



EMC TEST REPORT

For

SHENZHEN GMCELL TECHNOLOGY CO., LTD

Lithium Manganese Dioxide Button Cell

Test Model: CR2032

Additional Model No.: Please Refer to Page 9

Prepared for : SHENZHEN GMCELL TECHNOLOGY CO., LTD
Address : Hualian Panorama International Building, 27 District,
Bao'an, Shenzhen, China

Prepared by : Shenzhen LCS Compliance Testing Laboratory Ltd.
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Date of receipt of test sample : December 4, 2023
Number of tested samples : 1
Serial number : Prototype
Date of Test : December 4, 2023 to December 11, 2023
Date of Report : December 11, 2023





TEST REPORT

Report No.	: LCSA11203252E
Date of Issue	: December 11, 2023
Testing Laboratory Name	: Shenzhen LCS Compliance Testing Laboratory Ltd.
Address	: Room 101, 201, Building A and Room 301, Building C, Juji Industrial Park, Yabianxueziwei, Shajing Street, Bao'an District, Shenzhen, Guangdong, China
Testing Location/ Procedure	: Full application of Harmonised standards <input checked="" type="checkbox"/> Partial application of Harmonised standards <input type="checkbox"/> Other standard testing method <input type="checkbox"/>
Applicant's Name	: SHENZHEN GMCELL TECHNOLOGY CO., LTD
Address	: Hualian Panorama International Building, 27 District, Bao'an, Shenzhen, China
Test Specification	
Standard	: EN IEC 61000-6-3:2021 EN IEC 61000-6-1:2019
Test Report Form No	: LCSEMC-1.0
TRF Originator	: Shenzhen LCS Compliance Testing Laboratory Ltd.
Master TRF	: Dated 2011-03
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Test Item Description	: Lithium Manganese Dioxide Button Cell
Trade Mark	: GMCELL
Test Model	: CR2032
Result	: Positive

Compiled by:

Brody Xiong

Brody Xiong / File Administrator

Supervised by:

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Baron Wen / Technique principal

Approved by:

Gavin Liang

Gavin Liang / Manager





TEST REPORT

Test Report No.: LCSA11203252E	<u>December 11, 2023</u> Date of issue
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Test Model	: CR2032
EUT	: Lithium Manganese Dioxide Button Cell
Applicant	: SHENZHEN GMCELL TECHNOLOGY CO., LTD
Address	: Hualian Panorama International Building, 27 District, Bao'an, Shenzhen, China
Telephone	: /
Fax	: /
Manufacturer	: SHENZHEN GMCELL TECHNOLOGY CO., LTD
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Telephone	: /
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Factory	: SHENZHEN GMCELL TECHNOLOGY CO., LTD
Address	: Hualian Panorama International Building, 27 District, Bao'an, Shenzhen, China
Telephone	: /
Fax	: /

Test Result	Positive
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The test report merely corresponds to the test sample.
It is not permitted to copy extracts of these test result without the written permission of the test laboratory.





Revision History

Report Version	Issue Date	Revision Content	Revised By
000	December 11, 2023	Initial Issue	/





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1. TEST STANDARDS

The tests were performed according to following standards:

EN IEC 61000-6-3:2021: Electromagnetic compatibility (EMC) - Part 6-3: Generic standards - Emission standard for equipment in residential environments

EN IEC 61000-6-1:2019: Electromagnetic compatibility (EMC) - Part 6-1: Generic standards - Immunity standard for residential, commercial and light-industrial environments





2. SUMMARY OF STANDARDS AND RESULTS

2.1 Description of Standards and Results

The EUT have been tested according to the applicable standards as referenced below.

Description of Test Item	Standard	Limits	Result
Radiation disturbance (30MHz-1GHz)	EN IEC 61000-6-3:2021	Table 3	Pass
Electrostatic discharge	EN IEC 61000-6-1:2019	Table 1.4	Pass
Radio-frequency electromagnetic field	EN IEC 61000-6-1:2019	Table 1.2 & 1.3	Pass





2.2 Description of Test Modes

No	Title	Description
TM1	Discharging	Record

2.3 Description of Performance Criteria

Performance criteria A

The EUT shall continue to operate as intended during and after the test. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the EUT is used as intended. If the performance level is not specified by the manufacturer, this may be derived from the product description and documentation and what the user may reasonably expect from the equipment if used as intended.

Performance criteria B

The EUT shall continue to operate as intended after the test. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the EUT is used as intended. The performance level may be replaced by a permissible loss of performance. However, during the test degradation of performance is allowed but no change of actual operating state or stored data is allowed. If the minimum performance level or the permissible performance loss is not specified by the manufacturer, either of these may be derived from the product description and documentation and what the user may reasonably expect from the equipment if used as intended.

Performance criteria C

Temporary loss of function is allowed during the test, provided the function is self-recoverable or can be restored by the operation of the controls.





3. GENERAL INFORMATION

3.1 Description of Device (EUT)

EUT : Lithium Manganese Dioxide Button Cell
 Test Model : CR2032
 CR2025, CR2016, CR2032SC, CR2027, CR1025, CR1210, CR1216, CR1220, CR1225, CR1130, CR1616, CR1620, CR1632, CR2330, CR2325, CR2320, CR2430, CR2450, CR2477, CR123A, CR2, CR_P2, 2CR5, CR297
 Additional Model No. :
 Power Supply : Battery: 3V
 Highest Internal Frequency : Less than 108MHz

3.2 Support equipment List

The EUT was tested as an independent device.

3.3 Description of Test Facility

The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report acc. To CISPR 16 – 4 “Specification for radio disturbance and immunity measuring apparatus and methods – Part 4: Uncertainty in EMC Measurements” and is documented in the LCS quality system acc. To DIN EN ISO/IEC 17025. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

NVLAP Accreditation Code is 600167-0.
 FCC Designation Number is CN5024.
 CAB identifier is CN0071.
 CNAS Registration Number is L4595.

3.4 Measurement Uncertainty

Test Item	Measurement Uncertainty
Radiated Emission (30MHz to 1000MHz)	± 3.48 dB
Note: This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.	





4. MEASURING DEVICES AND TEST EQUIPMENT

Radiation disturbance (30MHz-1GHz)					
Equipment	Manufacturer	Model No	Serial No.	Cal Date	Due Date
EMI Test Software	Farad	EZ	/	/	/
EMI Test Software	AUDIX	E3	/	/	/
By-log Antenna	SCHWARZBECK	VULB9163	9163-470	2021-09-12	2024-09-11
Horn Antenna	SCHWARZBECK	BBHA 9120D	9120D-1925	2021-09-05	2024-09-04
EMI Test Receiver	R&S	ESR3	102311	2023-08-15	2024-08-14
Broadband Pre-amplifier	/	BP-01M18G	P190501	2023-06-09	2024-06-08
EMI Test Receiver	R&S	ESCI7	101173	2023-10-25	2024-10-24
By-log Antenna	SchwarzZBECK	VULB9163	01428	2023-09-05	2024-09-04

Electrostatic discharge					
Equipment	Manufacturer	Model No	Serial No.	Cal Date	Due Date
ESD Simulator	SCHLODER	SESD 230	604035	2023-07-17	2024-07-16

Radio-frequency electromagnetic field					
Equipment	Manufacturer	Model No	Serial No.	Cal Date	Due Date
MXG Vector Signal Generator	Agilent	E4438C	MY42081396(6G)	2023-06-09	2024-06-08
RF POWER AMPLIFIER	SKET	HAP_0306G-50W	/	2023-06-09	2024-06-08
RF POWER AMPLIFIER	OPHIR	5225R	1052	2023-06-09	2024-06-08
RF POWER AMPLIFIER	OPHIR	5273F	1019	2023-06-09	2024-06-08
Stacked Broadband Log Periodic Antenna	SCHWARZBECK	STLP 9128	9128ES-145	/	/
Stacked Mikrowellen Log.-Per Antenna	SCHWARZBECK	STLP 9149	9149-484	/	/
RS Electric field probe	narda	EP601	611WX80208	2023-06-09	2024-06-08





5. EMISSION TEST RESULTS (EMI)

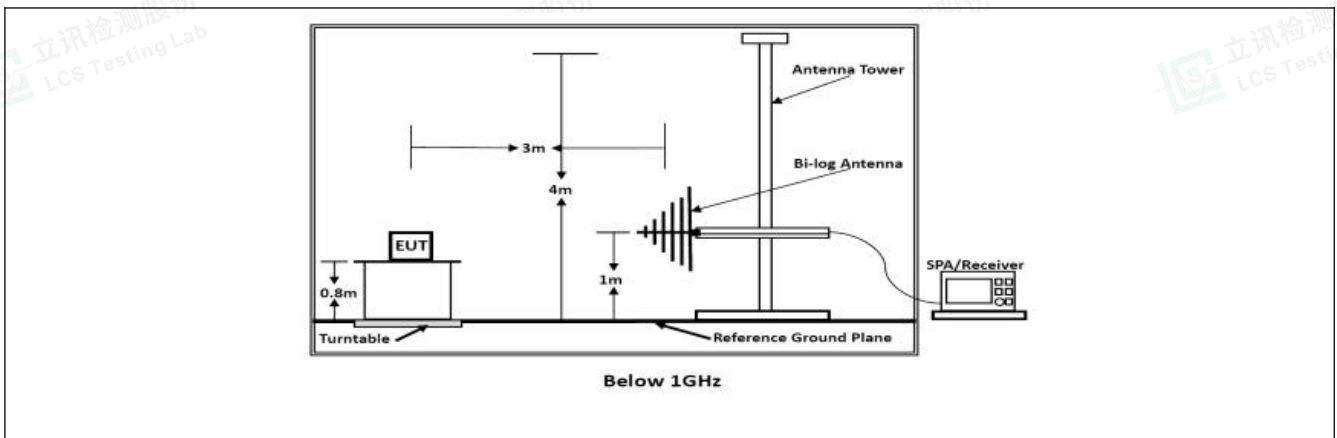
5.1 Radiation disturbance (30MHz-1GHz)

Test Requirement:	Table 3		
Test Limit:	Frequency range	Limits at 10m	Limits at 3m
	30 MHz to 230 MHz	30 dB(uV/m) quasi-peak	40 dB(uV/m) quasi-peak
	230 MHz to 1 000 MHz	37 dB(uV/m) quasi-peak	47 dB(uV/m) quasi-peak
	At transitional frequencies the lower limit applies.		
Test Method:	CISPR 16-2-3 Clause 7.3		
Procedure:	An initial pre-scan was performed in the chamber using the spectrum analyser in peak detection mode. Quasi-peak measurements were conducted based on the peak sweep graph. The EUT was measured by BiConiLog antenna with 2 orthogonal polarities. Level=Read Level + Antenna Factor + Cable Loss - Preamp Factor		

5.1.1 E.U.T. Operation:

Operating Environment:			
Temperature:	26.4 °C	Humidity:	54.2 %
Pre test mode:	TM1		
Final test mode:	TM1		

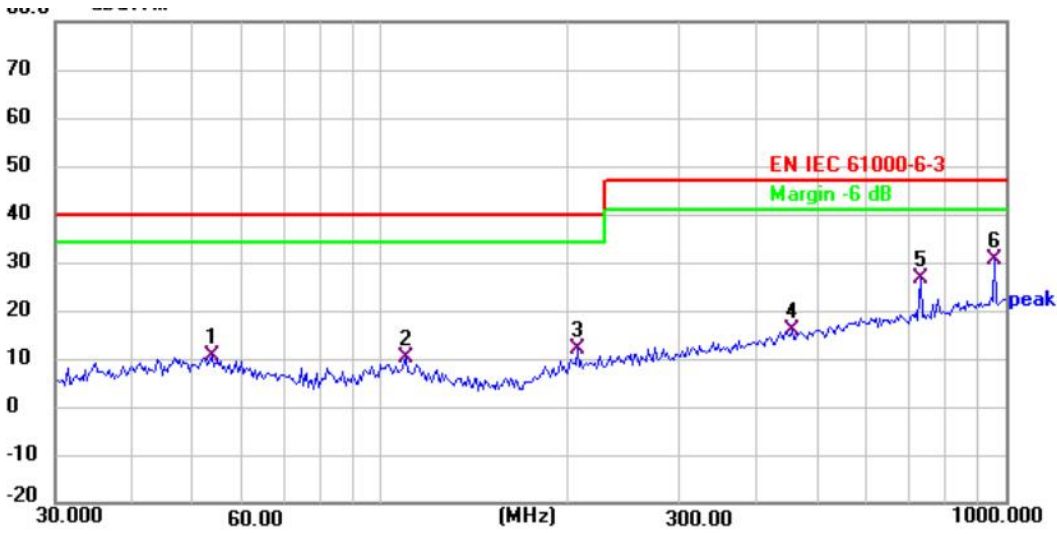
5.1.2 Test Setup Diagram:





5.1.3 Test Data:

TM1 / Polarization: Horizontal

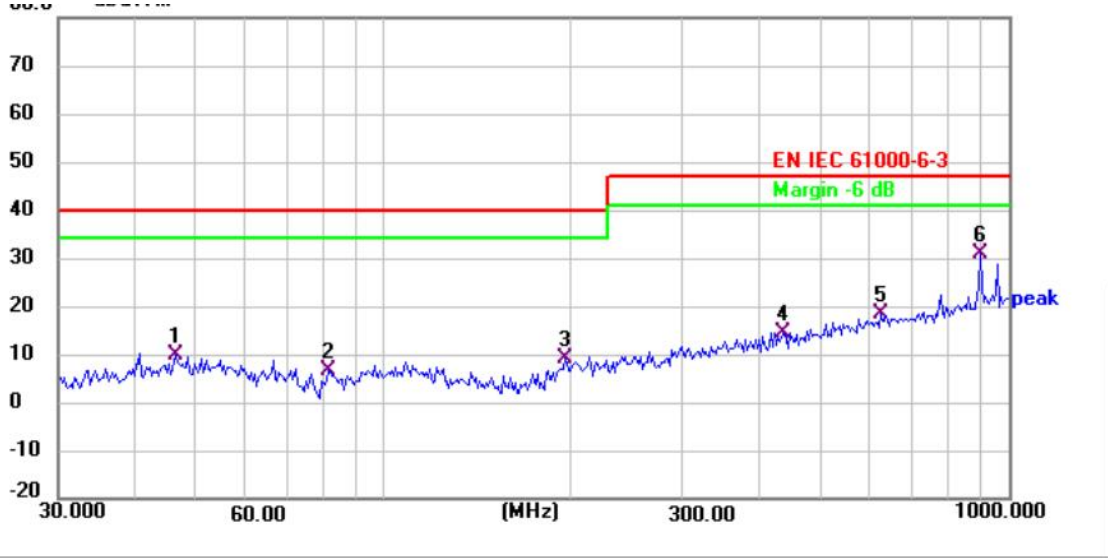


lo.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark
1	53.3794	26.89	-16.44	10.45	40.00	-29.55	QP			P	
2	109.3110	28.38	-18.19	10.19	40.00	-29.81	QP			P	
3	205.7460	29.70	-17.77	11.93	40.00	-28.07	QP			P	
4	455.1887	28.90	-12.93	15.97	47.00	-31.03	QP			P	
5	728.8971	35.81	-9.23	26.58	47.00	-20.42	QP			P	
6 *	958.7134	36.95	-6.34	30.61	47.00	-16.39	QP			P	





TM1 / Polarization: Vertical



lo.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark
1	46.3806	25.91	-15.91	10.00	40.00	-30.00	QP			P	
2	81.9477	28.25	-21.54	6.71	40.00	-33.29	QP			P	
3	194.4985	27.44	-18.49	8.95	40.00	-31.05	QP			P	
4	436.3956	27.83	-13.29	14.54	47.00	-32.46	QP			P	
5	624.4897	28.61	-10.11	18.50	47.00	-28.50	QP			P	
6	899.9576	37.63	-6.77	30.86	47.00	-16.14	QP			P	





6. IMMUNITY TEST RESULTS (EMS)

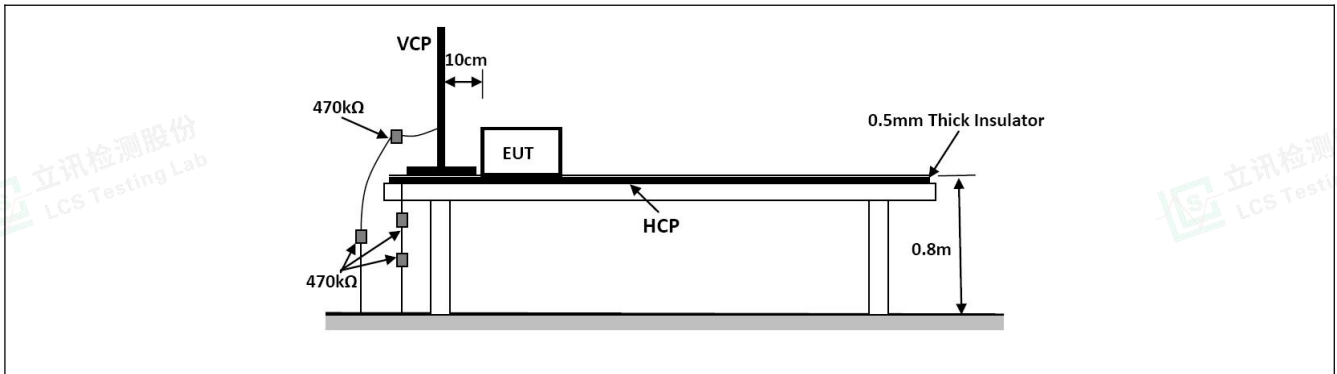
6.1 Electrostatic discharge

Test Requirement:	Table 1.4
Test Method:	EN 61000-4-2: 2009
Procedure:	Discharge Impedance: 330 Ω / 150 pF Discharge Voltage: Air Discharge: 8 kV; Contact Discharge: 4 kV; VCP/HCP: 4 kV. Polarity: Positive & Negative Number of Discharge: Minimum 10 times at each test point Discharge Mode: Single Discharge Discharge Period: 1 second minimum
Performance Criteria:	B

6.1.1 E.U.T. Operation:

Operating Environment:			
Temperature:	22.1 °C	Humidity:	53 %
Pre test mode:	TM1		
Final test mode:	TM1		

6.1.2 Test Setup Diagram:





6.1.3 Test Data:

Discharge type	Volt (kV)	Polarity	Test Point	Result/ Observations
Air discharge	8	+	1	B
Air discharge	8	-	1	B
Contact discharge	4	+	2	B
Contact discharge	4	-	2	B
Horizontal Coupling	4	+	3	B
Horizontal Coupling	4	-	3	B
Vertical Coupling	4	+	3	B
Vertical Coupling	4	-	3	B

- Test Point: 1. All insulated enclosure and seams.
- 2. All accessible metal parts of the enclosure.
- 3. All side.
- A: No degradation in the performance of the EUT was observed.





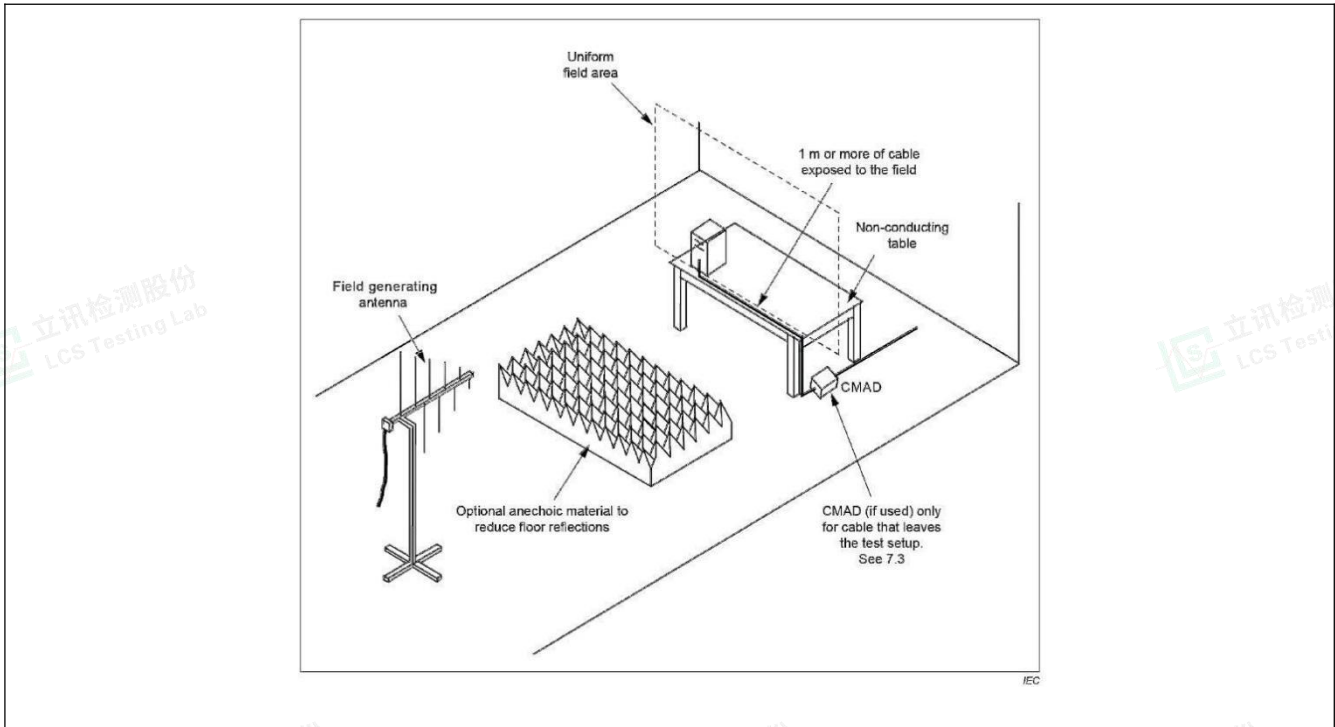
6.2 Radio-frequency electromagnetic field

Test Requirement:	Table 1.2 & 1.3
Test Method:	EN IEC 61000-4-3:2020
Procedure:	Antenna Polarisation: Vertical and Horizontal Modulation: 1kHz,80% Amp. Mod,1% increment Frequency Range: 80MHz to 1GHz, 1.4GHz to 6GHz
Performance Criteria:	A

6.2.1 E.U.T. Operation:

Operating Environment:			
Temperature:	22.1 °C	Humidity:	53 %
Pre test mode:	TM1		
Final test mode:	TM1		

6.2.2 Test Setup Diagram:





6.2.3 Test Data:

Frequency	Field Strength (V/m)	EUT face	Dwell time	Result/ Observations
80MHz-1GHz	3	Front	2s	A
80MHz-1GHz	3	Back	2s	A
80MHz-1GHz	3	Left	2s	A
80MHz-1GHz	3	Right	2s	A
80MHz-1GHz	3	Top	2s	A
80MHz-1GHz	3	Bottom	2s	A
1.4GHz-6GHz	3	Front	2s	A
1.4GHz-6GHz	3	Back	2s	A
1.4GHz-6GHz	3	Left	2s	A
1.4GHz-6GHz	3	Right	2s	A
1.4GHz-6GHz	3	Top	2s	A
1.4GHz-6GHz	3	Bottom	2s	A

A: No degradation in the performance of the EUT was observed.





7. TEST SETUP PHOTOS

Radiation disturbance (30MHz-1GHz)



Electrostatic discharge



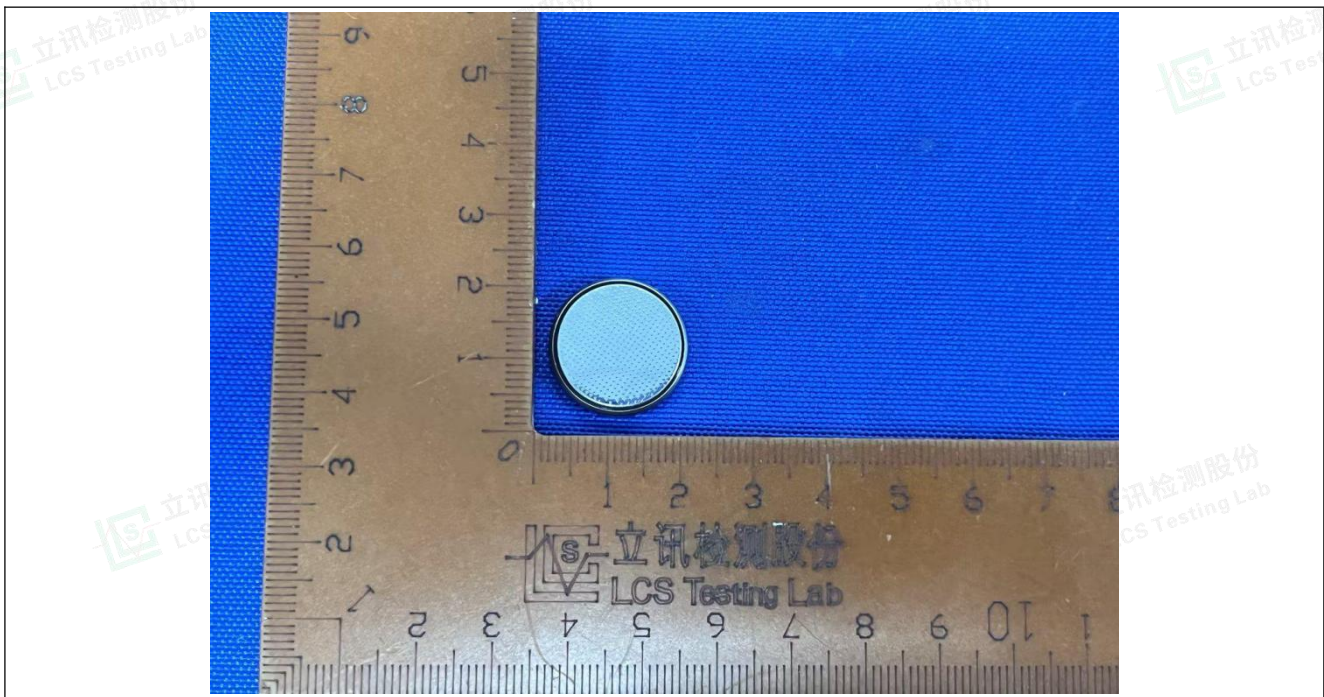
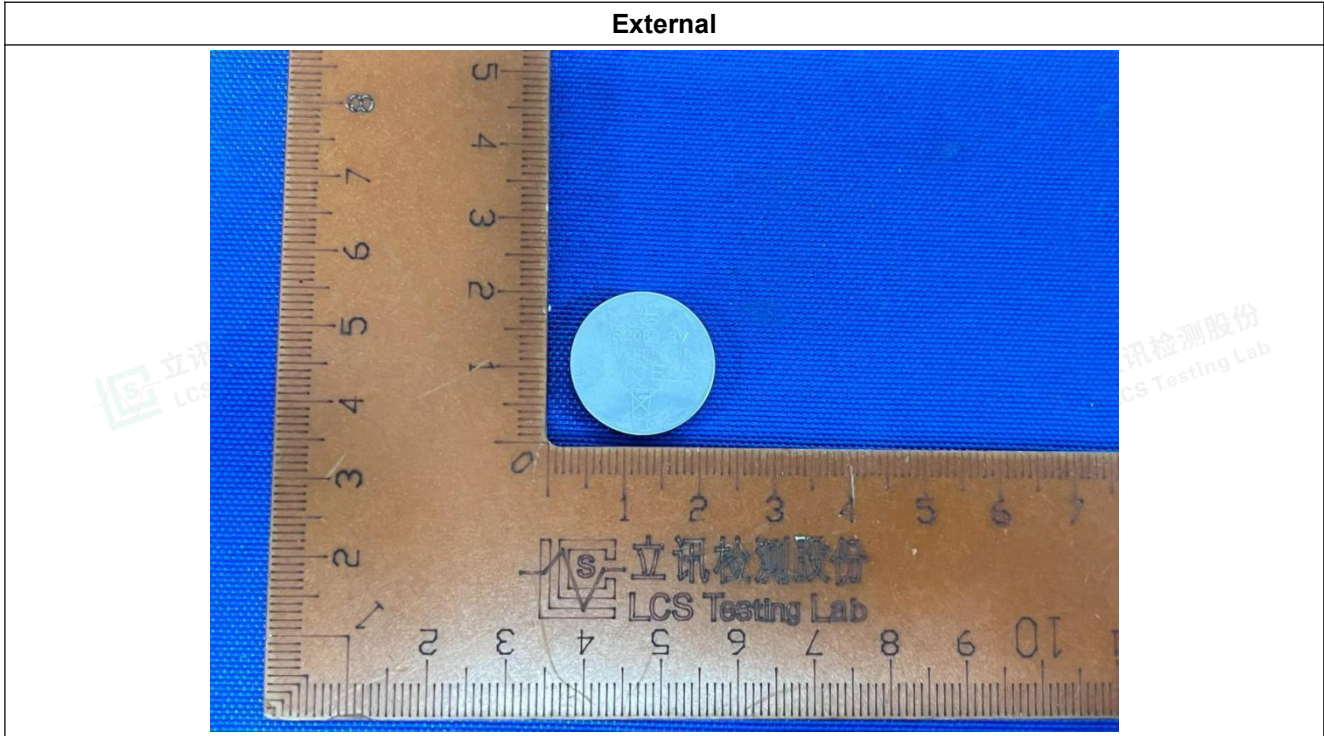


Radio-frequency electromagnetic field





8. EUT CONSTRUCTIONAL DETAILS (EUT PHOTOS)





--- End of Report ---

