Test Report

Product Name : 27MHz Mouse

Model No. : M333, M302

FCC ID. : O62M333

Applicant : Darfon Electronics Corp.

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

Date of Receipt : Feb. 17, 2006

Issued Date : March 16, 2006

Report No. : 062L074-RF-US-P03V01

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 : March 16, 2006
Report No.: 062L074-RF-US-P03V01

QuieTek Corporation

Accredited by NIST (NVLAP)
NVLAP Lab Code: 200533-0

Product Name	:	27MHz Mouse
Applicant	:	Darfon Electronics Corp.
Address	:	6, Feng-Shu Tsuen, Gueishan, Taoyuan 333, Taiwan, R.O.C.
Manufacturer	:	Darfon Eletronics (Suzhou) Co., Ltd.
Model No.	:	M333, M302
FCC ID.	:	O62M333
Rated Voltage	:	AC 110V / 60Hz
Working Voltage		Battery 1.5V*2
Trade Name	:	BenQ
Measurement Standard	:	FCC CFR Title 47 Part 15 Subpart C: 2005
Measurement Procedure	:	ANSI C63.4: 2003
Test Result	:	Complied

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Documented By : Genie Chang
(G e n i e C h a n g)

NVLAP
NVLAP Lab Code: 200533-0

Tested By : Tom Hsieh
(T o m H s i e h)

Approved By : Gene Chang
(G e n e C h a n g)

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1. GENERAL INFORMATION

1.1. EUT Description

Product Name	: 27MHz Mouse
Trade Name	: BenQ
FCC ID.	: O62M333
Model No.	: M333, M302
Working Voltage	: Battery 1.5V*2
Frequency Range	: 27.045MHz
Type of Modulation	: FSK
Type of antenna	: Loop Antenna
Number of Channel	: 1
Channel Control	: N/A

Frequency of Each Channel:

Channel	Frequency
1	27.045 MHz

Note:

1. The EUT is a 27MHz Mouse.
2. The EUT has two models and consists of two circuit boards. One board is the sensor board and the other is the RF board. The sensor boards of two models are different. The RF boards of two models are almost the same but one model adds a converter used for commutation.
3. The worst case M333 is shown on the report.
4. 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: 2005 Paragraph 15.227.

Pre-Test Mode	
EMI	Mode 1: Normal Operation
Final Test Mode	
EMI	Mode 1: Normal Operation

1.2. Operation Description

The EUT is a 27MHz Mouse used 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.

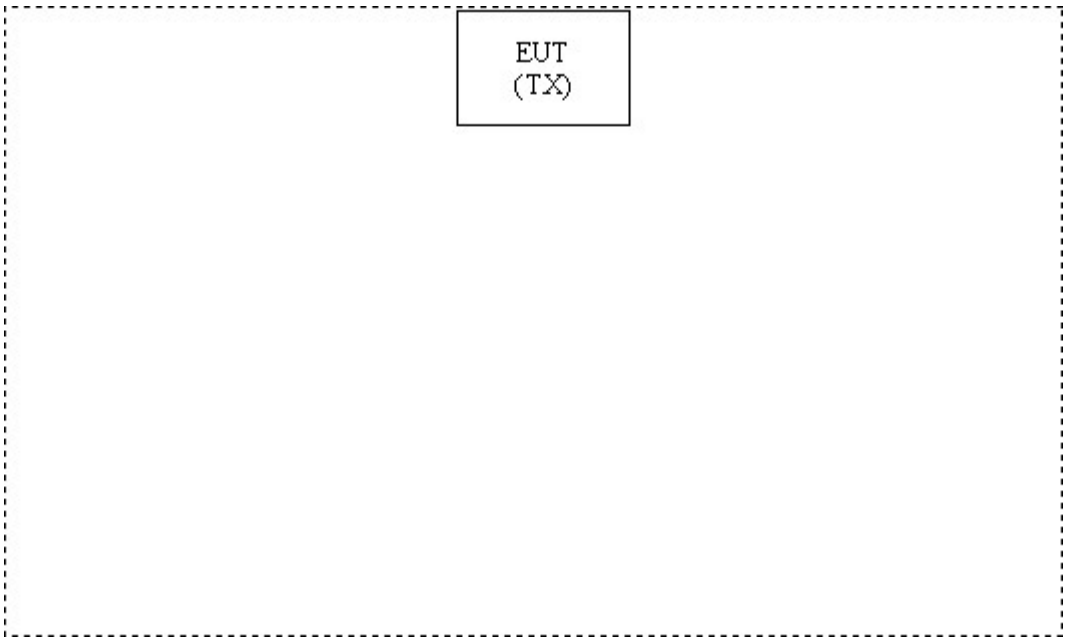
1.3. Test System Details

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 EUT as shown in section 1.4.

(2) Press and hold the left and the middle button.

(3) Install the batteries.

(4) Check that the cursor moves circularly on the notebook.

(5) Remove the notebook and start the tests.

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

CNLA 0914

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

Site Name: Quietek Corporation

Site Address: No. 5-22, Ruei-Shu Valley, Ruei-Ping Tsuen,
Lin-Kou Shiang, Taipei,
Taiwan, R.O.C.
TEL: 886-2-8601-3788 / FAX : 886-2-8601-3789
E-Mail : service@quietek.com

NVLAP Lab Code: 200533-0

2. Conducted Emission

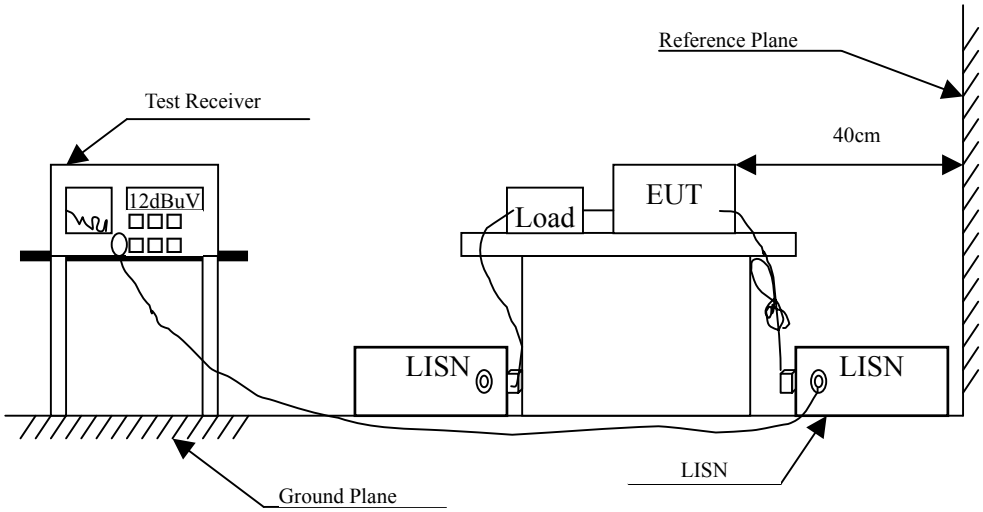
2.1. Test Equipment

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				

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: 2003 on conducted measurement.
Conducted emissions were invested over the frequency range from 0.15MHz to 30MHz using a receiver bandwidth of 9kHz.

2.5. Uncertainty

The measurement uncertainty is defined as ± 2.26 dB

2.6. Test Data of Conducted Emission

The EUT is powered by batteries. This test item is not performed

3. Radiated Emission

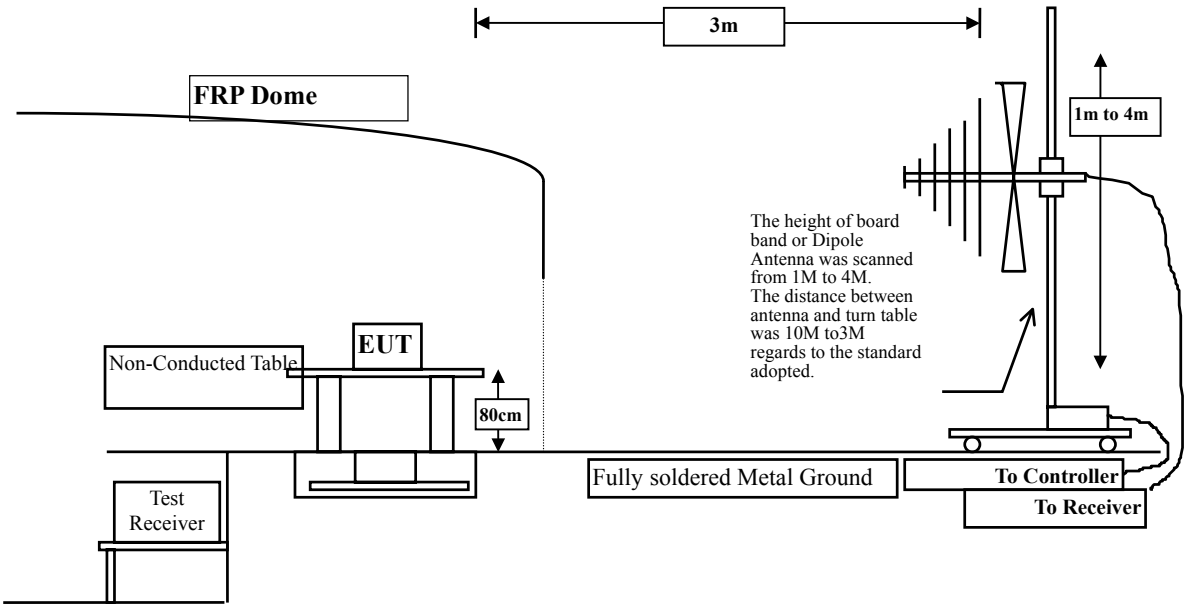
3.1. Test Equipment

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

Test Site	Equipment	Manufacturer	Model No./Serial No.	Last Cal.
☐Site # 1	Test Receiver	R & S	ESVS 10 / 834468/003	July, 2005
	Spectrum Analyzer	Advantest	R3162/ 00803480	May, 2005
	Pre-Amplifier	Advantest	BB525C/ 3307A01812	May, 2005
	Bilog Antenna	SCHAFFNER	CBL6112B / 2697	Nov., 2005
☐Site # 2	Test Receiver	R & S	ESCS 30 / 836858 / 022	Nov., 2005
	Spectrum Analyzer	Advantest	R3162 / 100803466	May, 2005
	Pre-Amplifier	Advantest	BB525C/3307A01814	May, 2005
	Bilog Antenna	SCHAFFNER	CBL6112B / 2705	Oct., 2005
☒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, 2005
	Pre-Amplifier	QTK	QTK-AMP-01 / 0001	July, 2005
	Broadband Antenna	Schwarzbeck	VULB9166/1085	April, 2005
	Loop Antenna	R&S	HFH2-Z2/833799/004	July, 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

FCC Part 15 Subpart C Paragraph 15.227 Limits		
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.

FCC Part 15 Subpart C Paragraph 15.209 Limits		
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 invested over the frequency range from 30MHz to1GHz 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 harminics is checked.

3.5. Uncertainty

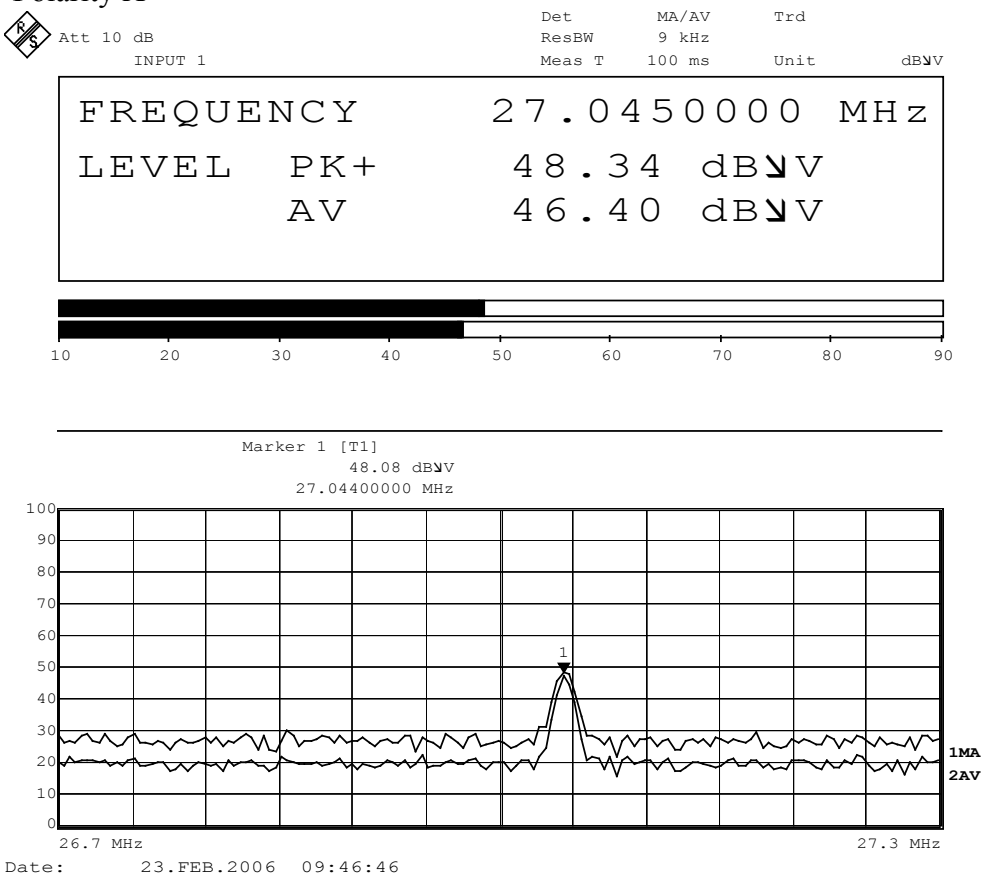
The measurement uncertainty is defined as ± 3.19 dB

3.6. Test Data of Radiated Emission

Product : 27MHz Mouse
Test Item : Fundamental Radiated Emission
Test Site : No.3 OATS
Test Voltage : AC 110V / 60Hz
Test Mode : Mode 1: Normal Operation

Polarity	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Average Limit (dBuV/m)
Peak Detector							
X	27.045	-3.55	48.34	44.79	-55.21	100.000	80.000
Y	27.045	-3.55	56.50	52.95	-47.05	100.000	80.000
Z	27.045	-3.55	56.63	53.08	-46.92	100.000	80.000

Polarity X



Polarity Y

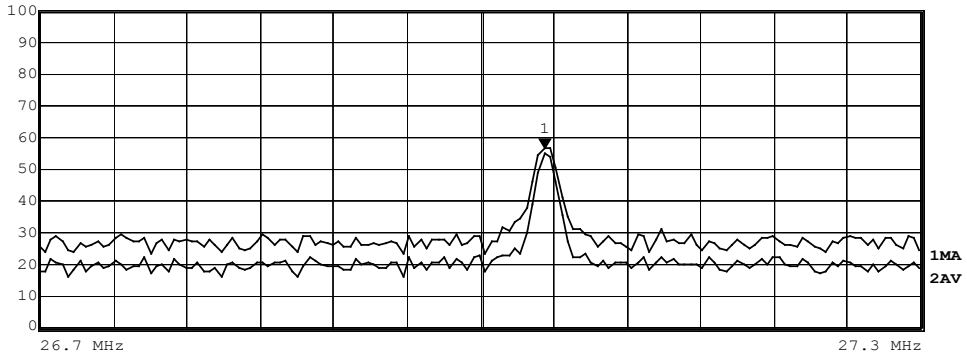
Att 10 dB
INPUT 1

Det	MA/AV	Trd	
ResBW	9 kHz		
Meas T	100 ms	Unit	dBµV

FREQUENCY		27.0450000 MHz
LEVEL	PK+	56.50 dBµV
	AV	55.21 dBµV

10 20 30 40 50 60 70 80 90

Marker 1 [T1]
56.23 dBµV
27.04400000 MHz



Date: 23.FEB.2006 09:49:25

Polarity Z

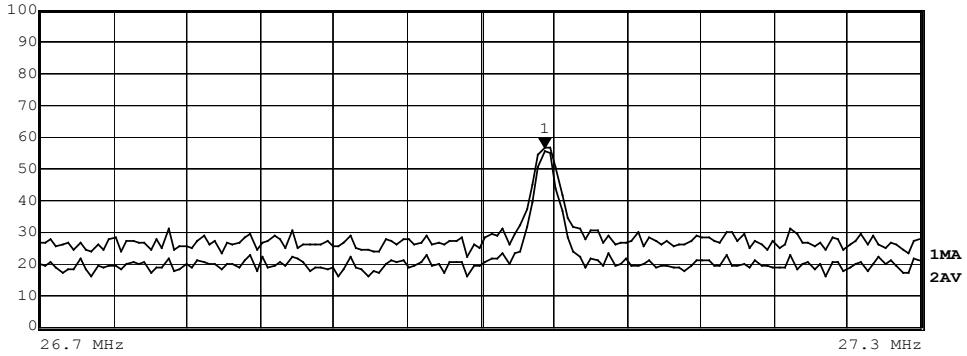
Att 10 dB
INPUT 1

Det	MA/AV	Trd	
ResBW	9 kHz		
Meas T	100 ms	Unit	dBµV

FREQUENCY		27.0450000 MHz
LEVEL	PK+	56.63 dBµV
	AV	55.34 dBµV

10 20 30 40 50 60 70 80 90

Marker 1 [T1]
56.50 dBµV
27.04400000 MHz



Date: 23.FEB.2006 09:51:50

Product : 27MHz Mouse
Test Item : General Radiated Emission
Test Site : No.3 OATS
Test Voltage : AC 110V / 60Hz
Test Mode : Mode 1: Normal Operation

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
Horizontal					
177.930	9.727	7.800	17.528	-25.992	43.520
216.700	9.552	12.900	22.452	-23.568	46.020
354.900	15.224	8.120	23.344	-22.676	46.020
468.900	18.781	8.200	26.981	-19.039	46.020
539.250	19.518	3.160	22.678	-23.342	46.020
*648.300	20.951	8.600	29.551	-16.469	46.020

Note:

1. Reading values below 1GHz are quasi-peak and reading values above 1GHz are peak and/or average.
2. " * " means the worst emission level.
3. Measurement Level = Reading Level + Correct Factor

Product : 27MHz Mouse
Test Item : General Radiated Emission
Test Site : No.3 OATS
Test Voltage : AC 110V / 60Hz
Test Mode : Mode 1: Normal Operation

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
Vertical					
211.800	10.287	7.300	17.587	-25.933	43.520
243.400	12.541	2.780	15.321	-30.699	46.020
257.900	14.270	3.900	18.170	-27.850	46.020
500.450	18.354	6.300	24.654	-21.366	46.020
536.800	19.720	8.010	27.730	-18.290	46.020
*699.300	20.653	7.140	27.793	-18.227	46.020

Note:

1. Reading values below 1GHz are quasi-peak and reading values above 1GHz are peak and/or average.
2. " * " means this data is the worst emission level.
3. Measurement Level = Reading Level + Correct Factor

4. Band Edge

4.1. Test Equipment

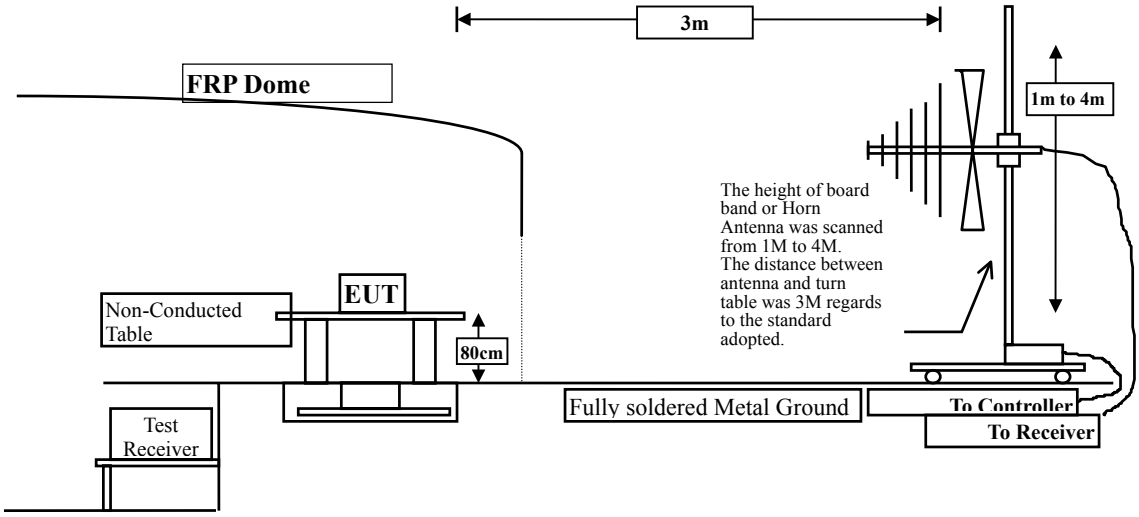
The following test equipment are used during the radiated emission test:

Test Site	Equipment	Manufacturer	Model No./Serial No.	Last Cal.
☐Site # 1	Test Receiver	R & S	ESVS 10 / 834468/003	July, 2005
	Spectrum Analyzer	Advantest	R3162/ 00803480	May, 2005
	Pre-Amplifier	Advantest	BB525C/ 3307A01812	May, 2005
	Bilog Antenna	SCHAFFNER	CBL6112B / 2697	Nov., 2005
☐Site # 2	Test Receiver	R & S	ESCS 30 / 836858 / 022	Nov., 2005
	Spectrum Analyzer	Advantest	R3162 / 100803466	May, 2005
	Pre-Amplifier	Advantest	BB525C/3307A01814	May, 2005
	Bilog Antenna	SCHAFFNER	CBL6112B / 2705	Oct., 2005
☒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, 2005
	Loop Antenna	R&S	HFH2-Z2/833799/004	July, 2005
	Pre-Amplifier	QTK	QTK-AMP-01 / 0001	July, 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.

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

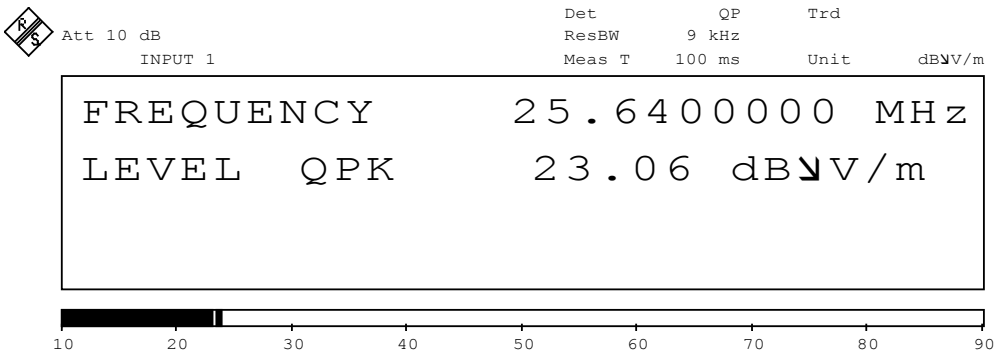
The EUT and its simulators are placed on a turn table which is 0.8 meter above ground. The turn table can rotate 360 degrees to determine the position of the maximum emission level. The EUT was positioned such that the distance from antenna to the EUT was 3 meters.
The antenna can move up and down between 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 dtrength of harmonics measurement.
The bandwidth below 30MHz setting on the field strength meter is 10 kHz

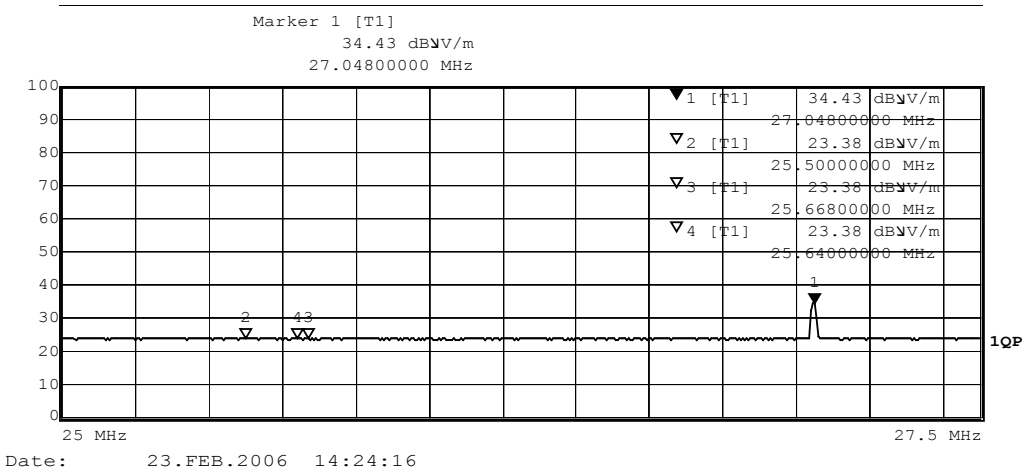
4.5. Test Result of Band Edge

Product : 27MHz Mouse
Test Item : Band Edge
Test Site : No.3 OATS
Test Mode : Mode 1: Normal Operation

RF Radiated Measurement: (Q-Peak Detector)

Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)
25.640	-6.076	23.06	16.984	-23.016	40.000





5. Occupied Bandwidth

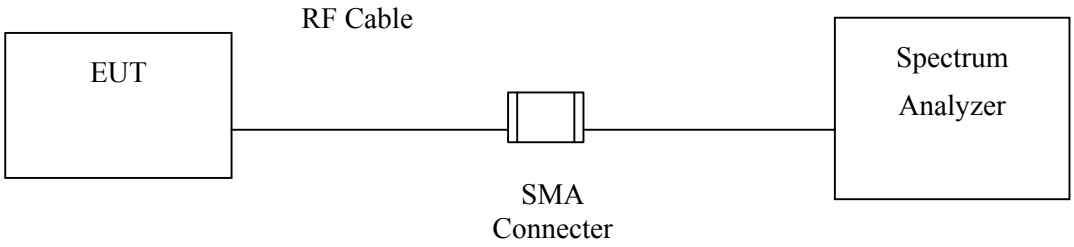
5.1. Test Equipment

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

Equipment		Manufacturer	Model No./Serial No.	Last Cal.
X	Test Receiver	R & S	ESI 26 / 838786 / 004	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.

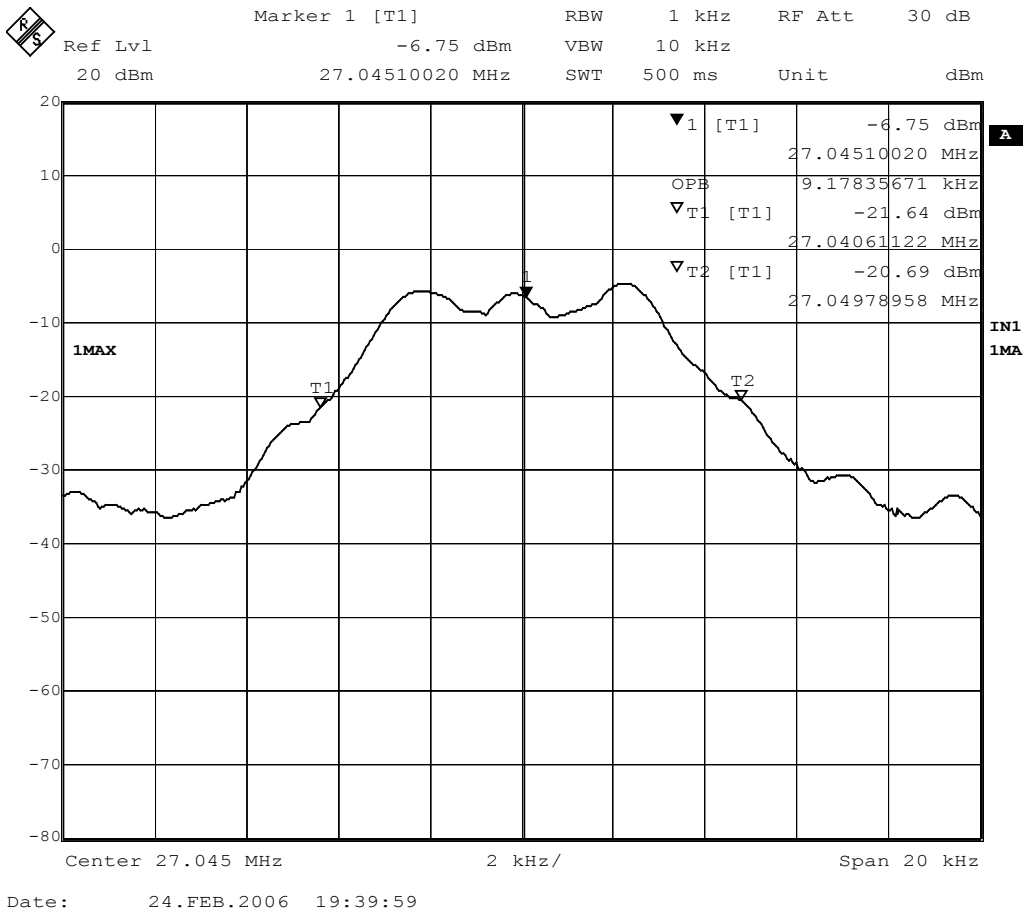
5.2. Test Setup



5.3. Test Result of Occupied Bandwidth

Product : 27MHz Mouse
Test Item : Occupied Bandwidth Data
Test Site : No.3 Shielded Room
Test Mode : Channel 1

Channel No.	Frequency (MHz)	Measurement Level (kHz)
1	27.045	9.18



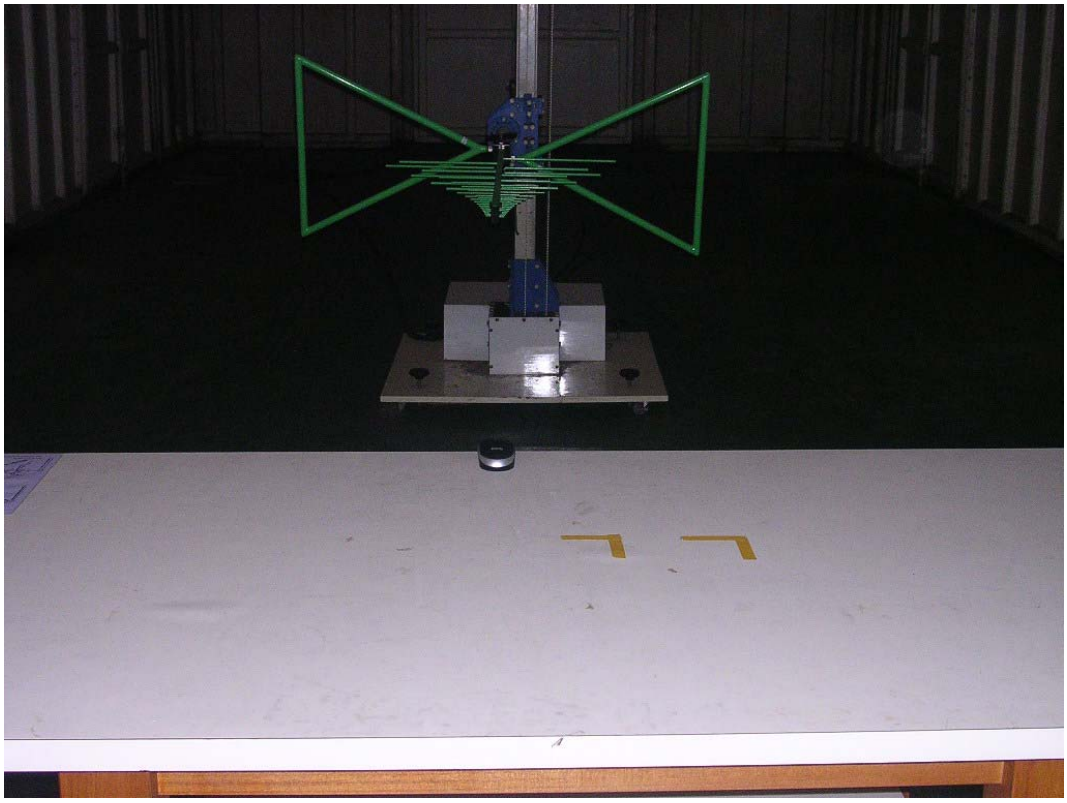
6. EMI Reduction Method During Compliance Testing

No modification was made during testing.

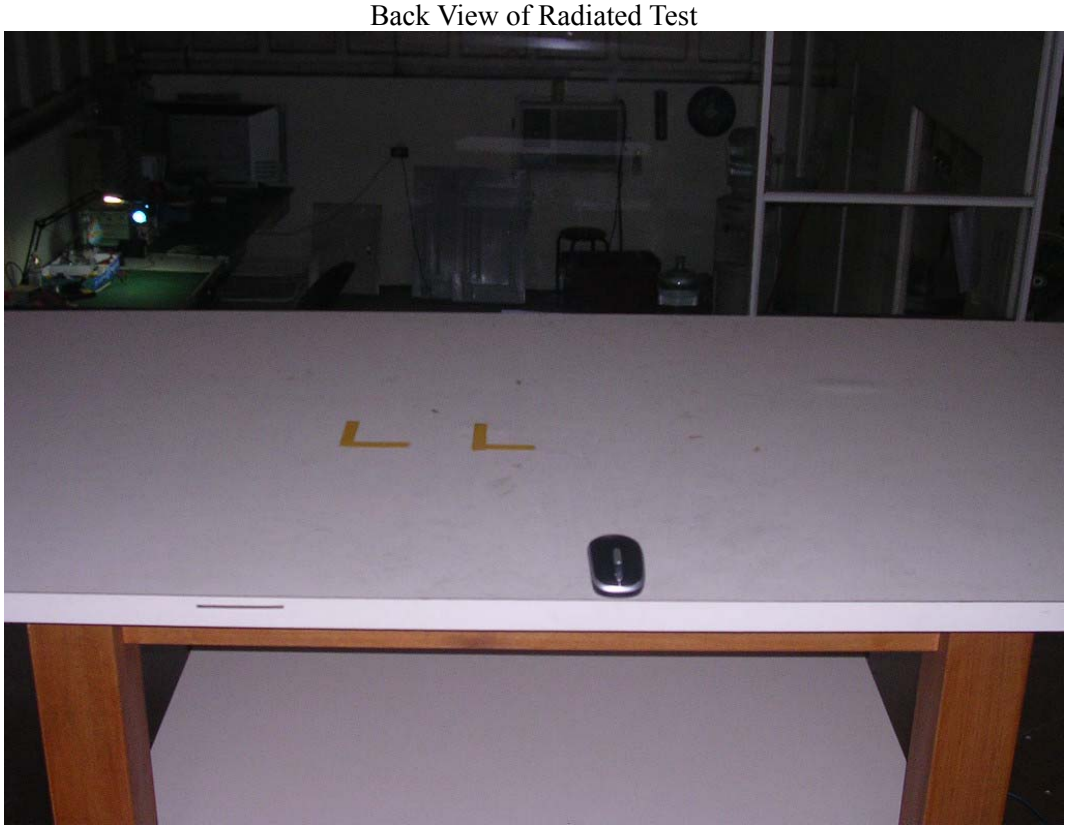
Attachment 1: EUT Test Photographs

Attachment 1: EUT Test Setup Photographs

Front View of Radiated Test



Back View of Radiated Test



Front View of Radiated Test

Back View of Radiated Test

Attachment 2: EUT Detailed Photographs

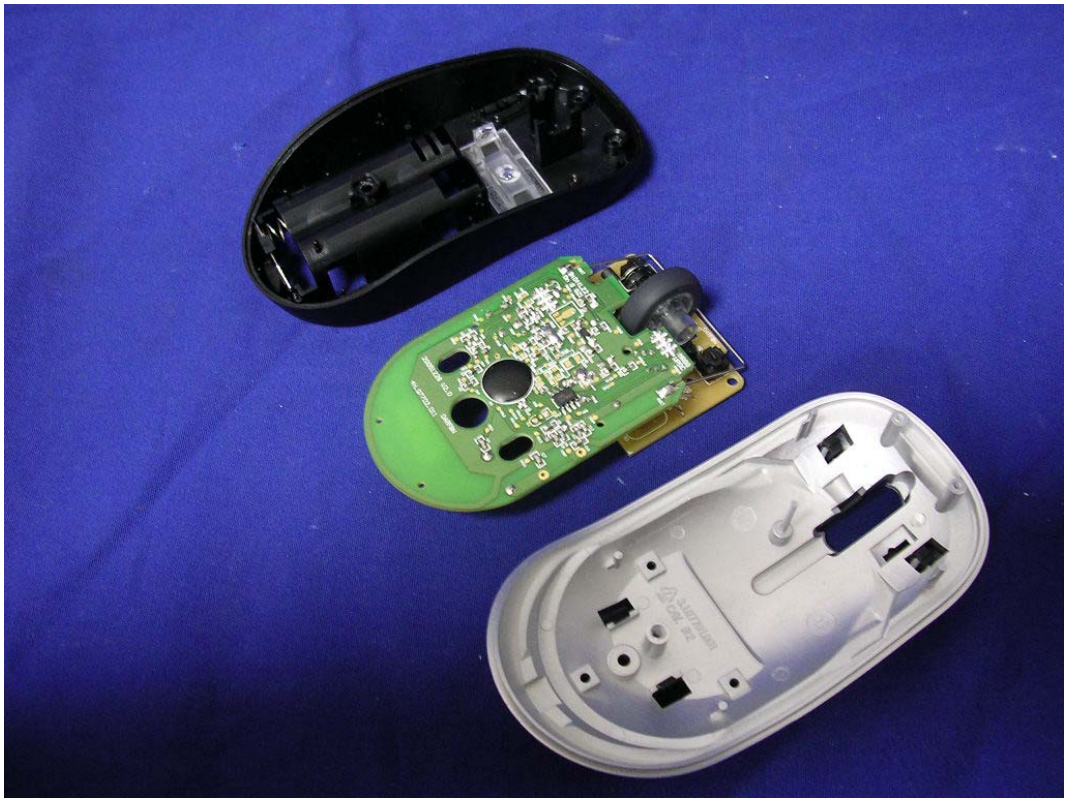
Attachment 2 : EUT Detailed Photographs

(1) EUT Photo (M333)

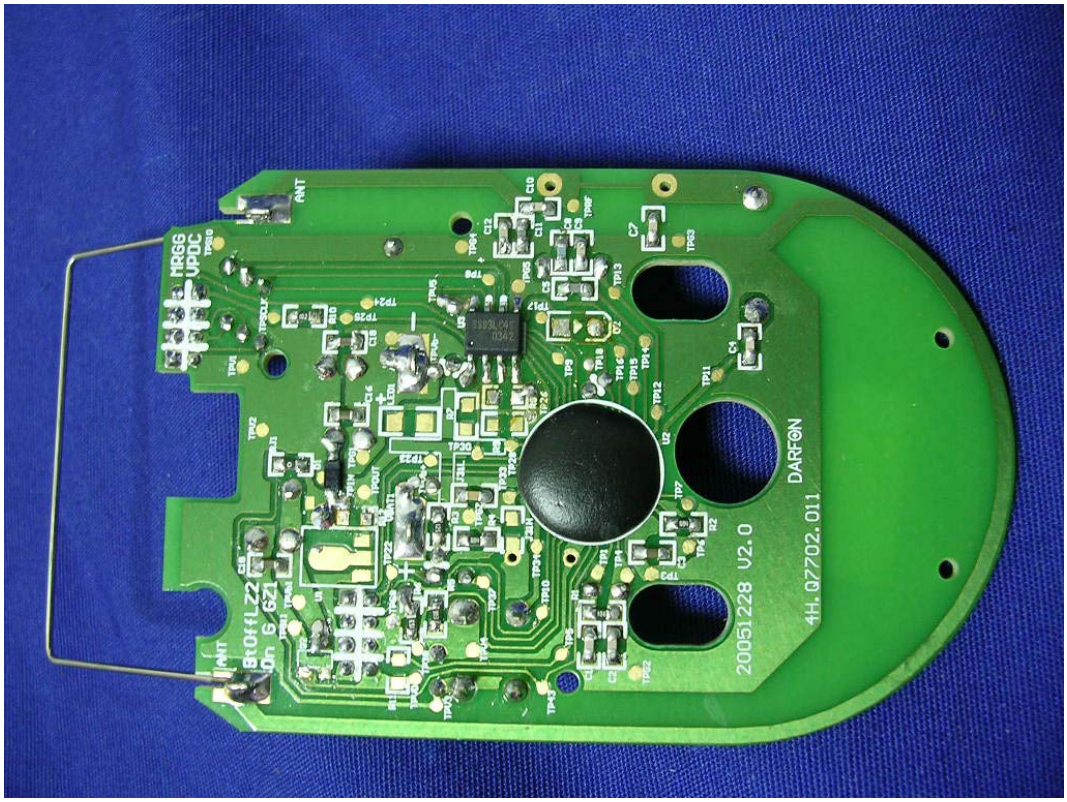
(2) EUT Photo (M333)

(3) EUT Photo (M333)

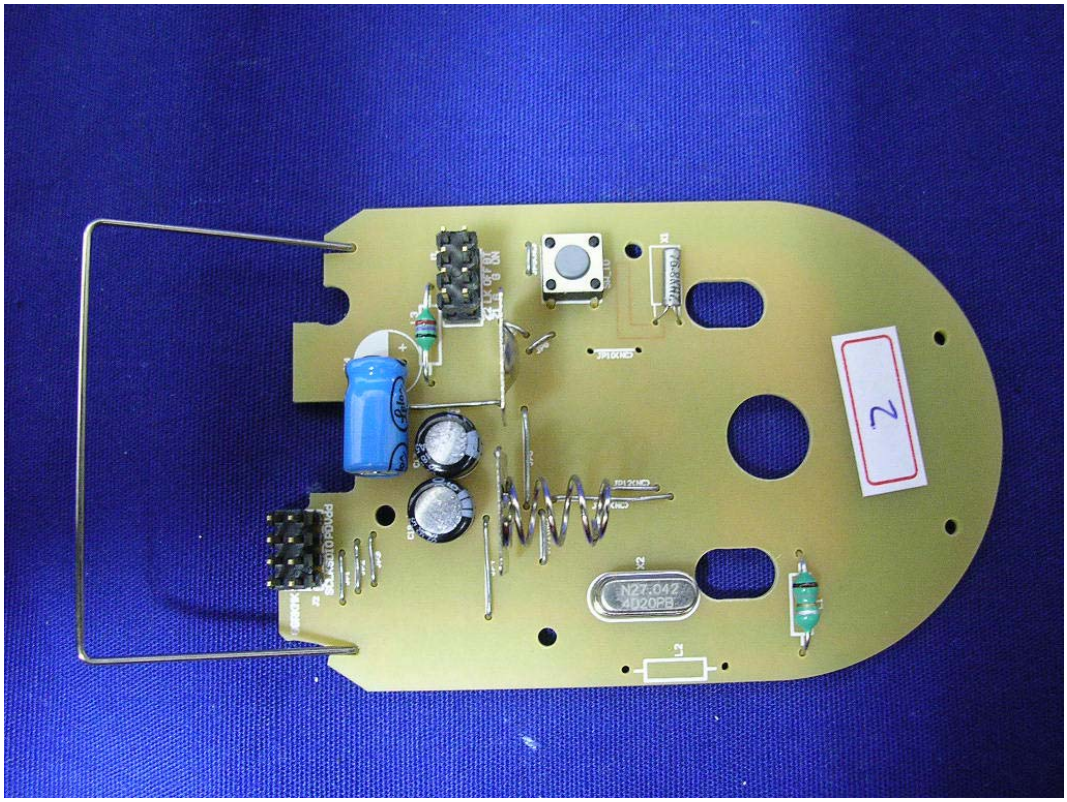
(4) EUT Photo (M333)



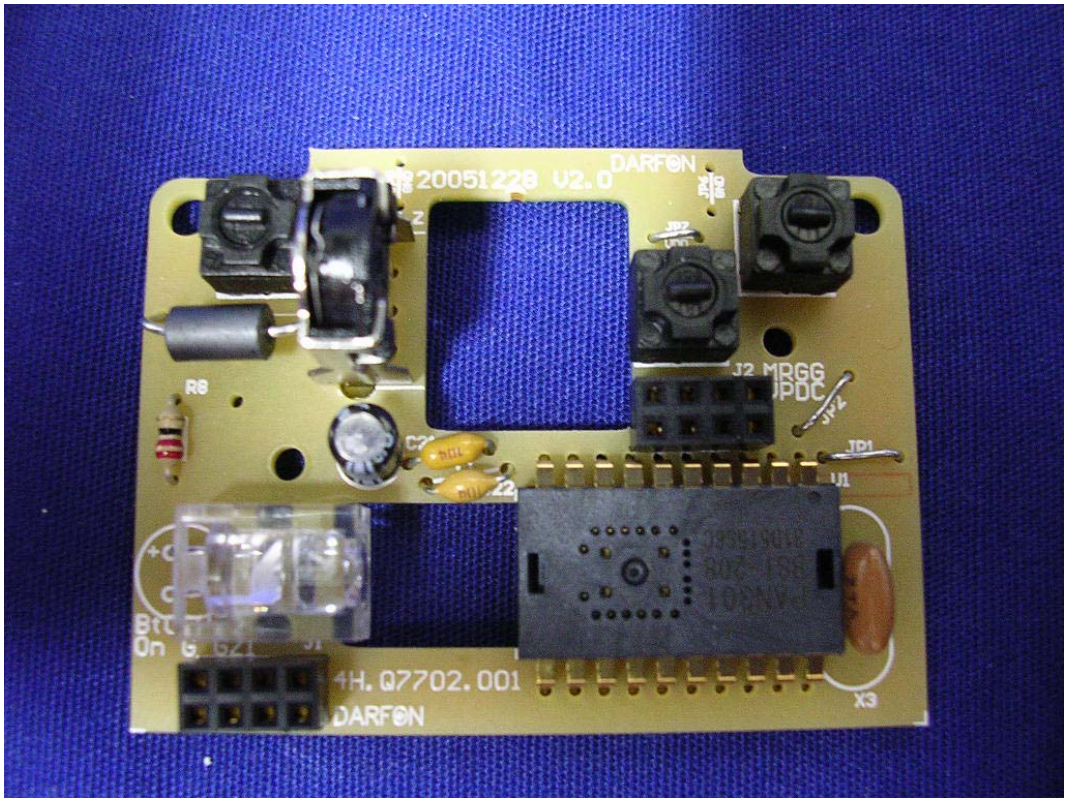
(5) EUT Photo (M333)



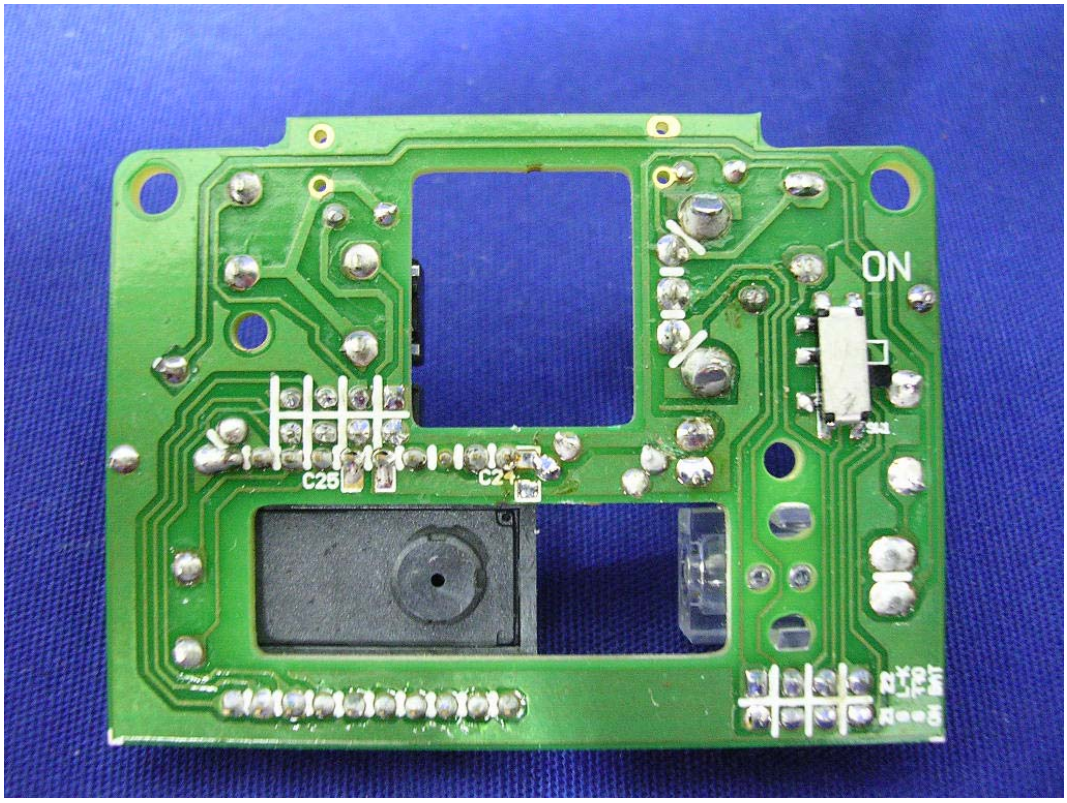
(6) EUT Photo (M333)



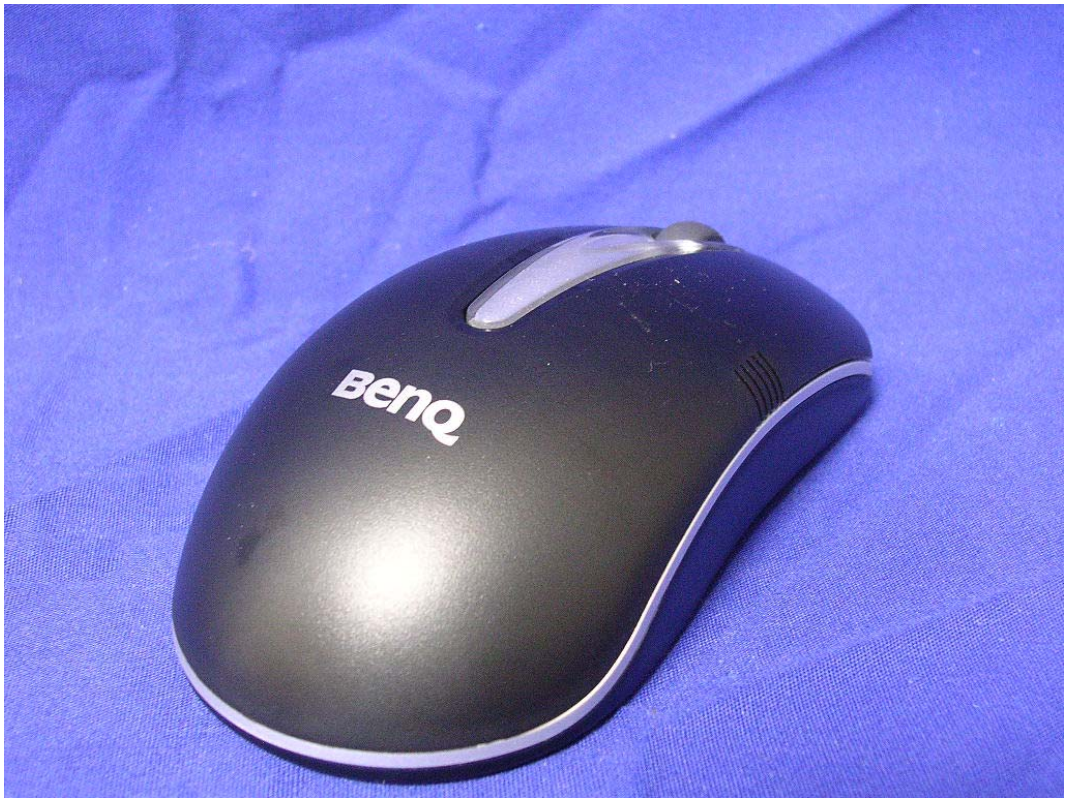
(7) EUT Photo (M333)



(8) EUT Photo (M333)



(9) EUT Photo (M302)

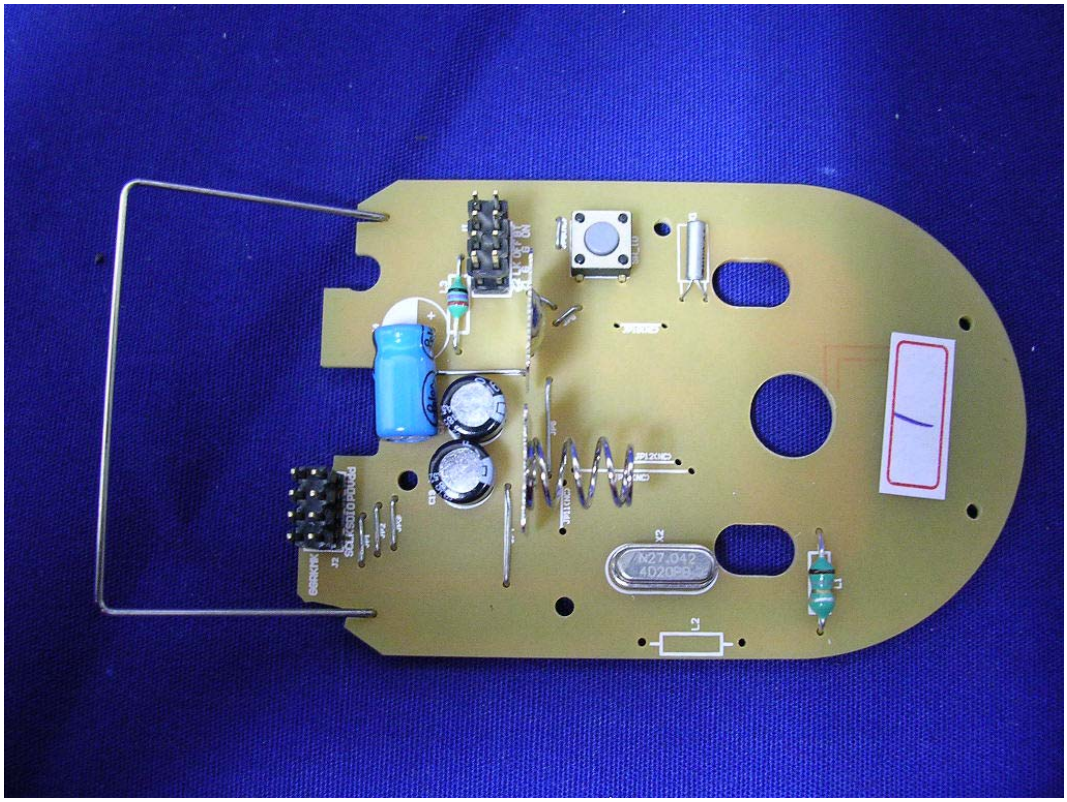


(10) EUT Photo (M302)

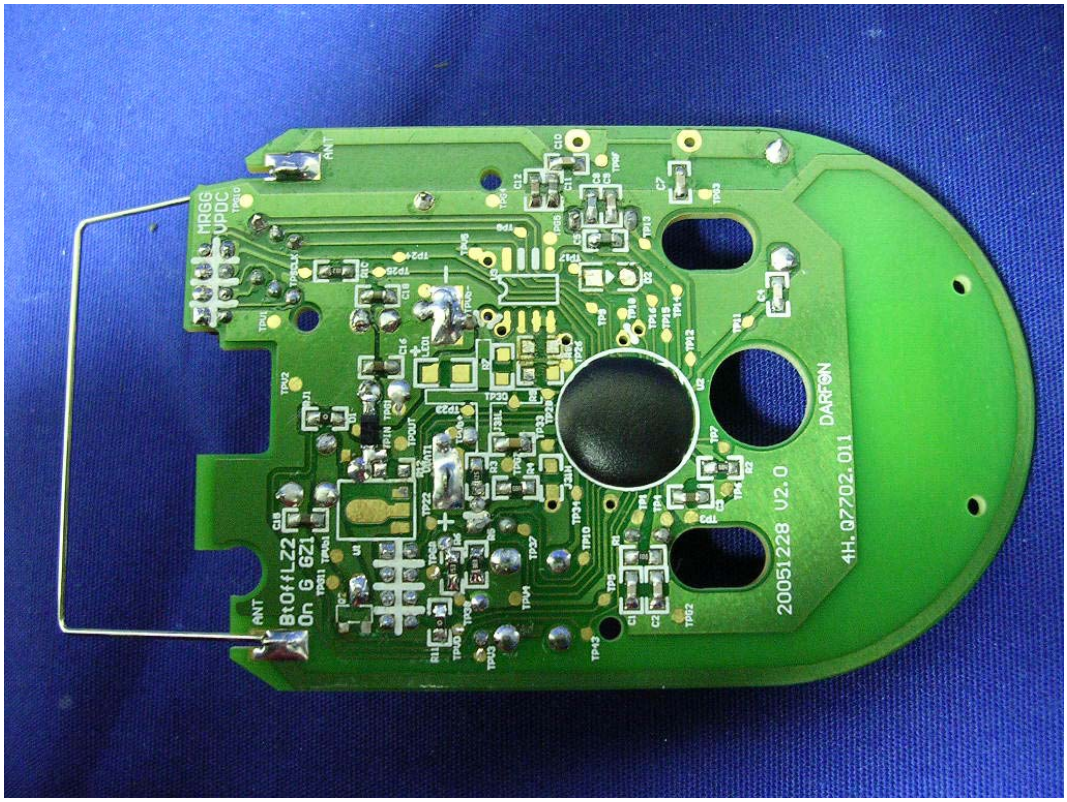
(11) EUT Photo (M302)

(12) EUT Photo (M302)

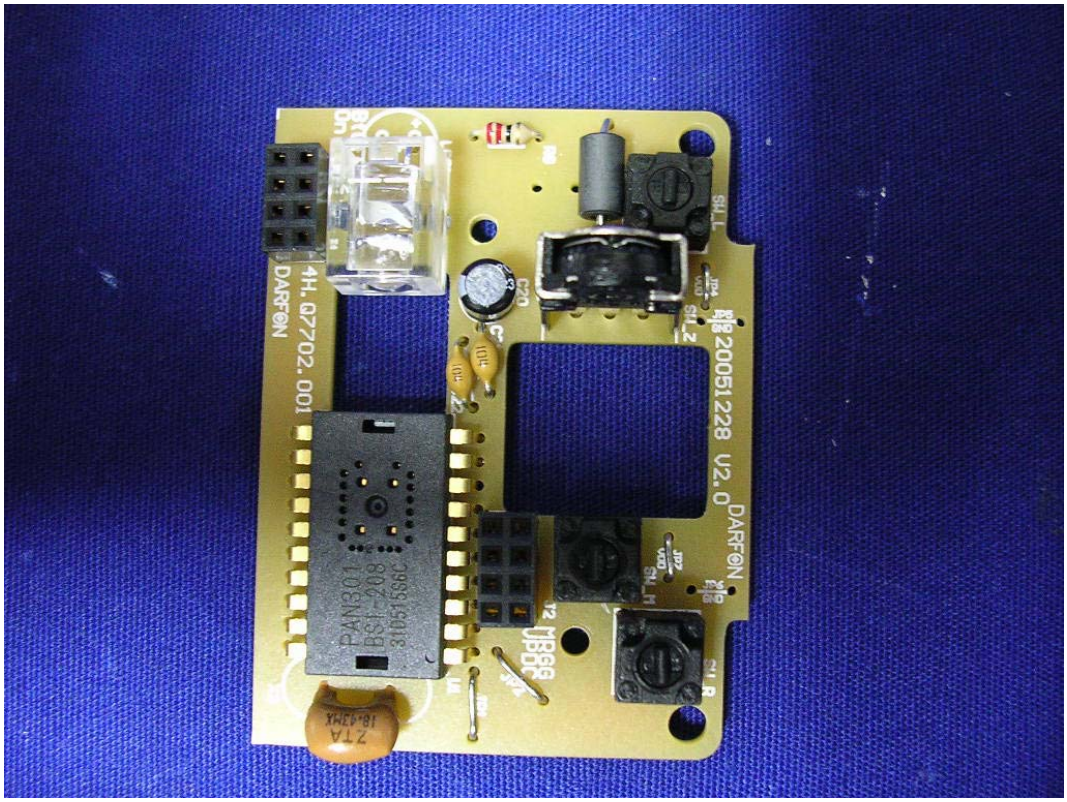
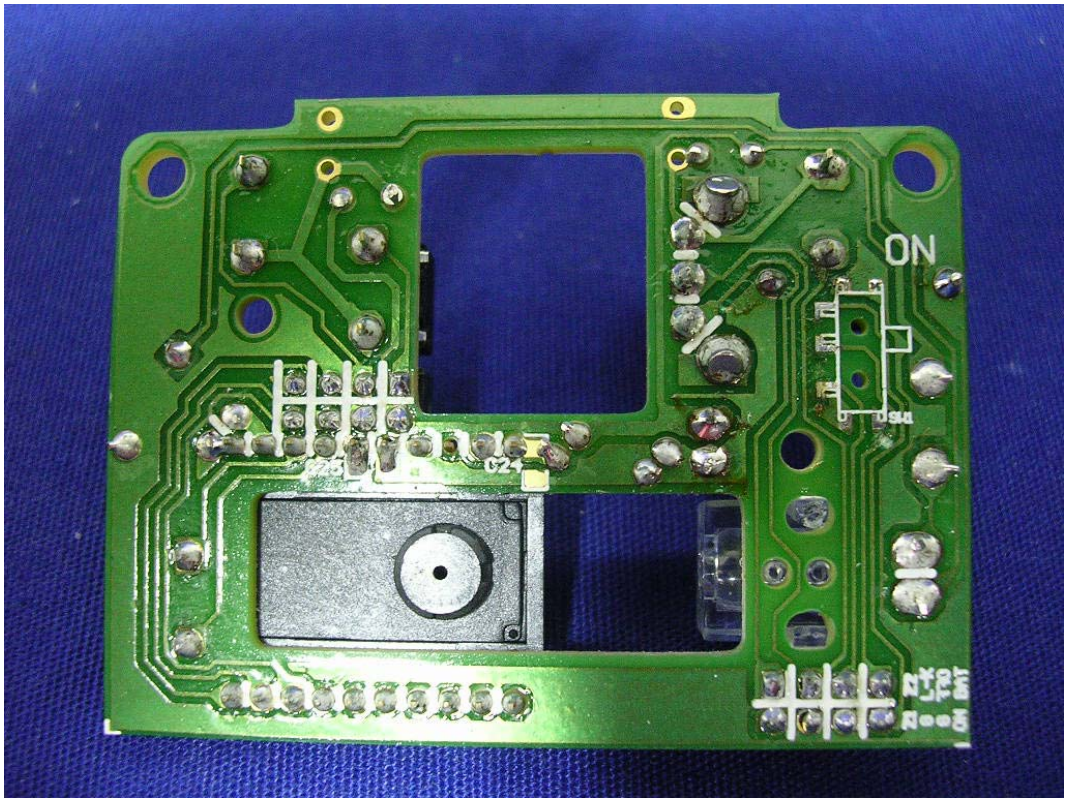
(13) EUT Photo (M302)



(14) EUT Photo (M302)



(15) EUT Photo (M302)



(16) EUT Photo (M302)