

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

*OF*

**Wireless Optical Mouse**

**MODEL No.: FERFXX**

**BRAND NAME: N/A**

**FCC ID: WUAFERFXX**

**REPORT NO: ED09120177-1**

**ISSUE DATE: January 14, 2010**

*Prepared for*  
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## VERIFICATION OF COMPLIANCE

Applicant:	PAWAS Trading Gmbh Nordstrasse 223, CH-8037 Zurich, Switzerland
Product Description:	Wireless Optical Mouse
Brand Name:	N/A
Model Number:	FERFXX
File Number:	ED09120177-1
Date of Test:	December 21, 2009 to January 14, 2010

### We hereby certify that:

The above equipment was tested by DONGGUAN 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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*Nicol Lee / Q.A. Manager*  
**DONGGUAN EMTEK CO., LTD.**

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## 1. General Information

### 1.1 Product Description

The PAWAS Trading GmbH Model: FERFXX (referred to as the EUT in this report) The EUT is an short range, lower power, Wireless Optical Mouse designed as an " Input Device. It is designed by way of utilizing the GFSK modulation achieves the system operating.

A major technical descriptions of EUT is described as following:

- A) Operation Frequency: 2405-2476MHz
- B) Modulation: GFSK
- C) Number of Channel: 32 channels hopping with 2 group form 2.405GHz~2.476GHz
- D) Antenna Designation: Integral
- E) Power Supply: DC 2.4V

Channel frequency:

Frequency Group1		Frequency Group2		Unit
2407	2442	2405	2443	[MHz]
2408	2447	2406	2444	
2412	2451	2409	2446	
2414	2452	2410	2448	
2417	2457	2411	2449	
2420	2458	2413	2453	
2421	2459	2415	2455	
2422	2460	2416	2456	
2427	2461	2418	2462	
2428	2465	2419	2463	
2431	2468	2423	2464	
2435	2469	2425	2466	
2436	2472	2429	2467	
2437	2473	2430	2470	
2438	2475	2432	2471	
2439	2476	2434	2474	

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

This submittal(s) (test report) is intended for FCC ID: WUAFERFXX 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 Shenzhen, 2009,9  
The certificate is valid until 2011,3  
The Laboratory has been assessed according to the requirements ISO/IEC 17025

Accredited by FCC, Nov. 05, 2008  
The Certificate Registration Number is 247565.

Accredited by Industry Canada, May 24, 2008  
The Certificate Registration Number is 46405-4480

#### Name of Firm

: DONGGUAN EMTEK CO., LTD

#### Site Location

: No.281, Guantai Road, Nancheng District,  
Dongguan, 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 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 dB $\mu\text{V/m}$ =20 log (uV/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(dB $\mu\text{V/m}$ )(at 3m)		Class B(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.	Wireless Optical Mouse	N/A	FERFXX	WUAFERFXX	N/A	<b>EUT</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

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

### 4. Description of test modes

The basic operation modes are:

1. Low Channel: TX 2405MHz
2. Middle Channel: TX 2442MHz
3. High Channel: TX 2476MHz

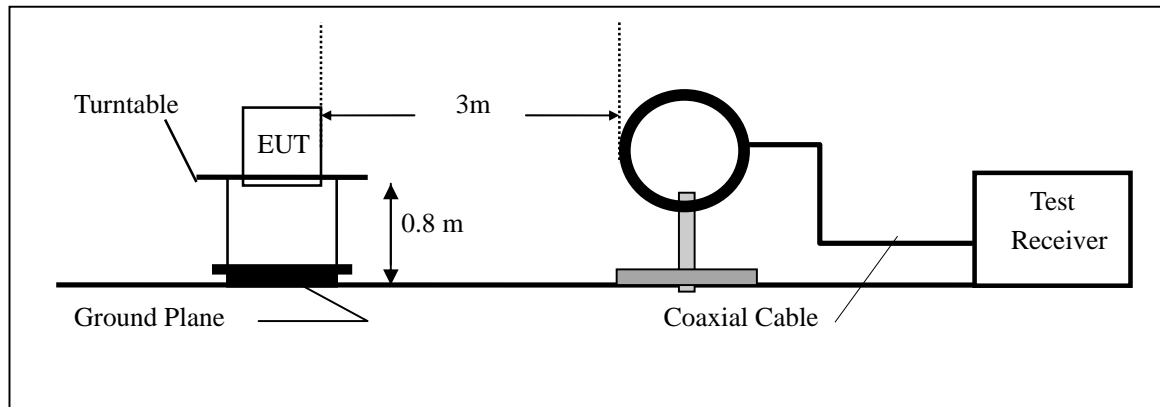
## **5. Radiated Emission Test**

### **5.1 Measurement Procedure**

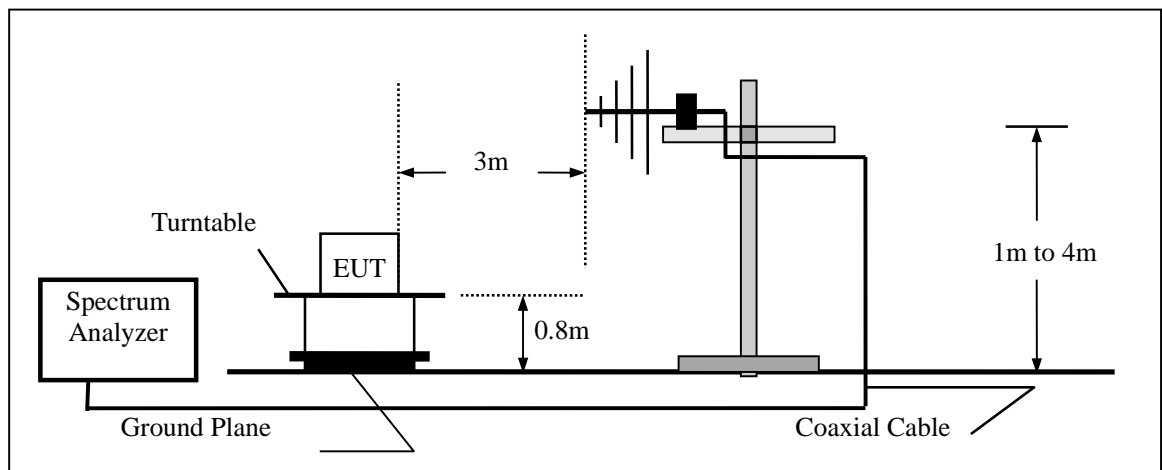
1. The EUT was placed on a turn table which is 0.8m above ground plane.
2. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
3. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
4. Repeat above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

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

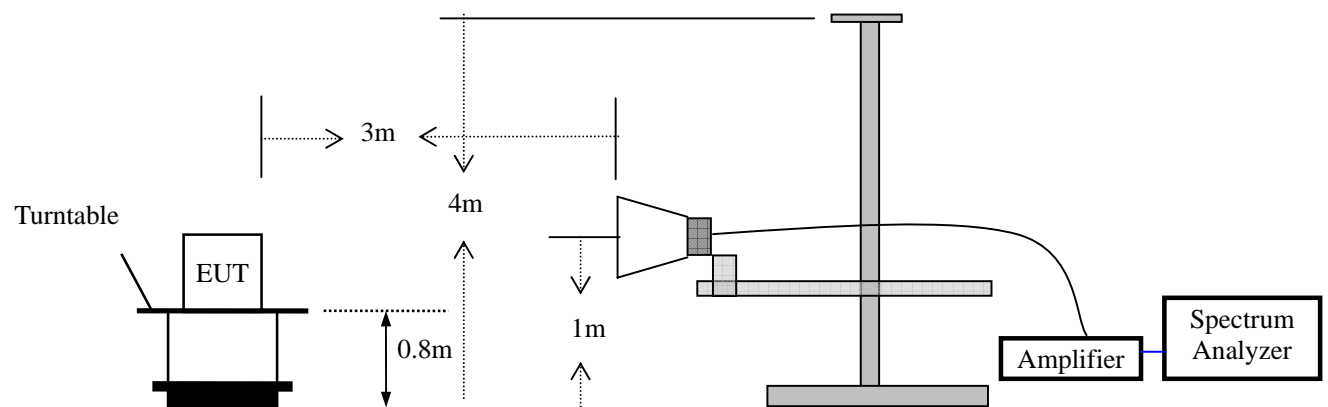
(A) Radiated Emission Test Set-Up, Frequency Below 30MHz



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



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



### 5.3 Measurement Equipment Used:

EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Spectrum Analyzer	Rohde & Schwarz	FSP7	839511/010	05/29/2009	05/29/2010
Spectrum Analyzer	HP	E4407B	839840481	05/29/2009	05/29/2010
EMI Test Receiver	Rohde & Schwarz	ESCS30	828985/018	05/29/2009	05/29/2010
Pre-Amplifier	HP	8447D	2944A07999	05/29/2009	05/29/2010
Bilog Antenna	Schwarzbeck	VULB9163	142	05/29/2009	05/29/2010
Loop Antenna	ARA	PLA-1030/B	1029	05/29/2009	05/29/2010
Horn Antenna	Electro-Metrics	EM-6961	103314	05/29/2009	05/29/2010
Horn Antenna	Schwarzbeck	BBHA 9120	D143	05/29/2009	05/29/2010

### 5.4 Out of Band Radiated Measurement Result

Operation Mode: TX Mode      Test Date : December 27, 2009  
Frequency Range: 30~1000MHz      Temperature : 23 °C  
Test Result: PASS      Humidity : 59 %  
Measured Distance: 3m      Test By: Andy

Freq. (MHz)	Ant.Pol. H/V	Emission Level (dBuV)	Limit 3m (dBuV/m)	Margin (dB)	Note
54.710	V	24.41	40.00	-15.59	QP
64.950	V	27.25	40.00	-12.75	QP
521.61	V	34.91	46.00	-11.09	QP
711.51	V	33.24	46.00	-12.76	QP
49.380	H	26.14	40.00	-13.86	QP
97.440	H	27.81	43.50	-15.69	QP
636.58	H	33.94	46.00	-12.06	QP
720.69	H	36.71	46.00	-9.29	QP

**Note:** (1) All Readings are QP 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.

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

Operation Mode:	TX (2405MHz)	Test Date :	December 27, 2009
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
2.405(F)	V	101.34	83.25	114	94	-12.66	-10.75
4.810	V	61.76	45.52	74	54	-12.24	-8.48
7.215	V	62.94	43.78	74	54	-11.06	-10.22
9.620	V	60.34	44.96	74	54	-13.66	-9.04
12.025	V	58.15	43.62	74	54	-15.85	-10.38
2.405(F)	H	101.23	84.16	114	94	-12.77	-9.84
4.810	H	61.74	42.91	74	54	-12.26	-11.09
7.215	H	58.31	43.27	74	54	-15.69	-10.73
9.620	H	64.84	42.96	74	54	-9.16	-11.04
12.025	H	62.31	41.98	74	54	-11.69	-12.02

**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(2442MHz)	Test Date :	December 27, 2009
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
2.442(F)	V	98.95	82.55	114	94	-15.05	-11.45
4.884	V	61.24	44.14	74	54	-12.76	-9.86
7.326	V	64.56	42.84	74	54	-9.44	-11.16
9.768	V	60.33	38.97	74	54	-13.67	-15.03
12.210	V	57.21	43.24	74	54	-16.79	-10.76
2.442(F)	H	98.97	84.16	114	94	-15.03	-9.84
4.884	H	64.35	45.85	74	54	-9.65	-8.15
7.326	H	63.84	44.96	74	54	-10.16	-9.04
9.768	H	60.02	43.86	74	54	-13.98	-10.14
12.210	H	61.14	39.84	74	54	-12.86	-14.16

**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(2476MHz)	Test Date :	December 27, 2009
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
2.476(F)	V	97.92	81.85	114	94	-16.08	-12.15
4.952	V	62.57	43.27	74	54	-11.43	-10.71
7.428	V	61.96	43.15	74	54	-12.04	-10.85
9.904	V	57.64	42.53	74	54	-16.36	-11.47
12.380	V	58.92	42.13	74	54	-15.08	-11.87
2.476(F)	H	95.84	83.12	114	94	-18.16	-10.88
4.952	H	63.77	42.14	74	54	-10.23	-11.86
7.428	H	58.92	42.52	74	54	-15.08	-11.48
9.904	H	61.35	43.15	74	54	-12.65	-10.85
12.380	H	61.63	42.51	74	54	-12.37	-11.49

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

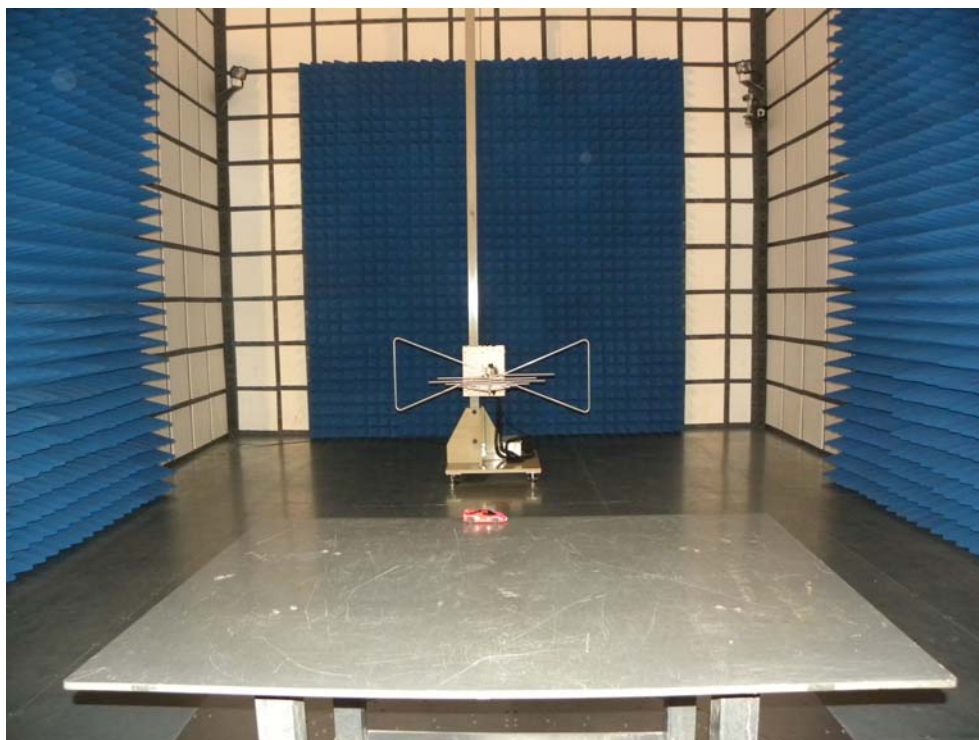
**Note:** (1) All Readings are Peak Value and AV.

(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.



### 5.5 Radiated Measurement Photos:



## **6. Band Edge**

### **6.1 Test limits**

Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in Section 15.209, whichever is the lesser attenuation.

### **6.2 Measurement Procedure**

1. The EUT was placed on a turn table which is 0.8m above ground plane.
2. Set EUT as normal operation.
3. Set SPA Center Frequency=Fundamental frequency, RBW=100KHz, VBW=100KHz.
4. Set SPA Max hold. Mark peak.

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

Same as 5.2 Radiated Emission Measurement.

### **6.4 Measurement Equipment Used:**

Same as 5.3 Radiated Emission Measurement.

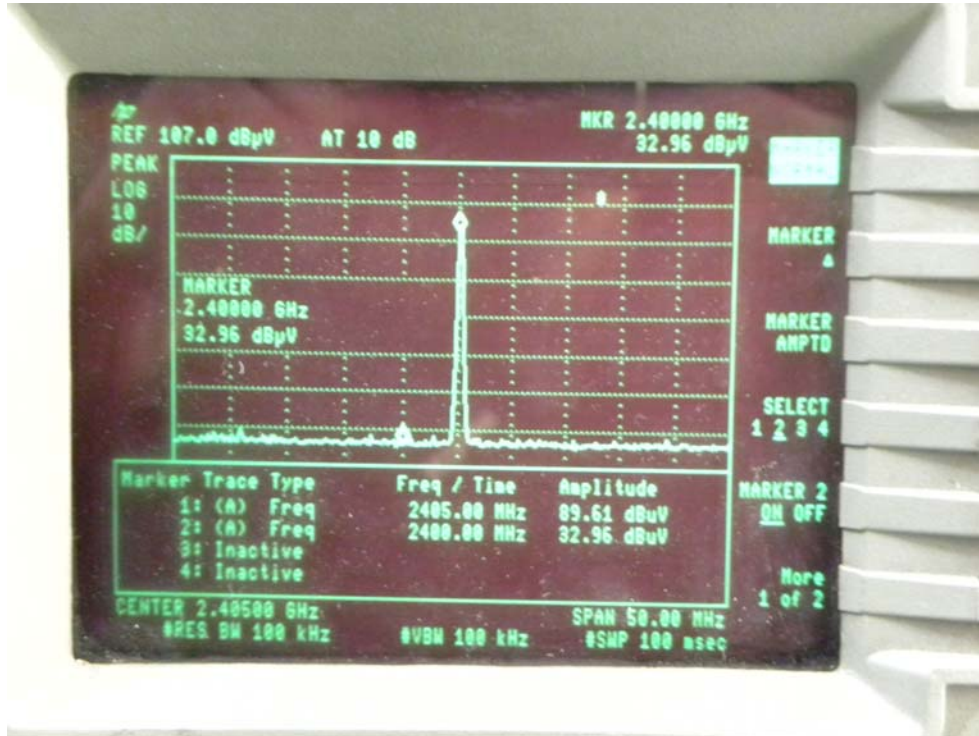
### **6.5 Measurement Results:**

PASS.

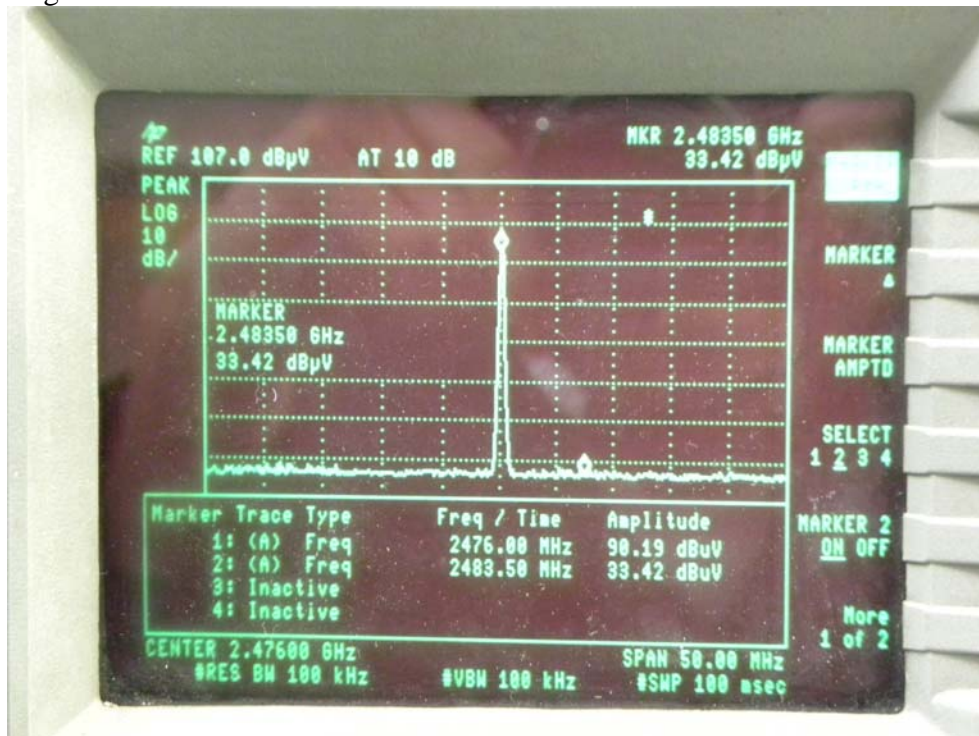
The test plots as following:

## Test Data:

### Low Channel



### High Channel



## **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's antenna used a chip antenna and integrated on PCB , this is permanently attached antenna and meets the requirements of this section.