
FCC Test Report

Report No.: AGC019110202F2

FCC ID : ZD2SB-1
PRODUCT DESIGNATION : Bluetooth speaker
BRAND NAME : SOUNDPIPE
TEST MODEL : SB-1
CLIENT : SKA System Corporation
DATE OF ISSUE : Mar.24, 2011
STANDARD(S) : FCC Part 15 Rules

Attestation of Global Compliance Co., Ltd.

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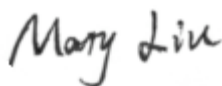
VERIFICATION OF COMPLIANCE

Applicant	SKA Systems Corporation
	1525 W. Orange Grove Ave. Unit A, Orange, CA 92868 USA
Manufacturer	Shenzhen Forcelink Electronic Co., Ltd.
	6F, Building B, Runchang Industrial Area, Xuexiang, Zhonghao Road, Bantian, Buji, Shenzhen, Guangdong, China
Product Designation	Bluetooth speaker
Brand Name	SOUNDPIPE
Model Name	SB-1
FCC ID	ZD2SB-1
Report Number	AGC019110202F2
Date of Test	Mar.18, 2011 to Mar.24, 2011

WE HEREBY CERTIFY THAT:

The above equipment was tested by Attestation of Global Compliance 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.

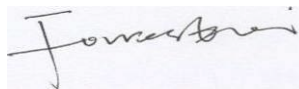
Checked By:



Mary Liu

Mar.24, 2011

Authorized By



Forrest Lei

Mar.24, 2011

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1 GENERAL INFORMATION

1.1 PRODUCT DESCRIPTION

The EUT is a **Bluetooth speaker** designed as an “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
Rated Output Power	Bluetooth (1Mbps) -5.0dBm Bluetooth EDR (2Mbps) -4.85dBm Bluetooth EDR(3Mbps) -4.76 dBm
Modulation	GFSK, $\pi/4$ -DQPSK, 8-DPSK
Number of channels	79
Antenna Designation	Integrated Antenna
Antenna Gain	1.02dBi
Power Supply	DC6V by Battery or DC12V by Adapter
Adapter Input	AC100-240V, 50-60Hz
Adapter Output	DC12V, 1300mA (Max)

1.2 TABLE OF CARRIER FREQUENCIES

Frequency Band	Channel Number	Frequency
2400~2483.5MHZ	0	2402MHZ
	1	2403MHZ
	:	:
	38	2440 MHZ
	39	2441 MHZ
	40	2442 MHZ
	:	:
	77	2479 MHZ
	78	2480 MHZ

1.3 RECEIVER INPUT BANDWIDTH

The input bandwidth of the receiver is 1MHZ, 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 multislots 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.

1.4 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

1.5 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 synchronisation 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 cases 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 the

Sequence. This will be done at the beginning of every new transmission.

Regarding short transmissions the Bluetooth system has the following behaviour:

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.

1.6 RELATED SUBMITTAL(S) / GRANT (S)

This submittal(s) (test report) is intended for **FCC ID: ZD2SB-1** filing to comply with Section 15.247 of the FCC Part 15, Subpart C Rules.

1.7 TEST METHODOLOGY

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

1.8 TEST FACILITY

All measurement facilities used to collect the measurement data are located at
Attestation of Global Compliance Co., Ltd.

1F., No.2 Building, Huafeng No.1 Technical Industrial Park, Sanwei, Xixiang, Baoan District, Shenzhen

The test site is constructed and calibrated to meet the FCC requirements in documents ANSI C63.4: 2003.

FCC register No.: 259865

1.9 SPECIAL ACCESSORIES

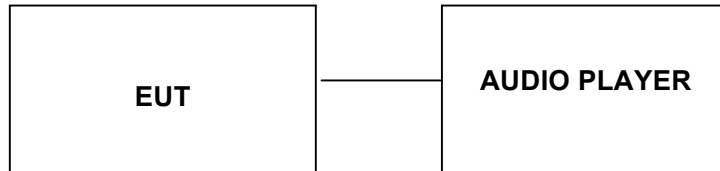
Not available for this EUT intended for grant.

1.10 EQUIPMENT MODIFICATIONS

Not available for this EUT intended for grant.

2 SYSTEM TEST CONFIGURATION

2.1 CONFIGURATION OF TESTED SYSTEM



2.2 EQUIPMENT USED IN TESTED SYSTEM

Item	Equipment	Mfr/Brand	Model/Type No.	FCC ID
1	Bluetooth speaker	SOUNDPIPE	SB-1	ZD2SB-1

3 SUMMARY OF TEST RESULTS

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

4 DESCRIPTION OF TEST MODES

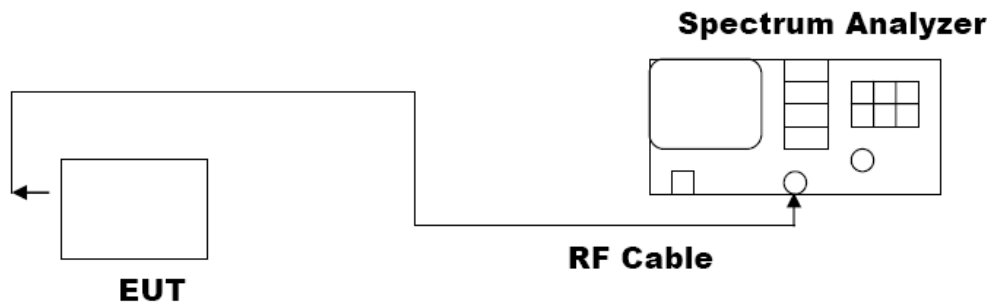
1. The EUT has been set to operate continuously on the lowest, middle and highest operation frequency individually.
2. The EUT stays in continuous transmitting mode on the operation frequency being set.
3. The EUT stays in hopping mode.

5 MAXIMUM OUTPUT POWER

5.1 MEASUREMENT PROCEDURE

1. The EUT was placed on a turn table which is 0.8m above ground plane.
2. Connect EUT RF output port to the Spectrum Analyzer through an RF attenuator
3. Set the EUT Work on the top, the middle and the bottom operation frequency individually.
4. Set SPA Centre Frequency = Operation Frequency, RBW= 3 MHz, VBW= 3 MHz.
5. Set SPA Trace 1 Max hold, then View.

5.2 TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)



5.3 MEASUREMENT EQUIPMENT USED

Description	Manufacturer	Model	SERIAL NUMBER	Cal. Date	Cal. Due
Spectrum Analyzer	Agilent	E4440A	N/A	06/29/2010	06/28/2011
Amplifier	EM	EM30180	0607030	06/29/2010	06/28/2011
Horn Antenna	EM	EM-AH-10180	N/A	06/29/2010	06/28/2011
EMI Test Receiver	Rohde & Schwarz	ESCI	N/A	06/29/2010	06/28/2011
Amplifier	EM	EM30180	N/A	06/29/2010	06/28/2011
Biological Antenna	A.H. Systems Inc.	SAS-521-4	N/A	06/29/2010	06/28/2011
Loop Antenna	Daze	ZN30900N	SEL0097	06/29/2010	06/28/2011
Isolation Transformer	LETEAC	LTBK	--	06/29/2010	06/28/2011

5.4 LIMITS AND MEASUREMENT RESULT

BLUETOOTH 1MBPS LIMITS AND MEASUREMENT RESULT			
Frequency (GHz)	Result (dBm)	Applicable Limits (dBm)	Pass or Fail
2.402	-4.97	30	Pass
2.441	-5.07	30	Pass
2.480	-4.88	30	Pass

BLUETOOTH 2MBPS LIMITS AND MEASUREMENT RESULT			
Frequency (GHz)	Result (dBm)	Applicable Limits (dBm)	Pass or Fail
2.402	-4.75	30	Pass
2.441	-4.79	30	Pass
2.480	-4.86	30	Pass

BLUETOOTH 3MBPS LIMITS AND MEASUREMENT RESULT			
Frequency (GHz)	Result (dBm)	Applicable Limits (dBm)	Pass or Fail
2.402	-4.80	30	Pass
2.441	-4.76	30	Pass
2.480	-4.62	30	Pass

6 20 DB BANDWIDTH

6.1 MEASUREMENT PROCEDURE

1. The EUT was placed on a turn table which is 0.8m above ground plane.
2. Connect EUT RF output port to the Spectrum Analyzer through an RF attenuator
3. Set the EUT Work on the top, the middle and the bottom operation frequency individually.
3. Set SPA Centre Frequency = Operation Frequency, RBW= 100 KHz, VBW= 100 KHz.
4. Set SPA Trace 1 Max hold, then View.

6.2 TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)

The Same as described in Section 5.2

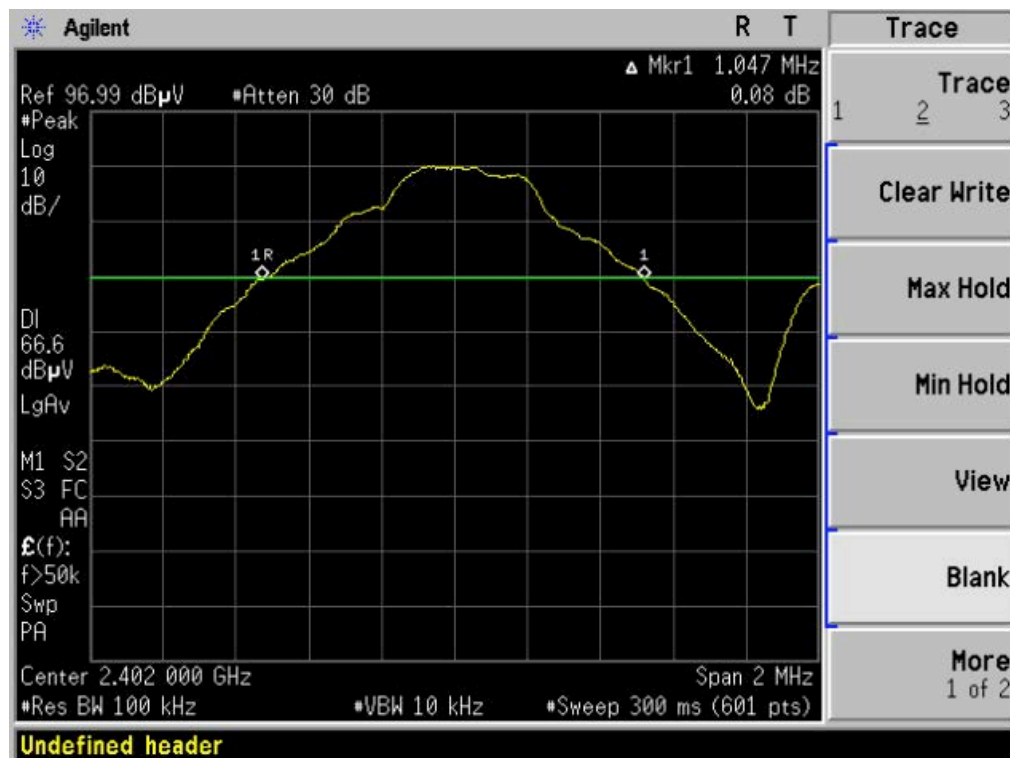
6.3 MEASUREMENT EQUIPMENT USED

The same as described in Section 5.3

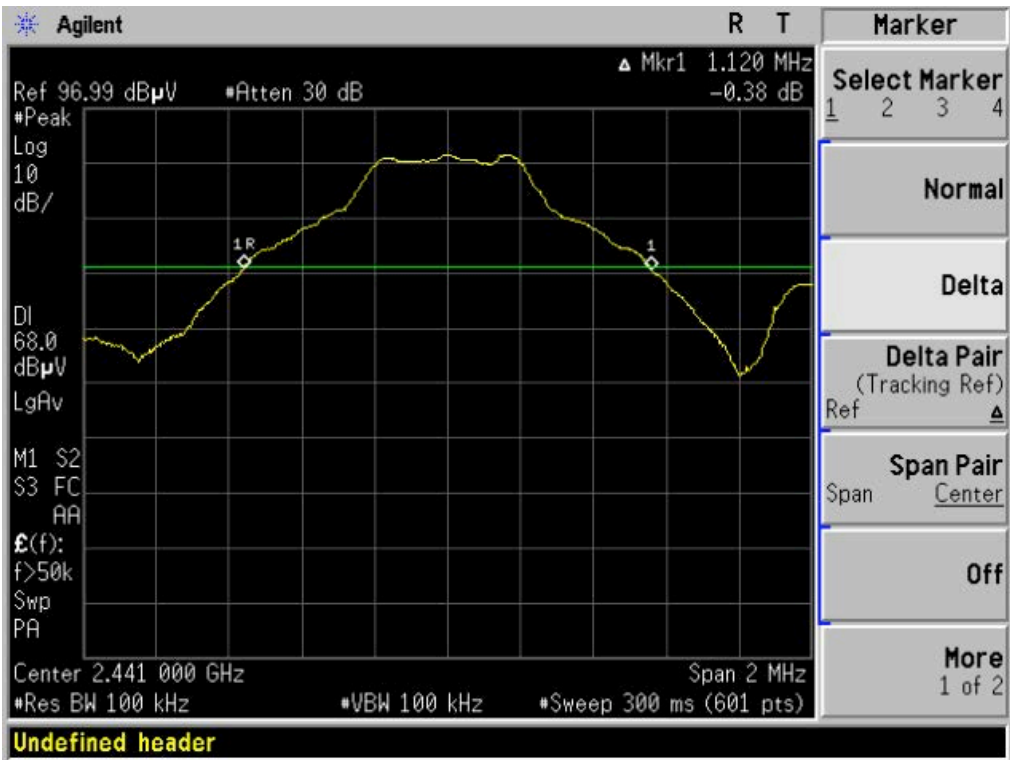
6.4 LIMITS AND MEASUREMENT RESULTS

BLUETOOTH 1MBPS LIMITS AND MEASUREMENT RESULT			
Applicable Limits	Measurement Result		
	Test Data (MHz)		Criteria
--	Low Channel	1.047	PASS
	Middle Channel	1.120	PASS
	High Channel	1.103	PASS

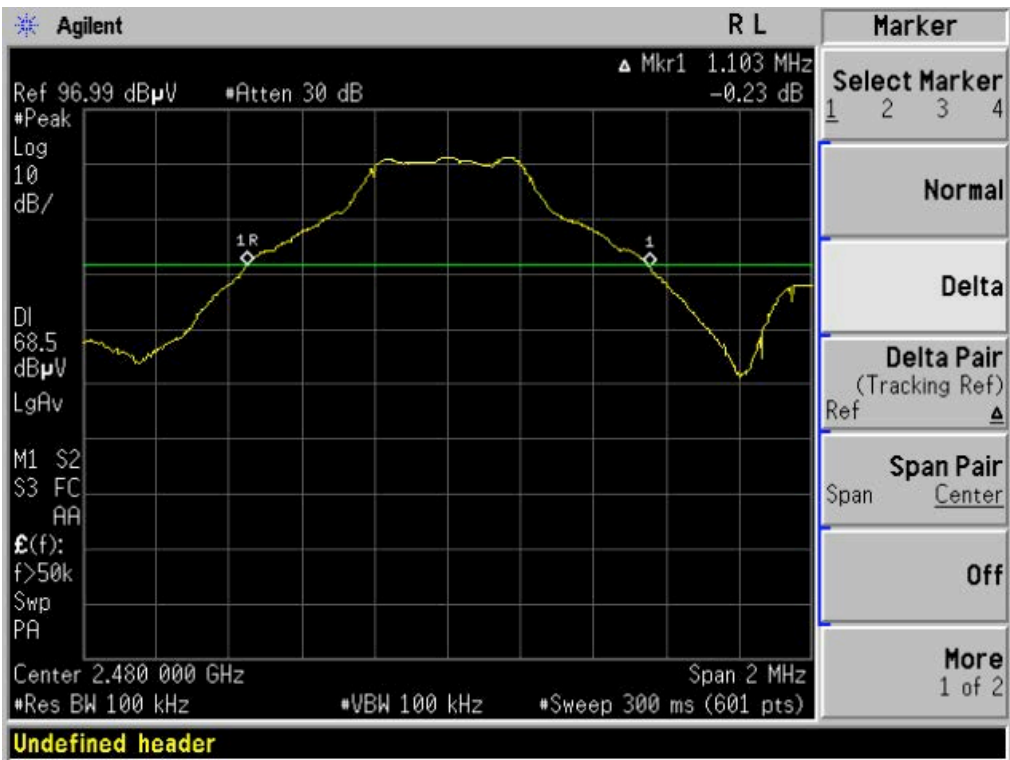
TEST PLOT OF BANDWIDTH FOR LOW CHANNEL



TEST PLOT OF BANDWIDTH FOR MIDDLE CHANNEL

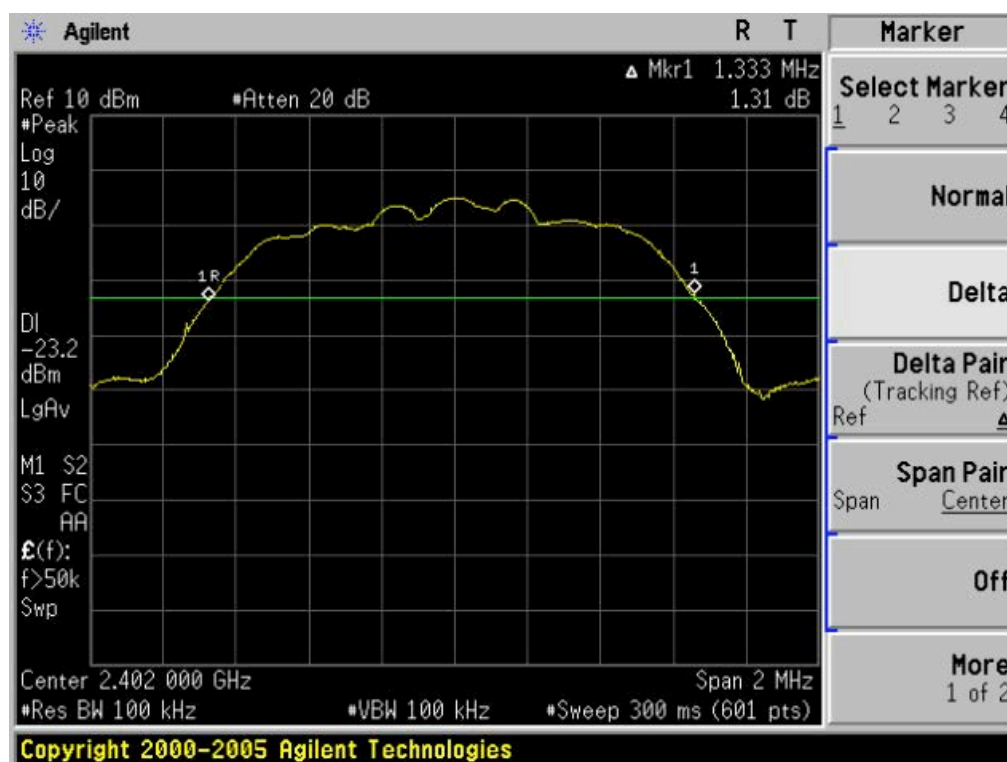


TEST PLOT OF BANDWIDTH FOR HIGH CHANNEL

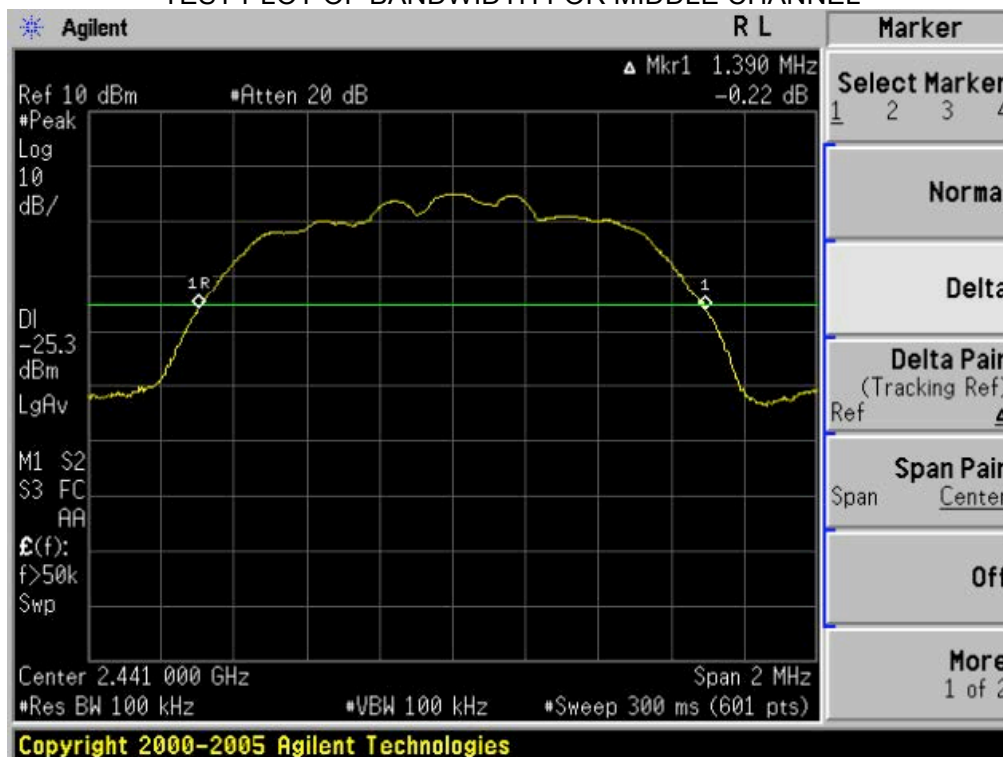


BLUETOOTH 2MBPS LIMITS AND MEASUREMENT RESULT			
Applicable Limits	Measurement Result		
	Test Data (MHz)		Criteria
--	Low Channel	1.333	PASS
	Middle Channel	1.390	PASS
	High Channel	1.383	PASS

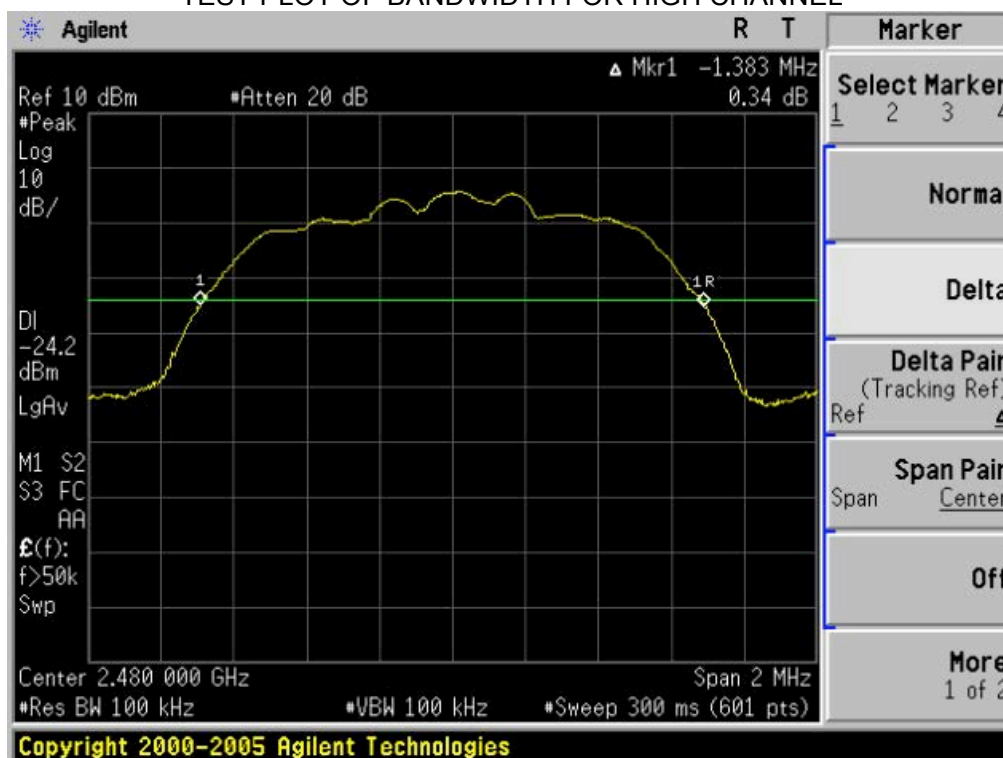
TEST PLOT OF BANDWIDTH FOR LOW CHANNEL



TEST PLOT OF BANDWIDTH FOR MIDDLE CHANNEL

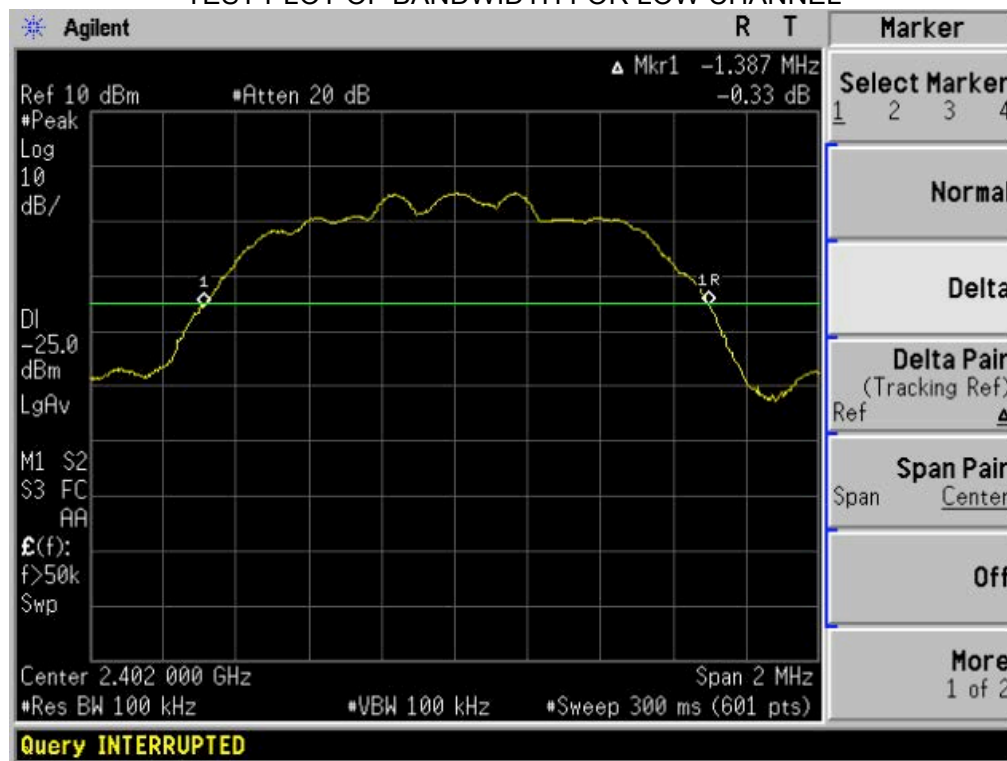


TEST PLOT OF BANDWIDTH FOR HIGH CHANNEL

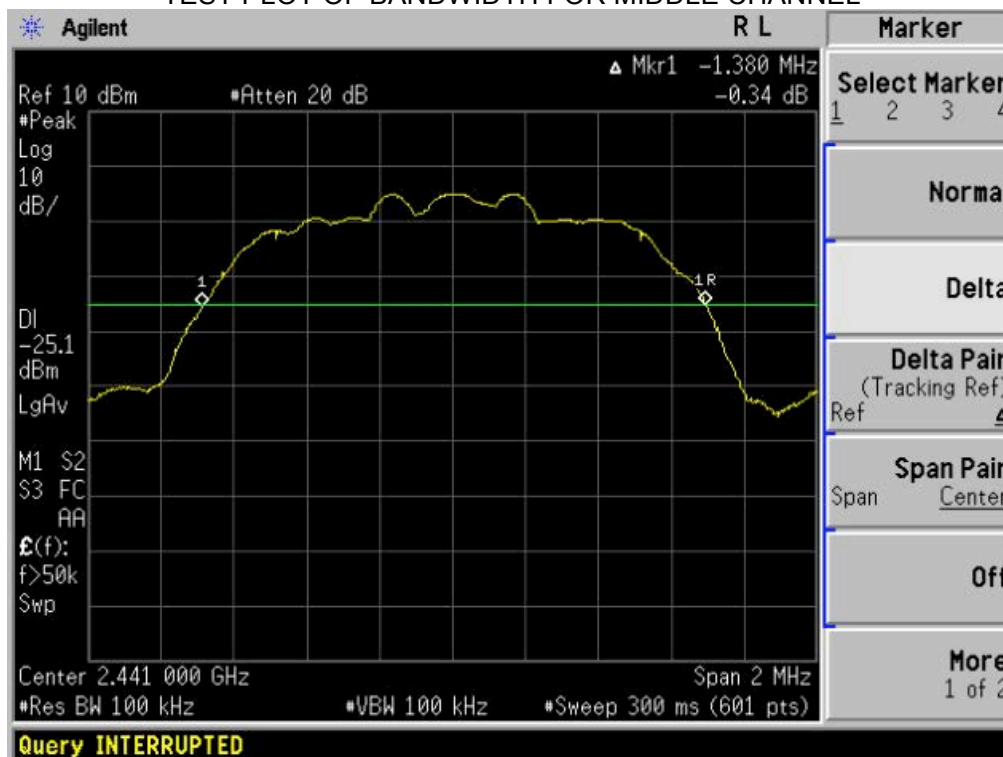


BLUETOOTH 3MBPS LIMITS AND MEASUREMENT RESULT			
Applicable Limits	Measurement Result		
	Test Data (MHz)		Criteria
--	Low Channel	1.387	PASS
	Middle Channel	1.380	PASS
	High Channel	1.383	PASS

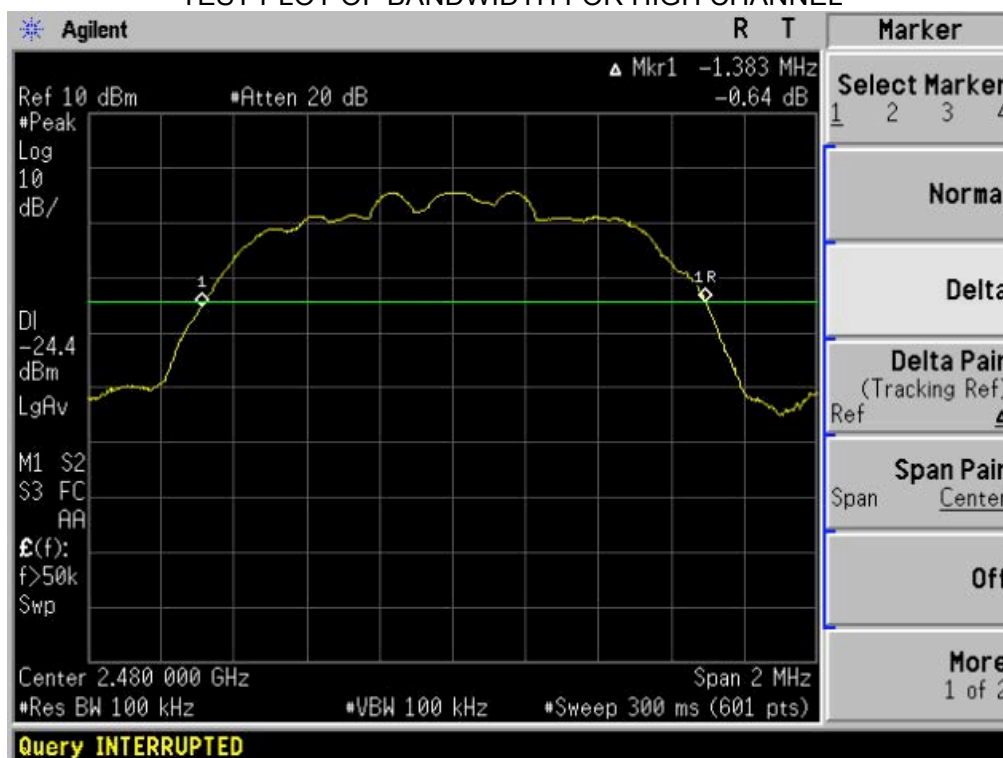
TEST PLOT OF BANDWIDTH FOR LOW CHANNEL



TEST PLOT OF BANDWIDTH FOR MIDDLE CHANNEL



TEST PLOT OF BANDWIDTH FOR HIGH CHANNEL

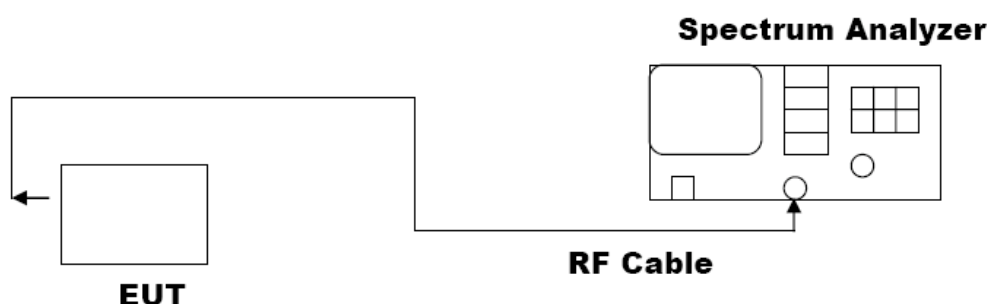


7. MAXIMUM CONDUCTED OUTPUT POWER SPECTRAL DENSITY (N/A)

7.1 MEASUREMENT PROCEDURE

- (1). The EUT was placed on a turn table which is 0.8m above ground plane.
- (2). Connect EUT RF output port to the Spectrum Analyzer through an RF attenuator
- (3). Set the EUT Work on the top, the middle and the bottom operation frequency individually.
- (4). Set SPA Centre Frequency = Operation Frequency, RBW= 3 KHz,
VBW= 10 KHz., Sweep time= Auto
- (5). Set SPA Trace 1 Max hold, then View.

7.2 TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)



7.3 MEASUREMENT EQUIPMENT USED

SHIELDING ROOM					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Spectrum Analyzer	Agilent	E4440A	N/A	06/29/2010	06/28/2011

7.4 LIMITS AND MEASUREMENT RESULT

LIMITS AND MEASUREMENT RESULT			
Applicable Limits	Measurement Result		
	Test Data (dBm/3KHz)		Criteria
8 dBm / 3KHz	Low Channel	--	--
	Middle Channel	--	--
	High Channel	--	--

8. CONDUCTED SPURIOUS EMISSION

8.1 MEASUREMENT PROCEDURE

1. The EUT was placed on a turn table which is 0.8m above ground plane.
2. Connect EUT RF output port to the Spectrum Analyzer through an RF attenuator
3. Set the EUT Work on the top, the middle and the bottom operation frequency individually.
3. Set SPA Centre Frequency = Operation Frequency, RBW= 100 KHz, VBW= 100 KHz.
4. Set SPA Trace 1 Max hold, then View.

8.2 TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)

The Same as described in section 5.2

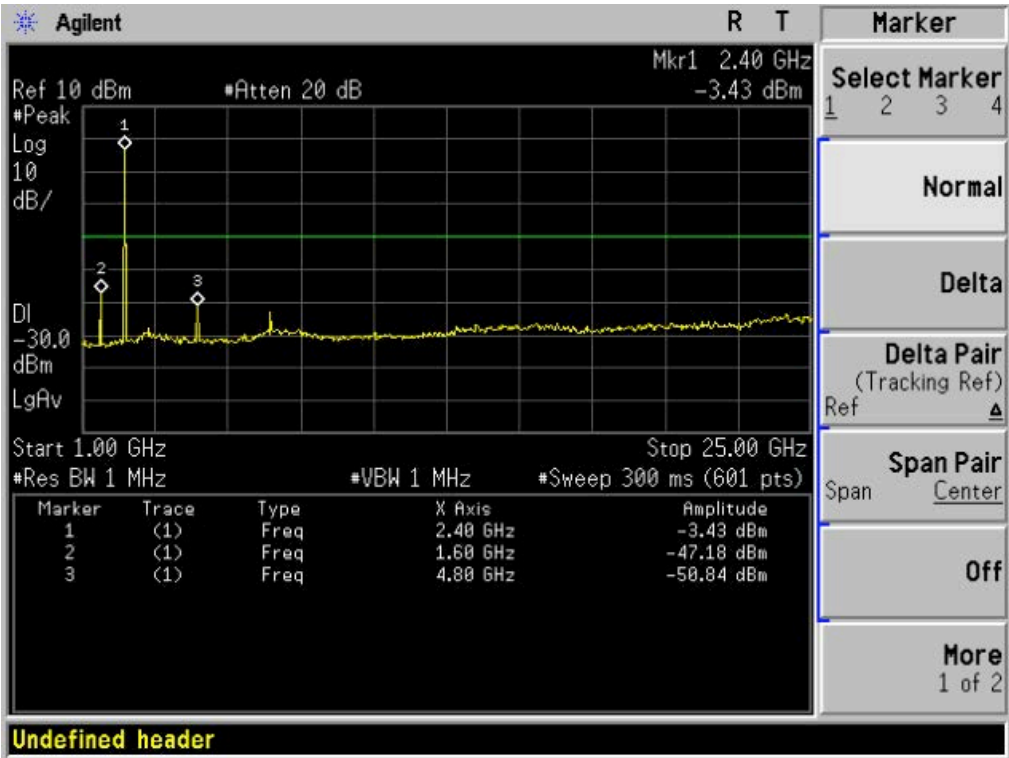
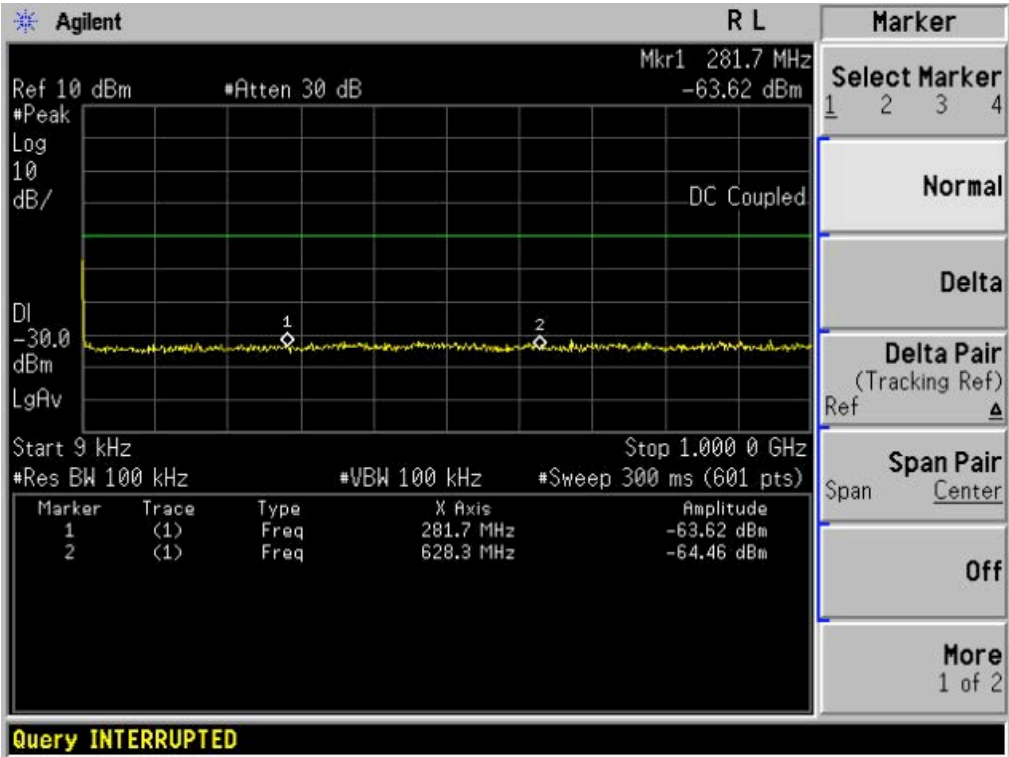
8.3 MEASUREMENT EQUIPMENT USED

The Same as described in section 5.3

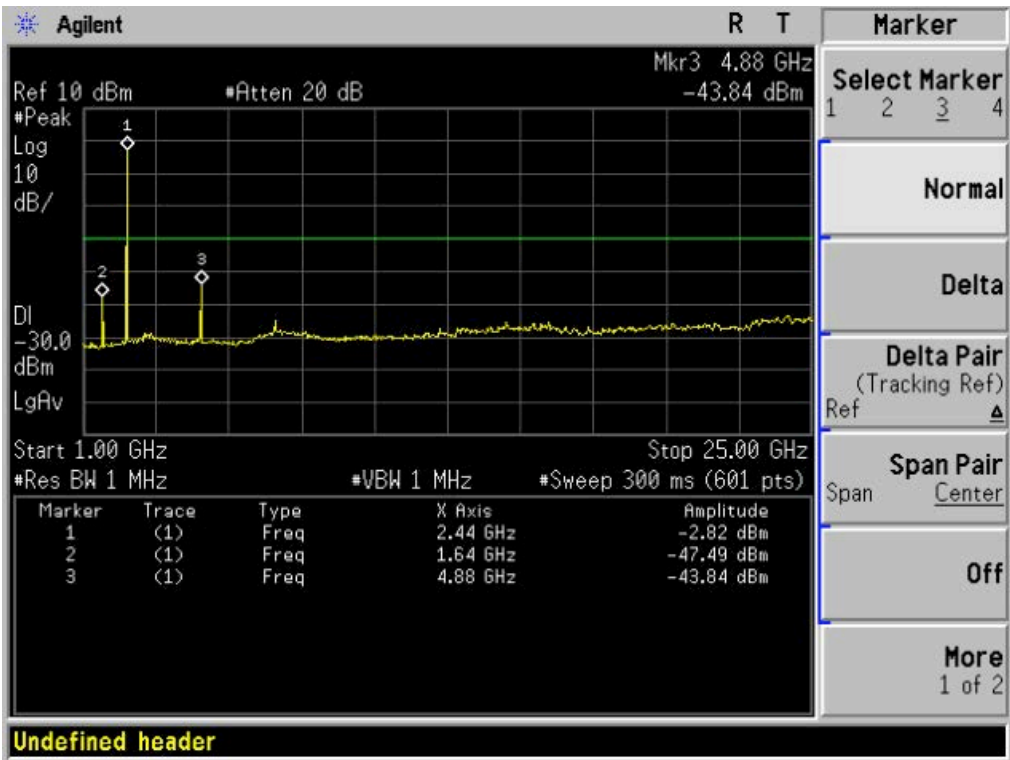
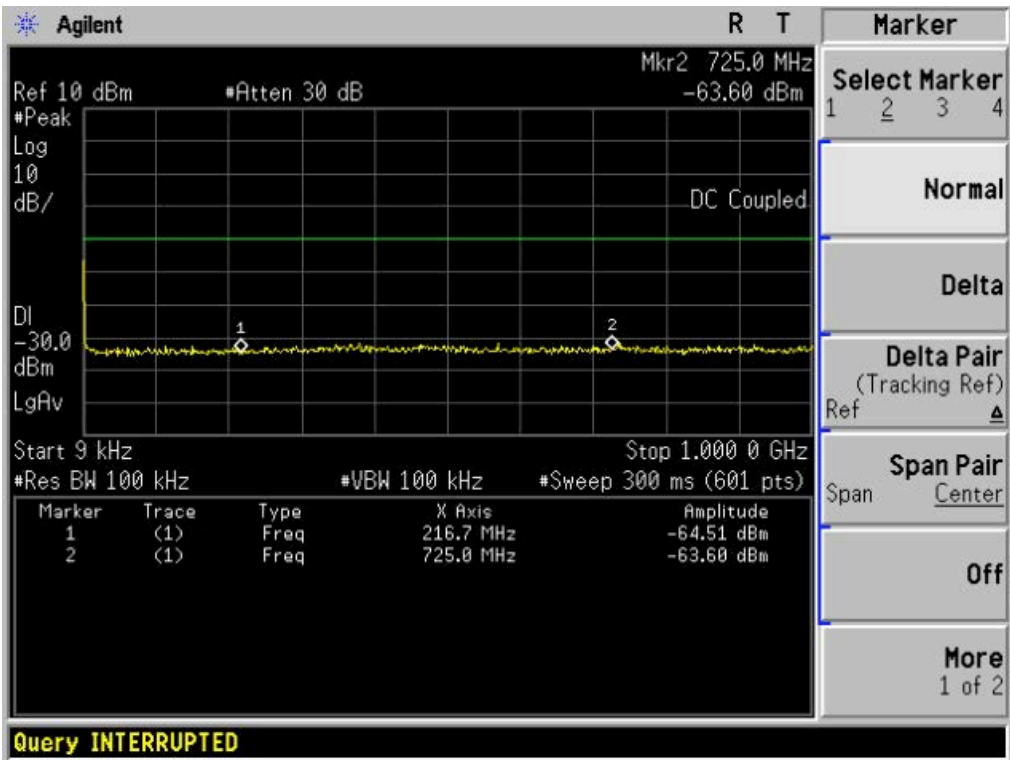
8.4 LIMITS AND MEASUREMENT RESULT

LIMITS AND MEASUREMENT RESULT		
Applicable Limits	Measurement Result	
	Test Data	Criteria
<p>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.</p> <p>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))</p>	At least -20dBc than the limit Specified on the BOTTOM Channel	PASS
	At least -20dBc than the limit Specified on the TOP Channel	PASS

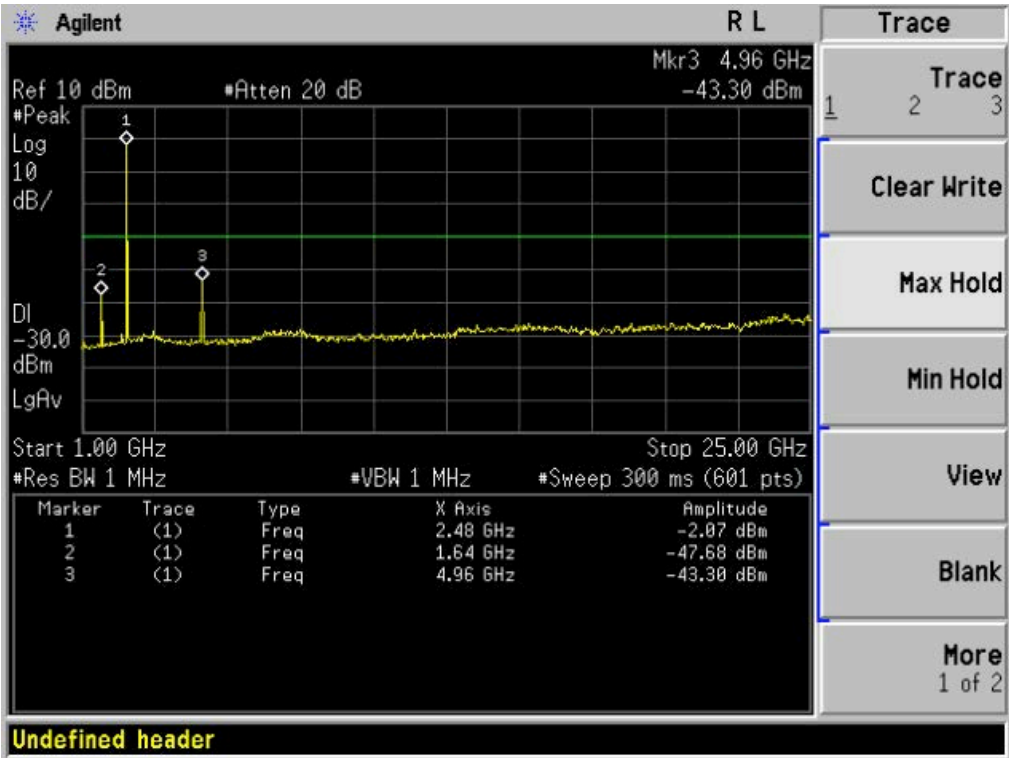
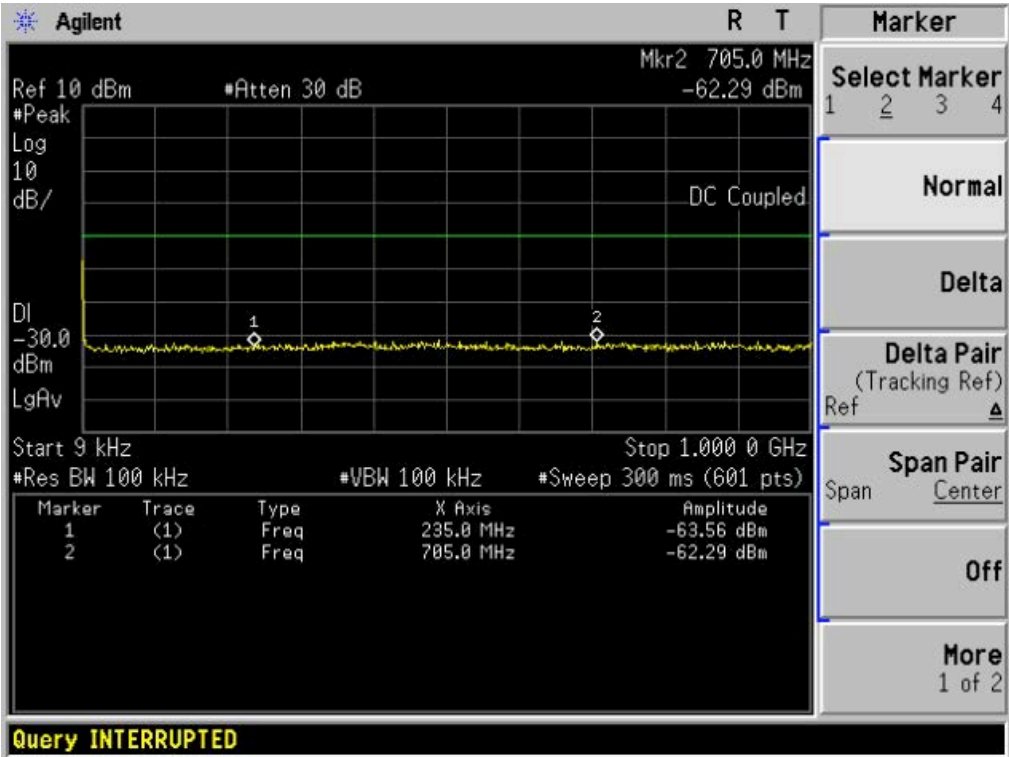
TEST PLOT OF OUT OF BAND EMISSIONS FOR LOW CHANNEL(1Mbps)



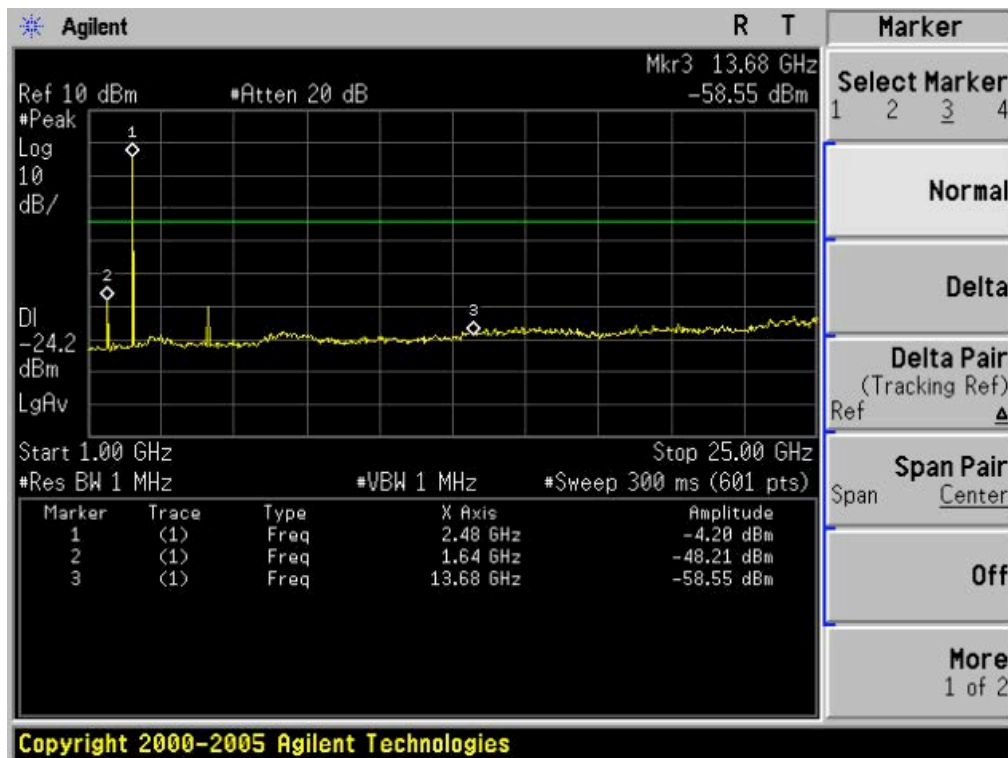
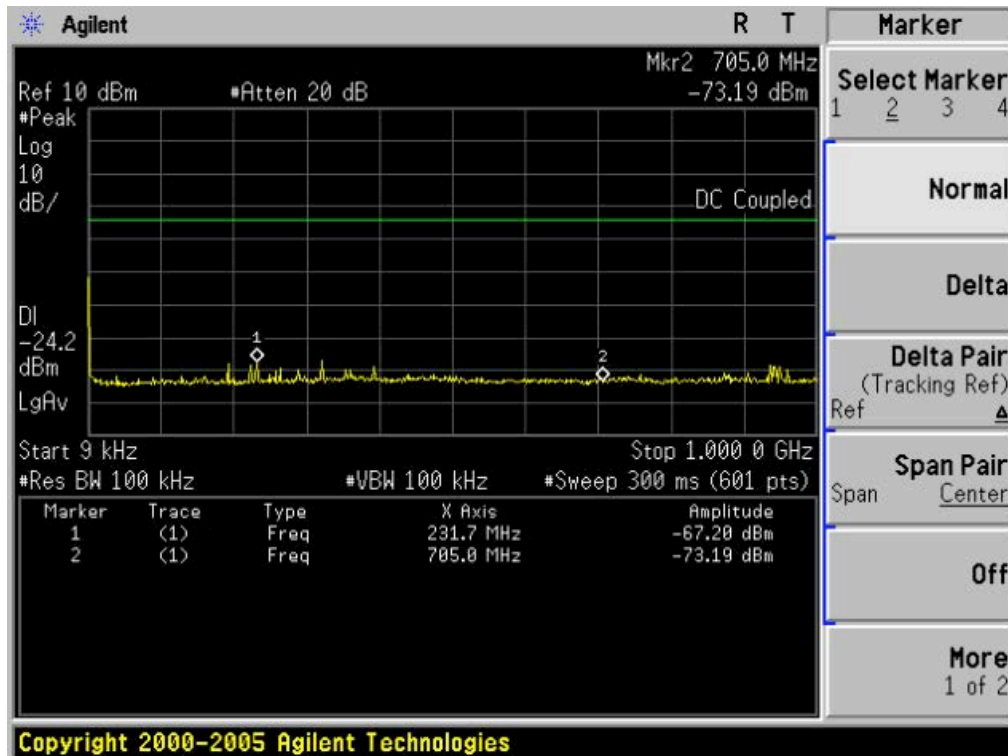
TEST PLOT OF OUT OF BAND EMISSIONS FOR MIDDLE CHANNEL (1Mbps)



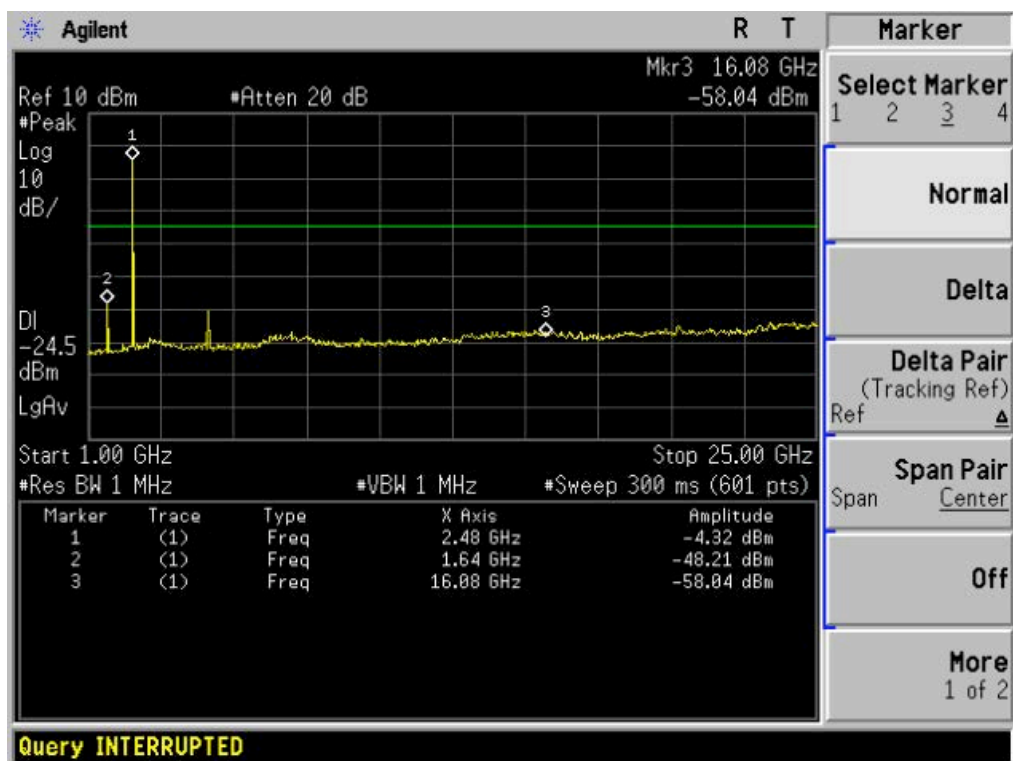
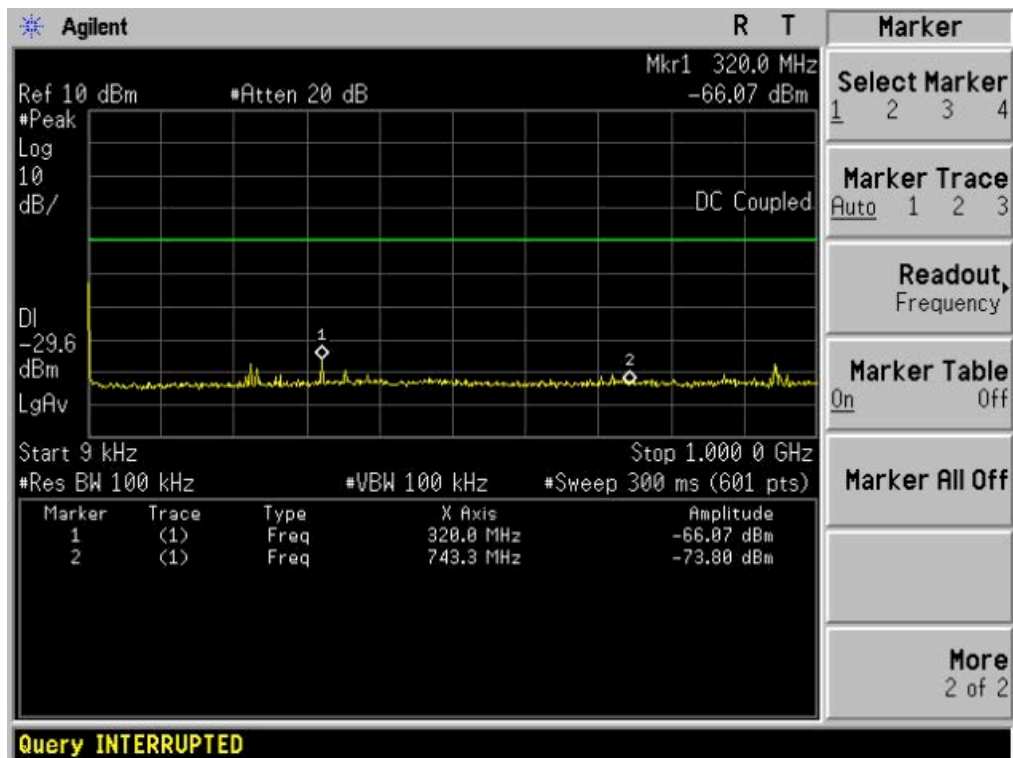
TEST PLOT OF OUT OF BAND EMISSIONS FOR HIGH CHANNEL(1Mbps)



TEST PLOT OF OUT OF BAND EMISSIONS FOR HIGH CHANNEL(2Mbps)



TEST PLOT OF OUT OF BAND EMISSIONS FOR HIGH CHANNEL(3Mbps)



9. RADIATED EMISSION

9.1 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 value.
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.

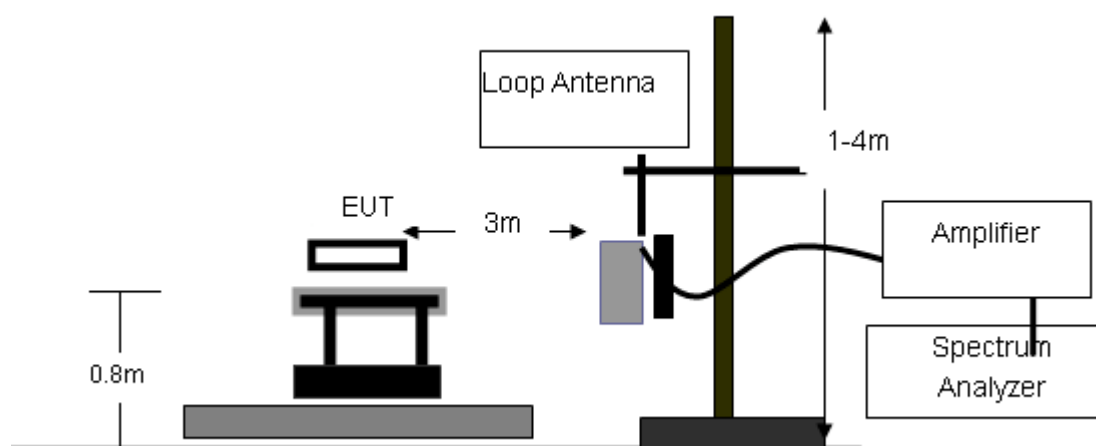
The following table is the setting of spectrum analyzer and receiver.'

Spectrum Parameter	Setting
Start Frequency	1GHz
Stop Frequency	26.5GHz
RB/VB(Emission in restricted band)	1MHz/1MHz for Peak, 1MHz/10Hz for Average
RB/VB(Emission in non-restricted band)	1MHz/1MHz for Peak

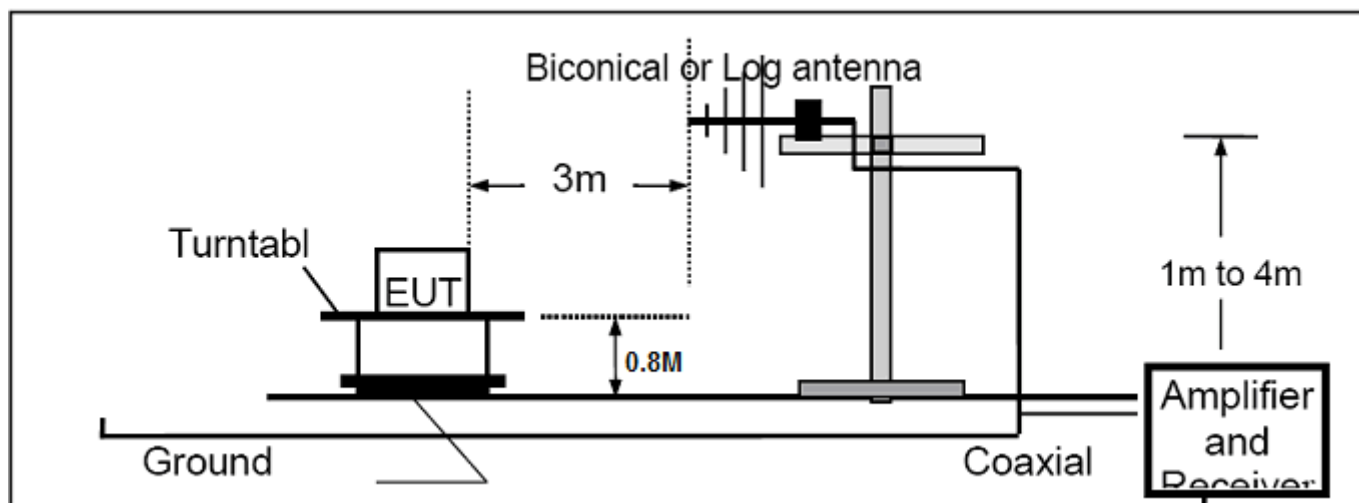
Receiver Parameter	Setting
Start ~Stop Frequency	9KHz~150KHz/RB 200Hz for QP
Start ~Stop Frequency	150KHz~30MHz/RB 9KHz for QP
Start ~Stop Frequency	30MHz~1000MHz/RB 120KHz for QP

9.2 TEST SETUP

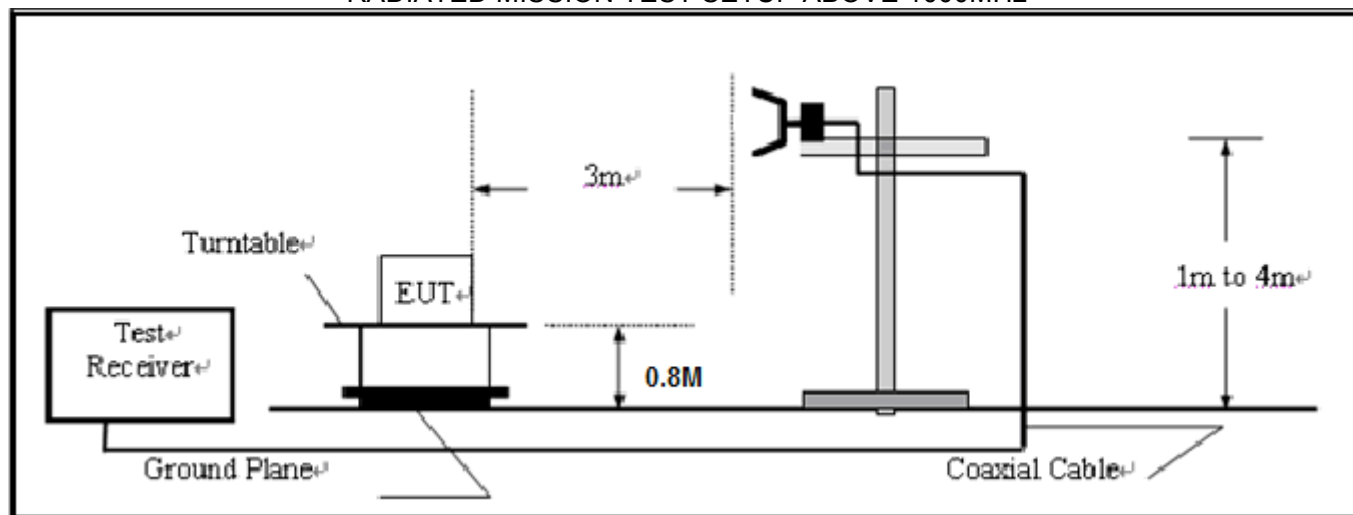
RADIATED EMISSION TEST SETUP BELOW 30MHz



RADIATED MISSION TEST SETUP 30MHz-1000MHz



RADIATED MISSION TEST SETUP ABOVE 1000MHz



9.2 TEST EQUIPMENT LIST

Description	Manufacturer	Model	SERIAL NUMBER	Cal. Date	Cal. Due
Spectrum Analyzer	Agilent	E4440A	N/A	06/29/2010	06/28/2011
Amplifier	EM	EM30180	0607030	06/29/2010	06/28/2011
Horn Antenna	EM	EM-AH-10180	N/A	06/29/2010	06/28/2011
Horn Antenna	A.H. Systems Inc.	SAS-574	--	06/29/2010	06/28/2011
EMI Test Receiver	Rohde & Schwarz	ESCI	N/A	06/29/2010	06/28/2011
Amplifier	EM	EM30180	N/A	06/29/2010	06/28/2011
Biological Antenna	A.H. Systems Inc.	SAS-521-4	N/A	06/29/2010	06/28/2011
Loop Antenna	Daze	ZN30900N	SEL0097	06/29/2010	06/28/2011
Isolation Transformer	LETEAC	LTBK	--	06/29/2010	06/28/2011

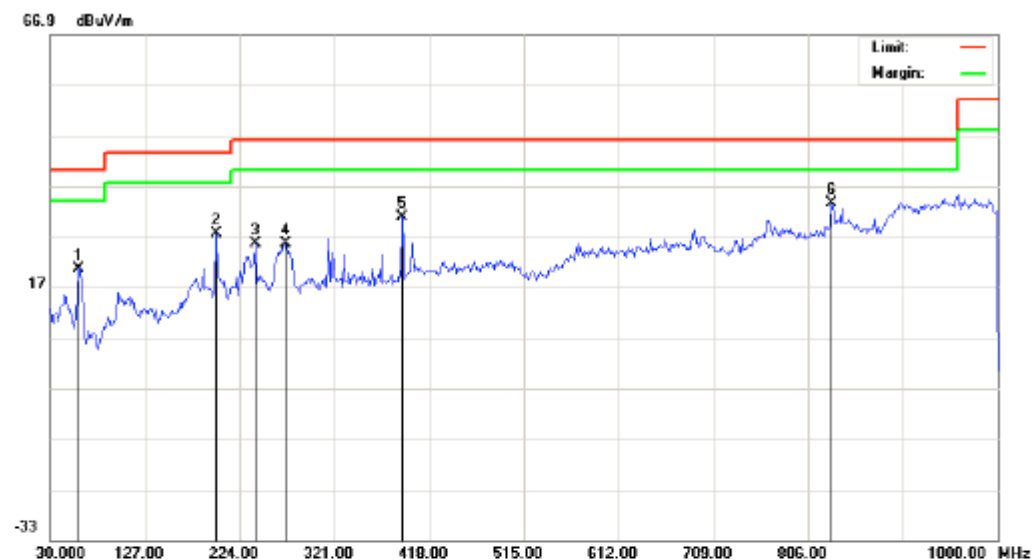
9.3 TEST RESULT

RADIATED EMISSION BELOW 30MHZ

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

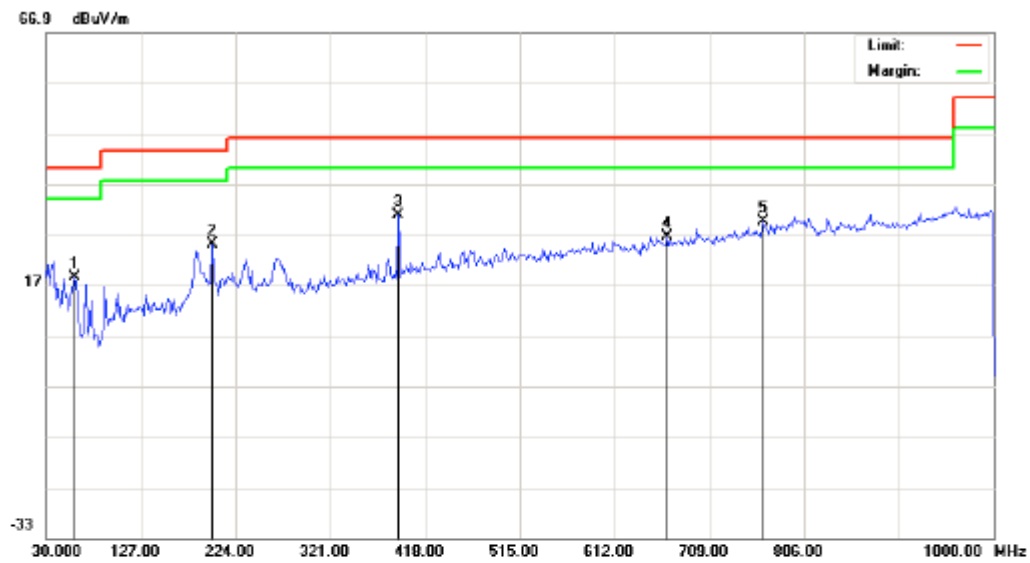
RADIATED EMISSION BELOW 1GHZ

EUT	Bluetooth speaker	Model Name	SB-1
Temperature	25° C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	AC120V
Test Mode	Normal(hopping mode)		



Site: site #1	Polarization: Horizontal	Temperature: 26
Limit: FCC Class B 3M Radiation	Power: AC120V	Humidity: 60 %
EUT: Bluetooth Speaker	Distance: 3m	
M/N: SB-1		
Mode: Normal(hopping)		
Note:		

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		59.1000	1.71	18.84	20.55	40.00	-19.45	peak			
2		199.7500	15.27	12.23	27.50	43.50	-16.00	peak			
3		240.1667	8.19	17.23	25.42	48.00	-20.58	peak			
4		270.8833	8.33	17.22	25.55	48.00	-20.45	peak			
5		390.5167	10.80	20.08	30.88	48.00	-15.12	peak			
6	*	830.2500	3.82	29.75	33.57	48.00	-12.43	peak			



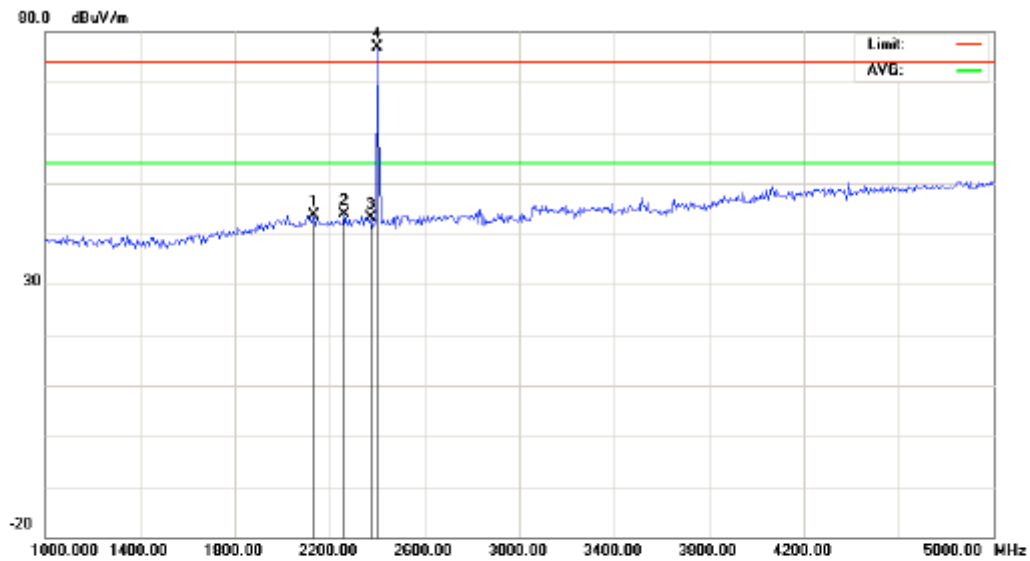
Site: site #1 Polarization: **Vertical** Temperature: 26
Limit: FCC Class B 3M Radiation Power: AC120V Humidity: 60 %
EUT: Bluetooth Speaker Distance: 3m
M/N: SB-1
Mode: Normal(Hopping)
Note:

No.	Mk	Freq. MHz	Reading dBuV	Factor dB/m	Measurement dBuV/m	Limit dBuV/m	Over dB	Detector	Antenna Height cm	Table Degree degree	Comment
1		59.1000	-0.50	19.08	18.58	40.00	-21.42	peak			
2		199.7500	9.91	15.23	25.14	43.50	-18.36	peak			
3	*	390.5167	10.70	20.08	30.78	46.00	-15.22	peak			
4		665.3500	0.59	25.82	26.41	46.00	-19.59	peak			
5		763.9667	1.92	27.67	29.59	46.00	-16.41	peak			

Note: Battery test mode at least have 20dB margin, so no recording on the test report.

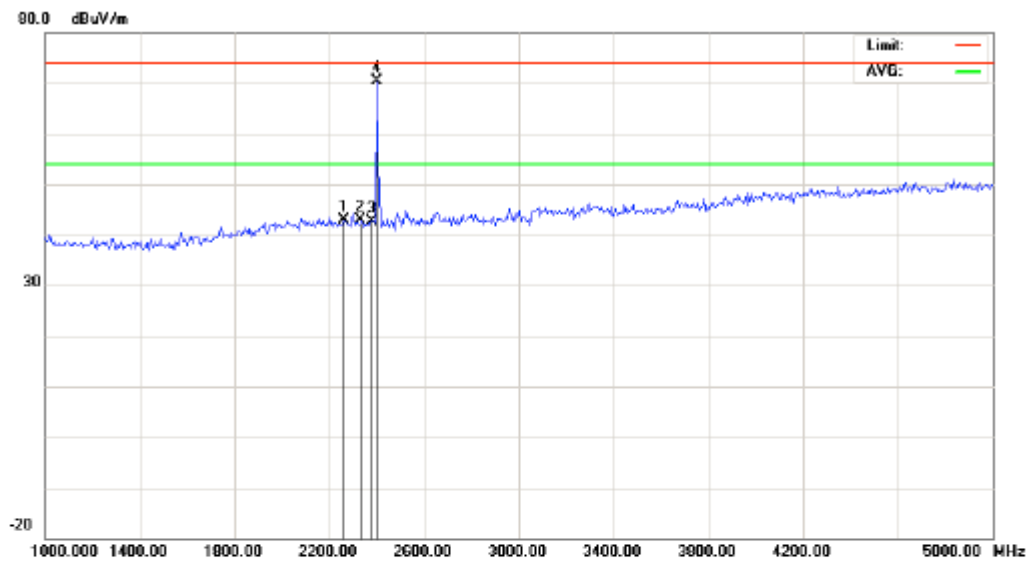
RADIATED EMISSION ABOVE 1GHZ(1-10th Harmonics)

EUT	Bluetooth speaker	Model Name	SB-1
Temperature	25° C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	AC120V
Test Mode	BT2402MHZ	Modulation	GFSK



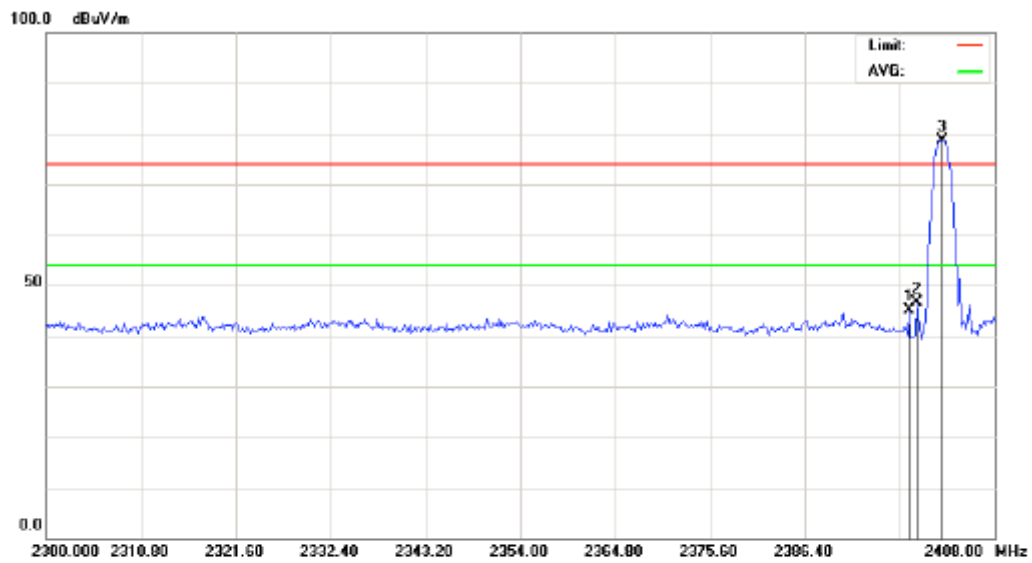
Site: site #1	Polarization: <i>Horizontal</i>	Temperature: 26
Limit: FCC Class B 3M Radiation above 1GHZ(PK)	Power: AC120V	Humidity: 60 %
EUT: Bluetooth Speaker	Distance: 3m	
M/N: SB-1		
Mode: 2402TX		
Note:		

No.	Mk	Freq. MHz	Reading dBuV	Factor dB/m	Measurement dBuV/m	Limit dBuV/m	Over dB	Detector	Antenna Height cm	Table Degree degree	Comment
1		2133.333	53.53	-9.97	43.56	74.00	-30.44	peak			
2		2280.000	53.66	-9.83	43.83	74.00	-30.17	peak			
3		2373.333	52.85	-9.71	43.14	74.00	-30.86	peak			
4	*	2400.000	86.51	-9.68	76.83	74.00	2.83	peak			



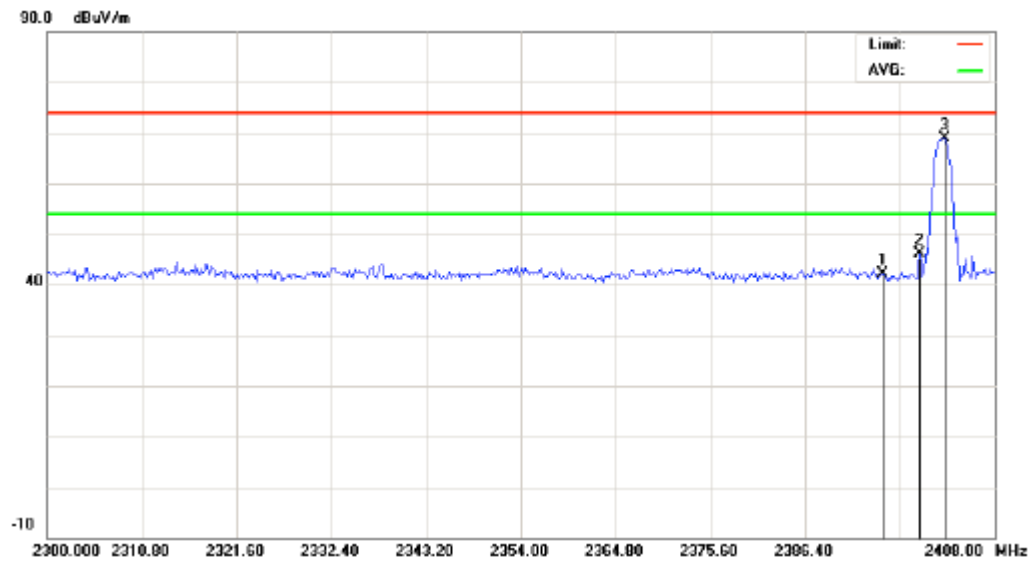
Site: site #1 Polarization: *Vertical* Temperature: 28
Limit: FCC Class B 3M Radiation above 1GHZ(PK) Power: AC120V Humidity: 60 %
EUT: Bluetooth Speaker Distance: 3m
M/N: SB-1
Mode: 2402-TX
Note:

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		2260.000	52.65	-9.83	42.82	74.00	-31.18	peak			
2		2333.333	52.62	-9.75	42.87	74.00	-31.13	peak			
3		2380.000	52.42	-9.70	42.72	74.00	-31.28	peak			
4	*	2400.000	80.11	-9.68	70.43	74.00	-3.57	peak			



Site: site #1 Polarization: **Horizontal** Temperature: 26
Limit: FCC Class B 3M Radiation above 1GHZ(PK) Power:AC120V Humidity: 60 %
EUT: Bluetooth Speaker Distance: 3m
M/N: SB-1
Mode: 2402TX
Note:

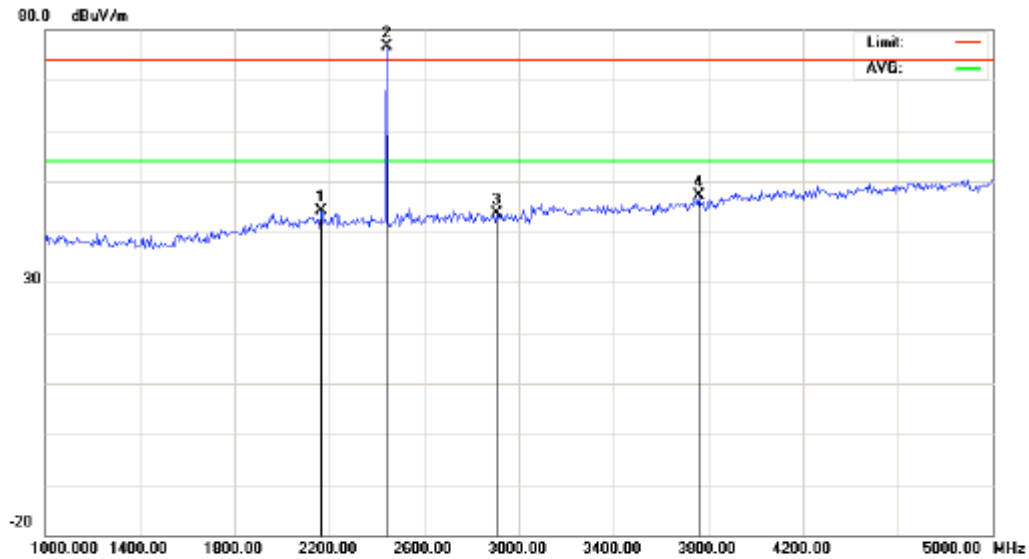
No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		cm	degree	
1		2398.280	54.77	-9.68	45.09	74.00	-28.91	peak			
2		2399.180	56.27	-9.68	46.59	74.00	-27.41	peak			
3	*	2402.060	88.30	-9.68	78.62	74.00	4.62	peak			



Site: site #1 Polarization: *Vertical* Temperature: 26
Limit: FCC Class B 3M Radiation above 1GHZ(PK) Power:AC120V Humidity: 60 %
EUT: Bluetooth Speaker Distance: 3m
M/N: SB-1
Mode: 2402TX
Note:

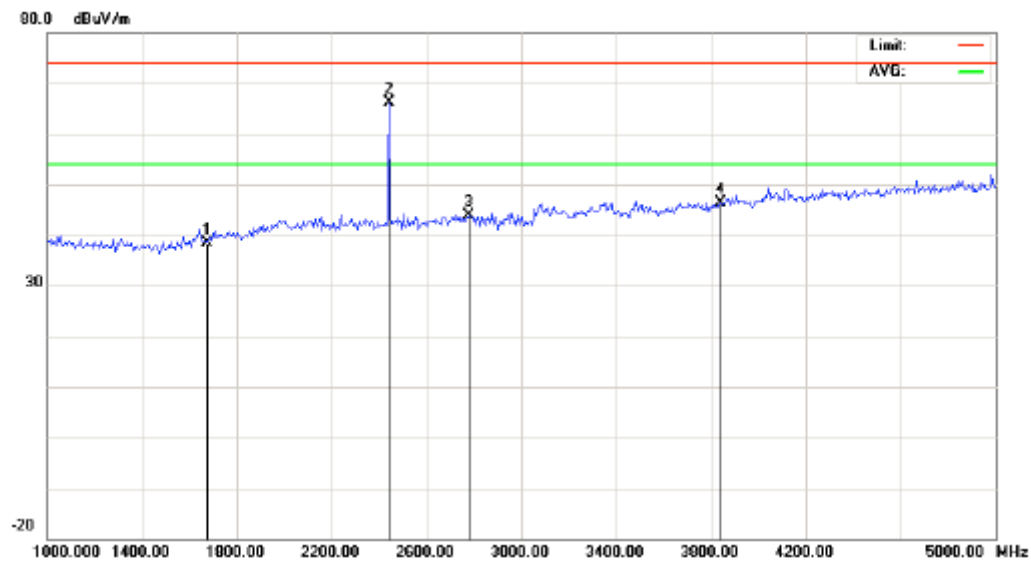
No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		cm	degree	
1		2395.220	51.80	-9.69	42.11	74.00	-31.89	peak			
2		2399.360	55.80	-9.68	46.12	74.00	-27.88	peak			
3	*	2402.240	78.48	-9.68	68.80	74.00	-5.20	peak			

EUT	Bluetooth speaker	Model Name	SB-1
Temperature	25° C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	AC120V
Test Mode	BT2441MHZ	Modulation	GFSK



Site: site #1 Polarization: **Horizontal** Temperature: 26
Limit: FCC Class B 3M Radiation above 1GHZ(PK) Power:AC120V Humidity: 60 %
EUT: Bluetooth Speaker Distance: 3m
M/N: SB-1
Mode: 2441TX
Note:

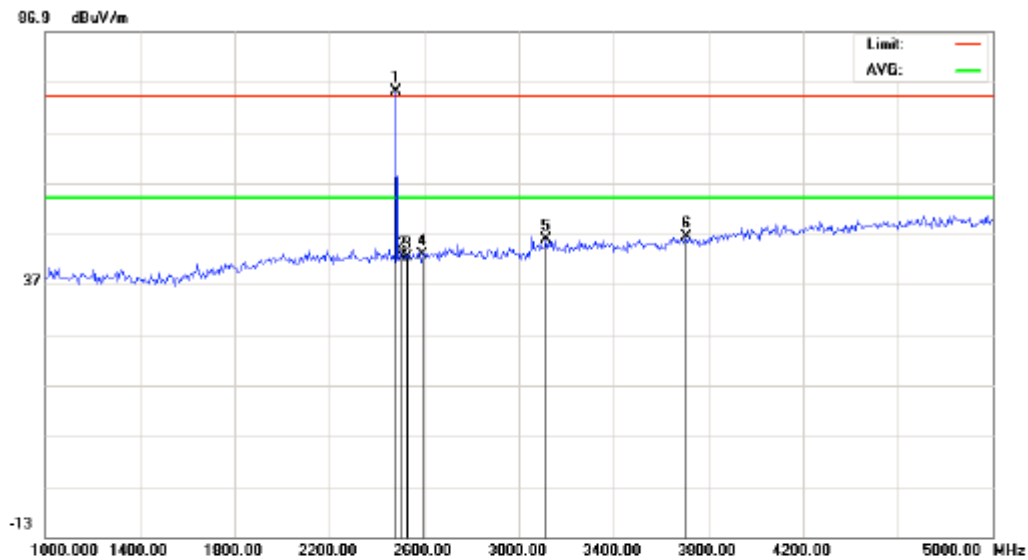
No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		cm	degree	
1		2166.667	54.06	-9.94	44.11	74.00	-29.89	peak			
2	*	2440.000	86.17	-9.64	76.53	74.00	2.53	peak			
3		2906.667	52.11	-8.59	43.52	74.00	-30.48	peak			
4		3760.000	53.33	-8.29	47.04	74.00	-26.96	peak			



Site: site #1 Polarization: **Vertical** Temperature: 26
Limit: FCC Class B 3M Radiation above 1GHZ(PK) Power:AC120V Humidity: 60 %
EUT: Bluetooth Speaker Distance: 3m
M/N: SB-1
Mode: 2441TX
Note:

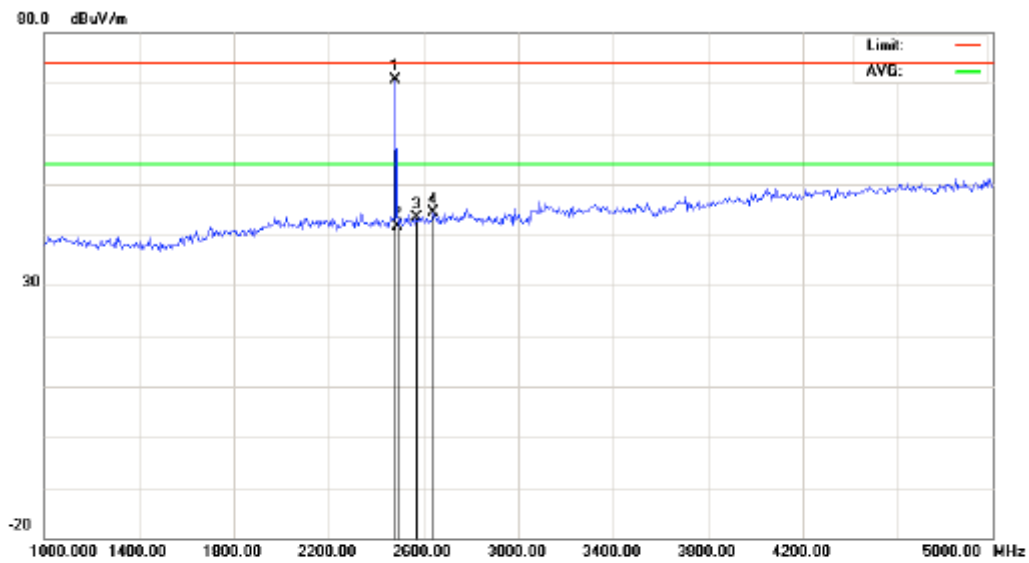
No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		cm	degree	
1		1673.333	52.06	-13.56	38.50	74.00	-35.50	peak			
2	*	2440.000	75.88	-9.64	66.04	74.00	-7.96	peak			
3		2780.000	52.79	-8.89	43.90	74.00	-30.10	peak			
4		3840.000	52.15	-5.80	46.35	74.00	-27.65	peak			

EUT	Bluetooth speaker	Model Name	SB-1
Temperature	25° C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	AC120V
Test Mode	BT2480MHZ	Modulation	GFSK



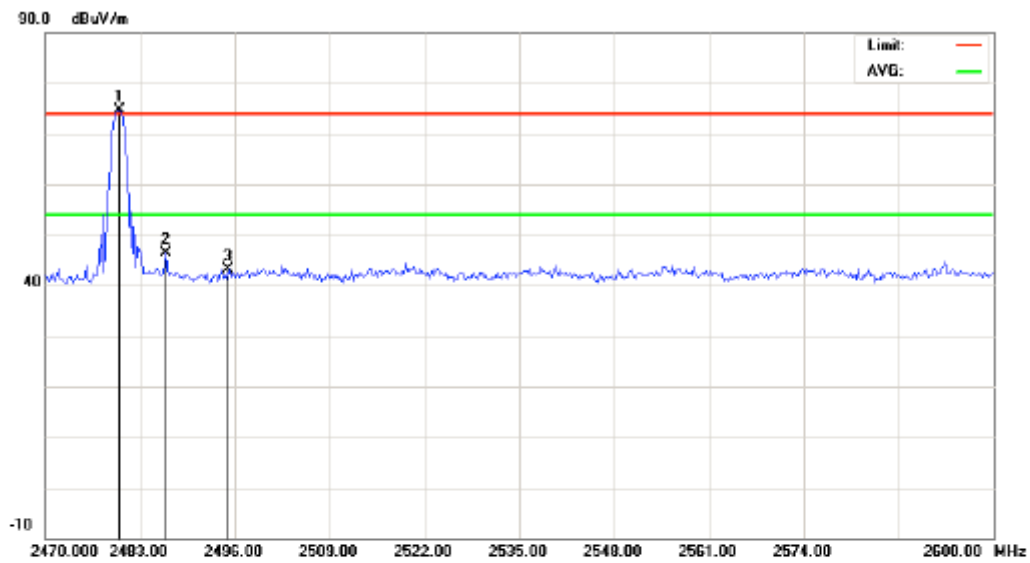
Site: site #1 Polarization: **Horizontal** Temperature: 28
Limit: FCC Class B 3M Radiation above 1GHZ(PK) Power:AC120V Humidity: 60 %
EUT: Bluetooth Speaker Distance: 3m
M/N: SB-1
Mode: 2480TX
Note:

No.	Mk	Freq. MHz	Reading dBuV	Factor dB/m	Measurement dBuV/m	Limit dBuV/m	Over dB	Detector	Antenna Height cm	Table Degree degree	Comment
1	*	2480.000	84.66	-9.59	75.07	74.00	1.07	peak			
2		2506.667	51.90	-9.55	42.35	74.00	-31.65	peak			
3		2526.667	51.74	-9.51	42.23	74.00	-31.77	peak			
4		2593.333	52.06	-9.34	42.72	74.00	-31.28	peak			
5		3113.333	54.13	-8.25	45.88	74.00	-28.12	peak			
6		3706.667	52.99	-8.62	46.37	74.00	-27.63	peak			



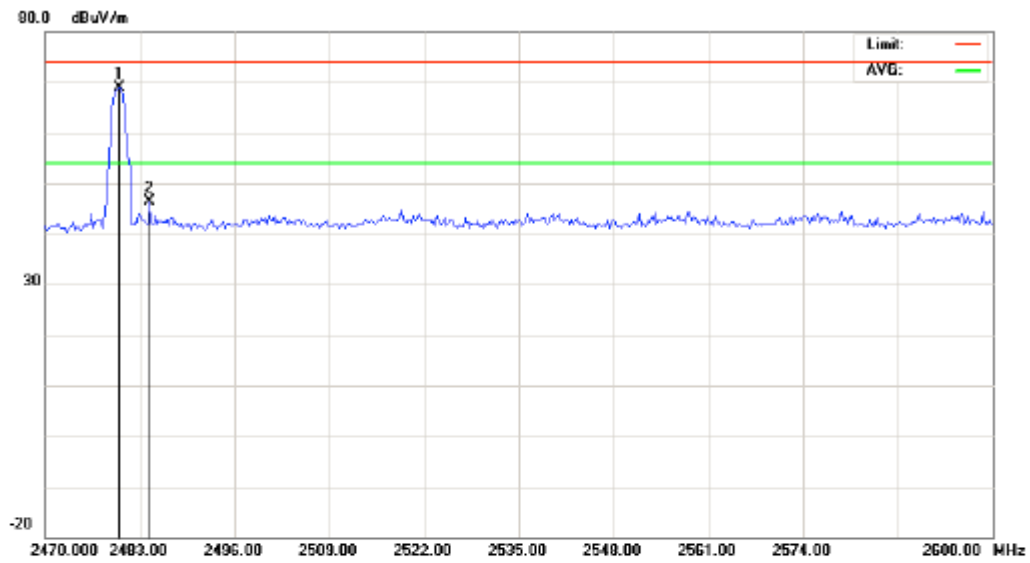
Site: site #1 Polarization: *Vertical* Temperature: 28
Limit: FCC Class B 3M Radiation above 1GHZ(PK) Power: AC120V Humidity: 60 %
EUT: Bluetooth Speaker Distance: 3m
M/N: SB-1
Mode: 2480TX
Note:

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	80.34	-9.59	70.75	74.00	-3.25	peak			
2		2493.333	51.31	-9.58	41.73	74.00	-32.27	peak			
3		2573.333	52.75	-9.39	43.36	74.00	-30.64	peak			
4		2640.000	53.58	-9.23	44.35	74.00	-29.65	peak			



Site: site #1 Polarization: *Horizontal* Temperature: 28
Limit: FCC Class B 3M Radiation above 1GHZ(PK) Power: AC120V Humidity: 60 %
EUT: Bluetooth Speaker Distance: 3m
M/N: SB-1
Mode: 2480TX
Note:

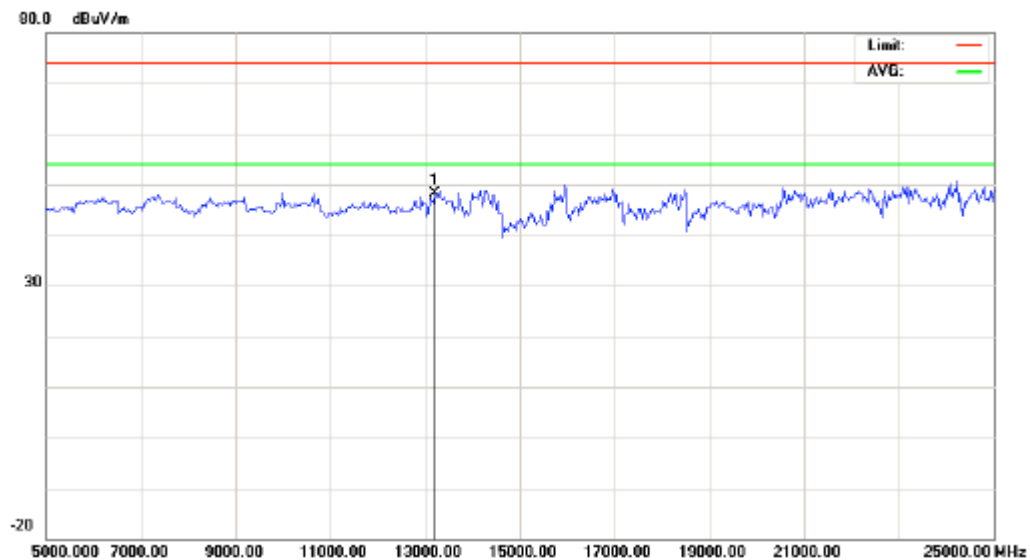
No.	Mk	Freq. MHz	Reading dBuV	Factor dB/m	Measurement dBuV/m	Limit dBuV/m	Over dB	Detector	Antenna Height cm	Table Degree degree	Comment
1	*	2480.183	84.20	-9.59	74.61	74.00	0.61	peak			
2		2486.467	55.96	-9.58	46.38	74.00	-27.62	peak			
3		2495.133	52.78	-9.58	43.20	74.00	-30.80	peak			



Site: site #1	Polarization: <i>Vertical</i>	Temperature: 26
Limit: FCC Class B 3M Radiation above 1GHZ(PK)	Power: AC120V	Humidity: 60 %
EUT: Bluetooth Speaker	Distance: 3m	
M/N: SB-1		
Mode: 2480TX		
Note:		

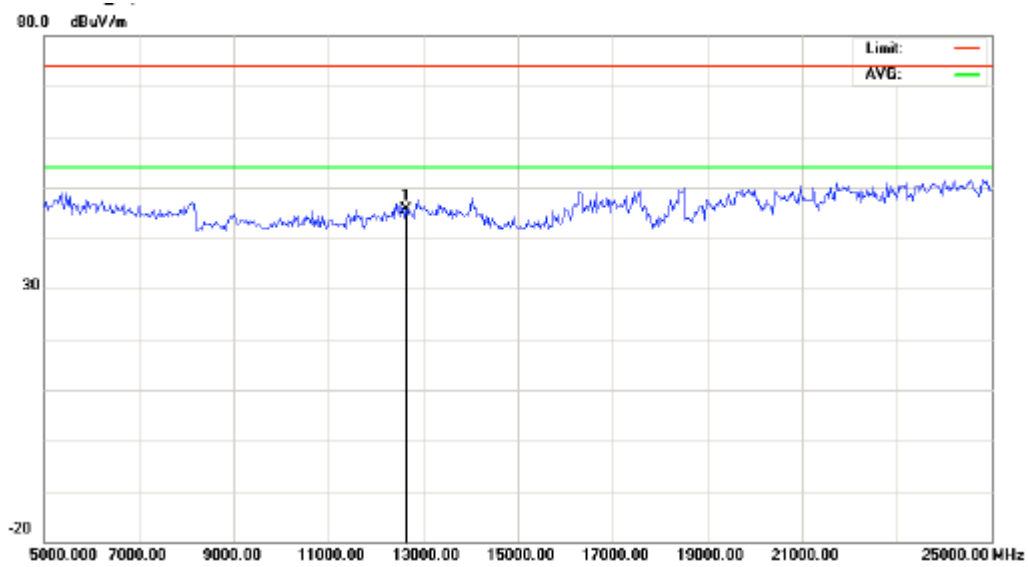
No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		cm	degree	
1	*	2480.183	78.35	-9.59	68.76	74.00	-5.24	peak			
2		2484.300	55.87	-9.59	46.28	74.00	-27.72	peak			

EUT	Bluetooth speaker	Model Name	SB-1
Temperature	25° C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	AC120V
Test Mode	BT2441MHZ	Modulation	GFSK



Site: site #1 Polarization: *Horizontal* Temperature: 26
Limit: FCC Class B 3M Radiation above 1GHZ(PK) Power:AC120V Humidity: 60 %
EUT: Bluetooth Speaker Distance: 3m
M/N: SB-1
Mode: 2441TX
Note:

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	*	13200.000	41.22	7.02	48.24	74.00	-25.76	peak			



Site: site #1 Polarization: **Vertical** Temperature: 26
Limit: FCC Class B 3M Radiation above 1GHZ(PK) Power:AC120V Humidity: 60 %
EUT: Bluetooth Speaker Distance: 3m
M/N: SB-1
Mode: 2441TX
Note:

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	*	12633.333	38.71	7.01	45.72	74.00	-28.28	peak			

Note: a Battery test mode at least have 20dB margin,so no recording on the test report.
b Other modulation mode at least have 20dB margin.
c Factor=Antenna Factor+Cable loss-Amplifier gain,Margin=Measurement-Limit.

10 BAND EDGE EMISSION

10.1 MEASUREMENT PROCEDURE

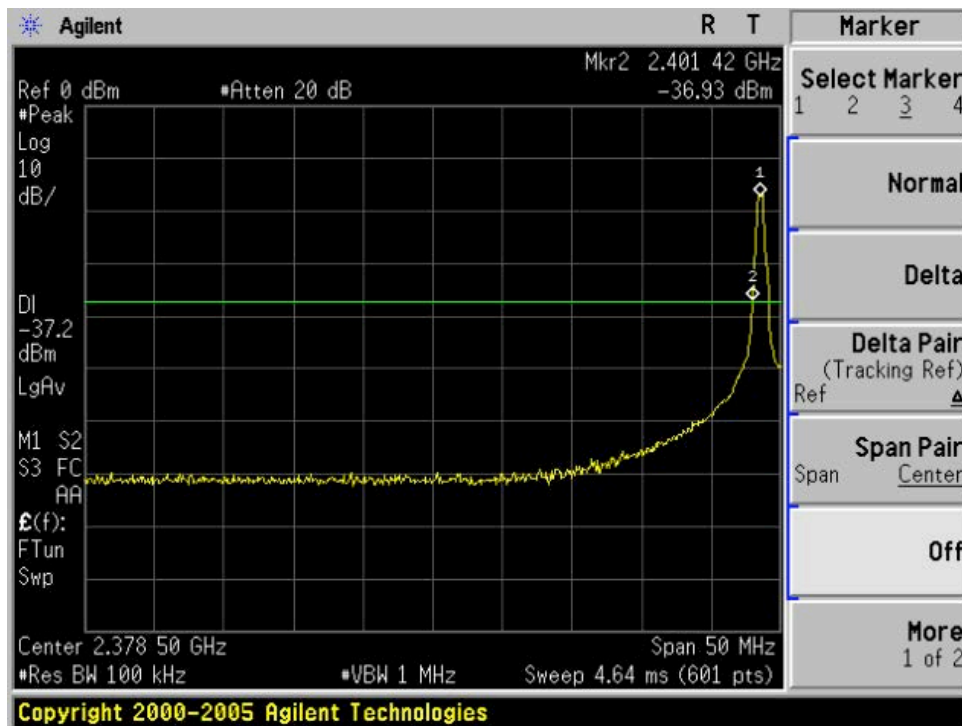
1. Set the EUT Work on the top, the bottom operation frequency individually.
2. Set SPA Start or Stop Frequency = Operation Frequency, RBW= 100kHz, VBW= 1MHz.
3. The band edges was measured and recorded.

10.2 TEST SET-UP

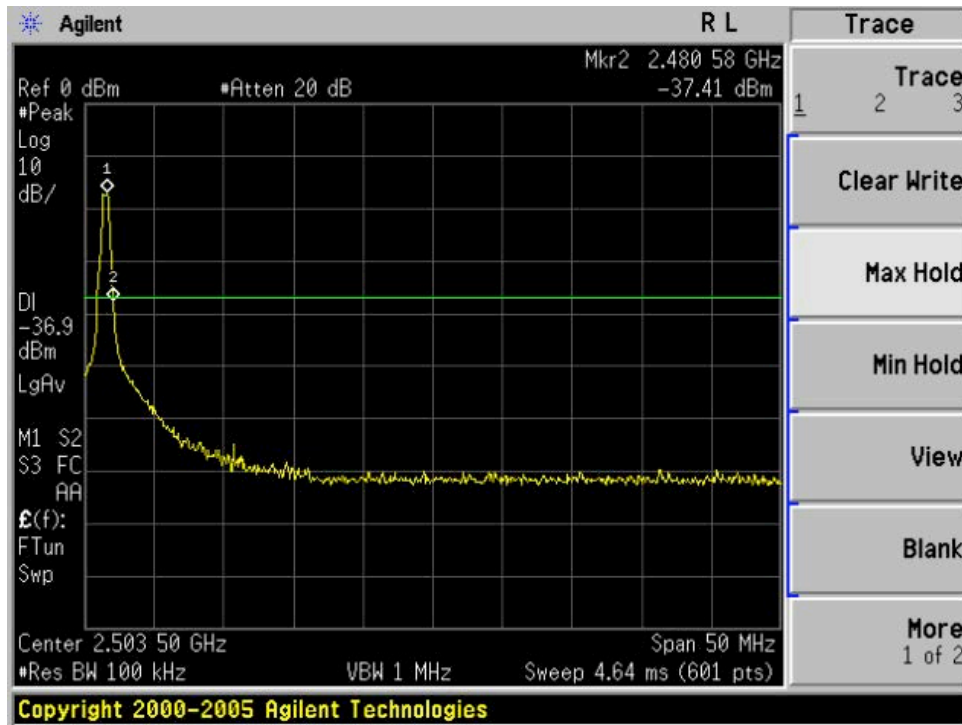
The Same as described in section 5.2

10.3 TEST RESULT

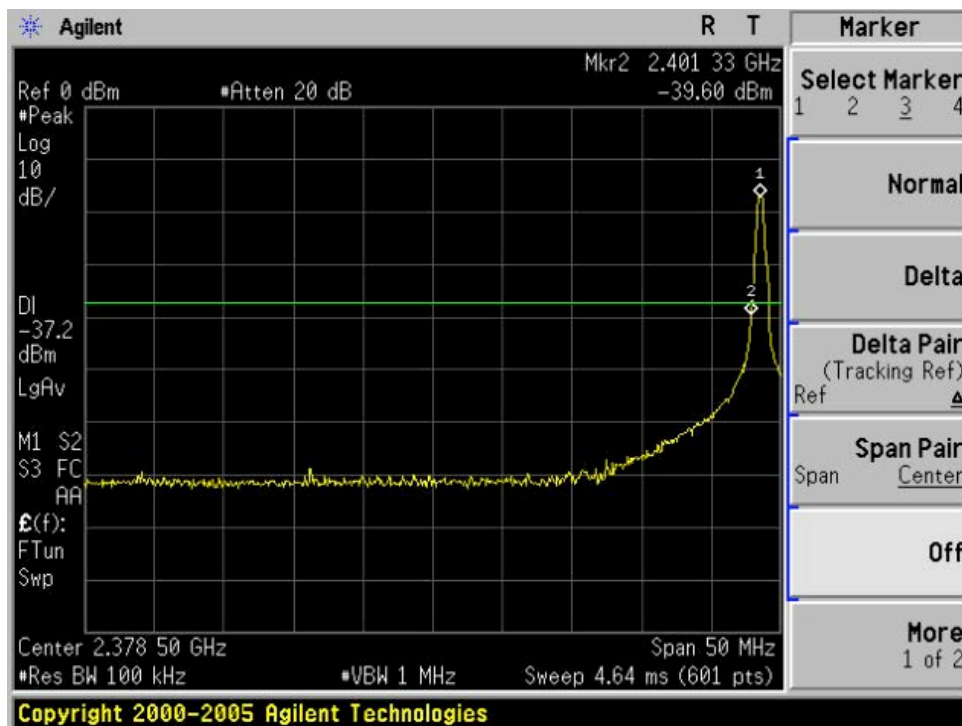
TEST PLOT OF BAND EDGE FOR LOW CHANNEL(1Mbps)



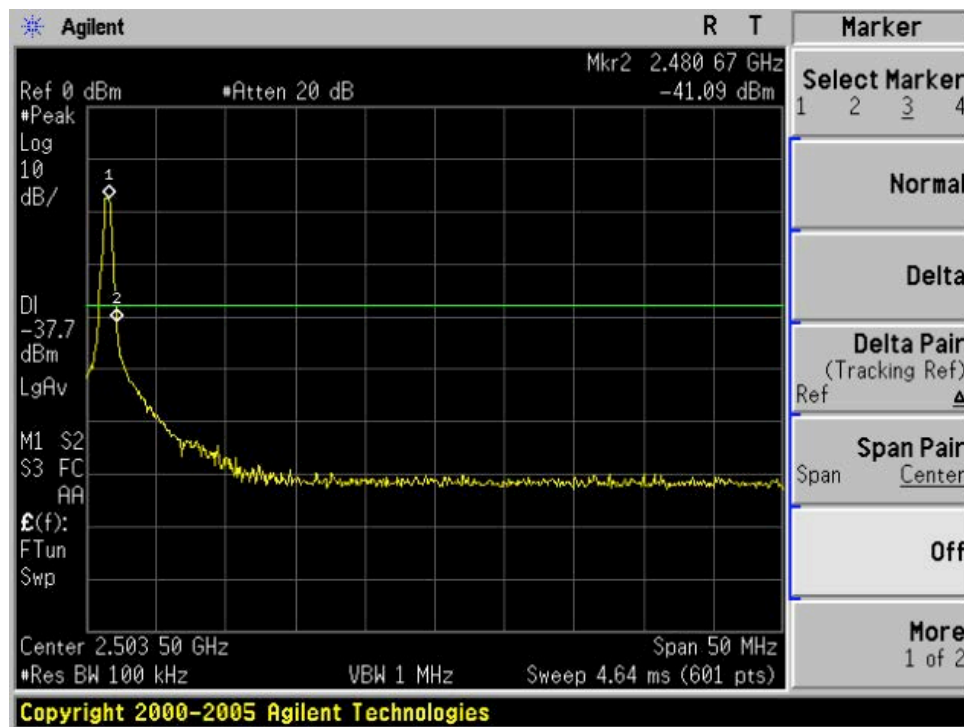
TEST PLOT OF BAND EDGE FOR HIGH CHANNEL(1Mbps)



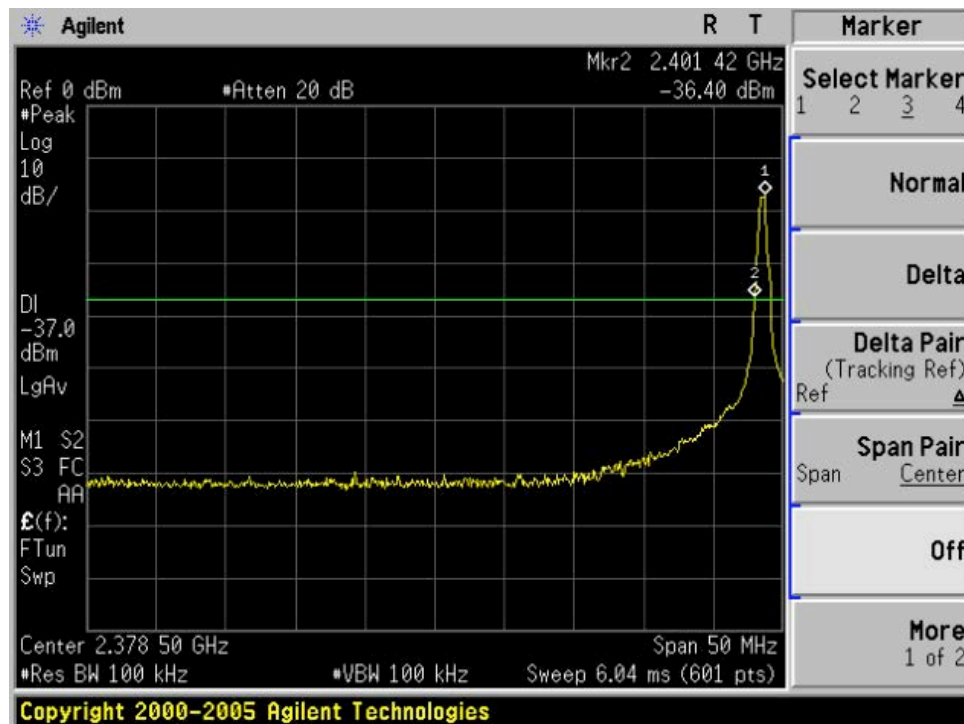
TEST PLOT OF BAND EDGE FOR LOW CHANNEL(2Mbps)



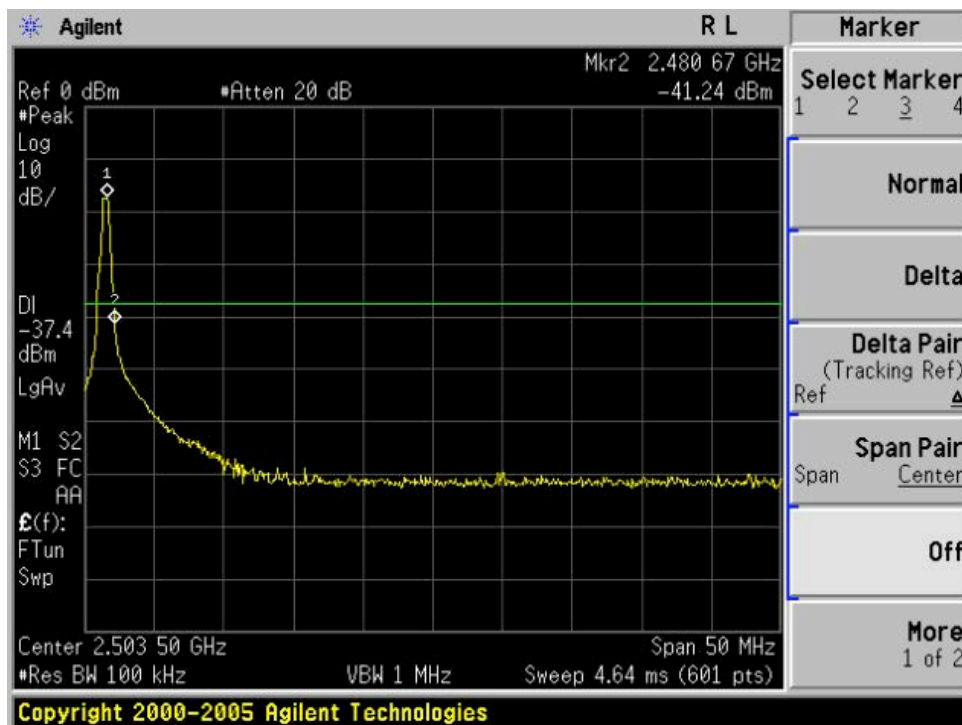
TEST PLOT OF BAND EDGE FOR HIGH CHANNEL(2Mbps)



TEST PLOT OF BAND EDGE FOR LOW CHANNEL(3Mbps)



TEST PLOT OF BAND EDGE FOR HIGH CHANNEL(3Mbps)



EUT	Bluetooth speaker	Model Name	SB-1
Temperature	25° C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	AC120V
Test Mode	BT2402MHZ	Modulation	GFSK

Freq. (MHZ)	Ant.Pol. H/V	Peak Reading (dBuV)	AV Reading (dBuV)	Factor (dB)	Result		Peak Limit (dBuV/m)	AV Limit (dBuV/m)	Margin
					Peak (dBuV/m)	AV (dBuV/m)			
--	H	--	--	--	--	--	--	--	--
--	H	--	--	--	--	--	--	--	--
--	V	--	--	--	--	--	--	--	--
--	V	--	--	--	--	--	--	--	--

EUT	Bluetooth speaker	Model Name	G-ViB2
Temperature	25° C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	AC120V
Test Mode	BT2480MHZ	Modulation	GFSK

Freq. (MHZ)	Ant.Pol. H/V	Peak Reading (dBuV)	AV Reading (dBuV)	Factor (dB)	Result		Peak Limit (dBuV/m)	AV Limit (dBuV/m)	Margin
					Peak (dBuV/m)	AV (dBuV/m)			
--	H	--	--	--	--	--	--	--	--
--	H	--	--	--	--	--	--	--	--
--	V	--	--	--	--	--	--	--	--
--	V	--	--	--	--	--	--	--	--

Note: "--" means other frequencies at least have 20dB margin.

The other modulation modes comply with standard requirement and at least have 20dB margin.

11 NUMBER OF HOPPING FREQUENCY

11.1 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 = 100KHZ

11.2 TEST SETUP (BLOCK DIAGRAM OF CONFIGURATION)

Same as described in section 5.2

1. Conducted Method.

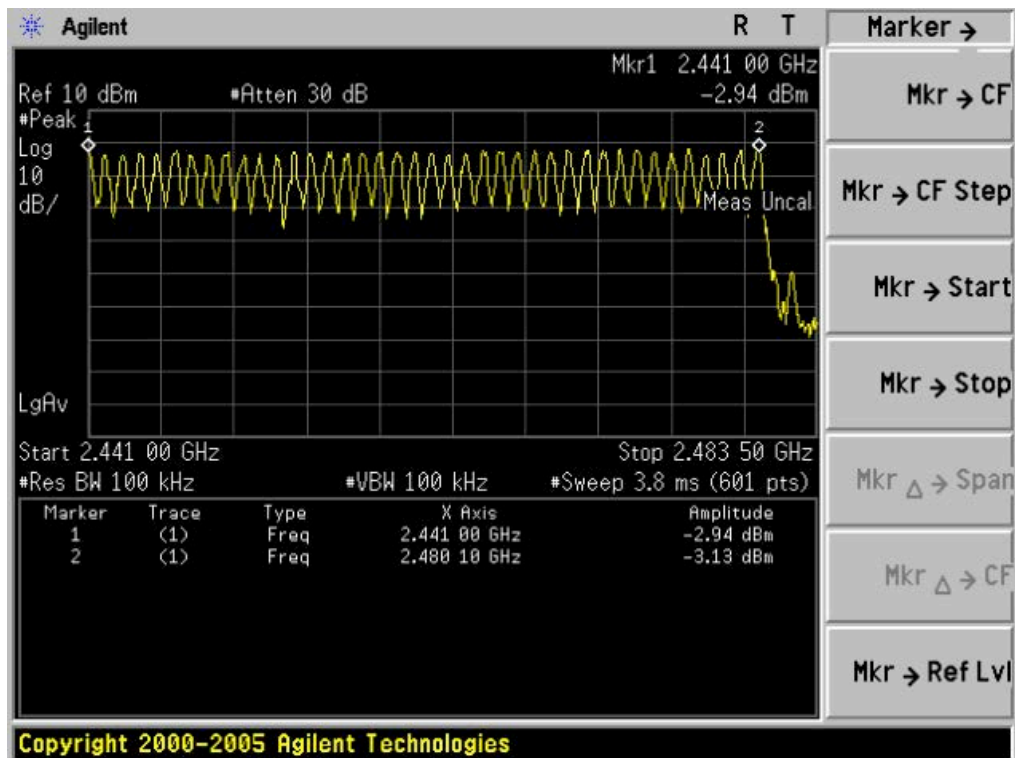
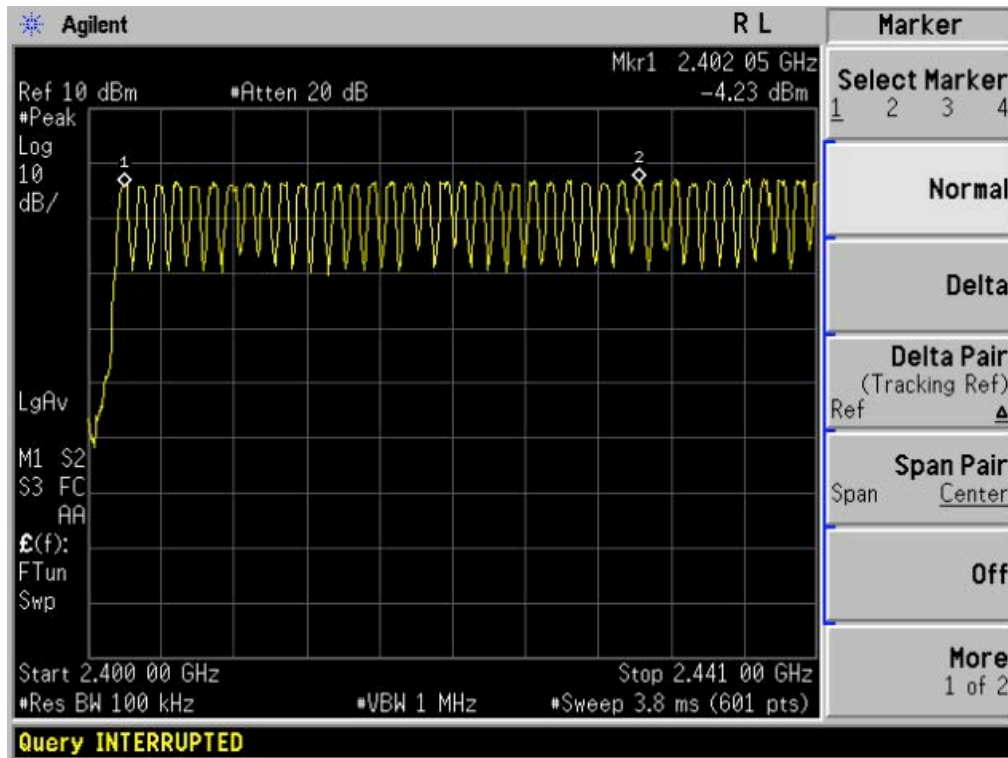
11.3 MEASUREMENT EQUIPMENT USED

The Same as described in section 5.3

11.4 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



12 IME OF OCCUPANCY (DWELL TIME)

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 center frequency of spectrum analyzer = Operating frequency
4. Set the spectrum analyzer as RBW, VBW=1MHz, Span = 0 Hz,

12.2 TEST SETUP (BLOCK DIAGRAM OF CONFIGURATION)

Same as described in section 5.2
Conducted Method

12.3 MEASUREMENT EQUIPMENT USED

The same as described in section 5.3

12.4 LIMITS AND MEASUREMENT RESULT

Bluetooth 1Mbps Test Result

Channel	Time of Pulse for DH5 (ms)	Period Time (s)	Sweep Time (ms)	Limit (ms)
Low	2.90	31.6	309.33	400
Middle	2.86	31.6	305.07	400
High	2.88	31.6	307.20	400

Low Channel Time

$$2.90 \times (1600/6) / 79 \times 31.6 = 309.33 \text{ms}$$

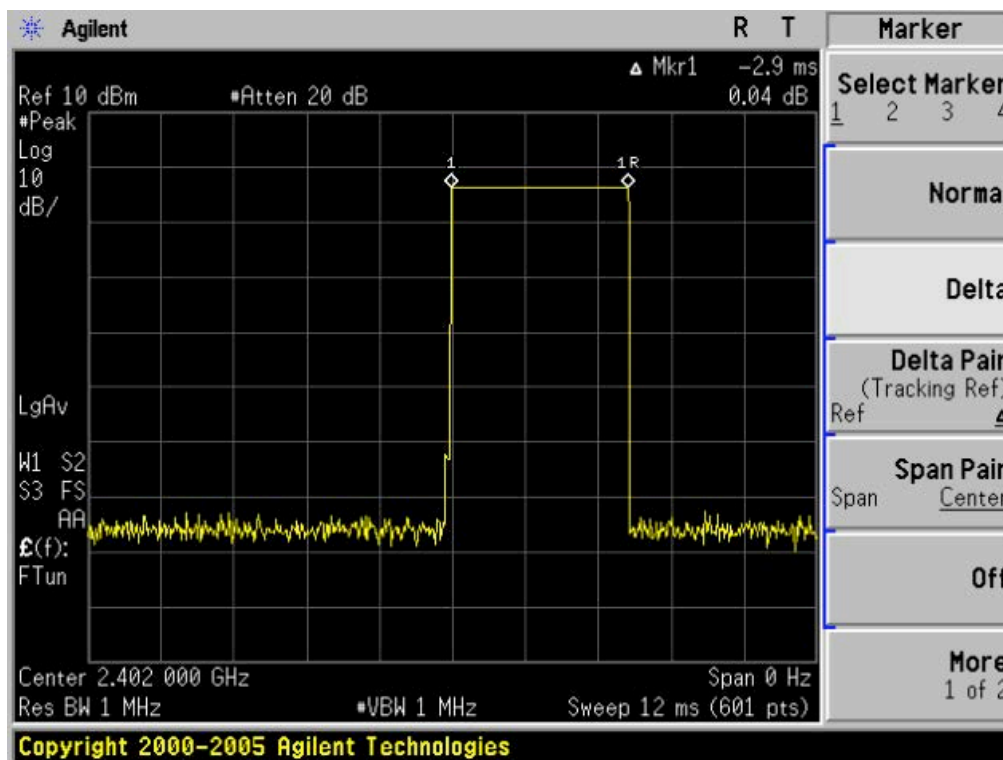
Middle Channel Time

$$2.86 \times (1600/6) / 79 \times 31.6 = 305.07 \text{ms}$$

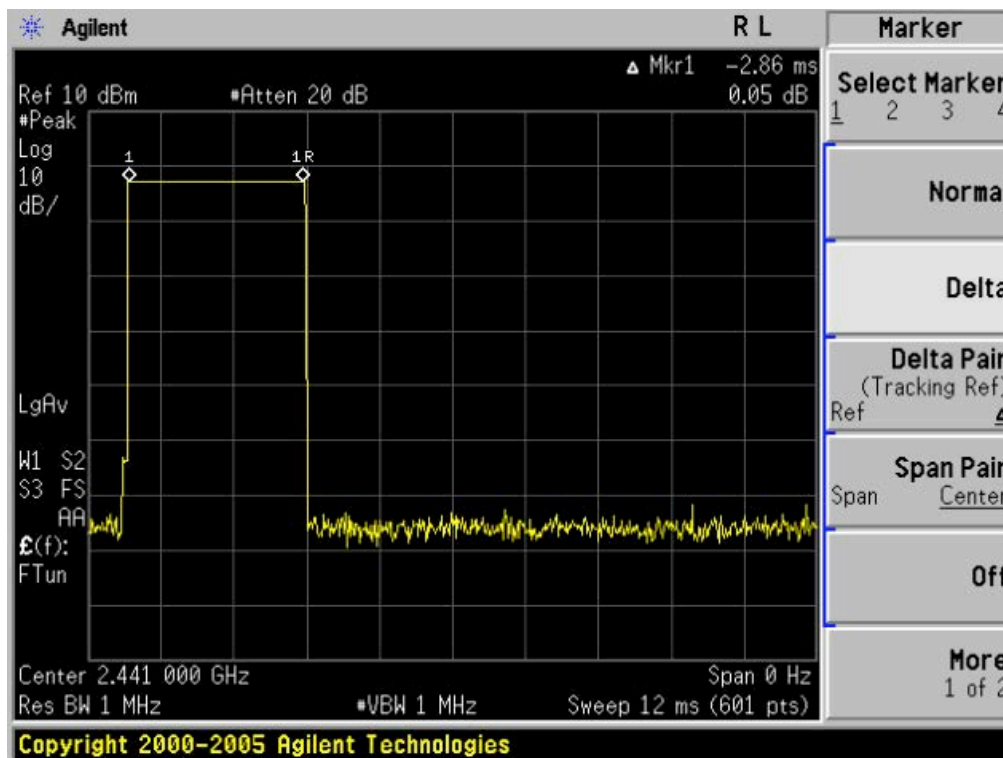
High Channel Time

$$2.88 \times (1600/6) / 79 \times 31.6 = 307.20 \text{ms}$$

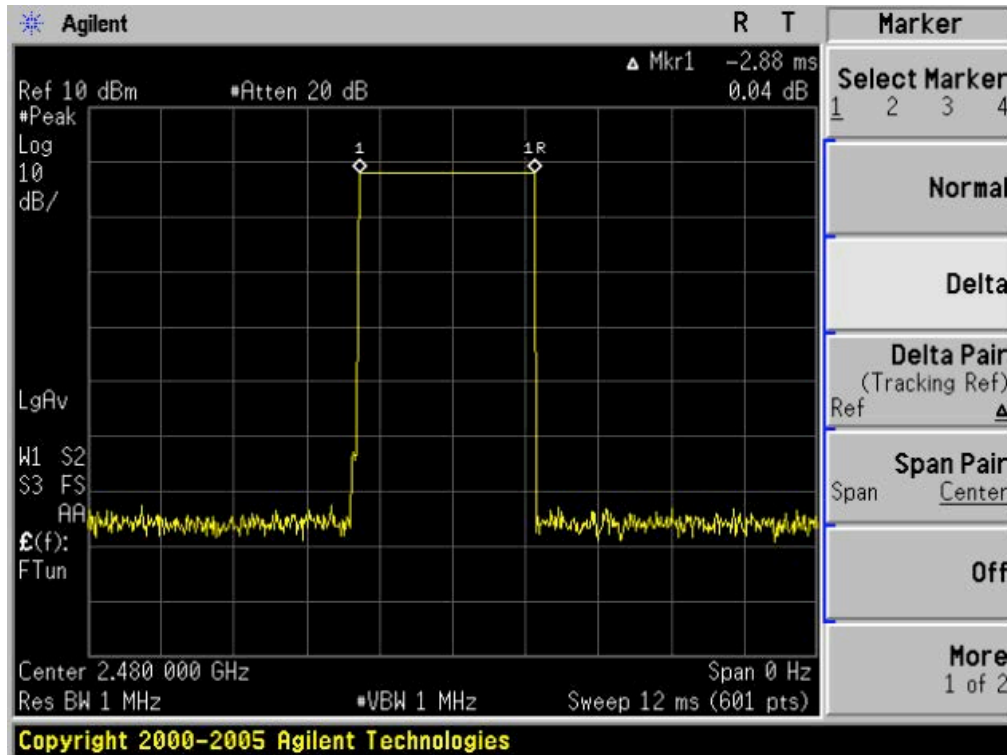
TEST PLOT OF LOW CHANNEL



TEST PLOT OF MIDDLE CHANNEL



TEST PLOT OF HIGH CHANNEL

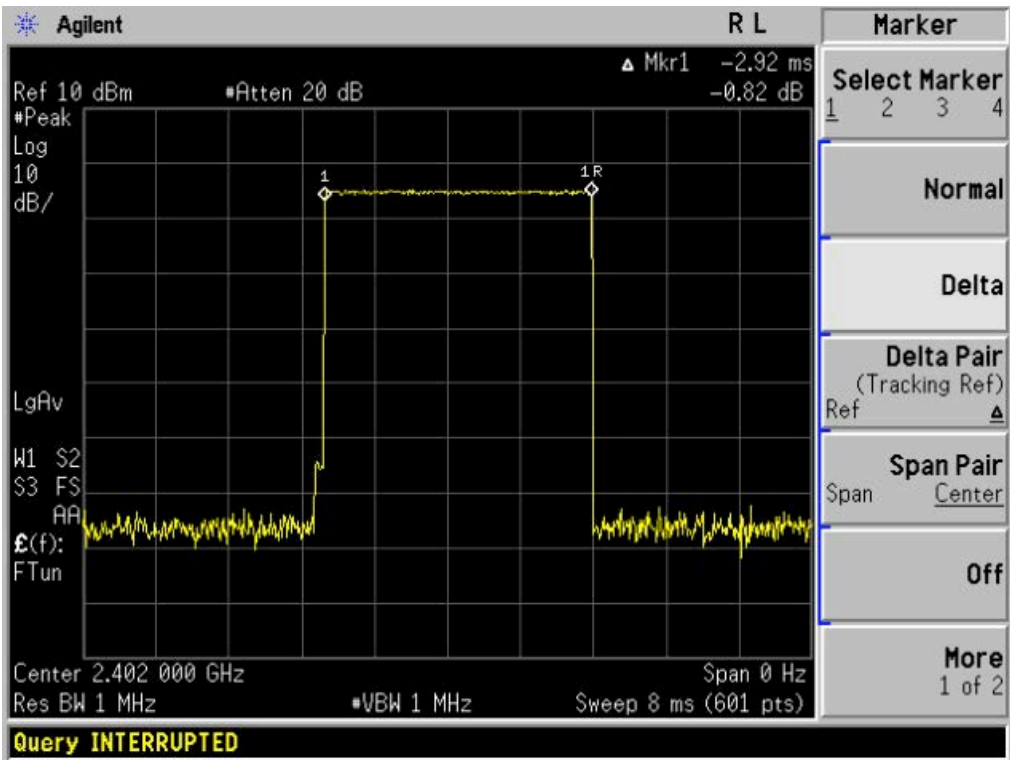


Bluetooth 2Mbps Test Result

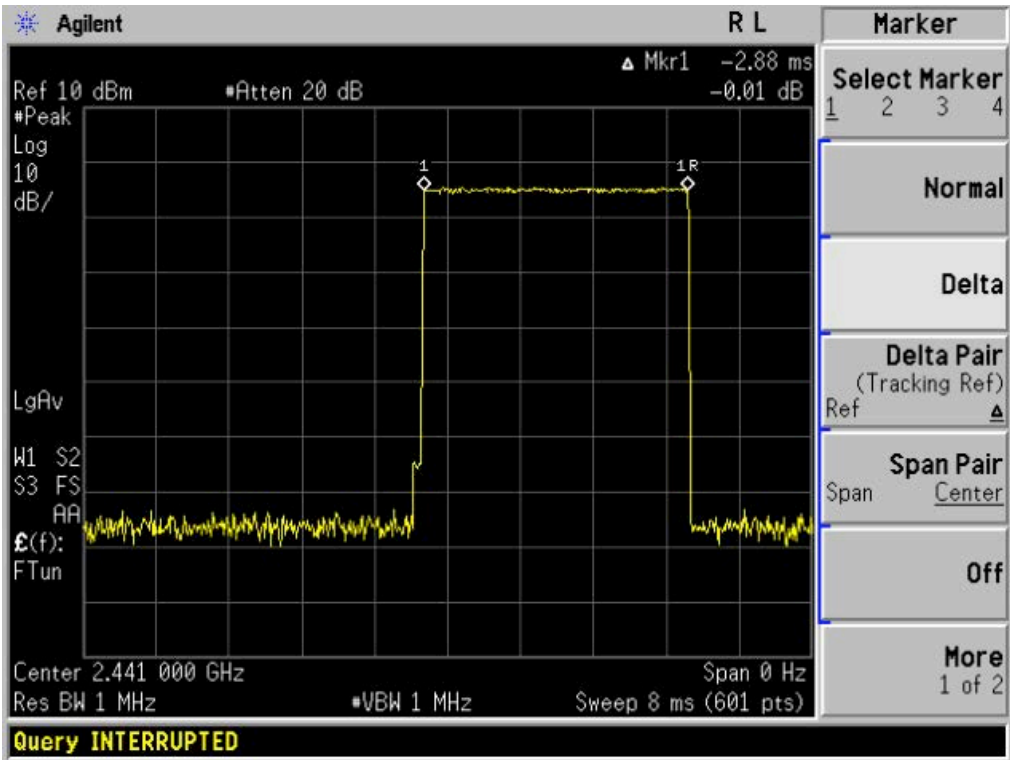
Channel	Time of Pulse for DH5 (ms)	Period Time (s)	Sweep Time (ms)	Limit (ms)
Low	2.92	31.6	311.47	400
Middle	2.88	31.6	307.20	400
High	2.893	31.6	308.59	400

Low Channel Time
 $2.92 \times (1600/6) / 79 \times 31.6 = 311.47 \text{ ms}$
 Middle Channel Time
 $2.88 \times (1600/6) / 79 \times 31.6 = 307.20 \text{ ms}$
 High Channel Time
 $2.893 \times (1600/6) / 79 \times 31.6 = 308.59 \text{ ms}$

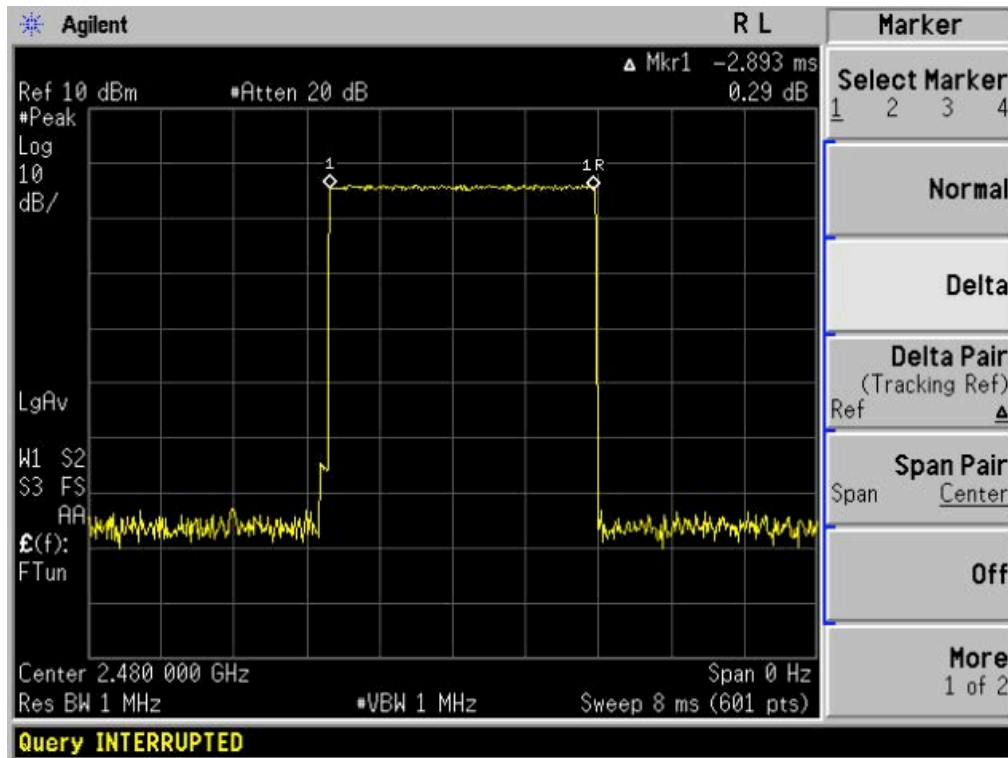
TEST PLOT OF LOW CHANNEL



TEST PLOT OF MIDDLE CHANNEL



TEST PLOT OF HIGH CHANNEL

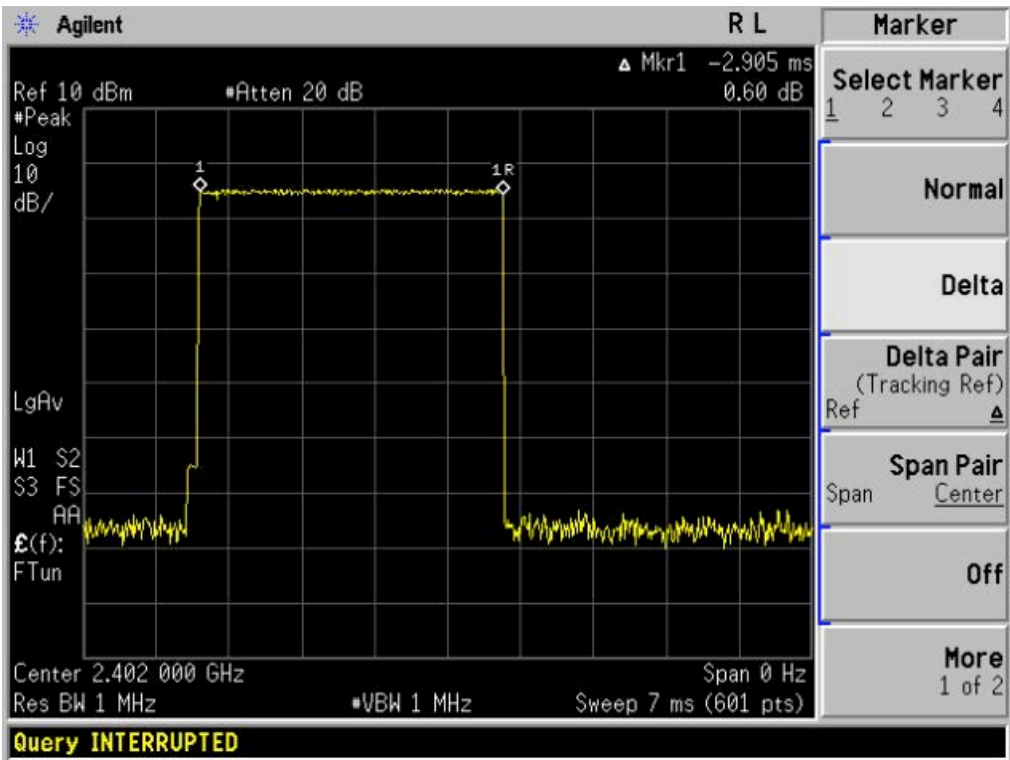


Bluetooth 3Mbps Test Result

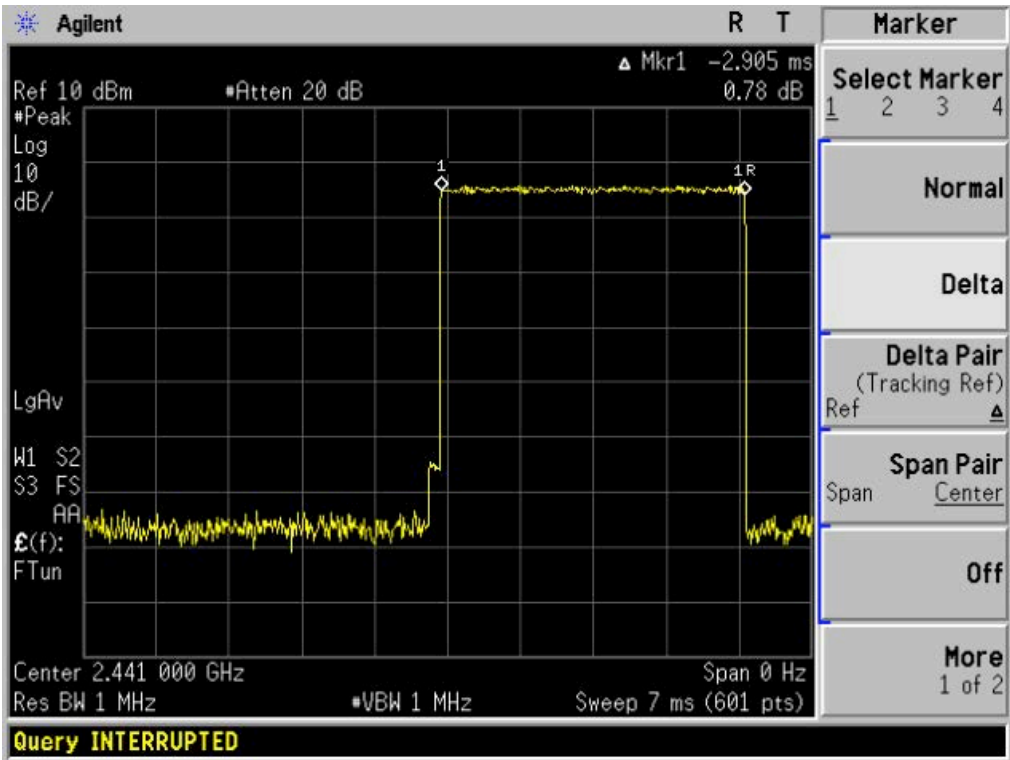
Channel	Time of Pulse for DH5 (ms)	Period Time (s)	Sweep Time (ms)	Limit (ms)
Low	2.905	31.6	309.87	400
Middle	2.905	31.6	309.87	400
High	2.917	31.6	311.15	400

Low Channel Time
 $2.905 \times (1600/6) / 79 \times 31.6 = 309.87 \text{ ms}$
 Middle Channel Time
 $2.905 \times (1600/6) / 79 \times 31.6 = 309.87 \text{ ms}$
 High Channel Time
 $2.917 \times (1600/6) / 79 \times 31.6 = 311.15 \text{ ms}$

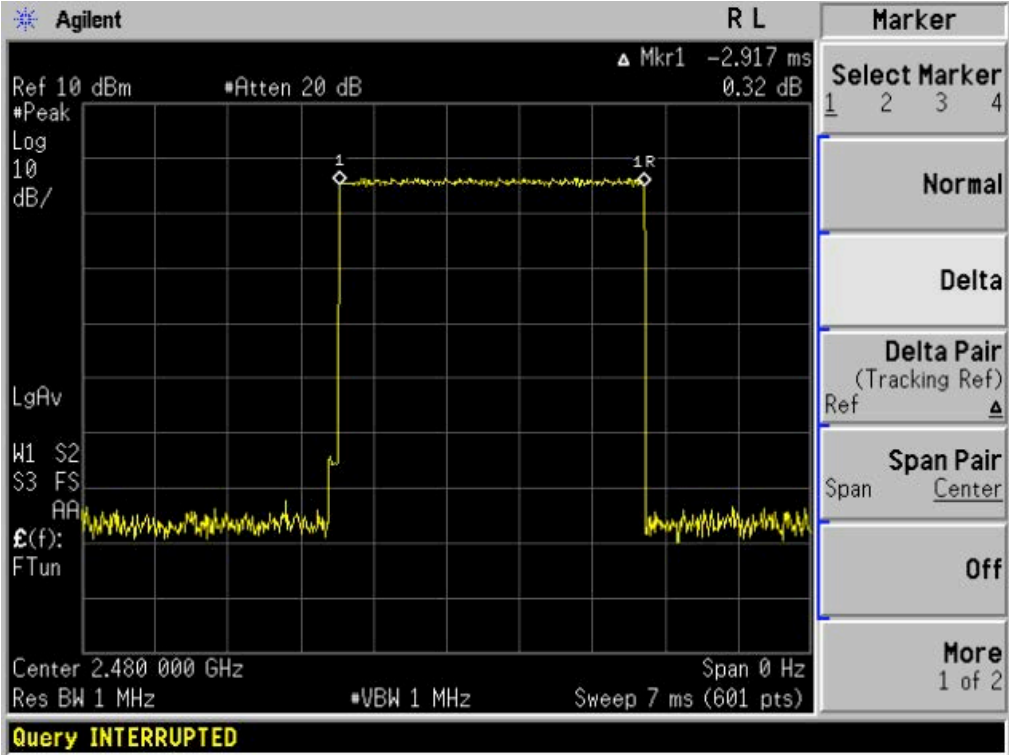
TEST PLOT OF LOW CHANNEL



TEST PLOT OF MIDDLE CHANNEL



TEST PLOT OF HIGH CHANNEL



13. FREQUENCY SEPARATION

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 center frequency of spectrum analyzer = Middle of Operating frequency
4. Set the spectrum analyzer as RBW, VBW=100KHz, Span = 5 MHz,

13.2 TEST SETUP (BLOCK DIAGRAM OF CONFIGURATION)

Same as described in section 5.2

13.3 MEASUREMENT EQUIPMENT USED

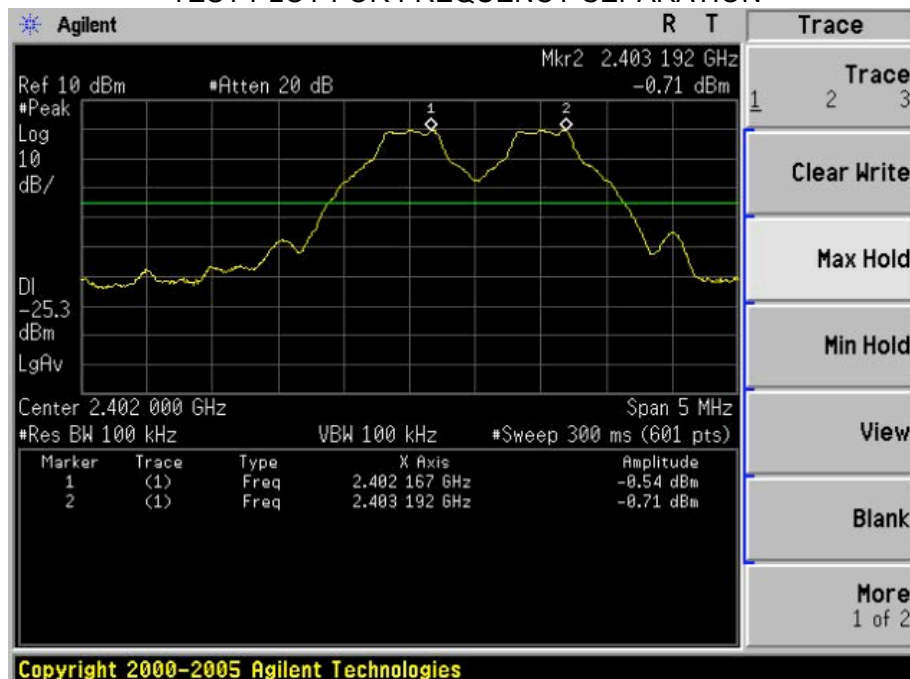
The same as described in section 5.3

13.4 LIMITS AND MEASUREMENT RESULT

BLUETOOTH 1MBPS TEST RESULT

CHANNEL	CHANNEL SEPARATION	LIMIT	RESULT
	KHz	KHz	
CH00-CH01	1025	≥ 25 KHz or 2/3 20 dB BW	Pass

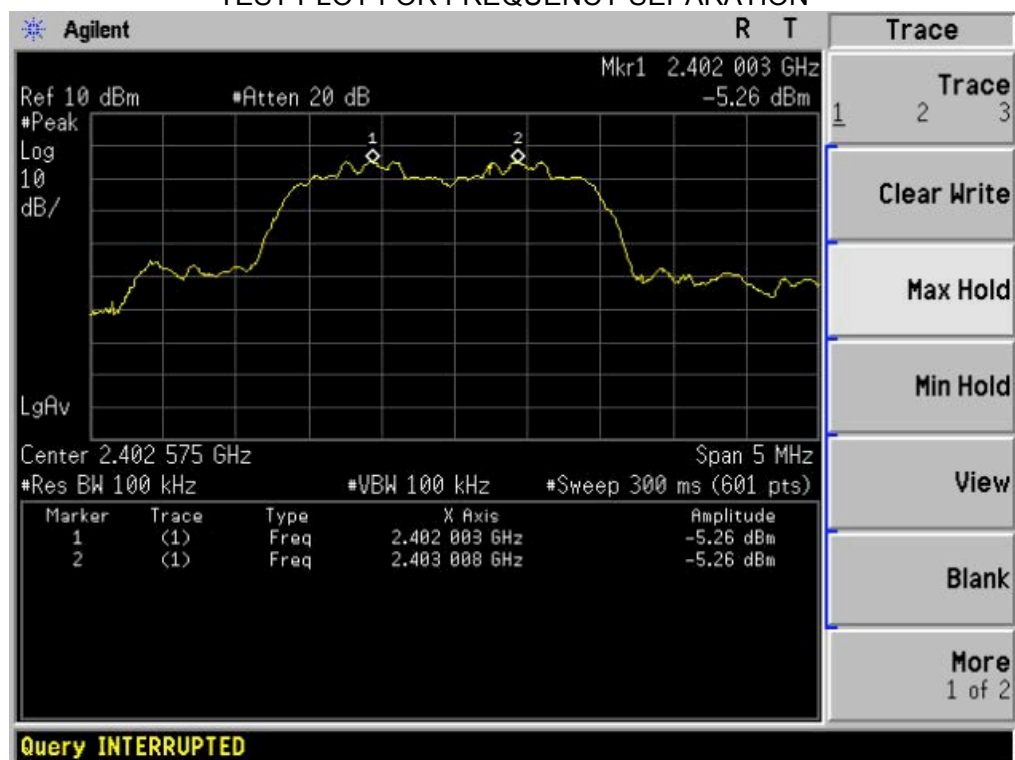
TEST PLOT FOR FREQUENCY SEPARATION



BLUETOOTH 2MBPS TEST RESULT

CHANNEL	CHANNEL SEPARATION	LIMIT	RESULT
	KHz	KHz	
CH00-CH01	1005	≥ 25 KHz or 2/3 20 dB BW	Pass

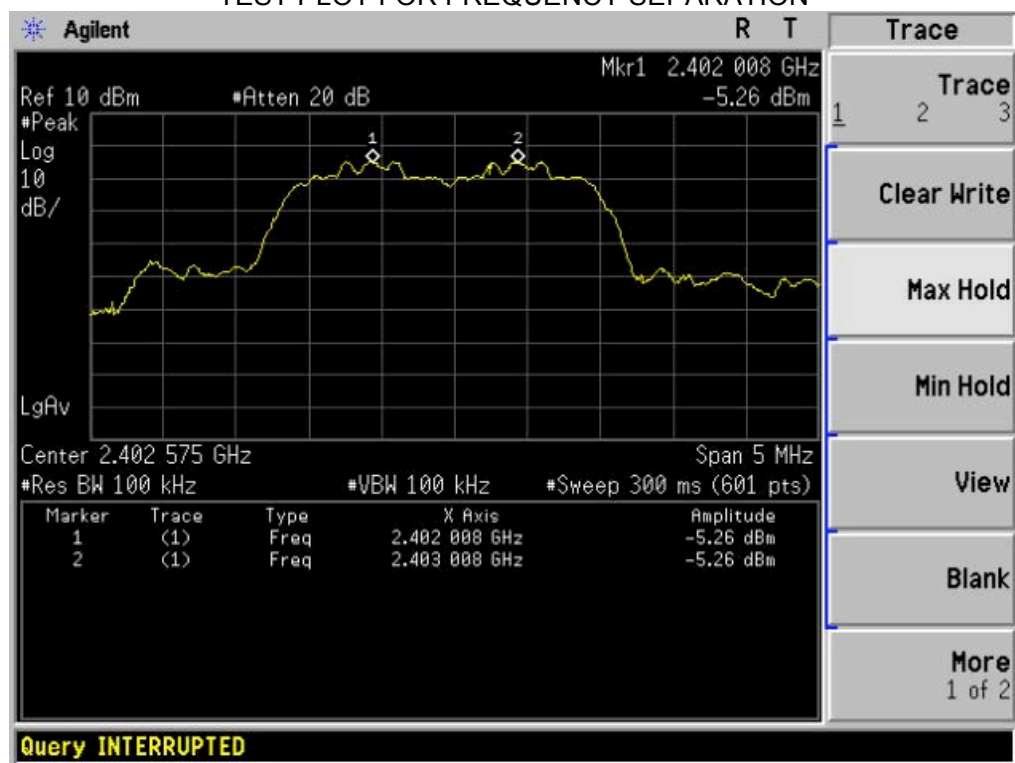
TEST PLOT FOR FREQUENCY SEPARATION



TEST PLOT FOR FREQUENCY SEPARATION

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

TEST PLOT FOR FREQUENCY SEPARATION



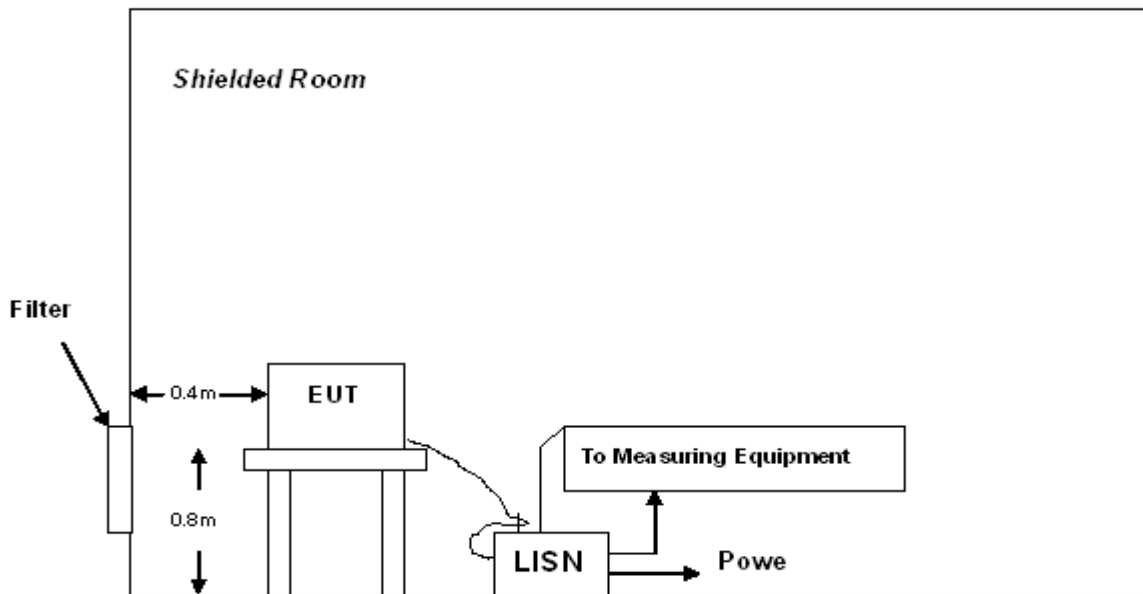
14 FCC LINE CONDUCTED EMISSION TEST

14.1 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

14.2 BLOCK DIAGRAM OF LINE CONDUCTED EMISSION TEST



A: Powered through filter

14.3 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 12V power by adapter.
- 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 following test mode(s) were scanned during the preliminary test:

Preliminary Line Conducted Emission Test				
Frequency Range Investigated		150 KHz TO 30 MHz		
Mode of operation	Date	Report No.	Data#	Worst Mode
Bluetooth speaker	22/03/2011	AGC019110202F2	SB-1 (L,N)	<input type="checkbox"/>
Common speaker	22/03/2011	AGC019110202F2	SB-1 (L,N)	<input checked="" type="checkbox"/>

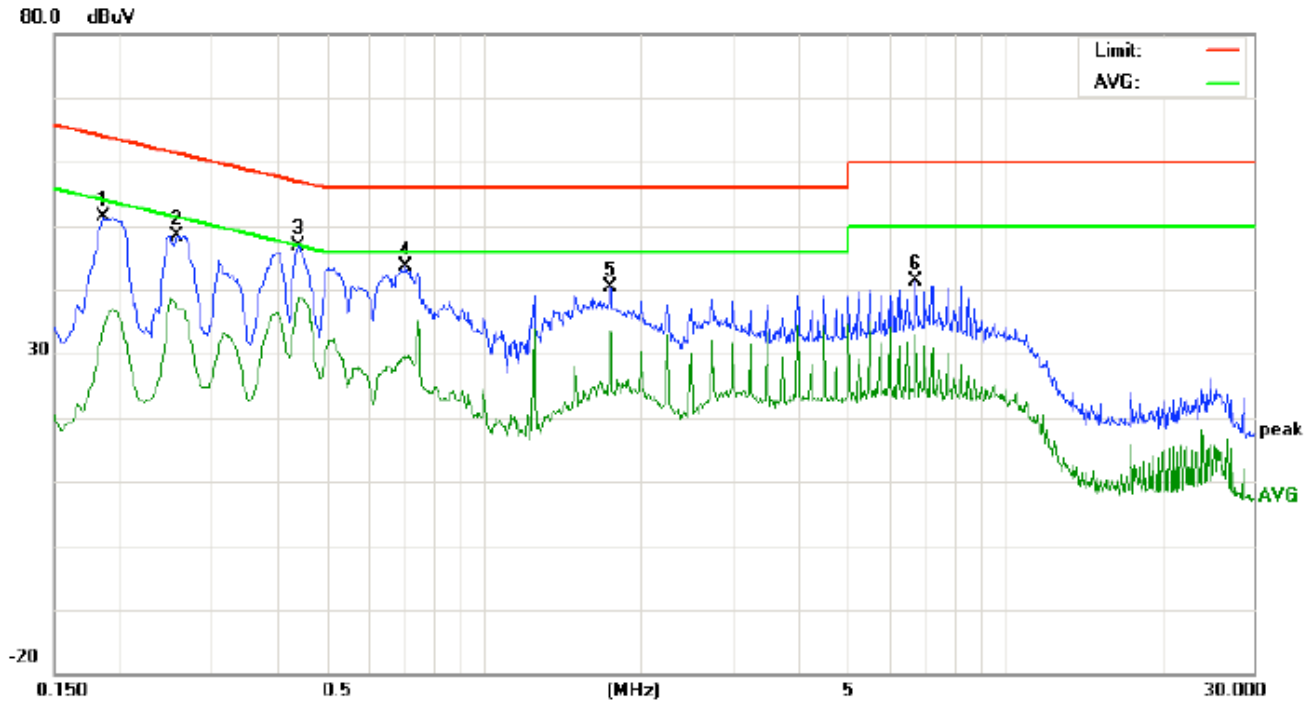
Then, the EUT configuration and cable configuration of the above highest emission level were recorded for reference of final testing.

14.4 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.

14.5 TEST RESULT OF LINE CONDUCTED EMISSION TEST

Line Conducted Emission Test Line 1-L

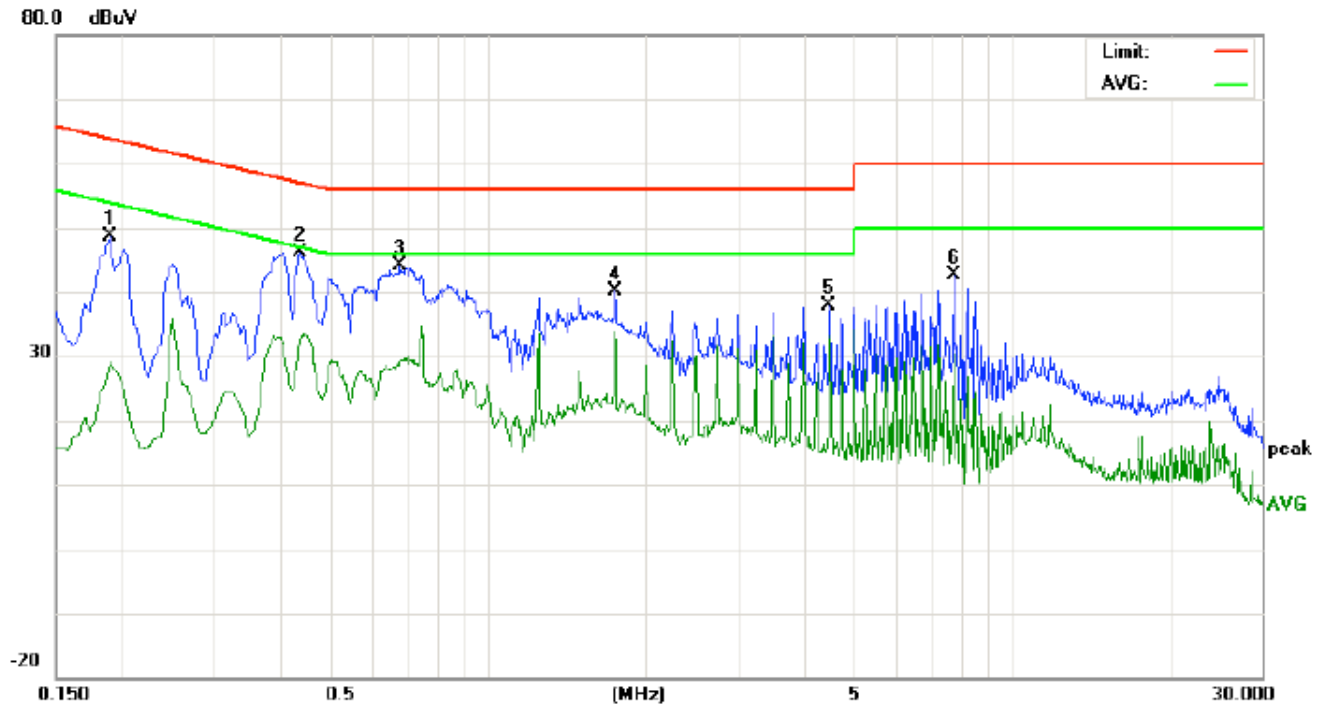


Site: Conduction
Limit: FCC Class B Conduction(QP)
EUT: Bluetooth speaker
M/N: SB-1
Mode:
Note:

Phase: **L1**
Power: AC 120V/60Hz
Temperature: 26
Humidity: 60 %

No.	Freq. (MHz)	Reading_Level (dBuV)			Correct Factor	Measurement (dBuV)			Limit (dBuV)		Margin (dB)		P/F	Comment
		Peak	QP	AVG		Peak	QP	AVG	QP	AVG	QP	AVG		
1	0.1864	41.06		23.95	10.20	51.26		34.15	64.19	54.19	-12.93	-20.04	P	
2	0.2580	38.09		26.84	10.27	48.36		37.11	61.49	51.49	-13.13	-14.38	P	
3	0.4420	36.61		28.50	10.36	46.97		38.86	57.02	47.02	-10.05	-8.16	P	
4	0.7100	33.26		19.02	10.34	43.60		29.36	56.00	46.00	-12.40	-16.64	P	
5	1.7500	30.14		23.26	10.30	40.44		33.56	56.00	46.00	-15.56	-12.44	P	
6	6.7539	30.93		22.43	10.33	41.26		32.76	60.00	50.00	-18.74	-17.24	P	

Line Conducted Emission Test Line 2-N



Site: Conduction Phase: **N** Temperature: 26
Limit: FCC Class B Conduction(QP) Power: AC 120V/60Hz Humidity: 60 %
EUT: Bluetooth speaker
M/N: SB-1
Mode:
Note:

No.	Freq. (MHz)	Reading_Level (dBuV)			Correct Factor dB	Measurement (dBuV)			Limit (dBuV)		Margin (dB)		P/F	Comment
		Peak	QP	AVG		Peak	QP	AVG	QP	AVG	QP	AVG		
1	0.1900	38.35		18.91	10.20	48.55		29.11	64.03	54.03	-15.48	-24.92	P	
2	0.4380	35.87		22.10	10.36	46.23		32.46	57.10	47.10	-10.87	-14.64	P	
3	0.6820	33.72		18.45	10.34	44.06		28.79	56.00	46.00	-11.94	-17.21	P	
4	1.7500	29.89		23.56	10.30	40.19		33.86	56.00	46.00	-15.81	-12.14	P	
5	4.4980	27.57		23.02	10.21	37.78		33.23	56.00	46.00	-18.22	-12.77	P	
6	7.7500	32.24		20.04	10.34	42.58		30.38	60.00	50.00	-17.42	-19.62	P	

APPENDIX I PHOTOGRAPHS OF THE EUT

TOP VIEW OF EUT



BOTTOM VIEW OF EUT



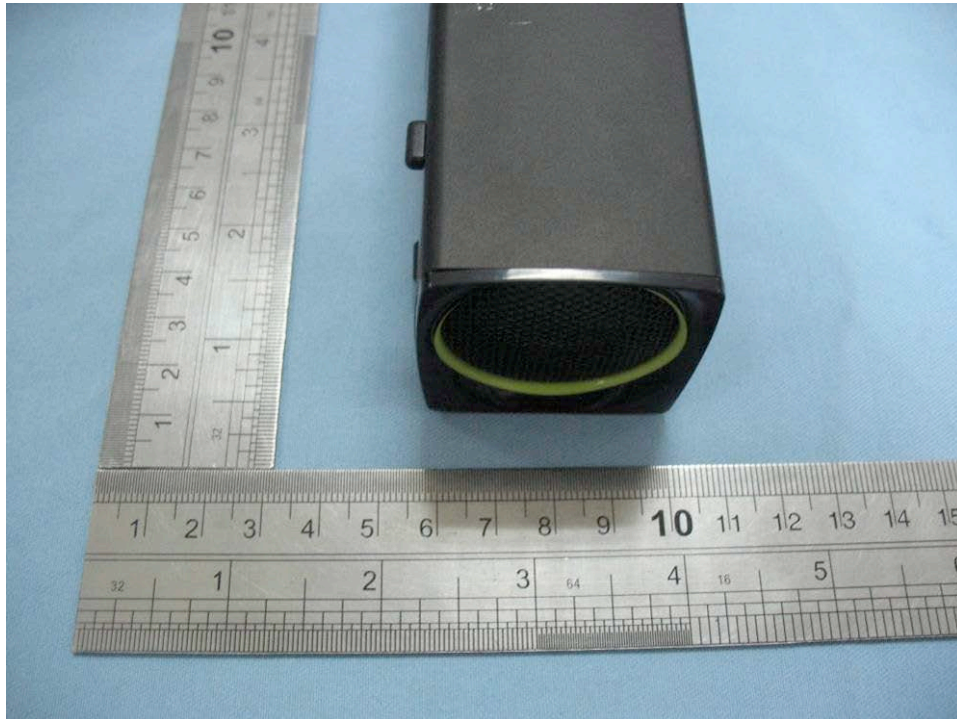
FRONT VIEW OF EUT



BACK VIEW OF EUT



SIDE VIEW OF EUT



ALL VIEW OF EUT



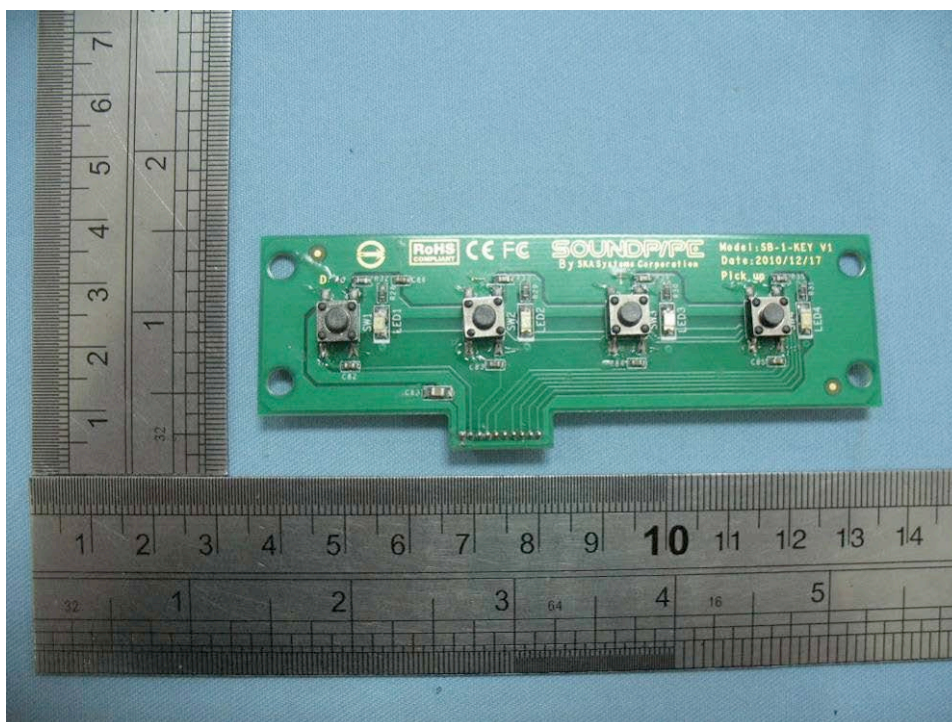
OPEN VIEW OF EUT -1



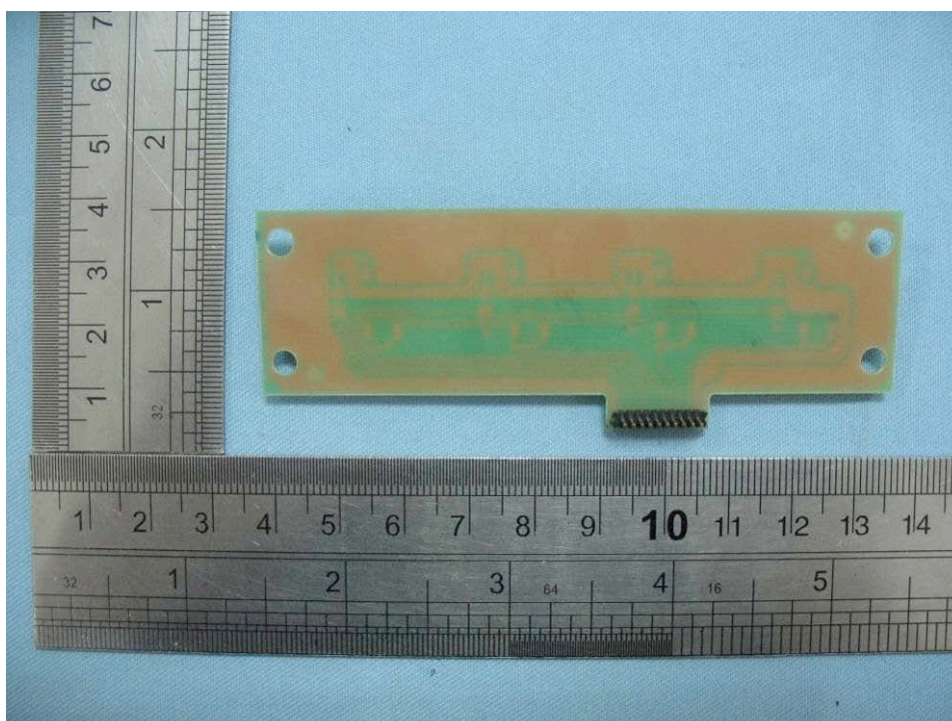
OPEN VIEW OF EUT -2



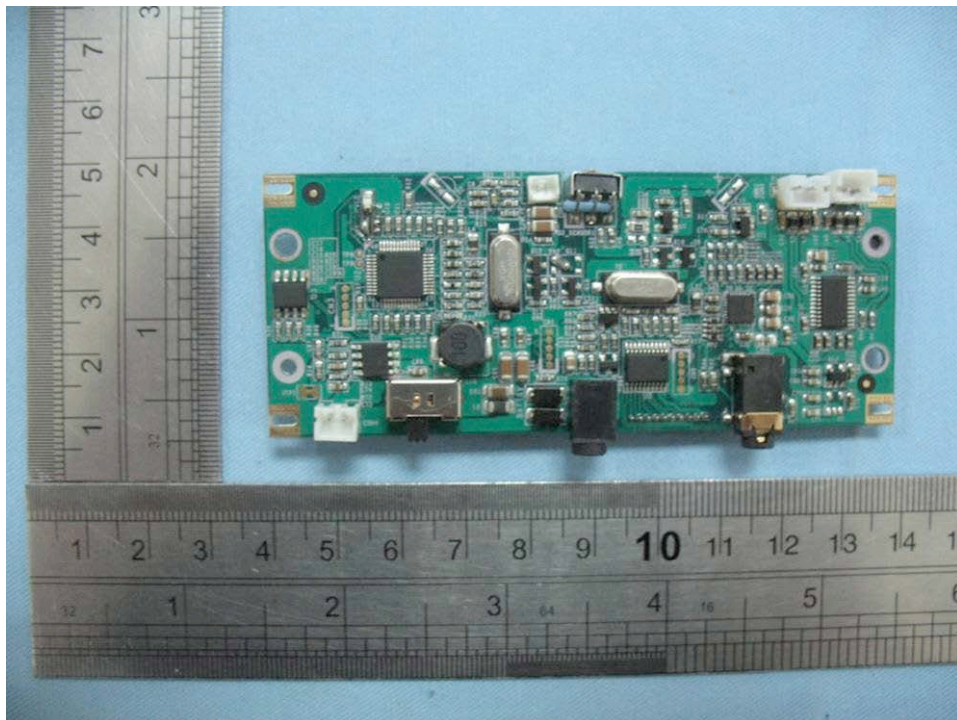
INTERNAL VIEW OF EUT-1



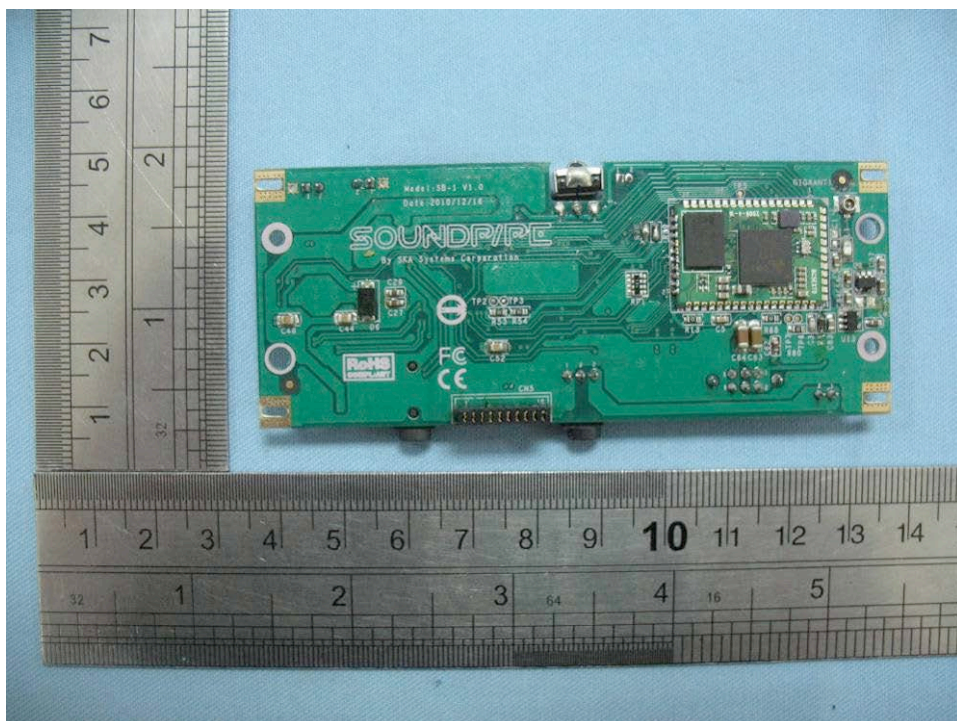
INTERNAL VIEW OF EUT-2



INTERNAL VIEW OF EUT-3



INTERNAL VIEW OF EUT-4

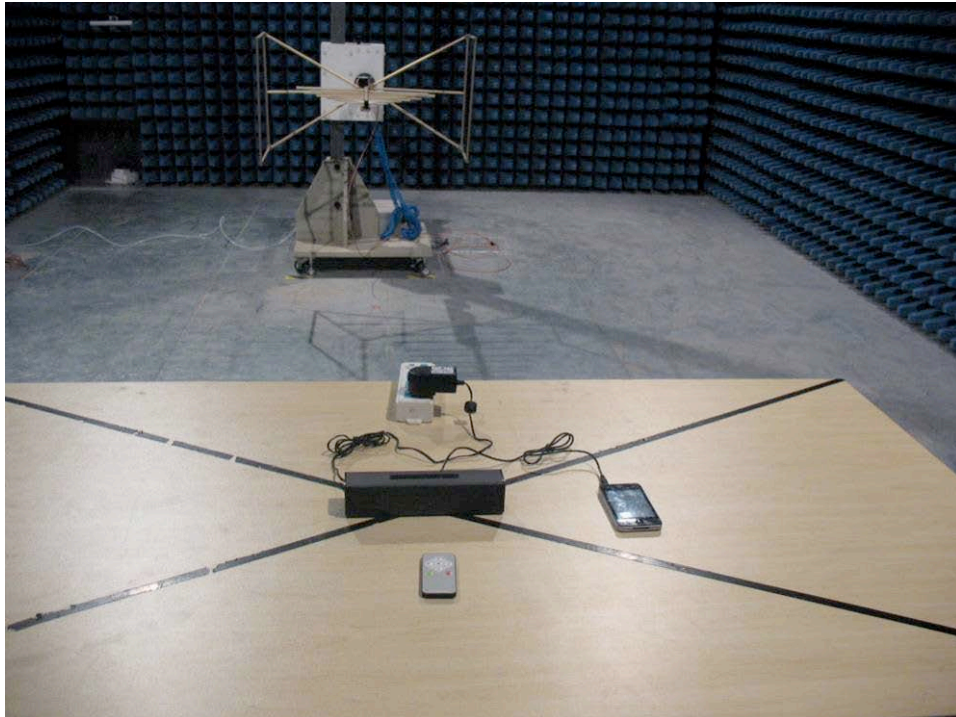


APPENDIX II PHOTOGRAPHS OF THE TEST SETUP

LINE CONDUCTED EMISSION TEST SETUP



RADIATED EMISSION TEST SETUP



----END OF REPORT----