

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

*OF*

**2.4GHz RC Helicopter**

**MODEL No.: EF136, mDX188, mDX189, mSP190**

**FCC ID: Z5B1361889MSP190**

**Trandemark:** 

**REPORT NO: ES110930161F**

**ISSUE DATE: October 15, 2011**

*Prepared for*

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*Prepared by*

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## VERIFICATION OF COMPLIANCE

Applicant:	SHENZHEN EFLY HOBBY TECH CO., LTD Room307, Qinghai Building, No.7043 Beihuan Road, Futian, Shenzhen, Guangdong, P.R.C.
Manufacturer:	SHENZHEN EFLY HOBBY TECH CO., LTD Room307, Qinghai Building, No.7043 Beihuan Road, Futian, Shenzhen, Guangdong, P.R.C.
Product Description:	2.4GHz RC Helicopter
Model Number:	EF136, mDX188, mDX189, mSP190 (Note: all the models are the same, except their model number and appearance. We take mSP190 to test.)
File Number:	ES110930161F
Date of Test:	September 30, 2011 to October 14, 2011

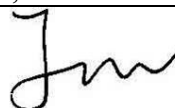
### We hereby certify that:

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 (2009) 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 15.207, 15.209, 15.249.

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

Date of Test : September 30, 2011 to October 14, 2011

Prepared by :



(Engineer)

Reviewer :



(Quality Manager)

Approve & Authorized Signer :



(Manager)

## Table of Contents

<b>1. GENERAL INFORMATION.....</b>	<b>4</b>
1.1 PRODUCT DESCRIPTION.....	4
1.2 RELATED SUBMITTAL(S) / GRANT(S).....	4
1.3 TEST METHODOLOGY.....	4
1.4 SPECIAL ACCESSORIES .....	4
1.5 EQUIPMENT MODIFICATIONS .....	5
1.6 TEST FACILITY .....	5
<b>2. SYSTEM TEST CONFIGURATION.....</b>	<b>6</b>
2.1 EUT CONFIGURATION .....	6
2.2 EUT EXERCISE.....	6
2.3 TEST PROCEDURE.....	6
2.4 CONFIGURATION OF TESTED SYSTEM.....	6
<b>3. DESCRIPTION OF TEST MODES.....</b>	<b>8</b>
<b>4. SUMMARY OF TEST RESULTS .....</b>	<b>9</b>
<b>5. CONDUCTED EMISSIONS TEST.....</b>	<b>10</b>
5.1 MEASUREMENT PROCEDURE .....	10
5.2 TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION).....	10
5.3 MEASUREMENT EQUIPMENT USED.....	10
5.4 CONDUCTED EMISSION LIMIT .....	10
5.5 MEASUREMENT RESULT .....	11
5.6 CONDUCTED MEASUREMENT PHOTO .....	11
<b>6. RADIATED EMISSION TEST.....</b>	<b>12</b>
6.1 MEASUREMENT PROCEDURE .....	12
6.2 TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION).....	12
6.3 MEASUREMENT EQUIPMENT USED.....	13
6.4 RADIATED EMISSION LIMIT .....	14
6.5 MEASUREMENT RESULT .....	15
6.6 RADIATED MEASUREMENT PHOTOS .....	18
<b>7. BAND EDGE TEST.....</b>	<b>19</b>
7.1 MEASUREMENT PROCEDURE .....	19
7.2 TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION).....	19
7.3 MEASUREMENT EQUIPMENT USED.....	19
7.4 MEASUREMENT RESULTS .....	19
<b>8. ANTENNA APPLICATION.....</b>	<b>24</b>
12.1 ANTENNA REQUIREMENT .....	24
12.2 RESULT.....	24

## 1. General Information

### 1.1 Product Description

A major technical descriptions of EUT is described as following:

- A). Operation Frequency: 2405-2480MHz
- B). Modulation: GFSK
- D). Number of Channel: 16 Channels
- E). Max Data Rate: 500kbps
- F) Antenna Gain: 0dBi
- G). Antenna Type: PCB Antenna
- H). Power Supply: DC 9V from battery

Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
1	2405	7	2435	13	2465
2	2410	8	2440	14	2470
3	2415	9	2445	15	2475
4	2420	10	2450	16	2480
5	2425	11	2455		
6	2430	12	2460		

Note:

1. This device is 2.4GHz RC Helicopter included 2.4GHz transceiver function.
2. Test of channel was included the lowest middle and highest frequency in lowest data rate and to perform the test, then record on this report.

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

This submittal(s) (test report) is intended for FCC ID: Z5B1361889MSP190 filing to comply with Section of the FCC Part 15, Subpart C Rules. The composite system (receiver) is compliance with Subpart B is authorized under a VOC procedure.

### 1.3 Test Methodology

Both conducted and radiated testing were performed according to the procedures in ANSI C63.4 (2009). 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, 2010.10.29  
The certificate is valid until 2013.10.28  
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 Shenzhen 2010.5.25  
The Laboratory has been assessed according to the requirements ISO/IEC 17025

Accredited by FCC, October 28, 2010  
The Certificate Registration Number is 406365.

Accredited by Industry Canada, March 05, 2010  
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 C63.4-2009 Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30 MHz 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 C63.4-2009.

### 2.4 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.	2.4GHz RC Helicopter	EFLY HOBBY	mSP190	Z5B1361889 MSP190	N/A	EUT

**Note:**

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

### **3. Description of Test Modes**

The Transmitter of EUT is a 2.4GHz RC Helicopter and powered by host equipment.

The equipment uses the GFSK Modulation to enable wireless communications between the host 2.4GHz RC Helicopter and Receiver.

1. For lowest channel : 2405MHz (Channel 1)
2. For middle channel : 2440MHz (Channel 8)
3. For highest channel: 2480MHz (Channel 16)

#### **EUT operating conditions:**

The EUT exercise program used during conducted testing was designed to exercise the EUT in a manner similar to typical use, The exercise sequence is listed as below:

1. Setup the EUT and simulators as shown on 2.4.
2. Turn on the power of all equipments.
3. The EUT Ping with the wireless router.
4. Repeat the above steps.



#### 4. Summary of Test Results

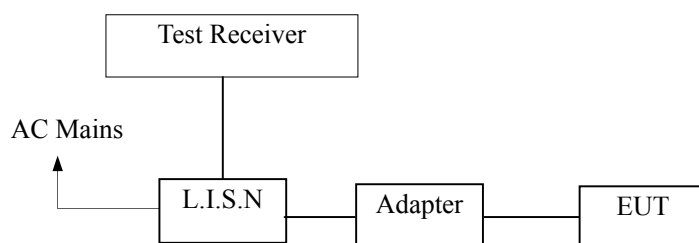
<b>FCC Rules</b>	<b>Description Of Test</b>	<b>Result</b>
§15.249(d)	Band edge test	Compliant
§15.207	AC Power Conducted Emission	Not Applicable
§15.249(a,e), §15.209	Radiated Emission	Compliant
§15.203	Antenna requirement	Compliant

## 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 six 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					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Test Receiver	Rohde & Schwarz	ESCS30	828985/018	05/29/2011	05/29/2012
L.I.S.N.	Schwarzbeck	NNLK8129	8129203	05/29/2011	05/29/2012
50Ω Coaxial Switch	Anritsu	MP59B	M20531	N/A	N/A
Pulse Limiter	Rohde & Schwarz	ESH3-Z2	100006	05/29/2011	05/29/2012
Voltage Probe	Rohde & Schwarz	TK9416	N/A	05/29/2011	05/29/2012
I.S.N	Rohde & Schwarz	ENY22	1109.9508.02	05/29/2011	05/29/2012

### 5.4 Conducted Emission Limit

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.

## **5.5 Measurement Result**

Not Applicable.

Since the power of EUT from battery, it's not applicable.

## **5.6 Conducted Measurement Photo**

Not Applicable.

## 6. Radiated Emission Test

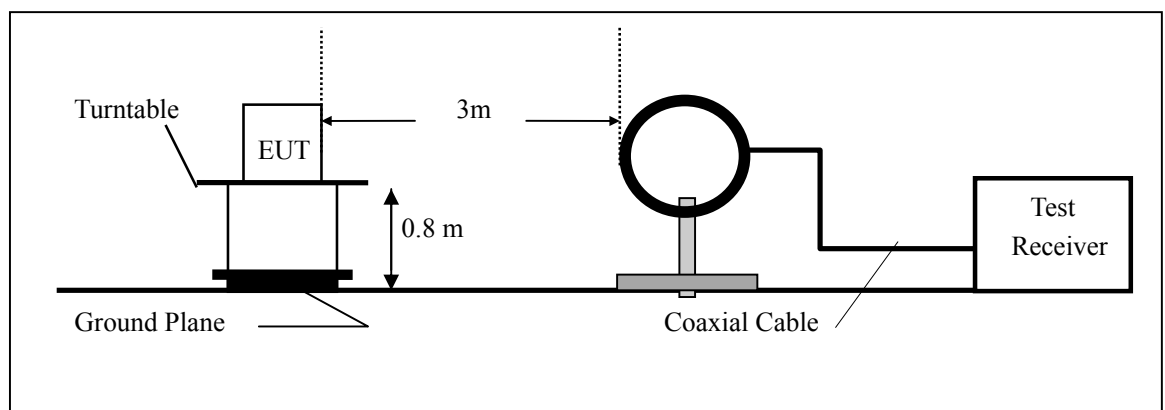
### 6.1 Measurement Procedure

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.

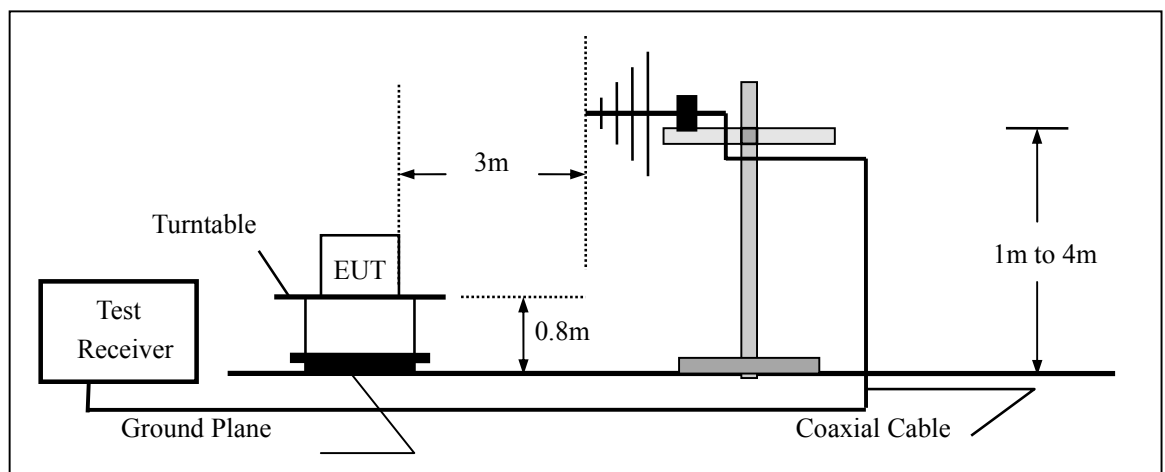
For Radiated emissions measurement, Set the bandwidth of the Spectrum's RBW at 1MHz above 1GHz and RBW 100KHz below 1GHz .

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

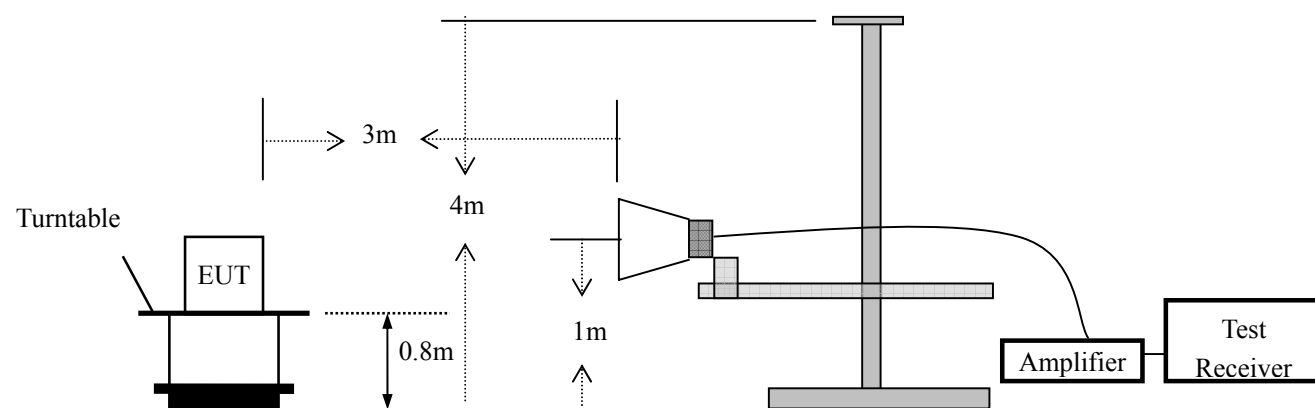
(A) Radiated Emission Test Set-Up, Frequency Below 30MHz



(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.
EMI Test Receiver	Rohde & Schwarz	ESU	1302.6005.26	May 29, 2011	05/29/2012
Pre-Amplifier	HP	8447D	2944A07999	May 29, 2011	05/29/2012
Bilog Antenna	Schwarzbeck	VULB9163	142	May 29, 2011	05/29/2012
Loop Antenna	ARA	PLA-1030/B	1029	May 29, 2011	05/29/2012
Horn Antenna	Schwarzbeck	BBHA 9170	BBHA9170399	May 29, 2011	05/29/2012
Horn Antenna	Schwarzbeck	BBHA 9120	D143	May 29, 2011	05/29/2012
Cable	Schwarzbeck	AK9513	ACRX1	May 29, 2011	05/29/2012
Cable	Rosenberger	N/A	FP2RX2	May 29, 2011	05/29/2012
Cable	Schwarzbeck	AK9513	CRPX1	May 29, 2011	05/29/2012
Cable	Schwarzbeck	AK9513	CRRX2	May 29, 2011	05/29/2012

## 6.4 Radiated Emission Limit

In the section 15.249(a): Except as provided in paragraph (b) of this section, the field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following:

Fundamental Frequency	Field Strength of Fundamental Field Strength (mV/m)	Field Strength of Harmonics(μV/m)
902-928 MHz	50	500
2400 - 2483.5 MHz	50	500
5725 - 5875 MHz	50	500
24.0 - 24.25 GHz	250	2500

### FCC Class B Limit at 3m:

Frequency MHz	Distance Meter	Field Strength uV/m	Field Strength dBuV/m
30~88	3	100	40.0
88~216	3	150	43.5
216~960	3	200	46.0
960~1000	3	500	54.0
Above 1000	3	74(Peak), 54(AVG)	

Note: The frequencies above 1000MHz, as measured using instrumentation with a peak detector function was corresponding to 20dB above maximum permitted average limit.

## 6.5 Measurement Result

Operation Mode: TX Channel Low      Test Date : October 9, 2011  
Frequency Range: 30~1000MHz      Temperature : 28°C  
Test Result: PASS      Humidity : 65 %  
Measured Distance: 3m      Test By: WOLF

Freq. (MHz)	Ant.Pol. H/V	Emission Level (dBuV)	Limit 3m (dBuV/m)	Over (dB)	Note
30.00	V	20.66	40.00	-19.34	PK
95.29	V	13.84	43.50	-29.66	PK
193.22	V	14.52	43.50	-28.98	PK
356.44	V	16.45	46.00	-29.55	PK
713.97	V	25.28	46.00	-20.72	PK
919.17	V	25.16	46.00	-20.84	PK
30.00	H	21.32	40.00	-18.68	PK
99.95	H	13.78	43.50	-29.72	PK
258.51	H	15.65	46.00	-30.35	PK
460.59	H	19.74	46.00	-26.26	PK
707.76	H	23.28	46.00	-22.72	PK
832.12	H	24.31	46.00	-21.69	PK

Operation Mode: TX Channel Low      Test Date : October 9, 2011  
Frequency Range: Above 1GHz      Temperature : 28°C  
Test Result: PASS      Humidity : 65 %  
Measured Distance: 3m      Test By: WOLF

Freq. (MHz)	Ant.Pol. H/V	Emission Level(dBuV)		Limit 3m(dBuV/m)		Over(dB)	
		PK	AV	PK	AV	PK	AV
2405	V	62.4	61.27	114.00	94.00	-51.60	-32.73
4807.69	V	63.13	44.01	74.00	54.00	-10.87	-9.99
7211.53	V	60.20	43.21	74.00	54.00	-13.80	-10.79
9615.38	V	57.34	44.31	74.00	54.00	-16.66	-9.69
2405	H	74.43	74.27	114.00	94.00	-39.57	-19.73
4807.69	H	60.95	42.12	74.00	54.00	-13.05	-11.88
7211.53	H	59.49	43.12	74.00	54.00	-14.51	-10.88
9615.38	H	57.10	44.08	74.00	54.00	-16.90	-9.92

**All emissions not reported were more than 20dB below the specified limit or in the noise floor.**

**Note:** (1) All Readings are Peak Value and AV.  
(2) Emission Level= Reading Level+Probe Factor +Cable Loss.  
(3) Data of measurement within this frequency range shown “ -- ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

Operation Mode: TX Channel Mid Test Date : October 9, 2011  
Frequency Range: 30~1000MHz Temperature : 28°C  
Test Result: PASS Humidity : 65 %  
Measured Distance: 3m Test By: WOLF

Freq. (MHz)	Ant.Pol. H/V	Emission Level (dBuV)	Limit 3m (dBuV/m)	Over (dB)	Note
30.95	V	19.91	40.00	-20.09	PK
94.81	V	14.19	43.50	-29.31	PK
193.89	V	14.31	43.50	-29.19	PK
358.49	V	17.68	46.00	-28.32	PK
712.86	V	25.73	46.00	-20.27	PK
918.00	V	24.89	46.00	-21.11	PK
31.36	H	23.88	40.00	-16.12	PK
97.87	H	14.56	43.50	-28.94	PK
259.53	H	16.15	46.00	-29.85	PK
461.80	H	19.23	46.00	-26.77	PK
708.74	H	23.07	46.00	-22.93	PK
832.96	H	23.86	46.00	-22.14	PK

Operation Mode: TX Channel Mid Test Date : October 9, 2011  
Frequency Range: Above 1GHz Temperature : 28°C  
Test Result: PASS Humidity : 65 %  
Measured Distance: 3m Test By: WOLF

Freq. (MHz)	Ant.Pol. H/V	Emission Level(dBuV)		Limit 3m(dBuV/m)		Over(dB)	
		PK	AV	PK	AV	PK	AV
2440	V	63.18	62.31	114.00	94.00	-50.82	-31.69
4888.32	V	62.52	43.67	74.00	54.00	-11.48	-10.33
7331.53	V	59.35	42.48	74.00	54.00	-14.65	-11.52
9775.38	V	58.69	44.98	74.00	54.00	-15.31	-9.02
2440	H	75.68	74.26	114.00	94.00	-38.32	-19.74
4888.32	H	60.50	41.85	74.00	54.00	-13.50	-12.15
7331.53	H	58.81	42.80	74.00	54.00	-15.19	-11.20
9775.38	H	55.87	43.15	74.00	54.00	-18.13	-10.85

**All emissions not reported were more than 20dB below the specified limit or in the noise floor.**

**Note:** (1) All Readings are Peak Value and AV.  
(2) Emission Level= Reading Level+Probe Factor +Cable Loss.  
(3) Data of measurement within this frequency range shown “ -- ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.



Operation Mode: TX Channel High      Test Date : October 9, 2011  
Frequency Range: 30~1000MHz      Temperature : 28°C  
Test Result: PASS      Humidity : 65 %  
Measured Distance: 3m      Test By: WOLF

Freq. (MHz)	Ant.Pol. H/V	Emission Level (dBuV)	Limit 3m (dBuV/m)	Over (dB)	Note
30.21	V	20.41	40.00	-19.59	PK
96.27	V	13.09	43.50	-30.41	PK
192.84	V	13.47	43.50	-30.03	PK
354.39	V	15.14	46.00	-30.86	PK
715.02	V	22.30	46.00	-23.70	PK
917.91	V	21.45	46.00	-24.55	PK
28.85	H	19.00	40.00	-21.00	PK
102.28	H	13.09	43.50	-30.41	PK
260.29	H	14.53	46.00	-31.47	PK
458.54	H	18.60	46.00	-27.40	PK
709.01	H	21.40	46.00	-24.60	PK
833.35	H	23.52	46.00	-22.48	PK

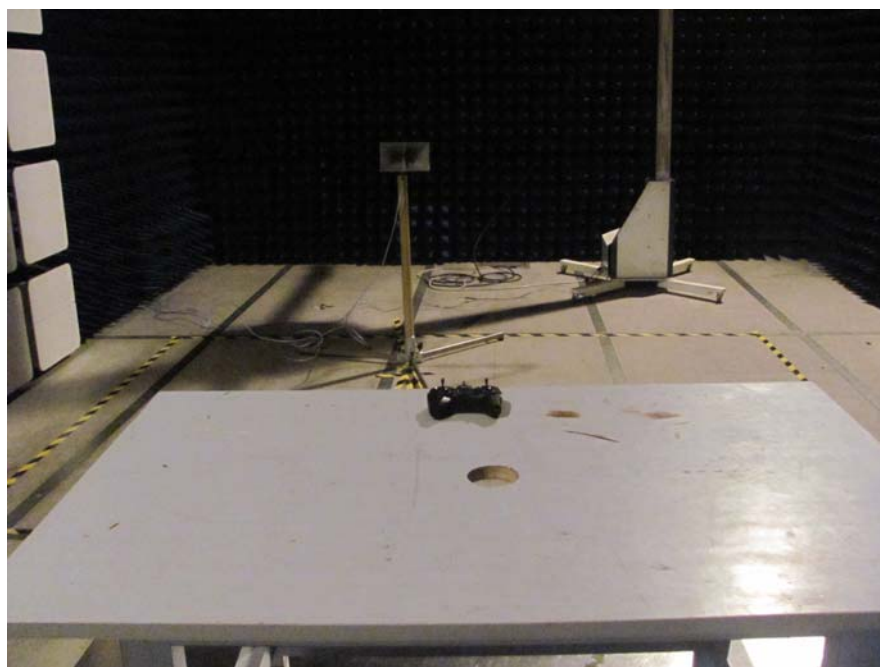
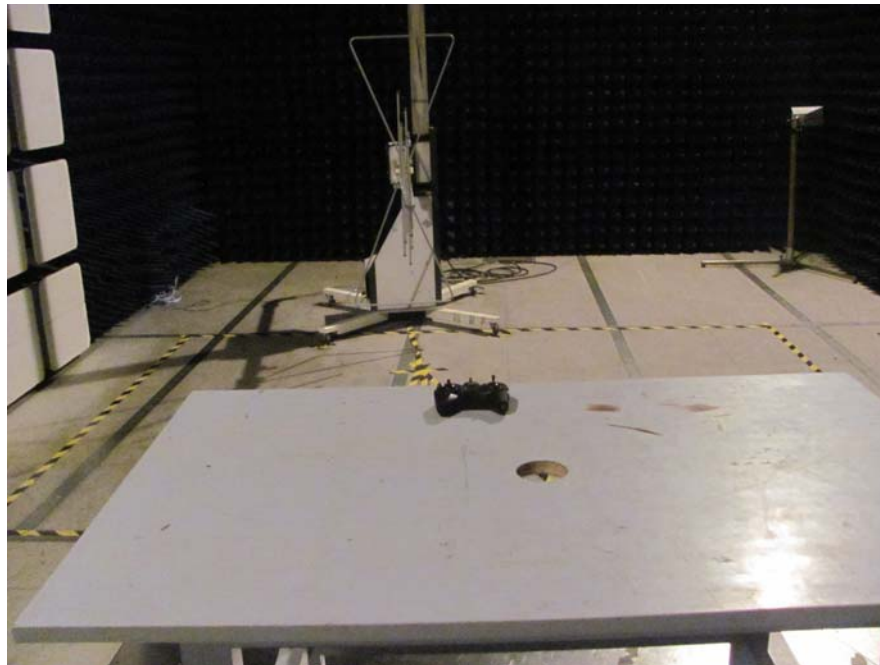
Operation Mode: TX Channel High      Test Date : October 9, 2011  
Frequency Range: Above 1GHz      Temperature : 28°C  
Test Result: PASS      Humidity : 65 %  
Measured Distance: 3m      Test By: WOLF

Freq. (MHz)	Ant.Pol. H/V	Emission Level(dBuV)		Limit 3m(dBuV/m)		Over(dB)	
		PK	AV	PK	AV	PK	AV
2480	V	62.4	61.27	114.00	94.00	-51.60	-32.73
4967.69	V	62.22	43.12	74.00	54.00	-11.78	-10.88
7451.65	V	59.15	42.53	74.00	54.00	-14.85	-11.47
9935.43	V	57.71	43.95	74.00	54.00	-16.29	-10.05
2480	H	74.43	74.27	114.00	94.00	-39.57	-19.73
4967.71	H	61.90	42.41	74.00	54.00	-12.10	-11.59
7451.72	H	60.57	43.95	74.00	54.00	-13.43	-10.05
9935.49	H	56.25	43.52	74.00	54.00	-17.75	-10.48

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

**Note:** (1) All Readings are Peak Value and AV.  
(2) Emission Level= Reading Level+Probe Factor +Cable Loss.  
(3) Data of measurement within this frequency range shown “ -- ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

## 6.6 Radiated Measurement Photos



## **7. Band Edge Test**

### **7.1 Measurement Procedure**

1. The EUT was Operating in hopping mode or could be controlled its channel. Printed out test result from the spectrum by hard copy function.
2. The EUT was placed on a turn table which is 0.8m above ground plane.
3. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
4. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
5. Repeat above procedures until all frequency measured were complete.

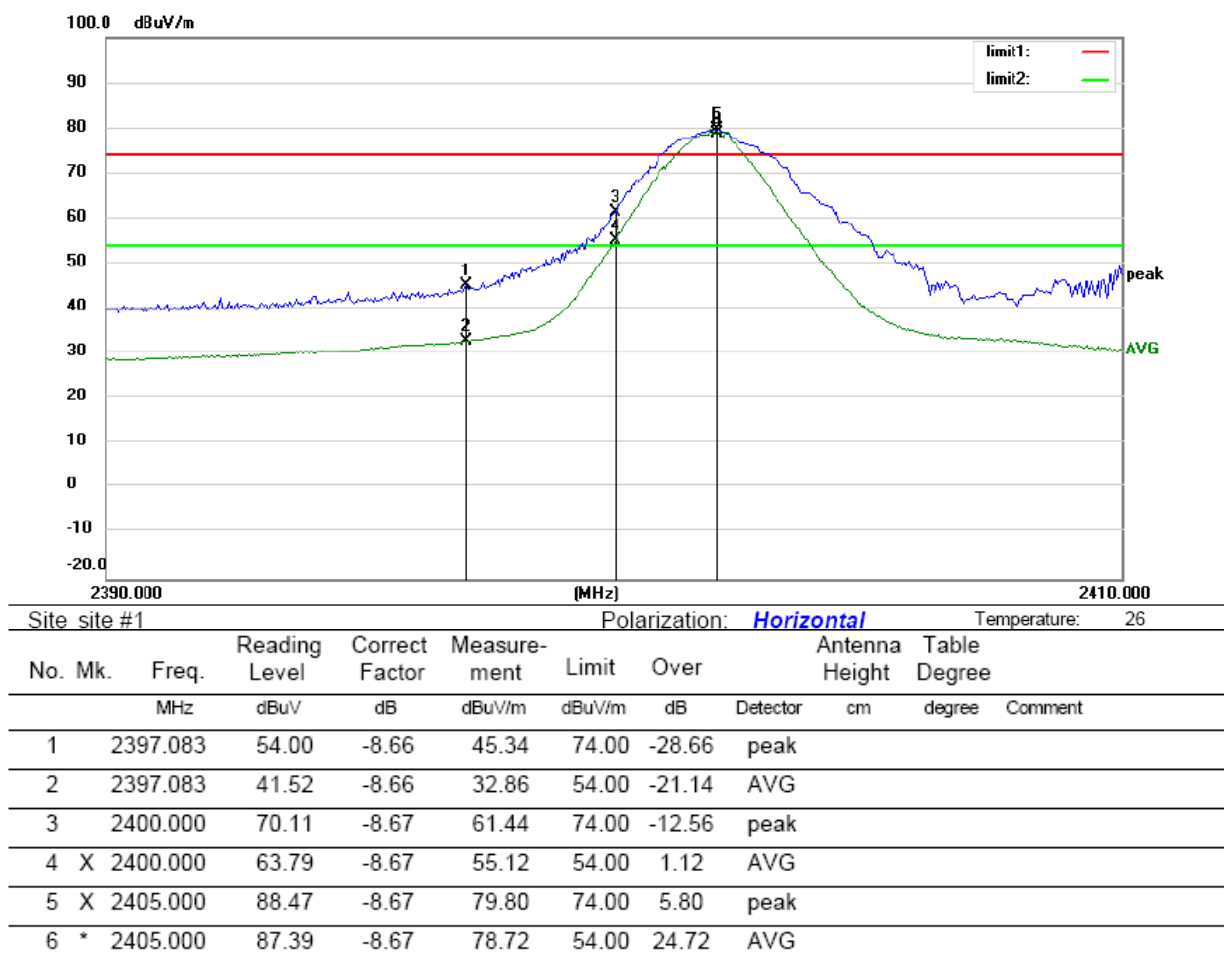
### **7.2 Test SET-UP (Block Diagram of Configuration)**

As 6.2 Test set up (B) and (C)

### **7.3 Measurement Equipment Used**

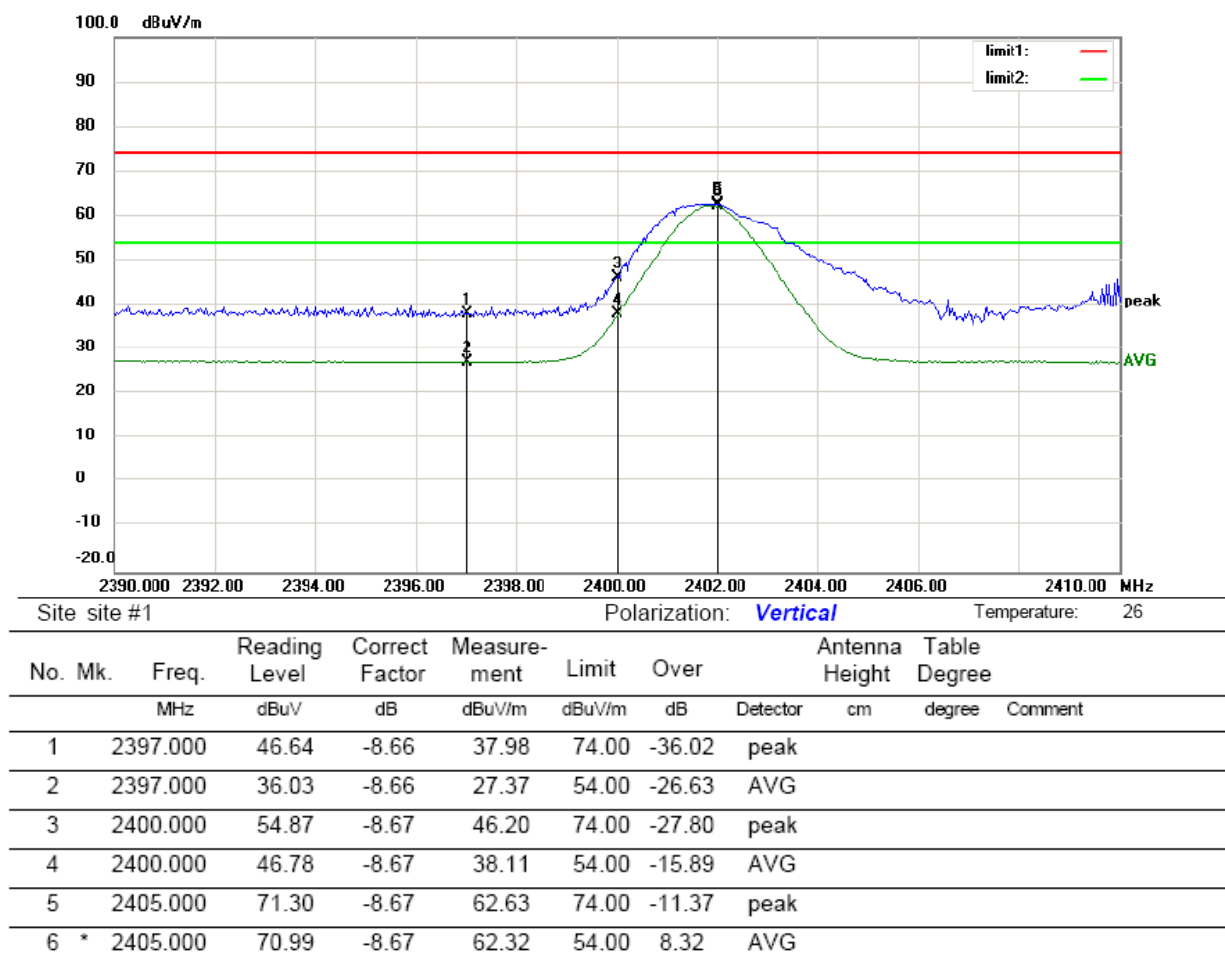
Same as 6.3 Radiated Emission Measurement.

### **7.4 Measurement Results**



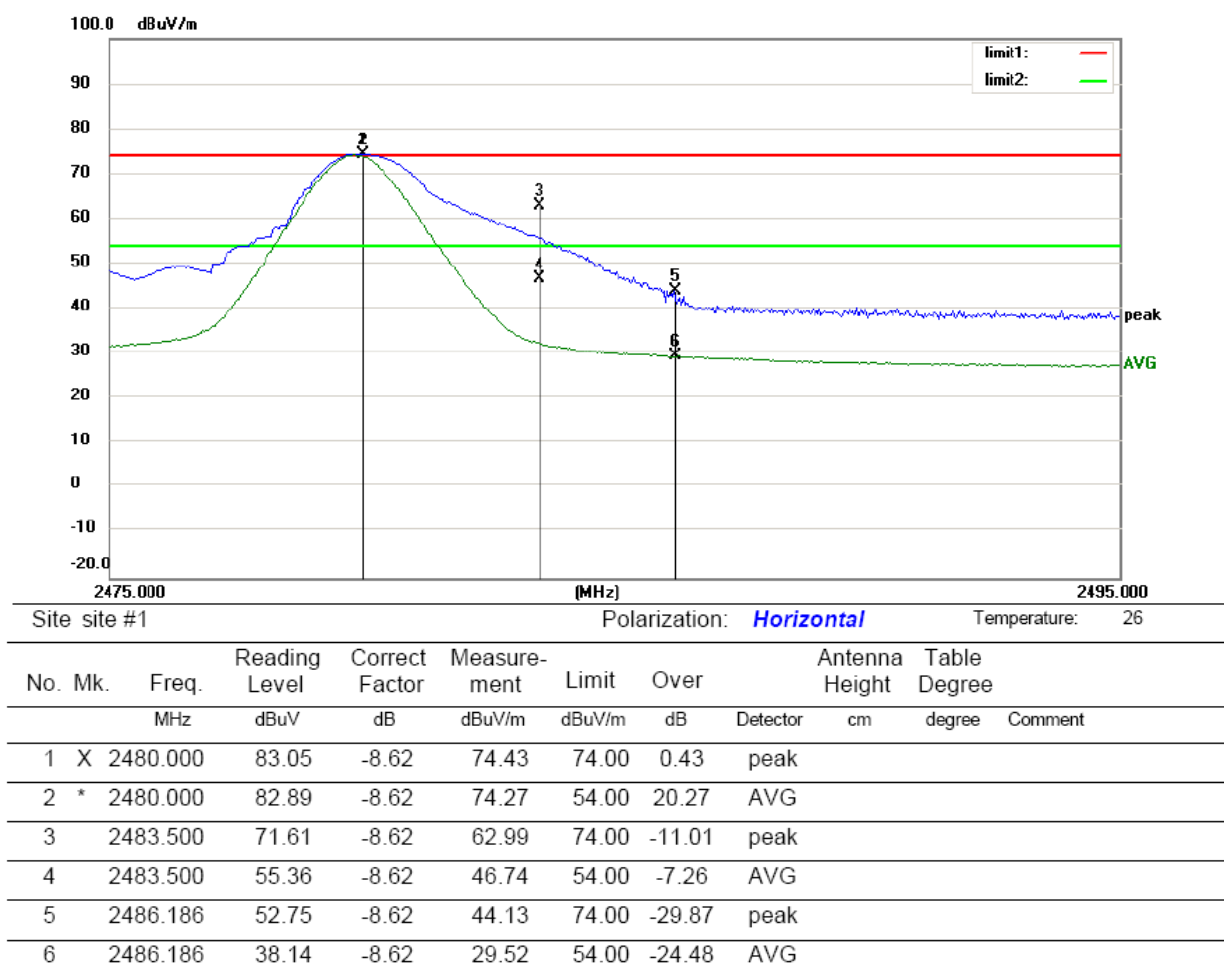
\*:Maximum data x:Over limit !:over margin

Operator: WOLF



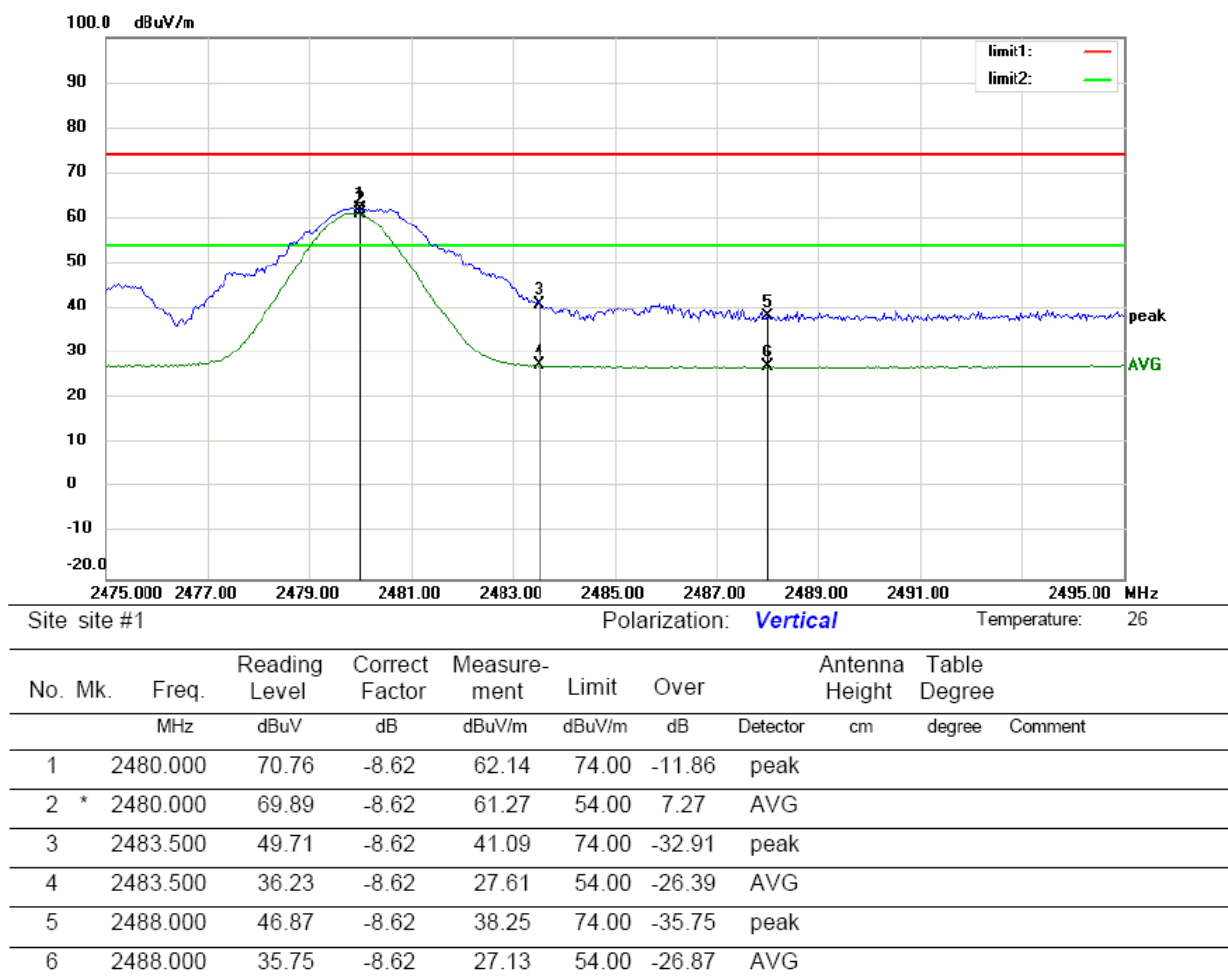
\*:Maximum data x:Over limit !:over margin

Operator: WOLF



\*:Maximum data x:Over limit l:over margin

Operator: WOLF



\*:Maximum data x:Over limit !:over margin

Operator: WOLF

## **8. Antenna Application**

### **12.1 Antenna Requirement**

For intentional device, according to FCC 47 CFR Section 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.

### **12.2 Result**

The EUT'S antenna is PCB Antenna. The antenna's gain is 0dBi and meets the requirement.