



Assembly Guide for the KAPtery Log-a-Long Timer Kit

<http://kaptery.com/guides/>

This kit will make a timer which can control an Arduino-based data logger. The timer itself consumes very little power (30 μ A) and the Arduino logger typically uses power for only a few seconds during each event. So small batteries can last many months powering the whole system.

The kit includes two key components: a TPL5110 low power timer chip, and a P-channel mosfet. These are surface mount components and require some care to solder onto a PCB. The PCB included is a generic SOIC8 to DIP8 adapter which is intended for other types of use but is well suited for this circuit.

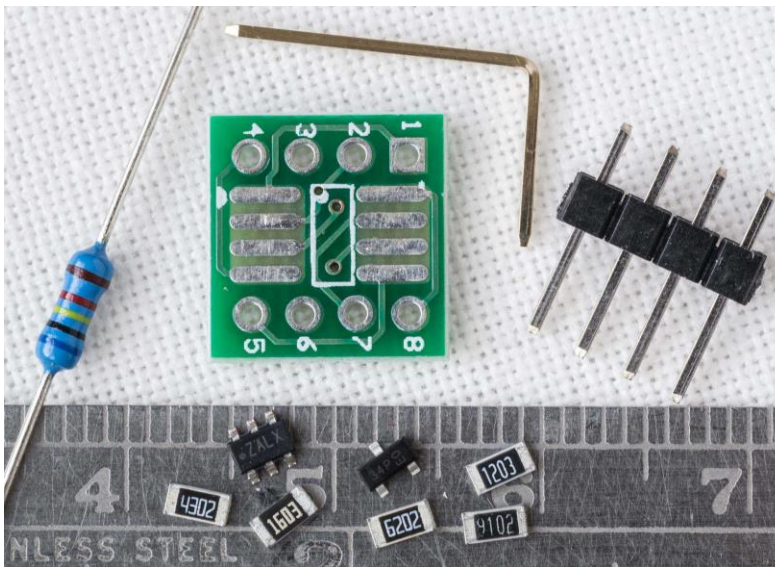


Figure 1. Parts included in the kit. Five surface mount resistors (bottom) are included so you can choose a timer interval between 5 and 110 minutes.

Parts

- SOIC8 to DIP8 adapter (green circuit board)
- TPL5110 timer IC
- P-channel mosfet
- Selection of surface mount resistors. Choose one to determine logging interval:
 - 4302=5 minutes, 6202=12 minutes, 9102=29 minutes, 1203=55 minutes, 1603=110 minutes
- 1M Ω through-hole resistor to clean up the Done line
- 4 male header pins, 1 extra-long pin

Header pins are not needed if the five wires to the battery and data logger are soldered directly to the pin holes. Header pins allow DuPont wires (not included in the kit) to slide on to make the connections.

Assembly steps

1. Solder the TPL5110 to the PCB as shown. The six legs (1-6) should connect to pads 1 to 3 and 6 to 8. The orientation is important. This can be done with fancy equipment (solder paste, reflow oven, rework station) or any good soldering iron. Tin the six pads on the PCB, align the IC, and heat each leg with a soldering iron.
2. Solder the two legs on one side of the mosfet (Gate and Source) to pin holes 7 and 8 as shown. Solder the third leg (Drain) to solder pad 5.
3. If you are using header pins (instead of soldering wires directly to the pin holes) solder male header pins on the underside of the PCB at holes 1, 2, 5, and 6. Two wires must be connected to ground, so an extra-long pin (included) can be used at pin 2 so a connector can be attached above and below the PCB.
4. If you are soldering wires directly to pin holes 1, 2, 5, and 6, do it now. Two ground wires (from battery and Arduino) get connected to hole 2.
5. Solder a resistor between holes 2 (Ground) and 3 (Delay) to determine the logging interval. The orientation is not important.
6. Connect hole 1 to solder pad 8 with a short wire or solder blob.
7. Solder a 1M Ω through-hole resistor between holes 2 (Ground) and 6 (Done). The legs of the resistor can be cut to fit. It can be under the PCB but might be easier on top if you used header pins. This is optional but can clean up the signal sent from the Arduino to cut the power.

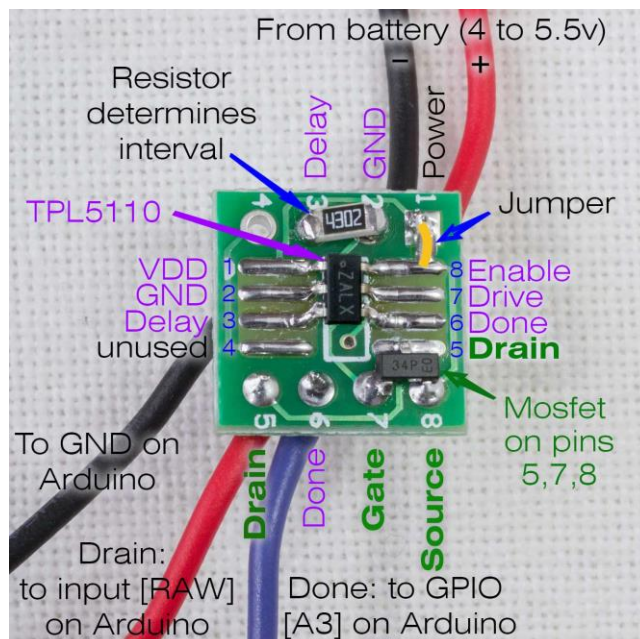


Figure 2. Build diagram for TPL5110 timer module. Solder pads 1-8 connect (with PCB traces) to pin holes 1-8 respectively. Only number 4 is not used. Four of the pin holes (1, 2, 5, 6) get wires attached from the battery or to the Arduino.

Powering the timer

Do not supply more than 5.5 volts to the timer--the TPL5110 IC cannot tolerate more than that. A 3.3-volt Arduino should receive at least 3.3 volts so if you supply about 5 volts when logging starts, that allows for voltage sag as batteries drain. Five-volt Arduinos are harder to use with this timer because they operate best with more than 5.5 volts.

Changing the logging interval

The timer interval is determined by the resistance of the resistor between the Delay and Ground pins. Find a list of resistances and intervals here: <https://learn.adafruit.com/adafruit-tp15110-power-timer-breakout/usage> and a more complete list here (page 13): <https://cdn-learn.adafruit.com/assets/assets/000/039/782/original/tp15110.pdf>.

Using the timer

For tips on using the timer and for Arduino sketches, see the links in the descriptions of the [Mini Pearl Snap](#) and [Mini Pearl Pro loggers](#) at KAPtery.com.