Overview

This OTG HID example is a simple demonstration program based on the KSDK.
User can test the OTG functions by using the menu that is printed in the vcom.

System Requirement

Hardware requirements

- Mini/micro USB cable
- USB A to micro AB cable
- Hardware (tower/base board, ...) for a specific device
- Personal Computer(PC)

Software requirements

- The project path is:
  <SDK_Install>/boards/<board>/usb_examples/usb_otg_hid_mouse/<rtos>/<toolchain>.

  Note

  The <rtos> is Bare Metal or FreeRTOS OS.

Getting Started

Hardware Settings

- The Jumper settings:
  J25 1-2 3-5, J20 2-3 Remove all jumpers from J22.
- The Jumper settings for twr-ser1:
  J16 5-6, J11 7-8.

  Note

  The jumpers of the hardware (tower system/base module) needs to be set to default setting at first.

Prepare the example

1. Download the program to the target board.
2. Power off the target board and power on again.
3. Connect one board to another board.

Note

For detailed instructions, see the appropriate board User's Guide.

Run the example

1. Use the menu to operate the OTG functions, the menu is different for different state, you can input 'p' to get the menu information. The menu is as follow:
   - The state is a_idle (A-device is idle):

     ```
     1. bus request;
     2. bus release (set bus request false);
     3. set bus drop false;
     4. set bus drop true.
     ```

- The state is a_host (A-device works as host function):

```
2. bus release;
4. set bus drop true.
```

- The state is a_peripheral (A-device works as device function):

```
1. bus request;
4. set bus drop true.
```

- The state is b_idle (B-device is idle):

```
1. bus request (SRP).
```

- The state is b_peripheral (B-device works as device function):

```
1. bus request (HNP).
```

- The state is b_host (B-device works as host function):

```
2. bus release.
```

- The state is a_vbus_err (A-device works as error state):

```
5. clear error.
```

2. Connect the two boards UART to the PC and open the COM port in terminal tools.
3. You can do the following tests.

- Test1: Plug OTG cable to one board, the board works as A-device; plug out the cable, the board works as B-device.
- Test2: Plug one board to the PC. The PC recognizes it as an USB mouse device and the mouse moves around the screen.
- Test3 (bus request test):

  1. Plug OTG calbe to one board (board_1);
  2. plug another board (board_2) to the board_1;
  3. On the com port of the board_1, press "1" key to request bus; Or On the com port of the board_2, press "1" key to request bus;
  4. board_1 will work as host, board_2 work as device.

```
The logs are as follow if press "1" on the board_2.
On the com port of the board_1 displays:
        enter a_host
        host init success
        hid mouse attached:pid=0x7cvid=0x1fc9 address=1
        mouse attached
        set device HNP feature enable success
                                        Right
                                        Right
                                        Right
                                        Right
                                        Right
                                        Right
                                        Right
                                        Right
                                        Right
                                        Right
                                        ............

On the com port of the board_2 displays:
        1. bus request (SRP)
        enter b_srp_init
        enter b_idle
        device init success
        enter b_peripheral
```

- Test4 (SRP test):

  1. Plug OTG calbe to one board (board_1);
  2. plug another board (board_2) to the board_1;
  3. reset board_2, Or On the com port of the board_2, press "1" key to do SRP;
  4. board_1 will work as host, board_2 work as device as follow:

```
On the com port of the board_1 displays:
        enter a_host
        host init success
        hid mouse attached:pid=0x7cvid=0x1fc9 address=1
        mouse attached
        set device HNP feature enable success
                                        Right
                                        Right
                                        Right
                                        Right
                                        Right
                                        Right
                                        Right
                                        Right
                                        Right
                                        Right
                                        ............

On the com port of the board_2 displays (reset the board_2):
        usb otg stack init done
        enter b_idle
        enter b_srp_init
        enter b_idle
        device init success
        enter b_peripheral
```

- Test5 (HNP test):

1. Do as test3, test4 or other ways, make sure: board_1 work as A-device and host, board_2 work as B-device and peripheral;
2. On the com port of the board_2, press "1" key, the board_2 requests the bus and would like to become host, the host and peripheral functions are swapped. board_1 now becomes peripheral and borad_2 becomes host;

```
On the com port of the board_2 displays
        1. bus request (HNP)
        device deinit success
        enter b_wait_acon
        enter b_host
        host init success
        hid mouse attached:pid=0x7cvid=0x1fc9 address=1
        mouse attached
                                        Right
                                        Right
                                        Right
On the com port of the board_1 displays
        mouse detached
        host deinit success
        enter a_suspend
        device init success
        enter a_peripheral
```

3. On the com port of the board_2, press "2" key, the board_2 releases the bus and becomes peripheral and board_1 becomes host;

```
On the com port of the board_1 displays
        device deinit success
        enter a_wait_bcon
        enter a_host
        host init success
        hid mouse attached:pid=0x7cvid=0x1fc9 address=1
        mouse attached
        set device HNP feature enable success
                                Left
                                Left
                                Left
                                Left
                                Left
                                Left
On the com port of the board_2 displays
        2. bus release
        mouse detached
        host deinit success
        device init success
        enter b_peripheral
```

4. On the com port of the board_2, press "1" key, the host and peripheral functions are swapped as step 2;

5. On the com port of the board_1, press "1" key, the board_1 requests the bus and would like to become host, the host and device functions are swapped.

```
On the com port of the board_1 displays
        1. bus request
        device deinit success
        enter a_wait_bcon
        enter a_host
        host init success
        hid mouse attached:pid=0x7cvid=0x1fc9 address=1
        mouse attached
        set device HNP feature enable success
                                                UP
                                                UP
                                                UP
                                                UP
                                                UP
                                                UP
                                                UP
                                                UP
                                                UP
On the com port of the board_2 displays
        mouse detached
        host deinit success
        device init success
        enter b_peripheral
```

- Test6 (bus drop and bus request test):

1. Do as test3, test4 or other ways, make sure: board_1 work as A-device and host, board_2 work as B-device and peripheral;
2. On the com port of the board_1, press "4" key, vbus is dropped; board_1 becomes a_idle and board_2 becomes b_idle;

```
On the com port of the board_1 displays
        4. set bus drop true
        mouse detached
        host deinit success
        enter a_wait_vfall
        enter a_idle
        2. bus release (set bus request false)
On the com port of the board_2 displays
        device deinit success
        enter b_idle
```

3. On the com port of the board_1, press "3" key, vbus is controlled by board_1; press "1" key, the board_1 requests the bus and would like to become host, board_1 becomes a_host and board_2 becomes b_peripheral;

```
On the com port of the board_1 displays
        3. set bus drop false
        1. bus request
        enter a_wait_vrise
        enter a_wait_bcon
        enter a_host
        host init success
        hid mouse attached:pid=0x7cvid=0x1fc9 address=1
        mouse attached
        set device HNP feature enable success
                                          Right
                                          Right
                                          Right
                                          Right
On the com port of the board_2 displays
        device init success
        enter b_peripheral
```

4. On the com port of the board_1, press "2" key, the board_1 release the bus; board_1 becomes a_idle and board_2 become b_idle;

```
On the com port of the board_1 displays
        2. bus release
        mouse detached
        host deinit success
        enter a_suspend
        enter a_wait_vfall
        enter a_idle
On the com port of the board_2 displays
        device deinit success
        enter b_idle
```

5. On the com port of the board_1, press "1" key, the board_1 request the bus; board_1 becomes a_host and board_2 become b_peripheral;

```
On the com port of the board_1 displays
        1. bus request
        enter a_wait_vrise
        enter a_wait_bcon
        enter a_host
        host init success
        hid mouse attached:pid=0x7cvid=0x1fc9 address=1
        mouse attached
        set device HNP feature enable success
                                        Right
                                        Right
                                        Right
                                        Right
                                        Right
On the com port of the board_2 displays
        device init success
        enter b_peripheral
```

6. On the com port of the board_1, press "2" key, the board_1 release the bus; board_1 becomes a_idle and board_2 become b_idle. the com port of the board_2, press "1" key, the board_2 request a session; board_1 becomes a_host and board_2 become b_peripheral.

```
On the com port of the board_1 displays
        2. bus release
        mouse detached
        host deinit success
        enter a_suspend
        enter a_wait_vfall
        enter a_idle
        enter a_wait_vrise
        enter a_wait_bcon
        enter a_host
        host init success
        hid mouse attached:pid=0x7cvid=0x1fc9 address=1
        mouse attached
        set device HNP feature enable success
                                            Down
                                            Down
                                            Down
                                            Down
                                            Down
On the com port of the board_2 displays
        device deinit success
        enter b_idle
        1. bus request (SRP)
        enter b_srp_init
        enter b_idle
        device init success
        enter b_peripheral
```

- Test7 (hotplug test):

1. Do as test3, test4 or other ways, make sure: board_1 work as A-device and host, board_2 work as B-device and peripheral;
2. Unplug the usb cable at the board_2 side, wait until board_1 becomes a_idle and board_2 becomes b_idle;

```
On the com port of the board_1 displays
                                            UP
                                            UP
                                            UP
        mouse detached
        host deinit success
        enter a_wait_bcon
        enter a_wait_vfall
        enter a_idle
On the com port of the board_2 displays
        device deinit success
        enter b_idle
```

3. Plug the usb cable at board_2, on the com port of the board_2, press "1" key, the board_2 requests a session; board_1 becomes a_host and board_2 becomes b_peripheral;

```
        enter a_wait_vrise
        enter a_wait_bcon
        enter a_host
```

```
        host init success
        hid mouse attached:pid=0x7cvid=0x1fc9 address=1
        mouse attached
        set device HNP feature enable success
                                                UP
                                                UP
                                                UP
                                                UP
                                                UP
                                                UP
                                                UP
On the com port of the board_2 displays
        1. bus request (SRP)
        enter b_srp_init
        enter b_idle
        device init success
        enter b_peripheral
```

4. Unplug the USB cable at board_2 side, wait until board_1 becomes a_idle and board_2 becomes b_idle. Plug the USB calbe at board_2 side, on the com port of the board_1 press "1" key, the board_1 requests the bus; board_1 becomes a_host and board_2 becomes b_peripheral.

```
                                                UP
                                                UP
        mouse detached
        host deinit success
        enter a_wait_bcon
        enter a_wait_vfall
        enter a_idle
        1. bus request
        enter a_wait_vrise
        enter a_wait_bcon
        enter a_host
        host init success
        hid mouse attached:pid=0x7cvid=0x1fc9 address=1
        mouse attached
        set device HNP feature enable success
                                                UP
                                                UP
                                                UP
                                          Right
                                          Right
                                          Right
On the com port of the board_2 displays
        device deinit success
        enter b_idle
        device init success
        enter b_peripheral
```