

## Product Datasheet

### 60mm Ø Ultracapacitors – weldable type

- Rated voltage 3VDC
- 3400F capacitance
- Low ESR
- High cycle life of 1 million cycles
- Excellent DC life performance
- Laser-weldable posts
- Very high energy and power density



#### ELECTRICAL SPECIFICATIONS

Type	C60W-3R0-3400
Rated Voltage $V_R$	3.00 V
Surge Voltage $V_S^1$	3.10 V
Rated Capacitance $C^2$	3400 F
Capacitance Tolerance <sup>3</sup>	0% / +20%
ESR <sup>2</sup> (DC)	<0.24 mΩ
ESR <sup>2</sup> (AC, 1 kHz)	<0.21 mΩ
Leakage Current $I_L^4$	<12 mA
Self-discharge Rate <sup>5</sup>	<20%
Constant Current ( $\Delta T = 15^\circ C$ ) <sup>6</sup>	142 A
Max Current $I_{Max}^7$	2.8 kA
Short Current $I_S^8$	12.5 kA
Stored Energy $E^9$	4.25 Wh
Energy Density $E_d^{10}$	8.7 Wh/kg
Usable Power Density $P_d^{11}$	9.2 kW/kg
Matched Impedance Power Density $P_{dMax}^{12}$ , 10 Hz ESR	19.1 kW/kg
Matched Impedance Power Density $P_{dMax}^{12}$ , 1 kHz ESR	21.9 kW/kg

#### THERMAL CHARACTERISTICS

Type	C60W-3R0-3400
Working Temperature	-40 ~ 65°C
Storage Temperature <sup>13</sup>	-40 ~ 70°C
Thermal Resistance $R_{Th}^{14}$	3.1 K/W
Thermal Capacitance $C_{Th}^{15}$	565 J/K

#### LIFETIME CHARACTERISTICS

Type	C60W-3R0-3400
DC Life at High Temperature <sup>16</sup>	1500 hours
DC Life at RT <sup>17</sup>	10 years
Cycle Life <sup>18</sup>	1'000'000 cycles
Shelf Life <sup>19</sup>	4 years

#### SAFETY & ENVIRONMENTAL SPECIFICATIONS

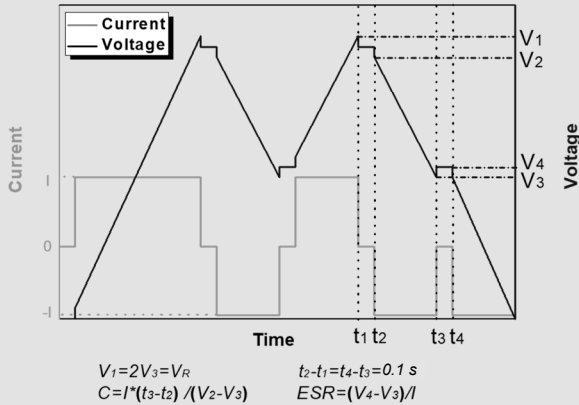
Type	C60W-3R0-3400
Safety	RoHS, REACH and UL810
Vibration	ISO 16750-3 (Table 12)
Shock	IEC 60068-2-27, 100g 6ms

#### PHYSICAL PARAMETERS

Type	C60W-3R0-3400
Mass M	490 g
Terminals	Weldable <sup>20</sup>
Dimensions <sup>21</sup> Height L	138 mm
Diameter	60 mm

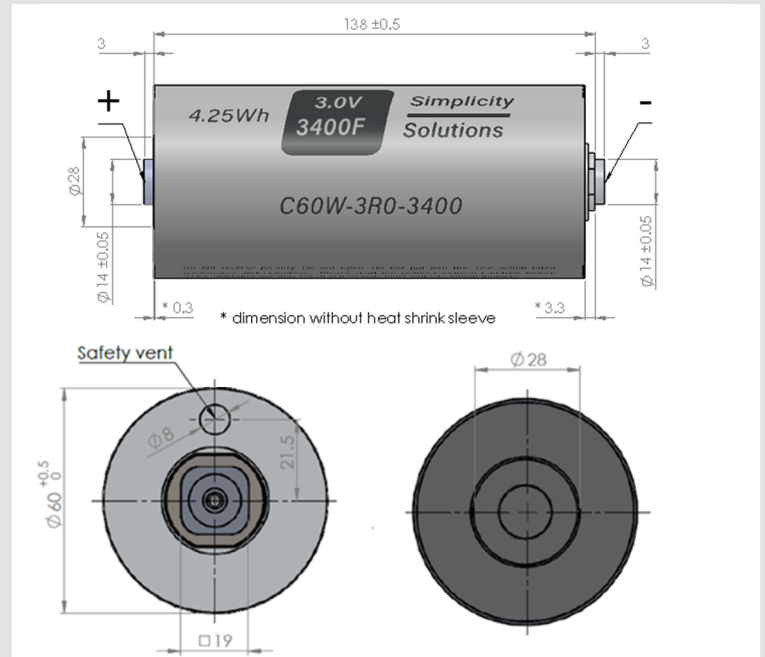
## NOTES:

1. Surge voltage  $V_S$ : Absolut maximum voltage, non-repetitive. The duration must not exceed 1 second.
2. Capacitance C: The test current is 0.075 A/F, if the calculated current is >100A, then apply 100A.



3. Capacitance tolerance: Typical tolerance is +5%~+10%.
4. 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.
5. 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.
6. Max constant working current:  $I_{MCC} = \sqrt{\Delta T / (ESR \cdot R_{Th})}$
7. Max current:  $I_{Max} = 0.5C \cdot V_R / (\Delta t + ESR \cdot C)$ , discharge from  $V_R$  to  $V_R/2$  in 1 second.
8. Short current:  $I_S = V_R / ESR$
9. Stored energy:  $E = 0.5C \cdot V^2 / 3600$
10. Energy density:  $E_d = E / M$
11. Usable power density:  $P_d = (0.12V_R^2 / ESR) / M$
12. Matched impedance power density:  $P_{dMax} = (0.25V_R^2 / ESR) / M$
13. Storage temperature: Storage in discharge state.
14. Thermal resistance:  $R_{Th} = \Delta T / P$ , where  $P = ESR \cdot I^2$
15. Thermal capacitance is indicated for the whole product.
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 the 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 the rated value.
18. 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).
19. Shelf life: Discharged and no load applied at RT.
20. The welding depth should be larger than 0.8 mm
21. Dimensions C60W-3R0 3400:



### 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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