

SPECIFICATION FOR APPROVAL

Model: MCP0036C0-0048R0SHC-01
File Number: JX-YF-S-140.E
File Version: V2017-1

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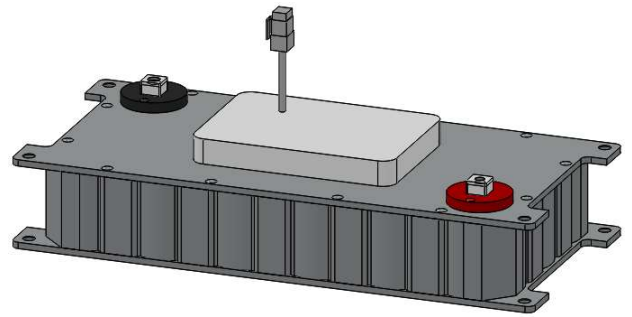
Features

- 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

MCP0036C0-0048R0SHC-01

Nominal Capacitance	36 F
Capacitance Tolerance	0% / +20%
Rated Voltage	48 V
Surge Voltage	51 V
ESR, DC	16 mΩ
Maximum Continuous Current (Δ T=15°C)	37 A
Maximum Continuous Current (Δ T=40°C)	60 A
Maximum Peak Current, 1 sec.	500 A
Leakage Current (25°C, after 72h)	2 mA
Capacitance of Individual Cells	650 F
Number of Cells	18

Environment

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

PHYSICAL

Weight	8.5 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	IP54

FUNCTION

Cell Voltage Monitoring	Overvoltage Alarm
Temperature Monitoring	NTC Thermistor

POWER AND ENERGY

Usable Power Density (Pd)	2,032 W/kg
Impedance Match Power Density (Pmax)	4,235 W/kg
Gravimetric Energy Density (Emax)	1.36 Wh/kg
Stored Energy	11.5 Wh

LIFE		MCP0036C0-0048R0SHC-01
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
THERMAL CHARACTERISTICS		
Typical Thermal Resistance		0.7 °C/W
Typical Thermal Capacitance		6,000 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

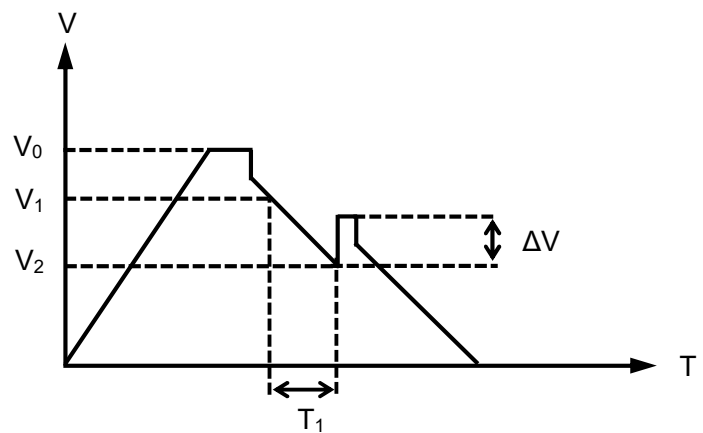
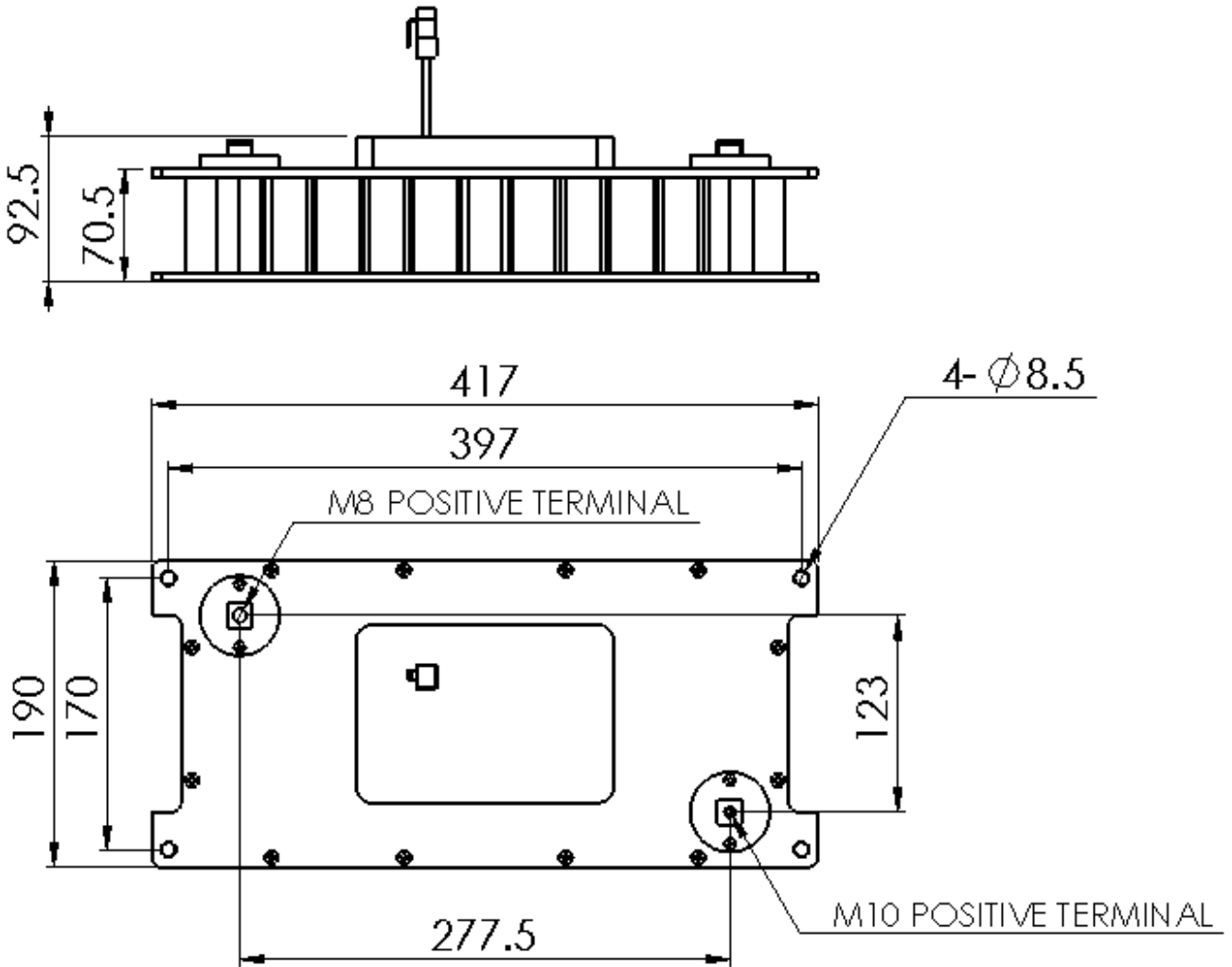


Figure 1

Dimensions



Part Number	Dimension (mm)		
	L (±1mm)	W (±1mm)	H (Max)
MCP0036C0-0048R0SHC-01	417	190	92.5

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	