

2.3V 50F Pseudocapacitor

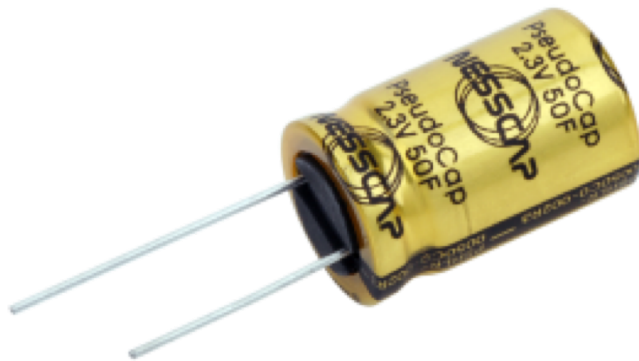
PCAP0050 P230 S01

PSHLR-0050C0-002R3

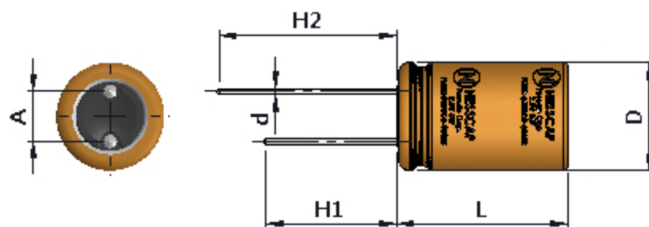
Datasheet

FEATURES

- High performance product with low ESR
- Exceptional shock and vibration resistance
- Long lifetimes with up to 100,000 duty cycles*
- Compliant with RoHS and REACH requirements
- Recommended Applications:
Flashlights, LED, Memory Back-Up, Portable Hand Tools, Solar Charger, Off-Grid Lighting, Automotive Subsystems (Power Windows and Door Locks), and Others



See Note on Mounting Recommendations⁸



ELECTRICAL SPECIFICATIONS

Rated Voltage, V_R	2.3 VDC
Surge Voltage ¹	2.5 VDC
Rated Capacitance, C^2	50 F
Capacitance Tolerance	Min. / Max. -10% / +20%
Initial DC-ESR, R_{DC}^3	Max. 36 mΩ
Maximum Leakage Current ⁴	76 μA
Maximum Peak Current, Non-repetitive ⁵	20 A

OPERATING ENVIRONMENT / POWER & ENERGY

Operating Temperature Range	-25°C to 60°C
Maximum Stored Energy, E_{max}^6	36 mWh
Gravimetric Specific Energy ⁶	5.2 Wh/kg
Usable Specific Power ⁶	2.5 kW/kg
Impedance Match Specific Power ⁶	5.2 kW/kg

TYPICAL LIFETIME CHARACTERISTICS*

Projected DC Life at Room Temperature ⁷ (Continuous charging at V_R and 25 ± 10 °C)	10 years
DC Life at High Temperature ⁷ (Continuous charging at V_R and 60°C)	2,000 hours
Projected Cycle Life at Room Temperature ⁷ (Constant current charge-discharge from V_R to 1/2 V_R at 25 ± 10 °C)	100,000 cycles
Shelf Life (Stored without charge at 25 ± 10 °C)	2 years

DIMENSION & WEIGHT

D (+0.5)	16.0 mm	H1 (Min.)	15.0 mm
L (±1.0)	25.5 mm	H2 (Min.)	19.0 mm
d (±0.05)	0.8 mm	A (±0.5)	7.5 mm
Nominal Weight	7.0 g		

SAFETY & ENVIRONMENTAL

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

*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.

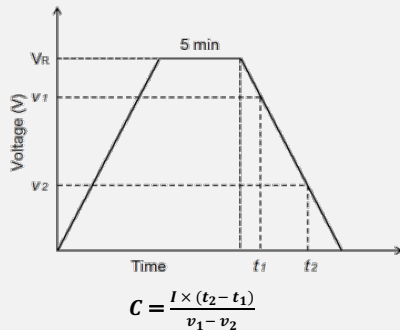
NOTE

1. Surge Voltage

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

2. Rated Capacitance (Measurement Method)

- > Constant current charge to V_R with 40mA.
- > Constant voltage charge at V_R for 5 min.
- > Constant current discharge to 0.9V with 40mA.

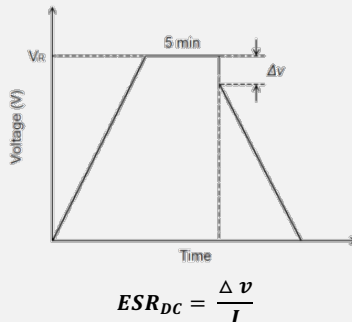


where C is the capacitance (F);

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 to V_R with 40mA.
- > Constant voltage charge at V_R for 5 min.
- > Constant current discharge with $40 \times C \times V_R$ [mA] to 0.9V.
e.g. In case of 2.3V 50F pseudo cell, $40 \times 50 \times 2.3 = 4,600 \text{ mA} = 4.6\text{A}$.



where ESR_{DC} is the DC-ESR (Ω);

ΔV is the voltage drop during first 10ms of discharge (V);
 I is the absolute value of the discharge current (A)

4. 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 .

5. 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);

Δt 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 (Ω)

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

6. 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) = $\frac{0.25V_R^2}{ESR_{DC} \times Weight}$

7. DC Life and Cycle Life Test

- > End-of-Life (EOL) Conditions:
 - Capacitance: -30% from the minimum rated value
 - DC-ESR: +100% from the maximum specified initial value
- > Capacitance and ESR measurements are taken at 25°C.

8. Mounting Recommendations

- > Provide properly spaced holes for mounting according to the specified cell dimension in order to minimize the terminal leads 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.
- > The recommended mounting orientation is with the terminal leads pointing upward.
- > 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 under Support -> Download.

When ordering, please reference the Maxwell Model Number below.

Maxwell Model Number:	Maxwell Part Number:	Nesscap Model Number:
PCAP0050 P230 S01	133738	PSHLR-0050C0-002R3

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,
 Giheung-gu, Yongin-si,
 Gyeonggi-do
 17102
Republic of Korea
 Tel: +82 31 289 0721
 Fax: +82 31 286 6767

The data in this document 3001969 corresponds to the data in Nesscap document 20170914 Rev02. 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.