

SP7685 Flash using a Supercap on the battery

Designed by: Brian Kennedy

Part Number: SP7685ER

Application Description: SP7685 Flash using a Supercap on the battery

Electrical Requirements:

Input Voltage	2.7V to 4.2V
Output LED	LumiLED PWF4
Output Current	1.0A

Circuit Description:

This design solution illustrates taking a Li-Ion single cell battery rated for 2.7V to 4.2V and adding a 0.55F Supercap in parallel with the battery to lower the battery current delivered when driving a 1.0A Flash using the SP7685 Flash driver. The SP7685 can deliver 1.0A output current to a LumiLED PWF4 Flash LED, but when the battery voltage lowers the SP7685 charge pump will at some point go into 2X mode which increases the input current to about 2X the output current. In the 2X Flash mode the battery current may be as high as 2.0A unless the Supercap is used.

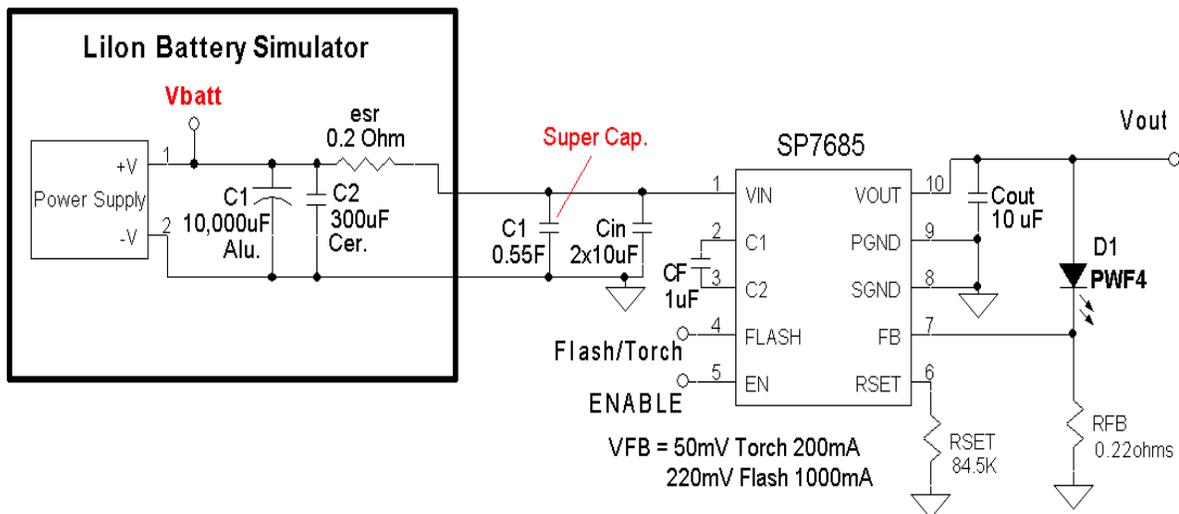


Figure 1. Application Schematic: SP7685 with Super Cap and battery simulator

The Supercap in parallel with the battery helps deliver some of the 2.0A current in 2X mode and reduces the input current to only 1.2A peak as seen in figure 1.

The Supercap accomplishes this by acting as a another voltage source in parallel with the Li-Ion cell, and if you think of the battery and the Supercap as having about the same equivalent series resistance or ESR of about 0.1 to 0.2ohms, then having the two in parallel lowers the equivalent combined source resistance in half and lowers the current draw from the battery to almost half of that required by the SP7685. All the external components have been optimized for an output current of 1.0A output and have been laid out for small size and to minimize output ripple.

This report includes figure 1 application schematic complete with component part numbers, and figures 2 to 8 illustrating electrical performance of the design.

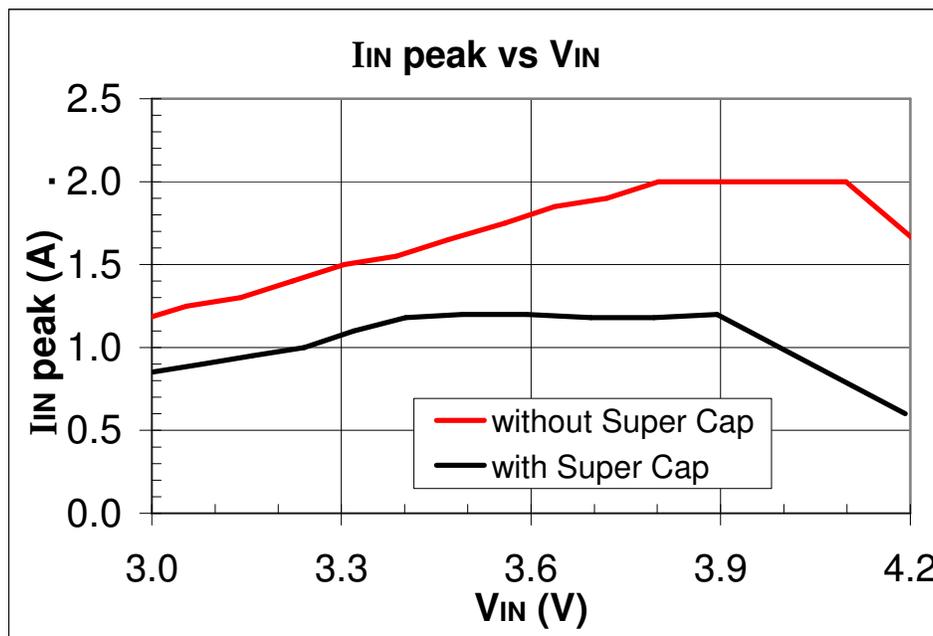


Figure 2. I_{IN} peak for 1.0A Flash with and without 0.55μF Supercap on the Battery

For Figures 3 to 6:
 CH1=Flash Enable (100mS ON, 2Sec OFF), Ch2=V_{OUT}, CH3=V_{Fb}, CH4=I_{IN}=1A/div

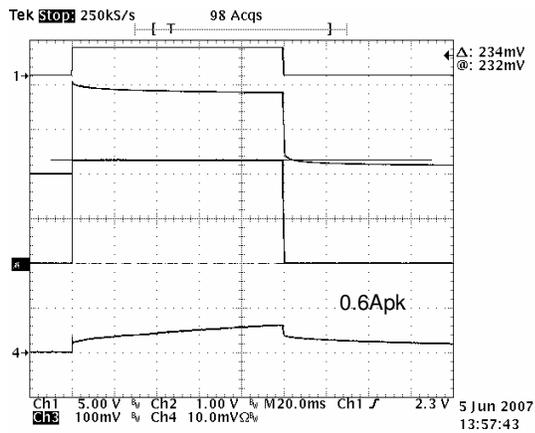


Figure 3. 4.2V with Supercap in 1X

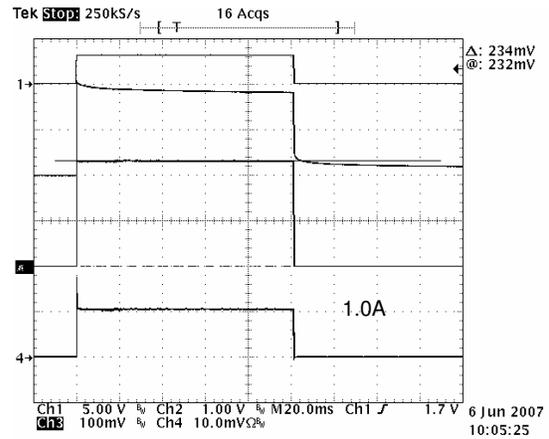


Figure 4. 4.2V without Supercap in 1X

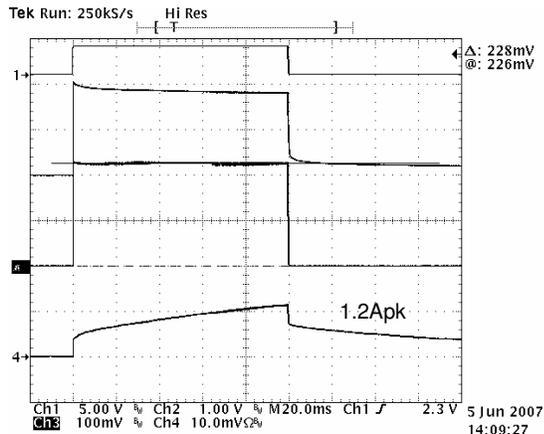


Figure 5. 4.1V with Supercap in 2X

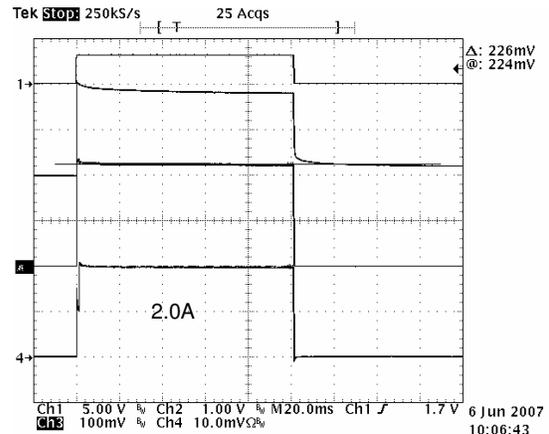


Figure 6. 4.1V without Supercap in 2X

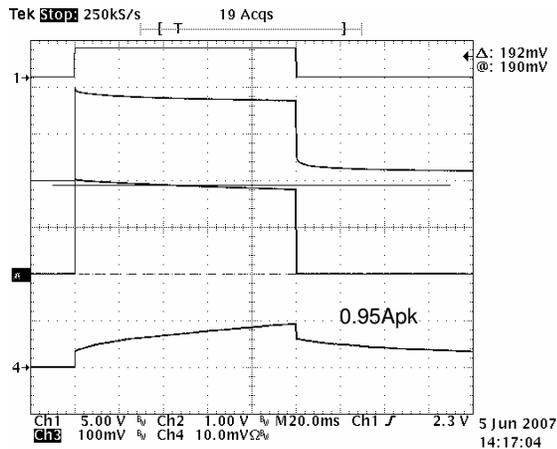


Figure 7. 3.2V with Supercap in 2X

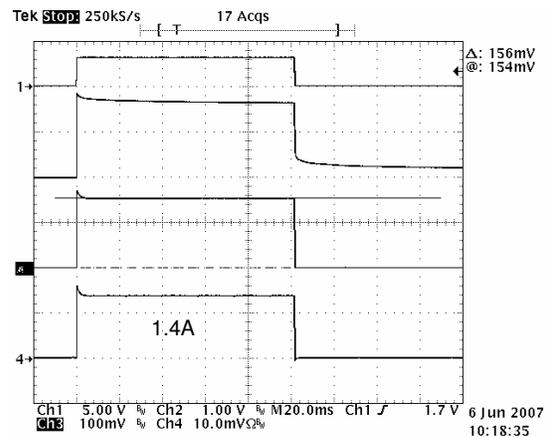
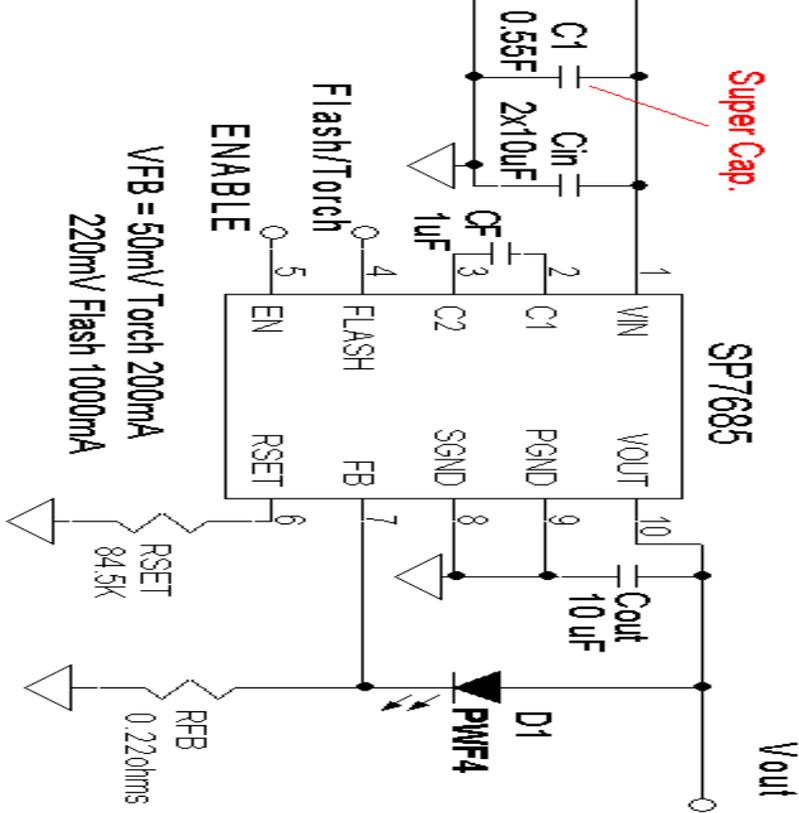
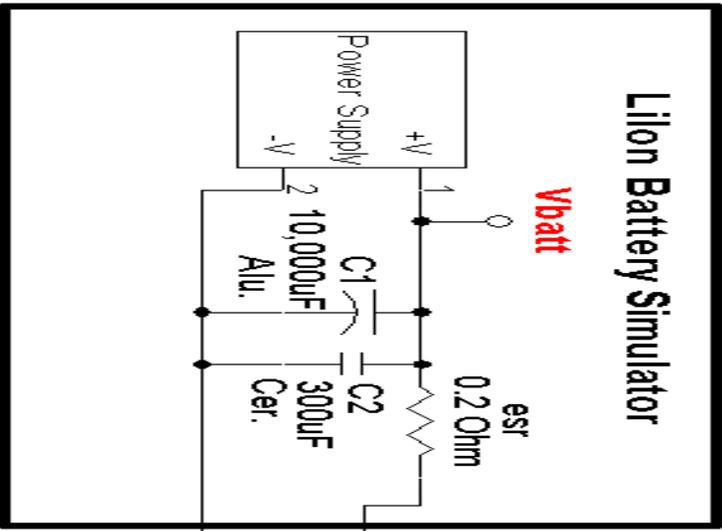


Figure 8. 3.2V without Supercap in 2X



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