EMC Test Report

Application No.	:	TB171017143
Applicant	:	USC056
Equipment Under Test (EUT)		
EUT Name	:	Wireless power bank
Model(s)	:	SP0328 (TITAN)
Brand Name	:	N/A
Receipt Date	:	2017-10-26
Test Date	:	2017-10-26 to 2017-10-30
Issue Date	:	2017-10-30
Standards	:	EN55032: 2015 Class B EN55024: 2010+A1: 2015
Conclusions	:	**PASS** In the configuration tested, the EUT complied with the standards specified above The EUT technically complies with the 2014/30/EU directive requirements
Test/Witness Engineer	:	Rebeca
Approved & Authorized	:	

This report details the results of the testing carried out on one sample. The results contained in this test report do not relate to other samples of the same product. The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in the report.

1 A/F., Bldg.6, Yusheng Industrial Zone, The National Road No.107 Xixiang Section 467, Xixiang, Bao'an, Shenzhen, Guangdong, China
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1. General Information

1.1. Client Information

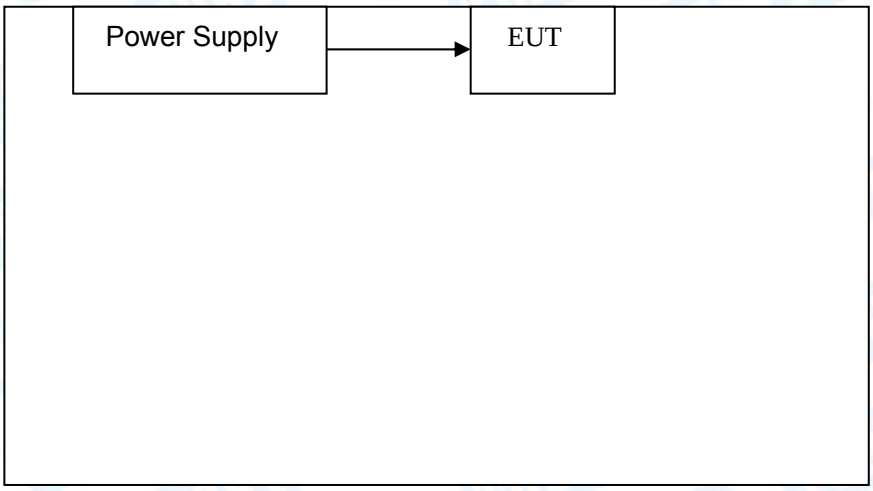
Applicant	:	USC056
Address	:	China
Manufacturer	:	USC056
Address	:	China

1.2. General Description of EUT (Equipment Under Test)

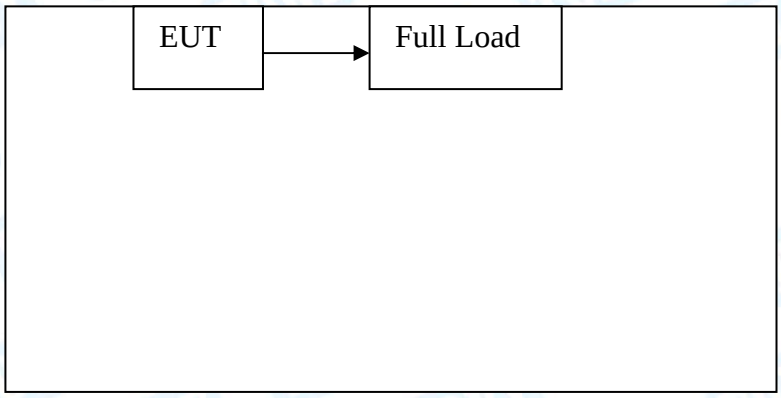
EUT Name	:	Wireless power bank
Model(s)	:	SP0328 (TITAN)
Class of EUT	:	☐ Class A ☒ Class B
EUT Type	:	☒ Table top ☐ Floor standing ☐ combination
F_X	:	≤108 MHz
Power Supply	:	Input: DC 5V/1500mA,Output: DC 5V/2100mA Capacity: 4400mAh
Remark: / ***F_X***: Highest internal frequency.		

1.3. Block Diagram Showing The Configuration of System Tested

Model 1



Model 2



1.4. Description of Support Units

Name	Model	S/N	Manufacturer	Used " √ "
Power Supply	02D050200	---	BSY	√

1.5. Description of Operating Mode

To investigate the maximum EMI emission characteristics generated from EUT, the test system was pre-scanning tested based 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.

Pretest Mode	Description
Mode 1	Charging Mode
Mode 2	Discharging Mode

The EUT system operated these modes were found to be the worst case during the pre-scanning test as Following:

For EMI Test	
Final Test Mode	**Description**
Mode 1	Charging Mode
Mode 2	Discharging Mode
For EMS Test	
Final Test Mode	**Description**
Mode 1	Charging Mode
Mode 2	Discharging Mode

1.6. Performance Criterion

Criterion A: The equipment shall continue to operate as intended without operator intervention. No degradation of performance of loss of function is allowed below a performance level specified by the manufacturer when the equipment is used as intended.

Criterion B: After the test, the equipment 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 equipment is used as intended.

Criterion C: Loss of function is allowed, provided the function is self-recoverable, or can be restored by the operation of the controls by the user in accordance with the manufacturer's instructions.

1.7. Measurement Uncertainty

The reported uncertainty of measurement y ± U，where expended uncertainty U is based on a standard uncertainty multiplied by a coverage factor of k=2，providing a level of confidence of approximately 95 %.

Test	Parameters	Expanded Uncertainty (U_{Lab})	Expanded Uncertainty (U_{Cispr})
Conducted Emission	Level Accuracy: 9kHz~150kHz 150kHz to 30MHz	±3.42 dB ±3.42 dB	±4.0 dB ±3.6 dB
Radiated Emission	Level Accuracy: 9kHz to 30 MHz	±4.60 dB	N/A
Radiated Emission	Level Accuracy: 30MHz to 1000 MHz	±4.40 dB	±5.2 dB
Radiated Emission	Level Accuracy: Above 1000MHz	±4.20 dB	N/A
Mains Harmonic	Voltage	±3.11%	N/A
Voltage Fluctuations & Flicker	Voltage	±3.25%	N/A

1.8. Test Facility

The testing report were performed by the Shenzhen Toby Technology Co., Ltd., in their facilities located at 1A/F., Bldg.6, Yusheng Industrial Zone, The National Road No.107 Xixiang Section 467, Xixiang, Bao'an, Shenzhen, Guangdong, China. At the time of testing, the following bodies accredited the Laboratory:

CNAS (L5813)
The Laboratory has been accredited by CNAS to ISO/IEC 17025: 2005 General Requirements for the Competence of Testing and Calibration Laboratories for the competence in the field of testing. And the Registration No.: CNAS L5813.

FCC List No.: (811562)
The Laboratory is listed in the United States of American Federal Communications Commission (FCC), and the registration number is 811562.

IC Registration No.: (11950A-1)
The Laboratory has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing. The site registration: Site# 11950A-1.

2. TEST Results Summary

EMISSION		
Description of test items	**Standards**	**Results**
Conducted disturbance at mains terminals	EN 55032: 2015 Class B	N/A
Radiated Disturbance	EN 55032: 2015 Class B	Pass(2)
Harmonic current emissions	EN 61000-3-2: 2014	N/A
Voltage fluctuation and flicker	EN 61000-3-3: 2013	N/A
IMMUNITY		
Description of test items	**Standards**	**Results**
Electrostatic Discharge (ESD)	EN 61000-4-2: 2009	Pass
Radio-frequency, Continuous radiated disturbance	EN 61000-4-3: 2006+A1:2008 +A2:2010	Pass
EFT/B Immunity	EN 61000-4-4: 2012	N/A
Surge Immunity	EN 61000-4-5: 2014	N/A
Conducted RF Immunity	EN 61000-4-6: 2014	N/A
Power frequency magnetic field	EN 61000-4-8: 2010	N/A(3)
Voltage dips, >95% reduction	EN 61000-4-11: 2004	N/A
Voltage dips, 30% reduction		
Voltage interruptions		

Note: N/A is an abbreviation for Not Applicable.

(1) For Harmonic Current the equipment power is less than 75W.

(2) The EUT maximum operating frequency is less than 108MHz, so no requirement for the radiated disturbance for above 1GHz.

(3) Not applicable, the EUT has not magnetic field.

3. Test Equipment Used

Radiation Emission Test					
Equipment	**Manufacturer**	**Model No.**	**Serial No.**	**Last Cal.**	**Cal.Due Date**
Spectrum Analyzer	Agilent	E4407B	MY45106456	Jul. 20, 2017	Jul. 19, 2018
EMI Test Receiver	Rohde & Schwarz	ESCI	100010/007	Jul. 20, 2017	Jul. 19, 2018
Bilog Antenna	ETS-LINDGREN	3142E	00117537	Mar. 25, 2017	Mar. 24, 2018
Bilog Antenna	ETS-LINDGREN	3142E	00117542	Mar. 25, 2017	Mar. 24, 2018
Horn Antenna	ETS-LINDGREN	3117	00143207	Mar. 24, 2017	Mar. 23, 2018
Horn Antenna	ETS-LINDGREN	3117	00143209	Mar. 24, 2017	Mar. 23, 2018
Pre-amplifier	HP	11909A	185903	Mar. 24, 2017	Mar. 23, 2018
Pre-amplifier	HP	8449B	3008A00849	Mar. 25, 2017	Mar. 24, 2018
Cable	HUBER+SUHNER	100	SUCOFLEX	Mar. 24, 2017	Mar. 23, 2018
Positioning Controller	ETS-LINDGREN	2090	N/A	N/A	N/A
Discharge Immunity Test					
Equipment	**Manufacturer**	**Model No.**	**Serial No.**	**Last Cal.**	**Cal.Due Date**
ESD Generator	HAFELY	PESD 1610	H808671	Mar. 27, 2017	Mar. 26, 2018
Radiated Immunity Test					
Equipment	**Manufacturer**	**Model No.**	**Serial No.**	**Last Cal.**	**Cal.Due Date**
Signal Generator	Rohde & Schwarz	SMT03	200754	Mar. 24, 2017	Mar. 23, 2018
Power Meter	Rohde & Schwarz	NRVD	110562	Feb. 14, 2017	Feb. 13, 2018
Voltage Probe	Rohde & Schwarz	URV5-Z2	12056	Feb. 14, 2017	Feb. 13, 2018
Voltage Probe	Rohde & Schwarz	URV5-Z2	12074	Feb. 14, 2017	Feb. 13, 2018
RF Amplifier	AR	50S1G4A	326720	Feb. 14, 2017	Feb. 13, 2018
Bilog Antenna	ETS	3142C	00047662	Feb. 14, 2017	Feb. 13, 2018
Horn Antenna	ARA	DRG-118A	16554	Feb. 14, 2017	Feb. 13, 2018
Audio Analyzer	Rohde & Schwarz	UPL 16	SB2208	Feb. 14, 2017	Feb. 13, 2018
Sound Level Calibrator	B&K	4231	264516	Feb. 14, 2017	Feb. 13, 2018

4. Radiated Emission Test

4.1. Test Standard and Limit

4.1.1. Test Standard

EN 55032: 2015 Class B

4.1.2. Test Limit

Bellow 1GHz

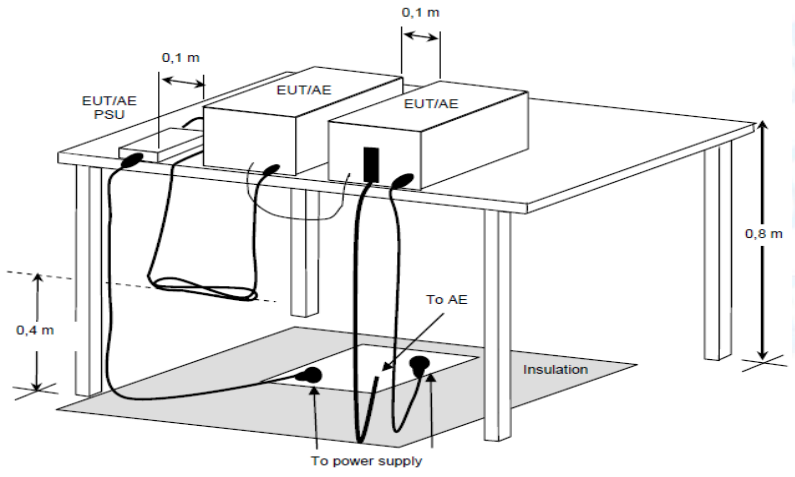
Frequency	Limit (dBμV/m) (3m)	
	Quasi-peak Level	
	Class A	Class B
30MHz~230MHz	50	40
230MHz~1000MHz	57	47
Remark: 1. The lower limit shall apply at the transition frequency. 2. The test distance is 3m.		

Above 1GHz

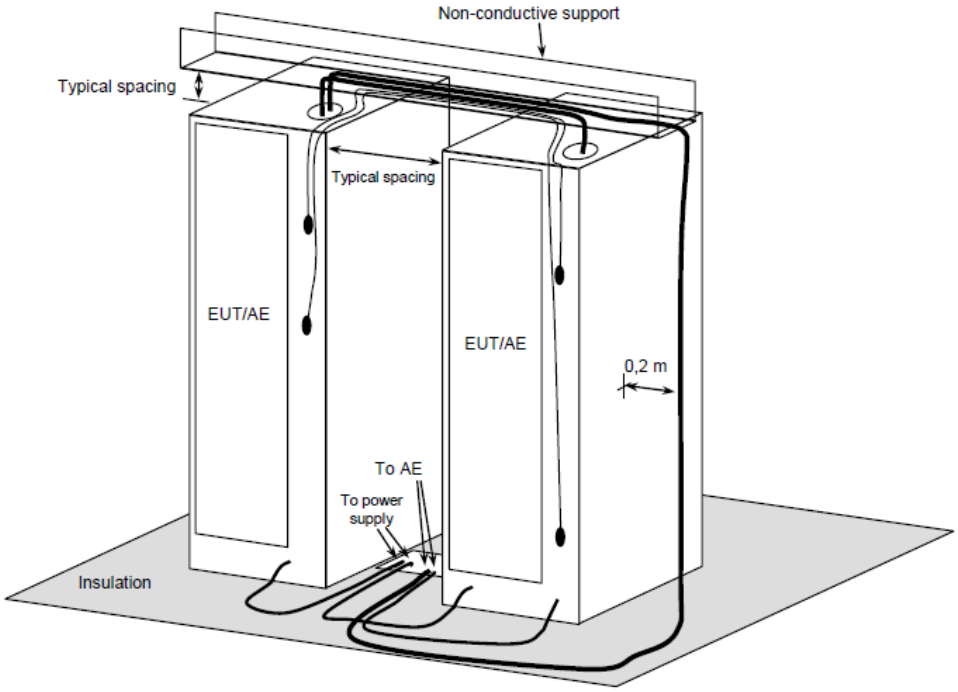
Frequency (GHz)	Limit (dBμV/m) (3m)			
	Class A		Class B	
	Peak	Average	Peak	Average
1~3	76	56	70	50
3~6	80	60	74	54
Remark: 1. The lower limit shall apply at the transition frequency. 2. The test distance is 3m.				

4.2. Test Setup

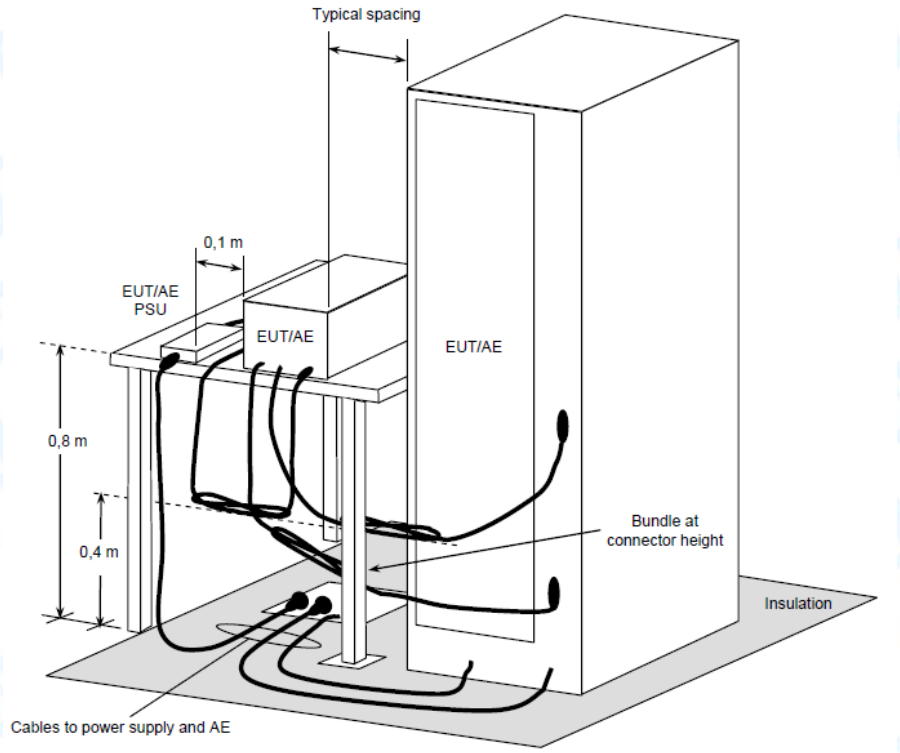
☒ For table top equipment



☐ For floor standing equipment



☐ For combination equipment



4.3. Test Procedure

Measurement was performed according to clause 7.3 of CISPR 16-2-3.

The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3m. The table was rotated 360 degrees to determine the position of the highest radiation.
The height of the equipment or of the substitution antenna shall be 0.8 m; the height of the test antenna shall vary between 1 m to 4 m. Both horizontal and vertical polarizations of the antenna are set to make the measurement.

The initial step in collecting radiated emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range.

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.

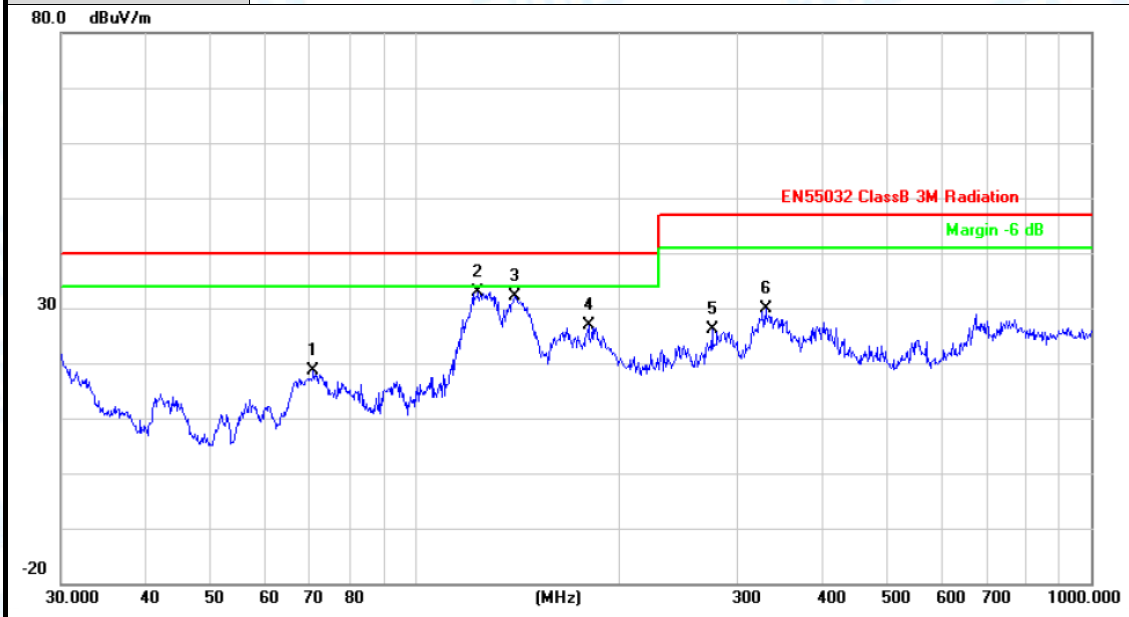
Highest internal frequency (Fx)	Highest measured frequency for radiated measurement	Measured Bandwidth
Fx ≤ 108 MHz	1 GHz	120kHz
108 MHz < Fx ≤ 500 MHz	2 GHz	1MHz
500 MHz < Fx ≤ 1 GHz	5 GHz	1MHz
Fx > 1 GHz	5*Fx up to a maximum of 6 GHz	1MHz
NOTE 1: For FM and TV broadcast receivers, Fx is determined from the highest frequency generated orused excluding the local oscillator and tuned frequencies. **NOTE 2:** For outdoor units of home satellEquipment receiving systems highest measured frequency shall be 18GHz.		

4.4. Test Data

Please refer to the following pages.

Bellow 1GHz

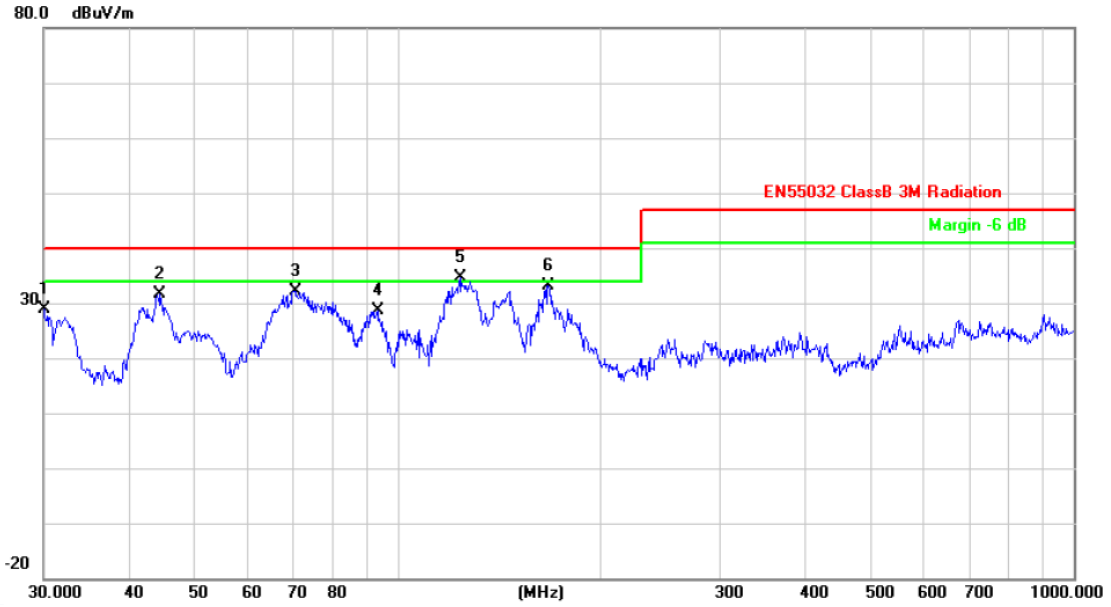
EUT:	Wireless power bank	Model Name :	SP0328 (TITAN)
Temperature:	25 ℃	Relative Humidity:	55%
Test Voltage:	DC 5V		
Ant. Pol.	Horizontal		
Test Mode:	Mode 1		
Remark:			



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector
1		70.8315	41.80	-23.25	18.55	40.00	-21.45	peak
2	*	124.1330	54.91	-21.92	32.99	40.00	-7.01	peak
3		140.3421	53.68	-21.51	32.17	40.00	-7.83	peak
4		180.6488	46.79	-20.03	26.76	40.00	-13.24	peak
5		275.1570	42.94	-16.81	26.13	47.00	-20.87	peak
6		330.1949	44.81	-15.02	29.79	47.00	-17.21	peak

Emission Level= Read Level+ Correct Factor

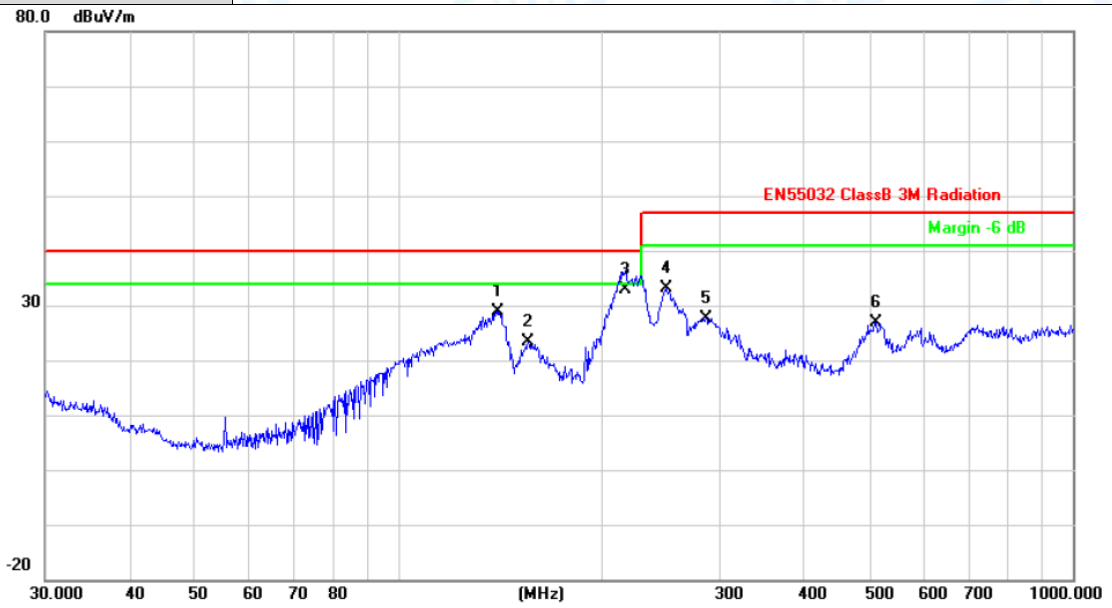
EUT:	Wireless power bank	Model Name :	SP0328 (TITAN)
Temperature:	25 ℃	Relative Humidity:	55%
Test Voltage:	DC 5V		
Ant. Pol.	Vertical		
Test Mode:	Mode 1		
Remark:			



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector
1		30.0000	42.58	-13.78	28.80	40.00	-11.20	peak
2		44.5868	53.44	-21.81	31.63	40.00	-8.37	peak
3		70.5836	55.50	-23.26	32.24	40.00	-7.76	peak
4		93.4402	50.57	-21.97	28.60	40.00	-11.40	peak
5	*	124.1330	56.62	-21.92	34.70	40.00	-5.30	peak
6		167.2368	53.54	-20.49	33.05	40.00	-6.95	peak

Emission Level= Read Level+ Correct Factor

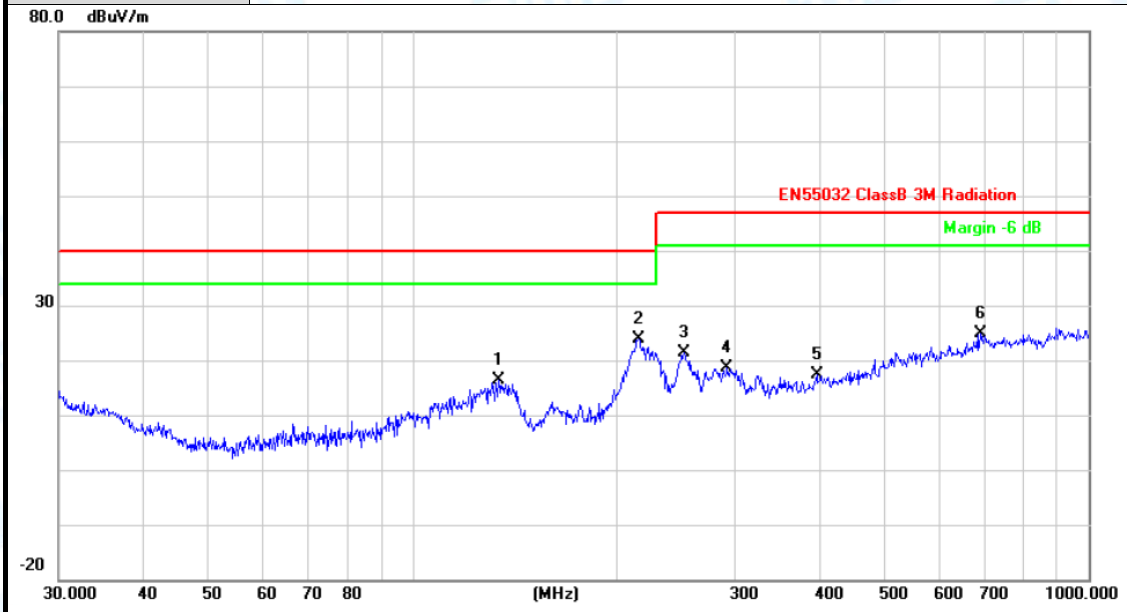
EUT:	Wireless power bank	Model Name :	SP0328 (TITAN)
Temperature:	25 ℃	Relative Humidity:	55%
Test Voltage:	DC 5V		
Ant. Pol.	Horizontal		
Test Mode:	Mode 2		
Remark:			



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector
1		140.8351	50.40	-21.47	28.93	40.00	-11.07	peak
2		155.9101	43.59	-20.33	23.26	40.00	-16.74	peak
3	*	216.7828	51.91	-19.01	32.90	40.00	-7.10	QP
4		249.4250	50.58	-17.44	33.14	47.00	-13.86	peak
5		285.9778	44.18	-16.58	27.60	47.00	-19.40	peak
6		511.8352	37.07	-10.15	26.92	47.00	-20.08	peak

Emission Level= Read Level+ Correct Factor

EUT:	Wireless power bank	Model Name :	SP0328 (TITAN)
Temperature:	25 ℃	Relative Humidity:	55%
Test Voltage:	DC 5V		
Ant. Pol.	Vertical		
Test Mode:	Mode 2		
Remark:			



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector
1		134.0882	38.00	-21.65	16.35	40.00	-23.65	peak
2	*	216.0240	42.88	-19.04	23.84	40.00	-16.16	peak
3		252.0627	38.65	-17.35	21.30	47.00	-25.70	peak
4		292.0583	35.07	-16.45	18.62	47.00	-28.38	peak
5		396.2415	29.53	-12.25	17.28	47.00	-29.72	peak
6		691.9867	31.05	-6.07	24.98	47.00	-22.02	peak

Emission Level= Read Level+ Correct Factor

5. Electrostatic Discharge Immunity Test

5.1. Test Requirements

5.1.1. Test Standard

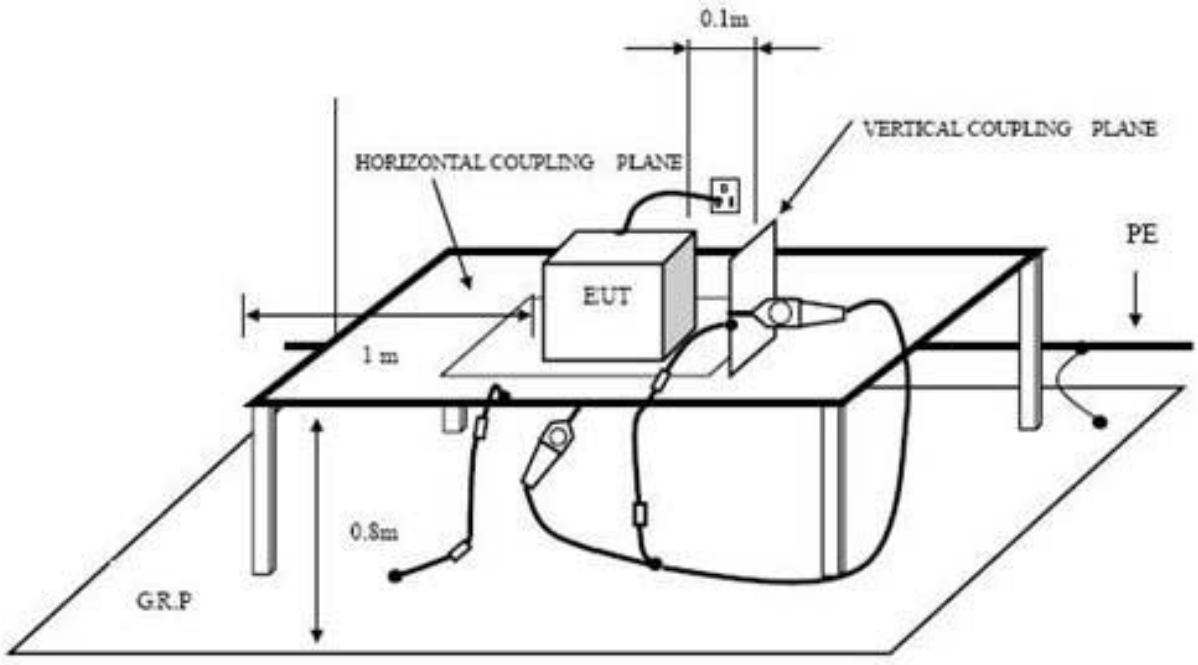
EN 55024:2010+A1: 2015 (EN 61000-4-2:2009)

5.1.2. Test Level

Level	Test Voltage Contact Discharge (kV)	Test Voltage Air Discharge (kV)
1	±2	±2
2	±4	±4
3	±6	±8
4	±8	±15
X	Special	Special

5.1.3. Performance criterion: **B**

5.2. Test Setup



INDIRECT DISCHARGE SETUP

5.3. Test Procedure

5.3.1. Air Discharge:

This test is done on a non-conductive surface. The round discharge tip of the discharge electrode shall be approached as fast as possible to touch the EUT. After each discharge, the discharge electrode shall be removed from the EUT. The generator is then re-triggered for a new single discharge and repeated 10 times for each pre-selected test point. This procedure shall be repeated until all the air discharge completed.

5.3.2. Contact Discharge:

All the procedure shall be same as air discharge. Except that the tip of the discharge electrode shall touch the EUT before the discharge switch is operated.

5.3.3. Indirect discharge for horizontal coupling plane

At least 10 single discharges (in the most sensitive polarity) shall be applied at the front edge of each HCP opposite the center point of each unit (if applicable) of the EUT and 0.1m from the front of the EUT. The long axis of the discharge electrode shall be in the plane of the HCP and perpendicular to its front edge during the discharge.

5.3.4. Indirect discharge for vertical coupling plane

At least 10 single discharges (in the most sensitive polarity) shall be applied to the center of one vertical edge of the coupling plane. The coupling plane, of dimensions 0.5m X 0.5m, is placed parallel to, and positioned at a distance of 0.1m from the EUT. Discharges shall be applied to the coupling plane, with this plane in sufficient different positions that the four faces of the EUT are completely illuminated.

5.4. Test Data

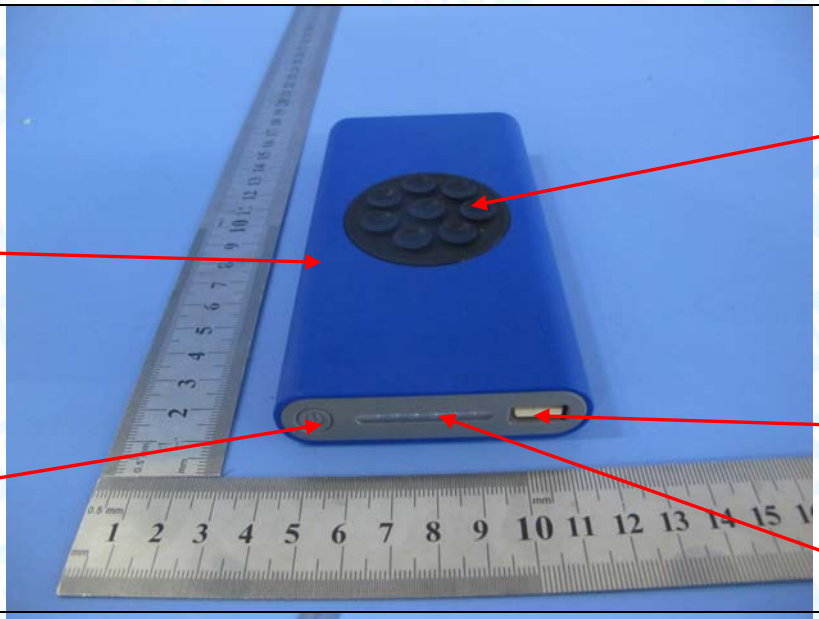
Please refer to the following pages.

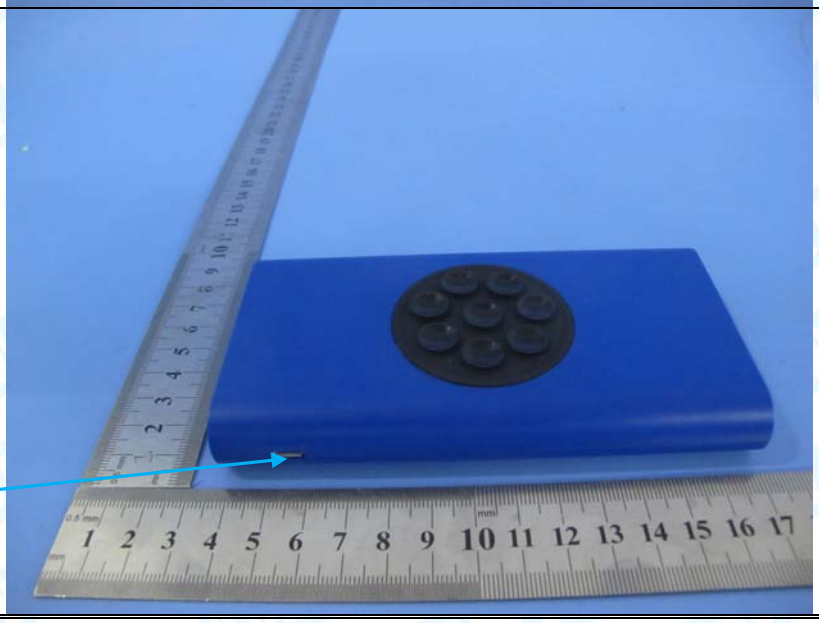
Electrostatic Discharge Test Result

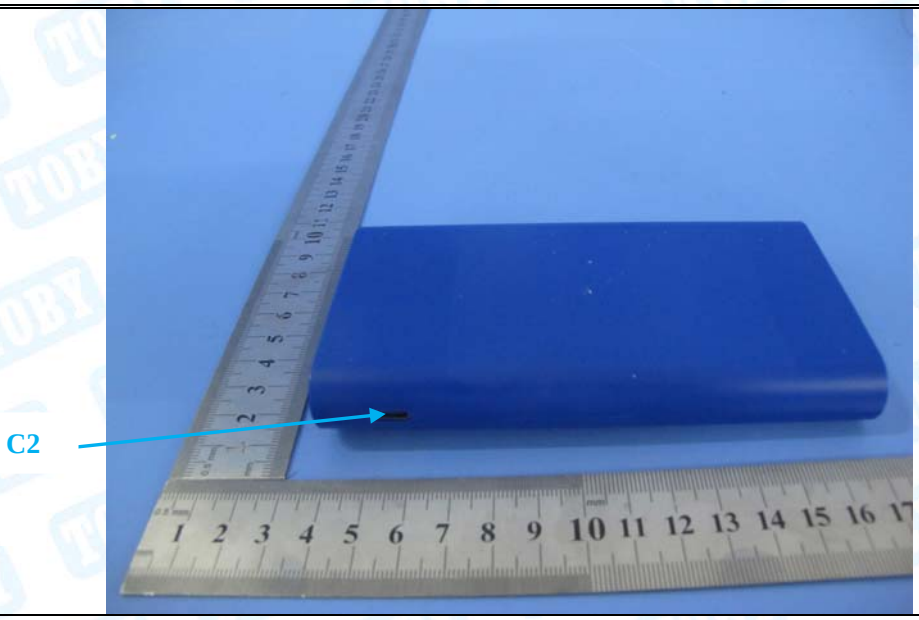
EUT :	Wireless power bank	Model Name :	SP0328 (TITAN)
Temperature :	22℃	Humidity :	50%
Power supply :	DC 5V	Test Mode :	Mode 1/2
Test Engineer :	Jason		
Criterion: B			
Air Discharge: ±2/±4/±8kV Contact Discharge: ±2/±4kV			

Location	Test Level (kV)	No. of Discharge	Result
A1	±2kV ±4kV ±8kV	20	A
A2		20	A
A3		20	A
A4		20	A
A5		20	A
C1	±2kV ±4kV	20	A
C2		20	A
HCP	±4kV	40	A
VCP	±4kV	40	A

Test Location Photos







Note:

1) Criteria A: There was no change operated with initial operating during the test.
2) Criteria B: The EUT function loss during the test, but self-recoverable after the test.
3) Criteria C: The system shut down during the test.

6. Radiated Electromagnetic Field Immunity Test

6.1. Test Requirements

6.1.1. Test Standard

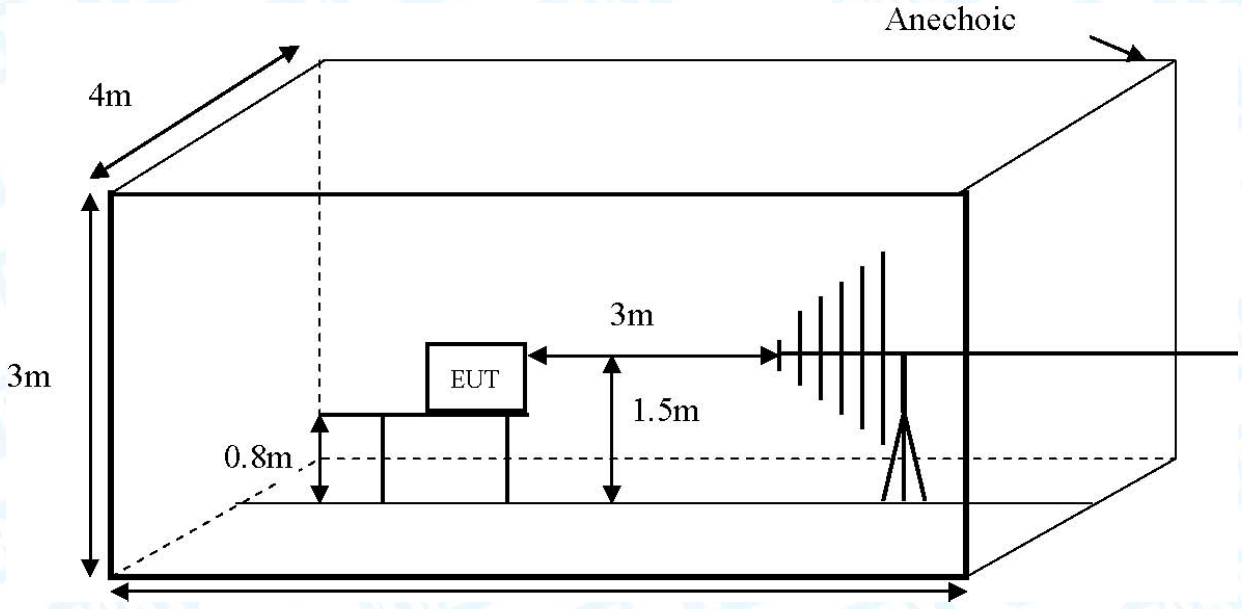
EN 55024:2010+A1: 2015 (EN 61000-4-3:2006+A1:2008+A2:2010)

6.1.2. Test Level

Level	Field Strength V/m
1	1
2	3
3	10
X	Special

6.1.3. Performance criterion: **A**

6.2. Test Setup



6.3. Test Procedure

The EUT are placed on a table, which is 0.8 meter high above the ground. The EUT is set 3 meters away from the transmitting antenna, which is mounted on an antenna tower. Both horizontal and vertical polarization of the antenna is set on test. Each of the four sides of the EUT must be faced this transmitting antenna and measured individually.

In order to judge the EUT performance, a camera is used to monitor its screen.

All the scanning conditions are as following:

Condition of Test	Remark
Fielded strength	3V/m (Severity Level 2)
Radiated signal	Modulated
Scanning frequency	80-1000MHz
Sweep time of radiated	0.0015 Decade/s
Dwell time	1 Sec.

6.4. Test Data

Please refer to the following pages.

RF Field Strength Susceptibility Test Results

EUT	:	Wireless power bank	M/N	:	SP0328 (TITAN)
Temperature	:	25℃	Humidity	:	40%
Power supply	:	DC 5V	Test Mode	:	Mode 1/2

Required Performance Criteria: A

Modulation: AM 80%

Pulse: 1 kHz

EUT Position	Actual Performance Criteria				Judgment
	Frequency Range 1: 80~1000MHz		Frequency Range 2: /		
	Horizontal	**Vertical**	**Horizontal**	**Vertical**	
Front	**A**	**A**	/	/	**PASS**
Right	**A**	**A**	/	/	**PASS**
Rear	**A**	**A**	/	/	**PASS**
Left	**A**	**A**	/	/	**PASS**

Remark:

1) Criteria A: There was no change operated with initial operating during the test.
2) Criteria B: The EUT function loss during the test, but self-recoverable after the test.
3) Criteria C: The system shut down during the test.

7. Photographs - Constructional Details

Photo 1 Appearance of EUT

Photo 2 Appearance of EUT

Photo 3 Appearance of EUT

Photo 4 Appearance of EUT

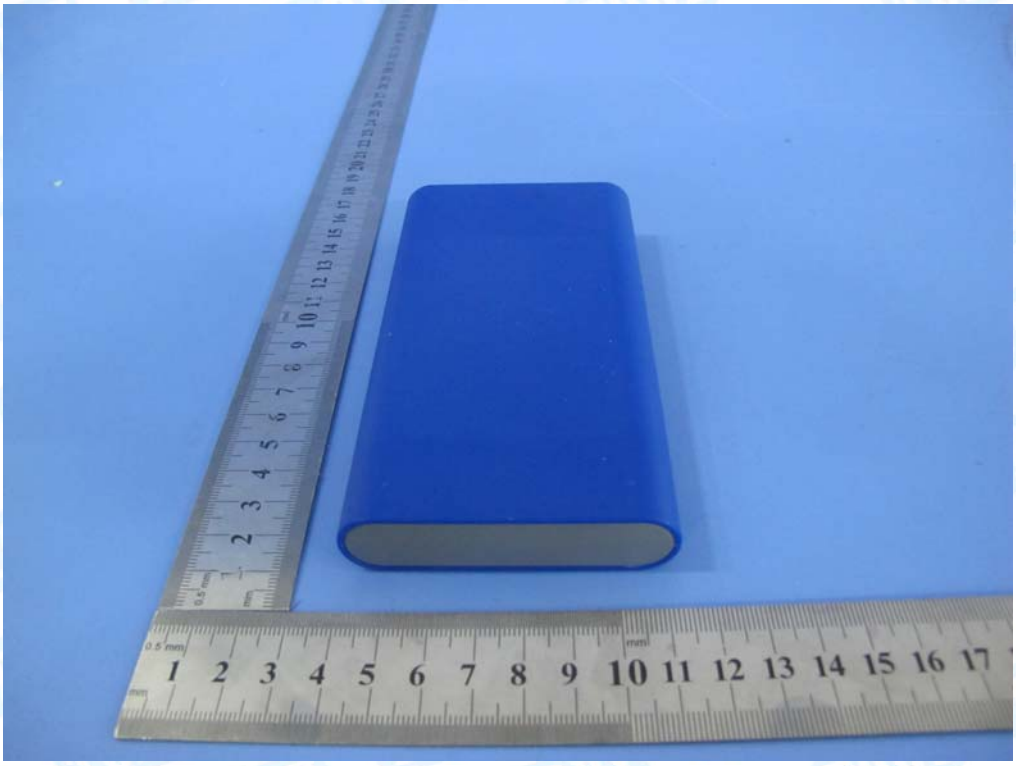


Photo 5 Internal of EUT

Photo 6 Appearance of PCB

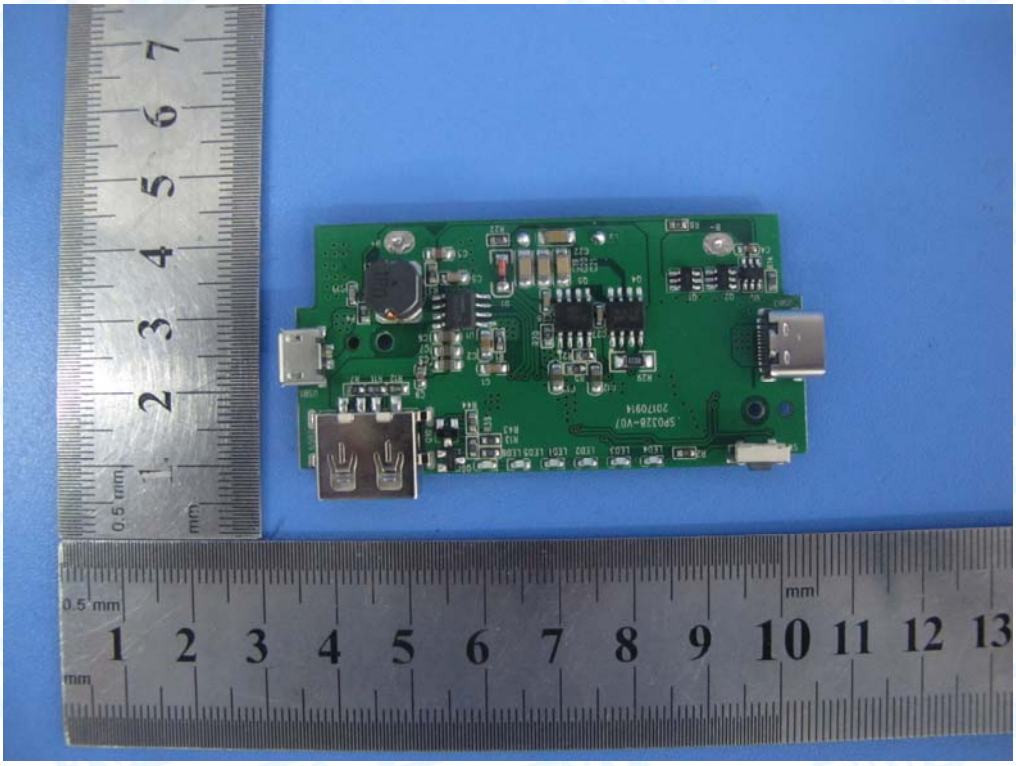
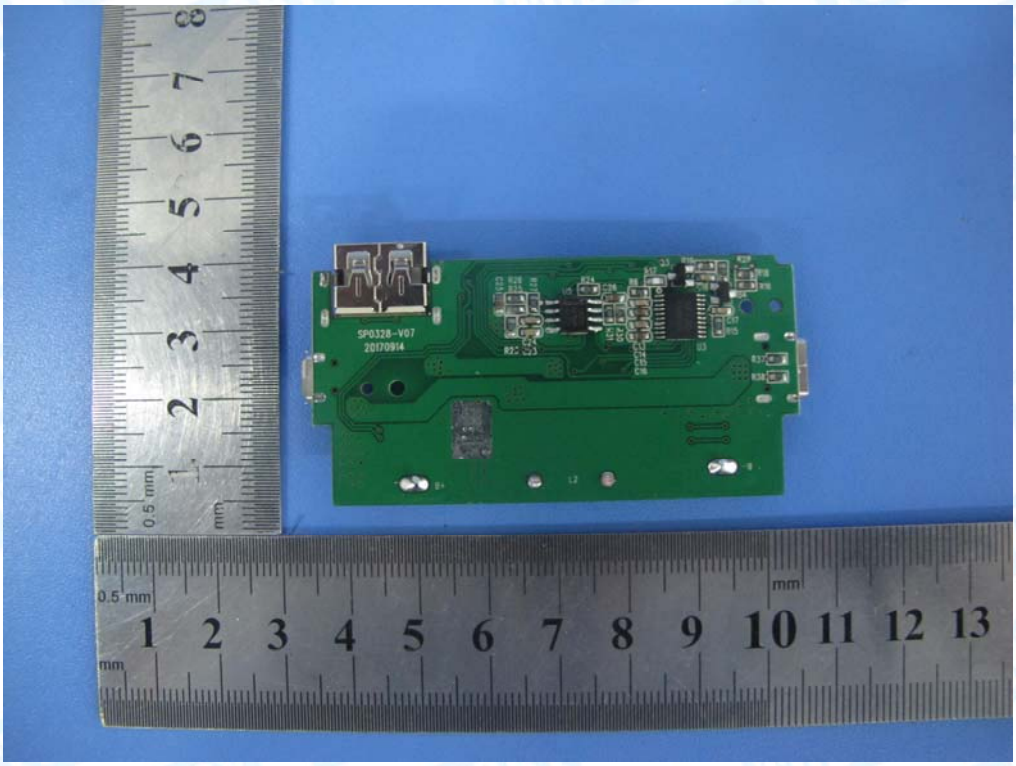


Photo 7 Appearance of PCB



8. Photographs – Test Setup

Photo 1 Radiated Emission Test Setup

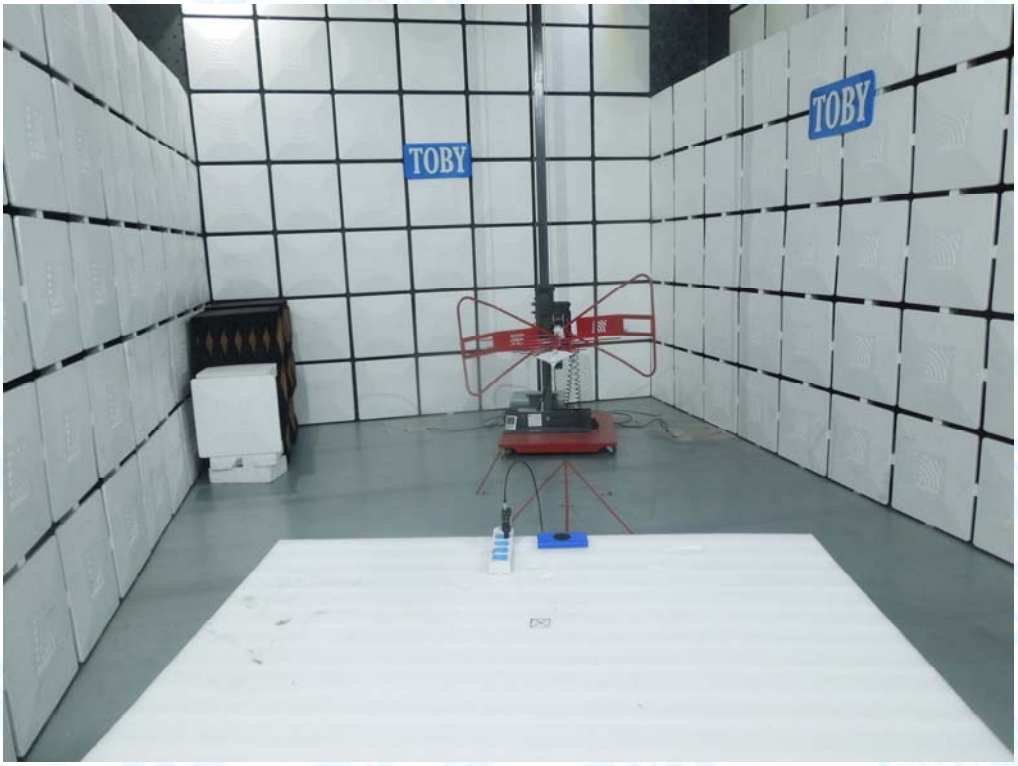


Photo 2 Radiated Emission Test Setup

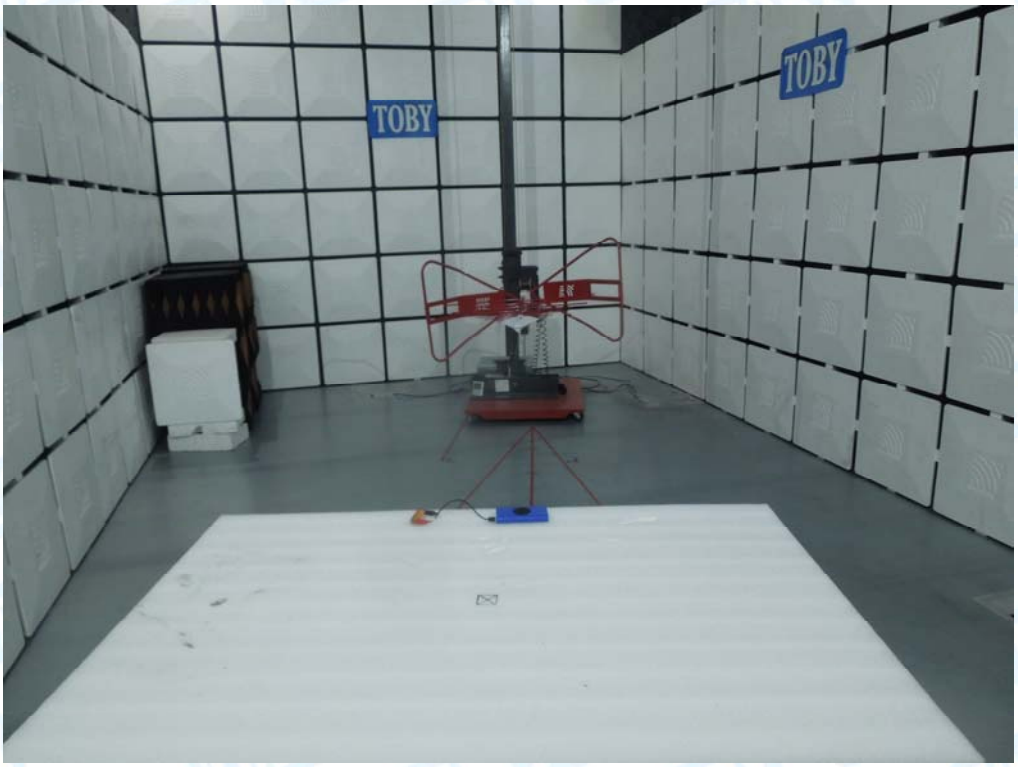


Photo 3 Electrostatic Discharge Test Setup

Photo 4 Electrostatic Discharge Test Setup

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