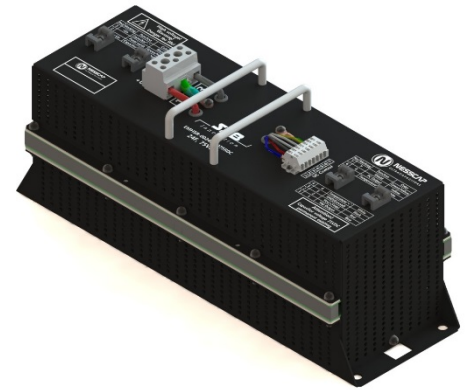


FEATURES

- » *Rated voltage of 75V and capacitance of 24F*
- » *High performance module with low ESR*
- » *Designed for indoor cabinet environment*
- » *Long lifetimes with up to 500,000 duty cycles**
- » *Integrated UMU (Ultracapacitor Management Unit) for*
 - *Individual cell balancing*
 - *Voltage and temperature monitoring*
 - *Reverse polarity detection*
- » *Typical applications:*
 - *Wind turbine pitch control system*
 - *Industrial UPS and DVR*



* Image is not to scale.

ELECTRICAL SPECIFICATIONS		BMOD0024 P075 B02 EMHSR-0024C0-075R0
Rated Voltage, V_R		75 V_{DC}
Surge Voltage ¹		85 V _{DC}
Rated Capacitance, C^2		24 F
Capacitance Tolerance	Min. / Max.	0% / +20%
	Average ⁴	+5% / +10%
Initial DC-ESR, R_{DC}^3	Max.	55 mΩ
	Average ⁴	48 mΩ
Typical Leakage Current ⁵	At 2.5V per cell	50 mA
Maximum Peak Current, Non-repetitive ⁶		200 A
Maximum Stored Energy, E_{max}^7		18.7 Wh
Gravimetric Specific Energy ⁷		2.0 Wh/kg
Usable Specific Power ⁷		1.3 kW/kg
Impedance Match Specific Power ⁷		2.8 kW/kg

TEMPERATURE SPECIFICATIONS	
Operating Temperature Range	-40 ~ 65°C
Storage Temperature Range (stored without charge)	-40 ~ 70°C

TYPICAL LIFETIME CHARACTERISTICS*	
DC Life at High Temperature ⁸ (at V_R and 65°C)	1,500 hours
Projected DC Life at Room Temperature ⁸ (at V_R and 25 ± 10°C)	10 years
Projected Cycle Life ⁸ (constant current charge-discharge from V_R to 1/2 V_R at 25 ± 10°C)	500,000 cycles
Shelf Life (stored without charge at 25 ± 10°C)	4 years

PHYSICAL SPECIFICATIONS	
Output Terminals	7-conductor terminal strip
Insulation Coordination	IEC 61287-1 (Category: OV II) Rated insulation voltage: 1kV DC or 2.8kV AC (at 50Hz, 10 sec) Rated impulse withstand voltage: 6kV DC
Protection Degree	IEC 60529 – IP 20 Protected against solid foreign objects more than 6mm diameter
Vibration	SAE J2380
Shock	SAE J2464

*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.

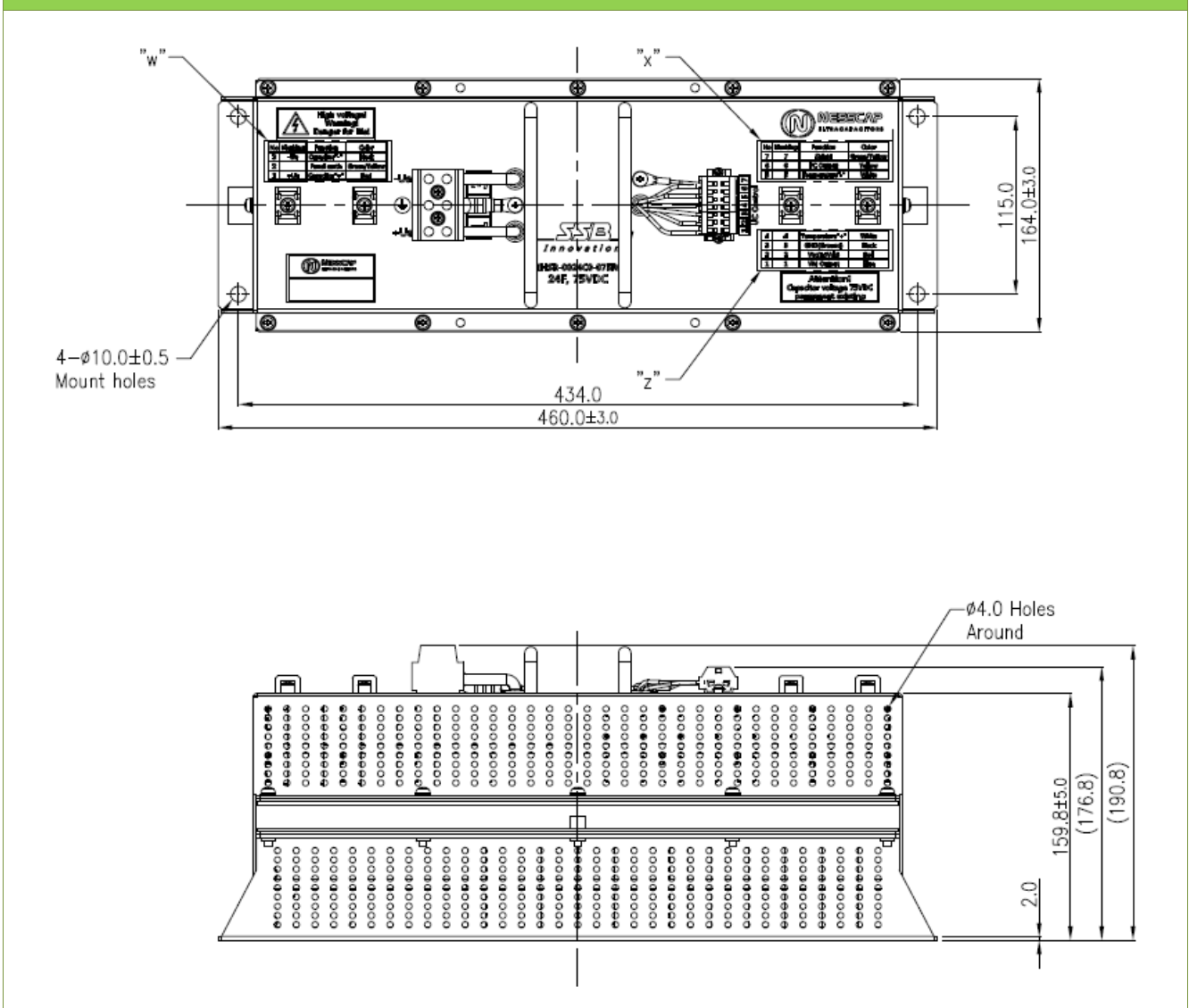
UMU / MONITORING SPECIFICATIONS

Cell Balancing	Passive single cell balancing
Voltage Monitoring	5V, high and low over-voltage logic signal
Temperature Monitoring	Resistance via NTC thermistor (10kΩ at 25°C)
Signal Output	7-pin connector

SAFETY & ENVIRONMENTAL SPECIFICATIONS

RoHS	Compliant
REACH	Cell-level compliant
UL	Cell-level compliant

DRAWING



DIMENSION & WEIGHT

Length (±3.0)	Width (±3.0)	Height (±5.0)	Nominal Weight
460.0 mm	164.0 mm	190.8 mm	9.0 kg

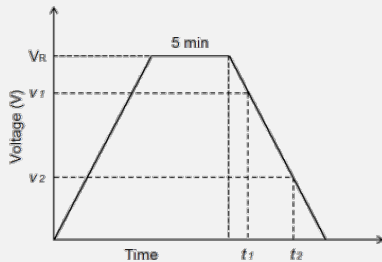
NOTE

1. Surge Voltage

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

2. Rated Capacitance (Measurement Method)

> Constant current charge with 4CV [mA] to V_R .
e.g. In case of 75V-24F module, $4 \times 24 \times 75 = 7,200\text{mA} = 7.2\text{A}$
> Constant voltage charge at V_R for 5 min.
> Constant current discharge with 4CV [mA] to 12V.

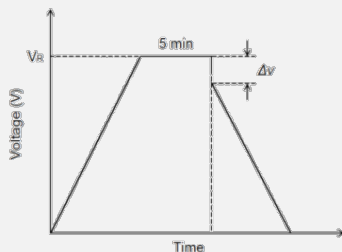


$$C = \frac{I \times (t_2 - t_1)}{v_1 - v_2}$$

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 4CV [mA] to V_R .
> Constant voltage charge at V_R for 5 min.
> Constant current discharge with 40CV [mA] to 65V.
e.g. In case of 75V-24F module, $40 \times 24 \times 75 = 72,000\text{mA} = 72\text{A}$



$$ESR_{DC} = \frac{\Delta v}{I}$$

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. Average

> Typical value or percentage spread that may be present in one shipment

5. Typical Leakage Current

> Typical leakage current of the module is the sum of the leakage current of the cell (measured at the rated voltage and at room temperature after 72 hours) and the bypass current created by the balancing circuit.

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 discharge 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.

7. Energy & Power

> 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 Conditions:
- Capacitance: -20% from the minimum rated value
- DC-ESR: +100% from the maximum specified initial value
> Capacitance and ESR measurements are taken at $25 \pm 10^\circ\text{C}$

When ordering, please reference the Maxwell Model Number below.

Maxwell Model Number: BMOD0024 P075 B02	Maxwell Part Number: 133732	Nesscap Model Number: EMHSR-0024C0-075R0
---	---------------------------------------	--

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 3001964 corresponds to the data in Nesscap document 20170324 Rev0. 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.