

SKELETON
TECHNOLOGIES

SkelCap

supercapacitor

SCA1200 to SCA3200 weldable cells
& SCA0300 PCB-mountable cell



SkelCap supercapacitor

The SkelCap SCA supercapacitor series brings the benefits of our patented production technology to a form factor most commonly found in industry. Industry-leading performance for mass market applications to give you the upper hand over the competition.

- + Capacitance 300 - 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

* PCB-mountable for 300F cell



General Specifications*	Value	Unit
Rated voltage V_R	2.85	V
Surge voltage V_s	3.0	V
Specific energy	5.1 - 6.8	Wh/kg
Nominal specific power	27 - 48	kW/kg
Practical specific power	21 - 27	kW/kg

* See values for SCA0300 on page 3.

Standards and certifications

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

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

General

	SCA1200	SCA1800	SCA3200	Unit
Product code	6710040	6710039	6710038	
Rated capacitance	1200	1800	3200	F
DC 10ms ESR rated	0.18	0.16	0.14	mΩ
DC 1s ESR rated	0.30	0.27	0.18	mΩ
Maximum peak current, for 1 second ^{1,9}	1.26	1.73	2.89	kA
Leakage current (At 2.85 V, 25 °C and 72 hours, max)	4.5	6.3	11.0	mA

Safety

Short circuit current (For informational purposes - do not use as operating current.)	15.8	17.8	20.4	kA
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Energy	SCA1200	SCA1800	SCA3200	Unit
Energy ²	1.4	2.0	3.6	Wh
Specific energy ³	5.4	6.0	6.8	Wh/kg
Energy density ⁴	7.6	8.5	9.3	Wh/L

Power

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

Specific power, matched impedance ⁶	45	38	27	kW/kg
Power density, matched impedance ⁷	63	53	37	kW/L

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

Power, matched impedance ⁵	6.8	7.5	11.3	kW
Specific power, matched impedance ⁶	27	22	21	kW/kg
Power density, matched impedance ⁷	38	31	29	kW/L

Thermal (based on DC 1s ESR)

Thermal resistance, R_{ca} , typical	5.7	4.3	3.0	°C/W
Thermal capacitance, C_{th} , typical	252.7	334.7	633.7	J/°C
Max continuous current, $\Delta T = 15^\circ C$ ⁸	93.4	114	167	A
Max continuous current, $\Delta T = 40^\circ C$ ⁸	152.5	187	273	A

Physical

Mass, typical (± 3 -6 g, from small to large size)	0.25	0.34	0.53	kg
Volume	0.18	0.24	0.39	L
Diameter (± 0.2 mm, including label), D1	60.2	60.2	60.2	mm
Length (± 0.3 mm), L1	63	85	138	mm
Terminal diameter, D2	12	12	12	mm
Terminal length, L2	3.2	3.2	3.2	mm

Package details*

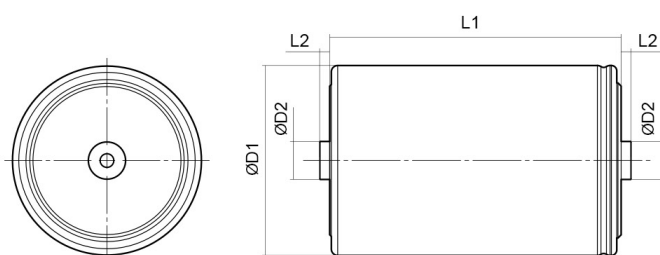
Package quantity	25	25	25	pcs
Package weight	7.1	9.2	14.1	kg
Package height	170	170	170	mm
Package width	395	395	395	mm
Package depth	395	395	395	mm

* SCA0300 only sold as a product platform, not as individual cells.

$$(1) \text{ Maximum peak current (1 sec)} = \frac{\frac{1}{2} CV}{C \times \text{ESR} + 1s} \quad (2) E_{\text{stored}} = \frac{\frac{1}{2} CV^2}{3600} \quad (3) E_{\text{max}} = \frac{\frac{1}{2} CV^2}{3600 \times \text{mass}}$$

$$(4) E_{\text{max}} = \frac{\frac{1}{2} CV^2}{3600 \times \text{volume}} \quad (5) P_{\text{max}} = \frac{V^2}{4 \times \text{ESR}} \quad (6) P_{\text{max}} = \frac{V^2}{4 \times \text{ESR} \times \text{mass}}$$

$$(7) P_{\text{max}} = \frac{V^2}{4 \times \text{ESR} \times \text{volume}} \quad (8) I_{\text{max}} = \sqrt{\frac{\Delta T}{\text{ESR} \times R_{th}}}$$



(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.

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*.

SCA0300

PCB-Mountable Cell

Note: Polarity of the cell is stated as following:
center terminal for "-", can and 3-pillar PCB frame for "+".



General Specifications*	Value	Unit
Rated voltage V_R	2.85	V
Surge voltage V_s	3.0	V
Specific energy	5.3	Wh/kg
Nominal specific power	32	kW/kg
Practical specific power	20	kW/kg

* See values for SCA0300 on page 3.

Standards and certifications

Vibration Specification	ISO 16750-3, Table 12
Shock Resistance	IEC60068-2-27 Shock Test
Certifications	RoHS, UL 810A
Standards	REACH, UL 810A, AEC-Q200*

*Tested according AEC-Q200 requirements, modified to match supercapacitor properties

General	Value	Unit
Product code	3710041	
Rated capacitance	300	F
DC 10ms ESR rated	1.0	m Ω
DC 1s ESR rated	1.60	m Ω
Maximum peak current, for 1 second ^{1,9}	0.29	kA
Leakage current (At 2.85 V, 25 °C and 72 hours, max)	1.5	mA

Safety

Short circuit current (For informational purposes - do not use as operating current.)	3	kA
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Physical parameters	Value	Unit
Mass. Typical	0.064	kg
Volume	0.053	L
Diameter	33	mm
Length	61.5	mm

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

Energy

Energy ²	0.34	Wh
Specific energy ³	5.3	Wh/kg
Energy density ⁴	6.4	Wh/L

Power

Nominal power, calculated from 10 ms ESR (for comparison)		
Specific power, matched Impedance ⁶	32	kW/kg
Power density, matched Impedance ⁷	38	kW/L

Practical power, calculated from 1 s ESR (for engineering)		
Power, matched impedance ⁵	1.3	kW
Specific power, matched Impedance ⁶	20	kW/kg
Power density, matched impedance ⁷	24	kW/L

Thermal (based on DC 1s ESR)	Value	Unit
Thermal resistance, R_{ca} , typical	10.8	°C/W
Thermal capacitance, C_{th} , typical	60	J/°C
Max continuous current, $\Delta T = 15^\circ C$ ⁸	29	A
Max continuous current, $\Delta T = 40^\circ C$ ⁸	48	A

(1) Maximum peak current (1 sec) = $\frac{\frac{1}{2} CV}{C \times ESR + 1s}$ (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) $P_{\text{max}} = \frac{V^2}{4 \times ESR}$ (6) $P_{\text{max}} = \frac{V^2}{4 \times ESR \times \text{mass}}$

(7) $P_{\text{max}} = \frac{V^2}{4 \times ESR \times \text{volume}}$ (8) $I_{\text{max}} = \sqrt{\frac{\Delta T}{ESR \times R_{\text{th}}}}$

(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.

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