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| Part Number | LSUM 086R4C 0093F EA |
| Document Number | V02_20140217 |

Product specification

LSUM 086R4C 0093F EA



Product specification

| Version | Date | Change Description | Author |
|---------|-----------------|---------------------------------------|---------|
| V00 | 20 . Feb . 2013 | Product specification | S.W Son |
| V01 | 07 . JAN . 2014 | Change the measurement method(10m-5m) | S.W.Son |
| V02 | 17 . FEB . 2014 | Update product specification | S.W.SON |
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Product specification

■ Specification

1. Primary specification

| Part number | Capacitance (F) | Resistance DC (mΩ) | Max. Current (A) ¹ | Leakage Current (mA) |
|----------------------|-----------------|--------------------|-------------------------------|----------------------|
| LSUM 086R4C 0093F EA | 93 | 11.3 | 1,950 | < 120 |

2. Power & Energy

| Part number | Usable Specific Power, P _d (W/kg) | Impedance Match Specific Power, P _{max} (W/kg) | Energy Density (Wh/kg) | Stored Energy (Wh) |
|----------------------|--|---|------------------------|--------------------|
| LSUM 086R4C 0093F EA | 3,049 | 6,352 | 3.7 | 96.4 |

3. Standard & Reliability

| | | | | |
|-----------------------------|--|--|--|--|
| Rated Voltage | 86.4V | | | |
| Max. Voltage ² | 91.2V | | | |
| Maximum series Voltage | 750V | | | |
| Capacitance Tolerance | -0% / +20% | | | |
| Resistance Tolerance | < Spec. Value | | | |
| Operating temperature range | -40 ~ 65 °C | | | |
| Storage temperature range | -40 ~ 70 °C | | | |
| Max. continuous current | ΔT = 15 °C | 50A | | |
| | ΔT = 40 °C | 80A | | |
| Endurance | After 1500 hours application of Rated voltage .DC at 65 °C, the capacitor shall meet the following limits. | | | |
| | Capacitance change | Within 20% of initially specified value | | |
| | Internal resistance change | Within 100% of initially specified value | | |
| Shelf life | After 1500 hours storage at +65 °C without load shall meet specification of endurance | | | |
| Life Time (25°C) | After 10 years at rated voltage and +25 °C | | | |
| | Capacitance change | Within 20% of initially specified value | | |
| | Internal resistance change | Within 100% of initially specified value | | |
| Cycle Life (25°C) | After 1,000,000 cycles between rated voltage to half rated voltage at +25 °C | | | |
| | Capacitance change | Within 20% of initially specified value | | |
| | Internal resistance change | Within 100% of initially specified value | | |

4. Monitoring

| Part number | Temperature sensor | Temperature interface | Connector | Cell voltage monitoring | Balancing |
|----------------------|--------------------|-----------------------|-----------|-------------------------|-----------|
| LSUM 086R4C 0093F EA | PT100 | Analog | Harting | - | Passive |

*Remarks

- 1) Current for 1sec discharge from the rated voltage to the half of it in constant current discharge, do not use as an operating current.
- 2) Non repeated, not to exceed 1sec.

Product specification

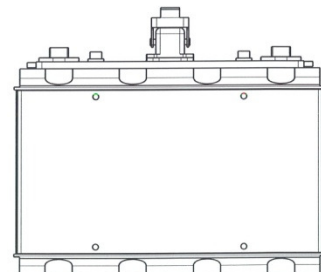
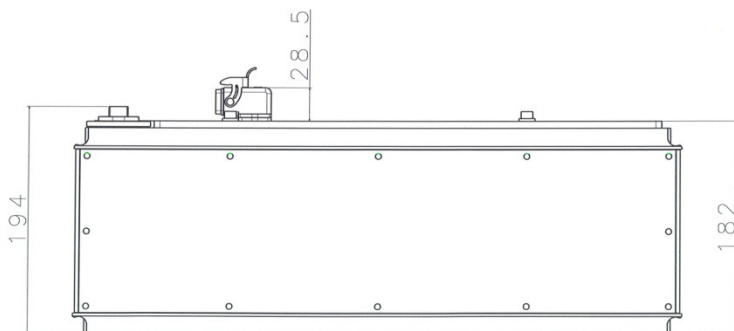
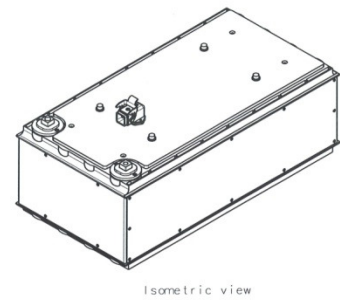
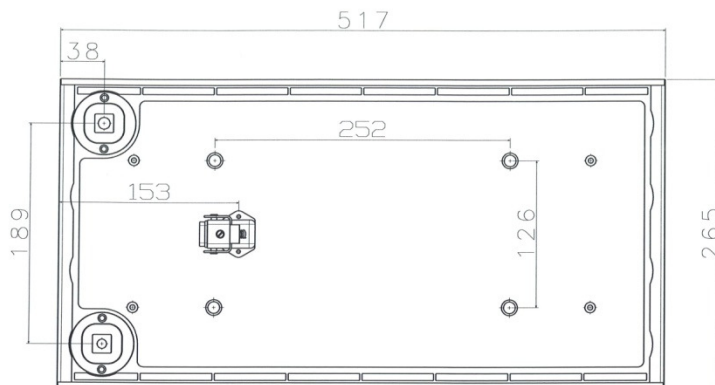
■ Safety & Physical Protection

| Isolation voltage (DC) | Short circuit current(A) | Power Terminals | Recommended Torque - Terminal | Environmental Protection | Shock & vibration Protection |
|------------------------|--------------------------|-----------------|-------------------------------|--------------------------|------------------------------|
| 2.5kV | 7,646 | M8 / M10 | 20 / 30 Nm | IP 54 | SAE J2380 |

Dimension in mm (not to scale)

■ Geometric properties

| Part number | Dimension (mm) | | | Weight (kg) |
|----------------------|----------------|-----------|-----------|-------------|
| | Length | Wide | Height | |
| LSUM 086R4C 0093F EA | 517.0±1.0 | 265.0±1.0 | 194.0±1.0 | 26.0±1.0 |



Technical Information (1)

How to calculate specification value

1. The Measurement Methods

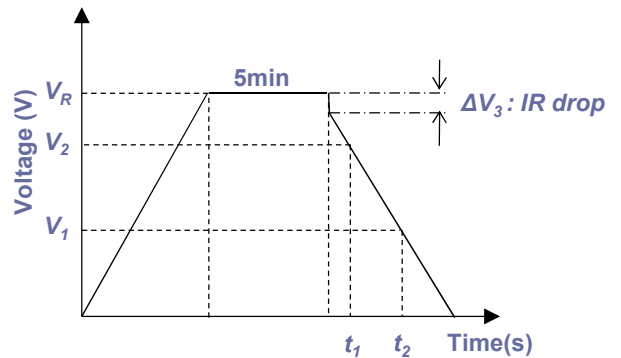
1-1 Capacitance

Apply rated voltage and charge for 5min after the constant current / constant voltage power supply has achieved the rated voltage. After a charge for 5min has finished, discharge with 10mA/F to 0.1V.

Measure the time t_1 to t_2 where the voltage between capacitor terminals at the time of discharge reduces from V_1 to V_2 as shown figure and calculate the capacitance value by the following formula:

- 1) Constant current charge with 10mA/F to V_R
- 2) Constant voltage charge at V_R for 5min
- 3) Constant current discharge with 10mA/F to 0.1V

$$C = \frac{I \times (t_2 - t_1)}{V_2 - V_1}$$



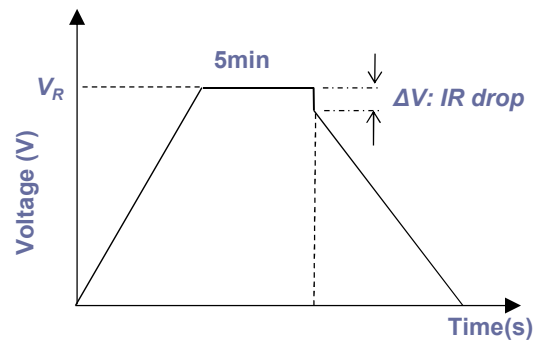
1-2 Resistance

The AC and DC resistance of a capacitor shall be calculated by the following formula;

$$R_{AC} = \frac{V}{I_{AC}} \quad (\text{The frequency of the measuring voltage shall be 100Hz or 1kHz})$$

$$R_{DC} = \frac{\Delta V}{I_{DC}}$$

Where R_{AC} is the AC internal resistance (Ω);
 R_{DC} is the DC internal resistance (Ω);
 V is the effective value of AC voltage (V);
 ΔV is the drop voltage for 10ms (V);
 I_{AC} is the effective value of AC current (A);
 I_{DC} is the discharge current (A);



Technical Information (2)

1-3 Leakage current & Self discharge

The leakage current shall be measured using the direct voltage appropriate to the test temperature(25℃) for 72hrs. Self discharge voltage shall be measured after charging up for 12hrs, disconnect the capacitor terminals from the voltage source. The capacitor shall be kept under standard condition for 100hrs.

1-4 Maximum current

Current for 1sec discharge from the rated voltage to the half of it in constant current discharge,

$$I_{Max} = \frac{V_R - 0.5 \cdot V_R}{\Delta t / C + R_{DC}}$$

Where I_{Max} is the Maximum current (A);

Δt is the discharge time (sec), 1 sec in this case ;

C is the capacitance (F);

R_{DC} is the DC resistance (Ω);

V_R is the rated voltage (V).

1-5 Maximum stored energy (E_{MAX})

$$E_{MAX} (Wh) = \frac{\frac{1}{2} C V_R^2}{3600}$$

2. The Standard Atmospheric Condition for Measurement

All test and measurements shall be made under standard atmospheric conditions for testing. Before the measurements are made, the capacitor shall be stored at the measuring temperature for a time sufficient to allow the entire capacitor to reach this temperature. The period as prescribed for recovery at the end of a test is a normally sufficient for this purpose.

Temperature : 15~35 ℃

Relative humidity : 25~75%

Air Pressure : 86~106 kPa