FCC Test Report

Product Name	SOUND BAR + WIRELESS SUBWOOFER
Model No.	STUDIO SB 40
FCC ID.	2AJAA-STUDIOSB40

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	Jun. 27, 2016
Issued Date	May. 17, 2017
Report No.	1750164R-RFUSP23V00-A
Report Version	V1.0

Testing Laboratory
3023

Test Report

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Applicant	Dongguan Meiloon Acoustic Equipments Co., Ltd.
Address	77, Yuanlin Road Fenghuanggang Ind Estate, Tangxia Town, 523727 Dongguan City, Guangdong Province, China.
Manufacturer	Klipsch Group, Inc.
Model No.	STUDIO SB 40
FCC ID.	2AJAA-STUDIOSB40
EUT Rated Voltage	AC 100-240V, 50/60Hz
EUT Test Voltage	AC 120V/60Hz
Trade Name	Jamo
Applicable Standard	FCC CFR Title 47 Part 15 Subpart C: 2016 ANSI C63.4: 2014, ANSI C63.10: 2013 KDB 558074 D01 DTS Meas Guidance v03r04
Test Result	Complied

Documented By : Elephant Chen

(Adm. Assistant / Elephant Chen)

Tested By : Paul Jiang

(Engineer / Paul Jiang)

Approved By :

(Director / Vincent Lin)

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1. GENERAL INFORMATION

1.1. EUT Description

Product Name	SOUND BAR + WIRELESS SUBWOOFER
Trade Name	Jamo
Model No.	STUDIO SB 40
FCC ID.	2AJAA-STUDIOSB40
Frequency Range	2402 – 2480MHz
Channel Number	79
Type of Modulation	FHSS: GFSK(1Mbps) / π /4DQPSK(2Mbps) / 8DPSK(3Mbps)
Antenna Type	PIFA Antenna
Channel Control	Auto
Antenna Gain	Refer to the table “Antenna List”
Power Adapter	MFR: DYS, M/N: DYS650-180280W-1 Input: AC 100-240V~50/60Hz Output: 18V⎓2.8A Cable Out: Non-shielded, 1.9m, with one ferrite core bonded.
Contain Module	CSR / CSR8670

Antenna List

No.	Manufacturer	Part No.	Antenna Type	Peak Gain
1	Taiwan Anjie Electronice	AJMP1J-C0016	PIFA	6.2dBi for 2.4 GHz

Note:

1. The antenna of EUT conforms to FCC 15.203.
2. Only the higher gain antenna was tested and recorded in this report.

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		

Note:

1. The EUT is a Sound bar with a built-in Bluetooth transceiver, this report for Bluetooth
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. 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.

Test Mode	Mode 1: Transmit - 1Mbps (GFSK) Mode 2: Transmit - 3Mbps (8DPSK)

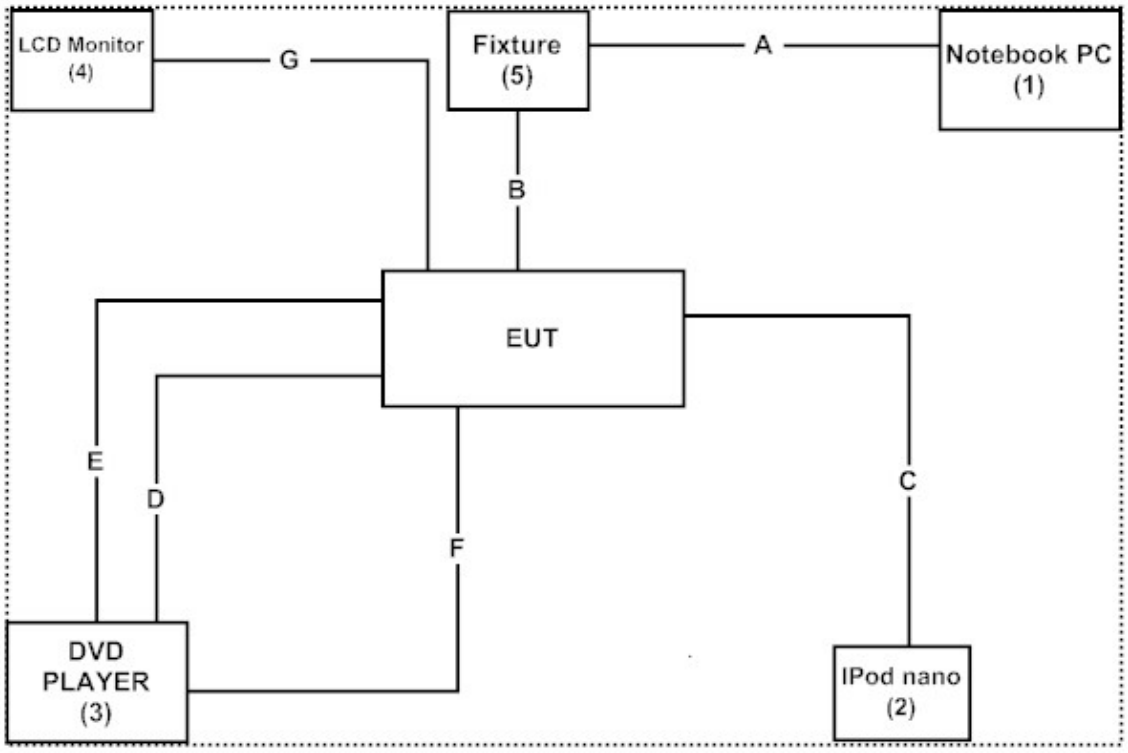
1.3. Tested System Details

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	Notebook PC	DELL	Latitude E5440	FS9TK32	Non-Shielded, 0.8m
2	IPod nano	Apple	A1199	YM733325VQ5	N/A
3	DVD PLAYER	Pioneer	DV-600AV	GHKD003531 LS	Non-Shielded, 1.8m
4	LCD Monitor	ASUS	VS229HA	F4LMQS135395	Non-Shielded, 1.8m
5	Fixture	N/A	N/A	N/A	N/A

Signal Cable Type		Signal cable Description
A	USB Cable	Non-Shielded, 1.8m
B	Fixture Cable	Non-Shielded, 0.02m, two PCS.
C	IPod Cable	Non-Shielded, 1m
D	Analog Cable	on-Shielded, 0.9m
E	Fiber Cable	Non-Shielded, 1.9m
F	HDMI Cable	Non-Shielded, 1.4m
G	HDMI Cable	Non-Shielded, 1.4m

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 v2.5.0" 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	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 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: http://www.dekra.com.tw/index_en.aspx

FCC Test Firm Registration Number: 92195

Site Description: Accredited by TAF
Accredited Number: 3023

Site Name: DEKRA Testing and Certification Co., Ltd
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 : info.tw@dekra.com

2. Conducted Emission

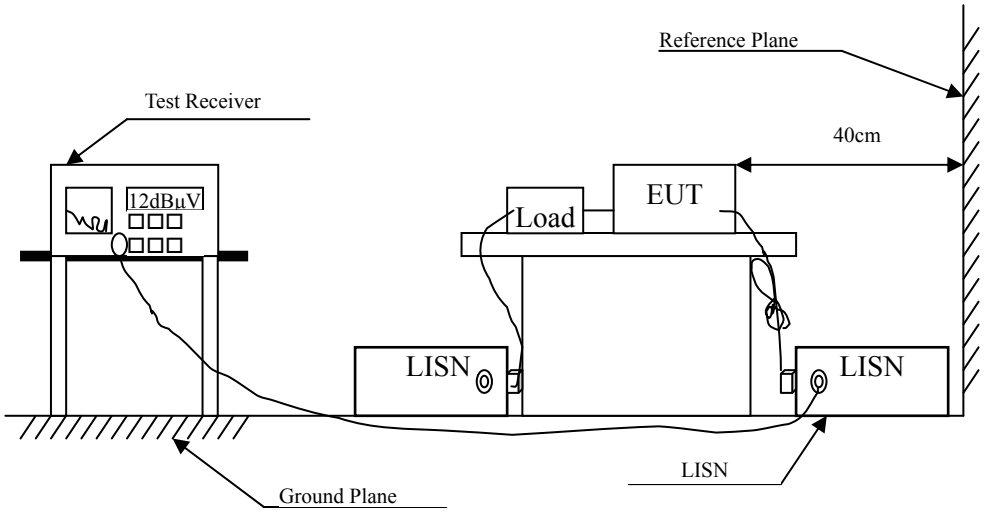
2.1. Test Equipment

	Equipment	Manufacturer	Model No. / Serial No.	Last Cal.	Due Cal.	Remark
X	Test Receiver	R & S	ESCS 30 / 825442/018	Sep., 2016	Sep., 2017	
X	Artificial Mains Network	R & S	ENV4200 / 848411/10	Feb., 2017	Feb., 2018	Peripherals
X	LISN	R & S	ESH3-Z5 / 825562/002	Feb., 2017	Feb., 2018	EUT
	DC LISN	Schwarzbeck	8226 / 176	Mar., 2017	Mar., 2018	EUT
X	Pulse Limiter	R & S	ESH3-Z2 / 357.8810.52	Feb., 2017	Feb., 2018	
	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 (dBμV) 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 C63.4: 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.

2.5. Uncertainty

± 2.26 dB

2.6. Test Result of Conducted Emission

Product : SOUND BAR + WIRELESS SUBWOOFER
Test Item : Conducted Emission Test
Power Line : Line 1
Test date : 2016.08.09
Test Mode : Mode 2: Transmit - 3Mbps (8DPSK) (2441MHz)

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBµV	dBµV	dB	dBµV
LINE 1					
Quasi-Peak					
0.158	9.685	28.210	37.895	-27.876	65.771
0.216	9.677	20.490	30.167	-33.947	64.114
0.236	9.677	17.090	26.767	-36.776	63.543
0.392	9.672	14.230	23.902	-35.184	59.086
0.572	9.678	11.660	21.338	-34.662	56.000
1.486	9.719	3.280	12.999	-43.001	56.000
Average					
0.158	9.685	14.110	23.795	-31.976	55.771
0.216	9.677	6.550	16.227	-37.887	54.114
0.236	9.677	5.120	14.797	-38.746	53.543
0.392	9.672	0.930	10.602	-38.484	49.086
0.572	9.678	9.380	19.058	-26.942	46.000
1.486	9.719	-1.830	7.889	-38.111	46.000

Note:

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

Product : SOUND BAR + WIRELESS SUBWOOFER
Test Item : Conducted Emission Test
Power Line : Line 2
Test date : 2016.08.09
Test Mode : Mode 2: Transmit - 3Mbps (8DPSK) (2441MHz)

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBµV	dBµV	dB	dBµV
LINE 2					
Quasi-Peak					
0.228	9.737	22.640	32.377	-31.394	63.771
0.369	9.741	24.680	34.421	-25.322	59.743
0.584	9.748	11.000	20.748	-35.252	56.000
2.974	9.827	4.560	14.387	-41.613	56.000
3.451	9.831	7.300	17.131	-38.869	56.000
14.658	10.080	7.720	17.800	-42.200	60.000
Average					
0.228	9.737	15.530	25.267	-28.504	53.771
0.369	9.741	13.410	23.151	-26.592	49.743
0.584	9.748	6.960	16.708	-29.292	46.000
2.974	9.827	-1.850	7.977	-38.023	46.000
3.451	9.831	-1.670	8.161	-37.839	46.000
14.658	10.080	0.910	10.990	-39.010	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

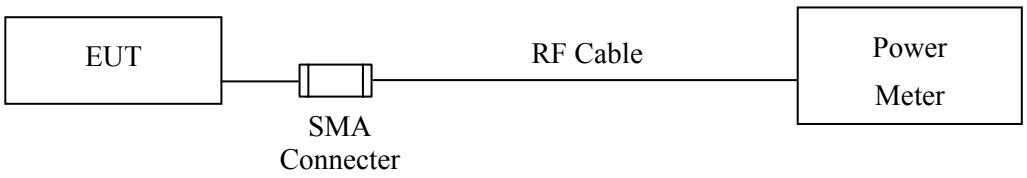
3.1. Test Equipment

	Equipment	Manufacturer	Model No./Serial No.	Last Cal.	Due Cal.
X	Power Meter	Anritsu	ML2495A/6K00003357	May, 2017	May, 2018
X	Power Sensor	Anritsu	MA2411B/0738448	Jun., 2016	Jun., 2017

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 1Watt.

3.4. 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.

3.5. Uncertainty

± 1.19 dB

3.6. Test Result of Peak Power Output

Product : SOUND BAR + WIRELESS SUBWOOFER
Test Item : Peak Power Output
Test Site : No.3 OATS
Test date : 2016.08.09
Test Mode : Mode 1: Transmit - 1Mbps (GFSK)

Channel No.	Frequency (MHz)	Measurement (dBm)	Required Limit	Result
Channel 00	2402.00	5.66	1 Watt= 29.80 dBm	Pass
Channel 39	2441.00	5.55	1 Watt= 29.80 dBm	Pass
Channel 78	2480.00	5.53	1 Watt= 29.80 dBm	Pass

Note:
1. Peak Power Output Value =Reading value on power meter + cable loss
2. Required Limit= 30dBm-[6.2dBi-6dBi]=29.80 dBm for compliance to FCC 47CFR 15.247(b) (4) requirements.

Product : SOUND BAR + WIRELESS SUBWOOFER
Test Item : Peak Power Output
Test Site : No.3 OATS
Test Mode : Mode 2: Transmit - 3Mbps (8DPSK)

Channel No.	Frequency (MHz)	Measurement (dBm)	Required Limit	Result
Channel 00	2402.00	7.66	1 Watt= 29.8 dBm	Pass
Channel 39	2441.00	7.65	1 Watt= 29.8 dBm	Pass
Channel 78	2480.00	7.66	1 Watt= 29.8 dBm	Pass

Note:
1. Peak Power Output Value =Reading value on power meter + cable loss
2. Required Limit= 30dBm-[6.2dBi-6dBi]=29.80 dBm for compliance to FCC 47CFR 15.247(b) (4) requirements.

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.	Due Cal.
☒Site # 3	X	Magnetic Loop Antenna	Teseq	HLA6121/ 37133	Sep, 2016	Sep, 2017
	X	Bilog Antenna	Schaffner Chase	CBL6112B/ 2707	Jun., 2016	Jun., 2017
	X	EMI Test Receiver	R&S	ESCS 30/838251/ 001	Jun., 2016	Jun., 2017
	X	Coaxial Cable	QTK(Arnist)	RG 214/ LC003-RG	Jun., 2016	Jun., 2017
	X	Coaxial signal switch	Arnist	MP59B/ 6200798682	Jun., 2016	Jun., 2017

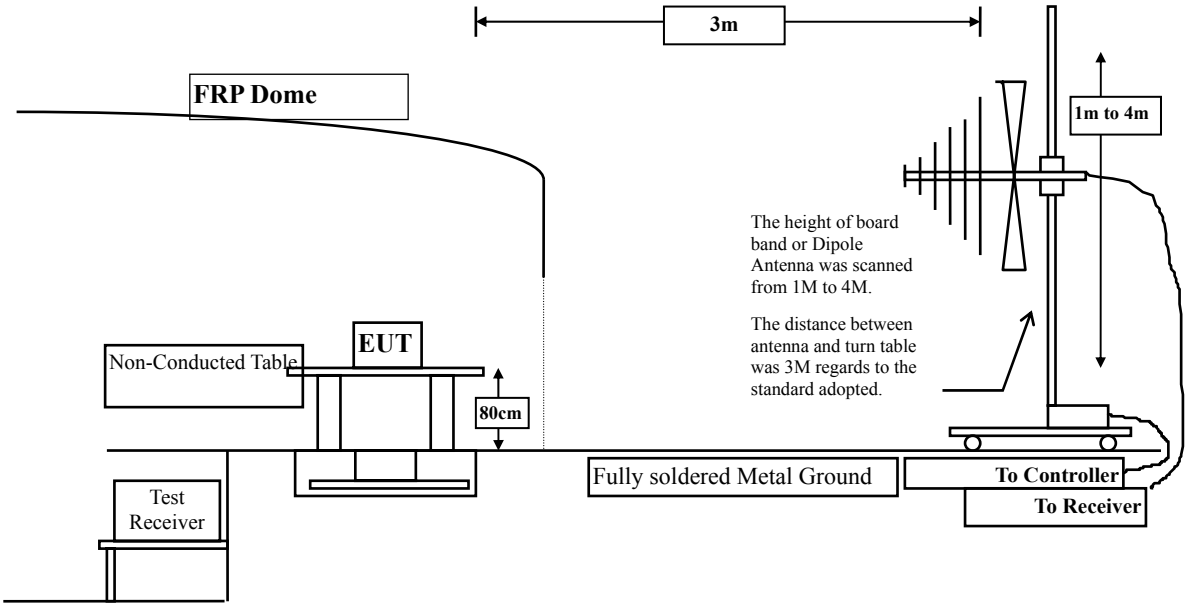
Test Site	Equipment		Manufacturer	Model No./Serial No.	Last Cal.	Due Cal.
☒CB # 8	X	Spectrum Analyzer	R&S	FSP40/ 100339	Oct., 2016	Oct., 2017
	X	Horn Antenna	ETS-Lindgren	3117/ 35205	Mar., 2017	Mar., 2018
	X	Horn Antenna	Schwarzbeck	BBHA9170/209	Jan., 2017	Jan., 2018
	X	Horn Antenna	TRC	AH-0801/95051	Aug., 2016	Aug., 2017
	X	Pre-Amplifier	EMCI	EMC012630SE/980210	Jan., 2017	Jan., 2018
	X	Pre-Amplifier	MITEQ	JS41-001040000-58-5P/ 153945	Jul., 2016	Jul., 2017
	X	Pre-Amplifier	NARDA	DBL-1840N506/013	Jul., 2016	Jul., 2017

Note: 1. All equipments are calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.

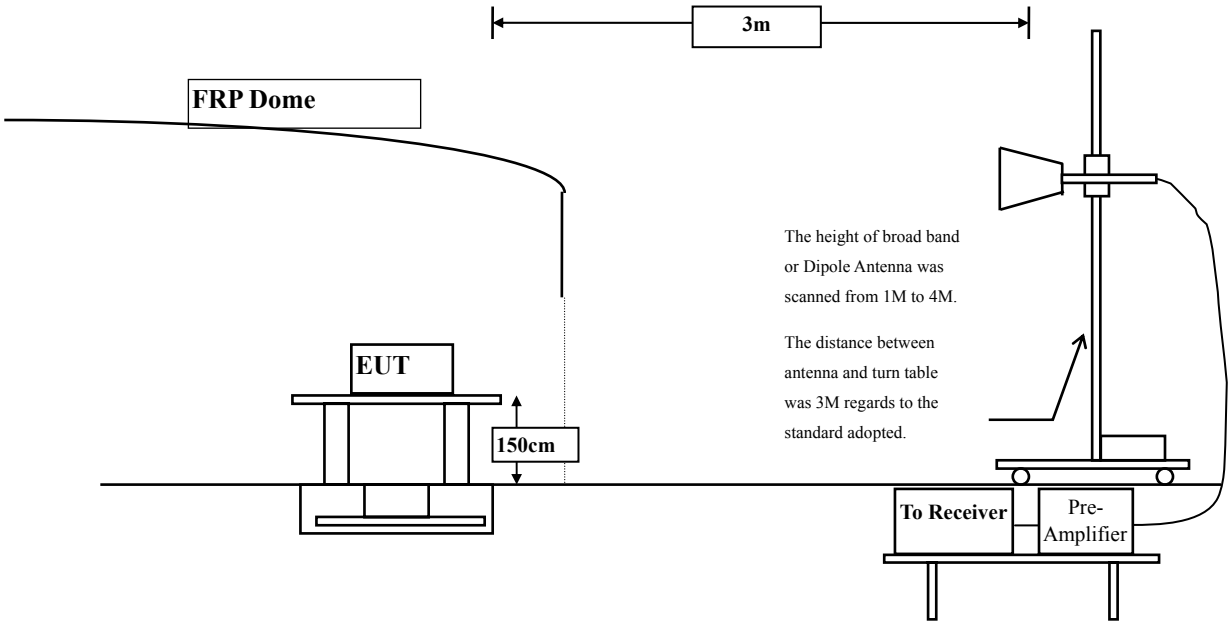
2. The test instruments marked with “X” are used to measure the final test results.

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	uV/m @3m	dBμV/m@3m
30-88	100	40
88-216	150	43.5
216-960	200	46
Above 960	500	54

Remarks: 1. RF Voltage (dBμV) = 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, 2013 and tested compliance to FCC 47CFR 15.249 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 worst radiated emission is measured in the Open Area Test Site on the Final Measurement.

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

4.5. Uncertainty

± 4.08 dB above 1GHz

± 4.22 dB below 1GHz

4.6. Test Result of Radiated Emission

Product : SOUND BAR + WIRELESS SUBWOOFER
Test Item : Harmonic Radiated Emission
Test Site : No.3 OATS
Test date : 2016.08.09
Test Mode : Mode 1: Transmit - 1Mbps (GFSK)(2402MHz)

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBμV	dBμV/m	dB	dBμV/m
Horizontal					
Peak Detector:					
4804.000	3.327	38.980	42.307	-31.693	74.000
7206.000	10.136	31.140	41.276	-32.724	74.000
9608.000	13.706	30.800	44.506	-29.494	74.000
Average Detector:					
--					
Vertical					
Peak Detector:					
4804.000	6.638	38.560	45.197	-28.803	74.000
7206.000	11.005	30.930	41.935	-32.065	74.000
9608.000	14.103	31.650	45.753	-28.247	74.000
Average Detector:					
--					

Note:

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

Product : SOUND BAR + WIRELESS SUBWOOFER
Test Item : Harmonic Radiated Emission
Test Site : No.3 OATS
Test date : 2016.08.09
Test Mode : Mode 1: Transmit - 1Mbps (GFSK)(2441MHz)

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBμV	dBμV/m	dB	dBμV/m
Horizontal					
Peak Detector:					
4882.000	3.001	41.250	44.251	-29.749	74.000
7323.000	11.846	31.040	42.887	-31.113	74.000
9764.000	12.563	31.710	44.273	-29.727	74.000
Average Detector:					
--					
Vertical					
Peak Detector:					
4882.000	5.713	41.350	47.064	-26.936	74.000
7323.000	12.727	31.450	44.178	-29.822	74.000
9764.000	13.028	31.550	44.578	-29.422	74.000
Average Detector:					
--					

Note:

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

Product : SOUND BAR + WIRELESS SUBWOOFER
Test Item : Harmonic Radiated Emission
Test Site : No.3 OATS
Test date : 2016.08.09
Test Mode : Mode 1: Transmit - 1Mbps (GFSK)(2480MHz)

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBμV	dBμV/m	dB	dBμV/m
Horizontal					
Peak Detector:					
4960.000	2.760	38.150	40.910	-33.090	74.000
7440.000	12.567	31.620	44.186	-29.814	74.000
9920.000	13.456	32.100	45.556	-28.444	74.000
Average					
Detector:					
--					
Vertical					
Peak Detector:					
4960.000	5.557	38.740	44.297	-29.703	74.000
7440.000	13.426	31.910	45.335	-28.665	74.000
9920.000	13.958	32.420	46.378	-27.622	74.000
Average					
Detector:					
--					

Note:

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

Product : SOUND BAR + WIRELESS SUBWOOFER
Test Item : Harmonic Radiated Emission
Test Site : No.3 OATS
Test date : 2016.08.09
Test Mode : Mode 2: Transmit - 3Mbps (8DPSK)(2402MHz)

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBμV	dBμV/m	dB	dBμV/m
Horizontal					
Peak Detector:					
4804.000	3.327	37.150	40.477	-33.523	74.000
7206.000	10.136	30.570	40.706	-33.294	74.000
9608.000	13.706	31.180	44.886	-29.114	74.000
Average Detector:					
--					
Vertical					
Peak Detector:					
4804.000	6.638	37.350	43.987	-30.013	74.000
7206.000	11.005	31.220	42.225	-31.775	74.000
9608.000	14.103	31.140	45.243	-28.757	74.000
Average Detector:					
--					

Note:

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

Product	:	SOUND BAR + WIRELESS SUBWOOFER
Test Item	:	Harmonic Radiated Emission
Test Site	:	No.3 OATS
Test date	:	2016.08.09
Test Mode	:	Mode 2: Transmit - 3Mbps (8DPSK) (2441MHz)

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBμV	dBμV/m	dB	dBμV/m
Horizontal					
Peak Detector:					
4882.000	3.001	37.840	40.841	-33.159	74.000
7323.000	11.846	31.440	43.287	-30.713	74.000
9764.000	12.563	32.140	44.703	-29.297	74.000
Average					
Detector:					
--					
Vertical					
Peak Detector:					
4882.000	5.713	38.240	43.954	-30.046	74.000
7323.000	12.727	31.880	44.608	-29.392	74.000
9764.000	13.028	32.610	45.638	-28.362	74.000
Average					
Detector:					
--					

Note:

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

Product : SOUND BAR + WIRELESS SUBWOOFER
Test Item : Harmonic Radiated Emission
Test Site : No.3 OATS
Test date : 2016.08.09
Test Mode : Mode 2: Transmit - 3Mbps (8DPSK) (2480MHz)

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBμV	dBμV/m	dB	dBμV/m
Horizontal					
Peak Detector:					
4960.000	2.760	38.240	41.000	-33.000	74.000
7440.000	12.567	32.640	45.206	-28.794	74.000
9920.000	13.456	32.680	46.136	-27.864	74.000
Average Detector:					
--					
Vertical					
Peak Detector:					
4960.000	5.557	38.680	44.237	-29.763	74.000
7440.000	13.426	32.410	45.835	-28.165	74.000
9920.000	13.958	32.840	46.798	-27.202	74.000
Average Detector:					
--					

Note:

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

Product : SOUND BAR + WIRELESS SUBWOOFER
Test Item : General Radiated Emission
Test Site : No.3 OATS
Test date : 2016.08.09
Test Mode : Mode 1: Transmit - 1Mbps (GFSK) (2441MHz)

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBμV	dBμV/m	dB	dBμV/m
Horizontal					
150.280	-7.870	45.212	37.342	-6.158	43.500
191.020	-9.679	48.060	38.381	-5.119	43.500
301.600	-4.465	41.319	36.854	-9.146	46.000
402.480	0.915	35.631	36.546	-9.454	46.000
577.080	3.221	34.763	37.984	-8.016	46.000
833.160	6.616	33.936	40.552	-5.448	46.000
Vertical					
142.520	-5.547	45.622	40.075	-3.425	43.500
216.240	-6.051	40.782	34.731	-11.269	46.000
324.880	-3.120	38.358	35.238	-10.762	46.000
367.560	-0.088	35.575	35.486	-10.514	46.000
604.240	2.199	31.849	34.049	-11.951	46.000
833.160	1.716	34.689	36.405	-9.595	46.000

Note:

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

Product	:	SOUND BAR + WIRELESS SUBWOOFER
Test Item	:	General Radiated Emission
Test Site	:	No.3 OATS
Test date	:	2016.08.09
Test Mode	:	Mode 2: Transmit - 3Mbps (8DPSK) (2441MHz)

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBµV	dBµV/m	dB	dBµV/m
Horizontal					
146.400	-7.756	43.862	36.106	-7.394	43.500
191.020	-9.679	49.031	39.352	-4.148	43.500
286.080	-5.619	43.830	38.211	-7.789	46.000
353.980	-1.274	42.142	40.868	-5.132	46.000
400.540	0.942	37.085	38.027	-7.973	46.000
606.180	4.196	35.345	39.541	-6.459	46.000
Vertical					
125.060	-3.725	36.450	32.725	-10.775	43.500
198.780	-5.708	38.676	32.968	-10.532	43.500
322.940	-3.616	40.005	36.390	-9.610	46.000
499.480	-0.199	32.346	32.146	-13.854	46.000
833.160	1.716	34.613	36.329	-9.671	46.000
955.380	2.956	37.546	40.502	-5.498	46.000

Note:

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

5. RF Antenna Conducted Test

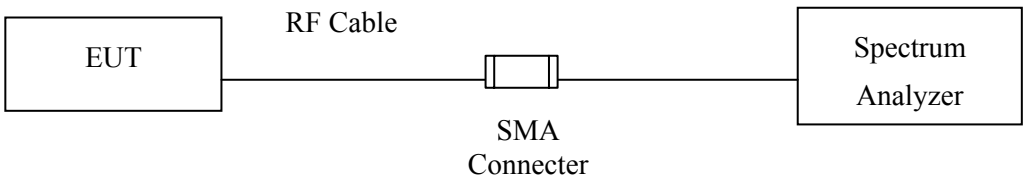
5.1. Test Equipment

	Equipment	Manufacturer	Model No./Serial No.	Last Cal.	Due Cal.
	Spectrum Analyzer	R&S	FSP40 / 100170	Jun., 2016	Jun., 2017
	Spectrum Analyzer	Agilent	E4407B / US39440758	Jun., 2016	Jun., 2017
X	Spectrum Analyzer	Agilent	N9010A / MY48030495	Apr., 2017	Apr., 2018

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

5.5. Uncertainty

± 1.20dB

5.6. Test Result of RF Antenna Conducted Test

Product	:	SOUND BAR + WIRELESS SUBWOOFER
Test Item	:	RF Antenna Conducted Test
Test Site	:	No.3 OATS
Test date	:	2016.08.09
Test Mode	:	Mode 1: Transmit - 1Mbps (GFSK)

Figure Channel 00:

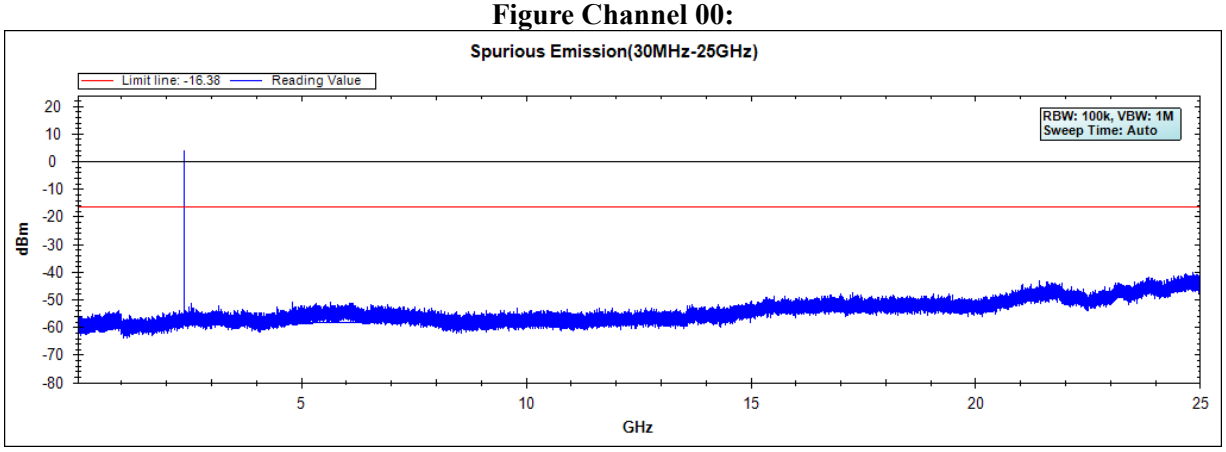


Figure Channel 39:

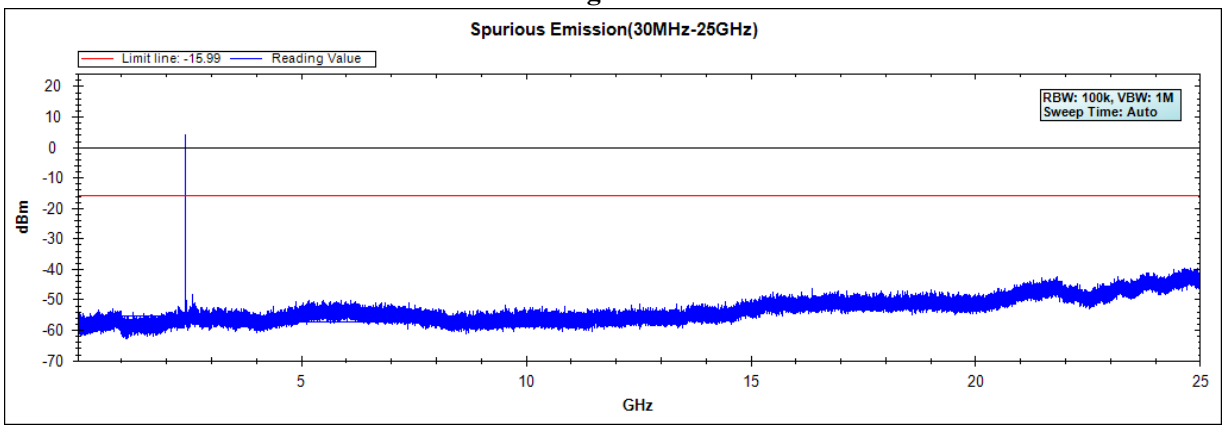
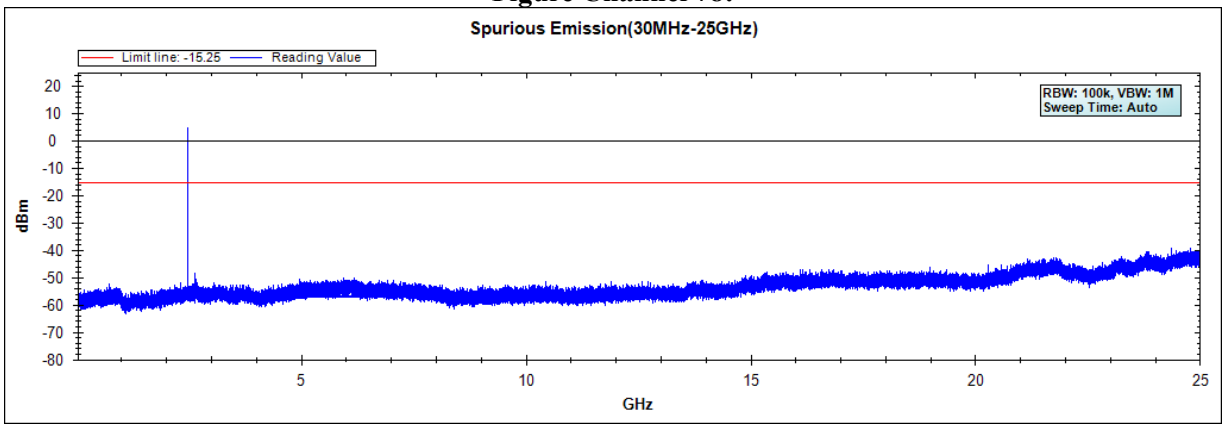


Figure Channel 78:



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

Product	:	SOUND BAR + WIRELESS SUBWOOFER
Test Item	:	RF Antenna Conducted Test
Test Site	:	No.3 OATS
Test date	:	2016.08.09
Test Mode	:	Mode 2: Transmit - 3Mbps (8DPSK)

Figure Channel 00:

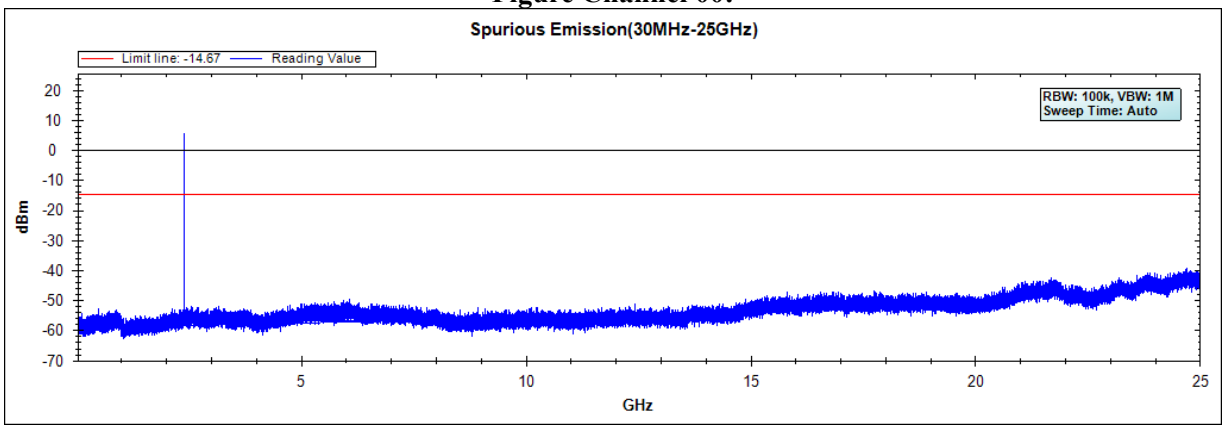


Figure Channel 39:

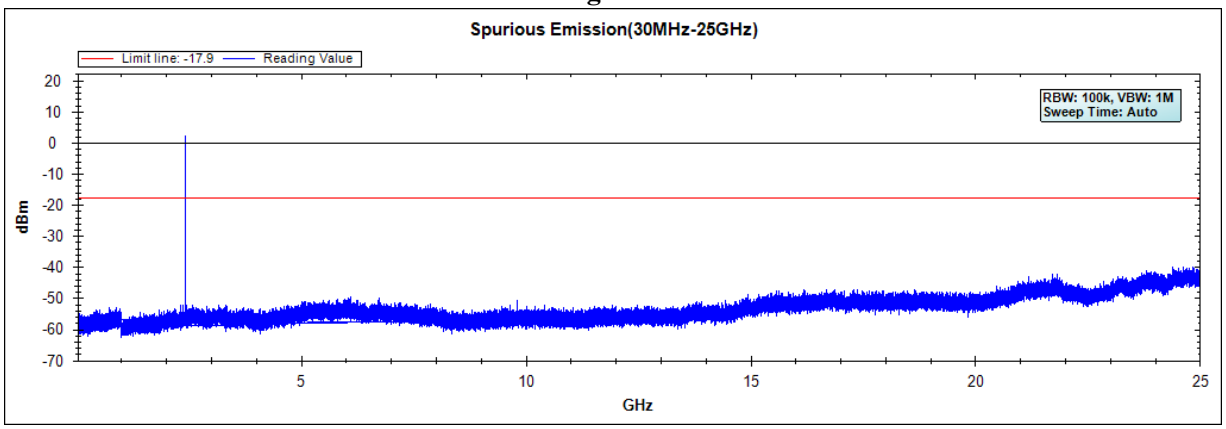
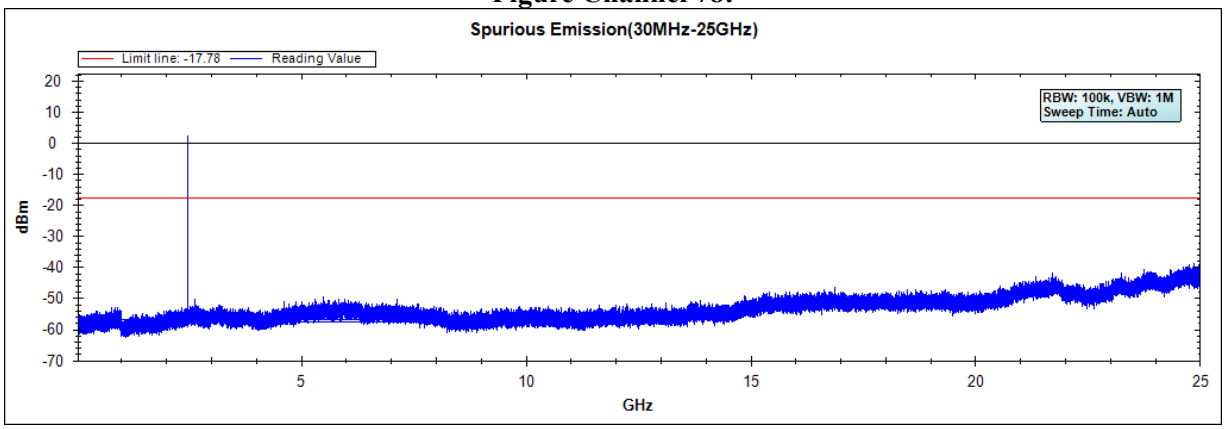


Figure Channel 78:



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

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.	Due Cal.
☒CB # 8	X	Spectrum Analyzer	R&S	FSP40/ 100339	Oct., 2016	Oct., 2017
	X	Horn Antenna	ETS-Lindgren	3117/ 35205	Mar., 2017	Mar., 2018
	X	Horn Antenna	Schwarzbeck	BBHA9170/209	Jan., 2017	Jan., 2018
	X	Horn Antenna	TRC	AH-0801/95051	Aug., 2016	Aug., 2017
	X	Pre-Amplifier	EMCI	EMC012630SE/980210	Jan., 2017	Jan., 2018
	X	Pre-Amplifier	MITEQ	JS41-001040000-58-5P/ 153945	Jul., 2016	Jul., 2017
	X	Pre-Amplifier	NARDA	DBL-1840N506/013	Jul., 2016	Jul., 2017

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

RF Conducted Measurement

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

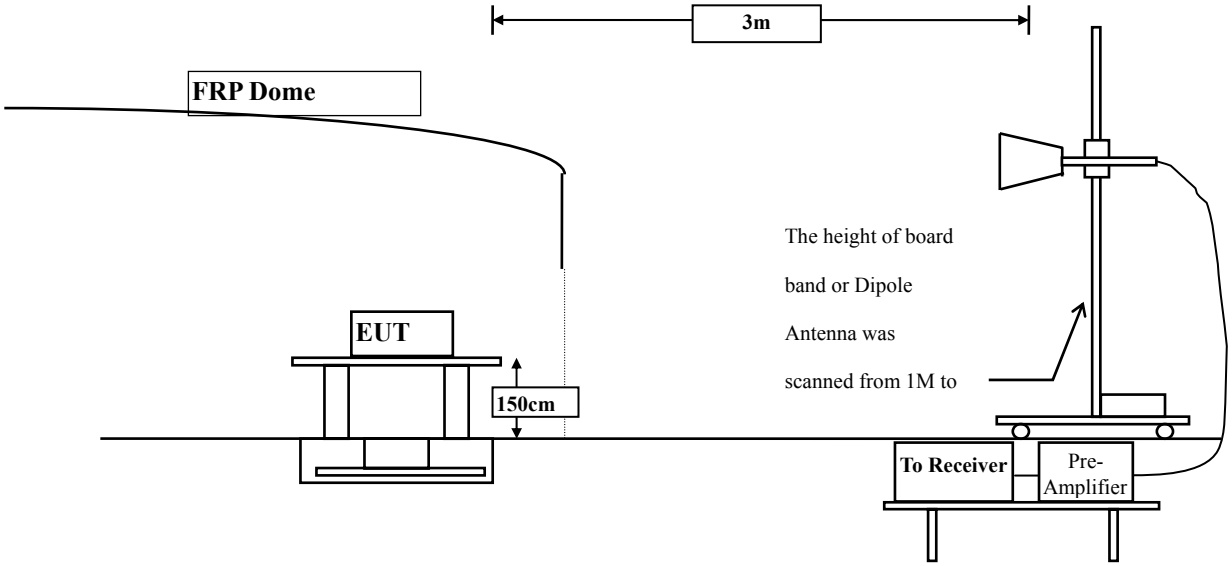
Equipment		Manufacturer	Model No./Serial No.	Last Cal.	Due Cal.
X	Spectrum Analyzer	R&S	FSP40 / 100170	Jun, 2016	Jun, 2017
X	Spectrum Analyzer	Agilent	E4407B / US39440758	Jun, 2016	Jun, 2017
X	Spectrum Analyzer	Agilent	N9010A / MY48030495	Apr., 2017	Apr., 2018

Note:
1. All equipments are calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.
2. The test instruments marked with "X" are used to measure the final test results.

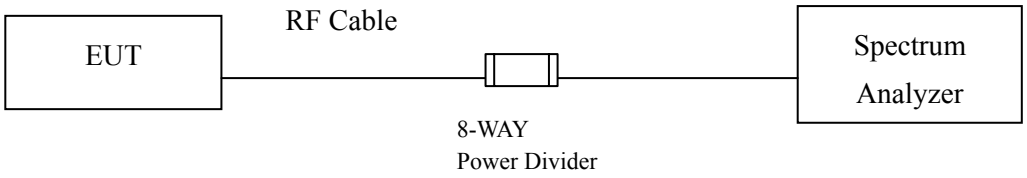
6.2. Test Setup

RF Radiated Measurement:

Above 1GHz



RF Conducted Measurement



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 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.

6.5. Uncertainty

± 4.08 dB above 1GHz
± 4.22 dB below 1GHz

6.6. Test Result of Band Edge

Product : SOUND BAR + WIRELESS SUBWOOFER
Test Item : Band Edge
Test Site : No.3 OATS
Test date : 2016.08.09
Test Mode : Mode 1: Transmit - 1Mbps (GFSK) (2402MHz)

RF Radiated Measurement (Horizontal):

Channel No.	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBμV)	Emission Level (dBμV/m)	Peak Limit (dBμV/m)	Arerage Limit (dBμV/m)	Result
00 (Peak)	2381.884	31.477	27.376	58.854	74.00	54.00	Pass
00 (Peak)	2390.000	31.509	26.413	57.922	74.00	54.00	Pass
00 (Peak)	2400.000	31.561	35.531	67.092	74.00	54.00	--
00 (Peak)	2402.174	31.574	69.306	100.881	--	--	--
00 (Average)	2342.754	31.324	14.529	45.853	74.00	54.00	Pass
00 (Average)	2390.000	31.509	13.433	44.942	74.00	54.00	Pass
00 (Average)	2400.000	31.561	18.969	50.530	74.00	54.00	Pass
00 (Average)	2402.029	31.573	56.709	88.283	--	--	--

Figure Channel 00: Horizontal (Peak)

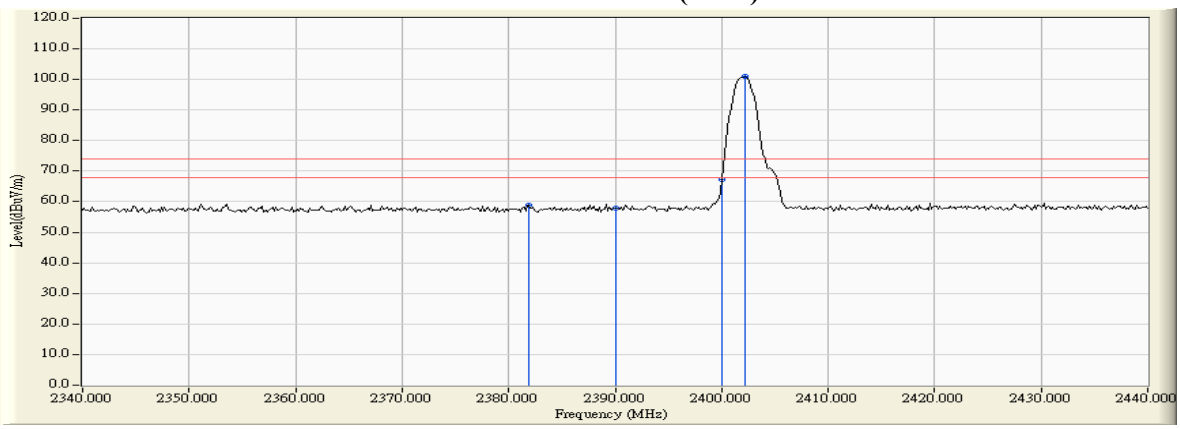
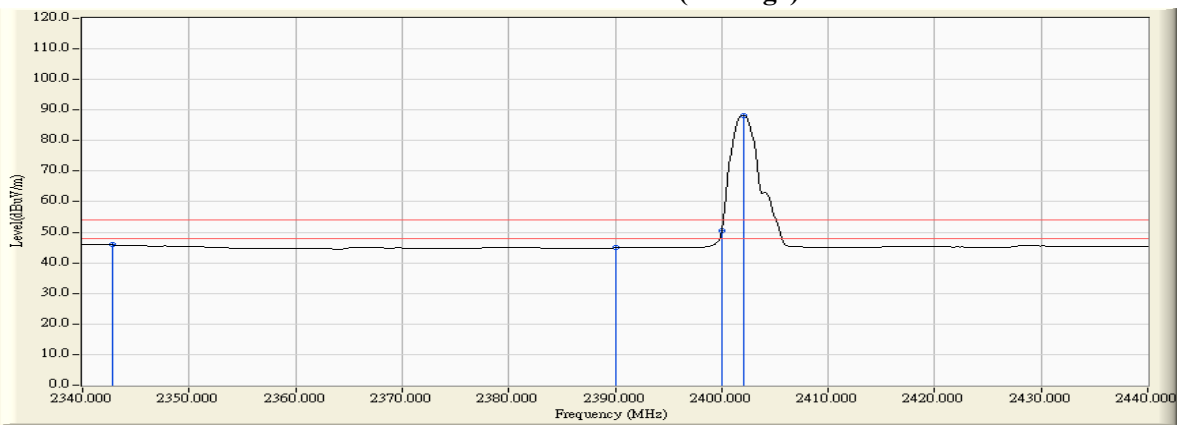


Figure Channel 00: Horizontal (Average)



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

Product	:	SOUND BAR + WIRELESS SUBWOOFER
Test Item	:	Band Edge
Test Site	:	No.3 OATS
Test date	:	2016.08.09
Test Mode	:	Mode 1: Transmit - 1Mbps (GFSK) (2402MHz)

RF Radiated Measurement (VERTICAL):

Channel No.	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBμV)	Emission Level (dBμV/m)	Peak Limit (dBμV/m)	Arerage Limit (dBμV/m)	Result
00 (Peak)	2368.551	31.014	27.740	58.755	74.00	54.00	Pass
00 (Peak)	2390.000	30.915	26.327	57.242	74.00	54.00	Pass
00 (Peak)	2400.000	30.912	32.199	63.111	74.00	54.00	Pass
00 (Peak)	2402.174	30.917	65.287	96.205	--	--	--
00 (Average)	2341.594	31.140	14.657	45.797	74.00	54.00	Pass
00 (Average)	2390.000	30.915	13.468	44.383	74.00	54.00	Pass
00 (Average)	2400.000	30.912	16.799	47.711	74.00	54.00	Pass
00 (Average)	2402.029	30.917	53.469	84.386	--	--	--

Figure Channel 00: VERTICAL (Peak)

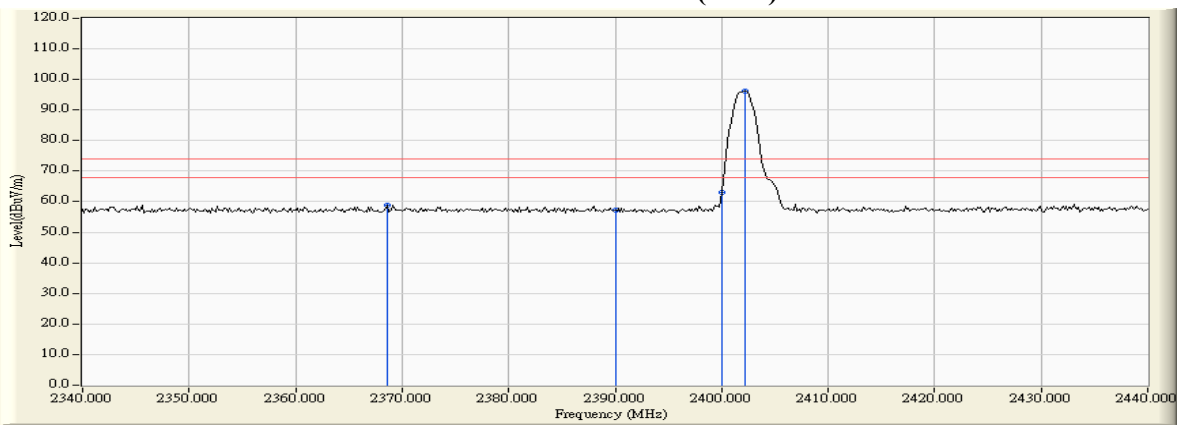
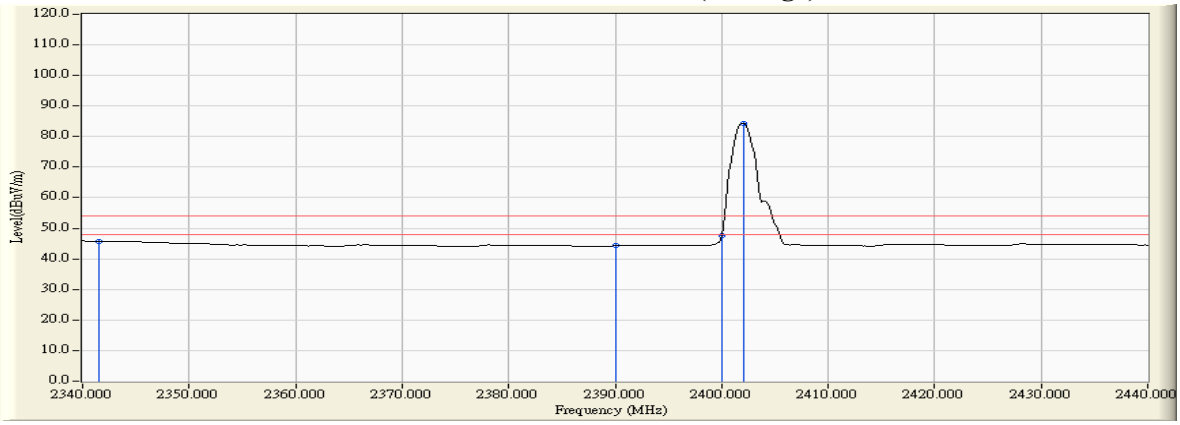


Figure Channel 00: VERTICAL (Average)



Note:

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

Product	:	SOUND BAR + WIRELESS SUBWOOFER
Test Item	:	Band Edge
Test Site	:	No.3 OATS
Test date	:	2016.08.09
Test Mode	:	Mode 1: Transmit - 1Mbps (GFSK) (2480MHz)

RF Radiated Measurement (Horizontal):

Channel No.	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBμV)	Emission Level (dBμV/m)	Peak Limit (dBμV/m)	Arerage Limit (dBμV/m)	Result
78 (Peak)	2479.877	32.155	70.207	102.362	--	--	Pass
78 (Peak)	2483.500	32.182	29.382	61.564	74.00	54.00	Pass
78 (Average)	2480.022	32.156	56.310	88.466	--	--	Pass
78 (Average)	2483.500	32.182	15.952	48.134	74.00	54.00	Pass

Figure Channel 78: Horizontal (Peak)

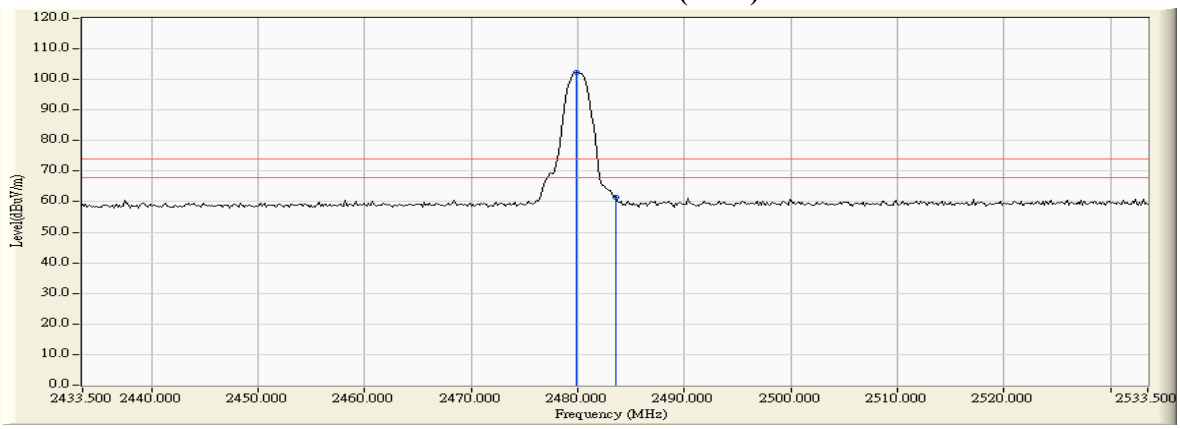
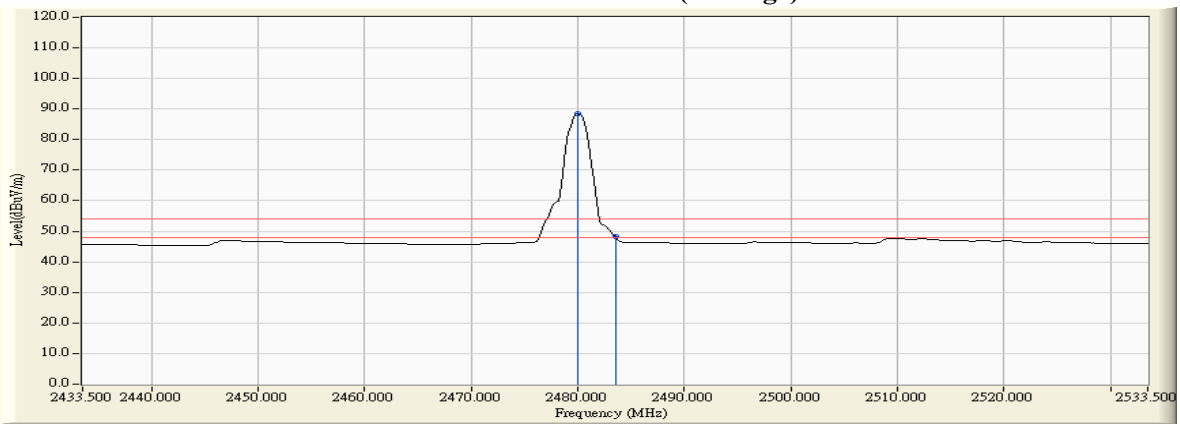


Figure Channel 78: Horizontal (Average)



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

Product	:	SOUND BAR + WIRELESS SUBWOOFER
Test Item	:	Band Edge
Test Site	:	No.3 OATS
Test date	:	2016.08.09
Test Mode	:	Mode 1: Transmit - 1Mbps (GFSK) (2480MHz)

RF Radiated Measurement (VERTICAL):

Channel No.	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBμV)	Emission Level (dBμV/m)	Peak Limit (dBμV/m)	Arerage Limit (dBμV/m)	Result
78 (Peak)	2479.877	31.411	65.502	96.913	--	--	Pass
78 (Peak)	2483.500	31.435	26.959	58.394	74.00	54.00	Pass
78 (Peak)	2490.891	31.485	27.909	59.394	74.00	54.00	Pass
78 (Average)	2480.022	31.412	53.691	85.103	--	--	Pass
78 (Average)	2483.500	31.435	14.813	46.248	74.00	54.00	Pass
78 (Average)	2510.167	31.548	15.300	46.847	74.00	54.00	Pass

Figure Channel 78: VERTICAL (Peak)

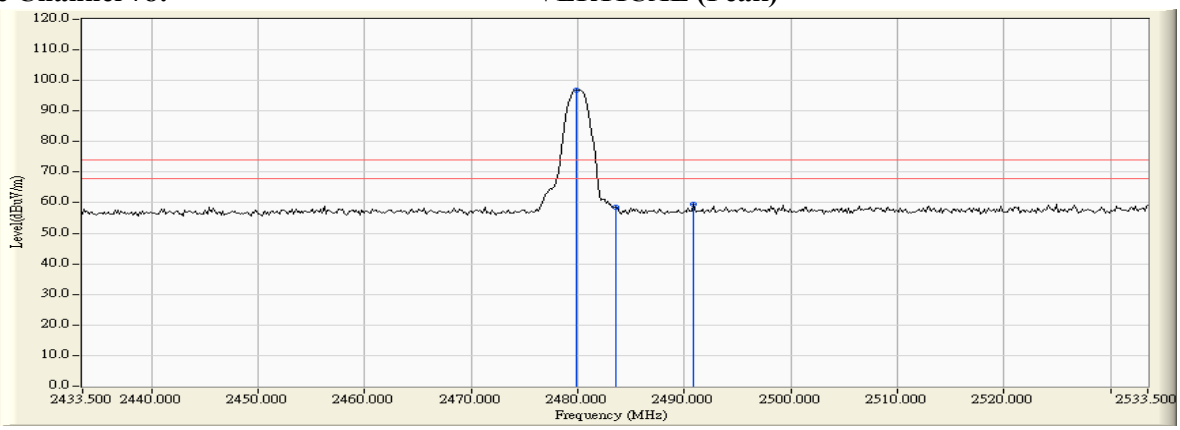
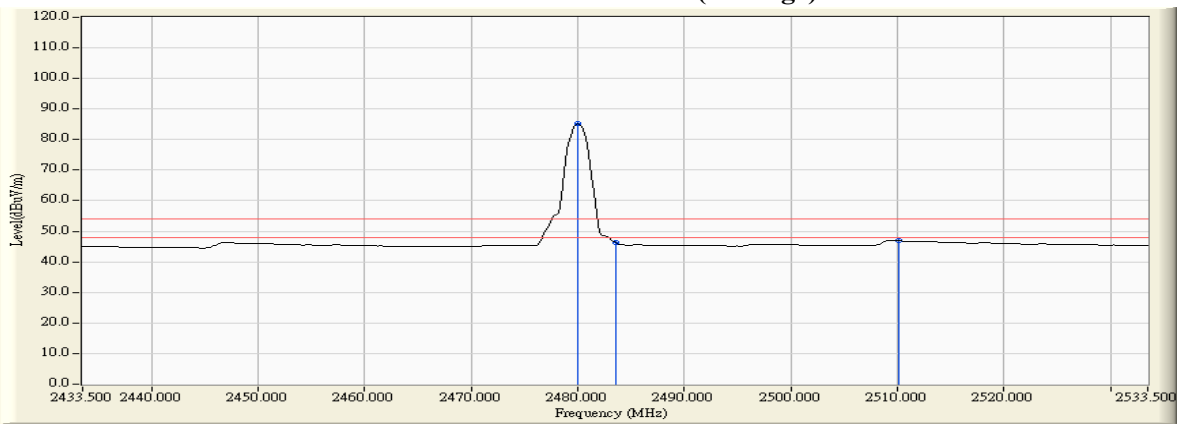


Figure Channel 78: VERTICAL (Average)



Note:

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

Product	:	SOUND BAR + WIRELESS SUBWOOFER
Test Item	:	Band Edge
Test Site	:	No.3 OATS
Test date	:	2016.08.09
Test Mode	:	Mode 2: Transmit - 3Mbps (8DPSK) (2402MHz)

RF Radiated Measurement (Horizontal):

Channel No.	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBμV)	Emission Level (dBμV/m)	Peak Limit (dBμV/m)	Arerage Limit (dBμV/m)	Result
00 (Peak)	2386.812	31.497	26.755	58.252	74.00	54.00	Pass
00 (Peak)	2390.000	31.509	26.243	57.752	74.00	54.00	Pass
00 (Peak)	2400.000	31.561	44.065	75.626	74.00	54.00	Pass
00 (Peak)	2402.029	31.573	70.623	102.197	--	--	--
00 (Average)	2342.899	31.325	14.492	45.817	74.00	54.00	Pass
00 (Average)	2390.000	31.509	13.451	44.960	74.00	54.00	Pass
00 (Average)	2400.000	31.561	27.497	59.058	74.00	54.00	Pass
00 (Average)	2402.029	31.573	55.455	87.029	--	--	--

Figure Channel 00: Horizontal (Peak)

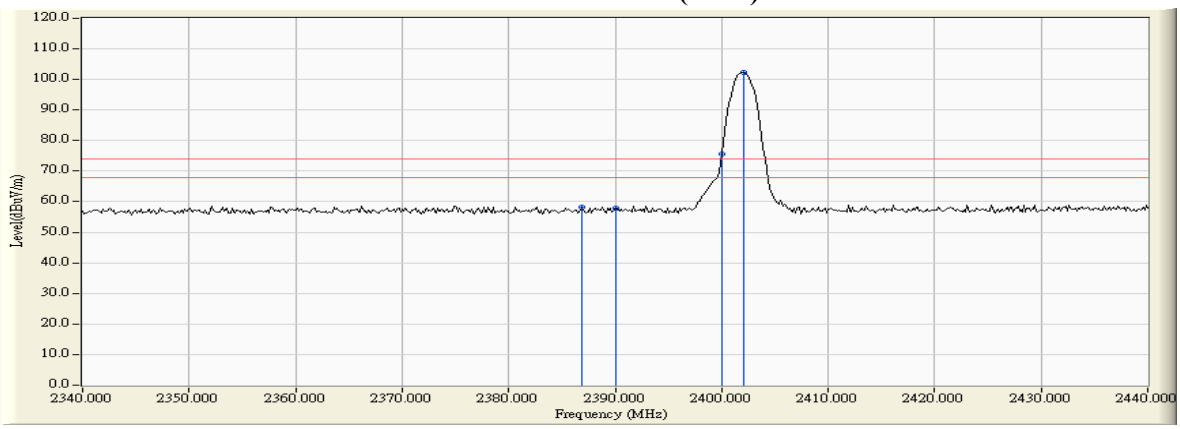
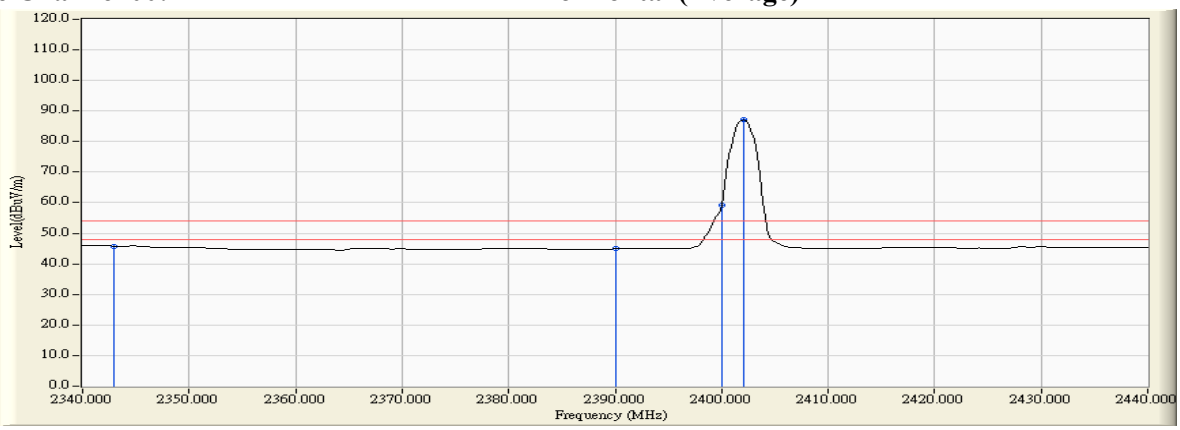


Figure Channel 00: Horizontal (Average)



Note:

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

Product	:	SOUND BAR + WIRELESS SUBWOOFER
Test Item	:	Band Edge
Test Site	:	No.3 OATS
Test date	:	2016.08.09
Test Mode	:	Mode 2: Transmit - 3Mbps (8DPSK) (2402MHz)

RF Radiated Measurement (VERTICAL):

Channel No.	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBμV)	Emission Level (dBμV/m)	Peak Limit (dBμV/m)	Arerage Limit (dBμV/m)	Result
00 (Peak)	2387.536	30.927	27.863	58.790	74.00	54.00	Pass
00 (Peak)	2390.000	30.915	25.700	56.615	74.00	54.00	Pass
00 (Peak)	2400.000	30.912	40.450	71.362	74.00	54.00	Pass
00 (Peak)	2402.029	30.917	66.240	97.157	--	--	--
00 (Average)	2342.319	31.136	14.644	45.780	74.00	54.00	Pass
00 (Average)	2390.000	30.915	13.481	44.396	74.00	54.00	Pass
00 (Average)	2400.000	30.912	23.794	54.706	74.00	54.00	Pass
00 (Average)	2402.029	30.917	51.596	82.513	--	--	--

Figure Channel 00: VERTICAL (Peak)

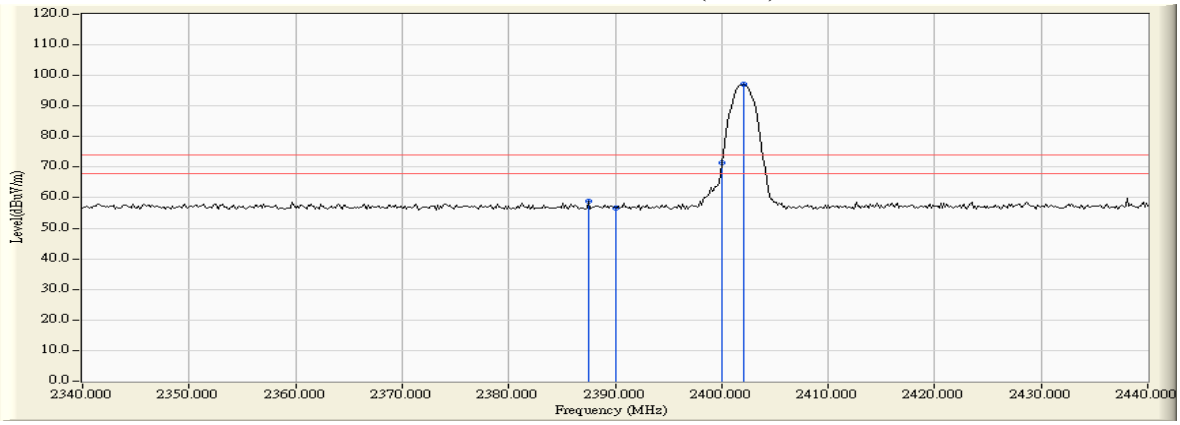
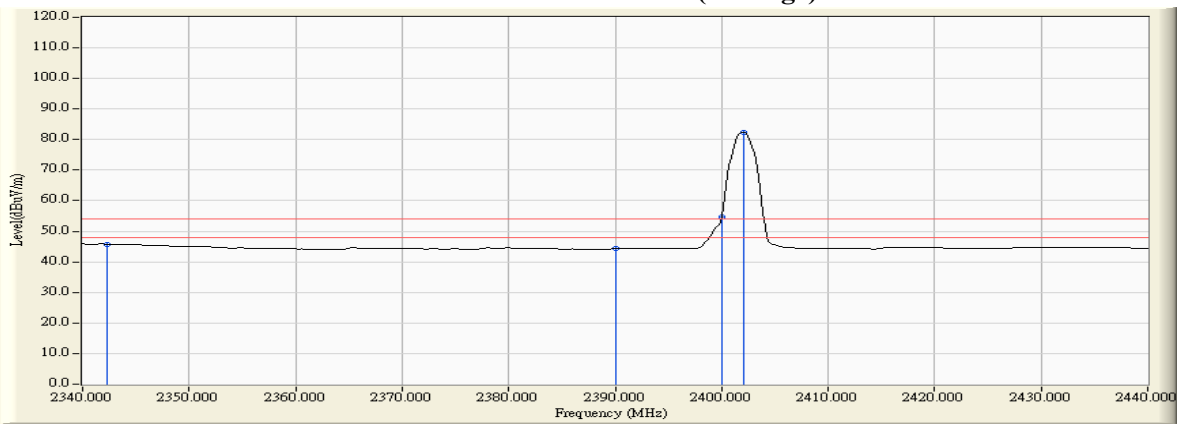


Figure Channel 00: VERTICAL (Average)



Note:

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

Product	:	SOUND BAR + WIRELESS SUBWOOFER
Test Item	:	Band Edge
Test Site	:	No.3 OATS
Test date	:	2016.08.09
Test Mode	:	Mode 2: Transmit - 3Mbps (8DPSK) (2480MHz)

RF Radiated Measurement (Horizontal):

Channel No.	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBμV)	Emission Level (dBμV/m)	Peak Limit (dBμV/m)	Arerage Limit (dBμV/m)	Result
78 (Peak)	2480.022	32.156	71.009	103.165	--	--	Pass
78 (Peak)	2483.500	32.182	29.200	61.382	74.00	54.00	Pass
78 (Average)	2480.022	32.156	55.078	87.234	--	--	Pass
78 (Average)	2483.500	32.182	14.724	46.906	74.00	54.00	Pass
78 (Average)	2509.732	32.252	15.419	47.672	74.00	54.00	Pass

Figure Channel 78: Horizontal (Peak)

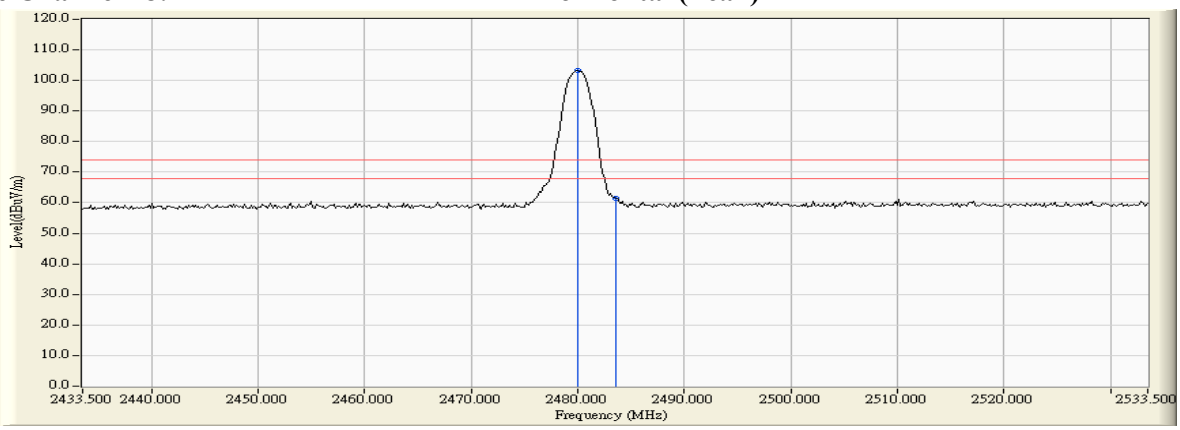
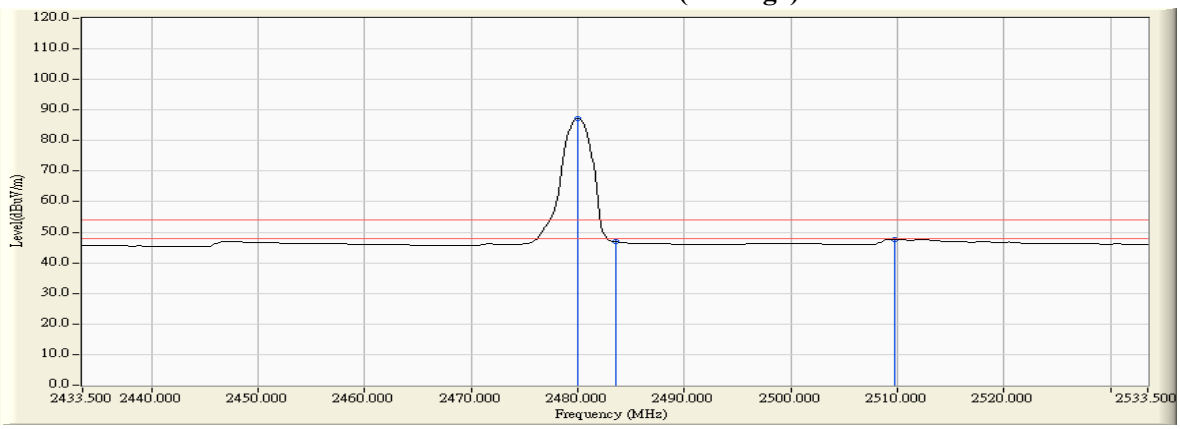


Figure Channel 78: Horizontal (Average)



Note:

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

Product	:	SOUND BAR + WIRELESS SUBWOOFER
Test Item	:	Band Edge
Test Site	:	No.3 OATS
Test date	:	2016.08.09
Test Mode	:	Mode 2: Transmit - 3Mbps (8DPSK) (2480MHz)

RF Radiated Measurement (VERTICAL):

Channel No.	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBμV)	Emission Level (dBμV/m)	Peak Limit (dBμV/m)	Arerage Limit (dBμV/m)	Result
78 (Peak)	2479.877	31.411	66.478	97.889	--	--	Pass
78 (Peak)	2483.500	31.435	26.629	58.064	74.00	54.00	Pass
78 (Peak)	2489.877	31.478	27.559	59.037	74.00	54.00	Pass
78 (Average)	2480.022	31.412	52.579	83.991	--	--	Pass
78 (Average)	2483.500	31.435	14.224	45.659	74.00	54.00	Pass
78 (Average)	2509.152	31.546	15.384	46.929	74.00	54.00	Pass

Figure Channel 78: VERTICAL (Peak)

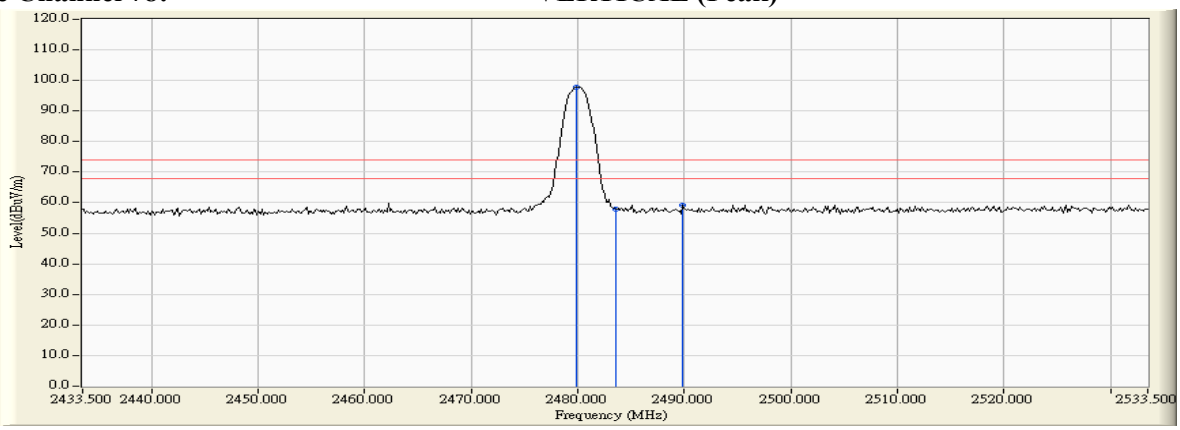
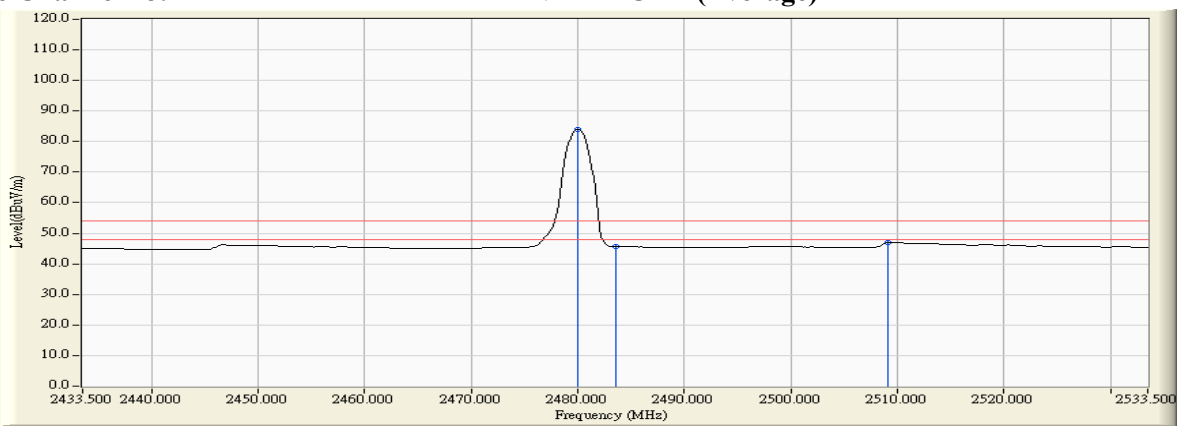


Figure Channel 78: VERTICAL (Average)



Note:

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

Product : SOUND BAR + WIRELESS SUBWOOFER
Test Item : Band Edge
Test Site : No.3 OATS
Test Mode : Mode 1: Transmit - 1Mbps (GFSK)(Hopping off)

Measurement Level Δ (dB)	Result
> 20	PASS

Figure Channel 00:

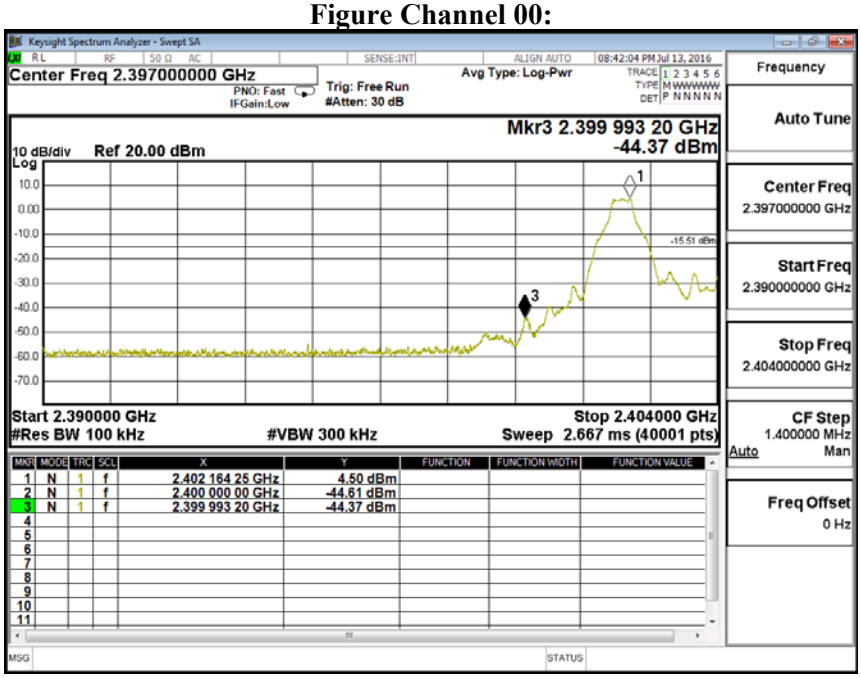
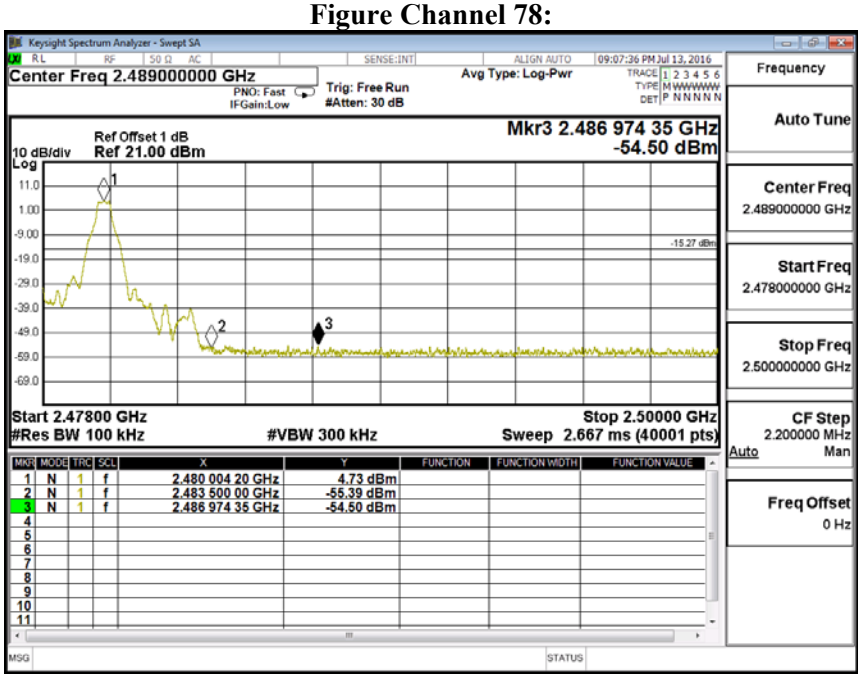


Figure Channel 78:



Product : SOUND BAR + WIRELESS SUBWOOFER
Test Item : Band Edge
Test Site : No.3 OATS
Test Mode : Mode 2: Transmit - 3Mbps (8DPSK) (Hopping off)

Measurement Level Δ (dB)	Result
> 20	PASS

Figure Channel 00:

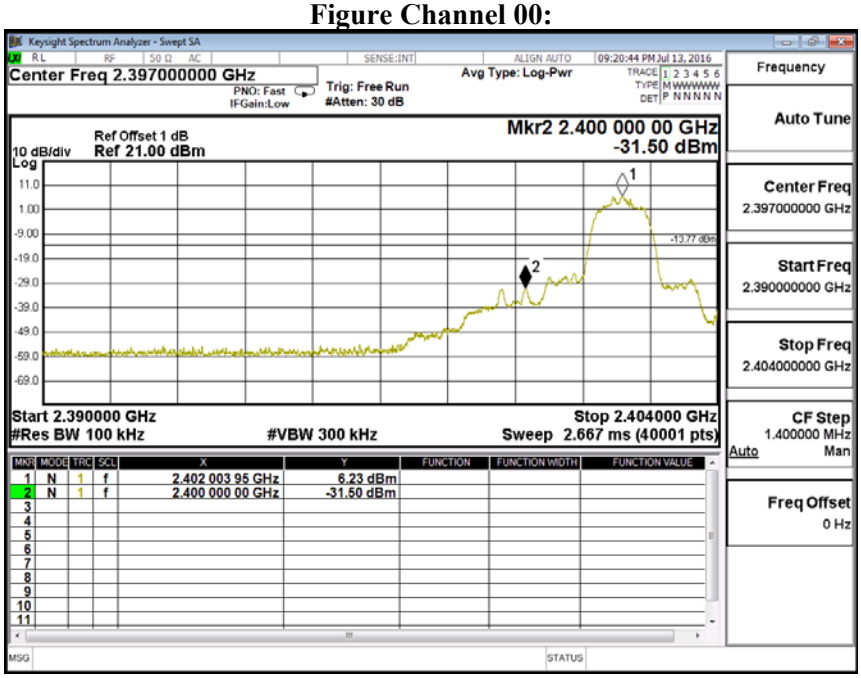
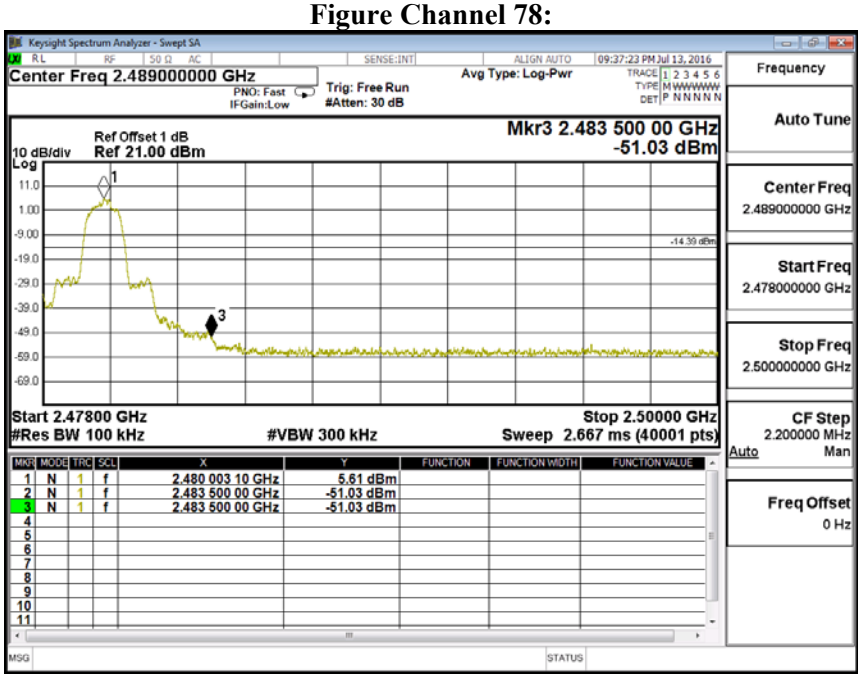


Figure Channel 78:



Product : SOUND BAR + WIRELESS SUBWOOFER
Test Item : Band Edge
Test Site : No.3 OATS
Test Mode : Mode 1: Transmit - 1Mbps (GFSK)(Hopping on)

Measurement Level Δ (dB)	Result
> 20	PASS

Figure Channel Hopping:

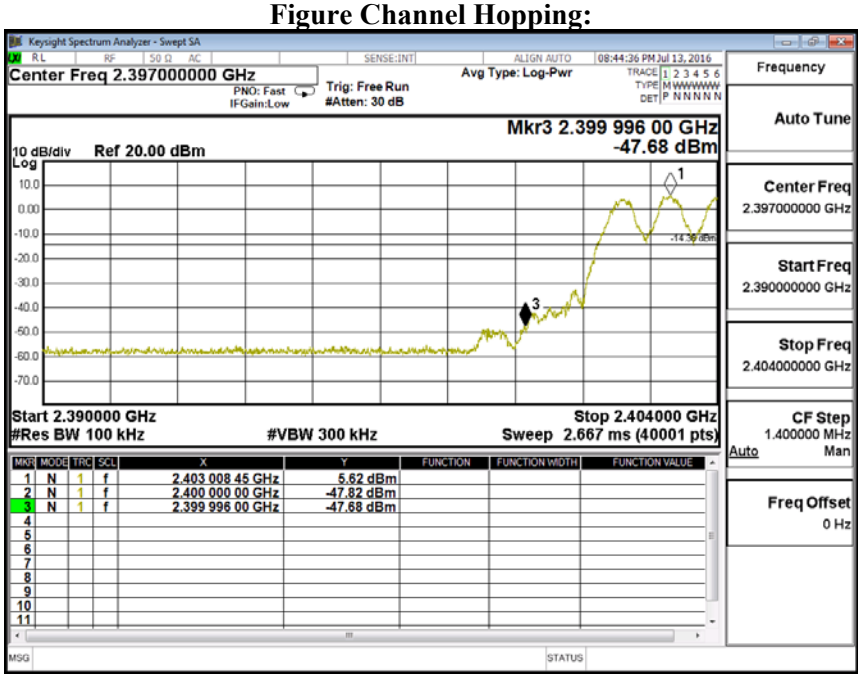
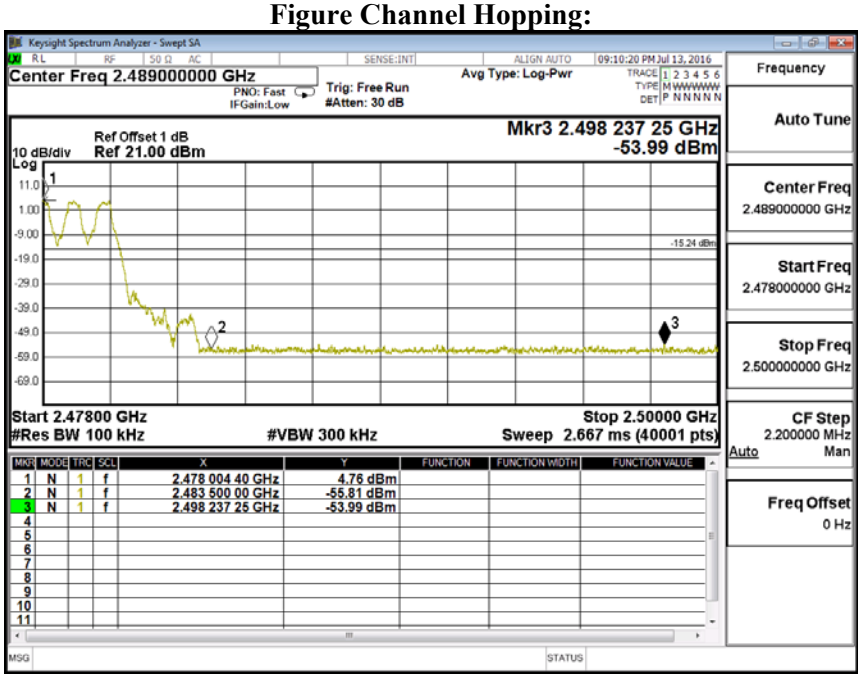


Figure Channel Hopping:



Product : SOUND BAR + WIRELESS SUBWOOFER
Test Item : Band Edge
Test Site : No.3 OATS
Test Mode : Mode 2: Transmit - 3Mbps (8DPSK) (Hopping on)

Measurement Level Δ (dB)	Result
> 20	PASS

Figure Channel Hopping:

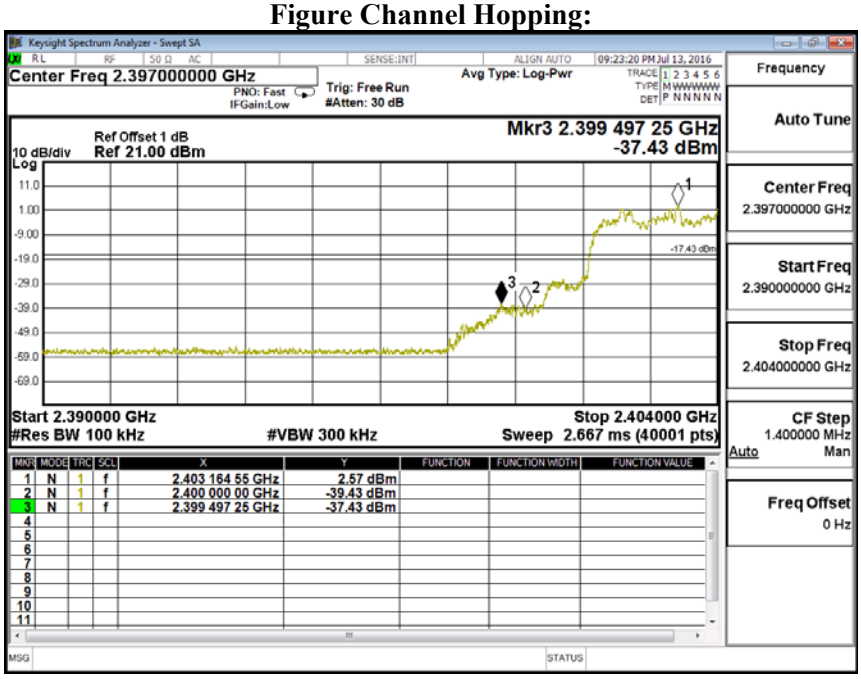
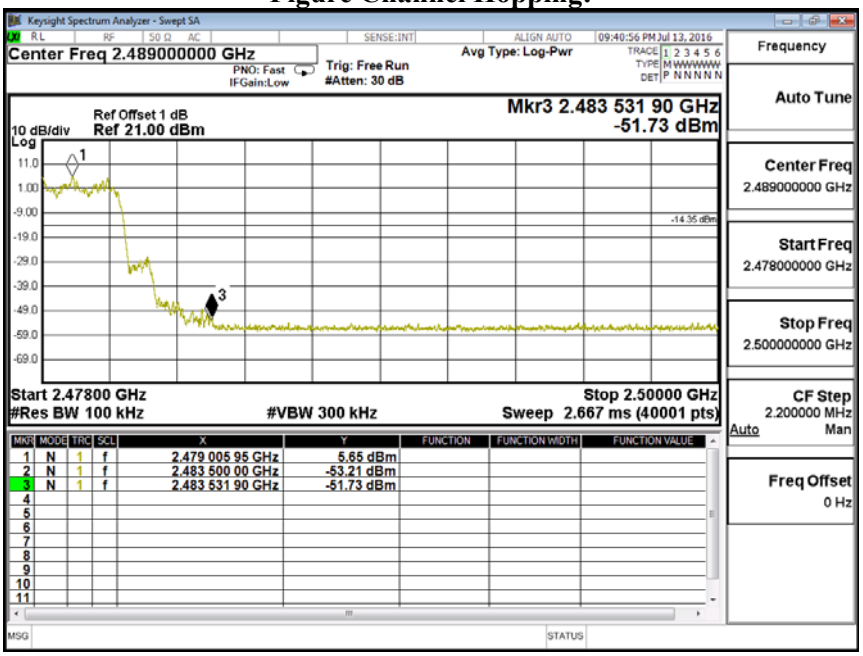


Figure Channel Hopping:



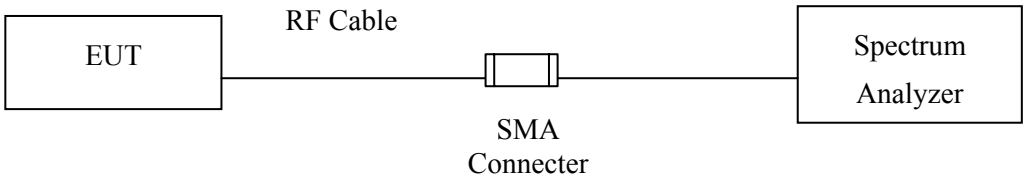
7. Channel Number

7.1. Test Equipment

	Equipment	Manufacturer	Model No./Serial No.	Last Cal.	Due Cal.
	Spectrum Analyzer	R&S	FSP40 / 100170	Jun., 2016	Jun., 2017
	Spectrum Analyzer	Agilent	E4407B / US39440758	Jun., 2016	Jun., 2017
X	Spectrum Analyzer	Agilent	N9010A / MY48030495	Apr., 2017	Apr., 2018

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 75 hopping frequencies.

7.4. 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.

7.5. Uncertainty

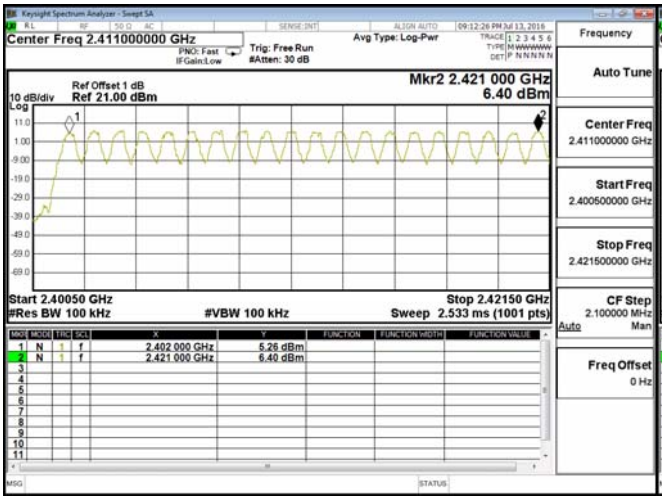
N/A

7.6. Test Result of Channel Number

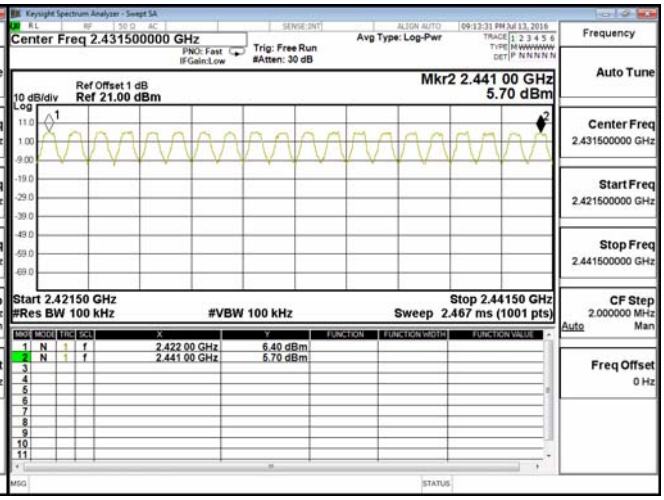
Product : SOUND BAR + WIRELESS SUBWOOFER
Test Item : Channel Number
Test Site : No.3 OATS
Test Mode : Mode 1: Transmit - 1Mbps (GFSK)

Frequency Range (MHz)	Measurement (Hopping Channel)	Required Limit (Hopping Channel)	Result
2402 ~ 2480	79	>75	Pass

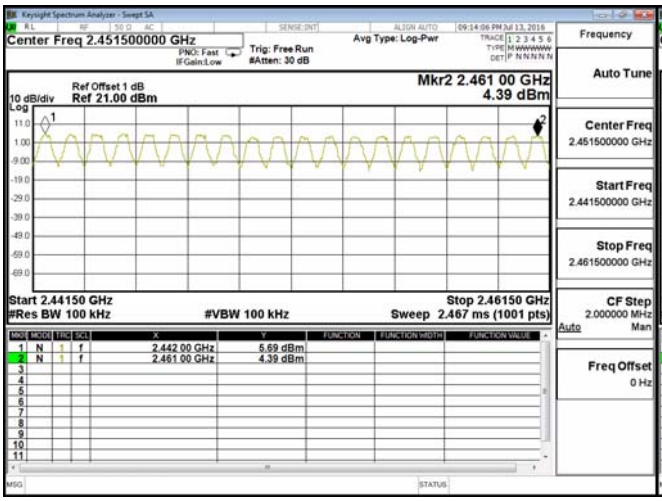
2402-2421MHz



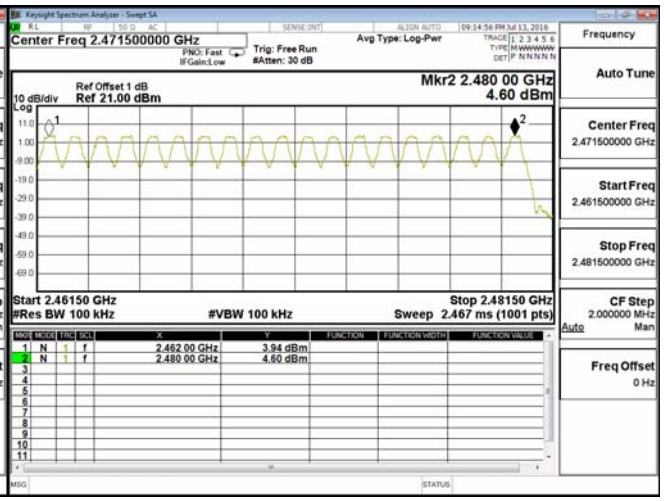
2422-2441MHz



2442-2461MHz



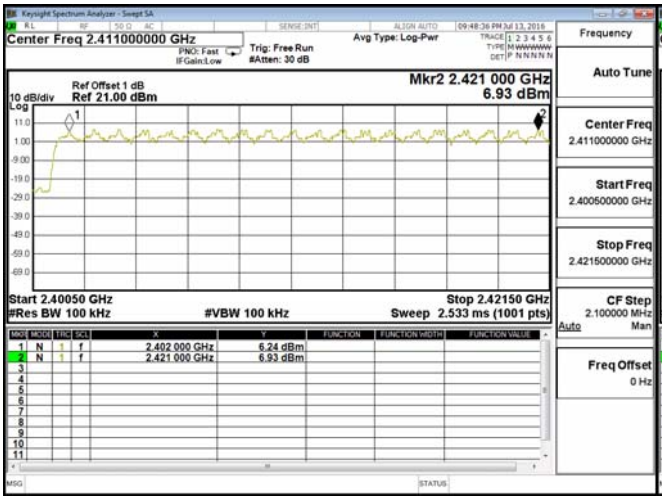
2462-2480MHz



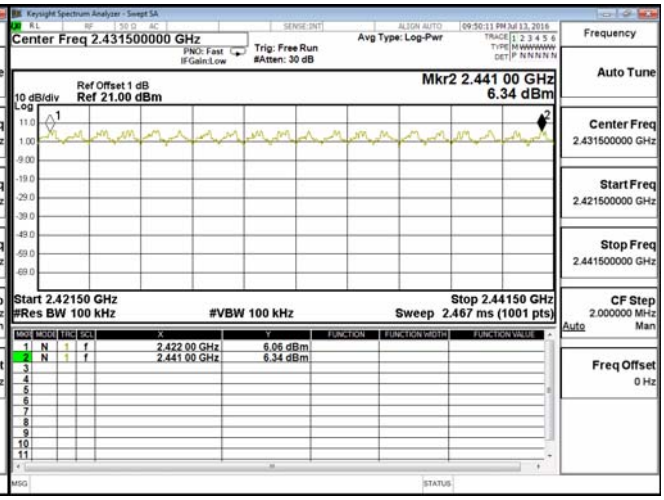
Product : SOUND BAR + WIRELESS SUBWOOFER
Test Item : Channel Number
Test Site : No.3 OATS
Test Mode : Mode 2: Transmit - 3Mbps (8DPSK)

Frequency Range (MHz)	Measurement (Hopping Channel)	Required Limit (Hopping Channel)	Result
2402 ~ 2480	79	>75	Pass

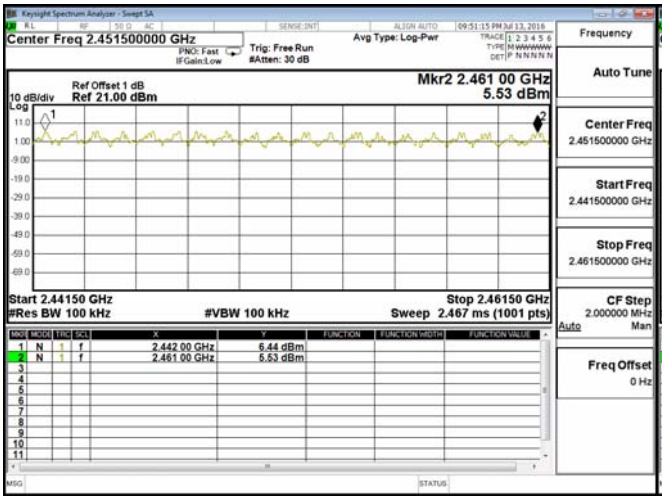
2402-2421MHz



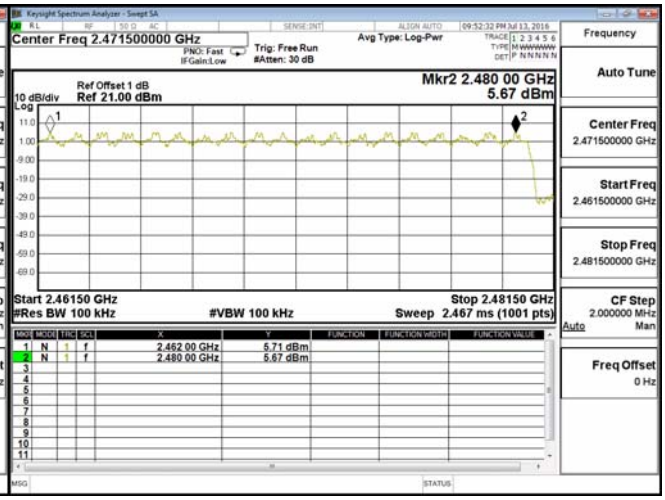
2422-2441MHz



2442-2461MHz



2462-2480MHz



8. Channel Separation

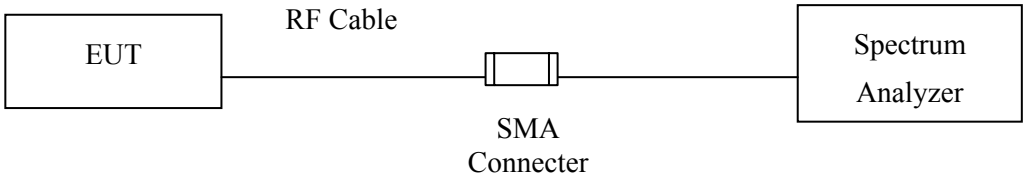
8.1. Test Equipment

	Equipment	Manufacturer	Model No./Serial No.	Last Cal.	Due Cal.
	Spectrum Analyzer	R&S	FSP40 / 100170	Jun., 2016	Jun., 2017
	Spectrum Analyzer	Agilent	E4407B / US39440758	Jun., 2016	Jun., 2017
X	Spectrum Analyzer	Agilent	N9010A / MY48030495	Apr., 2017	Apr., 2018

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

8.5. Uncertainty

± 283Hz

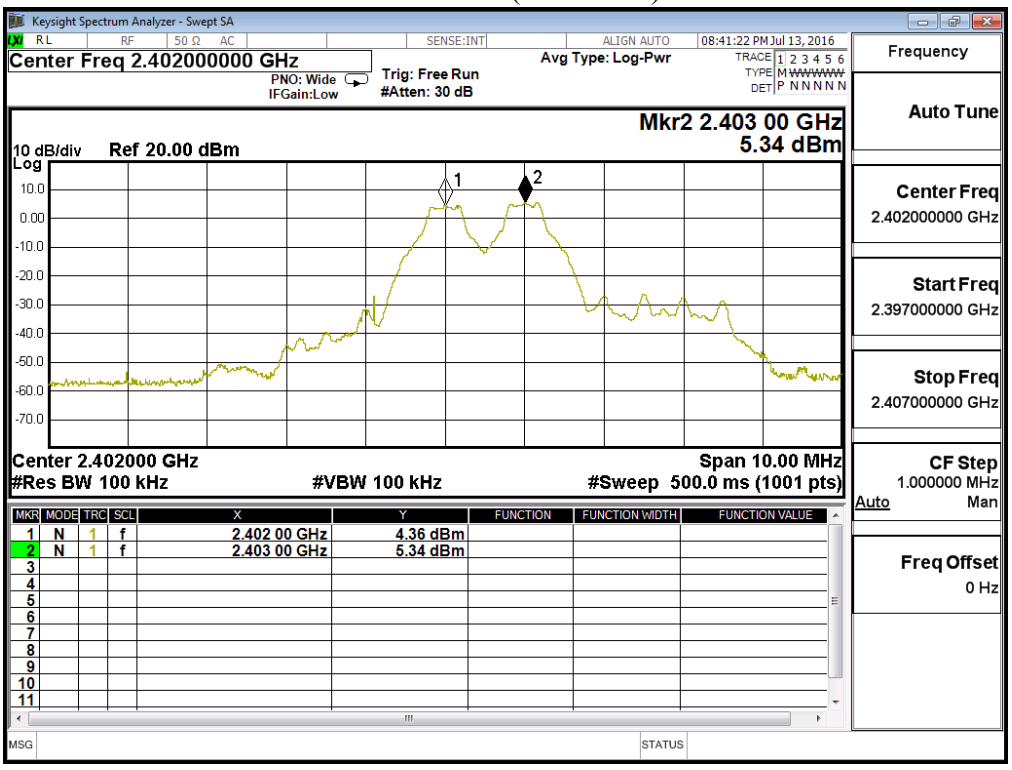
8.6. Test Result of Channel Separation

Product : SOUND BAR + WIRELESS SUBWOOFER
Test Item : Channel Separation
Test Site : No.3 OATS
Test Mode : Mode 1: Transmit - 1Mbps (GFSK)

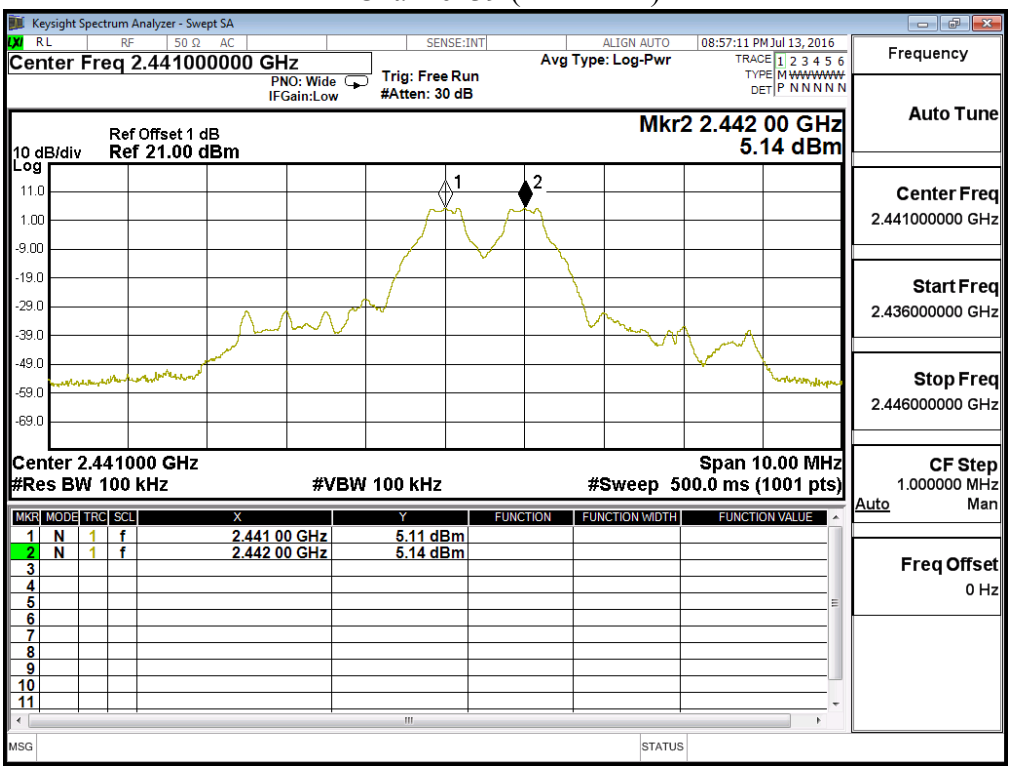
Channel No.	Frequency (MHz)	Measurement Level (kHz)	Limit (kHz)	Limit of (2/3)*20dB Bandwidth (kHz)	Result
00	2402	1000	>25 kHz	634.0	Pass
39	2441	1000	>25 kHz	628.0	Pass
78	2480	1000	>25 kHz	628.0	Pass

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

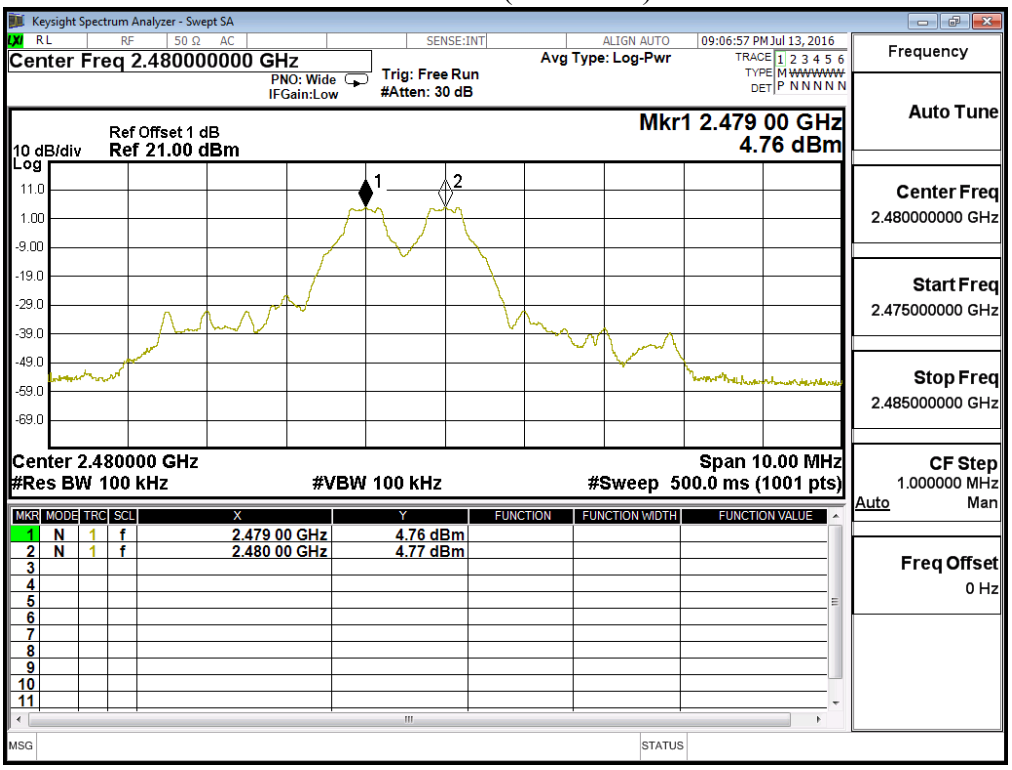
Channel 00 (2402MHz)



Channel 39 (2441MHz)



Channel 78 (2480MHz)

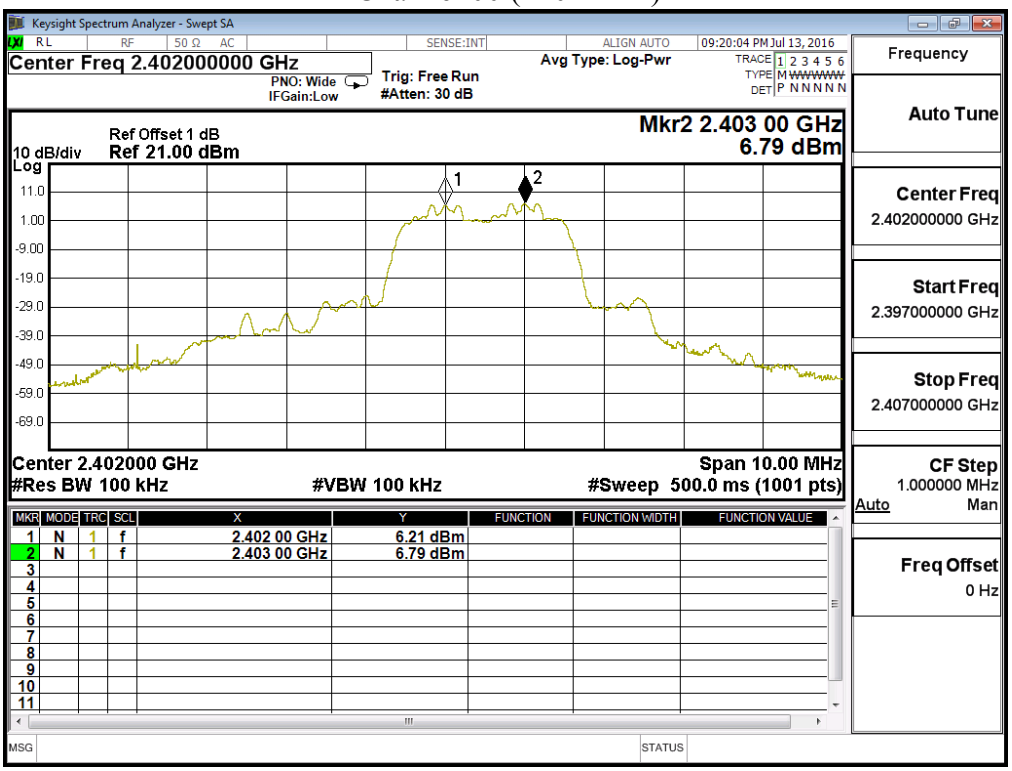


Product : SOUND BAR + WIRELESS SUBWOOFER
Test Item : Channel Separation
Test Site : No.3 OATS
Test Mode : Mode 2: Transmit - 3Mbps (8DPSK)

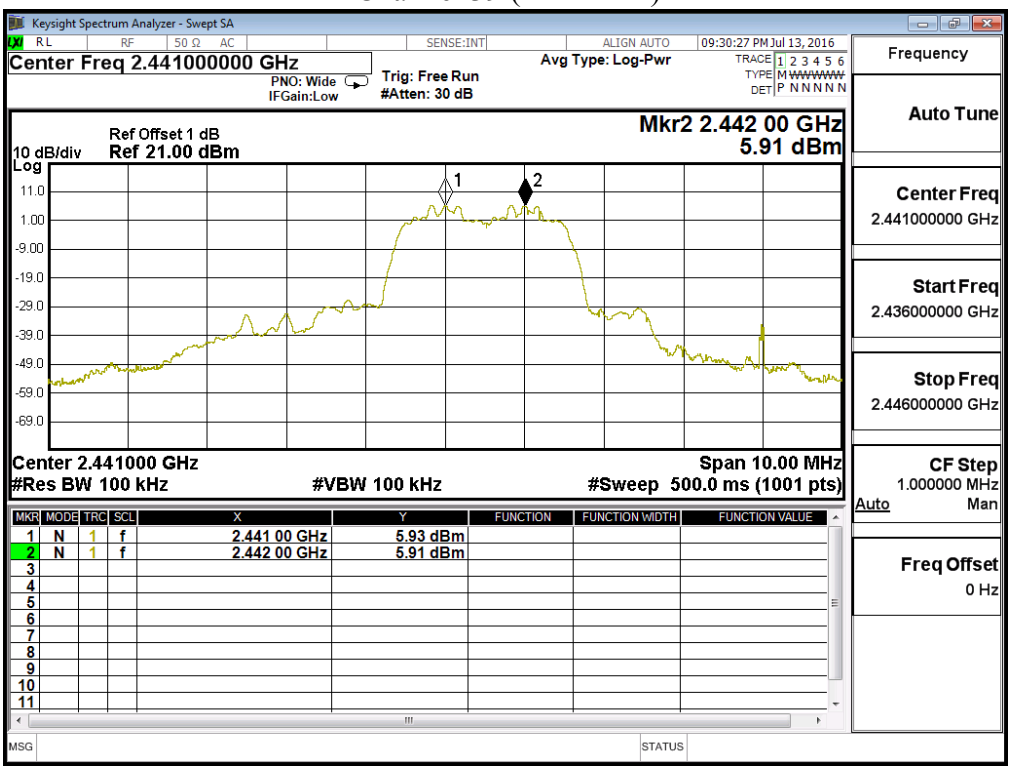
Channel No.	Frequency (MHz)	Measurement Level (kHz)	Limit (kHz)	Limit of (2/3)*20dB Bandwidth (kHz)	Result
00	2402	1000	>25 kHz	846.0	Pass
39	2441	1000	>25 kHz	846.0	Pass
78	2480	1000	>25 kHz	844.0	Pass

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

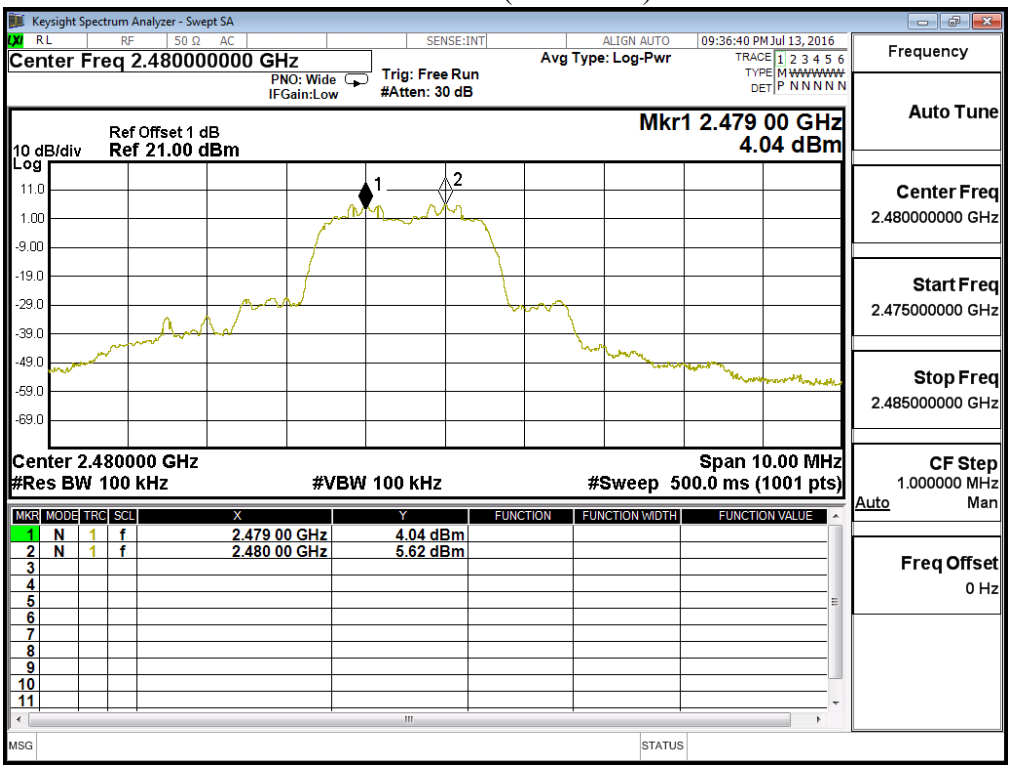
Channel 00 (2402MHz)



Channel 39 (2441MHz)



Channel 78 (2480MHz)



9. Dwell Time

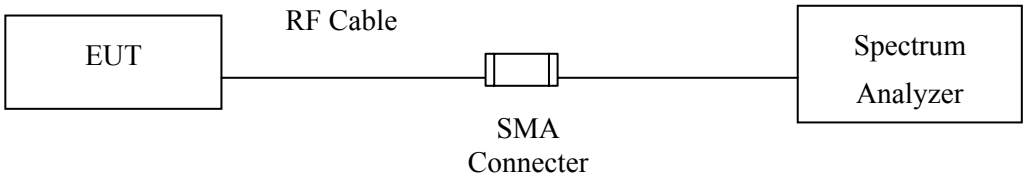
9.1. Test Equipment

	Equipment	Manufacturer	Model No./Serial No.	Last Cal.	Due Cal.
	Spectrum Analyzer	R&S	FSP40 / 100170	Jun., 2016	Jun., 2017
	Spectrum Analyzer	Agilent	E4407B / US39440758	Jun., 2016	Jun., 2017
X	Spectrum Analyzer	Agilent	N9010A / MY48030495	Apr., 2017	Apr., 2018

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 C63.4, 2014; 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

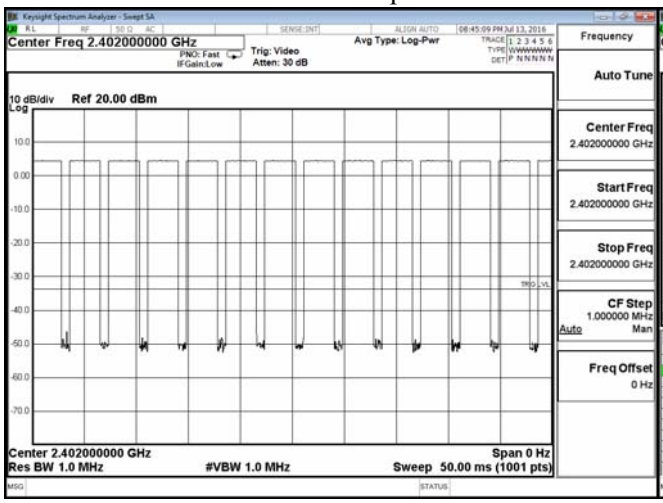
Product : SOUND BAR + WIRELESS SUBWOOFER
Test Item : Dwell Time
Test Site : No.3 OATS
Test Mode : Mode 1: Transmit - 1Mbps (GFSK) (Channel 00,39,78 –DH5)

Frequency (MHz)	Time slot length (ms)	Hopping of Number	Sweep time (ms)	Duty cycle	Dwell Time (Sec)	Limit (Sec)	Result
2402	2.887	13	50	0.75	0.300	0.4	Pass
2441	2.887	13	50	0.75	0.300	0.4	Pass
2480	2.887	13	50	0.75	0.300	0.4	Pass

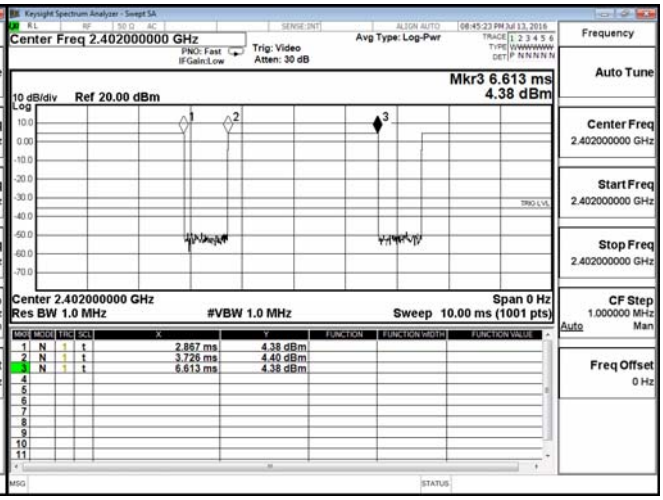
Duty cycle = ((Time slot length(ms)*Hopping of Number) / Sweep time (ms)

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

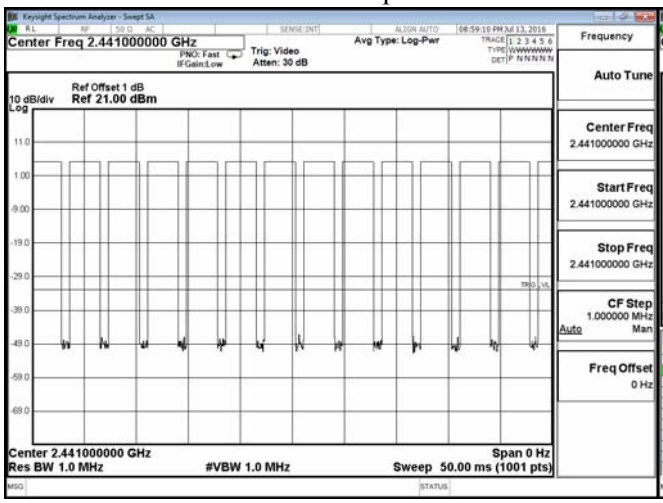
CH 00 Time Interval between hops



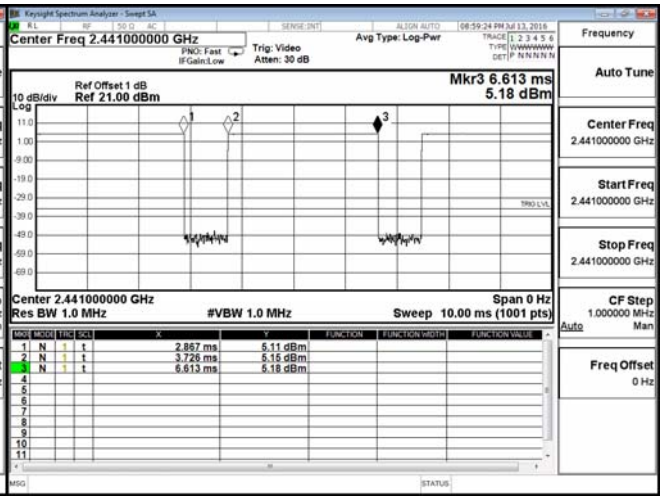
CH 00 Transmission Time



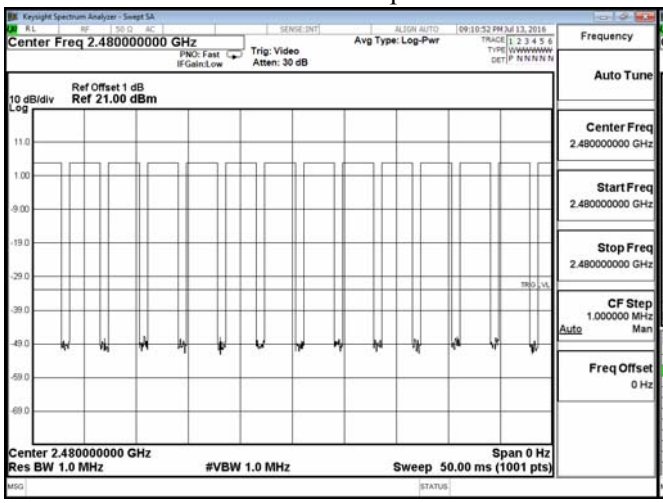
CH39 Time Interval between hops



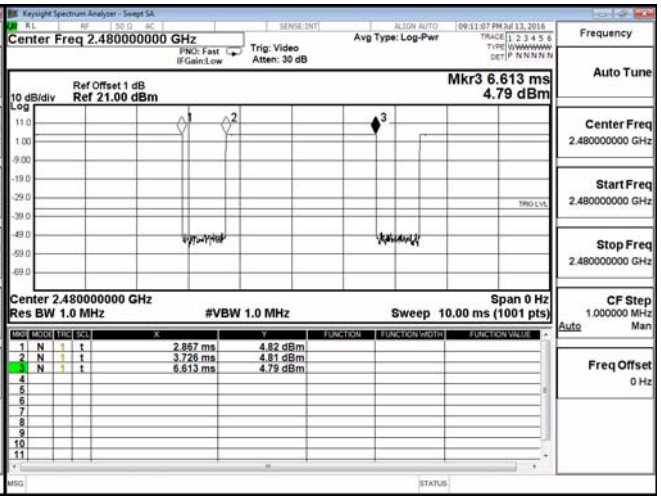
CH 39Transmission Time



CH 78 Time Interval between hops



CH 78 Transmission Time



Note:

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

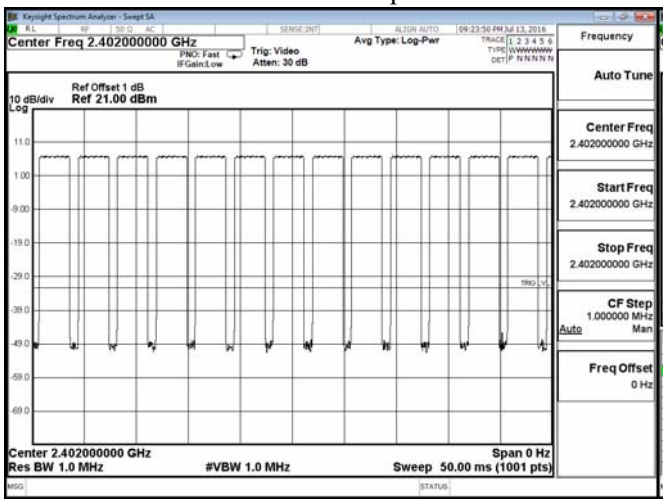
Product : SOUND BAR + WIRELESS SUBWOOFER
Test Item : Dwell Time
Test Site : No.3 OATS
Test Mode : Mode 2: Transmit - 3Mbps (8DPSK) (Channel 00,39,78 –DH5)

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	2.898	13	50	0.75	0.301	0.4	Pass
2480	2.898	13	50	0.75	0.301	0.4	Pass

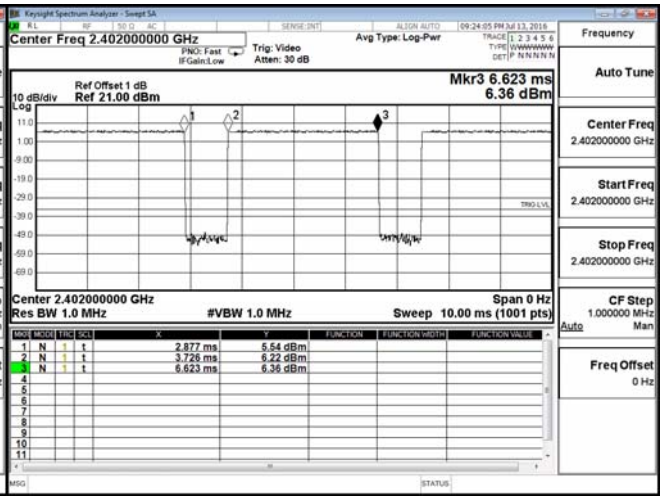
Duty cycle =((Time slot length(ms)*Hopping of Number) / Sweep time (ms)

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

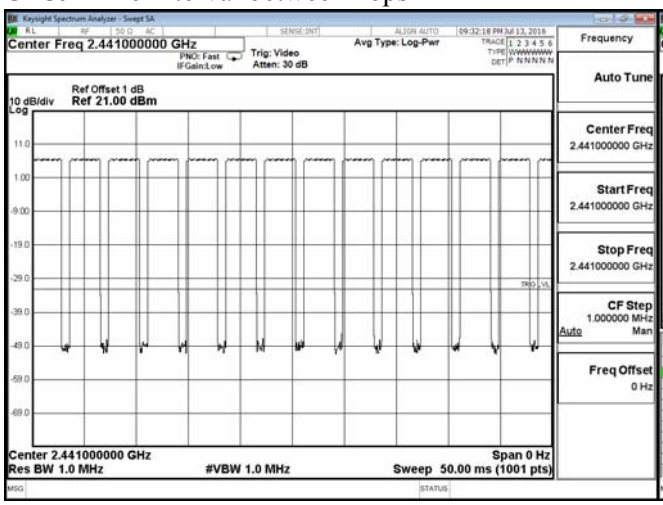
CH 00 Time Interval between hops



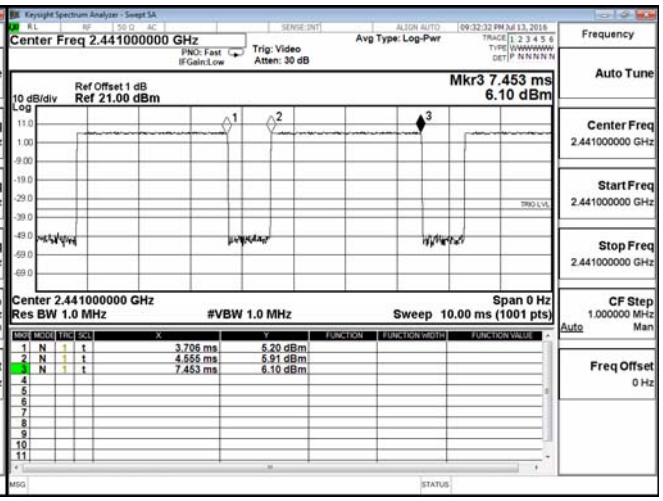
CH 00 Transmission Time



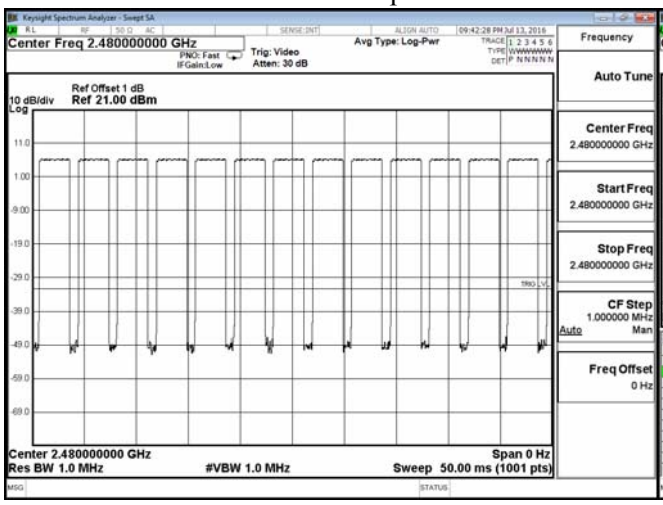
CH39 Time Interval between hops



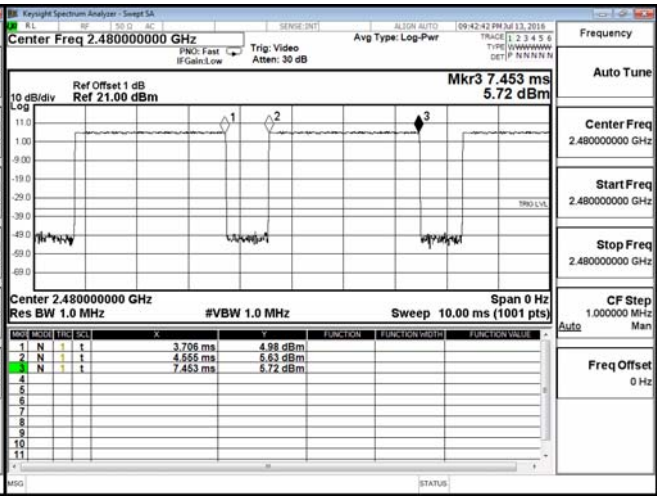
CH 39Transmission Time



CH 78 Time Interval between hops



CH 78 Transmission Time



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

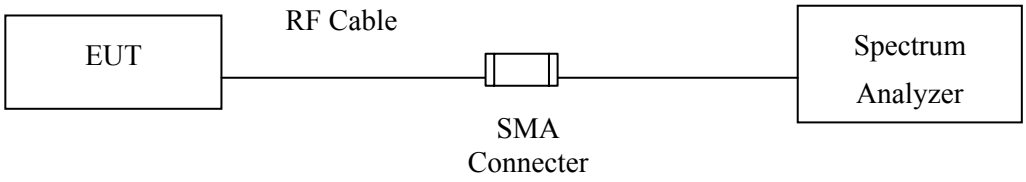
10.1. Test Equipment

	Equipment	Manufacturer	Model No./Serial No.	Last Cal.	Due Cal.
	Spectrum Analyzer	R&S	FSP40 / 100170	Jun., 2016	Jun., 2017
	Spectrum Analyzer	Agilent	E4407B / US39440758	Jun., 2016	Jun., 2017
X	Spectrum Analyzer	Agilent	N9010A / MY48030495	Apr., 2017	Apr., 2018

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

10.5. Uncertainty

± 283Hz

10.6. Test Result of Occupied Bandwidth

Product : SOUND BAR + WIRELESS SUBWOOFER
Test Item : Occupied Bandwidth Data
Test Site : No.3 OATS
Test Mode : Mode 1: Transmit - 1Mbps (GFSK)

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

Figure Channel 00:

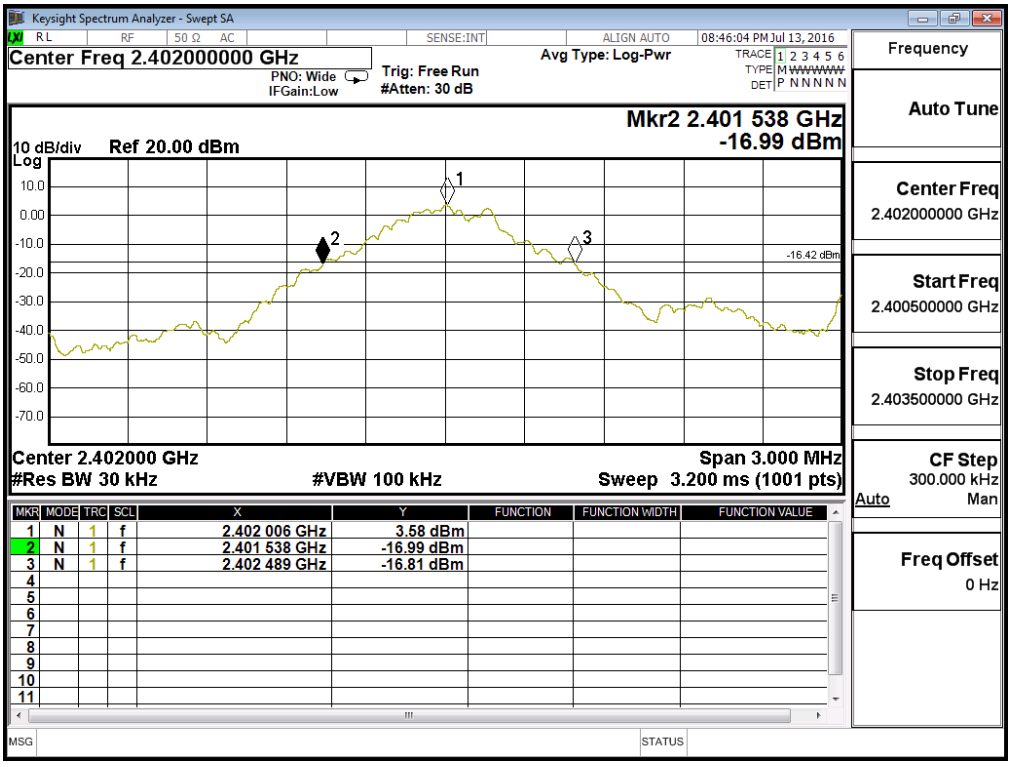


Figure Channel 39:

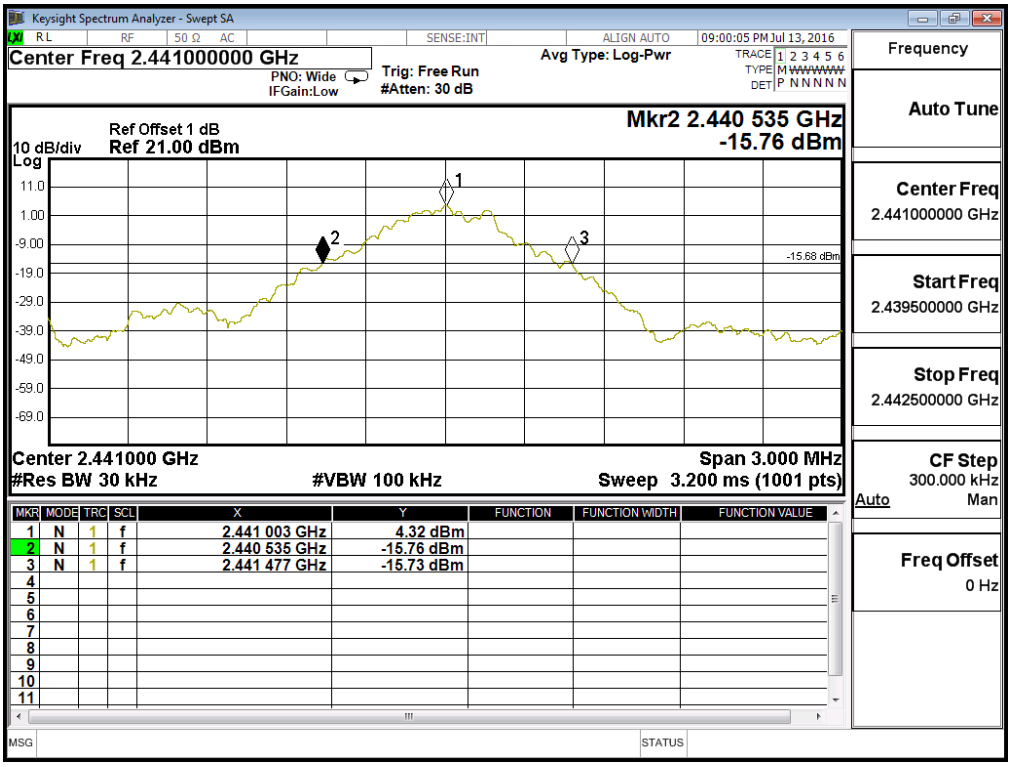
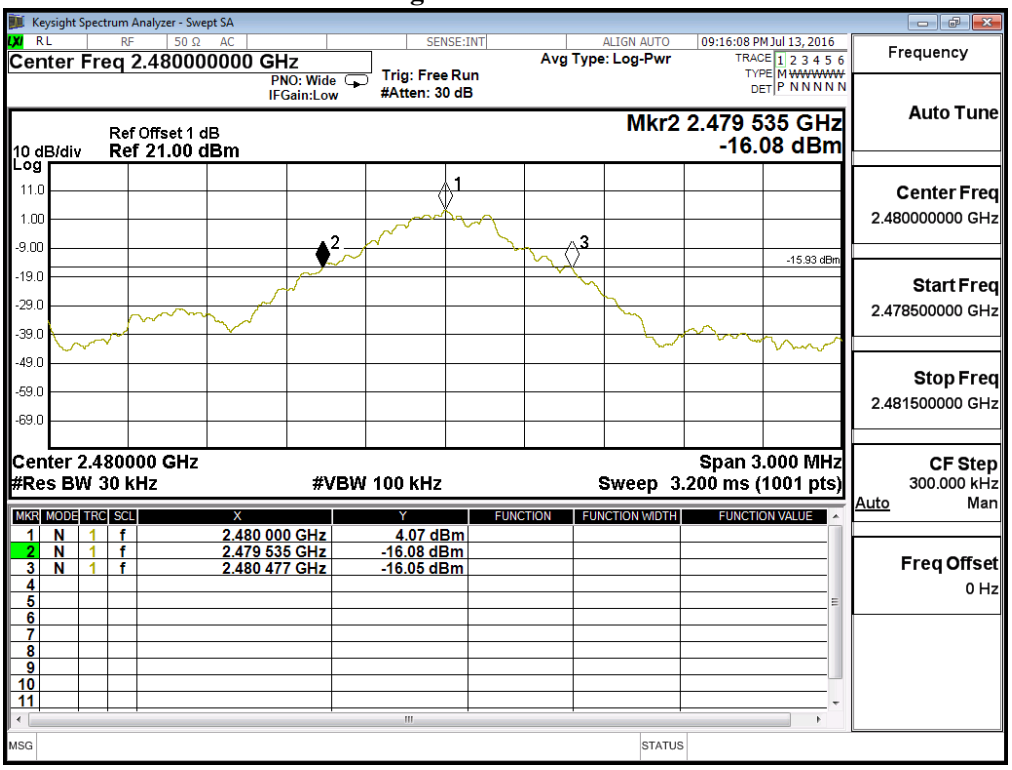


Figure Channel 78:



Product : SOUND BAR + WIRELESS SUBWOOFER
Test Item : Occupied Bandwidth Data
Test Site : No.3 OATS
Test Mode : Mode 2: Transmit - 3Mbps (8DPSK) (2402MHz)

Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
00	2402	1269	--	NA
39	2441	1269	--	NA
78	2480	1266	--	NA

Figure Channel 00:

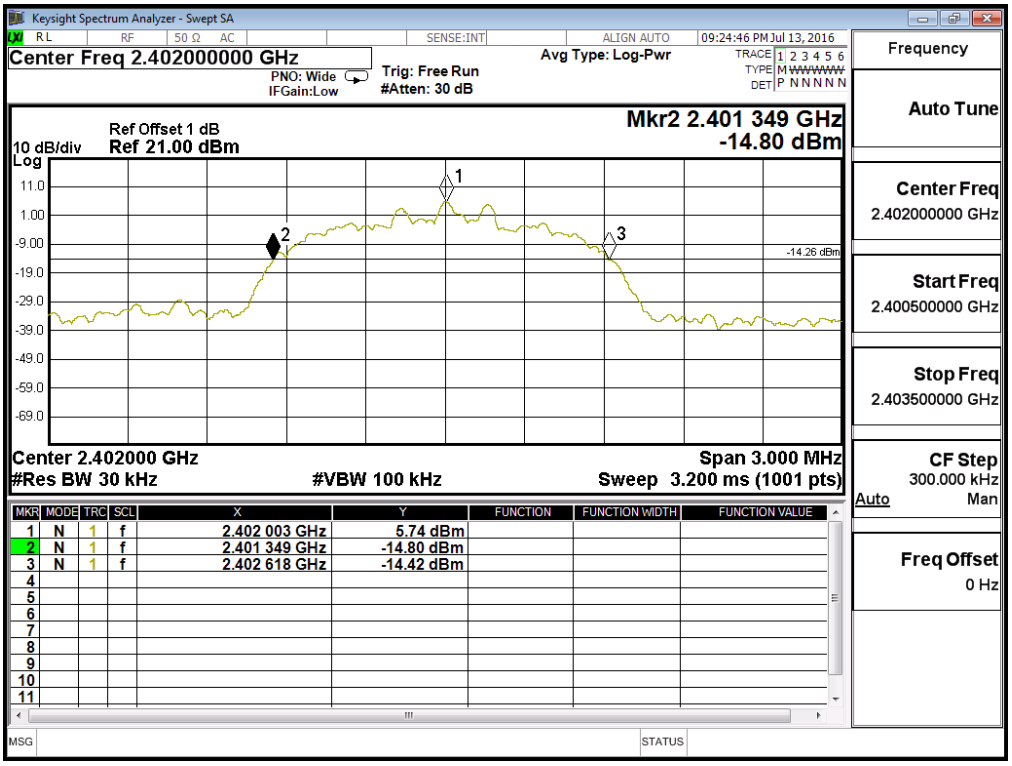


Figure Channel 39:

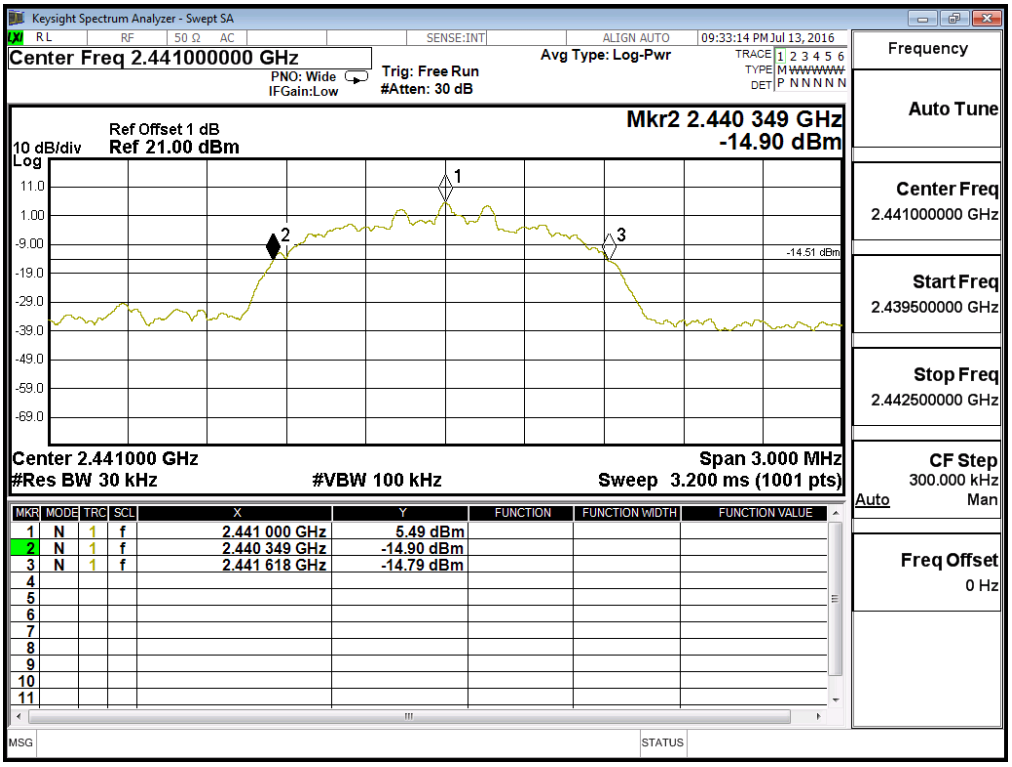
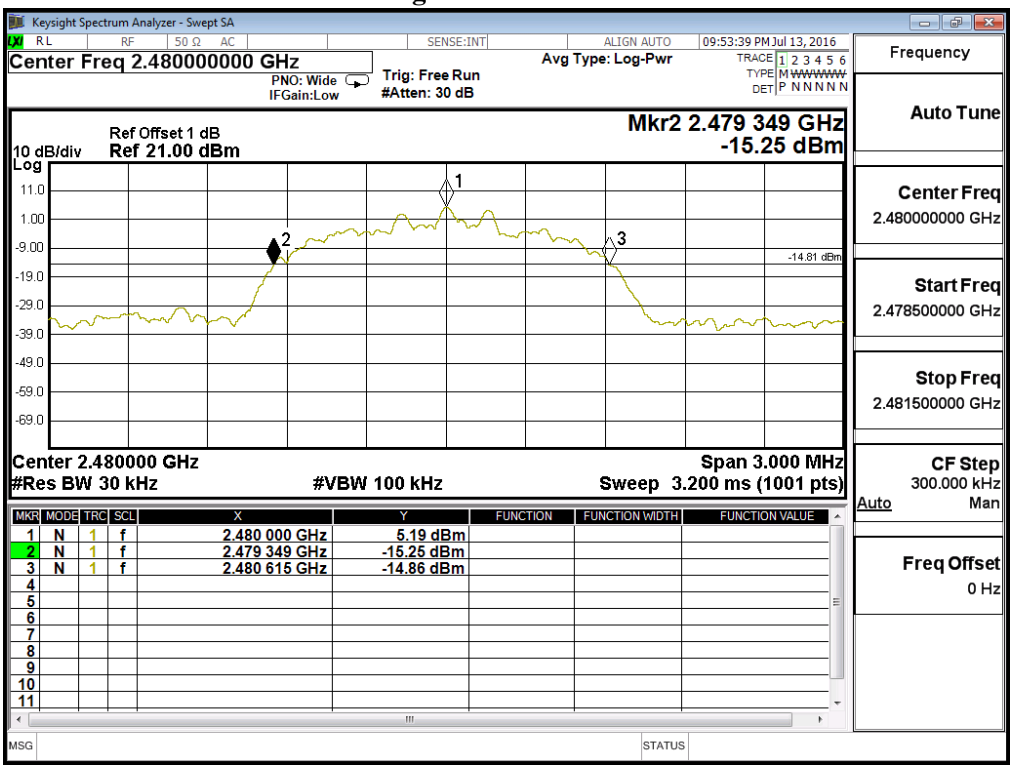


Figure Channel 78:



11. EMI Reduction Method During Compliance Testing

No modification was made during testing.

Attachment 1: EUT Test Photographs

Attachment 2: EUT Detailed Photographs