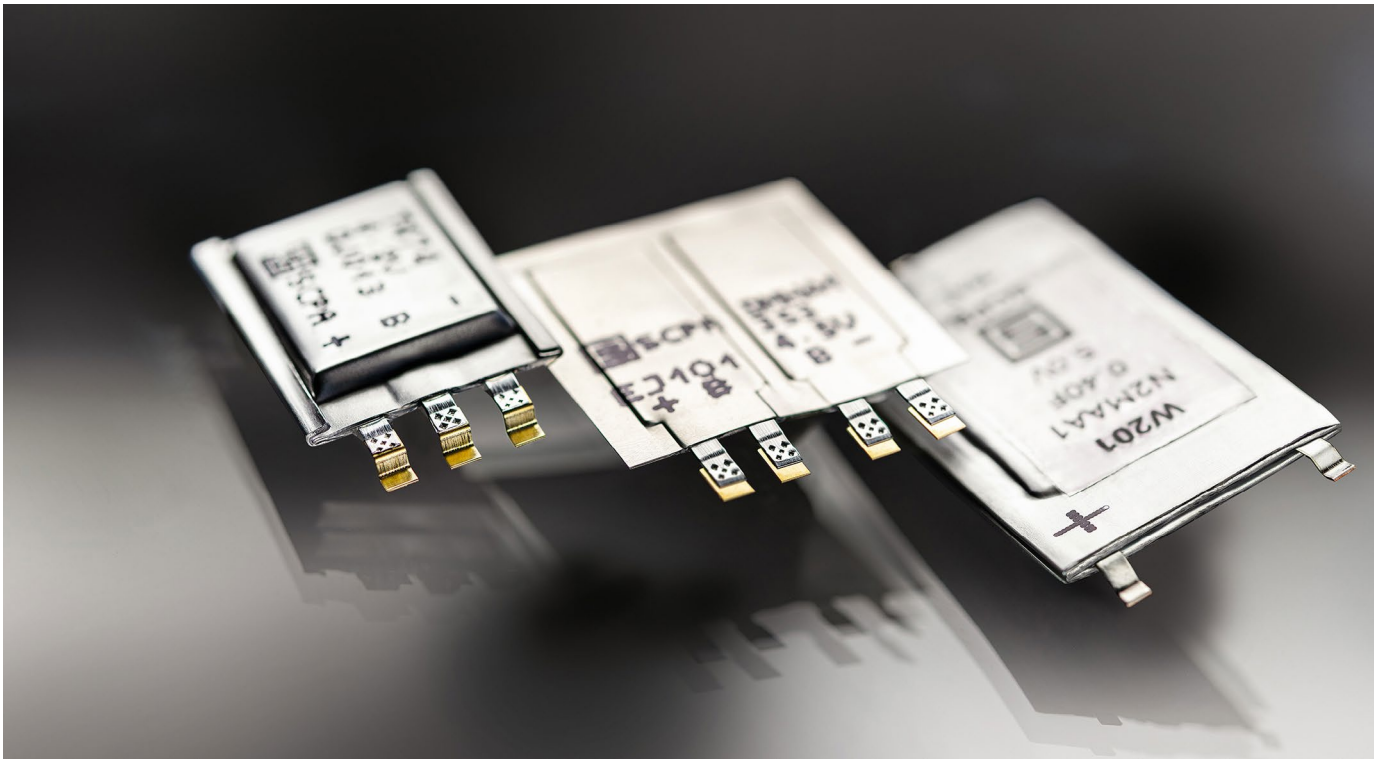
Suggestions on Handling Supercaps

Supercapacitors (Supercaps) combine the high energy density of batteries with the fast charge/discharge capability of capacitors. They are particularly suitable for applications that require fast energy bursts. The following are important notes and application recommendations for handling prismatic SCHURTER supercaps.



Super-compact and powerful: When using prismatic SCHURTER supercaps, the following points must be observed

Precautions before Use

SCHURTER supercapacitors are "burned-in" during production and have a defined polarity, which is indicated by the positive terminal marked on the product. Reversing the polarity will not damage the product, but may lead to an increase in ESR and invalidate the warranty.

It is advisable to check the orientation of the supercapacitor according to the product markings before installation.

SCHURTER supercapacitors are sensitive to heat. Overheating can impair their performance and shorten their service life. Supercaps may only be operated within the specified voltage range, as overvoltage can lead to swelling or failure of the product.

Dual-cell supercapacitor modules contain two cells connected in series. It must be ensured that the voltage of both cells remains below the maximum permissible operating values.

SCHURTER recommends the use of an active balancing circuit or passive balancing resistors to avoid overvoltage of a single cell.

SCHURTER supercapacitors are supplied in a discharged state. They should only be handled and soldered in this state.

Mounting Instructions

- Placement: Avoid contact between the underside of the supercapacitor and conductive areas on the PCB. Maximum pressure during assembly: 400 kPa.
- Connections: The tinned copper connections must not be bent.
- Assembly tools: Hand, vacuum pin or automated placement arm. Optional: insulating adhesive tape for fixing.
- Surface cleaning: Printed circuit boards must be free of residues.

Soldering Process

Direct soldering on the circuit board is permitted - but not on the housing. SCHURTER supercapacitors are not suitable for reflow, hot air or wave soldering. It is recommended to work with a <70 W soldering iron and low-melting solder (max. 5 s at 400 °C). A cooling time of 15 s must be observed between several soldering processes.

Cleaning and Drying

No solvent-based cleaners (e.g. acetone, isopropanol). Instead: aqueous

solution with deionized water (<70 °C, <50 psi). Minimum exposure time. Drying with air flow at max. 70 °C.

Protective Coatings

Potting compounds or conformal coatings (e.g. epoxy resins, silicones, Parylene) can be used to improve environmental safety or mechanical stability. Pay attention to temperature limits and material compatibility with the housing.

Cell Balancing / Leakage Current

The leakage current depends on voltage, temperature and time. It is significantly higher in the initial phase (diffusion current). After approx. 120 h at nominal voltage at room temperature, the leakage current typically drops to ~1 µA/F. At 70 °C it can be 5-10 µA/F.

Balancing with Dual Cells

To avoid overvoltage of individual cells, SCHURTER selects the cells with ±4 % capacity tolerance. Without this measure, a cell could be charged to >3 V, which would significantly shorten its service life.

Balancing Circuits

Simple balancing circuits consist of resistors in parallel with the cells. To ensure a stable center voltage (e.g. 2.25 V at 4.5 V total voltage), balancing resistors should correspond to about one tenth of the effective leakage current. Resistors that are too small increase energy consumption, while resistors that are too large delay voltage equalization. As the leakage current changes over time, the optimum resistor value must be determined empirically. SCHURTER recommends 10 kΩ as a guide value.

About SCHURTER

The SCHURTER Group is a globally successful Swiss technology business. With our components ensuring the clean and safe supply of power, input systems for ease of use, we impress our customers with agility and excellent product and service quality.

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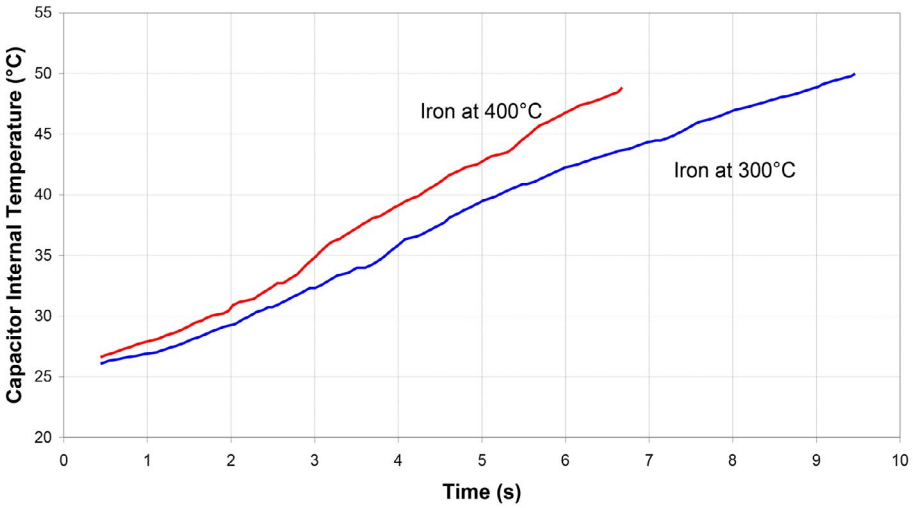
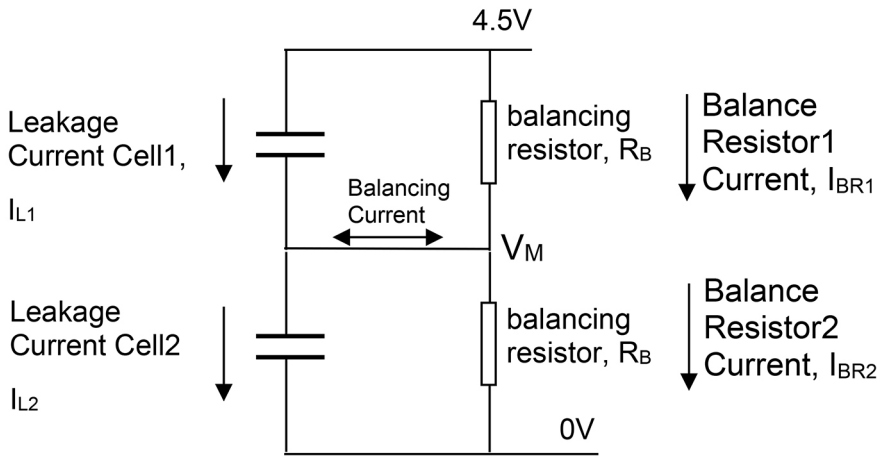


Temperature inside a supercap during the soldering process. Prismatic supercaps are sensitive to heat. They must not be soldered in a reflow oven; the ideal solution is to use a hand soldering iron at a low temperature and special solders.



The simplest balancing circuit is a pair of balancing resistors. The purpose of the circuit is to keep VM close to 4.5 V/2 = 2.25 V. VM = RB x IBR2 = RB x (IBR1 - balancing current). For the circuit to work, the balancing current must be << IBR1, IBR2. VM must be prevented from exceeding >> 2.25V or << 2.25V for a significant period of time.