

SPECIFICATION FOR APPROVAL

Model: MCP0055C0-0144R0SHB
File Number: JX-YF-S-158.E
File Version: V2017-2

Supreme Power Solutions Co., Ltd.
Room 425, Tailai Business Mansion, No.88, Nongda South Rd,
Haidian District, Beijing, P.R. China
TEL: +86-0755-89486800
FAX: +86-10-61272268
Email: info@spscap.com

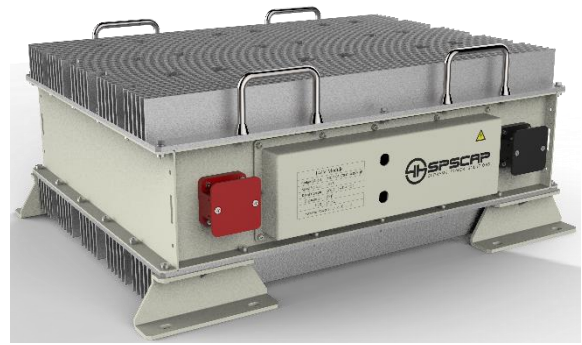
Features

- 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

MCP0055C0-0144R0SHB

Nominal Capacitance	55 F
Capacitance Tolerance	0% / +20%
Rated Voltage	144 V
Surge Voltage	151.2 V
ESR, DC	17 mΩ
Maximum Continuous Current (Δ T=15°C)	120 A
Maximum Continuous Current (Δ T=40°C)	200 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	54

Environment

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

PHYSICAL

Weight	85 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
Communication Interface	CAN

POWER AND ENERGY

Usable Power Density (Pd)	1,722 W/kg
Impedance Match Power Density (Pmax)	3,587 W/kg
Gravimetric Energy Density (Emax)	1.9 Wh/kg
Stored Energy	158.4 Wh

LIFE MCP0055C0-0144R0SHB

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°C)	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°C, uncharged)	4 years

SAFE

Factory High-Pot Test	2,500 V DC
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THERMAL CHARACTERISTICS

Typical Thermal Resistance	0.06 °C/W
Typical Thermal Capacitance	70,000 J/°C

Notes

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

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

C is rated capacity, V is rated voltage.

- 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

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

C: Capacitance (F)

I: Constant Discharge Current (A)

T_1 : Discharge Time (S)

$V_1 - V_2$: Voltage Change (V)

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

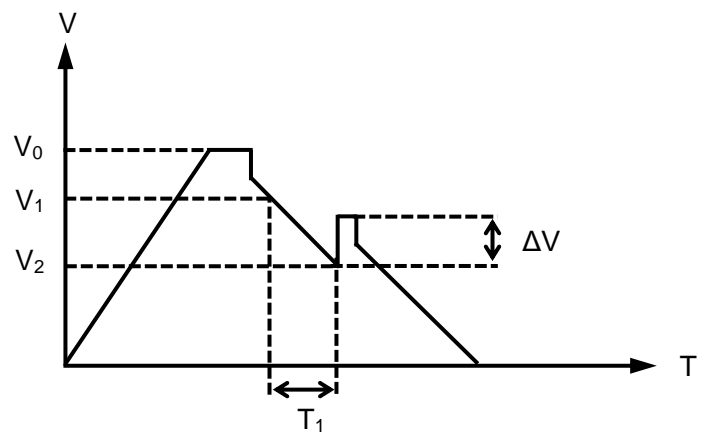
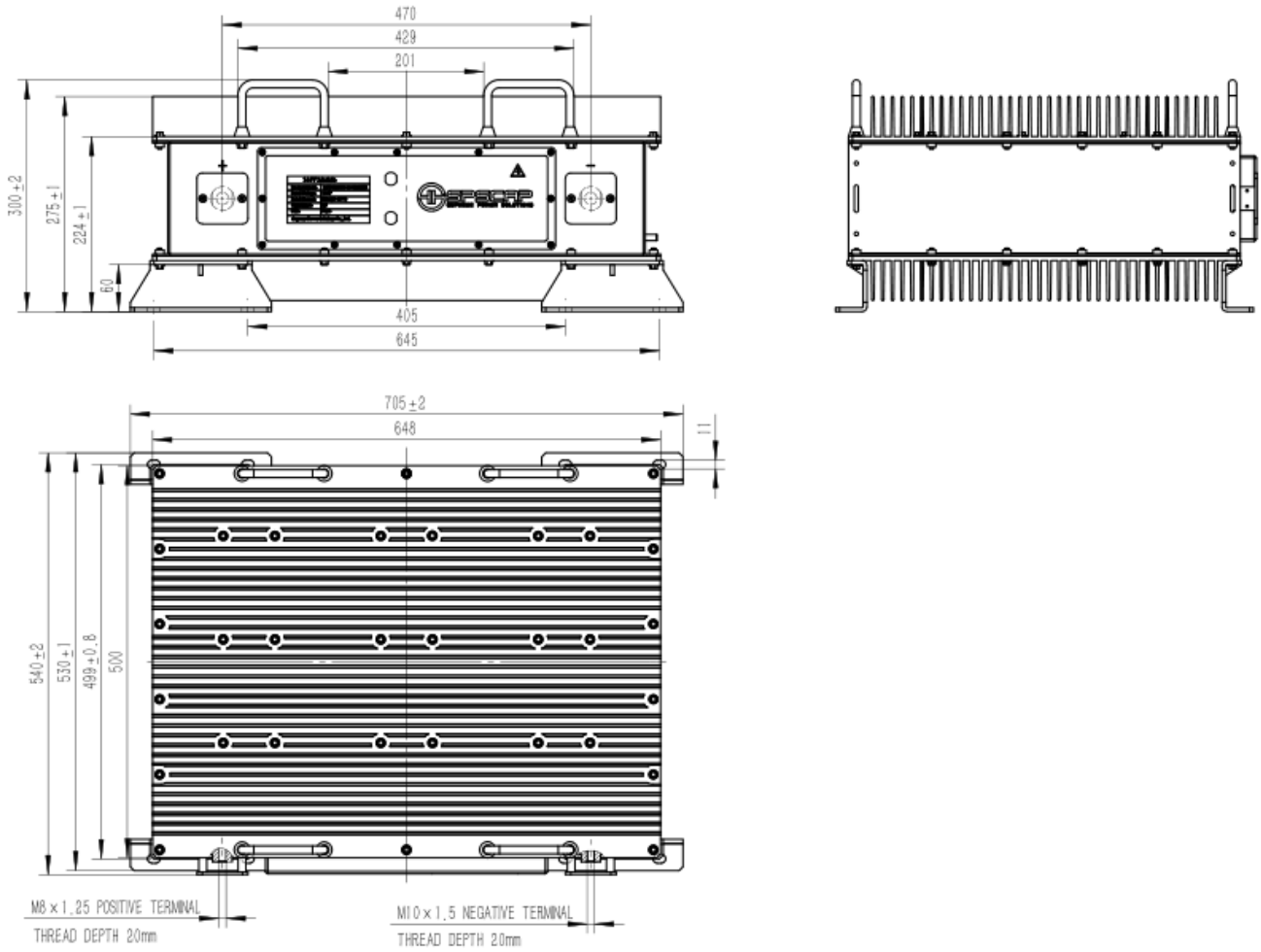


Figure 1

Dimensions



Part Number	Dimension (mm)		
	L (± 2 mm)	W (± 2 mm)	H (± 2 mm)
MCP0055C0-0144R0SHB	705	540	300