# Test Report

Product Name: Trackball

Model No.: T-RB22

FCC ID.: JNZ2015578

Applicant : Logitech Far East Ltd.

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

Date of Receipt : Apr. 18, 2002

Date of Test : Apr. 23, 2002

Report No. : 024H051FI

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 : Apr. 23, 2002
Report No. : 024H051FI

QuieTek Corporation
Accredited by NIST (NVLAP)
NVLAP Lab Code: 200347-0

| | | |
|---|---|---|
| Product Name | : | Trackball |
| 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. | : | T-RB22 |
| FCC ID. | : | JNZ2015578 |
| Rated Voltage | : | DC 3.0V (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 |

NVLAP®
NVLAP Lab Code : 200347-0

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# 1. GENERAL INFORMATION

## 1.1. EUT Description

| | | |
|---|---|---|
| Product Name | : | Trackball |
| Trade Name | : | Logitech |
| FCC ID. | : | JNZ2015578 |
| Model No. | : | T-RB22 |
| EUT Voltage | : | DC 3.0V (Battery) |
| Frequency Range | : | 27.045MHz |
| Type of Modulation | : | FSK |
| Type of antenna | : | Soldered on PCB |

Note:

1. The EUT is a Trackball 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.
   EMI Mode: Transmit

## 1.2. Operation Description

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

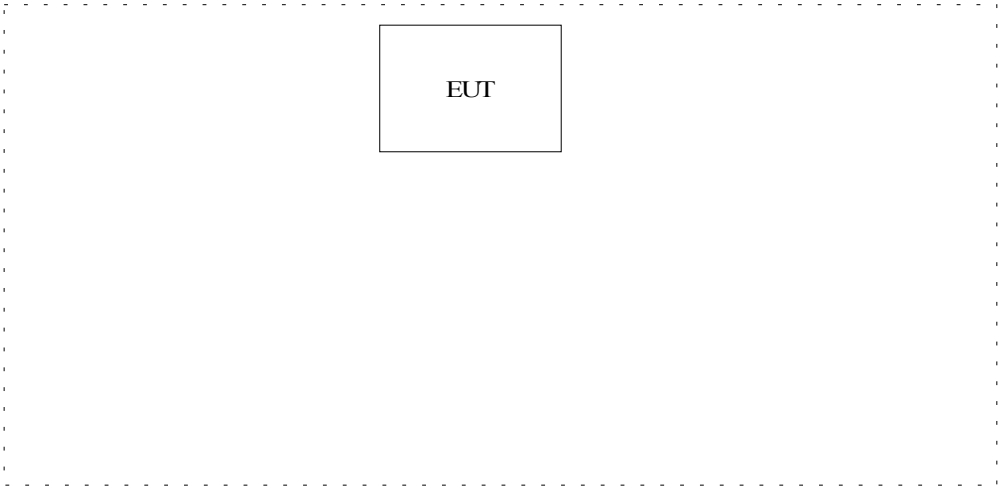
The device adapts FSK modulation. The antenna Soldered on PCB Provides diversity function to improve the transmitting function.

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

## 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) Setup the EUT and simulators as shown on 1.3.

(2) Enable RF signal and confirm EUT active.

(3) Modulate output capacity of EUT up to 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:

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

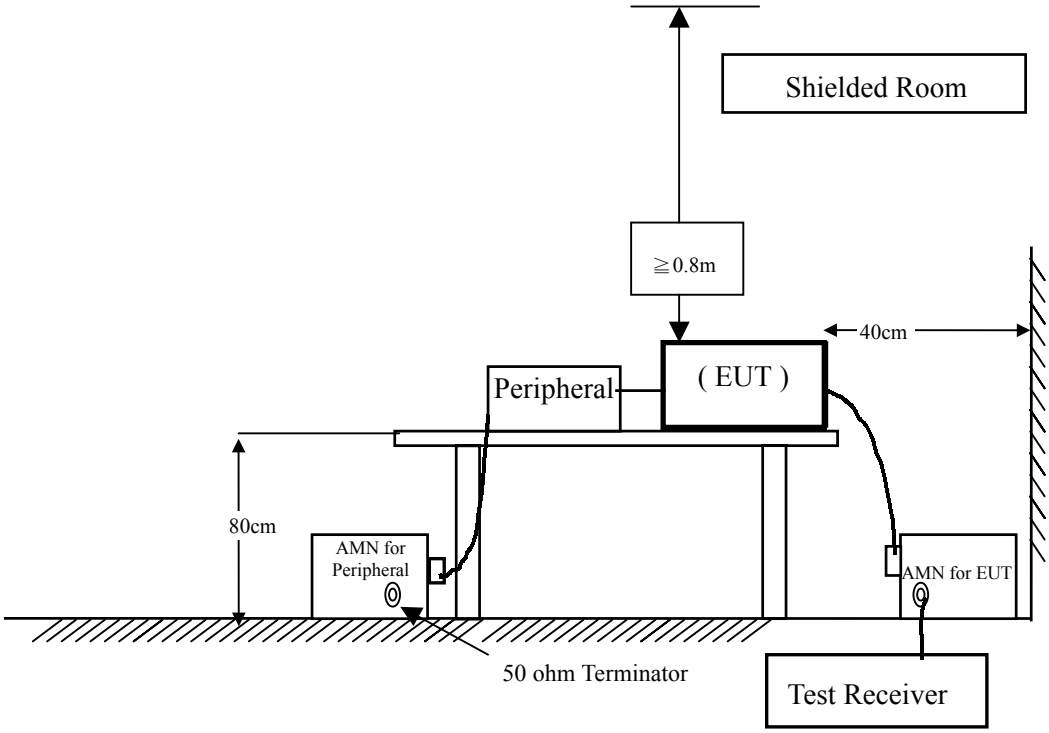
### 2.1. Test Equipment List

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, 2001 | |
| 2 | L.I.S.N. | R & S | ESH3-Z5/836679/0023 | May, 2001 | EUT |
| 3 | L.I.S.N. | R & S | ENV 4200/833209/0023 | May, 2001 | Peripherals |
| 4 | Pulse Limiter | R & S | ESH3-Z2 | May, 2001 | |
| 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

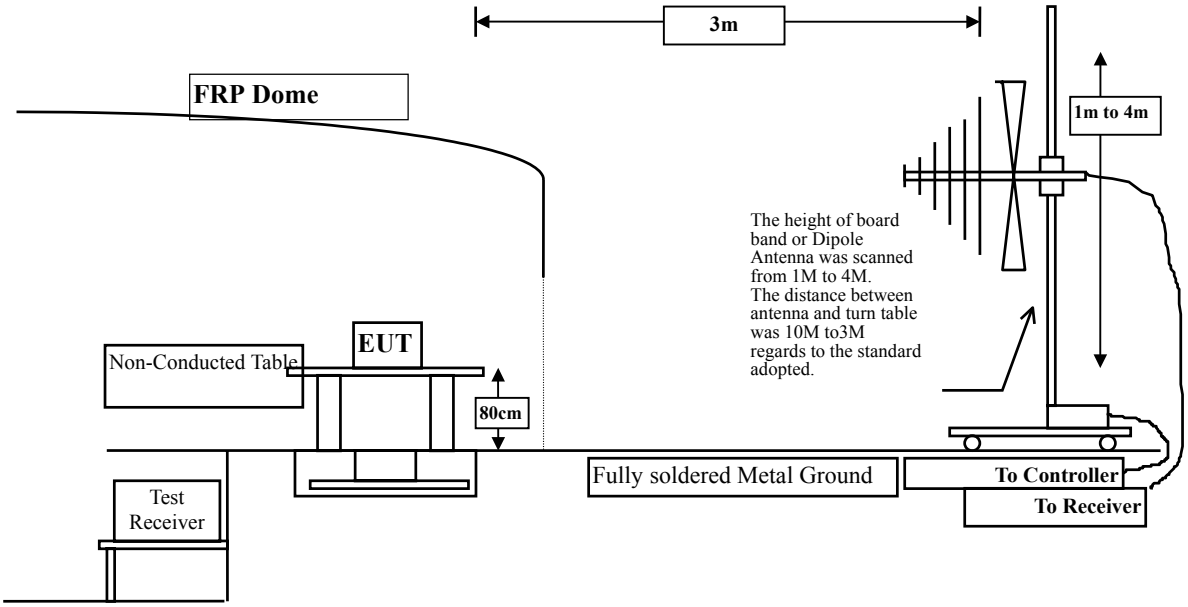
## 3.1. Test Equipment

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

| Test Site | | Equipment | Manufacturer | Model No./Serial No. | Last Cal. |
|---|---|---|---|---|---|
| ☒Site # 1 | X | Test Receiver | R & S | ESVS 10 / 834468/003 | July, 2001 |
| | X | Spectrum Analyzer | Advantest | R3162/ 00803480 | May, 2001 |
| | X | Pre-Amplifier | Advantest | BB525C/ 3307A01812 | May, 2001 |
| | X | Bison Log Antenna | Schwarz beck | VU1B9166 | July, 2001 |
| | | Bilog Antenna | SCHAFFNER | CBL6112B / 2697 | Nov., 2001 |
| ☐Site # 2 | | Test Receiver | R & S | ESCS 30 / 836858/022 | Nov., 2001 |
| | | Spectrum Analyzer | Advantest | 3162 / 100803466 | May, 2001 |
| | | Pre-Amplifier | Advantest | BB525C/3307A01814 | May, 2001 |
| | | 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 Paragraph15.209.

| 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 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. 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. EMI Reduction Method During Compliance Testing

No modification was made during testing.

## 5. 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.

All the tests were carried out with the EUT in normal operation, which was defined as:

EMI Mode: Transmit

## 5.1. Test Data of Conducted Emission

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

## 5.2. Test Data of Radiated Emission

Product : Trackball
Test Item : Fundamental Radiated Emission Data
Test Site : No.1 OATS
Test Voltage : DC 4.5V (Battery)
Test Mode : Transmit

| Freq. MHz | Cable Loss dB | Probe Factor dB/m | PreAMP dB | Reading Level dBuV | Emission Level dBuV/m | Margin dB | Limit dBuV/m |
|---|---|---|---|---|---|---|---|
| **Horizontal** | | | | | | | |
| 27.045 | 1.00 | 24.36 | 0.00 | 39.00 | 64.36 | 35.64 | 100.00 |
| **Vertical** | | | | | | | |
| 27.045 | 1.00 | 24.36 | 0.00 | 38.30 | 63.66 | 16.34 | 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 detection.

Product : Trackball
Test Item : General Radiated Emission Data
Test Site : No.1 OATS
Test Voltage : DC 3V (Battery)
Test Mode : Transmit

| Freq. MHz | Cable Loss dB | Probe Factor dB/m | PreAMP dB | Reading Level dBuV | Emission Level dBuV/m | Margin dB | Limit dBuV/m |
|---|---|---|---|---|---|---|---|
| Horizontal: | | | | | | | |
| 33.880 | 1.03 | 20.97 | 26.85 | 34.00 | 29.15 | 10.85 | 40.00 |
| *39.700 | 1.06 | 17.66 | 26.85 | 38.40 | 30.27 | 9.73 | 40.00 |
| 53.280 | 1.11 | 11.17 | 26.86 | 43.40 | 28.82 | 11.18 | 40.00 |
| 94.020 | 1.28 | 16.59 | 26.87 | 31.60 | 22.60 | 20.90 | 43.50 |
| 108.570 | 1.34 | 17.55 | 26.88 | 32.20 | 24.21 | 19.29 | 43.50 |
| 122.150 | 1.40 | 17.78 | 26.88 | 34.60 | 26.89 | 16.61 | 43.50 |
| Vertical: | | | | | | | |
| 35.820 | 1.04 | 20.07 | 26.85 | 37.80 | 32.05 | 7.95 | 40.00 |
| *54.250 | 1.12 | 21.04 | 26.86 | 39.20 | 34.49 | 5.51 | 40.00 |
| 68.800 | 1.18 | 20.76 | 26.86 | 33.60 | 28.67 | 11.33 | 40.00 |
| 85.290 | 1.24 | 18.59 | 26.87 | 31.40 | 24.36 | 15.64 | 40.00 |
| 122.150 | 1.40 | 17.78 | 26.88 | 30.00 | 22.29 | 21.21 | 43.50 |
| 218.180 | 1.79 | 20.23 | 26.92 | 28.60 | 23.70 | 22.30 | 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.
3. Emission Level = Reading Level + Probe Factor + Cable loss-PerAMP.

# 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

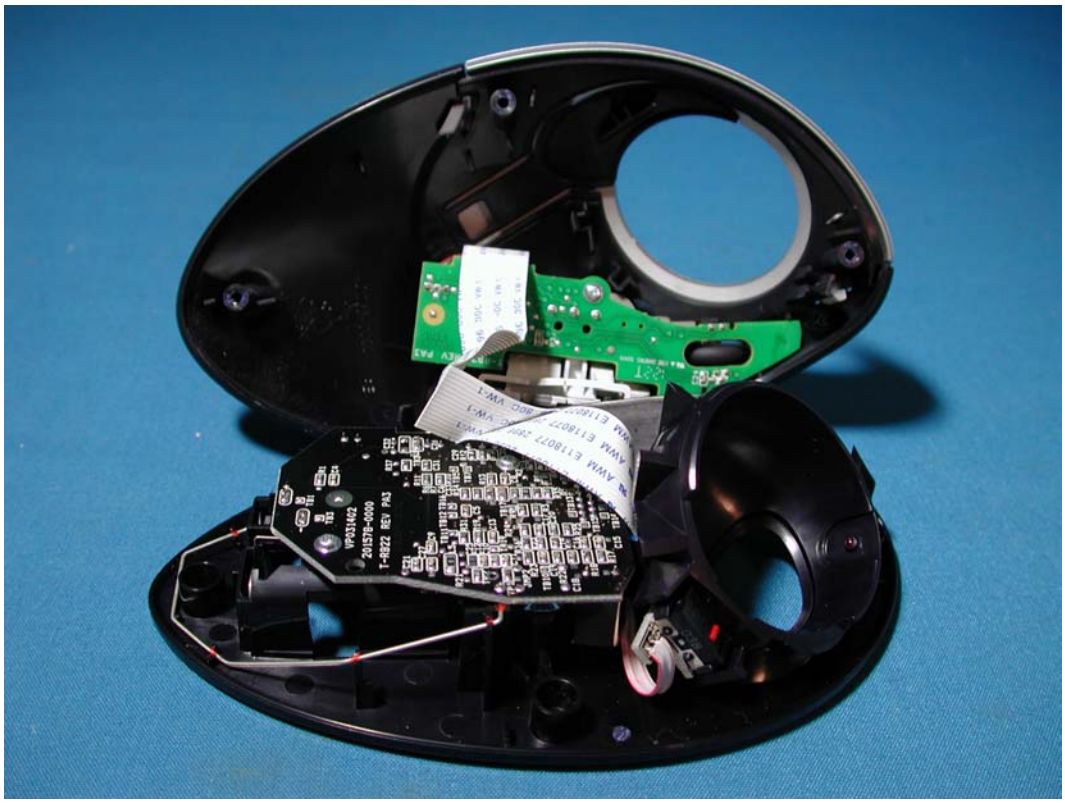
**Attachment 2 : EUT Detailed Photographs**

(1) EUT Photo

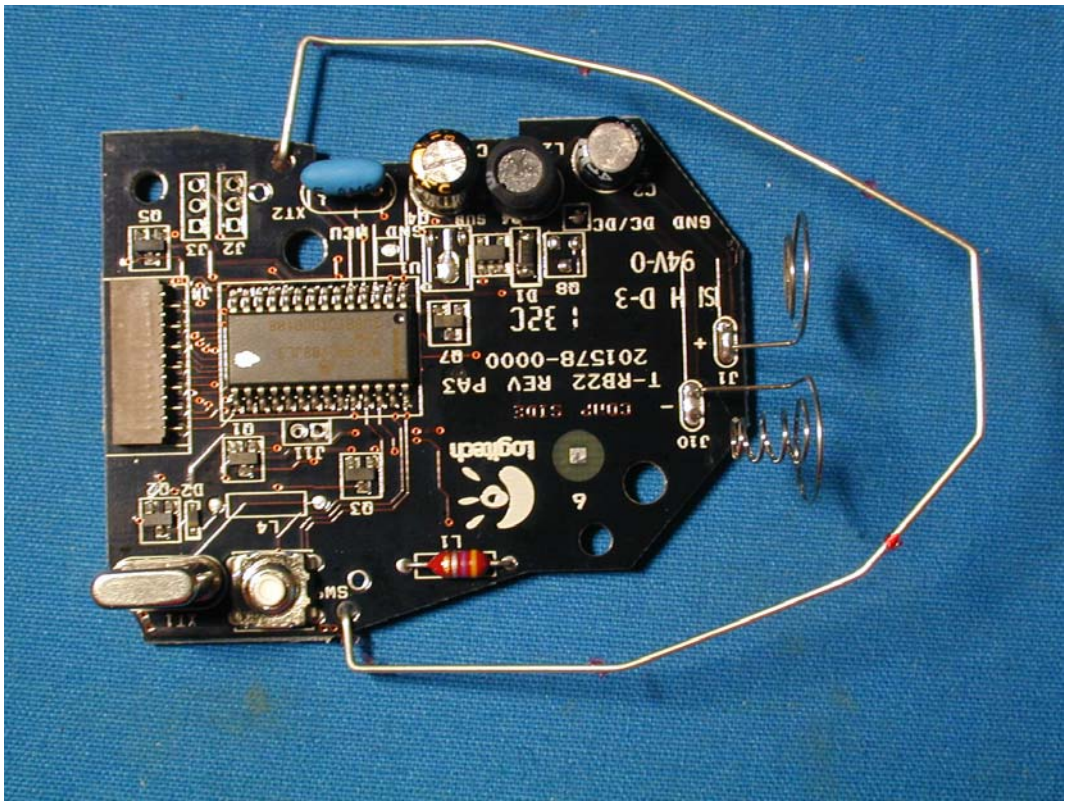
(2) EUT Photo

(3) EUT Photo

(4) EUT Photo



(5) EUT Photo

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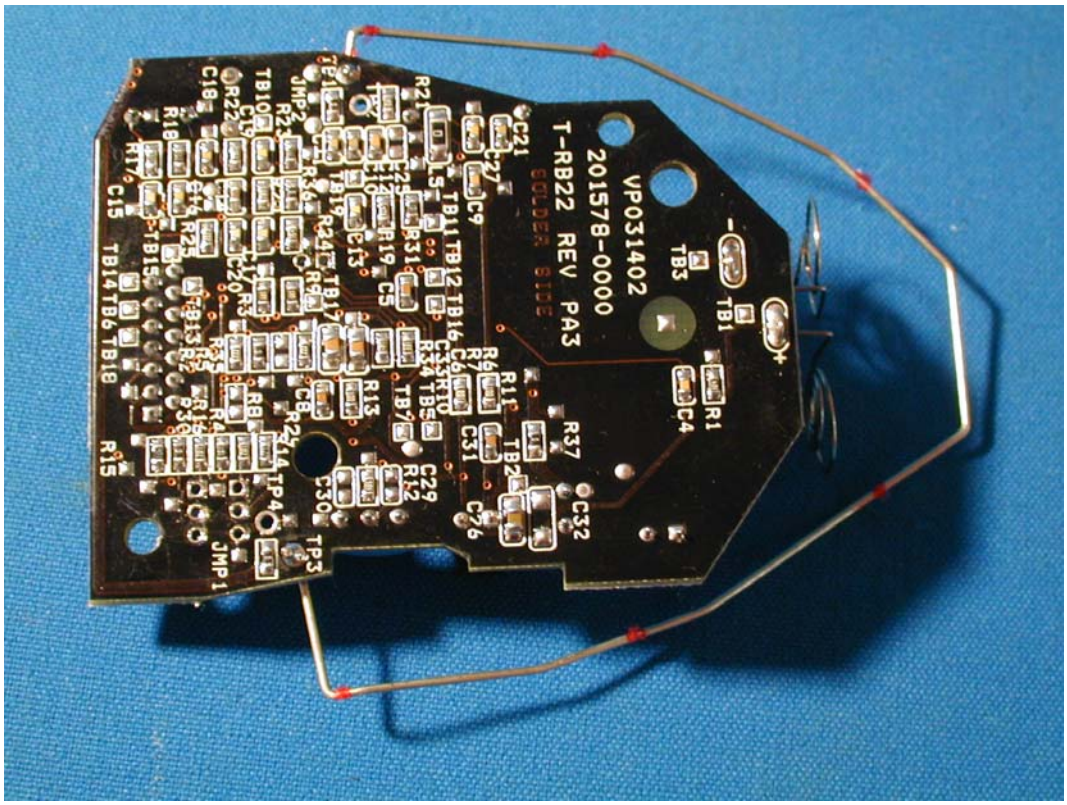

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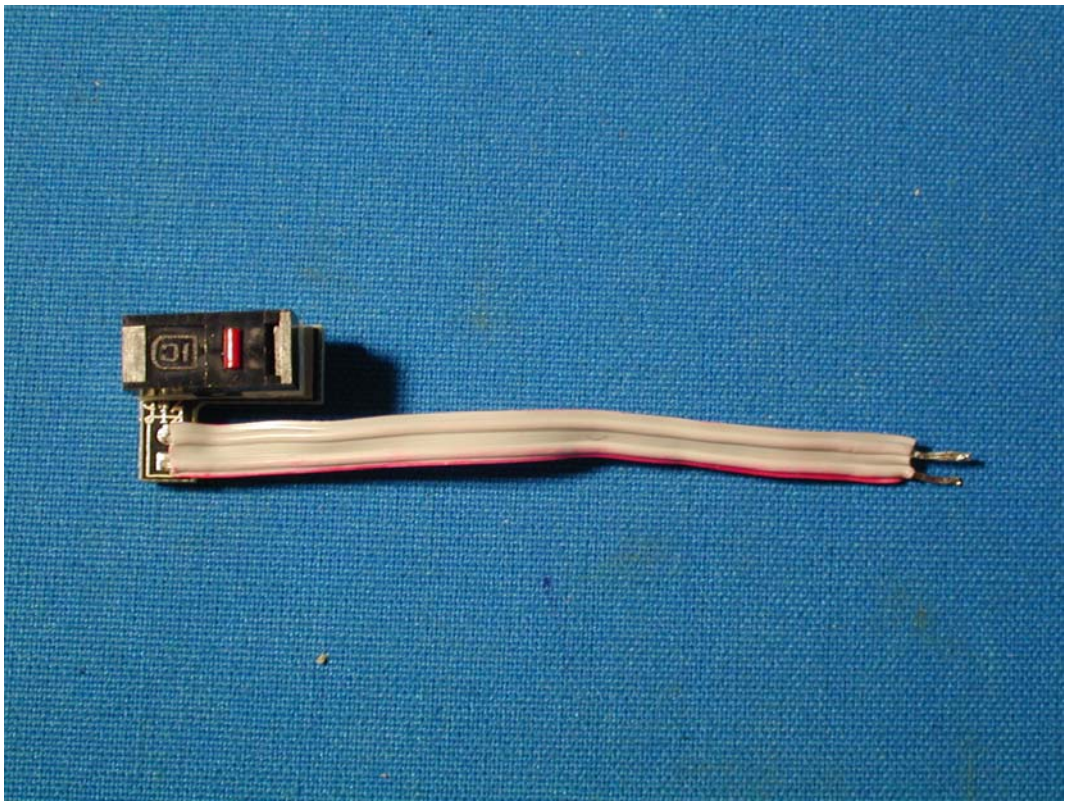

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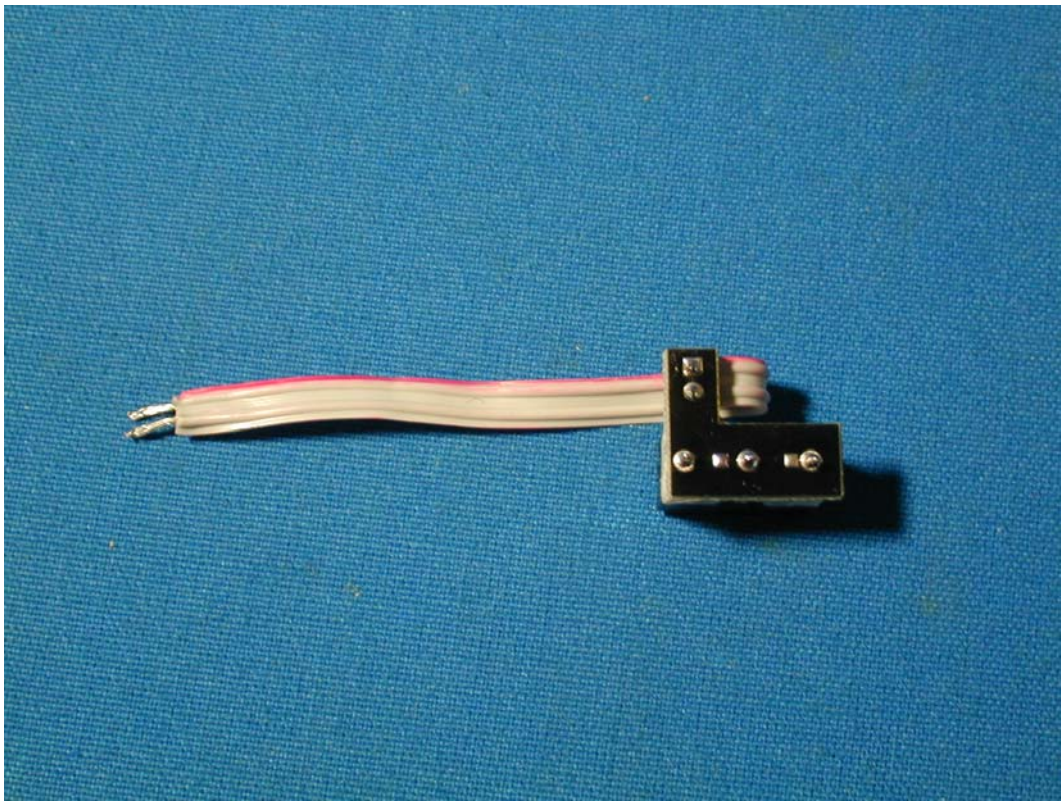
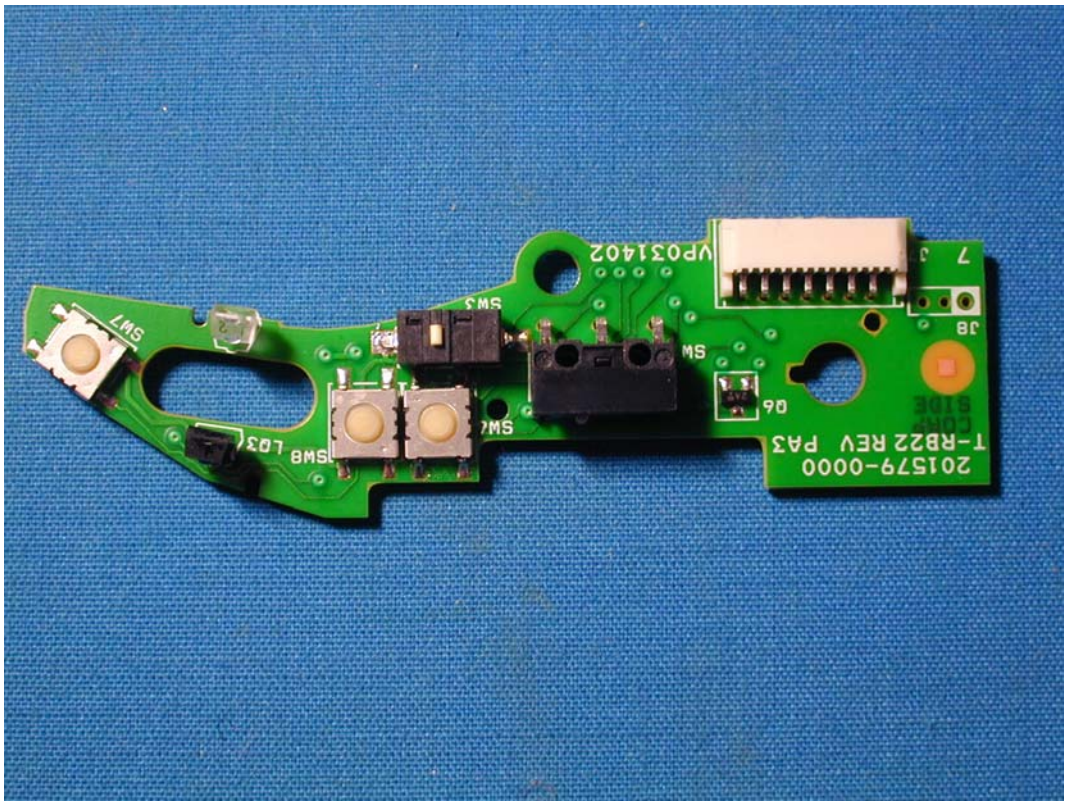
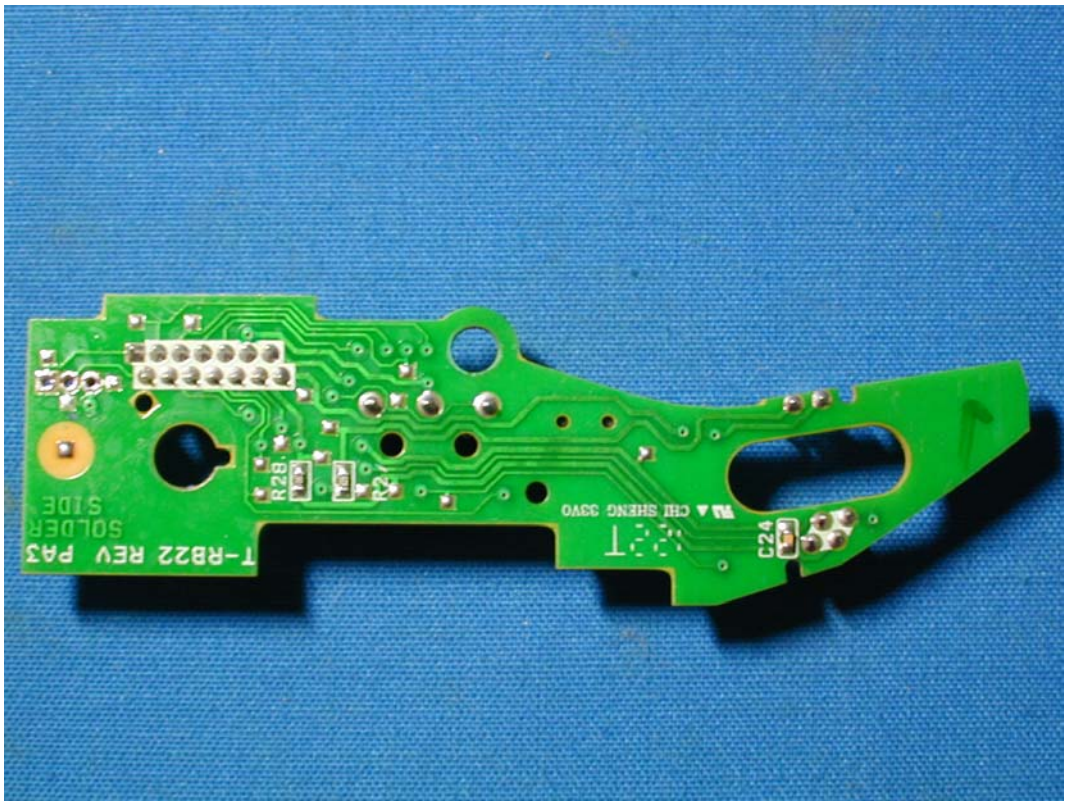


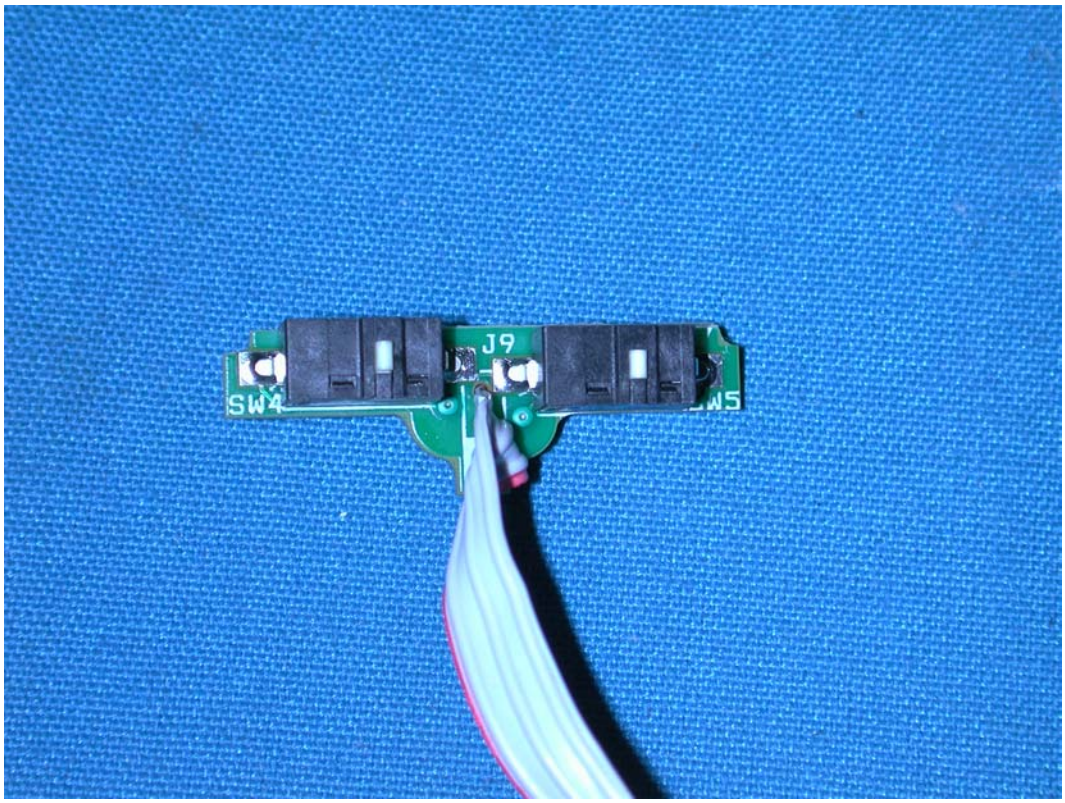
(9) EUT Photo

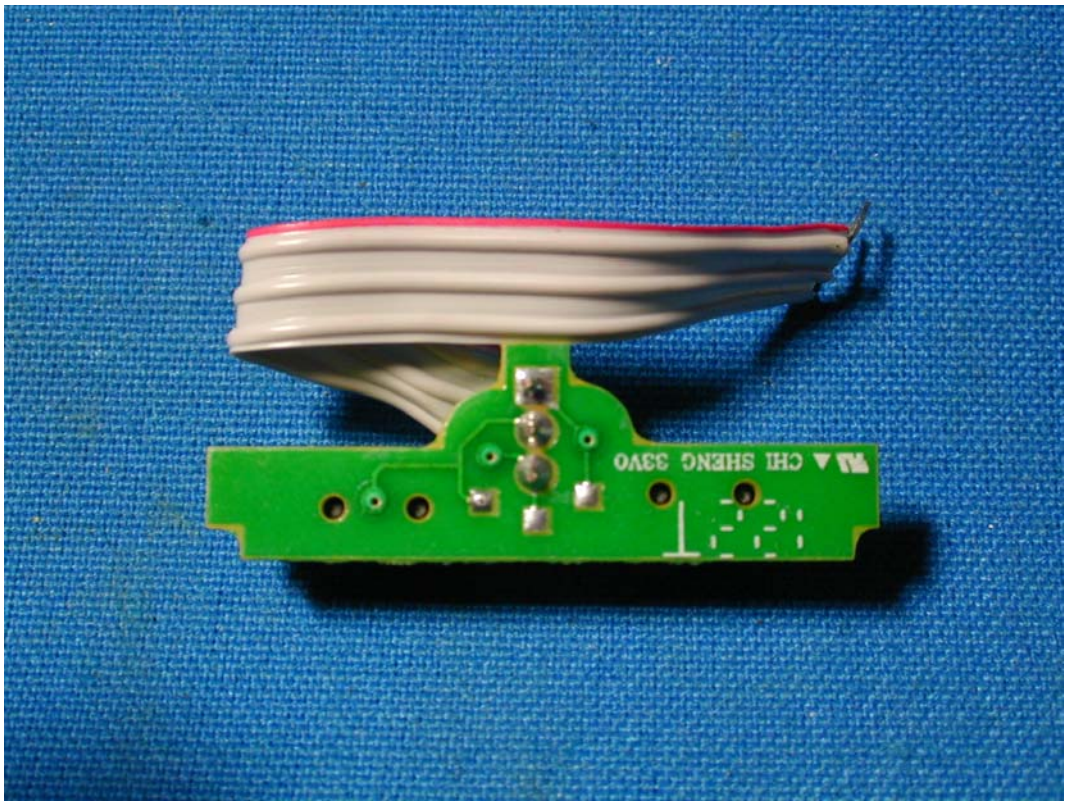



(10) EUT Photo



(11) EUT Photo




(12) EUT Photo