



STC Test Report

Date : 2008-10-27

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No. : MH182618

Applicant (STD003): Guillemot Corporation S.A.
Place du Granier, P.O.Box B.P 97143, Chantepie, 35171
France

Manufacturer: Shenzhen Litestar Electronics Technology Co., Ltd
Xinghong Science & Technology Park, Fenghuanggang
1st Industrial Zone, Xixiang, Bao'an District, Shenzhen,
China

Description of Samples: Product: T-Nchuk Wireless Adapter NW
Brand Name: THRUSTMASTER
Model Number: 4660306
FCC ID: NAM4660306

Date Samples Received: 2008-10-13

Date Tested: 2008-10-18 to 2008-10-24

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 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, Taiipo 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

Guillemot Corporation S.A.
Place du Granier, P.O.Box B.P 97143, Chantepie, 35171 France

Manufacturer

Shenzhen Litestar Electronics Technology Co., Ltd
Xinghong Science & Technology Park, Fenghuanggang
1st Industrial Zone, Xixiang, Bao'an District, Shenzhen, China

The Hong Kong Standards and Testing Centre Ltd.

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1.3 Equipment Under Test [EUT]

Description of Sample

Product: T-Nchuk Wireless Adapter NW
Manufacturer: Shenzhen Litestar Electronics Technology Co., Ltd
Brand Name: THRUSTMASTER
Model Number: 4660306
Input Voltage: 3Vd.c. ("AAA" size battery x 2)

1.3.1 Description of EUT Operation

The Equipment Under Test (EUT) is a Guillemot Corporation S.A., transmit when button is pressed, The Wii expansion port was designed solely for the wired Wii controllers when the EUT detect an input control signal from a connected Wii controller, the input control signal will be modulate and transmit from the RF module of the EUT. The EUT continues to transmit while paired with the host device, modulation by IC; and the type is pulse modulation.

1.4 Date of Order

2008-10-13

1.5 Submitted Sample(s):

1 Sample

1.6 Test Duration

2008-10-18 to 2008-10-24

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

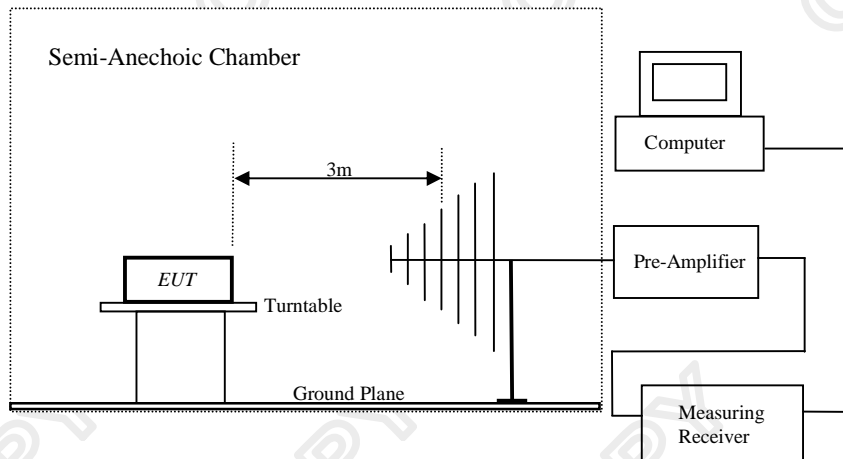
Test Requirement:	FCC 47CFR 15.247
Test Method:	N/A
Test Date:	2008-10-24
Mode of Operation:	Communication mode with Wii

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 (2402MHz to 2476MHz) : Pass (TX Unit) Maximum conducted output power

Transmitter Frequency (MHz)	Transmitter Power (V/m)	Maximum conducted output power (mW)
2402	0.019	0.086

Transmitter Frequency (MHz)	Transmitter Power (V/m)	Maximum conducted output power (mW)
2440	0.016	0.061

Transmitter Frequency (MHz)	Transmitter Power (V/m)	Maximum conducted output power (mW)
2476	0.018	0.077

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

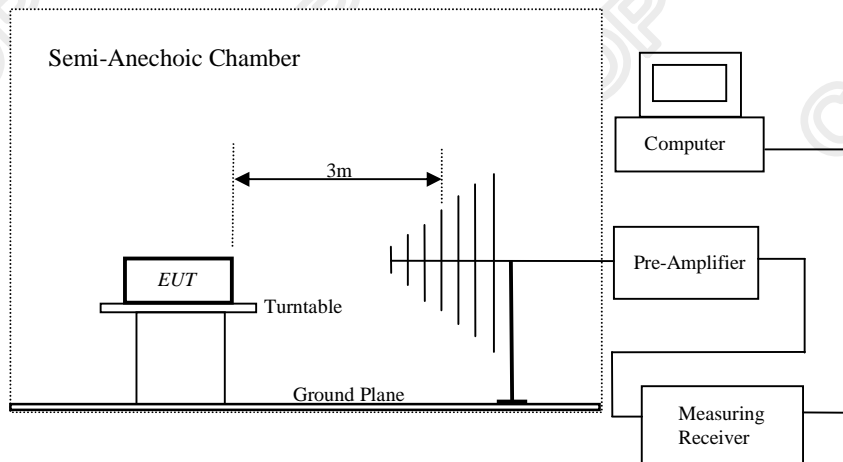
Test Requirement: FCC 47CFR 15.209
Test Method: ANSI C63.4:2003
Test Date: 2008-10-24
Mode of Operation: Communication mode with WII

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 with WII (2402MHz): Pass

Field Strength of Fundamental Emissions						
Peak Value						
Frequency MHz	Measured Level @3m dB μ V	Correction Factor dB/m	Field Strength dB μ V/m	Field Strength μ V/m	Limit @3m μ V/m	E-Field Polarity
2402.0	50.8	34.8	85.6	19,054.6	495,450	Horizontal
* 4804.4	11.7	35.9	47.6	239.9	5,000	Horizontal
7206.0					5,000	Vertical
9608.0					5,000	Vertical
* 12010.0					5,000	Vertical
14412.0					5,000	Vertical
16814.0					5,000	Vertical
* 19216.0					5,000	Vertical
21618.0					5,000	Vertical
24020.0					5,000	Vertical

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 (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 with WII (2440MHz): Pass

Field Strength of Fundamental Emissions Peak Value						
Frequency MHz	Measured Level @3m dB μ V	Correction Factor dB/m	Field Strength dB μ V/m	Field Strength μ V/m	Limit @3m μ V/m	E-Field Polarity
2440.0	49.1	34.9	84.0	15,848.9	495,450	Horizontal
* 4880.5	13.0	35.9	48.9	278.6	5,000	Horizontal
7320.0					5,000	Vertical
9760.0					5,000	Vertical
* 12200.0					5,000	Vertical
14640.0					5,000	Vertical
17080.0					5,000	Vertical
* 19520.0					5,000	Vertical
21960.0					5,000	Vertical
24400.0					5,000	Vertical

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 (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 with WII (2476MHz): Pass

Field Strength of Fundamental Emissions Peak Value						
Frequency MHz	Measured Level @3m dB μ V	Correction Factor dB/m	Field Strength dB μ V/m	Field Strength μ V/m	Limit @3m μ V/m	E-Field Polarity
2476.0	50.3	35.0	85.3	18,407.7	495,450	Horizontal
* 4952.7	12.5	35.9	48.4	263.0	5,000	Horizontal
7428.0					5,000	Vertical
9904.0					5,000	Vertical
* 12380.0					5,000	Vertical
14856.0					5,000	Vertical
17332.0					5,000	Vertical
* 19808.0					5,000	Vertical
22284.0					5,000	Vertical
24760.0					5,000	Vertical

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
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.

Result of Communication Mode with WII: 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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3.1.3 Frequency Range Measurement

Test Requirement: FCC 47CFR 15.247
Test Method: ANSI C63.4:2003
Test Date: 2008-10-24
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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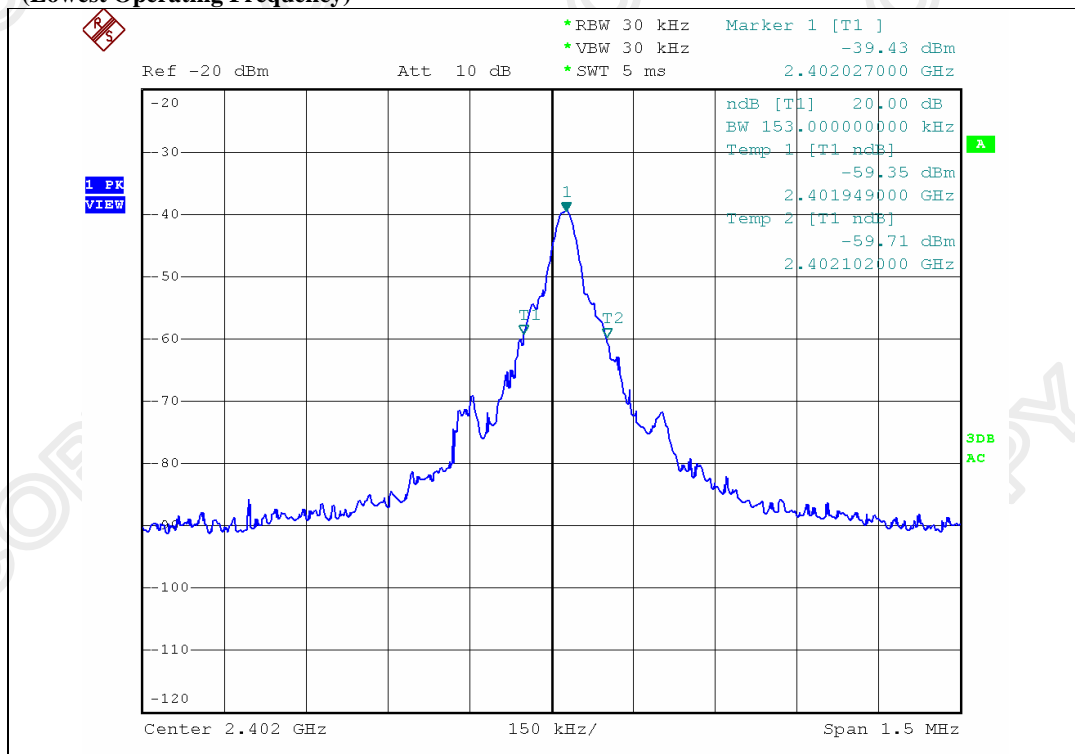
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Limits for Frequency Range Measurement:

Frequency Range [MHz]	20dB Bandwidth [kHz]	FCC Limits [MHz]
2402	153	Within 2400-2483.5

(Lowest Operating Frequency)



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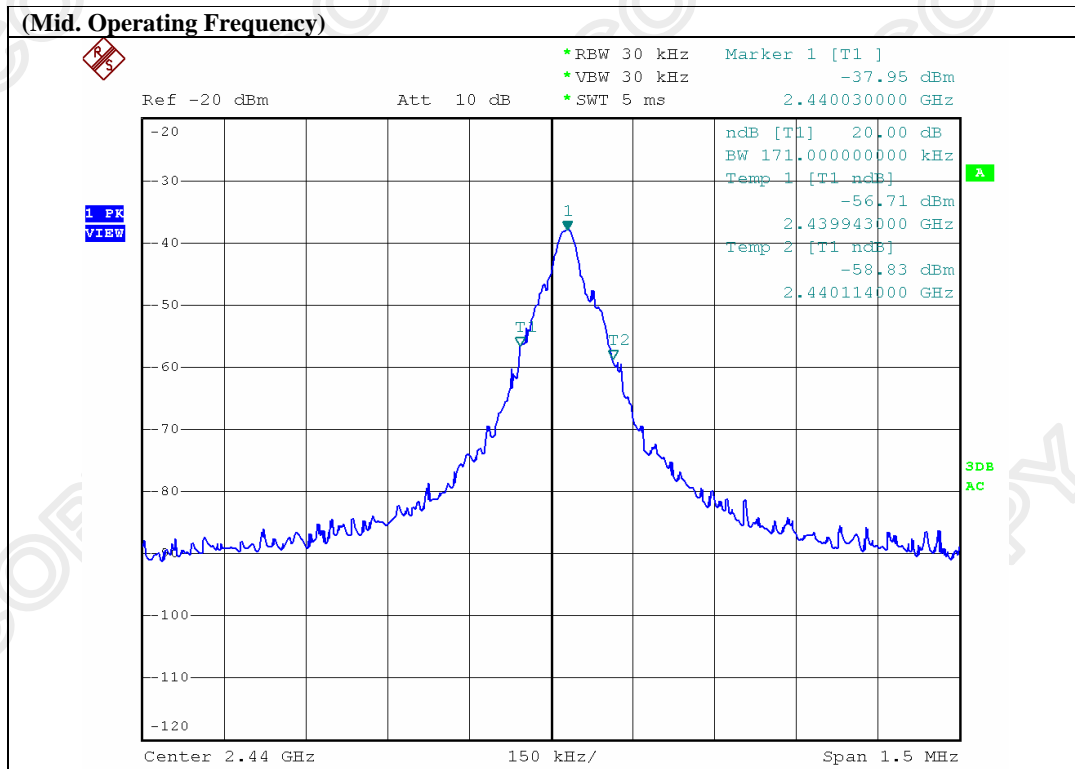
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Frequency Range [MHz]	20dB Bandwidth [kHz]	FCC Limits [MHz]
2440	171.00	Within 2400-2483.5



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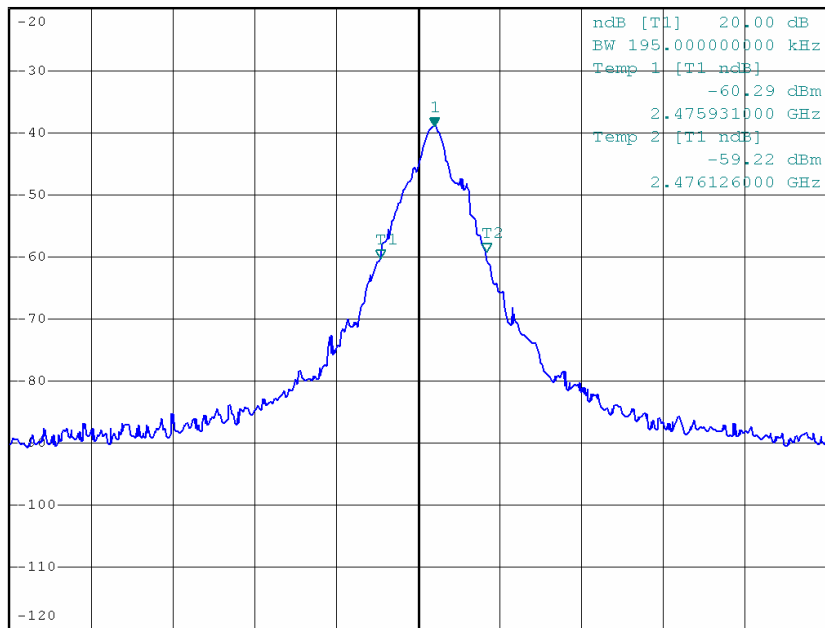
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Frequency Range [MHz]	20dB Bandwidth [kHz]	FCC Limits [MHz]
2476	195	Within 2400-2483.5

(Highest Operating Frequency)



Ref -20 dBm Att 10 dB
*RBW 30 kHz Marker 1 [T1]
*VBW 30 kHz -39.11 dBm
*SWT 5 ms 2.476030000 GHz



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Channel Centre Frequency

Requirements:

Frequency hopping system in the 2402-2476MHz band shall use at least 15 non-overlapping channels.

Item	Frequency (MHz)	Item	Frequency (MHz)	Item	Frequency (MHz)
1	2402.0000	31	2432.0000	61	2462.0000
2	2403.0000	32	2433.0000	62	2463.0000
3	2404.0000	33	2434.0000	63	2464.0000
4	2405.0000	34	2435.0000	64	2465.0000
5	2406.0000	35	2436.0000	65	2466.0000
6	2407.0000	36	2437.0000	66	2467.0000
7	2408.0000	37	2438.0000	67	2468.0000
8	2409.0000	38	2439.0000	68	2469.0000
9	2410.0000	39	2440.0000	69	2470.0000
10	2411.0000	40	2441.0000	70	2471.0000
11	2412.0000	41	2442.0000	71	2472.0000
12	2413.0000	42	2443.0000	72	2473.0000
13	2414.0000	43	2444.0000	73	2474.0000
14	2415.0000	44	2445.0000	74	2475.0000
15	2416.0000	45	2446.0000	75	2476.0000
16	2417.0000	46	2447.0000		
17	2418.0000	47	2448.0000		
18	2419.0000	48	2449.0000		
19	2420.0000	49	2450.0000		
20	2421.0000	50	2451.0000		
21	2422.0000	51	2452.0000		
22	2423.0000	52	2453.0000		
23	2424.0000	53	2454.0000		
24	2425.0000	54	2455.0000		
25	2426.0000	55	2456.0000		
26	2427.0000	56	2457.0000		
27	2428.0000	57	2458.0000		
28	2429.0000	58	2459.0000		
29	2430.0000	59	2460.0000		
30	2431.0000	60	2461.0000		

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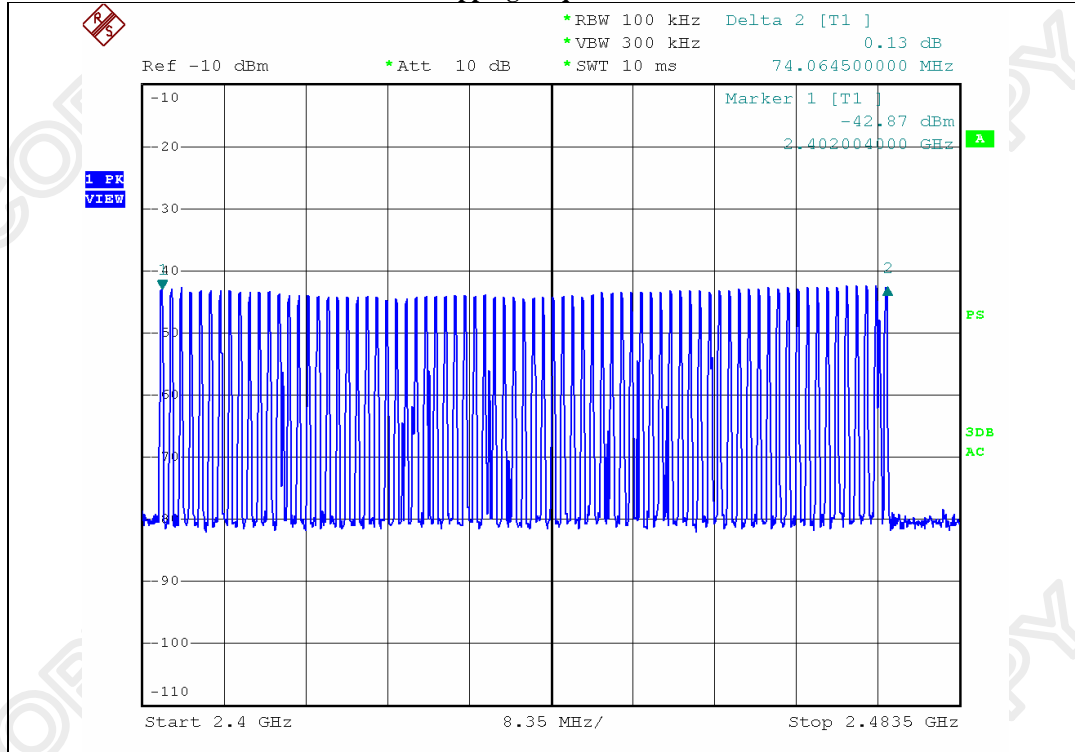
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Number of Hopping frequencies = 75 Channels



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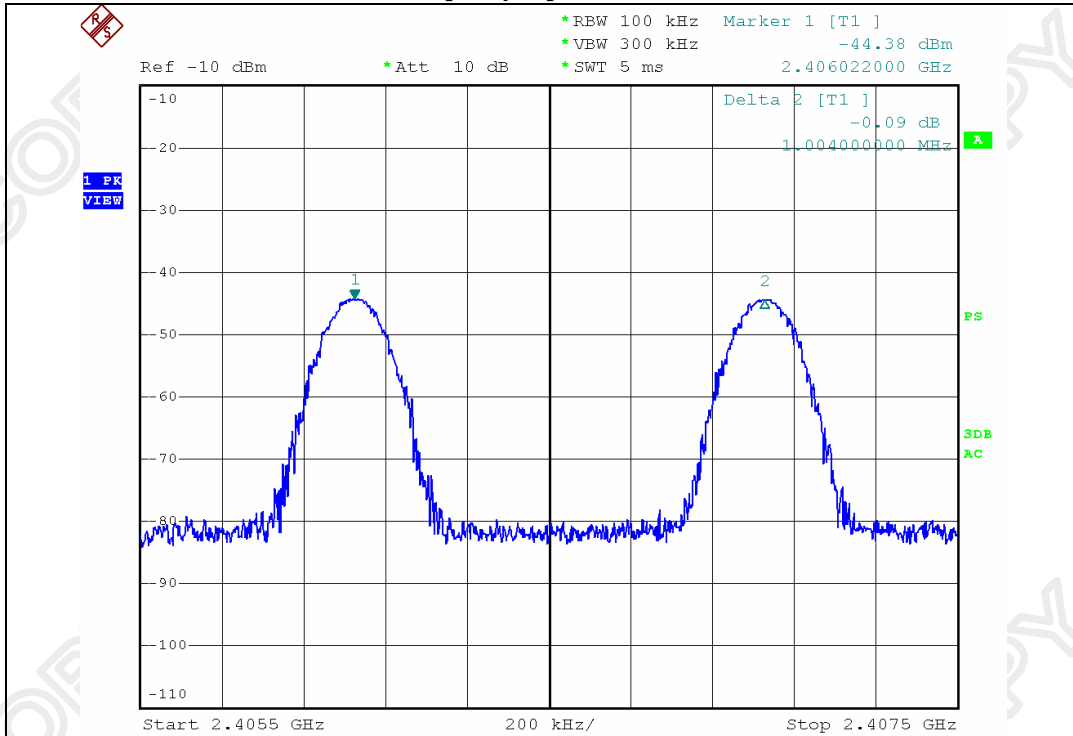
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Carrier Frequency Separation (1.004MHz)



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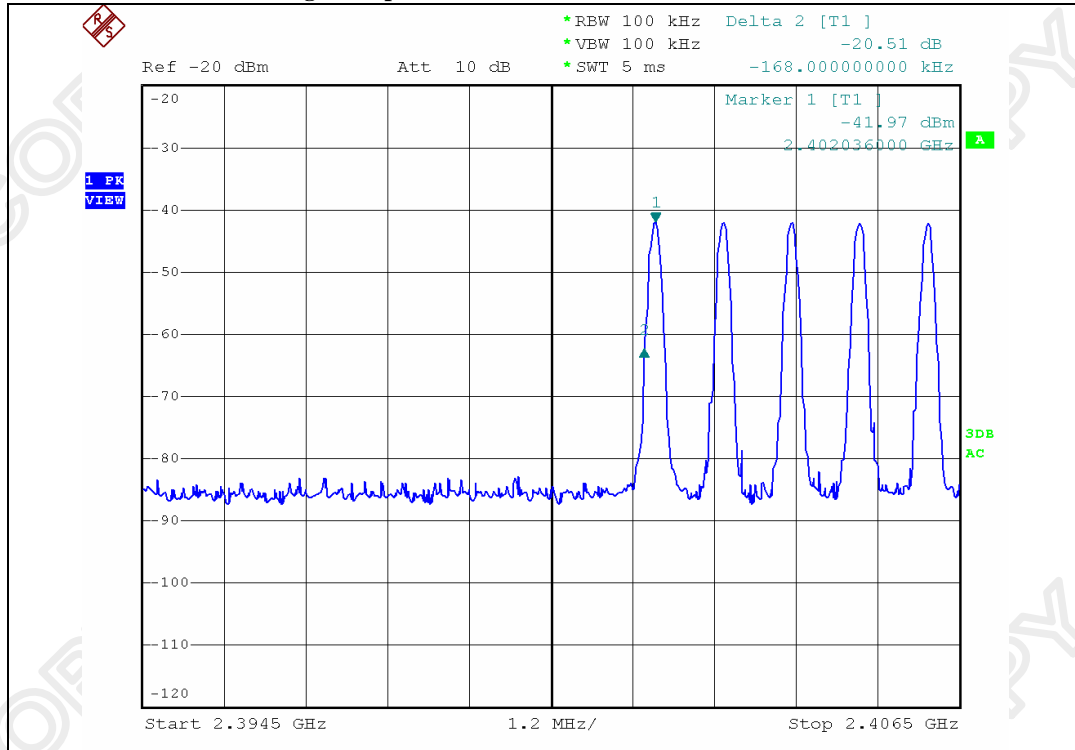
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Band-edge Compliance of RF Conducted Emissions (Lowest)



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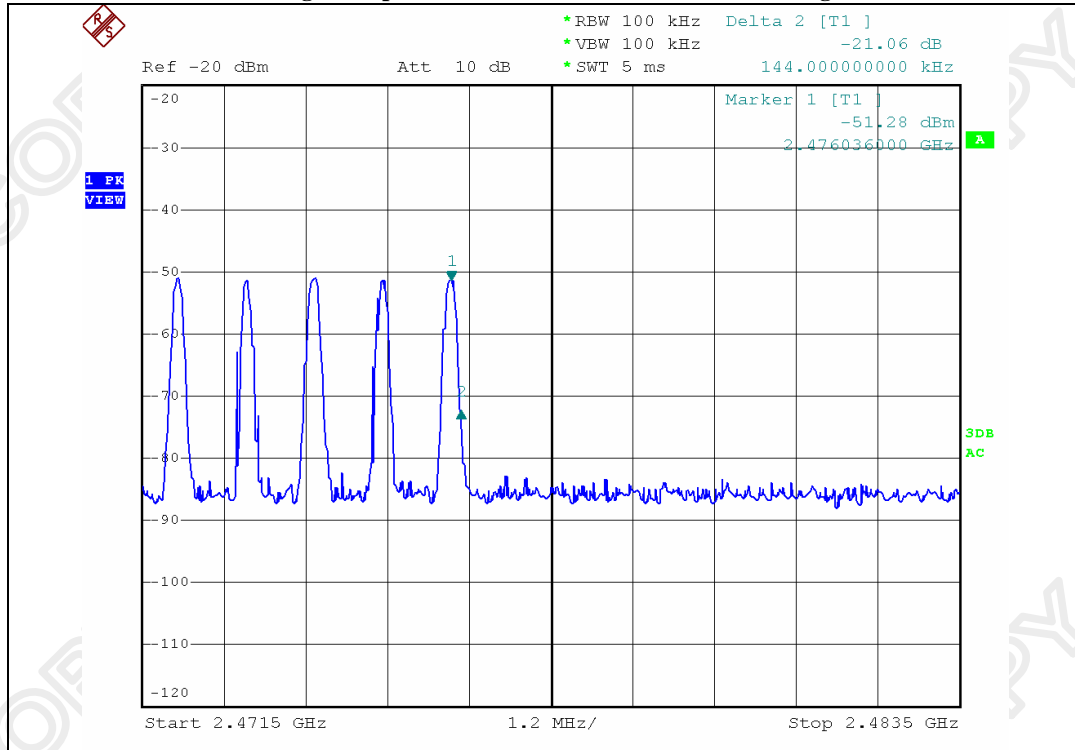
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Band-edge Compliance of RF Conducted Emissions (Highest)



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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 2402MHz to 2476MHz with separating in 1M Hz 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 100 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 1M Hz. 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

Time of occupancy: $((5 \times 5.2) / 2\text{s} \times 30) = 0.390\text{msec} < 0.4\text{s}$

See fig. A and B.

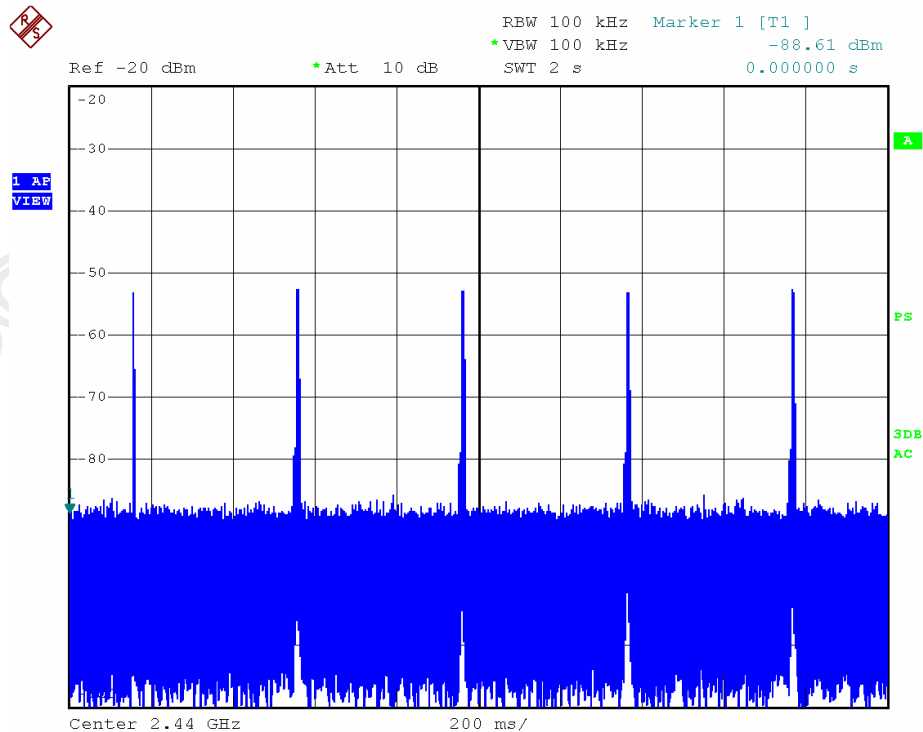


Fig. A Time between RF Burst

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1 AP
VIEW

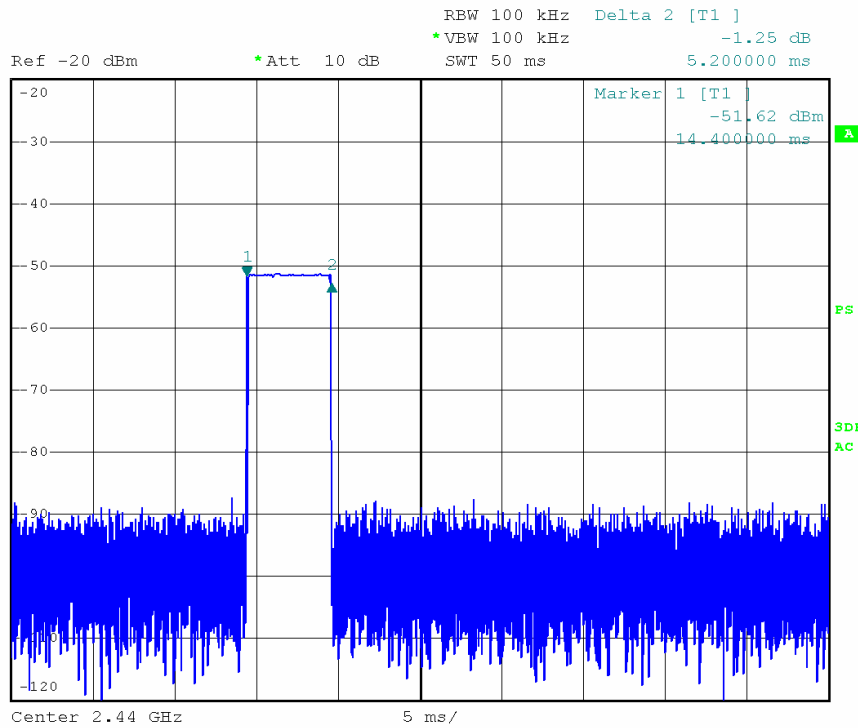


Fig B . RF Burst

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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

Ancillary Equipment

ITEM NO.	DESCRIPTION	BRAND NAME	MODEL NO.	SERIAL NO	FCC ID	REMARK
1	WII GAME MAIN	Wii	RVL-001	LJF14123151 6	MCLJ27H002, MCLJ27H003	--
2	AC ADAPTER	Wii	RVL-002	AOVKL21	--	NPUT:AC 230V 94VA 50/60Hz OUTPUT:DC 12V 3.7A
3	INFRARED CONTROL HANDGRIP	Wii	RVL-003	003WW07081020 1	P00-WC45	--

Remarks:-

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

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Appendix B

Photographs of EUT

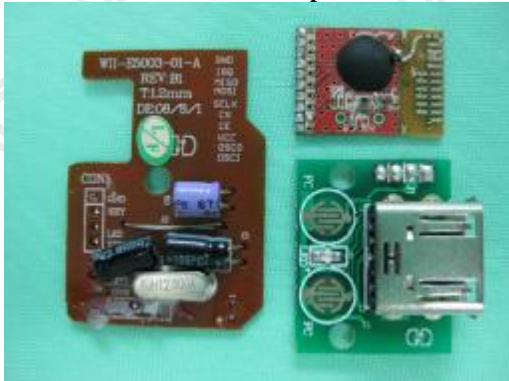
Front View of the product



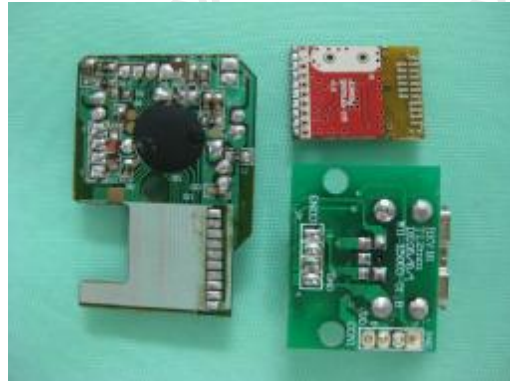
Rear View of the product



Inner Circuit Top View



Inner Circuit Bottom View



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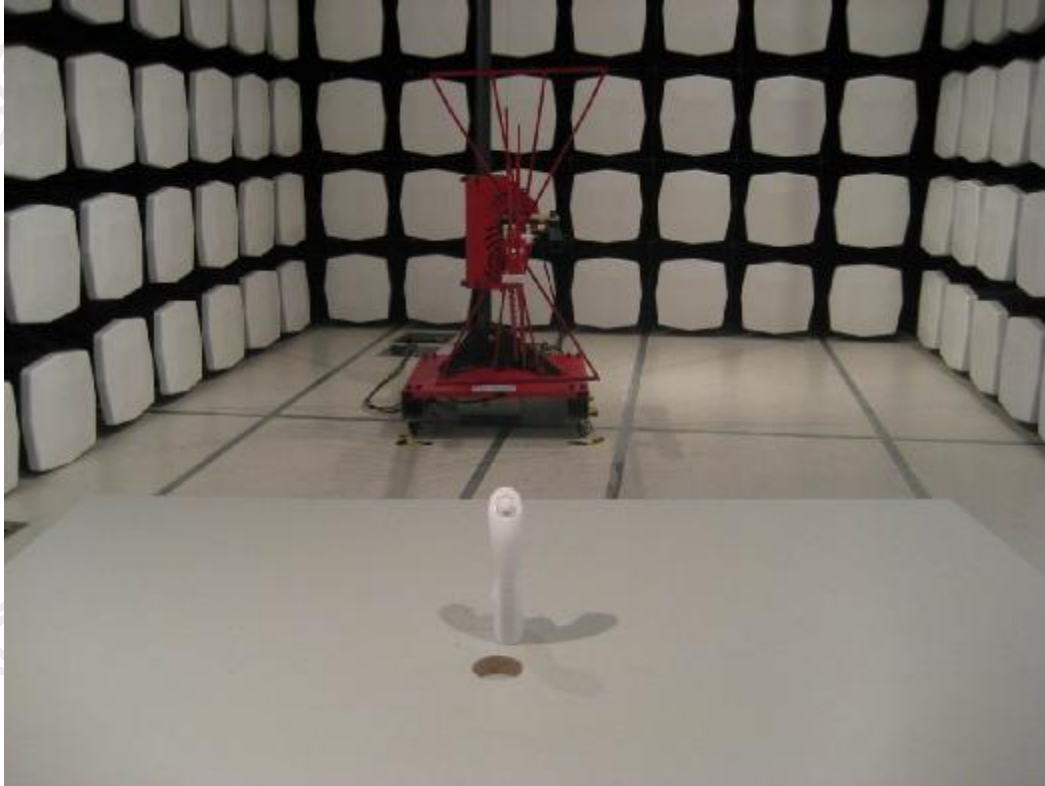
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Photographs of EUT

Measurement of Radiated Emission Test Set Up



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

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