

# **DATASHEET** 2.7V 3800F SUPERCAPACITOR

# **APPLICATIONS**

### Grid & Power Systems

- $\circ$  E-STATCOM support for power compensation and grid resilience
- $\circ$  Electrical generators, grid regulation, and frequency stabilization
- ${}^{\circ}$  Power stability, quality, and peak load shaving
- $\circ$  Rapid response to power demand fluctuations

### AI, Data Centers & Mission-Critical Power

- AI computing & data center UPS backup
- Power smoothing for high-performance computing
- $^\circ$  Backup & UPS for emergency systems
- Military, aerospace & nuclear power systems
- Black Start System assistance

### Transportation & Heavy Equipment

- Engine start/stop, fast charging, and high-cycle durability
- Regenerative braking & hybrid power systems
- Rail, cranes, elevators, and industrial vehicle electrification
- Peak power support for mining, aerospace, and naval applications

## BENEFITS

- Extended temperature range (operating and storage)
- High Power Density
- Dry electrode technology
- High cycle life >1,000,000 cycles



### Renewable Energy

- Hydroelectric Plant Support
- Wind turbine pitch backup & plant control
- Microgrid & Smart Grid Stabilization
- Grid integration & energy buffering
- Hybrid Supercap-Battery Energy Storage
- Rapid charging and discharging
- Durable
- Safety tested
- Certified

APT1-3800		Note Page 3
Rated capacitance ( $C_R$ )	3800 F (+5%/-0%)	5
Equivalent Series Resistance (ESR)	0.45 mΩ (+/- 0.15)	
Rated voltage (Vr)	2.7 V	
Surge voltage ( $V_s$ )	2.85 V	1
Max energy (E <sub>max</sub> )	3.85 Wh	4.B
Max gravimetric energy density (Ed)	7.3 Wh/kg	4.C
Max volumetric energy density ( $E_v$ )	9.9 Wh/L	4.D
Nominal max power density (Pd)	8.7 kW/kg	4.A
Peak current (I <sub>P</sub> )	2.0 kA	3
Leakage current (I)	5-15 mA	2
Operating temperature range	-30 to +65 °C	
Storage temperature range	-30 to +65 °C	
Cycle Life	>1,000,000	6



The intellectual and technical concepts contained herein are proprietary to Atlas Power Technologies Inc. and its suppliers, if any, and may be protected by patents, pending patents, and by trade secret and/or copyright law. Unless expressly indicated to the contrary, product dimensions are for reference only. Parameters may change without notice. Please contact Atlas Power Technologies Inc. directly for any technical specifications critical to application via info@atlaspower.ca

Atlas Power Technologies Inc. 31633 Marshall Rd Abbotsford, B.C. Canada, V2T 6B2 604-776-1111 Info@atlaspower.ca



# **DATASHEET** 2.7V 3800F SUPERCAPACITOR

## **Physical Specifications**

APT1-3800		
Mass	525 g (+/- 2%)	
Volume	390.2 ml	
Diameter	60 mm	
Length	138 mm	
Terminal to Terminal Length	166 mm	
Terminal diameter	1.75 mm	
Terminal length	14 mm	



# **Safety & Certification**





The intellectual and technical concepts contained herein are proprietary to Atlas Power Technologies Inc. and its suppliers, if any, and may be protected by patents, pending patents, and by trade secret and/or copyright law. Unless expressly indicated to the contrary, product dimensions are for reference only. Parameters may change without notice. Please contact Atlas Power Technologies Inc. directly for any technical specifications critical to application via **info@atlaspower.ca** 

Atlas Power Technologies Inc. 31633 Marshall Rd Abbotsford, B.C. Canada, V2T 6B2 604-776-1111 Info@atlaspower.ca



# **DATASHEET** 2.7V 3800F SUPERCAPACITOR

## Notes

#### 1. Surge Voltage (V₅)

Maximum voltage that a supercapacitor can withstand without being damaged. Duration must not exceed **1 second.** 

#### 2. Leakage Current (I = Vr / R )

Small current that flows in the device to keep it fully charged in its fully charged state.

Leakage current is quantified using  $\ensuremath{\textit{Ohm's Law:}}$ 

• Where I<sub>i</sub> is leakage current (A); Vr is voltage across the supercapacitor (V); and **R** is the equivalent leakage resistance of the supercapacitor ( $\Omega$ ).

#### 3. Peak Current ( $I_P = (1/2 V_r) / (\Delta t / C_R + ESR)$ ) The current required to discharge a cell from rated voltage to half rated voltage within 1 second.

- Where I<sub>P</sub> is the maximum peak current (A);
- Vr is the rated voltage (V); Δt is the discharge time (sec) (in this case, **1 sec**); C<sub>R</sub> is the rated capacitance (F);
- **ESR** is the equivalent series resistance ( $\Omega$ ).

#### 4. Energy and Power

A. Nominal max power density (P<sub>4</sub>) specifies the optimization of power transfer between the supercapacitor and the load by matching the impedance characteristics. (Based on IEC 62391-2)

#### $P_a$ (W/kg) = Vr<sup>2</sup> / (4 × ESR × Mass)

**B. Maximum stored Energy (E**<sub>max</sub>) describes the maximum amount of electrical energy stored within the supercapacitor under optimal operating conditions. (Based on IEC 62391-2)  $E_{max}$  (Wh) = (0.5 × C<sub>R</sub> × Vr<sup>2</sup>) / 3600

Where,  $V_r$  is the rated voltage (V); **m** is the typical mass (kg);  $C_R$  is the rate capacitance (F).

C. Gravimetric Specific Energy (E₄) refers to the amount of electrical energy stored per unit mass of the supercapacitor. (Based on IEC 62391-2) E₄ (Wh/kg) = Emax / Mass

**D. Volumetric Specific Energy (E**<sub>v</sub>) refers to the amount of electrical energy stored per unit volume of the supercapacitor.  $E_v$  (Wh/L) =  $E_{max}$  / Volume 5. Rate Capacitance ( $C_R$ ) and ESR

 $V_1 = V_r$ t<sub>2</sub> - t<sub>1</sub> = 15 seconds  $C_R = I \times (t_3 - t_2) / (V_2 - V_3)$  $V_3 = 0.5 \times V_r$ t<sub>4</sub> - t<sub>3</sub> = 5 seconds ESR = (V\_4 - V\_3) / I I = 4 × C\_R × V\_r

Graph 1: Capacitance and ESR Measurement Profile



### 6. Beginning of Life, End of Life Conditions, and Projected Life Span

- **Beginning of Life:** Defined when the cell capacitance and ESR match the values specified in the datasheet.
- End of Life: Defined when either of the following conditions is met (whichever occurs first):
  - i. The capacitance falls below **80%** of the rated capacitance **(C**<sub>R</sub>).
  - ii. The ESR increases above **200%** of the rated ESR.



The intellectual and technical concepts contained herein are proprietary to Atlas Power Technologies Inc. and its suppliers, if any, and may be protected by patents, pending patents, and by trade secret and/or copyright law. Unless expressly indicated to the contrary, product dimensions are for reference only. Parameters may change without notice. Please contact Atlas Power Technologies Inc. directly for any technical specifications critical to application via info@atlaspower.ca

Atlas Power Technologies Inc. 31633 Marshall Rd Abbotsford, B.C. Canada, V2T 6B2 604-776-1111 Info@atlaspower.ca