



# FCC TEST REPORT

**FCC ID** : KE3-3001132  
**Applicant** : Radio Systems Corporation  
**Address** : 10427 Petsafe Way Knoxville, TN 37932 USA  
**Manufacturer** : Radio Systems Corporation  
**Address** : 10427 Petsafe Way Knoxville, TN 37932 USA  
**Equipment Under Test (EUT) :**  
**Product Name** : Basic Remote Trainer  
**Model No.** : RFA-486, RFA-488, RFA-505  
**Rules** : FCC CFR47 Part 15 Section 15.109:2010

**Date of Test** : Nov. 02~09, 2012

**Date of Issue** : Nov. 12, 2012

**Test Result** : **PASS\***

Remarks:

\* The sample described above has been tested to be in compliance with the requirements of the rules listed above.

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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Approved by:

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## 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	N/A
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			



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## 4 General Information

### 4.1 General Description of E.U.T.

<b>Product Name</b>	: Basic Remote Trainer
<b>Model No.</b>	: RFA-486, RFA-488, RFA-505
<b>Model Description</b>	: Circuit principle and PCB layout of above models are the same. Only the product colour is different.
<b>Operation Frequency</b>	: 433.92MHz(Receiver)
<b>Oscillator</b>	: MCU crystal 8MHz ; RF crystal 13.52127MHz

### 4.2 Details of E.U.T.

<b>Technical Data</b>	: Battery 6.0V
<b>Adapter Model</b>	:N/A
<b>Manufacturer of Adapter</b>	:N/A

### 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 No.: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

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	Aug. 13,2012	Aug. 13,2013
2.	Active Loop Antenna	Beijing Dazhi	ZN30900A	-	Aug. 13,2012	Aug. 13,2013
3.	Trilog Broadband Antenna	SCHWARZBECK	VULB9163	336	Aug. 13,2012	Aug. 13,2013
4.	Broad-band Horn Antenna	SCHWARZBECK	BBHA 9120 D	667	Aug. 13,2012	Aug. 13,2013
5.	Broad-band Horn Antenna	SCHWARZBECK	BBHA 9170	399	Aug. 13,2012	Aug. 13,2013
6.	Broadband Preamplifier	COMPLIANCE DIRECTION	PAP-1G18	2004	Feb. 23,2012	Feb. 23,2013
7.	10m Coaxial Cable with N- plug	SCHWARZBECK	AK 9515 H	-	Aug.14,2012	Aug. 14,2013
8.	10m 50 Ohm Coaxial Cable with N-plug	SCHWARZBECK	AK 9513	-	Aug.14,2012	Aug. 14,2013

### 5.2 Measurement Uncertainty

Parameter	Uncertainty
Radiated Spurious Emissions test	$\pm 5.03$ dB (Bilog antenna 30M~1000MHz)
Emissions test	$\pm 4.74$ dB (Horn antenna 1000M~25000MHz)

### 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
Frequency Range:	150kHz to 30MHz
Class:	Class B
Limit:	66-56 dB $\mu$ V between 0.15MHz & 0.5MHz 56 dB $\mu$ V between 0.5MHz & 5MHz 60 dB $\mu$ V between 5MHz & 30MHz
Detector:	Peak for pre-scan (9kHz Resolution Bandwidth) Quasi-Peak & Average if maximised peak within 6dB of Average Limit
Test Result:	N/A
Remark:	This device is powered by battery, this item do not be required.



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## 7 Radiated Emissions

Test Requirement:	FCC CFR47 Part 15 Section 15.109
Test Method:	ANSI C63.4:2003
Test Result:	PASS
Frequency Range:	8 MHz to 2GHz
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)	20log <sup>(2400/F(kHz))</sup> + 80
0.490 ~ 1.705	24000/F(kHz)	30	100 * 24000/F(kHz)	20log <sup>(24000/F(kHz))</sup> + 40
1.705 ~ 30	30	30	100 * 30	20log <sup>(30)</sup> + 40
30 ~ 88	100	3	100	20log <sup>(100)</sup>
88 ~ 216	150	3	150	20log <sup>(150)</sup>
216 ~ 960	200	3	200	20log <sup>(200)</sup>
Above 960	500	3	500	20log <sup>(500)</sup>

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

$$L_{d1} = 30\text{uV/m} * (30/3)^2 = 100 * 30\text{uV/m}$$

### 7.1 EUT Operation :

#### Operating Environment:

Temperature:	25.5 °C
Humidity:	51 % RH
Atmospheric Pressure:	1012 mbar

#### EUT Operation:

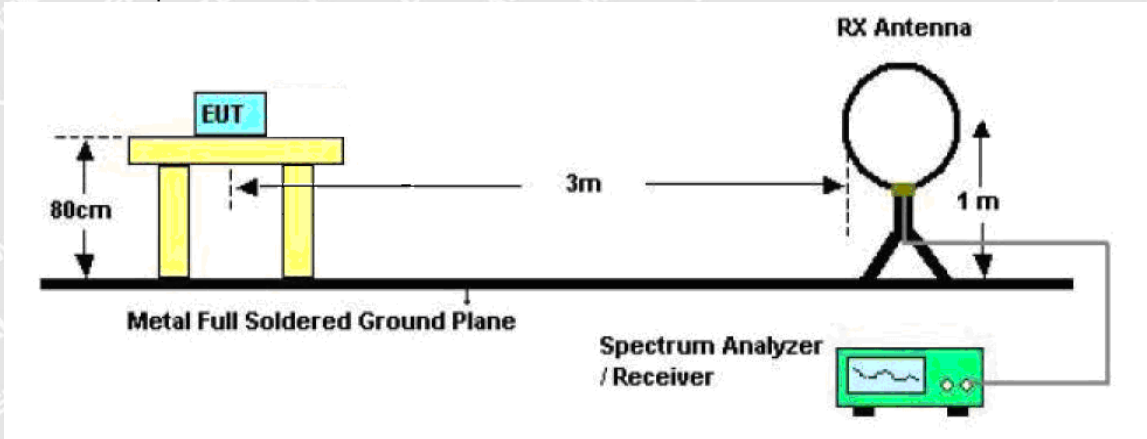
The pre-test was performed in standby mode and receive mode, and the worse mode is receive mode, so the data show is that mode's only.



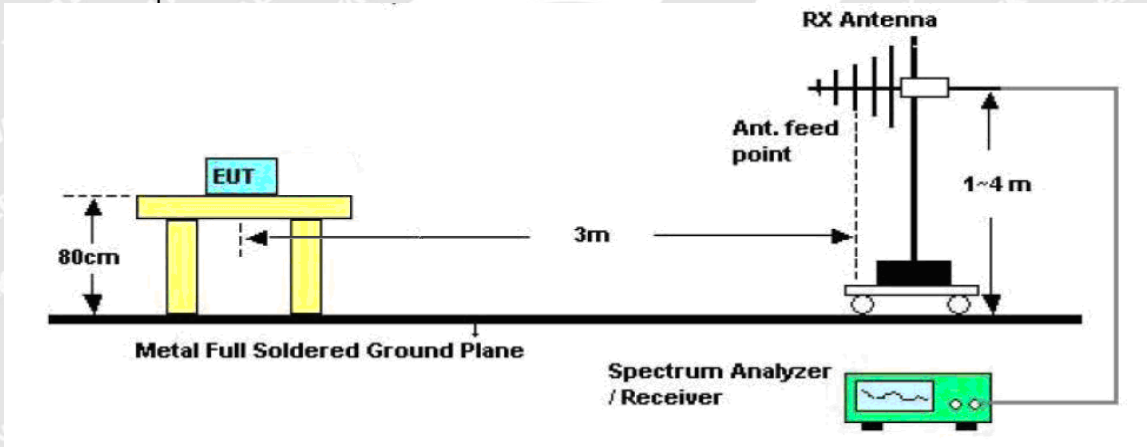
## 7.2 EUT Setup

The radiated emission tests were performed in the 3m Semi- Anechoic Chamber test site, using the setup accordance with the ANSI C63.4.

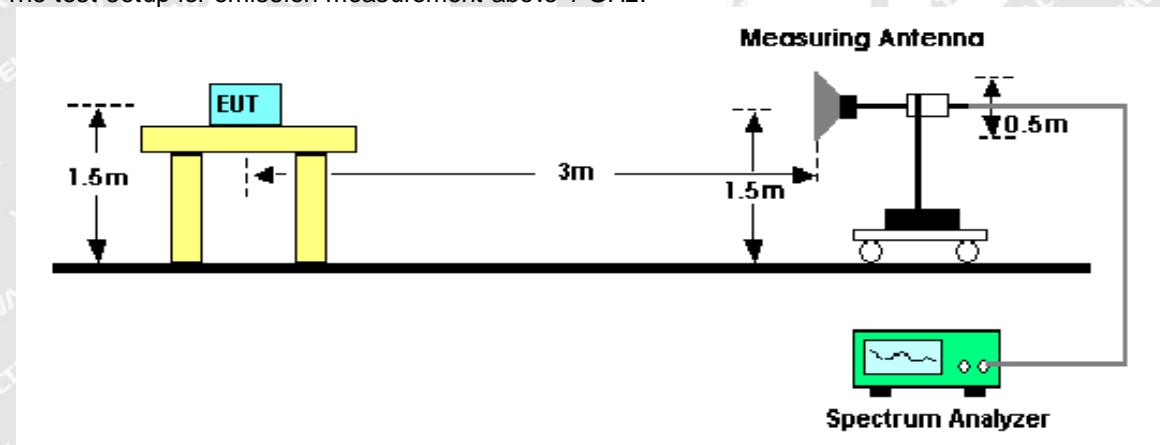
The test setup for emission measurement below 30MHz.



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



The test setup for emission measurement above 1 GHz.







### 7.3 Spectrum Analyzer Setup

According to FCC Part15 Rules, the system was tested 8MHz to 2000MHz.

#### Below 30MHz

Sweep Speed ..... Auto

IF Bandwidth 10 KHz

Video Bandwidth.....10KHz

Resolution Bandwidth.....10KHz

#### 30MHz ~ 1000MHz

Sweep Speed ..... Auto

IF Bandwidth 120 KHz

Video Bandwidth.....100KHz

Quasi-Peak Adapter Bandwidth.....120 KHz

Quasi-Peak Adapter Mode.....Normal

Resolution Bandwidth.....120kHz

#### Above 1GHz

Sweep Speed ..... Auto

IF Bandwidth 120 KHz

Video Bandwidth.....1MHz

Quasi-Peak Adapter Bandwidth.....120 KHz

Quasi-Peak Adapter Mode.....Normal

Resolution Bandwidth.....1MHz

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## 7.4 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.

### 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(normal uses) axis positioning. And all the modes was tested in the report.Only the worst case is shown in the report.
8. The EUT was pre-testrd in two mode:standby mode and receive mode.According to ANSI STANDARD C63.4-2003 12.1.1.2 OTHER TYPES OF RECEIVERS: In receive mode,a typical signal or an unmodulated CW signal at the operating frequency of the EUT shall be supplied to the EUT for all measurements. Such a signal may be supplied by either a signal generator and an antenna in close proximity to the EUT or directly conducted into the antenna terminals of the E UT. The signal level shall be sufficient to the local oscillator of the EUT.In this report, the antenna of the signal generator is under the turntable.

## 7.5 Test Result

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

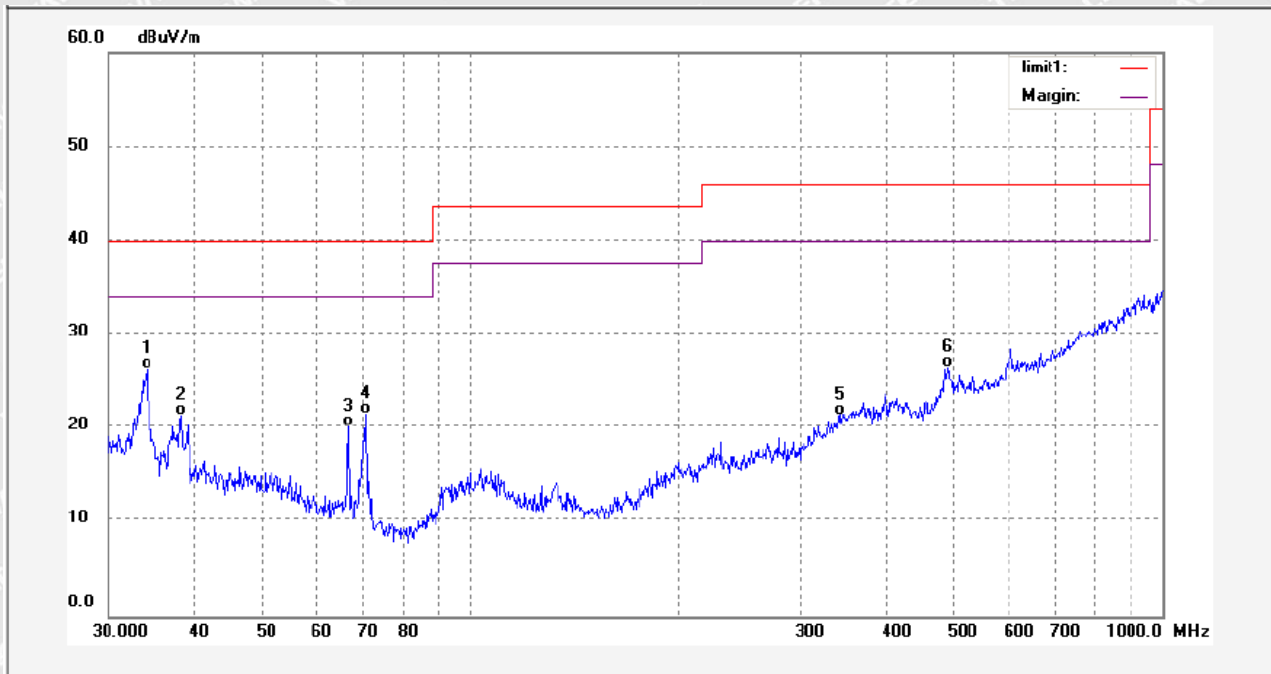
33            20dBuV+10.36dB=30.36dBuV/m @3m



The emissions below 30MHz are more than 20dB below the limit, so the data is not show in the report.

**Test Data: 30MHz ~ 1000MHz**

Antenna Polarization: Vertical

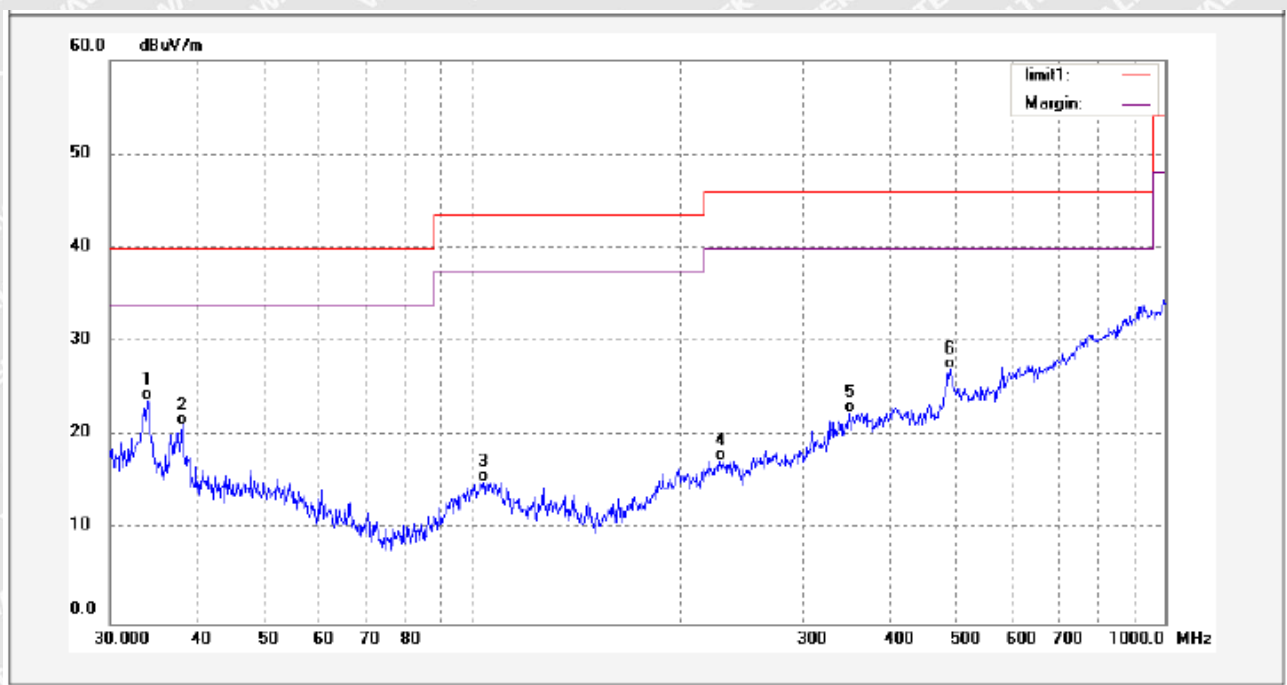


No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Remark
1	34.0451	9.82	16.53	26.35	40.00	-13.65	QP	
2	38.2305	4.82	16.63	21.45	40.00	-18.55	QP	
3	66.6051	9.57	10.67	20.24	40.00	-19.76	QP	
4	70.7047	11.75	9.81	21.56	40.00	-18.44	QP	
5	340.0473	1.09	20.23	21.32	46.00	-24.68	QP	
6	490.0451	0.77	25.75	26.52	46.00	-19.48	QP	





Antenna Polarization: Horizontal



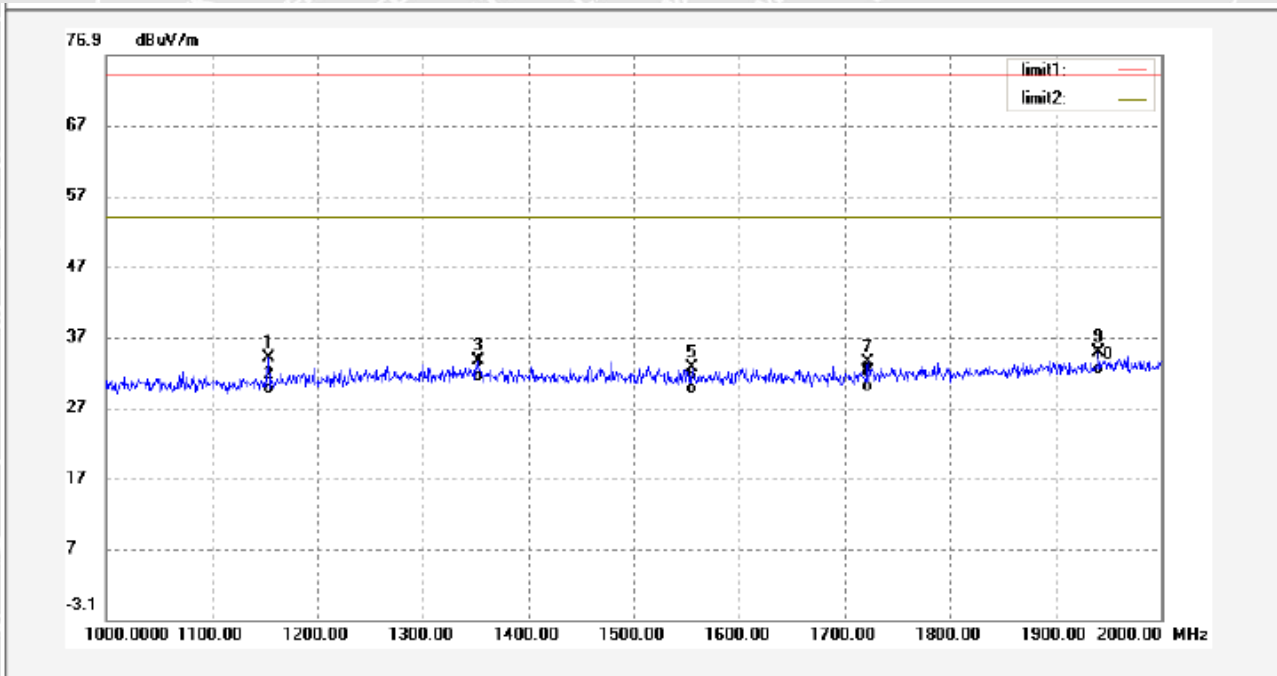
No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Remark
1	33.9256	7.29	16.54	23.83	40.00	-16.17	QP	
2	38.0965	4.47	16.68	21.15	40.00	-18.85	QP	
3	103.6990	0.92	14.19	15.11	43.50	-28.39	QP	
4	227.8155	1.10	16.27	17.37	46.00	-28.63	QP	
5	349.7412	2.32	20.13	22.45	46.00	-23.55	QP	
6	490.0451	1.32	25.75	27.07	46.00	-18.93	QP	





Test Data: 1GHz ~ 2GHz

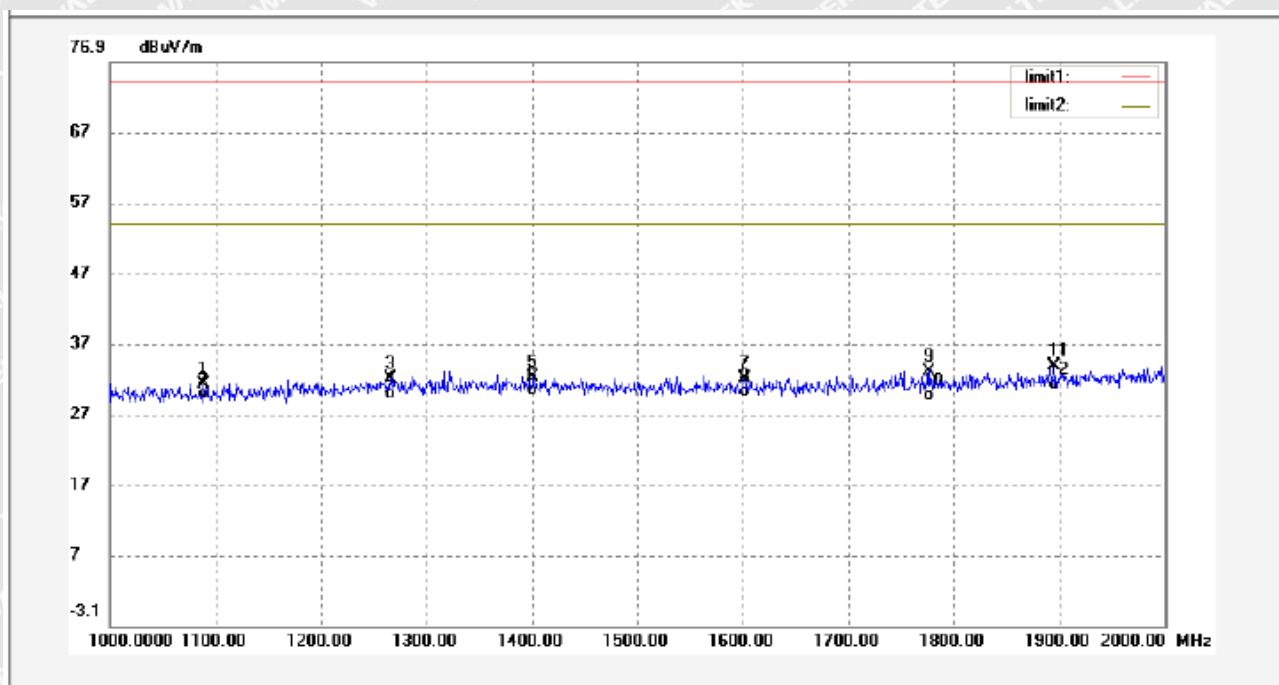
Antenna polarization: Vertical



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Remark
1	1154.000	47.81	-13.87	33.94	74.00	-40.06	peak	
2	1154.000	42.58	-13.87	28.71	54.00	-25.29	AVG	
3	1352.000	46.29	-12.69	33.60	74.00	-40.40	peak	
4	1352.000	43.26	-12.69	30.57	54.00	-23.43	AVG	
5	1555.000	45.75	-13.11	32.64	74.00	-41.36	peak	
6	1555.000	41.85	-13.11	28.74	54.00	-25.26	AVG	
7	1722.000	46.39	-12.93	33.46	74.00	-40.54	peak	
8	1722.000	42.16	-12.93	29.23	54.00	-24.77	AVG	
9	1941.000	46.49	-11.70	34.79	74.00	-39.21	peak	
10	1941.000	43.32	-11.70	31.62	54.00	-22.38	AVG	



Antenna polarization: Horizontal



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Remark
1	1088.000	45.39	-14.15	31.24	74.00	-42.76	peak	
2	1088.000	43.20	-14.15	29.05	54.00	-24.95	AVG	
3	1266.000	44.95	-12.94	32.01	74.00	-41.99	peak	
4	1266.000	41.95	-12.94	29.01	54.00	-24.99	AVG	
5	1401.000	45.09	-12.96	32.13	74.00	-41.87	peak	
6	1401.000	42.50	-12.96	29.54	54.00	-24.46	AVG	
7	1602.000	45.20	-13.16	32.04	74.00	-41.96	peak	
8	1602.000	42.65	-13.16	29.49	54.00	-24.51	AVG	
9	1776.000	45.79	-12.69	33.10	74.00	-40.90	peak	
10	1776.000	41.58	-12.69	28.89	54.00	-25.11	AVG	
11	1895.000	45.65	-11.94	33.71	74.00	-40.29	peak	
12	1895.000	42.36	-11.94	30.42	54.00	-23.58	AVG	



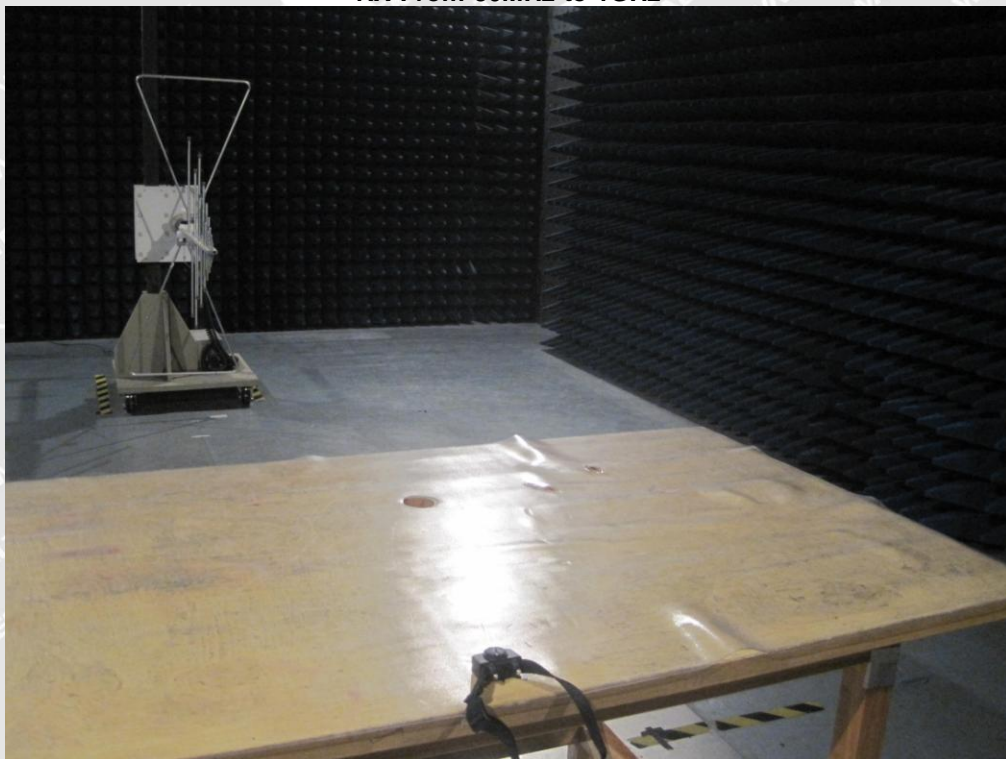
## 8 Photographs – Test Setup

### 8.1 Photograph – Radiation Emission Test Setup

RX Below 30MHz

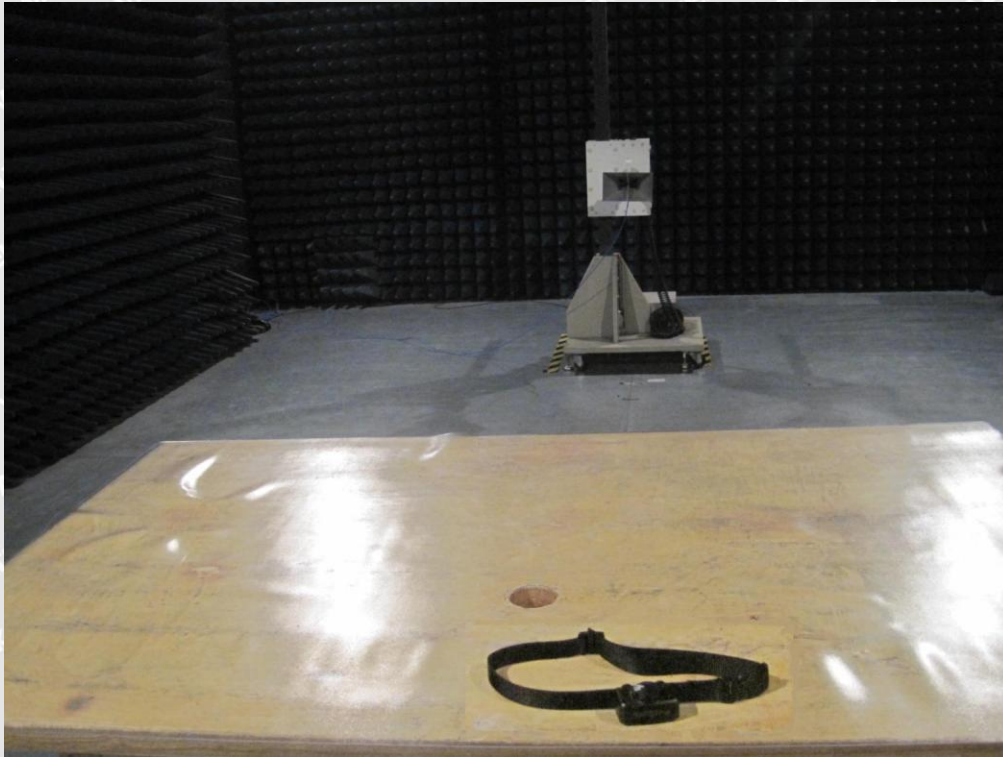


RX From 30MHz to 1GHz





**RX Above 1GHz**



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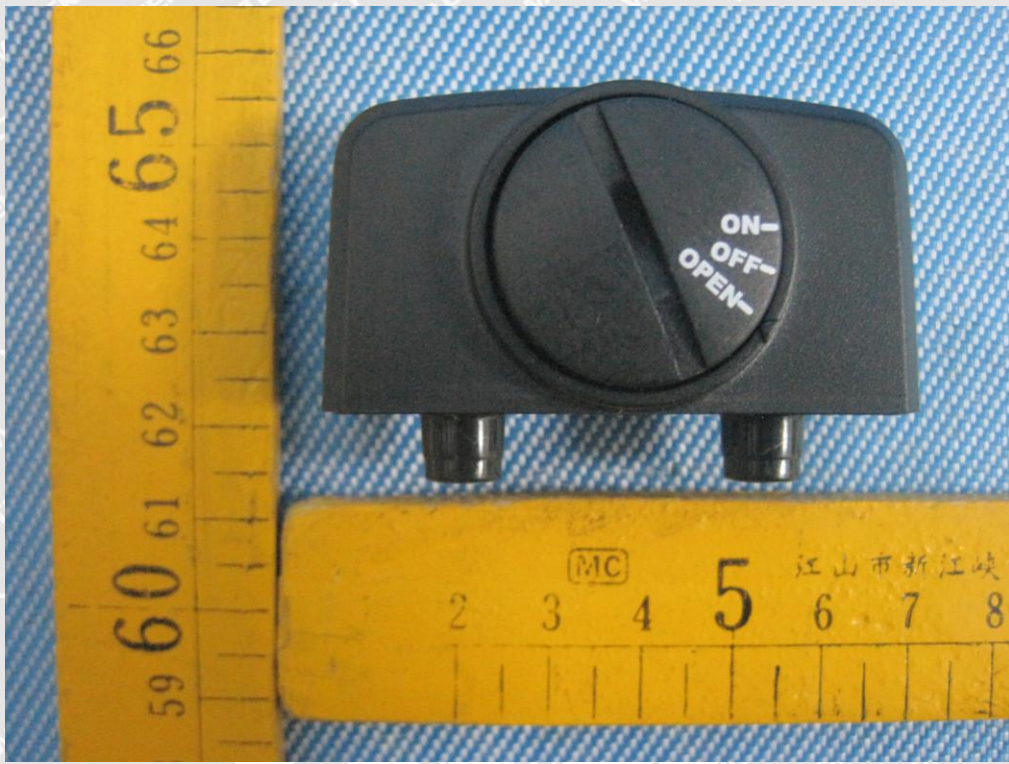




## 9 Photographs - Constructional Details

### 9.1 EUT –Appearance View



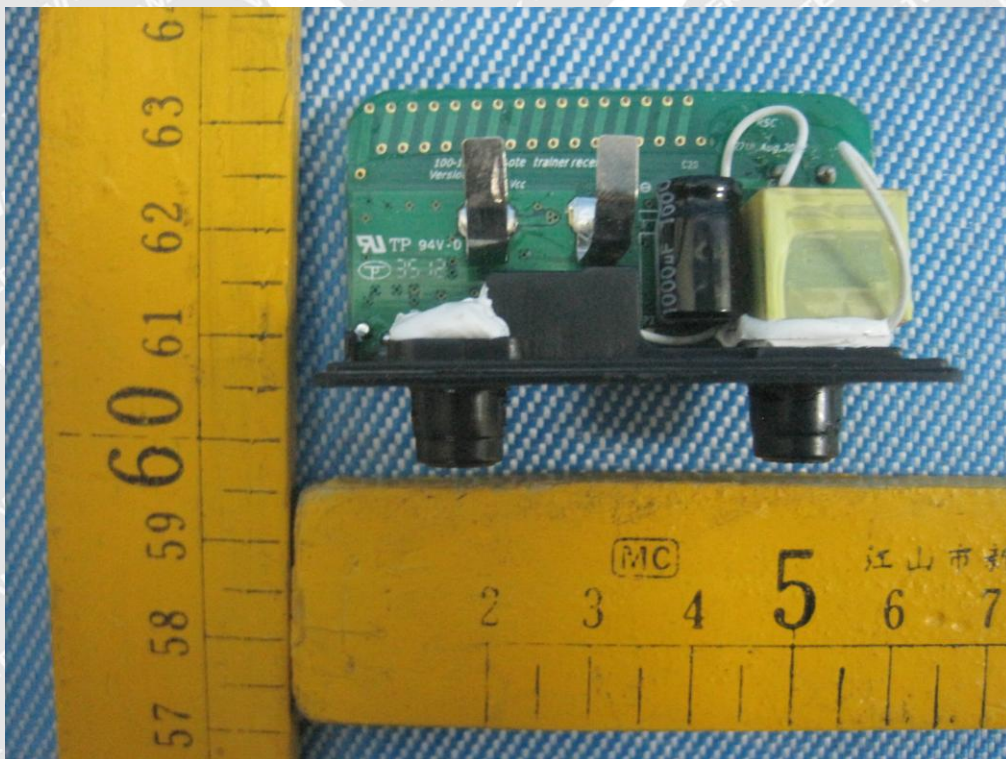
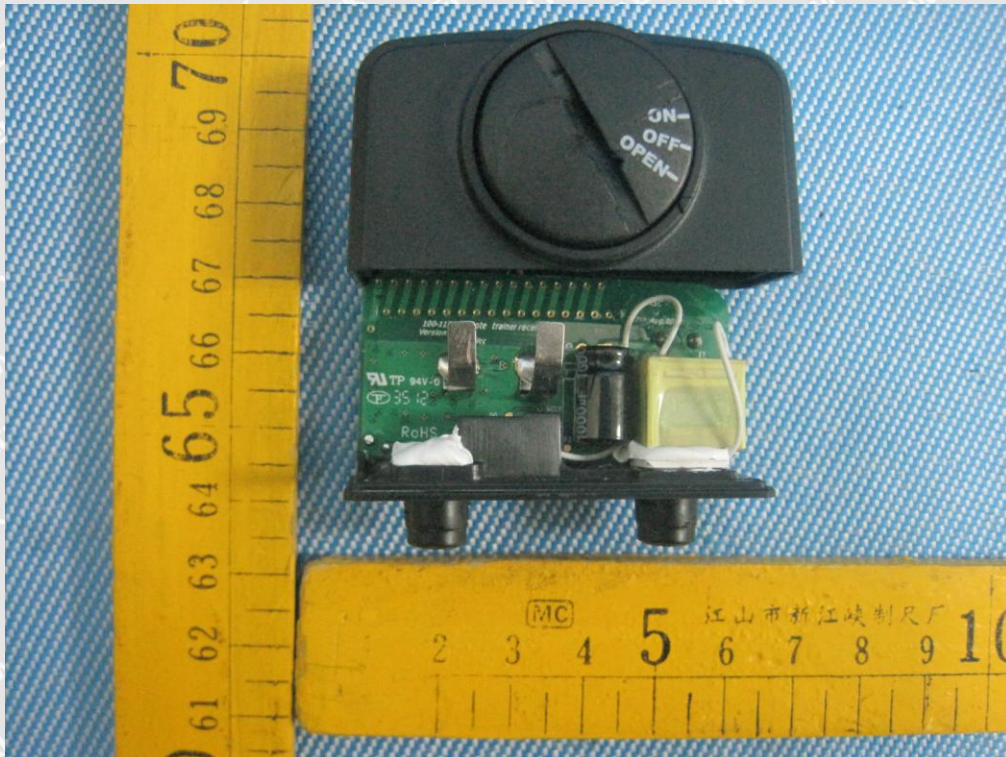






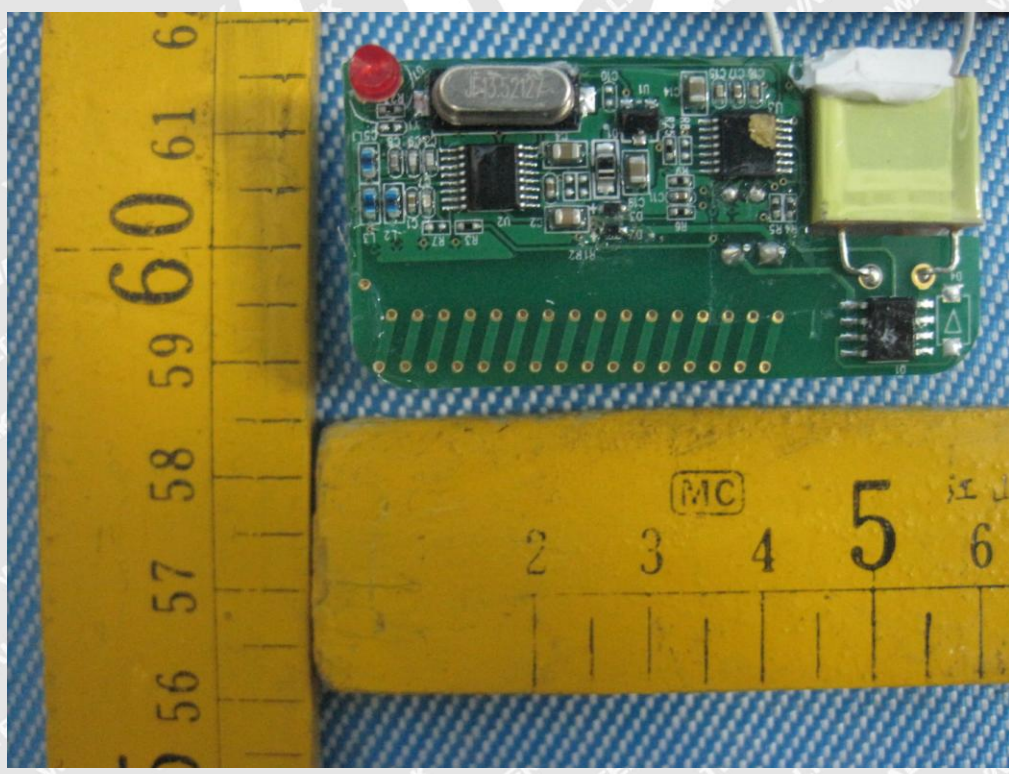
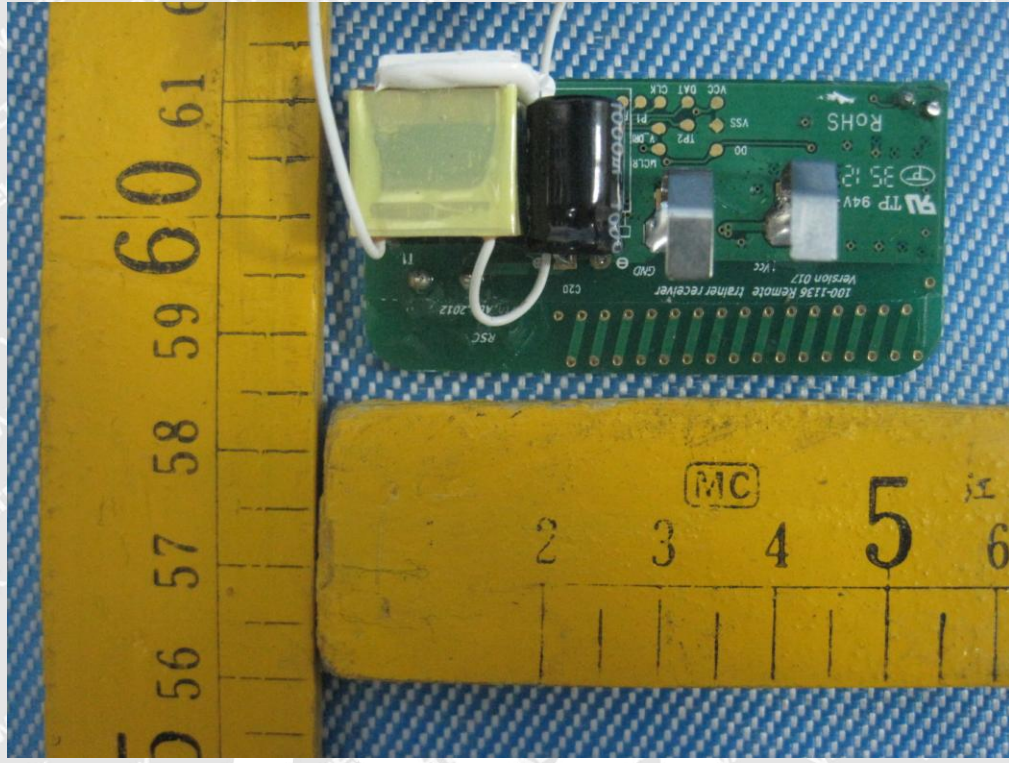


## 9.2 EUT – Open View





### 9.3 EUT – PCB View





## 10 FCC Label

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:(1)this device may not cause harmful interference,and (2) this device must accept any interference received, including interference that may cause undesired operation

The Label must not be a stick-on paper. The Label on these products must be permanently affixed to the product and readily visible at the time of purchase and must last the expected lifetime of the equipment not be readily detachable.

=End of report=



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