Datasheet [86V-62F Standard Module]

POWERED TO MOVE

FEATURES

- *Rated voltage of 86V and capacitance of 62F*
- *High power module with ultra-low ESR*
- *Exceptional shock and vibration resistance*
- *Long lifetimes with up to 1 million duty cycles*
- *Integrated UMU (Ultracapacitor Management Unit) for effective cell balancing and monitoring*
- *Typical applications:*
  - *Wind turbine*
  - *Industrial UPS and DVR*

**** Image is not to scale***

ELECTRICAL SPECIFICATIONS		EMHSR-0062C0-086R0S
Rated Voltage, V_R		**86 V_{DC}**
Surge Voltage[1]		91 V_{DC}
Rated Capacitance, C[2]		**62 F**
Capacitance Tolerance	Min. / Max.	0% / +20%
	Average[4]	+5% / +10%
Initial DC-ESR, R_{DC}[3]	Max.	12.7 mΩ
	Average[4]	6.9 mΩ
Typical Leakage Current[5]	Under 64V	4.2 mA
	Over 64V	44 ~ 58 mA
Maximum Peak Current, Non-repetitive[6]		1,400 A
Maximum Stored Energy, E_{max}[7]		63.6 Wh
Gravimetric Specific Energy[7]		3.0 Wh/kg
Usable Specific Power[7]		3.3 kW/kg
Impedance Match Specific Power[7]		6.9 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 $1/2V_R$ at 25 ± 10°C)	1,000,000 cycles
Shelf Life (stored without charge at 25 ± 10°C)	4 years

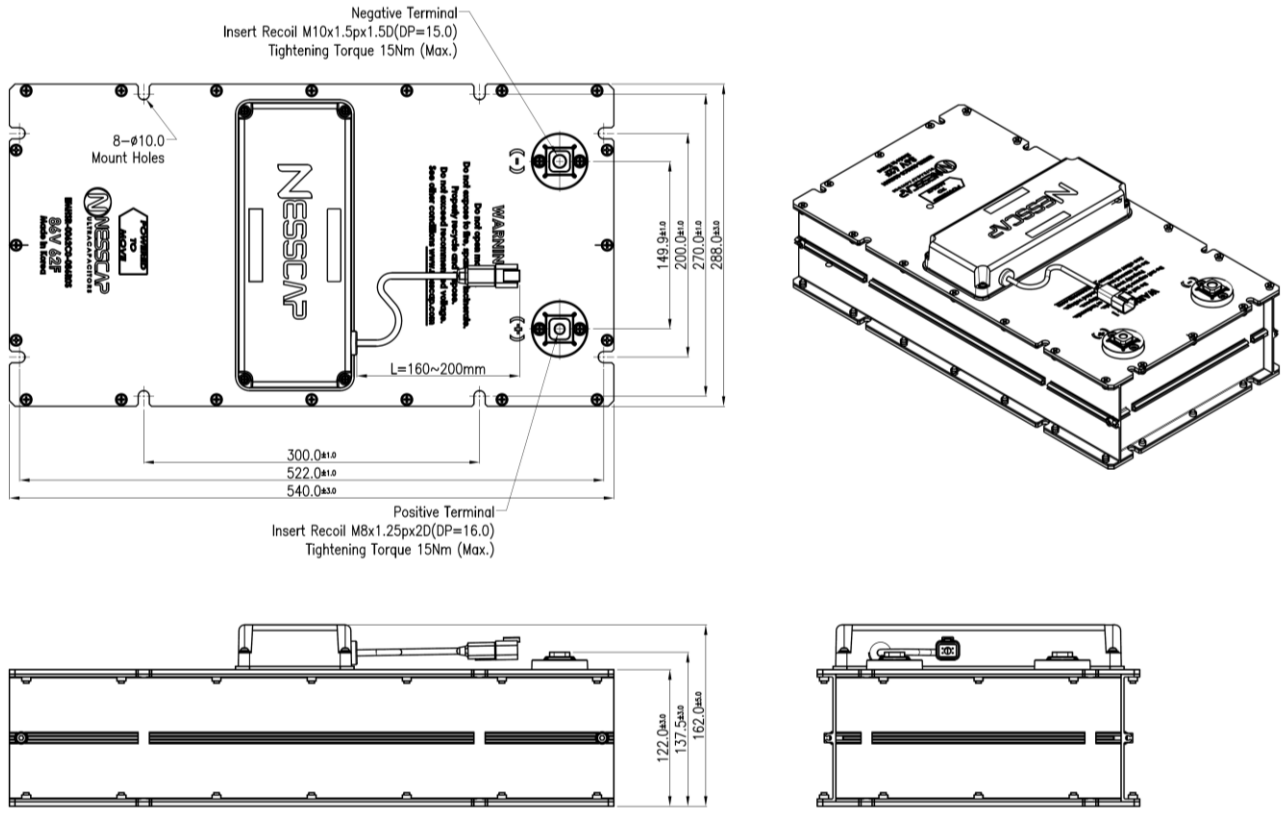
PHYSICAL SPECIFICATIONS	
Output Terminals	M8 screw holes (positive) / M10 screw holes (negative)
Insulation Coordination	IEC 61287-1 (Category: OV II) Rated insulation voltage: 1kV DC or 2.8kV AC (at 50Hz, 10 sec) Rated impulse withstand voltage: 6kV DC
Protection Degree	IEC 60529 – IP 65 Dust-tight and protected against water jets
Vibration Specification	SAE J2380
Shock Specification	SAE J2464

UMU / MONITORING SPECIFICATIONS	
Cell Balancing	Active single cell balancing
Voltage Monitoring	High and low over-voltage logic signal
Temperature Monitoring	Resistance via NTC thermistor (10kΩ at 25℃)
Signal Output	Deutsch 4-pin water-proof connector

TYPICAL THERMAL CHARACTERISTICS	
Thermal Resistance, R_{th} (Temperature Sensor Output)	0.15 °C/W
Thermal Capacitance, C_{th}	19,000 J/°C
Usable Continuous Current (ΔT = 15°C)[9]	80 A
Usable Continuous Current (ΔT = 40°C)[9]	140 A

SAFETY & ENVIRONMENTAL SPECIFICATIONS	
RoHS	Compliant
REACH	Cell-level compliant
UL	Cell-level compliant

DRAWING



DIMENSION & WEIGHT					
L (±3.0)	W (±3.0)	H1 (±3.0)	H2 (±3.0)	H3 (±5.0)	Nominal Weight
540.0 mm	288.0 mm	122.0 mm	137.5 mm	162.0 mm	21 kg

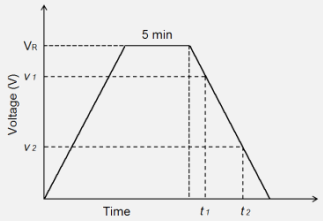
NOTE

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 86V-62F module, 4 x 62 x 86 = 21,300mA = 21.3A
> Constant voltage charge at V_R for 5 min.
> Constant current discharge with 4CV [mA] to 12V.

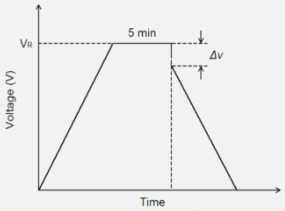


$$C = \frac{I \times (t_2 - t_1)}{v_1 - v_2}$$

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 x V_R (V);
v_2 is the measurement end voltage, 0.4 x 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 to V_R.
> Constant voltage charge at V_R for 5 min.
> Constant current discharge with 100A to 75V.



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

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 (Measurement Method)**

> LC under 64V (2V per cell) is equal to the LC of the cell measured at the cell's rated voltage and room temperature after 72 hours.
> LC over 64V (2V per cell) is the sum of the LC of the cell and the bypass current created by the active 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

$$I = \frac{½V_R}{\Delta t \ / \ C + ESR_{DC}}$$

where I is the maximum peak current (A);
V_R is the rated voltage (V);
Δt is the discharge time (sec); Δt = 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 (Based on IEC 62391-2)**

> Maximum Stored Energy, E_{max} (Wh) = $\frac{½CV_R^2}{3600}$

> 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 ± 10°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);
ΔT is the change in temperature (°C);
R_{th} is the thermal resistance (°C/W);
ESR_{DC} is the DC-ESR (Ω)

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