# Supercapacitor Charging Reference Design

1.0 Description

We propose to charge and discharge a single supercapacitor with a Silego GreenPAK SLG46517 device. This GreenPAK is a configurable mixed-signal matrix chip that includes several GPIOs, Look Up Tables, ACMPs, and counters, as well as a pair of integrated power switches. The design will charge the supercapacitor up to a voltage determined by an Analog Comparator inside the GreenPAK, and then discharge the supercapacitor when VIN drops below a set voltage. If desired, the GreenPAK can also receive a Charge_EN signal which would allow a host controller to determine when it wants to begin charging the supercapacitor.

2.0 Modes of Operation

Bypass mode: As soon as VDD is connected to the circuit, FET0 will be turned on so that the load will be powered off of VDD. FET1 will be turned off so that the supercapacitor does not begin charging prematurely. Charging mode: If Charge_EN goes HIGH, FET0 will stay on and FET1 will be turned on until until Charge_EN goes LOW or VC1 = VACMP1_THRESHOLD, at which point the GreenPAK will disable FET1 to avoid overcharging the supercapacitor. Discharging mode: When VDD drops below VACMP0_THRESHOLD, switch FET0 will be turned off and switch FET1 will be turned on, so that the circuit is powered off of the supercapacitor.
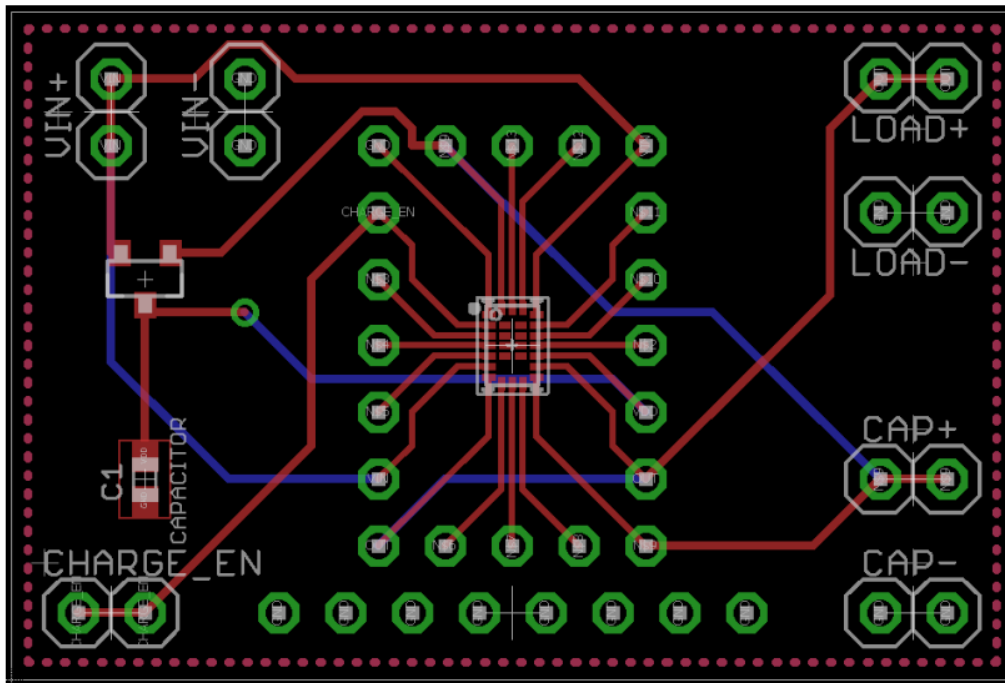
3.0 Schematic
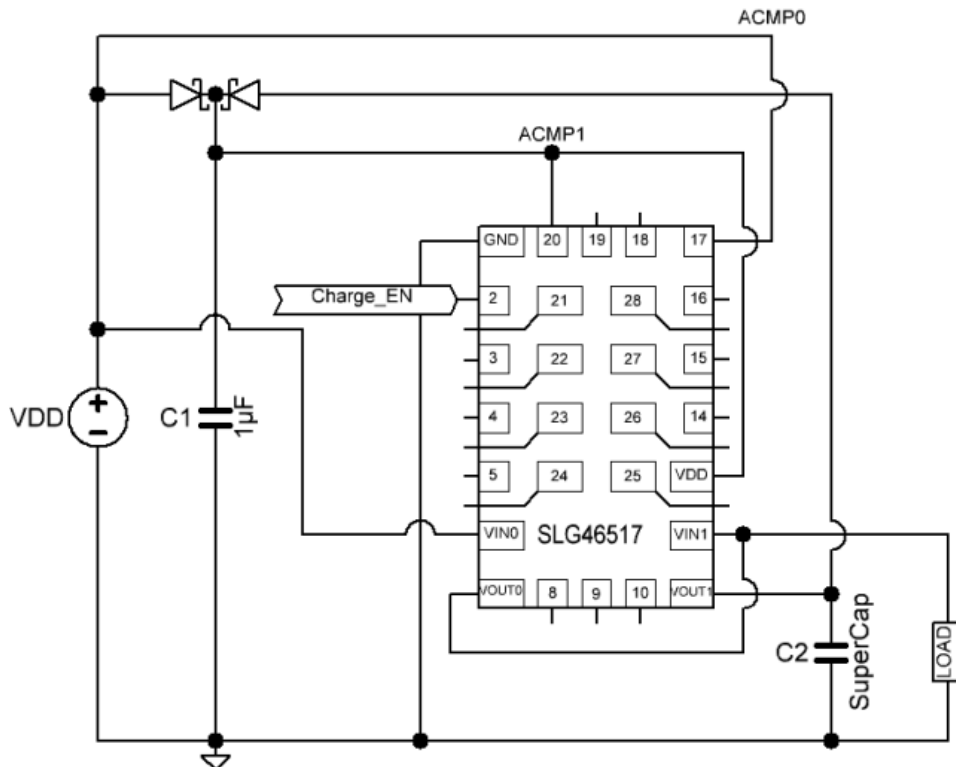
4.0 GreenPAK Design
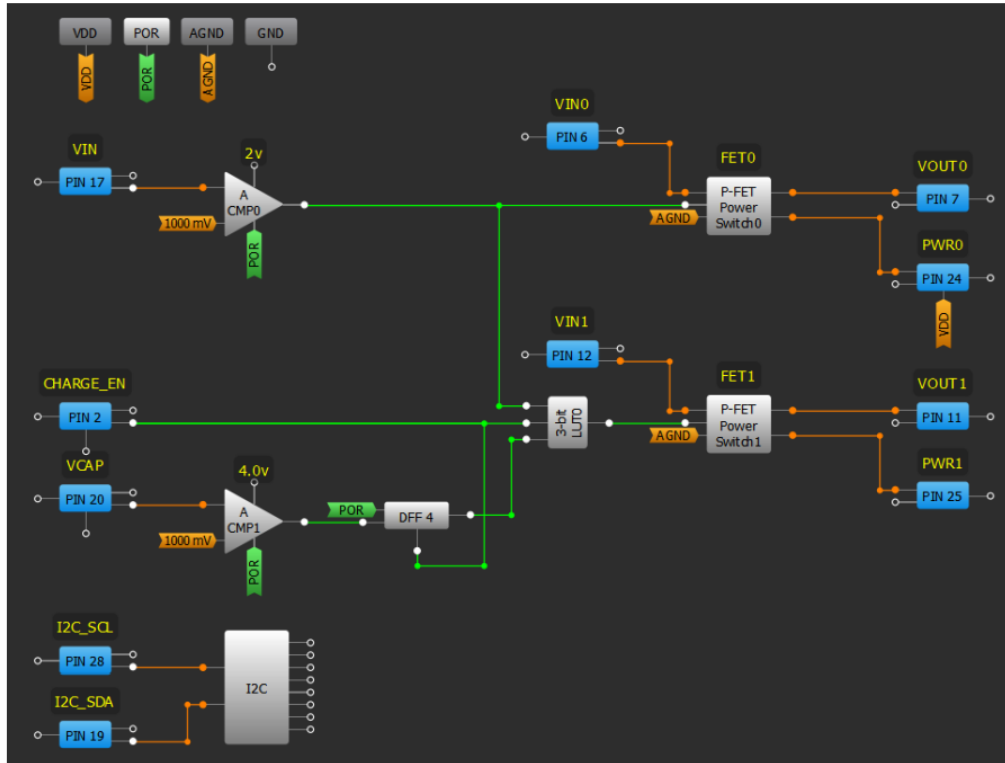
5.0 PCB Schematic

6.0 PCB Schematic

BOM per module:

- Supercapacitor (x1)

- GreenPAK SLG46517 (x1)

- 0.1µF Hold up capacitor (x1)

- BAT54C Schottky Diode (x1)

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