

SkelCap

supercapacitor

- + Capacitance 3200 F
- + Extreme power density
- + Durable and safe aluminum casings
- + Weldable terminals*
- + High cycle life >1,000,000 cycles
- + High temperature tolerance (operating and storage)
- + German quality
- + RoHS compliant
- + UL certified



| General | Value | Unit |
|--|---------|-------|
| Rated voltage V_R | 2.85 | V |
| Rated capacitance | 3200 | F |
| Specific energy | 6.8 | Wh/kg |
| Product code | 6710038 | |
| DC 10ms ESR rated | 0.14 | mΩ |
| DC 1s ESR rated | 0.18 | mΩ |
| Maximum peak current, for 1 second ^{1,9} | 2.89 | kA |
| Leakage current (At 2.85 V, 25 °C and 72 hours, max) | 11.0 | mA |

Standards and certifications

| | |
|-------------------------|-----------------------|
| Vibration Specification | ISO 16750-3, Table 12 |
| Certifications | RoHS, UL 810A |

Physical parameters

| | | |
|--|-------|----|
| Mass, typical (± 3-6 g, from small to large size) | 0.53 | kg |
| Volume | 0.390 | L |
| Diameter (± 0.2 mm, including label), D1 | 60.2 | mm |
| Length (± 0.3 mm), L1 | 138 | mm |
| Terminal diameter, D2 | 12 | mm |
| Terminal length, L2 | 3.2 | mm |

| Power | Value | Unit |
|--|-------|-------|
| Nominal power, calculated from 10ms ESR (for comparison) | | |
| Specific power, matched impedance ⁶ | 27 | kW/kg |
| Power density, matched impedance ⁷ | 37 | kW/L |

| | | |
|---|------|-------|
| Nominal power, calculated from 1s ESR (for engineering) | | |
| Power, matched impedance ⁵ | 11.3 | kW |
| Specific power, matched impedance ⁶ | 21 | kW/kg |
| Power density, matched impedance ⁷ | 29 | kW/L |

Temperature and Life

| | | |
|-----------------------------|-----|----|
| Operating temperature range | | |
| Minimum | -40 | °C |
| Maximum | +65 | °C |

| | | |
|---------------------------------------|-----|----|
| Storage temperature range (uncharged) | | |
| Minimum | -40 | °C |
| Maximum | +50 | °C |

| | | |
|--|-----------|--------|
| Life | | |
| Lifetime @ V_R and +65 °C Capacitance decrease 20% against rated value; 1s ESR increase 100% against rated value | 1500 | Hours |
| Storage life @ RT, uncharged | 10 | Years |
| Cyclelife @ RT, between V_R and $V_R/2$ | 1,000,000 | Cycles |

| Energy | Value | Unit |
|------------------------------|-------|-------|
| Energy ² | 3.6 | Wh |
| Specific energy ³ | 6.8 | Wh/kg |
| Energy density ⁴ | 9.3 | Wh/L |

Safety

| | | |
|---|------|----|
| Short circuit current | 20.4 | kA |
| (For informational purposes - do not use as operating current.) | | |

| Thermal (based on DC 1s ESR) | Value | Unit |
|---|-------|-----------------------------|
| Thermal resistance given $\Delta T = 30^{\circ}\text{C}$, R_{th} | 3.0 | $^{\circ}\text{C/W}$ |
| Thermal capacitance, C_{th} , typical | 633.7 | $\text{J}/^{\circ}\text{C}$ |
| Max continuous current ¹⁰ , $\Delta T = 15^{\circ}\text{C}$ ⁸ | 167 | A |
| Max continuous current ¹⁰ , $\Delta T = 40^{\circ}\text{C}$ ⁸ | 273 | A |

| Package details | Value | Unit |
|------------------|-------|------|
| Package quantity | 25 | pcs |
| Package weight | 14.1 | kg |
| Package height | 170 | mm |
| Package width | 395 | mm |
| Package depth | 395 | mm |

(1) Maximum peak current (1 sec) = $\frac{\frac{1}{2} CV}{C \times \text{ESR} + 1\text{s}}$

(2) $E_{\text{stored}} = \frac{\frac{1}{2} CV^2}{3600}$

(3) $E_{\text{max}} = \frac{\frac{1}{2} CV^2}{3600 \times \text{mass}}$

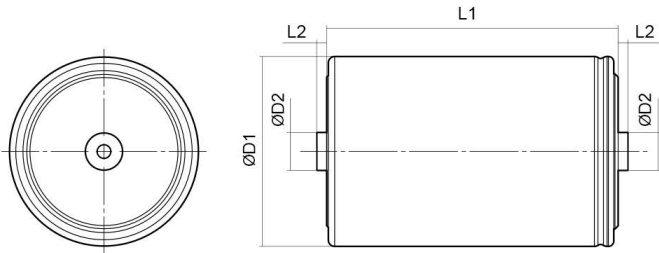
(4) $E_{\text{max}} = \frac{\frac{1}{2} CV^2}{3600 \times \text{volume}}$

(5) $P_{\text{max}} = \frac{V^2}{4 \times \text{ESR}}$

(6) $P_{\text{max}} = \frac{V^2}{4 \times \text{ESR} \times \text{mass}}$

(7) $P_{\text{max}} = \frac{V^2}{4 \times \text{ESR} \times \text{volume}}$

(8) $I_{\text{max}} = \sqrt{\frac{\Delta T}{\text{ESR} \times R_{th}}}$



(9) The stated maximum peak current should not be exceeded during use. If the limit is to be exceeded by the customer, Skeleton must be consulted beforehand and give approval for the exceeded power load. Typical value represents the mean production sample value. Rated value represents the absolute minimum capacitance or maximum ESR value of production sample.

*Power values calculated using DC 10ms ESR ≈ AC 100Hz.

- Standard markings**
- + Name of manufacturer, part number, serial number, rated voltage
 - + Rated capacitance, negative and positive terminals, warning marking
 - + Total energy in watt-hours
 - + Electrolyte material used

Notes

- + Testing instructions available on www.skeletontech.com
- + All information provided on this data sheet and all subsequent ultracapacitors sales and testing are subject to Standard Terms of Service (ToS) available on www.skeletontech.com, document *General Terms of Sale for Skeleton Technologies GmbH*.

SkelCap

supercapacitor

The SkelCap supercapacitor series brings the benefits of our patented production technology to a form factor most commonly found in industry. These cells are developed for a variety of applications and offer very high power and excellent lifetime characteristics.

- + Capacitance 3400 F
- + Extreme power density
- + Durable and safe aluminum casings
- + Non-Threaded terminals
- + High cycle life >1,000,000 cycles
- + RoHS & UL810A compliant



General Specifications*

| | Value | Unit |
|--------------------------|-------|-------|
| Rated voltage V_R | 3.0 | V |
| Specific energy | 8.4 | Wh/kg |
| Nominal specific power | 26.0 | kW/kg |
| Practical specific power | 21.0 | kW/kg |

Standards and certifications

| | |
|-------------------------|--------------------------|
| Vibration Specification | ISO 16750-3, Table 12 |
| Shock Resistance | IEC60068-2-27 Shock Test |
| Certifications | RoHS |
| Standards | REACH, UL 810A |

General

| | Value | Unit |
|---|---------|------|
| Product code | 6710048 | |
| Rated capacitance | 3400 | F |
| DC 1s ESR, rated at 50A | 0.21 | mΩ |
| DC 10ms ESR, rated at 50A | 0.17 | mΩ |
| Maximum peak current, for 1 second ^{1,9} | 3035 | A |

Energy

| | | |
|------------------------------|------|-------|
| Energy ² | 4.25 | Wh |
| Specific energy ³ | 8.4 | Wh/kg |
| Energy density ⁴ | 10.9 | Wh/L |

Temperature and Life

| | Value | Unit |
|--|-------|------|
| Operating temperature range | | |
| Minimum | -40 | °C |
| Maximum | +65 | °C |
| Storage temperature range (uncharged) | | |
| Minimum | -40 | °C |
| Maximum | +50 | °C |

Life

| | | |
|--|-----------|--------|
| Lifetime @ V_R and +65 °C Capacitance decrease 20% against rated value; 1s ESR increase 100% against rated value | 1500 | Hours |
| Storage life @ RT, uncharged | 10 | Years |
| Cyclelife @ RT, between V_R and $V_R/2$ | 1,000,000 | Cycles |

Power

Nominal power, calculated from 10 ms ESR (for comparison)

| | | |
|--|------|-------|
| Specific power, matched Impedance ⁶ | 26.0 | kW/kg |
| Power density, matched Impedance ⁷ | 34.0 | kW/L |

Practical power, calculated from 1 s ESR (for engineering)

| | | |
|--|------|-------|
| Power, matched impedance ⁵ | 10.7 | kW |
| Specific power, matched Impedance ⁶ | 21.0 | kW/kg |
| Power density, matched impedance ⁷ | 27.5 | kW/L |

Safety

| | | |
|---|------|----|
| Short circuit current (For informational purposes - do not use as operating current.) | 18.8 | kA |
|---|------|----|

| Physical parameters | Value | Unit |
|---------------------|-------|------|
| Mass. Typical | 0.51 | kg |
| Volume | 0.39 | L |
| Diameter | 60 | mm |
| Length | 138 | mm |

| Thermal (based on DC 1s ESR) | Value | Unit |
|---|-------|-------|
| Thermal resistance, R_{ca} , typical | 3.35 | °C/W |
| Thermal capacitance, C_{th} , typical | 0.6 | kJ/°C |
| Max continuous current, $\Delta T = 15^{\circ}\text{C}^8$ | 150 | A |
| Max continuous current, $\Delta T = 40^{\circ}\text{C}^8$ | 244 | A |

$$\begin{aligned}
 (1) \text{ Maximum peak current (1 sec)} &= \frac{\frac{1}{2} CV}{C \times \text{ESR} + 1\text{s}} & (2) E_{\text{stored}} &= \frac{\frac{1}{2} CV^2}{3600} & (3) E_{\text{max}} &= \frac{\frac{1}{2} CV^2}{3600 \times \text{mass}} \\
 (4) E_{\text{max}} &= \frac{\frac{1}{2} CV^2}{3600 \times \text{volume}} & (5) P_{\text{max}} &= \frac{V^2}{4 \times \text{ESR}} & (6) P_{\text{max}} &= \frac{V^2}{4 \times \text{ESR} \times \text{mass}} \\
 (7) P_{\text{max}} &= \frac{V^2}{4 \times \text{ESR} \times \text{volume}} & (8) I_{\text{max}} &= \sqrt{\frac{\Delta T}{\text{ESR} \times R_{th}}}
 \end{aligned}$$

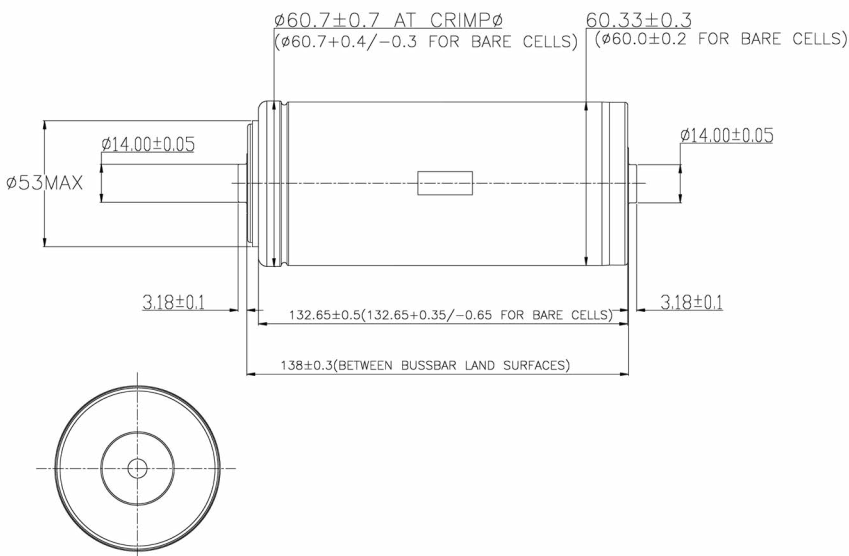
(9) The stated maximum peak current should not be exceeded during use. If the limit is to be exceeded by the customer, Skeleton must be consulted beforehand and give approval for the exceeded power load. Typical value represents the mean production sample value. Rated value represents the absolute minimum capacitance or maximum ESR value of production sample.

Standard markings

- + Name of manufacturer, part number, serial number, rated voltage
- + Rated capacitance, negative and positive terminals, warning marking
- + Total energy in watt-hours
- + Electrolyte material used

Notes

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SkelCap

supercapacitor

- + Capacitance 5000 F
- + Extreme power density
- + Durable and safe aluminum casings
- + Weldable terminals
- + High cycle life >1,000,000 cycles
- + High temperature tolerance (operating and storage)
- + German quality
- + RoHS compliant



| General | Value | Unit |
|---|-------|------------|
| Rated voltage V_R | 3 | V |
| Rated capacitance | 5000 | F |
| Initial capacitance, typical | 5200 | F |
| DC 10ms ESR rated | 0.14 | m Ω |
| DC 1s ESR rated | 0.20 | m Ω |
| ESR (IEC62391-1), rated | 0.20 | m Ω |
| Maximum peak current, for 1 second ^{1,9} | 3.8 | kA |

Standards and certifications

| | |
|-------------------------|-----------------------------------|
| Vibration Specification | ISO 16750-3, Table 12 Table 14 |
| Certifications | RoHS |

Physical parameters

| | | |
|---|-------|----|
| Mass, typical (\pm 3-6 g, from small to large size) | 0.565 | kg |
| Volume | 0.390 | L |
| Diameter (\pm 0.2 mm, including label), D1 | 60.2 | mm |
| Length (\pm 0.3 mm), L1 | 138 | mm |
| Terminal diameter, D2 | 12 | mm |
| Terminal length, L2 | 3.2 | mm |

| Power | Value | Unit |
|--|-------|-------|
| Nominal power, calculated from 10ms ESR (for comparison) | | |
| Power, matched impedance ⁵ | 16.1 | kW |
| Specific power, matched impedance ⁶ | 28.4 | kW/kg |
| Power density, matched impedance ⁷ | 41.2 | kW/L |

| | | |
|---|------|-------|
| Nominal power, calculated from 1s ESR (for engineering) | | |
| Power, matched impedance ⁵ | 11.2 | kW |
| Specific power, matched impedance ⁶ | 19.9 | kW/kg |
| Power density, matched impedance ⁷ | 28.9 | kW/L |

Temperature and Life

| | | |
|-----------------------------|-----|----|
| Operating temperature range | | |
| Minimum | -40 | °C |
| Maximum | +65 | °C |

| | | |
|---------------------------------------|-----|----|
| Storage temperature range (uncharged) | | |
| Minimum | -40 | °C |
| Maximum | +50 | °C |

| | | |
|---|-----------|--------|
| Life | | |
| Capacitance decrease 20% from rated value; resistance increase 100% from rated value | | |
| Storage life @ RT, uncharged | 10 | Years |
| Cyclelife @ RT, between V_R and $V_R/2$ | 1,000,000 | Cycles |

| Energy | Value | Unit |
|------------------------------|-------|-------|
| Energy ² | 6.3 | Wh |
| Specific energy ³ | 11.1 | Wh/kg |
| Energy density ⁴ | 16.0 | Wh/L |

| | | |
|---|------|----|
| Short circuit current | 21.4 | kA |
| (For informational purposes - do not use as operating current.) | | |

| Thermal (based on DC 1s ESR) | Value | Unit |
|---|-------|-----------------------------|
| Thermal resistance given $\Delta T = 30^{\circ}\text{C}$, R_{th} | 3 | $^{\circ}\text{C/W}$ |
| Thermal capacitance, C_{th} , typical | 634 | $\text{J/}^{\circ}\text{C}$ |
| Max continuous current ¹⁰ , $\Delta T = 15^{\circ}\text{C}$ ⁸ | 158 | A |
| Max continuous current ¹⁰ , $\Delta T = 30^{\circ}\text{C}$ ⁸ | 224 | A |
| Max continuous current ¹⁰ , $\Delta T = 40^{\circ}\text{C}$ ⁸ | 258 | A |

(1) Maximum peak current (1 sec) = $\frac{\frac{1}{2} CV}{C \times \text{ESR} + 1\text{s}}$

(2) $E_{\text{stored}} = \frac{\frac{1}{2} CV^2}{3600}$

(3) $E_{\text{max}} = \frac{\frac{1}{2} CV^2}{3600 \times \text{mass}}$

(4) $E_{\text{max}} = \frac{\frac{1}{2} CV^2}{3600 \times \text{volume}}$

(5) $P_{\text{max}} = \frac{V^2}{4 \times \text{ESR}}$

(6) $P_{\text{max}} = \frac{V^2}{4 \times \text{ESR} \times \text{mass}}$

(7) $P_{\text{max}} = \frac{V^2}{4 \times \text{ESR} \times \text{volume}}$

(8) $I_{\text{max}} = \sqrt{\frac{\Delta T}{\text{ESR} \times R_{th}}}$

(9) The stated maximum peak current should not be exceeded during use. If the limit is to be exceeded by the customer, Skeleton must be consulted beforehand and give approval for the exceeded power load. Typical value represents the mean production sample value. Rated value represents the absolute minimum capacitance or maximum ESR value of production sample.

*Power values calculated using DC 10ms ESR ≈ AC 100Hz.

- Standard markings**
- + Name of manufacturer, part number, serial number, rated voltage
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