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Application Note – Wireless Fuel System

Super-Capacitors (SC) drive pulse power to RFID-based wireless fuel system

Description of application

Active RFID, or Smart card, is implemented in fuel nozzle. The RFID contains special information of the nozzle, which is transmitted by RF transmission unit into the passive RFID tag that is implemented at car's fuel tank. Just after authorization is finished and approved, fuel supply starts.

The problem

For performing prompt RF identification the active RFID should transmit with a power of 1.8W during 10msec. A Lithium Thionyl Chloride battery is implemented for powering nozzle's active RFID. This battery type has large energy density but due to its high internal resistance (10-20 Ω) it has no ability to transmit high power pulses required for the RF transmission and hence the connection between the nozzle to the vehicle couldn't be established. Since no identification occurs, customer is not able to fill-in the fuel tank.

The solution

By applying Cellergy Supercapacitor (SC) in parallel to the Lithium Thionyl Chloride battery the problem was solved. Thanks to its unique electrical characteristics: low ESR (180m Ω) and high capacitance (40mF) the SC was able to supply the required pulse power to the RF transmitter. As a result, the connection between the nozzle to the vehicle established, the identification process completed, enabling the customer to fill the fuel tank.



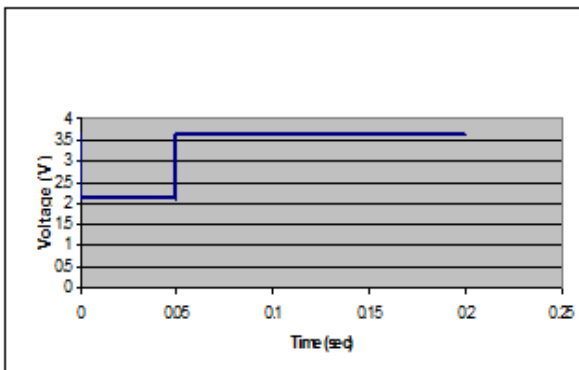
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Figure 1 describes the voltage behavior with and without Supercapacitor.

Figure 1

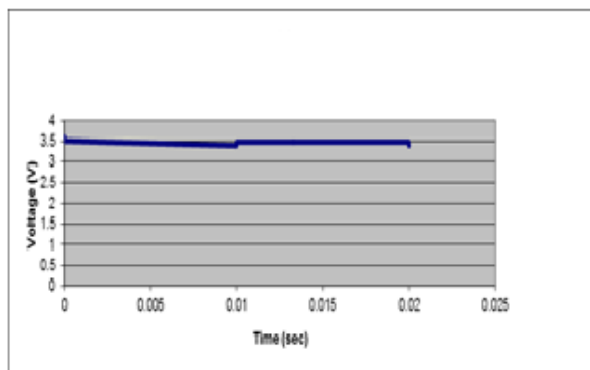
Voltage on RF transmitter, **without** SC implementation

Voltage drop = 1.5V



Voltage on RF transmitter, **with** SC implementation

Voltage drop = 0.2V



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