

# Shenzhen Toby Technology Co., Ltd.

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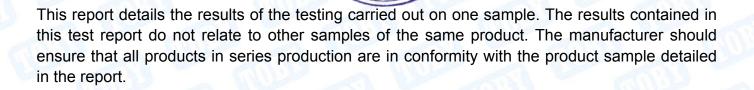
CE

# **EMC Test Report**

Application No.	: TB161214405	
Applicant	TON THE THE	
Equipment Under	est (EUT)	
EUT Name	: Power bank	
Model No.	: SP0301	
Series Model No.	: N/A	
Brand Name		
Receipt Date	: 2016-11-30	
Test Date	: 2016-11-30 to 2016-12-05	
Issue Date	: 2016-12-05	
Standards	: EN55032: 2015 Class B EN55024: 2010+A1: 2015	
Conclusions	PASS	
	In the configuration tested, the EUT complied with the standards specified above	

**Test/Witness Engineer** 

#### Approved & Authorized



The EUT technically complies with the 2014/30/EU directive requirements

TB-RF-075-1.0



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## 1. General Information

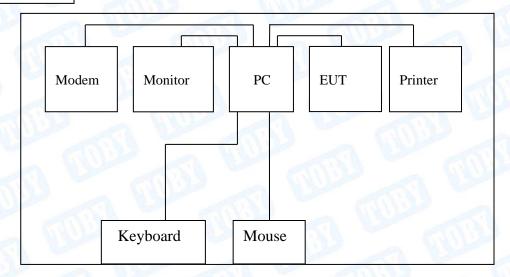
### 1.1. Client Information

Applicant	:	
Address	3	ROBI TOBI TOBI TOBI TOBI
Manufacturer		
Address		TOP THE TOP TOP TOP TOP

### 1.2. General Description of EUT (Equipment Under Test)

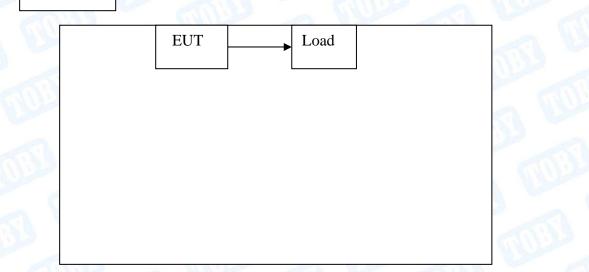
EUT Name	:	Power bank
Model No.		SP0301
Series Model No.		N/A
Brand Name	:	
Class of EUT	:	Class A 🛛 Class B
EUT Type	:	☐ Table top ☐ Floor standing ☐ combination
Fx		N/A
Power Supply	:	Input: DC 5V/1000mA Output: DC 5V/ 1000mA Capacity:1000mAh
Remark: / Fx: Highest inter	nal	frequency.

### 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 "√"
Printer	HP1505n	VNF3G06957	HP	$\checkmark$
Modem	RX304Xv2		ASUS	$\checkmark$
LCD Monitor	E170Sc		DELL	$\checkmark$
PC	OPTIPLEX380		DELL	$\checkmark$
Keyboard	L100	U01C	DELL	$\checkmark$
Mouse	M-UARDEL7		DELL	$\checkmark$

#### 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



Description	
Charging Mode	
Discharging Mode	
For EMS Test	
Description	
Charging Mode	
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  $\pm$  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 <sub>Lab</sub> )	Expanded Uncertainty (Uc <sub>ispr</sub> )
Conducted Emission	Level Accuracy: 9kHz~150kHz 150kHz to 30MHz	$\pm$ 3.42 dB $\pm$ 3.42 dB	$\pm$ 4.0 dB $\pm$ 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	$\pm$ 5.2 dB
Radiated Emission	Level Accuracy: Above 1000MHz	$\pm$ 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	BU TO TO TO	
Voltage dips, 30% reduction	EN 61000-4-11: 2004	N/A
Voltage interruptions		
Note: NI/A is an abbraviation for Not Apr		

**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 E	mission Test				
Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal.Due Date
Spectrum Analyzer	Agilent	E4407B	MY45106456	Jul. 22, 2016	Jul. 21, 2017
EMI Test Receiver	Rohde & Schwarz	ESCI	100010/007	Jul. 22, 2016	Jul. 21, 2017
Bilog Antenna	ETS-LINDGREN	3142E	00117537	Mar. 20, 2016	Mar. 19, 2017
Horn Antenna	ETS-LINDGREN	3117	00143207	Mar. 19, 2016	Mar. 18, 2017
Pre-amplifier	Sonoma	310N	185903	Mar. 20, 2016	Mar. 19, 2017
Pre-amplifier	HP	8447B	3008A00849	Mar. 26, 2016	Mar. 25, 2017
Cable	HUBER+SUHNER	100	SUCOFLEX	Mar. 26, 2016	Mar. 25, 2017
Positioning Controller	ETS-LINDGREN	2090	N/A	N/A	N/A
Discharge II	nmunity Test	-			
Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal.Due Date
ESD Generator	HAFELY	PESD 1610	H808671	Mar.18, 2016	Mar.17, 2017
Radiated Im	munity Test				
Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal.Due Date
Signal Generator	Rohde & Schwarz	SMT03	200754	Mar.26, 2016	Mar. 25, 2017
Power Meter	Rohde & Schwarz	NRVD	110562	Feb. 16, 2016	Feb. 15, 2017
Voltage Probe	Rohde & Schwarz	URV5-Z2	12056	Feb. 16, 2016	Feb. 15, 2017
Voltage Probe	Rohde & Schwarz	URV5-Z2	12074	Feb. 16, 2016	Feb. 15, 2017
RF Amplifier	AR	50S1G4A	326720	Feb. 16, 2016	Feb. 15, 2017
Bilog Antenna	ETS	3142C	00047662	Feb. 16, 2016	Feb. 15, 2017
Horn Antenna	ARA	DRG-118A	16554	Feb. 16, 2016	Feb. 15, 2017
Audio Analyzer	Rohde & Schwarz	UPL 16	SB2208	Feb. 16, 2016	Feb. 15, 2017
Sound Level Calibrator	B&K	4231	264516	Feb. 16, 2016	Feb. 15, 2017



## 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

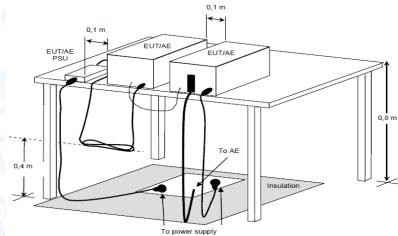
Frequency	Limit (dBµV Quasi-pea	, , ,
	Class A	Class B
30MHz~230MHz	50	40
230MHz~1000MHz	57	47

#### Above 1GHz

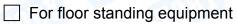
		Limit (dBµV/m) (3m)				
Frequency (GHz)	Clas	s A	Class B			
(0112)	Peak	Average	Peak	Average		
1~3	76	56	70	50		
3~6	80	60	74	54		

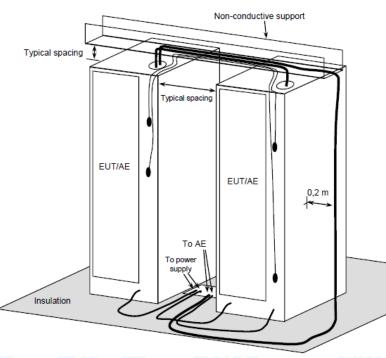
#### 4.2. Test Setup

For table top equipment

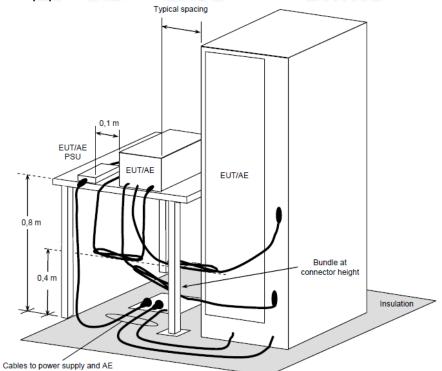








For combination equipment





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#### 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 rece	eivers, Fx is determined from the highest frequ	ency generated orused

**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.



EUT:	Pow	er bank	M	odel Name :	;	SP0301	
Temperature:	25 °C	С	R	elative Humi	dity:	55%	
Test Voltage:	DC 5	DC 5V				100	-
Ant. Pol.	Horiz	zontal		- AN			197
Test Mode:	Char	rging Mode		AUD		a V	
		Lee le	A SI			39	a.
30				herbert	5 ×	AssB-3M Radiation Margin -1 6 X	
20							
20	50 60 70		(MHz)	300	400	500 600 700	1000.00
	50 60 70 Freq.	Reading Level	(MHz) Correct Factor	300 Measure- ment	400 Limit	500 600 700 Over	1000.00
30.000 40		Reading	Correct	Measure-		Over	1000.00
No. Mk.	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over n dB	Detecto
30.000 40 No. Mk. 1 3	Freq. MHz	Reading Level dBuV	Correct Factor dB/m	Measure- ment dBuV/m	Limit dBu√/m	Over dB -25.43	
30.000 40 No. Mk. 1 3 2 14	Freq. MHz 7.8121	Reading Level dBuV 33.52	Correct Factor dB/m -18.95	Measure- ment dBuV/m 14.57	Limit dBu√m 40.00	Over dB -25.43 -23.05	Detecto peak peak
30.000 40 No. Mk. 1 3 2 14 3 * 16	Freq. MHz 7.8121 3.8295	Reading Level dBuV 33.52 38.46	Correct Factor dB/m -18.95 -21.51	Measure- ment dBuV/m 14.57 16.95	Limit dBu√/m 40.00 40.00	Over dB -25.43 -23.05 -17.90	Detecto peak peak peak
30.000      40        No.      Mk.        1      3        2      14        3      *      16        4      19	Freq. MHz 7.8121 3.8295 57.8243	Reading Level dBuV 33.52 38.46 42.88	Correct Factor dB/m -18.95 -21.51 -20.78	Measure- ment dBuV/m 14.57 16.95 22.10	Limit dBu√/m 40.00 40.00 40.00	Over dB -25.43 -23.05 -17.90 -22.43	Detecto peak

Emission Level= Read Level+ Correct Factor



EUT:	Powe	r bank	M	odel Name :		SP0301	
Temperature:	<b>25</b> °C		Re	elative Humid	ity:	55%	6
Test Voltage:	DC 5	V	-013	N. Contraction	61102		
Ant. Pol.	Vertic	al				6	Can
Test Mode:	Charg	ging Mode		MUL	1	$\alpha$	
Remark:			A SI				-
30		3	4 5 6 X X X			assB-3M Radiati Margin	-6 dB
	hallanna	and the second	- A WWW WWW	have been been been been been been been be	Holen Daylorder	Newtodownol <sup>ber</sup> renol <sup>b</sup> ee	
-20			(MHz)				
-20 		80 Reading Level	(MHz) Correct Factor	300 Measure- ment	400 Limit	500 600 70 Over	
-20 30.000 40 50 No. Mk. F	60 70	80 Reading	Correct	300 Measure-	400	500 600 70 Over	
-20 	60 70 Freq.	80 Reading Level	Correct Factor	300 Measure- ment	400 Limit	500 600 70 Over n dB	0 1000.00
-20 30.000 40 50 No. Mk. F 1 * 37.	60 70 Freq. MHz	80 Reading Level dBuV	Correct Factor dB/m	300 Measure- ment dBuV/m	400 Limit dBu√/r	500 600 70 Over n dB	0 1000.00 Detecto 7 peak
-20 30.000 40 50 No. Mk. F 1 * 37. 2 44.	60 70 Freq. MHz 9450	80 Reading Level dBuV 47.87	Correct Factor dB/m -19.04	300 300 Measure- ment dBuV/m 28.83	400 Limit dBu√/r 40.00	500 600 70 Over n dB ) -11.17 ) -20.65	0 1000.00 Detecto 7 peak
-20 30.000 40 50 No. Mk. F 1 * 37. 2 44. 3 108	60 70 Freq. MHz 9450 2752	80 Reading Level dBuV 47.87 41.44	Correct Factor dB/m -19.04 -22.09	Measure- ment dBuV/m 28.83 19.35	<b>400</b> Limit dBu√/r 40.00	500 600 70 Over n dB ) -11.17 ) -20.65 ) -23.39	Detecto 7 peak 5 peak
-20 30.000 40 50 No. Mk. F 1 * 37. 2 44. 3 108 4 123	60 70 Freq. MHz 9450 2752 3.2667	80 Reading Level dBuV 47.87 41.44 38.46	Correct Factor dB/m -19.04 -22.09 -21.85	300 300 Measure- ment dBuV/m 28.83 19.35 16.61	400 Limit dBu√/r 40.00 40.00	500 600 70 Over n dB ) -11.17 ) -20.65 ) -23.39 ) -20.89	Detecto 7 peak 5 peak 9 peak

Emission Level= Read Level+ Correct Factor

TOBY

EUT:			PO	wer	bank		Model	Name :		SP0301 55%				
Гетре	erature	):	25	°C	11.2		Relativ	e Humi	idity:					
Fest V	oltage	:	DC	5V		-0	22			GIND				2
Ant. P	ol.		Ho	rizo	ntal			-			1	1	1	
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Emission Level= Read Level+ Correct Factor



EUT:	F	owe	r bank	M	odel Name		SP03	301	6		
Temperature	: 2	<b>25</b> ℃		R	elative Hum	idity:	55%				
Test Voltage	: C	DC 5\	V	an		10	11	2		1	N
Ant. Pol.	N	/ertic	al	N. S.	-			6	1		
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-20 30.000 40 No. Mk. 1 2	50 60 Free MHz 35.624	<b>0 70</b> q. 2 40	80 Reading Level dBuV 31.52	(MH₂) Correct Factor dB/m -17.61	300 Measure- ment dBuV/m 13.91	<b>400</b> Limit dBu√/r 40.00	500 () ) -;	600 Dver dB 26.0	700 700	Deteo pea	ak ak
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20 30.000 40 No. Mk. 1 2 3 4 5 * 2	50 6 Free MHz 35.624 44.900 196.50 239.14	9 70 q. 2 40 06 998 -73 039	80 Reading Level dBuV 31.52 36.05 47.60 53.98	(MHz) Correct Factor dB/m -17.61 -22.35 -20.19 -18.23	300 Measure- ment dBuV/m 13.91 13.70 27.41 35.75	400 Limit dBu√r 40.00 40.00 40.00 47.00	500	600 by en dB 26.0 26.3 12.5 11.2	700 700 7 30 30 59 25 46	Detec pec pec pec	ak ak ak

#### Emission Level= Read Level+ Correct Factor



# 5. Electrostatic Discharge Immunity Test

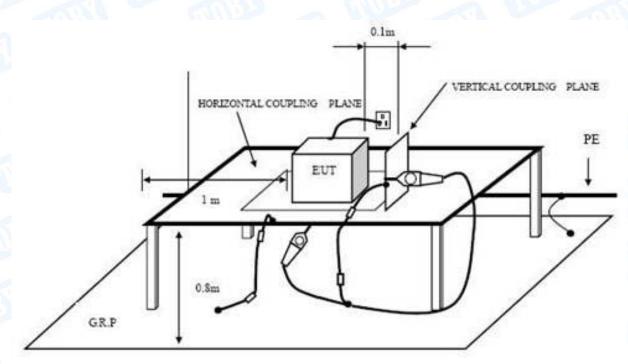
- 5.1. Test Requirements
- 5.1.1. Test Standard

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

5.1.2. Test Level

Discharge Impedance:	330 ohm/ 150pF				
Discharge Voltage:	Air Discharge: 2kV/4kV/8kV(Direct) Contact Discharge: 2kV/4kV (Direct /Indirect)				
Polarity:	Positive& Negative				
Number of Discharge:	Air Discharge: min.20 times at each test point Contact Discharge: min.200 times in total				
Discharge Mode:	Single Discharge				
Discharge Period:	1 second minimum				

- 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 <u>Power bank</u>	M/N : SP030	12
Temperature : <u>22℃</u>	Humidity : <u>50%</u>	
Power supply: <u>DC 5V</u>	Test Mode : Mode 1/	2
Criterion: B	and and	
Air Discharge: $\pm 2/\pm 4/\pm 8$ kV C	ontact Discharge: $\pm 2/\pm 4$ kV	TOPP OF
For each point positive 10 times a	nd negative 10 times discharge.	- AU
Location	Kind A-Air Discharge C-Contact Discharge	Result
Nonconductive Enclosure	A	PASS
Slot of the EUT	A	PASS
USB Port	A	PASS
НСР	С	PASS
VCP of front	с	PASS
VCP of rear	С	PASS
VCP of left	С	PASS
VCP of right	С	PASS

- 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

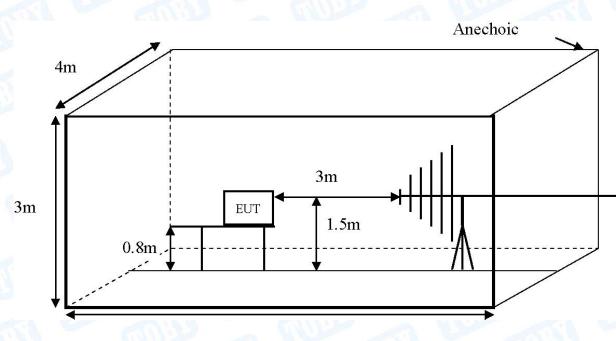
EN 55024:2010+A1: 2015 (EN 61000-4-3:2006+A1:2008+A2:2010)

6.1.2. Test Level

Port	Test Specification
Enclosure Port	80-1000MHz
	3 V/m
	80 % AM (1kHz)

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	: Power ban	k	M/N	SP0301	3 LUCE
Temperature	: <b>22</b> °C		Humidity	50%	TOBY
Power supply	: DC 5V		Test Mode	Mode 1/2	E E
Required Perfo	ormance Crite	eria: A	TO DE	Frank	and a
Modulation: AM	80%				
Pulse: 1 kHz					
	Ac	tual Perfor	mance Criteri	a	BU
EUT Position	Frequency Range 1: 80~1000MHz		Frequency /	Range 2:	Judgment
	Horizontal	Vertical	Horizontal	Vertical	
Front	А	A		1	PASS
Right	A	A	1		PASS
Rear	A	A	7	1	PASS
Left	A	A	1	1	PASS
Remark:			GIND		

- 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.



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### 7. Photographs - Constructional Details

Photo 1 Appearance of EUT



Photo 2 Appearance of EUT

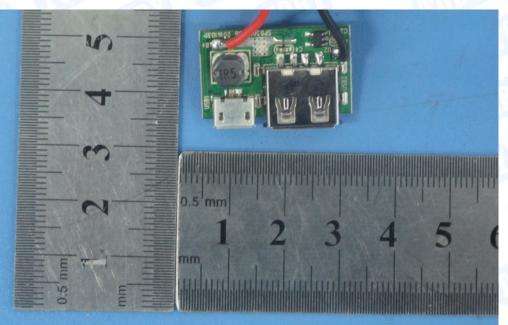




Photo 3 Internal of EUT

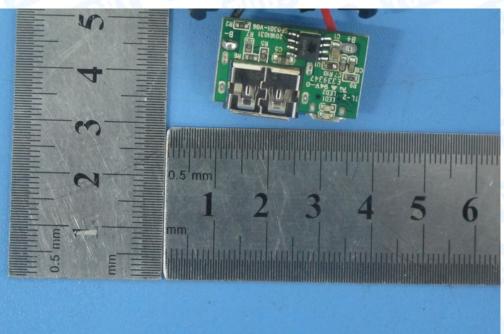


Photo 4 Appearance of PCB





#### Photo 5 Appearance of PCB



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# TOBY

# 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



-----END OF REPORT-----