Part Number	LSUM 356R4C 0009F EA
Document Number	V04_20160303

Product specification

LSUM 356R4C 0009F EA

LS ULTRACAPACITOR
LSUC

Product specification

Specification

1. Primary specification

Part number	Capacitance (F)	Resistance DC (mΩ)	Max. Current (A)[1]	Leakage Current (mA)
LSUM 356R4C 0009F EA	9	52.3	1,000	< 2.7

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 356R4C 0009F EA	5,000	10,400	2.7	158.8

3. Standard & Reliability

Rated Voltage	356.4 V	
Max. Voltage[2]	376.2 V	
Maximum series Voltage	750 V	
Capacitance Tolerance	-0% / +20%	
Cell tolerance inside a module	< 3%	
Resistance Tolerance	< Spec. Value	
Operating temperature range	-40 ~ 65 °C	
Storage temperature range	-40 ~ 70 °C	
Endurance	After 1500 hours application of Rated voltage. DC at 65℃, 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	4 Years stored uncharged state at +25°C	
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 356R4C 0009F EA	NTC Thermistor	Analog	4 pin connector	-	Active

*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.

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Product specification

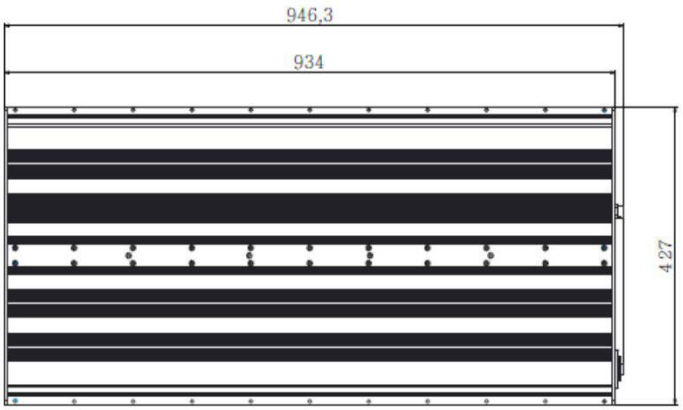
Safety & Physical Protection

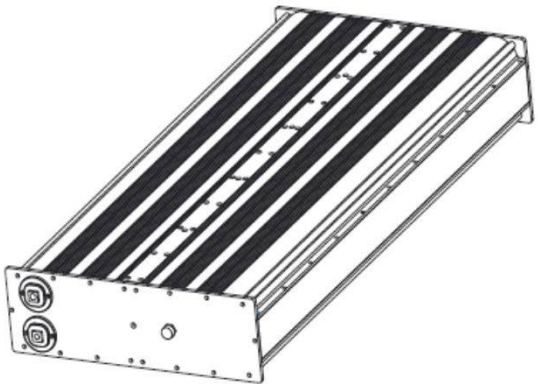
Isolation voltage (DC)	Short circuit current(A)	Power Terminals	Recommended Torque - Terminal	Environmental Protection	Shock & vibration Protection
2.5kV	6,800	M8 / M10	20 / 30 Nm	IP 65	IEC-61373

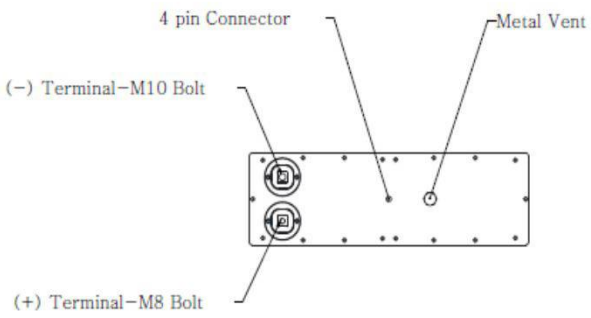
Dimension in mm (not to scale)

Geometric properties

Part number	Dimension (mm)			Weight (kg)
	Length	Width	Height	
LSUM 356R4C 0009F EA	946.3±2.0	427.0±1.0	132.2±1.0	Max. 58







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Technical Information (1)

How to calculate specification value

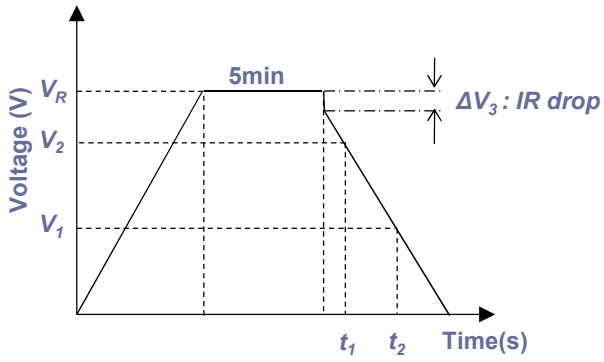
1. The Measurement Methods

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.

Measure the time t1 to t2 where the voltage between capacitor terminals at the time of discharge reduces from V1 to V2 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



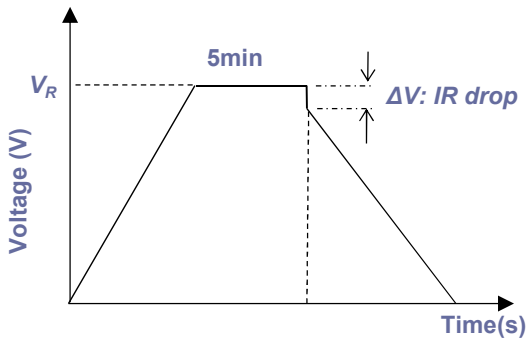
$$C = \frac{I \times (t_2 - t_1)}{V_2 - V_1}$$

1-2 Resistance

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

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

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



Technical Information (2)

1-3 Leakage current

The leakage current shall be measured using the direct voltage appropriate to the test temperature(25℃) for 72hrs.

1-4 Maximum current

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

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

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})

$$E_{MAX}\,(Wh) = \frac{½\,CV_R^2}{3600}$$

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