SPECIFICATION FOR APPROVAL

Model: MCP0165C0-0048R0SHC-03

File Number: JX-YF-S-163.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

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

Specification

ELECTRICAL	MCP0165C0-0048R0SHC-03
Nominal Capacitance	165 F
Capacitance Tolerance	0% / +20%
Rated Voltage	48 V
Surge Voltage	51 V
ESR, DC	5 mΩ
Maximum Continuous Current (ΔT=15℃)	90 A
Maximum Continuous Current (ΔT=40℃)	150 A
Maximum Peak Current, 1 sec.	2000 A
Leakage Current (25℃, after 72h)	5.2 mA
Capacitance of Individual Cells	3000 F
Number of Cells	18
Envoirnment	
Operating Temperature Range	-40℃ to +65℃
Storage Temperature Range	-40℃ to +70℃
Environment Humidity	≤96%RH
PHYSICAL	
Weight	14.5 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	IP65
MONITORING / CELL VOLTAGE MANAGEMENT	
Cell Voltage Monitoring	Overvoltage Alarm
Temperature Monitoring	NTC Thermistor
POWER AND ENERGY	
Usable Power Density (Pd)	3,813 W/kg
Impedance Match Power Density (Pmax)	7,944 W/kg
Gravimetric Energy Density (Emax)	3.6 Wh/kg
Strored Energy	52.8 Wh

LIFE	MCP0165C0-0048R0SHC-03
High Temperature (at Rated Voltage & Maximum operating Temperature)	1,500 hours
Capacitance Change (% decrease from initial measured value)	⩽20%
ESR Change (% increase from specified value)	⩽100%
Room Temperature (at Rated Voltage at 25℃)	10 years
Capacitance Change (% decrease from initial measured value)	⩽20%
ESR Change (% increase from specified value)	⩽100%
Cycle Life (Number of cycles)	1,000,000
Capacitance Change (% decrease from initial measured value)	⩽20%
ESR Change (% increase from specified value)	⩽100%
Shelf Life (25℃, uncharged)	4 years
SAFE	
Factory High-Pot Test	2,500 V DC
THERMAL CHARACTERISTICS	
Typical Thermal Resistance	0.3 ℃/W
Typical Thermal Capacitance	14,000 J/℃

Notes

1. Surge voltage is non-repetitive. The duration must not exceed 1 second.
2. Maxmium peak Current is non-repetitive. The duration must not exceed 1 second.
3. Formula of maxmium peak Current:

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

C is rated capacity, V is rated voltage.

4. Formula of power and energy

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

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

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

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=85% 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)

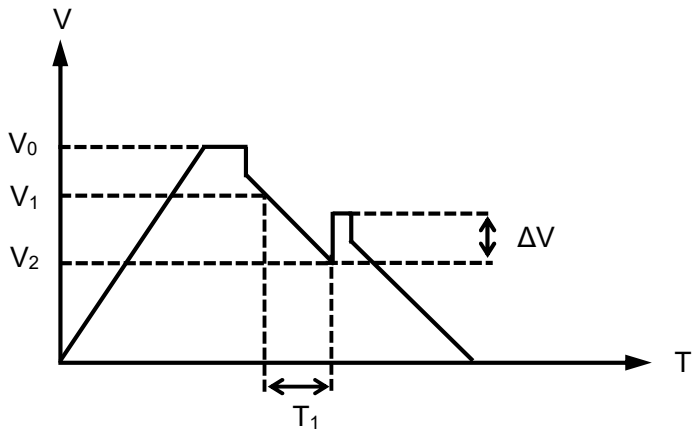


Figure 1

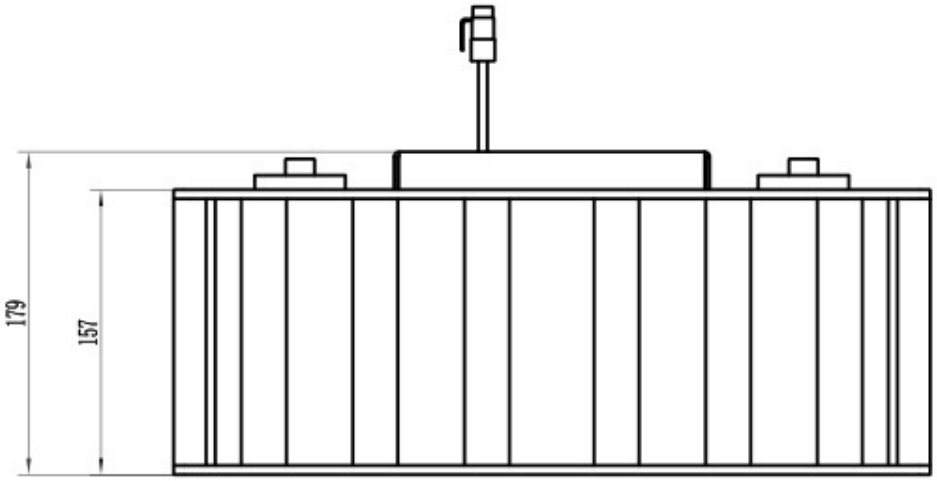
3) DC ESR

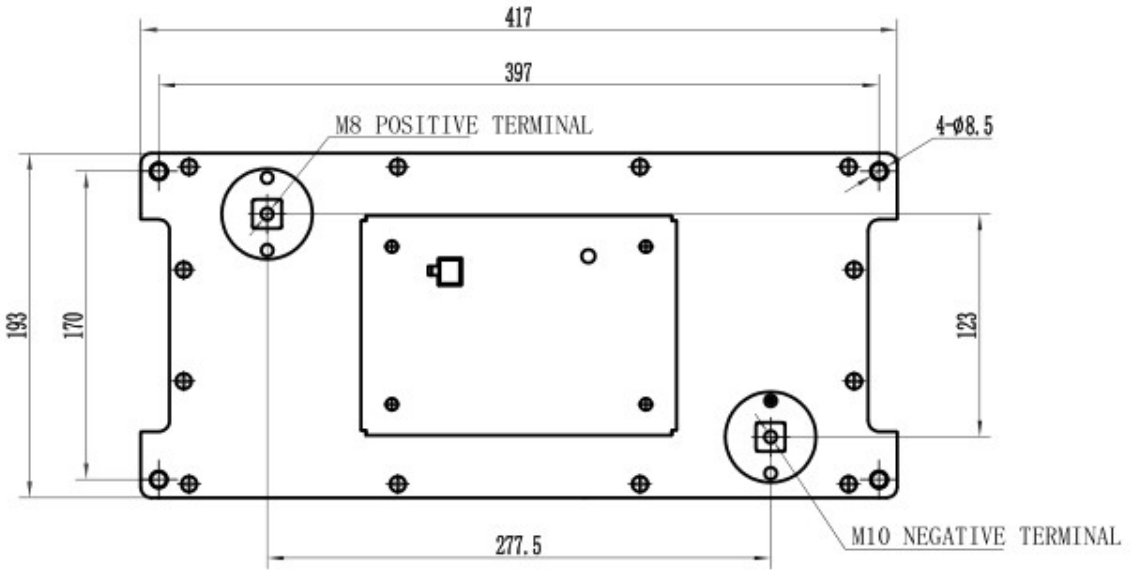
   $DC\ ESR=\Delta V/I$

   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

Dimensions





Part Number	Dimension (mm)		
MCP0165C0-0048R0SHC-03	L (±1mm)	W (±1mm)	H (Max)
	417	193	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	