to simulate a fake U disk.

When PC enter or exit sleep mode, the U disk device will enter or exit low power mode.

#### 5.3.15.2 Directory contents

This example can be found in the [~ \Examples\APM32F1xx\Device\\_Examples\OTGD\\_MSC\\_LowPower](#) directory.

### 5.3.16 OTGD\_WINUSB

#### 5.3.16.1 Example Description

This example describes how to use OTG to simulate a WINUSB device. Program will send hello + num string to USB host. And when WINUSB device receive data will send back the same data to USB host.

#### 5.3.16.2 Directory contents

This example can be found in the [~ \Examples\APM32F1xx\Device\\_Examples\OTGD\\_WINUSB](#) directory.

### 5.3.17 USBD\_CDC

#### 5.3.17.1 Example Description

This example describes how to use USB D to simulate a CDC device. Program will send hello + num string to USB host. And when CDC device receive data will send back the same data to USB host.

### 5.3.17.2 Directory contents

This example can be found in the [~ \Examples\APM32F1xx\Device Examples\USB D\\_CDC](#) directory.

## 5.3.18 USB D\_Composite\_CDC

### 5.3.18.1 Example Description

This example describes how to use OTG to implement a composite device with two CDC functional interfaces.

### 5.3.18.2 Directory contents

This example can be found in the [~ \Examples\APM32F1xx\Device Examples\USB D\\_Composite\\_CDC](#) directory.

## 5.3.19 USB D\_Composite\_CDC\_HID

### 5.3.19.1 Example Description

This example describes how to use OTG to implement a composite device with CDC and HID functional interfaces.

### 5.3.19.2 Directory contents

This example can be found in the [~ \Examples\APM32F1xx\Device Examples\USB D\\_Composite\\_CDC\\_HID](#) directory.

## 5.3.20 USB D\_Composite\_CDC\_MSC

### 5.3.20.1 Example Description

This example describes how to use OTG to implement a composite device with CDC and HID functional interfaces.

### 5.3.20.2 Directory contents

This example can be found in the [~ \Examples\APM32F1xx\Device\\_Examples\USBD\\_Composite\\_CDC\\_MSC](#) directory.

## 5.3.21 USBD\_Composite\_CDC\_WINUSB

### 5.3.21.1 Example Description

This example describes how to use OTG to implement a composite device with CDC and WINUSB functional interfaces.

### 5.3.21.2 Directory contents

This example can be found in the [~ \Examples\APM32F1xx\Device\\_Examples\USBD\\_Composite\\_CDC\\_WINUSB](#) directory.

## 5.3.22 USBD\_Composite\_HID\_MSC

### 5.3.22.1 Example Description

This example describes how to use OTG to implement a composite device with HID and MSC functional interfaces.

### 5.3.22.2 Directory contents

This example can be found in the [~ \Examples\APM32F1xx\Device\\_Examples\USBD\\_Composite\\_HID\\_MSC](#) directory.

## 5.3.23 USBD\_Composite\_HID\_WINUSB

### 5.3.23.1 Example Description

This example describes how to use OTG to implement a composite device with WINUSB and HID functional interfaces.

### 5.3.23.2 Directory contents

This example can be found in the [~ \Examples\APM32F1xx\Device\\_Examples\USBD\\_Composite\\_HID\\_WINUSB](#) directory.

## 5.3.24 USBD\_Composite\_MSC\_WINUSB

### 5.3.24.1 Example Description

This example describes how to use OTG to implement a composite device with WINUSB and HID functional interfaces.

### 5.3.24.2 Directory contents

This example can be found in the [~ \Examples\APM32F1xx\Device\\_Examples\USBD\\_Composite\\_MSC\\_WINUSB](#) directory.

## 5.3.25 USBD\_Composite\_WINUSB

### 5.3.25.1 Example Description

This example describes how to use OTG to implement a composite device with two WINUSB functional interfaces.

### 5.3.25.2 Directory contents

This example can be found in the [~ \Examples\APM32F1xx\Device\\_Examples\USBD\\_Composite\\_WINUSB](#) directory.

## 5.3.26 USBD\_CUSTOM\_HID

[www.geehy.com](http://www.geehy.com)



### 5.3.26.1 Example Description

This example describes how to use USB D to simulate a custom hid.

This is a template example.

User can customize HID reports to implement the desired functionality.

### 5.3.26.2 Directory contents

This example can be found in the [~ \Examples\APM32F1xx\Device\\_Examples\USB D\\_CUSTOM\\_HID](#) directory.

## 5.3.27 USB D\_CUSTOM\_HID\_Keyboard

### 5.3.27.1 Example Description

This example describes how to use USB D to simulate a custom HID keyboard.

Press KEY1 will send the report descriptor of a - z or Enter to the USB host.

The state of Capslock and numlock determine whether LED2 and LED3 are on or off.

### 5.3.27.2 Directory contents

This example can be found in the [~ \Examples\APM32F1xx\Device\\_Examples\USB D\\_CUSTOM\\_HID\\_Keyboard](#) directory.

## 5.3.28 USB D\_HID

### 5.3.28.1 Example Description

This example describes how to use USB to simulate a HID mouse.

Press KEY1 will move the cursor to the left.

Press KEY2 will move the cursor to the right.

### 5.3.28.2 Directory contents

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This example can be found in the [~ \Examples\APM32F1xx\Device\\_Examples\USBD\\_HID](#) directory.

## **5.3.29 USBD\_HID\_WakeUp\_LowPower**

### **5.3.29.1 Example Description**

This example describes how to use USB to simulate a HID mouse.

When PC enter sleep mode, device will enter low power mode.

You can wake up the PC and the device at the same time by using another keyboard and mouse device on the PC or by pressing the KEY1.

Press KEY2 will move the cursor to the right.

### **5.3.29.2 Directory contents**

This example can be found in the [~ \Examples\APM32F1xx\Device\\_Examples\USBD\\_HID\\_WakeUp\\_LowPower](#) directory.

## **5.3.30 USBD\_MSC**

### **5.3.30.1 Example Description**

This example describes how to use sram array to simulate a fake U disk.

### **5.3.30.2 Directory contents**

This example can be found in the [~ \Examples\APM32F1xx\Device\\_Examples\USBD\\_MSC](#) directory.

## **5.3.31 USBD\_MSC\_LowPower**

### 5.3.31.1 Example Description

This example describes how to use sram array to simulate a fake U disk.

When PC enter or exit sleep mode, the U disk device will enter or exit low power mode.

### 5.3.31.2 Directory contents

This example can be found in the [~ \Examples\APM32F1xx\Device\\_Examples\USBD\\_MSC\\_LowPower](#) directory.

## 5.3.32 USBD\_WINUSB

### 5.3.32.1 Example Description

This example describes how to use USBD to simulate a WINUSB device. Program will send hello + num string to USB host. And when WINUSB device receive data will send back the same data to USB host.

### 5.3.32.2 Directory contents

This example can be found in the [~ \Examples\APM32F1xx\Device\\_Examples\USBD\\_WINUSB](#) directory.

## 5.3.33 OTGH\_CDC

### 5.3.33.1 Example Description

This example describes how to use the usb host to enum a CDC device. And use UART to print CDC device operation information.

### 5.3.33.2 Directory contents

This example can be found in the [~ \Examples\APM32F1xx\Host\\_Examples\OTGH\\_CDC](#) directory.

### 5.3.34 OTGH\_HID

#### 5.3.34.1 Example Description

This example describes how to use the usb host to enum a HID device(mouse or keyboard).  
And use UART to print mouse or keyboard operation information.

#### 5.3.34.2 Directory contents

This example can be found in the [~ \Examples\APM32F1xx\Host\\_Examples\OTGH\\_HID](#) directory.

### 5.3.35 OTGH\_MSC

#### 5.3.35.1 Example Description

This example describes how to use sram array to simulate a fake U disk.

#### 5.3.35.2 Directory contents

This example can be found in the [~ \Examples\APM32F1xx\Host\\_Examples\OTGH\\_MSC](#) directory.

### 5.3.36 DRD\_MSC\_CDC\_DualCore

#### 5.3.36.1 Example Description

This example describes how to use the USB host HS2 to switch between host and device by press KEY2.

When USB is host, it is a MSC host. Use FATFS to write and read file to U disk.

Press KEY1 to write file to U disk and read file from U disk.

When USB is device, it is a CDC device. It will save the accepted data and send it to usb flash drive when it switch to host.

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### 5.3.36.2 Directory contents

This example can be found in the [~ \Examples\APM32F1xx\Host\\_Device\\_Examples\DRD\\_MSC\\_CDC\\_DualCore](#) directory.

## 5.4 APM32F4xx

### 5.4.1 OTGD\_CDC

#### 5.4.1.1 Example Description

This example describes how to use OTG to simulate a CDC device. When CDC device receive data will send back the same data to USB host.

#### 5.4.1.2 Directory contents

This example can be found in the [~ \Examples\APM32F4xx\Device\\_Examples\OTGD\\_CDC](#) directory.

### 5.4.2 OTGD\_CDC\_DualCore

#### 5.4.2.1 Example Description

This example describes how to use OTG HS2 to simulate a CDC device. When CDC device receive data will send back the same data to USB host.

#### 5.4.2.2 Directory contents

This example can be found in the [~ \Examples\APM32F4xx\Device\\_Examples\OTGD\\_CDC\\_DualCore](#) directory.

### 5.4.3 OTGD\_CDC\_HS2

#### 5.4.3.1 Example Description

This example describes how to use OTG HS2 to simulate a CDC device. When CDC device receive data will send back the same data to USB host.

#### 5.4.3.2 Directory contents

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This example can be found in the [~ \Examples\APM32F4xx\Device\\_Examples\ OTGD\\_CD C\\_HS2](#) directory.

## **5.4.4 OTGD\_Composite\_CDC**

### **5.4.4.1 Example Description**

This example describes how to use OTG to implement a composite device with two CDC functional interfaces.

### **5.4.4.2 Directory contents**

This example can be found in the [~ \Examples\APM32F4xx\Device\\_Examples\OTGD\\_Composite\\_CDC](#) directory.

## **5.4.5 OTGD\_Composite\_CDC\_HID**

### **5.4.5.1 Example Description**

This example describes how to use OTG to implement a composite device with CDC and HID functional interfaces.

### **5.4.5.2 Directory contents**

This example can be found in the [~ \Examples\APM32F4xx\Device\\_Examples\OTGD\\_Composite\\_CDC\\_HID](#) directory.

## **5.4.6 OTGD\_Composite\_CDC\_MSC**

### **5.4.6.1 Example Description**

This example describes how to use OTG to implement a composite device with CDC and MSC functional interfaces.

### 5.4.6.2 Directory contents

This example can be found in the [~ \Examples\APM32F4xx\Device\\_Examples\OTGD\\_Composite\\_CDC\\_MSC](#) directory.

## 5.4.7 OTGD\_Composite\_CDC\_WINUSB

### 5.4.7.1 Example Description

This example describes how to use OTG to implement a composite device with CDC and WINUSB functional interfaces.

### 5.4.7.2 Directory contents

This example can be found in the [~ \Examples\APM32F4xx\Device\\_Examples\OTGD\\_Composite\\_CDC\\_WINUSB](#) directory.

## 5.4.8 OTGD\_Composite\_HID\_MSC

### 5.4.8.1 Example Description

This example describes how to use OTG to implement a composite device with MSC and HID functional interfaces.

### 5.4.8.2 Directory contents

This example can be found in the [~ \Examples\APM32F4xx\Device\\_Examples\OTGD\\_Composite\\_HID\\_MSC](#) directory.

## 5.4.9 OTGD\_Composite\_HID\_WINUSB

### 5.4.9.1 Example Description



This example describes how to use OTG to implement a composite device with WINUSB and HID functional interfaces.

### 5.4.9.2 Directory contents

This example can be found in the [~ \Examples\APM32F4xx\Device\\_Examples\OTGD\\_Composite\\_HID\\_WINUSB](#) directory.

## 5.4.10 OTGD\_Composite\_MSC\_WINUSB

### 5.4.10.1 Example Description

This example describes how to use OTG to implement a composite device with WINUSB and MSC functional interfaces.

### 5.4.10.2 Directory contents

This example can be found in the [~ \Examples\APM32F4xx\Device\\_Examples\OTGD\\_Composite\\_MSC\\_WINUSB](#) directory.

## 5.4.11 OTGD\_Composite\_WINUSB

### 5.4.11.1 Example Description

This example describes how to use OTG to implement a composite device with two WINUSB interfaces.

### 5.4.11.2 Directory contents

This example can be found in the [~ \Examples\APM32F4xx\Device\\_Examples\OTGD\\_Composite\\_WINUSB](#) directory.

## 5.4.12 OTGD\_Custom\_HID

### 5.4.12.1 Example Description

This example describes how to use OTG to simulate a custom hid.

This is a template example.

User can customize HID reports to implement the desired functionality.

### 5.4.12.2 Directory contents

This example can be found in the [~ \Examples\APM32F4xx\Device\\_Examples\OTGD\\_Custom\\_HID](#) directory.

## 5.4.13 OTGD\_Custom\_HID\_HS2

### 5.4.13.1 Example Description

This example describes how to use OTG to simulate a custom hid.

This is a template example.

User can customize HID reports to implement the desired functionality.

### 5.4.13.2 Directory contents

This example can be found in the [~ \Examples\APM32F4xx\Device\\_Examples\OTGD\\_Custom\\_HID\\_HS2](#) directory.

## 5.4.14 OTGD\_Custom\_HID\_Keyboard

### 5.4.14.1 Example Description

This example describes how to use OTG to simulate a custom HID keyboard.

Press KEY1 will send the report descriptor of a - z or Enter to the USB host.

The state of Caps lock and num lock determine whether LED2 and LED3 are on or off.

### 5.4.14.2 Directory contents

This example can be found in the [~ \Examples\APM32F4xx\Device\\_Examples\OTGD\\_Custom\\_HID\\_Keyboard](#) directory.

## **5.4.15 OTGD\_Custom\_HID\_Keyboard\_HS2**

### **5.4.15.1 Example Description**

This example describes how to use OTG HS2 to simulate a custom HID keyboard.

Press KEY1 will send the report descriptor of a - z or Enter to the USB host.

The state of Capslock and numlock determine whether LED2 and LED3 are on or off.

### **5.4.15.2 Directory contents**

This example can be found in the [~ \Examples\APM32F4xx\Device\\_Examples\OTGD\\_Custom\\_HID\\_Keyboard\\_HS2](#) directory.

## **5.4.16 OTGD\_HID**

### **5.4.16.1 Example Description**

This example describes how to use OTG to simulate a HID mouse.

Press KEY1 will move the cursor to the left.

Press KEY2 will move the cursor to the right.

### **5.4.16.2 Directory contents**

This example can be found in the [~ \Examples\APM32F4xx\Device\\_Examples\OTGD\\_HID](#) directory.

## **5.4.17 OTGD\_HID\_HS2**

### **5.4.17.1 Example Description**

This example describes how to use OTG HS2 to simulate a HID mouse.

Press KEY1 will move the cursor to the left.

Press KEY2 will move the cursor to the right.

### 5.4.17.2 Directory contents

This example can be found in the [~ \Examples\APM32F4xx\Device\\_Examples\OTGD\\_HID\\_HS2](#) directory.

## 5.4.18 OTGD\_HID\_HS2\_LowPower

### 5.4.18.1 Example Description

This example describes how to use OTG HS2 to simulate a HID mouse.

Press KEY1 will move the cursor to the left.

Press KEY2 will move the cursor to the right.

And it is a HS2 low power example.

### 5.4.18.2 Directory contents

This example can be found in the [~ \Examples\APM32F4xx\Device\\_Examples\OTGD\\_HID\\_HS2\\_LowPower](#) directory.

## 5.4.19 OTGD\_HID\_Keyboard

### 5.4.19.1 Example Description

This example describes how to use OTG to simulate a HID keyboard.

Press KEY1 will send the report descriptor of a - z or Enter to the USB host.

### 5.4.19.2 Directory contents

This example can be found in the [~ \Examples\APM32F4xx\Device\\_Examples\OTGD\\_HID\\_Keyboard](#) directory.

## 5.4.20 OTGD\_HID\_Keyboard\_HS2

### 5.4.20.1 Example Description

This example describes how to use OTG HS2 to simulate a HID keyboard.

Press KEY1 will send the report descriptor of a - z or Enter to the USB host.

### 5.4.20.2 Directory contents

This example can be found in the [~ \Examples\APM32F4xx\Device\\_Examples\OTGD\\_HID\\_Keyboard\\_HS2](#) directory.

## 5.4.21 OTGD\_HID\_WakeUp\_LowPower

### 5.4.21.1 Example Description

This example describes how to use OTG to simulate a HID mouse.

When PC enter sleep mode, device will enter lowpower mode.

You can wake up the PC and the device at the same time by using another keyboard and mouse device on the PC or by pressing the KEY1.

Press KEY2 will move the cursor to the right.

### 5.4.21.2 Directory contents

This example can be found in the [~ \Examples\APM32F4xx\Device\\_Examples\OTGD\\_HID\\_WakeUp\\_LowPower](#) directory.

## 5.4.22 OTGD\_MSC

### 5.4.22.1 Example Description

This example describes how to use sram array to simulate a fake U disk.

[www.geehy.com](http://www.geehy.com)

### 5.4.22.2 Directory contents

This example can be found in the [~ \Examples\APM32F4xx\Device\\_Examples\OTGD\\_MSC](#) directory.

### 5.4.23 OTGD\_MSC\_HS\_IN\_FS

#### 5.4.23.1 Example Description

This example describes how to use sram array and OTG HS(use FS PHY) to simulate a fake U disk.

#### 5.4.23.2 Directory contents

This example can be found in the [~ \Examples\APM32F4xx\Device\\_Examples\OTGD\\_MSC\\_HS\\_IN\\_FS](#) directory.

### 5.4.24 OTGD\_MSC\_HS1

#### 5.4.24.1 Example Description

This example describes how to use sram array and OTG HS1 to simulate a fake U disk.

The external USB HS PHY is USB3300.

#### 5.4.24.2 Directory contents

This example can be found in the [~ \Examples\APM32F4xx\Device\\_Examples\OTGD\\_MSC\\_HS1](#) directory.

### 5.4.25 OTGD\_MSC\_HS2

#### 5.4.25.1 Example Description

This example describes how to use sram array and OTG HS2 to simulate a fake U disk.

## 5.4.25.2 Directory contents

This example can be found in the [~ \Examples\APM32F4xx\Device\\_Examples\OTGD\\_MSC\\_HS2](#) directory.

## 5.4.26 OTGD\_MSC\_LowPower

### 5.4.26.1 Example Description

This example describes how to use OTG FS and sram array to simulate a U disk.

When PC enter or exit sleep mode, the U disk device will enter or exit low power mode.

## 5.4.26.2 Directory contents

This example can be found in the [~ \Examples\APM32F4xx\Device\\_Examples\OTGD\\_MSC\\_LowPower](#) directory.

## 5.4.27 OTGD\_MSC\_NorFlash

### 5.4.27.1 Example Description

This example describes how to use external NOR flash to simulate a U disk.

## 5.4.27.2 Directory contents

This example can be found in the [~ \Examples\APM32F4xx\Device\\_Examples\OTGD\\_MSC\\_NorFlash](#) directory.

## 5.4.28 OTGD\_MSC\_NorFlash\_HS2

### 5.4.28.1 Example Description

This example describes how to use external NOR flash to simulate a U disk.

### 5.4.28.2 Directory contents

This example can be found in the [~ \Examples\APM32F4xx\Device\\_Examples\OTGD\\_MSC\\_NorFlash\\_HS2](#) directory.

### 5.4.29 OTGD\_MSC\_SDCard

#### 5.4.29.1 Example Description

This example describes how to use OTG FS and SD card to simulate a U disk.

#### 5.4.29.2 Directory contents

This example can be found in the [~ \Examples\APM32F4xx\Device\\_Examples\OTGD\\_MSC\\_SDCard](#) directory.

### 5.4.30 OTGD\_MSC\_SDCard\_HS2

#### 5.4.30.1 Example Description

This example describes how to use OTG HS2 and SD Card to simulate a U disk.

#### 5.4.30.2 Directory contents

This example can be found in the [~ \Examples\APM32F4xx\Device\\_Examples\OTGD\\_MSC\\_SDCard\\_HS2](#) directory.

### 5.4.31 OTGD\_WINUSB

#### 5.4.31.1 Example Description

This example describes how to use OTG to simulate a WINUSB device. Program will send hello + num string to USB host. And when WINUSB device receive data will send back the same data to USB host.



### 5.4.31.2 Directory contents

This example can be found in the [~ \Examples\APM32F4xx\Device\\_Examples\OTGD\\_WINUSB](#) directory.

### 5.4.32 OTGD\_WINUSB\_HS2

#### 5.4.32.1 Example Description

This example describes how to use OTG HS2 to simulate a WINUSB device. Program will send hello + num string to USB host. And when WINUSB device receive data will send back the same data to USB host.

#### 5.4.32.2 Directory contents

This example can be found in the [~ \Examples\APM32F4xx\Device\\_Examples\OTGD\\_WINUSB\\_HS2](#) directory.

### 5.4.33 OTGH\_CDC

#### 5.4.33.1 Example Description

This example describes how to use the usb host to enum a CDC device. And use UART to print CDC device operation information.

#### 5.4.33.2 Directory contents

This example can be found in the [~ \Examples\APM32F4xx\Host\\_Examples\OTGH\\_CDC](#) directory.

### 5.4.34 OTGH\_CDC\_HS2

#### 5.4.34.1 Example Description

This example describes how to use the OTG HS2 host to enum a CDC device.

And use UART to print CDC device operation information.

Press KEY1 to send a data to CDC device.

### 5.4.34.2 Directory contents

This example can be found in the [~ \Examples\APM32F4xx\Device\\_Examples\OTGH\\_CDC\\_HS2](#) directory.

## 5.4.35 OTGH\_HID

### 5.4.35.1 Example Description

This example describes how to use the usb host to enum a HID device(mouse or keyboard).

And use UART to print mouse or keyboard operation information.

### 5.4.35.2 Directory contents

This example can be found in the [~ \Examples\APM32F4xx\Host\\_Examples\OTGH\\_HID](#) directory.

## 5.4.36 OTGH\_HID\_HS\_IN\_FS

### 5.4.36.1 Example Description

This example describes how to use the OTG host (Embedded FS PHY in HS channel) to enum a HID device(mouse or keyboard).

And use UART to print mouse or keyboard operation information.

### 5.4.36.2 Directory contents

This example can be found in the [~ \Examples\APM32F1xx\Device\\_Examples\OTGH\\_HID\\_HS\\_IN\\_FS](#) directory.

## 5.4.37 OTGH\_HID\_HS2

### 5.4.37.1 Example Description

This example describes how to use the OTG HS2 host to enum a HID device(mouse or keyboard).

And use UART to print mouse or keyboard operation information.

note: High speed host is not support for LS device.

### 5.4.37.2 Directory contents

This example can be found in the [~ \Examples\APM32F4xx\Device\\_Examples\OTGH\\_HID\\_HS2](#) directory.

## 5.4.38 OTGH\_MSC

### 5.4.38.1 Example Description

This example describes how to use the usb host to enum a U disk.

And use FATFS to write and read file to U disk.Press KEY1 to write file to U disk and press KEY2 to read file from U disk.

### 5.4.38.2 Directory contents

This example can be found in the [~ \Examples\APM32F4xx\Host\\_Examples\OTGH\\_MSC](#) directory.

## 5.4.39 OTGH\_MSC\_DualCore

### 5.4.39.1 Example Description

This example describes how to use the USB host HS2 and FS to enum two U disk.

And use FATFS to write and read file to U disk. Press KEY1 to write file to U disk and press KEY2 to read file from U disk.

Press KEY3 to write file to U disk and press KEY4 to read file from U disk.

### 5.4.39.2 Directory contents

This example can be found in the [~ \Examples\APM32F4xx\Host\\_Examples\OTGH\\_MSC\\_DualCore](#) directory.

## 5.4.40 OTGH\_MSC\_FWUpgrade

### 5.4.40.1 Example Description

This example describes how to use the usb host to enum a U disk.

And use it to upgrade application firmware.

MSC\_FWUpgradeBootloader include all operations for USB upgrade firmware.

MSC\_FWUpgradeApp include enum U disk and scan and read or write file through KEY1 / KEY2.

### 5.4.40.2 Directory contents

This example can be found in the [~ \Examples\APM32F4xx\Host\\_Examples\OTGH\\_MSC\\_FWUpgrade](#) directory.

## 5.4.41 OTGH\_MSC\_HS1

### 5.4.41.1 Example Description

This example describes how to use the usb host HS1 to enum a U disk.

And use FATFS to write and read file to U disk. Press KEY1 to write file to U disk and press KEY2 to read file from U disk.

### 5.4.41.2 Directory contents

This example can be found in the [~ \Examples\APM32F4xx\Device\\_Examples\OTGH\\_MSC\\_HS1](#) directory.

## 5.4.42 OTGH\_MSC\_HS2

### 5.4.42.1 Example Description

This example describes how to use the usb host HS2 to enum a U disk.

And use FATFS to write and read file to U disk. Press KEY1 to write file to U disk and press KEY2 to read file from U disk.

### 5.4.42.2 Directory contents

This example can be found in the [~ \Examples\APM32F4xx\Host\\_Examples\OTGH\\_MSC\\_HS2](#) directory.

## 5.4.43 DRD\_MSC\_CDC\_DualCore

### 5.4.43.1 Example Description

This example describes how to use the USB host HS2 to switch between host and device by press KEY3.

When USB is host, it is a MSC host. Use FATFS to write and read file to U disk.

Press KEY1 to write file to U disk and press KEY2 to read file from U disk.

When USB is device, it is a CDC device. It will save the accepted data and send it to

USB flash drive when it switch to host.

### 5.4.43.2 Directory contents

This example can be found in the [~ \Examples\APM32F4xx\Host\\_Device\\_Examples\DRD\\_MSC\\_CDC\\_DualCore](#) directory.

## 5.4.44 MSC\_CDC\_DualCore

### 5.4.44.1 Example Description

This example describes how to use the usb host HS2 to enum a U disk and use OTG FS to simulate a CDC device.

And use FATFS to write and read file to U disk. Press KEY1 to write file to U disk and press KEY2 to read file from U disk.

When CDC device receive data will write file to U disk.

### 5.4.44.2 Directory contents

This example can be found in the [~ \Examples\APM32F4xx\Host\\_Device\\_Examples\MSC\\_CDC\\_DualCore](#) directory.

## 5.5 APM32L0xx

### 5.5.1 USBD\_CDC

#### 5.5.1.1 Example Description

This example describes how to use USBD to simulate a CDC device. Program will send hello + num string to USB host. And when CDC device receive data will send back the same data to USB host.

#### 5.5.1.2 Directory contents

This example can be found in the [~ \Examples\APM32L0xx\Device\\_Examples\USBD\\_CDC](#) directory.

### 5.5.2 USBD\_CUSTOM\_HID

#### 5.5.2.1 Example Description

This example describes how to use USBD to simulate a custom hid.

This is a template example.

User can customize HID reports to implement the desired functionality.

#### 5.5.2.2 Directory contents

This example can be found in the [~ \Examples\APM32L0xx\Device\\_Examples\USBD\\_CUSTOM\\_HID](#) directory.

### 5.5.3 USBD\_CUSTOM\_HID\_Keyboard

#### 5.5.3.1 Example Description

This example describes how to use USBD to simulate a custom HID keyboard.

Press KEY1 will send the report descriptor of a - z or Enter to the USB host.

---

The state of Capslock and numlock determine whether LED2 and LED3 are on or off.

### 5.5.3.2 Directory contents

This example can be found in the [~ \Examples\APM32L0xx\Device\\_Examples\USBD\\_CUS TOM\\_HID\\_Keyboard](#) directory.

## 5.5.4 USBD\_HID

### 5.5.4.1 Example Description

This example describes how to use USB to simulate a HID mouse.

Press KEY1 will move the cursor to the left.

Press KEY2 will move the cursor to the right.

### 5.5.4.2 Directory contents

This example can be found in the [~ \Examples\APM32L0xx\Device\\_Examples\USBD\\_HID](#) directory.

## 5.5.5 USBD\_MSC

### 5.5.5.1 Example Description

This example describes how to use sram array to simulate a fake U disk.

### 5.5.5.2 Directory contents

This example can be found in the [~ \Examples\APM32L0xx\Device\\_Examples\USBD\\_MSC](#) directory.

## 5.5.6 USBD\_WINUSB



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### 5.5.6.1 Example Description

This example describes how to use USBD to simulate a WINUSB device. Program will send hello + num string to USB host. And when WINUSB device receive data will send back the same data to USB host.

### 5.5.6.2 Directory contents

This example can be found in the [~ \Examples\APM32L0xx\Device\\_Examples\USBD\\_WINUSB](#) directory.

## 6 About libraries

The libraries folder includes a series library. It can provide supports for APM32XXX MCU such as device support and standard peripheral etc. The libraries can be found in the [~/Libraries](#) directory.

APM32XXX MCU include following library:

- Libraries folder
  - \* APM32XXX\_StdPeriphDriver
  - \* CMSIS
  - \* Device

## 7 About middlewares

The middlewares folder includes a series third-party middleware. The middlewares can be found in the [~/middlewares](#) directory.

The middlewares used by APM32XXX MINI or EVAL include following:

- Middlewares folder
  - \* APM32\_USB\_Library
  - \* Fat\_Fs

## 8 About Package

The Package folder includes Geehy DFP Package. The Package can be found in the [~/Package](#) directory.

The middlewares used by APM32XXX include following:

- Package folder

## 9 Revision History

Table 1 File Revision History

Date	Rev	Description
2023.01.30	1.0	First Release version of APM32 USB SDK
2023.11.30	1.1	Add some APM32E10x examples. Add some class examples: custom hid; low power; Keyboard; MSC_HS1; Add dual core examples and DRD example.

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## 8. Scope of Application

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