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# **Adafruit SEESAW Library Documentation**

*Release 1.0*

**Dean Miller**

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CircuitPython module for use with the Adafruit ATSAMD09 seesaw.



# CHAPTER 1

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## Dependencies

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This driver depends on:

- [Adafruit CircuitPython](#)
- [Bus Device](#)

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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### Installing from PyPI

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On supported GNU/Linux systems like the Raspberry Pi, you can install the driver locally [from PyPI](#). To install for current user:

```
pip3 install adafruit-circuitpython-seesaw
```

To install system-wide (this may be required in some cases):

```
sudo pip3 install adafruit-circuitpython-seesaw
```

To install in a virtual environment in your current project:

```
mkdir project-name && cd project-name  
python3 -m venv .env  
source .env/bin/activate  
pip3 install adafruit-circuitpython-seesaw
```



## CHAPTER 3

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### Usage Example

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See `examples/seesaw_simpletest.py` for usage example.



## CHAPTER 4

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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 5

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### Documentation

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For information on building library documentation, please check out [this guide](#).





## 6.1 Simple test

Ensure your device works with this simple test.

Listing 1: examples/seesaw\_simpletest.py

```
1  # Simple seesaw test using an LED attached to Pin 15.
2  #
3  # See the seesaw Learn Guide for wiring details:
4  # https://learn.adafruit.com/adafruit-seesaw-atsamd09-breakout?view=all#circuitpython-
   ↪ wiring-and-test
5  import time
6
7  from board import SCL, SDA
8  import busio
9  from adafruit_seesaw.seesaw import Seesaw
10
11 i2c_bus = busio.I2C(SCL, SDA)
12
13 ss = Seesaw(i2c_bus)
14
15 ss.pin_mode(15, ss.OUTPUT)
16
17 while True:
18     ss.digital_write(15, True)    # turn the LED on (True is the voltage level)
19     time.sleep(1)                 # wait for a second
20     ss.digital_write(15, False)  # turn the LED off by making the voltage LOW
21     time.sleep(1)
```

## 6.2 Other Examples

Here are some other examples using the Seesaw library

Listing 2: examples/seesaw\_crickit\_test.py

```

1  from board import SCL, SDA
2  import busio
3  from adafruit_seesaw.seesaw import Seesaw
4  from adafruit_seesaw.pwmout import PWMOut
5  from adafruit_motor import servo
6
7  #from analogio import AnalogOut
8  #import board
9
10 i2c_bus = busio.I2C(SCL, SDA)
11 ss = Seesaw(i2c_bus)
12 pwm1 = PWMOut(ss, 17)
13 pwm2 = PWMOut(ss, 16)
14 pwm3 = PWMOut(ss, 15)
15 pwm4 = PWMOut(ss, 14)
16
17 pwm1.frequency = 50
18 pwm2.frequency = 50
19 pwm3.frequency = 50
20 pwm4.frequency = 50
21
22 S1 = servo.Servo(pwm1)
23 S2 = servo.Servo(pwm2)
24 S3 = servo.Servo(pwm3)
25 S4 = servo.Servo(pwm4)
26
27 servos = (S1, S2, S3, S4)
28
29 CRCKIT_NUM_ADC = 8
30 CRCKit_adc = (2, 3, 40, 41, 11, 10, 9, 8)
31
32 CRCKIT_NUM_DRIVE = 4
33 CRCKit_drive = (42, 43, 12, 13)
34
35 CAPTOUCH_THRESH = 500
36
37 _CRCKIT_M1_A1 = 18
38 _CRCKIT_M1_A2 = 19
39 _CRCKIT_M1_B1 = 22
40 _CRCKIT_M1_B2 = 23
41
42 cap_state = [False, False, False, False]
43 cap_justtouched = [False, False, False, False]
44 cap_justreleased = [False, False, False, False]
45
46 motor1_dir = False
47 motor2_dir = True
48
49 test_servos = False
50 test_motors = False
51 test_drives = False

```

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```

52 test_speaker = False
53
54 counter = 0
55
56 #analog_out = AnalogOut(board.A0)
57 #analog_out.value = 512
58
59 while True:
60     counter = (counter + 1) % 256
61
62     if counter % 32 == 0:
63         print("----- analog -----")
64         str_out = ""
65         for i in range(8):
66             val = ss.analog_read(CRCKit_adc[i]) * 3.3/1024
67             str_out = str_out + str(round(val, 2)) + "\t"
68
69         print(str_out + "\n")
70
71
72     for i in range(4):
73         val = ss.touch_read(i)
74         cap_justtouched[i] = False
75         cap_justreleased[i] = False
76
77         if val > CAPTOUCH_THRESH:
78             print("CT" + str(i + 1) + " touched! value: " + str(val))
79
80             if not cap_state[i]:
81                 cap_justtouched[i] = True
82
83                 cap_state[i] = True
84
85             else:
86                 if cap_state[i]:
87                     cap_justreleased[i] = True
88
89                     cap_state[i] = False
90
91     if cap_justtouched[0]:
92         test_servos = not test_servos
93         if test_servos:
94             print("Testing servos")
95         else:
96             print("Stopping servos")
97
98     if cap_justtouched[1]:
99         test_drives = not test_drives
100        if test_drives:
101            print("Testing drives")
102        else:
103            print("Stopping drives")
104
105    if cap_justtouched[2]:
106        test_motors = not test_motors
107        if test_motors:
108            print("Testing motors")

```

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```

109     else:
110         print("Stopping motors")
111
112     if cap_justtouched[3]:
113         test_speaker = not test_speaker
114         if test_speaker:
115             print("Testing speaker")
116         else:
117             print("Stopping speaker")
118
119
120     if test_servos:
121         if counter % 32 == 0:
122             print("----- servos -----")
123             servonum = int(counter / 32) % 4
124
125             if counter < 128:
126                 print("SER" + str(servonum) + " LEFT")
127                 servos[servonum].angle = 0
128             else:
129                 print("SER" + str(servonum) + " RIGHT")
130                 servos[servonum].angle = 180
131
132
133     if test_drives:
134         if counter % 32 == 0:
135             print("----- drives -----")
136             drivenum = int(counter / 64) % 4
137
138             if counter % 64 == 0:
139                 print("DRIVE" + str(drivenum) + " ON")
140                 ss.analog_write(CRCKit_drive[drivenum], 65535)
141
142             else:
143                 print("DRIVE" + str(drivenum) + " OFF")
144                 ss.analog_write(CRCKit_drive[drivenum], 0)
145
146     if test_motors:
147         if counter < 128:
148             if motor1_dir:
149                 ss.analog_write(_CRCKIT_M1_A1, 0)
150                 ss.analog_write(_CRCKIT_M1_A2, counter * 512)
151             else:
152                 ss.analog_write(_CRCKIT_M1_A2, 0)
153                 ss.analog_write(_CRCKIT_M1_A1, counter * 512)
154         else:
155             if motor1_dir:
156                 ss.analog_write(_CRCKIT_M1_A1, 0)
157                 ss.analog_write(_CRCKIT_M1_A2, (255-counter) * 512)
158             else:
159                 ss.analog_write(_CRCKIT_M1_A2, 0)
160                 ss.analog_write(_CRCKIT_M1_A1, (255-counter) * 512)
161         if counter == 255:
162             print("----- motor 1 -----")
163             motor1_dir = not motor1_dir
164
165     if counter < 128:

```

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```

166     if motor2_dir:
167         ss.analog_write(_CRCKIT_M1_B1, 0)
168         ss.analog_write(_CRCKIT_M1_B2, counter * 512)
169     else:
170         ss.analog_write(_CRCKIT_M1_B2, 0)
171         ss.analog_write(_CRCKIT_M1_B1, counter * 512)
172 else:
173     if motor2_dir:
174         ss.analog_write(_CRCKIT_M1_B1, 0)
175         ss.analog_write(_CRCKIT_M1_B2, (255-counter) * 512)
176     else:
177         ss.analog_write(_CRCKIT_M1_B2, 0)
178         ss.analog_write(_CRCKIT_M1_B1, (255-counter) * 512)
179 if counter == 255:
180     print("----- motor 2 -----")
181     motor2_dir = not motor2_dir

```

Listing 3: examples/seesaw\_joy\_featherwing.py

```

1  import time
2
3  from board import SCL, SDA
4  import busio
5  from micropython import const
6
7  from adafruit_seesaw.seesaw import Seesaw
8
9  # pylint: disable=bad-whitespace
10 BUTTON_RIGHT = const(6)
11 BUTTON_DOWN  = const(7)
12 BUTTON_LEFT  = const(9)
13 BUTTON_UP    = const(10)
14 BUTTON_SEL   = const(14)
15 # pylint: enable=bad-whitespace
16 button_mask = const((1 << BUTTON_RIGHT) |
17                     (1 << BUTTON_DOWN) |
18                     (1 << BUTTON_LEFT) |
19                     (1 << BUTTON_UP) |
20                     (1 << BUTTON_SEL))
21
22 i2c_bus = busio.I2C(SCL, SDA)
23
24 ss = Seesaw(i2c_bus)
25
26 ss.pin_mode_bulk(button_mask, ss.INPUT_PULLUP)
27
28 last_x = 0
29 last_y = 0
30
31 while True:
32     x = ss.analog_read(2)
33     y = ss.analog_read(3)
34
35     if (abs(x - last_x) > 3) or (abs(y - last_y) > 3):
36         print(x, y)
37         last_x = x

```

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```

38     last_y = y
39
40     buttons = ss.digital_read_bulk(button_mask)
41     if not buttons & (1 << BUTTON_RIGHT):
42         print("Button A pressed")
43
44     if not buttons & (1 << BUTTON_DOWN):
45         print("Button B pressed")
46
47     if not buttons & (1 << BUTTON_LEFT):
48         print("Button Y pressed")
49
50     if not buttons & (1 << BUTTON_UP):
51         print("Button x pressed")
52
53     if not buttons & (1 << BUTTON_SEL):
54         print("Button SEL pressed")
55
56     time.sleep(.01)

```

Listing 4: examples/seesaw\_soil\_simpletest.py

```

1  import time
2
3  from board import SCL, SDA
4  import busio
5
6  from adafruit_seesaw.seesaw import Seesaw
7
8  i2c_bus = busio.I2C(SCL, SDA)
9
10 ss = Seesaw(i2c_bus, addr=0x36)
11
12 while True:
13     # read moisture level through capacitive touch pad
14     touch = ss.moisture_read()
15
16     # read temperature from the temperature sensor
17     temp = ss.get_temp()
18
19     print("temp: " + str(temp) + " moisture: " + str(touch))
20     time.sleep(1)

```

Listing 5: examples/seesaw\_minift\_featherwing.py

```

1  import time
2
3  import board
4  from micropython import const
5
6  from adafruit_seesaw.seesaw import Seesaw
7
8  # pylint: disable=bad-whitespace
9  BUTTON_RIGHT = const(7)
10 BUTTON_DOWN  = const(4)
11 BUTTON_LEFT  = const(3)

```

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```

12 BUTTON_UP    = const(2)
13 BUTTON_SEL   = const(11)
14 BUTTON_A     = const(10)
15 BUTTON_B     = const(9)
16
17 # pylint: enable=bad-whitespace
18 button_mask = const((1 << BUTTON_RIGHT) |
19                    (1 << BUTTON_DOWN) |
20                    (1 << BUTTON_LEFT) |
21                    (1 << BUTTON_UP) |
22                    (1 << BUTTON_SEL) |
23                    (1 << BUTTON_A) |
24                    (1 << BUTTON_B))
25
26 i2c_bus = board.I2C()
27
28 ss = Seesaw(i2c_bus, 0x5E)
29
30 ss.pin_mode_bulk(button_mask, ss.INPUT_PULLUP)
31
32 while True:
33     buttons = ss.digital_read_bulk(button_mask)
34     if not buttons & (1 << BUTTON_RIGHT):
35         print("Button RIGHT pressed")
36
37     if not buttons & (1 << BUTTON_DOWN):
38         print("Button DOWN pressed")
39
40     if not buttons & (1 << BUTTON_LEFT):
41         print("Button LEFT pressed")
42
43     if not buttons & (1 << BUTTON_UP):
44         print("Button UP pressed")
45
46     if not buttons & (1 << BUTTON_SEL):
47         print("Button SEL pressed")
48
49     if not buttons & (1 << BUTTON_A):
50         print("Button A pressed")
51
52     if not buttons & (1 << BUTTON_B):
53         print("Button B pressed")
54
55     time.sleep(.01)

```

## 6.3 adafruit\_seesaw.seesaw

An I2C to whatever helper chip.

- Author(s): Dean Miller

### 6.3.1 Implementation Notes

**Hardware:**

- Adafruit [ATSAMD09 Breakout with seesaw](#) (Product ID: 3657)

### Software and Dependencies:

- Adafruit CircuitPython firmware: <https://circuitpython.org/>
- or Adafruit Blinka: <https://circuitpython.org/blinka>
- Adafruit's Bus Device library: [https://github.com/adafruit/Adafruit\\_CircuitPython\\_BusDevice](https://github.com/adafruit/Adafruit_CircuitPython_BusDevice)

**class** `adafruit_seesaw.seesaw.Seesaw` (*i2c\_bus*, *addr=73*, *drdy=None*)  
Driver for Seesaw i2c generic conversion trip

#### Parameters

- **i2c\_bus** (*I2C*) – Bus the SeeSaw is connected to
- **addr** (*int*) – I2C address of the SeeSaw device
- **drdy** (*DigitalInOut*) – Pin connected to SeeSaw's 'ready' output

**analog\_read** (*pin*)

Read the value of an analog pin by number

**analog\_write** (*pin*, *value*)

Set the value of an analog output by number

**digital\_read** (*pin*)

Get the value of an input pin by number

**digital\_read\_bulk** (*pins*, *delay=0.008*)

Get the values of all the pins on the 'A' port as a bitmask

**digital\_read\_bulk\_b** (*pins*, *delay=0.008*)

Get the values of all the pins on the 'B' port as a bitmask

**digital\_write** (*pin*, *value*)

Set the value of an output pin by number

**digital\_write\_bulk** (*pins*, *value*)

Set the mode of pins on the 'A' port as a bitmask

**digital\_write\_bulk\_b** (*pins*, *value*)

Set the mode of pins on the 'B' port as a bitmask

**eeeprom\_read8** (*addr*)

Read a single byte directly to the device's EEPROM

**eeeprom\_write** (*addr*, *buf*)

Write multiple bytes directly to the device's EEPROM

**eeeprom\_write8** (*addr*, *val*)

Write a single byte directly to the device's EEPROM

**get\_i2c\_addr** ()

Return the device's I2C address stored in its EEPROM

**get\_options** ()

Retrieve the 'options' word from the SeeSaw board

**get\_temp** ()

Read the temperature

**get\_version** ()

Retrieve the 'version' word from the SeeSaw board



**moisture\_read()**  
Read the value of the moisture sensor

**pin\_mode(pin, mode)**  
Set the mode of a pin by number

**pin\_mode\_bulk(pins, mode)**  
Set the mode of all the pins on the 'A' port as a bitmask

**pin\_mode\_bulk\_b(pins, mode)**  
Set the mode of all the pins on the 'B' port as a bitmask

**read(reg\_base, reg, buf, delay=0.008)**  
Read an arbitrary I2C register range on the device

**read8(reg\_base, reg)**  
Read an arbitrary I2C byte register on the device

**set\_GPIO\_interrupts(pins, enabled)**  
Enable or disable the GPIO interrupt

**set\_i2c\_addr(addr)**  
Store a new address in the device's EEPROM and reboot it.

**set\_pwm\_freq(pin, freq)**  
Set the PWM frequency of a pin by number

**sw\_reset()**  
Trigger a software reset of the SeeSaw chip

**touch\_read(pin)**  
Read the value of a touch pin by number

**uart\_set\_baud(baud)**  
Set the serial baudrate of the device

**write(reg\_base, reg, buf=None)**  
Write an arbitrary I2C register range on the device

**write8(reg\_base, reg, value)**  
Write an arbitrary I2C byte register on the device

## 6.4 adafruit\_seesaw.crickit - Pin definition for Adafruit CRICKIT

## 6.5 adafruit\_seesaw.analoginput

**class** `adafruit_seesaw.analoginput.AnalogInput(seesaw, pin)`  
CircuitPython-compatible class for analog inputs

This class is intended to be a compatible subset of `analogio.AnalogIn`

### Parameters

- **seesaw** (`Seesaw`) – The device
- **pin** (`int`) – The pin number on the device

### reference\_voltage

The reference voltage for the pin

**value**

The current analog value on the pin, as an integer from 0..65535 (inclusive)

## 6.6 `adafruit_seesaw.digitalio`

**class** `adafruit_seesaw.digitalio.DigitalIO` (*seesaw, pin*)

CircuitPython-compatible class for digital I/O pins

This class is intended to be a compatible subset of `digitalio.DigitalInOut`.

Due to technical limitations, PULL\_DOWNs are not supported.

### Parameters

- **seesaw** (*Seesaw*) – The device
- **pin** (*int*) – The pin number on the device

**direction**

Retrieve or set the direction of the pin

**drive\_mode**

Retrieve or set the drive mode of an output pin

**pull**

Retrieve or set the pull mode of an input pin

**switch\_to\_input** (*pull=None*)

Switch the pin to input mode

**switch\_to\_output** (*value=False, drive\_mode=<sphinx.ext.autodoc.importer.\_MockObject object>*)

Switch the pin to output mode

**value**

Retrieve or set the value of the pin

## 6.7 `adafruit_seesaw.keypad`

**class** `adafruit_seesaw.keypad.KeyEvent` (*num, edge*)

Holds information about a key event in its properties

### Parameters

- **num** (*int*) – The number of the key
- **edge** (*int*) – One of the EDGE properties of `adafruit_seesaw.keypad.Keypad`

**class** `adafruit_seesaw.keypad.Keypad` (*i2c\_bus, addr=73, drdy=None*)

On compatible SeeSaw devices, reads from a keypad.

### Parameters

- **i2c\_bus** (*I2C*) – Bus the SeeSaw is connected to
- **addr** (*int*) – I2C address of the SeeSaw device
- **drdy** (*DigitalInOut*) – Pin connected to SeeSaw's 'ready' output

**EDGE\_FALLING = 2**

Indicates that the key was recently pressed

**EDGE\_HIGH = 0**

Indicates that the key is currently pressed

**EDGE\_LOW = 1**

Indicates that the key is currently released

**EDGE\_RISING = 3**

Indicates that the key was recently released

**count**

Retrieve or set the number of keys

**interrupt\_enabled**

Retrieve or set the interrupt enable flag

**read\_keypad** (*num*)

Read data from the keypad

**Parameters** *num* (*int*) – The number of bytes to read

**set\_event** (*key, edge, enable*)

Control which kinds of events are set

**Parameters**

- **key** (*int*) – The key number
- **edge** (*int*) – The type of event
- **enable** (*bool*) – True to enable the event, False to disable it

## 6.8 adafruit\_seesaw.neopixel

`adafruit_seesaw.neopixel.GRB = (1, 0, 2)`

Green Red Blue

`adafruit_seesaw.neopixel.GRBW = (1, 0, 2, 3)`

Green Red Blue White

**class** `adafruit_seesaw.neopixel.NeoPixel` (*seesaw, pin, n, \*, bpp=3, brightness=1.0, auto\_write=True, pixel\_order=None*)

Control NeoPixels connected to a seesaw

**Parameters**

- **seesaw** (*Seesaw*) – The device
- **pin** (*int*) – The pin number on the device
- **n** (*int*) – The number of pixels
- **bpp** (*int*) – The number of bytes per pixel
- **brightness** (*float*) – The brightness, from 0.0 to 1.0
- **auto\_write** (*bool*) – Automatically update the pixels when changed
- **pixel\_order** (*tuple*) – The layout of the pixels. Use one of the order constants such as RGBW.

`__getitem__` (*key, color*)

Set one pixel to a new value

**brightness**

Overall brightness of the pixel

**fill** (*color*)

Set all pixels to the same value

**show** ()

Update the pixels even if `auto_write` is `False`

```
adafruit_seesaw.neopixel.RGB = (0, 1, 2)  
Red Green Blue
```

```
adafruit_seesaw.neopixel.RGBW = (0, 1, 2, 3)  
Red Green Blue White
```

## 6.9 `adafruit_seesaw.pwmout`

**class** `adafruit_seesaw.pwmout.PWMOut` (*seesaw, pin*)

A single seesaw channel that matches the `PWMOut` API.

**duty\_cycle**

16-bit value that dictates how much of one cycle is high (1) versus low (0). 65535 (0xffff) will always be high, 0 will always be low, and 32767 (0x7fff) will be half high and then half low.

**fraction**

Expresses `duty_cycle` as a fractional value. Ranges from 0.0-1.0.

**frequency**

The overall PWM frequency in Hertz.

## 6.10 `adafruit_seesaw.robohat` - Pin definition for RoboHAT

**class** `adafruit_seesaw.robohat.MM1_Pinmap`

This class is automatically used by `adafruit_seesaw.seesaw.Seesaw` when a RoboHAT board is detected.

It is also a reference for the capabilities of each pin.

**analog\_pins** = (35, 34)

The pins capable of analog output

**pwm\_pins** = (16, 17, 18, 19, 11, 10, 9, 8, 40, 41, 42, 43)

The pins capable of PWM output

**pwm\_width** = 16

The effective bit resolution of the PWM pins

**touch\_pins** = (7, 6, 5, 4)

The pins capable of touch input

## 6.11 `adafruit_seesaw.samd09` - Pin definition for Adafruit SAMD09 Breakout with seesaw

**class** `adafruit_seesaw.samd09.SAMD09_Pinmap`

This class is automatically used by `adafruit_seesaw.seesaw.Seesaw` when a SAMD09 Breakout is

detected.

It is also a reference for the capabilities of each pin.

```
analog_pins = (2, 3, 4, 5)
```

The effective bit resolution of the PWM pins

```
pwm_pins = (4, 5, 6, 7)
```

No pins on this board are capable of touch input

```
pwm_width = 8
```

The pins capable of PWM output

## 6.12 `adafruit_seesaw.tftshield18` - Pin definitions for 1.8" TFT Shield V2

```
class adafruit_seesaw.tftshield18.Buttons (right, down, left, up, select, a, b, c)
```

```
static __new__ (_cls, right, down, left, up, select, a, b, c)
```

Create new instance of Buttons(right, down, left, up, select, a, b, c)

```
__repr__ ()
```

Return a nicely formatted representation string

```
a
```

Alias for field number 5

```
b
```

Alias for field number 6

```
c
```

Alias for field number 7

```
down
```

Alias for field number 1

```
left
```

Alias for field number 2

```
right
```

Alias for field number 0

```
select
```

Alias for field number 4

```
up
```

Alias for field number 3

```
class adafruit_seesaw.tftshield18.TFTShield18 (i2c_bus=<sphinx.ext.autodoc.importer._MockObject object>, addr=46)
```

```
buttons
```

Return a set of buttons with current push values

```
set_backlight (value)
```

Set the backlight on

```
set_backlight_freq (freq)
```

Set the backlight frequency of the TFT Display

`tft_reset` (*rst=True*)  
Reset the TFT Display

# CHAPTER 7

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