PEP Testing Laboratory
12-3Fl, No. 27-1, Lane 169, Kang-Ning St., Hsi-Chih,
Taipei Hsien, Taiwan, R. O. C.
TEL: 886-2-26922097 FAX: 886-2-26956236

NVLAP LAB CODE: 200097-0

FCC ID TEST REPORT

According to

FCC Part 15 Subpart C, Intentional Radiators

EUT Type **RF Optical Mouse(TX)**

Transmitter (TX) **1) Model No.: KSMINIRF-TX**
2) FCC ID: TUQ424242

Applicant Name: **K-WELL INTERNATIONAL CORP.**

Address **See the General Information for details.**

Test Date : 2005/11/18 Issued Date : DEC. 30, 2005

Test Engineer : JASON KUNG NVLAP Signature : M. Y. Tsui
M. Y. Tsui / Director

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- The report must not be used by the client to claim product endorsement by NVLAP or any agency of the United States government.
- This report is applicable only for EUT Model which described in page 4 .
- The testing result in this report are traceable to national or international standard .

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Table of Contents

1. General Information

Measurement of electromagnetic emissions (EME) of radio frequency devices including intentional and/or unintentional radiators for compliance with the technical rules and regulations of the Federal Communications Commission under FCC Part 2 and 15.

Applicant Name/Address: **K-WELL INTERNATIONAL CORP.**
10F, NO. 57, SEC. 4, JHONGSIAO E. RD., DA-AN DIST.,
TAIPEI CITY, TAIWAN, R. O. C.

Contact Person: **ALAN SHEN / ENGINEER**

Phone No.: **886-2-27317775** **Fax No.:** **886-2-87735730**

Manufacturer Name/Address: **K-WELL INTERNATIONAL CORP.**
10F, NO. 57, SEC. 4, JHONGSIAO E. RD., DA-AN DIST., TAIPEI CITY, TAIWAN, R. O. C.

- ✧ Regulation: FCC Part 2 and 15
- ✧ Limitation: Part 15, Section 15.249, 15.207 and 15.209
- ✧ Test Procedure: ANSI C63.4-2003
- ✧ Place of Test: PEP Testing Laboratory
  12-3Fl, No. 27-1, Lane 169, Kang-Ning St., Hsi-Chih,
  Taipei Hsien, Taiwan, R. O. C.
  TEL : 886-2-26922097 FAX : 886-2-26956236

2. Product Information

a. EUT Type: **RF Optical Mouse(TX)**

b. Transmitter Model: **KSMINIRF-TX**

c. TX FCC ID: **TUQ424242**

d. TX Channel No.： **16**

e. TX Working Freq. : **2.409 –2.476GHz**

f. TX Modulation： **GFSK**

g. TX Crystal / Osc.： **6 MHz, 16 MHz, 18.432 MHz**

h. TX Port(s) ： **N/A**

i. TX Transmitting Power： **DC 3V**

j TX Power Supply： **Battery (DC 1.5V * 2)**

k. TX Case： **ABS**

l. EUT Condition : ☐ **Prototype** ☑ **Engineering** ☐ **Production**

m. EUT Received Date : **NOV. 18, 2005**

n. Date(s) of performance of test: **NOV. 18, 2005 – DEC. 30, 2005**

3. EUT Description and Test Methods

(A) The EUT is RF Optical Mouse(TX), FCC ID: TUQ424242, model KSMINIRF-TX and KSMINIRF-RX. The EUT consists of transmitter unit and receiver unit. The radio frequency of EUT is 2.409-2.476 GHz. DC 3V from two rechargeable batteries (size AAA, DC 1.5V) receiver unit. Additional USB interface power cord for EUT is attached for power charge. For more detail specification about the EUT, please refer to the user's manual.

(B) Test Method: According to the major function designed, the EUT placement on test table was arranged alone to proceed with test. The test was carried out on EUT operational condition of Tx-On mode: continuous transmission state. The worst-case test result of each test mode was recorded and provided in this report.

(C) At the frequencies where the peak values of the emission exceeded the quasi-peak limit, the emissions were also measured with the quasi-peak detectors. The average detector also measured the emission either (A) quasi-peak values were under quasi-peak limit but exceeded average limit, or (B) peak values were under quasi-peak limit but exceeded average limit.

4. Modification(s):

N/A

5. Test Software Used

(A) EMCTEST program that continuously generates a complete line of repeating “H” letter was the software used during test.

6. Support Equipment Used

N/A

7. Description Field Strength of Fundamental and Harmonics Test

7.1 Field Strength of Fundamental and Harmonics Test

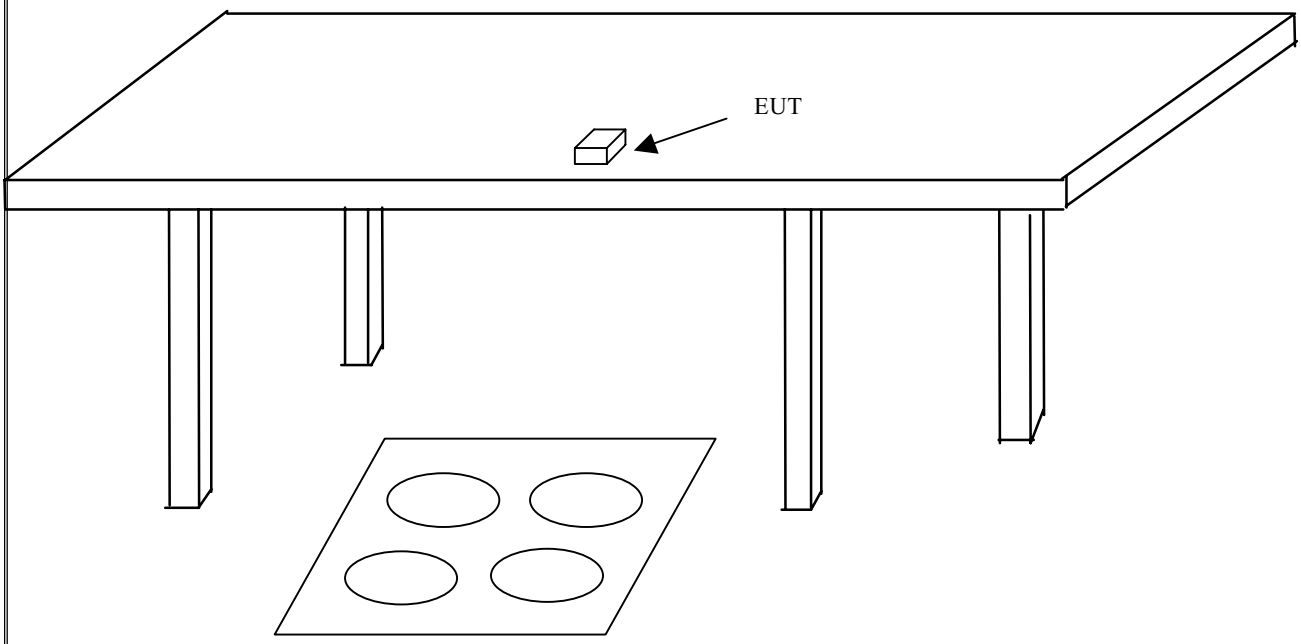
Field Strength of Fundamental and Harmonics Test were made outdoors at 3-meter test range using horn antenna. The test equipment was placed on a wooden bench situated on a 1.5x1 meter area adjacent to the measurement area. Sufficient time for the EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating condition. The detector function was set to peak and average value, the bandwidth of the receiver was set to 1000MHz.

The turntable containing the system was rotated; the antenna height was varied 1 to 4 meters and stopped at the azimuth or height producing the maximum emission.

7.2 Field Strength of Fundamental and Harmonics Limits

Fundamental Frequency	Fundamental		Harmonics	
	（mV/m）	（dBμV/m）	（μV/m）	（dBμV/m）
902-928MHz	50	94	500	54
2400-2483.5MHz	50	94	500	54
5725-5875MHz	50	94	500	54
24.0-24.25GHz	250	108	2500	68

7.3 Test Configuration



8. Description of Conducted Emissions Test

8.1 Conducted Emissions

A 1m x1.5m wooden table 80 cm high is placed 40cm away from the vertical wall. Two AMN are bonded to the grounding plane. The EUT is powered from the designated AMN and the support equipment is powered from another designated AMN. Powers to the AMN are filtered by a high-current high insertion loss power line filters. All electrical cables are shielded by braided tinned copper zipper tubing with inner diameter of 1/2". All interconnecting cables more than 1 meter were shortened by non-inductive bundling (serpentine fashion) to a 1-meter length.

Sufficient time for the EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating condition. The RF output of the AMN was connected to the spectrum analyzer to determine the frequency producing the maximum EME from the EUT.

The spectrum was scanned from 150kHz to 30 MHz with1.5 sec sweep time. The frequency producing the maximum level was re-examined using Quasi-Peak adapter. The detector function was set to CISPR quasi-peak mode. The bandwidth of the receiver was set to 10kHz. The EUT, support equipment, and interconnecting cables were re-arranged and manipulated to maximize each EME emission. Each emission was maximized by: switching power lines; varying the mode of operation or resolution; clock or data exchange speed; scrolling H pattern to the EUT and/or support equipment, and powering the monitor from the floor mounted outlet box and the computer aux AC outlet, if applicable; whichever determined the worst-case emission.

8.2 Conducted Emissions Limits

Frequency	Maximum RF Line Voltage dB(uV)			
	Class A		Class B	
MHz	QUASI-PEAK	AVERAGE	QUASI-PEAK	AVERAGE
0.15 - 0.50	79	66	66-56	56-46
0.50 - 5.0	73	60	56	46
5.0 - 30	73	60	60	50

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

9. Description of Radiated Emissions Test

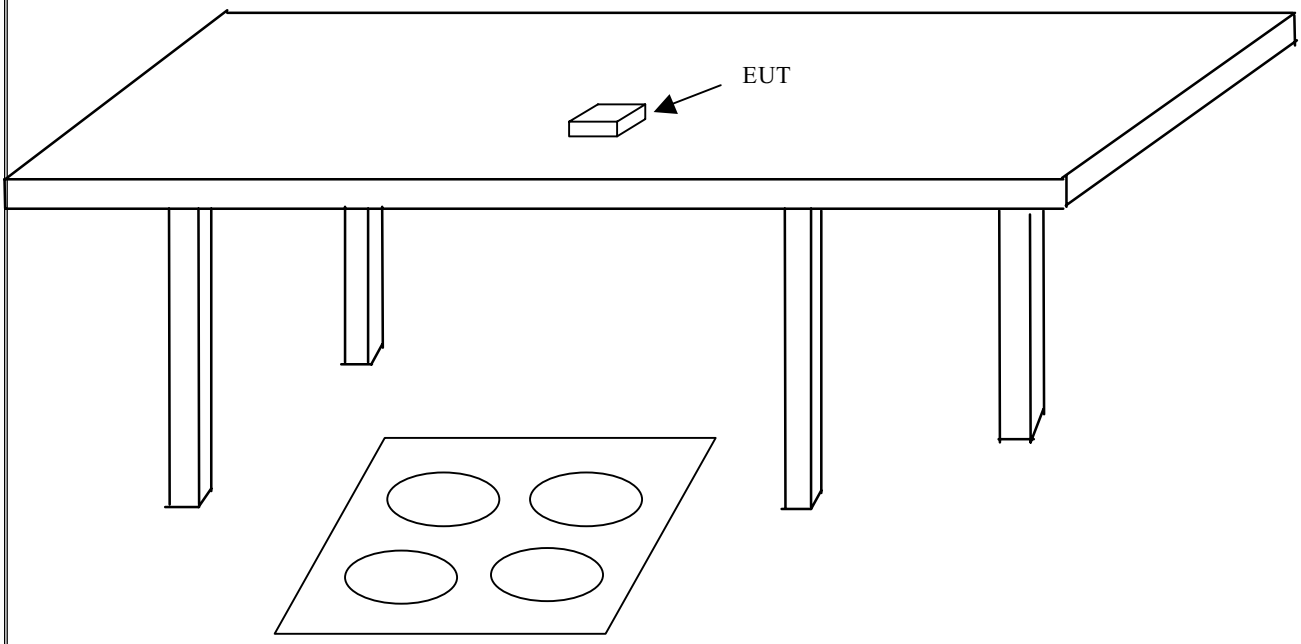
9.1 Radiated Emissions

Preliminary measurements were made indoors chamber at 3 meter using broadband antennas, broadband amplifier, and spectrum analyzer to determine the frequency producing the maximum EME. Appropriate precaution was taken to ensure that all EME from the EUT were maximized and investigated. The system configuration, clock speed, mode of operation or video resolution, turntable azimuth with respect to the antenna were noted for each frequency found. The spectrum was scanned from 30 to 1000 MHz using logbicon antenna. Above 1GHz, linearly polarized double ridge horn antenna was used.

Final measurements were made outdoors at 3-meter test range using logbicon antenna and horn antenna. The test equipment was placed on a wooden bench situated on a 1.5x1 meter area adjacent to the measurement area. Sufficient time for the EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating condition. Each frequency found during pre-scan measurements was re-examined and investigated using Quasi-Peak and Average Adapter. 30MHz-1GHz, the detector function was set to CISPR quasi-peak mode and the bandwidth of the receiver was set to 120kHz. Above 1GHz, the detector function was set to peak and average value, the bandwidth of the receiver was set to 1000MHz.

The turntable containing the system was rotated; the antenna height was varied 1 to 4 meters and stopped at the azimuth or height producing the maximum emission. Each emission was maximized by: varying mode of operation or resolution; clock or data exchange speed; scrolling H pattern to the EUT and/or support equipment, and powering the monitor from the floor mounted outlet box and the computer aux AC outlet , if applicable; and changing the polarity of the antenna, whichever determined the worst-case emission. Photographs of the worst-case emission can be seen in radiated emission test photo.

9.2 Test Configuration



9.3 Radiated Emission Limits

Limits for radiated disturbance of
Class B ITE or Intentional Radiator
At a measuring distance of 3 m

Frequency MHz	Field Strength dB μ V/m or uV/m	
30 to 88	40	100
88 to 216	43.5	150
216 to 960	46	200
Above 960	56	500

NOTES
1 The lower limit shall apply at the transition frequency.
2 Additional provisions may be required for cases where interference occurs.

10. Field Strength of Fundamental and Harmonics Test Setup Photos

< FRONT VIEW >

< REAR VIEW >

11. Field Strength of Fundamental and Harmonics Test Data

Model No. : KSMINIRF-TX
Temperature : 20° C Humidity : 54 %
Memo : CH LOW MODE (2.049GHz)

Antenna polarization : HORIZONTAL ; Test distance : 3m ;

Freq. (MHz)	Level (dBuV/m)	Over Limit (dB)	Limit Line (dBuV/m)	Detector	Remark
2408.970	83.16	-30.84	114	Peak	Fundamental
4819.500	61.93	-12.07	74	Peak	Harmonic
4819.500	51.66	- 2.34	54	Average	Harmonic

Antenna polarization : VERTICAL ; Test distance : 3m ;

Freq. (MHz)	Level (dBuV/m)	Over Limit (dB)	Limit Line (dBuV/m)	Detector	Remark
2409.520	77.81	-36.19	114	Peak	Fundamental
4817.500	61.86	-12.14	74	Peak	Harmonic
4817.500	51.17	- 2.43	54	Average	Harmonic

Model No. : KSMINIRF-TX
Temperature : 20° C Humidity : 54 %
Memo : CH MID MODE (2.450GHz)

Antenna polarization : HORIZONTAL ; Test distance : 3m ;

Freq. (MHz)	Level (dBuV/m)	Over Limit (dB)	Limit Line (dBuV/m)	Detector	Remark
2449.750	86.17	-27.83	114	Peak	Fundamental
4901.000	60.40	-13.60	74	Peak	Harmonic
4901.000	48.16	- 5.84	54	Average	Harmonic

Antenna polarization : VERTICAL ; Test distance : 3m ;

Freq. (MHz)	Level (dBuV/m)	Over Limit (dB)	Limit Line (dBuV/m)	Detector	Remark
2449.750	83.32	-30.68	114	Peak	Fundamental
4899.500	61.09	-12.91	74	Peak	Harmonic
4899.500	50.12	- 3.88	54	Average	Harmonic

Model No. : KSMINIRF-TX
Temperature : 20° C Humidity : 54 %
Memo : CH HIGH MODE (2.476GHz)

Antenna polarization : HORIZONTAL ; Test distance : 3m ;

Freq. (MHz)	Level (dBuV/m)	Over Limit (dB)	Limit Line (dBuV/m)	Detector	Remark
2476.750	85.51	-28.49	114	Peak	Fundamental
4953.000	60.34	-13.66	74	Peak	Harmonic
4953.000	48.76	- 5.24	54	Average	Harmonic

Antenna polarization : VERTICAL ; Test distance : 3m ;

Freq. (MHz)	Level (dBuV/m)	Over Limit (dB)	Limit Line (dBuV/m)	Detector	Remark
2475.750	83.52	-30.48	114	Peak	Fundamental
4953.000	60.23	-13.77	74	Peak	Harmonic
4953.000	47.36	- 6.64	54	Average	Harmonic

12. Conducted Emissions Test Setup Photos

N/A

13. Conducted Emissions Test Data

The EUT is supplied by DC power source from batteries. The conducted powerline test is not applicable to EUT.

14. Radiated Emissions Test Setup Photos

< FRONT VIEW >

< REAR VIEW >

15. Radiated Emissions Test Data

15.1 Field Strength of Fundamental and Harmonics Test Data

Model No. : KSMINIRF-TX
Frequency range : 30MHz to 1GHz Detector : Quasi-Peak Value
Temperature : 28° C Humidity : 55 %
Memo : TX ON MODE

Antenna polarization : HORIZONTAL ; Test distance : 3m ;

Freq. (MHz)	Level (dBuV/m)	Over Limit (dB)	Limit Line (dBuV/m)	Read Level (dBuV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Azimuth (°angle)	Antenna High(m)
174.549	27.54	-15.96	43.50	31.91	15.53	1.50	21.40	175.0	4.0
186.505	30.40	-13.10	43.50	36.51	13.59	1.60	21.30	105.0	4.0
203.559	28.30	-15.20	43.50	35.36	12.61	1.63	21.30	135.0	4.0
260.607	30.08	-15.92	46.00	36.34	12.75	2.17	21.18	215.0	4.0
624.250	38.76	- 7.24	46.00	35.93	19.85	3.48	20.50	200.0	4.0
649.544	37.92	- 8.08	46.00	34.79	20.17	3.56	20.60	275.0	4.0

Note :

1. Level = Read Level + Probe Factor + Cable Loss – Preamp Factor
2. Over Limit = Level – Limit Line

Model No. : KSMINIRF-TX
Frequency range : 30MHz to 1GHz Detector : Quasi-Peak Value
Temperature : 28° C Humidity : 55 %
Memo : TX ON MODE

Antenna polarization : VERTICAL ; Test distance : 3m ;

Freq. (MHz)	Level (dBuV/m)	Over Limit (dB)	Limit Line (dBuV/m)	Read Level (dBuV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Azimuth (°angle)	Antenna High(m)
120.535	29.79	-13.71	43.50	36.72	13.45	1.02	21.40	105.0	1.0
169.469	28.42	-15.08	43.50	32.03	16.29	1.50	21.40	115.0	1.0
209.452	29.23	-14.27	43.50	36.33	12.52	1.68	21.30	215.0	1.0
377.151	31.30	-14.70	46.00	34.21	15.45	2.64	21.00	205.0	1.0
623.645	38.47	- 7.53	46.00	35.68	19.82	3.48	20.51	300.0	1.0
660.752	39.63	- 6.37	46.00	36.26	20.33	3.59	20.55	315.0	1.0

Note :

1. Level = Read Level + Antenna Factor + Cable Loss – Preamp Factor
2. Over Limit = Level – Limit Line

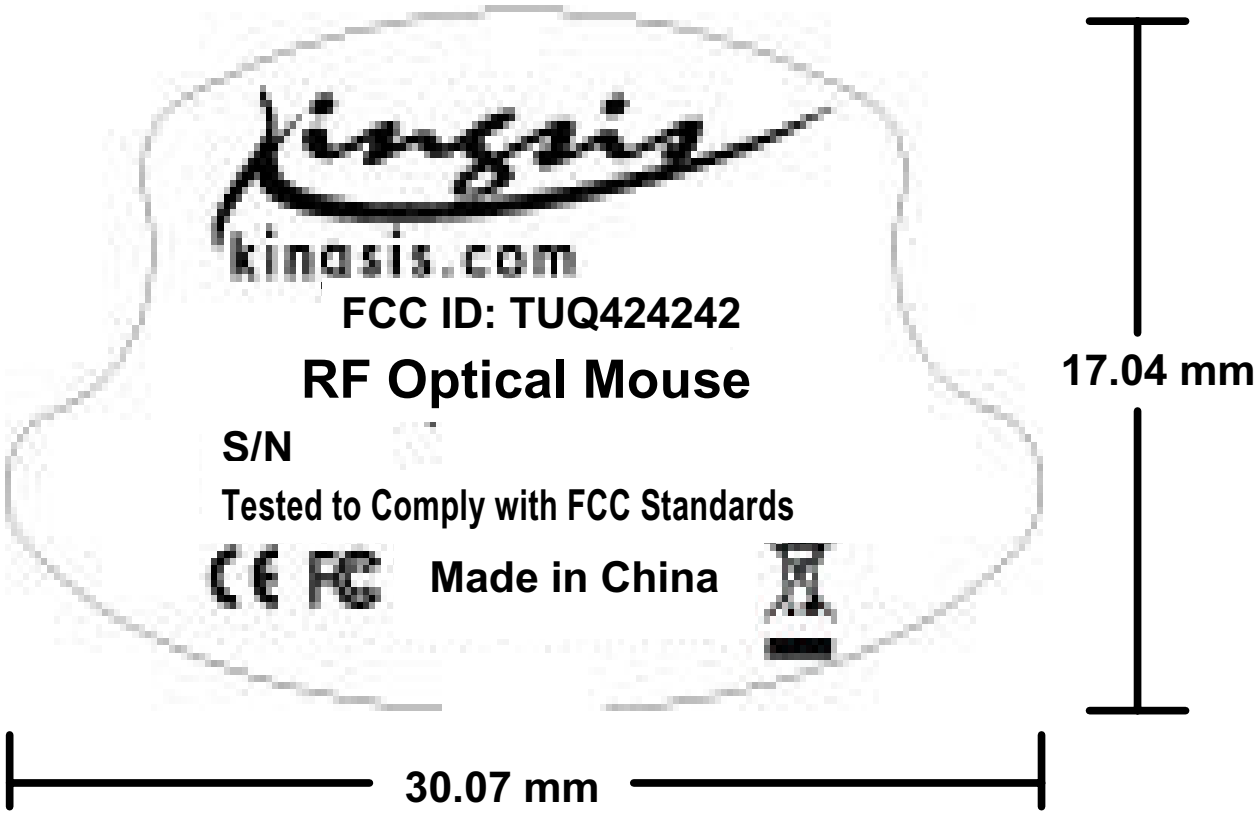
16. List of Measured Instruments

Test Mode	Instrument	Model No.	Serial No.	Next Cal. Date	Cal. Interval
Radiation (OP No.1)	R & S Receiver	ESVS30	863342/012	Apr. 23, 2006	1Year
	Schaffner Pre-amplifier	CPA9232	1028	May 20, 2006	1Year
	COM-Power Horn Ant.	AH-118 (1GHz~18GHz)	10095	May 21, 2007	2Year
	Schwarzbeck Precision Dipole Ant	VHAP (30MHz~1GHz)	970 + 971 953 + 954	June 26, 2006	3Year
	R &S Signal Generator	SMY01	841104/037	Apr. 29, 2007	2Year
	RF Cable	No. 1	N/A	May 11, 2006	1Year
	EMCO Antenna	3142B (26MHz~2GHz)	9904-1370	Aug. 24, 2006	1Year

17. FCC ID Label Sample

The sample label shown below shall be permanently affixed at a conspicuous location on the device, instruction manual or pamphlet supplied to the user and be readily visible to the purchaser at the time of purchase. However, when the device is so small wherein placement of the label with specified statement is not practicable, only the trade name, model number, and the FCC logo must be displayed on the device per Section §15.19 (b)(2).

EUT Label



18. Information To The User

For a Class B digital device or peripheral, the instructions furnished the user shall include the following or similar statement, placed in a prominent location in the text of the manual:

Federal Communications Commission (FCC) Statement

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instruction, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures :

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver .
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected .
- Consult the dealer or an experienced radio / TV technician for help .

19. EUT External Photos

PHOTO. 1. EUT (TX, RX) FRONT VIEW

PHOTO. 2. EUT (TX, RX) REAR VIEW

20. EUT Internal Photos

PHOTO. 3. EUT (TX) INSIDE VIEW

PHOTO. 4. EUT (TX) COMPONENT SIDE VIEW

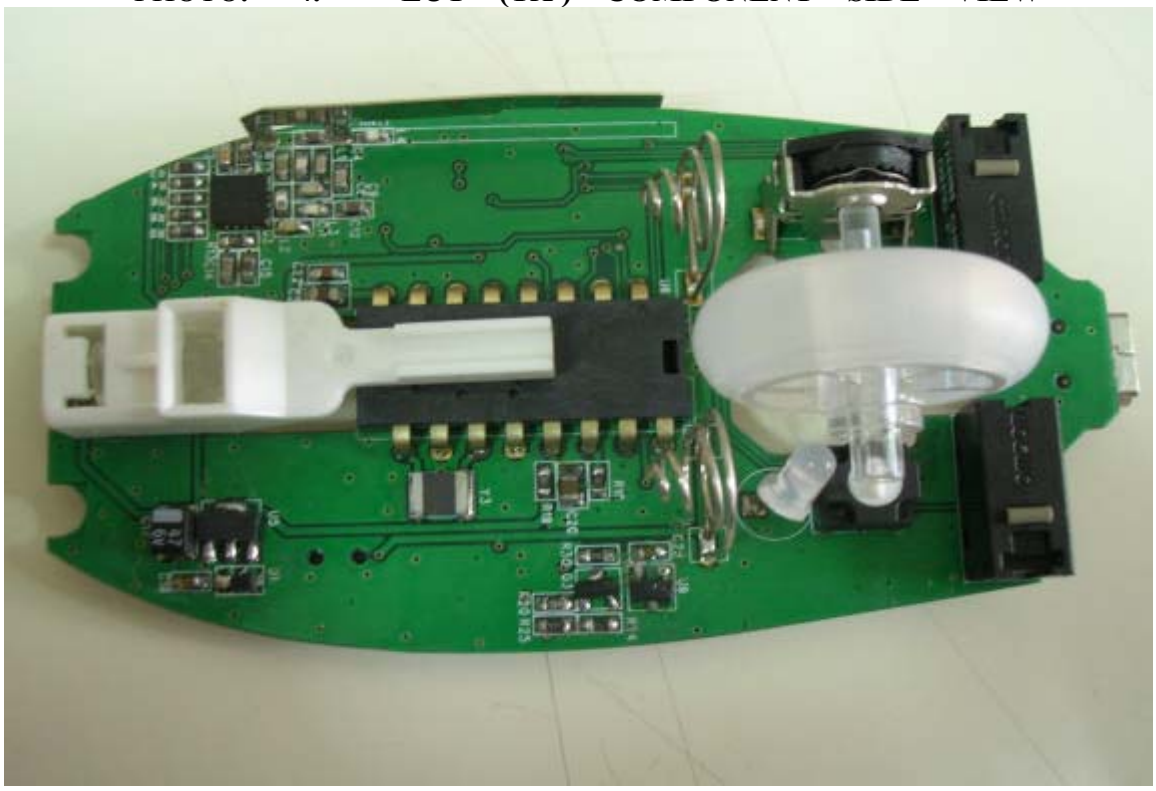


PHOTO. 5. **EUT (TX) SOLDERING SIDE VIEW**