PCB 12– in–1 Multitool

User Guide

Date created: 12/29/2020
Version 1

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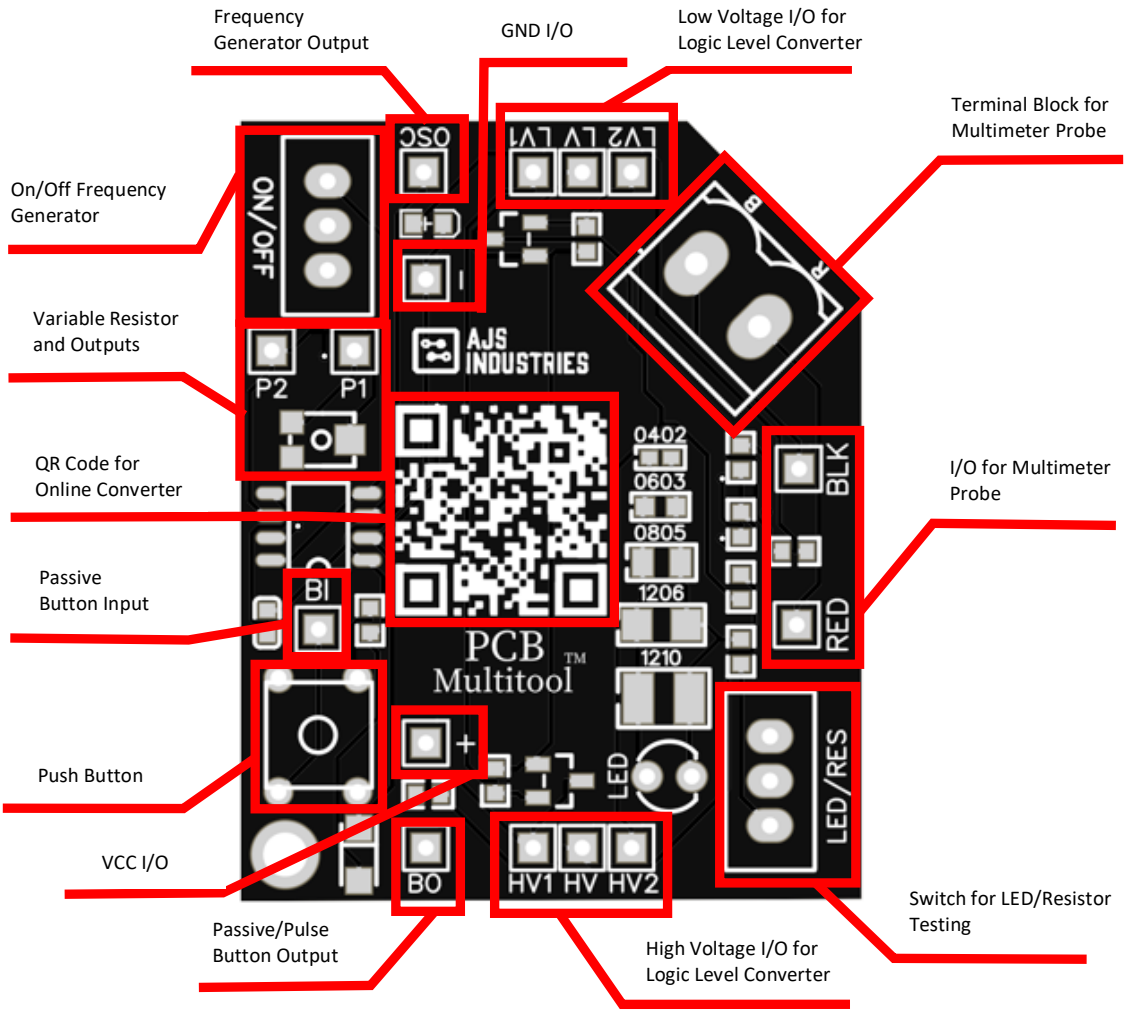
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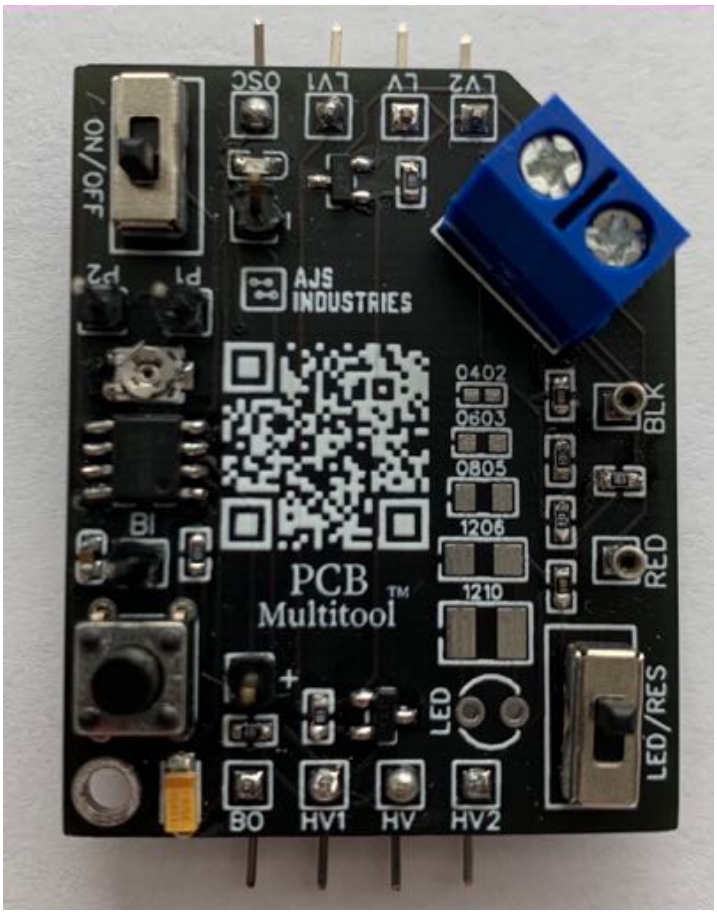
ON/OFF
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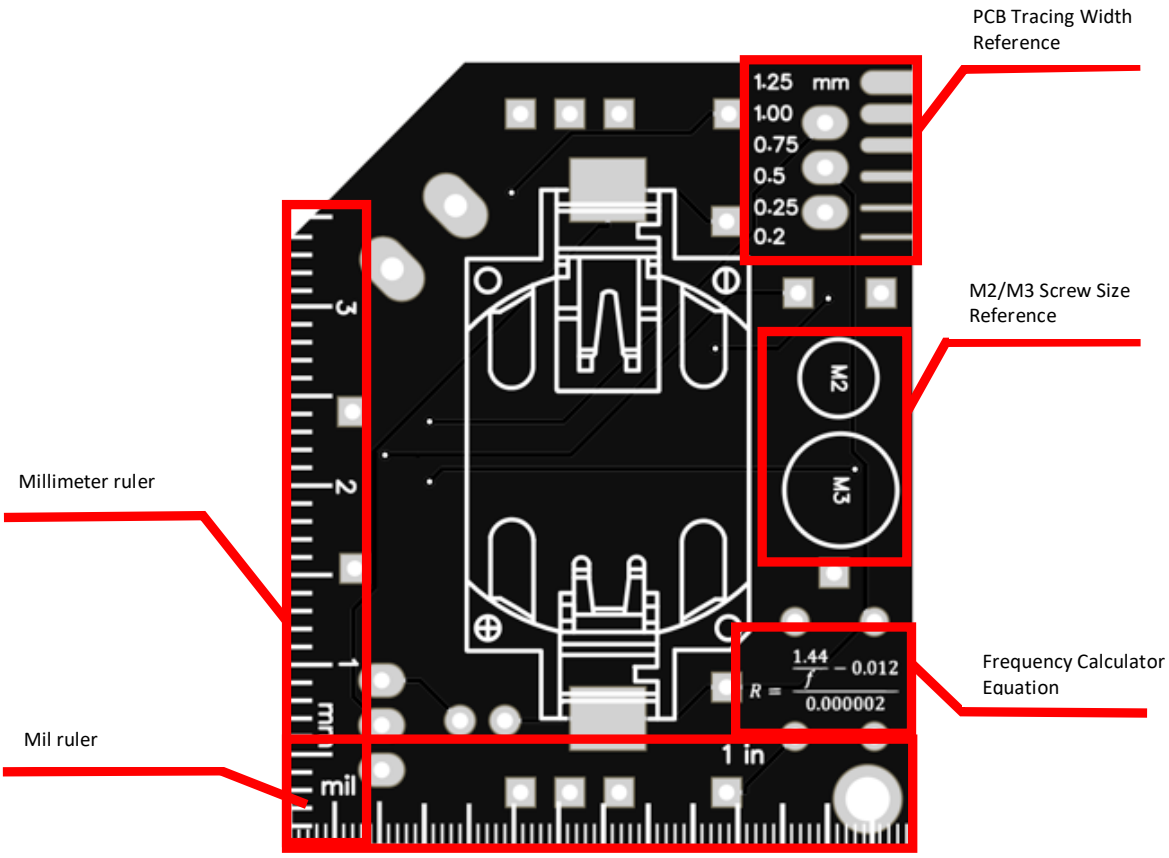

PCB Tracing Width Reference
1.25 mm
1.00
0.75
0.5
0.25
0.2
M2/M3 Screw Size Reference
M2
M3
Millimeter ruler
Frequency Calculator Equation
$R = \frac{\frac{1.44}{f} - 0.012}{0.000002}$
Mil ruler
1 in
mil


maxell
CR2032
3 V
MADE IN JAPAN
1 in
mil

01

Variable Frequency Generator

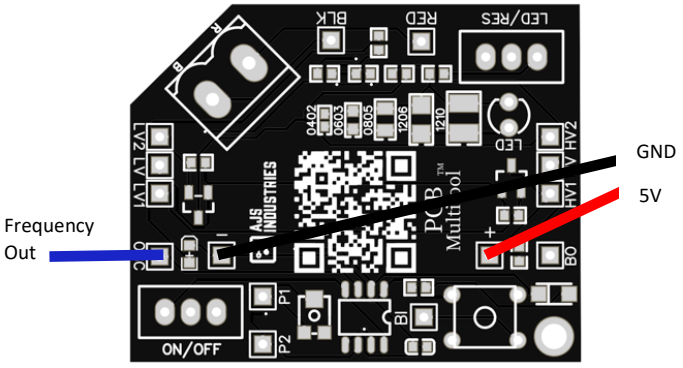
This feature uses a 555 timer and a variable resistor to create an adjustable (6.8-120Hz) frequency generator at a 50% duty cycle. An on-board LED indicates frequency and the OSC pin is the output that can be connected to your circuit.

SETUP:

1. Remove coin cell battery
2. Supply power to VCC and GND Inputs
3. Calculate resistance based on desired frequency

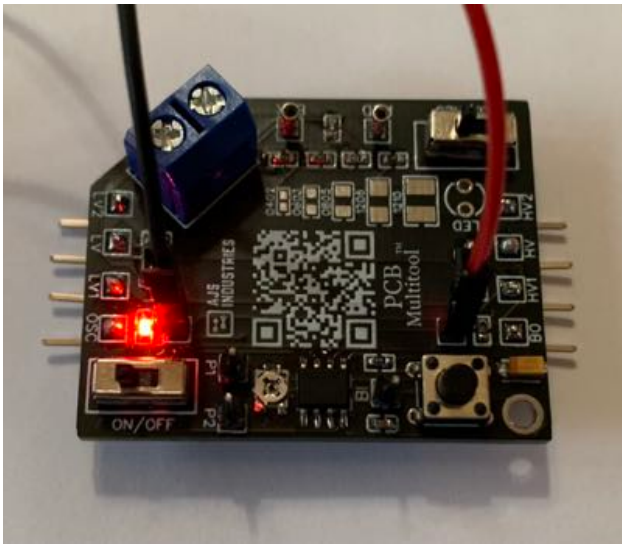
$$R = \frac{\frac{1.44}{f} - 0.012}{0.000002}$$

4. Follow **08** on page 12 to adjust variable resistor
5. Slide switch on
6. Connect OSC output to circuit

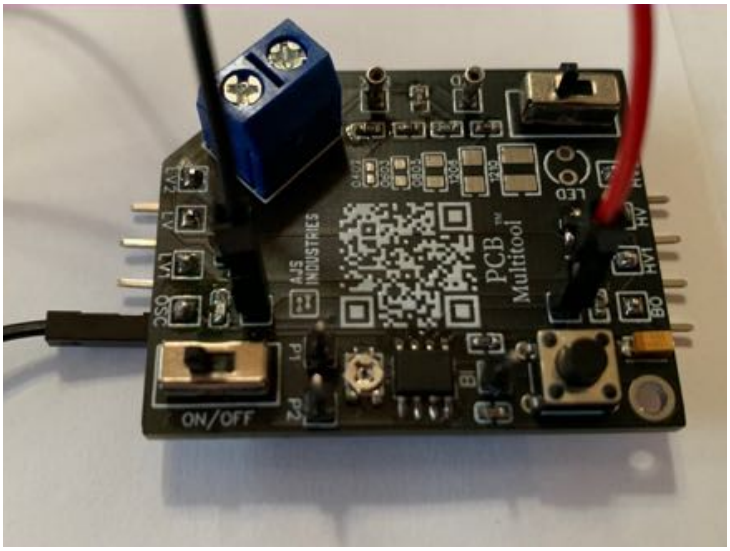


Example:

For a 60 Hz output, plug 60 into the equation above for *f* and solve for R. Doing so results in a resistance of 6000 Ohm. Next, adjust the variable resistor to this value to achieve the desired 60 Hz output at the OSC pin.



Power to board with frequency generator switch on and LED indicating output.



Power to board with OSC output pin connected to circuit on a breadboard.

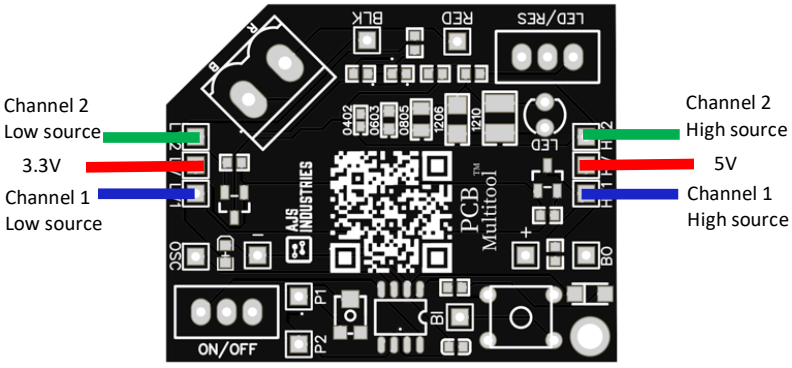
02

Bi-Directional Logic Level Converter

This feature can step up or down voltages signals between 5V, 3.3V, 2.8V, and 1.8V once the High and Low source voltages are set. This board has the capability to convert 2 pins on the high side to 2 pins on the low side.

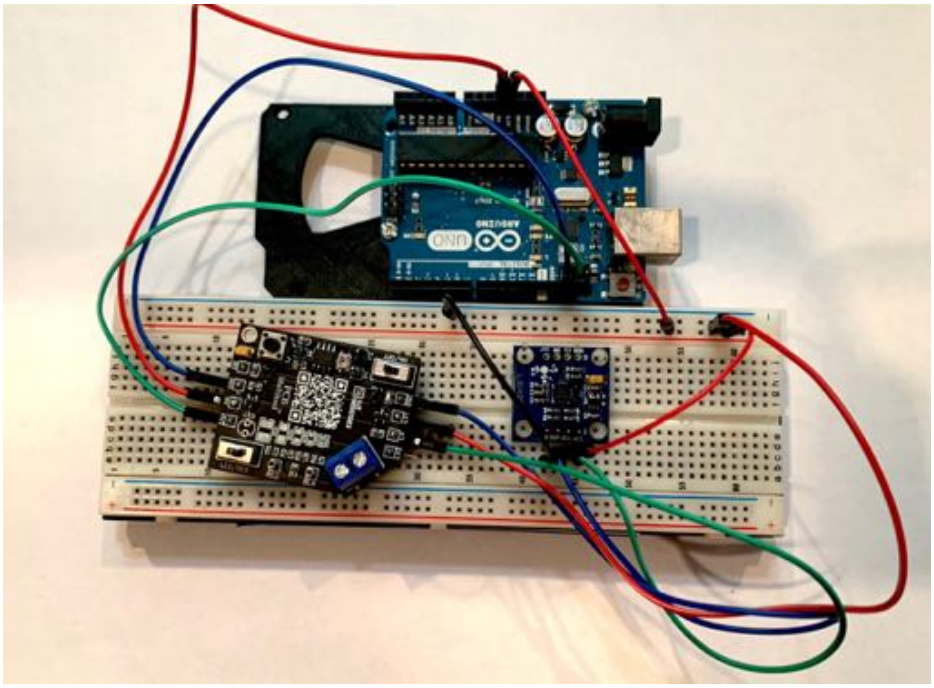
SETUP:

1. Supply High voltage source to HV pin
2. Supply Low voltage source to LV pin
3. HV(n) and LV(n) is the n channel that will be converted between logic levels of the sources
4. Connect HV1 channel to higher voltage signal
5. Connect LV1 channel to lower voltage signal
6. Begin shifting



Example:

If you had an I^2C device with an operating range around 3.3V and wanted to interface with an Arduino, this board would be able to pass the SDA and SCL signals between both devices. HV would be connected to 5V. LV would be connected to 3.3V. SDA would be connected to HV1/LV1 and SCL would be connected to HV2/LV2.



Arduino Interfacing I2C device using PCB multitool to shift between 5V and 3.3 V.

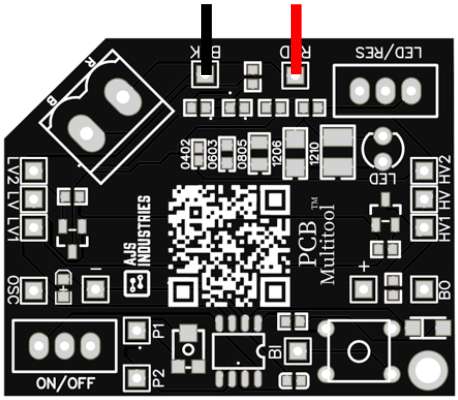
03

Multimeter Breadboard Extender

The terminal block on the PCB is used to connect the Red and Black probes of your multimeter. The probes are connected to the RED and BLK socket pins which allow for easy hands-free connection to your breadboard.

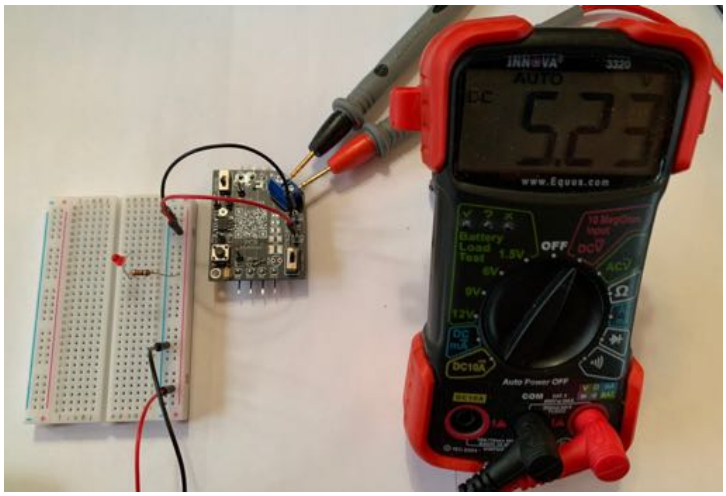
SETUP:

1. Insert multimeter probes into respective terminal block sockets
2. Use the RED and BLK socket pins to connect jumper wires to various points on your breadboard circuit

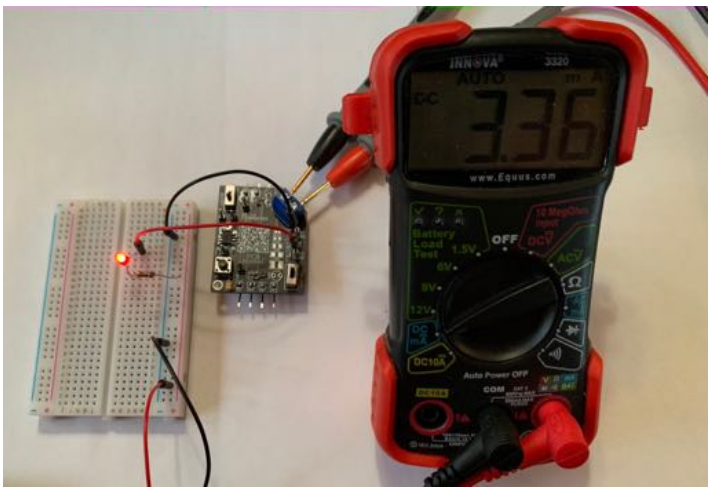


Example:

If you want to probe the voltage/current/etc. in your breadboard circuit, jumper wires can be used to connect the breadboard to the probes. This frees up your hands and limits probe placement error when trying to troubleshoot a circuit.



Probing voltage in a breadboard circuit.



Probing current in a breadboard circuit.

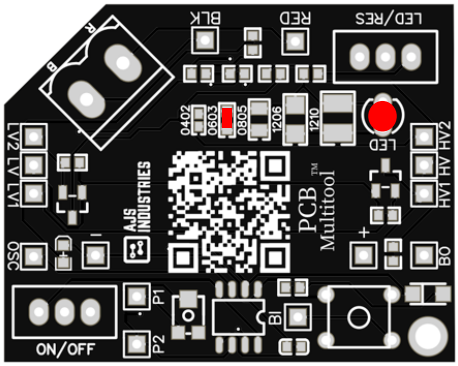
04

LED Tester (SMD and Through-hole)

This board is connected to a 3.3 V coin cell battery that can be used to test LEDs without any additional connections. Any size through-hole LED can be tested. Common SMD packages 1210, 1206, 0805, 0603, 0402 can be tested. (A current limiting resistor is in place).

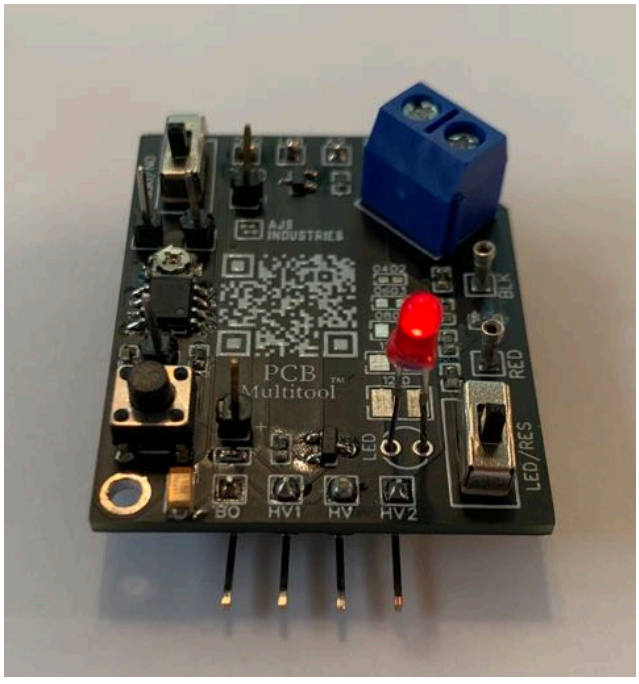
SETUP:

1. Insert CR2032 battery into back of PCB
2. Slide switch to LED position
3. Place SMD LED on respective pad or insert pins of LED in through holes.

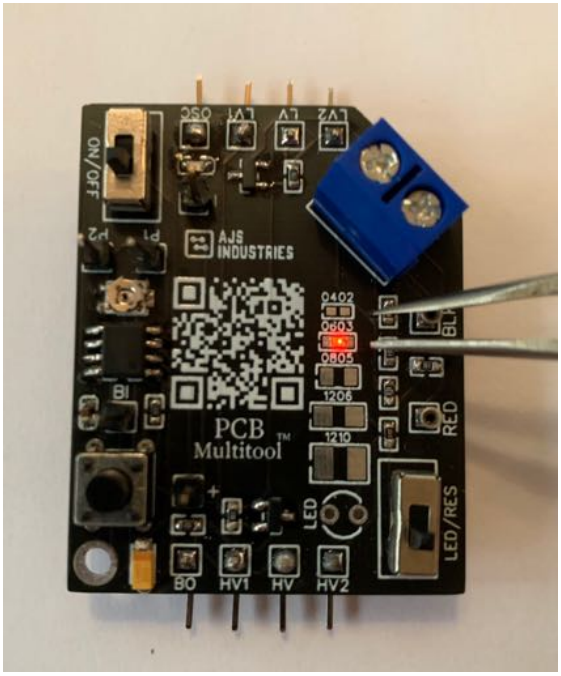


Example:

This feature is useful for testing LED function and orientation before adding them to your circuit.



Testing a 3mm through-hole LED



Testing a SMD 0603 Red LED.

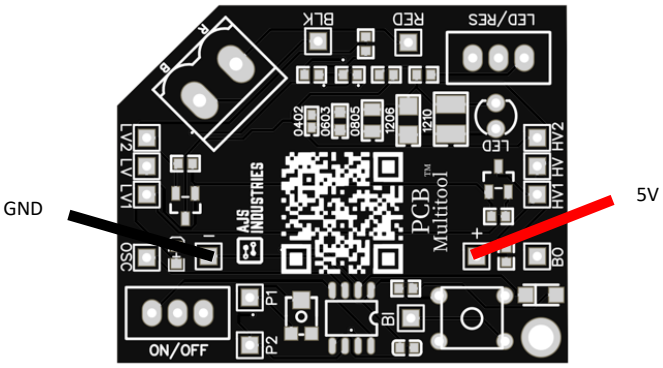
05

Coin Cell Battery 3V Output

This PCB comes with an on board 3V CR2032 battery holder. The (+) and (--) pins are directly connected to the battery terminals which can be used as a quick power source for your circuit.

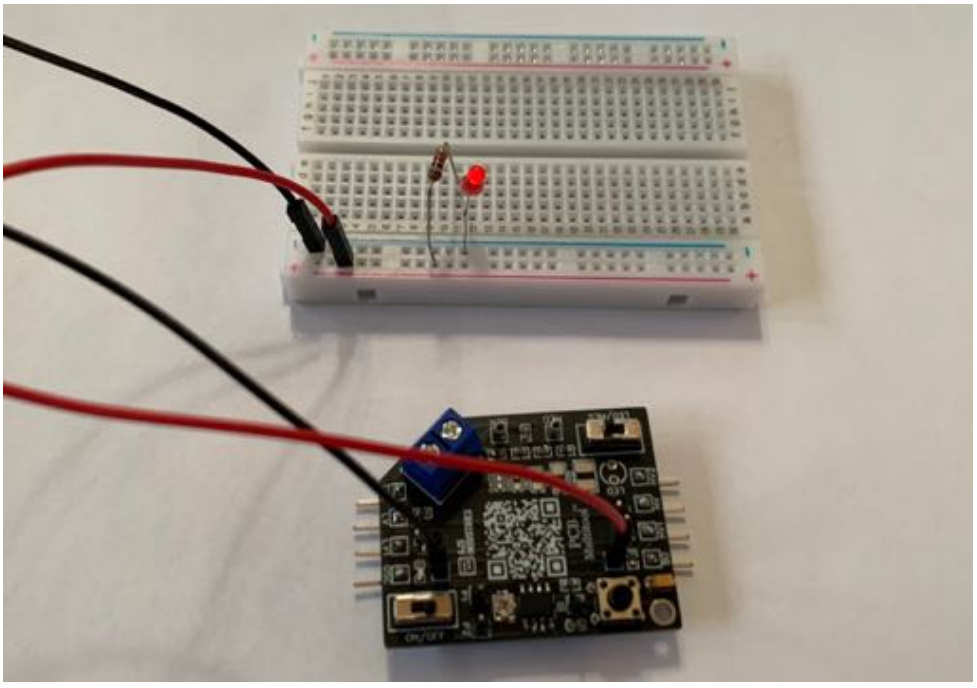
SETUP:

1. Insert CR2032 battery into back of PCB
2. Connect (+) pin to VCC wire
3. Connect (--) pin to GND wire



Example:

This feature is useful for if you need a quick power source for you test circuit.



Powering a simple LED circuit from the on board 3V coin cell battery.

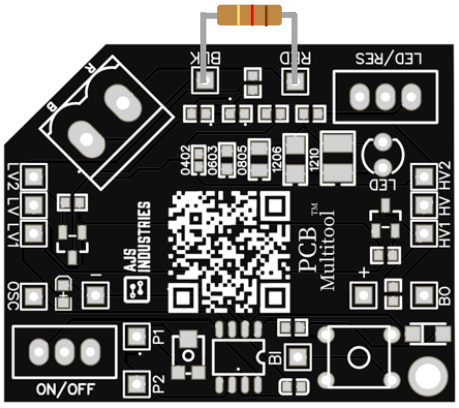
06

Resistor Tester (SMD and Through-hole)

This board can be used to test-through hole resistors and SMD resistors (with multimeter extension function **03**). Common SMD packages including 1210, 1206, 0805, 0603, 0402 can be tested.

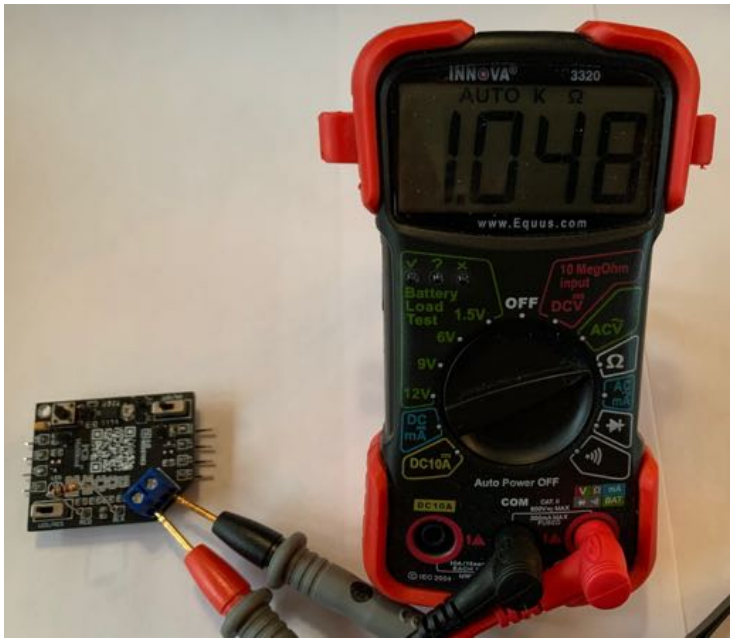
SETUP:

1. Slide switch to RES position
2. Remove coin cell battery
3. Insert multimeter probes into terminal block
4. For SMD resistor
    a. Connect RED pin to (+) pin
    b. Connect BLK pin to (--) pin
    c. Place SMD resistor on respective pad
5. For through-hole resistor
    a. Insert pins of resistor in socket pins.

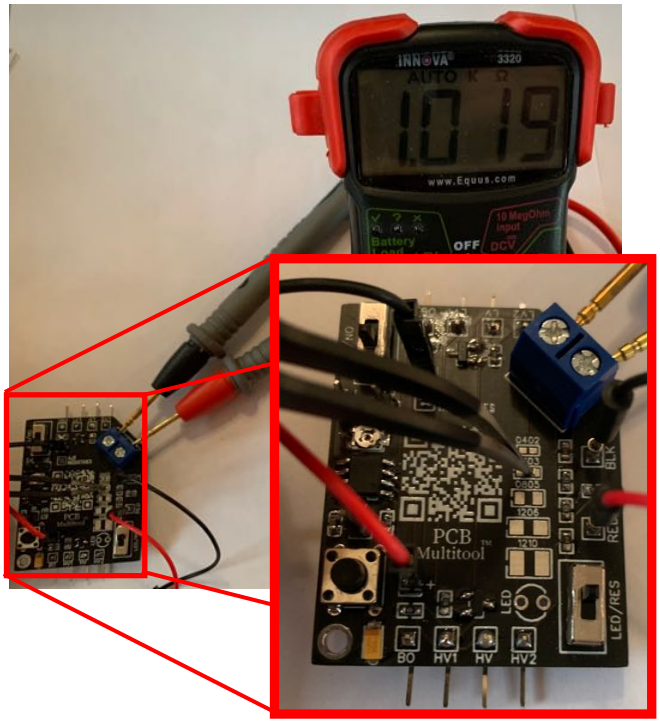


Example:

This feature is useful for testing resistor values before adding them to your circuit. It is especially useful for high throughput resistor sorting.



Testing a through-hole resistor.



Testing a SMD 0603 Red resistor.

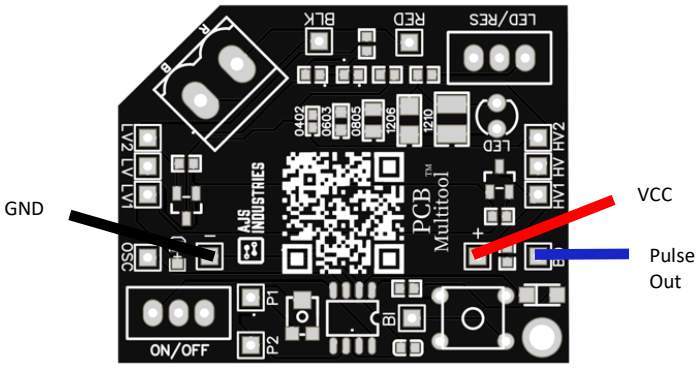
07

Push Button Single Pulse Generator

This feature allows you to take advantage of the onboard battery cell power to supply a single 3V push button pulse output. Alternatively, you can supply your own voltage to the board for a pulse at the respective voltage.

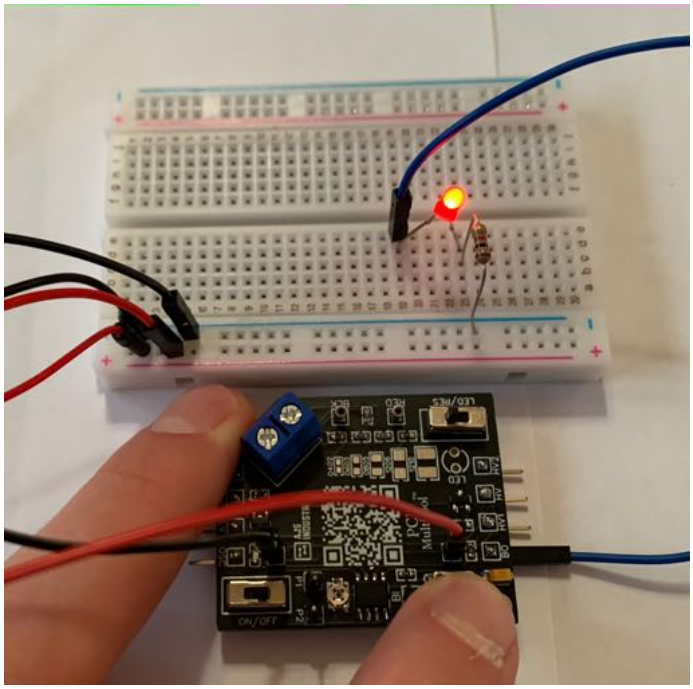
SETUP:

1. For 3V pulse
    a. Insert CR2032 battery into back of PCB
    b. Connect BO to circuit to supply a pulse.
2. For supply pulse
    a. Remove battery
    b. Connect VCC to (+) pin
    c. Connect GND to (--) pin
    d. Connect BO to circuit to supply a pulse



Example:

This feature is useful if you need to use a discrete high voltage pulse in your circuit.



Providing a supply voltage pulse to simple LED circuit. LED lights with push of the button.

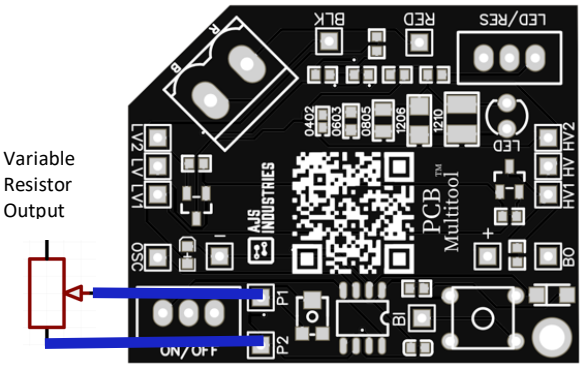
08

100 kOhm Variable Resistor Output

This feature allows you to set a resistance value between 0-100 kOhm to add to your circuit

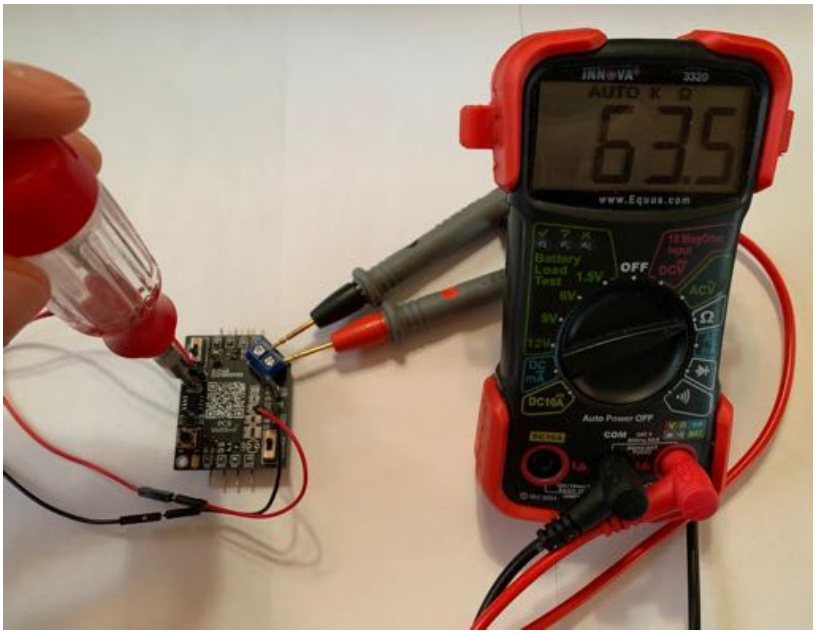
SETUP:

1. Set Resistance
    a. Connect P1 pin to RED pin
    b. Connect P2 pin to BLK pin
    c. Insert multimeter probes into terminal block
    d. Adjust resistor value with Philips head screw driver
2. Use resistance
    a. Connect P1 and P2 pins to circuit

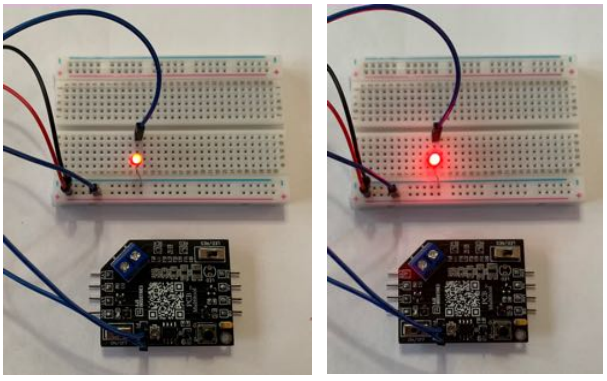


Example:

This is useful if you need to test a specific resistor value in your circuit before placing a permanent value. This can also be used in potentiometer applications.



Setting variable resistor with Philips head screw driver.



Using different resistance values in simple LED circuit.

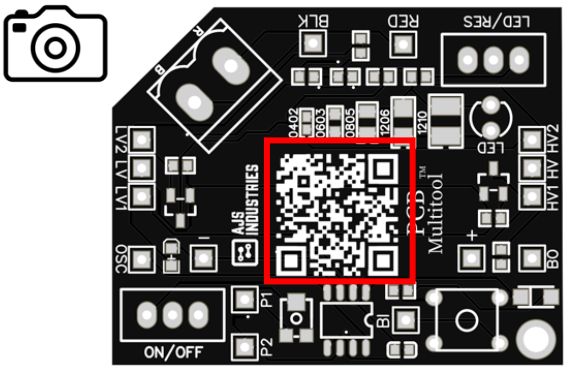
09

Scannable QR Code to Online Conversion Calculator

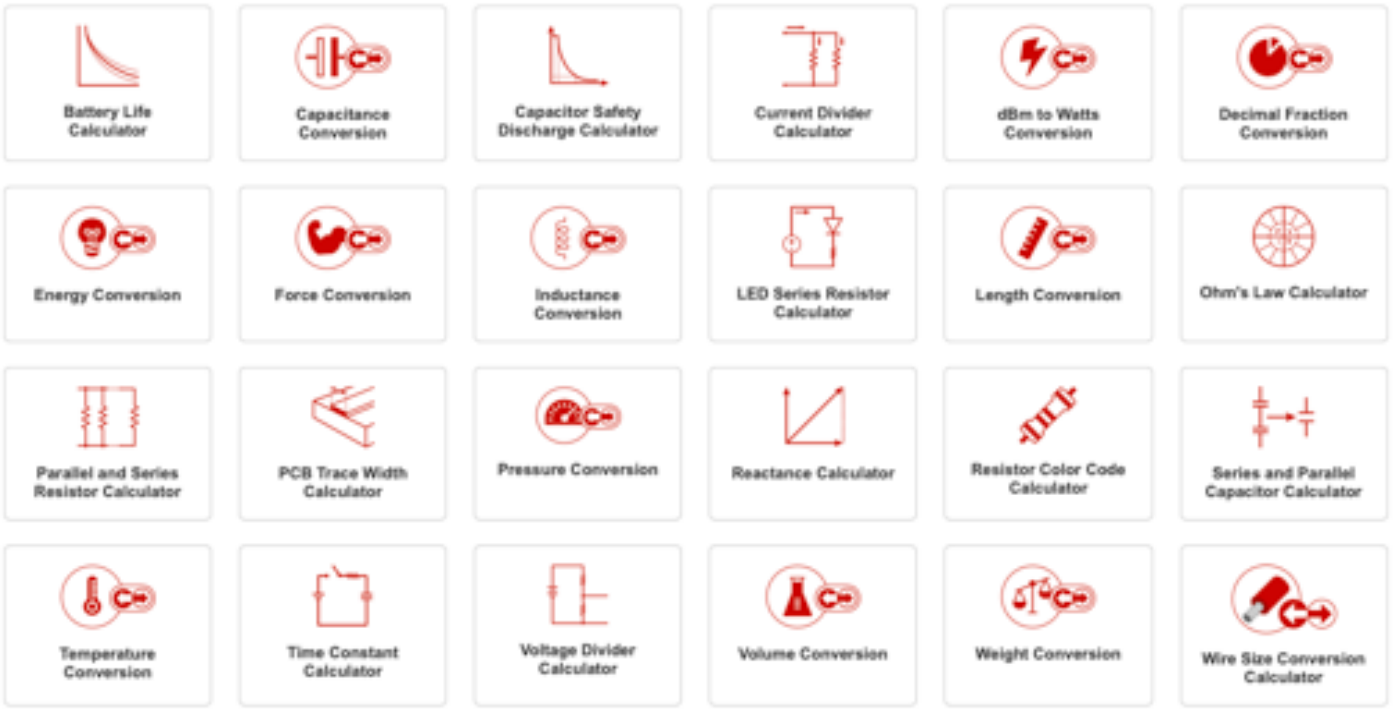
This feature gives you quick access to Digi-Key's Conversion Calculator page by simply scanning the QR code on the top of the PCB Multitool.

SETUP:

1. Open camera app or QR scanning app on your smart phone
2. Get the QR code in focus through the app
3. Click the link to take you to Digi-Key Website



The online conversion calculator includes:



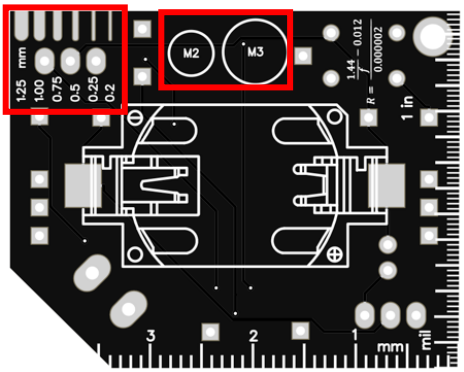
10

M2/M3 Screw Size and PCB Tracing Width Reference

This back of this PCB has a reference for M2 and M3 screw sizes. The Tracing width reference includes common widths of 0.2, 0.25, 0.5, 0.75, 1, 1.25 mm.

SETUP:

1. None



The back of the PCB displaying the tracing and screw reference

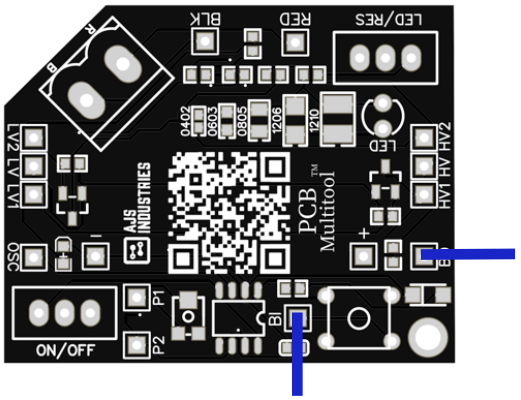
11

Passive I/O Push Button

This feature allows you to use the onboard push button as a passive button that can be added to any circuit using the BI and BO pins.

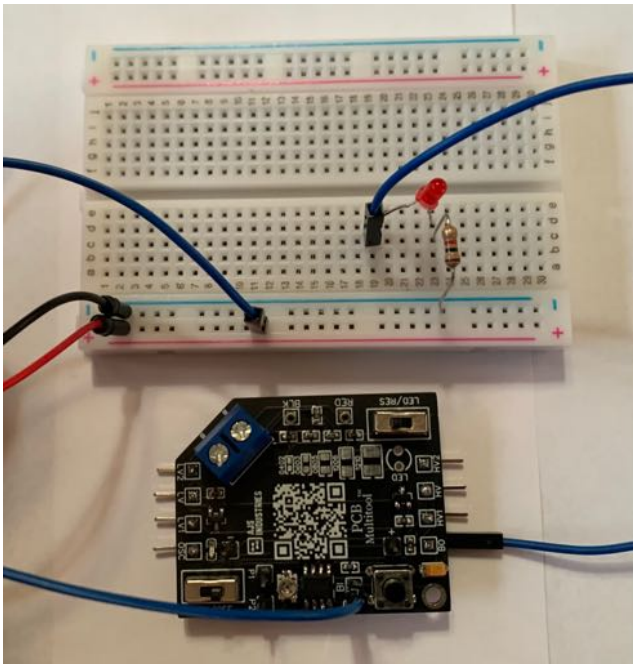
SETUP:

1. Remove the CR2032 battery
2. Connect button input jumper to BI pin
3. Connect BO to button output jumper

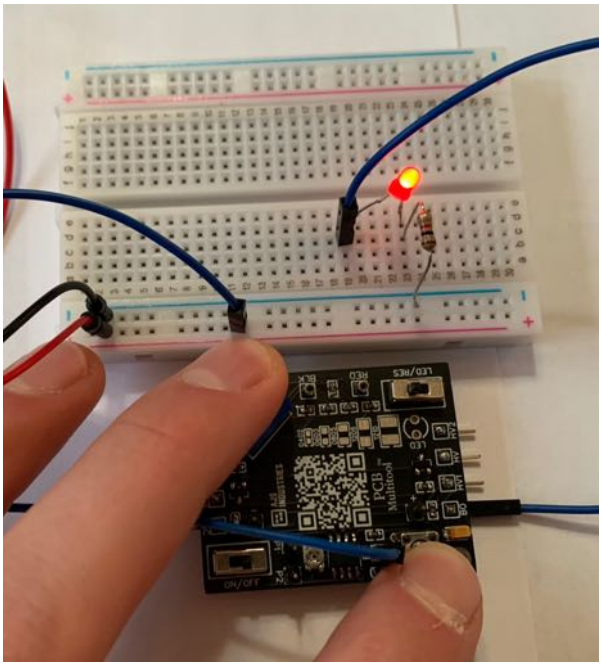


Example:

This feature can be used to add any button to a circuit. It has all the appropriate circuitry to directly wire up an Input and Output to the button. This can used when a momentary switch is needed or if you have run out of room on a breadboard.



Connecting a push button to a simple LED circuit



Using the passive push button as a momentary switch to turn on the LED

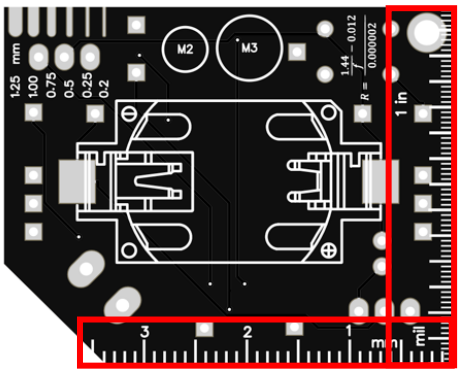
12

Precise mm/mil Ruler

This back of this PCB has a3.4mm metric ruler with 1mm graduations and a 1.4 decimal inch ruler with 0.01 inch graduations. Although not a standard ruler size, this board may be handy for smaller measurements. The decimal inch ruler may be useful as a reference for PCB design.

SETUP:

2. None



The back of the PCB displaying the rulers.