

Duck Mini Construction Kit

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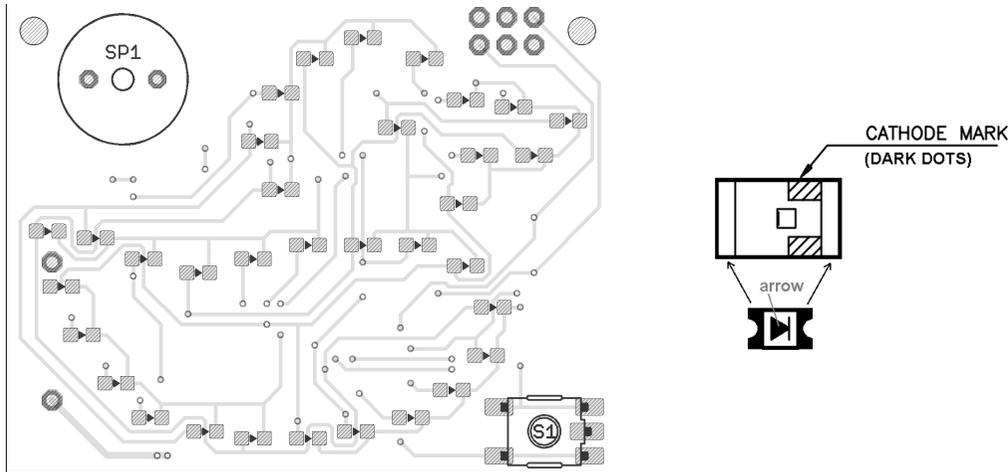
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|-------------------------------------|--------------------------------------|
| 1 PCB "Duck Mini Rev. 1.0" | 1 Ceramic Capacitor 100 nF (0805) |
| 35 LEDs yellow (0805) – one spare | 1 Tantalum Capacitor 100 μF (size C) |
| 1 Controller ATtiny88 (TQFP-32) | 1 Push-button (SMD) |
| 2 PNP Transistors BC807-40 (SOT-23) | 1 Pin Header 2x3 (THT) |
| 8 NPN Transistors BC817-40 (SOT-23) | 1 Electromagnetic Speaker (THT) |
| 7 Resistors 1 kΩ (0805) | 1 Battery Holder for 3x AAA (THT) |

SMD Soldering Advice

To solder the SMD components, tin only one of the pads, then grab the component with tweezers, re-heat the tinned pad and slide the component in sideways. When the component is aligned properly, remove the soldering iron, let the solder joint cool and solder the remaining pins (starting with the diagonally opposite pin for ICs). Solder bridges between adjacent pins can be removed with desoldering wick or by heating up the solder joint, then very quickly knocking the board against the table (with the heated solder bridge facing down). For some illustrated soldering instructions, see

<http://talkingelectronics.com/projects/SurfaceMount/SurfaceMount-P1.html#table2>

I recommended soldering the components in the order listed below.



1. LEDs (top): The orientation is important for the LEDs. You can see two small green (or dark) dots inside the LED on one side (cathode). Some LEDs also have an arrow on the bottom pointing that way. This side must face in the direction the little arrow on the PCB is pointing to, as shown in the image above. All LEDs face the same way. Don't solder too long on the LEDs, they will have reduced brightness if they become too hot during soldering. The kit contains one spare LED in case you break or lose one.

2. Controller (IC1, bottom): The circular dent in one corner (indicating pin 1) must match the silkscreen outline on the board. To avoid solder bridges, use flux and move the tip away from the controller along the board during soldering.



3. Transistors (bottom): The transistors only fit in one orientation. There are two different types, they can be identified by their marking:

T1~T8: BC817-40, marked "6C"
T9, T10: BC807-40, marked "5C"



4. Resistors (R1~R7, bottom): The resistors are the small rectangular components marked "102" or "1001". Orientation doesn't matter.



5. Capacitors (bottom):

There are two different capacitors. The ceramic capacitor **C1** is the small brown component, similar to the resistors but with no marking. Orientation doesn't matter for this one. **C2** is a tantalum capacitor, orientation is important here. The printed bar on top of the capacitor must match the bar on the silkscreen.



6. Push-button (S1, top): Solder the push-button to the intended location on the board. Orientation is not important if your push-button has only 4 pins, the fifth pad remains unused. 5-pin push-buttons will only fit in one orientation.



7. Pin Header (X2, bottom): The header is only needed if you want to re-program the controller (ISP). Insert its short end from the bottom side. Orientation doesn't matter.



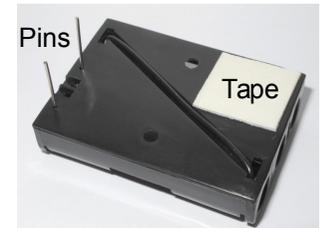
8. Speaker (SP1, top): Orientation doesn't matter. If there is a label on the speaker, remove it after soldering.



9. TEST THE DUCK! Do this before soldering the battery holder!

Insert batteries, then insert the two pins of the battery holder into the PCB and angle it to make good contact. Hold down the push-button until the LEDs start flashing. Push it again to make the duck quack. Hold the button down again until the LEDs turn off. If only one LED doesn't work correctly, it's likely installed the wrong way around. If a group of LEDs doesn't work, check controller pins 30~32, 1, 2, 9, R1~R6 and T1~T6. If equally spaced LEDs don't work, check controller power pins 3~6, 18, 21.

10. Battery Holder (BAT1): Remove the batteries before soldering the battery holder. If you want to make it a bit sturdier, apply a piece of double-sided tape on the back of it as shown to the right. Trim the leads to just stick out a tiny amount on the LED side before soldering.



Questions? Problems? Comments? Ideas?

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Project webpage: <http://wiki.blinkenarea.org/index.php/DuckMiniEnglish>

