EUROFINS PRODUCT TESTING SERVICE (SHANGHAI) CO., LTD.

EMC TEST- REPORT

TEST REPORT NUMBER: EFSH14110298-IE-01-E01

eurofins
Eurofins Product Testing Service (Shanghai) Co., Ltd.
No.395 West Jiangchang Road, Zhabei District, Shanghai,
200436, P.R. China
Phone: +86-21-61819181
Fax: +86-21-61819180

TABLE OF CONTENTS

1 Contents

2 General Information

2.1 Notes

The results of this test report relate exclusively to the item tested as specified in chapter "Description of test item" and are not transferable to any other test items.
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Operator:

2015-01-08		Stefan Zhao	Stefan Zhao
Date	Eurofins-Lab.	Name	Signature

Technical responsibility for area of testing:

2015-01-08		Ken Xu	
Date	Eurofins	Name	Signature

2.2 Testing laboratory

Eurofins Product Testing Service (Shanghai) Co., Ltd.
No.395 West Jiangchang Road, Zhabei District, Shanghai, 200436, P.R. China
Telephone : +86-21-61819181
Telefax : +86-21-61819180

Test location, where different:

Subcontractor(Radiated emission and Radiated immunity)
Name : Quietek Technology(Suzhou) Co., Ltd.
Address : No.99 Hongye Rd., Suzhou Industrial Park luofeng Hi-Tech Development Zone, Suzhou, China
Telephone : +86-512-62515088
Fax : +86-512-62515098
All tests were performed by Stefan Zhao at Quietek Technology(Suzhou) Co., Ltd.

2.3 Details of approval holder

Name	: Xindao B.V.
Address	: P.O. Box 3082, 2280 GB, Rijswijk, The Netherlands
Telephone	: ./.
Fax	: ./.

2.4 Application details

Date of receipt of application	: 2014-11-05
Date of receipt of test item	: 2014-11-06
Date of test	: 2014-11-06 to 2015-01-08

2.5 EUT information

Description of test item	: Port solar charger
Type identification	: P323.14
Brand Name	: ./.
Serial number	: ./.
Power supply	: input:DC5.0V/1.0A; output:DC5.0V/1.0A
Additional information	: The appliance is powerbank. Adapter was used for test accessory.

2.6 Test standards

Technical standard :

EN 55022:2010

EN 55024:2010

3 Technical test

3.1 Summary of test results

No deviations from the technical specification(s) were ascertained in the course of the tests performed. ☒

or

The deviations as specified were ascertained in the course of the tests performed. ☐

3.2 Test environment

Temperature	: 20	...	25°C
Relative humidity content	: 30	...	60%
Air pressure	: 100	...	103kPa

3.3 Test equipment utilized

Measurement Equipment List				
No.	**Name**	**Model**	**Manufacturer**	**Cal. due date**
1	EMI test receiver	ESCI	R&S	2015-11-27
2	Triple Loop Antenna	HXYZ 9170	Scwarzbeck	2015-11-27
3	Single phase Harmonics & Flicker analyser	PACS-1	California Instruments	2015-11-27
4	AC Power Source	5001ix	California Instruments	2015-11-27
5	Coupling/Decoupling Network	L 801 M2/M3	Luethi	2015-11-27
6	Ultra Compact Simulator	UCS 500N7	EMTEST	2015-11-27
7	ESD	NSG 437	TESEQ	2015-11-27
8	Current transformer	MC2630	EMTEST	2015-11-27
9	Motorized variac	MV2616	EMTEST	2015-11-27
10	Continuous wave simulator	CWS500N1	EMTEST	2015-11-27
11	Magnetic field coil	MS100	EMTEST	2015-11-27
12	Current transformer	MC26100	EMTEST	2015-11-27
13	Artificial mains	ENV216-DCV	R&S	2015-11-27
14	Shielded Room	4*3*3	Zhong-shuo	2015-11-27
15	Shielded Room	7*4*3	Zhong-shuo	2015-11-27
16	EMI Test Receiver	ESCI	R&S	2015-03-28
17	Bilog Antenna	CBL6112D	Teseq GmbH	2015-10-10
18	Coaxial Cable	SUCOFLEX 106	Huber+Suhner	2015-03-01
19	Signal Generator	SML03	R&S	2015-09-16
20	Power Meter	E4416A	Agilent	2015-09-16
21	Power Sensor	E9323A	Agilent	2015-09-16
22	Power Meter	4231A	Boonton	2015-09-16
23	Power Sensor	51011-EMC	Boonton	2015-09-16
24	RF Switch	SW1072	MF	N/A
25	Power Amplifier	CBA9428	Schaffner	NA
26	Power Amplifier	CBA9413B	Schaffner	NA
27	Directional Coupler	DC7144A	AR	N/A
28	Directional Coupler	CHA 9652B	Schaffner	N/A
29	Electric Field Probe	HI-6105	LINDGREN	2015-02-20
30	Horn Antenna	AT4002A	AR	N/A
31	Bilog Antenna	CBL6141A	Schaffner	N/A
32	Temperature/Humidity Meter	ZC1-2	Zhichen	2015-01-08

3.4 Test results

☒ 1st test ☐ test after modification ☐ production test

Test case	Sub clause	Required	Test passed	Test failed
Conducted disturbance at the mains ports	Clause 5.1 of EN 55022	☒	☒	☐
Radiated disturbance below 1GHz	Clause 6.1 of EN 55022	☒	☒	☐
Electrostatic Discharge	Clause 4.2.1 of EN 55024	☒	☒	☐
Radio frequency electromagnetic fields	Clause 4.2.3.2 of EN 55024	☒	☒	☐
Power-frequency magnetic fields	Clause 4.2.4 of EN 55024	☒	☒	☐

4 Emission Test

4.1 Conducted Emission

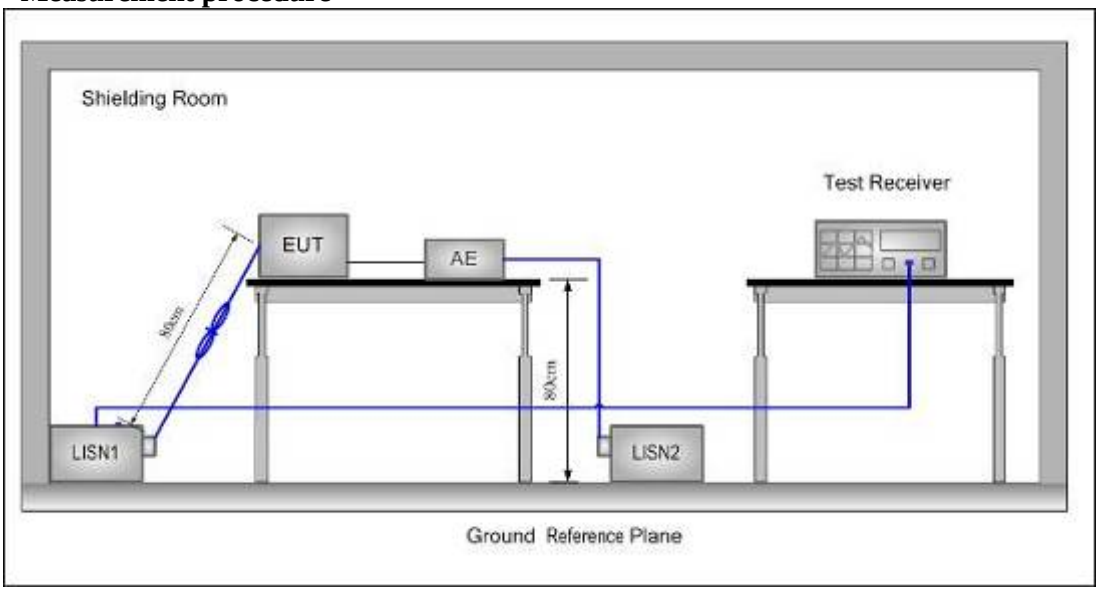
This clause lays down the general requirements for the measurement of disturbance voltage produced at the terminals of apparatus.

4.1.1 Limits

Class B ITE

Frequency range MHz	At mains terminals dB (μV)	
	Quasi-peak Limit	Average Limit
0.15 to 0.50	66 to 56	56 to 46
0.50 to 5	56	46
5 to 30	60	50
NOTE 1 The lower limit shall apply at the transition frequencies. NOTE 2 The limit decreases linearly with the logarithm of the frequency in the range 0,15 MHz to 0,50 MHz.		

4.1.2 Measurement procedure



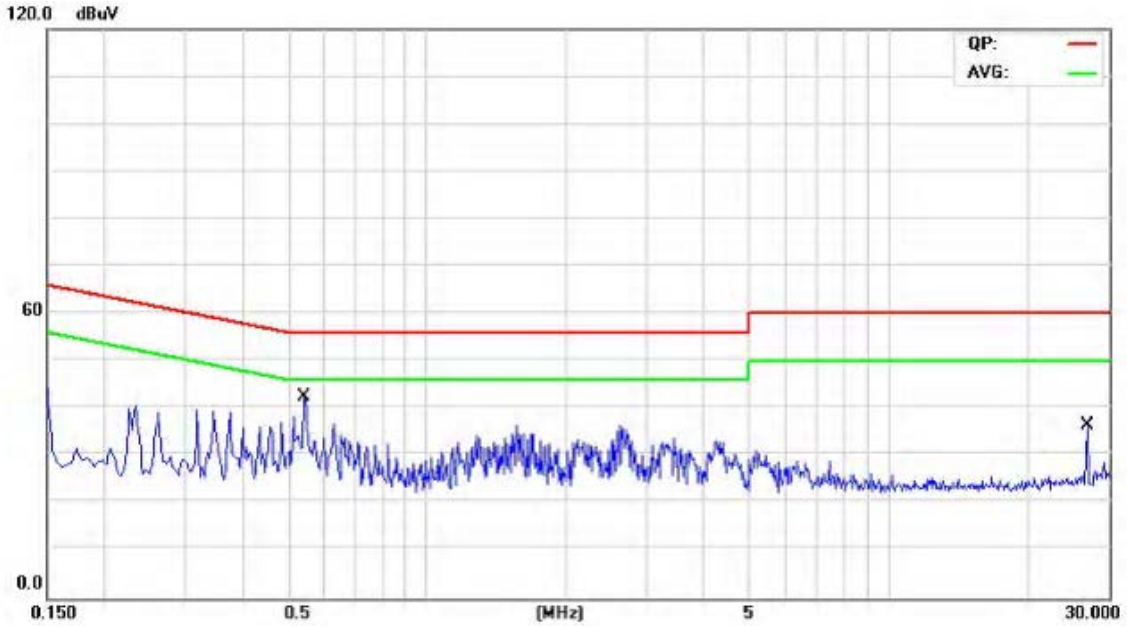
1. The mains terminal disturbance voltage was measured with the EUT in a shielded room.
2. The EUT was connected to AC power source through a LISN (Line Impedance Stabilization Network) which provides a (50 μH + 5 Ω) || 50 Ω linear impedance. The power cables of all other units of the EUT were connected to a second LISN, which was bonded to the ground reference plane in the same way as the LISN for the unit being measured.
3. The tabletop EUT was placed upon a non-metallic table 0.8m above the ground reference plane. And for floor-standing arrangement, the EUT was placed on the horizontal ground reference plane, but separated from metallic contact with the ground reference plane by 0.1m of insulation.
4. A pre-scan was performed with the peak(PK) and average(AV) detector to find out the maximum emission data plots of the EUT.

4.1.3 Measurement uncertainty

Ulab(cond) = 1.8dB at 95% level of confidence, k=2

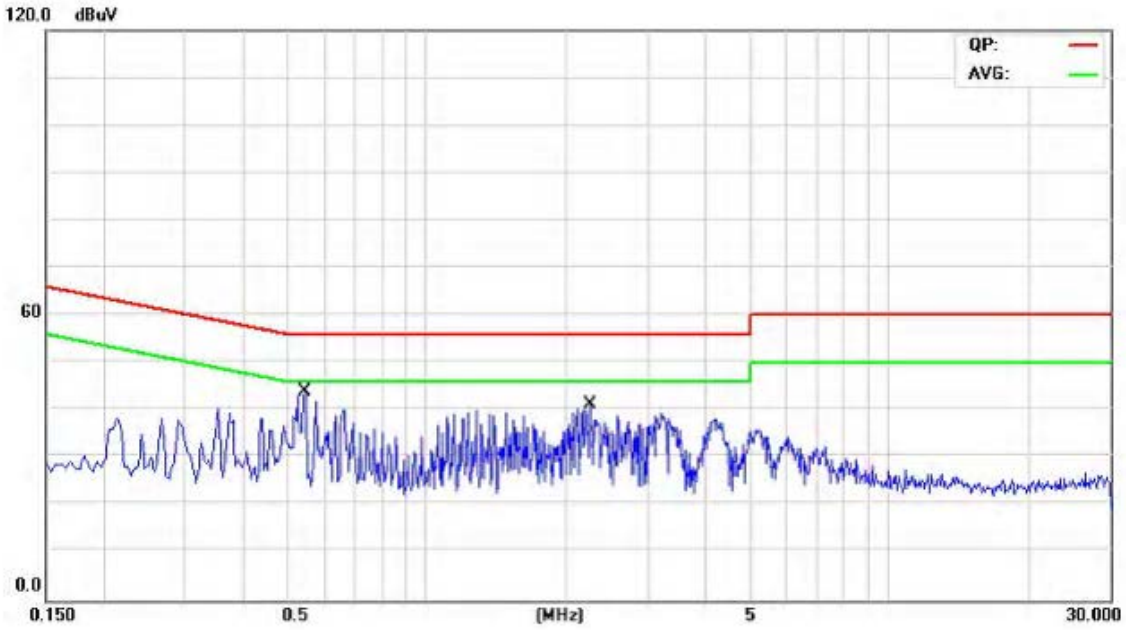
4.1.4 Results -Measurement Data

Live Line:
Level



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1		0.5420	30.95	9.72	40.67	56.00	-15.33	QP	
2	*	0.5420	22.97	9.72	32.69	46.00	-13.31	AVG	
3		26.8420	28.29	10.24	38.53	60.00	-21.47	QP	
4		26.8420	25.64	10.24	35.88	50.00	-14.12	AVG	

Neutral Line:
Level



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1		0.5460	10.82	9.72	20.54	56.00	-35.46	QP	
2		0.5460	7.42	9.72	17.14	46.00	-28.86	AVG	
3	*	2.2540	26.58	9.88	36.46	56.00	-19.54	QP	
4		2.2540	13.57	9.88	23.45	46.00	-22.55	AVG	

4.2 Radiated disturbance

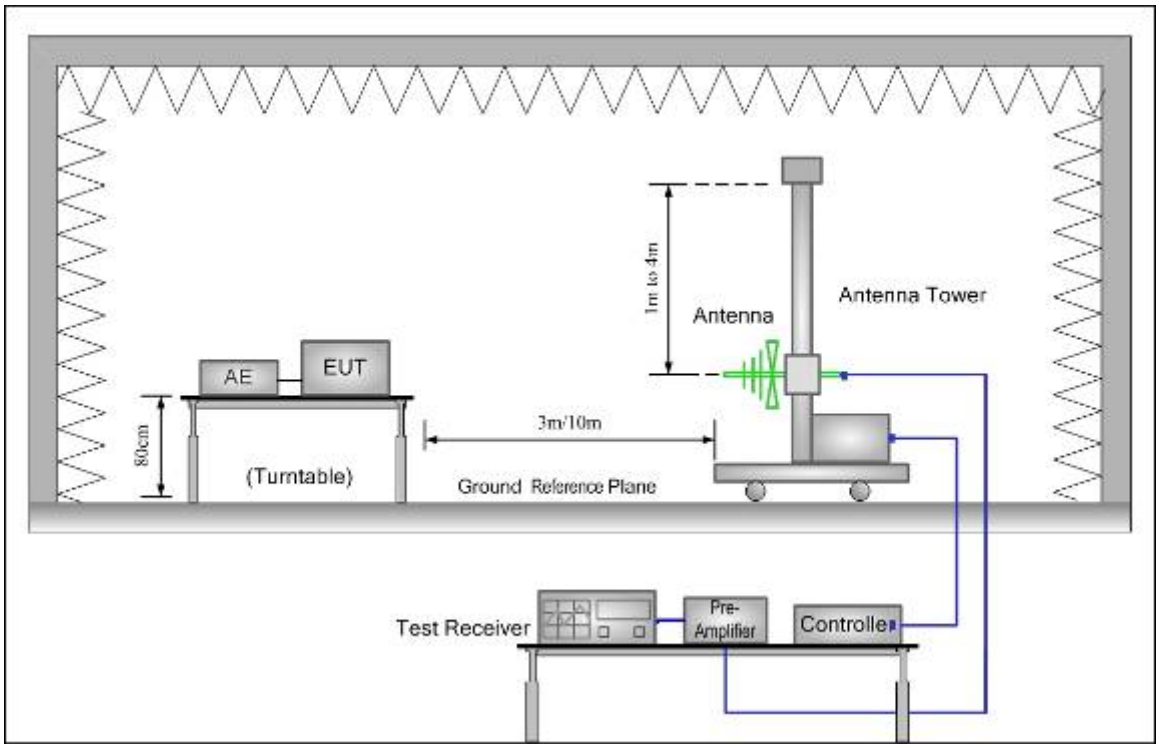
This clause lays down the general requirements for the measurement of Radiated disturbance produced at the space of apparatus.

4.2.1 Limits

Below 1GHz

Frequency range	Quasi-peak limits at 3m
MHz	dB (μV/m)
30 to 230	40
230 to 1000	47
At transitional frequencies the lower limit applies.	

4.2.2 Measurement procedure



1. The radiated emissions test was conducted in a semi-anechoic chamber. The EUT was placed upon a non-metallic table 0.8m above the ground reference plane. And for floor-standing arrangement, the EUT was placed on the horizontal ground reference plane, but separated from metallic contact with the ground reference plane by 0.1m of insulation.

2. Before get the final emission results with quasi-peak(QP) detector, a pre-scan was performed with the peak(PK) detector to find out the maximum emission data plots of the EUT.

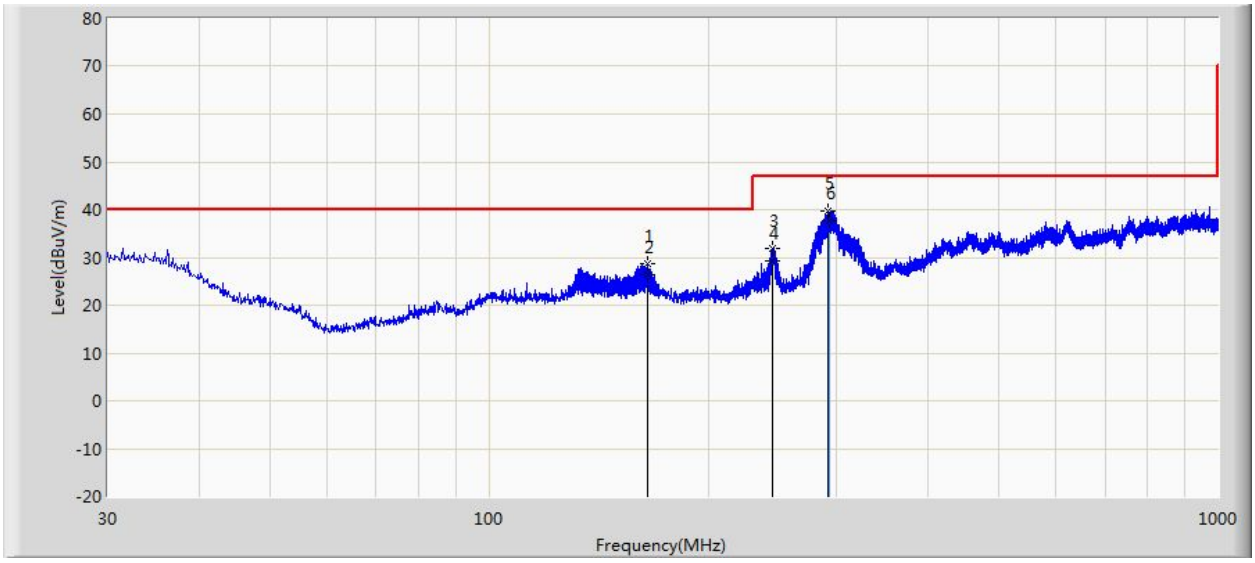
3. The frequencies of maximum emission were determined in the final radiated emissions measurement, the physical arrangement of the test system and associated cabling was varied in order to determine the effect on the EUT's emissions in amplitude, direction and frequency. At each frequency, the EUT was rotated 360°, and the antenna was raised and lowered from 1 to 4 meters in order to determine the maximum disturbance. Measurements were performed for both horizontal and vertical antenna polarization. Test was performed on subcontractor.

4.2.3 Measurement uncertainty

Ulab(cond) = 3.9dB at 95% level of confidence , k=2

4.2.4 Results

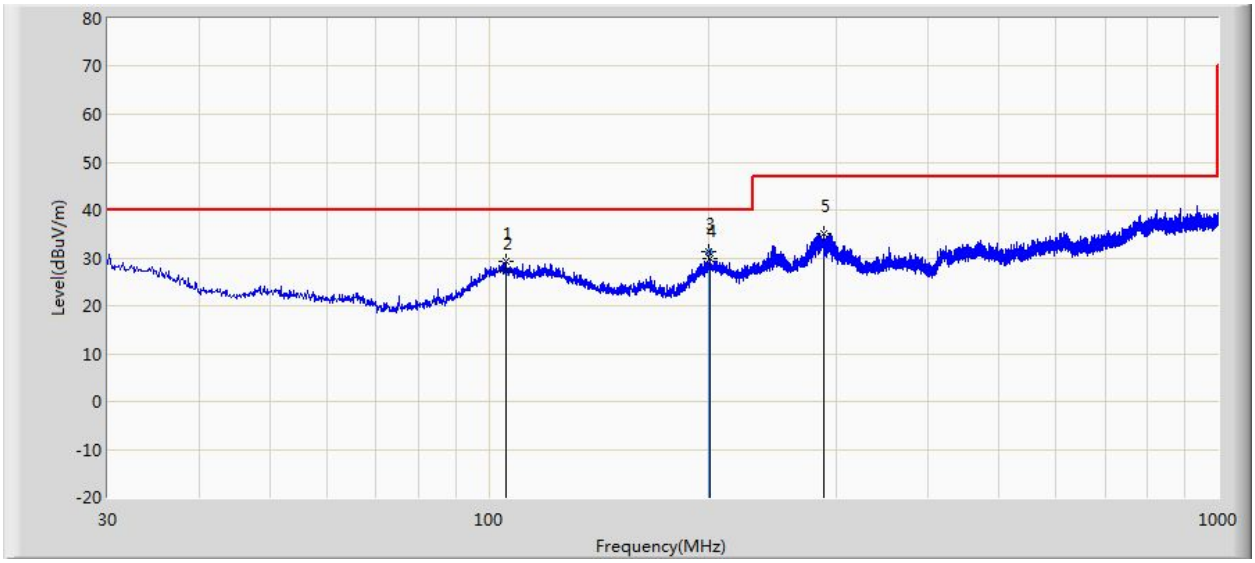
Horizontal:
Level



Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Probe (dB/m)	Cable (dB)	Amp (dB)	Ant Pos (cm)	Table Pos (deg)	Type
164.814	26.474	7.500	-13.526	40.000	11.835	7.140	0.000	100	268	QP
245.351	29.170	10.200	-17.830	47.000	11.550	7.420	0.000	200	56	QP
292.451	37.659	15.200	-9.341	47.000	14.889	7.570	0.000	100	249	QP

Note:
1. All Readings below 1GHz are Quasi-Peak, above are performed with peak and/or average measurements as necessary.
2. Measurement Level = Reading Level + Factor(Probe+Cable-Amp).

Vertical:
Level



Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Probe (dB/m)	Cable (dB)	Amp (dB)	Ant Pos (cm)	Table Pos (deg)	Type
105.614	27.156	3.500	-12.844	40.000	16.776	6.880	0.000	100	264	QP
200.535	31.217	6.400	-8.783	40.000	17.549	7.268	0.000	100	49	QP
288.505	35.139	8.331	-11.861	47.000	19.248	7.560	0.000	0	0	QP

Note:
1. All Readings below 1GHz are Quasi-Peak, above are performed with peak and/or average measurements as necessary.
2. Measurement Level = Reading Level + Factor(Probe+Cable-Amp).

5 Immunity Test

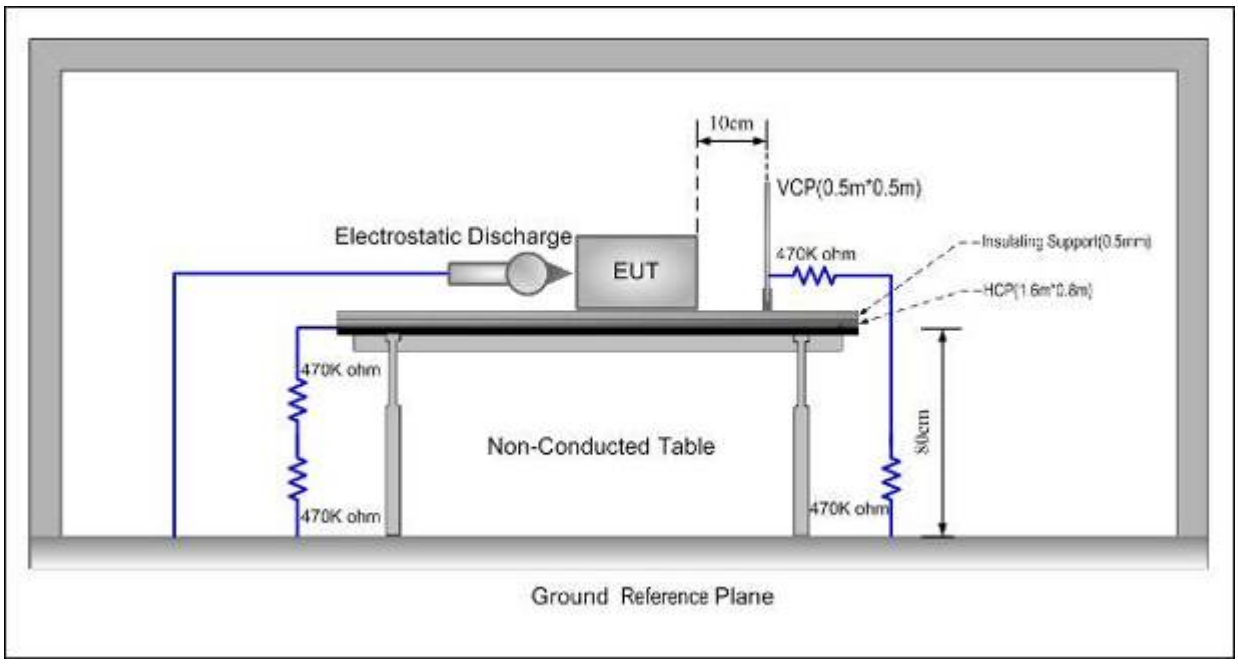
5.1 Performance Criteria Description in Clause 6 of EN 55024

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

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 discharges

5.2.1 Test Procedures



1. Contact discharge was applied only to conductive surfaces of the EUT. Air discharge was applied only to non-conducted surfaces of the EUT.
2. The EUT was put on a 0.8m high wooden table for table-top equipment or 0.1m high for floor standing equipment standing on the ground reference plane (GRP).
3. A horizontal coupling plane(HCP) 1.6m by 0.8m in size was placed on the table, and the EUT with its cables were isolated from the HCP by an insulating support thick than 0.5mm. The VCP 0.5m by 0.5m in size while HCP were constructed from the same material type and thickness as that of the GRP, and connected to the GRP via a 470kΩ resistor at each end. The distance between EUT and any of the other metallic surfaces excepted the GRP, HCP and VCP was greater than 1m.
4. During the contact discharges, the tip of the discharge electrode was touching the EUT before the discharge switch is operated. During the air discharges, the round discharge tip of the discharge electrode was approached as fast as possible to touch the EUT. After each discharge, the ESD generator was removed from the EUT, the generator is then retriggered for a new single discharge. For ungrounded product, a discharge cable with two resistances was used after each discharge to remove remnant electrostatic voltage.
5. The discharges shall be applied in two ways: a) contact discharges to the conductive surfaces and to coupling planes- The EUT shall be exposed to at least 200 discharges, 100 each at negative and positive polarity, at a minimum of four test points (a minimum of 50 discharges at each point). One of the test points shall be subjected to at least 50 indirect discharges (contact) to the centre of the front edge of the horizontal coupling plane. The remaining three test points shall each receive at least 50 direct contact discharges. If no direct contact test points are available, then at least 200 indirect discharges shall be applied in the indirect mode. Tests shall be performed at a maximum repetition rate of one discharge per second. b) air discharge at slots and apertures, and insulating surfaces: On those parts of the EUT where it is not possible to perform contact discharge testing, the equipment should be investigated to identify user accessible points where breakdown may occur; examples are openings at edges of keys, or in the covers of keyboards and telephone handsets. Such points are tested using the air discharge method. This investigation should be restricted to those areas normally handled by the user. A minimum of 10 single air discharges shall be applied to the selected test point for each such area.

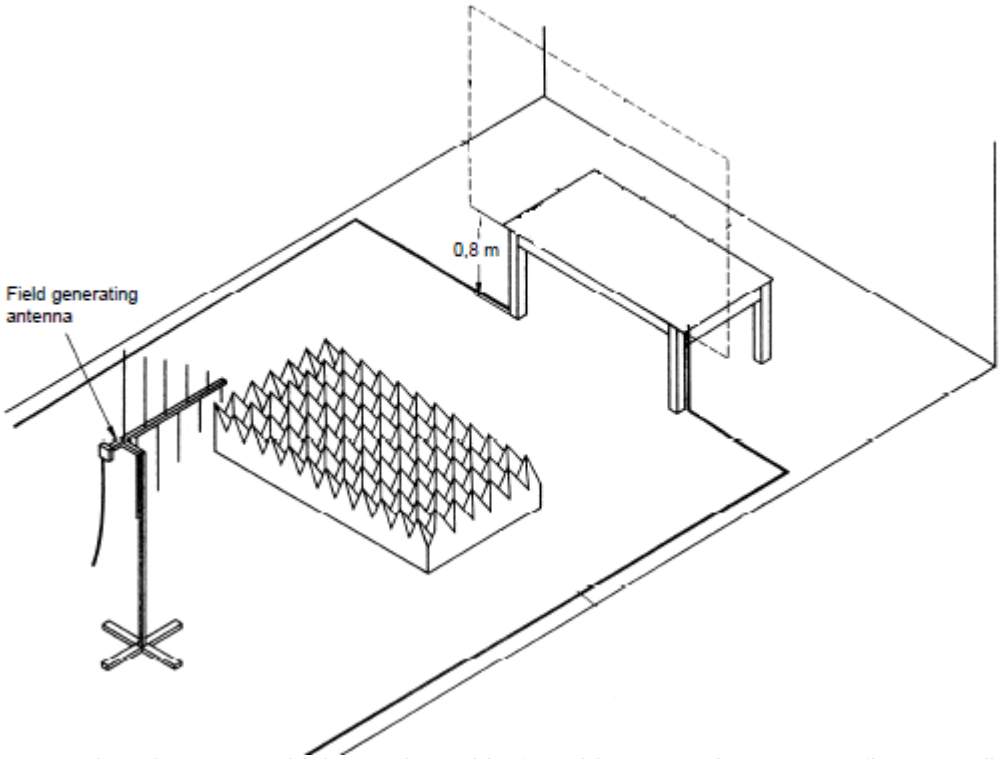
5.2.2 Results

Test point	Table (T) Floor (F)	Contact (C) Air (A)	Voltage (kV)	Number of discharge	Polarity (+ / -)	Opinion
Air contact	T	A	8	20	+ / -	A
Direct contact	T	C	4	200	+ / -	A
HCP	T	C	4	200	+ / -	A
VCP	T	C	4	200	+ / -	A

A: no loss of function.
B: the appliance wound not work normally during test, but after test it could recover itself.

5.3 Radio frequency electromagnetic fields

5.3.1 Measurement procedure



1 The EUT was placed on 0.8m high wooden table for table-top equipment. For floor standing equipment, the EUT was placed on a 0.1m high wooden support above the GRP.The tests normally shall be performed with the generating antenna facing each of four sides of the EUT. When equipment can be used in different orientations (e.g. vertical or horizontal) the test shall be performed on all possible sides of the EUT.

2 The tests are carried out with a field strength by 3 V/m (measured in the unmodulated field) with amplitude modulated signal by a depth of 80 % by a sinusoidal audio signal of 1 kHz. The logarithmic step was 1% and the dwell time was 3s dependent of the EUT cycle time.

3 The EUT shall be positioned so that the four sides of the EUT shall be exposed to the electromagnetic field in sequence. In each position the performance of the EUT will be investigated. In the case where the most sensitive surface side of the EUT is known throughout the frequency range (for example, via preliminary tests), testing may be restricted to that surface side only. Test was performed on subcontractor.

5.3.2 Results

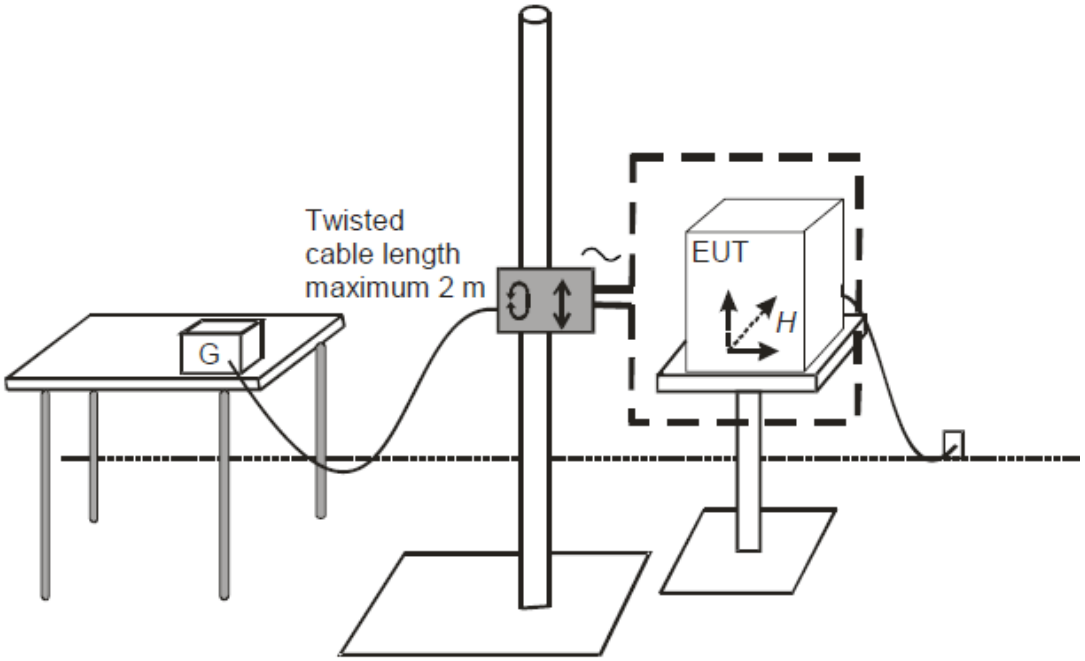
Frequency Range	Voltage(RMS)	Modulation Frequency	Opinion
80M-1GHz	3V/m	1kHz,80%,AM	A

A: no loss of function.
B: the appliance wound not work normally during test, but after test it could recover itself.

5.4 Power-frequency magnetic fields

The magnetic fields to which equipment is subjected may influence the reliable operation of equipment and systems.

5.4.1 Measurement procedure



The electromagnetic conditions of the laboratory shall be such as to guarantee the correct operation of the EUT in order not to influence the test results; otherwise, the tests shall be carried out in a Faraday cage. The plane of the inductive coil shall then be rotated by 90° in order to expose the EUT to the test field with different orientations.

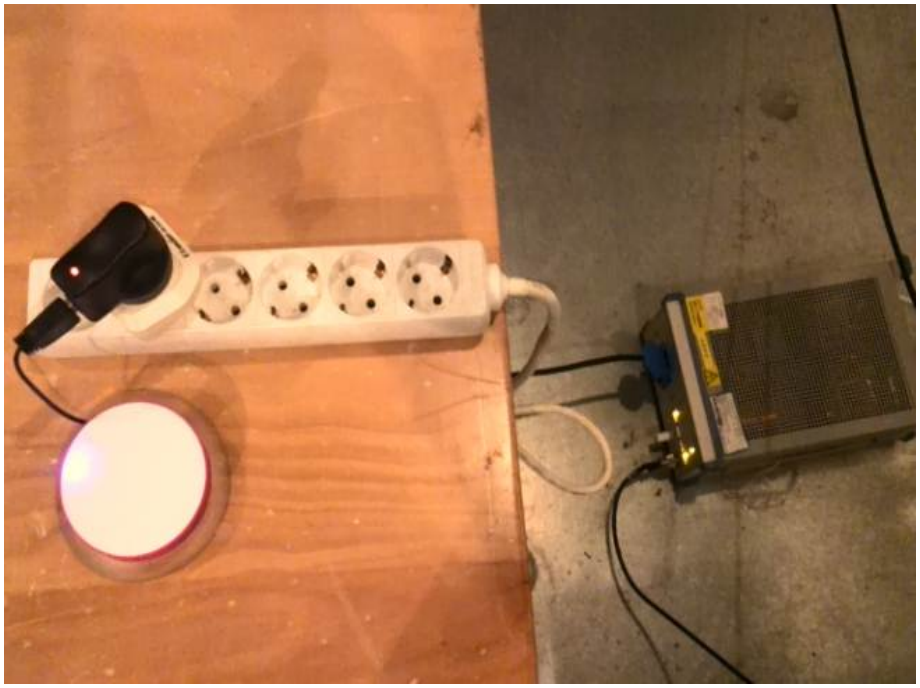
5.4.2 Results

Test Frequency	Field Level (A/m)	Duration (Second)	Axis of Orientation	Opinion
50/60Hz	1	60	X	A
50/60Hz	1	60	Y	A
50/60Hz	1	60	Z	A

A: no loss of function.

6 Test setup Photos

Conducted disturbance

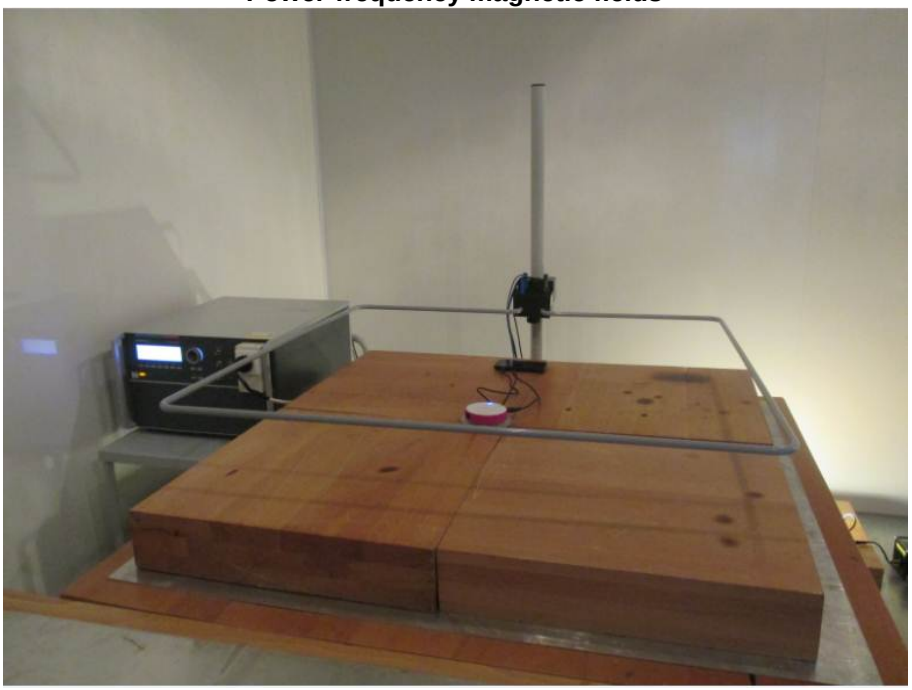


Radiated disturbance

Electrostatic Discharge

Radio frequency electromagnetic fields

Power-frequency magnetic fields



7 EUT Photos

Photo 1
Overall view

Photo 2
Overall view

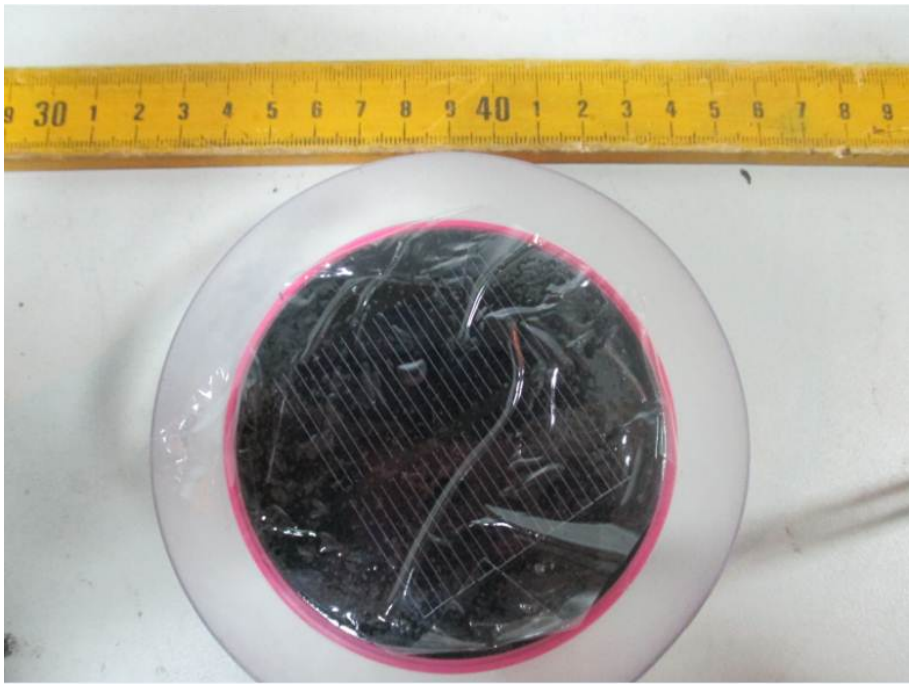


Photo 3
Overall view

Photo 4
Overall view

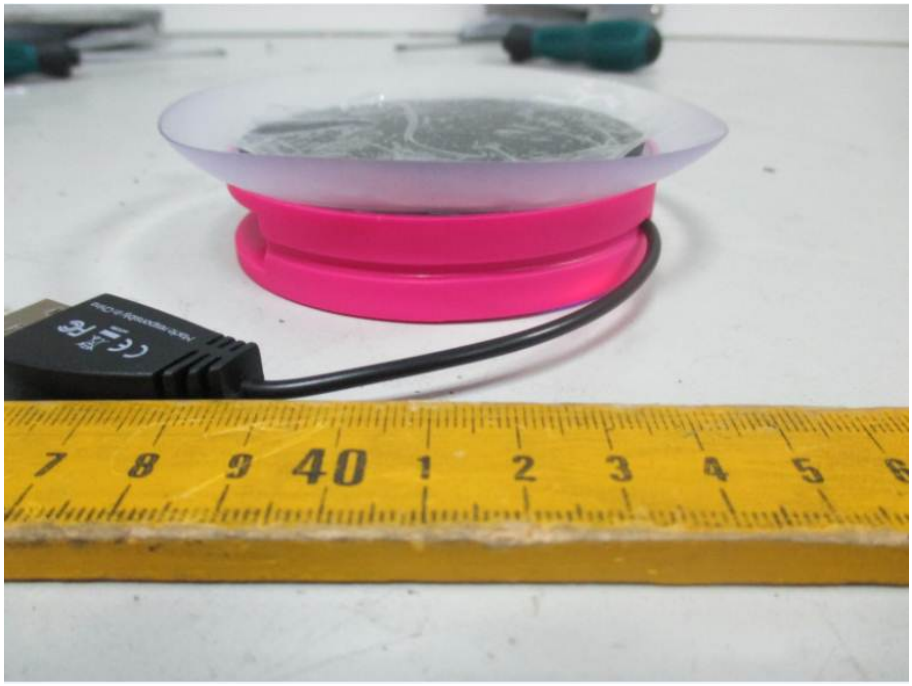


Photo 5
internal view

Photo 6
PCB view

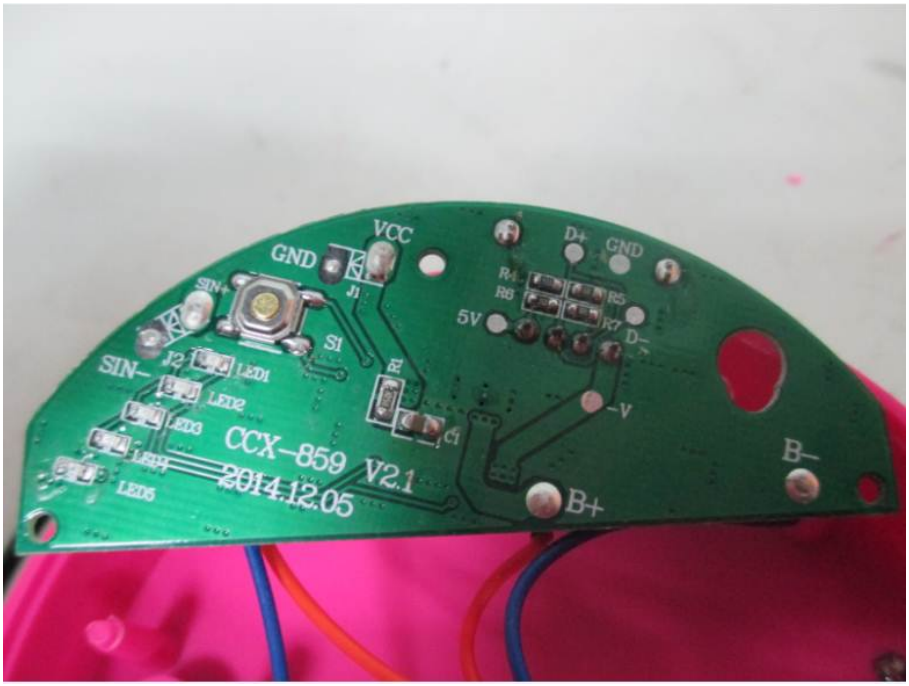


Photo 7
PCB view

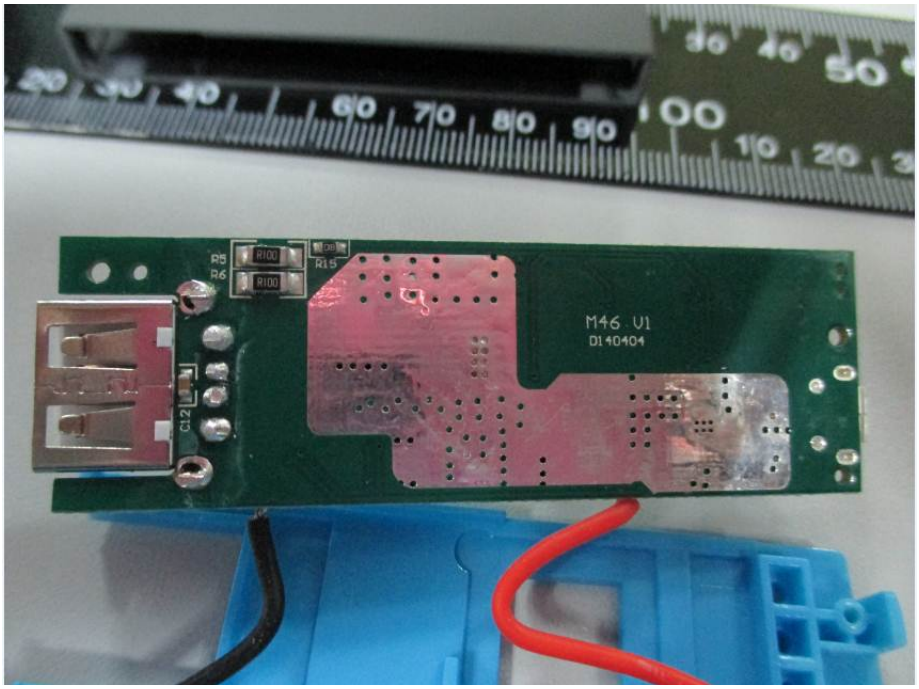


Photo 8
Battery view