SKELETON TECHNOLOGIES

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

CE

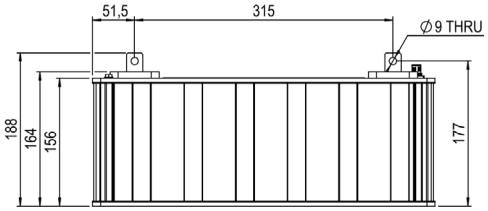
SMA51V177FAF TECHNICAL SPECIFICATIONS	UNIT	VALUE
Electrical		
Rated voltage V_R	V	51
Surge voltage	V	54
Minimum monitoring voltage	V	9
Rated capacitance	F	177
DC 10ms ESR (~AC 100Hz) rated	mΩ	3.3
DC 1s ESR (~AC 0.1 Hz), rated	mΩ	4.0
Maximum series voltage	VDC	850
Maximum peak current (for 1 s duration)[1]	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
Capacitance decrease 20% from rated value; resistance increase 100% from rated value		
Temperature		
Operating temperature range		-40 °C to +65 °C
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

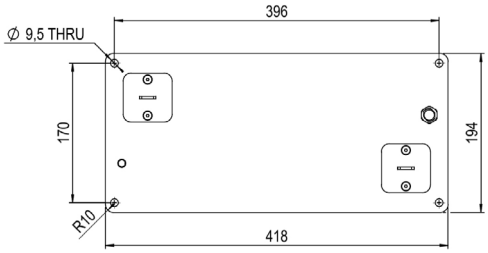
Standards

International protection marking	IEC 60529, IP65
Isolation protection	EN60664-1, OV2
Vibration protection	ISO 16750-3, Table 14
EMC immunity	IEC EN 61000-6-2, UNECE R-10
EMC emissions	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] Maximum peak current(1s) $= \frac{C \times {}^{1}/_{2} \times V}{C \times ESR + 1\,s}$ [2] $E_{stored} = \frac{{}^{1}/_{2} \times C \times V^2}{3600}$ [3] $E_{specific} = \frac{E_{stored}}{mass}$

[4] $E_{density} = \frac{E_{stored}}{volume}$ [5] $P_{max} = \frac{V^2}{4 \times ESR}$ [6] $P_{specific} = \frac{P_{max}}{mass}$ [7] $P_{density} = \frac{P_{max}}{volume}$

[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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