# FCC PART 15 SUBPART C CERTIFICATION REPORT

# FOR LOW POWER TRANSMITTER

## TEST REPORT No.: HM110917

| | |
|---|---|
| Equipment Under Test [EUT]: | Hand Band Glove |
| Model Number: | MI-021-07 |
| Applicant: | Kader Industrial Co., Ltd. |
| FCC ID : | GMMMI023RIGHT |

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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.**

Verified by

K C Lee
for Chief Executive

## 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**

KADER INDUSTRIAL CO., LTD.
22 Kai Cheung Road, Kowloon Bay, Kowloon, Hong Kong.

**HKSTC Code Number for Applicant** **KAI006**

**Manufacturer**

KADER INDUSTRIAL CO., LTD.
22 Kai Cheung Road, Kowloon Bay, Kowloon, Hong Kong.

## 1.3 Equipment Under Test [EUT]

**Description of Sample**

Product: Hand Band Glove
Manufacturer: Kader Industrial Co., Ltd.
Brand Name: Body Groovz
Model Number: MI-021-07
Input Voltage: 6Vd.c
Additional Model Number: MI-021-10

### 1.3.1 Description of EUT Operation

The Equipment Under Test (EUT) is an Kader Industrial Co., Ltd., Hand Band Glove. The transmitter is a 2 button transmitter. The EUT continues to transmit while button is being pressed, Modulation by IC. and tape is pulse modulation.

## 1.4 Date of Order

2003-06-19

## 1.5 Submitted Sample(s):

1 Sample per model

## 1.6 Test Duration

2003-06-24

## 1.7 Country of Origin

China

## 1.8 Additional Information of EUT

| | Submitted | Not Available |
|---|---|---|
| User Manual | ☒ | ☐ |
| Part List | ☒ | ☐ |
| Circuit Diagram | ☒ | ☐ |
| Printed Circuit Board [PCB] Layout | ☒ | ☐ |
| Block diagram | ☒ | ☐ |
| FCC ID Label | ☒ | ☐ |

## 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

**EMISSION**
**Results Summary**

| Test Condition | Test Requirement | Test Method | Class / Severity | Test Result | | |
|---|---|---|---|---|---|---|
| | | | | Pass | Failed | N/A |
| Field Strength of Fundamental Emissions & Spurious Emissions | FCC 47CFR 15.227 | ANSI C63.4:2000 | N/A | ☒ | ☐ | ☐ |
| Radiated Emissions, 30MHz to 1GHz | FCC 47CFR 15.209 | ANSI C63.4:2000 | Class B | ☒ | ☐ | ☐ |
| Conducted Emissions on AC, 0.15MHz to 30MHz | FCC 47CFR 15.207 | ANSI C63.4:2000 | Class B | ☒ | ☐ | ☐ |

Note: N/A - Not Applicable

## 3.0 Test Results

### 3.1 Emission

#### 3.1.1 Radiated Emissions

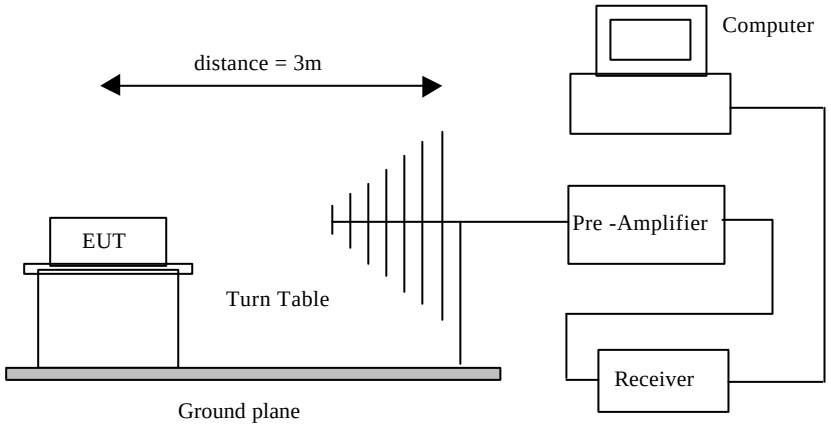
| | |
|---|---|
| Test Requirement: | FCC 47CFR 15.227 |
| Test Method: | ANSI C63.4:2000 |
| Test Date: | 2003-06-24 |
| Mode of Operation: | On mode |

**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:**



**Limits for Field Strength of Fundamental Emissions [FCC 47CFR 15.227]:**

| Frequency Range of Fundamental [MHz] | Field Strength of Fundamental Emission [Peak] [µV/m] | Field Strength of Fundamental Emission [Average] [µV/m] |
|---|---|---|
| 26.96-27.28 | 100,000 | 10,000 |

**Results:**

| **Field Strength of Fundamental Emissions Peak Value** | | | | | | |
|---|---|---|---|---|---|---|
| Frequency MHz | Measured Level @3m dBµV/m | Correction Factor dBµV/m | Field Strength dBµV/m | Field Strength µV/m | Limit @3m µV/m | Antenna Polarity |
| 27.20 | 42.50 | 22.3 | 64.8 | 1,737.8 | 100,000 | Vertical |

| **Field Strength of Fundamental Emissions Average** | | | | | | |
|---|---|---|---|---|---|---|
| Frequency MHz | Measured Level @3m dBµV/m | Correction Factor dBµV/m | Field Strength dBµV/m | Field Strength µV/m | Limit @3m µV/m | Antenna Polarity |
| 27.20 | 35.5 | 22.3 | 57.8 | 776.2 | 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:
*: Adjusted by Duty Cycle = -7dB

*: 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

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

| Frequency Range [MHz] | Quasi-Peak Limits [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 Quasi-Peak** | | | | | | |
|---|---|---|---|---|---|---|
| Frequency MHz | Measured Level @3m dBµV/m | Correction Factor dBµV/m | Field Strength dBµV/m | Field Strength µV/m | Limit @3m µV/m | Antenna Polarity |
| 54.39 | < 1.0 | 9.8 | < 10.8 | < 3.5 | 150 | Vertical |
| 81.59 | < 1.0 | 9.8 | < 10.8 | < 3.5 | 150 | Vertical |
| 108.78 | < 1.0 | 11.5 | < 12.5 | < 4.2 | 150 | Vertical |
| 135.98 | < 1.0 | 15.9 | < 16.9 | < 7.0 | 200 | Vertical |
| 163.17 | < 1.0 | 17.4 | < 18.4 | < 8.3 | 200 | Vertical |
| 190.37 | < 1.0 | 17.2 | < 18.2 | < 8.1 | 200 | Vertical |
| 217.56 | < 1.0 | 18.8 | < 19.8 | < 9.8 | 200 | Vertical |
| 244.76 | < 1.0 | 19.7 | < 20.7 | < 10.8 | 200 | Vertical |
| 271.95 | < 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

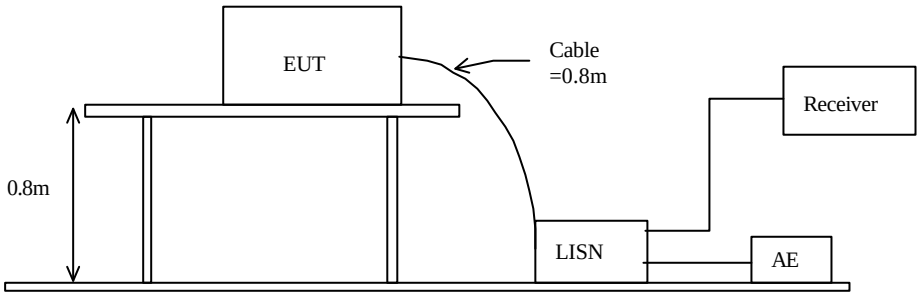
### 3.1.1 Conducted Emissions (0.15MHz to 30MHz)

| | |
|---|---|
| Test Requirement: | FCC 47CFR 15.207 |
| Test Method: | ANSI C63.4:2000 |
| Test Date: | 2003-06-24 |
| 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:**



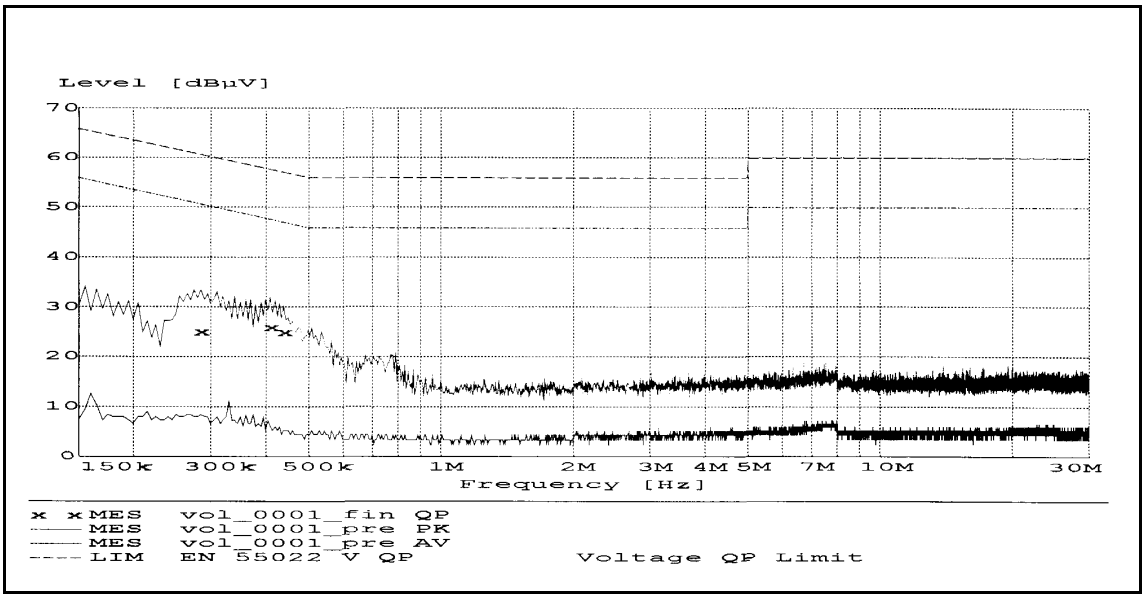
**Limit for Conducted Emissions (FCC 47 CFR 15.207):**

| Frequency Range [MHz] | Quasi-Peak Limits [dBµV] | Average [dBµV] |
|---|---|---|
| 0.15-0.5 | 66 to 56* | 56 to 46* |
| 0.5-5.0 | 56 | 46 |
| 5.0-30.0 | 60 | 50 |

* Decreases with the logarithm of the frequency.

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

Results:



**Results:**

| Conductor Live or Neutral | Frequency MHz | Quasi-peak | | Average | |
|---|---|---|---|---|---|
| | | Level dBµV | Limit dBµV | Level dBµV | Limit dBµV |
| Neutral | 0.285 | 25.0 | 61 | -*- | -*- |
| Neutral | 0.410 | 25.9 | 58 | -*- | -*- |
| Neutral | 0.440 | 24.9 | 57 | -*- | -*- |

Remarks:

Calculated measurement uncertainty = ±2.3dB
-*- Emission greater than 30dB below limit line.

## 3.2 26dB Bandwidth of Fundamental Emission

| | |
|---|---|
| Test Requirement: | FCC 47 CFR 15.227 |
| Test Method: | ANSI C63.4:2000 (Section 13.1.7) |
| Test Date: | 2003-06-24 |
| 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.

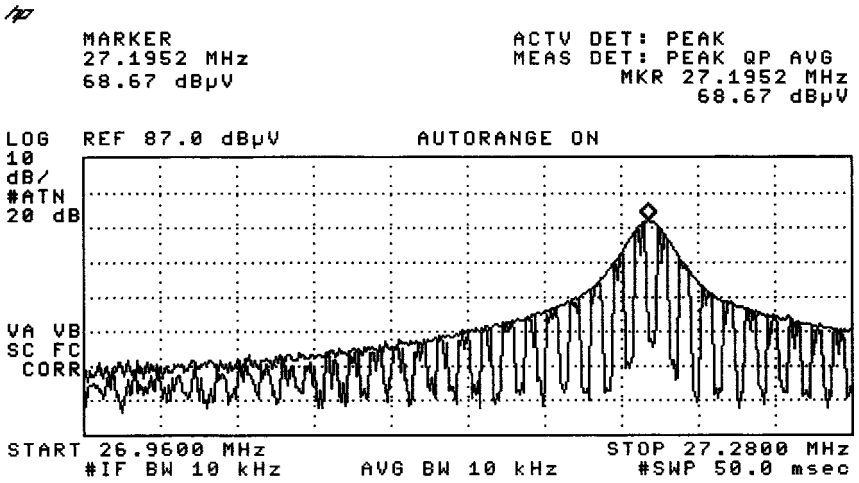
**Test Setup:**

As Test Setup of clause 3.1.1 in this test report.

**Limits for 26 dB Bandwidth of Fundamental Emission:**

| Frequency Range [MHz] | 26dB Bandwidth [KHz] | FCC Limits * [MHz] |
|---|---|---|
| 27.195 | 48.3 | within 26.96-27.28 |

## 26dB Bandwidth of Fundamental Emission



## Appendix A

### Test Equipment Audit

**Radiated Emission**

| EQP NO. | DESCRIPTION | MANUFACTURER | MODEL NO. | SERIAL NO. | LAST CAL |
|---|---|---|---|---|---|
| EM007 | SPECTRUM ANALYZER | HEWLETT PACKARD | HP85660B | 3144A21192 | 14/03/03 |
| EM008 | SPECTRUM ANALYZER DISPLAY | HEWLETT PACKARD | HP85662A | 3144A20514 | 14/03/03 |
| EM009 | QUASI PEAK ADAPTOR | HEWLETT PACKARD | HP85650A | 3303A01702 | 14/03/03 |
| EM010 | RF PRESELECTOR | HEWLETT PACKARD | HP85685A | 3221A01410 | 14/03/03 |
| EM011 | ATTENNUATOR/SWITCH | HEWLETT PACKARD | HP11713A | 2508A10595 | 14/03/03 |
| EM012 | PRE-AMPLIFIER | HEWLETT PACKARD | HP8449B | 3008A00262 | 14/03/03 |
| EM013 | CONTROLLER (COMPUTER),<br>COLOR MONITOR, KEYBOARD & 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 | 08/11/02 |
| EM131 | PORTABLE SPECTRUM 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 | 18/10/02 |
| EM119 | LISN | R & S | ESH3-Z5 | 0831.5518.52 | 01/10/02 |
| EM127 | ISOLATION TRANSFORMER 220 TO 300 | WING SUN | N/A | N/A | CM |
| EM142 | PULES LIMITER | R & S | ESH3Z2 | 357.8810.52 | 03/07/02 |
| EM181 | EMI TEST RECEIVER | R & S | ESIB7 | 100072 | 28/11/01 |
| EM154 | SHIELDING ROOM | SIEMENA MATSUSHITA COMPONENTS | N/A | 803-740-057-99A | 18/10/02 |
| EM197 | LISN | EMCO | 4825/2 | 1193 | 08/04/03 |

Remarks:

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

## Appendix B

### Duty Cycle Correction During 100msec

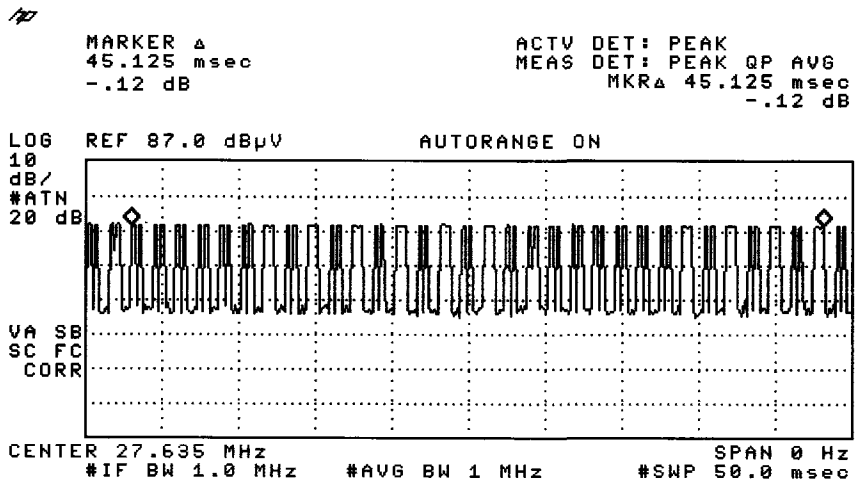
Each function key sends a different series of characters, but each packet period (45.125msec) never exceeds a series of 32 long (625µsec) or short (500µsec) pulse. Assuming any combination of short and long pulse may be obtained due to encoding the worse case transmit duty cycle would be considered 32x625µsec per 45.125msec=44.3% duty cycle. Figure A through C show the characteristics of the pulse train for one of these functions.

Remarks:

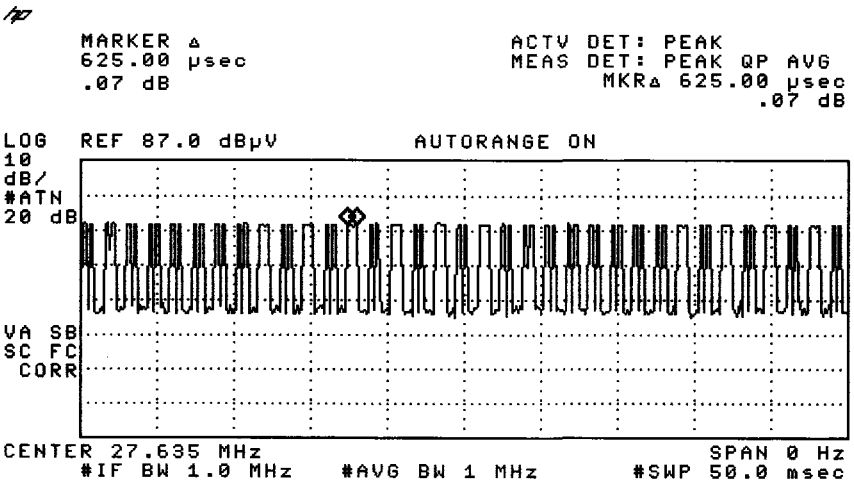
Duty Cycle Correction = 20Log(0.443) =-7dB

The following figures [Figure A to Figure C] show the characteristics of the pulse train for one of these functions.

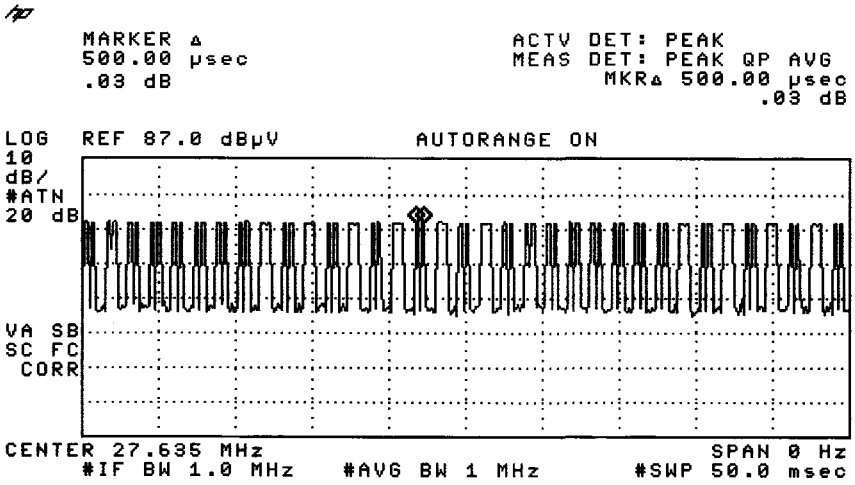
Figure A [Pulse Train]



## Figure B [Long Pulse]




## Figure C [Short Pulse]



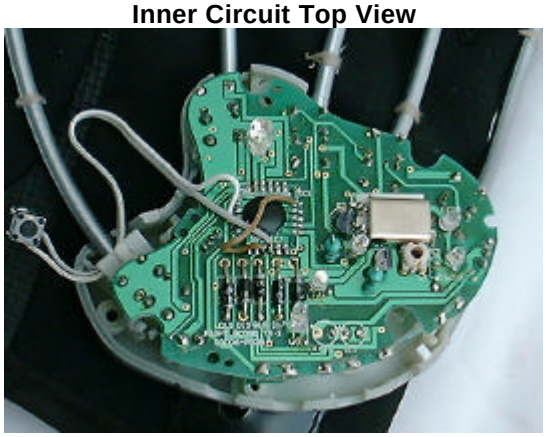
## Appendix C

### Photographs of EUT

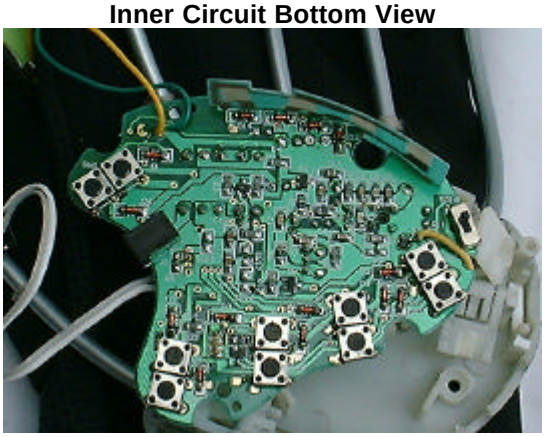
**Front View of the product**

**Rear View of the product**

**Inner Circuit Top View**

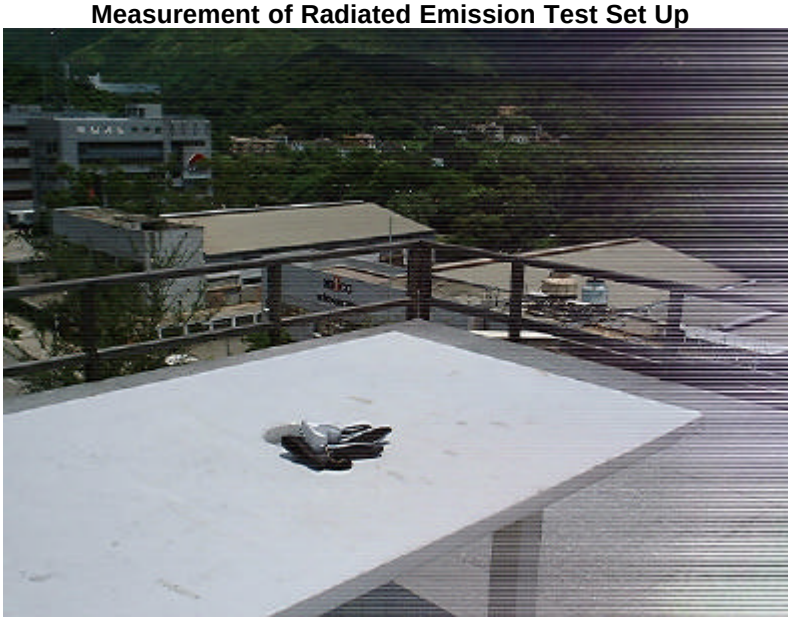


**Inner Circuit Bottom View**

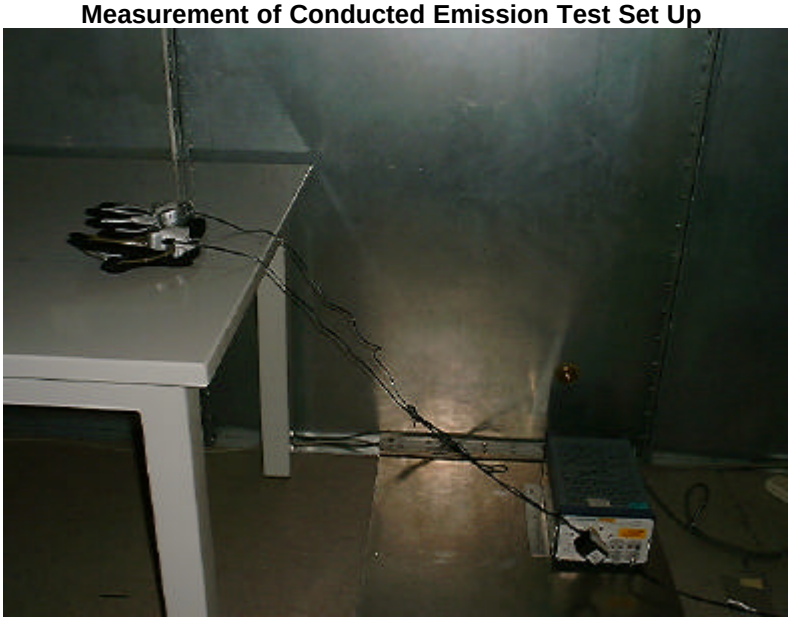


**Photographs of EUT**

**Measurement of Radiated Emission Test Set Up**



**Measurement of Conducted Emission Test Set Up**



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