

# FCC Part 15C

## Measurement And Test Report For

### JIANGXI TONGGU JIANGQIAO TIMBER&BAMBOO INDUSTRY COMPANY. LTD

XIA YAOPU INDUSTRIAL ZONE, TONGGU COUNTY,  
JIANGXI PROVINCE, CHINA

**Model: WQ-93 WQ-100,WQ-110,WQ-N-YZ  
(N can be 00-999,Y can be A~Z,Z can be A~Z)**

Mar.18 ,2011

<b>This Report Concerns:</b> <input checked="" type="checkbox"/> Original Report	<b>Equipment Type:</b> wireless mouse
<b>Report Number:</b>	MTI110302002RF
<b>Test Engineer:</b>	Bill Chen
<b>Reviewed By:</b>	Jason Zheng
<b>Approved &amp; Authorized By:</b>	Hebe Lee
<b>Test Date:</b>	Mar.9-15 ,2011
<b>Prepared By:</b>	<b>MTI Technology Laboratory Ltd.</b> 10F, Yinxing Business Hotel, Xixiang Road, Bao'an District, Shenzhen, P.R.China. Tel: +86-755-8885 0135 Fax: +86-755-8885 0136

**Note:** This test report is limited to the above client company and the product model only. It may not be duplicated without prior written consent of MTI Technology Laboratory Ltd.

## TABLE OF CONTENTS

<b>1. GENERAL INFORMATION.....</b>	<b>3</b>
1.1 PRODUCT DESCRIPTION FOR EQUIPMENT UNDER TEST (EUT) .....	3
1.2 RELATED SUBMITTAL(S) / GRANT (S) .....	3
1.3 TEST METHODOLOGY .....	4
1.4 TEST FACILITY .....	4
<b>2. SYSTEM TEST CONFIGURATION .....</b>	<b>5</b>
2.1 EUT CONFIGURATION.....	5
2.2 EUT EXERCISE .....	5
2.3 GENERAL TEST PROCEDURES .....	5
2.4 LIST OF MEASURING EQUIPMENTS USED .....	6
<b>3. SUMMARY OF TEST RESULTS.....</b>	<b>7</b>
<b>4. ANTENNA REQUIREMENT .....</b>	<b>8</b>
4.1 STANDARD APPLICABLE .....	8
4.2 ANTENNA CONNECTED CONSTRUCTION .....	8
<b>5. §15.205, §15.209, §15.249 (A)- RADIATED EMISSION.....</b>	<b>9</b>
5.1 STANDARD APPLICABLE .....	9
5.2 EUT SETUP .....	9
5.3 TEST EQUIPMENT LIST AND DETAILS .....	10
5.4 TEST PROCEDURE .....	10
5.5 CORRECTED AMPLITUDE & MARGIN CALCULATION.....	11
5.6 TEST RESULT.....	11
<b>6. §15.249(B) OUT OF BAND EMISSIONS.....</b>	<b>16</b>
6.1 LIMITS OF BANDEdge MEASUREMENT .....	16
6.2 TEST EQUIPMENT LIST AND DETAILS .....	16
6.3 TEST PROCEDURE .....	16
6.4 TEST RESULT /PLOTS .....	16
<b>APPENDIX A - PRODUCT LABELING .....</b>	<b>19</b>
PROPOSED FCC ID LABEL FORMAT.....	19
PROPOSED LABEL LOCATION ON EUT .....	19
<b>APPENDIX B - EUT PHOTOGRAPHS .....</b>	<b>20</b>
<b>APPENDIX C - EUT INTERNAL PHOTOGRAPHS.....</b>	<b>21</b>

## 1. GENERAL INFORMATION

### 1.1 Product Description for Equipment Under Test (EUT)

Applicant: JIANGXI TONGGU JIANGQIAO TIMBER&BAMBOO INDUSTRY COMPANY. LTD

Address of applicant: XIA YAOPU INDUSTRIAL ZONE, TONGGU COUNTY, JIANGXI PROVINCE, CHINA

Manufacturer: JIANGXI TONGGU JIANGQIAO TIMBER&BAMBOO INDUSTRY COMPANY. LTD

Address of manufacturer: XIA YAOPU INDUSTRIAL ZONE, TONGGU COUNTY, JIANGXI PROVINCE, CHINA

Equipment Under Test: wireless mouse

Tested Model No.: WQ-93

Supplementary Models No: WQ-100,WQ-110,WQ-N-YZ  
(N can be 00-999,Y can be A~Z,Z can be A~Z )  
Remark: supplementary models are only different in exterior with tested Model and with the same circuit construction

FCC ID:

Type of Modulation: GFSK

Antenna Type: Integral Antenna

Frequency Band: 2402~2480 MHz

Rated Power: <10mW

Power Supply: DC 3V (Tx); USB 5V (Rx)

Remark: \* The test data gathered are from the production sample provided by the manufacturer.

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

This submittal(s) is a test report based on the Electromagnetic Interference (EMI) tests performed on the EUT. The EMI measurements were performed according to the measurement procedure described in ANSI C63.4 - 2003.

The tests were performed in order to determine compliance with FCC Part 15, Subpart C, and section 15.203, 15.209, and 15.249 rules.

### **1.3 Test Methodology**

Both conducted and radiated testing were performed according to the procedures in ANSI C63.4 - 2003, American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the range of 9 kHz to 40 GHz. Radiated testing was performed at an antenna to EUT distance 3 meters.

### **1.4 Test Facility**

All measurement required was performed at laboratory of MTI Technology Laboratory Ltd. at 10F, Yinxing Business Building, Xixiang Road, Bao'an District, Shenzhen, P.R.China.

The test facility is recognized, certified, or accredited by the following organizations:

#### **FCC – Registration No.: 167003**

MTI Technology Laboratory 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 167003, May 04, 2009.

## **2. SYSTEM TEST CONFIGURATION**

The tests documented in this report were performed in accordance with ANSI C63.4-2003 and FCC CFR 47 Part 15 Subpart C.

### **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 that intends to maximize its emission characteristics in a continuous normal application.

### **2.2 EUT Exercise**

The calibrated antennas used to sample the radiated field strength are mounted on a non-conductive, motorized antenna mast 3 or 10 meters from the leading edge of the turntable.

### **2.3 General Test Procedures**

**Conducted Emissions** The EUT is placed on the turntable, which is 0.8 m above ground plane. According to the requirements in Section 7.1 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 detector mode.

**Radiated Emissions** The EUT is placed on the turntable, which is 0.8 m above ground plane. The turntable 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 maximum emissions, exploratory radiated emission measurements were made according to the requirements in Section 13.1.4.1 of ANSI C63.4-2003.

## 2.4 List of Measuring Equipments Used

Items	Equipment	Manufacturer	Model No.	Serial No.	Last Cal	Calibration Period
1	EMI Test Receiver	ROHDE & SCHWARZ	ESI 26	100079	2010/11	1 year
2	Horn Antenna	R/S	CH14-H052	1091698	2010/11	1 year
3	3m Semi- Anechoic Chamber	ETS	N/A	N/A	2010/11	1 year
1	EMI Test Receiver	ROHDE & SCHWARZ	ESCS30	100038	2010/11	1 year
2	EMI Test Receiver	ROHDE & SCHWARZ	ESI 26	100009	2010/11	1 year
3	Receiver/ Spectrum Analyzer	ROHDE & SCHWARZ	ESCI	100106	2010/11	1 year
4	Spectrum Analyzer	Agilent	E7405A	US41160415	2010/11	1 year
5	Artificial Mains	ROHDE & SCHWARZ	ESH2-Z5	100028	2010/11	1 year
6	Pulse Limiter	ROHDE & SCHWARZ	ESHSZ2	100044	2010/11	1 year
7	LISN	COM Power	LI-200	12212	2010/11	1 year
8	LISN	COM Power	LI-200	12019	2010/11	1 year
9	3m/5m Semi- Anechoic Chamber	ETS	N/A	N/A	2010/11	1 year
10	Ultra-Broadband Antenna	R/S	HL562	100015	2010/11	1 year
11	Horn Antenna	R/S	HF906	100039	2010/11	1 year
12	RF Test Panel	R/S	TS / RSP	335015/ 0017	N/A	N/A
13	Turntable	ETS	2088	2149	N/A	N/A
14	Antenna Mast	ETS	2075	2346	N/A	N/A

### 3. SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Result
15.203	Antenna Requirement	Pass
15.205	Restricted Band of Operation	Pass
15.209	Radiated Emission	Pass
15.249(a)	Field Strength	Pass
15.249(d)	Out of Band Emission	Pass

## **4. ANTENNA REQUIREMENT**

### **4.1 Standard Applicable**

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. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this Section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

### **4.2 Antenna Connected Construction**

This product has a permanent antenna, fulfill the requirement of this section.

## 5. §15.205, §15.209, §15.249 (a)- RADIATED EMISSION

### 5.1 Standard Applicable

According to §15.249(a), the field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following:

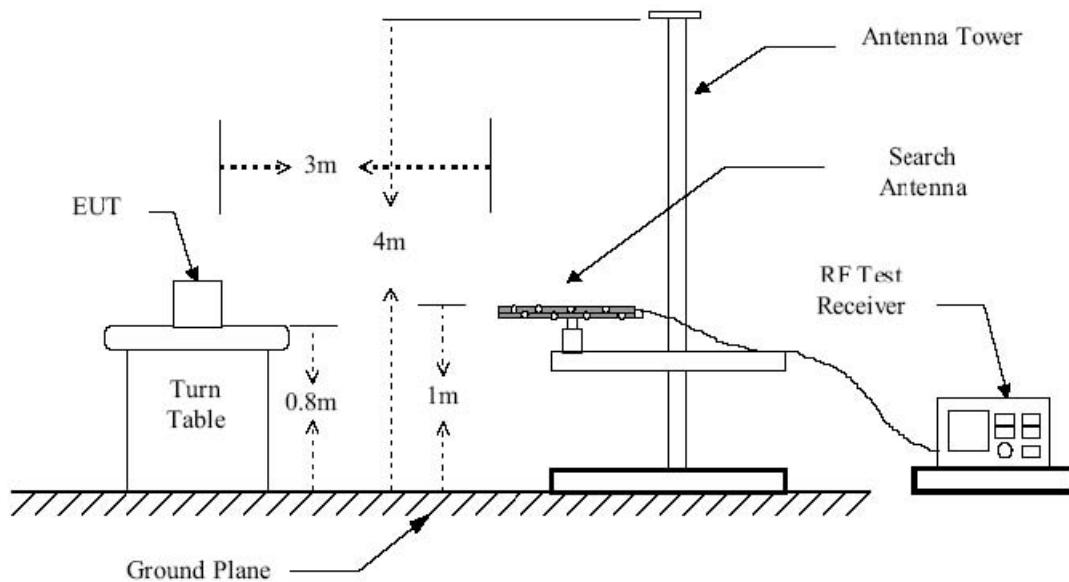
Fundamental Frequency	Field strength of fundamental (milli-volts/meter)	Field strength of fundamental (micro-volts/meter)
902-928 MHz	50	500
2400-2483.5 MHz	50	500
5725-5875 MHz	50	500
24.0-24.25 GHz	250	2500

The emission limit in this paragraph is based on measurement instrumentation employing an average detector. The provisions in §15.35 for limiting peak emissions apply.

EMISSIONS RADIATED OUTSIDE OF THE SPECIFIED FREQUENCY BANDS, EXCEPT FOR HARMONICS, SHALL BE ATTENUATED BY AT LEAST 20 dB BELOW THE LEVEL OF THE FUNDAMENTAL OR TO THE GENERAL RADIATED EMISSION LIMITS IN 15.209, WHICHEVER IS THE LESSER ATTENUATION.

Emissions that fall in the restricted bands (15.205) must be less than 54dB<sub>UV</sub>/m otherwise the spurious and harmonics must be attenuated by at least 20dB.

### 5.2 EUT Setup



### **5.3 Test Equipment List and Details**

See section 2.4.

### **5.4 Test Procedure**

1. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
2. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
3. The antenna is a broadband antenna, and its height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
4. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
5. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
6. If the emission level of the EUT in peak mode was 10 dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10 dB margin would be re-tested one by one using the quasi-peak method or average method as specified and then reported in Data sheet peak mode and QP mode.

**NOTE:**

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and video bandwidth is 3MHz for Peak detection at frequency above 1GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 10Hz for Average detection (AV) at frequency above 1GHz.

## 5.5 Corrected Amplitude & Margin Calculation

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

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

The "Margin" column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of -6dB $\mu$ V means the emission is 6dB $\mu$ V below the maximum limit for Class B. The equation for margin calculation is as follows:

$$\text{Margin} = \text{Corr. Ampl.} - \text{FCC Part 15 Limit}$$

## 5.6 Test Result

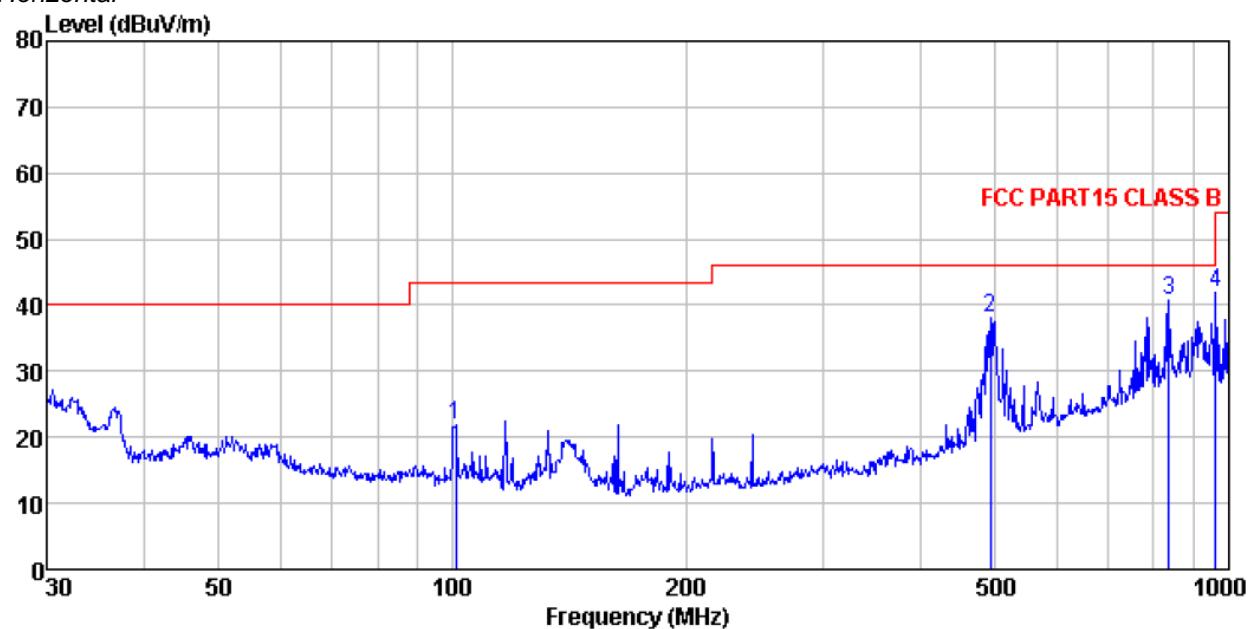
According to the data below, the FCC Part 15.205, 15.209 and 15.249 standards, and had the worst margin of:

**-4.30 dB $\mu$ V at 2402 MHz in the Horizontal polarization, 30 MHz to 25 GHz, 3Meters**

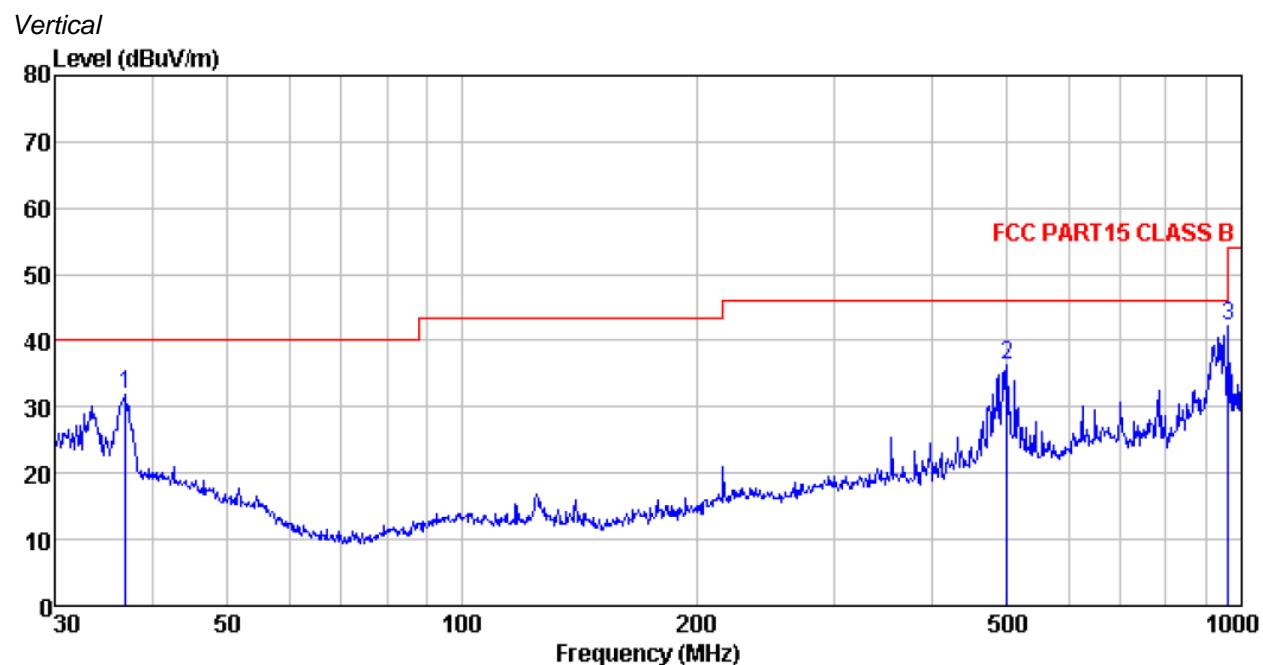
***Note: this EUT was tested in 3 orthogonal positions and the worst case position data was reported.***

**Plot of Radiation Emissions Test**

Transmitting below 1GHz- Low CH  
Horizontal



Freq	ReadAntenna		Cable Preamp		Limit Level	Line dBm/m	Over Limit dB	Remark
	MHz	dBm	dB/m	dB				
1	100.93	34.93	12.71	1.16	26.86	21.94	43.50	-21.56 Peak
2	492.47	45.45	17.14	2.39	26.92	38.06	46.00	-7.94 Peak
3	836.24	39.69	24.08	3.21	26.17	40.81	46.00	-5.19 Peak
4	962.16	39.90	24.96	3.43	26.35	41.94	54.00	-12.06 Peak



Freq	Read	Antenna	Cable	Preamp	Limit	Line	Over	Limit	Remark
	MHz	dBm	dB/m	dB					
1	37.02	39.69	18.64	0.63	27.04	31.92	40.00	-8.08	Peak
2	499.42	39.47	21.19	2.40	26.90	36.16	47.00	-10.84	Peak
3	962.16	39.18	26.04	3.43	26.35	42.30	47.00	-4.70	Peak

### Spurious Emission Above 1GHz

Frequency MHz	Detector	Meter Reading dBuV	Direction Degree	Polar H / V	Antenna Loss dB	Cable loss dB	Amplifier dB	Correction Amplitude dBuV/m	Limit dBuV/m	Margin dB
Low CH										
4804.0	AV	30.6	240	V	34.1	5.2	33.0	36.9	54	-17.1
4804.0	AV	33.5	341	H	34.1	5.2	33.0	39.8	54	-14.2
4804.0	PK	42.9	177	V	34.1	5.2	33.0	49.2	74	-24.8
4804.0	PK	45.7	28	H	34.1	5.2	33.0	52.0	74	-22.0
7287.0	AV	28.2	325	V	37.4	6.1	33.5	38.2	54	-15.8
7287.0	AV	32.3	159	H	37.4	6.1	33.5	42.3	54	-11.7
7287.0	PK	39.8	77	V	37.4	6.1	33.5	49.8	74	-24.2
7287.0	PK	43.6	267	H	37.4	6.1	33.5	53.6	74	-20.4
2402.0	AV	88.5	122	V	29.1	3.7	34.0	87.3	94	-6.7
2402.0	AV	90.9	32	H	29.1	3.7	34.0	89.7	94	-4.3
2402.0	PK	99.9	45	V	29.1	3.7	34.0	98.7	114	-15.3
2402.0	PK	102.5	115	H	29.1	3.7	34.0	101.3	114	-12.7
Middle CH										
4882.0	AV	31.1	90	V	34.1	5.2	33.0	37.4	54	-16.6
4882.0	AV	32.8	8	H	34.1	5.2	33.0	39.1	54	-14.9
4882.0	PK	42.9	134	V	34.1	5.2	33.0	49.2	74	-24.8
4882.0	PK	46.7	45	H	34.1	5.2	33.0	53.0	74	-21.0
7323.0	AV	29.4	78	V	37.4	6.1	33.5	39.4	54	-14.6
7323.0	AV	31.7	315	H	37.4	6.1	33.5	41.7	54	-12.3
7323.0	PK	41.0	43	V	37.4	6.1	33.5	51.0	74	-23.0
7323.0	PK	43.7	67	H	37.4	6.1	33.5	53.7	74	-20.3
2441.0	AV	88.2	133	V	29.1	3.7	34.0	87.0	94	-7.0
2441.0	AV	90.1	78	H	29.1	3.7	34.0	88.9	94	-5.1
2441.0	PK	99.6	23	V	29.1	3.7	34.0	98.4	114	-15.6
2441.0	PK	101.0	110	H	29.1	3.7	34.0	99.8	114	-14.2
High CH										
4960.0	AV	31.9	67	V	34.1	5.2	33.0	38.2	54	-15.8
4960.0	AV	35.1	331	H	34.1	5.2	33.0	41.4	54	-12.6
4960.0	PK	43.5	90	V	34.1	5.2	33.0	49.8	74	-24.2
4960.0	PK	47.6	61	H	34.1	5.2	33.0	53.9	74	-20.1
7440.0	AV	31.6	44	V	37.4	6.1	33.5	41.6	54	-12.4
7440.0	AV	32.9	67	H	37.4	6.1	33.5	42.9	54	-11.1
7440.0	PK	43.4	68	V	37.4	6.1	33.5	53.4	74	-20.6
7440.0	PK	45.1	10	H	37.4	6.1	33.5	55.1	74	-18.9
2480.0	AV	86.8	23	V	29.1	3.7	34.0	85.6	94	-8.4
2480.0	AV	89.2	321	H	29.1	3.7	34.0	88.0	94	-6.0
2480.0	PK	98.5	67	V	29.1	3.7	34.0	97.3	114	-16.7
2480.0	PK	99.8	94	H	29.1	3.7	34.0	98.6	114	-15.4

Note: Testing is carried out with frequency rang 30MHz to the tenth harmonics, which above 4th Harmonics is close to the noise base even antenna close up to 1meter distance according the measurement of ANSI C63.4. Emissions 20dB lower than the limit are not reported.

## 6. §15.249(b) OUT OF BAND EMISSIONS

### 6.1 Limits of bandedge Measurement

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 §15.209, whichever is the lesser attenuation.

### 6.2 Test Equipment List and Details

See section 2.4.

### 6.3 Test Procedure

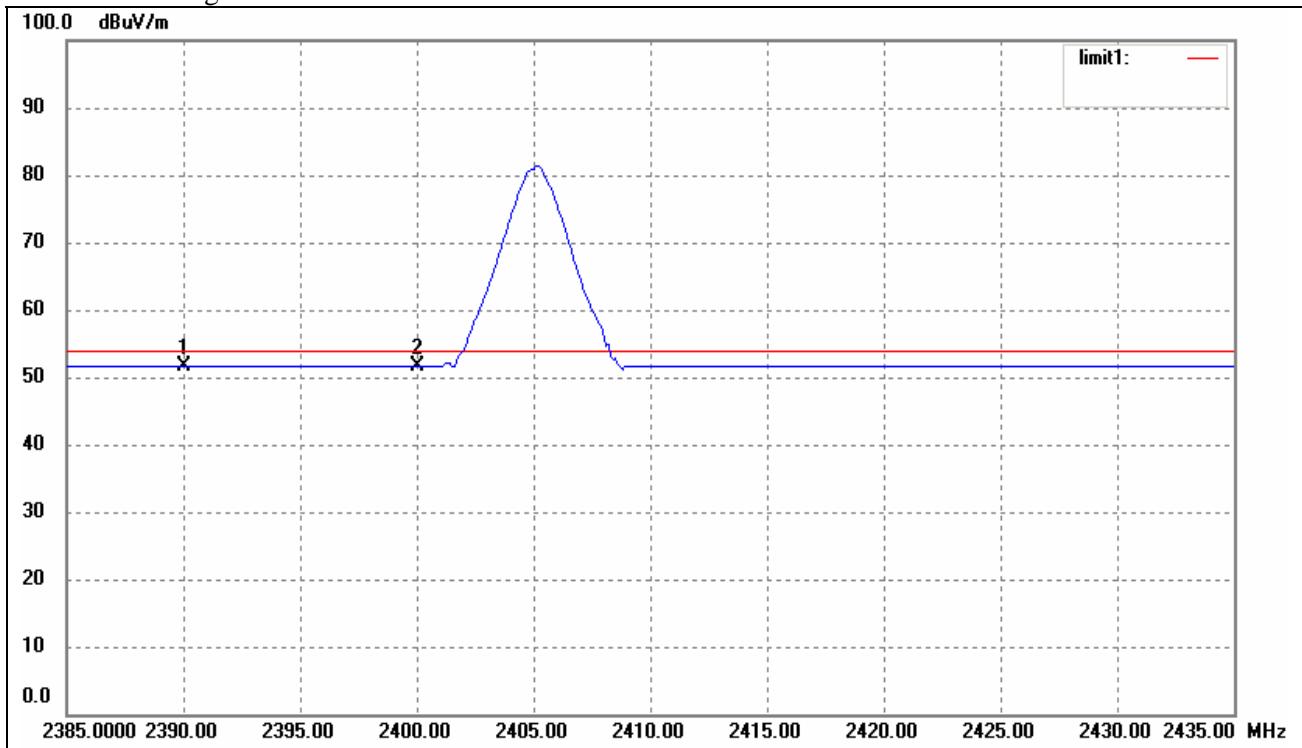
As the radiation test, set the Lowest and Highest Transmitting Channel, observed the outside band of 2400MHz to 2483.5MHz, than mark the higher-level emission for comparing with the FCC rules.

### 6.4 Test Result /Plots

Frequency MHz	Limit dBuv	Result
Low Edge	<54	Pass
High Edge	<54	Pass

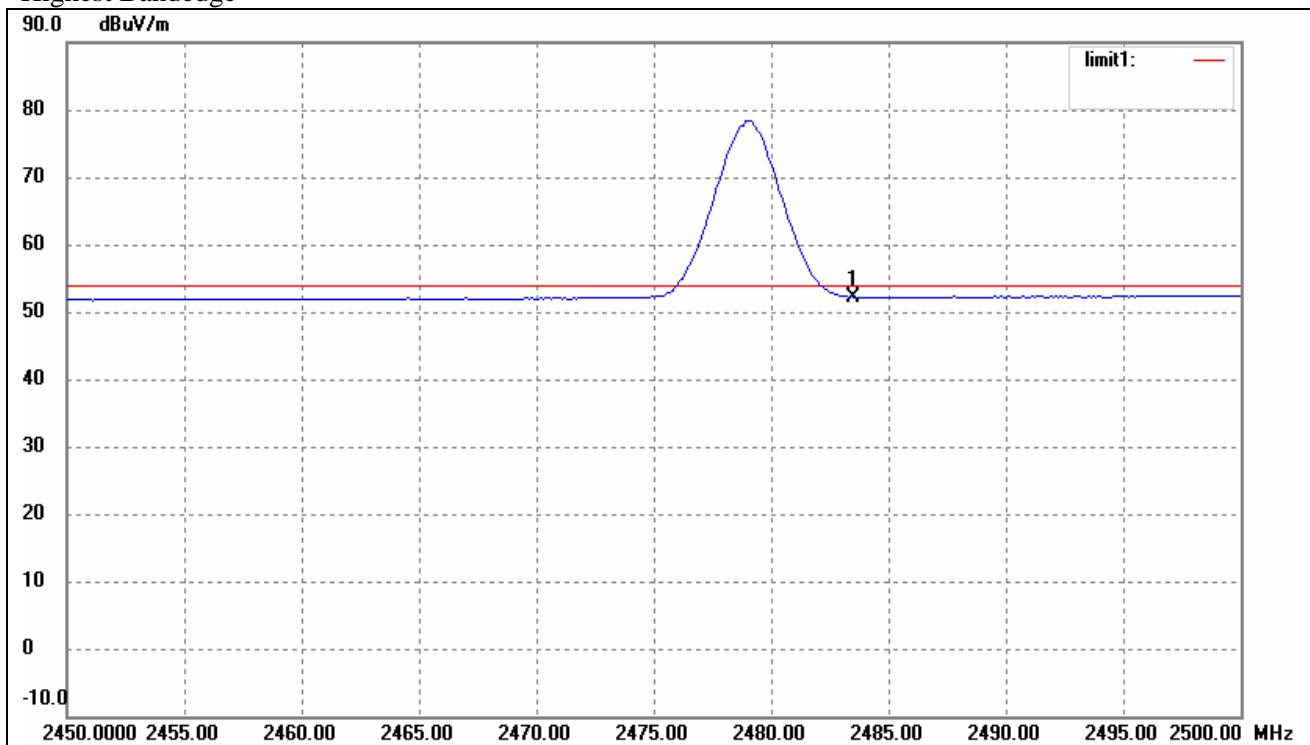
The edge emissions are below the FCC 15.209 Limits. Please refer to the test plots below.

Lowest Bandedge



No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2390.000	11.98	39.66	51.64	54.00	-2.36	Average Detector
	2390.000	22.09	39.66	61.75	74.00	-12.25	Peak Detector
2	2400.000	11.82	39.76	51.58	/	/	Average Detector

### Highest Bandedge



No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2483.500	12.07	40.18	52.25	54.00	-1.75	Average Detector
	2483.500	22.86	40.18	63.04	74.00	-10.96	Peak Detector

## APPENDIX A - PRODUCT LABELING

---

### Proposed FCC ID Label Format

**FCC ID: ZEQJQMOUSE**

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.

Specifications: Text is Black in color and justified. Labels are printed in indelible ink on permanent adhesive silk-screened onto the EUT or shall be affixed at a conspicuous location on the EUT.

### Proposed Label Location on EUT



## APPENDIX B - EUT PHOTOGRAPHS

---

### EUT - Front View



### EUT - Rear View



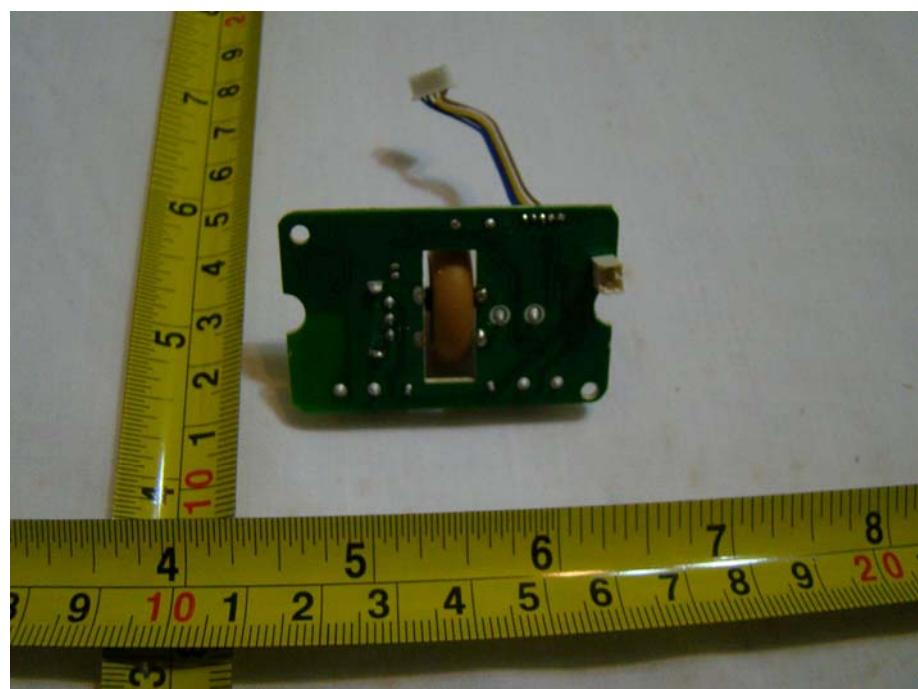
## APPENDIX C - EUT INTERNAL PHOTOGRAPHS

---

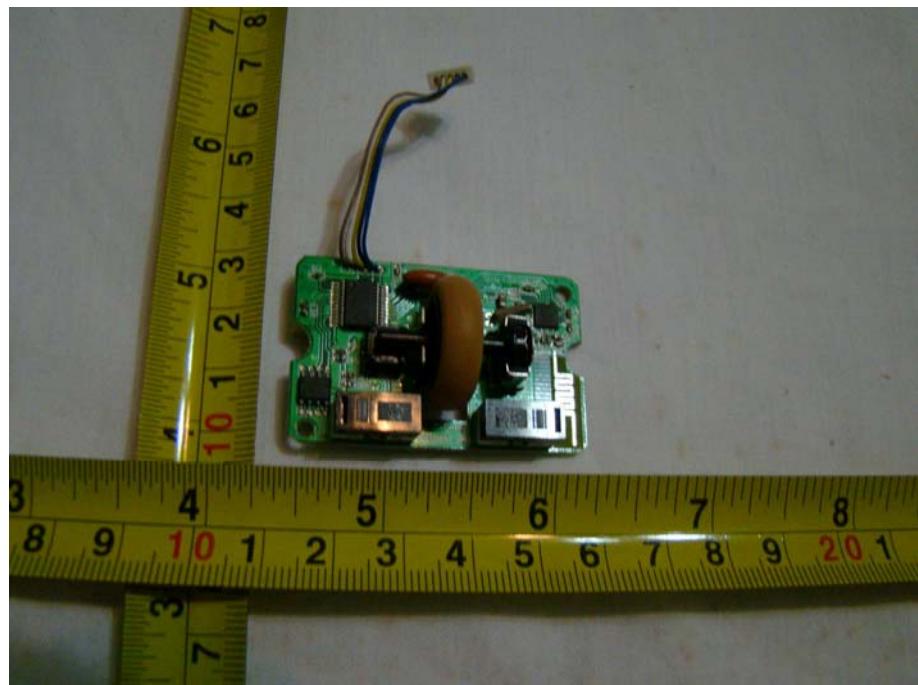
### EUT – Open View



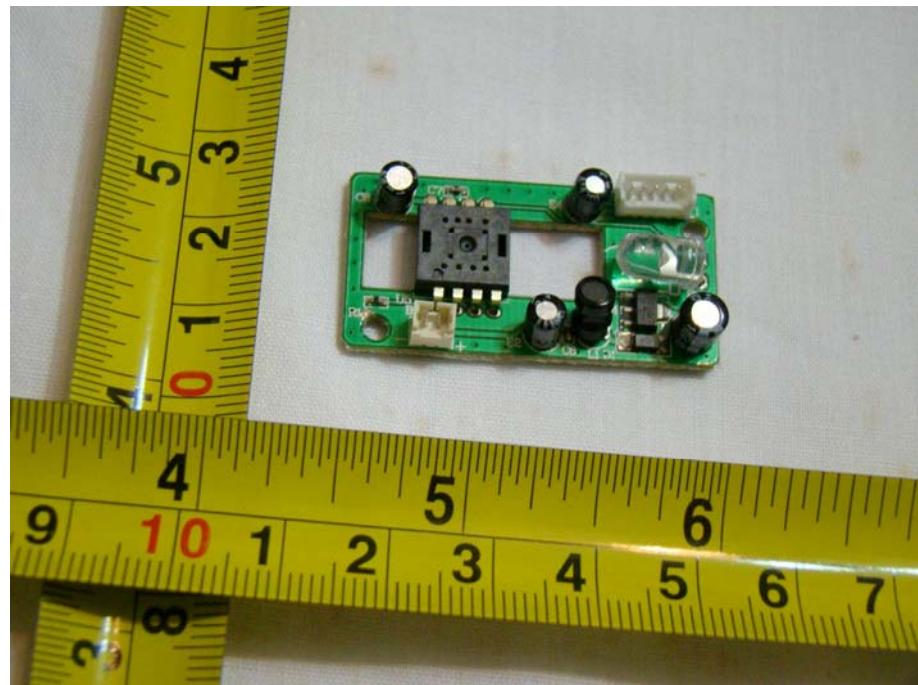
### EUT – PCB View 1



## EUT – PCB View 2



## EUT – PCB View 3



## EUT – PCB View 4

