



STC Test Report

Date : 2008-07-11

Page 1 of 29

No. : MH182362

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 Starter Pack
Brand Name: STIX
Model Number: 23970
FCC ID: WBDSTIX200GPR

Date Samples Received:

2008-05-12

Date Tested:

2008-05-13 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

Tel: (852) 2666 1888 Fax: (852) 2664 4353 Homepage: www.hkstc.org E-mail: hkstc@hkstc.org



STC Test Report

Date : 2008-07-11

Page 2 of 29

No. : MH182362

CONTENT:

Cover
Content

Page 1 of 29

Page 2 of 29

1.0 General Details

1.1 Test Laboratory

Page 3 of 29

1.2 Applicant Details
Applicant
Manufacturer

Page 3 of 29

1.3 Equipment Under Test [EUT]
Description of EUT operation

Page 4 of 29

1.4 Date of Order

Page 4 of 29

1.5 Submitted Sample

Page 4 of 29

1.6 Test Duration

Page 4 of 29

1.7 Country of Origin

Page 4 of 29

2.0 Technical Details

2.1 Investigations Requested

Page 5 of 29

2.2 Test Standards and Results Summary

Page 5 of 29

3.0 Test Results

3.1 Radiated Emission

Page 6-9 of 29

3.2 Conducted Emission

Page 10-12 of 29

3.3 Frequency Range Measurement

Page 13-25 of 29

Appendix A

List of Measurement Equipment

Page 26 of 29

Appendix B

Photographs

Page 27-29 of 29

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STC Test Report

Date : 2008-07-11

Page 3 of 29

No. : MH182362

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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STC Test Report

Date : 2008-07-11

Page 4 of 29

No. : MH182362

1.3 Equipment Under Test [EUT] Description of Sample

Product: STIX 200 Starter Pack
Manufacturer: Playhut Inc.
Brand Name: STIX
Model Number: 23970
Additional Product Name: STIX 200 Combo Pack, STIX 400 Combo Pack, STIX 400 Starter Pack
Additional Model Number (s): 23968, 23973, 23974
Input Voltage: The product draws power from the signal port of the console.

1.3.1 Description of EUT Operation

The Equipment Under Test (EUT) is a Playhut Inc., STIX 200 Starter Pack, transmit while switch on, it is data transmitter, 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

2008-05-13 to 2008-05-22

1.7 Country of Origin

China

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Date : 2008-07-11

Page 5 of 29

No. : MH182362

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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Date : 2008-07-11

Page 6 of 29

No. : MH182362

3.0 Test Results

3.1 Emission

3.1.1 Maximum Peak Output Power

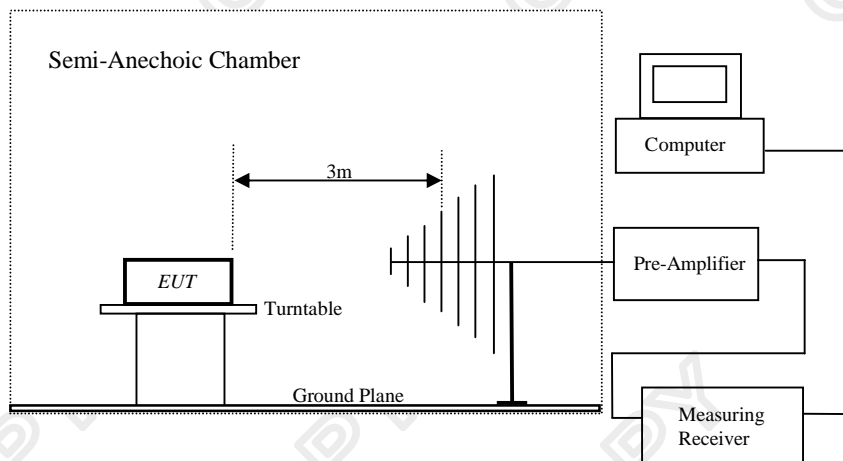
Test Requirement:	FCC 47CFR 15.247
Test Method:	N/A
Test Date:	2008-05-14
Mode of Operation:	Communication mode (Host connected PC)

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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STC Test Report

Date : 2008-07-11

Page 7 of 29

No. : MH182362

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
 For all other frequency hopping systems in the 2400-2483.5 MHz band: 0.125 Watts
 For Digital Transmission systems in 2400-2483.5 MHz Band: 1 Watt

Results of transmission Mode (2409.94MHz to 2475.62MHz) : Pass (TX Unit)

Maximum conducted output power

Transmitter Frequency (MHz)	Transmitter Power (V/m)	Maximum conducted output power (mW)
2410.02	0.072	1.5552

Transmitter Frequency (MHz)	Transmitter Power (V/m)	Maximum conducted output power (mW)
2440.08	0.073	1.5987

Transmitter Frequency (MHz)	Transmitter Power (V/m)	Maximum conducted output power (mW)
2470.14	0.074	1.6428

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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STC Test Report

Date : 2008-07-11

Page 8 of 29

No. : MH182362

3.1.2 Radiated Emissions

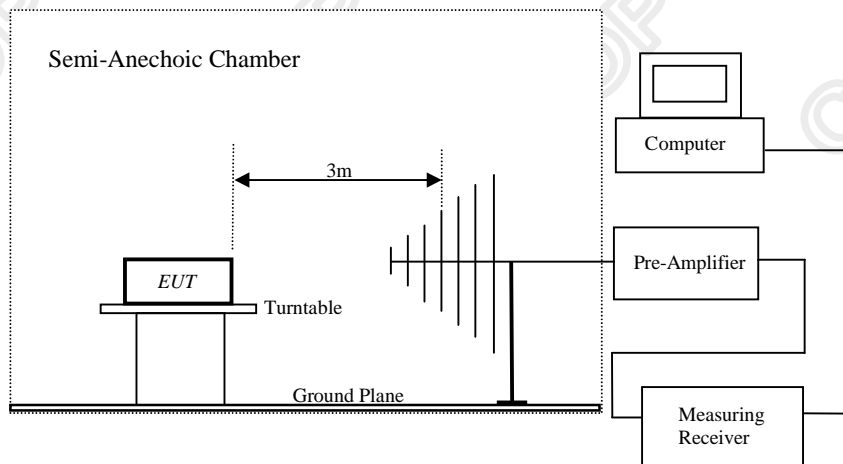
Test Requirement: FCC 47CFR 15.209
Test Method: ANSI C63.4:2003
Test Date: 2008-05-14
Mode of Operation: Communication mode (Host connected PC)

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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STC Test Report

Date : 2008-07-11

Page 9 of 29

No. : MH182362

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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STC Test Report

Date : 2008-07-11

Page 10 of 29

No. : MH182362

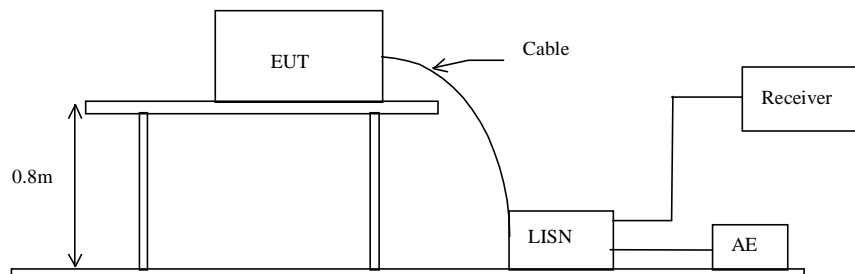
3.2 Conducted Emissions (0.15MHz to 30MHz)

Test Requirement: FCC 47CFR 15.107
Test Method: ANSI C63.4:2003
Test Date: 2008-05-13
Mode of Operation: Communication mode (connected to PC)

Test Method:

The test was performed in accordance with ANSI C63.4: 2003, 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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STC Test Report

Date : 2008-07-11

Page 11 of 29

No. : MH182362

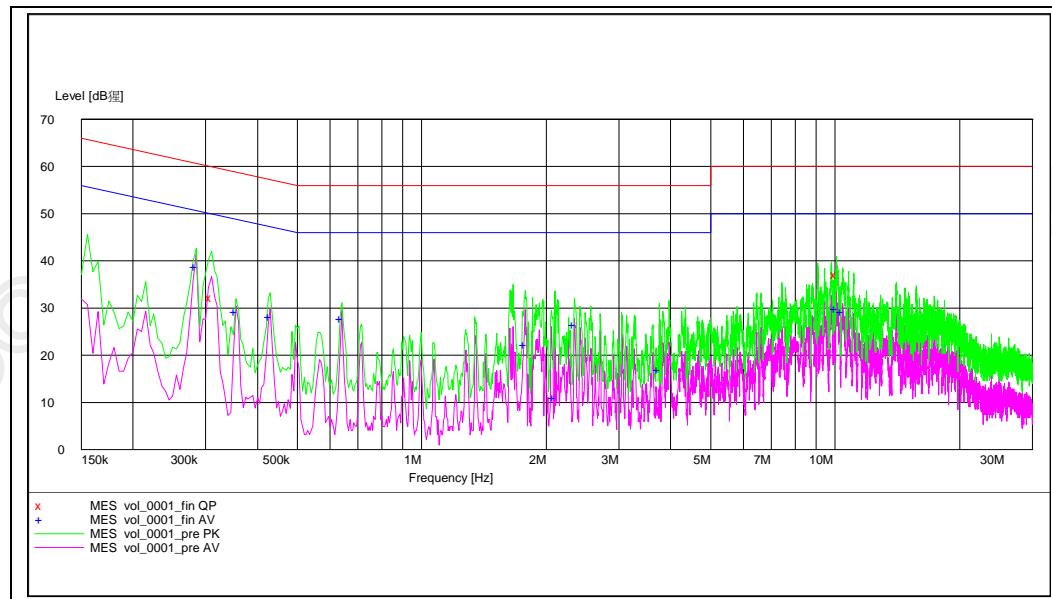
Limit for Conducted Emissions (FCC 47 CFR 15.107):

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.

Results of communication mode (connected to PC): PASS



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STC Test Report

Date : 2008-07-11

Page 12 of 29

No. : MH182362

Results of communication mode (connected to PC): PASS

Conductor Live or Neutral	Frequency MHz	Quasi-peak		Average	
		Level dB μ V	Limit dB μ V	Level dB μ V	Limit dB μ V
Live	0.285	-*-	-*-	38.7	51
Live	0.355	-*-	-*-	29.1	49
Live	0.430	-*-	-*-	28.3	47
Live	0.640	-*-	-*-	27.9	46
Live	10.080	37.1	60	-*-	-*-
Neutral	0.310	32.3	60	-*-	-*-
Neutral	1.780	-*-	-*-	22.1	46
Neutral	2.100	-*-	-*-	11.1	46
Neutral	2.340	-*-	-*-	26.4	46
Neutral	3.755	-*-	-*-	17.0	46
Neutral	10.080	-*-	-*-	29.8	50
Neutral	10.420	-*-	-*-	29.2	50

Remarks:

Calculated measurement uncertainty : 3.97dB

-*- Emission(s) that is far below the corresponding limit line.

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Date : 2008-07-11

Page 13 of 29

No. : MH182362

3.3 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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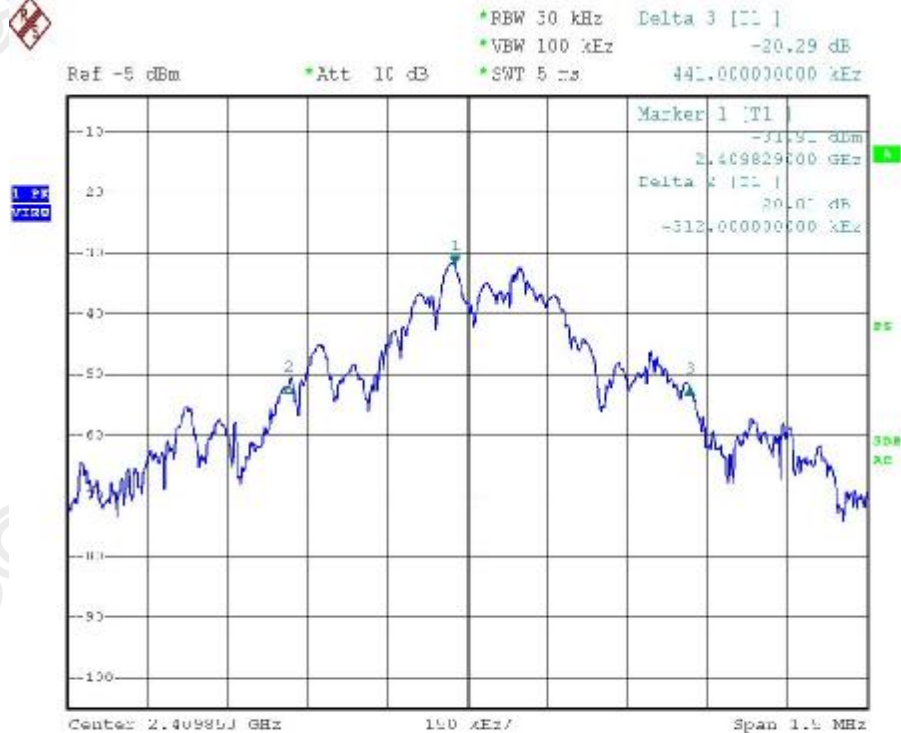
Page 14 of 29

No. : MH182362

Limits for Frequency Range Measurement:

Frequency Range [MHz]	20dB Bandwidth [kHz]	FCC Limits [MHz]
2409.82	753.00	Within 2400-2483.5

(Lowest Operating Frequency)



Date: 24.SEP.2008 11:29:09

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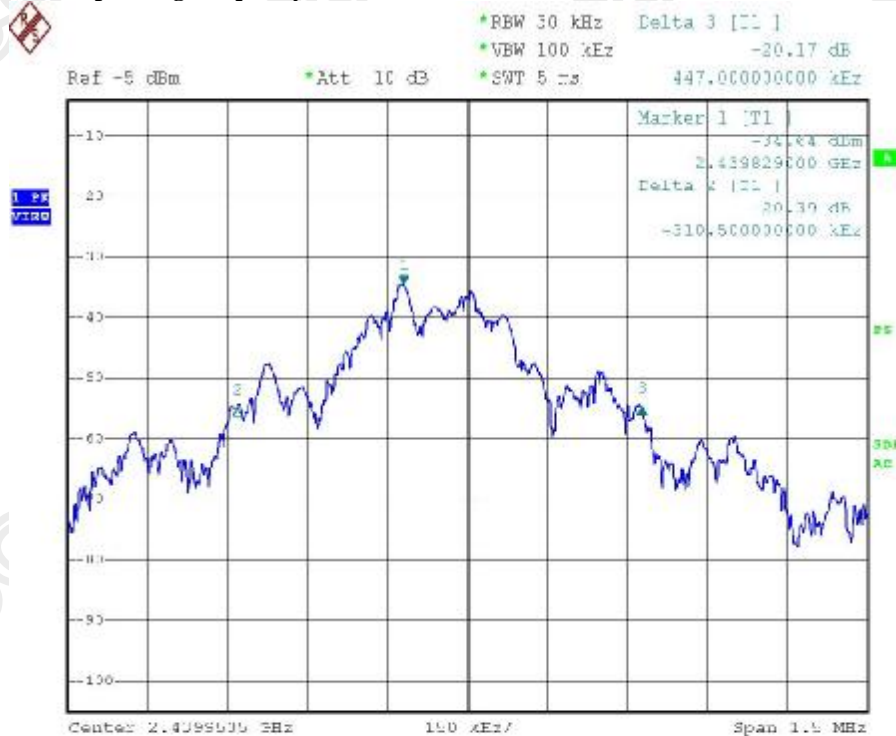
Page 15 of 29

No. : MH182362

Limits for Frequency Range Measurement:

Frequency Range [MHz]	20dB Bandwidth [kHz]	FCC Limits [MHz]
2439.82	757.00	Within 2400-2483.5

(Mid. Operating Frequency)



Date: 24.SEP.2008 11:27:01

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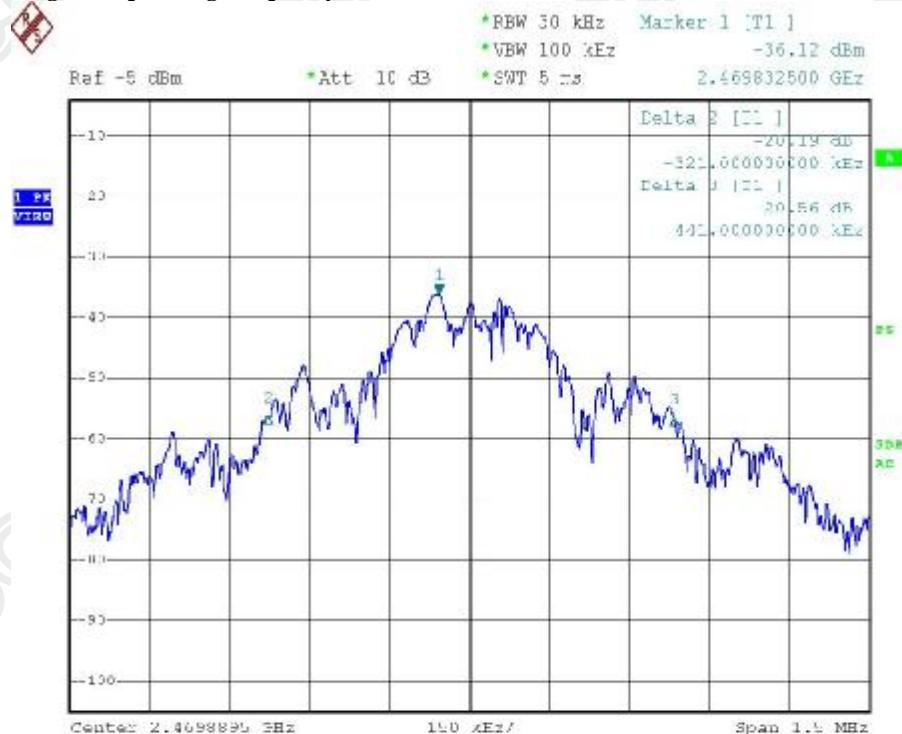
Page 16 of 29

No. : MH182362

Limits for Frequency Range Measurement:

Frequency Range [MHz]	20dB Bandwidth [kHz]	FCC Limits [MHz]
2469.83	762.00	Within 2400-2483.5

(Highest Operating Frequency)



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STC Test Report

Date : 2008-07-11

Page 17 of 29

No. : MH182362

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	2410.02	31	2434.39	61	2458.77
2	2410.83	32	2435.21	62	2459.58
3	2411.64	33	2436.02	63	2460.39
4	2412.46	34	2436.83	64	2461.20
5	2413.27	35	2437.64	65	2462.02
6	2414.08	36	2438.46	66	2462.83
7	2414.89	37	2439.27	67	2463.64
8	2415.71	38	2440.08	68	2464.45
9	2416.52	39	2440.89	69	2465.27
10	2417.33	40	2441.70	70	2466.08
11	2418.14	41	2442.52	71	2466.89
12	2418.96	42	2443.33	72	2467.70
13	2419.77	43	2444.14	73	2468.52
14	2420.58	44	2444.95	74	2469.33
15	2421.39	45	2445.77	75	2470.14
16	2422.21	46	2446.58		
17	2423.02	47	2447.39		
18	2423.83	48	2448.20		
19	2424.64	49	2449.02		
20	2425.46	50	2449.83		
21	2426.27	51	2450.64		
22	2427.08	52	2451.45		
23	2427.89	53	2452.27		
24	2428.71	54	2453.08		
25	2429.52	55	2453.89		
26	2430.33	56	2454.70		
27	2431.14	57	2455.52		
28	2431.96	58	2456.33		
29	2432.77	59	2457.14		
30	2433.58	60	2457.95		

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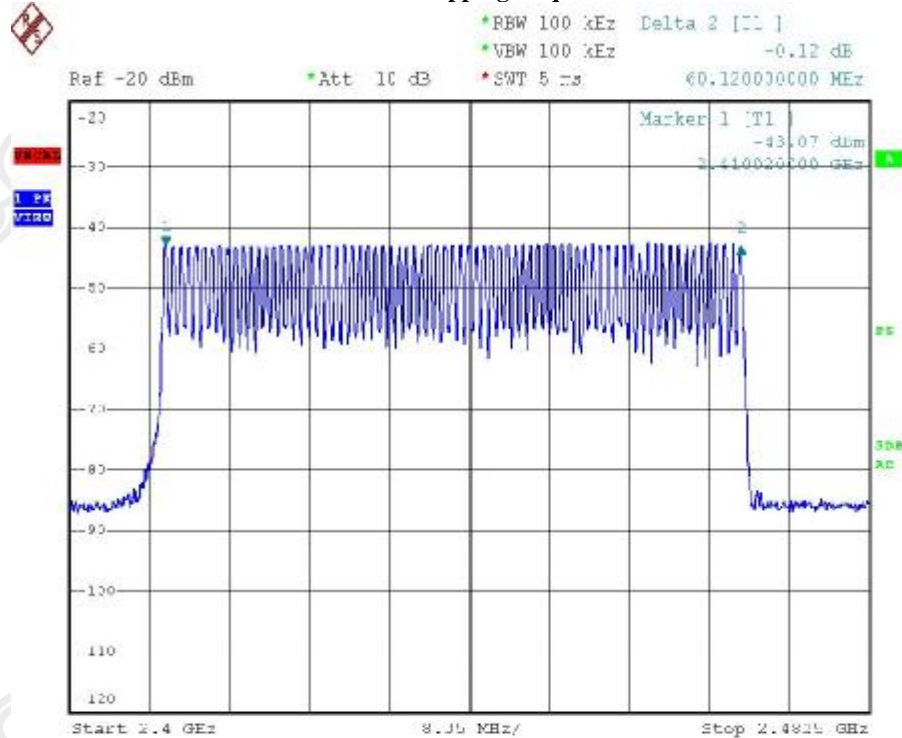
STC Test Report

Date : 2008-07-11

Page 18 of 29

No. : MH182362

Number of Hopping frequencies = 75 Channels



Date: 23.SEP.2008 10:37:01

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Date : 2008-07-11

Page 19 of 29

No. : MH182362

Carrier Frequency Separation (802.5KHz)



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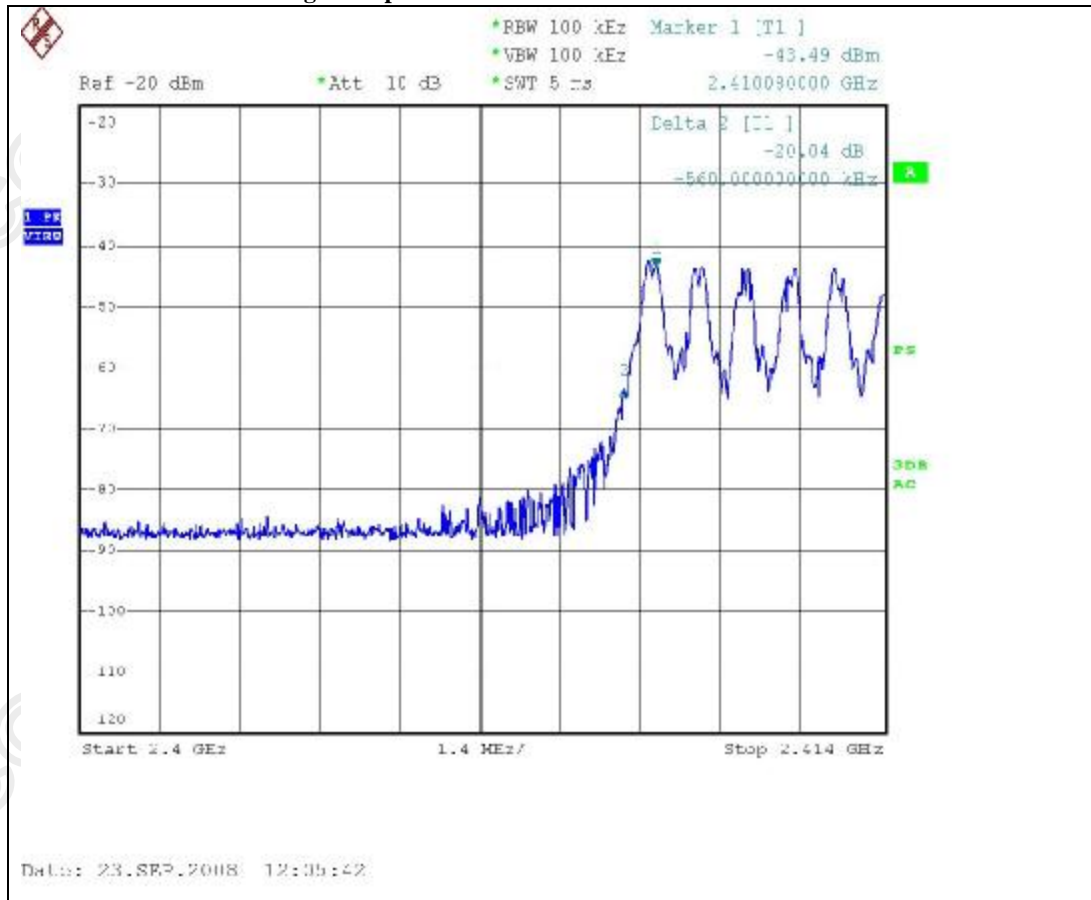
STC Test Report

Date : 2008-07-11

Page 20 of 29

No. : MH182362

Band-edge Compliance of RF Conducted Emissions (Lowest)



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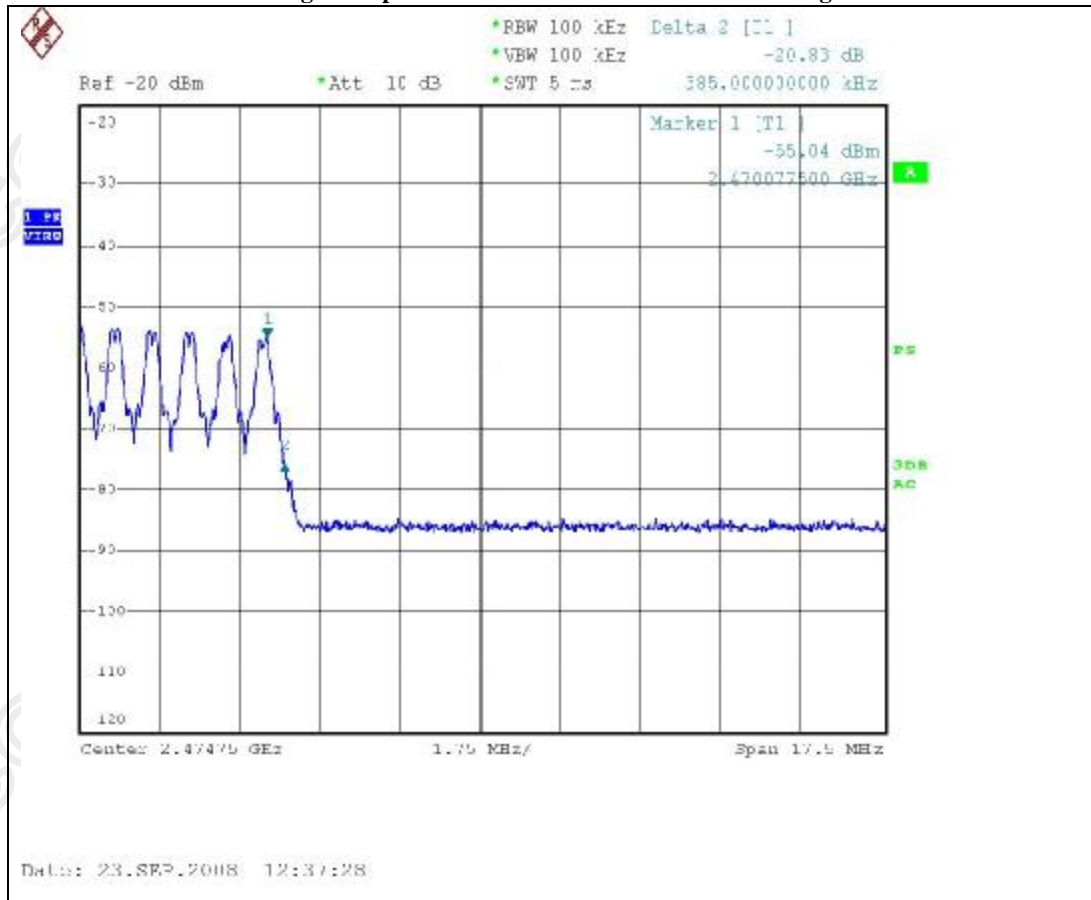
STC Test Report

Date : 2008-07-11

Page 21 of 29

No. : MH182362

Band-edge Compliance of RF Conducted Emissions (Highest)



The Hong Kong Standards and Testing Centre Ltd.

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STC Test Report

Date : 2008-07-11

Page 22 of 29

No. : MH182362

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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STC Test Report

Date : 2008-07-11

Page 23 of 29

No. : MH182362

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 2410.0200MHz to 2470.1400MHz with separating in 810.9kHz 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 mini-seconds.

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 802.5 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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STC Test Report

Date : 2008-07-11

Page 24 of 29

No. : MH182362

Occupancy Time

Requirements:

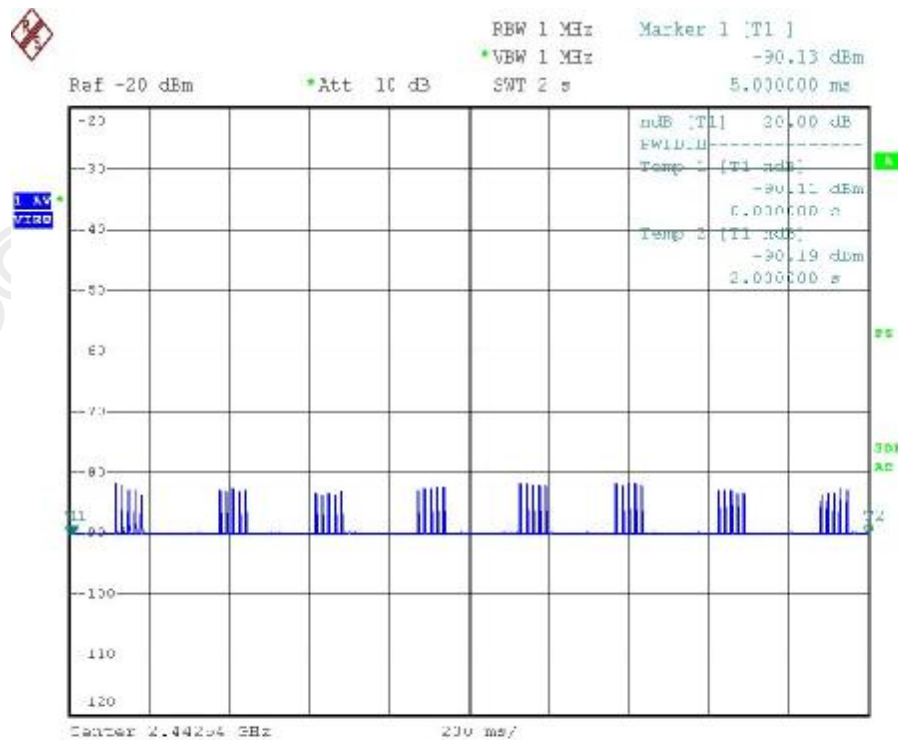
The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channel employed.

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: $500\mu\text{s}$

Time of occupancy: $((40 \times 0.0005\text{s}) / 2) \times 30 = 300\text{msec}$

See fig. A and B.



Date: 22.MAY.2008 08:24:33

Fig. A Time between RF Burst

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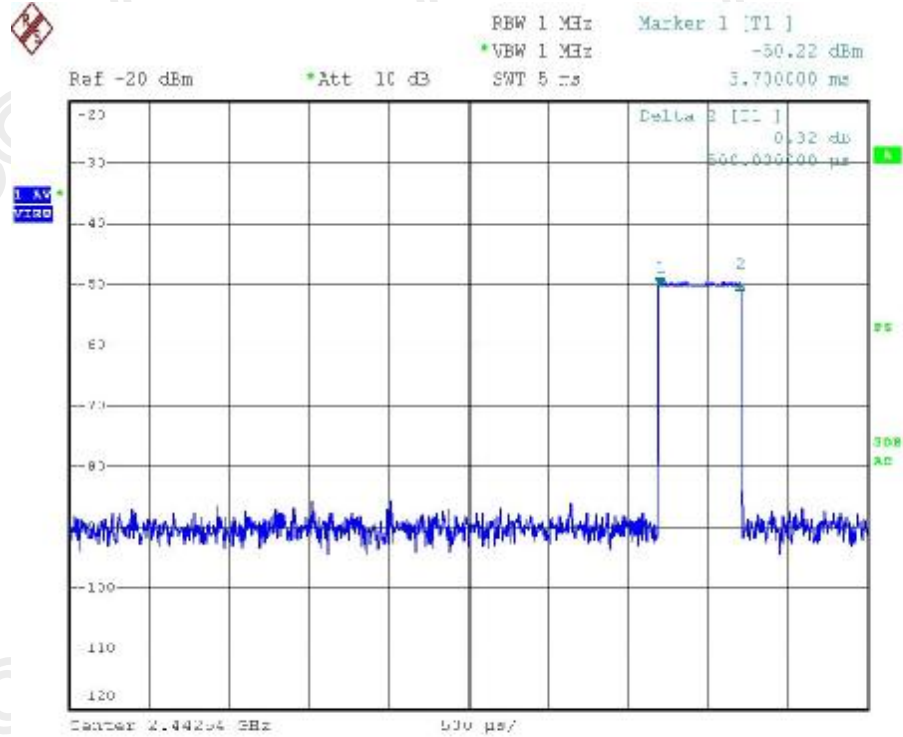


STC Test Report

Date : 2008-07-11

Page 25 of 29

No. : MH182362



Date: 22.MAY.2008 08:40:22

Fig B . RF Burst

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STC Test Report

Date : 2008-07-11

Page 26 of 29

No. : MH182362

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 TURNTABLE	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

Line Conducted

EQP NO.	DESCRIPTION	MANUFACTURER	MODEL NO.	SERIAL NO.	LAST CAL	DUE CAL
EM119	LISN	ROHDE & SCHWARZ	ESH3-Z5	0831.5518.52	2007/07/30	2008/07/30
EM229	EMI TEST RECEIVER	ROHDE & SCHWARZ	ESIB40	100248	2007/07/20	2008/08/20
EM154	SHIELDING ROOM	SIEMENS MATSUSHITA COMPONENTS	N/A	803-740-057-99A	2008/01/23	2009/01/23

Ancillary Equipment

ITEM NO.	DESCRIPTION	MODEL NO.	FCC ID	REMARK
1	NOTEBOOK PC	PP10L	E2K24GBRL	BRAND: DELL; SERIAL NUMBER : 29705527941
2	MOUSE	M056UC	N/A	BRAND: DELL; SERIAL NUMBER : G0G00PXZ
3	KEYBOARD	L100	N/A	BRAND: DELL; SERIAL NUMBER : CNORH6566589066H00AR
4	PRINTER	C3990A	N/A	BRAND: HP; SERIAL NUMBER : JPZT093977

Remarks:-

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

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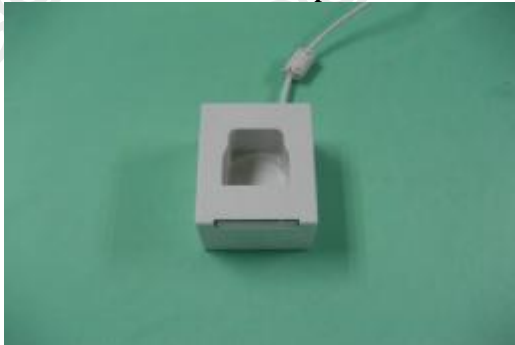
Page 27 of 29

No. : MH182362

Appendix B

Photographs of EUT

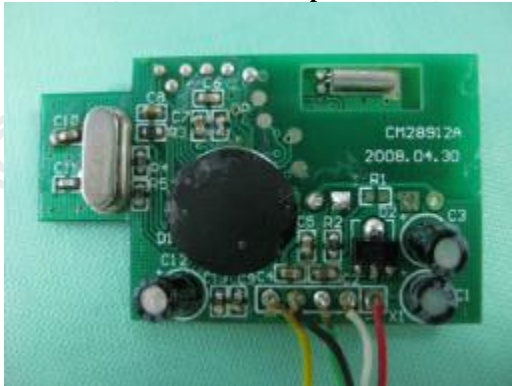
Front View of the product



Rear View of the product



Inner Circuit Top View



Inner Circuit Bottom View



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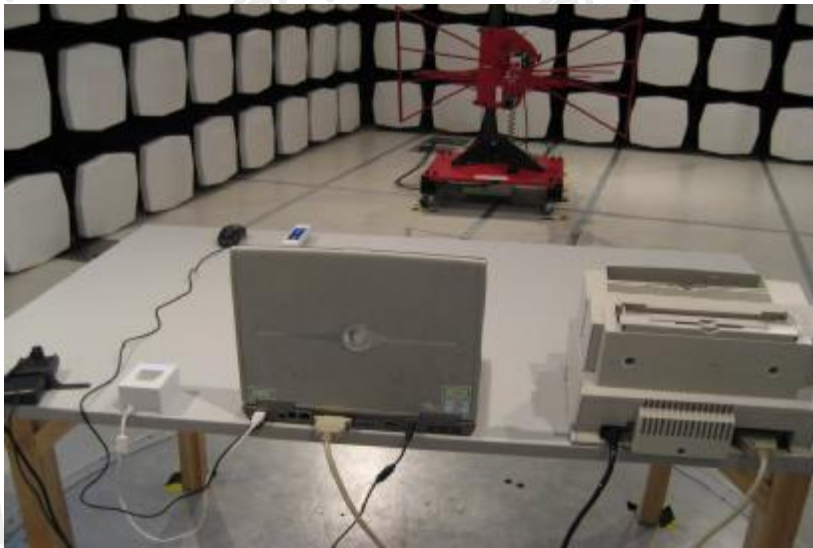
Date : 2008-07-11

Page 28 of 29

No. : MH182362

Photographs of EUT

Measurement of Radiated Emission Test Set Up



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STC Test Report

Date : 2008-07-11

Page 29 of 29

No. : MH182362

Measurement of Radiated Emission Test Set Up



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