



# TEST REPORT

<b>Report No.:</b>	<b>Z09J0240573</b>	<b>Page 1 of 65</b>
<b>Applicant:</b>	Motorola, Inc.	
<b>Applicant Address:</b>	600 N US Highway 45 Mail Drop:W1-21T libertyvile,IL 60048 USA	
<b>Sample Description:</b>	Ipod BT Adapter	
<b>Model:</b>	D670	
<b>FCC ID</b>	IHDT6KZ1	
<b>Test Location:</b>	EMC Laboratory of Guangzhou GRG Metrology and Test Technology Co., Ltd.	
<b>Test Specification:</b>	FCC PART 15 :2008	
<b>Test Date:</b>	2009-04-01 to 2009-04-09	
<b>Test Result:</b>	<i>According to the kind and extend of tests performed the test item passed test specification.</i>	
<b>Tested By:</b>	<b>Reviewed By:</b>	<b>Approved By:</b>
Shelle Zheng / Test Engineer	Jane Cao / Reviewer	Frank Chen / Director
Date: 15 <sup>th</sup> Apr. 2009	Date: 15 <sup>th</sup> Apr. 2009	Date: 15 <sup>th</sup> Apr. 2009
<b>Other Aspects:</b>		
/		
<b>Abbreviations:</b> ok / P = passed; fail / F = failed; n.a. / N = not applicable		
The test result in this test report refers exclusively to the presented test sample. This report shall not be reproduced except in full, without the written approval of GRGT.		



# 1 Test Summary

Test	Test Requirement	Standard Paragraph	Result
Antenna Requirement	FCC PART 15 :2008	Section 15.247 (c)	PASS
Occupied Bandwidth	FCC PART 15 :2008	Section 15.247 (a1)	PASS
Carrier Frequencies Separated	FCC PART 15 :2008	Section 15.247(a)(1)	PASS
Hopping Channel Number	FCC PART 15 :2008	Section 15.247(a)(1)(iii)	PASS
Dwell Time	FCC PART 15 :2008	Section 15.247(a)(1)(iii)	PASS
Pseudorandom Frequency Hopping Sequence	FCC PART 15 :2008	Section 15.247(a)(1)	PASS
Maximum Peak Output Power	FCC PART 15 :2008	Section 15.247(b)(1)	PASS
RF Exposure Compliance Requirement	FCC PART 15 :2008	15.247(b)(4)& TCB Exclusion List (7 July 2002)	PASS
Conducted Emission	FCC PART 15 :2008	Section 15.207	N/A(a)
Conducted Spurious Emission (30MHz to 25GHz)	FCC PART 15 :2008	Section 15.209 &15.247(d)	PASS
Radiated Spurious Emission (30MHz to 25GHz)	FCC PART 15 :2008	Section 15.209 &15.247(d)	PASS
Band Edges Measurement	FCC PART 15 :2008	Section 15.247 (d) &15.205	PASS

- (a) This device was powered by Ipod.  
 Because this device and charger have the same port connected with Ipod. So while the Ipod was charged by AC power lines, the device will be not work.

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## 2 General Information

### 2.1 Client Information

Applicant: Motorola, Inc.  
Address of Applicant: 600 N US Highway 45 Mail Drop:W1-21T libertyville,IL 60048 USA

### 2.2 Manufacturer Information

Manufacturer: Microlink Communications Inc.  
Address of Applicant: B Block, 5 th Floor Buliding 2, Cyber-Tech Zone, Gaoxin Ave.7.S,  
Nanshan District, ShenZhen.

### 2.3 General Description of E.U.T.

Product Name: Ipod BT Adapter  
Model: D670  
Number of Channels 79 Channels  
Channel Separation 1 MHz  
Type of Modulation FHSS (Frequency Hopping Spread Spectrum);  
Dwell time Per channel is less than 0.4s.  
Antenna Type Integral  
Speciality: Bluetooth 2.0 with EDR  
Power Supply: DC 3.3V from iPod

### 2.4 Description of Support Units

The EUT has been tested with Ipod MP3 supplied by test Lab.

### 2.5 Standards Applicable for Testing

The standard used was FCC PART 15 Subpart C: 2008. ANSI C63.4:2003.

### 2.6 Test Location

All tests were performed at:

EMC Laboratory of Guangzhou GRG Metrology and Test Technology Co., Ltd.  
No tests were sub-contracted.

### 2.7 Other Information Requested by the Customer

None.

### 2.8 Test Facility

Our laboratories are accredited and approved by the following approval agencies according to ISO/IEC 17025.

USA	FCC Listed Lab No. 688188
China	CNAS No.L0446
China	DILAC No.DL175
VCCI	VCCI No.2914

### 3 Equipments Used during Test

Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
Semi-anechoic chamber	ETS-LINGGREN	RFD-F/A-100	3730	2010-04-10
Test Receiver	ROHDE & SCHWARZ	ESU 40	100012	2009-06-02
Log period antenna	ETS-LINGGREN	3142C	00075971	2009-08-03
Bi-log antenna	Schaffner-chase	CBL6443	5070	2009-12-08
Horn antenna	SCHWARZBECK	BBHA 9120 E	BBHA9120E318	2009-08-03
Horn antenna	ETS.LINDGREN	3117	00075824	2009-08-03
Coaxial	GRGT	Cable 2	N/A	2009-07-01
LISN	SCHWARZBECK	NSLK 8127	8127450	2009-07-01
Signal generetor	ROHDE & SCHWARZ	SML03	103002	2009-06-05

## 4 Test Results

### 4.1 E.U.T. test conditions

Type of antenna: Integral

Operating Environment:

Temperature: 20.0 °C

Humidity: 52 % RH

Atmospheric Pressure: 1006 mbar

Test frequencies: According to the 15.31(m) Measurements on intentional radiators or receivers, other than TV broadcast receivers, shall be performed and, if required, reported for each band in which the device can be operated with the device operating at the number of frequencies in each band specified in the following table:

Frequency range over which device operates	Number of frequencies	Location in the range of operation
1 MHz or less	1	Middle
1 to 10 MHz	2	1 near top and 1 near bottom
More than 10 MHz	3	1 near top, 1 near middle and 1 near bottom

#### EUT channels and frequencies list:

Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
0	2402	14	2416	28	2430
1	2403	15	2417	29	2431
2	2404	16	2418	30	2432
3	2405	17	2419	31	2433
4	2406	18	2420	32	2434
5	2407	19	2421	33	2435
6	2408	20	2422	34	2436
7	2409	21	2423	35	2437
8	2410	22	2424	36	2438
9	2411	23	2425	37	2439
10	2412	24	2426	38	2440
11	2413	25	2427	39	2441
12	2414	26	2428	40	2442
13	2415	27	2429	41	2443

Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
42	2444	55	2457	68	2470
43	2445	56	2458	69	2471
44	2446	57	2459	70	2472
45	2447	58	2460	71	2473
46	2448	59	2461	72	2474
47	2449	60	2462	73	2475
48	2450	61	2463	74	2476
49	2451	62	2464	75	2477
50	2452	63	2465	76	2478
51	2453	64	2466	77	2479
52	2454	65	2467	78	2480
53	2455	66	2468		
54	2456	67	2469		

Test frequency is the lowest channel: 0 channel(2402MHz), middle channel: 39 channel(2441MHz) and highest channel: 78 channel(2480MHz)

## 4.2 Antenna Requirement

### 4.2.1 Standard requirement

15.203 requirement:

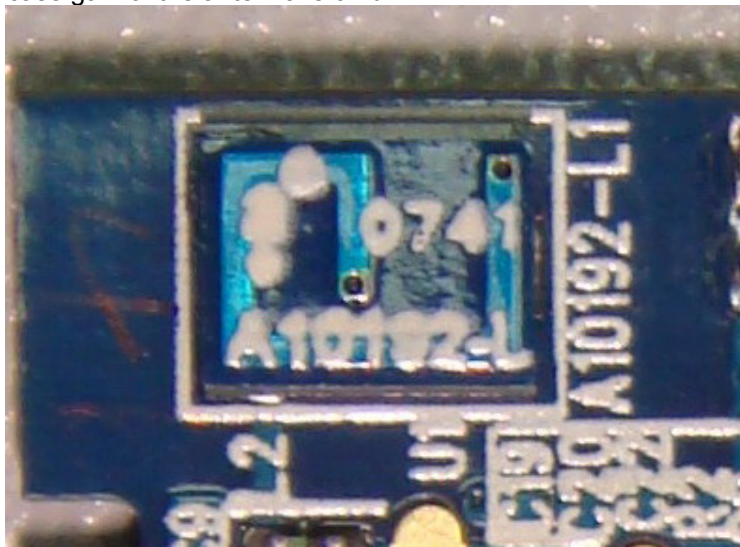
For intentional device, according to 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

15.247(c) (1)(i) requirement:

(i) Systems operating in the 2400-2483.5 MHz band that are used exclusively for fixed, point-to-point operations may employ transmitting antennas with directional gain greater than 6 dBi provided the maximum conducted output power of the intentional radiator is reduced by 1 dB for every 3 dB that the directional gain of the antenna exceeds 6 dBi.

### 4.2.2 EUT Antenna

The antenna is integrated on the main PCB and no consideration of replacement. The best case gain of the antenna is 0.4dBi.



**Test result: The unit does meet the FCC requirements.**

### 4.3 Occupied Bandwidth

**Test Requirement:** FCC Part 15 C  
**Test Method:** Based on FCC Part15 C Section 15.247 & DA 00-705  
**Test Date:** 2009-04-03  
**Test Status:** Test in fixing operating frequency at lowest, Middle, highest channel.  
**Power supply:** Connected with convert board powered by PC USB ports, and to fix frequency transmitting.

**Test Procedure:**

1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum;
2. Set the spectrum analyzer: Span = approximately 2 to 3 times the 20dB bandwidth, centered on a hopping channel;
3. Set the spectrum analyzer: RBW  $\geq$  1% of the 20dB bandwidth (set 10kHz). VBW  $\geq$  RBW. Sweep = auto; Detector Function = Peak. Trace = Max Hold.
4. Mark the peak frequency and -20dB points or 99% bandwidth.
5. bandwidth value is OBW value.

**Test result:**

**Normal mode:**

Frequency (GHz)	Test Channel	bandwidth
2.402	Lowest	865kHz
2.441	Middle	855kHz
2.480	Highest	865kHz

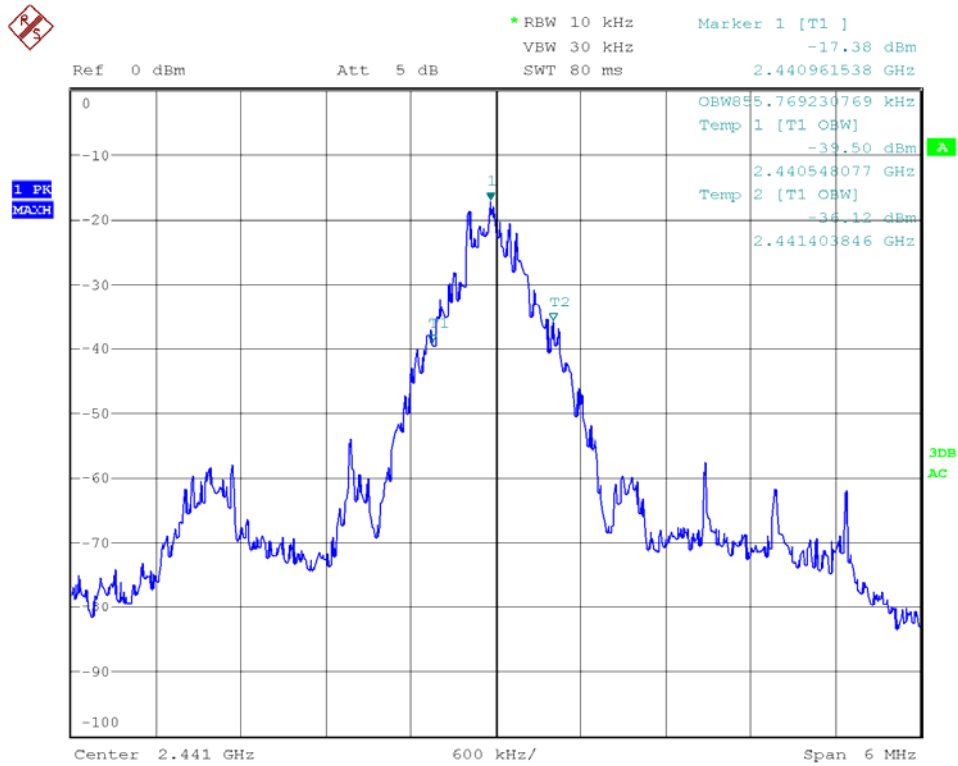
Result plot as follows:

Normal mode:

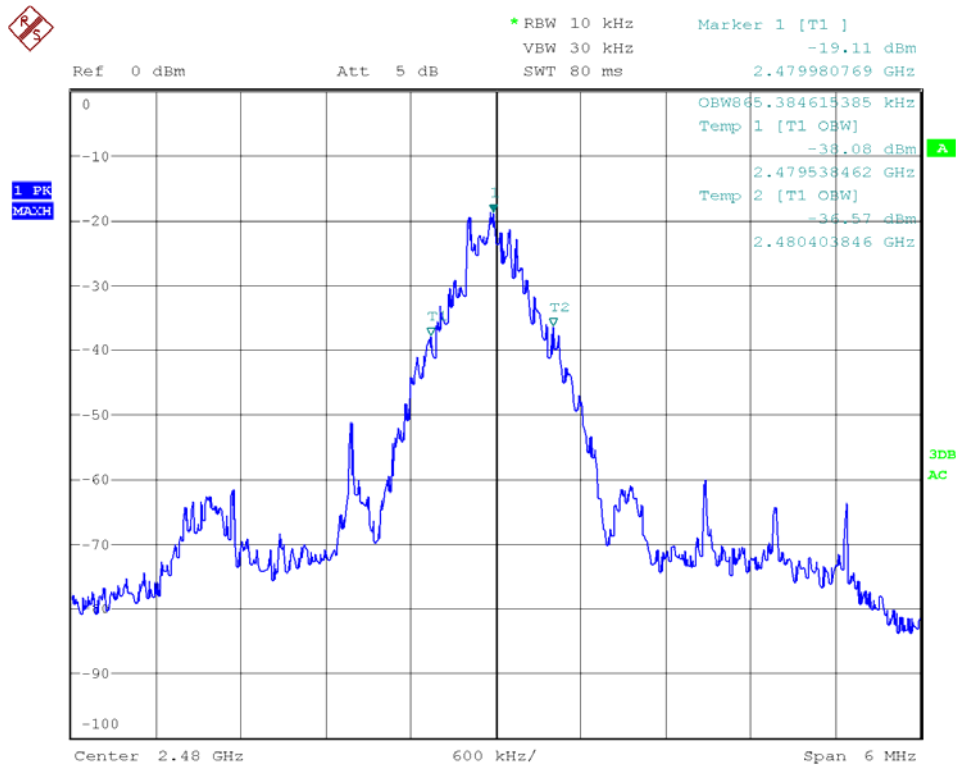
Lowest Channel:



Middle Channel:



Highest Channel:



#### 4.4 Carrier Frequencies Separated

**Test Requirement:** FCC Part 15 C

**Test Method:** Based on FCC Part15 C Section 15.247 & DA 00-705

**Test Date:** 2009-04-08

**Testrequirements:** Regulation 15.247(a),(1) Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater. Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW.

**Test Status:** Test in hopping transmitting operating mode.

**Power supply:** Connected with convert board powered by PC USB ports, and to fix frequency transmitting.

**Test Procedure:**

1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum.
2. Set the spectrum analyzer: RBW  $\geq$  1% of the span (set 100 kHz). VBW  $\geq$  RBW , Span = 6MHz. Sweep = auto; Detector Function = Peak. Trace = Max,hold.
3. Allow the trace to stabilize. Use the marker-delta function to determine the separation between the peaks of the adjacent channels. The limit is specified in one of the subparagraphs of this Section. Submit this plot.

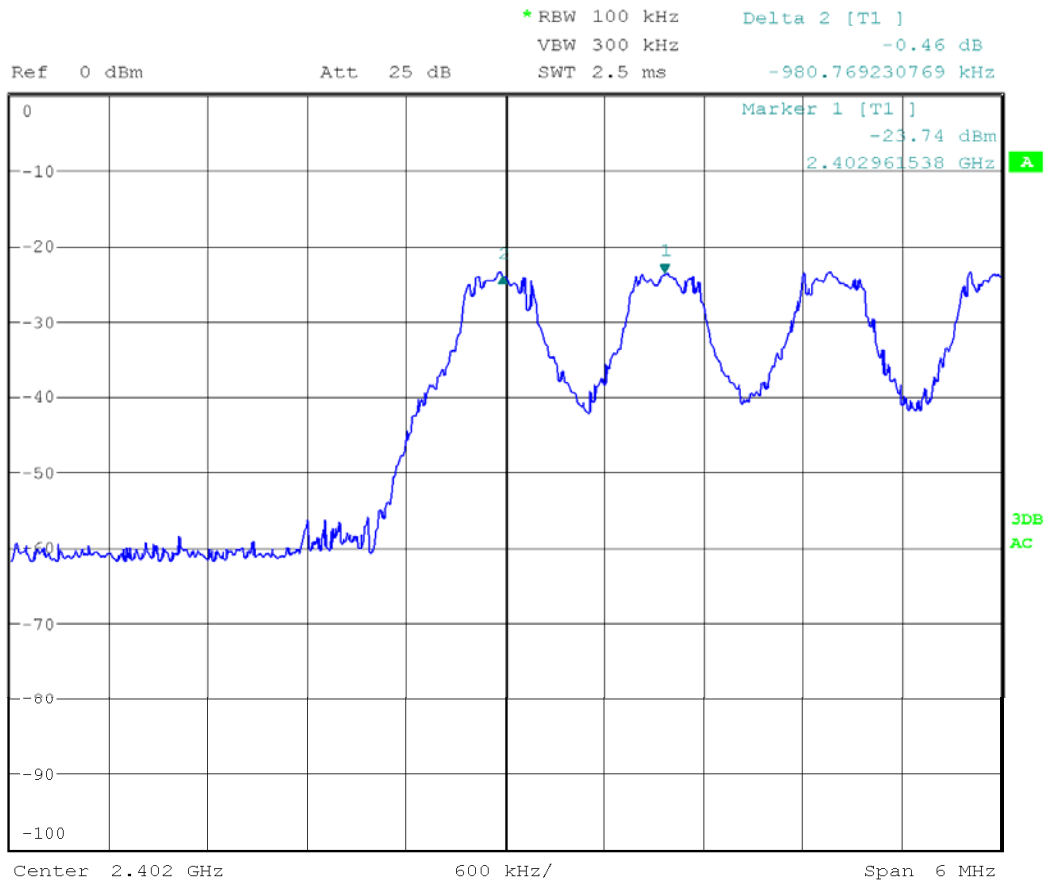
**Test result:**

Test Channel	Carrier Frequencies Separated	PASS/FAIL
Lower Channels (channel 0 and channel 1)	0.980MHz	Pass
Middle Channels (channel 39 and channel 40)	0.980MHz	Pass
Upper Channels (channel 77 and channel 78)	1.038MHz	Pass

Remark:

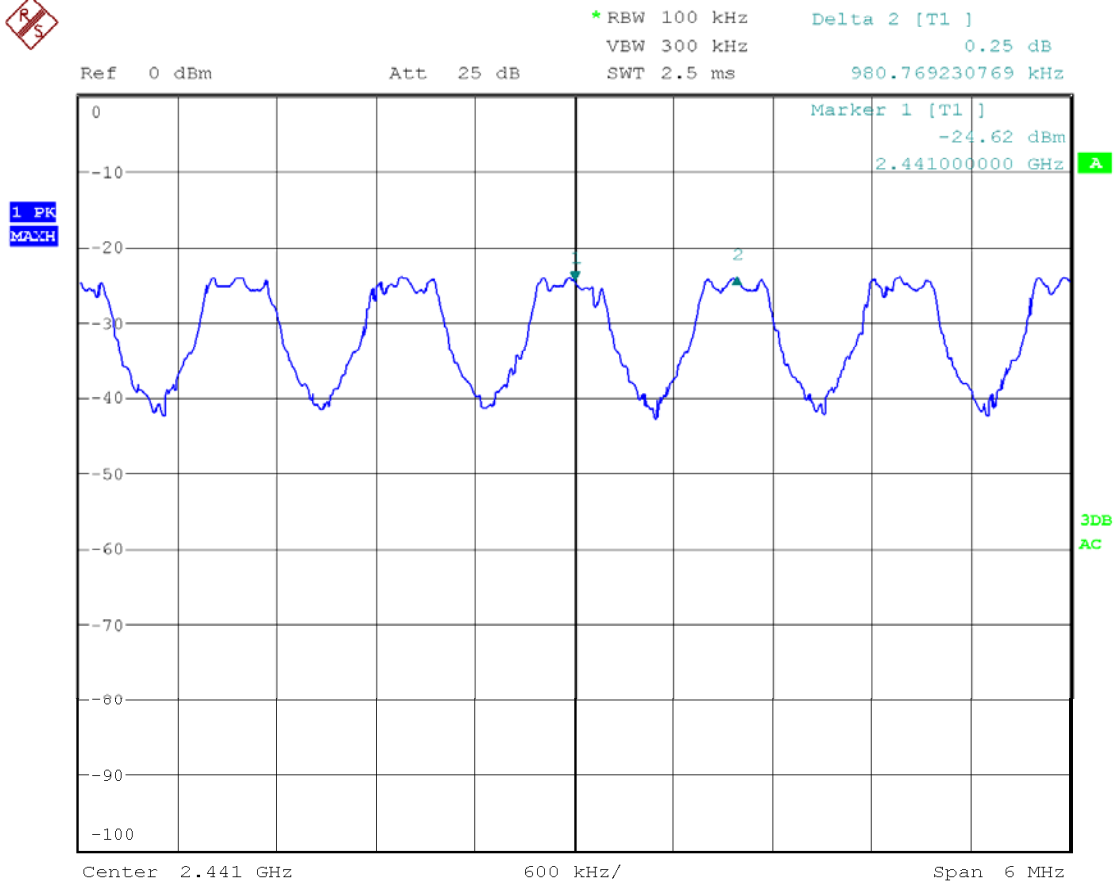
Pretest in Bluetooth normal mode and EDR mode , find the worse case is in normal mode, and the limit in normal mode is maximum 20dB channel bandwidth 912KHz. So report the normal mode data.

# 1. Lowest Channels: Carrier Frequencies Separated



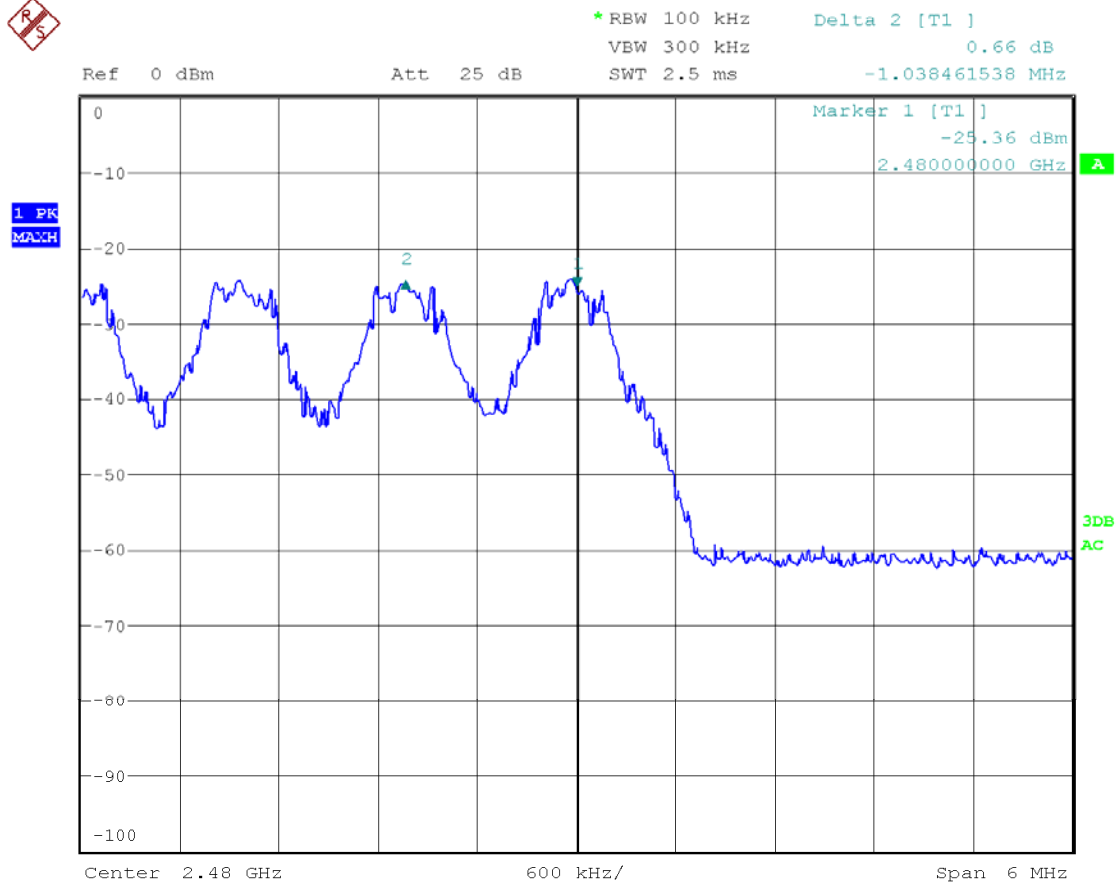
Date: 8.APR.2009 19:15:30

## 2. Middle Channels: Carrier Frequencies Separated



Date: 8.APR.2009 19:18:45

### 3. Highest Channels: Carrier Frequencies Separated



Date: 8.APR.2009 19:20:50

**Test result: The unit does meet the FCC requirements.**

## 4.5 Hopping Channel Number

**Test Requirement:** FCC Part15 C

**Test Method:** Based on FCC Part15 C Section 15.247 & DA 00-705

**Test Date:** 2009-04-08

**Requirements:** Regulation 15.247 (a) (1)(iii) Frequency hopping systems in the 2400-2483.5 MHz band shall use at least 15 channels.

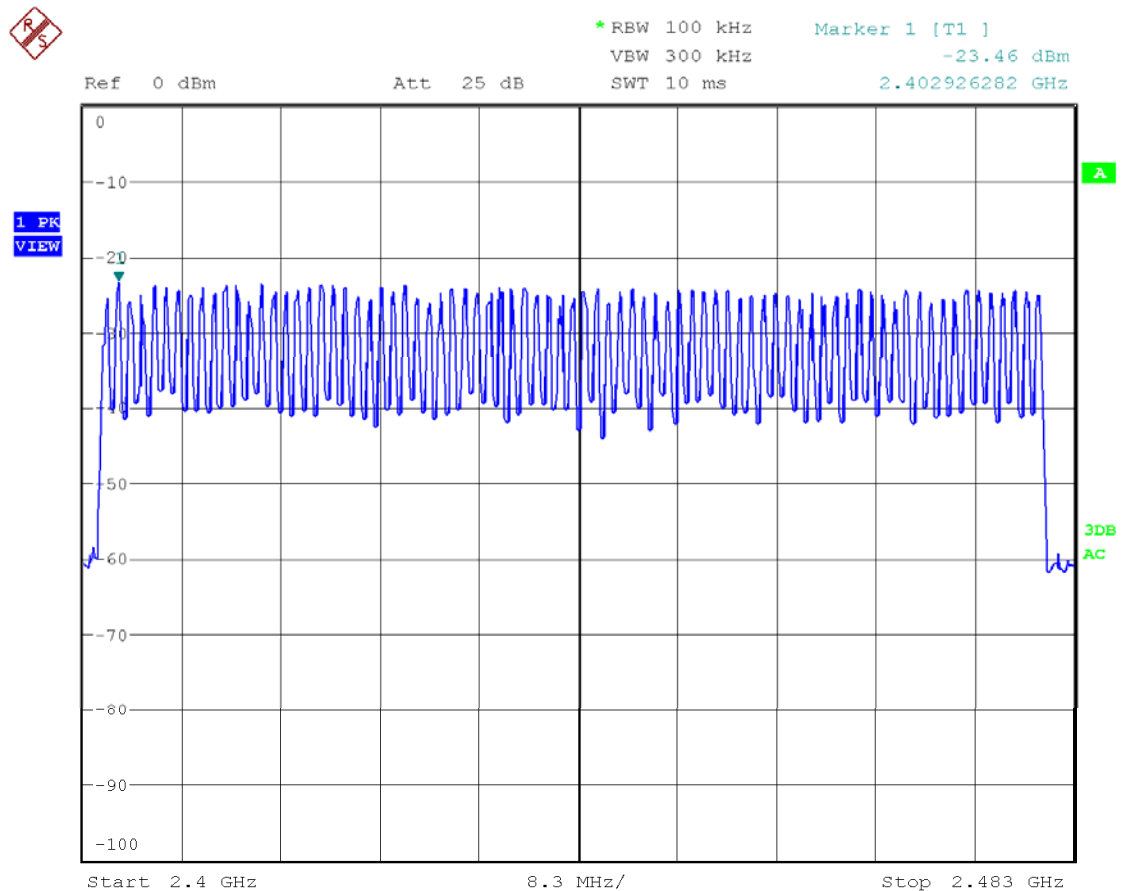
**Test Status:** Test in hopping transmitting operating mode.

**Power supply:** Connected with convert board powered by PC USB ports, and to fix frequency transmitting.

Test Procedure:

1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum.
2. Set the spectrum analyzer: RBW = 100 kHz. VBW = 300 kHz. Sweep = auto; Detector Function = Peak. Trace = Max hold.
3. Allow the trace to stabilize. It may prove necessary to break the span up to sections. in order to clearly show all of the hopping frequencies. The limit is specified in one of the subparagraphs of this Section.
4. Set the spectrum analyzer: start frequency = 2400MHz. stop frequency = 2483.5MHz. Submit the test result graph.

**Test result:** Total channels are 79 channels.



Date: 8.APR.2009 19:23:45

**Test result:** The unit does meet the FCC requirements.

## 4.6 Dwell Time

<b>Test Requirement:</b>	<b>FCC Part 15 C</b>
<b>Test Method:</b>	<b>Based on FCC Part15 C Section 15.247 &amp; DA 00-705</b>
<b>Test Date:</b>	<b>2009-04-07</b>
<b>Test requirements:</b>	<b>Regulation 15.247(a)(1)(iii) Frequency hopping systems in the 2400-2483.5 MHz band shall use at least 15 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.</b>
<b>Test Status:</b>	<b>Test in hopping transmitting operating mode.</b>
<b>Power supply:</b>	<b>Connected with convert board powered by PC USB ports, and to fix frequency transmitting.</b>

Test Procedure:

- 1.Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum.
- 2.Set spectrum analyzer span = 0. centered on a hopping channel;
- 3.Set RBW = 1MHz and VBW = 3MHz.Sweep = as necessary to capture the entire dwell time per hopping channel. Detector Function = Peak. Trace = Max hold;
- 4.Use the marker-delta function to determine the dwell time. If this value varies with different modes of operation (e.g.. data rate. modulation format. etc.). repeat this test for each variation. The limit is specified in one of the subparagraphs of this Section. Submit this plot(s). An oscilloscope may be used instead of a spectrum analyzer.

Pretest the Bluetooth normal mode

The test period:  $T = 0.4 \text{ Second/Channel} \times 79 \text{ Channel} = 31.6 \text{ s}$

1. **Channel 0:** 2.402GHz

DH1 time slot =  $0.363 \text{ (ms)} \times (1600/(2*79)) \times 31.6 = 135.000 \text{ ms}$

DH3 time slot =  $1.625\text{(ms)} \times (1600/(4*79)) \times 31.6 = 268.800 \text{ ms}$

DH5 time slot =  $2.894 \text{ (ms)} \times (1600/(6*79)) \times 31.6 = 313.600 \text{ ms}$

2. **Channel 39:** 2.441GHz

DH1 time slot =  $0.364 \text{ (ms)} \times (1600/(2*79)) \times 31.6 = 130.880 \text{ ms}$

DH3 time slot =  $1.625 \text{ (ms)} \times (1600/(4*79)) \times 31.6 = 268.800 \text{ ms}$

DH5 time slot =  $2.881 \text{ (ms)} \times (1600/(6*79)) \times 31.6 = 313.600 \text{ ms}$

3. **Channel 78:** 2.480GHz

DH1 time slot =  $0.390 \text{ (ms)} \times (1600/(2*79)) \times 31.6 = 135.000 \text{ ms}$

DH3 time slot =  $1.638\text{(ms)} \times (1600/(4*79)) \times 31.6 = 268.800 \text{ ms}$

DH5 time slot =  $2.885 \text{ (ms)} \times (1600/(6*79)) \times 31.6 = 313.600 \text{ ms}$

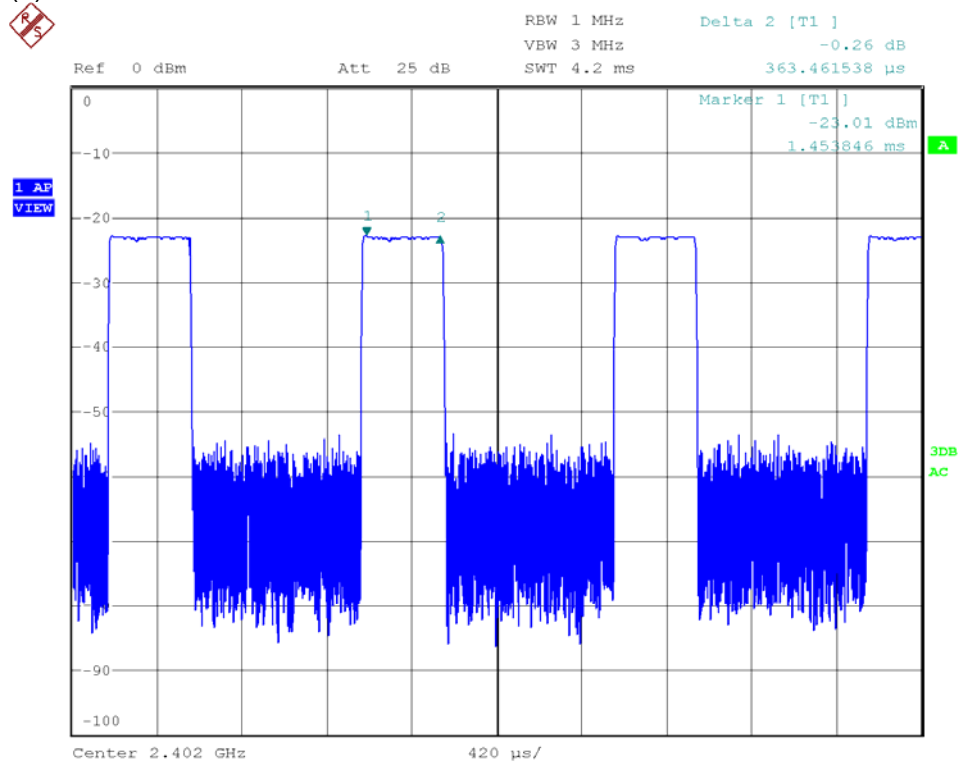
The results are not greater than 0.4 seconds.

**The unit does meet the FCC requirements.**

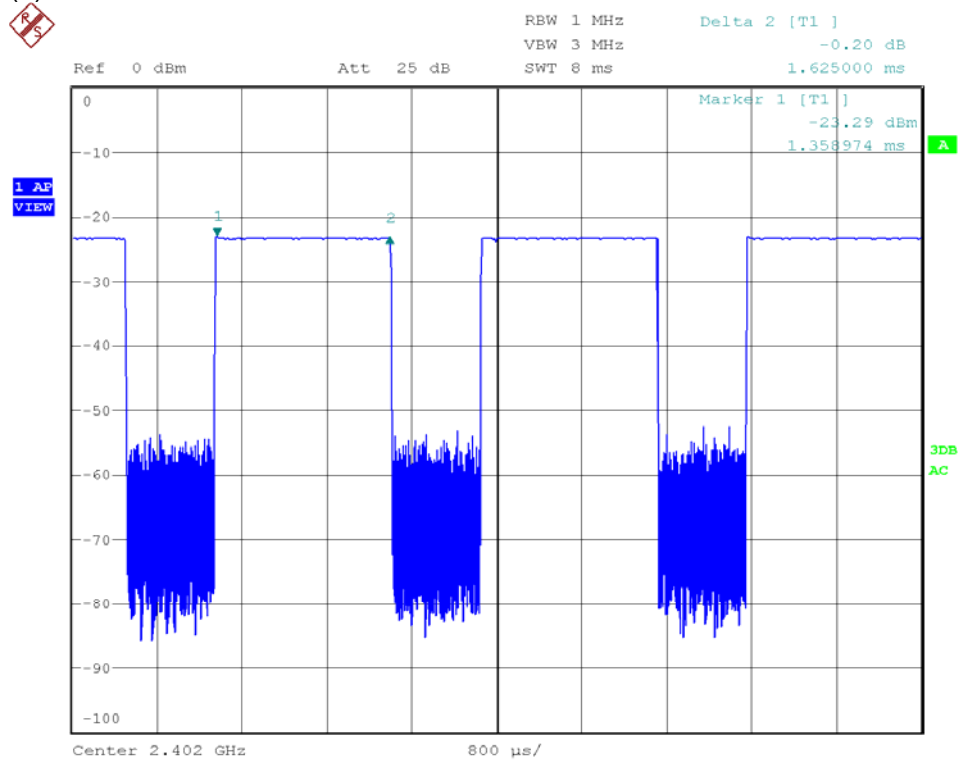
Please refer the graph as below:

1. Lowest channel (2.402 GHz):

(1). DH1

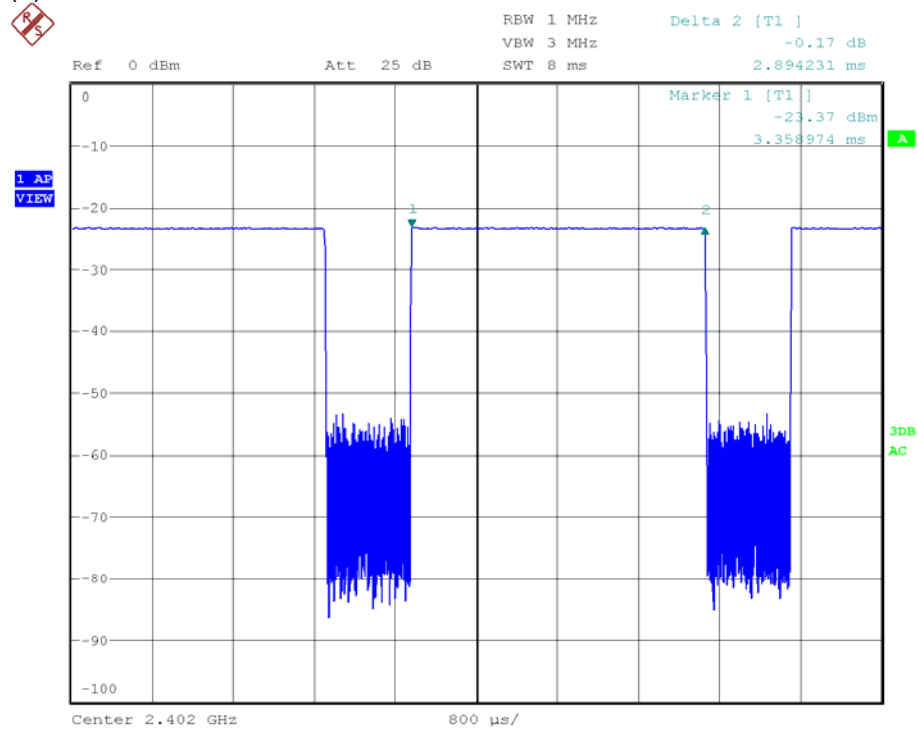


(2) DH3:



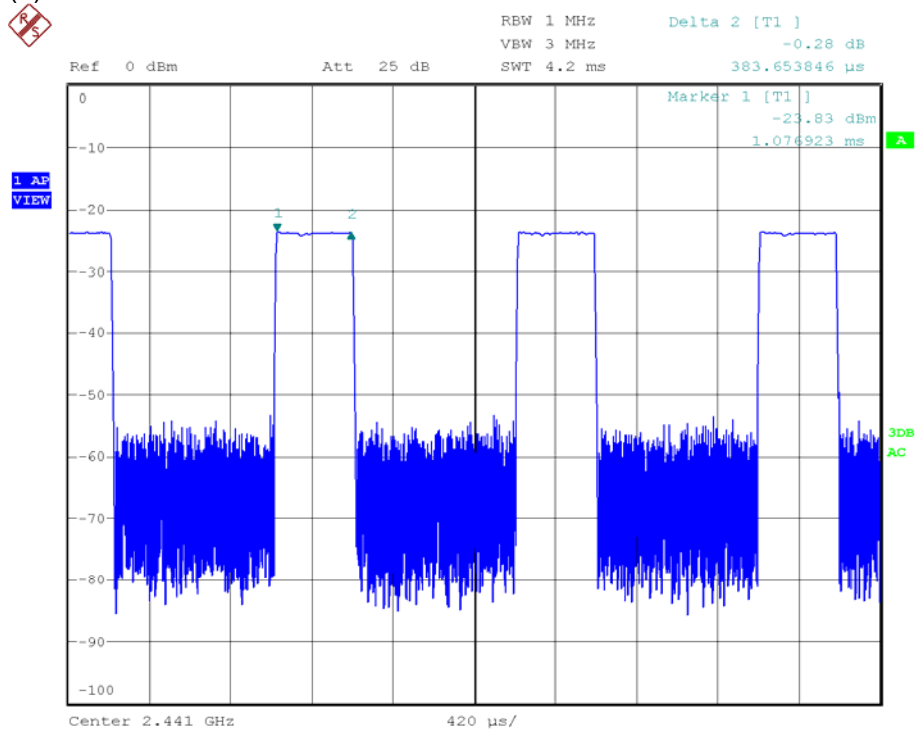
1. Lowest channel (2.402 GHz):

(3). DH5:



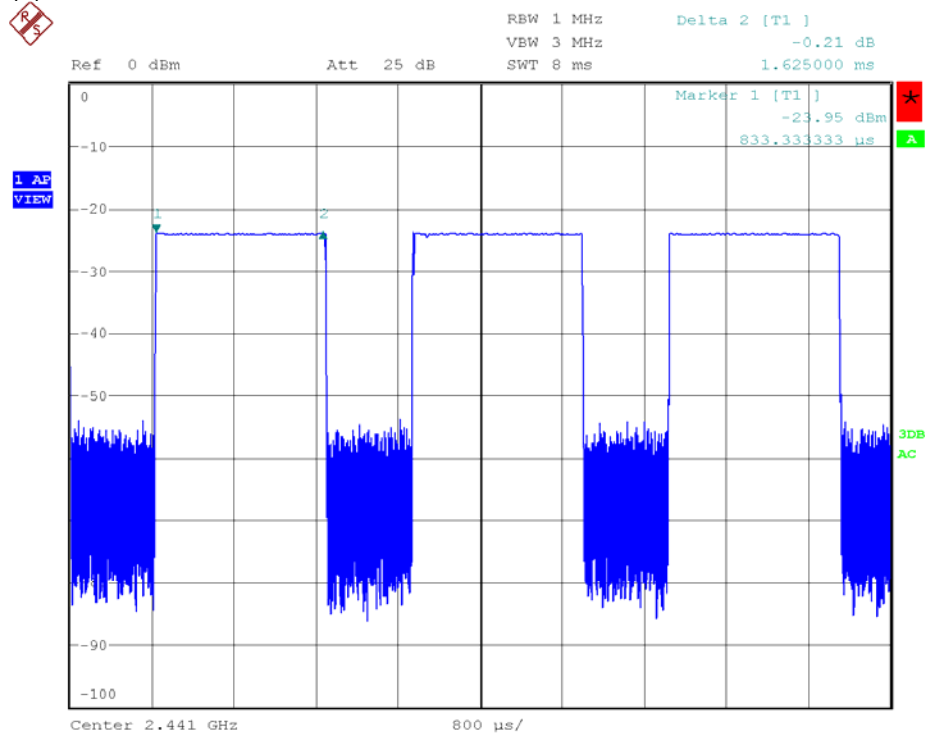
2. Middle Channel (2.441GHz)

(1) DH1

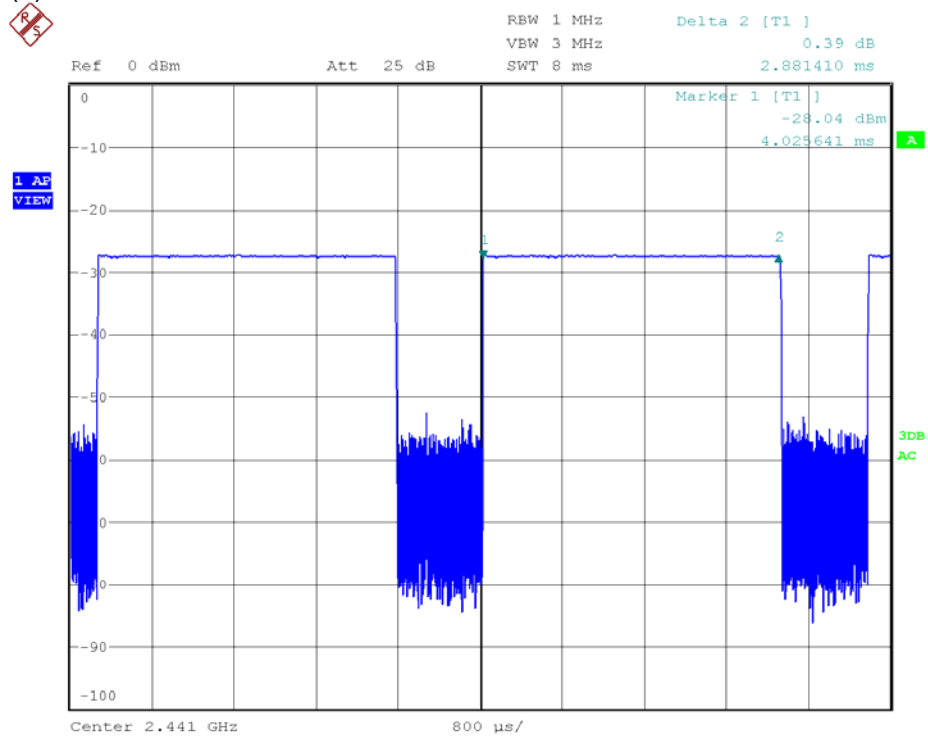


## 2. Middle Channel (2.441GHz)

### (2) DH3

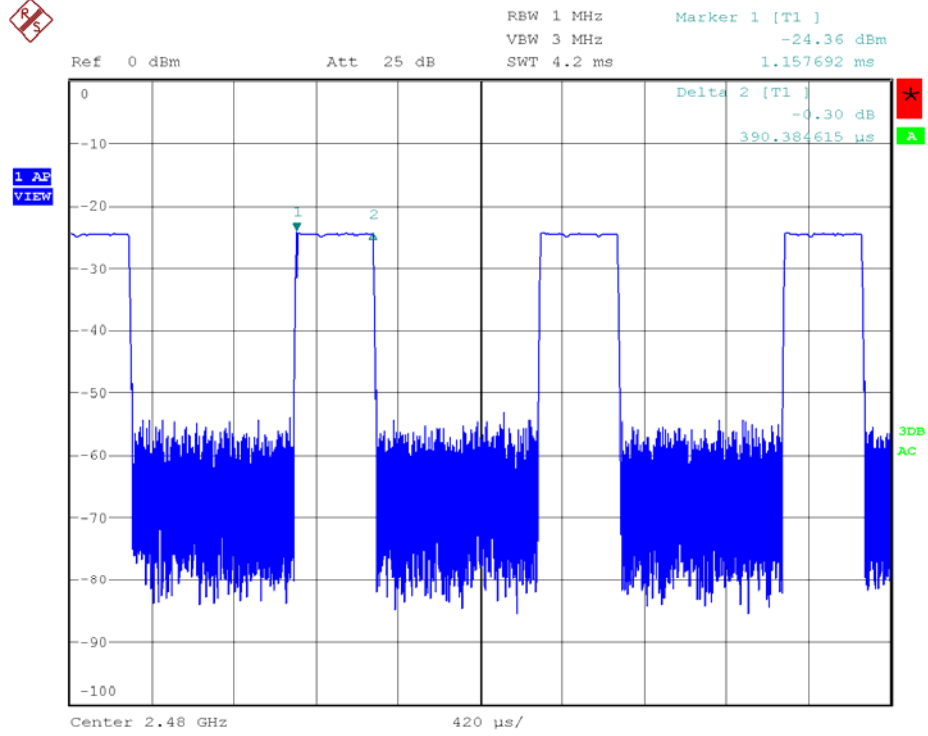


### (3) DH5

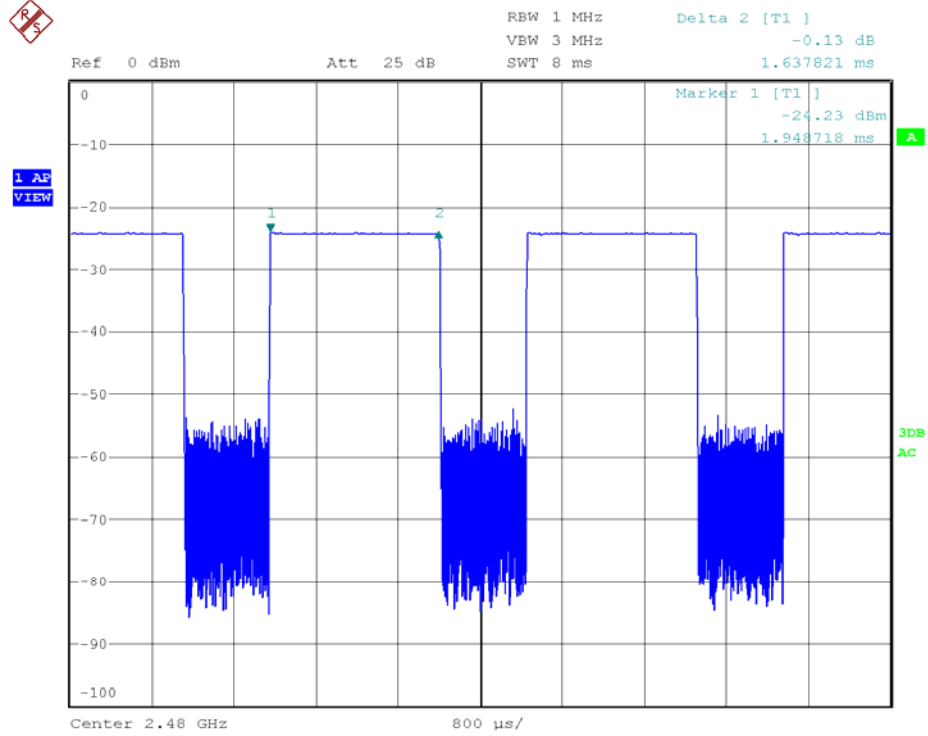


### 3. Highest channel (2.480GHz)

#### (1). DH1

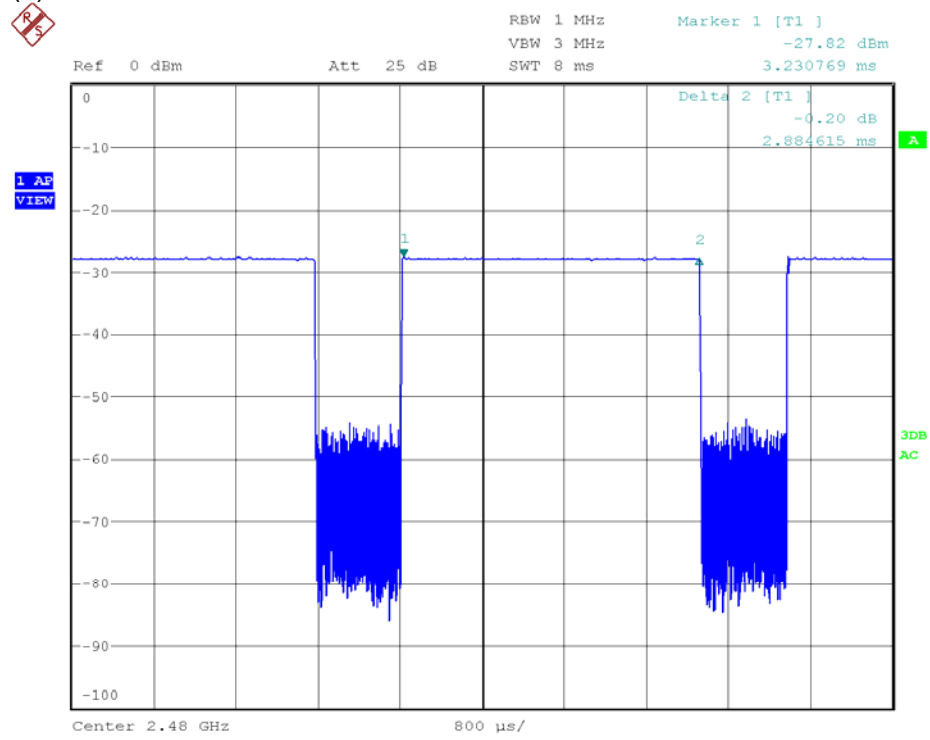


#### (2). DH3



### 3. Highest channel (2.480GHz)

#### (3). DH5



## 4.7 Pseudorandom Frequency Hopping Sequence

### 4.7.1 Standard requirement

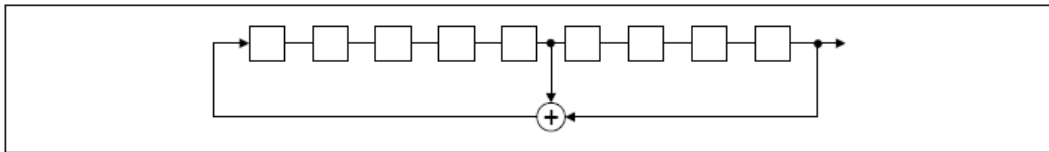
15.247(a)(1) requirement:

Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater. Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW. The system shall hop to channel frequencies that are selected at the system hopping rate from a Pseudorandom ordered list of hopping frequencies. Each frequency must be used equally on the average by each transmitter. The system receivers shall have input bandwidths that match the hopping channel bandwidths of their corresponding transmitters and shall shift frequencies in synchronization with the transmitted signals.

### 4.7.2 EUT Pseudorandom Frequency Hopping Sequence

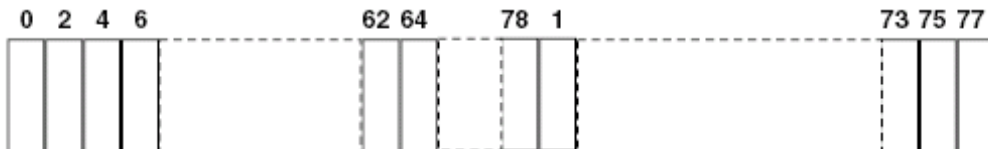
The pseudorandom sequence may be generated in a nine-stage shift register whose 5th and 9th stage outputs are added in a modulo-two addition stage, and the result is fed back to the input of the first stage. The sequence begins with the first ONE of 9 consecutive ONES; i.e. the shift register is initialized with nine ones.

- Number of shift register stages: 9
- Length of pseudo-random sequence:  $2^9 - 1 = 511$  bits
- Longest sequence of zeros: 8 (non-inverted signal)



*Linear Feedback Shift Register for Generation of the PRBS sequence*

An example of Pseudorandom Frequency Hopping Sequence as follow:



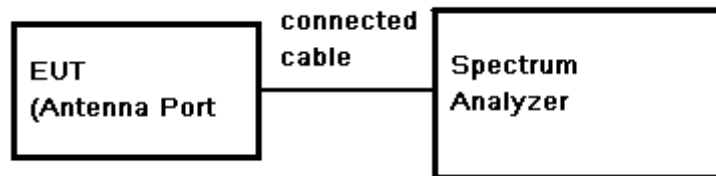
Each frequency used equally on the average by each transmitter.

The system receivers have input bandwidths that match the hopping channel bandwidths of their corresponding transmitters and shift frequencies in synchronization with the transmitted signals.

## 4.8 Maximum Peak Output Power

<b>Test Requirement:</b>	<b>FCC Part 15.247 &amp; DA 00-705</b>
<b>Test Method:</b>	<b>Base on ANSI 63.4.</b>
<b>Test Date:</b>	<b>2009-04-07</b>
<b>Test Limit:</b>	<b>Regulation 15.247 (b)(1)For frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 non-overlapping hopping channels, and all frequency hopping systems in the 5725-5850 MHz band: 1 watt. For all other frequency hopping systems in the 2400-2483.5 MHz band: 0.125 watts. Refer to the result “Hopping channel number” of this document. The 1 watt (30.0dBm) limit applies.</b>
<b>Test mode:</b>	<b>Test in fixing frequency transmitting mode.</b>
<b>Power supply:</b>	<b>Connected with convert board powered by PC USB ports, and to fix frequency transmitting.</b>

Test Configuration:



Test Procedure:

1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum.
2. Set the spectrum analyzer: RBW = 1 MHz. VBW = 3 MHz. Sweep = auto; Detector Function = Peak.
3. Keep the EUT in transmitting at lowest, medium and highest channel individually. Record the max value.

**Test Result:**

**Normal mode:**

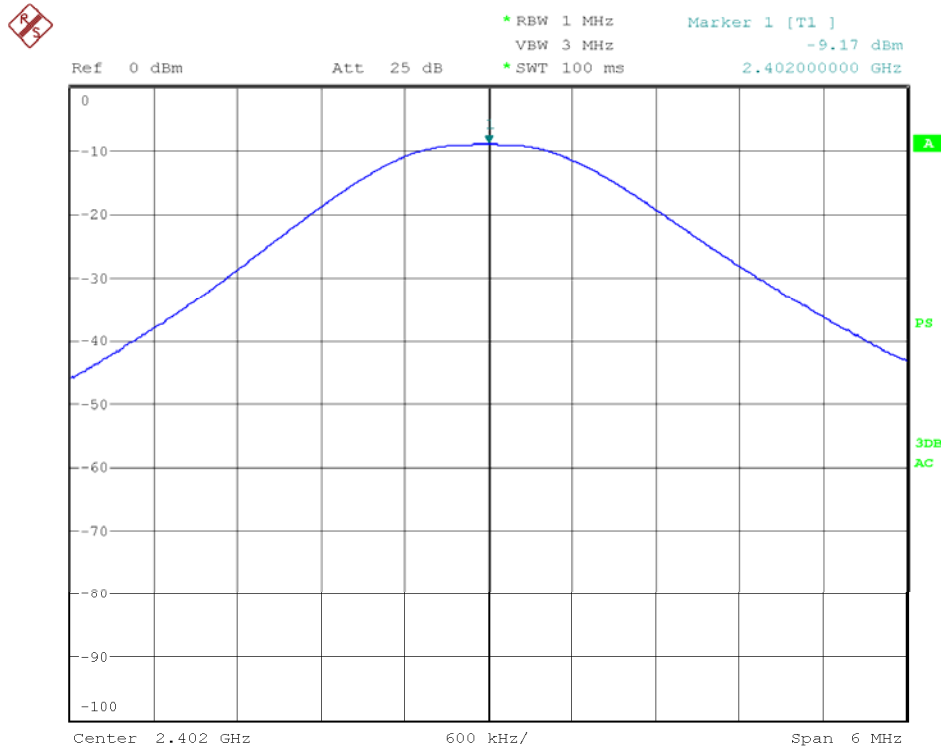
Test Channel	Fundamental Frequency (GHz)	Reading Power (dBm)	Cable Loss (dB)	Output Power (dBm)	Limit (dBm)	Margin (dB)
Lowest	2.402	-9.17	0.70	-8.47	30.0	38.47
Middle	2.441	-8.89	0.70	-8.19	30.0	38.19
Highest	2.480	-8.77	0.70	-8.07	30.0	38.07

**Test result: The unit does meet the FCC requirements.**

**Test result plot as follows:**

**Normal mode:**

**Lowest Channel:**





## 4.9 RF Exposure Compliance Requirement

### 4.9.1 Standard requirement

15.247(b)(4) requirement:

(4) The conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

TCB Exclusion List (7 July 2002)

Exposure category	low threshold	high threshold
general population	(60/fGHz) mW. $d < 2.5$ cm (120/fGHz) mW. $d \geq 2.5$ cm	(900/fGHz) mW. $d < 20$ cm
occupational	(375/fGHz) mW. $d < 2.5$ cm (900/fGHz) mW. $d \geq 2.5$ cm	(2250/fGHz) mW. $d < 20$ cm

### 4.9.2 EUT RF Exposure

The Max Conducted Peak Output Power is **-8.07dBm(0.156mW)** in channel **0**;

The best case gain of the antenna is 0.4dBi..

0.4dB logarithmic terms convert to numeric result is nearly **1.1**

According to the formula, calculate the EIRP test result:

$$\text{EIRP} = P \times G = 0.156 \text{ mW} \times 1.1 = 0.172 \text{ mW}$$

SAR requirement:

$$S = 60 / f(\text{GHz}) = 60 / 2.4 = 25 \text{ mW}$$

$$\text{EIRP} < S$$

So the SAR report is not required.

## 4.10 Conducted Spurious Emissions

**Test Requirement:** FCC Part 15.247

**Test Method:** Based on FCC Part 15 C Section 15.247

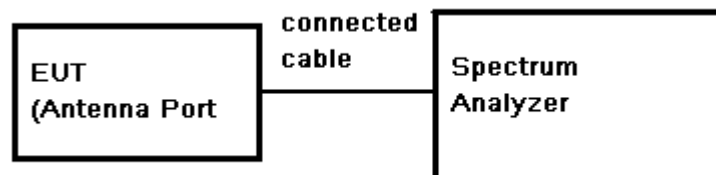
**Test Date:** 2009-04-05

**Power supply:** Connected with convert board powered by PC USB ports, and to fix frequency transmitting.

**Test requirements:** (d) In any 100 kHz 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 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits.

**Test Status:** Test the lowest, Middle, highest channel.

Test Configuration:



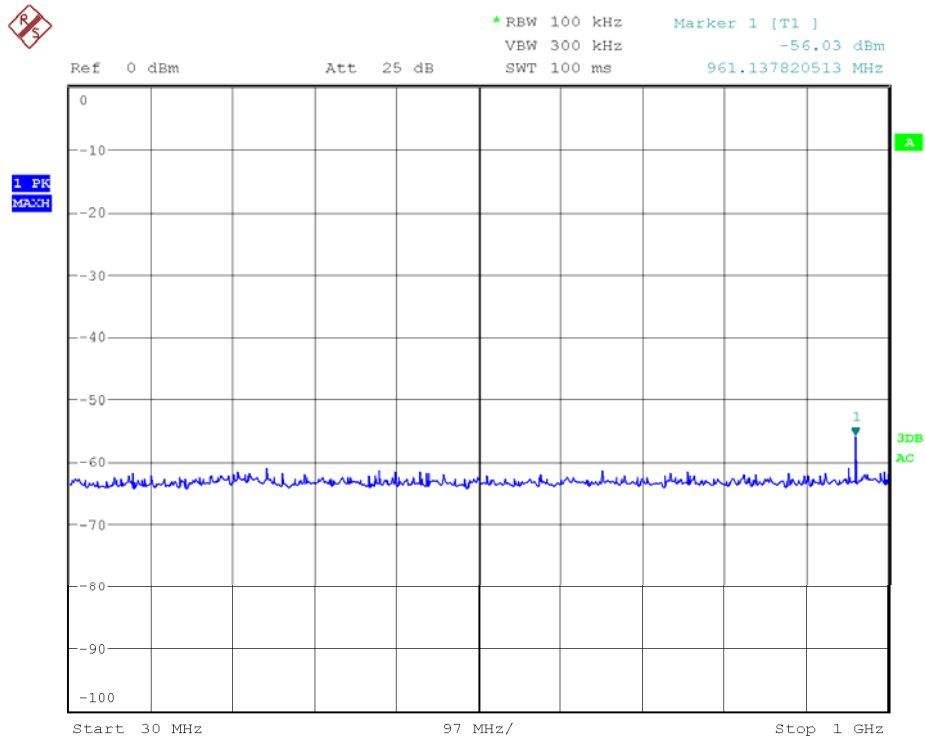
**Test Procedure:**

1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum.
2. Set the spectrum analyzer: Sweep = auto; Detector Function = Peak (Max. hold).

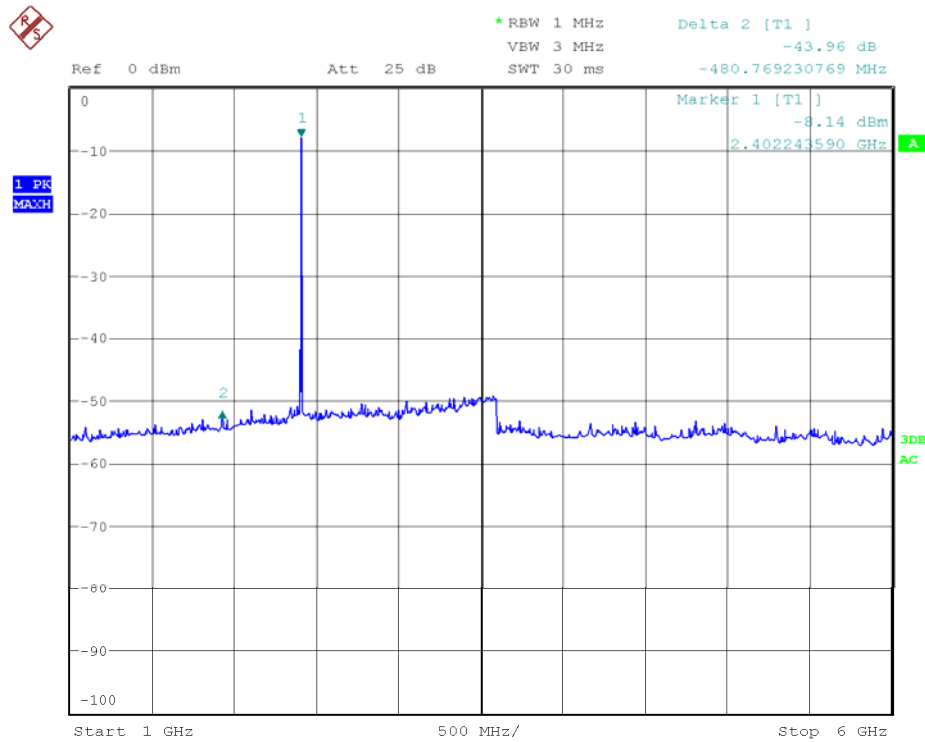
Test result plot as follows:

Lowest Channel:

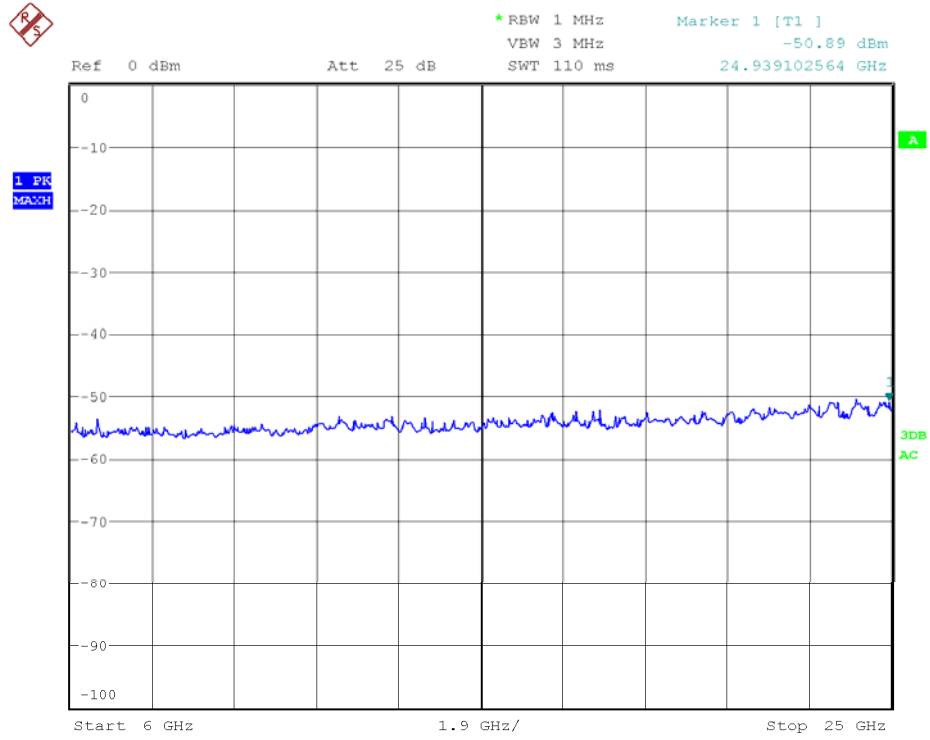
30M to 1GHz



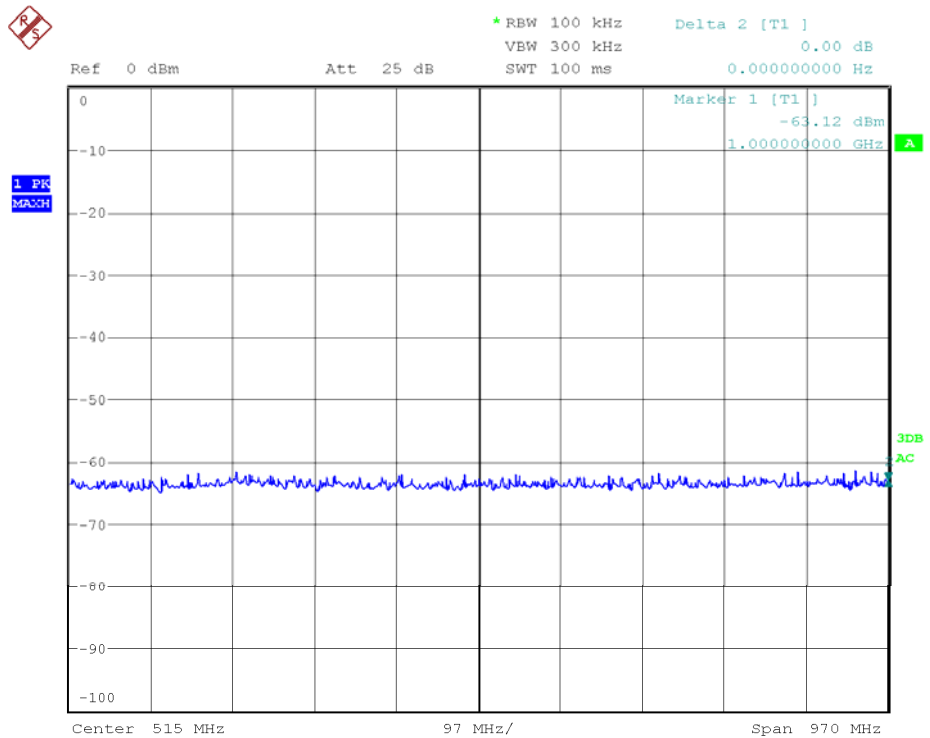
1G to 6GHz



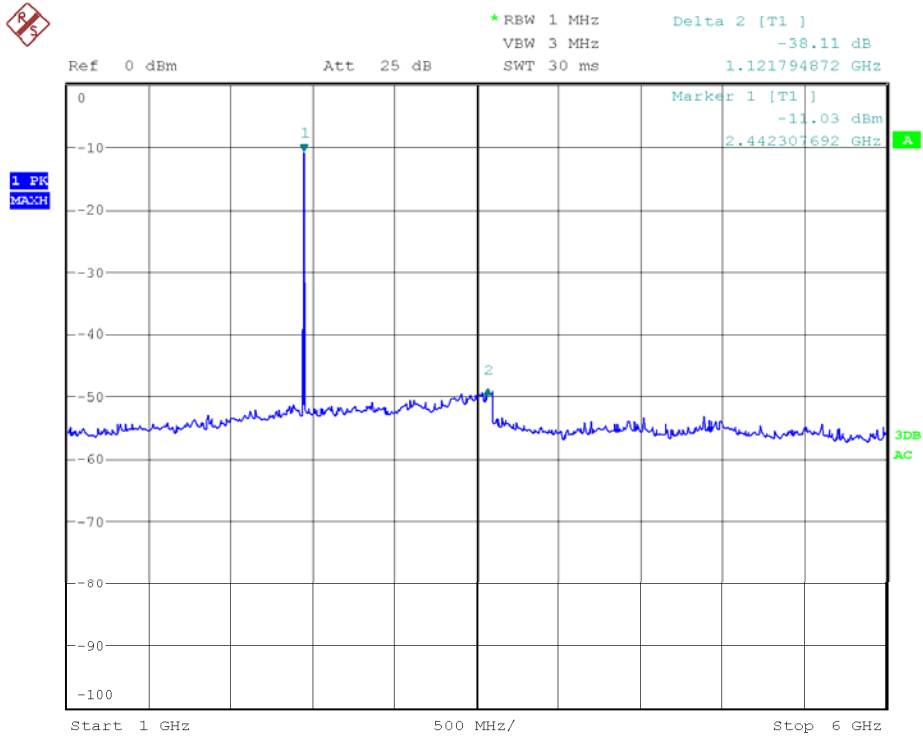
### 6G to 25GHz



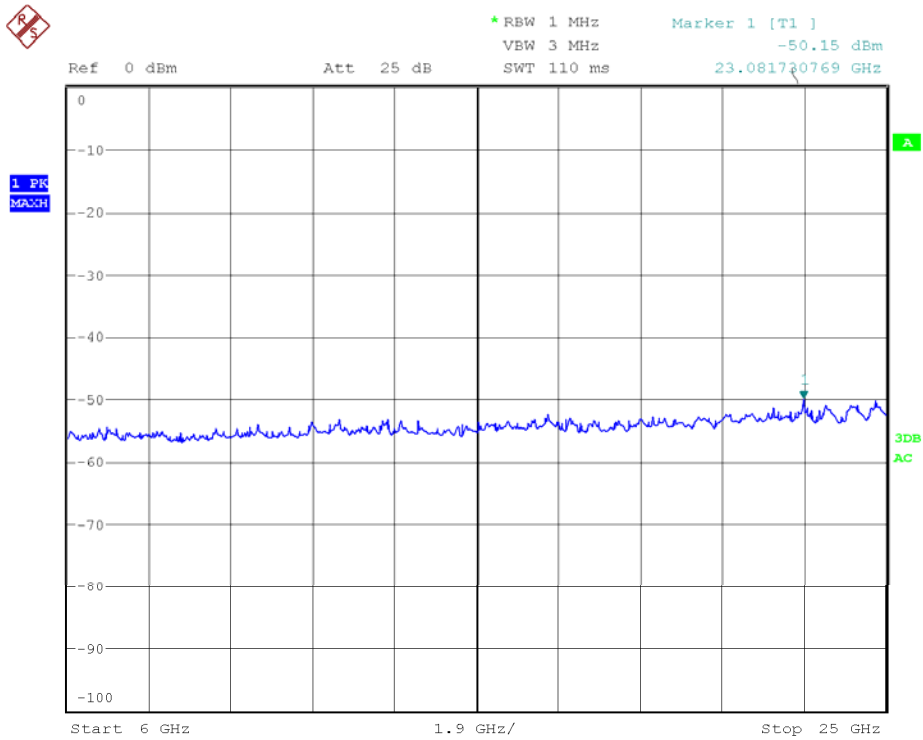
### Middle Channel: 30M to 1GHz



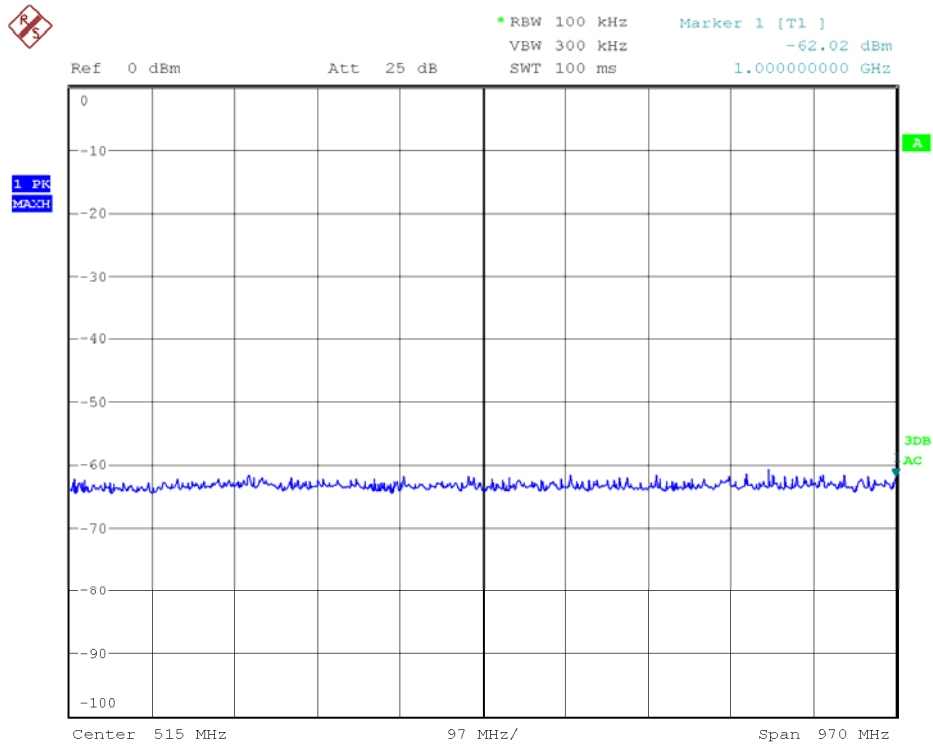
# 1G to 6GHz



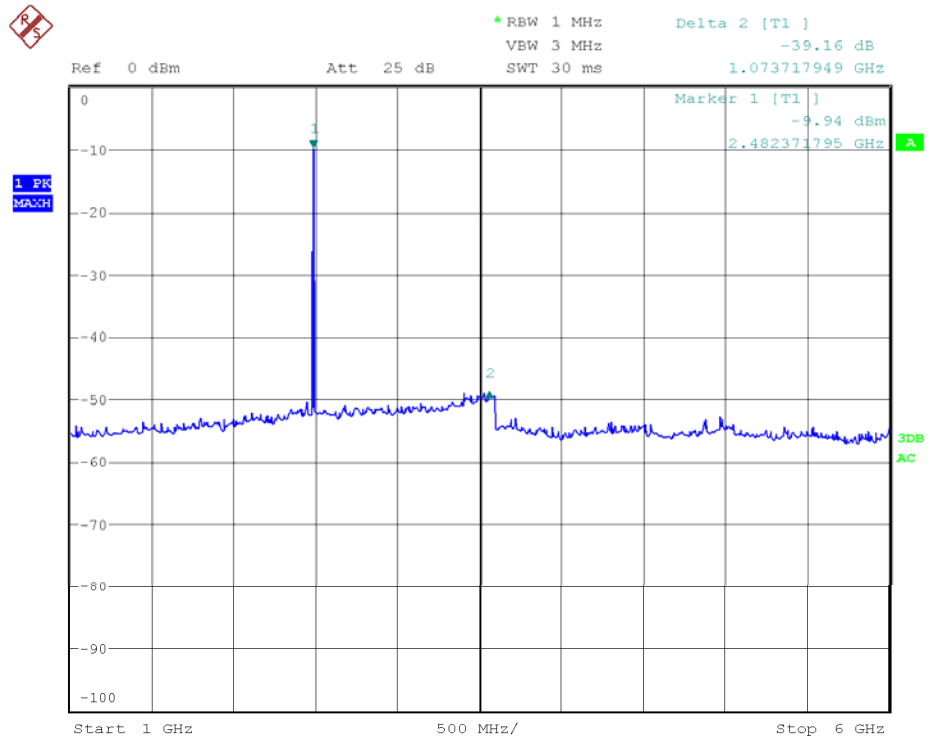
# 6G to 25GHz



### Highest Channel: 30M to 1GHz



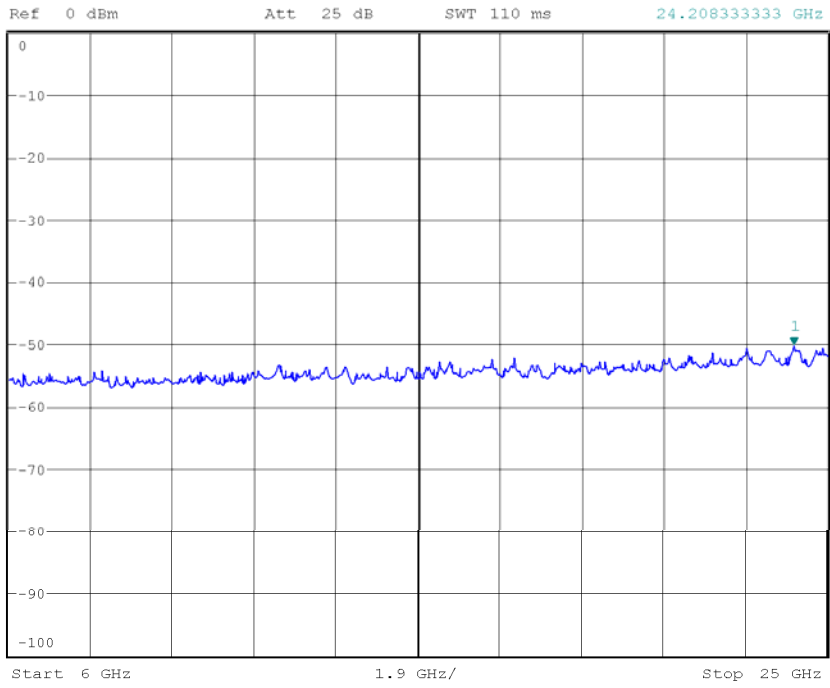
### 1G to 6GHz



# 6G to 25GHz



\*RBW 1 MHz      Marker 1 [T1 ]  
VBW 3 MHz      -50.25 dBm  
SWT 110 ms      24.208333333 GHz



## 4.11 Radiated Spurious Emissions

Test Requirement:	FCC 15.247(d) & 15.209
Test Method:	ANSI C63.4 section 8 & 13
Test Date:	2009-04-06
Test Status:	Playing music by bluetooth
Test site:	Measurement Distance: 3m (Semi-Anechoic Chamber) Test instrumentation resolution bandwidth 120 kHz and Quasi-Peak detector applies (30 MHz – 1000 MHz). 1MHz resolution bandwidth and Peak and Average-Peak detector apply (1000 MHz – 25GHz). Receive antenna scan height 1 m – 4 m. polarization Vertical / Horizontal
<b>Power supply:</b>	<b>Powered by Ipod MP3</b>
<b>15.209 Limit:</b>	40.0 dB $\mu$ V/m between 30MHz & 88MHz 43.5 dB $\mu$ V/m between 88MHz & 216MHz 46.0 dB $\mu$ V/m between 216MHz & 960MHz 54.0 dB $\mu$ V/m above 960MHz
<b>15.247(d) limit:</b>	(d) In any 100 kHz 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 20 dB below that in the 100 kHz bandwidth within the band that <b>Contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits.</b>

## Test Configuration:

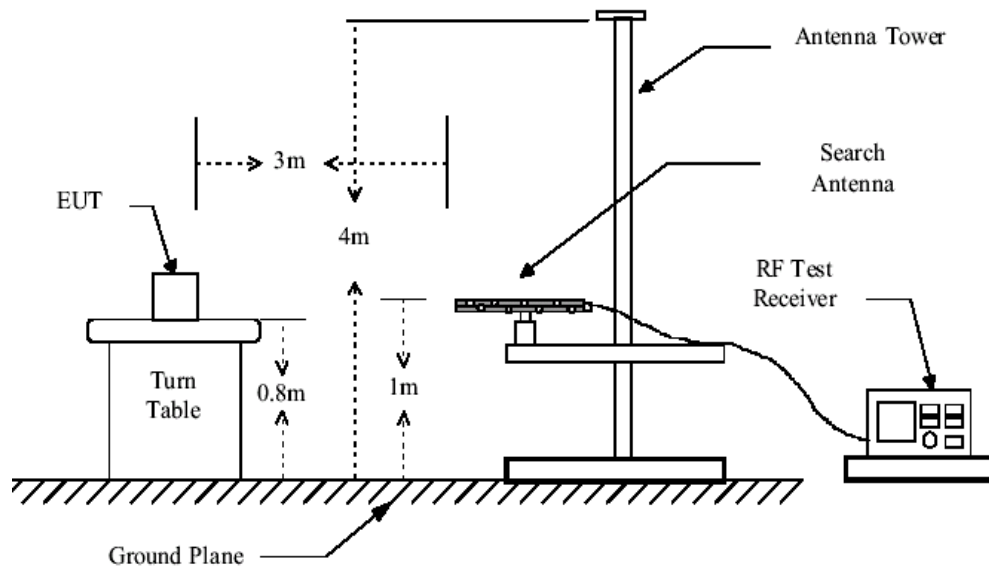


Figure 1. 30MHz to 1GHz radiated emissions test configuration

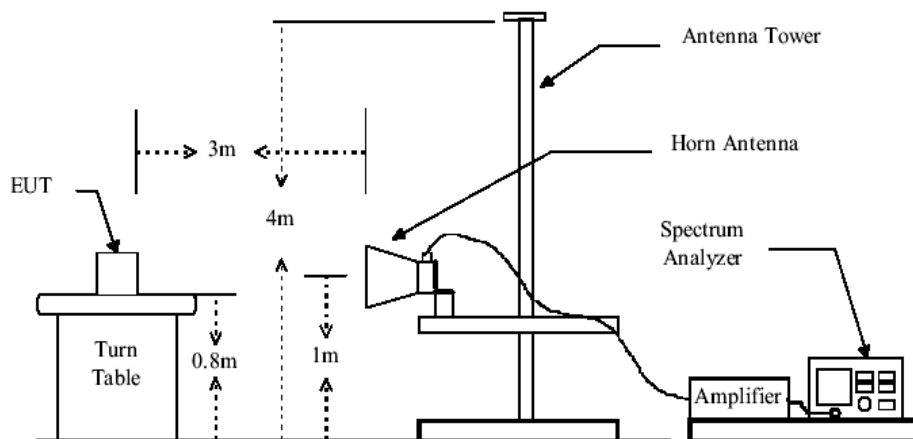
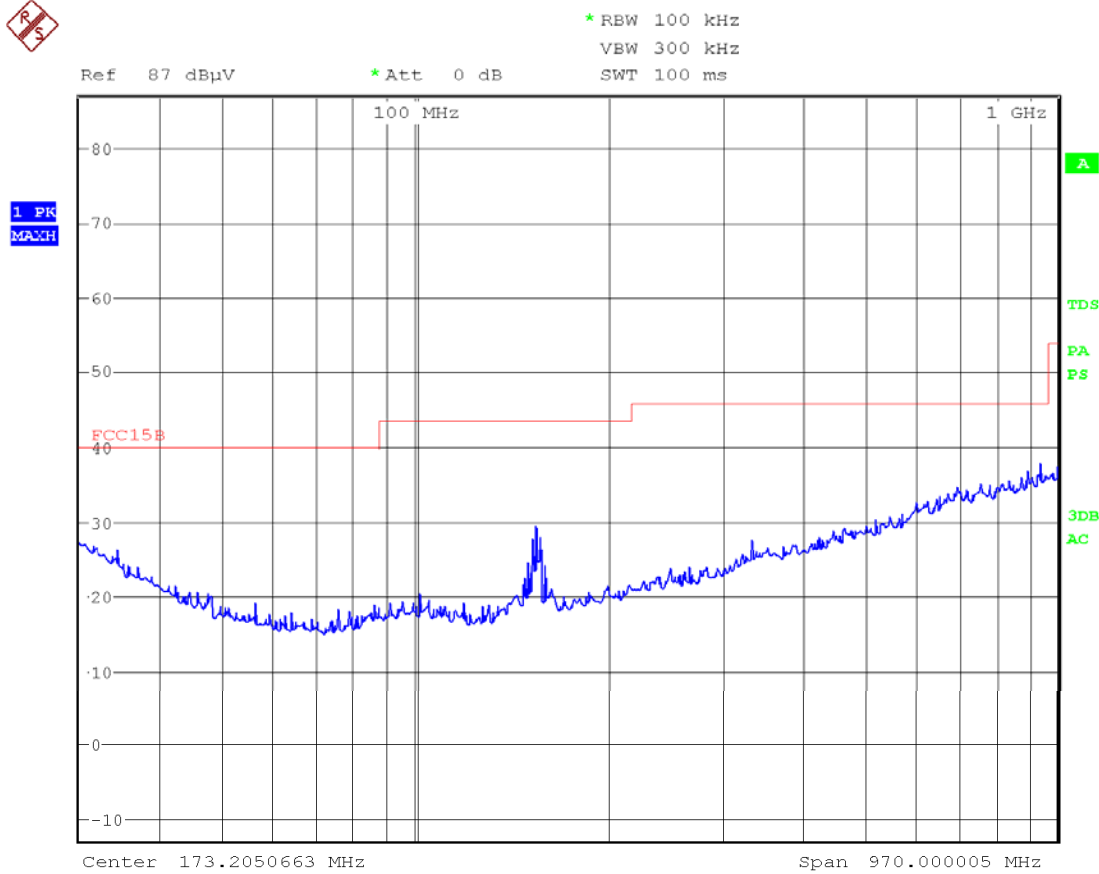


Figure 2. Above 1GHz radiated emissions test configuration

**Test Procedure:** The procedure used was ANSI Standard C63.4-2003. The receiver was scanned from 30MHz to 25GHz. When an emission was found, the table was rotated to produce the maximum signal strength. An initial pre-scan was performed for in peak detection mode using the receiver. The EUT was measured for both the Horizontal and Vertical polarities and performed a pre-test three orthogonal planes. For intentional radiators, measurements of the variation of the input power or the radiated signal level of the fundamental frequency component of the emission, as appropriate, shall be performed with the supply voltage varied between 85% and 115% of the nominal rated supply voltage. The worst case emissions were reported.

### 4.11.1 Harmonic and other spurious emissions

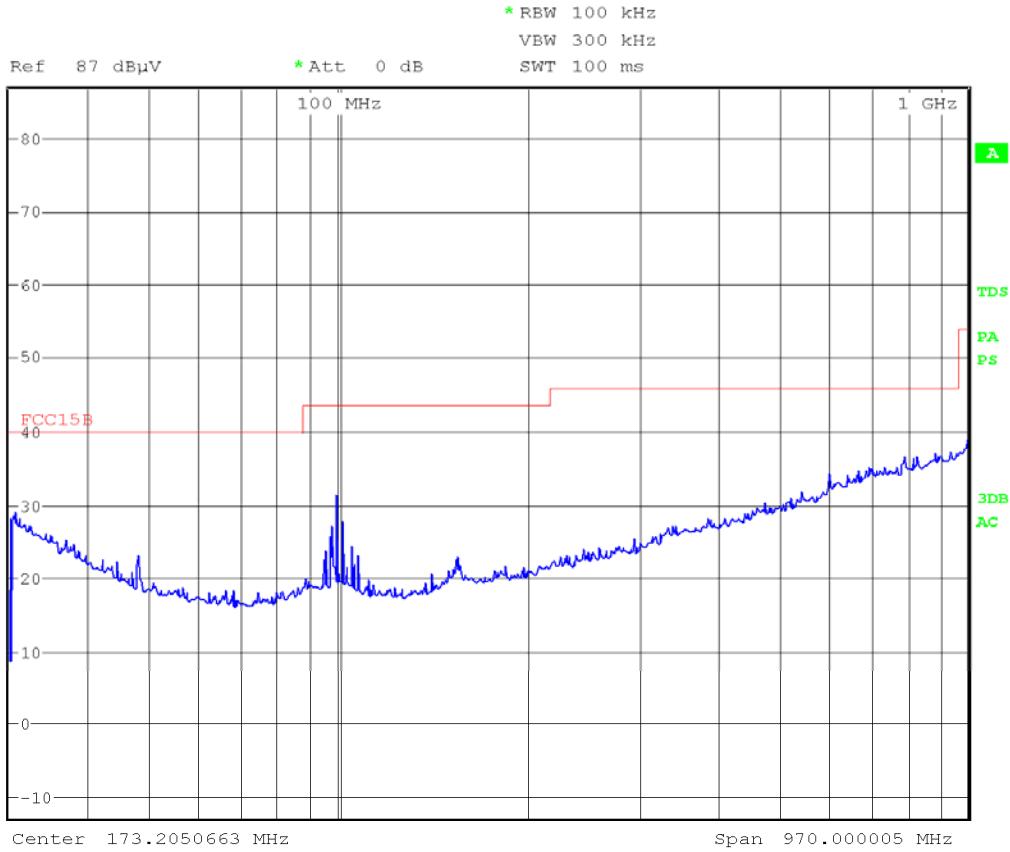
<b>Environment</b>	Tem:23 Hum:55%	<b>Test Engineer:</b>	Shelle Zheng
<b>Site:</b>	3M chamber	<b>Limit</b>	FCC 15.209
<b>Note:</b>	Playing music(ANT Horizontal )		



#### Detected Peaks:

No.	Frequency (MHz)	Reading (dBμV/m)	QP Limit (dBμV/m)	Margin (dBμV/m)	Angle (degrees)	Height (m)	Result	H/V
1	154.8	30.1	43.5	13.4	0	1	Pass	H
2	101.7	18.3	43.5	25.2	0	1	Pass	H
3	154.8	30.1	43.5	13.4	0	1	Pass	H
4	330	23.1	46.0	22.9	0	1.5	Pass	H
5	624.7	25.7	46.0	20.3	0	1	Pass	H
6	1000	28.9	54.0	25.1	90	1	Pass	H

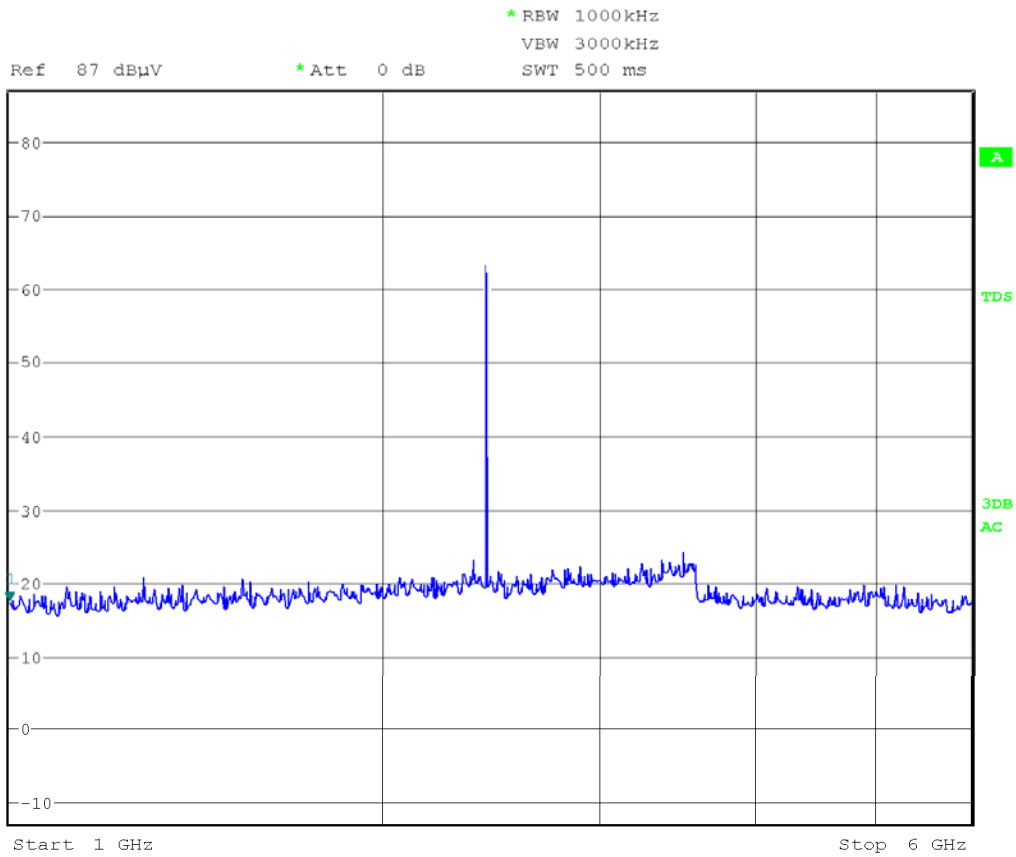
<b>Environment</b>	Tem:23 Hum:55%	<b>Test Engineer:</b>	Shelle Zheng
<b>Site:</b>	3M chamber	<b>Limit</b>	FCC 15.209
<b>Note:</b>	Playing music(ANT Vertical )		



**Detected Peaks:**

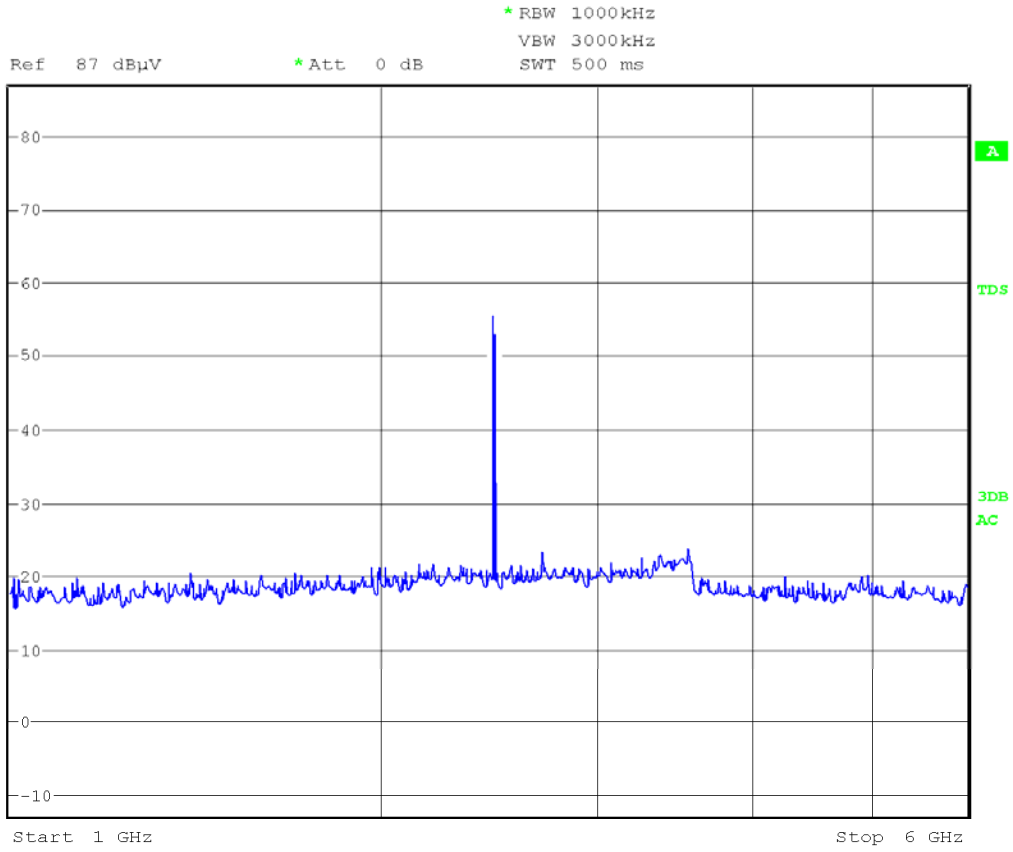
No.	Frequenc y (MHz)	Reading (dBμV/m)	QP Limit (dBμV/m)	Margin (dBμV/m)	Angle (degrees)	Height (m)	Result	H/V
1	99.3	28.6	43.5	14.9	0	1	Pass	V
2	101.7	25.2	43.5	18.3	0	1	Pass	V
3	154.8	24.9	43.5	18.6	0	1	Pass	V
4	351.5	24.1	46.0	21.9	0	1	Pass	V
5	705.0	25.6	46.0	20.4	90	1	Pass	V
6	999.5	29.4	54.0	24.6	0	1	Pass	V

<b>Environment</b>	Tem:23 Hum:55%	<b>Test Engineer:</b>	Shelle Zheng
<b>Site:</b>	3m chamber	<b>Limit</b>	FCC 15.209
<b>Note:</b>	Playing music(ANT Horizontal )		



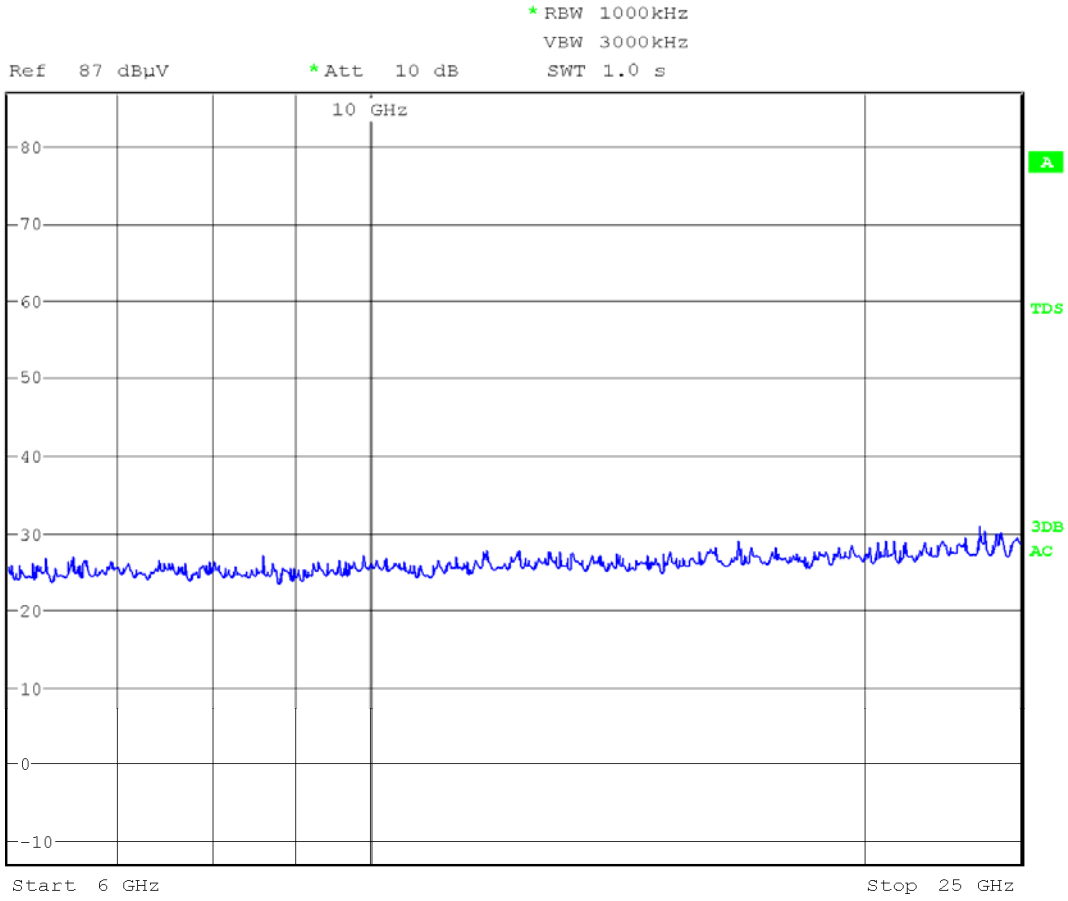
**Detected Peaks:**

<b>Environment</b>	Tem:23 Hum:55%	<b>Test Engineer:</b>	Shelle Zheng
<b>Site:</b>	3M chamber	<b>Limit</b>	FCC 15.209
<b>Note:</b>	Playing music(ANT Vertical )		



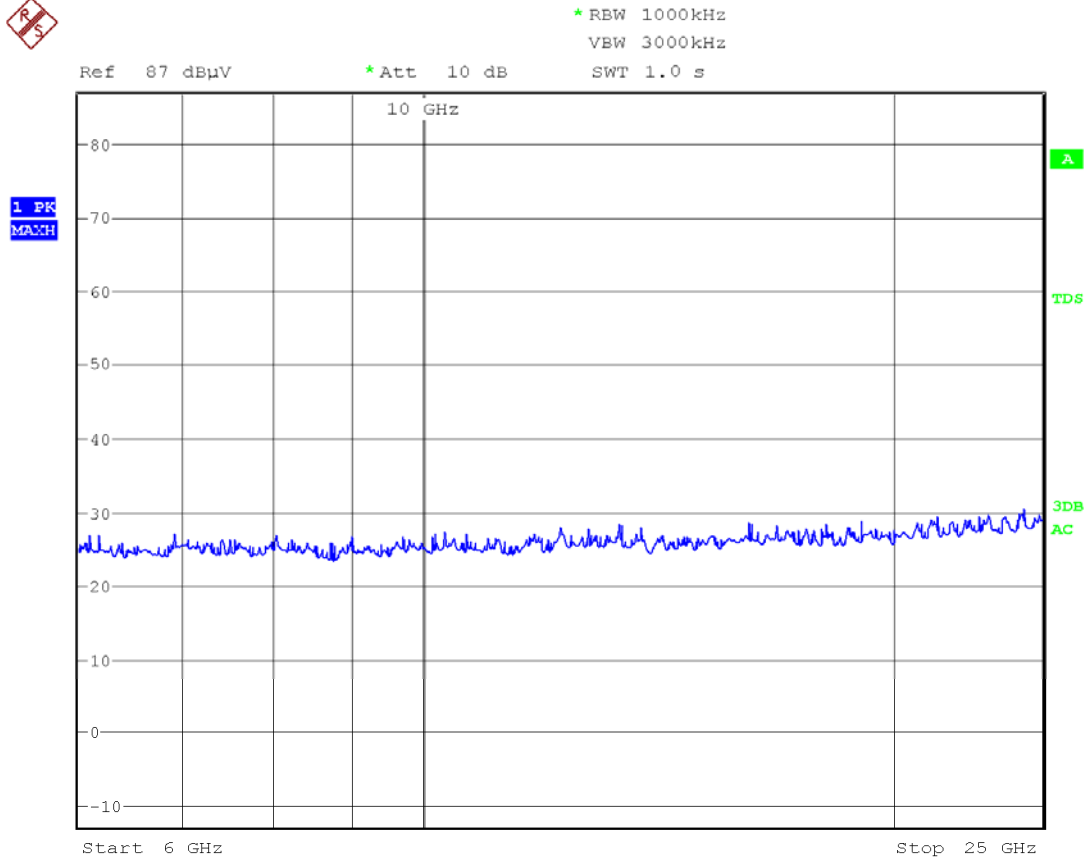
**DetectedPeaks:**

<b>Environment</b>	Tem:23 Hum:55%	<b>Test Engineer:</b>	Shelle Zheng
<b>Site:</b>	3M chamber	<b>Limit</b>	FCC 15.209
<b>Note:</b>	Playing music(ANT Horizontal )		



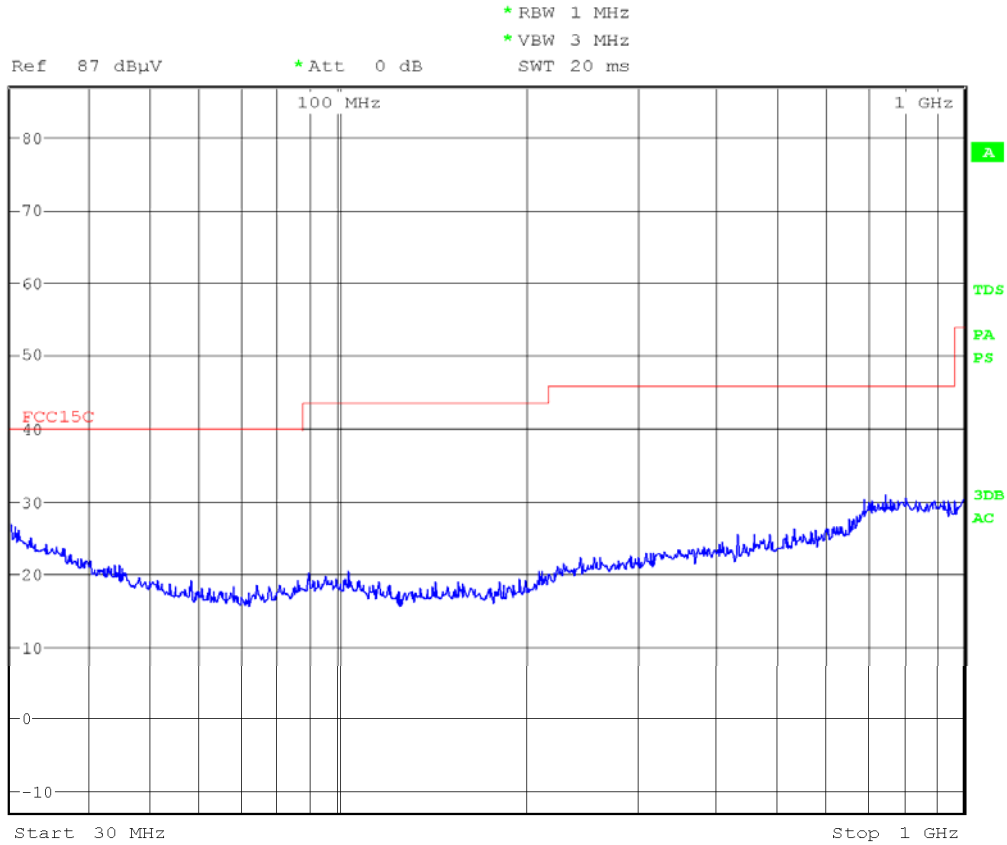
**Detected Peaks:**

<b>Environment</b>	Tem:23 Hum:55%	<b>Test Engineer:</b>	Shelle Zheng
<b>Site:</b>	3M chamber	<b>Limit</b>	FCC 15.209
<b>Note:</b>	Playing music(ANT Vertical )		



**Detected Peaks:**

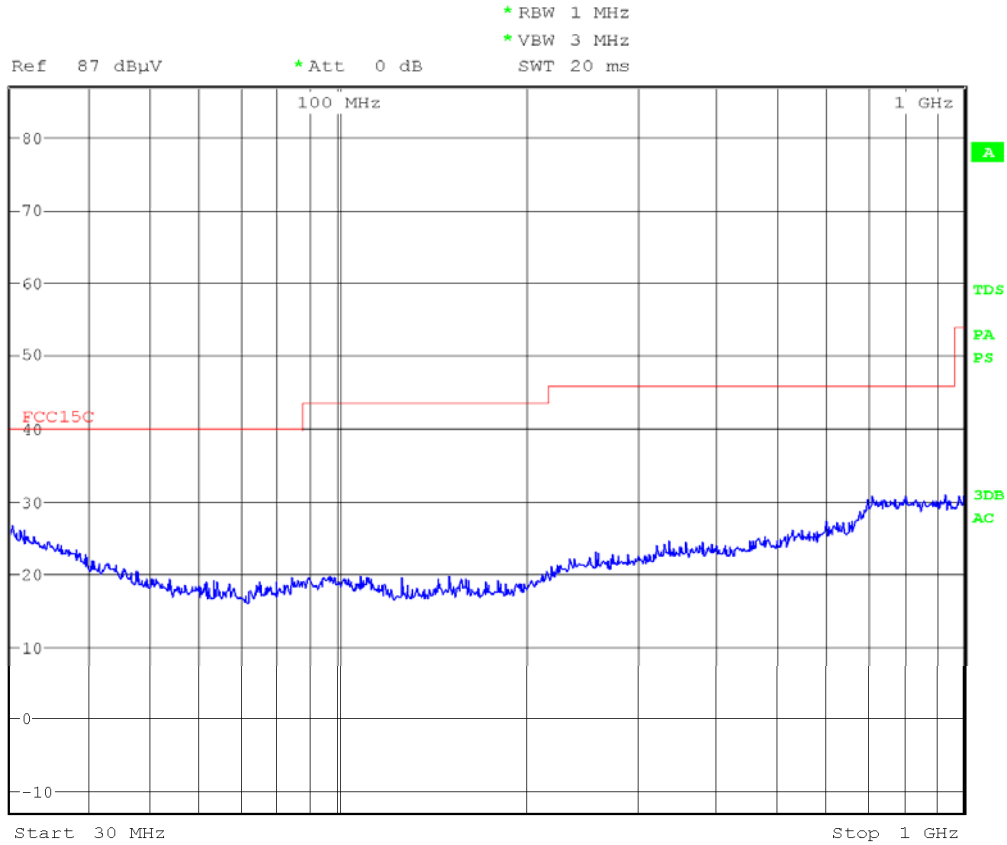
<b>Environment</b>	Tem:23 Hum:55%	<b>Test Engineer:</b>	Shelle Zheng
<b>Site:</b>	3M chamber	<b>Limit</b>	FCC 15.209
<b>Note:</b>	Operating at Lowest channel(ANT Horizontal )		



**Detected Peaks:**

No.	Frequency (MHz)	Reading (dBμV/m)	QP Limit (dBμV/m)	Margin (dBμV/m)	Angle (degrees)	Height (m)	Result	H/V
1	30	23.1	40.0	16.9	0	1	Pass	H
2	98	20.3	43.5	23.2	0	1	Pass	H
3	256	20.9	46.0	25.1	0	1	Pass	H
4	421	23.4	46.0	22.6	0	1	Pass	H
5	718	24.7	46.0	21.3	0	1	Pass	H
6	996	24.2	54.0	29.8	0	1	Pass	H

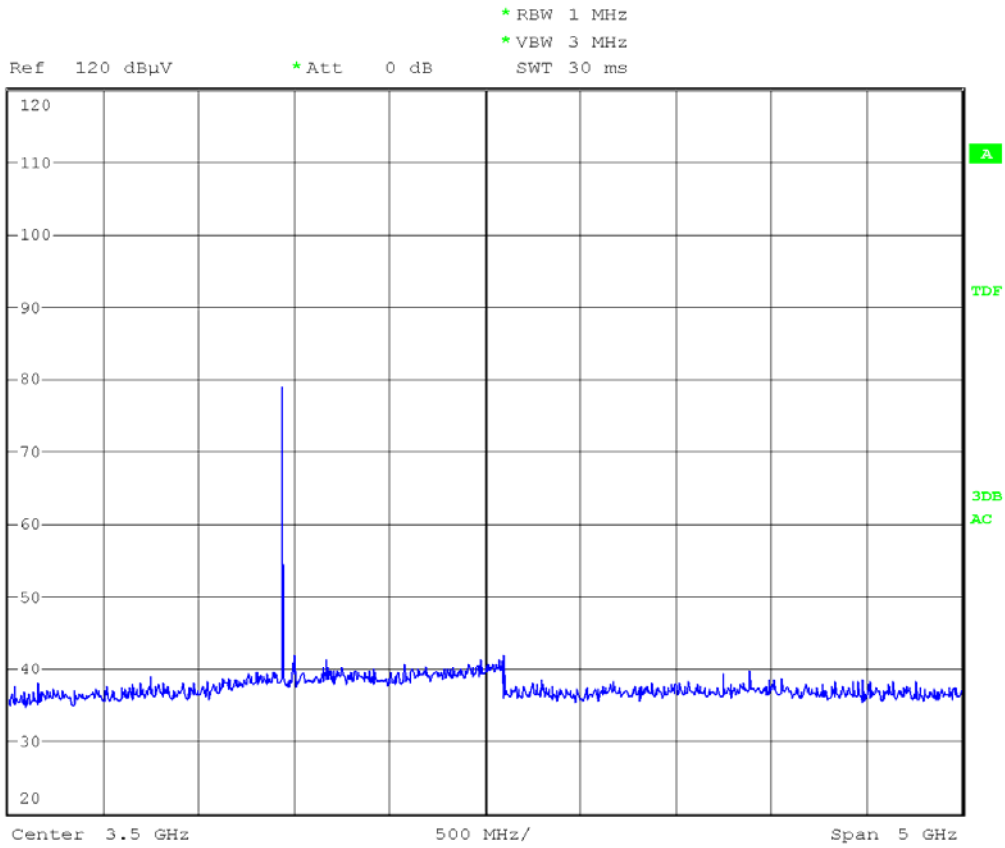
<b>Environment</b>	Tem:23 Hum:55%	<b>Test Engineer:</b>	Shelle Zheng
<b>Site:</b>	3M chamber	<b>Limit</b>	FCC 15.209
<b>Note:</b>	Operating at Lowest channel (ANT Vertical )		



### Detected Peaks:

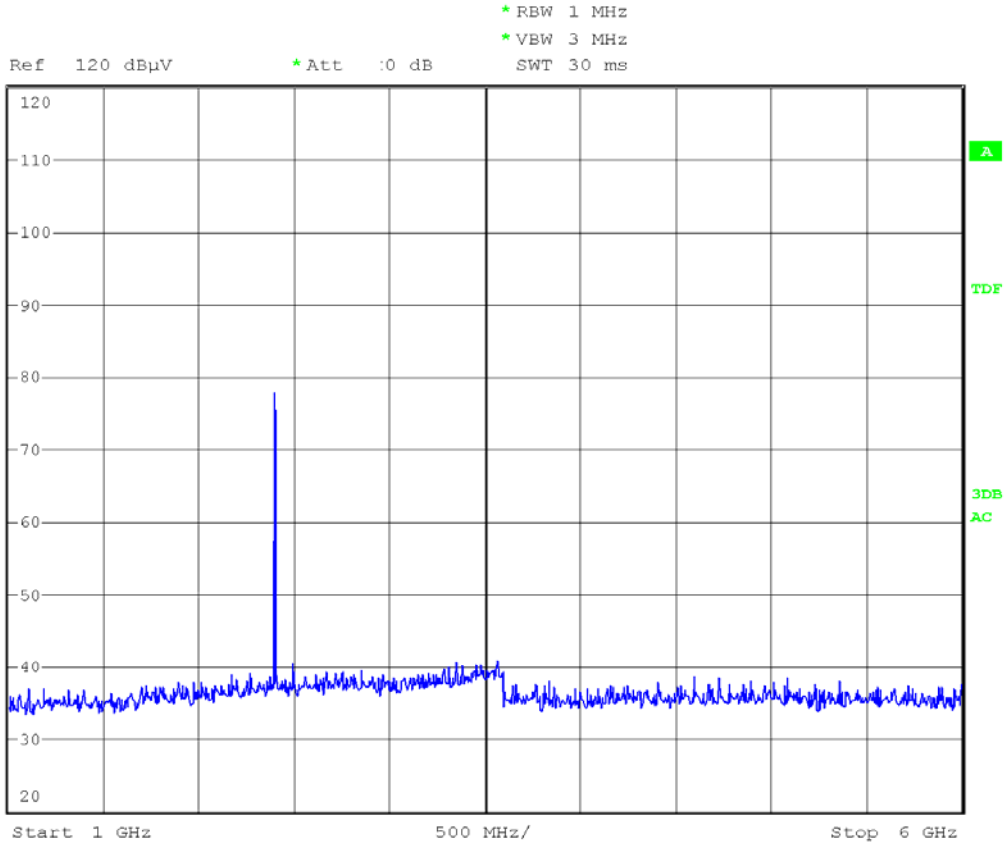
No.	Frequency (MHz)	Reading (dBμV/m)	QP Limit (dBμV/m)	Margin (dBμV/m)	Angle (degrees)	Height (m)	Result	H/V
1	30	23.4	40	16.6	0	1	Pass	V
2	33	22.7	40	17.3	0	1	Pass	V
3	96	19.4	43.5	24.1	180	1	Pass	V
4	251	20.4	46.0	25.6	0	1	Pass	V
5	705.0	24.7	46.0	21.3	0	1	Pass	V
6	999	24.4	54.0	29.6	0	1	Pass	V

<b>Environment</b>	Tem:23 Hum:55%	<b>Test Engineer:</b>	Shelle Zheng
<b>Site:</b>	3m chamber	<b>Limit</b>	FCC 15.209
<b>Note:</b>	Operating at Lowest channel (ANT Horizontal )		



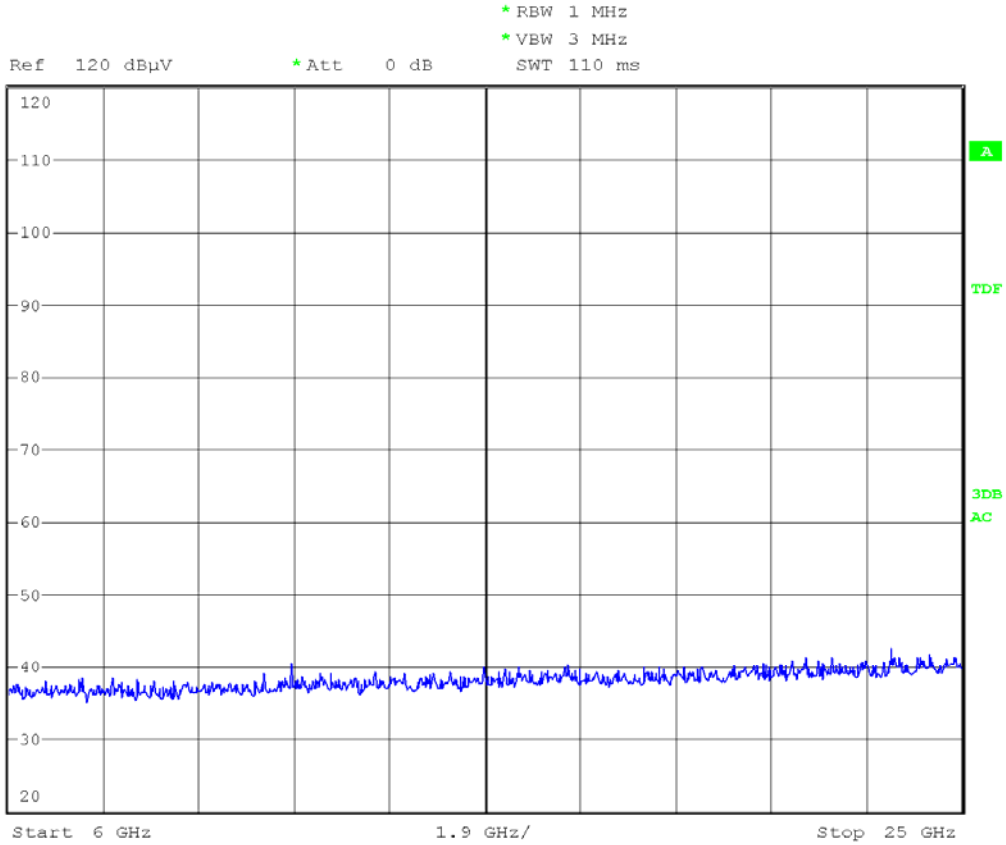
**Detected Peaks:**

<b>Environment</b>	Tem:23 Hum:55%	<b>Test Engineer:</b>	Shelle Zheng
<b>Site:</b>	3M chamber	<b>Limit</b>	FCC 15.209
<b>Note:</b>	<b>Operating at Lowest channel (ANT Vertical )</b>		



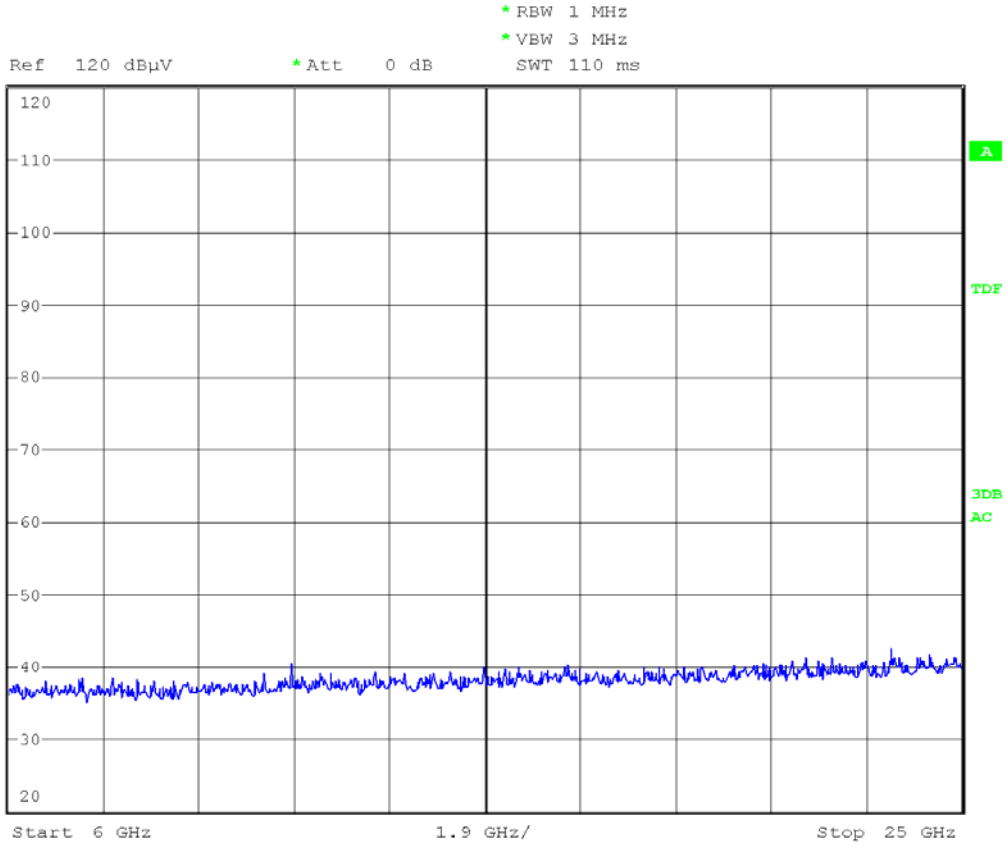
**DetectedPeaks:**

<b>Environment</b>	Tem:23 Hum:55%	<b>Test Engineer:</b>	Shelle Zheng
<b>Site:</b>	3M chamber	<b>Limit</b>	FCC 15.209
<b>Note:</b>	<b>Operating at Lowest channel (ANT Horizontal )</b>		



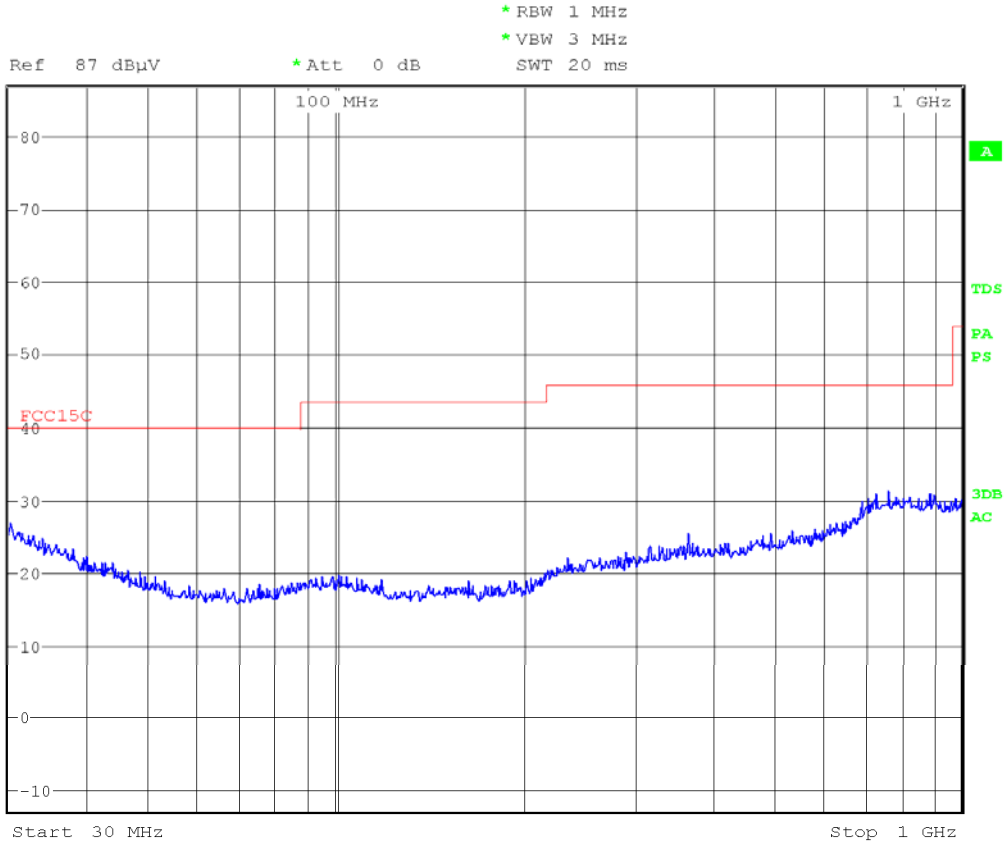
**Detected Peaks:**

<b>Environment</b>	Tem:23 Hum:55%	<b>Test Engineer:</b>	Shelle Zheng
<b>Site:</b>	3M chamber	<b>Limit</b>	FCC 15.209
<b>Note:</b>	<b>Operating at Lowest channel (ANT Vertical )</b>		



**Detected Peaks:**

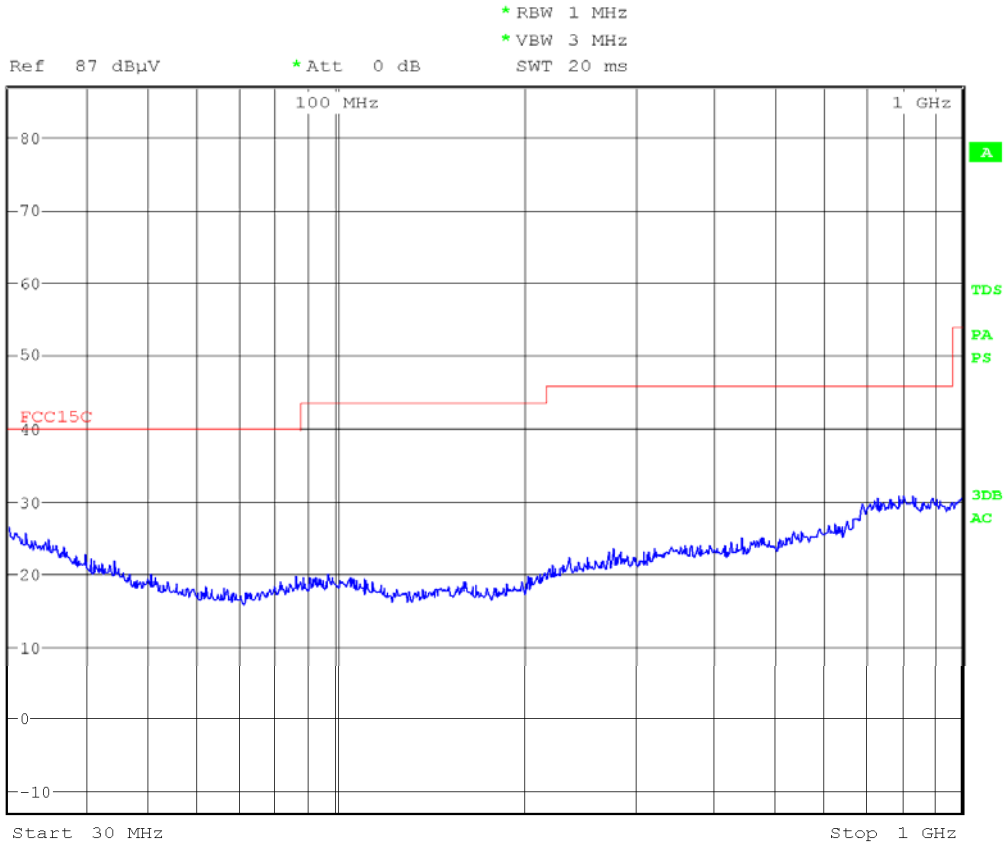
<b>Environment</b>	Tem:23 Hum:55%	<b>Test Engineer:</b>	Shelle Zheng
<b>Site:</b>	3M chamber	<b>Limit</b>	FCC 15.209
<b>Note:</b>	<b>Operating at middle channel(ANT Horizontal )</b>		



**Detected Peaks:**

No.	Frequenc y (MHz)	Reading (dB $\mu$ V/m)	QP Limit (dB $\mu$ V/m)	Margin (dB $\mu$ V/m)	Angle (degrees)	Height (m)	Result	H/V
1	32	22.5	40.0	17.5	0	1	Pass	H
2	95	19.4	43.5	24.1	0	1	Pass	H
3	248	20.4	46.0	25.6	0	1	Pass	H
4	413	22.5	46.0	23.5	0	1	Pass	H
5	704	24.7	46.0	21.3	0	1	Pass	H
6	891	23.9	46.0	22.1	0	1	Pass	H

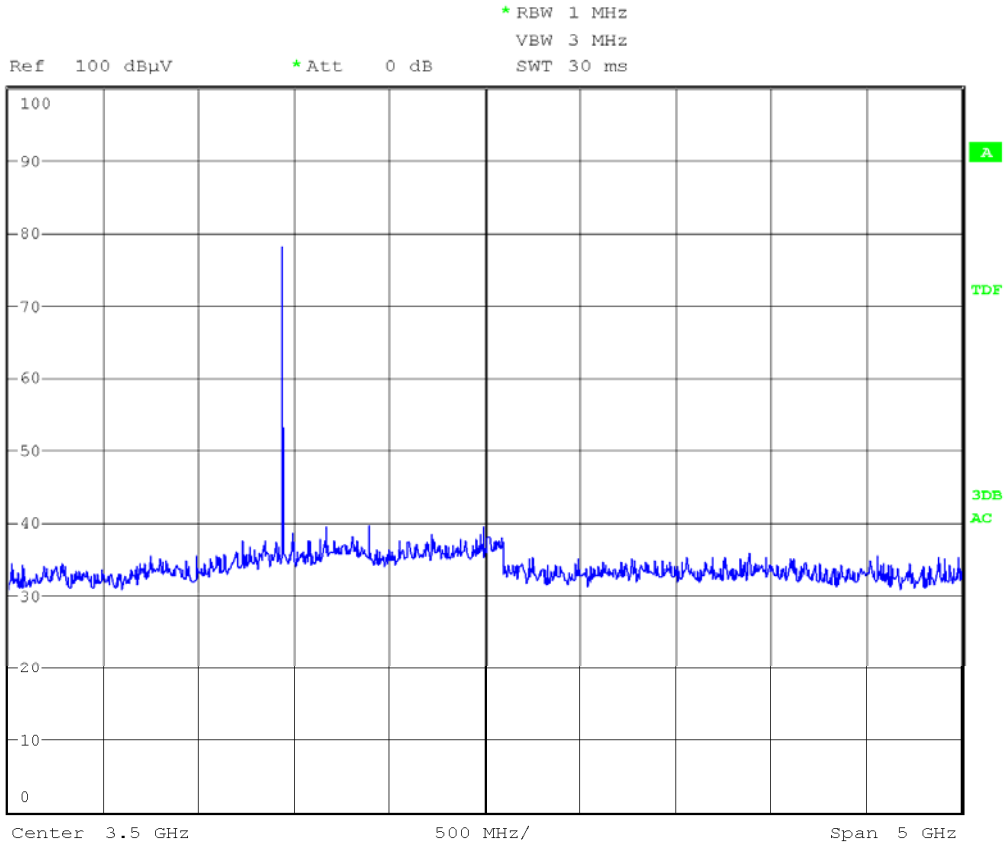
<b>Environment</b>	Tem:23 Hum:55%	<b>Test Engineer:</b>	Shelle Zheng
<b>Site:</b>	3M chamber	<b>Limit</b>	FCC 15.209
<b>Note:</b>	<b>Operating at middle channel (ANT Vertical )</b>		



**Detected Peaks:**

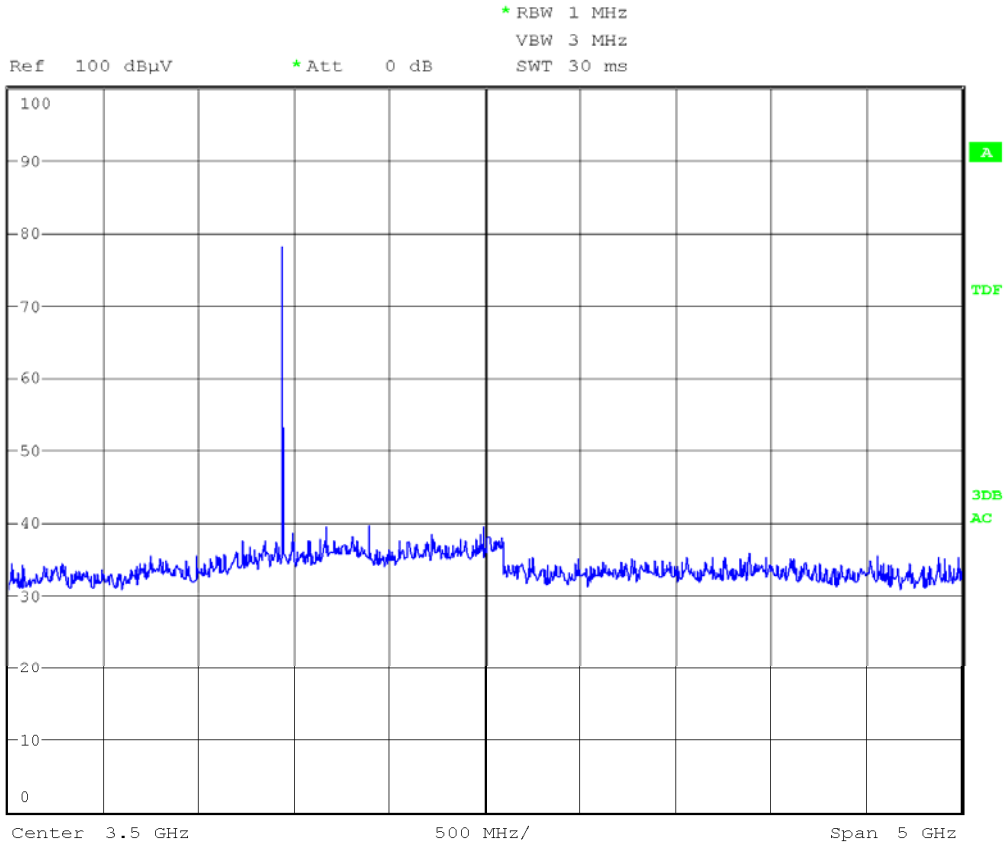
No.	Frequency (MHz)	Reading (dBμV/m)	QP Limit (dBμV/m)	Margin (dBμV/m)	Angle (degrees)	Height (m)	Result	H/V
1	30	22.7	40	17.3	0	1	Pass	V
2	41	19.8	40	20.2	0	1	Pass	V
3	97	19.6	43.5	23.9	0	1	Pass	V
4	301	21.3	46.0	24.7	0	1	Pass	V
5	713	24.5	46.0	21.5	0	1	Pass	V
6	821	25.4	46.0	20.6	0	1	Pass	V

<b>Environment</b>	Tem:23 Hum:55%	<b>Test Engineer:</b>	Shelle Zheng
<b>Site:</b>	3m chamber	<b>Limit</b>	FCC 15.209
<b>Note:</b>	Operating at middle channel (ANT Horizontal )		



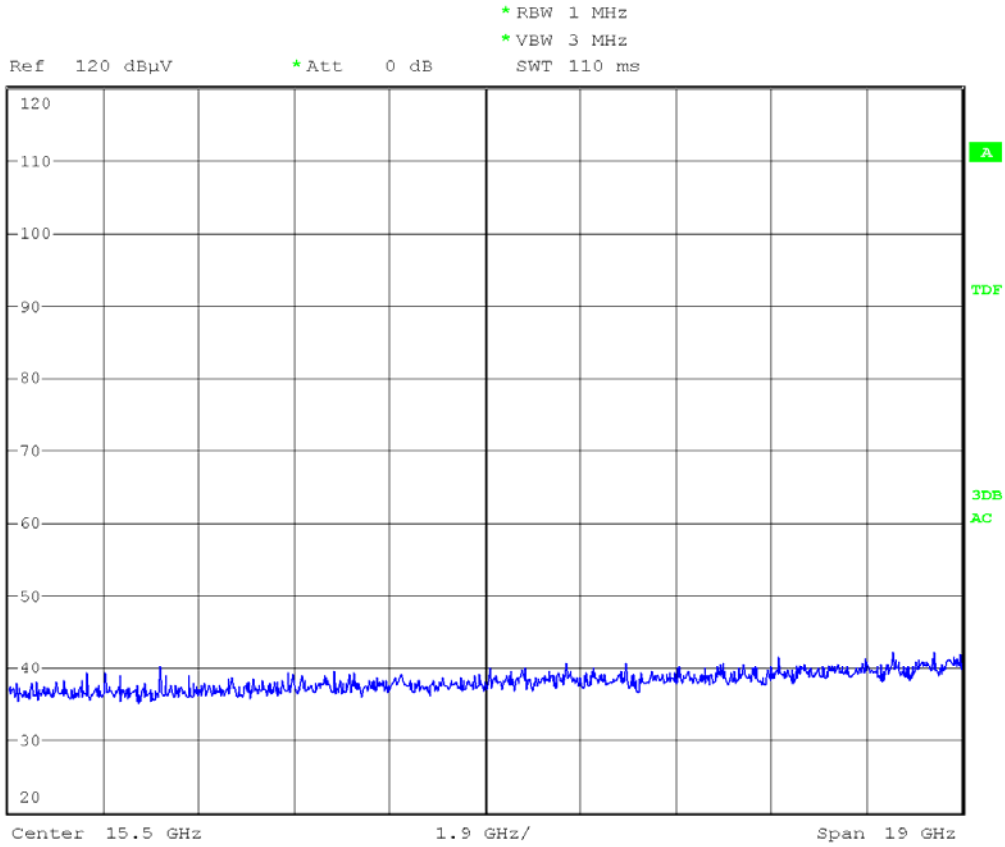
**Detected Peaks:**

<b>Environment</b>	Tem:23 Hum:55%	<b>Test Engineer:</b>	Shelle Zheng
<b>Site:</b>	3M chamber	<b>Limit</b>	FCC 15.209
<b>Note:</b>	Operating at middle channel (ANT Vertical )		



**DetectedPeaks:**

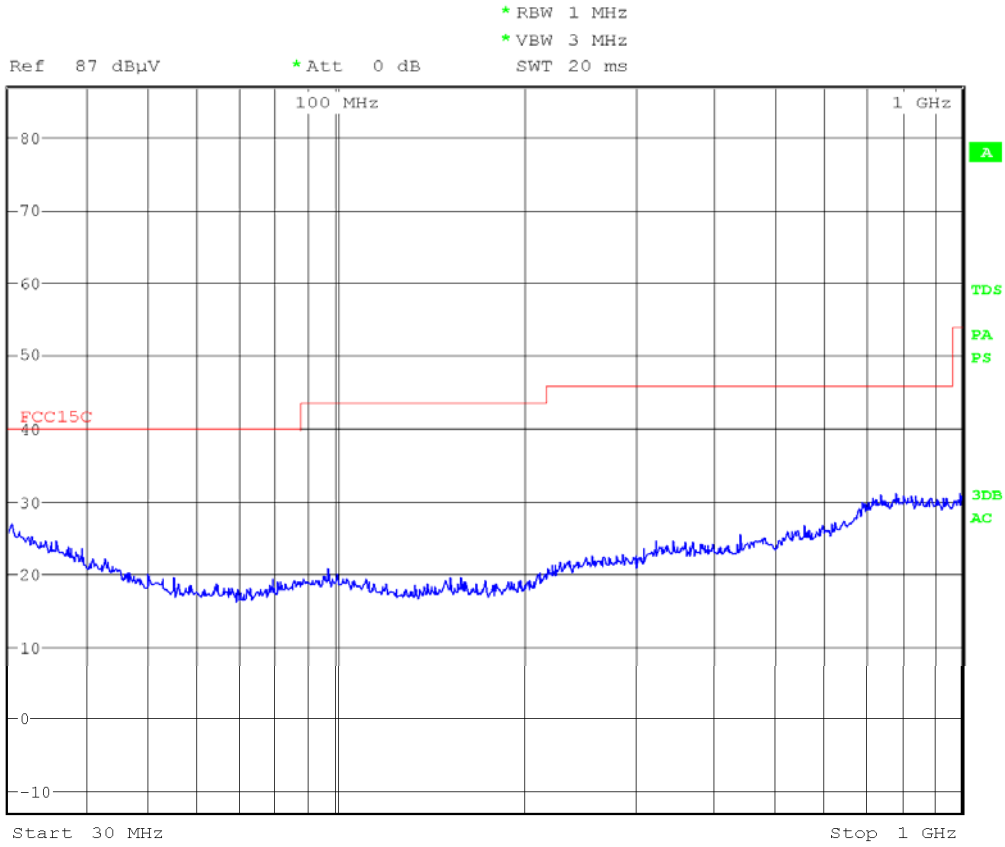
<b>Environment</b>	Tem:23 Hum:55%	<b>Test Engineer:</b>	Shelle Zheng
<b>Site:</b>	3M chamber	<b>Limit</b>	FCC 15.209
<b>Note:</b>	Operating at middle channel (ANT Horizontal )		



**Detected Peaks:**



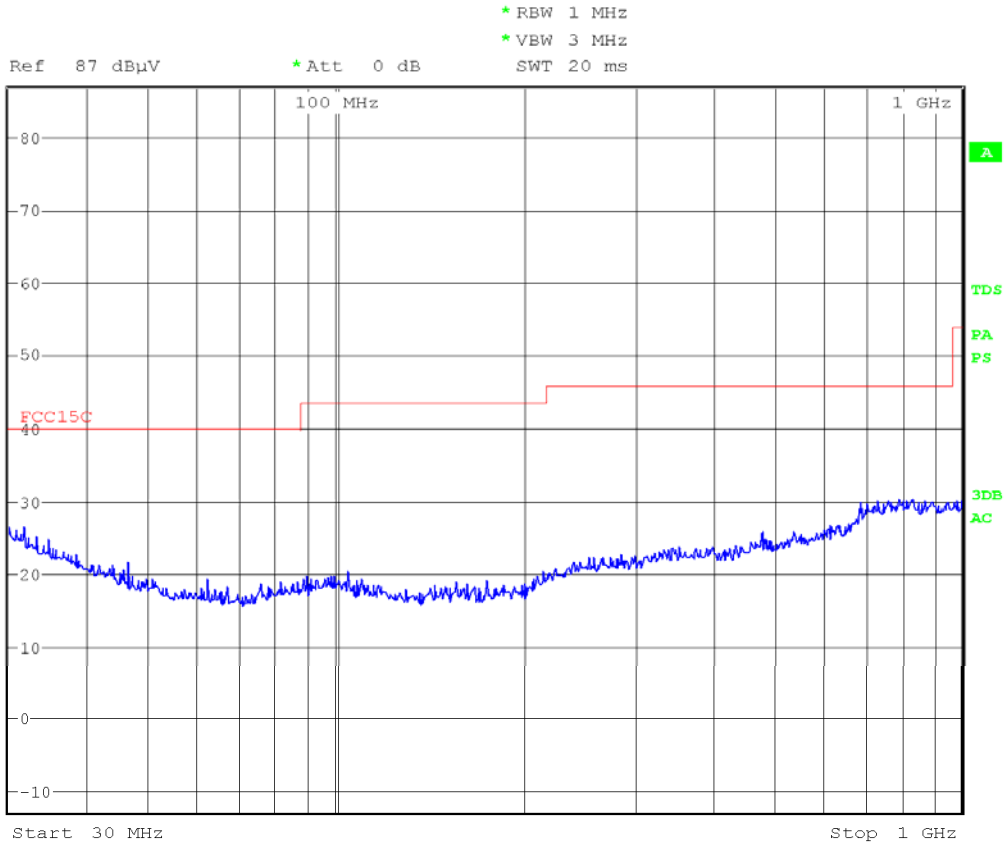
<b>Environment</b>	Tem:23 Hum:55%	<b>Test Engineer:</b>	Shelle Zheng
<b>Site:</b>	3M chamber	<b>Limit</b>	FCC 15.209
<b>Note:</b>	Operating at highest channel(ANT Horizontal )		



**Detected Peaks:**

No.	Frequency (MHz)	Reading (dBμV/m)	QP Limit (dBμV/m)	Margin (dBμV/m)	Angle (degrees)	Height (m)	Result	H/V
1	30	23.3	40.0	16.7	0	1	Pass	H
2	41	18.9	40.0	21.1	0	1	Pass	H
3	96	20.4	43.5	23.1	0	1	Pass	H
4	435	22.3	46.0	23.7	0	1	Pass	H
5	699	25.1	46.0	20.9	0	1	Pass	H
6	1000	24.8	54.0	29.2	0	1	Pass	H

<b>Environment</b>	Tem:23 Hum:55%	<b>Test Engineer:</b>	Shelle Zheng
<b>Site:</b>	3M chamber	<b>Limit</b>	FCC 15.209
<b>Note:</b>	Operating at highest channel (ANT Vertical )		

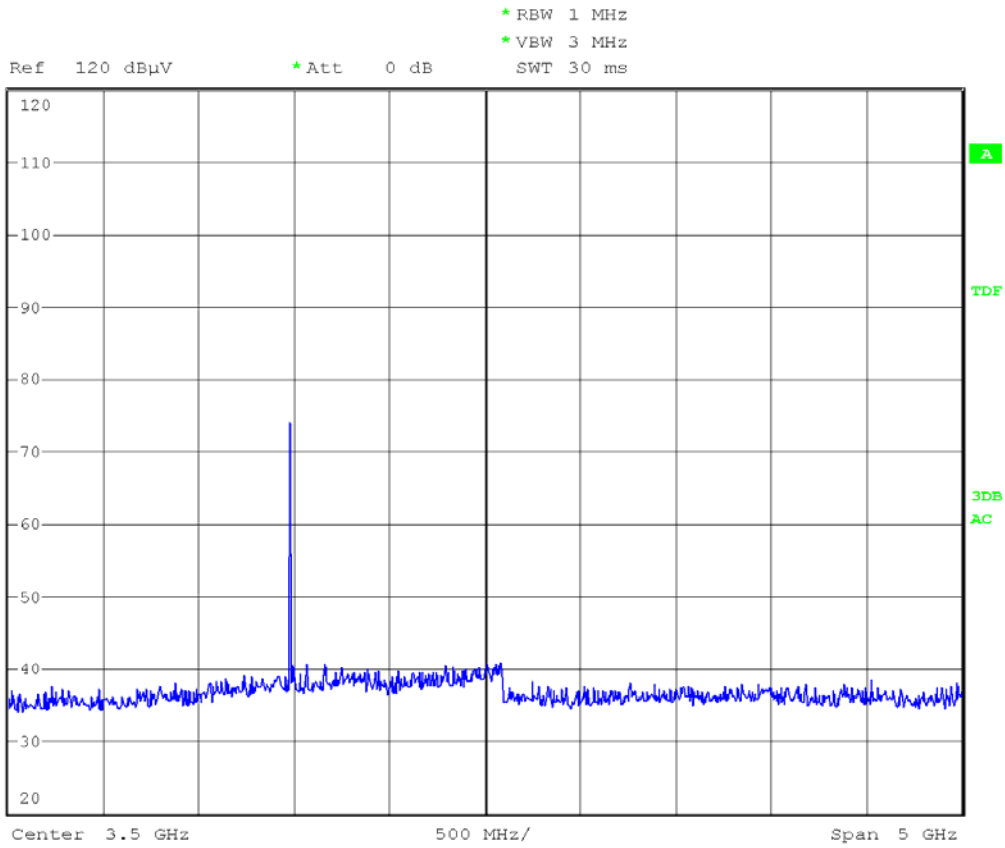


1

**Detected Peaks:**

No.	Frequency (MHz)	Reading (dBμV/m)	QP Limit (dBμV/m)	Margin (dBμV/m)	Angle (degrees)	Height (m)	Result	H/V
1	32	22.9	40.0	17.1	0	1	Pass	V
2	48	18.7	40.0	21.3	0	1	Pass	V
3	101	19.5	43.5	24.0	0	1	Pass	V
4	426	22.3	46.0	23.7	0	1	Pass	V
5	731	25.2	46.0	20.8	0	1	Pass	V
6	995	25.7	54.0	28.3	0	1	Pass	V

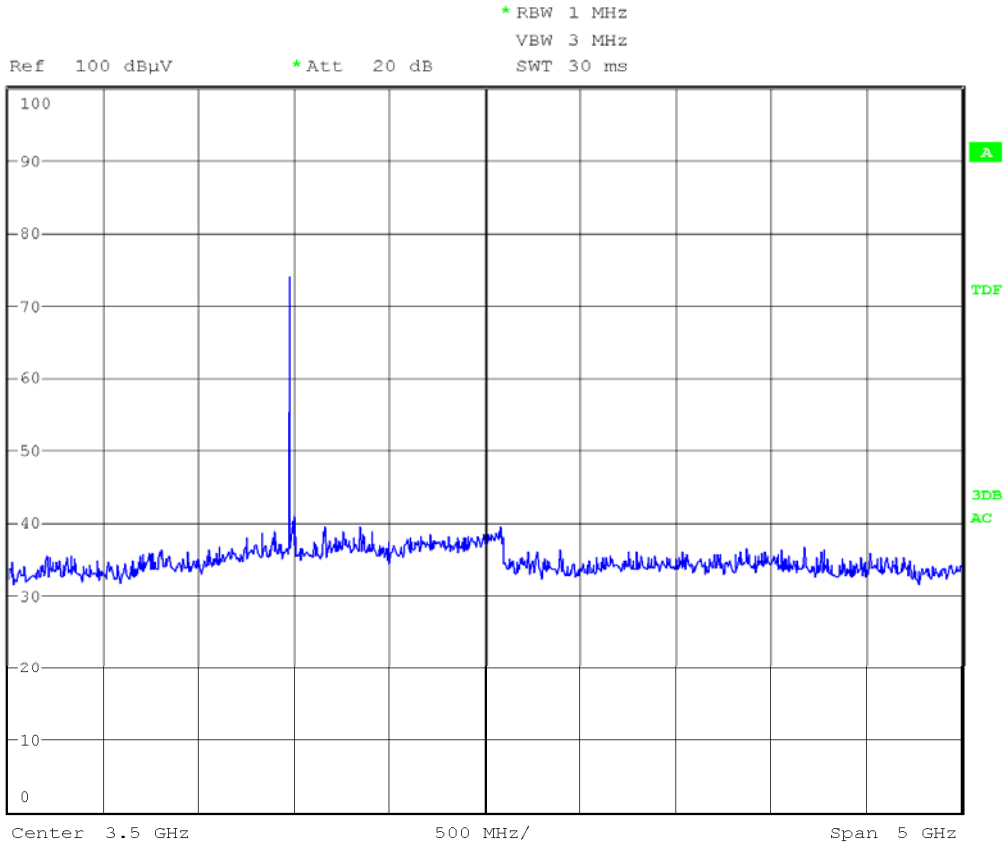
<b>Environment</b>	Tem:23 Hum:55%	<b>Test Engineer:</b>	Shelle Zheng
<b>Site:</b>	3m chamber	<b>Limit</b>	FCC 15.209
<b>Note:</b>	Operating at highest channel (ANT Horizontal )		



1

**Detected Peaks:**

<b>Environment</b>	Tem:23 Hum:55%	<b>Test Engineer:</b>	Shelle Zheng
<b>Site:</b>	3M chamber	<b>Limit</b>	FCC 15.209
<b>Note:</b>	Operating at highest channel (ANT Vertical )		



**DetectedPeaks:**





### 4.11.2 Radiated Emissions which fall in the restricted bands

Section 15.247(d) In addition, radiated emissions which fall in the restricted bands. as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 15.205(c)).

Test Requirement:

Test Method: Base on ANSI 63.4

Test Date: 2009-04-03

Measurement Distance: 3m (Semi-Anechoic Chamber)

**Limit:** 40.0 dB $\mu$ V/m between 30MHz & 88MHz;  
43.5 dB $\mu$ V/m between 88MHz & 216MHz;  
46.0 dB $\mu$ V/m between 216MHz & 960MHz;  
54.0 dB $\mu$ V/m above 960MHz.

**Detector:** Peak for pre-scan:  
100kHz resolution bandwidth and 100kHz video bandwidth within 1GHz.  
1MHz resolution bandwidth and 1MHz video bandwidth above 1GHz

**Test Result:**

Pretest the Bluetooth normal mode

The field strength was measured with an EMI measuring receiver and 1 MHz RBW / VBW for peak and with 1MHz RBW / 10Hz VBW for average at a distance of 3m.

**Max field strength in 3m distance:**

**Fundamental Peak Value:93.5 dB $\mu$ V/m; Average Value:92.8dB $\mu$ V/m.**

**1. Hopping mode**

Frequency (MHz)	Delta-Value(dB)	Peak Emission Level (dB $\mu$ V/m)	Average Emission Level (dB $\mu$ V/m)	Peak limits (dB $\mu$ V/m)	Average limits (dB $\mu$ V/m)
2390.000	59.03	37.47	33.77	74	54
2483.500	58.89	37.61	33.91		
2490.000	55.31	41.15	37.49		
2500.000	57.51	38.99	35.29		

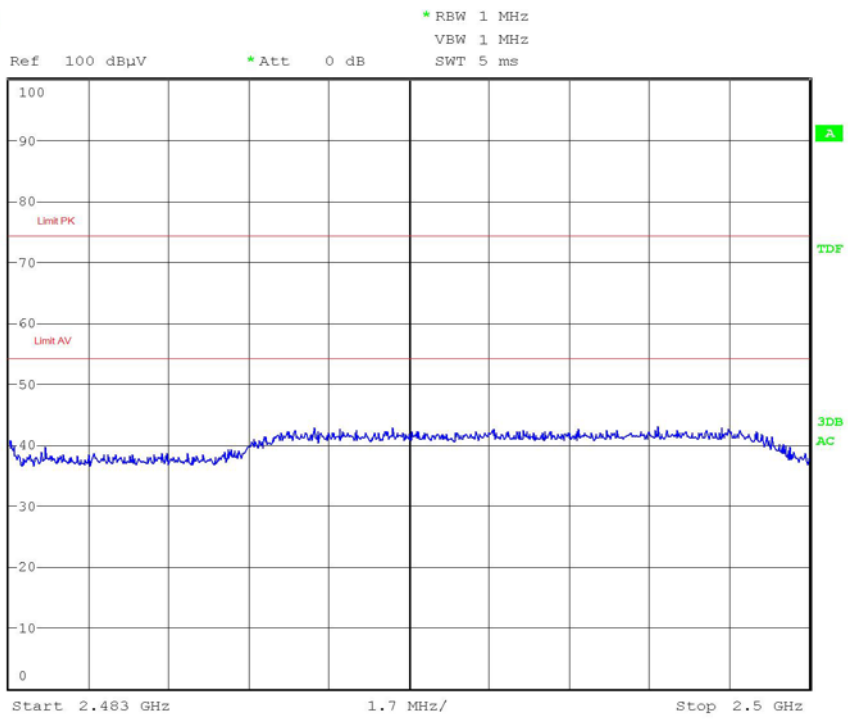
**2. single carrier**

Frequency (MHz)	Delta-Value(dB)	Peak Emission Level (dB $\mu$ V/m)	Average Emission Level (dB $\mu$ V/m)	PK limits (dB $\mu$ V/m)	AV limits (dB $\mu$ V/m)
2390.000	59.01	37.49	33.79	74	54
2483.500	57.13	39.37	35.67		
2490.000	55.73	40.77	37.07		
2500.000	58.31	38.19	34.49		

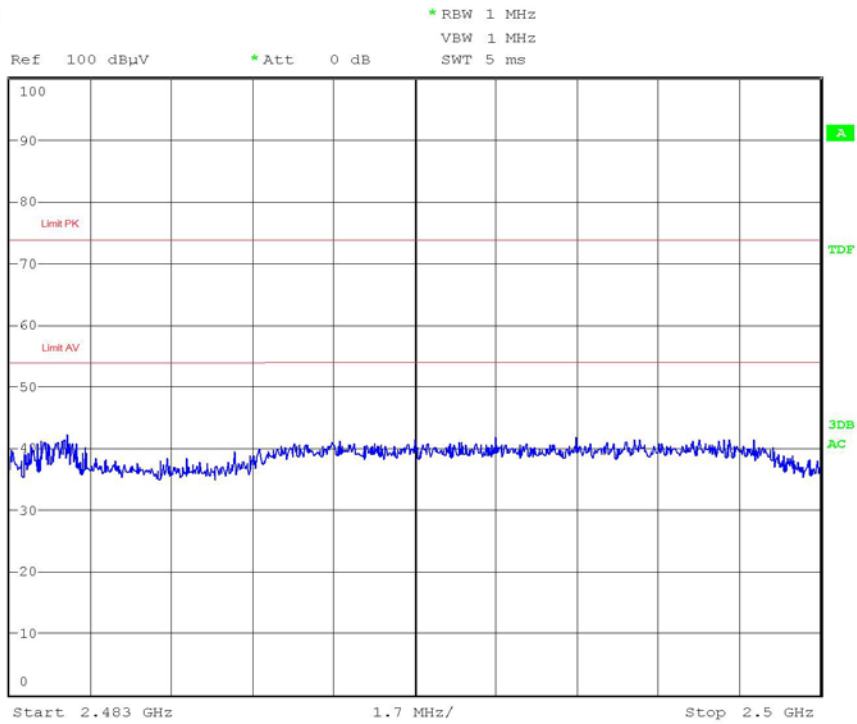
Remark: No any other emission which fall in restricted bands can be detected and be reported.

# Waveform (Restricted Bands high)

(Hopping mode)

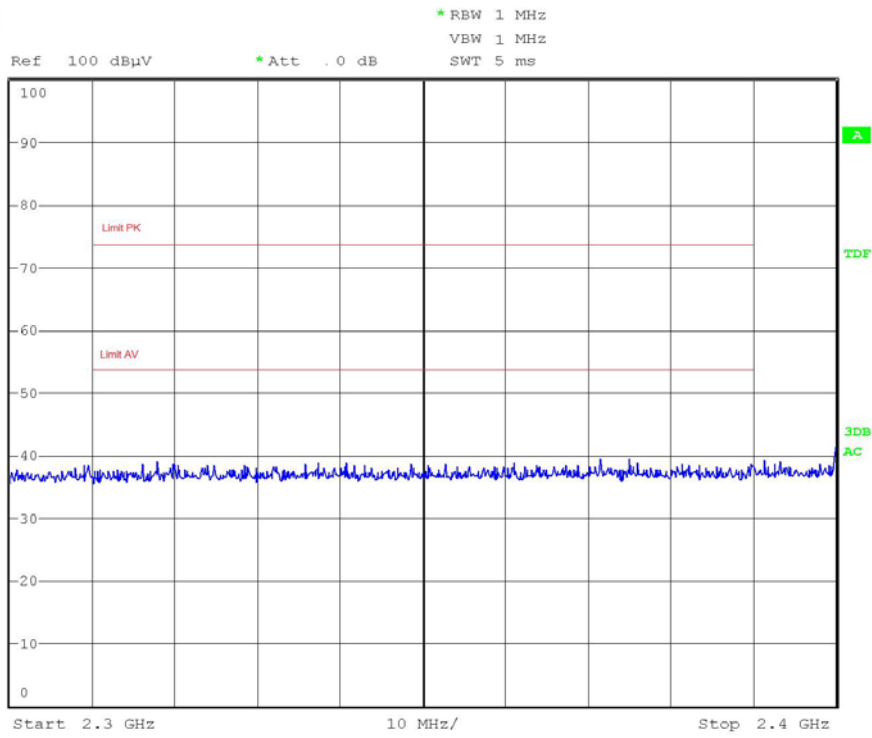


(single carrier)

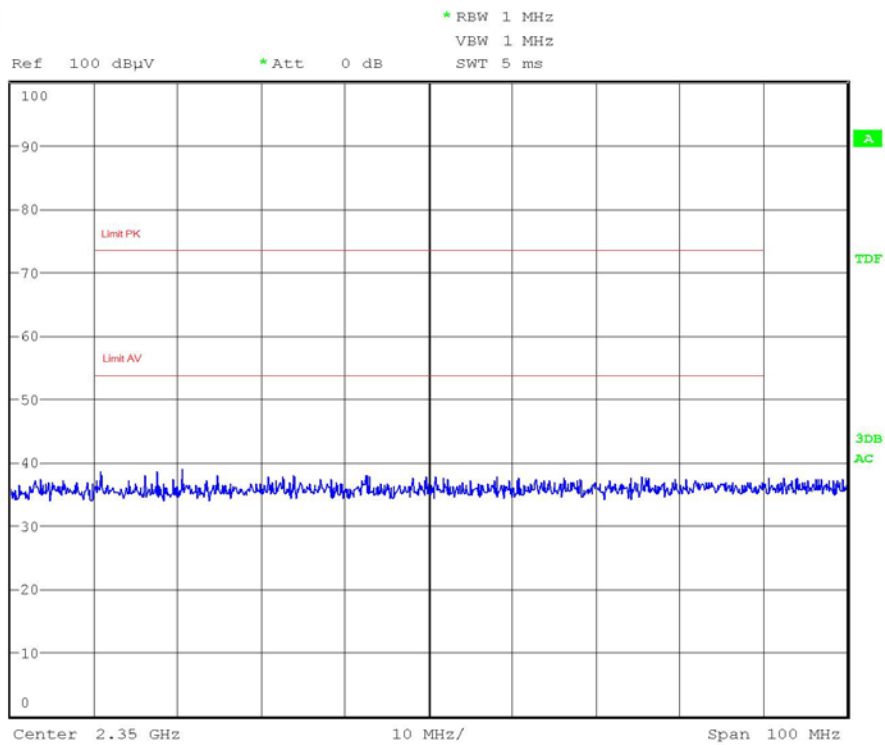


Waveform (Restricted Bands Low)

(Hopping mode)



(single carrier)



The unit does meet the FCC requirements.

Section 15.205 Restricted bands of operation.

(a) Except as shown in paragraph (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

<b>MHz</b>	<b>MHz</b>	<b>MHz</b>	<b>GHz</b>
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
<sup>1</sup> 0.495 - 0.505	16.69475 - 16.69525	608 - 614	5.35 - 5.46
2.1735 - 2.1905	16.80425 - 16.80475	960 - 1240	7.25 - 7.75
4.125 - 4.128	25.5 - 25.67	1300 - 1427	8.025 - 8.5
4.17725 - 4.17775	37.5 - 38.25	1435 - 1626.5	9.0 - 9.2
4.20725 - 4.20775	73 - 74.6	1645.5 - 1646.5	9.3 - 9.5
6.215 - 6.218	74.8 - 75.2	1660 - 1710	10.6 - 12.7
6.26775 - 6.26825	108 - 121.94	1718.8 - 1722.2	13.25 - 13.4
6.31175 - 6.31225	123 - 138	2200 - 2300	14.47 - 14.5
8.291 - 8.294	149.9 - 150.05	2310 - 2390	15.35 - 16.2
8.362 - 8.366	156.52475 -	2483.5 - 2500	17.7 - 21.4
8.37625 - 8.38675	156.52525	2655 - 2900	22.01 - 23.12
8.41425 - 8.41475	156.7 - 156.9	3260 - 3267	23.6 - 24.0
12.29 - 12.293	162.0125 - 167.17	3332 - 3339	31.2 - 31.8
12.51975 - 12.52025	167.72 - 173.2	3345.8 - 3358	36.43 - 36.5
12.57675 - 12.57725	240 - 285	3600 - 4400	
13.36 - 13.41	322 - 335.4		

#### 4.12 Band Edges Requirement

<b>Test Requirement:</b>	<b>FCC Part 15 C</b>
<b>Test Method:</b>	<b>Based on ANSI 63.4</b> <b>Operation within the band 2400 – 2483.5 MHz</b>
<b>Test Date:</b>	<b>2009-04-06</b>
<b>Power supply:</b>	<b>Connected with convert board powered by PC USB ports, and to fix frequency transmitting.</b>
<b>Requirements:</b>	<b>Section 15.247 (d) In any 100 kHz 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 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in Section 15.209(a) is not required.</b>
<b>Method of Measurement:</b>	Set RBW of spectrum analyzer to 100 kHz and VBW of spectrum analyzer to 300 kHz with suitable frequency span including 100 kHz bandwidth from band edge. The band edges was measured and recorded.

Normal mode:

The band edges was measured and recorded Result:

The Lower Edges attenuated more than 20dB.

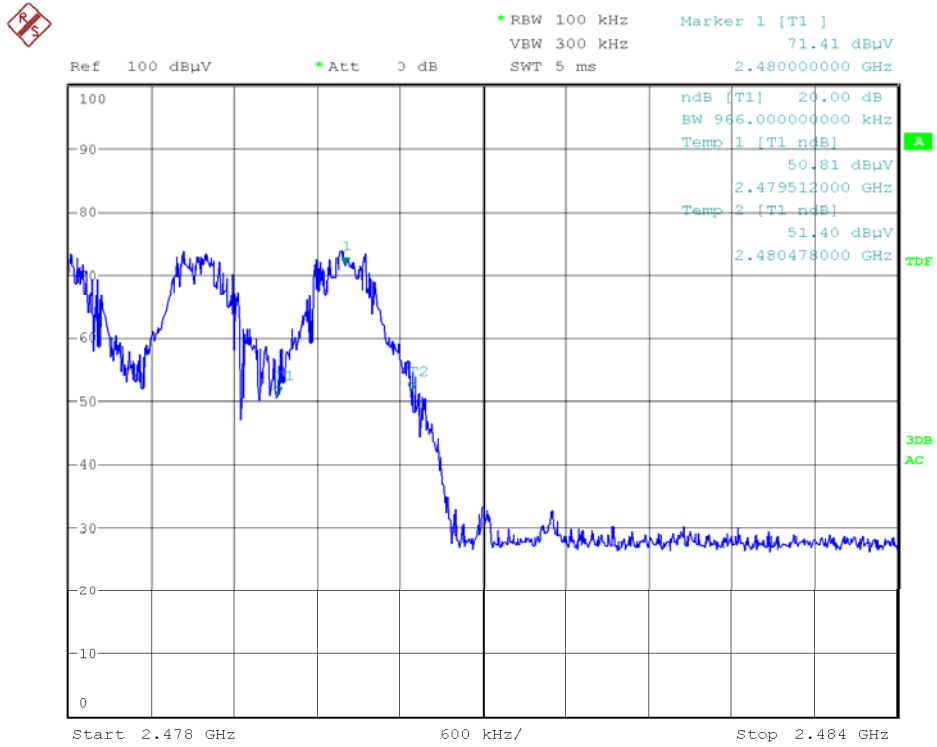
The Upper Edges attenuated more than 20dB.

The graph as below. represents the emissions take for this device.

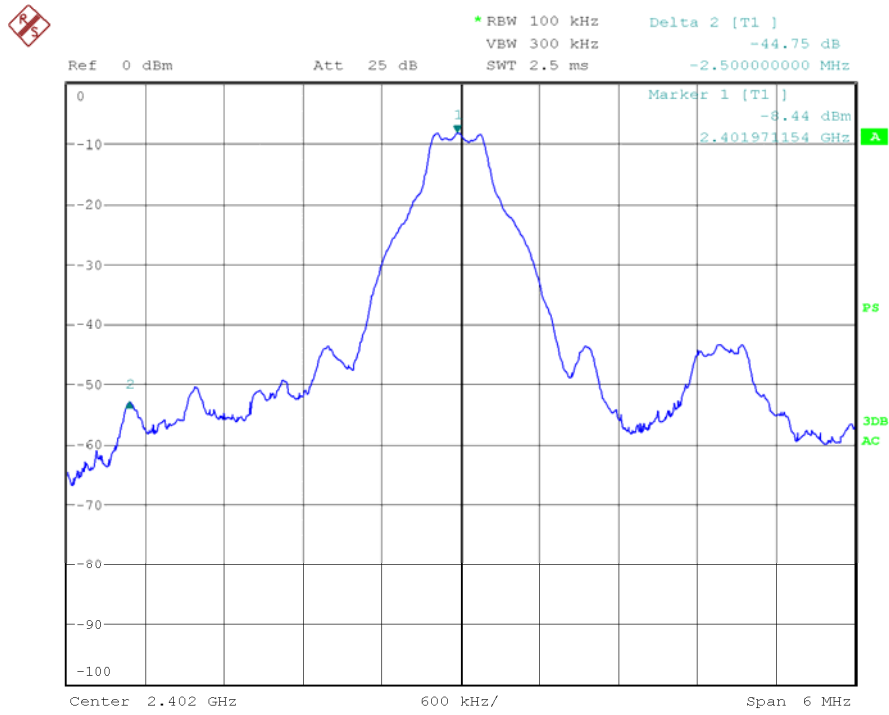
Lowest Channel(hopping On):



Highest Channel(hopping on):



Lowest Channel(hopping off):



Highest Channel(hopping off):

