FCC TEST REPORT

FCC ID	: KE3-3002769
Applicant	: Radio Systems Corporation
Address	: 10427 Petsafe Way Knoxville,TN 37932 USA
Manufacturer	: The same as above
Address	: The same as above

Equipment Under Test (EUT) :

Product Name	: INDOOR SHIELDS PLUS
Model No.	: RAC00-14112

Rule	: FCC CFR47 Part 15 Section 15.209:2010
Date of Test	: August 25, 2013
Date of Issue	: September 09, 2013
Test Result	: **Pass ***

Remarks:

The results shown in this test report refer only to the sample(s) tested, this test report cannot be reproduced, except in full, without prior written permission of the company.

The report would be invalid without specific stamp of test institute and the signatures of compiler and approver.

Prepared By:
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Testing location: 1/F., Fukangtai Building, West Baima Road, Songgang Street, Baoan District, Shenzhen, Guangdong, China
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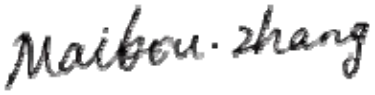
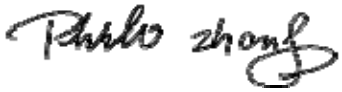
Compiled by: Approved by:





Maikou Zhang / Project Engineer Philo Zhong / Manager

2 Test Summary

Test Items	Test Requirement	Test Method	Result
Conducted Emissions	Part 15.207	ANSI C63.4:2003	PASS
Radiated Emissions	Part 15.209	ANSI C63.4: 2003	PASS

Remark:

PASS	Test item meets the requirement
FAIL	Test item does not meet the requirement
N/A	Test case does not apply to the test object

3 Contents

4 General Information

4.1 General Description of E.U.T.

Product Name	: INDOOR SHIELDS PLUS
Model No.	: RAC00-14112
Model Difference	: N/A
Operation Frequency	: 7.5kHz~10.5kHz

4.2 Details of E.U.T.

Technical Data: : DC 3.7V, 1900mAh by Internal lithium battery

4.3 Test Facility

The test facility has a test site registered with the following organizations:

- **IC – Registration No.: 7760A**

  Waltek Services(Shenzhen) Co., Ltd. has been registered and fully described in a report filed with the Industry Canada. The acceptance letter from the Industry Canada is maintained in our files. Registration number 7760A, July 12, 2012.

- **FCC – Registration No.: 880581**

  Waltek Services(Shenzhen) Co., Ltd. EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Registration 880581, May 26, 2011.

4.4 Test Location

All the tests were performed at:
Waltek Services(Shenzhen) Co., Ltd. at 1/F, Fukangtai Building, West Baima Rd., Songgang Street, Baoan District, Shenzhen, China

5 Equipment Used during Test

5.1 Equipments List

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Calibration Date	Calibration Due Date
1.	EMI Test Receiver	R&S	ESCI	101155	Aug. 13,2012	Aug. 12,2013
2.	LISN	SCHWARZBECK	NSLK 8128	8128-289	Aug. 13,2012	Aug. 12,2013
3.	Cable	LARGE	RF300	EW02014-3	Aug.14,2012	Aug. 13,2013
3m Semi-anechoic Chamber for Radiation Emissions						
1.	EMC Analyzer	Agilent	E7405A	MY45114943	Aug. 13,2012	Aug. 12,2013
2.	Active Loop Antenna	Beijing Dazhi	ZN30900A	-	Aug. 13,2012	Aug. 12,2013
3.	Trilog Broadband Antenna	SCHWARZBECK	VULB9163	336	Apr. 20,2013	Apr. 19,2014
4.	Broad-band Horn Antenna	SCHWARZBECK	BBHA 9120 D	667	Apr. 20,2013	Apr. 19,2014
5.	Broad-band Horn Antenna	SCHWARZBECK	BBHA 9170	399	Aug. 13,2012	Aug. 12,2013
6.	Broadband Preamplifier	COMPLIANCE DIRECTION	PAP-1G18	2004	Apr.07,2013	Apr.06,2014
7.	Broadband Preamplifier	SCHWARZBECK	BBV 9718	9718-148	Aug. 13,2012	Aug. 12,2013
8.	Cable	Top	EWO2014-7	-	Apr. 20,2013	Apr. 19,2014
9.	Cable	Top	TYPE16(13M)	-	Aug. 13,2012	Aug. 12,2013
10.	DC POWER SUPPLY	LWDQGS	PS-303D		Aug. 13,2012	Aug. 12,2013
11.	Humidity Chamber	GTH-225-40-1P	IAA061213		May. 15, 2013	May. 14, 2014
12.	Spectrum Analyzer	ROHDE & SCHWARZ	FSL6		Sep. 21, 2012	Sep. 20, 2013
Auxiliary equipment						
Item	**Equipment**	**Manufacturer**	**Model No.**	**Serial No.**	**Last Calibration Date**	**Calibration Due Date**
1	Adapter	GOE	GS2U	--	--	--

5.2 Measurement Uncertainty

Parameter	Uncertainty
Radiated Spurious Emissions test	± 5.03 dB (9KHz~1000MHz)

5.3 Test Equipment Calibration

All the test equipments used are valid and calibrated by CEPREI Certification Body that address is No.110 Dongguan Zhuang RD. Guangzhou, P.R.China.

6 Conducted Emissions

Test Requirement	: FCC CFR47 Part 15 Section 15.207
Test Method	: ANSI C63.4:2003
Test Result	: PASS
Frequency Range	: 150kHz to 30MHz
Limit	: 66-56 dBμV between 0.15MHz & 0.5MHz
	56 dBμV between 0.5MHz & 5MHz
	60 dBμV between 5MHz & 30MHz
Detector	: Peak for pre-scan (9kHz Resolution Bandwidth)
	Quasi-Peak & Average if maximised peak within 6dB of Average Limit

2.1 E.U.T. Operation

Operating Environment:

Temperature: 26 °C

Humidity: 50 % RH

Atmospheric Pressure: 1010 mbar

EUT Operation:

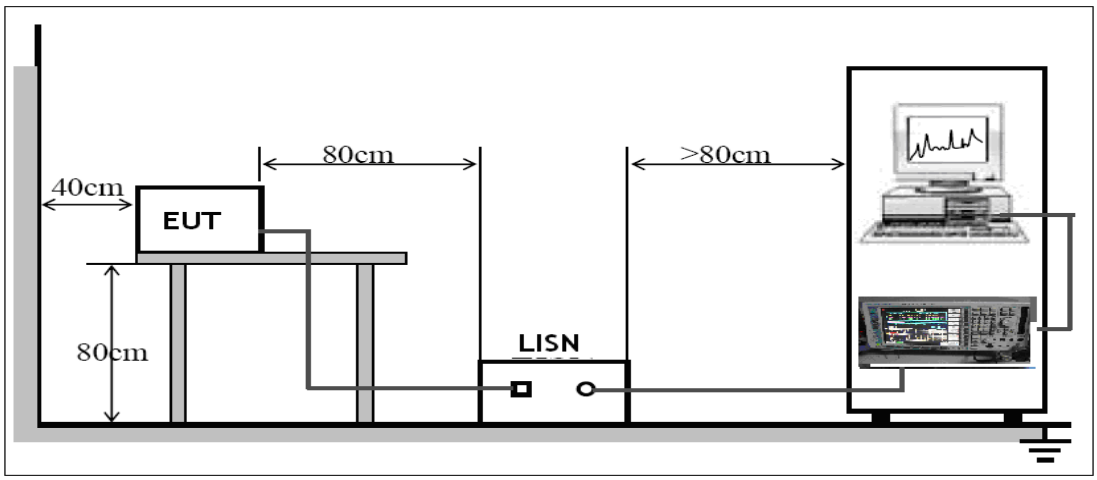
The EUT was tested in RF and charging mode with Adapter(The adapter is Auxiliary equipment).

The EUT was tested according to ANSI C63.4:2003. The frequency spectrum from 150kHz to 30MHz was investigated.

The maximised peak emissions from the EUT was scanned and measured for both the Live and Neutral Lines. Quasi-peak & average measurements were performed if peak emissions were within 6dB of the average limit line.

2.2 EUT Setup

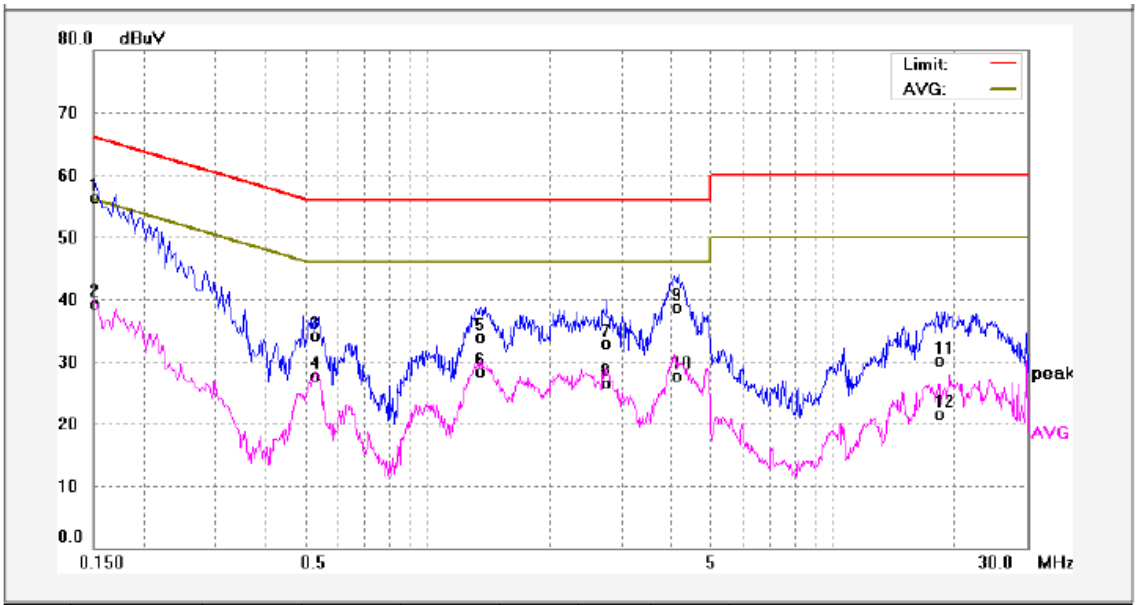
The conducted emission tests were performed using the setup accordance with the ANSI C63.4:2003.



2.3 Conducted Emission Test Result

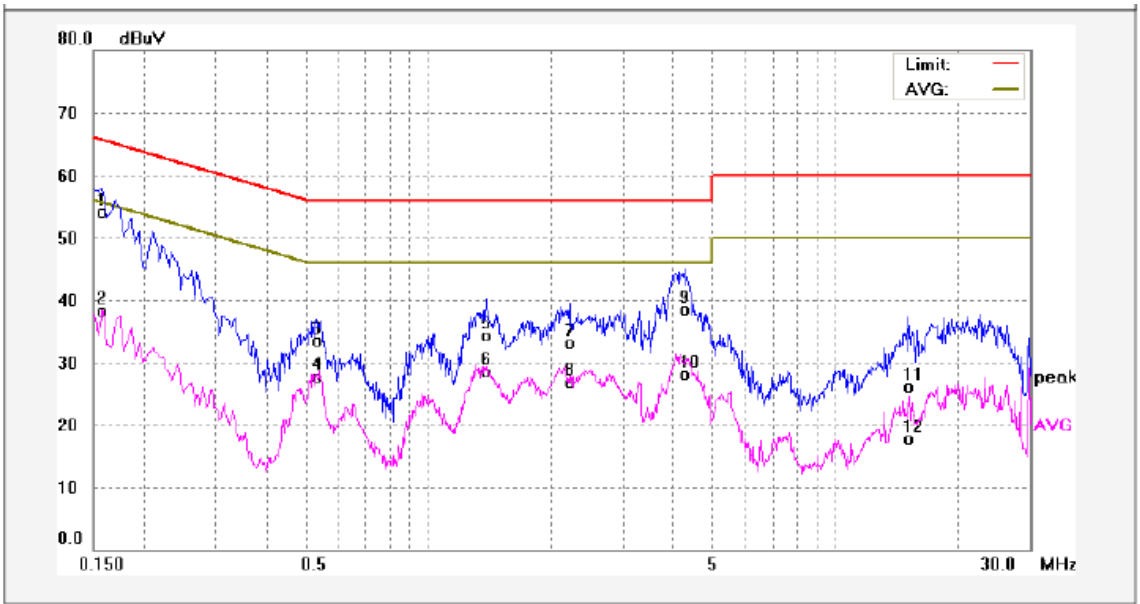
An initial pre-scan was performed on the live and neutral lines.

Live line:



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit dBuV	Margin (dB)	Detector	Remark
1	0.1500	46.55	9.80	56.35	65.99	-9.64	QP	
2	0.1500	29.41	9.80	39.21	55.99	-16.78	AVG	
3	0.5260	24.14	9.93	34.07	56.00	-21.93	QP	
4	0.5260	17.69	9.93	27.62	46.00	-18.38	AVG	
5	1.3500	23.90	10.00	33.90	56.00	-22.10	QP	
6	1.3500	18.22	10.00	28.22	46.00	-17.78	AVG	
7	2.7540	22.91	10.03	32.94	56.00	-23.06	QP	
8	2.7540	16.45	10.03	26.48	46.00	-19.52	AVG	
9	4.1500	28.65	10.07	38.72	56.00	-17.28	QP	
10	4.1500	17.59	10.07	27.66	46.00	-18.34	AVG	
11	18.4500	19.05	11.11	30.16	60.00	-29.84	QP	
12	18.4500	10.46	11.11	21.57	50.00	-28.43	AVG	

Neutral line:



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit dBuV	Margin (dB)	Detector	Remark
1	0.1580	44.33	9.81	54.14	65.56	-11.42	QP	
2	0.1580	28.42	9.81	38.23	55.56	-17.33	AVG	
3	0.5299	23.53	9.93	33.46	56.00	-22.54	QP	
4	0.5299	17.83	9.93	27.76	46.00	-18.24	AVG	
5	1.3820	24.25	10.00	34.25	56.00	-21.75	QP	
6	1.3820	18.43	10.00	28.43	46.00	-17.57	AVG	
7	2.2139	23.17	10.01	33.18	56.00	-22.82	QP	
8	2.2139	16.90	10.01	26.91	46.00	-19.09	AVG	
9	4.2540	28.35	10.07	38.42	56.00	-17.58	QP	
10	4.2540	18.09	10.07	28.16	46.00	-17.84	AVG	
11	15.0820	15.18	10.90	26.08	60.00	-33.92	QP	
12	15.0820	6.74	10.90	17.64	50.00	-32.36	AVG	

7 Radiated Emissions

Test Requirement : FCC CFR47 Part 15 Section 15.209
Test Method : ANSI C63.4:2003
Test Result : PASS
Frequency Range : 9kHz to 1GHz
Measurement Distance : 3m

Limit:

Frequency (MHz)	Field Strength		Field Strength Limit at 3m Measurement Dist	
	uV/m	Distance (m)	uV/m	dBuV/m
0.009 ~ 0.490	2400/F(kHz)	300	10000 * 2400/F(kHz)	$20\log^{(2400/F(kHz))} + 80$
0.490 ~ 1.705	24000/F(kHz)	30	100 * 24000/F(kHz)	$20\log^{(24000/F(kHz))} + 40$
1.705 ~ 30	30	30	100 * 30	$20\log^{(30)} + 40$
30 ~ 88	100	3	100	$20\log^{(100)}$
88 ~ 216	150	3	150	$20\log^{(150)}$
216 ~ 960	200	3	200	$20\log^{(200)}$
Above 960	500	3	500	$20\log^{(500)}$

Note:

a) The tighter limit applies at the band edges.
For example: F.S limit at 88MHz is 100uV/m

b) If measurement is made at 3m distance, then F.S Limit at 3m distance is adjusted by using the formula of $L_{d1} = L_{d2} * (d2/d1)^2$.
For example:
F.S Limit at 30m(d2) distance is 30uV/m(L_{d2}), then F.S Limit at 3m(d1) distance is
L_{d1} = 30uV/m * $(30/3)^2$ = 100 * 30uV/m

7.1 EUT Operation

Operating Environment:

Temperature : 25.5 °C
Humidity : 52% RH
Atmospheric Pressure : 1010 mbar

7.2 Test Procedure

a) Test Procedure (below 30MHz)

(1) The EUT is placed on a turntable, which is 0.8m above ground plane.

(2) The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.

(3) EUT is set 3m away from the receiving antenna.

(4) Maximum procedure was performed on the six highest emissions to ensure EUT compliance.

(5) Repeat above procedures until the measurements for all frequencies are complete.

(6) The radiation measurements are performed in X,Y,Z axes position(X denotes lying on the table, Y denotes side stand and Z denotes vertical stand), the worst is X position.

(7) New battery used during test.

(8) A calculated substitution wire ring antenna used during test.

b) Test Procedure (above 30MHz)

(1) The EUT is placed on a turntable, which is 0.8m above ground plane.

(2) The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.

(3) EUT is set 3m away from the receiving antenna, which is moved from 1m to 4m to find out the maximum emissions.

(4) Maximum procedure was performed on the six highest emissions to ensure EUT compliance.

(5) And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.

(6) Repeat above procedures until the measurements for all frequencies are complete.

(7) The radiation measurements are performed in X,Y,Z axes position(X denotes lying on the table, Y denotes side stand and Z denotes vertical stand), the worst is X position.

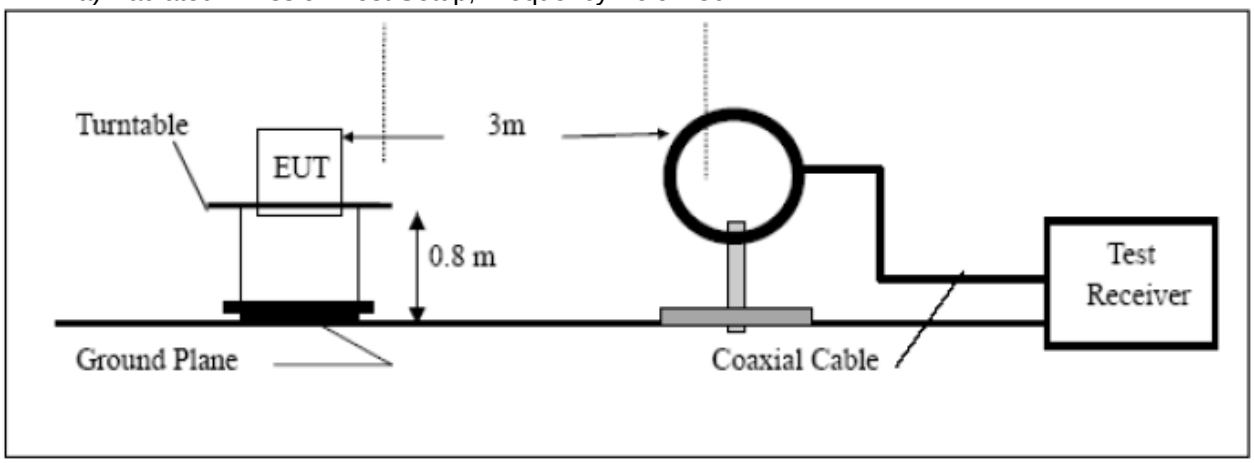
(8) New battery used during test.

(9) A calculated substitution wire ring antenna used during test.

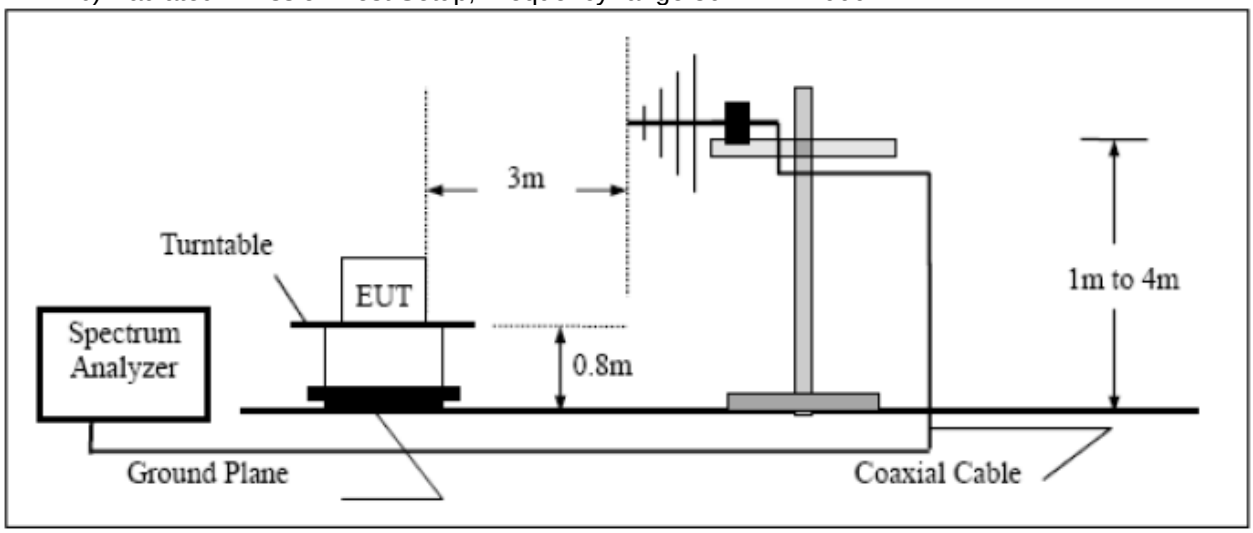
7.3 Test Setup

The radiated emission tests were performed in the 3m Semi- Anechoic Chamber test site.

a) Radiated Emission Test Setup, Frequency Below 30MHz



b) Radiated Emission Test Setup, Frequency range 30MHz ~ 1000MHz



7.4 Spectrum Analyzer Setup

According to FCC Part15 Rules, the system was tested 9kHz to 1000MHz.

Below 30MHz:

Sweep Speed .....Auto
IF Bandwidth .....10 KHz
Video Bandwidth 10KHz
Resolution Bandwidth 10KHz

Above 30MHz:

Sweep Speed .....Auto
IF Bandwidth .....120 KHz
Video Bandwidth 100KHz
Quasi-Peak Adapter Bandwidth.....120 KHz
Quasi-Peak Adapter Mode.....Normal
Resolution Bandwidth 120kHz

7.5 Corrected Amplitude & Margin Calculation

Formula of conversion factors:the field strength at 3m was established by adding the meter reading of the spectrum analyzer (which is set to read in units of dBuV/m) to the antenna correction factor supplied by the antenna manufacturer. The antenna correction factors are stared in terms of dB. The gain of the pressletor was accounted for in the spectrum analyser meter reading.

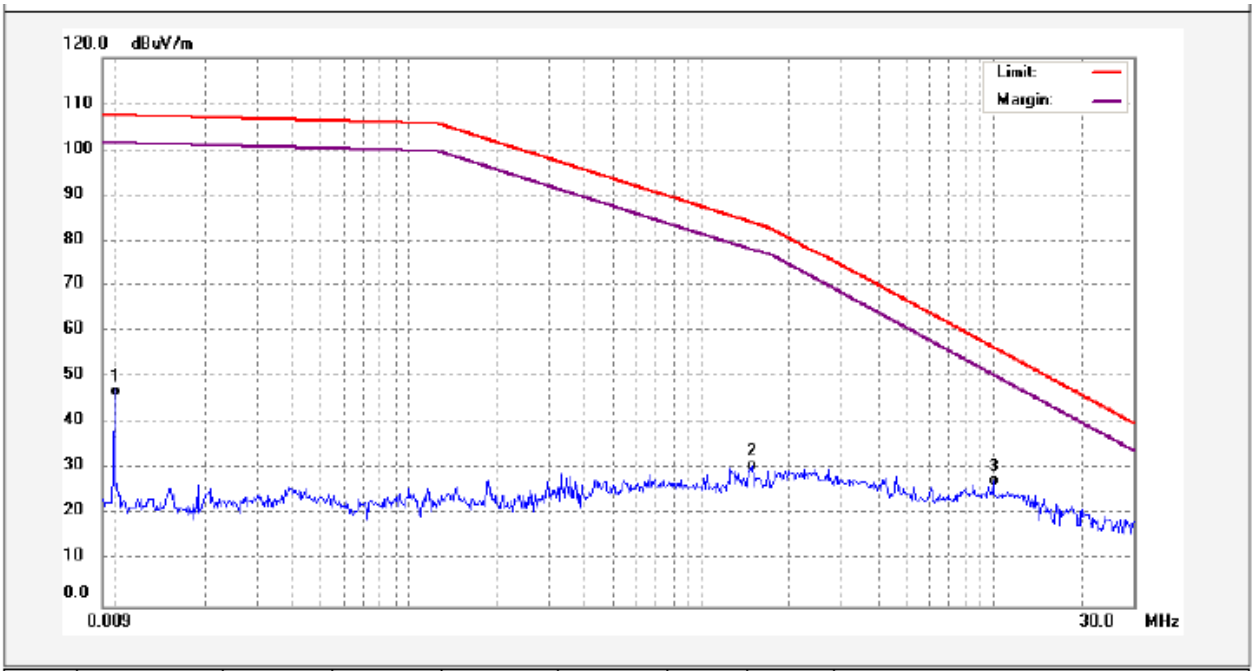
Example:

Freq(MHz) Meter Reading +ACF=FS

33 20dBuV+10.36dB=30.36dBuV/m @3m

7.6 Test Results

Test frequency below 30MHz:

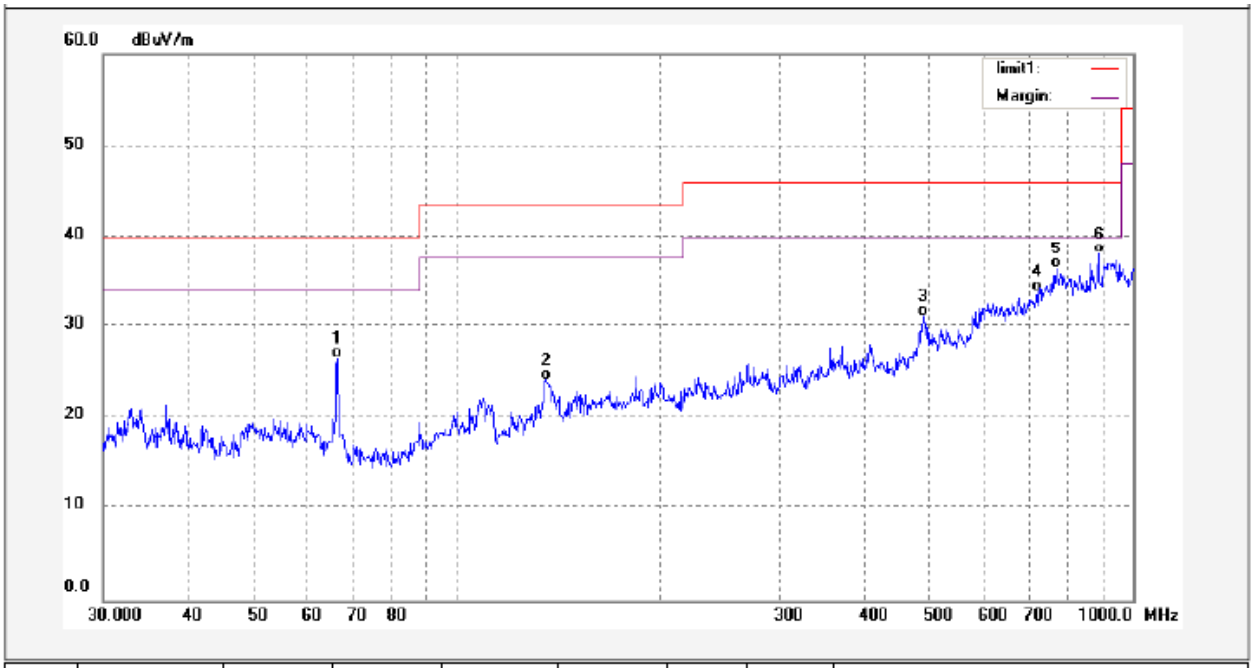


No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Remark
1	0.0100	-1.00	48.00	47.00	107.52	-60.52	QP	
2	1.4916	-9.84	40.60	30.76	84.13	-53.37	QP	
3	9.9541	-15.50	42.97	27.47	56.53	-29.06	QP	

Test frequency above 30MHz

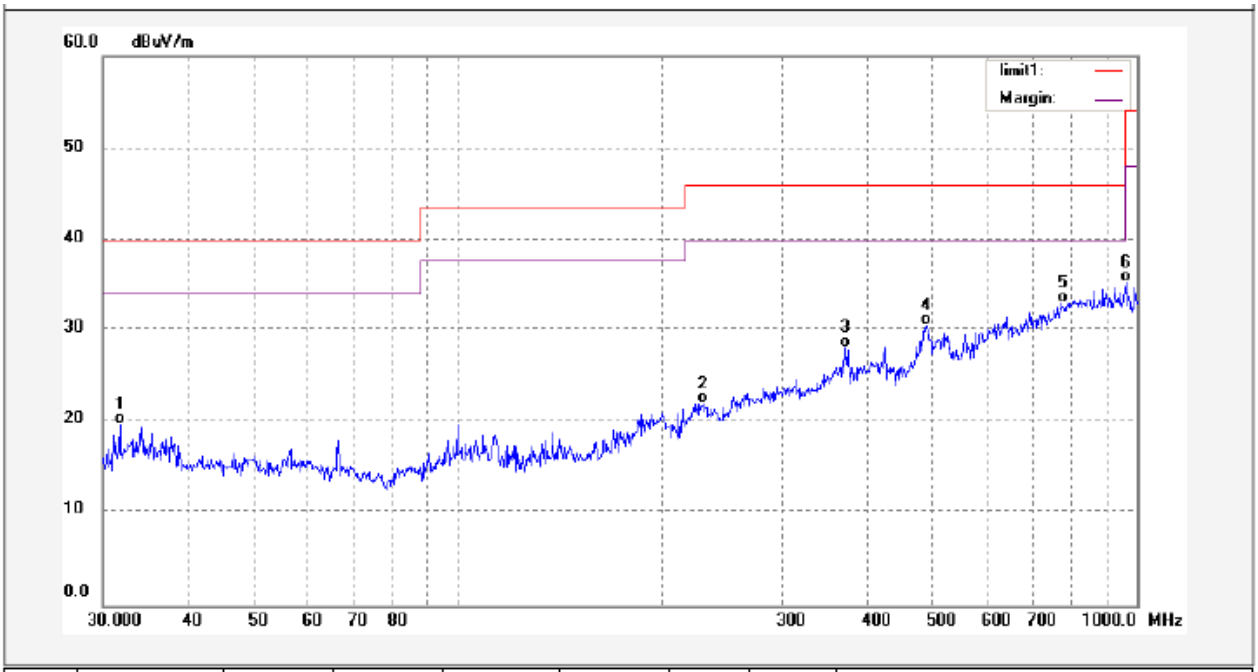
Test Mode: Working Mode

Antenna Porlarization: Vertical



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Remark
1	66.6051	15.81	10.72	26.53	40.00	-13.47	QP	
2	135.4395	12.15	12.00	24.15	43.50	-19.35	QP	
3	490.0451	5.89	25.24	31.13	46.00	-14.87	QP	
4	721.2544	7.90	26.00	33.90	46.00	-12.10	QP	
5	771.0475	8.46	27.86	36.32	46.00	-9.68	QP	
6	890.5213	7.80	30.18	37.98	46.00	-8.02	QP	

Antenna Porlarization: Horizontal



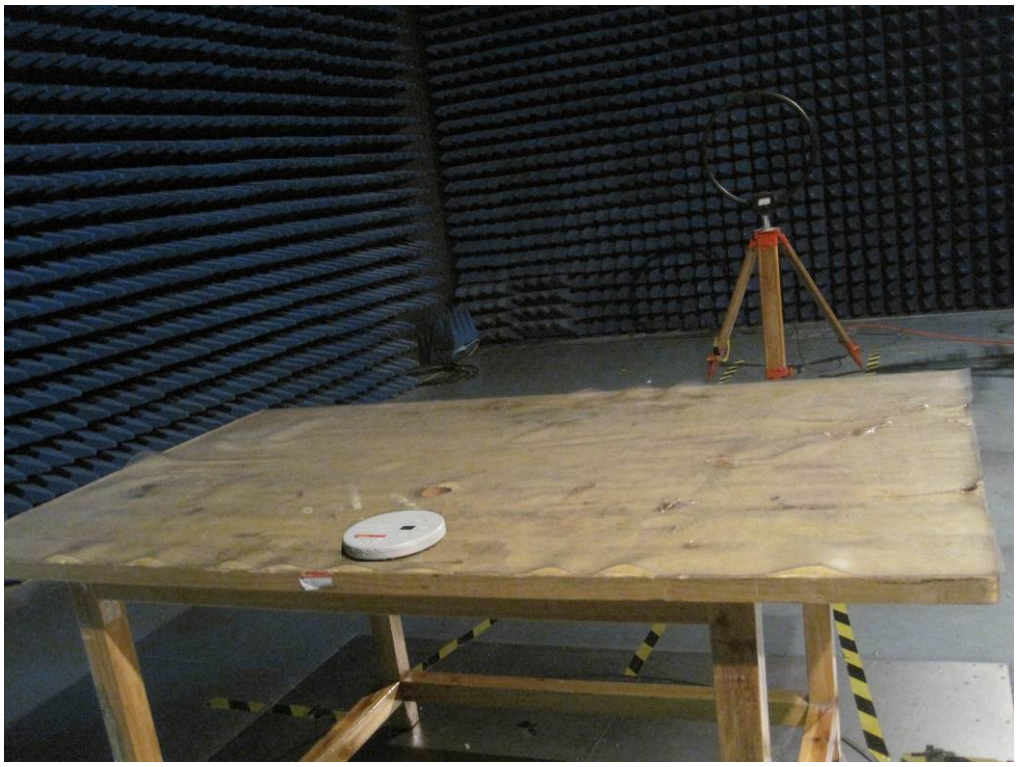
No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Remark
1	31.7348	3.16	16.58	19.74	40.00	-20.26	QP	
2	229.4220	6.40	15.64	22.04	46.00	-23.96	QP	
3	371.2679	8.36	19.78	28.14	46.00	-17.86	QP	
4	490.0451	5.31	25.24	30.55	46.00	-15.45	QP	
5	776.4849	4.69	28.27	32.96	46.00	-13.04	QP	
6	965.4742	6.14	29.10	35.24	54.00	-18.76	QP	

8 Photographs–Test Setup

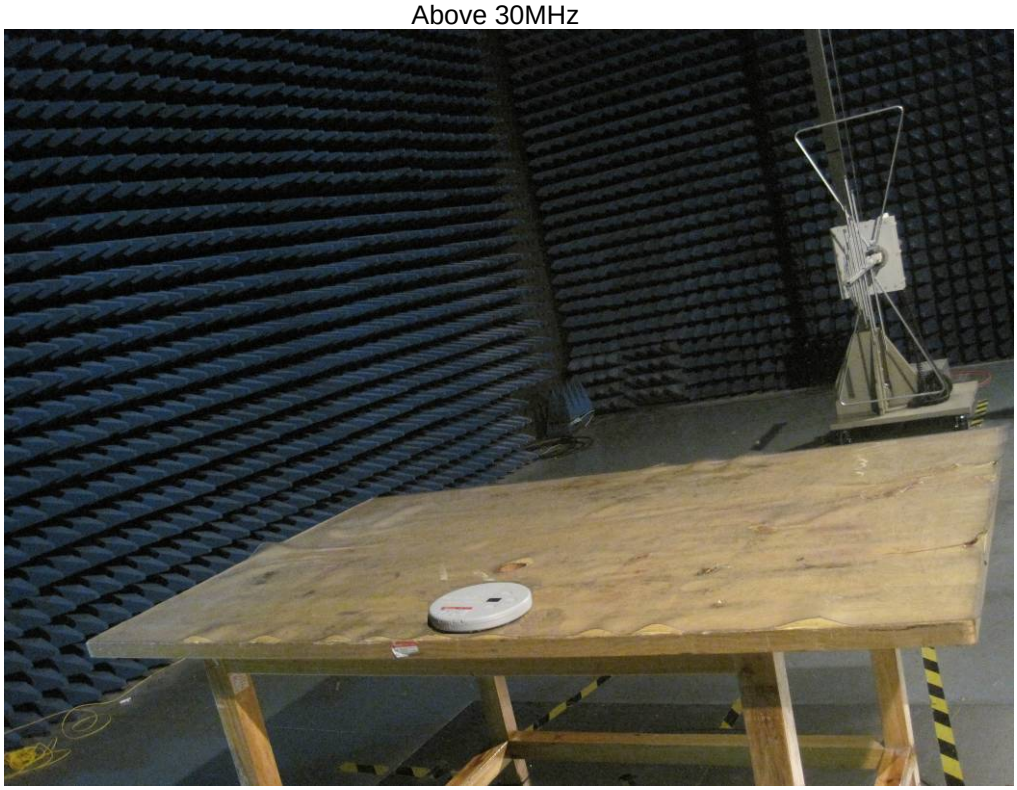
8.1 Conducted Emissions

8.2 Photograph – Radiation Emissions Test Setup

Below 30MHz

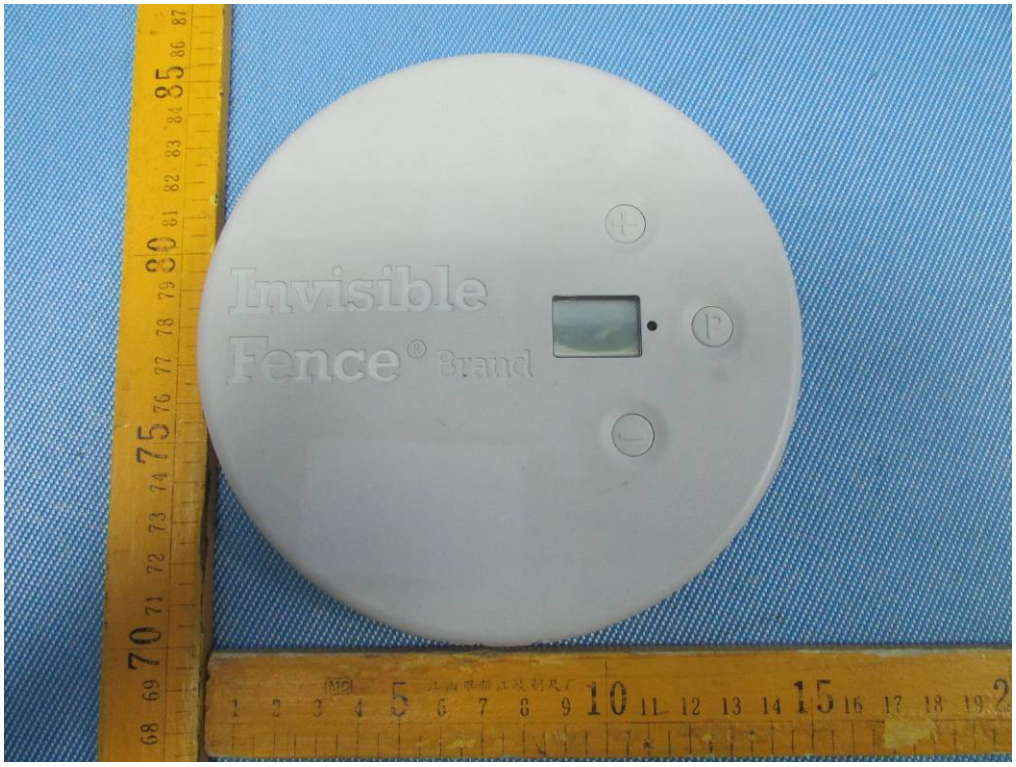


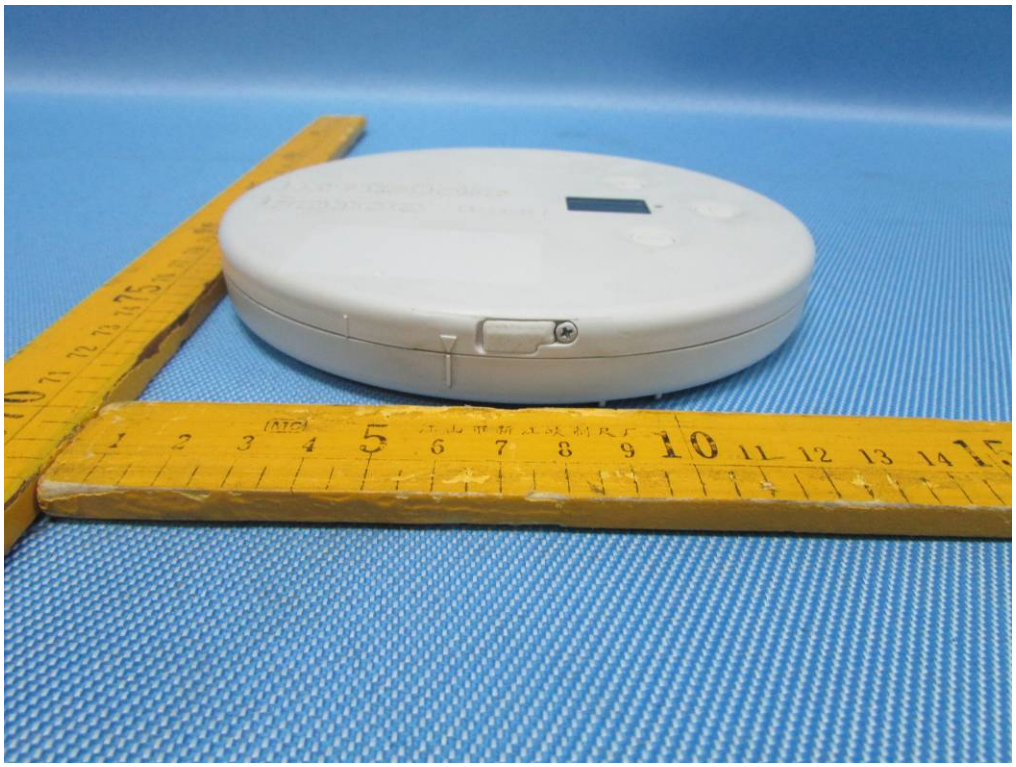
Above 30MHz

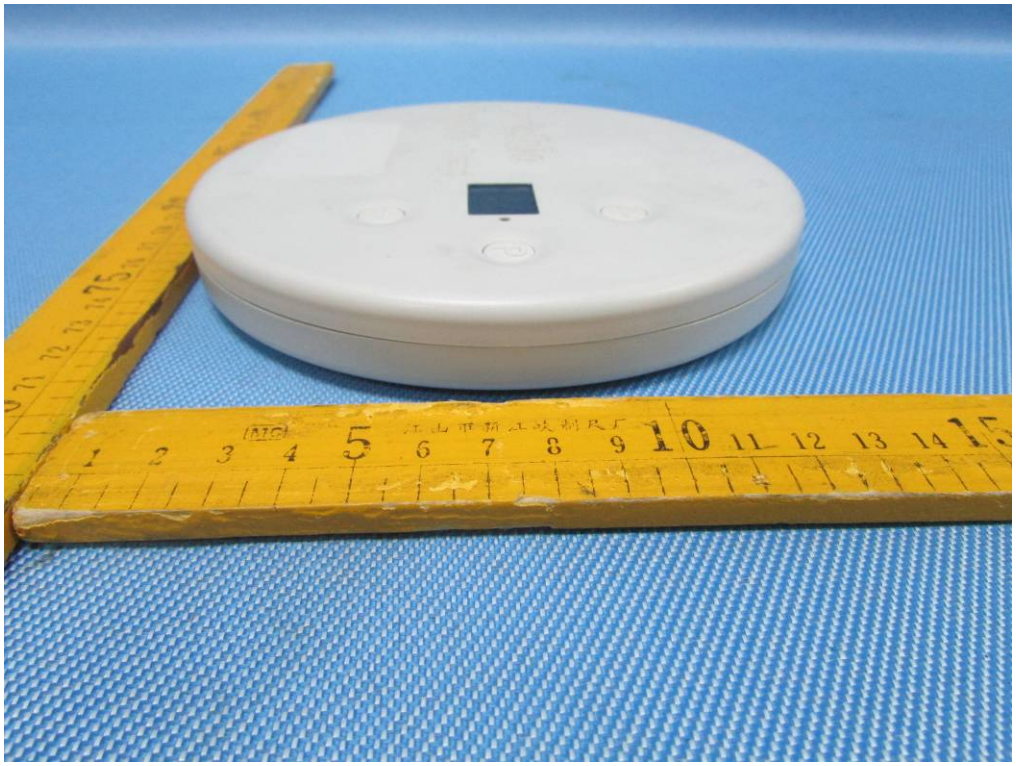


9 Photographs - Constructional Details

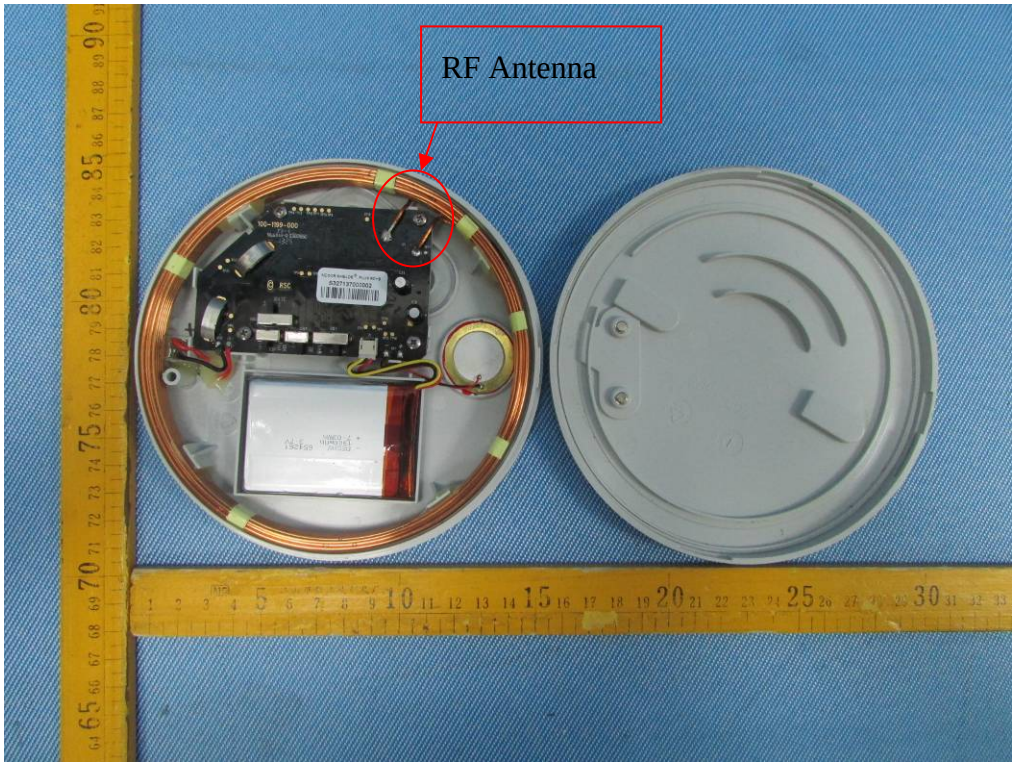
9.1 EUT – Appearance View

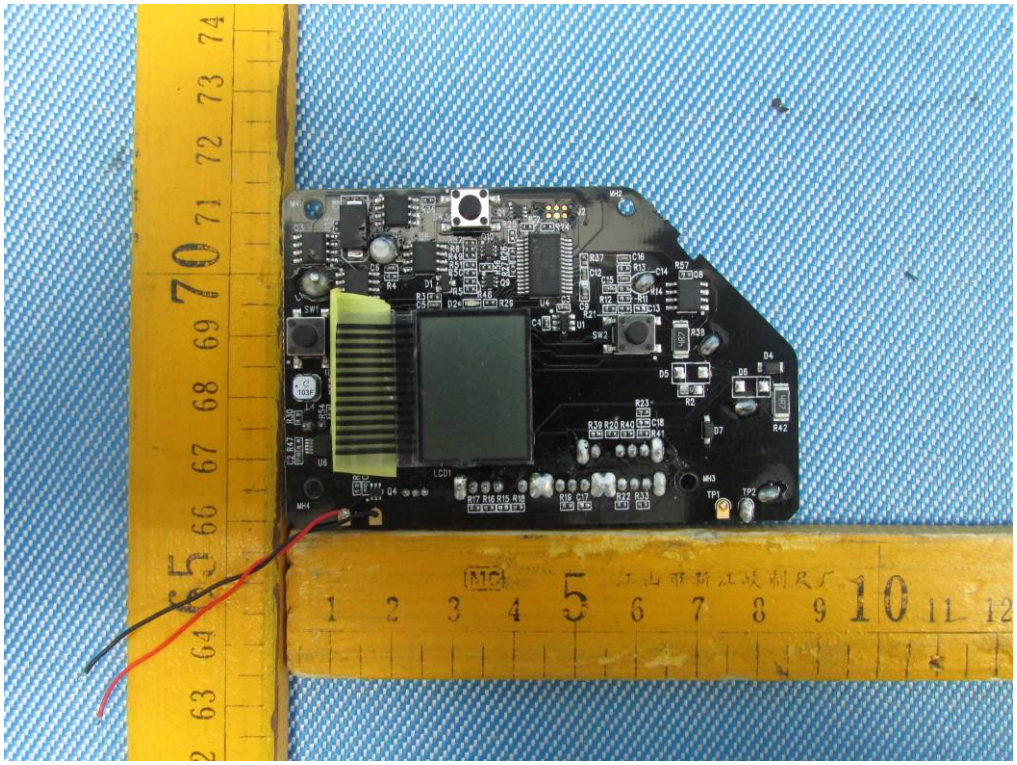


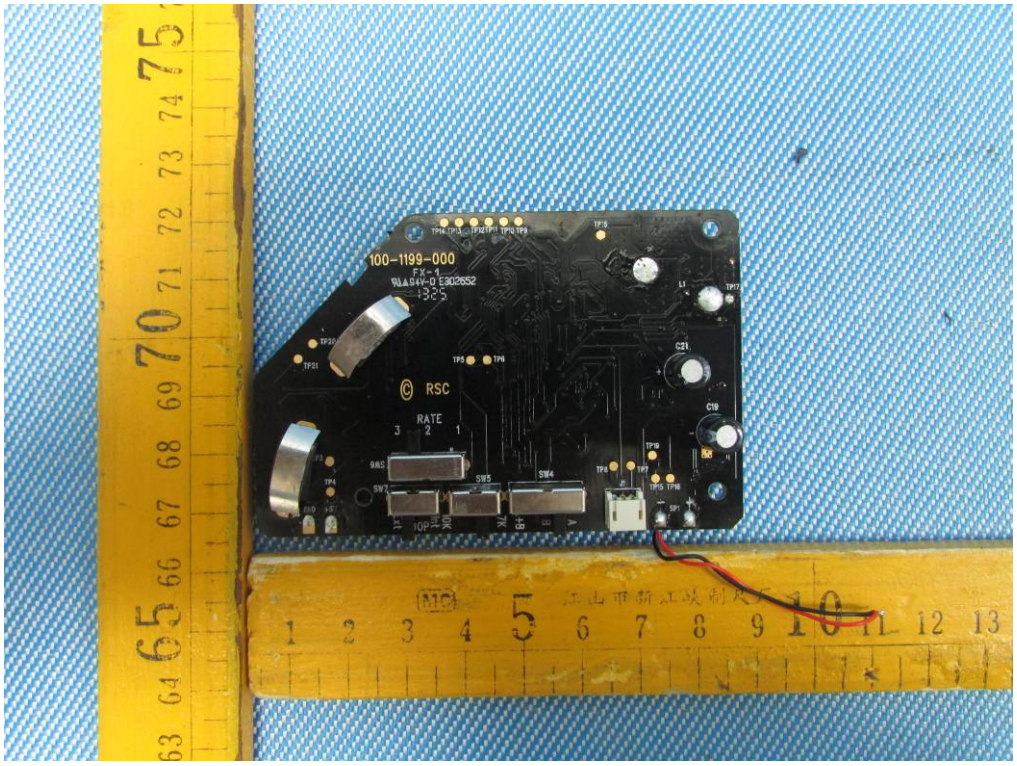


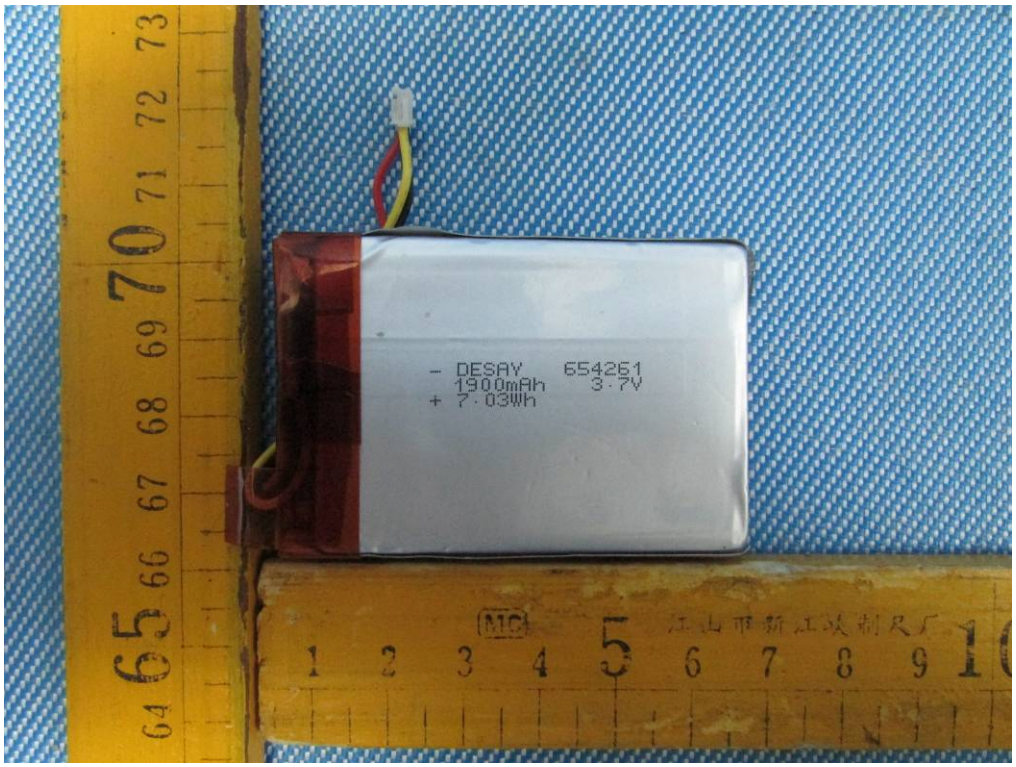


9.2 EUT – Open View









=End of test report==