

# 2.7V 360F

BCAP0360 P270 S18  
ESHSR-0360C0-002R7A1

# Datasheet

## FEATURES

- High performance product with low ESR
- Exceptional shock and vibration resistance
- Long lifetimes with up to 500,000 duty cycles\*
- Compliant with UL, RoHS, and REACH requirements
- Recommended Application:  
Wind Turbine Pitch Control, Automotive, UPS System, Actuators, Emergency Lighting, Telematics, Security Equipment, Backup System, and Others

## ELECTRICAL SPECIFICATIONS

Rated Voltage, $V_R$		<b>2.7 VDC</b>
Surge Voltage <sup>1</sup>		2.85 VDC
Rated Capacitance, $C^2$		<b>360 F</b>
Capacitance Tolerance	Min. / Max.	0% / +20%
	Average <sup>4</sup>	+5% / +10%
Initial DC-ESR, $R_{DC}^3$	Max.	3.2 mΩ
	Average <sup>4</sup>	<b>2.9 mΩ</b>
Maximum Leakage Current <sup>5</sup>		0.75 mA
Maximum Peak Current, Non-repetitive <sup>6</sup>		220 A

## TYPICAL LIFETIME CHARACTERISTICS\*

Projected DC Life at Room Temperature <sup>8</sup> (Continuous charging at $V_R$ and $25 \pm 10^\circ\text{C}$ )	10 years
DC Life at Standard High Temperature <sup>8</sup> (Continuous charging at $V_R$ and $65^\circ\text{C}$ )	1,500 hours
DC Life at De-Rated Voltage & Higher Temp. <sup>8</sup> (Continuous charging at 2.3V and $85^\circ\text{C}$ )	1,000 hours
Projected Cycle Life at Room Temperature <sup>8</sup> (Constant current charge-discharge from $V_R$ to $1/2V_R$ at $25 \pm 10^\circ\text{C}$ )	500,000 cycles
Shelf Life (Stored without charge at $25 \pm 10^\circ\text{C}$ )	4 years

## TYPICAL THERMAL CHARACTERISTICS

Thermal Resistance, $R_{th}$ (Housing)	8.8 $^\circ\text{C}/\text{W}$
Thermal Capacitance, $C_{th}$	75.6 $\text{J}/^\circ\text{C}$
Usable Continuous Current ( $\Delta T = 15^\circ\text{C}$ ) <sup>9</sup>	23 A
Usable Continuous Current ( $\Delta T = 40^\circ\text{C}$ ) <sup>9</sup>	38 A

## DIMENSION & WEIGHT

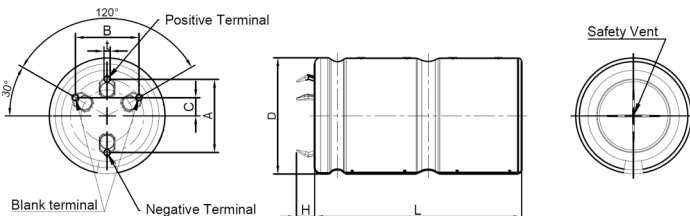
D (+1.0)	35.0 mm	L ( $\pm 1.0$ )	63.0 mm
H ( $\pm 0.1$ )	5.6 mm	t ( $\pm 0.05$ )	1.5 mm
A ( $\pm 0.1$ )	22.5 mm	B ( $\pm 0.1$ )	19.5 mm
C ( $\pm 0.1$ )	5.6 mm		
Nominal Weight			71.4 g

## SAFETY & ENVIRONMENTAL

RoHS & REACH & UL	Compliant
-------------------	-----------



See Note on Mounting Recommendations<sup>10</sup>



Recommended PCB pattern hole size : 2.0( $\pm 0.1$ )mm

## OPERATING ENVIRONMENT / POWER & ENERGY

Operating Temperature Range	Standard (-40°C to 65°C)		Extended (-40°C to 85°C)	
Maximum Stored Energy, $E_{max}^7$	at 2.7V	0.36 Wh	at 2.3V	0.26 Wh
Gravimetric Specific Energy <sup>7</sup>	at 2.7V	5.1 Wh/kg	at 2.3V	3.7 Wh/kg
Usable Specific Power <sup>7</sup>	at 2.7V	3.8 kW/kg	at 2.3V	2.7 kW/kg
Impedance Match Specific Power <sup>7</sup>	at 2.7V	7.9 kW/kg	at 2.3V	5.7 kW/kg

\*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.

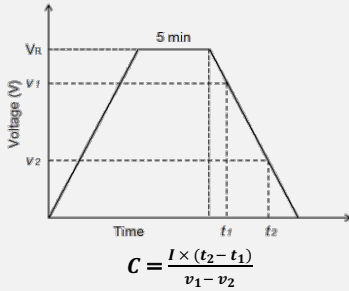
### NOTE

#### 1. Surge Voltage

Absolute maximum voltage, non-repetitive. The duration must not exceed 1 second.

#### 2. Rated Capacitance (Measurement Method)

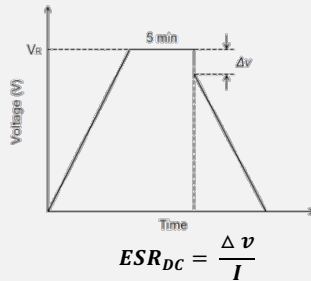
- > Constant current charge with 10 mA per farad to  $V_R$ .  
e.g. In case of 2.7V 360F cell,  $10 * 360 = 3,600 \text{ mA} = 3.6 \text{ A}$
- > Constant voltage charge at  $V_R$  for 5 min.
- > Constant current discharge with 10 mA per farad to 0.1V.



where  $C$  is the capacitance (F);  
 $I$  is the absolute value of the discharge current (A);  
 $v_1$  is the measurement starting voltage,  $0.8 \times V_R$  (V);  
 $v_2$  is the measurement end voltage,  $0.4 \times V_R$  (V);  
 $t_1$  is the time from discharge start to reach  $v_1$  (s);  
 $t_2$  is the time from discharge start to reach  $v_2$  (s)

#### 3. Initial DC-ESR (Measurement Method)

- > Constant current charge with 10 mA per farad to  $V_R$ .
- > Constant voltage charge at  $V_R$  for 5 min.
- > Constant current discharge with  $40 * C * V_R$  [mA] to 0.1V.  
e.g. In case of 2.7V 360F cell,  $40 * 360 * 2.7 = 38,880 \text{ mA} = 38.9 \text{ A}$



where  $ESR_{DC}$  is the DC-ESR ( $\Omega$ );  
 $\Delta v$  is the voltage drop during first 10ms of discharge (V);  
 $I$  is the absolute value of the discharge current (A)

#### 4. Average

- > Typical percentage spread that may be present in one shipment.

#### 5. Maximum Leakage Current (Measurement Method)

- > The capacitor is charged to its rated voltage  $V_R$  at 25°C.
- > Leakage current is the amount of current measured after 72 hours of continuous holding of the capacitor at  $V_R$ .

#### 6. Maximum Peak Current

- > Current that can be used for 1-second discharging from the rated voltage to the half-rated voltage under the constant current discharging mode.

$$I = \frac{\frac{1}{2}V_R}{\Delta t / C + ESR_{DC}}$$

where  $I$  is the maximum peak current (A);  
 $V_R$  is the rated voltage (V);  
 $\Delta t$  is the discharge time (sec);  $\Delta t = 1$  sec in this case;  
 $C$  is the rated capacitance (F);  
 $ESR_{DC}$  is the maximum DC-ESR ( $\Omega$ )

- > The stated maximum peak current should **not** be used in normal operation and is only provided as a reference value.

#### 7. Energy & Power (Based on IEC 62391-2)

- > Maximum Stored Energy,  $E_{max}$  (Wh) =  $\frac{\frac{1}{2}CV_R^2}{3600}$
- > Gravimetric Specific Energy (Wh/kg) =  $\frac{E_{Max}}{Weight}$
- > Usable Specific Power (W/kg) =  $\frac{0.12V_R^2}{ESR_{DC} \times Weight}$
- > Impedance Match Specific Power (W/kg) =  $\frac{0.25V_R^2}{ESR_{DC} \times Weight}$

#### 8. DC Life and Cycle Life Test

- > End-of-Life (EOL) Conditions:
  - Capacitance: -20% from the rated minimum value
  - DC-ESR: +100% from the specified maximum initial value
- > Capacitance and ESR measurements are taken at 25°C.

#### 9. Usable Continuous Current

- > Maximum current which can be used within the allowed temperature range under the constant current discharging mode.

$$I = \sqrt{\frac{\Delta T}{R_{th} \times ESR_{DC}}}$$

where  $I$  is the maximum continuous current (A);  
 $\Delta T$  is the change in temperature ( $^{\circ}\text{C}$ );  
 $R_{th}$  is the thermal resistance ( $^{\circ}\text{C}/\text{W}$ );  
 $ESR_{DC}$  is the maximum DC-ESR ( $\Omega$ )

#### 10. Mounting Recommendations

- > Provide properly spaced holes for mounting according to the specified cell dimension in order to minimize the terminals of the cell being mechanically stressed.
- > Do not place any through-holes directly underneath the cell or in the close proximity of the cell. Allow at least 5mm distance from any point on the outer diameter of the cell to the outer diameter of any through-hole.
- > Protective coating of components on the PCB is strongly recommended in order to reduce the risk of the components being damaged in an event of electrolyte leakage.
- > Provide at least 2mm clearance from the safety vent and do not position anything near the safety vent that may be damaged by the vent rupture.
- > Assemble the cell on the PCB taking into account that the cell may not be completely hermetic during its lifetime. Electrolyte vapor and gases generated during normal operation may escape the package.
- > Soldering guide for small and medium size cells is available and can be found at [www.nesscap.com](http://www.nesscap.com) under Support -> Download.

When ordering, please reference the Maxwell Model Number below.

Maxwell Model Number:	Maxwell Part Number:	Nesscap Model Number:
BCAP0360 P270 S18	133524	ESHSR-0360C0-002R7A1

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 Munich  
Germany  
Tel: +49 (0)89 4161403 0  
Fax: +49 (0)89 4161403 99

Maxwell Technologies  
Shanghai Trading Co., Ltd  
Room 1005, 1006, 1007  
No. 1898, Gonghexin Road,  
Jing An District, Shanghai 200072  
P.R. China  
Tel: +86 21 3680 4600  
Fax: +86 21 3680 4699

Nesscap Co., Ltd.  
17, Dongtangiheung-ro 681beon-gil,  
Gihung-gu, Yongin-si,  
Gyeonggi-do  
17102  
Republic of Korea  
Tel: +82 31 289 0721  
Fax: +82 31 286 6767

The data in this document 3001963 corresponds to the data in Nesscap document 20170711 Rev04. The information in this document is correct at time of printing and is subject to change without notice. Images are not to scale.

MAXWELL TECHNOLOGIES, MAXWELL, MAXWELL CERTIFIED INTEGRATOR, ENABLING ENERGY'S FUTURE, NESSCAP, BOOSTCAP, D CELL, CONDIS 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 © 2017 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.



Компания «ЭлектроПласт» предлагает заключение долгосрочных отношений при поставках импортных электронных компонентов на взаимовыгодных условиях!

Наши преимущества:

- Оперативные поставки широкого спектра электронных компонентов отечественного и импортного производства напрямую от производителей и с крупнейших мировых складов;
- Поставка более 17-ти миллионов наименований электронных компонентов;
- Поставка сложных, дефицитных, либо снятых с производства позиций;
- Оперативные сроки поставки под заказ (от 5 рабочих дней);
- Экспресс доставка в любую точку России;
- Техническая поддержка проекта, помощь в подборе аналогов, поставка прототипов;
- Система менеджмента качества сертифицирована по Международному стандарту ISO 9001;
- Лицензия ФСБ на осуществление работ с использованием сведений, составляющих государственную тайну;
- Поставка специализированных компонентов (Xilinx, Altera, Analog Devices, Intersil, Interpoint, Microsemi, Aeroflex, Peregrine, Syfer, Eurofarad, Texas Instrument, Miteq, Cobham, E2V, MA-COM, Hittite, Mini-Circuits, General Dynamics и др.);

Помимо этого, одним из направлений компании «ЭлектроПласт» является направление «Источники питания». Мы предлагаем Вам помощь Конструкторского отдела:

- Подбор оптимального решения, техническое обоснование при выборе компонента;
- Подбор аналогов;
- Консультации по применению компонента;
- Поставка образцов и прототипов;
- Техническая поддержка проекта;
- Защита от снятия компонента с производства.



#### Как с нами связаться

**Телефон:** 8 (812) 309 58 32 (многоканальный)

**Факс:** 8 (812) 320-02-42

**Электронная почта:** [org@eplast1.ru](mailto:org@eplast1.ru)

**Адрес:** 198099, г. Санкт-Петербург, ул. Калинина, дом 2, корпус 4, литера А.