

**Date: 2002-12-23**

# **TEST REPORT**

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**No.: HM109383**

## **FCC PART 15 SUBPART C CERTIFICATION REPORT**

### **FOR LOW POWER TRANSMITTER**

**TEST REPORT No.: HM109383**

Equipment Under Test [EUT]:

Model Number:

Applicant:

FCC ID :

Walkie Talkie

MILWT-353

Million Industrial Ltd.

MQDMILWT-353

Date: 2002-12-23

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### **CONCLUSION**

The submitted product was deemed to have COMPLIED with the requirements of Federal Communications Commission [FCC] Rules and Regulations Part 15. The tests were performed in accordance with the standards described above and on Section 2.2 in this Test Report.

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Verify by

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Patrick Wong  
for Chief Executive

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## **1.0 General Details**

### **1.1 Test Laboratory**

The Hong Kong Standards and Testing Centre Ltd.  
EMC Laboratory  
10 Dai Wang Street, Taipo Industrial Estate  
New Territories, Hong Kong

Telephone: 852 2666 1888  
Fax: 852 2664 4353

### **1.2 Applicant Details** **Applicant**

MILLION INDUSTRIAL LTD.  
Flat A, 9/F., Rodeo Centre 73-79 Larch St.,  
Tai Kok Tsui, Kowloon, Hong Kong.

Telephone: 852 2396 2098  
Fax: 852 2392 8192

**HKSTC Code Number for Applicant**

**MII001**

### **Manufacturer**

MILLION INDUSTRIAL LTD.  
Flat A, 9/F., Rodeo Centre 73-79 Larch St.,  
Tai Kok Tsui, Kowloon, Hong Kong.

Telephone: 852 2396 2098  
Fax: 852 2392 8192

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### **1.3 Equipment Under Test [EUT] Description of Sample**

Product: Walkie Talkie  
Manufacturer: Million Industrial Ltd.  
Brand Name: MILLION  
Model Number: MILWT-353  
Input Voltage: 6Vd.c ("AG13" size battery x 4)

#### **1.3.1 Description of EUT Operation**

The Equipment Under Test(EUT) is an Million Industrial Ltd., Walkie Talkie. The transmitter is a 2 button transmitter. The EUT continues to transmit while button is being pressed. It is voice transmission, Modulation by Q2 and tape is frequency modulation.

### **1.4 Date of Order**

2002-12-03

### **1.5 Submitted Sample(s):**

1 Sample per model

### **1.6 Test Duration**

2002-12-09

### **1.7 Country of Origin**

China

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**1.8 Additional Information of EUT**

|                                    | Submitted                           | Not Available            |
|------------------------------------|-------------------------------------|--------------------------|
| User Manual                        | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| Part List                          | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| Circuit Diagram                    | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| Printed Circuit Board [PCB] Layout | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| Block diagram                      | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| FCC ID Label                       | <input checked="" type="checkbox"/> | <input type="checkbox"/> |

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### **2.0 Technical Details**

#### **2.1 Investigations Requested**

Perform ElectroMagnetic Interference measurement in accordance with FCC 47CFR [Codes of Federal Regulations] Part 15 and ANSI C63.4:2000 for FCC Certification.

#### **2.2 Test Standards and Results Summary Tables**

| <b>EMISSION<br/>Results Summary</b>                                |                  |                 |                     |                                     |                          |                                     |
|--------------------------------------------------------------------|------------------|-----------------|---------------------|-------------------------------------|--------------------------|-------------------------------------|
| Test Condition                                                     | Test Requirement | Test Method     | Class /<br>Severity | Test Result                         |                          |                                     |
|                                                                    |                  |                 |                     | Pass                                | Failed                   | N/A                                 |
| Field Strength of<br>Fundamental Emissions<br>& Spurious Emissions | FCC 47CFR 15.235 | ANSI C63.4:2000 | N/A                 | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/>            |
| Radiated Emissions,<br>30MHz to 1GHz                               | FCC 47CFR 15.209 | ANSI C63.4:2000 | Class B             | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/>            |
| Conducted Emissions on<br>AC, 0.15MHz to 30MHz                     | FCC 47CFR 15.207 | ANSI C63.4:2000 | Class B             | <input type="checkbox"/>            | <input type="checkbox"/> | <input checked="" type="checkbox"/> |

Note: N/A - Not Applicable

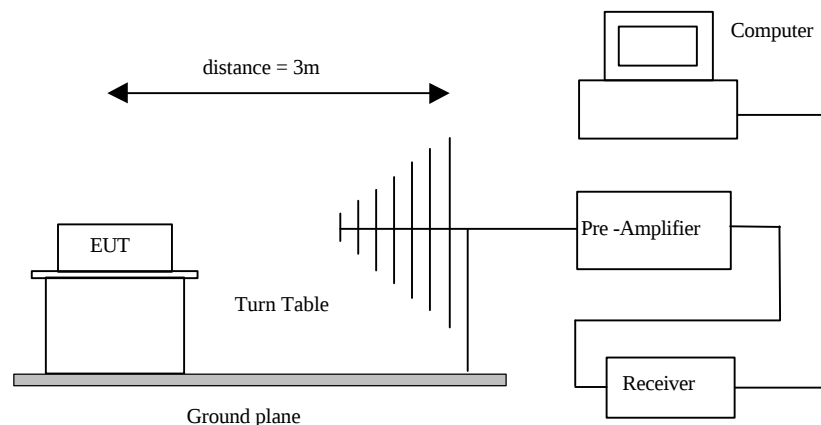
**3.0 Test Results****3.1 Emission****3.1.1 Radiated Emissions**

|                    |                  |
|--------------------|------------------|
| Test Requirement:  | FCC 47CFR 15.235 |
| Test Method:       | ANSI C63.4:2000  |
| Test Date:         | 2002-12-09       |
| Mode of Operation: | On mode          |

**Test Method:**

The sample was placed 0.8m above the ground plane on the OATS \*. Measurements in both horizontal and vertical polarities were performed. During the test, each emission was maximized by: having the EUT continuously working, investigate all operating modes, rotated about all 3 axis (X, Y & Z) to obtain worst position, manipulating interconnecting cables, rotating turntable, varying antenna height from 1m to 4m in both horizontal and vertical polarizations. The emissions worst-case are shown in Test Results of the following pages.

\*: OATS [Open Area Test Site] located at HKSTC with a metal ground plane on filed with the FCC pursuant to section 2.948 of the FCC rules, with Registration Number: 90657.

**Test Setup:**

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### **Limits for Field Strength of Fundamental Emissions [FCC 47CFR 15.235]:**

| Frequency Range of Fundamental<br>[MHz] | Field Strength of Fundamental Emission<br>[Peak]<br>[μV/m] | Field Strength of Fundamental Emission<br>[Average]<br>[μV/m] |
|-----------------------------------------|------------------------------------------------------------|---------------------------------------------------------------|
| 49.82-49.90                             | 100,000                                                    | 10,000                                                        |

### **Results:**

| Field Strength of Fundamental Emissions<br>Peak Value |                              |                             |                          |                        |                   |                  |
|-------------------------------------------------------|------------------------------|-----------------------------|--------------------------|------------------------|-------------------|------------------|
| Frequency<br>MHz                                      | Measured Level @3m<br>dBμV/m | Correction Factor<br>dBμV/m | Field Strength<br>dBμV/m | Field Strength<br>μV/m | Limit @3m<br>μV/m | Antenna Polarity |
| 49.86                                                 | 45.3                         | 10.0                        | 55.3                     | 584.8                  | 100,000           | Vertical         |

| Field Strength of Fundamental Emissions<br>Average |                              |                             |                          |                        |                   |                  |
|----------------------------------------------------|------------------------------|-----------------------------|--------------------------|------------------------|-------------------|------------------|
| Frequency<br>MHz                                   | Measured Level @3m<br>dBμV/m | Correction Factor<br>dBμV/m | Field Strength<br>dBμV/m | Field Strength<br>μV/m | Limit @3m<br>μV/m | Antenna Polarity |
| 49.86                                              | 45.0                         | 10.0                        | 55.0                     | 562.3                  | 100,00            | Vertical         |

According to FCC 47CFR15.35, the limit on the radio frequency emissions as measured using instrumentation with a peak detector function, corresponding to 20dB above the maximum permitted average limit for the frequency being investigated unless a different peak emission limit is otherwise specified in the rules.

### **Remarks:**

\*: Linear interpolations

Correction Factor included Antenna Factor and Cable Attenuation.

Calculated measurement uncertainty = 30MHz to 300MHz ±3.7dB  
300MHz to 1GHz +3.0dB / -2.7dB

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### Limited for Radiated Emissions [FCC 47 CFR 15.209 Class B]:

| Frequency Range<br>[MHz] | Quasi-Peak Limits<br>[μV/m] |
|--------------------------|-----------------------------|
| 30-88                    | 100                         |
| 88-216                   | 150                         |
| 216-960                  | 200                         |
| Above960                 | 500                         |

The emission limits shown in the above table are based on measurement employing a CISPR quasi-peak detector and above 1000MHz are based on measurements employing an average detector.

### Results :

| Radiated Emissions<br>Quasi-Peak |                                 |                                |                             |                           |                   |                     |
|----------------------------------|---------------------------------|--------------------------------|-----------------------------|---------------------------|-------------------|---------------------|
| Frequency<br>MHz                 | Measured<br>Level @3m<br>dBμV/m | Correction<br>Factor<br>dBμV/m | Field<br>Strength<br>dBμV/m | Field<br>Strength<br>μV/m | Limit @3m<br>μV/m | Antenna<br>Polarity |
| 99.72                            | < 1.0                           | 12.5                           | < 13.5                      | < 4.7                     | 150               | Vertical            |
| 149.58                           | < 1.0                           | 9.8                            | < 10.8                      | < 3.5                     | 150               | Vertical            |
| 199.44                           | < 1.0                           | 11.5                           | < 12.5                      | < 4.2                     | 150               | Vertical            |
| 249.30                           | < 1.0                           | 15.9                           | < 16.9                      | < 7.0                     | 200               | Vertical            |
| 299.16                           | < 1.0                           | 17.4                           | < 18.4                      | < 8.3                     | 200               | Vertical            |
| 349.02                           | < 1.0                           | 17.2                           | < 18.2                      | < 8.1                     | 200               | Vertical            |
| 398.88                           | < 1.0                           | 18.8                           | < 19.8                      | < 9.8                     | 200               | Vertical            |
| 448.74                           | < 1.0                           | 19.7                           | < 20.7                      | < 10.8                    | 200               | Vertical            |
| 498.60                           | < 1.0                           | 20.6                           | < 21.6                      | < 12.0                    | 200               | Vertical            |

Remarks:

\*: Linear interpolations

Correction Factor included Antenna Factor and Cable Attenuation.

Calculated measurement uncertainty = 30MHz to 300MHz ±3.7dB  
300MHz to 1GHz +3.0dB / -2.7dB

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### Limited for Radiated Emissions [FCC 47 CFR 15.109 Class B]:

| Frequency Range<br>[MHz] | Quasi-Peak Limits<br>[μV/m] |
|--------------------------|-----------------------------|
| 30-88                    | 100                         |
| 88-216                   | 150                         |
| 216-960                  | 200                         |
| Above960                 | 500                         |

The emission limits shown in the above table are based on measurement employing a CISPR quasi-peak detector and above 1000MHz are based on measurements employing an average detector.

### Results: Receiver

| Radiated Emissions<br>Quasi-Peak |                                 |                                |                             |                           |                   |                     |
|----------------------------------|---------------------------------|--------------------------------|-----------------------------|---------------------------|-------------------|---------------------|
| Frequency<br>MHz                 | Measured<br>Level @3m<br>dBμV/m | Correction<br>Factor<br>dBμV/m | Field<br>Strength<br>dBμV/m | Field<br>Strength<br>μV/m | Limit @3m<br>μV/m | Antenna<br>Polarity |
| 49.86                            | 26.3                            | 10.0                           | 36.3                        | 65.3                      | 100               | Vertical            |
| 99.72                            | < 1.0                           | 12.5                           | < 13.5                      | < 4.7                     | 150               | Vertical            |
| 149.58                           | < 1.0                           | 9.8                            | < 10.8                      | < 3.5                     | 150               | Vertical            |
| 199.44                           | < 1.0                           | 11.5                           | < 12.5                      | < 4.2                     | 150               | Vertical            |
| 249.30                           | < 1.0                           | 15.9                           | < 16.9                      | < 7.0                     | 200               | Vertical            |
| 299.16                           | < 1.0                           | 17.4                           | < 18.4                      | < 8.3                     | 200               | Vertical            |
| 349.02                           | < 1.0                           | 17.2                           | < 18.2                      | < 8.1                     | 200               | Vertical            |
| 398.88                           | < 1.0                           | 18.8                           | < 19.8                      | < 9.8                     | 200               | Vertical            |
| 448.74                           | < 1.0                           | 19.7                           | < 20.7                      | < 10.8                    | 200               | Vertical            |
| 498.60                           | < 1.0                           | 20.6                           | < 21.6                      | < 12.0                    | 200               | Vertical            |

\*\* For effective averaging, the bandwidth of the video filter must be smaller than the resolution bandwidth. The higher the ratio of resolution bandwidth to video bandwidth, the greater the averaging will be recorded. .Below setting for HP8572A EMI Receiver.

Resolution Bandwidth =3MHz  
Video Bandwidth =1Hz

Calculated measurement uncertainty = 30MHz to 300MHz ±3.7dB  
300MHz to 1GHz +3.0dB / -2.7dB

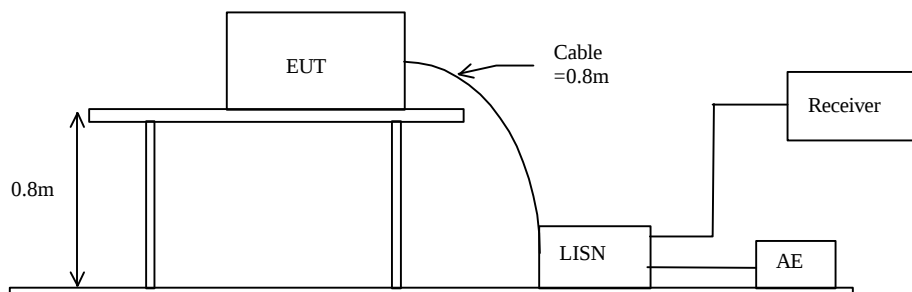
**3.1.1 Conducted Emissions (0.15MHz to 30MHz)**

|                    |                  |
|--------------------|------------------|
| Test Requirement:  | FCC 47CFR 15.207 |
| Test Method:       | ANSI C63.4:2000  |
| Test Date:         | 2002-12-09       |
| Mode of Operation: | On mode          |

**Test Method:**

The test was performed in accordance with ANSI C63.4:2000, with the following: an initial measurement was performed in peak and average detection mode on the live line. Any emissions recorded within 30dB of the relevant limit line were re-measured using quasi-peak and average detection on the live and neutral lines with the worst case recorded in the table of results.

**Test Setup:**



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**Limit for Conducted Emissions (FCC 47 CFR 15.207):**

| Frequency Range<br>[MHz] | Quasi-Peak Limits<br>[ $\mu$ V/m] |
|--------------------------|-----------------------------------|
| 0.15-30                  | 250                               |

Limits for Conducted Emissions Test, please refer to limit lines (Quasi-Peak and Average) in the following diagram labelled as (QP and AV).

Results: N/A

The EUT is operated by internal battery power only, therefore power line conducted emission was deemed unnecessary.

Remarks:

Calculated measurement uncertainty =  $\pm 2.3$ dB

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### **3.2 26dB Bandwidth of Fundamental Emission**

|                    |                                  |
|--------------------|----------------------------------|
| Test Requirement:  | FCC 47 CFR 15.235                |
| Test Method:       | ANSI C63.4:2000 (Section 13.1.7) |
| Test Date:         | 2002-12-09                       |
| Mode of Operation: | On mode                          |

#### **Test Method:**

The bandwidth is measured at an amplitude level reduced from the reference level by a specified ratio. The reference level is the level of the highest amplitude signal observed from the transmitter at the fundamental frequency. Once the reference level is established, the equipment is conditioned with typical modulating signal to produce the worst-case (i.e. the widest) bandwidth.

#### **Test Setup:**

As Test Setup of clause 3.1.1 in this test report.

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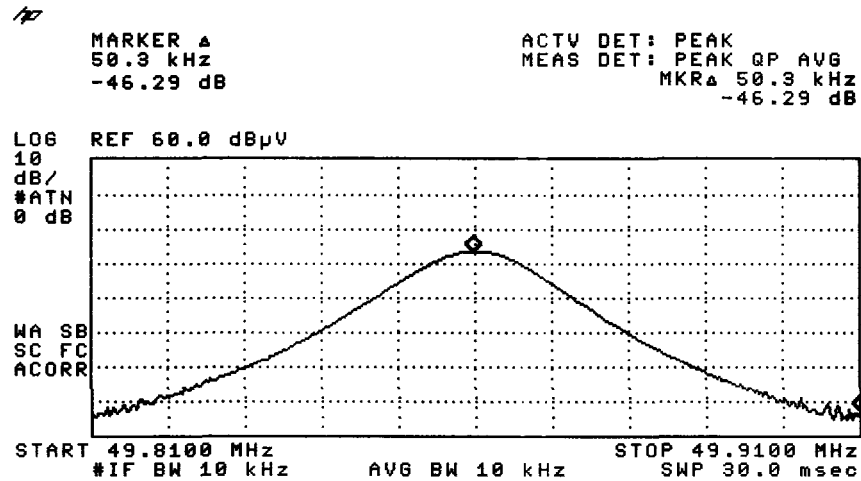
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Limits for 26 dB Bandwidth of Fundamental Emission:

| Frequency Range<br>[MHz] | 26dB Bandwidth<br>[KHz] | FCC Limits *<br>[KHz] |
|--------------------------|-------------------------|-----------------------|
| 49.86                    | 45                      | within 49.82-49.90    |

### 26dB Bandwidth of Fundamental Emission



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### Appendix A

#### Test Equipment Audit

##### Radiated Emission

| EQP NO. | DESCRIPTION                                                                  | MANUFACTURER                                          | MODEL NO.                      | SERIAL NO.                             | LAST CAL |
|---------|------------------------------------------------------------------------------|-------------------------------------------------------|--------------------------------|----------------------------------------|----------|
| EM007   | SPECTRUM ANALYZER                                                            | HEWLETT PACKARD                                       | HP85660B                       | 3144A21192                             | 07/09/01 |
| EM008   | SPECTRUM ANALYZER DISPLAY                                                    | HEWLETT PACKARD                                       | HP85662A                       | 3144A20514                             | 07/09/01 |
| EM009   | QUASI PEAK ADAPTOR                                                           | HEWLETT PACKARD                                       | HP85650A                       | 3303A01702                             | 07/09/01 |
| EM010   | RF PRESELECTOR                                                               | HEWLETT PACKARD                                       | HP85685A                       | 3221A01410                             | 07/09/01 |
| EM011   | ATTENUATOR/SWITCH                                                            | HEWLETT PACKARD                                       | HP11713A                       | 2508A10595                             | 07/09/01 |
| EM012   | PRE-AMPLIFIER                                                                | HEWLETT PACKARD                                       | HP8449B                        | 3008A00262                             | 07/09/01 |
| EM013   | CONTROLLER (COMPUTER),<br>COLOR MONITOR, KEYBOARD &<br>MOUSE<br>FLOPPY DRIVE | HEWLETT PACKARD<br>HEWLETT PACKARD<br>HEWLETT PACKARD | HP9000<br>HP A1097C<br>HP9133L | 6226A60314<br>3151J39517<br>2623A02468 | CM       |
| EM020   | HORN ANTENNA                                                                 | EMCO                                                  | 3115                           | 4032                                   | 19/07/00 |
| EM022   | LOOP ANTENNA                                                                 | EMCO                                                  | 6502                           | 1189-2424                              | 04/08/00 |
| EM072   | SIGNAL GENERATOR                                                             | HEWLETT PACKARD                                       | 8640B                          | 1948A11892                             | N/A      |
| EM083   | HKSTC OPEN AREA TEST SITE                                                    | HKSTC                                                 | N/A                            | N/A                                    | 14/02/02 |
| EM131   | PORTABLE SPECTRUM<br>ANALYSER                                                | HEWLETT PACKARD                                       | 8595EM                         | 3710A00155                             | 18/12/01 |
| EM145   | EMI TEST RECEIVER                                                            | R & S                                                 | ESCS 30                        | 830245/021                             | 22/07/02 |
| EM194   | BICONILOG ANTENNA                                                            | EMCO                                                  | 3142B                          | 1795                                   | 14/05/02 |
| EM195   | ANTENNA POSITIONING MAST                                                     | EMCO                                                  | 2075                           | 2368                                   | N/A      |
| EM196   | MULTI-DEVICE CONTROLLER                                                      | EMCO                                                  | 2090                           | 1662                                   | N/A      |

##### Conducted Emission

| EQP NO. | DESCRIPTION                         | MANUFACTURER                     | MODEL NO.  | SERIAL NO.          | LAST CAL |
|---------|-------------------------------------|----------------------------------|------------|---------------------|----------|
| EM078   | VARIAC                              | SHANGHAI VOLTAGE                 | TDGC-3/0.5 | N/A                 | CM       |
| EM081   | SMALL SCREENED ROOM                 | MIKO INST HK                     | N/A        | N/A                 | 04/10/01 |
| EM119   | LISN                                | R & S                            | ESH3-Z5    | 0831.5518.52        | 31/08/00 |
| EM127   | ISOLATION TRANSFORMER 220<br>TO 300 | WING SUN                         | N/A        | N/A                 | CM       |
| EM142   | PULSES LIMITER                      | R & S                            | ESH3Z2     | 357.8810.52         | 04/07/01 |
| EM181   | EMI TEST RECEIVER                   | R & S                            | ESIB7      | 100072              | 28/11/01 |
| EM154   | SHIELDING ROOM                      | SIEMENA MATSUSHITA<br>COMPONENTS | N/A        | 803-740-057-<br>99A | 02/01/02 |
| EM197   | LISN                                | EMCO                             | 4825/2     | 1193                | 28/03/02 |

Remarks:

CM        Corrective Maintenance  
N/A       Not Applicable or Not Available  
TBD       To Be Determined

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### Appendix B

#### Photographs of EUT

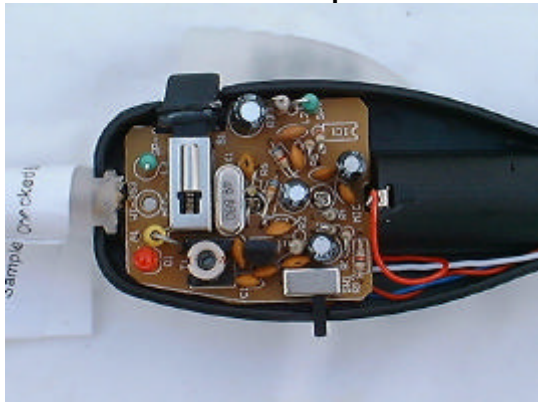
Front View of the product



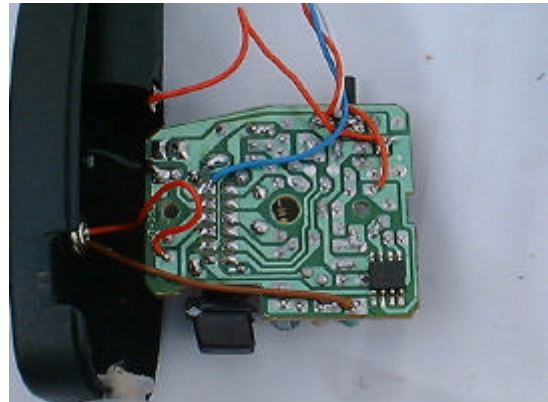
Rear View of the product



Inner Circuit Top View



Inner Circuit Bottom View



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### Photographs of EUT

Measurement of Radiated Emission Test Set Up



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