

MDCL0083C0-0048R0SHC DATASHEET



MODEL	MDCL0083C0-0048R0SHC
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Version	Revision of historical records
V2019-1 Trial Version	First Edition
V2020-1	Version Update

FEATURES

- Compact, fully enclosed splash proof design
- Over 1,000,000 duty cycles
- High power density

APPLICATIONS

- Automotive
- Railway transportation
- Heavy duty machinery
- Energy storage system

SPECIFICATIONS

Electrical	Characteristics
Nominal Capacitance	83 F
Capacitance Tolerance	0% / +20%
Rated Voltage	48 V
Surge Voltage	51 V
ESR,DC	9 mΩ
Maximum Continuous Current ($\Delta T=15^{\circ}\text{C}$)	60 A
Maximum Continuous Current ($\Delta T=40^{\circ}\text{C}$)	100 A
Maximum Peak Current,1sec.	1100 A
Leakage Current(25°C , after 72 h)	3 mA
Equalizing current	125 mA
Cell	CDCL1500C0-0002R7WLH
Number of Cells	18
Environment	
Operating Temperature Range	$-40^{\circ}\text{C} \sim +65^{\circ}\text{C}$
Storage Temperature Range	$-40^{\circ}\text{C} \sim +70^{\circ}\text{C}$
Environment Humidity	$\leq 90\%RH$
Physical	
Weight	10.6 kg
Power Terminals	M8/M10
Recommended Torque-Terminal	20/30 N·m
Vibration Specification	GB/T 11287-2000
Shock Specification	GB/T 14537-1993
Environment Protection	IP54
Monitoring	
Cell Voltage Monitoring	Overvoltage Alarm
Temperature	NTC Thermistor

SPECIFICATIONS

Power And Energy

Usable Power Density (Pd)	2898 W/kg
Impedance Match Power Density(Pmax)	6037 W/kg
Gravimetric Energy Density(Emax)	2.5 Wh/kg
Stored Energy	26.5 Wh

Life

High Temperature Life (at Rated Voltage & Maximum Operating Temperature)	1500 hours
Capacitance Change (%decrease from initial measured value) ESR Change (%increase from specified value)	≤20% ≤100%
Room Temperature Life (at Rated Voltage at 25°C)	10 years
Capacitance Change (%decrease from initial measured value) ESR Change (%increase from specified value)	≤20% ≤100%
Cycle Life (Number of cycles)	1,000,000
Capacitance Change (%decrease from initial measured value) ESR Change (%increase from specified value)	≤20% ≤100%
Shelf Life (25°C, uncharged)	4 years

Safe

Factory High-Pot Test	2500 VDC
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Thermal Characteristics

Typical Thermal Resistance	0.4 °C/W
Typical Thermal Capacitance	7900 J/°C

NOTES

1. Surge voltage is non-repetitive. The duration must not exceed 1second.
2. Maximum peak current in non-repetitive. The duration must not exceed 1second.
3. Formula of maximum peak current:

$$I_{peak} = \frac{1 / 2CV}{C \times ESR_{DC} + 1}$$

C is rated capacity, V is rated voltage.

4. Formula of power and energy:

Usable Power Density :

$$P_d = \frac{0.12V^2}{ESR_{DC} \times mass}$$

Gravimetric Energy Density:

$$E_{max} = \frac{1 / 2CV^2}{3600 \times mass}$$

Impedance Match Power Density:

$$P_{max} = \frac{V^2}{4ESR_{DC} \times mass}$$

Stored Energy:

$$E = \frac{1 / 2CV^2}{3600}$$

MEASURING METHOD

- 1) Charge and Discharge procedure (Figure 1)
 - a) Charge the capacitor using constant current I to rated voltage V_0 ;
 - b) Keep rated voltage 5 min;
 - c) Discharge the capacitor using constant current I to half rated voltage, record discharge time T_1 during voltage change from V_1 to V_2 ;
 - d) Rest 2-5s, record voltage change ΔV ;
 - e) Discharge it to a very low voltage around 0.01V;
 - f) $V_1=80\% V_0$, $V_2=50\% V_0$.

2) Capacitance

$$C = I * T_1 / (V_1 - V_2)$$

C: Capacitance(F);

I : Constant Discharge Current(A);

T_1 : Discharge Time(s);

V_1-V_2 : Voltage Change (V).

3) DC ESR

$$DC\ ESR = \Delta V / I$$

DC ESR: DC Equivalent Series Resistance(Ω)

ΔV : Voltage Change(V);

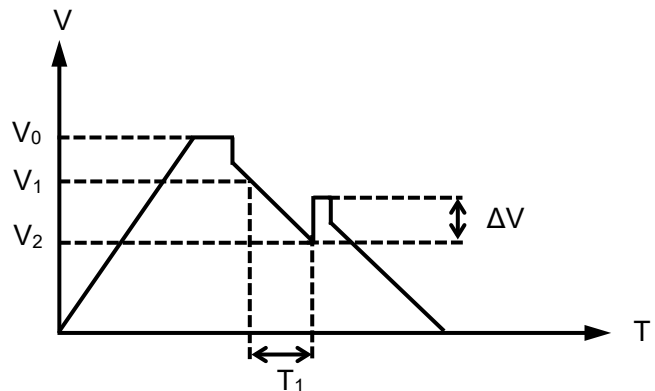
I: Constant Discharge Current (A);

4) AC ESR

Measure AC ESR using LCR meter

Frequency: 1KHz;

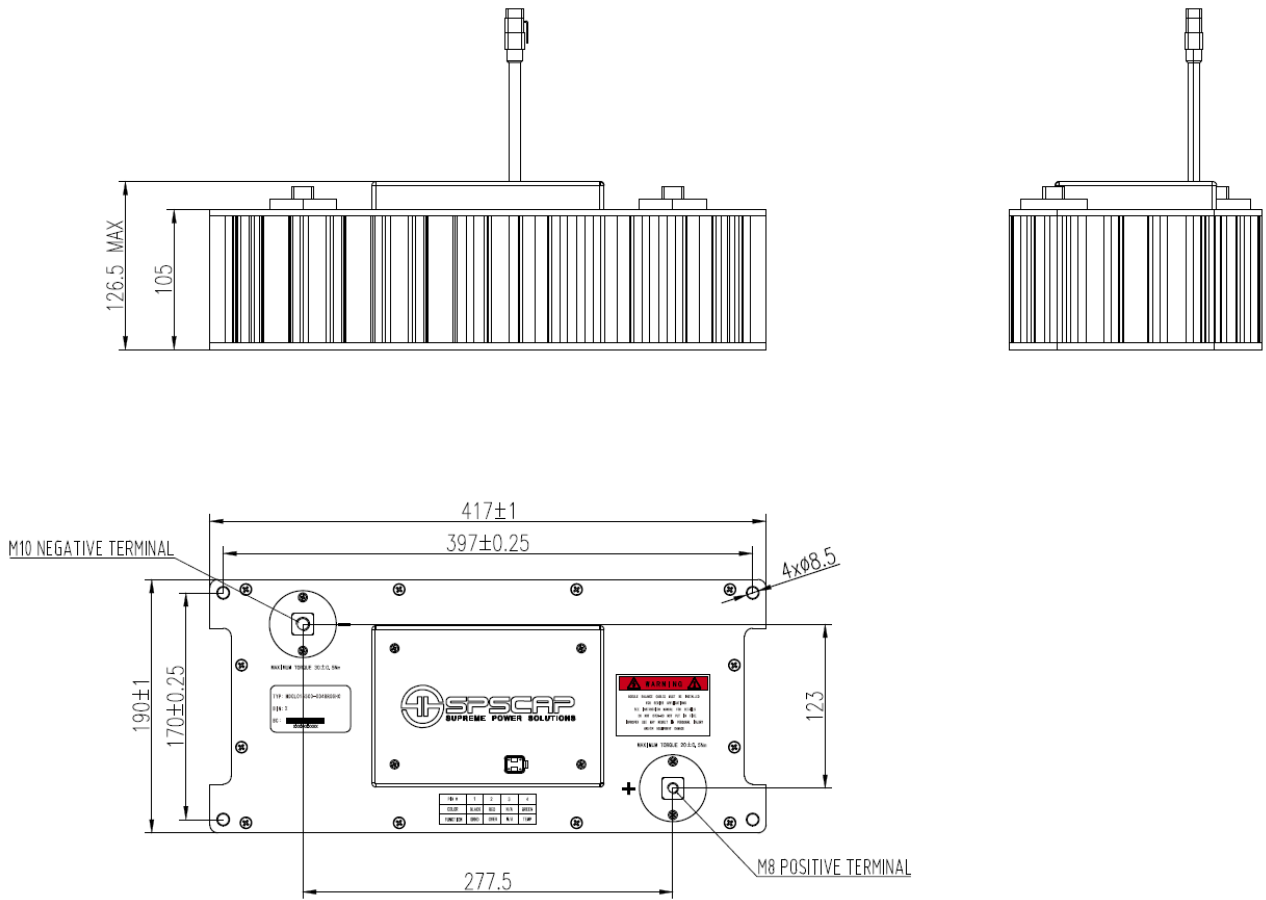
Voltage: fully discharge



Figure

Pin Number	Wire Color	Definition	Output
1	Black	GND	
2	Red	Overvoltage Alarm	High - Inactive
			Low - Active
3	Void	Void	
4	Green	Temperature	

DIMENSIONS



MODEL	Dimension(mm)		
	L(±1)	W(±1)	H(Max.)
MDCL0083C0-0048R0SHC	417	190	126.5

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