

**ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT  
INTENTIONAL RADIATOR CERTIFICATION TO  
FCC PART 15 SUBPART B & C REQUIREMENT**

*OF*

**Electrical Helicopter Toy**

**MODEL No.: Zulu**

**BRAND NAME: N/A**

**FCC ID: I38-COPTERS002**

**REPORT NO: E0711125F**

**ISSUE DATE: December 20, 2007**

*Prepared for*

**AZTECH SYSTEMS LTD  
31 Ubi Road 1, Aztech Building, Singapore 408694**

*Prepared by*

**SHENZHEN EMTEK CO., LTD**

**Bldg 69, Majialong Industry Zone, Nanshan District,  
Shenzhen, Guangdong, China**

**TEL: 86-755-26954280**

**FAX: 86-755-26954282**

**VERIFICATION OF COMPLIANCE**

Applicant:	AZTECH SYSTEMS LTD 31 Ubi Road 1, Aztech Building, Singapore 408694
Product Description:	Electrical Helicopter Toy
Brand Name:	N/A
Model Number:	Zulu
File Number:	E0711125F
Date of Test:	December 01, 2007 to December 18, 2007

**We hereby certify that:**

The above equipment was tested by SHENZHEN EMTEK CO., LTD. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.4 (2003) and the energy emitted by the sample EUT tested as described in this report is in compliance with conducted and radiated emission limits of FCC Rules Part 15.249.

The test results of this report relate only to the tested sample identified in this report.

*Approved By*



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*David Lee / Q.A. Manager*  
**SHENZHEN EMTEK CO., LTD.**

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## 1. GENERAL INFORMATION

### 1.1 Product Description

The AZTECH SYSTEMS LTD Model: Zulu (referred to as the EUT in this report) The EUT is an short range, lower power, Electrical Helicopter Toy designed as an " Input Device. It is designed by way of utilizing the MSK modulation achieves the system operating.

A major technical descriptions of EUT is described as following:

- A) Operation Frequency: 2412MHz~2463MHz(Channel 0: 2411.9998, Channel 124: 2436.7938, Channel 248: 2461.5877.)
- B) Channel space: 0.799805MHz
- C) Modulation: MSK
- D) Number of Channel: 249
- E) Antenna Designation: PCB antenna
- F) Power Supply: 8\*1.5V Battery, Charging with DC12V/1A of Adaptor

### 1.2 Related Submittal(s) / Grant (s)

This submittal(s) (test report) is intended for FCC ID: I38-COPTERS002 filing to comply with Section 15.249 of the FCC Part 15, Subpart B and Subpart C Rules, The composite system (receiver) is compliance with Subpart B is authorized under a DoC procedure.

### 1.3 Test Methodology

Both conducted and radiated testing were performed according to the procedures in ANSI C63.4 (2003). Radiated testing was performed at an antenna to EUT distance 3 meters.

### 1.4 Special Accessories

Not available for this EUT intended for grant.

### 1.5 Equipment Modifications

Not available for this EUT intended for grant.

## 1.6 Test Facility

Site Description  
EMC Lab. : Accredited by CNAS, 2005.11.02  
The certificate is valid until 2010.11  
The Laboratory has been assessed and proved to be in compliance  
with CNAS/CL01:2006(identical to ISO/IEC17025:2005)  
The Certificate Registration Number is L2291

Accredited by TUV Rheinland Guangzhou, 2005.1  
The certificate is valid until 2008.2  
The Laboratory has been assessed according to the requirements  
ISO/IEC 17025:1999

Accredited by FCC, July 07, 2005  
The Certificate Registration Number is 709623.

Accredited by Industry Canada, August 30, 2005  
The Certificate Registration Number is 46405-4480

Name of Firm : SHENZHEN EMTEK CO., LTD  
Site Location : Bldg 69, Majialong Industry Zone,  
Nanshan District, Shenzhen, Guangdong, China

## 2. System Test Configuration

### 2.1 EUT Configuration

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner which intends to maximize its emission characteristics in a continuous normal application.

### 2.2 EUT Exercise

The Transmitter was operated in the normal operating mode. the Tx frequency was fixed which was for the purpose of the measurements.

### 2.3 Test Procedure

#### 2.3.1 Conducted Emissions

The EUT is a placed on as turn table which is 0.8 m above ground plane. According to the requirements in Section 13.1.4.1 of ANSI C63.4-2003. Conducted emissions from the EUT measured in the **frequency range between 0.15 MHz and 30MHz** using **CISPR Quasi-Peak and average detector mode**.

#### 2.3.2 Radiated Emissions

The EUT is a placed on as turn table which is 0.8 m above ground plane. The turn table shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3m away from the receiving antenna which varied from 1m to 4m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the max. emission, the relative positions of this hand-held transmitter(EUT) was rotated through three orthogonal axes according to the requirements in Section 13.1.4.1 of ANSI C63.4-2003.

### 2.4 Limitation

#### (1) Conducted Emission

Frequency(MHz)	Quasi-peak	Average
0.15-0.5	66-56	56-46
0.5-5.0	56	46
5.0-30.0	60	50

**Note:**

1. The lower limit shall apply at the transition frequencies
2. The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50MHz.

**(2) Radiated Emissions FCC Rule: 15.249(a)**

FCC Part 15, Subpart C Section 15.249. The field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following:

Frequency(MHz)	Filed Strength of Fundamental(at 3m)		Filed Strength of Harmonics(at 3m)	
	PEAK	AVERAGE	PEAK	AVERAGE
902-928	114	94	74.0	54.0
2400-2483.5	114	94	74.0	54.0
5725-5875	114	94	74.0	54.0
24000-24250	128	108	88.0	68.0

**Radiated Emissions**

**FCC Rule: 15.249(d)(e)**

FCC Part 15, Subpart C Section 15.209 limit of radiated emission for frequency below 1000GHz. The emissions from an intentional radiator shall not exceed the field strength level specified in the following table:

Frequency (MHz)	Field strength $\mu\text{V/m}$	Distance(m)	Field strength at 3m $\text{dB}\mu\text{V/m}$
30-88	100	3	40
88-216	150	3	43.5
216-960	200	3	46
Above 960	500	3	54

- Remark:
1. Emission level in  $\text{dB}\mu\text{V/m} = 20 \log (\mu\text{V/m})$
  2. Measurement was performed at an antenna to the closed point of EUT distance of meters.

**FCC Part 15, Section 15.35(b) limit of radiated emission for frequency above 1000MHz**

Frequency(MHz)	Class A( $\text{dB}\mu\text{V/m}$ )(at 3m)		Class B( $\text{dB}\mu\text{V/m}$ )(at 3m)	
	PEAK	AVERAGE	PEAK	AVERAGE
Above 1000	80.0	60.0	74.0	54.0

## 2.5 Configuration of Tested System

**Fig. 2-1 Configuration of Tested System**



Table 2-1 Equipment Used in Tested System

Item	Equipment	Mfr/Brand	Model/Type No.	FCC ID	Series No.	Note
1.	Electrical Helicopter Toy	N/A	Zulu	I38-COPTERS002	N/A	<b><i>EUT</i></b>

**Note:**

- (1) Unless otherwise denoted as EUT in 『Remark』 column , device(s) used in tested system is a support equipment.



### 3. Summary Of Test Results

<b>FCC Rules</b>	<b>,Description Of Test</b>	<b>Result</b>
§ 15.207	Conducted Emission	Compliant
§ 15.249 (a),(b),(d),(e), § 15.209	Radiated Emission	Compliant
§ 15.203	Antenna Requirement	Compliant

### 4. Description of test modes

The EUT (Electrical Helicopter Toy) has been tested under normal operating condition. Three channels of EUT (the lowest channel, the middle channel and the highest channel) have been chosen for testing under Normal Operating condition. In this report, all the measured datum of the three channels have been reported. No software used to control the EUT for staying in continuous transmitting mode for testing.

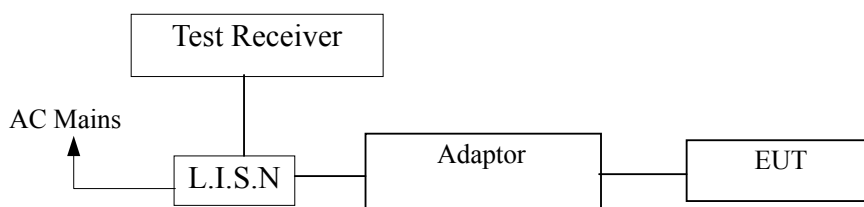
<b>Channel</b>	<b>Frequency(MHz)</b>
0	2411.9998 MHz
124	2436.7938MHz
248	2461.5877MHz

## 5. Conducted Emissions Test

### 5.1 Measurement Procedure:

1. The EUT was placed on a table which is 0.8m above ground plane.
2. Maximum procedure was performed on the three highest emissions to ensure EUT compliance.
3. Repeat above procedures until all frequency measured were complete.

### 5.2 Test SET-UP (Block Diagram of Configuration)



### 5.3 Measurement Equipment Used:

Conducted Emission Test Site # 4					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Test Receiver	Rohde & Schwarz	ESCS30	828985/018	05/29/2007	05/29/2008
L.I.S.N	Rohde & Schwarz	ESH2-Z5	834549/005	05/29/2007	05/29/2008
L.I.S.N	Rohde & Schwarz	ESH2-Z5	834549/005	05/29/2007	05/29/2008
50Ω Coaxial Switch	Anritsu	MP59B	M20531	05/29/2007	05/29/2008

**5.4 Measurement Result:**

Date of Test: December 05, 2007      Temperature: 22°C  
 Frequency Detector: 0.15~30MHz      Humidity: 50%  
 Test Result: PASS      Test Mode: Charging

Test Line	Frequency MHz	Emission Level QP dB(μV)	Emission Level AV dB(μV)	Limits QP dB(μV)	Limits AV dB(μV)	Margin QP dB(μV)	Margin AV dB(μV)
Neutral	0.185	55.51	46.50	64.26	54.26	-8.75	-7.76
	0.250	50.50	40.06	61.76	51.76	-11.26	-11.70
	0.310	48.70	37.94	59.97	49.97	-11.27	-12.03
	0.370	44.69	35.66	58.50	48.50	-13.81	-12.84
	0.4350	41.16	33.48	57.16	47.16	-16.00	-13.68
	21.450	36.90	37.07	60.00	50.00	-23.10	-12.93
Line	0.190	55.20	46.50	64.04	54.04	-8.84	-7.54
	0.245	42.59	35.54	61.92	51.92	-19.33	-16.38
	0.305	40.05	29.87	60.11	50.11	-20.06	-20.24
	0.375	46.58	36.37	58.39	48.39	-11.81	-12.02
	0.440	43.88	33.54	57.06	47.06	-13.18	-13.52
	22.075	38.30	38.70	60.00	50.00	-21.70	-11.30

**5.5 Conducted Measurement Photos:**



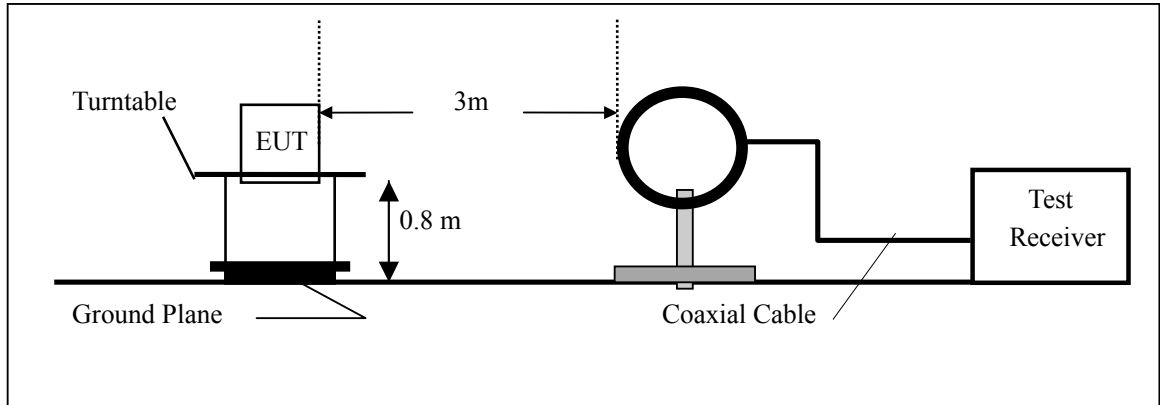
## **6. Radiated Emission Test**

### **6.1 Measurement Procedure**

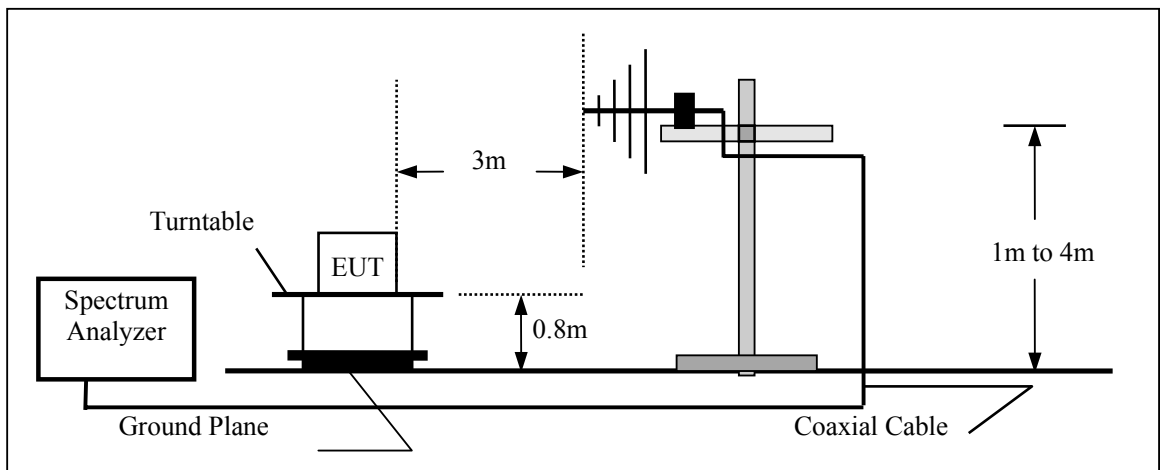
- 1 The EUT was placed on a turn table which is 0.8m above ground plane.
2. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
3. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
4. Repeat above procedures until all frequency measured were complete.

### 6.2 Test SET-UP (Block Diagram of Configuration)

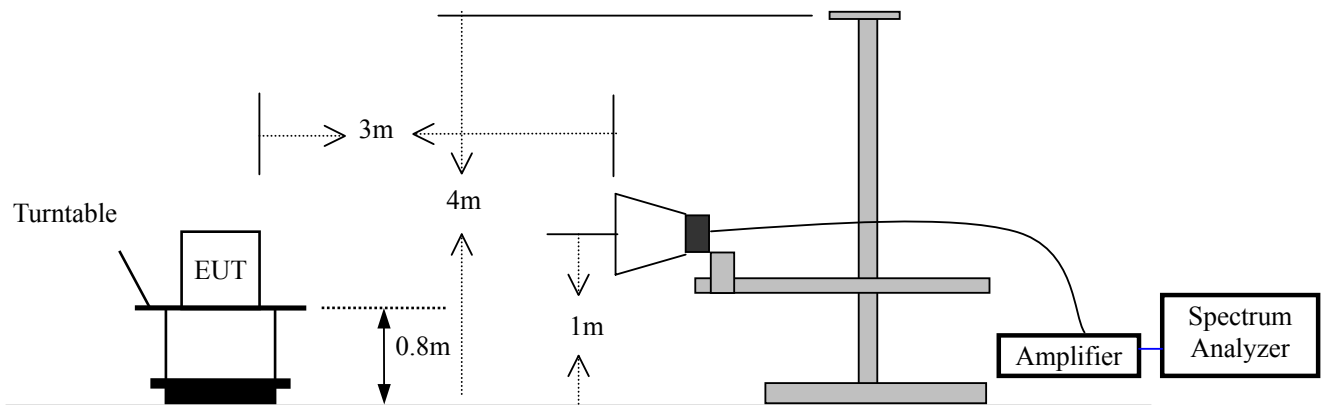
(A) Radiated Emission Test Set-Up, Frequency Below 30MHz



(B) Radiated Emission Test Set-Up, Frequency Below 1000MHz



(C) Radiated Emission Test Set-Up, Frequency above 1000MHz



**6.3 Measurement Equipment Used:**

EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Spectrum Analyzer	Rohde & Schwarz	FSP7	839511/010	05/29/2007	05/29/2008
Spectrum Analyzer	HP	E4407B	839840481	05/29/2007	05/29/2008
EMI Test Receiver	Rohde & Schwarz	ESCS30	828985/018	05/29/2007	05/29/2008
Pre-Amplifier	HP	8447D	2944A07999	05/29/2007	05/29/2008
Bilog Antenna	Schwarzbeck	VULB9163	142	05/29/2007	05/29/2008
Loop Antenna	ARA	PLA-1030/B	1029	05/29/2007	05/29/2008
Horn Antenna	Electro-Metrics	EM-6961	103314	05/29/2007	05/29/2008
Horn Antenna	Schwarzbeck	BBHA 9120	D143	05/29/2007	05/29/2008

**6.4 Out of Band Radiated Measurement Result**

Operation Mode: TX Mode                      Test Date : December 05, 2007  
 Frequency Range: 30~1000MHz              Temperature : 28 °C  
 Test Result: PASS                              Humidity : 65 %  
 Measured Distance: 3m                        Test By: Andy

Freq. (MHz)	Ant.Pol. H/V	Emission Level (dBuV)	Limit 3m (dBuV/m)	Margin (dB)	Note
53.610	V	25.61	40.00	-14.39	PK
65.910	V	28.35	40.00	-11.65	PK
523.61	V	34.51	46.00	-11.49	PK
710.51	V	32.94	46.00	-13.06	PK
42.480	H	25.64	40.00	-14.36	PK
98.540	H	28.61	43.50	-14.89	PK
635.48	H	32.84	46.00	-13.16	PK
721.59	H	35.51	46.00	-10.49	PK

**No others harmonics emissions are higher than 20dB below the limits of 47 CFR Part 15.209.**

- Note:**
- (1) All Readings are Peak Value.
  - (2) Emission Level= Reading Level+Probe Factor +Cable Loss
  - (3) The average measurement was not performed when the peak measured data under the limit of average detection.

Operation Mode: Charging                      Test Date : December 05, 2007  
Frequency Range: 30~1000MHz              Temperature : 28 °C  
Test Result: PASS                              Humidity : 65 %  
Measured Distance: 3m                        Test By: Andy

Freq. (MHz)	Ant.Pol. H/V	Emission Level (dBuV)	Limit 3m (dBuV/m)	Margin (dB)	Note
37.760	V	35.47	40.00	-4.53	PK
99.840	V	40.21	43.50	-3.29	PK
142.520	V	38.28	43.50	-5.22	PK
194.510	V	35.51	43.50	-7.99	PK
99.840	H	34.77	43.50	-8.73	PK
138.640	H	32.51	43.50	-10.99	PK
202.660	H	35.32	43.50	-8.18	PK
251.400	H	33.65	46.00	-12.35	PK

**No others harmonics emissions are higher than 20dB below the limits of 47 CFR Part 15.209.**

- Note:**
- (1) All Readings are Peak Value.
  - (2) Emission Level= Reading Level+Probe Factor +Cable Loss
  - (3) The average measurement was not performed when the peak measured data under the limit of average detection.



Operation Mode: TX (2411.9998MHz) Test Date : December 05, 2007  
 Frequency Range: 1-25GHz Temperature : 28 °C  
 Test Result: PASS Humidity : 65 %  
 Measured Distance: 3m Test By: Andy

Freq. (GHz)	Ant.Pol. H/V	Emission Level(dBuV)		Limit 3m(dBuV/m)		Margin(dB)	
		PK	AV	PK	AV	PK	AV
2.41199(F)	V	70.55	63.81	114	94	-43.45	-30.19
4.823	V	41.51	38.58	74	54	-32.49	-15.42
7.236	V	43.85	40.81	74	54	-30.15	-13.19
9.647	V	39.61	36.54	74	54	-34.39	-17.46
12.059	V	38.61	34.97	74	54	-35.39	-19.03
2.41199(F)	H	70.57	62.51	114	94	-43.43	-31.49
4.823	H	39.51	36.81	74	54	-34.49	-17.19
7.236	H	41.97	38.66	74	54	-32.03	-15.34
9.647	H	38.69	35.87	74	54	-35.31	-18.13
12.059	H	37.98	34.94	74	54	-36.02	-19.06

**No others harmonics emissions are higher than 20dB below the limits of 47 CFR Part 15.249.**

- Note:**
- (1) All Readings are Peak Value and AV.
  - (2) Emission Level= Reading Level+Probe Factor +Cable Loss
  - (3) The average measurement was not performed when the peak measured data under the limit of average detection.

Operation Mode: TX(2436.7938MHz)      Test Date : December 05, 2007  
 Frequency Range: 1-25GHz              Temperature : 28 °C  
 Test Result: PASS                      Humidity : 65 %  
 Measured Distance: 3m                 Test By: Andy

Freq. (GHz)	Ant.Pol. H/V	Emission Level(dBuV)		Limit 3m(dBuV/m)		Margin(dB)	
		PK	AV	PK	AV	PK	AV
2.436(F)	V	80.66	75.69	114	94	-33.34	-18.31
4.874	V	45.36	40.20	74	54	-28.64	-13.80
7.312	V	42.69	38.61	74	54	-31.31	-15.39
9.747	V	40.51	37.51	74	54	-33.49	-16.49
12.1839	V	38.67	35.10	74	54	-35.33	-18.90
2.436(F)	H	73.65	69.81	114	94	-40.35	-24.19
4.874	H	42.62	38.57	74	54	-31.38	-15.43
7.312	H	40.85	36.91	74	54	-33.15	-17.09
9.747	H	38.69	33.84	74	54	-35.31	-20.16
12.1839	H	38.89	35.64	74	54	-35.11	-18.36

**No others harmonics emissions are higher than 20dB below the limits of 47 CFR Part 15.249.**

- Note:**
- (1) All Readings are Peak Value and AV.
  - (2) Emission Level= Reading Level+Probe Factor +Cable Loss
  - (3) The average measurement was not performed when the peak measured data under the limit of average detection.

Operation Mode: TX(2461.5877MHz)      Test Date : December 05, 2007  
 Frequency Range: 1-10GHz              Temperature : 28 °C  
 Test Result: PASS                          Humidity : 65 %  
 Measured Distance: 3m                    Test By: Andy

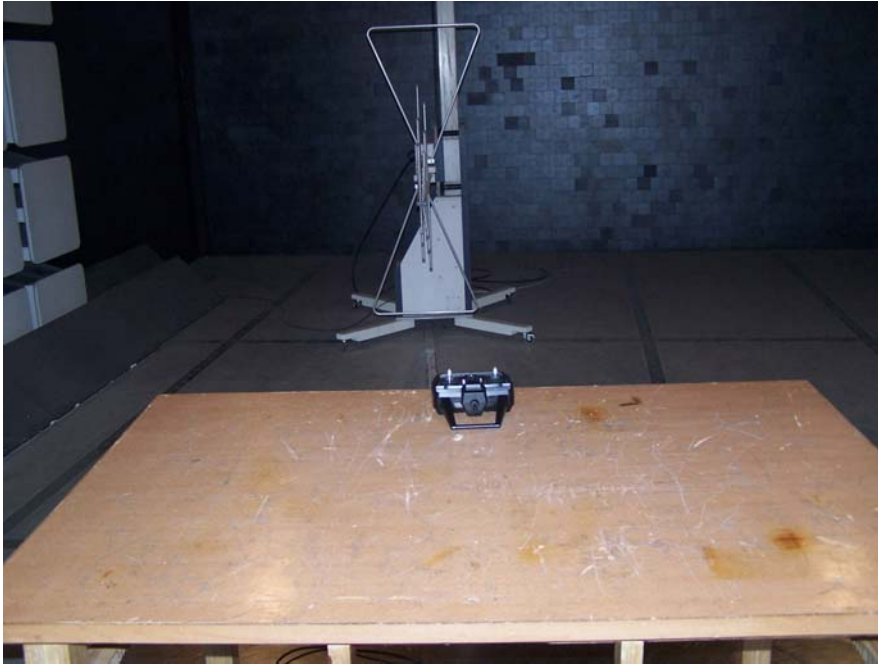
Freq. (GHz)	Ant.Pol. H/V	Emission Level(dBuV)		Limit 3m(dBuV/m)		Margin(dB)	
		PK	AV	PK	AV	PK	AV
2.461(F)	V	69.05	66.98	114	94	-44.95	-27.02
4.936	V	42.68	38.68	74	54	-31.32	-15.32
7.404	V	41.95	37.64	74	54	-32.05	-16.36
9.872	V	40.68	36.63	74	54	-33.32	-17.37
12.340	V	38.67	33.68	74	54	-35.33	-20.32
2.461(F)	H	71.66	68.48	114	94	-42.34	-25.52
4.936	H	43.98	39.68	74	54	-30.02	-14.32
7.404	H	40.65	37.63	74	54	-33.35	-16.37
9.872	H	38.73	35.61	74	54	-35.27	-18.39
12.340	H	36.94	33.72	74	54	-37.06	-20.28

**No others harmonics emissions are higher than 20dB below the limits of 47 CFR Part 15.249.**

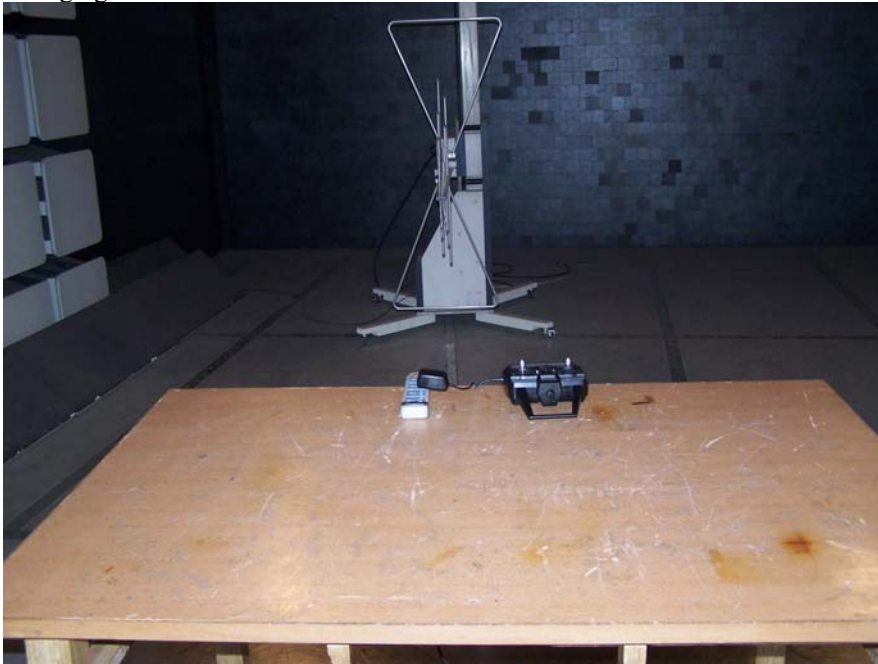
- Note:**
- (1) All Readings are Peak Value and AV.
  - (2) Emission Level= Reading Level+Probe Factor +Cable Loss
  - (3) The average measurement was not performed when the peak measured data under the limit of average detection.

**6.5 Radiated Measurement Photos:**

TX mode



Charging mode



## **7. Antenna Application**

### **7.1 Antenna requirement**

The EUT'S antenna is met the requirement of FCC part 15C section 15.203 and 15.240.

According to Section 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by responsible party shall be used with the device.

The EUT has a built in antenna which is a short wire solder on the PCB, this is permanently attached antenna and meets the requirements of this section.