

# Readme

## APM32 USB SDK

**Rev: V1.0**

# 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 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

### 3 **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.

## 4 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
  - \* Source

All example applications tested with:

**APM32F0xx StdPeriphDriver v1.0.3,**

**APM32F4xx StdPeriphDriver v1.0.2,**

**APM32F10x StdPeriphDriver v1.0.4,**

**APM32L0xx StdPeriphDriver v1.0.0,**

include the following examples:

- Examples
  - \* APM32F0xx
    - Device\_Examples
      - [USBD\\_CDC](#)
      - [USBD\\_HID](#)
      - [USBD\\_MSC](#)
      - [USBD\\_WINUSB](#)
  - \* APM32F1xx
    - Device\_Examples
      - [OTGD\\_CDC](#)
      - [OTGD\\_HID](#)
      - [OTGD\\_MSC](#)

- [OTGD\\_WINUSB](#)
- [USBD\\_CDC](#)
- [USBD\\_HID](#)
- [USBD\\_MSC](#)
- [USBD\\_WINUSB](#)
- Host\_Examples
  - [OTGH\\_CDC](#)
  - [OTGH\\_HID](#)
  - [OTGH\\_MSC](#)
- \* APM32F4xx
  - Device\_Examples
    - [OTGD\\_CDC](#)
    - [OTGD\\_CDC\\_HS2](#)
    - [OTGD\\_HID](#)
    - [OTGD\\_MSC](#)
    - [OTGD\\_MSC\\_HS2](#)
    - [OTGD\\_WINUSB](#)
    - [OTGD\\_WINUSB\\_HS2](#)
  - Host\_Examples
    - [OTGH\\_CDC](#)
    - [OTGH\\_HID](#)
    - [OTGH\\_MSC](#)
    - [OTGH\\_MSC\\_FWUpgrade](#)
    - [OTGH\\_MSC\\_HS2](#)
- \* APM32L0xx
  - Device\_Examples
    - [USBD\\_CDC](#)
    - [USBD\\_HID](#)

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



## **4.1 APM32F0xx**

### **4.1.1 USBD\_CDC**

#### **4.1.1.1 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.

#### **4.1.1.2 Directory contents**

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

### **4.1.2 USBD\_HID**

#### **4.1.2.1 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.

#### **4.1.2.2 Directory contents**

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

### **4.1.3 USBD\_MSC**

#### **4.1.3.1 Example Description**

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

#### **4.1.3.2 Directory contents**

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

### **4.1.4 USBD\_WINUSB**

#### **4.1.4.1 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.

#### **4.1.4.2 Directory contents**

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

## 4.2 APM32F1xx

### 4.2.1 OTGD\_CDC

#### 4.2.1.1 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.

#### 4.2.1.2 Directory contents

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

### 4.2.2 OTGD\_HID

#### 4.2.2.1 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.

#### 4.2.2.2 Directory contents

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

### 4.2.3 OTGD\_MSC

#### 4.2.3.1 Example Description

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

#### 4.2.3.2 Directory contents

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

## **4.2.4 OTGD\_WINUSB**

### **4.2.4.1 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.

### **4.2.4.2 Directory contents**

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

## **4.2.5 USBD\_CDC**

### **4.2.5.1 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.

### **4.2.5.2 Directory contents**

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

## **4.2.6 USBD\_HID**

### **4.2.6.1 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.

### **4.2.6.2 Directory contents**

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

## **4.2.7 USBD\_MSC**

### **4.2.7.1 Example Description**

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

### **4.2.7.2 Directory contents**

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

## **4.2.8 USBD\_WINUSB**

### **4.2.8.1 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.

### **4.2.8.2 Directory contents**

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

## **4.2.9 OTGH\_CDC**

### **4.2.9.1 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.

### **4.2.9.2 Directory contents**

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

## **4.2.10 OTGH\_HID**

### **4.2.10.1 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.

### **4.2.10.2 Directory contents**

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

## **4.2.11 OTGH\_MSC**

### **4.2.11.1 Example Description**

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

### **4.2.11.2 Directory contents**

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

## **4.3 APM32F4xx**

### **4.3.1 OTGD\_CDC**

#### **4.3.1.1 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.

#### **4.3.1.2 Directory contents**

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

### **4.3.2 OTGD\_CDC\_HS2**

#### **4.3.2.1 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.

#### **4.3.2.2 Directory contents**

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

### **4.3.3 OTGD\_HID**

#### **4.3.3.1 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.

#### **4.3.3.2 Directory contents**

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

#### **4.3.4 OTGD\_MSC**

##### **4.3.4.1 Example Description**

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

##### **4.3.4.2 Directory contents**

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

#### **4.3.5 OTGD\_MSC\_HS2**

##### **4.3.5.1 Example Description**

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

##### **4.3.5.2 Directory contents**

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

#### **4.3.6 OTGD\_WINUSB**

##### **4.3.6.1 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.

##### **4.3.6.2 Directory contents**

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

#### **4.3.7 OTGD\_WINUSB\_HS2**

##### **4.3.7.1 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.

### 4.3.7.2 Directory contents

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

### 4.3.8 OTGH\_CDC

#### 4.3.8.1 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.

#### 4.3.8.2 Directory contents

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

### 4.3.9 OTGH\_HID

#### 4.3.9.1 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.

#### 4.3.9.2 Directory contents

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

### 4.3.10 OTGH\_MSC

#### 4.3.10.1 Example Description

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

### **4.3.10.2 Directory contents**

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

### **4.3.11 OTGH\_MSC\_FWUpgrade**

#### **4.3.11.1 Example Description**

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

#### **4.3.11.2 Directory contents**

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

### **4.3.12 OTGH\_MSC\_HS2**

#### **4.3.12.1 Example Description**

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

#### **4.3.12.2 Directory contents**

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

## **4.4 APM32L0xx**

### **4.4.1 USBD\_CDC**

#### **4.4.1.1 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.

#### **4.4.1.2 Directory contents**

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

### **4.4.2 USBD\_HID**

#### **4.4.2.1 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.

#### **4.4.2.2 Directory contents**

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

### **4.4.3 USBD\_MSC**

#### **4.4.3.1 Example Description**

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

#### **4.4.3.2 Directory contents**

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

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#### **4.4.4 USBD\_WINUSB**

##### **4.4.4.1 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.

##### **4.4.4.2 Directory contents**

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

## 5 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

## 6 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

## 7 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

## 8 Revision History

Table 1 File Revision History

Date	Rev	Description
2023.01.30	1.0	First Release version of APM32 USB SDK



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## 8. Scope of Application

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