FCC TEST REPORT

Prepared For :	ARCTIC (HK) Ltd
Product Name:	P324BT Bluetooth Headphones with Microphone
Model :	P324BT
Prepared By :	Shenzhen United Testing Technology Co., Ltd. 4F, Block B Unit 2, Jianxing Building, Chaguang Industry Area, Nanshan District, Shenzhen, China Tel: 86-755-86180996 Fax: 86-755-86180156
Test Date:	November 01, 2014 to November 16, 2014
Date of Report :	November 16, 2014
Report No.:	UNI-1411006-02

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1 TEST CERTIFICATION

Product:	**P324BT Bluetooth Headphones with Microphone**
Model:	**P324BT**
Applicant:	**ARCTIC (HK) Ltd** **Unit 2304 | Nina Tower 2 | 8 Yeung Uk Road | Hong Kong**
Factory:	**Cyber Blue(HK) Ltd** **12th Floor, Guanghao International Building, Meilong Road, Longhua District, Shenzhen, China**
Trade Mark:	**Arctic**
Tested:	**November 01, 2014 to November 16, 2014**
Test Voltage:	**DC3.7V Powered Li-Po Battery**
Operational Frequency Range:	**Bluetooth: 2402-2480MHz**
Modulation Type:	**Bluetooth LE: GFSK**
Number of Channel	**40 Channels for Bluetooth**
Bluetooth Version:	**4.0**
Antenna:	**PCB antenna with Gain 2.0 dBi**
FCC ID:	**Z3AP324BT**
Applicable Standards:	**FCC Part 15.247**

The test report was prepared by Shenzhen United Testing Technology Co., Ltd.and found compliance with the requirements set forth in the technical standards mentioned above. The results of testing in this report apply only to the product/system, which was tested. Other similar equipment will not necessarily produce the same results due to production tolerance and measurement uncertainties.

Prepared by : Michael Su

Michael Su /Assistant Engineer

Reviewer : Mike Yong

Mike Yong/Supervisor

Approved & Authorized Signer : Hoffer Lau

Hoffer Lau/ Manager

2.0 Test Eqipment

Item	Test Equipment	Manufacturer	Model No.	Cal.Date (mm-dd-yy)	Cal.Due date (mm-dd-yy)
1	3m Semi- Anechoic Chamber	ZhongYu Electron	9.2(L)*6.2(W)* 6.4(H)	June. 30 2014	June. 29 2015
2	Control Room	ZhongYu Electron	6.2(L)*2.5(W)* 2.4(H)	N/A	N/A
3	EMI Test Receiver	Rohde & Schwarz	ESU26	Jul. 03 2014	Jul. 02 2015
4	BiConiLog Antenna	SCHWARZBECK MESS-ELEKTRONIK	VULB9163	Feb. 25 2014	Feb. 24 2015
5	Double -ridged waveguide horn	SCHWARZBECK MESS-ELEKTRONIK	9120D-829	June 29 2014	June 28 2015
6	Horn Antenna	ETS-LINDGREN	3160	June. 30 2014	June. 29 2015
7	EMI Test Software	AUDIX	E3	N/A	N/A
8	Amplifier(100kHz-3GHz)	HP	8347A	Jul. 03 2014	Jul. 02 2015
9	Amplifier(2GHz-20GHz)	HP	8349B	Jul. 03 2014	Jul. 02 2015
10	Amplifier (18-26GHz)	Rohde & Schwarz	AFS33-18002 650-30-8P-44	June. 30 2014	June. 29 2015
11	Band filter	Amindeon	82346	June. 30 2014	June. 29 2015
12	Constant temperature and humidity box	Oregon Scientific	BA-888	May 11 2014	May 10 2015
13	D.C. Power Supply	Instek	PS-3030	May 11 2014	May 10 2015
14	Universal radio communication tester	Rohde & Schwarz	CMU200	May 11 2014	May 10 2015
15	Splitter	Agilent	11636B	May 11 2014	May 10 2015
16	EMI Test Receiver	Rohde & Schwarz	ESCS30	Jul. 03 2014	Jul. 02 2015
17	LISN	Schwarebeck	NSLK 8126	Jul. 03 2014	Jul. 02 2015
18	Power meter	Anritsu	ML2487A	August 22, 2014	August 21, 2015
19	Power sensor	Anritsu	MA2491A	August 22, 2014	August 21, 2015

3.0 Technical Details

3.1 Summary of test results

The EUT has been tested according to the following specifications:

Standard	Test Type	Result	Notes
FCC Part 15, Paragraph 15.107 & 15.207	Conducted Emission Test	PASS	Complies
FCC Part 15 Subpart C Paragraph 15.247(a)(2) Limit	Spectrum bandwidth of a Orthogonal Frequency Division Multiplex System Limit: 6dB bandwidth>500kHz	PASS	Complies
FCC Part 15, Paragraph 15.247(b)	Maximum peak output power Limit: max. 30dBm	PASS	Complies
FCC Part 15, Paragraph 15.109,15.205	Transmitter Radiated Emission Limit: Table 15.209	PASS	Complies
FCC Part 15, Paragraph 15.247(e)	Power Spectral Density Limit: max. 8dBm	PASS	Complies
FCC Part 15, Paragraph 15.247(d)	Out of Band Emission and Restricted Band Radiation Limit: 20dB less than peak value of fundamental frequency Restricted band limit: Table 15.209	PASS	Complies

4.0 Test LAB Details

All Tests Performed at

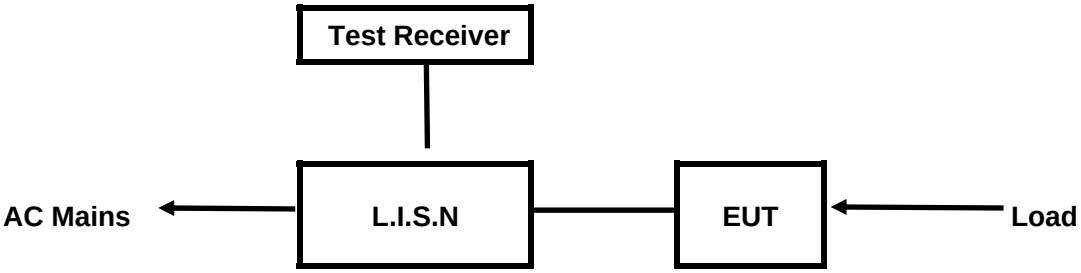
Name: ShenZhen CTL Testing Technology Co.,Ltd

Address: Floor 1-A, Baisha Technology Park, No. 3011, Shahexi Road, Nanshan, Shenzhen, Guangdong, China

FCC Registration Number: 970318

5. Power Line Conducted Emission Test

5.1 Schematics of the test



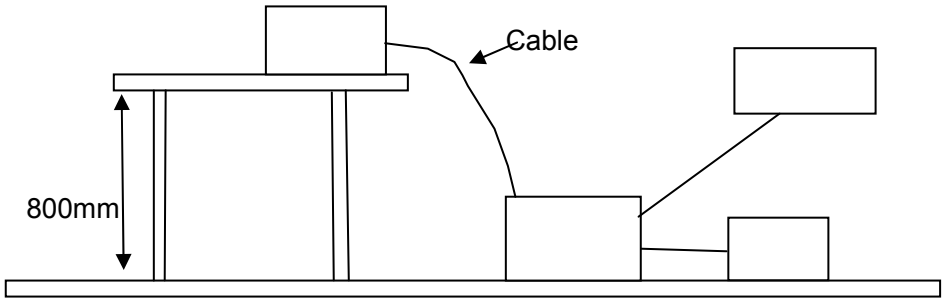
EUT: Equipment Under Test

5.2 Test Method and test Procedure

The EUT was tested according to ANSI C63.4-2003.The Frequency spectrum From 0.15MHz to 30MHz was investigated. The LISN used was 50ohm/50uH as specified by section 5.1 of ANSI C63.4 –2003.

Test Voltage: 120V~, 60Hz

Block diagram of Test setup



5.3 Configuration of The EUT

The EUT was configured according to ANSI C63.4-2003. All interface ports were connected to the appropriate peripherals. All peripherals and cables are listed below.

40 channels are provided to the EUT

A. EUT

Device	Manufacturer	Model	FCC ID
P324BT Bluetooth Headphones with Microphone	Cyber Blue(HK) Ltd	P324BT	Z3AP324BT

B. Internal Device

Device	Manufacturer	Model	FCC ID/DOC
N/A			

C. Peripherals

Device	Manufacturer	Model	FCC ID/DOC	Cable
Power Supply	HUONIU	HNB050100U	VOC	1.0m unshielded output cable

5.4 EUT Operating Condition

Operating condition is according to ANSI C63.4 -2003.

A Setup the EUT and simulators as shown on follow

B Enable AF signal and confirm EUT active to normal condition

5.5 Power line conducted Emission Limit according to Paragraph 15.107, 15.207

Frequency (MHz)	Class A Limits (dBμV)		Class B Limits (dBμV)	
	Quasi-peak Level	Average Level	Quasi-peak Level	Average Level
0.15 ～ 0.50	79.0	66.0	66.0～56.0*	56.0～46.0*
0.50 ～ 5.00	73.0	60.0	56.0	46.0
5.00 ～ 30.00	73.0	60.0	60.0	50.0

Notes: 1. *Decreasing linearly with logarithm of frequency.

2. The tighter limit shall apply at the transition frequencies

5.6 Test Results

The frequency spectrum from 0.15MHz to 30MHz was investigated. All reading are quasi-peak values with a resolution bandwidth of 9kHz.

A: Conducted Emission on Live Terminal (150kHz to 30MHz)

EUT Operating Environment

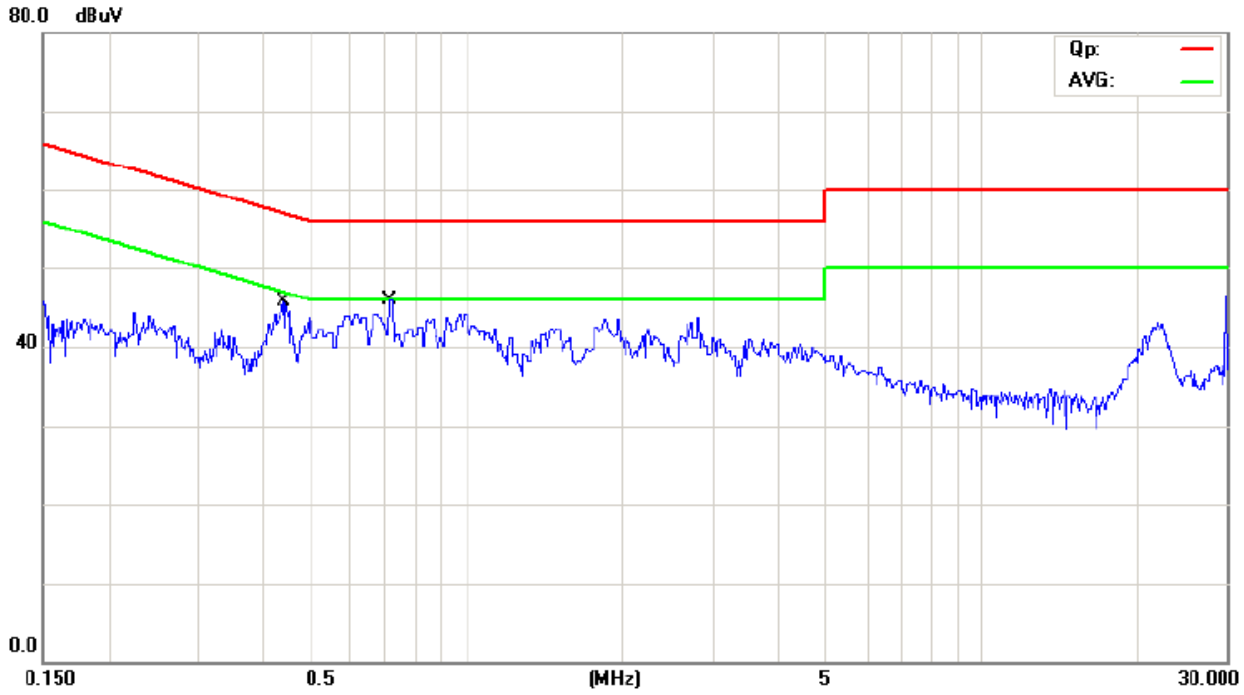
Temperature: 26℃ Humidity: 65%RH Atmospheric Pressure: 101 KPa

EUT set Condition: Keep Bluetooth Transmitting

Equipment Level: Class B

Results: Pass

Please refer to following diagram for individual



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1		0.4390	-7.70	11.31	3.61	57.08	-53.47	QP	
2		0.4390	-13.80	11.31	-2.49	47.08	-49.57	AVG	
3		0.7094	-8.00	11.59	3.59	56.00	-52.41	QP	
4	*	0.7094	-13.70	11.59	-2.11	46.00	-48.11	AVG	

B: Conducted Emission on Neutral Terminal (150kHz to 30MHz)

EUT Operating Environment

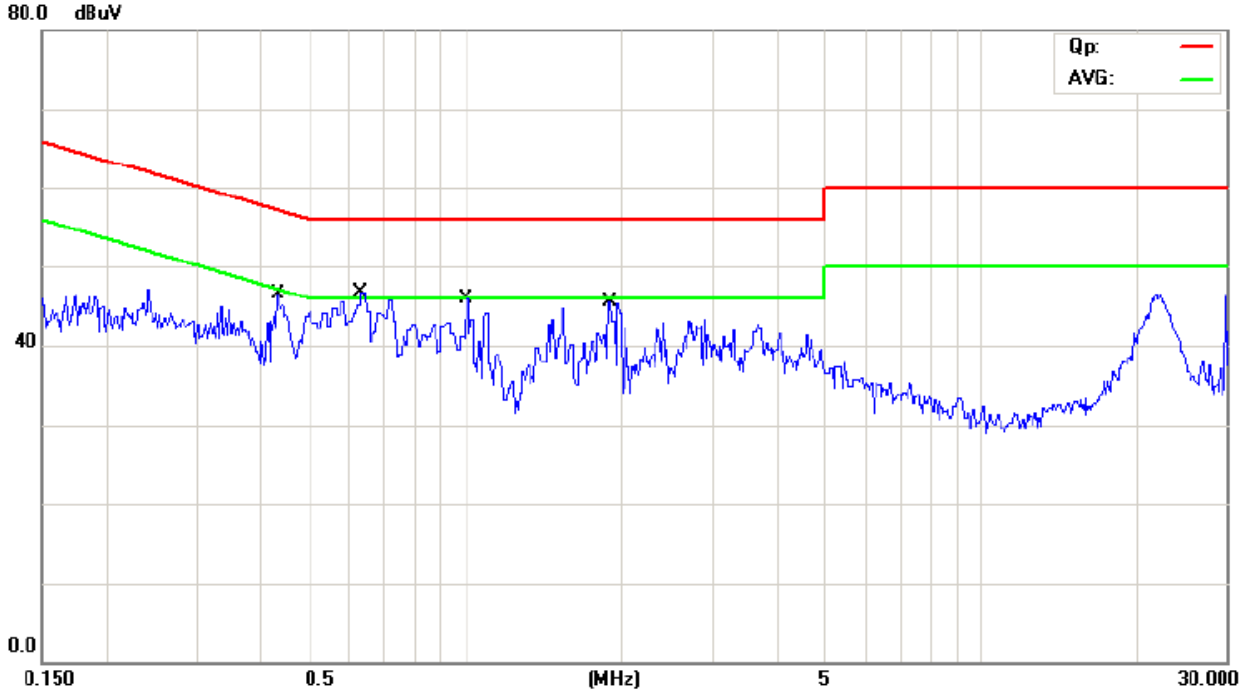
Temperature: 26℃ Humidity: 65%RH Atmospheric Pressure: 101 KPa

EUT set Condition: Keep Bluetooth Transmitting

Equipment Level: Class B

Results: Pass

Please refer to following diagram for individual



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1		0.4265	-7.70	11.29	3.59	57.32	-53.73	QP	
2		0.4265	-13.60	11.29	-2.31	47.32	-49.63	AVG	
3		0.6310	-8.00	11.51	3.51	56.00	-52.49	QP	
4		0.6310	-13.90	11.51	-2.39	46.00	-48.39	AVG	
5		1.0022	-8.10	11.90	3.80	56.00	-52.20	QP	
6		1.0022	-13.80	11.90	-1.90	46.00	-47.90	AVG	
7		1.8984	-7.80	12.26	4.46	56.00	-51.54	QP	
8	*	1.8984	-13.60	12.26	-1.34	46.00	-47.34	AVG	

6 Radiated Emission Test

6.1 Test Method and test Procedure:

(1) The EUT was tested according to ANSI C63.4 –2003. The radiated test was performed at CTL Laboratory. This site is on file with the FCC laboratory division, Registration No.807767

(2) The EUT, peripherals were put on the turntable which table size is 1m x 1.5 m, table high 0.8 m. All set up is according to ANSI C63.4-2003.

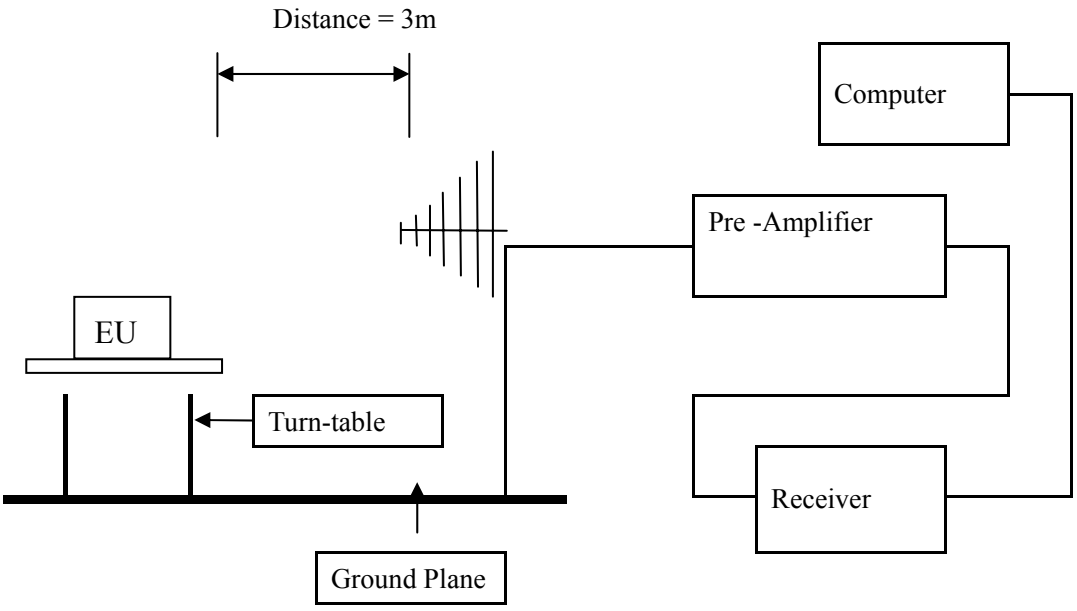
(3) The frequency spectrum from 30 MHz to 25 GHz was investigated. All readings from 30 MHz to 1 GHz are Quasi-peak values with a resolution bandwidth of 120 kHz. For measurement above 1GHz, peak values with RBW=1MHz, VBW=3MHz and PK detector. AV value with RBW=1MHz, VBW=3MHz and RMS detector. Measurements were made at 3 meters.

(4) The antenna high is varied from 1 m to 4 m high to find the maximum emission for each frequency.

(5) Maximizing procedure was performed on the six (6) highest emissions to ensure EUT compliance is with all installation combinations. All data was recorded in the peak detection mode. Quasi-peak readings was performed only when an emission was found to be marginal (within -4 dB of specification limit), and are distinguished with a "**QP**" in the data table.

(6) The antenna polarization : Vertical polarization and Horizontal polarization.

Block diagram of Test setup



6.2 Configuration of The EUT

Same as section 5.3 of this report

6.3 EUT Operating Condition

Same as section 5.4 of this report.

6.4 Radiated Emission Limit

All emission from a digital device, including any network of conductors and apparatus connected thereto, shall not exceed the level of field strength specified below:

Frequencies in restricted band are complied to limit on Paragraph 15.209 and 15.109

Frequency Range (MHz)	Distance (m)	Field strength (dBμV/m)
30-88	3	40.0
88-216	3	43.5
216-960	3	46.0
Above 960	3	54.0

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

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

3. Distance refers to the distance in meters between the measuring instrument antenna and the EUT

4. This is a handhold device. The radiated emissions should be tested under 3-axes position (Lying, Side, and Stand), After pre-test. It was found that the worse radiated emission was get at the lying position.

A: Radiated Disturbance In Horizontal (30MHz----1000MHz)

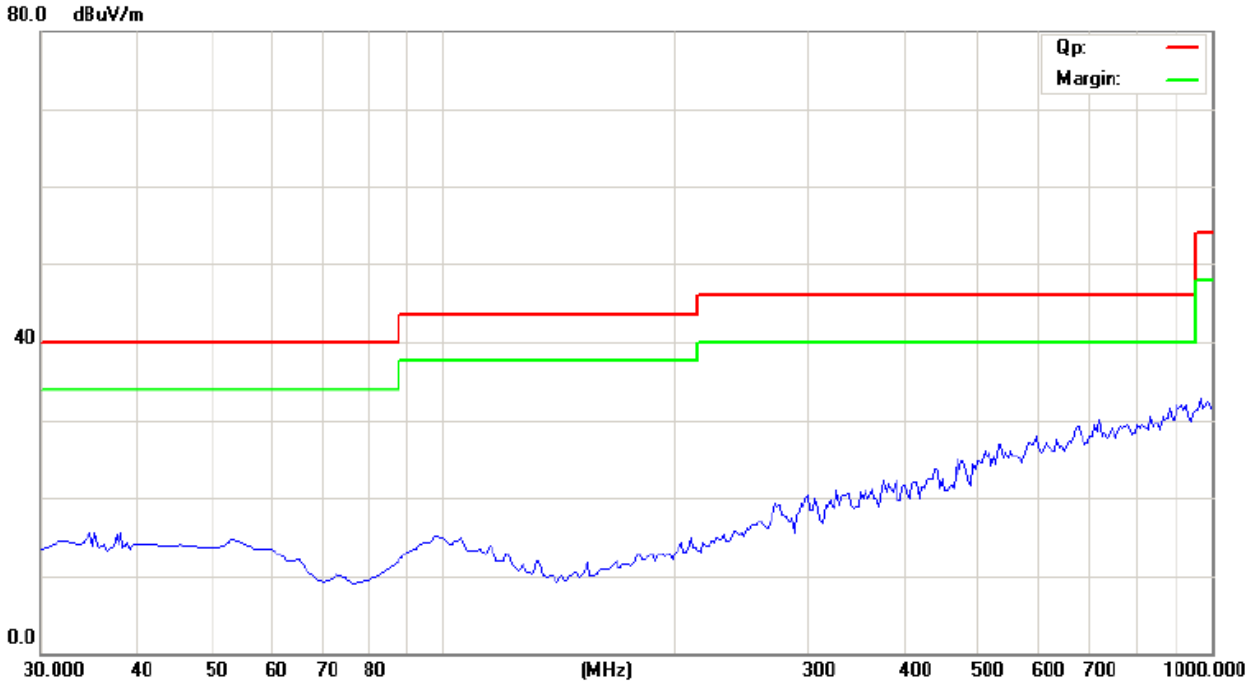
EUT set Condition: **Keep Bluetooth Transmitting**

Level: **Class B**

Results: **PASS**

Please refer to following diagram for individual

Picture of the test



Frequency (MHz)	Level@3m (dBμV/m)	Antenna Polarity	Limit@3m (dBμV/m)
--	--	H	--

-The test data shows much less than the limit, no necessary take down the results.

B: Radiated Disturbance In Vertical (30MHz----1000MHz)

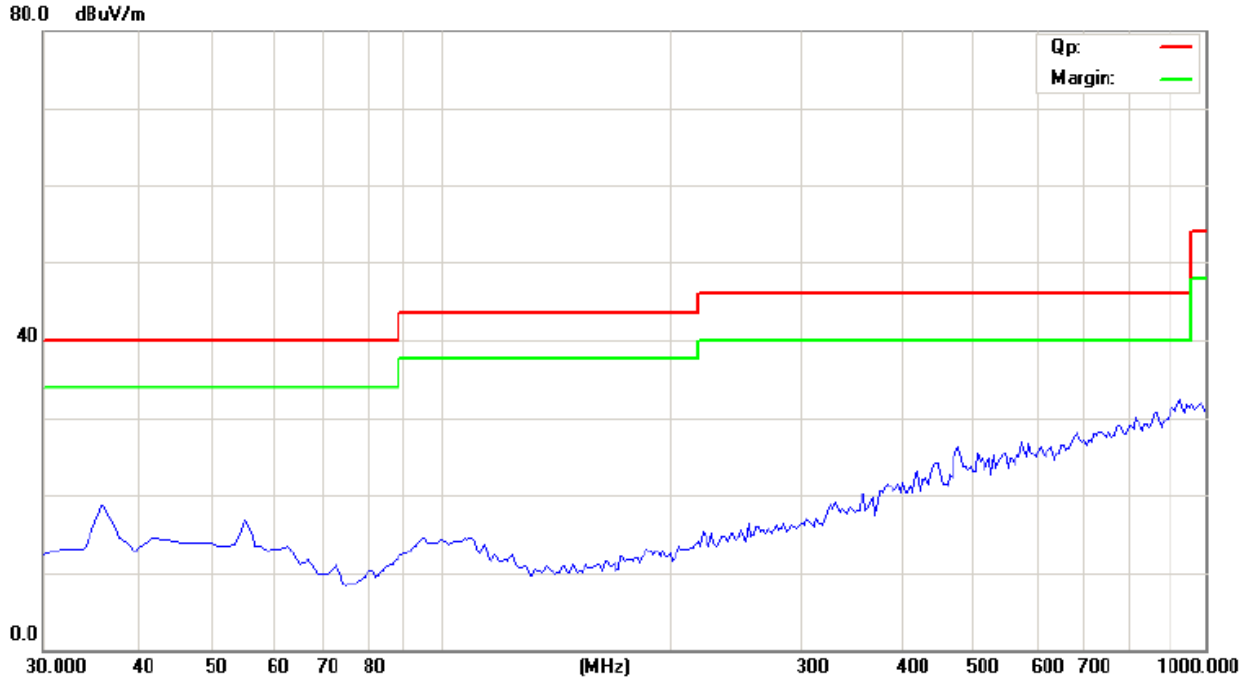
EUT set Condition: **Keep Bluetooth Transmitting**

Level: **Class B**

Results: **PASS**

Please refer to following diagram for individual

Picture of the test



Frequency (MHz)	Level@3m (dBμV/m)	Antenna Polarity	Limit@3m (dBμV/m)
--	--	V	--

-The test data shows much less than the limit, no necessary take down the results.

Operation Mode: Transmitting under Low Channel (2402MHz)

Frequency (MHz)	Level@3m (dBμV/m)	Antenna Polarity	Limit@3m (dBμV/m)
4804	--	H/V	74(Peak)/ 54(AV)
7206	--	H/V	74(Peak)/ 54(AV)
9608	--	H/V	74(Peak)/ 54(AV)
12010	--	H/V	74(Peak)/ 54(AV)
14412	--	H/V	74(Peak)/ 54(AV)
16814	--	H/V	74(Peak)/ 54(AV)
19216	--	H/V	74(Peak)/ 54(AV)
21618	--	H/V	74(Peak)/ 54(AV)
24020	--	H/V	74(Peak)/ 54(AV)

Note: 1. Level = Reading + AF + Cable - Preamp + Filter - Dist, Margin = Level - Limit

2. Remark “---” means that the emissions level is too low to be measured

Operation Mode: Transmitting g under Middle Channel (2440MHz)

Frequency (MHz)	Level@3m (dBμV/m)	Antenna Polarity	Limit@3m (dBμV/m)
4880	--	H/V	74(Peak)/ 54(AV)
7320	--	H/V	74(Peak)/ 54(AV)
9760	--	H/V	74(Peak)/ 54(AV)
12200	--	H/V	74(Peak)/ 54(AV)
14640	--	H/V	74(Peak)/ 54(AV)
17080	--	H/V	74(Peak)/ 54(AV)
19520	--	H/V	74(Peak)/ 54(AV)
21960	--	H/V	74(Peak)/ 54(AV)
24400	--	H/V	74(Peak)/ 54(AV)

Note: 1. Level = Reading + AF + Cable - Preamp + Filter - Dist, Margin = Level - Limit

2. Remark “---” means that the emissions level is too low to be measured

Operation Mode: Transmitting under High Channel (2480MHz)

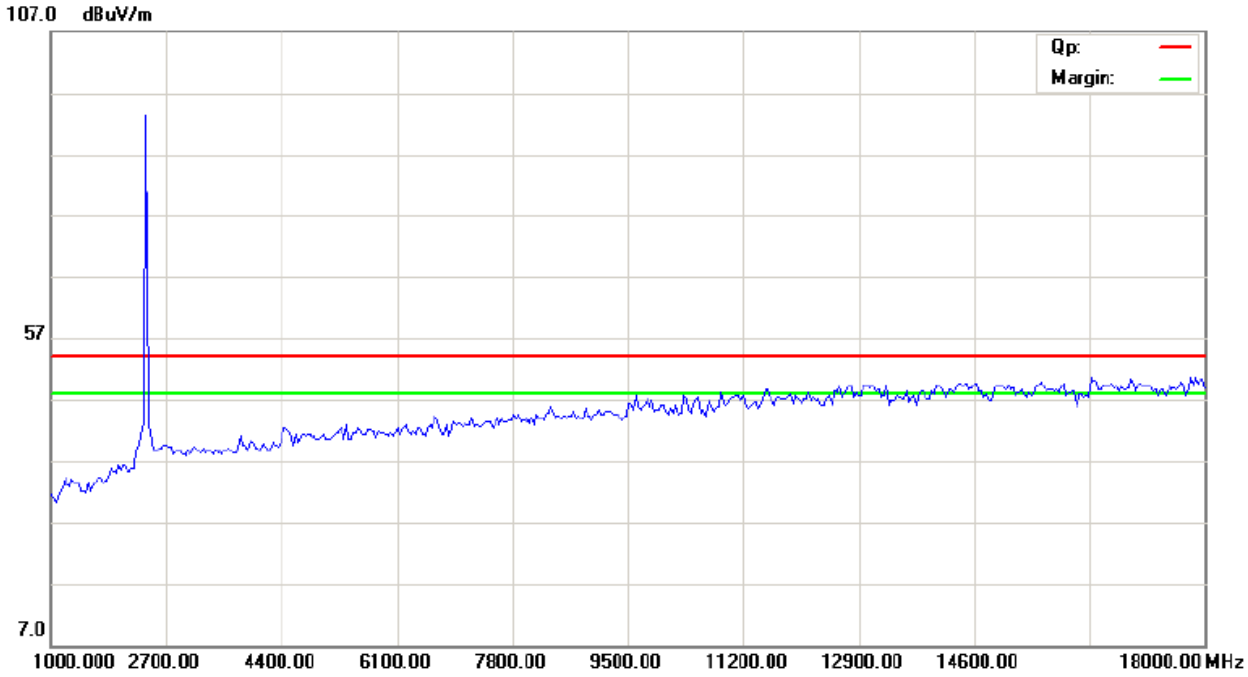
Frequency (MHz)	Level@3m (dBμV/m)	Antenna Polarity	Limit@3m (dBμV/m)
4960	--	H/V	74(Peak)/ 54(AV)
7440	--	H/V	74(Peak)/ 54(AV)
9920	--	H/V	74(Peak)/ 54(AV)
12400	--	H/V	74(Peak)/ 54(AV)
14880	--	H/V	74(Peak)/ 54(AV)
17360	--	H/V	74(Peak)/ 54(AV)
19840	--	H/V	74(Peak)/ 54(AV)
22320	--	H/V	74(Peak)/ 54(AV)
24800	--	H/V	74(Peak)/ 54(AV)

Note: 1. Level = Reading + AF + Cable - Preamp + Filter - Dist, Margin = Level - Limit

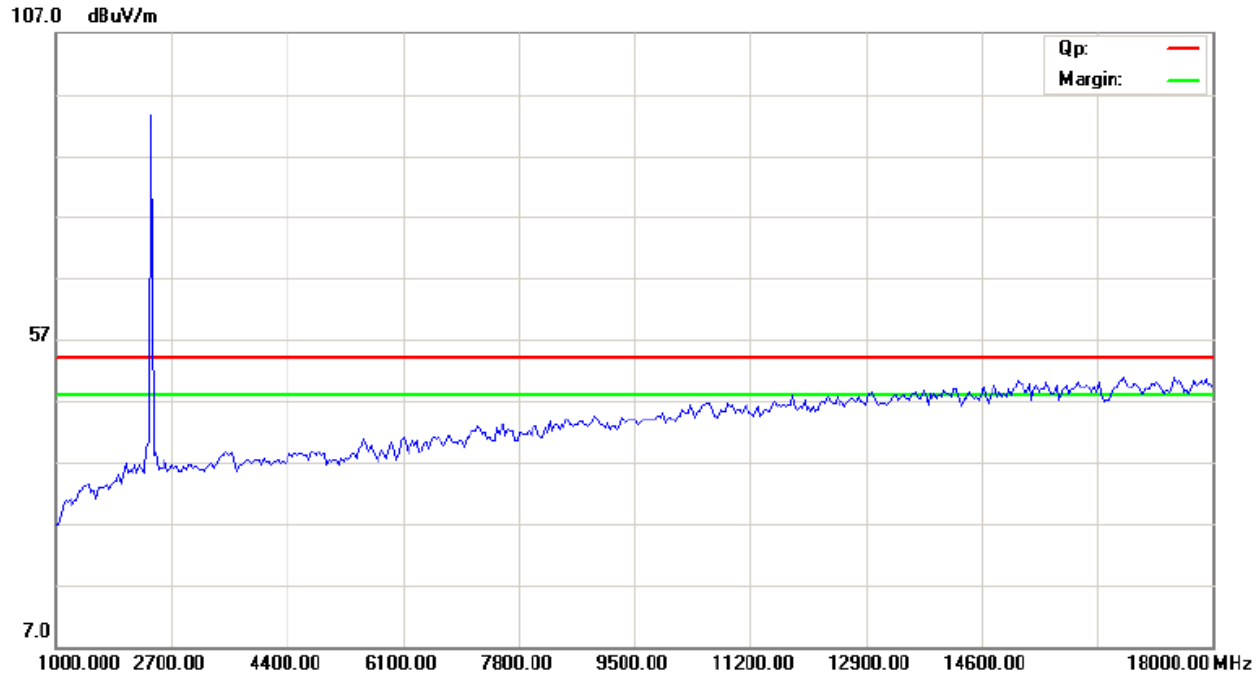
2. Remark “---” means that the emissions level is too low to be measured

Please refer to the following test plots for details:

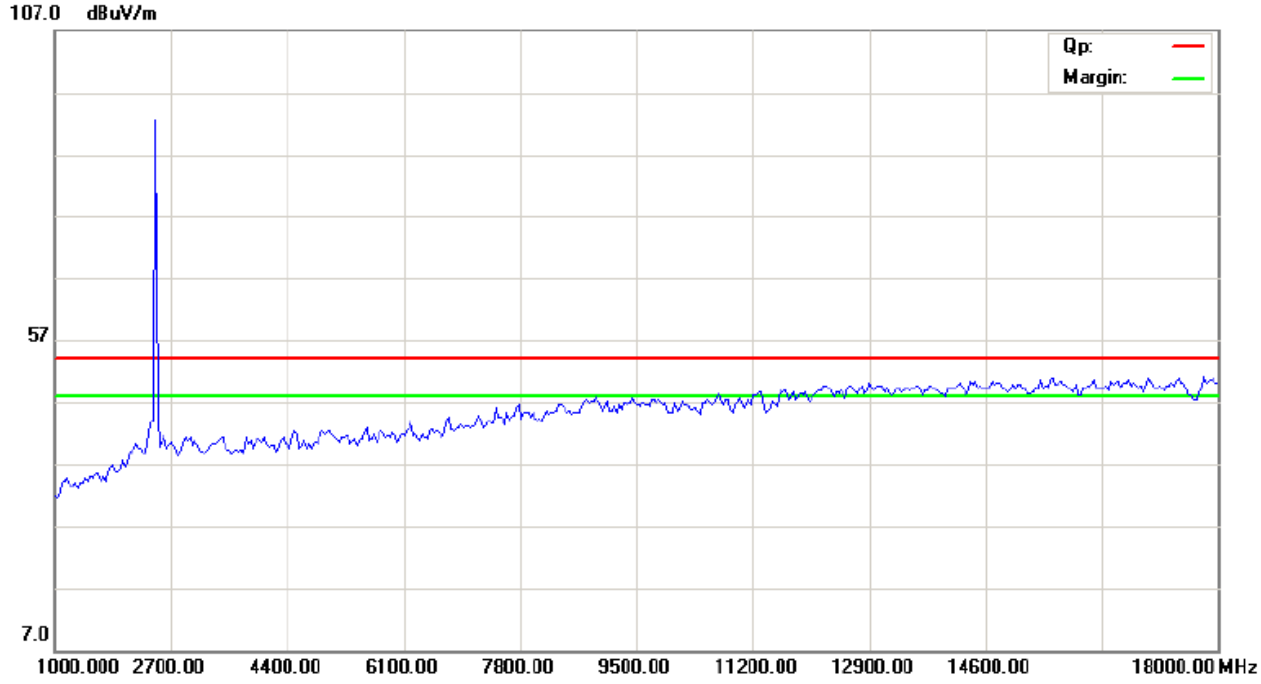
Low Channel: Horizontal



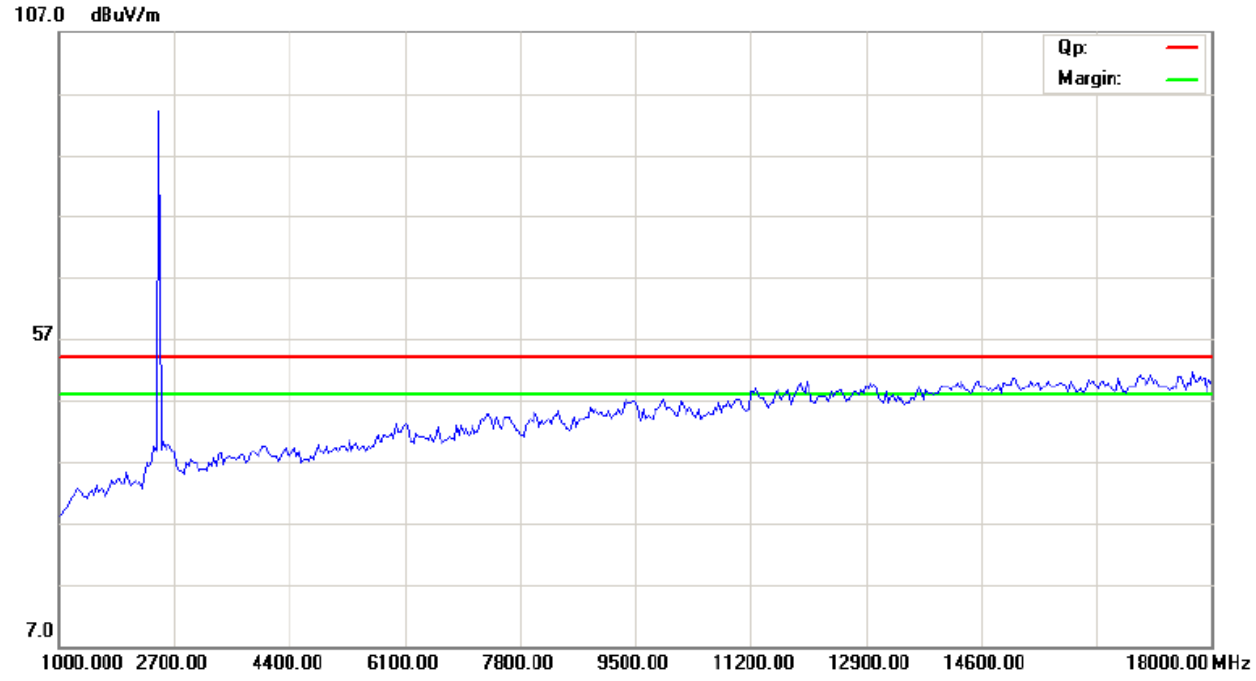
Low Channel : Vertical



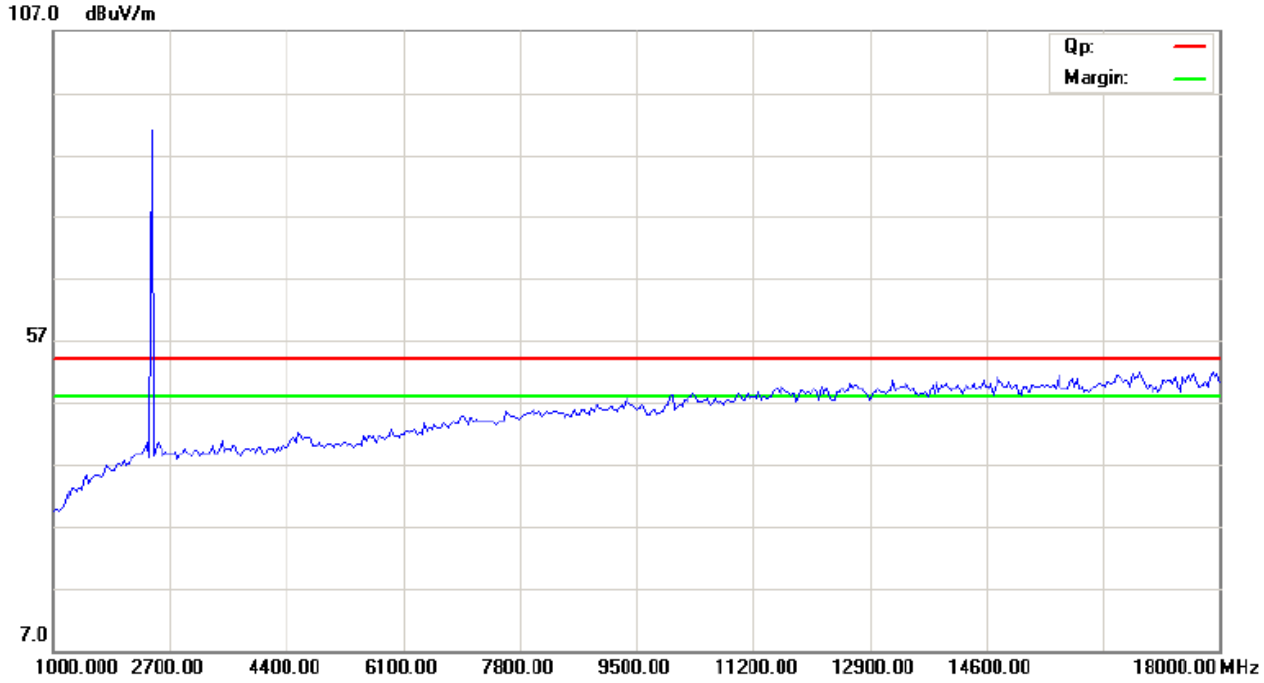
Middle Channel : Horizontal



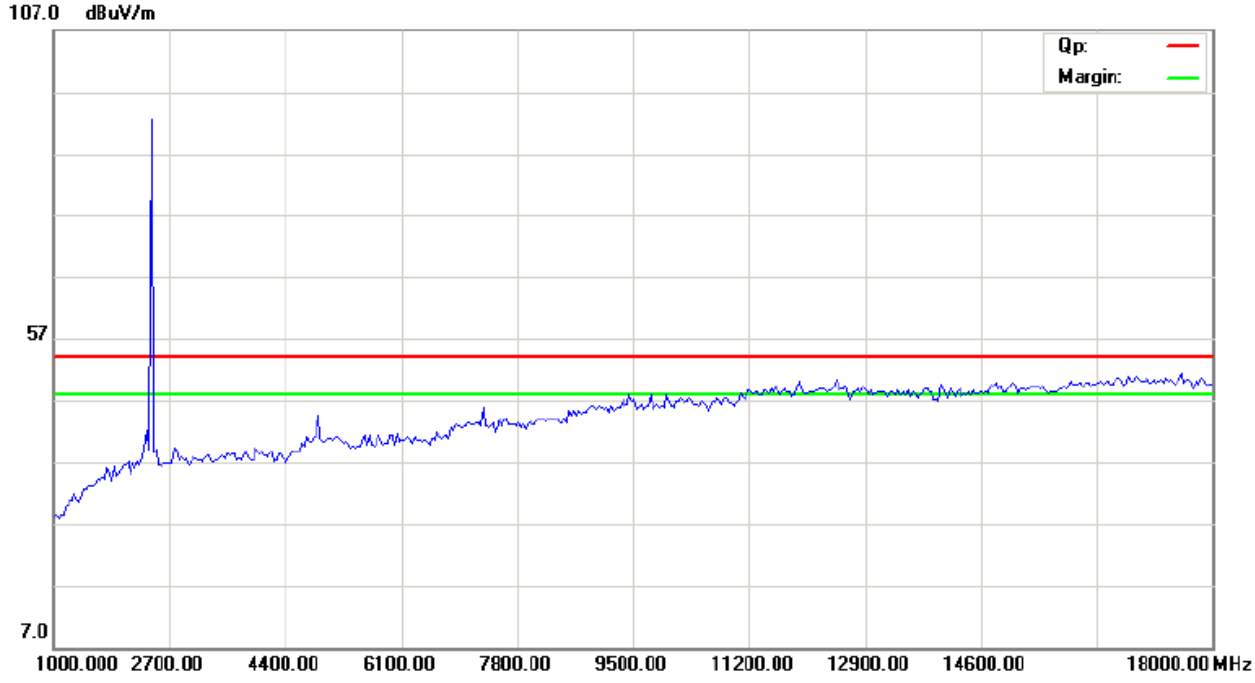
Middle Channel : Vertical



High Channel : Horizontal



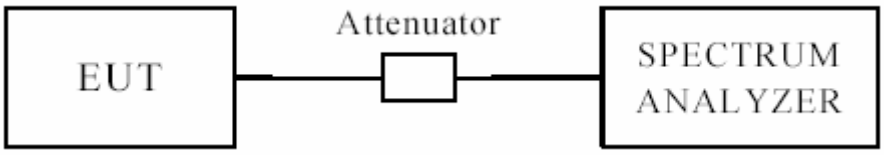
High Channel : Vertical



Note: for the radiated emissions above 18G, it is the floor noise.

7.0 6dB Bandwidth Measurement

7.1 Test Setup



7.2 Limits of 6dB Bandwidth Measurement

The minimum of 6dB Bandwidth Measurement is >500 kHz

7.3 Test Procedure

1. Set resolution bandwidth (RBW) = 100 kHz
2. Set the video bandwidth (VBW) ≥ 3 x RBW.
3. Detector = Peak.
4. Trace mode = max hold.
5. Sweep = auto couple.
6. Allow the trace to stabilize.
7. Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

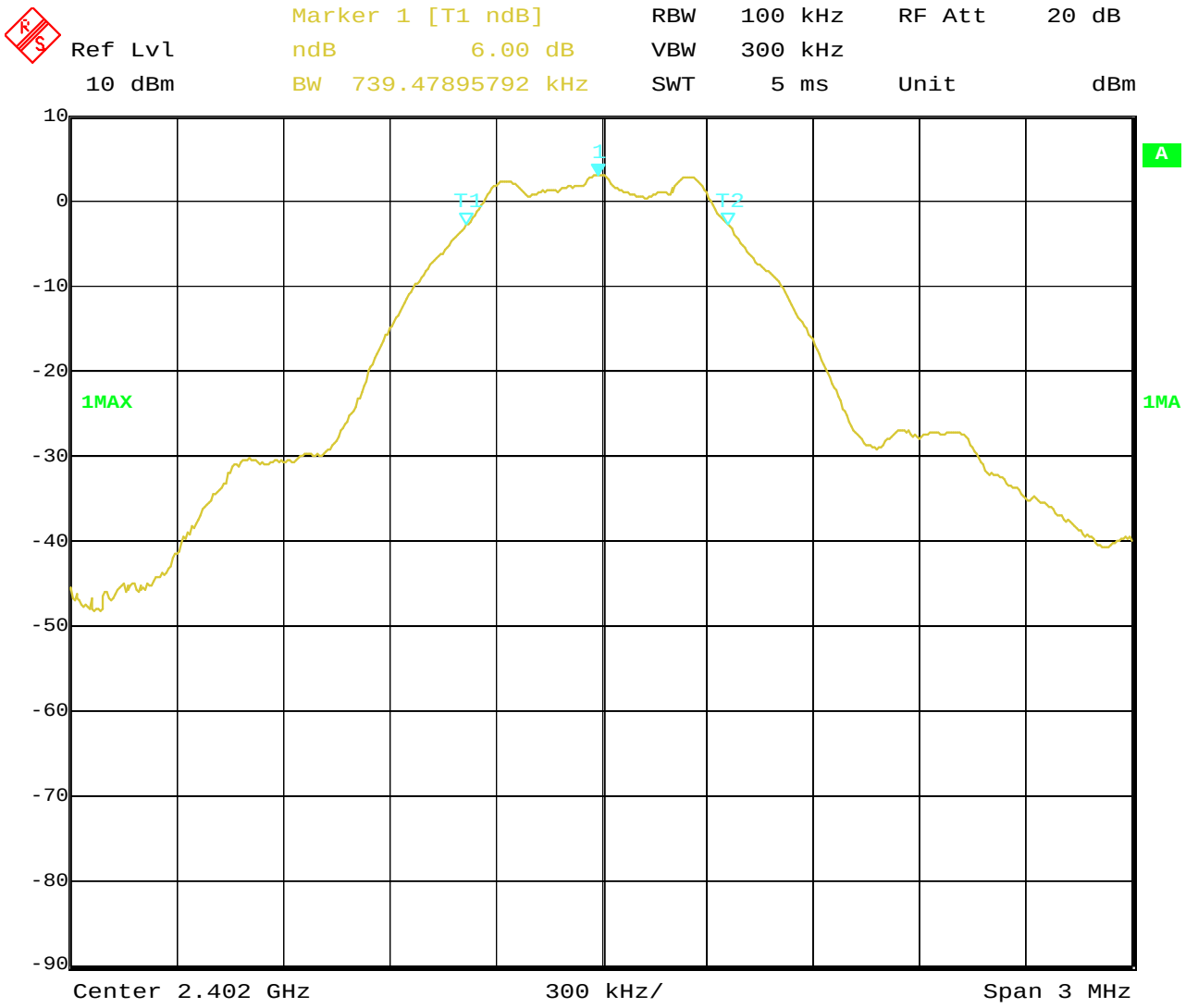
7.4 Test Result

EUT	P324BT Bluetooth Headphones with Microphone	Model	P324BT
Mode	Keep Transmitting	Input Voltage	DC3.7V
Temperature	24 deg. C,	Humidity	56% RH

Channel	Channel Frequency (MHz)	6 dB Bandwidth (kHz)	Maximum Limit (kHz)	Pass/ Fail
Low	2402	739.479	0.5	Pass
Middle	2440	751.503	0.5	Pass
High	2480	751.503	0.5	Pass

Test Figure:

1. Condition: Low Channel



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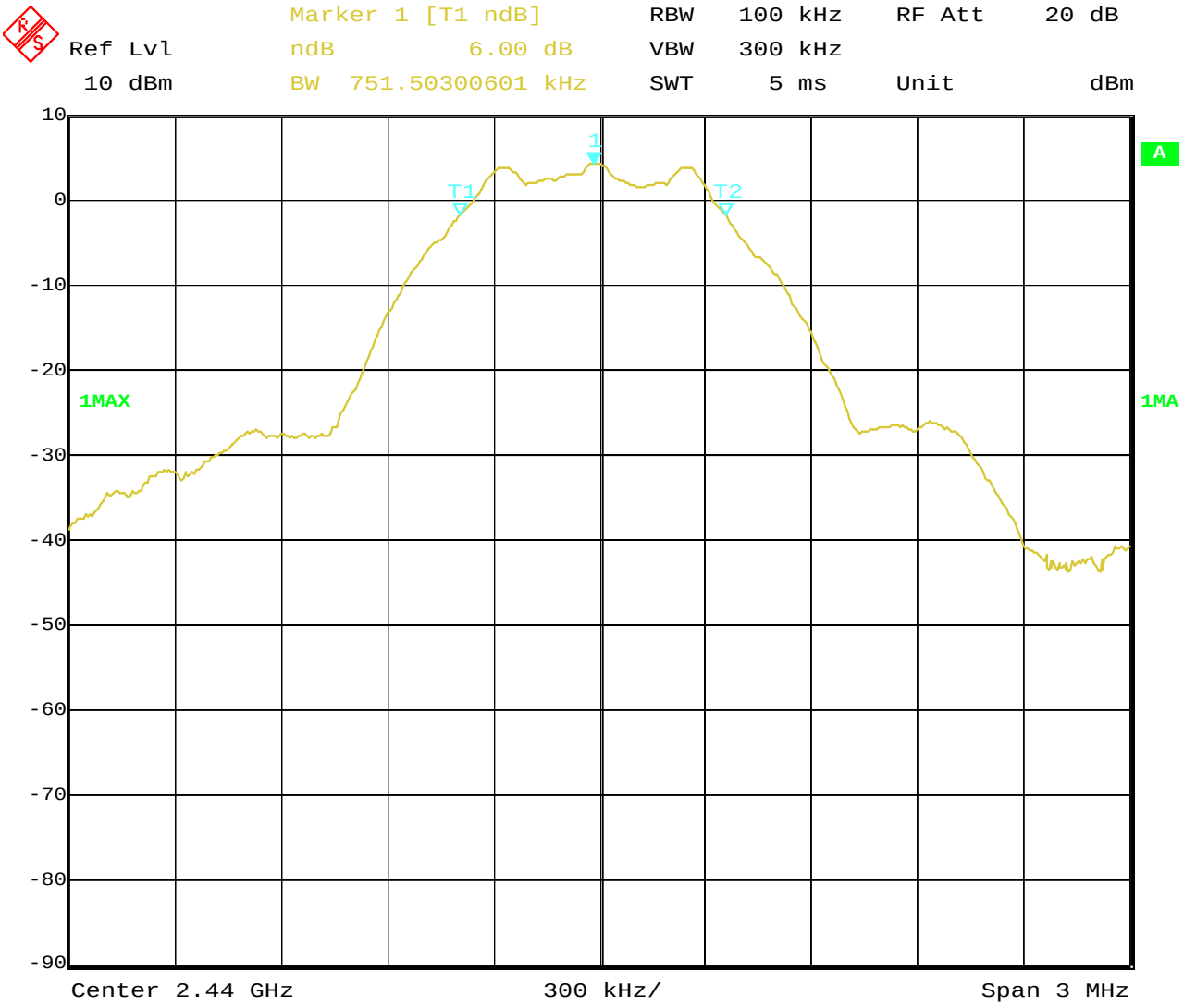
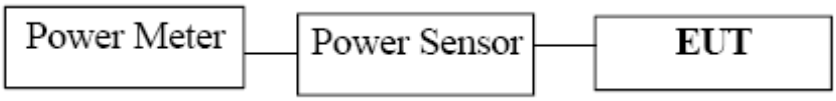
2. Condition: Middle Channel



3. High Channel

8. Maximum Peak Output Power

8.1 Test Setup



8.2 Limits of Maximum Peak Output Power

The Maximum Peak Output Power Measurement is 30dBm.

8.3 Test Procedure

The RF power output was measured with a Power meter connected to the RF Antenna connector (conducted measurement) while EUT was operating in transmit mode at the appropriate centre frequency.

Note: the peak power was measured

8.4Test Results

EUT	P324BT Bluetooth Headphones with Microphone	Model	P324BT
Mode	Keep Transmitting	Input Voltage	DC3.7V
Temperature	24 deg. C,	Humidity	56% RH

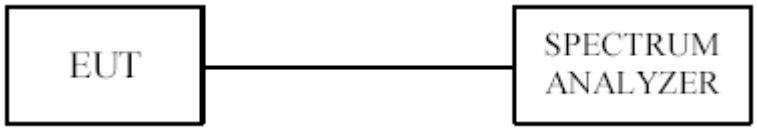
Channel	Channel Frequency (MHz)	Peak Power Output (dBm)	Peak Power Limit (dBm)	Pass/ Fail
Low	2402	3.44	30	Pass
Middle	2440	4.48	30	Pass
High	2480	**5.93**	30	Pass

Note: 1. the result basic equation calculation as follow:

Peak Power Output = Peak Power Reading + Cable loss + Attenuator

9. Power Spectral Density Measurement

9.1 Test Setup



9.2 Limits of Power Spectral Density Measurement

The Maximum Power Spectral Density Measurement is 8dBm.

9.3 Test Procedure

1. Use this procedure when the maximum peak conducted output power in the fundamental emission is used to demonstrate compliance.
2. Set the RBW = 10 kHz.
3. Set the VBW ≥ 30 kHz.
4. Set the span to 1.5 times the DTS channel bandwidth.
5. Detector = peak.
6. Sweep time = auto couple.
7. Trace mode = max hold.
8. Allow trace to fully stabilize.
9. Use the peak marker function to determine the maximum amplitude level.
10. If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.
11. The resulting peak PSD level must be ≤ 8 dBm.

9.4Test Result

EUT	P324BT Bluetooth Headphones with Microphone	Model	P324BT
Mode	Keep Transmitting	Input Voltage	DC3.7V
Temperature	24 deg. C,	Humidity	56% RH

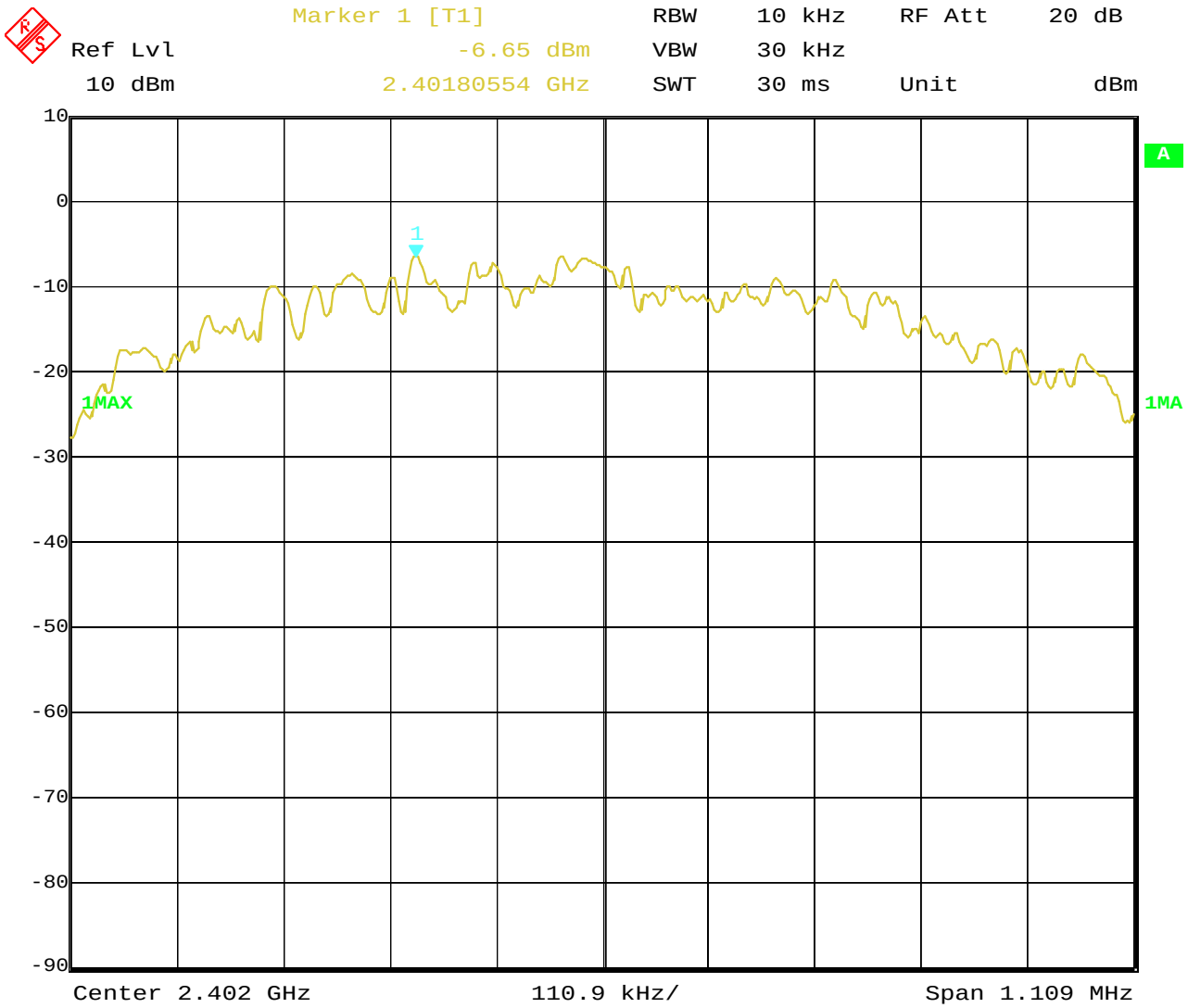
Channel	Peak Power Reading (dBm)	Cable Loss (dB)	Final Power Spectral Density (dBm)	Maximum Limit (dBm)	Pass/ Fail
Low	-6.65	0.2	-6.45	8	Pass
Middle	-5.32	0.2	-5.12	8	Pass
High	-3.84	0.2	-3.64	8	Pass

Note: The result basic equation calculation as follow:

Peak Power Output = Peak Power Reading + Cable loss

Test Figure:

1. Condition: Low Channel



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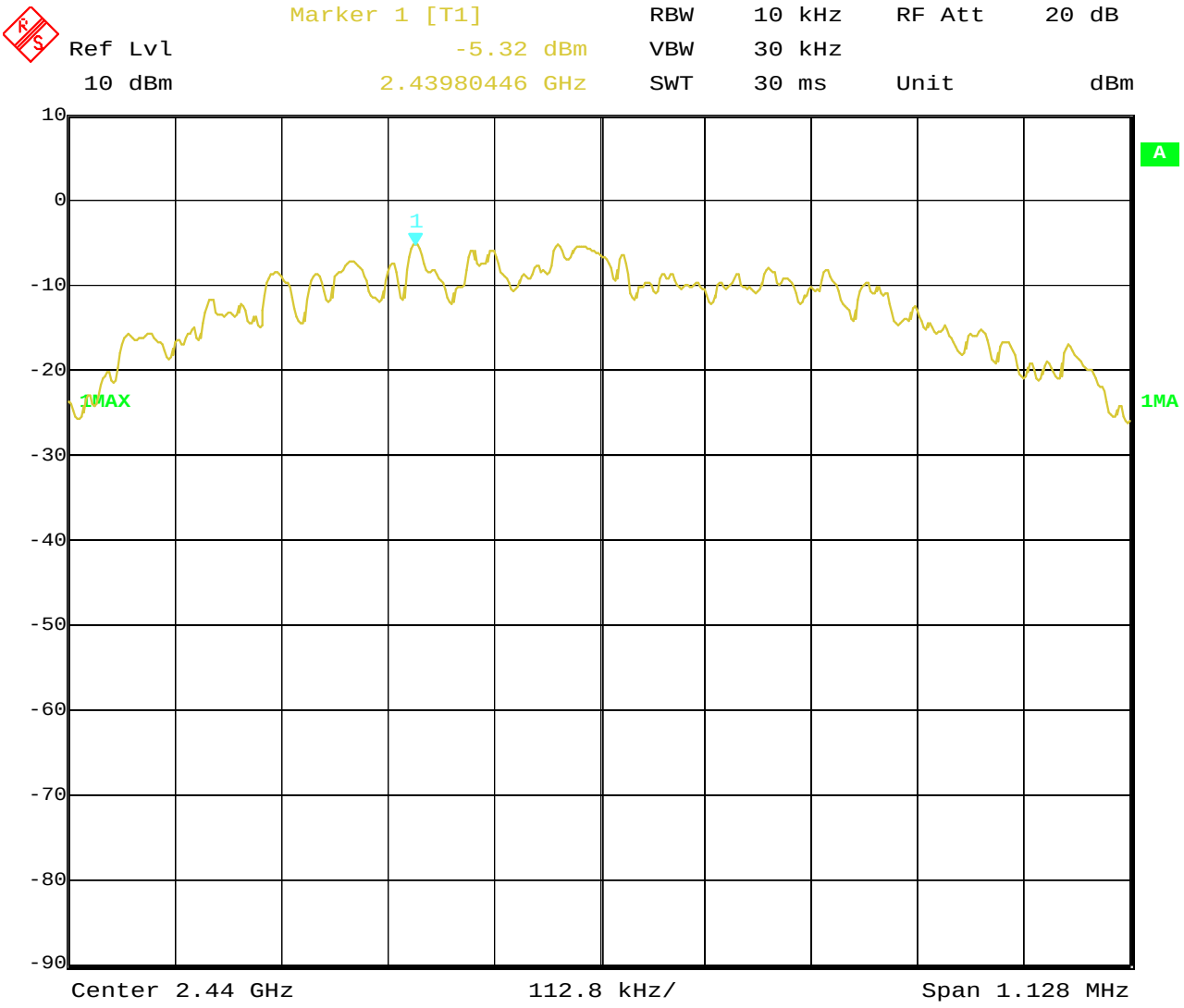
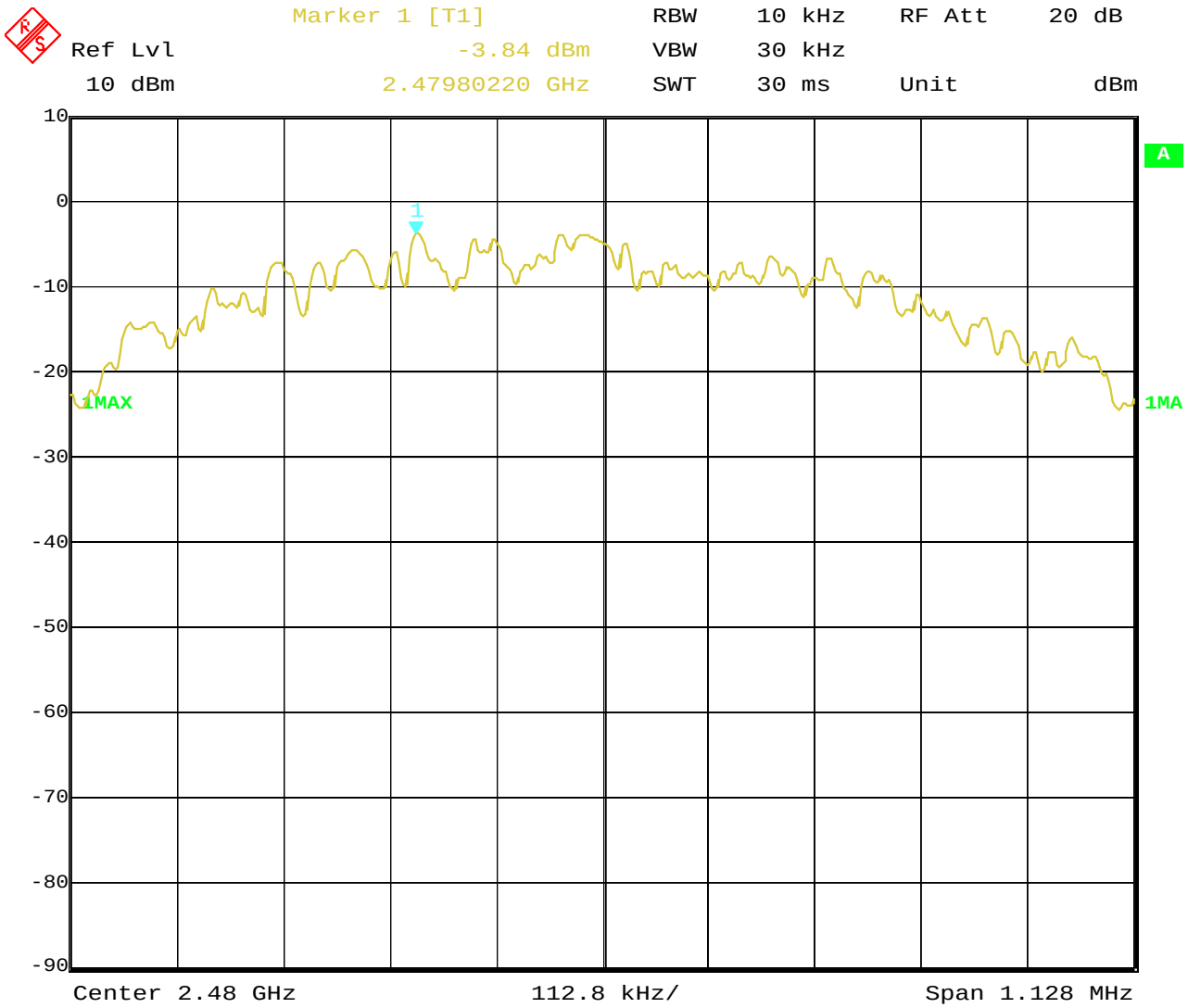
2. Condition: Middle Channel

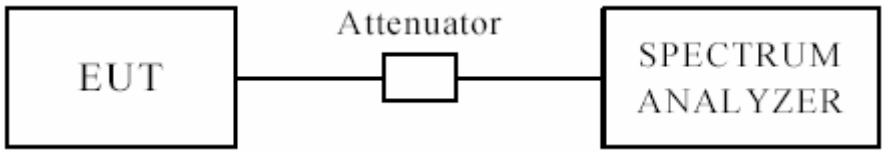


3. High Channel



10 Out of Band Measurement

10.1 Test Setup for band edge



The restricted band requirement based on radiated emission test; please see the clause 6 for the test setup

10.2 Limits of Out of Band Emissions Measurement

Below –20dB of the highest emission level of operating band (in 100kHz Resolution Bandwidth).

Fall in the restricted bands listed in section 15.205. The maximum permitted average field strength is listed in section 15.209.

10.3 Test Procedure

For signals in the restricted bands above and below the 2.4-2.483GHz allocated band a measurement was made of

radiated emission test.(Peak values with RBW=1MHz, VBW=3MHz and PK detector. AV value with RBW=1MHz, VBW=3MHz and RMS detector)

For bandage test, the spectrum set as follows: RBW=VBW=100 kHz. A conducted measurement used

10.4 Test Result

Please see next pages

Note: 1. For band-edge measurement, the frequency from 30MHz-25GHz was tested. And It met the FCC rule.

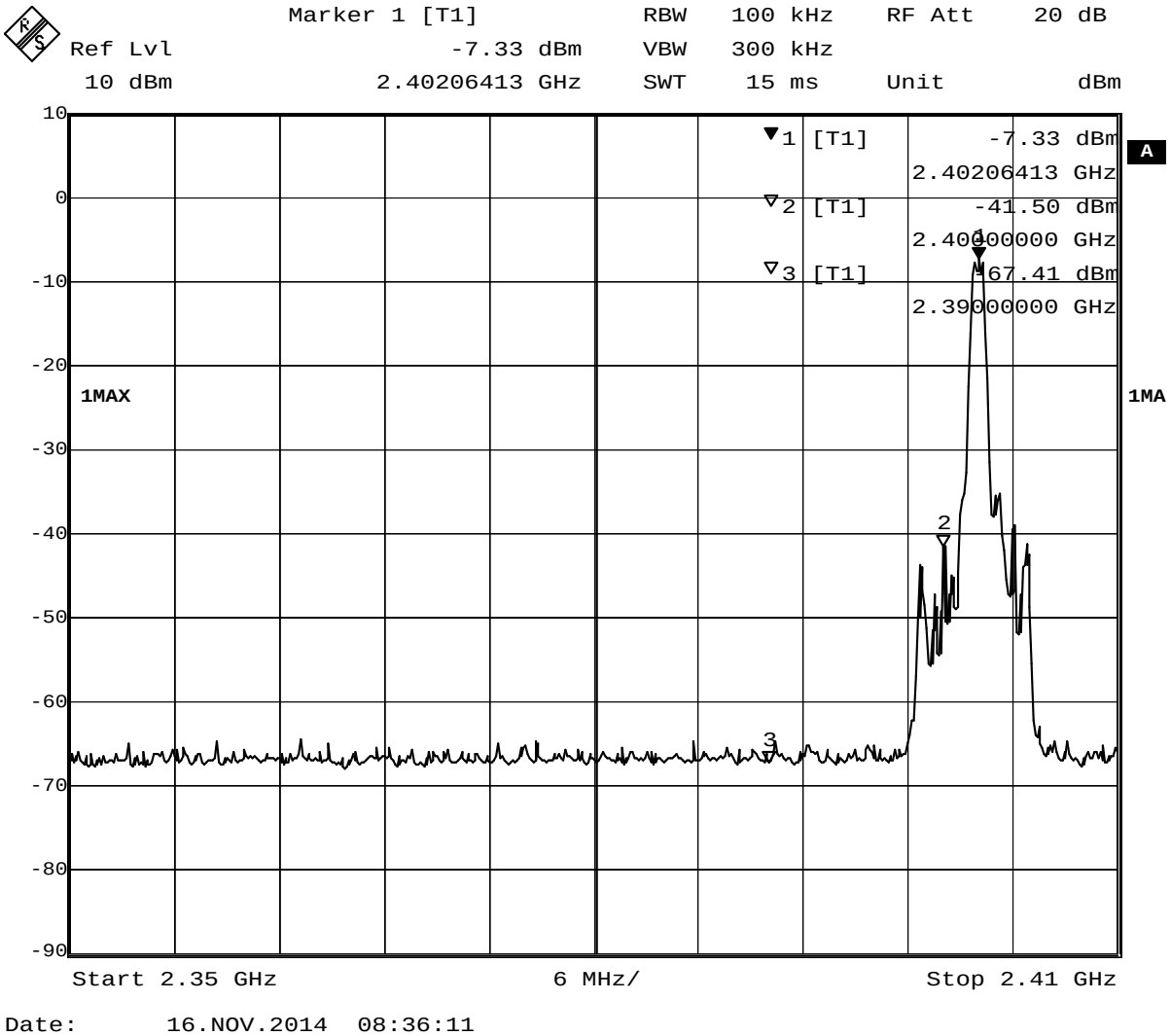
2. This is a handhold device. The radiated emissions should be tested under 3-axes position (Lying, Side, and Stand), After pre-test. It was found that the worse radiated emission was get at the lying position.

H and V polarity all have been tested only worse case is reported

10.4 Band-edge and Restricted band Measurement

EUT	P324BT Bluetooth Headphones with Microphone		Model	P324BT
Mode	Keeping Transmitting		Input Voltage	DC3.7V
Temperature	24 deg. C,		Humidity	56% RH
Test Result:	Pass		Detector	PK
2390MHz	PK (dBμV/m)	38.7	Limit	74(dBμV/m)
	AV (dBμV/m)	--		54(dBμV/m)

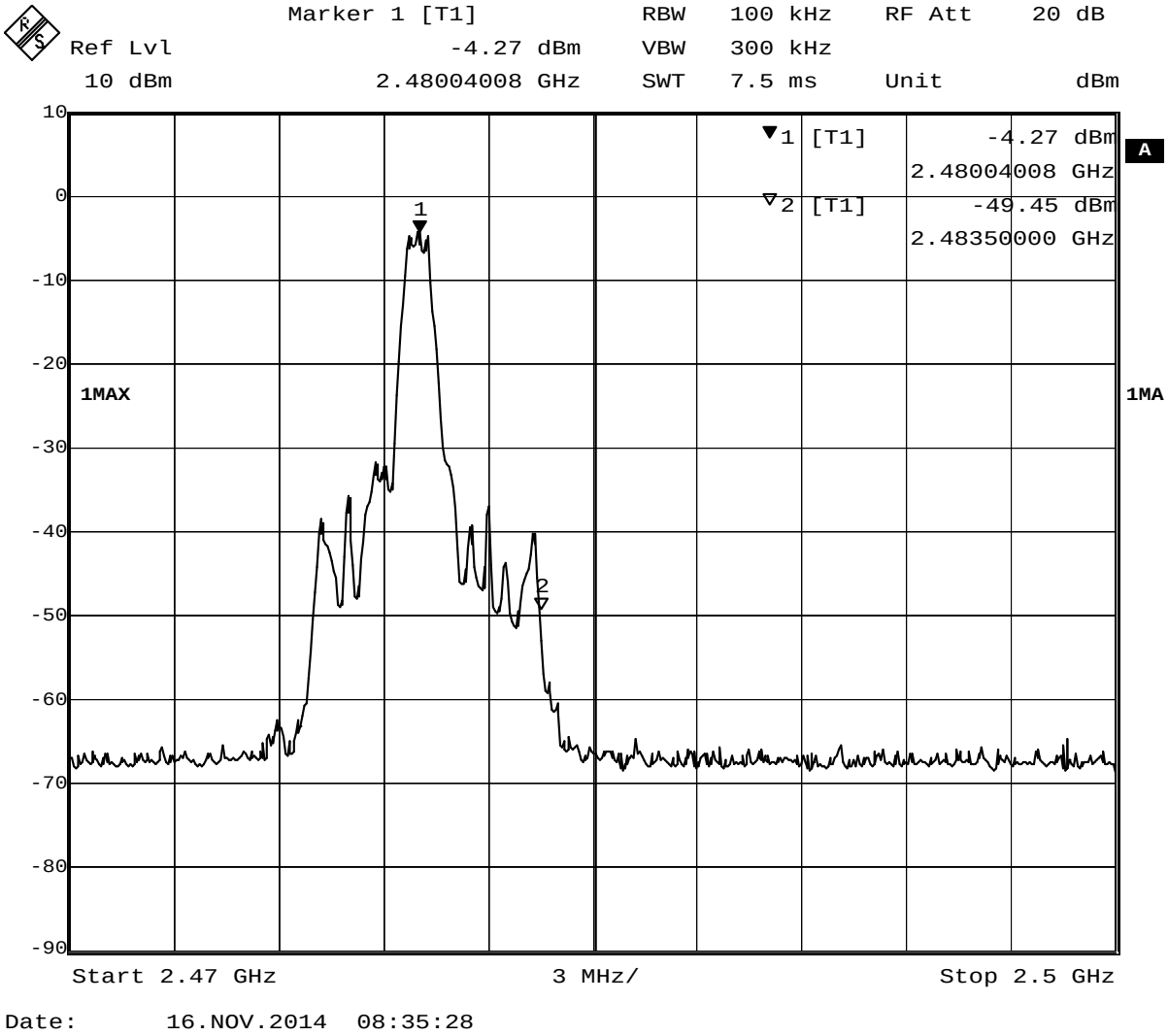
Test Figure:



10.4 Band-edge and Restricted band Measurement

EUT	P324BT Bluetooth Headphones with Microphone		Model	P324BT
Mode	Keeping Transmitting		Input Voltage	DC3.7V
Temperature	24 deg. C,		Humidity	56% RH
Test Result:	Pass		Detector	PK
2483.500MHz	PK (dBμV/m)	41.5	Limit	74(dBμV/m)
	AV (dBμV/m)	--		54(dBμV/m)

Test Figure:



11.0 Antenna Requirement

11.1 Standard Applicable

For intentional device, according to FCC 47 CFR Section 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

And according to FCC 47 CFR Section 15.247 (b), if transmitter antennas of directional gain greater than 6 dBi are used, the power shall be reduced by the mount in dB that the directional gain of the antenna exceeds 6 dBi.

11.2 Antenna Connected construction

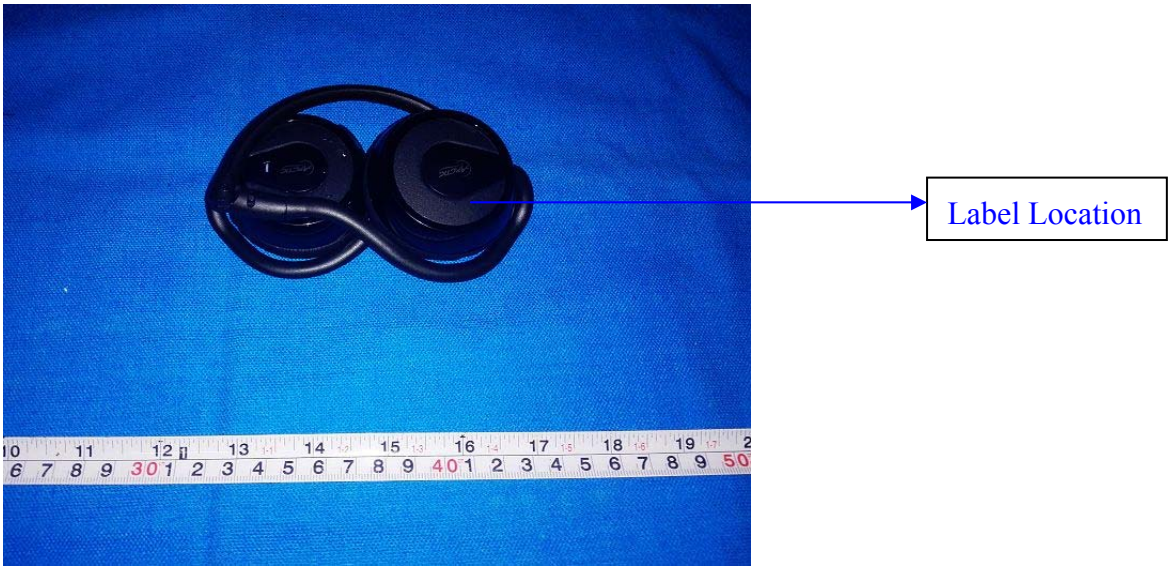
PCB antenna used. The maximum Gain of the antennas is 2.0 dBi.

12.0 FCC ID Label

FCC ID: Z3AP324BT

The label must not be a stick-on paper label. The label on these products must be permanently affixed to the product and readily visible at the time of purchase and must last the expected lifetime of the equipment not be readily detachable.

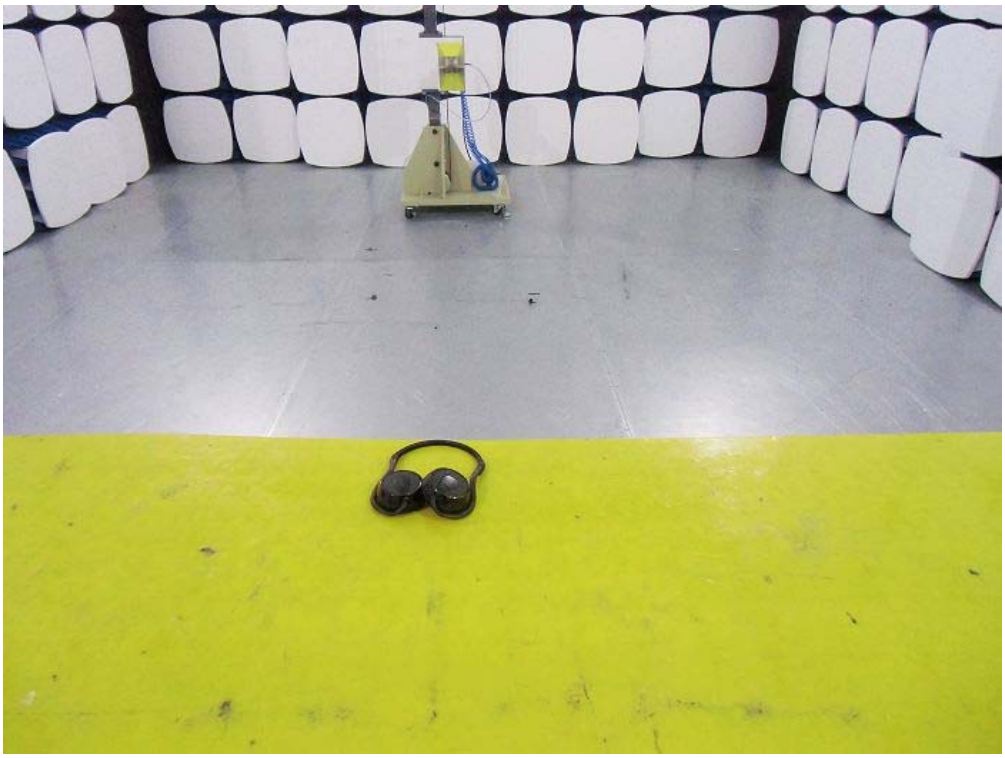
Mark Location:



13 PHOTOGRAPHS OF THE TEST CONFIGURATION

Conducted Emissions

Radiated Emissions



PHOTOGRAPHS OF EUT

Photo 1

Photo 2

Photo 3

Photo 4

Photo 5

Photo 6

Photo 7

Photo 8

Photo 9

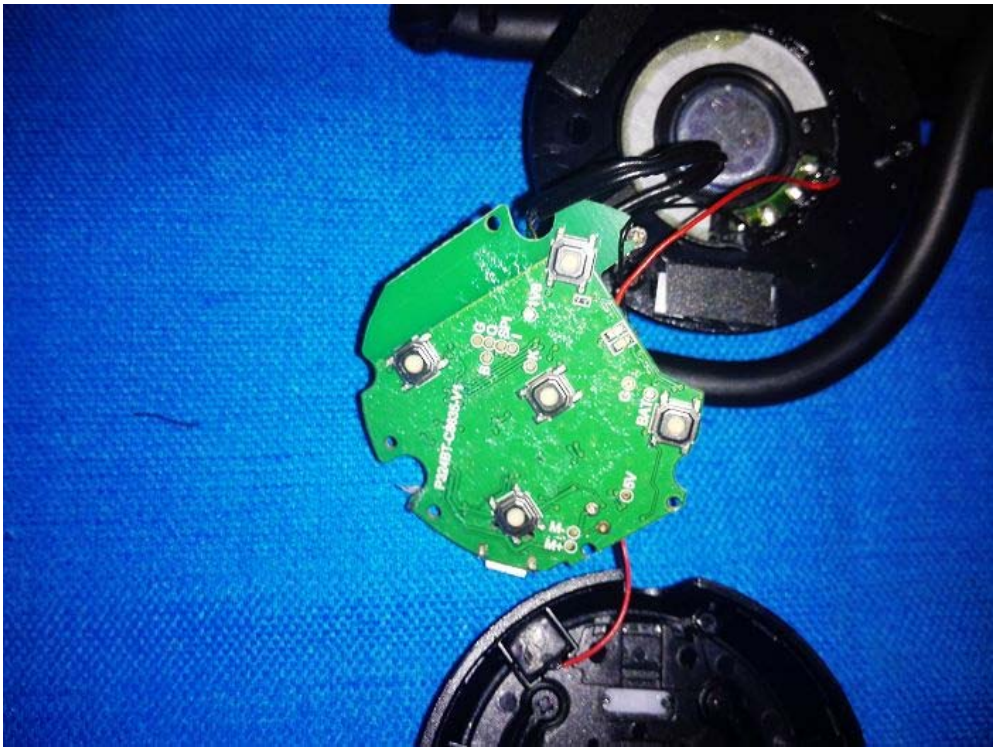


Photo 10

The Report End