FCC Test Report

Report No.: AGC04796170401FE03

FCC ID	:	Z9G-EDF50
APPLICATION PURPOSE	:	Original Equipment
PRODUCT DESIGNATION	:	Bluetooth Stereo Headphones, Headphones, Earphones, Earbuds
BRAND NAME	:	EDIFIER
MODEL NAME	:	W293BT
CLIENT	:	Edifier International Limited
DATE OF ISSUE	:	May 04, 2017
STANDARD(S)	:	FCC Part 15 Subpart C Section 15.247
REPORT VERSION	:	V1.0

*A*ttestation of *G*lobal *C*ompliance (Shenzhen) Co., Ltd

Report Revise Record

Report Version	Revise Time	Issued Date	Valid Version	Notes
V1.0	/	May 04, 2017	Valid	Original Report

TABLE OF CONTENTS

1. VERIFICATION OF CONFORMITY

Applicant	Edifier International Limited
Address	Room 2207-9, Tower Two, Lippo Centre 89 Queensway, HongKong
Manufacturer	Beijing Edifier Technology Co., Ltd.
Address	8th floor, ZuoAn Building, NO.68 BeiSiHuanXiLu, Haidian District, Beijing 100080, China
Product Designation	Bluetooth Stereo Headphones, Headphones, Earphones, Earbuds
Brand Name	EDIFIER
Test Model	W293BT
Date of test	Apr.24, 2017 to Apr.28, 2017
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 Dongguan Precise Testing Service Co., Ltd. The test data, the energy emitted by the sample tested as described in this report is in compliance with the requirements of FCC Rules Part 15.247.

Tested By Strive Liang
Strive Liang(Liang Faqiang) Apr.28, 2017

Reviewed By Forrest Lei
Forrest Lei(Lei Yonggang) May 04, 2017

Approved By Solger Zhang
Solger Zhang(Zhang Hongyi)
Authorized Officer May 04, 2017

2. GENERAL INFORMATION

2.1. PRODUCT DESCRIPTION

The EUT is “Bluetooth Stereo Headphones, Headphones, Earphones, Earbuds” 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

Operation Frequency	2.402 GHz to 2.480GHz
RF Output Power	1.22dBm(Max)
Bluetooth Version	V4.1
Modulation	GFSK, π /4-DQPSK, 8DPSK
Number of channels	79
Hardware Version	V1.0
Software Version	V1.0
Antenna Designation	Ceramic Antenna
Antenna Gain	1.6dBi
Power Supply	DC 3.7V by Battery

Note:
1. The USB port only be used for charging and can’t be used to transfer data with PC.
2. The EUT didn’t support BLE.
3. The BT function of EUT didn’t work when charging.

2.2. TABLE OF CARRIER FREQUENCYS

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

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 synchronization 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 behavior:

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.

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

This submittal(s) (test report) is intended for **FCC ID: Z9G-EDF50**, filing to comply with Section 15.247 of the FCC Part 15, Subpart C Rules.

2.7. TEST METHOD

All measurements contained in this report were conducted with ANSI C63.10-2013.

2.8. SPECIAL ACCESSORIES

Refer to section 5.2.

2.9. EQUIPMENT MODIFICATIONS

Not available for this EUT intended for grant.

3. MEASUREMENT UNCERTAINTY

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

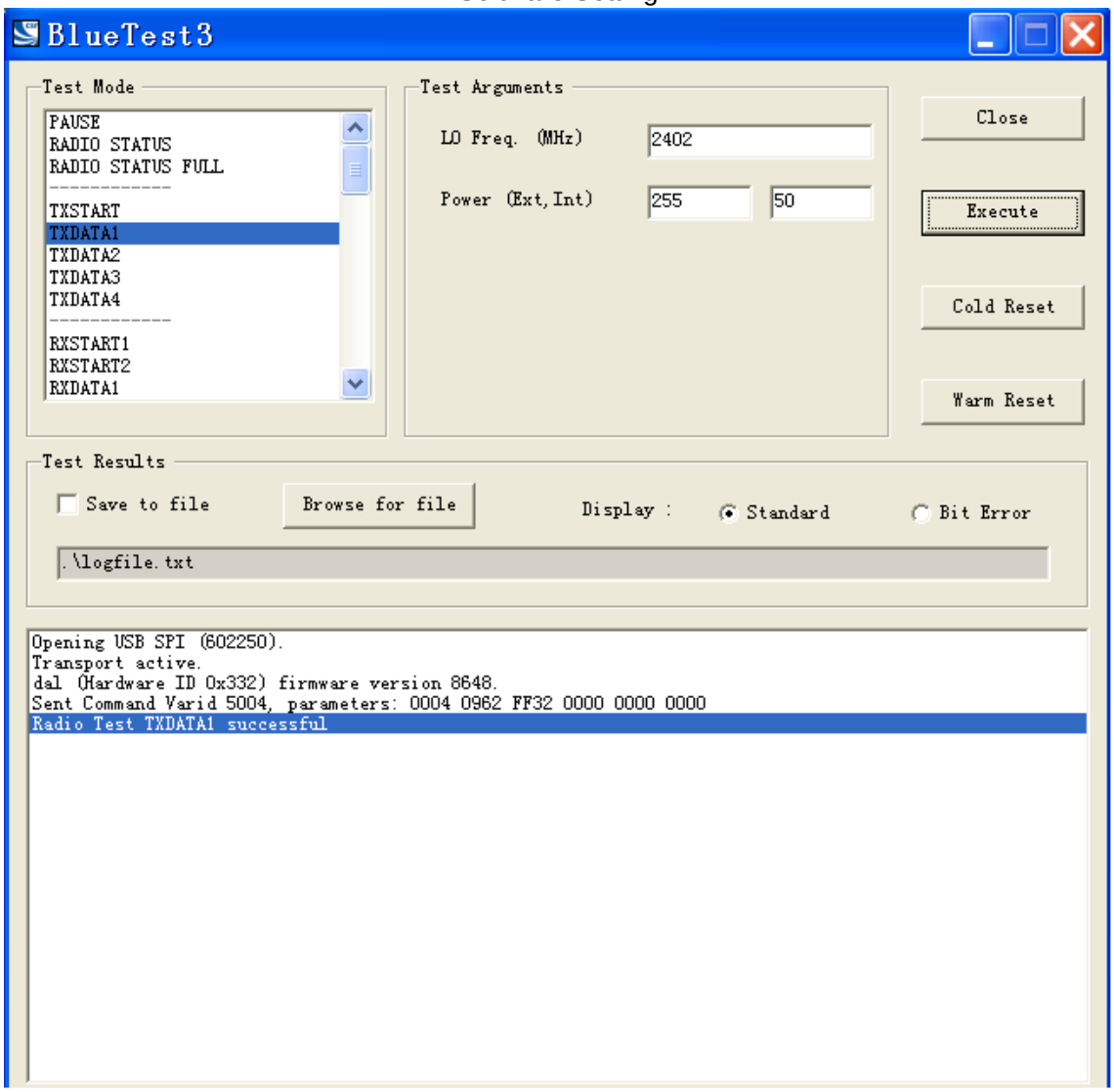
4. DESCRIPTION OF TEST MODES

NO.	TEST MODE DESCRIPTION
1	Low channel GFSK
2	Middle channel GFSK
3	High channel GFSK
4	Low channel π /4-DQPSK
5	Middle channel π /4-DQPSK
6	High channel π /4-DQPSK
7	Low channel 8DPSK
8	Middle channel 8DPSK
9	High channel 8DPSK
10	BT Link

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.
3. The EUT used fully-charged battery when tested.

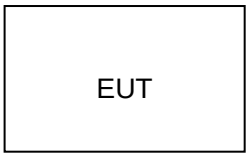
Software Setting



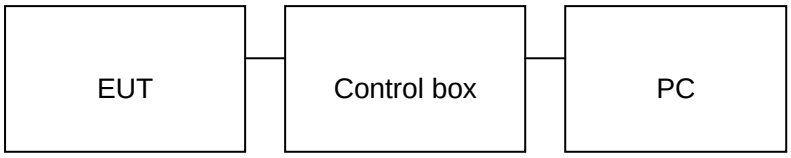
5. SYSTEM TEST CONFIGURATION

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 Stereo Headphones	EDIFIER	W293BT	EUT
2	Battery	AEC	AEC10120	Accessory
3	PC	Sony	E1412AYCW	A.E
4	PC Adapter	Sony	AC-L100	A.E
5	Control box	CSR	USB_SPI_TOOLS	A.E
6	USB Cable	N/A	0.8m Unshielded	A.E
7	Temporary Antenna Connector	T10	N/A	A.E

5.3. SUMMARY OF TEST RESULTS

FCC RULES	DESCRIPTION OF TEST	RESULT
§15.247 b(1)	Peak Output Power	Compliant
§15.247 a(1)	20 dB Bandwidth	Compliant
§15.247 d	Conducted Spurious Emission	Compliant
§15.247 d §15.209	Radiated Emission	Compliant
§15.247 d	Band Edges	Compliant
§15.247 a(1)(iii)	Number of hopping frequency	Compliant
§15.247 a(1)(iii)	Time of Occupancy	Compliant
§15.247 a(1)	Frequency Separation	Compliant
§15.207	Line conduction Emission	N/A

Note：N/A means it's not applicable to this item.

6. TEST FACILITY

Site	Dongguan Precise Testing Service Co., Ltd.
Location	Building D,Baoding Technology Park,Guangming Road2,Dongcheng District, Dongguan, Guangdong, China,
FCC Registration No.	371540
Description	The test site is constructed and calibrated to meet the FCC requirements in documents ANSI C63.4:2014.

7. TEST EQUIPMENT LIST

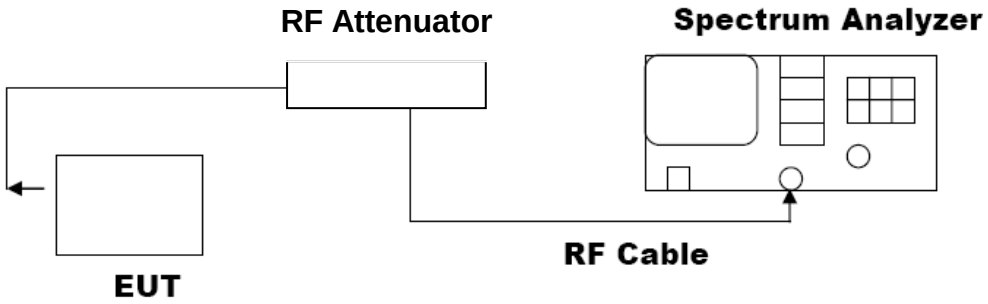
TEST EQUIPMENT LIST					
Name of Equipment	**Manufacturer**	**Model Number**	**Serial Number**	**Last Calibration**	**Due Calibration**
EMI Test Receiver	ROHDE & SCHWARZBECK	ESCI	101417	July 4, 2016	July 3, 2017
Trilog Broadband Antenna (25M-1GHz)	SCHWARZBECK	VULB9160	9160-3355	July 4, 2016	July 3, 2017
Signal Amplifier	SCHWARZBECK	BBV 9475	9745-0013	July 4, 2016	July 3, 2017
RF Cable	SCHWARZBECK	AK9515E	96221	July 4, 2016	July 3, 2017
3m Anechoic Chamber	CHENGYU	966	PTS-001	June 6, 2016	June 5, 2017
MULTI-DEVICE Positioning Controller	MAX-FULL	MF-7802	MF780208339	N/A	N/A
Active loop antenna (9K-30MHz)	SCHWARZBECK	FMZB1519	1519-038	June 6, 2016	June 5, 2017
Spectrum analyzer	AGILENT	E4407B	MY46185649	June 6, 2016	June 5, 2017
Horn Antenna (1G-18GHz)	SCHWARZBECK	BBHA9120D	9120D-1246	July 11, 2016	July 10, 2017
Spectrum Analyzer	AGILENT	E4411B	MY4511453	July 4, 2016	July 3, 2017
Signal Amplifier	SCHWARZBECK	BBV 9718	9718-269	July 4, 2016	July 3, 2017
RF Cable	SCHWARZBECK	AK9515H	96220	July 4, 2016	July 3, 2017
Horn Ant (18G-40GHz)	SCHWARZBECK	BBHA 9170	9170-181	June 6, 2016	June 5, 2017
Artificial Mains Network	NARDA	L2-16B	000WX31025	July 8, 2016	July 7, 2017
Artificial Mains Network (AUX)	NARDA	L2-16B	000WX31026	July 8, 2016	July 7, 2017
RF Cable	SCHWARZBECK	AK9515E	96222	July 4, 2016	July 3, 2017
Shielded Room	CHENGYU	843	PTS-002	June 6, 2016	June 5, 2017
Conduction Cable	MXT	SE1	S003	June 6, 2016	June 5, 2017

8. PEAK OUTPUT POWER

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, 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.

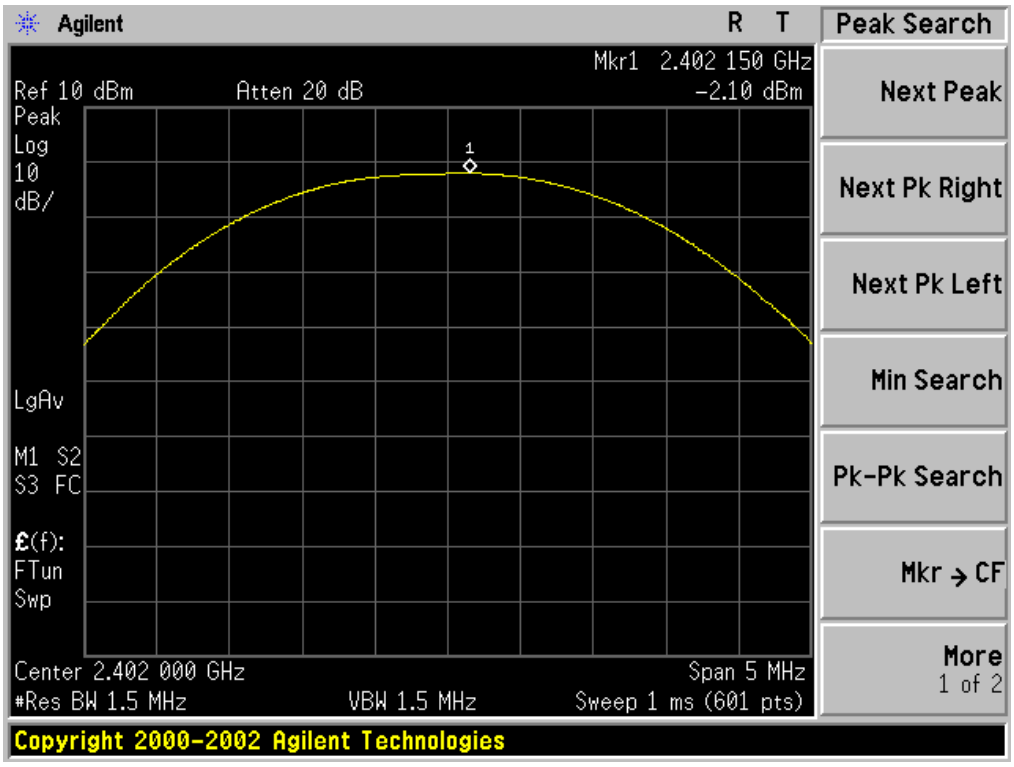
8.2. TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)



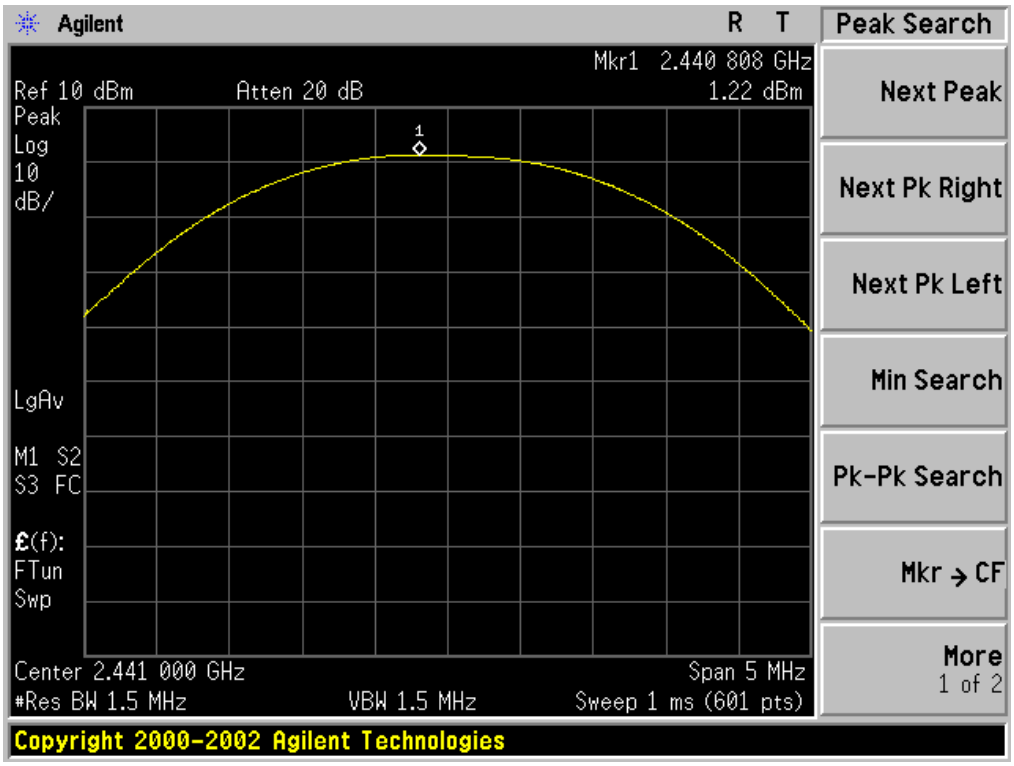
8.3. LIMITS AND MEASUREMENT RESULT

PEAK OUTPUT POWER MEASUREMENT RESULT FOR GFSK MOUDULATION			
Frequency (GHz)	**Peak Power (dBm)**	**Applicable Limits (dBm)**	**Pass or Fail**
2.402	-2.10	21	Pass
2.441	1.22	21	Pass
2.480	1.08	21	Pass

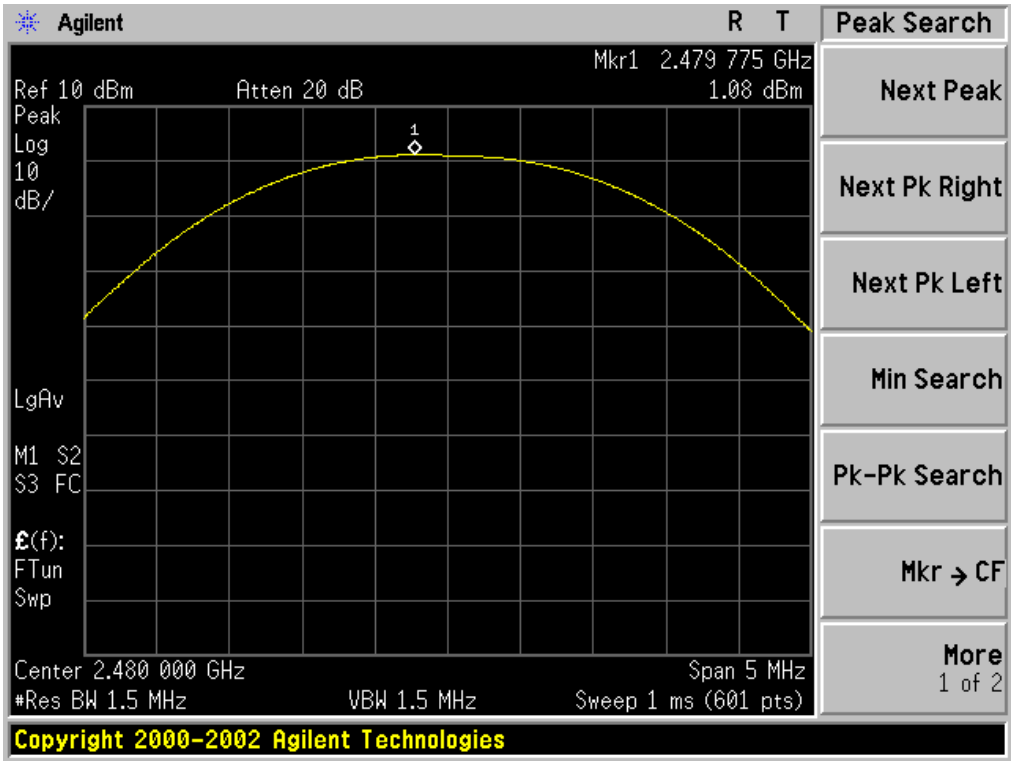
CH0



CH39

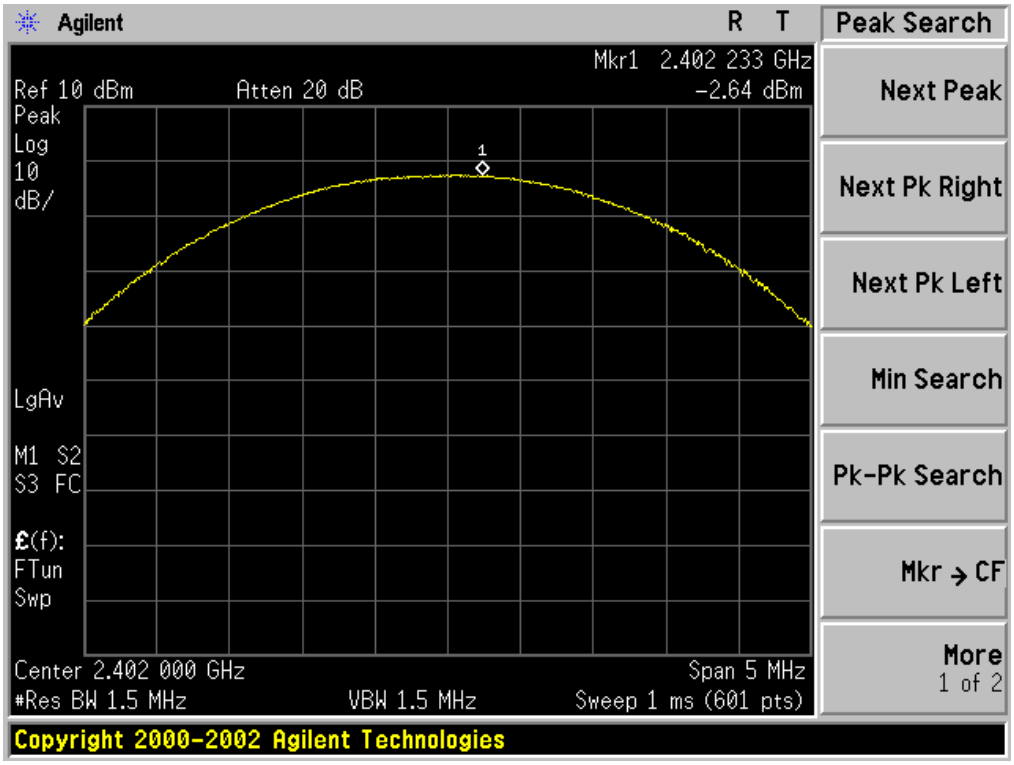

Agilent
R T
Peak Search
Mkr1 2.440 808 GHz
1.22 dBm
Ref 10 dBm
Atten 20 dB
Peak
Log
10
dB/
LgAv
M1 S2
S3 FC
£(f):
FTun
Swp
Next Peak
Next Pk Right
Next Pk Left
Min Search
Pk-Pk Search
Mkr → CF
More
1 of 2
Center 2.441 000 GHz
Span 5 MHz
#Res BW 1.5 MHz
VBW 1.5 MHz
Sweep 1 ms (601 pts)
Copyright 2000-2002 Agilent Technologies

CH78

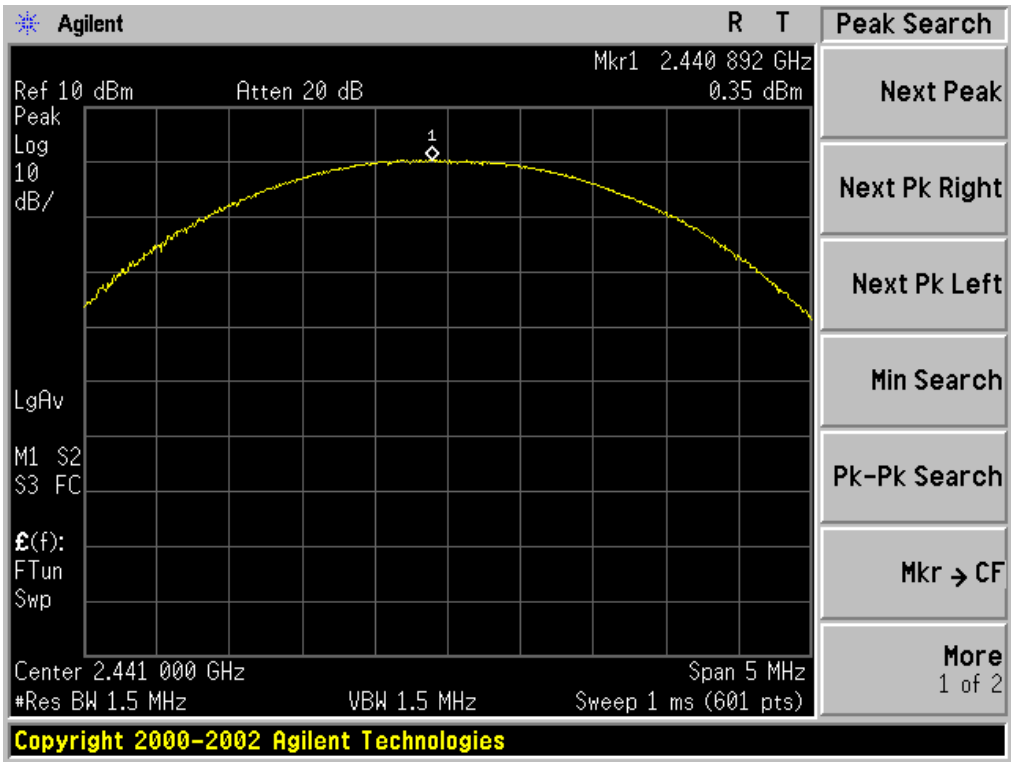

Agilent
R T
Peak Search
Mkr1 2.479 775 GHz
1.08 dBm
Ref 10 dBm
Atten 20 dB
Peak
Log
10
dB/
LgAv
M1 S2
S3 FC
£(f):
FTun
Swp
Next Peak
Next Pk Right
Next Pk Left
Min Search
Pk-Pk Search
Mkr → CF
More
1 of 2
Center 2.480 000 GHz
Span 5 MHz
#Res BW 1.5 MHz
VBW 1.5 MHz
Sweep 1 ms (601 pts)
Copyright 2000-2002 Agilent Technologies

PEAK OUTPUT POWER MEASUREMENT RESULT FOR Ⅱ /4-DQPSK MODULATION			
Frequency (GHz)	**Peak Power (dBm)**	**Applicable Limits (dBm)**	**Pass or Fail**
2.402	-2.64	21	Pass
2.441	0.35	21	Pass
2.480	0.21	21	Pass

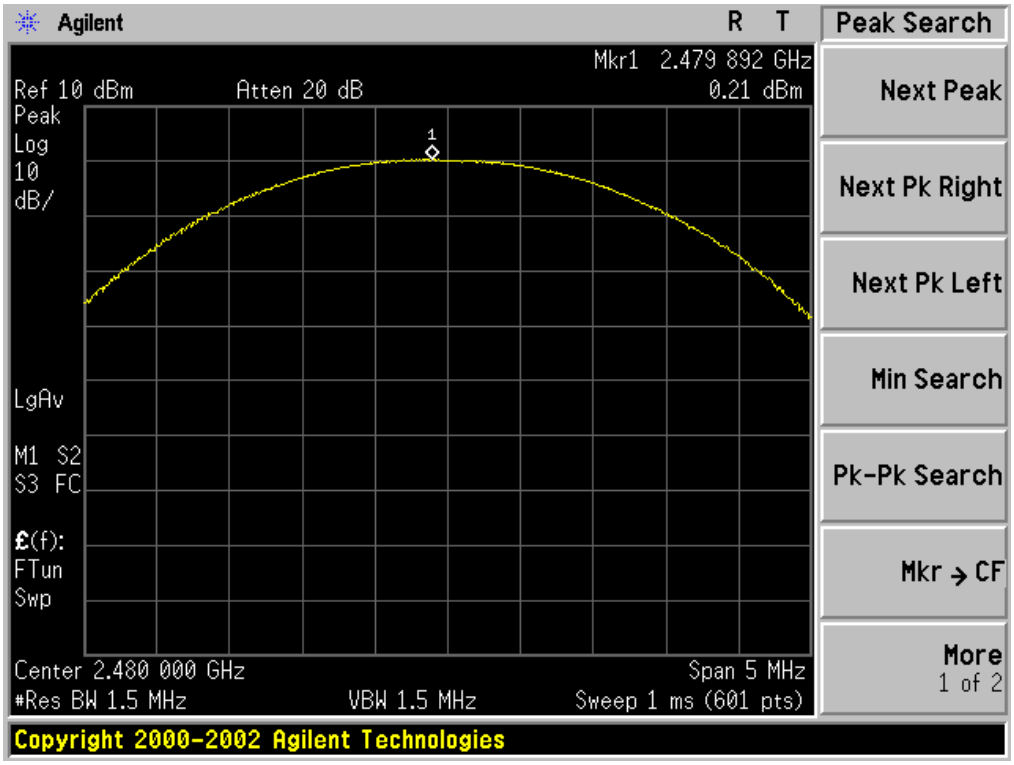
CH0



CH39

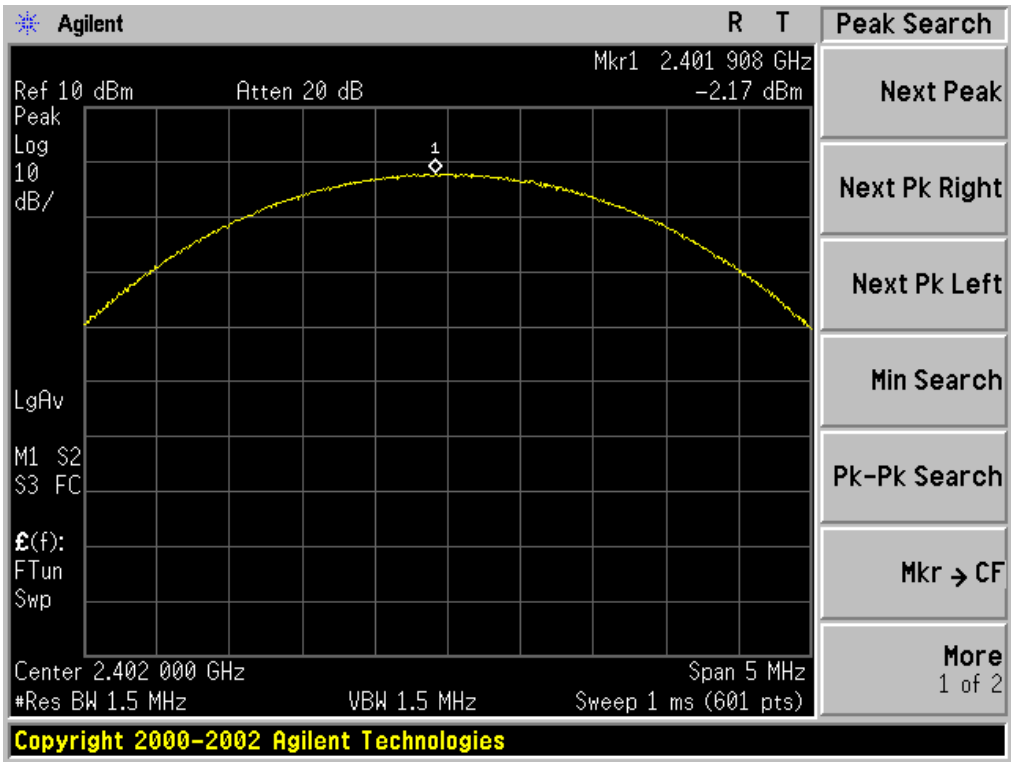

Agilent
R T
Peak Search
Mkr1 2.440 892 GHz
0.35 dBm
Ref 10 dBm
Atten 20 dB
Peak
Log
10
dB/
LgAv
M1 S2
S3 FC
£(f):
FTun
Swp
Next Peak
Next Pk Right
Next Pk Left
Min Search
Pk-Pk Search
Mkr → CF
More
1 of 2
Center 2.441 000 GHz
Span 5 MHz
#Res BW 1.5 MHz
VBW 1.5 MHz
Sweep 1 ms (601 pts)
Copyright 2000-2002 Agilent Technologies

CH78

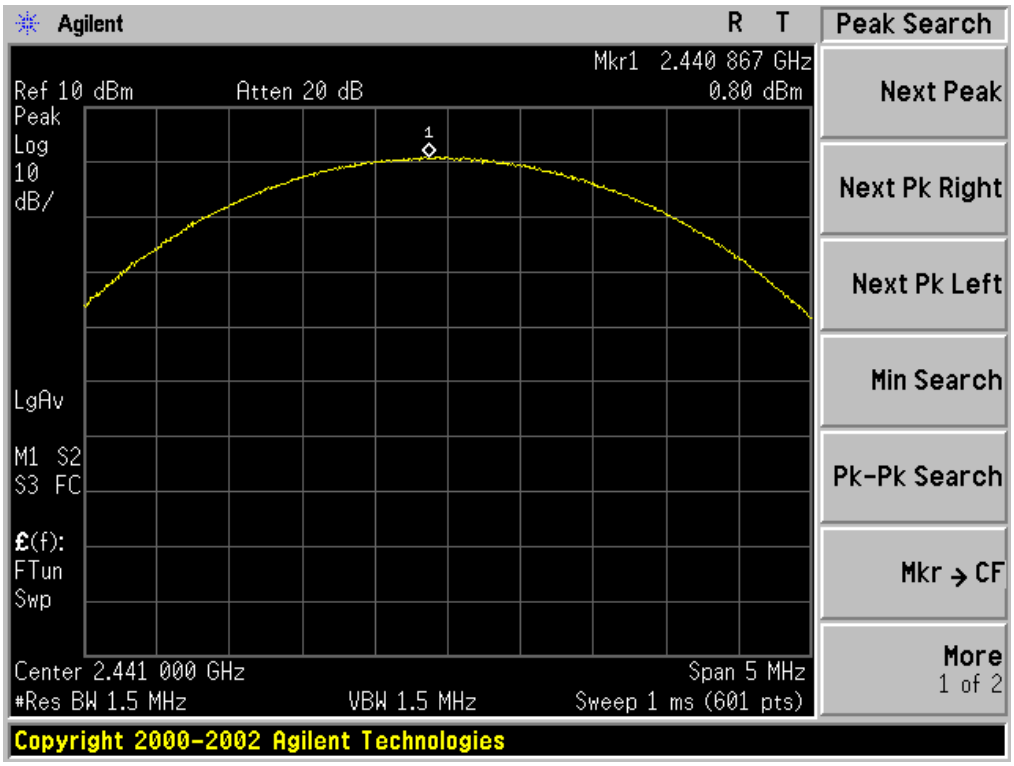

Agilent
R T
Peak Search
Mkr1 2.479 892 GHz
0.21 dBm
Ref 10 dBm
Atten 20 dB
Peak
Log
10
dB/
LgAv
M1 S2
S3 FC
£(f):
FTun
Swp
Next Peak
Next Pk Right
Next Pk Left
Min Search
Pk-Pk Search
Mkr → CF
More
1 of 2
Center 2.480 000 GHz
Span 5 MHz
#Res BW 1.5 MHz
VBW 1.5 MHz
Sweep 1 ms (601 pts)
Copyright 2000-2002 Agilent Technologies

PEAK OUTPUT POWER MEASUREMENT RESULT FOR 8-DPSK MODULATION			
Frequency (GHz)	**Peak Power (dBm)**	**Applicable Limits (dBm)**	**Pass or Fail**
2.402	-2.17	21	Pass
2.441	0.80	21	Pass
2.480	0.77	21	Pass

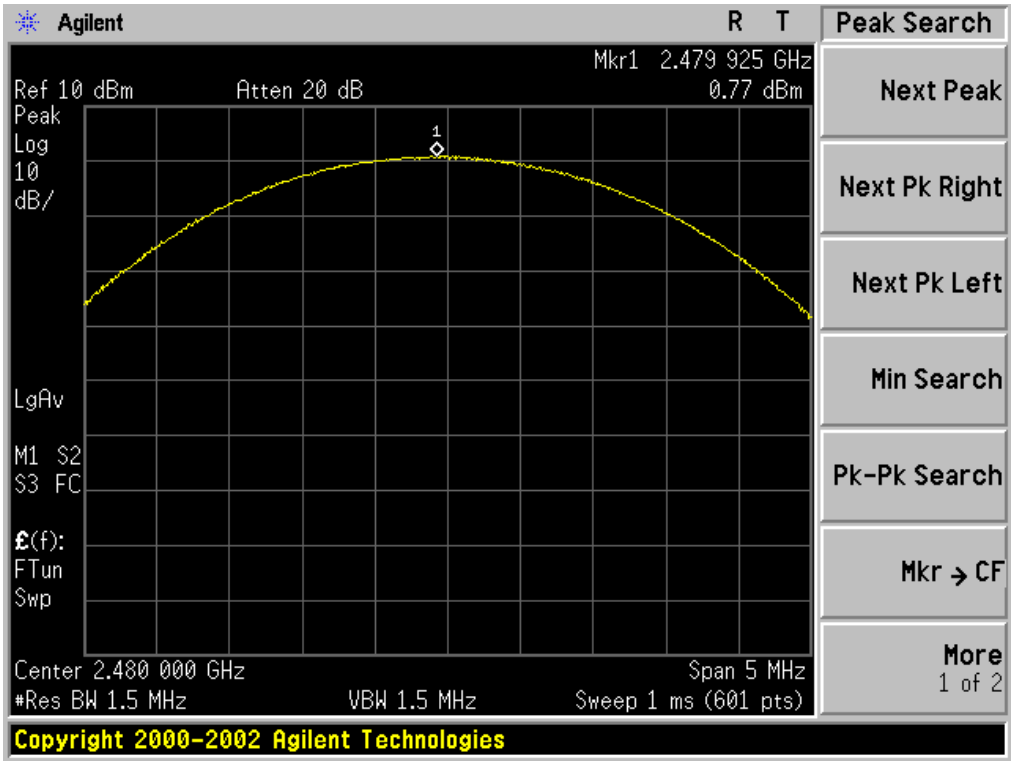
CH0



CH39


Agilent
R T
Peak Search
Mkr1 2.440 867 GHz
0.80 dBm
Ref 10 dBm
Atten 20 dB
Peak
Log
10
dB/
LgAv
M1 S2
S3 FC
£(f):
FTun
Swp
Next Peak
Next Pk Right
Next Pk Left
Min Search
Pk-Pk Search
Mkr → CF
More
1 of 2
Center 2.441 000 GHz
Span 5 MHz
#Res BW 1.5 MHz
VBW 1.5 MHz
Sweep 1 ms (601 pts)
Copyright 2000-2002 Agilent Technologies

CH78

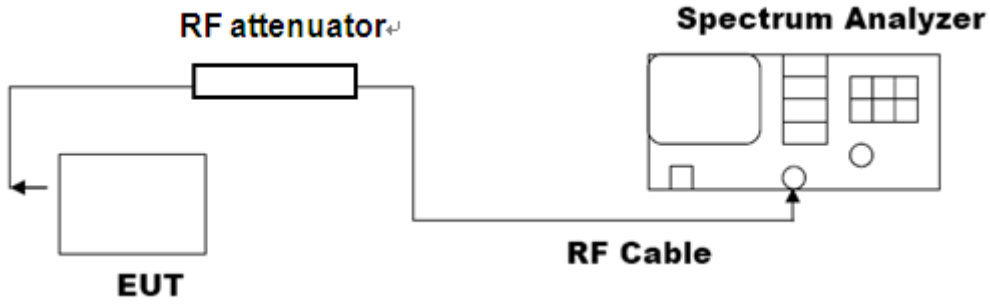

Agilent
R T
Peak Search
Mkr1 2.479 925 GHz
0.77 dBm
Ref 10 dBm
Atten 20 dB
Peak
Log
10
dB/
LgAv
M1 S2
S3 FC
£(f):
FTun
Swp
Next Peak
Next Pk Right
Next Pk Left
Min Search
Pk-Pk Search
Mkr → CF
More
1 of 2
Center 2.480 000 GHz
Span 5 MHz
#Res BW 1.5 MHz
VBW 1.5 MHz
Sweep 1 ms (601 pts)
Copyright 2000-2002 Agilent Technologies

9. BANDWIDTH

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 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.

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

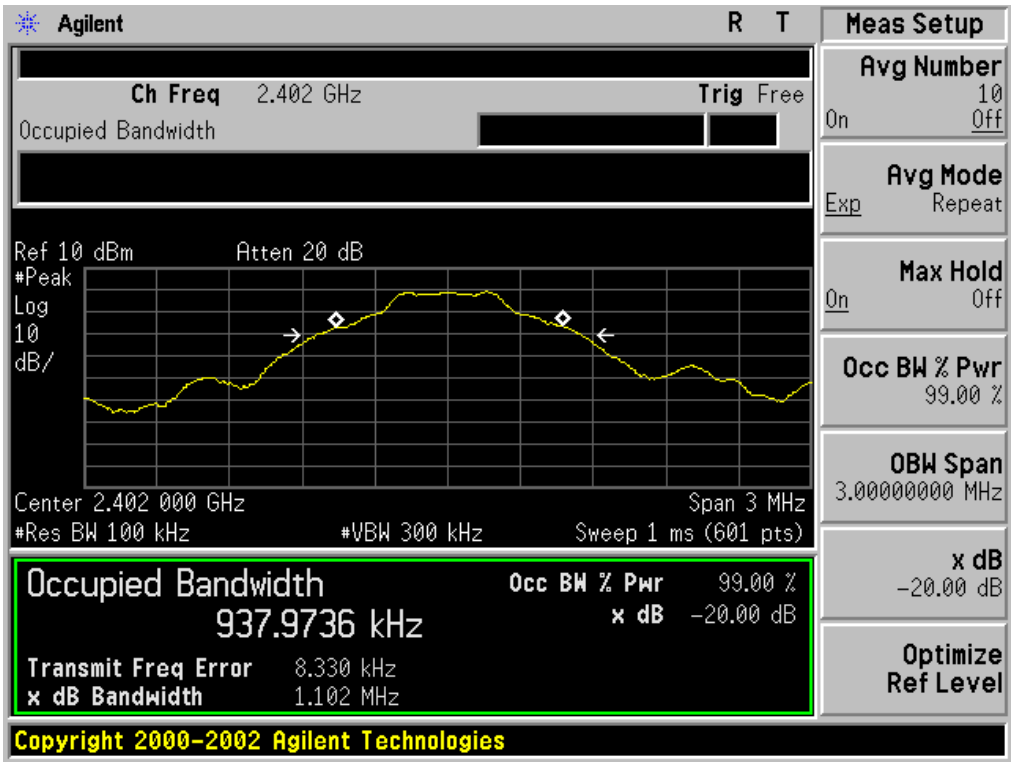


Note: The EUT has been used temporary antenna connector for testing.

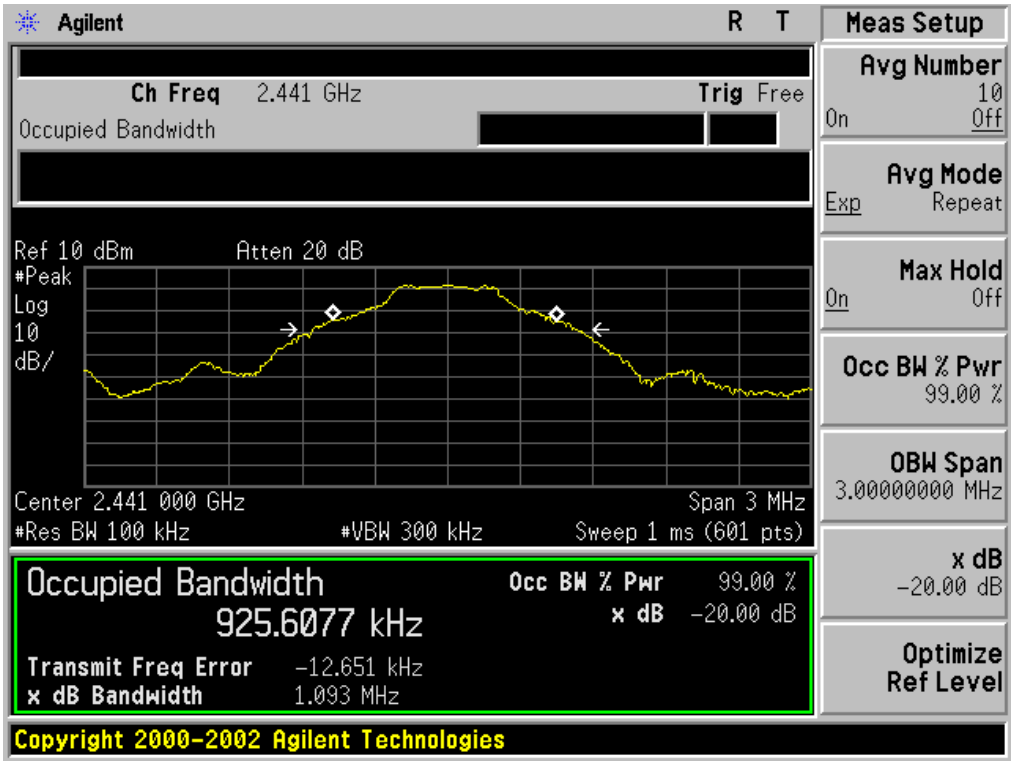
9.3. LIMITS AND MEASUREMENT RESULTS

BLUETOOTH 1MBPS LIMITS AND MEASUREMENT RESULT				
Applicable Limits	Measurement Result			
	Test Data (MHz)			Result
		99%OBW (MHz)	-20dB BW(MHz)	
N/A	Low Channel	0.938	1.102	PASS
	Middle Channel	0.926	1.093	PASS
	High Channel	0.924	1.095	PASS

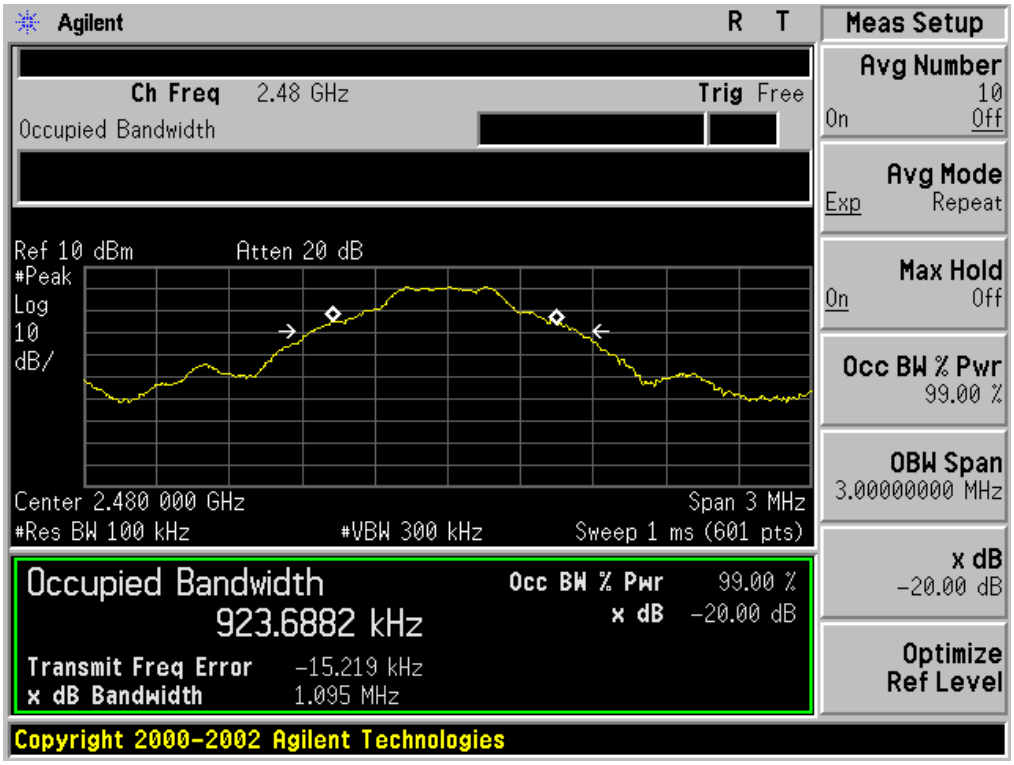
TEST PLOT OF BANDWIDTH FOR LOW CHANNEL



TEST PLOT OF BANDWIDTH FOR MIDDLE CHANNEL

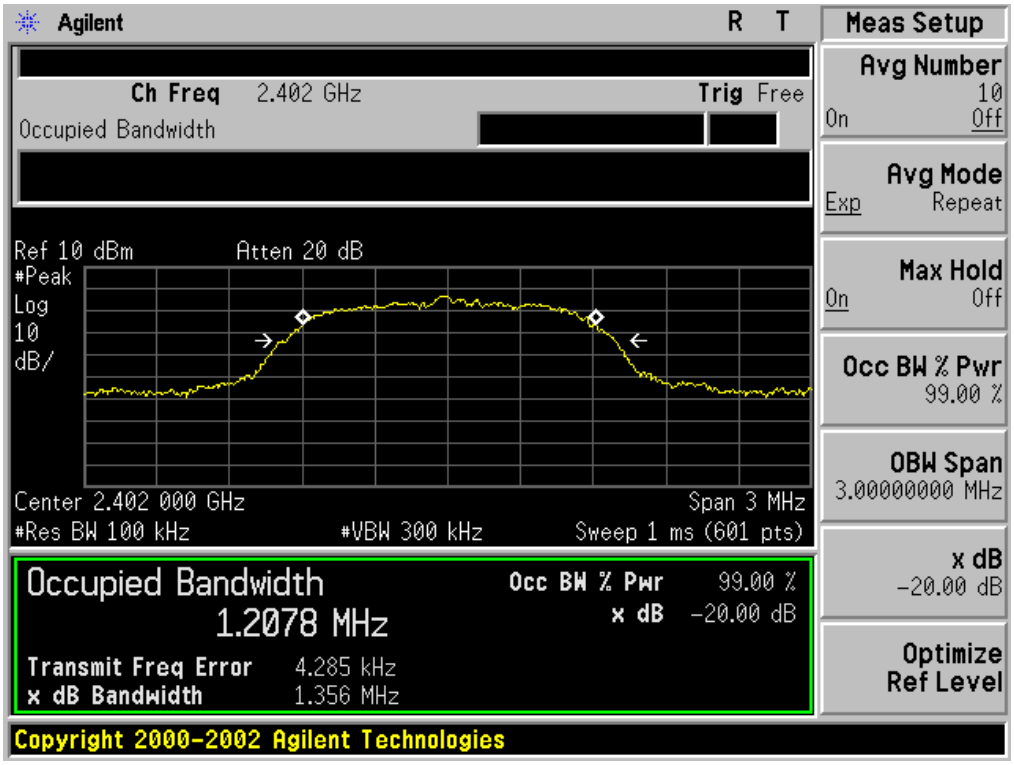


TEST PLOT OF BANDWIDTH FOR HIGH CHANNEL

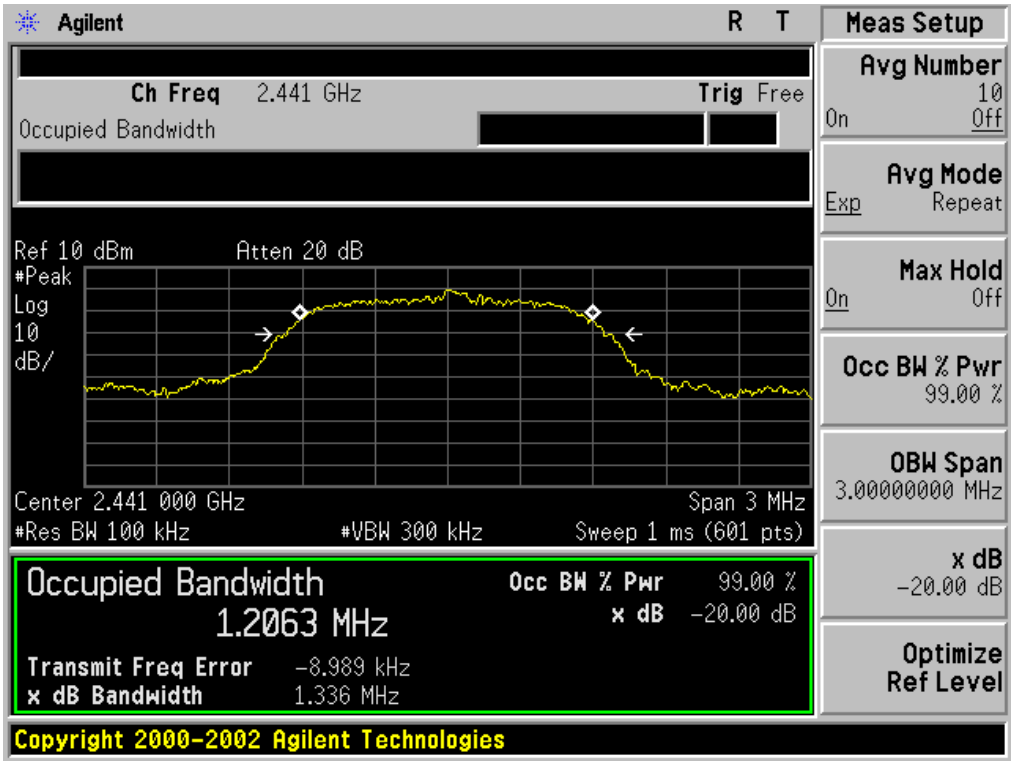


BLUETOOTH 2MBPS LIMITS AND MEASUREMENT RESULT				
Applicable Limits	Measurement Result			
	Test Data (MHz)			Result
		99%OBW (MHz)	-20dB BW(MHz)	
N/A	Low Channel	1.208	1.356	PASS
	Middle Channel	1.206	1.336	PASS
	High Channel	1.191	1.344	PASS

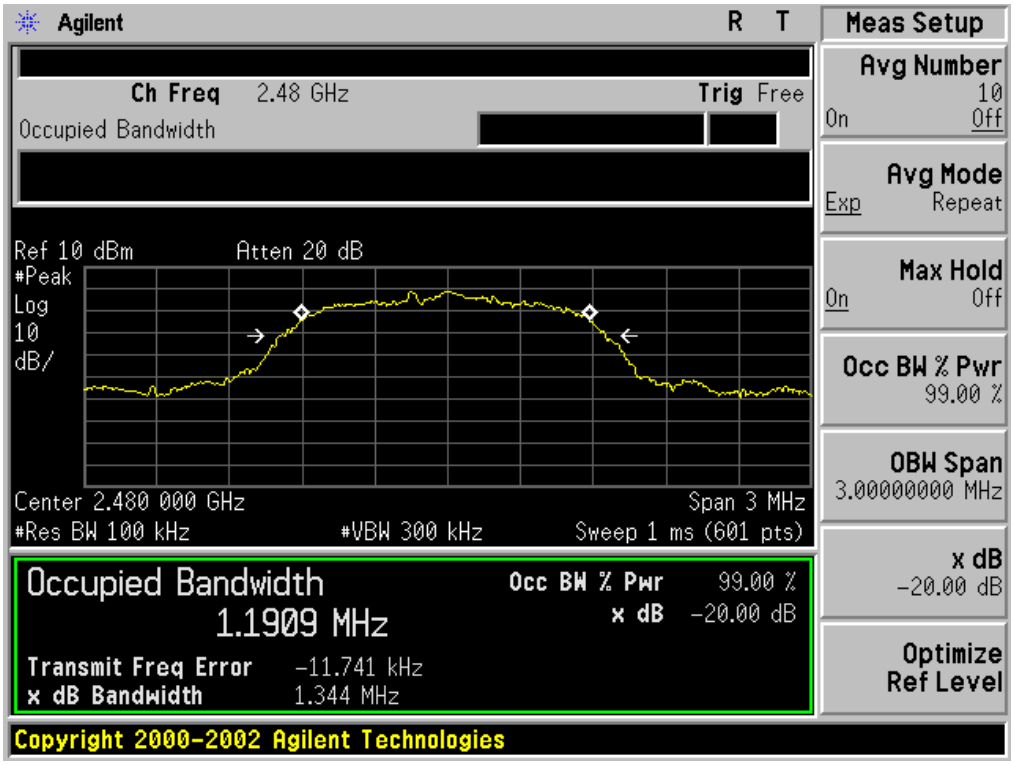
TEST PLOT OF BANDWIDTH FOR LOW CHANNEL



TEST PLOT OF BANDWIDTH FOR MIDDLE CHANNEL

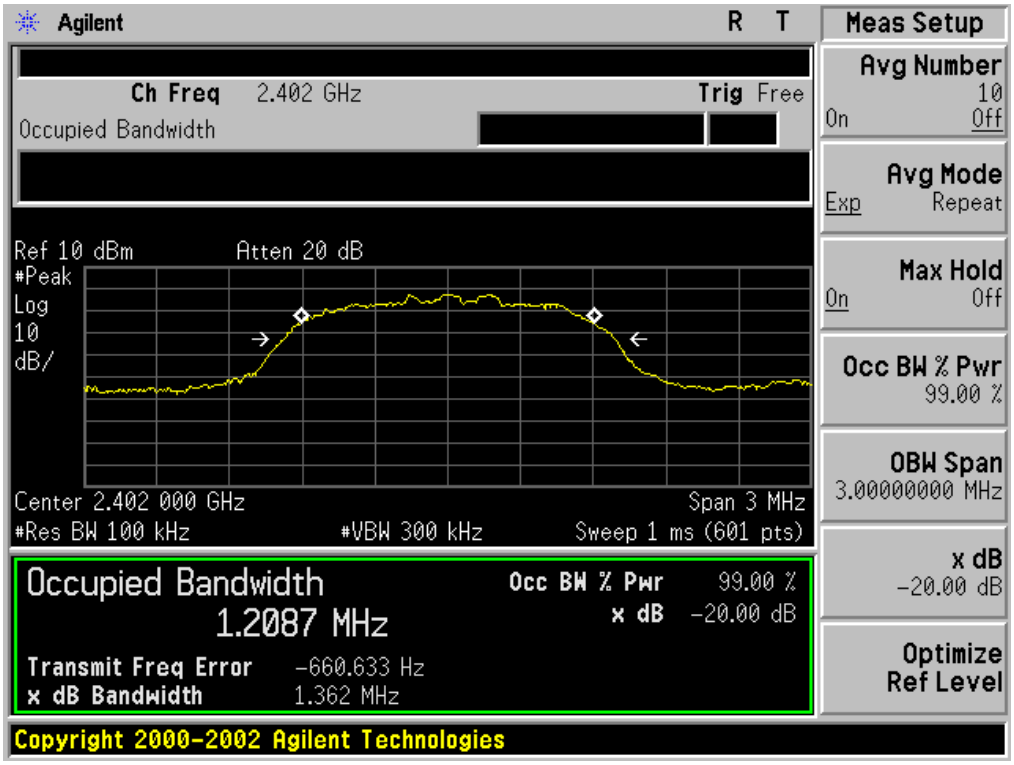


TEST PLOT OF BANDWIDTH FOR HIGH CHANNEL

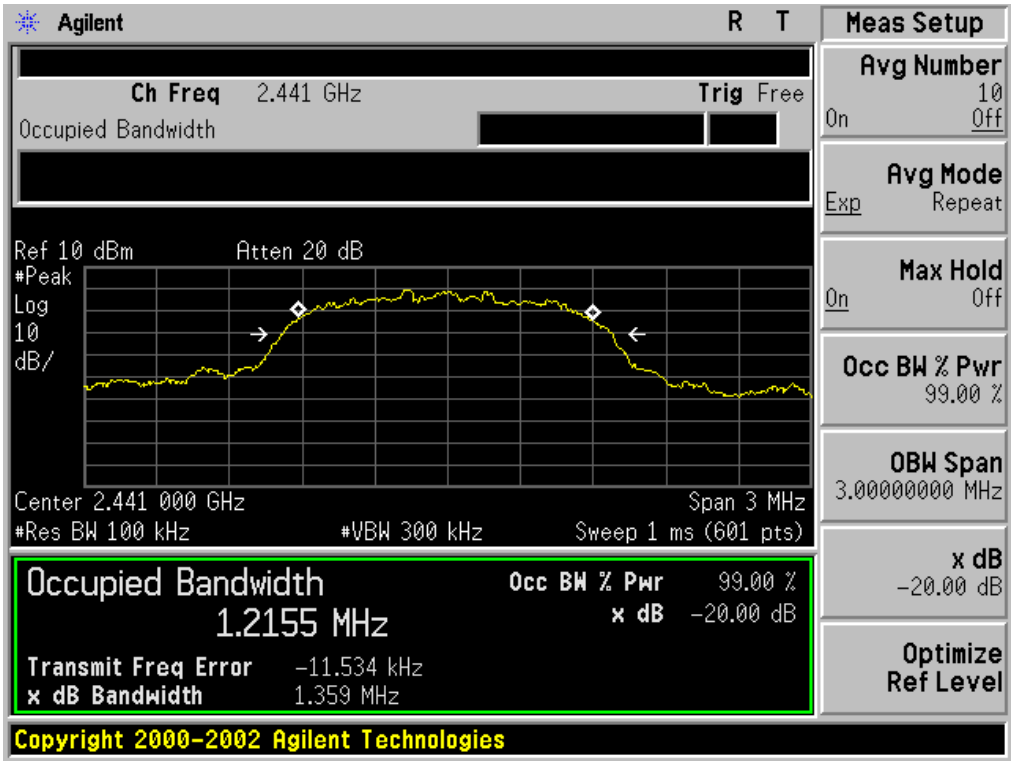


BLUETOOTH 3MBPS LIMITS AND MEASUREMENT RESULT				
Applicable Limits	Measurement Result			
	Test Data (MHz)			Result
		99%OBW (MHz)	-20dB BW(MHz)	
N/A	Low Channel	1.209	1.362	PASS
	Middle Channel	1.216	1.359	PASS
	High Channel	1.215	1.367	PASS

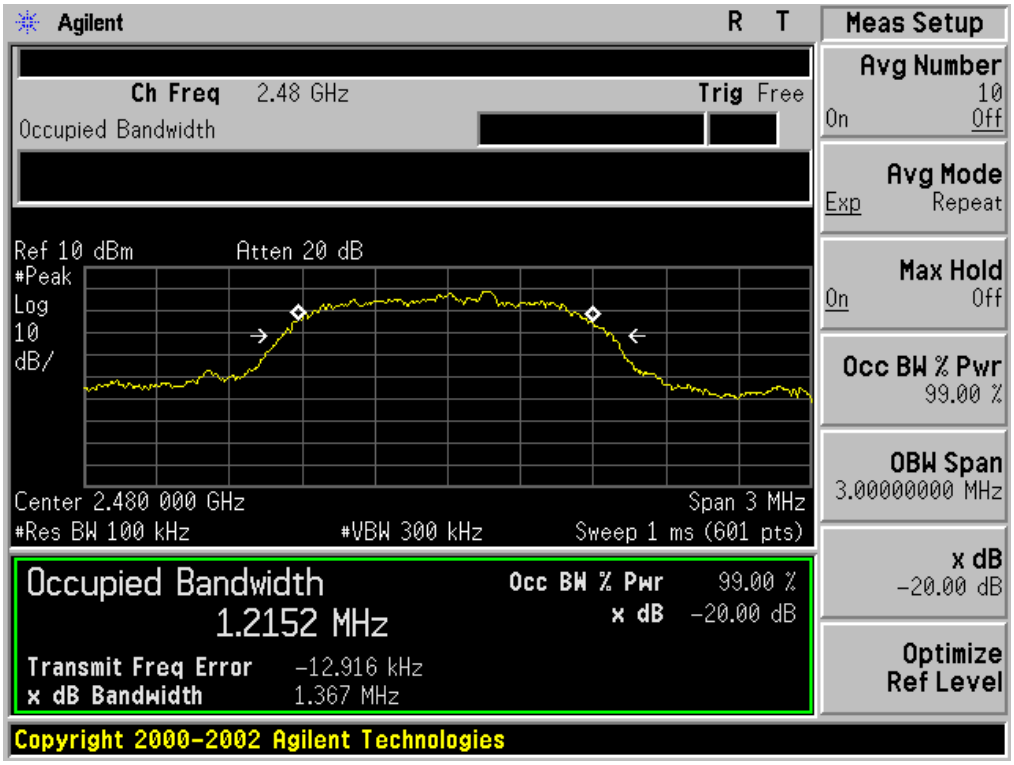
TEST PLOT OF BANDWIDTH FOR LOW CHANNEL



TEST PLOT OF BANDWIDTH FOR MIDDLE CHANNEL



TEST PLOT OF BANDWIDTH FOR HIGH CHANNEL

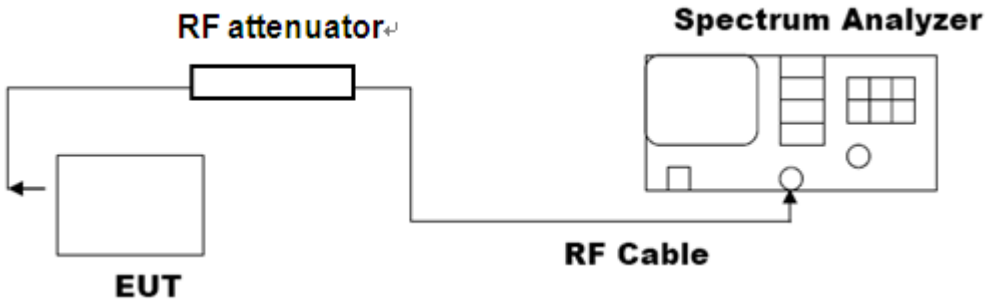


10. CONDUCTED SPURIOUS EMISSION

10.1. 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.

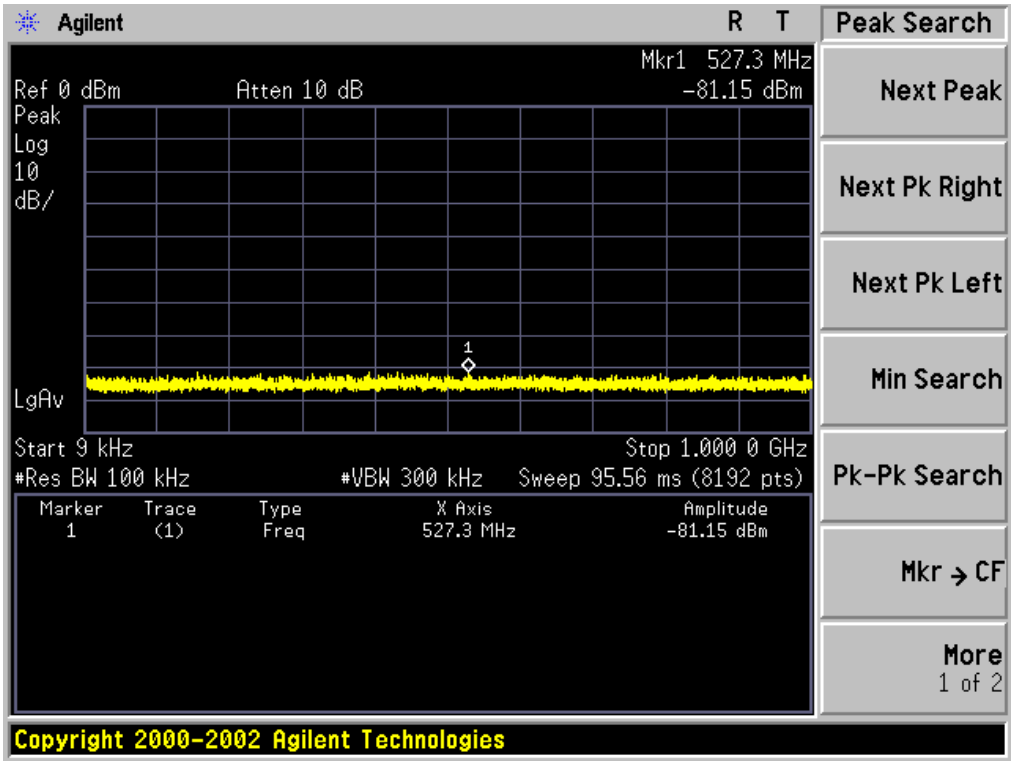
10.2. TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)

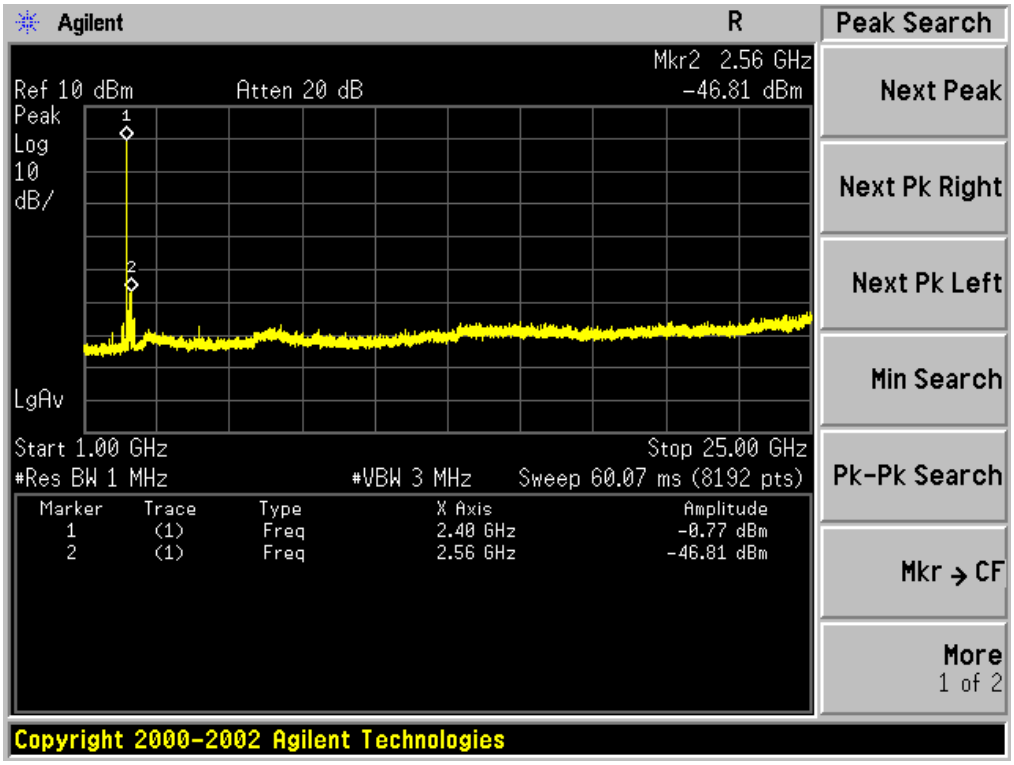


10.3. LIMITS AND MEASUREMENT RESULT

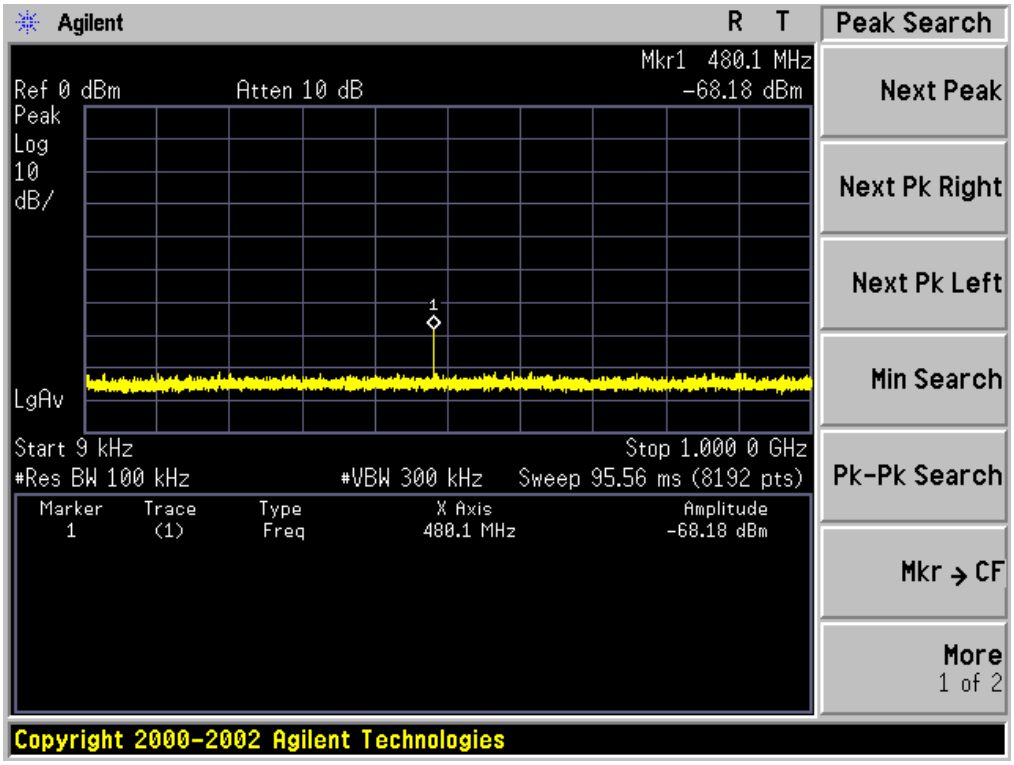
LIMITS AND MEASUREMENT RESULT		
Applicable Limits	**Measurement Result**	
	Test Data	**Result**
In any 100 KHz Bandwidth Outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produce by the intentional radiator shall be at least 20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

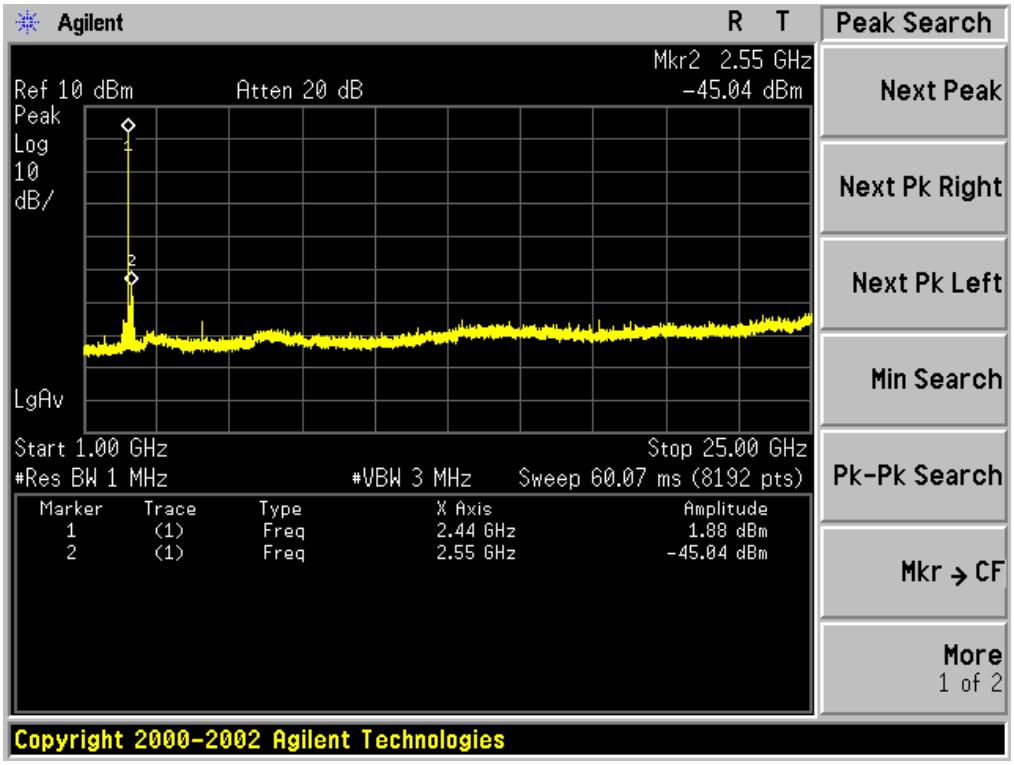
TEST PLOT OF OUT OF BAND EMISSIONS WITH THE WORST CASE OF GFSK MODULATION IN LOW CHANNEL



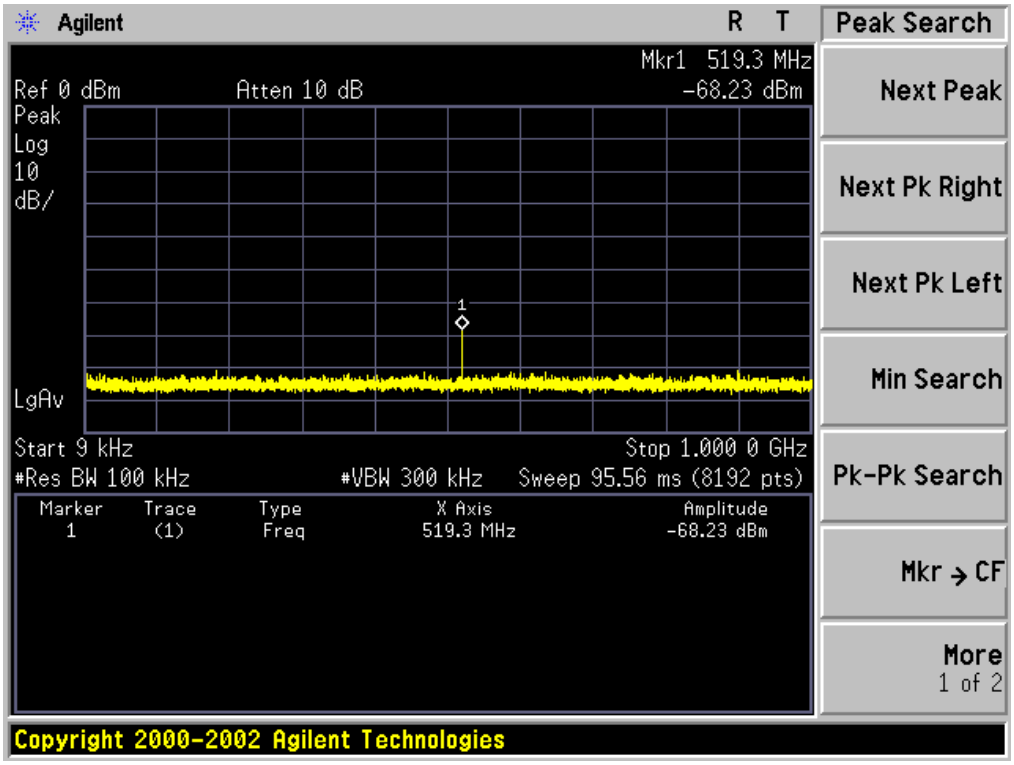


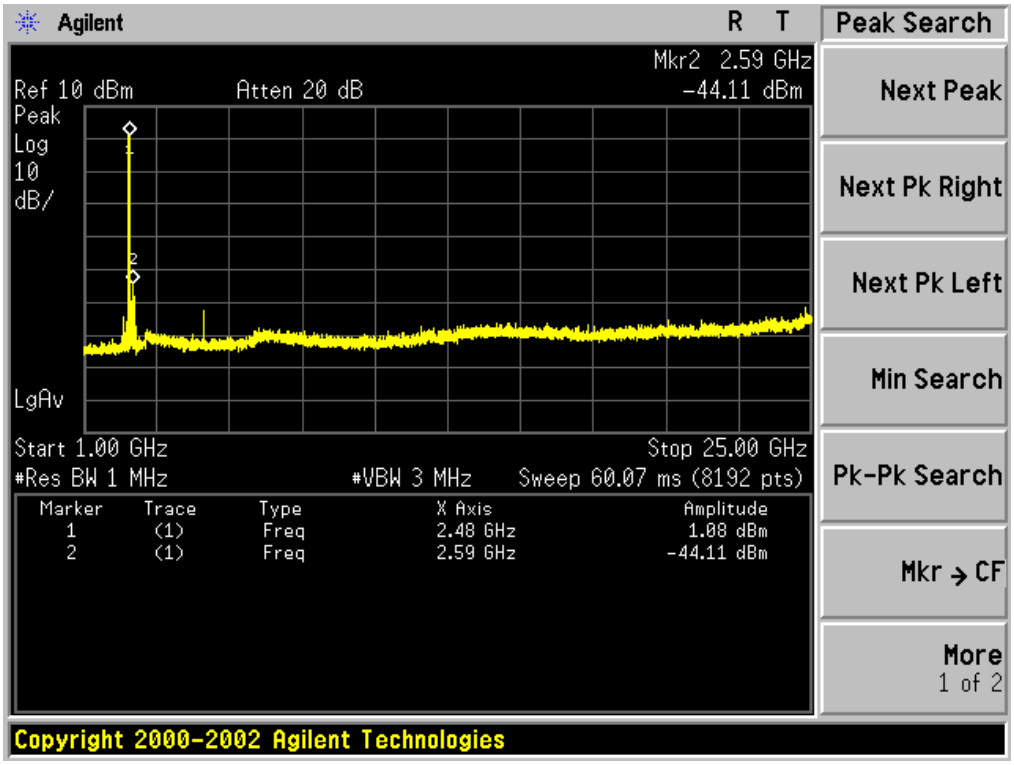
TEST PLOT OF OUT OF BAND EMISSIONS
OF GFSK MODULATION IN MIDDLE CHANNEL





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





11. RADIATED EMISSION

11.1. TEST LIMIT

Frequency (MHz)	Distance Meters	Field Strengths Limit	
		μ V/m	dB(μV)/m
0.009 ~ 0.490	300	2400/F(kHz)	---
0.490 ~ 1.705	30	24000/F(kHz)	---
1.705 ~ 30	30	30	---
30 ~ 88	3	100	40.0
88 ~ 216	3	150	43.5
216 ~ 960	3	200	46.0
960 ~ 1000	3	500	54.0
Above 1000	3	Other:74.0 dB(μV)/m (Peak) 54.0 dB(μV)/m (Average)	

Remark： (1) Emission level dBμ V = 20 log Emission level μ V/m

(2) The smaller limit shall apply at the cross point between two frequency bands.

(3) Distance is the distance in meters between the measuring instrument, antenna and the closest point of any part of the device or system.

11.2. MEASUREMENT PROCEDURE

1. The measuring distance of 3m shall be used for measurements. The EUT was placed on the top of a rotating table 0.8 meter above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation(Below 1GHz)
2. The measuring distance of 3m shall used for measurements. The EUT was placed on the top of a rotating table 1.5 meter above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation(Above 1GHz)
3. The height of the test antenna shall vary between 1m to 4m.Both horizontal and vertical polarization Of the antenna are set to make the measurement.
4. The initial step in collecting radiated emission data is a receive peak detector mode. Pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured.
5. All readings are peak unless otherwise stated QP in column of Note. Peak denoted that the Peak reading compliance with the QP limits and then QP Mode measurement didn't perform(Below 1GHz)
6. All readings are Peak mode value unless otherwise stated AVG in column of Note. If the Peak mode measured value compliance with the Peak limits and lower than AVG Limits, the EUT shall be deemed to meet Peak&AVG limits and then only Peak mode was measured, but AVG mode didn't perform.(Above 1GHz)

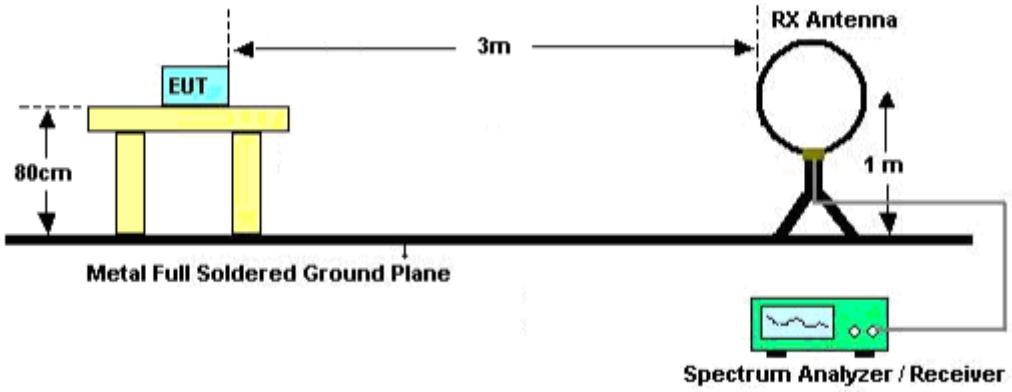
The following table is the setting of spectrum analyzer and receiver.

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 RBW 2MHz/VBW 6MHz for Peak, RBW 1.5MHz/10Hz for Average

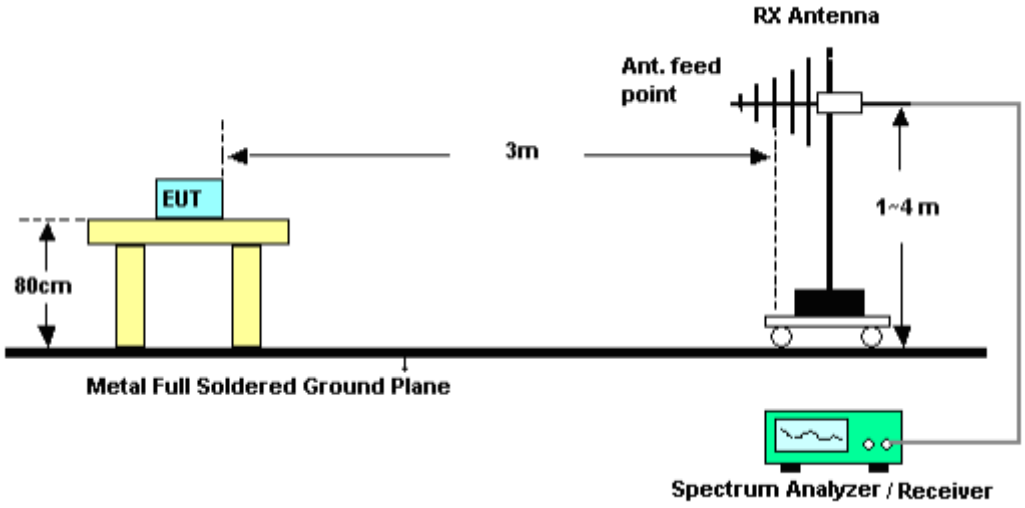
Receiver Parameter	Setting
Start ~Stop Frequency	9KHz~150KHz/RB 200Hz for QP
Start ~Stop Frequency	150KHz~30MHz/RB 9KHz for QP
Start ~Stop Frequency	30MHz~1000MHz/RB 120KHz for QP

11.3. TEST SETUP

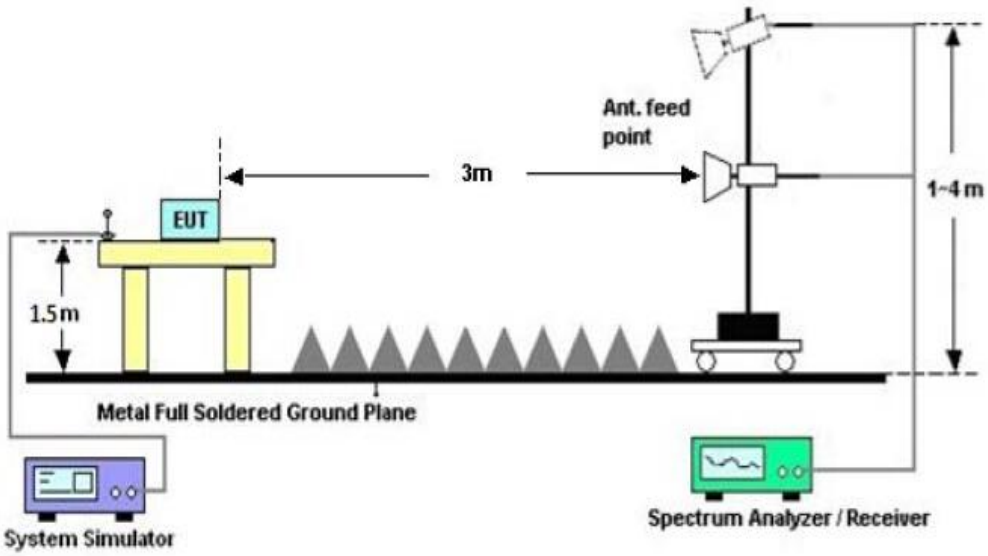
RADIATED EMISSION TEST SETUP BELOW 30MHz



RADIATED EMISSION TEST SETUP 30MHz-1000MHz



RADIATED EMISSION TEST SETUP ABOVE 1000MHz



11.4. TEST RESULT

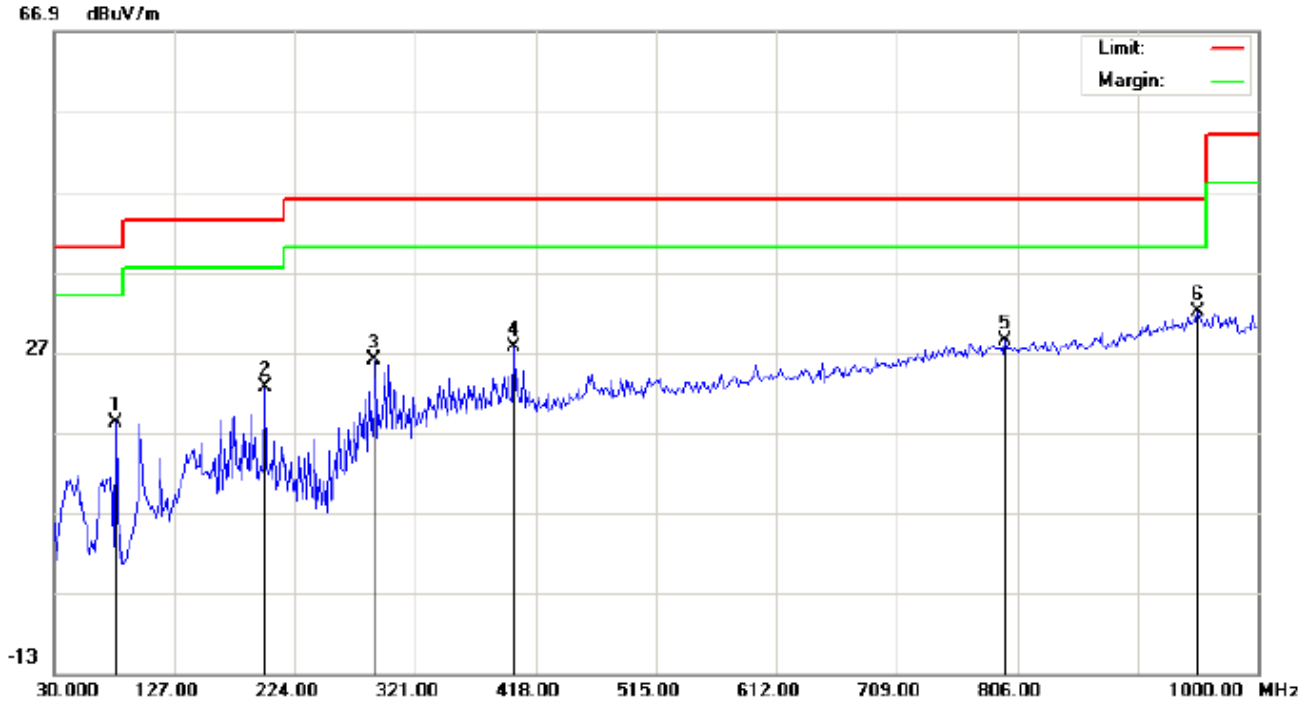
(Worst Modulation: GFSK)

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



Site: site #1
Limit: FCC Class B 3M Radiation
EUT:Bluetooth Stereo Headphones
M/N: W293BT
Mode: Low Channel TX
Note:

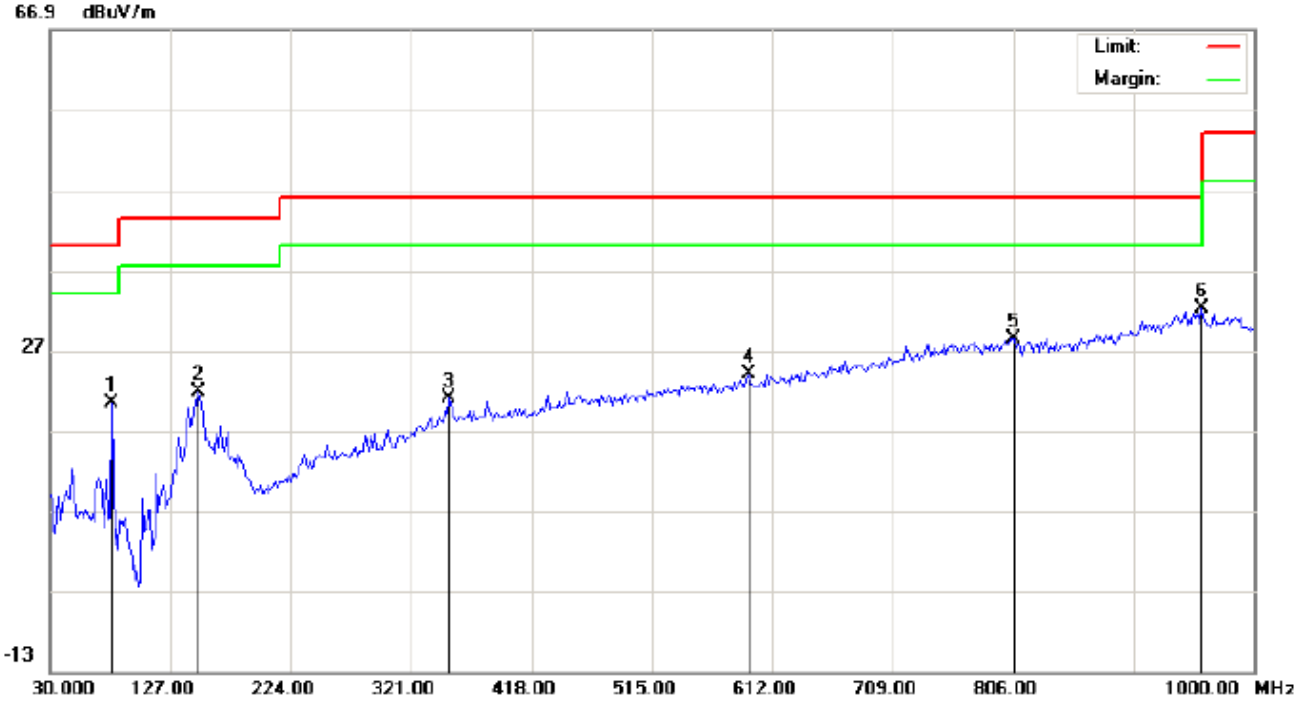
Polarization: *Horizontal*
Power:
Distance:

Temperature: 23.6
Humidity: 53.6 %

No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		cm	degree	
1		80.1167	17.68	0.50	18.18	40.00	-21.82	peak			
2		199.7500	10.54	11.99	22.53	43.50	-20.97	peak			
3		288.6666	12.60	13.48	26.08	46.00	-19.92	peak			
4		400.2167	8.46	19.08	27.54	46.00	-18.46	peak			
5		796.3000	1.23	27.27	28.50	46.00	-17.50	peak			
6	*	951.5000	1.96	29.99	31.95	46.00	-14.05	peak			

RESULT: PASS

RADIATED EMISSION TEST- (30MHz-1GHz)-LOW CHANNEL -VERTICAL



Site: site #1
Limit: FCC Class B 3M Radiation
EUT:Bluetooth Stereo Headphones
M/N: W293BT
Mode: Low Channel TX
Note:

Polarization: *Vertical*
Power:
Distance:

Temperature: 23.6
Humidity: 53.6 %

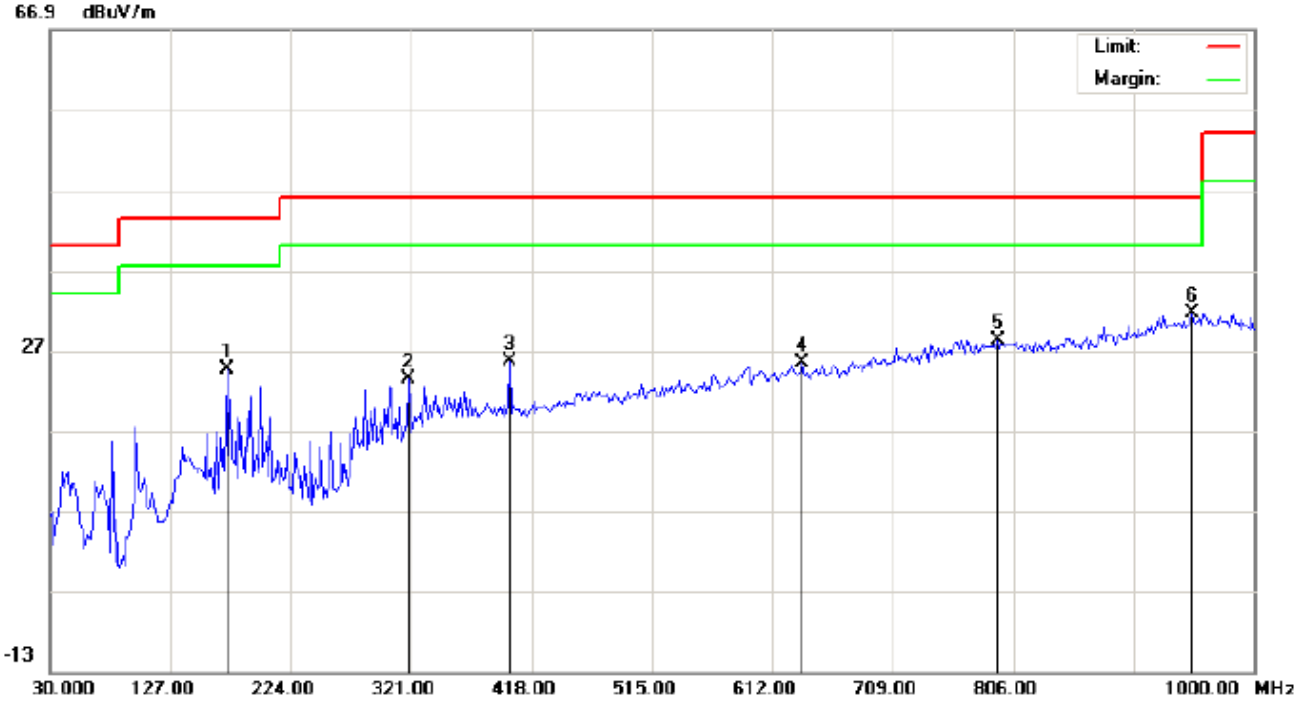
No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		cm	degree	
1		80.1167	18.55	1.84	20.39	40.00	-19.61	peak			
2		149.6333	6.63	15.26	21.89	43.50	-21.61	peak			
3		351.7167	2.31	18.75	21.06	46.00	-24.94	peak			
4		592.6000	1.28	22.69	23.97	46.00	-22.03	peak			
5		806.0000	1.07	27.32	28.39	46.00	-17.61	peak			
6	*	957.9667	2.32	29.92	32.24	46.00	-13.76	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.

RADIATED EMISSION TEST- (30MHz-1GHz)-MIDDLE CHANNEL-HORIZONTAL



Site: site #1
Limit: FCC Class B 3M Radiation
EUT:Bluetooth Stereo Headphones
M/N: W293BT
Mode: Middle Channel TX
Note:

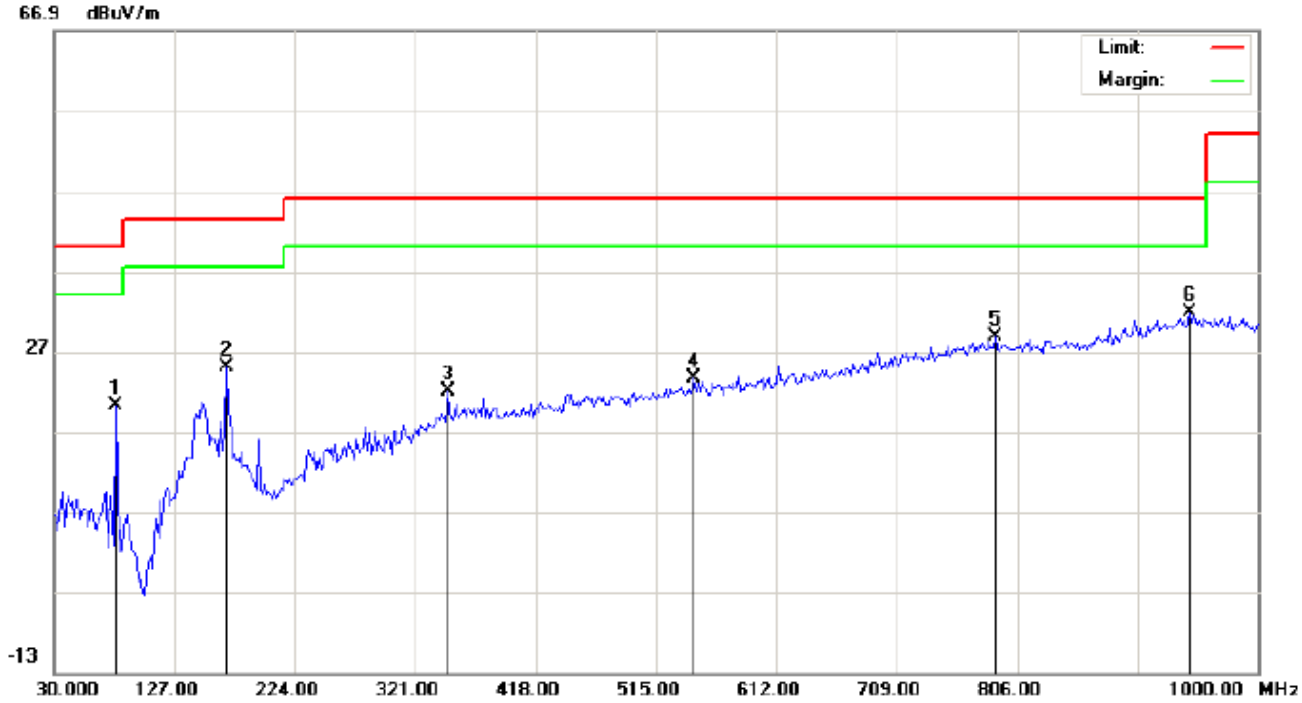
Polarization: *Horizontal*
Power:
Distance:

Temperature: 23.6
Humidity: 53.6 %

No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		cm	degree	
1		172.2667	13.85	10.78	24.63	43.50	-18.87	peak			
2		319.3833	6.77	16.70	23.47	46.00	-22.53	peak			
3		400.2167	6.62	19.08	25.70	46.00	-20.30	peak			
4		636.2500	1.63	23.82	25.45	46.00	-20.55	peak			
5		793.0667	0.96	27.22	28.18	46.00	-17.82	peak			
6	*	949.8833	1.59	30.00	31.59	46.00	-14.41	peak			

RESULT: PASS

RADIATED EMISSION TEST- (30MHz-1GHz)- MIDDLE CHANNEL -VERTICAL



Site: site #1
Limit: FCC Class B 3M Radiation
EUT:Bluetooth Stereo Headphones
M/N: W293BT
Mode: Middle Channel TX
Note:

Polarization: *Vertical*
Power:
Distance:

Temperature: 23.6
Humidity: 53.6 %

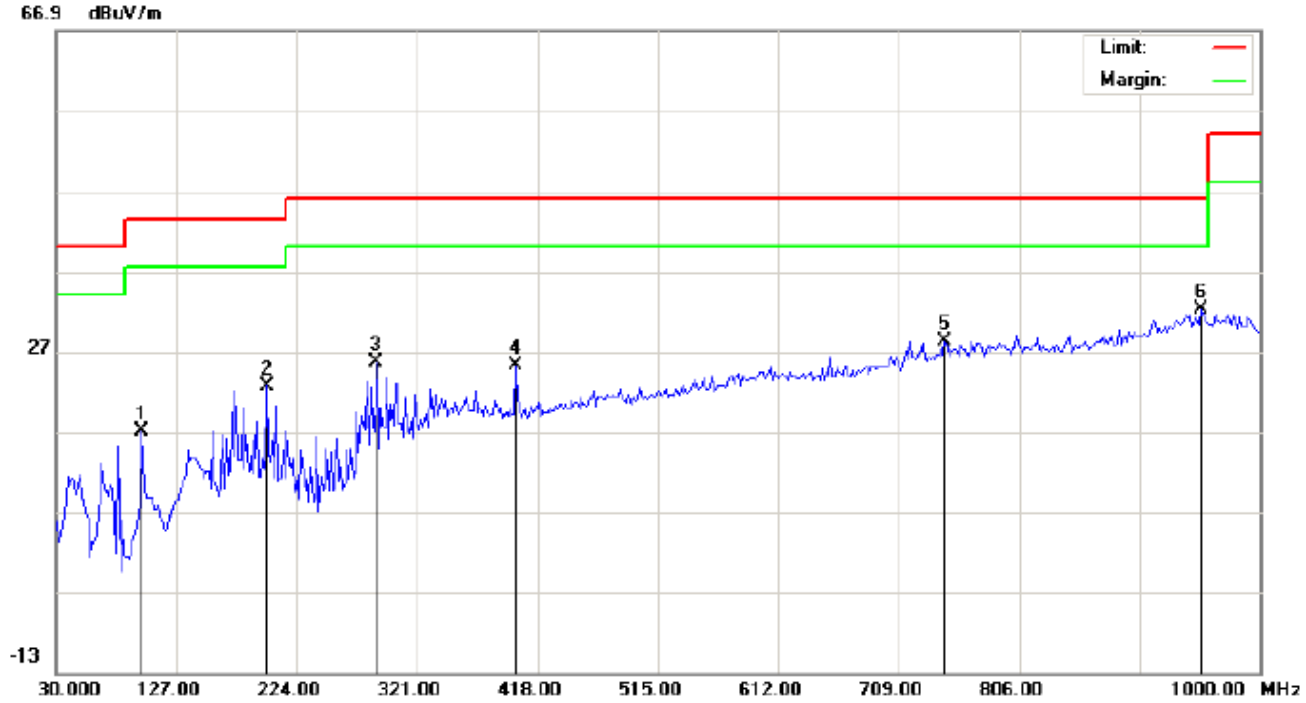
No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		cm	degree	
1		80.1167	18.45	1.84	20.29	40.00	-19.71	peak			
2		169.0333	10.21	14.76	24.97	43.50	-18.53	peak			
3		346.8667	3.40	18.53	21.93	46.00	-24.07	peak			
4		545.7167	1.20	22.36	23.56	46.00	-22.44	peak			
5		788.2167	1.63	27.16	28.79	46.00	-17.21	peak			
6	*	945.0333	1.92	29.86	31.78	46.00	-14.22	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.

RADIATED EMISSION TEST- (30MHz-1GHz)-HIGH CHANNEL-HORIZONTAL



Site: site #1
Limit: FCC Class B 3M Radiation
EUT:Bluetooth Stereo Headphones
M/N: W293BT
Mode: High Channel TX
Note:

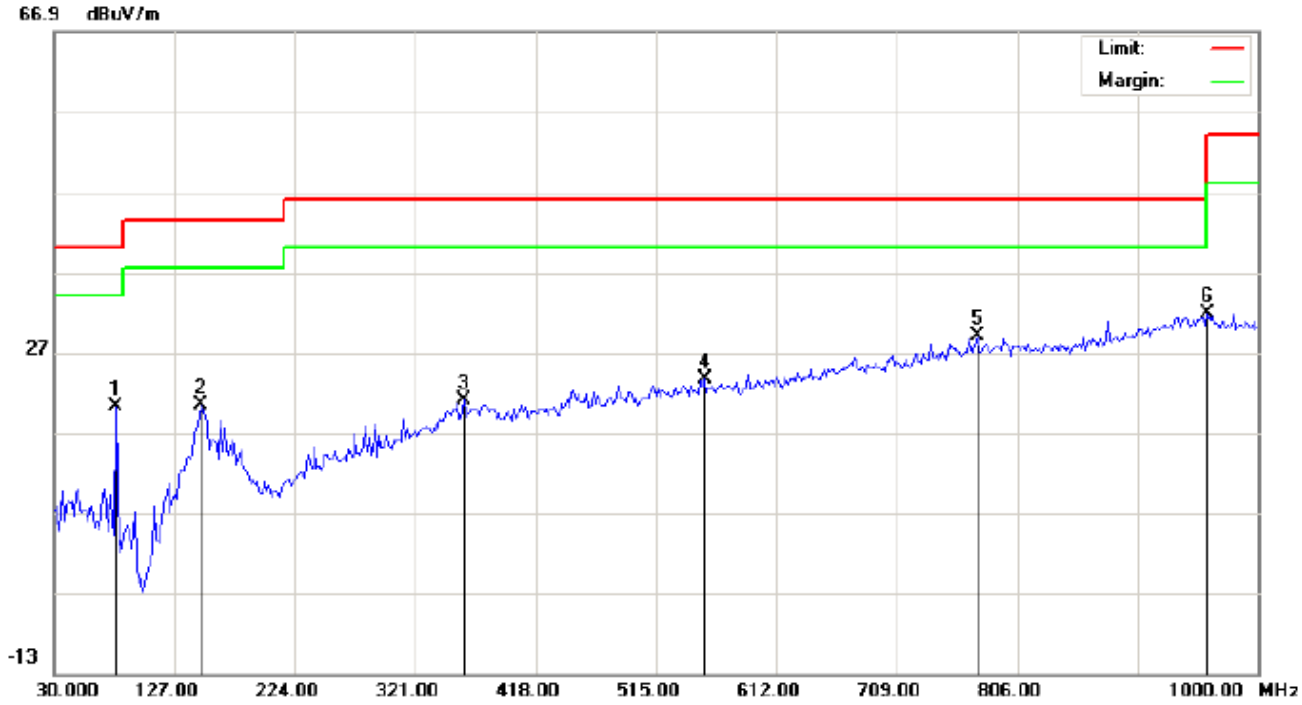
Polarization: *Horizontal*
Power:
Distance:

Temperature: 23.6
Humidity: 53.6 %

No.	Mk.	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		cm	degree	
1		99.5167	6.92	10.00	16.92	43.50	-26.58	peak			
2		199.7500	10.71	11.99	22.70	43.50	-20.80	peak			
3		288.6666	12.11	13.48	25.59	46.00	-20.41	peak			
4		400.2167	6.15	19.08	25.23	46.00	-20.77	peak			
5		746.1833	1.76	26.52	28.28	46.00	-17.72	peak			
6	*	953.1167	2.31	29.97	32.28	46.00	-13.72	peak			

RESULT: PASS

RADIATED EMISSION TEST- (30MHz-1GHz)-HIGH CHANNEL -VERTICAL



Site: site #1
Limit: FCC Class B 3M Radiation
EUT:Bluetooth Stereo Headphones
M/N: W293BT
Mode: High Channel TX
Note:

Polarization: *Vertical*
Power:
Distance:

Temperature: 23.6
Humidity: 53.6 %

No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
	-	MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		cm	degree	
1		80.1167	18.32	1.84	20.16	40.00	-19.84	peak			
2		148.0167	5.11	15.25	20.36	43.50	-23.14	peak			
3		359.8000	2.18	18.80	20.98	46.00	-25.02	peak			
4		553.8000	1.03	22.50	23.53	46.00	-22.47	peak			
5		773.6667	2.12	26.96	29.08	46.00	-16.92	peak			
6	*	959.5833	1.92	29.91	31.83	46.00	-14.17	peak			

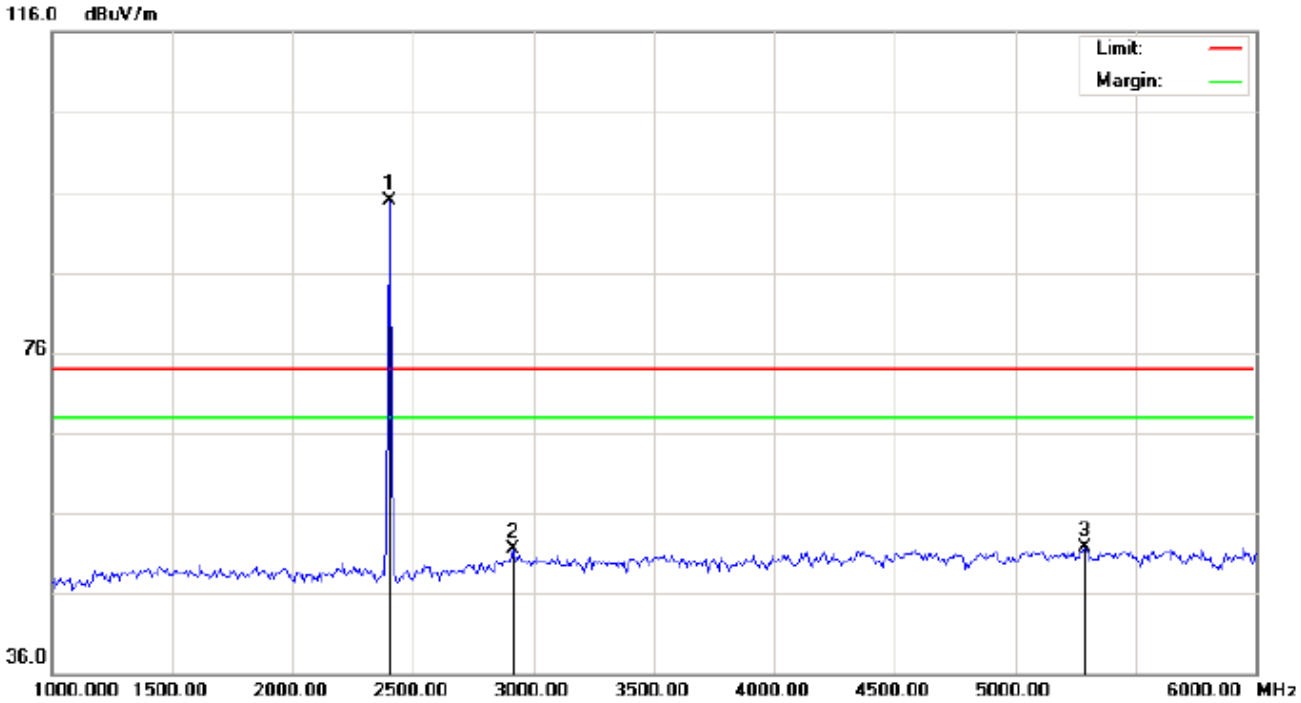
RESULT: PASS

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

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

RADIATED EMISSION ABOVE 1GHz

RADIATED EMISSION ABOVE 1GHz (1-10th Harmonics)-LOW CHANNEL-HORIZONTAL



Site: site #1
Limit: FCC Class B 3M Radiation above 1GHz(PK)
EUT:Bluetooth Stereo Headphones
M/N:W293BT
Mode: Low Channel TX
Note:

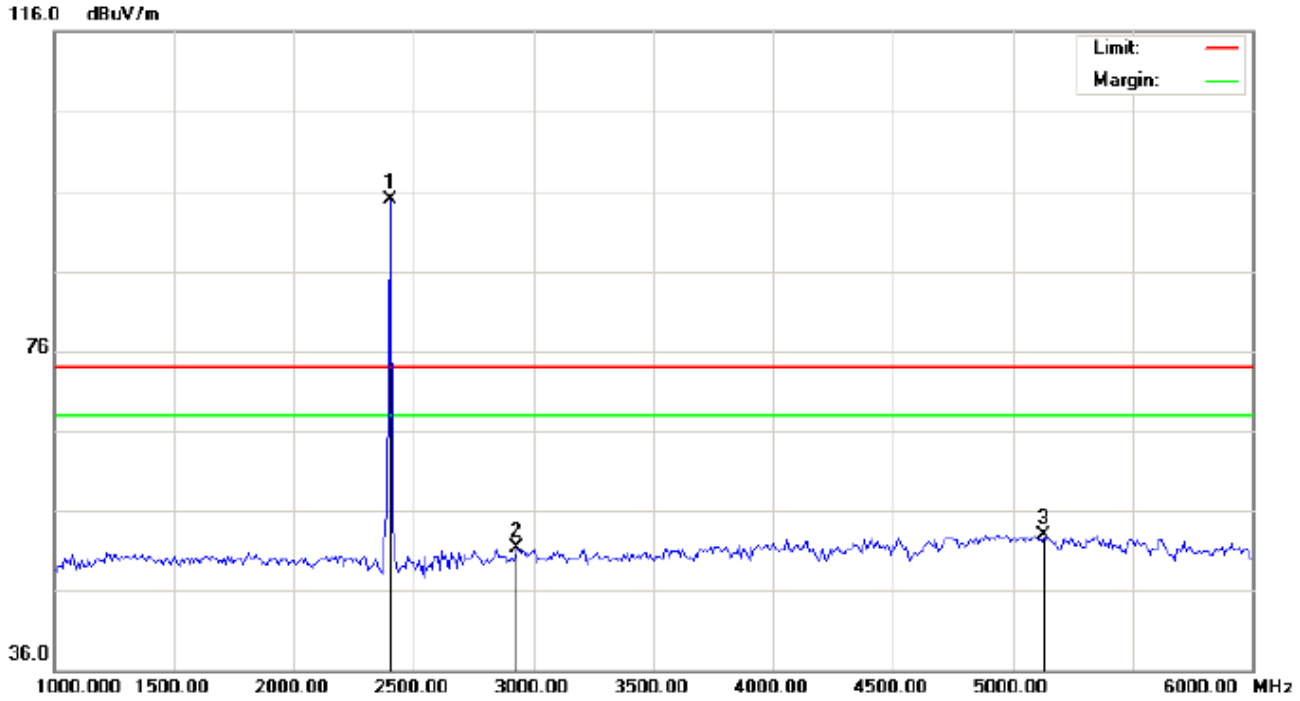
Polarization: *Horizontal*
Power:
Distance:

Temperature: 26
Humidity: 60 %

No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		cm	degree	
1	*	2402.000	84.61	10.32	94.93	74.00	20.93	peak			
2		2916.667	40.01	11.44	51.45	74.00	-22.55	peak			
3		5291.667	49.41	2.36	51.77	74.00	-22.23	peak			

RESULT: PASS

RADIATED EMISSION ABOVE 1GHz (1-10th Harmonics)-LOW CHANNEL –VERTICAL



Site: site #1
Limit: FCC Class B 3M Radiation above 1GHz(PK)
EUT:Bluetooth Stereo Headphones
M/N:W293BT
Mode: Low Channel TX
Note:

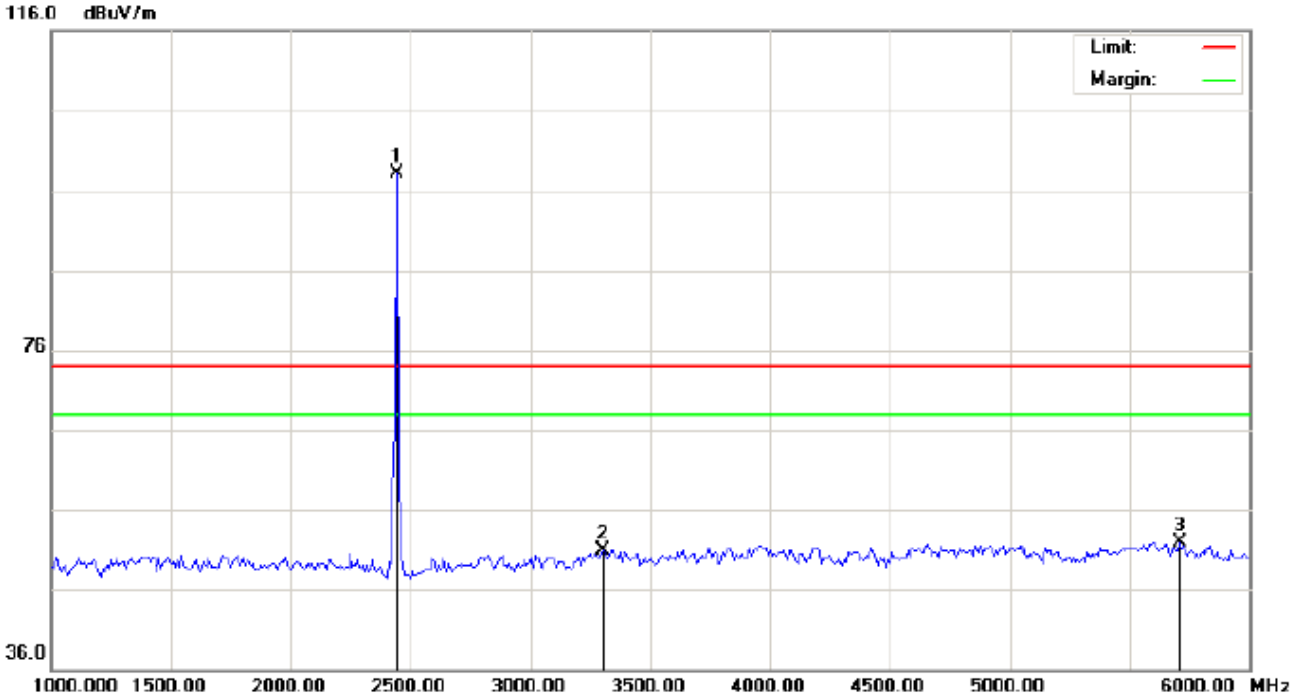
Polarization: *Vertical*
Power:
Distance:

Temperature: 26
Humidity: 60 %

No.	Mk.	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		cm	degree	
1	*	2402.000	84.57	10.32	94.89	74.00	20.89	peak			
2		2933.333	39.84	11.48	51.32	74.00	-22.68	peak			
3		5133.333	47.36	5.53	52.89	74.00	-21.11	peak			

RESULT: PASS

RADIATED EMISSION ABOVE 1GHz (1-10th Harmonics)-MIDDLE CHANNEL-HORIZONTAL



Site: site #1
Limit: FCC Class B 3M Radiation above 1GHz(PK)
EUT:Bluetooth Stereo Headphones
M/N:W293BT
Mode: Middle Channel TX
Note:

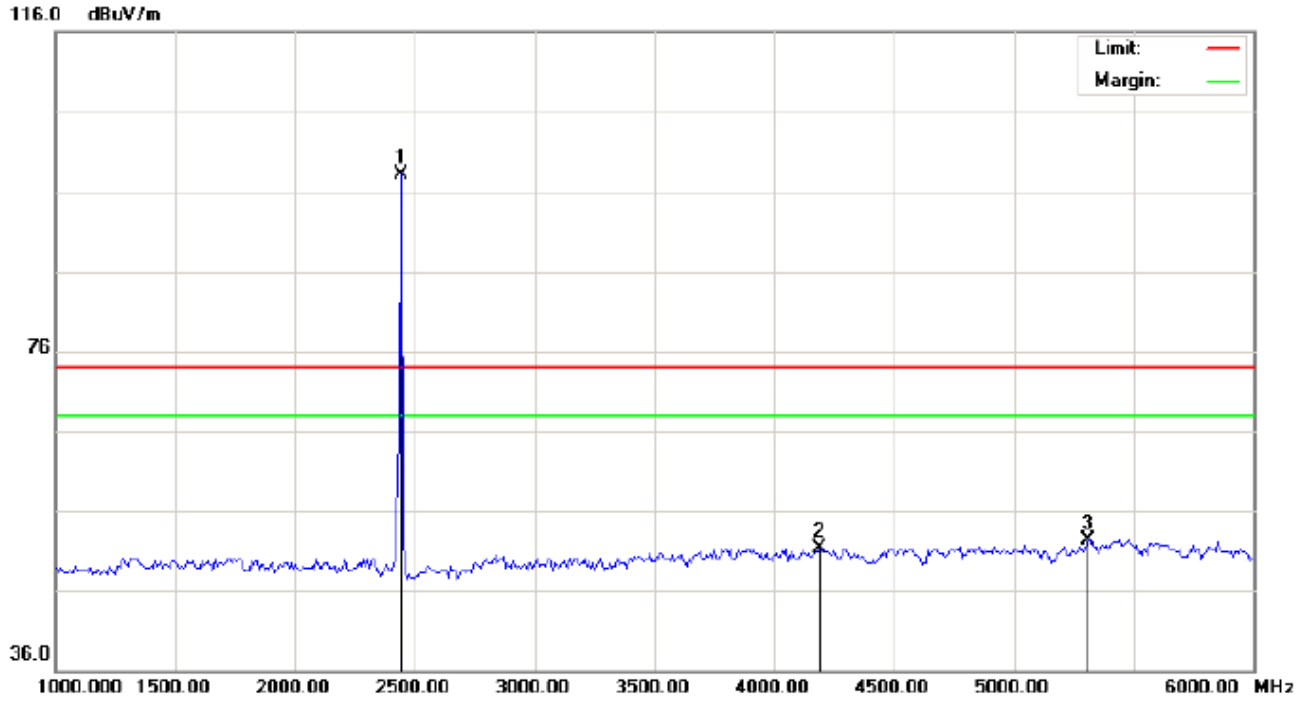
Polarization: *Horizontal*
Power:
Distance:

Temperature: 26
Humidity: 60 %

No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		cm	degree	
1	*	2441.000	87.73	10.36	98.09	74.00	24.09	peak			
2		3300.000	39.07	11.92	50.99	74.00	-23.01	peak			
3		5708.333	53.62	-1.71	51.91	74.00	-22.09	peak			

RESULT: PASS

RADIATED EMISSION ABOVE 1GHz (1-10th Harmonics) - MIDDLE CHANNEL –VERTICAL



Site: site #1
Limit: FCC Class B 3M Radiation above 1GHz(PK)
EUT:Bluetooth Stereo Headphones
M/N:W293BT
Mode: Middle Channel TX
Note:

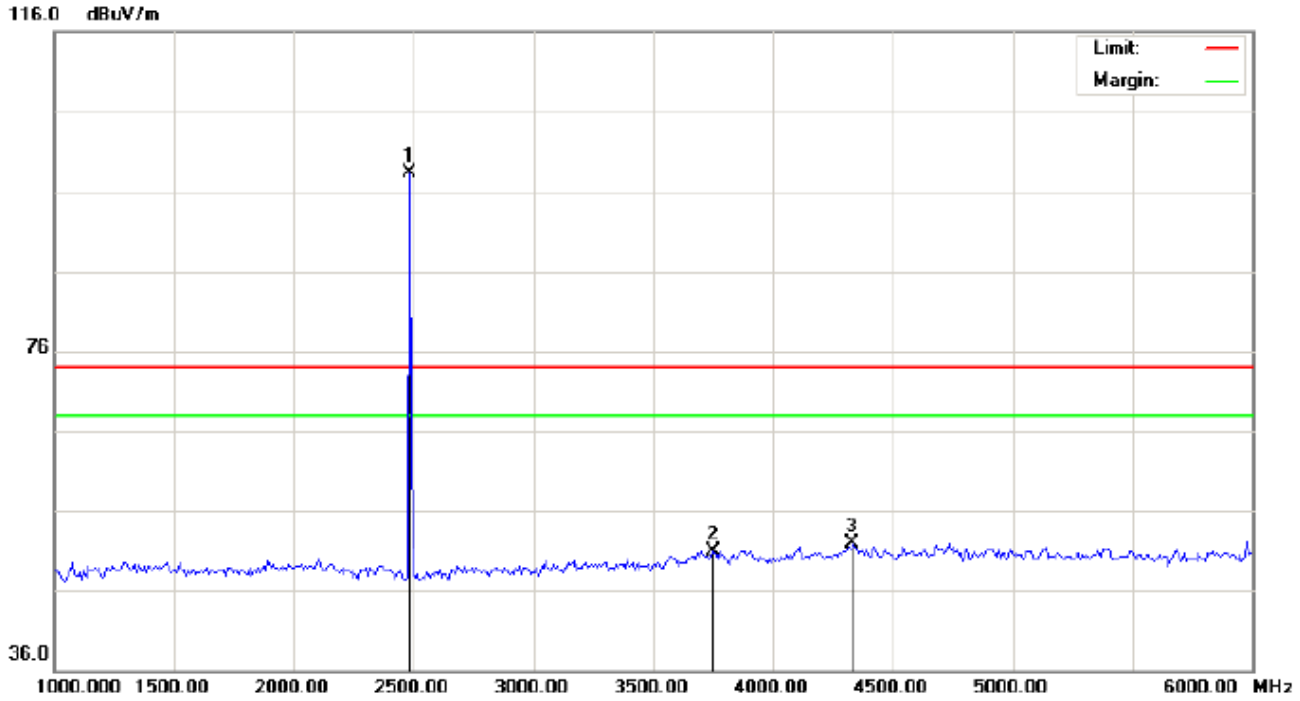
Polarization: *Vertical*
Power:
Distance:

Temperature: 26
Humidity: 60 %

No.	Mk.	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		cm	degree	
1	*	2441.000	87.79	10.36	98.15	74.00	24.15	peak			
2		4191.667	39.38	12.01	51.39	74.00	-22.61	peak			
3		5308.333	50.31	2.03	52.34	74.00	-21.66	peak			

RESULT: PASS

RADIATED EMISSION ABOVE 1GHz (1-10th Harmonics)-HIGH CHANNEL-HORIZONTAL



Site: site #1
Limit: FCC Class B 3M Radiation above 1GHz(PK)
EUT:Bluetooth Stereo Headphones
M/N:W293BT
Mode:High Channel TX
Note:

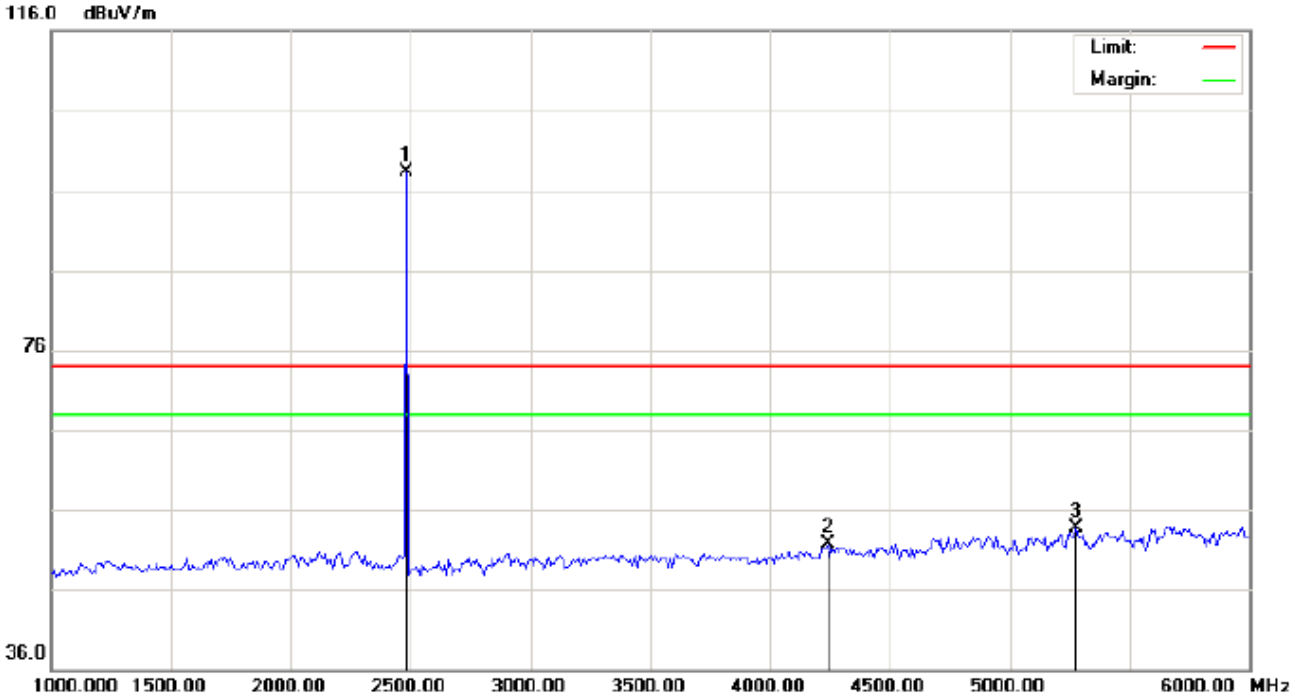
Polarization: *Horizontal*
Power:
Distance:

Temperature: 26
Humidity: 60 %

No.	Mk.	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		cm	degree	
1	*	2480.000	87.83	10.41	98.24	74.00	24.24	peak			
2		3750.000	37.25	13.65	50.90	74.00	-23.10	peak			
3		4333.333	42.19	9.66	51.85	74.00	-22.15	peak			

RESULT: PASS

RADIATED EMISSION ABOVE 1GHz (1-10th Harmonics)-HIGH CHANNEL –VERTICAL



Site: site #1
Limit: FCC Class B 3M Radiation above 1GHz(PK)
EUT:Bluetooth Stereo Headphones
M/N:W293BT
Mode:High Channel TX
Note:

Polarization: *Vertical*
Power:
Distance:

Temperature: 26
Humidity: 60 %

No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		cm	degree	
1	*	2480.000	87.87	10.41	98.28	74.00	24.28	peak			
2		4241.667	40.47	11.18	51.65	74.00	-22.35	peak			
3		5275.000	50.97	2.69	53.66	74.00	-20.34	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.

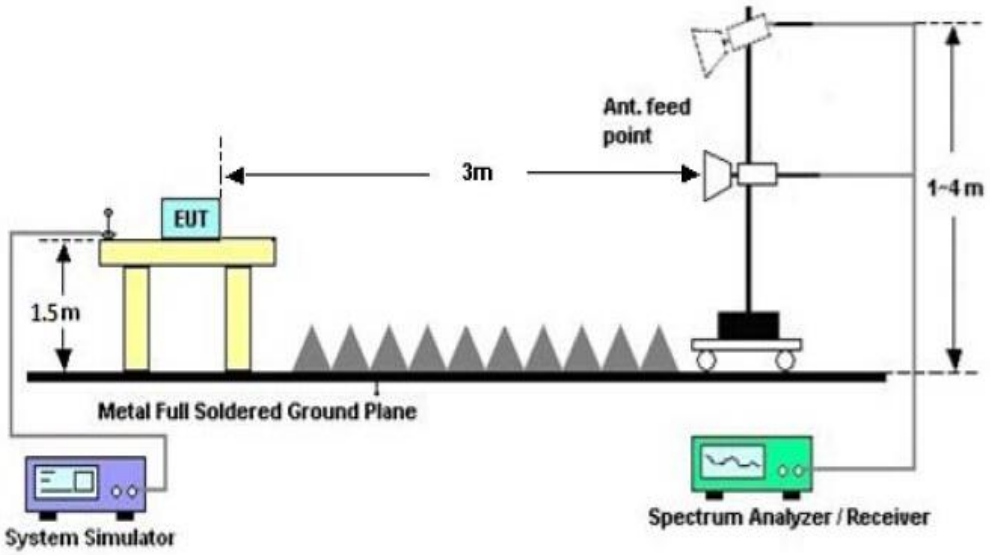
The “Factor” value can be calculated automatically by software of measurement system.

12. BAND EDGE EMISSION

12.1. 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>=100kHz, VBW>=3*RBW, Center frequency =Operation frequency
3. The band edges was measured and recorded.

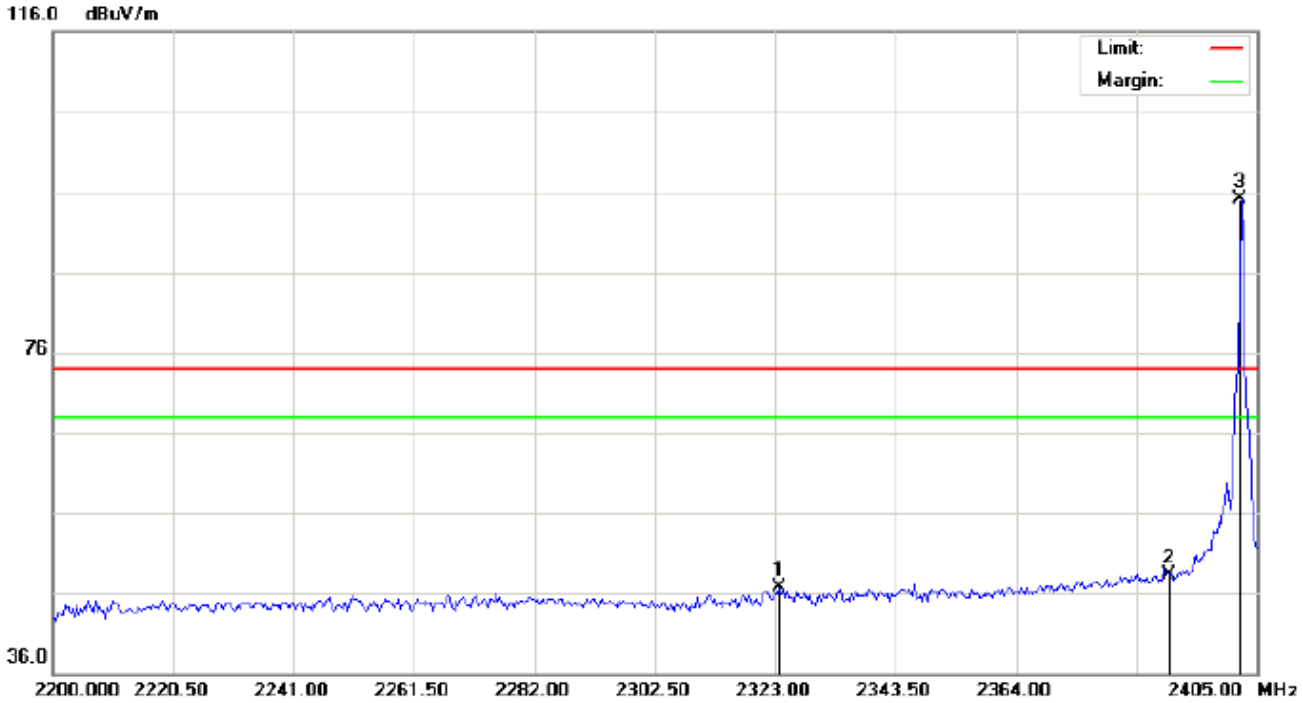
12.2. TEST SET-UP



12.3. TEST RESULT

(Worst Modulation: GFSK)

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



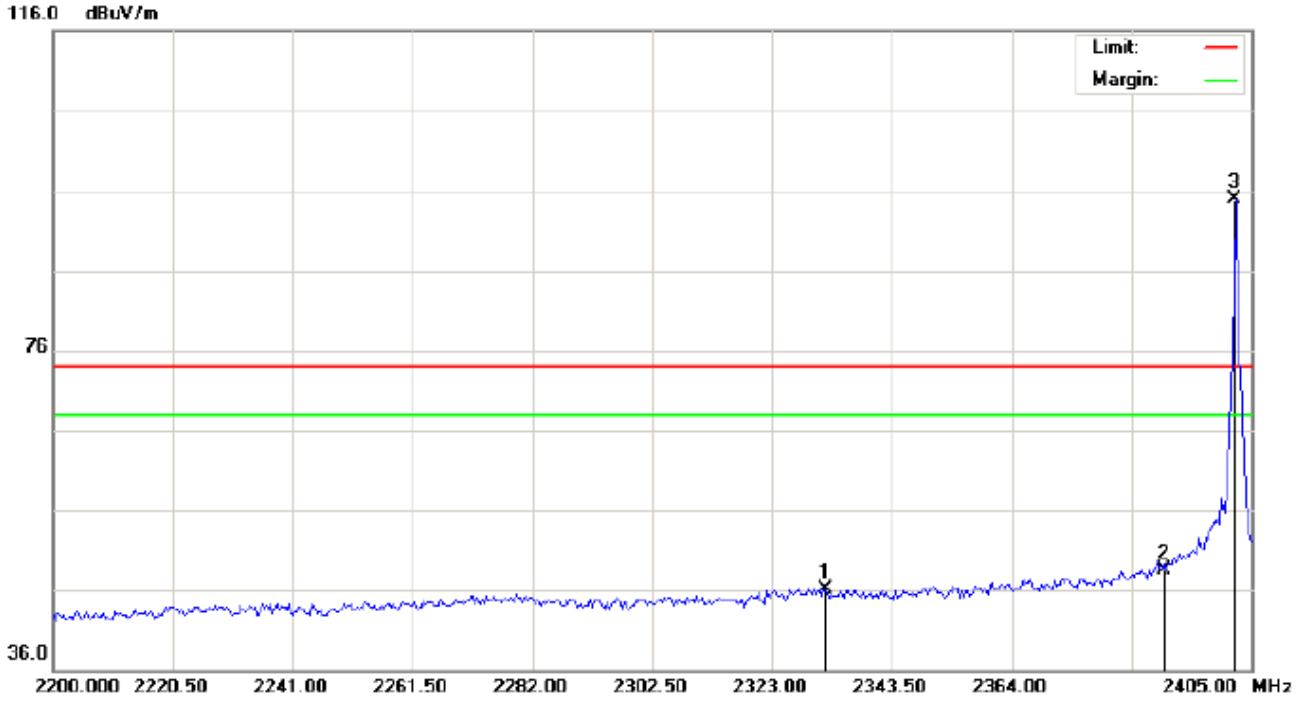
Site: site #1
Limit: FCC Class B 3M Radiation above 1GHz(PK)
EUT: Bluetooth Stereo Headphones
M/N: W293BT
Mode: Low Channel TX
Note:

Polarization: *Horizontal*
Power:
Distance:

Temperature: 26
Humidity: 60 %

No.	Mk.	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		cm	degree	
1		2323.683	36.37	10.24	46.61	74.00	-27.39	peak			
2		2390.000	38.00	10.31	48.31	74.00	-25.69	peak			
3	*	2402.000	84.72	10.32	95.04	74.00	21.04	peak			

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



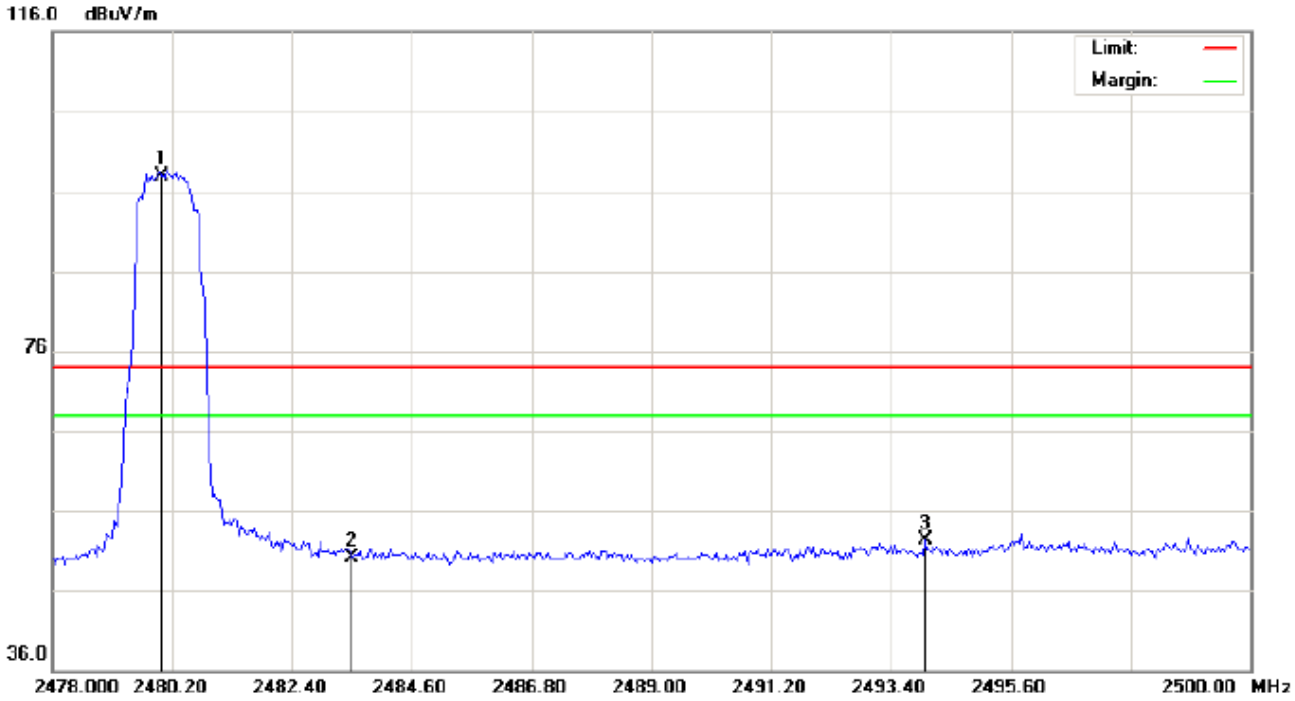
Site: site #1
Limit: FCC Class B 3M Radiation above 1GHz(PK)
EUT:Bluetooth Stereo Headphones
M/N:W293BT
Mode: Low Channel TX
Note:

Polarization: *Vertical*
Power:
Distance:

Temperature: 26
Humidity: 60 %

No.	Mk.	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		cm	degree	
1		2332.225	35.88	10.25	46.13	74.00	-27.87	peak			
2		2390.000	38.21	10.31	48.52	74.00	-25.48	peak			
3	*	2402.000	84.59	10.32	94.91	74.00	20.91	peak			

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



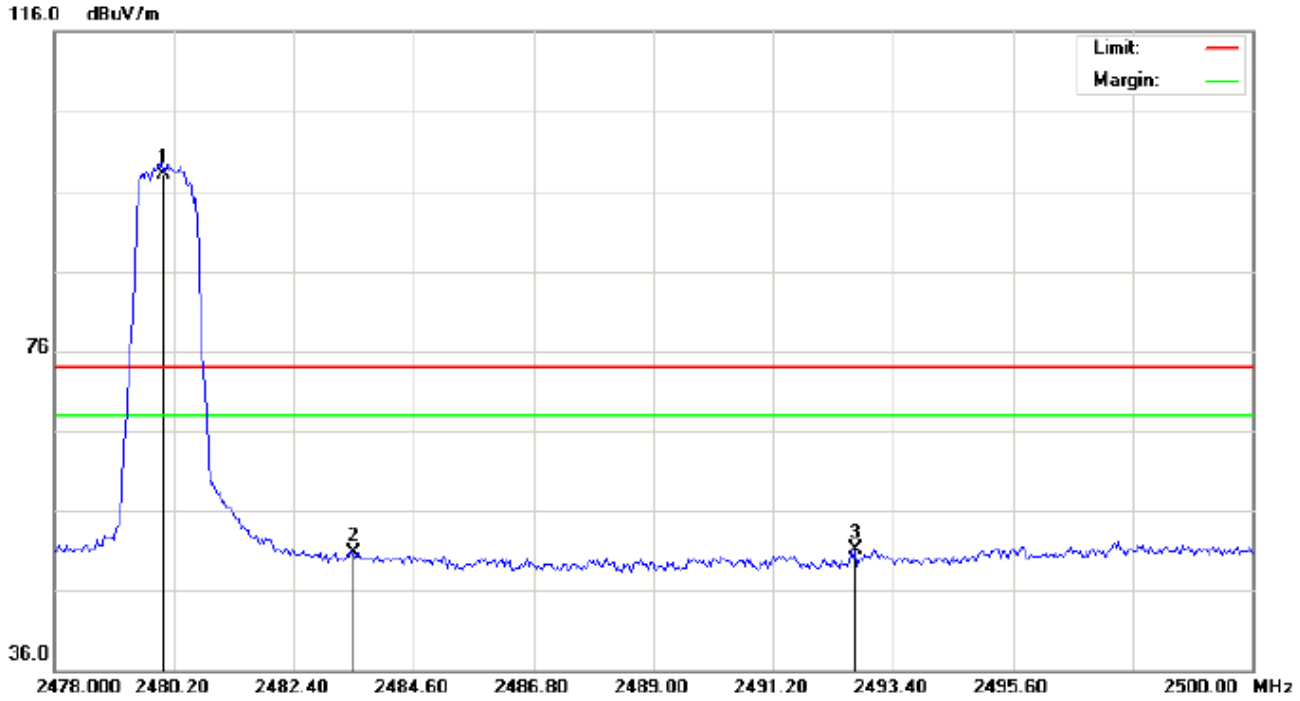
Site: site #1
Limit: FCC Class B 3M Radiation above 1GHz(PK)
EUT:Bluetooth Stereo Headphones
M/N:W293BT
Mode: High Channel TX
Note:

Polarization: *Horizontal*
Power:
Distance:

Temperature: 26
Humidity: 60 %

No.	Mk.	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		cm	degree	
1	*	2480.000	87.58	10.41	97.99	74.00	23.99	peak			
2		2483.500	39.69	10.41	50.10	74.00	-23.90	peak			
3		2494.023	41.85	10.42	52.27	74.00	-21.73	peak			

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



Site: site #1
Limit: FCC Class B 3M Radiation above 1GHz(PK)
EUT:Bluetooth Stereo Headphones
M/N:W293BT
Mode: High Channel TX
Note:

Polarization: *Vertical*
Power:
Distance:

Temperature: 26
Humidity: 60 %

No.	Mk.	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		cm	degree	
1	*	2480.000	87.72	10.41	98.13	74.00	24.13	peak			
2		2483.500	40.26	10.41	50.67	74.00	-23.33	peak			
3		2492.703	40.66	10.42	51.08	74.00	-22.92	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.

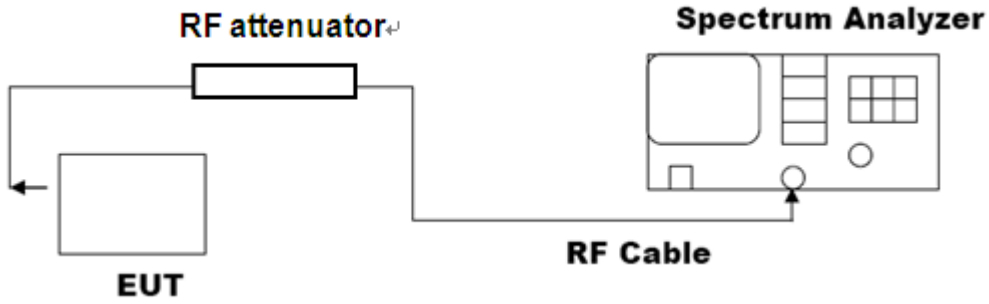
3. Hopping off and Hopping on have been tested and only worst case recorded

13. NUMBER OF HOPPING FREQUENCY

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 the spectrum analyzer Start = 2.4GHz Stop = 2.4835GHz
4. Set the Spectrum Analyzer as RBW>=1%span, VBW>=RBW.

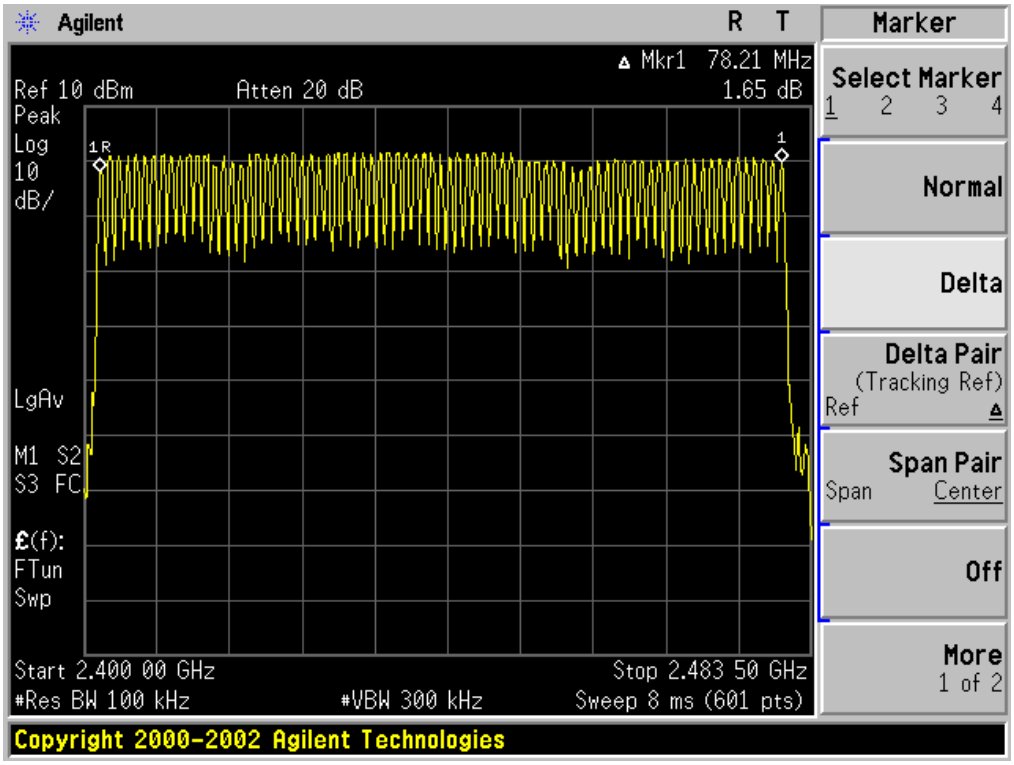
13.2. TEST SETUP (BLOCK DIAGRAM OF CONFIGURATION)



13.3. LIMITS AND MEASUREMENT RESULT

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

TEST PLOT FOR NO. OF TOTAL CHANNELS

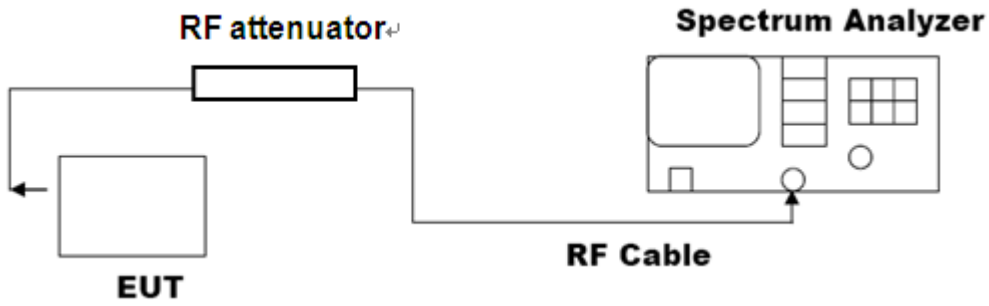


14. TIME OF OCCUPANCY (DWELL TIME)

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 = zero span, centered on a hoping channel
4. Set the spectrum analyzer as RBW=1MHz, VBW>=RBW, Span = 0 Hz

14.2. TEST SETUP (BLOCK DIAGRAM OF CONFIGURATION)



14.3. LIMITS AND MEASUREMENT RESULT

The Worst Case (3Mbps)

Channel	Time of Pulse for DH5 (ms)	Period Time (s)	Sweep Time (ms)	Limit (ms)
Low	2.898	31.6	309.12	400
Middle	2.898	31.6	309.12	400
High	2.856	31.6	304.64	400

Low Channel Time

2.898*(1600/6)/79*31.6=309.12ms

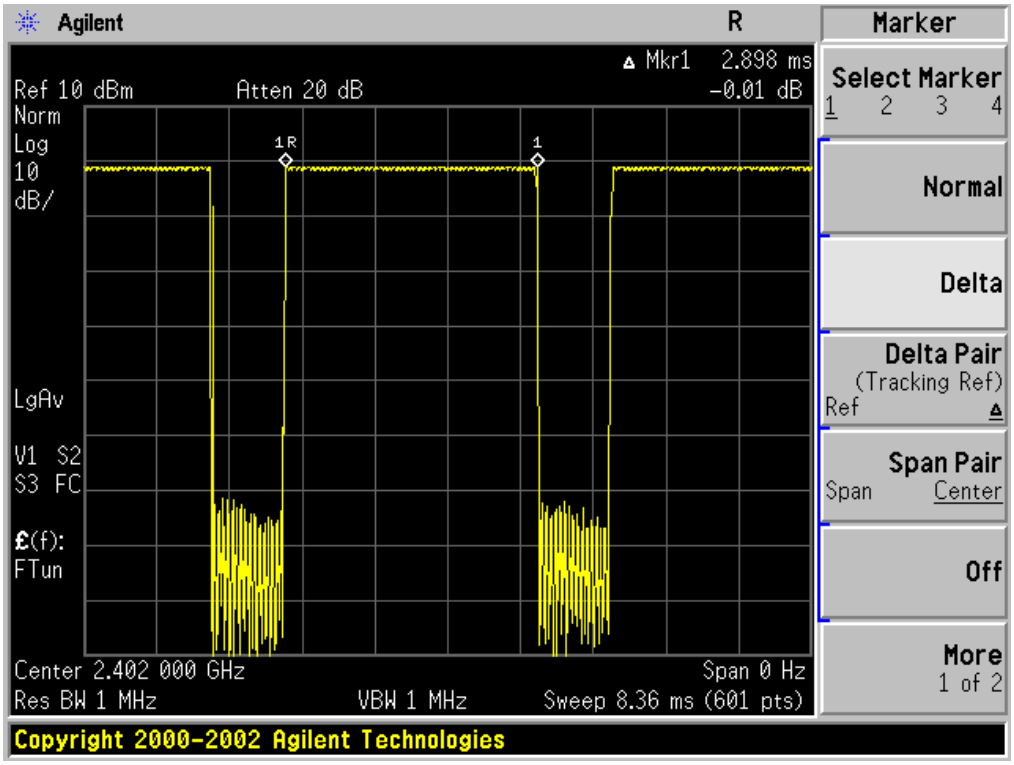
Middle Channel Time

2.898*(1600/6)/79*31.6=309.12ms

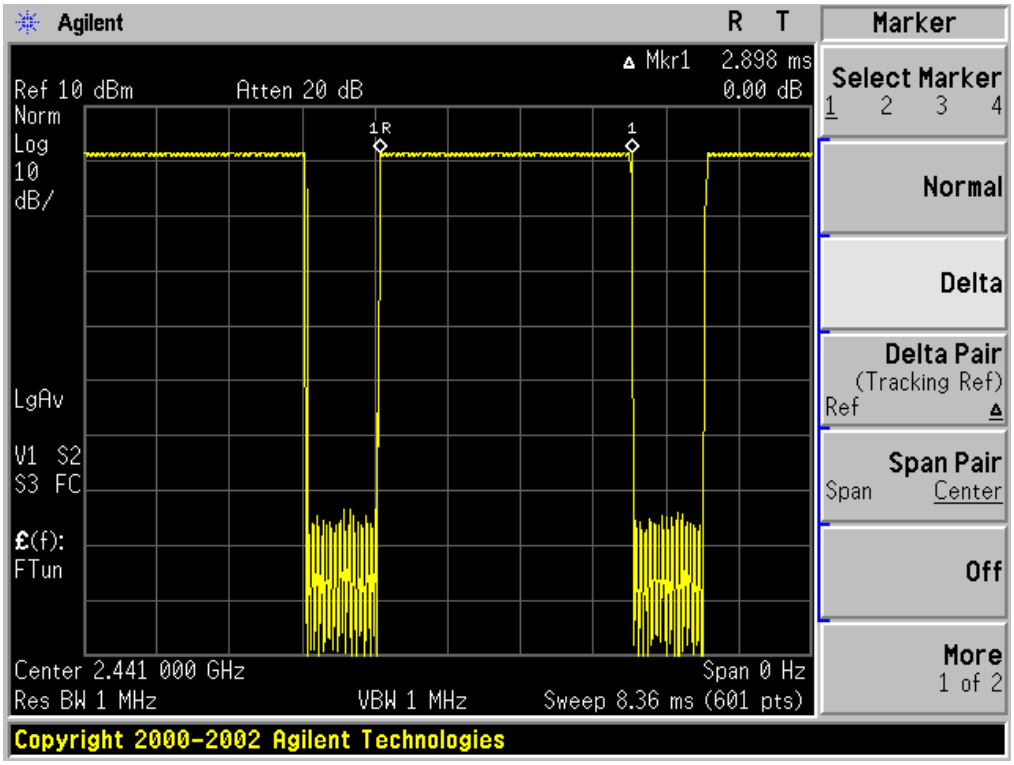
High Channel Time

2.856*(1600/6)/79*31.6=304.64ms

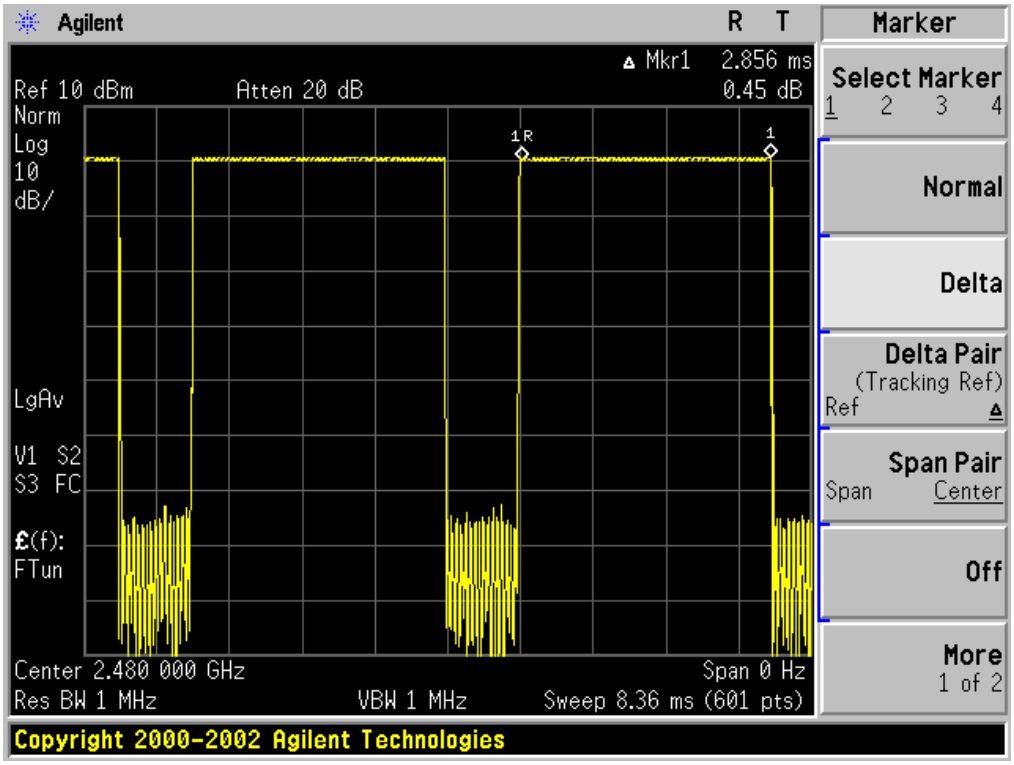
TEST PLOT OF LOW CHANNEL



TEST PLOT OF MIDDLE CHANNEL



TEST PLOT OF HIGH CHANNEL

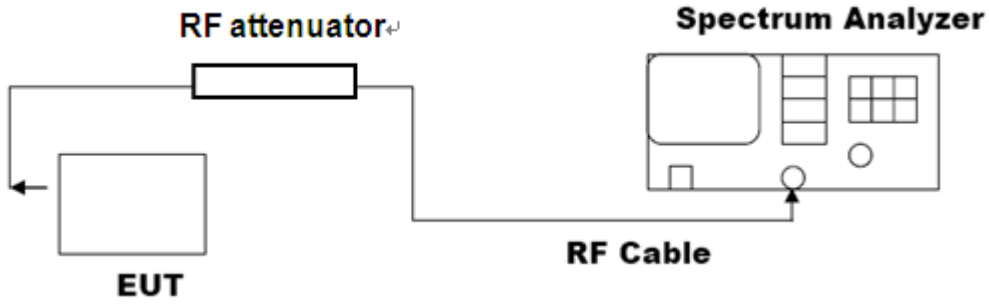


15. FREQUENCY SEPARATION

15.1. 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

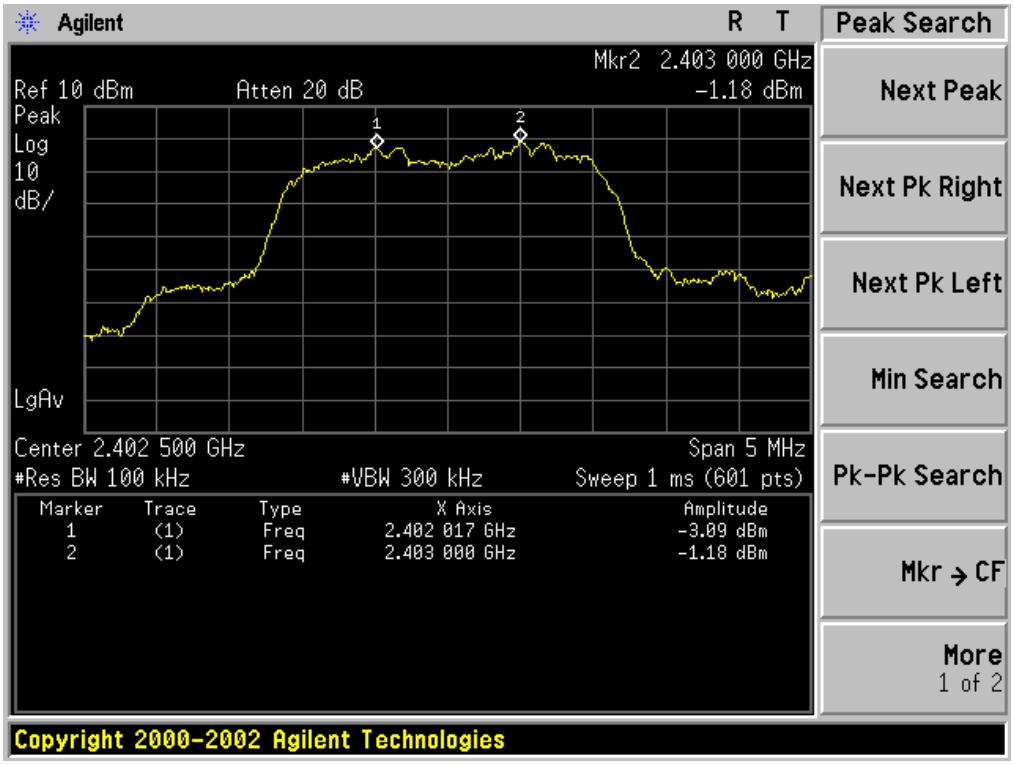
15.2. TEST SETUP (BLOCK DIAGRAM OF CONFIGURATION)



15.3. LIMITS AND MEASUREMENT RESULT

CHANNEL	CHANNEL SEPARATION	LIMIT	RESULT
	KHz	KHz	Pass
CH00-CH01	983	>=25 KHz or 2/3 20 dB BW	

TEST PLOT FOR FREQUENCY SEPARATION（3Mbps）



16. LINE CONDUCTED EMISSION TEST

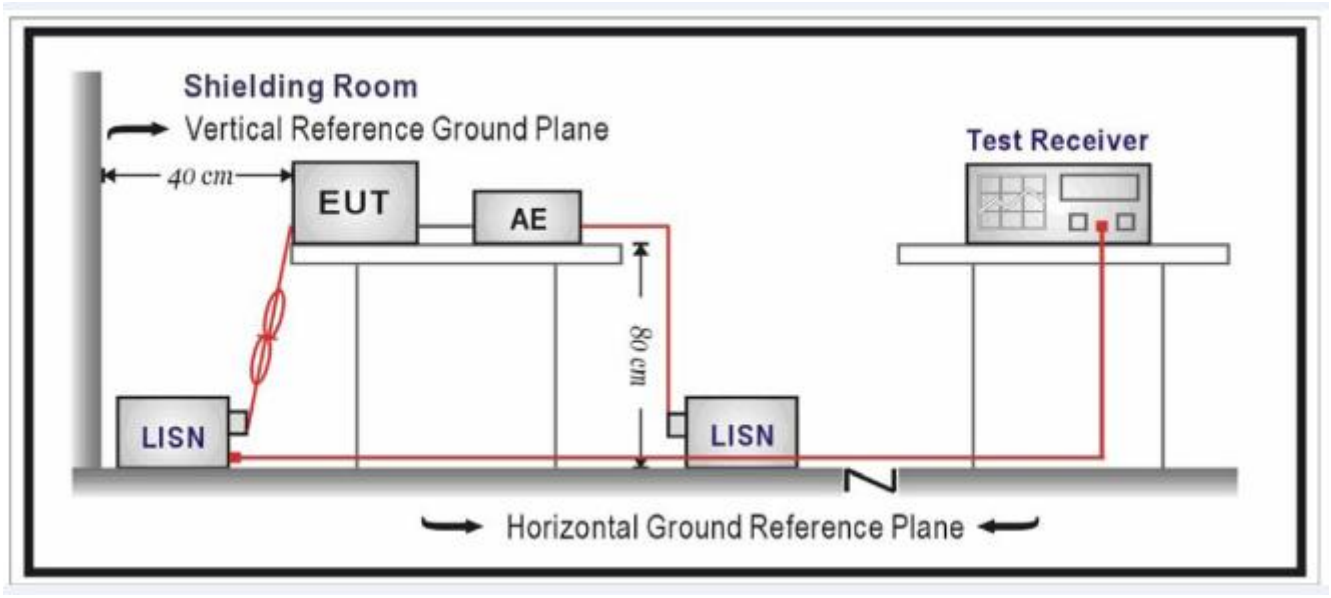
16.1. LIMITS OF LINE CONDUCTED EMISSION TEST

Frequency	Maximum RF Line Voltage	
	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.

16.2. BLOCK DIAGRAM OF LINE CONDUCTED EMISSION TEST



16.3. 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 C63.10 (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 C63.10.
3. All I/O cables were positioned to simulate typical actual usage as per ANSI C63.10.
4. All support equipments received AC120V/60Hz power from a LISN, if any.
5. The EUT received DC charging voltage by adapter 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.

16.4. 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.

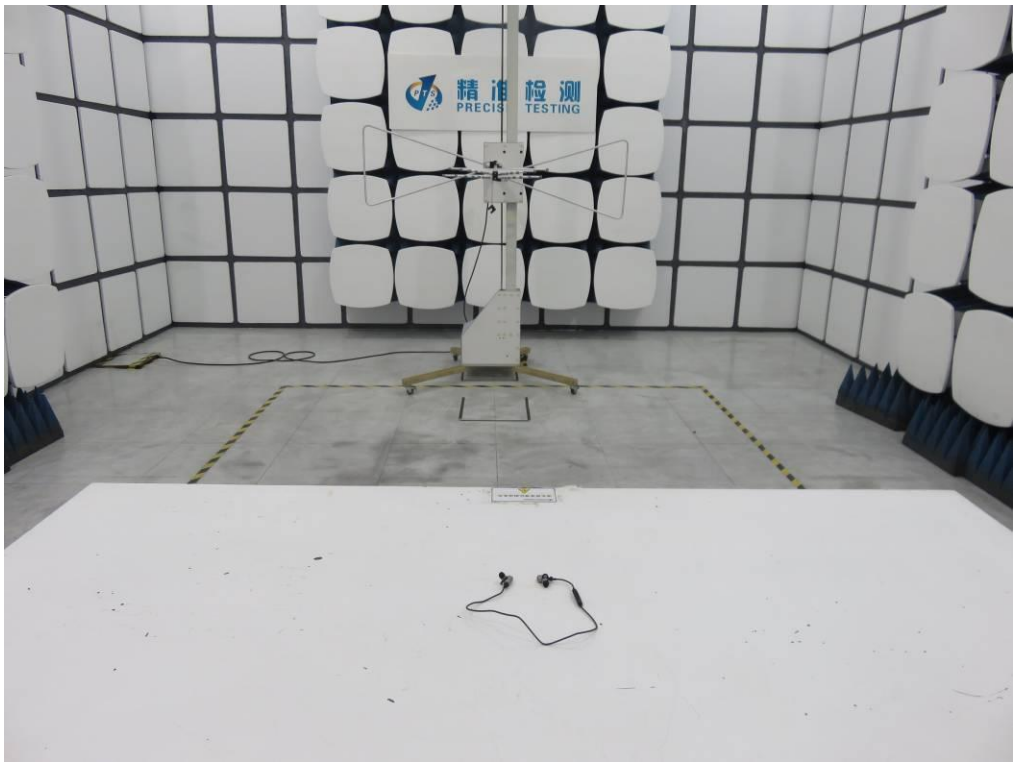
16.5. TEST RESULT OF LINE CONDUCTED EMISSION TEST

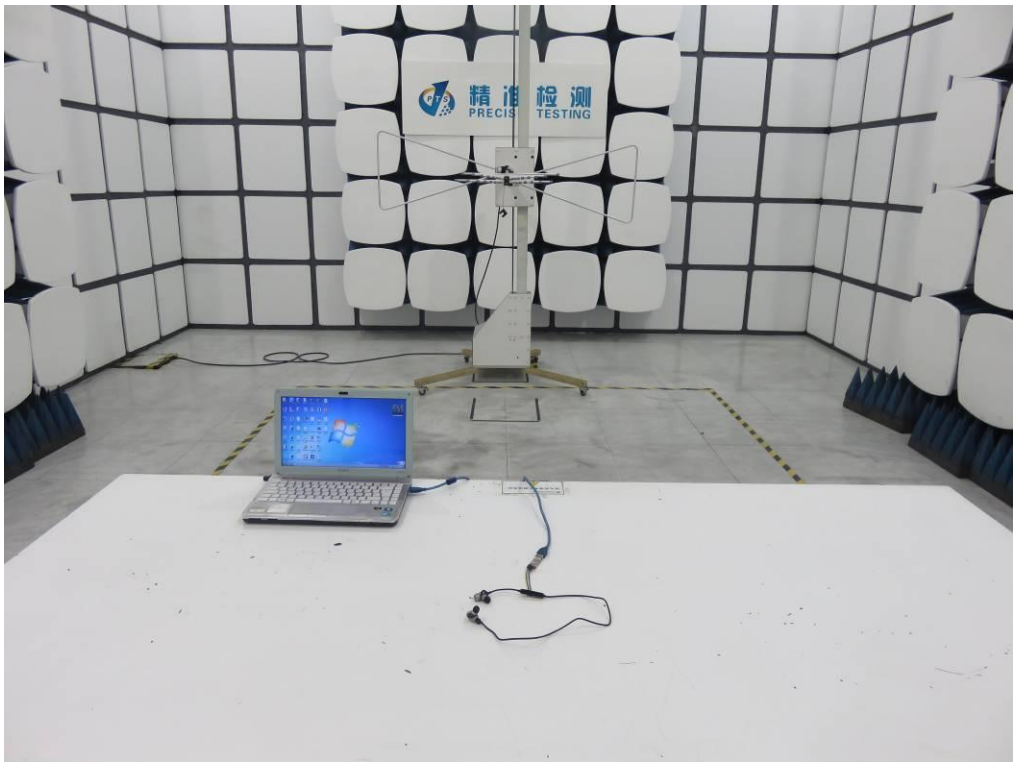
N/A

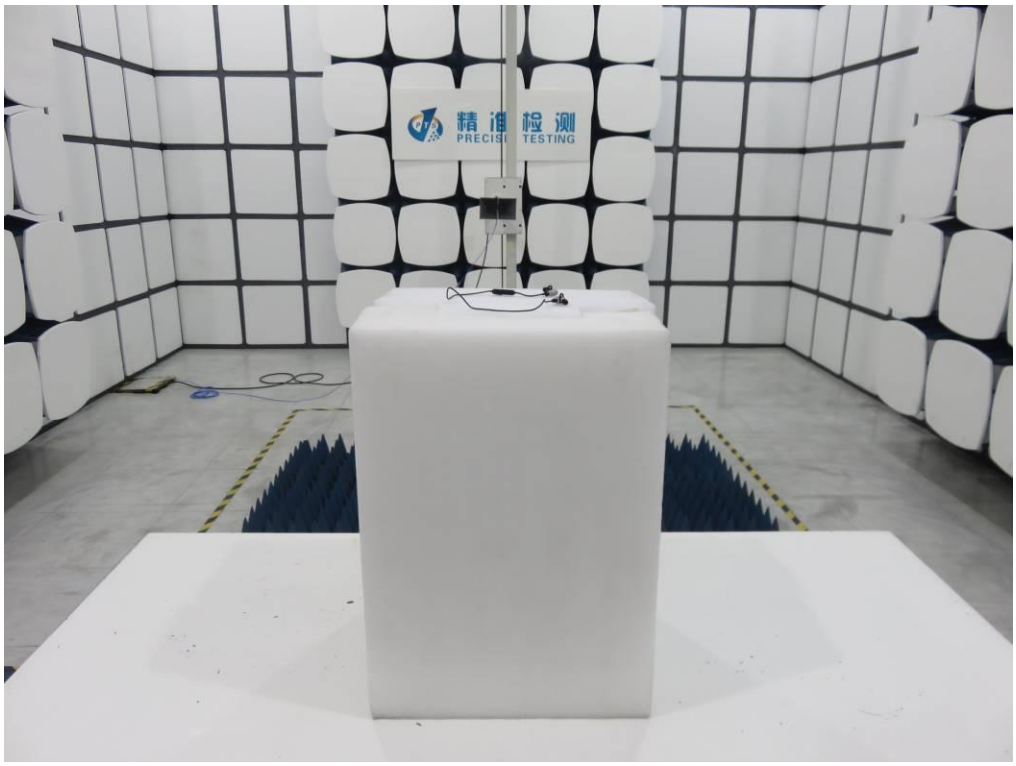
Note: The BT function of EUT didn't work when charging.

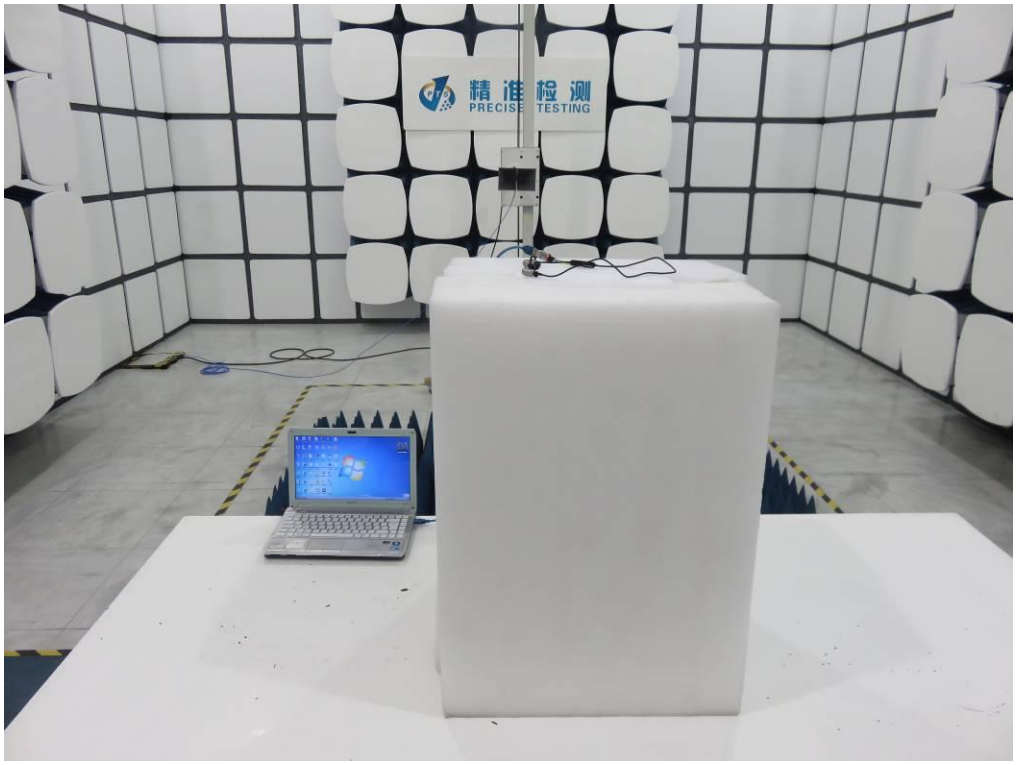
APPENDIX A: PHOTOGRAPHS OF TEST SETUP

FCC RADIATED EMISSION TEST SETUP





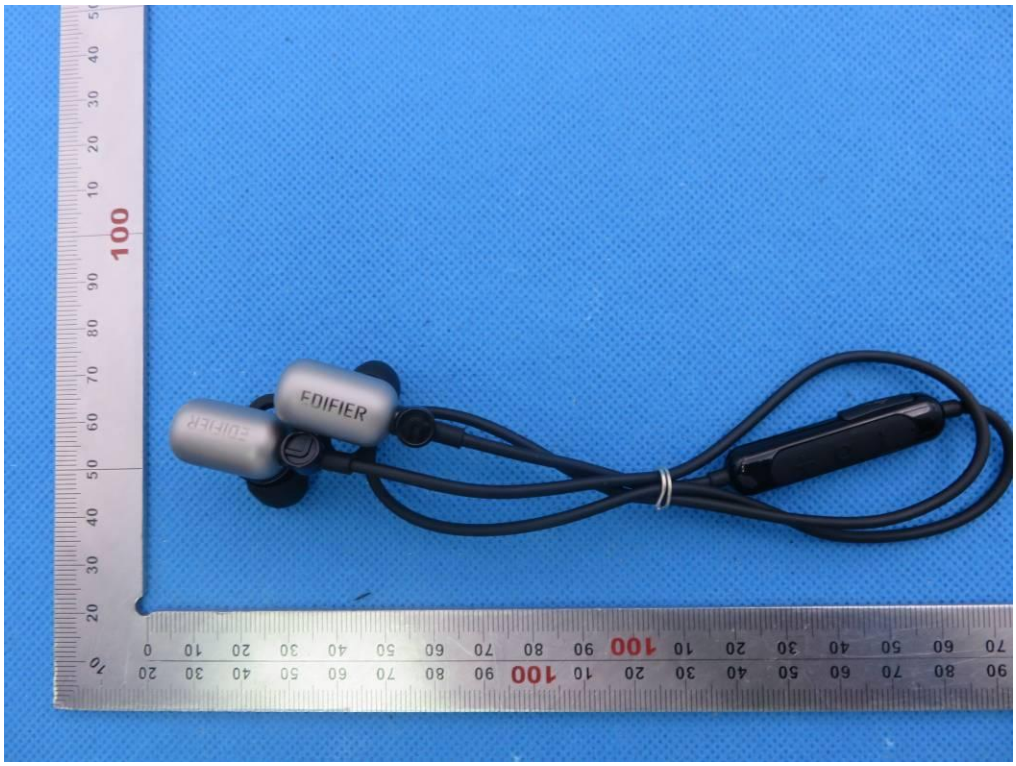




APPENDIX B: PHOTOGRAPHS OF EUT

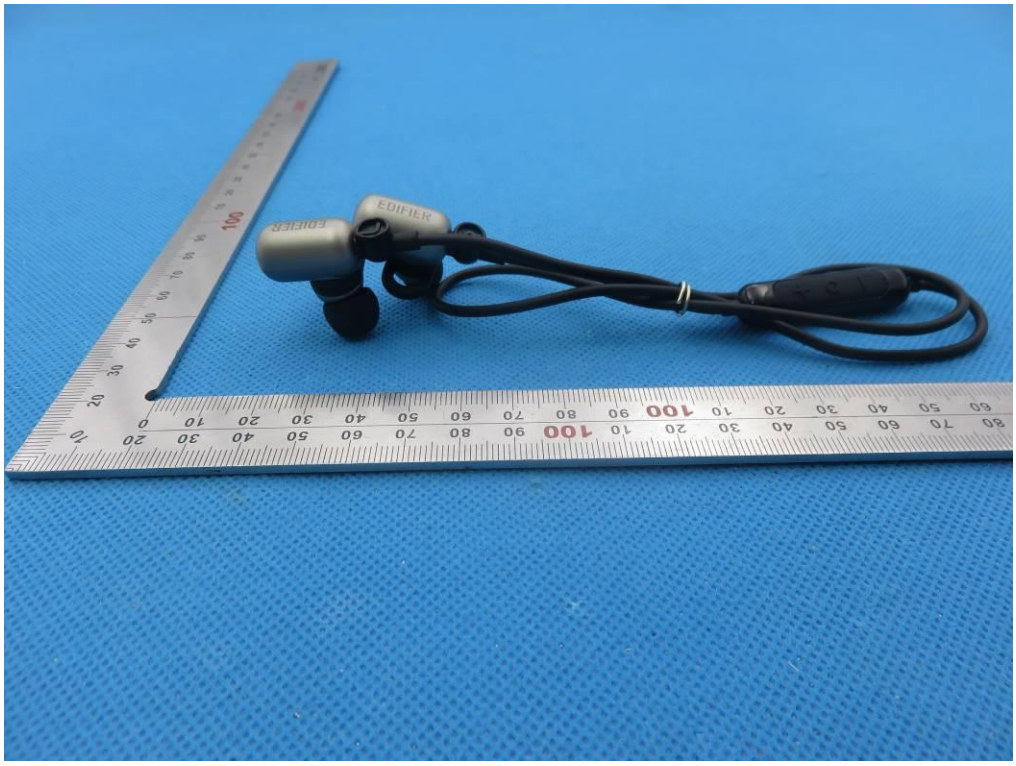
ALL VIEW OF EUT

TOP VIEW OF EUT



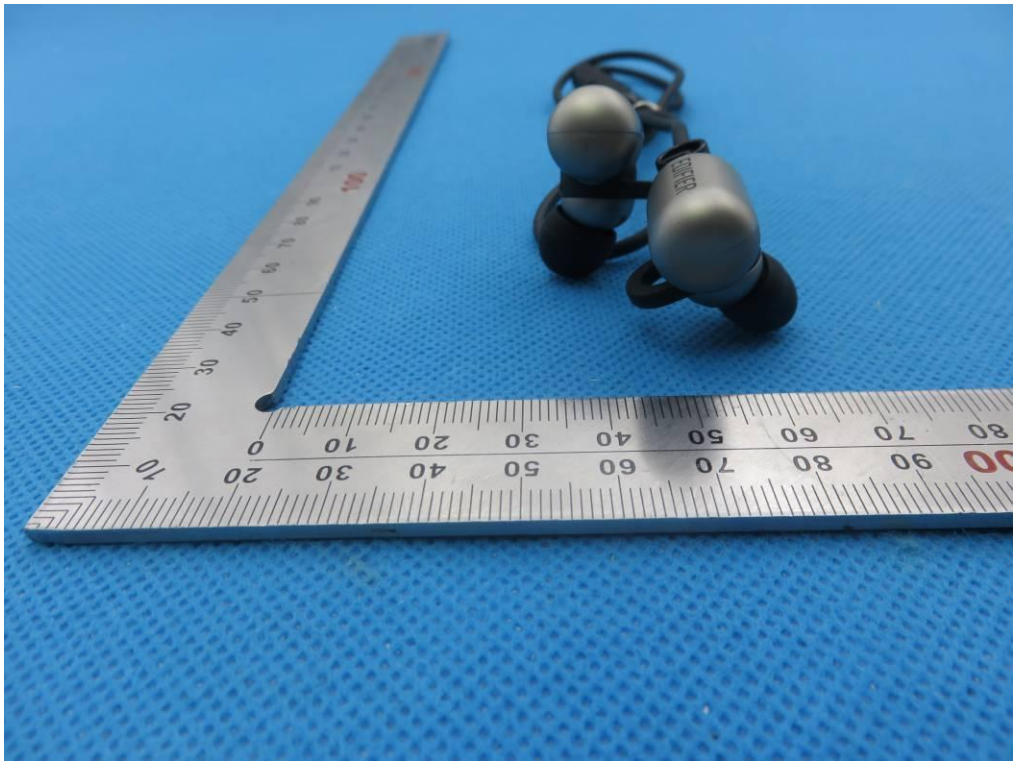
BOTTOM VIEW OF EUT

FRONT VIEW OF EUT

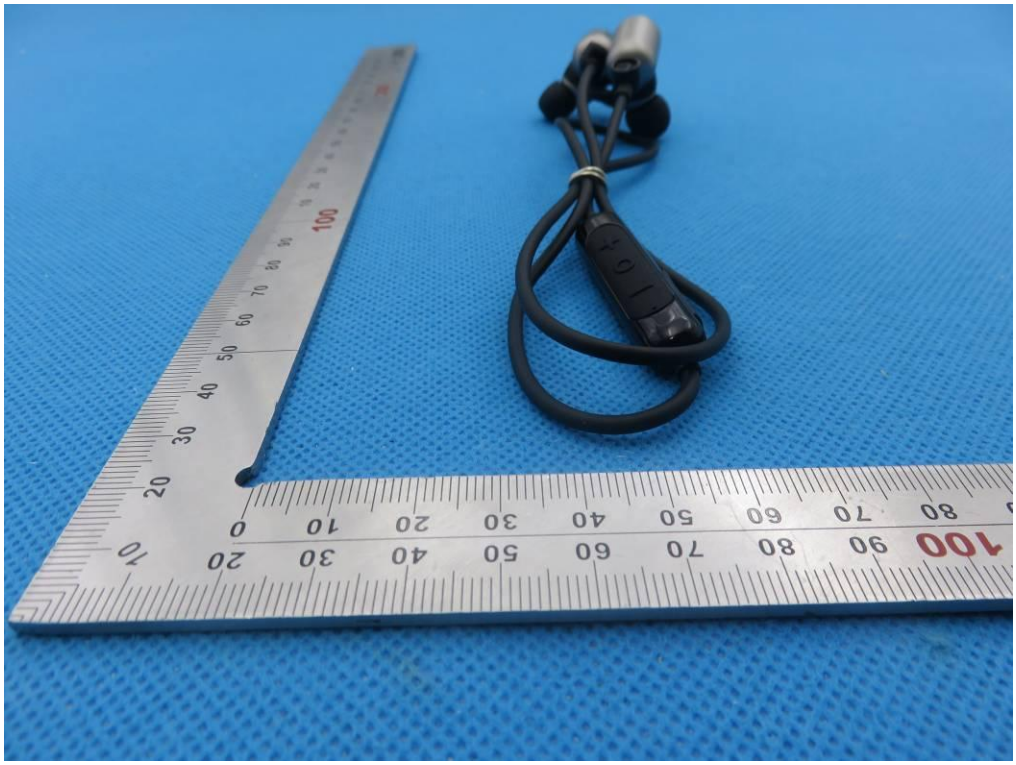


BACK VIEW OF EUT

LEFT VIEW OF EUT



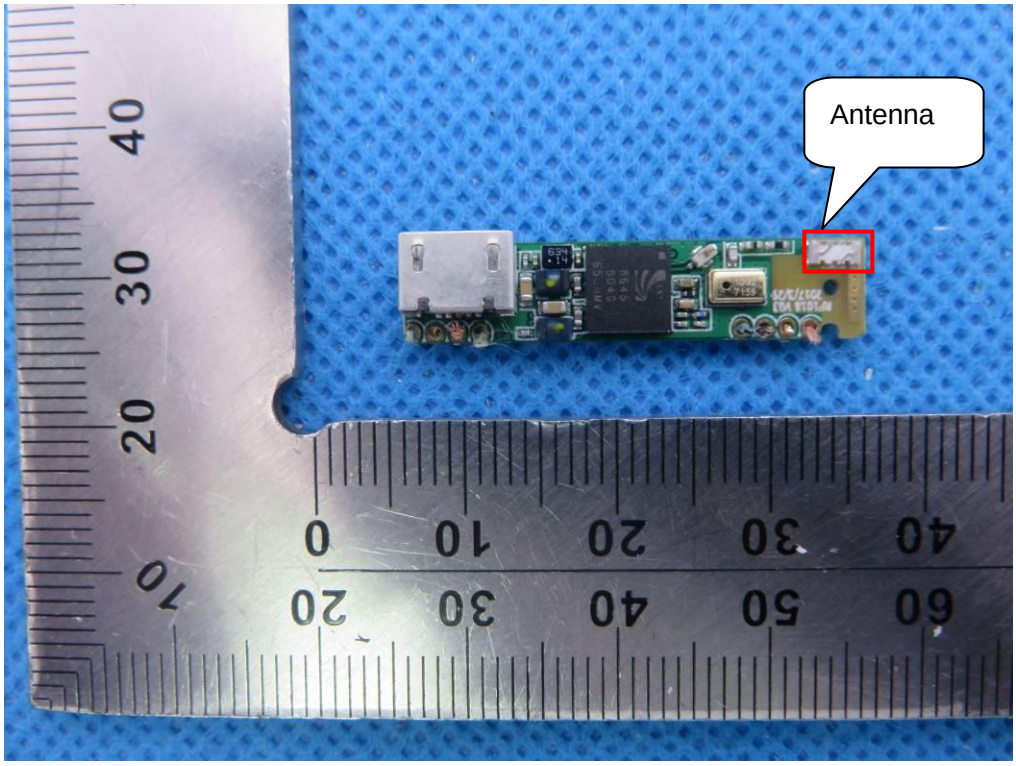
RIGHT VIEW OF EUT



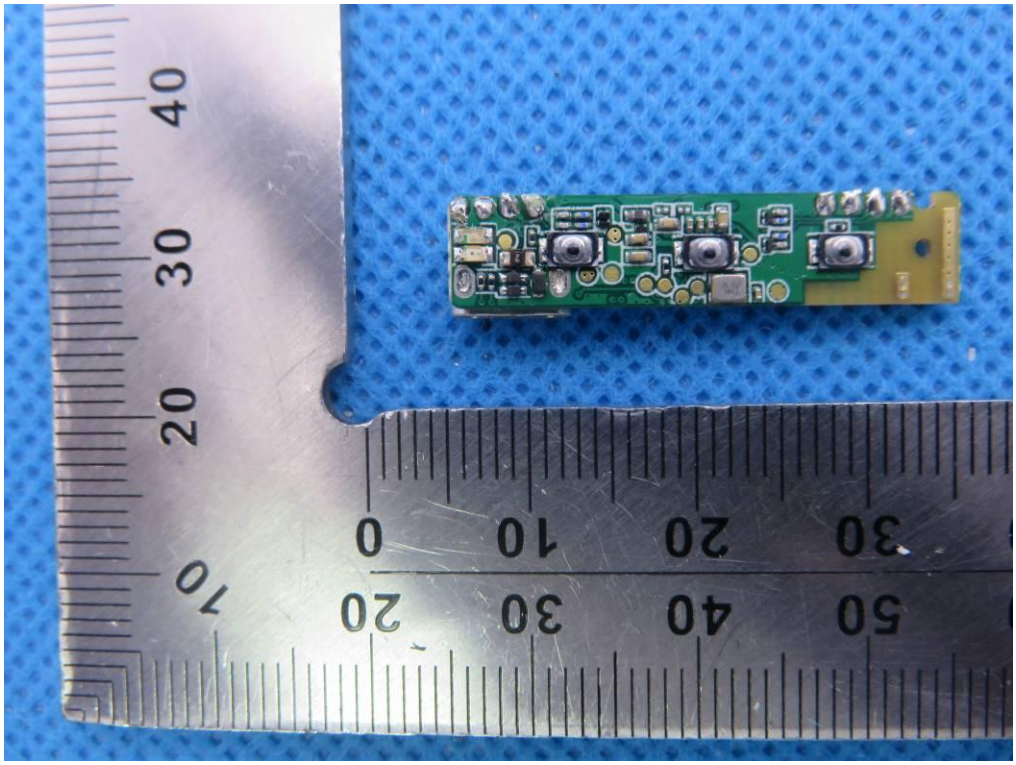
VIEW OF EUT (PORT)

VIEW OF EUT (OPEN)

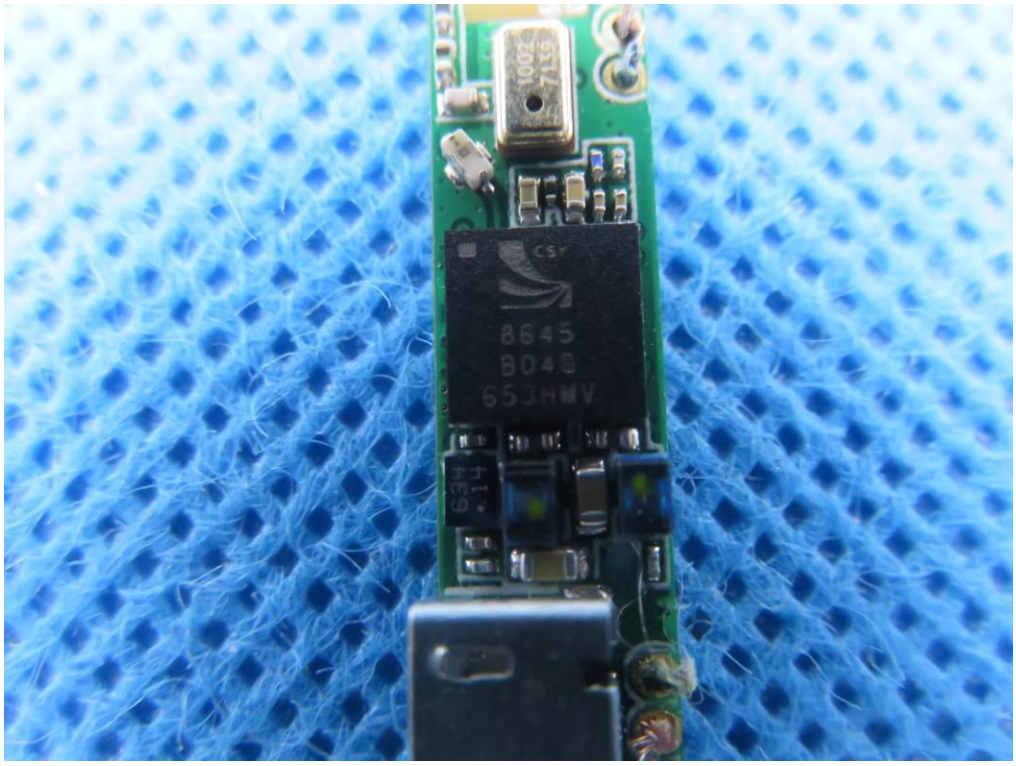
INTERNAL VIEW OF EUT-1



INTERNAL VIEW OF EUT-2



INTERNAL VIEW OF EUT-3



----END OF REPORT----