NESSCAP ULTRACAPACITORS

POWERED TO MOVE

N60™ 3.0V 3400F Cell

NE03V03400ST001

Datasheet

See Note on Assembly Recommendations[10]

ELECTRICAL SPECIFICATIONS		
Rated Voltage, V_R		**3.0 VDC**
Surge Voltage[1]		3.15 VDC
Rated Capacitance, C[2]		**3400 F**
Capacitance Tolerance	Min. / Max.	3400F / 4080F
	Average[4]	3560F
Initial DC-ESR, R_{DC}[3]	Max.	0.24 mΩ
	Average[4]	0.15 mΩ
Maximum Leakage Current[5]		12 mA
Maximum Peak Current, Non-repetitive[6]		2,800 A
Maximum Stored Energy, E_{max}[7]		4.2 Wh
Gravimetric Specific Energy[7]		8.4 Wh/kg
Usable Specific Power[7]		8.9 kW/kg
Impedance Match Specific Power[7]		18.5 kW/kg

TYPICAL LIFETIME CHARACTERISTICS	
DC Life at High Temperature[8] (Continuous charging at V_R and 65°C)	1,500 hours
Projected DC Life at Room Temperature[8] (Continuous charging at V_R and 25 ± 10 °C)	10 years
Projected Cycle Life at Room Temperature[8] (Cycled from V_R to 1/2V_R using constant current of 100A at 25 ± 10 °C)	1,000,000 cycles
Shelf Life (Stored without charge at 25 ± 10 °C)	4 years

DIMENSION & WEIGHT	
D1 (±0.5)	60.3 mm
D2 (±0.2)	60.3 mm
L (±0.3)	138.0 mm
H (±0.3)	13.0 mm
Nominal Weight	505 g

TEMPERATURE SPECIFICATIONS	
Operating Temperature Range	-40 ~ 65°C
Storage Temperature Range (Stored without charge)	-40 ~ 70°C

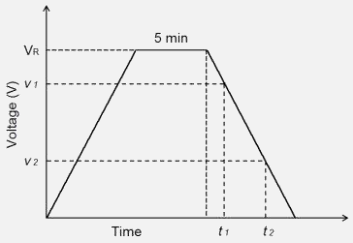
TYPICAL THERMAL CHARACTERISTICS	
Thermal Resistance, R_{th} (Housing)	3.2 °C/W
Thermal Capacitance, C_{th}	580 J/°C
Usable Continuous Current (ΔT = 15°C)[9]	140 A
Usable Continuous Current (ΔT = 40°C)[9]	225 A

SAFETY & ENVIRONMENTAL SPECIFICATIONS	
Vibration	ISO 16750-3 Table 12 & 14
Shock	SAE J2464, IEC 60068-2-27
RoHS	Compliant
REACH	Compliant
UL	Compliant (UL 810A)

NOTE

1. **Surge Voltage**
   > Absolute maximum voltage, non-repetitive. The duration must not exceed 1 second.

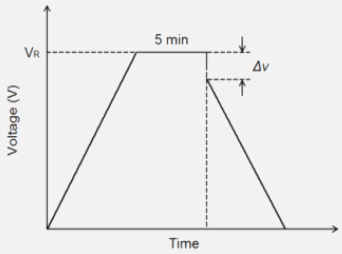
2. **Rated Capacitance (Measurement Method)**
   > Constant current charge with 5A to V_R.
   > Constant voltage charge at V_R for 5 min.
   > Constant current discharge with 5A to 0.1V.



$$C = \frac{I \times (t_2 - t_1)}{v_1 - v_2}$$

where C is the capacitance (F);
I is the absolute value of the discharge current (A);
v_1 is the measurement starting voltage, 0.8 x VR (V);
v_2 is the measurement end voltage, 0.4 x VR (V);
t_1 is the time from discharge start to reach v_1 (s);
t_2 is the time from discharge start to reach v_2 (s)

3. **Initial DC-ESR (Measurement Method)**
   > Constant current charge with 4 *C *V_R [mA] to V_R.
   *e.g. In case of 3V 3400F cell, 4 * 3400 * 3 = 40,800 mA = 40.8A*
   > Constant voltage charge at V_R for 5 min.
   > Constant current discharge with 150A to 0.1V.



$$ESR_{DC} = \frac{\Delta v}{I}$$

where ESR_{DC} is the DC-ESR (Ω);
Δv is the voltage drop during first 10ms of discharge (V);
I is the absolute value of the discharge current (A)

4. **Average**
   > Typical value or percentage spread that may be present in one shipment

5. **Maximum Leakage Current (Measurement Method)**
   > The capacitor is charged to its rated voltage V_R at 25°C.
   > Leakage current is the amount of current measured after 72 hours of continuous holding of the capacitor at V_R.

6. **Maximum Peak Current**
   > Current that can be used for 1-second discharging from the rated voltage to the half rated voltage under the constant current discharging mode

$$I = \frac{½V_R}{\Delta t / C + ESR_{DC}}$$

where I is the maximum peak current (A);
V_R is the rated voltage (V);
Δt is the discharge time (sec); Δt = 1 sec in this case;
C is the rated capacitance (F);
ESR_{DC} is the maximum DC-ESR (Ω)

   > The stated maximum peak current should **not** be used in normal operation and is only provided as a reference value.

7. **Energy & Power (Based on IEC 62391-2)**
   > Maximum Stored Energy, E_{max} (Wh) = $\frac{½CV_R^2}{3600}$
   > Gravimetric Specific Energy (Wh/kg) = $\frac{E_{Max}}{Weight}$
   > Usable Specific Power (W/kg) = $\frac{0.12V_R^2}{ESR_{DC} \times Weight}$
   > Impedance Match Specific Power (W/kg) = $\frac{0.25V_R^2}{ESR_{DC} \times Weight}$

8. **DC Life and Cycle Life Test**
   > End-of-Life (EOL) Conditions:
   - Capacitance: -20% from the rated minimum value
   - DC-ESR: +100% from the specified maximum initial value
   > Capacitance and ESR measurements are taken at 25°C.

9. **Usable Continuous Current**
   > Maximum current which can be used within the allowed temperature range under the constant current discharging mode

$$I = \sqrt{\frac{\Delta T}{R_{th} \times ESR_{DC}}}$$

where I is the maximum continuous current (A);
ΔT is the change in temperature (°C);
R_{th} is the thermal resistance (°C/W);
ESR_{DC} is the maximum DC-ESR (Ω)

10. **Assembly Recommendations**
   > Assembly should be done in such way as not to place undue mechanical stress on the terminals of the cell.
   > Do not exceed the maximum torque value of 14 N·m when assembling threaded type cells.
   > Provide adequate spacing in between cells to secure required insulation strength for the application.
   > Provide sufficient clearance above the safety vent and do not position anything near the safety vent that may be damaged in an event of vent rupture.

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