nanoCaps
LEADING EDGE SUPERCAPACITORS

Product Datasheet
Φ46 mm Ultracapacitors

- Rated voltage 3V DC
- 600-1200 F capacitance
- High cycle life of 1 million cycles
- Very high energy and power density
- Laser-weldable terminals
- Environmental friendly product

ELECTRICAL SPECIFICATIONS		
Type	**C46W-3R0-1200**	**C46W-3R0-0600**
Rated Voltage V_R	3.00 V	3.00 V
Surge Voltage V_S[1]	3.10 V	3.10 V
Rated Capacitance C [2]	1200 F	600 F
Capacitance Tolerance [3]	-0% / +20 %	> 5 %
DC ESR[2]	≤0.6 mΩ	≤0.7 mΩ
Leakage Current IL [4]	<5 mA	<3 mA
Self-discharge Rate [5]	<20 %	<20 %
Constant Current (ΔT = 15°C)[6]	65 A	52 A
Max Current I_{Max}[7]	1.0 kA	0.6 kA
Short Current I_S[8]	5.0 kA	4.3 kA
Stored Energy E [9]	1.5 Wh	0.8 Wh
Energy Density E_d [10]	7.4 Wh/kg	5.5 Wh/kg
Usable Power DensityP_d [11]	8.9 kW/kg	11.4 kW/kg
Impedance Match Power Density P_{dMax} [12]	18.6 kW/kg	23.8 kW/kg

THERMAL CHARACTERISTICS		
Type	**C46W-3R0-1200**	**C46W-3R0-0600**
Working Temperature	-40 ~ 65 °C	-40 ~ 65 °C
Storage Temperature[13]	-40 ~ 70 °C	-40 ~ 70 °C
Thermal Resistance R_{Th}[14]	5.8 K/W	8.0 K/W
Thermal Capacitance C_{Th} [15]	240 J/K	155 J/K

LIFETIME CHARACTERISTICS		
Type	**C46W-3R0-1200**	**C46W-3R0-0600**
DC Life at High Temperature[16]	1500 hours	1500 hours
DC Life at RT[17]	10 years	10 years
Cycle Life[18]	1’000’000 cycles	1’000’000 cycles
Shelf Life[19]	4 years	4 years

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SAFETY & ENVIRONMENTAL SPECIFICATIONS

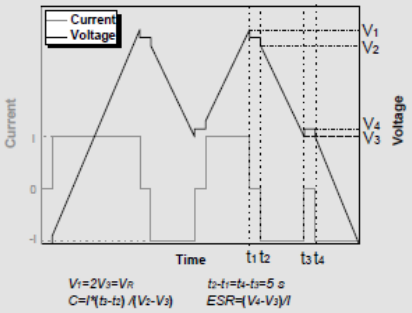
Type	C46W-3R0-1200	C46W-3R0-0600
Safety	RoHS, REACH and UL810A	RoHS, REACH and UL810A
Vibration	ISO 16750-3 (Table 14)	ISO 16750-3 (Table 14)
Shock	SAE J2464	SAE J2464

PHYSICAL PARAMETERS

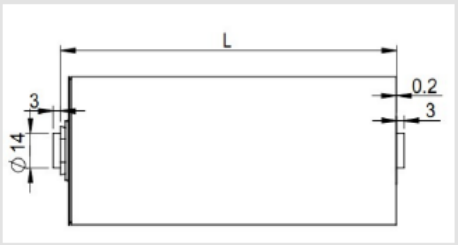
Type	C46W-3R0-1200	C46W-3R0-0600
Mass, typical M	197 g	139 g
Terminals[20]	Weldable	Weldable
Dimensions[21] Height	95 mm	63.8 mm
Diameter	45.6 mm	45.6 mm

PHYSICAL PARAMETERS

1. Surge voltage V_S: Absolute maximum voltage, non-repetitive. The duration must not exceed 1 second.
2. Capacitance C: The test current is 0.12 A/F, if the calculated current is >100A, then apply 100A.



3. Capacitance tolerance: Typical is 5% rated capacity
4. Leakage current measurement procedure: 1) Charge the capacitor to the V_R with a constant current (0.12 A/F, if the calculated current is >100A, then apply 100A). 2) Hold the voltage at V_R for 72h. 3) The current to maintain V_R after 72 h is the leakage current.
5. Self-discharge rate measurement procedure: 1) Charge the capacitor to V_R with a constant current (0.12 A/F, if the calculated current >100A, then apply 100A). 2) Hold the voltage at V_R for 3h. 3) Floating for 72h. 4) Measure the voltage after 72 h.
6. Max constant working current: $I_{MCC} = \sqrt{\Delta T/(ESR * R_{Th})}$
7. Max current: $I_{Max} = 0.5C * V_R/(\Delta t + ESR * C)$, discharge from V_R to $V_R/2$ in 1 second.
8. Short current: $I_S = V_R/ESR$
9. Stored energy: $E = 0.5C * V^2/3600$
10. Energy density: $E_d = E/M$
11. Usable power density: $P_d = 0.12V_R^2/(ESR * M)$
12. Impedance match power density: $P_{dMax} = 0.25V_R^2/(ESR * M)$
13. Storage temperature: Discharged state (The voltage of cell<0.2V).
14. Thermal resistance: $R_{Th} = 1/(h * A)$,, where h=10 W/(m²*K), A=surface area.
15. Thermal capacitance: For the whole capacitor
16. DC life at high temperature: Hold the capacitor charged at rated voltage at 65°C for 1500h. The capacitance shall be >80% of the rated value, the ESR shall be <200% of rated value.
17. DC life at RT: Hold the capacitor charged at rated voltage at room temperature RT, the capacitance shall be >80% of the rated value, the ESR shall be <200% of rated value.
18. Cycle life: Charge and discharged the capacitor in the range between V_R and $V_R/2$, 5 seconds rest between charge and discharge. The constant test current is 0.12 A/F (if the calculated current >100A, then apply 100A).
19. Shelf life: Discharged state (The voltage of cell<0.2V).
20. Threaded connection: Φ14*3mm,the welding depth should be larger than 1.8mm
21. Dimensions:



22. Standard markings:
    - Name of manufacturer, part number, serial number
    - Rated voltage and capacitance, negative and positive terminals, warning marking
    - Stored energy in watt-hours
23. Mounting recommendations:
    - Mounting without applying undue mechanical stress on the terminals
    - Provide adequate spacing in between cells to secure required insulation strength
    - Provide clearance around the safety vent and do not position anything above the safety vent that may be damaged in an event of vent rupture
24. The contents of this document are subject to change without notice.

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