

# MDCL0500C0-0016R0SHC DATASHEET



<b>MODEL</b>	<b>MDCL0500C0-0016R0SHC</b>
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<b>Version</b>	<b>Revision of historical records</b>
V2019-1 Trial Version	First Edition
V2020-1	Version Update

## FEATURES

- Compact, fully enclosed splash proof design
- Highest power performance
- Individually balanced cells
- Over 1000,000 duty cycles
- Ultra-low internal resistance

## APPLICATIONS

- Automotive
- Industrial
- Telecommunications
- Railway transportation
- Uninterruptible Power Supplies(UPS)

## SPECIFICATIONS

Electrical	Characteristics
Nominal Capacitance	500 F
Capacitance Tolerance	0% / +20%
Rated Voltage	16 V
Surge Voltage	17 V
ESR,DC	1.8 mΩ
Maximum Continuous Current ( $\Delta T=15^{\circ}\text{C}$ )	100 A
Maximum Continuous Current ( $\Delta T=40^{\circ}\text{C}$ )	160 A
Maximum Peak Current,1sec.	2000 A
Leakage Current( $25^{\circ}\text{C}$ , after 72 h)	5.2 mA
Equalizing current	100 mA
Cell	CDCL3000C0-0002R7WLH
Number of Cells	6
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	5.7 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)	2994 W/kg
Impedance Match Power Density(Pmax)	6237 W/kg
Gravimetric Energy Density(Emax)	3.1 Wh/kg
Stored Energy	17.8 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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## 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  $\Delta V$ ;
  - 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( $\Omega$ )

$\Delta V$ : Voltage Change(V);

I: Constant Discharge Current (A);

- 4) AC ESR

Measure AC ESR using LCR meter

Frequency: 1KHz;

Voltage: fully discharge

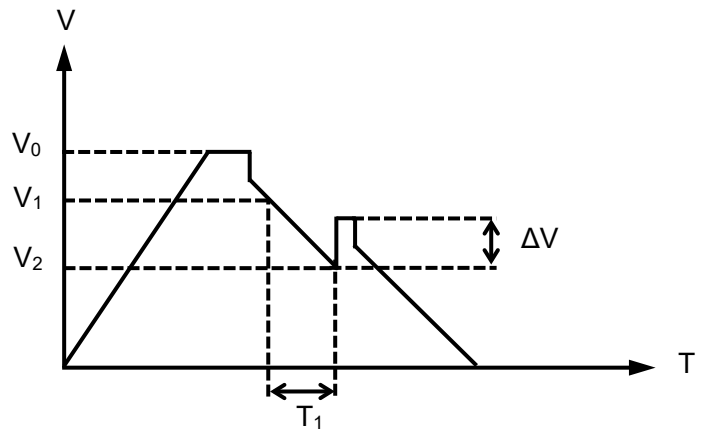
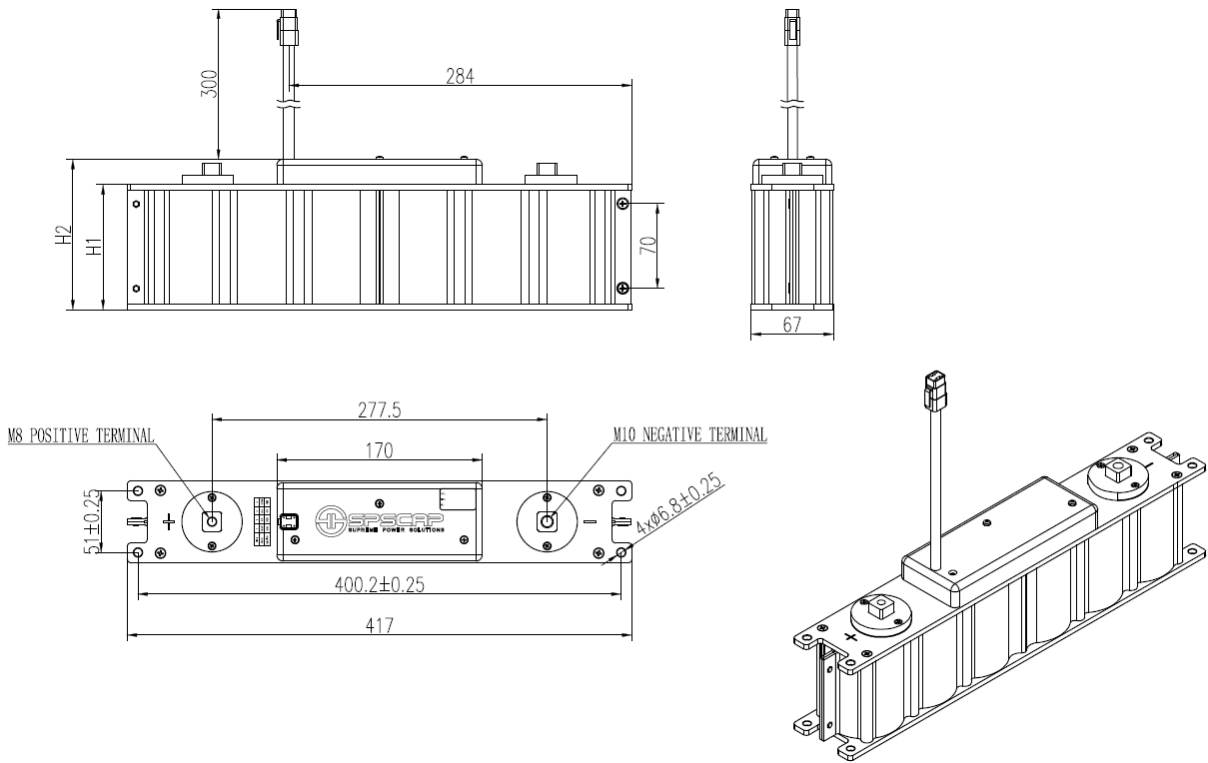


Figure 1

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	Maximum Overall Dimension			
	L(±1mm)	W(±0.5mm)	H1(max/mm)	H2(max/mm)
MDCL0500C0-0016R0SHC	417	67	157	179

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