

DATA SHEET
SkelMod 51V
177F

- + 51 V DC nominal voltage
- + Ultra-low ESR
- + Long lifetime - 1 million duty cycles
- + Integrated Ultracapacitor Management System for effective cell balancing
- + CAN bus communication
- + Natural cooling
- + High Power output
- + IP65 Protection



SMA51V177FAF TECHNICAL SPECIFICATIONS

UNIT VALUE

Electrical

Rated voltage V_R	V	51
Surge voltage	V	54
Minimum monitoring voltage	V	9
Rated capacitance	F	177
DC 10ms ESR (~AC 100Hz) rated	mΩ	3.3
DC 1s ESR (~AC 0.1 Hz), rated	mΩ	4.0
Maximum series voltage	VDC	850
Maximum peak current (for 1 s duration) ¹	A	2643
Short circuit current	kA	11.6
Maximum stored energy ²	Wh	63.9
Cells in total	pcs.	18
Cell type		SCA3200

Life

Life at 51 V and maximum operating temperature	1500 h
Life at 48 Volt and Maximum Operating Temperature	2500 h
Shelf life @ RT, uncharged	10 years
Projected cycle life @ RT between 51 V and 25.5 V	1 000 000 cycles
Projected cycle life @ RT between 48 V and 24 V	2 000 000 cycles
<i>Capacitance decrease 20% from rated value; resistance increase 100% from rated value</i>	

Temperature

Operating temperature range	-40 °C to +65 °C
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Ultracapacitor Management System

Cell balancing method	Controlled Resistive Balancing
Temperature reading	4 NTC sensors
Voltage monitoring/balancing	Individual Cell
Communication interface	CAN bus 2.0B
Nominal auxiliary supply voltage	24 V
Auxiliary supply voltage range	16-33 V
Auxiliary supply current	max. 0.02 A

Connectors

Power connector	Ø 9 mm Trough hole
Communications connector	Phoenix Contact Male M12 A coded 8-pos

Standards

International protection marking
Isolation protection
Vibration protection
EMC immunity
EMC emissions

IEC 60529, IP65
EN60664-1, OV2
ISO 16750-3, Table 14
IEC EN 61000-6-2, UNECE R-10
IEC EN 61000-6-3, UNECE R-10

SMA51V177FAF TECHNICAL SPECIFICATIONS

UNIT VALUE

Energy

Max stored energy ²	Wh	63.9
Specific energy ³	Wh/kg	4.0
Energy density ⁴	Wh/L	5.0

Nominal Power (calculated from DC 10ms ESR, for comparison)

Power (matched impedance) ⁵	kW	197.0
Practical specific power (matched impedance) ⁶	kW/kg	12.5
Practical power density (matched impedance) ⁷	kW/L	15.5

Practical Power (calculated from DC 1s ESR, for engineering)

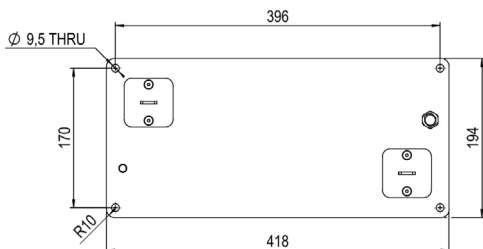
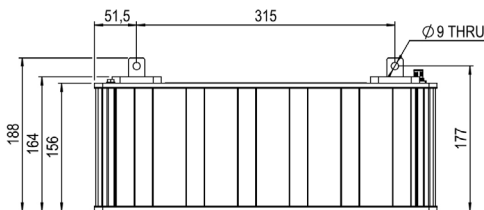
Power (matched impedance) ⁵	kW	162.6
Practical specific power (matched impedance) ⁶	kW/kg	10.3
Practical power density (matched impedance) ⁷	kW/L	12.8

Thermal Parameters (based on DC 1s ESR)

Thermal resistance given at ΔT 30 °C (R_{th}) ⁸	°C/W	0.33
Thermal capacitance (C_{th})	kJ/°C	16.85
Maximum continuous current (ΔT 15 °C)	A	102
Maximum continuous current (ΔT 30 °C)	A	150
Maximum continuous current (ΔT 40 °C)	A	177

Physical Parameters

Typical mass	kg	15.8
Volume	L	12.7
Length x width x height	mm	418 x 194 x 188



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

$$^2 E_{\text{stored}} = \frac{1/2 \times C \times V^2}{3600}$$

$$^3 E_{\text{specific}} = \frac{E_{\text{stored}}}{\text{mass}}$$

$$^4 E_{\text{density}} = \frac{E_{\text{stored}}}{\text{volume}}$$

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

$$^6 P_{\text{specific}} = \frac{P_{\text{max}}}{\text{mass}}$$

$$^7 P_{\text{density}} = \frac{P_{\text{max}}}{\text{volume}}$$

$$^8 R_{th} = \frac{\Delta T}{DC \ 1s \ ESR \times I^2}$$

Standard markings

- + Name of Manufacturer, Part number, Serial number, Rated voltage
- + Rated capacitance, Negative and positive terminals, Warning marking
- + Total energy in watt-hours

Notes

- + 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 OÜ*
- + For ultracapacitors, the power values are often calculated using nominal resistance values (DC 10 ms ESR). For engineering purposes, practical values based on total resistance (DC 1s ESR) are preferred.
- + Mounting Recommendation: Please refer to the user manual for installation recommendations.

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