



User Manual

LSUM 051R3C 0166F EA



User Manual

CONTENT

1. Overview	04
2. Unpacking	05
3. Safety	05
4. Identification of features	06
5. Module to module connection	07
6. Output terminal connection	08
7. Output connector	09
8. Mounting	12
9. Maintenance	13
10. Contact Information	14
Appendix I	15
Appendix II	16

User Manual

LSUM 051R3C 0166F EA

1. Overview

The LS 51.3V / 166F Ultracapacitor Module has high energy and low ESR to meet energy storage and power delivery requirements.

The cells used in the module have 2.85V maximum voltage rating and are connected in series to get higher operating voltage of modules. To meet the long cycle life requirements, the cells operate under 2.85V. In addition, all the cells are balanced by balancing circuit connected parallel to each cell.

User Manual

LSUM 051R3C 0166F EA

2. Unpacking

Inspect the shipping carton for signs of damage prior to unpacking the module. Damage to the shipping carton or module should be reported to the carrier immediately.

Remove the module from the shipping carton and retain the shipping materials until the unit has been inspected and is determined to be operational.

NOTE: The original shipping materials are approved for both air and ground shipment. The module should be removed from the shipping carton by lifting the body of the module.

3. Safety



Do not operate above specified voltage.

Do not operate above specified temperature rating.

Do not touch terminals with conductors while charged. Serious burns, shock, or material fusing may occur.

Protect surrounding electrical components from incidental contact.

Provide sufficient electrical isolation when working above 51.3V DC.

Prior to installation and removal from the equipment, it is mandatory to fully discharge the module.

User Manual

LSUM 051R3C 0166F EA

4. Identification of features

- Product Image



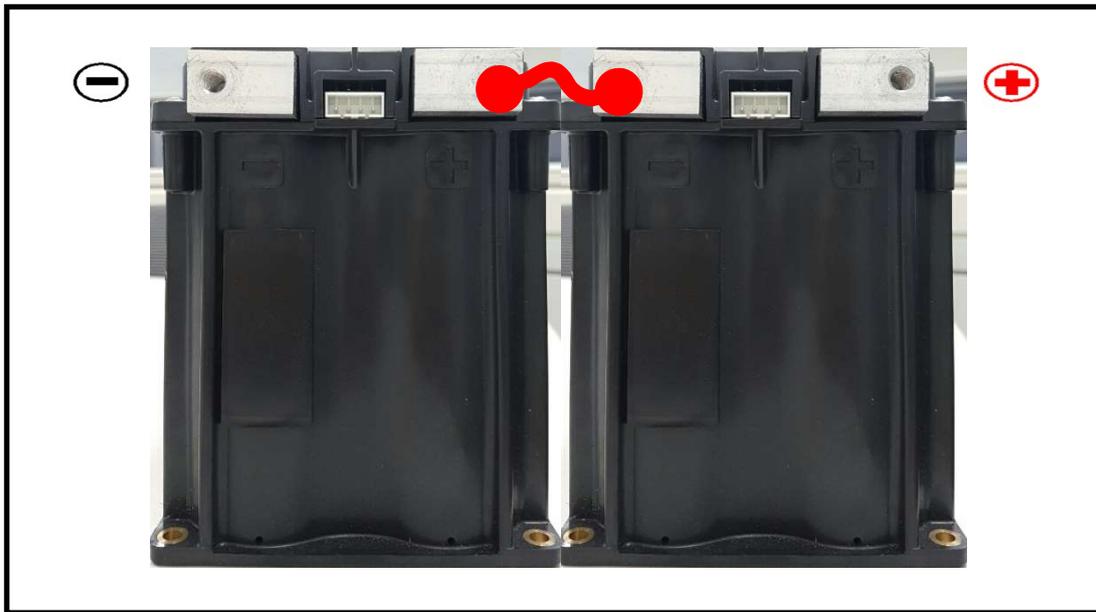
<Fig. 1> Product Image

User Manual

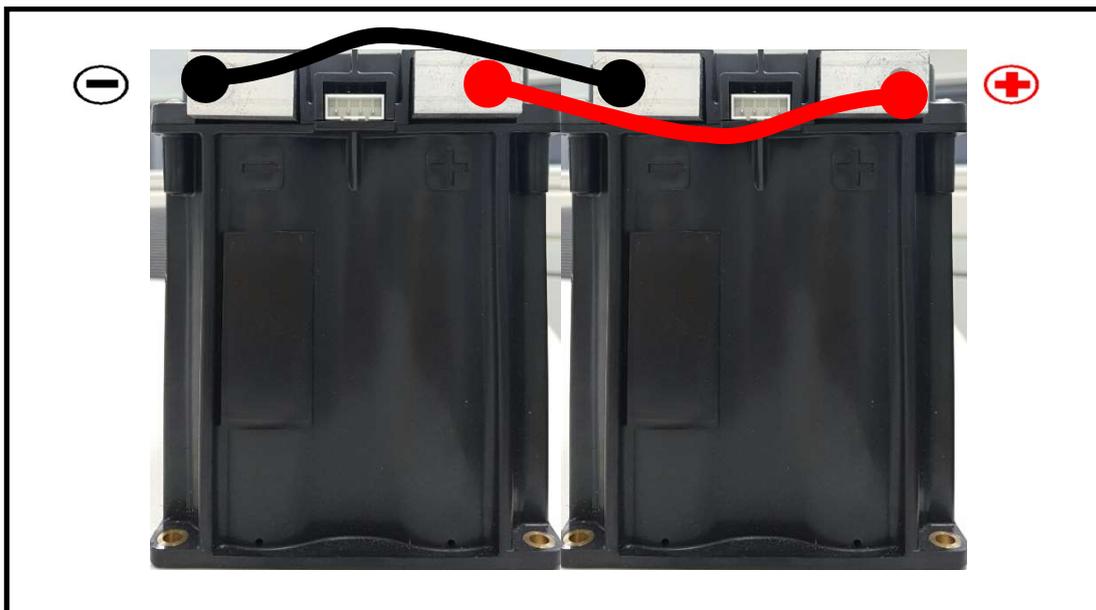
LSUM 051R3C 0166F EA

5. Module to module connection

- There are series and parallel connection for High power



<Fig. 2> Series Connection of Modules



<Fig. 3> Parallel Connection of Modules.

User Manual

LSUM 051R3C 0166F EA

6. Output terminal connection

The LS 51.3V / 166F Ultracapacitor Modules are designed to connect directly to a ring or a bus bar. The positive and negative terminals have each hole for the screw. The positive terminal threaded size is M8 and negative terminal is M10. Wave washers are required to ensure long term, reliable connections.

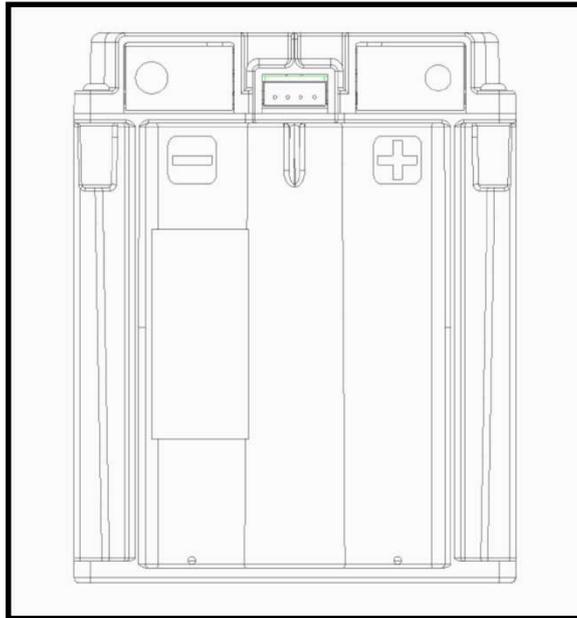
When tightening the terminal bolt, a torque of 20 N-m for the M8 bolt should be used.(30N-m for the M10 bolt) Because the modules have a very low ESR, total ESR will be affected by a ring lug, bus bar or torque. Therefore, it needs more attention to assemble the modules. And appropriate protection and sealing should be used on both module terminals to avoid shock hazards and corrosion.

User Manual

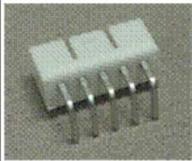
LSUM 051R3C 0166F EA

7. Output connector

- The part's No. of 4pin-connector is tabulated below.



<Fig. 4> Front view of the Module

LS UC Module side		Customer System side			
Lock Wafer		Crimp Terminal Housing		Crimp Terminal	
Image*		Image		Image	
Vendor (Part's No.)	Han-lim (LAB 1143-04**)	Vendor #1 (Part's No.)	Han-lim (CHB 1143-04***)	Vendor #1 (Part's No.)	Han-lim (CTB 1140****)
		Vendor #2 (Part's No.)	Molex (35156-040)	Vendor #2 (Part's No.)	Molex (50217)

* Image is used just reference only 4-pin type is actually used.

** http://en.han-lim.com/bbs/board.php?bo_table=products&wr_id=114

*** http://en.han-lim.com/bbs/board.php?bo_table=products&wr_id=113

**** http://en.han-lim.com/bbs/board.php?bo_table=products&wr_id=112

User Manual

LSUM 051R3C 0166F EA

- The output of 4pin-connector is tabulated below.

Pin #	Pin out	Signal
1	Temp. pin#1	470Ω ± 50% @25 °C*
2	Temp. pin#2	
3	Over Voltage Alarm	H - normal L - Alarm
4	GND	

* Resistance to temperature chart for the appendix I

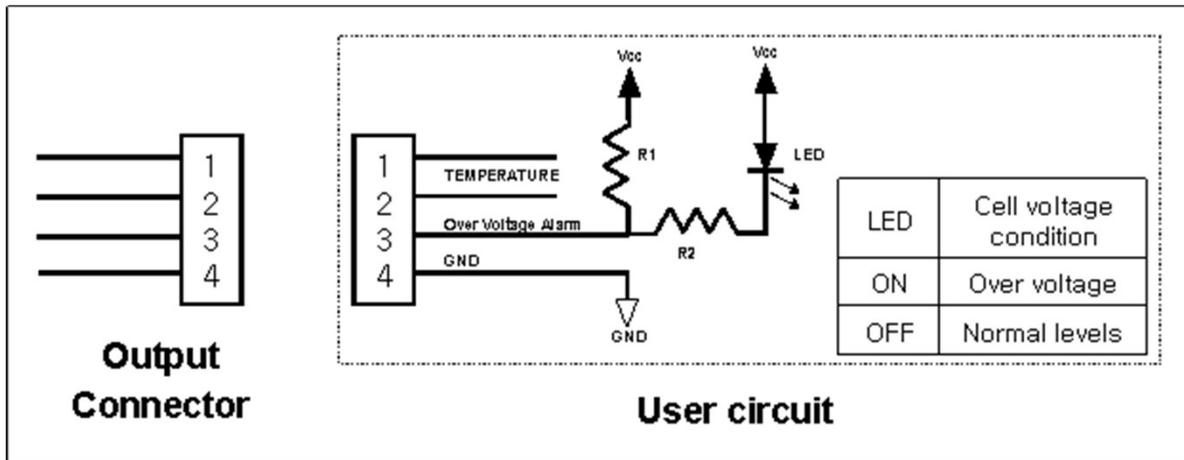
Pin 4 is connected with monitoring connector output signals receiver circuit's ground. The output signals are isolated from the capacitor voltage and from chassis ground. The recommended voltage is 5V DC.

When a cell in the module goes into over voltage condition, pin 3 has alarm signal. When every cell voltage is not over voltage state, the output of Pin 3 is high. If any cell in the module is exceeding normal voltage, the voltage balancing circuit becomes active and starts to discharge the cell to become normal voltage range. Then the output of Pin 3 goes low. At this time, user should stop charging. However, in order to use the signal, the user needs to attach a pull-up resistor(typically 1kΩ) to pin 3 and a 5V supply.

When the cell voltage is below the threshold, the output of Pin 3 goes high. And if the cell voltage is drop more, the balancing circuit becomes inactive and the cell stop discharging. It is possible that the output of Pin 3 is indicated by LED. The output signal receiver circuit is as following.

User Manual

LSUM 051R3C 0166F EA



<Fig. 5> Typical output signal receiver circuit to the Output connector

Pin 1-2 are connected with a PTC thermistor for temperature monitoring. According to temperature variation in the module, the resistance of the thermistor is determined. The resistance is approximately $470\Omega \pm 50\%$, when the internal temperature in the module is $25\text{ }^{\circ}\text{C}$.

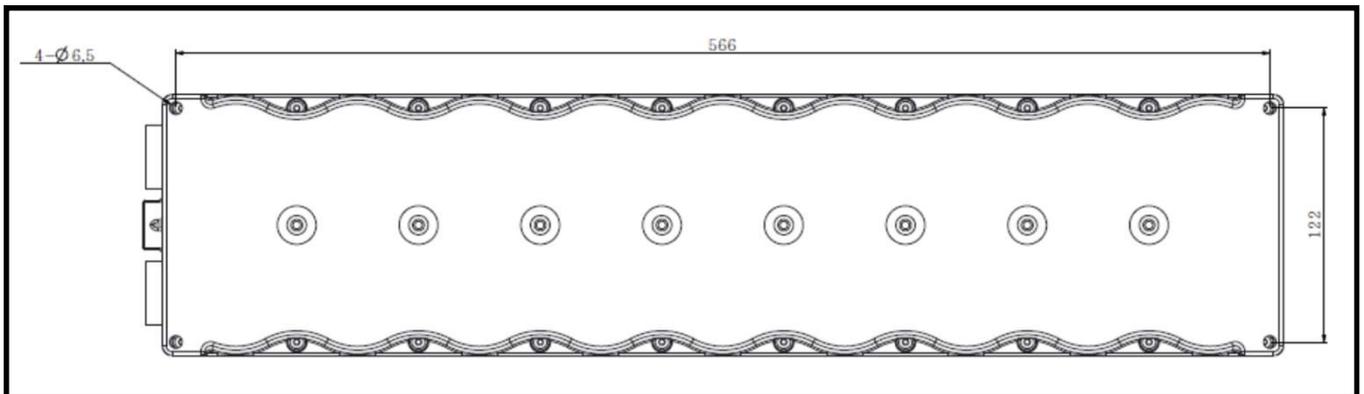
User Manual

LSUM 051R3C 0166F EA

8. Mounting

The modules should not be mounted in locations where they are directly exposed to the environment.

- <Fig. 6> shows the mounting positions of the module.



<Fig. 6> Mounting Positions

User Manual

LSUM 051R3C 0166F EA

9. Maintenance

Power Rating

The rated voltage of the module is max 51.3V. If the applied voltage is over 51.3V, charging the module should be stopped. And the allowable low voltage level of the module depends on the user's requirements, but full discharging to 0V does not affect the module performance.

Temperature

The module has its optimal operating temperature range of -40 to 65. Over 70°C, charging and discharging should be stopped to expect its performance and life cycle.

Do not expose to direct sunlight

For installation do not make the module expose to direct sunlight due to temperature increase inside the module.

Maintenance

The module has its expected life cycle over 10years at rated voltage and +25°C. However the life cycle of the module may be decreased in high temperature condition or over voltage charging.

If following abnormal module performances are detected, operation should be stopped and checking the electrical & mechanical connections is recommended.

- Monitoring high temperature in normal operating conditions
- Internal resistance increase or initial voltage drop increase
- Deformation of the module case

User Manual

LSUM 051R3C 0166F EA

10. Contact Information

LS Ultracapacitor

LS Mtron

6F, LS Mtron Hi-Tech Center, 39, LS-Ro, 116beon-gil, Dongan-gu, Anyang-si,
Gyeonggi-do 431-831, Korea

Tel. +82-31-8045-9579

Fax. +82-31-8045-9544

E-mail. ultracapacitor@lsmtron.com

User Manual

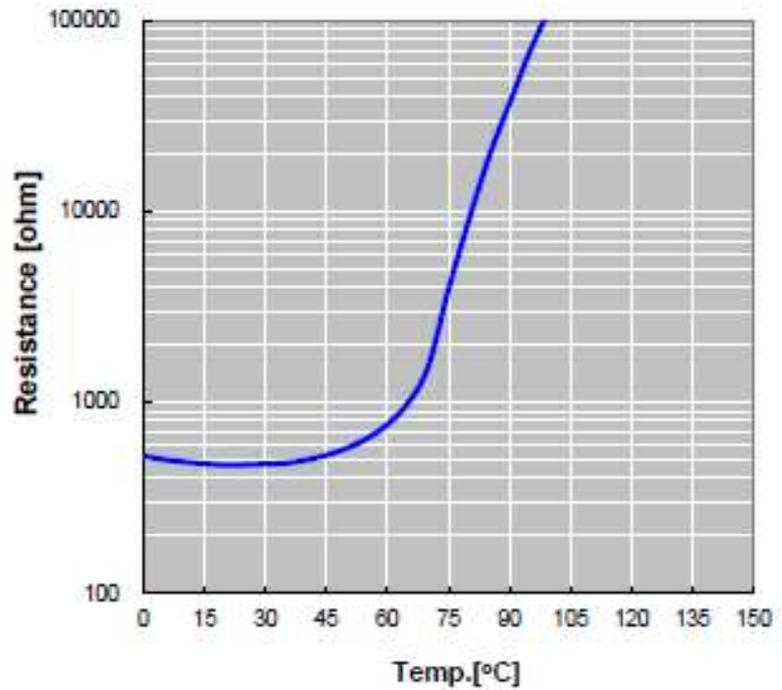
LSUM 051R3C 0166F EA

Appendix I

● DATA [Reference Only]

온도 [°C]	Resistance [ohm]
0	622
5	500
10	487
15	478
20	469
25	470
30	476
35	480
40	498
45	528
50	574
55	647
60	768
65	987
70	1632
75	3880
80	8934
85	19347
90	36595
95	68392
100	116318
105	189903
110	315151
115	524433
120	813036
125	1268220
130	
135	
140	
145	
150	

R-T curve



User Manual

LSUM 051R3C 0166F EA

Appendix II

Drawing

