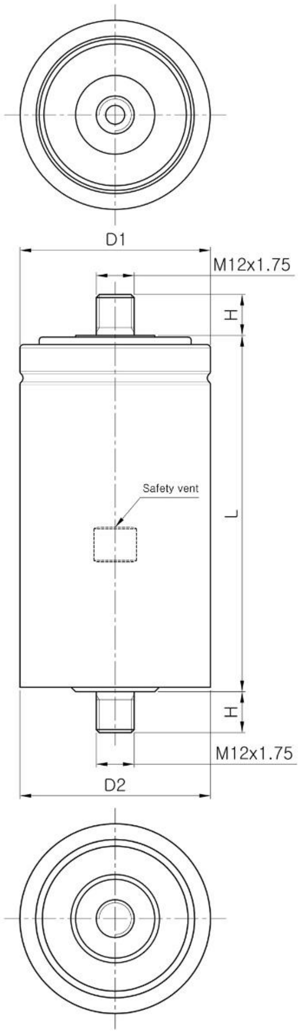
NESSCAP ULTRACAPACITORS

POWERED TO MOVE

N60™ 3.0V 3400F Cell

NE03V03400ST001

Datasheet



See Note on Mounting Recommendations[10]

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

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

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	
High Temperature Endurance[8] (at V_R and 65°C)	1,500 hours
Projected Room Temperature DC Life[8] (at V_R and 25°C)	10 years
Projected Cycle Life (at 25°C) (Cycled from V_R to $1/2V_R$ using constant current of 100A with 10-second average rest between charge and discharge steps)	1,000,000 cycles
Shelf Life (Stored fully discharged at under 25°C and 40% RH)	4 years

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

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)

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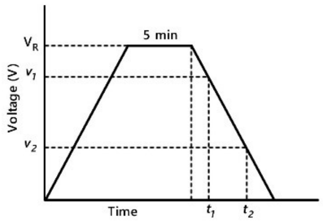
NOTES

1. Surge Voltage

Absolute maximum voltage, non-repetitive.
The duration must not exceed 1 second.

2. Rated Capacitance (Measurement Method)

- Constant current charge with 4CV [mA] to V_R.
  e.g. In case of 6F cell, 4 x 6 x 2.7 = 65mA
- Constant voltage charge at V_R for 5min.
- Constant current discharge with 4CV [mA] to 0.4V.

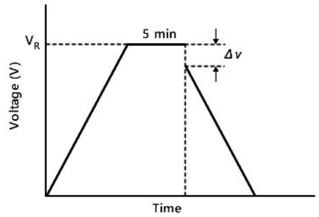


$$C = \frac{I \times (t_2 - t_1)}{v_1 - v_2}$$

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 V_R (V);
v_2 is the measurement end voltage, 0.4 x V_R (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. DC-ESR (DOE Measurement Method)

- Constant current charge with 4CV [mA] to V_R.
- Constant voltage charge at V_R for 5min.
- Constant current discharge with 40CV [mA] to 2.5V.
  e.g. In case of 6F cell, 40 x 6 x 2.7 = 650mA



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

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 the rated voltage at 25°C.
- Leakage current is the current after 72 hours that is required to keep the capacitor charged at the rated voltage.

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

$$I = \frac{{}^{1}/_{2}\, V_R}{\Delta t \,/\, C + ESR_{DC}}$$

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 (IEC 62391-2)

- Maximum Stored Energy, E_{max} (WH) $= \frac{1/2CV_R^2}{3600}$
- 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. High Temp. Endurance and Room Temperature DC Life

- Test Conditions:
  - Temperature: 65 ± 2°C, 25 ± 2°C
  - Applied Voltage: *VR* ± 0.02V
- End-of-Life Conditions:
  - Capacitance: -30% from the rated minimum value
  - DC-ESR: +100% from the rated maximum value
- Capacitance and ESR measurements are taken at 25°C

9. Maximum Continuous Current

- 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. Mounting Recommendations

- Provide properly spaced holes for mounting according to the cell dimension as to minimize leads being mechanically stressed.
- Do not place any copper patterns including the ground pattern or through-holes underneath the cell or on the underside of the PCB as the electrolyte inside the cell, if leaked, can corrode and short-circuit the patterns or damage other components nearby. Spacing of at least 1mm should be provided in between the footprint of the cell and the nearest copper pattern.
- Protective coating of components on the PCB is strongly recommended in order to reduce the risk of the components being damaged in an event of electrolyte leakage.
- The recommended mounting orientation is with the terminal leads pointing upward.
- Provide at least 2mm clearance from the safety vent and do not position anything near the safety vent that may be damaged by vent rupture.
- Place cells on the PCB taking into account that the cells may not be completely hermetic during its lifetime. Electrolyte vapor and gases generated during normal operation may escape the package.

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