



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 works very well for this circuit.

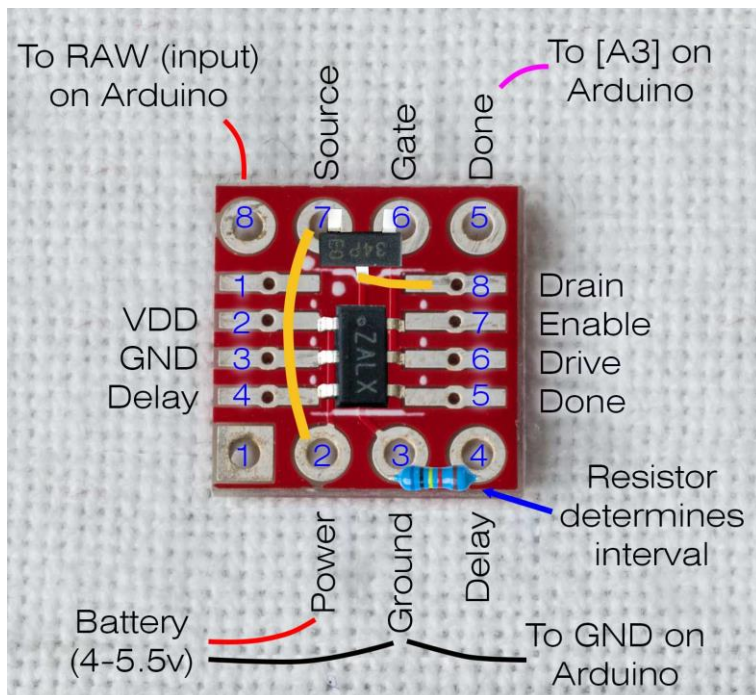


Figure 1. Build diagram for TPL5110 timer module. Solder pads 1-8 connect (with PCB traces) to pin holes 1-8 respectively. Only number 1 is not used. The two yellow lines are jumper wires connecting things. Four of the pin holes (2, 3, 5, 8) get wires attached from the battery or to the Arduino.

Parts

- SOIC8 to DIP8 adapter (red circuit board)
- TPL5110 timer IC
- P-channel mosfet
- 60.4k Ω resistor (blue, 1%) to determine logging interval
- 1M Ω resistor (tan, 5%) to calm the Done line
- 4 male header pins, 1 extra-long pin
- Short piece of solid-core wire to make jumpers

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 be slid on to make the connections.

Assembly steps

1. Solder the TPL5110 to the PCB as shown. The six legs (1-6) should connect to pins 2-7 respectively. 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 one end of the longer jumper wire to hole 7 (Source). It's probably best to run this jumper wire along the top side of the PCB as shown.
3. Solder the two legs on one side of the mosfet (Gate and Source) to pin holes 6 and 7 as shown.
4. Solder a very short jumper wire to connect the remaining leg of the mosfet (Drain) to solder pad 8. For strength, the leg should rest on the PCB, not be suspended above it. Insulation can be removed from this jumper.
5. 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 2, 3, 5, and 8. Two wires must be connected to ground, so an extra-long pin (included) can be used at pin 3 so a connector can be attached above and below the PCB.
6. If you are soldering wires directly pin holes 2, 3, 5, and 8, do it now. Two ground wires (from battery and Arduino) get connected to hole 3.
7. Solder the free end of the longer jumper wire to hole 2 (Power).
8. Solder a resistor between holes 3 (Ground) and 4 (Delay). A 60.4k Ω resistor (blue, 1%) is included for a 9.3 minute logging interval. Any interval between 0.3 seconds and 2 hours can be chosen with the appropriate resistor.
9. Solder a 1M Ω resistor between holes 3 (Ground) and 5 (Done). This is optional (and not shown in the diagram) but can make the signal sent from the Arduino to the TPL5110 to cut the power easier to read.

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 common consumer batteries do not supply between 5 and 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>. Through-hole resistors are included, but surface mount resistors could make a neater build.

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.