

# 160V ULTRACAPACITOR MODULE

## FEATURES AND BENEFITS

- Up to 10 year DC life\*
- 160V DC working voltage
- Resistive cell balancing
- Compact, light weight package
- Screw terminals

## TYPICAL APPLICATIONS

- Wind turbine pitch control
- Small UPS systems
- Small industrial systems



## PRODUCT SPECIFICATIONS

ELECTRICAL	BMOD0006 E160 B02
Rated Capacitance <sup>1</sup>	5.8 F
Minimum Capacitance, initial <sup>1</sup>	5.8 F
Maximum Capacitance, initial <sup>1</sup>	7 F
Maximum ESR <sub>DC</sub> , initial <sup>1</sup>	240 mΩ
Test Current for Capacitance and ESR <sub>DC</sub> <sup>1</sup>	35 A
Rated Voltage	160 V
Absolute Maximum Voltage <sup>2</sup>	170 V
Absolute Maximum Current	170 A
Leakage Current at 25°C, maximum <sup>3</sup>	25 mA
Maximum Series Voltage	750 V
Capacitance of Individual Cells <sup>9</sup>	350 F
Maximum Stored Energy, Individual Cell <sup>9</sup>	0.35 Wh
Number of Cells	60
TEMPERATURE	
Operating Temperature (Cell Case Temperature)	
Minimum	-40°C
Maximum	65°C
Storage Temperature (Stored Uncharged)	
Minimum	-40°C
Maximum	70°C

\*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.

## PRODUCT SPECIFICATIONS (Cont'd)

PHYSICAL	BMOD0006 E160 B02
Mass, typical	5.2 kg
Power Terminals	M5 Thread
Recommended Torque - Terminal	4 Nm
Vibration Specification	IEC60068-2-6
Shock Specification	IEC60068-2-27,-29
Environmental Protection	IP54
Cooling	Natural Convection
MONITORING / CELL VOLTAGE MANAGEMENT	
Internal Temperature Sensor	N/A
Temperature Interface	N/A
Cell Voltage Monitoring	Voltage Center Tap
Connector	M4
Cell Voltage Management	Passive
POWER & ENERGY	
Usable Specific Power, $P_d^4$	2,500 W/kg
Impedance Match Specific Power, $P_{max}^5$	5,100 W/kg
Specific Energy, $E_{max}^6$	4 Wh/kg
Stored Energy, $E_{stored}^7$	21 Wh
SAFETY	
Short Circuit Current, typical (Current possible with short circuit from rated voltage. Do not use as an operating current.)	670 A
Certifications	RoHS
High-Pot Capability <sup>10</sup>	5,600 VDC

## TYPICAL CHARACTERISTICS

### THERMAL CHARACTERISTICS

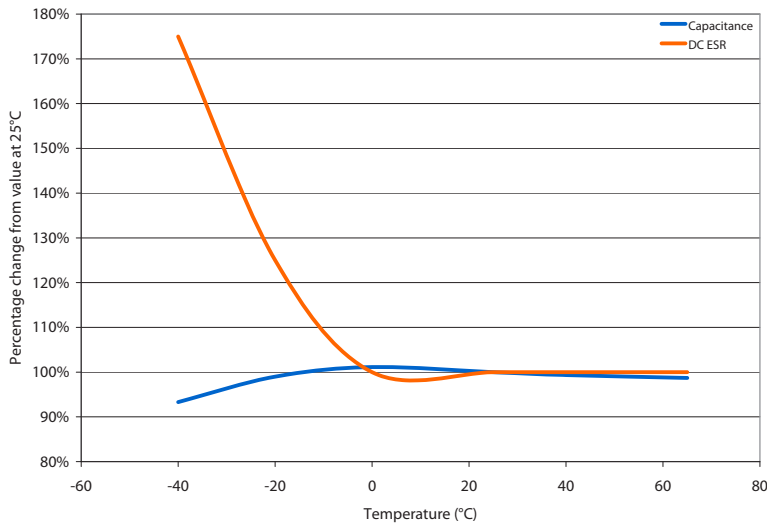
**BMOD0006 E160 B02**

Thermal Resistance ( $R_{ca}$ , All Cell Cases to Ambient), typical <sup>8</sup>	1.1°C/W
Thermal Capacitance ( $C_{th}$ ), typical	4,800 J/°C
Maximum Continuous Current ( $\Delta T = 15$ °C) <sup>8</sup>	7 A <sub>RMS</sub>
Maximum Continuous Current ( $\Delta T = 40$ °C) <sup>8</sup>	12 A <sub>RMS</sub>

### LIFE\*

<b>DC Life at High Temperature<sup>1</sup></b> (held continuously at Rated Voltage and Maximum Operating Temperature)	1,500 hours
Capacitance Change (% decrease from minimum initial value)	20%
ESR Change (% increase from maximum initial value)	100%
<b>Projected DC Life at 25°C<sup>1</sup></b> (held continuously at Rated Voltage)	10 years
Capacitance Change (% decrease from minimum initial value)	20%
ESR Change (% increase from maximum initial value)	100%
<b>Shelf Life</b> (Stored uncharged at 25°C)	4 years

## ESR AND CAPACITANCE VS TEMPERATURE

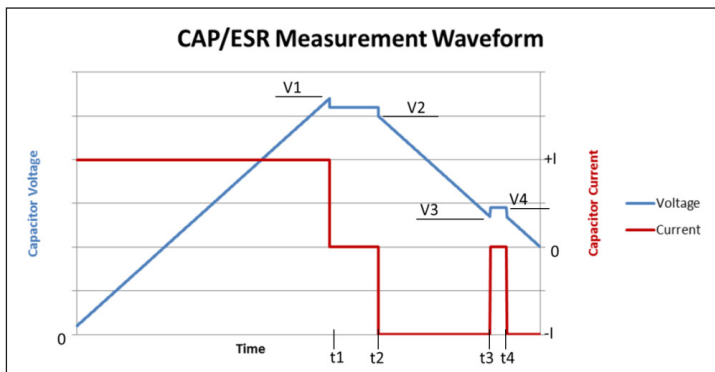


\*Results may vary. Additional terms and conditions, including the limited warranty, apply at the time of purchase. See the warranty details for applicable operating and use requirements.

## NOTES

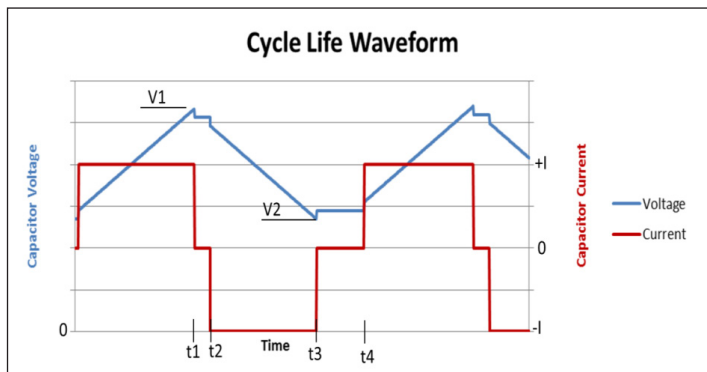
1. Capacitance and  $ESR_{DC}$  measured at 25°C using specified test current per waveform below.
2. Absolute maximum voltage, non-repeated. Not to exceed 1 second.
3. After 72 hours at rated voltage. Initial leakage current can be higher.
4. Per IEC 62391-2,  $P_d = \frac{0.12V^2}{ESR_{DC} \times \text{mass}}$
5.  $P_{\text{max}} = \frac{V^2}{4 \times ESR_{DC} \times \text{mass}}$
6.  $E_{\text{max}} = \frac{1/2 CV^2}{3,600 \times \text{mass}}$
7.  $E_{\text{stored}} = \frac{1/2 CV^2}{3,600}$

8.  $\Delta T = I_{\text{RMS}}^2 \times ESR \times R_{ca}$
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. Duration = 60 seconds. Not intended as an operating parameter.



$$V1 = V_{\text{rated}} \quad t2 - t1 = 15 \text{ seconds} \quad \text{Capacitance} = I \times (t3 - t2) / (V2 - V3)$$

$$V3 = 0.5 \times V_{\text{rated}} \quad t4 - t3 = 5 \text{ seconds} \quad \text{ESR} = (V4 - V3) / I$$



$$V1 = V_{\text{rated}} \quad t2 - t1 = 5 \text{ seconds (I=0)}$$

$$V2 = 0.5 \times V_{\text{rated}} \quad t4 - t3 = 15 \text{ seconds (I=0)}$$

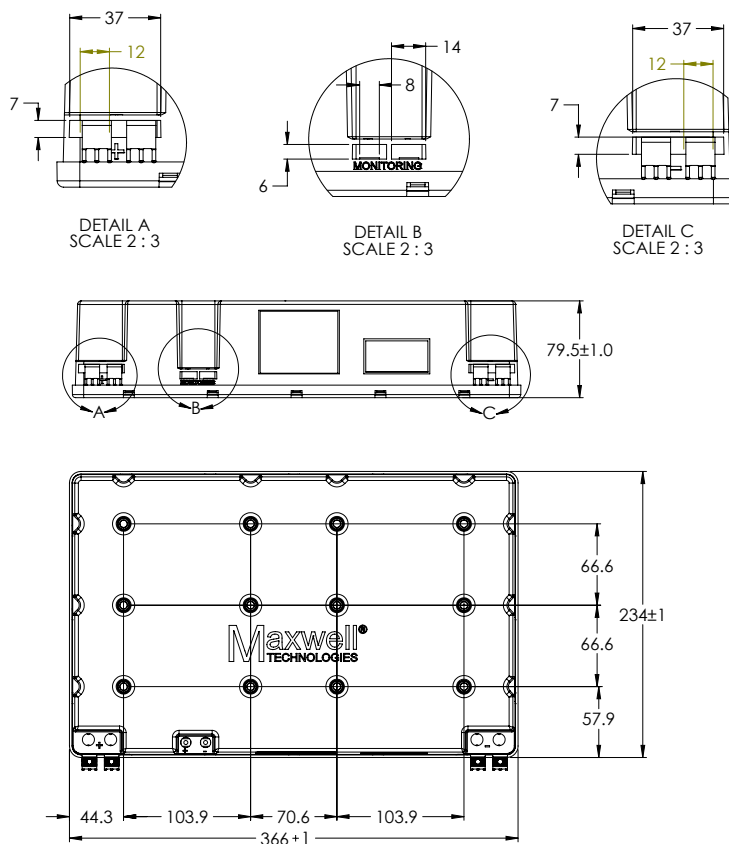
## MOUNTING RECOMMENDATIONS

Please refer to the user manual for installation recommendations.

## MARKINGS

Products are marked with the following information: Rated capacitance, rated voltage, product number, name of manufacturer, positive and negative terminal, warning marking, serial number.

## BMOD0006 E160 B02



## ORDERING INFORMATION

**Model Number** BMOD0006 E160 B02

**Package Quantity** 3

## DIMENSIONS

	MIN	TYP	MAX	UNIT
Length (L)	365.0	366.0	367.0	mm
Width (W)	233.0	234.0	235.0	mm
Height (H)	78.5	79.5	80.5	mm

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](http://www.maxwell.com/patents) for more information. Product dimensions are for reference only unless otherwise identified. Maxwell Technologies reserves the right to make changes without further notice to any products herein. "Typical" parameters which may be provided in Maxwell Technologies datasheets and/or specifications can and do vary in different applications and actual performance may vary over time. All operating parameters, including "Typicals" must be validated for each customer application by customer's technical experts. Please contact Maxwell Technologies directly for any technical specifications critical to application.

**Maxwell Technologies, Inc.**  
**Global Headquarters**  
 3888 Calle Fortunada  
 San Diego, CA 92123  
 USA  
 Tel: +1 (858) 503-3300  
 Fax: +1 (858) 503-3301

**Maxwell Technologies, GmbH**  
 Leopoldstrasse 244  
 80807 Munich  
 Germany  
 Tel: +49 (0)89 4161403 0  
 Fax: +49 (0)89 4161403 99

**Maxwell Technologies**  
**Shanghai Trading Co., Ltd.**  
 Room 1005, 1006, and 1007  
 No. 1898, Gonghexin Road,  
 Jin An District, Shanghai 2000072,  
 P.R. China  
 Tel: +86 21 3852 4000  
 Fax: +86 21 3852 4099

**Maxwell Technologies**  
**Korea Co., Ltd.**  
 17, Dongtangiheung-ro  
 681 Beon-gil, Giheung-gu,  
 Yongin-si, Gyeonggi-do 17102  
 Republic of Korea  
 Tel: +82 31 289 0721  
 Fax: +82 31 286 6767

MAXWELL TECHNOLOGIES, MAXWELL, MAXWELL CERTIFIED INTEGRATOR, ENABLING ENERGY'S FUTURE, DURABLU, NESSCAP, XP, BOOSTCAP, D CELL and their respective designs and/or logos are either trademarks or registered trademarks of Maxwell Technologies, Inc., and/or its affiliates, and may not be copied, imitated or used, in whole or in part, without the prior written permission Maxwell Technologies, Inc. All contents copyright © 2019 Maxwell Technologies, Inc. All rights reserved. No portion of these materials may be reproduced in any form, or by any means, without prior written permission from Maxwell Technologies, Inc.