## FEATURES AND BENEFITS
- Up to 500,000 duty cycles or 10 year DC life*
- Low internal resistance
- High power density
- -40° to 85°C operating temperature range

## TYPICAL APPLICATIONS
- Back-up power for cache to flash applications
- Smart Meters
- Automotive subsystems
- Consumer and industrial electronics
- Wireless transmitters

### PRODUCT SPECIFICATIONS

#### ELECTRICAL
- **Rated Voltage**: 2.7 V
- **Minimum Capacitance, initial**, rated value: 17.6 F
- **Maximum Capacitance, initial**: 26.4 F
- **Maximum ESR, initial**, rated value (100 msec): 45 mΩ
- **Leakage Current at 25°C, maximum**: 0.055 mA
- **Absolute Maximum Voltage**: 2.85 V
- **Absolute Maximum Current**: 15 A

#### POWER & ENERGY
- **Minimum Usable Specific Power**: 2,991 W/kg
- **Minimum Impedance Match Specific Power**: 6,231 W/kg
- **Minimum Specific Energy**: 2.7 Wh/kg
- **Minimum Stored Energy**: 0.018 Wh

#### SAFETY
- **Short Circuit Current, typical**: 60 A
- **Certifications**: UL810a, RoHS

#### PHYSICAL
- **Mass, typical**: 6.5 g
- **Terminals**: Wire Leads

### TYPICAL CHARACTERISTICS

#### TEMPERATURE
- **Operating temperature range** (Cell case temperature)
  - **Minimum**
  - **Maximum**: 65°C

#### THERMAL
- **Thermal Resistance (R\text{ca}, Case to Ambient), typical**: 37°C/W
- **Thermal Capacitance (C\text{th}), typical**: 5.8 J/°C
- **Maximum Continuous Current, (ΔT = 15°C)\text{BOL}**: 2.6 A\text{RMS}
- **Maximum Continuous Current, (ΔT = 40°C)\text{BOL}**: 4.2 A\text{RMS}

#### LIFE*
- **DC Life at High Temperature**\text(BOL)
  - **1,000 hours**
  - **Capacitance Change**: 30%
  - **ESR Change**: 100%
- **Projected DC Life at 25°C**\text(BOL)
  - **10 years**
  - **Capacitance Change**: 30%
  - **ESR Change**: 100%
- **Projected Cycle Life at 25°C**\text(BOL)
  - **500,000 cycles**
  - **Capacitance Change**: 30%
  - **ESR Change**: 100%
- **Shelf Life**
  - **2 years**

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*Results may vary. Additional terms and conditions, including the limited warranty, apply at the time of purchase. See the warranty details for applicable operating and use requirements.
1. **Surge Voltage**
   Absolute maximum voltage, non-repetitive. Duration not to exceed 1 second.

2. **“Typical” values** represent mean values of production sample.

3. **Capacitance and ESR** measured using 100 A test current at 25°C per document number 1007239 available at maxwell.com.

4. **Maximum Leakage Current**
   - Current measured after 72 hrs at rated voltage and 25°C. Initial leakage current can be higher.
   - If applicable, module leakage current is the sum of cell and balancing circuit leakage currents.

5. **Maximum Peak Current**
   - Current needed to discharge cell/module from rated voltage to half-rated voltage in 1 second.
   \[ I = \frac{1/2V}{\Delta t \cdot C + ESR} \]
   where \( \Delta t \) is the discharge time (sec); \( \Delta t = 1 \, \text{sec} \) in this case.

6. **Energy & Power (Based on IEC 62391-2)**
   - **Maximum Stored Energy**, \( E_{\text{max}} \) (Wh) = \( \frac{1/2CV}{100} \)
   - **Gravimetric Specific Energy** (Wh/kg) = \( \frac{E_{\text{max}}}{\text{mass}} \)

7. **Cycle Life Test Profile**
   Cycle life varies depending upon application-specific characteristics. Actual results will vary.

8. **Temperature Rise at Constant Current**
   \[ \Delta T = \frac{I_{\text{max}}^2}{R_{\text{th}}} \cdot 0.25V \]
   where \( \Delta T \): Temperature rise over ambient (°C)
   \( I_{\text{max}} \): Maximum continuous or RMS current (A)
   \( R_{\text{th}} \): Thermal resistance, cell to ambient (°C/W)
   \( ESR_{\text{max}} \): Rated (Max.) ESR (Ω)
   (Note: Design should consider EOL ESR for application temperature rise evaluation.)

9. **Per United Nations material classification UN3499, all Maxwell ultracapacitors have less than 10 Wh capacity to meet the requirements of Special Provisions 361. Both individual ultracapacitors and modules composed of those ultracapacitors shipped by Maxwell can be transported without being treated as dangerous goods (hazardous materials) under transportation regulations.**

10. **BOL: Beginning of Life, rated initial product performance**
    - **Capacitance**: 80% of min. BOL rating
    - **ESR**: 2x max. BOL rating

### Part Description

<table>
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<th>Part Description</th>
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<th>d (mm)</th>
<th>F (mm)</th>
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Product dimensions are for reference only unless otherwise identified. Product dimensions and specifications may change without notice. Please contact Maxwell Technologies directly for any technical specifications critical to application. Products and related processes may be covered by one or more U.S. or international patents and pending applications. Please see www.maxwell.com/patents for more information.

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