

16 - Tone Digital Alarm Sound Generator D.I.Y. Kit

『 for safe box, shop lifting, bike/bicycle alarm systems or scale modeling applications 』

Part Number: **AK-295**

Level: Intermediate



ABRA
www.abra-electronics.com

1. Description:

This kit contains the components needed to assemble a 16-tone digital sound generator. This module is based on a 9561 sound chip module and utilizes two logic IC chips to toggle between sound combinations using the switches.

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

- Door bells
- Alarm systems (safe box, shop lifting, bike/bicycle, etc.)
- Scale modelling

This is a D.I.Y. kit that requires soldering through-hole and surface mount components on the main double-sided printed circuit board. A separate PCB (the 9561 module) needs to be vertically soldered onto the main 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.

2. Specification:

- **Required Input Voltage:** 4.5 – 5 VDC (using batteries or power supply)
- **Current:** $\approx 15\text{mA}$
- **Switch Combination:** 16 Combinations
- **PCB Dimensions:** 48 x 40 x 12mm ($1\frac{7}{8}'' \times 1\frac{9}{16}''$)

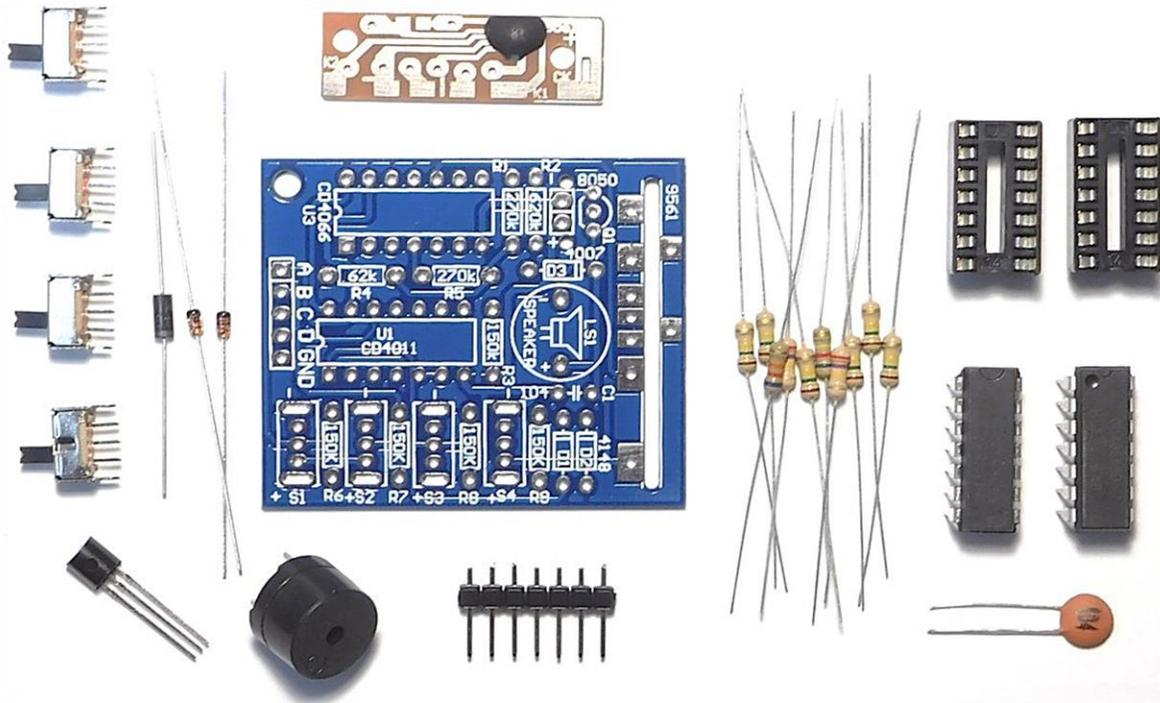
3. Advantages and Features:

- Easy to assemble and use
- Easy to handle
- Affordable price
- Small and lightweight package
- Can be powered up using commonly available batteries
- User-friendly PCB layout with precise silkscreen labelling
- Strong buzzer
- Controllable via microcontroller boards or sensor shields.

4. Bill of Materials

This package includes **27** pieces which are listed below along with their labels and quantity.

Component	Label	Value / Type	Quantity
Resistors	R1, R5	270K Ω	2
	R2	620K Ω	1
	R3, R6, R7, R8, R9	150K Ω	6 (1 spare)
	R4	62K Ω	1
Zener Diodes	D1, D2	1N4148	2
Rectifier Diode	D3	1N4007	1
Ceramic Capacitor	C1	104 (100nF)	1
Transistors	Q1	SS8050 Epitaxial Silicon NPN	1
IC Chips and Sockets	U1	CD4011BE	1
	U3	CD4066BE	1
	----	14-pin (DIP14) IC Socket	2
PCB and Module	9561	CK9561 Alarm Sound Module (orange PCB)	1
	----	PCB (Tin-plated and Blue Silkscreen)	1
Buzzer/Speaker	LS1	Electromagnetic SOT Continuous Beep	1
Switches and Header	S1, S2, S3, S4	Through-hole Single Throw Double Pole	4
	----	Single-row header*	1



The header included in the package is randomly sized and needs to be cut into a 2-pin and a 5-pin header before the assembly process.

5. 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.**

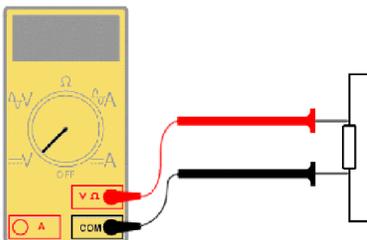
- 2) Open the package and verify the components. (refer to section 4. **Bill of Materials** on page 3)
- 3) Lay down all the components on your workbench and proceed to the next step.
- 4) Prepare your soldering tools.
 - a) Use an appropriate tip for the application. Also, make sure the soldering tip 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.



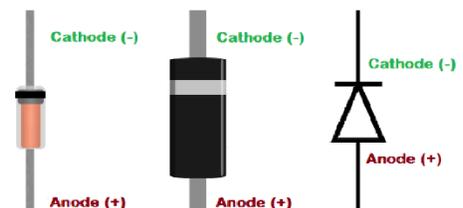
- b) The soldering iron temperature depends on the type of solder used. If you are using a typical **60/40 lead solder**, depending on the thickness the temperature should be set anywhere between **370 to 500 °F (187 to 260 °C)**. If you are using a lead-free solder, increase above temperatures **by 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

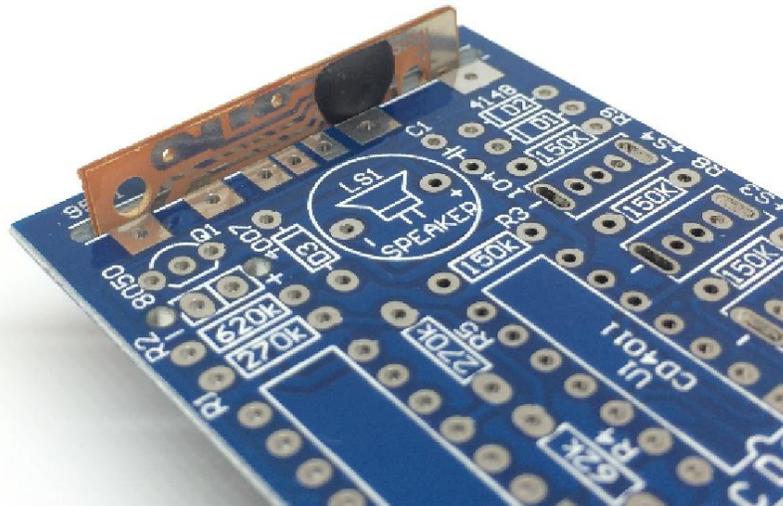


Pay attention to the polarity of the diodes.



1

Vertically insert the sound chip board in the designated slot on the main PCB.

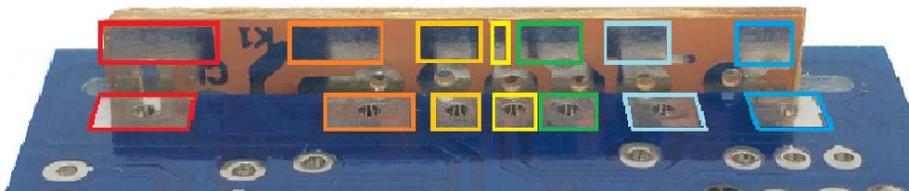


Make sure that the board stays upright by taping the edges on the main board, or by using leftover resistor leads as shown in the illustration:



Insert old resistor leads here to keep the board from falling off

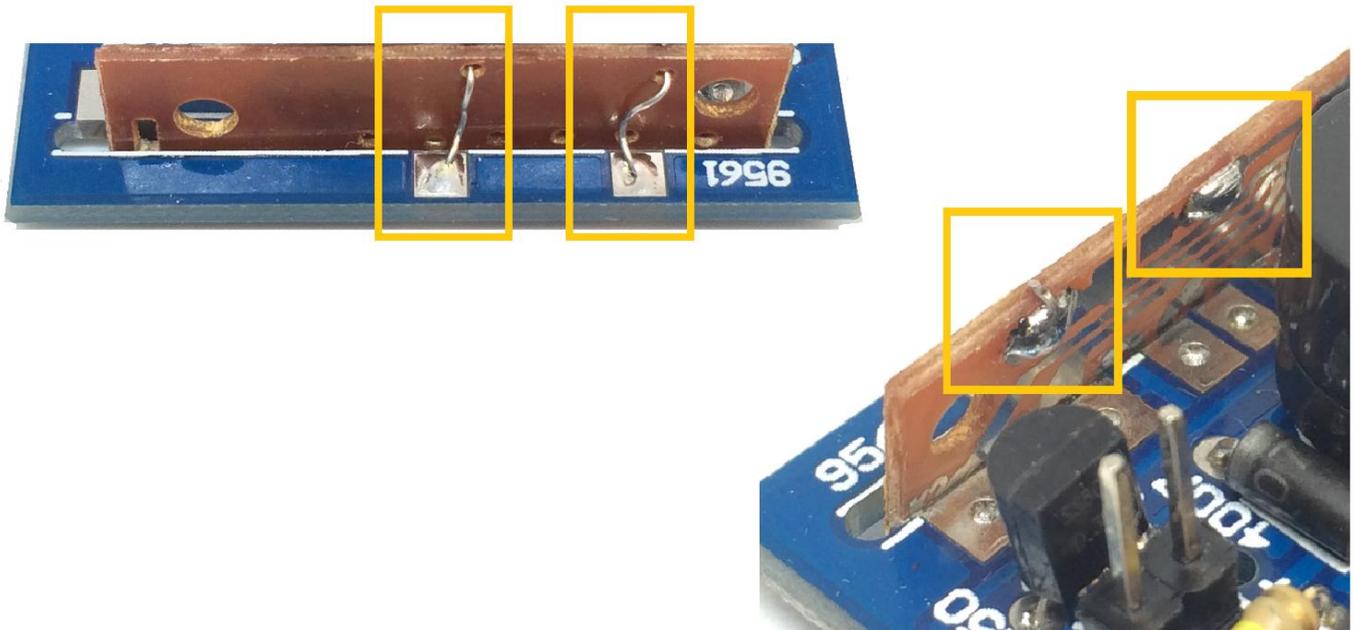
Once the sound chip board is in position start connecting the pads together by soldering.



The end results on the bottom side should look like this:

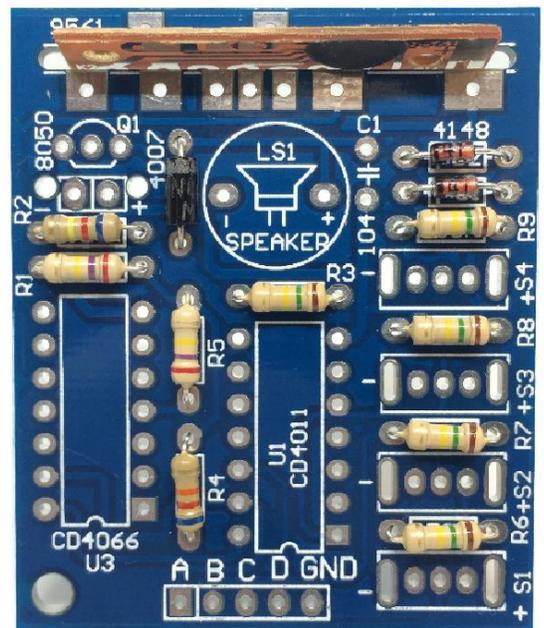
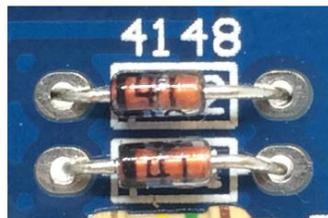
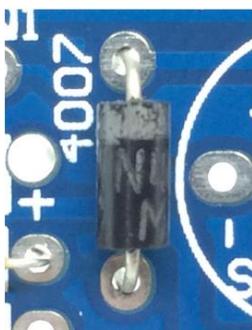


Use some thin wires or resistor leads to connect the two pads on the top side of the main PCB to the sound chip board.
Solder them as shown in the illustrations below:



2

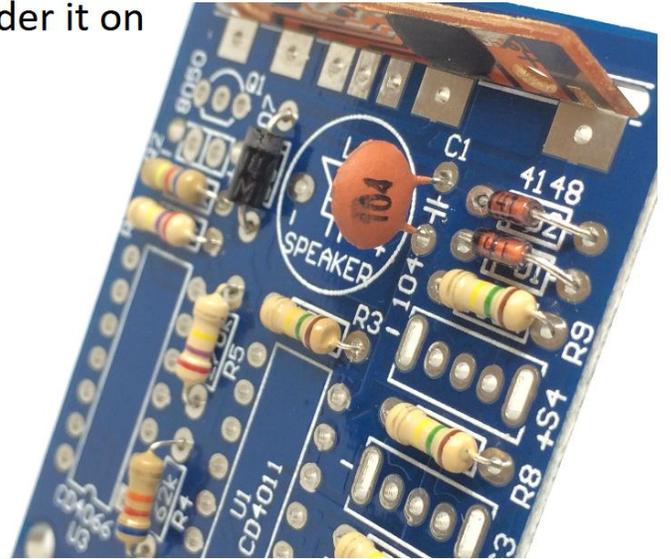
Insert the resistors (R1-R9) and the diodes (D1-D3) on the board and solder the leads on the bottom side of the board.



You can solder these components one by one or all at once depending on your level of comfort and skills.

3

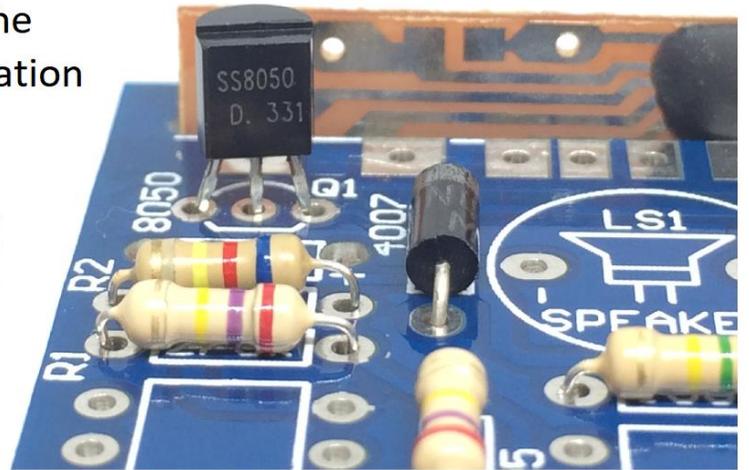
Insert the C1 ceramic capacitor and solder it on the bottom side of the board.



4

Solder the Q1 NPN transistor on the board. Pay attention to the orientation of the component.

The flat side with the SS8050 label should face down as shown in the figure.



5

Cut a 2-pin header off the provided single-row header and solder it on the board.

The plastic base should sit on the top side of the PCB as shown in the adjacent figure.

This header is used to power up the module with a +5VDC using batteries or a power supply.

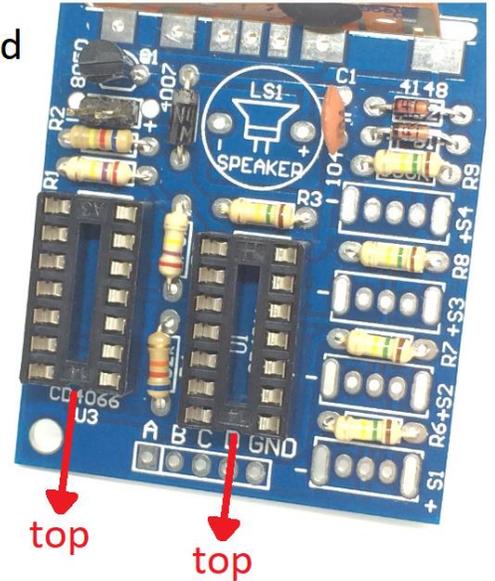
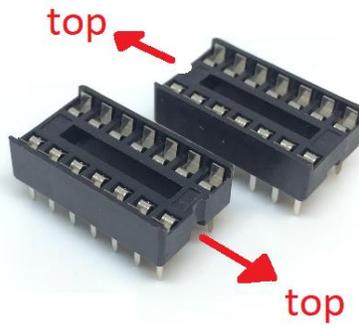


6

Place the 14-pin IC sockets on the board for U1 and U3 and solder them through the bottom.

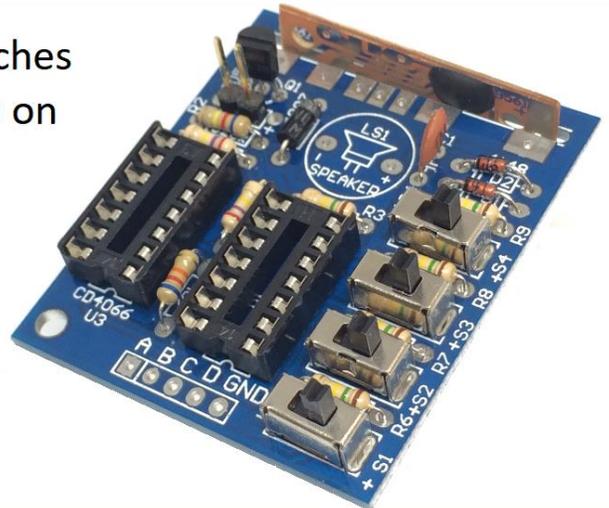
Pay close attention to the orientation of the sockets.

The curved notch should face down as shown in the figure.



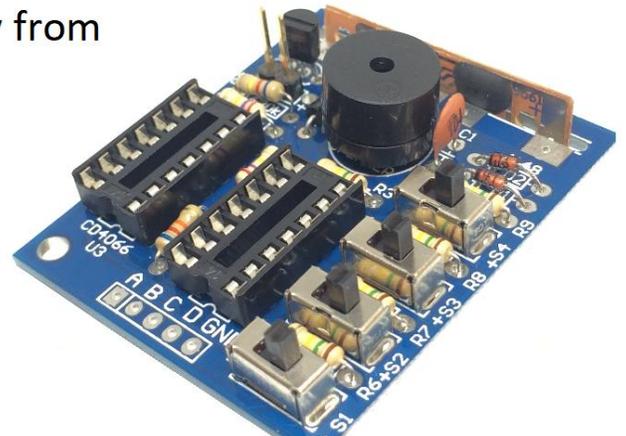
7

Insert the single through double pole switches (S1-S4) onto the board and solder the pins on the bottom.



8

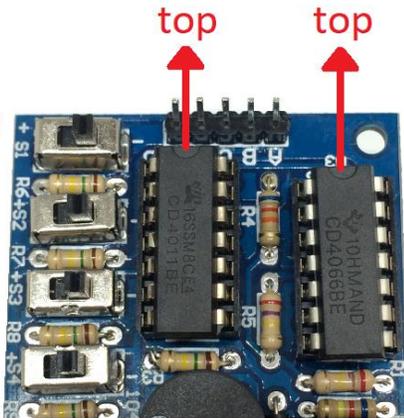
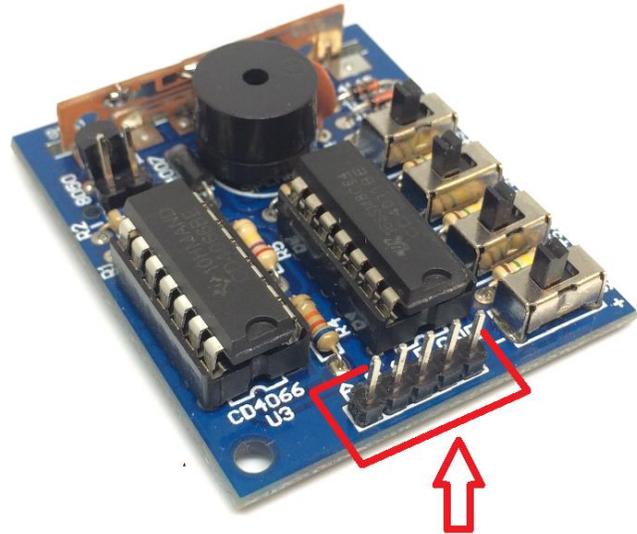
Push the pins of the buzzer/speaker away from each other and solder it on the board.



9

Insert the IC chips (U1 and U3) on the sockets.

The curved notch on the top the ICs should match the ones of the sockets as seen in the adjacent figure.



Optional

Depending on where you need to use this module, you can add a 5-pin header here.

6. Implementation

- The following switch combinations can be used to select an alarm tone:

- This module can be used in different applications that require some type of alarm or indication upon a certain action (touch, motion, etc.).

The benefit of such characteristic is that it can be hooked up to almost any programmable controller board or sensor shield in the market that emits +5VDC output signals (such as Arduinos).

- Below is an **example** of using an Arduino Uno microcontroller board and a capacitive touch sensor shield to control the alarm module.

- Components Used:

- Arduino Uno (or other compatible boards)

= **ABRA part numbers:** ABRAUNO
ARD-UNO
A000066

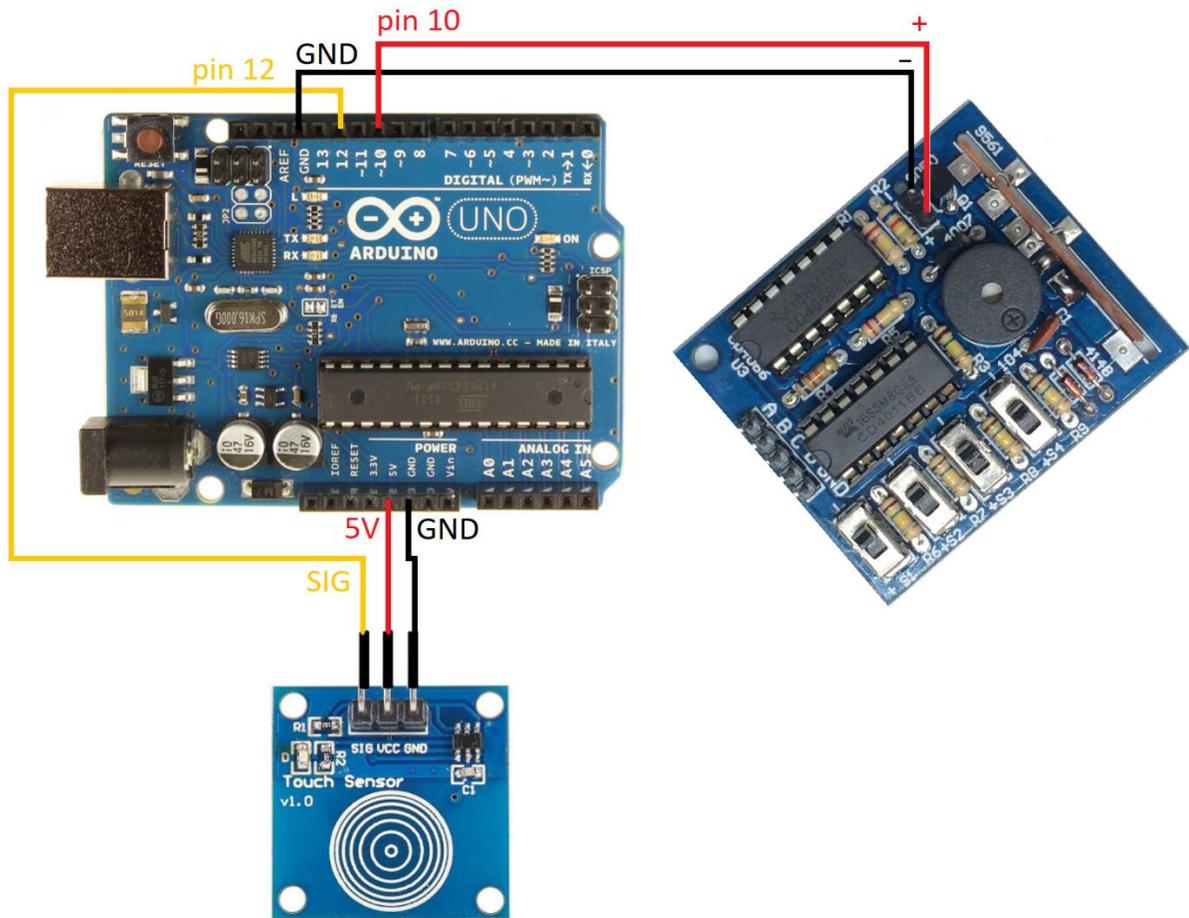
- Catalex TTP223B Capacitive Touch Sensor

= **ABRA part number:** SENS-54

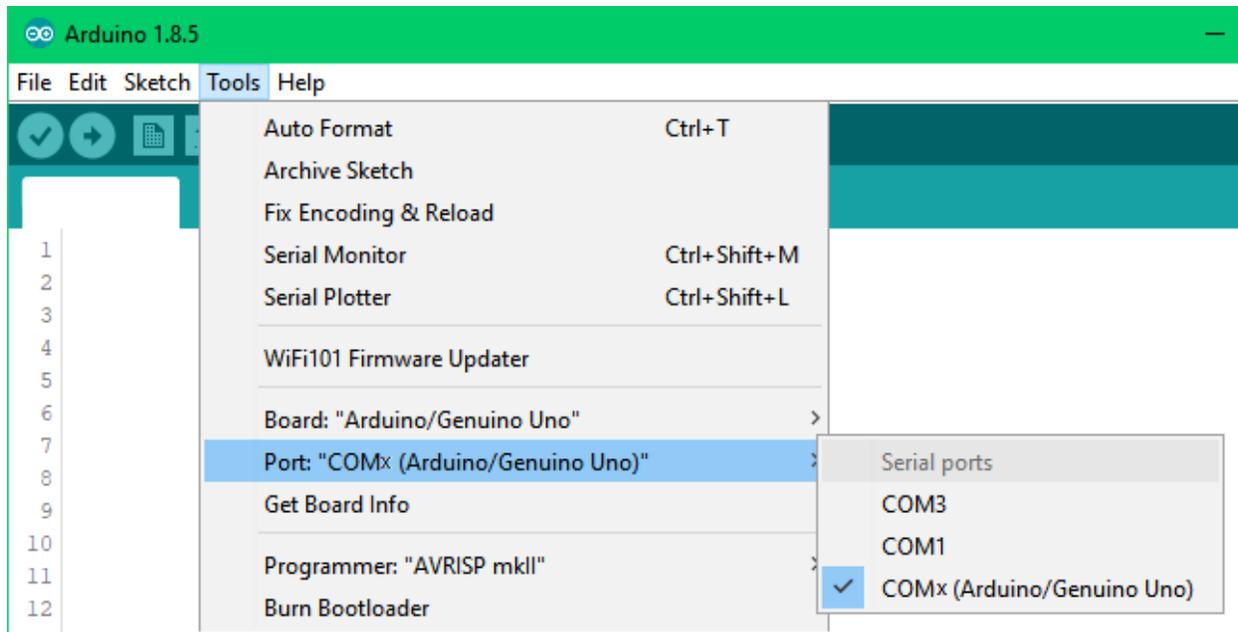
- 5x Male-Female Jumper Wires

S1	S2	S3	S4
0	0	0	0
0	0	0	1
0	0	1	0
0	0	1	1
0	1	0	0
0	1	0	1
0	1	1	0
0	1	1	1
1	0	0	0
1	0	0	1
1	0	1	0
1	0	1	1
1	1	0	0
1	1	0	1
1	1	1	0
1	1	1	1

6.1) Hook up the modules as shown in the diagram below:



6.2) Connect your Arduino to your computer using the provided USB cable and run Arduino's compiler program. Make sure the Arduino driver is installed and the correct COM port and board type is selected.



6.3) Copy the code below to your IDE and upload it to your Arduino.

```
int alarmSet = 10; // Sets the alarm HIGH/LOW
int sensorPin = 12; // Receives a HIGH when the sensor is touched

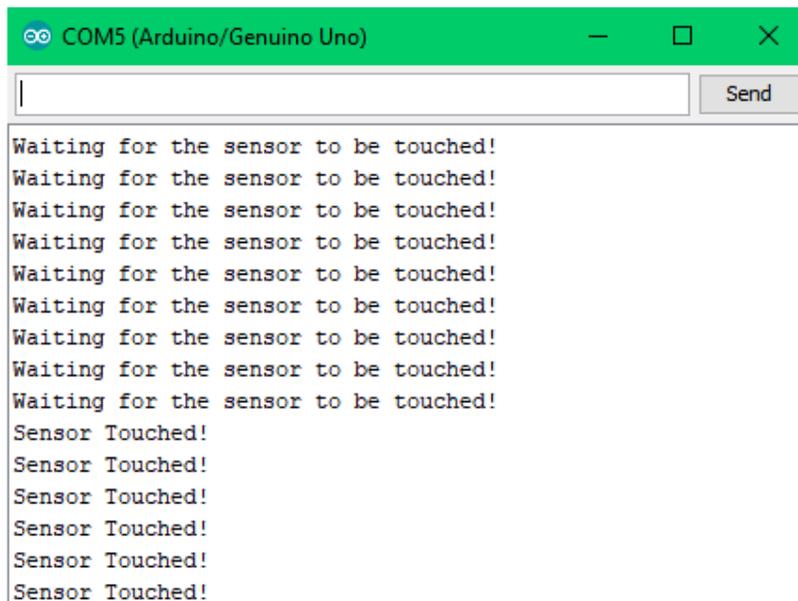
void setup() {
  Serial.begin(9600);
  pinMode(alarmSet, OUTPUT); // Sets pin 10 as an OUTPUT
  pinMode(sensorPin, INPUT); // Sets pin 12 as an INPUT
}

void loop() {
  int sensorValue = digitalRead(sensorPin);
  if (sensorValue == HIGH){
    digitalWrite(alarmSet, HIGH);
    delay(1500);
    Serial.println("Sensor Touched!");
  }
  else{
    digitalWrite(alarmSet, LOW);
    Serial.println("Waiting for the sensor to be touched!");
  }
  delay(500);
}
```

6.4) On your Arduino IDE click on **Tools>Serial Monitor** to watch the system in action.

Touch the sensor's touch pad to trigger the alarm!

Remember that the baud rate for the Arduino Driver and the Serial Monitor is set to 9600bps.



```
COM5 (Arduino/Genuino Uno)
Waiting for the sensor to be touched!
Sensor Touched!
Sensor Touched!
Sensor Touched!
Sensor Touched!
Sensor Touched!
Sensor Touched!
```

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