



CELLERGY LTD.
P.O.B 631
MIGDAL HAEMEK 23105
ISRAEL
TEL. 972-4-6417132
FAX. 972-4-6417132

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Advantages of Super-Capacitors in Electronic Locks

General

An **electronic lock** (more precisely an **electric lock**) is a locking device which operates by means of electric current.

Electric locks use magnets, solenoids, or motors to actuate the lock by either supplying or removing power.

The Problem

In most electro-mechanical devices a current peak of 2A-3A is required to move the solenoid for 10-20msec. Typical Lithium-Ion batteries, which are used in mobile electro-mechanical devices, are not able to supply that current peak due to its high internal resistance. This becomes worse when the ambient temperature decreases and causes the internal resistance of the battery to increase even more.

Application Requirement

Output voltage during discharge time must remain above 2V.

Cellergy Solution

Thanks to its unique electrical characteristics: low ESR & high power density, adding Cellergy super-capacitor (SC) in parallel to the battery enables designers to meet the technical requirements by assigning the SC to supply the high pulse current instead of the battery.



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An example of a Voltage Drop Calculation:

I = Peak pulse current (2A)

ESR = SC internal resistance (ESR= 150 mΩ)

Δt = Pulse width (10msec)

C = SC capacitance(C = 80mF)

The total voltage drop is given by : **[Vd= I*ESR + Δt*I/C]**

Vd= 2A*150mΩ +10msec *2A/80 mF = 550 mV

Vf= 3V -0.55V = **2.45V**

