

Vibrating LED Dice D.I.Y. Educational Kit



AK-280

1. Description:

The Vibrating LED Dice kit works based on a vibrator switch that allows the IC chip to use its logic to toggle through different dice combinations while the device is held upside down (when the LEDs are facing down). Once the device is turned around, a randomly picked dice combination is represented by the LEDs. The vibrator motor simulates the tossing process of the electronic dice. Once assembled, this kit can be used for entertainment purposes.

This is a D.I.Y. kit that requires soldering through-hole and basic surface mount components on a double-sided printed circuit board. It is designed for users with minimal soldering tools and skills. You must insert the components on one side of the board and solder the leads on the opposite side. The assembly process should take anywhere between 10 to 20 minutes.

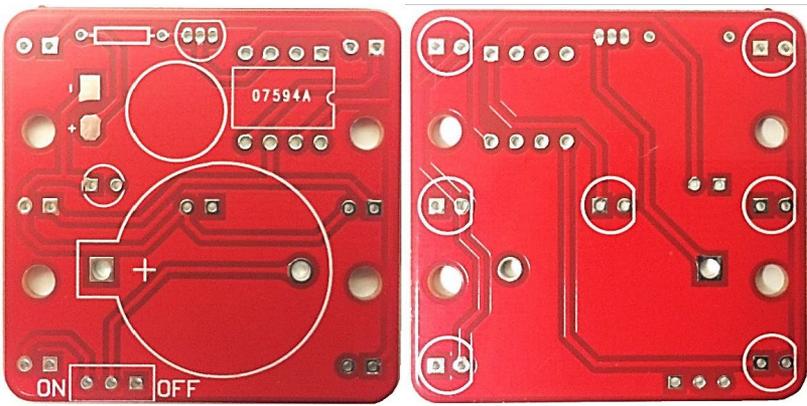
2. Specification:

- Required Input Voltage: 2x CR2032 3V Batteries (\approx 6V)

3. Bill of Materials

- This package includes **31** pieces which are listed below along with their labels:

- 1) **1x PCB** – Printed Circuit Board
(doubled-sided, tin plated, red soldermask, white silkscreen)



2) **1x 100Ω ¼ Watt Resistor**



3) **1x S9012 PNP Silicone Transistor**



4) **1x HDX Vibrator Motor**



5) **1x HDX Vibrator Switch**



6) **1x STC 15F104W DIP8 IC Chip**



7) **1x 3-Pin, 2-position DIP Switch**



8) **1x CR2032 Double Battery Holder**



9) **8x 5mm Green LEDs (1x Spare)**



10) **1x Acrylic Cover**



11) **4x Philips Screws**



12) **8x Hex Nuts**



13) **2x CR2032 Batteries**



4. 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 done soldering.**

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 3. Bill of Materials on page 3 and 4 for this step)
- 3) Lay down all the components on your workbench and proceed to the next step.
- 4) ***OPTIONAL*** It is best practice to check component values using proper equipment (i.e. using a Digital Multimeter to verify the ohmic value of the resistor) before proceeding to the next step. You can also verify that the LEDs are working using the diode function of your Digital Multimeter before soldering it onto the board.

5) Prepare your soldering tools.

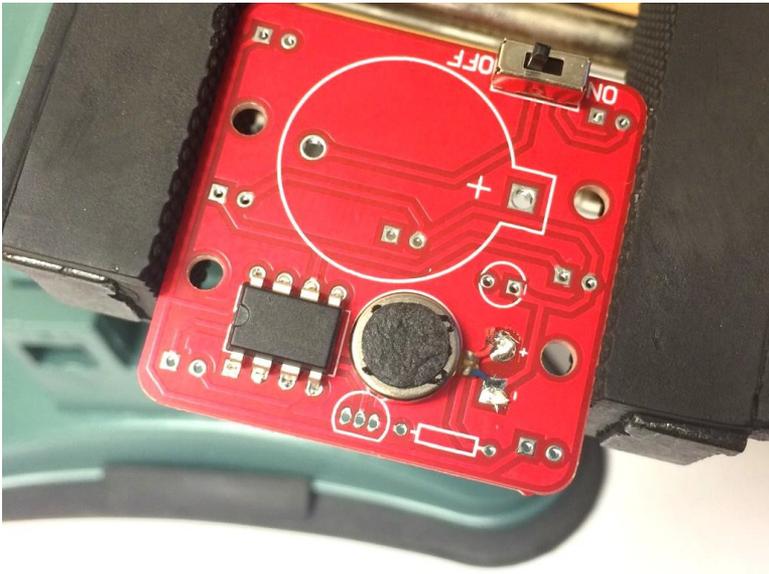
- a) Use an appropriate tip for the application. Also, make sure the soldering tip is clean. Gently use a brass wool or a brush to clean the tip when needed. Another way of cleaning the soldering tip is to use a wet sponge.



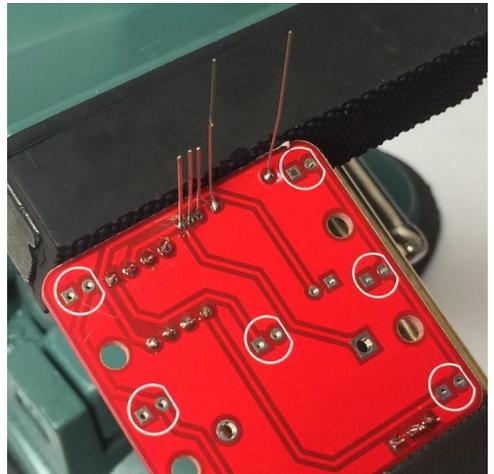
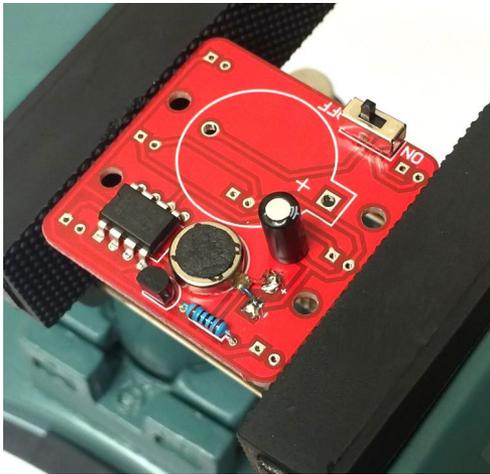
- b) The soldering iron temperature depends on the type of solder used. If you are using a typical 60/40 lead solder, depending on the thickness the temperature should be set anywhere between 370 to 500 °F (187 to 260 °C). If you are using a lead-free solder, increase above temperatures by 40 to 70 °F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

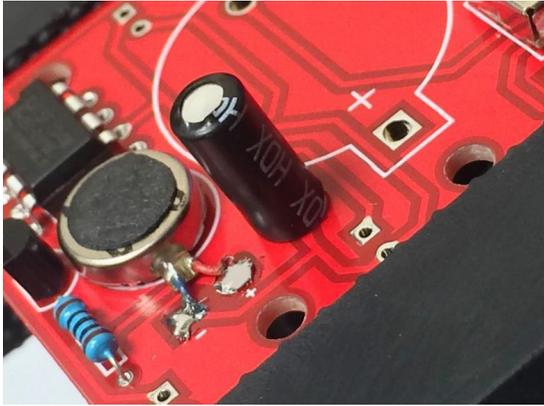
6) Start the assembly by placing the IC chip and the DIP switch on the board and soldering their leads on the opposite side. You can solder them all at once or one by one depending on your comfort and skill level. Pay attention to the orientation of the chip.

7) Strip the tiny wires of the vibrator motor, remove the double-sided tape and stick it on its designated location on the board. Solder the wires onto the surface mount pads. If you cannot strip the wires you can melt the plastic shield around the wires with your soldering iron tip to expose the copper for soldering. **Do it at your own risk.**

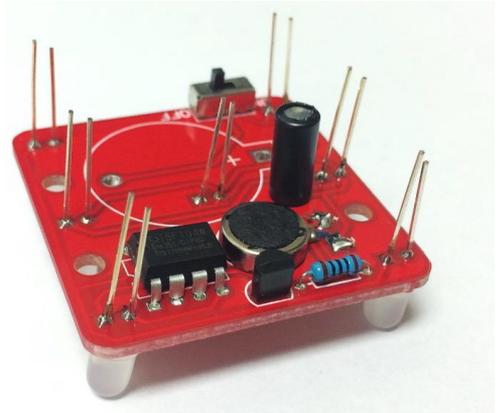
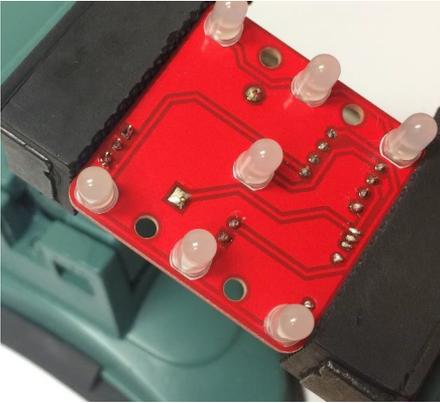


- 8) Place the resistor, transistor and the vibrator switch on the board and solder them. You can solder them one by one or all together.





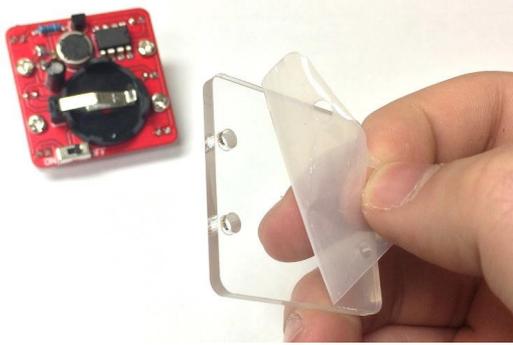
- 9) Insert the LEDs from the opposite side (shown in the picture on the next page) and solder them. Pay attention to the polarity of the LEDs. The square-shaped pads indicate the anode (+) which is the longer lead and the shorter lead is the cathode (-). Cut the leads once they are soldered. Don't cut them all the way, leave at least 1 to 2mm of the leads.



- 10) Finish your soldering by inserting the CR2032 battery holder on the board and soldering it from the opposite side. Since the drill size for this component on the PCB is large, it is recommended to use a large flat head soldering tip to properly heat up the pad and the leads. This way a we create a perfect soldering joint.



- 11) Remove the protective sticker from the acrylic cover and use the provided nuts and bolts to hold it down onto the board.



- 12) You have assembled your dice kit. Now, insert the batteries and turn the dice ON.

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