FCC Test Report

Product Name	Waterproof Bluetooth Speaker
Model No.	VIBROX SE
FCC ID.	2AJAAVIBROXSE

Applicant	Dongguan Meiloon Acoustic Equipments Co., Ltd.	
Address	77, Yuanlin Road Fenghuanggang Ind Estate, Tangxia Town,	
	523727 Dongguan City, Guangdong Province, China.	

Date of Receipt	Aug. 31, 2017
Issued Date	Oct. 16, 2017
Report No.	1780551R-RFUSP01V00
Report Version	V1.0



The test results relate only to the samples tested.

The test results shown in the test report are traceable to the national/international standard through the calibration report of the equipment and evaluated measurement uncertainty herein.

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Test Report

Issued Date: Oct. 16, 2017 Report No.: 1780551R-RFUSP01V00

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Product Name	Waterproof Bluetooth Speaker		
Applicant	Dongguan Meiloon Acoustic Equipments Co., Ltd.		
Address	77, Yuanlin Road Fenghuanggang Ind Estate, Tangxia Town, 523727		
	Dongguan City, Guangdong Province, China.		
Manufacturer	Vibes Audio, LLC		
Model No.	VIBROX SE		
FCC ID.	2AJAAVIBROXSE		
EUT Rated Voltage	DC 3.7V (Power by Battery) or DC 5V (Power by USB)		
EUT Test Voltage	DC 5V (Power by USB)		
Trade Name	VIBES		
Applicable Standard	FCC CFR Title 47 Part 15 Subpart C: 2016		
	ANSI C63.4: 2014, ANSI C63.10: 2013		
Test Result	Complied		

Documented By :

Jinn Chen

(Senior Adm. Specialist / Jinn Chen)

Tested By

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(Engineer / Bill Lin)

Approved By :

(Director / Vincent Lin)



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1. GENERAL INFORMATION

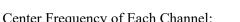
1.1. EUT Description

Product Name	Waterproof Bluetooth Speaker	
Trade Name	VIBES	
Model No.	VIBROX SE	
FCC ID.	2AJAAVIBROXSE	
Frequency Range	2402 – 2480MHz	
Channel Number	79	
Type of Modulation	FHSS: GFSK(1Mbps) / π /4DQPSK(2Mbps) / 8DPSK(3Mbps)	
Antenna Type	Printed Antenna	
Channel Control	Auto	
Antenna Gain	Refer to the table "Antenna List"	
Power Adapter	MFR: DYS, M/N: APP521-050210U	
	Input: AC 100-240V~50/60Hz, 0.45A MAX	
	Output: 5.0V==, 2.1A	
	Cable Out: Non-shielded, 1.5m	

Antenna List

No.	Manufacturer	Part No.	Antenna Type	Peak Gain
1	FIHONEST COMMUNICA Co.,Ltd.	N/A	Printed Antenna	0dBi for 2.4 GHz

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





Center Frequency of Each Channel:							
Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
Channel 00:	2402 MHz	Channel 20:	2422 MHz	Channel 40:	2442 MHz	Channel 60:	2462 MHz
Channel 01:	2403 MHz	Channel 21:	2423 MHz	Channel 41:	2443 MHz	Channel 61:	2463 MHz
Channel 02:	2404 MHz	Channel 22:	2424 MHz	Channel 42:	2444 MHz	Channel 62:	2464 MHz
Channel 03:	2405 MHz	Channel 23:	2425 MHz	Channel 43:	2445 MHz	Channel 63:	2465 MHz
Channel 04:	2406 MHz	Channel 24:	2426 MHz	Channel 44:	2446 MHz	Channel 64:	2466 MHz
Channel 05:	2407 MHz	Channel 25:	2427 MHz	Channel 45:	2447 MHz	Channel 65:	2467 MHz
Channel 06:	2408 MHz	Channel 26:	2428 MHz	Channel 46:	2448 MHz	Channel 66:	2468 MHz
Channel 07:	2409 MHz	Channel 27:	2429 MHz	Channel 47:	2449 MHz	Channel 67:	2469 MHz
Channel 08:	2410 MHz	Channel 28:	2430 MHz	Channel 48:	2450 MHz	Channel 68:	2470 MHz
Channel 09:	2411 MHz	Channel 29:	2431 MHz	Channel 49:	2451 MHz	Channel 69:	2471 MHz
Channel 10:	2412 MHz	Channel 30:	2432 MHz	Channel 50:	2452 MHz	Channel 70:	2472 MHz
Channel 11:	2413 MHz	Channel 31:	2433 MHz	Channel 51:	2453 MHz	Channel 71:	2473 MHz
Channel 12:	2414 MHz	Channel 32:	2434 MHz	Channel 52:	2454 MHz	Channel 72:	2474 MHz
Channel 13:	2415 MHz	Channel 33:	2435 MHz	Channel 53:	2455 MHz	Channel 73:	2475 MHz
Channel 14:	2416 MHz	Channel 34:	2436 MHz	Channel 54:	2456 MHz	Channel 74:	2476 MHz
Channel 15:	2417 MHz	Channel 35:	2437 MHz	Channel 55:	2457 MHz	Channel 75:	2477 MHz
Channel 16:	2418 MHz	Channel 36:	2438 MHz	Channel 56:	2458 MHz	Channel 76:	2478 MHz
Channel 17:	2419 MHz	Channel 37:	2439 MHz	Channel 57:	2459 MHz	Channel 77:	2479 MHz
Channel 18:	2420 MHz	Channel 38:	2440 MHz	Channel 58:	2460 MHz	Channel 78:	2480 MHz
Channel 19:	2421 MHz	Channel 39:	2441 MHz	Channel 59:	2461 MHz		

- 1. The EUT is a Bike Navigation computer with a Bluetooth transceiver.
- 2. These tests were conducted on a sample for the purpose of demonstrating compliance of Bluetooth 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 radiation measurements are performed in X, Y, Z axis positioning. Only the worst case is shown in the report.
- 5. Bluetooth operation was evaluated at both 1Mb/s and 3Mb/s data rates. 2Mb/s data rate was found, through pre-testing, to produce emissions similar to those for 3Mb/s.
- 6. The EUT employs Adaptive Frequency Hopping (AFH) which identifies sources of interference namely devices operating in 802.11 WLAN and excludes them from the list of available channels. The process of re-mapping reduces the number of test channels from 79 channels to a minimum number of 20 channels.

Test Mode	Mode 1: Transmit - 1Mbps
	Mode 2: Transmit - 3Mbps

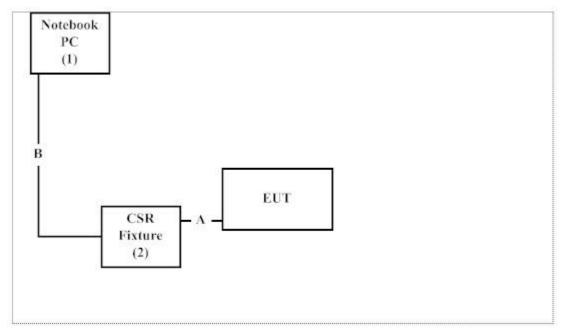
1.3. Tested System Details

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

Prod	uct	Manufacturer	Model No.	Serial No.	Power Cord
1	Notebook PC	DELL	P62G	229FJC2	N/A
2	CSR Fixture	N/A	N/A	N/A	N/A

Signal Cable Type		Signal cable Description	
A Signal Cable		Non-Shielded, 0.1m	
В	CSR Signal Cable	Non-Shielded, 0.8m	

1.4. Configuration of Tested System



1.5. EUT Exercise Software

- 1. Setup the EUT as shown in Section 1.4.
- 2. Execute software "Blue Test 3 V2.6.2" on the EUT.
- 3. Configure the test mode, the test channel, and the data rate.
- 4. Press "OK" to start the continuous Transmit.
- 5. 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	50-65
Barometric pressure (mbar)	860-1060	950-1000

The related certificate for our laboratories about the test site and management system can be downloaded from DEKRA Testing and Certification Co., Ltd. Web Site:

http://www.dekra.com.tw/english/about/certificates.aspx?bval=5

The address and introduction of DEKRA Testing and Certification Co., Ltd. laboratories can be founded in our Web site: <u>http://www.dekra.com.tw/index_en</u>

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	Accredited Number: 3023
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	New Taipei City 24457, Taiwan.
	TEL: 886-2-2602-7968 / FAX : 866-2-2602-3286
	E-Mail : info.tw@dekra.com

FCC Accreditation Number: TW3023

1.7. List of Test Equipment

For Conduction measurements /ASR1

	Equipment	Manufacturer	Model No.	Serial No.	Cali. Data	Due. Data
Х	EMI Test Receiver	R&S	ESR7	161601	2017.01.06	2018.01.05
Х	Two-Line V-Network	R&S	ENV216	101306	2017.02.16	2018.02.15
Х	Two-Line V-Network	R&S	ENV216	101307	2017.03.17	2018.03.16
Х	Coaxial Cable	Quietek	RG400_BNC	RF001	2017.05.24	2018.05.23

Note:

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

3. Test Software version : QuieTek EMI 2.0 V2.1.113

For Conducted measurements /ASR4

	Equipment	Manufacturer	Model No.	Serial No.	Cali. Data	Due. Data
Х	Spectrum Analyzer	R&S	FSV30	103464	2017.01.09	2018.01.08
Х	Power Meter	Anritsu	ML2496A	1548003	2016.12.15	2017.12.14
Х	Power Sensor	Anritsu	MA2411B	1531024	2016.12.15	2017.12.14
Х	Power Sensor	Anritsu	MA2411B	1531025	2016.12.15	2017.12.14
	Bluetooth Tester	R&S	CBT	101238	2017.01.03	2018.01.02

Note:

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

3. Test Software version : QuieTek Conduction Test System V8.0.110

For Radiated measurements /ACB1

	Equipment	Manufacturer	Model No.	Serial No.	Cali. Data	Due. Data
Х	Loop Antenna	TESEQ	HLA6121	37133	2016.03.18	2018.03.17
Х	Bi-Log Antenna	SCHWARZBECK	VULB9168	9168-674	2017.02.13	2018.02.12
Х	Horn Antenna	ETS-Lindgren	3117	00203800	2016.10.13	2017.10.12
Х	Horn Antenna	Com-Power	AH-840	101087	2017.05.24	2018.05.23
Х	Pre-Amplifier	EMCI	EMC001330	980316	2017.05.16	2018.05.15
Х	Pre-Amplifier	EMCI	EMC051835SE	980311	2017.05.17	2018.05.16
Х	Pre-Amplifier	EMCI	EMC05820SE	980310	2017.05.17	2018.05.16
Х	Pre-Amplifier	EMCI	EMC184045SE	980314	2017.05.17	2018.05.16
Х	Filter	MICRO TRONICS	BRM50702	G249	2017.08.11	2018.08.10
	Filter	MICRO TRONICS	BRM50716	G187	2017.08.16	2018.08.15
Х	EMI Test Receiver	R&S	ESR7	101602	2016.12.15	2017.12.14
Х	Spectrum Analyzer	R&S	FSV40	101148	2017.01.24	2018.01.23
Х	Coaxial Cable	SUHNER	SUCOFLEX 106	RF002	2017.05.25	2018.05.24
Х	Mircoflex Cable	HUBER SUHNER	SUCOFLEX 102	MY3381/2	2017.08.11	2018.08.10

Note:

1. Loop Antenna is calibrated every two year, the other equipments are calibrated every one year.

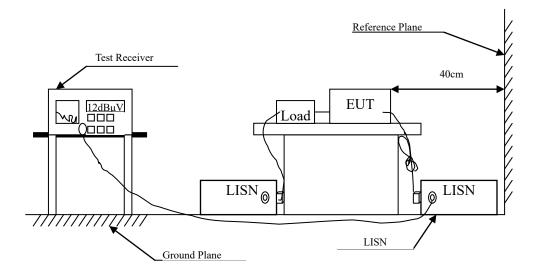
- 2. The test instruments marked with "X" are used to measure the final test results.
- 3. Test Software version : QuieTek EMI 2.0 V2.1.113

^{1.} All equipments are calibrated every one year.



2. Conducted Emission

2.1. Test Setup



2.2. Limits

FCC Part 15 Subpart C Paragraph 15.207 (dBµV) Limit				
Frequency	Limits			
MHz	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.

2.3. 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 C63.4: 2014 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 C63.4, 2014; tested to FHSS test procedure of FCC Public Notice DA 00-705 for compliance to FCC 47CFR 15.247 requirements.

2.4. Uncertainty

±2.35dB

2.5. Test Result of Conducted Emission

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Frequency	Correct	Reading	Measurement	Margin	Limit
	Factor	Level	Level		
MHz	dB	dBµV	dBµV	dB	dBµV
LINE 1					
Quasi-Peak					
0.161	9.636	34.714	44.351	-21.335	65.686
4.940	9.830	10.151	19.980	-36.020	56.000
13.864	9.992	3.422	13.414	-46.586	60.000
22.389	10.090	17.411	27.501	-32.499	60.000
24.522	10.100	22.054	32.154	-27.846	60.000
26.639	10.110	23.711	33.821	-26.179	60.000
Average					
0.161	9.636	19.959	29.595	-26.091	55.686
4.940	9.830	5.419	15.249	-30.751	46.000
13.864	9.992	-3.538	6.455	-43.545	50.000
22.389	10.090	-1.165	8.925	-41.075	50.000
24.522	10.100	2.319	12.419	-37.581	50.000
26.639	10.110	2.733	12.843	-37.157	50.000

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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	: Waterproof Bluetooth Speaker						
Test Item	: Conduc	: Conducted Emission Test					
Power Line	: Line 2	: Line 2					
Test Mode		: Transmit - 3Mbp	s (2441MHz)				
Test Date	: 2017/09	0/28					
Frequency	Correct	Reading	Measurement	Margin	Limit		
	Factor	Level	Level				
MHz	dB	dBµV	dBµV	dB	dBµV		
LINE 2							
Quasi-Peak							
0.157	10.173	36.553	46.726	-19.074	65.800		
2.252	9.892	13.424	23.316	-32.684	56.000		
4.875	9.873	14.000	23.872	-32.128	56.000		
22.391	10.180	15.825	26.005	-33.995	60.000		
24.524	10.198	19.683	29.881	-30.119	60.000		
28.781	10.253	22.122	32.375	-27.625	60.000		
Average							
0.157	10.173	21.742	31.915	-23.885	55.800		
2.252	9.892	8.010	17.902	-28.098	46.000		
4.875	9.873	7.605	17.478	-28.522	46.000		
22.391	10.180	-1.581	8.599	-41.401	50.000		
24.524	10.198	2.236	12.434	-37.566	50.000		
28.781	10.253	2.116	12.369	-37.631	50.000		

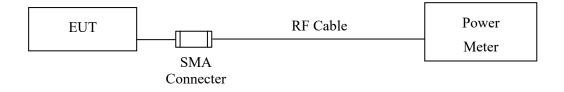
1. All Reading Levels are Quasi-Peak and average value.

2. " means the worst emission level.

3. Measurement Level = Reading Level + Correct Factor

3. Peak Power Output

3.1. Test Setup



3.2. Limit

For frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 non-overlapping hopping channels, and all frequency hopping systems in the 5725-5850 MHz band: 1 watt. For all other frequency hopping systems in the 2400-2483.5 MHz band: 0.125 watts.

3.3. Test Procedure

The EUT was setup to ANSI C63.4, 2014; tested to FHSS test procedure of FCC Public Notice DA 00-705 for compliance to FCC 47CFR 15.247 requirements.

3.4. Uncertainty

±0.86 dB

3.5. Test Result of Peak Power Output

Product	:	Waterproof Bluetooth Speaker
Test Item	:	Peak Power Output
Test Mode	:	Mode 1: Transmit - 1Mbps
Test Date	:	2017/09/29

Channel No.	Frequency	Measurement	Required Limit	Result
	(MHz)	(dBm)		
Channel 00	2402.00	5.34	0.125W = 20.97 dBm	Pass
Channel 39	2441.00	7.14	0.125W = 20.97 dBm	Pass
Channel 78	2480.00	8.28	0.125W = 20.97 dBm	Pass

Note: For AFH mode using 20 hopping channels, the maximum output power limit is 0.125W.



Product	:	Waterproof Bluetooth Speaker
Test Item	:	Peak Power Output
Test Mode	:	Mode 2: Transmit - 3Mbps
Test Date	:	2017/09/29

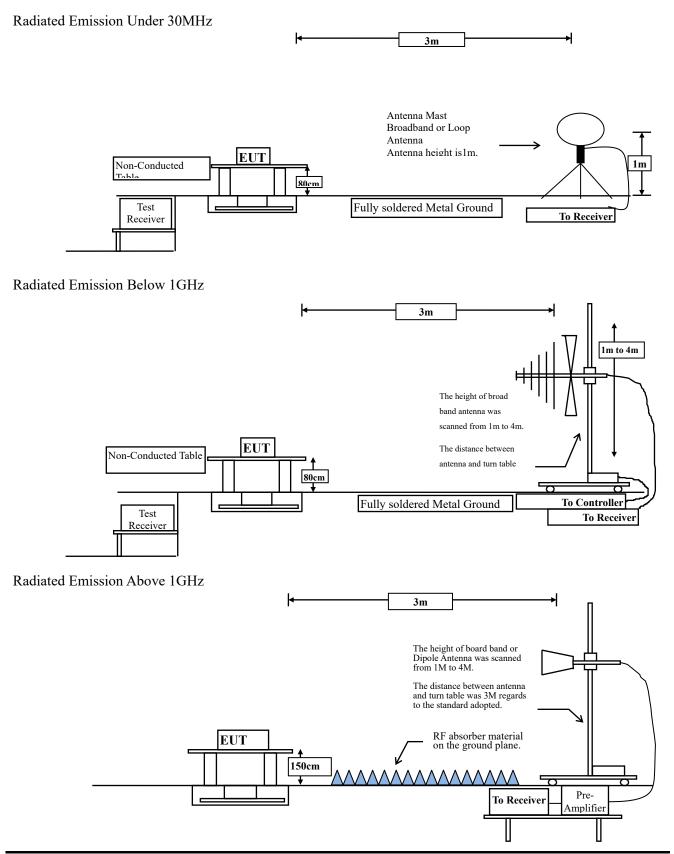
Channel No.	Frequency	Measurement	Required Limit	Result
	(MHz)	(dBm)		
Channel 00	2402.00	4.64	20.97 dBm	Pass
Channel 39	2441.00	6.77	20.97 dBm	Pass
Channel 78	2480.00	7.90	20.97 dBm	Pass

Note: For AFH mode using 20 hopping channels, the maximum output power limit is 0.125W.



4. Radiated Emission

4.1. Test Setup



4.2. 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.

4.3. Test Procedure

The EUT was setup according to ANSI C63.10, 2013 and tested compliance to FCC 47CFR 15.247 requirements.

Measuring the frequency range below 1GHz, the EUT is placed on a turn table which is 0.8 meter above ground, when measuring the frequency range above 1GHz, the EUT is placed on a turn table which is 1.5 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 between 1 meter and 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: 2013 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 measurement frequency range form 9kHz - 10th Harmonic of fundamental was investigated.

4.4. Uncertainty

Horizontal polarization :

30-300MHz: ±4.08dB ; 300M-1GHz: ±3.86dB ; 1-18GHz: ±3.77dB ; 18-40GHz: ±3.98dB Vertical polarization :

30-300MHz: ±4.81dB ; 300M-1GHz: ±3.87dB ; 1-18GHz : ±3.83dB ; 18-40GHz: ±3.98dB

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Product Test Item Test Mode Test Date	 Waterproof Bluetooth Speaker Harmonic Radiated Emission Mode 1: Transmit - 1Mbps(2402MHz) 2017/09/28 					
Frequency	Correct	Reading	Measurement	Margin	Limit	
	Factor	Level	Level			
MHz	dB	dBµV	$dB\mu V/m$	dB	dBµV/m	
Horizontal						
Peak Detector:						
4804.000	-6.114	54.200	48.086	-25.914	74.000	
7206.000	-3.112	58.020	54.908	-19.092	74.000	
9608.000	-0.801	45.730	44.930	-29.070	74.000	
Average						
Detector:						
7206.000	-3.112	49.510	46.398	-7.602	54.000	
Vertical						
Peak Detector:						
4804.000	-6.114	55.080	48.966	-25.034	74.000	
7206.000	-3.112	59.920	56.808	-17.192	74.000	
9608.000	-0.801	45.760	44.960	-29.040	74.000	
Average						
Detector:						
7206.000	-3.112	51.080	47.968	-6.032	54.000	

4.5. **Test Result of Radiated Emission**

- 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	:	Waterproof Bluetooth Speaker
Test Item	:	Harmonic Radiated Emission
Test Mode	:	Mode 1: Transmit - 1Mbps(2441MHz)
Test Date	:	2017/09/28

Frequency	Correct	Reading	Measurement	Margin	Limit
	Factor	Level	Level		
MHz	dB	dBµV	dBµV/m	dB	dBµV/m
Horizontal					
Peak Detector:					
4882.000	-6.066	54.950	48.884	-25.116	74.000
7323.000	-3.022	59.720	56.698	-17.302	74.000
9764.000	-0.522	46.190	45.667	-28.333	74.000
Average					
Detector:					
7323.000	-3.022	50.510	47.488	-6.512	54.000
Vertical					
Peak Detector:					
4882.000	-6.066	56.960	50.894	-23.106	74.000
7323.000	-3.022	62.560	59.538	-14.462	74.000
9764.000	-0.522	46.430	45.907	-28.093	74.000
Average					
Detector:					
7323.000	-3.022	53.370	50.348	-3.652	54.000

- 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	:	Waterproof Bluetooth Speaker
Test Item	:	Harmonic Radiated Emission
Test Mode	:	Mode 1: Transmit - 1Mbps(2480MHz)
Test Date	:	2017/09/28

Frequency	Correct	Reading	Measurement	Margin	Limit
	Factor	Level	Level		
MHz	dB	dBµV	dBµV/m	dB	dBµV/m
Horizontal					
Peak Detector:					
4960.000	-6.055	54.530	48.475	-25.525	74.000
7440.000	-2.861	58.840	55.978	-18.022	74.000
9920.000	-0.306	45.420	45.114	-28.886	74.000
Average					
Detector:					
7440.000	-2.861	49.980	47.118	-6.882	54.000
Vertical					
Peak Detector:					
4960.000	-6.055	57.280	51.225	-22.775	74.000
7440.000	-2.861	60.420	57.558	-16.442	74.000
9920.000	-0.306	45.210	44.904	-29.096	74.000
Average					
Detector:					
7440.000	-2.861	51.250	48.388	-5.612	54.000

- 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 Test Item Test Mode Test Date	: Harmon	oof Bluetooth Spo ic Radiated Emiss : Transmit - 3Mbp 1/28	sion		
Frequency	Correct	Reading	Measurement	Margin	Limit
	Factor	Level	Level		
MHz	dB	dBµV	dBµV/m	dB	dBµV/m
Horizontal					
Peak Detector:					
4804.000	-6.114	51.340	45.226	-28.774	74.000
7206.000	-3.112	55.300	52.188	-21.812	74.000
9608.000	-0.801	46.470	45.670	-28.330	74.000
Average					
Detector:					
					54.000
Vertical					
Peak Detector:					
4804.000	-6.114	52.750	46.636	-27.364	74.000
7206.000	-3.112	56.890	53.778	-20.222	74.000
9608.000	-0.801	45.860	45.060	-28.940	74.000
Average					
Detector:					
					54.000

- 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 Test Item Test Mode Test Date	 Waterproof Bluetooth Speaker Harmonic Radiated Emission Mode 2: Transmit - 3Mbps (2441MHz) 2017/09/28 					
Frequency	Correct	Reading	Measurement	Margin	Limit	
	Factor	Level	Level	-		
MHz	dB	dBµV	dBµV/m	dB	dBµV/m	
Horizontal						
Peak Detector:						
4882.000	-6.066	53.540	47.474	-26.526	74.000	
7323.000	-3.022	55.880	52.858	-21.142	74.000	
9764.000	-0.522	46.670	46.147	-27.853	74.000	
Average						
Detector:						
					54.000	
Vertical						
Peak Detector:						
4882.000	-6.066	55.080	49.014	-24.986	74.000	
7323.000	-3.022	59.100	56.078	-17.922	74.000	
9764.000	-0.522	45.970	45.447	-28.553	74.000	
Average						
Detector:						
7323.000	-3.022	46.830	43.808	-10.192	54.000	

- 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	:	Waterproof Bluetooth Speaker
Test Item	:	Harmonic Radiated Emission
Test Mode	:	Mode 2: Transmit - 3Mbps (2480MHz)
Test Date	:	2017/09/28

Frequency	Correct	Reading	Measurement	Margin	Limit
	Factor	Level	Level		
MHz	dB	dBµV	$dB\mu V/m$	dB	dBµV/m
Horizontal					
Peak Detector:					
4960.000	-6.055	52.800	46.745	-27.255	74.000
7440.000	-2.861	55.600	52.738	-21.262	74.000
9920.000	-0.306	45.480	45.174	-28.826	74.000
Average					
Detector:					
					54.000
Vertical					
Peak Detector:					
4960.000	-6.055	55.550	49.495	-24.505	74.000
7440.000	-2.861	56.810	53.948	-20.052	74.000
9920.000	-0.306	45.300	44.994	-29.006	74.000
Average					
Detector:					
					54.000

- 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	:	Waterproof Bluetooth Speaker
Test Item	:	General Radiated Emission
Test Mode	:	Mode 1: Transmit - 1Mbps (2441MHz)
Test Date	:	2017/09/28

Correct	Reading	Measurement	Margin	Limit
Factor	Level	Level		
dB	dBµV	$dB\mu V/m$	dB	$dB\mu V/m$
-15.468	41.706	26.238	-13.762	40.000
-11.998	36.852	24.854	-21.146	46.000
-7.393	32.300	24.908	-21.092	46.000
-3.958	30.935	26.977	-19.023	46.000
-2.306	31.258	28.952	-17.048	46.000
0.377	31.028	31.406	-22.594	54.000
-10.823	45.781	34.958	-5.042	40.000
-15.468	47.580	32.112	-7.888	40.000
-13.325	43.241	29.916	-16.084	46.000
-7.393	34.902	27.510	-18.490	46.000
-1.894	30.869	28.974	-17.026	46.000
0.303	30.199	30.502	-15.498	46.000
	Factor dB -15.468 -11.998 -7.393 -3.958 -2.306 0.377 -10.823 -15.468 -13.325 -7.393 -1.894	Factor Level dB dBμV -15.468 41.706 -11.998 36.852 -7.393 32.300 -3.958 30.935 -2.306 31.258 0.377 31.028 -10.823 45.781 -15.468 47.580 -13.325 43.241 -7.393 34.902 -1.894 30.869	FactorLevelLeveldB $dB\mu V$ $dB\mu V/m$ -15.46841.70626.238-11.99836.85224.854-7.39332.30024.908-3.95830.93526.977-2.30631.25828.9520.37731.02831.406-10.82345.78134.958-15.46847.58032.112-13.32543.24129.916-7.39334.90227.510-1.89430.86928.974	$\begin{array}{c c c c c c c c c c c c c c c c c c c $

- 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.



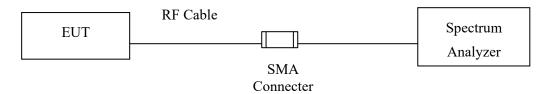
Product	:	Waterproof Bluetooth Speaker
Test Item	:	General Radiated Emission
Test Mode	:	Mode 2: Transmit - 3Mbps (2441MHz)
Test Date	:	2017/09/28

Frequency	Correct	Reading	Measurement	Margin	Limit
	Factor	Level	Level		
MHz	dB	dBµV	$dB\mu V/m$	dB	dBµV/m
Horizontal					
79.203	-15.468	40.628	25.160	-14.840	40.000
263.362	-11.772	36.801	25.029	-20.971	46.000
408.159	-7.876	33.467	25.591	-20.409	46.000
672.449	-3.437	31.871	28.434	-17.566	46.000
845.362	-1.036	30.933	29.897	-16.103	46.000
984.536	0.670	30.464	31.133	-22.867	54.000
Vertical					
46.870	-10.845	44.647	33.801	-6.199	40.000
79.203	-15.468	45.871	30.403	-9.597	40.000
219.783	-13.325	42.295	28.970	-17.030	46.000
408.159	-7.876	34.318	26.442	-19.558	46.000
602.159	-4.041	31.105	27.064	-18.936	46.000
925.493	-0.043	31.304	31.261	-14.739	46.000

- 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 Setup



5.2. 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.

5.3. Test Procedure

The EUT was setup to ANSI C63.4, 2014; tested to FHSS test procedure of FCC Public Notice DA 00-705 for compliance to FCC 47CFR 15.247 requirements.

5.4. Uncertainty

±1.23dB

5.5. Test Result of RF Antenna Conducted Test

Product	:	Waterproof Bluetooth Speaker
Test Item	:	RF Antenna Conducted Test
Test Mode	:	Mode 1: Transmit - 1Mbps
Test Date	:	2017/09/29

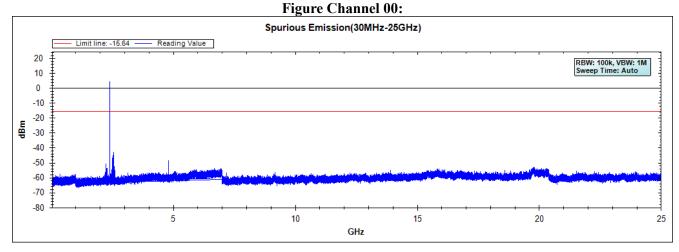


Figure Channel 39:

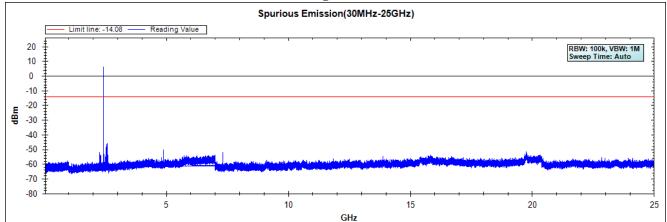
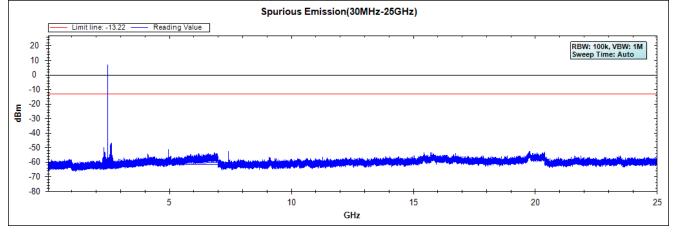


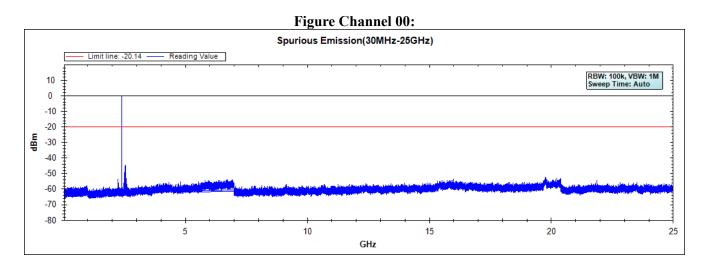
Figure Channel 78:

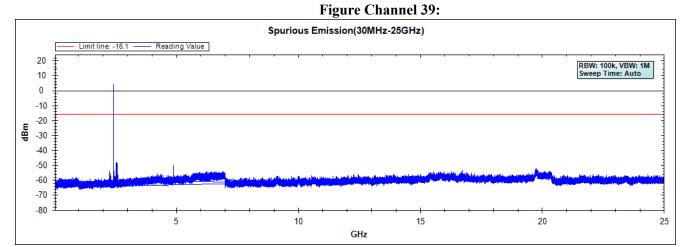


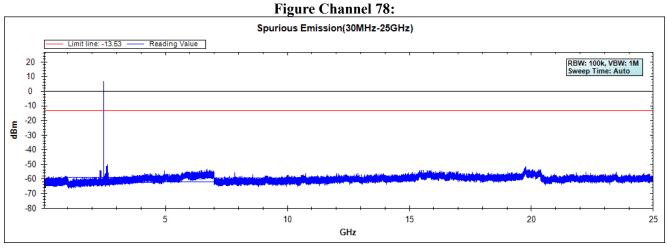
Note: The above test pattern is synthesized by multiple of the frequency range.



Product	:	Waterproof Bluetooth Speaker
Test Item	:	RF Antenna Conducted Test
Test Mode	:	Mode 2: Transmit - 3Mbps
Test Date	:	2017/09/29







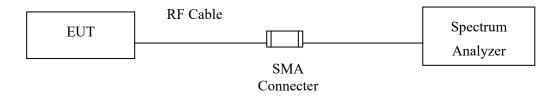
Note: The above test pattern is synthesized by multiple of the frequency range.



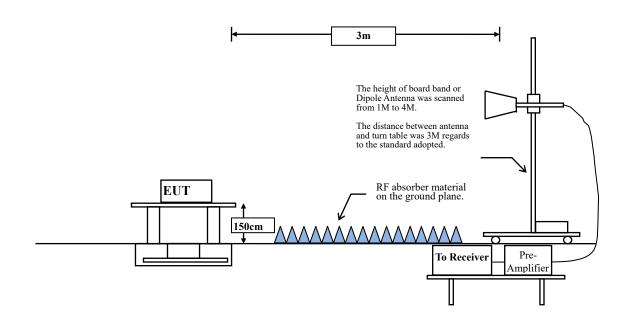
6. Band Edge

6.1. Test Setup

RF Conducted Measurement



RF Radiated Measurement:



6.2. Limit

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. 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)).

6.3. Test Procedure

The EUT is placed on a turn table which is 1.5 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 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: 2013 on radiated measurement.

The bandwidth setting below 1GHz and above 1GHz on the field strength meter is 120 kHz and 1MHz, respectively.

6.4. Uncertainty

Conducted: ±1.23dB Radiated: Horizontal polarization : 1-18GHz: ±3.77dB Vertical polarization : 1-18GHz : ±3.83dB



6.5. **Test Result of Band Edge**

Product	:	Waterproof Bluetooth Speaker
Test Item	:	Band Edge
Test Mode	:	Mode 1: Transmit - 1Mbps (2402MHz)
Test Date	:	2017/09/28

RF Radiated Measurement (Horizontal):

Channel No.	Frequency	Correct Factor	Reading Level	Emission Level	Peak Limit	Arerage Limit	Result
Channel No.	(MHz)	(dB)	(dBµV)	$(dB\mu V/m)$	$(dB\mu V/m)$	$(dB\mu V/m)$	Result
00 (Peak)	2376.232	10.206	38.830	49.036	74.00	54.00	Pass
00 (Peak)	2390.000	10.262	36.897	47.159	74.00	54.00	Pass
00 (Peak)	2400.000	10.304	58.015	68.318			
00 (Peak)	2402.174	10.312	91.742	102.054			
00 (Average)	2375.942	10.205	26.086	36.291	74.00	54.00	Pass
00 (Average)	2390.000	10.262	24.438	34.700	74.00	54.00	Pass
00 (Average)	2400.000	10.304	43.891	54.194			
00 (Average)	2402.029	10.312	77.570	87.882			

Figure Channel 00:

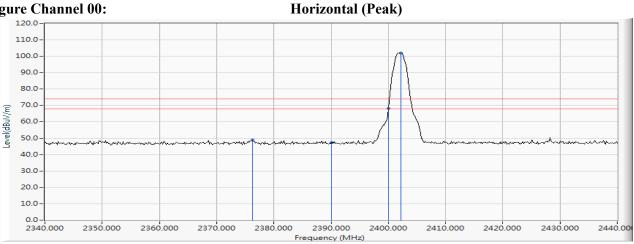
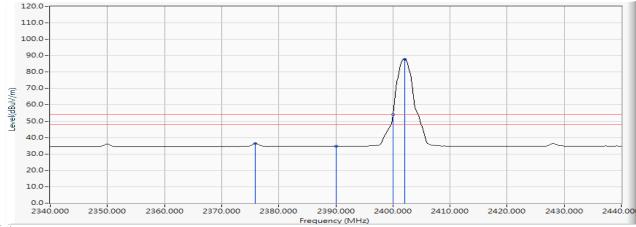


Figure Channel 00:

Horizontal (Average)



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



Product Waterproof Bluetooth Speaker :

Test Item	:	Band Edge
rest nem	•	Danu Luge

- Test Mode Mode 1: Transmit - 1Mbps (2402MHz) :
- 2017/09/28 Test Date :

RF Radiated Measurement (VERTICAL):

Channel No.	Frequency	Correct Factor	Reading Level	Emission Level	Peak Limit	Arerage Limit	Result
Channel No.	(MHz)	(dB)	(dBµV)	$(dB\mu V/m)$	$(dB\mu V/m)$	$(dB\mu V/m)$	Result
00 (Peak)	2385.942	10.245	38.056	48.301	74.00	54.00	Pass
00 (Peak)	2390.000	10.262	36.774	47.036	74.00	54.00	Pass
00 (Peak)	2400.000	10.304	60.224	70.527			
00 (Peak)	2402.174	10.312	94.518	104.830			
00 (Average)	2376.232	10.206	26.610	36.816	74.00	54.00	Pass
00 (Average)	2390.000	10.262	24.509	34.771	74.00	54.00	Pass
00 (Average)	2400.000	10.304	45.998	56.301			
00 (Average)	2402.029	10.312	79.826	90.138			

Figure Channel 00:

VERTICAL (Peak)

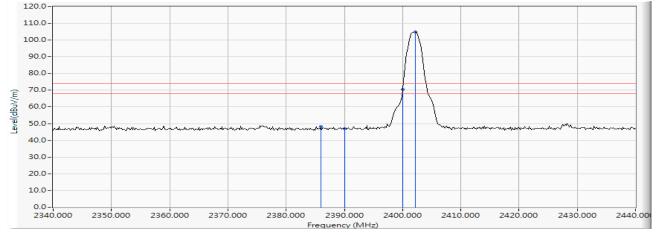
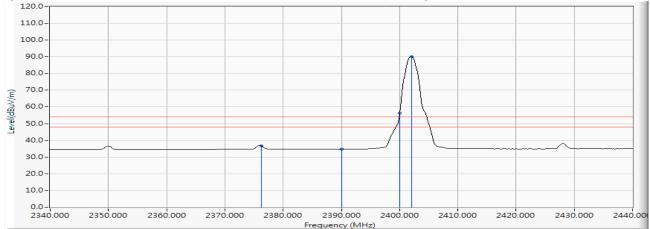


Figure Channel 00:

VERTICAL (Average)



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



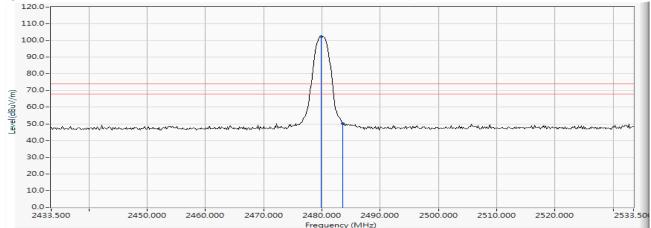
Product	:	Waterproof Bluetooth Speaker
Test Item	:	Band Edge
Test Mode	:	Mode 1: Transmit - 1Mbps (2480MHz)
Test Date	:	2017/09/28

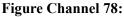
RF Radiated Measurement (Horizontal):

Channel No.	1 V	Correct Factor	Reading Level	Emission Level		Ç	Result
Channel No.	(MHz)	(dB)	(dBµV)	$(dB\mu V/m)$	$(dB\mu V/m)$	$(dB\mu V/m)$	Result
78 (Peak)	2479.877	10.628	91.662	102.289			
78 (Peak)	2483.500	10.640	39.595	50.236	74.00	54.00	Pass
78 (Average)	2480.022	10.628	77.565	88.193			
78 (Average)	2483.500	10.640	28.932	39.573	74.00	54.00	Pass

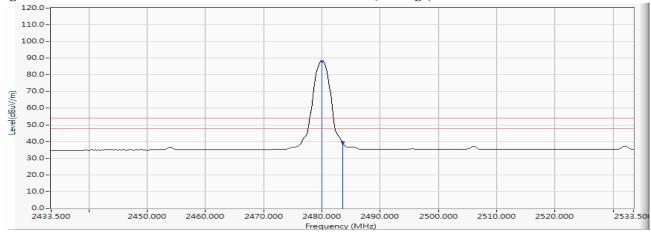
Figure Channel 78:

Horizontal (Peak)





Horizontal (Average)



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



- Product Waterproof Bluetooth Speaker :
- Test Item Band Edge :
- Test Mode Mode 1: Transmit - 1Mbps (2480MHz) :
- Test Date 2017/09/28 :

RF Radiated Measurement (VERTICAL):

Channel No.	Frequency	Correct Factor	Reading Level	Emission Level	Peak Limit	Arerage Limit	Result
	(MHz)	(dB)	(dBµV)	$(dB\mu V/m)$	$(dB\mu V/m)$	$(dB\mu V/m)$	
78 (Peak)	2479.877	10.628	96.528	107.155			
78 (Peak)	2483.500	10.640	42.738	53.379	74.00	54.00	Pass
78 (Average)	2480.022	10.628	81.445	92.073			
78 (Average)	2483.500	10.640	32.135	42.776	74.00	54.00	Pass

Figure Channel 78:

VERTICAL (Peak)

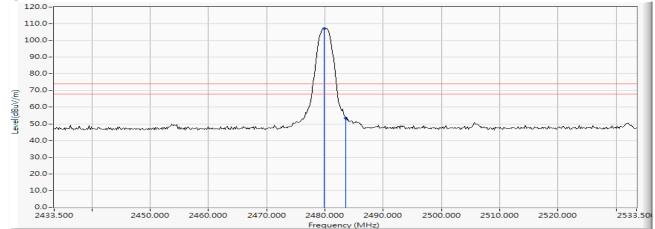
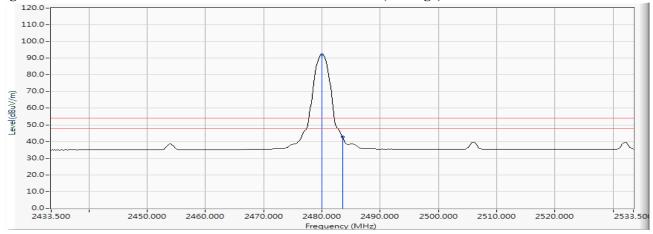


Figure Channel 78:

VERTICAL (Average)



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



Product	:	Waterproof Bluetooth Speaker
Test Item	:	Band Edge
Test Mode	:	Mode 2: Transmit - 3Mbps (2402MHz)
Test Date	:	2017/09/28

RF Radiated Measurement (Horizontal):

Channel No.	Frequency		Ų	Emission Level		U U	Result
Chamier 100.	(MHz)	(dB)	(dBµV)	$(dB\mu V/m)$	$(dB\mu V/m)$	(dBµV/m)	neosuit
00 (Peak)	2375.652	10.204	38.272	48.476	74.00	54.00	Pass
00 (Peak)	2390.000	10.262	37.624	47.886	74.00	54.00	Pass
00 (Peak)	2400.000	10.304	64.698	75.001			
00 (Peak)	2402.029	10.312	89.921	100.233			
00 (Average)	2375.942	10.205	25.134	35.339	74.00	54.00	Pass
00 (Average)	2390.000	10.262	24.437	34.699	74.00	54.00	Pass
00 (Average)	2400.000	10.304	47.476	57.779			
00 (Average)	2402.029	10.312	73.916	84.228			

Figure Channel 00:

Horizontal (Peak)

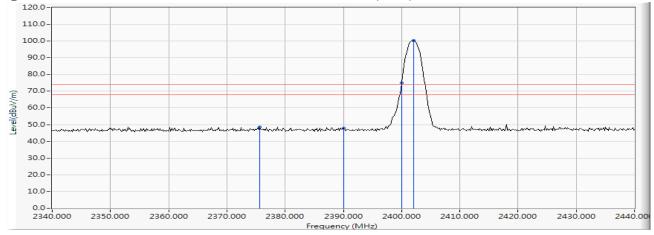
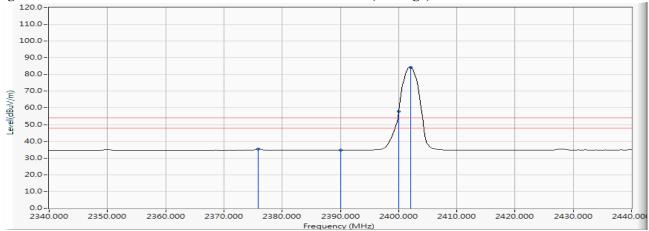


Figure Channel 00:

Horizontal (Average)



- All readings above 1GHz are performed with peak and/or average measurements as necessary. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto. "*", means this data is the worst emission level. 1.

- 2. 3. 4.
- 5. Measurement Level = Reading Level + Correction Factor.
- The average measurement was not performed when the peak measured data is under the limit of 6. average detection.



Product	:	Waterproof Bluetooth Speaker	
		D 1D1	

- Test Item : Band Edge
- Test Mode Mode 2: Transmit - 3Mbps (2402MHz) :
- Test Date 2017/09/28 :

RF Radiated Measurement (VERTICAL):

Channel No.	Frequency	Correct Factor	Reading Level	Emission Level	Peak Limit	Arerage Limit	Result
Channel No.	(MHz)	(dB)	(dBµV)	$(dB\mu V/m)$	$(dB\mu V/m)$	$(dB\mu V/m)$	Result
00 (Peak)	2380.290	10.222	38.747	48.969	74.00	54.00	Pass
00 (Peak)	2390.000	10.262	36.136	46.398	74.00	54.00	Pass
00 (Peak)	2400.000	10.304	67.268	77.571			
00 (Peak)	2402.029	10.312	92.843	103.155			
00 (Average)	2375.942	10.205	25.526	35.731	74.00	54.00	Pass
00 (Average)	2390.000	10.262	24.529	34.791	74.00	54.00	Pass
00 (Average)	2400.000	10.304	49.788	60.091			
00 (Average)	2402.029	10.312	76.245	86.557			

Figure Channel 00:

VERTICAL (Peak)

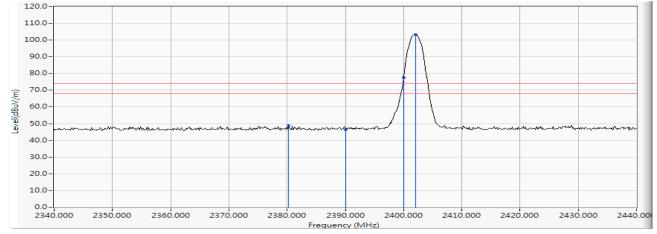
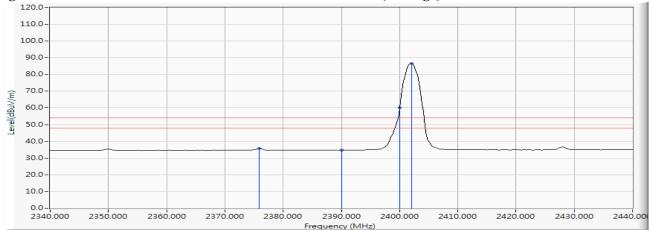


Figure Channel 00:

VERTICAL (Average)



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



- Product Waterproof Bluetooth Speaker :
- Test Item Band Edge :
- Test Mode : Mode 2: Transmit - 3Mbps (2480MHz)
- Test Date 2017/09/28 :

RF Radiated Measurement (Horizontal):

Channel No.	Frequency	Correct Factor	Reading Level	Emission Level	Peak Limit	Arerage Limit	Result
Channel No.	(MHz)	(dB)	(dBµV)	$(dB\mu V/m)$	$(dB\mu V/m)$	$(dB\mu V/m)$	Result
78 (Peak)	2480.022	10.628	90.222	100.850			
78 (Peak)	2483.500	10.640	41.522	52.163	74.00	54.00	Pass
78 (Average)	2479.877	10.628	74.365	84.992			
78 (Average)	2483.500	10.640	26.910	37.551	74.00	54.00	Pass

Figure Channel 00:

Horizontal (Peak)

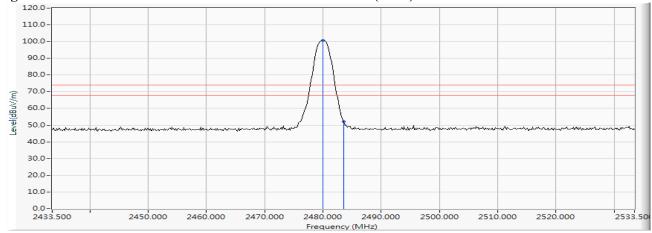
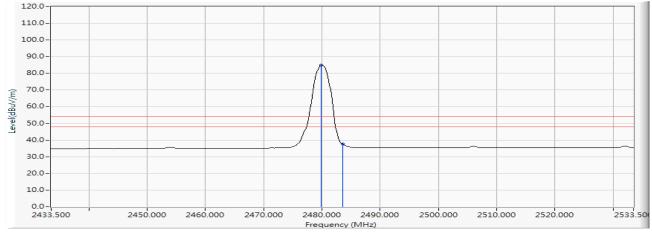


Figure Channel 00:

Horizontal (Average)



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



Product	:	Waterproof Bluetooth Speaker
Test Item	:	Band Edge
Test Mode	:	Mode 2: Transmit - 3Mbps (2480MHz)
Test Date	:	2017/09/28

RF Radiated Measurement (VERTICAL):

Channel No.	Frequency	Correct Factor	Reading Level	Emission Level	Peak Limit	Arerage Limit	Result
Channel No.	(MHz)	(dB)	(dBµV)	$(dB\mu V/m)$	$(dB\mu V/m)$	$(dB\mu V/m)$	Result
78 (Peak)	2480.022	10.628	94.883	105.511			
78 (Peak)	2483.500	10.640	45.836	56.477	74.00	54.00	Pass
78 (Average)	2480.022	10.628	78.144	88.772			
78 (Average)	2483.500	10.640	29.306	39.947	74.00	54.00	Pass

Figure Channel 78:

VERTICAL (Peak)

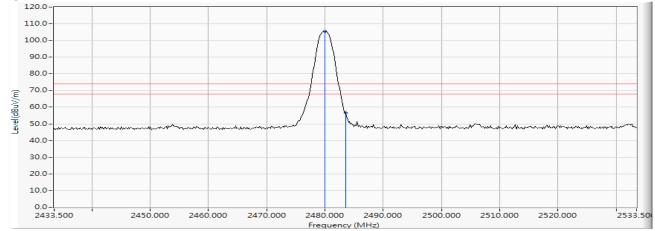
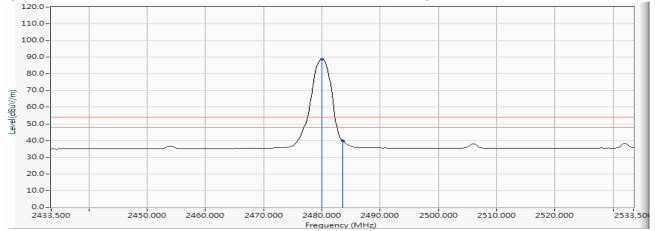


Figure Channel 78:

VERTICAL (Average)



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

Product	:	Waterproof Bluetooth	Speaker

Test Mode : Mode 1: Transmit - 1Mbps(Hopping off)

Measurement Level	Result
Δ (dB)	
> 20	PASS

₩ Spectrum Offset 0.50 dB • RBW 100 kHz SWT 32.1 ms • VBW 300 kHz Ref Level 20.50 dBm Att 30 dB Mode Sweep IPk View 4.97 dBm 2.402164960 GHz M1 -44.50 dBm 2.40000000 GHz M1[1] 10 dBm M2[1] 0 dBm -10 dBm D1 -15.025 dBm--20 dBm -30 dBm -40 dBm -50 dBm -70 dBm 32001 pts Stop 2.404 GHz Start 2.39 GHz Marker Type Ref Trc M1 1 Y-value 4.97 dBm -44.50 dBm -43.74 dBm X-value 2.40216496 GHz Function Function Result M2 M3 2.4 GHz 2.399996876 GHz 11 40

Date: 29 SEP 2017 14:52:24

Figure Channel 78:

DIPk View	30	de SWT	AND A DESCRIPTION	VBW 300 kHz	Mode Swee	-P			
10 dBm	1				M1[1] M2[1]			7.41 df 2.480152150 G -55.74 df 2.483500000 G	
1									1.2.1
-10 dBn	D1 -12.58	36 dBm				-			
-20 dBfn	1	-							-
30 Nm-	1.			-				_	-
Nam	MA								1.0001
dBm-	V	M MB						ii	1
-50 dBm	•	M2T							
-60 dBm	-	W		mitroste and Made	hans take millionist	konin (ma)	in any anguadrath	and dealers do	and the second state
-70 dBm		1		and the second s	a second from the second		and the second second		and a substituted
o d dbill									1
Start 2.47	8 GHz	2.		32001	ots	4		st	op 2.5 GHz
larker									
Type Re	f Trc	X-value		Y-value	Function	1111	Fund	tion Resul	t
M1	1	2.480152		7.41 dBm		1			
M2	1	2.48	35 GHz	-55.74 dBm					

Date: 29 SEP 2017 15:06:43

Figure Channel 00:

Product	:	Waterproof Bluetooth	Speaker
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Test Mode : Mode 2: Transmit - 3Mbps (Hopping off)

Measurement Level	Result
Δ (dB)	
> 20	PASS

Figure Channel 00:

₩ Spectrum Offset 0.50 dB • RBW 100 kHz SWT 32.1 ms • VBW 300 kHz Ref Level 20.50 dBm Att 30 dB Mode Sweep 1Pk View 3.12 dBm 2.401820660 GHz M1 -43.87 dBm 7.400000000 GHz M1[1] 10 dBm M2[1] 0 dBm -10 dBm D1 -16.878 dBm -20 dBm--30 dBm 40 dBm -50 dBm -70 dBm 32001 pts Stop 2.404 GHz Start 2.39 GHz Marker Type Ref Trc M1 1 Y-value 3.12 dBm -43.87 dBm -42.29 dBm X-value 2.40182066 GHz Function Function Result M2 M3 2.4 GHz 2.399987688 GHz 140

Date: 29 SEP 2017 15:27:52

Figure Channel 78:

Att 1Pk View	-30	dB SWT	52,1 ms ₩	VBW 300 kHz	Mode S	weep			
10 dBm					M1 M2	10.0	- P		6.48 dBn 990590 GH: -52.43 dBn 500000 GH:
-10 dBm-	01 -13.5	10 40-1							
april -	lim	Ta dBill							
80 dBm	1	4							
50 dBm-									
60 dBm	-		with the last	li alcinatori					
-70 dBm									
Start 2.478	GHz		//	32001	pts			St	op 2.5 GHz
larker	Trc	X-value	. 1	Y-value	Functi	en 1	Frim	ction Resul	
Type Ref M1	1	2,479990		6,48 dBm		on	Fun	ction Resul	
M2	1		35 GHz	-52.43 dBm					
MB	1	2.4835288	75 GHz	-50.87 dBm		1			

Date 29 SEP 2017 15 45 00

Product	:	Waterproof Bluetoc	th Speaker
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Test Mode : Mode 1: Transmit - 1Mbps(Hopping on)

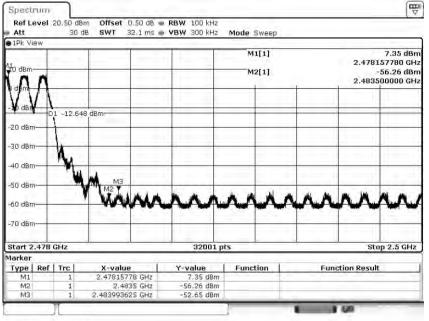
Measurement Level	Result
Δ (dB)	
> 20	PASS

Figure Channel Hopping:

Att	ver 2	0.50 dBm 30 dB			RBW 100 kH		Sween			
1Pk Viev	w	50 50	anti	Weite Inst a	TON SOUND	- mode	Dweep			
10 dBm—					1		1[1] 2[1]			5.06 dBr 56210 GH 52.11 dBr
0 dBm	-							1 1	7000	DOMO GH
-10 dBm-	-			_	-				$ \rightarrow $	\wedge
-20 dBm-	01	-14.939	dBm						1	1
-30 dBm-						_			1	1
-40 dBm-	-					_		Ma N		
-50 dBm-	-	-		-				ME		
Squap	-	Alexand and	Marin M	بالمحسينية	ملايهم	بالمستعدية		Y		-
-70 dBm-	-	C 2-14					-			
Start 2.3	39 GF	łz			3200	1 pts			Stop :	2.404 GHz
Marker										
	Ref		X-valu		Y-value	Func	tion	Func	tion Result	1
M1 M2		1	2.40215	2.4 GHz	5.06 dB -52.11 dB					
M3		1	2.3999920		-43.46 dB					

Date 29 SEP 2017 14:55:24

Figure Channel Hopping:



Date 29 SEP 2017 15 10 26



Product	:	Waterproof Bluetooth	Speaker
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Test Mode : Mode 2: Transmit - 3Mbps (Hopping on)

Measurement Level	Result
Δ (dB)	
> 20	PASS

Figure Channel Hopping:

Ref Le	vel	20.50 dBm	Offset	0.50 dB 🖷	RBW 100	kHz	S				X
Att		30 de	SWT	32.1 ms 🖷	VBW 300	kHz	Mode	Sweep			
∎1Pk Vi	we		-					-			
10 dBm-								1[1] 2[1]			4.11 dBn 826970 GH -50.02 dBn 000000 GH
0 dBm-				-					1	1000	Contra Van
-10 dBm	-					-	_			<u> </u>	
-20 dBm		01 -15.891	dBm-			-				1	
-30 dBm	+	_			-	-	_		JAM .	_	-
-40 dBm	+					-	_		MB		-
-50 dBm	-	-			-	-	-	-			
una Had	-			to home	. diama	-	الم بالمرب	And Advent			
-70 dBm	-					-					
Start 2	39 0	Hz			320	01 pt	5			Stop	2.404 GHz
Marker	1			_	-	_					_
Туре	Ref	Trc	X-valu		Y-value		Func	tion	Func	tion Resu	lt
M1 M2	_	1	2,403826	97 GHz 2.4 GHz	4.11					_	
M3		1	2.3999833		-42.52		_				

Date 29 SEP 2017 15:32:01

Figure Channel Hopping:

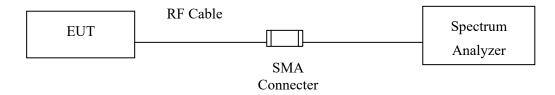
Att	30	dB SWT 3	82.1 ms 🖷	VBW 300 kHz	Mode :	Sweep			
1Pk View									
10 dBm-M						1[1] 2[1]			6.46 dBm 994720 GHz -55.05 dBm 500000 GHz
Alexandre									
-10 dBm	01 -13.5	44 dBm	-			-	1		
20 dBm-									
30 dBm	-	-		-					-
40 dBm		4							
50 dBm		UGM2 M3			_				
60 dBm	-			t for a set of the set	a similar and				the start
-70 dBm	-	-			-				
Start 2.47	78 GHz		-	32001	pts	-		St	op 2.5 GHz
larker									
	ef Trc	X-value		Y-value	Func	tion	Fund	tion Resul	t.
M1	1	2.479994		6.46 dBn					
M2 M3	1	2.48	35 GHz	-55.05 dBn -53.48 dBn					

Date: 29 SEP 2017 15:49:01



7. Channel Number

7.1. Test Setup



7.2. Limit

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

7.3. Test Procedure

The EUT was setup to ANSI C63.4, 2014; tested to FHSS test procedure of FCC Public Notice DA 00-705 for compliance to FCC 47CFR 15.247 requirements.

7.4. Uncertainty

N/A



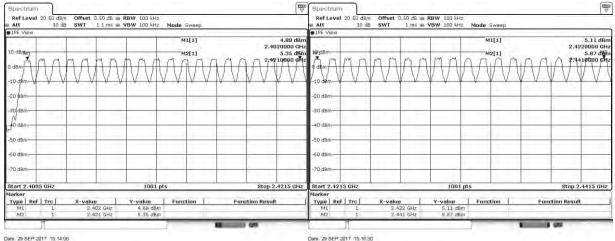
7.5. Test Result of Channel Number

Product	:	Waterproof Bluetooth Speaker
Test Item	:	Channel Number
Test Mode	:	Mode 1: Transmit - 1Mbps

Frequency Range	Number of Hopping	Adaptive Frequency	Required Limit	Result
(MHz)	(Channel)	Hopping (Channel)	(Channel)	
2402 ~ 2480	79	20	>15	Pass

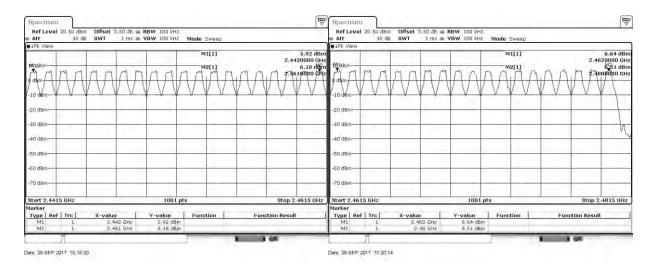


2422-2441MHz



2442-2461MHz

2462-2480MHz



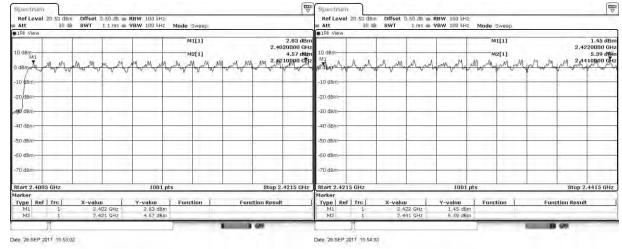


Product	:	Waterproof Bluetooth Speaker
Test Item	:	Channel Number
Test Mode	:	Mode 2: Transmit - 3Mbps

Frequency Range	Number of Hopping	Adaptive Frequency Required Limit		Result	
(MHz)	(Channel)	Hopping (Channel)	(Channel)	Result	
$2402 \sim 2480$	79	20	>15	Pass	

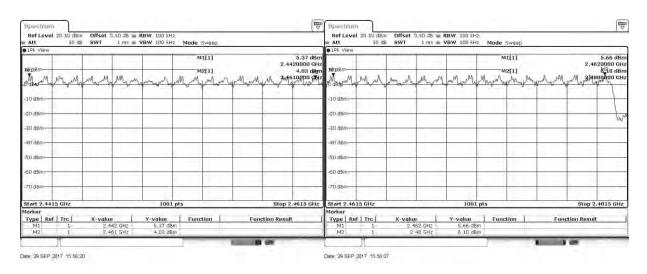
2402-2421MHz

2422-2441MHz



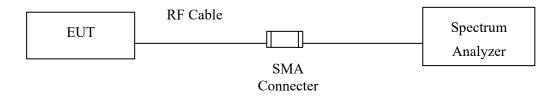
2442-2461MHz

2462-2480MHz



8. Channel Separation

8.1. Test Setup



8.2. 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.

8.3. Test Procedure

The EUT was setup to ANSI C63.4, 2014; tested to FHSS test procedure of FCC Public Notice DA 00-705 for compliance to FCC 47CFR 15.247 requirements.

8.4. Uncertainty

<u>+</u>279.2Hz

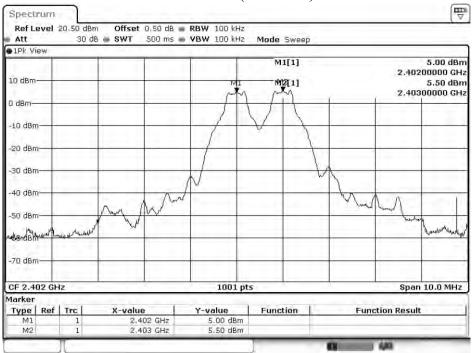


8.5. Test Result of Channel Separation

Product	:	Waterproof Bluetooth Speaker
Test Item	:	Channel Separation
Test Mode	:	Mode 1: Transmit - 1Mbps

	Fraguanay	Measurement	Limit	Limit of (2/3)*20dB	
Channel No.	Frequency (MHz)	Level	(kHz)	Bandwidth (kHz)	Result
		(kHz)	(кпz)	Ballowioui (KFIZ)	
00	2402	1000	>25 kHz	634.0	Pass
39	2441	1000	>25 kHz	630.0	Pass
78	2480	1000	>25 kHz	628.0	Pass

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

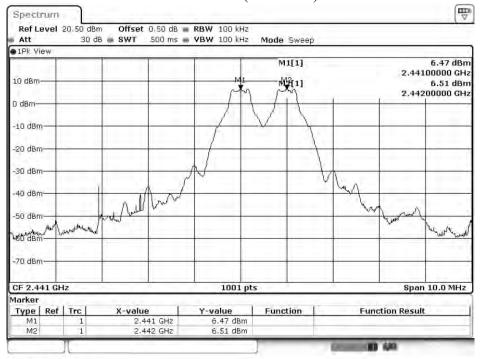


Channel 00 (2402MHz)

Date: 29.SEP 2017 14:51:46

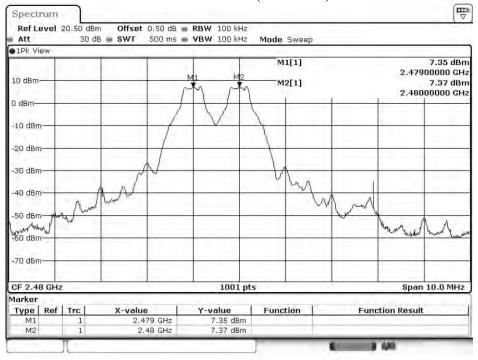


Channel 39 (2441MHz)



Date: 29.SEP 2017 14:59:57

Channel 78 (2480MHz)



Date: 29.SEP 2017 15:05:56



Product	:	Waterproof Bl	luetooth Speaker
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Test Item : Channel Sepa	ration
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Test Mode : Mode 2: Transmit - 3Mbps

		Fraguaray	Measurement	Limit	Limit of (2/3)*20dB		
Channel No.		Frequency (MHz)	Level	(kHz)	Bandwidth (kHz)	Result	
		(MIIIZ)	(kHz)	(кпz)	Ballowidul (KHZ)		
	00	2402	1000	>25 kHz	842.0	Pass	
	39	2441	1000	>25 kHz	846.0	Pass	
	78	2480	1000	>25 kHz	846.0	Pass	

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

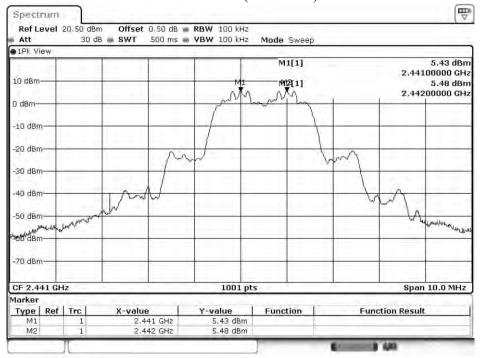
Att		30 de	S 🖝 SWT	500 ms 🛛	• YBW 100 kHz	Mode Sweep	ġ.		
1Pk Vi	ew								
10 dBm					MI	M1[1]			3.04 dBm 00000 GH; 4.00 dBm 00000 GH;
0 dBm—		-			man	m My m			
-10 dBm	-			-					-
-20 dBn	r								
-30 dBn	n			No	v		hay		
-40 dBn	-	-	~ /	1				a.	
-50 dBm	-	1. Here	www. Auron	ÚN.			ling	how the	
usouder	purse his	neldrodenstations			-		-		allinanin
-70 dBn									
CF 2.4	02 GF	Iz		-	1001 pt	5		Span	10.0 MHz
1arker Type	Rof	Trc	X-value	1	Y-value	Function	Euro	ction Result	
M1	and a	1		2 GHz	3.04 dBm	. unstall		stron resourc	

Channel 00 (2402MHz)

Date: 29.SEP 2017 15:27:22

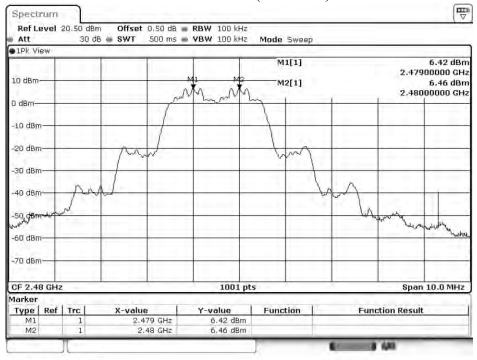


Channel 39 (2441MHz)



Date: 29.SEP 2017 15:36:55

Channel 78 (2480MHz)

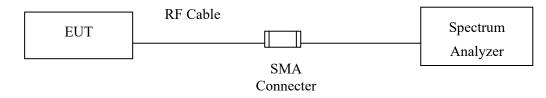


Date: 29.SEP 2017 15:43:56



9. Dwell Time

9.1. Test Setup



9.2. Limit

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

9.3. Test Procedure

The EUT was setup to ANSI C63.4, 2014; tested to FHSS test procedure of FCC Public Notice DA 00-705 for compliance to FCC 47CFR 15.247 requirements.

9.4. Uncertainty

 ± 2.31 msec

9.5. Test Result of Dwell Time

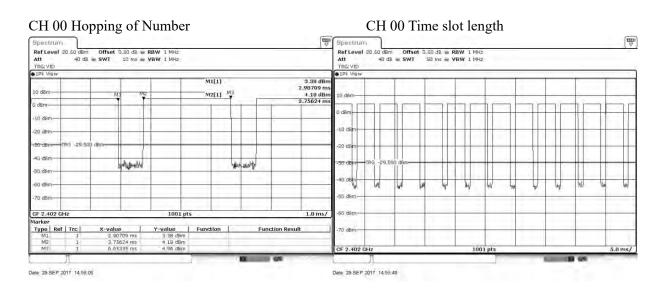
Product	:	Waterproof Bluetooth Speaker
Test Item	:	Dwell Time
Test Mode	:	Mode 1: Transmit - 1Mbps (Channel 00,39,78)

Frequency (MHz)	Time slot length (ms)	Hopping of Number	Sweep time (ms)	Duty cycle	Dwell Time (Sec)	Limit (Sec)	Result
2402	2.897	13	50	0.75	0.301	0.4	Pass
2441	2.897	13	50	0.75	0.301	0.4	Pass
2480	2.897	13	50	0.75	0.301	0.4	Pass

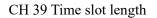
Duty cycle = ((Time slot length(ms)*Hopping of Number) / Sweep time (ms)

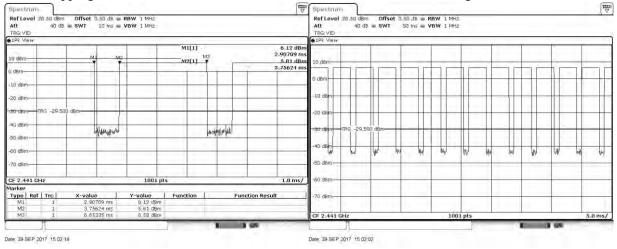
Dwell time = (Duty cycle /79) * (79*0.4)

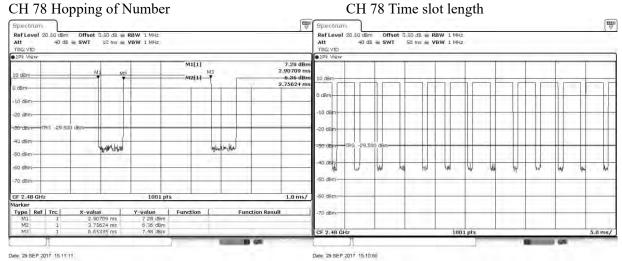
Dwell time in AFH mode / 20 channels with hopping rate 800 hops /sec.



CH39 Hopping of Number







DEKRA

CH 78 Hopping of Number

Note:

The dwell times of the packet type of DH1, DH3, and DH5 are tested. Only the worst case is shown on the report.



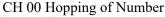
Product	:	Waterproof Bluetooth Speaker
Test Item	:	Dwell Time
Test Mode	:	Mode 2: Transmit - 3Mbps (Channel 00,39,78)

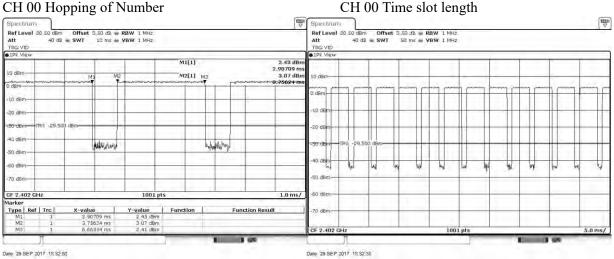
Frequency (MHz)	Time slot length (ms)	Hopping of Number	Sweep time (ms)	Duty cycle	Dwell Time (Sec)	Limit (Sec)	Result
2402	2.907	13	50	0.76	0.302	0.4	Pass
2441	2.907	13	50	0.76	0.302	0.4	Pass
2480	2.907	13	50	0.76	0.302	0.4	Pass

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

Dwell time = (Duty cycle /79) * (79*0.4)

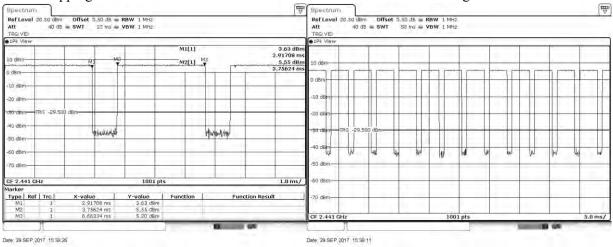
Dwell time in AFH mode / 20 channels with hopping rate 800 hops /sec.

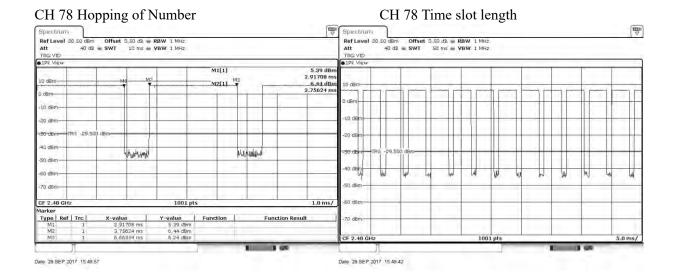




CH39 Hopping of Number

CH 39 Time slot length





DEKRA

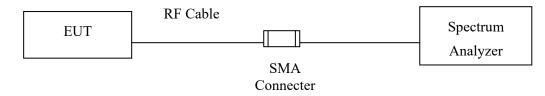
Note:

The dwell times of the packet type of DH1, DH3, and DH5 are tested. Only the worst case is shown on the report.



10. Occupied Bandwidth

10.1. Test Setup



10.2. Limits

N/A

10.3. Test Procedure

The EUT was setup to ANSI C63.4, 2014; tested to FHSS test procedure of FCC Public Notice DA 00-705 for compliance to FCC 47CFR 15.247 requirements.

10.4. Uncertainty

 $\pm 279.2 \mathrm{Hz}$



10.5. Test Result of Occupied Bandwidth

Product	:	Waterproof Bluetooth Speaker
Test Item	:	Occupied Bandwidth Data
Test Mode	:	Mode 1: Transmit - 1Mbps

Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
00	2402	951		NA
39	2441	945		NA
78	2480	942		NA

Figure Channel 00:

1Pk Vi	вW		1. The second second		S. 8. Control 1997	17 TO 18 YOM		10 Mar 10 Mar 10		
10 dBm D dBm—					Mi	M1[1]		3.62 dBn 2.40199400 GH - 16.98 dBn 2.40152300 GH		
-10 dBm				MZ	A A	NOT M	3			
-20 dBm	P	1 -16.3	77 dBm	1 m		- 69	5			
-30 dBn	+	÷	N	1			The art	m		
-40 dBn	No	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	YV-				V*	hh		
-50 dBn		4								
-70 dBr										
CF 2.4	12 GH	z			1001 pt	5		Span 3.0 MHz		
Marker	-		4							
Type M1	Ref	Trc 1	2.401994 GHz		Y-value 3.62 dBm	Function	Function Result			
M2	-	1		1523 GHz	-16.98 dBm					
M3	-	1		474 GHz	-16.53 dBm					

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Figure Channel 39:

1Pk Vi	ew	_		-			1[1]			
10 dBm					M	M		5.36 dBn 2.44099100 GH -14.71 dBn 2.44052600 GH		
0 dBm-		_	-		N	25	1			
-10 dBn	r	_	-	M2 0	N	7	M	3		
	D1	-14.638	dBm	TV	+ +		1			
-20 dBn	r	_		1	-		-	M	-	-
1. 10					1		1.00	m		
-30 dBn	1	M					-	7		1
م الم	N	- Area	Two .					L.	m	
40 dBn	1						1	P.		un .
So dBn										1 mm
-50 ubii							1			
60 dBn						_	-		_	
-70 dBn				-					-	
							1.0			1.0
CF 2.4	41 GH:	2	1		1001 p	its			Sp	an 3.0 MHz
larker	1.00									
Type	Ref	Trc	X-valu	e	Y-value	Func	tion	Fi	unction Resu	ılt
M1	-	1	2.440991 GHz		5.36 dBm					
M2		1	2.440526 GHz		-14.71 dBm					
M3	_	1	2.441	471 GHz	-14,96 dBm					

Figure Channel 78:

Att	30	dB SWT 1,1 ms	VBW 100 kHz	Mode Sweep		
10 dBm			M	M1[1]		6.33 dBn 2.47999400 GH -13.83 dBn 2.47952600 GH
0 dBm -10 dBm)1 -13.66	57 dBm		MM		
-20 dBm	wh				The second	m
-40 dBm					V	
-60 dBm						
CF 2.48 GH	z		1001 pt	s	- L	Span 3.0 MHz
	f Trc X-value		Y-value	Function	Funct	ion Result
M1 M2 M3	1	2.479994 GHz 2.479526 GHz 2.480468 GHz	6.33 dBm -13.83 dBm -13.69 dBm			

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Product	:	Waterproof Bluetooth Speaker
Test Item	:	Occupied Bandwidth Data
Test Mode	:	Mode 2: Transmit - 3Mbps

Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
00	2402	1263		NA
39	2441	1269		NA
78	2480	1269		NA

Figure Channel 00:

Att 1Pk View	30	IdB SWT 1,1 ms	VBW 100 kHz	Mode Sweep			-
10 dBm			Мі	M1[1] M2[1]		2.15 2.4019940 -17.93 2.4013460	dBm
D dBm			1 Anth	Λ			
-10 dBm	-	M2	when a l	m	-M3		-
-20 dBm-	D1 -17.8		_		100	-	
-30 dBm-	1				1		-
40 dBm-	m	ww			m	man	m
-50 dBm							-
-60 dBm							-
-70 dBm—					-		
CF 2.402	GHz		1001 pts	ş	- 1. P	Span 3.0	MHz
Marker		12000000	(
Type R M1	ef Trc	2.401994 GHz	2.15 dBm	Function	Fun	ction Result	-
M2	1	2.401346 GHz	-17.93 dBm				-
MB	1	2.402609 GHz	-18.12 dBm				

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Figure Channel 39:

Spect	rum										
Ref L Att	evel	20.50 d 30		0.50 dB 🖷 1,1 ms 🖷	RBW 30 kHz VBW 100 kHz	Mode S	weep				
●1Pk V	iew		1. 11. 11. A		10.00						
10 dBm	-					M1[1] M2[1]			4.62 dBr 2.44099400 GH - 15.42 dBr 2.44034300 GH		
0 dBm- -10 dBr	n		Mg		mm	and a	why	AN3			
-20 dBr	0	1 -15.3	81 dBm 7	4				h			
ेखकतार्थ -40 dBr		proc	stores -						-	300000000000000000000000000000000000000	
-50 dBr	n-	_	-					-			
-60 dBr	n	_	+						-	-	
-70 dBr	n						÷				
CF 2.4	41 GH	z			1001 p	ts		-1.º	Spa	an 3.0 MHz	
Marker											
Туре	Ref	Trc	X-valu		Y-value	Functi	on	Fu	nction Resul	ţ.	
M1	-	1		94 GHz	4.62 dBm						
M2 M3		1		43 GHz 12 GHz	-15.42 dBm -15.63 dBm						
		1].	-	C.C.	9 AN		

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Figure Channel 78:

Spectru	irri.									
Ref Lev Att	vel 20	0.50 dB 30 (RBW 30 kHz VBW 100 kHz		Sweep			
1Pk View	۷.				5. S					
10 dBm				- Mi		M1[1] M2[1]		5.65 dBn 2.47999400 GH -14.36 dBn 2.47934300 GH		
D dBm				~	and mal	wit	to			
-10 dBm-	-	19.50	Ma	~		1	* ~~	Wala:	-	-
-20 dBm-	D1	-14.34		-	-		-	2		
-30 abm	m	m	And	_		-	-	w h	ma	mm
-40 dBm-	-	_			_	-		_	-	
-50 dBm-	-			_			-		-	
-60 dBm-				_						
-70 dBm-				-				-	-	-
CF 2.48	GHz				1001	pts			Sp	an 3.0 MHz
Marker	-									
	Ref	Trc	X-value	CUE	Y-value 5.65 dBr		ction	FL	inction Resu	lt
M1 M2	-	1	2.479994		-14.36 dBr		_			
M3	-	1	2.480612		-14.56 dBr					
_	J	-].	-		1 in	

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11. EMI Reduction Method During Compliance Testing

No modification was made during testing.