

SPECIFICATION FOR APPROVAL

Model: MCP0500C0-0016R0SHC
File Number: JX-YF-S-110.E
File Version: V2017-1

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Features

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

Applications

- Wind turbine
- Automotive
- Heavy duty machinery
- Energy storage system

Specification



ELECTRICAL

MCP0500C0-0016R0SHC

Nominal Capacitance	500 F
Capacitance Tolerance	0% / +20%
Rated Voltage	16 V
Surge Voltage	17 V
ESR, DC	1.8 mΩ
Maximum Continuous Current (Δ T=15°C)	100 A
Maximum Continuous Current (Δ T=40°C)	160 A
Maximum Peak Current, 1 sec.	2000 A
Leakage Current (25°C, after 72h)	5.2 mA
Capacitance of Individual Cells	3000 F
Number of Cells	6

Environment

Operating Temperature Range	-40°C to +65°C
Storage Temperature Range	-40°C to +70°C
Environment Humidity	≤90%RH

PHYSICAL

Weight	5.7 kg
Power Terminals	M8/M10
Recommended Torque - Terminal	20/30 Nm
Vibration Specification	IEC 255-21-1
Shock Specification	IEC 255-21-2
Environmental Protection	IP54

MONITORING / CELL VOLTAGE MANAGEMENT

Cell Voltage Monitoring	Overvoltage Alarm
Temperature Monitoring	NTC Thermistor

POWER AND ENERGY

Usable Power Density (Pd)	2,994 W/kg
Impedance Match Power Density (Pmax)	6,237 W/kg
Gravimetric Energy Density (Emax)	3.1 Wh/kg
Stored Energy	17.8 Wh

LIFE		MCP0500C0-0016R0SHC
High Temperature		1,500 hours
(at Rated Voltage & Maximum operating Temperature)		
Capacitance Change		≤20%
(% decrease from initial measured value)		
ESR Change		≤100%
(% increase from specified value)		
Room Temperature		10 years
(at Rated Voltage at 25°C)		
Capacitance Change		≤20%
(% decrease from initial measured value)		
ESR Change		≤100%
(% increase from specified value)		
Cycle Life		1,000,000
(Number of cycles)		
Capacitance Change		≤20%
(% decrease from initial measured value)		
ESR Change		≤100%
(% increase from specified value)		
Shelf Life		4 years
(25°C, uncharged)		
SAFE		
Factory High-Pot Test		2,500 V DC
THERMAL CHARACTERISTICS		
Typical Thermal Resistance		0.8 °C/W
Typical Thermal Capacitance		4,400 J/°C

Notes

1. Surge voltage is non-repetitive. The duration must not exceed 1 second.
2. Maximum peak Current is non-repetitive. The duration must not exceed 1 second.
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

$$\text{Usable Power Density } P_d = \frac{0.12V^2}{ESR_{DC} \times mass}$$

$$\text{Impedance Match Power Density } P_{max} = \frac{V^2}{4ESR_{DC} \times mass}$$

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

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

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) $V_1=85\% V_0$ $V_2=50\% V_0$

2) Capacitance

$$C = I \cdot T_1 / (V_1 - V_2)$$

C: Capacitance (F)

I: Constant Discharge Current (A)

T_1 : Discharge Time (S)

$V_1 - V_2$: Voltage Change (V)

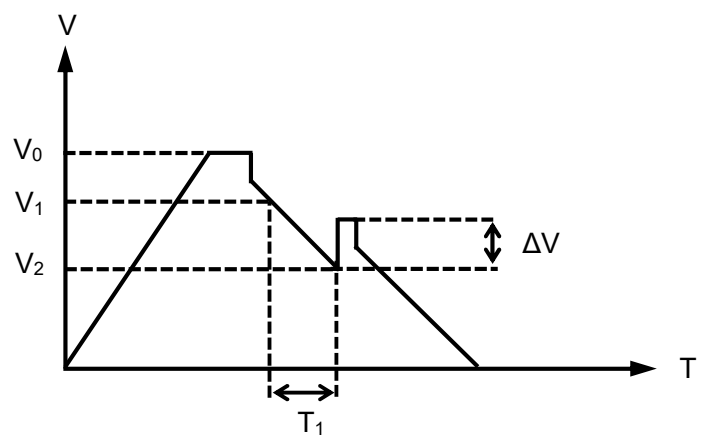


Figure 1

3) DC ESR

$$\text{DC ESR} = \Delta V / I$$

DC ESR: DC Equivalent Series Resistance (Ω)

ΔV : Voltage Change (V)

I: Constant Discharge Current (A)

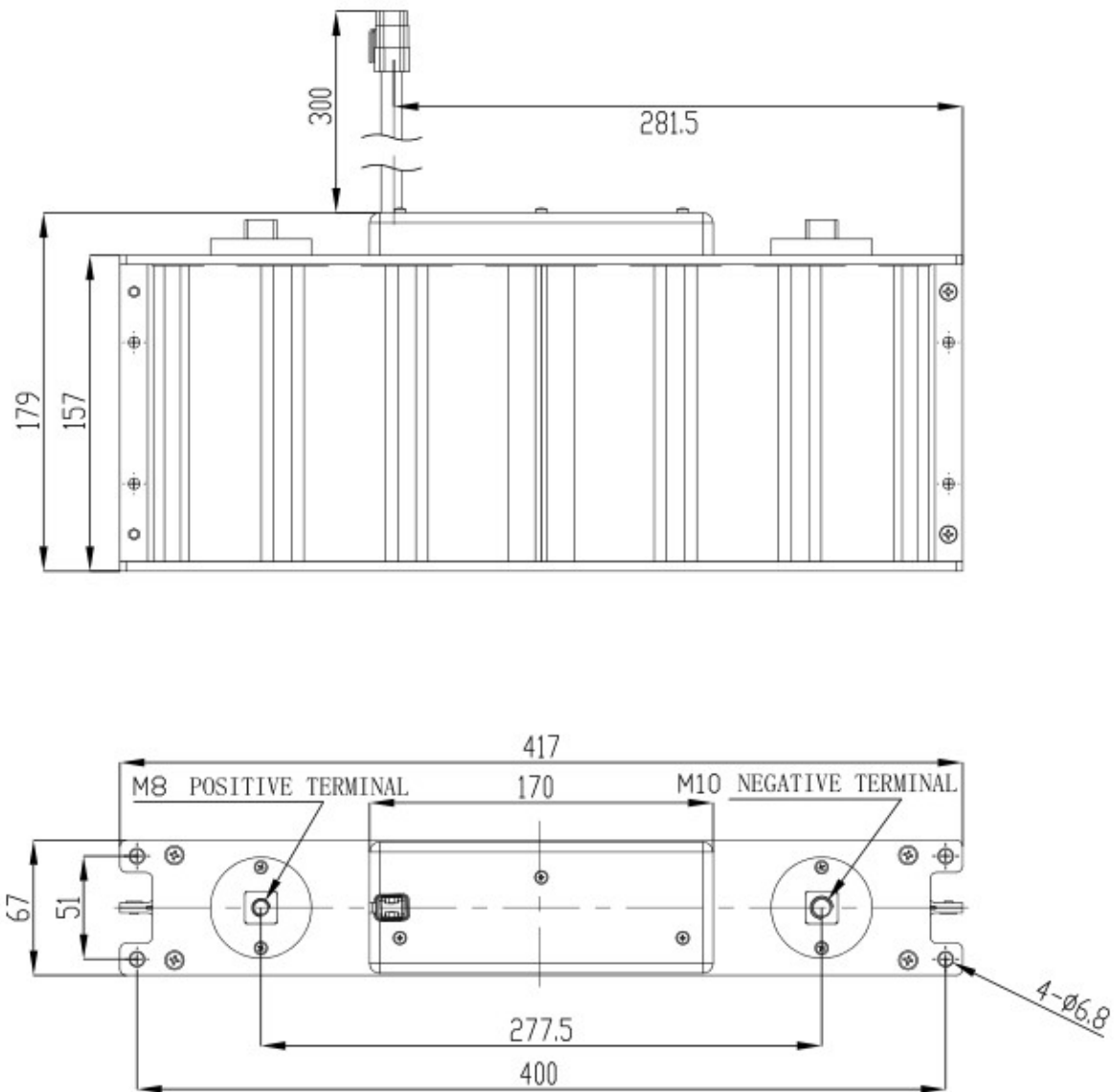
4) AC ESR

Measure AC ESR using LCR meter

Frequency: 1KHz

Voltage: fully discharge

Dimensions



Part Number	Dimension (mm)		
MCP0500C0-0016R0SHC	L (±1mm)	W (±1mm)	H (Max)
	417	67	179

Pin Definition

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