FCC Test Report

Product Name	Wireless Speaker
Model No.	V600
FCC ID.	SCGV6002013

Applicant	Core Brands, LLC
Address	1800 South McDowell Blvd- 2nd Floor, Petaluma, California, United States

Date of Receipt	Apr. 22, 2013
Issued Date	May 28, 2013
Report No.	134418R-RFUSP43V01
Report Version	V1.0

Testing Laboratory
0914

Test Report Certification

Issued Date: May 28, 2013
Report No.: 134418R-RFUSP43V01

Product Name	Wireless Speaker
Applicant	Core Brands, LLC
Address	1800 South McDowell Blvd- 2nd Floor, Petaluma, California, United States
Manufacturer	Core Brands, LLC
Model No.	V600
FCC ID.	SCGV6002013
EUT Rated Voltage	AC 100-240V, 50-60Hz or DC 9V by battery
EUT Test Voltage	AC 120V/ 60Hz
Trade Name	Korus
Applicable Standard	FCC CFR Title 47 Part 15 Subpart C: 2012 ANSI C63.4: 2003, ANSI C63.10: 2009
Test Result	Complied

The Test Results relate only to the samples tested.
The test report shall not be reproduced except in full without the written approval of QuieTek Corporation.
This report must not be used to claim product endorsement by TAF or any agency of the U.S. Government

Documented By : Rita Huang
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(Engineer / Nowal Kuo)

Approved By :
(Manager / Vincent Lin)

TABLE OF CONTENTS

1. GENERAL INFORMATION

1.1. EUT Description

Product Name	Wireless Speaker
Trade Name	Korus
Model No.	V600
FCC ID.	SCGV6002013
Frequency Range	2403.585 – 2477.313MHz
Channel Number	49
Type of Modulation	FHSS: FSK
Antenna Type	Copper Tube Antenna
Channel Control	Auto
Antenna Gain	Refer to the table “Antenna List”
RCA to Audio Cable	Non-Shielded, 1.8m
Power Cable	Non-Shielded, 1.8m
SKAA USB TX	MFR: SKAA, M/N: PL5557

Antenna List

No.	Manufacturer	Part No.	Antenna Type	Peak Gain
1	Shengyih	907X00352X2	Copper Tube	3.37 dBi for 2.4 GHz

Note: The antenna of EUT is conform to FCC 15.203.

Center Frequency of Each Channel:

Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
Channel 01:	2403.585 MHz	Channel 02:	2405.121 MHz	Channel 03:	2406.657 MHz	Channel 04:	2408.193 MHz
Channel 05:	2409.729 MHz	Channel 06:	2411.265 MHz	Channel 07:	2412.801 MHz	Channel 08:	2414.337 MHz
Channel 09:	2415.873 MHz	Channel 10:	2417.409 MHz	Channel 11:	2418.945 MHz	Channel 12:	2420.481 MHz
Channel 13:	2422.017 MHz	Channel 14:	2423.553 MHz	Channel 15:	2425.089 MHz	Channel 16:	2426.625 MHz
Channel 17:	2428.161 MHz	Channel 18:	2429.697 MHz	Channel 19:	2431.233 MHz	Channel 20:	2432.769 MHz
Channel 21:	2434.305 MHz	Channel 22:	2435.841 MHz	Channel 23:	2437.377 MHz	Channel 24:	2438.913 MHz
Channel 25:	2440.449 MHz	Channel 26:	2441.985 MHz	Channel 27:	2443.521 MHz	Channel 28:	2445.057 MHz
Channel 29:	2446.593 MHz	Channel 30:	2448.129 MHz	Channel 31:	2449.665 MHz	Channel 32:	2451.201 MHz
Channel 33:	2452.737 MHz	Channel 34:	2454.273 MHz	Channel 35:	2455.809 MHz	Channel 36:	2457.345 MHz
Channel 37:	2458.881 MHz	Channel 38:	2460.417 MHz	Channel 39:	2461.953 MHz	Channel 40:	2463.489 MHz
Channel 41:	2465.025 MHz	Channel 42:	2466.561 MHz	Channel 43:	2468.097 MHz	Channel 44:	2469.633 MHz
Channel 45:	2471.169 MHz	Channel 46:	2472.705 MHz	Channel 47:	2474.241 MHz	Channel 48:	2475.777 MHz
Channel 49:	2477.313 MHz						

Note:

1. The EUT is a Wireless Speaker with a built-in 2.4GHz transceiver.
2. These tests were conducted on a sample for the purpose of demonstrating compliance of FHSS transmitter with Part 15 Subpart C Paragraph 15.247 for spread spectrum devices.
3. Regarding to the operation frequency, the lowest, middle and highest frequency are selected to perform the test.
4. "The Wireless Speaker operation with USB TX, the USB TX has been granted under the FCC ID: OP5PL5557 and IC: 3534A-PL5557"

Test Mode	Mode 1: Transmit

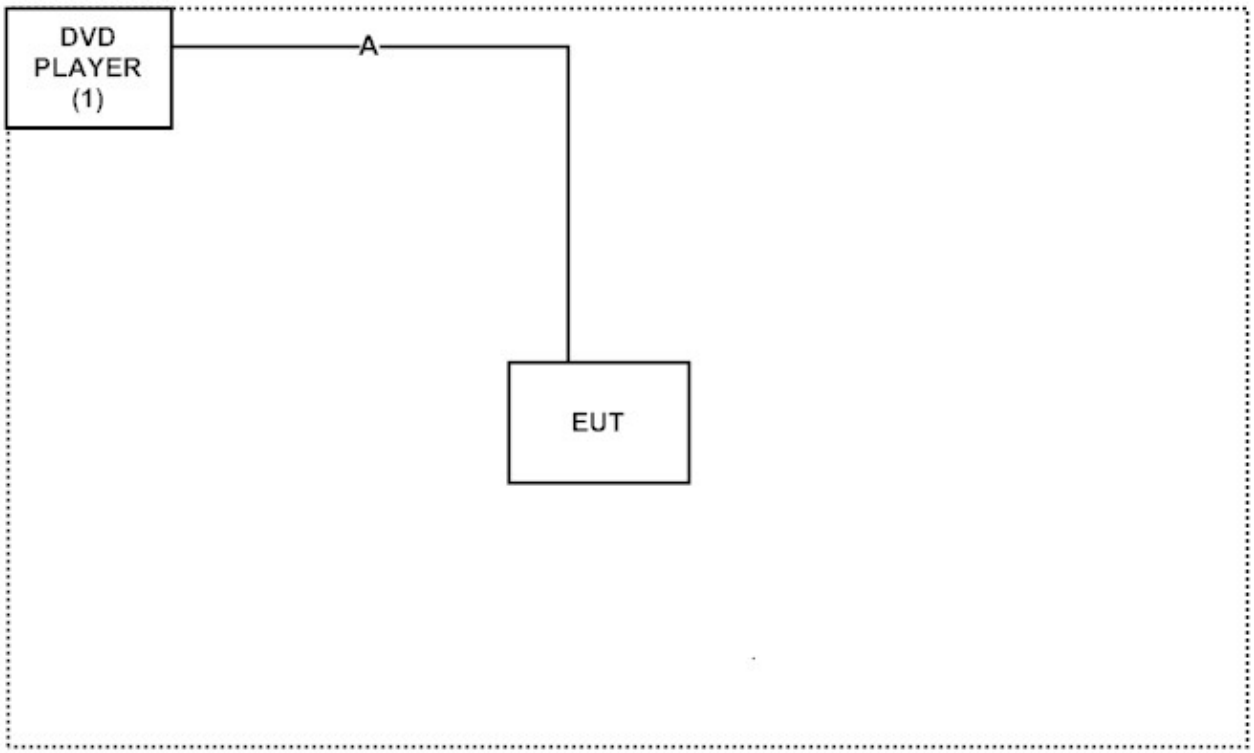
1.3. Tested System Details

The types for all equipment, plus descriptions of all cables used in the tested system (including inserted cards) are:

	Product	Manufacturer	Model No.	Serial No.	Power Cord
1	DVD PLAYER	Pioneer	DV-600AV	GJKD006378LS	Non-Shielded, 1.8m

Signal Cable Type		Signal cable Description
A	RCA to Audio Cable	Non-Shielded, 1.8m

1.4. Configuration of Tested System



1.5. EUT Exercise Software

(1) Setup the EUT as shown in section 1.4.

(2) Press and hold the button on EUT.

(3) Start the continuous transmission.

(4) Verify that the EUT works properly.

1.6. Test Facility

Ambient conditions in the laboratory:

Items	Required (IEC 68-1)	Actual
Temperature (°C)	15-35	20-35
Humidity (%RH)	25-75	30-65
Barometric pressure (mbar)	860-1060	950-1000

The related certificate for our laboratories about the test site and management system can be downloaded from QuieTek Corporation's Web Site: http://www.quietek.com/tw/ctg/cts/accreditations.htm
The address and introduction of QuieTek Corporation's laboratories can be founded in our Web site: http://www.quietek.com/

Site Description: File on
Federal Communications Commission
FCC Engineering Laboratory
7435 Oakland Mills Road
Columbia, MD 21046
Registration Number: 92195

Site Name: Quietek Corporation
Site Address: No.5-22, Ruishukeng,
Linkou Dist. New Taipei City 24451,
Taiwan, R.O.C.
TEL: 886-2-8601-3788 / FAX : 886-2-8601-3789
E-Mail : service@quietek.com

FCC Accreditation Number: TW1014

2. Conducted Emission

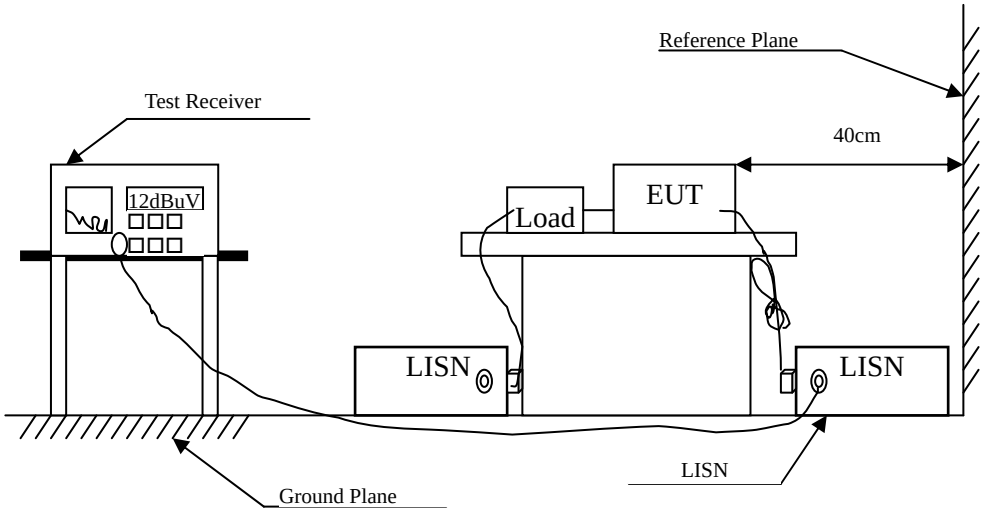
2.1. Test Equipment

	Equipment	Manufacturer	Model No. / Serial No.	Last Cal.	Remark
X	Test Receiver	R & S	ESCS 30 / 825442/018	Sep., 2012	
X	Artificial Mains Network	R & S	ENV4200 / 848411/10	Feb., 2013	Peripherals
X	LISN	R & S	ESH3-Z5 / 825562/002	Feb., 2013	EUT
	DC LISN	Schwarzbeck	8226 / 176	Mar, 2013	EUT
X	Pulse Limiter	R & S	ESH3-Z2 / 357.8810.52	Feb., 2013	
	No.1 Shielded Room				

Note:

1. All equipments are calibrated every one year.
2. The test instruments marked by “X” are used to measure the final test results.

2.2. Test Setup



2.3. Limits

FCC Part 15 Subpart C Paragraph 15.207 (dBuV) Limit		
Frequency MHz	Limits	
	QP	AV
0.15 - 0.50	66-56	56-46
0.50-5.0	56	46
5.0 - 30	60	50

Remarks: In the above table, the tighter limit applies at the band edges.

2.4. Test Procedure

The EUT and Peripherals are connected to the main power through a line impedance stabilization network (L.I.S.N.). This provides a 50 ohm /50uH coupling impedance for the measuring equipment. The peripheral devices are also connected to the main power through a LISN that provides a 50ohm /50uH coupling impedance with 50ohm termination. (Please refer to the block diagram of the test setup and photographs.)

Both sides of A.C. line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all the interface cables must be changed according to ANSI C63.10: 2009 on conducted measurement.

Conducted emissions were invested over the frequency range from 0.15MHz to 30MHz using a receiver bandwidth of 9kHz.

The EUT was setup to ANSI C63.10: 2009; tested to FHSS test procedure of FCC Public Notice DA 00-705 for compliance to FCC 47CFR 15.247 requirements.

2.5. Uncertainty

± 2.26 dB

2.6. Test Result of Conducted Emission

Product : Wireless Speaker
Test Item : Conducted Emission Test
Power Line : Line 1
Test Mode : Mode 1: Transmit (2438.913MHz)

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBuV	dBuV	dB	dBuV
LINE 1					
Quasi-Peak					
0.166	9.790	33.280	43.070	-22.473	65.543
0.193	9.790	33.760	43.550	-21.221	64.771
0.275	9.790	21.650	31.440	-30.989	62.429
0.314	9.790	14.160	23.950	-37.364	61.314
0.365	9.790	10.560	20.350	-39.507	59.857
0.548	9.790	1.690	11.480	-44.520	56.000
Average					
0.166	9.790	17.050	26.840	-28.703	55.543
0.193	9.790	21.380	31.170	-23.601	54.771
0.275	9.790	12.540	22.330	-30.099	52.429
0.314	9.790	7.870	17.660	-33.654	51.314
0.365	9.790	5.090	14.880	-34.977	49.857
0.548	9.790	-1.500	8.290	-37.710	46.000

Note:

1. All Reading Levels are Quasi-Peak and average value.
2. " " means the worst emission level.
3. Measurement Level = Reading Level + Correct Factor

Product : Wireless Speaker
Test Item : Conducted Emission Test
Power Line : Line 2
Test Mode : Mode 1: Transmit (2438.913MHz)

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBuV	dBuV	dB	dBuV
LINE 2					
Quasi-Peak					
0.166	9.770	33.220	42.990	-22.553	65.543
0.193	9.770	33.080	42.850	-21.921	64.771
0.283	9.770	22.580	32.350	-29.850	62.200
0.396	9.770	9.510	19.280	-39.691	58.971
1.591	9.790	0.980	10.770	-45.230	56.000
3.525	9.810	1.490	11.300	-44.700	56.000
Average					
0.166	9.770	25.510	35.280	-20.263	55.543
0.193	9.770	15.440	25.210	-29.561	54.771
0.283	9.770	7.610	17.380	-34.820	52.200
0.396	9.770	1.410	11.180	-37.791	48.971
1.591	9.790	-2.970	6.820	-39.180	46.000
3.525	9.810	-2.860	6.950	-39.050	46.000

Note:

1. All Reading Levels are Quasi-Peak and average value.
2. " " means the worst emission level.
3. Measurement Level = Reading Level + Correct Factor

3. Peak Power Output

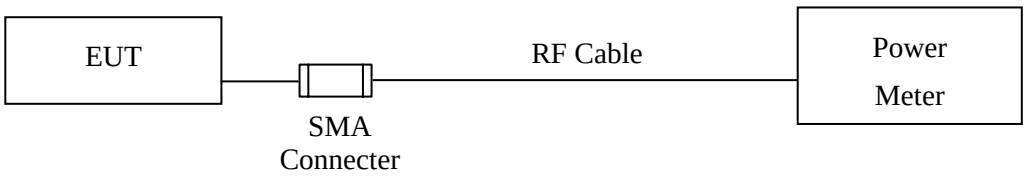
3.1. Test Equipment

	Equipment	Manufacturer	Model No./Serial No.	Last Cal.
X	Power Meter	Anritsu	ML2495A/6K00003357	May, 2013
X	Power Sensor	Anritsu	MA2411B/0738448	Jun, 2012

Note: 1. All equipments are calibrated every one year.

2. The test instruments marked by "X" are used to measure the final test results.

3.2. Test Setup



3.3. Limit

The maximum peak power shall be less 0.125Watt.

3.4. Test Procedure

The EUT was setup to ANSI C63.10: 2009; tested to FHSS test procedure of FCC Public Notice DA 00-705 for compliance to FCC 47CFR 15.247 requirements.

3.5. Uncertainty

± 1.27 dB

3.6. Test Result of Peak Power Output

Product : Wireless Speaker
Test Item : Peak Power Output
Test Site : No.3 OATS
Test Mode : Mode 1: Transmit

Channel No.	Frequency (MHz)	Measurement (dBm)	Required Limit	Result
Channel 01	2403.585	7.90	0.125 Watt= 21 dBm	Pass
Channel 24	2438.913	7.30	0.125 Watt= 21 dBm	Pass
Channel 49	2477.313	7.69	0.125 Watt= 21 dBm	Pass

4. Radiated Emission

4.1. Test Equipment

The following test equipments are used during the radiated emission test:

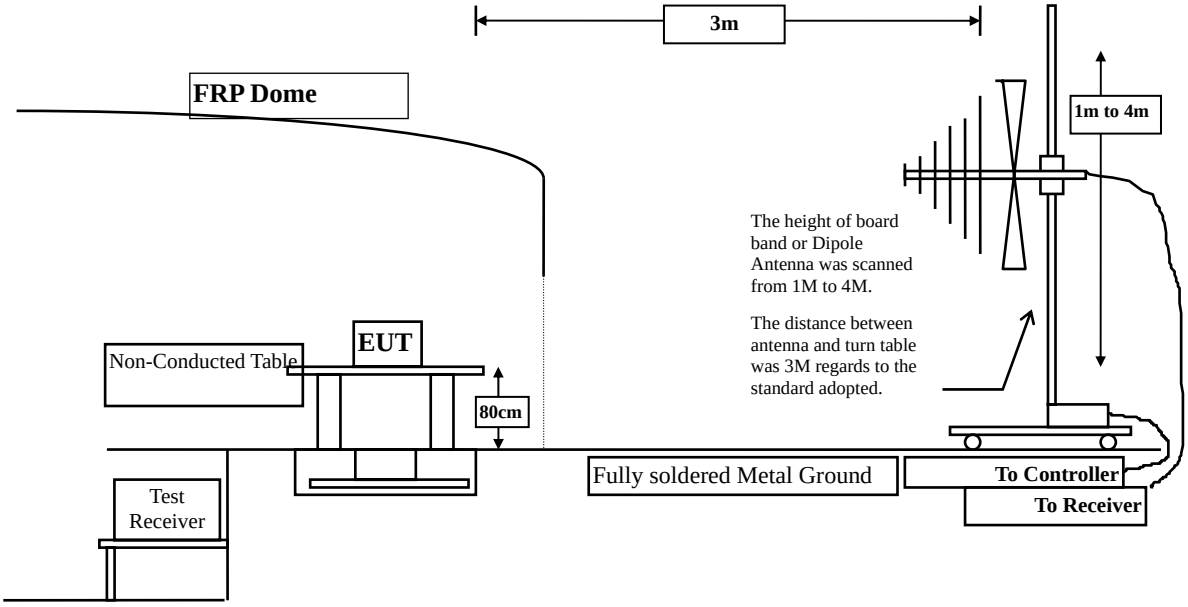
Test Site		Equipment	Manufacturer	Model No./Serial No.	Last Cal.
☒Site # 3	X	Loop Antenna	Teseq	HLA6120 / 26739	Jul., 2012
	X	Bilog Antenna	Schaffner Chase	CBL6112B/2673	Sep., 2012
	X	Horn Antenna	Schwarzbeck	BBHA9120D/D305	Sep., 2012
	X	Horn Antenna	Schwarzbeck	BBHA9170/208	Jul., 2012
	X	Pre-Amplifier	Agilent	8447D/2944A09549	Sep., 2012
	X	Spectrum Analyzer	Agilent	E4407B / US39440758	May, 2013
	X	Test Receiver	R & S	ESCS 30/ 825442/018	Sep., 2012
	X	Coaxial Cable	QuieTek	QTK-CABLE/ CAB5	Feb., 2013
	X	Controller	QuieTek	QTK-CONTROLLER/ CTRL3	N/A
	X	Coaxial Switch	Anritsu	MP59B/6200265729	N/A

Note: 1. All equipments are calibrated every one year.

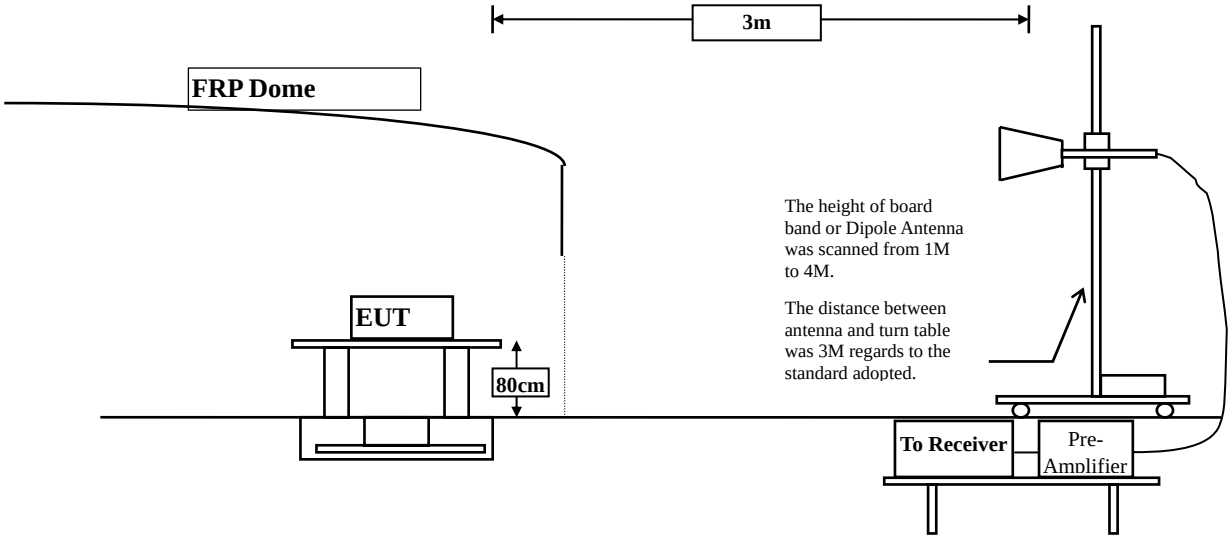
2. The test instruments marked by "X" are used to measure the final test results.

4.2. Test Setup

Below 1GHz



Above 1GHz



4.3. Limits

➢ **General Radiated Emission Limits**

Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 20dB below the level of the fundamental or to the general radiated emission limits in paragraph 15.209, whichever is the lesser attenuation.

FCC Part 15 Subpart C Paragraph 15.209 Limits		
Frequency MHz	Field strength (microvolts/meter)	Measurement distance (meter)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

Remarks: 1. RF Voltage (dBuV) = 20 log RF Voltage (uV)

2. In the Above Table, the tighter limit applies at the band edges.

3. Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system.

4.4. Test Procedure

The EUT was setup according to ANSI C63.10, 2009 and tested according to FHSS test procedure of FCC Public Notice DA 00-705 for compliance to FCC 47CFR 15.247 requirements.

The EUT is placed on a turn table which is 0.8 meter above ground. The turn table is rotated 360 degrees to determine the position of the maximum emission level. The EUT was positioned such that the distance from antenna to the EUT was 3 meters.

The antenna is scanned from 1 meter to 4 meters to find out the maximum emission level. This is repeated for both horizontal and vertical polarization of the antenna. In order to find the maximum emission, all of the interface cables were manipulated according to ANSI C63.10: 2009 on radiated measurement.

The resolution bandwidth below 30MHz setting on the field strength meter is 9kHz and 30MHz~1GHz is 120kHz and above 1GHz is 1MHz.

Radiated emission measurements below 30MHz are made using Loop Antenna and 30MHz~1GHz are made using broadband Bilog antenna and above 1GHz are made using Horn Antennas.

The measurement is divided into the Preliminary Measurement and the Final Measurement.

The suspected frequencies are searched for in Preliminary Measurement with the measurement antenna kept pointed at the source of the emission both in azimuth and elevation, with the polarization of the antenna oriented for maximum response. The antenna is pointed at an angle towards the source of the emission, and the EUT is rotated in both height and polarization to maximize the measured emission. The emission is kept within the illumination area of the 3 dB bandwidth of the antenna.

The worst radiated emission is measured on the Final Measurement.

The measurement frequency range form 9KHz - 10th Harmonic of fundamental was investigated.

4.5. Uncertainty

± 3.9 dB above 1GHz

± 3.8 dB below 1GHz

4.6. Test Result of Radiated Emission

Product : Wireless Speaker
Test Item : Harmonic Radiated Emission
Test Site : No.3 OATS
Test Mode : Mode 1: Transmit (2403.585MHz)

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBuV	dBuV/m	dB	dBuV/m
Horizontal					
Peak Detector:					
4807.000	2.537	46.640	49.177	-24.823	74.000
7210.500	9.461	52.680	62.141	-11.859	74.000
9614.000	10.338	44.550	54.888	-19.112	74.000
Average					
Detector:					
7210.500	9.461	43.590	53.051	-0.949	54.000
9614.000	10.338	32.520	42.858	-11.142	54.000
Vertical					
Peak Detector:					
4807.000	2.935	49.820	52.756	-21.244	74.000
7210.500	9.942	50.490	60.432	-13.568	74.000
9614.000	10.804	42.100	52.904	-21.096	74.000
Average					
Detector:					
7210.500	9.942	41.130	51.072	-2.928	54.000

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. Measurement Level = Reading Level + Correct Factor.
5. Correct Factor = Antenna factor + Cable loss –Amplifier gain.
6. The average measurement was not performed when the peak measured data under the limit of average detection.
7. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product : Wireless Speaker
Test Item : Harmonic Radiated Emission
Test Site : No.3 OATS
Test Mode : Mode 1: Transmit (2438.913MHz)

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBuV	dBuV/m	dB	dBuV/m
Horizontal					
Peak Detector:					
4877.800	2.053	48.020	50.072	-23.928	74.000
7316.700	9.630	50.910	60.540	-13.460	74.000
9755.600	9.648	43.640	53.287	-20.713	74.000
Average Detector:					
7316.700	9.630	41.630	51.260	-2.740	54.000
Vertical					
Peak Detector:					
4877.800	2.512	47.600	50.111	-23.889	74.000
7316.700	10.224	50.720	60.945	-13.055	74.000
9755.600	10.284	42.000	52.283	-21.717	74.000
Average Detector:					
7316.700	10.224	41.340	51.565	-2.435	54.000

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. Measurement Level = Reading Level + Correct Factor.
5. Correct Factor = Antenna factor + Cable loss –Amplifier gain.
6. The average measurement was not performed when the peak measured data under the limit of average detection.
7. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product : Wireless Speaker
Test Item : Harmonic Radiated Emission
Test Site : No.3 OATS
Test Mode : Mode 1: Transmit (2477.313MHz)

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBuV	dBuV/m	dB	dBuV/m
Horizontal					
Peak Detector:					
4954.600	2.528	47.810	50.339	-23.661	74.000
7431.900	10.523	48.130	58.653	-15.347	74.000
9909.200	10.189	44.590	54.779	-19.221	74.000
Average Detector:					
7431.900	10.523	38.180	48.703	-5.297	54.000
9909.200	10.189	30.900	41.089	-12.911	54.000
Vertical					
Peak Detector:					
4954.600	3.314	46.490	49.805	-24.195	74.000
7431.900	11.220	47.720	58.941	-15.059	74.000
9909.200	11.240	45.620	56.860	-17.140	74.000
Average Detector:					
7431.900	11.220	37.790	49.011	-4.989	54.000
9909.200	11.240	33.800	45.040	-8.960	54.000

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. Measurement Level = Reading Level + Correct Factor.
5. Correct Factor = Antenna factor + Cable loss –Amplifier gain.
6. The average measurement was not performed when the peak measured data under the limit of average detection.
7. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product : Wireless Speaker
Test Item : General Radiated Emission
Test Site : No.3 OATS
Test Mode : Mode 1: Transmit (2438.913MHz)

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBuV	dBuV/m	dB	dBuV/m
Horizontal					
39.700	-3.625	31.602	27.977	-12.023	40.000
307.420	-4.120	40.181	36.061	-9.939	46.000
381.140	1.386	34.895	36.281	-9.719	46.000
582.900	3.351	23.844	27.195	-18.805	46.000
798.240	6.409	22.972	29.380	-16.620	46.000
967.020	7.299	22.579	29.878	-24.122	54.000
Vertical					
307.420	-4.030	35.514	31.484	-14.516	46.000
381.140	0.816	27.533	28.349	-17.651	46.000
617.820	0.958	26.047	27.005	-18.995	46.000
689.600	2.302	25.083	27.385	-18.615	46.000
806.000	3.686	22.175	25.861	-20.139	46.000
928.220	3.640	22.741	26.381	-19.619	46.000

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. Measurement Level = Reading Level + Correct Factor.
5. Correct Factor = Antenna factor + Cable loss –Amplifier gain.
6. The average measurement was not performed when the peak measured data under the limit of average detection.
7. The emission levels of other frequencies are very lower than the limit and not show in test report.
8. No emission found between lowest internal used/generated frequency to 30MHz.

5. RF Antenna Conducted Test

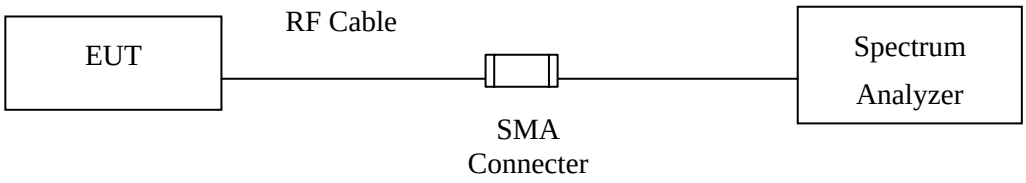
5.1. Test Equipment

	Equipment	Manufacturer	Model No./Serial No.	Last Cal.
	Spectrum Analyzer	R&S	FSP40 / 100170	Jun, 2012
	Spectrum Analyzer	Agilent	E4407B / US39440758	Jun, 2012
X	Spectrum Analyzer	Agilent	N9010A / MY48030495	Apr., 2013

Note: 1. All equipments are calibrated every one year.

2. The test instruments Marked "X" are used to measure the final test results.

5.2. Test Setup



5.3. Limits

According to FCC Section 15.247(d). In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, the attenuation required under this paragraph shall be 30 dB instead of 20 dB.

5.4. Test Procedure

The EUT was setup to ANSI C63.10: 2009; tested to FHSS test procedure of FCC Public Notice DA 00-705 for compliance to FCC 47CFR 15.247 requirements.

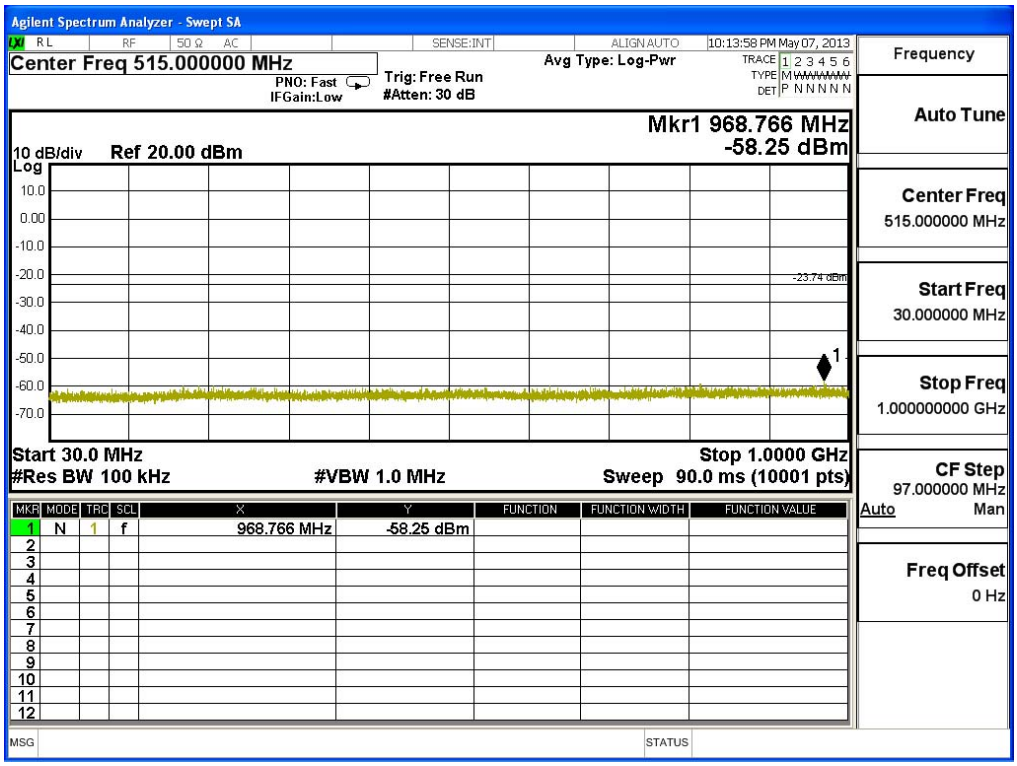
5.5. Uncertainty

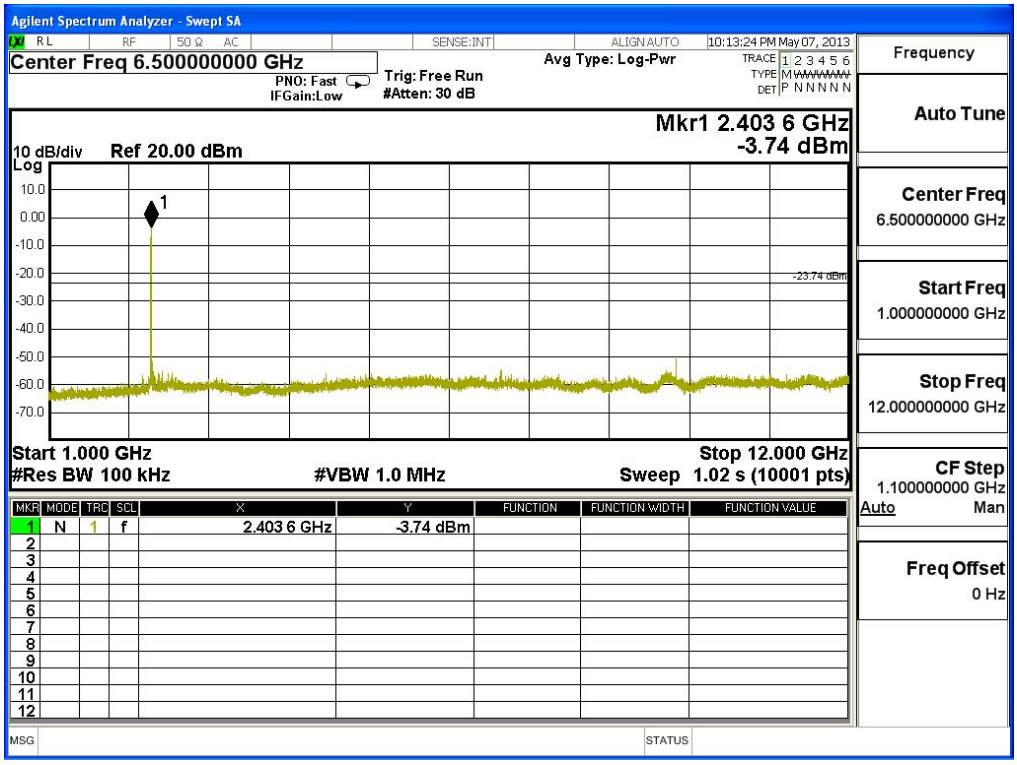
± 150Hz

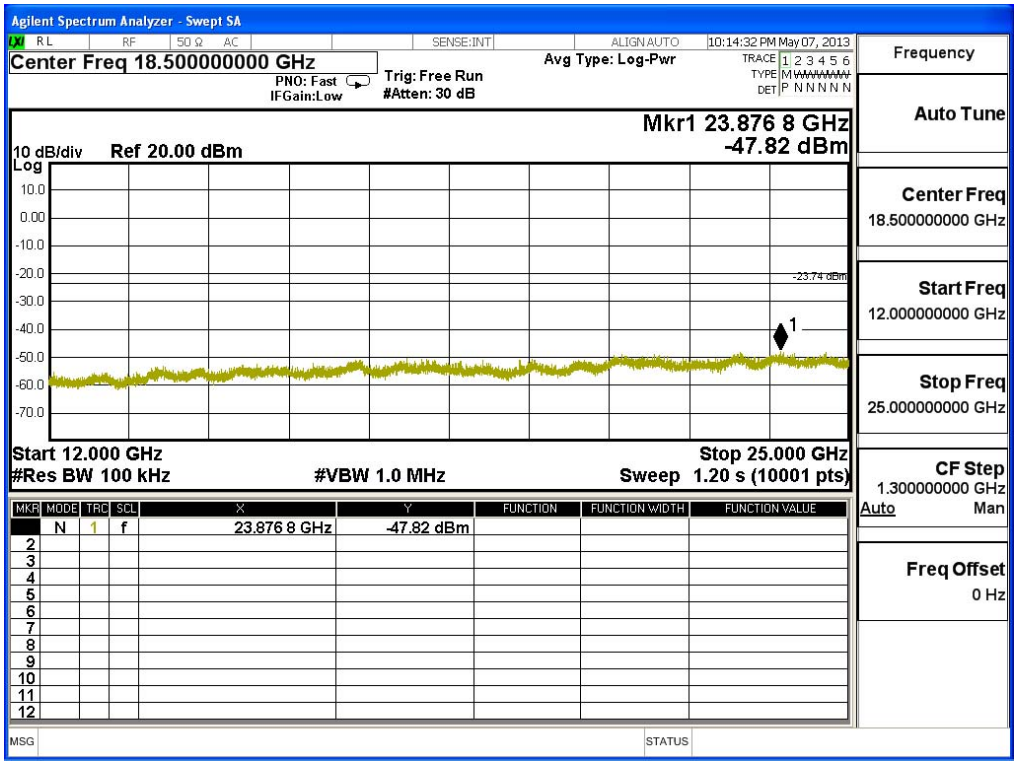
5.6. Test Result of RF Antenna Conducted Test

Product : Wireless Speaker
Test Item : RF Antenna Conducted Test
Test Site : No.3 OATS
Test Mode : Mode 1: Transmit

Figure Channel 01:

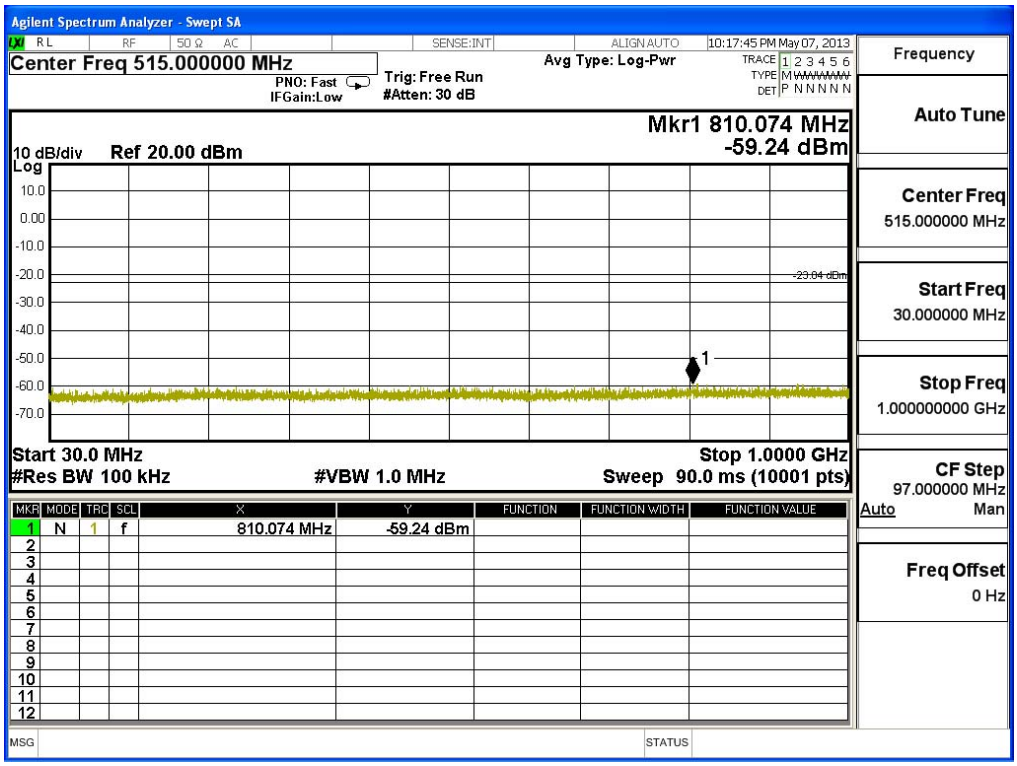


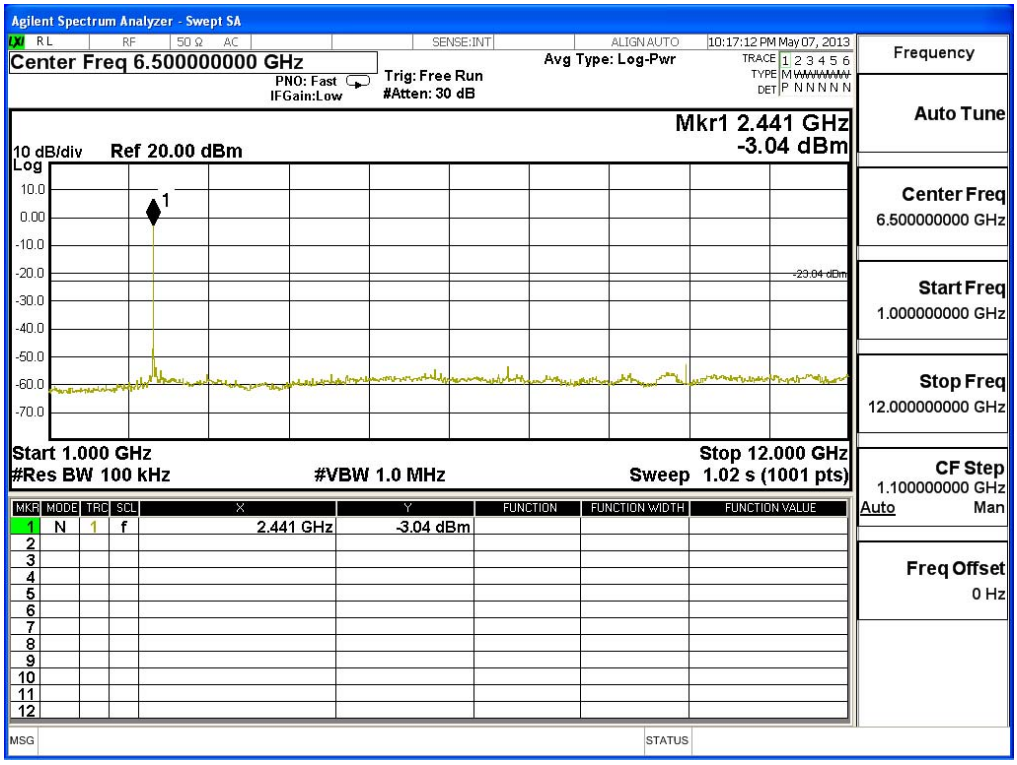

Agilent Spectrum Analyzer - Swept SA
Center Freq 6.500000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 30 dB
Avg Type: Log-Pwr
10:13:24 PM May 07, 2013
Mkr1 2.403 6 GHz
-3.74 dBm
10 dB/div
Ref 20.00 dBm
Log
-23.74 dBm
Start 1.000 GHz
#Res BW 100 kHz
#VBW 1.0 MHz
Stop 12.000 GHz
Sweep 1.02 s (10001 pts)
1 N 1 f 2.403 6 GHz -3.74 dBm
Frequency
Auto Tune
Center Freq
6.500000000 GHz
Start Freq
1.000000000 GHz
Stop Freq
12.000000000 GHz
CF Step
1.100000000 GHz
Auto
Man
Freq Offset
0 Hz

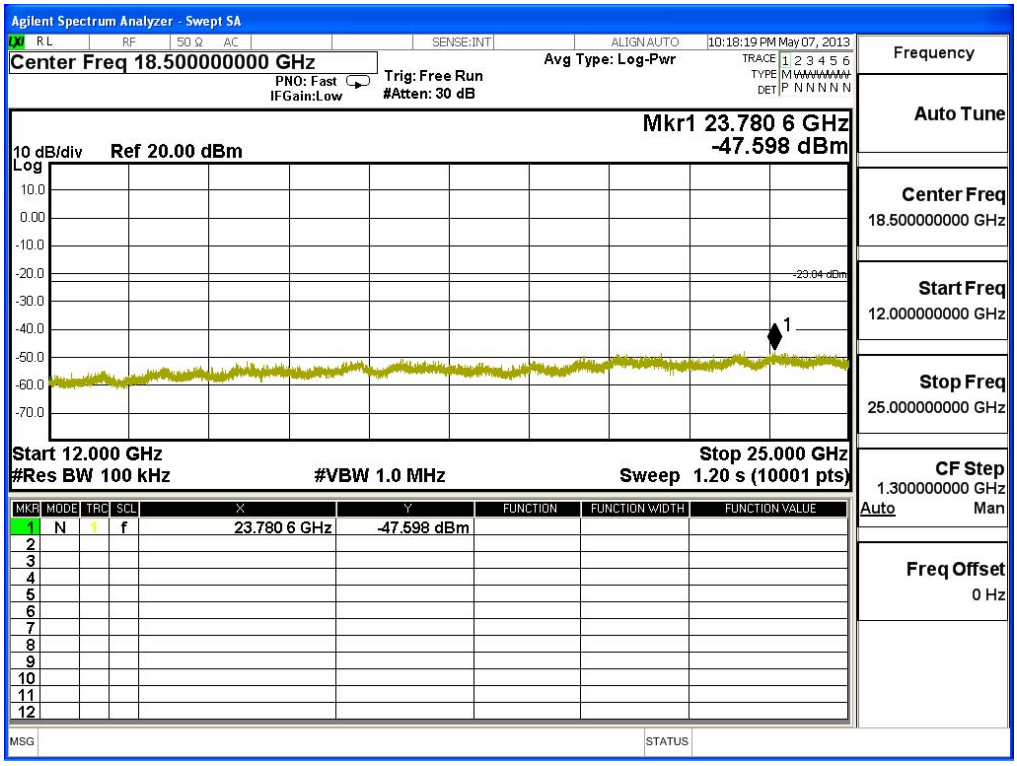

Agilent Spectrum Analyzer - Swept SA
Center Freq 18.500000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 30 dB
Avg Type: Log-Pwr
10:14:32 PM May 07, 2013
Mkr1 23.876 8 GHz
-47.82 dBm
10 dB/div
Ref 20.00 dBm
Log
-23.74 dBm
Start 12.000 GHz
#Res BW 100 kHz
#VBW 1.0 MHz
Stop 25.000 GHz
Sweep 1.20 s (10001 pts)
1 N 1 f 23.876 8 GHz -47.82 dBm
Frequency
Auto Tune
Center Freq
18.500000000 GHz
Start Freq
12.000000000 GHz
Stop Freq
25.000000000 GHz
CF Step
1.300000000 GHz
Auto
Man
Freq Offset
0 Hz

Product : Wireless Speaker
Test Item : RF Antenna Conducted Test
Test Site : No.3 OATS
Test Mode : Mode 1: Transmit

Figure Channel 10:

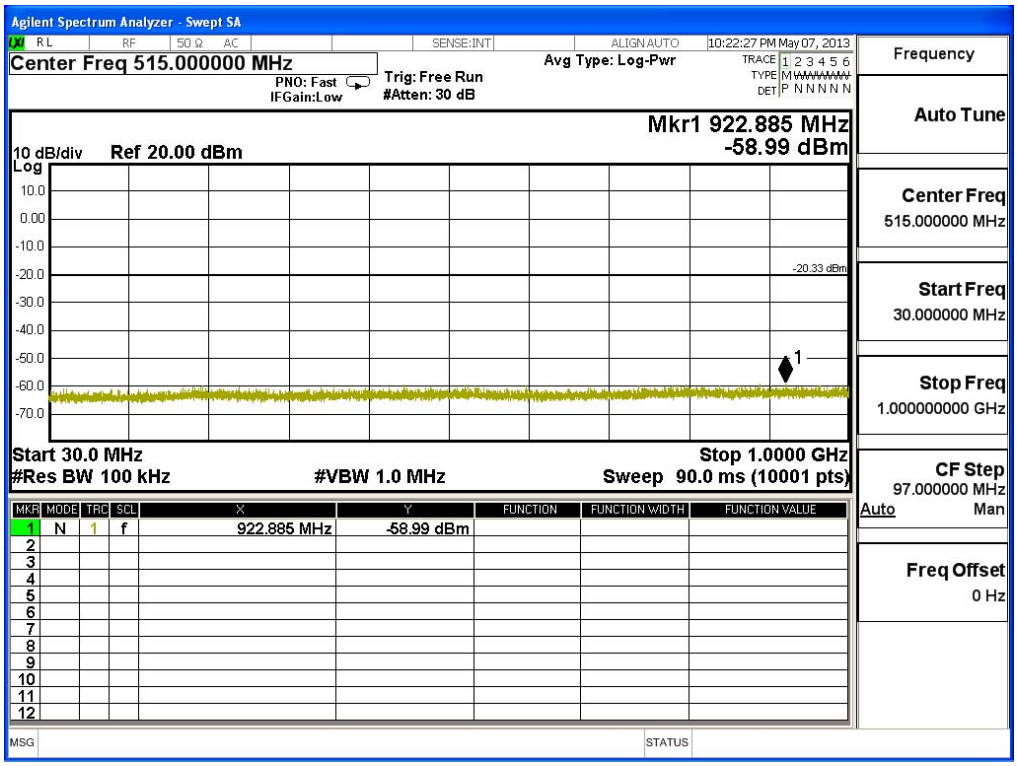


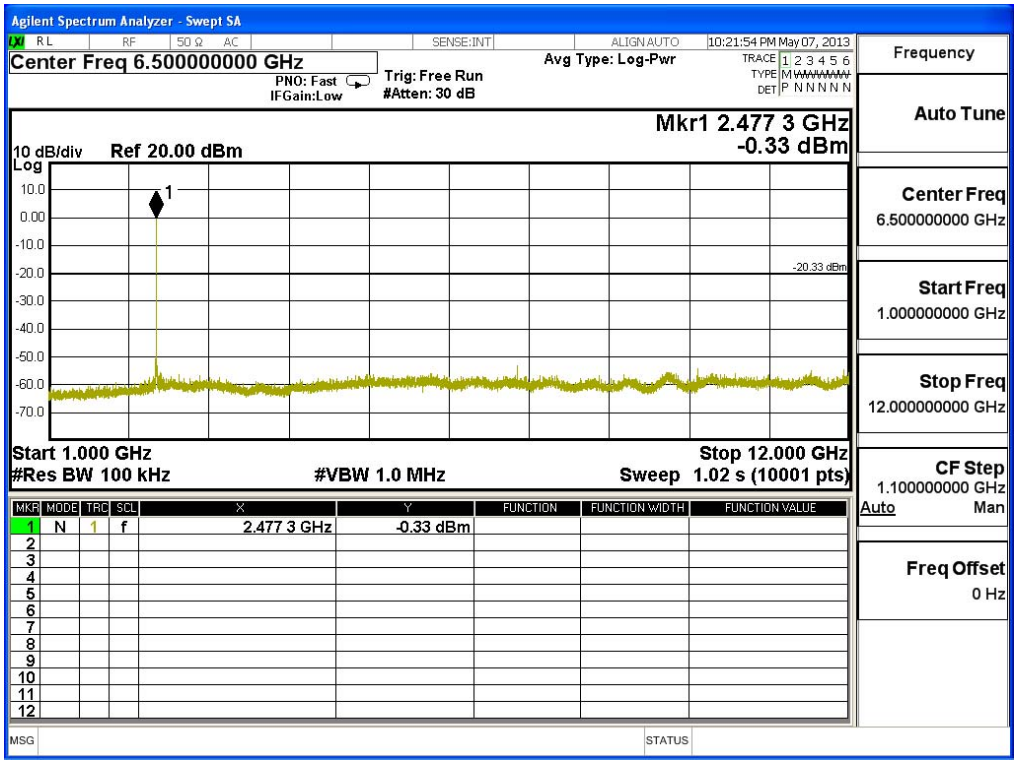

Agilent Spectrum Analyzer - Swept SA
Center Freq 6.500000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 30 dB
Avg Type: Log-Pwr
10:17:12 PM May 07, 2013
Mkr1 2.441 GHz
-3.04 dBm
10 dB/div
Ref 20.00 dBm
Log
-23.04 dBm
Start 1.000 GHz
#Res BW 100 kHz
#VBW 1.0 MHz
Stop 12.000 GHz
Sweep 1.02 s (1001 pts)
1 N 1 f 2.441 GHz -3.04 dBm
Frequency
Auto Tune
Center Freq
6.500000000 GHz
Start Freq
1.000000000 GHz
Stop Freq
12.000000000 GHz
CF Step
1.100000000 GHz
Auto
Man
Freq Offset
0 Hz
MSG
STATUS

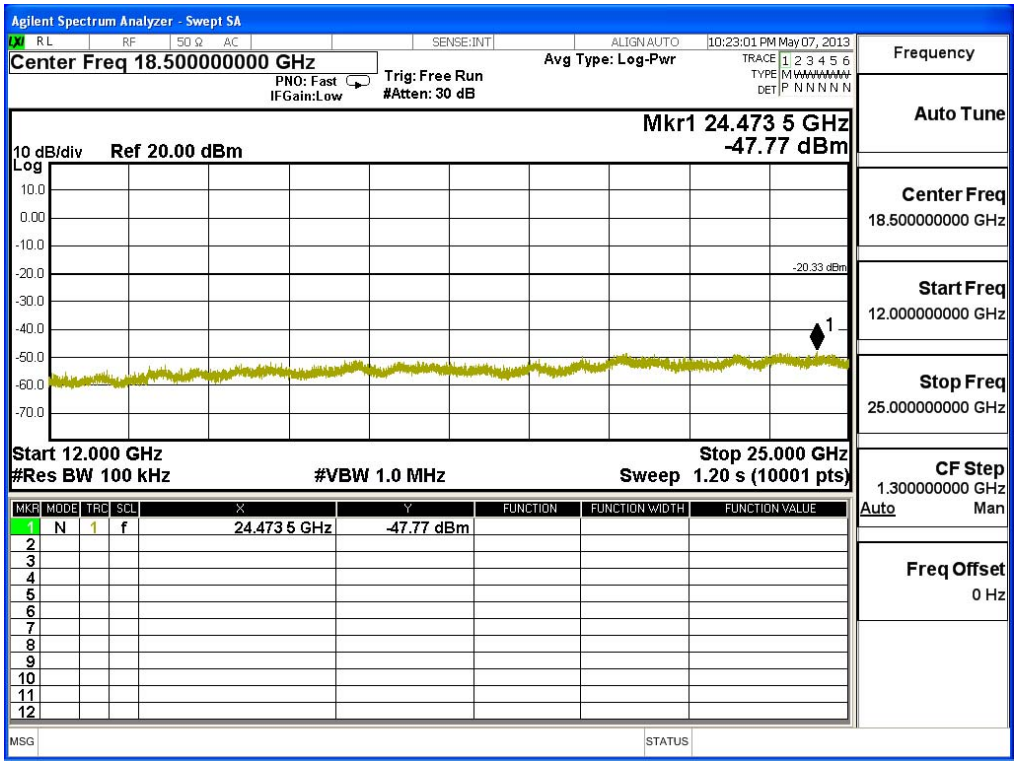

Agilent Spectrum Analyzer - Swept SA
Center Freq 18.500000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 30 dB
Avg Type: Log-Pwr
10:18:19 PM May 07, 2013
Mkr1 23.780 6 GHz
-47.598 dBm
10 dB/div
Ref 20.00 dBm
Log
-23.04 dBm
Start 12.000 GHz
#Res BW 100 kHz
#VBW 1.0 MHz
Stop 25.000 GHz
Sweep 1.20 s (10001 pts)
1 N 1 f 23.780 6 GHz -47.598 dBm
Frequency
Auto Tune
Center Freq
18.500000000 GHz
Start Freq
12.000000000 GHz
Stop Freq
25.000000000 GHz
CF Step
1.300000000 GHz
Auto
Man
Freq Offset
0 Hz
MSG
STATUS

Product : Wireless Speaker
Test Item : RF Antenna Conducted Test
Test Site : No.3 OATS
Test Mode : Mode 1: Transmit

Figure Channel 20:




Agilent Spectrum Analyzer - Swept SA
Center Freq 6.500000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 30 dB
Avg Type: Log-Pwr
10:21:54 PM May 07, 2013
Mkr1 2.477 3 GHz
-0.33 dBm
10 dB/div
Ref 20.00 dBm
-20.33 dBm
Start 1.000 GHz
#Res BW 100 kHz
#VBW 1.0 MHz
Stop 12.000 GHz
Sweep 1.02 s (10001 pts)
1 N 1 f 2.477 3 GHz -0.33 dBm
Frequency
Auto Tune
Center Freq
6.500000000 GHz
Start Freq
1.000000000 GHz
Stop Freq
12.000000000 GHz
CF Step
1.100000000 GHz
Auto
Man
Freq Offset
0 Hz


Agilent Spectrum Analyzer - Swept SA
Center Freq 18.500000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 30 dB
Avg Type: Log-Pwr
10:23:01 PM May 07, 2013
Mkr1 24.473 5 GHz
-47.77 dBm
10 dB/div
Ref 20.00 dBm
-20.33 dBm
Start 12.000 GHz
#Res BW 100 kHz
#VBW 1.0 MHz
Stop 25.000 GHz
Sweep 1.20 s (10001 pts)
1 N 1 f 24.473 5 GHz -47.77 dBm
Frequency
Auto Tune
Center Freq
18.500000000 GHz
Start Freq
12.000000000 GHz
Stop Freq
25.000000000 GHz
CF Step
1.300000000 GHz
Auto
Man
Freq Offset
0 Hz

6. Band Edge

6.1. Test Equipment

RF Radiated Measurement:

The following test equipments are used during the band edge tests:

Test Site		Equipment	Manufacturer	Model No./Serial No.	Last Cal.
☒Site # 3		Bilog Antenna	Schaffner Chase	CBL6112B/2673	Sep., 2012
	X	Horn Antenna	Schwarzbeck	BBHA9120D/D305	Sep., 2012
		Horn Antenna	Schwarzbeck	BBHA9170/208	Jul., 2012
	X	Pre-Amplifier	Agilent	8447D/2944A09549	Sep., 2012
	X	Spectrum Analyzer	Agilent	E4407B / US39440758	May, 2013
		Test Receiver	R & S	ESCS 30/ 825442/018	Sep., 2012
	X	Coaxial Cable	QuieTek	QTK-CABLE/ CAB5	Feb., 2013
	X	Controller	QuieTek	QTK-CONTROLLER/ CTRL3	N/A
	X	Coaxial Switch	Anritsu	MP59B/6200265729	N/A

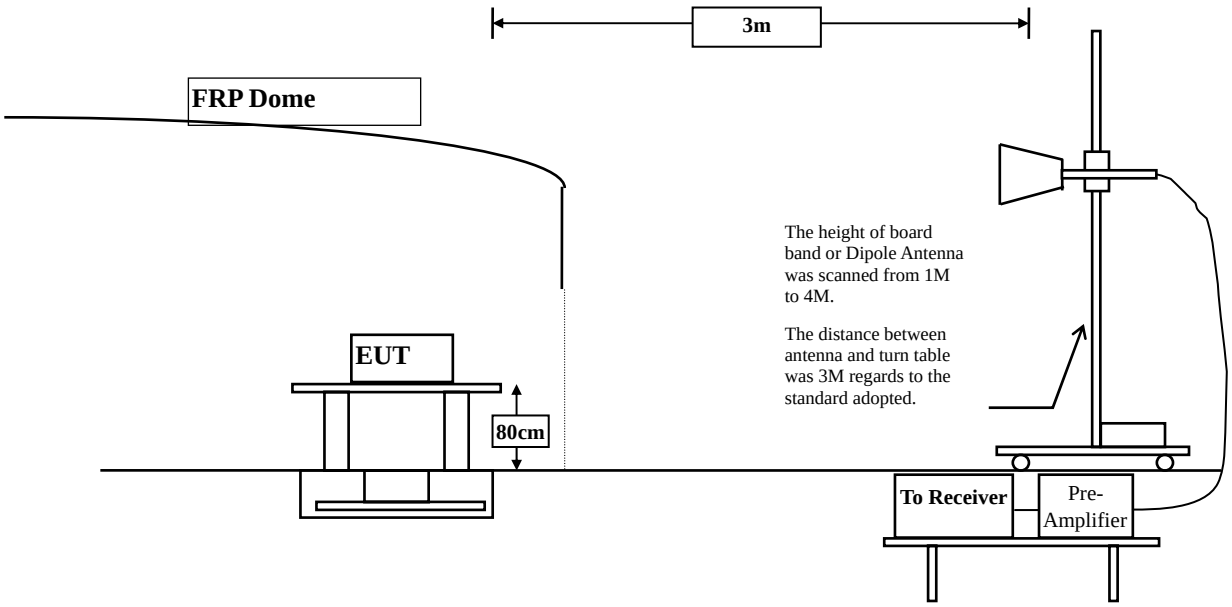
Note: 1. All equipments are calibrated every one year.

2. The test instruments marked by "X" are used to measure the final test results.

6.2. Test Setup

RF Radiated Measurement:

Above 1GHz



6.3. Limit

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. Attenuation below the general limits specified in Section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 15.205(c)).

6.4. Test Procedure

The EUT and its simulators are placed on a turn table which is 0.8 meter above ground. The turn table can rotate 360 degrees to determine the position of the maximum emission level. The EUT was positioned such that the distance from antenna to the EUT was 3 meters.
The antenna can move up and down between 1 meter and 4 meters to find out the maximum emission level.
Both horizontal and vertical polarization of the antenna are set on measurement. In order to find the maximum emission, all of the interface cables must be manipulated according to ANSI C63.10:2009 on radiated measurement.
The bandwidth below 1GHz setting on the field strength meter is 120 kHz, above 1GHz are 1 MHz.
The EUT was setup to ANSI C63.10, 2009; tested to FHSS test procedure of FCC Public Notice DA 00-705 for compliance to FCC 47CFR 15.247 requirements.

6.5. Uncertainty

± 3.9 dB above 1GHz

± 3.8 dB below 1GHz

6.6. Test Result of Band Edge

Product : Wireless Speaker
Test Item : Band Edge Data
Test Site : No.3 OATS
Test Mode : Mode 1: Transmit

RF Radiated Measurement (Horizontal):

Channel No.	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Emission Level (dBuV/m)	Peak Limit (dBuV/m)	Average Limit (dBuV/m)	Result
01 (Peak)	2379.600	33.731	25.159	58.890	74.000	54.000	Pass
01 (Peak)	2390.000	33.739	23.080	56.819	74.000	54.000	Pass
01 (Peak)	2403.200	33.757	60.218	93.974	--	--	--
01 (Average)	2379.600	33.731	13.123	46.854	74.000	54.000	Pass
01 (Average)	2390.000	33.739	13.188	46.927	74.000	54.000	Pass
01 (Average)	2403.600	33.757	57.150	90.907	--	--	--

Figure Channel 01: Horizontal (Peak)

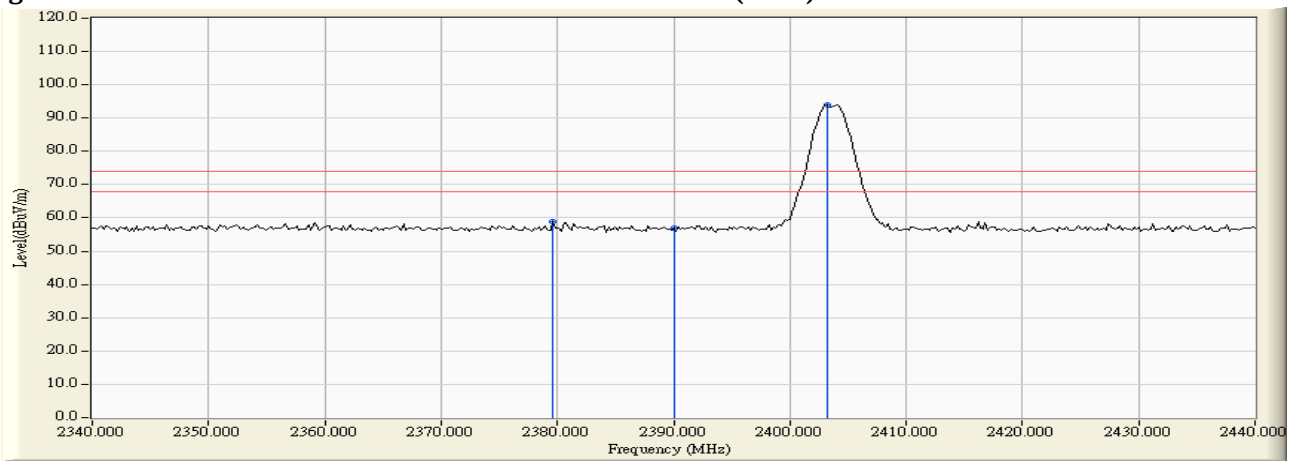
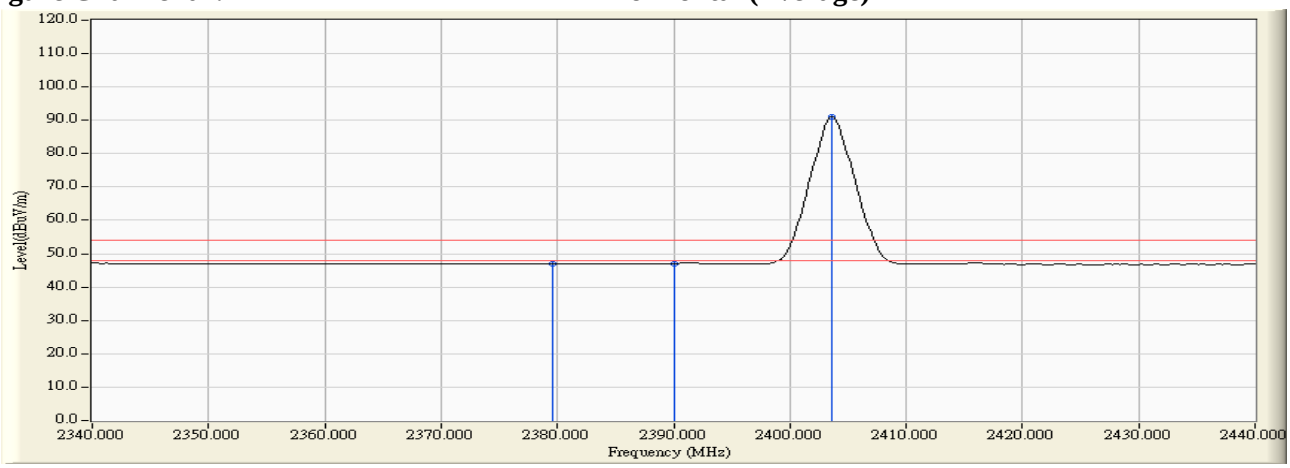


Figure Channel 01: Horizontal (Average)



Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. " * ", means this data is the worst emission level.
5. Measurement Level = Reading Level + Correct Factor.
6. The average measurement was not performed when the peak measured data under the limit of average detection.

Product : Wireless Speaker
Test Item : Band Edge Data
Test Site : No.3 OATS
Test Mode : Mode 1: Transmit

RF Radiated Measurement (Vertical):

Channel No.	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Emission Level (dBuV/m)	Peak Limit (dBuV/m)	Average Limit (dBuV/m)	Result
01 (Peak)	2390.000	32.267	25.717	57.984	74.000	54.000	Pass
01 (Peak)	2403.200	32.242	66.713	98.955	--	--	--
01 (Average)	2390.000	32.267	13.794	46.061	74.000	54.000	Pass
01 (Average)	2403.600	32.242	63.711	95.953	--	--	--

Figure Channel 01: Vertical (Peak)

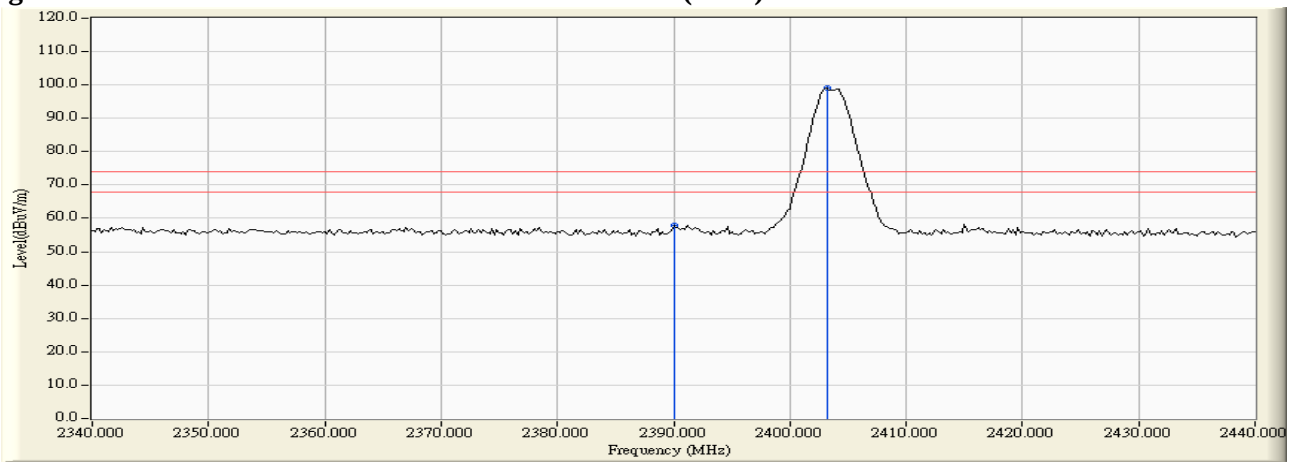
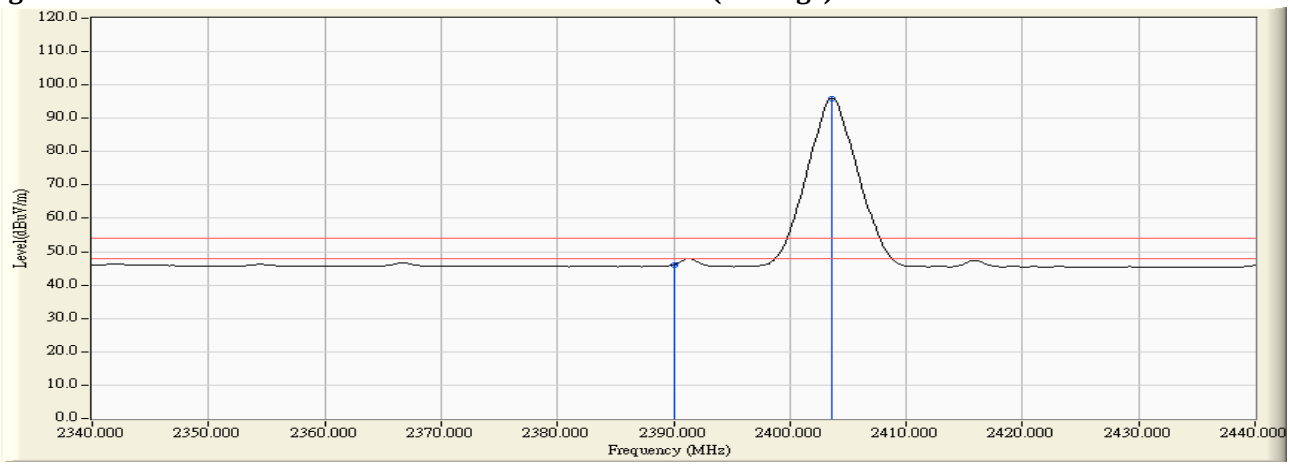


Figure Channel 01: Vertical (Average)



Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. " * ", means this data is the worst emission level.
5. Measurement Level = Reading Level + Correct Factor.
6. The average measurement was not performed when the peak measured data under the limit of average detection.

Product : Wireless Speaker
Test Item : Band Edge Data
Test Site : No.3 OATS
Test Mode : Mode 1: Transmit

RF Radiated Measurement (Horizontal):

Channel No.	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Emission Level (dBuV/m)	Peak Limit (dBuV/m)	Average Limit (dBuV/m)	Result
49 (Peak)	2477.700	33.935	63.914	97.849	--	--	--
49 (Peak)	2483.500	33.951	23.519	57.469	74.000	54.000	Pass
49 (Peak)	2489.700	33.967	24.864	58.830	74.000	54.000	Pass
49 (Average)	2477.300	33.933	60.901	94.834	--	--	--
49 (Average)	2483.500	33.951	13.301	47.251	74.000	54.000	Pass
49(Average)	2489.700	33.967	14.150	48.116	74.000	54.000	Pass

Figure Channel 49: Horizontal (Peak)

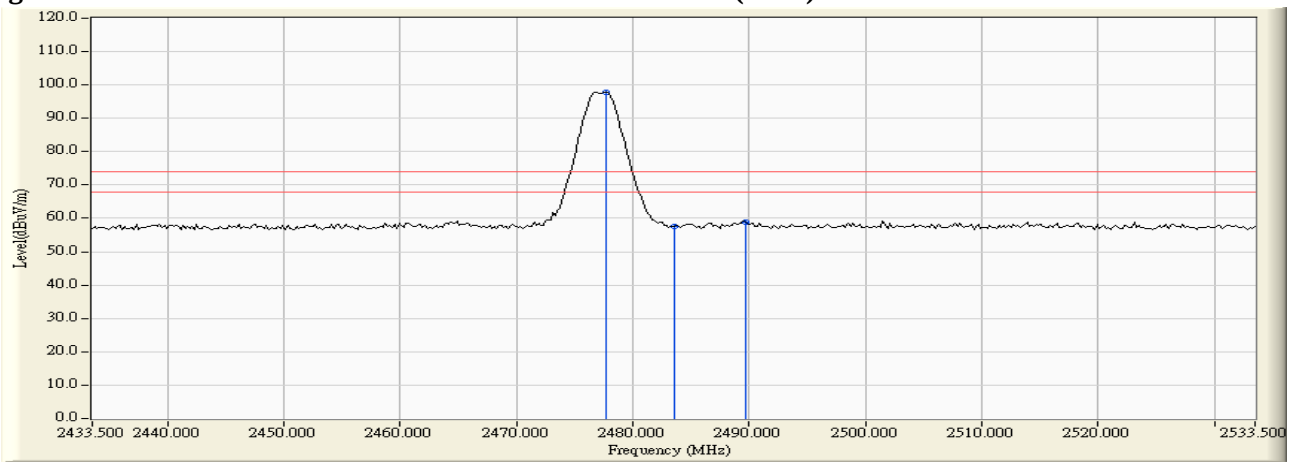
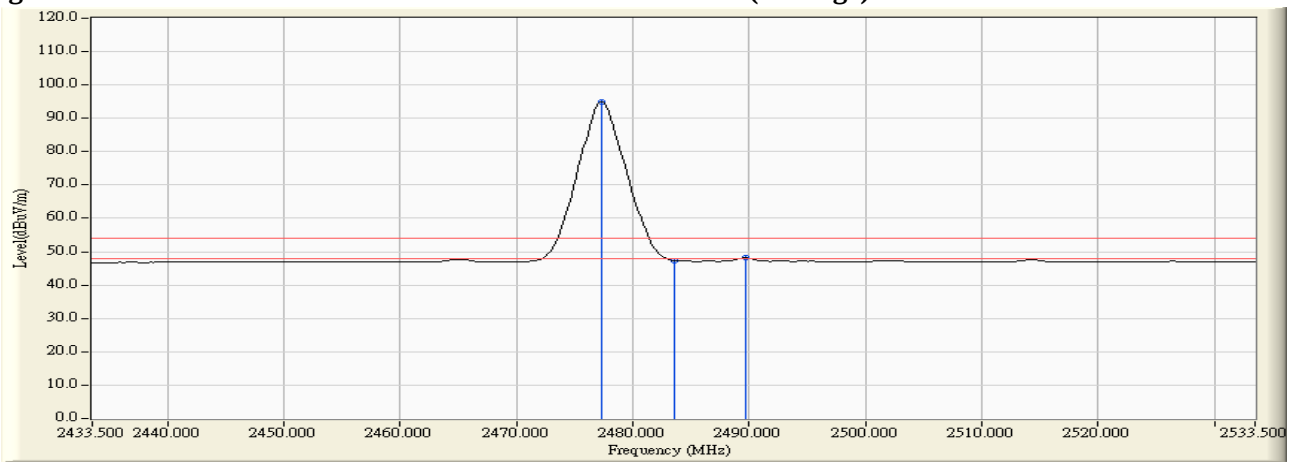


Figure Channel 49: Horizontal (Average)



Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. " * ", means this data is the worst emission level.
5. Measurement Level = Reading Level + Correct Factor.
6. The average measurement was not performed when the peak measured data under the limit of average detection.

Product : Wireless Speaker
Test Item : Band Edge Data
Test Site : No.3 OATS
Test Mode : Mode 1: Transmit

RF Radiated Measurement (Vertical):

Channel No.	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Emission Level (dBuV/m)	Peak Limit (dBuV/m)	Average Limit (dBuV/m)	Result
49 (Peak)	2477.700	32.557	64.330	96.887	--	--	--
49 (Peak)	2483.500	32.586	23.555	56.140	74.000	54.000	Pass
49 (Peak)	2489.100	32.612	25.399	58.011	74.000	54.000	Pass
49 (Average)	2477.300	32.554	61.246	93.801	--	--	--
49 (Average)	2483.500	32.586	13.370	45.955	74.000	54.000	Pass
49(Average)	2489.100	32.612	14.081	46.693	74.000	54.000	Pass

Figure Channel 49: Vertical (Peak)

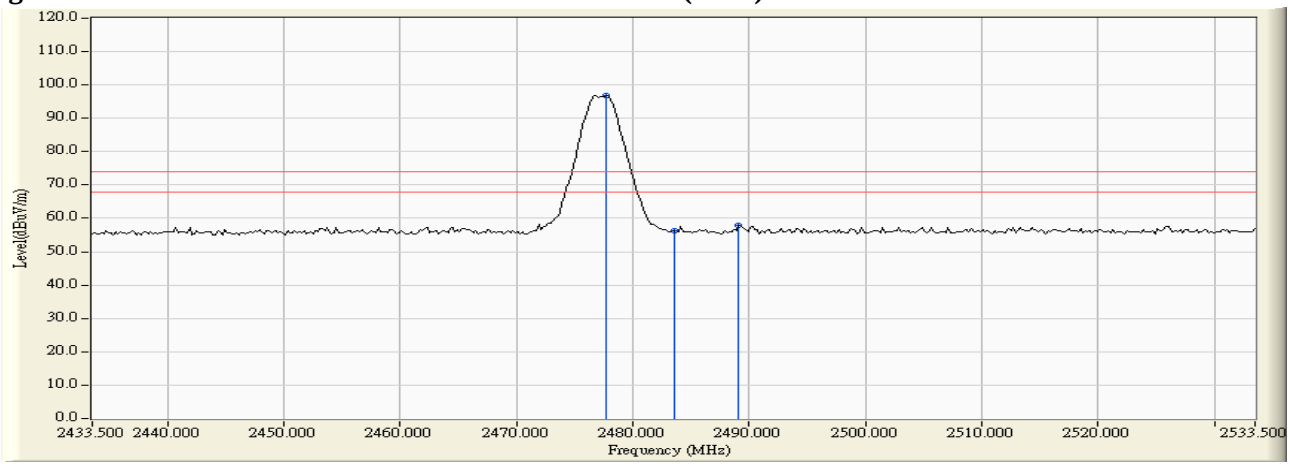
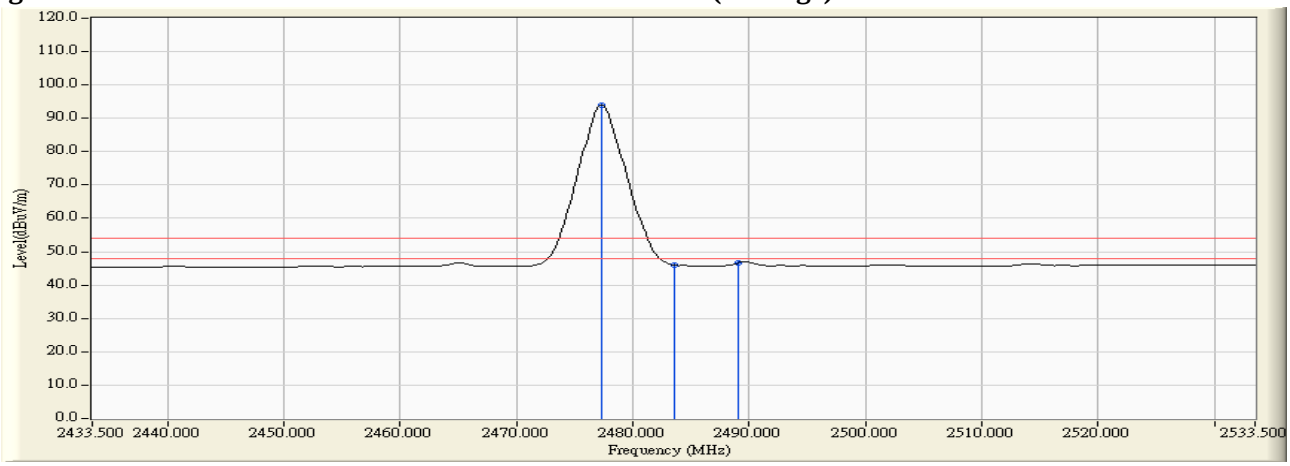


Figure Channel 49: Vertical (Average)



Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. " * ", means this data is the worst emission level.
5. Measurement Level = Reading Level + Correct Factor.
6. The average measurement was not performed when the peak measured data under the limit of average detection.

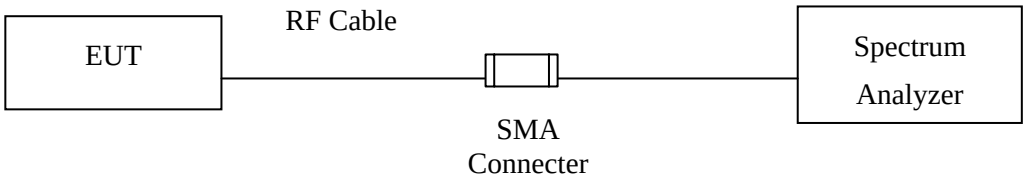
7. Channel Number

7.1. Test Equipment

	Equipment	Manufacturer	Model No./Serial No.	Last Cal.
	Spectrum Analyzer	R&S	FSP40 / 100170	Jun, 2012
	Spectrum Analyzer	Agilent	E4407B / US39440758	Jun, 2012
X	Spectrum Analyzer	Agilent	N9010A / MY48030495	Apr., 2013

Note: 1. All equipments are calibrated every one year.
2. The test instruments marked by "X" are used to measure the final test results.

7.2. Test Setup



7.3. Limit

Frequency hopping systems operating in the 2400-2483.5 MHz bands shall use at least 15 hopping frequencies.

7.4. Test Procedure

The EUT was setup to ANSI C63.10, 2009; tested to FHSS test procedure of FCC Public Notice DA 00-705 for compliance to FCC 47CFR 15.247 requirements.

7.5. Uncertainty

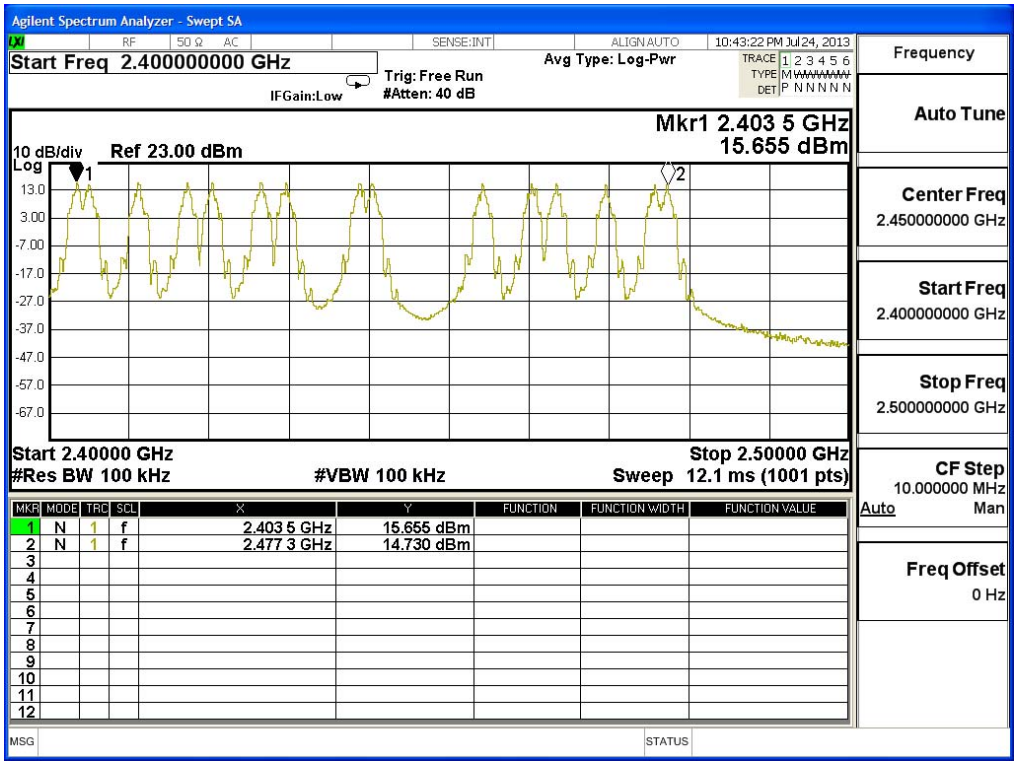
N/A

7.6. Test Result of Channel Number

Product : Wireless Speaker
Test Item : Channel Number
Test Site : No.3 OATS
Test Mode : Mode 1: Transmit

Frequency Range (MHz)	Measurement (Hopping Channel)	Required Limit (Hopping Channel)	Result
2403.585 ~ 2477.313	15	>15	Pass

2403.585-2477.313MHz



8. Channel Separation

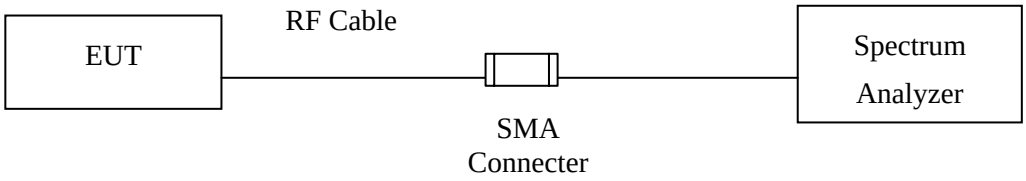
8.1. Test Equipment

	Equipment	Manufacturer	Model No./Serial No.	Last Cal.
	Spectrum Analyzer	R&S	FSP40 / 100170	Jun, 2012
	Spectrum Analyzer	Agilent	E4407B / US39440758	Jun, 2012
X	Spectrum Analyzer	Agilent	N9010A / MY48030495	Apr., 2013

Note: 1. All equipments are calibrated every one year.

2. The test instruments mark by "X" are used to measure the final test results.

8.2. Test Setup



8.3. Limit

Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater.

8.4. Test Procedure

The EUT was setup to ANSI C63.10, 2009; tested to FHSS test procedure of FCC Public Notice DA 00-705 for compliance to FCC 47CFR 15.247 requirements.

8.5. Uncertainty

± 150Hz

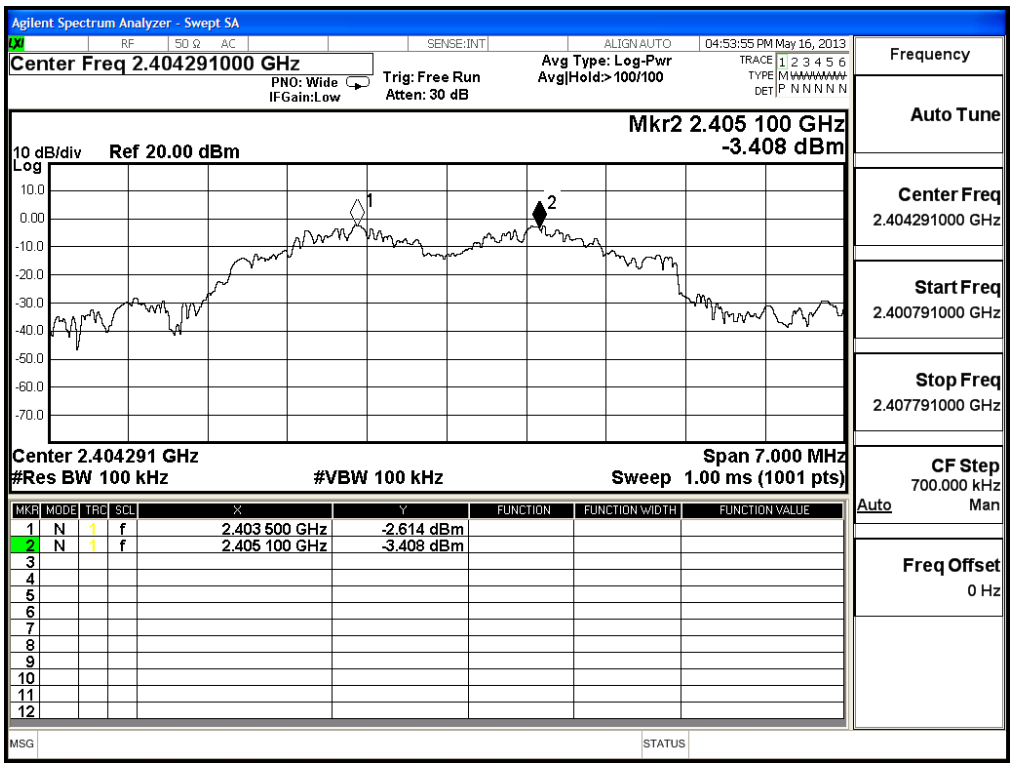
8.6. Test Result of Channel Separation

Product : Wireless Speaker
Test Item : Channel Separation
Test Site : No.3 OATS
Test Mode : Mode 1: Transmit

Channel No.	Frequency (MHz)	Measurement Level (kHz)	Limit (kHz)	Limit of (2/3)*20dB Bandwidth (kHz)	Result
01	2403.585	1600	>25 kHz	1440.0	Pass
24	2438.913	3100	>25 kHz	1460.0	Pass
49	2477.313	1500	>25 kHz	1440.0	Pass

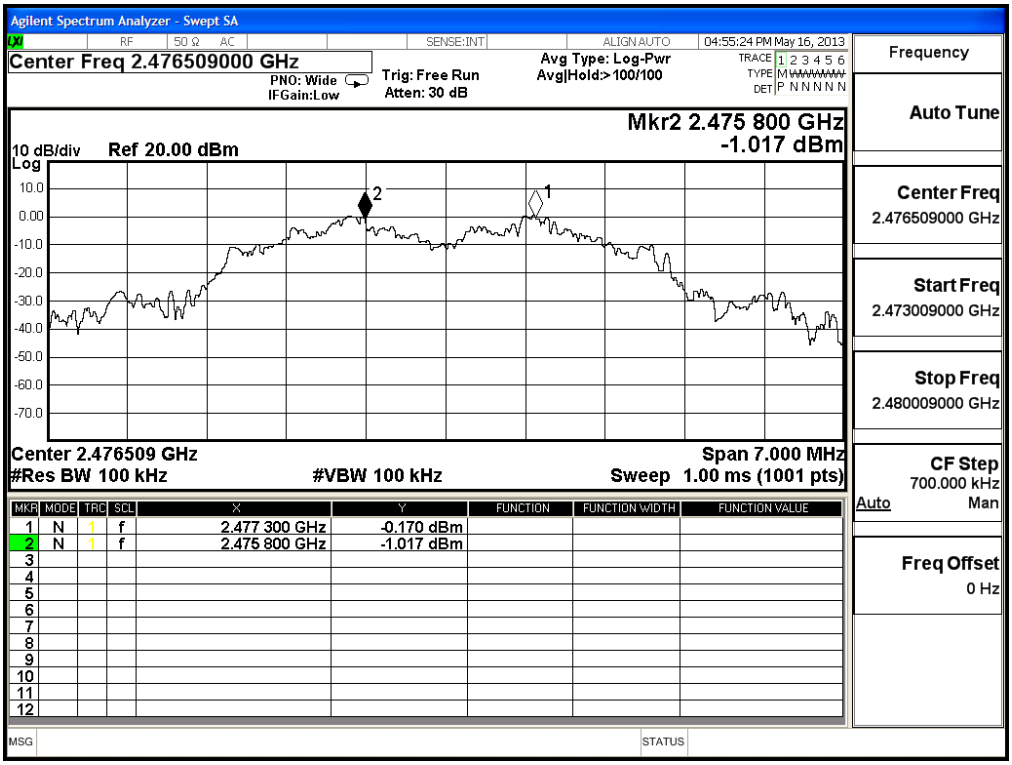
NOTE: The 20dB Bandwidth is refer to section 10.

Channel 01 2403.585MHz



Channel 24 2438.913MHz

Channel 49 2477.313MHz



9. Dwell Time

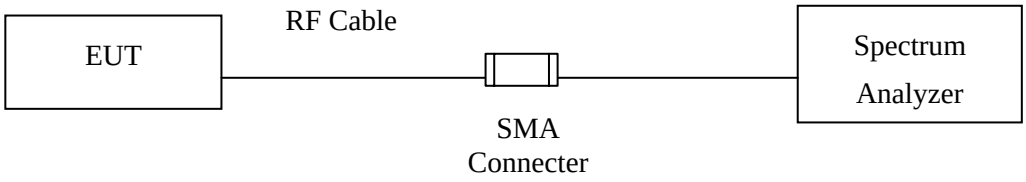
9.1. Test Equipment

	Equipment	Manufacturer	Model No./Serial No.	Last Cal.
	Spectrum Analyzer	R&S	FSP40 / 100170	Jun, 2012
	Spectrum Analyzer	Agilent	E4407B / US39440758	Jun, 2012
X	Spectrum Analyzer	Agilent	N9010A / MY48030495	Apr., 2013

Note: 1. All equipments are calibrated every one year.

2. The test instruments marked by "X" are used to measure the final test results.

9.2. Test Setup



9.3. Limit

The dwell time shall be the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 30 second period.

9.4. Test Procedure

The EUT was setup to ANSI C63.10, 2009; tested to FHSS test procedure of FCC Public Notice DA 00-705 for compliance to FCC 47CFR 15.247 requirements.

9.5. Uncertainty

± 25msec

9.6. Test Result of Dwell Time

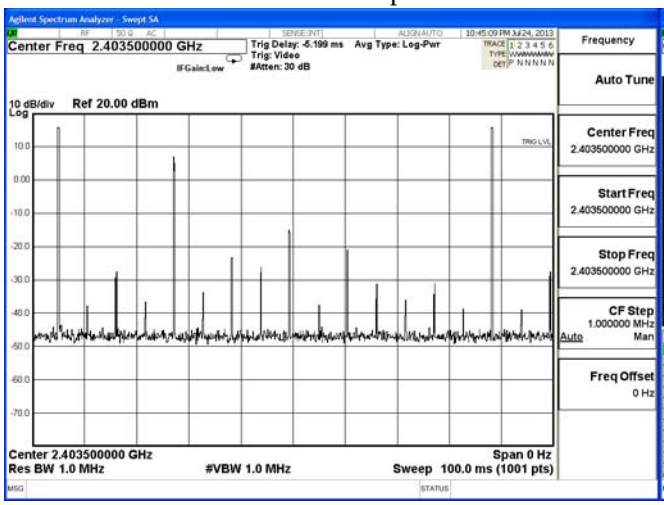
Product : Wireless Speaker
Test Item : Dwell Time
Test Site : No.3 OATS
Test Mode : Mode 1: Transmit (Channel 00,24,49)

Frequency (MHz)	Time slot length (ms)	Hopping of Number	Sweep time (ms)	Duty cycle	Dwell Time (Sec)	Limit (Sec)	Result
2403.5	0.144	2	100	0.0029	0.0011	0.4	Pass
2438.9	0.144	2	100	0.0029	0.0011	0.4	Pass
2477.3	0.144	2	100	0.0029	0.0011	0.4	Pass

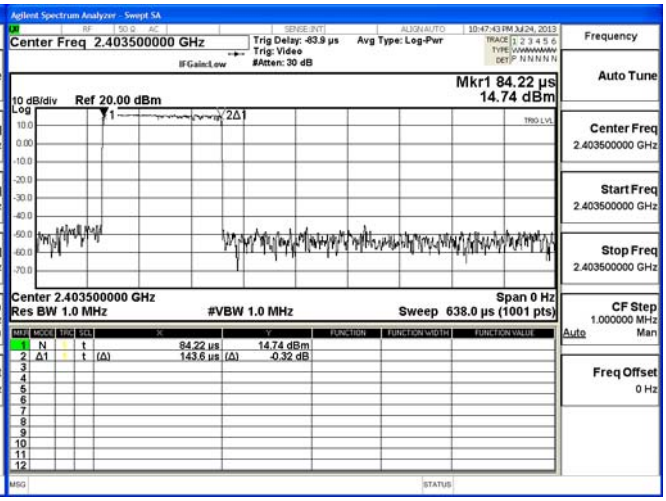
Duty cycle =((Time slot length(ms)*Hopping of Number) / Sweep time (ms)

Dwell time = (Duty cycle /15) * (15*0.4)

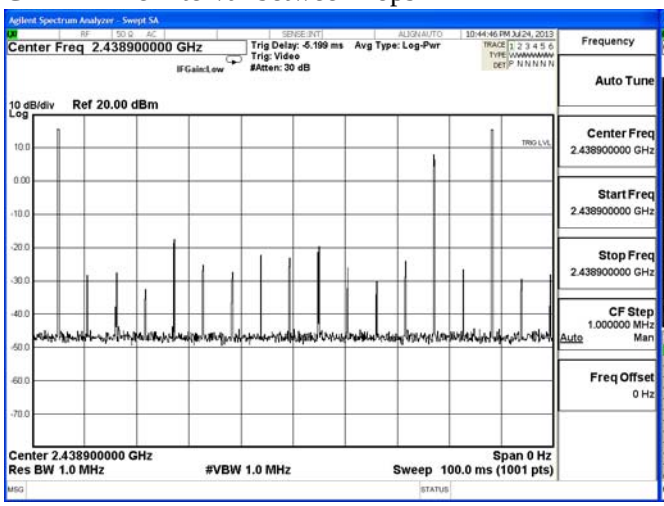
CH 01 Time Interval between hops



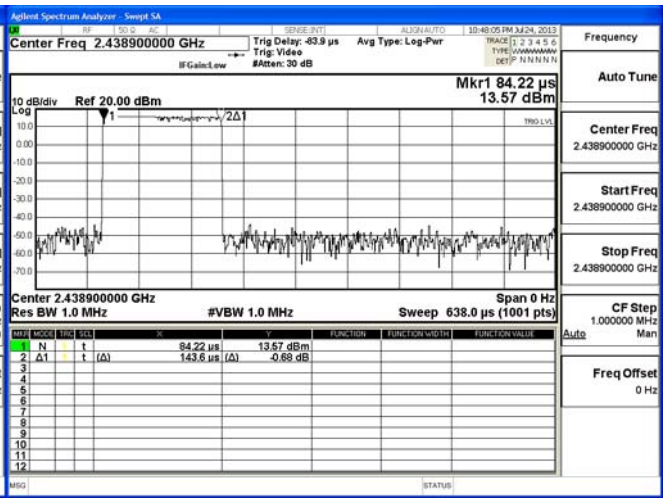
CH 01 Transmission Time



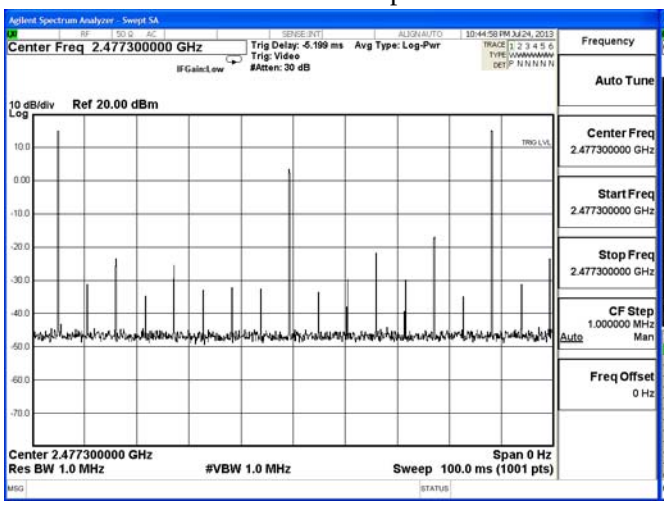
CH 24 Time Interval between hops



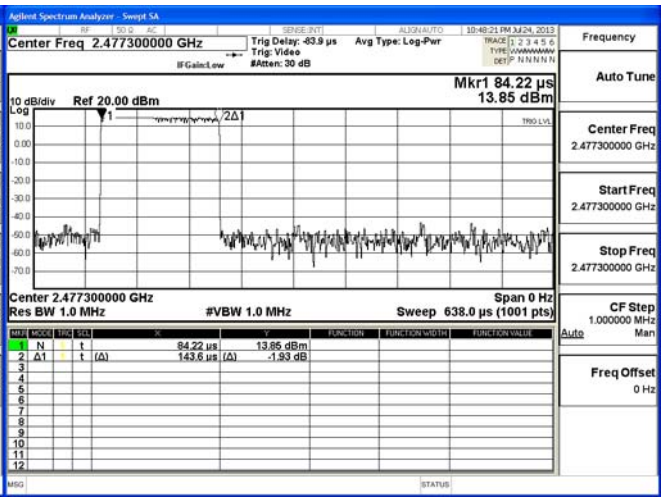
CH 24 Transmission Time



CH 49 Time Interval between hops



CH 49 Transmission Time



10. Occupied Bandwidth

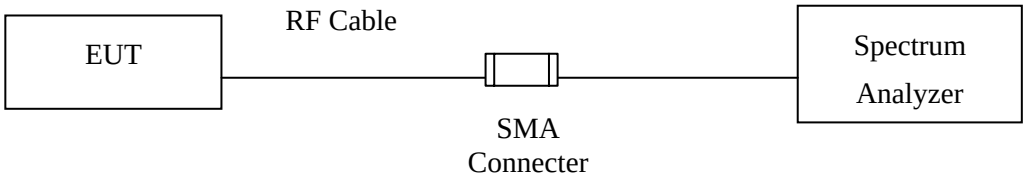
10.1. Test Equipment

	Equipment	Manufacturer	Model No./Serial No.	Last Cal.
	Spectrum Analyzer	R&S	FSP40 / 100170	Jun, 2012
	Spectrum Analyzer	Agilent	E4407B / US39440758	Jun, 2012
X	Spectrum Analyzer	Agilent	N9010A / MY48030495	Apr., 2013

Note: 1. All equipments are calibrated every one year.

2. The test instruments marked by "X" are used to measure the final test results.

10.2. Test Setup



10.3. Limits

N/A

10.4. Test Procedure

The EUT was setup to ANSI C63.10, 2009; tested to FHSS test procedure of FCC Public Notice DA 00-705 for compliance to FCC 47CFR 15.247 requirements.

10.5. Uncertainty

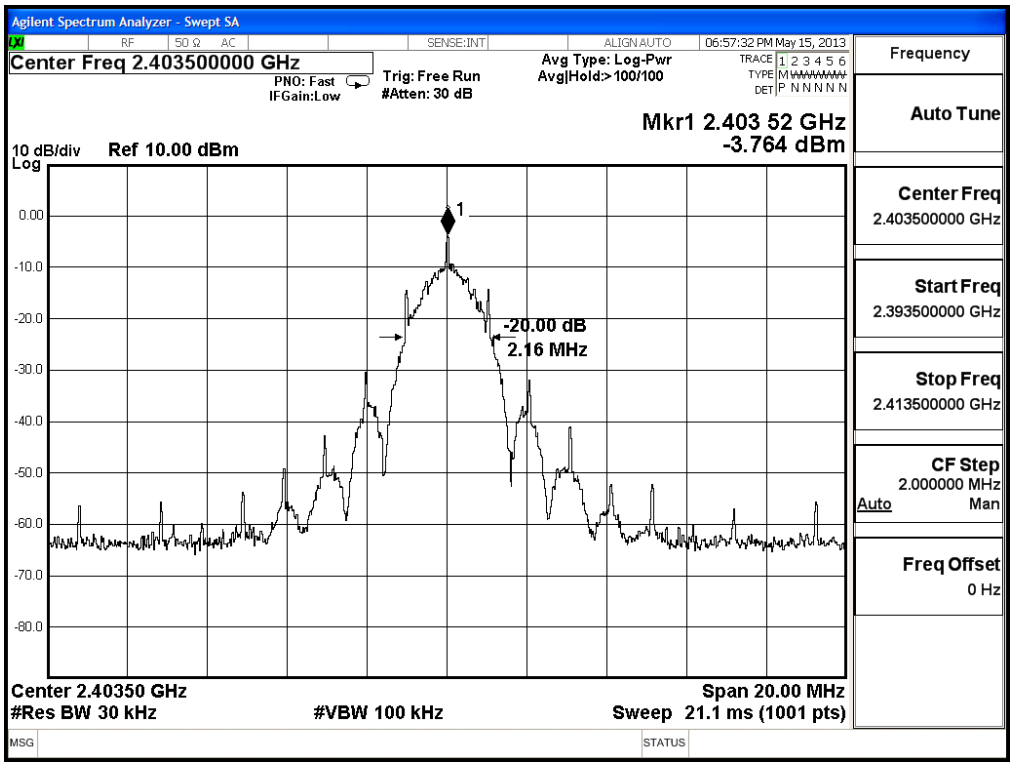
± 150Hz

10.6. Test Result of Occupied Bandwidth

Product : Wireless Speaker
Test Item : Occupied Bandwidth Data
Test Site : No.3 OATS
Test Mode : Mode 1: Transmit (2403.585MHz)

Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
01	2403.585	2160	--	NA

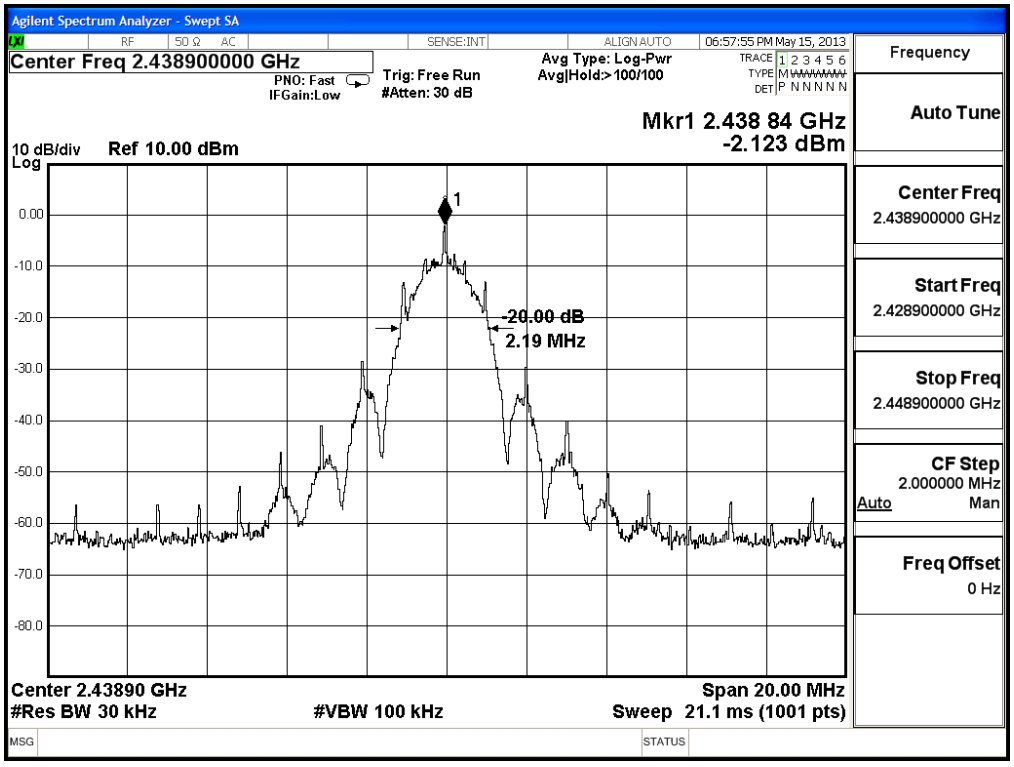
Figure Channel 01:



Product : Wireless Speaker
Test Item : Occupied Bandwidth Data
Test Site : No.3 OATS
Test Mode : Mode 1: Transmit (2438.913MHz)

Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
24	2438.913	2190	--	NA

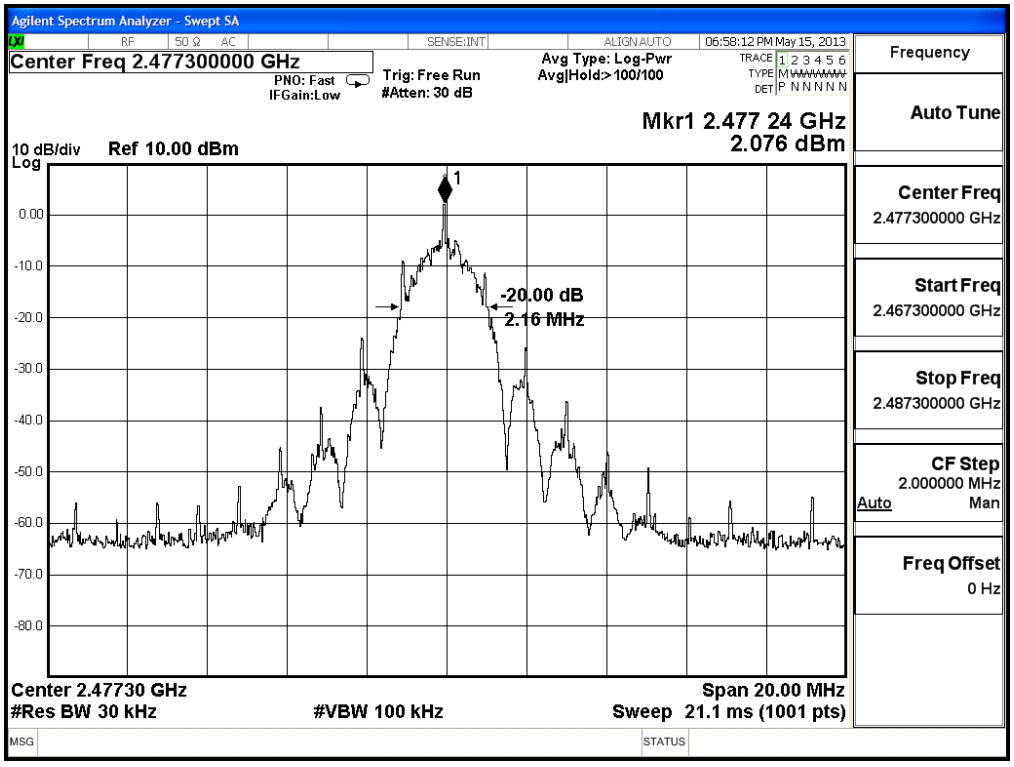
Figure Channel 24:



Product : Wireless Speaker
Test Item : Occupied Bandwidth Data
Test Site : No.3 OATS
Test Mode : Mode 1: Transmit (2477.313MHz)

Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
49	2477.313	2160	--	NA

Figure Channel 49:



11. EMI Reduction Method During Compliance Testing

No modification was made during testing.

Attachment 1: EUT Test Photographs

Attachment 2: EUT Detailed Photographs