### FEATURES AND BENEFITS*
- Up to 1,000,000 duty cycles or 10 year DC life
- 48V DC working voltage
- Active cell balancing
- Temperature output
- Overvoltage outputs available
- High power density

### TYPICAL APPLICATIONS
- Hybrid vehicles
- Rail
- Heavy industrial equipment
- UPS systems

### PRODUCT SPECIFICATIONS

#### ELECTRICAL

<table>
<thead>
<tr>
<th>Specification</th>
<th>BMOD0083 P048 B01</th>
<th>BMOD0165 P048 BXX</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated Capacitance</td>
<td>83 F</td>
<td>165 F</td>
</tr>
<tr>
<td>Minimum Capacitance, initial</td>
<td>83 F</td>
<td>165 F</td>
</tr>
<tr>
<td>Maximum Capacitance, initial</td>
<td>100 F</td>
<td>200 F</td>
</tr>
<tr>
<td>Maximum ESR&lt;sub&gt;dc&lt;/sub&gt;, initial</td>
<td>10 mΩ</td>
<td>6.3 mΩ</td>
</tr>
<tr>
<td>Test Current for Capacitance and ESR&lt;sub&gt;dc&lt;/sub&gt;</td>
<td>100 A</td>
<td>100 A</td>
</tr>
<tr>
<td>Rated Voltage</td>
<td>48 V</td>
<td>48 V</td>
</tr>
<tr>
<td>Absolute Maximum Voltage</td>
<td>51 V</td>
<td>51 V</td>
</tr>
<tr>
<td>Absolute Maximum Current</td>
<td>1,150 A</td>
<td>1,900 A</td>
</tr>
<tr>
<td>Leakage Current at 25°C, maximum</td>
<td>3.0 mA</td>
<td>5.2 mA</td>
</tr>
<tr>
<td>Maximum Series Voltage</td>
<td>750 V</td>
<td>750 V</td>
</tr>
<tr>
<td>Capacitance of Individual Cells</td>
<td>1,500 F</td>
<td>3,000 F</td>
</tr>
<tr>
<td>Stored Energy, Individual Cell</td>
<td>1.5 Wh</td>
<td>3.0 Wh</td>
</tr>
<tr>
<td>Number of Cells</td>
<td>18</td>
<td>18</td>
</tr>
</tbody>
</table>

#### TEMPERATURE

<table>
<thead>
<tr>
<th>Specification</th>
<th>BMOD0083 P048 B01</th>
<th>BMOD0165 P048 BXX</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating Temperature (Cell Case Temperature)</td>
<td>-40°C</td>
<td>-40°C</td>
</tr>
<tr>
<td>Maximum</td>
<td>65°C</td>
<td>65°C</td>
</tr>
<tr>
<td>Storage Temperature (Stored Uncharged)</td>
<td>-40°C</td>
<td>-40°C</td>
</tr>
<tr>
<td>Maximum</td>
<td>70°C</td>
<td>70°C</td>
</tr>
</tbody>
</table>

*Results may vary. Additional terms and conditions, including the limited warranty, apply at the time of purchase. See the warranty details and enclosed information for applicable operating and use requirements.
## PRODUCT SPECIFICATIONS (Cont’d)

### PHYSICAL

<table>
<thead>
<tr>
<th></th>
<th>BMOD0083 B01</th>
<th>BMOD0165 BXX</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mass, typical</td>
<td>10.3 kg</td>
<td>13.5 kg</td>
</tr>
<tr>
<td>Power Terminals</td>
<td>M8/M10</td>
<td>M8/M10</td>
</tr>
<tr>
<td>Recommended Torque - Terminal</td>
<td>20/30 Nm</td>
<td>20/30 Nm</td>
</tr>
<tr>
<td>Vibration Specification</td>
<td>SAE J2380</td>
<td>SAE J2380</td>
</tr>
<tr>
<td>Shock Specification</td>
<td>SAE J2464</td>
<td>SAE J2464</td>
</tr>
<tr>
<td>Environmental Protection</td>
<td>IP65</td>
<td>IP65</td>
</tr>
<tr>
<td>Cooling</td>
<td>Natural Convection</td>
<td>Natural Convection</td>
</tr>
</tbody>
</table>

### MONITORING / CELL VOLTAGE MANAGEMENT

<table>
<thead>
<tr>
<th></th>
<th>BMOD0083 B01</th>
<th>BMOD0165 BXX</th>
</tr>
</thead>
<tbody>
<tr>
<td>Internal Temperature Sensor</td>
<td>NTC Thermistor</td>
<td>NTC Thermistor</td>
</tr>
<tr>
<td>Temperature Interface</td>
<td>Analog</td>
<td>Analog</td>
</tr>
<tr>
<td>Cell Voltage Monitoring</td>
<td>Overvoltage Alarm</td>
<td>Overvoltage Alarm</td>
</tr>
<tr>
<td>Connector</td>
<td>Deutsch DTM</td>
<td>Deutsch DTM</td>
</tr>
<tr>
<td>Cell Voltage Management</td>
<td>VMS 2.0</td>
<td>VMS 2.0</td>
</tr>
</tbody>
</table>

### POWER & ENERGY

<table>
<thead>
<tr>
<th></th>
<th>BMOD0083 B01</th>
<th>BMOD0165 BXX</th>
</tr>
</thead>
<tbody>
<tr>
<td>Usable Specific Power, $P_d$</td>
<td>2,700 W/kg</td>
<td>3,300 W/kg</td>
</tr>
<tr>
<td>Impedance Match Specific Power, $P_{\text{max}}$</td>
<td>5,600 W/kg</td>
<td>6,800 W/kg</td>
</tr>
<tr>
<td>Specific Energy, $E_{\text{max}}$</td>
<td>2.6 Wh/kg</td>
<td>3.9 Wh/kg</td>
</tr>
<tr>
<td>Stored Energy</td>
<td>27 Wh</td>
<td>53 Wh</td>
</tr>
</tbody>
</table>

### SAFETY

<table>
<thead>
<tr>
<th></th>
<th>BMOD0083 B01</th>
<th>BMOD0165 BXX</th>
</tr>
</thead>
<tbody>
<tr>
<td>Short Circuit Current, typical</td>
<td>4,800 A</td>
<td>7,600 A</td>
</tr>
<tr>
<td>(Current possible with short circuit from rated voltage. Do not use as an operating current.)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Certifications</td>
<td>RoHS</td>
<td>UL810a (B01 &amp; B06 only, 150 Volts)</td>
</tr>
<tr>
<td>High-Pot Capability$^{12}$</td>
<td>2,500 VDC</td>
<td>2,500 VDC</td>
</tr>
</tbody>
</table>

---

*The information is subject to change without notice.*
## TYPICAL CHARACTERISTICS

### THERMAL CHARACTERISTICS

<table>
<thead>
<tr>
<th></th>
<th>BMOD0083 B01</th>
<th>BMOD0165 BXX</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thermal Resistance ($R_{\text{ca}}$, All Cell Cases to Ambient), typical</td>
<td>0.40°C/W</td>
<td>0.40°C/W</td>
</tr>
<tr>
<td>Thermal Capacitance ($C_{\theta s}$), typical</td>
<td>7,700 J/°C</td>
<td>13,000 J/°C</td>
</tr>
<tr>
<td>Maximum Continuous Current ($\Delta T = 15 , ^\circ C$)</td>
<td>61 A, RMS</td>
<td>77 A, RMS</td>
</tr>
<tr>
<td>Maximum Continuous Current ($\Delta T = 40 , ^\circ C$)</td>
<td>100 A, RMS</td>
<td>130 A, RMS</td>
</tr>
</tbody>
</table>

### LIFE

**DC Life at High Temperature**

- (held continuously at Rated Voltage and Maximum Operating Temperature)
  - 1,500 hours
  - 1,500 hours

<table>
<thead>
<tr>
<th></th>
<th>BMOD0083 B01</th>
<th>BMOD0165 BXX</th>
</tr>
</thead>
<tbody>
<tr>
<td>Capacitance Change (% decrease from minimum initial value)</td>
<td>20%</td>
<td>20%</td>
</tr>
<tr>
<td>ESR Change (% increase from maximum initial value)</td>
<td>100%</td>
<td>100%</td>
</tr>
</tbody>
</table>

**Projected DC Life at 25°C**

- (held continuously at Rated Voltage)
  - 10 years
  - 10 years

<table>
<thead>
<tr>
<th></th>
<th>BMOD0083 B01</th>
<th>BMOD0165 BXX</th>
</tr>
</thead>
<tbody>
<tr>
<td>Capacitance Change (% decrease from minimum initial value)</td>
<td>20%</td>
<td>20%</td>
</tr>
<tr>
<td>ESR Change (% increase from maximum initial value)</td>
<td>100%</td>
<td>100%</td>
</tr>
</tbody>
</table>

**Projected Cycle Life at 25°C**

- 1,000,000 cycles
  - 1,000,000 cycles

<table>
<thead>
<tr>
<th></th>
<th>BMOD0083 B01</th>
<th>BMOD0165 BXX</th>
</tr>
</thead>
<tbody>
<tr>
<td>Capacitance Change (% decrease from minimum initial value)</td>
<td>20%</td>
<td>20%</td>
</tr>
<tr>
<td>ESR Change (% increase from maximum initial value)</td>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td>Test Current</td>
<td>100 A</td>
<td>100 A</td>
</tr>
</tbody>
</table>

**Shelf Life**

- (Stored uncharged at 25°C)
  - 4 years
  - 4 years
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. $E_{\text{max}} = \frac{\frac{1}{2} CV^2}{3,600 \times \text{mass}}$

7. $E_{\text{stored}} = \frac{\frac{1}{2} CV^2}{3,600}$

8. $\Delta T = I_{\text{RMS}}^2 \times ESR \times R_{\text{ca}}$

9. Cycle using specified test current per waveform below.

10. Cycle life varies depending upon application-specific characteristics. Actual results will vary.

11. 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.

12. Duration = 60 seconds. Not intended as an operating parameter.
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.

BMOD0083 P048 B01

<table>
<thead>
<tr>
<th>Part Description</th>
<th>L (max)</th>
<th>Dimensions (mm)</th>
<th>Package Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>BMOD0083 P048 B01</td>
<td>418</td>
<td>194 126 106</td>
<td>1</td>
</tr>
</tbody>
</table>

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.
### BMOD0165 P048 BXX

**Part Description**

- **Dimensions (mm)**
  - L (max)
  - W (max)
  - H1 (max)
  - H2 (max)

| BMOD0165 P048 BXX* | 418 | 194 | 179 | 157 | 1 |

*Refer to user manual for product variant details.

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. All products featured on this datasheet are covered by the following U.S. patents and their respective foreign counterparts: 6643119, 7180726, 7342770, 7352558, 7384433, 7440258, 7492571, 7508651, 7580243, 7791860, 7816891, 7859826, 7883553, 7935155, 807234, 8098481, 8279580, and patents pending.

---

**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 SA**
Route de Montena 65
CH-1728 Rossens
Switzerland
Tel: +41 (0)26 411 85 00
Fax: +41 (0)26 411 85 05

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

**Maxwell Technologies Shanghai Trading Co. Ltd.**
Unit A2, C 12th Floor
Huarun Times Square
500 Zhangyang Road,
Pudong New Area
Shanghai 200122,
P.R. China
Phone: +86 21 3852 4000
Fax: +86 21 3852 4099

**Maxwell Technologies Korea, Ltd.**
Room 1524, D-Cube City
Office Tower, 15F #662
Gyeongin-Ro, Guro-Gu,
Seoul, 152-706
South Korea
Phone: +82 10 4518 9829