CE EMC Test Report

Test Standard(s):	EN IEC 61000-6-1:2019 EN IEC 61000-6-3:2021
Applicant:	Ropla Elektronik Sp. z o. o.
Product Name:	Polymer Lithium-Ion Battery
Model:	LP 503040
Report No.:	ZKS220500354-1
Tested Date:	2022-05-11
Issued Date:	2022-05-12
Tested By:	Lieber Ouyang (Engineer)
Approved By:	Lahm Peng (Manager)
Prepared By:	

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1. General Information

1.1 Product Information

Applicant and Manufacturer	
Applicant:	Ropla Elektronik Sp. z o. o.
Address of Applicant:	ul. Wrocławska 1C, 52-200 Suchy Dwór
Manufacturer:	Ropla Elektronik Sp. z o. o.
Address of Manufacturer:	ul. Wrocławska 1C, 52-200 Suchy Dwór

General Description of EUT	
Product Name:	Polymer Lithium-Ion Battery
Model No.:	LP 503040
Trade Name:	AKYGA
Adding Model(s):	LP XXYYZZ XX: 01-99 (Height), YY: 01-200 (Width), ZZ: 01-200 (Length)
Rated Voltage:	DC 3.7V, 550mAh
Note 1: The test data is gathered from a production sample, provided by the manufacturer. Note 2: The appearance of others models listed in the report is different from main-test model LP 503040, but the circuit and the electronic construction do not change, declared by the manufacturer.	

1.2 Compliance Standards

Compliance Standards	
EN IEC 61000-6-1	Electromagnetic compatibility (EMC) -- Part 6-1: Generic standards - Immunity for residential, commercial and light-industrial environments
EN IEC 61000-6-3	Electromagnetic compatibility (EMC) -- Part 6-3: Generic standards - Emission standard for residential, commercial and light-industrial environments
EN IEC 61000-3-2	Electromagnetic compatibility (EMC) - Part 3-2: Limits - Limits for harmonic current emissions (equipment input current ≤16 A per phase)
EN 61000-3-3	Electromagnetic compatibility (EMC) - Part 3-3: Limits - Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems, for equipment with rated current ≤16 A per phase and not subject to conditional connection
The objective of the manufacturer or applicant is to demonstrate compliance with the above standards.	
According to standards for test methodology	
IEC 61000-4-2	Electromagnetic compatibility (EMC) - Part 4-2: Testing and measurement techniques - Electrostatic discharge immunity test
IEC 61000-4-3	Electromagnetic compatibility (EMC) - Part 4-3: Testing and measurement techniques - Radiated, radio-frequency, electromagnetic field immunity test
IEC 61000-4-4	Electromagnetic compatibility (EMC) - Part 4-4: Testing and measurement techniques - Electrical fast transient/burst immunity test
IEC 61000-4-5	Electromagnetic compatibility (EMC) - Part 4-5: Testing and measurement techniques - Surge immunity test
IEC 61000-4-6	Electromagnetic compatibility (EMC) - Part 4-6: Testing and measurement techniques - Immunity to conducted disturbances, induced by radio-frequency fields
IEC 61000-4-8	Electromagnetic compatibility (EMC) - Part 4-8: Testing and measurement techniques - Power frequency magnetic field immunity test
IEC 61000-4-11	Electromagnetic compatibility (EMC) - Part 4-11: Testing and measurement techniques - Voltage dips, short interruptions and voltage variations immunity tests
All measurements contained in this report were conducted with all above standards	
Maintenance of compliance is the responsibility of the manufacturer or applicant. Any modification of the product, which result is lowering the emission, should be checked to ensure compliance has been maintained.	

1.3 Test Facilities

Testing Lab: Shenzhen QC Testing Laboratory Co., Ltd. (CNAS - Registration No.: L8464)
To ISO/IEC 17025:25 General Requirements for the Competence of Testing and Calibration Laboratories(CNAS-CLO1 Accreditation Criteria for the Competence of Testing and Calibration Laboratories) for the competence in the field of testing. The acceptance letter from the CNAS is maintained in our files: Registration: CNAS L8464, November 11, 2020.
All measurement facilities used to collect the measurement data are located at 1F, Building 10, Tiegang Reservoir Road, Xinghong Science Park, Xixiang Sub-district, Bao'an District, Shenzhen City, China.

1.4 Test Setup Information

List of Test Modes			
Test Mode	Description	Remark	
TM1	Discharging	--	
TM2	Charging	--	
List and Details of Auxiliary Cable			
Description	Length (M)	Shielded/Unshielded	With/Without Ferrite
--	--	--	--
--	--	--	--
--	--	--	--
List and Details of Auxiliary Equipment			
Description	Manufacturer	Model	Serial Number
--	--	--	--
--	--	--	--
--	--	--	--
The equipment under test (EUT) was configured to measure its highest possible emission and immunity level. The test modes were adapted according to the operation manual for use.			

1.5 Measurement Uncertainty

Parameter	Conditions	Uncertainty
Conducted Disturbance	9kHz ~30MHz	±2.75 dB
Radiated Disturbance	30MHz ~ 1GHz	±4.89 dB

1.6 Performance Criteria for EMS

All the test data has been collected and analyzed within this report in accordance with Immunity requires the following as specific performance criteria:	
A	The apparatus shall continue to operate as intended during and after the test. The manufacturer specifies some minimum performance level. The performance level may be specified by the manufacturer as a permissible loss of performance.
B	The apparatus shall continue to operate as intended after the test. This indicates that the EUT does not need to function at normal performance levels during the test, but must recover. Again some minimal performance is defined by the manufacture. No change in operating state or loss or data is permitted.
C	Temporary loss of function is allowed. Operation of the EUT may stop as long as it is either automatically reset or can be manually restored by operation of the controls.

1.7 List of Test and Measurement Instruments

Description	Manufacturer	Model	Serial Number	Due. Date
EMI Test Receiver	Rohde & Schwarz	ESCS30	830245/009	2023-04-19
AMN	Rohde & Schwarz	ESH2-Z5	100002	2023-04-19
EMI Test Receiver	Rohde & Schwarz	ESI26	838786/013	2023-04-19
Pre-amplifier	CD	PAP-0118	24004	2023-04-19
Bilog Antenna	Chase	CBL6112B	2591	2023-04-19
Horn Antenna	Rohde & Schwarz	HF906	100014	2023-04-19
Digital Power Analyzer	California Instrument	5001ix-CTS-400	X71730	2023-04-19
ESD Generator	SCHNAFFNER	NSG 435	2103	2023-04-19
Signal Generator	Rohde & Schwarz	SMT03	100059	2023-04-19
Voltage Probe	Rohde & Schwarz	URV5-Z2	100013	2023-04-19
Power Amplifier	AR	150W1000	300999	2023-04-19
Power Amplifier	AR	25S1G4AM1	305993	2023-04-19
Immunity Simulator	EMTEST	UCS500M4	0800-44	2023-04-19
CS Immunity Tester	EMTEST	CWS500	0900-12	2023-04-19
EMCPRO	KEYTEK	EMCPRO	9909302	2023-04-19
Coil	KEYTEK	F-1000-4-8	9935	2023-04-19

2. Summary of Test Results

Standards	Description of Test Items	Result
EN IEC 61000-6-3	Conducted Disturbance	N/A
	Radiated Disturbance	Passed
	Harmonic Current Emission	N/A
	Voltage Fluctuation and Flicker	N/A
EN IEC 61000-6-1	Electrostatic Discharge	Passed
	Continuous Radiated Disturbances Immunity	Passed
	Electrical Fast Transient/Burst Immunity	N/A
	Surges Immunity	N/A
	Continuous Conducted Disturbances Immunity	N/A
	Power-frequency Magnetic Fields Immunity	N/A
	Voltage Dips/Interruptions Immunity	N/A
Passed: The EUT complies with the essential requirements in the standard Failed: The EUT does not comply with the essential requirements in the standard N/A: Not applicable		

3. Radiated Disturbance

3.1 Standard and Limit

According to the standard EN IEC 61000-6-3, clause 7 - Limits for radiated disturbance as below:

Frequency range MHz	Quasi-peak limits dB(μV/m)
30 to 230	30
230 to 1 000	37
NOTE 1 The lower limit shall apply at the transition frequency. NOTE 2 Additional provisions may be required for cases where interference occurs.	

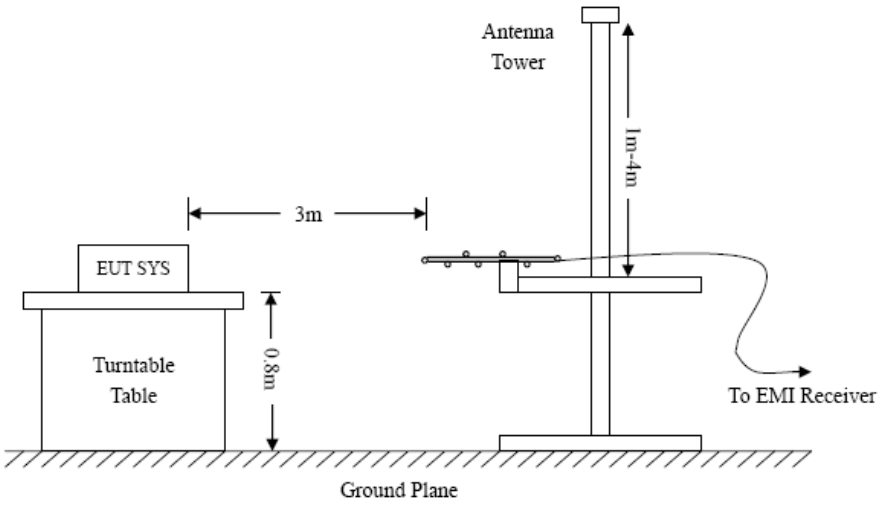
Limits below 1GHz at a measurement distance of 10 m
(Limit at 3m = limit at 10 m + 10dB)

Frequency range GHz	Average limit dB(μV/m)	Peak limit dB(μV/m)
1 to 3	50	70
3 to 6	54	74
NOTE The lower limit applies at the transition frequency.		

Limits above 1GHz at a measurement distance of 3 m

3.2 Test Procedure

Test is conducting under the description of CISPR 22 Information technology equipment - Radio disturbance characteristics - Limits and methods of measurement.

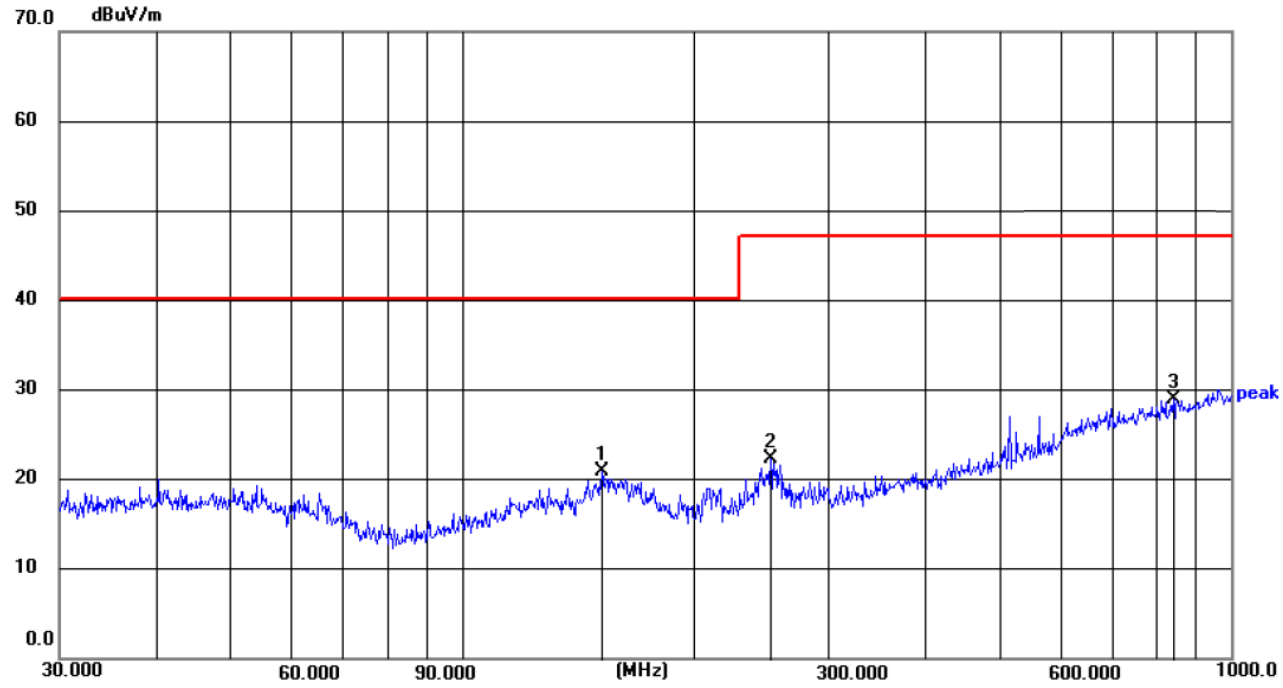


Test Setup Block Diagram

3.3 Test Data and Results

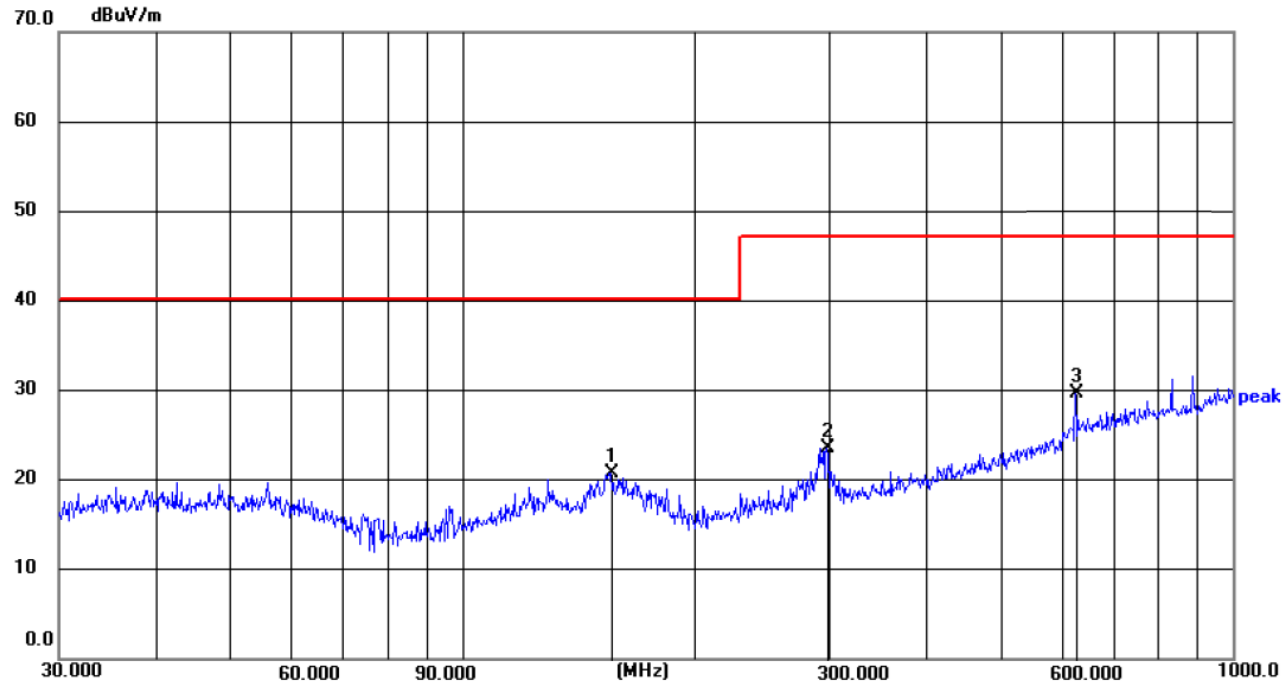
Based on all tested data, the EUT complied with the EN IEC 61000-6-3 standard limit for a Class B device, and with the worst case as below:

Test Plots and Data of Radiated Emissions	
Tested Model:	LP 503040
Tested Mode:	TM1
Test Power Specification:	AC 230V/50Hz
Test Antenna Polarization:	Horizontal
Remark:	



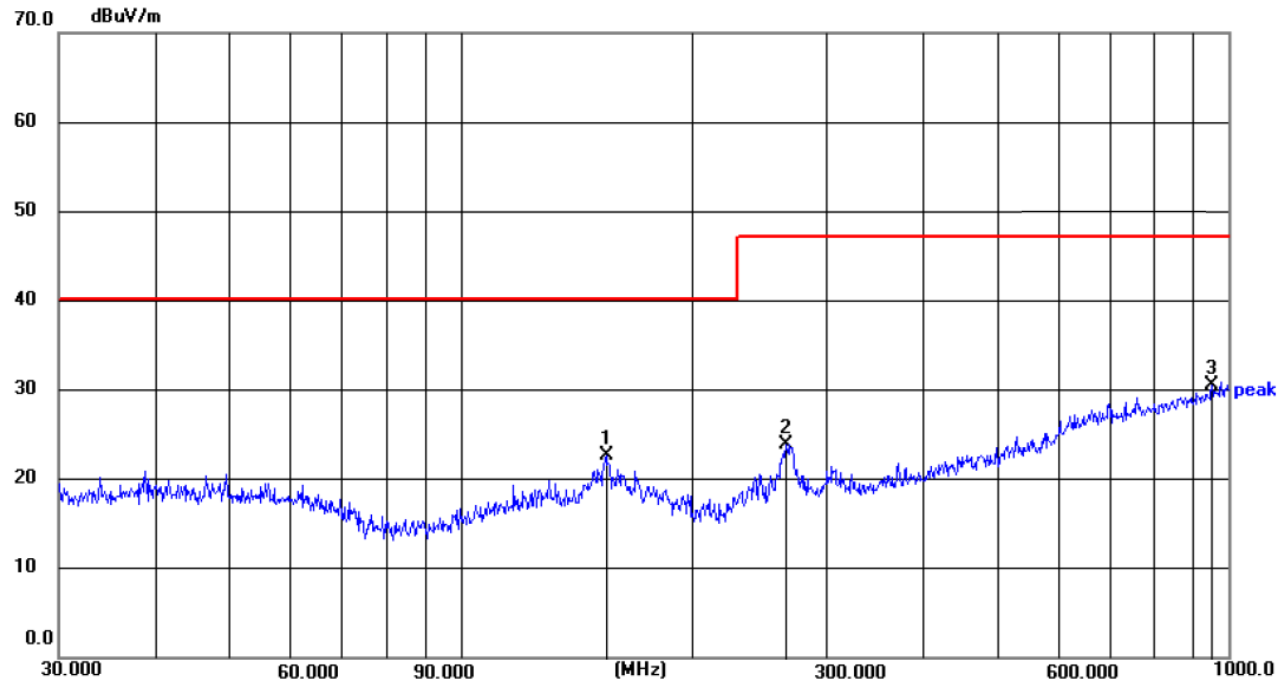
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark
1	152.1297	4.87	16.00	20.87	40.00	19.13	peak			P	
2	252.0627	8.79	13.56	22.35	47.00	24.65	peak			P	
3 *	842.1296	5.63	23.37	29.00	47.00	18.00	peak			P	

Test Plots and Data of Radiated Emissions	
Tested Model:	LP 503040
Tested Mode:	TM1
Test Power Specification:	AC 230V/50Hz
Test Antenna Polarization:	Vertical
Remark:	



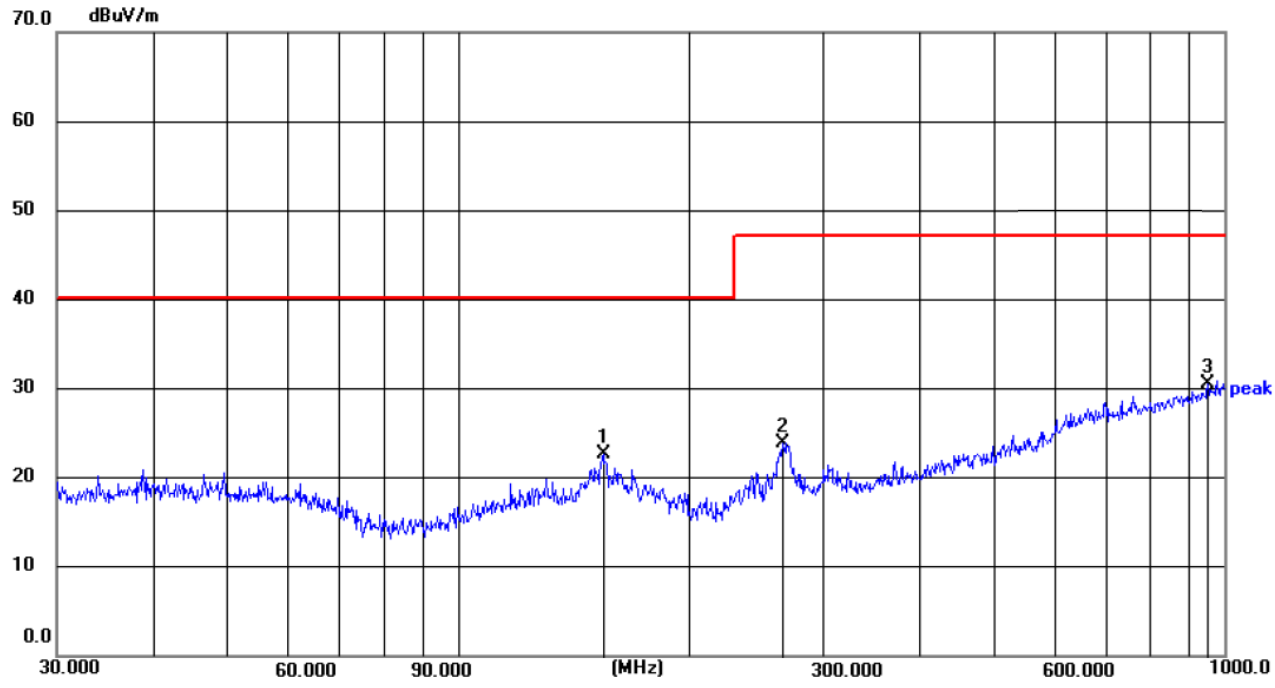
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark
1	155.9101	4.76	15.99	20.75	40.00	19.25	peak			P	
2	297.2241	8.83	14.69	23.52	47.00	23.48	peak			P	
3 *	625.0780	8.52	21.07	29.59	47.00	17.41	peak			P	

Test Plots and Data of Radiated Emissions	
Tested Model:	LP 503040
Tested Mode:	TM2
Test Power Specification:	AC 230V/50Hz
Test Antenna Polarization:	Horizontal
Remark:	



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark
1	154.8204	6.63	15.99	22.62	40.00	17.38	peak			P	
2	265.6757	10.05	13.87	23.92	47.00	23.08	peak			P	
3 *	952.0937	5.97	24.60	30.57	47.00	16.43	peak			P	

Test Plots and Data of Radiated Emissions	
Tested Model:	LP 503040
Tested Mode:	TM2
Test Power Specification:	AC 230V/50Hz
Test Antenna Polarization:	Vertical
Remark:	



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark
1	154.8204	6.63	15.99	22.62	40.00	17.38	peak			P	
2	265.6757	10.05	13.87	23.92	47.00	23.08	peak			P	
3 *	952.0937	5.97	24.60	30.57	47.00	16.43	peak			P	

4. Electrostatic Discharges (ESD)

4.1 Standard and Limit

According to the standard EN 61000-6-1 Clause 8, Limit as below:

Test Specifications	Test Levels	Performance Criterion
Air Discharge	8kV	B
Contact Discharge	4kV	B

4.2 Test Procedure

Test is conducting under the description of IEC 61000-4-2.

4.3 Test Results

Air Discharge	**Test Levels (kV)**							
Test Points	-2	+2	-4	+4	-8	+8	-15	+15
Surface	A	A	A	A	A	A	--	--

Contact Discharge	**Test Levels (kV)**							
Test Points	-2	+2	-4	+4	-6	+6	-8	+8
Metal Ports	A	A	A	A	--	--	--	--

5. Continuous Radiated Disturbances (R/S)

5.1 Standard and Limit

According to the standard EN 61000-6-1 Clause 8, Limit as below:

Test Specifications	Test Levels	Performance Criterion
80MHz-1000MHz	3V/m	A
1.4GHz-2GHz	3V/m	A
2GHz-2.7GHz	1V/m	A

5.2 Test Procedure

Test is conducting under the description of IEC 61000-4-3.

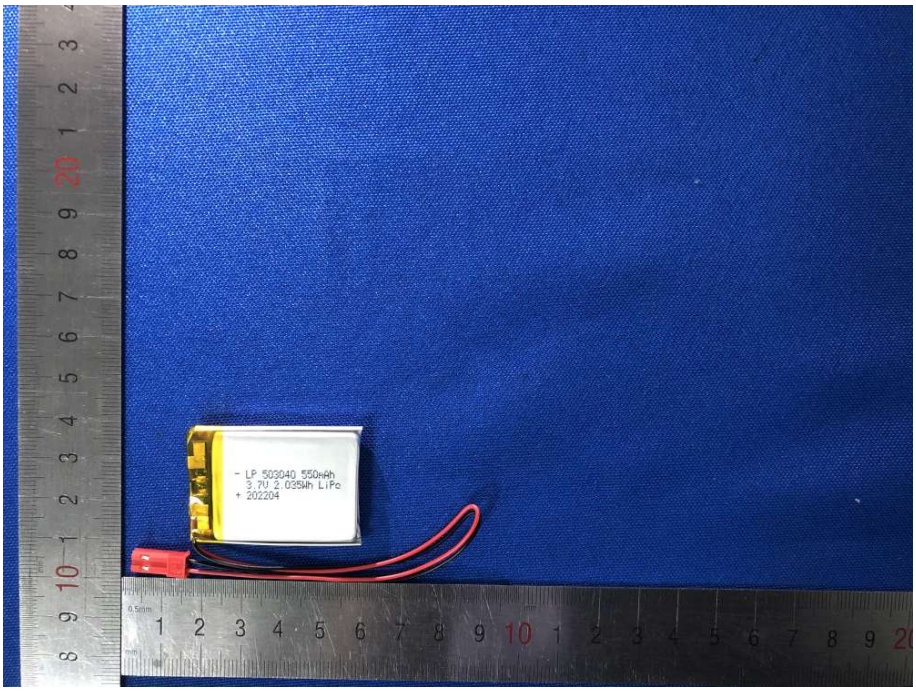
5.3 Test Results

Frequency step: 1% of fundamental
Dwell time: 1 second
Modulation: AM by 1kHz sine wave with 80% modulation depth

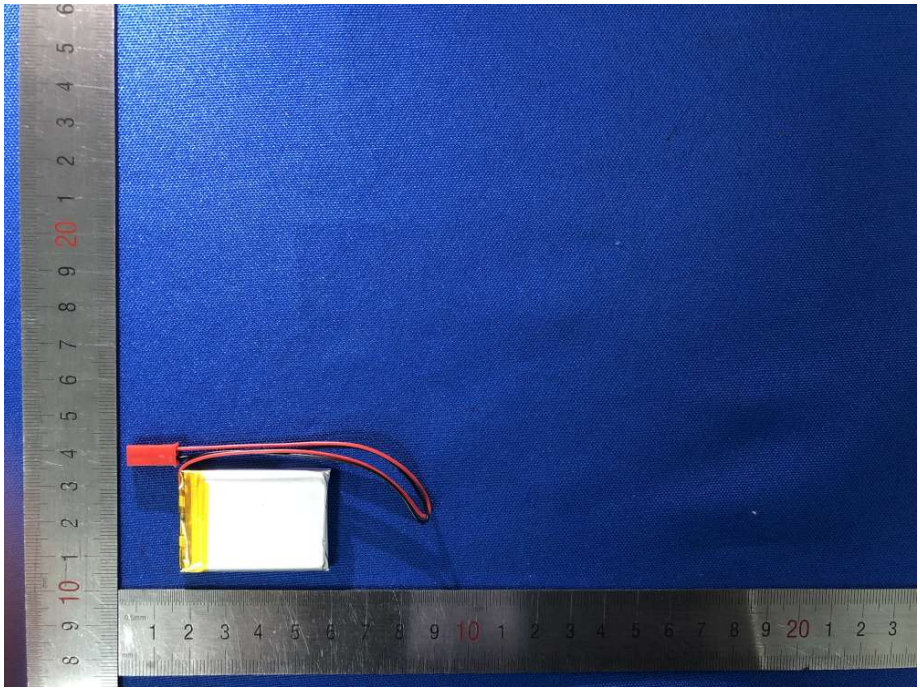
Frequency Range	**EM Field**	**Polarization**	**Front**	**Rear**	**Left**	**Right**
80MHz-1GHz	3V/m	Horizontal	A	A	A	A
80MHz-1GHz	3V/m	Vertical	A	A	A	A
1.4GHz-2GHz	3V/m	Horizontal	A	A	A	A
1.4GHz-2GHz	3V/m	Vertical	A	A	A	A
2GHz-2.7GHz	1V/m	Horizontal	A	A	A	A
2GHz-2.7GHz	1V/m	Vertical	A	A	A	A

Annex A. EUT Photos

EUT View 1



EUT View 2



Annex B. Label and Information

CE Mark Sample

CE Mark Specifications

Text is Black in color and is justified. Labels are printed in indelible ink on permanent adhesive backing or silk-screened onto the EUT or shall be affixed at a conspicuous location on the EUT. The ‘CE’ marking must be affixed to the EUT or to its data plate. Where this is not possible or not warranted on account of the nature of the apparatus, it must be affixed to the packaging, if any, and to the accompanying documents. The ‘CE’ marking must have a height of at least 5 mm. If the ‘CE’ marking is reduced or enlarged the proportions given in the above graduated drawing must be respected.

******* END OF REPORT *******