



Test Report issued under the responsibility of:



TEST REPORT
IEC 60086-4
Primary batteries
Part 4: Safety of lithium batteries

Report Number..... : CN21PI12 002

Date of issue..... : 2023-08-29

Total number of pages : 9 pages

Name of Testing Laboratory
preparing the Report : TÜV Rheinland (Shenzhen) Co., Ltd.

Applicant's name : RADIANQBIO Co.,Ltd.

Address..... : (Gasandong, Halla-Sigma Valley 1609~1611), 53, Gasan digital 2-ro, Geumcheon-gu, Seoul 08588, Republic of Korea

Test specification:

Standard : IEC 60086-4: 2019

Test procedure : CB Scheme

Non-standard test method : N/A

Test Report Form No. : IEC60086_4C

Test Report Form(s) Originator : DEKRA

Master TRF : Dated 2019-06-19

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General disclaimer:

The test results presented in this report relate only to the object tested.

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Test item description :	Battery Pack	
Trade Mark :		
Manufacturer	Same as applicant	
Model/Type reference	BT-303W, BT-303R, BT-303O	
Ratings	DC 12V, 4.2Ah	
Responsible Testing Laboratory (as applicable), testing procedure and testing location(s):		
<input checked="" type="checkbox"/>	CB Testing Laboratory:	TÜV Rheinland (Shenzhen) Co., Ltd.
Testing location/ address :	1F East & 3F West -4F, Cybio Technology Building No.1, No.16 Kejibei 2nd Road, High-Tech Industrial Park North Nanshan District, 518057, Shenzhen, China	
Tested by (name, function, signature) :	Revan Dai (Engineer)	
Approved by (name, function, signature) ... :	Kaman Qiu (Reviewer)	
<input type="checkbox"/>	Testing procedure: CTF Stage 1:	
Testing location/ address :		
Tested by (name, function, signature) :		
Approved by (name, function, signature) ... :		
<input type="checkbox"/>	Testing procedure: CTF Stage 2:	
Testing location/ address :		
Tested by (name + signature)		
Witnessed by (name, function, signature) . :		
Approved by (name, function, signature) ... :		
<input type="checkbox"/>	Testing procedure: CTF Stage 3:	
<input type="checkbox"/>	Testing procedure: CTF Stage 4:	
Testing location/ address :		
Tested by (name, function, signature) :		
Witnessed by (name, function, signature) . :		
Approved by (name, function, signature) ... :		
Supervised by (name, function, signature) :		

List of Attachments (including a total number of pages in each attachment):

Attachment 1: Test data (1 page)

Attachment 2: Photo Documentation (4 pages) and see original report CN21PI12 001.

Summary of testing:**Tests performed (name of test and test clause):**

6.5.5 Test I: Abnormal charging

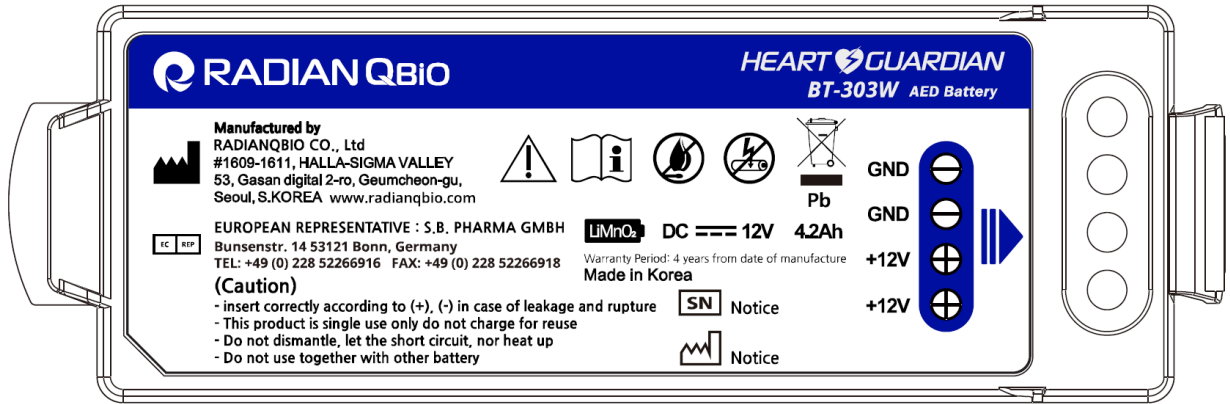
Testing location:**TÜV Rheinland (Shenzhen) Co., Ltd.**1F East & 3F West -4F, Cybio Technology Building
No.1, No.16 Kejibei 2nd Road, High-Tech Industrial
Park North Nanshan District, 518057, Shenzhen,
China**Summary of compliance with National Differences (List of countries addressed):**

N/A

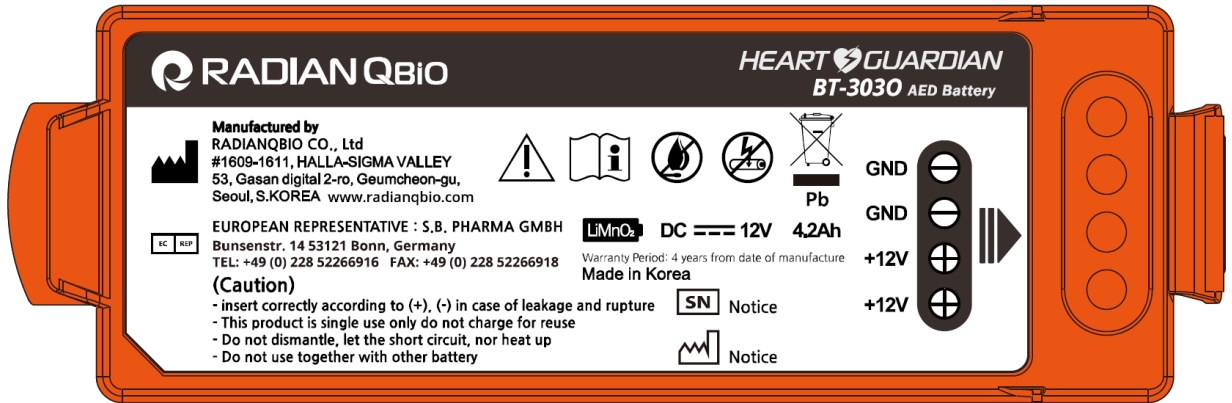
 The product fulfils the requirement of EN IEC 60086-4: 2019

Copy of marking plate:

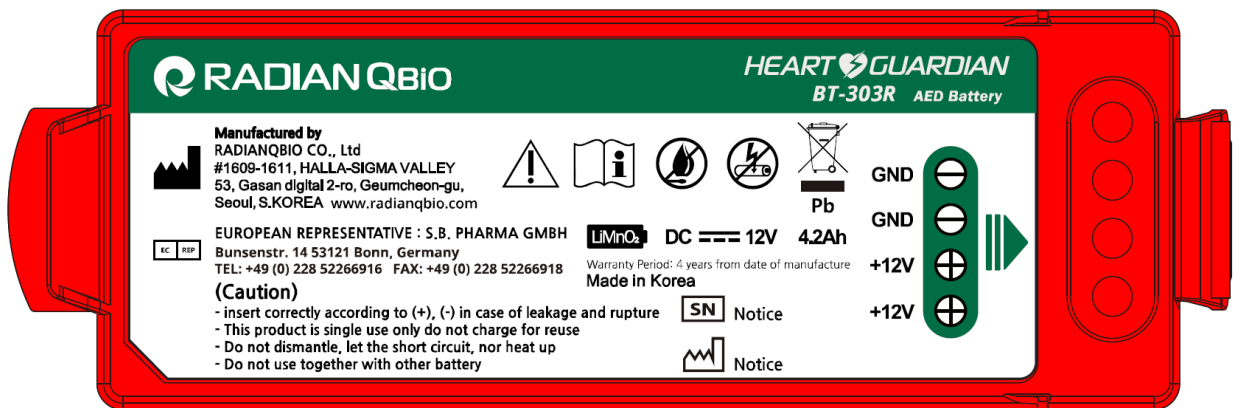
The artwork below may be only a draft. The use of certification marks on a product must be authorized by the respective NCBs that own these marks.



Label for model BT-303W



Label for model BT-303O



Label for model BT-303R

Test item particulars:	
Classification of installation and use: To be defined in final product	
Supply Connection: DC terminal	
Weight of Battery: Approx. 300g	
Possible test case verdicts:	
- test case does not apply to the test object.....: N/A	
- test object does meet the requirement.....: P (Pass)	
- test object does not meet the requirement.....: F (Fail)	
Testing:	
Date of receipt of test item: 2023-08-02	
Date (s) of performance of tests: 2023-08-02 to 2023-08-10	
General remarks:	
"(See Enclosure #)" refers to additional information appended to the report. "(See appended table)" refers to a table appended to the report.	
Throughout this report a <input type="checkbox"/> comma / <input checked="" type="checkbox"/> point is used as the decimal separator.	
Manufacturer's Declaration per sub-clause 4.2.5 of IEC60086-2:	
The application for obtaining a CB Test Certificate includes more than one factory location and a declaration from the Manufacturer stating that the sample(s) submitted for evaluation is (are) representative of the products from each factory has been provided	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> Not applicable
When differences exist; they shall be identified in the General product information section.	
Name and address of factory (ies) : 1. MPLUS ELECTRONICS CO., LTD. 152-10, Muchon-ro, Bubal-eup, Icheon-si, Gyeonggi-do, Republic of Korea 2. POWERLINX Co., Ltd. (Gocheon-dong, SEONGWOO VENTUREVILLE), A-101, 11, Hanbatdeul 1-gil, Uiwang-si, Gyeonggi-do 16073, Republic of Korea	

General product information and other remarks:

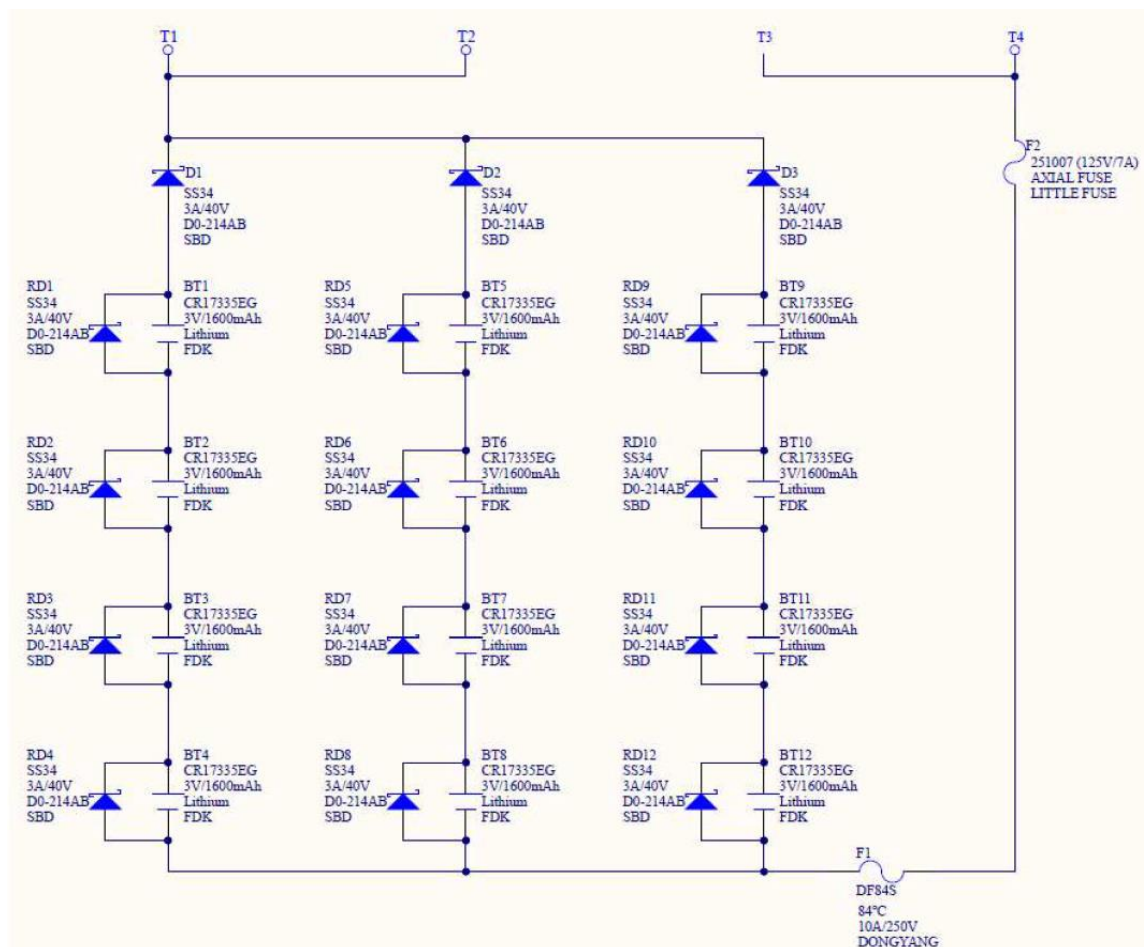
This test report shall be read in conjunction with the original report CN21PI12 001.

The main features of the battery are shown as below:

Model	Rated capacity	Nominal voltage	Maximum discharge current	Discharge cut-off voltage	Abnormal charging current	Dimensions
BT-303W, BT-303R, BT-303O	4200mAh	12V	3000mA	10.4V	25mA	H*W*L=24.6mm* 59.2mm*181.58

Construction:

See original report CN21PI12 001.

Circuit diagram:


Description of main change(s):

1. Changed the diode type from "SB-240" to "**SS34**".
2. Updated the circuit diagram, see page 6 for details.
3. Add a factory "**POWERLINX Co., Ltd.**" and address "**(Gocheon-dong, SEONGWOO VENTUREVILLE), A-101, 11, Hanbatdeul 1-gil, Uiwang-si, Gyeonggi-do 16073, Republic of Korea**", see page 5 for details.
4. Updated the label, see page 4 for details.
5. Changed the model name from "BT-303 W" to "**BT-303W**", "BT-303 R" to "**BT-303R**" and "BT-303 O" to "**BT-303O**".

For the above described change(s) the following test item was considered to be necessary:

Change	Testing	Comments	Result
1	6.5.5 Test I: Abnormal charging	Changed the diode model name and reconsidered the abnormal charging.	P
2, 3, 4, 5	N/A	No related test were considered necessary.	P

History of amendments and modifications:

Ref. No. CN21PI12 001, dated 2021-09-01 (original test report)

Ref. No. CN21PI12 002, dated 2023-08-29 (1st modification)

IEC 60086-4			
Clause	Requirement + Test	Result - Remark	Verdict
6	TESTING AND REQUIREMENTS		P
6.1	General		P
6.1.1	Test application matrix	(See table 2 in the standard)	P
	s: cell or single cell battery		N/A
	m: multi cell battery	Multi cell battery	P
6.1.3	Ambient temperature (°C)	20±5°C	P
6.1.4	Parameter measurement tolerances		P
6.1.5	Predischarge	Predischarged samples provided by manufacturer	P
6.1.6	Additional cells		P
6.5	Tests for reasonably foreseeable misuse		P
6.5.5	Test I: Abnormal charging	(See appended table 1 and table 6.5.5)	P

IEC 60086-4			
Clause	Requirement + Test	Result - Remark	Verdict

TABLE 1 (clause 6.4.1 – 6.5.9)					P
Tests	Cell / battery type	Discharge state	Number of test sample	Test result	Verdict
A to E	Cells and single cell batteries	Undischarged	10		N/A
		Fully discharged	10		N/A
	Multi-cell batteries	Undischarged	4		N/A
		Fully discharged	4		N/A
F	Cells and single cell batteries	Undischarged	5		N/A
		Fully discharged	5		N/A
	Multi-cell batteries	Undischarged	5 component cells		N/A
		Fully discharged	5 component cells		N/A
G	Cells and single cell batteries	Undischarged	5		N/A
		Fully discharged	5		N/A
	Multi-cell batteries	Undischarged	5 component cells		N/A
		Fully discharged	5 component cells		N/A
H	Cells and single cell batteries	Fully discharged	10		N/A
	Multi-cell batteries	Fully discharged	10 component cells		N/A
I to K	Cells and single cell batteries	Undischarged	5		N/A
	Multi-cell batteries	Undischarged	5	NV, NE, NF (for test J); NE, NF (for test I & K)	P
L	Cells and single cell batteries	Undischarged	20		N/A
M	Cells and single cell batteries	50 % pre-discharged	20		N/A
		75 % pre-discharged	20		N/A

Supplementary information:

NC: No short-circuit

NE: No explosion

NF: No fire

NL: No leakage

NR: No rupture

NT: No excessive temperature rise

NV: No venting

--End of Report--

6.5.5	TABLE: Test I: Abnormal charging (Undischarged)				P
Cell No.	OCV at start of test, (Vdc)	Test current, (A)	Test duration, (Mins)	Results	
A003530880-001	12.74	0.075	8400	P	
A003530880-002	12.74	0.075	8400	P	
A003530880-003	12.69	0.075	8400	P	
A003530880-004	12.73	0.075	8400	P	
A003530880-005	12.71	0.075	8400	P	
Supplementary information: - No explosion and no fire.					

Product: Battery Pack

Type Designation: BT-303W, BT-303R, BT-303O



Figure 1. Front view of battery

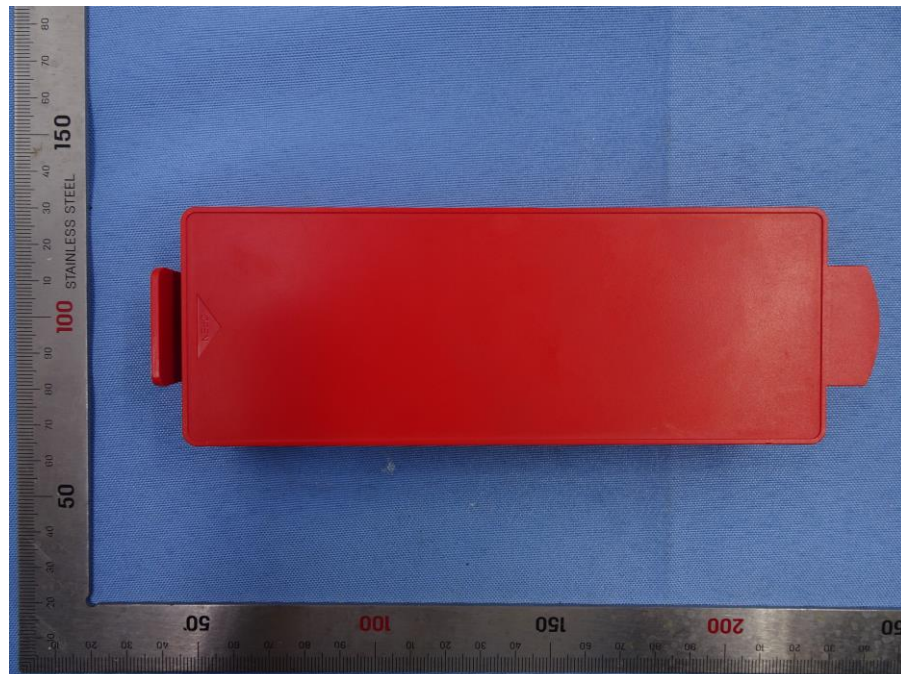


Figure 2. Back view of battery

Product: Battery Pack

Type Designation: BT-303W, BT-303R, BT-303O

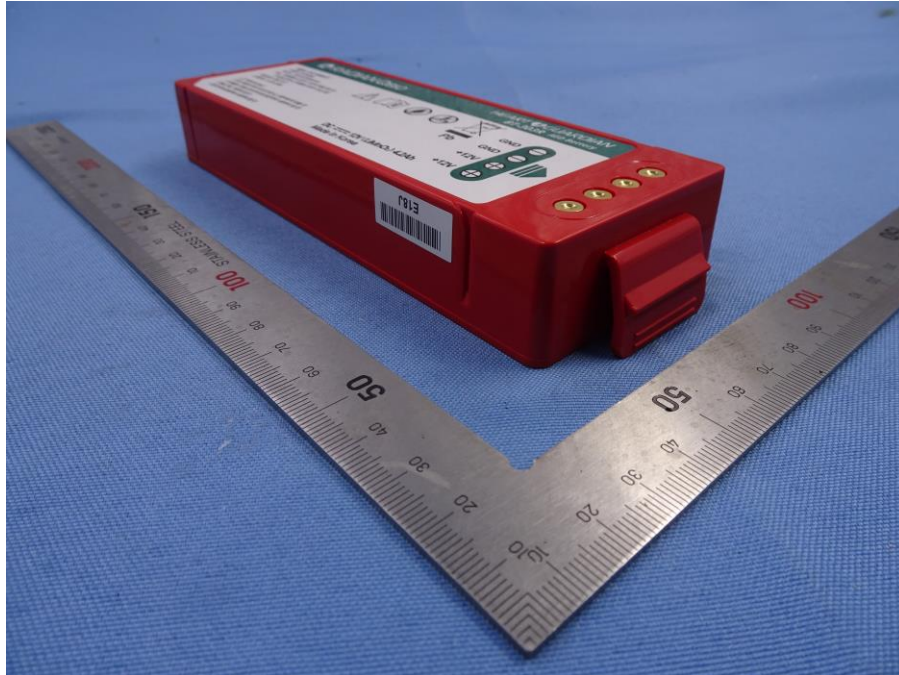


Figure 3. Side view of battery

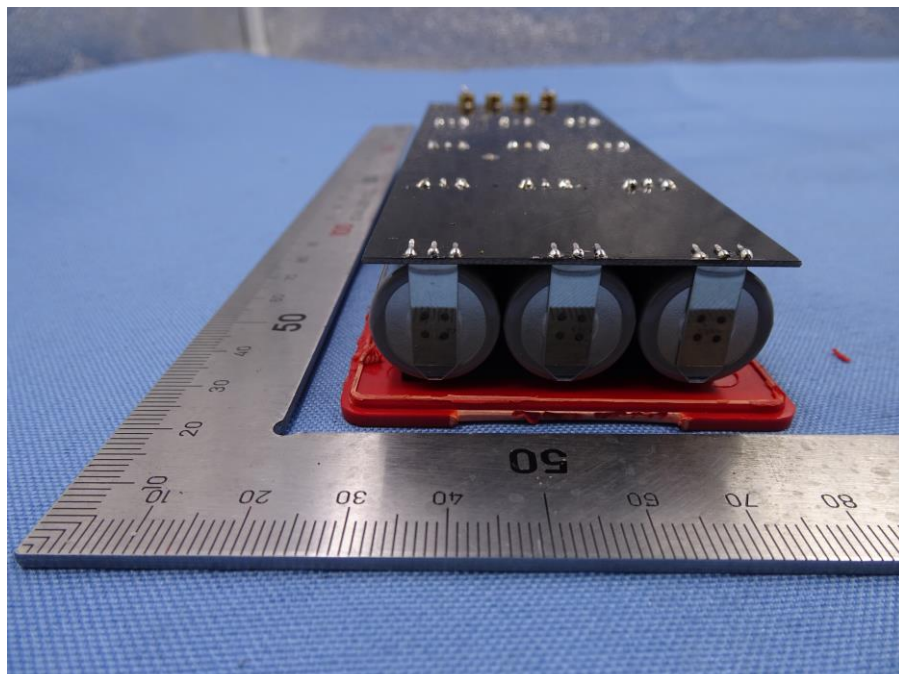


Figure 4. Internal view 1 of battery

Product: Battery Pack

Type Designation: BT-303W, BT-303R, BT-303O

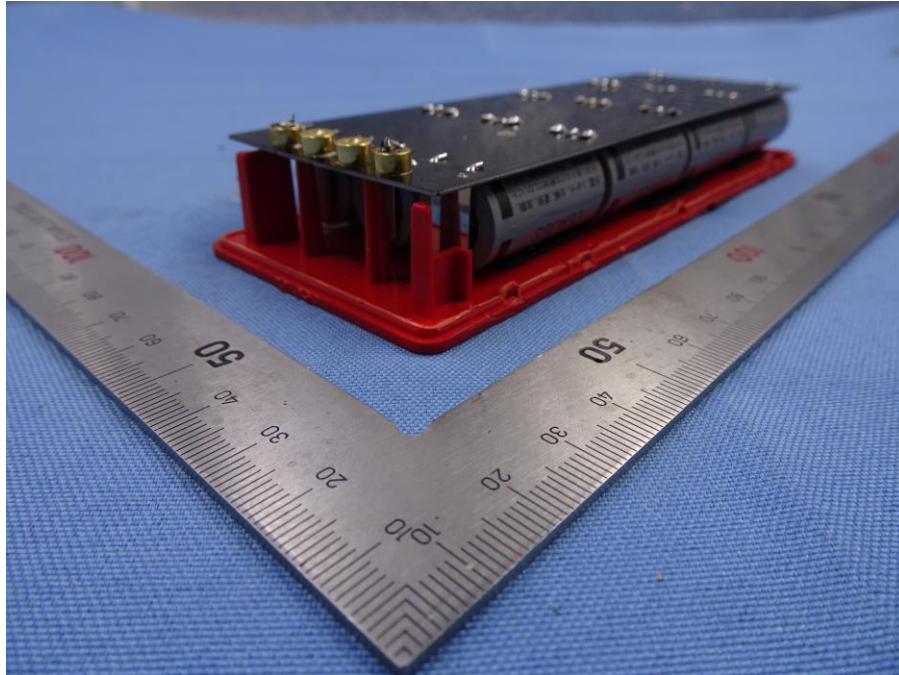


Figure 5. Internal view 2 of battery

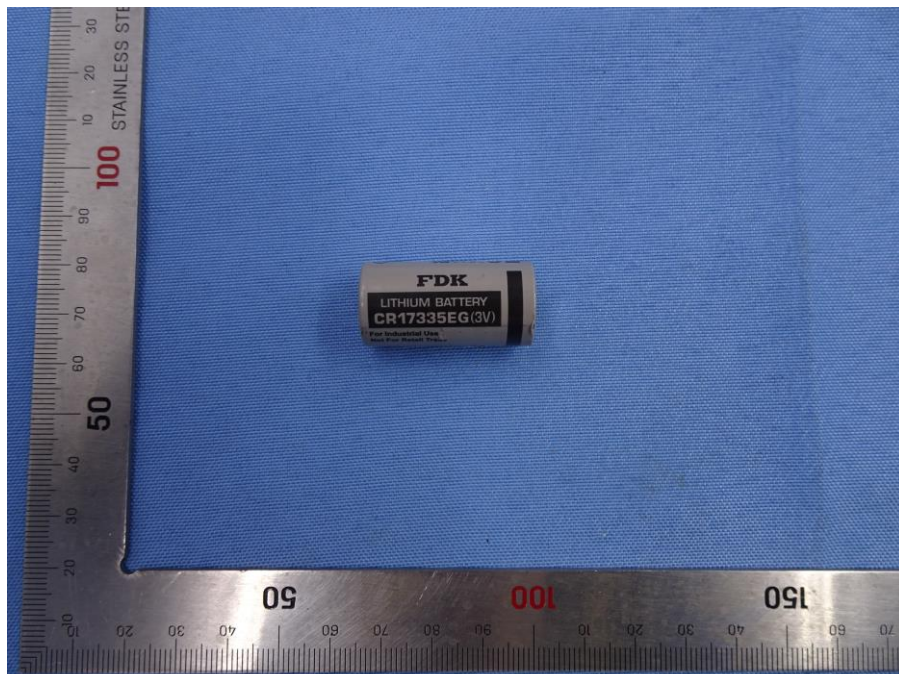


Figure 6. Front view of cell

Product: Battery Pack

Type Designation: BT-303W, BT-303R, BT-303O

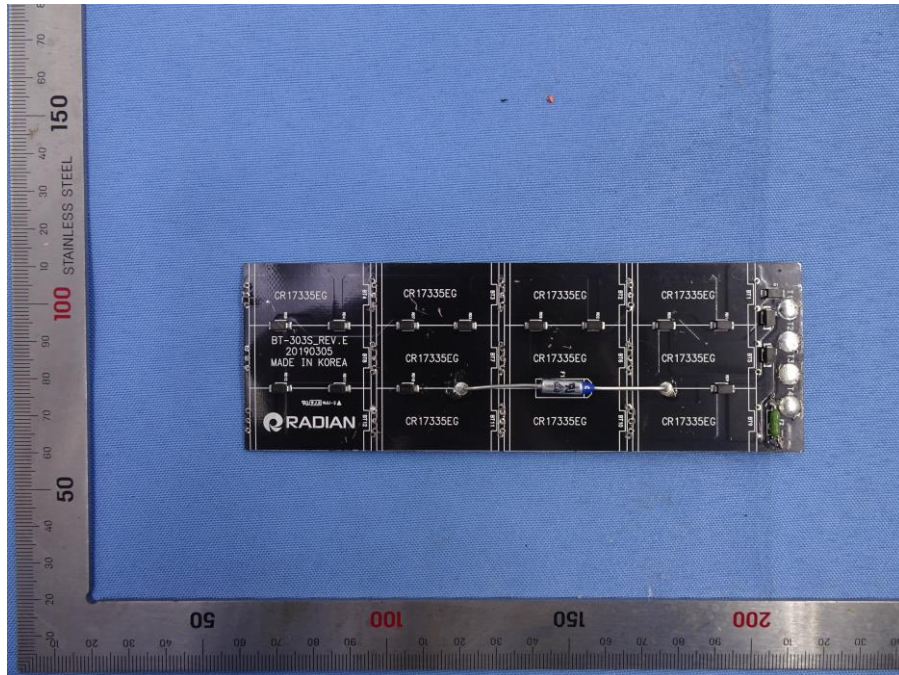


Figure 7. Front view of PCB

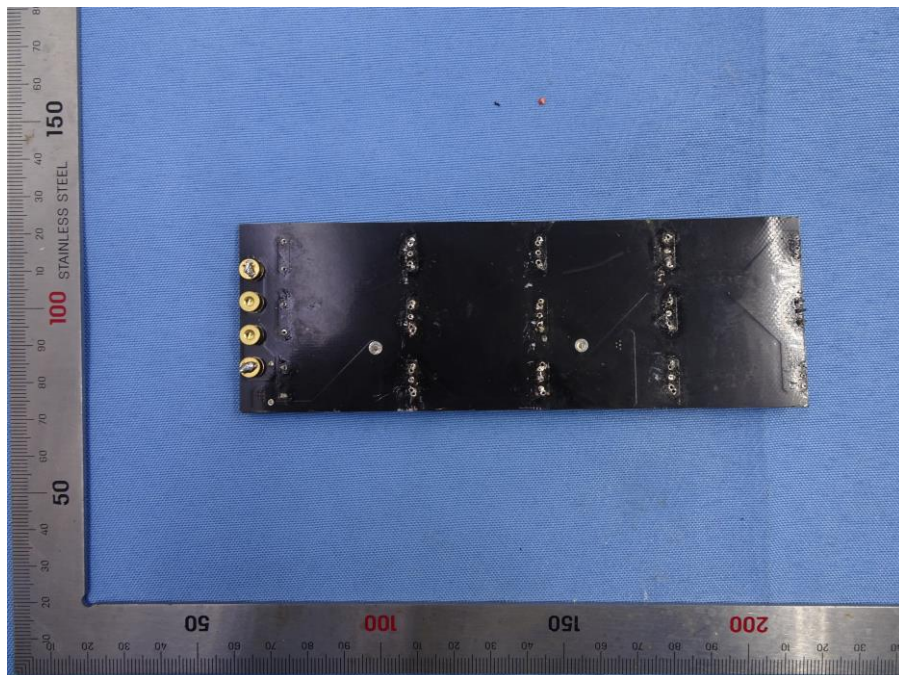


Figure 8. Back view of PCB