

# Test Report

Report No.: MTi190918E020

Date of issue: Sep. 18, 2019

Sample Description: Power Bank

Model(s):

Applicant:

Address:

Date of Test: Sep. 09, 2019 to Sep. 18, 2019

Shenzhen Microtest Co., Ltd.  
<http://www.mtitest.com>



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Test Result Certification	
Applicant's name:	
Address:	
Manufacture's Name:	
Address:	
Product name:	Power Bank
Trademark:	N/A
Model name:	DP51
Standards:	EN 55032:2015 EN 55024:2010

*This device described above has been tested by Shenzhen Microtest Co., Ltd. and the test results show that the equipment under test (EUT) is in compliance with the EMC requirements. And it is applicable only to the tested sample identified in the report.*

Tested by:

*Neal Lee*

Neal Lee

Sep. 18, 2019

Reviewed by:

*Smith Chen*

Smith Chen

Sep. 18, 2019

Approved by:

*Tom Xue*

Tom Xue

Sep. 18, 2019

## Summary of Test Result

Item	Description of Test	Result
EN 55032		
1	Conducted emission	Pass
2	Radiated emission	Pass
EN 55024		
1	Electrostatic discharge immunity (ESD)	Pass
2	Radiated electromagnetic field immunity (RS)	Pass
3	Fast transients / burst immunity (EFT)	N/A*
4	Surge immunity	N/A*
5	Conducted disturbance immunity (CS)	N/A*
6	Voltage interruptions & voltage Dips	N/A*
7	Power frequency magnetic fields (PFMF)	N/A*

\* Not applicable, this test item is not applicable.

## 1 General description

### 1.1 Feature of equipment under test (EUT)

Product name:	Power Bank
Model name:	DP51
Power source:	DC 5V by adapter
Specification:	Input: 5V 2A Output: 5V 2A Capacity:5000mAh

### 1.2 Test mode

To investigate the maximum EMI emission characteristics generates from EUT, the test system was pre-scanning tested base on the consideration of following EUT operation mode or test configuration mode which possible have effect on EMI emission level. Each of these EUT operation mode(s) or test configuration mode(s) mentioned above was evaluated respectively.

Test mode	Description
Mode 1	Charging
Mode 2	Full Load

NOTE: The test modes were carried out for all operation modes. The final test mode of the EUT was the worst test mode for EMI, and its test data is showed.

### 1.3 Test conditions

During the measurement the environmental conditions were within the listed ranges:

- Temperature: 20°C~30°C
- Humidity: 30%~70% (30%~60% for ESD test)
- Atmospheric pressure: 98kPa~101kPa

### 1.4 EUT test setup

See photographs of the test setup in the report for the actual setup and connections between EUT and support equipment.

### 1.5 Ancillary equipment

Equipment	Model	S/N	Manufacturer
Dummy load	/	/	/
Adapter	HW-050100E01	/	huawei

## 1.6 Measurement Uncertainty

Measurement Uncertainty for a Level of Confidence of 95 %,  $U=2 \times U_c(y)$

Conducted emission(150kHz~30MHz)	$\pm 2.5$ dB
Radiated emission(30MHz~1GHz)	$\pm 4.2$ dB
Radiated emission (above 1GHz)	$\pm 4.3$ dB
Temperature	$\pm 1$ degree
Humidity	$\pm 5$ %

## 2 Testing site

Test Site	Shenzhen Microtest Co., Ltd.
Test Site Location	No.102A & 302A, East Block, Hengfang Industrial Park, Xingye Road, Xixiang, Bao'an District, Shenzhen, Guangdong, China
Telephone:	(86-755)88850135
Fax:	(86-755)88850136
CNAS Registration No.:	CNAS L5868

### 3 List of test equipment

Emission test:

Equipment	Manufacturer	Model	Serial No.	Calibration Due
LISN	Schwarzbeck	NSLK8127	#841	2019/9/25
LISN	Laplace	LISN-16A	003420	2019/11/4
EMI Test Receiver	Rohde&schwarz	ESCI3	101368	2019/11/4
Broadband TRILOG Antenna	Schwarzbeck	VULB9163	9163-872	2019/11/14
Horn Antenna	Schwarzbeck	BBHA 9120 D	9120D-1145	2019/11/14
Amplifier	HP	8447D	3113A06150	2019/11/4
Amplifier	Agilent	8449B	3008A02400	2020/7/4
EMI Test Receiver	R&S	ESPI	100314	2019/11/4

Immunity test:

Equipment	Manufacturer	Model	Serial No.	Calibration Due
ESD Generator	Schloder	SESD 3000	509325	2019/11/14
Surge Generator	HTEC	HCWG 51	153702	2019/11/17
EFT Generator	HTEC	HEFT 51	153701	2019/11/17
Cycle SAG Simulator	Prima	DRP61011AG	PR15056303	2019/11/4
Conducted Disturbances Test System	Schloder	CDG-6000-25	126A1343/2015	2019/11/4
CDN	Schloder	CDN-M2+3	A2210332/2015	2019/11/4
Log-Bicon Antenna	MESS-ELEKTRONIK	VULB 9160	3058	2019/11/14
Signal Generator	Agilent	E4438C	MY49070163	2019/11/4
Power Amplifier	AR	SESD 3000	509325	2019/11/4

Note: the calibration interval of the above test instruments is 12 months and the calibrations are traceable to international system unit (SI).

## 4 EMC emission test

### 4.1 Conducted emission

#### 4.1.1 Limits

Frequency (MHz)	Class A (dBμV)		Class B (dBμV)	
	Quasi-peak	Average	Quasi-peak	Average
0.15 -0.5	79	66	66 - 56 *	56 - 46 *
0.5 -5	73	60	56	46
5 -30	73	60	60	50

Note 1: the tighter limit applies at the band edges.

Note 2: the limit of " \* " marked band means the limitation decreases linearly with the logarithm of the frequency in the range.

#### 4.1.2 Test Procedures

The EUT was placed 0.8 meters from the horizontal ground plane with EUT being connected to the power mains through a line impedance stabilization network (LISN). All other support equipment powered from additional LISN(s). The LISN provide 50 Ohm/ 50uH of coupling impedance for the measuring instrument.

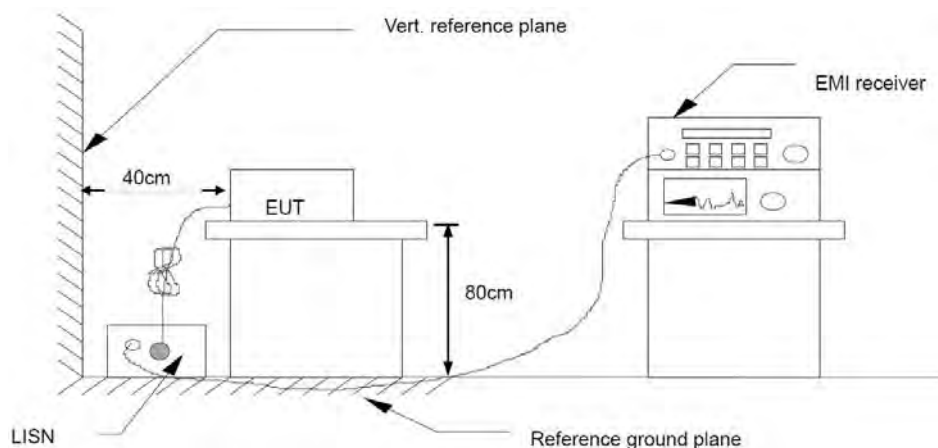
Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 to 40 cm long.

I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1 m.

LISN is at least 80 cm from nearest part of EUT chassis.

For the actual test configuration, please refer to the related Item – photographs of the test setup.

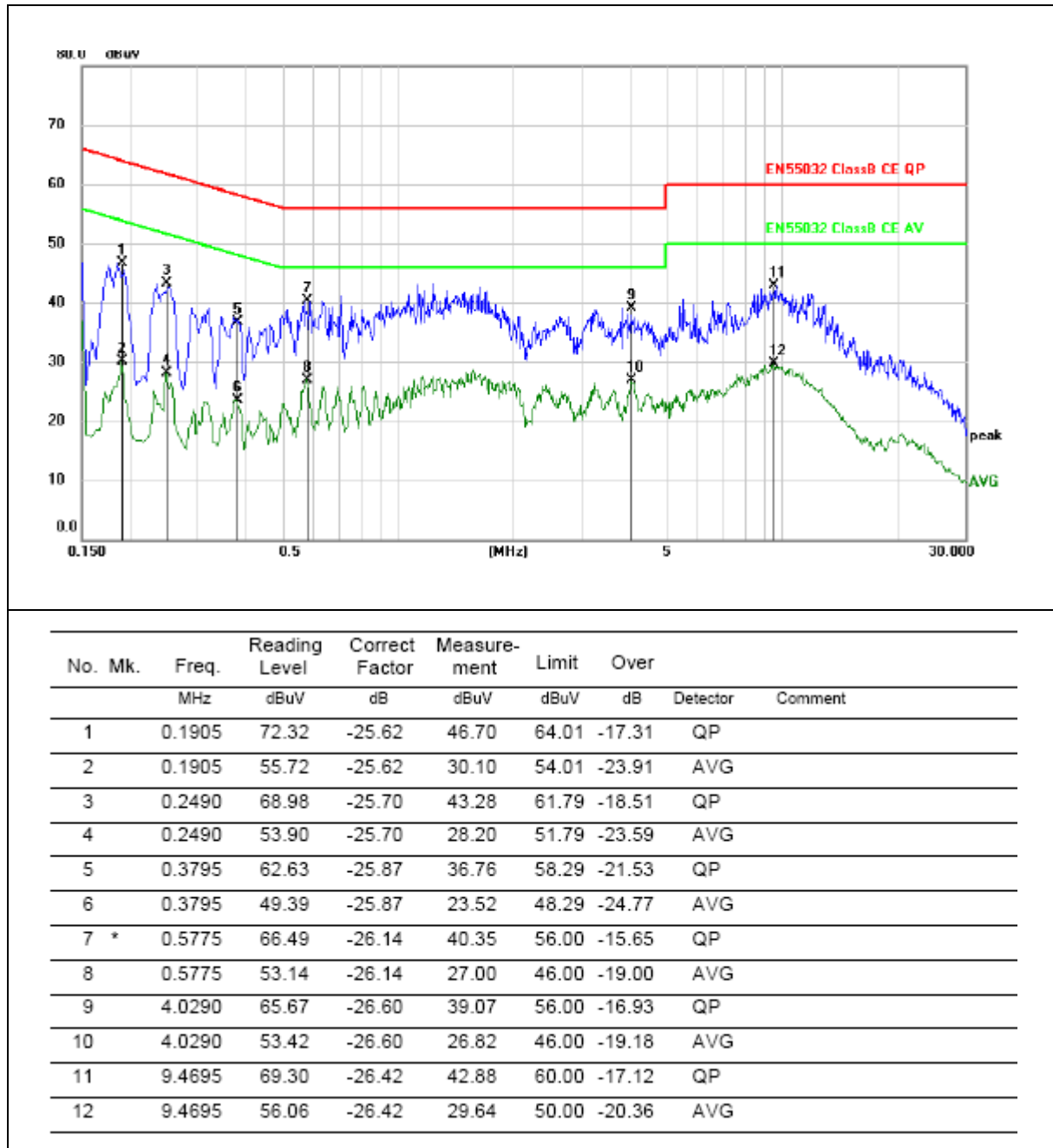
#### 4.1.3 Test setup



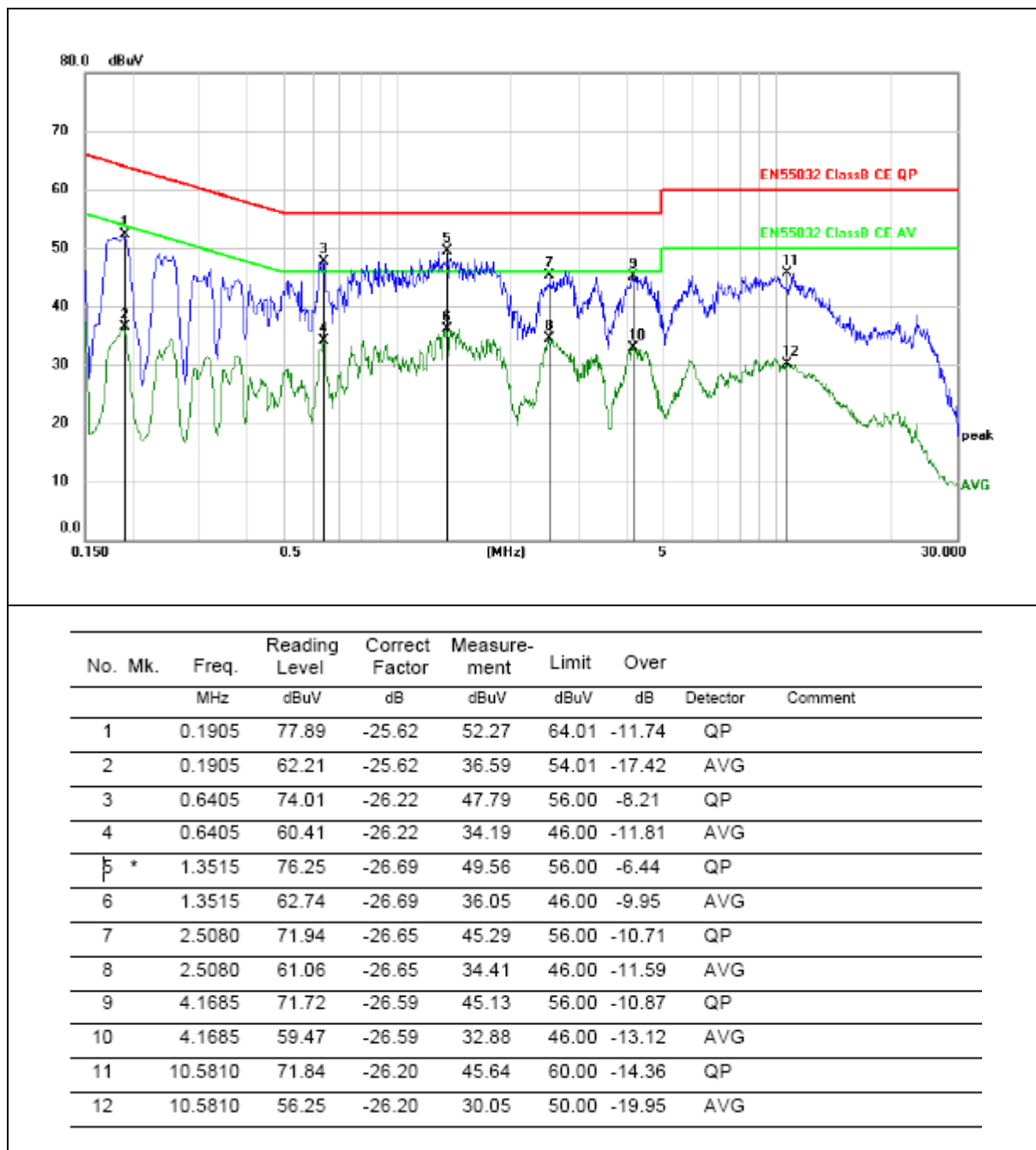
#### 4.1.4 Test Result



Temperature:	24℃	Relative Humidity:	53%
Pressure:	101kPa	Phase:	L
Test voltage:	AC 230V/50Hz	Test mode:	Mode 1



Temperature:	24°C	Relative Humidity:	53%
Pressure:	101kPa	Phase:	N
Test voltage:	AC 230V/50Hz	Test mode:	Mode 1



## 4.2 Radiated emission

### 4.2.1 Limits

Frequency (MHz)	Class A (at 3m) dB $\mu$ V/m		Class B (at 3m) dB $\mu$ V/m	
	Quasi-peak		Quasi-peak	
30-230	50		40	
230-1000	57		47	
/	Peak	Average	Peak	Average
1000-3000	76	56	70	50
3000-6000	80	60	74	54

### 4.2.2 Test Procedures

The radiated emission tests were performed in the 3 meters.

The EUT was placed on the top of a rotating table 0.8 meters above the ground. The table was rotated 360 degrees to determine the position of the highest radiation.

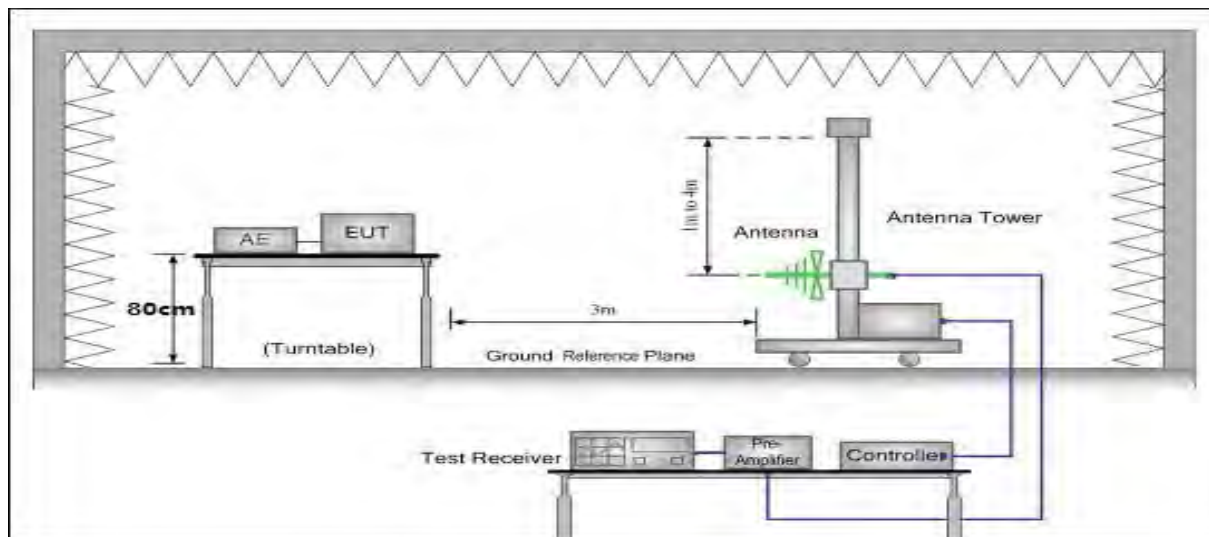
The height of the test antenna shall vary between 1m to 4m. Both horizontal and vertical polarizations of the antenna are set to make the measurement.

If the peak mode measured value compliance with and lower than quasi peak mode limit, the EUT shall be deemed to meet QP limits and then no additional QP mode measurement performed.

If the peak mode measured value compliance with and lower than average mode limit, the EUT shall be deemed to meet average limits and then no additional average mode measurement performed.

For the actual test configuration, please refer to the related item – EUT test photos.

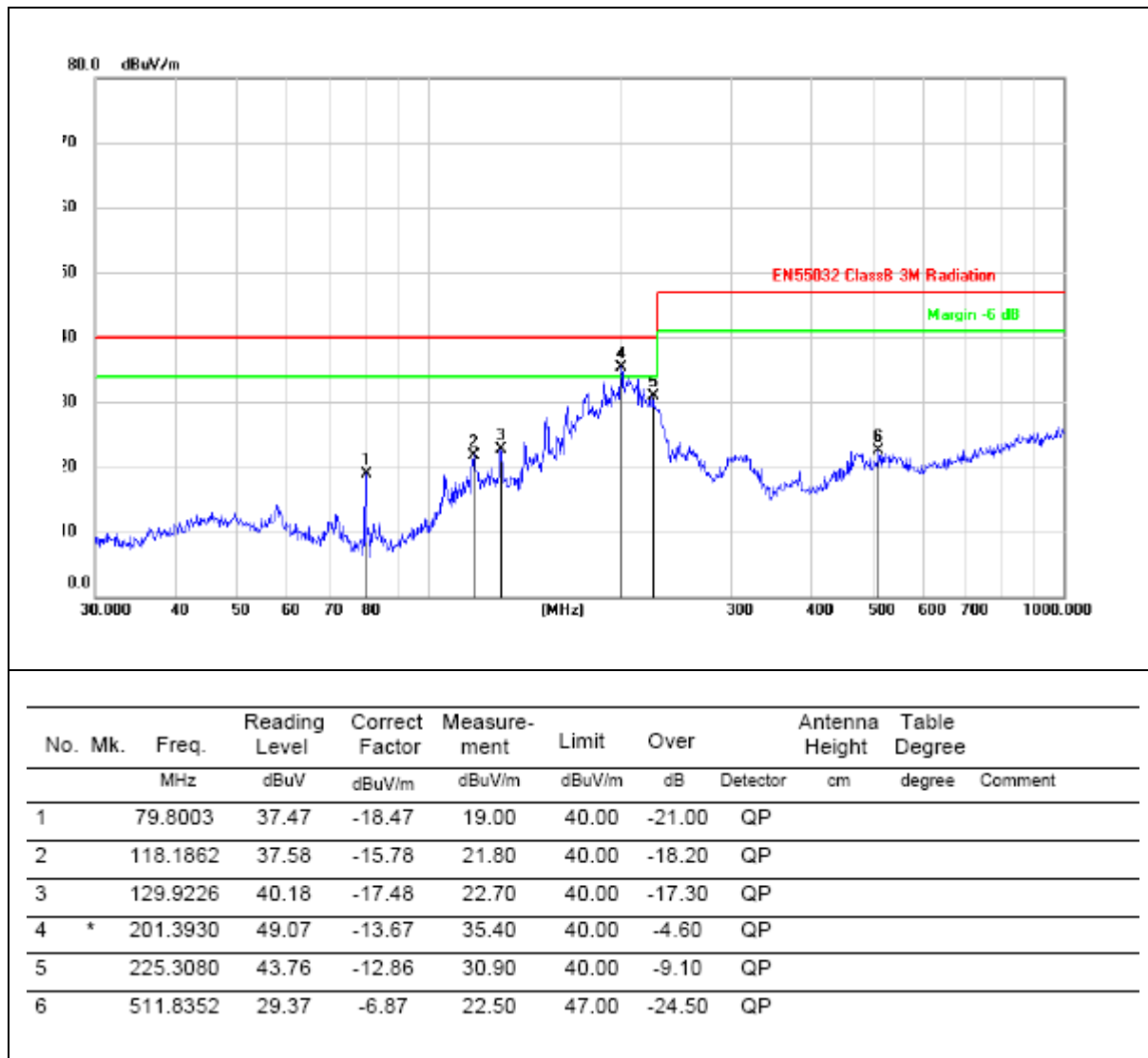
### 4.2.3 Test Setup



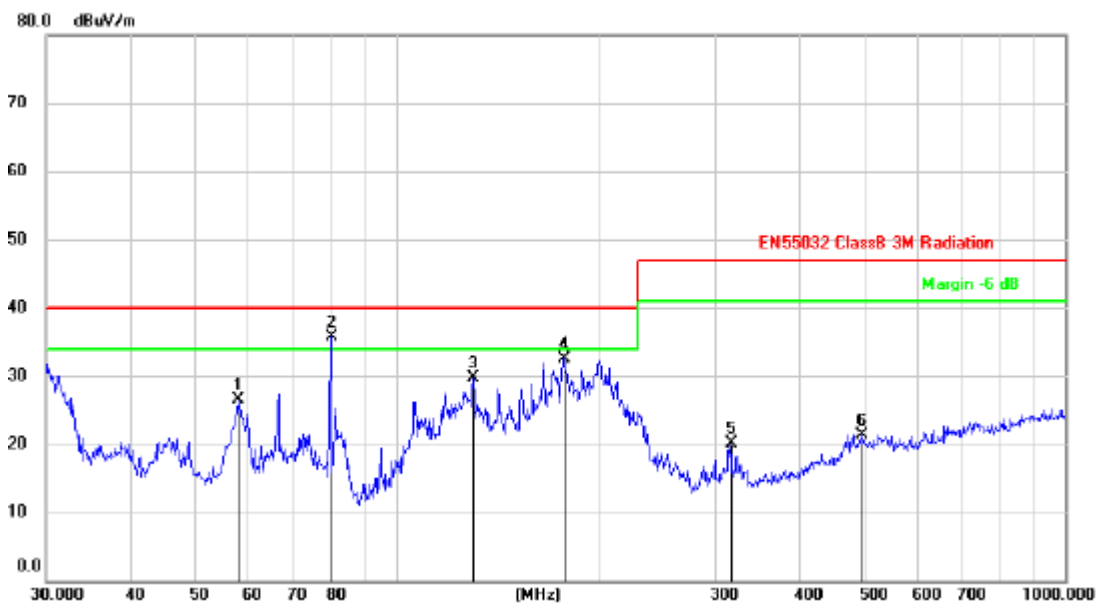
### 4.2.4 Test Result

Note: the highest working frequency of EUT is below 108MHz.

Temperature:	24℃	Relative Humidity:	53%
Pressure:	101kPa	Polarization:	Horizontal
Test voltage:	AC 230V/50Hz	Test mode:	Mode 1



Temperature:	24℃	Relative Humidity:	53%
Pressure:	101kPa	Polarization:	Vertical
Test voltage:	AC 230V/50Hz	Test mode:	Mode 1



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	Antenna Height	Table Degree	
		MHz	dBuV	dBuV/m	dBuV/m	dBuV/m	dB	cm	degree	Comment
1		57.9993	40.37	-13.87	26.50	40.00	-13.50	QP		
2	*	80.0806	54.28	-18.48	35.80	40.00	-4.20	QP		
3		130.3789	47.21	-17.51	29.70	40.00	-10.30	QP		
4		177.5092	48.54	-15.94	32.60	40.00	-7.40	QP		
5		315.4808	30.40	-10.30	20.10	47.00	-26.90	QP		
6		495.9344	28.44	-7.14	21.30	47.00	-25.70	QP		

## 5 Immunity test

### 5.1 Performance criteria

#### Performance criterion A:

During and after the test the EUT shall continue to operate as intended without operator intervention. No degradation of performance or loss of function is allowed below a minimum 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. If the minimum performance level or the permissible performance loss is not specified by the manufacturer, then either of these may be derived from the product description and documentation, and by what the user may reasonably expect from the EUT if used as intended.

#### Performance criterion B:

After the test, the EUT shall continue to operate as intended without operator intervention. No degradation of performance or loss of function is allowed, after the application of the phenomena 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.

During the test, degradation of performance is allowed. However, no change of operating state or stored data is allowed to persist after the test.

If the minimum performance level (or the permissible performance loss) is not specified by the manufacturer, then either of these may be derived from the product description and documentation, and by what the user may reasonably expect from the EUT if used as intended.

#### Performance criterion C:

During and after testing, a temporary loss of function is allowed, provided the function is self-recoverable, or can be restored by the operation of the controls or cycling of the power to the EUT by the user in accordance with the manufacturer's instructions.

Functions, and/or information stored in non-volatile memory, or protected by a battery backup, shall not be lost.

#### Particular performance criteria:

The particular performance criteria which are specified in the normative annexes take precedence over the corresponding parts of the general performance criteria.

Where particular performance criteria for specific functions are not given, then the general performance criteria shall apply.

## 5.2 Electrostatic discharge immunity (ESD)

### 5.2.1 Test Procedures

The test generator necessary to perform direct and indirect application of discharges to the EUT in the following manner:

Contact discharge was applied to conductive surfaces and coupling planes of the EUT. During the test, it was performed with single discharges. For the single discharge time between successive single discharges was at least 1 second.

Vertical Coupling Plane (VCP):

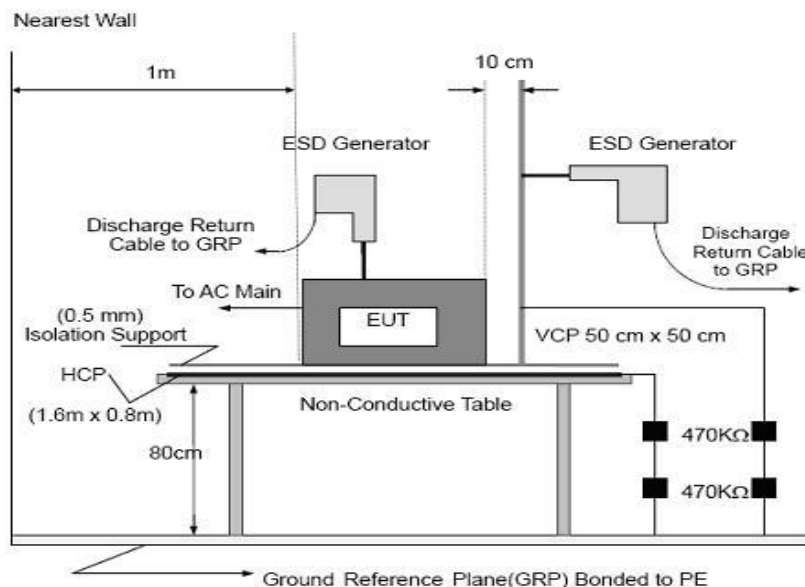
The coupling plane, of dimensions 0.5m x 0.5m, is placed parallel to, and positioned at a distance 0.1m from, the EUT, with the Discharge Electrode touching the coupling plane. The four faces of the EUT will be performed with electrostatic discharge.

Horizontal Coupling Plane (HCP):

The coupling plane is placed under to the EUT. The generator shall be positioned vertically at a distance of 0.1m from the EUT, with the Discharge Electrode touching the coupling plane. The four faces of the EUT will be performed with electrostatic discharge.

Air discharges at insulation surfaces of the EUT. It was at least ten single discharges with positive and negative at the same selected point. For the actual test configuration, please refer to the related Item –EUT Test Photos.

### 5.2.2 Test Setup



### 5.2.3 Test Result

Temperature:	25℃	Relative Humidity:	46%
Pressure:	101kPa	Test mode:	Mode 1,2

#### Indirect discharge

Test Point	Contact discharge level (kV)	Number and polarity	Criterion met	Criterion Required
1. VCP-Front side	<input type="checkbox"/> ..2 <input checked="" type="checkbox"/> ..4	25 (+)	A	B
	<input type="checkbox"/> ..6 <input type="checkbox"/> ..8	25 (-)	A	
2.VCP-Rear side	<input type="checkbox"/> ..2 <input checked="" type="checkbox"/> ..4	25 (+)	A	
	<input type="checkbox"/> ..6 <input type="checkbox"/> ..8	25 (-)	A	
3.VCP-Left side	<input type="checkbox"/> ..2 <input checked="" type="checkbox"/> ..4	25 (+)	A	
	<input type="checkbox"/> ..6 <input type="checkbox"/> ..8	25 (-)	A	
4. VCP-Right side	<input type="checkbox"/> ..2 <input checked="" type="checkbox"/> ..4	25 (+)	A	
	<input type="checkbox"/> ..6 <input type="checkbox"/> ..8	25 (-)	A	
5. HCP	<input type="checkbox"/> ..2 <input checked="" type="checkbox"/> ..4	25 (+)	A	
	<input type="checkbox"/> ..6 <input type="checkbox"/> ..8	25 (-)	A	

**Result: Compliance.**

#### Direct discharge

Test Point	Contact discharge level (kV)	Air discharge level (kV)	Number and polarity	Criterion met	Criterion Required
1. Each nonconductive location touchable by hand	<input type="checkbox"/> ..2 <input type="checkbox"/> ..4	<input type="checkbox"/> ..2 <input type="checkbox"/> ..4	25 (+)	A	B
	<input type="checkbox"/> ..6 <input type="checkbox"/> ..8	<input type="checkbox"/> ..6 <input checked="" type="checkbox"/> ..8	25 (-)	A	
1. Each conductive location touchable by hand	<input type="checkbox"/> ..2 <input type="checkbox"/> ..4	<input type="checkbox"/> ..2 <input type="checkbox"/> ..4	25 (+)	N/A	
	<input type="checkbox"/> ..6 <input type="checkbox"/> ..8	<input type="checkbox"/> ..6 <input type="checkbox"/> ..8	25 (-)	N/A	

Note1: Please see the photographs blew about the details of test points.

**Result: compliance.**



**Test location (Transmitter):**



Note: Yellow circle for Air Discharge.

## 5.3 Radiated electromagnetic field immunity (RS)

### 5.3.1 Test Procedures

The EUT and support equipment, which are placed on a table that is 0.8 meter above ground and the testing was performed in a fully-anechoic chamber.

The testing distance from antenna to the EUT was 3 meters.

The other condition as following manner:

The field strength level was 3V/m.

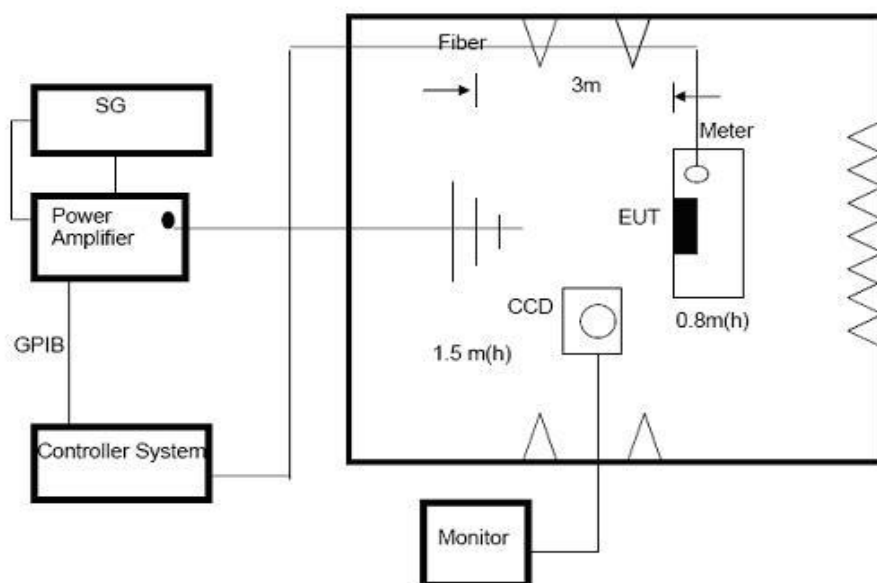
The frequency range is swept from 80 MHz to 1000 MHz with the signal 80%amplitude modulated with a 1kHz sine wave. The rate of sweep did not exceed  $1.5 \times 10^{-3}$  decade/s. Where the frequency range is swept incrementally, the step size was 1% of fundamental.

The dwell time at each frequency shall be not less than the time necessary for the EUT to be able to respond.

The test was performed with the EUT exposed to both vertically and horizontally polarized fields on each of the four sides.

For the actual test configuration, please refer to the related Item –EUT Test Photos.

### 5.3.2 Test setup



### 5.3.3 Test Result

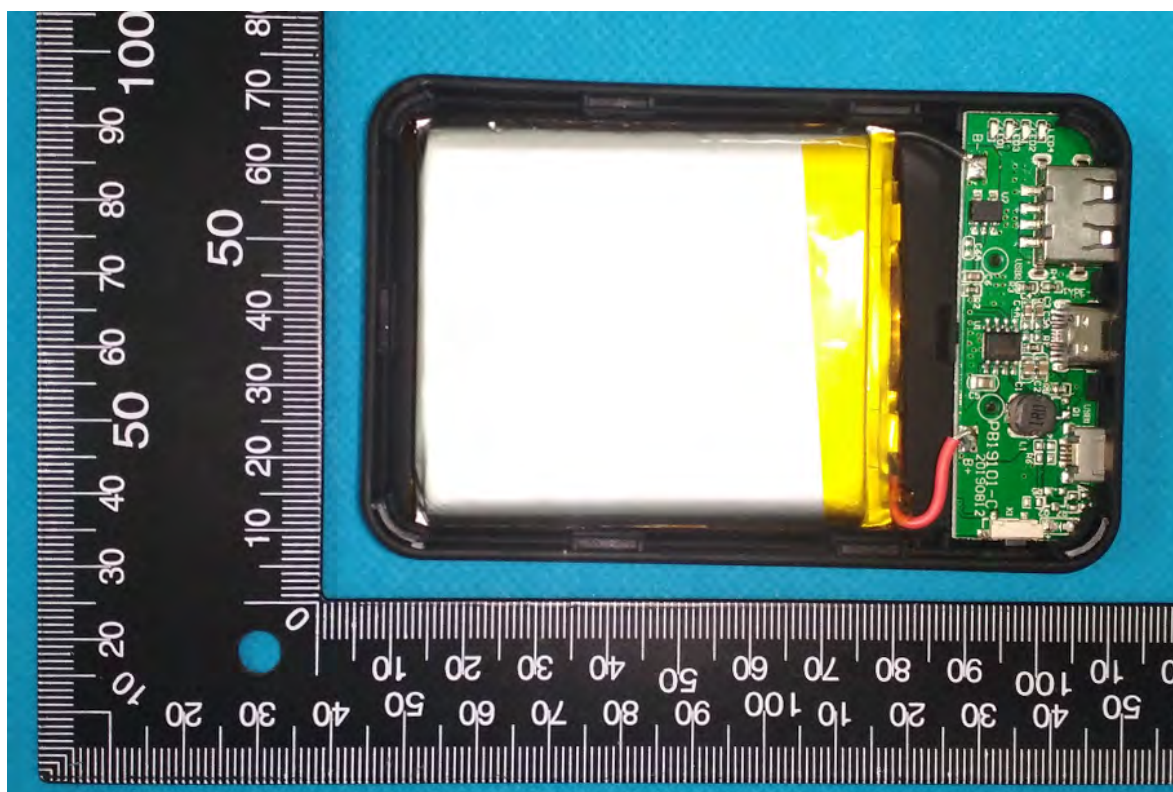
Temperature:	24°C	Relative Humidity:	53%
Pressure:	101kPa	Test mode:	Mode 1,2

Frequency Range (MHz)	RF Field Position	R.F. Field Strength	Azimuth	Perform. Criteria	Results	Judgment
80~1000	H / V	3 V/m (rms) AM Modulated 1000Hz, 80%	Front	A	A	Pass
			Rear			
			Left			
			Right			

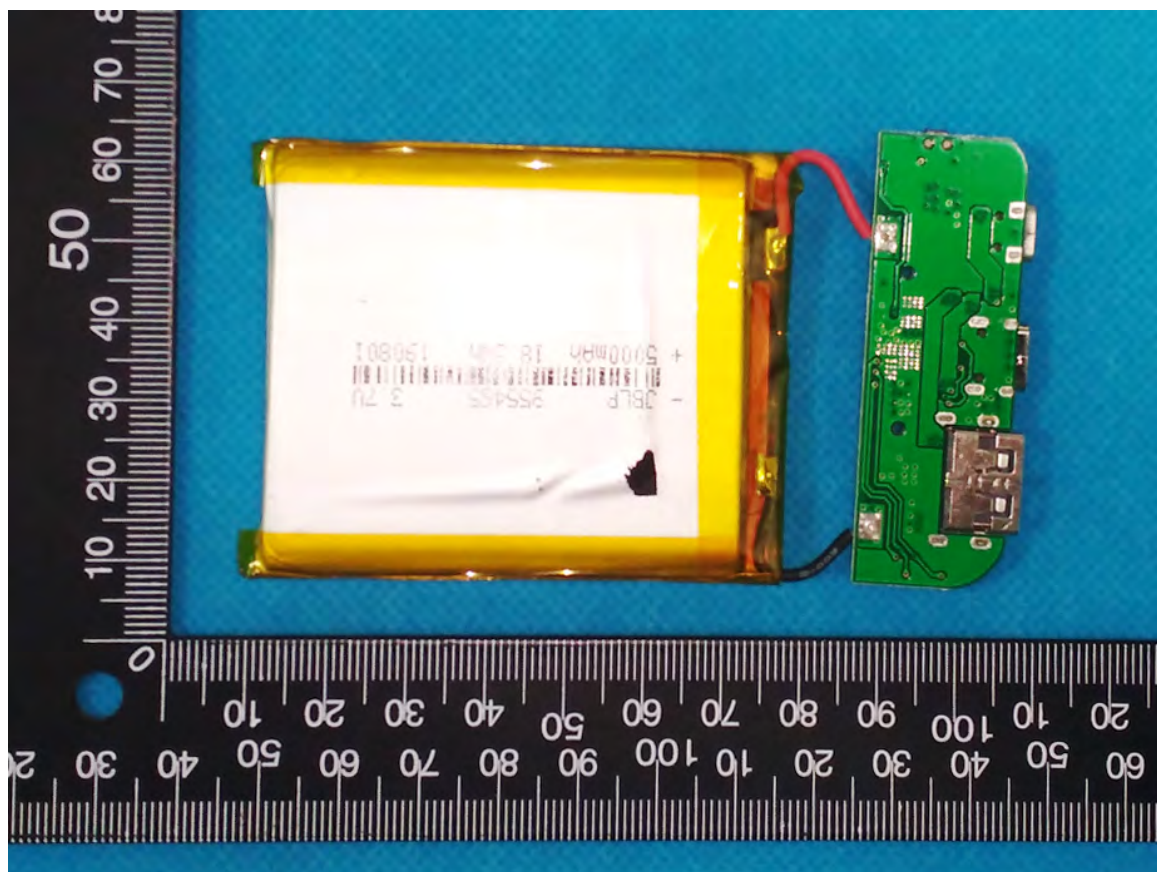
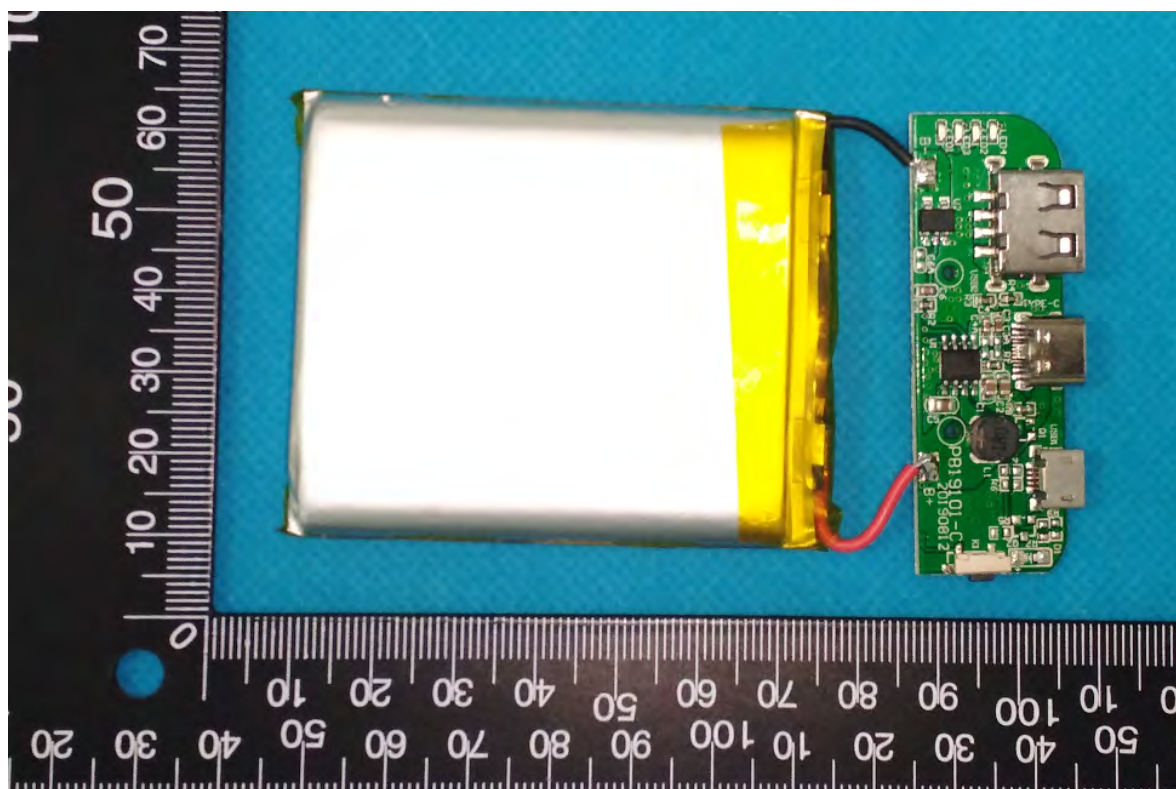
## Photographs of the EUT

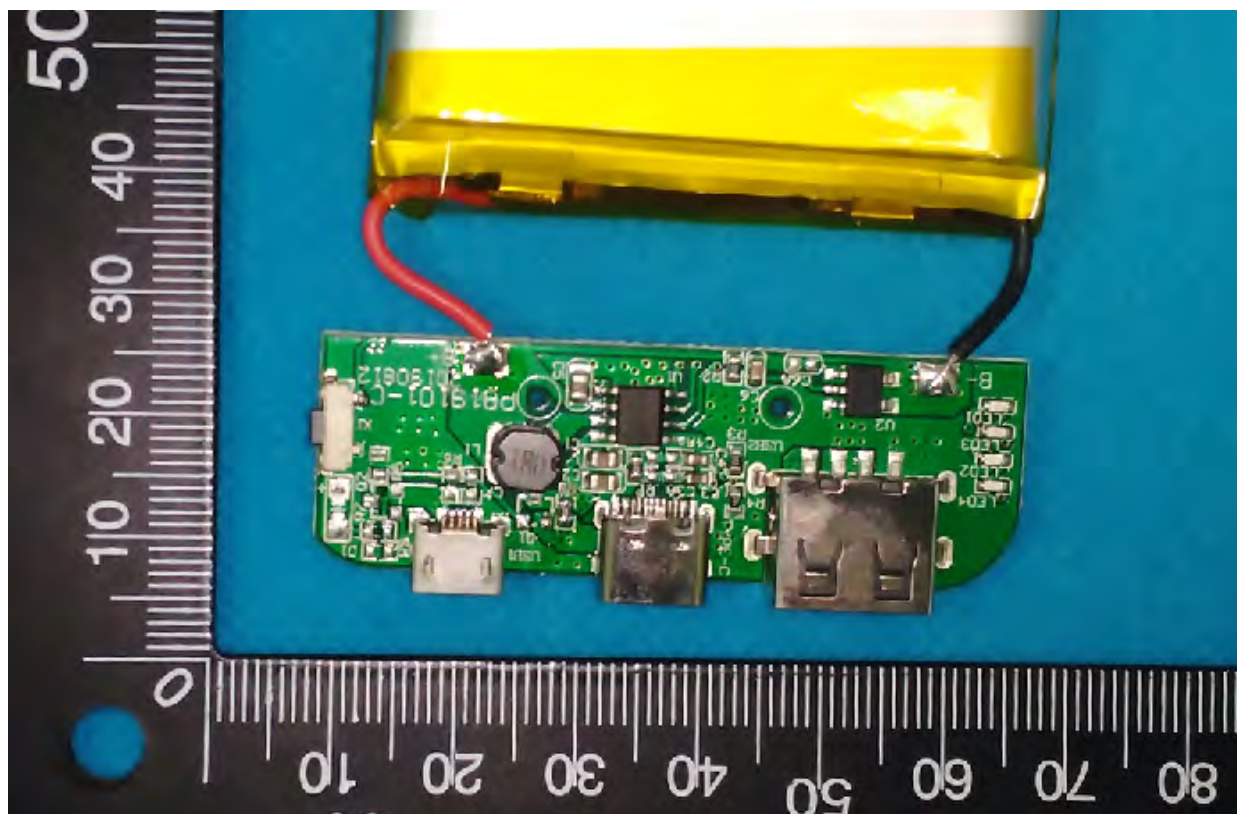












-----End of Report-----