# ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT
# CERTIFICATION TO FCC PART 15 REQUIREMENTS

*for*

**INTENTIONAL RADIATOR**

**49.860MHz RC TRANSMITTER**

**MODEL NO: 91497**

**BRAND NAME: TYCO RC-WHIPLASH**

**FCC ID NO: APB91497-02A4T**

**REPORT NO: 02U1437-1**

**ISSUE DATE: AUGUST 12, 2002**

*Prepared for*
**MATTEL MT. LAUREL**
**6000 MIDATLANTIC DRIVE**
**MOUNT LAUREL, NJ 08054**
**USA**

*Prepared by*
**COMPLIANCE CERTIFICATION SERVICES**
**561 F MONTEREY ROAD**
**MORGAN HILL, CA 95037, USA**
**TEL: (408) 463-0885**
**FAX: (408) 463-0888**

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# 1.VERIFICATION OF COMPLIANCE

| | | |
|---|---|---|
| COMPANY NAME | : | MATTEL MT. LAUREL<br>6000 MIDATLANTIC DRIVE<br>MOUNT LAUREL, NJ 08054<br>USA |
| CONTACT PERSON | : | FRANK WINKLER, SENIOR PROJECT ENGINEER |
| TELEPHONE NO. | : | (856) 840-1259 |
| EUT DESCRIPTION | : | 49.860MHz RC TRANSMITTER |
| MODEL NAME/NUMBER | : | 91497 |
| BRAND NAME | : | TYCO RC-WHIPLASH |
| SERIAL NUMBER | : | N/A |
| FCC ID | : | APB97993-02A4T |
| DATE TESTED | : | AUGUST 8, 2002 |
| REPORT NUMBER | : | 02U1437-1 |

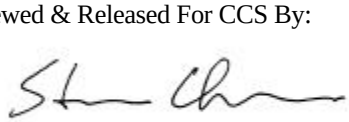
| | |
|---|---|
| TYPE OF EQUIPMENT | RADIO CONTROL |
| EQUIPMENT TYPE | 49.86 MHz TRANSMITTER |
| MEASUREMENT PROCEDURE | ANSI 63.4 / 1992 |
| LIMIT TYPE | CERTIFICATION |
| FCC RULE | CFR 47, PART 15 SUBPART C |

The above equipment was tested by Compliance Engineering Services, Inc. for compliance with the requirements set forth in CFR 47, PART 15 SUBPART C. This said equipment in the configuration described in this report shows that maximum emission levels emanating from equipment are within the compliance requirements.
**Warning** : This document reports conditions under which testing was conducted and results of tests performed. This document may not be altered or revised in any way unless done so by Compliance Certification Services and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by Compliance Certification will constitute fraud and shall nullify the document.

Tested By:

THU CHAN
SENIOR EMC ENGINEER
COMPLIANCE CERTIFICATION SERVICES

Reviewed & Released For CCS By:



STEVE CHENG
EMC ENGINEERING MANAGER
COMPLIANCE CERTIFICATION SERVICES

# 2.PRODUCT DESCRIPTION

| | |
|---|---|
| **CHASSIS TYPE** | **Plastic** |
| **Fundamental Frequency** | **49.86 MHz** |
| **Rated FR Output** | **Less than 30uW (ave)** |
| **Type of Transmission** | **Data & Continuous** |
| **Type of Modulation** | **On Off Keying of a fixed frequency carrier wave- OOK AM** |
| **Duty Cycle of Transmitter** | **4 start bits @ 75% duty cycle followed by N data bits @ 50% duty cycle** |
| **Antenna Type(s) and Number of Each** | **8" Long, Permanently Attached Whip Antenna** |
| **Antenna Requirement** | **Permanently Affixed** |
| **Power Requirement** | **9VDC** |
| **Power Derived From** | **9 Volt Battery** |
| **Describe Intended Use** | **RC Transmitter For Controlling a Toy Vehicle** |
| **Associated Receiver** | **APB91497-02A4R** |

# 3.TEST FACILITY

The 3/10/30 meter open area test site and conducted measurement facility used to collect the radiated data is located at 561F Monterey Road, Morgan Hill, California, U.S.A. A detailed description of the test facility was submitted to the Commission on May 27, 1994.

# 4.MEASUREMENT STANDARDS

The site is constructed and calibrated in conformance with the requirements of ANSI C63.4/1992.

# 5.TEST METHODOLOGY

For an intentional radiator, the spectrum shall be investigated from the lowest radio frequency signal generated in the device, without going below 9 KHz, up to at least the tenth harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower. (CFR 47 Section 15.33)

# 6.MEASUREMENT EQUIPMENT USED

| TEST EQUIPMENTS LIST | | | | |
|---|---|---|---|---|
| **Name of Equipment** | **Manufacturer** | **Model No.** | **Serial No.** | **Due Date** |
| **Antenna, Bilog** | **Schaffnner-Chase30MHz-2GHz** | **CBL6112B** | **2586** | **3/30/03** |
| **Quasi-Peak Detector** | **HP9K - 1GHz** | **85650A** | **3145A01654** | **6/1/03** |
| **Spectrum Analyzer** | **HP100Hz - 1.5GHz** | **8568B** | **2841A04227** | **4/15/03** |
| **Pre-Amplifier** | **HP0.1-1300MHz** | **8447D** | **2944A06589** | **8/10/02** |

# 7.TEST PROCEDURES AND TEST RESULTS

## RADIATED EMISSION TEST: ( 15.235 (a))

Test Procedure

1. The EUT was placed on a wooden table on the outdoor ground plane. The search antenna was placed 3 meter from the EUT. The EUT was placed in X, Y, and Z position to simulate the actual usage.

2. The turntable was slowly rotated to locate the direction of maximum emission at each EUT position. Once the maximum direction and EUT position was determined, the search antenna was raised and lowered in both vertical and horizontal polarization. The maximum readings so obtained are recorded in the data list below.

Test Result: Peak emission was under average limit. Refer to attached plot and spreadsheet.

## RADIATED EMISSION TEST: ( 15.235 (b))

Test Requirement: The field strength between the band edges and up to 10kHz above and below the band edges shall be attenuated at least 26 dB below the level of the unmodulated carrier or to the general limits in 15.209, which permits the higher emission levels. All emissions more than 10KHz from the band edges shall be below the levels specified in 15.209.

Test Procedure:

1. The EUT was placed on a wooden table on the outdoor ground plane. The search antenna was placed 3 meter from the EUT. The EUT was placed in X, Y, and Z position to simulate the actual usage.

2. The turntable was slowly rotated to locate the direction of the maximum emission. Once the maximum direction was determined, the search antenna was raised and lowered in both vertical and horizontal polarizations. Maximum emissions were then recorded. For band edge measurements plots were taken. All plots were offset for cable loss, amplifier gain, antenna factor, etc.

3. In the position and orientation of maximum emission a plot was taken using 100KHz RES B/W and 100KHz VID B/W, Start frequency 49.81MHz, Stop frequency 49.91MHz. The marker function shows the peak emission level.

4. In the same position and orientation as step 3 a plot was taken using 30KHz RES B/W and 30KHz VID B/W, Start frequency 49.81MHz, Stop frequency 49.91MHz. The marker function shows the peak emission level.

5. In the same position and orientation as step 3 a plot was taken using 10KHz RES B/W and 10KHz VID B/W, Start frequency 49.81MHz, Stop frequency 49.91MHz. The marker function shows the peak emission level.

6. The peak carrier level did not change using 100KHz, 30KHz and 10KHz RES B/Ws. The 10KHz RES B/W plot is used to show compliance to the 15.209 limits in the 10KHz band edges.

Test results: All emissions were under specified limits. Refer to attached plots and tabular data sheet.

COMPLIANCE Certification Services
FCC, VCCI, CISPR, CE, AUSTEL, NZ
UL, CSA, TUV, BSMI, DHHS, NVLAP

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PHONE: (408) 463-0885 FAX: (408) 463-0888

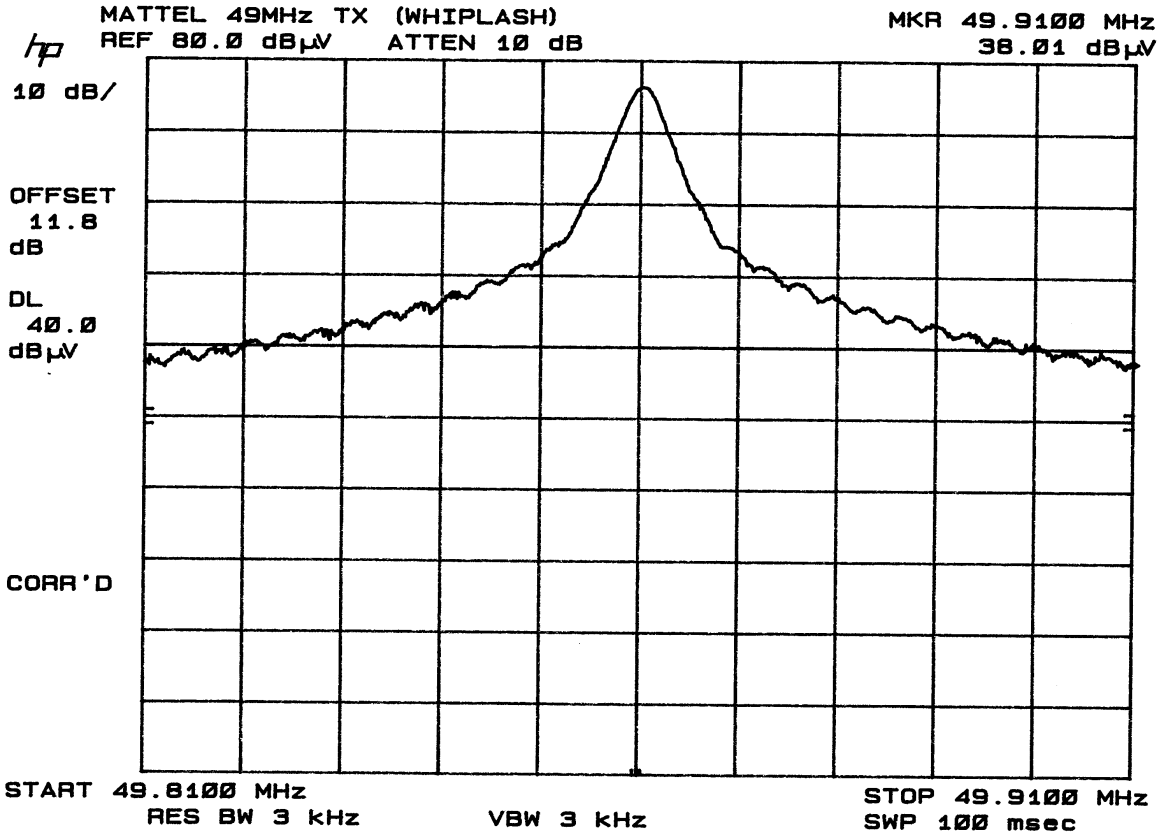
| | |
|---|---|
| *Project #:* | 02U1437-1 |
| *Report #:* | 020808C2 |
| *Date& Time:* | 08/08/02 12:24 PM |
| *Test Engr:* | Thu Chan |

| | |
|---|---|
| *Company:* | Mattel Mount Laurel FW |
| *EUT Description:* | 49MHz Transmitter (M/N: Whiplash) |
| *Test Configuration :* | EUT only |
| *Type of Test:* | FCC 15.235 |
| *Mode of Operation:* | Transmitting |

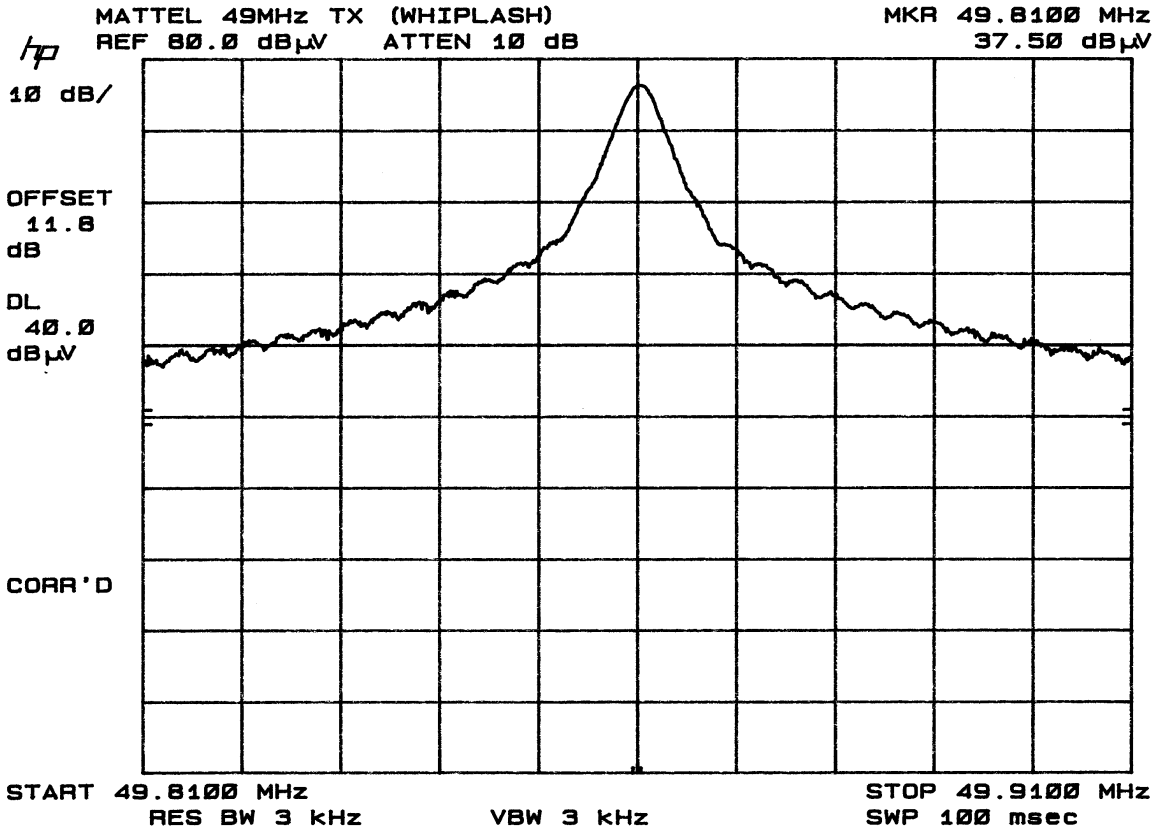
○ A-Site ○ B-Site ◉ C-Site ○ F-Site 6 Worst Data Descending

| Freq. (MHz) | Reading (dBuV) | AF (dB) | Closs (dB) | Pre-amp (dB) | Level (dBuV/m) | Limit FCC_B | Margin (dB) | Pol (H/V) | Az (Deg) | Height (Meter) | Mark (P/Q/A) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Fundamental: | | | | | | | | | | | |
| X-Position, Standup: | | | | | | | | | | | |
| 49.86 | 64.80 | 10.93 | 0.88 | 0.00 | 76.61 | 100.00 | -23.39 | 3mV | 0.00 | 1.00 | P |
| 49.86 | 55.00 | 10.93 | 0.88 | 0.00 | 66.81 | 80.00 | -13.19 | 3mV | 0.00 | 1.00 | Av |
| 49.86 | 50.00 | 10.93 | 0.88 | 0.00 | 61.81 | 100.00 | -38.19 | 3mH | 0.00 | 3.50 | P |
| Y-Position, Back Lay Down: | | | | | | | | | | | |
| 49.86 | 58.00 | 10.93 | 0.88 | 0.00 | 69.81 | 100.00 | -30.19 | 3mH | 0.00 | 3.50 | P |
| 49.86 | 54.00 | 10.93 | 0.88 | 0.00 | 65.81 | 100.00 | -34.19 | 3mV | 0.00 | 1.00 | P |
| Z-Position, Side Lay Down: | | | | | | | | | | | |
| 49.86 | 58.00 | 10.93 | 0.88 | 0.00 | 69.81 | 100.00 | -30.19 | 3mV | 0.00 | 1.00 | P |
| 49.86 | 57.00 | 10.93 | 0.88 | 0.00 | 68.81 | 100.00 | -31.19 | 3mV | 0.00 | 1.00 | P |
| Below data were taken by Worst case X-position (Standup): | | | | | | | | | | | |
| Band Edges, RBW=VBW=3KHz: | | | | | | | | | | | |
| 49.81 | 25.70 | 10.95 | 0.88 | 0.00 | 37.53 | 40.00 | -2.47 | 3mV | 0.00 | 1.00 | P |
| 49.91 | 26.20 | 10.92 | 0.88 | 0.00 | 38.00 | 40.00 | -2.00 | 3mV | 0.00 | 1.00 | P |
| Spurious & Harmonics, RBW=VBW=100KHz: | | | | | | | | | | | |
| 149.58 | 37.00 | 16.42 | 1.58 | 27.13 | 27.87 | 43.50 | -15.63 | 3mV | 0.00 | 1.00 | P |
| 35.65 | 42.00 | 12.98 | 0.81 | 27.55 | 28.24 | 40.00 | -11.76 | 3mV | 0.00 | 1.00 | P |
| 37.88 | 47.00 | 12.89 | 0.83 | 27.54 | 33.17 | 40.00 | -6.83 | 3mV | 0.00 | 1.00 | P |
| 42.45 | 46.00 | 12.48 | 0.86 | 27.53 | 31.81 | 40.00 | -8.19 | 3mV | 0.00 | 1.00 | P |
| 44.65 | 50.00 | 12.19 | 0.88 | 27.52 | 35.54 | 40.00 | -4.46 | 3mV | 0.00 | 1.00 | P |
| 56.65 | 50.00 | 8.64 | 0.89 | 27.47 | 32.06 | 40.00 | -7.94 | 3mV | 0.00 | 1.00 | P |
| 61.88 | 46.00 | 7.18 | 0.92 | 27.45 | 26.64 | 40.00 | -13.36 | 3mV | 0.00 | 1.00 | P |
| 136.95 | 44.00 | 14.18 | 1.54 | 27.17 | 32.56 | 43.50 | -10.94 | 3mV | 0.00 | 1.00 | P |
| 139.15 | 45.00 | 14.69 | 1.56 | 27.16 | 34.09 | 43.50 | -9.41 | 3mV | 0.00 | 1.00 | P |
| 142.15 | 47.00 | 15.23 | 1.57 | 27.15 | 36.64 | 43.50 | -6.86 | 3mV | 0.00 | 1.00 | P |
| 144.36 | 51.50 | 15.58 | 1.57 | 27.15 | 41.51 | 43.50 | -1.99 | 3mV | 0.00 | 1.00 | P |
| 150.16 | 48.00 | 16.50 | 1.58 | 27.13 | 38.95 | 43.50 | -4.55 | 3mV | 0.00 | 1.00 | P |
| 156.35 | 48.50 | 16.85 | 1.63 | 27.10 | 39.87 | 43.50 | -3.63 | 3mV | 0.00 | 1.00 | P |
| 144.36 | 41.00 | 15.58 | 1.57 | 27.15 | 31.01 | 43.50 | -12.49 | 3mH | 0.00 | 1.00 | P |
| 349.02 | 40.50 | 15.06 | 2.78 | 26.99 | 31.35 | 46.00 | -14.65 | 3mV | 0.00 | 1.00 | P |
| 448.74 | 40.50 | 16.73 | 3.22 | 27.65 | 32.80 | 46.00 | -13.20 | 3mV | 0.00 | 1.00 | P |
| 498.60 | 41.00 | 18.00 | 3.45 | 27.95 | 34.51 | 46.00 | -11.49 | 3mV | 0.00 | 1.00 | P |
| No other emissions were found within 20dB under the limits up to 1GHz. | | | | | | | | | | | |
| Total data #: 27 | | | | | | | | | | | |
| V.2c | | | | | | | | | | | |

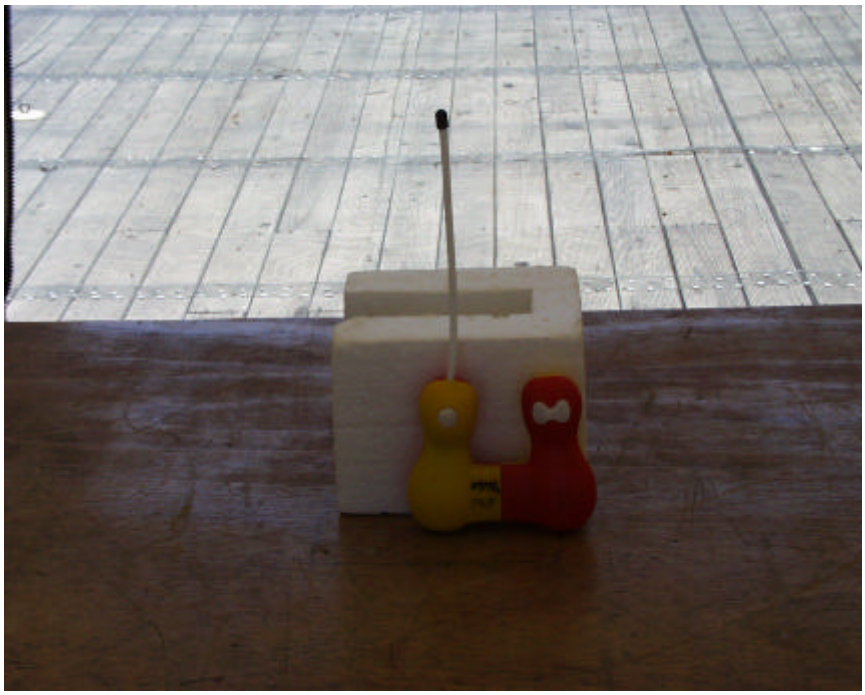
**High Bandedge Plot**



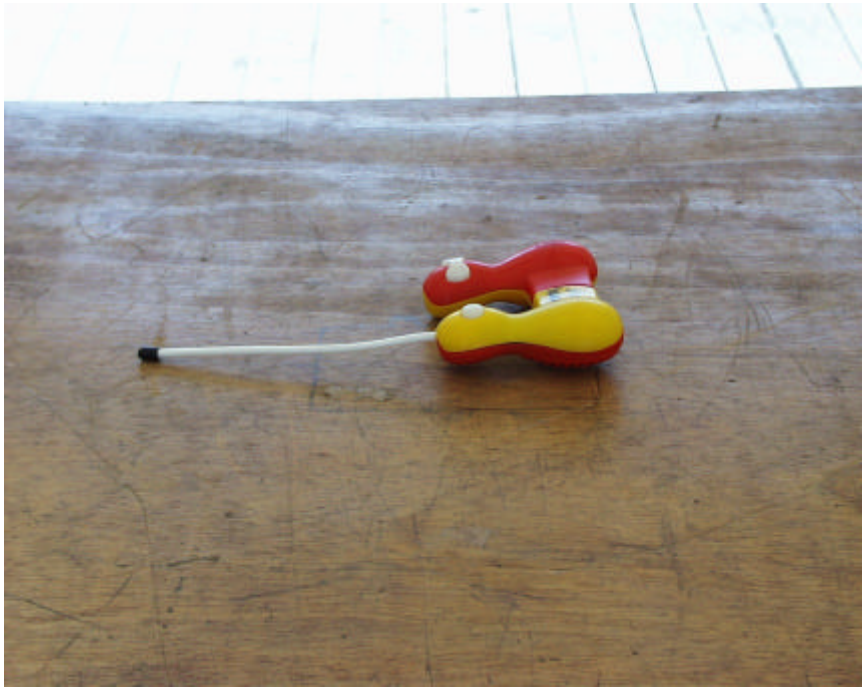
**Low Bandedge Plot**



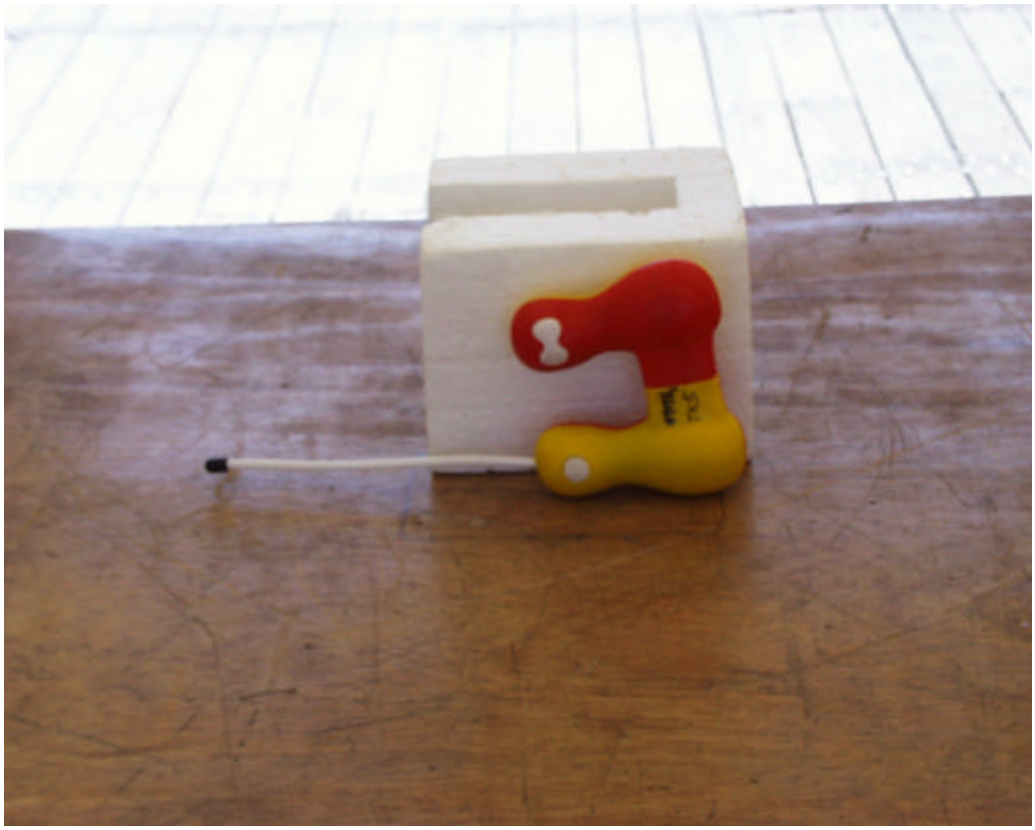
# 8.RADIATED EMISSION TEST SETUP PHOTOS



X-POSITION



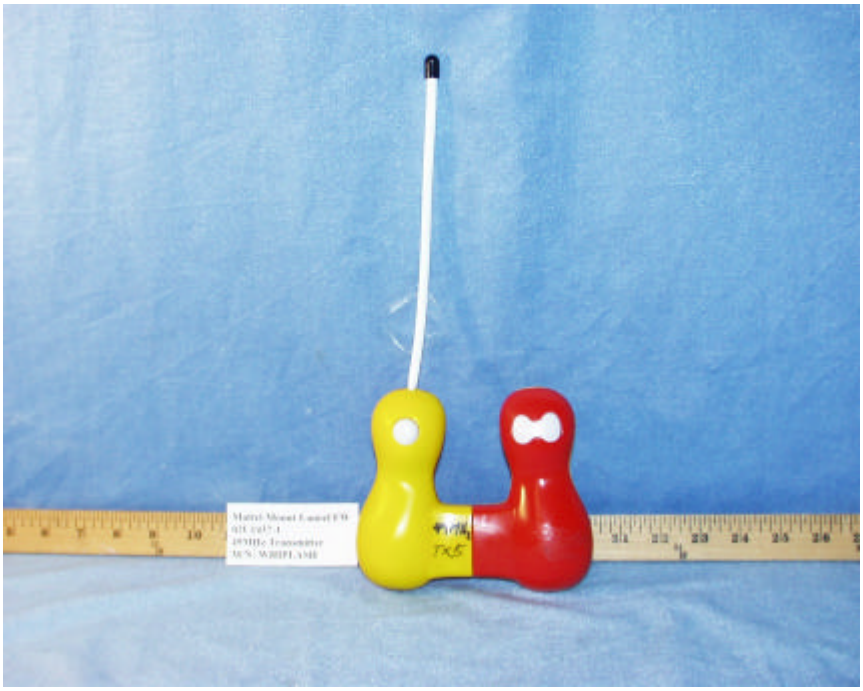
Y-POSITION

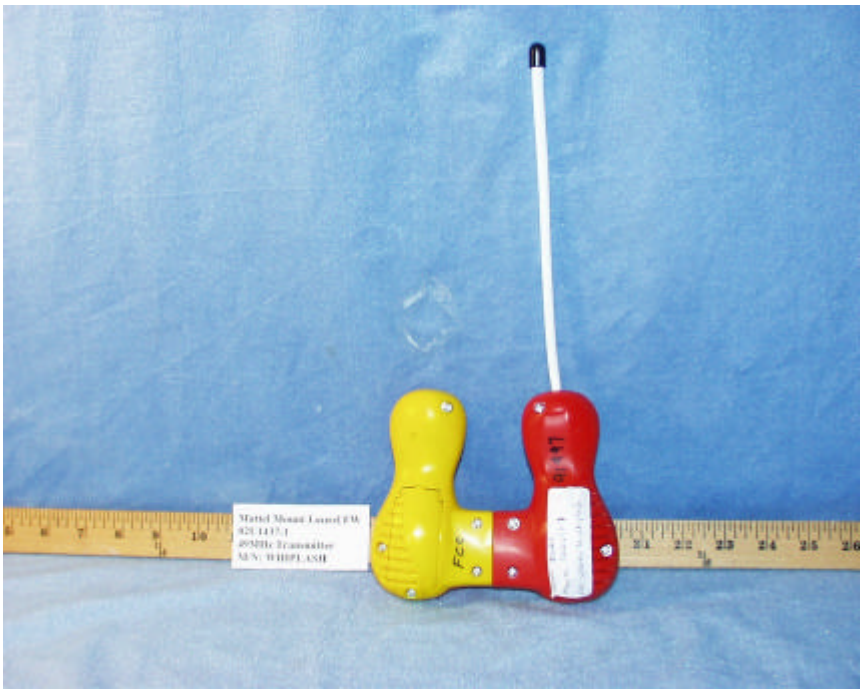


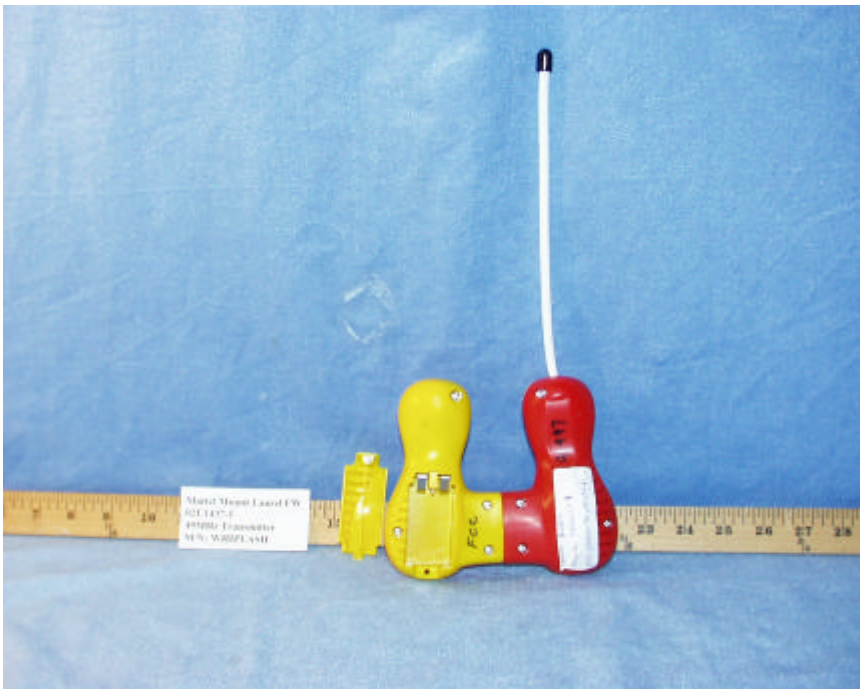
Z-POSITION

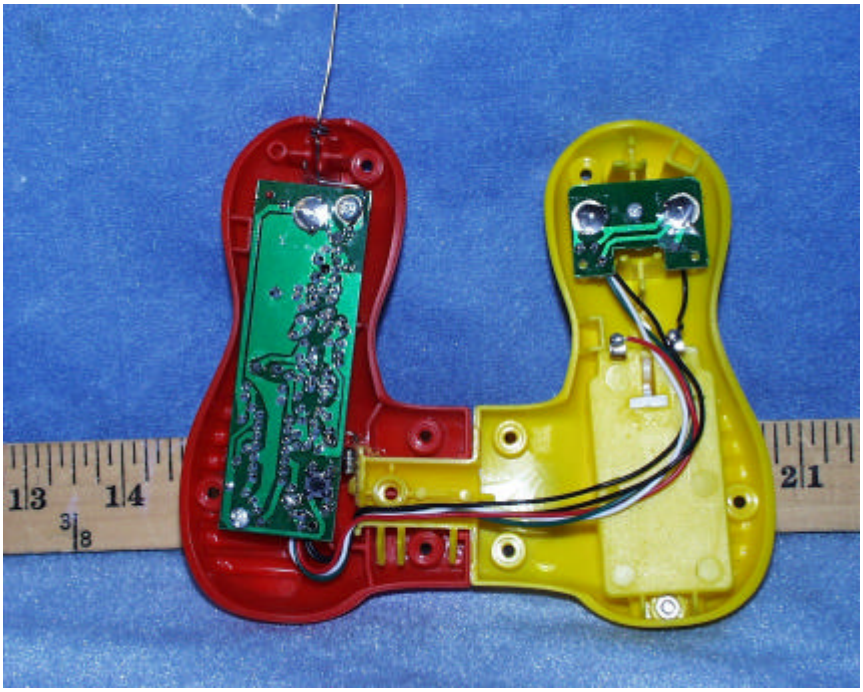
# 9.APPENDIX

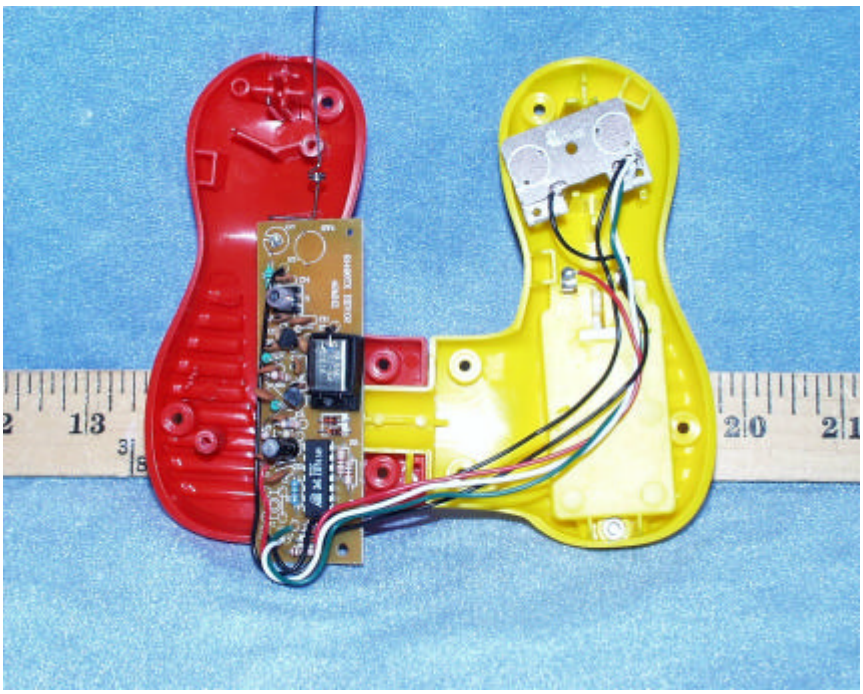
## EUT PHOTOGRAPHS

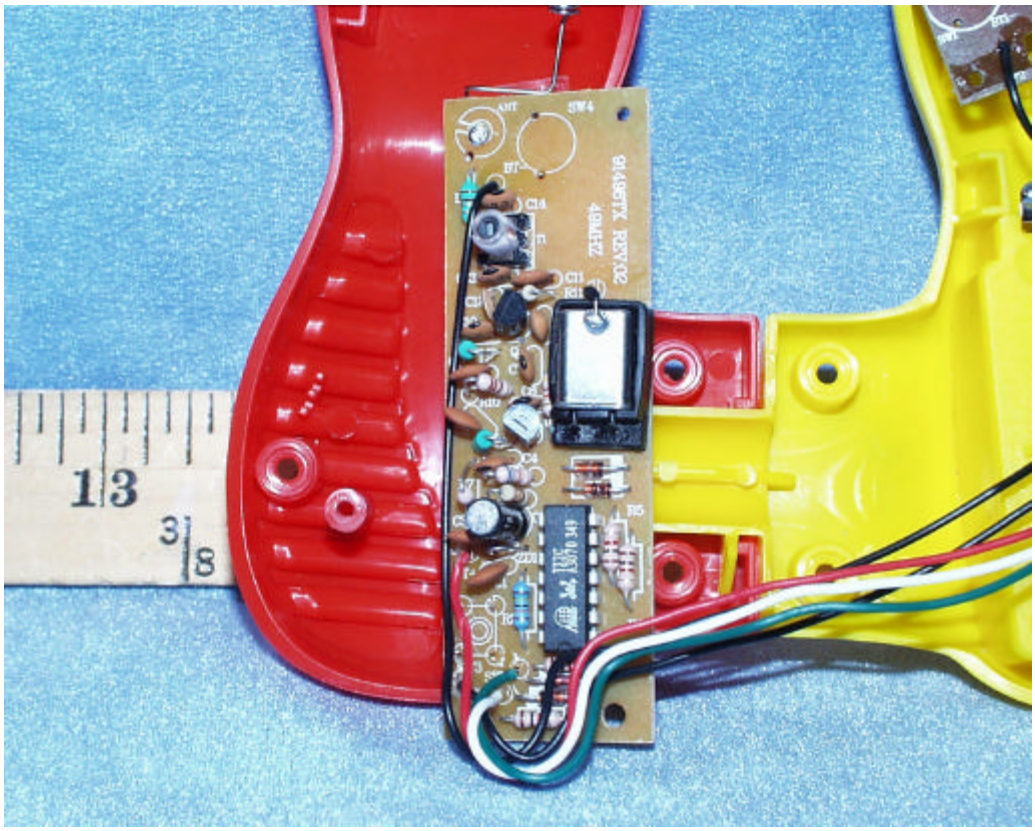












**SCHEMATICS**

Please refer to attached sheets.

**BLOCK DIAGRAM**

Please refer to attached sheets.

**USER'S MANUAL**

Please refer to attached sheets.

# END OF REPORT