



## STC Test Report

Date : 2007-06-15

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No. : HM158963

**Applicant (KMA001):**

K-Mark Industrial Limited.  
Flat A, 7/F., Mai On Ind. Bldg., 17-21 Kung Yip St., Kwai  
Chung, Hong Kong.

**Description of Samples:**

Model Name: Game Caller  
Brand Name: Knight & Hale  
Model Number: DUC142/SZE-KHEGC  
FCC ID: VEP-SZE-KHEGC

**Date Samples Received:**

2007-06-04

**Date Tested:**

2007-06-08

**Investigation Requested:**

Perform ElectroMagnetic Interference measurement in  
accordance with FCC 47CFR [Codes of Federal Regulations]  
Part 15: 2006 and ANSI C63.4:2003 for FCC Certification.

**Conclusions:**

The submitted product 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.

**Remarks:**

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LEE Kam Chuen,  
ElectroMagnetic Compatibility Department  
For and on behalf of  
The Hong Kong Standards and Testing Centre Ltd.

**The Hong Kong Standards and Testing Centre Ltd.**

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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**

K-Mark Industrial Limited.  
Flat A, 7/F., Mai On Ind. Bldg., 17-21 Kung Yip St., Kwai Chung, Hong Kong.

#### **HKSTC Code Number for Applicant**

#### **Manufacturer**

K-Mark Industrial (Shen Zhen) Ltd.  
Niuhu Village, Guan Lan Town, Bao An County,  
Shenzhen City, Guangdong Province, China

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### **1.3 Equipment Under Test [EUT]**

#### **Description of Sample**

Model Name: Game Caller  
Manufacturer: K-Mark Industrial (Shen Zhen) Ltd.  
Brand Name: Knight & Hale  
Model Number: DUC142/SZE-KHEGC  
Rating: 12Vd.c. ("L1028" size battery x 1)

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

The Equipment Under Test (EUT) is a Harvest One Limited., 433MHz Wireless Control Flash Trigger. The transmitter is one button transmitter. The EUT continues to transmit while button is being pressed. It is pulse transmitter. Modulation by IC; and type is pulse modulation.

### **1.4 Date of Order**

2007-06-04

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

1 Sample

### **1.6 Test Duration**

2007-06-08

### **1.7 Country of Origin**

China

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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 2006 and ANSI C63.4:2003 for FCC Certification.

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

| EMISSION<br>Results Summary  |                   |                 |                     |                                     |                          |                                     |
|--|-------------------|-----------------|---------------------|-------------------------------------|--------------------------|-------------------------------------|
| 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 15.231a | ANSI C63.4:2003 | N/A                 | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/>            |
| Radiated Emissions,<br>30MHz to 1GHz                               | FCC 47CFR 15.209  | ANSI C63.4:2003 | N/A                 | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/>            |
| Conducted Emissions on<br>AC, 0.15MHz to 30MHz                     | FCC 47CFR 15.207  | ANSI C63.4:2003 | N/A                 | <input type="checkbox"/>            | <input type="checkbox"/> | <input checked="" type="checkbox"/> |

Note: N/A - Not Applicable

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### **3.0 Test Results**

#### **3.1 Emission**

##### **3.1.1 Radiated Emissions (30 – 1000MHz)**

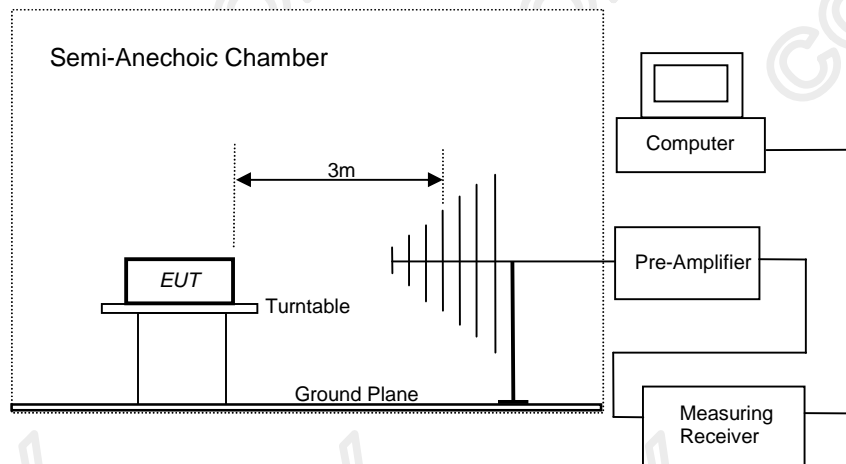
Test Requirement: FCC 47CFR 15.231a  
Test Method: ANSI C63.4:2003  
Test Date: 2007-06-08  
Mode of Operation: Tx mode

#### **Test Method:**

The sample was placed 0.8m above the ground plane of semi-anechoic Chamber\*. 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.

\*: Semi-anechoic chamber located on the G/F of HKSTC with a metal ground plane filed with the FCC pursuant to section 2.948 of the FCC rules, with Registration Number: 607756.

#### **Test Setup:**



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### Limits for Field Strength of Fundamental Emissions [FCC 47CFR 15.231a]:

| Frequency Range of Fundamental<br>[MHz] | Field Strength of Fundamental Emission<br>[Average]<br>[ $\mu\text{V}/\text{m}$ ] | Field Strength of Spurious Emission<br>[Average]<br>[ $\mu\text{V}/\text{m}$ ] |
|---|---|--|
| 40.66-40.70                             | 2,250   | 225  |
| 70-130                                  | 1,250   | 125  |
| 130-174                                 | 1,250 to 3,750 *  | 125 to 375 *   |
| 174-260                                 | 3,750   | 375  |
| 260-470                                 | 3,750 to 12,500 *   | 375 to 1,250 *   |
| Above 470                               | 12,500  | 1,250  |

Where F is the frequency in MHz, the formulas for calculating the maximum permitted fundamental field strengths are as follows: for the band 130-174 MHz,  $\text{V}/\text{m}$  at 3 meters =  $56.81818(F) - 6136.3636$ ; for the band 260-470 MHz,  $\text{V}/\text{m}$  at 3 meters =  $41.66667(F) - 7083.3333$ . The maximum permissible unwanted emission level is 20dB below the maximum permitted fundamental level.

### Results:

| Field Strength of Fundamental Emissions<br>Peak Value |  |   |   |  |                                     |                  |
|---|--|---|---|--|-------------------------------------|------------------|
| Frequency<br>MHz                                      | Measured Level @3m<br>$\text{dB}\mu\text{V}$ | Correction Factor<br>$\text{dB}/\text{m}$ | Field Strength<br>$\text{dB}\mu\text{V}/\text{m}$ | Field Strength<br>$\mu\text{V}/\text{m}$ | Limit @3m<br>$\mu\text{V}/\text{m}$ | E-Field Polarity |
| 315.10  | 55.2   | 16.0                                      | 71.2  | 3630.8                                   | 60,458.4                            | Horizontal       |

| Field Strength of Spurious Emissions<br>Peak Value |  |   |   |  |                                     |                  |
|--|--|---|---|--|-------------------------------------|------------------|
| Frequency<br>MHz                                   | Measured Level @3m<br>$\text{dB}\mu\text{V}$ | Correction Factor<br>$\text{dB}/\text{m}$ | Field Strength<br>$\text{dB}\mu\text{V}/\text{m}$ | Field Strength<br>$\mu\text{V}/\text{m}$ | Limit @3m<br>$\mu\text{V}/\text{m}$ | E-Field Polarity |
| 630.20   | < 1.0  | 29.1                                      | < 30.1  | < 32.0                                   | 6,045.8                             | Vertical         |
| 945.30   | < 1.0  | 26.7                                      | < 27.7  | < 24.3                                   | 6,045.8                             | Vertical         |
| 1260.40  | < 1.0  | 32.2                                      | < 33.2  | < 45.7                                   | 6,045.8                             | Vertical         |
| + 1575.50  | < 1.0  | 38.8                                      | < 39.8  | < 97.7                                   | 5,000.0                             | Vertical         |
| 1890.60  | < 1.0  | 17.4                                      | < 18.4  | < 8.3                                    | 6,045.8                             | Vertical         |
| + 2205.70  | < 1.0  | 17.2                                      | < 18.2  | < 8.1                                    | 5,000.0                             | Vertical         |
| 2520.80  | < 1.0  | 18.8                                      | < 19.8  | < 9.8                                    | 6,045.8                             | Vertical         |
| + 2835.90  | < 1.0  | 19.7                                      | < 20.7  | < 10.8                                   | 5,000.0                             | Vertical         |
| 3151.00  | < 1.0  | 20.6                                      | < 21.6  | < 12.0                                   | 6,045.8                             | Vertical         |

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### Results:

| Field Strength of Fundamental Emissions |                    |                   |                |                |           |                  |
|---|--------------------|-------------------|----------------|----------------|-----------|------------------|
| Average Value                           |                    |                   |                |                |           |                  |
| Frequency                               | Measured Level @3m | Correction Factor | Field Strength | Field Strength | Limit @3m | E-Field Polarity |
| MHz                                     | dB $\mu$ V         | dB/m              | dB $\mu$ V/m   | $\mu$ V/m      | $\mu$ V/m |                  |
| 315.00                                  | 38.4               | 16.0              | 54.4           | 524.8          | 6,041.7   | Horizontal       |

| Field Strength of Spurious Emissions |                    |                   |                |                |           |                  |
|--------------------------------------|--------------------|-------------------|----------------|----------------|-----------|------------------|
| Average Value                        |                    |                   |                |                |           |                  |
| Frequency                            | Measured Level @3m | Correction Factor | Field Strength | Field Strength | Limit @3m | E-Field Polarity |
| MHz                                  | dB $\mu$ V         | dB/m              | dB $\mu$ V/m   | $\mu$ V/m      | $\mu$ V/m |                  |
| 630.20                               | < 1.0              | 29.1              | < 30.1         | < 32.0         | 604.6     | Vertical         |
| 945.30                               | < 1.0              | 26.7              | < 27.7         | < 24.3         | 604.6     | Vertical         |
| 1260.40                              | < 1.0              | 32.2              | < 33.2         | < 45.7         | 604.6     | Vertical         |
| + 1575.50                            | < 1.0              | 38.8              | < 39.8         | < 97.7         | 500.0     | Vertical         |
| 1890.60                              | < 1.0              | 17.4              | < 18.4         | < 8.3          | 604.6     | Vertical         |
| + 2205.70                            | < 1.0              | 17.2              | < 18.2         | < 8.1          | 500.0     | Vertical         |
| 2520.80                              | < 1.0              | 18.8              | < 19.8         | < 9.8          | 604.6     | Vertical         |
| + 2835.90                            | < 1.0              | 19.7              | < 20.7         | < 10.8         | 500.0     | Vertical         |
| 3151.00                              | < 1.0              | 20.6              | < 21.6         | < 12.0         | 604.6     | Vertical         |

### Remarks:

\*: Adjusted by Duty Cycle = -16.8dB

FCC Limit for Average Measurement =  $41.6667(315.1\text{MHz}) - 7083.3333 = 6045.84\mu\text{V/m}$

+: Denotes restricted band of operation.

Measurements were made using a peak detector. Any emission less than 1000 MHz and falling within the restricted bands of FCC Rules Part 15 Section 15.205 were not adjusted for averaging and the limits of FCC Rules Part 15 Section 15.209 were applied.

Correction Factor includes Antenna Factor and Cable Attenuation.

Calculated measurement uncertainty : 30MHz to 1GHz  $\pm 5.2\text{dB}$

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

| Frequency Range<br>[MHz] | Quasi-Peak Limits<br>[ $\mu\text{V}/\text{m}$ ] |
|--------------------------|---|
| 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>dB $\mu\text{V}$ | Correction<br>Factor<br>dB/m | Field<br>Strength<br>dB $\mu\text{V}/\text{m}$ | Field<br>Strength<br>$\mu\text{V}/\text{m}$ | Limit @3m<br>$\mu\text{V}/\text{m}$ | E-Field<br>Polarity |
| <b>Emissions detected are more than 20 dB below the FCC Limits</b> |   |                              |  |   |                                     |                     |

Remarks:

Correction Factor includes Antenna Factor and Cable Attenuation.

Calculated measurement uncertainty : 30MHz to 1GHz  $\pm 5.2\text{dB}$

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

Test Requirement: FCC 47CFR 15.207  
Test Method: ANSI C63.4:2003  
Test Date: N/A  
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 20dB Bandwidth of Fundamental Emission**

Test Requirement: FCC 47 CFR 15.231a  
Test Method: ANSI C63.4:2003 (Section 13.1.7)  
Test Date: 2007-06-09  
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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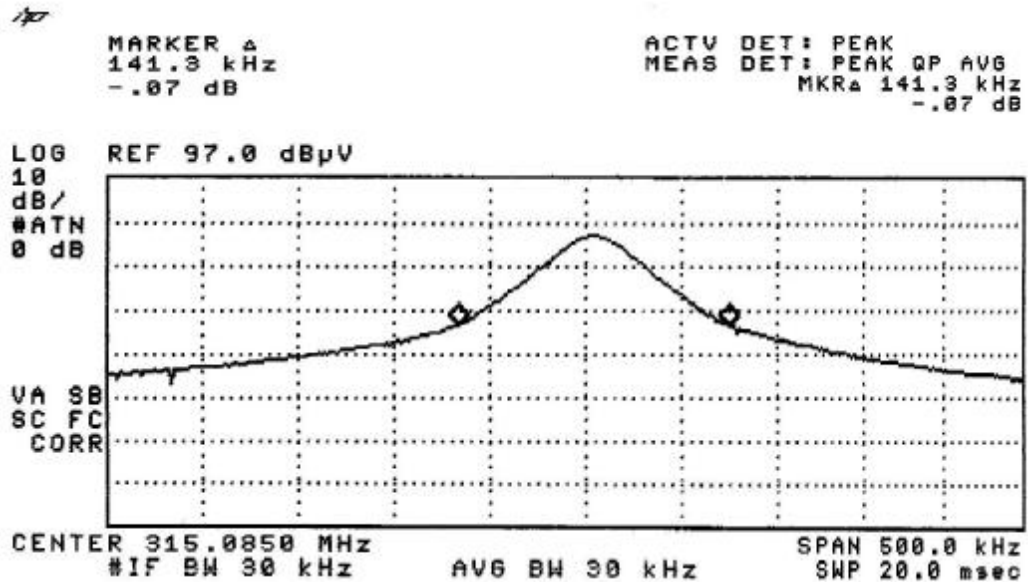
No. : HM158963

### Limits for 20 dB Bandwidth of Fundamental Emission:

| Frequency Range<br>[MHz] | 20dB Bandwidth<br>[KHz] | FCC Limits *<br>[KHz] |
|--------------------------|-------------------------|-----------------------|
| 315.085                  | 141.3                   | 787.7                 |

\*: FCC Limit for Bandwidth measurement = (0.25%)(Center Frequency)  
= (0.0025)(315.085)  
= 787.7KHz

### 20dB Bandwidth of Fundamental Emission



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### Appendix A

#### List of Measurement Equipment

##### Radiated Emission

| EQP NO. | DESCRIPTION                | MANUFACTURER    | MODEL NO. | SERIAL NO. |
|---------|----------------------------|-----------------|-----------|------------|
| EM007   | SPECTRUM ANALYZER          | HEWLETT PACKARD | HP85660B  | 3144A21192 |
| EM008   | SPECTRUM ANALYZER DISPLAY  | HEWLETT PACKARD | HP85662A  | 3144A20514 |
| EM009   | QUASI PEAK ADAPTOR         | HEWLETT PACKARD | HP85650A  | 3303A01702 |
| EM010   | RF PRESELECTOR             | HEWLETT PACKARD | HP85685A  | 3221A01410 |
| EM011   | ATTENUATOR/SWITCH          | HEWLETT PACKARD | HP11713A  | 2508A10595 |
| EM012   | PRE-AMPLIFIER              | HEWLETT PACKARD | HP8449B   | 3008A00262 |
| EM020   | HORN ANTENNA               | ETS-Linggren    | 3115      | 4032       |
| EM022   | LOOP ANTENNA               | ETS-Linggren    | 6502      | 1189-2424  |
| EM072   | SIGNAL GENERATOR           | HEWLETT PACKARD | 8640B     | 1948A11892 |
| EM083   | OPEN AREA TEST SITE        | HKSTC           | N/A       | N/A        |
| EM131   | EMC ANALYZER               | HEWLETT PACKARD | 8595EM    | 3710A00155 |
| EM145   | EMI TEST RECEIVER          | ROHDE & SCHWARZ | ESCS 30   | 830245/021 |
| EM195   | ANTENNA POSITIONING MAST   | ETS-Linggren    | 2075      | 2368       |
| EM196   | MULTI-DEVICE CONTROLLER    | ETS-Linggren    | 2090      | 1662       |
| EM215   | MULTIDEVICE CONTROLER      | ETS-Linggren    | 2090      | 00024676   |
| EM216   | MINI MAST SYSTEM           | ETS-Linggren    | 2075      | 00026842   |
| EM217   | ELECTRIC POWERED TURNTABLE | ETS-Linggren    | 2088      | 00029144   |
| EM218   | ANECHOIC CHAMBER           | ETS-Linggren    | FACT-3    | --         |
| EM219   | BICONILOG ANTENNA          | ETS-Linggren    | 3142C     | 00029071   |
| EM229   | EMI TEST RECEIVER          | ROHDE & SCHWARZ | ESIB40    | 100248     |

##### Line Conducted

| EQP NO. | DESCRIPTION                       | MANUFACTURER                        | MODEL NO.  | SERIAL NO.      |
|---------|-----------------------------------|-------------------------------------|------------|-----------------|
| EM078   | VARIAC                            | SHANGHAI VOLTAGE                    | TDGC-3/0.5 | N/A             |
| EM081   | SMALL SCREENED ROOM               | MIKO INST HK                        | N/A        | N/A             |
| EM119   | LISN                              | ROHDE & SCHWARZ                     | ESH3-Z5    | 0831.5518.52    |
| EM127   | ISOLATION TRANSFORMER 220 TO 300V | WING SUN                            | N/A        | N/A             |
| EM233   | PULSE LIMITER                     | ROHDE & SCHWARZ                     | ESH3-Z2    | 100314          |
| EM181   | EMI TEST RECEIVER                 | ROHDE & SCHWARZ                     | ESIB7      | 100072          |
| EM154   | SHIELDING ROOM                    | SIEMENA<br>MATSUSHITA<br>COMPONENTS | N/A        | 803-740-057-99A |
| EM197   | LISN                              | ETS-Linggren                        | 4825/2     | 1193            |

##### Remarks:-

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

#### The Hong Kong Standards and Testing Centre Ltd.

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### Appendix B

#### Duty Cycle Correction During 100msec

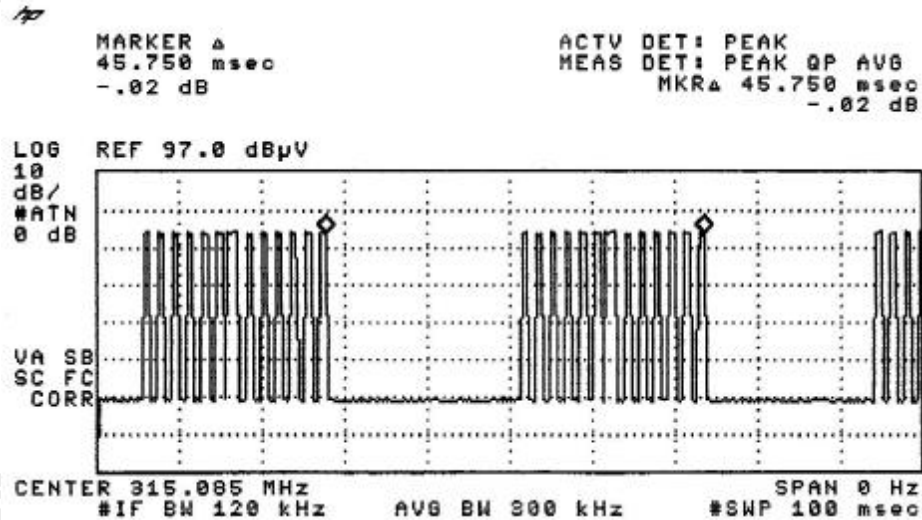
Each function key sends a different series of characters, but each packet period (45.75msec) never exceeds a series of 1 long (1.125µsec) or 11 short (500µsec) pulses. Assuming any combination of short and long pulses may be obtained due to encoding the worst case transmit duty cycle would be considered  $1 \times 1.125 \text{msec} + 11 \times 500 \mu\text{sec}$  per 45.75msec = 14.4% duty cycle. Figure A through C show the characteristics of the pulses train for one of these functions.

Remarks:

Duty Cycle Correction =  $20 \log(0.144) = -16.8 \text{dB}$

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

Figure A [Pulse Train]



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Figure B [Long Pulse]

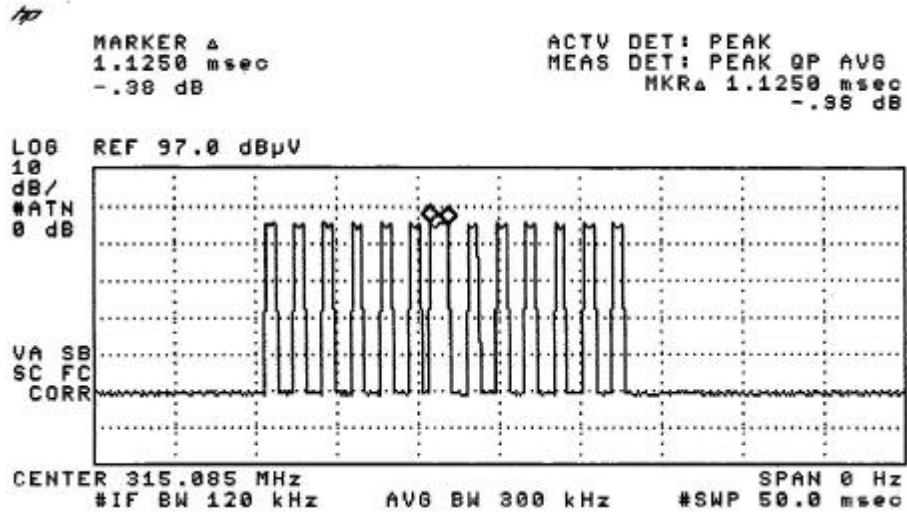
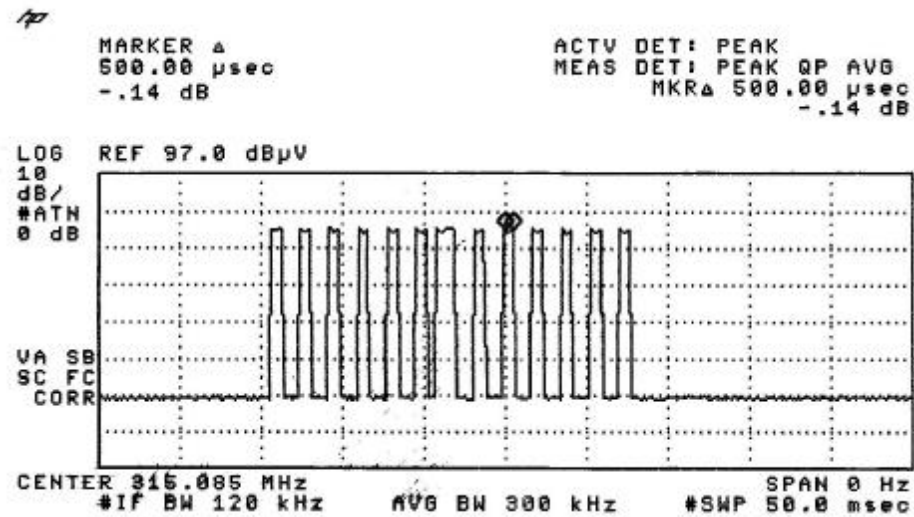


Figure C [Short Pulse]



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### Appendix C

#### Periodic Operation [FCC 47CFR 15.231(a2)]

According to FCC 47CFR15.231 (a2). A transmitter automatically activated must automatically deactivate within not more than 5 seconds of being released. The EUT ceases transmission almost immediately upon being released and appears to finish the current packet being transmitted. Therefore the longest period of time the transmitter should take to deactivate is a packet length.

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### Appendix D

#### 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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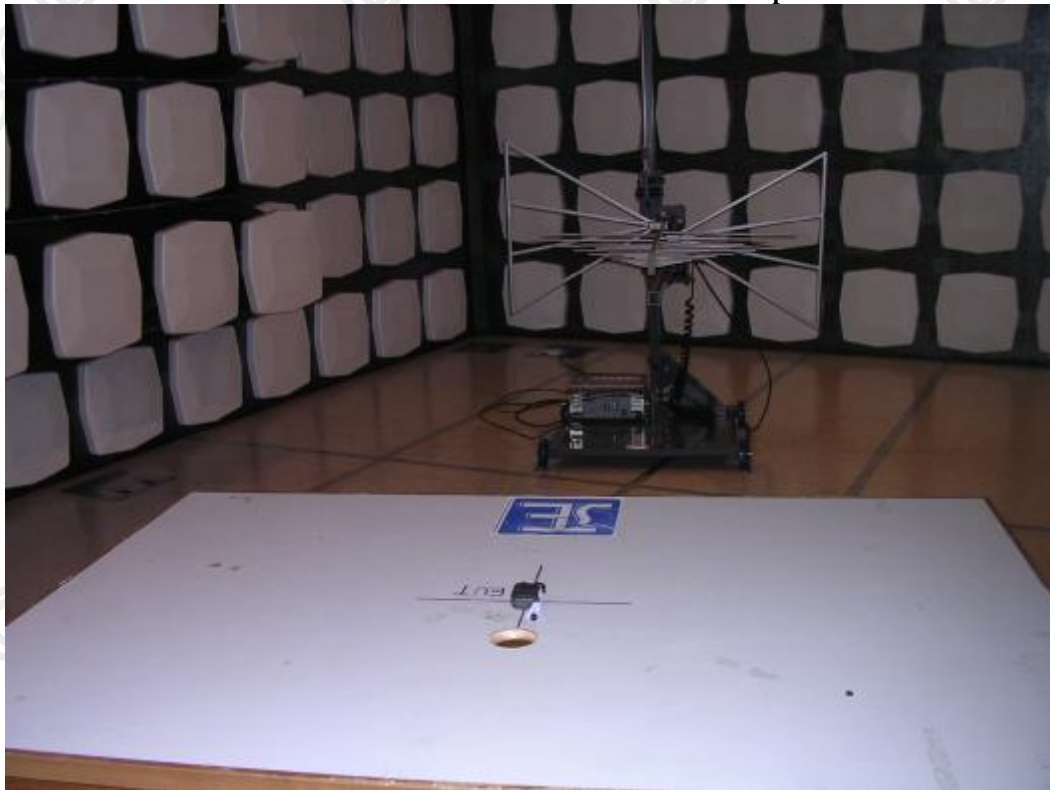
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### Photographs of EUT

#### Measurement of Radiated Emission Test Set Up



\*\*\*\*\* End of Test Report \*\*\*\*\*

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