Alcohol Vapor Detector D.I.Y Kit

" for detecting alcohol vapor in household or workplace environment using the MQ3 sensor "

Part Number: AK-330

Level: Intermediate

Description:

This kit contains the required components to build yourself an alcohol vapor detector. This module is based on an NE555 I.C. and an MQ3 sensor.

While being a simple soldering project for beginners, this kit can be used in a variety of small personal, educational or enterprise applications.

This alcohol sensor is suitable for detecting alcohol concentration on your breath, just like your common breathalyzer. It has a high sensitivity and fast response time. The MQ3 sensor provides an analog resistive output based on alcohol concentration. The drive circuit is also very simple.

This is a D.I.Y. kit that requires soldering through-hole components on the main double-sided printed circuit board (PCB). Users with minimal soldering tools and intermediate skills can easily assemble this module. The assembly process should take anywhere between 10 to 20 minutes.

Specification:

Module

- Required Input Voltage: 5VDC
- Current: $\approx$ 150mA
- PCB Dimensions: 63 x 37 x 1.4mm (2.48"x 1.46" x 0.05")

Sensor MQ3

- Environment Condition: -10°C~50°C
- Sensing Parameter: 0.05 - 10mg/L Alcohol
- Concentration slope rate: $\leq$ 0.6

Bill of Materials:

This package includes **16** pieces which are listed below along with their labels and quantity.

Component	Label	Value / Type / Label	Quantity
Resistors	R1, R2	1KΩ / (Brown, black, red, Gold)	2
	R3	120Ω/ (Brown, red, gold, gold)	1
	R4	5.1Ω/ (Green, brown, gold, gold)	1
	RW	10KΩ Potentiometer	1
Light Emitting Diode	D1	5mm Red	1
	D2	5mm Green	1
Zener Diode	D3	1N4148	1
Relay	JK	HK23F-DC5V-SHG Subminiature High Power Relay	1
IC Chips and Sockets	U1	NE555	1
	—	DIP8 socket	1
Switches and Connectors	S1	Slide Switch, SPDT	1
	J1	2.1mm DC Barrel Female Jack	1
PCB	—	Tin Plated, Green Soldermask, White Silkscreen	1
Modules	MQ-3	MQ3 Sensor	1
	B1	Buzzer	1
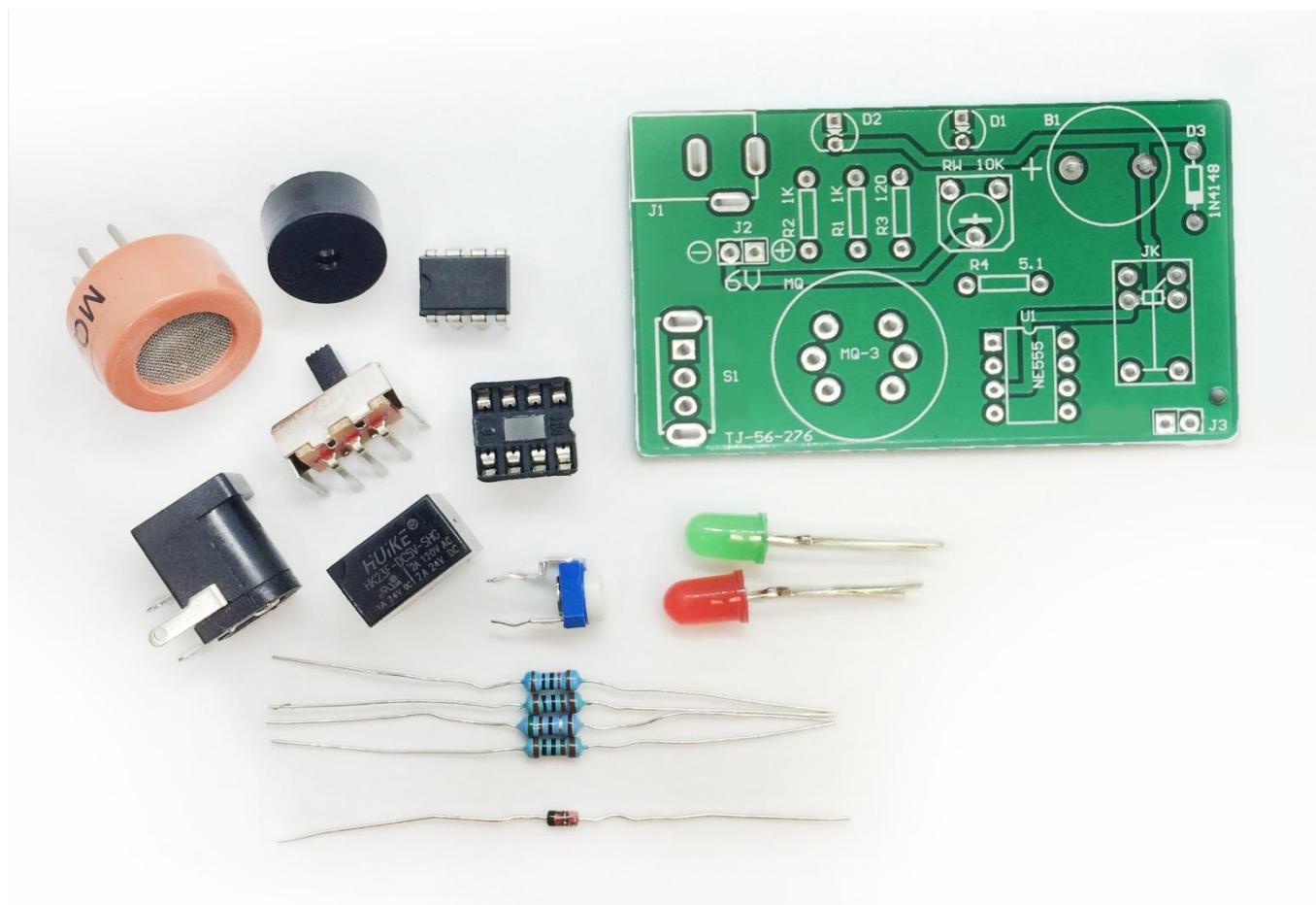
Assembly:

1) In order to assemble the module, you need the following tools:

Must Have

Temperature Adjustable Soldering Iron A variety of soldering tips Brass wool Wet sponge	60/40 or 63/37, Tin-Lead Solder	Flush Cutters
Needle Nose Plier or Tweezers	Wire Stripper	Lint Free Cloth

*It is recommended to have some isopropyl alcohol and a fine soldering brush handy to clean off the excess flux on the circuit board when the soldering is done.

Recommended

Isopropyl Alcohol	Soldering Brush	Rosin Flux Pen or Paste

*ATTENTION* DO NOT USE RUBBING ALCOHOL, IT WILL DAMAGE THE COMPONENTS.

2) Open the package and verify the components. (refer to section **4. Bill of Materials** on **page 3**)
3) Lay down all the components on your workbench and proceed to the next step.
4) Prepare your soldering tools.
   a) Use an appropriate tip for the application. Also, make sure the soldering tip is clean. Gently use a brass wool or a brush to clean the tip when needed. Another way of cleaning the soldering tip is to use a wet sponge.

b) The soldering iron temperature depends on the type of solder used. If you are using a typical **60/40 lead solder**, depending on the thickness the temperature should be set anywhere between **370 to 500 °F (187 to 260 °C)**. If you are using a lead-free solder, increase above temperatures by **40 to 70 °F (5 to 20 °C)**.
ATTENTION HIGHER TEMPERATURES WILL DAMAGE THE COMPONENTS ALONG WITH THE CIRCUIT BOARD.
*ATTENTION*DO NOT TOUCH THE SOLDERING IRON WHEN IT IS HOT.

c) It is recommended that you clean the board with a fine brush, isopropyl alcohol and lint-free cloth to get rid of any pre-existing residue, glue or dirt. This way the solder will create a better joint with the copper surface.

d) Have your flush cutter, needle nose plier or tweezers handy.

e) Having a roll of paper tape helps you to keep the components in place when soldering on the bottom side of the board.

f) Have a rosin flux pen or paste handy. Adding flux to the pads before soldering the components makes the wetting process easier by letting the melted solder to flow better on the pad and create a better joint.
ATTENTION SOLDERING SHOULD BE DONE IN A VENTILATED AREA. BREATHING SOLDER FUMES WILL HARM YOU.

g) Always cut the excess leads with a flush cutter once a component is soldered on the PCB. At least 1mm of the lead should stick out from the solder joints.
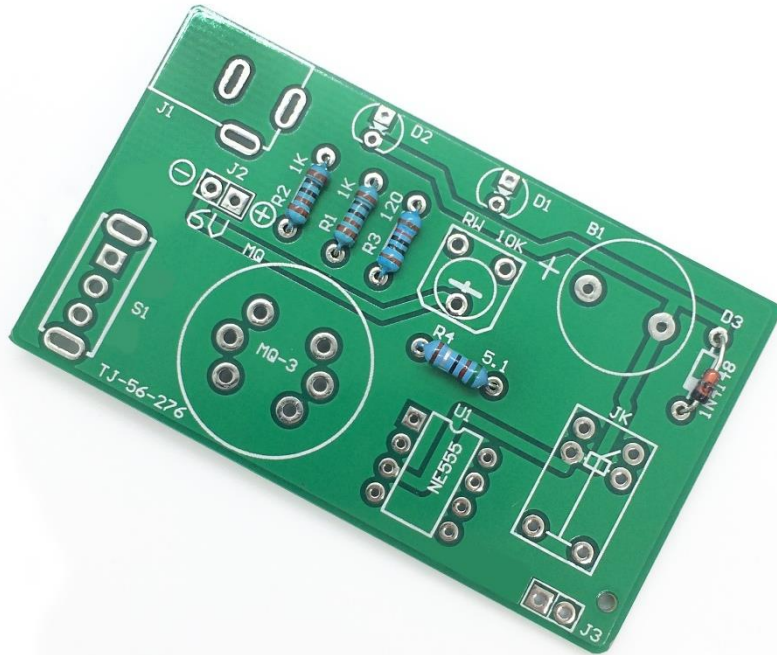
Optional
Use a digital multimeter to measure the resistor values
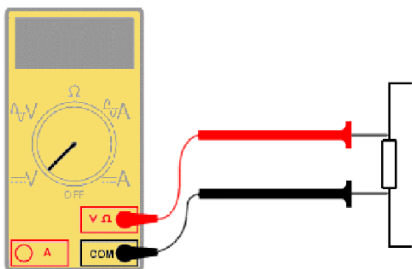
Pay attention to the polarity of the diodes.
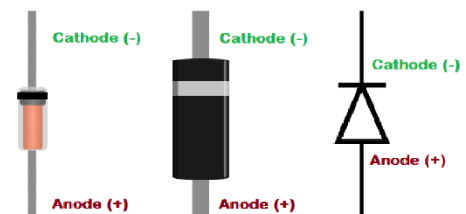
You may proceed to solder the resistors in place by following the labels on the board and placing the correct color resistor indicated in the "Bill of Materials" section on page 3.

All soldering will be done on the backside of the board.

Insert the 8 pin (DIP8) IC socket as shown in the photo.

Once it's soldered onto the PCB, gently insert the NE555 chip onto the socket.

Ensure the notch of the Integrated Circuit aligns with the markings on the board, also known as the silkscreen.

Solder the relay, the 10K potentiometer and the buzzer. Make sure the (+) of the buzzer is facing the correct way.
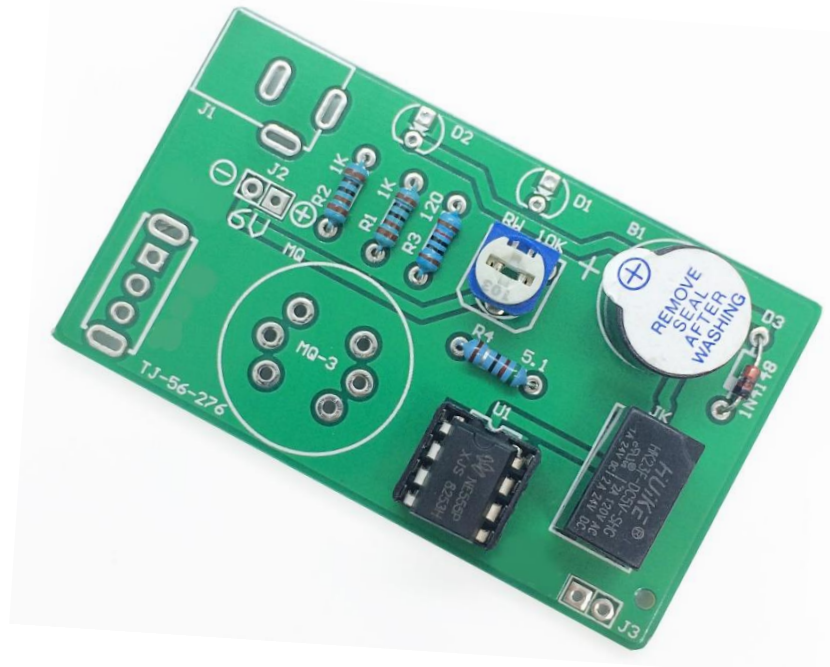
It is recommended to solder and cut of the excess lead with a flush cutter, one component at a time.
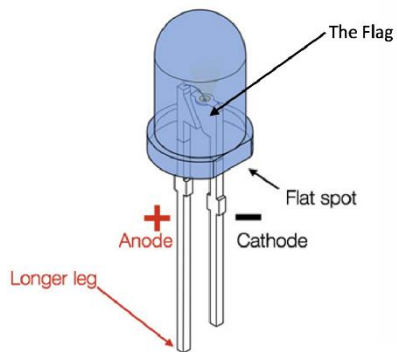
Insert the switch, DC connector and the MQ3 sensor as shown in the picture and solder them.
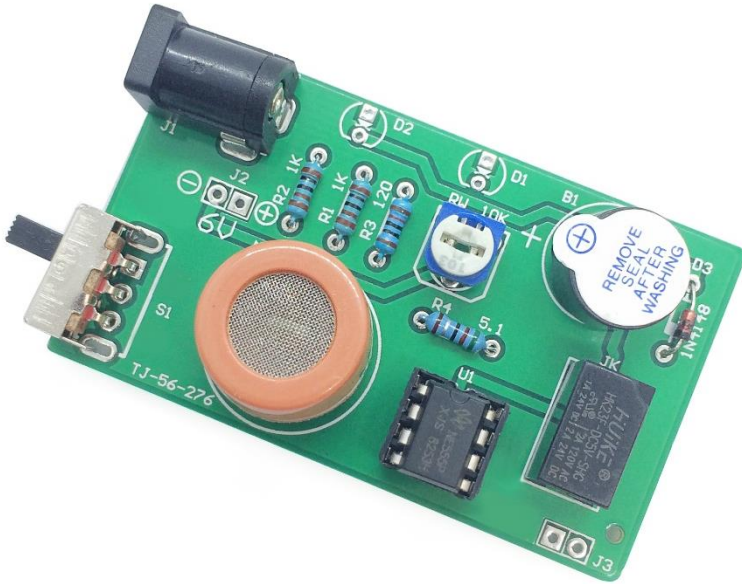
Insert the 5mm LEDs as shown in the image. Ensure that the orientation of the LED is correct.

Pay attention to the LED polarity.

The Flag

Flat spot

+
Anode

−
Cathode

Longer leg

Implementation:

This module should be powered up by connecting a 5V 1A DC power supply to the J1 connector. This device has an onboard high power relay rated to 24VDC 2A; therefore, you can connect any peripheral device that you desire to the output of the relay so it can be turned ON and OFF during the operation of the sensor module.

The device is designed to work standalone where, when alcohol vapor or ethanol is detected by the MQ3, the buzzer will be triggered to inform you that alcohol has been detected. At the same time the relay will turn OFF. You may use the potentiometer RW to adjust the sensitivity of the detector.

Related D.I.Y Kits:

AK-30 D.I.Y MINI Speaker Educational Kit

Acrylic Frame that requires assembly and a controller board that requires some soldering work to get up and running.

The provided audio boards come with LED Vu Meter to see the sound level.

PI-ZEROWH-KIT Raspberry Pi Zero W Basic Kit

A low-cost method of getting into Linux environment and providing some pinouts to interface with some sensors.

Excellent to learn programming using scratch, OpenCV projects using python script language or running a 3D printer server using Octo-print.
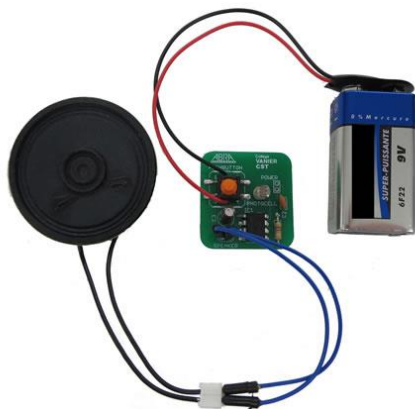
EK-1 Theremin Player Kit

A soldering based kit that works as a Theremin when completed. The sounds coming out of the speaker will vary depending on the closeness of the fingers to the photocell sensor.

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