TEST REPORT

Reference No.	:	WTS13S1210016E
FCC ID	:	KE3-3002613
Applicant	:	Radio Systems Corporation
Address	:	10427 Petsafe Way Knoxville,TN 37932 USA
Manufacturer	:	The same as above.
Address	:	The same as above.
Product Name	:	Auto Trainer
Model No.	:	RFA-517
Standards	:	FCC CFR47 Part 15 Section 15.109:2012
Date of Receipt sample	:	Dec. 16, 2013
Date of Test	:	Dec. 18~23, 2013
Date of Issue	:	Dec.30, 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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Compiled by:

Maikou Zhang / Project Engineer

Approved by:

Philo Zhong / Manager

2 Test Summary

Test Items	Test Requirement	Test Method	Result
Radiated Emissions	Part 15.109	ANSI C63.4: 2003	PASS
Conducted Emissions	Part 15.107	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	: Auto Trainer
Model No.	: RFA-517
Frequency Range	: 433.92 MHz
Oscillator	: 13.56MHz
Antenna installation	: PCB Printed Antenna

4.2 Details of E.U.T.

Technical Data:	: DC 6V,1000mA powered by adapter or Battery(1.5V D Type x 4) (Adapter input:AC 100-240V, 50/60Hz)
Adapter	: M/N:ABT010060

4.3 Test Facility

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

- **IC – Registration No.: 7760A-1**

  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-1, 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

Conducted Emissions						
Item	**Equipment**	**Manufacturer**	**Model No.**	**Serial No.**	**Last Calibration Date**	**Calibration Due Date**
1.	EMI Test Receiver	R&S	ESCI	100947	Sep.18,2013	Sep.17,2014
2.	LISN	R&S	ENV216	101215	Nov. 29,2013	Nov. 28,2014
3.	Cable	Top	TYPE16(3.5M)	-	Sep.18,2013	Sep.17,2014
3m Semi-anechoic Chamber for Radiation Emissions						
Item	**Equipment**	**Manufacturer**	**Model No.**	**Serial No.**	**Last Calibration Date**	**Calibration Due Date**
1.	EMC Analyzer	Agilent	E7405A	MY45114943	Sep.18,2013	Sep.17,2014
2.	Active Loop Antenna	Beijing Dazhi	ZN30900A	-	Sep.18,2013	Sep.17,2014
3.	Trilog Broadband Antenna	SCHWARZBECK	VULB9163	336	Apr.20,2013	Apr.19,2014
4	Coaxial Cable (below 1GHz)	Top	TYPE16(13M)	-	Sep.18,2013	Sep.17,2014
5	Broad-band Horn Antenna	SCHWARZBECK	BBHA 9120 D	667	Apr.20,2013	Apr.19,2014
7	Coaxial Cable (above 1GHz)	Top	25MHz-18GHz	EW02014-7	Apr.20,2013	Apr.19,2014

5.2 Measurement Uncertainty

Parameter	Uncertainty
Radiated Spurious Emissions test	± 5.03 dB
Conducted Spurious Emissions test	± 3.64 dB (AC mains 150KHz~30MHz)

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 15.107
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

6.1 E.U.T. Operation

Operating Environment:

Temperature: 25 °C

Humidity: 53 % RH

Atmospheric Pressure: 101.2kPa

Operation Mode:

The EUT was tested in RX mode. The test data were shown as follow.

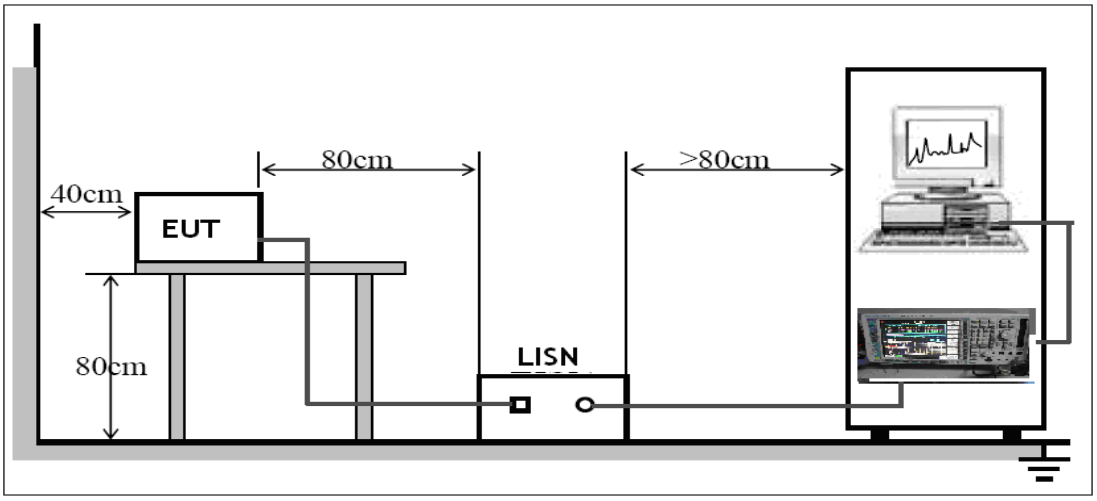
6.2 Test Procedure

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.

6.3 Test Setup

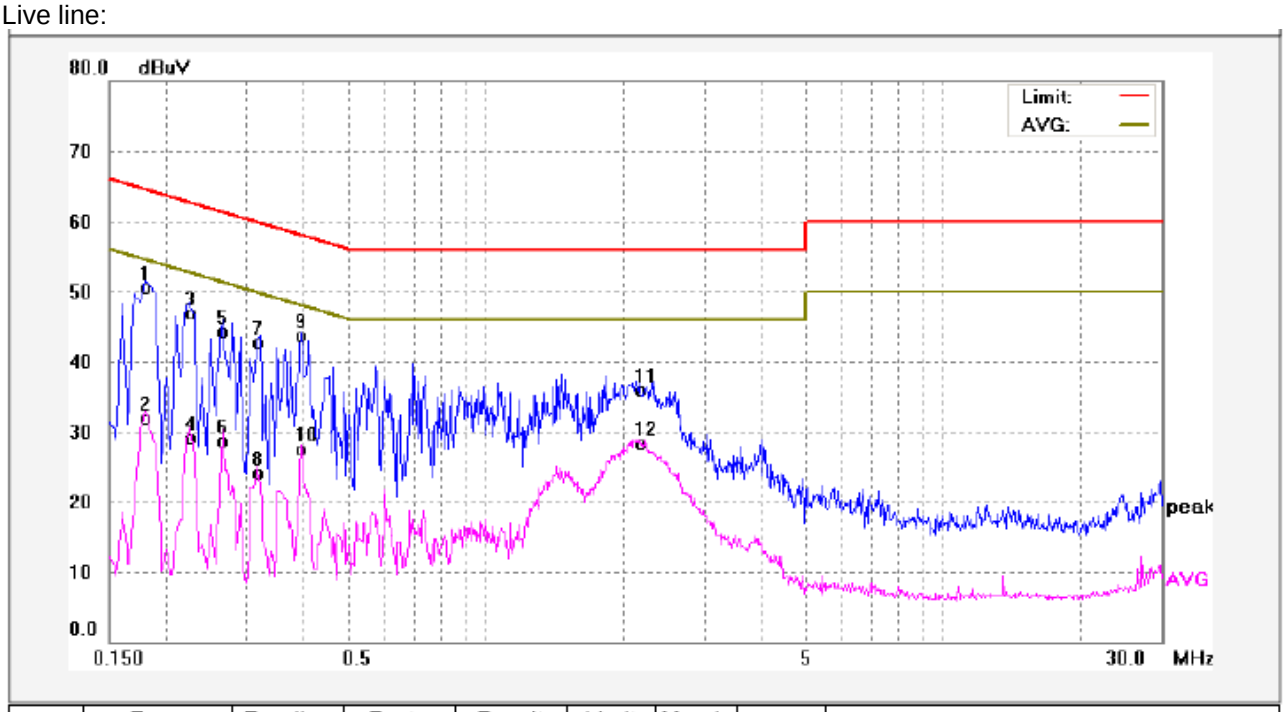
The EUT was placed on the test table in shielding room



6.4 Test Result

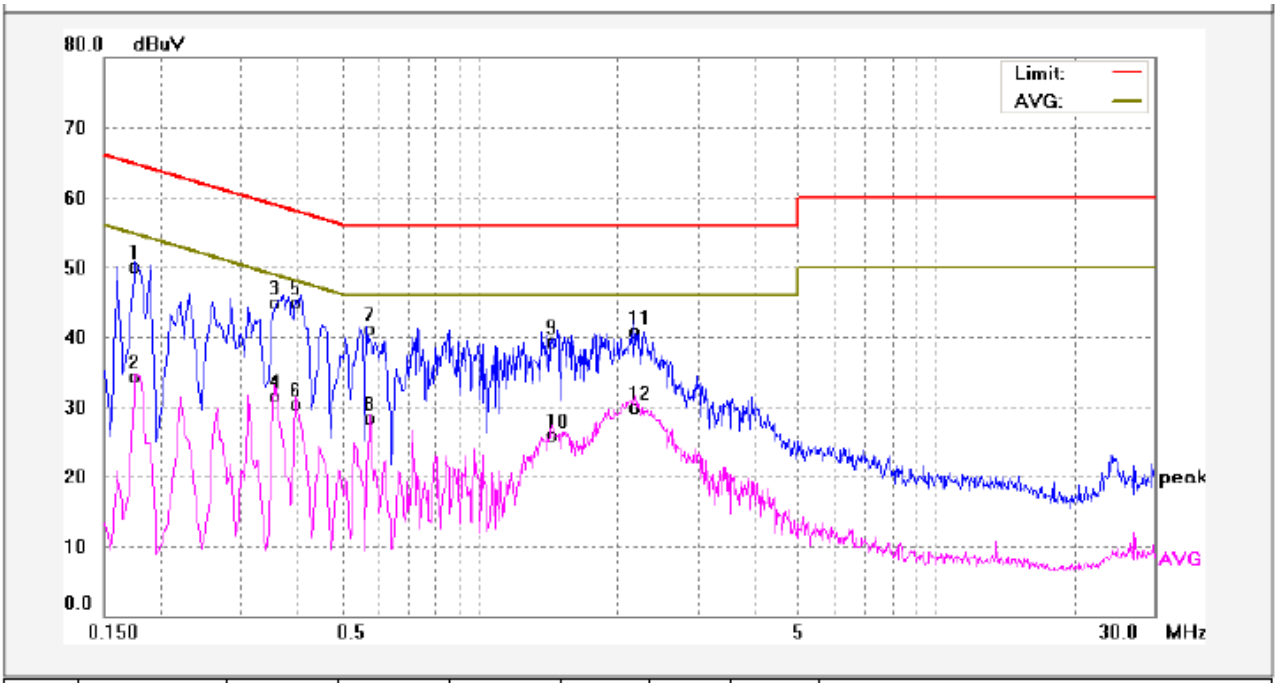
Test Mode: Receiving

Live line:



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit dBuV	Margin (dB)	Detector	Remark
1	0.1800	40.63	9.82	50.45	64.48	-14.03	QP	
2	0.1800	22.01	9.82	31.83	54.48	-22.65	AVG	
3	0.2250	37.09	9.85	46.94	62.63	-15.69	QP	
4	0.2250	19.31	9.85	29.16	52.63	-23.47	AVG	
5	0.2649	34.54	9.86	44.40	61.27	-16.87	QP	
6	0.2649	18.91	9.86	28.77	51.27	-22.50	AVG	
7	0.3150	32.90	9.87	42.77	59.84	-17.07	QP	
8	0.3150	14.21	9.87	24.08	49.84	-25.76	AVG	
9	0.3950	33.71	9.90	43.61	57.96	-14.35	QP	
10	0.3950	17.67	9.90	27.57	47.96	-20.39	AVG	
11	2.1550	25.81	10.01	35.82	56.00	-20.18	QP	
12	2.1550	18.39	10.01	28.40	46.00	-17.60	AVG	

Neutral line:



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit dBuV	Margin (dB)	Detector	Remark
1	0.1750	40.32	9.82	50.14	64.71	-14.57	QP	
2	0.1750	24.41	9.82	34.23	54.71	-20.48	AVG	
3	0.3550	34.97	9.89	44.86	58.84	-13.98	QP	
4	0.3550	21.69	9.89	31.58	48.84	-17.26	AVG	
5	0.3950	34.97	9.90	44.87	57.96	-13.09	QP	
6	0.3950	20.33	9.90	30.23	47.96	-17.73	AVG	
7	0.5650	31.09	9.94	41.03	56.00	-14.97	QP	
8	0.5650	18.37	9.94	28.31	46.00	-17.69	AVG	
9	1.4349	29.32	10.00	39.32	56.00	-16.68	QP	
10	1.4349	15.88	10.00	25.88	46.00	-20.12	AVG	
11	2.1850	30.70	10.01	40.71	56.00	-15.29	QP	
12	2.1850	19.93	10.01	29.94	46.00	-16.06	AVG	

7 Radiated Emissions

Test Requirement: FCC CFR47 Part 15 Section 15.109

Test Method: ANSI C63.4:2003

Test Result: PASS

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:24°C

Humidity: 52 % RH

Atmospheric Pressure:101.6 kPa

Operation Mode:

The EUT was tested in RX mode with Adapter and Battery. the adapter input mode test data were the worst, and shown as follow.

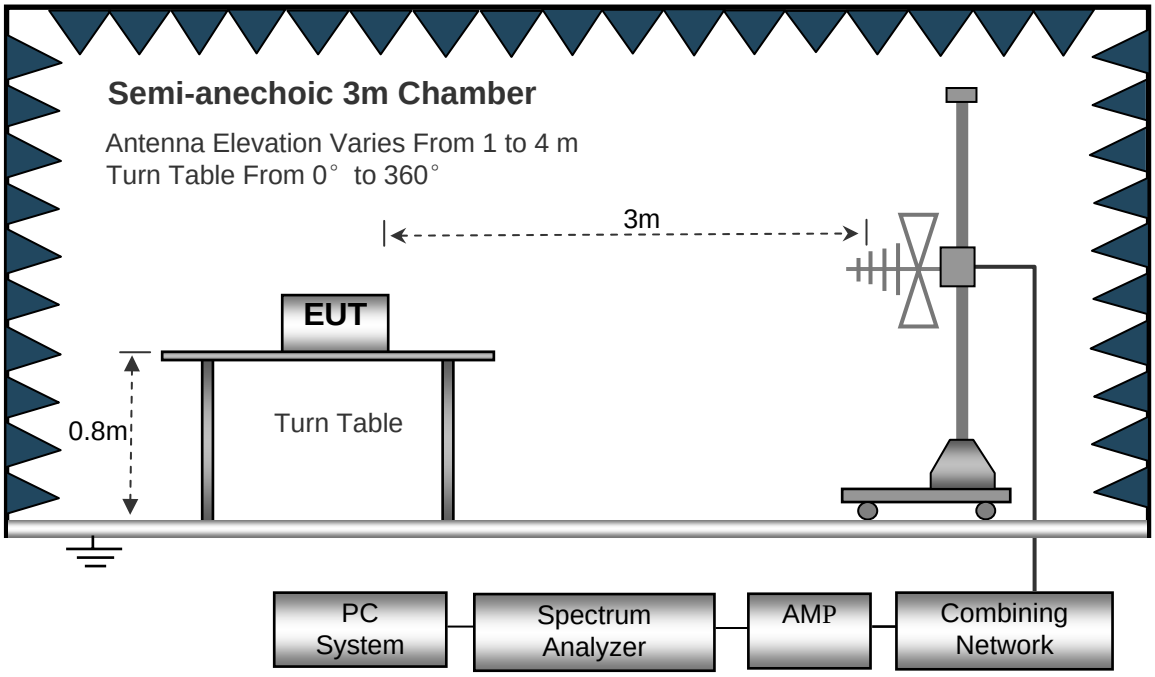
7.2 Test Procedure

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,the worst is X position.

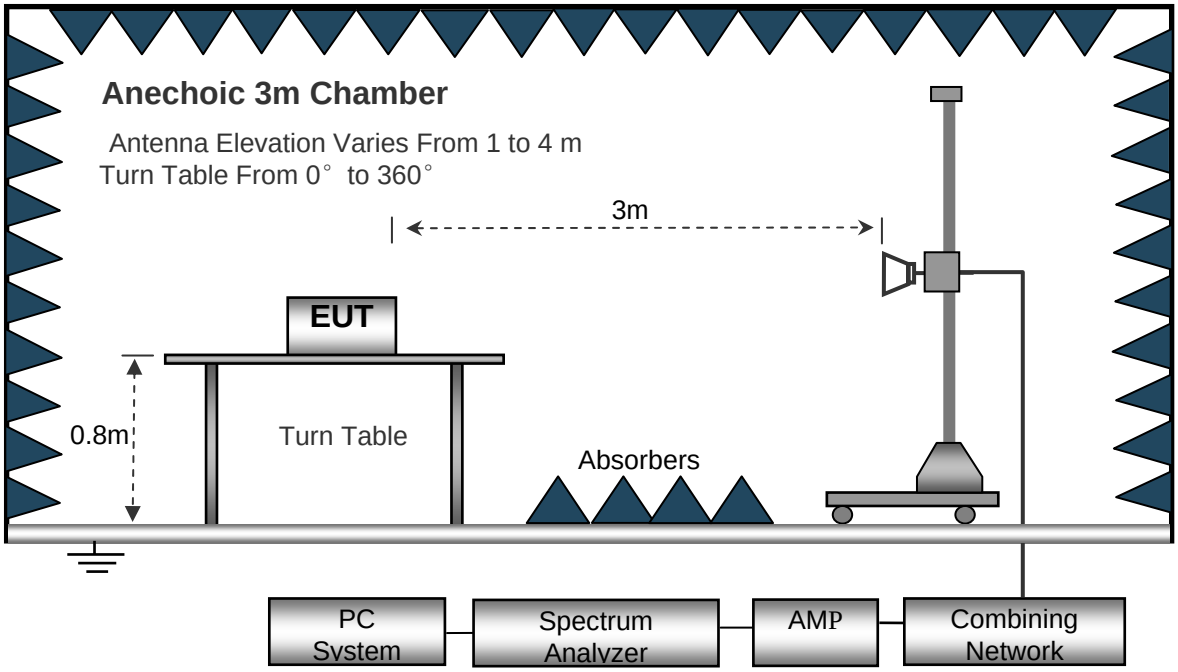
7.3 Test Setup

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

The test setup for emission measurement from 30 MHz to 1 GHz.



The test setup for emission measurement above 1 GHz.



7.4 Spectrum Analyzer Setup

According to FCC Part15 Rules, the system was tested 30MHz to 2GHz

30MHz ~ 1GHz

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

Above 1GHz

Sweep Speed	Auto
Detector	PK
Resolution Bandwidth	1MHz
Video Bandwidth	3MHz

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:

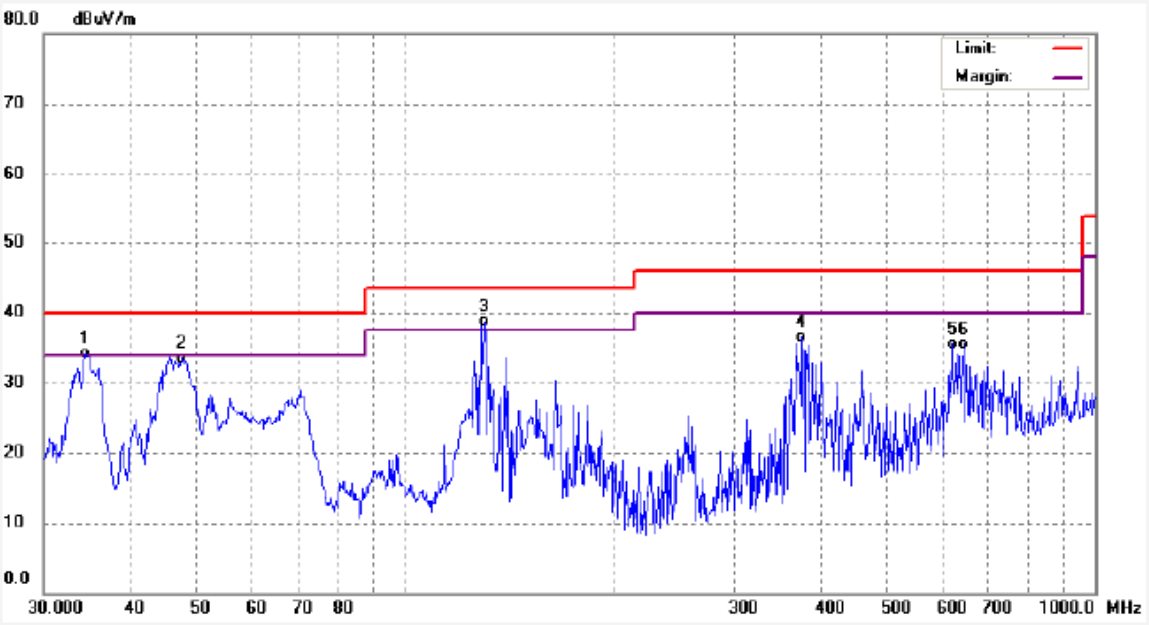
Freq(MHz)	Meter Reading +ACF=FS
33	20dBuV+10.36dB=30.36dBuV/m @3m

7.6 Test Results

Test frequency : 30MHz~1GHz

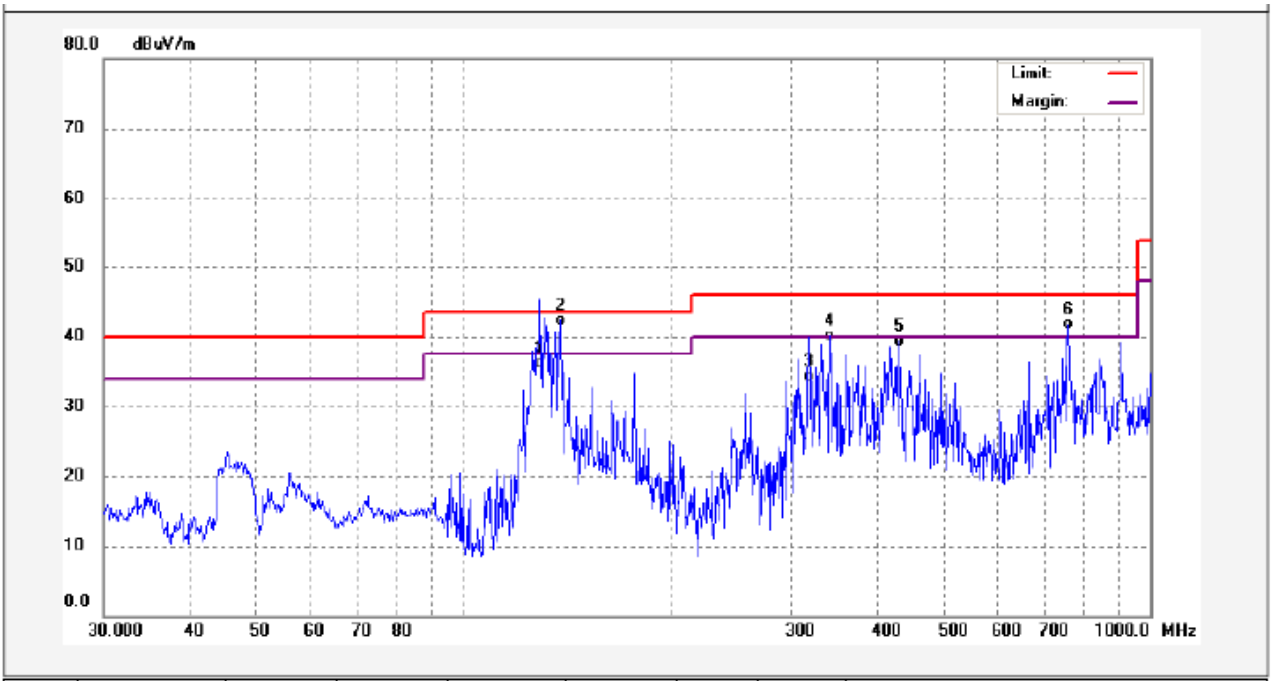
Test Mode:Receiving

Antenna Porlarization: Vertical



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Remark
1	34.3964	58.99	-24.80	34.19	40.00	-5.81	QP	
2	47.4918	57.53	-24.09	33.44	40.00	-6.56	QP	
3	130.3789	61.03	-22.29	38.74	43.50	-4.76	QP	
4	375.9384	54.03	-17.44	36.59	46.00	-9.41	QP	
5	620.7096	46.57	-11.08	35.49	46.00	-10.51	QP	
6	645.1194	46.20	-10.66	35.54	46.00	-10.46	QP	

Antenna Porlarization: Horizontal



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Remark
1	129.4677	58.17	-22.15	36.02	43.50	-7.48	QP	
2	138.8734	63.75	-21.42	42.33	43.50	-1.17	QP	
3	318.8170	53.28	-19.06	34.22	46.00	-11.78	QP	
4	341.9786	58.41	-18.38	40.03	46.00	-5.97	QP	
5	431.0314	55.13	-15.84	39.29	46.00	-6.71	QP	
6	760.7036	49.71	-7.99	41.72	46.00	-4.28	QP	

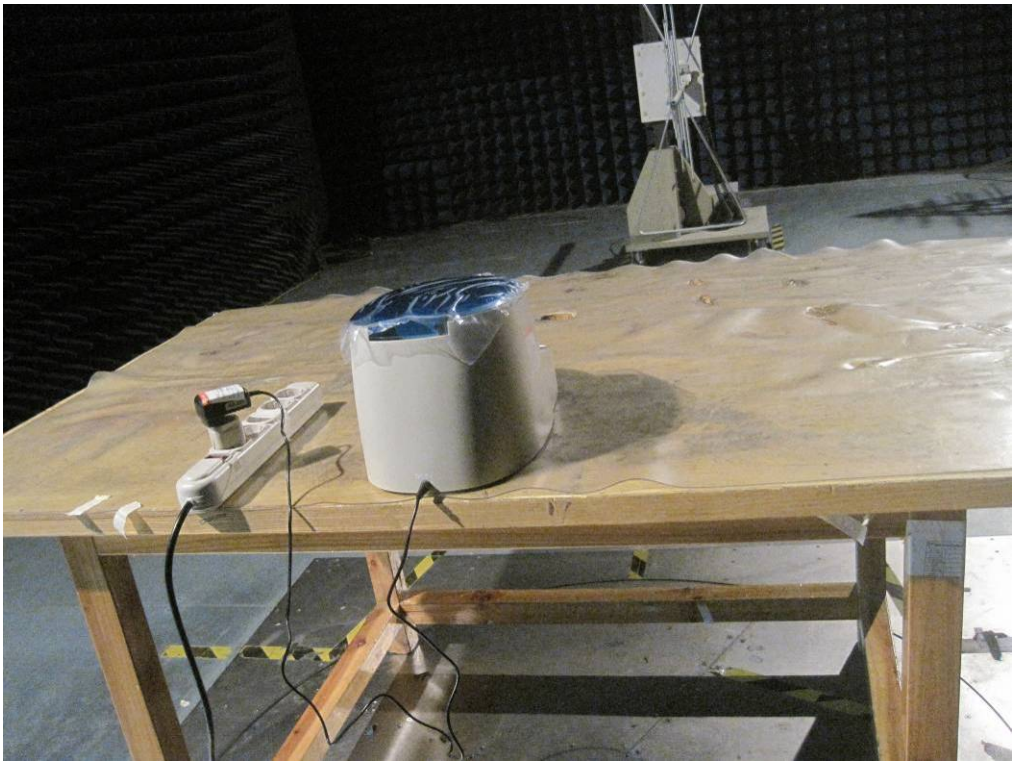
Test Frequency : Above 1000MHz

The measurements were more than 20 dB below the limit and not reported.

8 Photographs –Test Setup

8.1 Photograph – Conduction Emission Test Setup

8.2 Photograph – Radiation Emission Test Setup

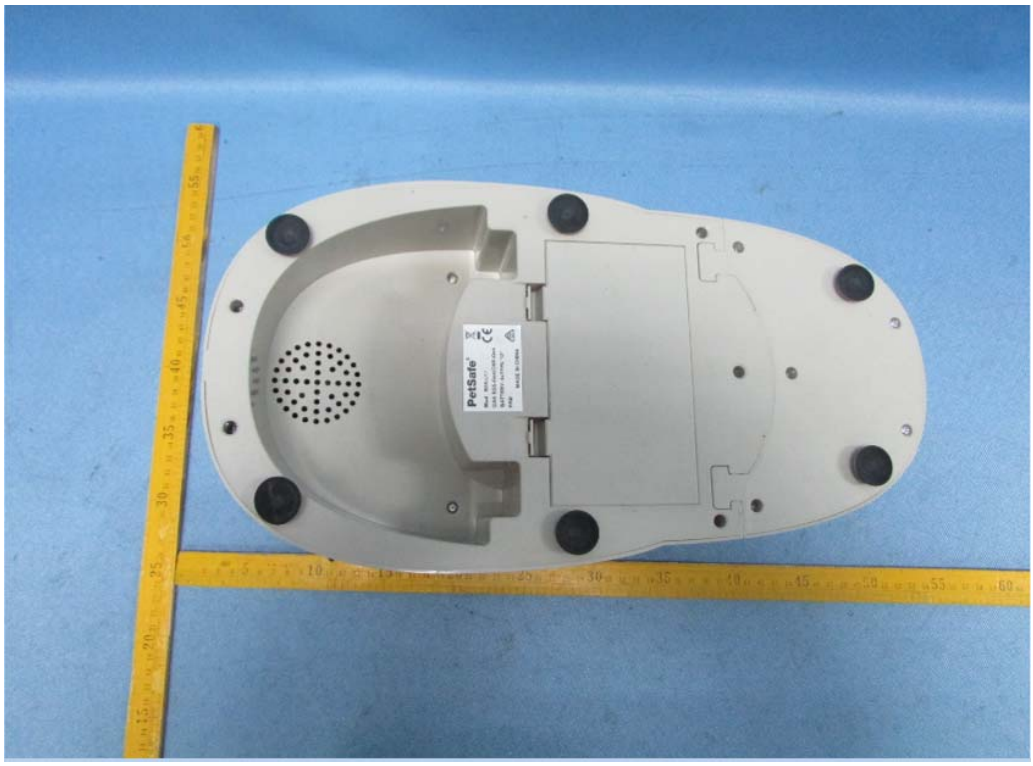


Above 1GHz

9 Photographs - Constructional Details

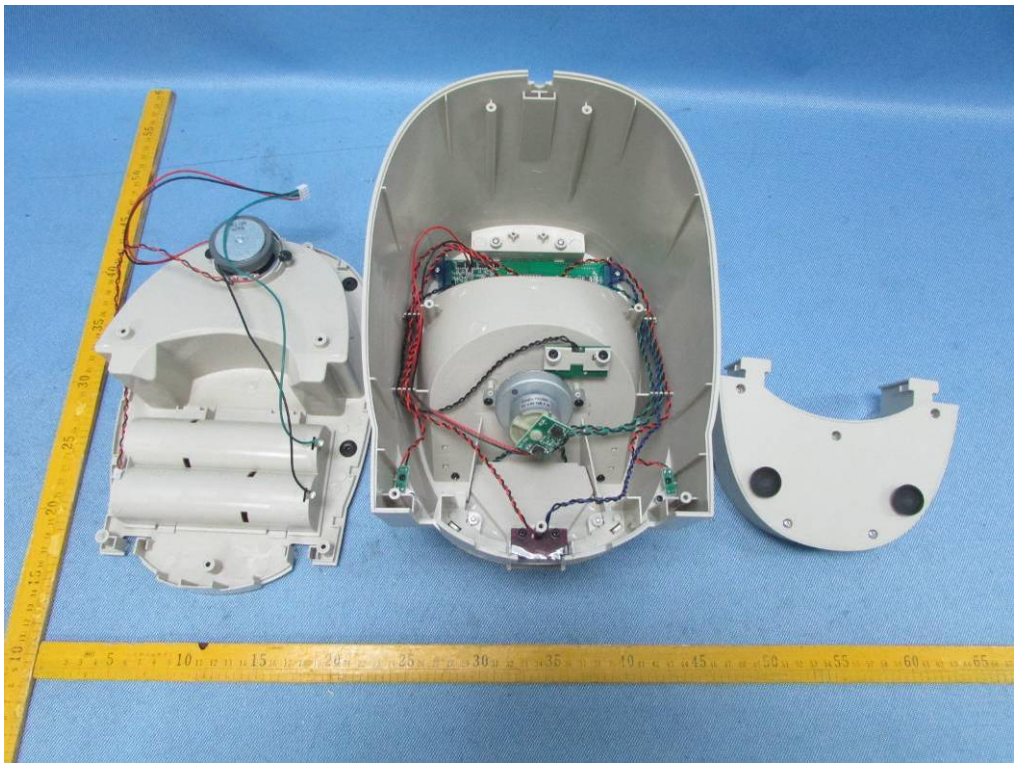
9.1 EUT – Appearance View

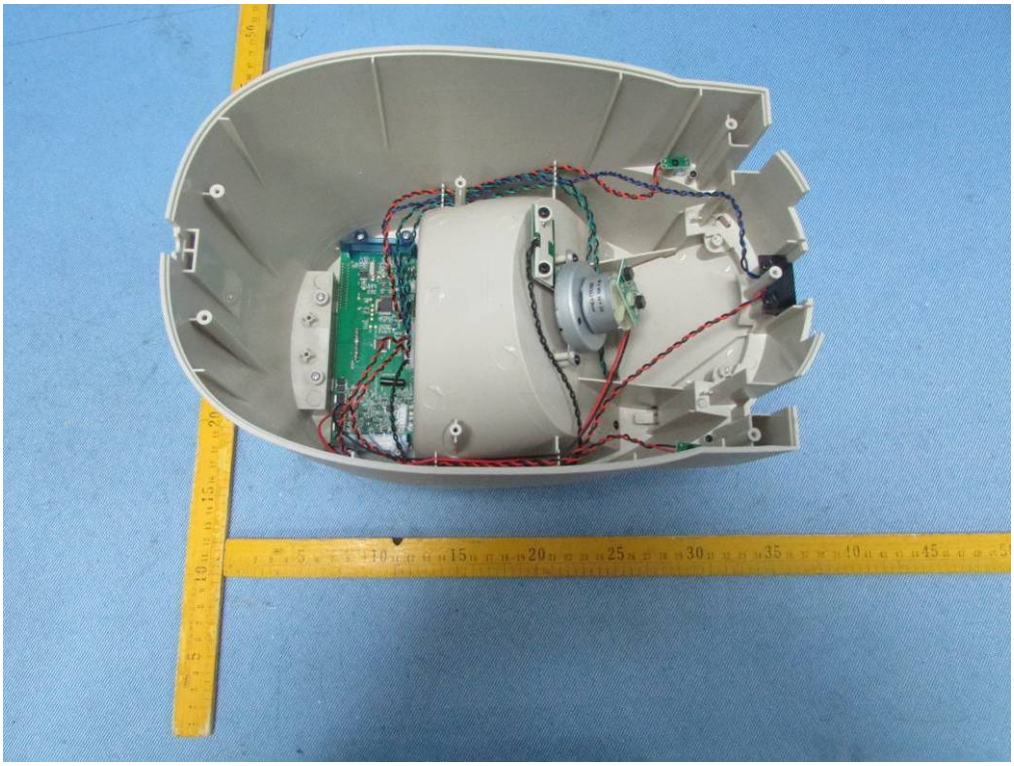

DC6V


PetSafe

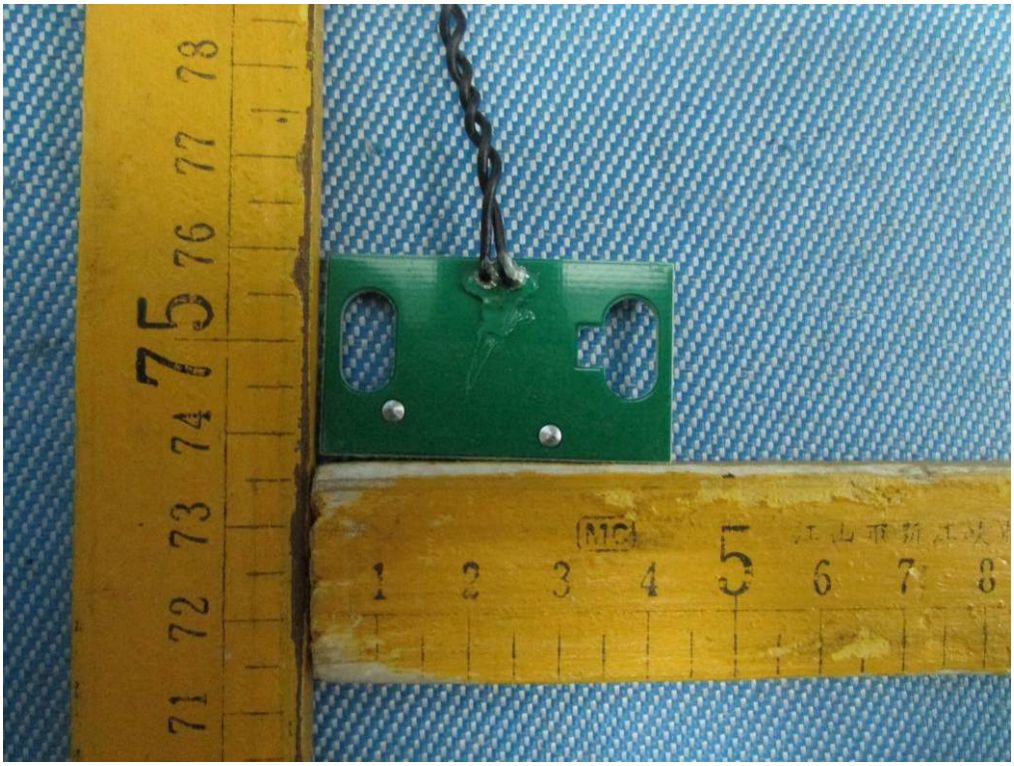
9.2 Adapter- External View

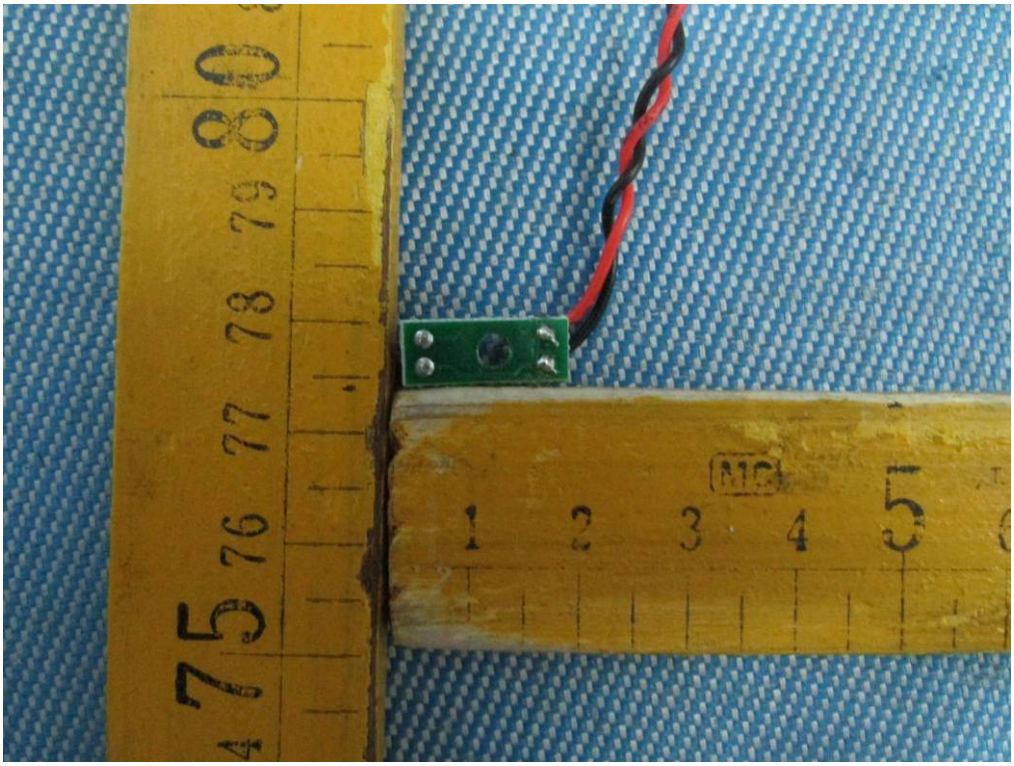
9.3 EUT – Open View

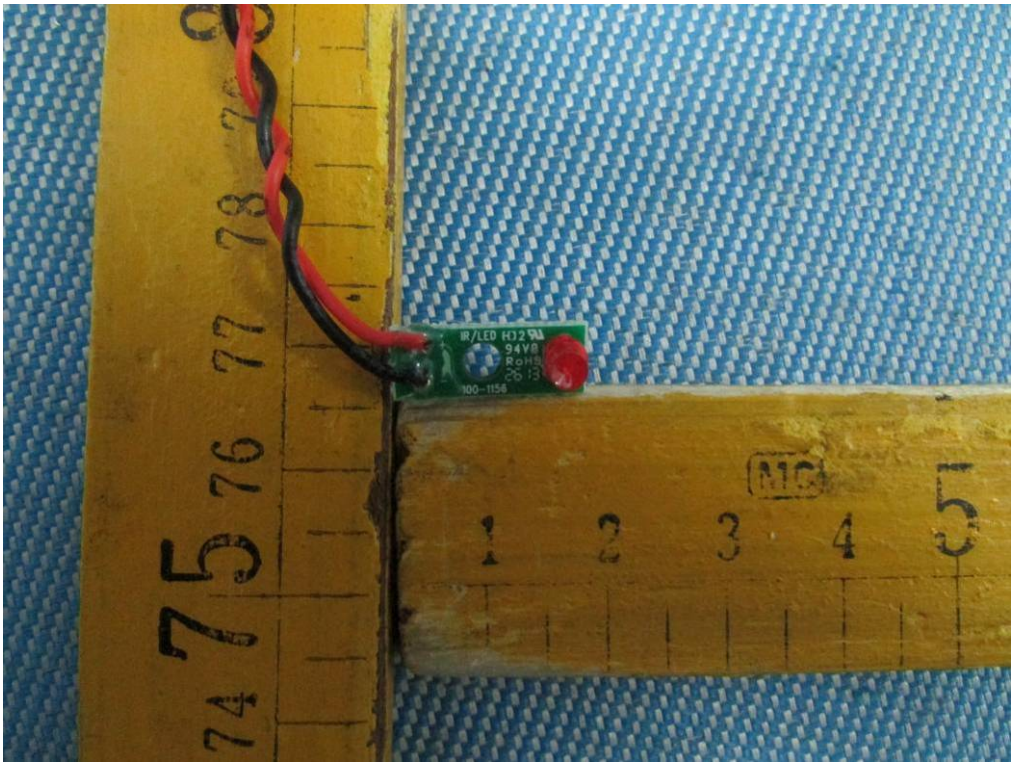


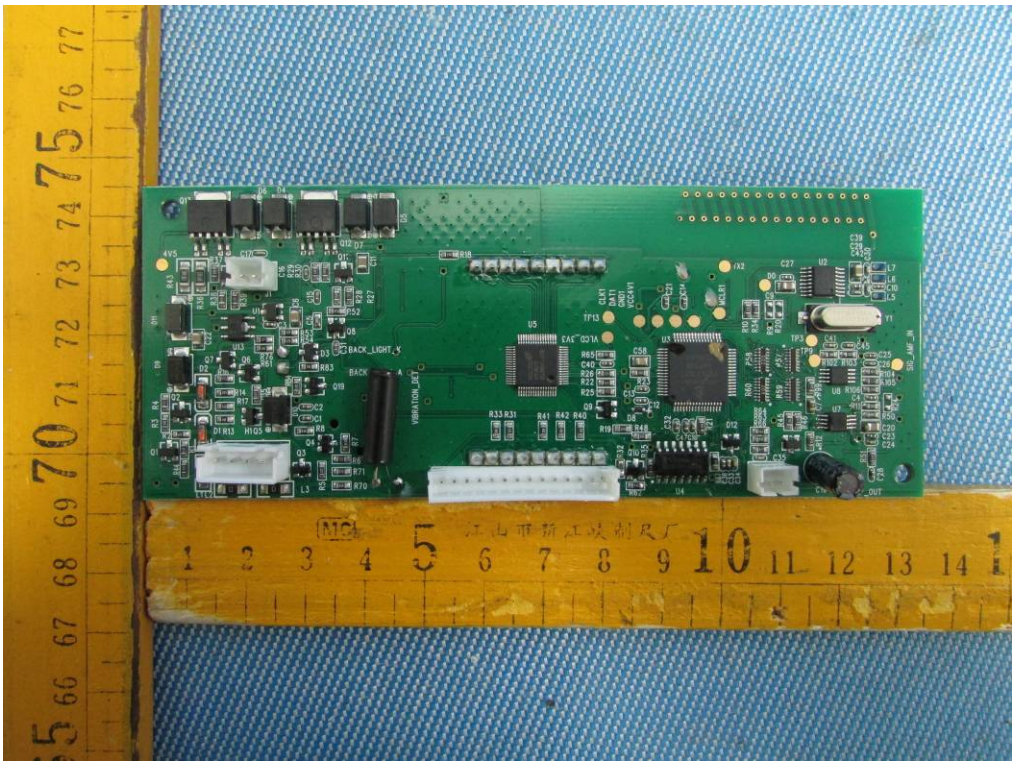


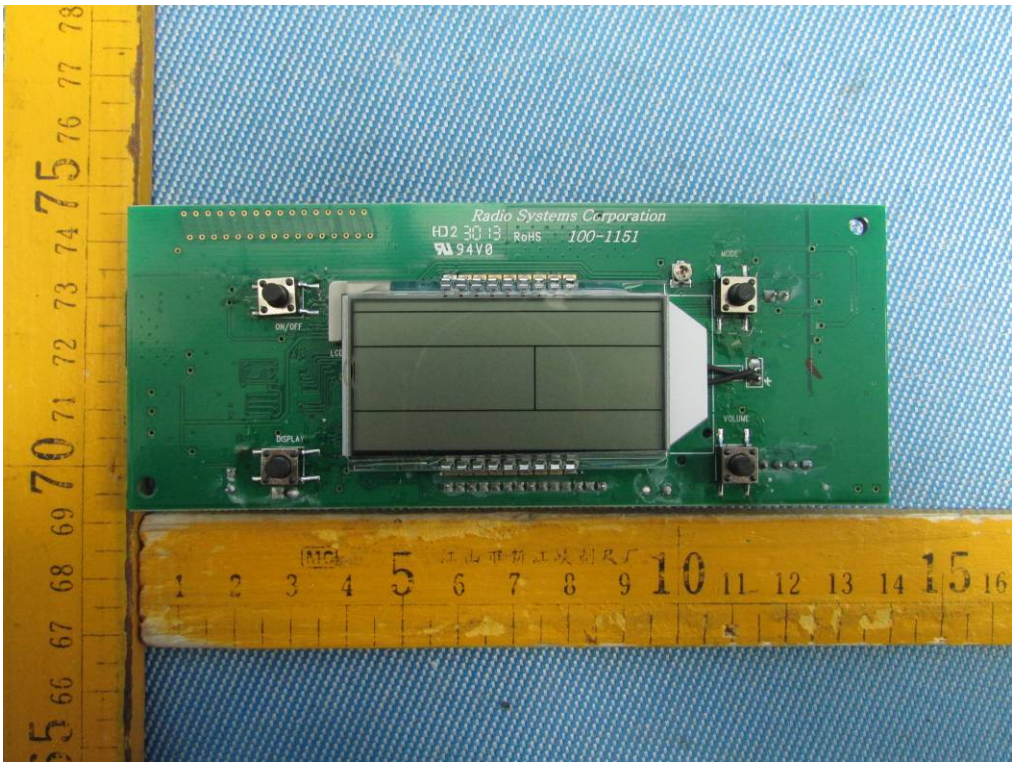
9.4 EUT – PCB View











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