Energy Demo

# Overview

This demonstration shows how to evaluate RDK energy use as various peripherals are disabled under user control.

# Procedure

* Connect a supercapacitor across the 5V0 rail and ground, observing proper polarity. I used a 0.022 F, 5.5V unit (Panasonic EECS0HD223, Digikey P10785-ND). Note that the positive lead comes from the bottom of the capacitor, and the arrow points to the negative lead.
* Load the EnergyDemo program onto the RL78.
* End the Embedded Workbench debugging session by clicking the red X.
* Set SW5 position 2 to ON to enable stand-alone program execution on the RDK.
* Disable the RDK debug MCU by shorting J15 pins 1 and 2.
* Select “Start” state
  + Hold down Switch 2 to toggle LED1
  + Disconnect power
  + Measure how long LED1 continues to flash regularly.
* Repeat this test several times to evaluate repeatability.
* Repeat with “All Done” state, which shuts off many devices and reduces MCU speed.

I measured the following times, and calculated average power accordingly, assuming final voltage was 1.7 V (when the MCU is forced into reset).

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| --- | --- | --- | --- | --- | --- |
| Debugger | Initial Capacitor Voltage | Default Power Setting (“Start”) | | Lowest Power Setting (“All Done”) | |
| **Time** | **Average Power** | **Time** | **Average Power** |
| Enabled | 5.0 V | 12 s | 304 mW | 40 s | 91.2 mW |
| Disabled | 5.0 V | 20 s | 182.4 mW | 84 s | 43.4 mW |

# Additional Possible Experiments

* Try connecting the capacitor to the C73 location (3.3 V MCU power rail) and determine how long the circuit runs. Compare this with expected results.
* Have the class estimate how much power would be saved by disconnecting the two green LED power LEDs, and then evaluate empirically.