

**Date: 2003-10-25**

# **TEST REPORT**

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**No.: HM111843**

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

### **FOR LOW POWER TRANSMITTER**

#### **TEST REPORT No.: HM111843**

Equipment Under Test [EUT]:

Model Number:

Applicant:

FCC ID :

1:14 R/C Carbon Fiber Cab

1800-39

Kentoys Ltd.

RI3-1800-39-49

Date: 2003-10-25

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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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Verified by  
Ivan Toa

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K C Lee  
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

### **1.2 Applicant Details Applicant**

KENTOYS LTD.  
Rm 3-6, 23/F., Grandtech Centre, 8 On Ping St.,  
Siu Lek Yuen, Shatin, N.T., Hong Kong.

**HKSTC Code Number for Applicant**

**GLT002**

#### **Manufacturer**

KENTOYS LTD.  
Rm 3-6, 23/F., Grandtech Centre, 8 On Ping St.,  
Siu Lek Yuen, Shatin, N.T., Hong Kong.

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

Product: 1:14 Remote Control Carbon Fiber Cab  
Manufacturer: Kentoys Ltd.  
Brand Name: Kentoys  
Model Number: 1800-39  
Input Voltage: 3Vd.c ("AA" size battery x 2)  
Additional Model Number: 1800-G-01, 1800-G-02, 1800-G-03, 1800-G-04

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

The Equipment Under Test (EUT) is an Kentoys Ltd., 1:14 Remote Control Carbon Fiber Cab. The transmitter is a 2 button transmitter. The EUT continues to transmit while button is being pressed, Modulation by IC. and tape is pulses modulation.

### **1.4 Date of Order**

2003-10-03

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

1 Sample per model

### **1.6 Test Duration**

2003-10-14

### **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

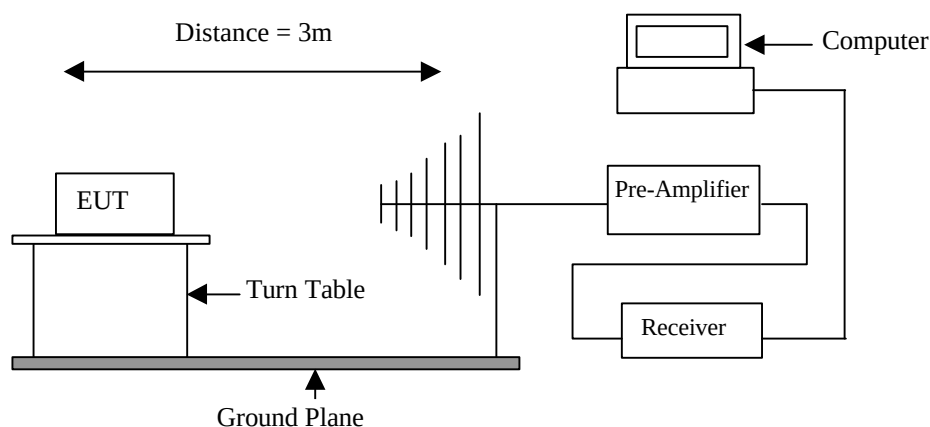
**3.0 Test Results****3.1 Emission****3.1.1 Radiated Emissions (30 – 1000MHz)**

|                    |                          |
|--------------------|--------------------------|
| Test Requirement:  | FCC 47CFR 15.109 Class A |
| Test Method:       | ANSI C63.4:2000          |
| Test Date:         | 2003-10-14               |
| 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, investigated all operating modes, rotated about all 3 axis (X, Y & Z) and considered typical configuration 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 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 | E-Field Polarity |
| 49.86                                                 | 48.5                         | 10.0                        | 58.5                     | 841.4                  | 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 | E-Field Polarity |
| 49.86                                               | 42.9                         | 10.0                        | 52.9                     | 441.6                  | 10,000            | 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 = -5.6dB

Correction Factor included Antenna Factor and Cable Attenuation.

Calculated measurement uncertainty : 30MHz to 1GHz ±5.7dB

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

| Frequency Range<br>[MHz] | Quasi-Peak Limits<br>[ $\mu\text{V/m}$ ] |
|--------------------------|------------------------------------------|
| 30-88                    | 100                                      |
| 88-216                   | 150                                      |
| 216-960                  | 200                                      |
| Above 960                | 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>$\text{dB}\mu\text{V/m}$ | Correction<br>Factor<br>$\text{dB}\mu\text{V/m}$ | Field<br>Strength<br>$\text{dB}\mu\text{V/m}$ | Field<br>Strength<br>$\mu\text{V/m}$ | Limit @3m<br>$\mu\text{V/m}$ | E-Field<br>Polarity |
| 99.72                            | < 1.0                                             | 10.8                                             | < 11.8                                        | < 3.9                                | 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:

Correction Factor included Antenna Factor and Cable Attenuation.

Calculated measurement uncertainty : 30MHz to 1GHz  $\pm 5.7\text{dB}$

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

|                    |                  |
|--------------------|------------------|
| Test Requirement:  | FCC 47CFR 15.107 |
| Test Method:       | ANSI C63.4:2000  |
| Test Date:         | 2003-10-14       |
| Mode of Operation: | N/A              |

**Results: N/A**

The EUT is operated by a single source of internal battery power [located in the battery compartment], therefore power line conducted emission was deemed unnecessary.

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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:         | 2003-10-14                       |
| 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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Limits for 26 dB Bandwidth of Fundamental Emission:

| Frequency Range<br>[MHz] | 26dB Bandwidth<br>[KHz] | FCC Limits *<br>[MHz] |
|--------------------------|-------------------------|-----------------------|
| 49.86                    | 39.4                    | within 49.82-49.90    |

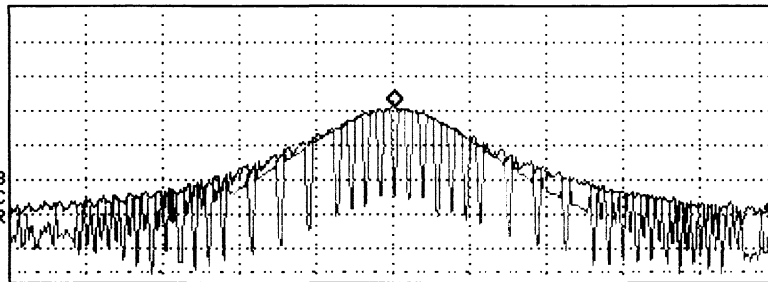
### 26dB Bandwidth of Fundamental Emission

09:11:24 JAN 16, 1995 23:49:37 NOV 12, 1997  
MARKER Δ ACTV DET: PEAK  
49.3 kHz MEAS DET: PEAK QP AVG  
-31.14 dB MKRΔ 49.3 kHz  
-31.14 dB

LOG REF 77.0 dBμV/m AUTORANGE ON

10  
dB/  
#ATN  
0 dB

VA VB  
SC FC  
ACORR



START 49.8100 MHz STOP 49.9100 MHz  
#IF BW 10 kHz AVG BW 10 kHz #SWP 50.0 msec

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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                             | 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   | ATTENUATOR/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 &<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                                    | 08/11/02 |
| EM131   | PORTABLE SPECTRUM<br>ANALYSER                                                | HEWLETT PACKARD                                       | 8595EM                         | 3710A00155                             | 18/12/01 |
| EM145   | EMI TEST RECEIVER                                                            | R & S                                                 | ESCS 30                        | 830245/021                             | 02/08/03 |
| 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<br>TO 300 | WING SUN                         | N/A        | N/A                 | CM       |
| EM142   | PULSES 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<br>COMPONENTS | N/A        | 803-740-057-<br>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

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### Appendix B

#### Duty Cycle Correction During 100msec

Each function key sends a different series of characters, but each packet period (16.75msec) never exceeds a series of 4 long (1.2msec) and 10 short (375µsec) pulses. Assuming any combination of short and long pulses may be obtained due to encoding the worst case transmit duty cycle would be considered  $4 \times 1.25\text{msec} + 10 \times 375\mu\text{sec}$  per 16.75msec = 52.2% duty cycle. Figure A through C show the characteristics of the pulse train for one of these functions.

Remarks:

Duty Cycle Correction =  $20\text{Log}(0.522) = -5.6\text{dB}$

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

Figure A [Pulse Train]

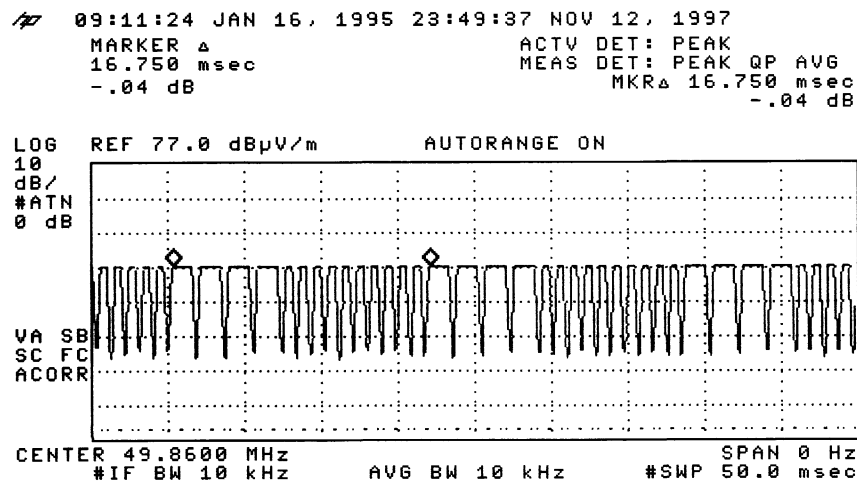


Figure B [Long Pulse]

09:11:24 JAN 16, 1995 23:49:37 NOV 12, 1997  
MARKER  $\Delta$  ACTV DET: PEAK  
1.2500 msec MEAS DET: PEAK QP AVG  
-.04 dB MKR  $\Delta$  1.2500 msec  
-.04 dB

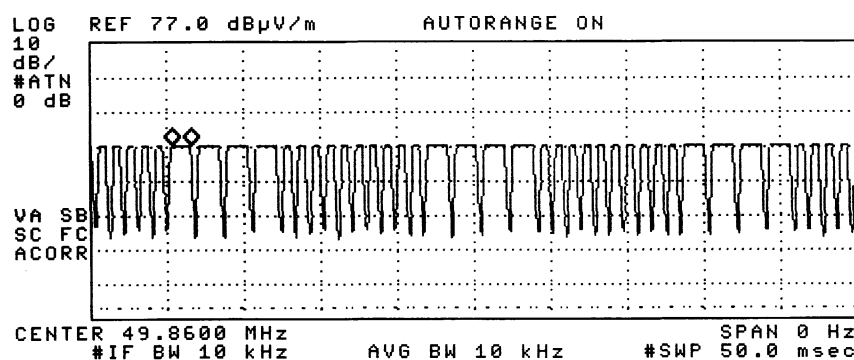
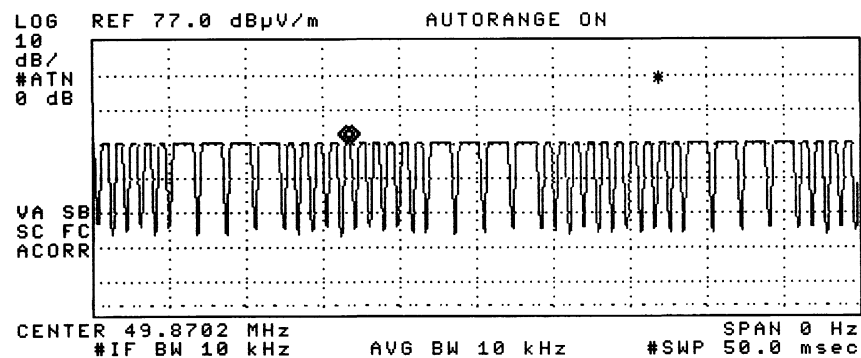


Figure C [Short Pulse]

09:11:24 JAN 16, 1995 23:49:37 NOV 12, 1997  
MARKER  $\Delta$  ACTV DET: PEAK  
375.00  $\mu$ sec MEAS DET: PEAK QP AVG  
.12 dB MKR  $\Delta$  375.00  $\mu$ sec  
.12 dB



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### Appendix C

#### Photographs of EUT

Front View of the product



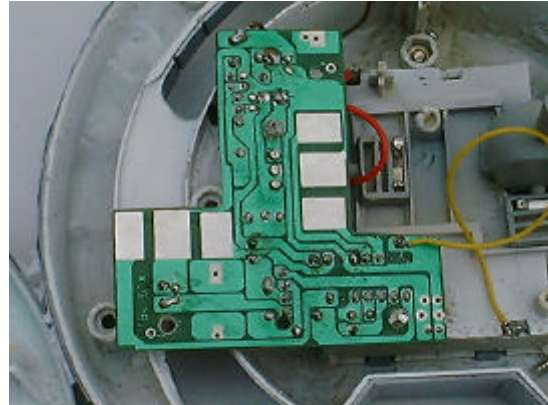
Rear View of the product



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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