Test Report

Product Name	Wireless Speaker
Model No.	V400
FCC ID.	SCGV4002013

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

Date of Receipt	Apr. 17, 2013
Issued Date	May 20, 2013
Report No.	134317R-RFUSP43V01
Report Version	V1.0

Testing Laboratory
0914

Test Report Certification

Issued Date: May 20, 2013
Report No.: 134317R-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.	V400
FCC ID.	SCGV4002013
EUT Rated Voltage	AC 100-240V, 50/60Hz
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 : Joanne Lin
(Adm. Specialist / Joanne Lin)

Tested By : Nowal Kuo
(Assistant Engineer / Nowal Kuo)

Approved By :
(Manager / Vincent Lin)

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1. GENERAL INFORMATION

1.1. EUT Description

Product Name	Wireless Speaker
Trade Name	Korus
Model No.	V400
FCC ID.	SCGV4002013
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	907X00352X1	Copper Tube	3.37 dBi in 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:	2403.585MHz	Channel 02:	2405.121MHz	Channel 03:	2406.657MHz	Channel 04:	2408.193MHz
Channel 05:	2409.729MHz	Channel 06:	2411.265MHz	Channel 07:	2412.801MHz	Channel 08:	2414.337MHz
Channel 09:	2415.873MHz	Channel 10:	2417.409MHz	Channel 11:	2418.945MHz	Channel 12:	2420.481MHz
Channel 13:	2422.017MHz	Channel 14:	2423.553MHz	Channel 15:	2425.089MHz	Channel 16:	2426.625MHz
Channel 17:	2428.161MHz	Channel 18:	2429.697MHz	Channel 19:	2431.233MHz	Channel 20:	2432.769MHz
Channel 21:	2434.305MHz	Channel 22:	2435.841MHz	Channel 23:	2437.377MHz	Channel 24:	2438.913MHz
Channel 25:	2440.449MHz	Channel 26:	2441.985MHz	Channel 27:	2443.521MHz	Channel 28:	2445.057MHz
Channel 29:	2446.593MHz	Channel 30:	2448.129MHz	Channel 31:	2449.665MHz	Channel 32:	2451.201MHz
Channel 33:	2452.737MHz	Channel 34:	2454.273MHz	Channel 35:	2455.809MHz	Channel 36:	2457.345MHz
Channel 37:	2458.881MHz	Channel 38:	2460.417MHz	Channel 39:	2461.953MHz	Channel 40:	2463.489MHz
Channel 41:	2465.025MHz	Channel 42:	2466.561MHz	Channel 43:	2468.097MHz	Channel 44:	2469.633MHz
Channel 45:	2471.169MHz	Channel 46:	2472.705MHz	Channel 47:	2474.241MHz	Channel 48:	2475.777MHz
Channel 49:	2477.313MHz						

Note:

1. This device 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

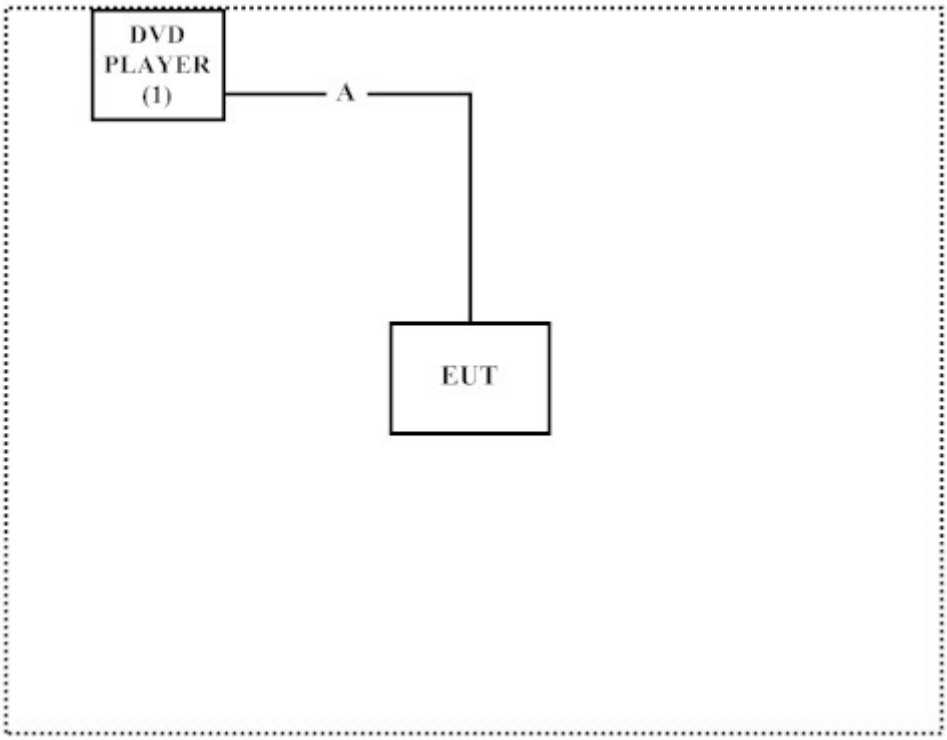
1.3. Tested System Details

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

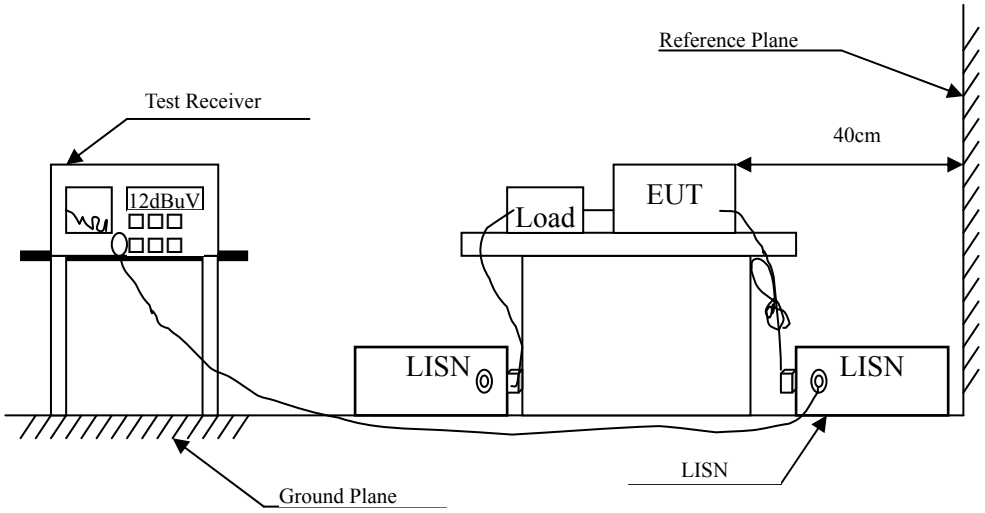
2.1. Test Equipment

	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					
0.209	9.790	48.920	58.710	-5.604	64.314
0.283	9.790	33.680	43.470	-18.730	62.200
0.349	9.790	34.130	43.920	-16.394	60.314
0.560	9.790	20.600	30.390	-25.610	56.000
1.045	9.790	14.800	24.590	-31.410	56.000
16.642	10.100	20.400	30.500	-29.500	60.000
Average					
0.209	9.790	38.940	48.730	-5.584	54.314
0.283	9.790	26.550	36.340	-15.860	52.200
0.349	9.790	24.300	34.090	-16.224	50.314
0.560	9.790	9.840	19.630	-26.370	46.000
1.045	9.790	9.390	19.180	-26.820	46.000
16.642	10.100	14.370	24.470	-25.530	50.000

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					
0.209	9.770	48.750	58.520	-5.794	64.314
0.279	9.770	36.510	46.280	-16.034	62.314
0.345	9.770	32.560	42.330	-18.099	60.429
0.556	9.770	21.220	30.990	-25.010	56.000
1.045	9.780	17.430	27.210	-28.790	56.000
16.716	10.180	21.470	31.650	-28.350	60.000
Average					
0.209	9.770	38.540	48.310	-6.004	54.314
0.279	9.770	29.130	38.900	-13.414	52.314
0.345	9.770	24.000	33.770	-16.659	50.429
0.556	9.770	9.930	19.700	-26.300	46.000
1.045	9.780	11.160	20.940	-25.060	46.000
16.716	10.180	16.470	26.650	-23.350	50.000

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

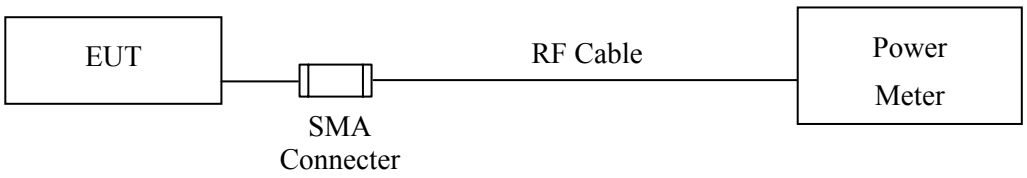
3.1. Test Equipment

	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	18.73	0.125 Watt= 21 dBm	Pass
Channel 24	2438.913	18.64	0.125 Watt= 21 dBm	Pass
Channel 49	2477.313	18.22	0.125 Watt= 21 dBm	Pass

4. Radiated Emission

4.1. Test Equipment

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

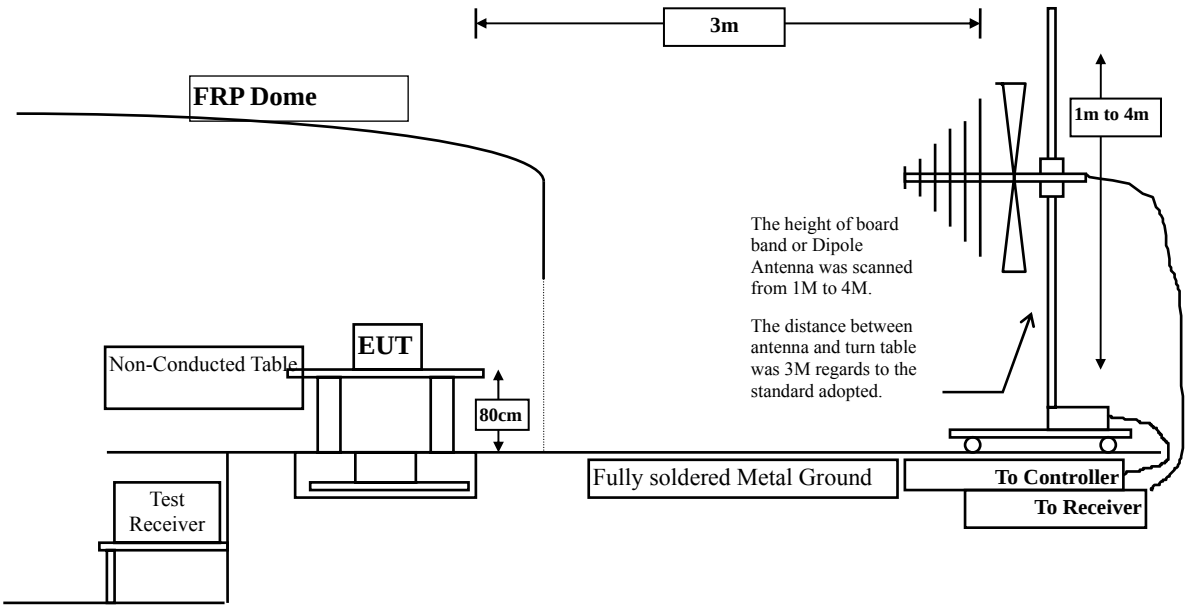
Test Site		Equipment	Manufacturer	Model No./Serial No.	Last Cal.
☒Site # 3	X	Loop Antenna	Teseq	HLA6120 / 26739	Jul., 2012
	X	Bilog Antenna	Schaffner Chase	CBL6112B/2673	Sep., 2012
	X	Horn Antenna	Schwarzbeck	BBHA9120D/D305	Sep., 2012
	X	Horn Antenna	Schwarzbeck	BBHA9170/208	Jul., 2012
	X	Pre-Amplifier	QTK	QTK-AMP-03 / 0003	May, 2013
	X	Pre-Amplifier	QTK	AP-180C / CHM_0906076	Sep., 2012
	X	Pre-Amplifier	MITEQ	AMF-4D-180400-45-6P/ 925975	Mar, 2013
	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.

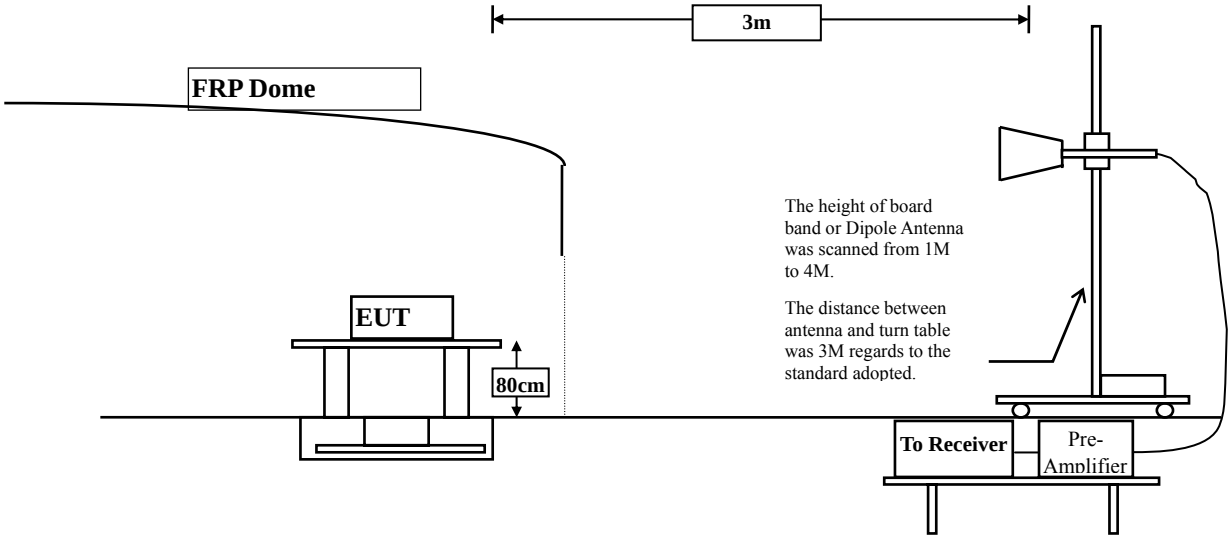
2. The test instruments marked by "X" are used to measure the final test results.

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	40
88-216	150	43.5
216-960	200	46
Above 960	500	54

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)

Peak Detector:

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBuV	dBuV/m	dB	dBuV/m
Horizontal					
Peak Detector:					
4807.000	3.330	48.910	52.240	-21.760	74.000
7210.500	10.214	51.160	61.373	-12.627	74.000
9614.000	13.651	41.740	55.391	-18.609	74.000
--					
Vertical					
Peak Detector:					
4807.000	6.621	54.540	61.161	-12.839	74.000
7210.500	11.079	50.650	61.728	-12.272	74.000
9614.000	14.059	44.320	58.379	-15.621	74.000
--					

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.

Average Detector:

Frequency	Peak Measurement	Duty Cycle Correct Factor	Measurement Level	Margin	Limit
MHz	dBuV/m	dB	dBuV/m	dB	dBuV/m
Horizontal Average Detector:					
7210.500	61.373	-50.458	10.915	-43.085	54.000
9614.000	55.391	-50.458	4.933	-49.067	54.000
--					
Vertical Average Detector:					
4807.000	61.161	-50.458	10.703	-43.297	54.000
7210.500	61.728	-50.458	11.270	-42.730	54.000
9614.000	58.379	-50.458	7.921	-46.079	54.000
--					

Note:

1. AVG Measurement=Peak Measurement + Duty Cycle Correct Factor.
2. The Duty Cycle is refer to section 11.

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

Peak Detector:

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBuV	dBuV/m	dB	dBuV/m
Horizontal					
Peak Detector:					
4877.800	3.020	49.540	52.560	-21.440	74.000
7316.700	11.819	50.850	62.669	-11.331	74.000
9755.600	12.601	42.550	55.151	-18.849	74.000
--					
Vertical					
Peak Detector:					
4877.800	5.765	52.670	58.435	-15.565	74.000
7316.700	12.676	52.140	64.816	-9.184	74.000
9755.600	13.080	44.340	57.420	-16.580	74.000
--					

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.

Average Detector:

Frequency	Peak Measurement	Duty Cycle Correct Factor	Measurement Level	Margin	Limit
MHz	dBuV/m	dB	dBuV/m	dB	dBuV/m
Horizontal Average Detector:					
7316.700	62.669	-50.458	12.211	-41.789	54.000
9755.600	55.151	-50.458	4.693	-49.307	54.000
--					
Vertical Average Detector:					
4877.800	58.435	-50.458	7.977	-46.023	54.000
7316.700	64.816	-50.458	14.358	-39.642	54.000
9755.600	57.420	-50.458	6.962	-47.038	54.000
--					

Note:

1. AVG Measurement=Peak Measurement + Duty Cycle Correct Factor.
2. The Duty Cycle is refer to section 11.

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

Peak Detector:

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBuV	dBuV/m	dB	dBuV/m
Horizontal					
Peak Detector:					
4954.600	2.776	50.640	53.415	-20.585	74.000
7431.900	12.490	49.370	61.860	-12.140	74.000
9909.200	13.395	40.360	53.756	-20.244	74.000
--					
Vertical					
Peak Detector:					
4954.600	5.553	52.610	58.162	-15.838	74.000
7431.900	13.415	50.750	64.164	-9.836	74.000
9909.200	13.966	43.980	57.947	-16.053	74.000
--					

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.

Average Detector:

Frequency	Peak Measurement	Duty Cycle Correct Factor	Measurement Level	Margin	Limit
MHz	dBuV/m	dB	dBuV/m	dB	dBuV/m
Horizontal Average Detector:					
7431.900	61.86	-50.458	11.402	-42.598	54.000
--					
Vertical Average Detector:					
4954.600	58.162	-50.458	7.704	-46.296	54.000
7431.900	64.164	-50.458	13.706	-40.294	54.000
9909.200	57.947	-50.458	7.489	-46.511	54.000
--					

Note:

1. AVG Measurement=Peak Measurement + Duty Cycle Correct Factor.
2. The Duty Cycle is refer to section 11.

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	32.075	28.450	-11.550	40.000
123.120	-7.320	33.922	26.602	-16.898	43.500
369.500	0.787	29.807	30.594	-15.406	46.000
540.220	3.499	28.485	31.984	-14.016	46.000
829.280	7.376	23.232	30.608	-15.392	46.000
984.480	8.098	24.449	32.547	-21.453	54.000
Vertical					
177.440	-1.248	23.515	22.267	-21.233	43.500
293.840	-4.990	29.181	24.191	-21.809	46.000
540.220	2.169	23.709	25.878	-20.122	46.000
617.820	0.958	25.364	26.322	-19.678	46.000
786.600	2.724	26.456	29.181	-16.819	46.000
965.080	3.832	22.080	25.912	-28.088	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.
8. No emission found between lowest internal used/generated frequency to 30MHz.

5. RF Antenna Conducted Test

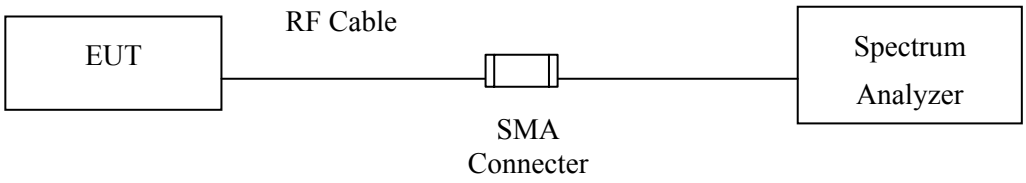
5.1. Test Equipment

	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.

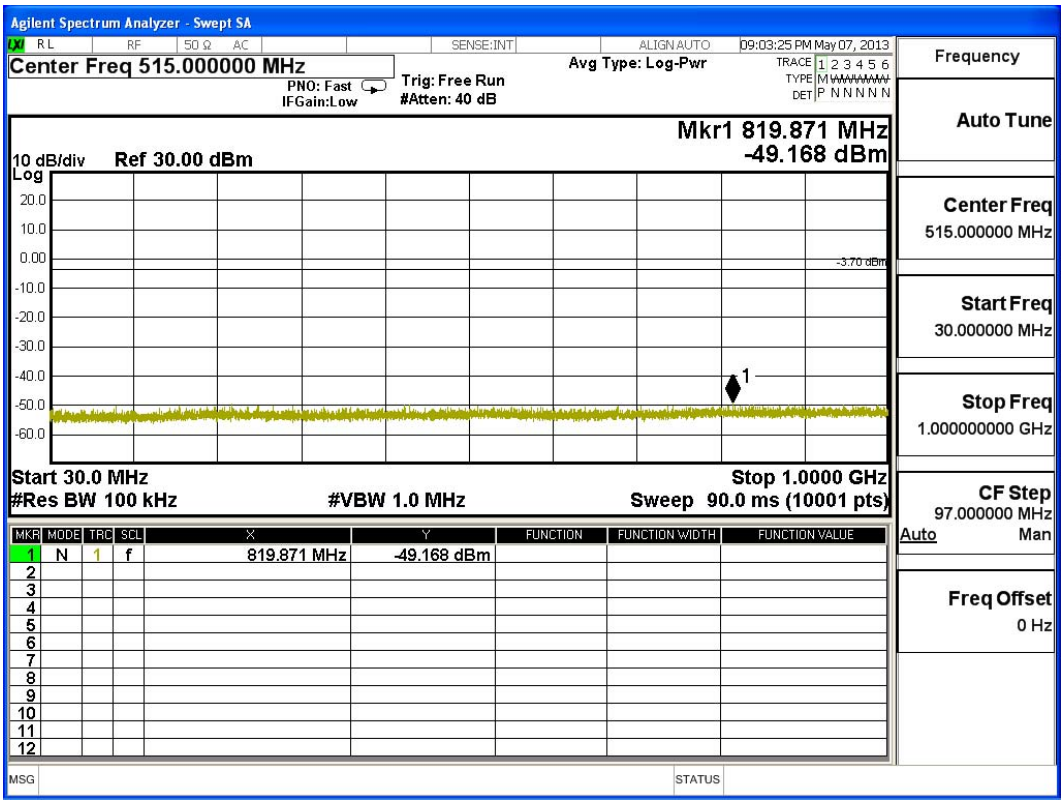
5.5. Uncertainty

± 150Hz

5.6. Test Result of RF Antenna Conducted Test

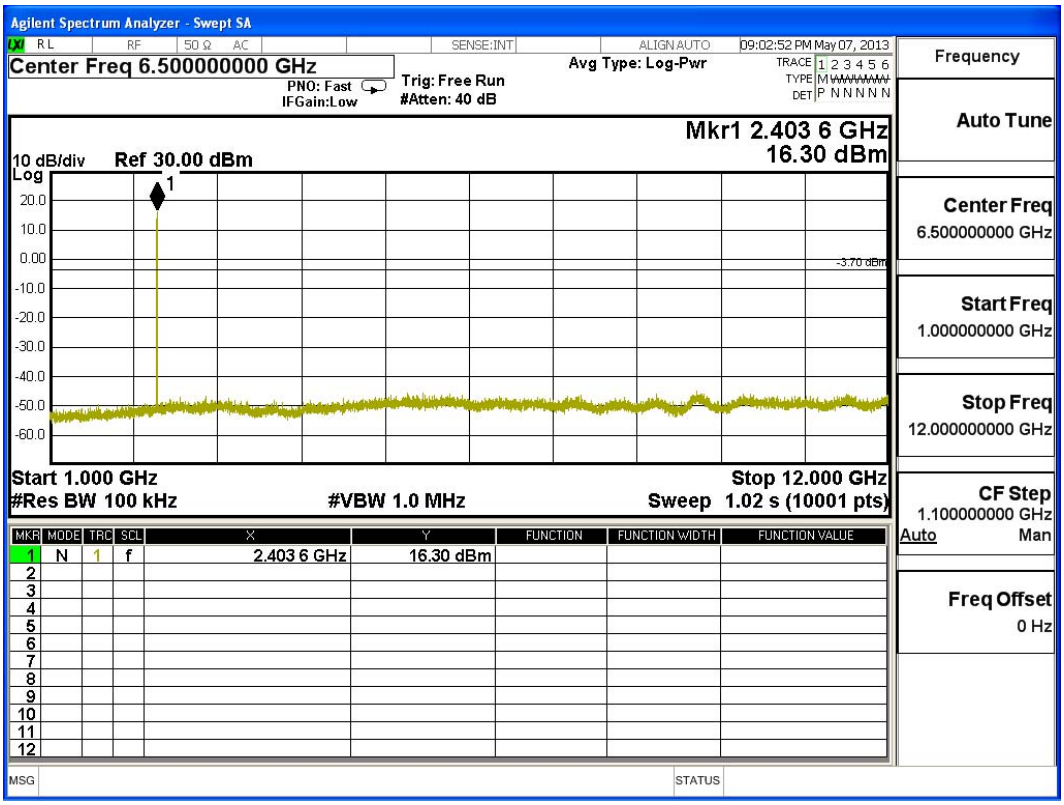
Product : Wireless Speaker
Test Item : RF Antenna Conducted Test
Test Site : No.3 OATS
Test Mode : Mode 1: Transmit

Figure Channel 01: 30MHz-1GHz



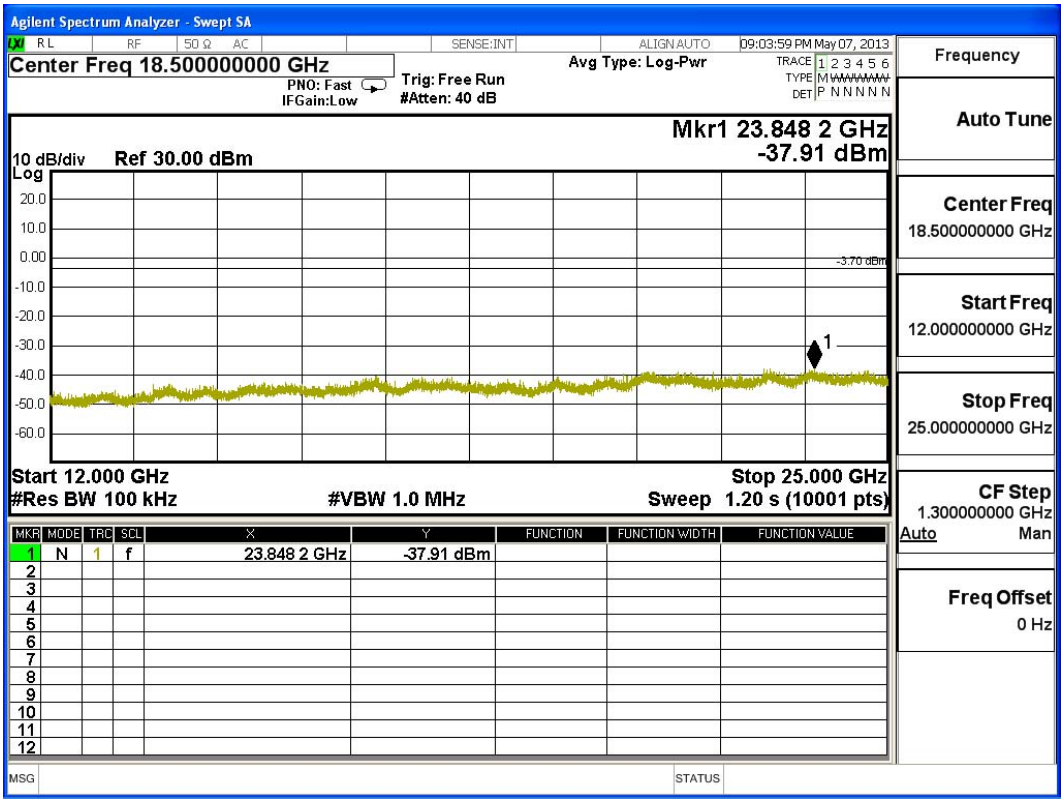
Product : Wireless Speaker
Test Item : RF Antenna Conducted Test
Test Site : No.3 OATS
Test Mode : Mode 1: Transmit

Figure Channel 01: 1GHz-12GHz



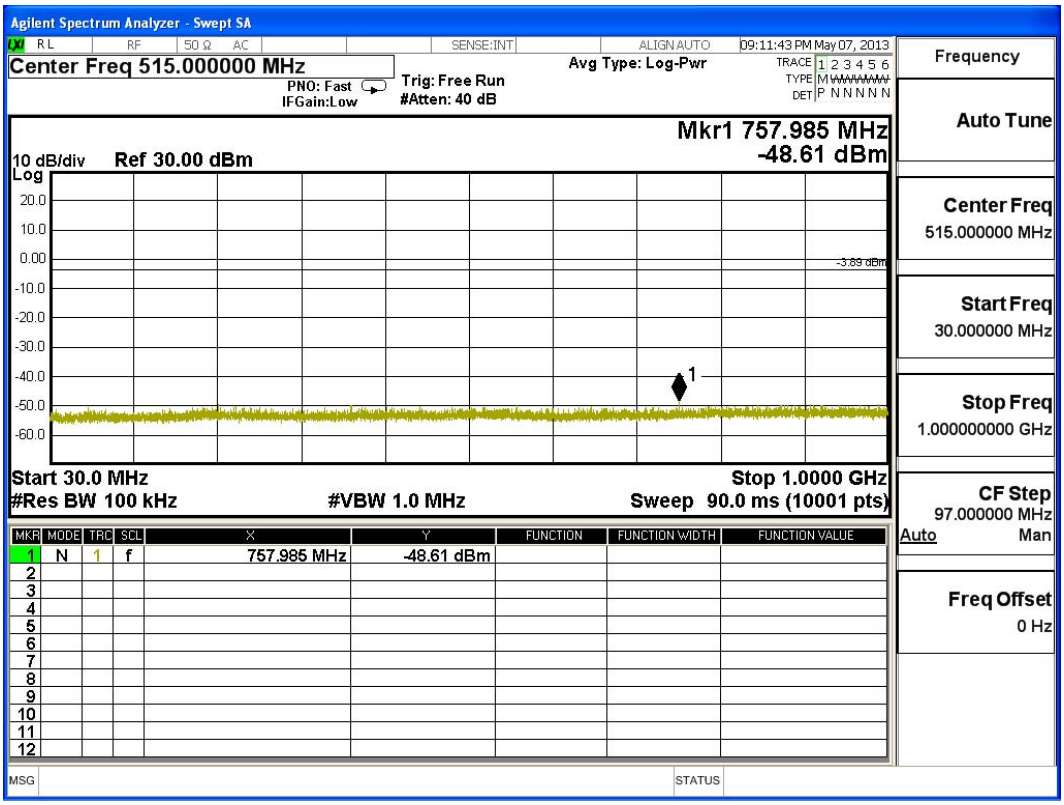
Product : Wireless Speaker
Test Item : RF Antenna Conducted Test
Test Site : No.3 OATS
Test Mode : Mode 1: Transmit

Figure Channel 01: 12GHz-25GHz



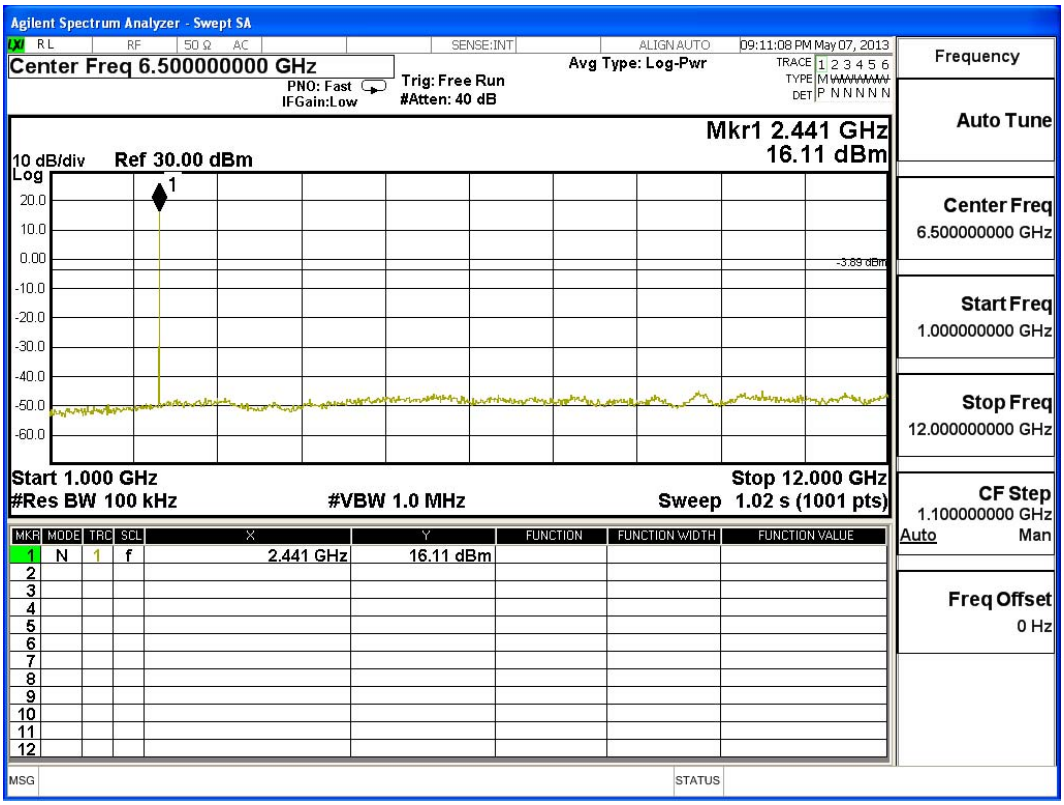
Product : Wireless Speaker
Test Item : RF Antenna Conducted Test
Test Site : No.3 OATS
Test Mode : Mode 1: Transmit

Figure Channel 24: 30MHz-1GHz



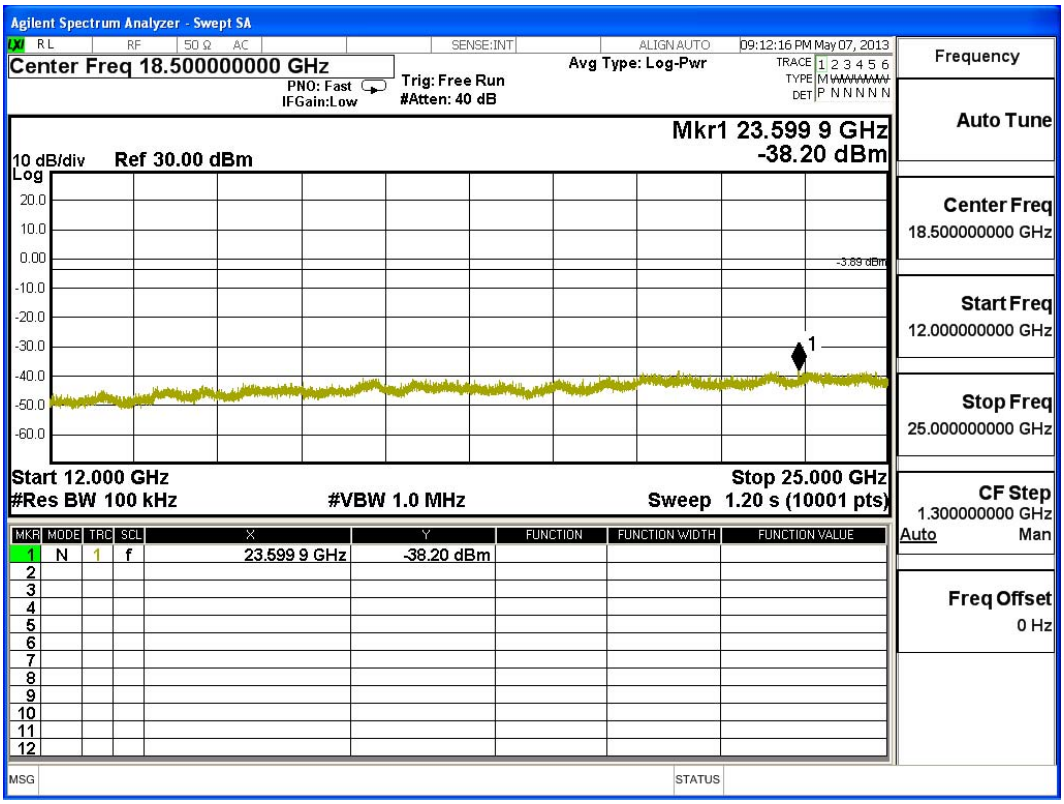
Product : Wireless Speaker
Test Item : RF Antenna Conducted Test
Test Site : No.3 OATS
Test Mode : Mode 1: Transmit

Figure Channel 24: 1GHz-12GHz



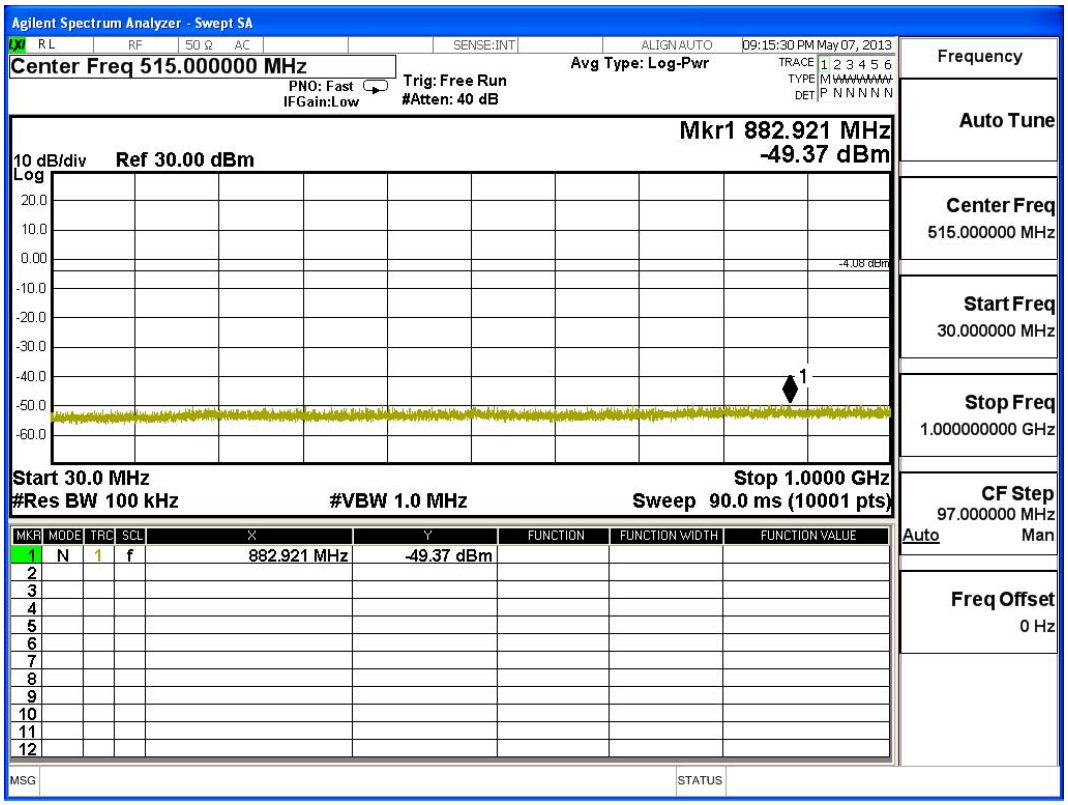
Product : Wireless Speaker
Test Item : RF Antenna Conducted Test
Test Site : No.3 OATS
Test Mode : Mode 1: Transmit

Figure Channel 24: 12GHz-25GHz



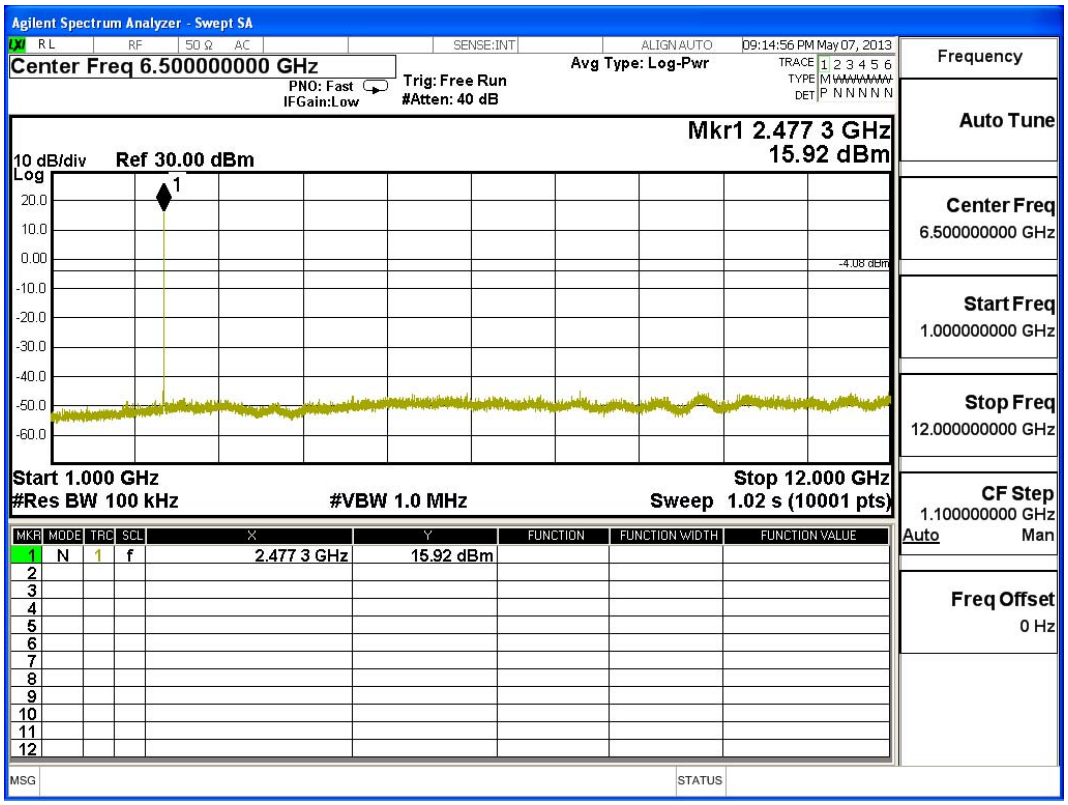
Product : Wireless Speaker
Test Item : RF Antenna Conducted Test
Test Site : No.3 OATS
Test Mode : Mode 1: Transmit

Figure Channel 49: 30MHz-1GHz



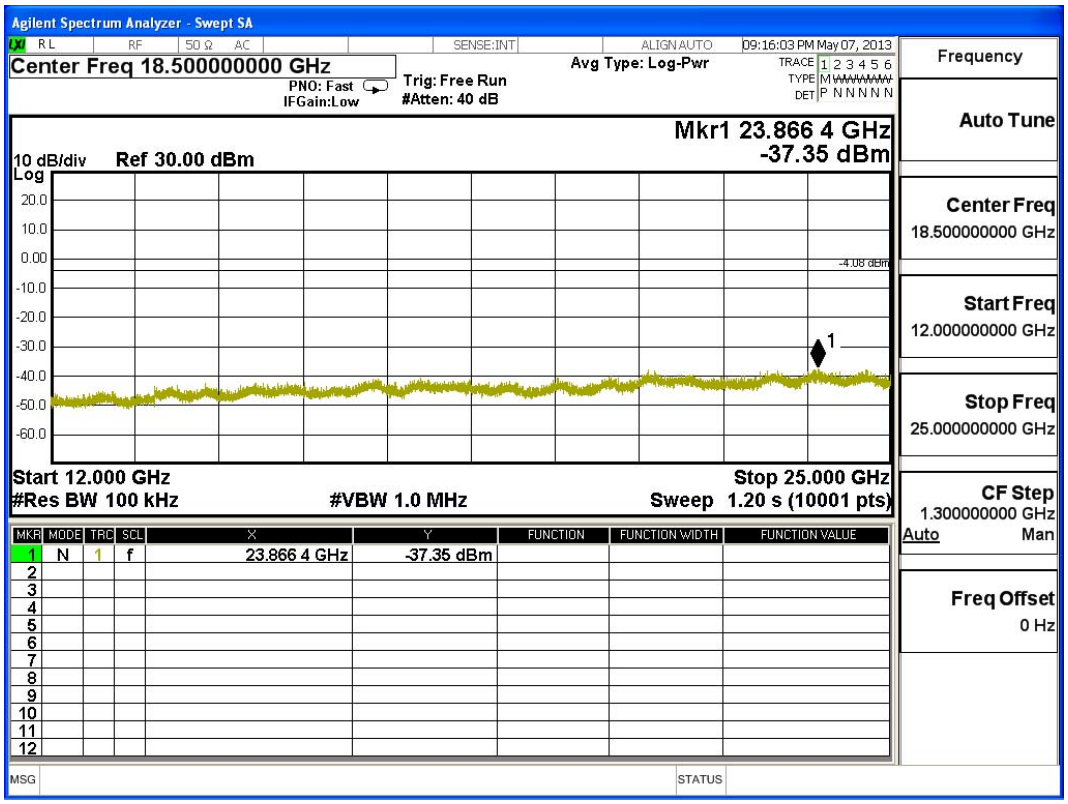
Product : Wireless Speaker
Test Item : RF Antenna Conducted Test
Test Site : No.3 OATS
Test Mode : Mode 1: Transmit

Figure Channel 49: 1GHz-12GHz



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

Figure Channel 49: 12GHz-25GHz



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
		Pre-Amplifier	QTK	QTK-AMP-03 / 0003	May, 2013
	X	Pre-Amplifier	QTK	AP-180C / CHM_0906076	Sep., 2012
		Pre-Amplifier	MITEQ	AMF-4D-180400-45-6P/ 925975	Mar, 2013
	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

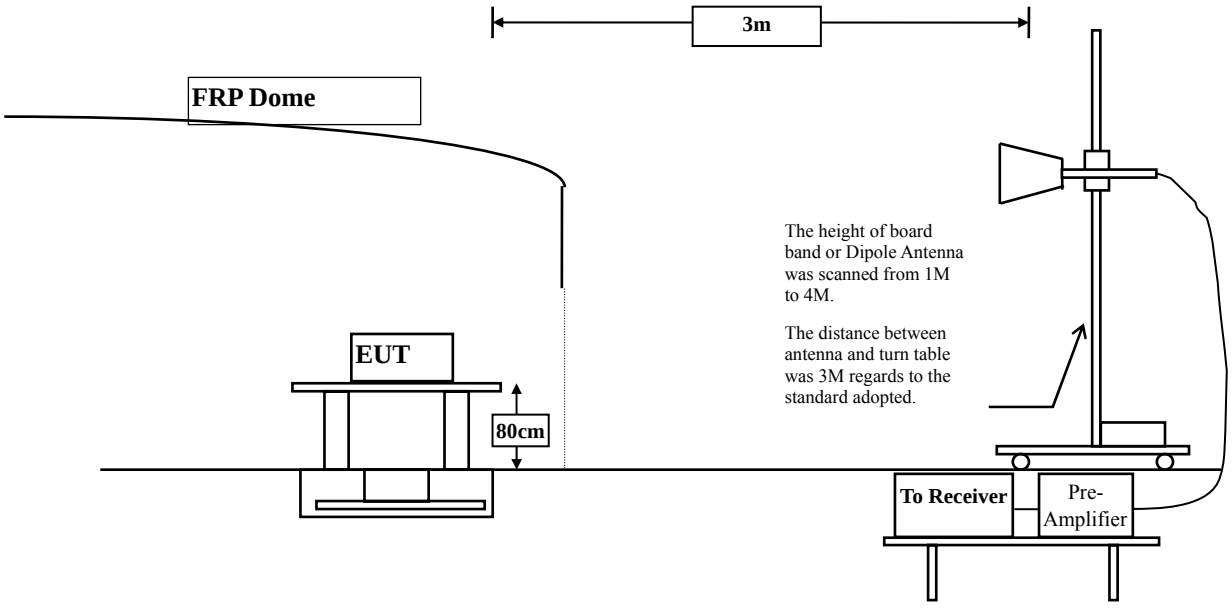
Note: 1. All equipments are calibrated every one year.

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

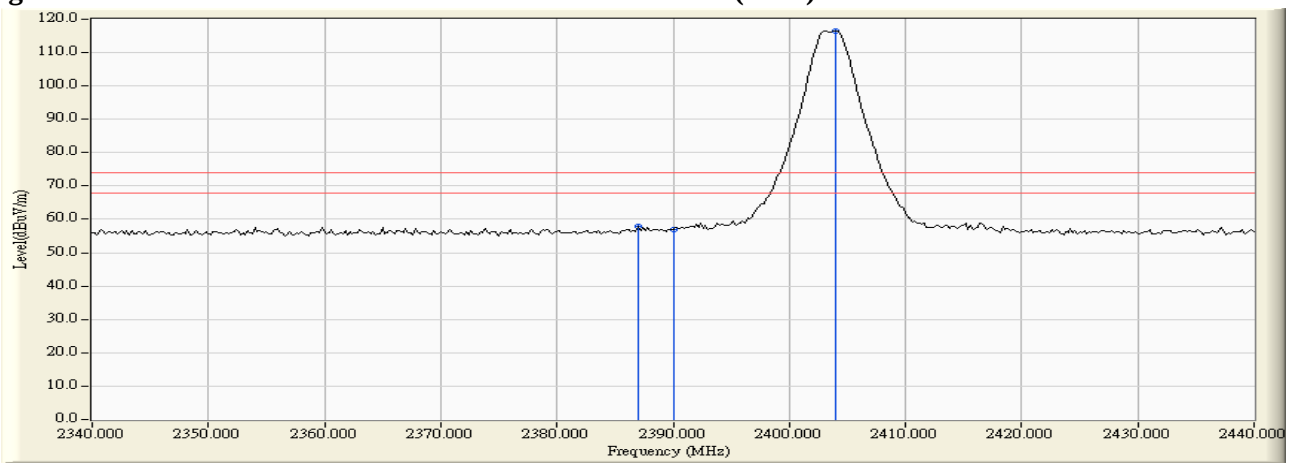
6.6. Test Result of Band Edge

Product : Wireless Speaker
Test Item : Band Edge
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)	Arerage Limit (dBuV/m)	Result
01 (Peak)	2387.000	31.497	26.497	57.994	-16.006	74.000	Pass
01 (Peak)	2390.000	31.509	25.319	56.828	-17.172	74.000	Pass
01 (Peak)	2404.000	31.586	85.022	116.608	--	--	Pass

Figure Channel 01: Horizontal (Peak)



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.

Average Detector:

Frequency MHz	Peak Measurement dBμV/m	Duty Cycle Factor dB	Measurement Level dBμV/m	Margin dB	Limit dBμV/m	Result Pass
HORIZONTAL						
Average Detector:						
2387.000	57.994	-50.458	7.536	-46.464	54.000	Pass
2390.000	56.828	-50.458	6.370	-47.630	54.000	Pass

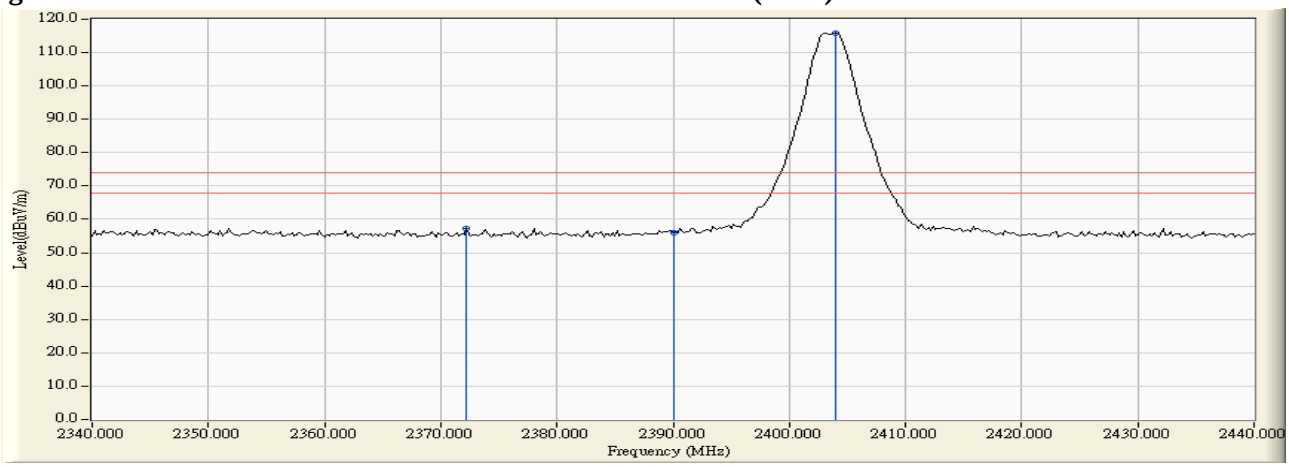
Note:
1. AVG Measurement=Peak Measurement + Duty Cycle Correct Factor
2. The Duty Cycle is refer to section 11.

Product : Wireless Speaker
Test Item : Band Edge
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)	Arerage Limit (dBuV/m)	Result
01 (Peak)	2372.200	30.998	26.351	57.349	-16.651	74.000	Pass
01 (Peak)	2390.000	30.915	24.976	55.891	-18.109	74.000	Pass
01 (Peak)	2404.000	30.923	84.916	115.839	--	--	Pass

Figure Channel 01: VERTICAL (Peak)



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.

Average Detector:

Frequency MHz	Peak Measurement dBµV/m	Duty Cycle Factor dB	Measurement Level dBµV/m	Margin dB	Limit dBµV/m	Result Pass
Vertical						
Average Detector:						
2372.200	57.349	-50.458	6.891	-47.109	54.000	Pass
2390.000	55.891	-50.458	5.433	-48.567	54.000	Pass

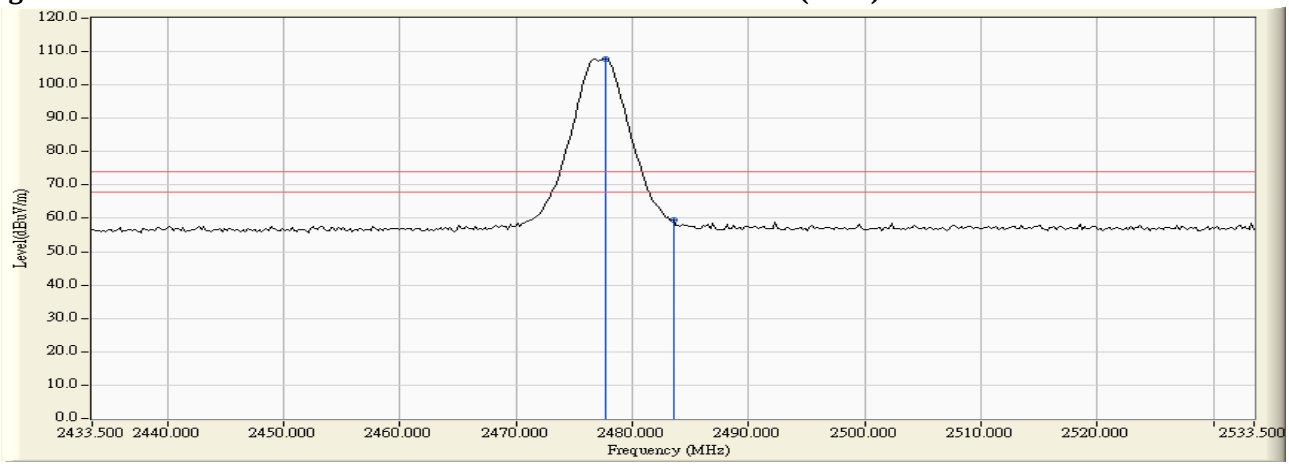
Note:
1. AVG Measurement=Peak Measurement + Duty Cycle Correct Factor
2. The Duty Cycle is refer to section 11.

Product : Wireless Speaker
Test Item : Band Edge
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)	Arerage Limit (dBuV/m)	Result
49 (Peak)	2477.700	32.138	75.643	107.781	--	--	Pass
49 (Peak)	2483.500	32.182	27.280	59.462	-14.538	74.000	Pass

Figure Channel 49: HORIZONTAL (Peak)



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.

Average Detector:

Frequency MHz	Peak Measurement dBµV/m	Duty Cycle Factor dB	Measurement Level dBµV/m	Margin dB	Limit dBµV/m	Result Pass
HORIZONTAL						
Average Detector:						
2483.500	59.462	-50.458	9.004	-44.996	54.000	Pass

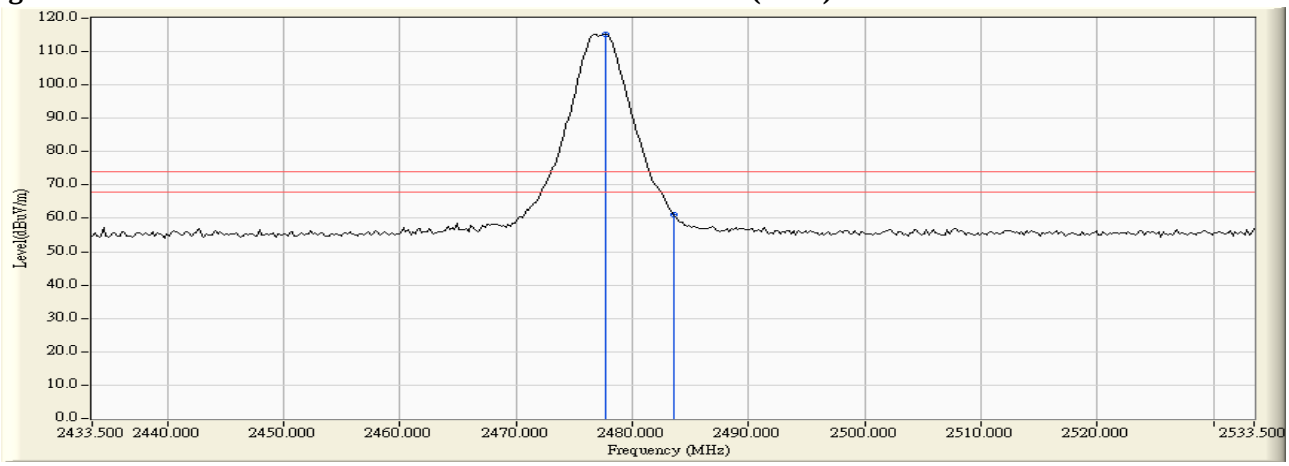
Note:
1. AVG Measurement=Peak Measurement + Duty Cycle Correct Factor
2. The Duty Cycle is refer to section 11.

Product : Wireless Speaker
Test Item : Band Edge
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)	Arerage Limit (dBuV/m)	Result
49 (Peak)	2477.700	31.396	83.743	115.139	--	--	Pass
49 (Peak)	2483.500	31.435	29.800	61.235	-12.765	74.000	Pass

Figure Channel 49: VERTICAL (Peak)



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.

Average Detector:

Frequency	Peak Measurement	Duty Cycle Factor	Measurement Level	Margin	Limit	Result Pass
MHz	dBμV/m	dB	dBμV/m	dB	dBμV/m	
Vertical						
Average Detector:						
2483.500	61.235	-50.458	10.777	-43.223	54.000	Pass

Note:
1. AVG Measurement=Peak Measurement + Duty Cycle Correct Factor
2. The Duty Cycle is refer to section 11.

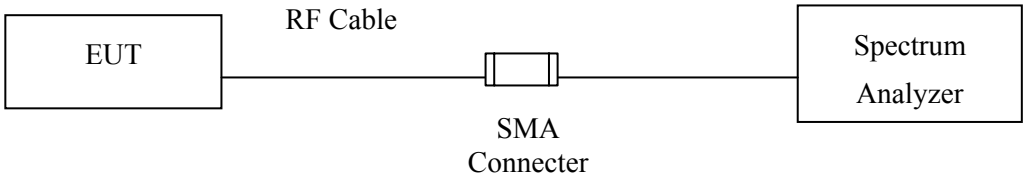
7. Channel Number

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

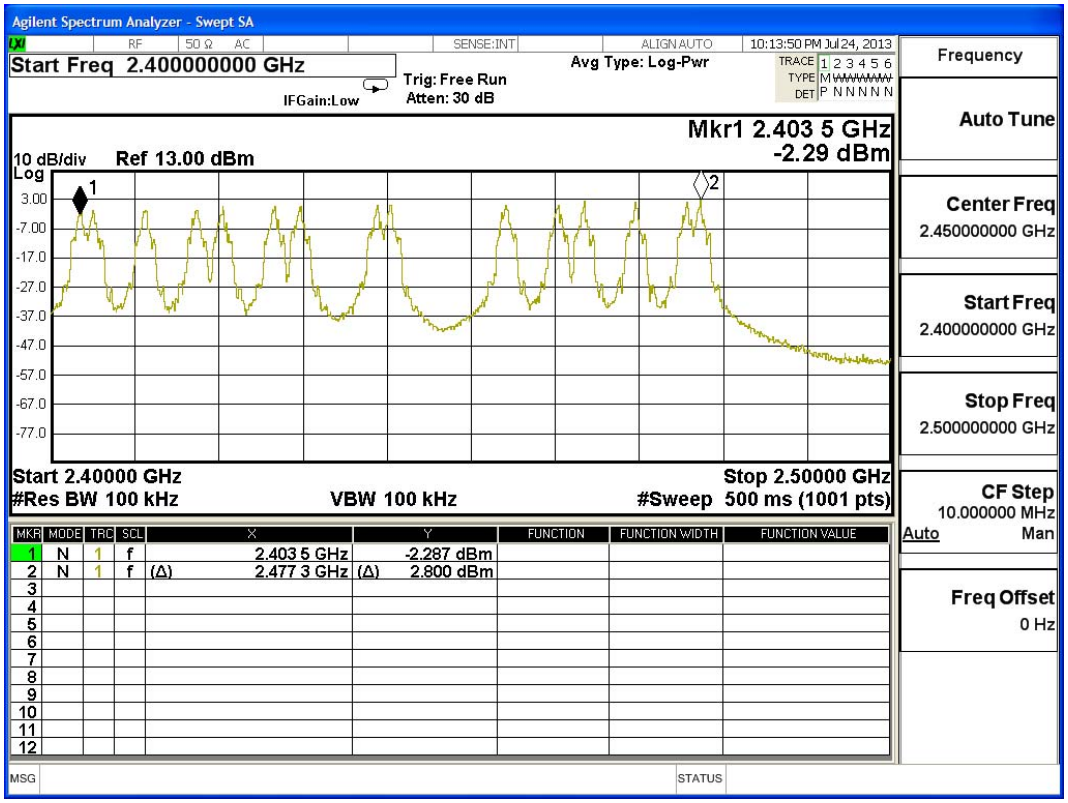
N/A

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

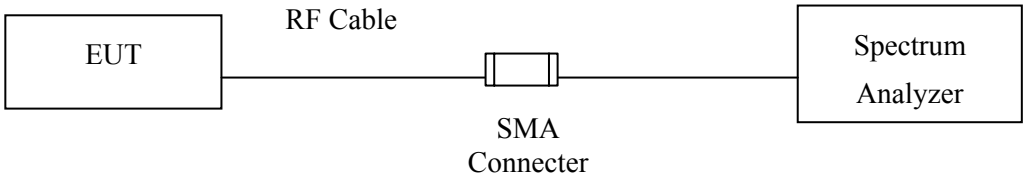
8.1. Test Equipment

	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

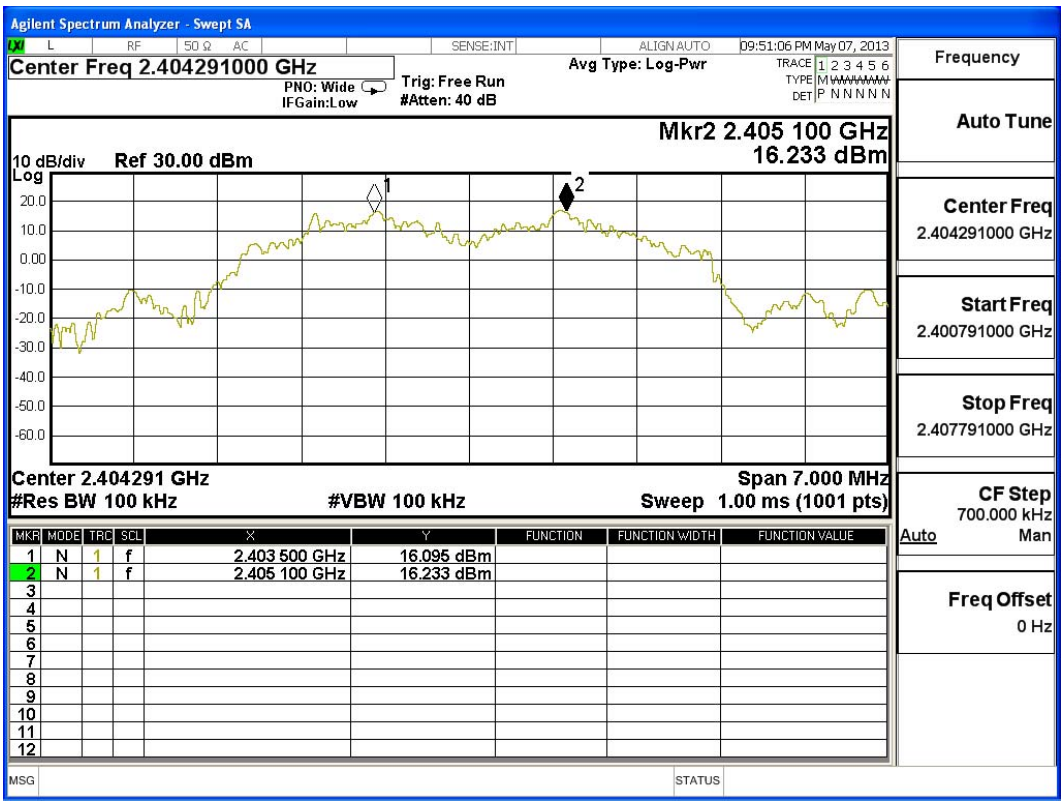
8.6. Test Result of Channel Separation

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

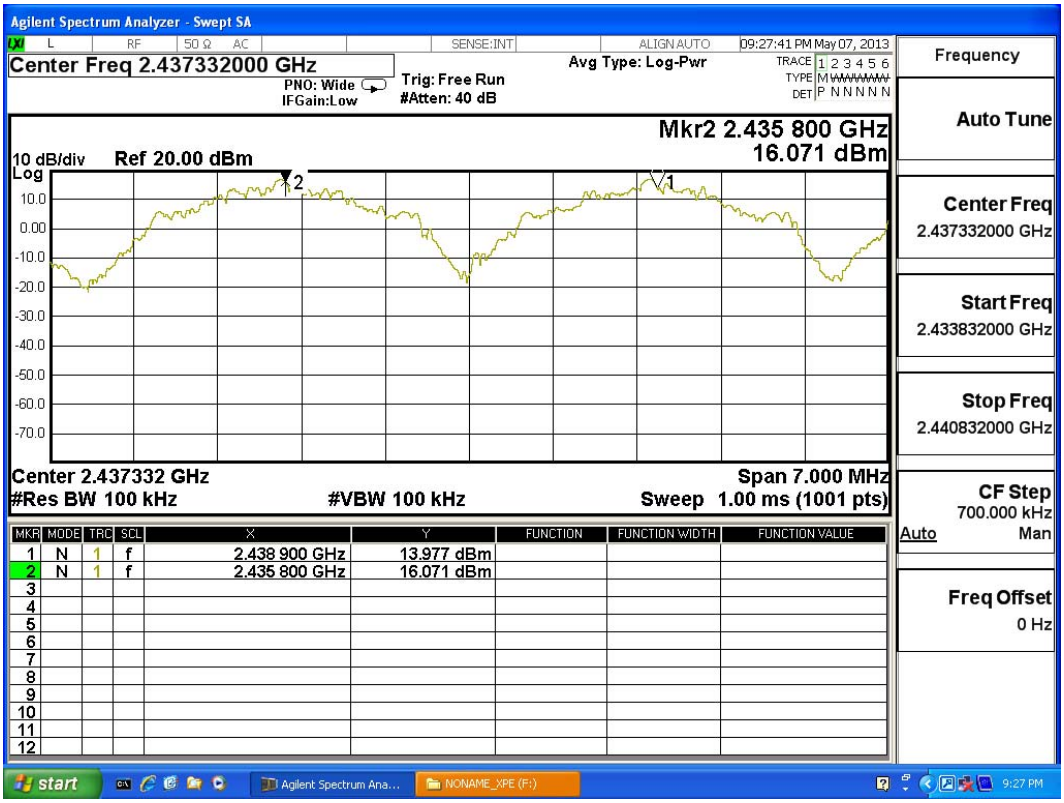
Channel No.	Frequency (MHz)	Measurement Level (kHz)	Limit (kHz)	Limit of (2/3)*20dB Bandwidth (kHz)	Result
01	2403.585	1600	>25 kHz	1473.3	Pass
24	2438.913	3100	>25 kHz	1446.7	Pass
49	2477.313	1500	>25 kHz	1460.0	Pass

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

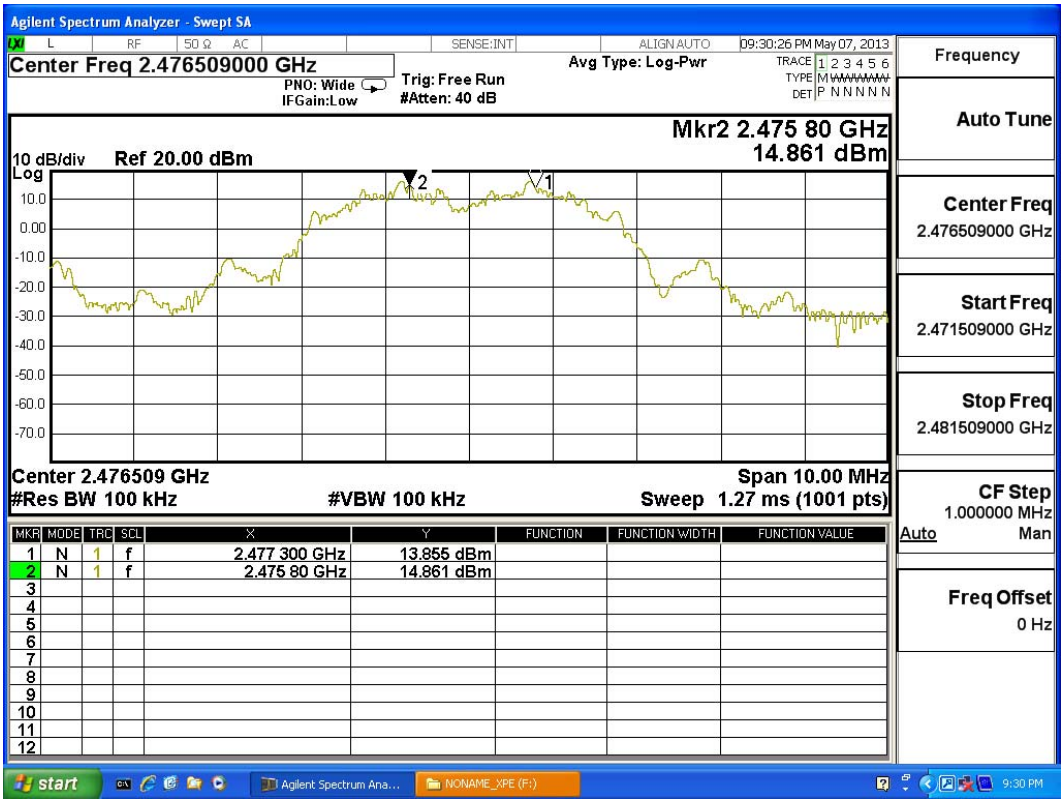
Channel 01 2403.585MHz



Channel 24 2438.913MHz



Channel 49 2477.313MHz



9. Dwell Time

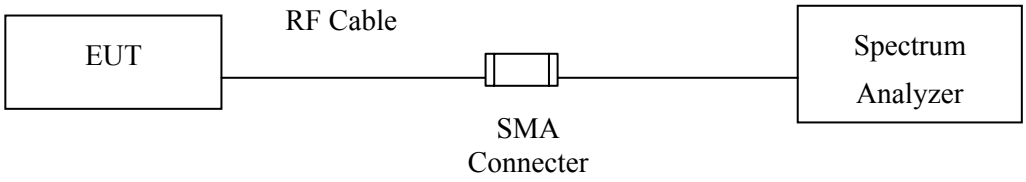
9.1. Test Equipment

	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

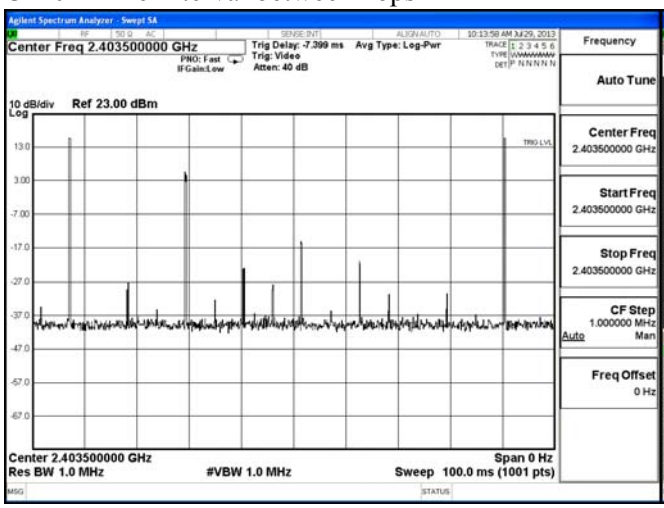
Product : Wireless Speaker
Test Item : Dwell Time
Test Site : No.3 OATS
Test Mode : Mode 1: Transmit (Channel 01,24,49)

Frequency (MHz)	Time slot length (ms)	Hopping of Number	Sweep time (ms)	Duty cycle	Dwell Time (Sec)	Limit (Sec)	Result
2403.585	0.150	2	100	0.00300	0.001	0.4	Pass
2438.913	0.145	2	100	0.00290	0.001	0.4	Pass
2477.313	0.145	2	100	0.00290	0.001	0.4	Pass

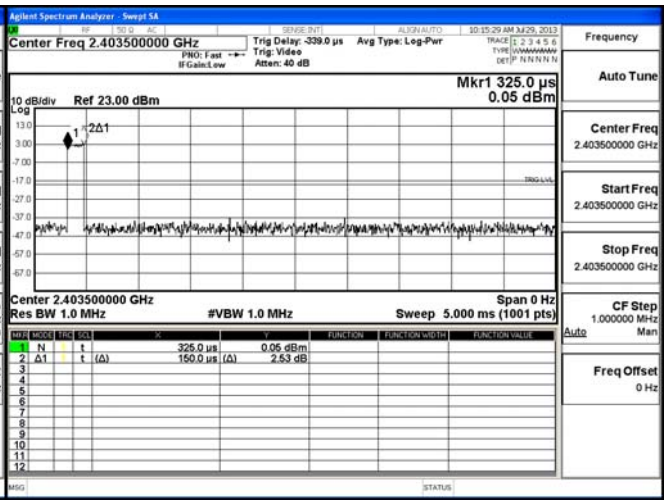
Duty cycle =((Time slot length(ms)*Hopping of Number) / Sweep time (ms)

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

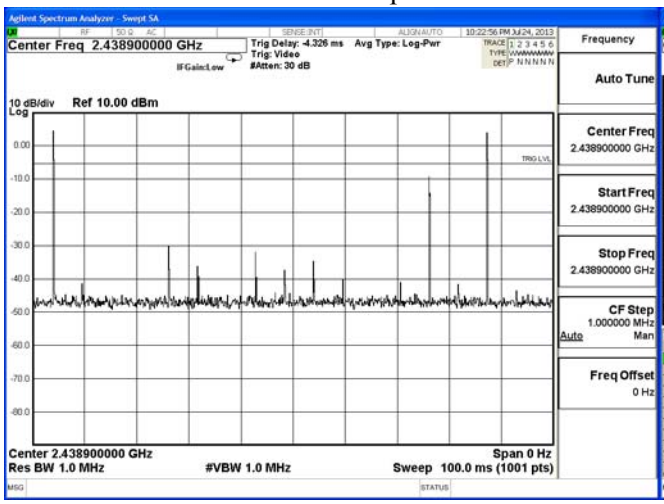
CH 01 Time Interval between hops



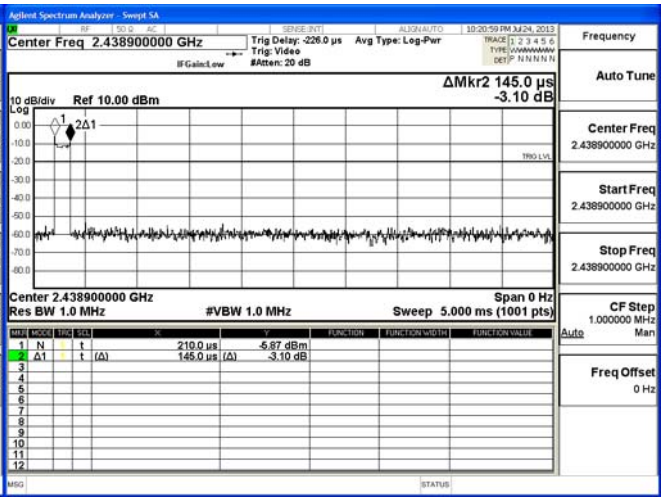
CH 01 Transmission Time



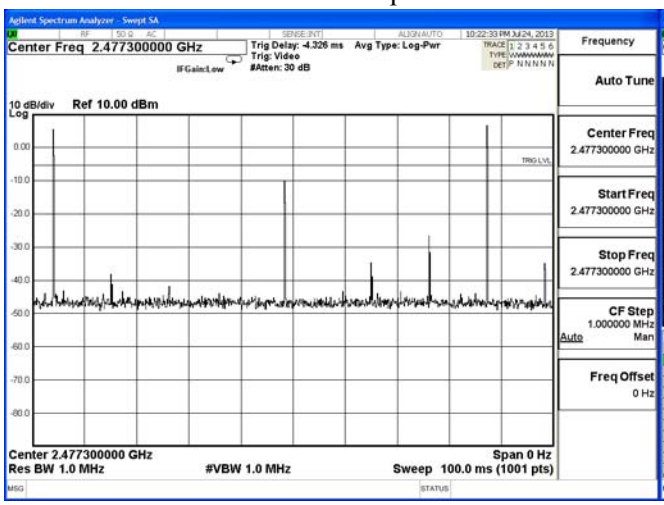
CH 24 Time Interval between hops



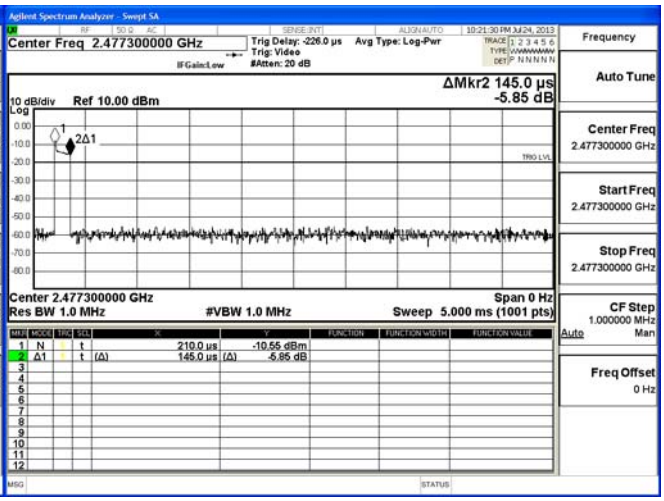
CH 24 Transmission Time



CH 49 Time Interval between hops



CH 49 Transmission Time



10. Occupied Bandwidth

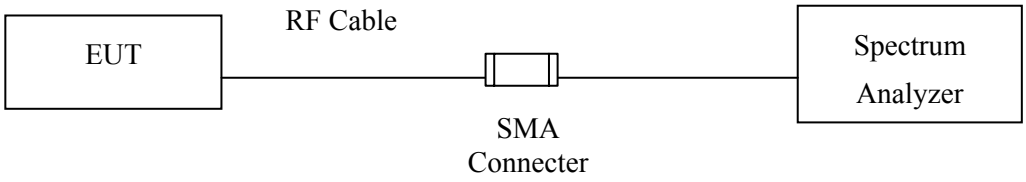
10.1. Test Equipment

	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

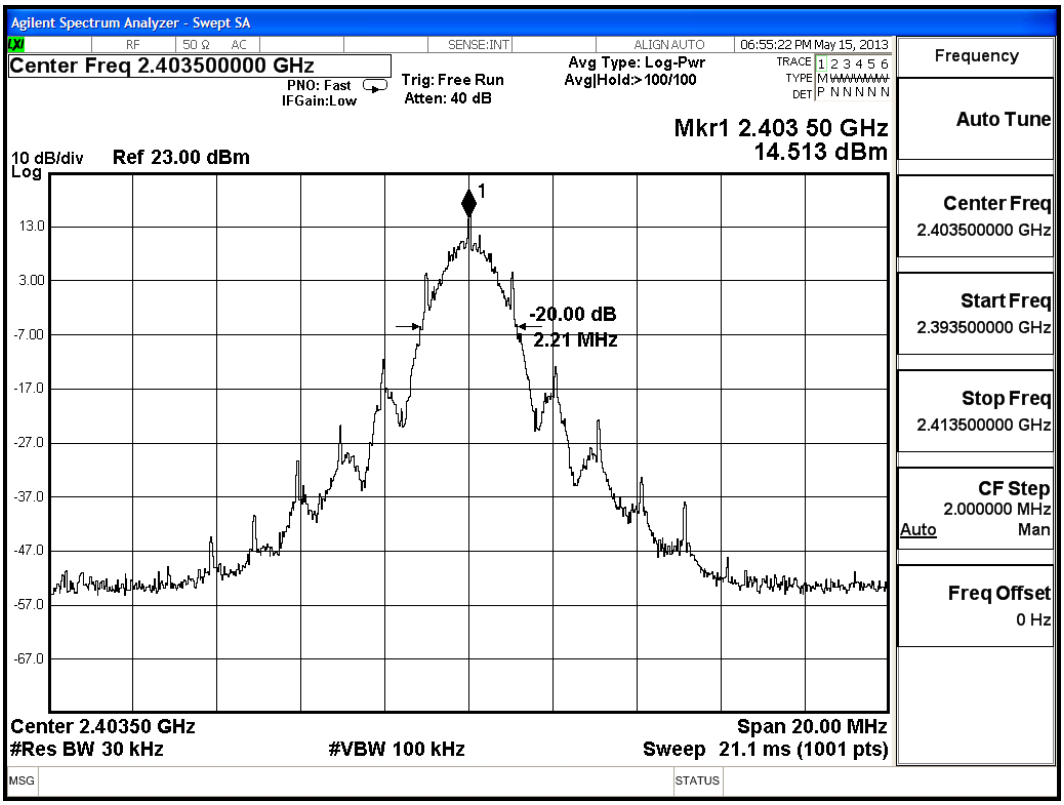
± 150Hz

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	2210	--	NA

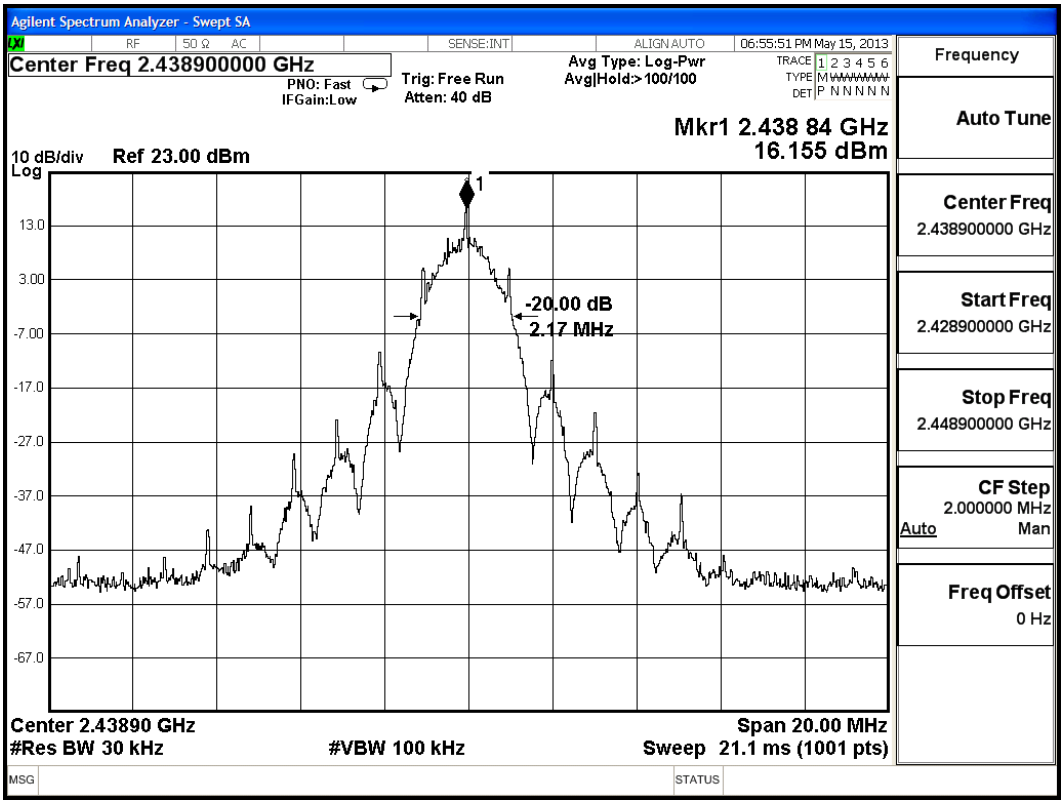
Figure Channel 01:



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	2170	--	NA

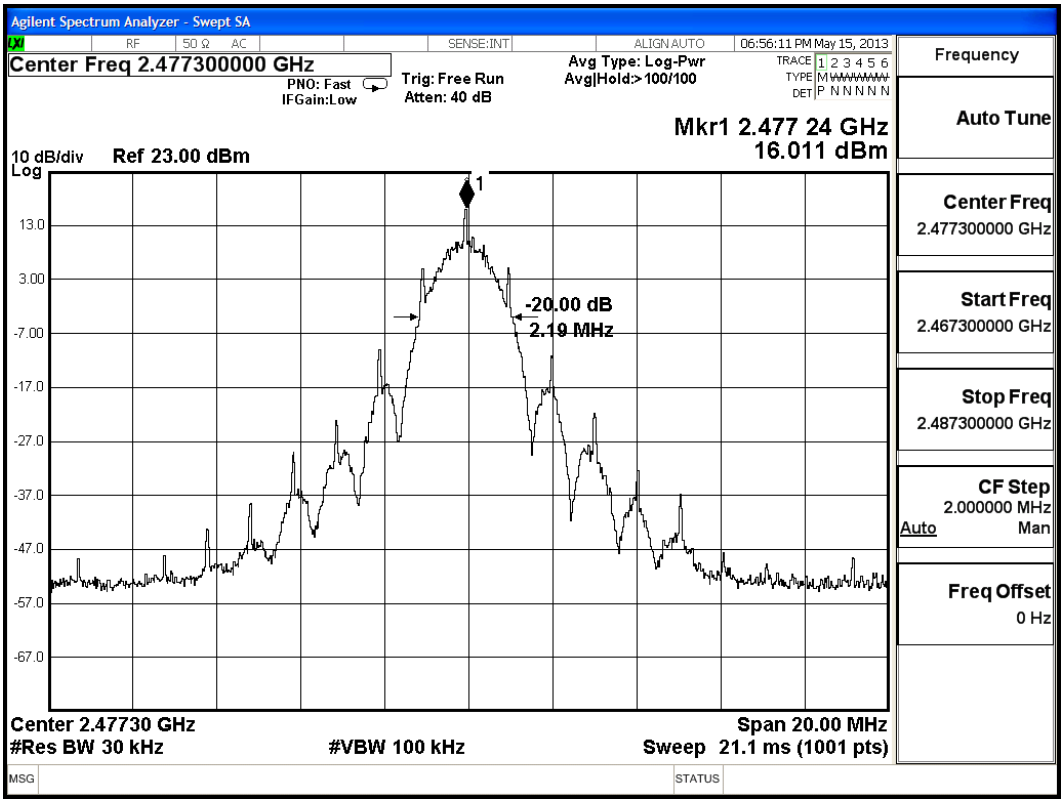
Figure Channel 24:



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	2190	--	NA

Figure Channel 49:



11. Duty Cycle

11.1. Test Equipment

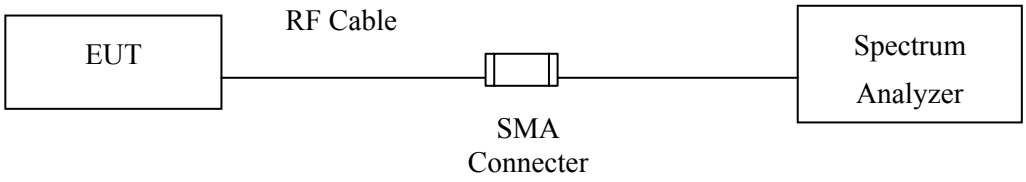
The following test equipments are used during the band edge tests:

	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 equipments marked by "X" are used to measure the final test results.

11.2. Test Setup

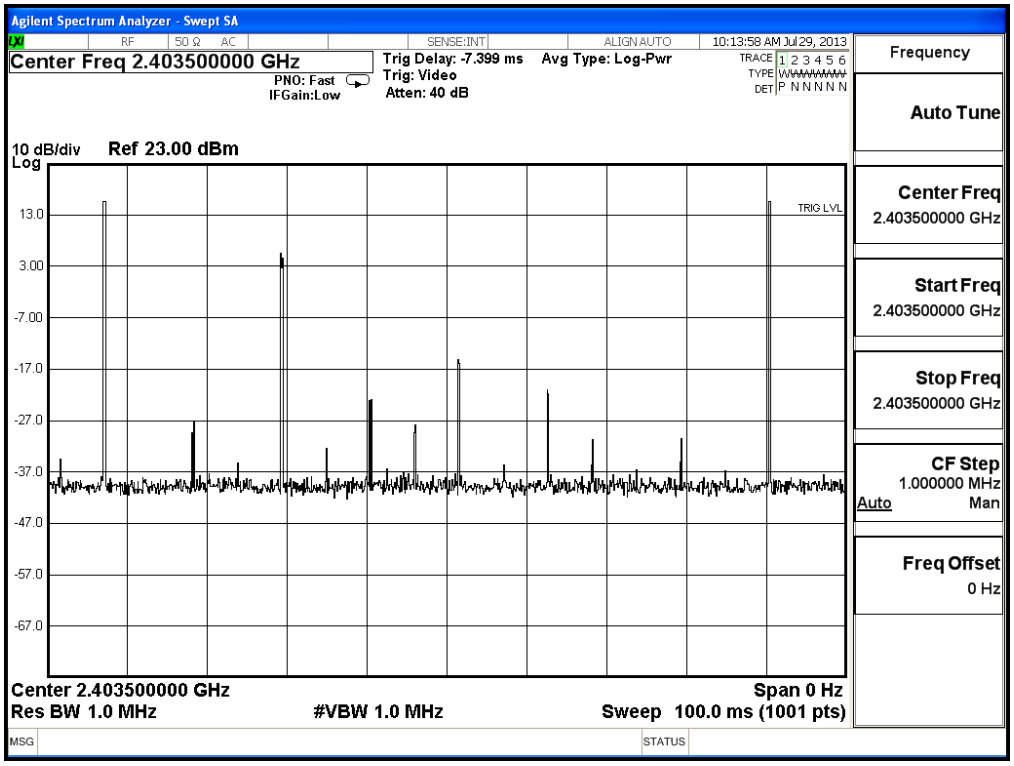


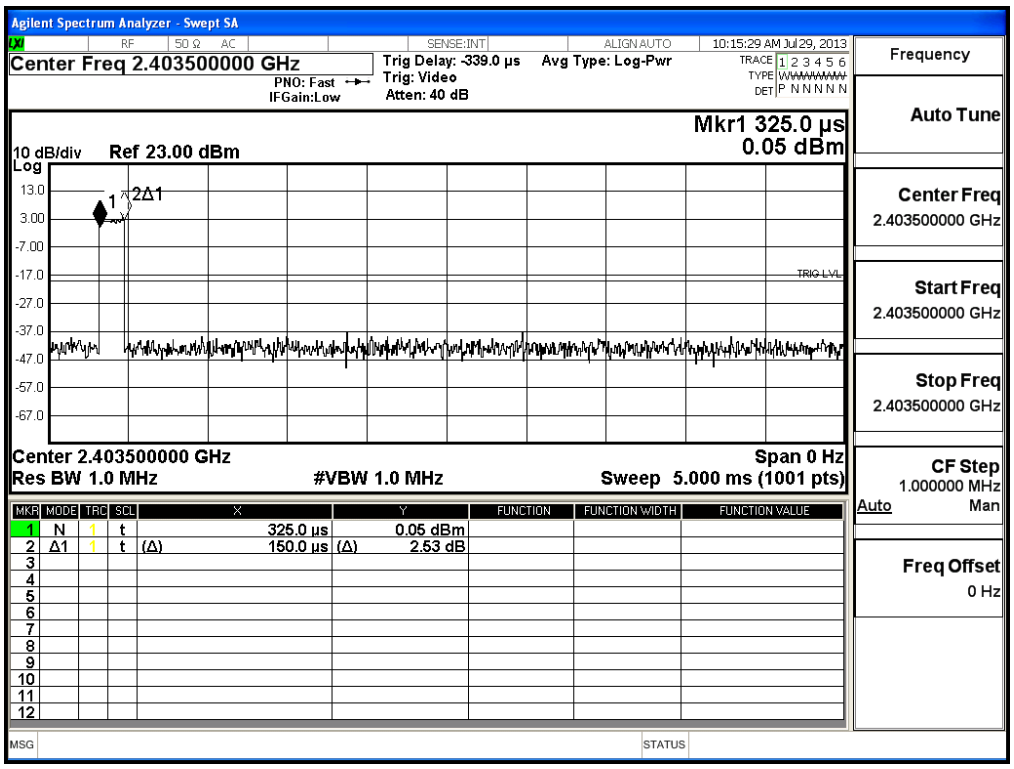
11.3. Uncertainty

± 150Hz

11.4. Test Result of Duty Cycle

Product : Wireless Speaker
Test Item : Duty Cycle Data
Test Site : No.3 OATS
Test Mode : Mode 1: Transmit





Time on of 100ms= 0.3ms

Duty Cycle= 0.3ms / 100ms= 0.003

Duty Cycle correction factor= 20 LOG 0.003= -50.458 dB

Duty Cycle correction factor	**-50.458**	**dB**

12. EMI Reduction Method During Compliance Testing

No modification was made during testing.