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# **Adafruit HID Library Documentation**

***Release 1.0***

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This driver simulates USB HID devices. Currently keyboard and mouse are implemented.



# CHAPTER 1

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## Dependencies

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This driver depends on:

- [Adafruit CircuitPython](#)

Please ensure all dependencies are available on the CircuitPython filesystem. This is easily achieved by downloading the [Adafruit library and driver bundle](#).





## CHAPTER 2

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### Usage Example

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The Keyboard class sends keypress reports for a USB keyboard device to the host.

The Keycode class defines USB HID keycodes to send using Keyboard.

```
from adafruit_hid.keyboard import Keyboard
from adafruit_hid.keycode import Keycode

# Set up a keyboard device.
kbd = Keyboard()

# Type lowercase 'a'. Presses the 'a' key and releases it.
kbd.send(Keycode.A)

# Type capital 'A'.
kbd.send(Keycode.SHIFT, Keycode.A)

# Type control-x.
kbd.send(Keycode.CONTROL, Keycode.X)

# You can also control press and release actions separately.
kbd.press(Keycode.CONTROL, Keycode.X)
kbd.release_all()

# Press and hold the shifted '1' key to get '!' (exclamation mark).
kbd.press(Keycode.SHIFT, Keycode.ONE)
# Release the ONE key and send another report.
kbd.release(Keycode.ONE)
# Press shifted '2' to get '@'.
kbd.press(Keycode.TWO)
# Release all keys.
kbd.release_all()
```

The KeyboardLayoutUS sends ASCII characters using keypresses. It assumes the host is set to accept keypresses from a US keyboard.

If the host is expecting a non-US keyboard, the character to key mapping provided by KeyboardLayoutUS will

not always be correct. Different keypresses will be needed in some cases. For instance, to type an 'A' on a French keyboard (AZERTY instead of QWERTY), `Keycode.Q` should be pressed.

Currently this package provides only `KeyboardLayoutUS`. More `KeyboardLayout` classes could be added to handle non-US keyboards and the different input methods provided by various operating systems.

```
from adafruit_hid.keyboard import Keyboard
from adafruit_hid.keyboard_layout_us import KeyboardLayoutUS

kbd = Keyboard()
layout = KeyboardLayoutUS(kbd)

# Type 'abc' followed by Enter (a newline).
layout.write('abc\n')

# Get the keycodes needed to type a '$'.
# The method will return (Keycode.SHIFT, Keycode.FOUR).
keycodes = layout.keycodes('$')
```

The `Mouse` class simulates a three-button mouse with a scroll wheel.

```
from adafruit_hid.mouse import Mouse

m = Mouse()

# Click the left mouse button.
m.click(Mouse.LEFT_BUTTON)

# Move the mouse diagonally to the upper left.
m.move(-100, -100, 0)

# Roll the mouse wheel away from the user one unit.
# Amount scrolled depends on the host.
m.move(0, 0, -1)

# Keyword arguments may also be used. Omitted arguments default to 0.
m.move(x=-100, y=-100)
m.move(wheel=-1)

# Move the mouse while holding down the left button. (click-drag).
m.press(Mouse.LEFT_BUTTON)
m.move(x=50, y=20)
m.release_all()          # or m.release(Mouse.LEFT_BUTTON)
```

The `ConsumerControl` class emulates consumer control devices such as remote controls, or the multimedia keys on certain keyboards.

*New in CircuitPython 3.0.*

```
from adafruit_hid.consumer_control import ConsumerControl
from adafruit_hid.consumer_control_code import ConsumerControlCode

cc = ConsumerControl()

# Raise volume.
cc.send(ConsumerControlCode.VOLUME_INCREMENT)

# Pause or resume playback.
cc.send(ConsumerControlCode.PLAY_PAUSE)
```

The Gamepad class emulates a two-joystick gamepad with 16 buttons.

*New in CircuitPython 3.0.*

```
from adafruit_hid.gamepad import Gamepad

gp = Gamepad()

# Click gamepad buttons.
gp.click_buttons(1, 7)

# Move joysticks.
gp.move_joysticks(x=2, y=0, z=-20)
```



## CHAPTER 3

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### Contributing

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Contributions are welcome! Please read our [Code of Conduct](#) before contributing to help this project stay welcoming.



## CHAPTER 4

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### Building locally

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To build this library locally you'll need to install the `circuitpython-build-tools` package.

```
python3 -m venv .env
source .env/bin/activate
pip install circuitpython-build-tools
```

Once installed, make sure you are in the virtual environment:

```
source .env/bin/activate
```

Then run the build:

```
circuitpython-build-bundles --filename_prefix adafruit-circuitpython-hid --library_
↪location .
```

### 4.1 Sphinx documentation

Sphinx is used to build the documentation based on rST files and comments in the code. First, install dependencies (feel free to reuse the virtual environment from above):

```
python3 -m venv .env
source .env/bin/activate
pip install Sphinx sphinx-rtd-theme
```

Now, once you have the virtual environment activated:

```
cd docs
sphinx-build -E -W -b html . _build/html
```

This will output the documentation to `docs/_build/html`. Open the `index.html` in your browser to view them. It will also (due to `-W`) error out on any warning like Travis will. This is a good way to locally verify it will pass.





## 5.1 Simple test

Ensure your device works with this simple test.

Listing 1: examples/keyboard\_shortcuts.py

```
1 import time
2 import board
3 import digitalio
4 from adafruit_hid.keyboard import Keyboard
5 from adafruit_hid.keycode import Keycode
6
7 kbd = Keyboard()
8
9 # define buttons. these can be any physical switches/buttons, but the values
10 # here work out-of-the-box with a CircuitPlayground Express' A and B buttons.
11 swap = digitalio.DigitalInOut(board.D4)
12 swap.direction = digitalio.Direction.INPUT
13 swap.pull = digitalio.Pull.DOWN
14
15 search = digitalio.DigitalInOut(board.D5)
16 search.direction = digitalio.Direction.INPUT
17 search.pull = digitalio.Pull.DOWN
18
19 while True:
20     # press ALT+TAB to swap windows
21     if swap.value:
22         kbd.send(Keycode.ALT, Keycode.TAB)
23
24     # press CTRL+K, which in a web browser will open the search dialog
25     elif search.value:
26         kbd.send(Keycode.CONTROL, Keycode.K)
27
```

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```
28 time.sleep(0.1)
```

Listing 2: examples/scroll.py

```

1 import time
2 import board
3 import digitalio
4 from adafruit_hid.mouse import Mouse
5
6 mouse = Mouse()
7
8 # define buttons. these can be any physical switches/buttons, but the values
9 # here work out-of-the-box with a CircuitPlayground Express' A and B buttons.
10 up = digitalio.DigitalInOut(board.D4)
11 up.direction = digitalio.Direction.INPUT
12 up.pull = digitalio.Pull.DOWN
13
14 down = digitalio.DigitalInOut(board.D5)
15 down.direction = digitalio.Direction.INPUT
16 down.pull = digitalio.Pull.DOWN
17
18 while True:
19     # scroll up one unit (varies with host/OS)
20     if up.value:
21         mouse.move(wheel=1)
22
23     # scroll down one unit (varies with host/OS)
24     elif down.value:
25         mouse.move(wheel=-1)
26
27     time.sleep(0.1)
```

## 5.2 adafruit\_hid.keyboard.Keyboard

- Author(s): Scott Shawcroft, Dan Halbert

**class** adafruit\_hid.keyboard.Keyboard

Send HID keyboard reports.

**press** (\*keycodes)

Send a report indicating that the given keys have been pressed.

**Parameters** **keycodes** – Press these keycodes all at once.

**Raises** **ValueError** – if more than six regular keys are pressed.

Keycodes may be modifiers or regular keys. No more than six regular keys may be pressed simultaneously.

Examples:

```

from adafruit_hid.keycode import Keycode

# Press ctrl-x.
kbd.press(Keycode.LEFT_CONTROL, Keycode.X)

# Or, more conveniently, use the CONTROL alias for LEFT_CONTROL:
```

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```
kbd.press(Keycode.CONTROL, Keycode.X)

# Press a, b, c keys all at once.
kbd.press(Keycode.A, Keycode.B, Keycode.C)
```

**release (\*keycodes)**

Send a USB HID report indicating that the given keys have been released.

**Parameters** **keycodes** – Release these keycodes all at once.

If a keycode to be released was not pressed, it is ignored.

Example:

```
# release SHIFT key
kbd.release(Keycode.SHIFT)
```

**release\_all()**

Release all pressed keys.

**send (\*keycodes)**

Press the given keycodes and then release all pressed keys.

**Parameters** **keycodes** – keycodes to send together

## 5.3 adafruit\_hid.keycode.Keycode

- Author(s): Scott Shawcroft, Dan Halbert

### **class** adafruit\_hid.keycode.Keycode

USB HID Keycode constants.

This list is modeled after the names for USB keycodes defined in [http://www.usb.org/developers/hidpage/Hut1\\_12v2.pdf#page=58](http://www.usb.org/developers/hidpage/Hut1_12v2.pdf#page=58). This list does not include every single code, but does include all the keys on a regular PC or Mac keyboard.

Remember that keycodes are the names for key *positions* on a US keyboard, and may not correspond to the character that you mean to send if you want to emulate non-US keyboard. For instance, on a French keyboard (AZERTY instead of QWERTY), the keycode for ‘q’ is used to indicate an ‘a’. Likewise, ‘y’ represents ‘z’ on a German keyboard. This is historical: the idea was that the keycaps could be changed without changing the keycodes sent, so that different firmware was not needed for different variations of a keyboard.

**A = 4**

a and A

**ALT = 226**

Alias for LEFT\_ALT; Alt is also known as Option (Mac)

**APPLICATION = 101**

Application: also known as the Menu key (Windows)

**B = 5**

b and B

**BACKSLASH = 49**

\ and |

**BACKSPACE = 42**

Delete backward (Backspace)

**C = 6**  
c and C

**CAPS\_LOCK = 57**  
Caps Lock

**COMMA = 54**  
, and <

**COMMAND = 227**  
Labeled as Command on Mac keyboards, with a clover glyph

**CONTROL = 224**  
Alias for LEFT\_CONTROL

**D = 7**  
d and D

**DELETE = 76**  
Delete forward

**DOWN\_ARROW = 81**  
Move the cursor down

**E = 8**  
e and E

**EIGHT = 37**  
8 and \*

**END = 77**  
End (often moves to end of line)

**ENTER = 40**  
Enter (Return)

**EQUALS = 46**  
= ` and `` +

**ESCAPE = 41**  
Escape

**F = 9**  
f and F

**F1 = 58**  
Function key F1

**F10 = 67**  
Function key F10

**F11 = 68**  
Function key F11

**F12 = 69**  
Function key F12

**F13 = 104**  
Function key F13 (Mac)

**F14 = 105**  
Function key F14 (Mac)

**F15 = 106**  
Function key F15 (Mac)

**F16 = 107**  
Function key F16 (Mac)

**F17 = 108**  
Function key F17 (Mac)

**F18 = 109**  
Function key F18 (Mac)

**F19 = 110**  
Function key F19 (Mac)

**F2 = 59**  
Function key F2

**F3 = 60**  
Function key F3

**F4 = 61**  
Function key F4

**F5 = 62**  
Function key F5

**F6 = 63**  
Function key F6

**F7 = 64**  
Function key F7

**F8 = 65**  
Function key F8

**F9 = 66**  
Function key F9

**FIVE = 34**  
5 and %

**FORWARD\_SLASH = 56**  
/ and ?

**FOUR = 33**  
4 and \$

**G = 10**  
g and G

**GRAVE\_ACCENT = 53**  
` and ~

**GUI = 227**  
Alias for LEFT\_GUI; GUI is also known as the Windows key, Command (Mac), or Meta

**H = 11**  
h and H

**HOME = 74**  
Home (often moves to beginning of line)

**I = 12**  
i and I

**INSERT = 73**  
Insert

**J = 13**  
j and J

**K = 14**  
k and K

**KEYPAD\_ASTERISK = 85**  
Keypad \*

**KEYPAD\_BACKSLASH = 100**  
Keypad \ and | (Non-US)

**KEYPAD\_EIGHT = 96**  
Keypad 8 and Up Arrow

**KEYPAD\_ENTER = 88**  
Keypad Enter

**KEYPAD\_EQUALS = 103**  
Keypad = (Mac)

**KEYPAD\_FIVE = 93**  
Keypad 5

**KEYPAD\_FORWARD\_SLASH = 84**  
Keypad /

**KEYPAD\_FOUR = 92**  
Keypad 4 and Left Arrow

**KEYPAD\_MINUS = 86**  
Keypad -

**KEYPAD\_NINE = 97**  
Keypad 9 and PgUp

**KEYPAD\_NUMLOCK = 83**  
Num Lock (Clear on Mac)

**KEYPAD\_ONE = 89**  
Keypad 1 and End

**KEYPAD\_PERIOD = 99**  
Keypad . and Del

**KEYPAD\_PLUS = 87**  
Keypad +

**KEYPAD\_SEVEN = 95**  
Keypad 7 and Home

**KEYPAD\_SIX = 94**  
Keypad 6 and Right Arrow

**KEYPAD\_THREE = 91**  
Keypad 3 and PgDn

**KEYPAD\_TWO = 90**  
Keypad 2 and Down Arrow

**KEYPAD\_ZERO = 98**  
Keypad 0 and Ins

**L = 15**  
l and L

**LEFT\_ALT = 226**  
Alt modifier left of the spacebar

**LEFT\_ARROW = 80**  
Move the cursor left

**LEFT\_BRACKET = 47**  
[ and {

**LEFT\_CONTROL = 224**  
Control modifier left of the spacebar

**LEFT\_GUI = 227**  
GUI modifier left of the spacebar

**LEFT\_SHIFT = 225**  
Shift modifier left of the spacebar

**M = 16**  
m and M

**MINUS = 45**  
-` and ``\_

**N = 17**  
n and N

**NINE = 38**  
9 and (

**O = 18**  
o and O

**ONE = 30**  
1 and !

**OPTION = 226**  
Labeled as Option on some Mac keyboards

**P = 19**  
p and P

**PAGE\_DOWN = 78**  
Go forward one page

**PAGE\_UP = 75**  
Go back one page

**PAUSE = 72**  
Pause (Break)

**PERIOD = 55**  
. and >

**POUND = 50**  
# and ~ (Non-US keyboard)

**POWER = 102**  
Power (Mac)

**PRINT\_SCREEN = 70**  
Print Screen (SysRq)

**Q = 20**  
q and Q

**QUOTE = 52**  
' and "

**R = 21**  
r and R

**RETURN = 40**  
Alias for ENTER

**RIGHT\_ALT = 230**  
Alt modifier right of the spacebar

**RIGHT\_ARROW = 79**  
Move the cursor right

**RIGHT\_BRACKET = 48**  
] and }

**RIGHT\_CONTROL = 228**  
Control modifier right of the spacebar

**RIGHT\_GUI = 231**  
GUI modifier right of the spacebar

**RIGHT\_SHIFT = 229**  
Shift modifier right of the spacebar

**S = 22**  
s and S

**SCROLL\_LOCK = 71**  
Scroll Lock

**SEMICOLON = 51**  
; and :

**SEVEN = 36**  
7 and &

**SHIFT = 225**  
Alias for LEFT\_SHIFT

**SIX = 35**  
6 and ^

**SPACE = 44**  
Alias for SPACEBAR

**SPACEBAR = 44**  
Spacebar



```

T = 23
    t and T

TAB = 43
    Tab and Backtab

THREE = 32
    3 and #

TWO = 31
    2 and @

U = 24
    u and U

UP_ARROW = 82
    Move the cursor up

V = 25
    v and V

W = 26
    w and W

WINDOWS = 227
    Labeled with a Windows logo on Windows keyboards

X = 27
    x and X

Y = 28
    y and Y

Z = 29
    z and Z

ZERO = 39
    0 and )

classmethod modifier_bit (keycode)
    Return the modifier bit to be set in an HID keycode report if this is a modifier key; otherwise return 0.

```

## 5.4 adafruit\_hid.keyboard\_layout\_us.KeyboardLayoutUS

- Author(s): Dan Halbert

**class** `adafruit_hid.keyboard_layout_us.KeyboardLayoutUS` (*keyboard*)

Map ASCII characters to appropriate keypresses on a standard US PC keyboard.

Non-ASCII characters and most control characters will raise an exception.

**keycodes** (*char*)

Return a tuple of keycodes needed to type the given character.

**Parameters** *char* (*str of length one.*) – A single ASCII character in a string.

**Returns** tuple of Keycode keycodes.

**Raises** `ValueError` – if *char* is not ASCII or there is no keycode for it.

Examples:

```
# Returns (Keycode.TAB,)
keycodes(' ')
# Returns (Keycode.A,)
keycode('a')
# Returns (Keycode.SHIFT, Keycode.A)
keycode('A')
# Raises ValueError because it's a accented e and is not ASCII
keycode('é')
```

**write** (*string*)

Type the string by pressing and releasing keys on my keyboard.

**Parameters** **string** – A string of ASCII characters.

**Raises** **ValueError** – if any of the characters are not ASCII or have no keycode (such as some control characters).

Example:

```
# Write abc followed by Enter to the keyboard
layout.write('abc\n')
```

## 5.5 adafruit\_hid.mouse.Mouse

- Author(s): Dan Halbert

**class** adafruit\_hid.mouse.**Mouse**

Send USB HID mouse reports.

**LEFT\_BUTTON** = 1

Left mouse button.

**MIDDLE\_BUTTON** = 4

Middle mouse button.

**RIGHT\_BUTTON** = 2

Right mouse button.

**click** (*buttons*)

Press and release the given mouse buttons.

**Parameters** **buttons** – a bitwise-or'd combination of **LEFT\_BUTTON**, **MIDDLE\_BUTTON**, and **RIGHT\_BUTTON**.

Examples:

```
# Click the left button.
m.click(Mouse.LEFT_BUTTON)

# Double-click the left button.
m.click(Mouse.LEFT_BUTTON)
m.click(Mouse.LEFT_BUTTON)
```

**move** (*x=0, y=0, wheel=0*)

Move the mouse and turn the wheel as directed.

**Parameters**

- **x** – Move the mouse along the x axis. Negative is to the left, positive is to the right.

- **y** – Move the mouse along the y axis. Negative is upwards on the display, positive is downwards.
- **wheel** – Rotate the wheel this amount. Negative is toward the user, positive is away from the user. The scrolling effect depends on the host.

Examples:

```
# Move 100 to the left. Do not move up and down. Do not roll the scroll wheel.
m.move(-100, 0, 0)
# Same, with keyword arguments.
m.move(x=-100)

# Move diagonally to the upper right.
m.move(50, 20)
# Same.
m.move(x=50, y=-20)

# Roll the mouse wheel away from the user.
m.move(wheel=1)
```

#### **press (buttons)**

Press the given mouse buttons.

**Parameters buttons** – a bitwise-or'd combination of `LEFT_BUTTON`, `MIDDLE_BUTTON`, and `RIGHT_BUTTON`.

Examples:

```
# Press the left button.
m.press(Mouse.LEFT_BUTTON)

# Press the left and right buttons simultaneously.
m.press(Mouse.LEFT_BUTTON | Mouse.RIGHT_BUTTON)
```

#### **release (buttons)**

Release the given mouse buttons.

**Parameters buttons** – a bitwise-or'd combination of `LEFT_BUTTON`, `MIDDLE_BUTTON`, and `RIGHT_BUTTON`.

#### **release\_all ()**

Release all the mouse buttons.

## 5.6 adafruit\_hid.consumer\_control.ConsumerControl

- Author(s): Dan Halbert

### **class** adafruit\_hid.consumer\_control.ConsumerControl

Send ConsumerControl code reports, used by multimedia keyboards, remote controls, etc.

*New in CircuitPython 3.0.*

#### **send (consumer\_code)**

Send a report to do the specified consumer control action, and then stop the action (so it will not repeat).

**Parameters consumer\_code** – a 16-bit consumer control code.

Examples:

```
from adafruit_hid.consumer_control_code import ConsumerControlCode

# Raise volume.
consumer_control.send(ConsumerControlCode.VOLUME_INCREMENT)

# Advance to next track (song).
consumer_control.send(ConsumerControlCode.SCAN_NEXT_TRACK)
```

## 5.7 adafruit\_hid.consumer\_control\_code.ConsumerControlCode

- Author(s): Dan Halbert

**class** adafruit\_hid.consumer\_control\_code.ConsumerControlCode

USB HID Consumer Control Device constants.

This list includes a few common consumer control codes from [http://www.usb.org/developers/hidpage/Hut1\\_12v2.pdf#page=75](http://www.usb.org/developers/hidpage/Hut1_12v2.pdf#page=75).

*New in CircuitPython 3.0.*

**EJECT = 184**

Eject

**FAST\_FORWARD = 179**

Fast Forward

**MUTE = 226**

Mute

**PLAY\_PAUSE = 205**

Play/Pause toggle

**RECORD = 178**

Record

**REWIND = 180**

Rewind

**SCAN\_NEXT\_TRACK = 181**

Skip to next track

**SCAN\_PREVIOUS\_TRACK = 182**

Go back to previous track

**STOP = 183**

Stop

**VOLUME\_DECREMENT = 234**

Decrease volume

**VOLUME\_INCREMENT = 233**

Increase volume

## 5.8 adafruit\_hid.gamepad.Gamepad

- Author(s): Dan Halbert

**class** adafruit\_hid.gamepad.Gamepad

Emulate a generic gamepad controller with 16 buttons, numbered 1-16, and two joysticks, one controlling `x`` and ``y`` values, and the other controlling `z` and `r_z` (z rotation or Rz) values.

The joystick values could be interpreted differently by the receiving program: those are just the names used here. The joystick values are in the range -127 to 127.

**click\_buttons** (*\*buttons*)

Press and release the given buttons.

**move\_joysticks** (*x=None, y=None, z=None, r\_z=None*)

Set and send the given joystick values. The joysticks will remain set with the given values until changed

One joystick provides `x` and `y` values, and the other provides `z` and `r_z` (z rotation). Any values left as `None` will not be changed.

All values must be in the range -127 to 127 inclusive.

Examples:

```
# Change x and y values only.
gp.move_joysticks(x=100, y=-50)

# Reset all joystick values to center position.
gp.move_joysticks(0, 0, 0, 0)
```

**press\_buttons** (*\*buttons*)

Press and hold the given buttons.

**release\_all\_buttons** ()

Release all the buttons.

**release\_buttons** (*\*buttons*)

Release the given buttons.

**reset\_all** ()

Release all buttons and set joysticks to zero.



## CHAPTER 6

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### Indices and tables

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