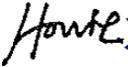
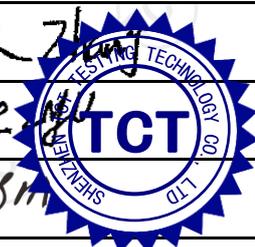


EMC TEST REPORT

Multimedia equipment

Test Report No.:	TCT220505E017
Date of issue	May 12, 2022
Testing laboratory.....:	Shenzhen TCT Testing Technology Co., Ltd.
Testing location/ address.....:	2101 & 2201, Zhenchang Factory, Renshan Industrial Zone, Fuhai Subdistrict, Bao'an District, Shenzhen, Guangdong, China
Applicant's name	Shenzhen X-RaTong Technology Co., Ltd
Address.....:	310, Hongwan Business Building, No. 4235, Bao'an Avenue, Gushu Community, Xixiang Street, Bao'an District, Shenzhen
Manufacturer's name	Shenzhen X-RaTong Technology Co., Ltd
Address.....:	310, Hongwan Business Building, No. 4235, Bao'an Avenue, Gushu Community, Xixiang Street, Bao'an District, Shenzhen
Standard(s)	EN 55032:2015+A1:2020+A11:2020 EN 55035:2017+A11:2020 EN IEC 61000-3-2:2019 EN 61000-3-3:2013+A1:2019
Test item description	Power Bank
Trade Mark.....:	SEALEY
Model/Type reference	SPB102
Rating(s)	Input: DC 5 V, 2 A Output: DC 5 V, 2.1 A Battery: DC 3.7 V, 10000 mAh, 37 Wh
Date of receipt of test item.....:	May 05, 2022
Date (s) of performance of test:	May 05, 2022 - May 12, 2022
Tested by (+signature).....:	Mark ZHANG 
Check by (+signature)	Howie LYU 
Approved by (+signature)	Tomsin 



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1. General Product Information

1.1.EUT description

Test item description	Power Bank
Model/Type reference	SPB102
Rating(s)	Input: DC 5 V, 2 A Output: DC 5 V, 2.1 A Battery: DC 3.7 V, 10000 mAh, 37 Wh
Highest internal frequency F_x	<input checked="" type="checkbox"/> $F_x < 108 \text{ MHz}$
	<input type="checkbox"/> $108 \text{ MHz} < F_x \leq 500 \text{ MHz}$
	<input type="checkbox"/> $500 \text{ MHz} < F_x \leq 1 \text{ GHz}$
	<input type="checkbox"/> $F_x > 1 \text{ GHz}$
DC Line	<input type="checkbox"/> Shielded <input type="checkbox"/> Unshielded, <input type="checkbox"/> Detachable <input type="checkbox"/> Un-detachable <input checked="" type="checkbox"/> No applicable <input type="checkbox"/> Length:
AC Line	<input type="checkbox"/> Shielded <input type="checkbox"/> Unshielded, <input type="checkbox"/> Detachable <input type="checkbox"/> Un-detachable <input checked="" type="checkbox"/> No applicable <input type="checkbox"/> Length:

1.2.Model(s) list

None.

2. Test Information

2.1.EUT operation mode(s)

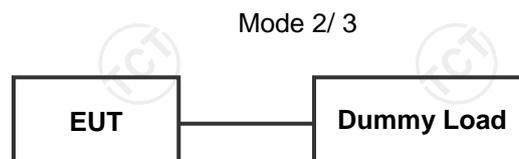
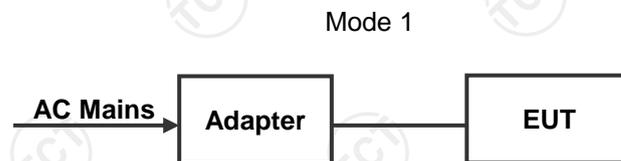
Mode #	Operating mode description	Test voltage
1	Charging	DC 9 V (Adapter Input AC 230 V/ 50 Hz)
2	USB1 Output: 5V 2.1A	DC 5 V
3	USB2 Output: 5V 2.1A	DC 5 V

Test worst operating mode	
Radiated emission	Mode 3
Remark: The worst measurement data and graphical presentation show in this report.	

2.2.Special accessories and auxiliary equipment

Product Type	Manufacturer	Model No.	Serial No.
Adapter	SAMSUNG	ETA0U82CBC	RT10206CS/AE

2.3.Configuration of system under test



(EUT: Power Bank)

2.4. General test conditions

Environmental reference conditions

The climatic conditions during the tests are within the limits specified by the manufacturer for the operation of the EUT and the test equipment.

The climatic conditions during the tests were within the following limits:

Temperature	Humidity	Atmospheric pressure
15 °C – 35 °C	30 % - 60 %	86 kPa – 106 kPa

If explicitly required in the basic standard or applied product standard the climatic values are recorded and documented separately in this test report.

Measurement uncertainties

Test Item	Uncertainty
Uncertainty for Disturbance voltage at the mains terminals	3.10 dB
Uncertainty for Disturbance voltage at the telecommunication terminals	4.06 dB
Uncertainty for Radiated emission (30 MHz to 1 GHz)	4.56 dB
Uncertainty for Radiated emission (1 GHz to 6 GHz)	4.22 dB

The overall measurement uncertainty of a measurement is defined as the range of which can be supposed that it contains the true value with a specified probability.

This probability is 95 % for the generally specified measurement uncertainty (so-called expanded measurement uncertainty).

The limits for emission measurements and the Test levels for immunity tests in the applied standards were defined taking into consideration the accuracy limits for measurement and testing equipment required by the Basic standards.

All measurement and test results of the EMC laboratory of Shenzhen TCT Testing Technology Co., Ltd. fulfil the requirements for measurement uncertainties according to the standards applied.

Decision rule for statement(s) of conformity is based on accuracy method specified in Clause 4.4.3 in IEC Guide 115:2021.

3. Test Result Summary

EN 55032:2015+A1:2020+A11:2020	
Requirement – Test case	Verdict
Classification Class (<input type="checkbox"/> A <input checked="" type="checkbox"/> B)	-
Disturbance voltage at mains terminals	N/A
Disturbance voltage at telecommunication terminals	N/A
Disturbance voltage at antenna terminals	N/A
Conducted disturbance between 1 GHz to 18 GHz	N/A
Radiated disturbance 30 MHz –6 GHz	Pass
OUTDOOR UNITS – Limits of radiated disturbance between 1 GHz to 18 GHz	N/A
EN IEC 61000-3-2:2019	
Requirement – Test case	Verdict
Harmonic current emissions	N/A
EN 61000-3-3:2013+A1:2019	
Requirement – Test case	Verdict
Voltage changes, voltage fluctuations and flicker	N/A
EN 55035:2017+A11:2020	
Requirement – Test case	Verdict
Electrostatic discharge immunity (ESD)	Pass
Radiated, radio-frequency, electromagnetic field immunity (RS)	Pass
Electrical fast transient/burst immunity (EFT/B)	N/A
Surge immunity	N/A
Immunity to conducted disturbances, induced by radio-frequency fields (CS)	N/A
Broadband impulse noise disturbances for xDSI ports	N/A
Power frequency magnetic field immunity (PFMF)	N/A
Voltage dips, short interruptions and voltage variations immunity (DIPS)	N/A
Remark:---	

Test case verdicts	
- Test case does not apply to the test object	N/A
- Test object does meet the requirement.....	P (Pass)
- Test object does not meet the requirement	F (Fail)

4. List of Test Equipment

Equipment	Manufacturer	Model No.	Serial No.	Cal. Due
Disturbance voltage at mains terminals				
EMI Test Receiver	R&S	ESCI3	100898	2022/07/07
Line Impedance Stabilisation Newtork(LISN)	Schwarzbeck	NSLK 8126	8126453	2023/02/24
Attenuator	N/A	10dB	164080	2022/07/07
Disturbance voltage at telecommunication terminals				
EMI Test Receiver	R&S	ESCI3	100898	2022/07/07
Line Impedance Stabilisation Newtork(LISN)	Schwarzbeck	NSLK 8126	8126453	2023/02/24
ISN	Schwarzbeck	CAT5 8158	151	2023/02/24
Radiated emission (30 MHz to 1 GHz)				
Broadband Antenna	Schwarzbeck	VULB9163	340	2022/09/04
EMI Test Receiver	R&S	ESIB7	100197	2022/07/07
Pre-amplifier	HP	8447D	2727A05017	2022/07/07
Radiated emission (1 GHz to 6 GHz)				
Horn Antenna	Schwarzbeck	BBHA 9120 D	02372	2023/03/06
EMI Test Receiver	R&S	ESIB7	100197	2022/07/07
Pre-amplifier	SKET	LNPA_0118G-4 5	SK2021012102	2023/02/24
Harmonic current emissions & Voltage Fluctuations and Flicker				
AC Power Supply	KIKUSUI	PCR4000M	UC002552	2022/07/07
Harmonic/Flicker Analyzer	KIKUSUI	KHA1000	UD002324	2022/07/08
Line Impedance Network	KIKUSUI	LIN1020JF	UC001738	2022/07/07
Electrostatic discharge immunity (ESD)				
Electrostatic Discharge Generator	HAEFELY	PESD300	H012056	2022/07/08
Radiated, radio-frequency, electromagnetic field immunity (RS)				
Antenna	SKET	STLP 9129_Plus	/	/
Signal Generator	Agilent	N5182A	MY47070282	2022/07/18
Amplifier	SKET	HAP_80M01G- 250W	/	2023/02/24
Amplifier	SKET	HAP_01G03G- 75W	202104180	2022/07/07

Amplifier	SKET	HAP_03G06G-80W	202004044	2022/07/07
Field Probe	Narda	EP-601	611WX80256	2022/07/13
USB Power Sensor	Agilent	U2001A	MY53410013	2023/02/24
USB Power Sensor	Agilent	U2001A	MZ54330012	2023/02/24
Electrical fast transient/burst immunity (EFT/B)				
Fast Transient Burst Simulator	Prima	EFT61004BG	PR12074375	2022/07/07
Capacitive Coupling folder	Prima	EFT-CLAMP	N/A	2022/09/11
Surge immunity				
Lightning Surge Generator	Prima	SUG61005BG	PR12125534	2022/07/07
Immunity to conducted disturbances, induced by radio-frequency fields (CS)				
Conducted Immunity Test System	Schloder	CDG-6000-75	126B1290/2014	2022/07/07
CDN	Schloder	CDN M2+M3-16	A2210281/2014	2022/07/07
EM-Clamp	Schloder	EMCL-20	132A1194/2014	2022/07/04
RF Attenuator	PE	75W 6dB	N/A	2022/07/07
Power frequency magnetic field immunity (PFMF)				
Power Frequency Magnetic Field Generator	EVERFINE	EMS61000-8K	G121941CS1341114	2022/07/07
Adjustable Magnetic Field Coil	EVERFINE	MFC-4	G1242BBS1341114	2022/07/07
Voltage dips, short interruptions and voltage variations immunity (DIPS)				
Cycle Sag Simulator	Prima	DRP61011AG	PR12106201	2022/07/07

5. Test Conditions and Results (Emission)

5.1. Disturbance voltage at mains terminals

Test requirement	EN 55032:2015+A1:2020+A11:2020		
Test frequency range	150 kHz to 30 MHz		
Limits	Limits – Class A		
	Frequency (MHz)	dBμV Quasi-peak	dBμV Average
	0.15 to 0.5	79	66
	0.5 to 30	73	60
	Limits – Class B		
	Frequency (MHz)	dBμV Quasi-peak	dBμV Average
	0.15 to 0.5	66 to 56	56 to 46
	0.5 to 5	56	46
	5 to 30	60	50
	Test method	The AMN placed 0.8 m from the boundary of the unit under test and bonded to a ground reference plane. This distance was between the closest points of the AMN and the EUT. All other units of the EUT and associated equipment were at least 0.8 m from the AMN. All power was connected to the system through Artificial Mains Network (AMN). Conducted voltage measurements on mains lines were made at the output of the AMN.	
Ambient temperature	/		
Relative humidity	/		
Test location	/		
Test model(s)	/		
EUT operation mode	/		
Test results	N/A		
Remark	According to the electrical construction of the EUT, there is no AC terminal incorporated. Therefore this test is not applicable for this EUT.		

5.2. Disturbance voltage at telecommunication terminals

Test requirement	EN 55032:2015+A1:2020+A11:2020				
Test frequency range.....	150 kHz to 30 MHz				
Limits.....	Limits – Class A				
	Frequency	Voltage Limits		Current Limits	
	MHz	dBμV Quasi-peak	dBμV Average	dBμV Quasi-peak	dBμV Average
	0.15 to 0.5	97 to 87	84 to 74	53 to 43	40 to 30
	0.5 to 30	87	74	43	30
	Frequency	Voltage Limits		Current Limits	
	MHz	dBμV Quasi-peak	dBμV Average	dBμV Quasi-peak	dBμV Average
	0.15 to 0.5	84 to 74	74 to 64	40 to 30	30 to 20
	0.5 to 30	74	64	30	20
	Test method.....	The AMN placed 0.8 m from the boundary of the unit under test and bonded to a ground reference plane. This distance was between the closest points of the AMN and the EUT. All other units of the EUT and associated equipment were at least 0.8 m from the AMN. All power was connected to the system through Artificial Mains Network (AMN). Conducted voltage measurements on mains lines were made at the output of the AMN.			
Ambient temperature.....	/				
Relative humidity	/				
Test location	/				
Test model(s)	/				
EUT operation mode.....	/				
Test results	N/A				
Remark.....	According to the electrical construction of the EUT, there is no AC terminal incorporated. Therefore this test is not applicable for this EUT.				

5.3. Disturbance voltage at antenna terminals

Test requirement	EN 55032:2015+A1:2020+A11:2020						
Test frequency range...	30 MHz to 2150 MHz						
Limits.....	Table clause	Frequency range (MHz)	Detector type/ bandwidth	Class B limits dB μ V 75 Ω			
				Other	Local Oscillator Fundamental	Local Oscillator Harmonics	
	a	30 to 950	For frequencies ≥ 1 GHz QP/120 kHz	46	46	46	
		950 to 2150		46	54	54	
	b	950 to 2150		46	54	54	
	c	30 to 300		46	54	50	
		300 to 1000				52	
	d	30 to 300		For frequencies ≥ 1 GHz Peak/1 MHz	46	66	59
		300 to 1000					52
	e	30 to 950		46	76	46	
		950 to 2150				n/a	54
	<p>a Television receivers (analogue or digital), video recorders and PC TV broadcast receiver tuner cards working in channels between 30 MHz and 1 GHz, and digital audio receivers.</p> <p>b Tuner units (not the LNB) for satellite signal reception.</p> <p>c Frequency modulation audio receivers and PC tuner cards.</p> <p>d Frequency modulation car radios.</p> <p>e Applicable to EUTs with RF modulator output ports (for example DVD equipment, video recorders, camcorders and decoders etc.) designed to connect to TV broadcast receiver tuner ports. Limits specified for the LO are for the RF modulator carrier signal and harmonics.</p>						
	Test method.....	<p>The measurement was performed in accordance with the requirement set in clause 5.4. The antenna terminal of the sample and the signal generator were connected to the EMI receiver by means of coaxial cables and a resistive combining network having a minimum attenuation of 6dB.</p> <p>The following results were those measured accordingly.</p>					
	Ambient temperature...	/					
Relative humidity	/						
Test location	/						
Test model(s)	/						
EUT operation mode....	/						
Test results	N/A						
Remark.....	This test isn't applicable because the EUT doesn't have relative function.						

5.4. Conducted disturbance between 1 GHz to 18 GHz

Test requirement	EN 55032:2015+A1:2020+A11:2020	
Test frequency range.....	1 GHz to 18 GHz	
Limits.....	Frequency (GHz)	Power Limits (dBpW)
		Average
	1 to 18	30
Test method.....	In the case of a detachable feed horn, the radiated emission of the LO leakage within 7° of the main beam axis can be measured directly by a power measurement at the feed horn interface. If a suitable interface (typically types R120, C120) is available, a power meter or spectrum analyzer can be connected to the LNB via a suitable adapter. Due allowance shall be made for the feed losses between the available interface and the antenna flange.	
Ambient temperature.....	/	
Relative humidity	/	
Test location	/	
Test model(s)	/	
EUT operation mode.....	/	
Test results	N/A	
Remark.....	This test isn't applicable because the EUT doesn't have relative function.	

5.5.Radiated emission

Test requirement	EN 55032:2015+A1:2020+A11:2020		
Test frequency range.:	30 MHz to 6 GHz		
Limits.....	Limits – Class A (OATS or SAC)		
	Frequency (MHz)	10 m measurement distance	3 m measurement distance
		dBμV/m	
	30 to 230	40 Quasi-peak	50 Quasi-peak
	230 to 1000	47 Quasi-peak	57 Quasi-peak
	Limits – Class B (OATS or SAC)		
	Frequency (MHz)	3 m measurement distance	10 m measurement distance
		dBμV/m	
	30 to 230	30 Quasi-peak	40 Quasi-peak
	230 to 1000	37 Quasi-peak	47 Quasi-peak
	Limits – Class A (FSOATS)		
	Frequency (MHz)	Peak	Average
		dBμV/m	
	1000 to 6000	80	60
Limits – Class B (FSOATS)			
Frequency (MHz)	Peak	Average	
	dBμV/m		
1000 to 6000	74	54	
Test method.....	Measurements were made in a 3/10-meter semi-anechoic chamber that complies to CISPR 16. Preliminary (peak) measurements were performed at an antenna to EUT separation distance of 3/10 meters with the receive antenna located at 1 to 4-meter height in both horizontal and vertical polarities. Final measurements (quasi-peak) were then performed by rotating the EUT 360° and adjusting the receive antenna height from 1 to 4-meters. All frequencies were investigated in both horizontal and vertical antenna polarity, where applicable.		
Ambient temperature.:	24.4 °C		
Relative humidity	51 %		
Test location	2101 & 2201, Zhenchang Factory, Renshan Industrial Zone, Fuhai Subdistrict, Bao'an District, Shenzhen, Guangdong, China		
Test model(s)	SPB102		
EUT operation mode..:	Mode 3		
Test results	Pass		
Remark.....	The EUT highest internal frequency less 108 MHz, So don't need to test above 1 GHz		

Measurement data and Graphical presentation of the result



Site #2 3m Anechoic Chamber

Polarization: **Horizontal**

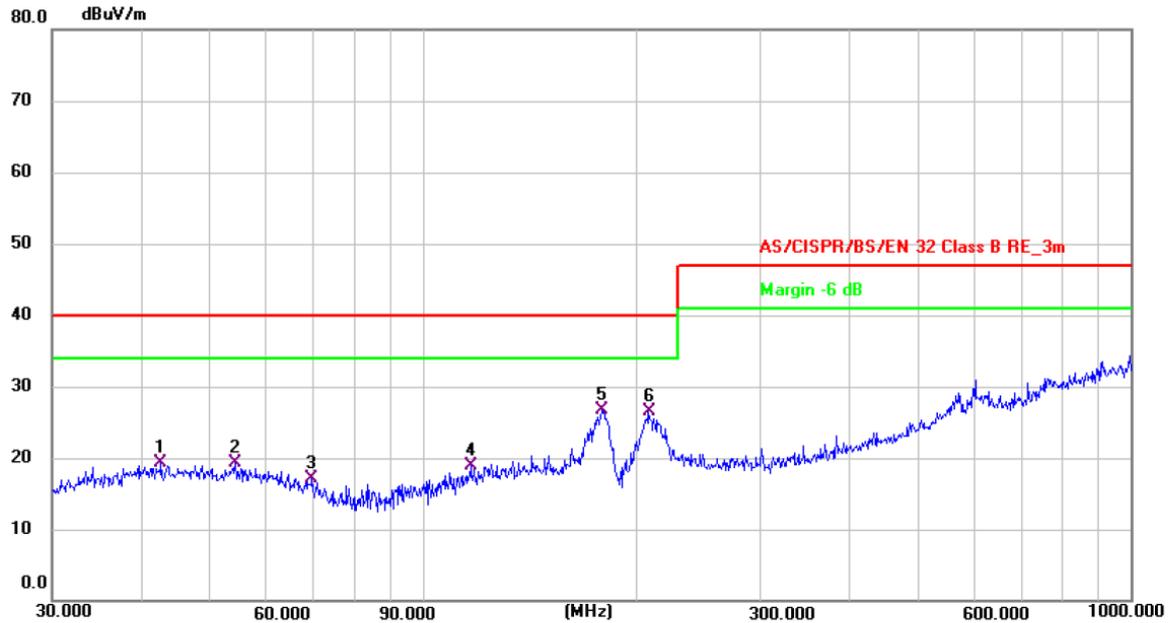
Temperature: 24.4(C)

Humidity: 51 %

Limit: AS/CISPR/BS/EN 32 Class B RE_3m

Power: DC 5 V

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	P/F	Remark
1	40.8444	5.04	14.00	19.04	40.00	-20.96	QP	P	
2	60.9174	6.67	12.94	19.61	40.00	-20.39	QP	P	
3	99.8777	11.50	10.40	21.90	40.00	-18.10	QP	P	
4	139.8507	13.96	13.24	27.20	40.00	-12.80	QP	P	
5 *	181.2834	25.69	11.22	36.91	40.00	-3.09	QP	P	
6 !	207.8500	25.26	10.70	35.96	40.00	-4.04	QP	P	



Site #2 3m Anechoic Chamber

Polarization: **Vertical**

Temperature: 24.4(C) Humidity: 51 %

Limit: AS/CISPR/BS/EN 32 Class B RE_3m

Power: DC 5 V

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	P/F	Remark
1	42.7494	5.35	13.96	19.31	40.00	-20.69	QP	P	
2	54.4515	5.79	13.49	19.28	40.00	-20.72	QP	P	
3	69.8448	6.03	11.10	17.13	40.00	-22.87	QP	P	
4	116.9493	7.10	11.74	18.84	40.00	-21.16	QP	P	
5 *	179.3863	15.28	11.35	26.63	40.00	-13.37	QP	P	
6	208.5803	15.67	10.74	26.41	40.00	-13.59	QP	P	

5.6. OUTDOOR UNITS – Limits of radiated disturbance between 1 GHz to 18 GHz

Test requirement	EN 55032:2015+A1:2020+A11:2020	
Test frequency range.:	1 GHz to 18 GHz	
Limits.....	Limits – LO leakage and spurious radiated emissions from the EUT, in the region outside +/- 7° of the main beam axis.	
	Frequency (GHz)	Class B limits (dBµV/m)
		Average
	1 to 2.5	50
	2.5 to 18	64
	Limits – LO leakage from the EUT, in the region within +/- 7° of the main beam axis.	
Frequency (GHz)	Class B limits (dBµV/m)	
	Average	
	1 to 18	70
Test method.....	Measurements were made in a 3-meter Open Area Test Site that complies to CISPR 16. Preliminary (peak) measurements were performed at an antenna to EUT separation distance of 3 meter above 1GHz. The EUT was rotated 360° with the receive antenna located in horizontal and vertical polarities. Final measurements (average detector above 1GHz) were then performed by rotating the EUT 360°. All frequencies were investigated in both horizontal and vertical antenna polarity, where applicable.	
Ambient temperature.:	/	
Relative humidity	/	
Test location	/	
Test model(s)	/	
EUT operation mode..:	/	
Test results	N/A	
Remark.....	This test isn't applicable because the EUT doesn't have relative function.	

5.7. Harmonic current emissions

Test requirement	EN IEC 61000-3-2:2019		
Limit classification in accordance with the standard	Limits - Class A equipment		
	Odd harmonics		
	Harmonic order (n)	Maximum permissible harmonic current (A)	
	3	2.30	
	5	1.14	
	7	0.77	
	9	0.40	
	11	0.33	
	13	0.21	
	$15 \leq n \leq 39$	$0.15 \times 15/n$	
	Even harmonics		
	2	1.08	
	4	0.43	
	6	0.30	
	$8 \leq n \leq 40$	$0.23 \times 8/n$	
	Limits - Class D equipment		
	Harmonic order (n)	Maximum permissible harmonic current per watt Ma/W	Maximum permissible harmonic current A
3	3.4	2.30	
5	1.9	1.14	
7	1.0	0.77	
9	0.5	0.40	
11	0.35	0.33	
$13 \leq n \leq 39$	$3.85/n$	See Class A limits	
Test method	This test consists on the measurement of harmonics components of the input current which may be produced by equipment having an input current up to and including 16 A per phase, and intended to be connected to public low-voltage distribution systems. The equipment is tested under specified conditions of operation.		
Ambient temperature	/		
Relative humidity	/		
Test location	/		
Test model(s)	/		
EUT operation mode	/		
Test results	N/A		
Remark	According to the electrical construction of the EUT, there is no AC terminal incorporated. Therefore this test is not applicable for this EUT.		

5.8.Voltage changes, voltage fluctuations and flicker

Test requirement	EN 61000-3-3:2013+A1:2019
Applied limit	<p>The value of P_{st} shall be not greater than 1.0 The value of P_{lt} shall be not greater than 0.65 The value of $d(t)$ during a voltage change shall not exceed 3.3 % for more than 500 ms The relative steady-state voltage change, dc shall not exceed 3.3 % The maximum relative voltage change d_{max} shall not exceed:</p> <p>a) 4 % without additional conditions b) 6 % for equipment which is: - switched manually, or - switched automatically more frequently than twice per day, and also has either a delayed restart (the delay being not less than a few tens of seconds), or manual restart, after a power supply interruption c) 7 % for equipment which is - attended whilst in use (for example : hair dryers, vacuum cleaners, kitchen equipment such as mixers, garden equipment such as mowers, portable tools such as electric drills), or - switched on automatically, or is intended to be switched on manually, no more than twice per day, and also has either a delayed restart (the delay being not less than a few tens of seconds) or manual restart, after a power supply interruption.</p>
Test method	This test consists on the measurement of voltage changes, voltage fluctuations and flicker which may be produced by equipment having an input current ≤ 16 A per phase, and intended to be connected to public low-voltage distribution systems. The equipment is tested under specified conditions of operation.
Observation time	10 Minutes
	120 Minutes
	24 times switching according to Annex B
Ambient temperature	/
Relative humidity	/
Test location	/
Test model(s)	/
EUT operation mode	/
Test results	N/A
Remark	According to the electrical construction of the EUT, there is no AC terminal incorporated. Therefore this test is not applicable for this EUT.

6. Test Conditions and Results (Immunity)

6.1.General information

Performance criteria as defined by the standard	
Criterion	Description from standard
A	The equipment shall continue to operate as intended without operator intervention. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer when the equipment 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 equipment if used as intended.
B	During the application of the disturbance, degradation of performance is allowed. However, no unintended change of actual operating state or stored data is allowed to persist after the test. After the test, the equipment shall continue to operate as intended without operator intervention; no degradation of performance or loss of function is allowed, below a performance level specified by the manufacturer, when the equipment is used as intended. The performance level may be replaced by a permissible loss of performance.
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. A reboot or re-start operation is allowed. Information stored in non-volatile memory, or protected by a battery backup, shall not be lost.

6.2. Electrostatic discharge immunity

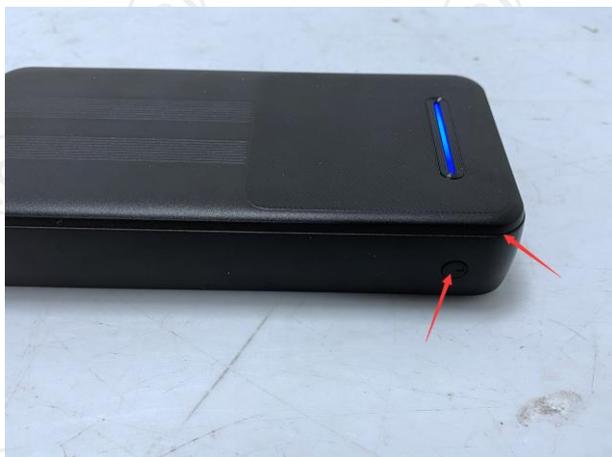
Test requirement	EN 55035:2017+A11:2020	
Basic standard	EN 61000-4-2:2009	
Test level	Discharge type	Discharge voltage
	Contact discharge voltage	± 4 kV
	Air discharge voltage	± 8 kV
Storage capacitor	150 pF	
Discharge resistor	330 Ω	
Horizontal coupling plate	1.6 x 0.8 m	
Vertical coupling plate	0.5 x 0.5 m	
Number of discharges	Min. 10 per discharge location	
Discharge interval	1 second	
Performance criteria	B	
Test method	The table-top equipment under test is placed on a wooden table, 0.8 m high, standing on the ground reference plane. A horizontal coupling plane (HCP), 1.6 x 0.8 m, is placed on the table. The EUT and the cables are isolated from the coupling plane by an insulating support 0.5 mm thick. The floor standing equipment is isolated from the ground reference plane by an insulating support about 0.1 m thick. The vertical coupling plane (VCP) of dimensions 0.5 m x 0.5 m is placed parallel to, and positioned at a distance of 0.1 m from, the EUT.	
Ambient temperature	23.6 °C	
Relative humidity	53 %	
Air pressure	100.6 kPa	
Test location	2101 & 2201, Zhenchang Factory, Renshan Industrial Zone, Fuhai Subdistrict, Bao'an District, Shenzhen, Guangdong, China	
Test model(s)	SPB102	
EUT operation mode	Mode 1, Mode 2, Mode 3	
Test results	Pass	
Remark	/	

6.2.1. Test results for electrostatic discharges

Photos of selected test points:

( Air Discharge)

( Contact Discharge)



Contact discharges			
Test point	Positive polarity	Negative polarity	Observations
	4 kV	4 kV	
VCP- Four Sides	Pass	Pass	<input checked="" type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3
HCP- Four Sides	Pass	Pass	<input checked="" type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3

Air discharges			
Test point	Positive polarity	Negative polarity	Observations
	8 kV	8 kV	
Points on non-conductive surface as indicated in the picture above	Pass	Pass	<input checked="" type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3

6.2.2. Test results of observations description

/ - Not performed or not required.
1 –No obvious change of function was found after the test.
2 –The function stopped during the test, but can be recoverable by itself operation after the test.
3 –The function stopped during the test, but can be recoverable manually after the test.

6.3.Radiated, radio-frequency, electromagnetic field immunity

Test requirement	EN 55035:2017+A11:2020		
Basic standard	EN 61000-4-3:2006+A1:2008+A2:2010		
Test level	Frequency (MHz)	Field strength	Modulation
	80 to1000	3 V/m (r.m.s.) (unmodulated)	80% AM (1 kHz)
	1800	3 V/m (r.m.s.) (unmodulated)	80% AM (1 kHz)
	2600	3 V/m (r.m.s.) (unmodulated)	80% AM (1 kHz)
	3500	3 V/m (r.m.s.) (unmodulated)	80% AM (1 kHz)
	5000	3 V/m (r.m.s.) (unmodulated)	80% AM (1 kHz)
Dwell time	2; 5 second		
Step size	1 %		
Distance antenna to EUT.....	3 m		
Performance criteria.....	A		
Test method.....	Measurements were made in a fully anechoic chamber and the indicated field strength was pre-calibrated prior to placement of the system under test. Tests were performed in both the horizontal and vertical polarities, where applicable. The antenna was placed 3 meters from the product under test. All sides of the EUT were investigated for anomalies.		
Ambient temperature.....	23.6 °C		
Relative humidity	53 %		
Air pressure.....	100.6 kPa		
Test location	2101 & 2201, Zhenchang Factory, Renshan Industrial Zone, Fuhai Subdistrict, Bao'an District, Shenzhen, Guangdong, China		
Test model(s)	SPB102		
EUT operation mode.....	Mode 1, Mode 2, Mode 3		
Test results	Pass		
Remark.....	/		

6.3.1. Test results for radio-frequency electromagnetic field

Frequency	EUT side	Antenna polarity	Field strength	Observation	Results
<input checked="" type="checkbox"/> 80 MHz to 1 GHz <input checked="" type="checkbox"/> 1.8 GHz <input checked="" type="checkbox"/> 2.6 GHz <input checked="" type="checkbox"/> 3.5 GHz <input checked="" type="checkbox"/> 5 GHz	Front	Horizontal	3 V/m	<input checked="" type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3	Pass
	Left Side	Horizontal	3 V/m	<input checked="" type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3	Pass
	Right Side	Horizontal	3 V/m	<input checked="" type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3	Pass
	Rear	Horizontal	3 V/m	<input checked="" type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3	Pass
	Front	Vertical	3 V/m	<input checked="" type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3	Pass
	Left Side	Vertical	3 V/m	<input checked="" type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3	Pass
	Right Side	Vertical	3 V/m	<input checked="" type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3	Pass
	Rear	Vertical	3 V/m	<input checked="" type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3	Pass

6.3.2. Test results of observations description

/ - Not performed or not required.

1 -No obvious change of function was found after the test.

2 -The function stopped during the test, but can be recoverable by itself operation after the test.

3 -The function stopped during the test, but can be recoverable manually after the test.

6.4. Electrical fast transient/burst immunity

Test requirement	EN 55035:2017+A11:2020	
Basic standard	EN 61000-4-4:2012	
Test level	Measurement port	Voltage
	Input a.c. power ports	±1 kV
	Input d.c. power ports	±0.5 kV
	Analogue/digital data ports	±0.5 kV
	xDSI	±0.5 kV
Burst duration	15 ms	
Burst period	300 ms	
Repetition frequency	5 kHz or 100 kHz	
Test time	2 minutes per level & polarity	
Performance criteria	B	
Test method	Measurements were made on a ground plane that extends 0.5-meter minimum beyond all sides of the system under test. Mains power tests were conducted with the product connected to a Coupling/Decoupling Network (CDN). One of each unique interface was tested for a period of 2 minute per polarity. The bursts are applied on the mains supply port by using a coupling decoupling network and on signal and control lines ports by using a capacitive clamp.	
Ambient temperature	/	
Relative humidity	/	
Air pressure	/	
Test location	/	
Test model(s)	/	
EUT operation mode	/	
Test results	N/A	
Remark	According to the electrical construction of the EUT, there is no AC terminal incorporated and which length was less than 3m. Therefore this test is not applicable for this EUT.	

6.5.Surge immunity

Test requirement	EN 55035:2017+A11:2020		
Basic standard	EN 61000-4-5:2014+A1:2017		
Test level	Measurement port	Coupling point	Open-circuit peak voltage
	Input a.c. power ports	Line to line	±1 kV
		Line to earth	±2 kV
	Input d.c. power ports	Line to earth	±0.5 kV
	Analogue/digital data ports (a), (b)	Line to earth	±1 kV and ±4 kV Apply when primary protection is intended
	Analogue/digital data ports (b)	Line to earth	±1 kV Apply when primary protection is not intended
	Analogue/digital data ports coaxial or shielded (c)	Line to earth	±0.5 kV
Supplementary information: (a): Surges are applied with primary protection fitted. Where possible, use the actual primary protector intended to be used in the installation. (b): Where the surge coupling network for the 10/700 (5/320) μ s waveform affects the functioning of high speed data ports, the test shall be carried out using a 1.2/50 (8/20) μ s waveform and appropriate coupling network. (c) Surges are applicable to ports which satisfy all the following conditions: -may connect directly to cables that leave the building structure, -defined as an antenna port (3.1.3), a wired network port (3.1.34), or a broadcast receiver tuner port (3.1.8).			
Repetition rate	1/min		
Phase angles	Positive pulses are applied 90° and negative pulses are applied 270°		
Number of pulses for each coupling	5		
Performance criteria	B		
Test method	Mains power tests were conducted with the product connected to a Coupling/Decoupling Network (CDN). The test voltage was increased from the lowest indicated level up to the maximum level. Five positive polarity pulses at the 90° phase angle, five negative polarity pulses at the 270° phase angle. Each surge was applied 60 seconds after the previous surge. Signal and Telecommunications ports were subject to five (5) positive and five (negative) surges applied through the appropriate Coupling/Decoupling Network (CDN).		
Ambient temperature	/		
Relative humidity	/		
Air pressure	/		
Test location	/		
Test model(s)	/		
EUT operation mode	/		
Test results	N/A		
Remark	According to the electrical construction of the EUT, there is no AC terminal incorporated. Therefore this test is not applicable for this EUT.		

6.6. Immunity to conducted disturbances, induced by radio-frequency fields

Test requirement	EN 55035:2017+A11:2020	
Basic standard	EN 61000-4-6:2014	
Frequency range	150 kHz to 80 MHz	
Test level	Measurement port	Frequency range / discrete frequencies
	Input a.c. power ports	0.15 MHz to 10 MHz; 3 V 10 MHz to 30 MHz; 3 V to 1 V 30 MHz to 80 MHz; 1 V
	Input d.c. power ports	
	Analogue/digital data ports	
xDSI		
Dwell time	1 second	
Step size	1 %	
Modulation	80% AM (1kHz)	
Performance criteria	A	
Test method	The test allows estimating of the conducted immunity of electrical and electronic equipment to electromagnetic disturbances coming from intended radio-frequency (RF) transmitters in the frequency range 150 kHz to 80 MHz. The interference is applied on mains supply, signal line and earth connection ports by using coupling decoupling networks or a clamp.	
Ambient temperature	/	
Relative humidity	/	
Air pressure	/	
Test location	/	
Test model(s)	/	
EUT operation mode	/	
Test results	N/A	
Remark	According to the electrical construction of the EUT, there is no AC terminal incorporated and which length was less than 3m. Therefore this test is not applicable for this EUT.	

6.7. Broadband impulse noise disturbances for xDSI ports

Test requirement	EN 55035:2017+A11:2020			
Basic standard	EN 61000-4-6:2014			
Frequency range	150 kHz to 80 MHz			
Test level.....	Broadband impulse noise disturbances, repetitive			
	Frequency (MHz)	(dBuV)	Burst duration	Burst period
	0.150 – 5	107	0.7 ms	8.3 (for 60 Hz) 10 (for 50 Hz)
	5 – 10	107 to 36		
	10 – 30	36 to 30		
	Broadband impulse noise disturbances, isolated			
	Frequency (MHz)	(dBuV)	Burst duration	Burst period
	0.150 – 30	107	0.24 ms 10 ms 300 ms	/
Performance criteria.....	A(repetitive) B(isolated)			
Test set up description.....	<p>Measurements were made on a ground plane that extends 0.5-meter minimum beyond all sides of the system under test. The EUT was located 10cm above the reference ground plane and any associated I/O cables attached to the EUT were located between 30mm and 50mm above the ground plane. The indicated field was pre-calibrated prior to placement of the system under test.</p> <p>For the repetitive impulse test the disturbance shall be applied for a period of at least 2 min for each port under test.</p> <p>For the isolated impulse test a minimum of 5 isolated impulses shall be applied with an interval of at least 60 s between successive impulses.</p>			
Ambient temperature.....	/			
Relative humidity	/			
Air pressure.....	/			
Test location	/			
Test model(s)	/			
EUT operation mode.....	/			
Test results	N/A			
Remark.....	This test isn't applicable because the EUT doesn't have relative function.			

6.8. Power frequency magnetic field immunity (PFMF)

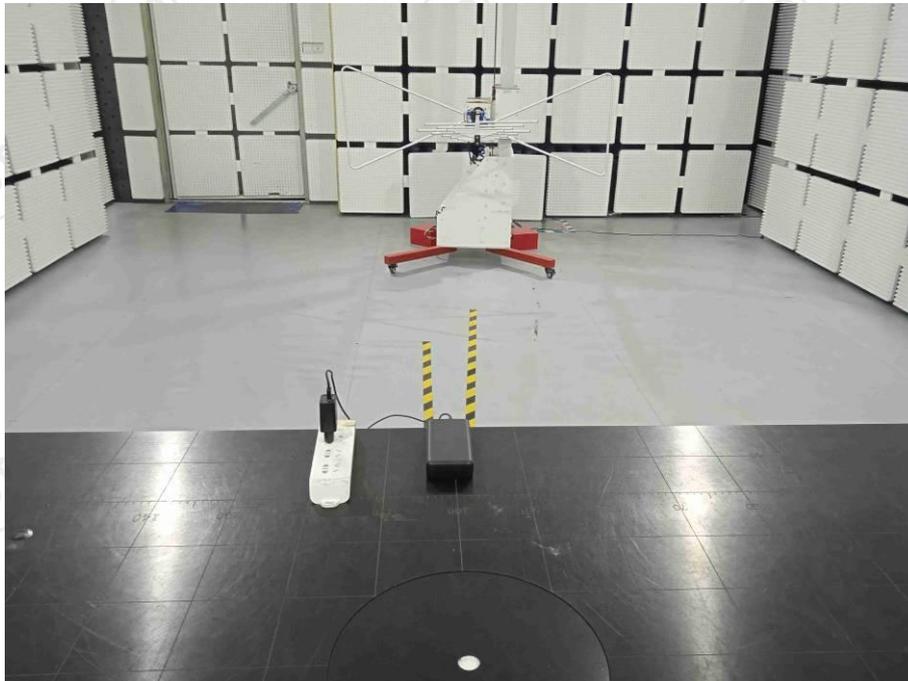
Test requirement	EN 55035:2017+A11:2020	
Basic standard	EN 61000-4-8:2010	
Test level	Frequency	A/m
	50/60 Hz	1
Performance criteria	A	
Test method	Measurements were made on a ground plane that extends 1-meter minimum beyond all sides of the system under test. The EUT was located 80cm above the reference ground plane and the indicated field was pre-calibrated prior to placement of the system under test.	
Ambient temperature	/	
Relative humidity	/	
Air pressure	/	
Test location	/	
Test model(s)	/	
EUT operation mode	/	
Test results	N/A	
Remark	The EUT does not contain components susceptible to magnetic fields, therefore this test is not applicable for this EUT.	

6.9.Voltage dips, short interruptions and voltage variations immunity

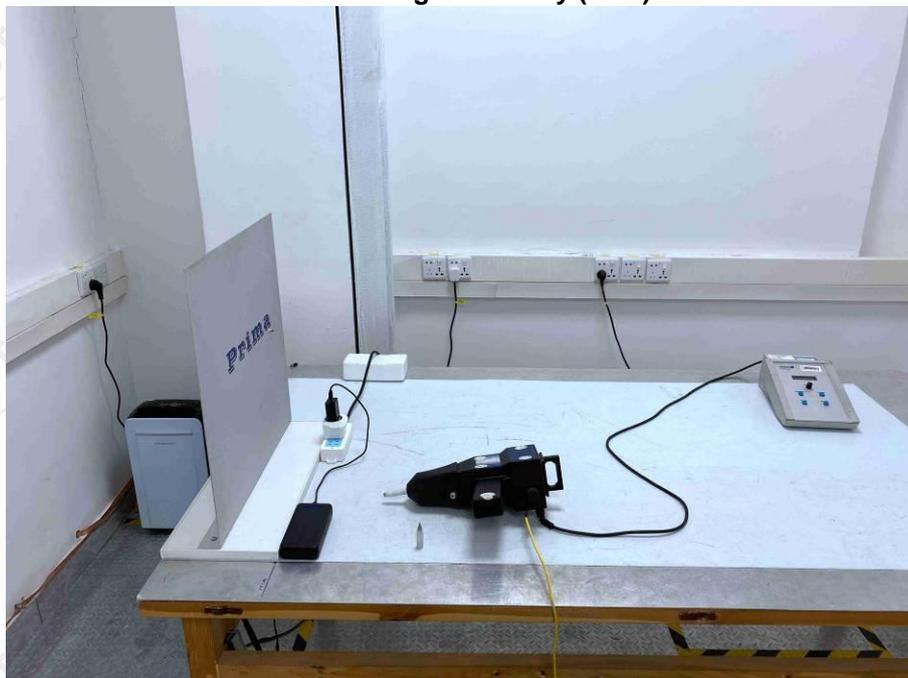
Test requirement	EN 55035:2017+A11:2020		
Basic standard	EN IEC 61000-4-11:2020		
Test level.....	Voltage Dips		
	Frequency	Test level in % U_T	Duration
	50 Hz	0	0.5 cycle
	50 Hz	70	25 cycles
	60 Hz	70	30 cycles
	Voltage interruptions		
	Frequency	Test level in % U_T	Duration
	50 Hz	0	250 cycles
	60 Hz	0	300 cycles
	U_T is the rated voltage of the equipment under test.		
Repetition rate.....	10 seconds		
Number of dips or interruptions.....	3		
Performance criteria.....	B & C		
Test method.....	The test allows estimating of the conducted immunity of electrical and electronic equipment connected to low-voltage power supply networks for voltage dips and short interruptions. The interference is applied on mains supply port by using a testing generator.		
Ambient temperature.....	/		
Relative humidity	/		
Air pressure.....	/		
Test location	/		
Test model(s)	/		
EUT operation mode.....	/		
Test results	N/A		
Remark.....	According to the electrical construction of the EUT, there is no AC terminal incorporated. Therefore this test is not applicable for this EUT.		

7. Test set-up photo

Radiated emission (30 MHz-1 GHz) test view



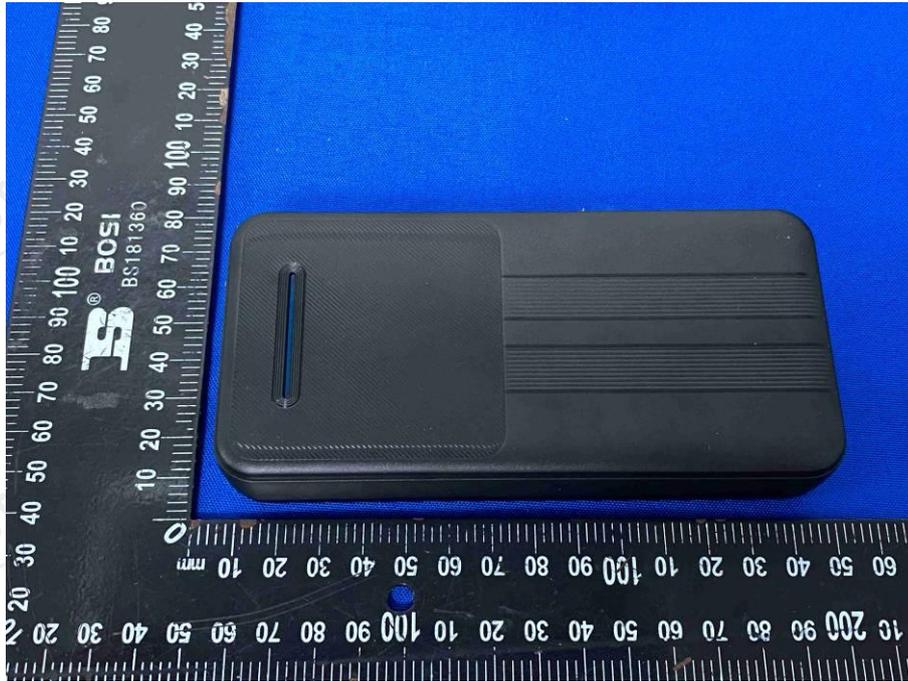
Electrostatic discharge immunity (ESD) test view

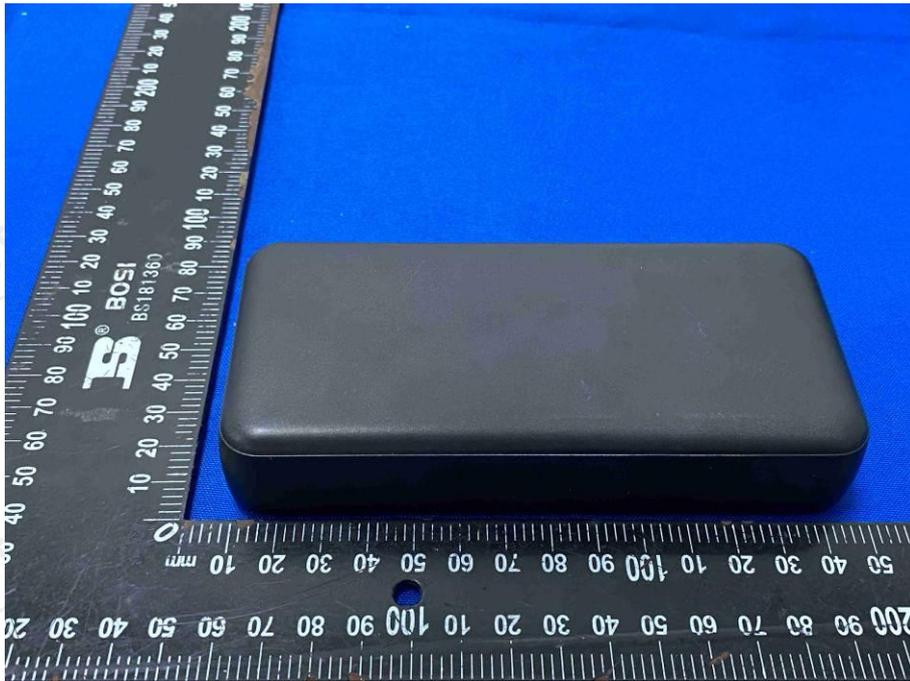


Radiated, radio-frequency, electromagnetic field immunity (RS) test view

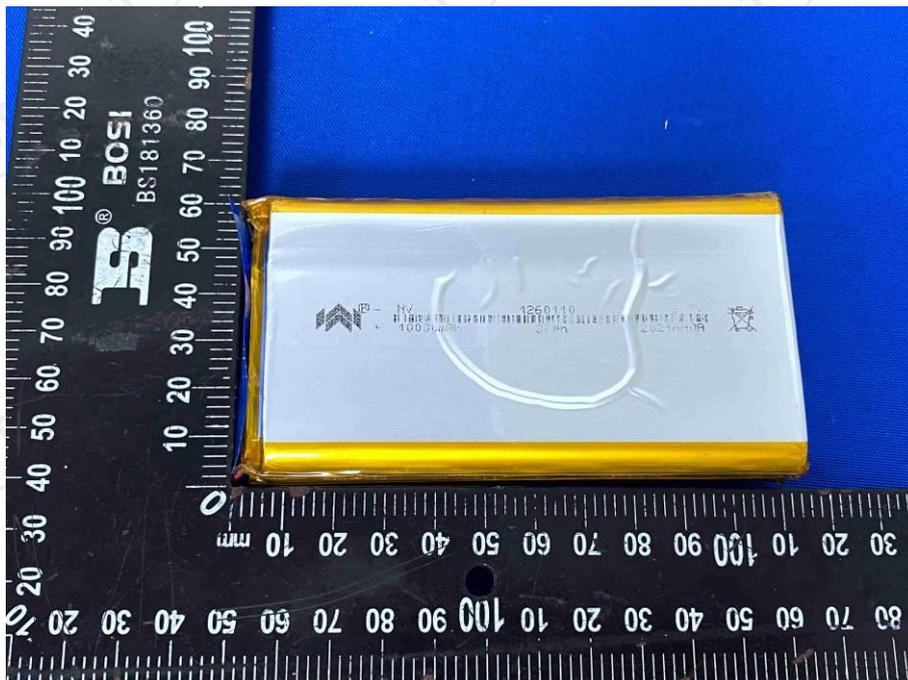
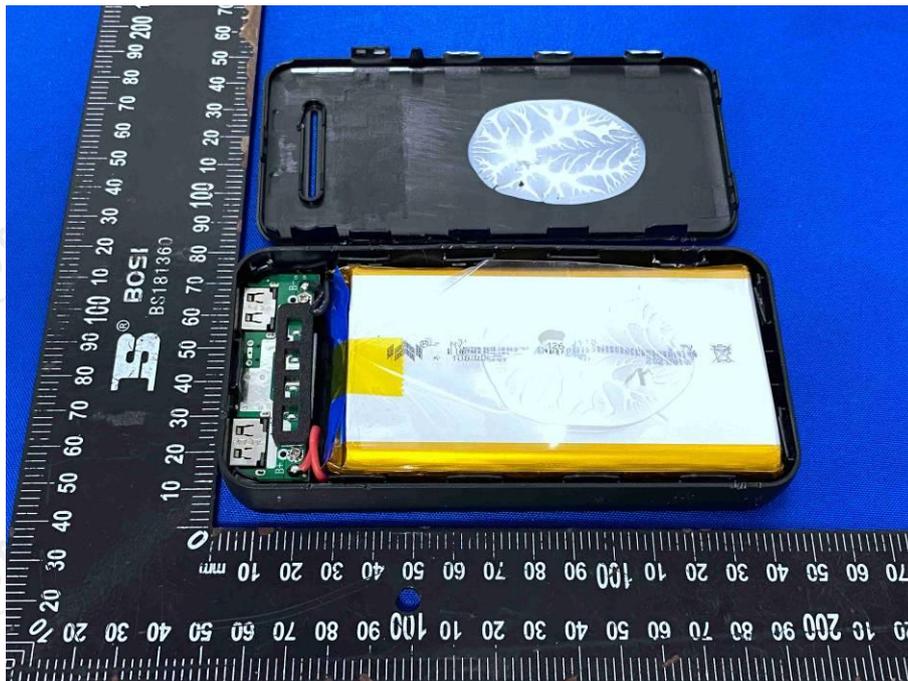


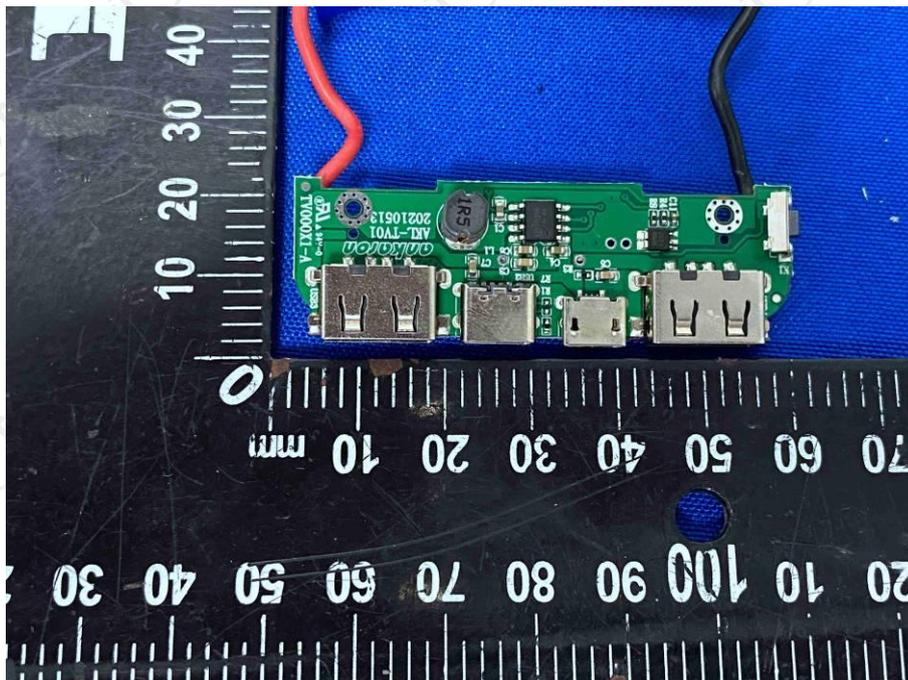
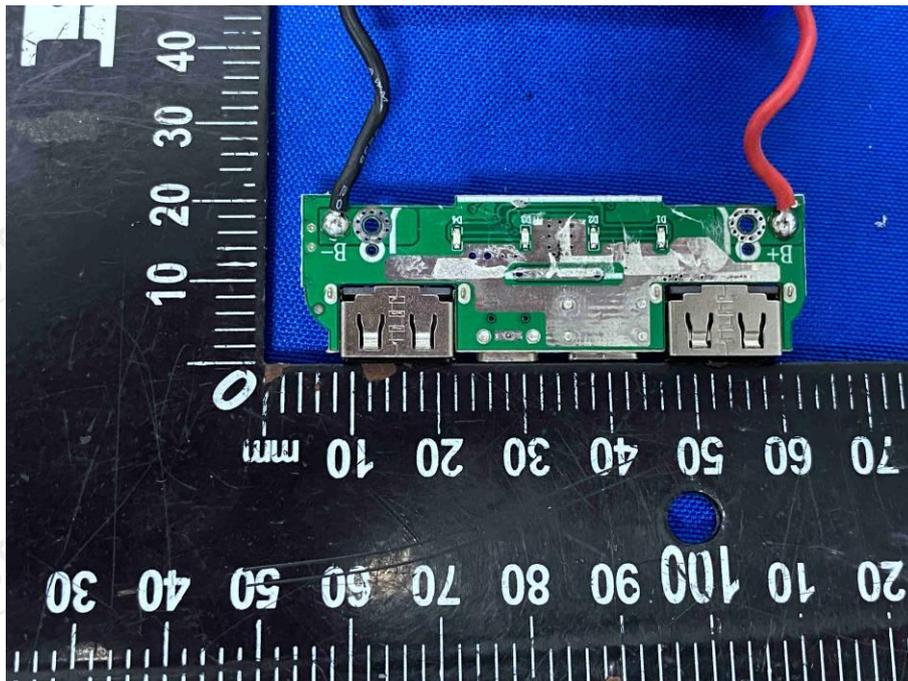
8. Photo of the EUT











*******End of report*******