



## 47 CFR PART 15 C - BLUETOOTH

# TEST REPORT

of

### ViewBook 730

Brand Name: ViewSonic  
Model Name: VS14145  
Report No.: SH11030006B01  
FCC ID: GSS-VS14145  
IC: 4280A-VS14145

*prepared for*

### ViewSonic Corporation

381 Brea Canyon Road Walnut, CA 91789, USA

*prepared by*

### Shenzhen Electronic Product Quality Testing Center

#### Morlab Laboratory

3/F, Electronic Testing Building, Shahe Road, Xili,  
Nanshan District, Shenzhen, 518055 P. R. China

Tel: +86 755 86130398

Fax: +86 755 86130218



**Bluetooth®**

**CTIA**

**Authorized Test Lab**

**LAB CODE 20081223-00**

**NOTE:** This test report can be duplicated completely for the legal use with the approval of the applicant; it shall not be reproduced except in full, without the written approval of Shenzhen Electronic Product Quality Testing Center Morlab Laboratory. Any objections should be raised to us within thirty workdays since the date of issue.

## TABLE OF CONTENTS

<b>1.</b>	<b>TEST CERTIFICATION.....</b>	<b>4</b>
<b>2.</b>	<b>GENERAL INFORMATION .....</b>	<b>5</b>
<b>2.1</b>	<b>EUT Description .....</b>	<b>5</b>
<b>2.2</b>	<b>Test Standards and Results .....</b>	<b>7</b>
<b>2.3</b>	<b>Facilities and Accreditations.....</b>	<b>7</b>
2.3.1	Facilities .....	7
2.3.2	Test Environment Conditions.....	8
<b>2.4</b>	<b>EUT Setup and Operating Conditions.....</b>	<b>8</b>
<b>3.</b>	<b>47 CFR PART 15C&amp;RSS 210 REQUIREMENTS .....</b>	<b>9</b>
<b>3.1</b>	<b>Number of Hopping Frequency .....</b>	<b>9</b>
3.1.1	Requirement .....	9
3.1.2	Test Description .....	9
3.1.3	Test Result.....	9
<b>3.2</b>	<b>Peak Output Power .....</b>	<b>11</b>
3.2.1	Requirement .....	11
3.2.2	Test Description .....	11
3.2.3	Test Result.....	11
<b>3.3</b>	<b>20dB Bandwidth .....</b>	<b>17</b>
3.3.1	Definition .....	17
3.3.2	Test Description .....	17
3.3.3	Test Result.....	17
<b>3.4</b>	<b>Carried Frequency Separation.....</b>	<b>23</b>
3.4.1	Definition .....	23
3.4.2	Test Description .....	23
3.4.3	Test Result.....	23
<b>3.5</b>	<b>Time of Occupancy (Dwell time) .....</b>	<b>24</b>
3.5.1	Requirement .....	24
3.5.2	Test Description .....	24
3.5.3	Test Result.....	24
<b>3.6</b>	<b>Conducted Spurious Emissions .....</b>	<b>27</b>
3.6.1	Requirement .....	27

3.6.2	Test Description .....	27
3.6.3	Test Result.....	27
<b>3.7</b>	<b>Band Edge .....</b>	<b>31</b>
3.7.1	Requirement .....	31
3.7.2	Test Description .....	31
3.7.3	Test Result.....	32
<b>3.8</b>	<b>Conducted Emission .....</b>	<b>34</b>
3.8.1	Requirement .....	34
3.8.2	Test Description .....	34
3.8.3	Test Result.....	35
<b>3.9</b>	<b>Radiated Emission .....</b>	<b>37</b>
3.9.1	Requirement .....	37
3.9.2	Test Description .....	37
3.9.3	Test Result.....	39
<b>3.10</b>	<b>RECEIVER SPURIOUS EMISSIONS .....</b>	<b>42</b>
3.10.1	Requirement of the standard .....	42
3.10.2	Test Procedure .....	43
3.10.3	Test Setup .....	43
3.10.4	Test Results .....	44

## 1. TEST CERTIFICATION

**Equipment under Test:** ViewBook 730

**Brand Name:** ViewSonic

**Model Name:** VS14145

**FCC ID:** GSS-VS14145

**IC :** 4280A-VS14145

**Applicant:** ViewSonic Corporation

381 Brea Canyon Road Walnut, CA 91789, USA

**Manufacturer:** Technology (China)CO.,LTD.

4-12Building,No1388,ZhangdongRoad,PudongNewDistrict,Shanghai  
,P.R.China.

**Test Standards:** 47 CFR Part 15 Subpart C

RSS 210; RSS-GEN

**Test Date(s):** Mar 11, 2011 –Mar 11, 2011


**Test Result:** PASS

### \* We Hereby Certify That:

The equipment under test was tested by Shenzhen Electronic Product Quality Testing Center Morlab Laboratory. The test data, data evaluation, test procedures and equipment configurations shown in this report were made in accordance with the requirement of related FCC rules.

The test results of this report only apply for the tested sample equipment identified above. The test report shall be invalid without all the signatures of the test engineer, the reviewer and the approver.

Tested by:	<u>Shi Feng</u> Shi Feng	Dated:	<u>2011.3.21</u>
Reviewed by:	<u>Zhang Jun</u> Zhang Jun	Dated:	<u>2011.3.21</u>
Approved by:	<u>Wei Bei</u> Wei Bei	Dated:	<u>2011.3.21</u>



## 2. GENERAL INFORMATION

### 2.1 EUT Description

**EUT Type.....:** ViewBook 730  
**Model Name .....** VS14145  
**Serial No. ....:** (n.a, marked #1 by test site)  
**IMEI.....:** (n.a, marked #1 by test site)  
**Modulation Type.....:** Frequency Hopping Spread Spectrum (FHSS)  
**Frequency .....** The frequency range used is 2402MHz - 2480MHz (79 channels, at intervals of 1MHz);  
The frequency block is 2400MHz to 2483.5MHz.  
**Power Supply .....** Battery  
Brand name: TCL  
Mode Name.: 43100113N  
Capacitance: 5000mAh  
Rated voltage: 3.7V  
Charge limited: 4.8V  
Manufacturer: TCL HYPERPOWER BATTERIES INC  
No.3,Hechang Dongliu Rd.,Huitai Industrial Zone,Huicheng District, Huizhou City, Guangdong Province ,China  
**Ancillary Equipments .....** AC Adapter (Charger for Battery)  
Brand name: GPE  
Mode Name.: GPE125-050200-Z  
Rated Input: AC100~240V, 0.4A, 50/60Hz  
Rated Output: DC5V, 2000mA  
Manufacturer: Golden Profit Electronics Ltd.  
Sha Yao Administrative District, Shijie Town, Dongguan City, Guangdong Province, P.R. China.  
**Antenna Specification .....** Brand Name.: AzureWave  
Model Name: AW-GH381  
Manufacturer: AzureWave Technologies, Inc.  
Gain: -0.3dBd gain (Max)

*Note 1:* The EUT is a Mobile Phone, it contains Bluetooth Module operating at 2.4GHz ISM band; the frequencies allocated for the Bluetooth Module is  $F(\text{MHz})=2402+1*n$  ( $0 \leq n \leq 78$ ). The lowest, middle, highest channel numbers of the Bluetooth Module used and tested in this report are separately 0 (2402MHz), 39 (2441MHz) and 78 (2480MHz).

*Note 2:* For a more detailed description, please refer to Specification or User's Manual supplied by the applicant and/or manufacturer.

## 2.2 Test Standards and Results

The objective of the report is to perform testing according to 47 CFR Part 15 Subpart C (Bluetooth, 2.4GHz ISM band radiators) and RSS 210 for the EUT FCC ID Certification and IC ID Certification:

No.	Identity		Document Title
1	47 CFR Part 15 (10-1-05 Edition)	RSS 210	Radio Frequency Devices

Test detailed items/section required by FCC rules and results are as below:

No.	Section		Description	Result
1	15.247(a)	A8.1(4)	Number of Hopping Frequency	PASS
2	15.247(b)	A8.2(a)	Peak Output Power	PASS
3	15.247(a)	A8.1(1)	20dB Bandwidth	PASS
4	15.247(a)	A8.1(2)	Carrier Frequency Separation	PASS
5	15.247(a)	A8.1(4)	Time of Occupancy (Dwell time)	PASS
6	15.247(c)	A7.2.2	Conducted Spurious Emission	PASS
7	15.247(c)	A8.5	Band Edge	PASS
8	15.207	A8.5	Conducted Emission	PASS
9	15.209 15.247(c)	A8.5	Radiated Emission	PASS

## 2.3 Facilities and Accreditations

### 2.3.1 Facilities

Shenzhen Electronic Product Quality Testing Center Morlab Laboratory is a testing organization accredited by China National Accreditation Service for Conformity Assessment (CNAS) according to ISO/IEC 17025. The accreditation certificate number is L1659.

All measurement facilities used to collect the measurement data are located at Electronic Testing Building, Shahe Road, Xili, Nanshan District, Shenzhen 518055 CHINA. The test site is constructed in conformance with the requirements of ANSI C63.7, ANSI C63.4 and CISPR Publication 22; the FCC registration number is 741109.

### 2.3.2 Test Environment Conditions

During the measurement, the environmental conditions were within the listed ranges:

Temperature ( °C):	20 - 25
Relative Humidity (%):	40 - 60
Atmospheric Pressure (kPa):	96

### 2.4 EUT Setup and Operating Conditions

The EUT has been tested under Operating and standby condition. CMU200 was used to control the EUT for staying in continuous transmitting mode. Channel 0, 39 and 78 with highest data rate ( DH1) (DH3) (DH5) are chosen for tested.

Mode 1: AC charge+EUT Mode;

Mode 2: Battery+EUT Mode;

Worst Case:GFSK(1 Mbps) Mode 1 Channel Low (2402MHz)、 Mid (2441MHz) and High (2480MHz) were chosen for full testing.

After the preliminary scan GFSK,  $\pi/4$ -DQPSK,8-DPSK. we found the modulation at GFSK producing the highest emission level, so evaluated we chosen the above modes (worst case ) as a representative.

### 3. 47 CFR PART 15C&RSS 210 REQUIREMENTS

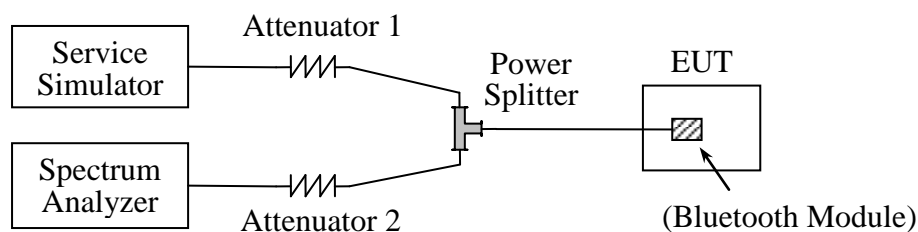
#### 3.1 Number of Hopping Frequency

##### 3.1.1 Requirement

According to FCC section 15.247(a)(1)(ii), frequency hopping systems operating in the 2400MHz to 2483.5MHz bands shall use at least 75 hopping frequencies.

##### 3.1.2 Test Description

###### A. Test Setup:



The Bluetooth Module of the EUT, which is powered by the Battery, is coupled to the Spectrum Analyzer (SA) and the Bluetooth Service Simulator (SS) with Attenuators through the Power Splitter; the RF load attached to the EUT antenna terminal is 50Ohm; the path loss as the factor is calibrated to correct the reading. During the measurement, the Bluetooth Module of the EUT is activated and controlled by the SS, and is set to operate under test mode transmitting 339 bytes DH5 packages at maximum power.

###### B. Equipments List:

Description	Manufacturer	Model	Serial No.	Cal. Date	Cal. Due
Service Simulator	Anritsu	MT8852A	6K00002788	2010.9	1year
Spectrum Analyzer	R&S	FSP30	101020	2010.9	1year
Spectrum Analyzer	Agilent	E4440A	MY46187763	2010.9	1year
Power Splitter	Weinschel	1506A	NW521	(n.a.)	(n.a.)
Attenuator 1	Resnet	10dB	(n.a.)	(n.a.)	(n.a.)
Attenuator 2	Resnet	3dB	(n.a.)	(n.a.)	(n.a.)

##### 3.1.3 Test Result

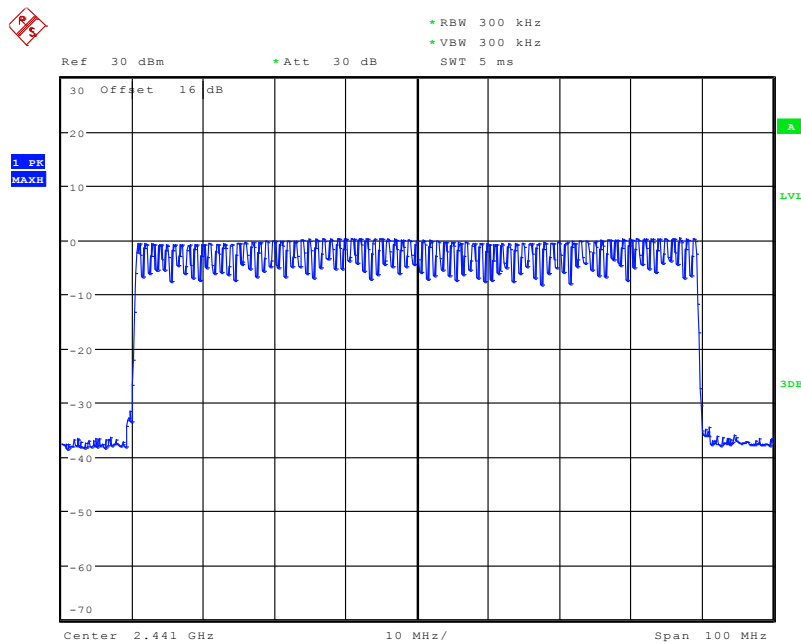
The Bluetooth Module operates at hopping-on test mode; the frequencies number employed is

counted to verify the Module's using the number of hopping frequency. compliance to Hopping Sequence and Equal Usage of the channels

#### A. Test Verdict:

Frequency Block (MHz)	Measured Channel Numbers	Min. Limit	Refer to Plot	Verdict
2400 - 2483.5	79	75	Plot A	PASS

#### B. Test Plot:



Date: 12.NOV.2010 07:41:34

(Plot A: 2402MHz to 2480MHz)

## 3.2 Peak Output Power

### 3.2.1 Requirement

According to FCC section 15.247(b)(1), for frequency hopping systems that operates in the 2400MHz to 2483.5MHz band employing at least 75 hopping channels, the maximum peak output power of the intentional radiator shall not exceed 1Watt. For all other frequency hopping systems in the 2400MHz to 2483.5MHz band, it is 0.125Watts.

### 3.2.2 Test Description

See section 3.1.2 of this report.

### 3.2.3 Test Result

The Bluetooth Module operates at hopping-off test mode. The lowest, middle and highest channels are selected to perform testing to verify the conducted RF output peak power of the Module.

#### A. Test Verdict:

GFSK (1Mbps)

Channel	Frequency (MHz)	Measured Output Peak Power			Limit		Verdict
		dBm	W	Refer to Plot	dBm	W	
0	2402	<b>-0.31</b>	0.00093	Plot A	30	1	PASS
39	2441	<b>0.21</b>	0.00105	Plot B			PASS
78	2480	<b>0.46</b>	0.00111	Plot C			PASS

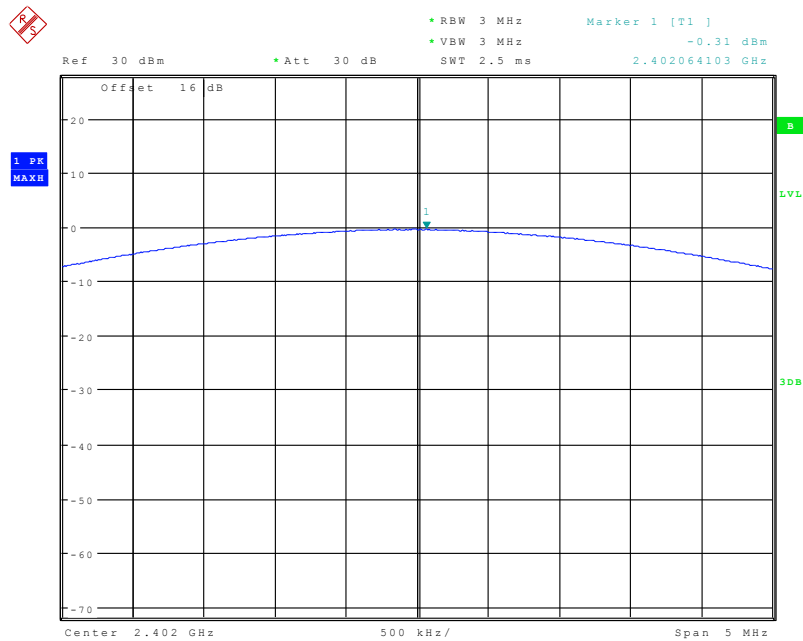
$\pi/4$ -DQPSK (2Mbps)

Channel	Frequency (MHz)	Measured Output Peak Power			Limit		Verdict
		dBm	W	Refer to Plot	dBm	W	
0	2402	-0.48	0.00090	Plot D	30	1	PASS
39	2441	0.04	0.00101	Plot E			PASS
78	2480	0.29	0.00107	Plot F			PASS

8-DPSK (3Mbps)

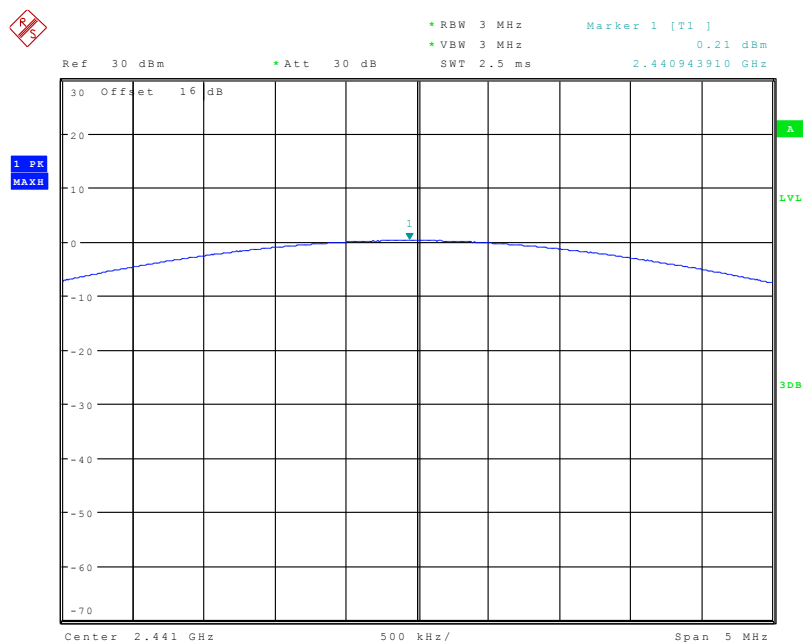
Channel	Frequency (MHz)	Measured Output Peak Power			Limit		Verdict
		dBm	W	Refer to Plot	dBm	W	
0	2402	-0.66	0.00086	Plot G	30	1	PASS
39	2441	-0.01	0.00100	Plot H			PASS
78	2480	0.06	0.00101	Plot I			PASS

## B. Test Plot:



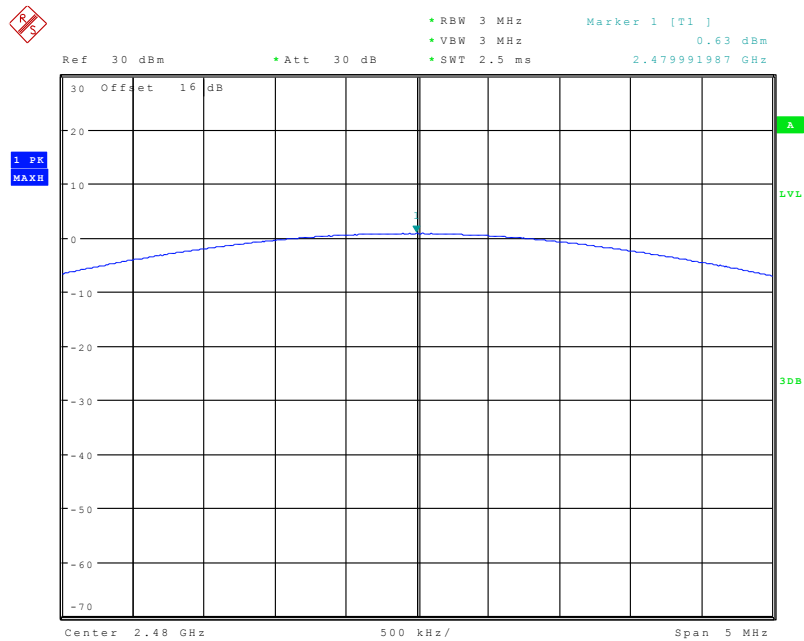
Date: 23.NOV.2010 15:15:34

(Plot A:Channel = 2402)



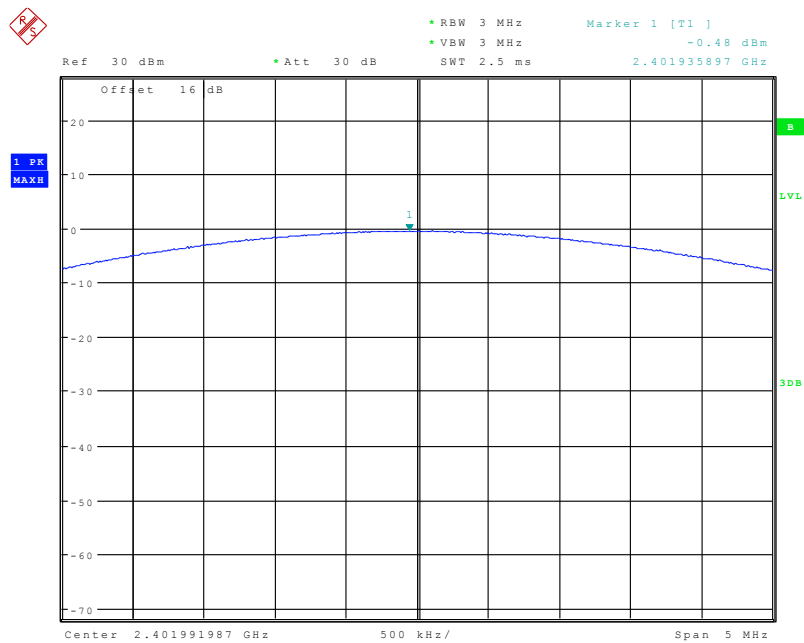
Date: 23.NOV.2010 15:30:18

(Plot B:Channel = 2441)



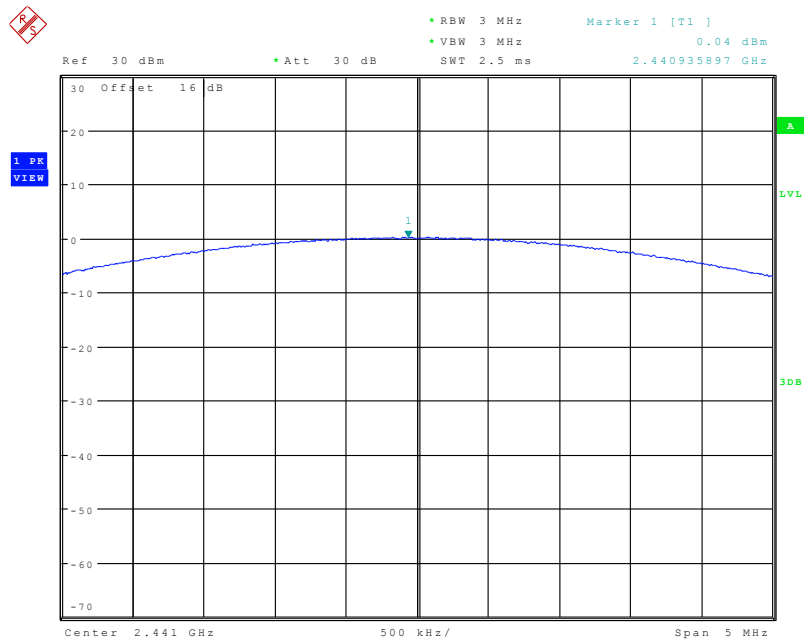
Date: 23.NOV.2010 15:42:23

(Plot C:Channel = 2480)



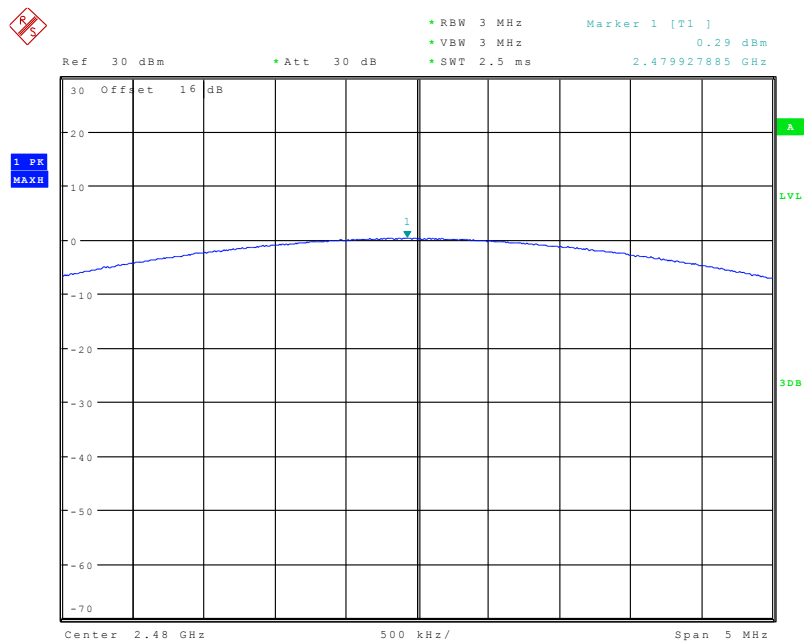
Date: 23.NOV.2010 15:16:49

(Plot D:Channel = 2402)



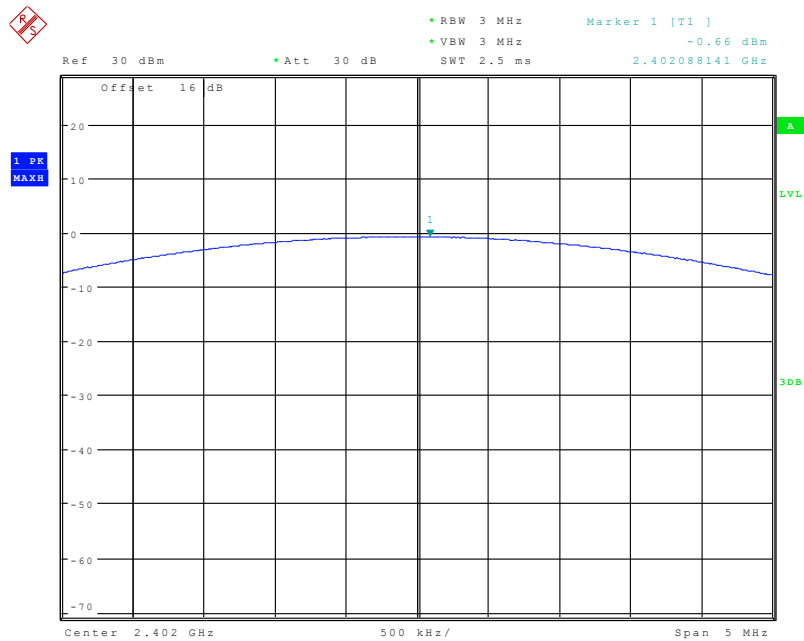
Date: 23.NOV.2010 15:32:16

(Plot E: Channel = 2441)



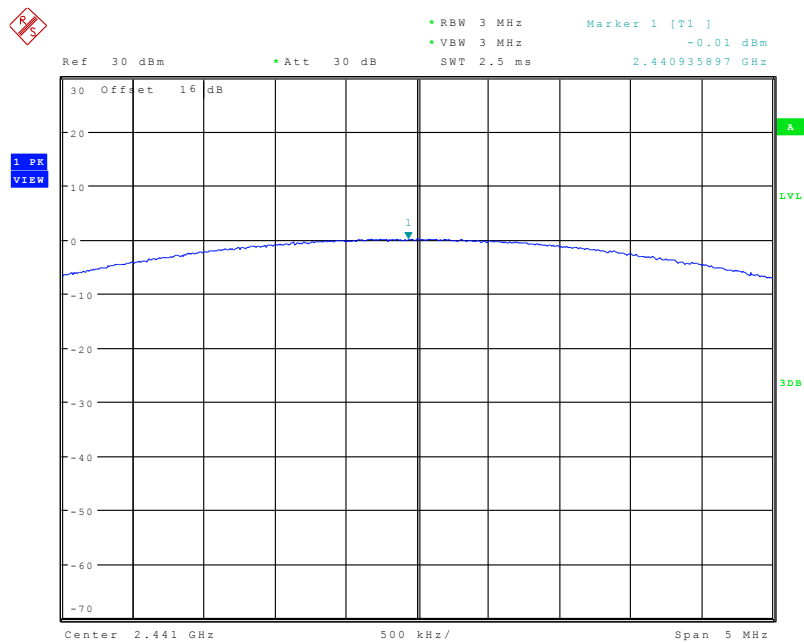
Date: 23.NOV.2010 15:35:54

(Plot F: Channel = 2480)



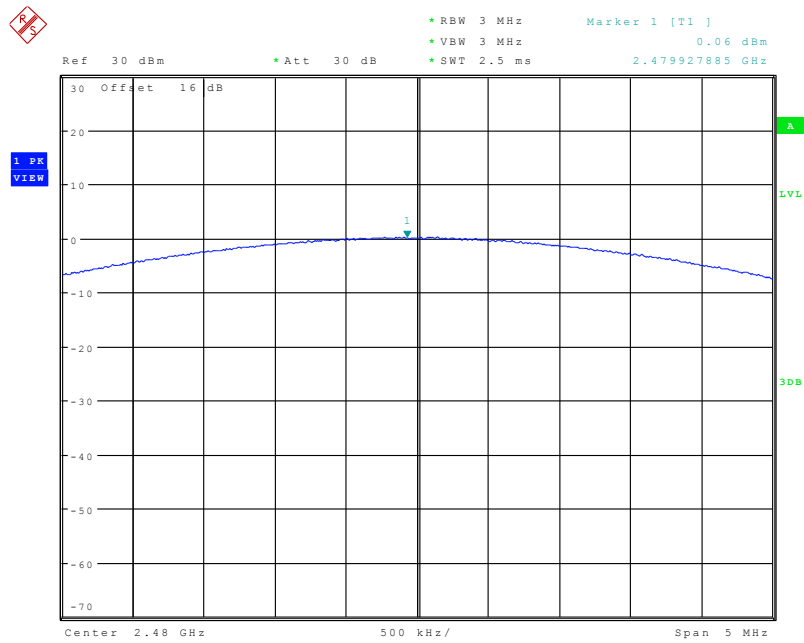
Date: 23.NOV.2010 15:23:25

(Plot G:Channel = 2402)



Date: 23.NOV.2010 15:32:35

(Plot H:Channel = 2441)



Date: 23.NOV.2010 15:36:35

(Plot I: Channel = 2480)

### 3.3 20dB Bandwidth

#### 3.3.1 Definition

The 20dB bandwidth is known as the 99% emission bandwidth, or 20dB bandwidth ( $10 \cdot \log 1\% = 20\text{dB}$ ) taking the total RF output power.

#### 3.3.2 Test Description

See section 3.1.2 of this report.

#### 3.3.3 Test Result

The Bluetooth Module operates at hopping-off test mode. The lowest, middle and highest channels are selected to perform testing to record the 20dB bandwidth of the Module.

##### A. Test Verdict:

The maximum 20dB bandwidth measured is 1.361MHz according to the table below.

GFSK (1Mbps)

Channel	Frequency (MHz)	20dB Bandwidth (MHz)	Refer to Plot
0	2402	1.017	Plot A
39	2441	1.017	Plot B
78	2480	1.017	Plot C

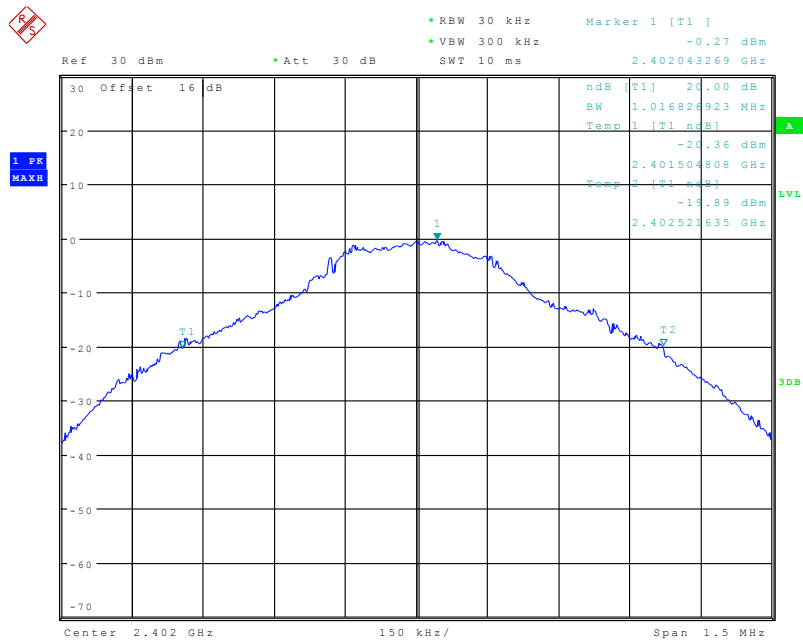
$\pi/4$ -DQPSK (2Mbps)

Channel	Frequency (MHz)	20dB Bandwidth (MHz)	Refer to Plot
0	2402	1.344	PlotD
39	2441	1.341	Plot E
78	2480	1.337	Plot F

8-DPSK (3Mbps)

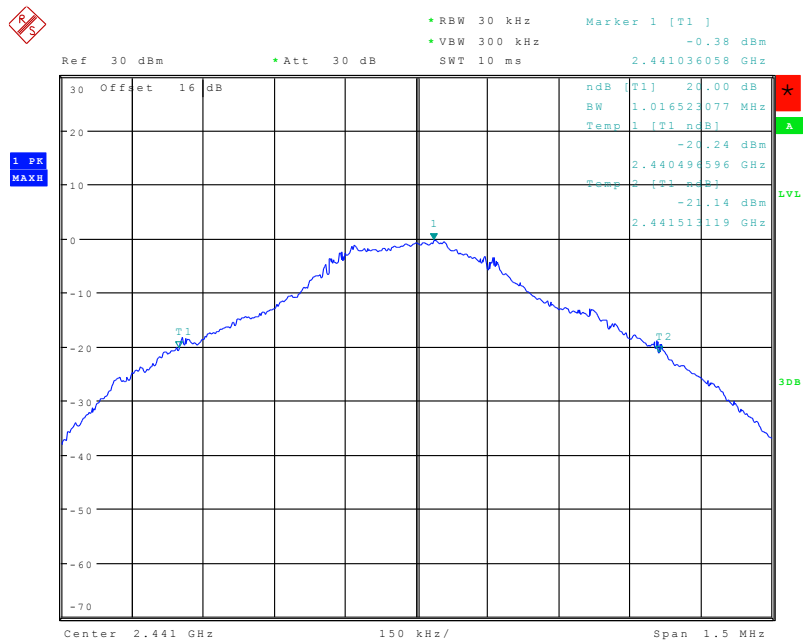
Channel	Frequency (MHz)	20dB Bandwidth (MHz)	Refer to Plot
0	2402	1.356	Plot G
39	2441	1.361	Plot H
78	2480	1.361	Plot I

### B. Test Plot:



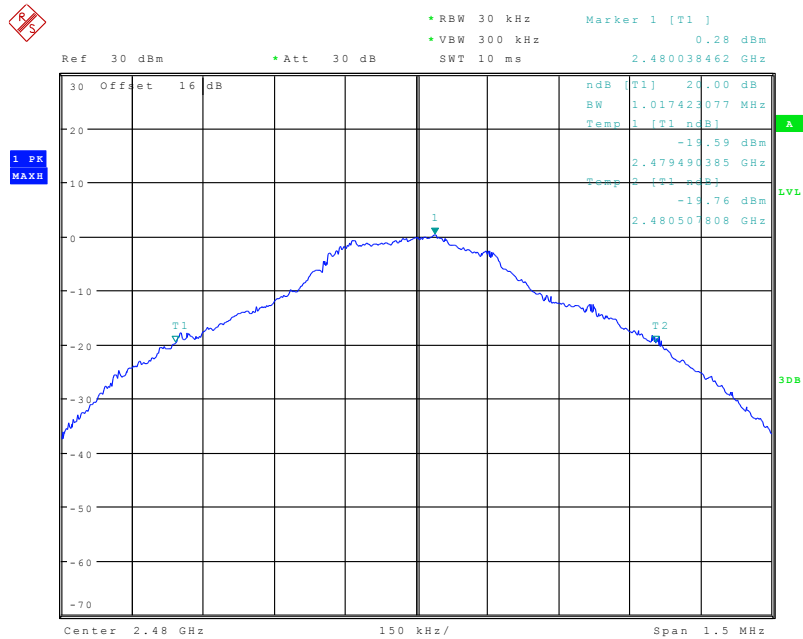
Date: 23.NOV.2010 15:49:13

(Plot A: Channel = 2402)



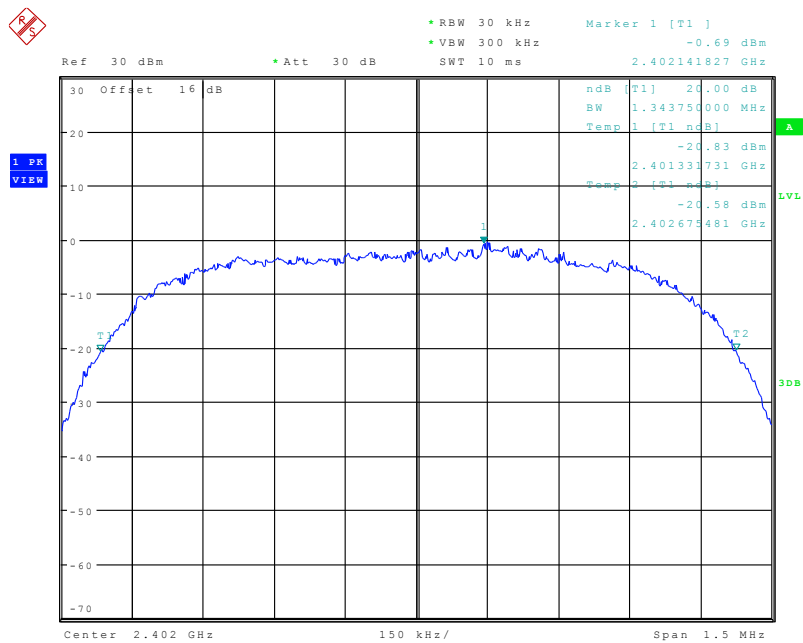
Date: 23.NOV.2010 15:58:47

(Plot B: Channel = 2441)



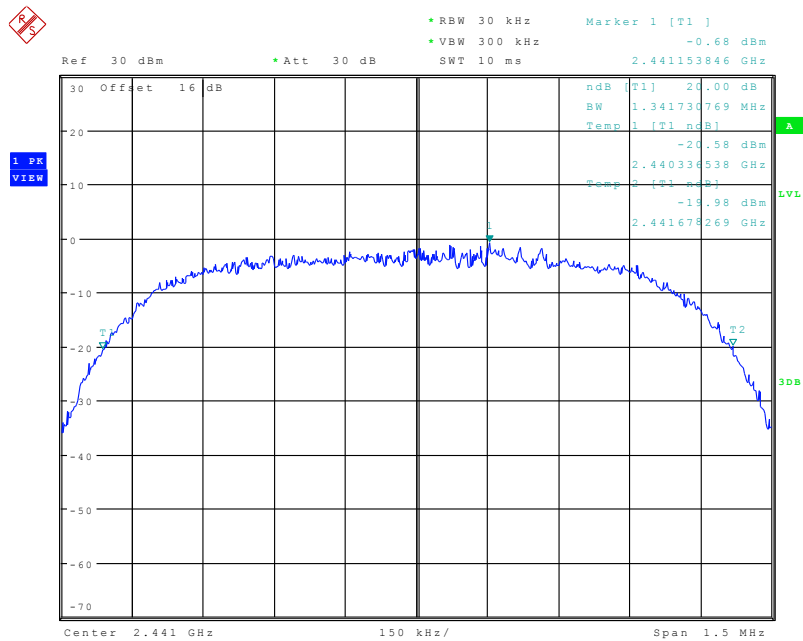
Date: 23.NOV.2010 16:10:06

(Plot C: Channel = 2480)



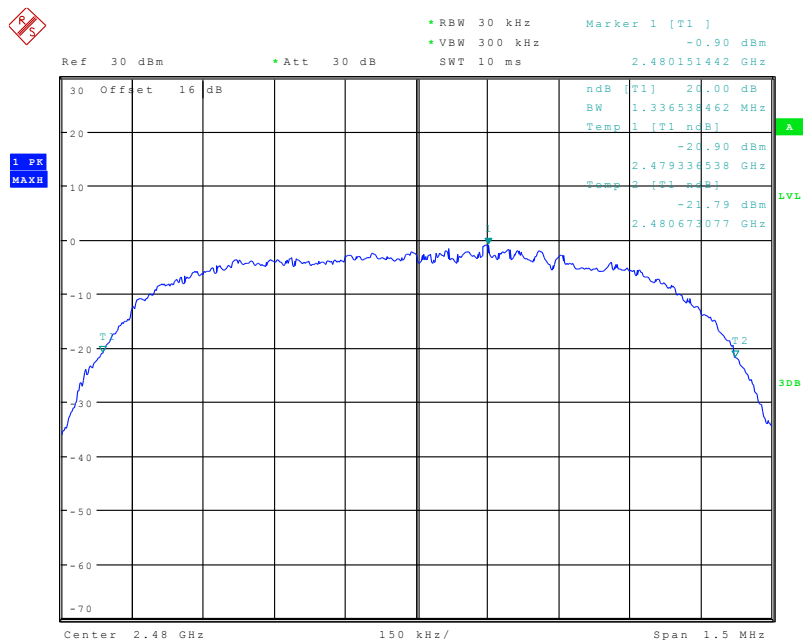
Date: 23.NOV.2010 15:52:50

(Plot D: Channel = 2402)



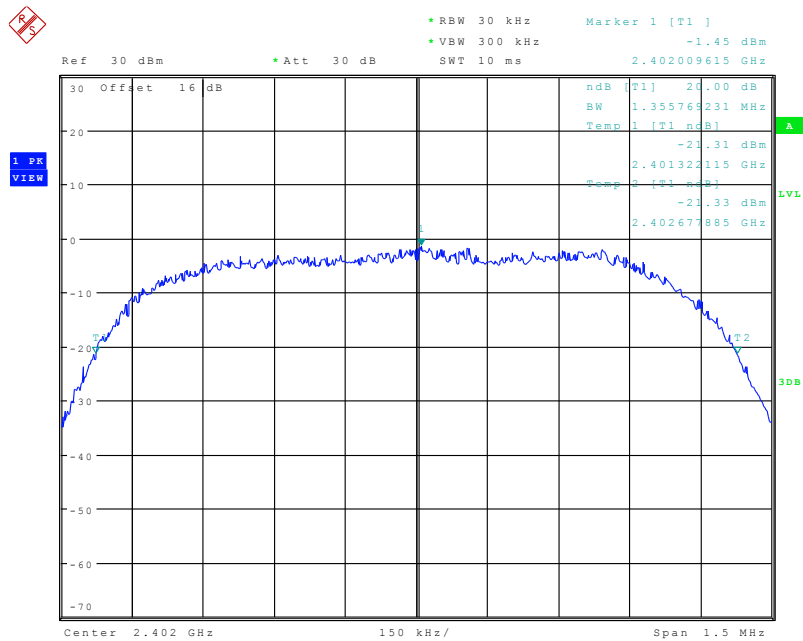
Date: 23.NOV.2010 16:04:29

(Plot E: Channel = 2441)



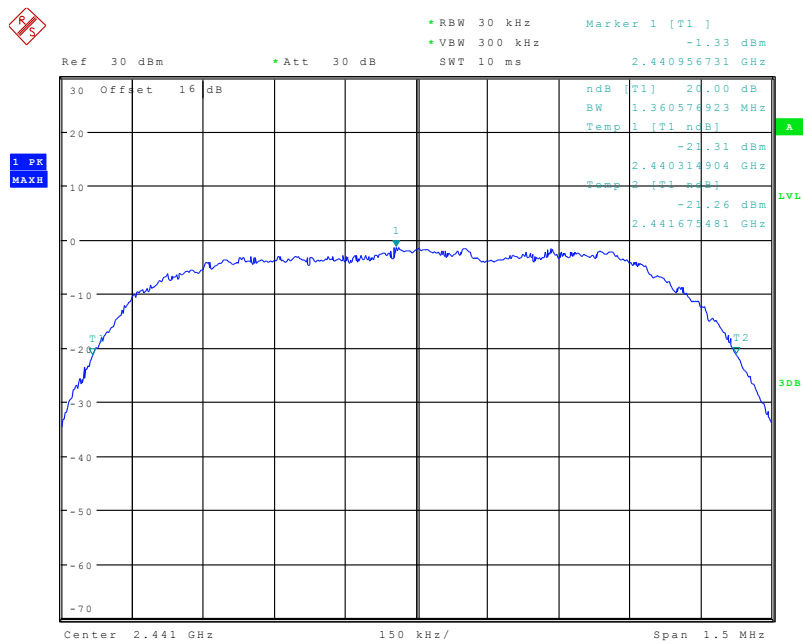
Date: 23.NOV.2010 16:19:50

(Plot F: Channel = 2480)



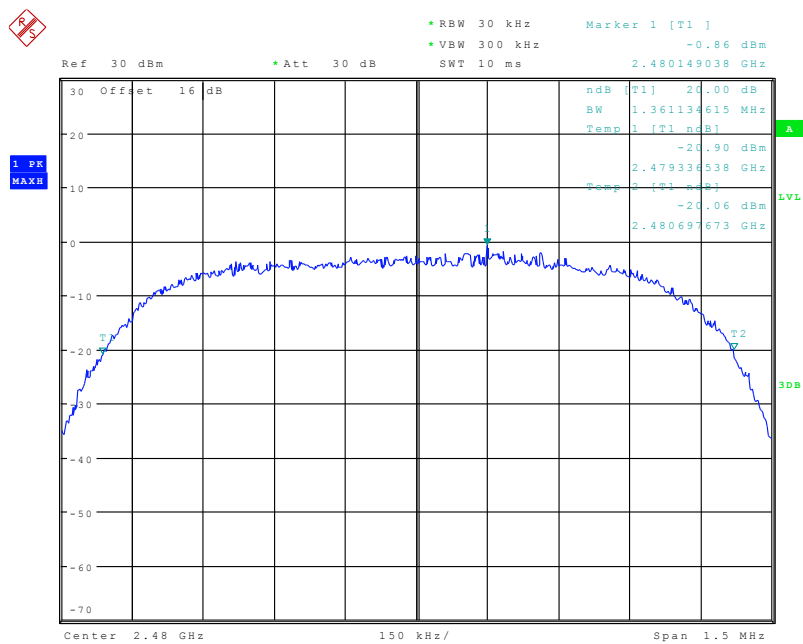
Date: 23.NOV.2010 15:55:28

(Plot G: Channel = 2402)



Date: 23.NOV.2010 16:06:29

(Plot H: Channel = 2441)



Date: 23.NOV.2010 16:18:57

(Plot I: Channel = 2480)

### 3.4 Carried Frequency Separation

#### 3.4.1 Definition

According to FCC section 15.247(a)(1), frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25kHz or two-thirds of the 20dB bandwidth of the hopping channel, whichever is greater.

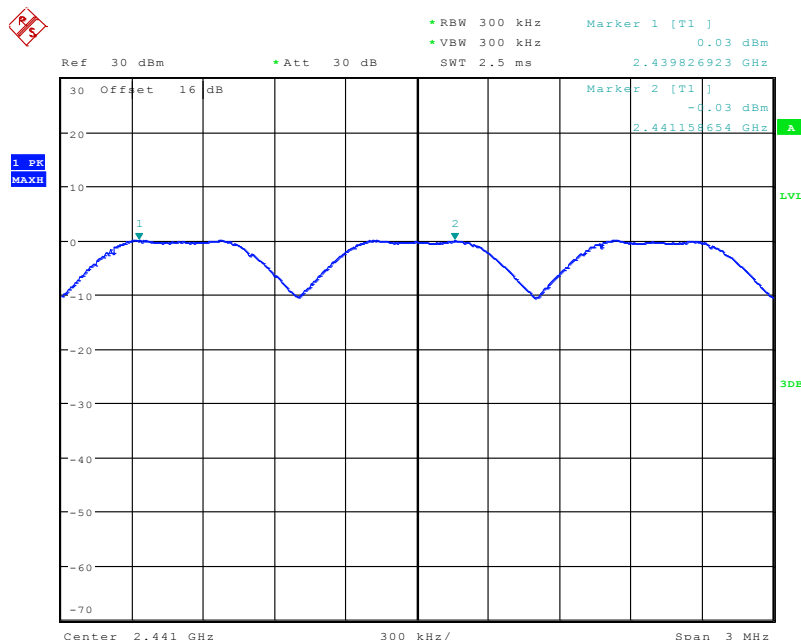
#### 3.4.2 Test Description

See section 3.1.2 of this report.

#### 3.4.3 Test Result

The Bluetooth Module operates at hopping-on test mode.

For any adjacent channels (e.g. the channel 39 and 40 as showed in the Plot A), the Module does have hopping channel carrier frequencies separated by a minimum of 25kHz or two-thirds of the 20dB bandwidth of the hopping channel (refer to section 3.3.3), whichever is greater. So, the verdict is PASS.



Date: 12.NOV.2010 08:26:17

(Plot A: Carried Frequency Separation)

### 3.5 Time of Occupancy (Dwell time)

#### 3.5.1 Requirement

According to FCC section 15.247(a)(1)(iii), frequency hopping systems in the 2400 - 2483.5MHz band shall use at least 15 non-overlapping channels. The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed. Frequency hopping systems may avoid or suppress transmissions on a particular hopping frequency provided that a minimum of 15 channels are used.

#### 3.5.2 Test Description

See section 3.1.2 of this report.

#### 3.5.3 Test Result

The average time of occupancy on any channel within the Period can be calculated with formulas (for DH1 and DH5 package type):

$$\begin{aligned}\{\text{Total of Dwell}\} &= \{\text{Pulse Time}\} * (1600 / 6) / \{\text{Number of Hopping Frequency}\} * \{\text{Period}\} \\ \{\text{Period}\} &= 0.4s * \{\text{Number of Hopping Frequency}\}\end{aligned}$$

The lowest, middle and highest channels are selected to perform testing to record the dwell time of each occupation measured in this channel, which is called Pulse Time here.

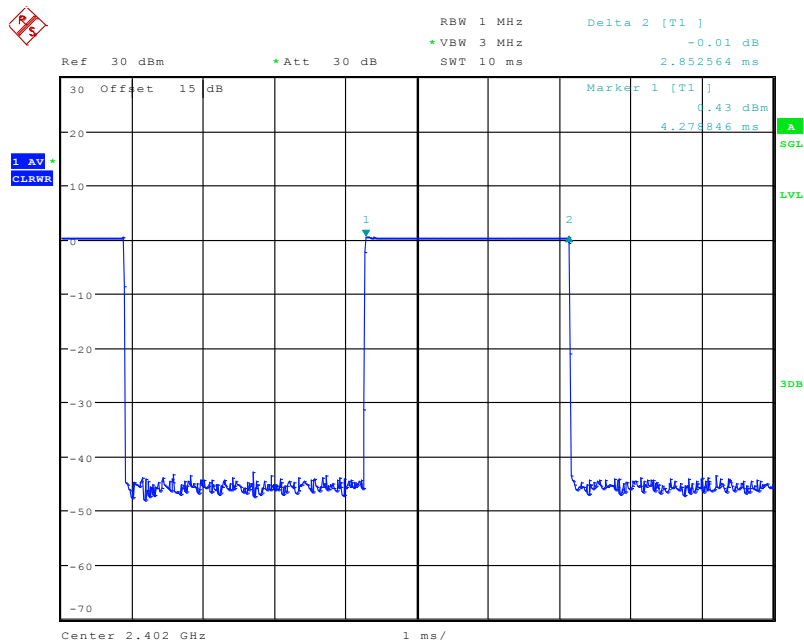
##### A. Test Verdict:

###### DH5

Channel	Frequency (MHz)	Pulse Time		Total of Dwell (ms)	Limit (ms)	Verdict
		Ms	Refer to Plot			
0	2402	2.853	Plot A	304.32	400	PASS
39	2441	2.869	Plot B	306.03		PASS
78	2480	2.853	Plot C	304.32		PASS

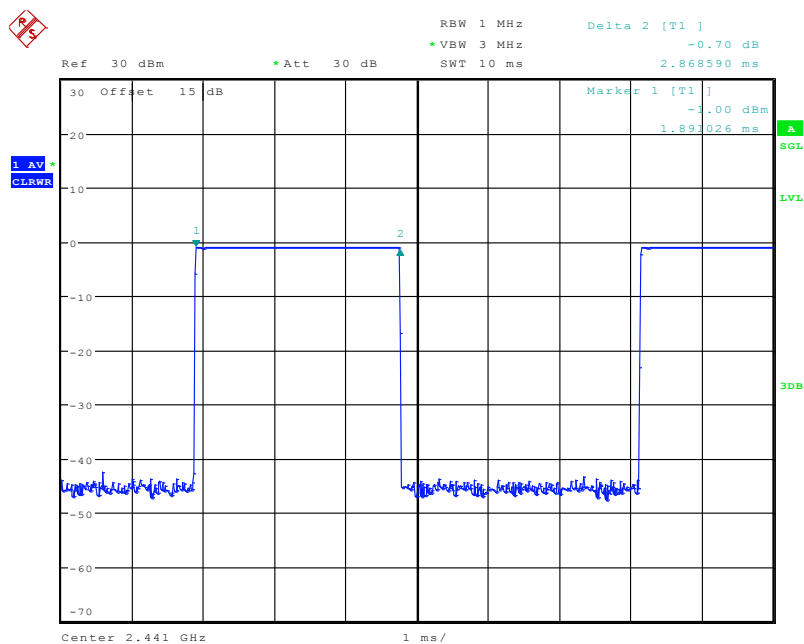
##### B. Test Plot:

Note: the following plots record the Pulse Time of the Module carrier.



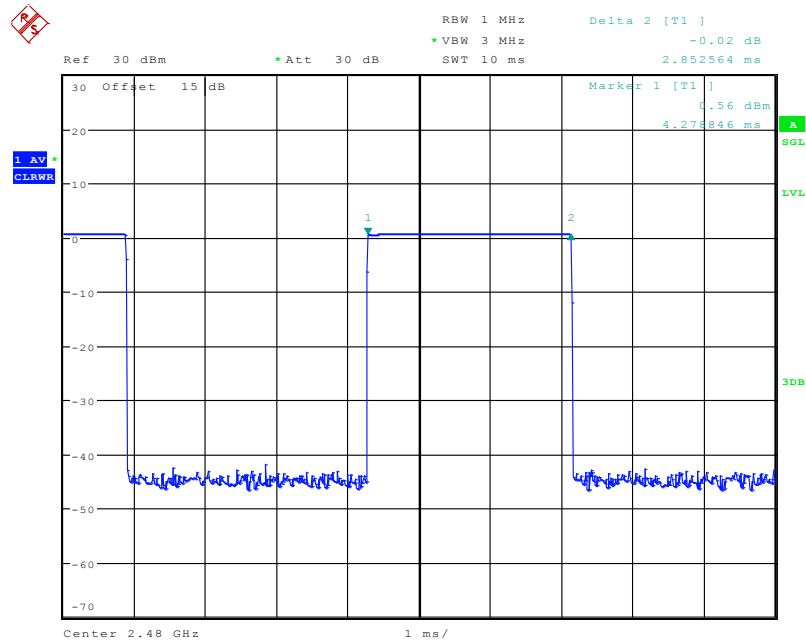
Date: 14.NOV.2010 18:19:50

(Plot A: Channel = 2402)



Date: 14.NOV.2010 18:15:45

(Plot B: Channel = 2441)



Date: 14.NOV.2010 18:24:40

(Plot C: Channel = 2480)

### 3.6 Conducted Spurious Emissions

#### 3.6.1 Requirement

According to FCC section 15.247(c), in any 100kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement.

#### 3.6.2 Test Description

See section 3.1.2 of this report.

#### 3.6.3 Test Result

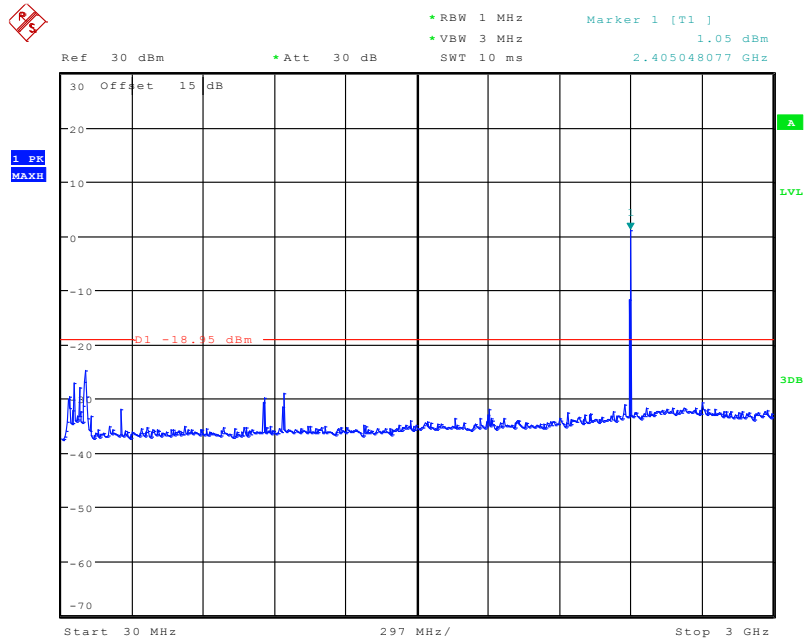
The Bluetooth Module operates at hopping-off test mode. The measurement frequency range is from 30MHz to the 10<sup>th</sup> harmonic of the fundamental frequency. The lowest, middle and highest channels are tested to verify the spurious emissions.

##### A. Test Verdict:

Channel	Frequency (MHz)	Measured Max. Out of Band Emission (dBm)	Refer to Plot	Limit (dBm)		Verdict
				Carrier Level	Calculated -20dBc Limit	
0	2402	-27.56	Plot A.1/A.2	1.05	-18.95	PASS
39	2441	-28.74	Plot B.1/B.2	0.11	-19.89	PASS
78	2480	-28.85	Plot C.1/C.2	1.33	-18.67	PASS

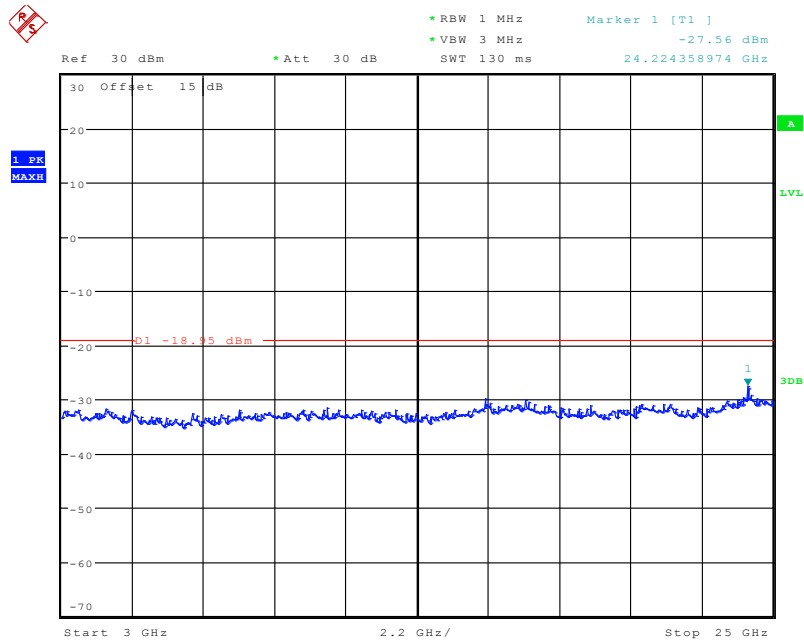
## B. Test Plot:

Note: the power of the Module transmitting frequency should be ignored.



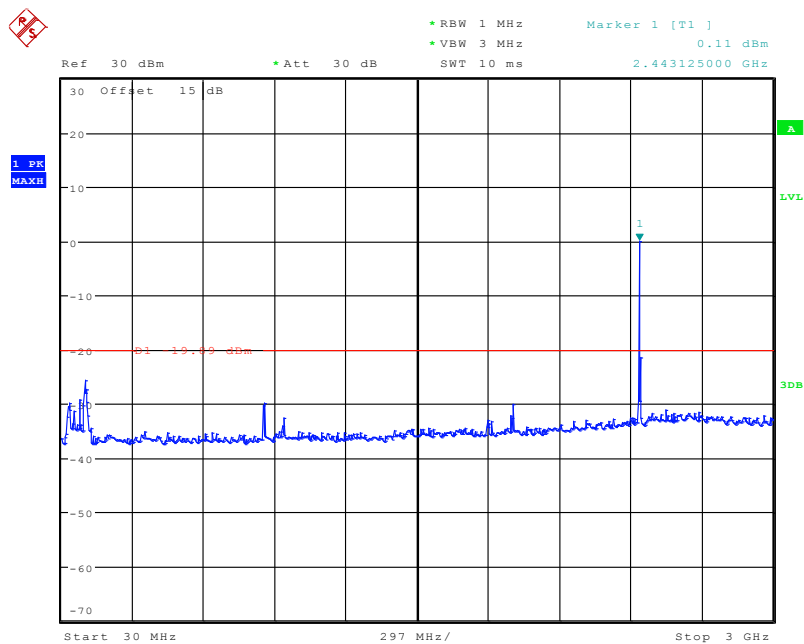
Date: 14.NOV.2010 18:40:35

(Plot A.1: Channel = 0, 30MHz to 3GHz)



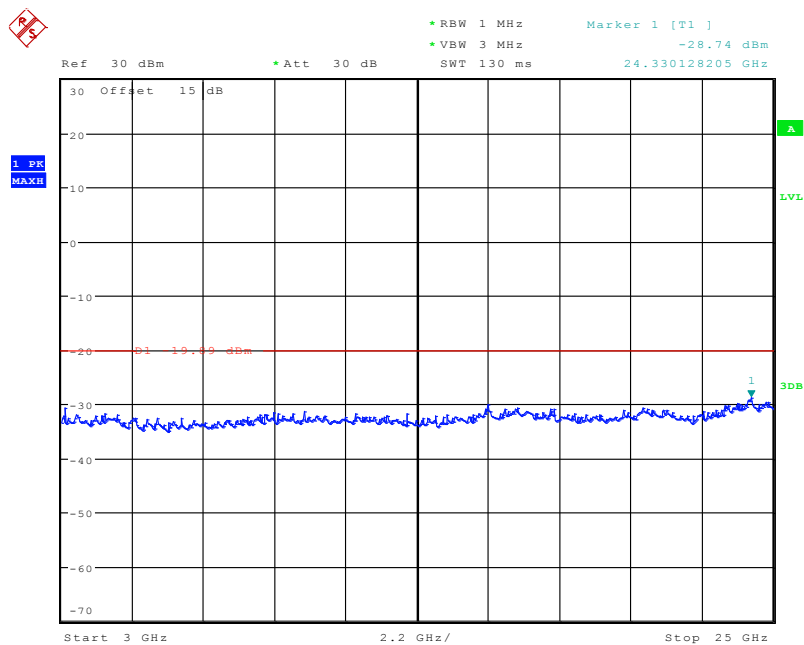
Date: 14.NOV.2010 18:41:32

(Plot A.2: Channel = 0, 3GHz to 25GHz)



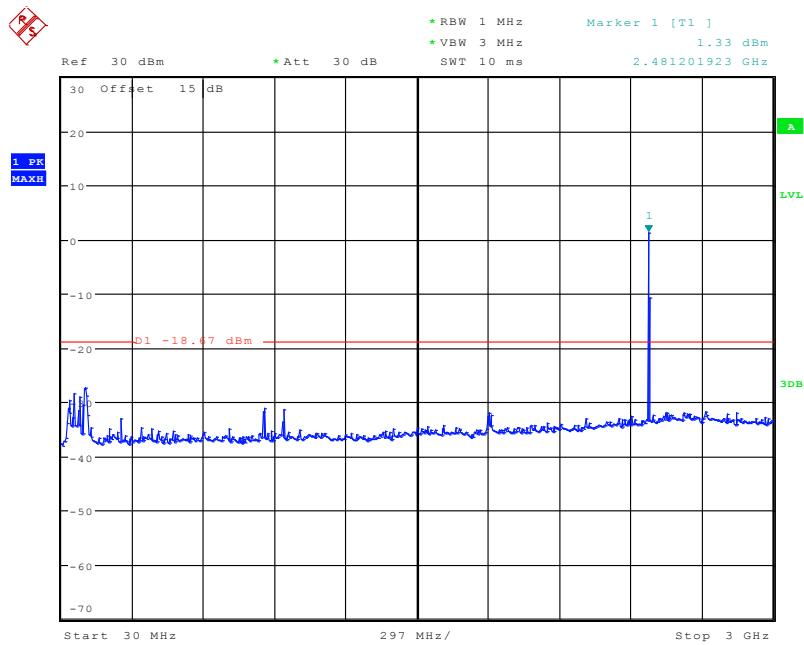
Date: 14.NOV.2010 18:35:39

(Plot B.1: Channel = 39, 30MHz to 3GHz)



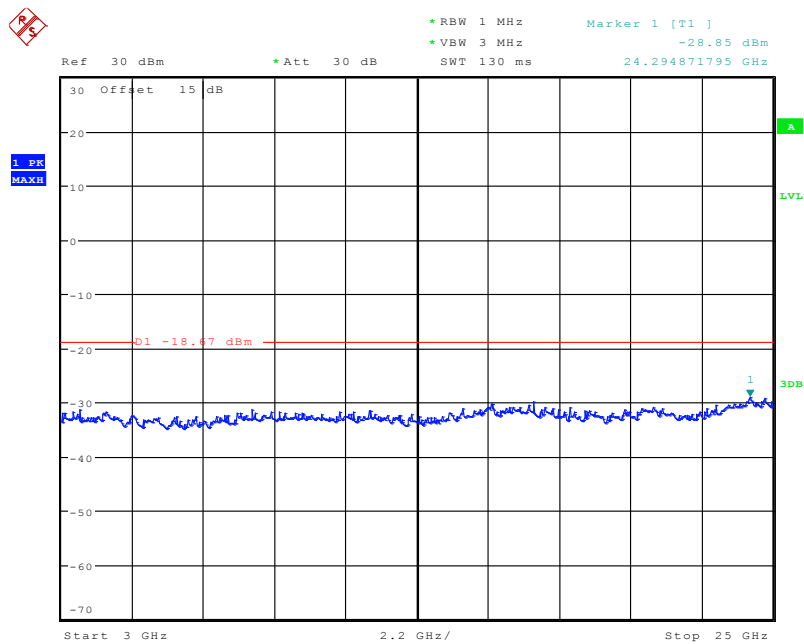
Date: 14.NOV.2010 18:37:29

(Plot B.2: Channel = 39, 3GHz to 25GHz)



Date: 14.NOV.2010 18:42:27

(Plot C.1: Channel = 78, 30MHz to 3GHz)



Date: 14.NOV.2010 18:43:51

(Plot C.2: Channel = 78, 3GHz to 25GHz)

### 3.7 Band Edge

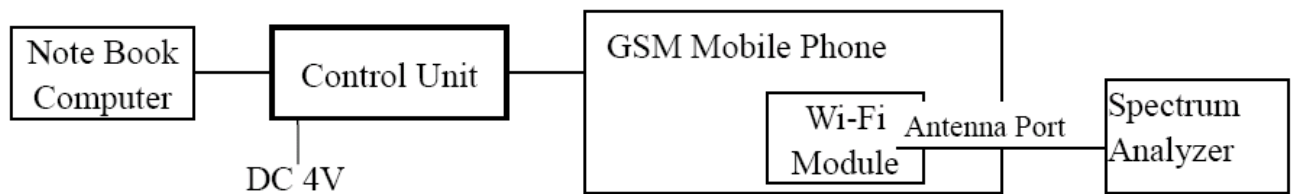
#### 3.7.1 Requirement

According to FCC section 15.247(c), in any 100kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement.

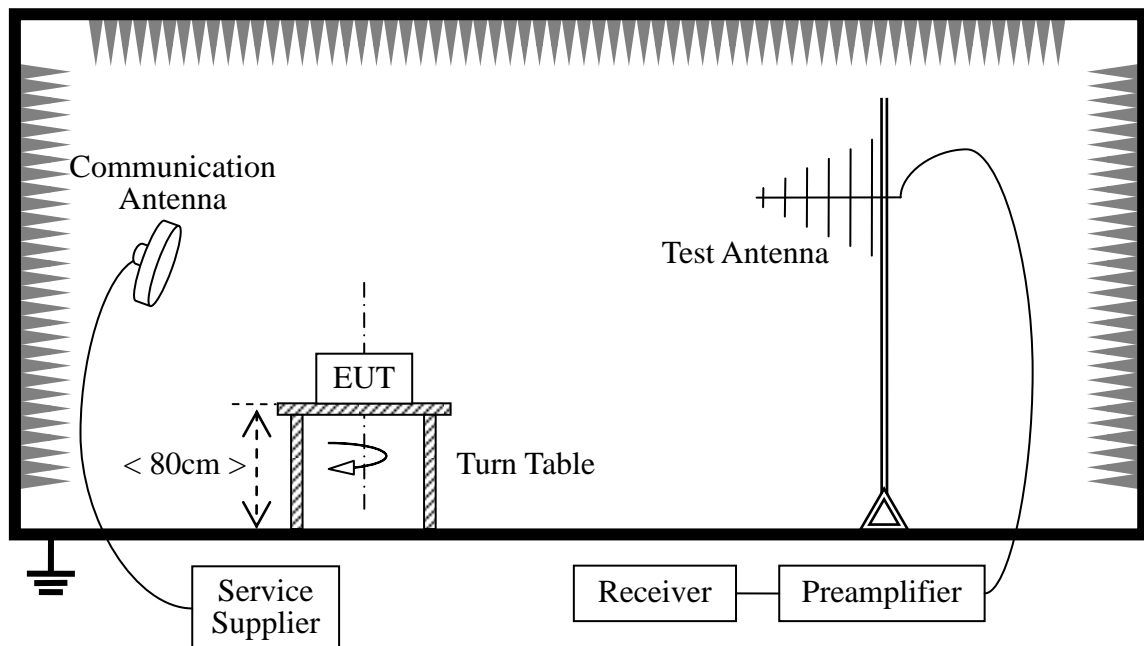
#### 3.7.2 Test Description

##### Test Setup:

##### Conducted Band Edge



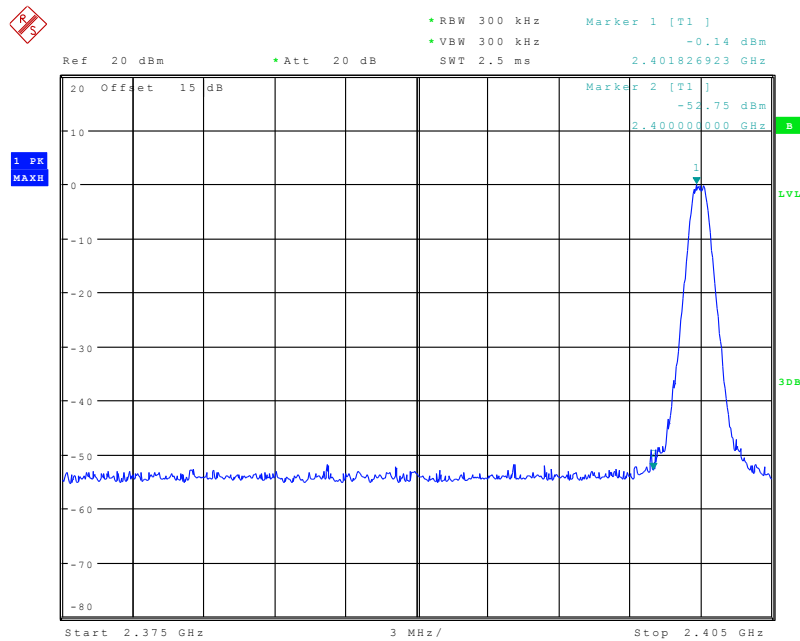
##### Radiated Band Edge



### 3.7.3 Test Result

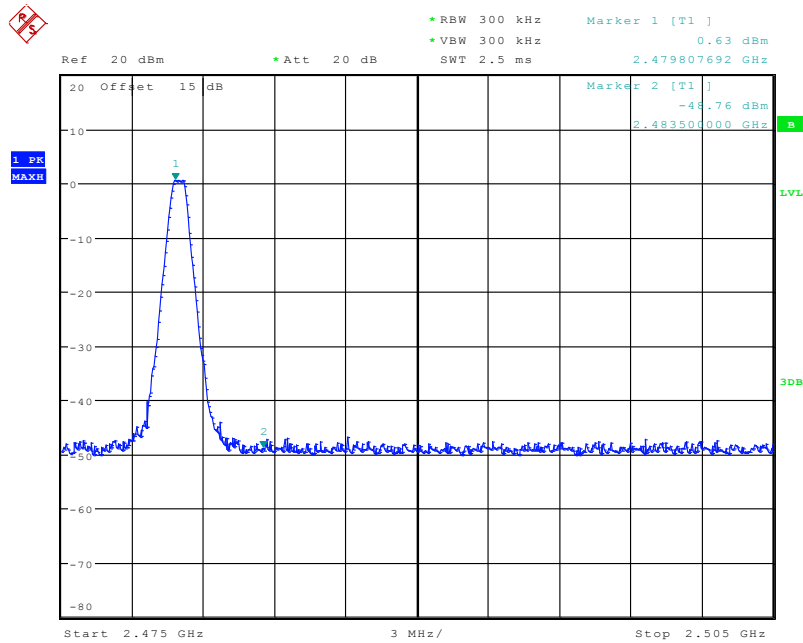
The Bluetooth Module operates at hopping-off test mode. The lowest and highest channels are tested to verify the band edge emissions.

#### Conducted Band Edge:



Date: 25.MAR.2011 14:25:55

(Plot A1: Channel = 0 )



Date: 25.MAR.2011 14:23:57

(Plot B1: Channel = 78)

### Radiated Band Edge:

Frequency (MHz)	Measure Level (dBuV/m)	Correct Factor (dB)	Reading Level (dBuV)	Limit (dBuV/m)	Detector Type	Antenna Polarity
2400	49.06	0.35	48.71	74	Peak	H
2400	34.40	0.35	34.05	54	Average	
2400	47.59	0.35	47.24	74	Peak	V
2400	32.62	0.35	32.27	54	Average	
2483.5	56.97	0.64	56.33	74	Peak	H
2483.5	44.72	0.64	44.08	54	Average	
2483.5	55.06	0.64	54.42	74	Peak	V
2483.5	42.80	0.64	42.16	54	Average	

### NOTE:

Measurement Level = Reading Level + Correct Factor

### 3.8 Conducted Emission

#### 3.8.1 Requirement

According to FCC section 15.207, for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency within the band 150kHz to 30MHz shall not exceed the limits in the following table, as measured using a 50  $\mu$ H/50 $\Omega$  line impedance stabilization network (LISN).

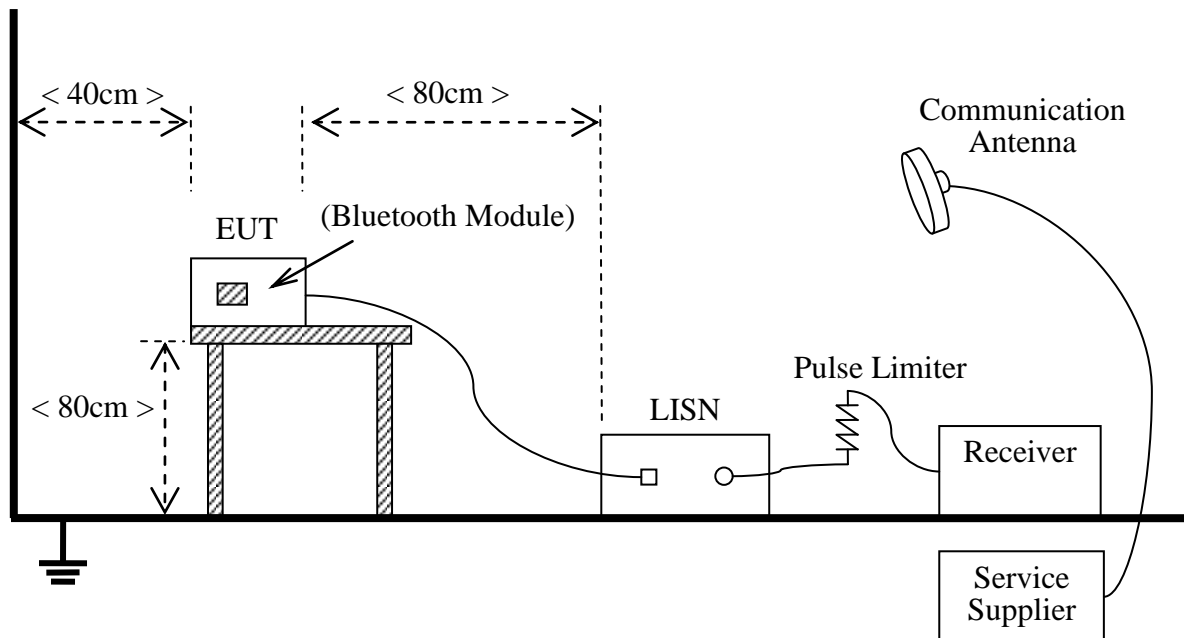
Frequency range (MHz)	Conducted Limit (dB $\mu$ V)	
	Quai-peak	Average
0.15 - 0.50	66 to 56	56 to 46
0.50 - 5	56	46
0.50 - 30	60	50

NOTE:

- The lower limit shall apply at the band edges.
- The limit decreases linearly with the logarithm of the frequency in the range 0.15 - 0.50MHz.

#### 3.8.2 Test Description

##### A. Test Setup:



The Table-top EUT was placed upon a non-metallic table 0.8m above the horizontal metal reference ground plane. EUT was connected to LISN and LISN was connected to reference Ground Plane. EUT was 80cm from LISN. The set-up and test methods were according to ANSI C63.4:2003

The Bluetooth Module of the EUT is powered by the Battery charged with the AC Adapter which is powered by 120V, 60Hz AC mains supply. The factors of the site are calibrated to correct the reading. During the measurement, the Bluetooth Module is activated and controlled by the Bluetooth Service Supplier (SS) via a Common Antenna, and is set to operate under hopping-on test mode transmitting 339 bytes DH5 packages at maximum power.

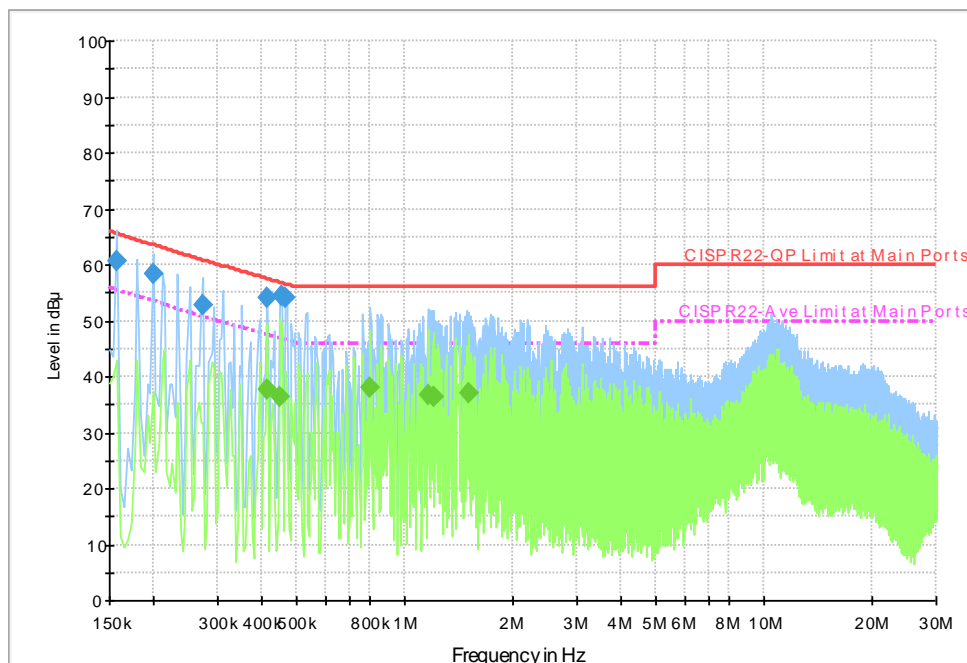
### B. Equipments List:

Description	Manufacturer	Model	Serial No.	Cal. Date	Cal. Due
Receiver	Agilent	E7405A	US44210471	2010.9	1year
LISN	Schwarzbeck	NSLK 8127	812744	2010.9	1year
Service Supplier	R&S	CMU200	100448	2010.9	1year
Pulse Limiter (20dB)	Schwarzbeck	VTSD 9561-D	9391	(n.a.)	(n.a.)

### 3.8.3 Test Result

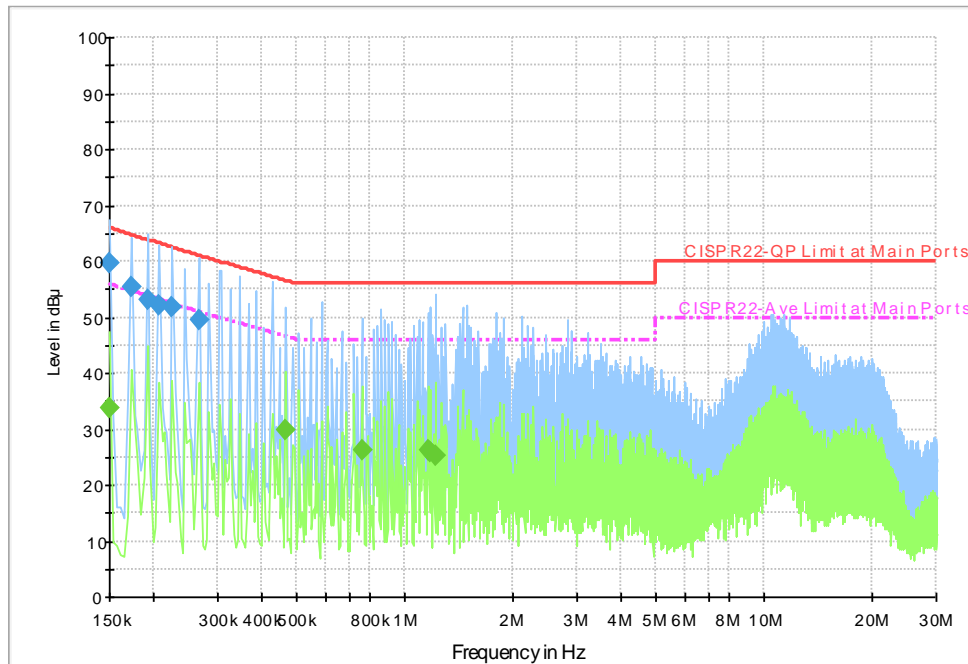
The maximum conducted interference is searched using Peak (PK), Quasi-peak (QP) and Average (AV) detectors; the emission levels more than the AV and QP limits, and that have narrow margins from the AV and QP limits will be re-measured with AV and QP detectors. Tests for both L phase and N phase lines of the power mains connected to the EUT are performed. Refer to recorded points and plots below.

EMI\_ENV216 Auto Test-L CISPR22



(Plot A: L Phase)

EMI\_ENV216 Auto Test-N CISPR22



(Plot B: N Phase)

### 3.9 Radiated Emission

#### 3.9.1 Requirement

According to FCC section 15.247(c), radiated emission outside the frequency band attenuation below the general limits specified in FCC section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in FCC section 15.205(a), must also comply with the radiated emission limits specified in FCC section 15.209(a).

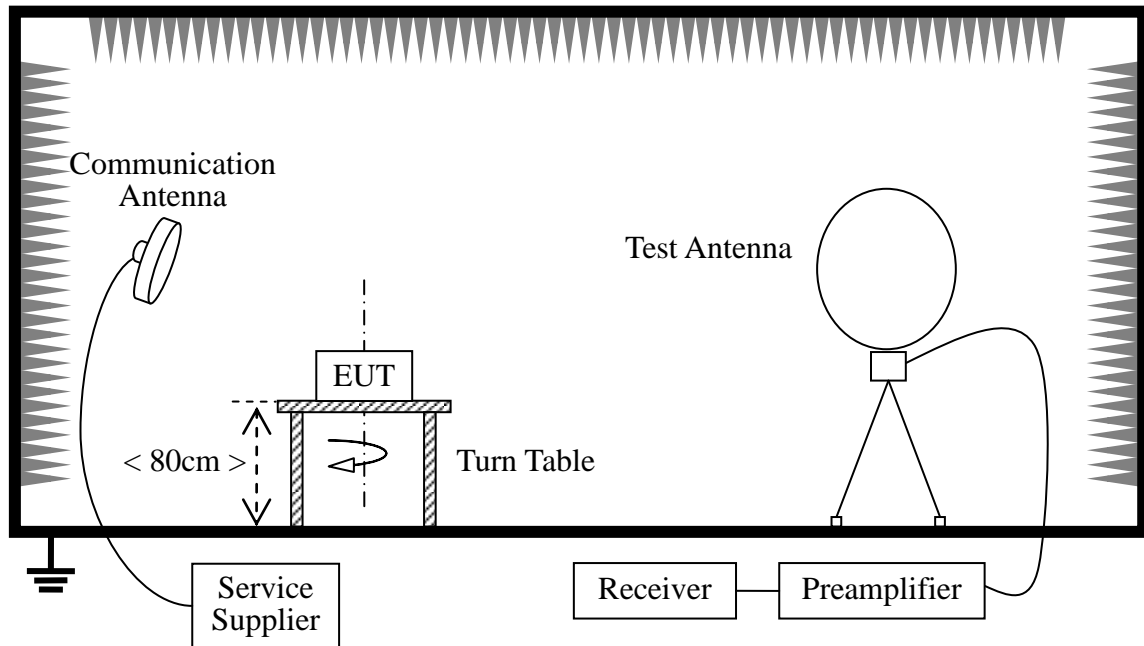
According to FCC section 15.209 (a), except as provided elsewhere in this subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency (MHz)	Field Strength ( $\mu\text{V/m}$ )	Measurement Distance (m)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30	30	30
30 - 88	100	3
88 - 216	150	3
216 - 960	200	3
960 - 1000	500	3
Above 1000	500	3

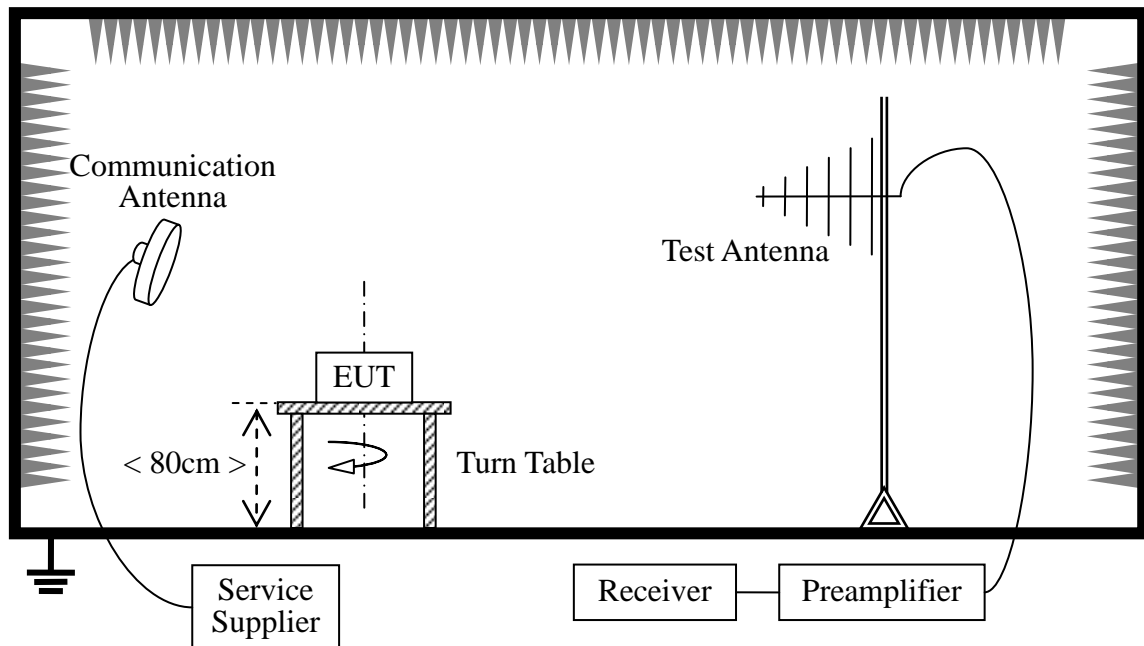
In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), also should comply with the radiated emission limits specified in Section 15.209(a)(above table)

#### 3.9.2 Test Description

##### A. Test Setup:



radiated emissions below 30MHz



radiated emissions above 30MHz

The test site semi-anechoic chamber has met the requirement of NSA tolerance 4dB according to the standards: ANSI C63.4 (2003). The EUT was set-up on insulator 80cm above the Ground Plane. The set-up and test methods were according to ANSI C63.4.

The Bluetooth Module of the EUT is powered by the Battery charged with the AC Adapter which is powered by 120V, 60Hz AC mains supply. The Module is located in a 3m Semi-Anechoic Chamber;

the antenna factors, cable loss and so on of the site as factors are calculated to correct the reading. During the measurement, the Bluetooth Module is activated and controlled by the Bluetooth Service Supplier (SS) via a Common Antenna, and is set to operate under hopping-on test mode transmitting 339 bytes DH5 packages at maximum power.

For the Test Antenna: In the frequency range above 30MHz, Bi-Log Test Antenna (30MHz to 1GHz) and Horn Test Antenna (above 1GHz) are used. Test Antenna is 3m away from the EUT. Test Antenna height is varied from 1m to 4m above the ground to determine the maximum value of the field strength, the azimuth range of turntable was 0° to 360°, the receive antenna has two polarizations horizontal and vertical. When doing measurements above 1GHz, the EUT was placed within the 3dB beam width range of the horn antenna, and the EUT was tested in 3 orthogonal positions as recommended in ANSI C63.4 for Radiated Emissions and the worst-case data was presented.

#### **B. Equipments List:**

Description	Manufacturer	Model	Serial No.	Cal. Date	Cal. Due
System Simulator	Anritsu	MT8852A	6K00002788	2010.9	1year
Spectrum Analyzer	R&S	FSP30	101020	2010.9	1year
Receiver	Agilent	E7405A	US44210471	2010.9	1year
Full-Anechoic Chamber	Albatross	9m*6m*6m	(n.a.)	2009.10	2year
Test Antenna - Bi-Log	Schwarzbeck	VULB 9163	9163-274	2010.9	1year
Test Antenna - Horn	Schwarzbeck	BBHA 9120C	9120C-384	2010.9	1year
Test Antenna - Loop	R&S	HFH2-Z2	860004/001	2010.9	1year

### **3.9.3 Test Result**

#### **A. Test Mode:**

1. Channel 0: Frequency 2402MHz
2. Channel 39: Frequency 2441MHz
3. Channel 78: Frequency 2480Mhz

#### **NOTE:**

All test modes are performed, only the worst cases are recorded in this report.

### B. Test Result for 9 kHz ~ 30 MHz:

Frequency (MHz)	Level (dBuV)	Over Limit (dB)	Limit Line (dBuV)	Remark
--	--	--	--	See Note

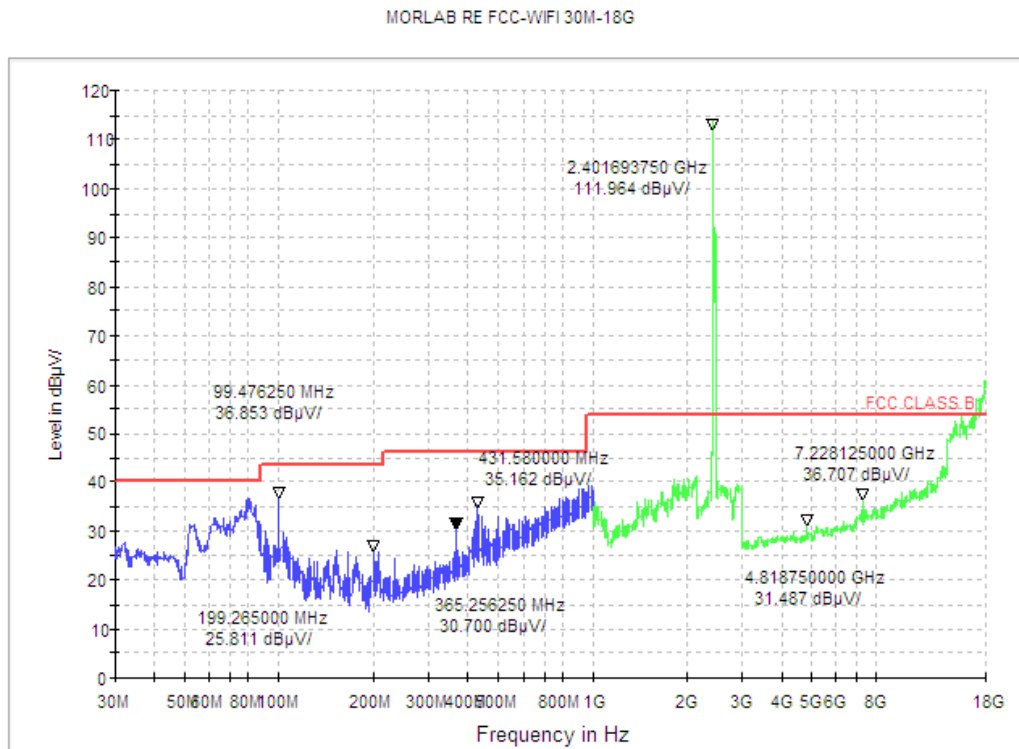
#### Note:

The amplitude of spurious emissions that are attenuated by more than 20dB below the permissible value has no need to be reported.

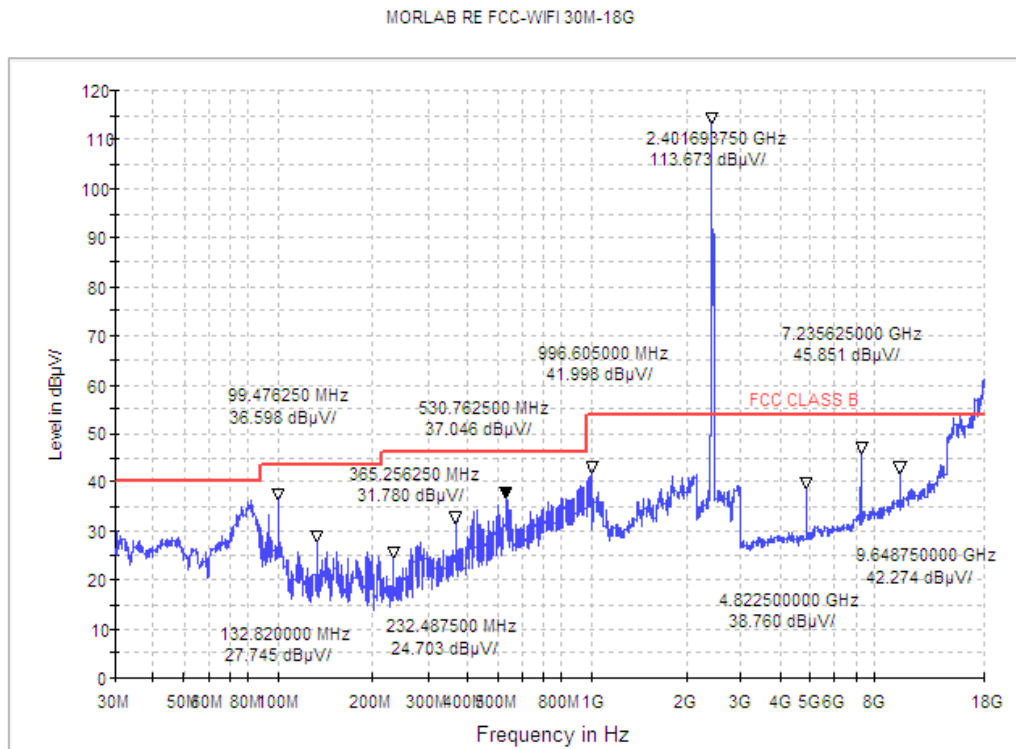
Distance extrapolation factor =  $40 \log (\text{specific distance} / \text{test distance})$  (dB);

Limit line = specific limits (dBuV) + distance extrapolation factor.

### C. Test Plots for 30 MHz ~ 10th Harmonic:



(Plot A.1: Antenna Horizontal)



(Plot A.2: Antenna Vertical)

## 3.10 RECEIVER SPURIOUS EMISSIONS

### 3.10.1 Requirement of the standard

According to RSS-GEN 4.10, the receiver shall be operated in the normal receive mode near the mid-point of the band over which the receiver is designed to operate. The search for spurious emissions shall be from the lowest frequency internally generated or used in the receiver (e.g. local oscillator, intermediate or carrier frequency), or 30 MHz, whichever is the higher, to at least 3 times the highest tuneable or local oscillator frequency, whichever is the higher, without exceeding 40 GHz. According to RSS-GEN 7.2.3.1, If the device has a detachable antenna of known antenna impedance, then the antenna conducted method is permitted in lieu of a radiated measurement.

Receiver spurious emissions at any discrete frequency shall not exceed 2 nanowatts in the band 30-1000 MHz, or 5 nanowatts above 1 GHz.

Limits for Conducted Receiver Spurious Emissions	
Frequency(MHz)	Limit
30 – 1000	2nW
Above 1000	5nW

According to RSS-GEN 7.2.3.2, for Radiated Measurement, all spurious emissions shall comply with the limits of Table below:

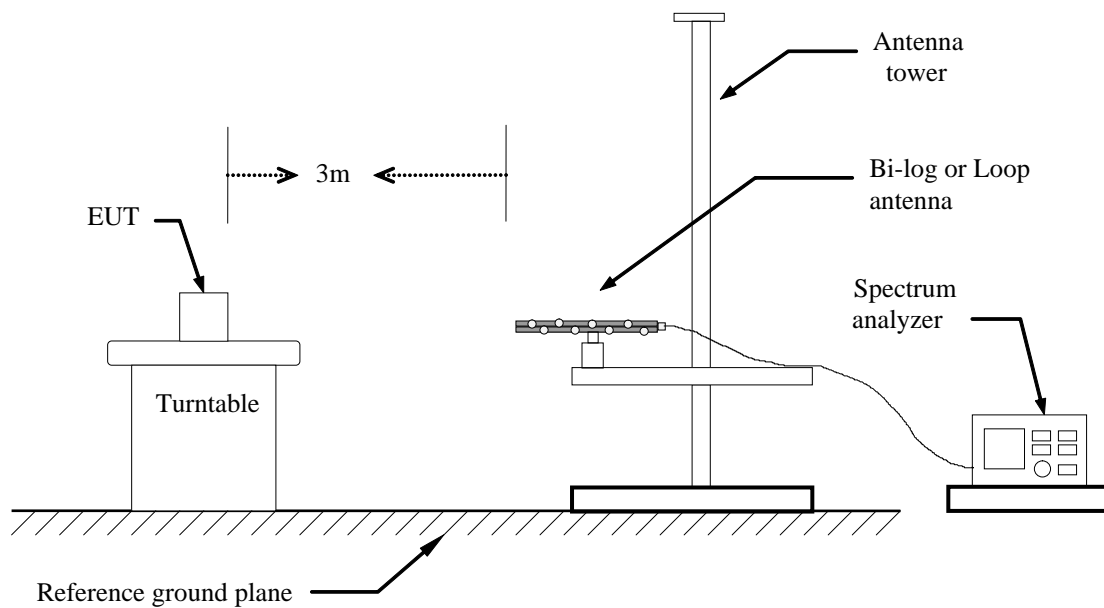
Limits for Radiated Receiver Spurious Emissions	
Frequency(MHz)	Field Strength( $\mu$ V/m at 3metres)
30 - 88	100
88 - 216	150
216 - 960	200
Above 960	500

### 3.10.2 Test Procedure

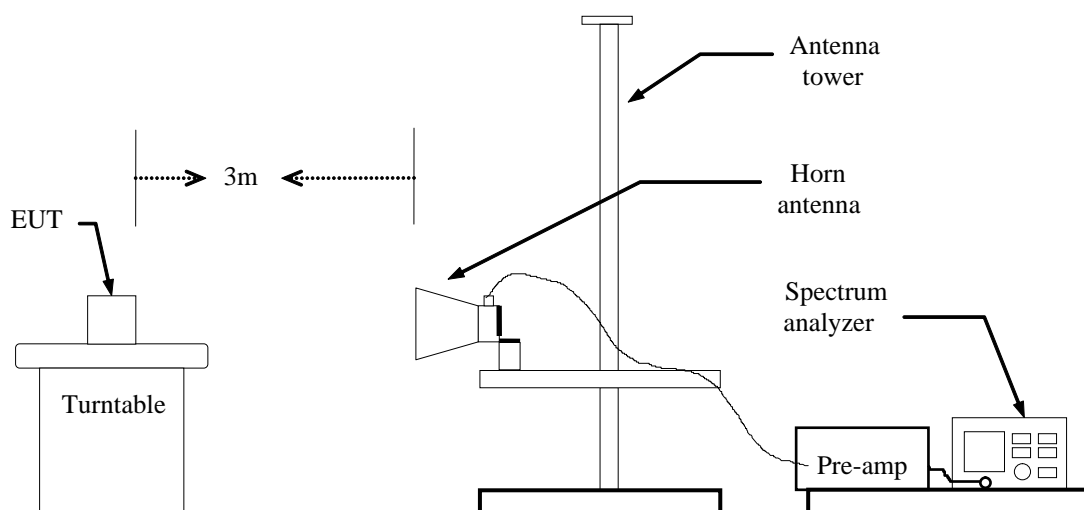
Please refer to RSS-GEN section 4.10 and section 7.2.3 for the measurement methods.

### 3.10.3 Test Setup

Below 1GHz



Above 1GHz



### 3.10.4 Test Results

#### Conducted Receiver Spurious Emissions

##### 1. TEST MODE: GFSK Transmitter Rx Mode

Frequency(MHz)	Measure Result(nW)	Limit (nW)
30 – 1000	--	2
Above 1000	--	5

#### Radiated Receiver Spurious Emissions

##### 2. TEST MODE: GFSK Transmitter Rx Mode

No.	Frequency (MHz)	Antenna Polarization	Detector mode	Level ERP(dB $\mu$ V)	Limit (dB $\mu$ V)	Margin (dB)
1	30 - 88	Vertical	Peak	--	40	>10
2	88 – 216	Vertical	Peak	--	43.5	>10
3	216 – 960	Vertical	Peak	--	46	>10
4	960 - 1000	Vertical	Peak	--	54	>10
5	1000 – 10000	Vertical	Average	--	54	>10
6	30 - 88	Horizontal	Peak	--	40	>10
7	88 – 216	Horizontal	Peak	--	43.5	>10
8	216 – 960	Horizontal	Peak	--	46	>10
9	960 - 1000	Horizontal	Peak	--	54	>10
10	1000 - 10000	Horizontal	Average	--	54	>10

#### Notes:

- Both radiated measurement method and conducted measurement method were used. For the radiated method, the antenna polarization was set to vertical and horizontal respectively.
- The measurement was performed at the mid operating frequencies.
- “--” in the table above means that the emissions are too small to be measured and are at least 10 dB below the limit.

\*\* END OF REPORT \*\*