



## Test Report

Product Name : Wireless mouse

Model No. : M302-M

FCC ID. : O62M301-B

Applicant : Darfon Electronics Corp.

Address : 6, Feng-Shu Tsuen, Gueishan, Taoyuan 333,  
Taiwan, R.O.C.

Date of Receipt : May 20, 2005

Issued Date : June 20, 2005

Report No. : 057L021FI

The Test Results relate only to the samples tested.

The test report shall not be reproduced except in full without the written approval of Quietek Corporation.

This report must not be used to claim product endorsement by NVLAP any agency of the U.S. Government

# Test Report Certification

Test Date : June 20, 2005

Report No.: 057L021FI



Accredited by NIST (NVLAP)

NVLAP Lab Code: 200533-0

Product Name : Wireless mouse

Applicant : Darfon Electronics Corp.

Address : 6, Feng-Shu Tsuen, Gueishan, Taoyuan 333, Taiwan, R.O.C.

Manufacturer : Darfon Electronics Corp.

Model No. : M302-M

FCC ID. : O62M301-B

Rated Voltage : DC 3V(Power by Battery)

Trade Name : BenQ

Measurement Standard : FCC CFR Title 47 Part 15 Subpart C: 2003

Measurement Procedure : ANSI C63.4: 2003

Test Result : Complied

The Test Results relate only to the samples tested.

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This report must not be used to claim product endorsement by NVLAP any agency of the U.S. Government

Documented By : Rita Huang  
( Rita Huang )

Tested By : Tim Sung  
( Tim Sung )

Approved By : Gene Chang  
( Gene Chang )



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## 1. GENERAL INFORMATION

### 1.1. EUT Description

Product Name : Wireless mouse  
Trade Name : BenQ  
FCC ID. : O62M301-B  
Model No. : M302-M  
EUT Voltage : DC 3V(Power by Battery)  
Frequency Range : 27.042MHz for Mouse  
Type of Modulation : FSK  
Type of antenna : Loop antenna  
Channel Number : 1  
Channel Control : Manual

#### Frequency of Each Channel:

Channel	Frequency
1	27.042 MHz (Mouse)

#### Note:

1. The EUT is a Wireless mouse intends to use in household and office PC system or related application.
2. These tests were conducted on a sample of the equipment for the purpose of demonstrating compliance with FCC CFR Title 47 Part 15 Subpart C:2003 Paragraph 15.227.

Test Mode: Mode 1: Normal Operation

**1.2. Operation Description**

The EUT is a 27 MHz Wireless mouse intends to use in household and office PC system.

The device adapts FSK modulation. The loop antenna provides diversity function to improve the transmitting function.

The super generation type receiver was used. An external excitation was used when the test of receiver was performed.

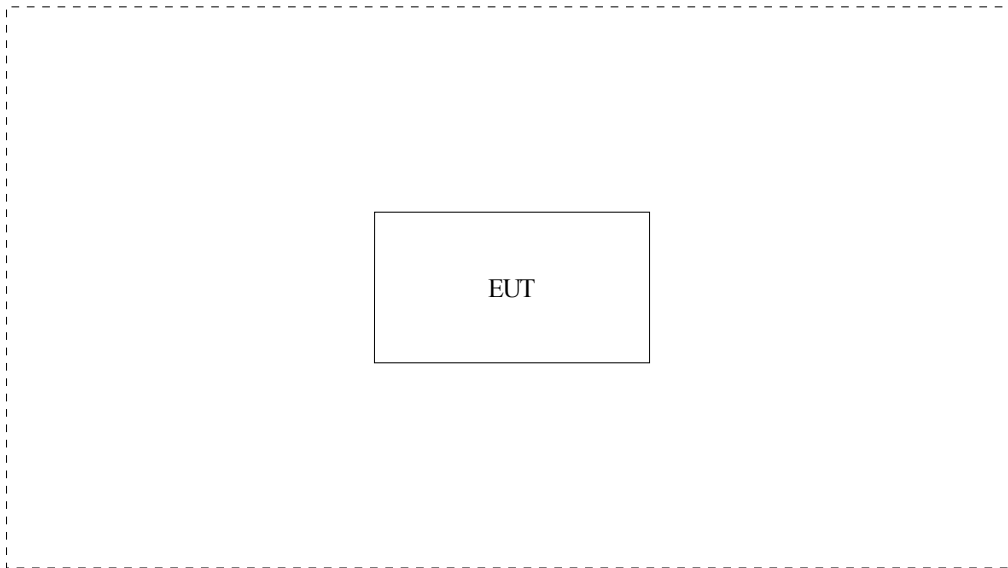
**1.3. Test System Details**

The types for all equipment, plus descriptions of all cables used in the tested system (including inserted cards) are:

Product	Manufacturer	Model No.	Serial No.	FCC ID	Power Cord
(1) N/A	N/A	N/A	N/A	N/A	N/A

Signal Cable Type	Signal cable Description
A. N/A	N/A

**1.4. Configuration of Test System**



**1.5. EUT Exercise Software**

- (1) Setup the test system as shown on 1.4.
- (2) Enable RF signal and confirm the EUT is active.
- (3) Adjust output capacity of EUT to the specification.

**1.6. Test Facility**

Ambient conditions in the laboratory:

Items	Required (IEC 68-1)	Actual
Temperature (°C)	15-35	20-35
Humidity (%RH)	25-75	50-65
Barometric pressure (mbar)	860-1060	950-1000

Site Description: June 22, 2001 File on  
 Federal Communications Commission  
 FCC Engineering Laboratory  
 7435 Oakland Mills Road  
 Columbia, MD 21046  
 Reference 31040/SIT1300F2



July 03, 2001 Accreditation on NVLAP  
 NVLAP Lab Code: 200533-0



Site Name: Quietek Corporation

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 E-Mail : [service@quietek.com](mailto:service@quietek.com)



## 2. Conducted Emission

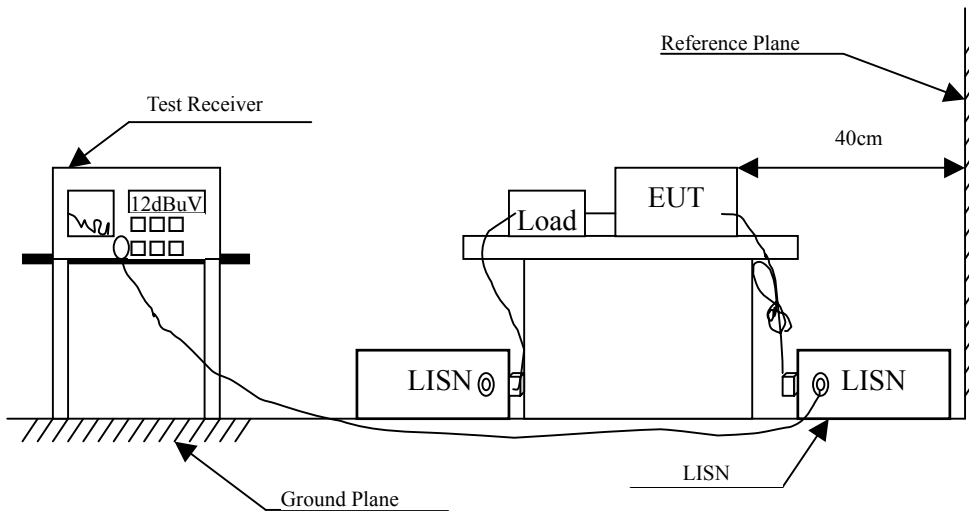
### 2.1. Test Equipment

The following test equipment are used during the conducted emission test:

Item	Instrument	Manufacturer	Type No./Serial No	Last Cal.	Remark
1	Test Receiver	R & S	ESCS 30/838251/001	May, 2005	
2	L.I.S.N.	R & S	ESH3-Z5/836679/0023	May, 2005	EUT
3	L.I.S.N.	R & S	ENV 4200/833209/0023	May, 2005	Peripherals
4	Pulse Limiter	R & S	ESH3-Z2	May, 2005	
6	No.1 Shielded Room			N/A	

Note: All equipment upon which need to calibrated are with calibration period of 1 year.

### 2.2. Test Setup



### 2.3. Limits

FCC Part 15 Subpart C Paragraph 15.207 (dBuV) Limit		
Frequency MHz	Limits	
	QP	AV
0.15 - 0.50	66-56	56-46
0.50-5.0	56	46
5.0 - 30	60	50

Remarks : In the above table, the tighter limit applies at the band edges.

## 2.4. Test Procedure

The EUT and simulators are connected to the main power through a line impedance stabilization network (L.I.S.N.). This provides a 50 ohm /50uH coupling impedance for the measuring equipment. The peripheral devices are also connected to the main power through a LISN that provides a 50ohm/50uH coupling impedance with 50ohm termination. (Please refers to the block diagram of the test setup and photographs.)

Both sides of A.C. line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.4: 2001 on conducted measurement.

Conducted emissions were investigated over the frequency range from 0.15MHz to 30MHz using a receiver bandwidth of 9kHz.

## 2.5. Uncertainty

The measurement uncertainty is defined as  $\pm 2.02$  dB



## 2.6. Test Data of Conducted Emission

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

### 3. Radiated Emission

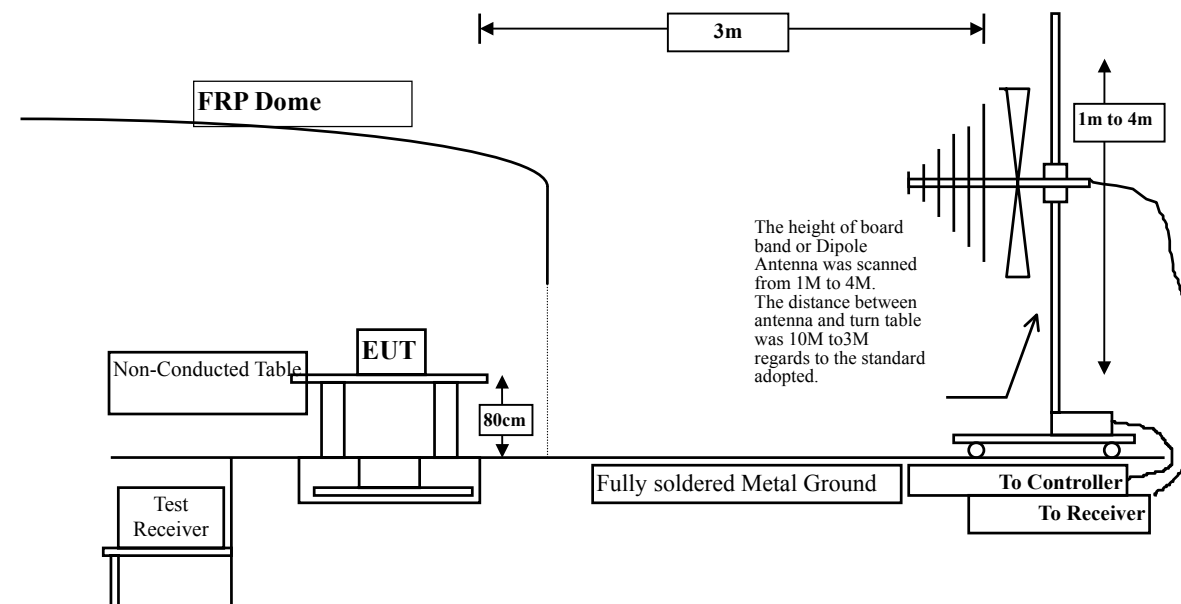
#### 3.1. Test Equipment

The following test equipment are used during the radiated emission test:

Test Site	Equipment	Manufacturer	Model No./Serial No.	Last Cal.
<input type="checkbox"/> Site # 1	Test Receiver	R & S	ESVS 10 / 834468/003	July, 2004
	Spectrum Analyzer	Advantest	R3162/ 00803480	May, 2005
	Pre-Amplifier	Advantest	BB525C/ 3307A01812	May, 2005
	Bilog Antenna	SCHAFFNER	CBL6112B / 2697	Nov., 2004
<input type="checkbox"/> Site # 2	Test Receiver	R & S	ESCS 30 / 836858 / 022	Nov., 2004
	Spectrum Analyzer	Advantest	R3162 / 100803466	May, 2005
	Pre-Amplifier	Advantest	BB525C/3307A01814	May, 2005
	Bilog Antenna	SCHAFFNER	CBL6112B / 2705	Oct., 2004
<input checked="" type="checkbox"/> Site # 3	Test Receiver	R & S	ESI 26 / 838786 / 004	May, 2005
	Spectrum Analyzer	Advantest	R3162 / 100803480	May, 2005
	Pre-Amplifier	QTK	QTK-AMP-03 / 0003	May, 2005
	Horn Antenna	ETS	3115 / 0005-6160	July, 2004
	Pre-Amplifier	QTK	QTK-AMP-01 / 0001	July, 2004
	Broadband Antenna	Schwarzbeck	VULB9166/1085	April, 2005

- Note:
1. All equipments that need to calibrate are with calibration period of 1 year.
  2. Mark "X" test instruments are used to measure the final test results.

#### 3.2. Test Setup



**3.3. Limits**

➤ FCC Part 15 Subpart C Paragraph 15.227 Limit

<b>FCC Part 15 Subpart C Paragraph 15.227 Limits</b>		
Fundamental Frequency MHz	Field strength of fundamental	
	uV/m	dBuV/m
26.96-27.28	10000	80.0

Remarks :

1. RF Voltage (dBuV) = 20 log RF Voltage (uV)
2. Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system.
3. The emission limit in this paragraph is based on measurement instrumentation employing an average detector. Measurement using instrumentation with a peak detector function, corresponding to 20dB above the maximum permitted average limit.

➤ Frequencies in restricted band are complied to limits on Paragraph 15.209.

<b>FCC Part 15 Subpart C Paragraph 15.209 Limits</b>		
Frequency MHz	uV/m @3m	dBuV/m@3m
30-88	100	40
88-216	150	43.5
216-960	200	46
Above 960	500	54

- Remarks :
1. RF Voltage (dBuV/m) = 20 log RF Voltage (uV/m)
  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 and the closed point of any part of the device or system.

### 3.4. Test Procedure

The EUT and its simulators are placed on a turn table which is 0.8 meter above ground. The turn table can rotate 360 degrees to determine the position of the maximum emission level. The EUT was positioned such that the distance from antenna to the EUT was 3 meters.

The antenna can move up and down between 1 meter and 4 meters to find out the maximum emission level.

Both horizontal and vertical polarization of the antenna are set on measurement. In order to find the maximum emission, all of the interface cables must be manipulated according to ANSI C63.4: 2003 on radiated measurement.

Radiated emissions were investigated over the frequency range from 30MHz to 1GHz using a receiver bandwidth of 120kHz. Radiated was performed at an antenna to EUT distance of 3 meters.

The frequency range from 30MHz to 10th harmonics is checked.

### 3.5. Uncertainty

The measurement uncertainty is defined as  $\pm 3.8$  dB

### 3.6. Test Data of Radiated Emission

Product : Wireless mouse  
 Test Item : Fundamental Radiated Emission  
 Test Site : No.3 OATS  
 Test Voltage : DC 3V(Power by Battery)  
 Test Mode : Mode 1: Normal Operation (Mouse)

Freq.	Cable	Probe	PreAMP	Reading	Emission	Margin	Limit
MHz	Loss	Factor	dB	Level	Level	dB	dBuV/m
	dB	dB/m		dBuV	dBuV/m		

#### Horizontal

##### Peak Detector:

27.042	0.40	3.85	22.53	70.92	52.64	47.36	100.0
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#### Vertical

##### Peak Detector:

27.042	0.40	9.46	22.53	63.2	50.53	49.47	100.0
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Note:

1. All Readings are Peak value.
2. Emission Level = Reading Level + Probe Factor + Cable loss – PreAMP.
3. The average measurement was not performed when the peak measured data under the limit of average detection. If the readings given are average, peak measurement should also be supplied.

Product : Wireless mouse  
 Test Item : General Radiated Emission  
 Test Site : No.3 OATS  
 Test Voltage : DC 3V(Power by Battery)  
 Test Mode : Mode 1: Normal Operation (Mouse)

Frequency MHz	Cable Loss dB	Probe Factor dB/m	PreAMP dB	Reading Level dBuV	Emission Level dBuV/m	Margin dB	Limit dBuV/m
<b>Horizontal:</b>							
54.090	0.99	6.24	0.00	10.67	17.90	22.10	40.00
81.135	1.13	7.99	0.00	6.48	15.60	24.40	40.00
135.225	1.41	11.59	0.00	12.40	25.40	18.10	43.50
162.270	1.55	9.39	0.00	14.41	25.35	18.15	43.50
189.315	1.69	8.00	0.00	18.42	28.11	15.39	43.50
216.360	1.83	8.21	0.00	16.12	26.16	19.84	46.00
* 243.405	1.97	10.82	0.00	17.81	30.60	15.40	46.00
270.450	2.11	12.00	0.00	10.08	24.19	21.81	46.00
<b>Vertical:</b>							
54.090	0.99	5.90	0.00	13.71	20.60	19.40	40.00
88.135	1.17	7.94	0.00	14.29	23.40	20.10	43.50
* 135.225	1.41	10.59	0.00	12.10	24.10	19.40	43.50
162.270	1.55	8.53	0.00	13.61	23.69	19.81	43.50
189.315	1.69	8.21	0.00	12.70	22.60	20.90	43.50
216.360	1.83	9.33	0.00	11.29	22.45	23.55	46.00
243.405	1.97	11.08	0.00	12.25	25.30	20.70	46.00
270.450	2.11	12.50	0.00	11.11	25.72	20.28	46.00

Note:

1. All Readings below 1GHz are Quasi-Peak, above are performed with peak and/or average measurements as necessary.
2. “ \* ” means this data is the worst emission level.
3. Emission Level = Reading Level + Probe Factor + Cable Loss.

## 4. Band Edge

### 4.1. Test Equipment

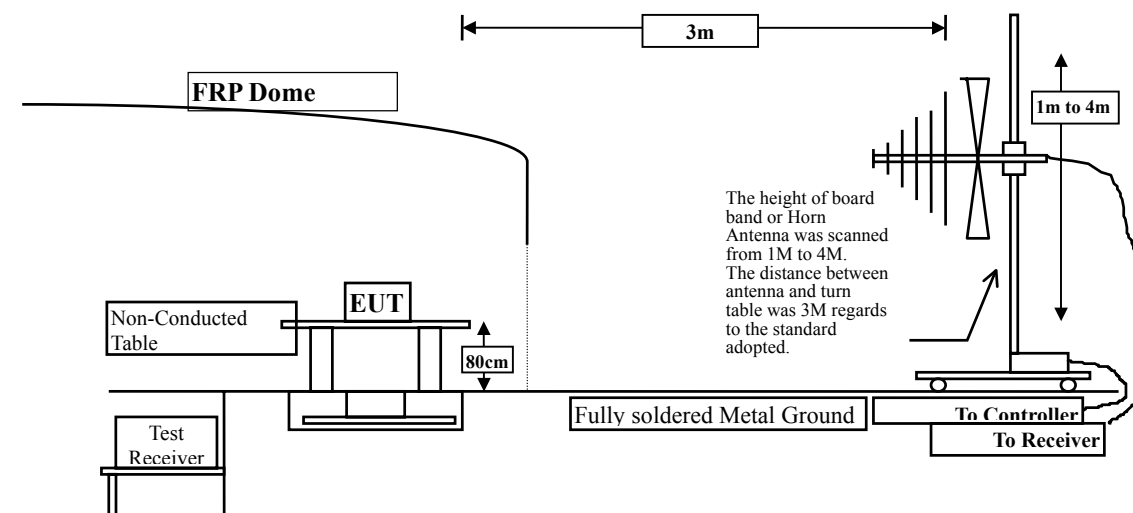
The following test equipment are used during the radiated emission test:

Test Site	Equipment	Manufacturer	Model No./Serial No.	Last Cal.
<input type="checkbox"/> Site # 1	Test Receiver	R & S	ESVS 10 / 834468/003	July, 2004
	Spectrum Analyzer	Advantest	R3162/ 00803480	May, 2005
	Pre-Amplifier	Advantest	BB525C/ 3307A01812	May, 2005
	Bilog Antenna	SCHAFFNER	CBL6112B / 2697	Nov., 2004
<input type="checkbox"/> Site # 2	Test Receiver	R & S	ESCS 30 / 836858 / 022	Nov., 2004
	Spectrum Analyzer	Advantest	R3162 / 100803466	May, 2005
	Pre-Amplifier	Advantest	BB525C/3307A01814	May, 2005
	Bilog Antenna	SCHAFFNER	CBL6112B / 2705	Oct., 2004
<input checked="" type="checkbox"/> Site # 3	Test Receiver	R & S	ESI 26 / 838786 / 004	May, 2005
	Spectrum Analyzer	HP	E4407B / US39440758	May, 2005
	Pre-Amplifier	QTK	QTK-AMP-03 / 0003	May, 2005
	Broadband Antenna	Schwarzbeck	VULB9166/1085	April, 2005
	Horn Antenna	ETS	3115 / 0005-6160	July, 2004
	Pre-Amplifier	QTK	QTK-AMP-01 / 0001	July, 2004

- Note:
1. All equipments that need to calibrate are with calibration period of 1 year.
  2. Mark "X" test instruments are used to measure the final test results.

### 4.2. Test Setup

#### RF Radiated Measurement:



### 4.3. Limit

Attenuation below the general limits specified in Section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 15.205(c)).

### 4.4. Test Procedure

The EUT and its simulators are placed on a turn table which is 0.8 meter above ground. The turn table can rotate 360 degrees to determine the position of the maximum emission level. The EUT was positioned such that the distance from antenna to the EUT was 3 meters.

The antenna can move up and down between 1 meter and 4 meters to find out the maximum emission level.

Both horizontal and vertical polarization of the antenna are set on measurement. In order to find the maximum emission, all of the interface cables must be manipulated according to ANSI C63.4: 2003 on radiated measurement.

The additional latch filter below 1GHz was used to measure the level of harmonics radiated emission during field strength of harmonics measurement.

The bandwidth below 30MHz setting on the field strength meter is 10 kHz



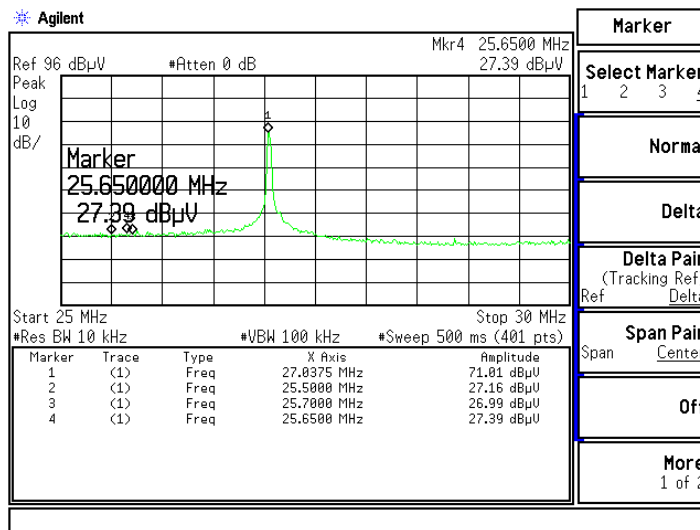
### 4.5. Test Result of Band Edge

Product : Wireless mouse  
 Test Item : Band Edge  
 Test Site : No.3 OATS  
 Test Mode : Mode 1: Normal Operation (Mouse)

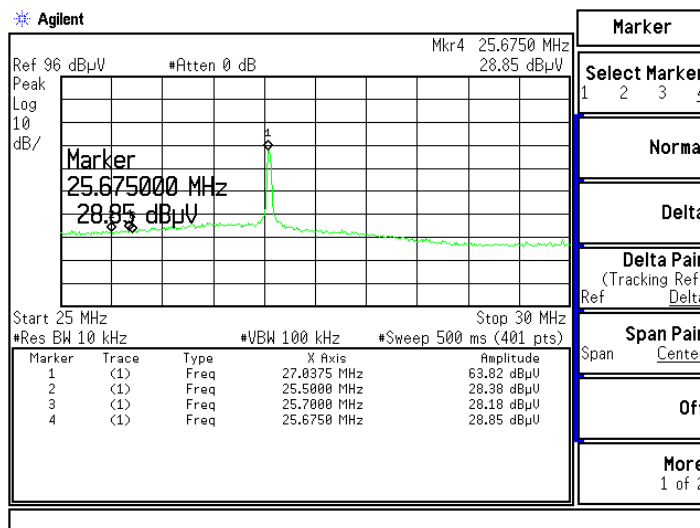
#### RF Radiated Measurement: (Q-Peak Detector)

Transmit	Frequency (MHz)	Reading Level (dBuV)	Probe Factor (dB/m)	Cable Loss (dB)	PreAMP (dB)	Emission Level (dBuV/m)	Limit (dBuV/m)	Result
Horizontal	25.650	27.39	3.69	0.40	22.73	8.75	40.00	Pass
Vertical	25.675	28.85	9.49	0.40	22.73	16.01	40.00	Pass

(Horizontal)



(Vertical)



Note:

- The average measurement was not performed when the peak measured data under the limit of average detection. If the readings given are average, peak measurement should also be supplied.

## 5. Occupied Bandwidth

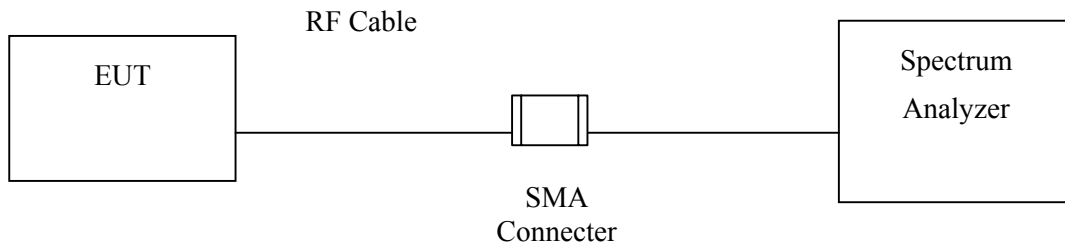
### 5.1. Test Equipment

The following test equipments are used during the radiated emission tests:

Equipment	Manufacturer	Model No./Serial No.	Last Cal.
X Spectrum Analyzer	HP	E4407B / US39440758	May, 2005

Note: 1. All equipment upon which need to calibrated are with calibration period of 1 year.  
 2. Mark "X" test instruments are used to measure the final test results.

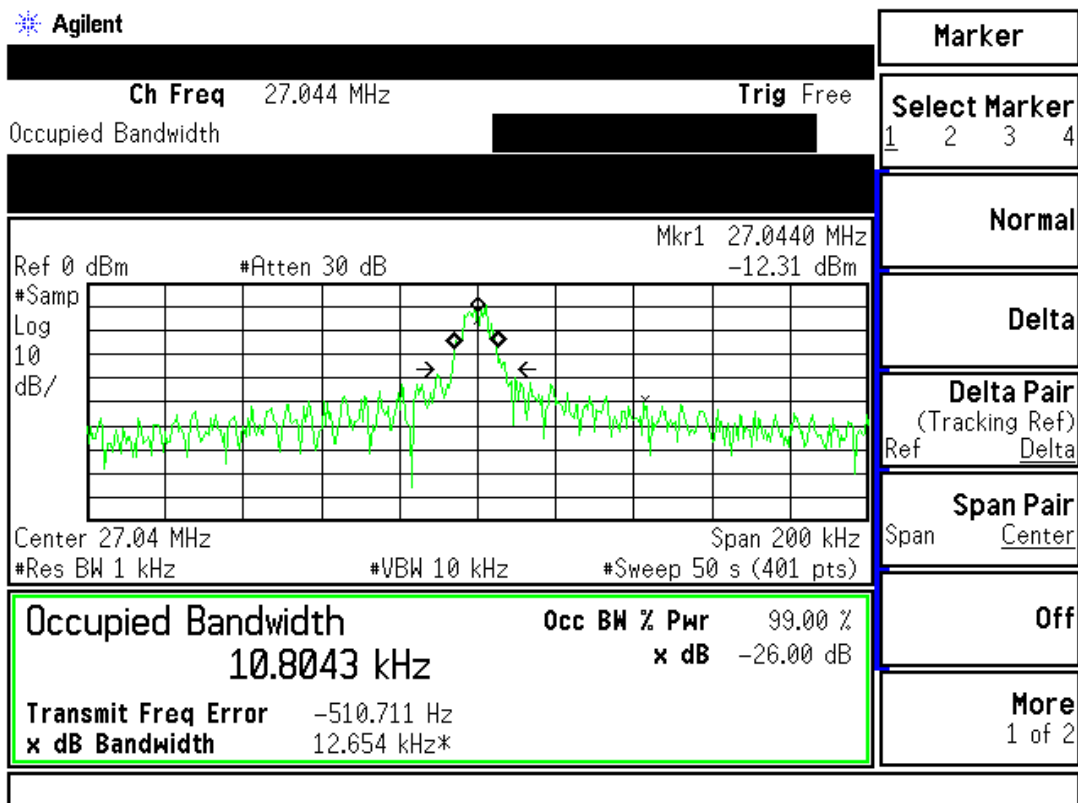
### 5.2. Test Setup



### 5.3. Test Result of Occupied Bandwidth

Product : Wireless mouse  
 Test Item : Occupied Bandwidth Data (Mouse)  
 Test Site : No.3 Shielded Room  
 Test Mode : Channel 1

Channel No.	Frequency (MHz)	Measurement Level (kHz)
Ch01	27.04	10.8043



## 6. EMI Reduction Method During Compliance Testing

No modification was made during testing.

## Attachment 1: EUT Test Photographs

**Attachment 1: EUT Test Setup Photographs**

Front View of Radiated Test



Back View of Radiated Test



## Attachment 2: EUT Detailed Photographs

Attachment 2 : EUT Detailed Photographs

(1) EUT Photo

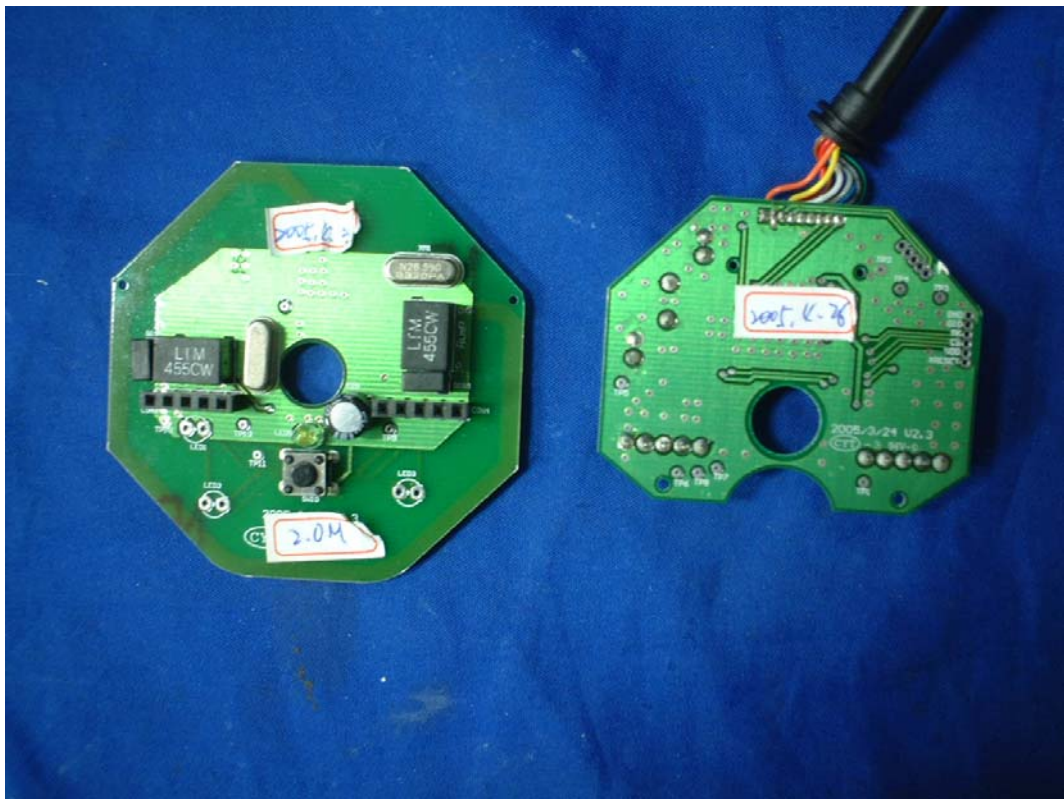


(2) EUT Photo

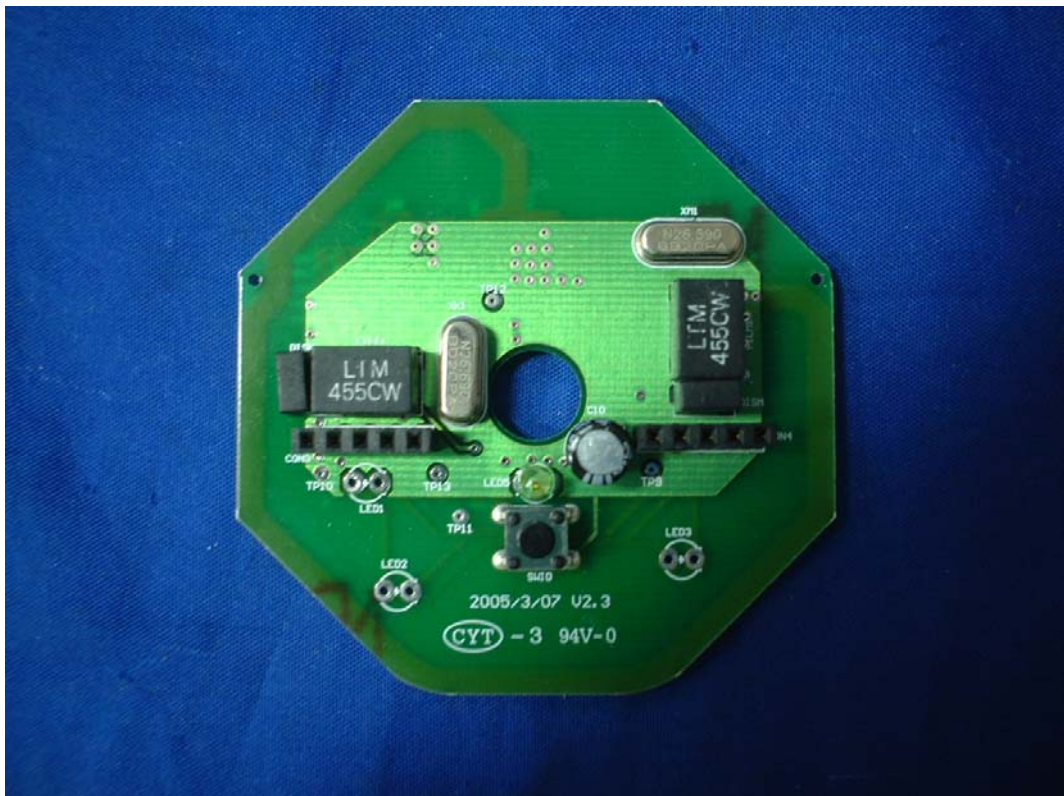




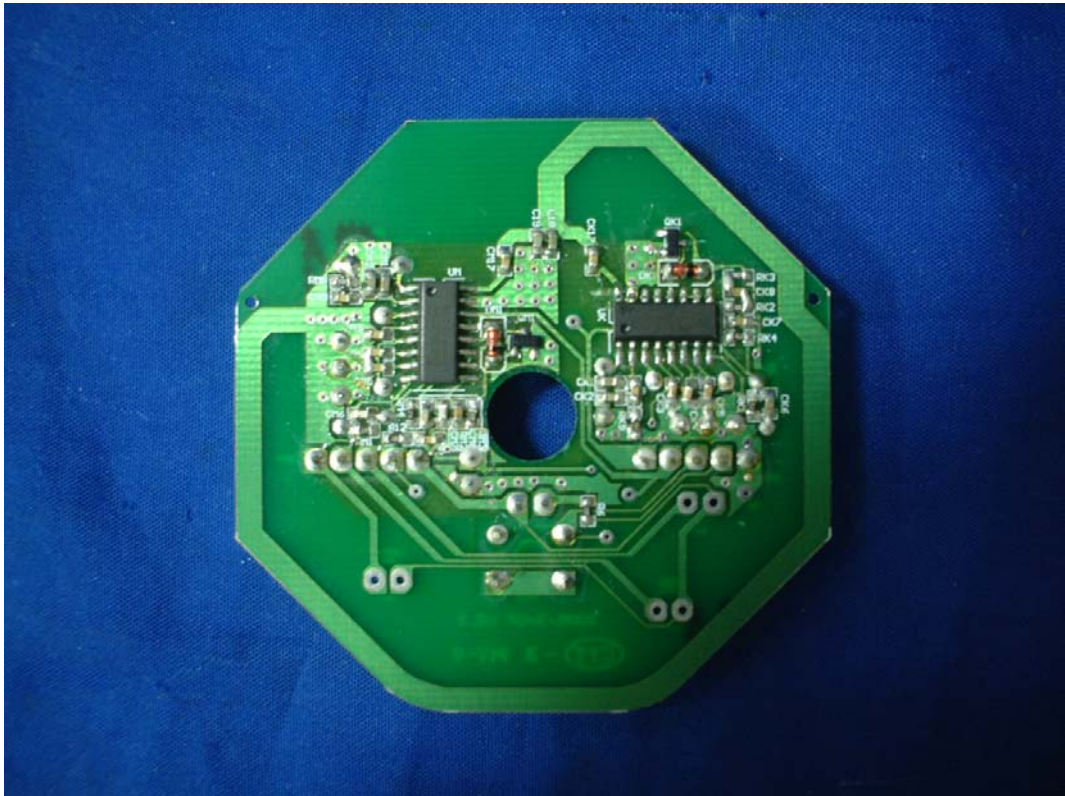
(3) EUT Photo



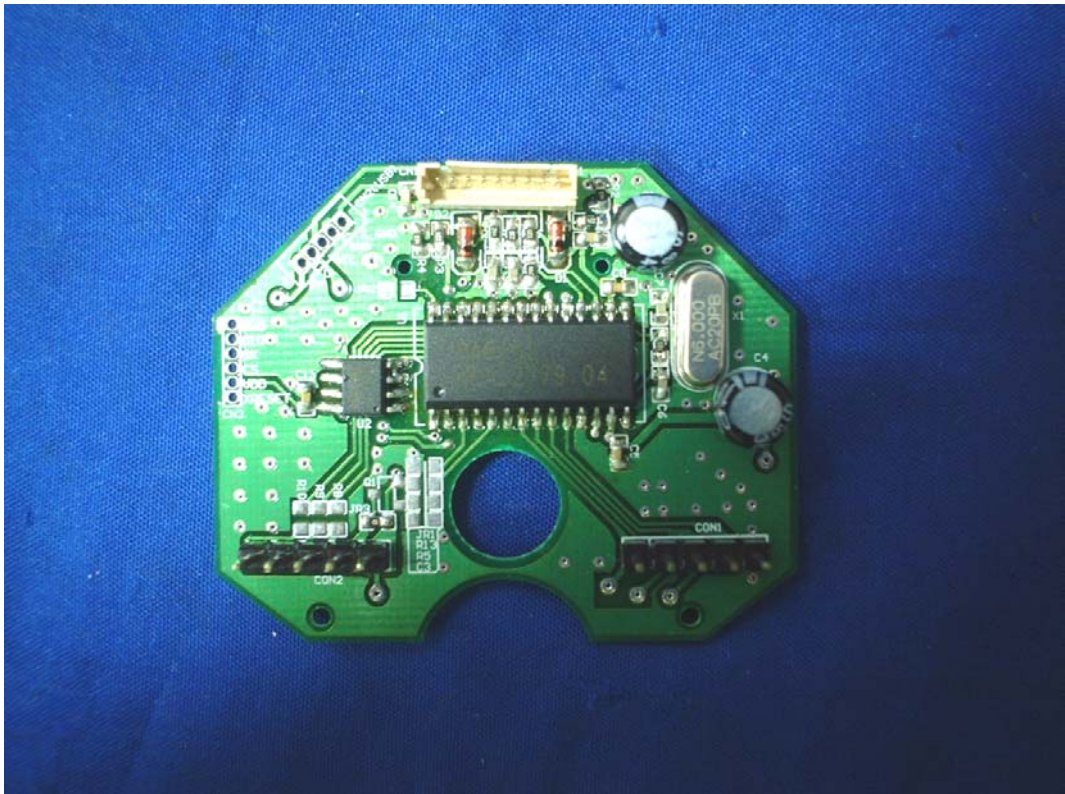
(4) EUT Photo



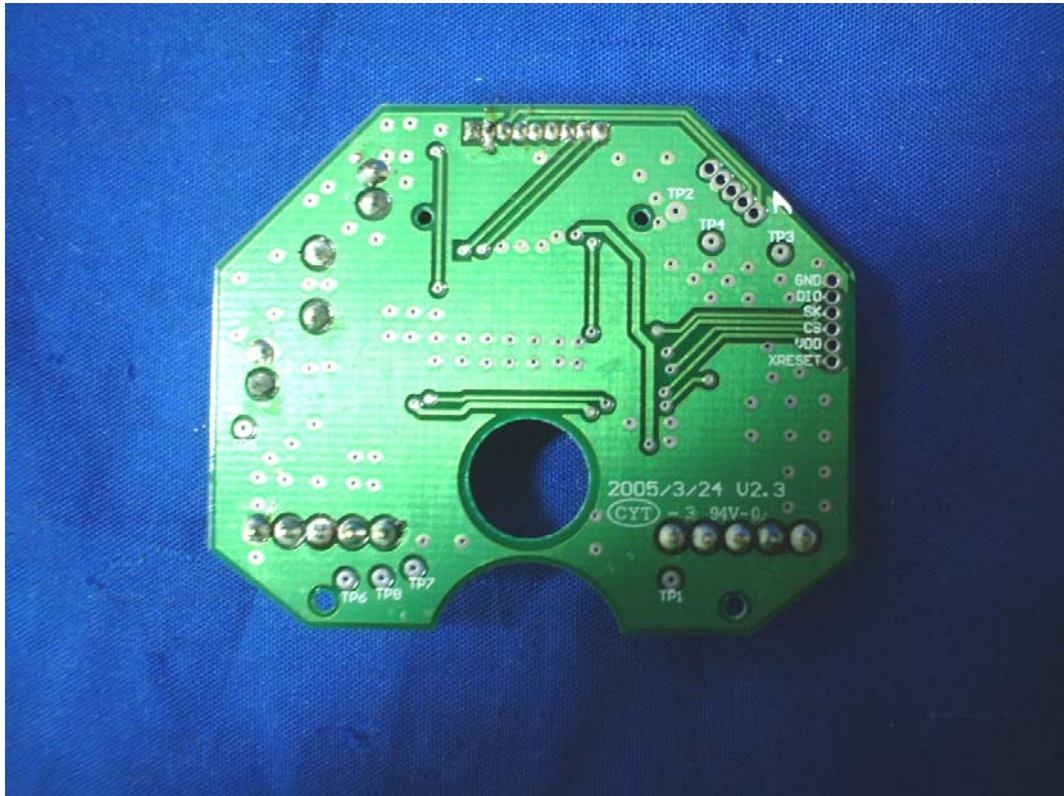
(5) EUT Photo



(6) EUT Photo



(7) EUT Photo



(8) EUT Photo



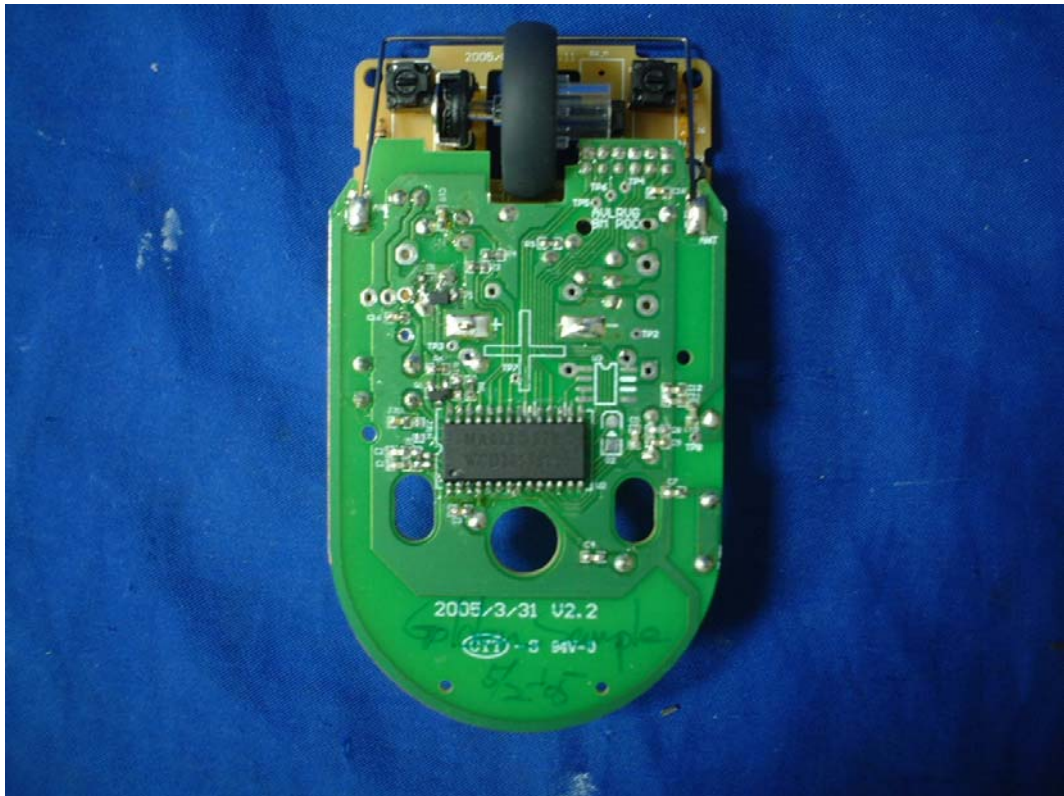
(9) EUT Photo



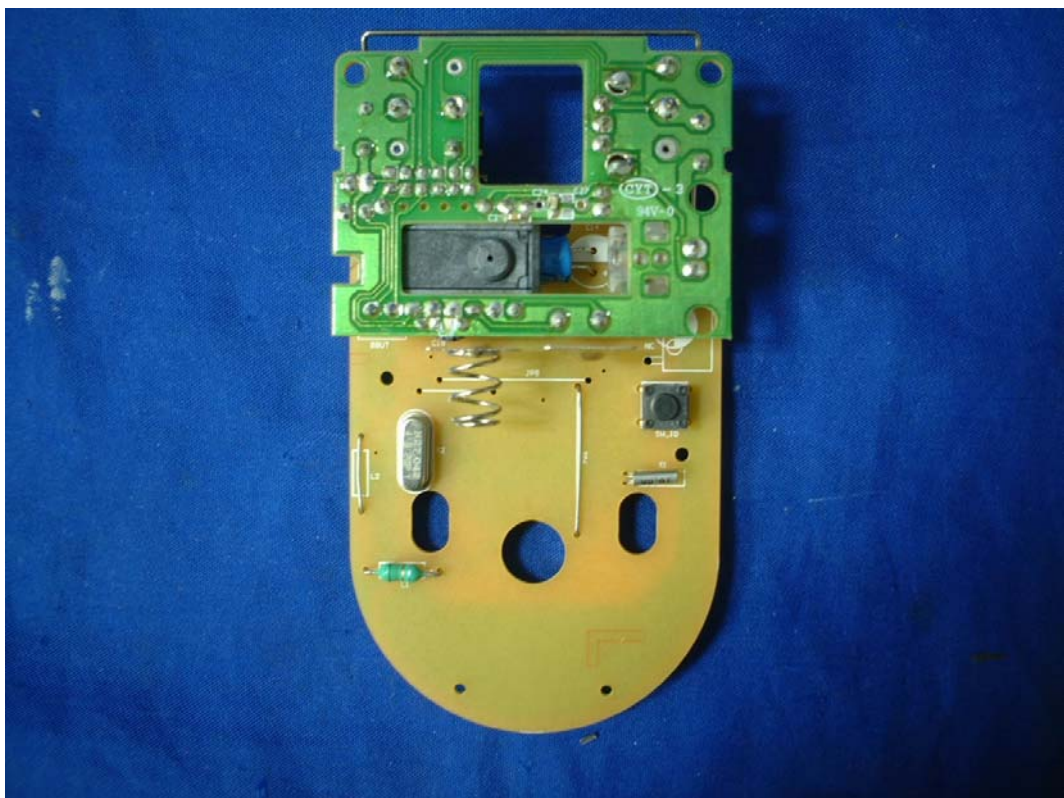
(10) EUT Photo



(11) EUT Photo



(12) EUT Photo



(13) EUT Photo

