

Product Datasheet

46mm \varnothing Ultracapacitors

- Rated voltage 3VDC
- 600, 700F and 1100F capacitance
- High cycle life of 1 million cycles
- Very high energy and power density
- Laser-weldable terminals
- Environmentally friendly product



ELECTRICAL SPECIFICATIONS

| Type | C46W-3R0-0600 | C46W-3R0-0700 | C46W-3R0-1100 |
|---|-----------------|-----------------|------------------|
| Rated Voltage V_R | 3.00 V | 3.00 V | 3.00 V |
| Surge Voltage V_S^1 | 3.10 V | 3.10 V | 3.10 V |
| Rated Capacitance C^2 | 600 F | 700 F | 1100 F |
| Capacitance Tolerance 3 | -0% / +20% | -0% / +20% | -0% / +20% |
| DC ESR 2 | <0.7 m Ω | <0.8 m Ω | <0.55 m Ω |
| Leakage Current I_L^4 | <3 mA | <3 mA | <5 mA |
| Self-discharge Rate 5 | <20% | <20% | <20% |
| Constant Current ($\Delta T = 15^\circ C$) 6 | 52 A | 40 A | 65 A |
| Max Current I_{Max}^7 | 0.6 kA | 0.5 kA | 1.0 kA |
| Short Current I_S^8 | 4.3 kA | 4 kA | 5 kA |
| Stored Energy E^9 | 0.75 Wh | 0.87 Wh | 1.37 Wh |
| Energy Density E_d^{10} | 5.5 Wh/kg | 6.3 Wh/kg | 6.8 Wh/kg |
| Usable Power Density P_d^{11} | 11.4 kW/kg | 10 kW/kg | 8.9 kW/kg |
| Matched Impedance Power Density P_{dMax}^{12} | 23.8 kW/kg | 20.8 kW/kg | 18.6 kW/kg |

THERMAL CHARACTERISTICS

| Type | C46W-3R0-0600 | C46W-3R0-0700 | C46W-3R0-1100 |
|-----------------------------------|---------------|---------------|---------------|
| Working Temperature | -40 ~ 65°C | -40 ~ 65°C | -40 ~ 65°C |
| Storage Temperature 13 | -40 ~ 70°C | -40 ~ 70°C | -40 ~ 70°C |
| Thermal Resistance R_{Th}^{14} | 8.0 K/W | 8.0 K/W | 5.8 K/W |
| Thermal Capacitance C_{Th}^{15} | 155 J/K | 160 J/K | 240 J/K |

LIFETIME CHARACTERISTICS

| Type | C46W-3R0-0600 | C46W-3R0-0700 | C46W-3R0-1100 |
|-------------------------------------|------------------|------------------|------------------|
| DC Life at High Temperature 16 | 1500 hours | 1500 hours | 1500 hours |
| DC Life at RT 17 | 10 years | 10 years | 10 years |
| Cycle Life 18 | 1'000'000 cycles | 1'000'000 cycles | 1'000'000 cycles |
| Shelf Life 19 | 4 years | 4 years | 4 years |

SAFETY & ENVIRONMENTAL SPECIFICATIONS

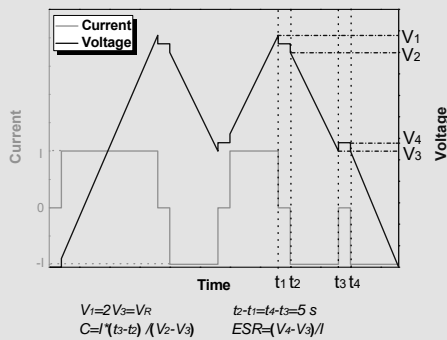
| Type | C46W-3R0-0600 | C46W-3R0-0700 | C46W-3R0-1100 |
|-----------|--------------------------------|--------------------------------|--------------------------------|
| Safety | RoHS, REACH and UL810 | RoHS, REACH and UL810 | RoHS, REACH and UL810 |
| Vibration | IEC 60068-2-64 (table A.5/A.6) | IEC 60068-2-64 (table A.5/A.6) | IEC 60068-2-64 (table A.5/A.6) |
| Shock | IEC 60068-2-27 | IEC 60068-2-27 | IEC 60068-2-27 |

PHYSICAL PARAMETERS

| Type | C46W-3R0-0600 | C46W-3R0-0700 | C46W-3R0-1100 |
|--------------------------|------------------------|------------------------|------------------------|
| Mass M | 135 g | 138 g | 202 g |
| Terminals | Weldable ²⁰ | Weldable ²⁰ | Weldable ²⁰ |
| Dimensions ²¹ | Height L | 63.8 mm | 95.5 mm |
| | Diameter | 45.6 mm | 45.6 mm |

NOTES:

- Surge voltage V_S : Absolute maximum voltage, non-repetitive. The duration must not exceed 1 second.
- Capacitance C: The test current is 0.075 A/F, if the calculated current is >100A, then apply 100A.
- 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 the rated value.
- Cycle life: Charge and discharged the capacitor in the range between V_R and $V_R/2$. 5 seconds waiting period between charge and discharge. The constant test current is 0.075 A/F (if the calculated current >100A, then apply 100A).
- Shelf life: Discharged and no load applied at RT.
- The welding depth should be larger than 0.8 mm
- Dimensions:



- Capacitance tolerance: Typical tolerance is +5%~+10%.
- Leakage current measurement procedure: 1) Charge the capacitor to the V_R with a constant current (0.075 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.
- Self-discharge rate measurement procedure: 1) Charge the capacitor to V_R with a constant current (0.075 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.
- Max constant working current: $I_{MCC} = \sqrt{\Delta T / (ESR * R_{Th})}$
- Max current: $I_{Max} = 0.5C * V_R / (\Delta t + ESR * C)$, discharge from V_R to $V_R/2$ in 1 second.
- Short current: $I_S = V_R / ESR$
- Stored energy: $E = 0.5C * V^2 / 3600$
- Energy density: $E_d = E / M$
- Usable power density: $P_d = (0.12V_R^2 / ESR) / M$
- Matched impedance power density: $P_{dMax} = (0.25V_R^2 / ESR) / M$
- Storage temperature: Storage in discharge state at RT.
- Thermal resistance: $R_{Th} = \Delta T / P$, where $P = ESR * I^2$
- Thermal capacitance: For the whole capacitor
- 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 the rated value.



Standard markings:

- + Name of manufacturer, part number, serial number
- + Rated voltage and capacitance, negative and positive terminals, warning marking
- + Stored energy in watt-hours

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

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