SPECIFICATION FOR APPROVAL

Model: MCP0083C0-0048R0SHC
File Number: JX-YF-S-142.E
File Version: V2017-2
### 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

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nominal Capacitance</td>
<td>83 F</td>
</tr>
<tr>
<td>Capacitance Tolerance</td>
<td>0% / +20%</td>
</tr>
<tr>
<td>Rated Voltage</td>
<td>48 V</td>
</tr>
<tr>
<td>Surge Voltage</td>
<td>51 V</td>
</tr>
<tr>
<td>ESR, DC</td>
<td>9 mΩ</td>
</tr>
<tr>
<td>Maximum Continuous Current (ΔT=15°C)</td>
<td>60 A</td>
</tr>
<tr>
<td>Maximum Continuous Current (ΔT=40°C)</td>
<td>100 A</td>
</tr>
<tr>
<td>Maximum Peak Current, 1 sec.</td>
<td>1100 A</td>
</tr>
<tr>
<td>Leakage Current (25°C, after 72h)</td>
<td>3 mA</td>
</tr>
<tr>
<td>Capacitance of Individual Cells</td>
<td>1500 F</td>
</tr>
<tr>
<td>Number of Cells</td>
<td>18</td>
</tr>
</tbody>
</table>

#### Environment

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

#### PHYSICAL

- Weight: 10.6 kg
- Power Terminals: M8/M10
- Recommended Torque - Terminal: 20/30 Nm
- Vibration Specification: IEC 255-21-1
- Environmental Protection: IP54

#### MONITORING / CELL VOLTAGE MANAGEMENT

- Cell Voltage Monitoring: Overvoltage Alarm
- Temperature Monitoring: NTC Thermistor

#### POWER AND ENERGY

- Usable Power Density (Pd): 2,898 W/kg
- Impedance Match Power Density (Pmax): 6,037 W/kg
- Gravimetric Energy Density (Emax): 2.5 Wh/kg
- Strored Energy: 26.5 Wh
LIFE

MCP0083C0-0048R0SHC

High Temperature
(at Rated Voltage & Maximum operating Temperature)

Capacitance Change
(% decrease from initial measured value) ≤20%

ESR Change
(% increase from specified value) ≤100%

Room Temperature
(at Rated Voltage at 25°C)

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
0.4 °C/W

Typical Thermal Capacitance
7,900 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:
   \[ I_{peak} = \frac{1}{C \times ESR_{dc} + 1} \]
   C is rated capacity, V is rated voltage.
4. Formula of power and energy
   \[ P_d = \frac{0.12V^2}{ESR_{dc} \times mass} \]
   \[ P_{\text{max}} = \frac{V^2}{4ESR_{dc} \times mass} \]
   \[ E_{\text{max}} = \frac{1}{3600} \times mass \times \frac{1}{2CV^2} \]
   \[ E = \frac{1}{3600} \times \frac{1}{2CV^2} \]
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) $V_1$=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)
$\Delta V$: Voltage Change (V)
I: Constant Discharge Current (A)

4) AC ESR
Measure AC ESR using LCR meter
Frequency: 1KHz
Voltage: fully discharge
### Dimensions

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Dimension (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MCP0083C0-0048R0SHC</td>
<td>L (Max.) 418</td>
</tr>
</tbody>
</table>

### Pin Definition

<table>
<thead>
<tr>
<th>Pin Number</th>
<th>Wire Color</th>
<th>Definition</th>
<th>Output</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Black</td>
<td>GND</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Red</td>
<td>Overvoltage Alarm</td>
<td>High - Inactive</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Low - Active</td>
</tr>
<tr>
<td>3</td>
<td>Void</td>
<td>Void</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Green</td>
<td>Temperature</td>
<td></td>
</tr>
</tbody>
</table>