

# ***FCC TEST REPORT***

**FCC ID** : YVV-AEED1100001

**Applicant** : Shenzhen AEE Technology CO., LTD.

**Address of Applicant** : AEE Hi-Tech Park, Sun Industrial Area, Xili,  
Nanshan District, Shenzhen, P.R.C 518108

**Equipment Under Test (EUT) :**

**Product description** : Remote Controller

**Model No.** : D11, D11P, D11L, D11C, A03C

**Standards** : FCC 15 Subpart C Paragraph 15.231

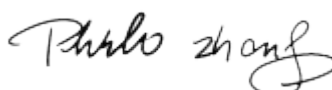
**Date of Receive** : Dec.12,2012

**Date of Issue** : Dec.19,2012

**Test Engineer** : Zero.zhou



**Reviewed By** : Philo.zhong



PERPARED BY:

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### 3 Test Summary

Test items	Test Requirement	Test Method	Class / Severity	Result
Periodic operation	FCC PART 15: 2008	ANSI C63.4: 2003	<b>Note</b>	PASS
Band Edge	FCC PART 15: 2008	ANSI C63.4: 2003	<b>Note</b>	PASS
Radiated Emission (30MHz to 5GHz)	FCC PART 15: 2008	ANSI C63.4: 2003	N/A	PASS
Conducted Emission (150KHz to 30MHz)	FCC PART 15: 2008	ANSI C63.4: 2003	N/A	N/A

**Note :** denote that for more details of the EUT , please refer to the relating test items as below .

**Remark :** the methods of measurement in all the test items were according to ANSI C63.4: 2003.

## **4 General Information**

### **4.1 Client Information**

Applicant: Shenzhen AEE Technology CO., LTD.  
Address: AEE Hi-Tech Park, Sun Industrial Area, Xili,  
Nanshan District, Shenzhen, P.R.C 518108

Manufacturer: Shenzhen AEE Technology CO., LTD.  
Address: AEE Hi-Tech Park, Sun Industrial Area, Xili,  
Nanshan District, Shenzhen, P.R.C 518108

### **4.2 General Description of E.U.T.**

Product description: Remote Controller  
Model No.: D11, D11P, D11L, D11C, A03C  
Model Description: Models difference is only model name.

### **4.3 Details of E.U.T.**

Power Supply: Battery 3.0V  
Modulation : ASK

### **4.4 Description of Support Units**

The EUT has been tested as an independent unit.

### **4.5 Standards Applicable for Testing**

The customer requested FCC tests for a Remote Controller. The standards used were FCC 15 Paragraph 15.231, Paragraph 15.205, Paragraph 15.31, Paragraph 15.33, Paragraph 15.35.

#### **4.6 Test Facility**

The test facility is recognized, certified, or accredited by 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 IC7760A, Aug. 03, 2010.

- **FCC – Registration No.: 880581**

Waltek Services(Shenzhen) Co., Ltd. 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, June 24, 2008. compliance

#### **4.7 Test Location**

All Emissions tests were performed at:-

Waltek Services(Shenzhen) Co., Ltd. at 1/F, Fukangtai Building, West Baima Rd., Songgang Street, Baoan District, Shenzhen 518105, China.

## 5 Equipment Used during Test

<b>Conducted Emissions</b>						
<b>Item</b>	<b>Equipment</b>	<b>Manufacturer</b>	<b>Model No.</b>	<b>Serial No.</b>	<b>Last Calibration Date</b>	<b>Calibration Due Date</b>
1.	EMI Test Receiver	R&S	ESCI	101178	Aug. 13,2012	Aug. 13,2013
2.	LISN	R&S	ENV216	101215	Aug. 13,2012	Aug. 13,2013
3.	Cable	HUBER+SUHNER	CBL2-NN-3M	2230300	Aug.14,2012	Aug. 14,2013
<b>3m Semi-anechoic Chamber for Radiation Emissions</b>						
<b>Item</b>	<b>Equipment</b>	<b>Manufacturer</b>	<b>Model No.</b>	<b>Serial No.</b>	<b>Last Calibration Date</b>	<b>Calibration Due Date</b>
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.	Broadband Preamplifier	SCHWARZBECK	BBV 9718	9718-148	Aug. 13,2012	Aug. 13,2013
8.	10m Coaxial Cable with N- plug	SCHWARZBECK	AK 9515 H	-	Aug. 13,2012	Aug. 13,2013
9.	10m 50 Ohm Coaxial Cable with N-plug	SCHWARZBECK	AK 9513	-	Aug. 13,2012	Aug. 13,2013

## 6 Conducted Emission Test

Product Name:	Remote Controller
Test Requirement:	FCC Part15 Paragraph 15.207
Test Method:	Based on FCC Part15 Paragraph 15.207
Test Date:	-----
Frequency Range:	150kHz to 30MHz
Class:	Class B
Detector:	Peak for pre-scan (9kHz Resolution Bandwidth) Quasi-Peak & Average if maximised peak within 6dB of Average Limit

### 6.1 Test Equipment

Please refer to Section 5 this report.

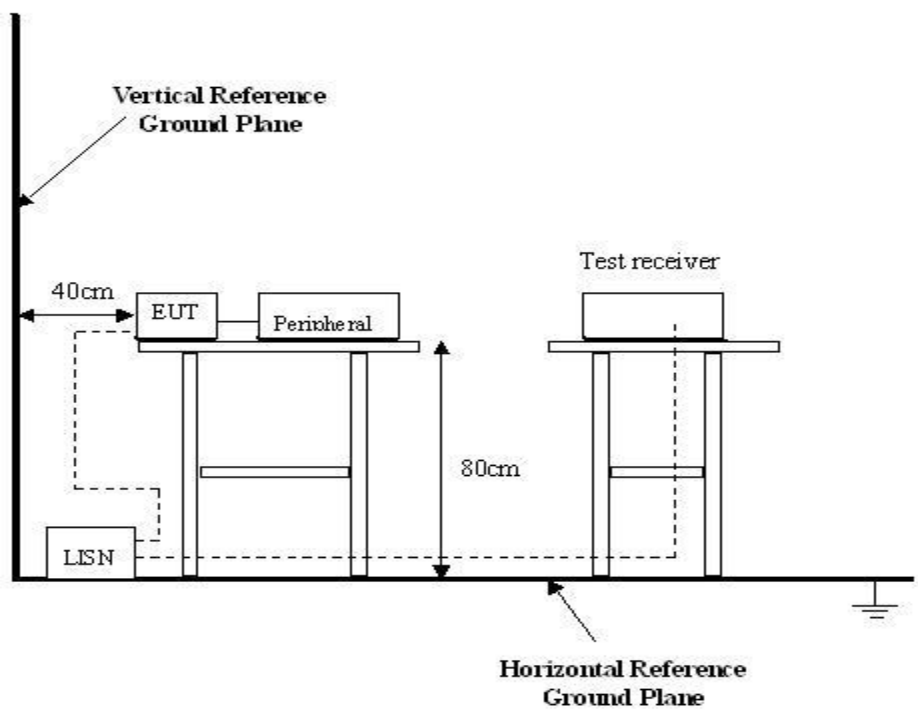
### 6.2 Test Procedure

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

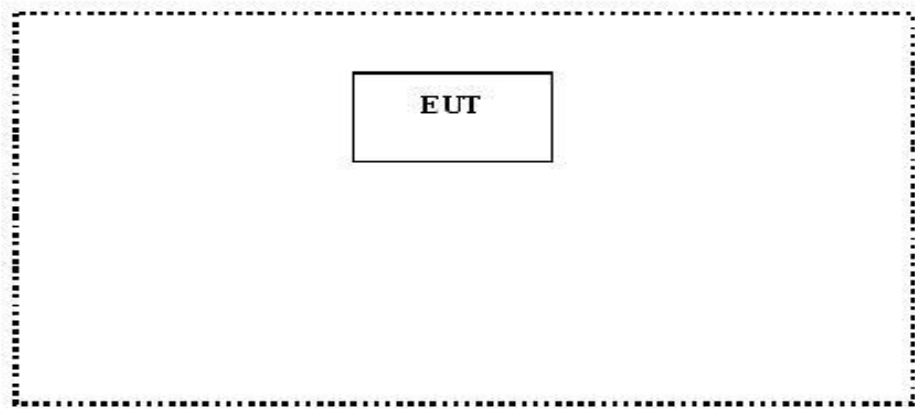
The conducted emission tests were performed using the setup accordance with the ANSI C63.4: 2003, The specification used in this report was the FCC Part15 Paragraph 15.207 limits.



6.4 EUT Operating Condition

Operating condition is according to ANSI C63.4: 2003.

- A. Setup the EUT and simulators as shown on follow.
- B. Enable RF signal and confirm EUT active.
- C. Modulate output capacity of EUT up to specification.



## **6.5 Conducted Emission Limits**

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

**Note:** In the above limits, the tighter limit applies at the band edges.

## **6.6 Conducted Emission Test Data**

Own to the EUT operation with battery, the test was not performed.

.

## 7 Radiation Emission Test

Product Name:	Remote Controller
Test Requirement:	FCC Part15 Paragraph 15.231
Test Method:	FCC Part15 Paragraph 15.33
Test Date:	Dec.19,2012
Frequency Range:	13.56MHz to 5GHz
Measurement Distance:	3m

### 7.1 Test Equipment

Please refer to Section 5 this report.

### 7.2 Measurement Uncertainty

All measurements involve certain levels of uncertainties, especially in the field of EMC. The factors contributing to uncertainties are spectrum analyzer, cable loss, antenna factor calibration, antenna directivity, antenna factor variation with height, antenna phase center variation, antenna factor frequency interpolation, measurement distance variation, site imperfections, mismatch (average), and system repeatability.

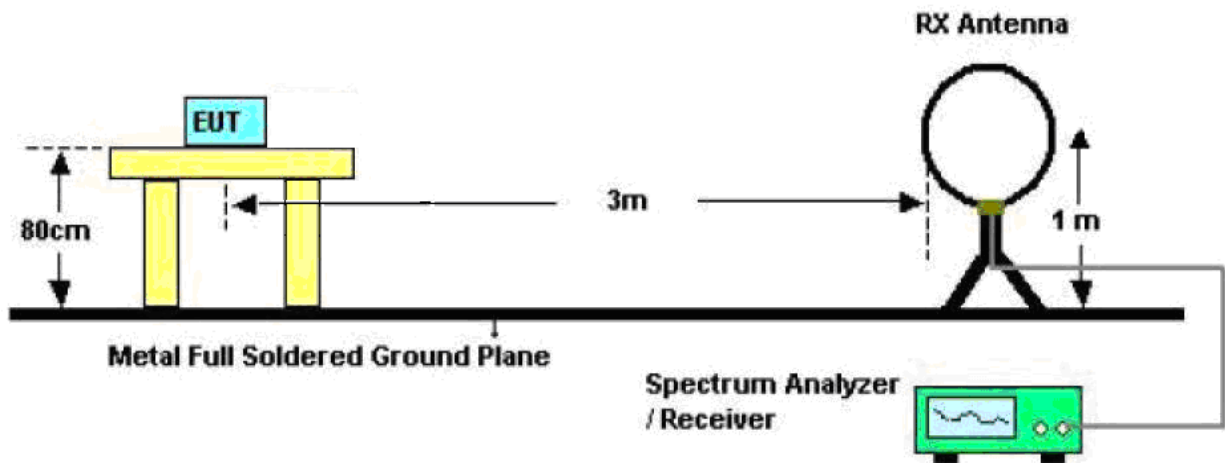
Based on ANSI C63.4: 2003, The Treatment of Uncertainty in EMC Measurements, the best estimate of the uncertainty of a radiation emissions measurement at Waltek EMC Lab is +/-5.03 dB.

### 7.3 Test Procedure

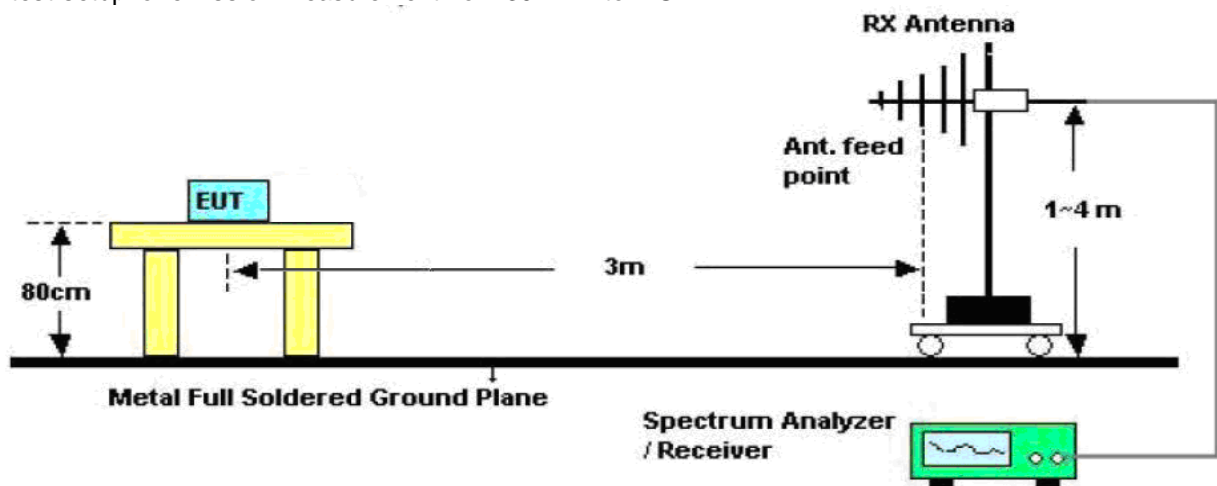
1. New battery was used in the equipment under test for radiated emissions test.
2. The radiation emission should be tested under 3-axes position(lying,side and stand),After pre-test,It was found that the worse radiation emission was get at the lying position.
3. Maximizing procedure was performed on the six (6) highest emissions to ensure EUT is compliant with all installation combinations.
4. All data was recorded in the peak and average detection mode.
5. The EUT was under working mode during the final qualification test and the configuration was used to represent the worst case results.

7.4 Radiated Test Setup

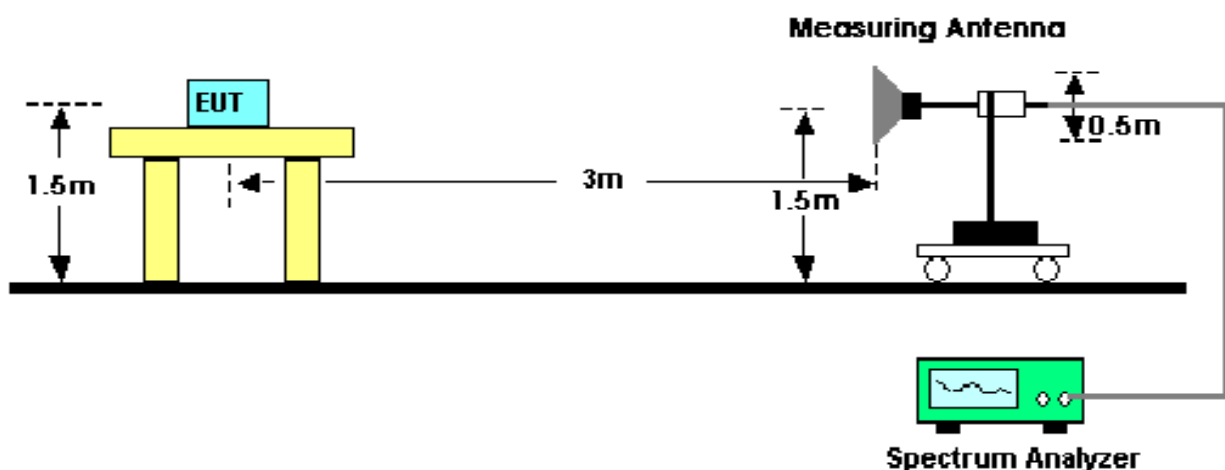
The radiated emission tests were performed in the 3m Semi- Anechoic Chamber test site, using the setup accordance with the ANSI C63.4.  
The test setup for emission measurement below 30MHz.



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



The test setup for emission measurement above 1 GHz.



## 7.5 Spectrum Analyzer Setup

According to FCC Part 15.209 and 15.231 Rules, the system was tested from 13.56MHz to 5000 MHz.

Below 30MHz

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

30MHz ~ 1GHz

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

Above 1GHz

Sweep Speed Auto  
 IF Bandwidth 120 KHz  
 Video Bandwidth ..... 3MHz  
 Quasi-Peak Adapter Bandwidth ..... 120 KHz  
 Quasi-Peak Adapter Mode ..... Normal  
 Resolution Bandwidth ..... 1MHz

## 7.6 Corrected Amplitude & Margin Calculation

The Corrected Amplitude is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain from the Amplitude reading. The basic equation is as follows:

$$\text{Corr. Ampl.} = \text{Indicated Reading} + \text{Antenna Factor} + \text{Cable Factor} - \text{Amplifier Gain}$$

The “**Margin**” column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of -7dBμV means the emission is 7dBμV below the maximum limit for Class B. The equation for margin calculation is as follows:

$$\text{Margin} = \text{Corr. Ampl.} - \text{Class B Limit}$$

7.7 EUT Operating Condition

Same as section 6.4 of this report.

7.8 Radiated Emissions Limit

Fundamental frequency (MHz)	Field strength of fundamental (microvolts/meter)	Field strength of spurious emissions (microvolts/meter)
40. 66-40. 70. ....	2, 250. ....	225
70-130. ....	1, 250. ....	125
130-174. ....	\1\ 1, 250 to 3, 750	\1\ 125 to 375
174-260. ....	3, 750. ....	375
260-470. ....	\1\ 3, 750 to 12, 500.	\1\ 375 to 1, 250
Above 470. ....	12, 500. ....	1, 250

## 7.9 Radiated Emissions 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)  
To the antenna correction factor supplied by the antenna manufacturer. The antenna  
Correction factors are stated in terms of dB. The gain of the presselector was accounted  
For in the spectrum analyzer meter reading.

Example:

Freq(MHz) Meter Reading +ACF=FS

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

### 7.9.1 Radiated Emission Test Data

Test Item:	Radiated Emission Test Data
Test Voltage:	DC 3.0V
Test Mode:	TX On
Temperature:	25.5 °C
Humidity:	51%RH
Test Result:	PASS

**Note:**

$$AV = \text{Peak} + 20\log_{10}(\text{duty cycle}) = \text{Peak} - 21.5$$

So the Radiated Emission Test Data as the table follow. For more details of the calculation ,  
please refer the section 9 of the Periodic operation .

Frequency (MHz)	Detector	Antenna Polarization	Emission Level (dBuV/m)	FCC 15 Subpart C Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Turntable Angle (°)
433.92	Peak	Vertical	94.75	100.82	6.07	1.1	0
433.92	Peak	Horizontal	91.81	100.82	9.01	1.0	60
867.831	Peak	Vertical	75.19	80.82	5.63	1.1	0
1301.76	Peak	Vertical	55.82	74.00	18.18	1.0	120
1735.58	Peak	Vertical	50.63	74.00	23.37	1.0	0
2169.6	Peak	Vertical	47.93	74.00	26.07	1.1	140
2603.52	Peak	Vertical	48.86	74.00	25.14	1.3	60
3037.44	Peak	Vertical	50.41	74.00	23.59	1.4	45
3471.36	Peak	Vertical	50.57	74.00	23.43	1.1	60
3905.28	Peak	Vertical	50.11	74.00	23.89	1.0	50
4339.2	Peak	Vertical	48.94	74.00	25.06	1.0	110
867.831	Peak	Horizontal	77.53	80.82	3.29	1.3	120
1301.76	Peak	Horizontal	57.74	74.00	16.26	1.2	45
1735.58	Peak	Horizontal	52.66	74.00	21.34	1.4	45
2169.6	Peak	Horizontal	54.52	74.00	19.48	1.2	90
2603.52	Peak	Horizontal	51.68	74.00	22.32	1.0	130
3037.44	Peak	Horizontal	49.87	74.00	24.13	1.0	40
3471.36	Peak	Horizontal	51.58	74.00	22.42	1.3	60
3905.28	Peak	Horizontal	46.31	74.00	27.69	1.1	110
4339.2	Peak	Horizontal	49.39	74.00	24.61	1.3	10
433.92	AV	Vertical	73.25	80.82	7.57	1.0	90
433.92	AV	Horizontal	70.31	80.82	10.51	1.1	0
867.831	AV	Vertical	53.69	60.82	7.13	1.1	0
1301.76	AV	Vertical	34.32	54.00	19.68	1.0	60
1735.58	AV	Vertical	29.13	54.00	24.87	1.0	120
2169.6	AV	Vertical	26.43	54.00	27.57	1.1	60
2603.52	AV	Vertical	27.36	54.00	26.64	1.1	140
3037.44	AV	Vertical	28.91	54.00	25.09	1.3	60
3471.36	AV	Vertical	29.07	54.00	24.93	1.1	45
3905.28	AV	Vertical	28.61	54.00	25.39	1.0	60
4339.2	AV	Vertical	27.44	54.00	26.56	1.1	45



867.831	AV	Horizontal	56.03	60.82	4.79	1.1	110
1301.76	AV	Horizontal	36.24	54.00	17.76	1.1	10
1735.58	AV	Horizontal	31.16	54.00	22.84	1.0	135
2169.6	AV	Horizontal	33.02	54.00	20.98	1.1	90
2603.52	AV	Horizontal	30.18	54.00	23.82	1.0	130
3037.44	AV	Horizontal	28.37	54.00	25.63	1.0	40
3471.36	AV	Horizontal	30.08	54.00	23.92	1.3	60
3905.28	AV	Horizontal	24.81	54.00	29.19	1.1	110
4339.2	AV	Horizontal	27.89	54.00	26.11	1.3	140

Where F is the frequency in MHz, The formulas for calculating the maximum permitted fundamental field strengths are as follows:

(1). For the band 130-174MHz, uV/m at 3 meters =  $56.81818(F) - 6136.3636$ ;

(2). For the band 260-470MHz, uV/m at 3 meters =  $41.6667(F) - 7083.3333$ .

Sample calculation of limit @ 433.92MHz

$41.6667(433.92) - 7083.3333 = 10996.681 \text{ uV/m}$

$20\log(10996.681) = 80.82 \text{ dBuV/m(AV) limit @ 433.92MHz}$

And

The maximum permitted unwanted emission level is 20 dB below the maximum permitted fundamental level.

$AV = \text{Peak} + 20\log_{10}(\text{duty cycle})$

## **8 Antenna Requirement.**

According to the FCC Part 15 Paragraph 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. This product has a permanent antenna, fulfill the requirement of this section

## 9 Periodic Operation

The duty cycle was determined by the following equation:

To calculate the actual field intensity, The duty cycle correction factor in decibel is needed for later use and can be obtained from following conversion

**Duty Cycle(%)=**

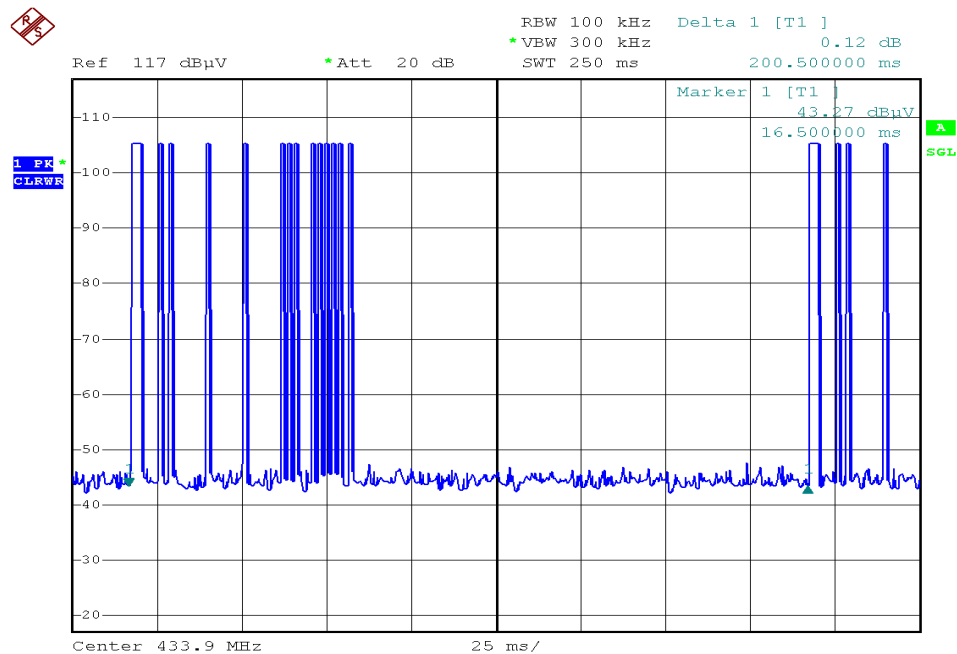
**Total On interval in a complete pulse train/ Length of a complete pulse train \* %**

**Duty Cycle Correction Factor(dB)=20 \* Log<sub>10</sub>(Duty Cycle(%))**

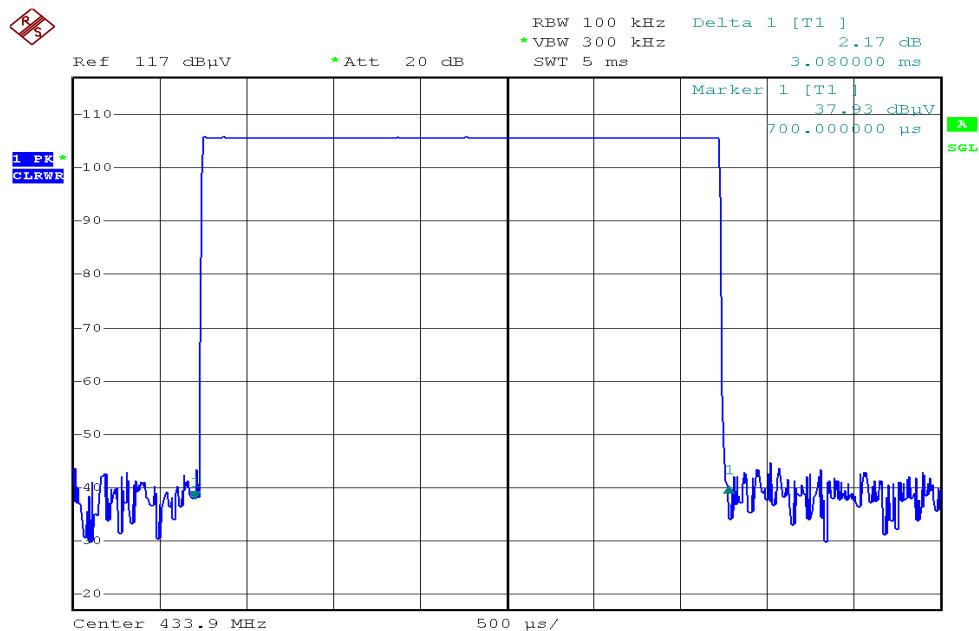
Pulse Train	Number of Pulse	T(ms)	Total Time(ms)
Long Pulse	1	3.08	3.08msec
Short Pulse	13	1.06	13.78msec

Total On interval in a complete pulse train	200.5msec
Length of a complete pulse train	16.86msec
Duty Cycle(%)	8.41%
Duty Cycle Correction Factor(dB)	-21.5

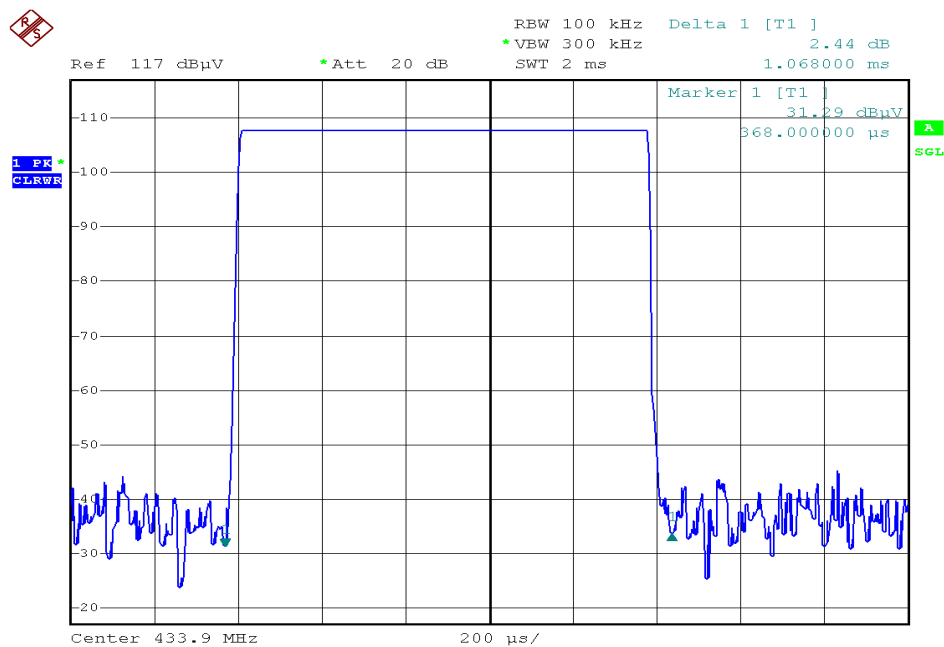
Refer to the duty cycle plot (as below),This device does meet the FCC requirement.  
Length of a complete pulse train:



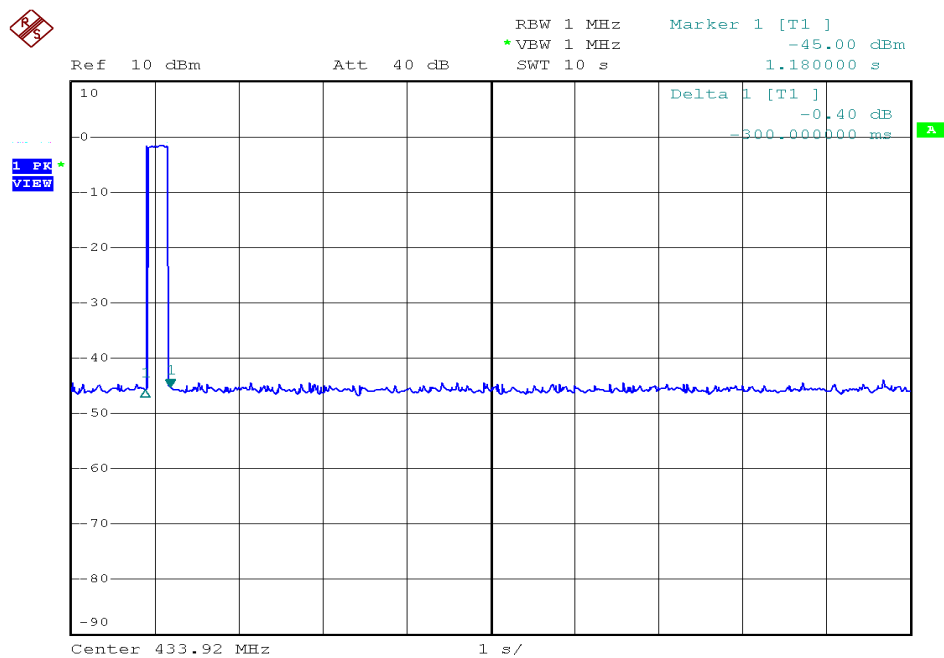
Long Pulse



Short Pulse:



Refer to the plot (as below),We find a manually operated transmitter shall employ a switch that will automatically deactivate the transmitter is 300ms, within not more than 5 seconds of being released.



## 10 Band Edge

Test Requirement:	FCC Part15 C
Test Method:	Based on FCC Part15 Paragraph 15.231
Test Date:	Dec.19,2012
Test mode:	TX On
Temperature:	25.5 °C
Humidity:	51%RH

### 10.1 Test Procedure

1. The transmitter output (antenna port) was connected to the spectrum analyzer.EUT and its simulators are placed on a table, let EUT working in test mode,then test it.
2. The bandwidth of the fundamental frequency was measure by spectrum analyser with 100KHz RBW and 100KHz VBW.The 20dB bandwidth is defined as the total spectrum the power of which is higher than peak power 20dB.

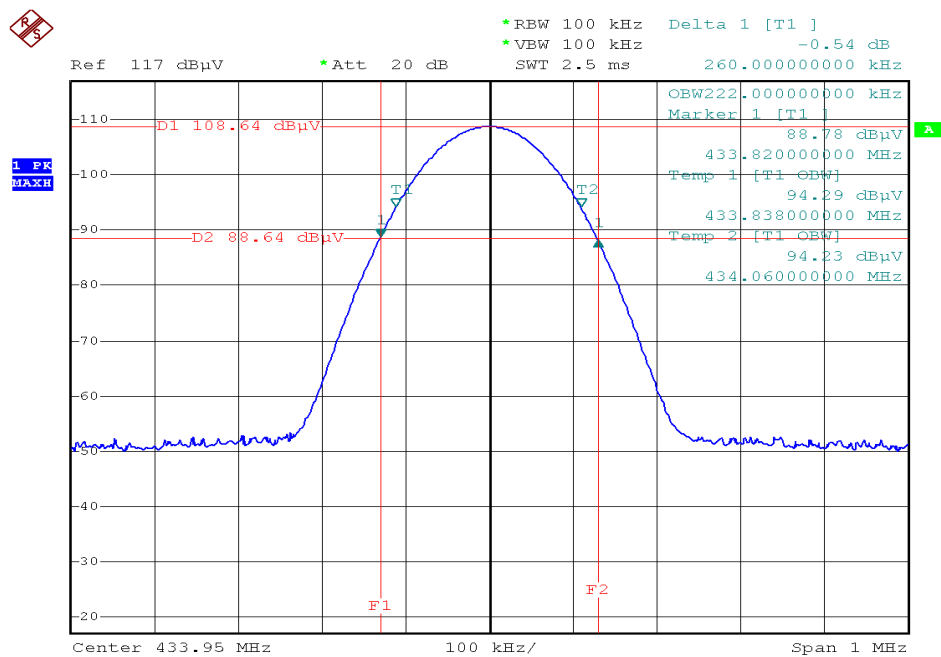
### 10.2 Band Edge

Requirements: The bandwidth of the emission shall be no wider than 0.25% of the center frequency for devices operating above 70MHz and below 900MHz. For devices operating above 900 MHz, the emission shall be no wider than 0.5% of the center frequency. Bandwidth is determined at the points 20 dB down from the modulated carrier.

Frequency (MHz)	Bandwidth Emission (KHz)	Limit (KHz)	Result
433.92	260.00	1084.8	Pass

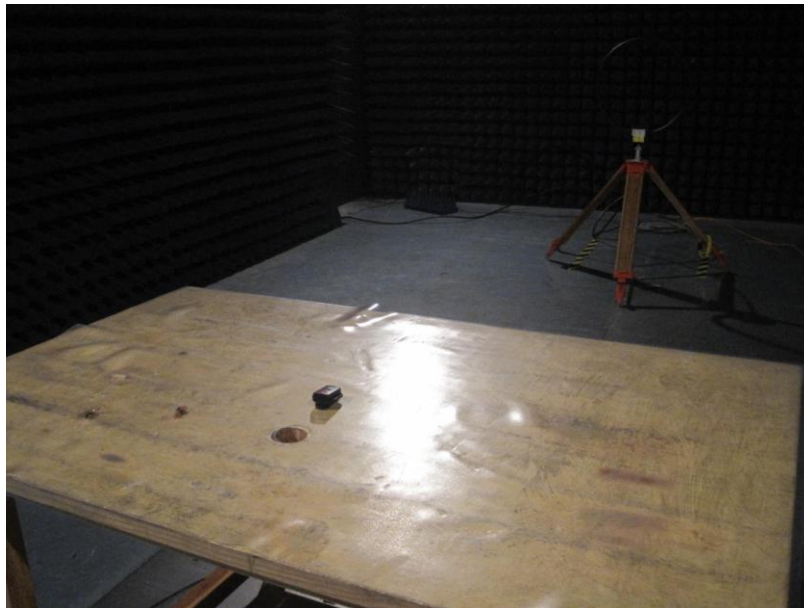
10.3 Band Edge Test Result

433.92MHz TX

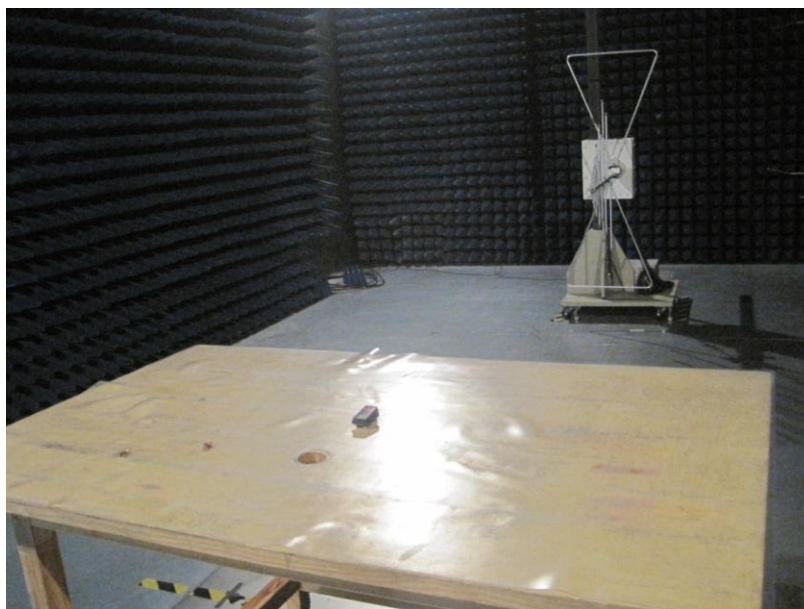


## **11 Photographs of Testing**

### **11.1 Radiation Emission Test View For Below 30MHz**

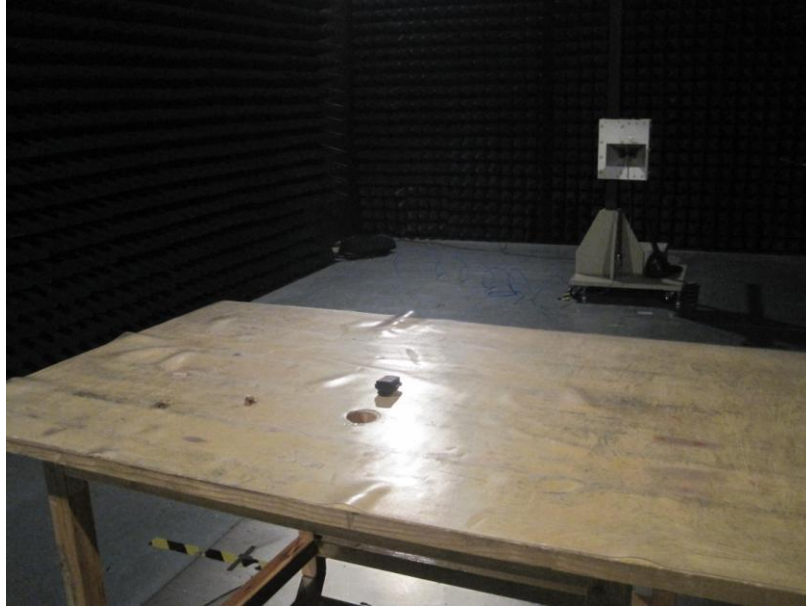


### **11.2 Radiation Emission Test View For 30MHz-1000MHz**





### 11.3 Radiation Emission Test View For 1GHz-5GHz



## 12 Photographs - Constructional Details

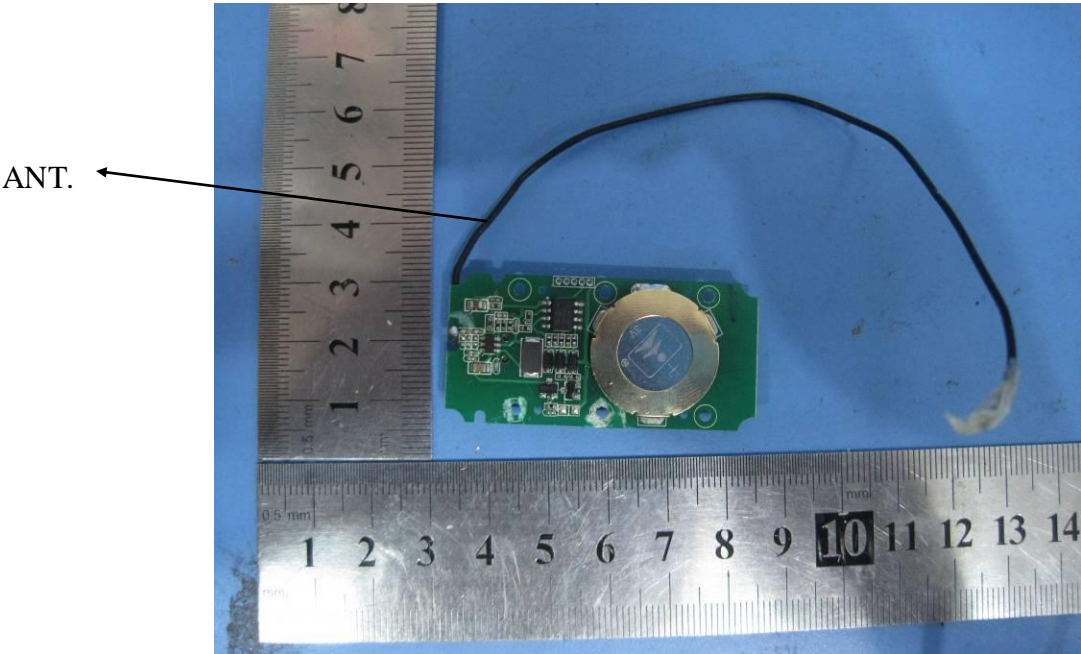
### 12.1 EUT-Front View



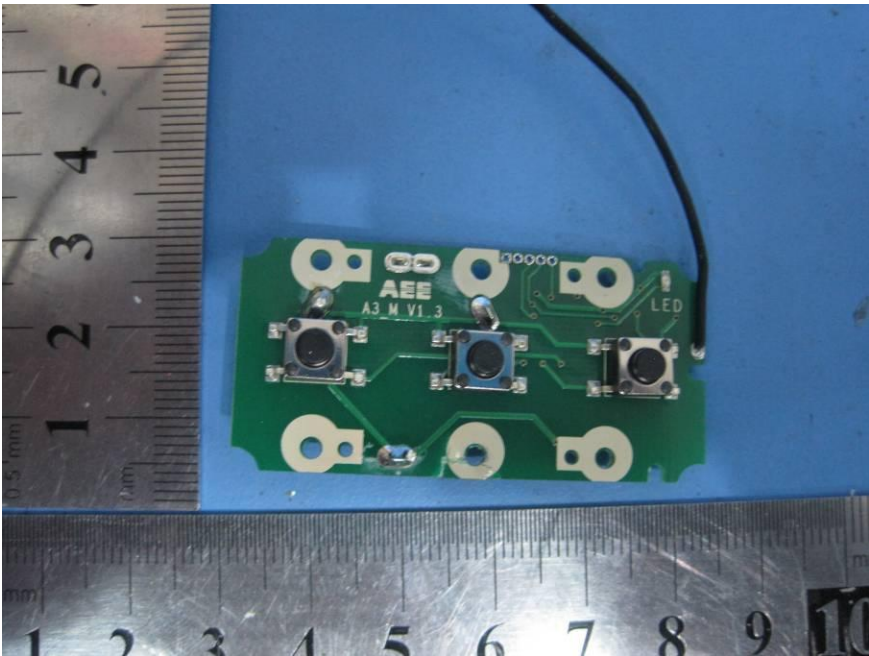
### 12.2 EUT-Back View



12.3 PCB-Front View



12.4 PCB-Back View





### 13 FCC ID 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.

Proposed Label Location on EUT  
EUT Bottom View/proposed FCC Label Location

