

# ***FCC TEST REPORT***

**FCC ID** : P5A-BL0002

**Applicant** : **Areson Technology Corporation**  
12F, No.111-6, Hsing-De Rd. SanChung, Taipei Hsien, Taiwan

**Equipment Under Test (EUT) :**


Product description : Wireless Mouse

Model No. : L122

**Standards** : FCC 15 Subpart C Paragraph 15.227

**Date of Test** : March 7, 2007

**Test Engineer** : Tiger Su

**Reviewed By** : 

PERPARED BY:

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### 3 Test Summary

<b>Test</b>	<b>Test Requirement</b>	<b>Test Method</b>	<b>Class / Severity</b>	<b>Result</b>
Radiated Emission (25MHz to 1GHz)	FCC PART 15: 2003	ANSI C63.4: 2003	Class B	PASS
Conducted Emission (150KHz to 30MHz)	FCC PART 15: 2003	ANSI C63.4: 2003	Class B	N/A

## **4 General Information**

### **4.1 Client Information**

Applicant: **Areson Technology Corporation**  
Address of Applicant: 12F, No.111-6, Hsing-De Rd. SanChung, Taipei Hsien, Taiwan  
Manufacturer: **Areson Technology Corporation**  
Address: 12F, No.111-6, Hsing-De Rd. SanChung, Taipei Hsien, Taiwan

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

Product description: Wireless Mouse  
Model No.: L122

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

Power Supply: DC 3V Battery

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

The EUT has been tested as an independent device unit.

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

The customer requested FCC tests for a Wireless Mouse. The standards used were FCC 15 Paragraph 15.227, Paragraph 15.205, Paragraph 15.209, 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:

- **FCC – Registration No.: 97379**

Shenzhen Academy Of Metrology and Quality Inspection 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 97379, April 20, 2006.

#### **4.7 Test Location**

All Emissions tests were performed at:-

Bldg, of Metrology and Quality Inspection , Longzhu Road , Nanshan District , Shenzhen , Guangdong , China

## 5 Equipment Used during Test

<b>Conducted Emission Test</b>						
<b>Item</b>	<b>Test Equipment</b>	<b>Manufacturer</b>	<b>Model No.</b>	<b>Serial No.</b>	<b>Cal. Date</b>	<b>Due date</b>
1	CE Variac	GZ Debao Factory	TS/DGC <sub>2</sub> -5	N/A	N/A	N/A
2	LISN	SCHAFFNER CHASE	MNZ050D 11	100002	18-11-2006	17-11-2007
3	Shielding Room	Frankonia	12 x 4 x 4 m <sup>3</sup>	N/A	N/A	N/A
4	EMI Receiver	ROHDE & SCHWARZ	ESCS30	830245/009	18-11-2006	17-11-2007
5	Coaxial Cable	SMQ	2m	N/A	18-11-2006	17-11-2007
<b>Radiated Emission Test</b>						
<b>Item</b>	<b>Test Equipment</b>	<b>Manufacturer</b>	<b>Model No.</b>	<b>Serial No.</b>	<b>Cal. Date</b>	<b>Due date</b>
1	3m Semi- Anechoic Chamber	Albatross Projects	9X6X6	N/A	18-11-2006	17-11-2007
2	EMI Test Receiver	ROHDE & SCHWARZ	ESCS30	830245/009	18-11-2006	17-11-2007
3	EMI Test Software	ROHDE & SCHWARZ	ES-K1	N/A	N/A	N/A
4	Coaxial cable	SMQ	N/A	N/A	18-11-2006	17-11-2007
5	Bilog Antenna	Chase	CBL6112B	2591	18-11-2006	17-11-2007
6	Horn Antenna	ROHDE & SCHWARZ	HF906	100014	18-11-2006	17-11-2007
7	Loop Antenna	R&S	6108	N/A	18-11-2006	17-11-2007
<b>Common Used Equipment</b>						
<b>Item</b>	<b>Test Equipment</b>	<b>Manufacturer</b>	<b>Model No.</b>	<b>Series No.</b>	<b>Cal. Date</b>	<b>Due date</b>
1	Temperature, Humidity & Barometer	OREGON SCIENTIFIC	BA-888	EMC0001 to EMC0004	11-11-2006	10-11-2007
2	DMM	FLUKE	73	70681569 or 70671122	11-11-2006	10-11-2007

## 6 Conducted Emission Test

Product Name: Wireless Mouse  
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.

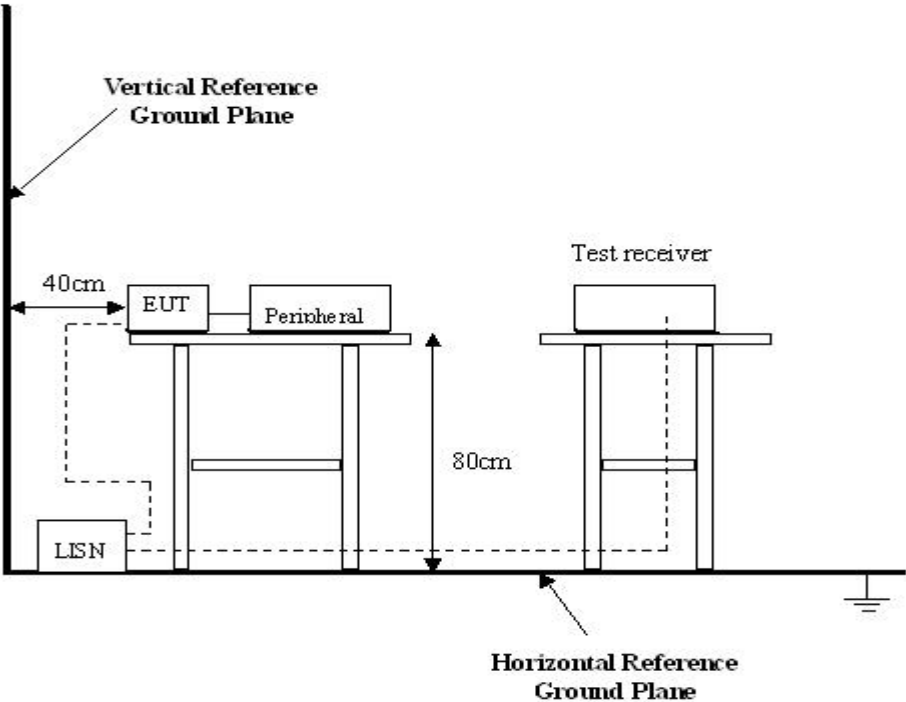
### 6.2 Test Procedure

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

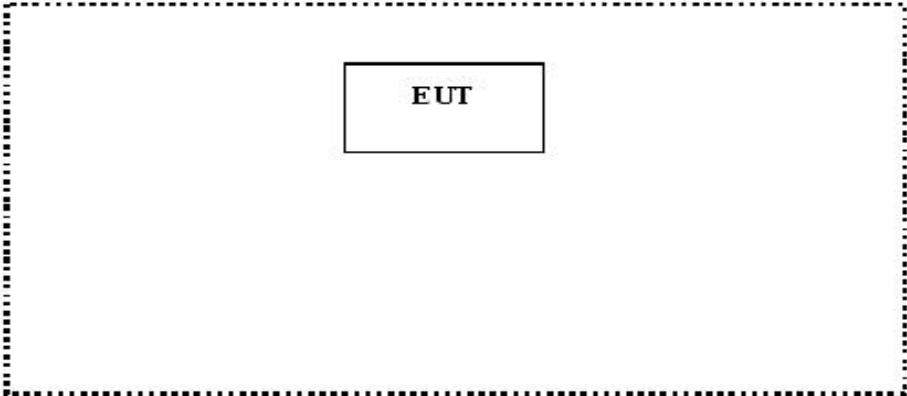
The conducted emission tests were performed using the setup accordance with the ANSI C63.4:2003, The specification used in this report was the FCC Part15 Paragraph 15.207 limits.



### 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/m between 0.15MHz & 0.5MHz

56 dB $\mu$ V/m between 0.5MHz & 5MHz

60 dB $\mu$ V/m between 5MHz & 30MHz

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

## 6.6 Conducted Emission Test Result

Owing to the DC operation of EUT, this test is not performed.

## 7 Radiation Emission Test

Product Name:	Wireless Mouse
Test Requirement:	FCC Part15 Paragraph 15.227
Test Method:	Based on FCC Part15 Paragraph 15.33
Test Date:	March 7, 2007
Frequency Range:	25MHz to 1GHz
Measurement Distance:	3m
Detector:	Peak for pre-scan (120kHz resolution bandwidth) Quasi-Peak if maximised peak within 6dB of limit

### 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 SMQ EMC Lab is +4.0 dB.

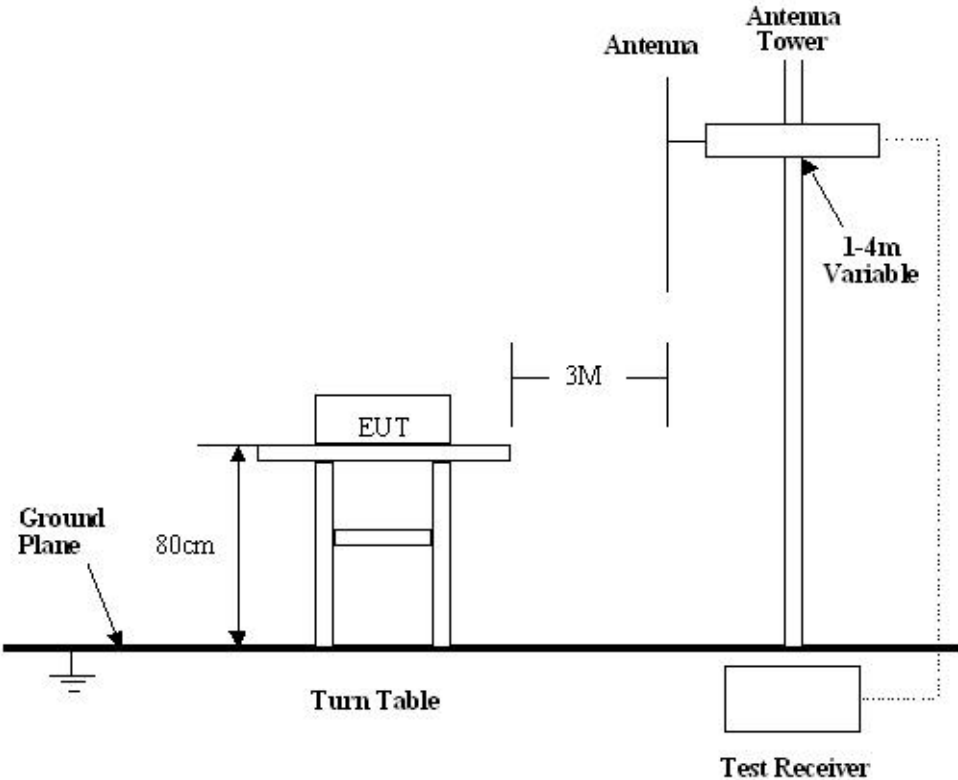
### 7.3 Test Procedure

1. For the radiated emissions test, since the EUT does not have a power source, there was no connection to AC outlets.
2. Maximizing procedure was performed on the six (6) highest emissions to ensure EUT is compliant with all installation combinations.
3. All data was recorded in the peak detection mode. Quasi-peak readings was performed only when an emission was found to be marginal (within -4 dB $\mu$ V of specification limits), and are distinguished with a "Qp" in the data table.
4. The EUT was under normal mode during the final qualification test and the configuration was used to represent the worst case results.

- 5. For below 30MHz, a loop antenna with its vertical plane is placed 3m from the EUT and rotated about its vertical axis for maximum response at each azimuth about the EUT. And the centre of the loop shall be 1m above the ground.
- 6. The device was rotated through three orthogonal axes to determine which attitude and configuration produce the highest emission during measurement.

**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 C63.4:2003, The specification used in this report was the FCC Part15 Paragraph 15.209, Paragraph 15.227 limits.



## 7.5 Spectrum Analyzer Setup

According to FCC Part15 Paragraph 15.227 Rules, the system was tested to 1000 MHz.

Start Frequency .....	25 MHz
Stop Frequency .....	1000 MHz
Sweep Speed	Auto
IF Bandwidth .....	100 kHz
Video Bandwidth .....	1 MHz
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 -7dB $\mu$ V means the emission is 7dB $\mu$ V 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 Summary of Test Results

According to the data in section 7.10, the EUT complied with the FCC Part15 Paragraph 15.227 standards.

**7.8 EUT Operating Condition**

Same as section 6.4 of this report.

**7.9 Radiated Emissions Limit**

**A. FCC Part 15 subpart C Paragraph 15.227 Limit**

Fundamental Frequency(MHZ)	Field Strength of Fundamental
	dBuV/m
27.045	80

**Note:**(1) Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system.

**B. Frequencies in restricted band are complied to limit on Paragraph 15.209**

Frequency(MHZ)	Distance(m)	Field strength(dBuV/m)
30-88	3	40.0
88-216	3	43.5
216-960	3	46.0
Above 960	3	54.0

**Note:** (1)  $RF\ Voltage(dBuV) = 20 \log RF\ Voltage(uV)$   
 (2) In the Above Table, the tighter limit applies at the band edges.  
 (3) Distance refers to the distance in meters between the measuring instrument antenna.

**7.10 Radiated Emissions Test Result**

Formula of conversion factors:the field strength at 3m was established by adding  
 The meter reading of the spectrum analyer (which is set to read in units of dBuV)  
 To the antenna correction factor supplied by the antenna manufacturer. The antenna  
 Correction factors are stared in terms of dB.The gain of the pressletor was accounted  
 For in the spectrum analyser meter reading.

Example:

$$\text{Freq(MHz) Meter Reading +ACF=FS}$$

$$33 \quad 20\text{dBuV}+10.36\text{dB}=30.36\text{dBuV/m @3m}$$

**7.11 Radiated Emission Test Data**

Test Item: Radiated Emission Test Data  
 Test Voltage: DC 3V Battery  
 Test Mode: TX On  
 Temperature: 24 °C  
 Humidity: 52%RH  
 Test Result: PASS

Frequency (MHz)	Antenna Polarization	Emission Level (dBuV/m)	FCC 15 Subpart C Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Turntable Angle (°)
27.045	Vertical	56.9	80.0	23.1	1.5	90
27.045	Horizontal	55.7	80.0	24.3	1.5	90
54.090	Horizontal	27.1	40.0	12.9	1.5	120
81.135	Horizontal	33.3	40.0	6.7	1.8	60
108.180	Horizontal	23.6	43.5	19.9	1.8	120
54.090	Vertical	26.4	40.0	13.6	1.5	120
81.135	Vertical	31.0	40.0	9.0	1.8	180
108.180	Vertical	22.3	43.5	21.2	1.5	90

## 8 Occupied Bandwidth

Rules of test : FCC Part15.227  
Test Date: March 7, 2007  
Test mode: TX On  
Temperature: 24 °C  
Humidity: 52%RH

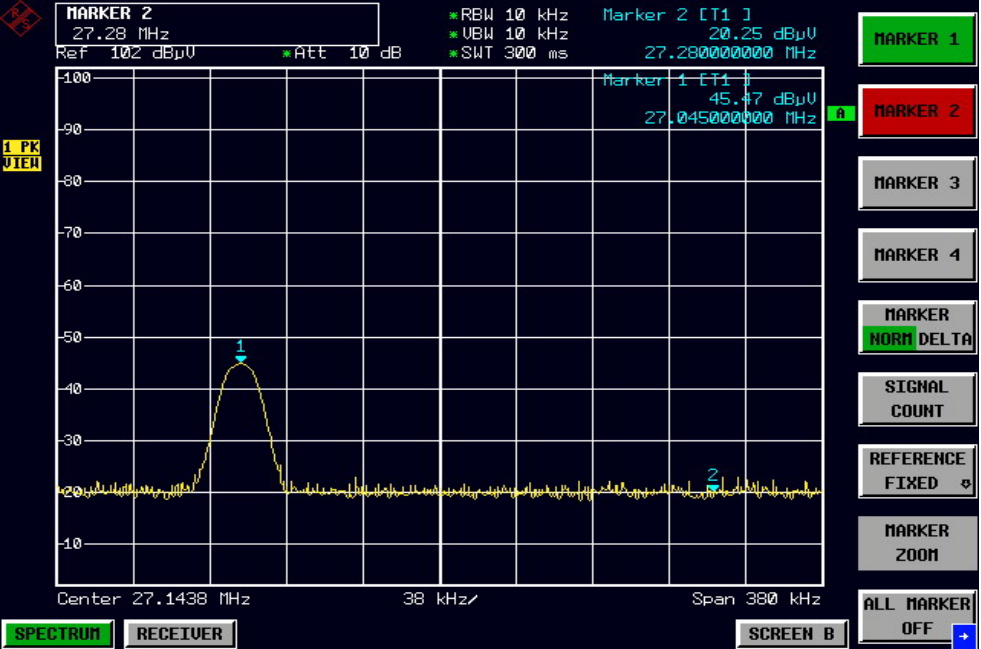
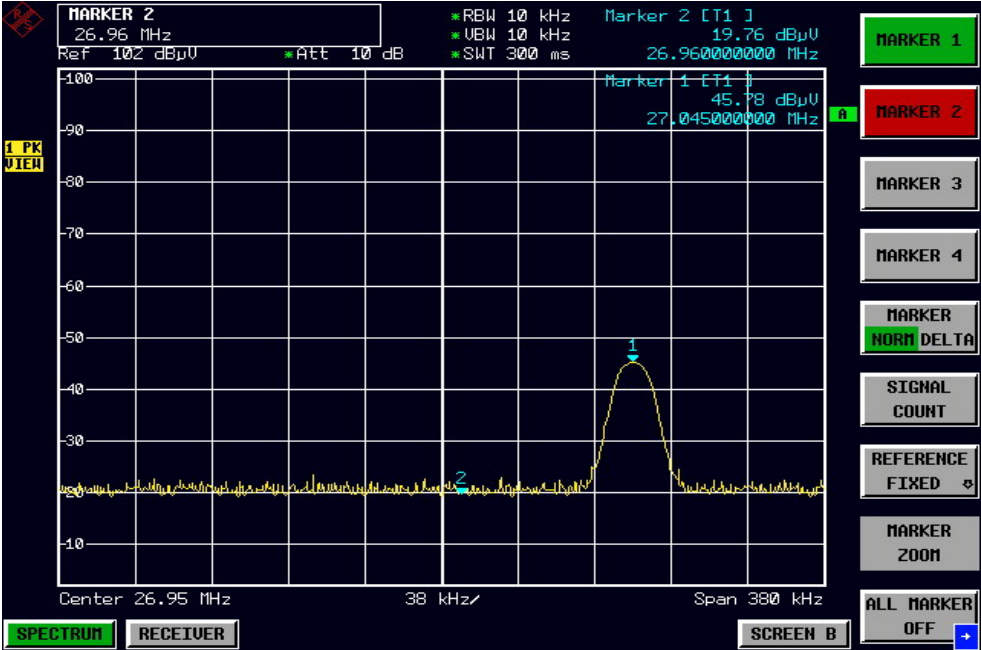
### 8.1 Test Procedure

1. The field strength of any emissions which appear outside of the band shall not exceed the general radiated emission limits in section 15.209.
2. The useful radiated emission from the EUT was detected by the spectrum analyser with peak detector.
3. The result has been complied with the 15.227 (b), see the following plot:

Frequency MHz	Emission dBuV/m	Limit dBuV/m
26.96	19.76	40
27.28	20.25	40

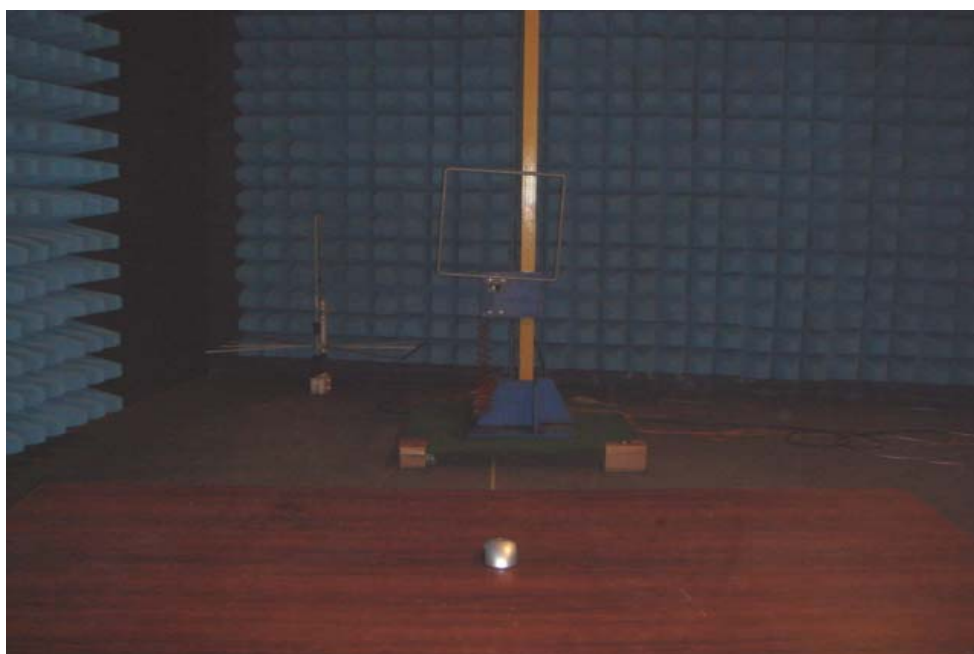
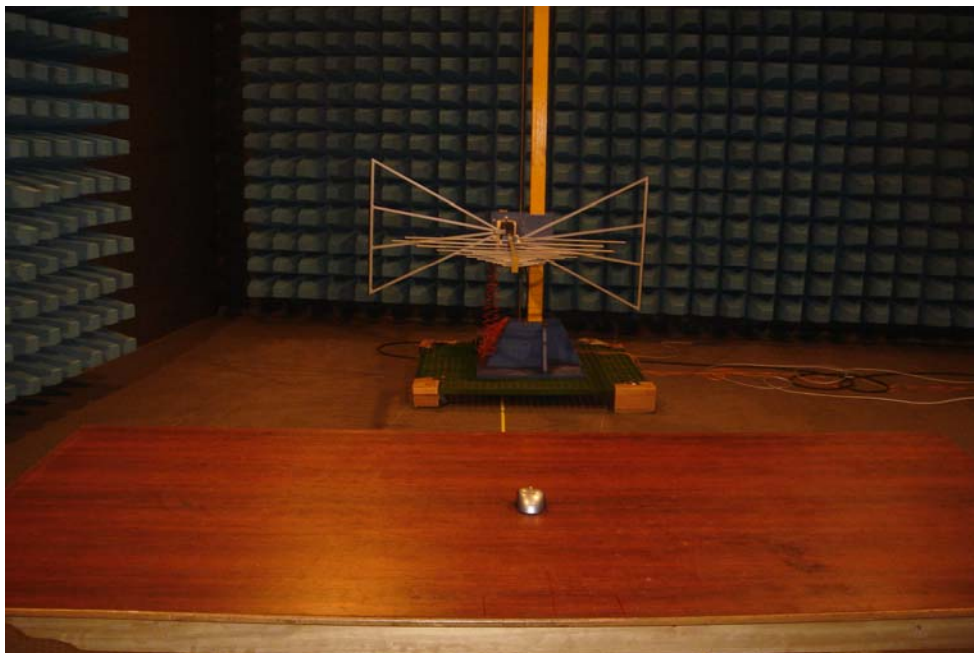


The graph as below



## 9 Photographs of Testing

### 9.1 Radiation Emission Test View



## 10 Photographs - Constructional Details

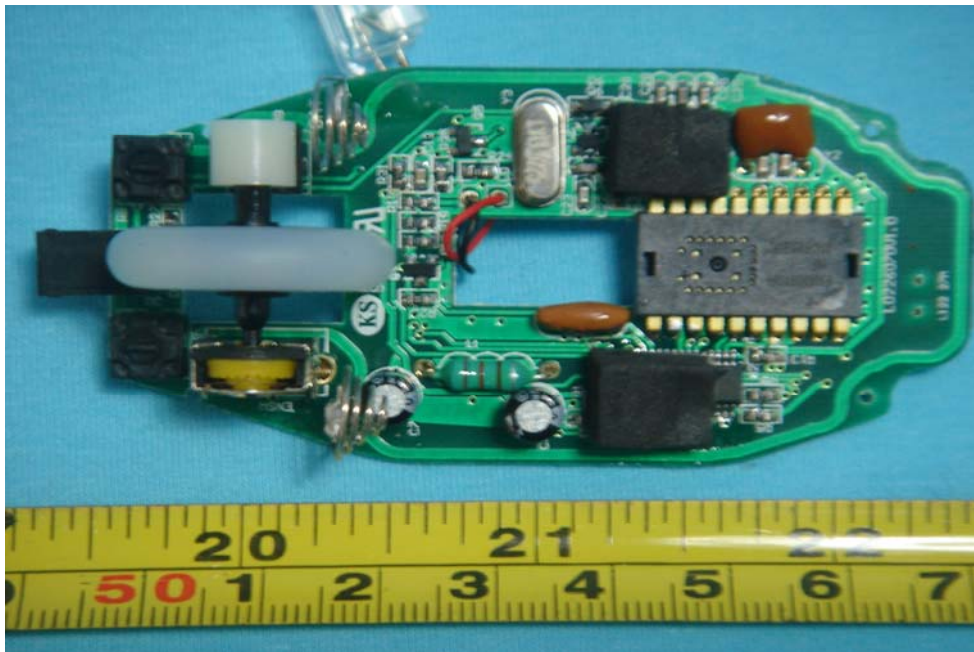
### 10.1 EUT - Front View



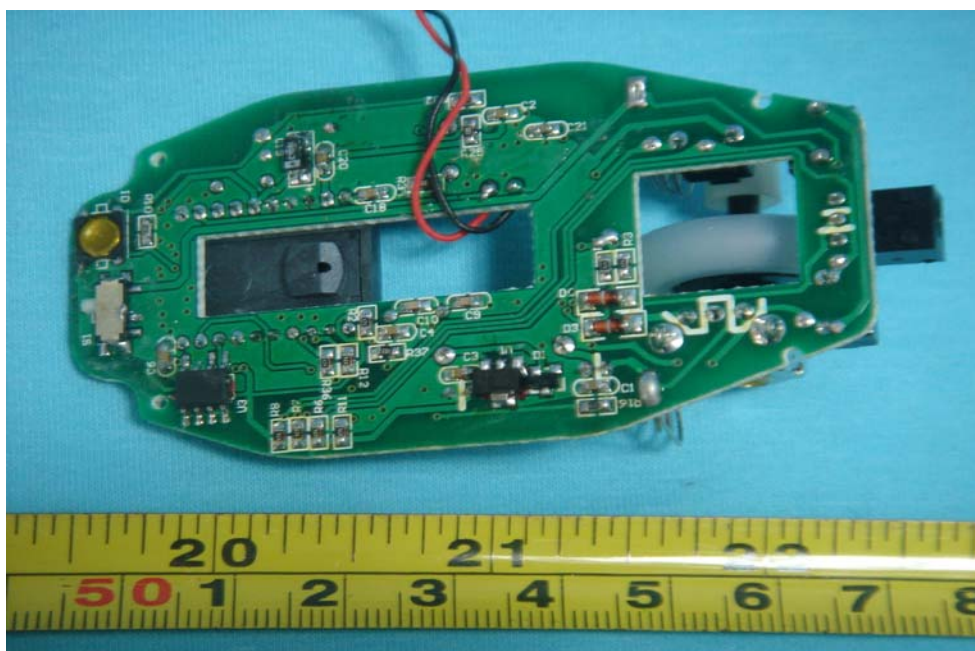
### 10.2 EUT - Back View



10.3 PCB- Front View



10.4 PCB- Back View



### 11 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 Mark Location

