



Report No.:SZ11100087W02



# FCC Part 15C TEST REPORT

Issued to

**Qingdao Haier Telecom Co.Ltd**

For

**Mobile Phone**

Model Name : HW-N80W  
 Trade Name : Haier /ekt  
 Brand Name : Haier /ekt  
 FCC ID : SG71110HW-N80W  
 Equipment Rule : 47 CFR Part 15 Subpart C  
 Test date : 2011-11-3 to 2011-11-23  
 Issue date : 2011-11-24

**Shenzhen MORLAB Communication Technology Co., Ltd.**



Tested by Zhang Yan  
Zhang Yan

Approved by Wu Xuewen  
Wu Xuewen

Review by Peng Huarui  
Peng Huarui

Date 2011.11.24

Date 2011.11.24

Date 2011.11.24



*The report refers only to the sample tested and does not apply to the bulk. This report is issued in confidence to the client and it will be strictly treated as such by the Shenzhen MORLAB Communication Technology Co., Ltd. It may not be reproduced in its entirety or in part and it may not be used for advertising. The client to whom the report is issued may, however, show or send it, or a certified copy thereof prepared by the Shenzhen MORLAB Telecommunication Co., Ltd to his customer. Supplier or others persons directly concerned. Shenzhen MORLAB Telecommunication Co., Ltd will not, without the consent of the client enter into any discussion of correspondence with any third party concerning the contents of the report. In the event of the improper use of the report, Shenzhen MORLAB Telecommunication Co., Ltd reserves the rights to withdraw it and to adopt any other remedies which may be appropriate.*

## DIRECTORY

<b>1. GENERAL INFORMATION .....</b>	<b>3</b>
1.1. EUT Description .....	3
1.2. Test Standards and Results.....	4
1.3. Facilities and Accreditations .....	5
<b>2. 47 CFR PART 15C REQUIREMENTS.....</b>	<b>6</b>
2.1. Peak Output Power.....	6
2.2. Bandwidth.....	8
2.3. Conducted Spurious Emissions.....	15
2.4. Power spectral density (PSD) .....	20
2.5. Band Edge.....	27
2.6. Conducted Emission .....	36
2.7. Radiated Emission.....	39

Change History		
Issue	Date	Reason for change
1.0	Nov 24, 2011	First edition

## 1. General Information

### 1.1. EUT Description

EUT Type .....: Mobile phone  
Serial No.....: (n.a, marked #1 by test site)  
IMEI .....: (n.a)  
Hardware Version.....: S046M001P200  
Software Version .....: HW-N80W-H01-S00-EN  
Applicant .....: Qingdao Haier Telecom Co.Ltd  
No.1 Haier Road, Hi-tech Zone,Qingdao266101,P.R.China  
Manufacturer .....: Qingdao Haier Telecom Co.Ltd  
No.1 Haier Road, Hi-tech Zone,Qingdao266101,P.R.China  
Modulation Type .....: DSSS, OFDM  
Frequency .....: 802.11b/g/n-20MHz: 2.412GHz - 2.462GHz  
Channel Number.....: 802.11b/g/n-20MHz: 11

Note 1: The EUT is a Mobile phone. It supports 802.11b, 802.11g and 802.11n (HT20), and they are all tested in this report.

Note 2: The frequencies allocated is  $F(\text{MHz})=2412+5*(n-1)$  ( $1 \leq n \leq 11$ ). The lowest, middle, highest channel numbers of the EUT used and tested in this report are separately 1 (2412MHz), 6 (2437MHz) and 11 (2462MHz).

Note 3: For a more detailed description, please refer to Specification or User's Manual supplied by the applicant and/or manufacturer.

## 1.2. Test Standards and Results

The objective of the report is to perform testing according to 47 CFR Part 15 Subpart C (Wi-Fi, 2.4GHz ISM band radiators) for the EUT FCC ID Certification:

No.	Identity	Document Title
1	47 CFR Part 15 (10-1-09 Edition)	Radio Frequency Devices

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

No.	Section	Description	Result
1	15.247(a)	Number of Hopping Frequency	(n.a)
2	15.247(b)	Peak Output Power	PASS
3	15.247(a)	Bandwidth	PASS
4	15.247(a)	Carrier Frequency Separation	(n.a)
5	15.247(a)	Time of Occupancy (Dwell time)	(n.a)
6	15.247(c)	Conducted Spurious Emission	PASS
7	15.247(c)	Band Edge	PASS
8	15.207	Conducted Emission	PASS
9	15.209 15.247(c)	Radiated Emission	PASS
10	15.247(d)	Power spectral density (PSD)	PASS

The tests of Conducted Emission and Radiated Emission were performed according to the method of measurements prescribed in ANSI C63.4 2009.

### **1.3. Facilities and Accreditations**

#### **1.3.1. Facilities**

Shenzhen Morlab Communications Technology Co., Ltd. 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 L3572.

All measurement facilities used to collect the measurement data are located at 3/F, Electronic Testing Building, Shahe Road, Xili, Nanshan District, Shenzhen, 518055 P. R. 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.

#### **1.3.2. Test Environment Conditions**

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

Temperature (°C):	15 - 35
Relative Humidity (%):	30 -60
Atmospheric Pressure (kPa):	86-106

## 2. 47 CFR Part 15C Requirements

### 2.1. Peak Output Power

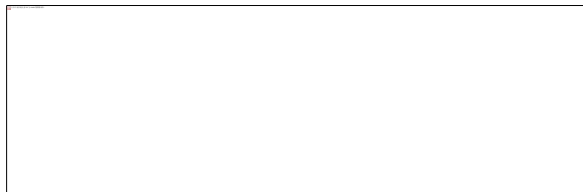
#### 2.1.1. Requirement

According to FCC section 15.247(b)(3), for systems using digital modulation in the 902–928 MHz, 2400–2483.5MHz, and 5725–5850 MHz bands: 1 Watt.

#### 2.1.2. Test Description

The measured output power was calculated by the reading of the Power Meter and calibration.

##### A. Test Setup:



The EUT which is coupled to the Power Meter; the RF load attached to the EUT antenna terminal is 50Ohm; the path loss as the factor is calibrated to correct the reading.

##### B. Equipments List:

Description	Manufacturer	Model	Serial No.	Cal. Date	Cal. Due
EPM Series Power Meter	Agilent	E4418B	GB43318055	2011.05	1year

### 2.1.3. Test Result

The EUT 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.

#### 2.1.3.1. 802.11b Test mode

Channel	Frequency (MHz)	Measured Output Peak Power		Limit		Verdict
		dBm	W	dBm	W	
1	2412	11.96	0.015704	30	1	PASS
6	2437	12.12	0.016293			PASS
11	2462	12.04	0.015996			PASS

#### 2.1.3.2. 802.11g Test mode

Channel	Frequency (MHz)	Measured Output Peak Power		Limit		Verdict
		dBm	W	dBm	W	
1	2412	10.14	0.010328	30	1	PASS
6	2437	10.29	0.010691			PASS
11	2462	10.47	0.011143			PASS

#### 2.1.3.3. 802.11n-20MHz Test mode

Channel	Frequency (MHz)	Measured Output Peak Power		Limit		Verdict
		dBm	W	dBm	W	
1	2412	8.03	0.006353	30	1	PASS
6	2437	8.14	0.006516			PASS
11	2462	8.24	0.006668			PASS

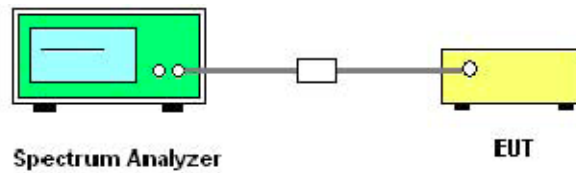
## 2.2. Bandwidth

### 2.2.1. Definition

According to FCC section 15.247(a) (2), Systems using digital modulation techniques may operate in the 902 - 928 MHz, 2400 - 2483.5 MHz, and 5725 - 5850 MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz.

### 2.2.2. Test Description

#### A. Test Set:



The EUT which is powered by the AC adapter, is coupled to the Spectrum Analyzer; the RF load attached to the EUT antenna terminal is 50Ohm; the path loss as the factor is calibrated to correct the reading.

#### B. Equipments List:

Description	Manufacturer	Model	Serial No.	Cal. Date	Cal. Due
Receiver	Agilent	E7405A	US44210471	2011.05	1year

### 2.2.3. Test Result

The lowest, middle and highest channels are selected to perform testing to record the 6 dB bandwidth of the Module.

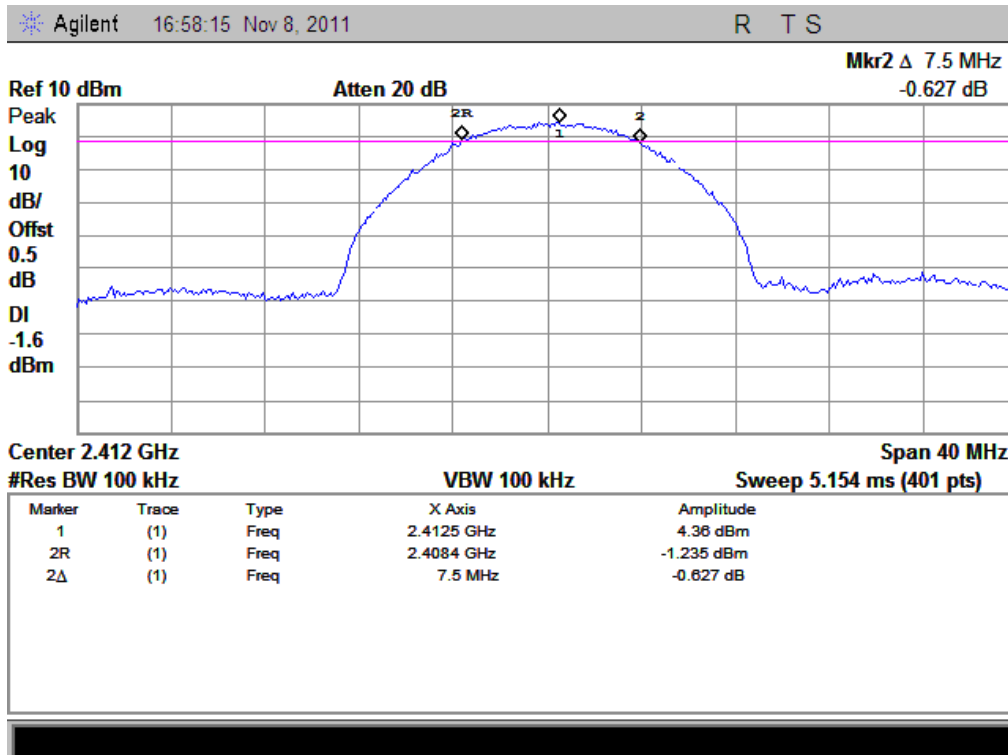
#### 2.2.3.1. 802.11b Test mode

#### A. Test Verdict:

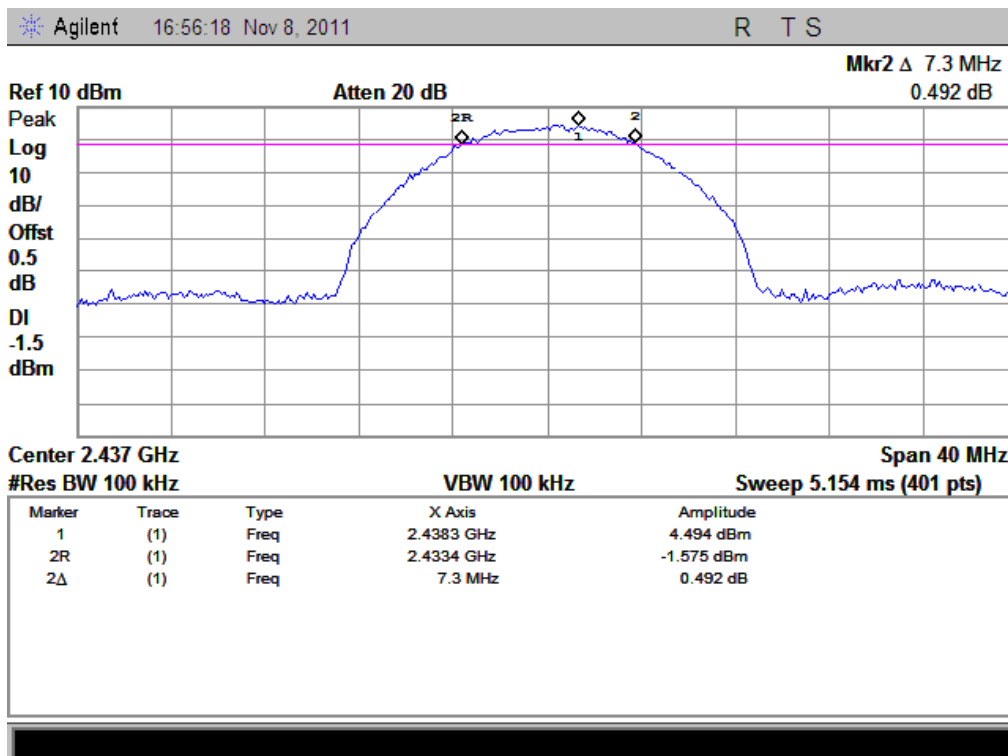
Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Refer to Plot	Limits(kHz)	Result
1	2412	7.5	Plot A	$\geq 500$	PASS
6	2437	7.3	Plot B	$\geq 500$	PASS
11	2462	7.4	Plot C	$\geq 500$	PASS

#### B. Test Plots:

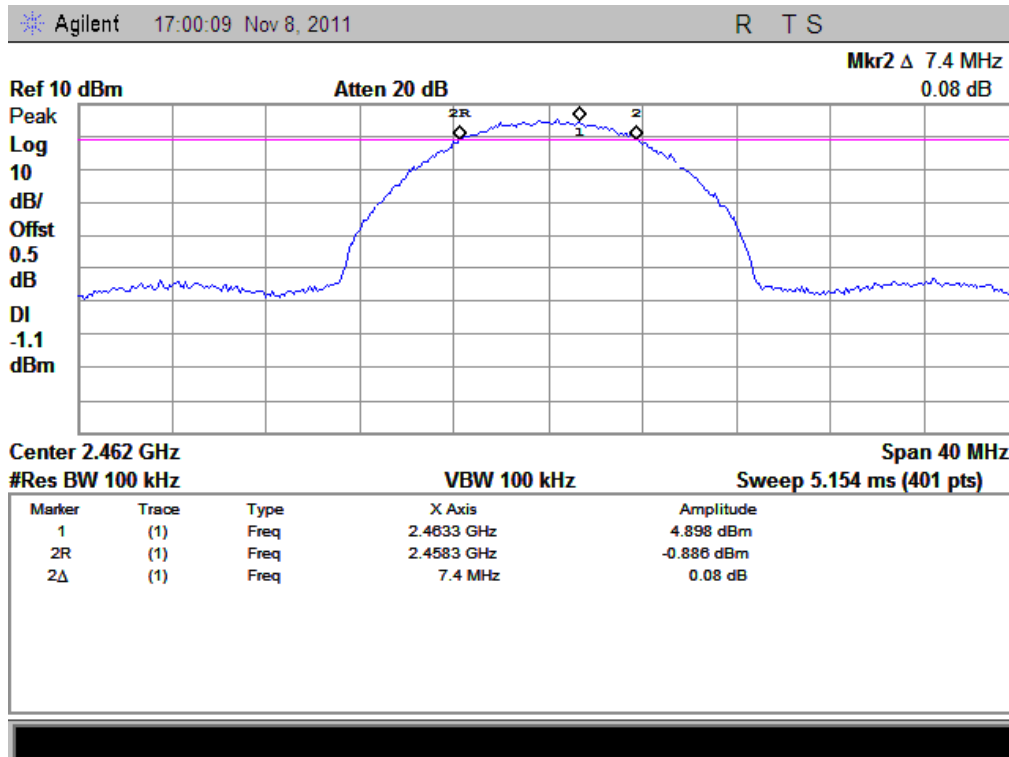




(Plot A: Channel 1 2412MHz)



(Plot B: Channel 6: 2437 MHz)



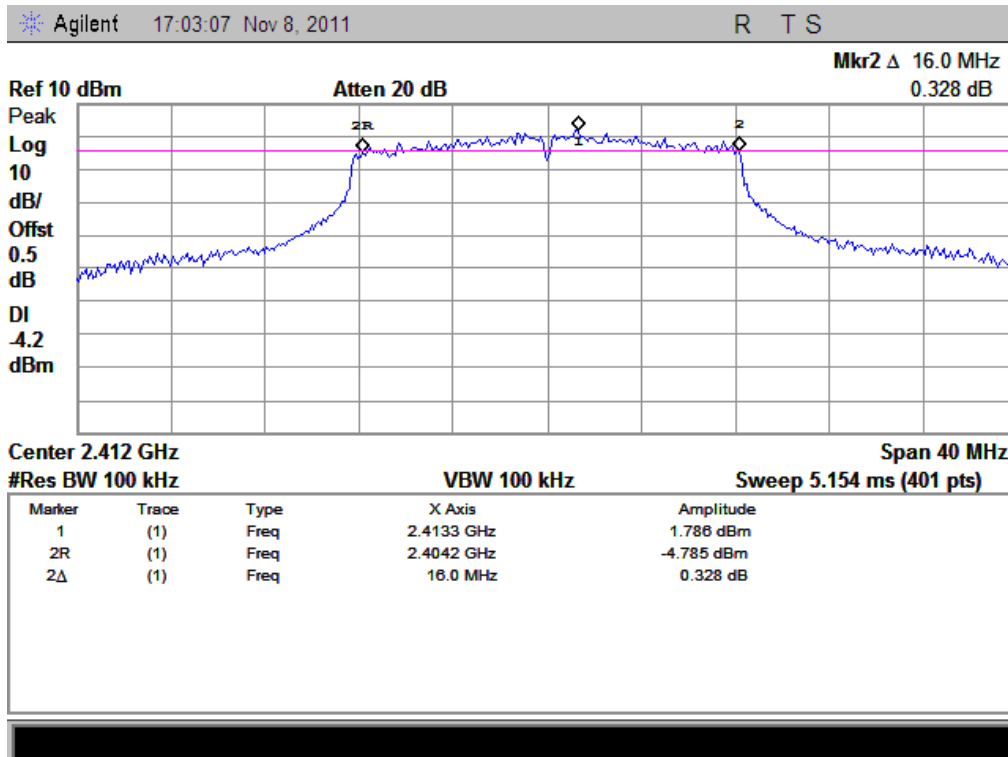
(Plot C: Channel 11: 2462MHz)

## 2.2.3.2. 802.11g Test mode

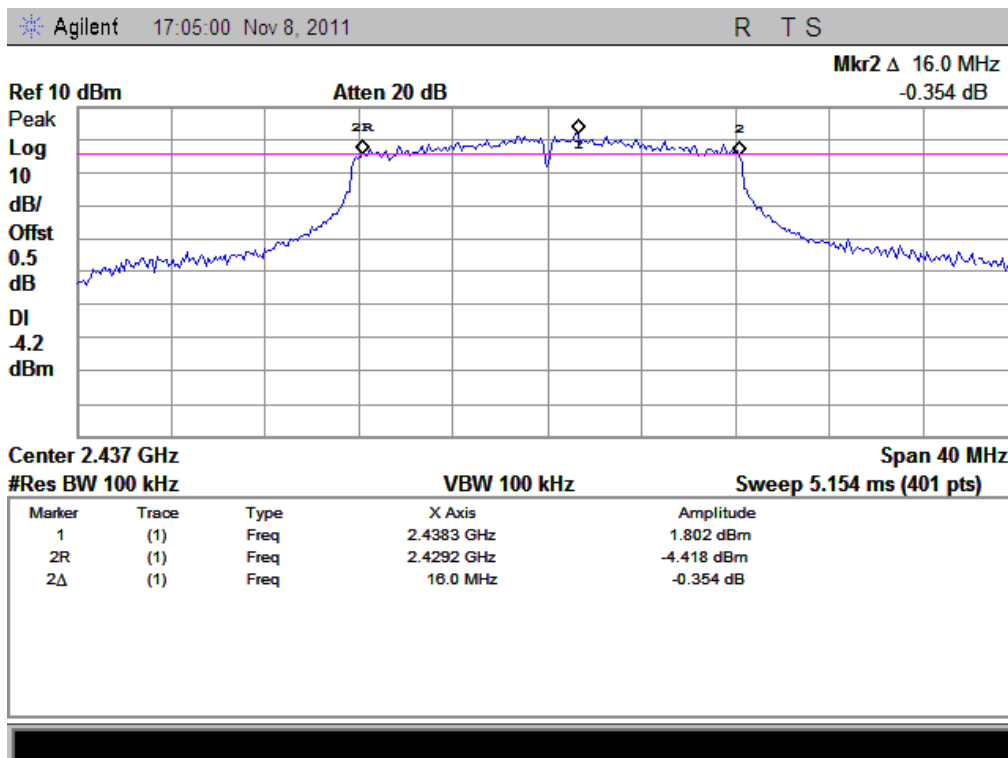
**A. Test Verdict:**

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Refer to Plot	Limits(kHz)	Result
1	2412	16.0	Plot A/B	$\geq 500$	PASS
6	2437	16.0	Plot C/D	$\geq 500$	PASS
11	2462	16.0	Plot E/F	$\geq 500$	PASS

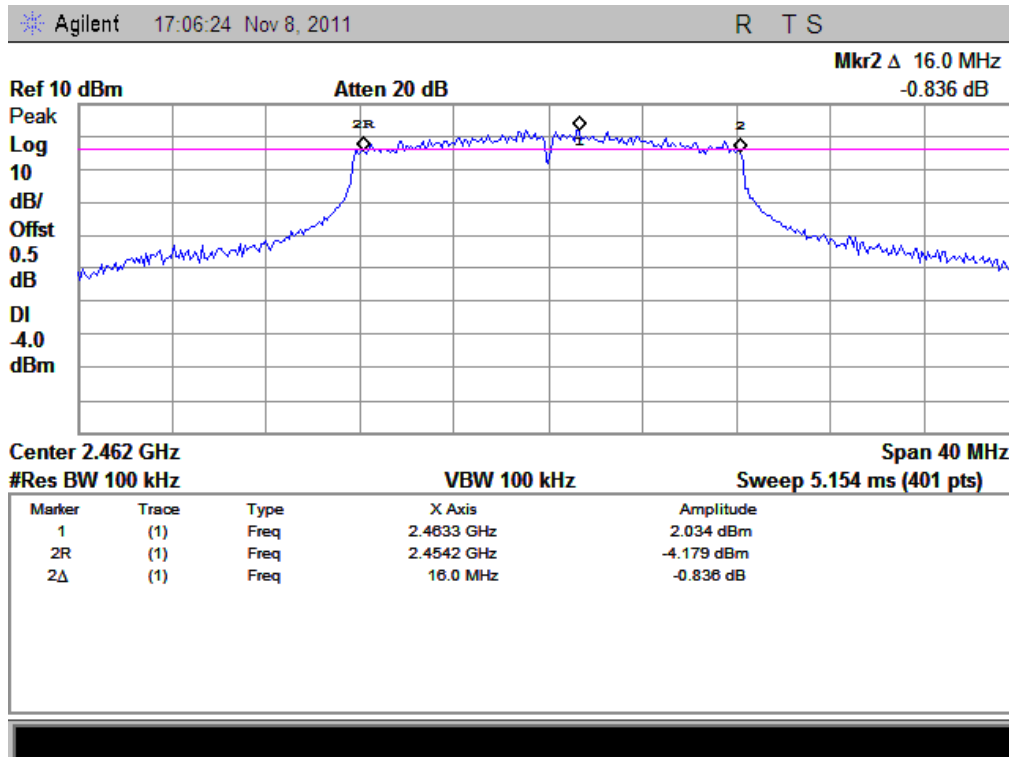
**B. Test Plots:**



(Plot A: Chain1\_Channel 1: 2412MHz)



(Plot B: Chain1\_Channel 6: 2437 MHz)



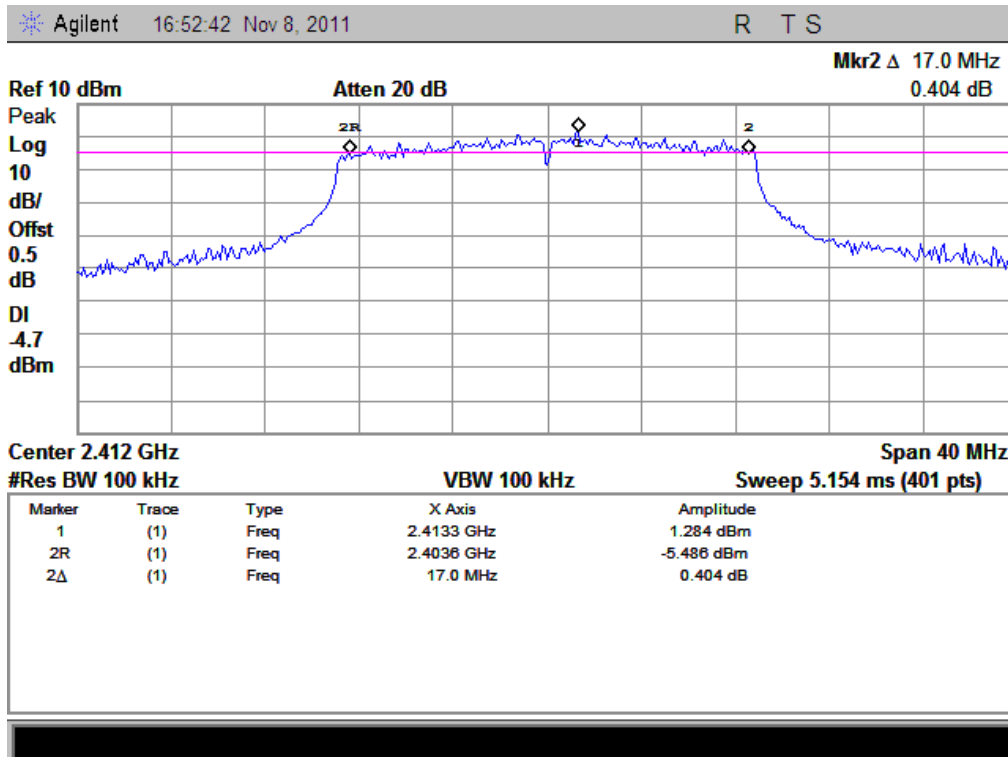
(Plot C: Chain1\_Channel 11: 2462MHz)

### 2.2.3.3. 802.11n-20MHz Test mode

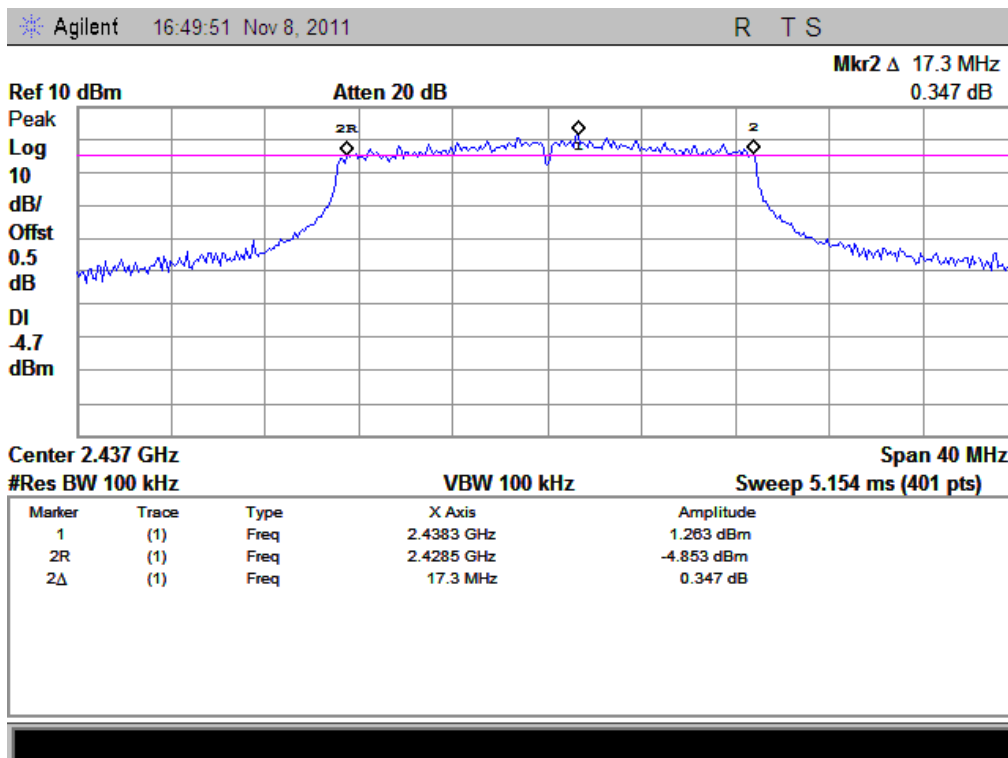
#### A. Test Verdict:

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Refer to Plot	Limits(kHz)	Result
1	2412	17.0	Plot A	$\geq 500$	PASS
6	2437	17.3	Plot B	$\geq 500$	PASS
11	2462	17.6	Plot C	$\geq 500$	PASS

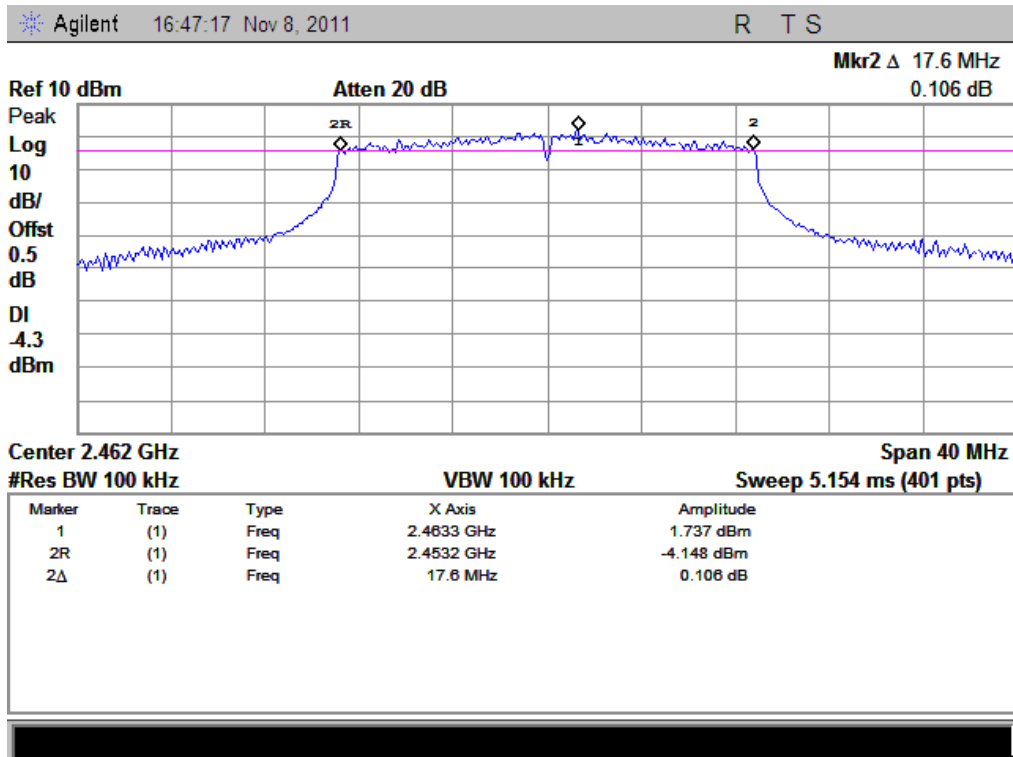
#### B. Test Plot:



(Plot A: Chain1\_Channel 1: 2412MHz)



(Plot B: Chain1\_Channel 6: 2437 MHz)



(Plot C: Chain1\_Channel 11: 2462MHz)

## 2.3. Conducted Spurious Emissions

### 2.3.1. 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.

### 2.3.2. Test Description

See section 2.2.2 of this report.

### 2.3.3. Test Result

The measurement frequency range is from 30MHz to the 10th harmonic of the fundamental frequency. The lowest, middle and highest channels are tested to verify the spurious emissions.

#### 2.3.3.1. 802.11b Test mode

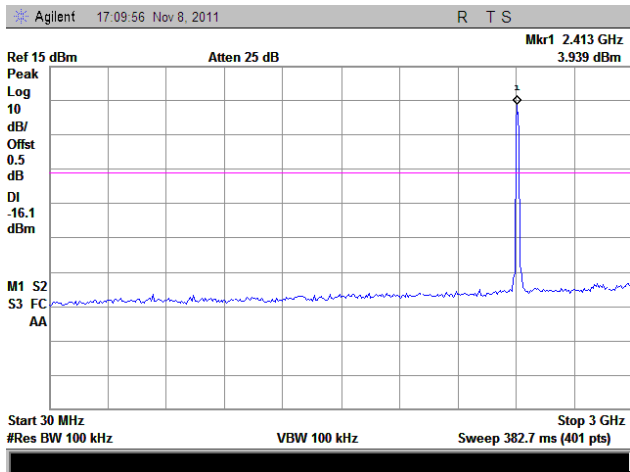
#### A. Test Verdict:

##### Chain1:

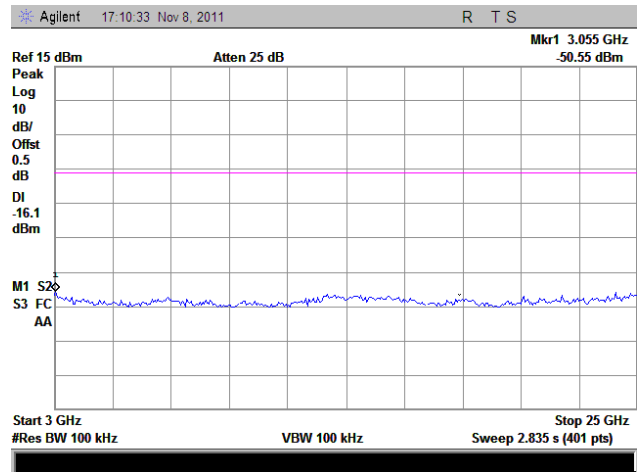
Channel	Frequency (MHz)	Measured Max. Out of Band Emission (dBm)	Refer to Plot	Limit (dBm)		Verdict
				Carrier Level	Calculated -20dBc Limit	
1	2412	-50.55	Plot A.1/A.2	3.939	-16.1	PASS
6	2437	-51.06	Plot B.1/B.2	4.027	-16.0	PASS
11	2462	-50.44	Plot C.1/C.2	4.563	-15.4	PASS

## B. Test Plots:

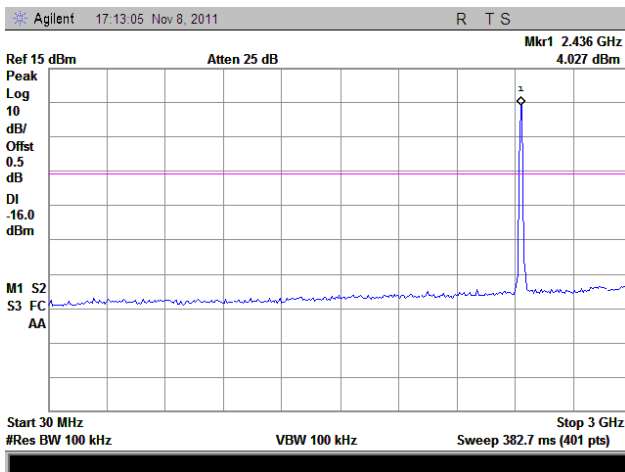
Note: the power of the Module transmitting frequency should be ignored.



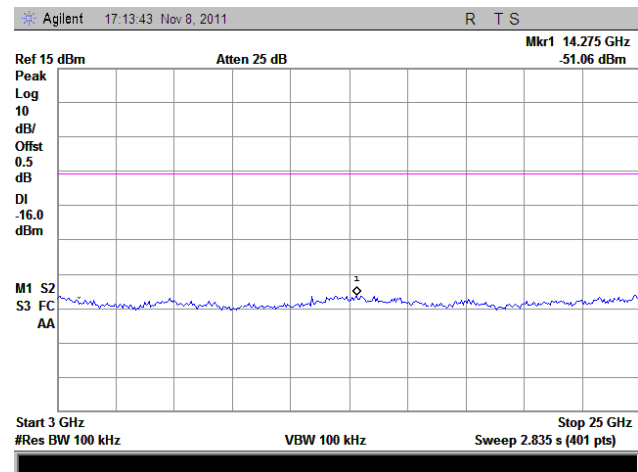
(Plot A.1: Channel = 1, 30MHz to 3GHz)



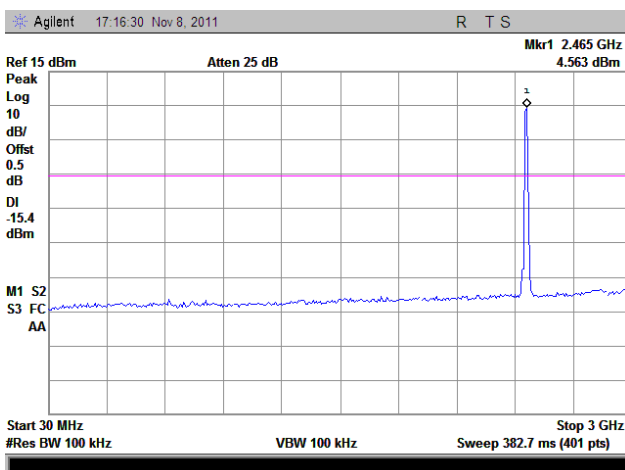
(Plot A.2: Channel = 1, 3GHz to 25GHz)



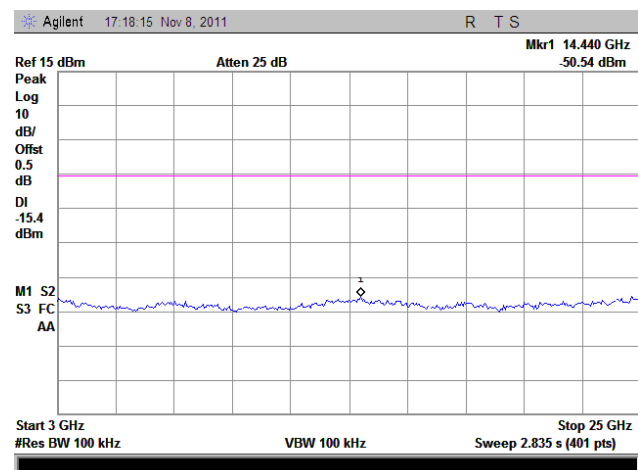
(Plot B.1: Channel = 6, 30MHz to 3GHz)



(Plot B.2: Channel = 6, 3GHz to 25GHz)



(Plot C.1: Channel = 11, 30MHz to 3GHz)



(Plot C.2: Channel = 11, 3GHz to 25GHz)



### 2.3.3.2. 802.11g Test mode

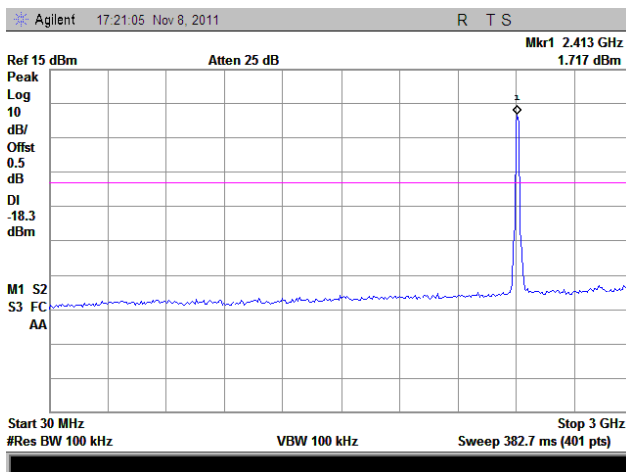
#### A. Test Verdict:

Channel	Frequency (MHz)	Measured Out of Band Emission (dBm)	Max. Refer to Plot	Limit (dBm)		Verdict
				Carrier Level	Calculated -20dBc Limit	
1	2412	-51.03	Plot A.1/A.2	1.717	-18.3	PASS
6	2437	-51.06	Plot B.1/B.2	1.591	-18.4	PASS
11	2462	-50.99	Plot C.1/C.2	2.096	-17.9	PASS

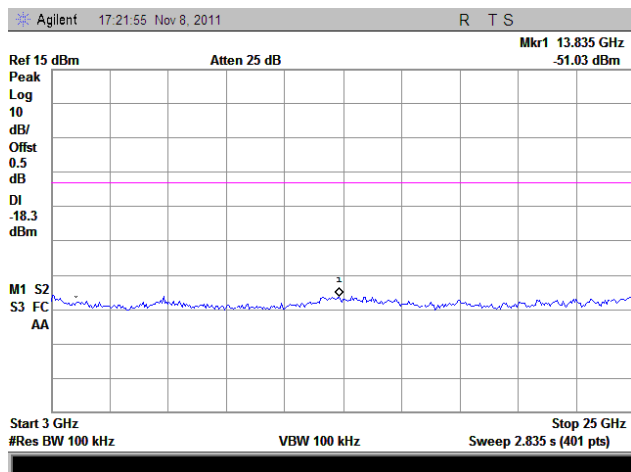
#### B. Test Plots:

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

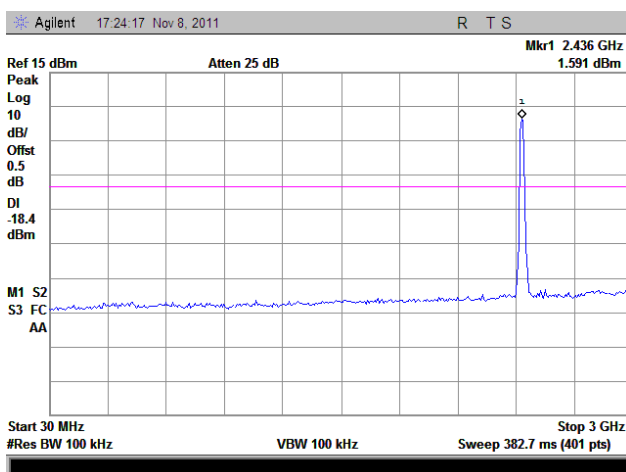
##### Chain1:



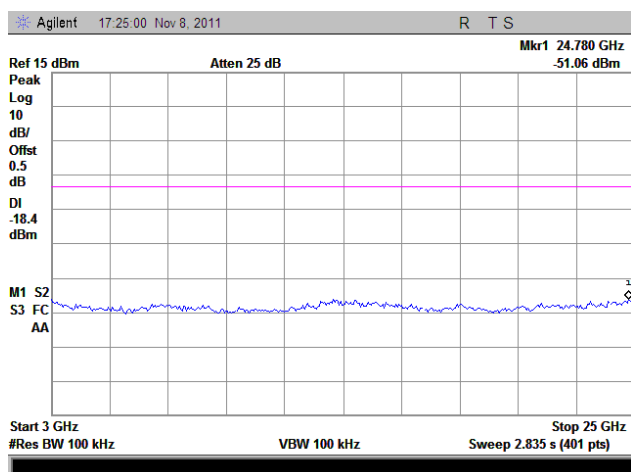
(Plot A.1: Channel = 1, 30MHz to 3GHz)



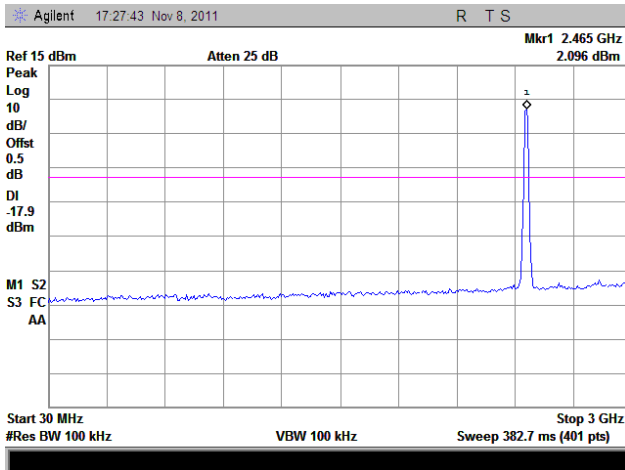
(Plot A.2: Channel = 1, 3GHz to 25GHz)



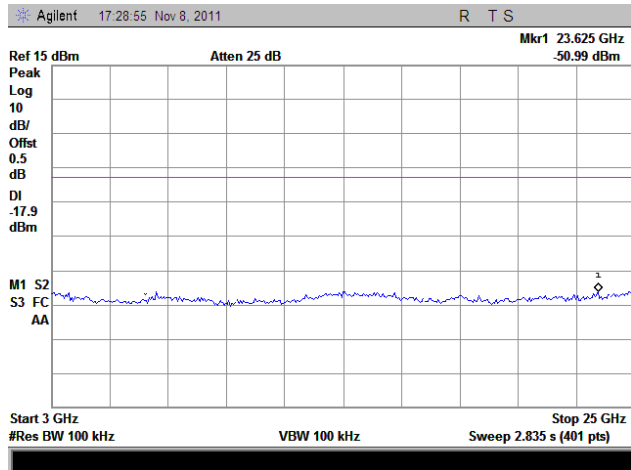
(Plot B.1: Channel = 6, 30MHz to 3GHz)



(Plot B.2: Channel = 6, 3GHz to 25GHz)



(Plot C.1: Channel = 11, 30MHz to 3GHz)



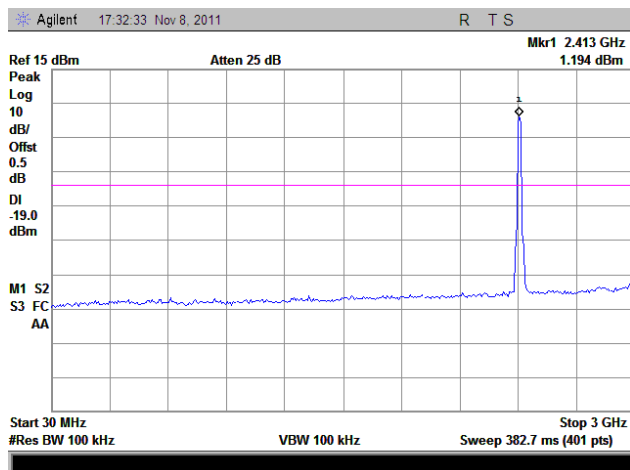
(Plot C.2: Channel = 11, 3GHz to 25GHz)

### 2.3.3.3. 802.11n-20MHz Test mode

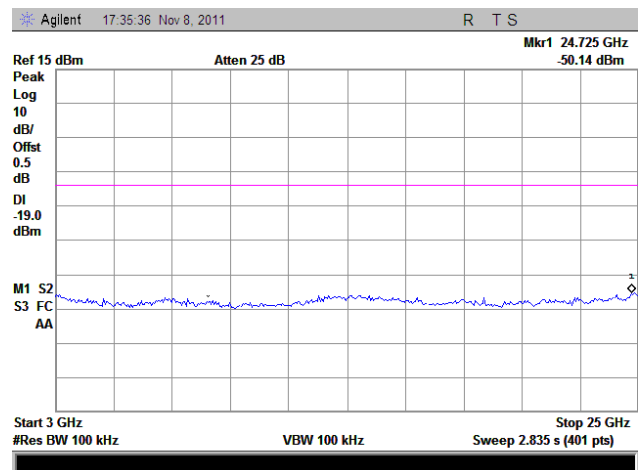
#### A. Test Verdict:

Channel	Frequency (MHz)	Measured Max. Out of Band Emission (dBm)	Refer to Plot	Limit (dBm)		Verdict
				Carrier Level	Calculated -20dBc Limit	
1	2412	-50.14	Plot A.1/A.2	1.194	-19.0	PASS
6	2437	-50.66	Plot B.1/B.2	1.209	-18.8	PASS
11	2462	-50.74	Plot C.1/C.2	1.105	-18.8	PASS

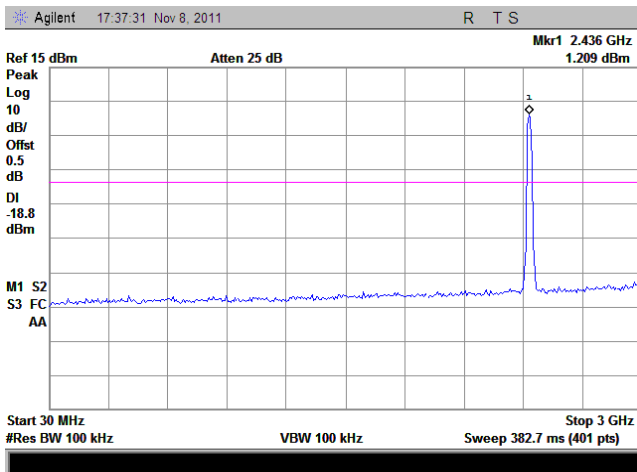
#### B. Test Plots:



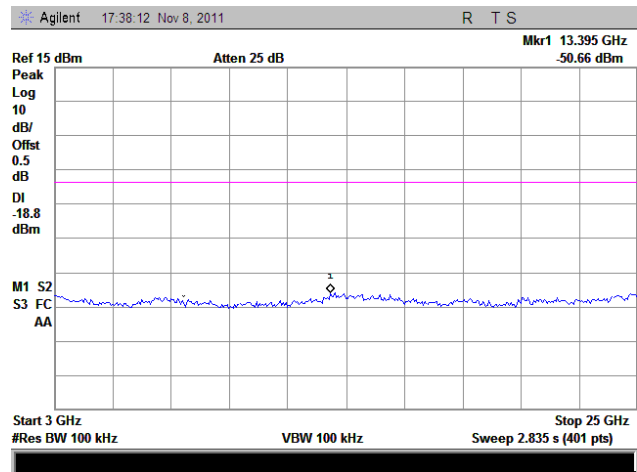
(Plot A.1: Channel = 1, 30MHz to 3GHz)



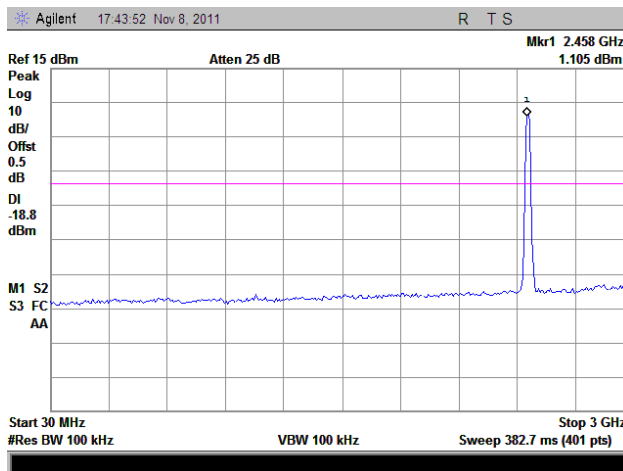
(Plot A.2: Channel = 1, 3GHz to 25GHz)



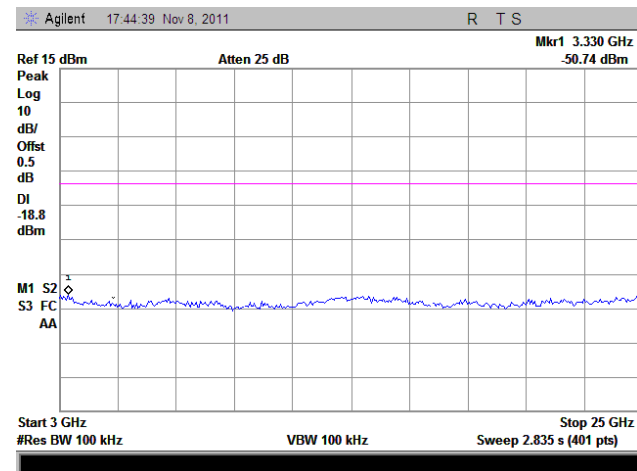
(Plot B.1: Channel = 6, 30MHz to 3GHz)



(Plot B.2: Channel = 6, 3GHz to 25GHz)



(Plot C.1: Channel = 11, 30MHz to 3GHz)



(Plot C.2: Channel = 11, 3GHz to 25GHz)

## 2.4. Power spectral density (PSD)

### 2.4.1. Requirement

According to FCC section 15.247(d), the same method of determining the conducted output power shall be used to determine the power spectral density. If a peak output power is measured, then a peak power spectral density measurement is required. If an average output power is measured, then an average power spectral density measurement should be used.

### 2.4.2. Test Description

See section 2.2.2 of this report.

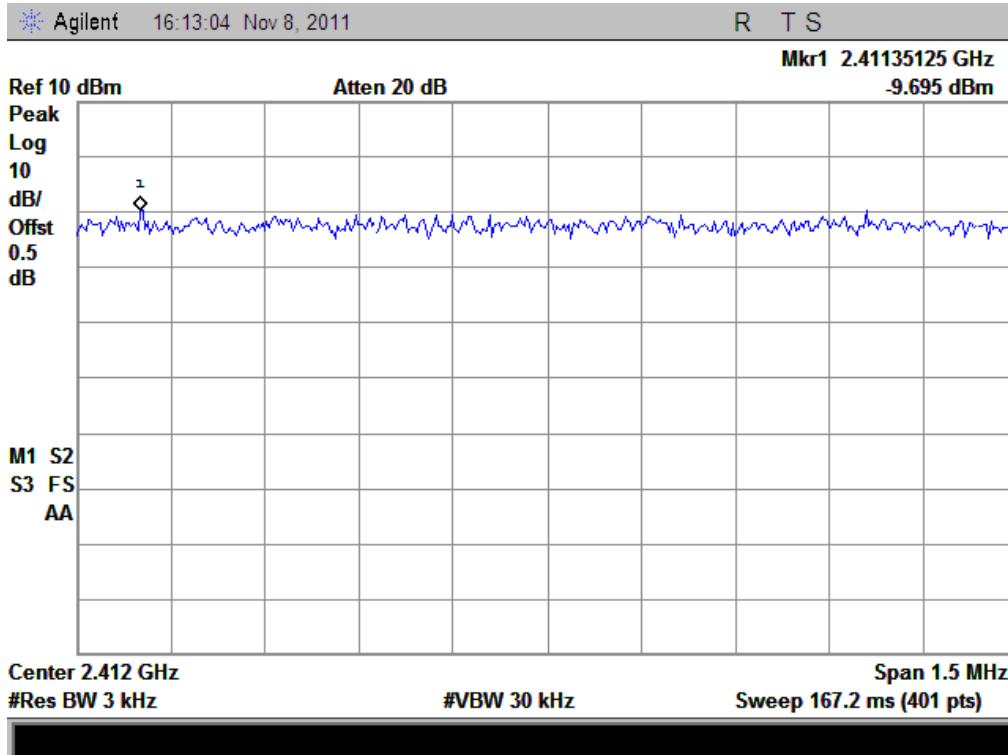
### 2.4.3. Test Result

The lowest, middle and highest channels are tested to verify the band edge emissions.

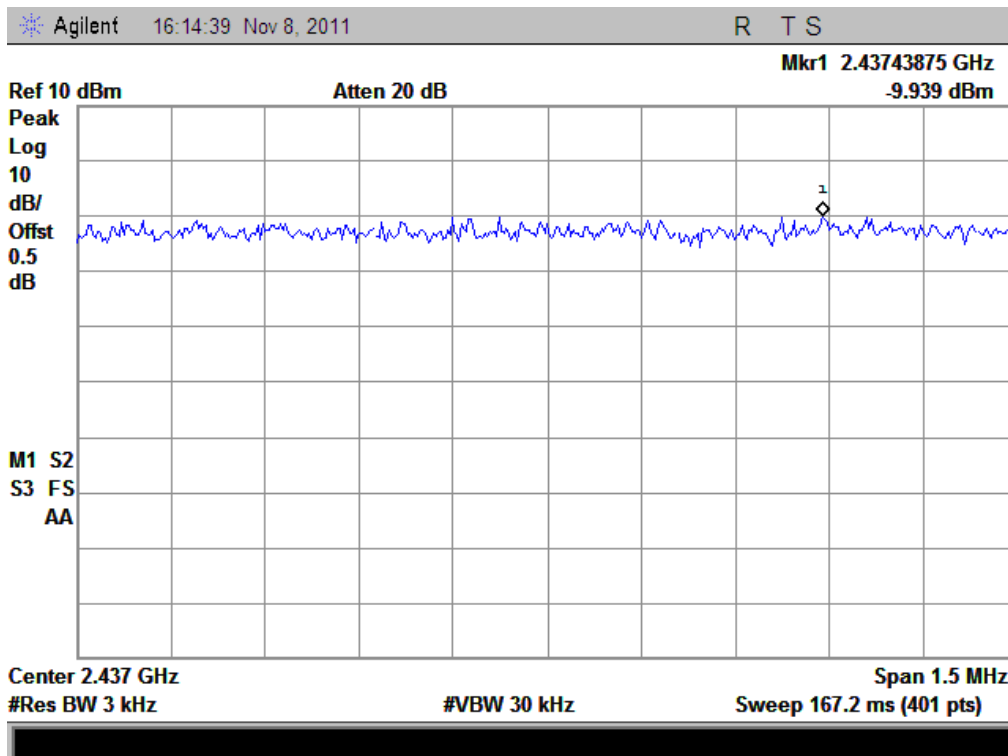
#### 2.4.3.1. 802.11b Test mode

#### A. Test Verdict:

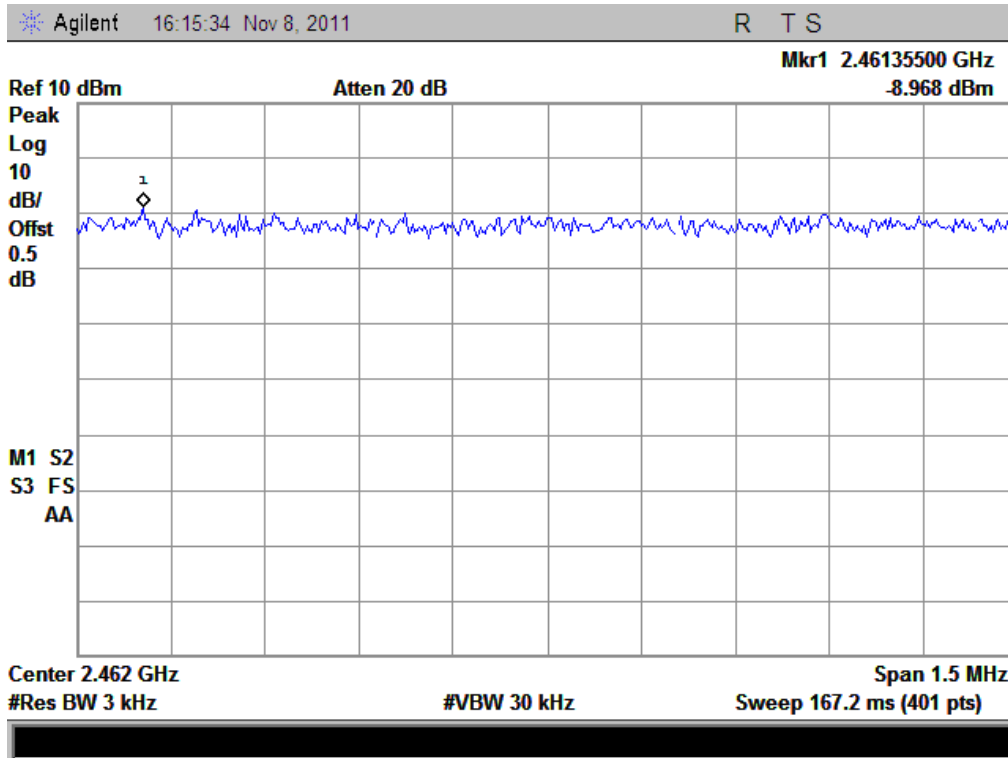
Spectral power density (dBm/MHz)					
Channel: 1 Frequency, 2412MHz		Channel: 6 Frequency, 2437MHz		Channel: 11 Frequency, 2462MHz	
Test Result	Test plot	Test Result	Test plot	Test Result	Test plot
-9.695	Plot A	-9.939	Plot B	-8.968	Plot C
Measurement uncertainty: $\pm 1.3$ dB					

**B. Test Plots:**


(Plot A: Chain1\_Channel = 1)



(Plot B: Chain1\_Channel = 6)

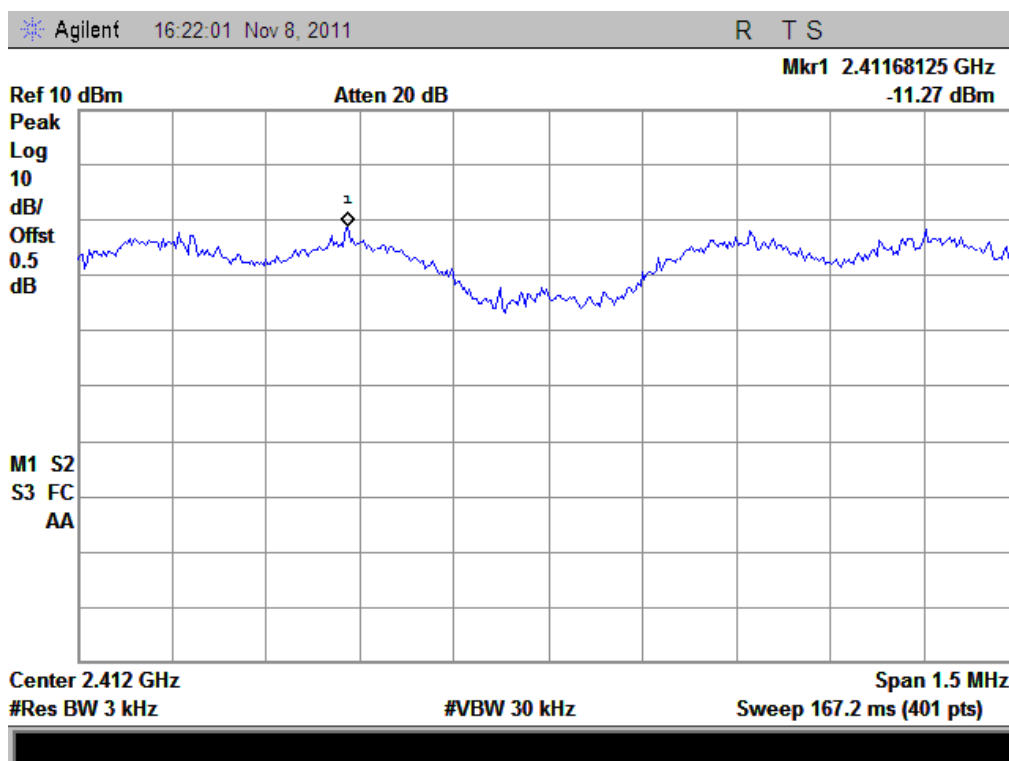


(Plot C: Chain1\_Channel = 11)

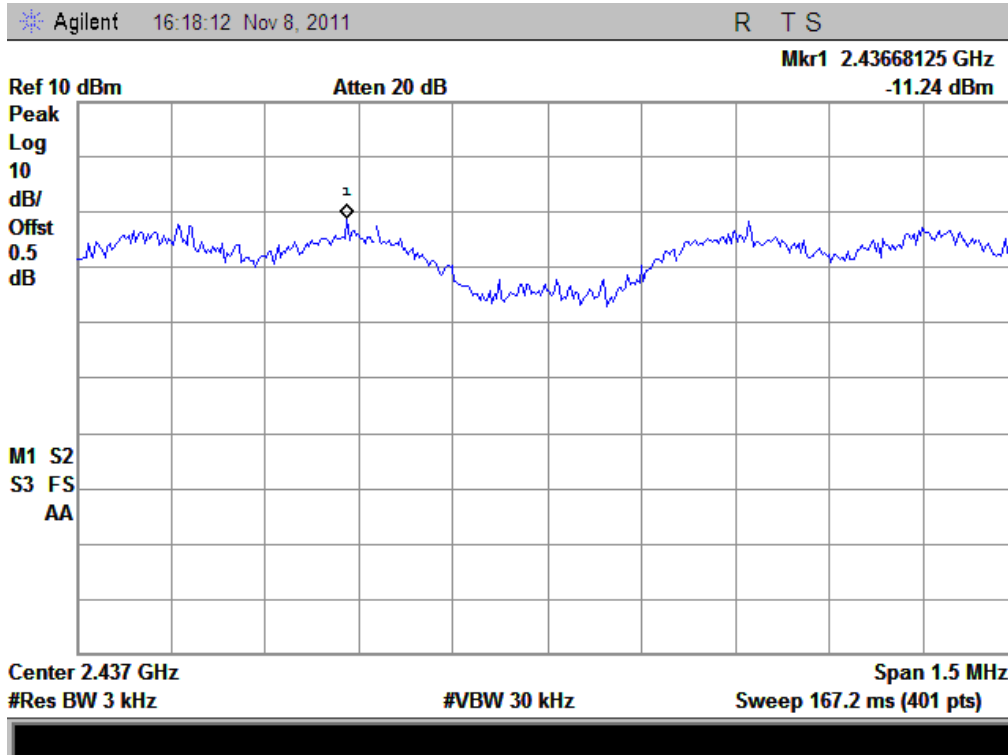
## 2.4.3.2. 802.11g Test mode

**A. Test Verdict:**

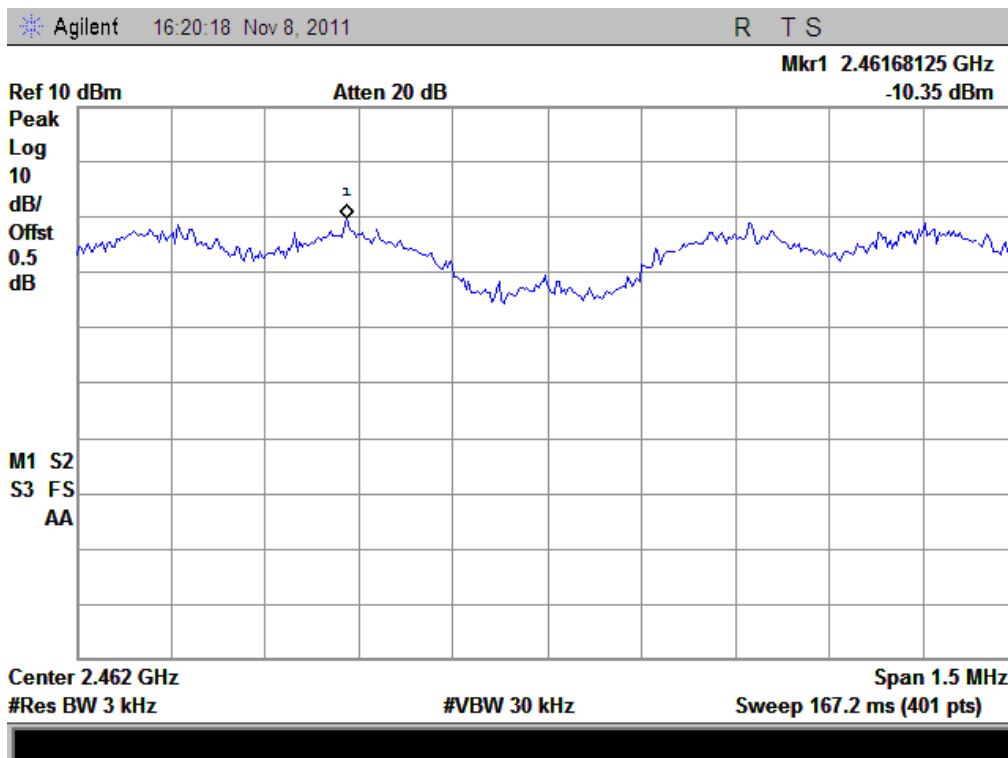
Spectral power density (dBm/MHz)					
Channel: 1 Frequency, 2412MHz		Channel: 6 Frequency, 2437MHz		Channel: 11 Frequency, 2462MHz	
Test Result	Test plot	Test Result	Test plot	Test Result	Test plot
-11.27	Plot A	-11.24	Plot B	-10.35	Plot C
Measurement uncertainty: $\pm 1.3$ dB					

**B. Test Plots:**


(Plot A: Chain1\_Channel = 1)



(Plot B: Chain1\_Channel = 6)



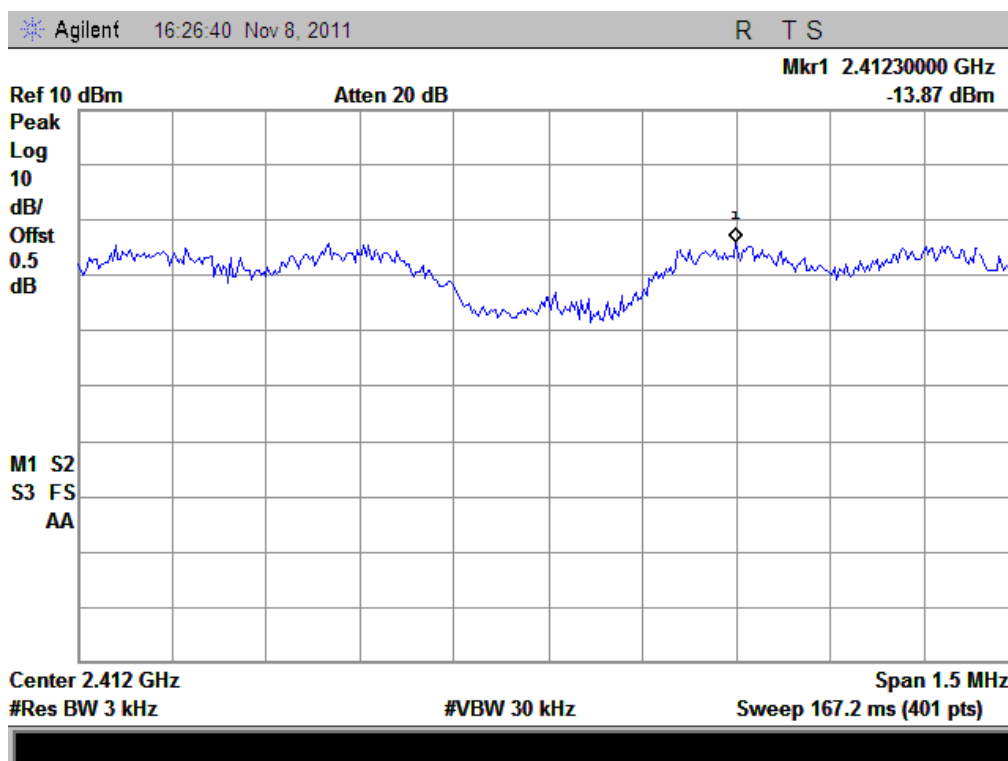
(Plot C: Chain1\_Channel = 11)



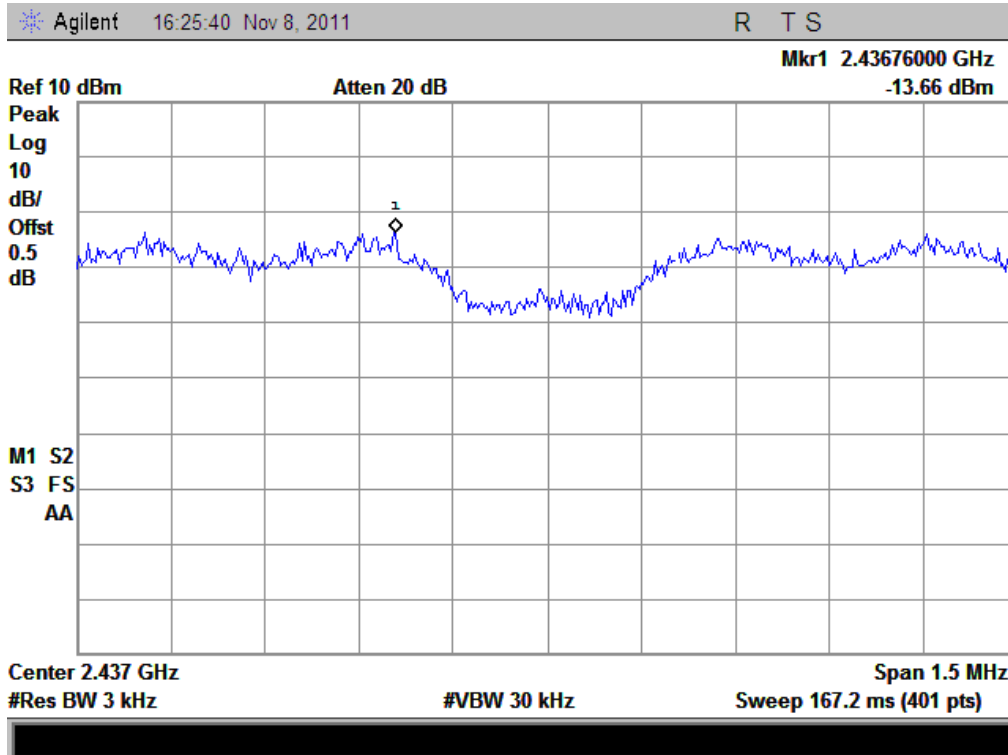
## 2.4.3.3. 802.11n-20MHz Test mode

**A. Test Verdict:**

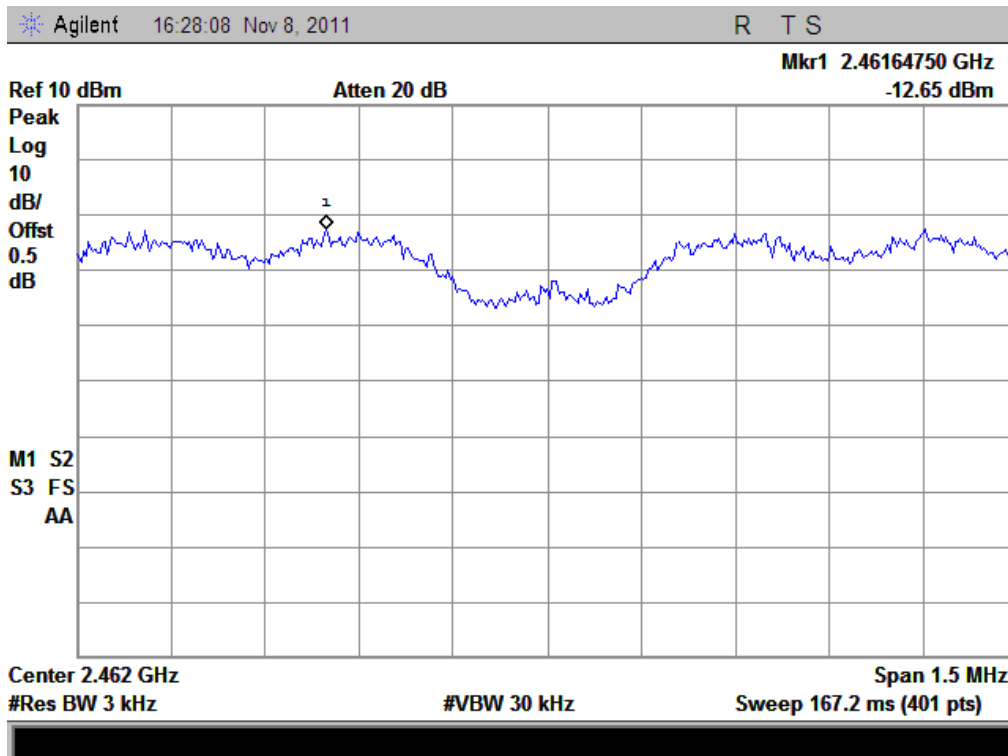
Spectral power density (dBm/MHz)					
Channel: 1 Frequency, 2412MHz		Channel: 6 Frequency, 2437MHz		Channel: 11 Frequency, 2462MHz	
Test Result	Test plot	Test Result	Test plot	Test Result	Test plot
-13.87	Plot A	-13.66	Plot B	-12.65	Plot C
Measurement uncertainty: $\pm 1.3$ dB					

**B. Test Plots:**


(Plot A: Chain1\_Channel = 1)



(Plot C: Chain1\_Channel = 6)



(Plot E: Chain1\_Channel = 11)

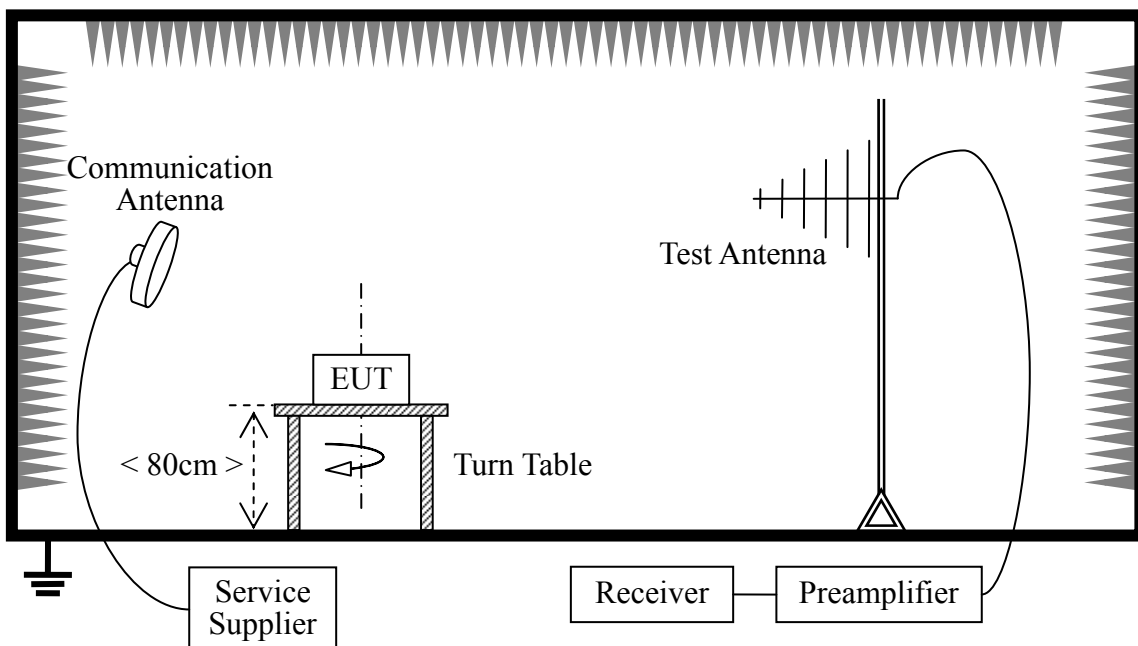
## 2.5. Band Edge

### 2.5.1. 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.

### 2.5.2. Test Description

#### A. Test Setup



The Module of the EUT is powered by the Battery charged with the AC Adapter. 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.

For the Test Antenna:

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.

#### B. Equipments List:

Description	Manufacturer	Model	Serial No.	Cal. Date	Cal. Due
Receiver	Agilent	E7405A	US44210471	2011.5	2year
Full-Anechoic Chamber	Albatross	9m*6m*6m	(n.a.)	2011.5	2year
Test Antenna	Schwarzbeck	BBHA 9120C	9120C-384	2011.5	2year

### 2.5.3. Test Result

The lowest and highest channels are tested to verify the band edge emissions.

The measurement results are obtained as below:

$$E \text{ [dB}\mu\text{V/m]} = U_R + A_T; A_T = L_{\text{Cable loss}} \text{ [dB]} - G_{\text{preamp}} \text{ [dB]} + A_{\text{Factor}} \text{ [dB]}$$

$A_T$ : Total correction Factor except Antenna

$U_R$ : Receiver Reading

$G_{\text{preamp}}$ : Preamplifier Gain

$A_{\text{Factor}}$ : Antenna Factor at 3m

During the test, the total correction Factor  $A_T$  was built in receiver.

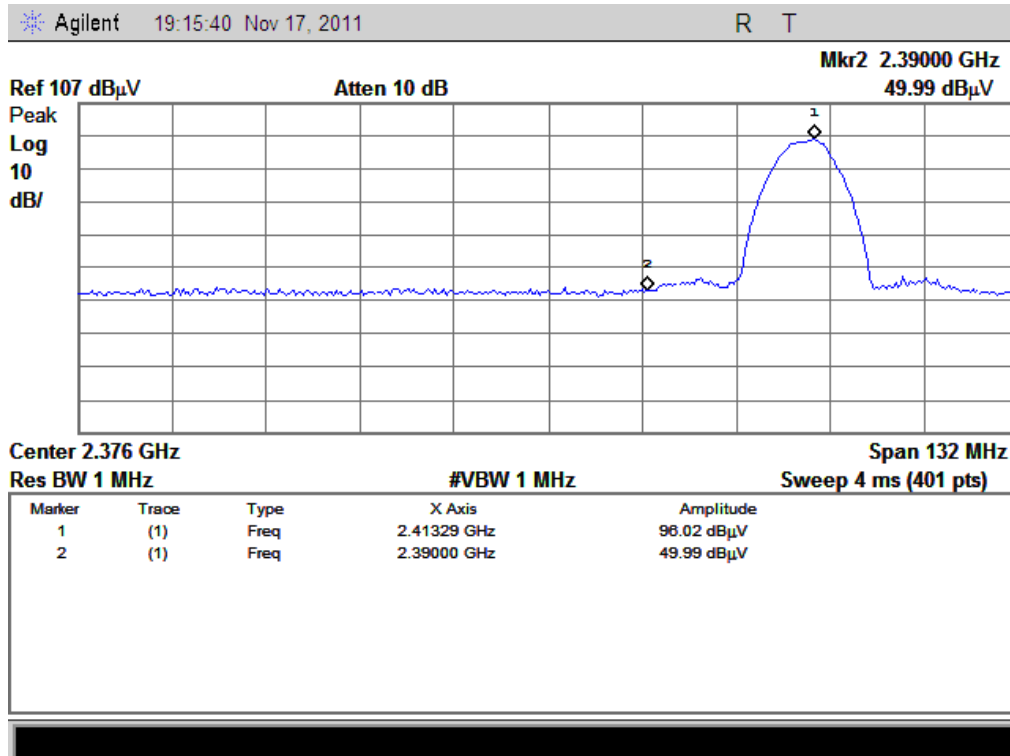
#### 2.5.3.1. 802.11b Test mode

The lowest and highest channels are tested to verify the band edge emissions.

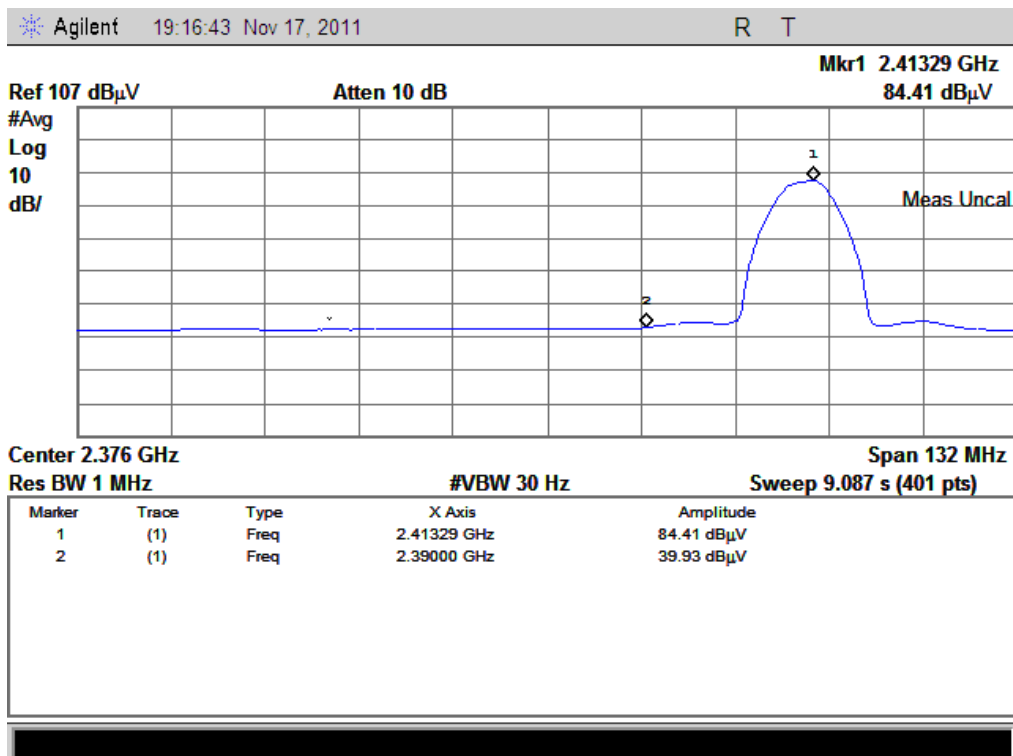
#### A. Test Verdict:

Channel	Frequency (MHz)	Max. Emission in the Restricted Bands (dB $\mu$ V/m)		Limit (dB $\mu$ V/m)		Verdict
				PK	AV	
		PK	AV	PK	AV	
1	2412	49.99	39.93	74	54	PASS
11	2462	48.64	39.54	74	54	PASS

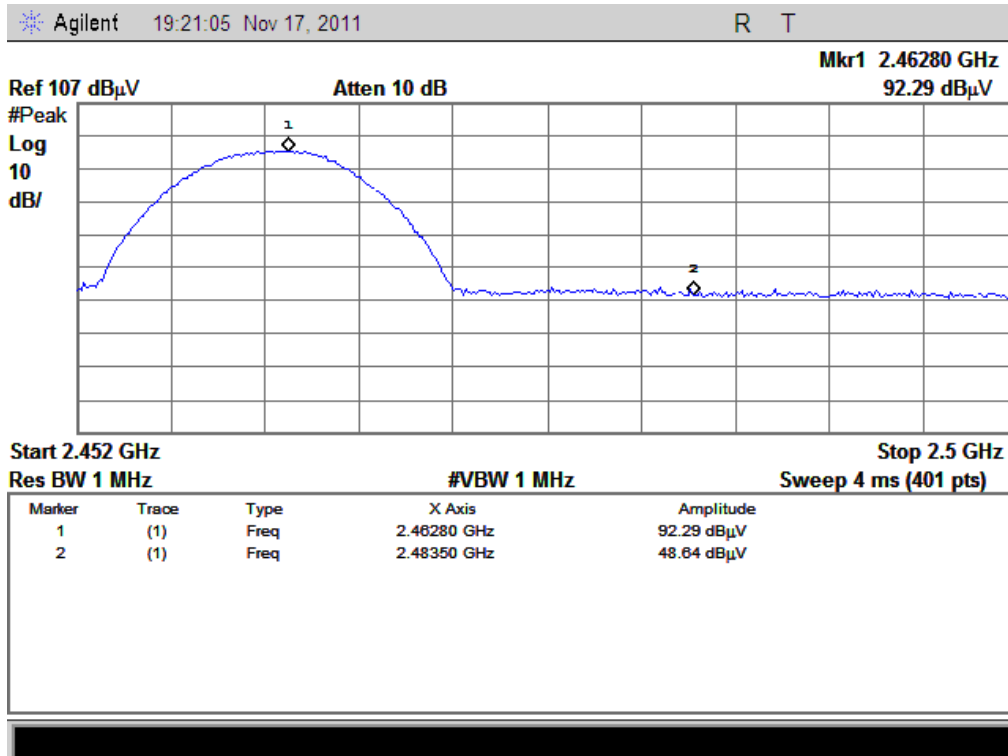
#### B. Test Plots:



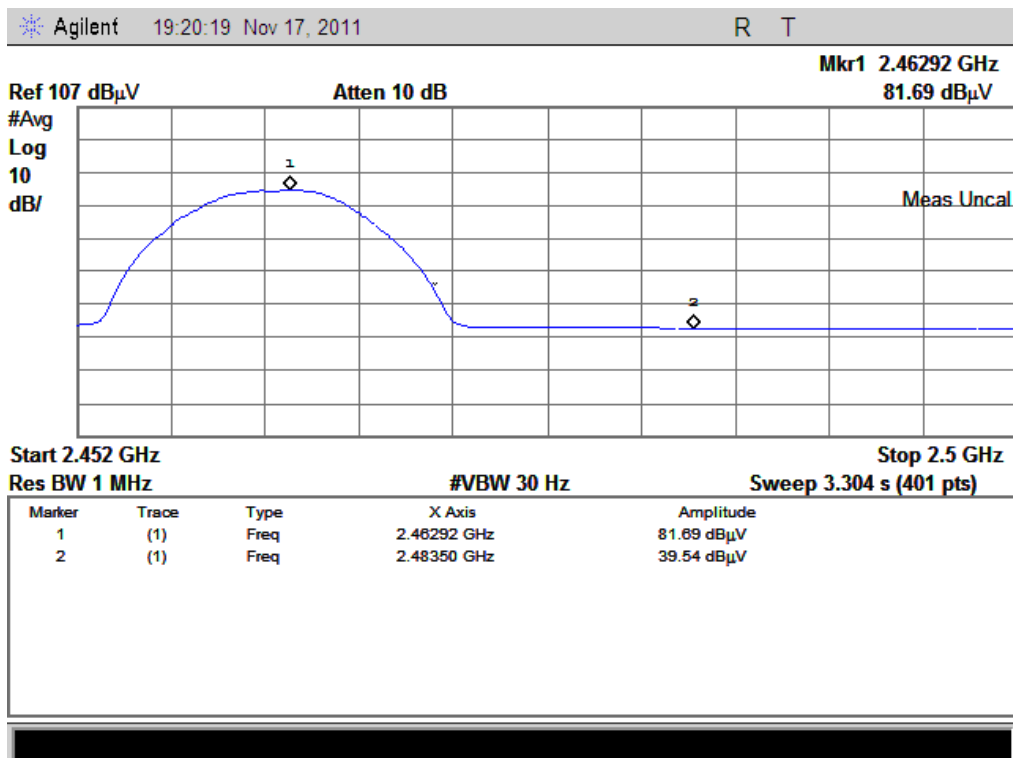
(Plot A1: Channel = 1 PEAK)



(Plot A2: Channel = 1 AVG)



(Plot B1: Channel1 = 11 PEAK)



(Plot B2: Channel = 11 AVG)

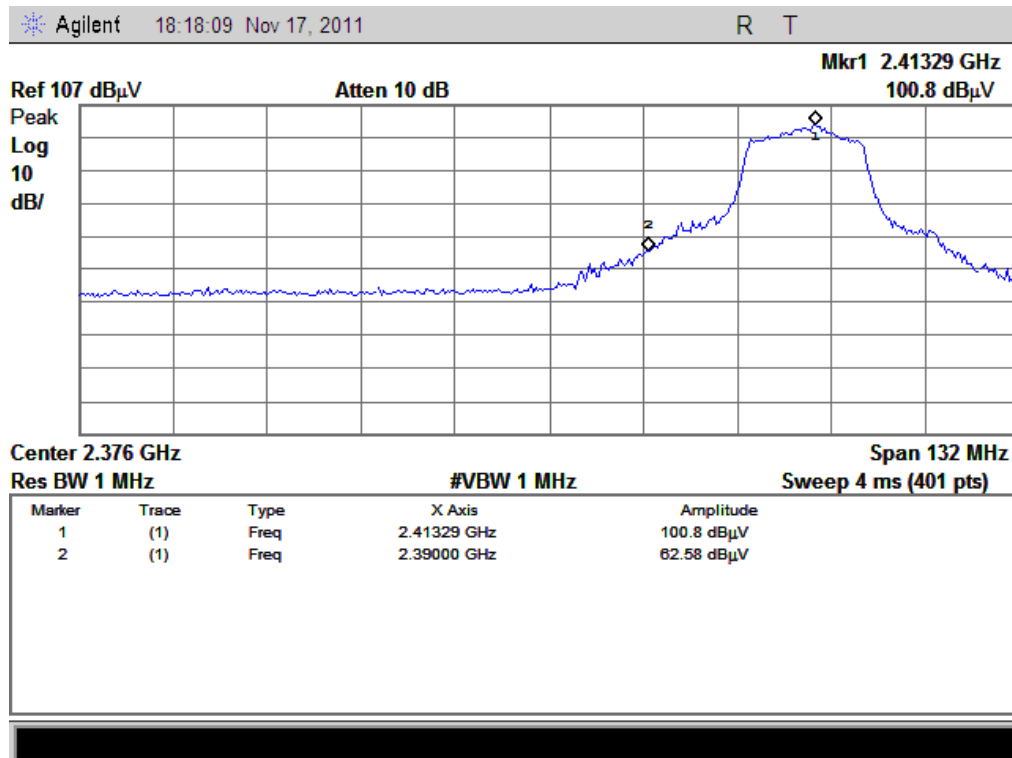
### 2.5.3.2. 802.11g Test mode

The lowest and highest channels are tested to verify the band edge emissions.

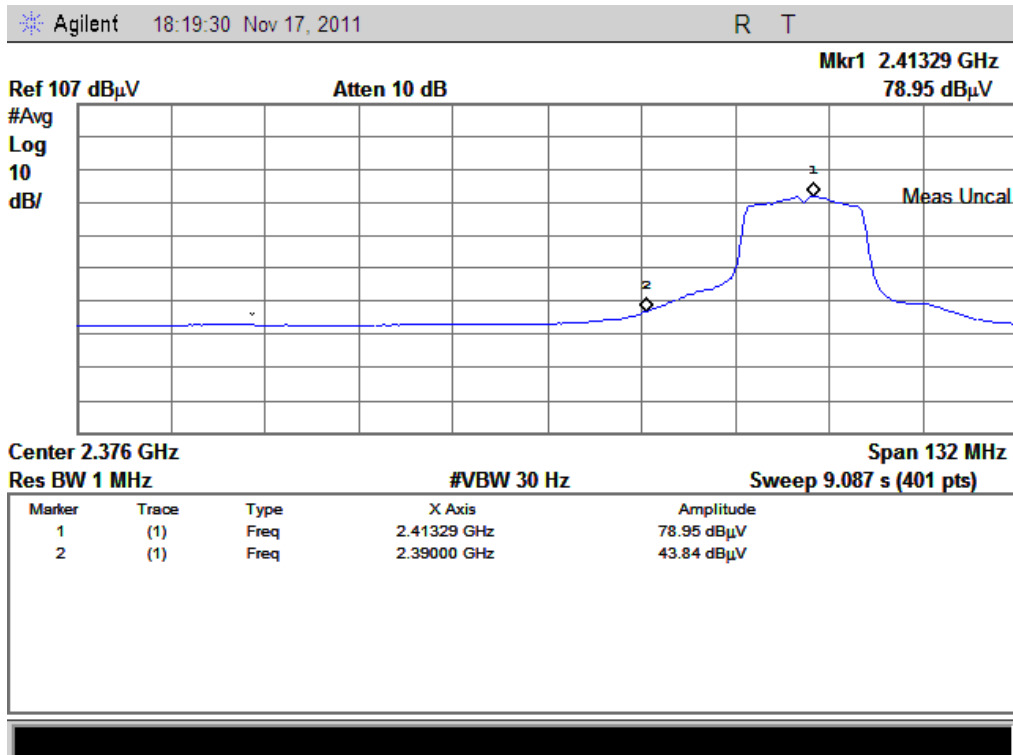
#### A. Test Verdict:

Channel	Frequency (MHz)	Max. Emission in the Restricted Bands (dB $\mu$ V/m)		Limit (dB $\mu$ V/m)		Verdict
		PK	AV	PK	AV	
1	2412	62.58	43.84	74	54	PASS
11	2462	53.85	40.67	74	54	PASS

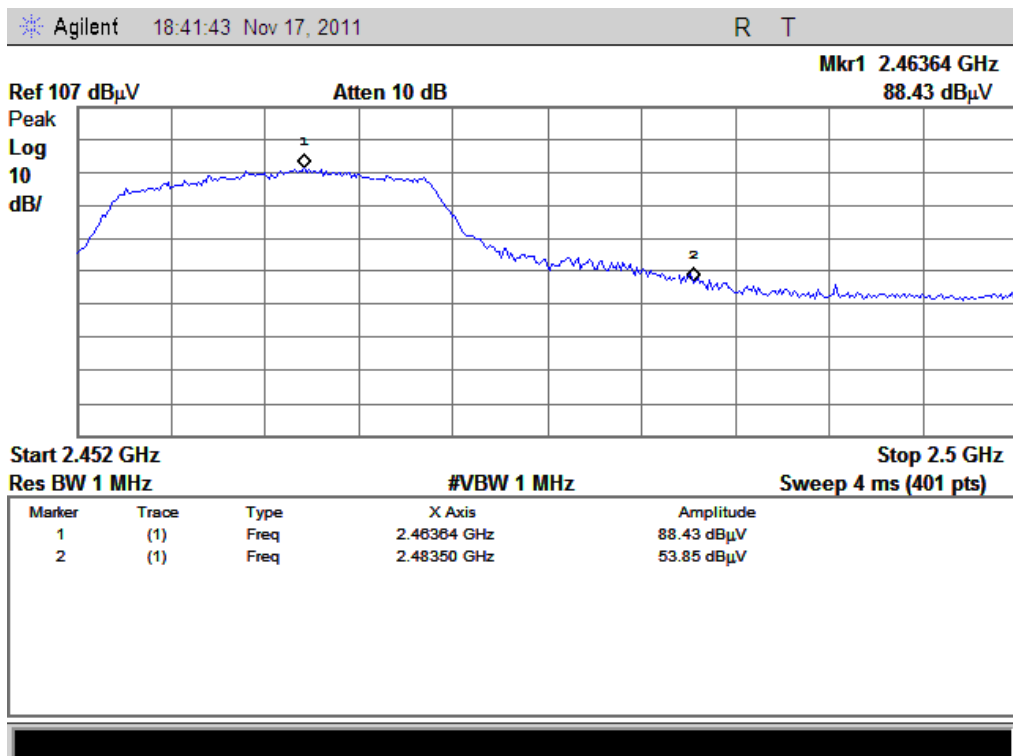
#### B. Test Plots:



(Plot A1: Channel = 1 PEAK)

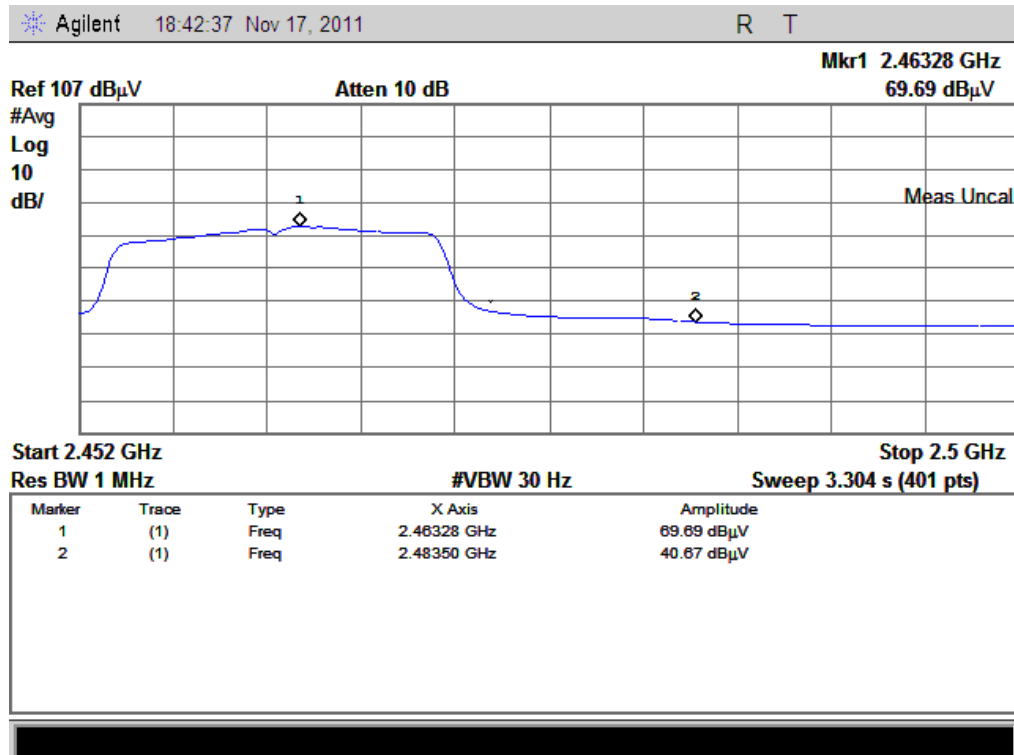


(Plot A2: Channel = 1 AVG)



(Plot B1: Channel = 11 PEAK)





(Plot B2: Channel = 11 AVG)

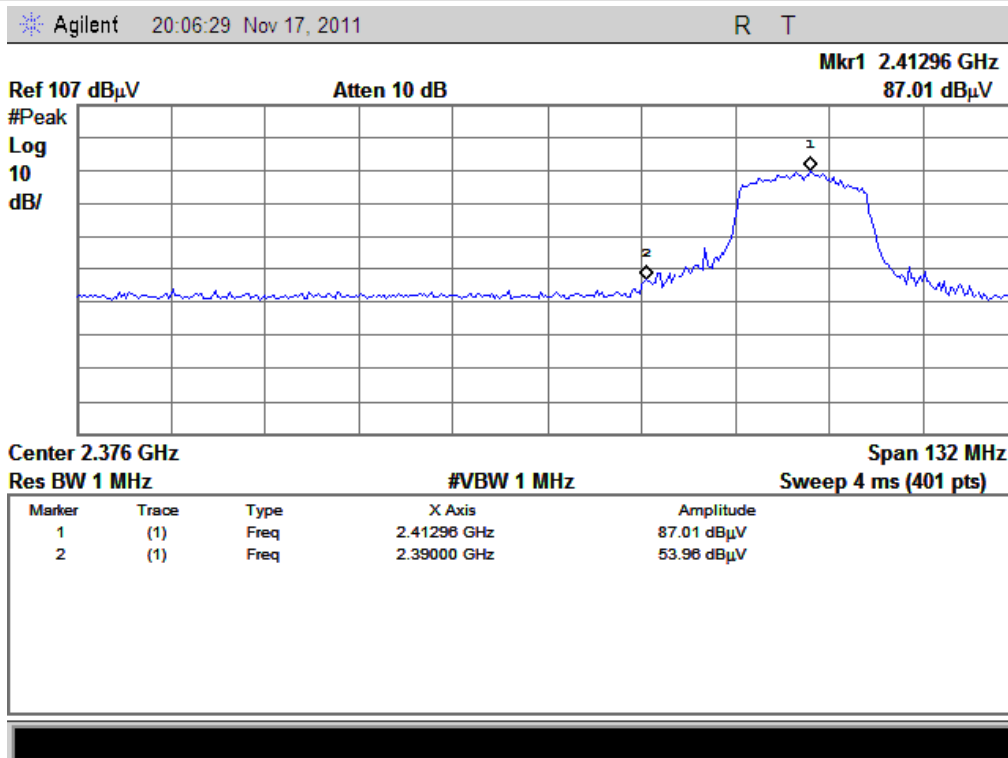
### 2.5.3.3. 802.11n-20MHz Test mode

The lowest and highest channels are tested to verify the band edge emissions.

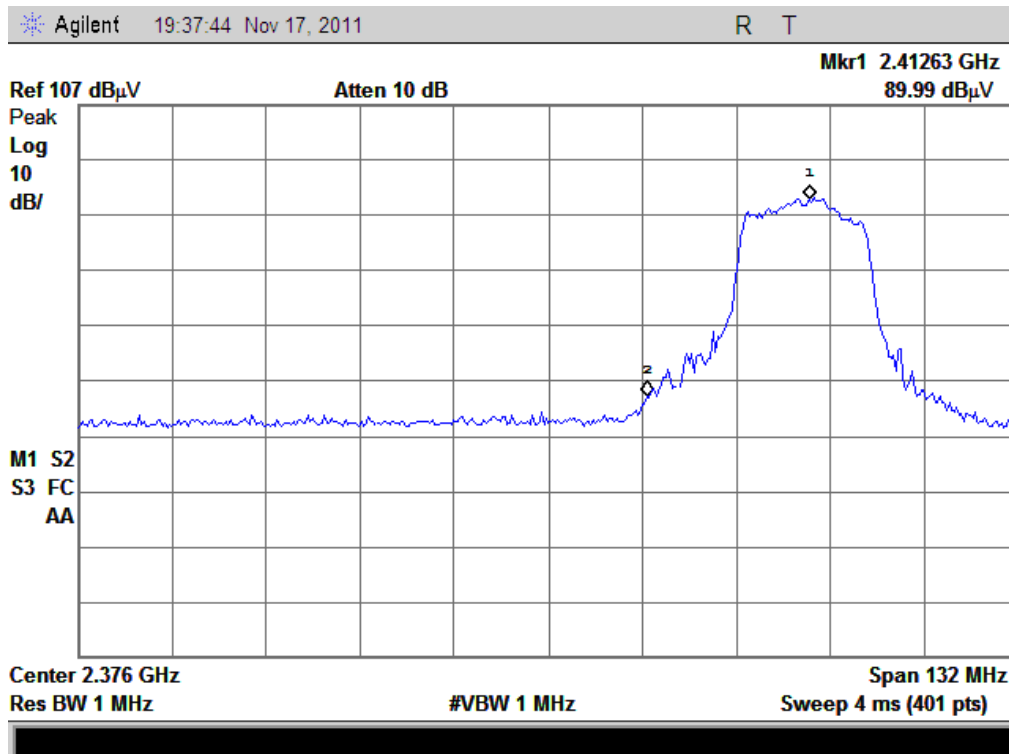
#### A. Test Verdict:

Channel	Frequency (MHz)	Max. Emission in the Restricted Bands (dB $\mu$ V/m)		Limit (dB $\mu$ V/m)		Verdict
		PK	AV	PK	AV	
11	2462	53.29	40.07	74	54	PASS

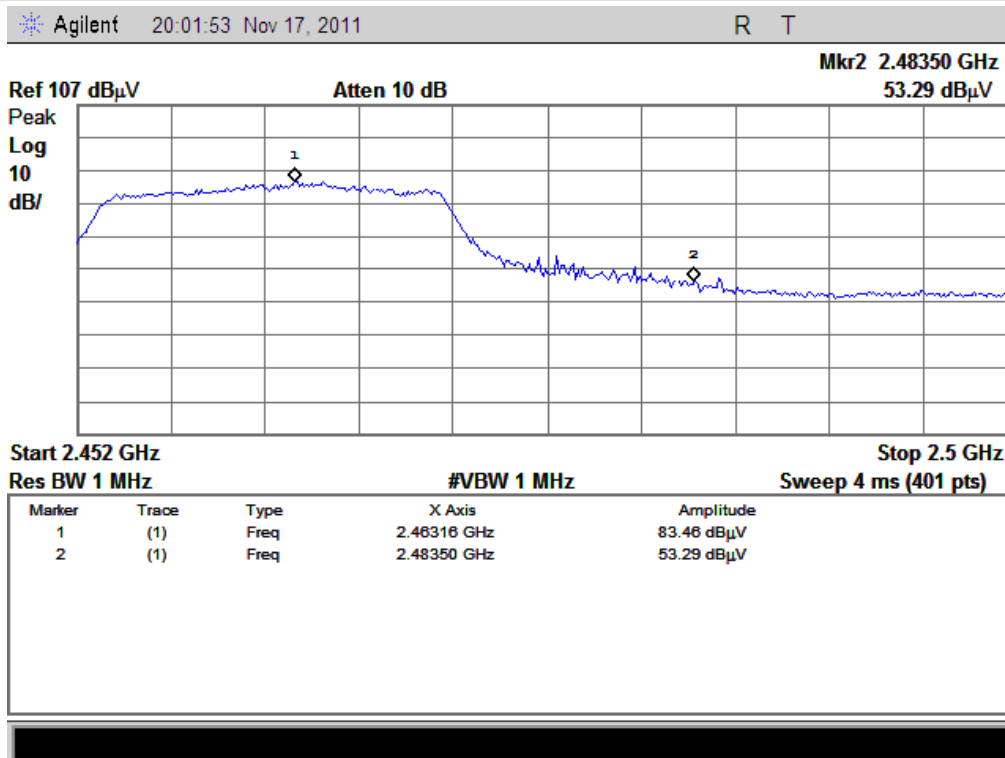
#### B. Test Plots:



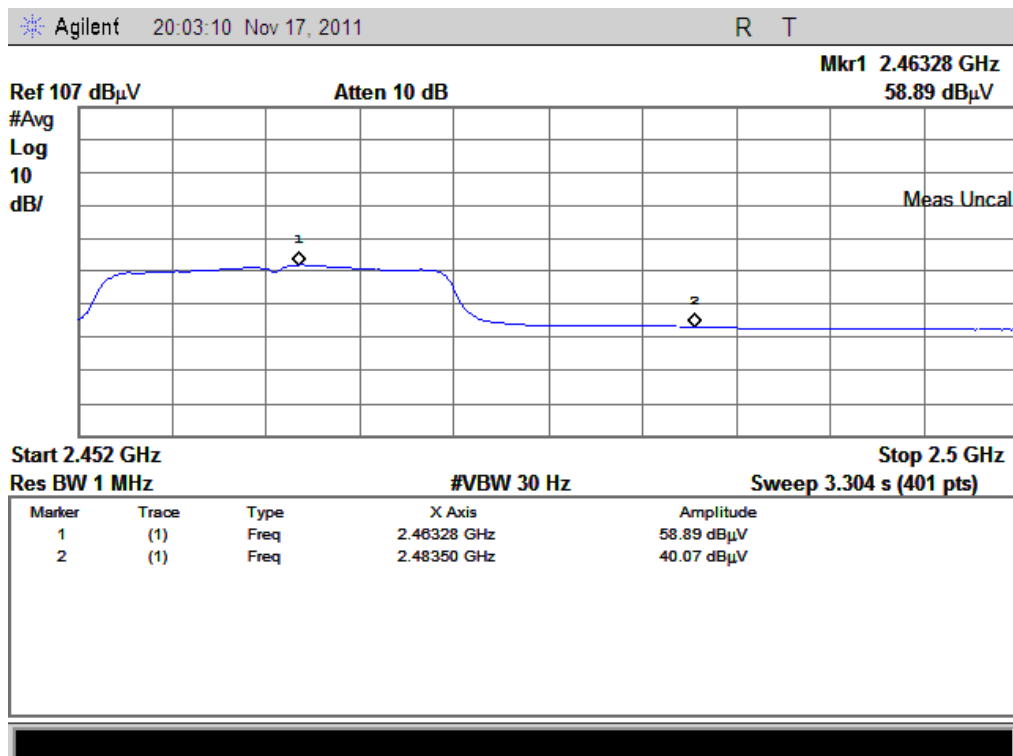
(Plot A1: Channel = 1 PEAK)



(Plot A2: Channel = 1 AVG)



(Plot B1: Channel = 11 PEAK)



(Plot B2: Channel = 11 AVG)

## 2.6. Conducted Emission

### 2.6.1. 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).

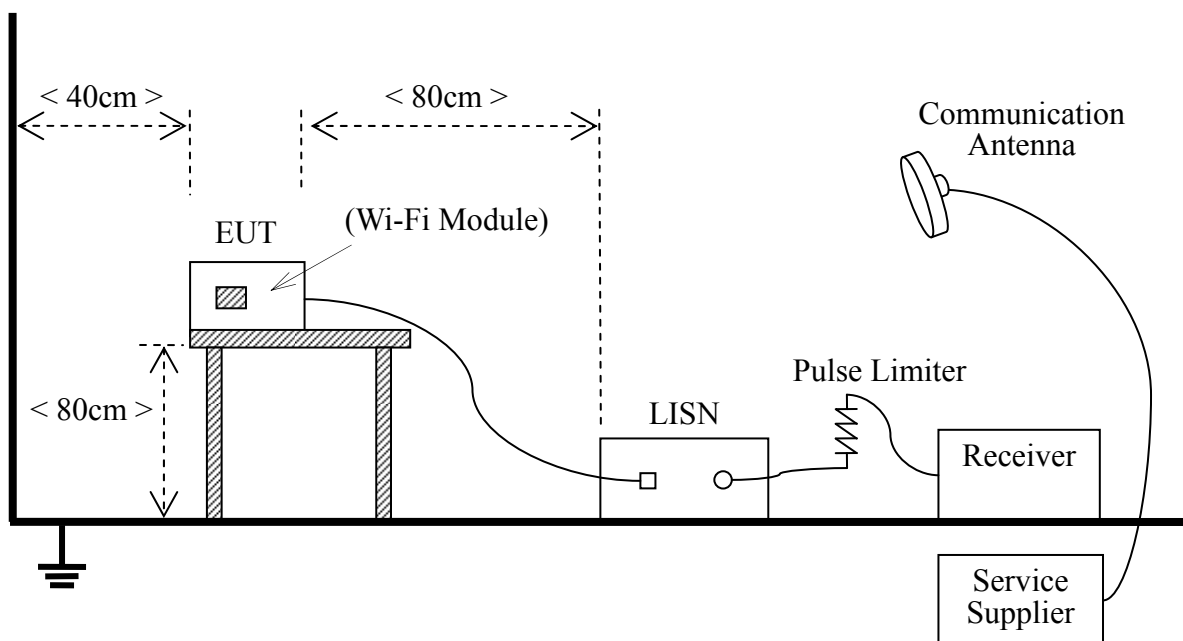
Frequency range (MHz)	Conducted Limit (dB $\mu$ V)	
	Quai-peak	Average
0.15 - 0.50	66 to 56	56 to 46
0.50 - 5	56	46
5 - 30	60	50

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.

### 2.6.2. Test Description

#### A. Test Setup:



The EUT 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 EUT is activated and controlled by the Wi-Fi 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.

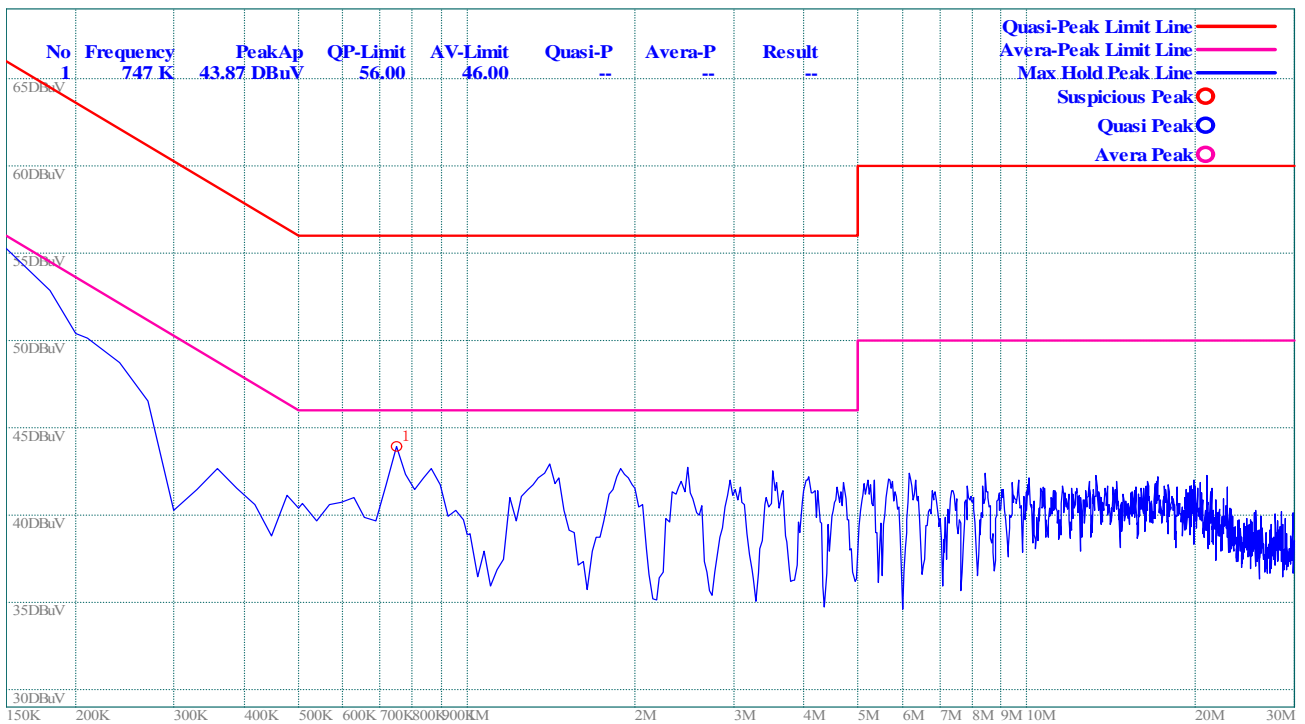
#### B. Equipments List:

Description	Manufacturer	Model	Serial No.	Cal. Date	Cal. Due
Receiver	Agilent	E7405A	US4421047 1	2011.05	1year
LISN	Schwarzbeck	NSLK 8127	812744	2011.05	1year
Service Supplier	R&S	CMU200	100448	2011.05	1year
Pulse Limiter (20dB)	Schwarzbeck	VTSD 9561-D	9391	(n.a.)	(n.a.)

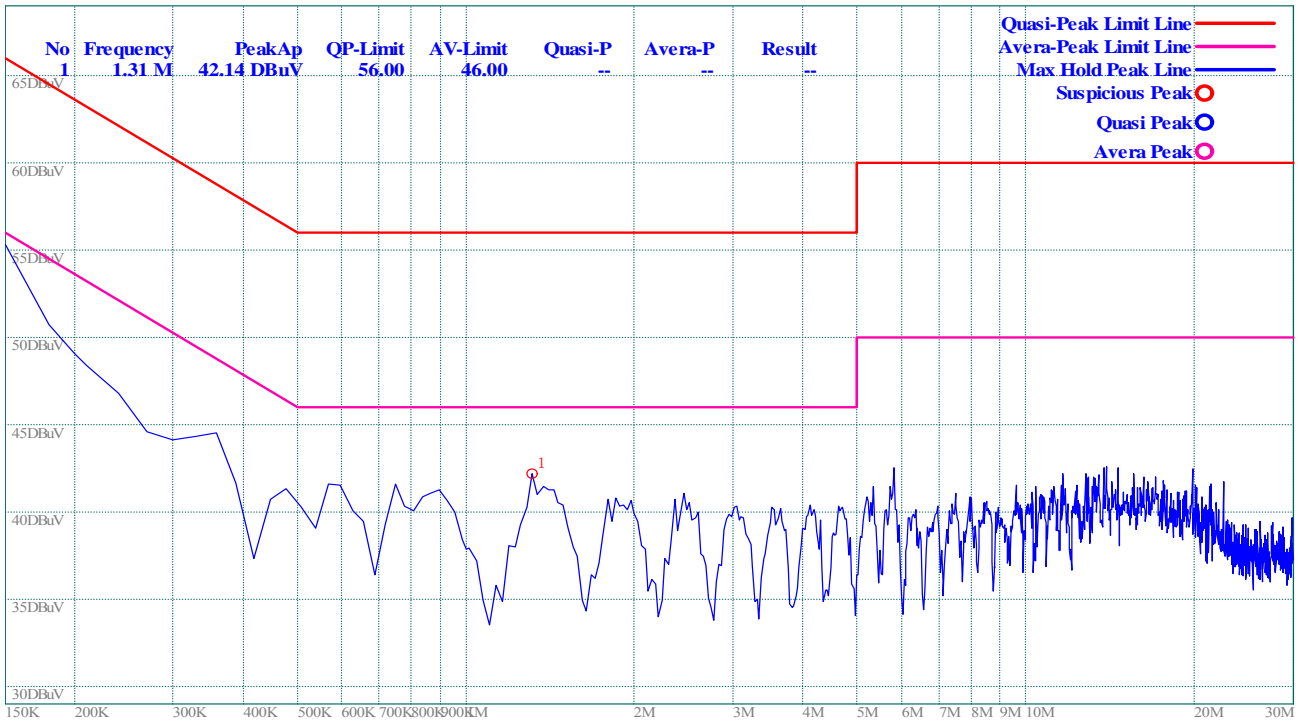
### 2.6.3. Test Result

The maximum conducted interference is searched using Peak (PK), if 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.

#### Test Plots under WI-FI Test mode:



(Plot A: L Phase)



(Plot B: N Phase)

## 2.7. Radiated Emission

### 2.7.1. 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 ( $\mu\text{V}/\text{m}$ )	Measurement Distance (m)
0.009 - 0.490	2400/F(kHz)	300
0.490 - 1.705	24000/F(kHz)	30
1.705 - 30.0	30	30
30 - 88	100	3
88 - 216	150	3
216 - 960	200	3
Above 960	500	3

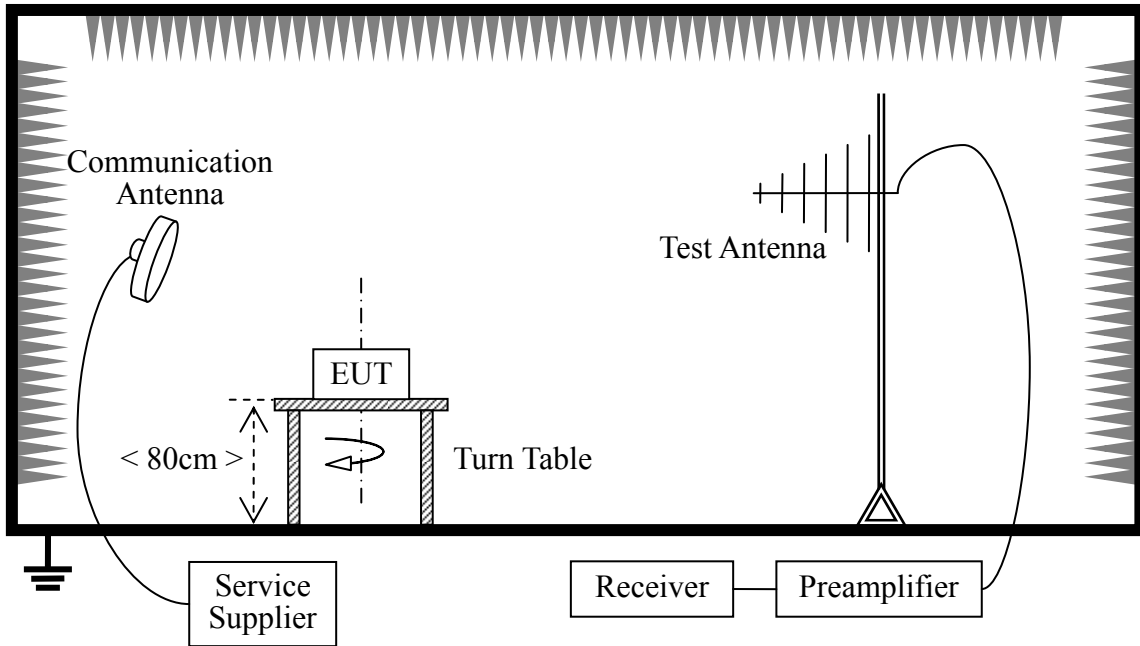
Note:

1. For Above 1000MHz, the emission limit in this paragraph is based on measurement instrumentation employing an average detector, measurement using instrumentation with a peak detector function, corresponding to 20dB above the maximum permitted average limit.
2. For above 1000MHz, limit field strength of harmonics: 54dBuV/m@3m (AV) and 74dBuV/m@3m (PK)

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)

### 2.7.2. Test Description

#### A. Test Setup:



The test site semi-anechoic chamber has met the requirement of NSA tolerance 4dB according to the standards: ANSI C63.4 (2009). 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 EUT 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 EUT is activated and controlled by the Wireless Router via a Common Antenna, and is set to operate under hopping-on test mode.

For the Test Antenna:

- (a) In the frequency range of 9kHz to 30MHz, magnetic field is measured with Loop Test Antenna. The Test Antenna is positioned with its plane vertical at 1m distance from the EUT. The center of the Loop Test Antenna is 1m above the ground. During the measurement the Loop Test Antenna rotates about its vertical axis for maximum response at each azimuth about the EUT.
- (b) 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 emission levels at both horizontal and vertical polarizations should be tested.

### B. Equipments List:

Description	Manufacturer	Model	Serial No.	Cal. Date	Cal. Due
System Simulator	R&S	CMU200	100448	2011.05	1year
Receiver	Agilent	E7405A	US44210471	2011.05	1year
Semi-Anechoic Chamber	Albatross	9m*6m*6m	(n.a.)	2011.05	2year
Test Antenna - Bi-Log	Schwarzbeck	VULB 9163	9163-274	2011.05	1year
Test Antenna - Horn	Schwarzbeck	BBHA 9120C	9120C-384	2011.05	1year



### 2.7.3. Test Result

According to ANSI C63.4 selection 4.2.2, because of peak detection will yield amplitudes equal to or greater than amplitudes measured with the quasi-peak (or average) detector, the measurement data from a spectrum analyzer peak detector will represent the worst-case results, if the peak measured value complies with the quasi-peak limit, it is unnecessary to perform an quasi-peak measurement.

The measurement results are obtained as below:

$$E \text{ [dB}\mu\text{V/m]} = U_R + A_T + A_{\text{Factor}} \text{ [dB]}; A_T = L_{\text{Cable loss}} \text{ [dB]} - G_{\text{preamp}} \text{ [dB]}$$

$A_T$ : Total correction Factor except Antenna

$U_R$ : Receiver Reading

$G_{\text{preamp}}$ : Preamplifier Gain

$A_{\text{Factor}}$ : Antenna Factor at 3m

During the test, the total correction Factor  $A_T$  and  $A_{\text{Factor}}$  were built in test software.

#### 2.7.3.1. 802.11b Test mode

The maximum radiated emission is searched using PK, if the emission levels more than the limits, and that have narrow margins from the limits will be re-measured with AV or QP detectors.

#### A. Test Verdict for Harmonics:

##### The Fundamental Emissions

The field strength of {Fundamental Emission} listed below is recorded, and used in the next table.

Channe l	Frequency (MHz)	Fundamental Emission (dB $\mu$ V/m)		Antenna Polarization	Refer to Plot
		PK	AV		
1	2412	43.48	41.24	Horizontal	Plot A.2
		46.00	40.12	Vertical	Plot A.3
6	2437	45.89	41.22	Horizontal	Plot B.2
		43.02	40.11	Vertical	Plot B.3
11	2462	45.63	42.26	Horizontal	Plot C.2
		43.85	41.21	Vertical	Plot C.3

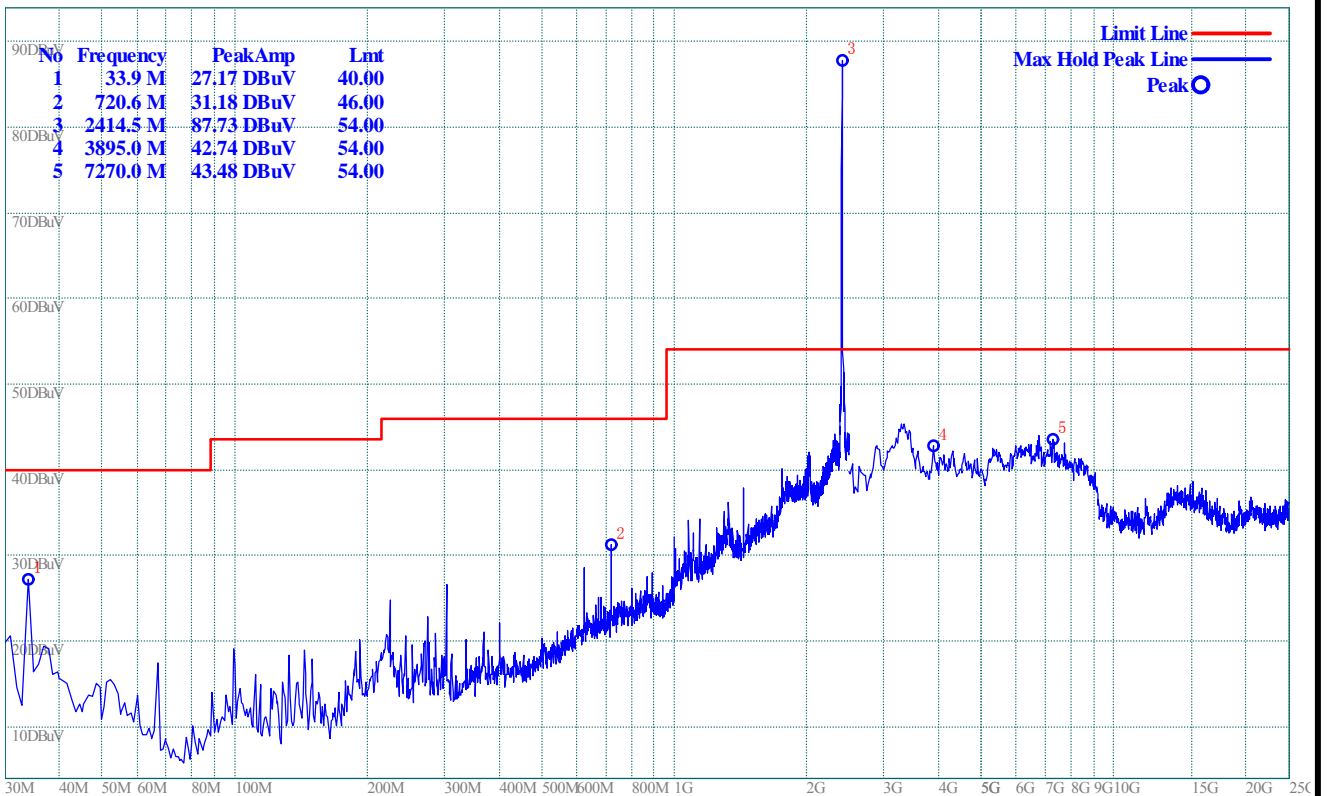
Also refer to following plots for the emissions falling in the restricted bands.

#### B. Test Plots for the Whole Measurement Frequency Range:

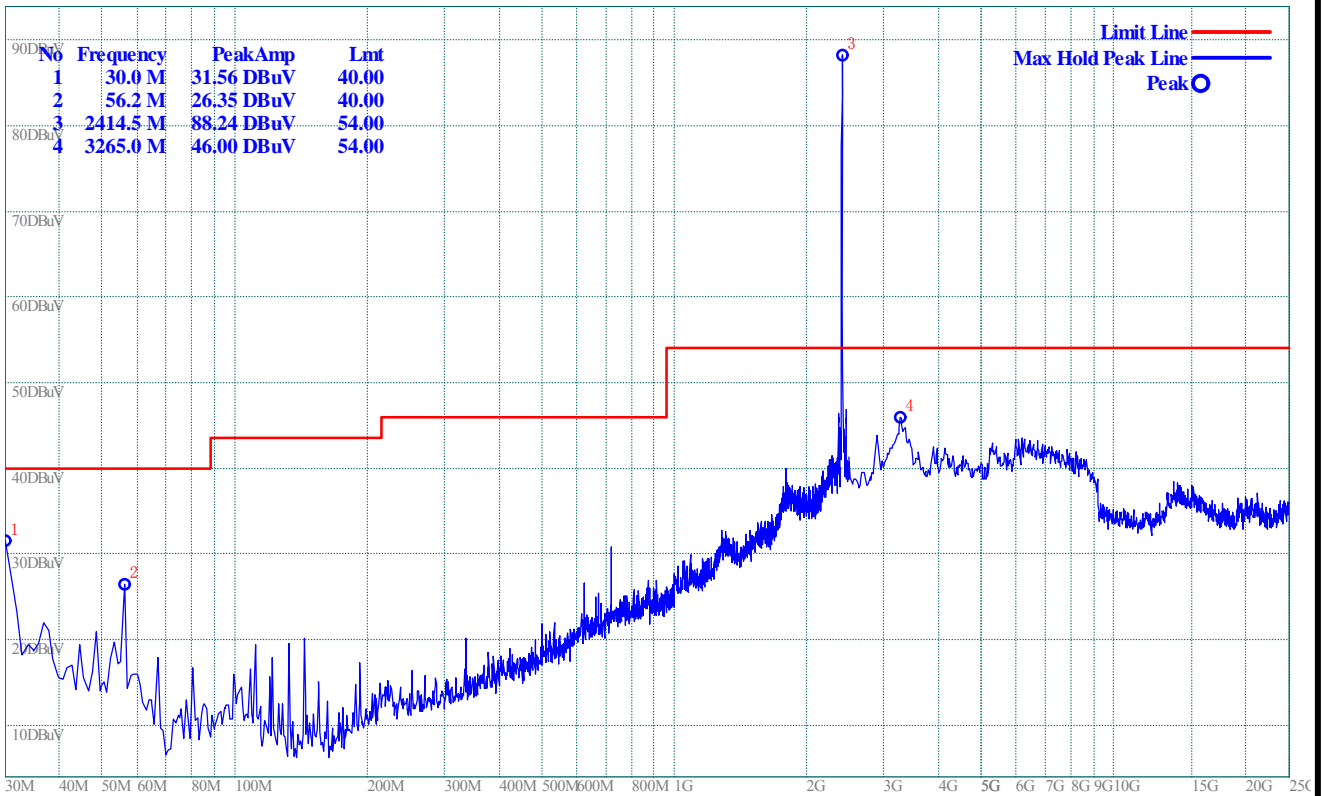
Plots for Channel = 1



(Plot A.1: 9kHz to 30MHz)

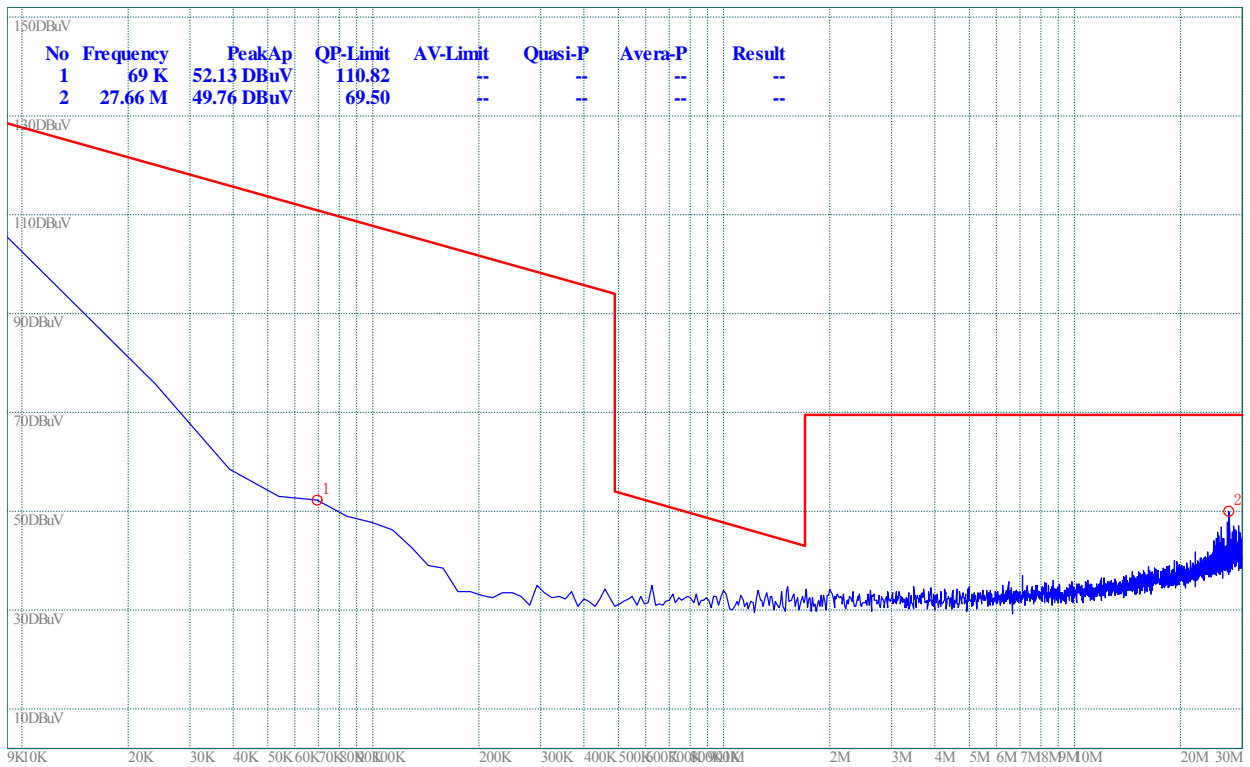


(Plot A.2: Antenna Horizontal, 30MHz to 25GHz)

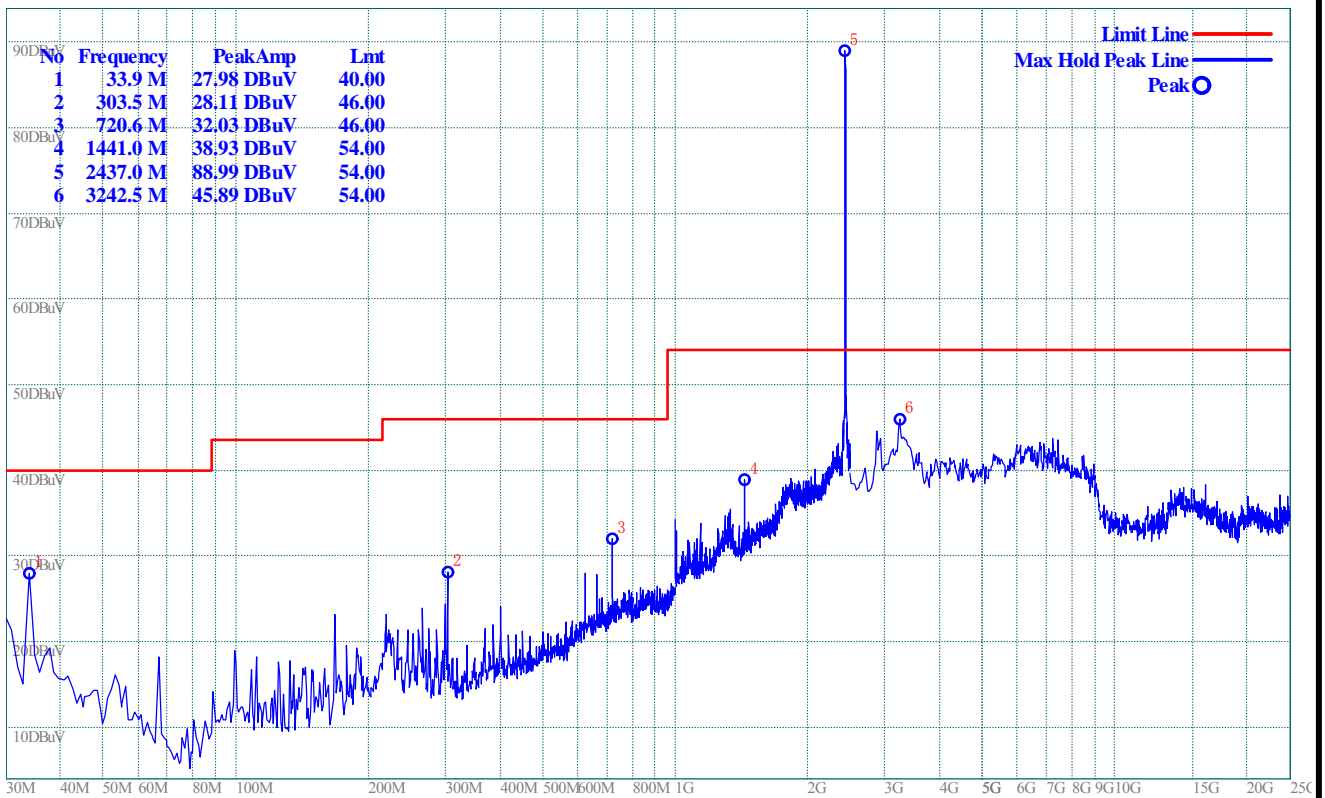


(Plot A.3: Antenna Vertical, 30MHz to 25GHz)

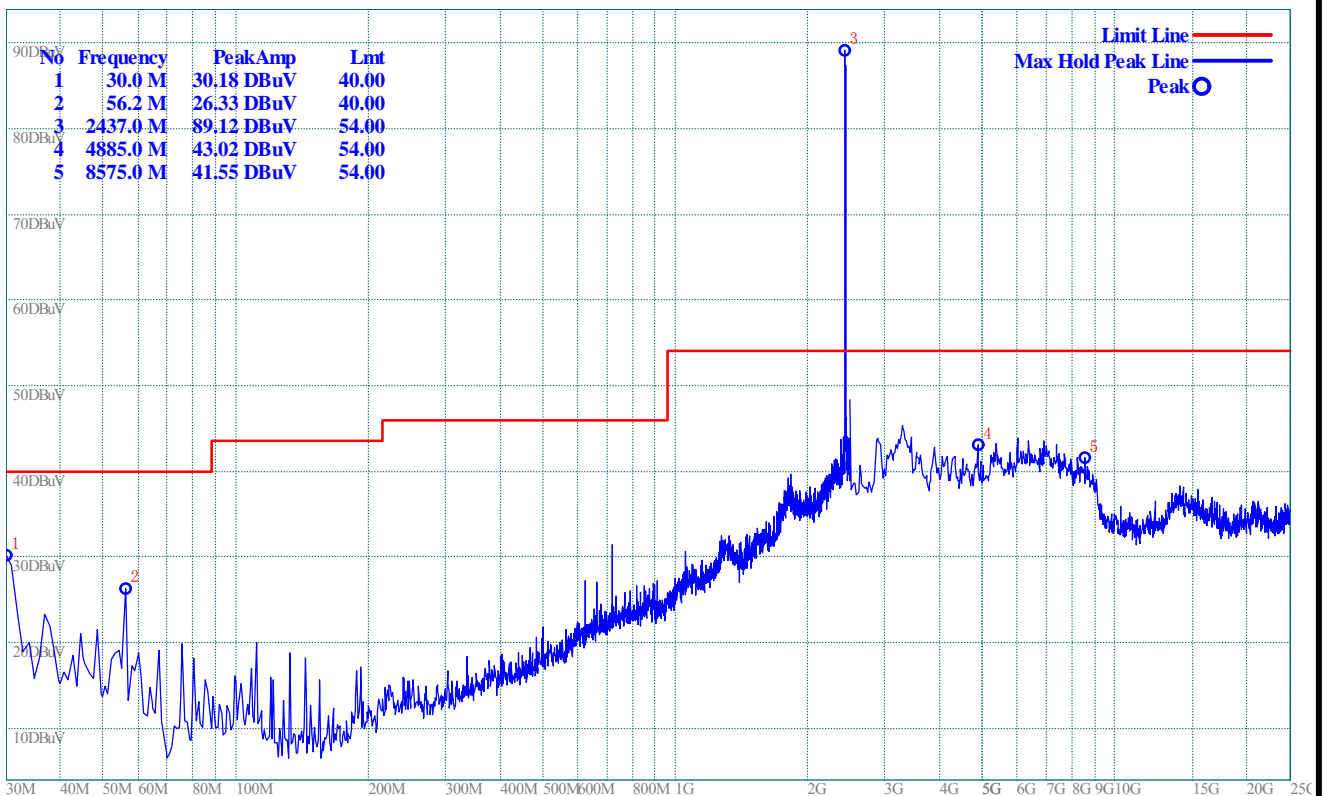
## Plot for Channel = 6



(Plot B.1: 9kHz to 30MHz)

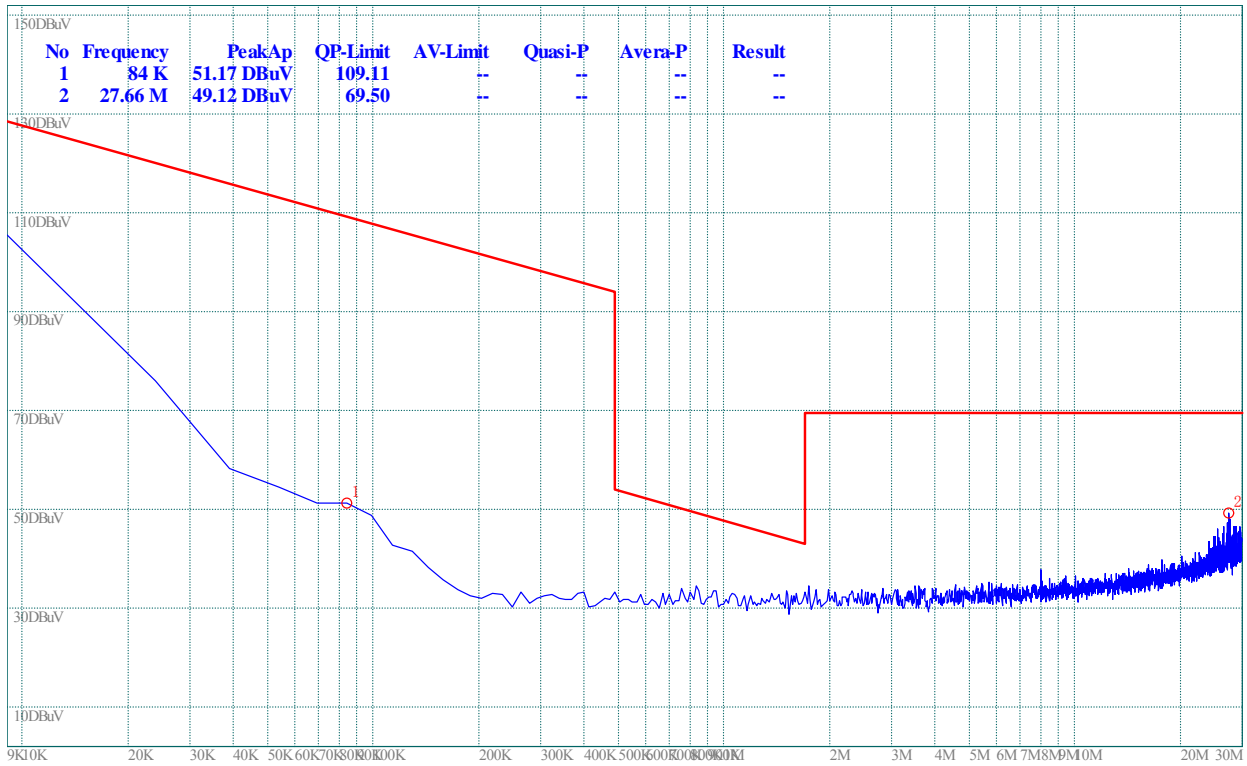


(Plot B.2: Antenna Horizontal, 30MHz to 25GHz)

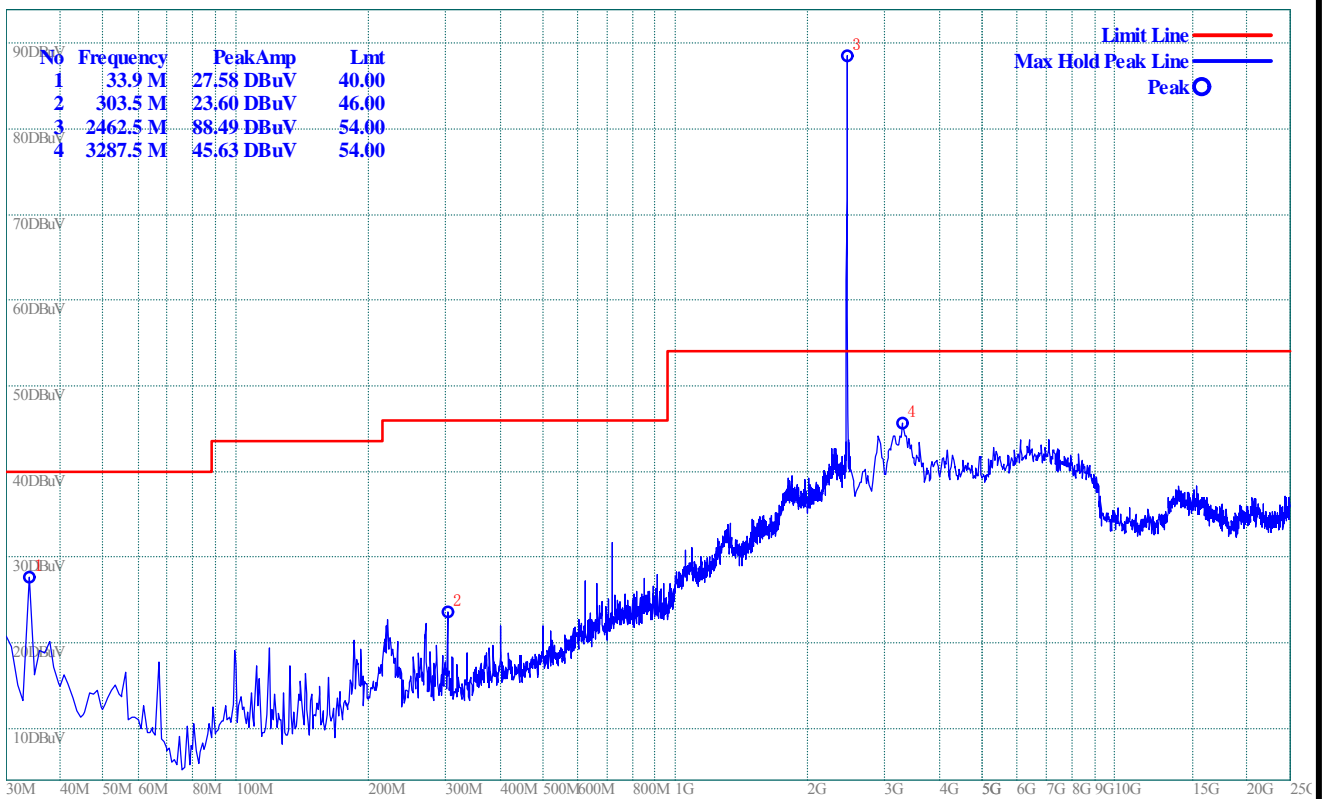


(Plot B.3: Antenna Vertical, 30MHz to 25GHz)

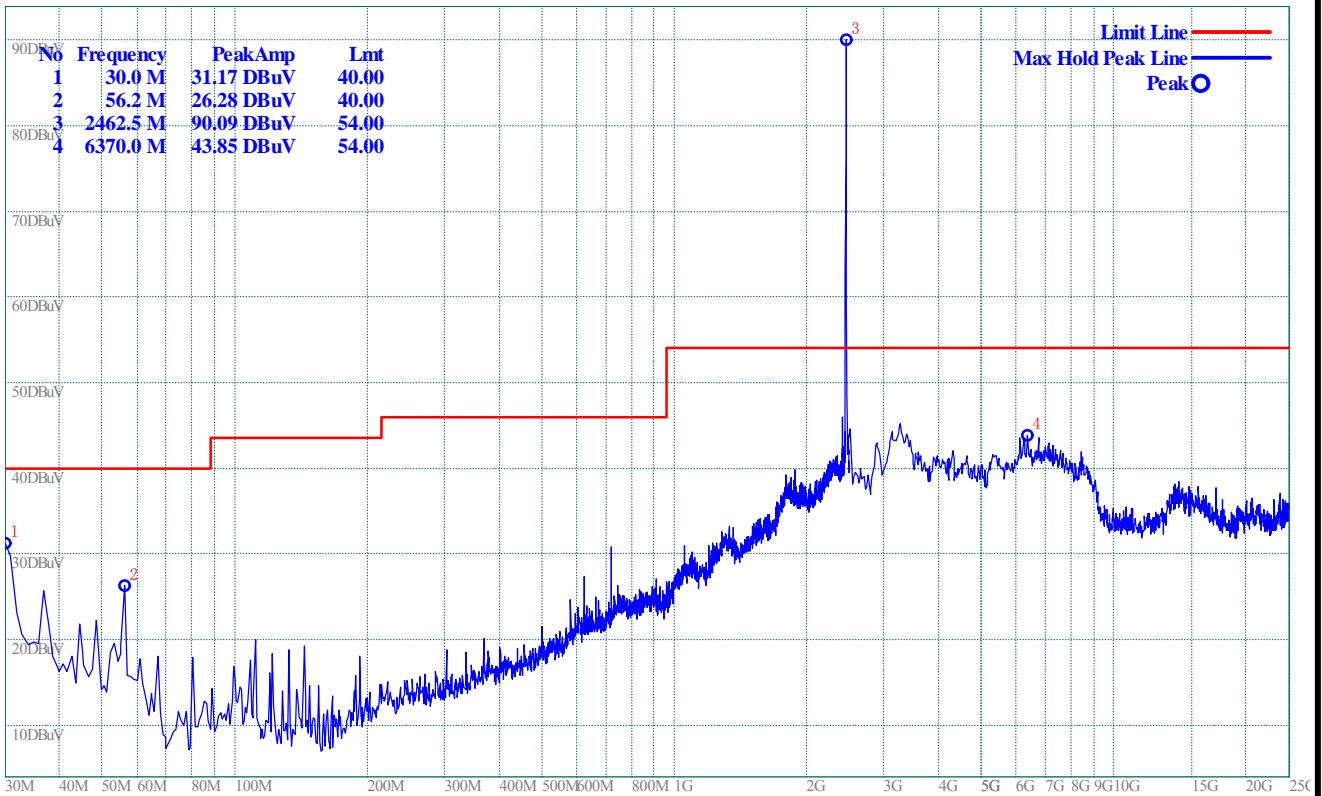
## Plot for Channel = 11



(Plot C.1: 9kHz to 30MHz)



(Plot C.2: Antenna Horizontal, 30MHz to 25GHz)



(Plot C.3: Antenna Vertical, 30MHz to 1GHz)

### 2.7.3.2. 802.11g Test mode

The maximum radiated emission is searched using PK, if the emission levels more than the limits, and that have narrow margins from the limits will be re-measured with AV or QP detectors.

#### A. Test Verdict for Harmonics:

##### The Fundamental Emissions

The field strength of {Fundamental Emission} listed below is recorded, and used in the next table.

Channe	Frequency (MHz)	Fundamental Emission (dB $\mu$ V/m)		Antenna Polarization	Refer to Plot
		PK	AV		
1	2412	44.91	41.89	Horizontal	Plot A.2
		43.57	41.24	Vertical	Plot A.3
6	2437	43.98	42.35	Horizontal	Plot B.2
		43.47	42.03	Vertical	Plot B.3
11	2462	44.06	41.11	Horizontal	Plot C.2
		44.05	41.02	Vertical	Plot C.3

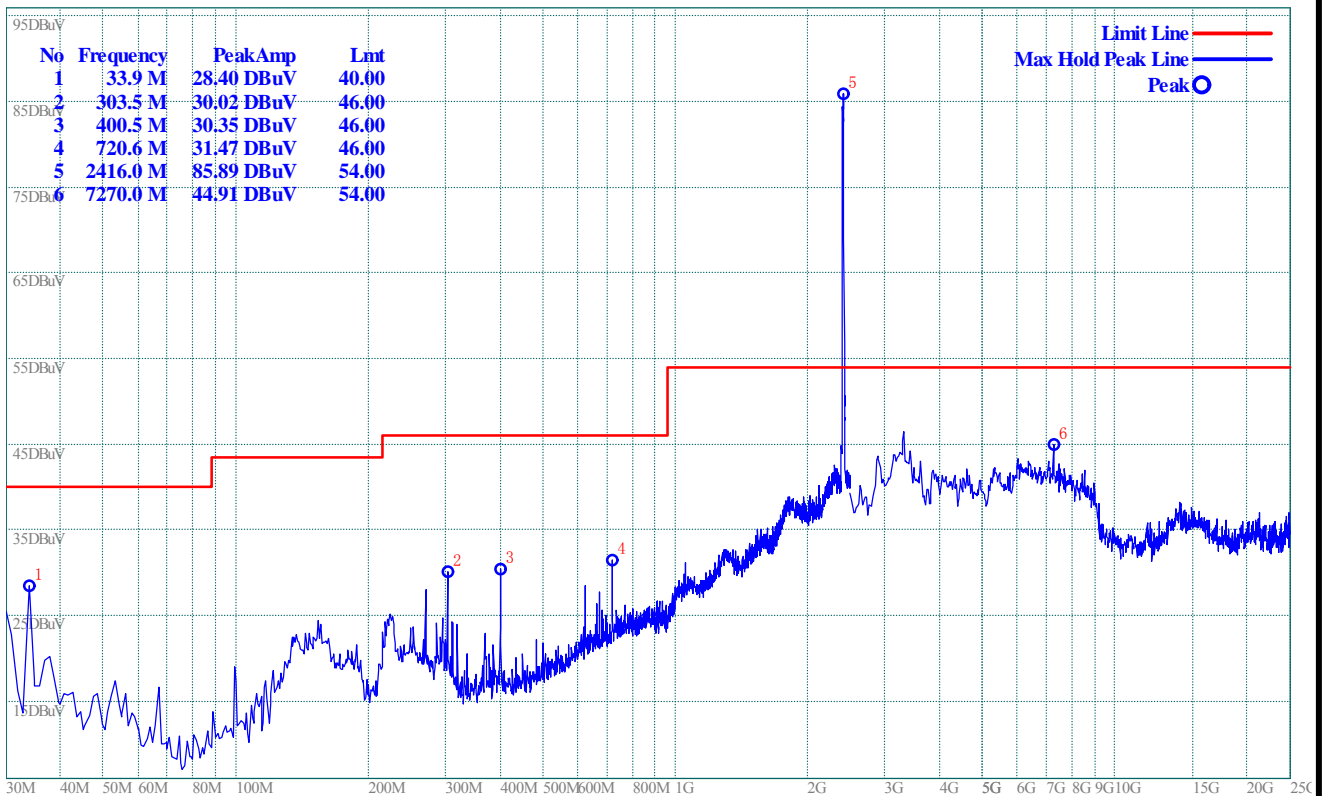
Also refer to following plots for the emissions falling in the restricted bands.

#### B. Test Plots for the Whole Measurement Frequency Range:

##### Plots for Channel = 1

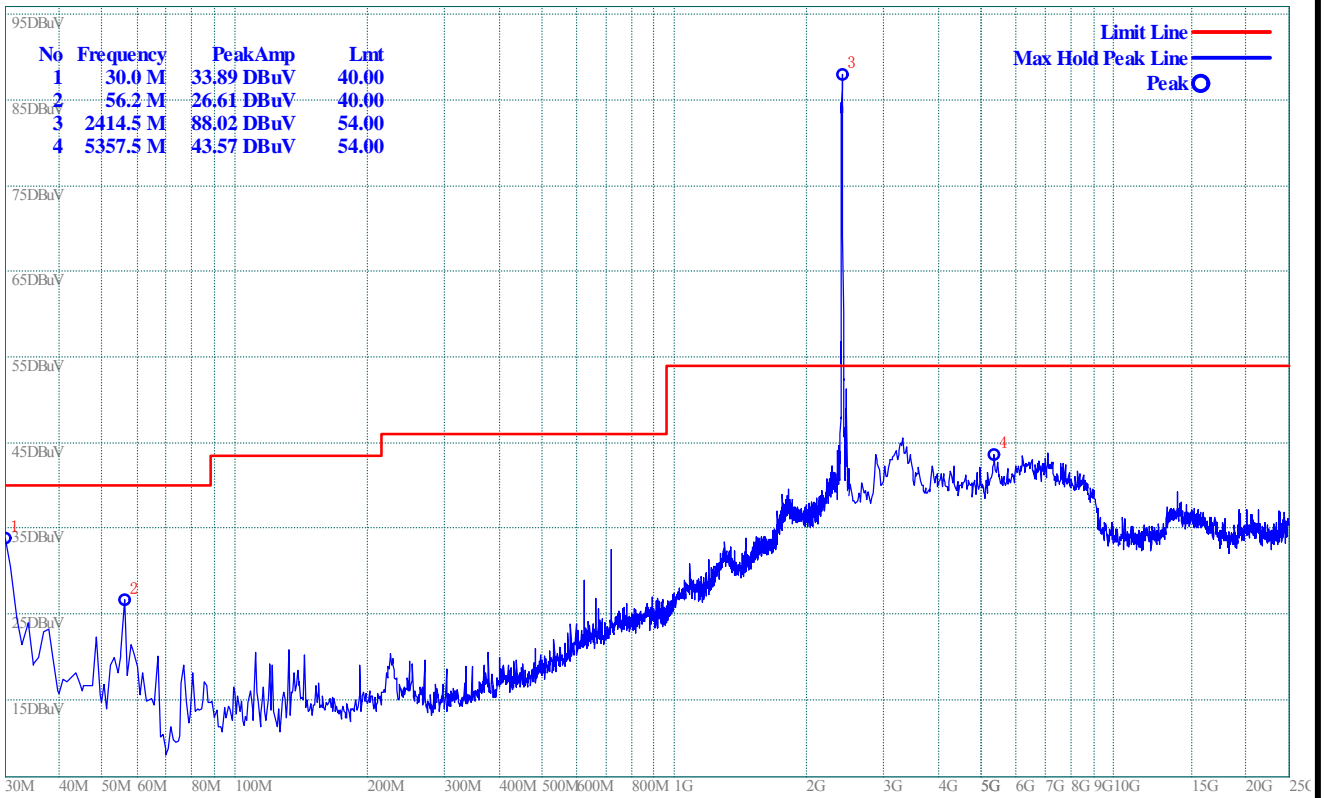


(Plot A.1: 9kHz to 30MHz)



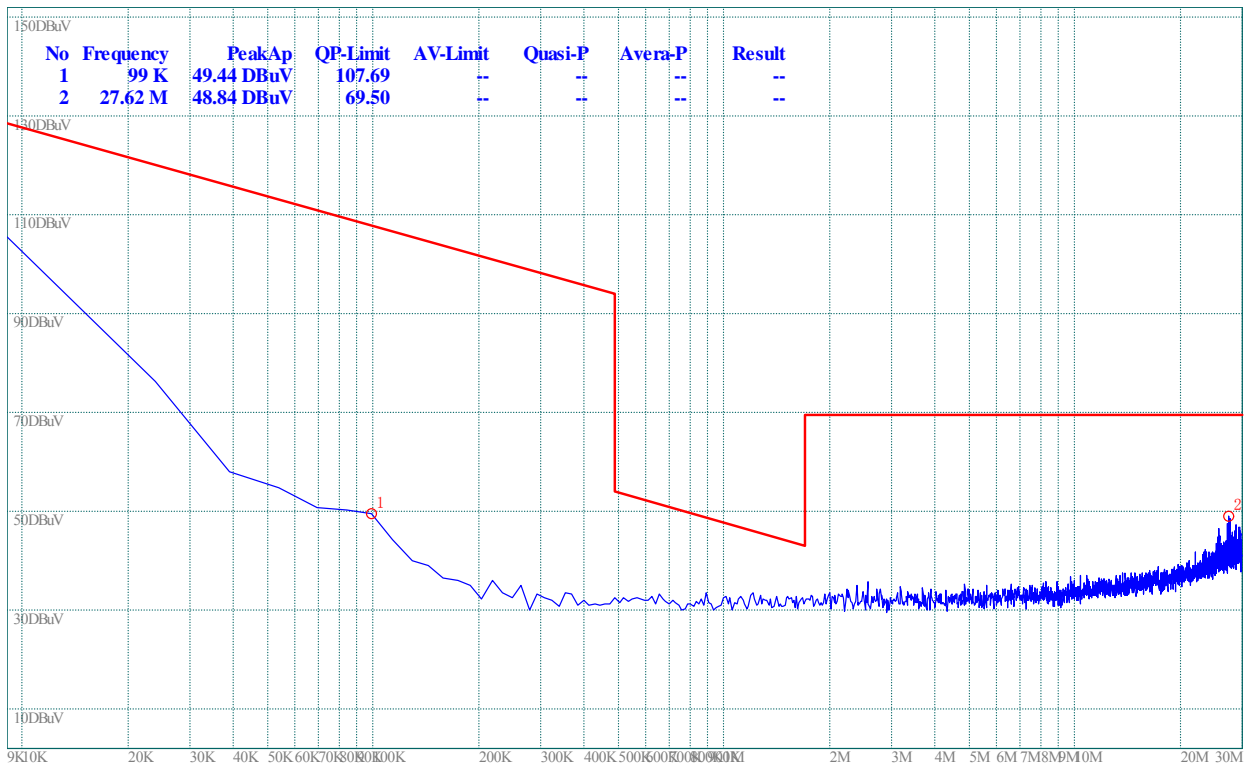
(Plot A.2: Antenna Horizontal, 30MHz to 25GHz)





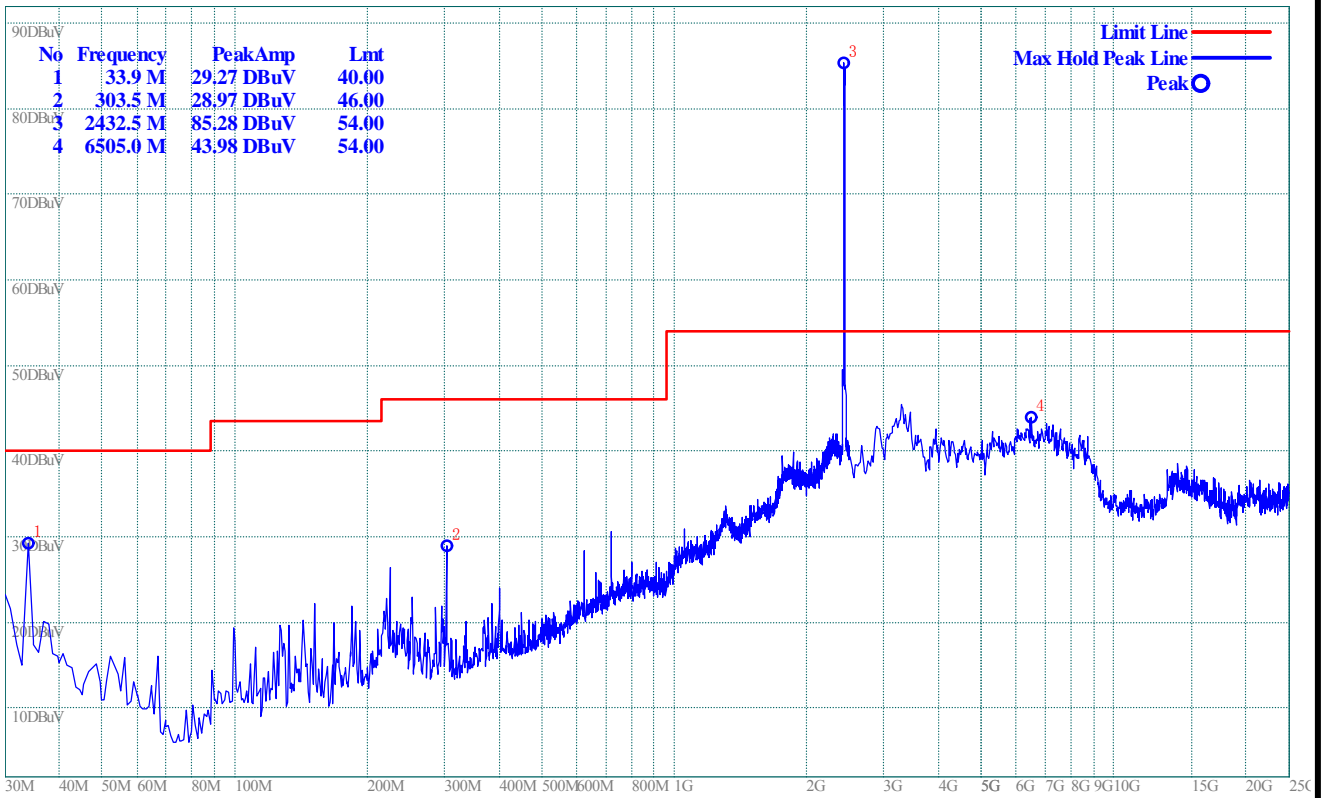
(Plot A.3: Antenna Vertical, 30MHz to 25GHz)

Plot for Channel = 6

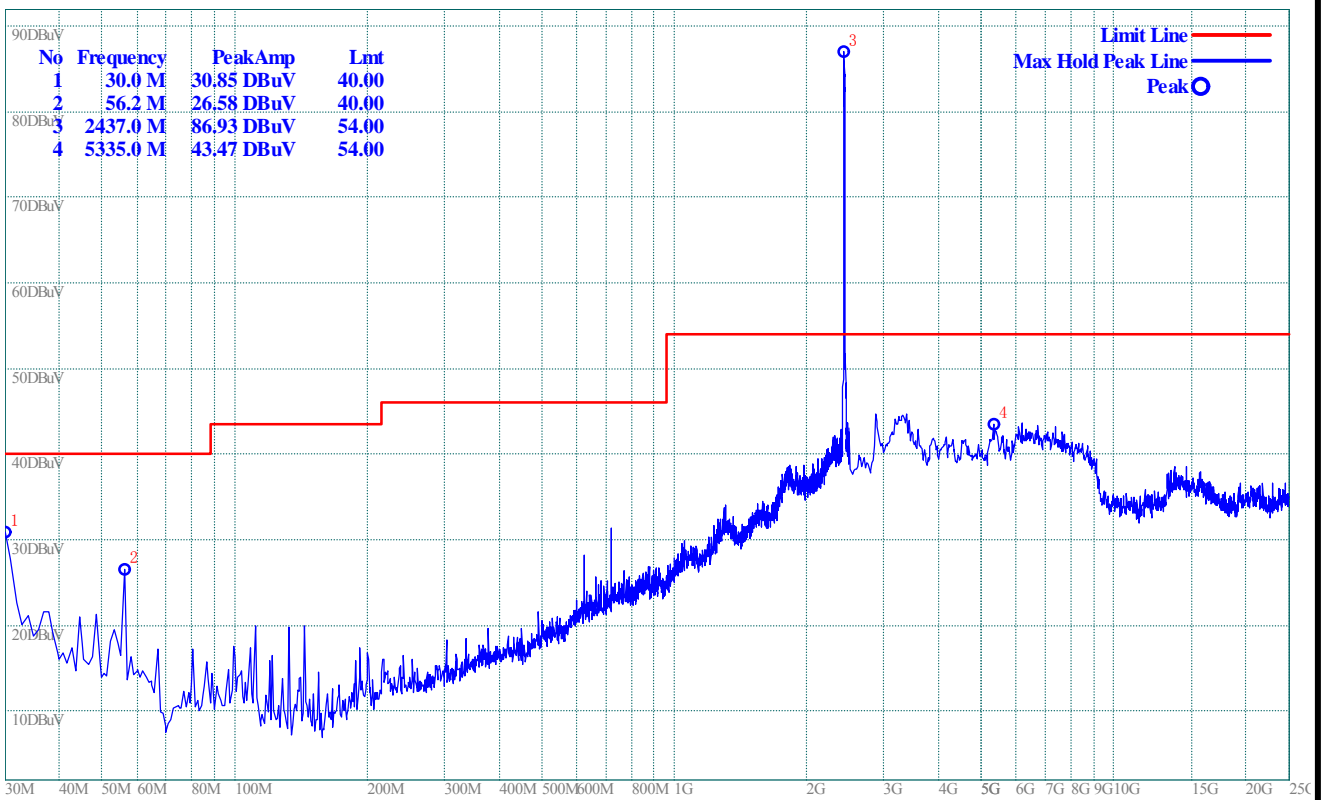


(Plot B.1: 9kHz to 30MHz)



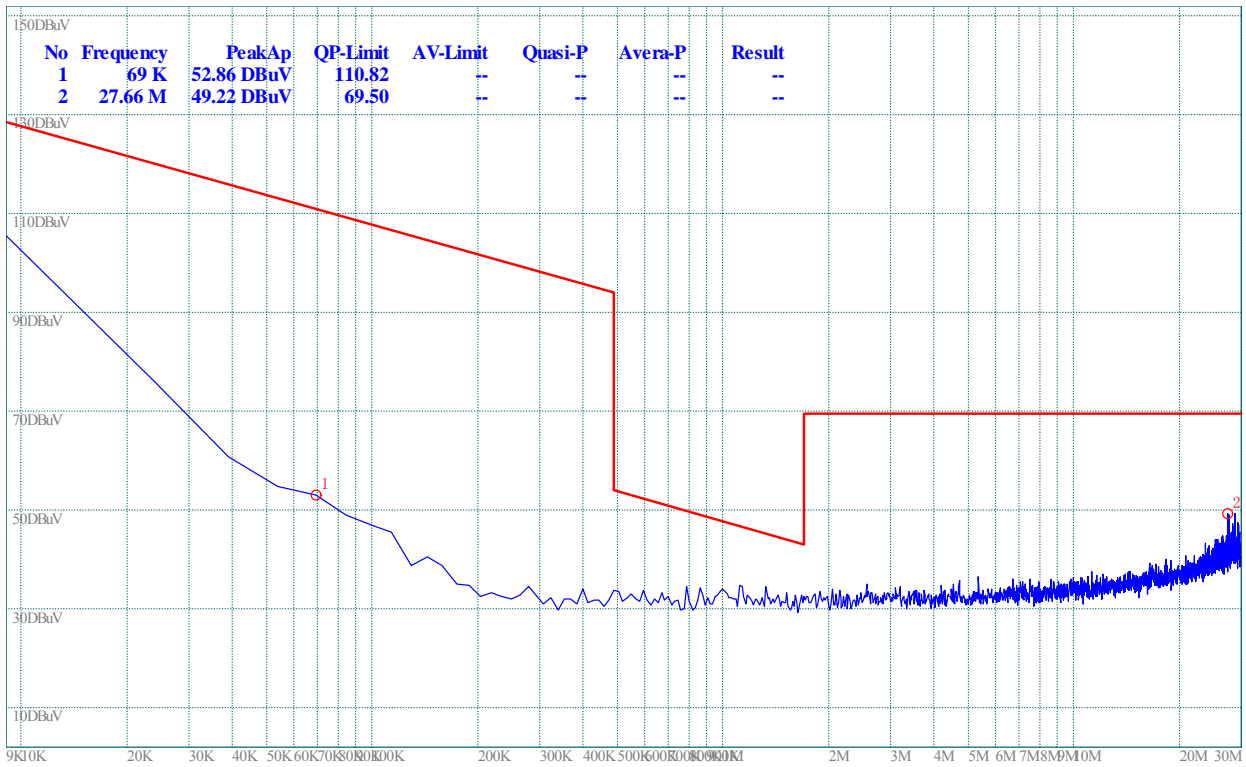


(Plot B.2: Antenna Horizontal, 30MHz to 25GHz)

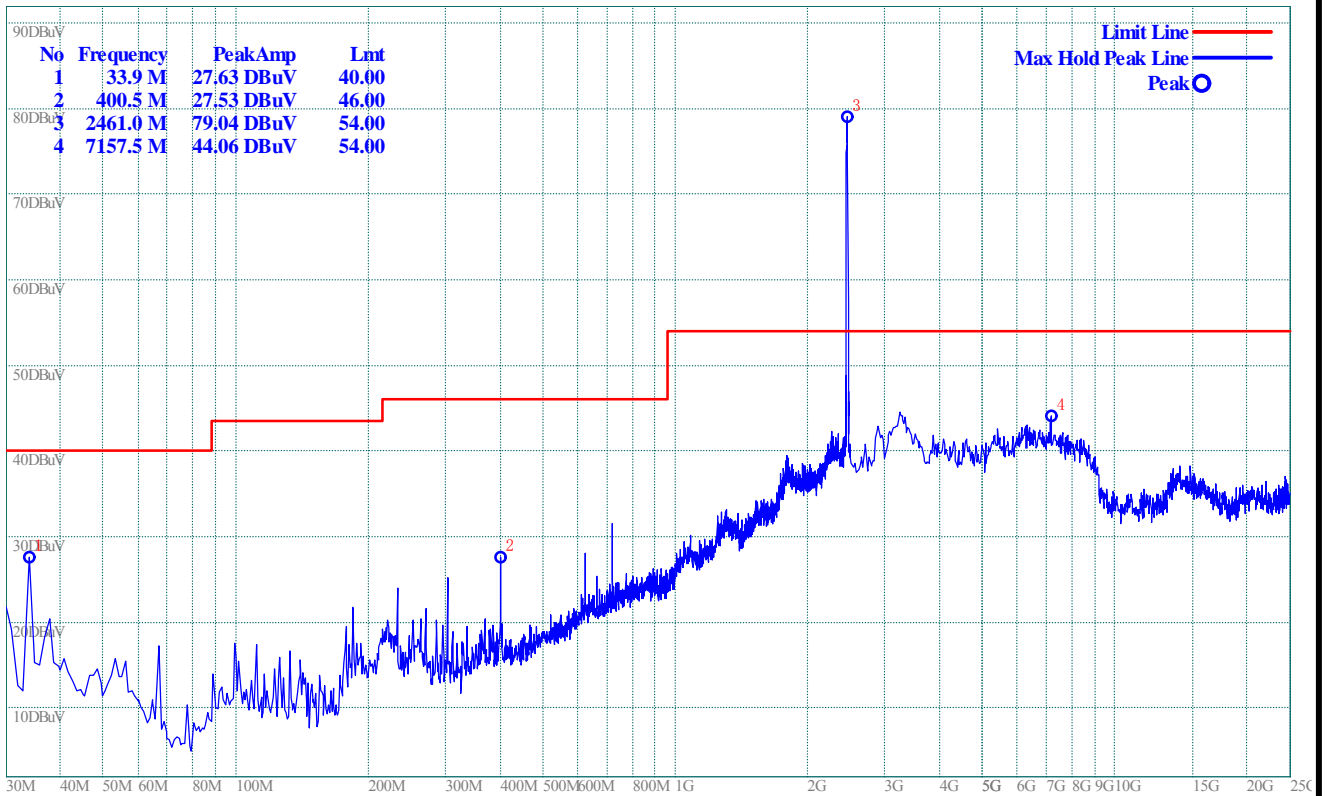


(Plot B.3: Antenna Vertical, 30MHz to 25GHz)

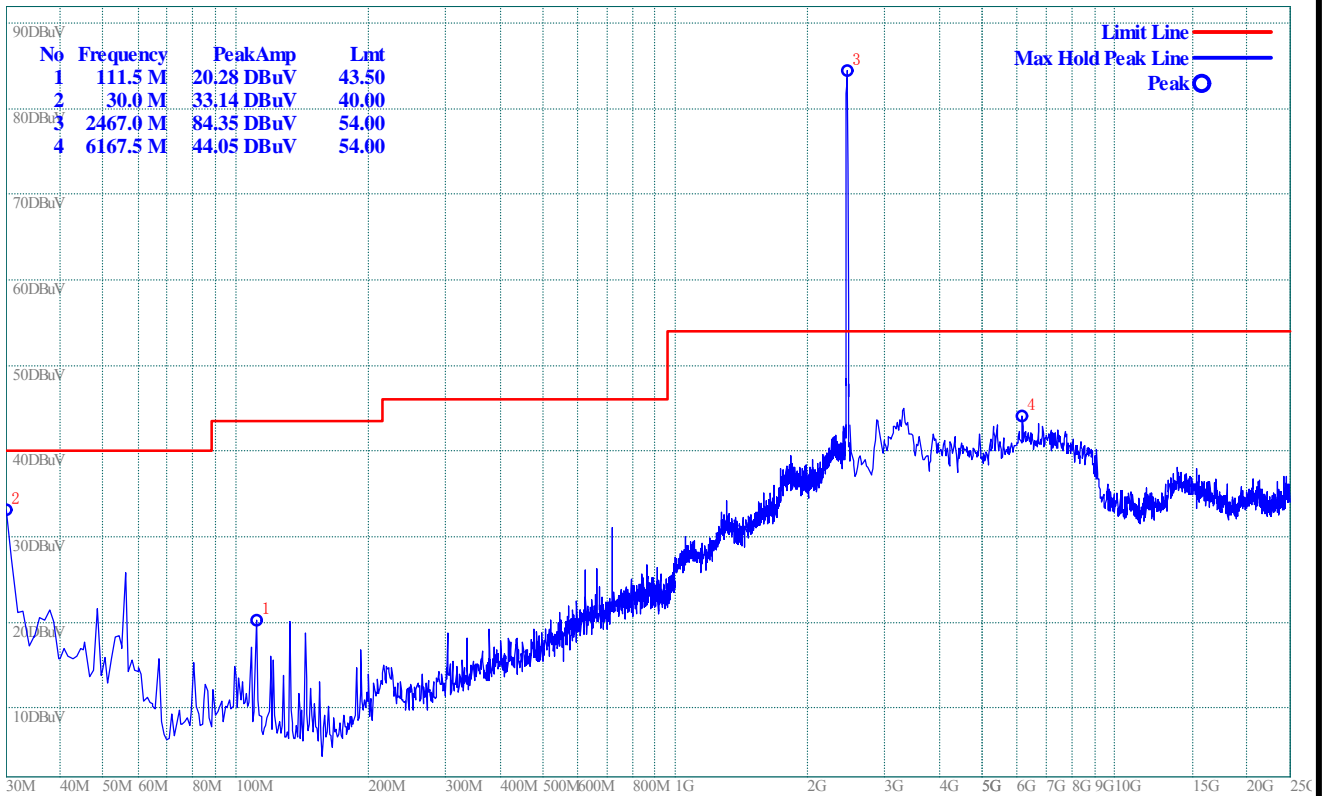
## Plot for Channel = 11



(Plot C.1: 9kHz to 30MHz)



(Plot C.2: Antenna Horizontal, 30MHz to 25GHz)



(Plot C.3: Antenna Vertical, 30MHz to 25GHz)

### 2.7.3.3. 802.11n-20MHz Test mode

The maximum radiated emission is searched using PK, if the emission levels more than the limits, and that have narrow margins from the limits will be re-measured with AV or QP detectors.

#### A. Test Verdict for Harmonics:

##### The Fundamental Emissions

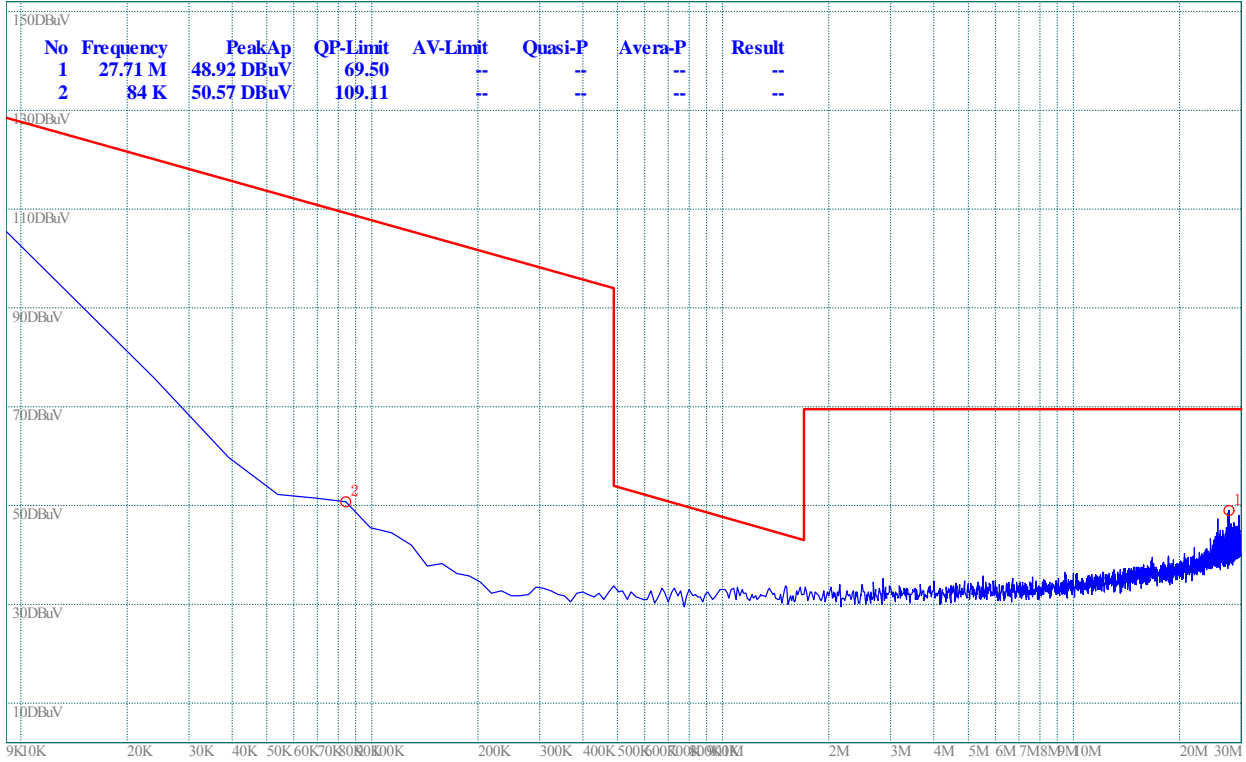
The field strength of {Fundamental Emission} listed below is recorded, and used in the next table.

Channe l	Frequency (MHz)	Fundamental Emission (dB $\mu$ V/m)		Antenna Polarization	Refer to Plot
		PK	AV		
1	2412	43.36	42.21	Horizontal	Plot A.2
		45.13	43.12	Vertical	Plot A.3
6	2437	43.98	41.32	Horizontal	Plot B.2
		44.30	42.21	Vertical	Plot B.3
11	2462	43.10	41.52	Horizontal	Plot C.2
		44.05	41.13	Vertical	Plot C.3

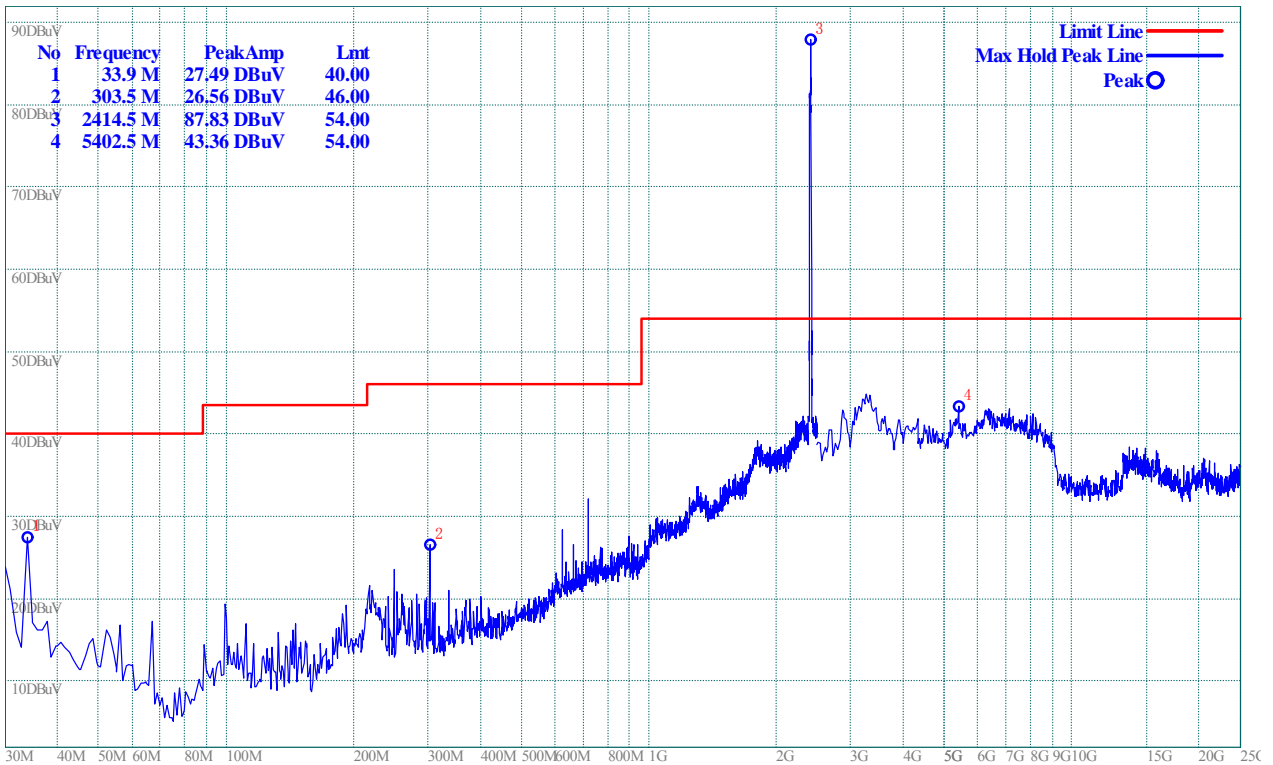
Also refer to following plots for the emissions falling in the restricted bands.

#### B. Test Plots for the Whole Measurement Frequency Range:

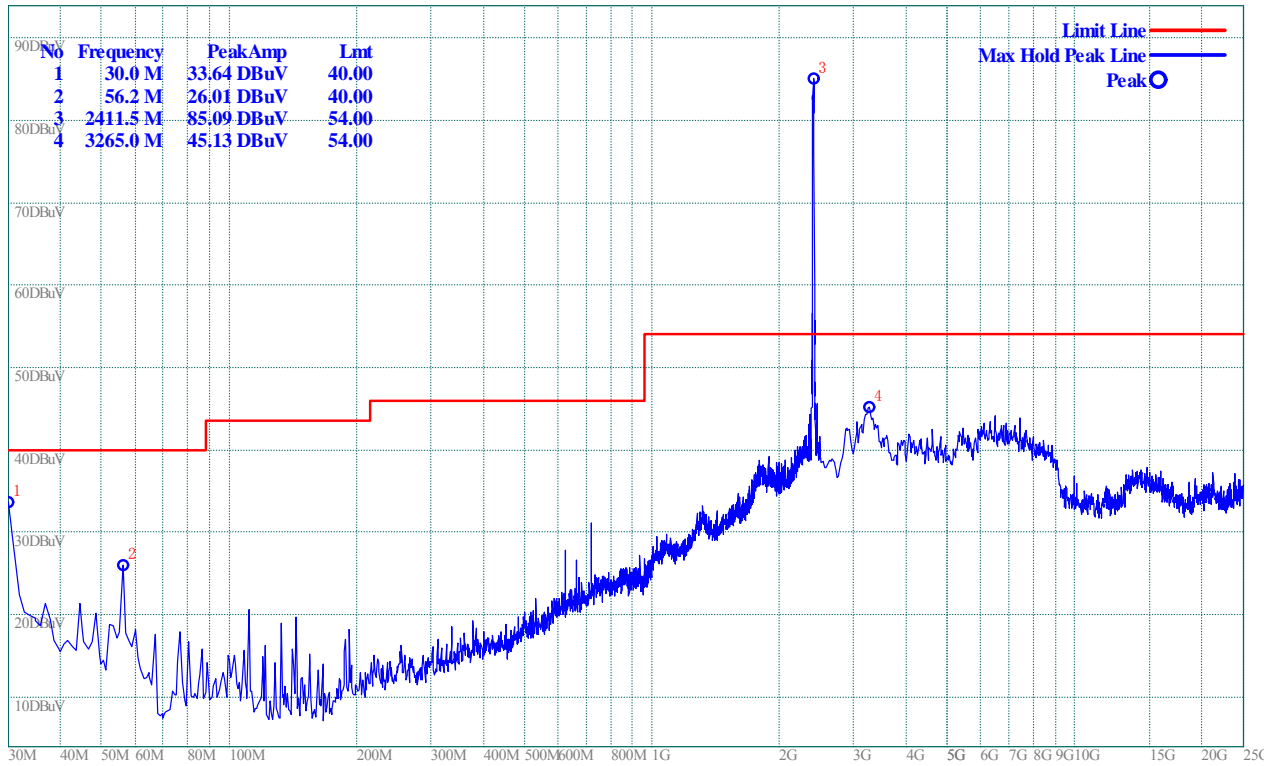
##### Plots for Channel = 1



(Plot A.1: 9kHz to 30MHz)



(Plot A.2: Antenna Horizontal, 30MHz to 25GHz)

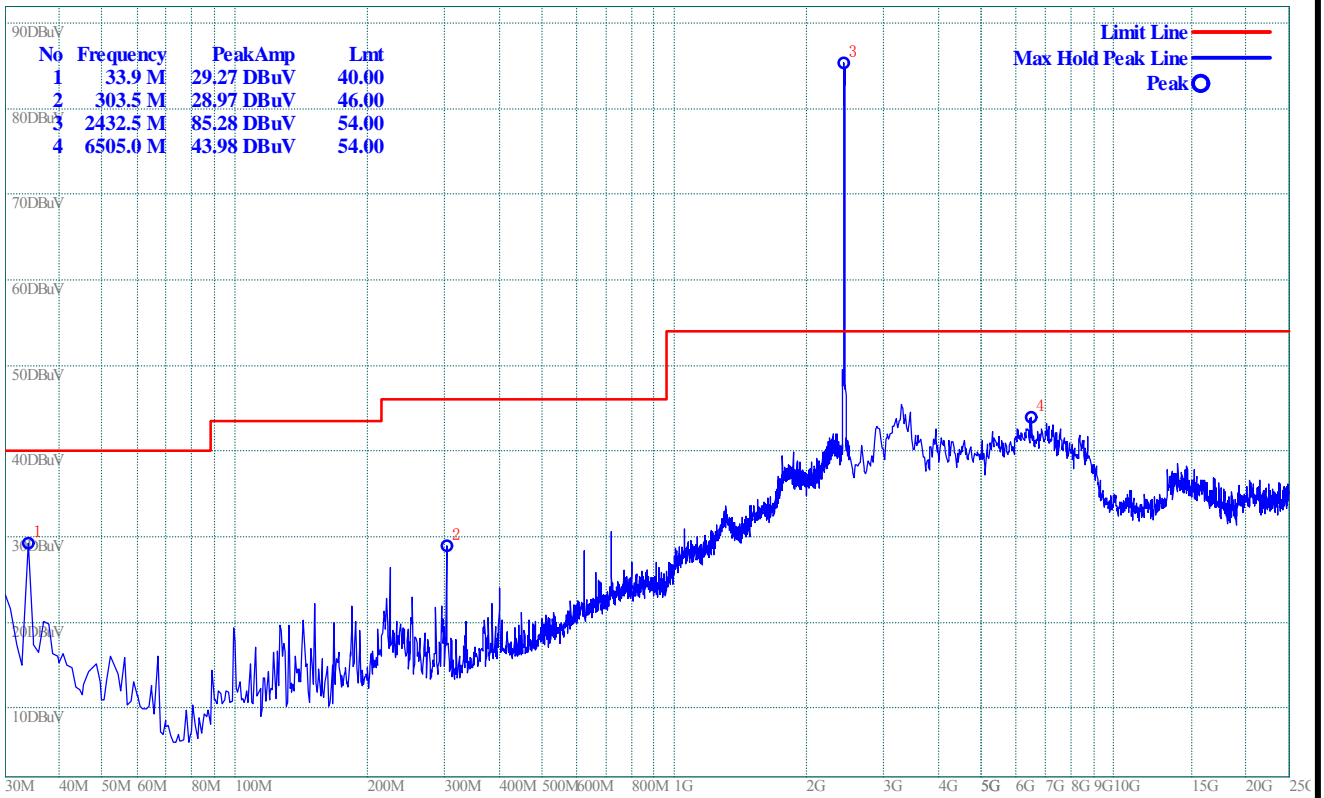


(Plot A.3: Antenna Vertical, 30MHz to 25GHz)

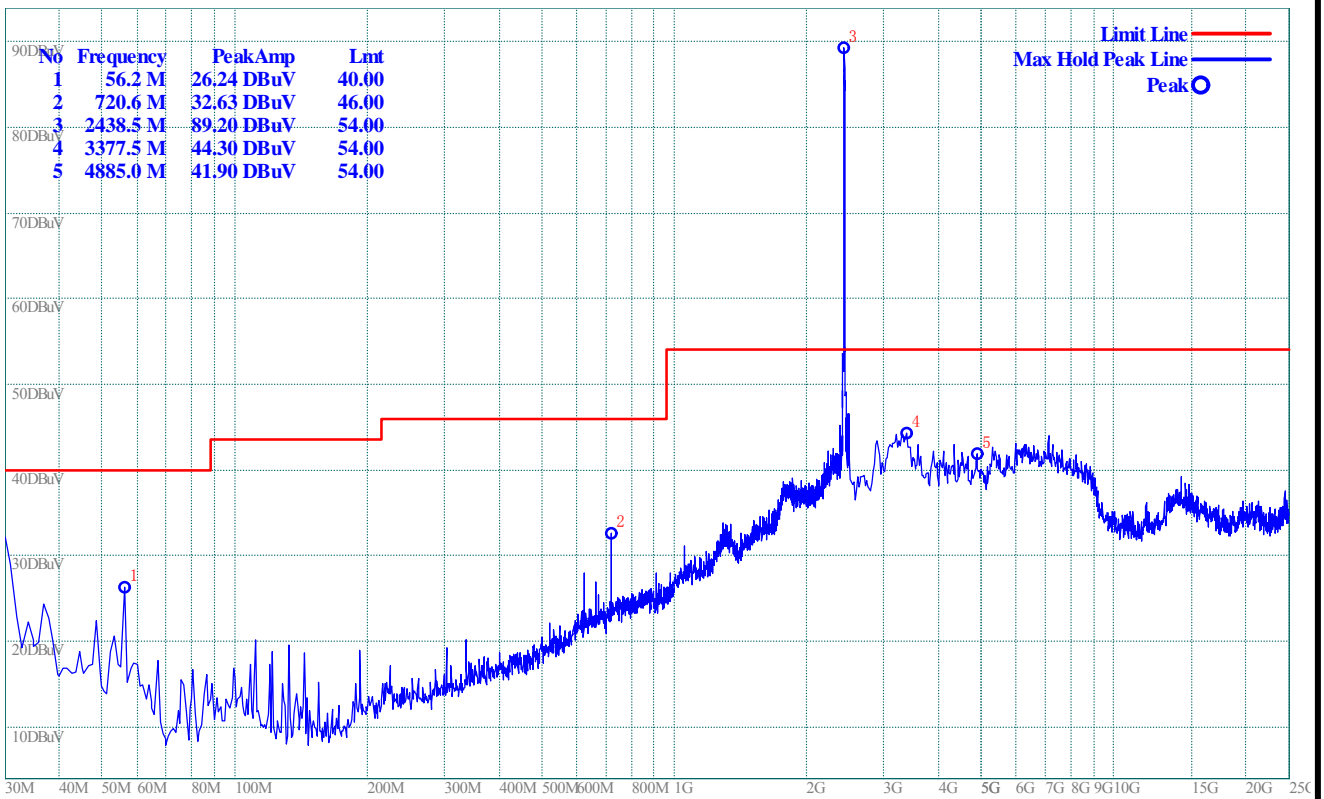
### Plot for Channel = 6



(Plot B.1: 9kHz to 30MHz)



(Plot B.2: Antenna Horizontal, 30MHz to 25GHz)

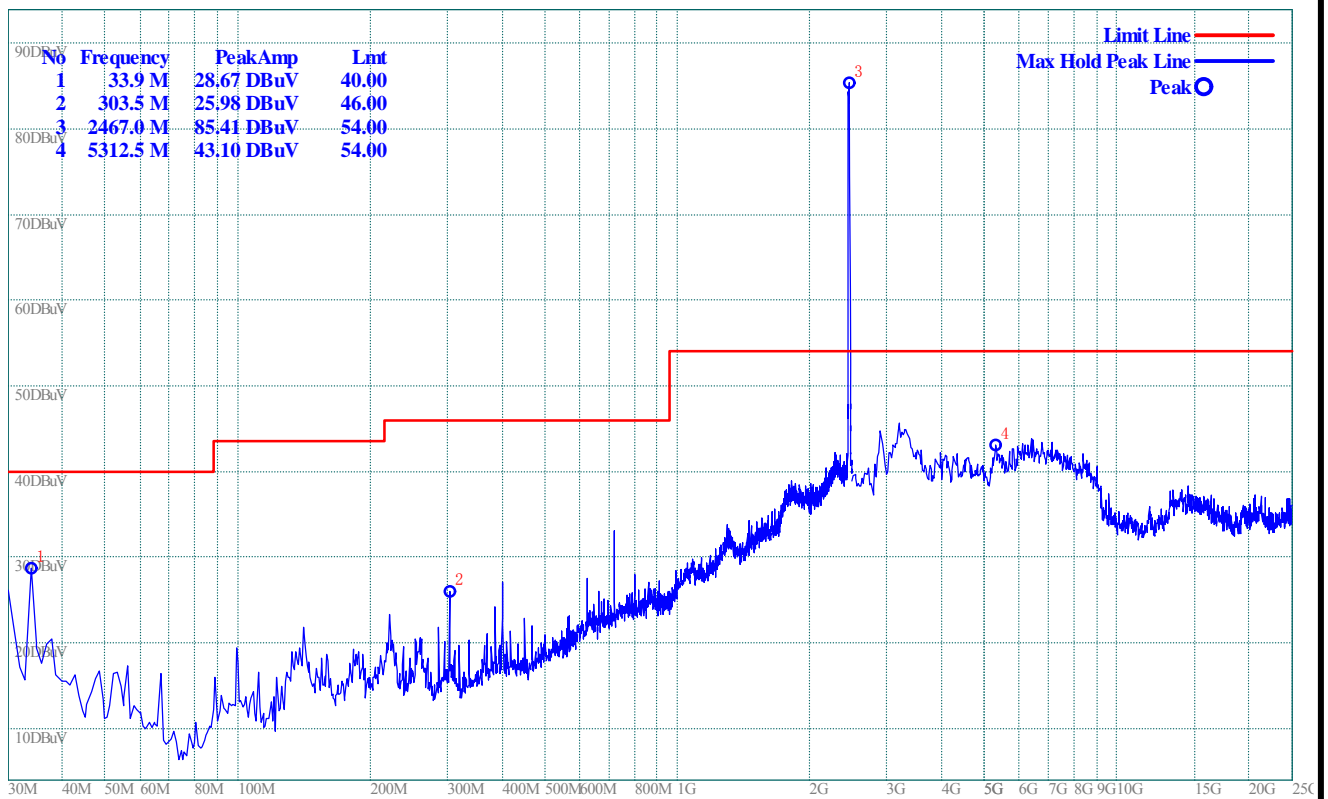


(Plot B.3: Antenna Vertical, 30MHz to 25GHz)

## Plot for Channel = 11

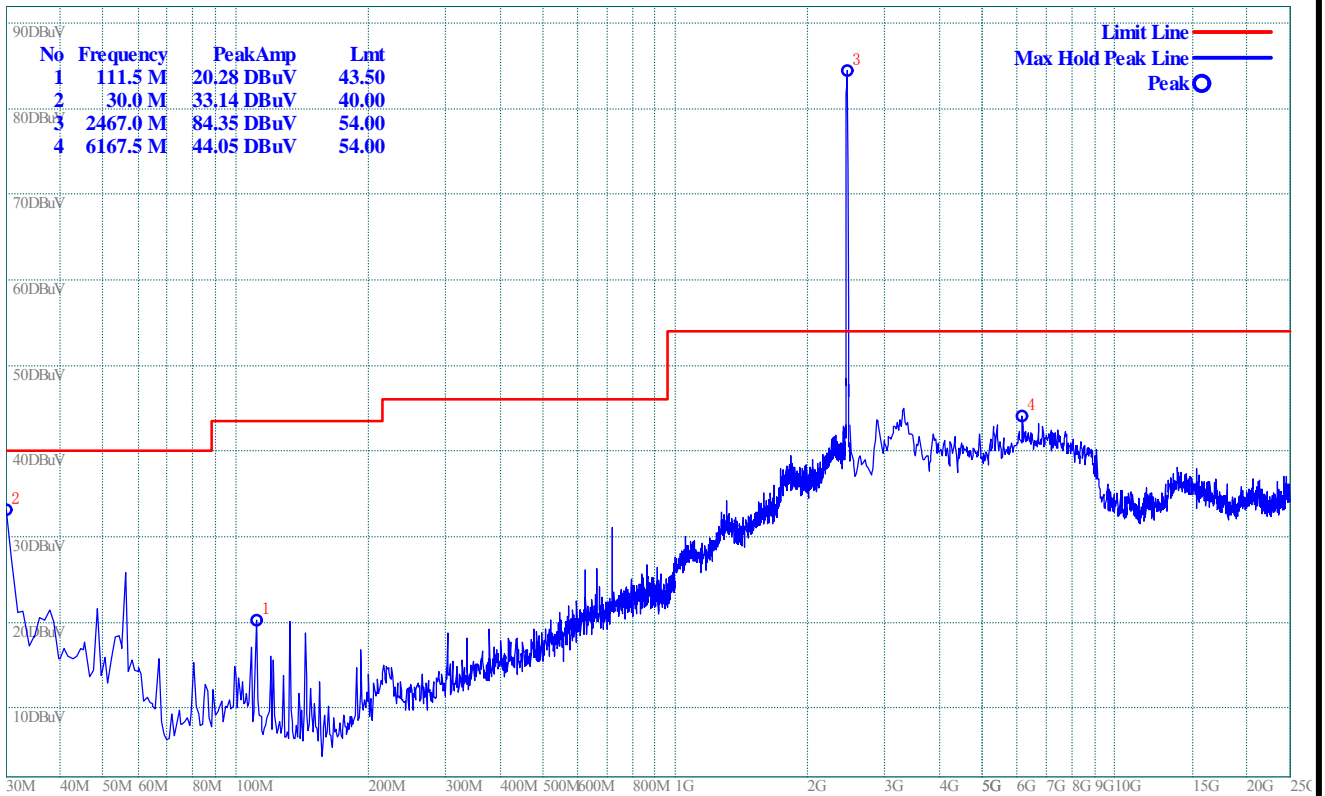


(Plot C.1: 9kHz to 30MHz)



(Plot C.2: Antenna Horizontal, 30MHz to 25GHz)





(Plot C.3: Antenna Vertical, 30MHz to 25GHz)

\*\* END OF REPORT \*\*