TEST REPORT

위변조방지/진위확인 www.docuqr.com

1. Report No. : PTL-TR-21-0214
2. Client : LS Materials Co.,Ltd.
   Address : 6F, LS Mtron Hi-tech center, 39, LS-ro, 116Beon-gil, Dongan-gu, Anyang-si, Gyeonggi-do, Korea, 431-831
3. Product : Ultracapacitor module
4. Model : LSUM YJ Series
5. Serial number : N/A
6. Test method : IEC 60529:2013 Degrees of protection provided by enclosures (IP Code)
7. Date of test : 2021. 05. 26 ~ 2021. 05. 27
8. Location of Test : ■ Permanent Testing Lab. □ On Site Testing
9. Test result : Page 7, 10
10. Use of report : Validation
11. Testing environment : (23 ± 3) ℃, (47 ± 6) % R.H.

Affirmation	Tested by Name : Young Gil Park (Signature)	Technical Manager Name : Suk Ryeol Cho (Signature)

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The above testing certificate is the accredited test result by Korea Laboratory Accreditation Scheme, which signed the ILAC-MRA

2021. 06. 01

Accredited by KOLAS, Republic of KOREA

PTL Co., Ltd.

※ The test report is related to our KS Q ISO/IEC 17025 and KOLAS accreditation.

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History of report

Date	History	Remarks
June 01, 2021	Originally issued	-

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1. Test laboratory

1) Name of test laboratory : PTL Co., Ltd.

2) Address : 3-3, Neummal-gil, Yanggam-myeon,
Hwaseong-si, Gyeonggi-do, Republic of Korea

2. Sample

2.1 Sample description

1) Client : LS Materials Co.,Ltd.

2) Manufacturer : LS Materials Co.,Ltd.

3) Product : Ultracapacitor module

4) Model : LSUM YJ Series

5) Serial number : N/A

6) Sample quantity : 1 EA

2.2. Sample picture

[Picture 1. Test Sample]

3. Test item

3.1 Test for protection against water

1) Date of test : 2021. 05. 26

2) Test method : IEC 60529:2013 Degrees of protection provided by enclosures (IP code)

3) Test condition : IPX5

4) Sample status : Non-packing / Non-operation

5) Sample check : After the test (Visual check)

6) Sample quantity : 1 EA

7) Test method

① Fix the sample on the shelf of waterproof tester.

② Adjust the spray nozzle of the waterproof test at a distance of (2.5 ~ 3) m from the sample's surface.

③ The test is carried out according to the conditions in [Table 1. Test for protection against water condition].

④ After the test, at the standard atmospheric conditions check whether penetrates water the test sample internal.

8) Test condition

Dimension of spray nozzle	Distance of spray nozzle to sample's surface	Flow rate	Test time
mm	m	L/min	min
6.3	2.5 ~ 3	12.5 ± 5 %	3

[Table 1. Test for protection against water condition]

9) Test picture

[Picture 2. Set up]

[Picture 3. Test distance_1]

[Picture 4. Test distance_2]

[Picture 5. Flow rate]

[Picture 6. During the test]

[Picture 7. Test time]

10) Test equipment

Equipment name	Model	Manufacturer	Next calibration date	Calibration Company
Waterproof tester	PTL-USER-001	SEJONG FA	-	-
Turbine flowmeter	FTT-020-S 20A	AUTO FLOW	2022. 05. 18	SICT
Tape measure	KMC-34	KOMELON	2022. 05. 08	SICT
Stop watch	HS-3	CASIO	2022. 05. 11	SICT
Temperature & Humidity recorder	MHB-382SD	LUTRON	2022. 05. 06	SICT

[Table 2. Test for protection against water equipment]

11) Test result

Division	Check list	Test result
Visual	Check for water penetration inside the sample	No penetration of water (Appendix 1. Visual check)

[Table 3. Test for protection against water result]

3.2 Tests for protection against solid foreign objects

1) Date of test : 2021. 05. 26 ~ 2021. 05. 27

2) Test method : IEC 60529:2013 Degrees of protection provided by enclosures (IP code)

3) Test conditions : IP6X

4) Sample status : Non-packing / Non-operation

5) Sample check : After the test (Visual check)

6) Sample quantity : 1 EA

7) Test method

① Before the test, at the standard atmospheric conditions

check the visual test sample.

② The test sample put the dust tester.

③ The test is carried out according to the conditions in

[Table 4. Tests for protection against solid foreign objects condition]

④ After the test, at the standard atmospheric conditions

check whether penetrates dust the test sample internal.

8) Test condition

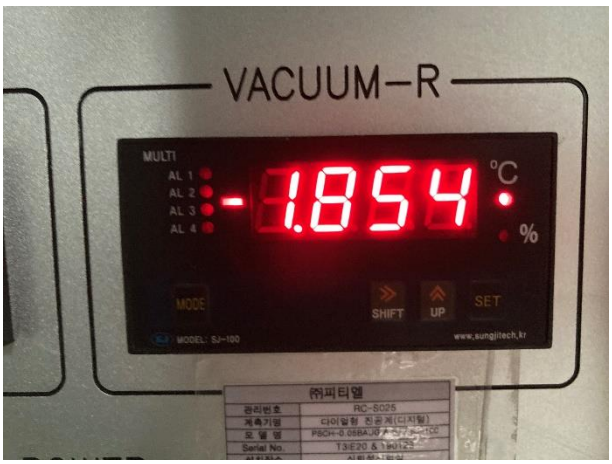
Dust type	Density of dust	Decompression	Test time
	kg/m^3	kPa	h
Talc	2	2 or less	8

[Table 4. Tests for protection against solid foreign objects condition]

9) Test picture

[Picture 8. Sample setup_1]

[Picture 9. Sample setup_2]



[Picture 10. Decompression]

[Picture 11. Sample the after test]

10) Test equipment

Equipment name	Model	Manufacturer	Next calibration date	Calibration company
Dust tester	JFMD-004	JFM Engineering	-	-
Positive displacement flow meter for gas	G4R	DEASUNG	2022. 03. 24	SICT
Dial vacuum gauge (Digital)	PSCH-0.05BAIG	Sensys	2022. 03. 25	SICT
Temperature & Humidity recorder	MHB-382SD	LUTRON	2022. 05. 06	SICT

[Table 5. Tests for protection against solid foreign objects used equipment]

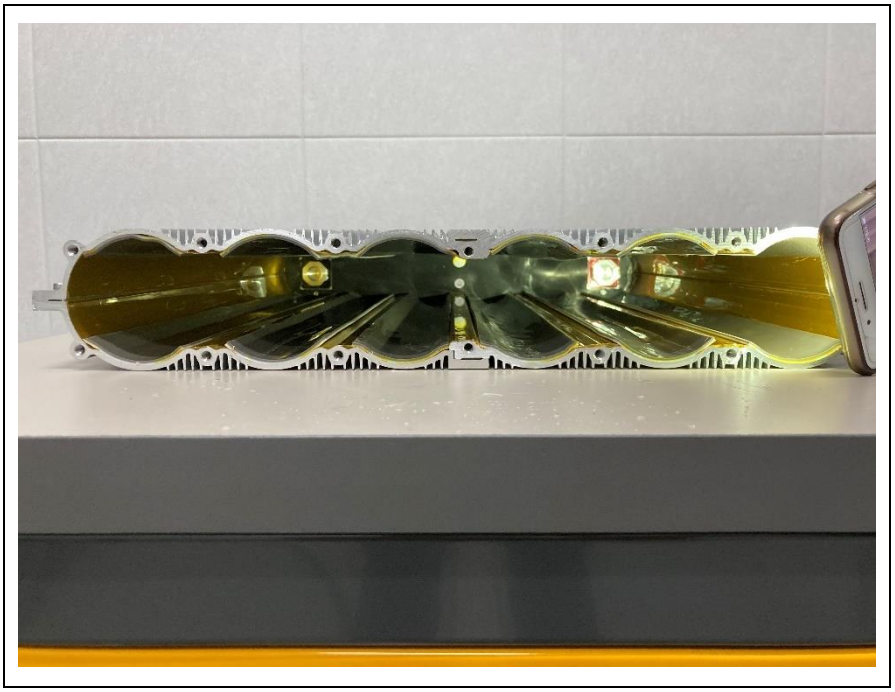
11) Test result

Division	Check list	Test result
Visual	Check for dust penetration Inside the sample	No penetration of dust (Appendix 1. Visual check)

[Table 6. Tests for protection against solid foreign objects result]

Appendix 1. Visual check

- Test for protection against water



[Picture 12. Inside the sample]

- Tests for protection against solid foreign objects

[Picture 13. Inside the sample]

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