



Test Report

Product Name: Wireless Mouse

Model No.: M-RY81

FCC ID.: JNZ211596

Applicant : Logitech Far East Ltd.

Address : #2 Creation Rd., 4, Science-Based Ind.
Park, Hsinchu, Taiwan, R.O.C.

Date of Receipt : June. 10, 2002

Date of Test : June. 27, 2002

Report No. : 026H038FI

The Test Results relate only to the samples tested.

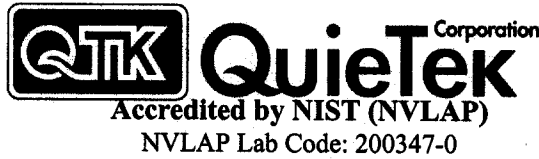
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This report must not be used to claim product endorsement by NVLAP any agency of the U.S. Government

Test Report Certification

Test Date : June. 27, 2002

Report No.: 026H038FI



Product Name : Wireless Mouse

Applicant : Logitech Far East Ltd.

Address : #2 Creation Rd., 4, Science-Based Ind. Park,
Hsinchu, Taiwan, R.O.C.

Manufacturer : Logitech Far East Ltd.

Model No. : M-RY81

FCC ID. : JNZ211596

Rated Voltage : DC 3.0V (Power by Battery)

Trade Name : Logitech

Measurement Standard : FCC Part 15 Intentional Radiators for Subpart C
Paragraph 15.227

Measurement Procedure : ANSI C63.4:1992

Test Result : Complied



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Tested By : Ken Hsu
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(Kevin Wang)

TABLE OF CONTENTS

Description	Page
1. GENERAL INFORMATION.....	4
1.1. EUT Description	4
1.2. Operation Description	4
1.3. Tested System Details	5
1.4. Configuration of tested System	5
1.5. EUT Exercise Software	6
1.6. Test Facility	6
2. Conducted Emission	7
2.1. Test Equipment	7
2.2. Test Setup	7
2.3. Limits	8
2.4. Test Procedure	8
2.5. Test Result	8
3. Radiated Emission.....	9
3.1. Test Equipment	9
3.2. Test Setup	9
3.3. Limits	10
3.4. Test Procedure	11
3.5. Test Result	11
4. Band Edge.....	12
4.1. Test Equipment	12
4.2. Test Setup	12
4.3. Test Condition	13
4.4. Standard Requirement	13
5. EMI Reduction Method During Compliance Testing	14
6. Summary of Test Datas.....	15
6.1. Test Data of Conducted Emission	16
6.2. Test Data of Radiated Emission	17
6.3. Test Result of Band Edge	19
Attachment 1: EUT Test Photographs	
Attachment 2: EUT Detailed Photographs	

1. GENERAL INFORMATION

1.1. EUT Description

Product Name : Wireless Mouse
Trade Name : Logitech
FCC ID. : JNZ211596
Model No. : M-RY81
EUT Voltage : DC 3.0V (Power by Battery)
Frequency Range : 27.045MHz ~ 27.195MHz
Channel Number : 2
Type of Modulation : FSK
Antenna type : Soldered on PCB
Operator Selection of Operating Frequency : By software

Frequency of Each Channel:

Channel	Frequency	Channel	Frequency
Channel 1:	27.045 MHz	Channel 2:	27.195 MHz

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 Part 15 Subpart C Paragraph 15.227.
3. Regards to the frequent band operation; one channels (channel 2) were selected to perform the test, then shown on this report.
4. This device is a composite device in accordance with Part 15 regulations. The function for the receiver was, measured and made a test report that the report number is 026H038F, under Declaration of Conformity.

1.2. Operation Description

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

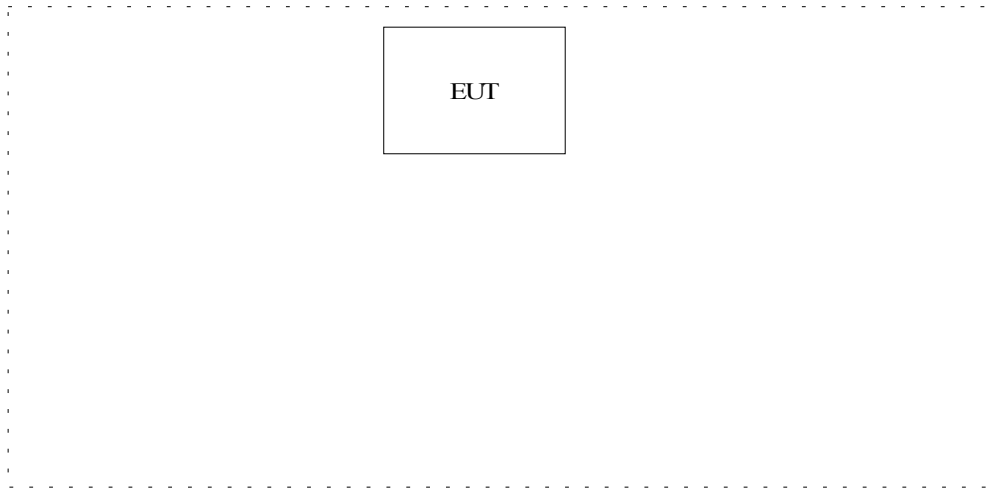
The device adapts FSK modulation. The antenna Soldered on PCB Provides diversity function to improve the transmitting function.

1.3. Tested System Details

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

None.

1.4. Configuration of tested System



1.5. EUT Exercise Software

- 1.5.1 Setup the EUT and simulators as shown on 1.3.
- 1.5.2 Turn on the power of all equipment.
- 1.5.3 Notebook PC reads data from disk.
- 1.5.4 Data will be transmitting through EUT.
- 1.5.5 The transmitted status will be shown on the monitor.
- 1.5.6 Repeat the above procedure 1.4.4 to 1.4.5

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:

August 30, 2001 Accreditation on NVLAP
 NVLAP Lab Code: 200347-0



February 23, 1999 Accreditation on DNV
 Statement No. : 413-99-LAB11



January 04, 1999 Accreditation on TUV Rheinland
 Certificate No.: I9865712-9901



April 18, 2001 Accreditation on Nemko
 Certificate No.: ELA 165
 Certificate No.: ELA 162
 Certificate No.: ELA 162



Site Name: Quietek Corporation

Site Address: No.75-1, Wang-Yeh Valley, Yung-Hsing,
 Chiung-Lin, Hsin-Chu County,
 Taiwa, R.O.C.
 TEL : 886-3-592-8858 / FAX : 886-3-592-8859
 E-Mail : service@quietek.com

2. Conducted Emission

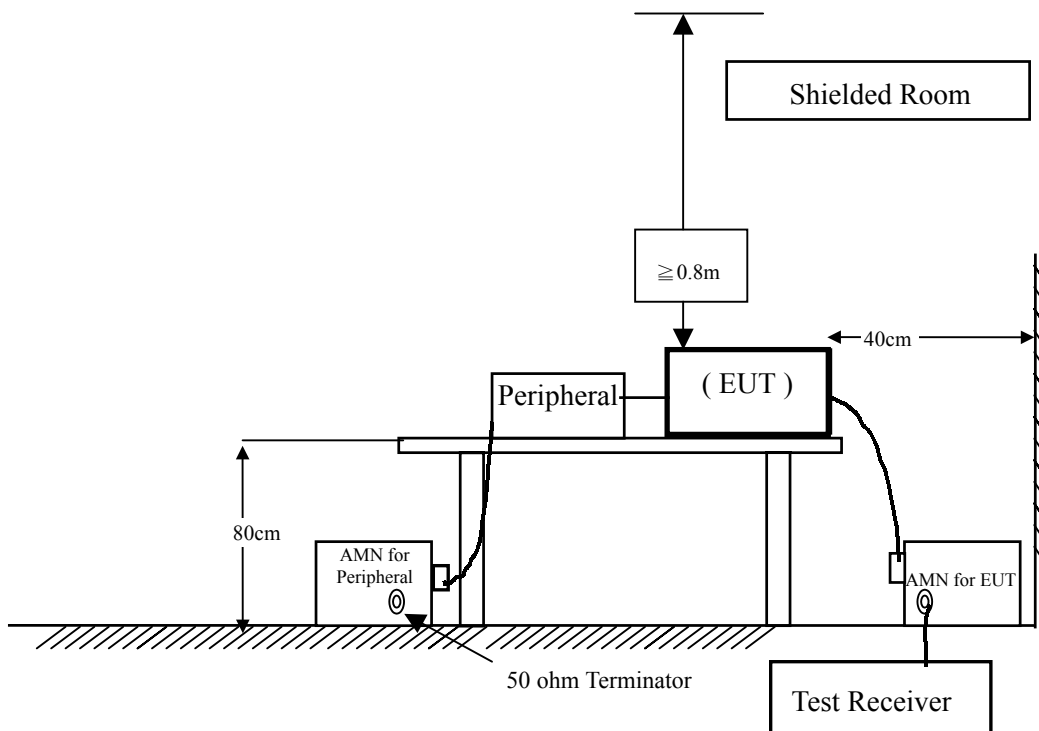
2.1. Test Equipment

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 30/838251/0001	May, 2002	
2	L.I.S.N.	R & S	ESH3-Z5/836679/0023	May, 2002	EUT
3	L.I.S.N.	R & S	ENV 4200/833209/0023	May, 2002	Peripherals
4	Pulse Limiter	R & S	ESH3-Z2	May, 2002	
5	No.4 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 Paragraph 15.207 (dBuV)		
Frequency MHz	Limits	
	uV	dBuV
0.45 - 30	250	48.0

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 C63.4:1992 on conducted measurement.

Conducted emissions were invested over the frequency range from 0.45MHz to 30MHz using a receiver bandwidth of 9kHz.

2.5. Test Result

The emission from the EUT was below the specified limits. The worst-case emissions are shown in [section 5](#). The acceptance criterion was met and the EUT passed the test.

3. Radiated Emission

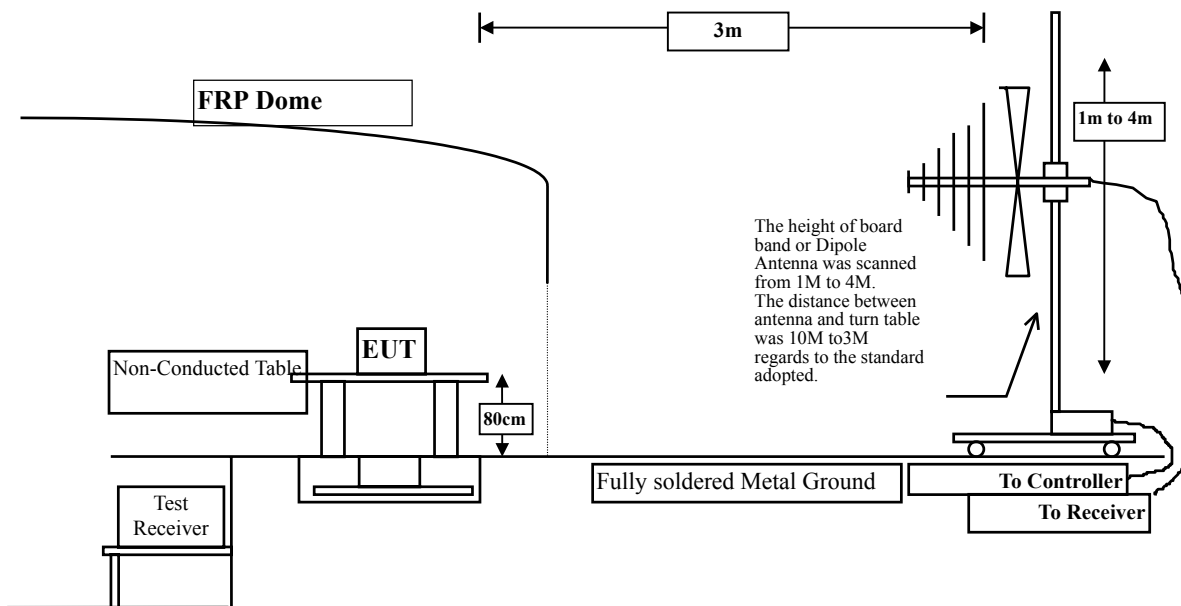
3.1. Test Equipment

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

Test Site	Equipment	Manufacturer	Model No./Serial No.	Last Cal.
<input checked="" type="checkbox"/> Site # 1	X Test Receiver	R & S	ESVS 10 / 834468/003	July, 2001
	X Spectrum Analyzer	Advantest	R3162/ 00803480	May, 2002
	X Pre-Amplifier	Advantest	BB525C/ 3307A01812	May, 2002
	X Bison Log Antenna	Schwarz beck	VU1B9166	July, 2001
	Bilog Antenna	SCHAFFNER	CBL6112B / 2697	Nov., 2001
<input type="checkbox"/> Site # 2	Test Receiver	R & S	ESCS 30 / 836858/022	Nov., 2001
	Spectrum Analyzer	Advantest	3162 / 100803466	May, 2002
	Pre-Amplifier	Advantest	BB525C/3307A01814	May, 2002
	Bilog Antenna	SCHAFFNER	CBL6112B / 2705	Oct., 2001
	Pre-Amplifier	QTK	QTK-AMP-01/ 0001	July, 2001

- 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

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.

Frequency MHz	15.209 Limits (dBuV/m @3m)
30-88	40
88-216	43.5
216-960	46
Above 960	54

- Remarks :
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 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 C63.4:1992 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. Test Result

The emission from the EUT was below the specified limits. The worst-case emissions are shown in [section 5](#). The acceptance criterion was met and the EUT passed the test.

4. Band Edge

4.1. Test Equipment

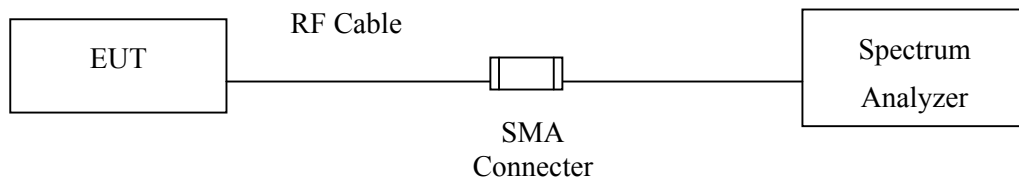
The following test equipments are used during the band edge tests:

	Equipment	Manufacturer	Model No./Serial No.	Last Cal.
X	Spectrum Analyzer	Advantest	R3272 / 72421194	May, 2002
X	Test Receiver	R & S	ESCS 30 / 825442/14	May, 2002
X	Spectrum Analyzer	Advantest	R3261C / 71720140	May, 2002
X	Pre-Amplifier	HP	8447D/3307A01812	May, 2002
X	Bilog Antenna	Chase	CBL6112B / 12452	Sep., 2001
X	Horn Antenna	EM	EM6917 / 103325	May, 2002

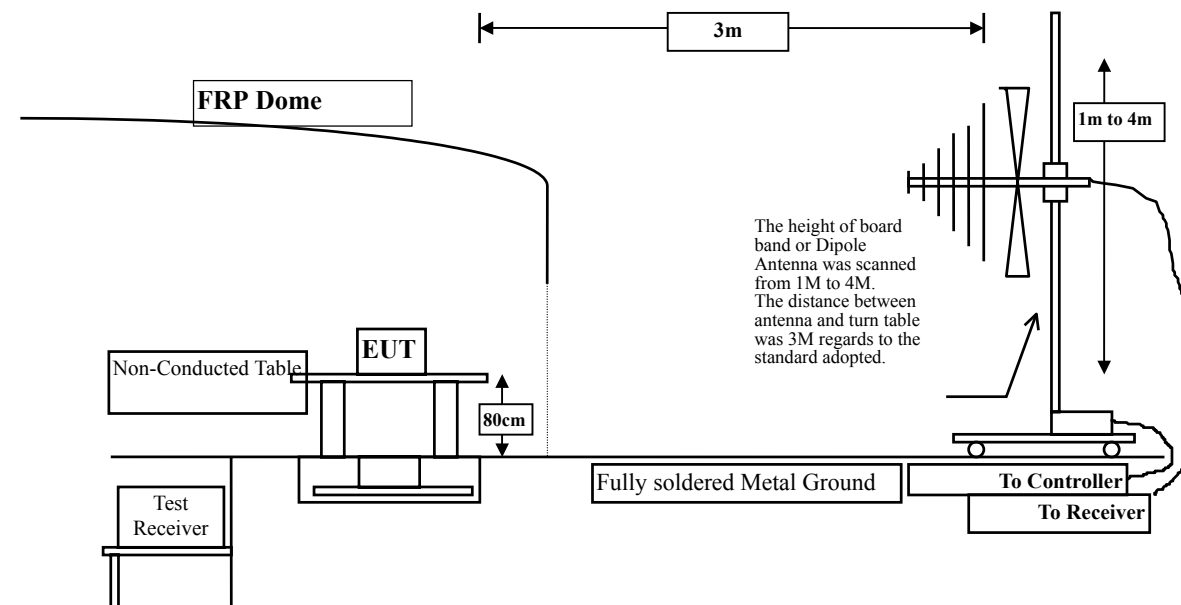
- Note: 1. All equipments that need to calibrate are with calibration period of 1 year.
 2. Mark "X" test instruments are used to measure the final test results.

4.2. Test Setup

RF Conducted Measurement:



RF Radiated Measurement:



4.3. Test Condition

Standard Temperature and Humidity, Standard Test Voltage

4.4. Standard Requirement

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. 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)).

5. EMI Reduction Method During Compliance Testing

No modification was made during testing.

6. Summary of Test Datas

The test result in the emission was performed according to the requirements of measurement standard and process. Quietek Corporation is assumed full responsibility for the accuracy and completeness of these measurements. The test data of the emission is listed as below.

6.1. Test Data of Conducted Emission

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

6.2. Test Data of Radiated Emission

Product : Wireless Mouse
 Test Item : Fundamental Radiated Emission Data
 Test Site : No.1 OATS
 Test Voltage : DC 3V (Power by PC)
 Test Mode : Channel 2

Freq.	Cable	Probe	PreAMP	Reading	Emission	Margin	Limit
	Loss	Factor		Level	Level		
MHz	dB	dB/m	dB	dBuV	dBuV/m	dB	dBuV/m
Horizontal (Peak Detector)							
27.193	1.00	24.36	0.00	38.25	63.61	36.39	100.00
Vertical (Peak Detector)							
27.194	1.00	24.36	0.00	39.25	64.61	35.39	100.00

Note:

1. All Readings are Peak 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 detector.

Product : Wireless Mouse
 Test Item : General Radiated Emission Data
 Test Site : No.1 OATS
 Test Voltage : DC 3V (Battery)
 Test Mode : Channel 2

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

Peak Detector

Horizontal:

76.000	1.59	8.90	0.00	15.12	25.61	14.39	40.00
108.757	1.91	12.55	0.00	9.65	24.10	19.40	43.50
163.193	2.43	11.10	0.00	14.91	28.44	15.06	43.50
*176.792	2.56	10.06	0.00	25.96	38.58	4.92	43.50
190.393	2.69	9.56	0.00	13.74	26.00	17.50	43.50
209.850	2.89	9.87	0.00	17.69	30.45	13.05	43.50
401.720	4.28	16.94	0.00	7.41	28.64	17.36	46.00

Peak Detector

Vertical:

*53.000	1.37	7.54	0.00	19.37	28.28	11.72	40.00
163.200	2.43	9.63	0.00	10.11	22.17	21.33	43.50
176.799	2.56	8.09	0.00	18.27	28.92	14.58	43.50
209.850	2.89	9.76	0.00	11.51	24.16	19.34	43.50
324.400	3.88	14.21	0.00	4.55	22.65	23.35	46.00
530.740	4.95	18.08	0.00	3.62	26.66	19.34	46.00

Note:

1. All Reading Levels below 1GHz are Quasi-Peak, above are peak and average value.
2. “ * ”, means this data is the worst emission level.
4. Emission Level = Reading Level + Probe Factor + Cable loss.

6.3. Test Result of Band Edge

Product : Wireless Mouse
 Test Item : Band Edge Data
 Test Site : No.1 OATS
 Test Mode : Channel 1

RF Radiated Measurement:

Channel No.	Frequency (MHz)	Reading Level (dBuV/m)	Emission Level (dBuV/m)	LimitLimit (dBuV/m)	Result
1 (Horizontal)	26.96	5.23	17.94	69.5	Pass
1 (Vertical)	26.96	3.92	16.63	69.5	Pass

Figure Channel 1: (Horizontal)

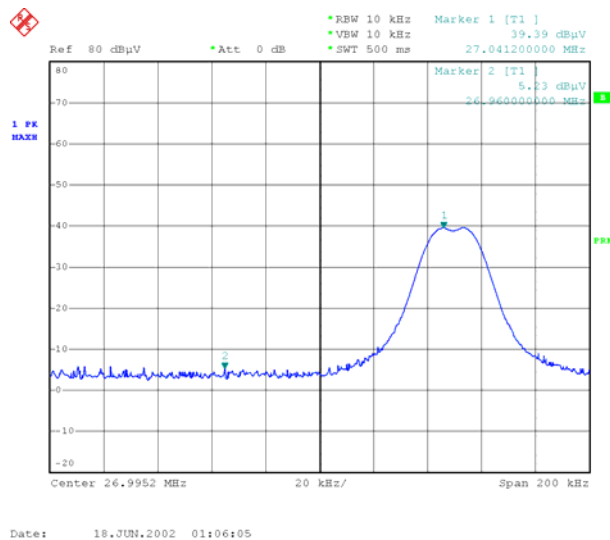
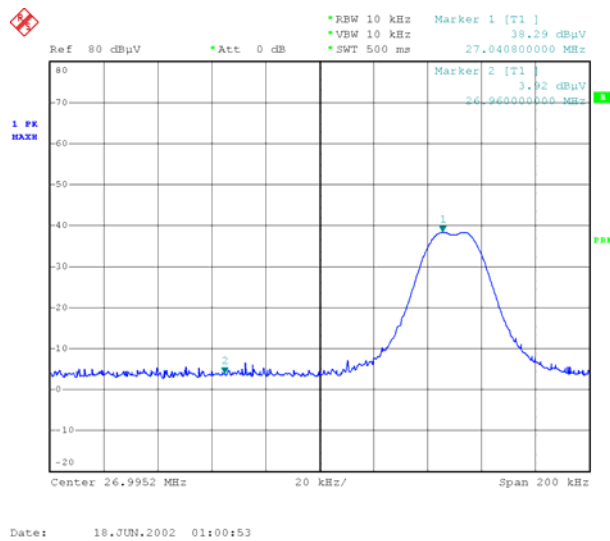


Figure Channel 1: (Vertical)



Note: The average measurement was not performed when the peak measured data under the limit of average detection.

Product : Wireless Mouse
 Test Item : Band Edge Data
 Test Site : No.1 OATS
 Test Mode : Channel 2

RF Radiated Measurement:

Channel No.	Frequency (MHz)	Reading Level (dBuV/m)	Emission Level (dBuV/m)	LimitLimit (dBuV/m)	Result
2 (Horizontal)	27.28	4.00	16.71	69.5	Pass
2 (Vertical)	27.28	3.58	16.29	69.5	Pass

Figure Channel 2: (Horizontal)

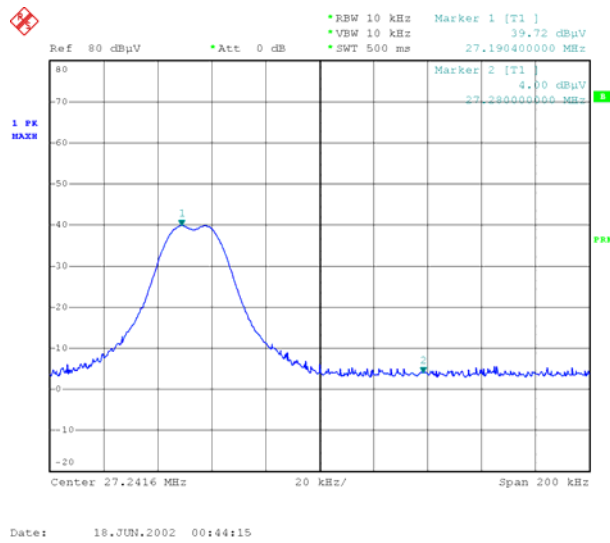
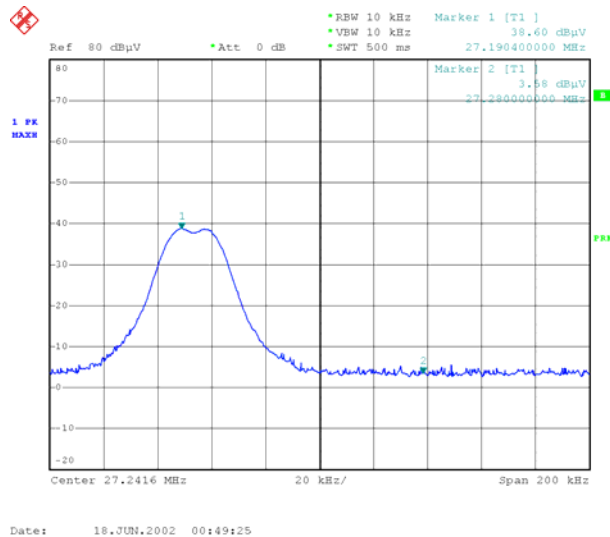


Figure Channel 2: (Vertical)

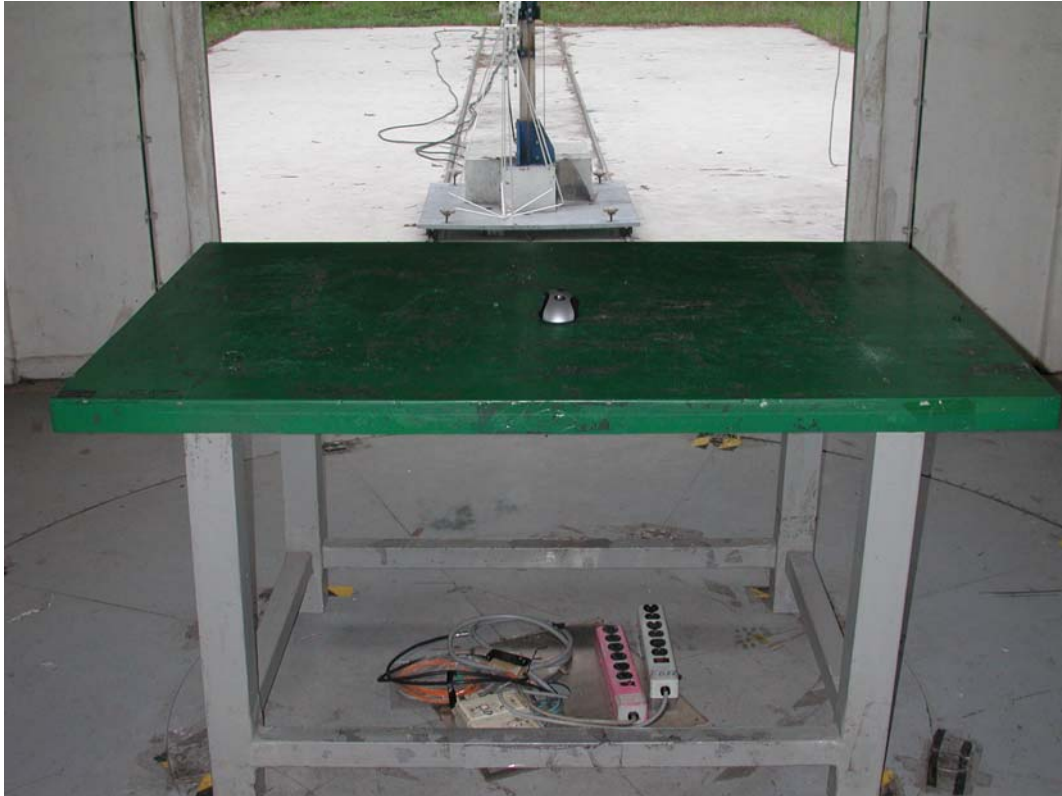


Note: The average measurement was not performed when the peak measured data under the limit of average detection.

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



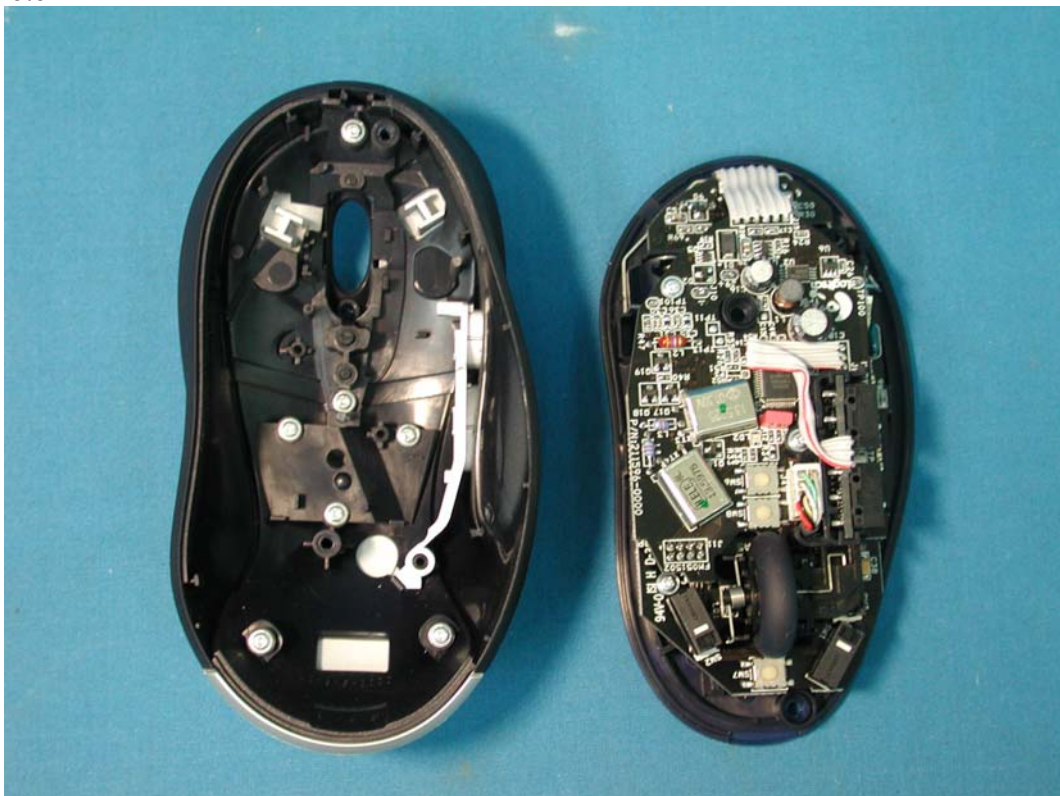
(2) EUT Photo



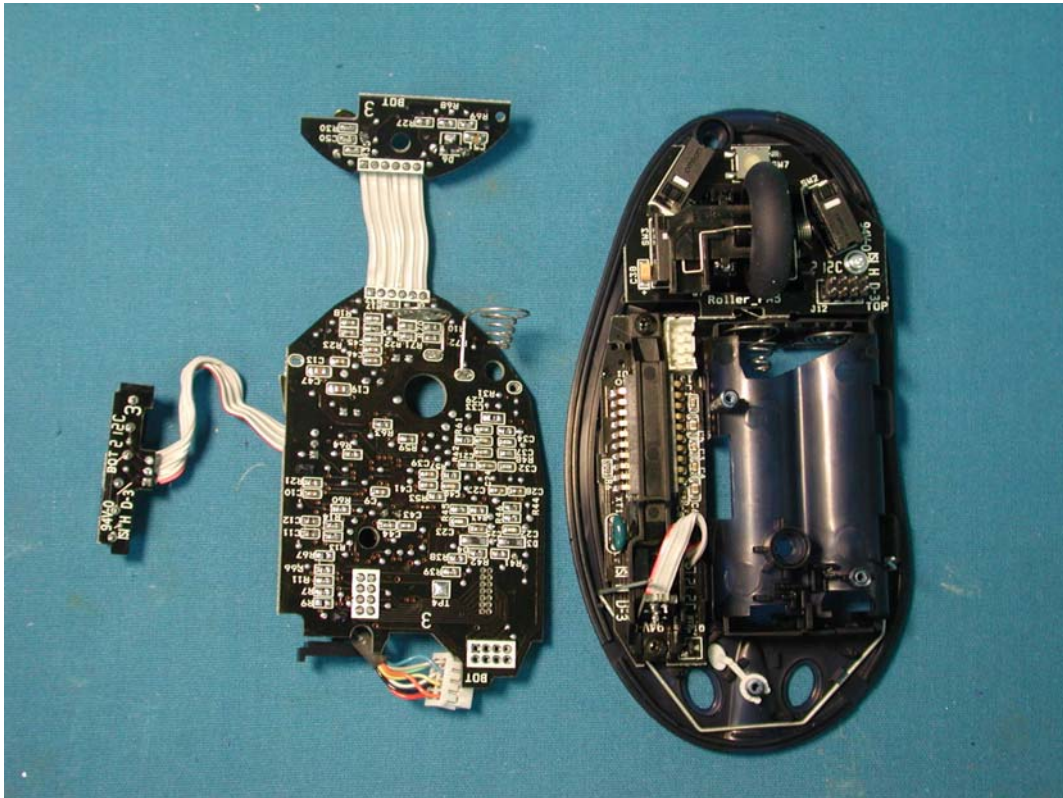
(3) EUT Photo



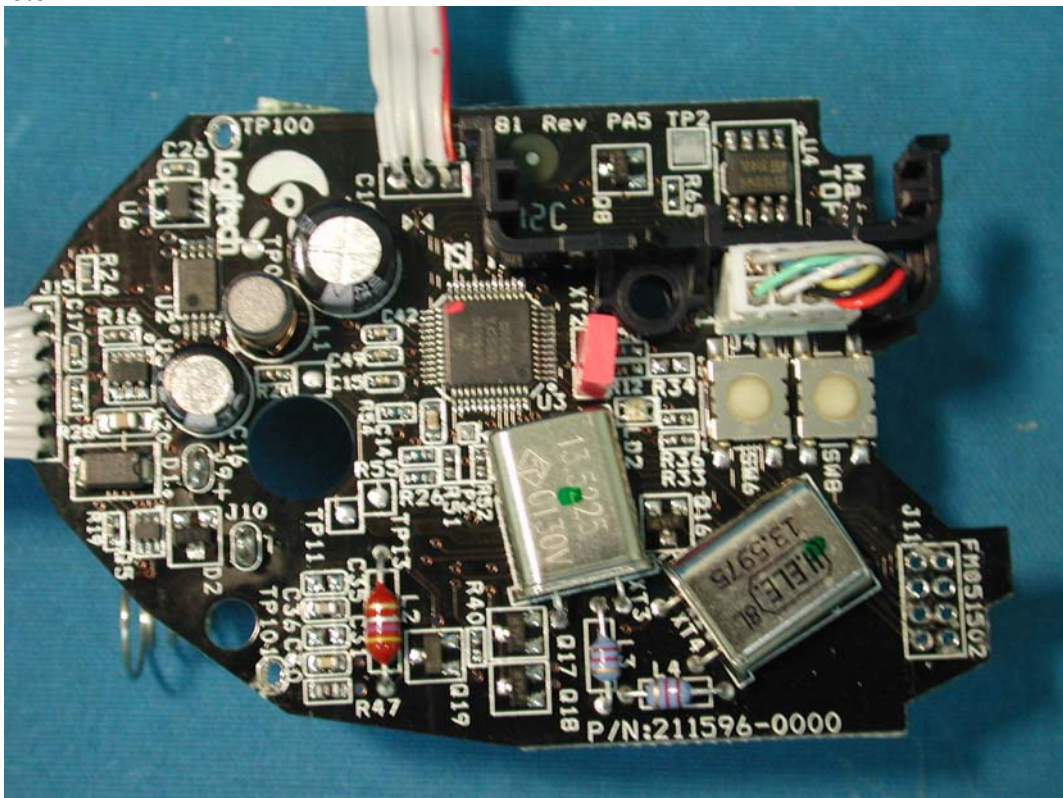
(4) EUT Photo



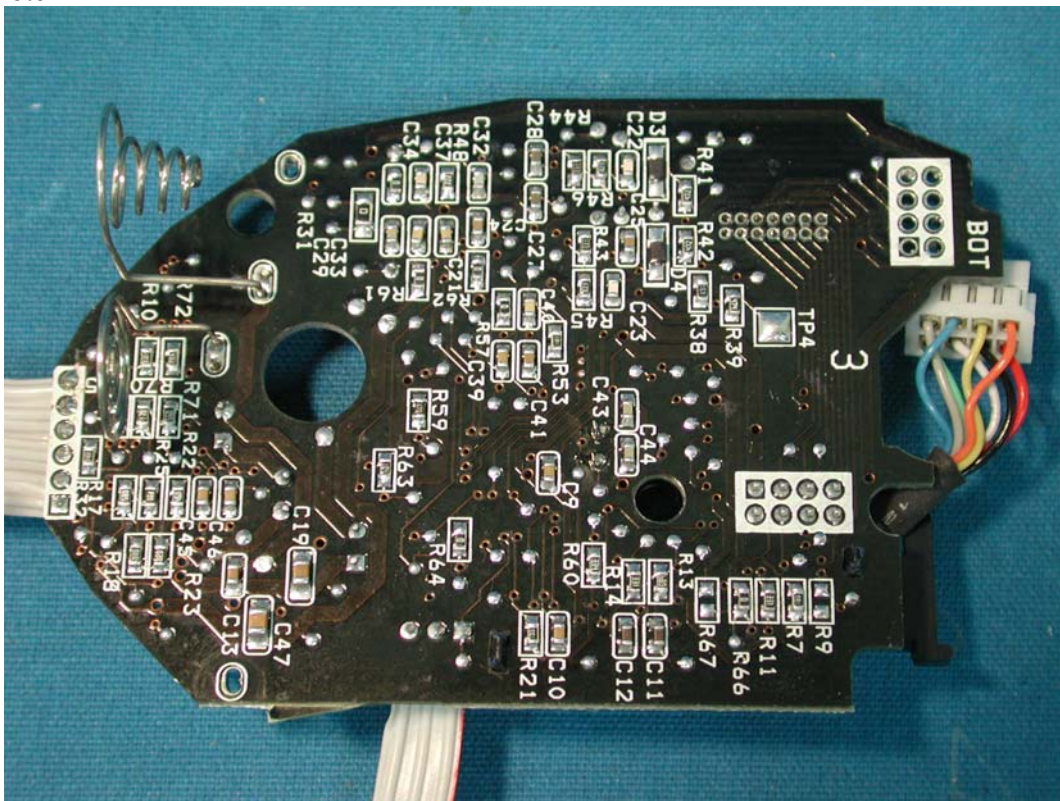
(5) EUT Photo



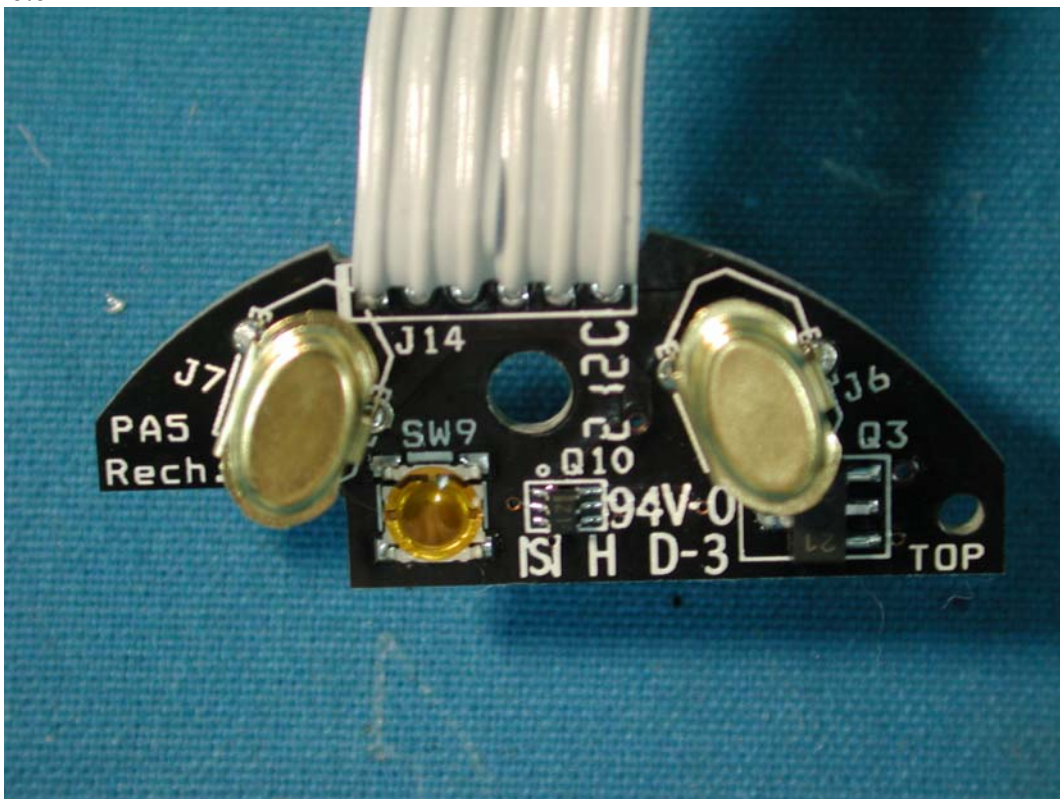
(6) EUT Photo



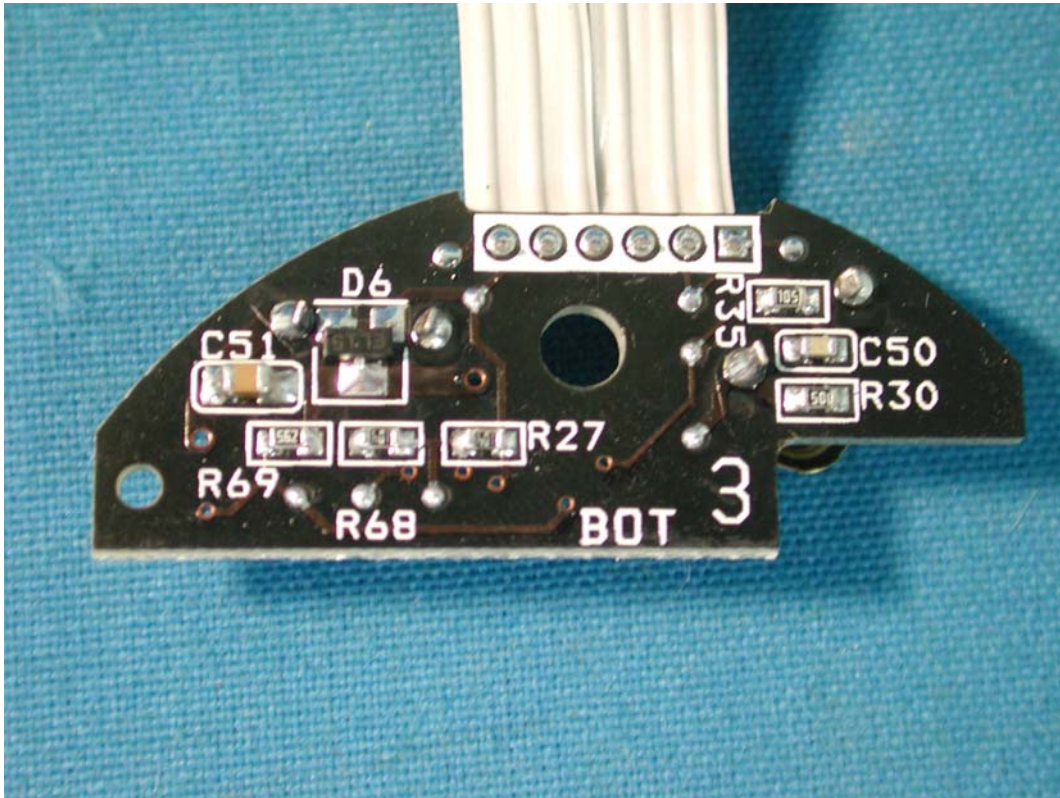
(7) EUT Photo



(8) EUT Photo



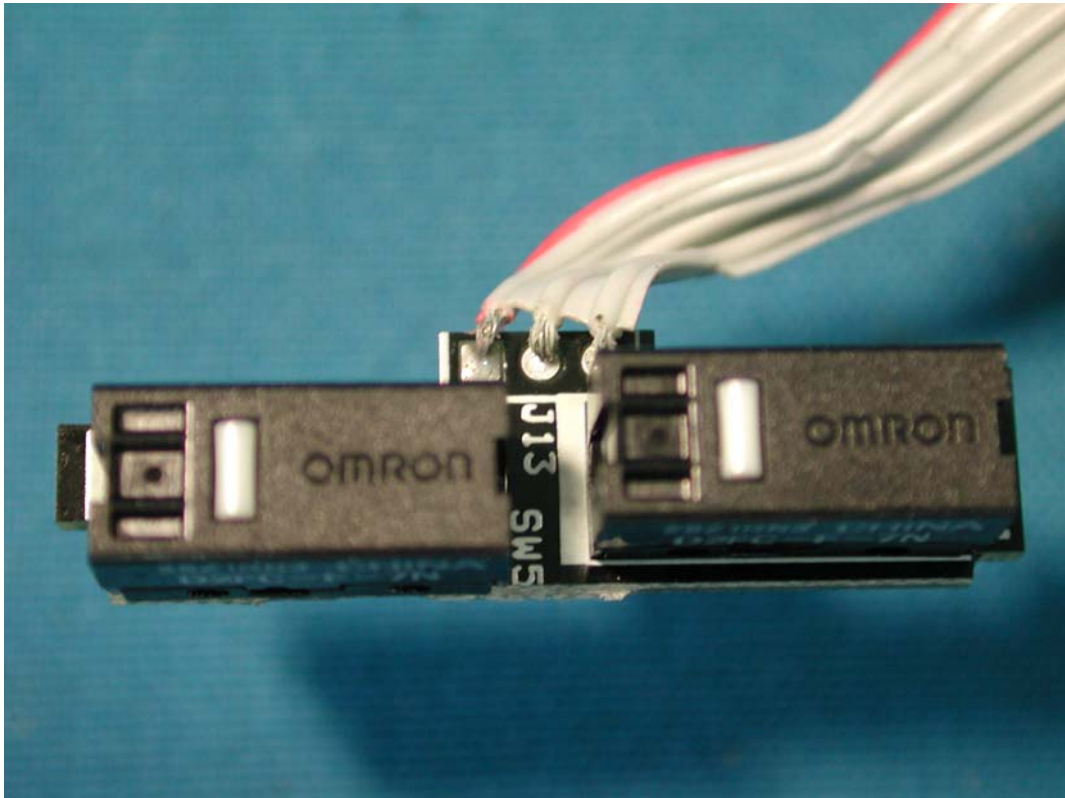
(9) EUT Photo



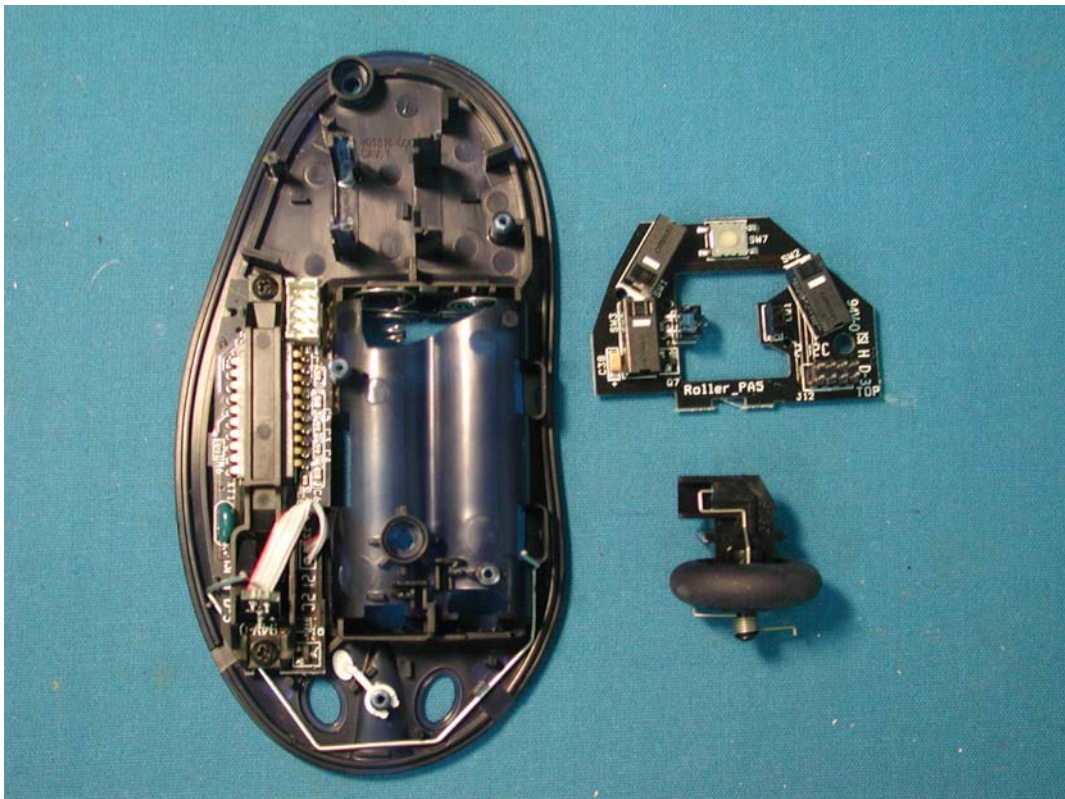
(10) EUT Photo



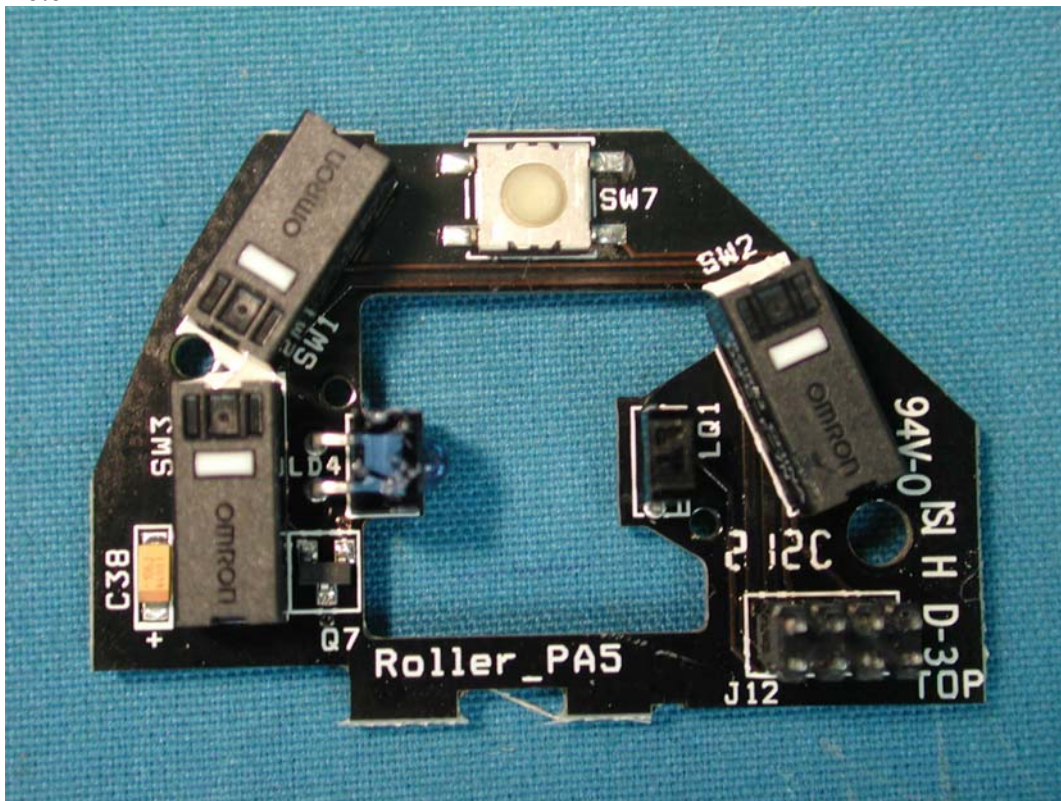
(11) EUT Photo



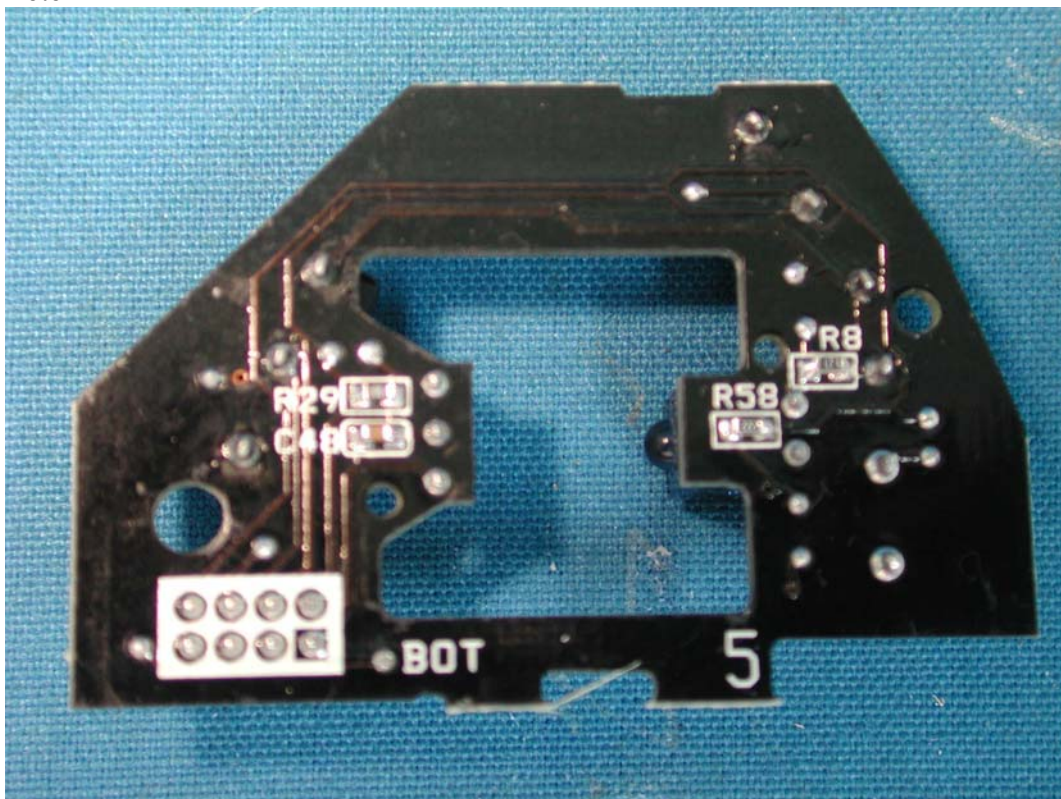
(12) EUT Photo



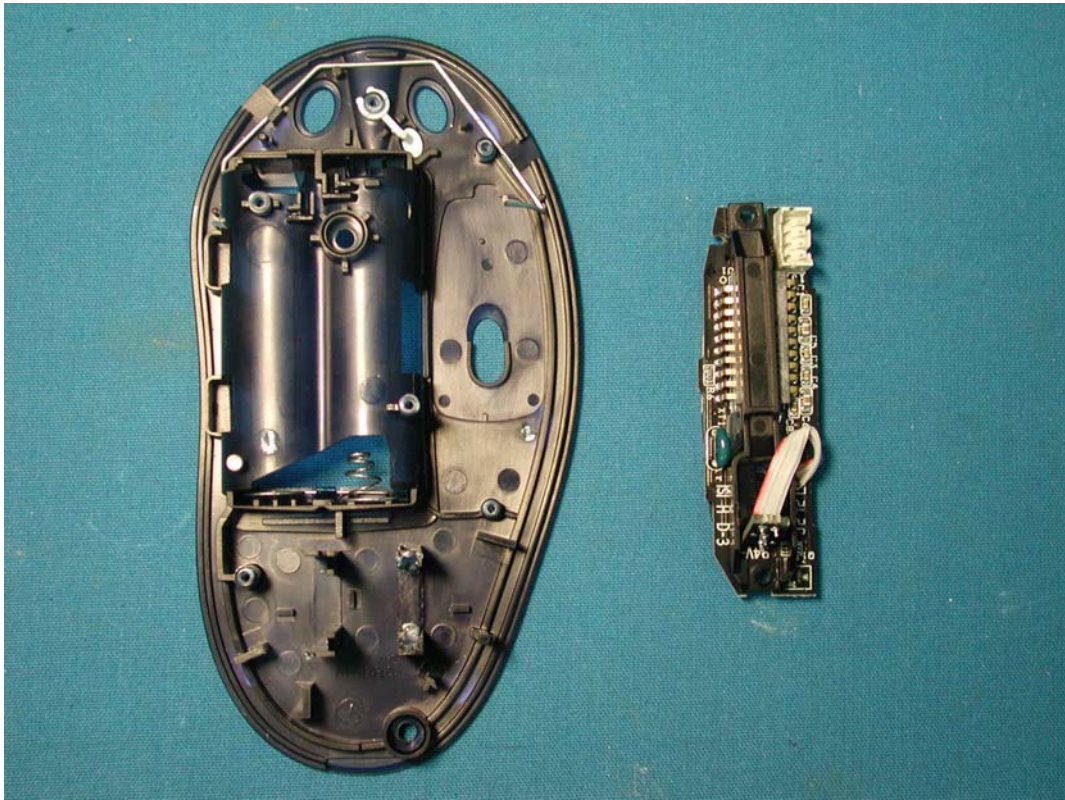
(13) EUT Photo



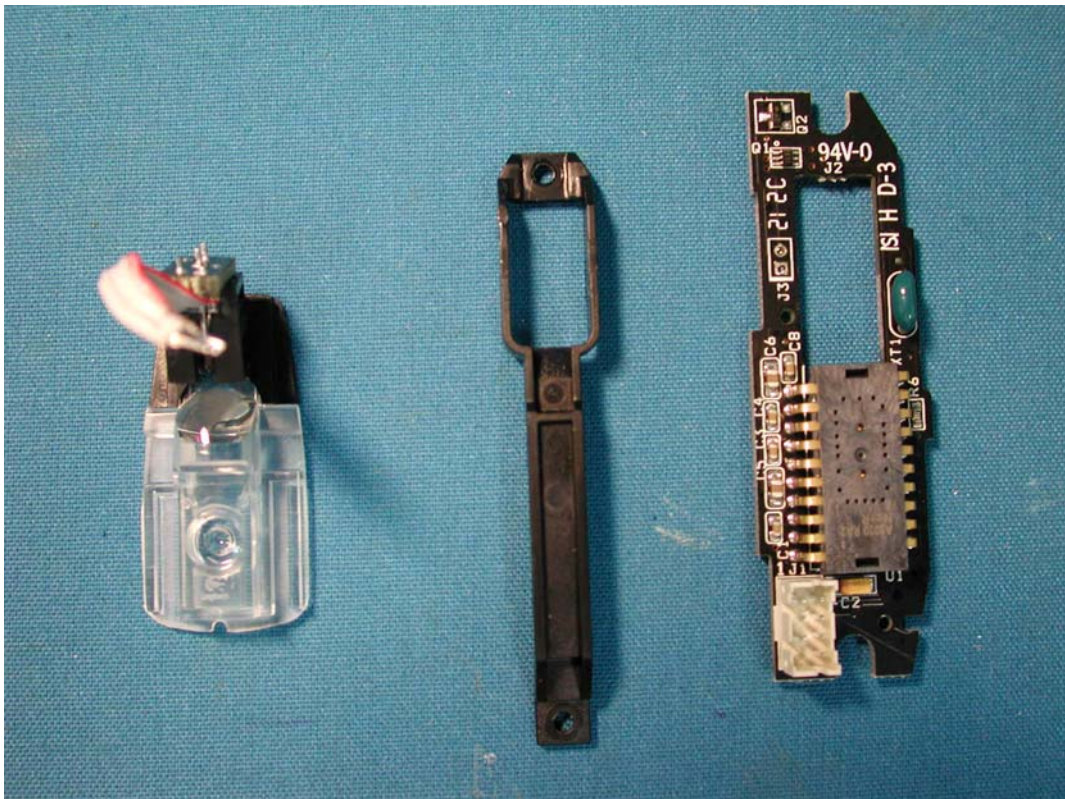
(14) EUT Photo



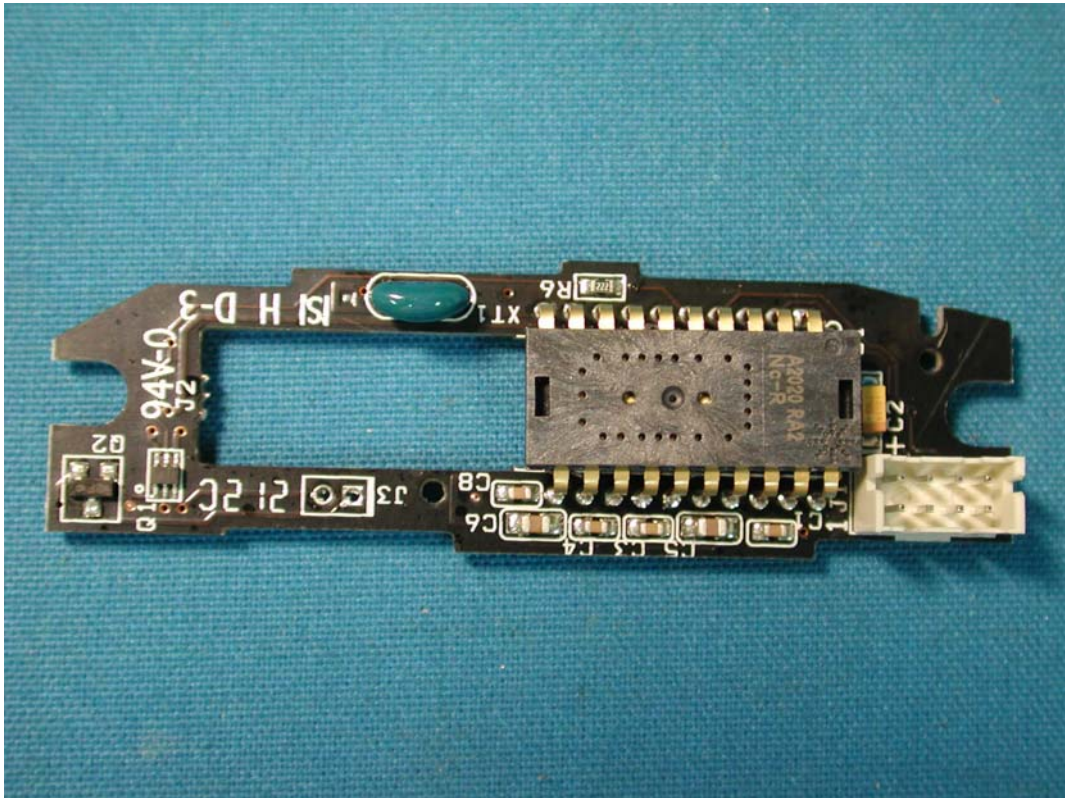
(15) EUT Photo



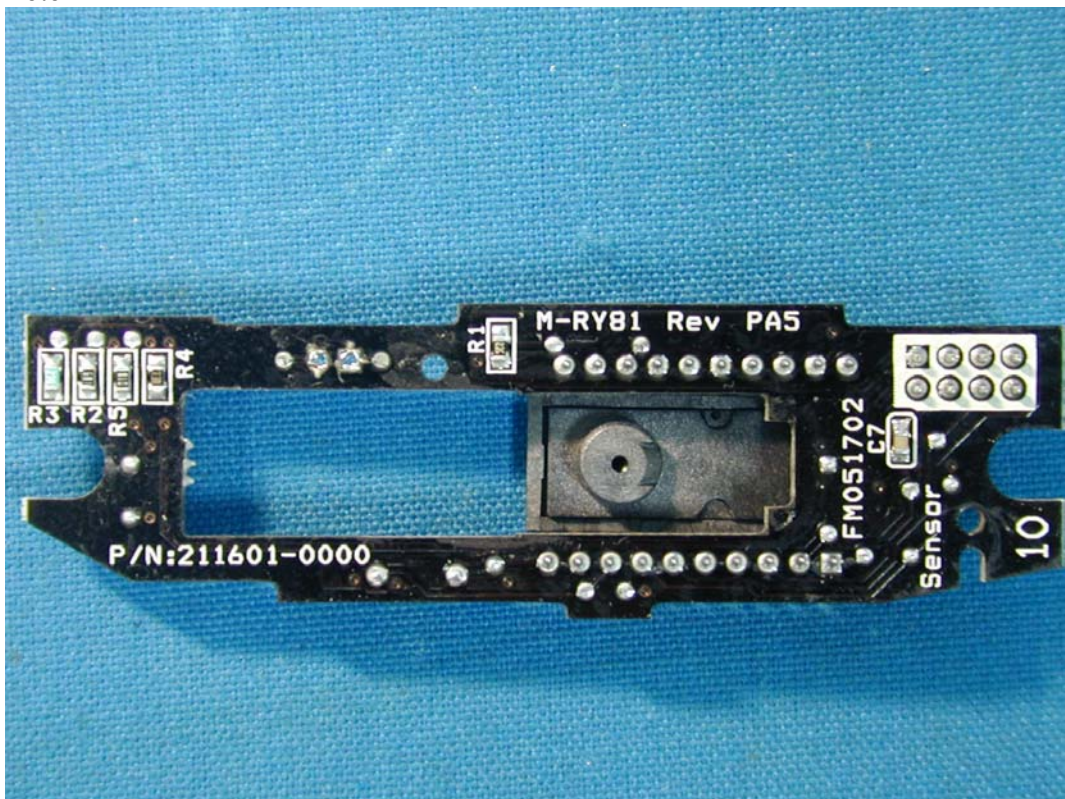
(16) EUT Photo



(17) EUT Photo



(18) EUT Photo



(19) EUT Photo

