Test Report

FCC Part15 Subpart C& Industry Canada RSS-247 Issue 1

Product Name	:	Bluetooth headphone (Backbeat PRO 2)
Model No.	:	SPRO16
FCC ID	:	AL8-SPRO16
IC	:	457A-SPRO16

Applicant	:	Plantronics, Inc.
Address	:	345 Encinal Street, Santa Cruz, CA95060 USA

Date of Receipt	:	May. 31, 2016
Test Date	:	May. 31, 2016~ Jul. 29, 2016
Issued Date	:	Jul. 29, 2016
Report No.	:	1652115R -RF-US-P06V01
Report Version	:	V 1.2

Test Report Certification

Issued Date :. Jul. 29, 2016
Report No. : 1652115R-RF-US-P06V01

Product Name	:	Bluetooth headphone (Backbeat PRO 2)
Applicant	:	Plantronics, Inc.
Address	:	345 Encinal Street, Santa Cruz, CA95060 USA
Manufacturer	:	Plantronics, Inc.
Address	:	345 Encinal Street, Santa Cruz, CA95060 USA
Model No.	:	SPRO16
FCC ID	:	AL8-SPRO16
IC	:	457A-SPRO16
EUT Voltage	:	DC 3.7V
Brand Name	:	Plantronics
Applicable Standard	:	FCC CFR Title 47 Part 15 Subpart C: 2015 KDB DA 00-705 Released March 30, 2000 ANSI C63.4: 2014; ANSI C63.10: 2013 Industry Canada RSS-Gen Issue 4/RSS-247 Issue 1
Test Result	:	Complied
Performed Location	:	Quietek Corporation - Suzhou EMC Laboratory No.99 Hongye Rd., Suzhou Industrial Park, Suzhou, 215006, Jiangsu, China TEL: +86-512-6251-5088 / FAX: +86-512-6251-5098 FCC Registration Number: 800392

Documented By : Kathy Feng
(Adm. Specialist: Kathy Feng)

Reviewed By : Jack Zhang
(Senior Engineer: Jack Zhang)

Approved By : Harry Zhao
(Engineering Manager: Harry Zhao)

Laboratory Information

We, **QuieTek Corporation**, are an independent EMC and safety consultancy that was established the whole facility in our laboratories. The test facility has been accredited/accepted(audited or listed) by the following related bodies in compliance with ISO 17025, EN 45001 and specified testing scope:

Taiwan R.O.C.	**:**	**BSMI, NCC, TAF**
USA	**:**	**FCC**
Japan	**:**	**VCCI**
China	**:**	**CNAS**

The related certificate for our laboratories about the test site and management system can be downloaded from QuieTek Corporation's Web Site : http://www.quietek.com/english/about/certificates.aspx?bval=5
The address and introduction of QuieTek Corporation's laboratories can be founded in our Web site : http://www.quietek.com/index_en.aspx
If you have any comments, Please don't hesitate to contact us. Our contact information is as below:

HsinChu Testing Laboratory :
No.75-2, 3rd Lin, Wangye Keng, Yonghxing Tsuen, Qionglin Shiang, Hsinchu County 307, Taiwan, R.O.C.
TEL:+886-3-592-8858 / FAX:+886-3-592-8859 E-Mail : service@quietek.com

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

Suzhou Testing Laboratory :
No.99 Hongye Rd., Suzhou Industrial Park, Suzhou, 215006, Jiangsu, China
TEL : +86-512-6251-5088 / FAX : 86-512-6251-5098 E-Mail : service@quietek.com

TABLE OF CONTENTS

History of This Test Report

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
1652115R-RF-US-P06V01	V1.0	Initial Issued Report	Jun. 22, 2016
1652115R-RF-US-P06V01	V1.1	1, on page 2, Add KDB DA 00-705 2, on page 40,42,44 modify Carrier Frequency Separation limit. 3,On page 7,add Product SW/HW version, Radio SW/HW version, Test SW Version, RF power setting in test SW. 4. Change Dwell time test method	Jul. 28, 2016
1652115R-RF-US-P06V01	V1.2	Add 240V Conducted Emission	Jul. 29, 2016

1. General Information

1.1. EUT Description

Product Name	Bluetooth headphone (Backbeat PRO 2)
Model No.	SPRO16
Product SW/HW version	SW: V07 HW: R5
Radio SW/HW version	N/A
Test SW Version	Blue test 3(V2.6.0)
RF power setting in test SW	N/A
Working Voltage	DC 3.7V
Bluetooth Specification	V3.0
Frequency Range	2402- 2480 MHz
Channel Number	V3.0: 79
Channel Separation	V3.0: 1MHz
Type of Modulation	V3.0: GFSK, Pi/4 DQPSK, 8DPSK
Data Rate	V3.0: 1Mbps(GFSK), 2Mbps(Pi/4 DQPSK), 3Mbps(8DPSK)
Antenna Type	Reference to Antenna List
Peak Antenna Gain	Reference to Antenna List

Bluetooth Working Frequency of Each Channel: (For V3.0)							
Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
00	2402 MHz	01	2403 MHz	02	2404 MHz	03	2405 MHz
04	2406 MHz	05	2407 MHz	06	2408 MHz	07	2409 MHz
08	2410 MHz	09	2411 MHz	10	2412 MHz	11	2413 MHz
12	2414 MHz	13	2415 MHz	14	2416 MHz	15	2417 MHz
16	2418 MHz	17	2419 MHz	18	2420 MHz	19	2421 MHz
20	2422 MHz	21	2423 MHz	22	2424 MHz	23	2425 MHz
24	2426 MHz	25	2427 MHz	26	2428 MHz	27	2429 MHz
28	2430 MHz	29	2431 MHz	30	2432 MHz	31	2433 MHz
32	2434 MHz	33	2435 MHz	34	2436 MHz	35	2437 MHz
36	2438 MHz	37	2439 MHz	38	2440 MHz	39	2441 MHz
40	2442 MHz	41	2443 MHz	42	2444 MHz	43	2445 MHz
44	2446 MHz	45	2447 MHz	46	2448 MHz	47	2449 MHz
48	2450 MHz	49	2451 MHz	50	2452 MHz	51	2453 MHz
52	2454 MHz	53	2455 MHz	54	2456 MHz	55	2457 MHz
56	2458 MHz	57	2459 MHz	58	2460 MHz	59	2461 MHz
60	2462 MHz	61	2463 MHz	62	2464 MHz	63	2465 MHz
64	2466 MHz	65	2467 MHz	66	2468 MHz	67	2469 MHz
68	2470 MHz	69	2471 MHz	70	2472 MHz	71	2473 MHz
72	2474 MHz	73	2475 MHz	74	2476 MHz	75	2477 MHz
76	2478 MHz	77	2479 MHz	78	2480 MHz	N/A	N/A

Bluetooth Antenna List

Antenna	Manufacturer	Model No.	Peak Gain
PCB Antenna	Goertek	N/A	3.11dBi for 2.4GHz

1.2 Mode of Operation

QuieTek has verified the construction and function in typical operation. All the test modes were carried out with the EUT in normal operation, which was shown in this test report and defined as:

Test Mode
Mode 1:Transmitter-1Mbps(GFSK_DH5)
Mode 2: Transmitter-2Mbps(Pi/4 DQPSK_DH5)
Mode 3: Transmitter-3Mbps(8DPSK_DH5)

Note:

1. For portable device, radiated spurious emission was verified over X, Y, Z Axis, and shown the worst case on this report.
2. Regards to the frequency band operation for systems using FHSS modulation: normal operation (hopping) was selected to test for conducted, and the lowest, highest frequency channel for radiation spurious test.
3. The extreme test condition for voltage and temperature were declared by the manufacturer.
4. The reading values of all the test items contain cable loss.

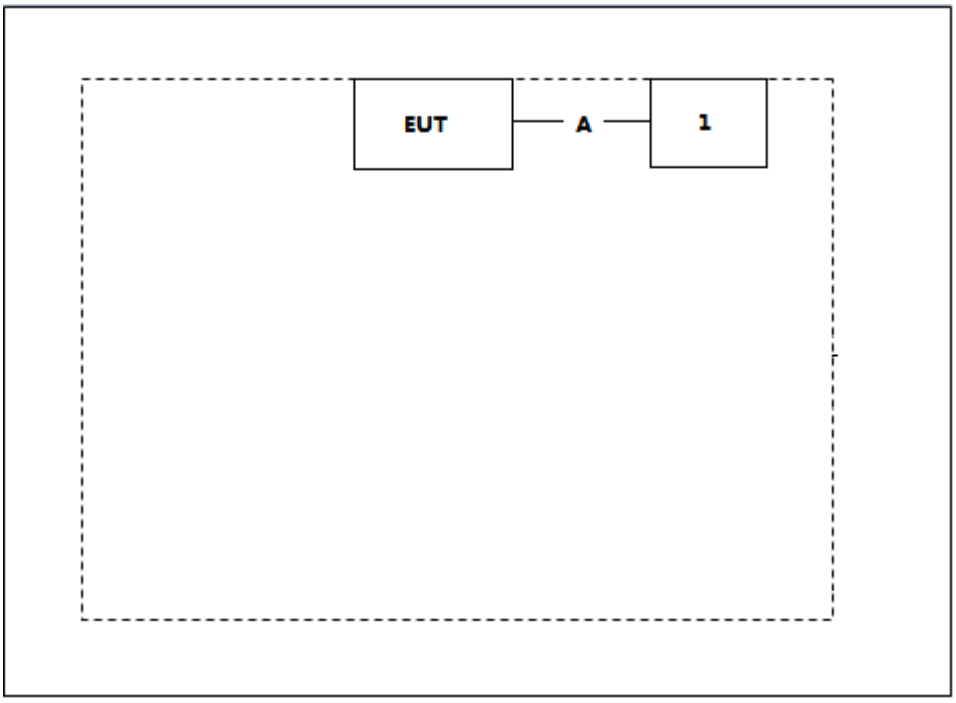
1.3 Tested System Details

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

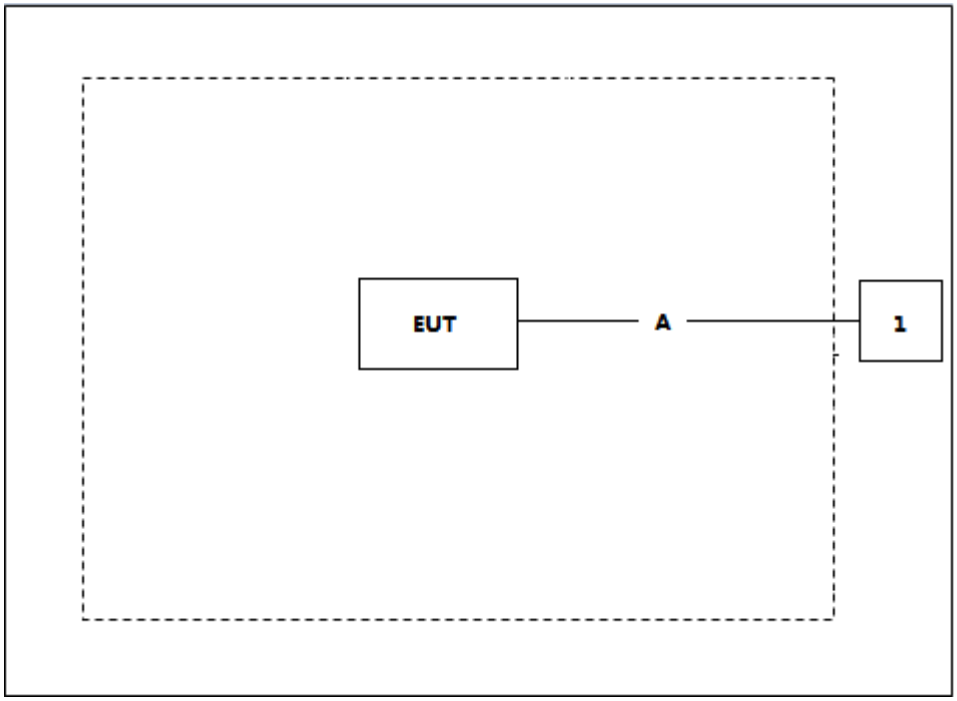
	Product	Manufacturer	Model No.	Serial No.	Power Cord
1	Notebook	Think Pad	2526	LV-A3285	Power by adapter

1.4 Configuration of Tested System

Connection Diagram(Conducted Emission)



Connection Diagram(Radiated Emission)



Signal Cable Type		Signal cable Description
A	USB Control Cable	Shielded, 70cm

1.5 EUT Exercise Software

1	Setup the EUT and simulators as shown on above.
2	Turn on the power of all equipment.
3	Run the RF test software, and set the test mode and channel, then press OK to start continue Transmit.

2. Technical Test

2.1. Summary of Test Result

☒ No deviations from the test standards

☐ Deviations from the test standards as below description:

For FCC

Performed Test Item	Normative References	Test Performed	Deviation
Conducted Emission	FCC CFR Title 47 Part 15 Subpart C: 2015 Section 15.207	Yes	No
Emissions in restricted frequency bands	FCC CFR Title 47 Part 15 Subpart C: 2015 Section 15.209	Yes	No
20dB Bandwidth	FCC CFR Title 47 Part 15 Subpart C: 2015 Section 15.247(a)(1)	Yes	No
Carrier Frequency Separation	FCC CFR Title 47 Part 15 Subpart C: 2015 Section 15.247(a)(1)	Yes	No
Number of Hopping Frequencies	FCC CFR Title 47 Part 15 Subpart C: 2015 Section 15.247(a)(1)(iii)	Yes	No
Time of Occupancy (Dwell Time)	FCC CFR Title 47 Part 15 Subpart C: 2015 Section 15.247(a)(1)(iii)	Yes	No
Peak Output Power	FCC CFR Title 47 Part 15 Subpart C: 2015 Section 15.247(b)(1)	Yes	No
Emissions in non-restricted frequency bands	FCC CFR Title 47 Part 15 Subpart C: 2015 Section 15.215(c), 15.247(d)	Yes	No
Radiated Emission Band Edge	FCC CFR Title 47 Part 15 Subpart C: 2015 15.247(d)	Yes	No

For IC

Performed Test Item	Normative References	Test Performed	Deviation
Conducted Emission	RSS-Gen Issue 4 Section 8.8	Yes	No
Radiated Emission	RSS-Gen Issue 4 Section 8.9	Yes	No
20dB Bandwidth	RSS-247 Issue 1 Section 5.1	Yes	No
Carrier Frequency Separation	RSS-247 Issue 1 Section 5.1	Yes	No
Number of Hopping Frequencies	RSS-247 Issue 1 Section 5.1	Yes	No
Time of Occupancy (Dwell Time)	RSS-247 Issue 1 Section 5.1	Yes	No
Peak Output Power	RSS-247 Issue 1 Section 5.4	Yes	No
Emissions in non-restricted frequency bands	RSS-247 Issue 1 Section 5.5	Yes	No
Radiated Emission Band Edge	RSS-Gen Issue 4 Section 8.10	Yes	No

2.2. Test Environment

Items	Required (IEC 68-1)	Actual
Temperature (°C)	15-35	21
Humidity (%RH)	25-75	50
Barometric pressure (mbar)	860-1060	950-1000

3. Conducted Emission

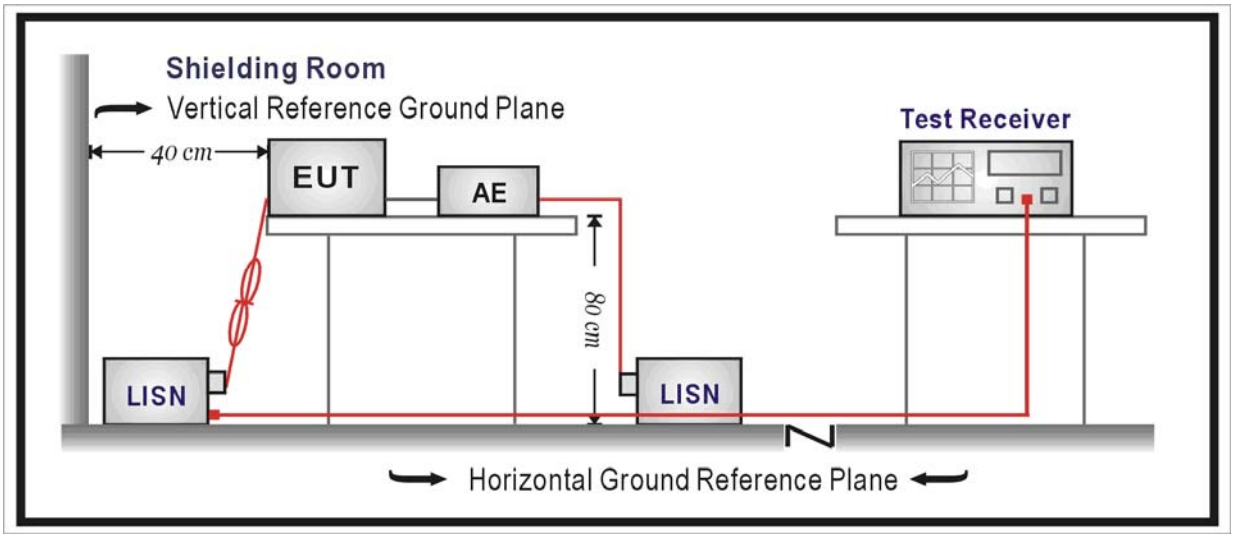
3.1. Test Equipment

Conducted Emission / TR-1

Instrument	Manufacturer	Type No.	Serial No.	Cal. Due Date
EMI Test Receiver	R&S	ESCI	100726	2017.03.05
Two-Line V-Network	R&S	ENV216	100043	2017.03.05
Two-Line V-Network	R&S	ENV216	100044	2016.09.16
50ohm Coaxial Switch	Anritsu	MP59B	6200464462	2017.03.01
50ohm Termination	SHX	TF2	07081401	2016.09.16
Temperature/Humidity Meter	zhicheng	ZC1-2	TR1-TH	2017.01.04

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

3.2. Test Setup



3.3. Limit

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

Note 1: The lower limit shall apply at the transition frequencies.

Note 2: The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.5 MHz.

3.4. Test Procedure

According to FCC ANSI C63.4: 2014 & ANSI C63.10: 2013.

The EUT was placed on a platform of nominal size, 1 m by 1.5 m, raised 80 cm above the conducting ground plane. The vertical conducting plane was located 40 cm to the rear of the EUT. All other surfaces of EUT were at least 80 cm from any other grounded conducting surface. The EUT and simulators are connected to the main power through a line impedance stabilization network (LISN). The LISN provides a 50 ohm /50uH coupling impedance for the measuring equipment. The peripheral devices are also connected to the main power through a LISN. (Please refer to the block diagram of the test setup and photographs)

Each current-carrying conductor of the EUT power cord, except the ground (safety) conductor, was individually connected through a LISN to the input power source.

The excess length of the power cord between the EUT and the LISN receptacle were folded back and forth at the center of the lead to form a bundle not exceeding 40 cm in length.

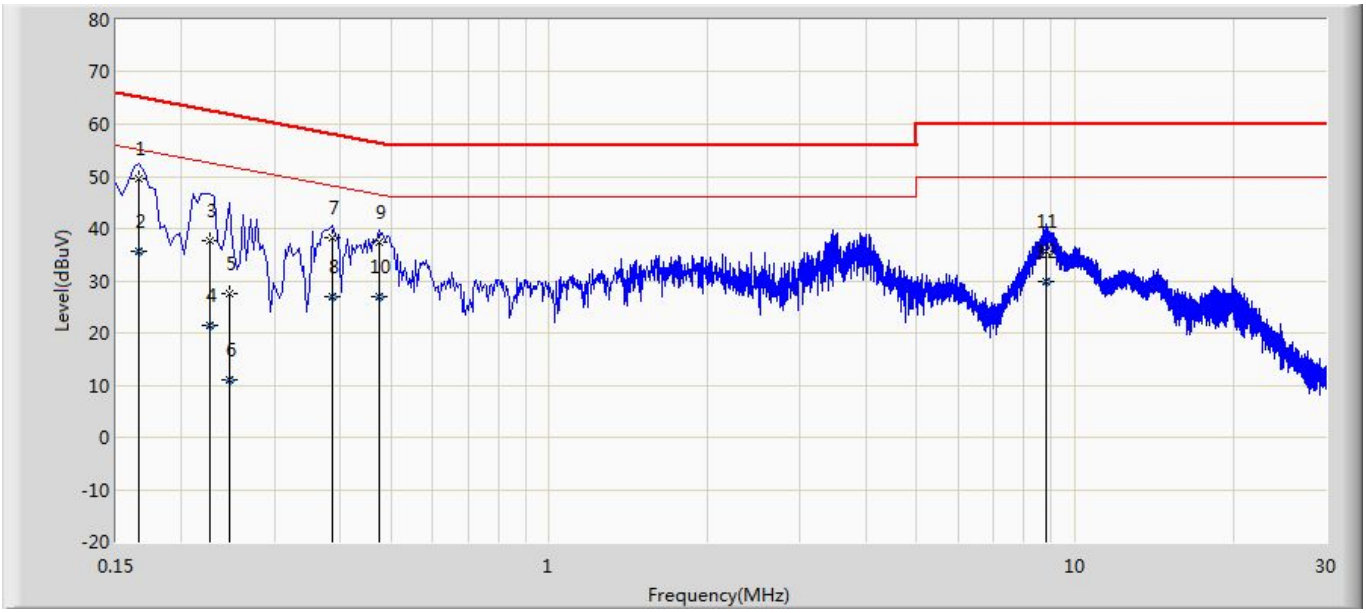
Conducted emissions were investigated over the frequency range from 0.15MHz to 30MHz using a receiver bandwidth of 9kHz.

3.5. Uncertainty

The measurement uncertainty is defined as ± 2.02 dB

3.6. Test Result

Site: TR1	Time: 2016/06/15
Limit: FCC_Part15.107_CE_AC Power_ClassB	Margin: 0
Probe: ENV216-L1	Polarity: Line
EUT: Bluetooth headphone(Backbeat PRO 2)	Power: AC 120V/60Hz
Note: Mode 2	

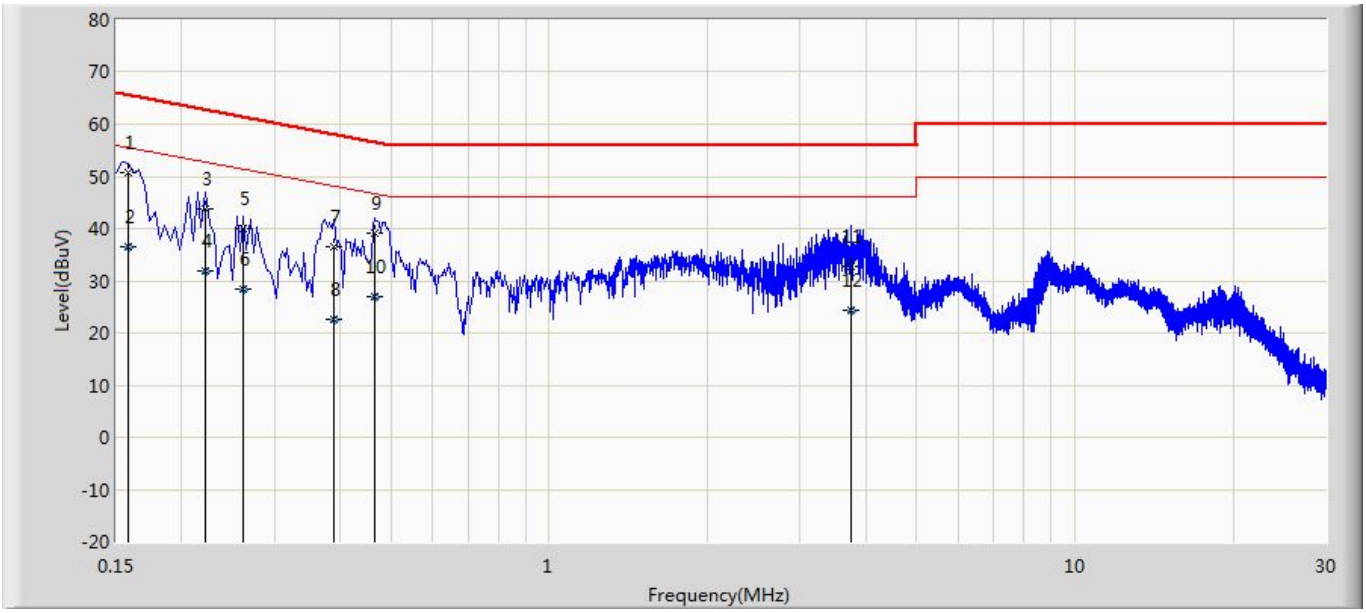


No	Mark	Frequency (MHz)	Measure Level (dBuV)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV)	Probe (dB)	Cable (dB)	Amp (dB)	Type
1	*	0.166	49.454	39.729	-15.704	65.158	9.665	0.060	0.000	QP
2		0.166	35.574	25.849	-19.584	55.158	9.665	0.060	0.000	AV
3		0.226	37.602	27.892	-24.993	62.595	9.650	0.060	0.000	QP
4		0.226	21.442	11.732	-31.153	52.595	9.650	0.060	0.000	AV
5		0.246	27.420	17.710	-34.471	61.891	9.650	0.060	0.000	QP
6		0.246	11.086	1.376	-40.805	51.891	9.650	0.060	0.000	AV
7		0.386	38.272	28.572	-19.877	58.149	9.640	0.060	0.000	QP
8		0.386	26.874	17.174	-21.275	48.149	9.640	0.060	0.000	AV
9		0.474	37.376	27.676	-19.068	56.444	9.630	0.070	0.000	QP
10		0.474	26.974	17.274	-19.470	46.444	9.630	0.070	0.000	AV
11		8.810	35.641	25.681	-24.359	60.000	9.720	0.240	0.000	QP
12		8.810	29.986	20.026	-20.014	50.000	9.720	0.240	0.000	AV

Note:

1. " * ", means this data is the worst emission level.
2. Measurement Level = Reading Level + Factor(Probe+Cable-Amp).

Site: TR1	Time: 2016/06/15
Limit: FCC_Part15.107_CE_AC Power_ClassB	Margin: 0
Probe: ENV216-N	Polarity: Neutral
EUT: Bluetooth headphone(Backbeat PRO 2)	Power: AC 120V/60Hz
Note: Mode 2	



No	Mark	Frequency (MHz)	Measure Level (dBuV)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV)	Probe (dB)	Cable (dB)	Amp (dB)	Type
1	*	0.158	50.698	40.967	-14.870	65.568	9.671	0.060	0.000	QP
2		0.158	36.508	26.777	-19.060	55.568	9.671	0.060	0.000	AV
3		0.222	43.799	34.079	-18.945	62.744	9.660	0.060	0.000	QP
4		0.222	31.802	22.082	-20.942	52.744	9.660	0.060	0.000	AV
5		0.262	40.142	30.426	-21.226	61.368	9.656	0.060	0.000	QP
6		0.262	28.396	18.680	-22.972	51.368	9.656	0.060	0.000	AV
7		0.390	36.459	26.759	-21.605	58.064	9.640	0.060	0.000	QP
8		0.390	22.501	12.801	-25.563	48.064	9.640	0.060	0.000	AV
9		0.466	39.159	29.459	-17.426	56.585	9.630	0.070	0.000	QP
10		0.466	27.022	17.322	-19.563	46.585	9.630	0.070	0.000	AV
11		3.738	32.629	22.837	-23.371	56.000	9.660	0.132	0.000	QP
12		3.738	24.330	14.538	-21.670	46.000	9.660	0.132	0.000	AV

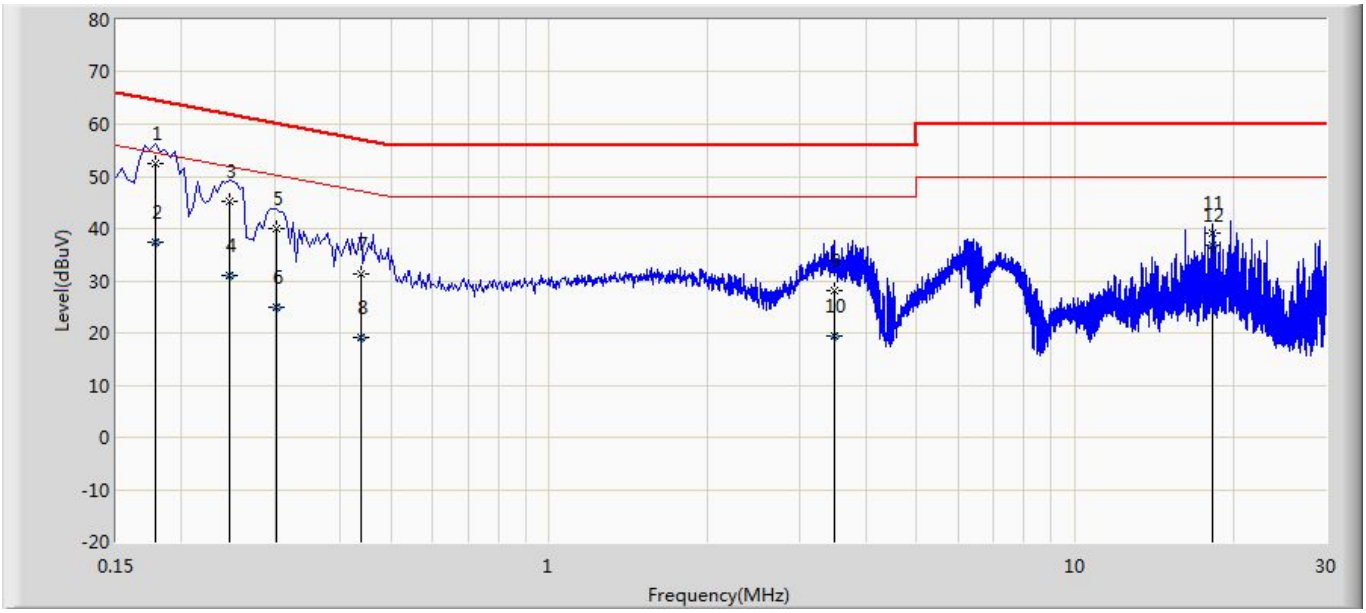
Note:

1. " * ", means this data is the worst emission level.

2. Measurement Level = Reading Level + Factor(Probe+Cable-Amp).

Note: All the low ,middle and high channels of all different modes are investigated, and only report the worst case.

Site: TR1	Time: 2016/06/29
Limit: FCC_Part15.107_CE_AC Power_ClassB	Margin: 0
Probe: ENV216-L1	Polarity: Line
EUT: Bluetooth headphone(Backbeat PRO 2)	Power: AC 240V/60Hz
Note: Mode 2	



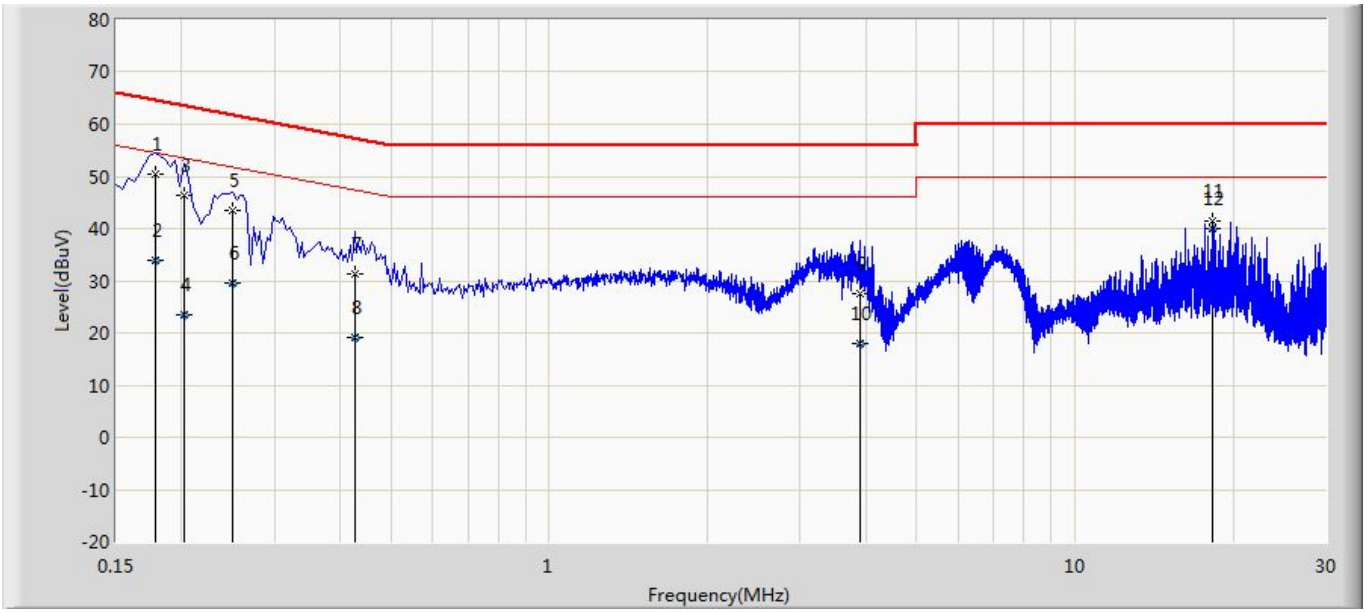
No	Mark	Frequency (MHz)	Measure Level (dBuV)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV)	Probe (dB)	Cable (dB)	Amp (dB)	Type
1	*	0.178	52.537	42.813	-12.041	64.578	9.664	0.060	0.000	QP
2		0.178	37.412	27.688	-17.166	54.578	9.664	0.060	0.000	AV
3		0.246	45.247	35.527	-16.644	61.891	9.660	0.060	0.000	QP
4		0.246	30.988	21.268	-20.903	51.891	9.660	0.060	0.000	AV
5		0.302	39.894	30.184	-20.294	60.188	9.650	0.060	0.000	QP
6		0.302	24.979	15.269	-25.209	50.188	9.650	0.060	0.000	AV
7		0.438	31.393	21.686	-25.707	57.100	9.637	0.070	0.000	QP
8		0.438	19.172	9.465	-27.928	47.100	9.637	0.070	0.000	AV
9		3.490	28.139	18.358	-27.861	56.000	9.651	0.130	0.000	QP
10		3.490	19.350	9.569	-26.650	46.000	9.651	0.130	0.000	AV
11		18.246	39.229	28.949	-20.771	60.000	9.840	0.440	0.000	QP
12		18.246	36.912	26.632	-13.088	50.000	9.840	0.440	0.000	AV

Note:

1. " * ", means this data is the worst emission level.

2. Measurement Level = Reading Level + Factor(Probe+Cable-Amp).

Site: TR1	Time: 2016/06/29
Limit: FCC_Part15.107_CE_AC Power_ClassB	Margin: 0
Probe: ENV216-N	Polarity: Neutral
EUT: Bluetooth headphone(Backbeat PRO 2)	Power: AC 240V/60Hz
Note: Mode 2	



No	Mark	Frequency (MHz)	Measure Level (dBuV)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV)	Probe (dB)	Cable (dB)	Amp (dB)	Type
1		0.178	50.403	40.686	-14.175	64.578	9.657	0.060	0.000	QP
2		0.178	34.025	24.308	-20.553	54.578	9.657	0.060	0.000	AV
3		0.202	46.312	36.602	-17.216	63.528	9.650	0.060	0.000	QP
4		0.202	23.348	13.638	-30.180	53.528	9.650	0.060	0.000	AV
5		0.250	43.442	33.732	-18.315	61.757	9.650	0.060	0.000	QP
6		0.250	29.495	19.785	-22.262	51.757	9.650	0.060	0.000	AV
7		0.426	31.309	21.608	-26.021	57.330	9.631	0.070	0.000	QP
8		0.426	19.261	9.560	-28.069	47.330	9.631	0.070	0.000	AV
9		3.902	27.459	17.659	-28.541	56.000	9.660	0.140	0.000	QP
10		3.902	17.987	8.187	-28.013	46.000	9.660	0.140	0.000	AV
11		18.242	41.537	31.307	-18.463	60.000	9.790	0.440	0.000	QP
12	*	18.242	39.932	29.702	-10.068	50.000	9.790	0.440	0.000	AV

Note:

1. " * ", means this data is the worst emission level.

2. Measurement Level = Reading Level + Factor(Probe+Cable-Amp).

Note: All the low ,middle and high channels of all different modes are investigated, and only report the worst case

4. Emissions in restricted frequency bands

4.1. Test Equipment

Emissions in restricted frequency bands / AC-2

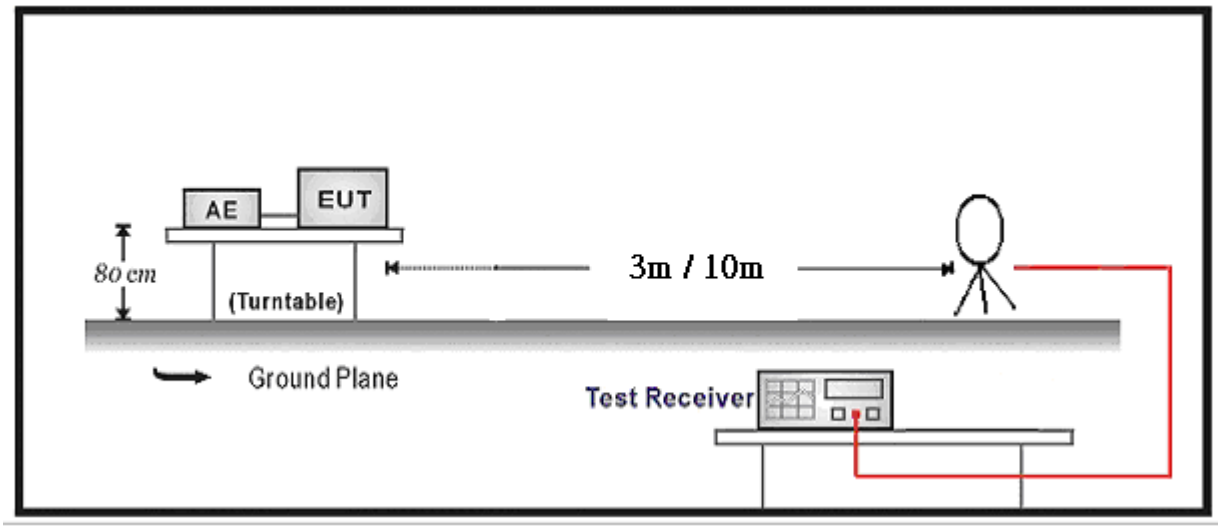
Instrument	Manufacturer	Type No.	Serial No.	Cal. Due Date
EMI Test Receiver	R&S	ESCI	100573	2017.03.05
Loop Antenna	R&S	HFH2-Z2	833799/003	2016.11.25
Bilog Antenna	Teseq GmbH	CBL6112D	27611	2016.10.10
Coaxial Cable	Huber+Suhner	SUCOFLEX 106	AC2-C	2017.02.28
Temperature/Humidity Meter	Zhicheng	ZC1-2	AC2-TH	2017.01.04

Emissions in restricted frequency bands / AC-5

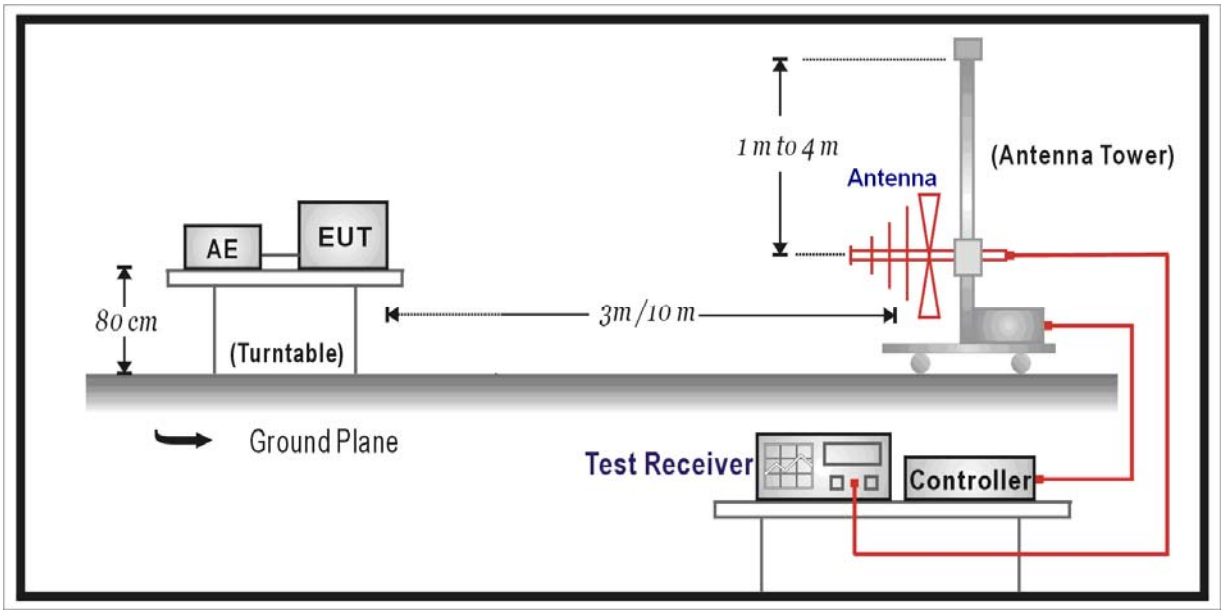
Instrument	Manufacturer	Type No.	Serial No.	Cal. Due Date
Spectrum Analyzer	Agilent	N9010A	MY48030494	2017.02.04
Preamplifier	Miteq	NSP1800-25	1364185	2017.05.03
Preamplifier	QuieTek	AP-040G	CHM-0906001	2017.05.03
Bilog Antenna	Teseq GmbH	CBL6112D	27612	2016.10.15
Broad-Band Horn Antenna	Schwarzbeck	BBHA9120D	499	2017.03.06
Broad-Band Horn Antenna	Schwarzbeck	BBHA9170	294	2016.09.18
Coaxial Cable	Huber+Suhner	SUCOFLEX 106	AC5-C1	2017.02.28
Coaxial Cable	Huber+Suhner	SUCOFLEX 106	AC5-C2	2017.02.28
Coaxial Cable	Huber+Suhner	SUCOFLEX 102	AC5-C3	2017.02.28
Temperature/Humidity Meter	Zhicheng	ZC1-2	AC5-TH	2017.01.04

4.2. Test Setup

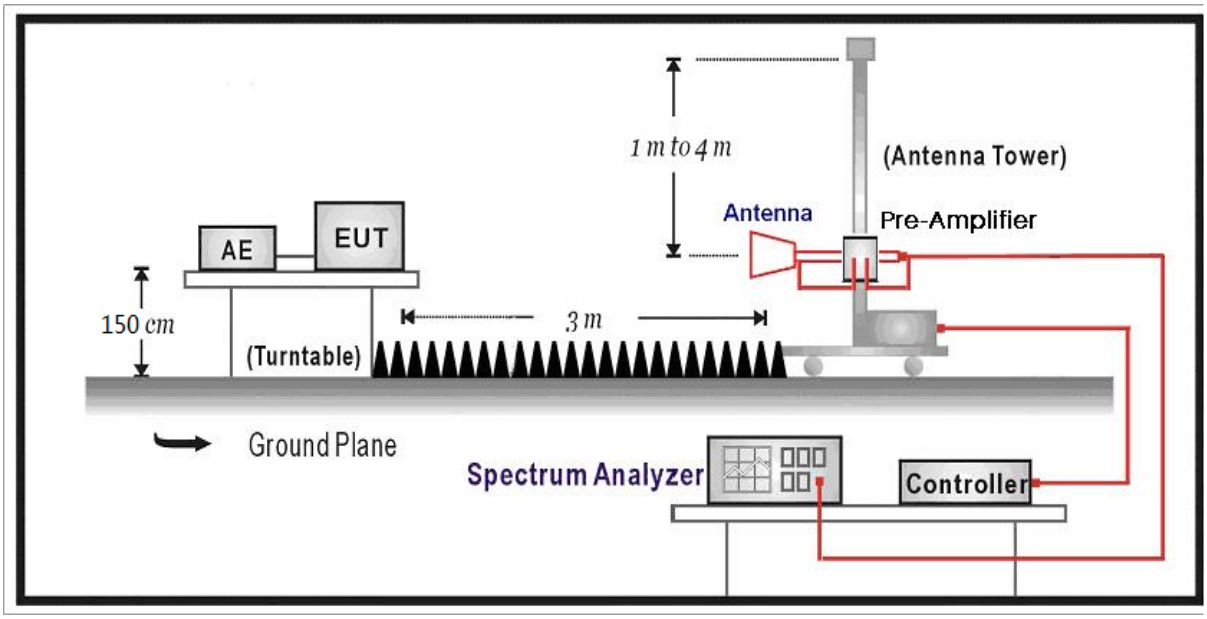
Below 30MHz Test Setup:



Below 1GHz Test Setup:



Above 1GHz Test Setup:



4.3. Limit

FCC Part 15 Subpart C Paragraph 15.209		
Frequency (MHz)	Distance (m)	Level (dBuV/m)
30 - 88	3	40
88 - 216	3	43.5
216 - 960	3	46
Above 960	3	54

Note 1: The lower limit shall apply at the transition frequency.

Note 2: Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system.

Note 3: E field strength (dBuV/m) = 20 log E field strength (uV/m)

4.4. Test Procedure

According to ANSI C63.4: 2014; ANSI C63.10: 2013.

The EUT is placed on a turn table which is 1.5 meter for above 1G and 0.8 meter for below 1G above ground. The turn table is rotated 360 degrees to determine the position of the maximum emission level. The EUT was positioned such that the distance from antenna to the EUT was 3 meters.

The antenna is scanned from 1 meter to 4 meters to find out the maximum emission level. This is repeated for both horizontal and vertical polarization of the antenna. In order to find the maximum emission, all of the interface cables were manipulated according to ANSI C63.4: 2014 on radiated measurement.
The resolution bandwidth below 1GHz setting on the field strength meter is 120 kHz and above 1GHz is 1MHz.
The frequency range from 30MHz to 10th harmonic is checked.
Note: When doing emission measurement above 1GHz, the horn antenna will be bended down a little (as horn antenna has the narrow beamwidth) in order to keeping the antenna in the “cone of radiation” of EUT. The 3dB beamwidth is 60~10 degrees for H-plane and 90~10 degrees for E-plane.

According to ANSI C63.10: 2013& ANSI C63.4: 2014

This test is required for any spurious emission or modulation product that falls in a Restricted Band, as defined in Section 15.205 of FCC part 15. It must be performed with the highest gain of each type of antenna proposed for use with the EUT. Use the following spectrum analyzer settings:
Span = wide enough to fully capture the emission being measured
RBW = 1 MHz for f ≧ 1 GHz, 100 kHz for f < 1GHz
VBW ≧ RBW
Sweep = auto
Detector function = peak
Trace = max hold
Follow the guidelines in ANSI C63.4 with respect to maximizing the emission by rotating the EUT, measuring the emission while the EUT is situated in three orthogonal planes (if appropriate), adjusting the measurement antenna height and polarization, etc. A pre-amp and a high pass filter are required for this test, in order to provide the measuring system with sufficient sensitivity. Allow the trace to stabilize. The peak reading of the emission, after being corrected by the antenna factor, cable loss, pre-amp gain, etc., is the peak field strength, which must comply with the limit specified in Section 15.35(b) of FCC part 15.
Now set the VBW to 10 Hz, while maintaining all of the other instrument settings. This peak level, once corrected, must comply with the limit specified in Section 15.209 of FCC Part 15. If the dwell time per channel of the hopping signal is less than 100 ms, then the reading obtained with the 10 Hz VBW may be further adjusted by a “duty cycle correction factor”, derived from 20log (dwell time/100 ms), in an effort to demonstrate compliance with the 15.209 limit of FCC part 15.
If the emission on which a radiated measurement must be made is located at the edge of the authorized band of operation, then the alternative “marker-delta” method may be employed.

4.5. Uncertainty

The measurement uncertainty above 1G is defined as ± 3.9 dB
below 1G is defined as ± 3.8 dB

4.6. Test Result

Mode 1: Transmitter-1Mbps(GFSK_DH5)

CH	Antenna	Frequency (MHz)	Reading Level (dBuV/m)	Factor (dB)	Measure Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
0	H	4804.0	42.558	-5.172	37.385	54(Note3)	16.615	PK
	V	4804.0	46.788	-5.172	41.615	54(Note3)	12.385	PK
	H	7206.0	37.867	-0.860	37.007	54(Note3)	16.993	PK
	V	7206.0	37.727	-0.860	36.867	54(Note3)	17.133	PK
	H	9608.0	33.583	4.325	37.908	54(Note3)	16.092	PK
	V	9608.0	33.374	4.325	37.699	54(Note3)	16.301	PK
39	H	4882.0	41.615	-5.068	36.547	54(Note3)	17.453	PK
	V	4882.0	45.852	-5.068	40.784	54(Note3)	13.216	PK
	H	7324.0	38.112	-0.979	37.133	54(Note3)	16.867	PK
	V	7323.1	38.362	-0.979	37.383	54(Note3)	16.617	PK
	H	9764.0	34.213	4.289	38.502	54(Note3)	15.498	PK
	V	9764.0	34.578	4.289	38.867	54(Note3)	15.133	PK
78	H	4960.0	40.842	-5.006	35.836	54(Note3)	18.164	PK
	V	4960.0	46.288	-5.006	41.282	54(Note3)	12.718	PK
	H	7443.0	38.138	-0.285	37.853	54(Note3)	16.147	PK
	V	7440.0	37.409	-0.285	37.124	54(Note3)	16.876	PK
	H	9920.0	33.892	4.725	38.617	54(Note3)	15.383	PK
	V	9920.0	33.773	4.725	38.617	54(Note3)	15.383	PK

Note 1: The test frequency range, 9kHz~30MHz, 18GHz~25GHz, both of the worst case are at least 6dB below the limits, therefore no data appear in the report.

2: This limit applies for using average detector, if the test result on peak is lower than average limit, then average measurement needn't be performed.

3: Measure Level = Reading Level + Factor.

Mode 2: Transmitter-2Mbps(Pi/4 DQPSK _DH5)

CH	Antenna	Frequency (MHz)	Reading Level (dBuV/m)	Factor (dB)	Measure Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
0	H	4804.0	40.118	-5.172	34.945	54(Note3)	19.055	PK
	V	4804.0	43.008	-5.197	37.811	54(Note3)	16.189	PK
	H	7206.0	35.648	-0.860	34.788	54(Note3)	19.212	PK
	V	7206.0	37.156	-0.860	36.296	54(Note3)	17.704	PK
	H	9608.0	32.631	4.137	36.768	54(Note3)	17.232	PK
	V	9608.0	32.725	4.137	36.862	54(Note3)	17.138	PK
39	H	4882.0	40.534	-5.068	35.466	54(Note3)	18.534	PK
	V	4882.0	43.495	-5.068	38.427	54(Note3)	15.573	PK
	H	7324.0	36.134	-0.979	35.155	54(Note3)	18.845	PK
	V	7323.0	37.421	-0.979	36.442	54(Note3)	17.558	PK
	H	9764.0	33.437	4.267	37.704	54(Note3)	16.296	PK
	V	9764.0	33.268	4.267	37.535	54(Note3)	16.465	PK
78	H	4960.0	40.612	-5.006	35.606	54(Note3)	18.394	PK
	V	4960.0	42.376	-5.005	37.370	54(Note3)	16.630	PK
	H	7443.0	36.205	-0.285	35.920	54(Note3)	18.080	PK
	V	7440.0	36.044	-0.285	35.759	54(Note3)	18.241	PK
	H	9920.0	32.226	4.572	36.798	54(Note3)	17.202	PK
	V	9920.0	32.764	4.572	37.336	54(Note3)	16.664	PK

Note 1: The test frequency range, 9kHz~30MHz, 18GHz~25GHz, both of the worst case are at least 6dB below the limits, therefore no data appear in the report.

2: This limit applies for using average detector, if the test result on peak is lower than average limit, then average measurement needn't be performed.

3: Measure Level = Reading Level + Factor.

Mode 3: Transmitter-3Mbps(8DPSK_DH5)

CH	Antenna	Frequency (MHz)	Reading Level (dBuV/m)	Factor (dB)	Measure Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
0	H	4808.0	40.628	-5.172	35.455	54(Note3)	18.545	PK
	V	4808.0	43.589	-5.172	38.416	54(Note3)	15.584	PK
	H	7206.0	36.858	-0.860	35.998	54(Note3)	18.002	PK
	V	7206.0	36.355	-0.860	35.495	54(Note3)	18.505	PK
	H	9608.0	31.966	4.115	36.081	54(Note3)	17.919	PK
	V	9608.0	31.829	4.115	35.944	54(Note3)	18.056	PK
39	H	4882.0	39.708	-5.068	34.640	54(Note3)	19.360	PK
	V	4882.0	44.165	-5.068	39.097	54(Note3)	14.903	PK
	H	7323.0	36.470	-0.979	35.491	54(Note3)	18.509	PK
	V	7323.0	37.132	-0.979	36.153	54(Note3)	17.847	PK
	H	9764.0	31.351	4.237	35.588	54(Note3)	18.412	PK
	V	9764.0	31.264	4.237	35.501	54(Note3)	18.499	PK
78	H	4960.0	39.885	-5.006	34.879	54(Note3)	19.121	PK
	V	4960.0	42.937	-5.006	37.931	54(Note3)	16.069	PK
	H	7440.0	35.950	-0.285	35.665	54(Note3)	18.335	PK
	V	7440.0	35.610	-0.285	35.325	54(Note3)	18.675	PK
	H	9920.0	31.276	4.375	35.651	54(Note3)	18.349	PK
	V	9920.0	31.632	4.375	36.007	54(Note3)	17.993	PK

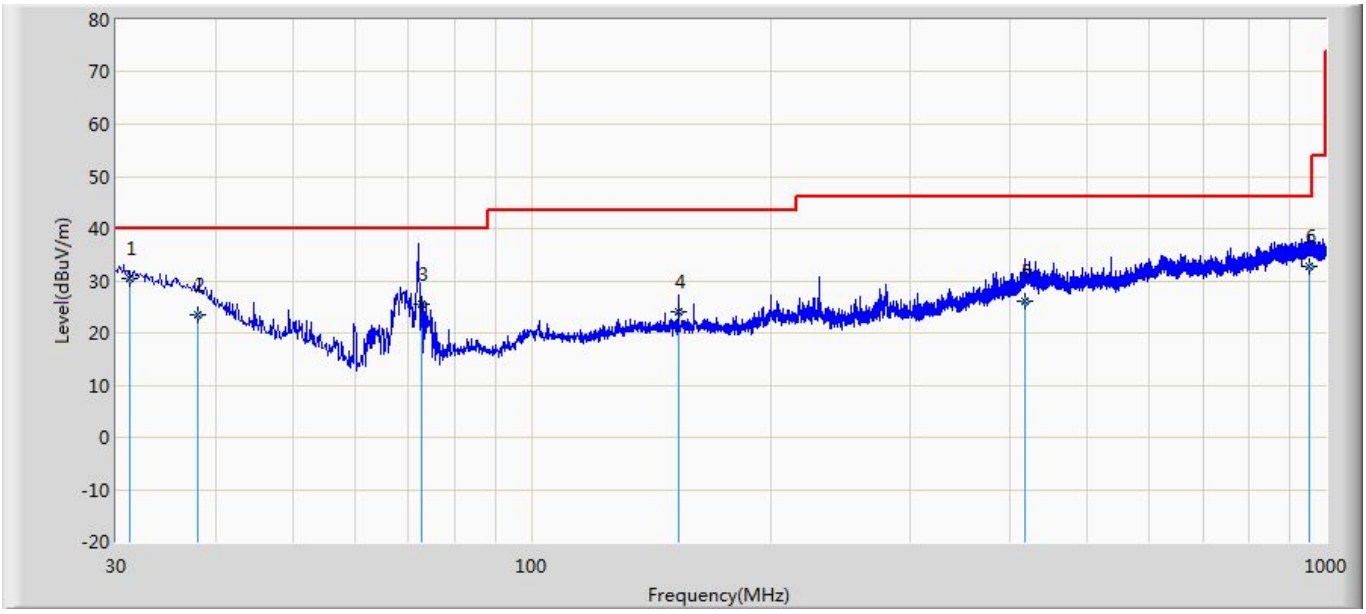
Note 1: The test frequency range, 9kHz~30MHz, 18GHz~25GHz, both of the worst case are at least 6dB below the limits, therefore no data appear in the report.

2: This limit applies for using average detector, if the test result on peak is lower than average limit, then average measurement needn't be performed.

3: Measure Level = Reading Level + Factor.

The worst case of Radiated Emission below 1GHz:

Engineer: Ray	
Site: AC3	Time: 2016/06/17 - 16:41
Limit: FCC_Part15.109_RE(3m)_ClassB	Margin: 0
Probe: CB7_CBL6112_0726	Polarity: Horizontal
EUT: Bluetooth headphone(Backbeat PRO 2)	Power: AC 120V/60Hz
Note: Mode 2	

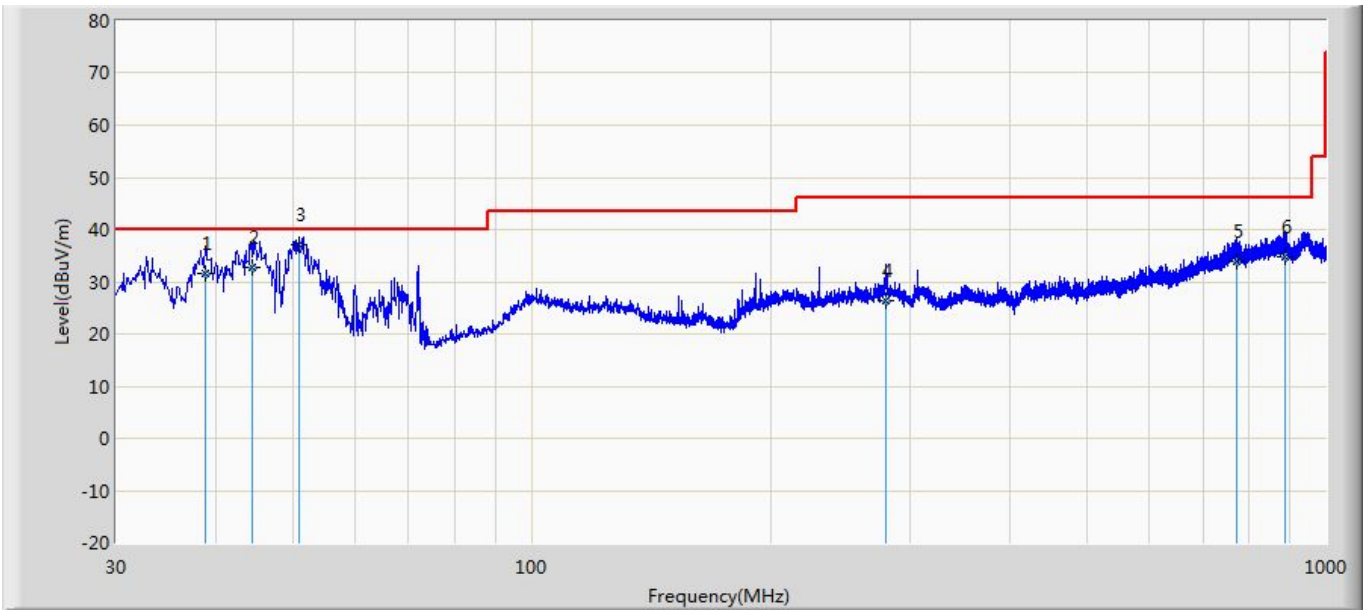


No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Probe (dB/m)	Cable (dB)	Amp (dB)	Ant Pos (cm)	Table Pos (deg)	Type
1	*	31.175	30.399	34.773	-9.601	40.000	18.118	0.612	23.104	100	195	QP
2		38.077	23.621	32.056	-16.379	40.000	14.115	0.673	23.223	100	87	QP
3		72.654	25.533	41.207	-14.467	40.000	6.486	0.920	23.080	200	19	QP
4		153.253	24.128	35.492	-19.372	43.500	10.305	1.341	23.010	200	214	QP
5		417.099	26.149	30.506	-19.851	46.000	16.342	2.250	22.949	100	325	QP
6		954.674	32.689	30.642	-13.311	46.000	20.937	3.410	22.300	100	310	QP

Note:

1. " * ", means this data is the worst emission level.
2. Measurement Level = Reading Level + Factor(Probe+Cable-Amp).

Engineer: Ray	
Site: AC3	Time: 2016/06/17 - 16:43
Limit: FCC_Part15.109_RE(3m)_ClassB	Margin: 0
Probe: CB7_CBL6112_0726	Polarity: Vertical
EUT: Bluetooth headphone(Backbeat PRO 2)	Power: AC 120V/60Hz
Note: Mode 2	



No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Probe (dB/m)	Cable (dB)	Amp (dB)	Ant Pos (cm)	Table Pos (deg)	Type
1		38.865	31.657	40.551	-8.343	40.000	13.659	0.680	23.233	100	144	QP
2		44.455	32.794	44.783	-7.206	40.000	10.505	0.729	23.223	100	2	QP
3	*	50.921	37.150	51.360	-2.850	40.000	8.043	0.780	23.033	100	86	QP
4		278.856	26.477	34.913	-19.523	46.000	12.889	1.790	23.114	186	360	QP
5		772.918	33.998	33.527	-12.002	46.000	19.892	3.070	22.491	200	209	QP
6		888.070	34.882	33.856	-11.118	46.000	20.476	3.280	22.730	179	360	QP

Note:

1. " * ", means this data is the worst emission level.
2. Measurement Level = Reading Level + Factor(Probe+Cable-Amp).

5. 20dB Bandwidth

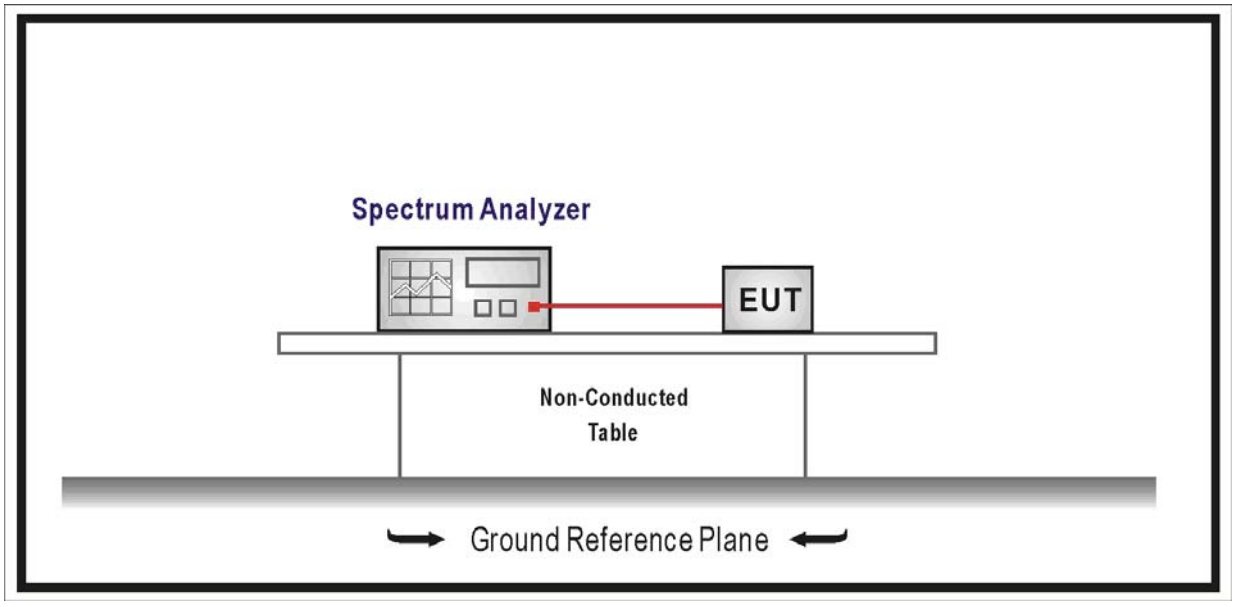
5.1 Test Equipment

20dB Bandwidth / TR8

Instrument	Manufacturer	Type No.	Serial No.	Cal. Due Date
Spectrum Analyzer	Agilent	N9010A	MY48030494	2017.02.04
Temperature/Humidity Meter	Zhicheng	ZC1-2	TR8-TH	2017.04.03

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

5.2 Test Setup



5.3 Limit

- For frequency hopping systems operating in 2400-2483.5 MHz band, no limitation.
- For frequency hopping systems operating in 902-928 MHz band, the maximum allowed 20 dB bandwidth of the hopping channel is 500 kHz.
- For frequency hopping systems operating in 5725-5850 MHz band, the maximum 20 dB bandwidth of the hopping channel is 1 MHz.

5.4 Test Procedure

According to ANSI C63.10: 2013& ANSI C63.4: 2014

Use the following spectrum analyzer settings:
Span = approximately 2 to 3 times the 20dB bandwidth, centered on a hopping channel
RBW ≧ 1% of the 20dB bandwidth
VBW ≧ RBW
Sweep = auto
Detector function = peak
Trace = max hold
The EUT should be transmitting at its maximum data rate. Allow the trace to stabilize. Use the marker-to-peak function to set the marker to the peak of the emission. Use the marker-delta function to measure 20 dB down one side of the emission. Reset the marker-delta function, and move the marker to the other side of the emission, until it is (as close as possible to) even with the reference marker level. The marker-delta reading at this point is the 20 dB bandwidth of the emission. If this value varies with different modes of operation (e.g., data rate, modulation format, etc.), repeat this test for each variation.

5.5 Uncertainty

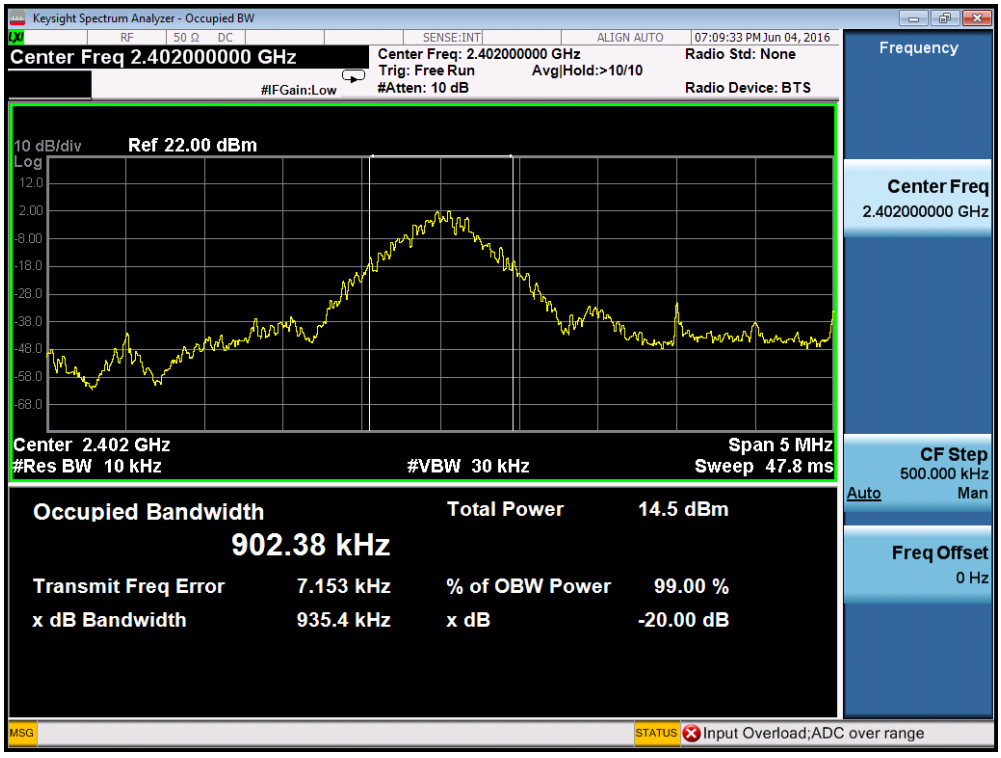
The measurement uncertainty is defined as ± 1 kHz

5.6 Test Result

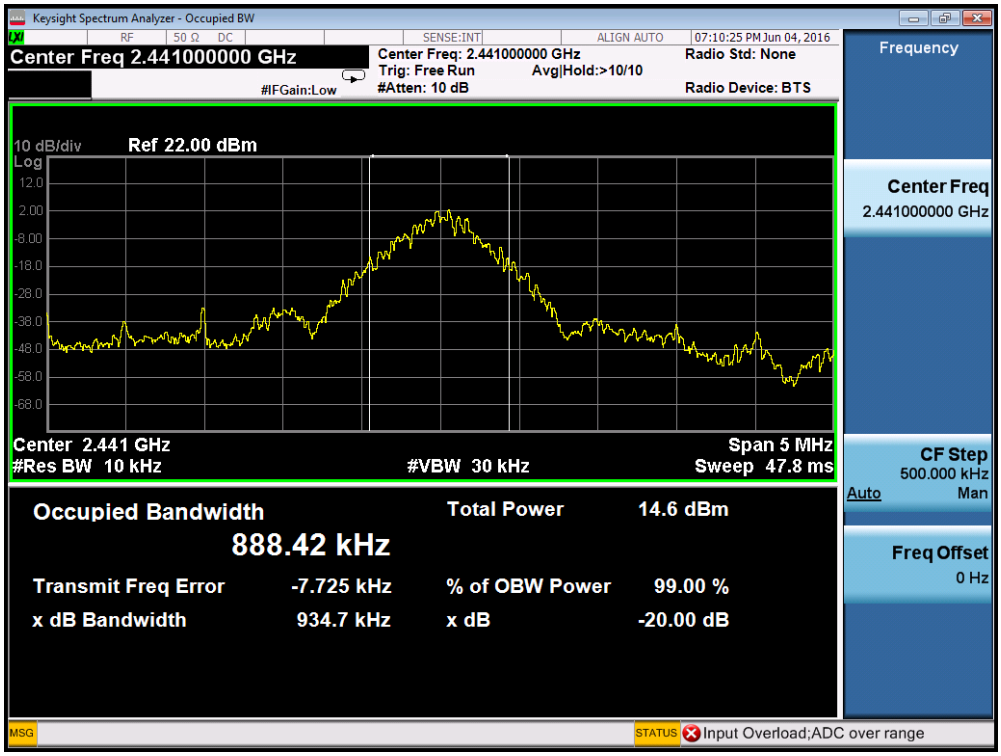
Product	:	Bluetooth headphone (Backbeat PRO 2)
Test Item	:	Occupied Bandwidth
Test Site	:	TR-8
Test Mode	:	Mode 1: Transmitter-1Mbps (GFSK_DH5)

Channel No.	Frequency (MHz)	20dB Bandwidth (kHz)	99% Bandwidth (kHz)
00	2402	935.40	902.38
39	2441	934.70	888.42
78	2480	933.60	981.72

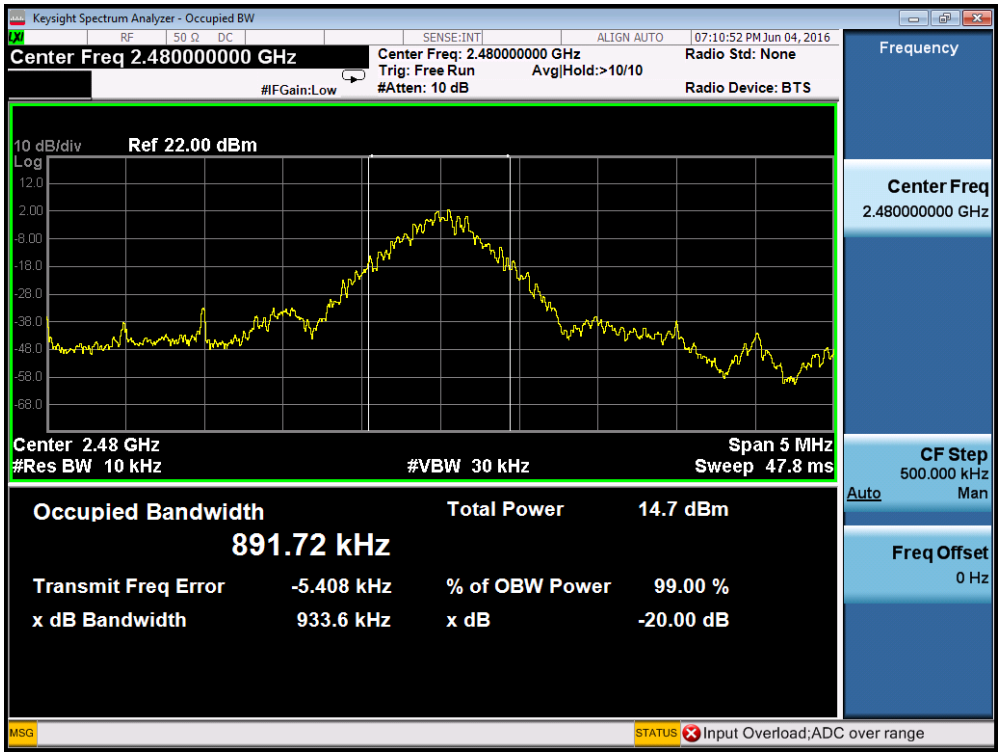
Channel 00 (2402MHz)



Channel 39 (2441MHz)



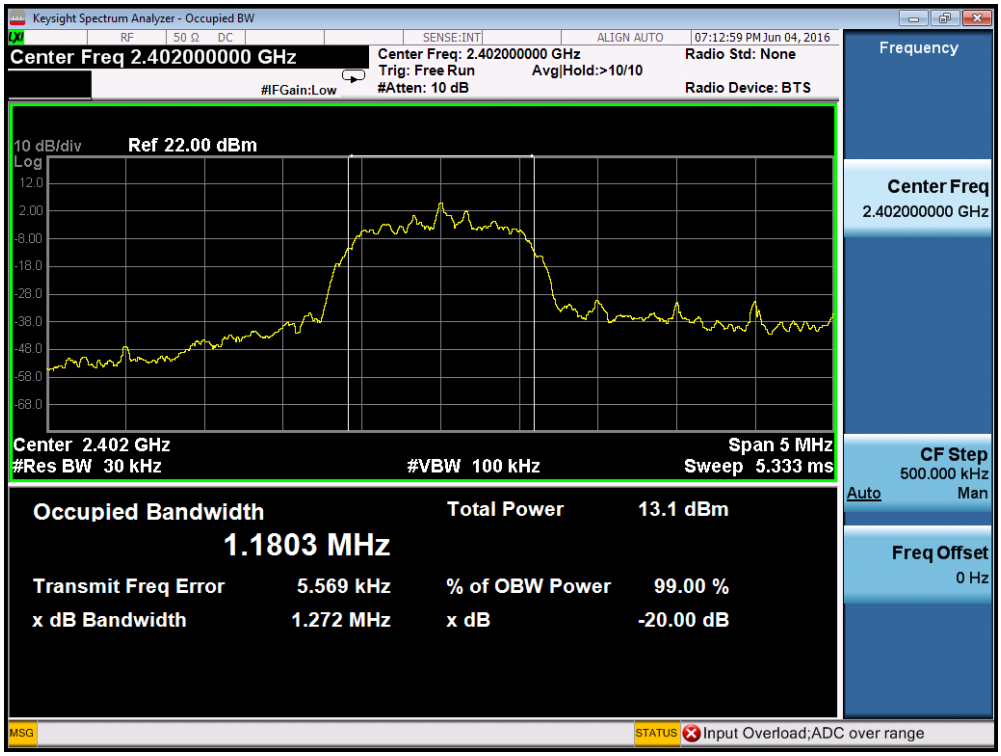
Channel 78 (2480MHz)



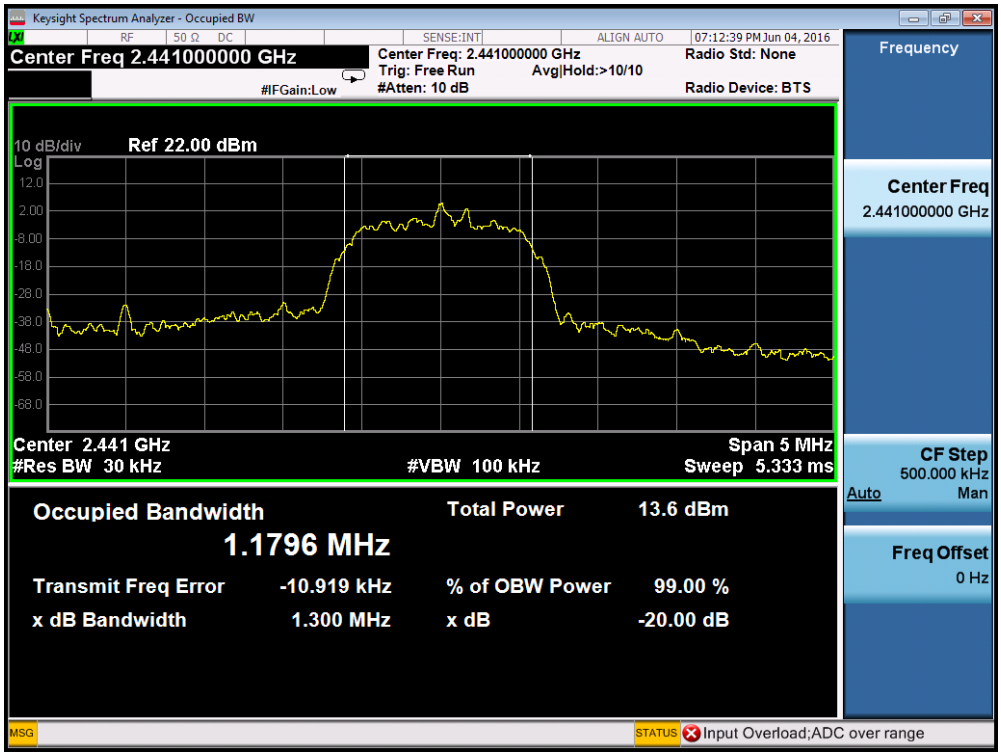
Product	:	Bluetooth headphone (Backbeat PRO 2)
Test Item	:	Occupied Bandwidth
Test Site	:	TR-8
Test Mode	:	Mode 2: Transmitter-2Mbps (Pi/4 DQPSK_DH5)

Channel No.	Frequency (MHz)	20dB Bandwidth (kHz)	99% Bandwidth (kHz)
00	2402	1272	1180.3
39	2441	1300	1179.6
78	2480	1319	1185.9

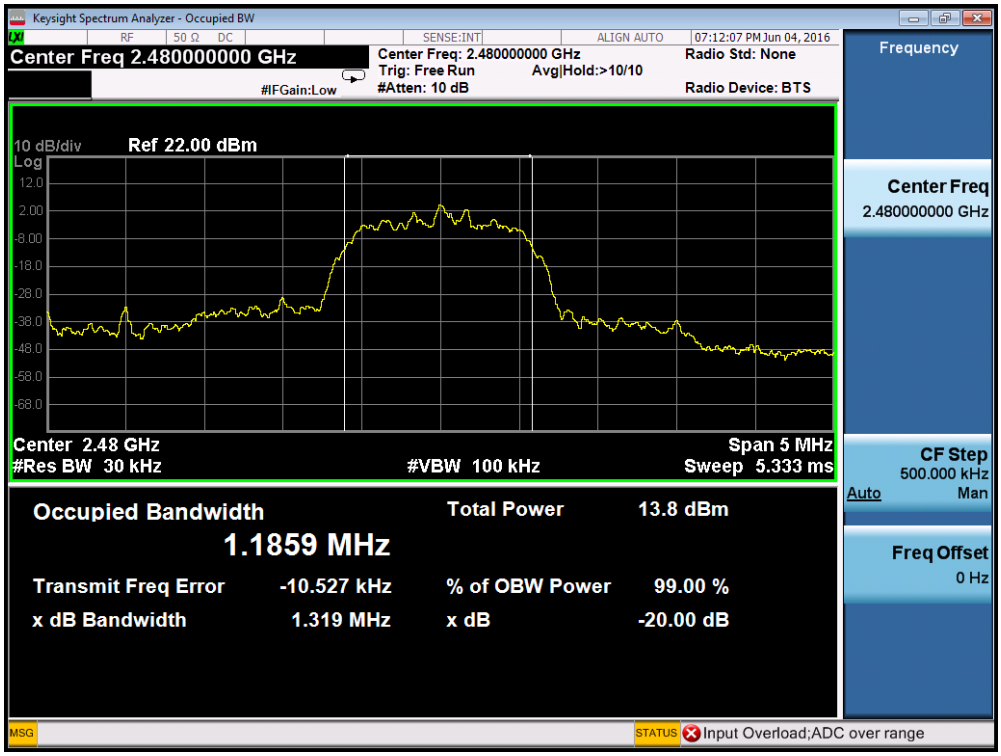
Channel 00 (2402MHz)



Channel 39 (2441MHz)



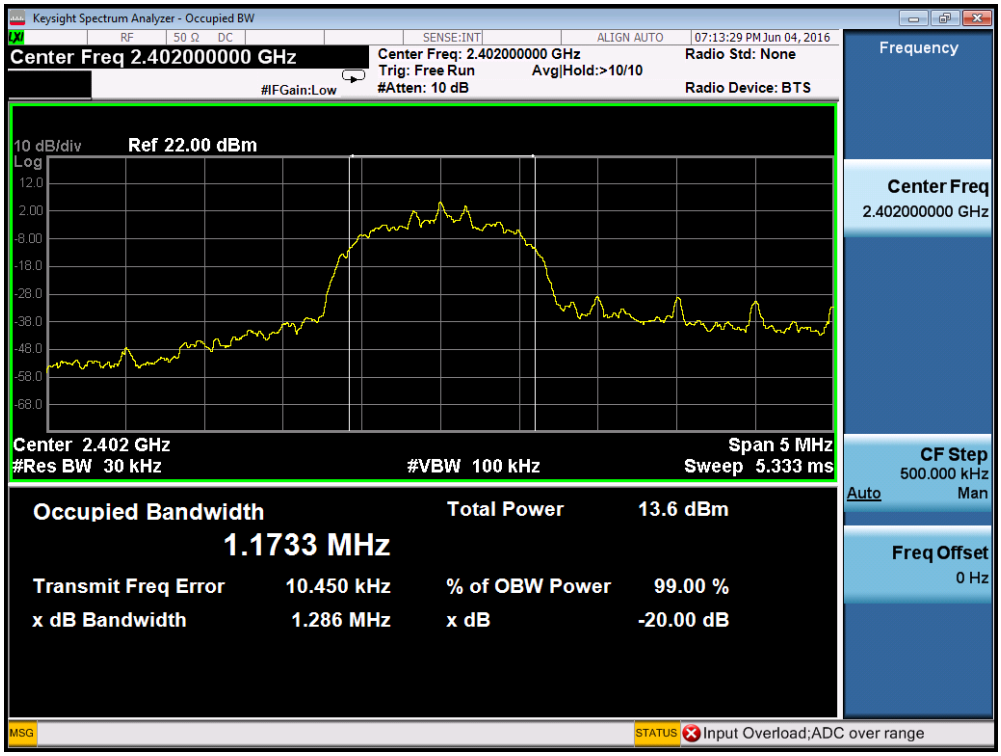
Channel 78 (2480MHz)



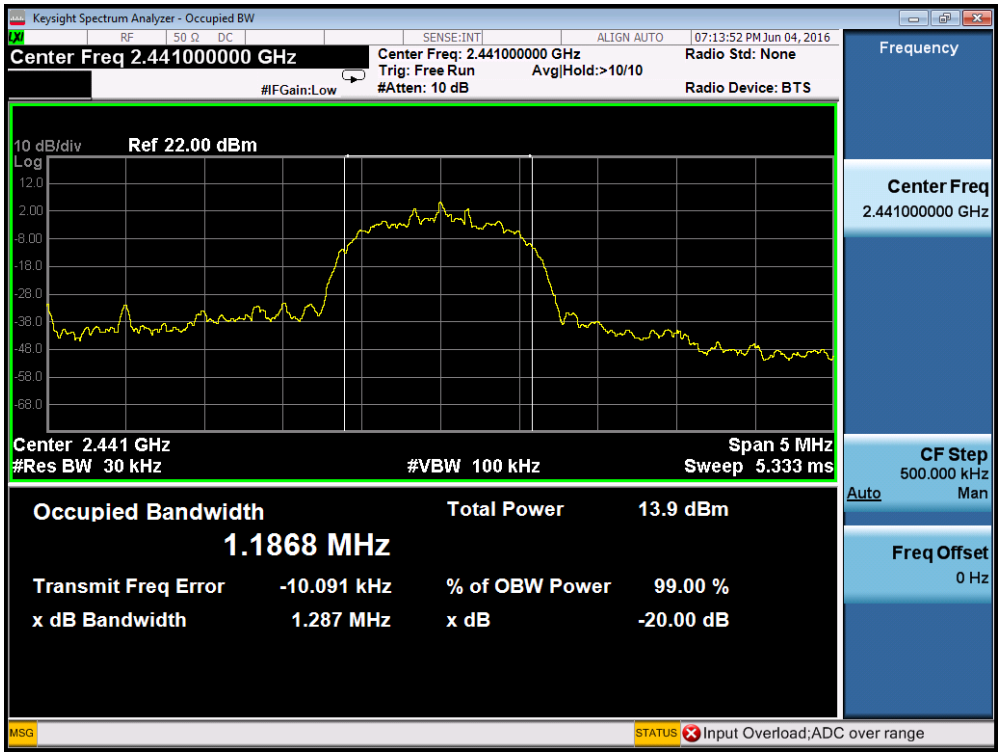
Product	:	Bluetooth headphone (Backbeat PRO 2)
Test Item	:	Occupied Bandwidth
Test Site	:	TR-8
Test Mode	:	Mode 3: Transmitter-3Mbps (8DPSK_DH5)

Channel No.	Frequency (MHz)	20dB Bandwidth (kHz)	99% Bandwidth (kHz)
00	2402	1286	1173.3
39	2441	1287	1186.8
78	2480	1302	1188.5

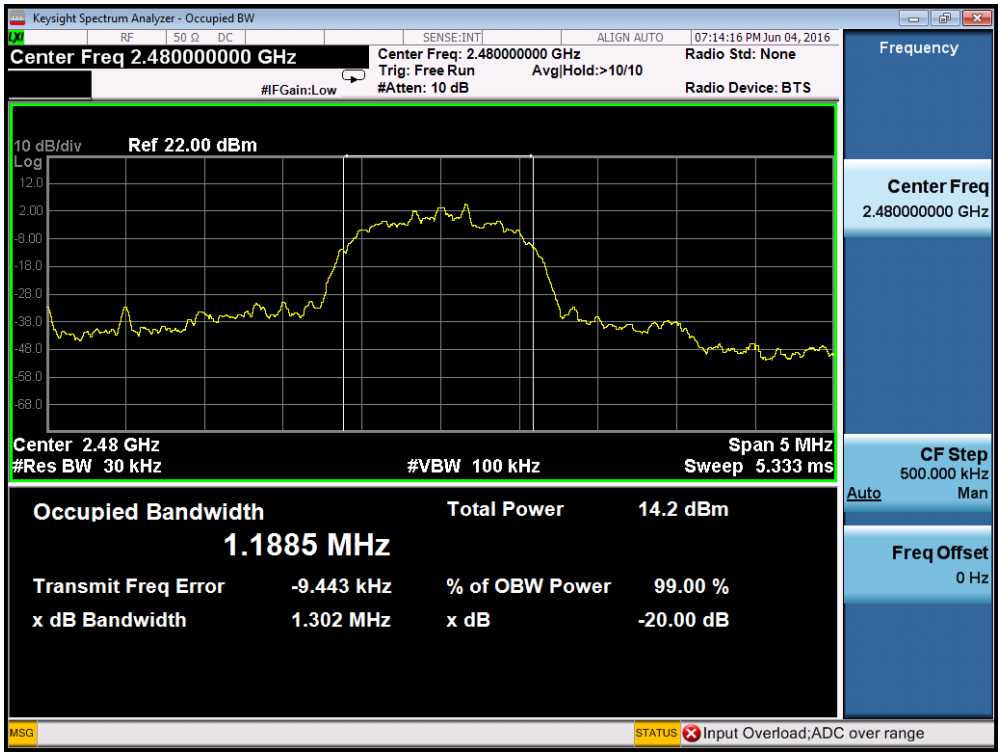
Channel 00 (2402MHz)



Channel 39 (2441MHz)



Channel 78 (2480MHz)



6. Carrier Frequency Separation

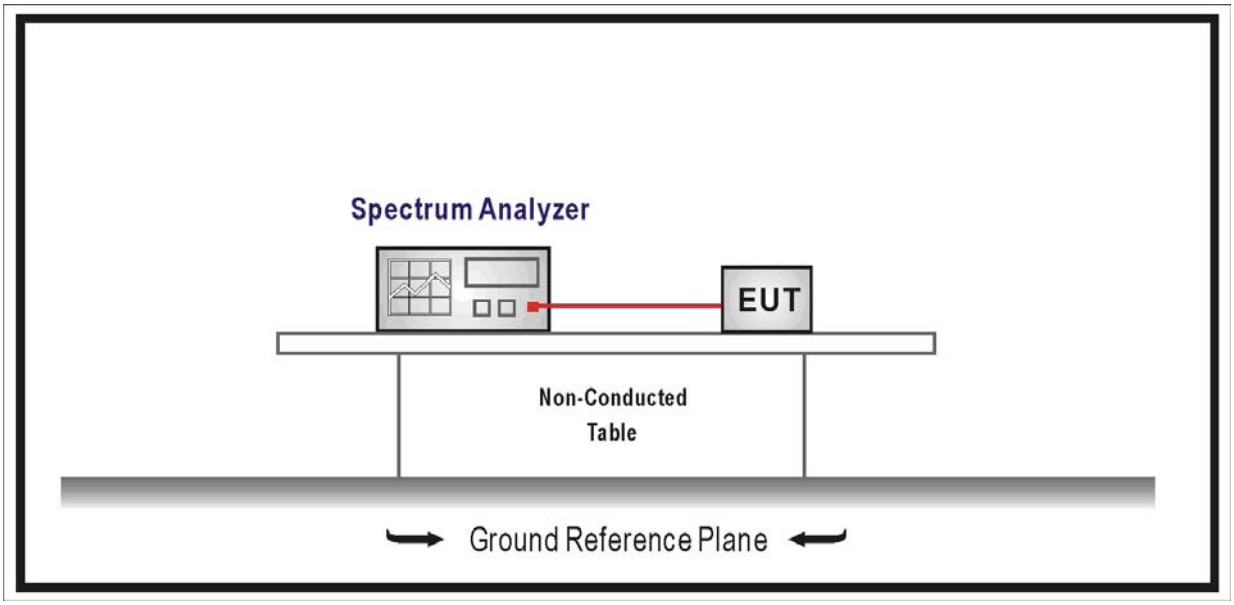
6.1. Test Equipment

Carrier Frequency Separation / TR-8

Instrument	Manufacturer	Type No.	Serial No.	Cal. Due Date
Spectrum Analyzer	Agilent	N9010A	MY48030494	2017.02.04
Temperature/Humidity Meter	Zhicheng	ZC1-2	TR8-TH	2017.04.03

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

6.2. Test Setup



6.3. 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. Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125mW. The system shall hop to channel frequencies that are selected at the system hopping rate from a pseudorandomly ordered list of hopping frequencies. Each frequency must be used equally on the average by each transmitter. The system receivers shall have input bandwidths that match the hopping

channel bandwidths of their corresponding transmitters and shall shift frequencies in synchronization with the transmitted signals.

- For frequency hopping systems operating in the 902-928 MHz band: if the 20 dB bandwidth of the hopping channel is less than 250 kHz, the system shall use at least 50 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 20 second period; If the 20 dB bandwidth of the hopping channel is 250 kHz or greater, the system shall use at least 25 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 10 second period. The maximum allowed 20 dB bandwidth of the hopping channel is 500 kHz.
- Frequency hopping systems operating in the 5725-5850 MHz band shall use at least 75 hopping frequencies. The maximum 20 dB bandwidth of the hopping channel is 1 MHz. The average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 30 second period.

6.4. Test Procedure

According to ANSI C63.10: 2013& ANSI C63.4: 2014

The EUT must have its hopping function enabled. Use the following spectrum analyzer settings:
Span = wide enough to capture the peaks of two adjacent channels
Resolution (or IF) Bandwidth (RBW) ≧ 1% of the span
Video (or Average) Bandwidth VBW ≧ RBW
Sweep = auto
Detector function = peak
Trace = max hold
Allow the trace to stabilize. Use the marker-delta function to determine the separation between the peaks of the adjacent channels.

6.5. Uncertainty

The measurement uncertainty is defined as ± 1 kHz

6.6. Test Result

Product	:	Bluetooth headphone (Backbeat PRO 2)
Test Item	:	Carrier Frequency Separation
Test Site	:	TR-8
Test Mode	:	Mode 1: Transmitter-1Mbps (GFSK_DH5)

Channel No.	Frequency (MHz)	Carrier Frequency Separation (kHz)	Limit (kHz)	Result
00	2402	1000	623.6	Pass
39	2441	1000	623.1	Pass
78	2480	1000	622.4	Pass

Channel 00 (2402MHz)

Channel 39 (2441MHz)

Channel 78 (2480MHz)

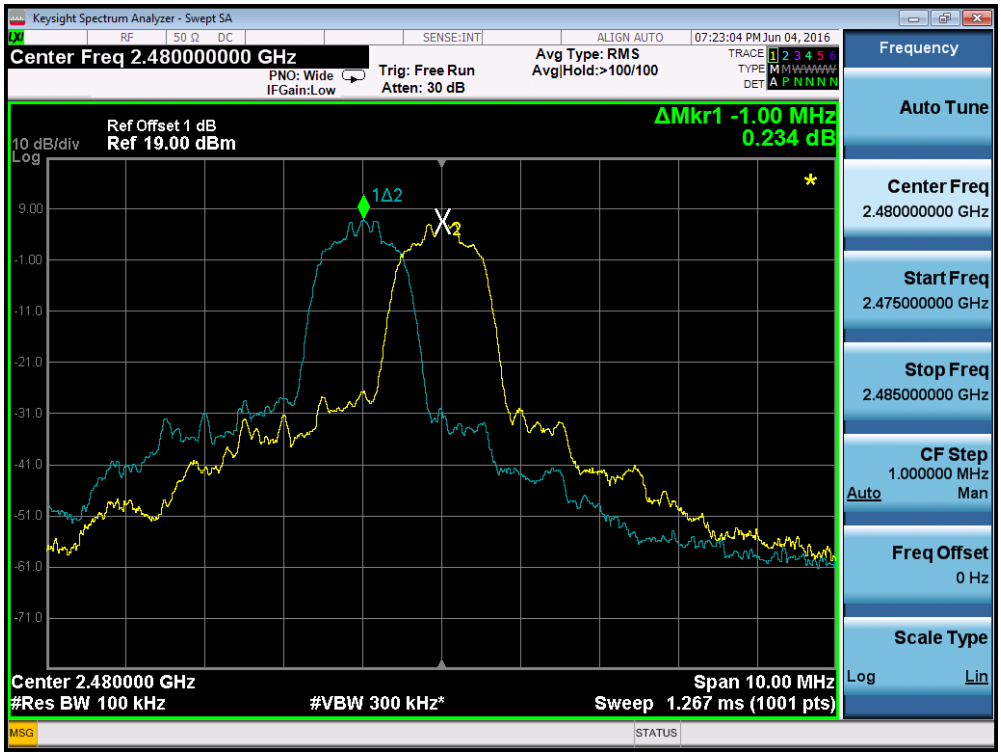
Product	:	Bluetooth headphone (Backbeat PRO 2)
Test Item	:	Carrier Frequency Separation
Test Site	:	TR-8
Test Mode	:	Mode 2: Transmitter-2Mbps (Pi/4 DQPSK_DH5)

Channel No.	Frequency (MHz)	Carrier Frequency Separation (kHz)	Limit (kHz)	Result
00	2402	1000	848.0	Pass
39	2441	1000	866.7	Pass
78	2480	1000	879.3	Pass

Channel 00 (2402MHz)

Channel 39 (2441MHz)

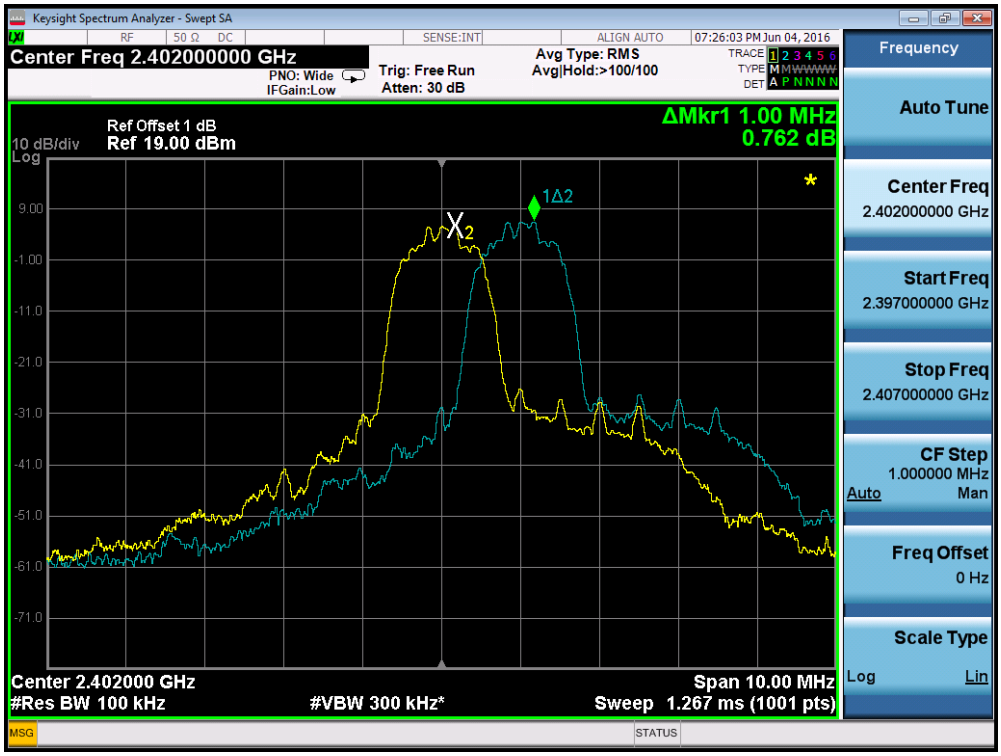
Channel 78 (2480MHz)



Product	:	Bluetooth headphone (Backbeat PRO 2)
Test Item	:	Carrier Frequency Separation
Test Site	:	TR-8
Test Mode	:	Mode 3: Transmitter-3Mbps (8DPSK_DH5)

Channel No.	Frequency (MHz)	Carrier Frequency Separation (kHz)	Limit (kHz)	Result
00	2402	1000	857.3	Pass
39	2441	1000	858.0	Pass
78	2480	1000	868.0	Pass

Channel 00 (2402MHz)



Channel 39 (2441MHz)

Channel 78 (2480MHz)

7. Number of Hopping Frequencies

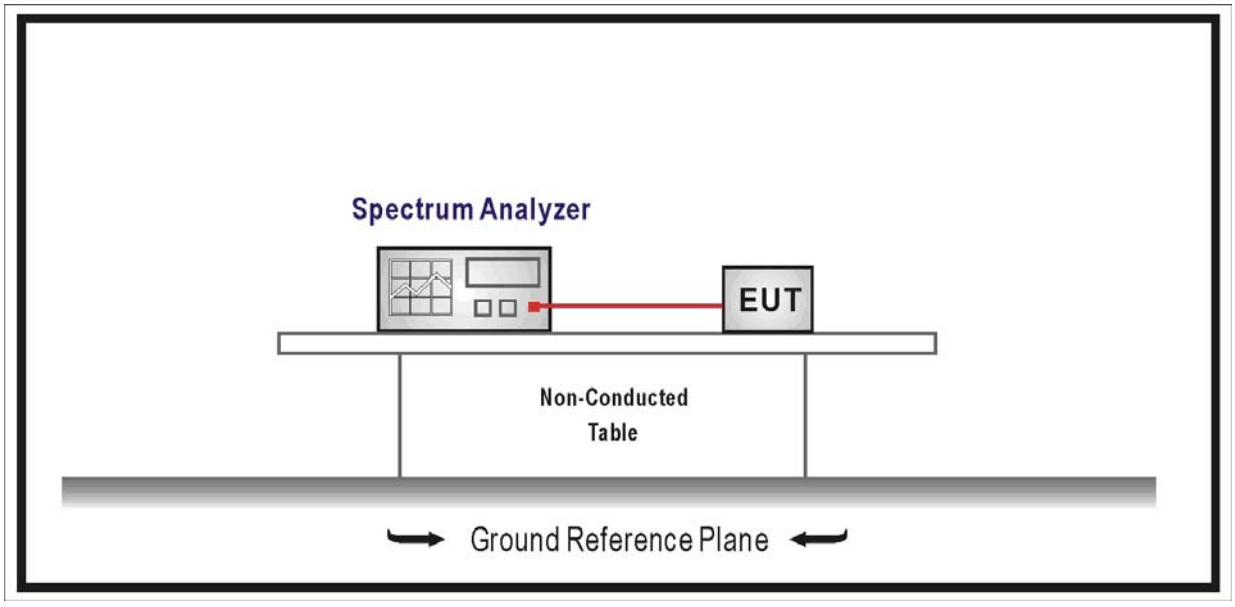
7.1. Test Equipment

Number of Hopping Frequencies / TR-8

Instrument	Manufacturer	Type No.	Serial No.	Cal. Due Date
Spectrum Analyzer	Agilent	N9010A	MY48030494	2017.02.04
Temperature/Humidity Meter	Zhicheng	ZC1-2	TR8-TH	2017.04.03

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

7.2. Test Setup



7.3. Limit

- For frequency hopping systems operating in the 2400-2483.5 MHz band shall use at least 15 hopping frequencies.
- For frequency hopping systems operating in 902-928 MHz band shall use at least 50 hopping frequencies.
- For frequency hopping systems operating in the 5725-5850 MHz band shall use at least 75 hopping frequencies.

7.4. Test Procedure

According to ANSI C63.10: 2013& ANSI C63.4: 2014

The EUT must have its hopping function enabled. Use the following spectrum analyzer settings:

Span = the frequency band of operation

RBW ≧ 1% of the span

VBW ≧ RBW

Sweep = auto

Detector function = peak

Trace = max hold

Allow the trace to stabilize. It may prove necessary to bread the span up to sections, in order to clearly show all of the hopping frequencies.

7.5. Uncertainty

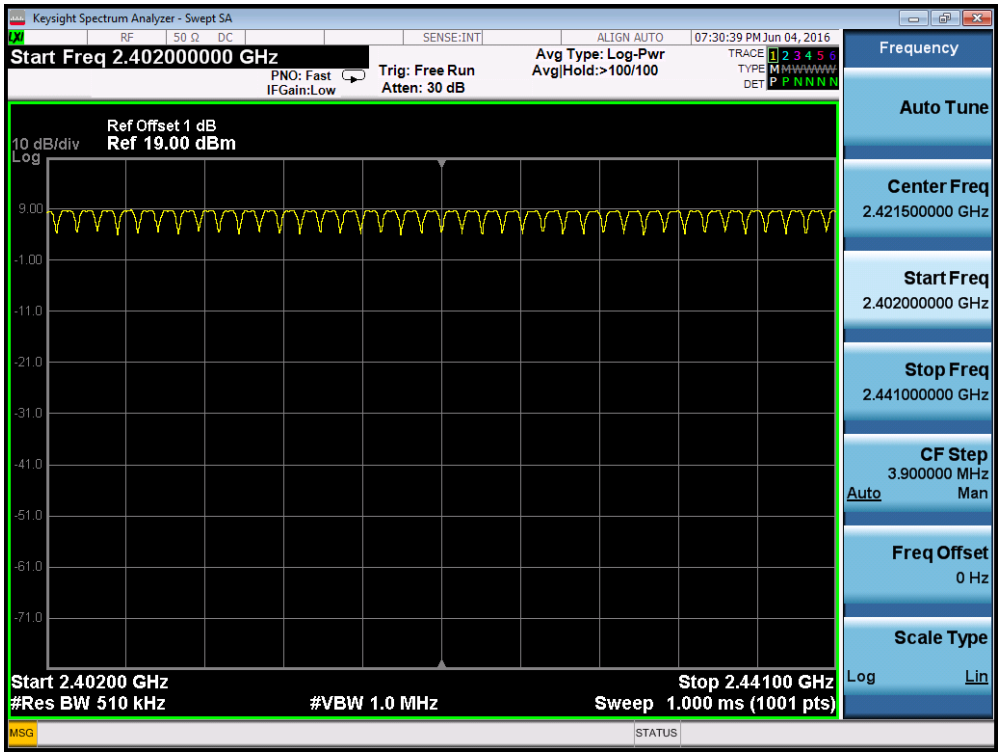
The measurement uncertainty is defined as ± 1 kHz

7.6. Test Result

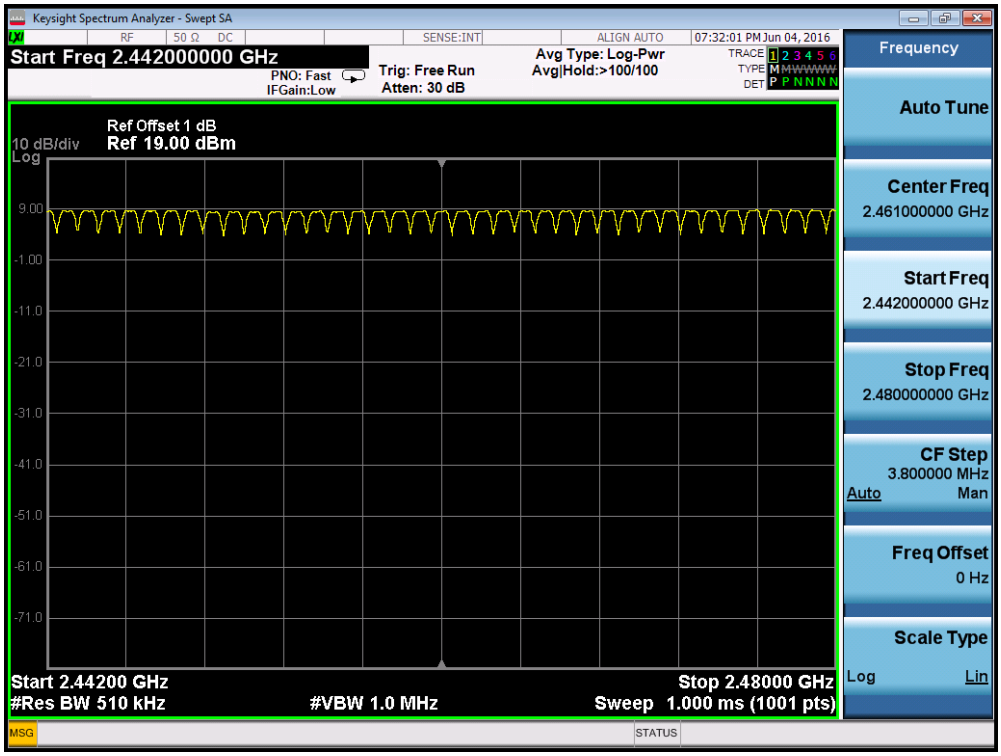
Product	:	Bluetooth headphone (Backbeat PRO 2)
Test Item	:	Number of Hopping Frequencies
Test Site	:	TR-8
Test Mode	:	Mode 1: Transmitter-1Mbps (GFSK_DH5)

Frequency Band (MHz)	Number of Hopping Frequencies	Limit	Result
2400 - 2483.5	79	>15	Pass

2402 - 2441 MHz



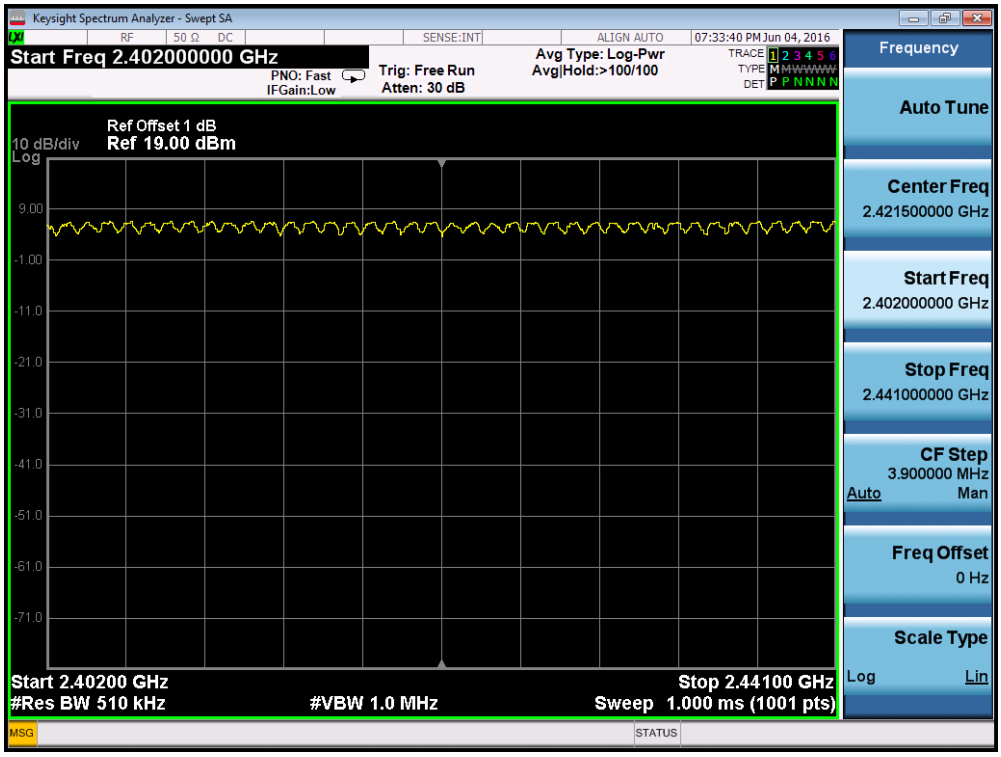
2442 - 2480 MHz



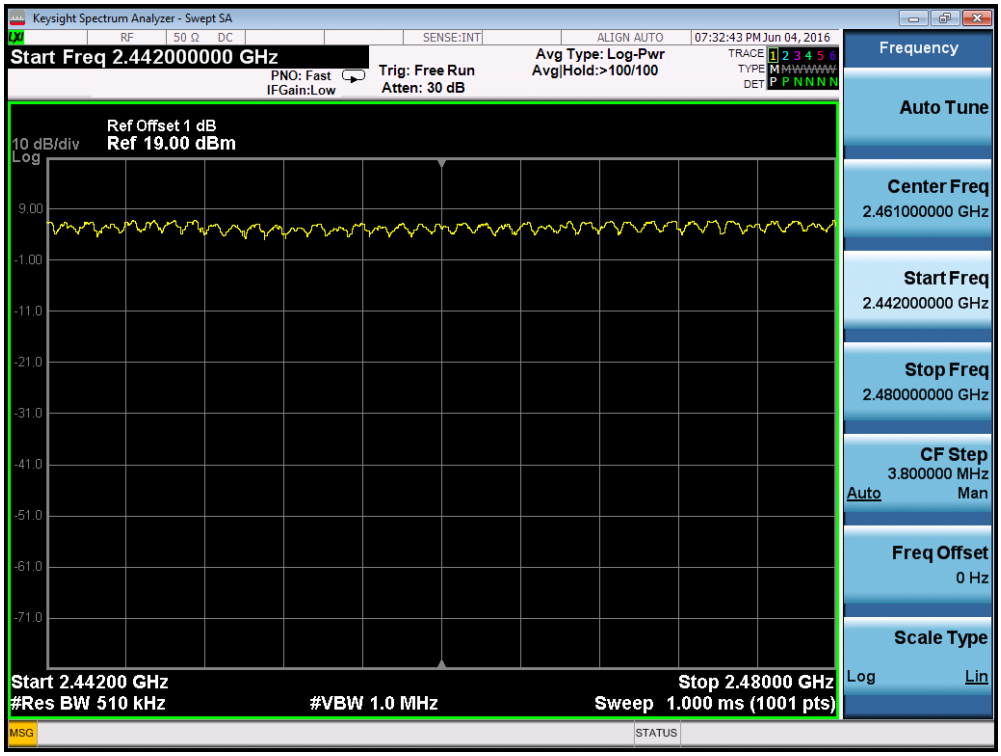
Product	:	Bluetooth headphone (Backbeat PRO 2)
Test Item	:	Number of Hopping Frequencies
Test Site	:	TR-8
Test Mode	:	Mode 2: Transmitter-2Mbps (Pi/4 DQPSK_DH5)

Frequency Band (MHz)	Number of Hopping Frequencies	Limit	Result
2400 - 2483.5	79	>15	Pass

2402 - 2441 MHz



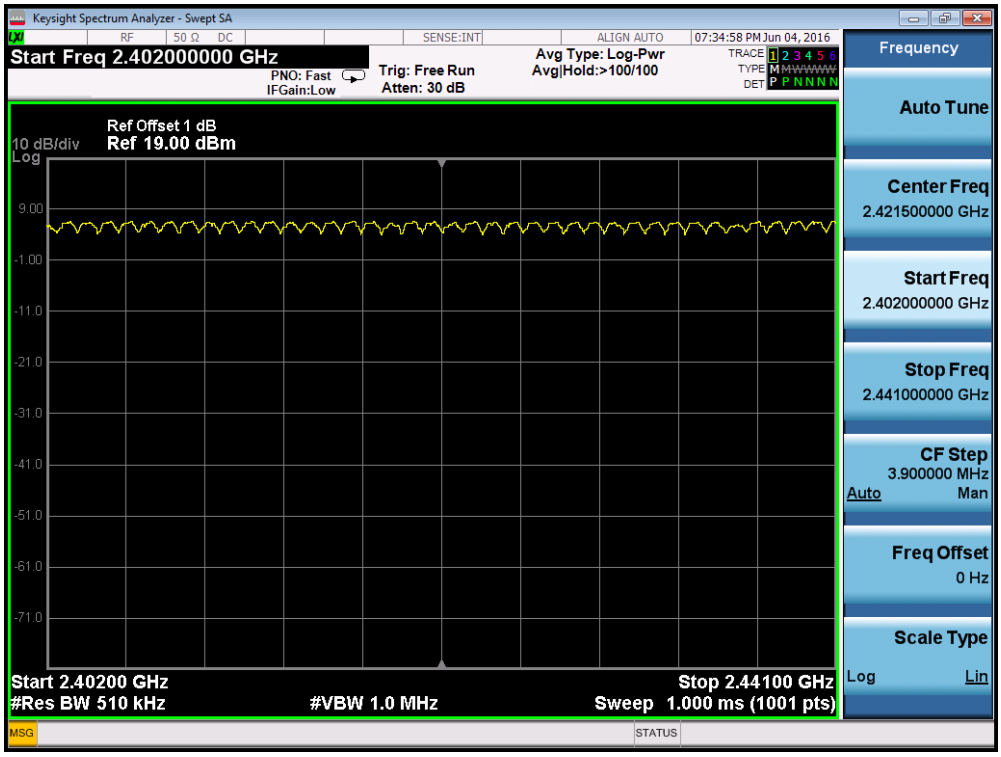
2442 - 2480 MHz



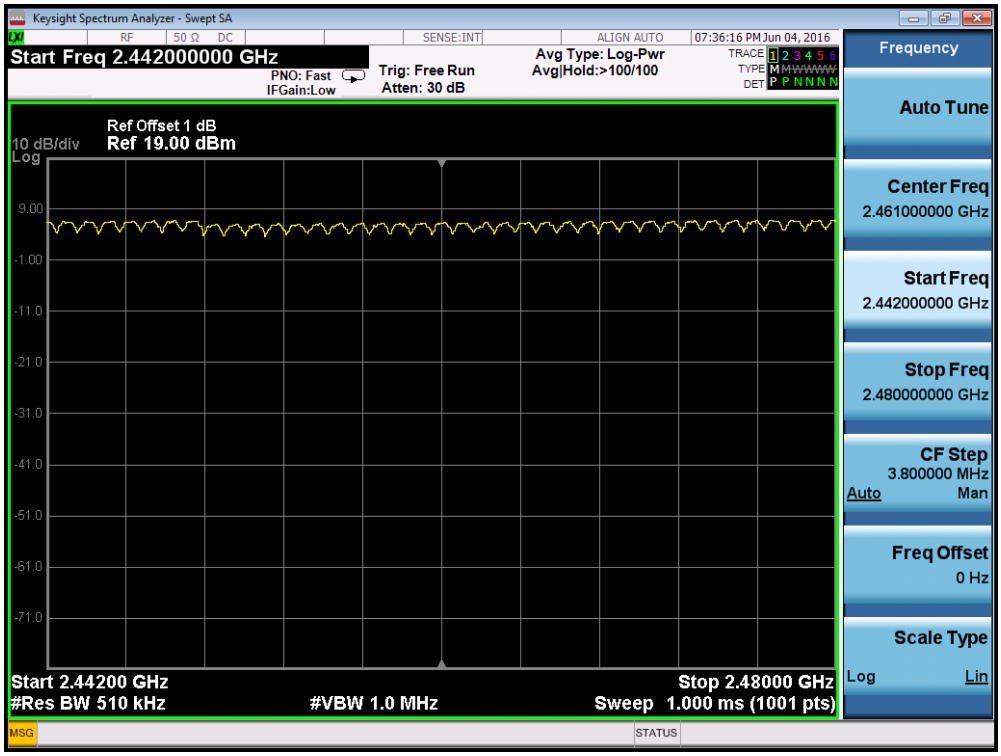
Product	:	Bluetooth headphone (Backbeat PRO 2)
Test Item	:	Number of Hopping Frequencies
Test Site	:	TR-8
Test Mode	:	Mode 3: Transmitter-3Mbps (8DPSK_DH5)

Frequency Band (MHz)	Number of Hopping Frequencies	Limit	Result
2400 - 2483.5	79	>15	Pass

2402 - 2441 MHz



2442 - 2480 MHz



8. Time of Occupancy (Dwell Time)

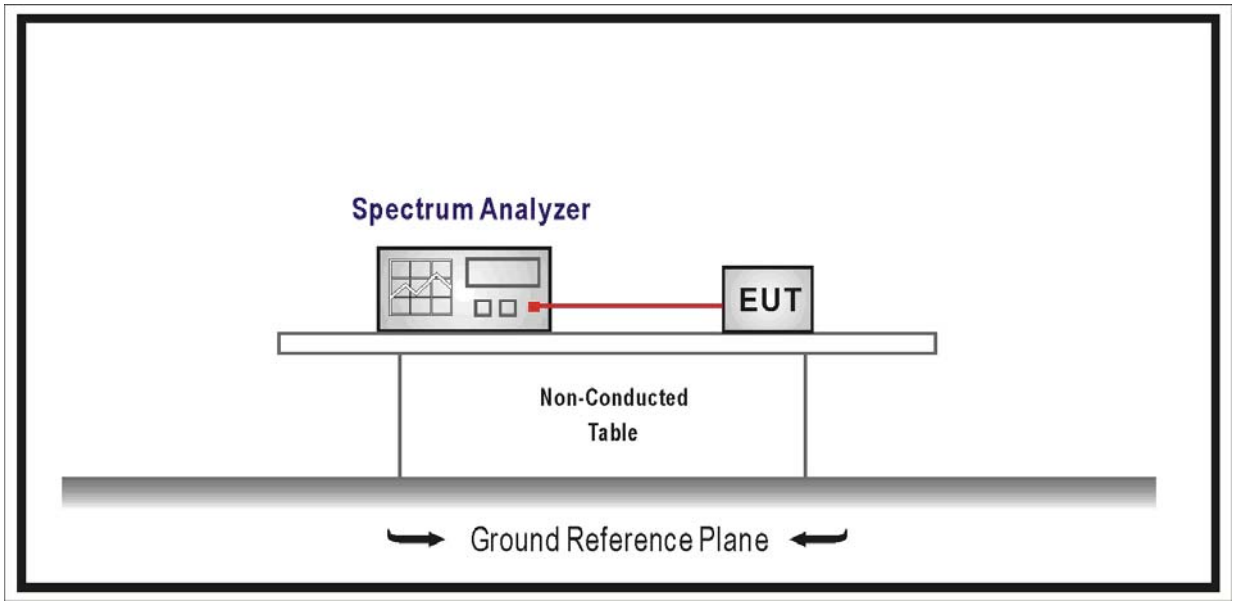
8.1. Test Equipment

Time of Occupancy (Dwell Time) / TR-8

Instrument	Manufacturer	Type No.	Serial No.	Cal. Due Date
Spectrum Analyzer	Agilent	N9010A	MY48030494	2017.02.04
Temperature/Humidity Meter	Zhicheng	ZC1-2	TR8-TH	2017.04.03

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

8.2. Test Setup



8.3. Limit

- For frequency hopping systems operating in the 902-928 MHz band: if the 20 dB bandwidth of the hopping channel is less than 250 kHz, the system shall use at least 50 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 20 second period; If the 20 dB bandwidth of the hopping channel is 250 kHz or greater, the system shall use at least 25 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 10 second period. The maximum allowed 20 dB bandwidth of the hopping channel is 500 kHz.
- Frequency hopping systems operating in the 5725-5850 MHz band shall use at least 75

hopping frequencies. The maximum 20 dB bandwidth of the hopping channel is 1 MHz. The average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 30 second period.

- Frequency hopping systems in the 2400-2483.5 MHz band shall use at least 15 channels. The average time of occupancy on any channel shall not be greater then 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed. Frequency hopping systems may avoid or suppress transmissions on a particular hopping frequency provided that a minimum of 15 channels are used.

8.4. Test Procedure

According to ANSI C63.10: 2013& ANSI C63.4: 2014

The EUT must have its hopping function enabled. Use the following spectrum analyzer settings:
Span = zero span, centered on a hopping channel
RBW = 1MHz
VBW ≧ RBW
Sweep = as necessary to capture the entire dwell time per hopping channel
Detector function = peak
Trace = max hold
If possible, use the marker-delta function to determine the dwell time. If this value varies with different modes of operation (e.g., data rate, modulation format, etc.), repeat this test for each variation.

8.5. Uncertainty

The measurement uncertainty is defined as ± 0.1 us

8.6. Test Result

Product	:	Bluetooth headphone (Backbeat PRO 2)
Test Item	:	Time of Occupancy (Dwell Time)
Test Site	:	TR-8
Test Mode	:	Transmitter-1Mbps (GFSK_DH1)

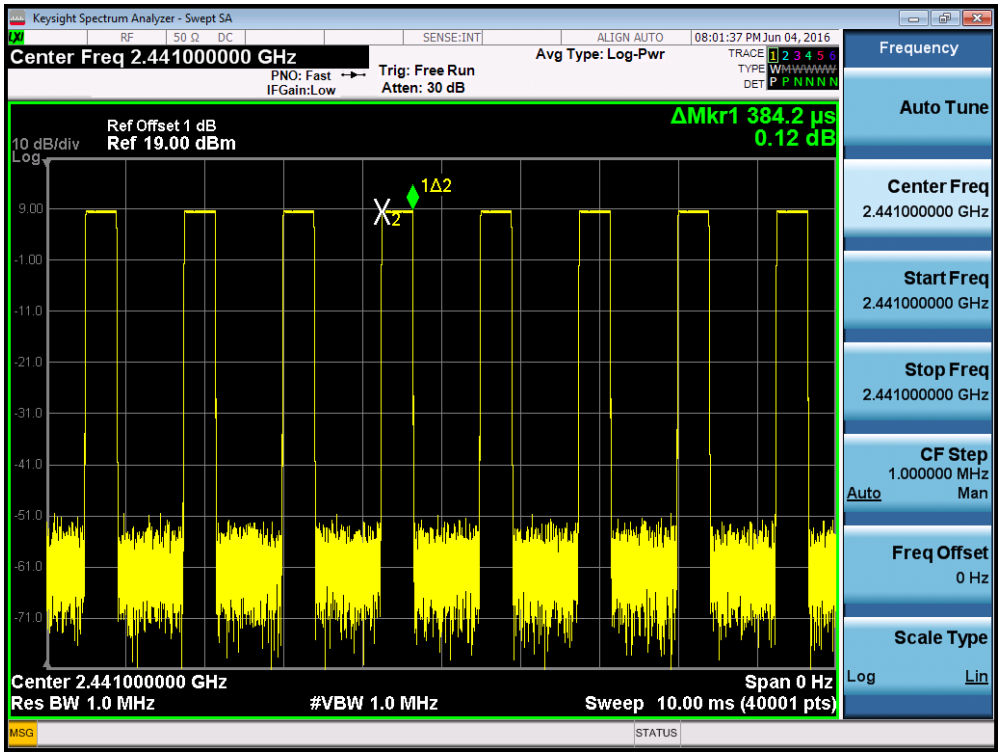
Channel No.	Frequency (MHz)	Time of Occupancy (ms)	Limit (ms)	Result
39	2441	122.88	< 400	Pass

Test Time Period: 0.4*79=31.6sec.

2441MHz, The Maximum Occupancy Time Within 31.6sec:

pulse time*(1600/(2*79)*31.6=122.88msec

Channel 39 (2441MHz)-(DH1)



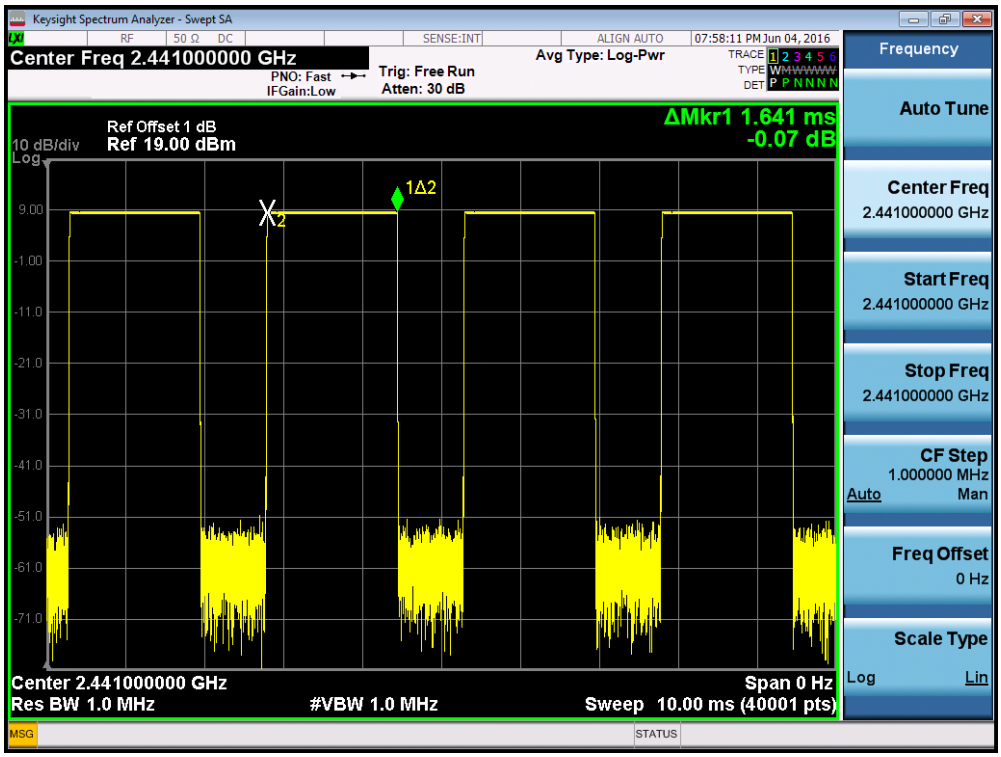
Product	:	Bluetooth headphone (Backbeat PRO 2)
Test Item	:	Time of Occupancy (Dwell Time)
Test Site	:	TR-8
Test Mode	:	Transmitter-1Mbps (GFSK_DH3)

Channel No.	Frequency (MHz)	Time of Occupancy (ms)	Limit (ms)	Result
39	2441	262.56	< 400	Pass

Test Time Period: 0.4*79=31.6sec.

- 2441MHz, The Maximum Occupancy Time Within 31.6sec:
  pulse time*(1600/(4*79)*31.6=262.56msec

Channel 39 (2441MHz) - (DH3)



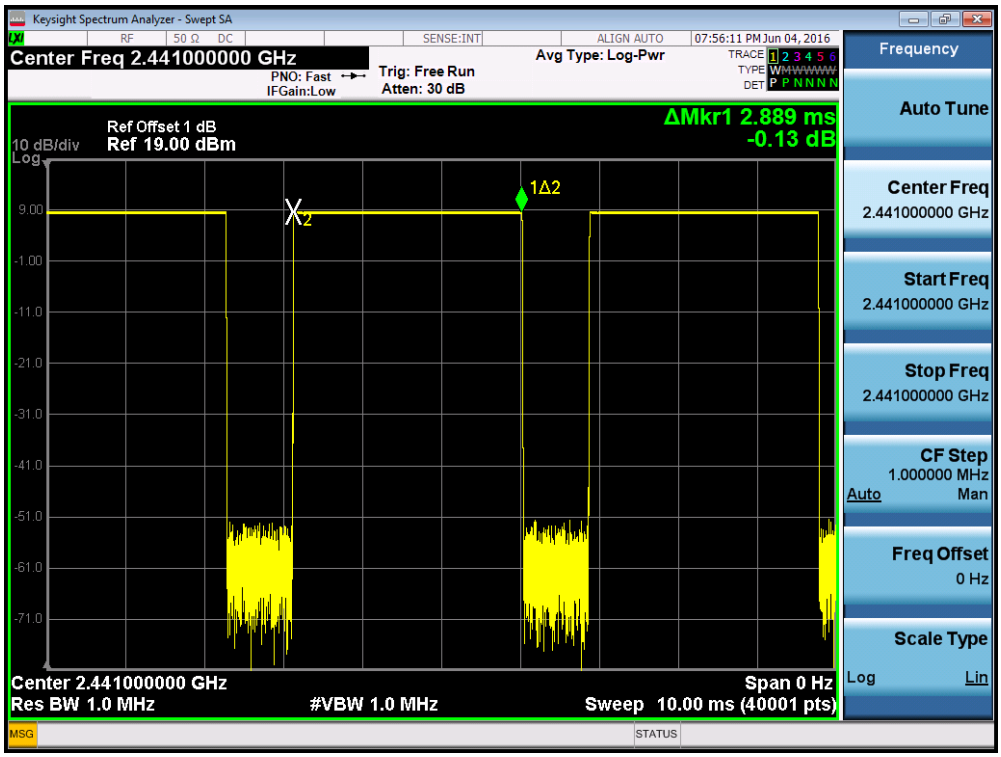
Product	:	Bluetooth headphone (Backbeat PRO 2)
Test Item	:	Time of Occupancy (Dwell Time)
Test Site	:	TR-8
Test Mode	:	Transmitter-1Mbps (GFSK_DH5)

Channel No.	Frequency (MHz)	Time of Occupancy (ms)	Limit (ms)	Result
39	2441	308.16	< 400	Pass

Test Time Period: 0.4*79=31.6sec.

- 2441MHz, The Maximum Occupancy Time Within 31.6sec:
  pulse time*(1600/(6*79)*31.6=308.16msec

Channel 39 (2441MHz) - (DH5)



9. Peak Output Power

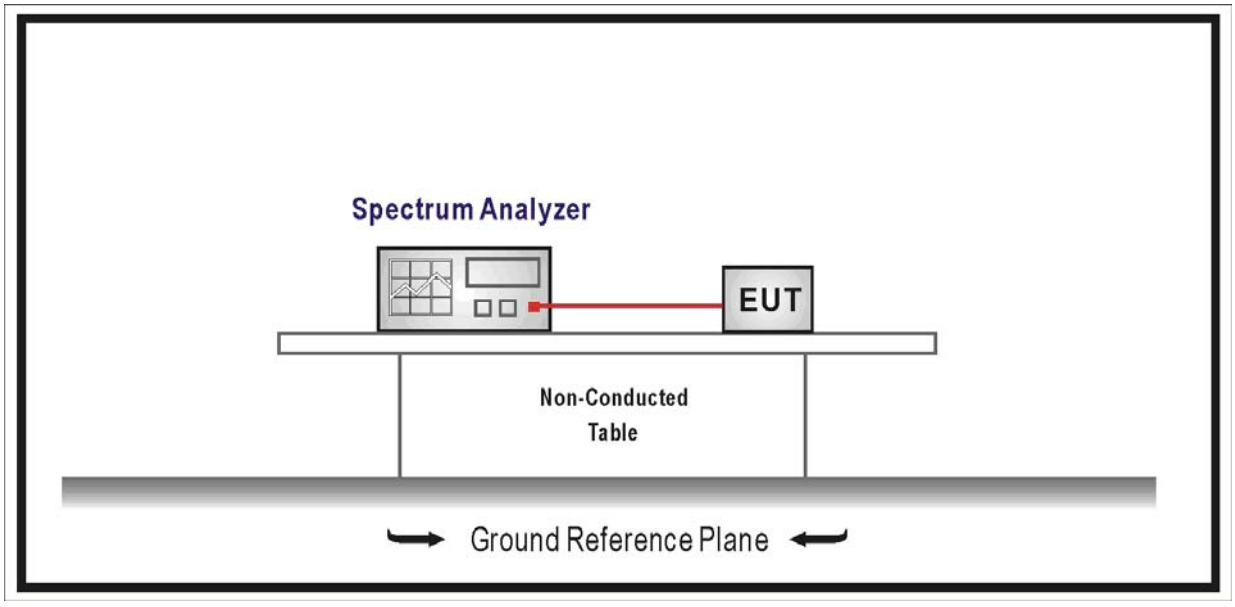
9.1. Test Equipment

Peak Output Power / TR-8

Instrument	Manufacturer	Type No.	Serial No.	Cal. Due Date
Spectrum Analyzer	Agilent	N9010A	MY48030494	2017.02.04
Temperature/Humidity Meter	Zhicheng	ZC1-2	TR8-TH	2017.04.03

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

9.2. Test Setup



9.3. 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.
- For frequency hopping systems operating in the 902-928 MHz band: 1 watt for systems employing at least 50 hopping channels; and, 0.25 watts for systems employing less than 50 hopping channels, but at least 25 hopping channels.

Note: the conducted output power limit specified above is based on the use the antennas with

directional gains that do not exceed 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values above, as appropriate, by the amount in dB that the directional gain of antenna exceeds 6 dBi.

9.4. Test Procedure

According to ANSI C63.10: 2013& ANSI C63.4: 2014

Use the following spectrum analyzer settings:
Span = approximately 5 times the 20dB bandwidth, centered on a hopping channel
RBW ＞ the 20 dB bandwidth of the emission being measured.
VBW ≧ RBW
Sweep = auto
Detector function = peak
Trace = max hold
Allow the trace to stabilize. Use the marker-to-peak function to set the marker to the peak of the emission. The indicated level is the peak output power (don't forget added the external attenuation and cable loss).

9.5. Uncertainty

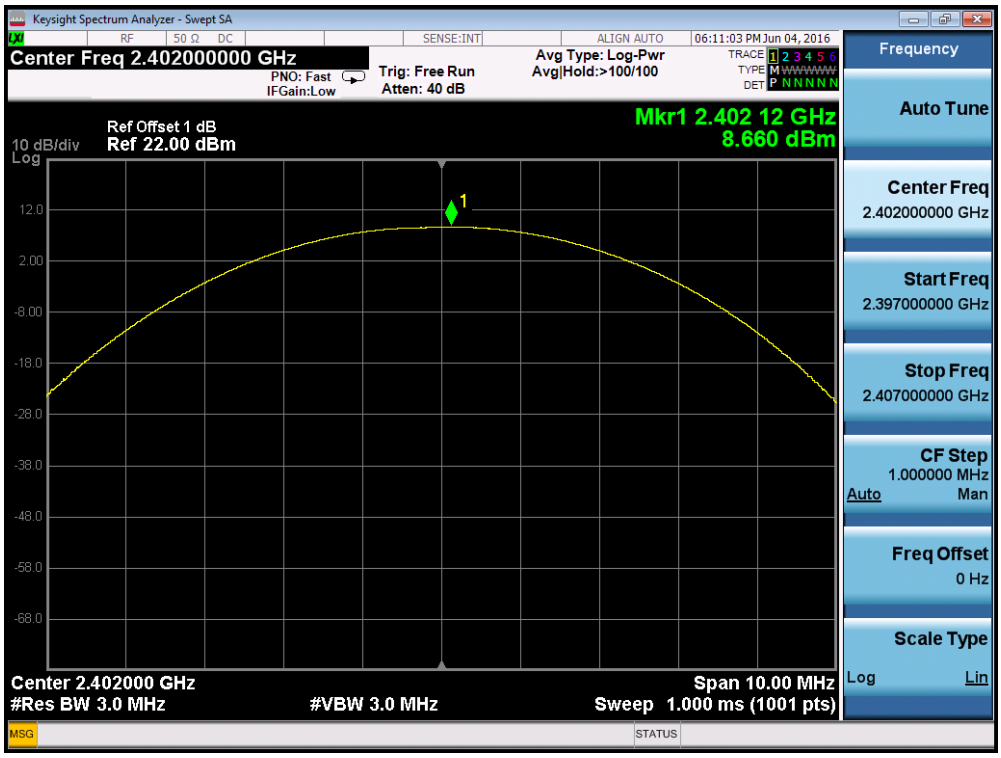
The measurement uncertainty is defined as ± 1.0 dB

9.6. Test Result

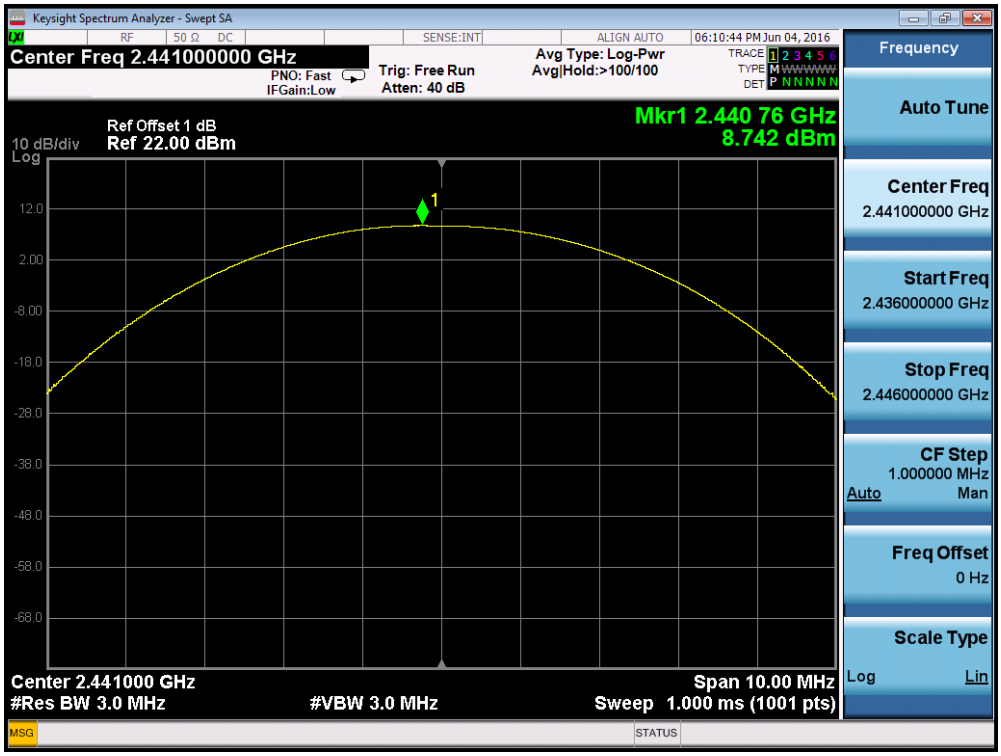
Product	:	Bluetooth headphone (Backbeat PRO 2)
Test Item	:	Power Output
Test Site	:	TR-8
Test Mode	:	Mode 1: Transmitter-1Mbps (GFSK_DH5)

Channel No.	Frequency (MHz)	Measurement Power Output (dBm)	Limit (dBm)	Result
0	2402	8.660	21.00	Pass
39	2441	8.742	21.00	Pass
78	2480	8.841	21.00	Pass

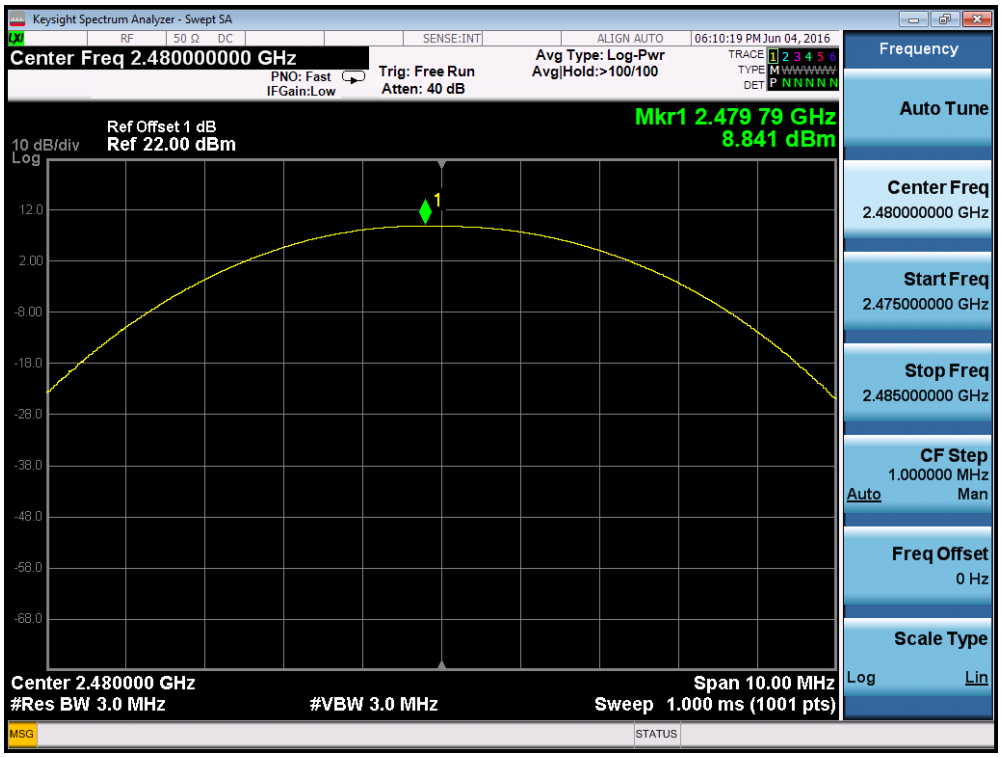
DH5 2402MHz



DH5 2441MHz



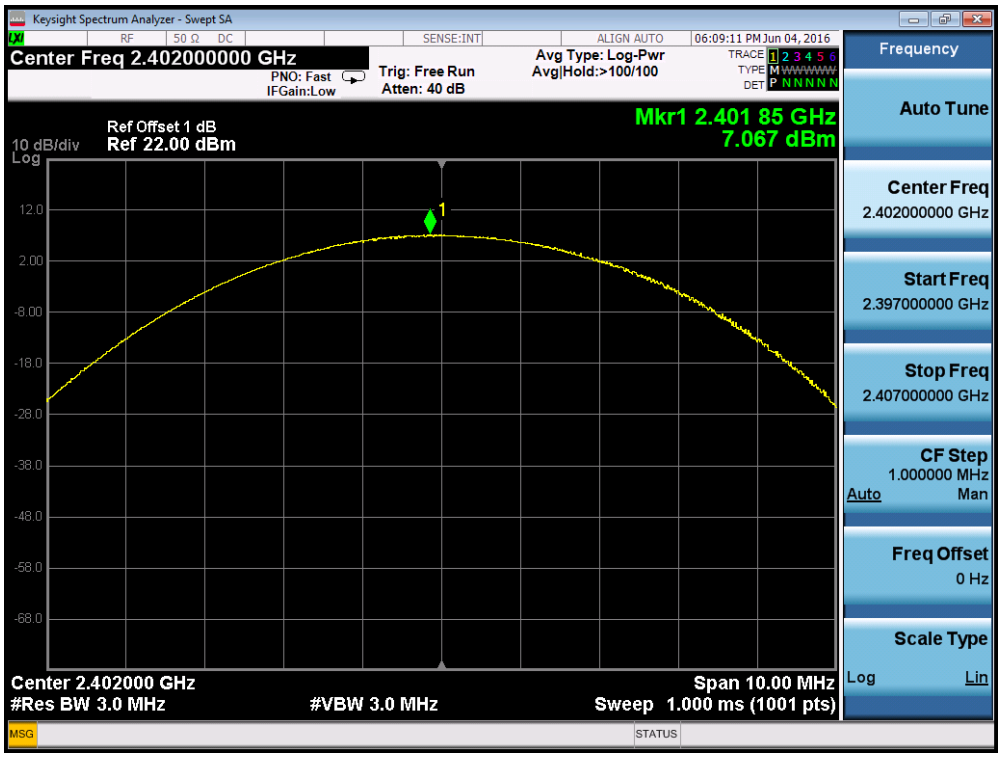
DH5 2480MHz



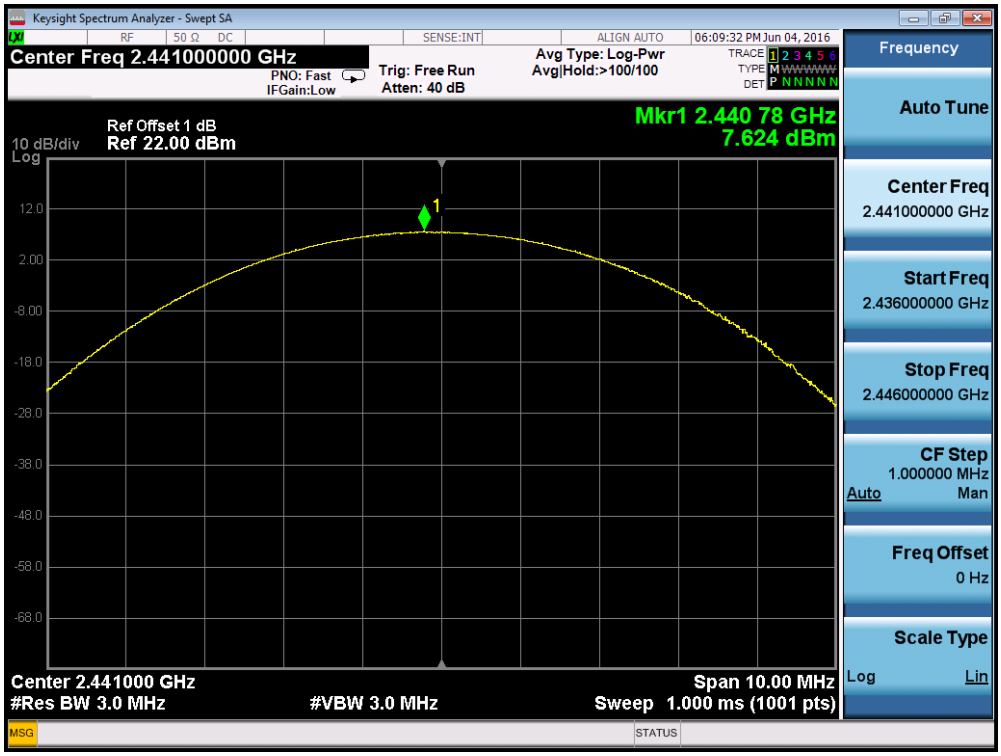
Product	:	Bluetooth headphone (Backbeat PRO 2)
Test Item	:	Power Output
Test Site	:	TR-8
Test Mode	:	Mode 2: Transmitter-2Mbps (Pi/4 DQPSK_DH5)

Channel No.	Frequency (MHz)	Measurement Power Output (dBm)	Limit (dBm)	Result
0	2402	7.067	21.00	Pass
39	2441	7.624	21.00	Pass
78	2480	7.795	21.00	Pass

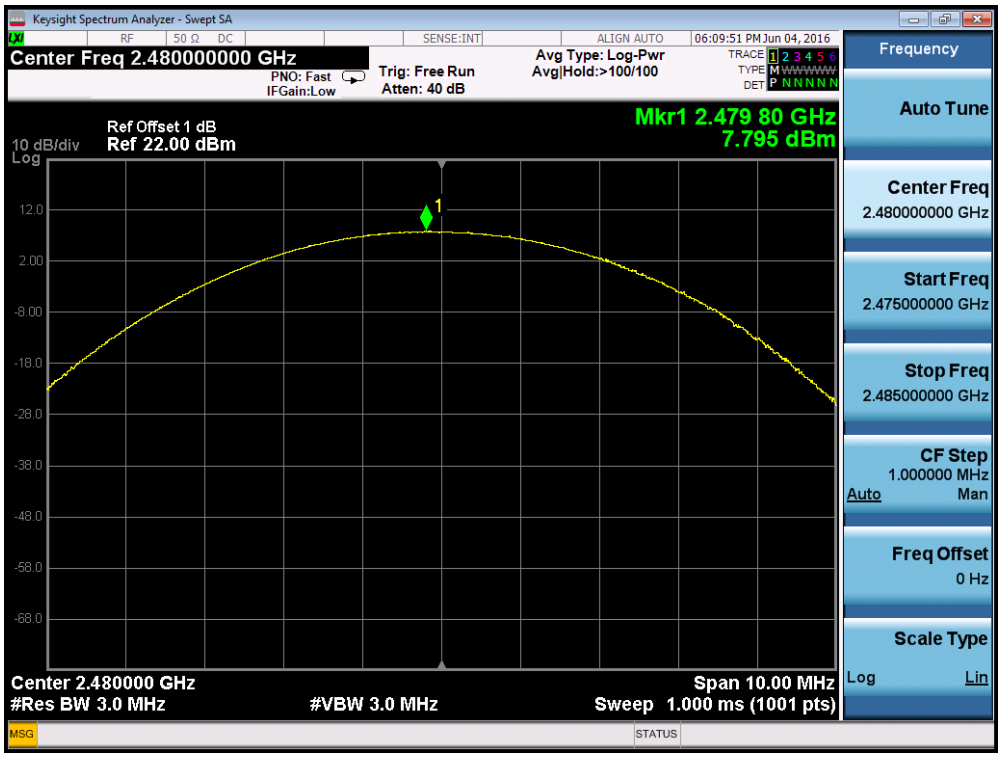
2DH5 2402MHz



2DH5 2441MHz



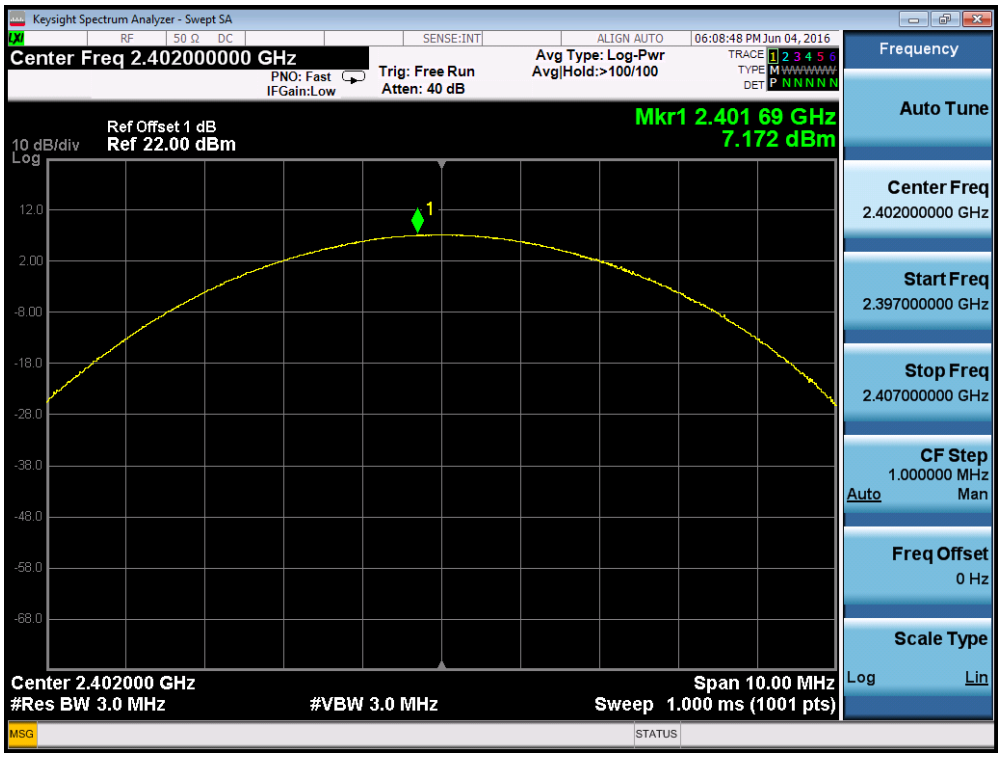
2DH5 2480MHz



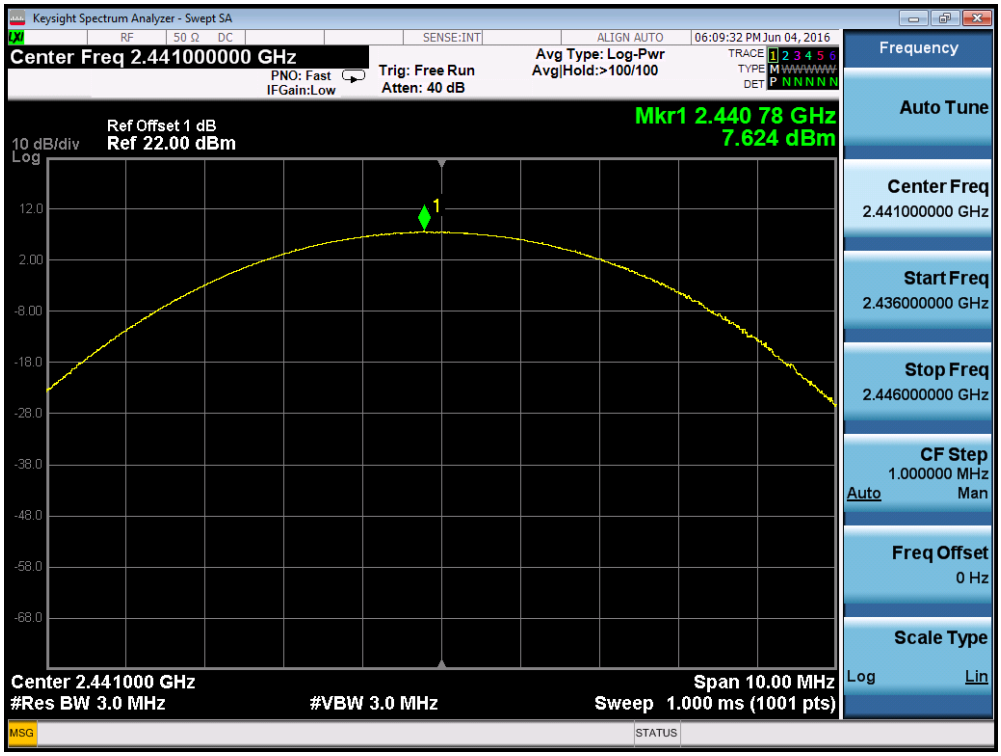
Product	:	Bluetooth headphone (Backbeat PRO 2)
Test Item	:	Power Output
Test Site	:	TR-8
Test Mode	:	Mode 3: Transmitter-3Mbps (8DPSK_DH5)

Channel No.	Frequency (MHz)	Measurement Power Output (dBm)	Limit (dBm)	Result
0	2402	7.172	21.00	Pass
39	2441	7.624	21.00	Pass
78	2480	7.875	21.00	Pass

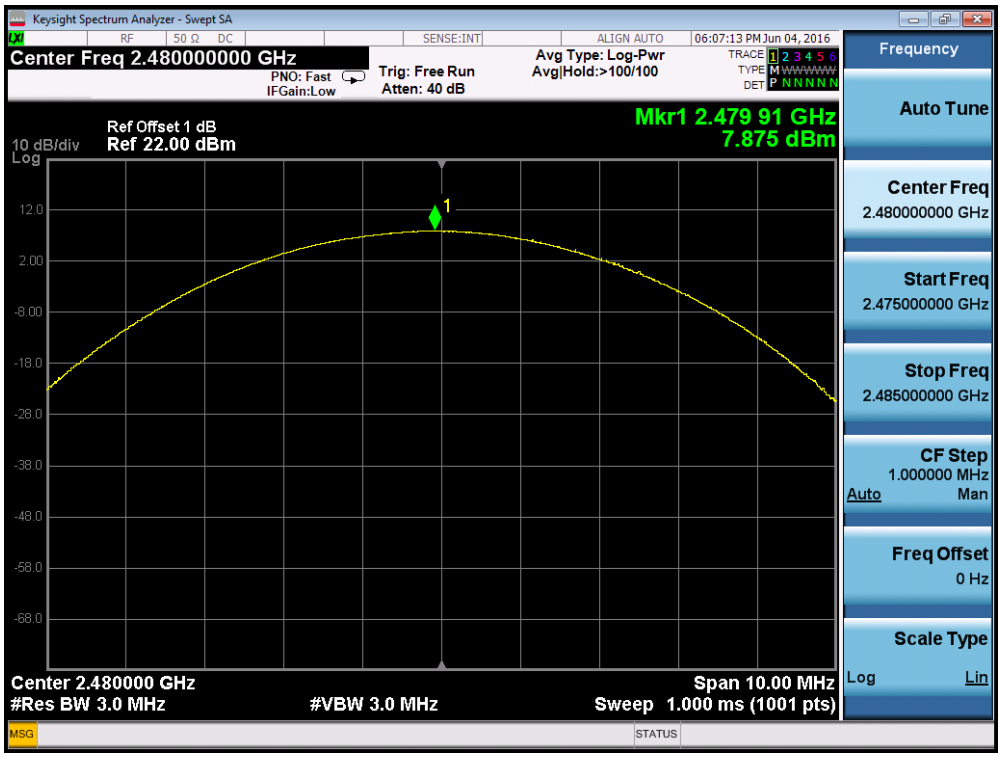
3DH5 2402MHz



3DH5 2441MHz



3DH5 2480MHz



10. Emissions in non-restricted frequency bands

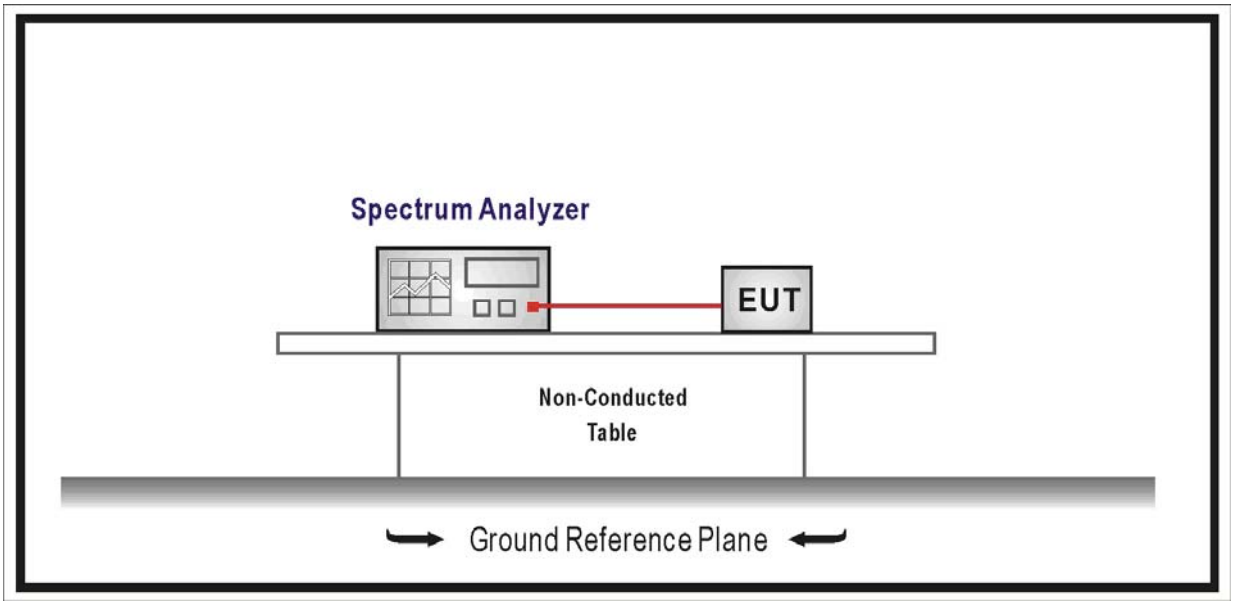
10.1. Test Equipment

Emissions in non-restricted frequency bands / TR-8

Instrument	Manufacturer	Type No.	Serial No.	Cal. Due Date
Spectrum Analyzer	Agilent	N9010A	MY48030494	2017.02.04
Temperature/Humidity Meter	Zhicheng	ZC1-2	TR8-TH	2017.04.03

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

10.2. Test Setup



10.3. Limit

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 a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted or a radiated 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) of FCC part 15 is not required.

10.4. Test Procedure

According to ANSI C63.10: 2013.
Use the following spectrum analyzer settings:
Span = wide enough to capture the peak level of the in-band emission and all spurious emissions (e.g., harmonics) from the lowest frequency generated in the EUT up through the 10^{th} harmonic. Typically, several plots are required to cover this entire span.
RBW = 100 kHz
VBW ≧ RBW
Sweep = auto
Detector function = peak
Trace = max hold
Allow the trace to stabilize. Set the marker on the peak of any spurious emission recorded. The level displayed must comply with the limit specified in this section.

10.5. Uncertainty

The measurement uncertainty is defined as ± 1.0 dB

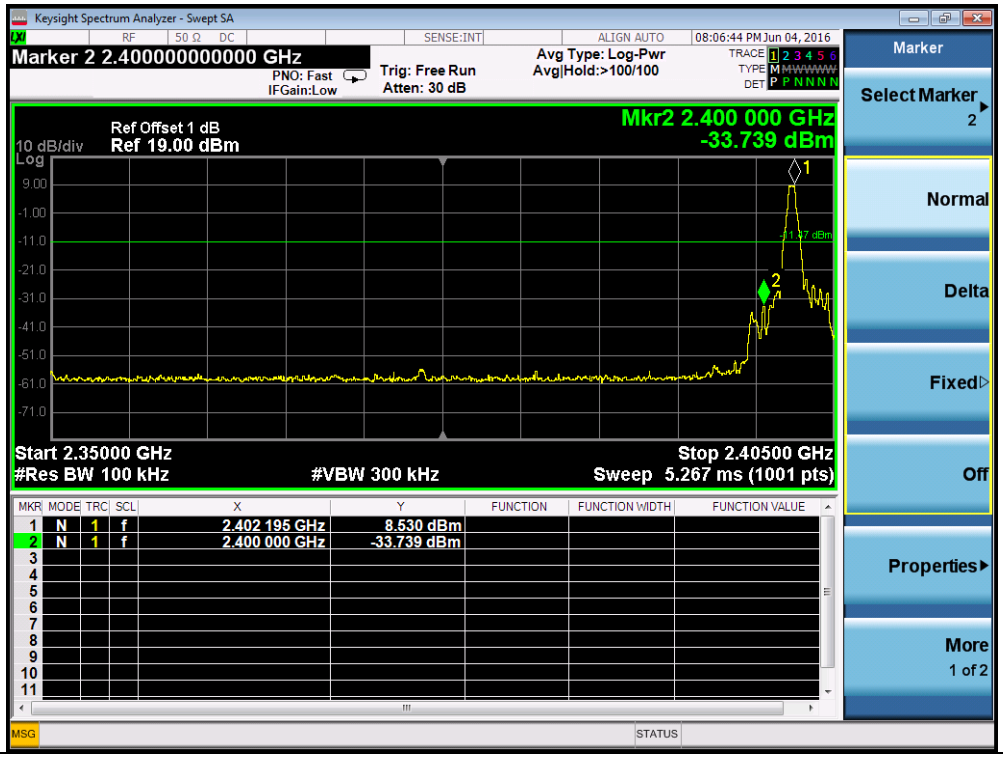
10.6. Test Result

Product	:	Bluetooth headphone (Backbeat PRO 2)
Test Item	:	Emissions in non-restricted frequency bands
Test Site	:	TR-8

Mode	Channel	Test Frequency (MHz)	In-Band PSD[a] (dBm/100kHz)	Frequency (MHz)	Out-Band PSD[b] (dBm/100kHz)	[a]-[b] (dB)	Limit (dB)	Result
1	00	2402	8.530	2400.00	-33.739	42.269	>20	Pass
1	78	2480	8.836	2483.50	-51.015	59.851	>20	Pass
2	00	2402	5.846	2400.00	-41.139	46.985	>20	Pass
2	78	2480	6.849	2483.50	-54.844	61.693	>20	Pass
3	00	2402	5.982	2400.00	-41.482	47.464	>20	Pass
3	78	2480	6.827	2483.50	-51.740	58.567	>20	Pass

Note: The worst case of Emissions in non-restricted frequency bands as below:

Mode 1 CH00(2402MHz)



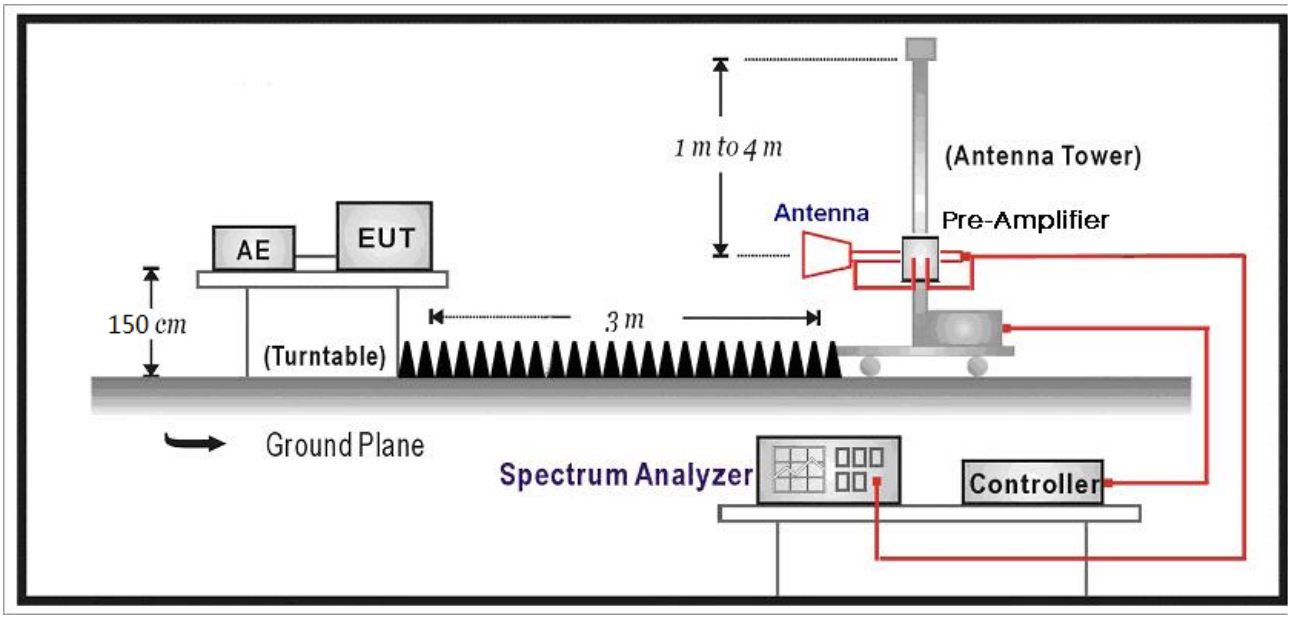
11. Radiated Emission Band Edge

11.1. Test Equipment

☒Radiated Emission Band Edge / AC-5

Instrument	Manufacturer	Type No.	Serial No.	Cal. Due Date
Spectrum Analyzer	Agilent	N9010A	MY48030494	2017.02.04
Preamplifier	Miteq	NSP1800-25	1364185	2017.05.03
Preamplifier	QuieTek	AP-040G	CHM-0906001	2017.05.03
Bilog Antenna	Teseq GmbH	CBL6112D	27612	2016.10.15
Broad-Band Horn Antenna	Schwarzbeck	BBHA9120D	733	2017.02.26
DRG Horn	ETS-Lindgren	3117	00167055	2016.07.16
Broad-Band Horn Antenna	Schwarzbeck	BBHA9170	294	2017.03.01
Coaxial Cable	Huber+Suhner	SUCOFLEX 106	AC5-C1	2017.03.01
Coaxial Cable	Huber+Suhner	SUCOFLEX 106	AC5-C2	2017.03.01
Coaxial Cable	Huber+Suhner	SUCOFLEX 102	AC5-C3	2016.08.07
Temperature/Humidity Meter	Zhicheng	ZC1-2	AC5-TH	2017.01.04

11.2. Test Setup



11.3. Limit

Radiated emissions which fall in the restricted bands, as defined in Section 15.205(a) of FCC part 15, must also comply with the radiated emission limits specified in Section 15.209(a) of FCC part 15.

11.4. Test Procedure

According to ANSI C63.10: 2013& ANSI C63.4: 2014

This test is required for any spurious emission or modulation product that falls in a Restricted Band, as defined in Section 15.205 of FCC part 15. It must be performed with the highest gain of each type of antenna proposed for use with the EUT. Use the following spectrum analyzer settings:

Span = wide enough to fully capture the emission being measured

RBW = 1 MHz for f ≧ 1 GHz, 100 kHz for f < 1GHz

VBW ≧ RBW

Sweep = auto

Detector function = peak

Trace = max hold

Follow the guidelines in ANSI C63.4 with respect to maximizing the emission by rotating the EUT, measuring the emission while the EUT is situated in three orthogonal planes (if appropriate), adjusting the measurement antenna height and polarization, etc. A pre-amp and a high pass filter are required for this test, in order to provide the measuring system with

sufficient sensitivity. Allow the trace to stabilize. The peak reading of the emission, after being corrected by the antenna factor, cable loss, pre-amp gain, etc., is the peak field strength, which must comply with the limit specified in Section 15.35(b) of FCC part 15.
Now set the VBW to 10 Hz, while maintaining all of the other instrument settings. This peak level, once corrected, must comply with the limit specified in Section 15.209 of FCC Part 15. If the dwell time per channel of the hopping signal is less than 100 ms, then the reading obtained with the 10 Hz VBW may be further adjusted by a “duty cycle correction factor”, derived from 20log (dwell time/100 ms), in an effort to demonstrate compliance with the 15.209 limit of FCC part 15.
If the emission on which a radiated measurement must be made is located at the edge of the authorized band of operation, then the alternative “marker-delta” method may be employed.

11.5. Uncertainty

The measurement uncertainty above 1G is defined as ± 3.9 dB
below 1G is defined as ± 3.8 dB

11.6. Test Result

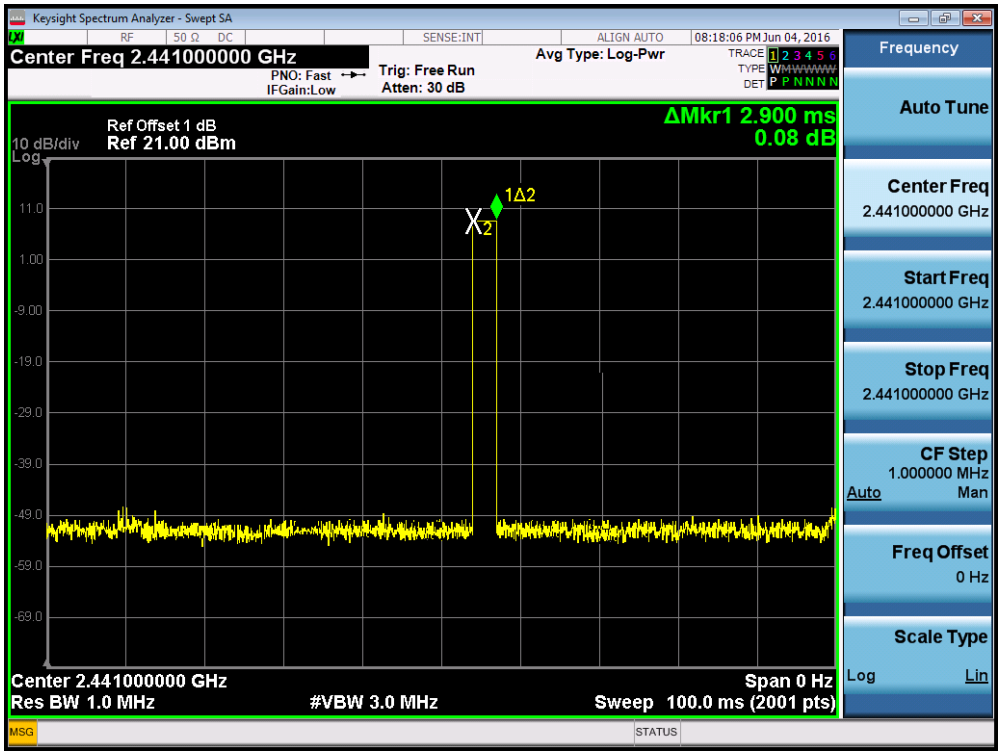
All of the test result shown indicates the worst case, and spectrum analyzer parameters setting as shown below:

Peak detector: RBW = 1MHz, VBW = 3MHz, sweep time = 200ms;

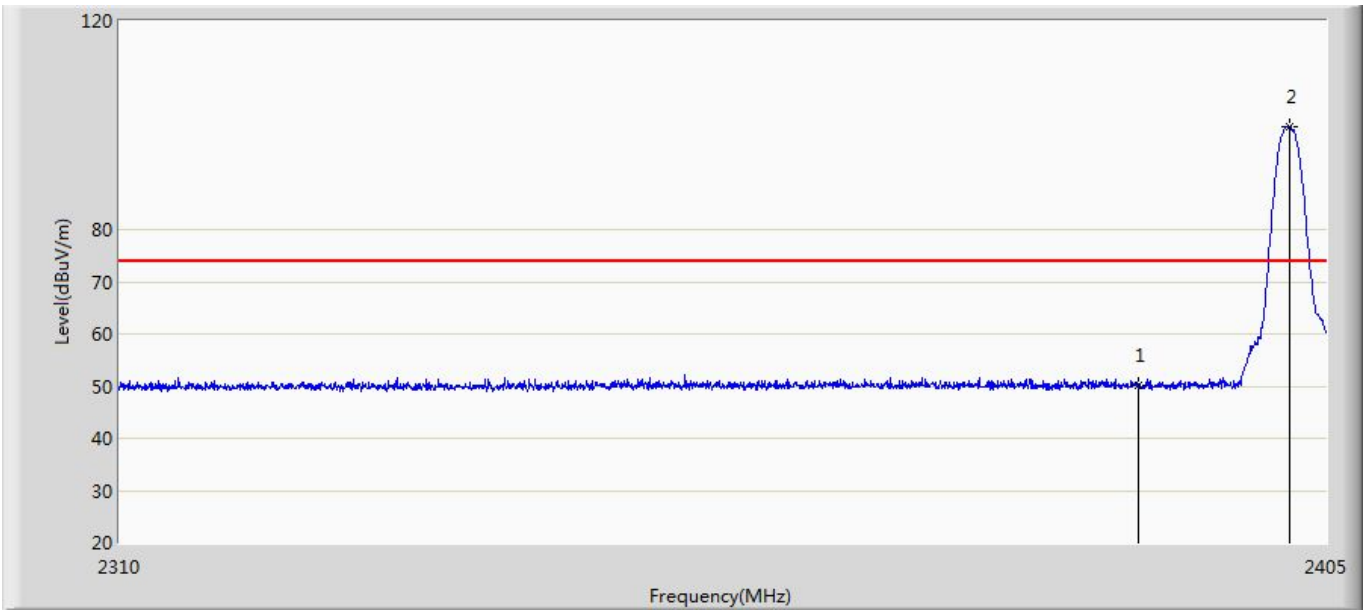
Average = Peak Measure Level+ Duty Factor

Duty Factor= 20*LOG(Pulse Number*On Time/100)= -30.75dB in worst condition in normal use.

Pulse Number



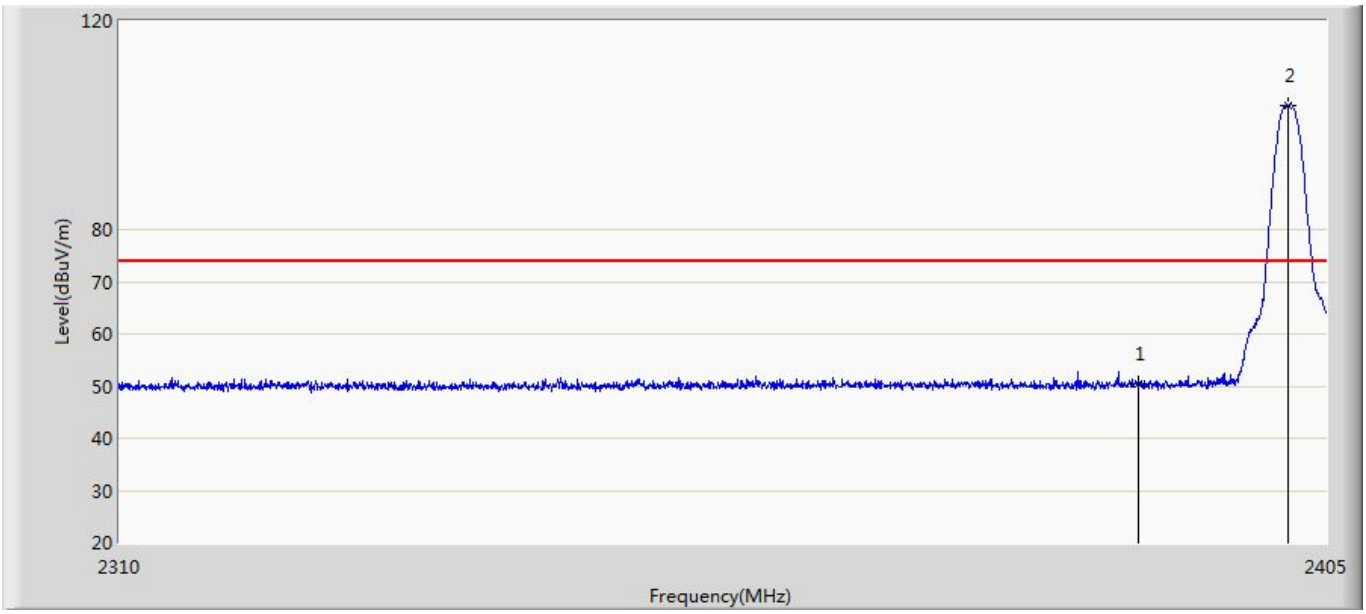
Engineer: Eric	
Site: AC5	Time: 2016/06/13 - 20:42
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00167055(1-18GHz)	Polarity: Horizontal
EUT: Bluetooth headphone (Backbeat PRO 2)	Power: By Battery
Note: Mode 1:Transmit at 2402MHz By DH5	



No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		2390.000	50.263	12.032	-23.737	74.000	38.231	PK
2	*	2402.103	99.670	61.381	N/A	N/A	38.289	PK

No	Mark	Frequency (MHz)	Peak Level (dBuV/m)	AV Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Duty Factor (dB)	Type
1		2390.000	50.263	19.513	-34.487	54.000	-30.75	AV
2		2402.008	99.670	68.92	N/A	N/A	-30.75	AV

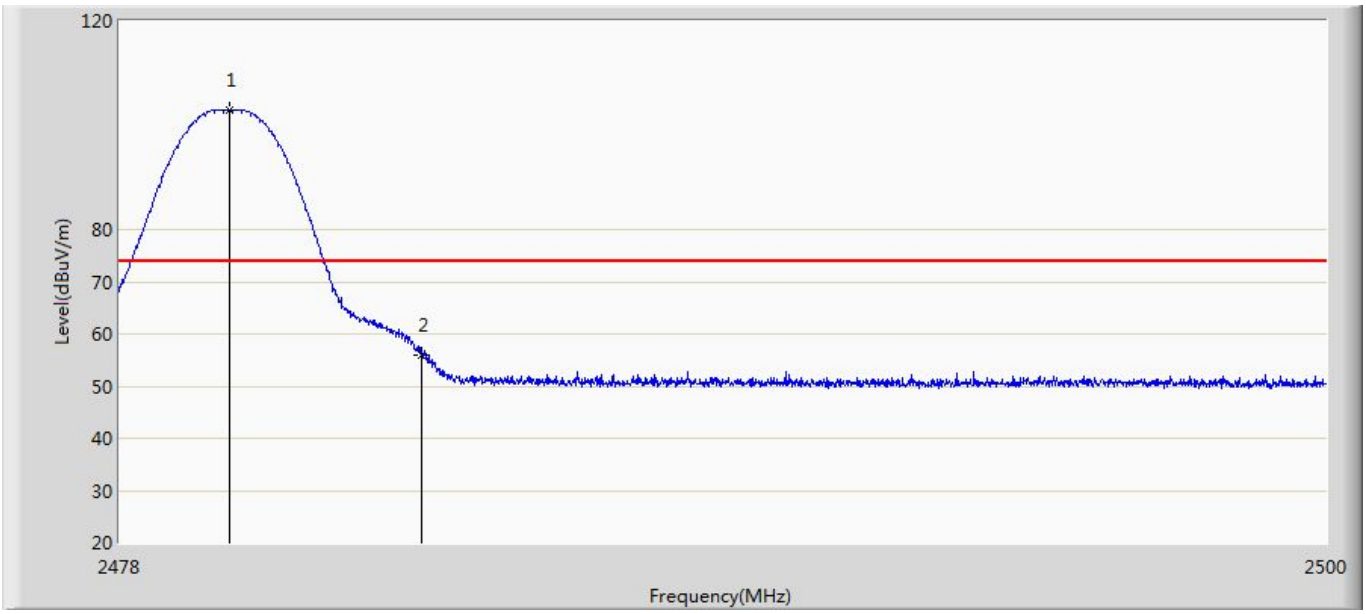
Engineer: Eric	
Site: AC5	Time: 2016/06/13 - 20:44
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00167055(1-18GHz)	Polarity: Vertical
EUT: Bluetooth headphone (Backbeat PRO 2)	Power: By Battery
Note: Mode 1:Transmit at 2402MHz By DH5	



No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		2390.000	50.441	12.210	-23.559	74.000	38.231	PK
2	*	2402.000	103.861	65.573	N/A	N/A	38.288	PK

No	Mark	Frequency (MHz)	Peak Level (dBuV/m)	AV Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Duty Factor (dB)	Type
1		2390.000	50.441	19.691	-34.309	54.000	-30.75	AV
2		2402.008	103.861	73.111	N/A	N/A	-30.75	AV

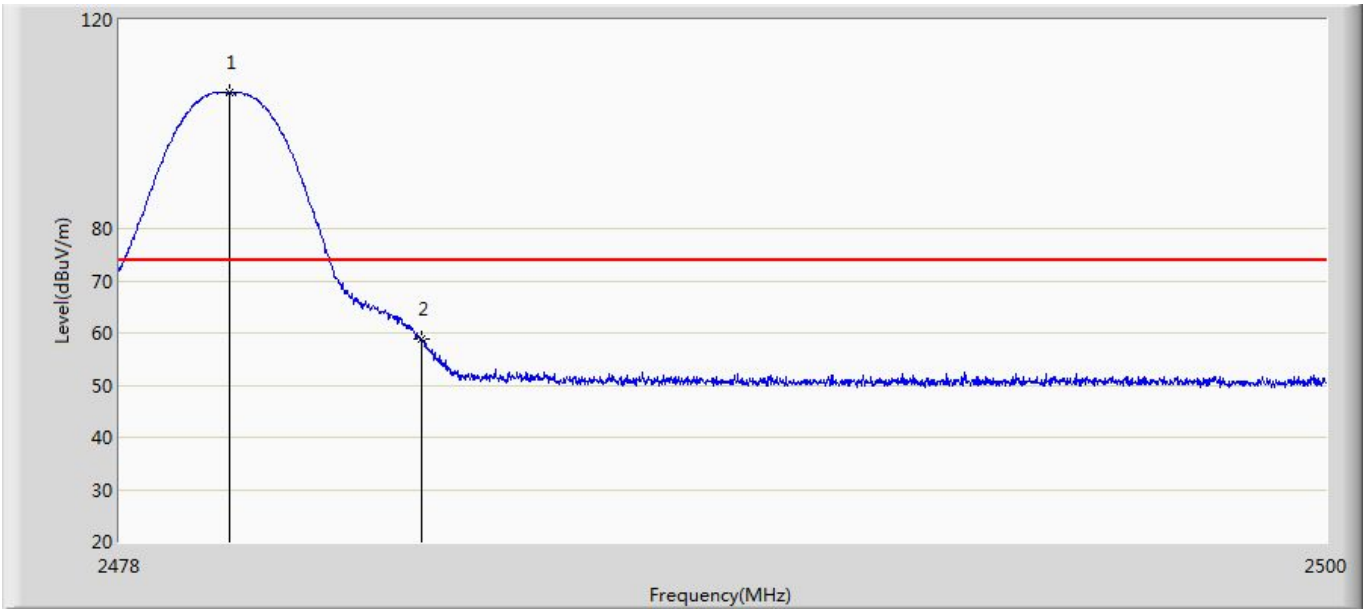
Engineer: Eric	
Site: AC5	Time: 2016/06/13 - 20:47
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00167055(1-18GHz)	Polarity: Horizontal
EUT: Bluetooth headphone (Backbeat PRO 2)	Power: By Battery
Note: Mode 1:Transmit at 2480MHz By DH5	



No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1	*	2480.000	102.948	64.466	N/A	N/A	38.481	PK
2		2483.500	55.824	17.332	-18.176	74.000	38.492	PK

No	Mark	Frequency (MHz)	Peak Level (dBuV/m)	AV Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Duty Factor (dB)	Type
1		2390.000	102.948	72.198	N/A	N/A	-30.75	AV
2		2402.008	55.824	25.074	-28.926	54.000	-30.75	AV

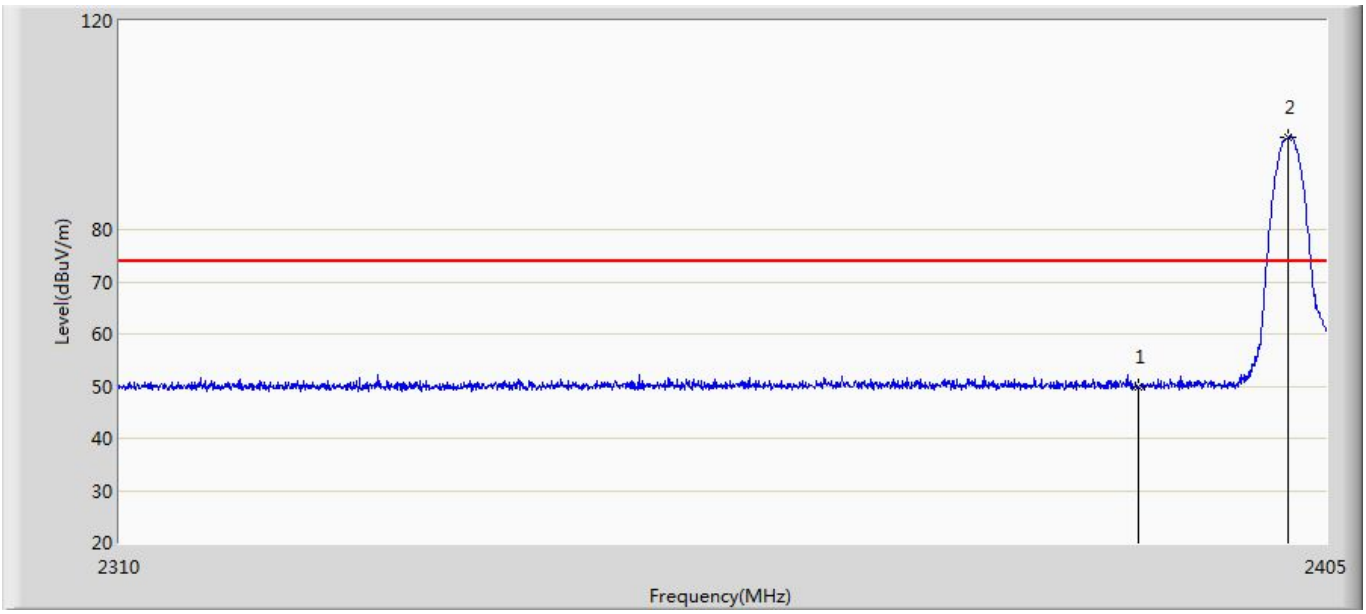
Engineer: Eric	
Site: AC5	Time: 2016/06/13 - 20:49
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00167055(1-18GHz)	Polarity: Vertical
EUT: Bluetooth headphone (Backbeat PRO 2)	Power: By Battery
Note: Mode 1:Transmit at 2480MHz By DH5	



No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1	*	2480.000	106.005	67.523	N/A	N/A	38.481	PK
2		2483.500	58.863	20.371	-15.137	74.000	38.492	PK

No	Mark	Frequency (MHz)	Peak Level (dBuV/m)	AV Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Duty Factor (dB)	Type
1		2390.000	106.005	75.255	N/A	N/A	-30.75	AV
2		2402.008	58.863	28.113	-25.887	54.000	-30.75	AV

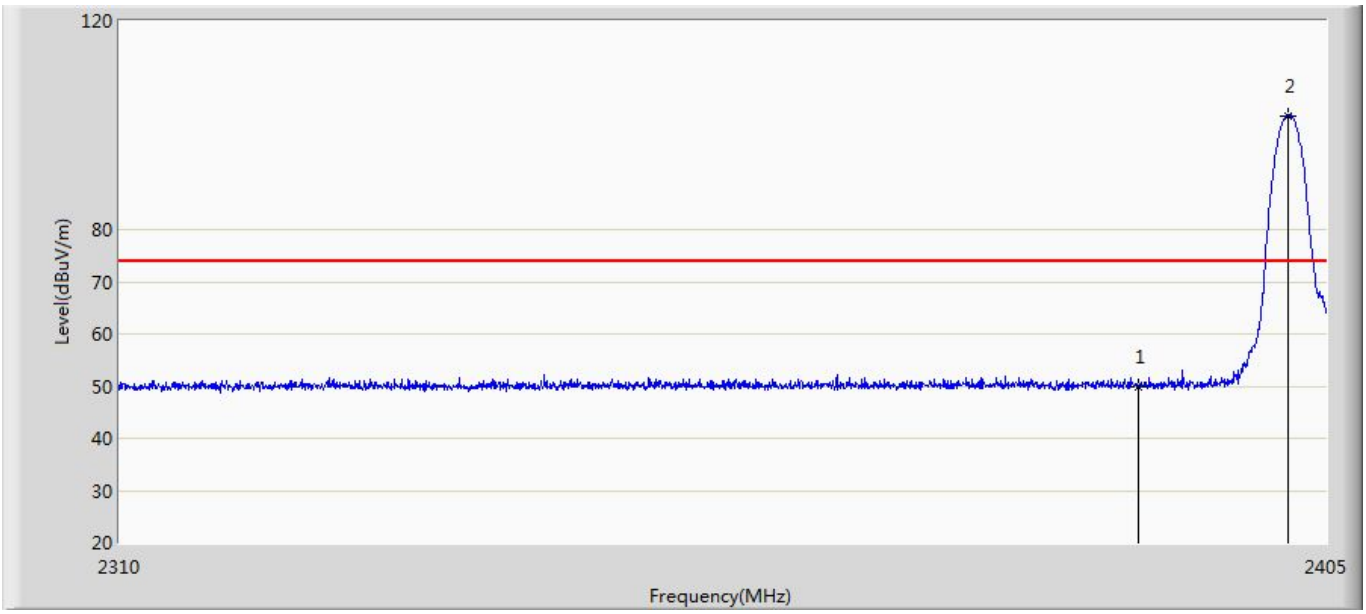
Engineer: Eric	
Site: AC5	Time: 2016/06/13 - 20:52
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00167055(1-18GHz)	Polarity: Horizontal
EUT: Bluetooth headphone (Backbeat PRO 2)	Power: By Battery
Note: Mode 1:Transmit at 2402MHz By 2DH5	



No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		2390.000	49.955	11.724	-24.045	74.000	38.231	PK
2	*	2402.000	97.647	59.359	N/A	N/A	38.288	PK

No	Mark	Frequency (MHz)	Peak Level (dBuV/m)	AV Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Duty Factor (dB)	Type
1		2390.000	49.955	19.205	-34.795	54.000	-30.75	AV
2		2402.008	97.647	66.897	N/A	N/A	-30.75	AV

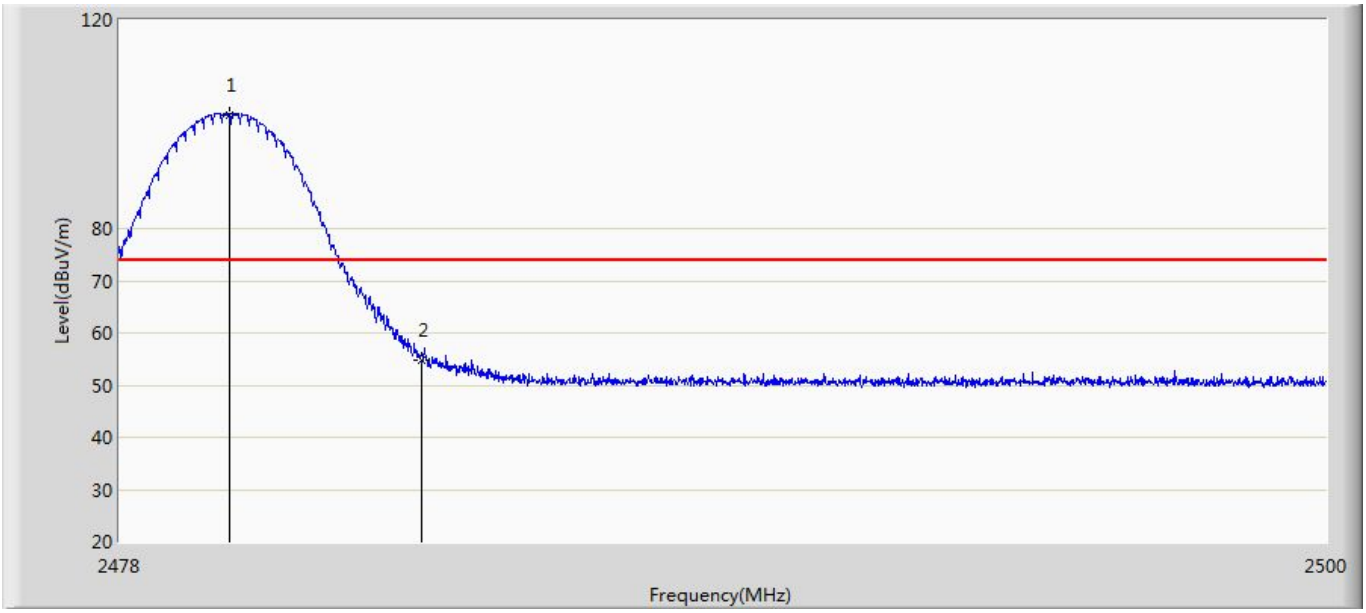
Engineer: Eric	
Site: AC5	Time: 2016/06/13 - 20:54
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00167055(1-18GHz)	Polarity: Vertical
EUT: Bluetooth headphone (Backbeat PRO 2)	Power: By Battery
Note: Mode 1:Transmit at 2402MHz By 2DH5	



No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		2390.000	49.865	11.634	-24.135	74.000	38.231	PK
2	*	2402.000	101.834	63.546	N/A	N/A	38.288	PK

No	Mark	Frequency (MHz)	Peak Level (dBuV/m)	AV Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Duty Factor (dB)	Type
1		2390.000	49.865	19.115	-34.885	54.000	-30.75	AV
2		2402.008	101.834	71.084	N/A	N/A	-30.75	AV

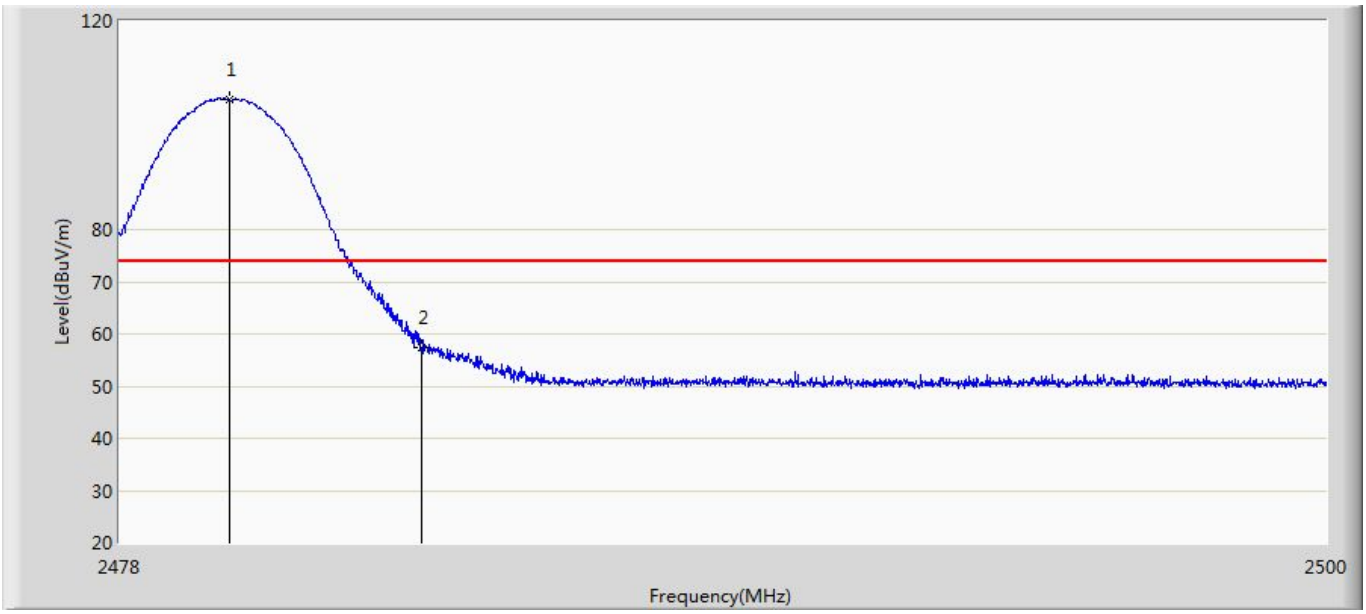
Engineer: Eric	
Site: AC5	Time: 2016/06/13 - 20:57
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00167055(1-18GHz)	Polarity: Horizontal
EUT: Bluetooth headphone (Backbeat PRO 2)	Power: By Battery
Note: Mode 1:Transmit at 2480MHz By 2DH5	



No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1	*	2480.000	101.883	63.401	N/A	N/A	38.481	PK
2		2483.500	54.758	16.266	-19.242	74.000	38.492	PK

No	Mark	Frequency (MHz)	Peak Level (dBuV/m)	AV Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Duty Factor (dB)	Type
1		2390.000	101.883	71.133	N/A	N/A	-30.75	AV
2		2402.008	54.758	24.008	-29.992	54.000	-30.75	AV

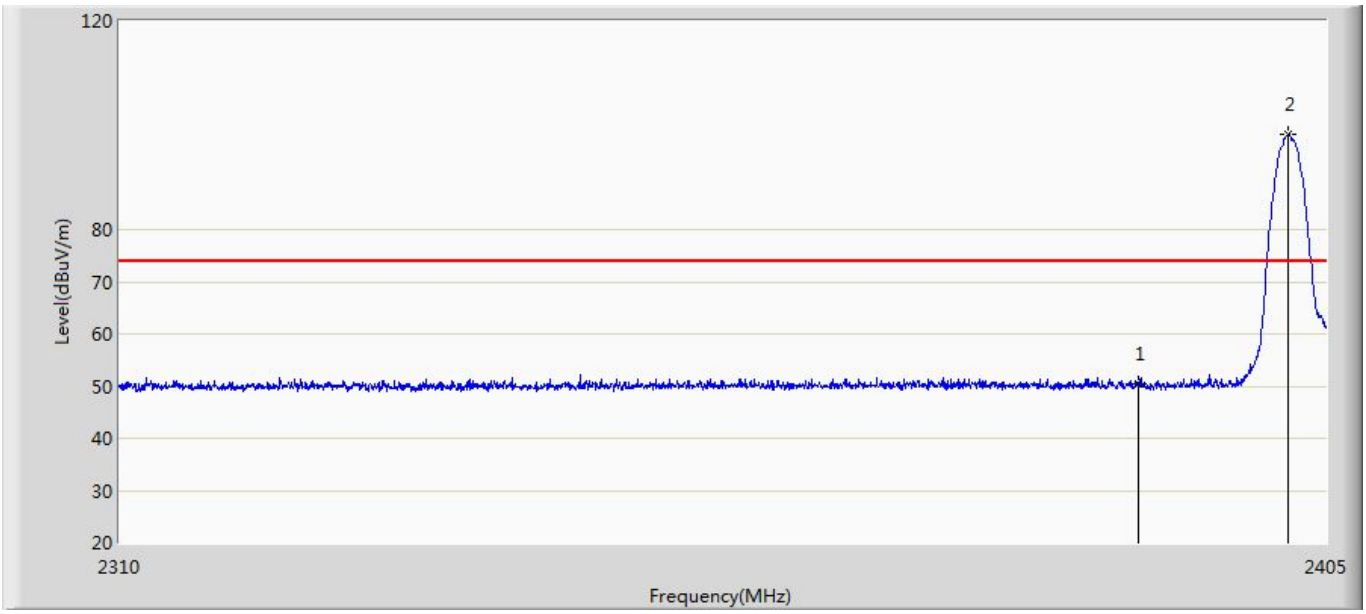
Engineer: Eric	
Site: AC5	Time: 2016/06/13 - 20:59
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00167055(1-18GHz)	Polarity: Vertical
EUT: Bluetooth headphone (Backbeat PRO 2)	Power: By Battery
Note: Mode 1:Transmit at 2480MHz By 2DH5	



No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1	*	2480.000	104.912	66.430	N/A	N/A	38.481	PK
2		2483.500	57.292	18.800	-16.708	74.000	38.492	PK

No	Mark	Frequency (MHz)	Peak Level (dBuV/m)	AV Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Duty Factor (dB)	Type
1		2390.000	104.912	74.162	N/A	N/A	-30.75	AV
2		2402.008	57.292	26.542	-27.458	54.000	-30.75	AV

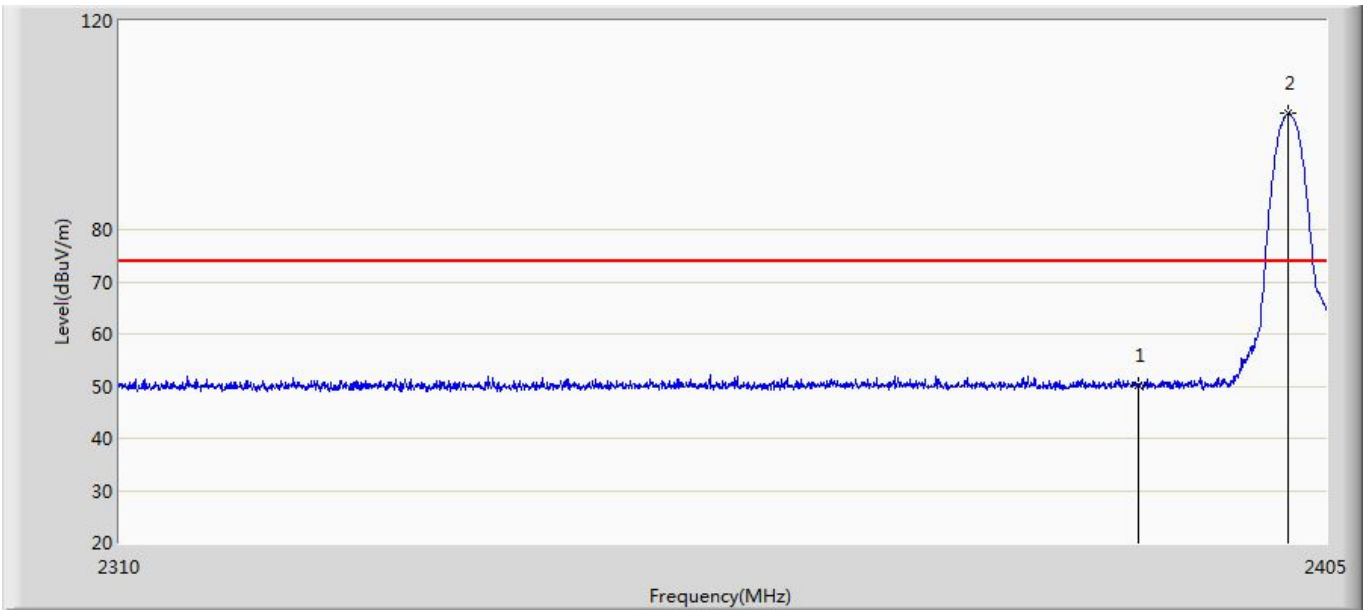
Engineer: Eric	
Site: AC5	Time: 2016/06/13 - 21:01
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00167055(1-18GHz)	Polarity: Horizontal
EUT: Bluetooth headphone (Backbeat PRO 2)	Power: By Battery
Note: Mode 1:Transmit at 2402MHz By 3DH5	



No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		2390.000	50.338	12.107	-23.662	74.000	38.231	PK
2	*	2402.000	98.182	59.894	N/A	N/A	38.288	PK

No	Mark	Frequency (MHz)	Peak Level (dBuV/m)	AV Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Duty Factor (dB)	Type
1		2390.000	50.338	19.588	-34.412	54.000	-30.75	AV
2		2402.008	98.182	67.432	N/A	N/A	-30.75	AV

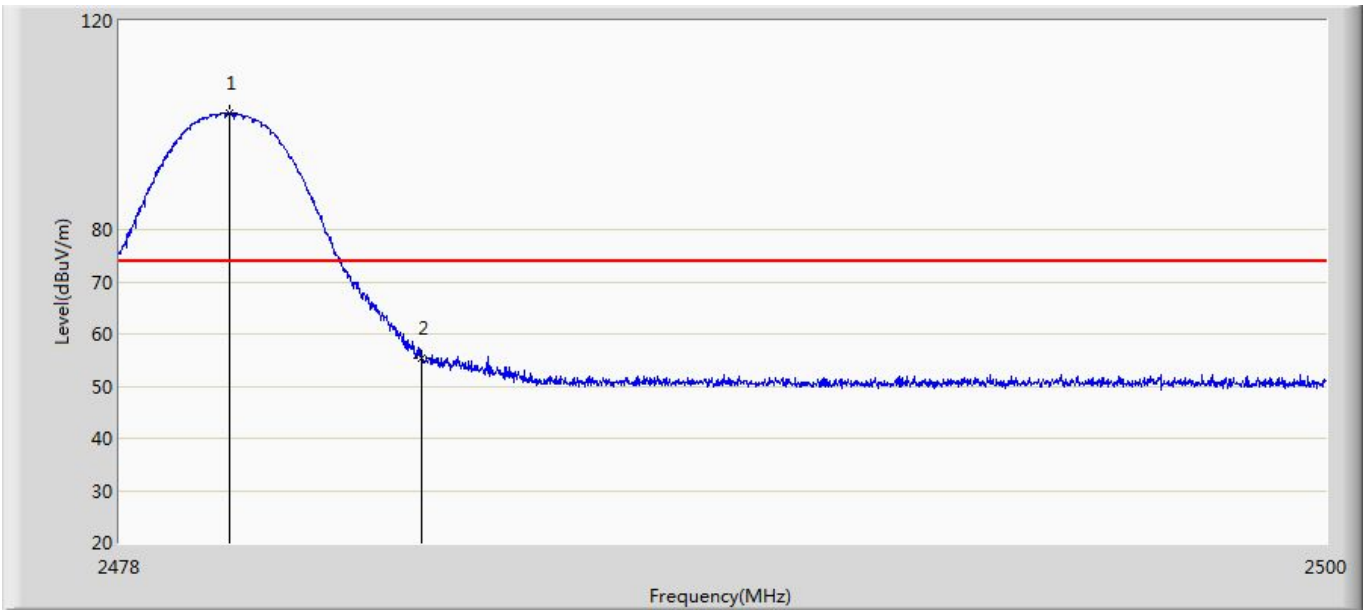
Engineer: Eric	
Site: AC5	Time: 2016/06/13 - 21:03
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00167055(1-18GHz)	Polarity: Vertical
EUT: Bluetooth headphone (Backbeat PRO 2)	Power: By Battery
Note: Mode 1:Transmit at 2402MHz By 3DH5	



No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		2390.000	50.236	12.005	-23.764	74.000	38.231	PK
2	*	2402.000	102.279	63.991	N/A	N/A	38.288	PK

No	Mark	Frequency (MHz)	Peak Level (dBuV/m)	AV Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Duty Factor (dB)	Type
1		2390.000	50.236	19.486	-34.514	54.000	-30.75	AV
2		2402.008	102.279	71.529	N/A	N/A	-30.75	AV

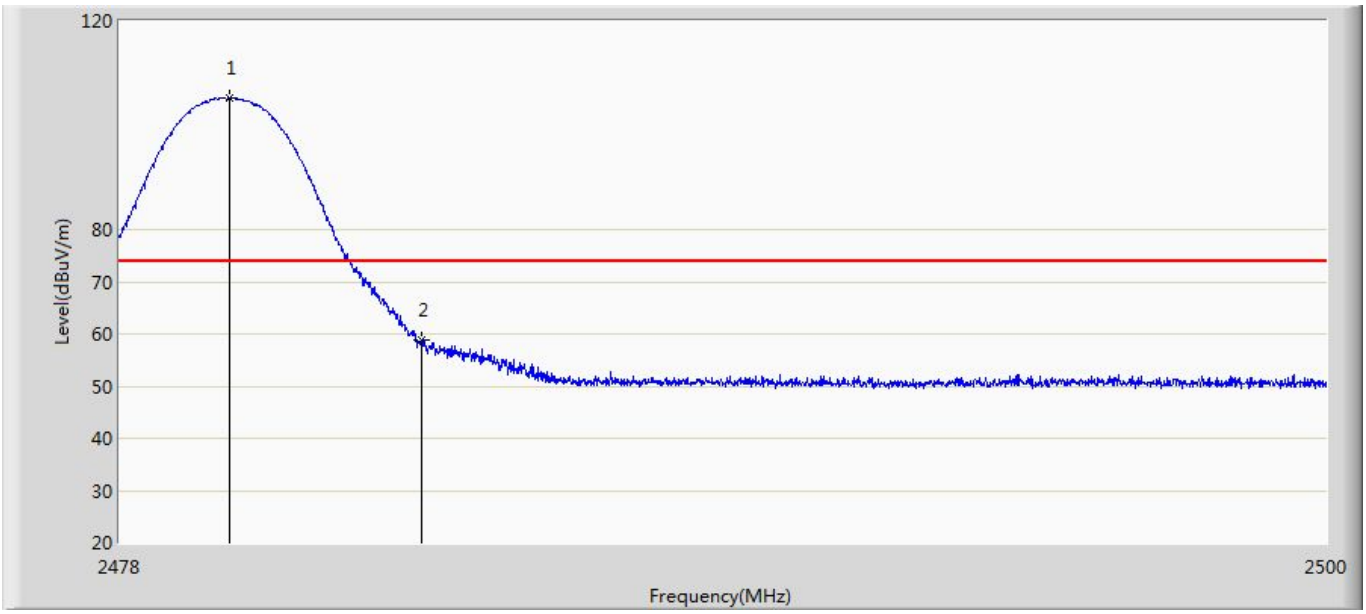
Engineer: Eric	
Site: AC5	Time: 2016/06/13 - 21:05
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00167055(1-18GHz)	Polarity: Horizontal
EUT: Bluetooth headphone (Backbeat PRO 2)	Power: By Battery
Note: Mode 1:Transmit at 2480MHz By 3DH5	



No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1	*	2480.000	102.259	63.777	N/A	N/A	38.481	PK
2		2483.500	55.432	16.940	-18.568	74.000	38.492	PK

No	Mark	Frequency (MHz)	Peak Level (dBuV/m)	AV Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Duty Factor (dB)	Type
1	*	2390.000	102.259	71.509	N/A	N/A	-30.75	AV
2		2402.008	55.432	24.682	-29.318	54.000	-30.75	AV

Engineer: Eric	
Site: AC5	Time: 2016/06/13 - 21:07
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00167055(1-18GHz)	Polarity: Vertical
EUT: Bluetooth headphone (Backbeat PRO 2)	Power: By Battery
Note: Mode 1:Transmit at 2480MHz By 3DH5	



No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1	*	2480.000	105.253	66.771	N/A	N/A	38.481	PK
2		2483.500	58.883	20.391	-15.117	74.000	38.492	PK

No	Mark	Frequency (MHz)	Peak Level (dBuV/m)	AV Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Duty Factor (dB)	Type
1	*	2390.000	105.253	74.503	N/A	N/A	-30.75	AV
2		2402.008	58.883	28.133	-25.867	54.000	-30.75	AV

The End