



STC Test Report

Date : 2008-07-11

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No. : MH182363

Applicant (STD003):

Playhut Inc.
368 S.Cheryl Lane, City of Industry, CA 91789 USA.

Manufacturer:

Playhut Inc.
368 S.Cheryl Lane, City of Industry, CA 91789 USA.

Description of Samples:

Product: STIX 200
Brand Name: STIX
Model Number: 23971
FCC ID: WBDSTIX23970GP

Date Samples Received:

2008-05-12

Date Tested:

2008-05-14 to 2008-09-24

Investigation Requested:

Perform ElectroMagnetic Interference measurement in accordance with FCC 47CFR [Codes of Federal Regulations] Part 15: 2007 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:

For additional models details, see page 4.

For Dr. 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.

10 Dai Wang Street, Tai Po Industrial Estate, N.T., Hong Kong

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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**

Playhut Inc.
368 S.Cheryl Lane, City of Industry, CA 91789 USA.

Manufacturer

Playhut Inc.
368 S.Cheryl Lane, City of Industry, CA 91789 USA.

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1.3 Equipment Under Test [EUT] Description of Sample

Product: STIX 200
Manufacturer: Playhut Inc.
Brand Name: STIX
Model Number: 23971
Additional Product Name: STIX 400
Additional Model Number (s): 23972
Input Voltage: 3Vd.c. ("AA" size battery x 2)

1.3.1 Description of EUT Operation

The Equipment Under Test (EUT) is a Playhut Inc., STIX 200, transmit when button is pressed, it is game controller, modulation by IC; and type is frequency hopping speed spectrum modulation.

1.4 Date of Order

2008-05-12

1.5 Submitted Sample(s):

1 Sample

1.6 Test Duration

2008-05-14 to 2008-09-24

1.7 Country of Origin

China

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2.0 Technical Details

2.1 Investigations Requested

Perform Electromagnetic Interference measurements in accordance with FCC 47CFR [Codes of Federal Regulations] Part 15: 2007 Regulations and ANSI C63.4:2003 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 | Fail | N/A |
| Output Power of Fundamental & Harmonics Emissions | FCC 47CFR 15.247 | ANSI C63.4:2003 | N/A | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Radiated Emissions | FCC 47CFR 15.209 | ANSI C63.4:2003 | N/A | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Number of Operating Channel | FCC 47CFR 15.247(a)(2)(b)(1) | N/A | N/A | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Channel Separation | FCC 47CFR 15.247(a)(1) | N/A | N/A | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Pseudorandom Hopping Algorithm | FCC 47CFR 15.247(a)(1) | N/A | N/A | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Time of Occupancy | FCC 47CFR 15.247(a)(1)(iii) | N/A | N/A | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Bandwidth | FCC 47CFR 15.247(a)(2) | N/A | N/A | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Antenna requirement | FCC 47CFR 15.203 | N/A | N/A | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

Note: N/A - Not Applicable

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3.0 Test Results

3.1 Emission

3.1.1 Maximum Peak Output Power

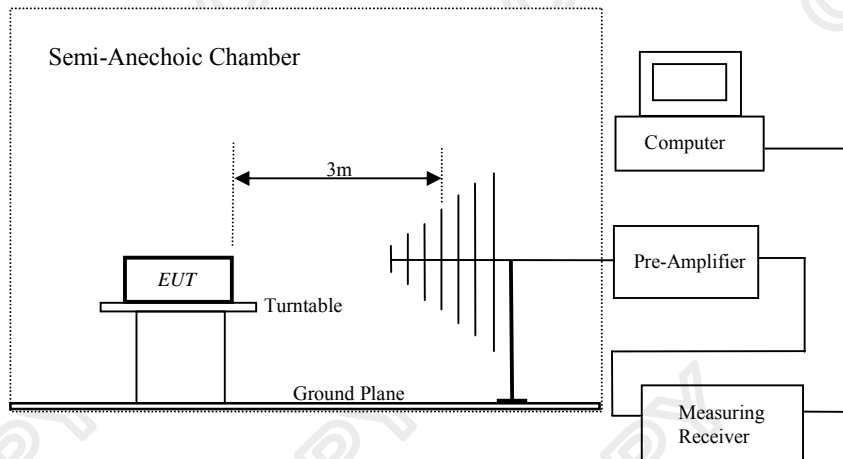
| | |
|--------------------|--------------------|
| Test Requirement: | FCC 47CFR 15.247 |
| Test Method: | N/A |
| Test Date: | 2008-05-14 |
| Mode of Operation: | Communication mode |

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 "The Hong Kong Standards and Testing Centre Ltd." 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 Peak Output Power of Fundamental & Harmonics Emissions [FCC 47CFR 15.247]:

The maximum peak output power shall not exceeded the following limits:
 For frequency hopping systems employing at least 75 hopping channels: 1 Watt
 Fo all other frequency hopping systems in the 2400-2483.5 MHz band: 0.125 Watts
 Fo Digital Transmission systems in 2400-2483.5 MHz Band: 1 Watt

Results of transmission Mode (2403.4 MHz to 2479.2MHz) : Pass (TX Unit) **Maximum conducted output power**

| Transmitter Frequency (MHz) | Transmitter Power (V/m) | Maximum conducted output power (mW) |
|-----------------------------|-------------------------|-------------------------------------|
| 2409.94 | 0.038 | 0.43 |

| Transmitter Frequency (MHz) | Transmitter Power (V/m) | Maximum conducted output power (mW) |
|-----------------------------|-------------------------|-------------------------------------|
| 2440.01 | 0.045 | 0.6075 |

| Transmitter Frequency (MHz) | Transmitter Power (V/m) | Maximum conducted output power (mW) |
|-----------------------------|-------------------------|-------------------------------------|
| 2470.03 | 0.068 | 1.387 |

Calculated measurement uncertainty : 30MHz to 1GHz 5.2dB
 1GHz to 18GHz 5.1dB

Antenna gain = 1dBi

Calculate the transmitter's peak power using the following equation:

$$E = \frac{\sqrt{30PG}}{d}$$

Where: E is the measured maximum fundamental field strength in V/m, utilizing a RBW \geq the 20 dB bandwidth of the emission, VBW > RBW, peak detector function. Follow the procedures in C63.4-2003 with respect to maximizing the emission.

G is the numeric gain of the transmitting antenna with reference to an isotropic radiator.

d is the distance in meters from which the field strength was measured.

P is the power in watts for which you are solving:

$$P = \frac{(E*d)^2}{30G}$$

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3.1.2 Radiated Emissions

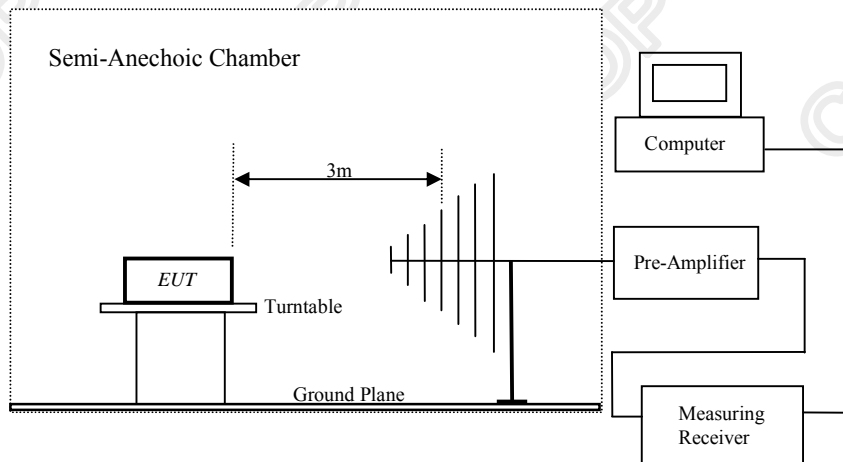
Test Requirement: FCC 47CFR 15.209
Test Method: ANSI C63.4:2003
Test Date: 2008-05-15
Mode of Operation: Communication mode

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 "The Hong Kong Standards and Testing Centre Ltd." 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 Radiated Emissions [FCC 47 CFR 15.209 Class B]:

| Frequency (MHz) | Field Strength (microvolts / meter) | Measurement Distance (meters) |
|--------------------|--|----------------------------------|
| 0.009-0.490 | 2400/F(kHz) | 300 |
| 0.490-1.705 | 24000/F(kHz) | 30 |
| 1.705-30.0 | 30 | 30 |
| 30-88 | 100** | 3 |
| 88-216 | 150** | 3 |
| 216-960 | 200** | 3 |
| Above 960 | 500 | 3 |

** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this Part, e.g., Sections 15.231 and 15.241.

Result of Communication Mode: Pass

Emissions detected are more than 20 dB below the FCC Limits

Result of Communication Mode (Connect to PC): Pass

Emissions detected are more than 20 dB below the FCC Limits

Remarks:

- * Denotes restricted band of operation.
Measurements were made using a peak detector. Any emission less than 1000MHz and falling within the restricted bands of FCC Rules Part 15 Section 15.205 and the limits of FCC Rules Part 15 Section 15.209 were applied.

Correction Factor included Antenna Factor and Cable Attenuation.

| | | | |
|------------------------------------|---|---------------|-------|
| Calculated measurement uncertainty | : | 9kHz to 30MHz | 1.8dB |
| | | 30MHz to 1GHz | 5.2dB |
| | | 1GHz to 18GHz | 5.1dB |

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

| Frequency Range [MHz] | Quasi-Peak Limits [μ 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.

Result of Communication Mode: Pass

Emissions detected are more than 20 dB below the FCC Limits

Remarks:

- * Denotes restricted band of operation.
Measurements were made using a peak detector. Any emission less than 1000MHz and falling within the restricted bands of FCC Rules Part 15 Section 15.205 and the limits of FCC Rules Part 15 Section 15.209 were applied.

Correction Factor included Antenna Factor and Cable Attenuation.

Calculated measurement uncertainty : 30MHz to 1GHz 5.2dB
1GHz to 18GHz 5.1dB

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3.1.3 Frequency Range Measurement

Test Requirement: FCC 47CFR 15.247
Test Method: ANSI C63.4:2003
Test Date: 2008-09-24
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.

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Limits for Frequency Range Measurement:

| Frequency Range [MHz] | 20dB Bandwidth [kHz] | FCC Limits [MHz] |
|--------------------------|-------------------------|---------------------|
| 2409.94 | 783.00 | Within 2400-2483.5 |

(Lowest Operating Frequency)



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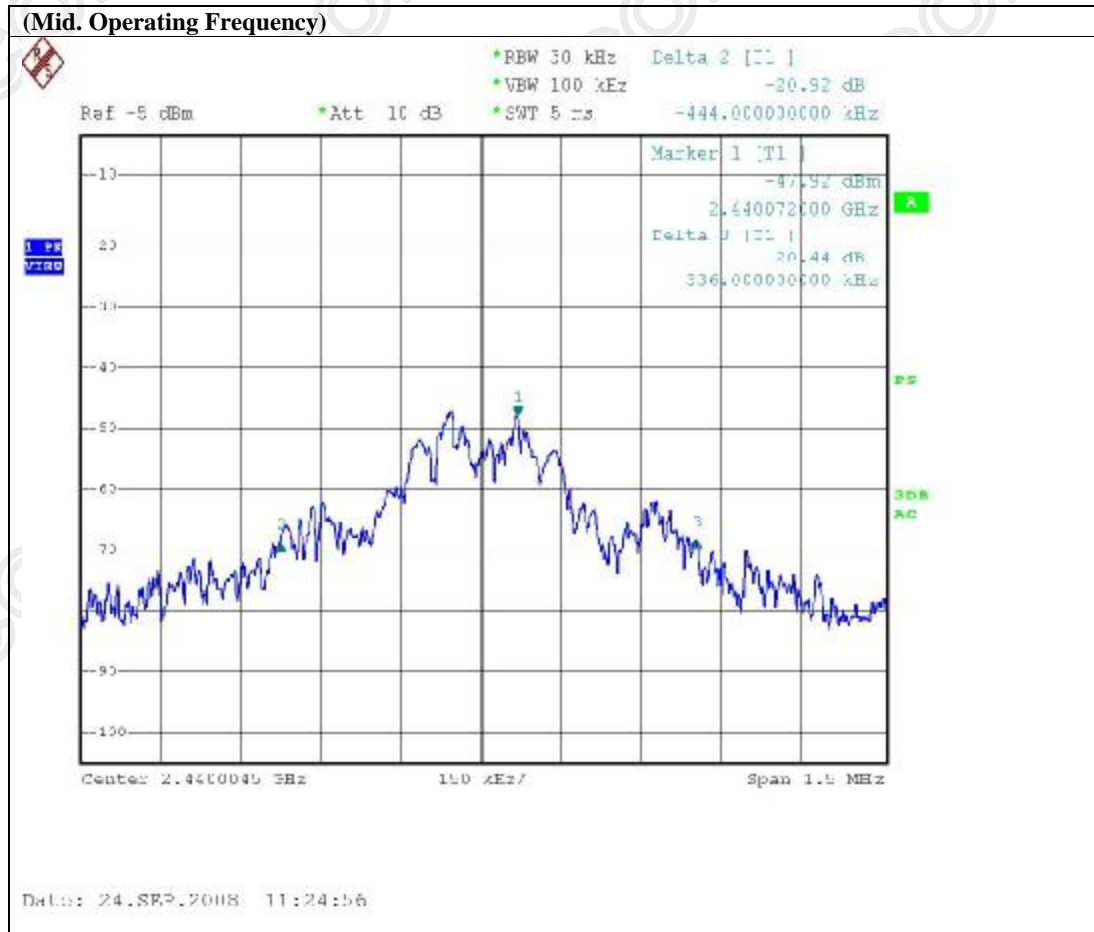
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| Frequency Range [MHz] | 20dB Bandwidth [kHz] | FCC Limits [MHz] |
|--------------------------|-------------------------|---------------------|
| 2440.07 | 780.00 | Within 2400-2483.5 |



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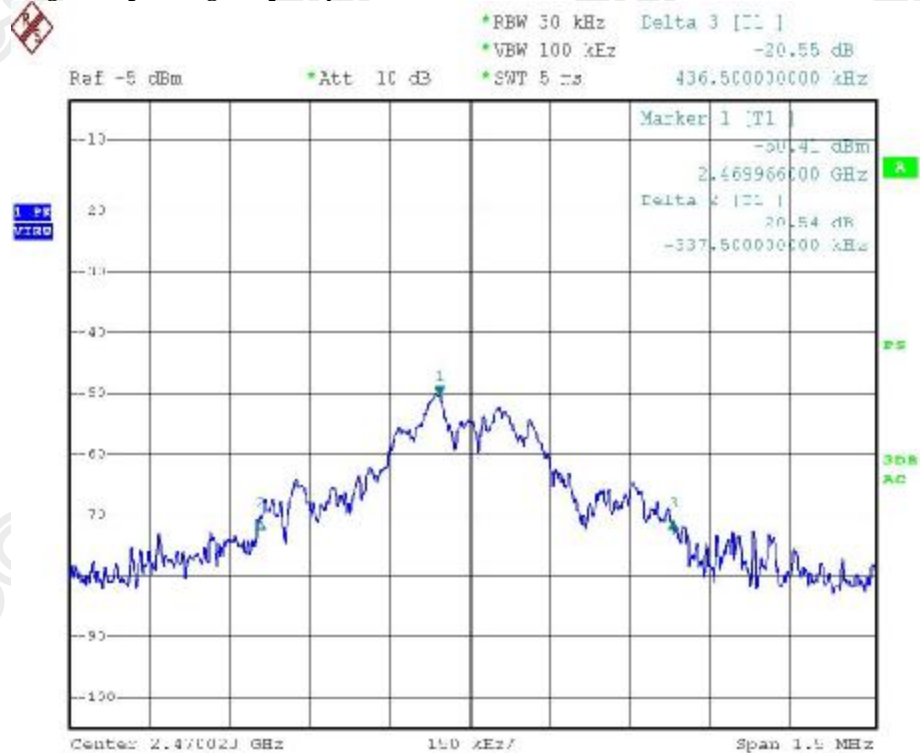
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| Frequency Range [MHz] | 20dB Bandwidth [kHz] | FCC Limits [MHz] |
|--------------------------|-------------------------|---------------------|
| 2470.00 | 774.00 | Within 2400-2483.5 |

(Highest Operating Frequency)



Date: 24.SEP.2008 11:20:52

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Channel Centre Frequency

Requirements:

Frequency hopping system in the 2400-2483.5MHz band shall use at least 15 non-overlapping channels.

| Item | Frequency (MHz) | Item | Frequency (MHz) | Item | Frequency (MHz) |
|------|-----------------|------|-----------------|------|-----------------|
| 1 | 2409.94 | 31 | 2434.33 | 61 | 2458.67 |
| 2 | 2410.80 | 32 | 2435.14 | 62 | 2459.48 |
| 3 | 2411.61 | 33 | 2435.95 | 63 | 2460.29 |
| 4 | 2412.43 | 34 | 2436.77 | 64 | 2461.10 |
| 5 | 2413.24 | 35 | 2437.58 | 65 | 2461.92 |
| 6 | 2414.05 | 36 | 2438.39 | 66 | 2462.73 |
| 7 | 2414.86 | 37 | 2439.20 | 67 | 2463.54 |
| 8 | 2415.67 | 38 | 2440.01 | 68 | 2464.35 |
| 9 | 2416.48 | 39 | 2440.82 | 69 | 2465.16 |
| 10 | 2417.29 | 40 | 2441.63 | 70 | 2465.97 |
| 11 | 2418.11 | 41 | 2442.37 | 71 | 2466.78 |
| 12 | 2418.92 | 42 | 2443.26 | 72 | 2467.59 |
| 13 | 2419.73 | 43 | 2444.07 | 73 | 2468.41 |
| 14 | 2420.54 | 44 | 2444.88 | 74 | 2469.22 |
| 15 | 2421.35 | 45 | 2445.69 | 75 | 2470.03 |
| 16 | 2422.16 | 46 | 2446.50 | | |
| 17 | 2422.97 | 47 | 2447.31 | | |
| 18 | 2423.78 | 48 | 2448.12 | | |
| 19 | 2424.60 | 49 | 2448.93 | | |
| 20 | 2425.41 | 50 | 2449.75 | | |
| 21 | 2426.22 | 51 | 2450.56 | | |
| 22 | 2427.03 | 52 | 2451.37 | | |
| 23 | 2427.84 | 53 | 2452.18 | | |
| 24 | 2428.65 | 54 | 2452.99 | | |
| 25 | 2429.46 | 55 | 2453.80 | | |
| 26 | 2430.27 | 56 | 2454.61 | | |
| 27 | 2431.09 | 57 | 2455.43 | | |
| 28 | 2431.90 | 58 | 2456.24 | | |
| 29 | 2432.71 | 59 | 2457.05 | | |
| 30 | 2433.52 | 60 | 2457.86 | | |

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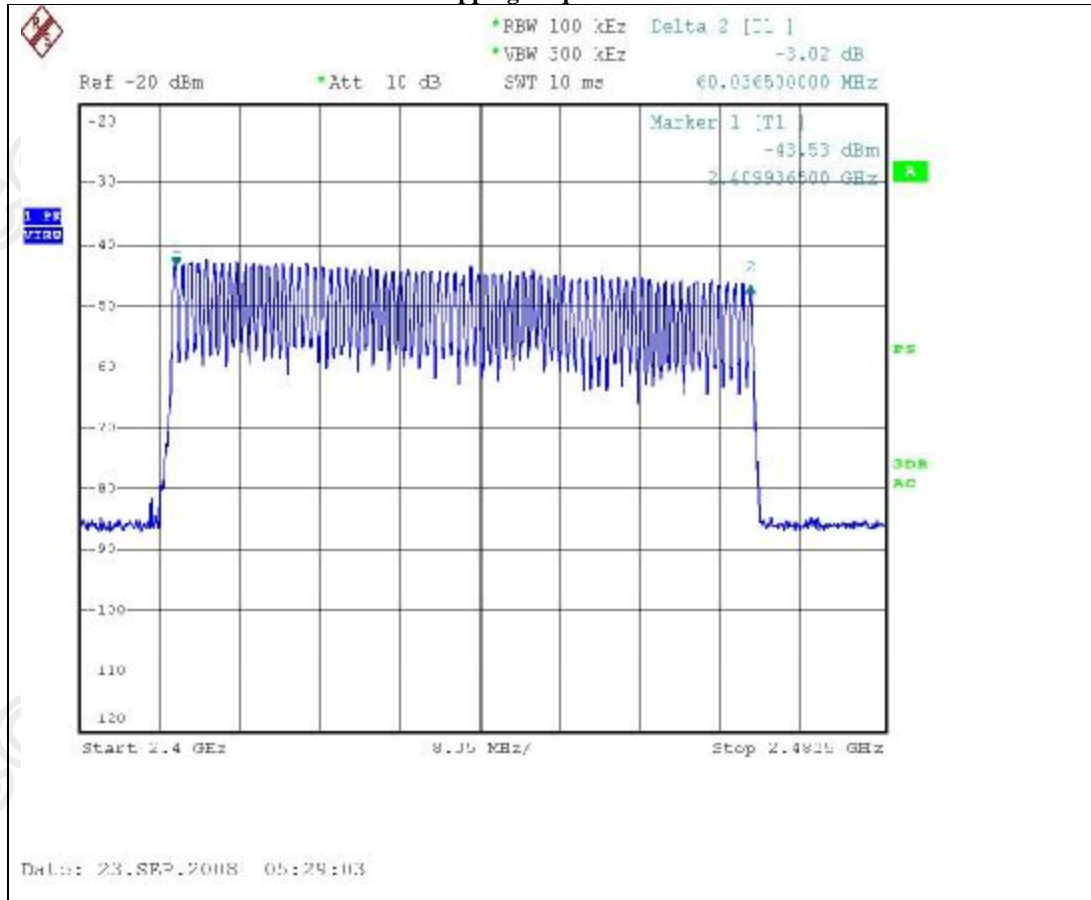
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Number of Hopping frequencies = 75 Channels



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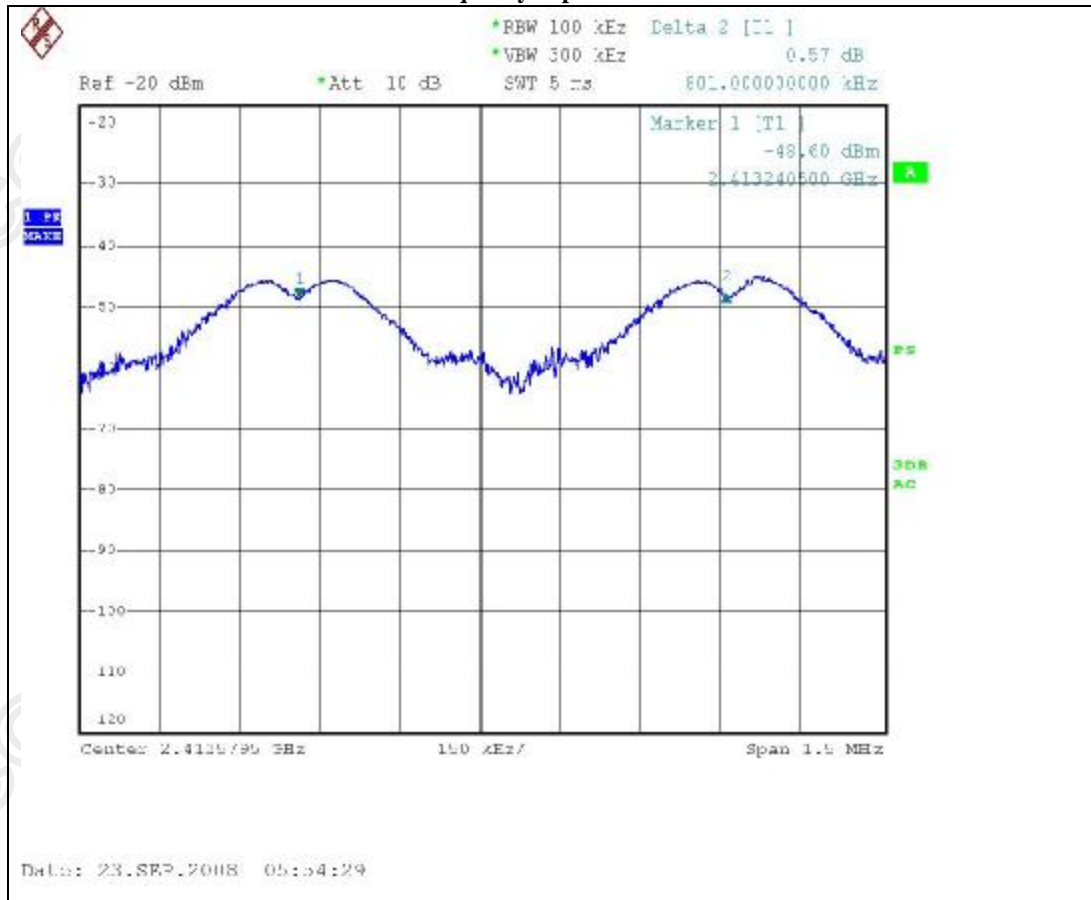
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Carrier Frequency Separation (801KHz)



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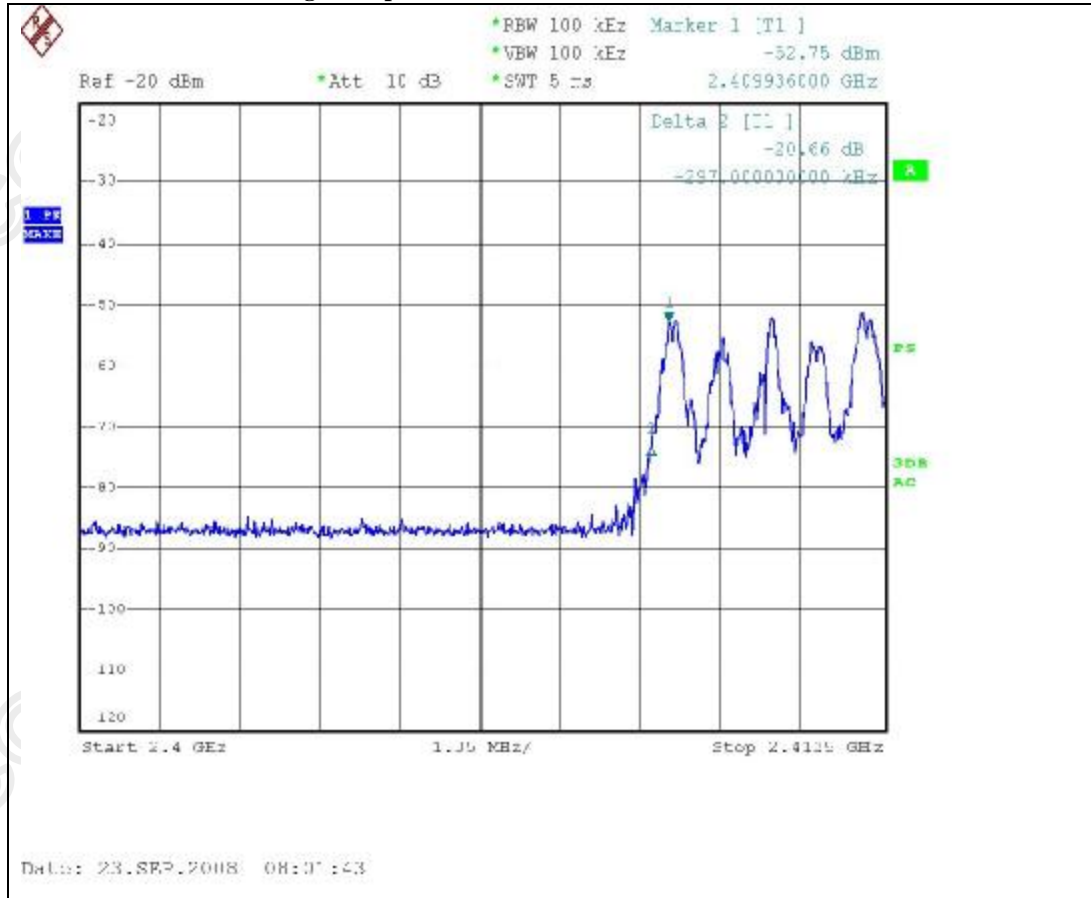
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Band-edge Compliance of RF Conducted Emissions (Lowest)



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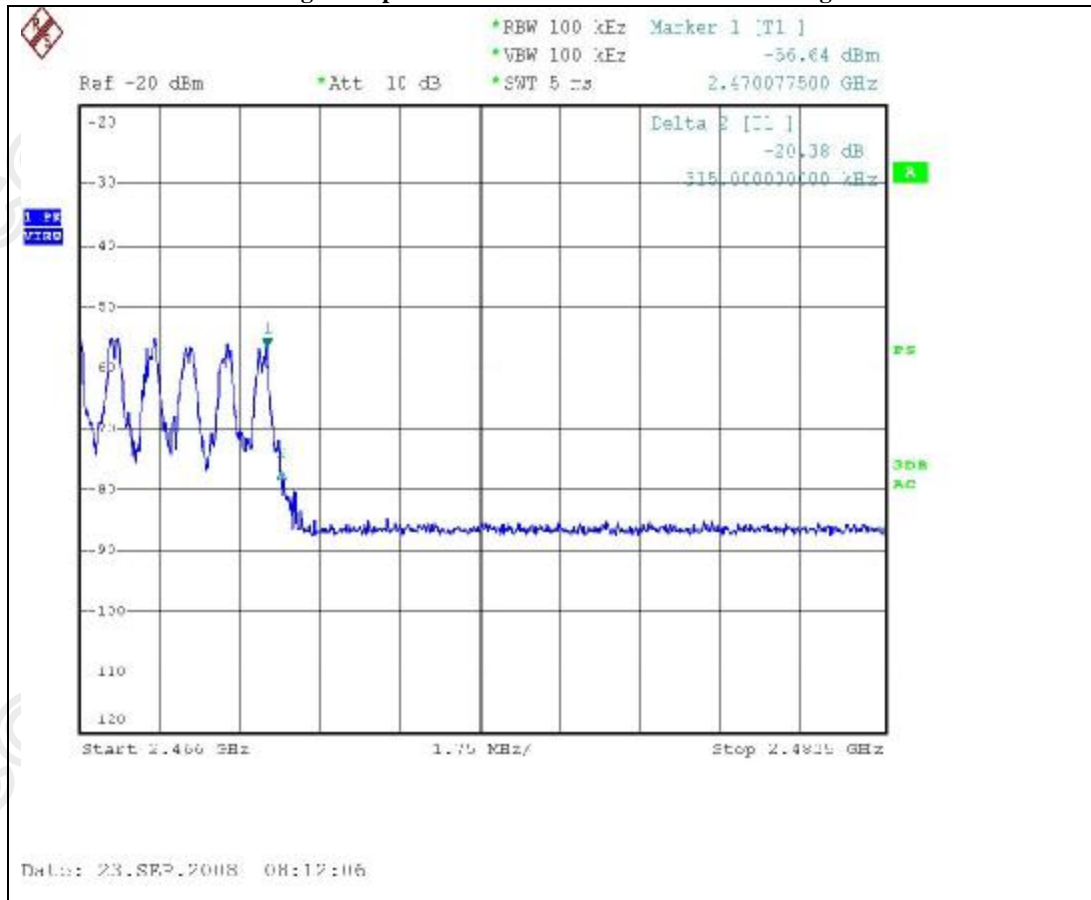
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Band-edge Compliance of RF Conducted Emissions (Highest)



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Antenna Requirement

Test Requirements: § 15.203

Test Specification:

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

Test Results:

The EUT has 1 Antenna which is permanently attached to the main unit and attached on PCB board, the antenna gain = 1dBi. All component install on inside of EUT. User unable to remove or changed the Antenna.

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Pseudorandom Hopping Algorithm

Requirements:

The channel frequencies shall be selected from a pseudorandom ordered list of hopping frequencies. Each frequency must be used equally by the transmitter.

Pseudorandom Frequency Hopping

The embedded FHSS engine uses 75 hopping frequencies. Each channel frequency is selected from a pseudorandom ordered list of hopping frequencies, from 2409.94 MHz to 2470.03 MHz with separating in 801 kHz apart from each of the channels. A single data frame is transmitted on each frequency location before skipping to the next hopping frequency in the list. Each channel is occupied 16 milliseconds.

Typically, the initiation of an FHSS communication is as follows

1. The initiating party sends a request via a predefined frequency or control channel.
2. The receiving party sends a number, known as a seed back to the initiating party.
3. The initiating party sends a synchronization signal acknowledging to the receiving party as it has successfully established a transmission link.
4. The communication begins, and both the receiving and the sending party change their frequencies along an unpredictable hopping sequence with pseudorandom properties.

System Receiver Input Bandwidth

The receiver bandwidth is equal to the receiver bandwidth in the 75 hopping channel mode, which is 801 kHz. The receiver bandwidth was verified during RF hopping to the relative channel.

Receiver Hopping Capability

The associated receiver has the ability to shift frequencies in synchronization with the transmitted signals, with they start connect with a same channel and then hop to next channel with a same formula among each other.

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Occupancy Time

Requirements:

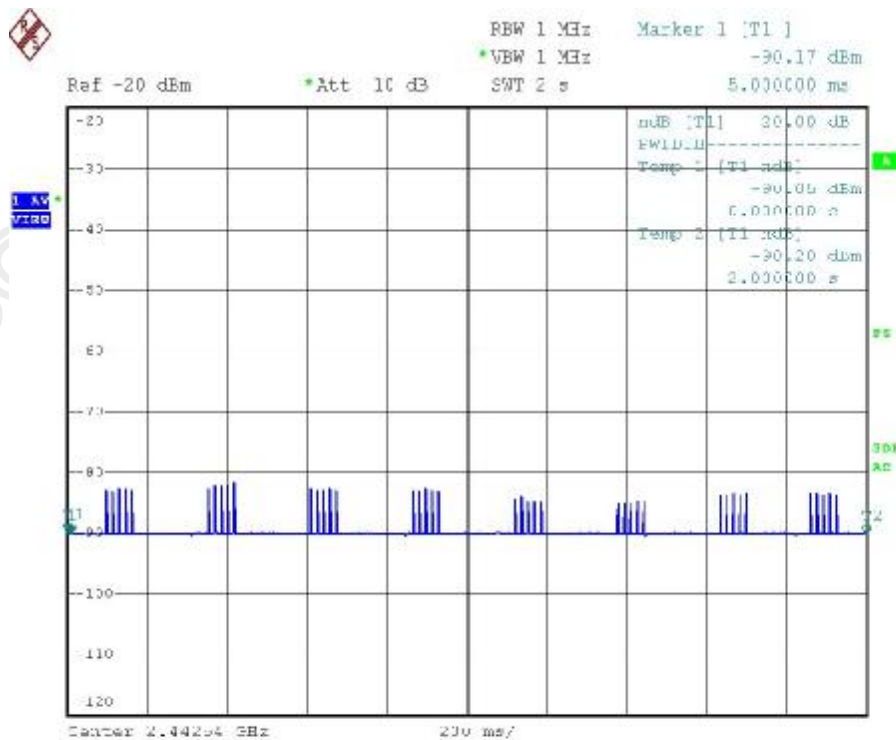
The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channel employed.

No requirements for Digital Transmission System.

Measurement Data: Number of RF channel: 75
Observed duration of occupancy: $0.4 \times 75 = 30\text{s}$
Period observed: 2s
Duration of a burst: $510\mu\text{s}$

Time of occupancy: $((40 \times 0.0051)/2\text{s} \times 30 = 0.306\text{ sec})$

See fig. A and B.



Date: 22.MAY.2008 08:28:58

Fig. A Time between RF Burst

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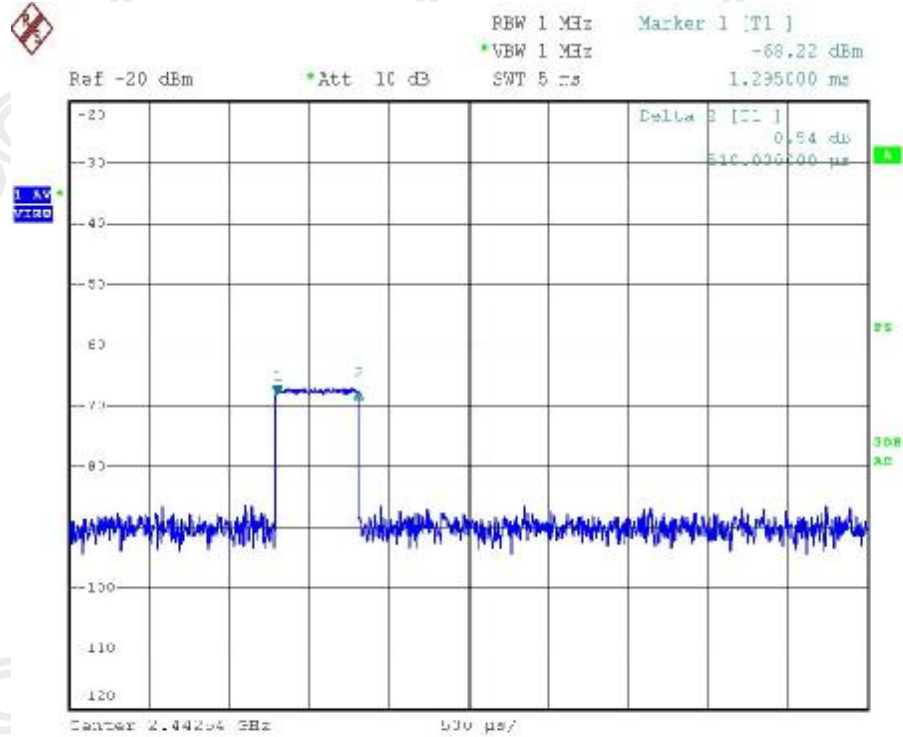


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Date: 22.MAY.2008 08:43:28

Fig B . RF Burst

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Appendix A

List of Measurement Equipment

Radiated Emission

| EQP NO. | DESCRIPTION | MANUFACTURER | MODEL NO. | SERIAL NO. | LAST CAL | DUE CAL |
|---------|------------------------------|-----------------|-----------|------------|------------|------------|
| EM215 | MULTIDEVICE CONTROLLER | EMCO | 2090 | 00024676 | N/A | N/A |
| EM216 | MINI MAST SYSTEM | EMCO | 2075 | 00026842 | N/A | N/A |
| EM217 | ELECTRIC POWERED TURNABLE | EMCO | 2088 | 00029144 | N/A | N/A |
| EM218 | ANECHOIC CHAMBER | ETS-Linggren | FACT-3 | -- | 2006/05/02 | 2009/05/02 |
| EM174 | BICONILOG ANTENNA | EMCO | 3142C | 00029071 | 2008/01/24 | 2010/01/24 |
| EM229 | EMI TEST RECEIVER | ROHDE & SCHWARZ | ESIB40 | 100248 | 2008/09/08 | 2009/09/08 |
| EM022 | LOOP ANTENNA | EMCO | 6502 | 1189-2424 | 2006/07/26 | 2009/07/26 |

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



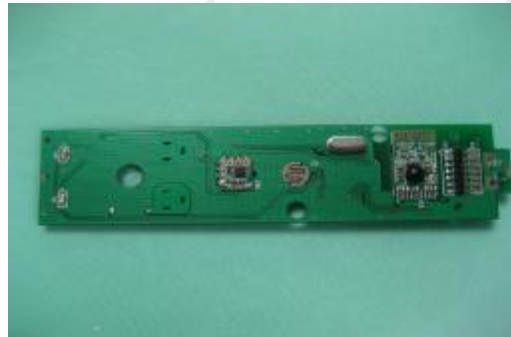
Rear View of the product



Inner Circuit Top View



Inner Circuit Bottom View



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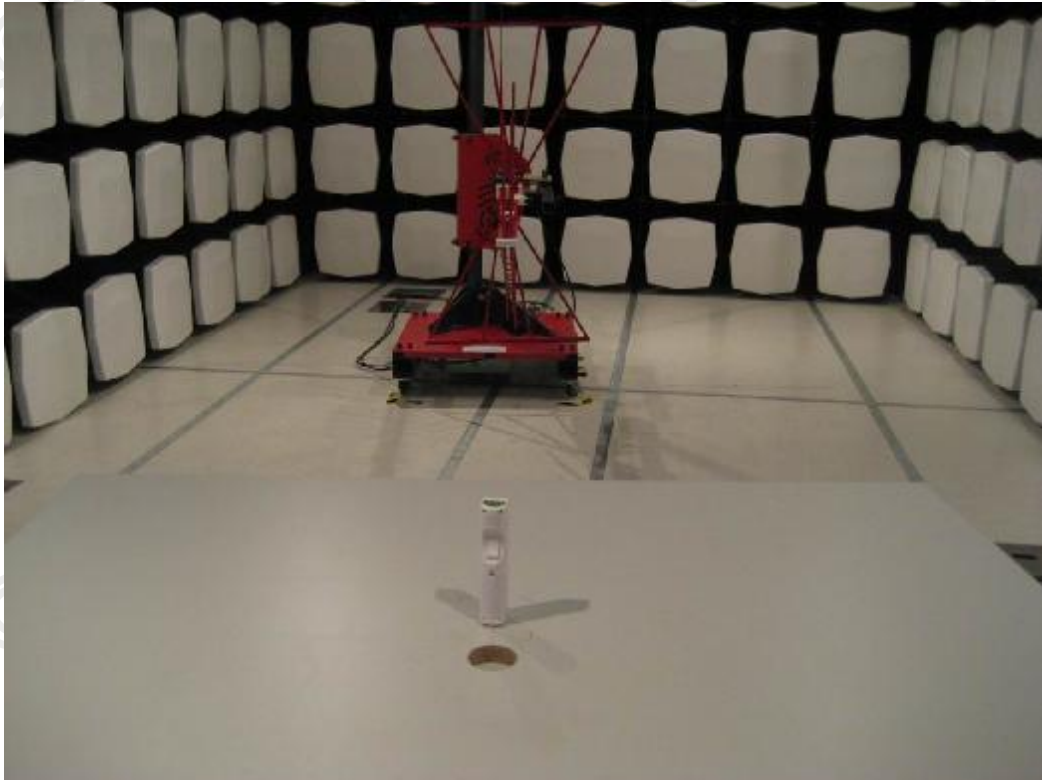
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Photographs of EUT

Measurement of Radiated Emission Test Set Up



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

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