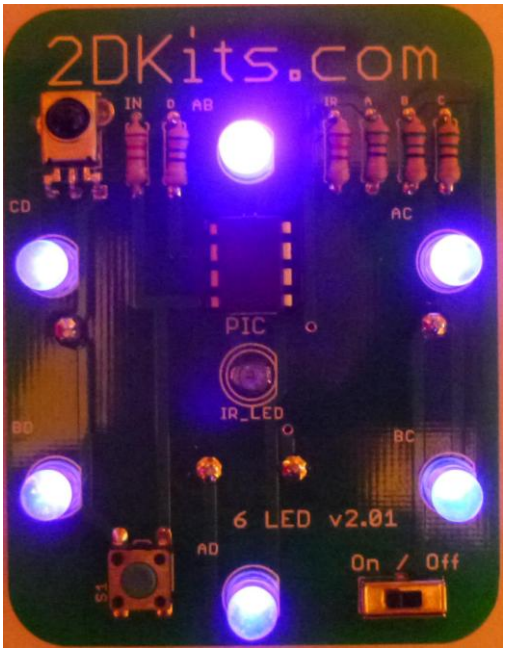
6 LED Circle G2 Blinkie

The heart of this blinkie is a 12F1822 PIC produced by a company called Microchip. A PIC is a tiny, yet surprisingly powerful little computer. By itself, it can't do much – it needs someway to interact with the world – we are going to do this by giving it senses:

- Sight – an IR receiver
- Touch – a push button

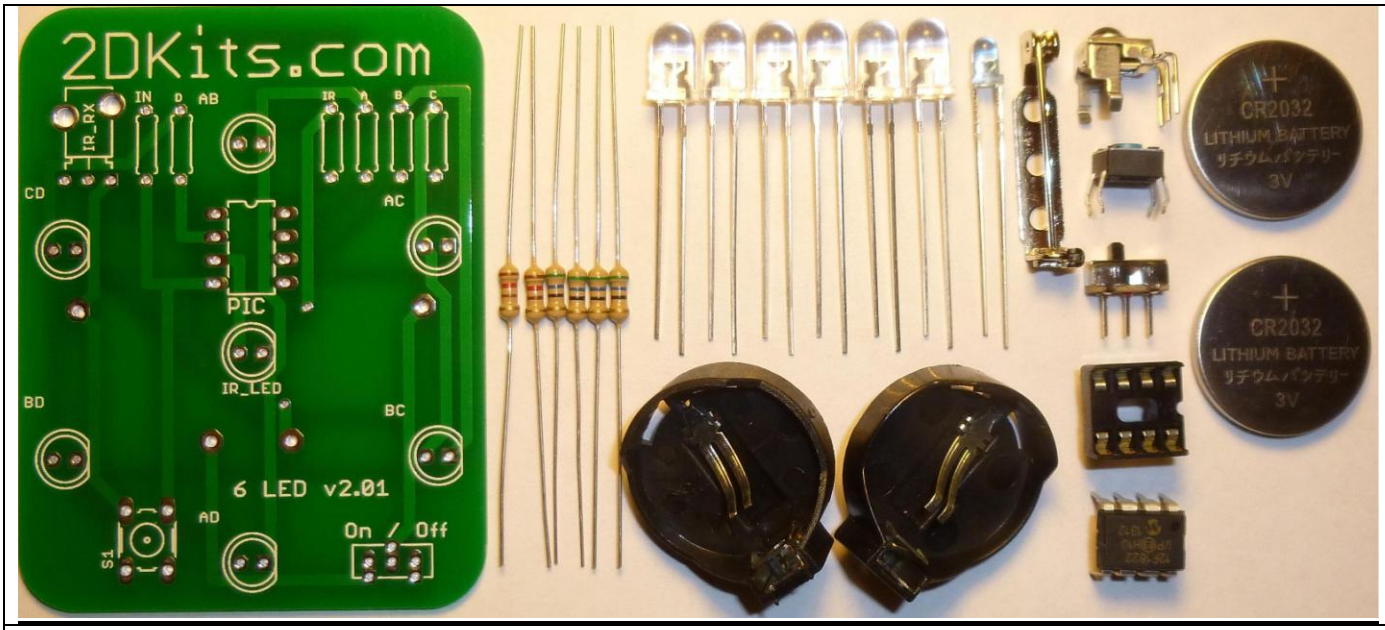
and ways to communicate:

- To us – 6 light emitting diodes (LEDs)
- To other blinkies – an infrared (IR) LED



By building this blinkie, we hope you have a lot of fun, as well as learn how easy it is to assemble and solder a circuit, as well as gain a desire to learn more!

First, open up the kit and review the contents. Looking from left to right, and top to bottom there should be the following parts:



Contents:

- Circuit board
- Two 120 ohm (**brown**, **red**, **brown**) resistors
- Four 56 ohm (**green**, **blue**, **black**) resistors
- Six LEDs
- IR LED
- Pin back
- IR detector
- Push button
- Power switch
- 8 pin socket
- 8 pin 12F1822 PIC chip
- Two CR2032 batteries
- Two battery holders

Got everything to start? If not, give us a shout. Do note that sometimes the switch gets hidden under the battery clips.

Soldering Hints

Soldering is not like gluing; the solder forms an alloy with the metals to be connected that creates a stable electrical path and a certain amount of mechanical attachment. For the small connections on this project, a 25 or 30 watt soldering iron works well. Rosin core solder is used – the acid core solder sold for plumbing would eat your components in a short time.

Here's how to make a good joint:

- Prepare the joint. Bend the component lead slightly after it passes through the printed circuit board (this helps hold it in place while soldering).
- Prepare the tool. The soldering iron should be up to temperature. We use a stainless steel scrubbing pad in a small baby food jar. Clean the tip by quickly brushing it against the pad, or if you are using something more traditional, quickly brush it against a damp sponge or cloth. Melt a little solder (a

2mm length) onto the tip so it's shiny. This is called "tinning". The solder coating helps conduct heat from the tip to the joint.

- Place the tip in contact with the component lead and the printed circuit board pad.
- Place the solder against the joint directly opposite the tool. It should melt within 2 seconds, and flow around the joint. If it takes longer than that, you're not getting enough heat into the joint.
- Keep the soldering iron in place until the solder flows freely and completely covers the joint. If the heat is removed too soon, the solder will tend to "ball up" and not stick well to the conductors. The solder joint should look "wetted", with concave shapes.
- Let the joint cool without movement at room temperature. This usually takes only a few seconds.
- If a joint is moved before it cools, it will take on a dull, satin look that is characteristic of a cold solder joint. A cold solder joint is fragile and conducts poorly – reheat the joint until the solder flows freely, and hold it still until it cools.
- Keep the tip of the soldering iron clean. Wipe off flux and excess solder regularly in the damp sponge or cloth, and re-tin if needed.

Use

Once built, the use of this blinkie is fairly straightforward. Don't get it wet. Don't stick it in a pocket with a bunch of change where it might short out.

This blinkie has additional patterns stored in the PIC. To change patterns, press the push button and hold. The topmost LED will light, and then the LEDs will count up in a binary sequence. Each binary number represents a stored pattern. If the push button is released, the pattern associated with that particular binary number will then be displayed on your badge blinkie.

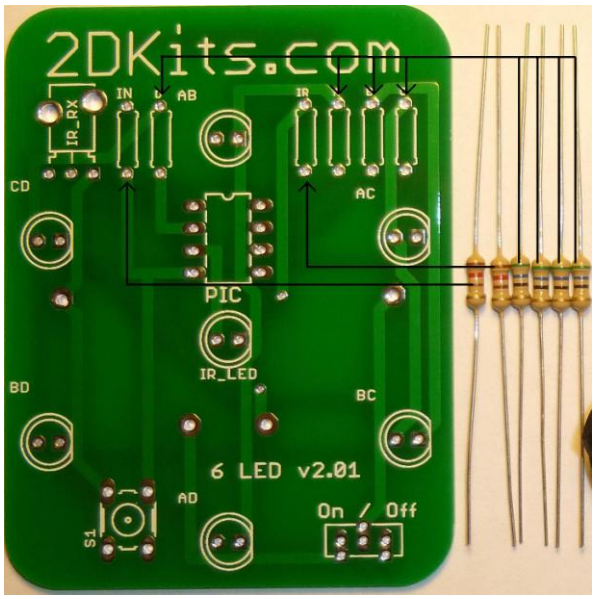
This blinkie will also broadcast its current pattern via the IR LED. If another blinkie with an IR detector sees this, it will change its pattern to match. Of course, this can also happen to this blinkie – another blinkie may "infect" its pattern on this one before it can do the same.

Assembly

First, orient the board horizontally and so the silk screening shows. If you see lots of little white letters and symbols, you are ready to begin.

As each group of parts is inserted, you will flip the board over and solder them in from the other side.

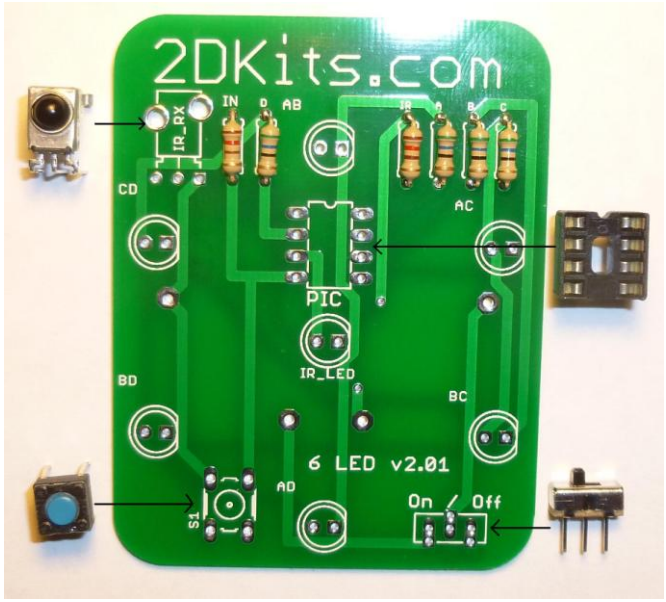
Solder in the resistors.



1. Depending on the kit, either 100, 120, or 180 ohm resistors will have been provided. Solder in the 100 ohm (**brown**, **black**, **brown**), 120 ohm (**brown**, **red**, **brown**) or 180 ohm (**brown**, **grey**, **brown**) resistors. One will go in the location marked "IN", the other in the location marked "IR".

2. Solder in each of the four 56 ohm (**green**, **blue**, **black**) resistors into the board. The locations are marked "D", "A", "B", and "C".

Solder in the IR detectors, 8 pin socket, push button, and power switch.



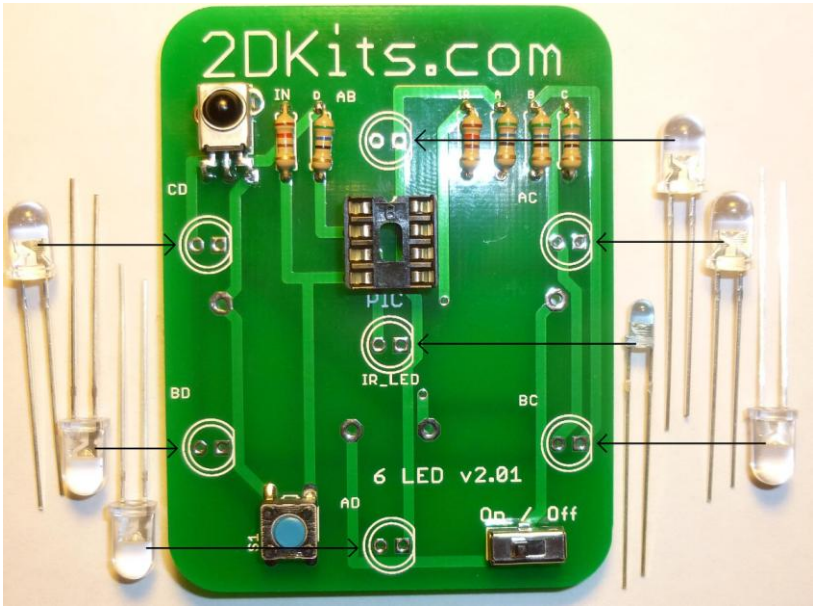
3. Solder the IR detector into the board. On the board, it is labeled IR_RX.

4. Solder the 8 pin socket into the board. The socket has a small notch in it. **The notch must face the top of the board.**

5. Solder the push button into the board. It will only fit in one way.

6. Solder the power switch into the board. It will only fit in one way.

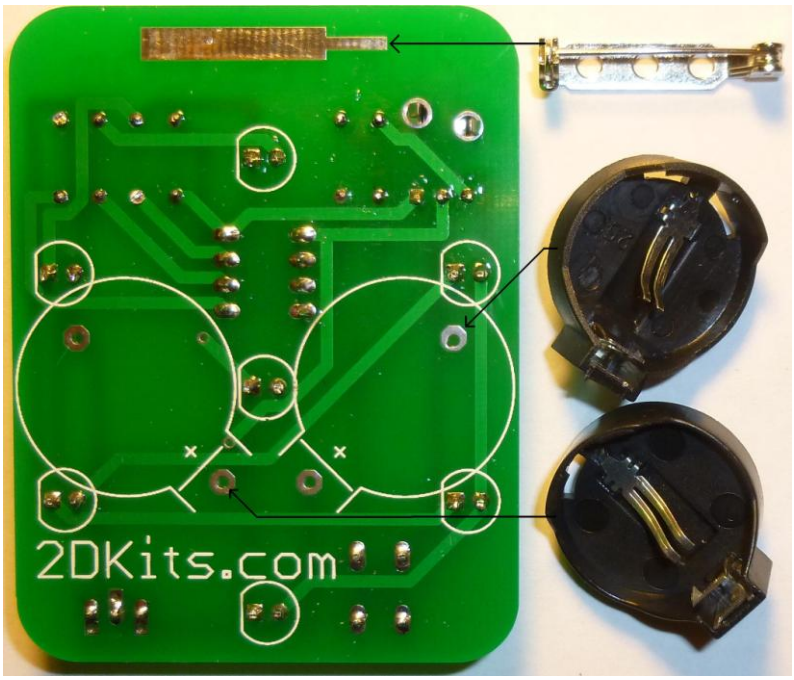
Now to solder in the LEDs.



7. Solder the IR LED into the board - the very center. Note how is cleverly labeled "IR_LED" on the board. **Orientation is important** for LEDs. Remember: **Short lead, square pad. Long lead, round pad.**

8. Solder the LEDs into the board. **Orientation is important** for LEDs. Remember: **Short lead, square pad. Long lead, round pad.**

Now to solder in the battery clips and the pin back. Flip the board over, as these components will be inserted from the other side.



9. Solder the battery holders. The silk screen outline of the battery holder shows how it is to be inserted. **Orientation is important** for the battery holders. Flip the board over and solder.

10. Flip the board back over as in the picture. Solder the pin back. It will take quite a bit of heat for the solder to flow, so it may take 10 to 15 seconds of heating before the solder flows easily. The hinge will be to the right side of the board as you solder.

11. The PIC chip is inserted so the **dot or notch is facing up**.

12. The batteries are inserted so **the "+" on the battery is facing up**.

13. Turn on the board! Enjoy.

Troubleshooting

If your LEDs don't flash, then you'll need to do a little troubleshooting to finish your project. The following steps should isolate most problems.

- Recheck your solder connections. 80% of all problems are traced to this. Cold solder joints and broken joints will cause erratic performance or failure. Reheat any questionable solder connections until they flow and look shiny and secure.
- Check for bits of solder, wire ends, or other foreign matter which may be lodged in the wiring.
- LEDs reversed. You will need to remove the LED by desoldering, and then solder it in the correct way.
- Batteries incorrectly inserted. The "+" side of the battery should always be inserted facing up.
- Bad part – it does happen. In the hundreds of boards assembled, we've seen two or three parts fail. Send us email, and we will send a replacement part.
- A part got lost/melted/damaged/destroyed while building the kit. It happens – you're not the first (or second, or fiftieth). Send us email, and we'll see what we can do. We have no problem selling just the parts you need to get it working.