

Report No.: AGC01974140603FE03 Page 1 of 70

# **FCC Test Report**

Report No.: AGC01974140603FE03

FCC ID : OR8-T1

**APPLICATION PURPOSE** : Original Equipment

**PRODUCT DESIGNATION**: Bluetooth Headphone

BRAND NAME : microlab

MODEL NAME : T1

**CLIENT** : Microlab Electronics Co.,Ltd.

**DATE OF ISSUE** : Jul.11, 2014

**STANDARD(S)** : FCC Part 15 Rules

**REPORT VERSION**: V1.0

Attestation of Global Compliance (Shenzhen) Co., Ltd

## **CAUTION:**

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Page 2 of 70

## **Report Revise Record**

Report Version	Revise Time	Issued Date	Valid Version	Notes
V1.0	1	Jul.11, 2014	Valid	Original Report

## **TABLE OF CONTENTS**

1. VERIFICATION OF CONFORMITY	5
2. GENERAL INFORMATION	6
2.1. PRODUCT DESCRIPTION	6
2.2. TABLE OF CARRIER FREQUENCYS	6
2.3. RECEIVER INPUT BANDWIDTH	7
2.4. EXAMPLE OF A HOPPING SEQUENCY IN DATA MODE	7
2.5. EQUALLY AVERAGE USE OF FREQUENCIES AND BEHAVIOUR	
2.6. RELATED SUBMITTAL(S) / GRANT (S)	8
2.7. TEST METHODOLOGY	8
2.8. SPECIAL ACCESSORIES	8
2.9. EQUIPMENT MODIFICATIONS	8
3. MEASUREMENT UNCERTAINTY	9
4. DESCRIPTION OF TEST MODES	9
5. SYSTEM TEST CONFIGURATION	10
5.1. CONFIGURATION OF EUT SYSTEM	
5.2. EQUIPMENT USED IN EUT SYSTEM	
5.3. SUMMARY OF TEST RESULTS	
6. TEST FACILITY	11
7. PEAK OUTPUT POWER	
7.1. MEASUREMENT PROCEDURE	
7.2. TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)	
7.3. LIMITS AND MEASUREMENT RESULT	
8. 20DB BANDWIDTH	19
8.1. MEASUREMENT PROCEDURE	
8.2. TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)	
8.3. LIMITS AND MEASUREMENT RESULTS	
9. CONDUCTED SPURIOUS EMISSION	
9.1. MEASUREMENT PROCEDURE	
9.2. TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)	26
9.3. MEASUREMENT EQUIPMENT USED	
9.4. LIMITS AND MEASUREMENT RESULT	
10. RADIATED EMISSION	
10.1. MEASUREMENT PROCEDURE	
10.2. TEST SETUP	
10.3. TEST RESULT (Worst Modulation: GFSK)	36

11. BAND EDGE EMISSION	48
11.1. MEASUREMENT PROCEDURE	48
11.2. TEST SET-UP	48
11.3. TEST RESULT	49
12. NUMBER OF HOPPING FREQUENCY	53
12.1. MEASUREMENT PROCEDURE	53
12.2. TEST SETUP (BLOCK DIAGRAM OF CONFIGURATION)	53
12.3. MEASUREMENT EQUIPMENT USED	53
12.4. LIMITS AND MEASUREMENT RESULT	53
13. TIME OF OCCUPANCY (DWELL TIME)	54
13.1. MEASUREMENT PROCEDURE	54
13.2. TEST SETUP (BLOCK DIAGRAM OF CONFIGURATION)	54
13.3. MEASUREMENT EQUIPMENT USED	54
13.4. LIMITS AND MEASUREMENT RESULT	54
14. FREQUENCY SEPARATION	57
14.1. MEASUREMENT PROCEDURE	57
14.2. TEST SETUP (BLOCK DIAGRAM OF CONFIGURATION)	57
14.3. MEASUREMENT EQUIPMENT USED	57
14.4. LIMITS AND MEASUREMENT RESULT	57
15. FCC LINE CONDUCTED EMISSION TEST	59
15.1. LIMITS OF LINE CONDUCTED EMISSION TEST	59
15.2. BLOCK DIAGRAM OF LINE CONDUCTED EMISSION TEST	59
15.3. PRELIMINARY PROCEDURE OF LINE CONDUCTED EMISSION TEST	60
15.4. FINAL PROCEDURE OF LINE CONDUCTED EMISSION TEST	60
15.5. TEST RESULT OF LINE CONDUCTED EMISSION TEST	61
APPENDIX A: PHOTOGRAPHS OF TEST SETUP	63
APPENDIX B. PHOTOGRAPHS OF FUT	65

Page 5 of 70

## 1. VERIFICATION OF CONFORMITY

Applicant	Microlab Electronics Co.,Ltd.		
Address	Baozi South Road, Shenzhen Microlab Industrial Park, Shenzhen Grand Industrial Zone, PingShan New District, Shenzhen, GuangDong, China		
Manufacturer	Microlab Electronics Co.,Ltd.		
Address	Baozi South Road, Shenzhen Microlab Industrial Park, Shenzhen Grand Industrial Zone, PingShan New District, Shenzhen, GuangDong, China		
Product Designation	Bluetooth Headphone		
Brand Name	microlab		
Test Model	T1		
Date of test	Jul.08, 2014 to Jul.10, 2014		
Deviation	None		
Condition of Test Sample	Normal		
Report Template	AGCRT-US-BR/RF (2013-03-01)		

We hereby certify that:

The above equipment was tested by Attestation of Global Compliance (Shenzhen) Co., Ltd. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.4 (2003) and the energy emitted by the sample EUT tested as described in this report is in compliance with radiated emission limits of FCC Rules Part 15.247.

Water Zuo Jul.11, 2014

Checked By

Forrest Lei Jul.11, 2014

Authorized By

Solger Zhang Jul.11, 2014

Page 6 of 70

## 2. GENERAL INFORMATION

## 2.1. PRODUCT DESCRIPTION

The EUT is "Bluetooth Headphone" designed as a "Communication Device". It is designed by way of utilizing the FHSS technology to achieve the system operation.

A major technical description of EUT is described as following

· ·······g·· · · · · · · · · · · · · ·			
Operation Frequency	2.402 GHz to 2.480GHz		
RF Output Power	3.94dBm(Max)		
Bluetooth Version	V 3.0		
Modulation	GFSK, π /4-DQPSK, 8DPSK		
Number of channels	79		
Hardware Version	R1.0		
Software Version	R1.0		
Antenna Designation	PCB Antenna		
Antenna Gain	0dBi		
Power Supply	DC3.7V by Battery		
Note: The USB port can be used for charging and transfer data with PC.			

Trote. The GOD port oan be doed for onlying and transfer data wit

## 2.2. TABLE OF CARRIER FREQUENCYS

Frequency Band	Channel Number	Frequency	
	0	2402MHZ	
	1	2403MHZ	
	:	:	
	38	2440 MHZ	
2402~2480MHZ	39	2441 MHZ	
	40	2442 MHZ	
	:	:	
	77	2479 MHZ	
	78	2480 MHZ	

Page 7 of 70

#### 2.3. RECEIVER INPUT BANDWIDTH

The input bandwidth of the receiver is 1.3MHZ,In every connection one Bluetooth device is the master and the other one is slave. The master determines the hopping sequence. The slave follows this sequence. Both devices shift between RX and TX time slot according to the clock of the master. Additionally the type of connection(e.g. single of multislot packet) is set up at the beginning of the connection. The master adapts its hopping frequency and its TX/RX timing according to the packet type of the connection. Also the slave of the connection will use these settings.

Repeating of a packet has no influence on the hopping sequence. The hopping sequence generated by the master of the connection will be followed in any case. That means, a repeated packet will not be send on the same frequency, it is send on the next frequency of the hopping sequence.

#### 2.4. EXAMPLE OF A HOPPING SEQUENCY IN DATA MODE

Example of a 79 hopping sequence in data mode: 40,21,44,23,42,53,46,55,48,33,52,35,50,65,54,67 56,37,60,39,58,69,62,71,64,25,68,27,66,57,70,59 72,29,76,31,74,61,78,63,01,41,05,43,03,73,07,75 09,45,13,47,11,77,15,00,64,49,66,53,68,02,70,06 01, 51, 03, 55, 05, 04

#### 2.5. EQUALLY AVERAGE USE OF FREQUENCIES AND BEHAVIOUR

The generation of the hopping sequence in connection mode depends essentially on two input values:

- 1. LAP/UAP of the master of the connection.
- 2. Internal master clock

The LAP(lower address part) are the 24 LSB's of the 48 BD\_ADDRESS. The BD\_ADDRESS is an unambiguous number of every Bluetooth unit. The UAP(upper address part) are the 24MSB's of the 48BD ADDRESS

The internal clock of a Bluetooth unit is derived from a free running clock which is never adjusted and is never turned off. For ehavior zation with other units only offset are used. It has no relation to the time of the day. Its resolution is at least half the RX/TX slot length of 312.5us. The clock has a cycle of about one day(23h30). In most case it is implemented as 28 bit counter. For the deriving of the hopping sequence the entire. LAP(24 bits), 4LSB's (4bits) (Input 1) and the 27MSB's of the clock (Input 2) are used. With this input values different mathematical procedures (permutations, additions, XOR-operations) are performed to generate te Sequence. This will be done at the beginning of every new transmission.

Regarding short transmissions the Bluetooth system has the following ehavior:

The first connection between the two devices is established, a hopping sequence was generated. For Transmitting the wanted data the complete hopping sequence was not used. The connection ended. The second connection will be established. A new hopping sequence is generated. Due to the fact the Bluetooth clock has a different value, because the period between the two transmission is longer(and it Cannot be shorter) than the minimum resolution of the clock(312.5us). The hopping sequence will always Differ from the first one.

Page 8 of 70

## 2.6. RELATED SUBMITTAL(S) / GRANT (S)

This submittal(s) (test report) is intended for **FCC ID: OR8-T1** filing to comply with Section 15.247 of the FCC Part 15, Subpart C Rules.

## 2.7. TEST METHODOLOGY

Both conducted and radiated testing was performed according to the procedures in ANSI C63.4 (2003). Radiated testing was performed at an antenna to EUT distance 3 meters.

## 2.8. SPECIAL ACCESSORIES

Refer to section 5.2.

## 2.9. EQUIPMENT MODIFICATIONS

Not available for this EUT intended for grant.

Page 9 of 70

## 3. MEASUREMENT UNCERTAINTY

Conducted measurement: +/- 2.75dB Radiated measurement: +/- 3.2dB

## 4. DESCRIPTION OF TEST MODES

NO.	TEST MODE DESCRIPTION
1	Low channel TX
2	Middle channel TX
3	High channel TX
4	Normal Operating (BT)

#### Note:

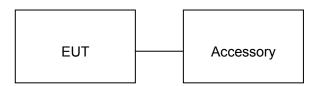
- 1. Only the result of the worst case was recorded in the report, if no other cases.
- 2. For Radiated Emission, 3axis were chosen for testing for each applicable mode.

Page 10 of 70

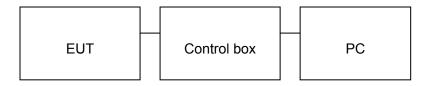
## **5. SYSTEM TEST CONFIGURATION**

## **5.1. CONFIGURATION OF EUT SYSTEM**

Configure 1: (Normal hopping)



Configure 2: (Control continuous TX)



## **5.2. EQUIPMENT USED IN EUT SYSTEM**

Item	Equipment	Mfr/Brand	Model/Type No.	Remark
1	Bluetooth Headphone	microlab	T1	EUT
2	PC	Dell	INSPIRON	A.E
3	Control box	N/A	N/A	A.E

## **5.3. SUMMARY OF TEST RESULTS**

FCC RULES	DESCRIPTION OF TEST	RESULT
§15.247	Peak Output Power	Compliant
§15.247	20 dB Bandwidth	Compliant
§15.247	Spurious Emission	Compliant
§15.209	Radiated Emission	Compliant
§15.247	Band Edges	Compliant
§15.207	Conduction Emission	Compliant
§15.247	Number of Hopping Frequency	Compliant
§15.247	Time of Occupancy	Compliant
§15.247	Frequency Separation	Compliant

Page 11 of 70

## **6. TEST FACILITY**

Site	Attestation of Global Compliance (Shenzhen) Co., Ltd		
Location	2/F., Building 2, No.1-No.4, Chaxi Sanwei Technical Industrial Park, Gushu, Xixiang, Bao'an District, Shenzhen, Guangdong, China		
Description	The test site is constructed and calibrated to meet the FCC requirements in documents ANSI C63.4:2003.		

## **ALL TEST EQUIPMENT LIST**

Description	Manufacturer	Model	S/N	Cal. Date	Cal. Due
Power Probe	R&S	NRP-Z23	100323	07/17/2013	07/16/2014
RF attenuator	N/A	RFA20db	68	N/A	N/A
Spectrum Analyzer	Agilent	E4440A	US41421290	07/17/2013	07/16/2014
EXA Signal Analyzer	Agilent	N9010A		02/28/2014	02/27/2015
Amplifier	EM	EM30180	0607030	02/28/2014	02/27/2015
Horn Antenna	EM	EM-AH-10180	67	04/19/2014	04/18/2015
Horn Antenna	A.H. Systems Inc.	SAS-574		07/17/2013	07/16/2014
EMI Test Receiver	Rohde & Schwarz	ESCI	100694	07/17/2013	07/16/2014
Bilogical Antenna	A.H. Systems Inc.	SAS-521-4	26	06/06/2014	06/05/2015
LISN	R&S	ESH3-Z5	8389791009	07/17/2013	07/16/2014
Loop Antenna	Daze	ZN30900N	SEL0097	07/17/2013	07/16/2014
Isolation Transformer	LETEAC	LTBK		07/17/2013	07/16/2014
USB cable	AGC	0.6m/unshield	N/A	N/A	N/A
USB cable	Microlab	1.2m/unshield	N/A	N/A	N/A
Charge cable	Microlab	1.5m/unshield	N/A	N/A	N/A
Radiated Emissions Cable	N/A	RE1		06/04/2014	06/04/2015

Page 12 of 70

## 7. PEAK OUTPUT POWER

#### 7.1. MEASUREMENT PROCEDURE

For peak power test:

- 1. Connect EUT RF output port to the Spectrum Analyzer through an RF attenuator
- 2. Set the EUT Work on the top, middle and the bottom operation frequency individually.
- 3. RBW > the 20 dB bandwidth of the emission being measured, VBW ≥ RBW.
- 4. Record the maximum power from the Spectrum Analyzer.

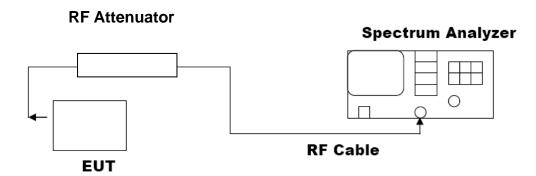
## For average power test:

- 1. Connect EUT RF output port to power probe through an RF attenuator.
- 2. Connect the power probe to the PC.
- 3. Set the EUT Work on the top, the middle and the bottom operation frequency individually.
- 4. Record the maximum power from the software.
- 5. The maximum peak power shall be less 125mW (21dBm).

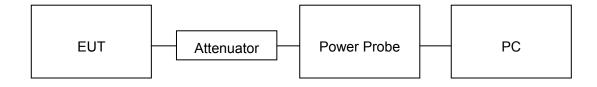
**Note**: The EUT was tested according to DA000705 for compliance to FCC 47CFR 15.247 requirements.

## 7.2. TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)

#### **PEAK POWER TEST SETUP**



## **AVERAGE POWER SETUP**

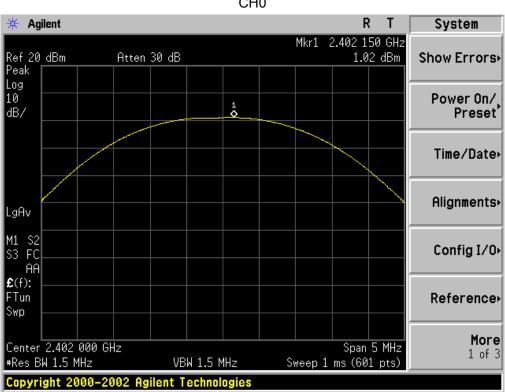


Page 13 of 70

## 7.3. LIMITS AND MEASUREMENT RESULT

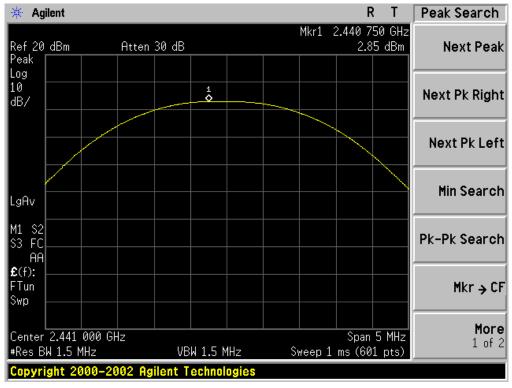
PEAK OUTPUT POWER MEASUREMENT RESULT FOR GFSK MOUDULATION						
Frequency (GHz)	Pass or Fail					
2.402	-0.9	1.02	21	Pass		
2.441	0.9	2.85	21	Pass		
2.480	1.98	3.94	21	Pass		

CH0

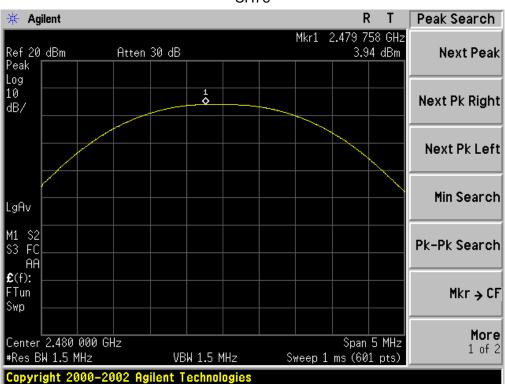


Page 14 of 70

**CH39** 



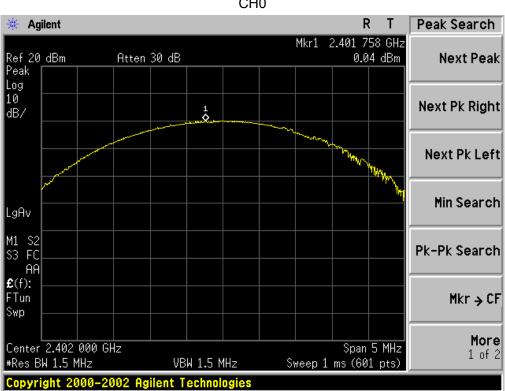
**CH78** 



Report No.: AGC01974140603FE03 Page 15 of 70

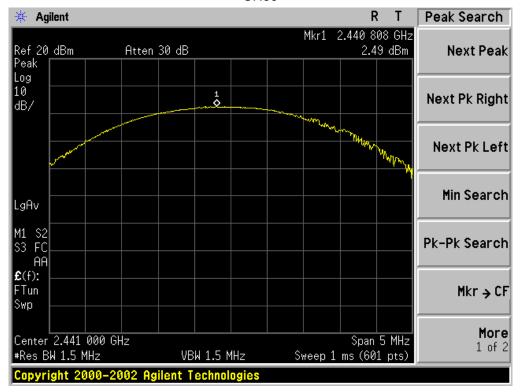
PEAK OUTPUT POWER MEASUREMENT RESULT  FOR II /4-DQPSK MODULATION								
Frequency (GHz)  Average Power (dBm)  Peak Power Applicable Limits (dBm)  Pass or Fail								
2.402	-1.81	0.04	21	Pass				
2.441	0.55	2.49	21	Pass				
2.480	1.36	3.32	21	Pass				

CH<sub>0</sub>

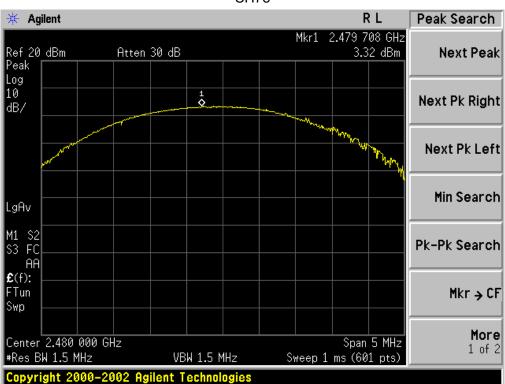


Page 16 of 70

**CH39** 



**CH78** 



Page 17 of 70

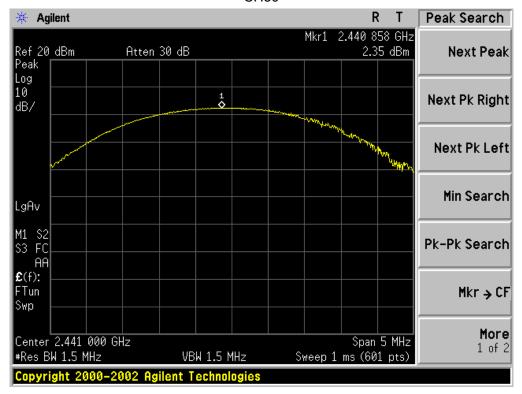
PEAK OUTPUT POWER MEASUREMENT RESULT FOR 8-DPSK MODULATION								
Frequency (GHz) Average Power (dBm) Peak Power (dBm) Applicable Limits (dBm) Pass or Fail								
2.402	-1.9	0.05	21	Pass				
2.441	21	Pass						
2.480	1.26	3.17	21	Pass				

CH0

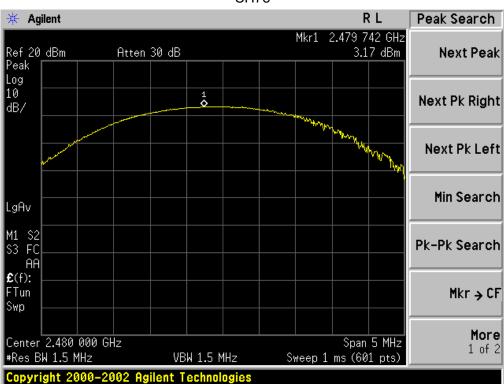


Page 18 of 70

**CH39** 



**CH78** 



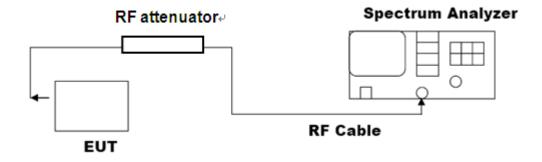
Page 19 of 70

## 8. 20DB BANDWIDTH

## **8.1. MEASUREMENT PROCEDURE**

- 1. Connect EUT RF output port to the Spectrum Analyzer through an RF attenuator
- 2, Set the EUT Work on the top, the middle and the bottom operation frequency individually.
- 3. Set Span = approximately 2 to 3 times the 20 dB bandwidth, centered on a hoping channel RBW ≥ 1% of the 20 dB bandwidth, VBW ≥ RBW; Sweep = auto; Detector function = peak
- 4. Set SPA Trace 1 Max hold, then View.

## 8.2. TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)

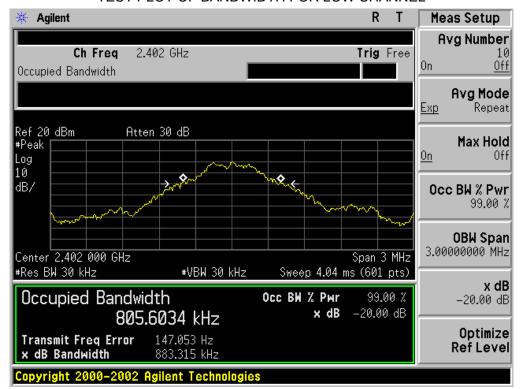


## 8.3. LIMITS AND MEASUREMENT RESULTS

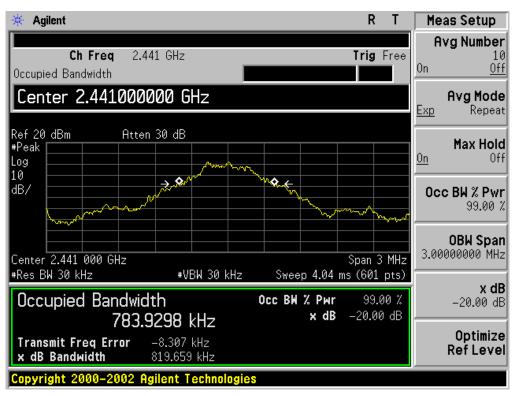
BLUETOOTH 1MBPS LIMITS AND MEASUREMENT RESUL						
Amaliachta Limita	Measurement Result					
Applicable Limits	Test Da	Criteria				
	Low Channel	0.883	PASS			
N/A	Middle Channel	0.820	PASS			
	High Channel	0.886	PASS			

Page 20 of 70

#### TEST PLOT OF BANDWIDTH FOR LOW CHANNEL

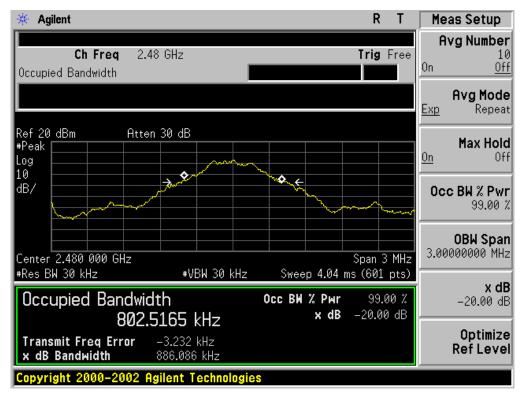


#### TEST PLOT OF BANDWIDTH FOR MIDDLE CHANNEL



Page 21 of 70

#### TEST PLOT OF BANDWIDTH FOR HIGH CHANNEL



Report No.: AGC01974140603FE03 Page 22 of 70

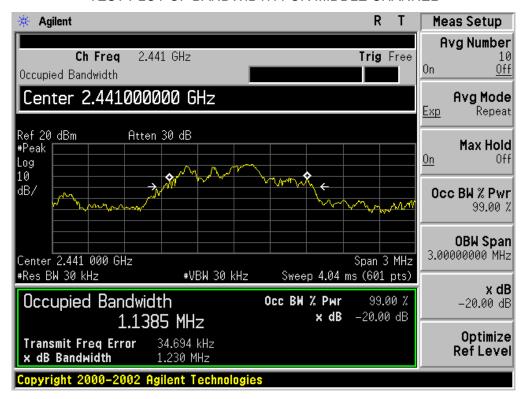
BLUETOOTH 2MBPS LIMITS AND MEASUREMENT RESUL						
Applicable Limite		Measurement Result				
Applicable Limits	Test Da	Criteria				
	Low Channel	1.125	PASS			
N/A	Middle Channel	1.230	PASS			
	High Channel	1.235	PASS			

#### TEST PLOT OF BANDWIDTH FOR LOW CHANNEL

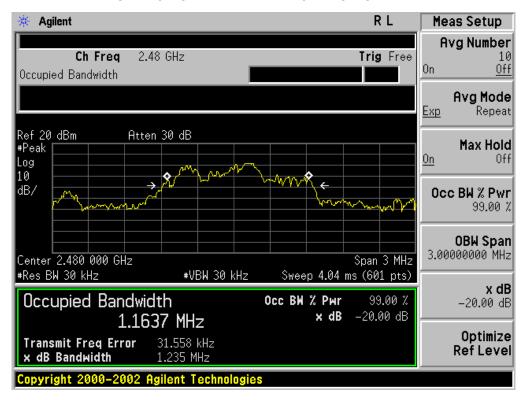


Page 23 of 70

#### TEST PLOT OF BANDWIDTH FOR MIDDLE CHANNEL



TEST PLOT OF BANDWIDTH FOR HIGH CHANNEL



Report No.: AGC01974140603FE03 Page 24 of 70

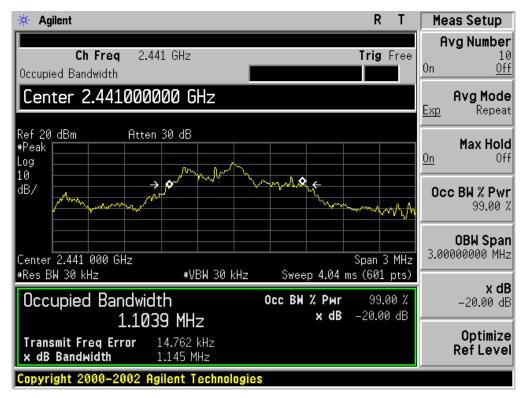
BLUETOOTH 3MBPS LIMITS AND MEASUREMENT RESUL						
Amaliachla Limita	Measurement Result					
Applicable Limits	Test Da	Criteria				
	Low Channel	1.210	PASS			
N/A	Middle Channel	1.145	PASS			
	High Channel	1.177	PASS			

#### TEST PLOT OF BANDWIDTH FOR LOW CHANNEL

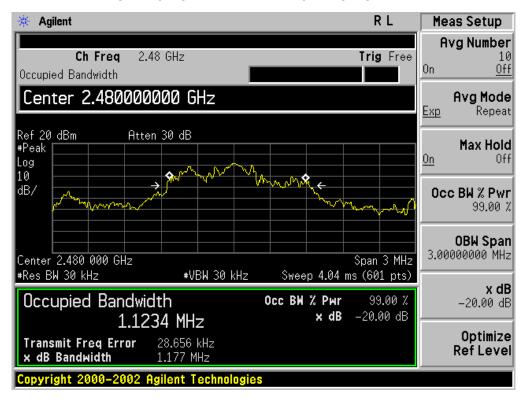


Page 25 of 70

#### TEST PLOT OF BANDWIDTH FOR MIDDLE CHANNEL



TEST PLOT OF BANDWIDTH FOR HIGH CHANNEL



Page 26 of 70

## 9. CONDUCTED SPURIOUS EMISSION

## 9.1. MEASUREMENT PROCEDURE

- 1. Connect EUT RF output port to the Spectrum Analyzer through an RF attenuator
- 2. Set the EUT Work on the top, the Middle and the bottom operation frequency individually.
- 3. Set the Span = wide enough to capture the peak level of the in-band emission and all spurious emissions from the lowest frequency generated in the EUT up through the 10th harmonic.

  RBW = 100 kHz; VBW ≥ RBW; Sweep = auto; Detector function = peak.
- 4. Set SPA Trace 1 Max hold, then View.

## 9.2. TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)

The same as described in section 8.2

## 9.3. MEASUREMENT EQUIPMENT USED

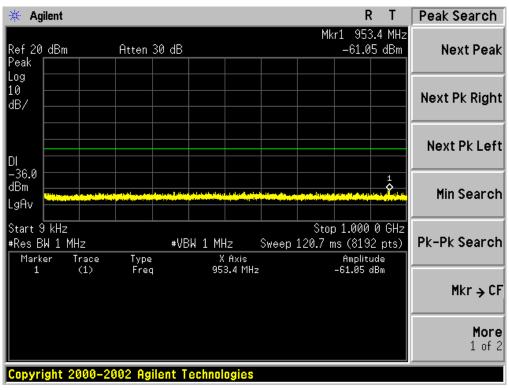
The same as described in section 6

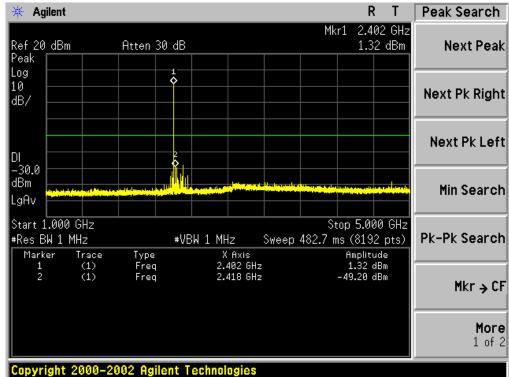
#### 9.4. LIMITS AND MEASUREMENT RESULT

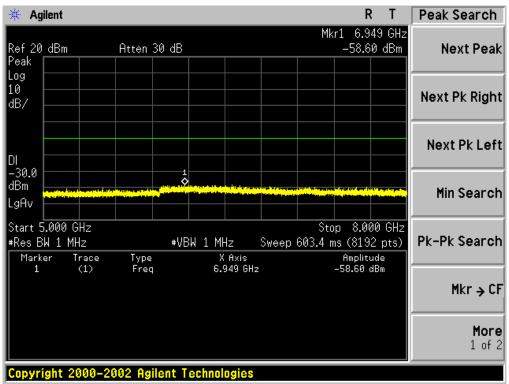
LIMITS AND MEASUREMENT RESULT						
Amulia abla Limita	Measurement Result					
Applicable Limits	Test Data	Criteria				
In any 100 KHz Bandwidth Outside the	At least -20dBc than the limit					
frequency band in which the spread spectrum	Specified on the BOTTOM	PASS				
intentional radiator is operating, the radio frequency	Channel					
power that is produce by the intentional radiator						
shall be at least 20 dB below that in 100KHz						
bandwidth within the band that contains the highest						
level of the desired power.	At least -20dBc than the limit	DAGO				
In addition, radiation emissions which fall in the	Specified on the TOP Channel	PASS				
restricted bands, as defined in §15.205(a), must also						
comply with the radiated emission limits specified						
in§15.209(a))						

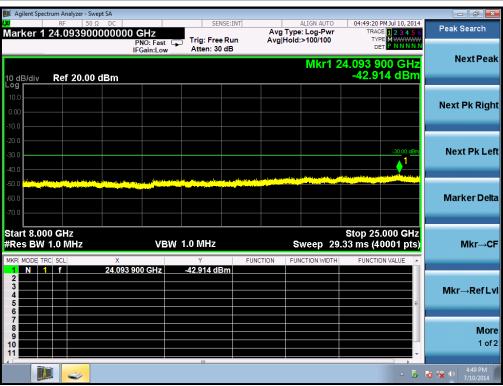
Page 27 of 70

## TEST PLOT OF OUT OF BAND EMISSIONS WITH THE WORST CASE OF GFSK MODULATION IN LOW CHANNEL



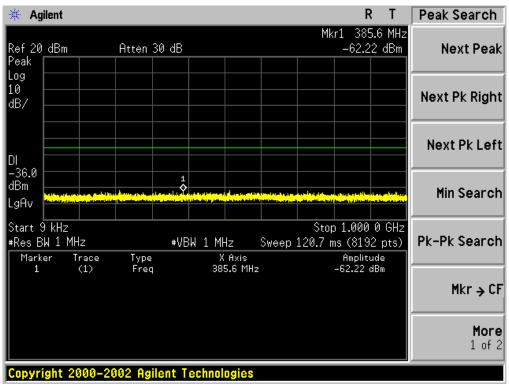


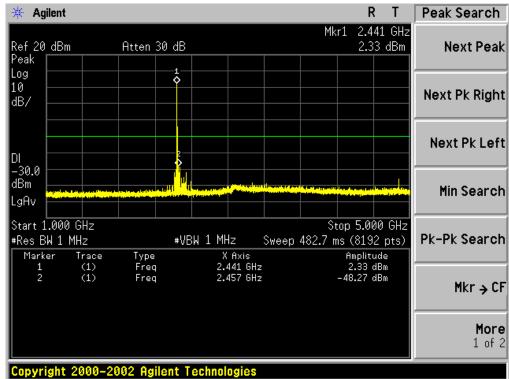


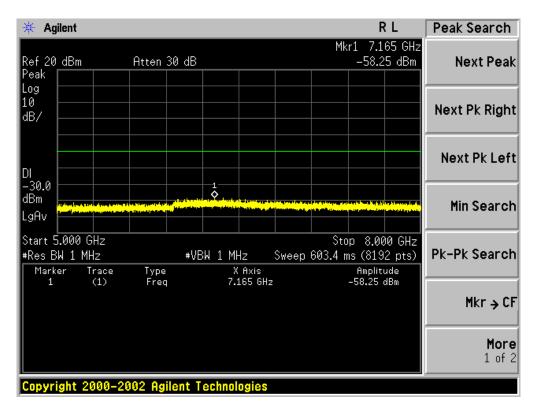


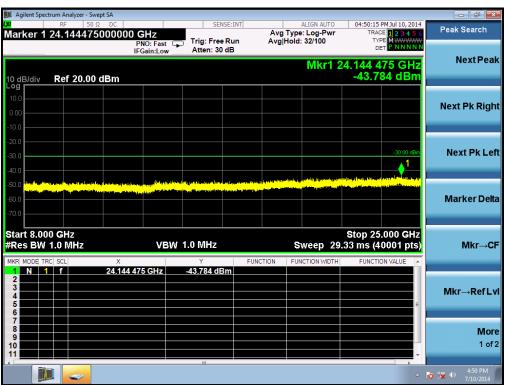
Page 29 of 70

## TEST PLOT OF OUT OF BAND EMISSIONS OF GFSK MODULATION IN MIDDLE CHANNEL



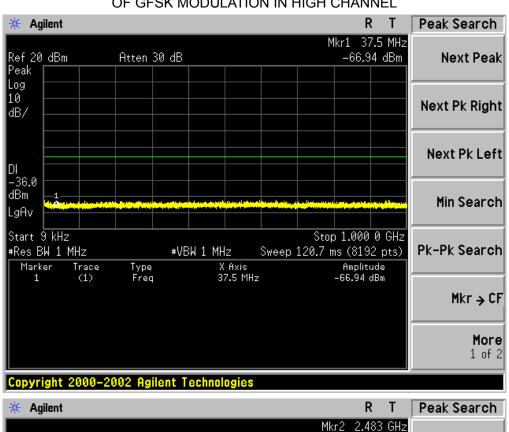


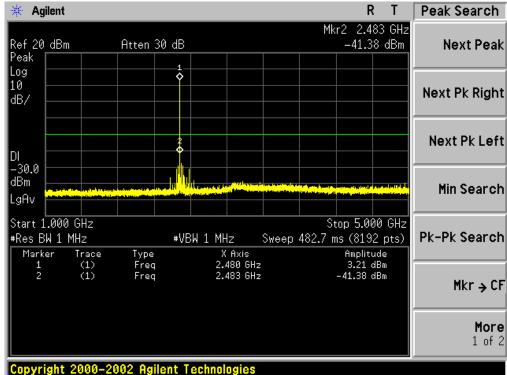




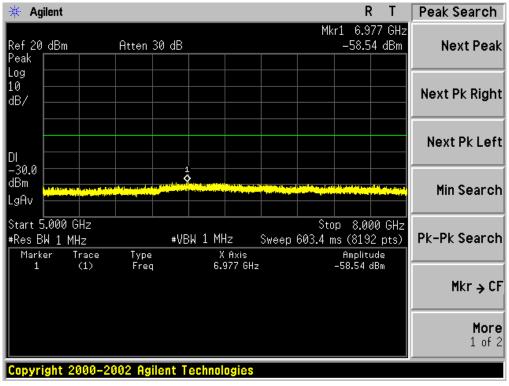
Page 31 of 70

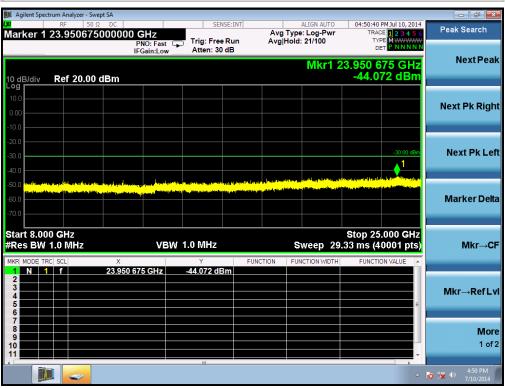
## TEST PLOT OF OUT OF BAND EMISSIONS OF GFSK MODULATION IN HIGH CHANNEL





Page 32 of 70





Page 33 of 70

#### 10. RADIATED EMISSION

#### **10.1. MEASUREMENT PROCEDURE**

- 1. Configure the EUT according to ANSI C63.4. The EUT was placed on the top of the turntable 0.8 meter above ground. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turntable.
- 2. Power on the EUT and all the supporting units. The turntable was rotated by 360 degrees to determine the position of the highest radiation.
- 3. The height of the broadband receiving antenna was varied between one meter and four meters above ground to find the maximum emissions field strength of both horizontal and vertical polarization.
- 4. For each suspected emissions, the antenna tower was scan (from 1 M to 4 M) and then the turntable was rotated (from 0 degree to 360 degrees) to find the maximum reading.
- 5. Set the test-receiver system to Peak or CISPR quasi-peak Detect Function with specified bandwidth under Maximum Hold Mode.
- 6. For emissions above 1GHz, use 1MHz VBW and RBW for peak reading. Then 1MHz RBW and 10Hz VBW for average reading in spectrum analyzer.
- 7. When the radiated emissions limits are expressed in terms of the average value of the emissions, and pulsed operation is employed, the measurement field strength shall be determined by averaging over one complete pulse train, including blanking intervals, as long as the pulse train does not exceed 0.1 seconds. As an alternative (provided the transmitter operates for longer than 0.1 seconds) or in cases where the pulse train exceeds 0.1 seconds, the measured field strength shall be determined from the average absolute voltage during a 0.1 second interval during which the field strength is at its maximum values.
- 8.If the emissions level of the EUT in peak mode was 3 dB lower than the average limit specified, then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions which do not have 3 dB margin will be repeated one by one using the quasi-peak method for below 1GHz.
- 9. For testing above 1GHz, the emissions level of the EUT in peak mode was lower than average limit (that means the emissions level in peak mode also complies with the limit in average mode), then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions will be measured in average mode again and reported.
- 10. In case the emission is lower than 30MHz, loop antenna has to be used for measurement and the recorded data should be QP measured by receiver. High Low scan is not required in this case.

Report No.: AGC01974140603FE03 Page 34 of 70

The following table is the setting of spectrum analyzer and receiver.

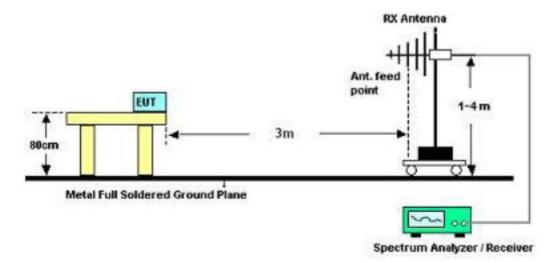
Spectrum Parameter	Setting			
Start ~Stop Frequency	9KHz~150KHz/RB 200Hz for QP			
Start ~Stop Frequency	150KHz~30MHz/RB 9KHz for QP			
Start ~Stop Frequency	30MHz~1000MHz/RB 120KHz for QP			
Start ~Stop Frequency	1GHz~26.5GHz 1MHz/1MHz for Peak, 1MHz/10Hz for Average			

Receiver Parameter	Setting			
Start ~Stop Frequency	9KHz~150KHz/RB 200Hz for QP			
Start ~Stop Frequency	150KHz~30MHz/RB 9KHz for QP			
Start ~Stop Frequency	30MHz~1000MHz/RB 120KHz for QP			

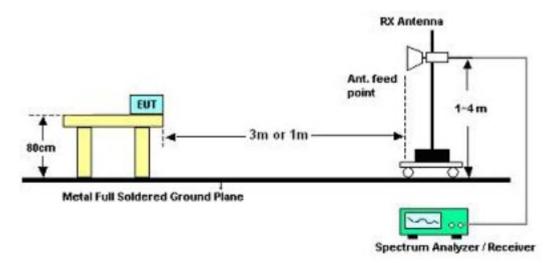
Page 35 of 70

## 10.2. TEST SETUP

## RADIATED EMISSION TEST SETUP 30MHz-1000MHz



## RADIATED EMISSION TEST SETUP ABOVE 1000MHz



Temperature: 26

Humidity: 60 %

Page 36 of 70

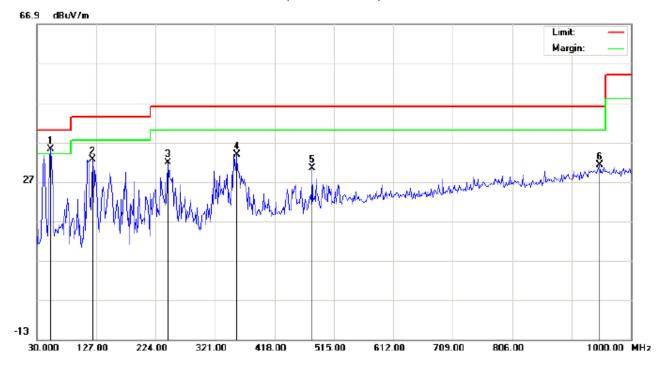
## 10.3. TEST RESULT (Worst Modulation: GFSK)

## **RADIATED EMISSION BELOW 30MHZ**

No emission found between lowest internal used/generated frequencies to 30MHz.

#### **RADIATED EMISSION BELOW 1GHZ**

RADIATED EMISSION TEST- (30MHZ-1GHZ)-LOW CHANNEL-HORIZONTAL



Polarization: Horizontal

Site: site #1 Limit: FCC Class B 3M Radiation

EUT:Bluetooth Headphone

M/N:T1

Mode:Low Channel TX

Note:

No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height		Comment
	-	MHz	dBu∀	dB/m	dBu∀/m	dBu∀/m	dB		cm	degree	
1	*	52.6333	24.05	11.22	35.27	40.00	-4.73	peak			
2		120.5333	20.70	11.95	32.65	43.50	-10.85	peak			
3		243.4000	18.20	13.65	31.85	46.00	-14.15	peak			
4		356.5667	15.12	18.78	33.90	46.00	-12.10	peak			
5		479.4333	9.59	20.91	30.50	46.00	-15.50	peak		·	
6		948.2667	1.33	29.95	31.28	46.00	-14.72	peak		·	

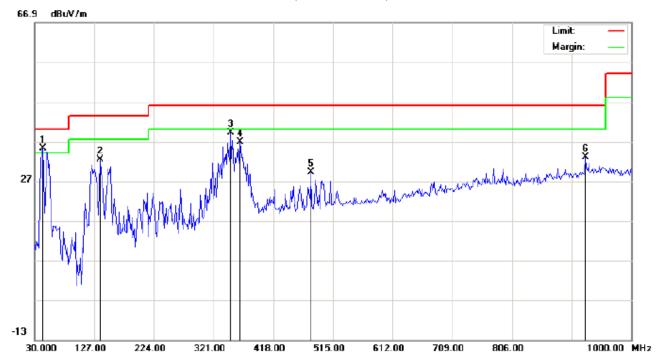
Power:

Distance: 3m

**RESULT: PASS** 

Page 37 of 70

## RADIATED EMISSION TEST- (30MHZ-1GHZ)-LOW CHANNEL -VERTICAL



Site: site #1

Limit: FCC Class B 3M Radiation

EUT:Bluetooth Headphone

M/N:T1

Mode:Low Channel TX

Note:

Polarization:	Vertical	Temperature: 2	6
Power:		Humidity: 60 %	

Distance: 3m

No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height		Comment
	-	MHz	dBu∀	dB/m	dBu∀/m	dBu∀/m	dB		cm	degree	
1	*	42.9333	26.50	8.71	35.21	40.00	-4.79	peak			
2		136.7000	18.50	13.82	32.32	43.50	-11.18	peak			
3		348.4833	20.63	18.64	39.27	46.00	-6.73	peak			
4		364.6500	17.96	18.84	36.80	46.00	-9.20	peak			
5		479.4333	8.37	20.91	29.28	46.00	-16.72	peak			
6		925.6333	3.62	29.32	32.94	46.00	-13.06	peak			

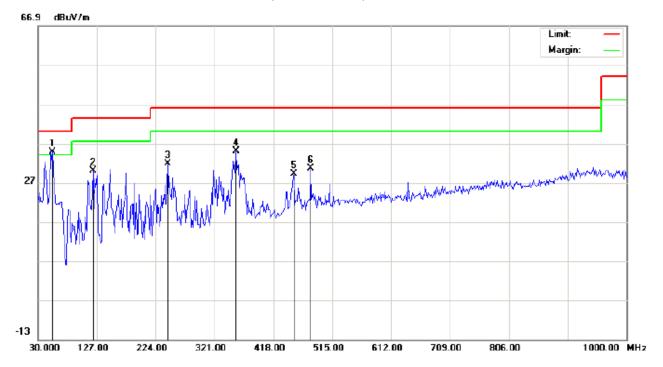
## **RESULT: PASS**

**Note:** 1. Factor=Antenna Factor + Cable loss, Margin=Measurement-Limit.

2. The "Factor" value can be calculated automatically by software of measurement system.

Page 38 of 70

## RADIATED EMISSION TEST- (30MHZ-1GHZ)-MIDDLE CHANNEL-HORIZONTAL



Site: site #1 Limit: FCC Class B 3M Radiation

EUT:Bluetooth Headphone

M/N:T1

Mode:Middle Channel TX

Note:

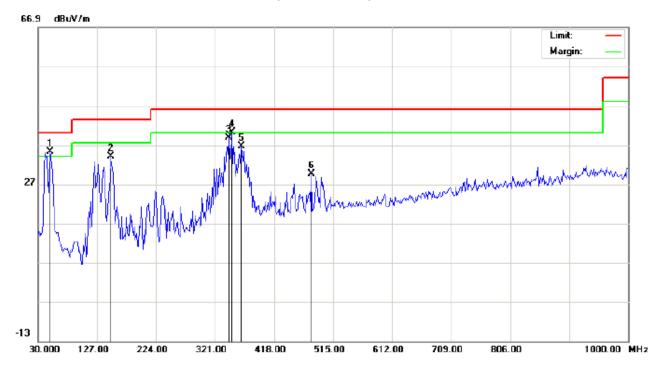
Polarization: Horizontal Temperature: 26
Power: Humidity: 60 %

Distance: 3m

No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
	-	MHz	dBu∀	dB/m	dBu∀/m	dBu∀/m	dB		cm	degree	
1	*	54.2500	23.62	11.20	34.82	40.00	-5.18	peak			
2		120.5333	18.09	11.95	30.04	43.50	-13.46	peak			
3		243.4000	18.21	13.65	31.86	46.00	-14.14	peak			
4		356.5667	16.24	18.78	35.02	46.00	-10.98	peak			
5		451.9500	8.53	20.61	29.14	46.00	-16.86	peak			
6		479.4333	9.67	20.91	30.58	46.00	-15.42	peak		·	

Page 39 of 70

## RADIATED EMISSION TEST- (30MHZ-1GHZ)- MIDDLE CHANNEL -VERTICAL



Site: site #1 Limit: FCC Class B 3M Radiation

EUT:Bluetooth Headphone

M/N:T1

Mode:Middle Channel TX

Note:

Polarization:	Vertical	Temperature: 2	6
Power:		Humidity: 60 %	

Distance: 3m

No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
		MHz	dBu∀	dB/m	dBu∀/m	dBu∀/m	dB		cm	degree	
1	*	49.4000	26.85	8.28	35.13	40.00	-4.87	peak			
2		149.6333	18.71	15.26	33.97	43.50	-9.53	peak			
3		343.6333	20.53	18.32	38.85	46.00	-7.15	peak			
4	:-	348.4833	21.48	18.64	40.12	46.00	-5.88	peak			
5		364.6500	17.77	18.84	36.61	46.00	-9.39	peak			
6		479.4333	8.66	20.91	29.57	46.00	-16.43	peak			

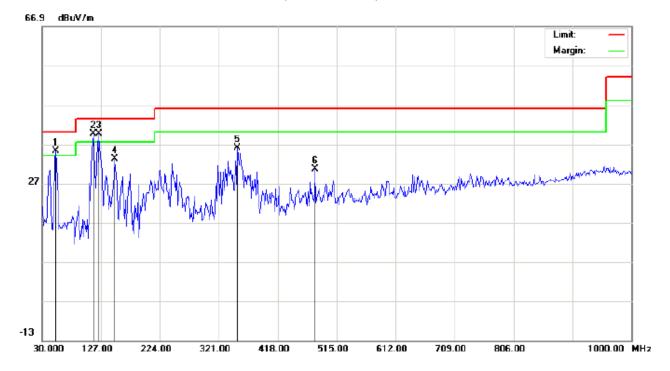
## **RESULT: PASS**

**Note:** 1. Factor=Antenna Factor + Cable loss, Margin=Measurement-Limit.

2. The "Factor" value can be calculated automatically by software of measurement system.

Page 40 of 70

## RADIATED EMISSION TEST- (30MHZ-1GHZ)-HIGH CHANNEL-HORIZONTAL



Site: site #1 Limit: FCC Class B 3M Radiation

EUT:Bluetooth Headphone

M/N:T1

Mode:High Channel TX

Note:

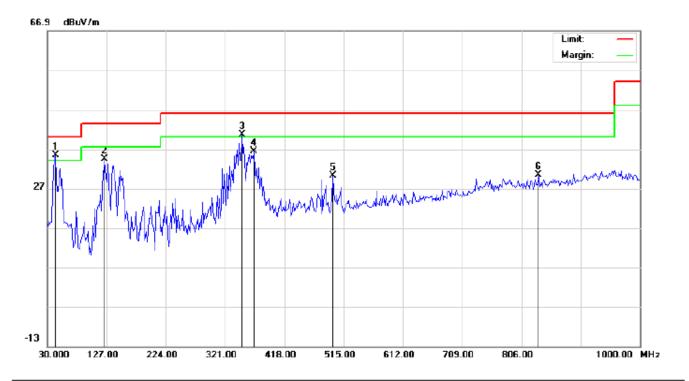
Polarization: Horizontal Temperature: 26 Power: Humidity: 60 %

Distance: 3m

No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
	-	MHz	dBu∀	dB/m	dBu∀/m	dBu∀/m	dB		cm	degree	
1	: <b>_</b>	52.6333	23.95	11.22	35.17	40.00	-4.83	peak			
2	į	114.0667	28.08	11.45	39.53	43.50	-3.97	peak			
3	*	123.7667	27.19	12.49	39.68	43.50	-3.82	peak			
4		149.6333	17.92	15.26	33.18	43.50	-10.32	peak			
5		351.7167	17.29	18.75	36.04	46.00	-9.96	peak			
6		479.4333	9.71	20.91	30.62	46.00	-15.38	peak		·	

Page 41 of 70

## RADIATED EMISSION TEST- (30MHZ-1GHZ)-HIGH CHANNEL -VERTICAL



Site: site #1
Limit: FCC Class B 3M Radiation

EUT:Bluetooth Headphone

M/N:T1

Mode:High Channel TX

Note:

Polarization:	verticai	remperature: 26
Power:		Humidity: 60 %
B: 4		

Distance: 3m

No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
	-	MHz	dBu∀	dB/m	dBuV/m	dBu∀/m	dB		cm	degree	
1	*	42.9333	26.71	8.71	35.42	40.00	-4.58	peak			
2		123.7667	26.02	8.43	34.45	43.50	-9.05	peak			
3	ļ	348.4833	21.90	18.64	40.54	46.00	-5.46	peak			
4		367.8833	17.53	18.86	36.39	46.00	-9.61	peak			
5		497.2167	9.03	21.10	30.13	46.00	-15.87	peak			
6		833.4833	3.11	27.31	30.42	46.00	-15.58	peak			

#### **RESULT: PASS**

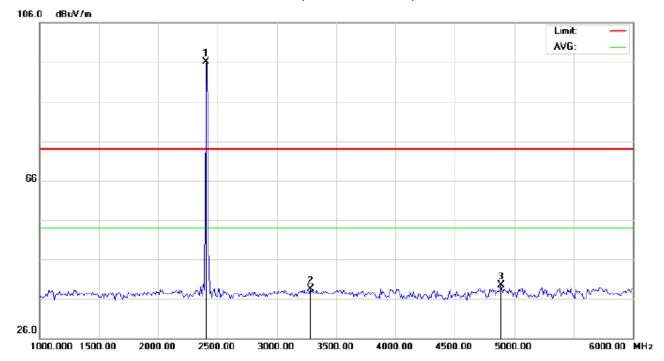
Note: 1. Factor=Antenna Factor + Cable loss, Margin=Measurement-Limit.

2. The "Factor" value can be calculated automatically by software of measurement systemRADIATED

Page 42 of 70

## **RADIATED EMISSION ABOVE 1GHZ**

RADIATED EMISSION ABOVE 1GHZ (1-10<sup>th</sup> Harmonics)-LOW CHANNEL-HORIZONTAL



Site: site #1 Polarization: Horizontal Temperature: 26
Limit: FCC Class B 3M Radiation above 1GHZ(PK) Power: Humidity: 60 %

Distance:

EUT:Bluetooth Headphone

----

M/N:T1

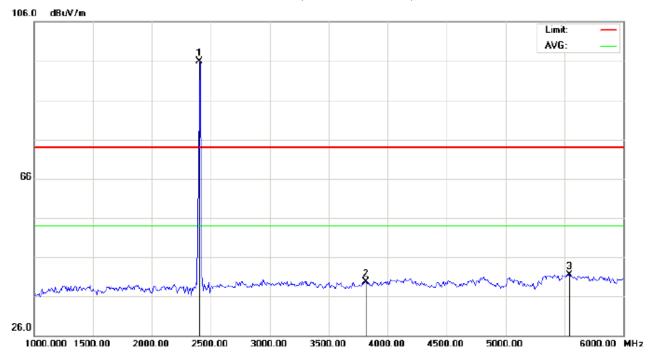
Mode: Low Channel TX

Note:

No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
	-	MHz	dBu∀	dB/m	dBu\//m	dBu∀/m	dB		cm	degree	
1	*	2402.000	105.83	-9.68	96.15	74.00	22.15	peak			
2		3283.333	46.62	-8.09	38.53	74.00	-35.47	peak			
3		4891.667	41.52	-2.08	39.44	74.00	-34.56	peak			

Page 43 of 70

# RADIATED EMISSION ABOVE 1GHZ (1-10<sup>th</sup> Harmonics)-LOW CHANNEL -VERTICAL



Site: site #1 Polarization: Vertical Temperature: 26
Limit: FCC Class B 3M Radiation above 1GHZ(PK) Power: Humidity: 60 %

EUT:Bluetooth Headphone

M/N:T1

Mode: Low Channel TX

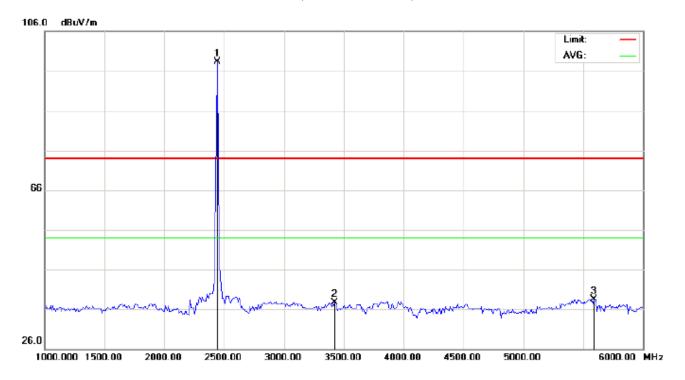
Note:

No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
		MHz	dBu∀	dB/m	dBu∀/m	dBu√/m	dB		cm	degree	
1	*	2402.000	105.58	-9.68	95.90	74.00	21.90	peak			
2		3816.667	45.67	-5.94	39.73	74.00	-34.27	peak			
3		5541.667	43.33	-1.79	41.54	74.00	-32.46	peak			

Distance:

Page 44 of 70

# RADIATED EMISSION ABOVE 1GHZ (1-10<sup>th</sup> Harmonics)-MIDDLE CHANNEL-HORIZONTAL



Site: site #1 Polarization: Horizontal Temperature: 26
Limit: FCC Class B 3M Radiation above 1GHZ(PK) Power: Humidity: 60 %

EUT:Bluetooth Headphone Distance:

M/N:T1

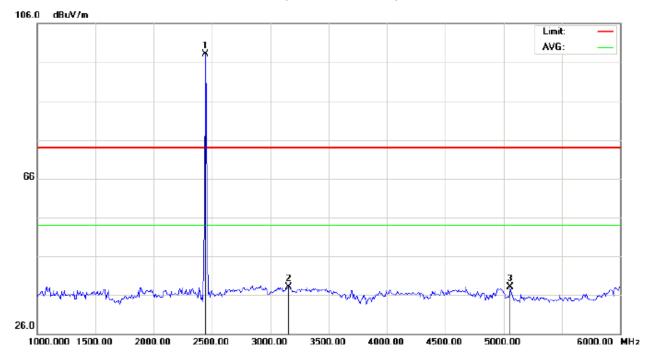
Mode: Middle Channel TX

Note:

No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
	-	MHz	dBu∀	dB/m	dBu∀/m	dBu∀/m	dB		cm	degree	
1	*	2441.000	107.87	-9.63	98.24	74.00	24.24	peak			
2		3425.000	45.60	-7.96	37.64	74.00	-36.36	peak			
3		5591.667	40.22	-1.77	38.45	74.00	-35.55	peak			

Page 45 of 70

# RADIATED EMISSION ABOVE 1GHZ (1-10<sup>th</sup> Harmonics) - MIDDLE CHANNEL -VERTICAL



Site: site #1 Polarization: Vertical Temperature: 26
Limit: FCC Class B 3M Radiation above 1GHZ(PK) Power: Humidity: 60 %

EUT:Bluetooth Headphone

M/N:T1

Mode: Middle Channel TX

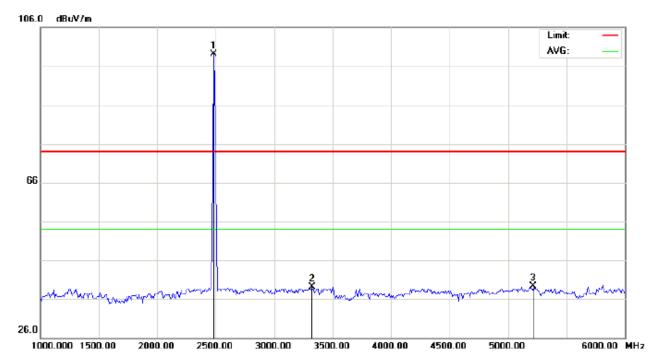
Note:

No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
	-	MHz	dBu∀	dB/m	dBuV/m	dBu∀/m	dB		cm	degree	
1	*	2441.000	107.80	-9.63	98.17	74.00	24.17	peak			
2		3158.333	46.28	-8.21	38.07	74.00	-35.93	peak			
3		5058.333	39.97	-1.80	38.17	74.00	-35.83	peak			

Distance:

Page 46 of 70

# RADIATED EMISSION ABOVE 1GHZ (1-10<sup>th</sup> Harmonics)-HIGH CHANNEL-HORIZONTAL



Site: site #1 Polarization: Horizontal Temperature: 26 Limit: FCC Class B 3M Radiation above 1GHZ(PK) Humidity: 60 % Power:

EUT:Bluetooth Headphone Distance:

M/N:T1

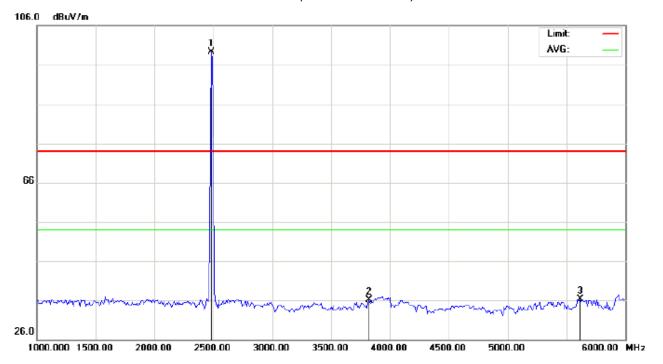
Mode: High Channel TX

Note:

No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
	-	MHz	dBu∀	dB/m	dBu\//m	dBu∀/m	dB		cm	degree	
1	*	2480.000	108.67	-9.59	99.08	74.00	25.08	peak			
2		3325.000	47.16	-8.05	39.11	74.00	-34.89	peak			
3		5216.667	41.05	-1.80	39.25	74.00	-34.75	peak			

Page 47 of 70

# RADIATED EMISSION ABOVE 1GHZ (1-10<sup>th</sup> Harmonics)-HIGH CHANNEL -VERTICAL



Site: site #1 Polarization: Vertical Temperature: 26
Limit: FCC Class B 3M Radiation above 1GHZ(PK) Power: Humidity: 60 %

Distance:

EUT:Bluetooth Headphone

101 T4

M/N:T1

Mode: High Channel TX

Note:

No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
	-	MHz	dBu∀	dB/m	dBu∀/m	dBu∀/m	dB		cm	degree	
1	*	2480.000	108.88	-9.59	99.29	74.00	25.29	peak			
2		3825.000	41.91	-5.89	36.02	74.00	-37.98	peak			
3		5616.667	37.99	-1.76	36.23	74.00	-37.77	peak			

#### **RESULT: PASS**

**Note:** 6~25GHz at least have 20dB margin. No recording in the test report.

Factor=Antenna Factor+ Cable loss-Amplifier gain, Margin=Measurement-Limit.

The "Factor" value can be calculated automatically by software of measurement system.

Page 48 of 70

## 11. BAND EDGE EMISSION

## 11.1. MEASUREMENT PROCEDURE

- 1. Set the EUT Work on the top, the bottom operation frequency individually.
- 2. Set SPA Start or Stop Frequency = Operation Frequency, RBW>=1%span, VBW>=RBW
- 3. The band edges was measured and recorded.

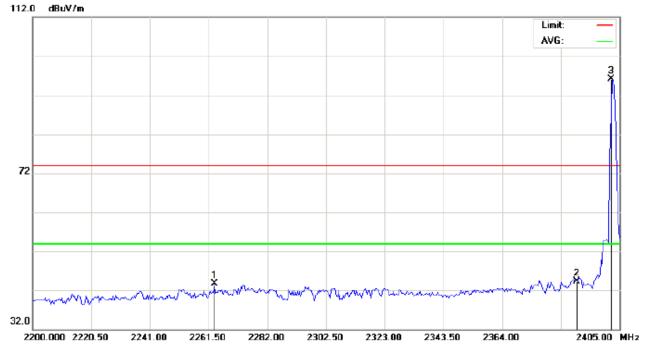
## **11.2. TEST SET-UP**

Radiated same as 10.2

Page 49 of 70

#### 11.3. TEST RESULT

## TEST PLOT OF BAND EDGE FOR LOW CHANNEL (1Mbps)-Horizontal



Site: site #1 Polarization: Horizontal Temperature: 26
Limit: FCC Class B 3M Radiation above 1GHZ(PK) Power: Humidity: 60 %

EUT:Bluetooth Headphone Distance:

M/N:T1

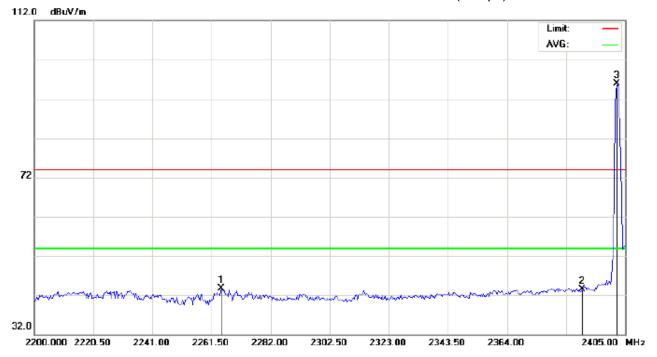
Mode: Low Channel TX

Note:

No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
		MHz	dBu∀	dB/m	dBu\//m	dBu∀/m	dB		cm	degree	
1		2263.550	53.59	-9.83	43.76	74.00	-30.24	peak			
2		2390.000	53.94	-9.69	44.25	74.00	-29.75	peak			
3	*	2402.000	105.73	-9.68	96.05	74.00	22.05	peak			

Page 50 of 70

## TEST PLOT OF BAND EDGE FOR LOW CHANNEL (1Mbps)-Vertical



Site: site #1 Polarization: Vertical Temperature: 26
Limit: FCC Class B 3M Radiation above 1GHZ(PK) Power: Humidity: 60 %

EUT:Bluetooth Headphone Distance:

M/N:T1

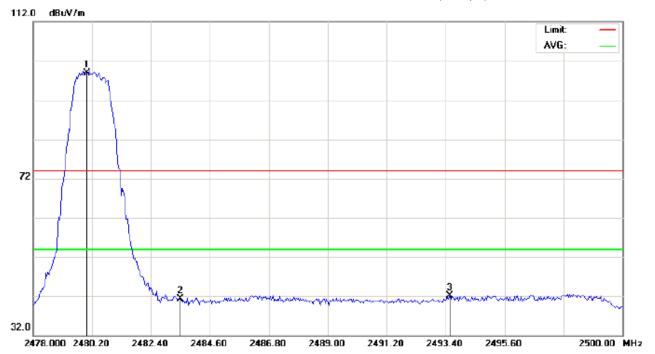
Mode: Low Channel TX

Note:

No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
	-	MHz	dBu∀	dB/m	dBu∀/m	dBu∀/m	dB		cm	degree	
1		2264.917	53.62	-9.83	43.79	74.00	-30.21	peak			
2		2390.000	53.15	-9.69	43.46	74.00	-30.54	peak			
3	*	2402.000	105.59	-9.68	95.91	74.00	21.91	peak			

Page 51 of 70

## TEST PLOT OF BAND EDGE FOR HIGH CHANNEL (1Mbps)-Horizontal



Site: site #1 Polarization: Horizontal Temperature: 26
Limit: FCC Class B 3M Radiation above 1GHZ(PK) Power: Humidity: 60 %

Distance:

EUT:Bluetooth Headphone

M/N:T1

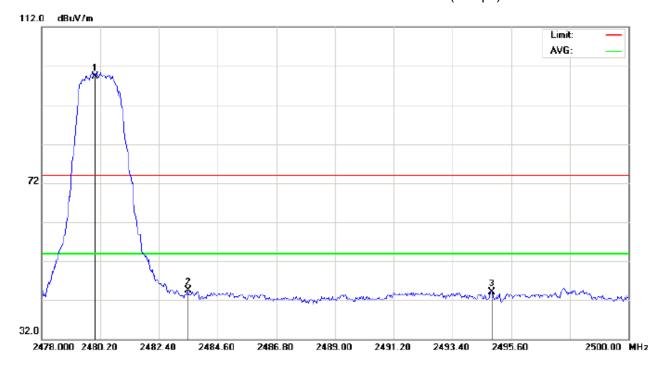
Mode: High Channel TX

Note:

No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
	-	MHz	dBu∀	dB/m	dBu∀/m	dBu∀/m	dB		cm	degree	
1	*	2480.000	108.55	-9.59	98.96	74.00	24.96	peak			
2		2483.500	50.88	-9.59	41.29	74.00	-32.71	peak			
3		2493.547	51.69	-9.58	42.11	74.00	-31.89	peak			

Page 52 of 70

## TEST PLOT OF BAND EDGE FOR HIGH CHANNEL (1Mbps)-Vertical



Site: site #1 Polarization: Vertical Temperature: 26
Limit: FCC Class B 3M Radiation above 1GHZ(PK) Power: Humidity: 60 %

EUT:Bluetooth Headphone Distance:

M/N:T1

Mode: High Channel TX

Note:

No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
		MHz	dBu∀	dB/m	dBuV/m	dBu∀/m	dB		cm	degree	
1	*	2480.000	108.95	-9.59	99.36	74.00	25.36	peak			
2		2483.500	54.19	-9.59	44.60	74.00	-29.40	peak			
3		2494.867	53.78	-9.58	44.20	74.00	-29.80	peak			

#### **RESULT: PASS**

Note: 1. Factor=Antenna Factor + Cable loss, Margin=Measurement-Limit.

- 2. The "Factor" value can be calculated automatically by software of measurement system.
- 3. Hopping on and Hopping off have been tested and only Hopping off worst case was recorded.

Page 53 of 70

#### 12. NUMBER OF HOPPING FREQUENCY

#### 12.1. MEASUREMENT PROCEDURE

- 1. Place the EUT on the table and set it in transmitting mode.
- 2. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum analyzer.
- 3. Set the spectrum analyzer Start = 2.4GHz Stop = 2.4835GHz
- 4. Set the Spectrum Analyzer as RBW>=1%span, VBW>=RBW.

## 12.2. TEST SETUP (BLOCK DIAGRAM OF CONFIGURATION)

Same as described in section 8.2

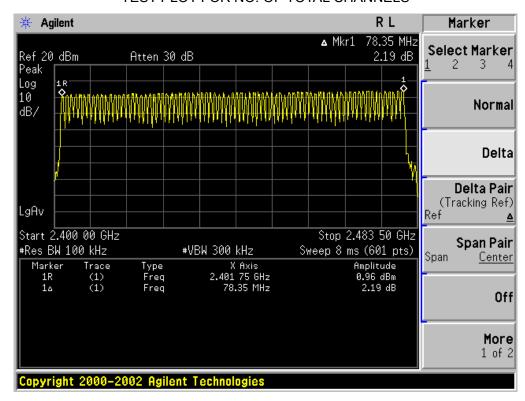
#### 12.3. MEASUREMENT EQUIPMENT USED

The same as described in section 6

#### 12.4. LIMITS AND MEASUREMENT RESULT

TOTAL NO. OF	LIMIT (NO. OF CH)	MEASUREMENT (NO. OF CH)	RESULT
HOPPING CHANNEL	>=15	79	PASS

#### TEST PLOT FOR NO. OF TOTAL CHANNELS



Page 54 of 70

## 13. TIME OF OCCUPANCY (DWELL TIME)

#### 13.1. MEASUREMENT PROCEDURE

- 1. Place the EUT on the table and set it in transmitting mode
- 2. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum analyzer.
- 3. Set Span = zero span, centered on a hoping channel
- 4. Set the spectrum analyzer as RBW=1MHz, VBW>=RBW, Span = 0 Hz

## 13.2. TEST SETUP (BLOCK DIAGRAM OF CONFIGURATION)

Same as described in section 8.2

#### 13.3. MEASUREMENT EQUIPMENT USED

The same as described in section 6

#### 13.4. LIMITS AND MEASUREMENT RESULT

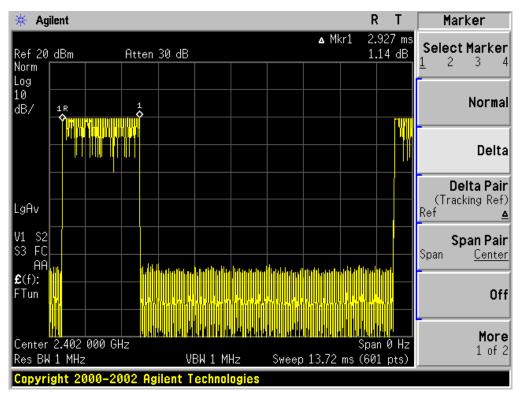
#### The Worst Case (3Mbps)

		· · · · · ·		
Channel	Time of Pulse for DH5	Period Time	Sweep Time	Limit
	(ms)	(s)	(ms)	(ms)
Low	2.927	31.6	312.21	400
Middle	2.904	31.6	309.76	400
High	2.904	31.6	309.76	400

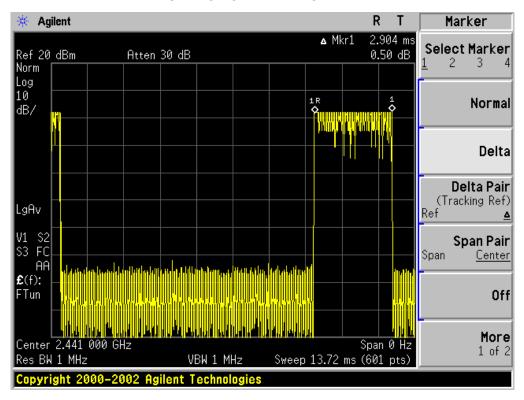
Low Channel Time 2.927\*(1600/6)/79\*31.6=312.21ms Middle Channel Time 2.904\*(1600/6)/79\*31.6=309.76ms High Channel Time

2.904\*(1600/6)/79\*31.6=309.76ms

#### TEST PLOT OF LOW CHANNEL

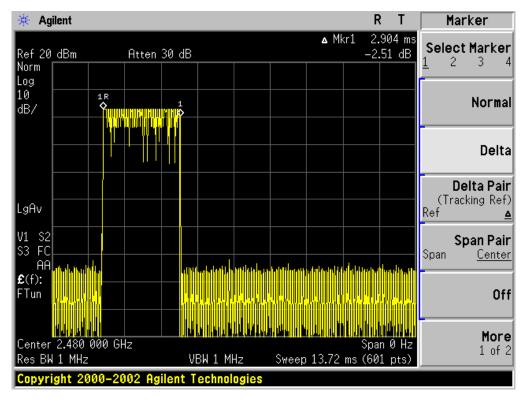


TEST PLOT OF MIDDLE CHANNEL



Page 56 of 70

#### TEST PLOT OF HIGH CHANNEL



Page 57 of 70

## 14. FREQUENCY SEPARATION

#### 14.1. MEASUREMENT PROCEDURE

- 1. Place the EUT on the table and set it in transmitting mode
- 2. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum analyzer
- 3. Set 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

## 14.2. TEST SETUP (BLOCK DIAGRAM OF CONFIGURATION)

Same as described in section 6.2

#### 14.3. MEASUREMENT EQUIPMENT USED

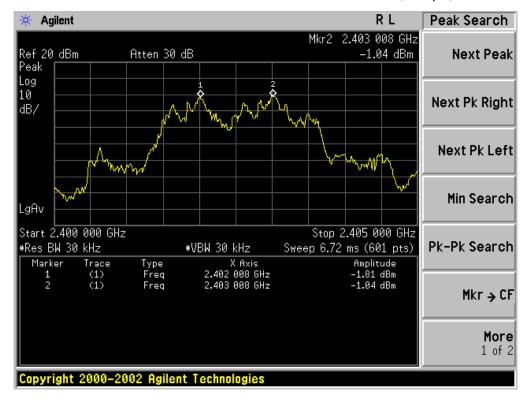
The same as described in section 6.3

#### 14.4. LIMITS AND MEASUREMENT RESULT

CHANNEL	CHANNEL SEPARATION	LIMIT	RESULT
	KHz	KHz	Dage
CH00-CH01	1000	>=25 KHz or 2/3 20 dB BW	Pass

Page 58 of 70

#### TEST PLOT FOR FREQUENCY SEPARATION (3Mbps)



Page 59 of 70

## 15. FCC LINE CONDUCTED EMISSION TEST

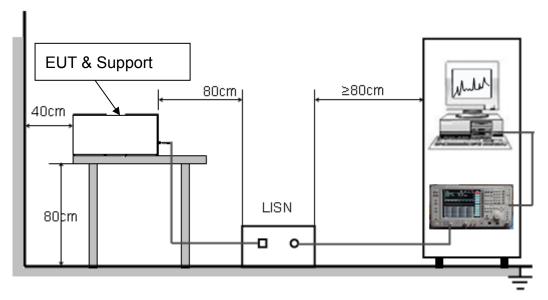
#### 15.1. LIMITS OF LINE CONDUCTED EMISSION TEST

Francis	Maximum RF	Line Voltage
Frequency	Q.P.( dBuV)	Average( dBuV)
150kHz~500kHz	66-56	56-46
500kHz~5MHz	56	46
5MHz~30MHz	60	50

#### Note:

- 1. The lower limit shall apply at the transition frequency.
- 2. The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz.

## 15.2. BLOCK DIAGRAM OF LINE CONDUCTED EMISSION TEST



Page 60 of 70

#### 15.3. PRELIMINARY PROCEDURE OF LINE CONDUCTED EMISSION TEST

1. The equipment was set up as per the test configuration to simulate typical actual usage per the user's manual. When the EUT is a tabletop system, a wooden table with a height of 0.8 meters is used and is placed on the ground plane as per ANSI C63.4 (see Test Facility for the dimensions of the ground plane used). When the EUT is a floor-standing equipment, it is placed on the ground plane which has a 3-12 mm non-conductive covering to insulate the EUT from the ground plane.

- 2. Support equipment, if needed, was placed as per ANSI C63.4.
- 3. All I/O cables were positioned to simulate typical actual usage as per ANSI C63.4.
- 4. All support equipments received AC120V/60Hz power from a LISN, if any.
- 5. The EUT received DC charging voltage by PC which received 120V/60Hzpower by a LISN..
- 6. The test program was started. Emissions were measured on each current carrying line of the EUT using a spectrum Analyzer / Receiver connected to the LISN powering the EUT. The LISN has two monitoring points: Line 1 (Hot Side) and Line 2 (Neutral Side). Two scans were taken: one with Line 1 connected to Analyzer / Receiver and Line 2 connected to a 50 ohm load; the second scan had Line 1 connected to a 50 ohm load and Line 2 connected to the Analyzer / Receiver.
- 7. Analyzer / Receiver scanned from 150 kHz to 30MHz for emissions in each of the test modes.
- 8. During the above scans, the emissions were maximized by cable manipulation.
- 9. The test mode(s) were scanned during the preliminary test.

Then, the EUT configuration and cable configuration of the above highest emission level were recorded for reference of final testing.

#### 15.4. FINAL PROCEDURE OF LINE CONDUCTED EMISSION TEST

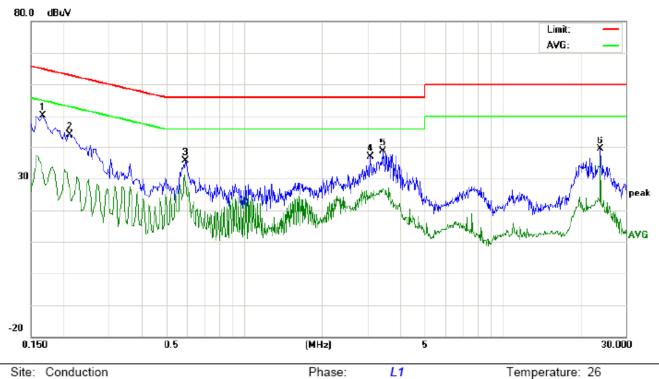
- 1. EUT and support equipment was set up on the test bench as per step 2 of the preliminary test.
- 2. A scan was taken on both power lines, Line 1 and Line 2, recording at least the six highest emissions. Emission frequency and amplitude were recorded into a computer in which correction factors were used to calculate the emission level and compare reading to the applicable limit. If EUT emission level was less –2dB to the A.V. limit in Peak mode, then the emission signal was re-checked using Q.P and Average detector.
- 3. The test data of the worst case condition(s) was reported on the Summary Data page.

Humidity: 60 %

Page 61 of 70

## 15.5. TEST RESULT OF LINE CONDUCTED EMISSION TEST

## Line Conducted Emission Test Line 1-L



Site: Conduction

Limit: FCC Class B Conduction(QP)

EUT:Bluetooth Headphone

M/N:T1

Mode:Normal operation

Note:

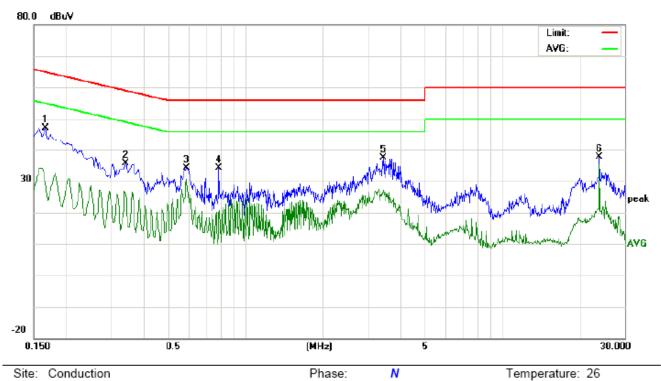
No.	Freq.		ding_L (dBuV)		Correct Factor	Мє	asuren (dBuV)			nit uV)	Mai (d	rgin IB)	P/F	Comment
	(MHz)	Peak	QP	AVG	dB	Peak	QP	AVG	QP	AVG	QP	AVG		
1	0.1660	39.87		21.57	10.18	50.05		31.75	65.15	55.15	-15.10	-23.40	Р	
2	0.2127	37.25		15.74	10.23	47.48		25.97	63.10	53.10	-15.62	-27.13	Р	
3	0.5940	25.33		17.38	10.32	35.65		27.70	56.00	46.00	-20.35	-18.30	Р	
4	3.0740	26.43		13.45	10.54	36.97		23.99	56.00	46.00	-19.03	-22.01	Р	
5	3.4420	28.11		16.47	10.51	38.62		26.98	56.00	46.00	-17.38	-19.02	Р	
6	23.9980	29.19		26.51	10.11	39.30		36.62	60.00	50.00	-20.70	-13.38	Р	

Power:

Humidity: 60 %

Page 62 of 70

## Line Conducted Emission Test Line 2-N



Site: Conduction

Limit: FCC Class B Conduction(QP)

EUT:Bluetooth Headphone

M/N:T1

Mode:Normal operation

Note:

No.	No. Freq. (MHz)		ding_L (dBuV)		Correct Factor	ı	asuren (dBuV)			nit uV)		rgin IB)	P/F	Comment
	(MHz)	Peak	QP	AVG	dB	Peak	QP	AVG	QP	AVG	QP	AVG		
1	0.1660	36.98		19.15	10.18	47.16		29.33	65.15	55.15	-17.99	-25.82	Р	
2	0.3420	34.42		17.06	10.31	44.73		27.37	59.15	49.15	-14.42	-21.78	Р	
3	0.5899	23.79		20.19	10.32	34.11		30.51	56.00	46.00	-21.89	-15.49	Р	
4	0.7900	23.75		9.60	10.29	34.04		19.89	56.00	46.00	-21.96	-26.11	Р	
5	3.4500	26.76		16.67	10.51	37.27		27.18	56.00	46.00	-18.73	-18.82	Р	
6	24.0019	27.50		25.14	10.11	37.61		35.25	60.00	50.00	-22.39	-14.75	Р	

Power:

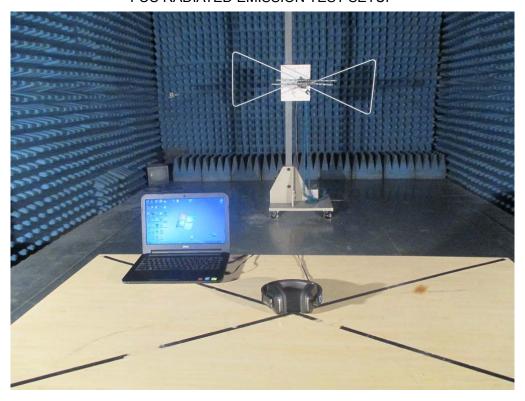
Page 63 of 70

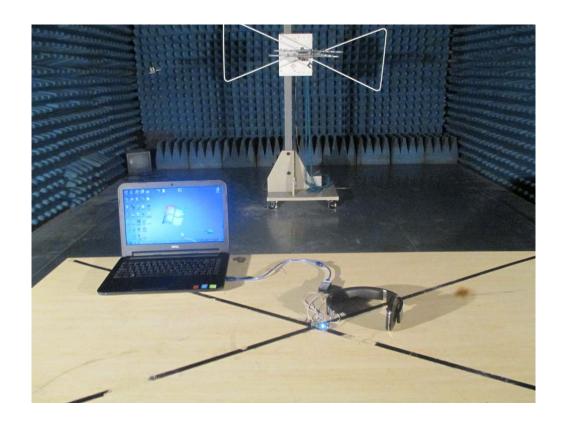
## **APPENDIX A: PHOTOGRAPHS OF TEST SETUP**

FCC LINE CONDUCTED EMISSION TEST SETUP



FCC RADIATED EMISSION TEST SETUP





Page 65 of 70

## **APPENDIX B: PHOTOGRAPHS OF EUT**

ALL VIEW OF EUT



TOP VIEW OF EUT



## **BOTTOM VIEW OF EUT**



FRONT VIEW OF EUT



## **BACK VIEW OF EUT**



LEFT VIEW OF EUT



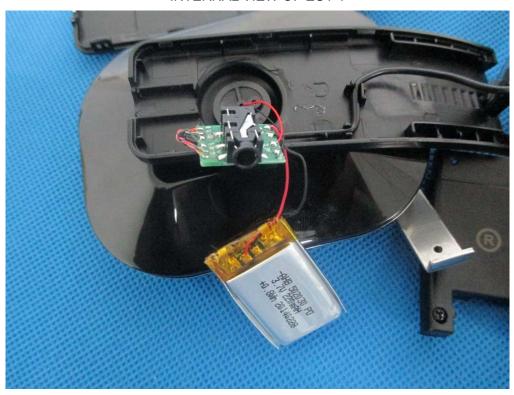
## RIGHT VIEW OF EUT



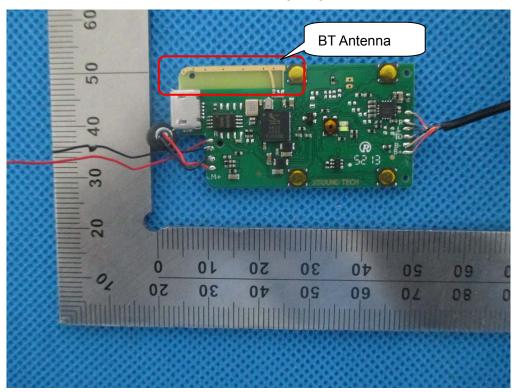
OPEN VIEW OF EUT



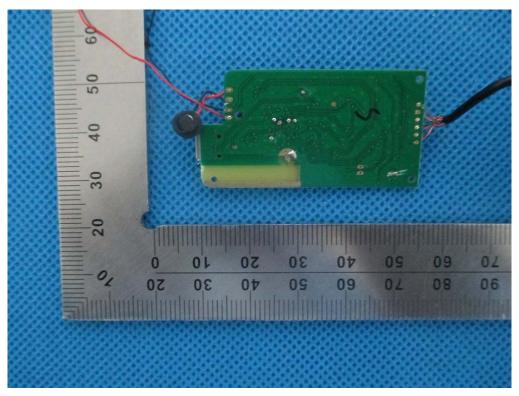
**INTERNAL VIEW OF EUT-1** 



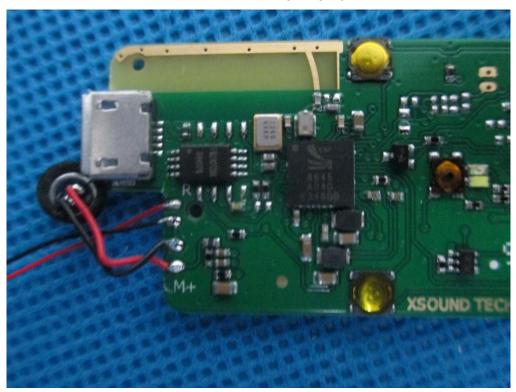
**INTERNAL VIEW OF EUT-2** 



**INTERNAL VIEW OF EUT-2** 



**INTERNAL VIEW OF EUT-3** 



----END OF REPORT----