

2.7V 22F ULTRACAPACITOR CELL

BCAP0022 P270 T01

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 ³ , rated value	17.6 F
Maximum Capacitance, initial	26.4 F
Maximum ESR _{DC} , initial ³ , rated value (100 msec)	45 mΩ
Leakage Current at 25°C, maximum ⁴	0.055 mA
Absolute Maximum Voltage ¹	2.85 V
Absolute Maximum Current ⁵	15 A

POWER & ENERGY

Minimum Usable Specific Power ⁶	2,991 W/kg
Minimum Impedance Match Specific Power ⁶	6,231 W/kg
Minimum Specific Energy ⁶	2.7 Wh/kg
Minimum Stored Energy ^{6,9}	0.018 Wh

SAFETY

Short Circuit Current, typical (Current possible with short circuit from rated voltage. Do not use as an operating current.)	60 A
Certifications	UL810a, RoHS

PHYSICAL

Mass, typical	6.5 g
Terminals	Wire Leads

TYPICAL CHARACTERISTICS

TEMPERATURE

Operating temperature range (Cell case temperature)	
Minimum	-40°C
Maximum	65°C

THERMAL

Thermal Resistance (R _{ca} , Case to Ambient), typical ^{2,8}	37°C/W
Thermal Capacitance (C _{th}), typical ²	5.8 J/°C
Maximum Continuous Current, (ΔT = 15°C) ^{8,10} (BOL)	2.6 A _{RMS}
Maximum Continuous Current, (ΔT = 40°C) ^{8,10} (BOL)	4.2 A _{RMS}

LIFE*

DC Life at High Temperature ^{3,10} (held continuously at Rated Voltage & Maximum Operating Temperature)	1,000 hours
Capacitance Change (% decrease from rated value)	30%
ESR Change (% increase from rated value)	100%
Projected DC Life at 25°C ^{3,10} (held continuously at Rated Voltage)	10 years
Capacitance Change (% decrease from rated value)	30%
ESR Change (% increase from rated value)	100%
Projected Cycle Life at 25°C ^{3,7,10}	500,000 cycles
Capacitance Change (% decrease from rated value)	30%
ESR Change (% increase from rated value)	100%
Shelf Life (Stored uncharged at 25°C, <50% RH)	2 years

*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.

DATASHEET: 2.7V 22F ULTRACAPACITOR CELL

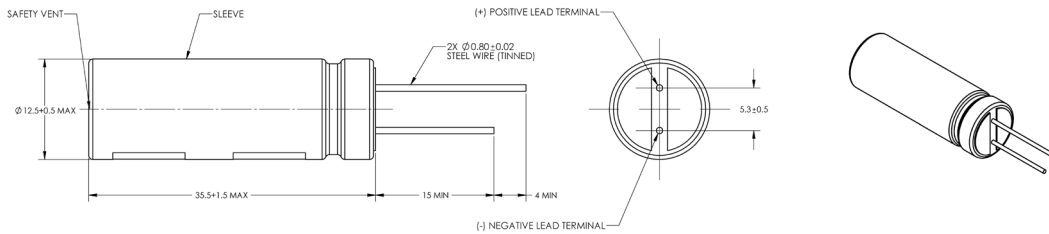
- Surge Voltage**
Absolute maximum voltage, non-repetitive. Duration not to exceed 1 second.
- “Typical” values represent mean values of production sample.
- Capacitance and ESR_{DC} measured using 100 A test current at 25°C per document number 1007239 available at maxwell.com.
- Maximum Leakage Current**
 - 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.
- Maximum Peak Current**
 - Current needed to discharge cell/module from rated voltage to half-rated voltage in 1 second.
$$I = \frac{\frac{1}{2}V_R}{\Delta t / C + ESR_{DC}}$$

where Δt is the discharge time (sec); $\Delta t = 1$ sec in this case.

 - The stated maximum peak current should not be used in normal operation and is only provided as a reference value.
- Energy & Power (Based on IEC 62391-2)**
 - Maximum Stored Energy, $E_{max}(Wh) = \frac{\frac{1}{2}CV_R^2}{3,600}$
 - Gravimetric Specific Energy (Wh/kg) = $\frac{E_{max}}{mass}$

- Usable Specific Power (W/kg) = $\frac{0.12V_R^2}{ESR_{DC} \times mass}$
 - Impedance Match Specific Power (W/kg) = $\frac{0.25V_R^2}{ESR_{DC} \times mass}$
 - Presented Power and Energy values are calculated based on Rated Capacitance & Rated (Max.) ESR_{DC} , Initial values.
- Cycle Life Test Profile**
Cycle life varies depending upon application-specific characteristics. Actual results will vary.
 - Temperature Rise at Constant Current**
 - $\Delta T = I_{RMS}^2 \times ESR_{DC} \times R_{th}$
 - where ΔT : Temperature rise over ambient (°C)
 - I_{RMS} : Maximum continuous or RMS current (A)
 - R_{th} : Thermal resistance, cell to ambient (°C/W)
 - ESR_{DC} : Rated (Max.) $ESR_{DC}(\Omega)$.
 - (Note: Design should consider EOL ESR_{DC} for application temperature rise evaluation.)
 - 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.
 - BOL: Beginning of Life, rated initial product performance**
EOL: End of Life criteria.
 - Capacitance: 80% of min. BOL rating
 - ESR_{DC} : 2x max. BOL rating

BCAP0022 P270 T01



Part Description	Dimensions (mm)				Package Quantity
	L	D	d	F	
BCAP0022 P270 T01	35.5	12.5	0.8	5.3	1,500

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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