Report No.: SZ13030218W02

FCC Part 15C TEST REPORT

Issued to

Corporativo Lanix S.A. de C.V.

For

Smartphone

Model Name	:	Ilium S210
Trade Name	:	Lanix
Brand Name	:	Lanix
FCC ID	:	ZC4S210
Standard	:	47 CFR Part 15 Subpart C
Test date	:	2013-3-29 to 2013-4-17
Issue date	:	2013-4-18

by

Shenzhen MORLAB Communication Technology Co., Ltd.

Tested by Nie Quan	*Approved by* Zeng Dexin	*Review by* Peng Huarui
(Test Engineer)	*(Department Manager)*	*(Project Manager)*
Date 2013.4.18	*Date* 2013.4.18	*Date* 2013.4.18

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DIRECTORY

Change History		
Issue	Date	Reason for change
1.0	April 18, 2013	First edition

1. General Information

1.1. EUT Description

EUT Type	:	Smartphone
Serial No.	:	(n.a, marked #1 by test site)
Hardware Version	:	V1.0
Software Version	:	N/A
Applicant	:	Corporativo Lanix S.A. de C.V. Carretera Internacional Hermosillo-Nogales Km 8.5,Hermosillo Sonora, Mexico
Manufacturer	:	Tinno Mobile Technology Corp. 4/F, H-3 Building, OCT Eastern industrial Park, No.1 XiangShan East Road, Nan Shan District, Shenzhen, P.R. China.
Frequency Range	:	802.11b/g/n-20MHz: 2.412GHz - 2.462GHz
Channel Number	:	802.11b/g/n-20MHz: 11
Modulation Type	:	DSSS (802.11b), OFDM (802.11g/n)
Antenna Type	:	PCB Antenna
Antenna Gain	:	0.5dBi

Note 1: The EUT is Smartphone, it contains WIFI Module operating at 2.4GHz ISM band; it supports 802.11b, 802.11g, 802.11n and they are all tested in this report.

Note 2: The frequencies allocated is F (MHz) =2412+5*(n-1) (1<=n<=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.

Note 4: The antenna connector of EUT is designed with permanent attachment and no consideration of replacement.

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	15.203	Antenna Requirement	PASS
2	15.247(b)	Peak Output Power	PASS
3	15.247(a)	Bandwidth	PASS
4	15.247(d)	Conducted Spurious Emission	PASS
5	15.247(d)	Band Edge	PASS
6	15.207	Conducted Emission	PASS
7	15.209 ,15.247(d)	Radiated Emission	PASS
8	15.247(d)	Power spectral density (PSD)	PASS
9	15.247(i), 1.1307&2.1093	RF exposure evaluation	PASS

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

These RF tests were performed according to the method of measurements prescribed in KDB558074 D01 V02 10/04/2012.

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 FL.1, Building A, FeiYang Science Park, Block 67, BaoAn District, Shenzhen, 518101 P. R. China. The test site is constructed in conformance with the requirements of ANSI C63.10 2009, ANSI C63.4 2009 and CISPR Publication 22; the FCC registration number is 695796.

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. Antenna requirement

2.1.1. Applicable Standard

According to FCC 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. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section.

2.1.2. **Result:** Compliant

The EUT has a permanently and irreplaceable attached antenna. Please refer to the EUT internal photos.

2.2. Peak Output Power

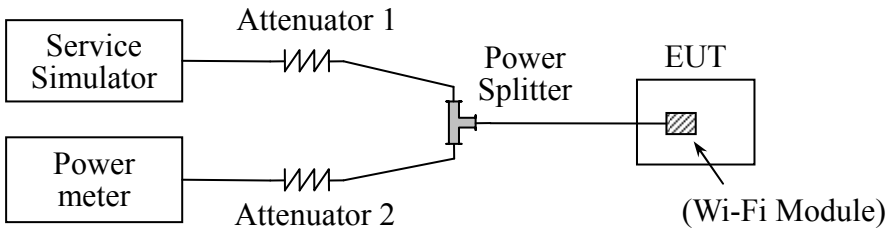
2.2.1. Requirement

According to FCC section 15.247(b)(3), For systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands: The maximum peak conducted output power of the intentional radiator shall not exceed1 Watt.

2.2.2. Test Description

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

A. Test Setup:



The EUT (Equipment under the test) which is powered by the Battery 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, all test result in power meter.

B. Equipments List:

Description	Manufacturer	Model	Serial No.	Cal. Date	Cal. Due
EPM Series Power Meter	Agilent	E4418B	GB43318055	2012.05	2013.05
Power Sensor	Agilent	8482A	MY41091706	2012.05	2013.05

2.2.3. Test Result

The lowest, middle and highest channels are selected to perform testing to verify the conducted RF output peak power of the Module.

2.2.3.1. 802.11b Test mode

Channel	Frequency (MHz)	Measured Output Peak Power		Limit		Verdict
		dBm	W	dBm	W	
1	2412	13.81	0.024044	30	1	PASS
6	2437	13.82	0.024099			PASS
11	2462	13.59	0.022856			PASS

2.2.3.2. 802.11g Test mode

Channel	Frequency (MHz)	Measured Output Peak Power		Limit		Verdict
		dBm	W	dBm	W	
1	2412	10.54	0.011324	30	1	PASS
6	2437	10.51	0.011246			PASS
11	2462	10.26	0.010617			PASS

2.2.3.3. 802.11n-20MHz Test mode

Channel	Frequency (MHz)	Measured Output Peak Power		Limit		Verdict
		dBm	W	dBm	W	
1	2412	10.45	0.011092	30	1	PASS
6	2437	10.53	0.011298			PASS
11	2462	10.57	0.011402			PASS

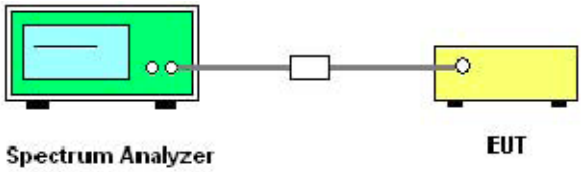
2.3. Bandwidth

2.3.1. Requirement

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.

2.3.2. Test Description

A. Test Set:



The EUT which is powered by the Battery, 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.

Make the measurement with the spectrum analyzer's resolution bandwidth (RBW) = 100 kHz. In order to make an accurate measurement, set the span greater than RBW.

B. Equipments List:

Description	Manufacturer	Model	Serial No.	Cal. Date	Cal. Due
Receiver	Agilent	E7405A	US44210471	2012.05	2013.05

2.3.3. Test Result

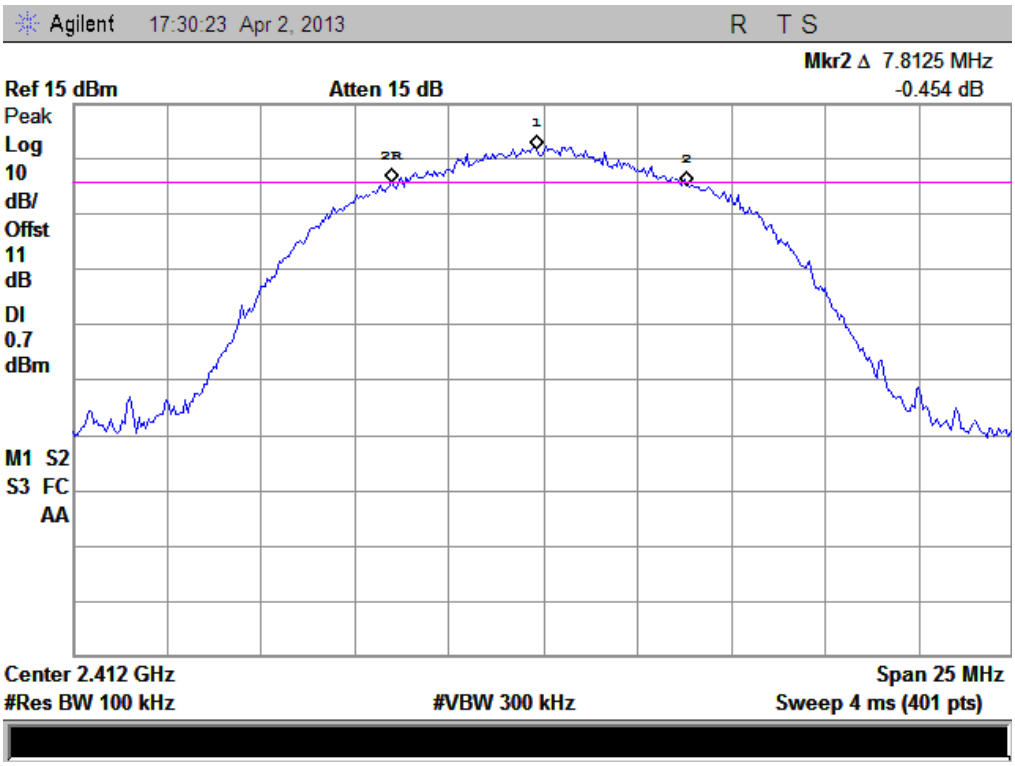
The lowest, middle and highest channels are selected to perform testing to record the 6 dB bandwidth of the Module.

2.3.3.1. 802.11b Test mode

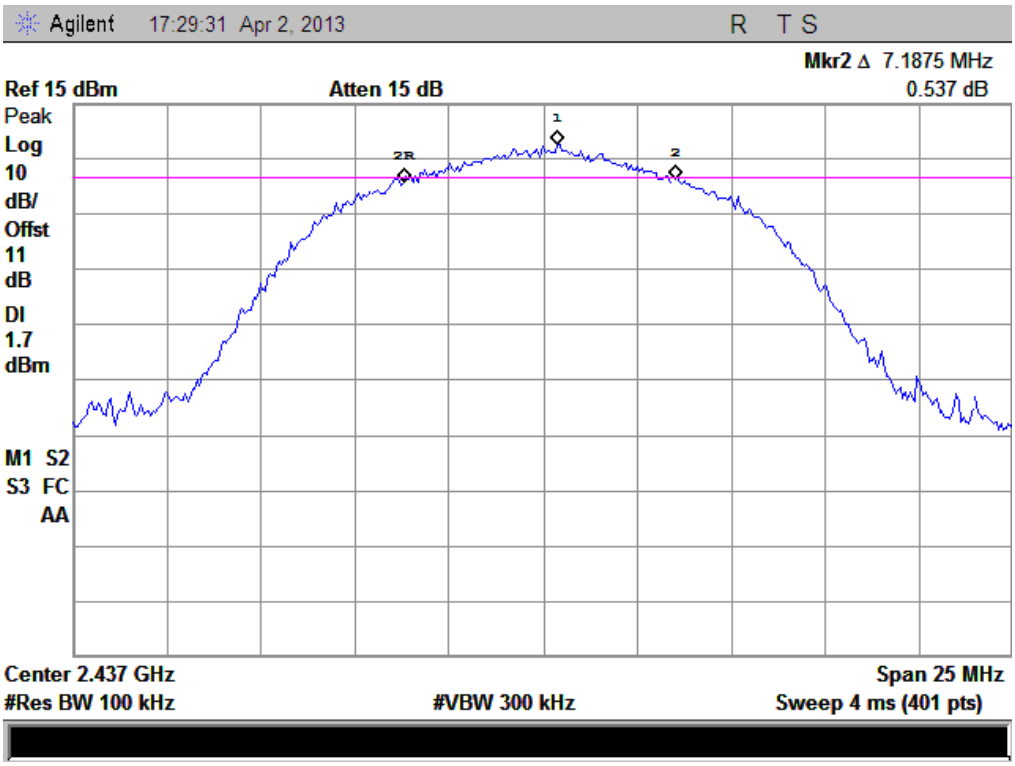
A. Test Verdict:

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Refer to Plot	Limits(kHz)	Result
1	2412	7.8125	Plot A	≥500	PASS
6	2437	7.1875	Plot B	≥500	PASS
11	2462	7.8125	Plot C	≥500	PASS

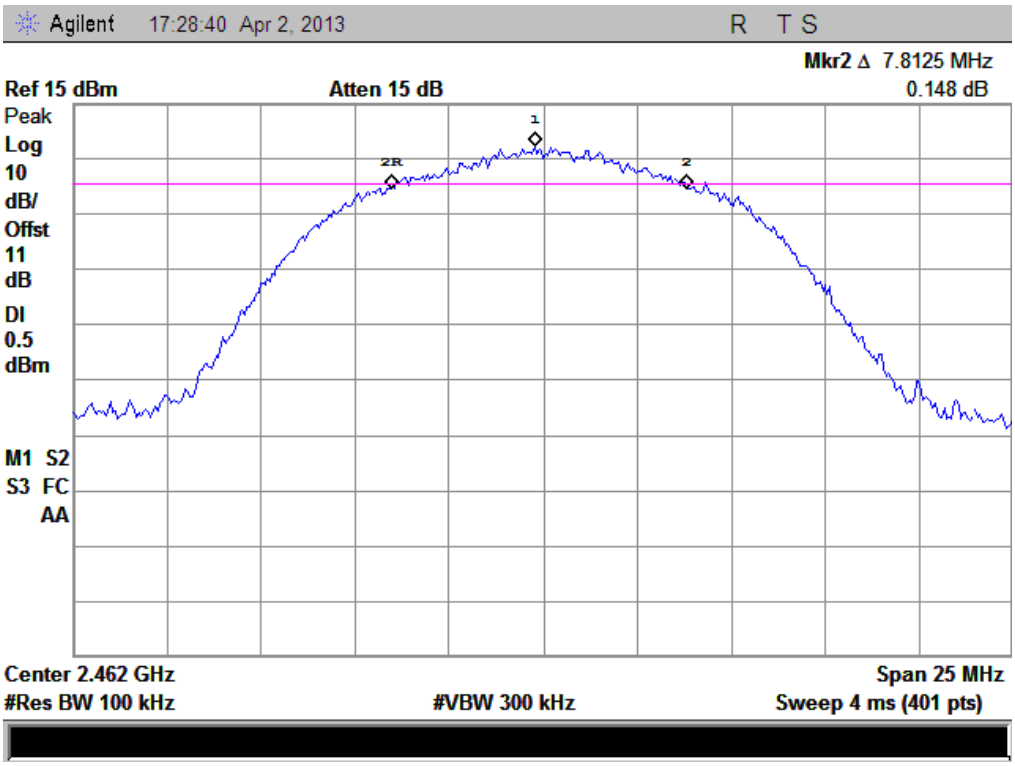
B. Test Plots:



(Plot A: Channel 1: 2412MHz @ 802.11b)



(Plot B: Channel 6: 2437 MHz @ 802.11b)



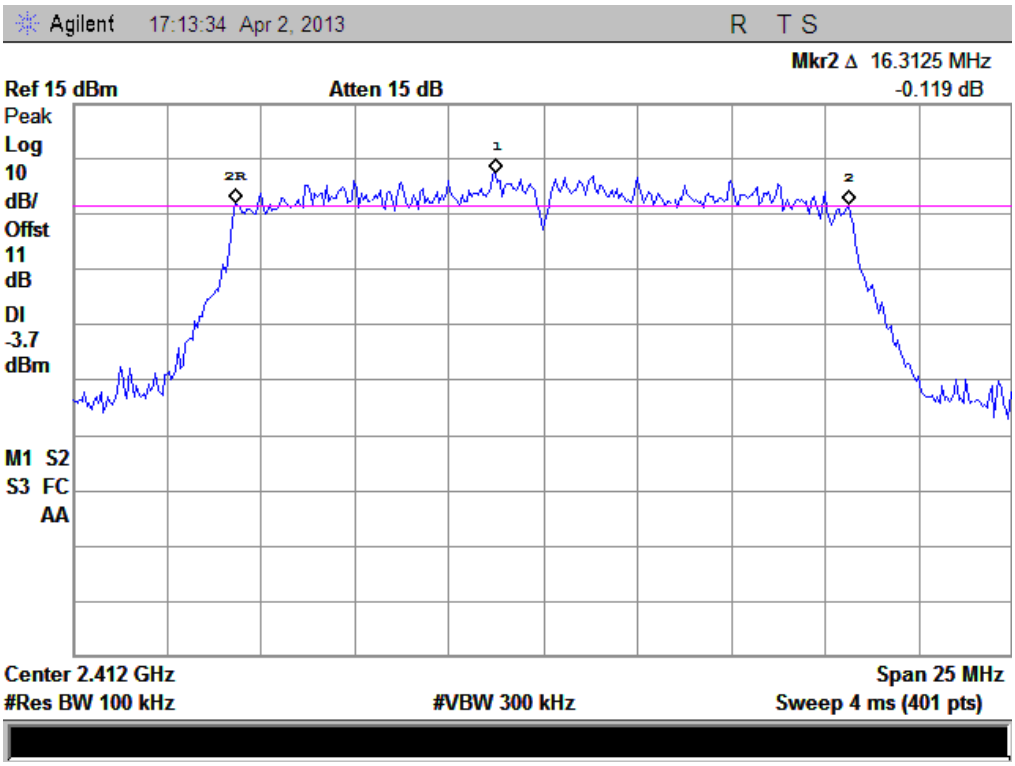
(Plot C: Channel 11: 2462MHz @ 802.11b)

2.3.3.2. 802.11g Test mode

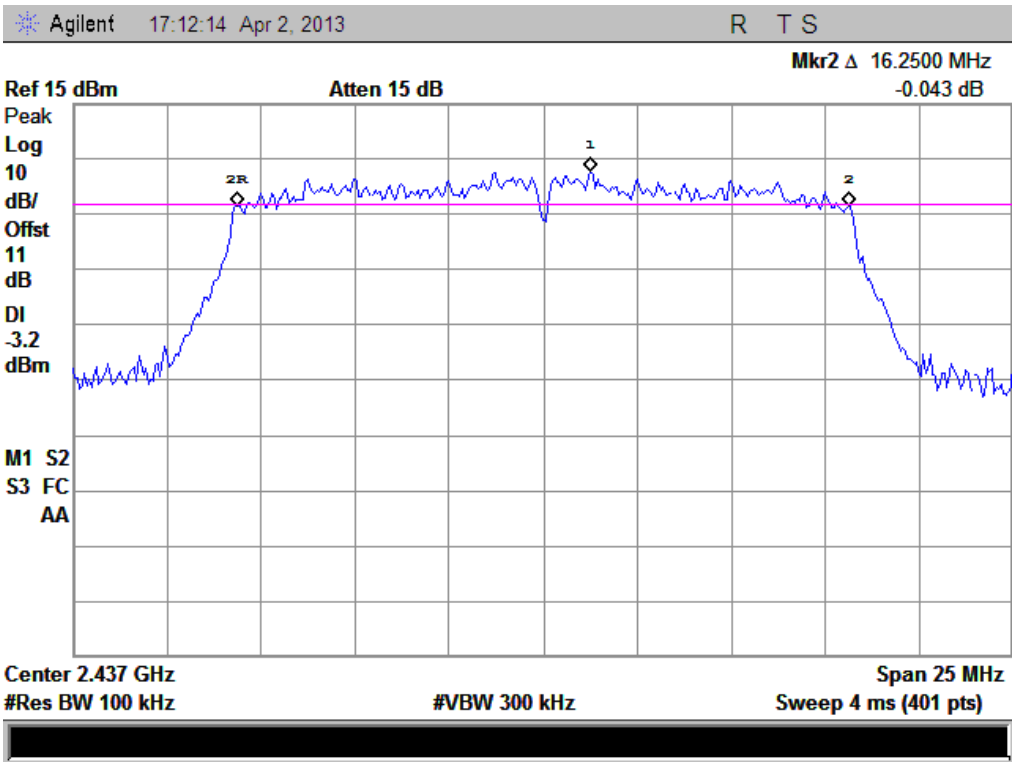
A. Test Verdict:

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Refer to Plot	Limits (kHz)	Result
1	2412	16.3125	Plot D	≥500	PASS
6	2437	16.2500	Plot E	≥500	PASS
11	2462	16.0625	Plot F	≥500	PASS

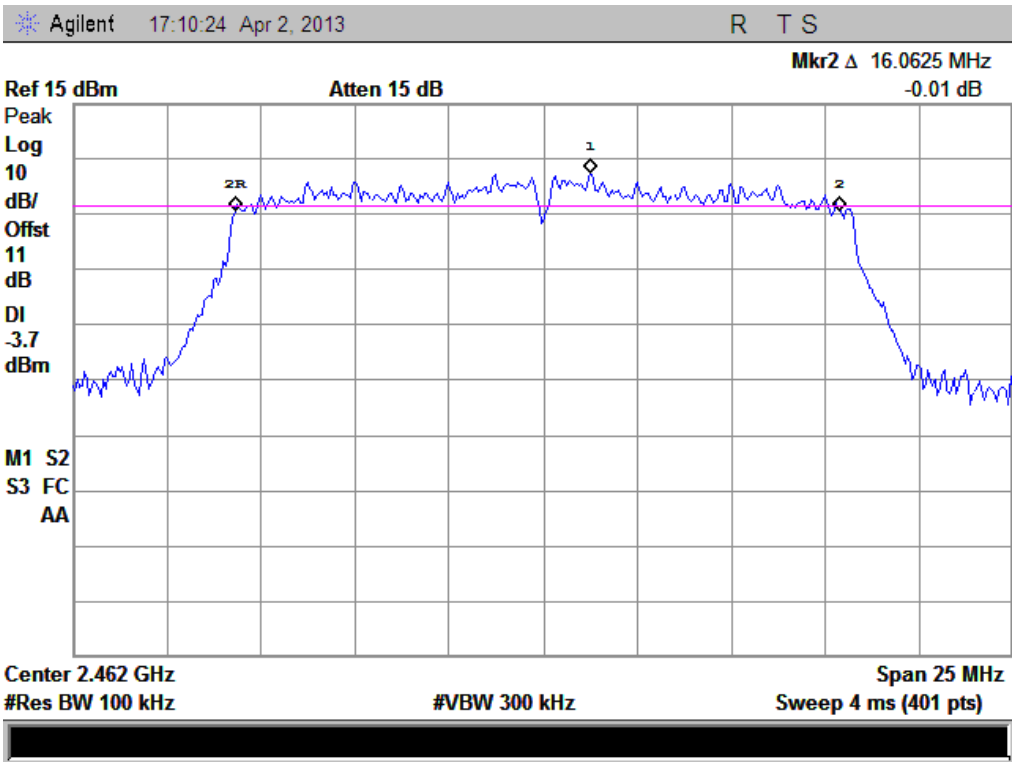
B. Test Plots:



(Plot D: Channel 1: 2412MHz @ 802.11g)



(Plot E: Channel 6: 2437MHz @ 802.11g)



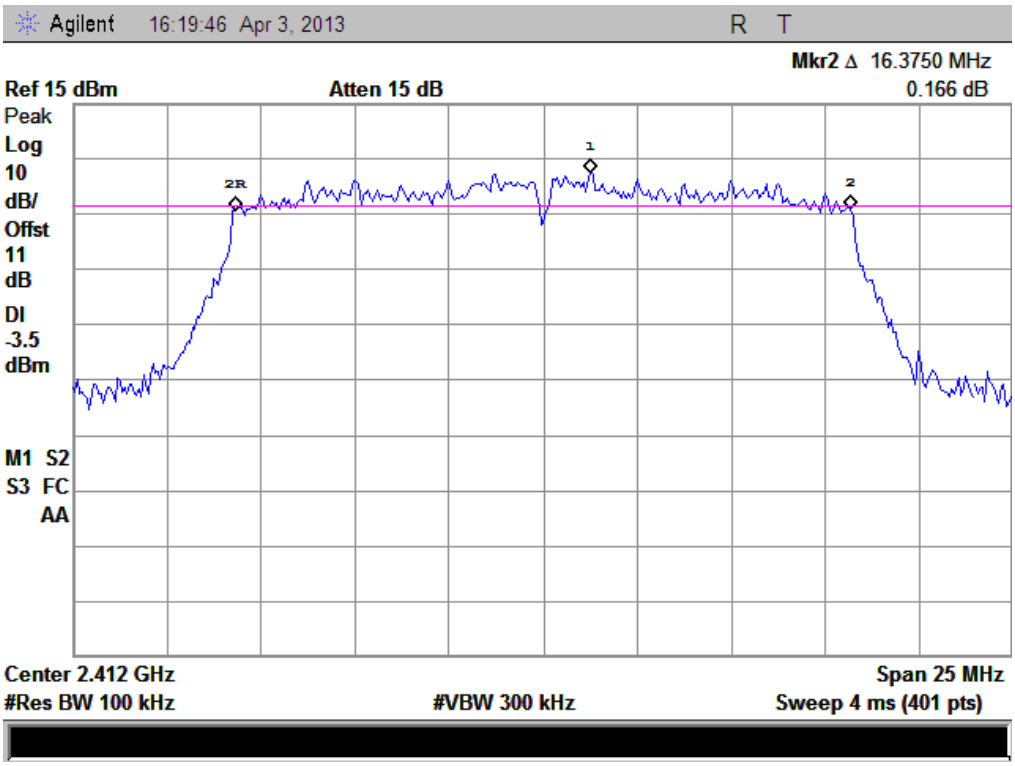
(Plot F: Channel 11: 2462MHz @ 802.11g)

2.3.3.3. 802.11n-20 Test mode

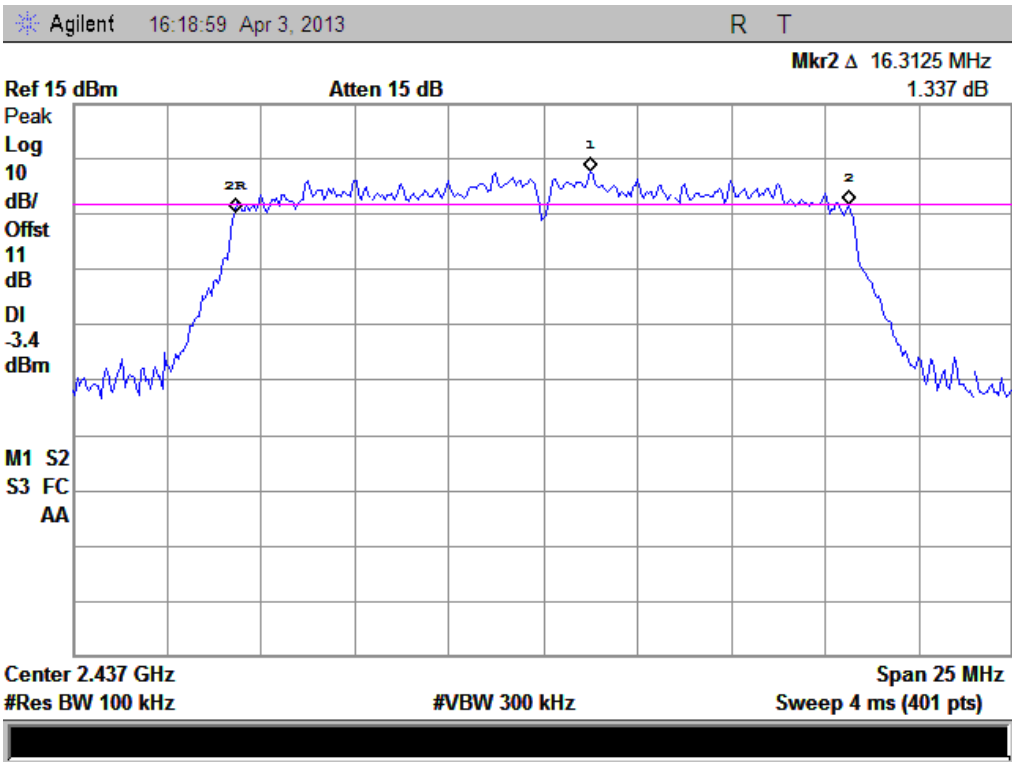
A. Test Verdict:

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Refer to Plot	Limits (kHz)	Result
1	2412	16.3750	Plot G	≥500	PASS
6	2437	16.3125	Plot H	≥500	PASS
11	2462	16.3125	Plot I	≥500	PASS

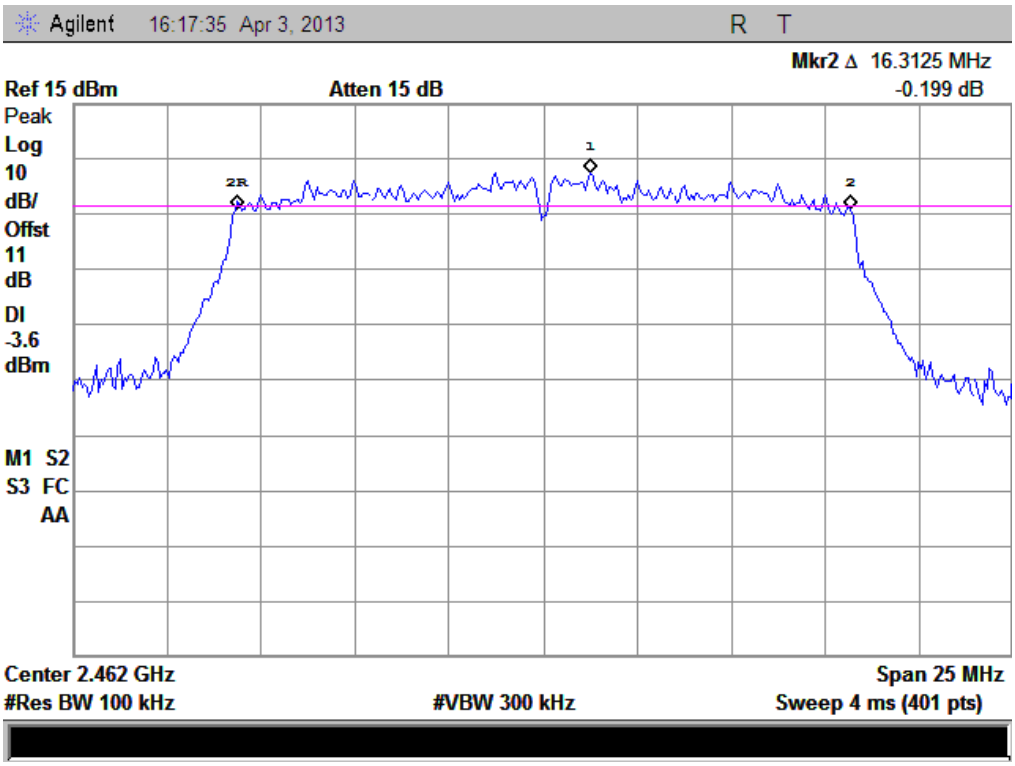
B. Test Plots:



(Plot G: Channel 1: 2412MHz @ 802.11n-20)



(Plot H: Channel 6: 2437MHz @ 802.11n-20)



(Plot I: Channel 11: 2462MHz @ 802.11n-20)

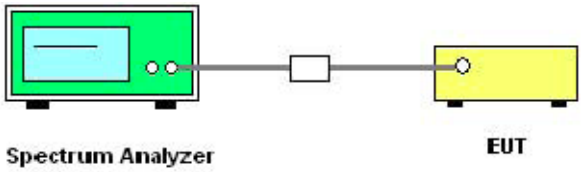
2.4. Conducted Spurious Emissions

2.4.1. 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.

2.4.2. Test Description

A. Test Set:



The EUT which is powered by the Battery, 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.

Make the measurement with the spectrum analyzer's resolution bandwidth (RBW) = 100 kHz. In order to make an accurate measurement, set the span greater than RBW.

B. Equipments List:

Description	Manufacturer	Model	Serial No.	Cal. Date	Cal. Due
Receiver	Agilent	E7405A	US44210471	2012.05	2013.05

2.4.3. 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.

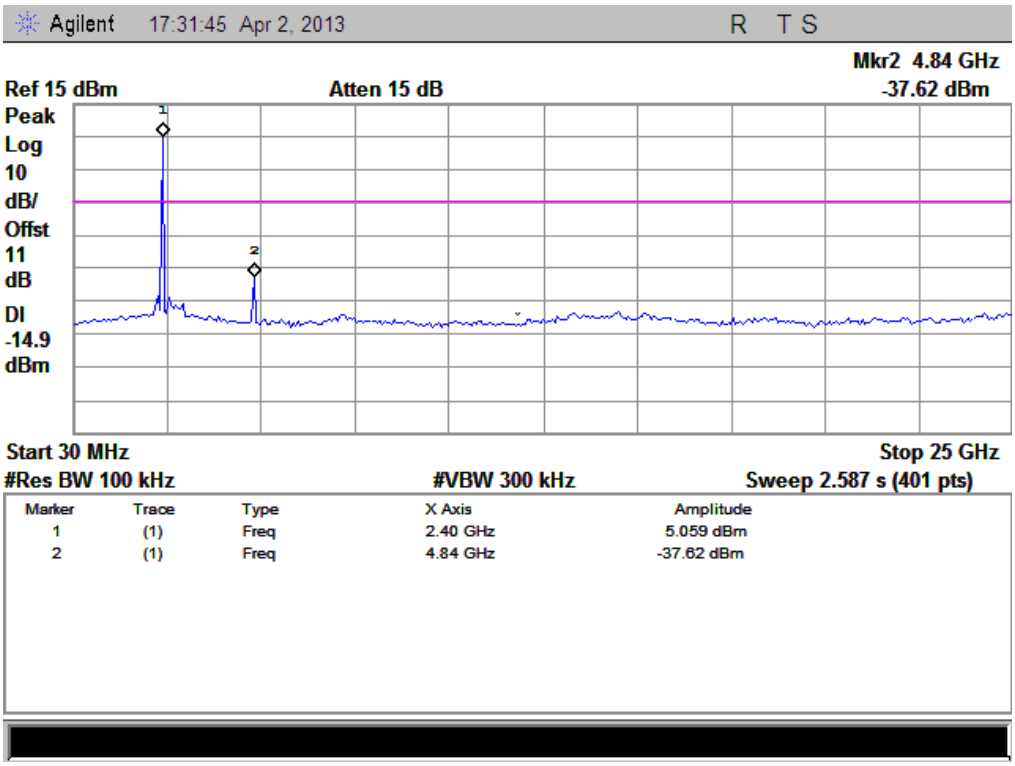
2.4.3.1. 802.11b Test mode

A. Test Verdict:

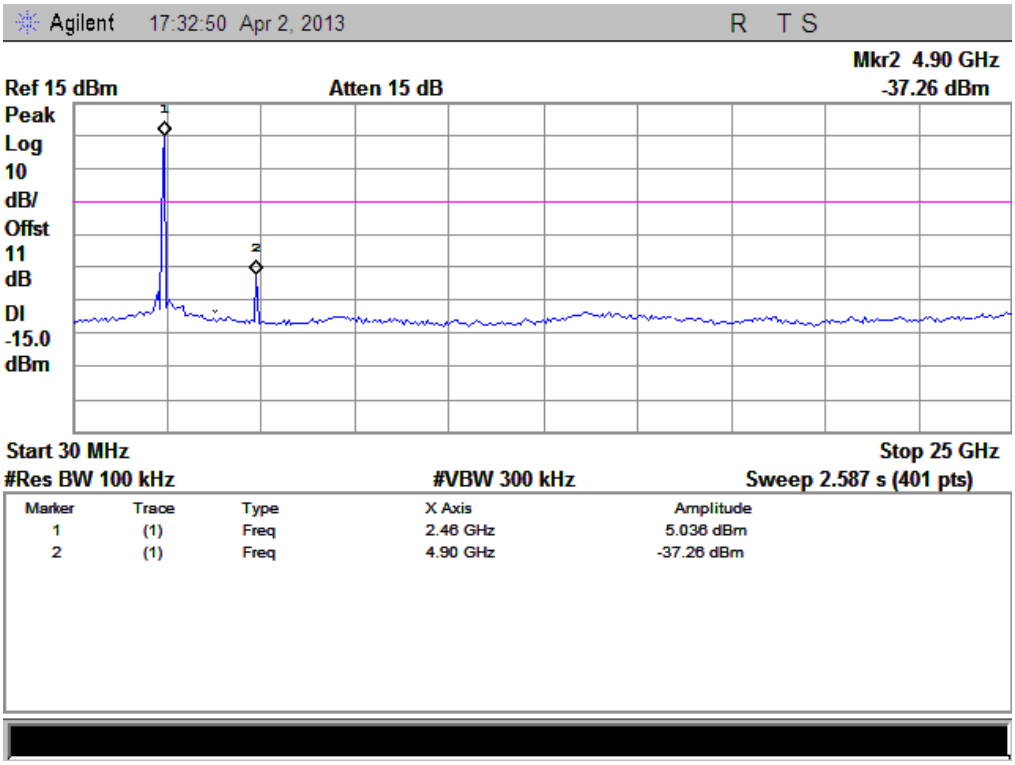
Channel	Frequency (MHz)	Measured Max. Out of Band Emission (dBm)	Refer to Plot	Limit (dBm)		Verdict
				Carrier Level	Calculated -20dBc Limit	
1	2412	-37.62	Plot A.1	5.059	-14.9	PASS
6	2437	-37.26	Plot B.1	5.036	-15.0	PASS
11	2462	-37.23	Plot C.1	4.861	-15.1	PASS

B. Test Plots:

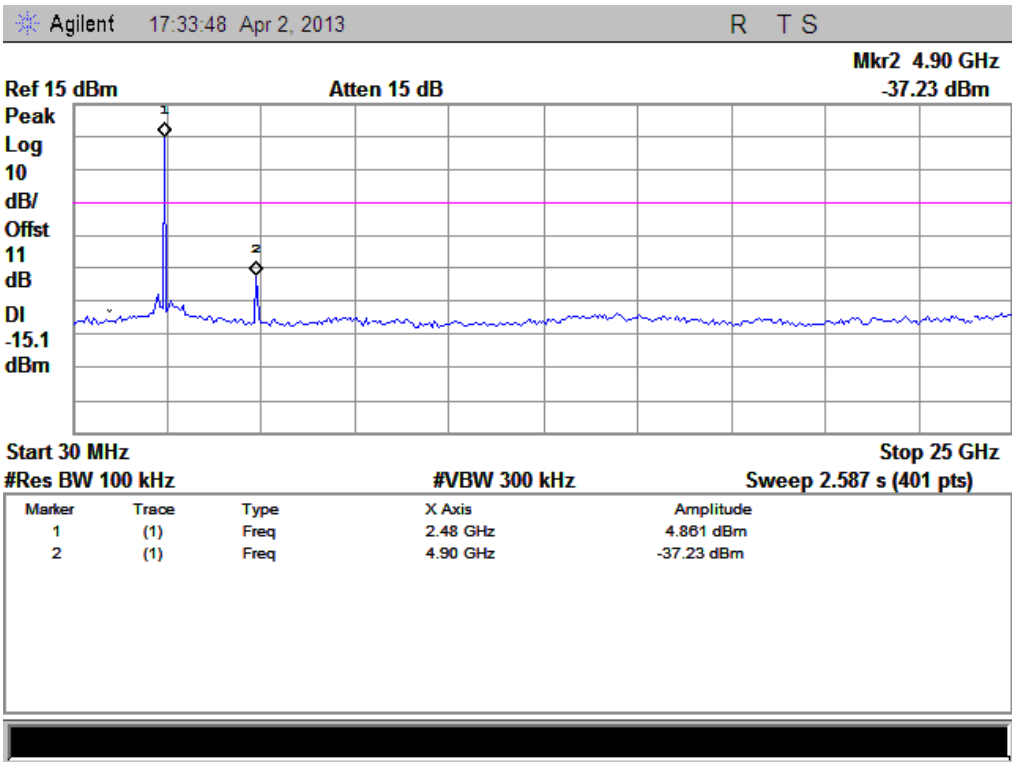
Note: the power of the Module transmitting frequency should be ignored.



(Plot A.1: Channel = 1, 30MHz to 25GHz)



(Plot B.1: Channel = 6, 30MHz to 25GHz)



(Plot C.1: Channel = 11, 30MHz to 25GHz)

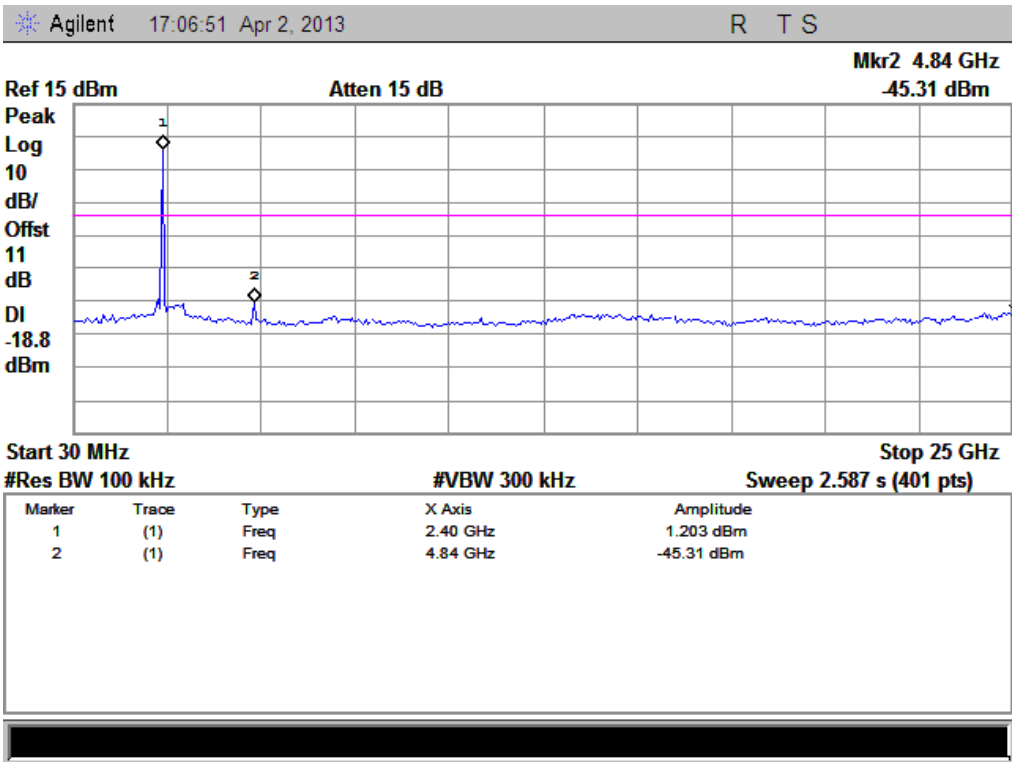
2.4.3.2. 802.11g Test mode

A. Test Verdict:

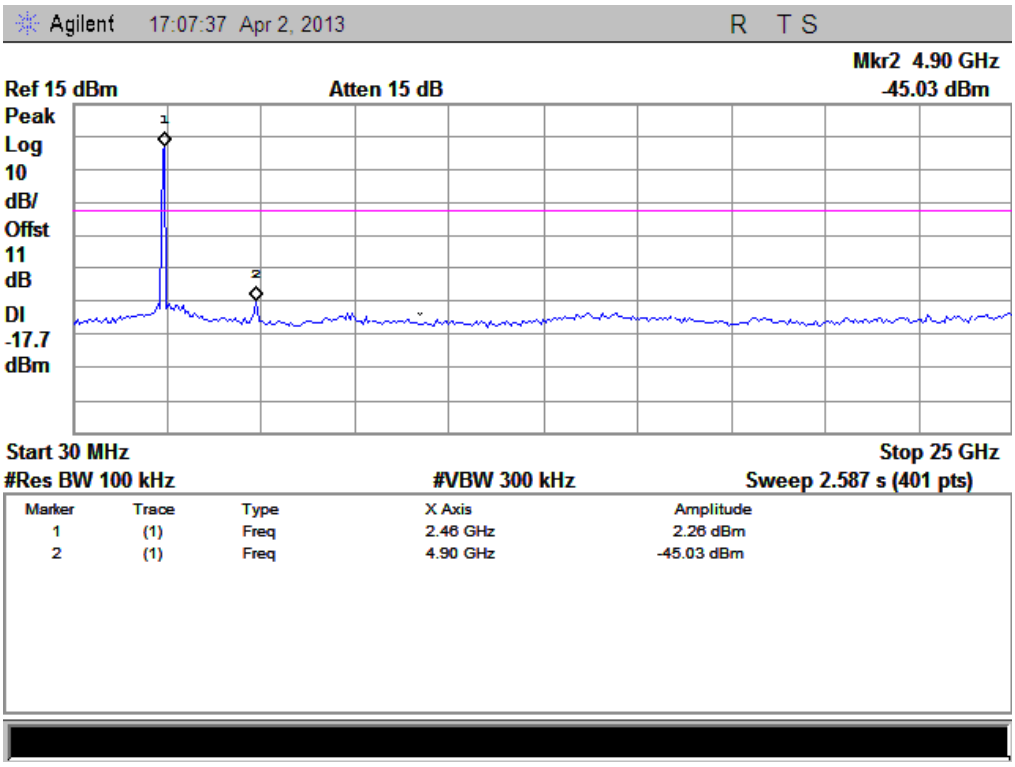
Channel	Frequency (MHz)	Measured Max. Out of Band Emission (dBm)	Refer to Plot	Limit (dBm)		Verdict
				Carrier Level	Calculated -20dBc Limit	
1	2412	-45.31	Plot D.1	1.203	-18.8	PASS
6	2437	-45.03	Plot E.1	2.260	-17.7	PASS
11	2462	-44.99	Plot F.1	1.764	-18.2	PASS

B. Test Plots:

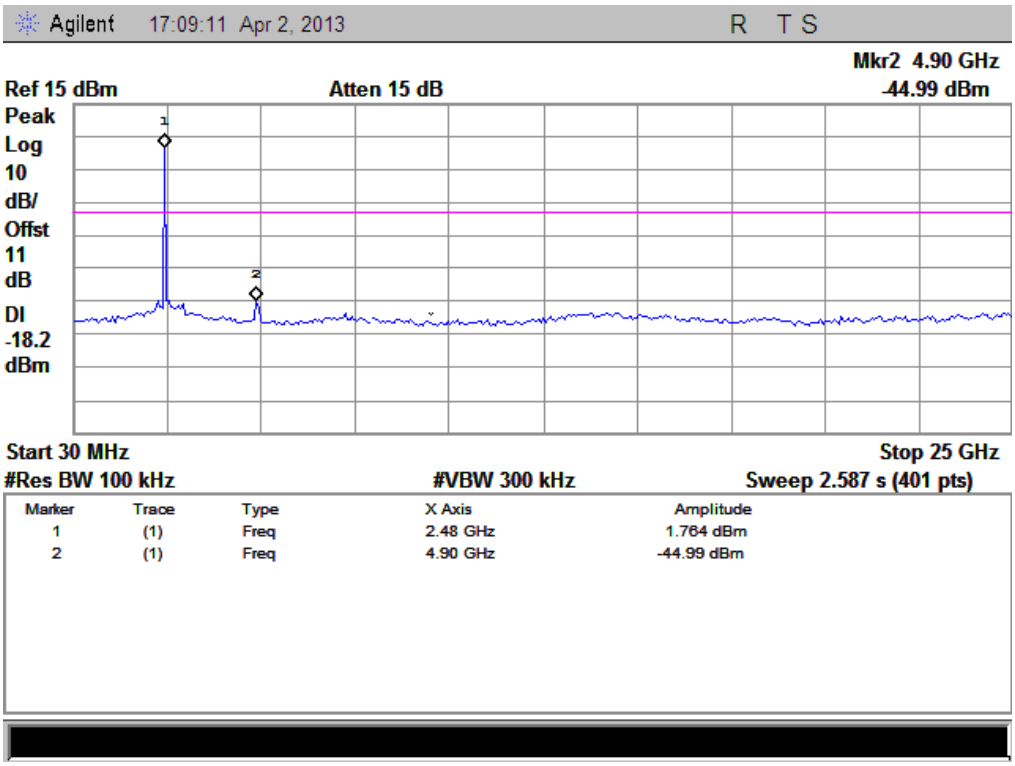
Note: the power of the Module transmitting frequency should be ignored.



(Plot D.1: Channel = 1, 30MHz to 25GHz)



(Plot E.1: Channel = 6, 30MHz to 25GHz)



(Plot F.1: Channel = 11, 30MHz to 25GHz)

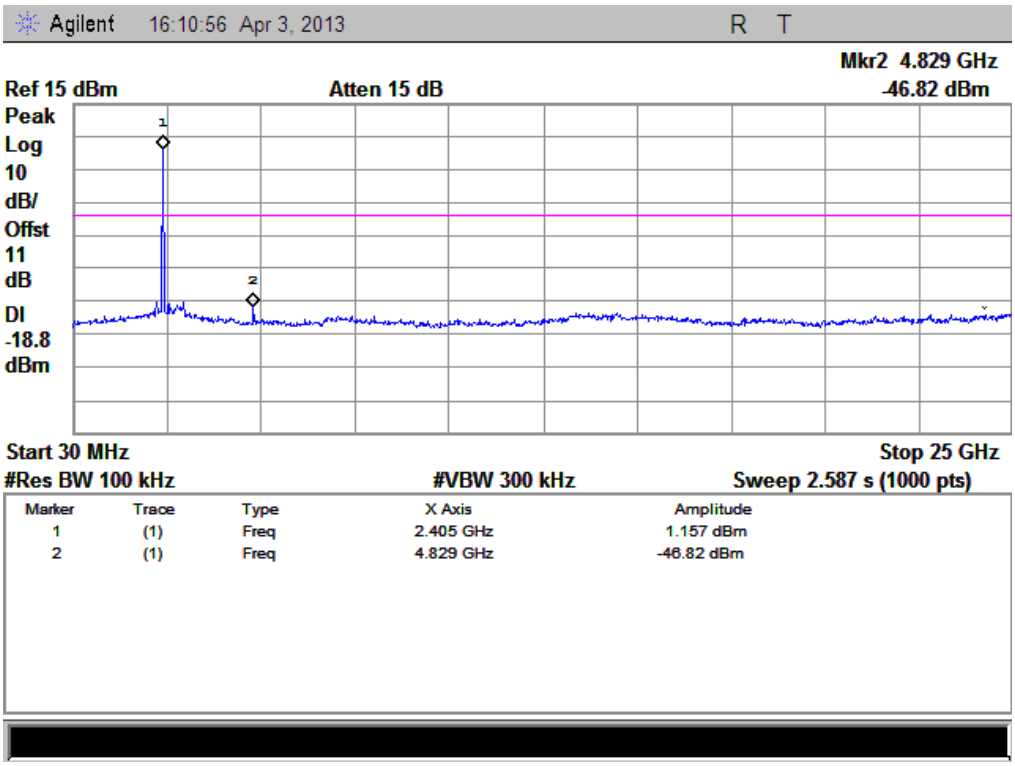
2.4.3.3. 802.11n -20MHz Test mode

A. Test Verdict:

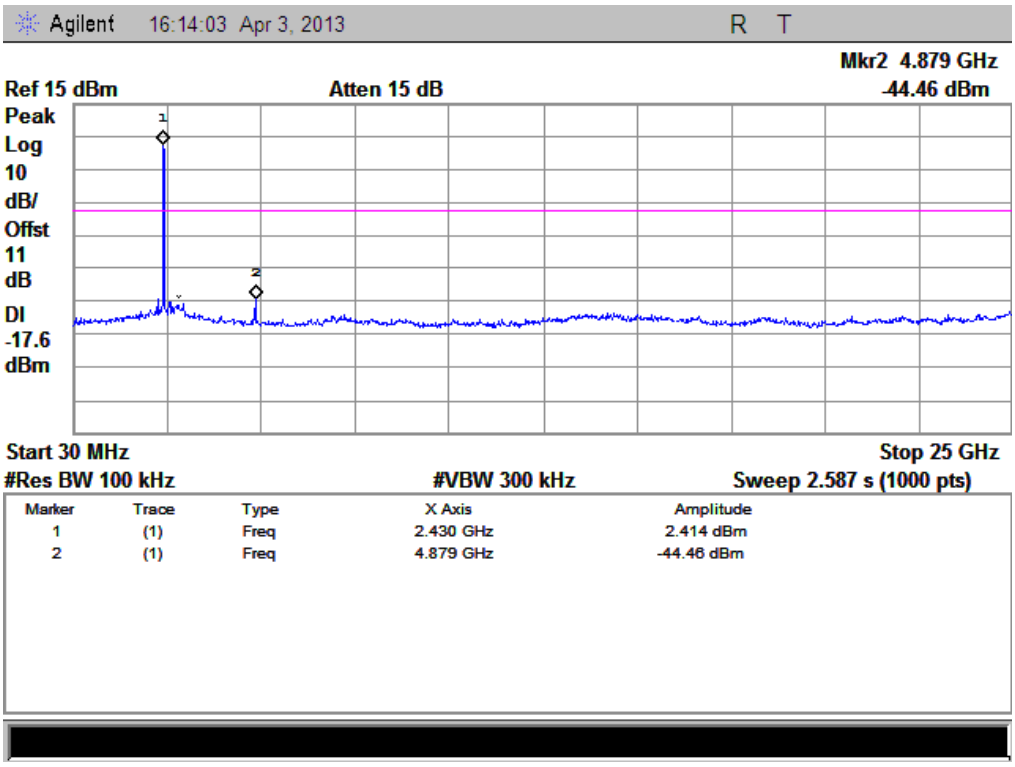
Channel	Frequency (MHz)	Measured Max. Out of Band Emission (dBm)	Refer to Plot	Limit (dBm)		Verdict
				Carrier Level	Calculated -20dBc Limit	
1	2412	-46.82	Plot G.1	1.157	-18.8	PASS
6	2437	-44.46	Plot H.1	2.414	-17.6	PASS
11	2462	-44.84	Plot I.1	1.002	-19.0	PASS

B. Test Plots:

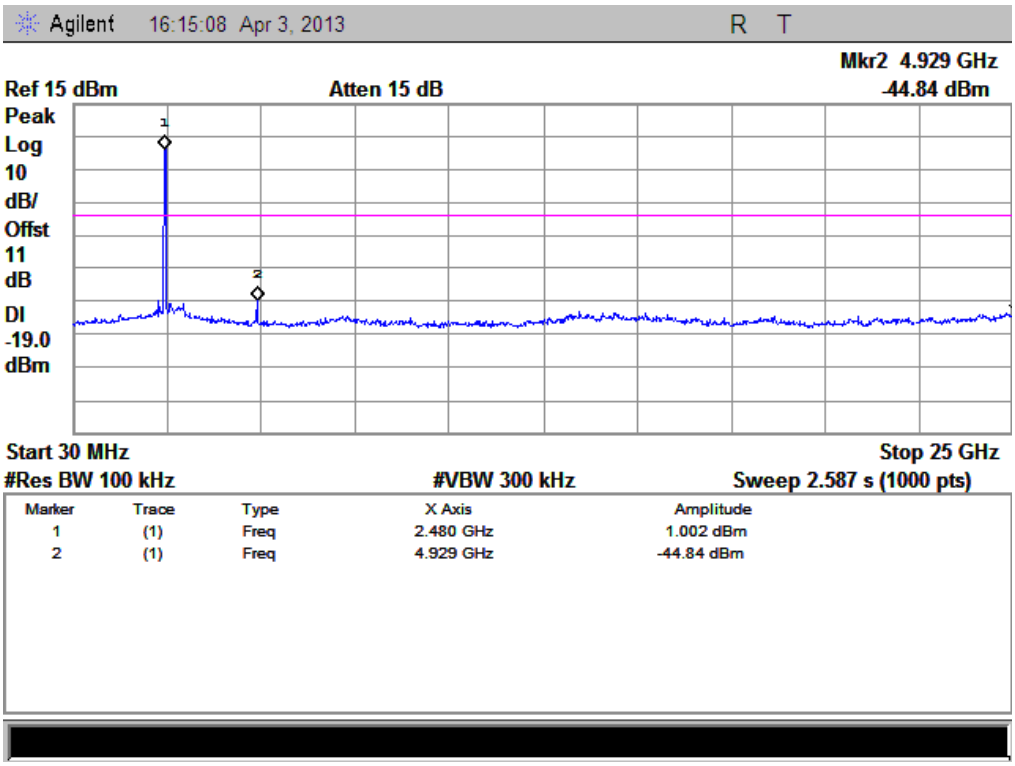
Note: the power of the Module transmitting frequency should be ignored.



(Plot G.1: Channel = 1, 30MHz to 25GHz)



(Plot H.1: Channel = 6, 30MHz to 25GHz)



(Plot I.1: Channel = 11, 30MHz to 25GHz)

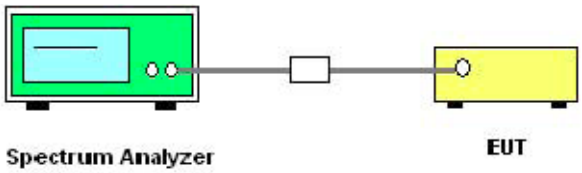
2.5. Power spectral density (PSD)

2.5.1. 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.

2.5.2. Test Description

A. Test Set:



The EUT which is powered by the Battery, 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.

Make the measurement with the spectrum analyzer's resolution bandwidth (RBW) = 100 kHz. In order to make an accurate measurement, set the span greater than RBW.

B. Equipments List:

Description	Manufacturer	Model	Serial No.	Cal. Date	Cal. Due
Receiver	Agilent	E7405A	US44210471	2012.05	2013.05

2.5.3. Test Result

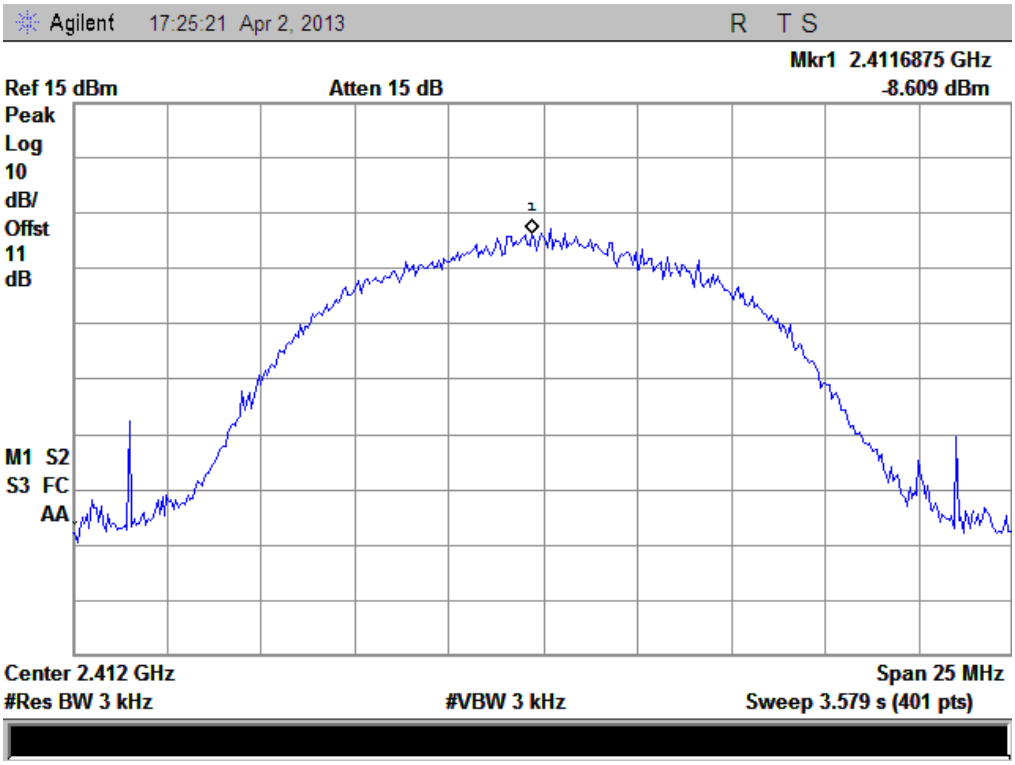
The lowest, middle and highest channels are tested to verify the band edge emissions.

2.5.3.1. 802.11b Test mode

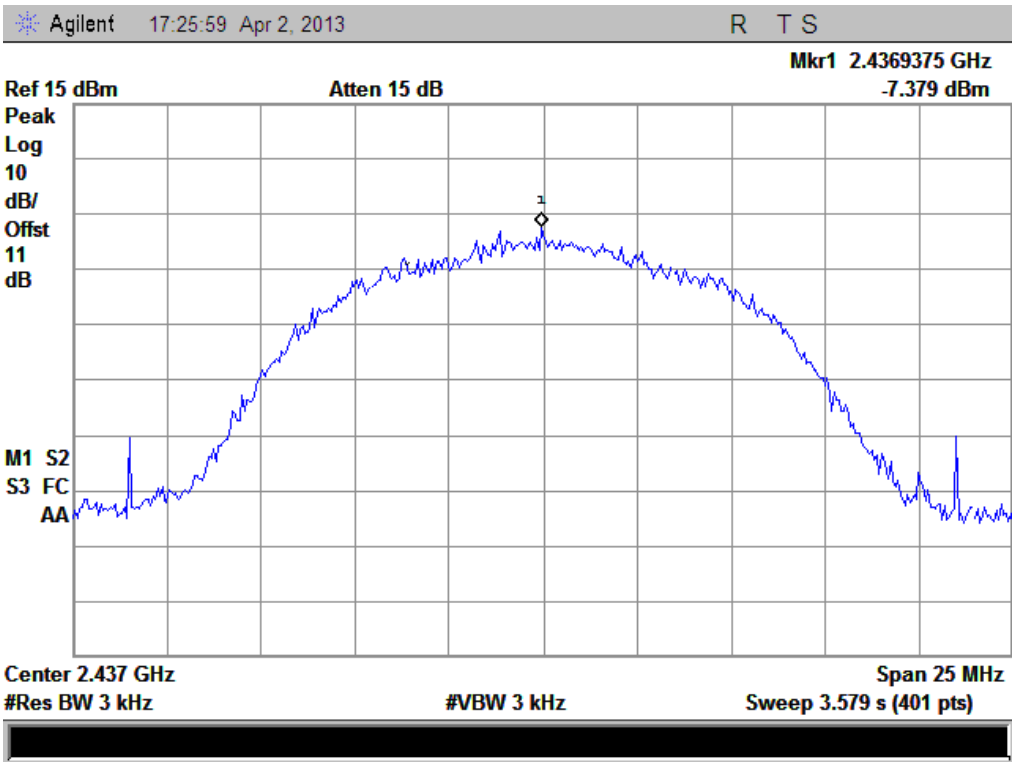
A. Test Verdict:

Spectral power density (dBm/3kHz)					
Channel	Frequency (MHz)	Measured PSD (dBm/3kHz)	Refer to Plot	Limit (dBm/3kHz)	Verdict
1	2412	-8.609	Plot A	8	PASS
6	2437	-7.379	Plot B	8	PASS
11	2462	-7.899	Plot C	8	PASS
Measurement uncertainty: ±1.3dB					

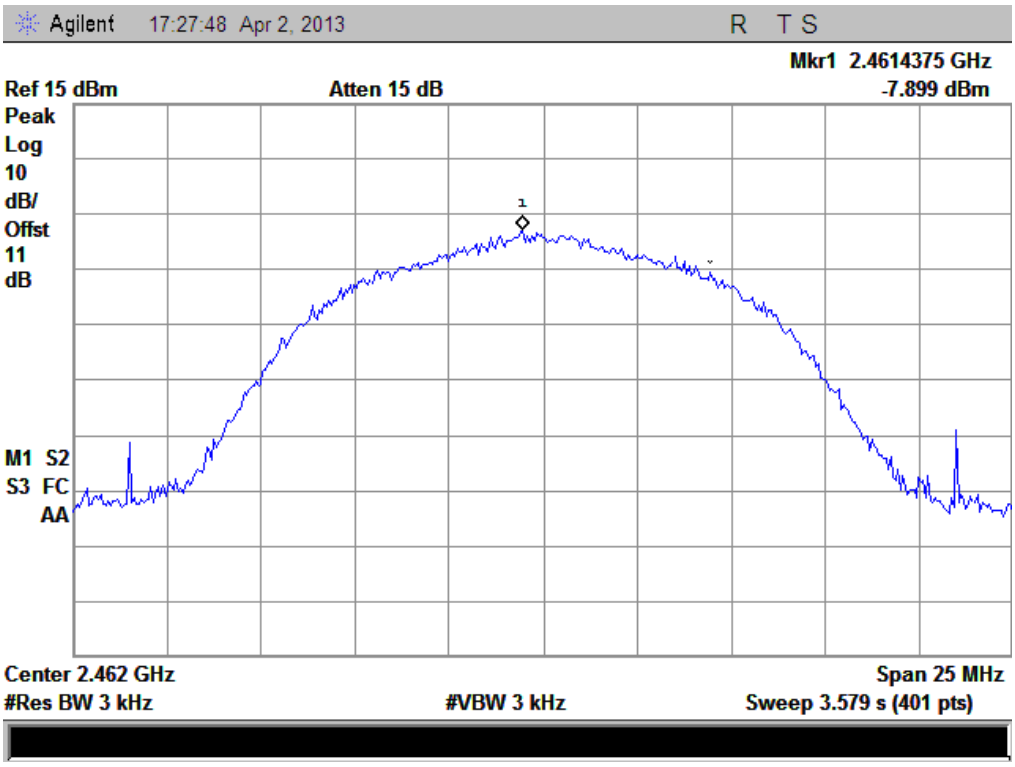
B. Test Plots:



(Plot A: Channel = 1 @ 802.11b)



(Plot B: Channel = 6 @ 802.11b)



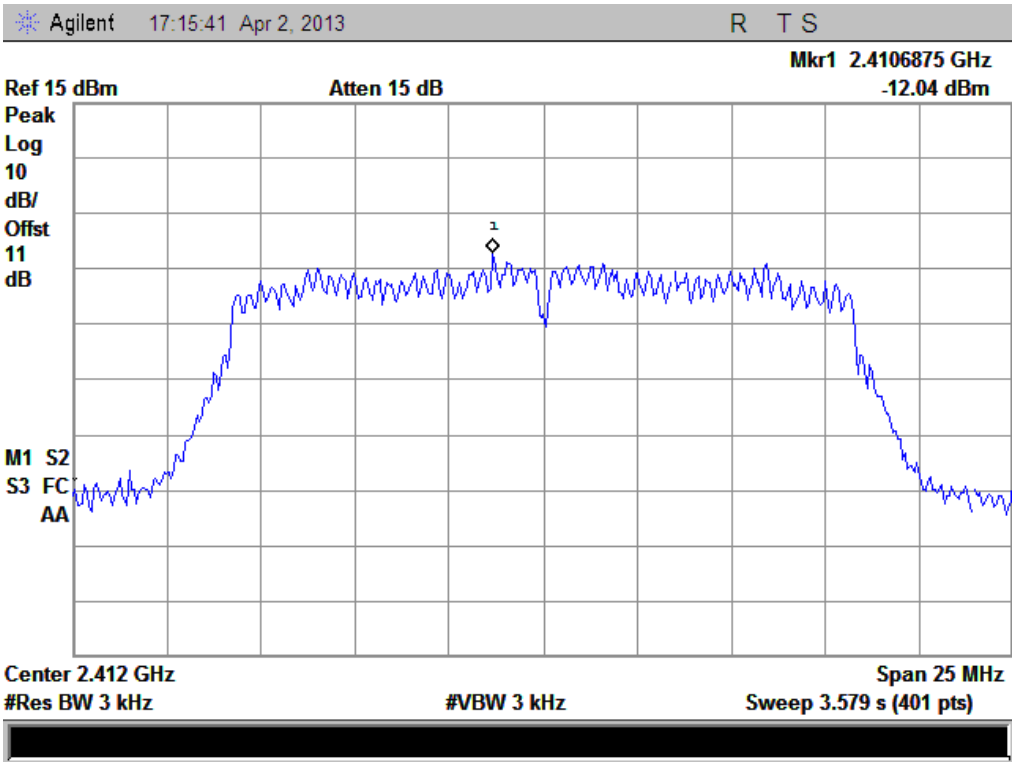
(Plot C: Channel = 11 @ 802.11b)

2.5.3.2. 802.11g Test mode

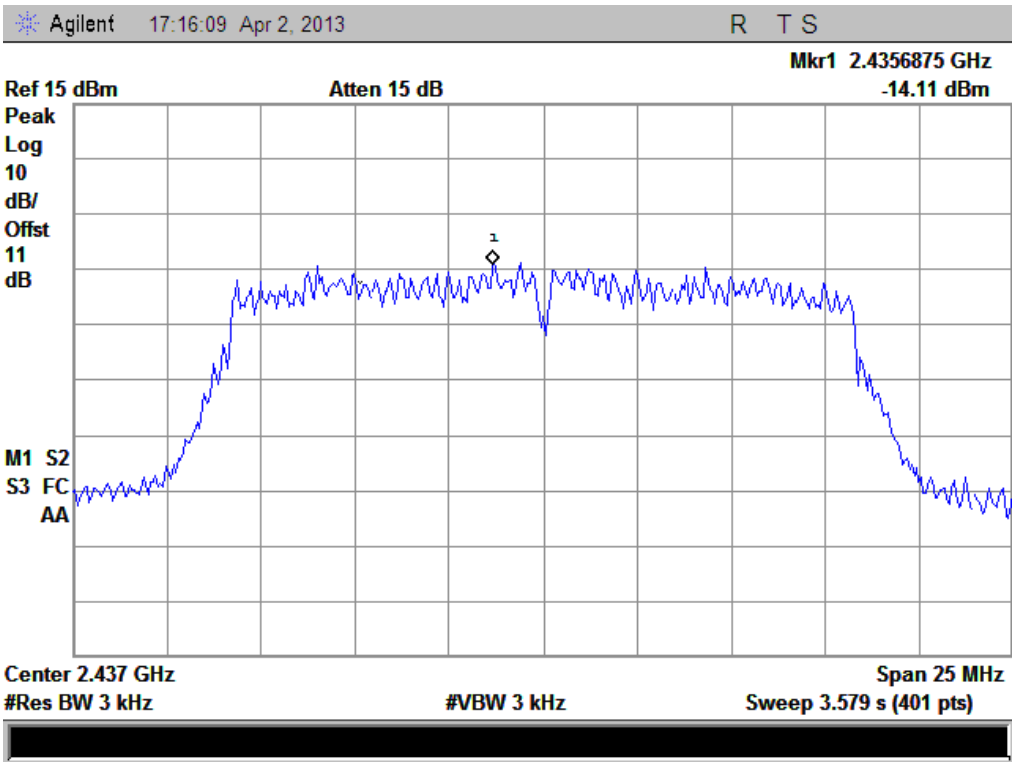
A. Test Verdict:

Spectral power density (dBm/3kHz)					
Channel	Frequency (MHz)	Measured PSD (dBm/3kHz)	Refer to Plot	Limit (dBm/3kHz)	Verdict
1	2412	-12.04	Plot A	8	PASS
6	2437	-14.11	Plot B	8	PASS
11	2462	-13.87	Plot C	8	PASS
Measurement uncertainty: ±1.3dB					

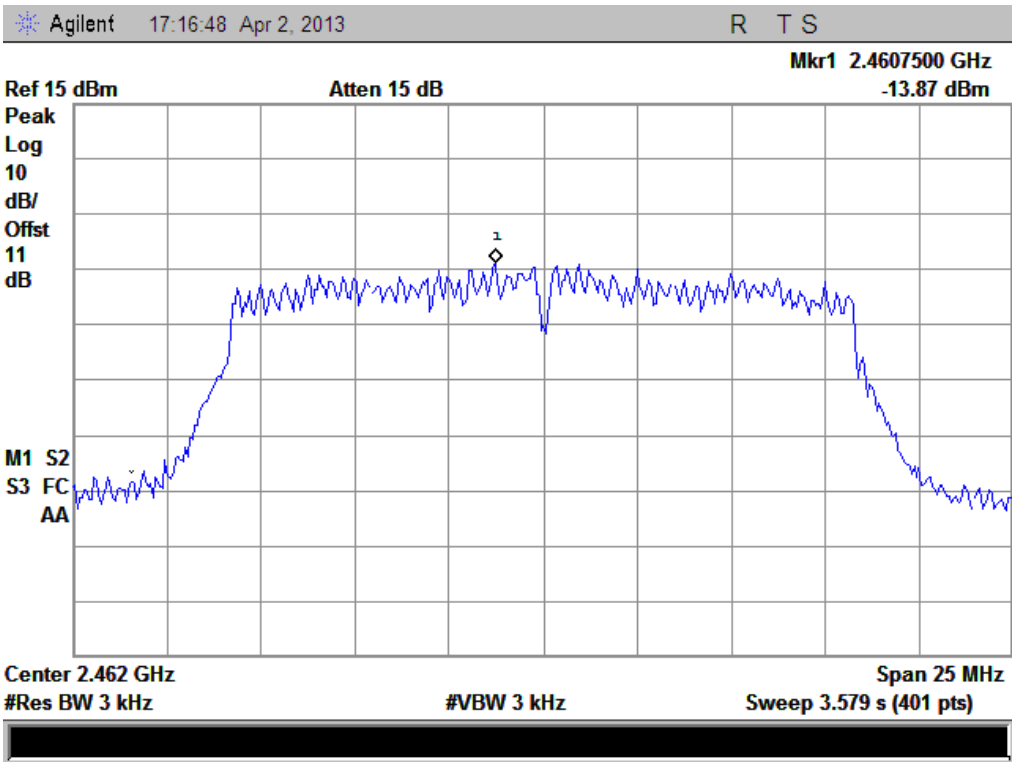
B. Test Plots:



(Plot D: Channel = 1 @ 802.11g)



(Plot E: Channel = 6 @ 802.11g)



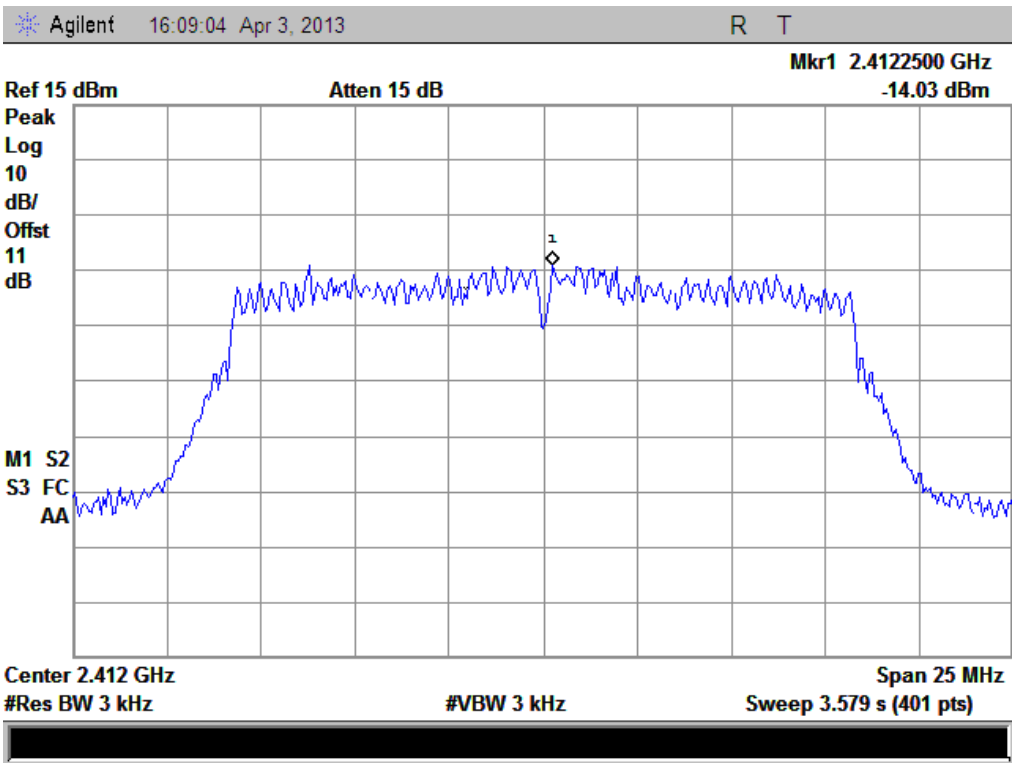
(Plot F: Channel = 11 @ 802.11g)

2.5.3.3. 802.11n-20MHz Test mode

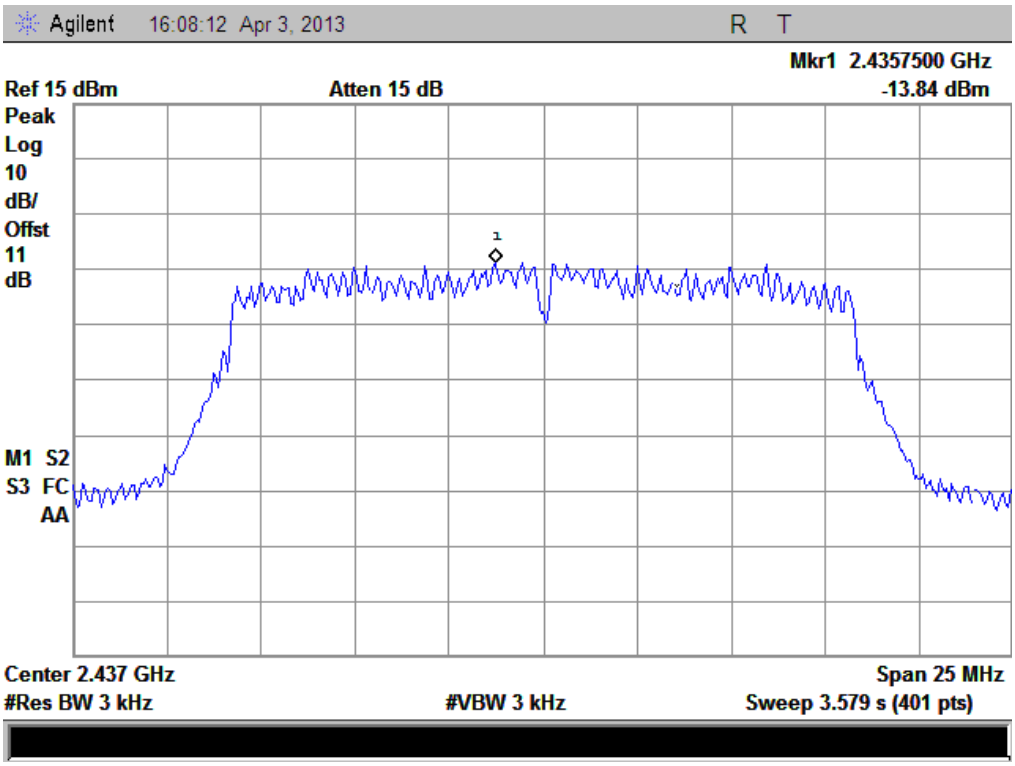
A. Test Verdict:

Spectral power density (dBm/3kHz)					
Channel	Frequency (MHz)	Measured PSD (dBm/3kHz)	Refer to Plot	Limit (dBm/3kHz)	Verdict
1	2412	-14.03	Plot A	8	PASS
6	2437	-13.84	Plot B	8	PASS
11	2462	-13.81	Plot C	8	PASS
Measurement uncertainty: ±1.3dB					

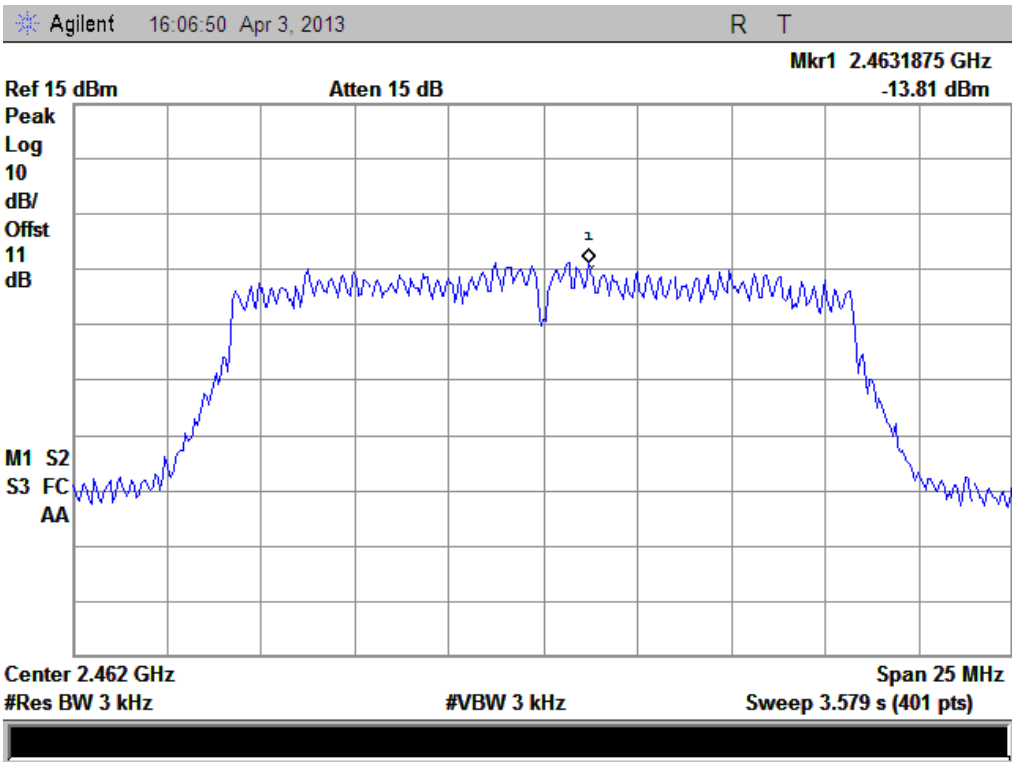
Test Plots:



(Plot G: Channel = 1 @ 802.11n-20MHz)



(Plot H: Channel = 6 @ 802.11n-20MHz)



(Plot I: Channel = 11 @ 802.11n-20MHz)

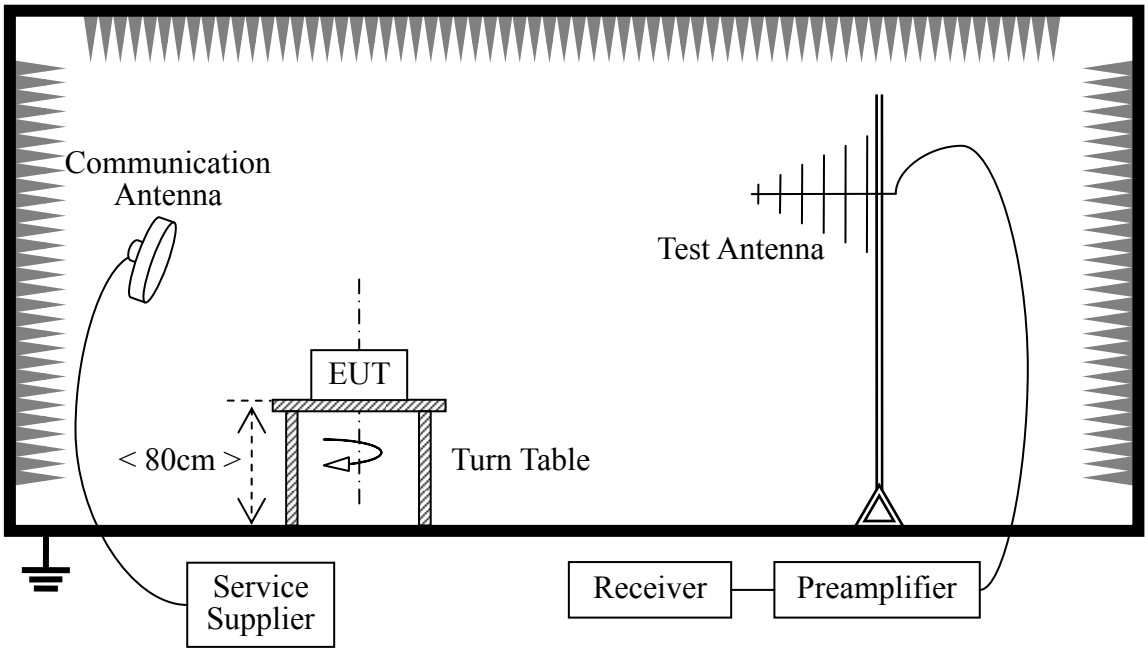
2.6. Band Edge

2.6.1. Requirement

According to FCC section 15.247(d), 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.

2.6.2. 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	2012.5	2013.05
Full-Anechoic Chamber	Albatross	9m*6m*6m	(n.a.)	2012.5	2014.05
Test Antenna	Schwarzbeck	BBHA 9120C	9120C-384	2012.5	2013.05

2.6.3. Test Result

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

The measurement results are obtained as below:
$E\ [dB\mu V/m] = U_R + A_T + A_{Factor}\ [dB]$; $A_T = L_{Cable\ loss}\ [dB] - G_{preamp}\ [dB]$
A_T: Total correction Factor except Antenna
U_R: Receiver Reading
G_{preamp}: Preamplifier Gain
A_{Factor}: Antenna Factor at 3m

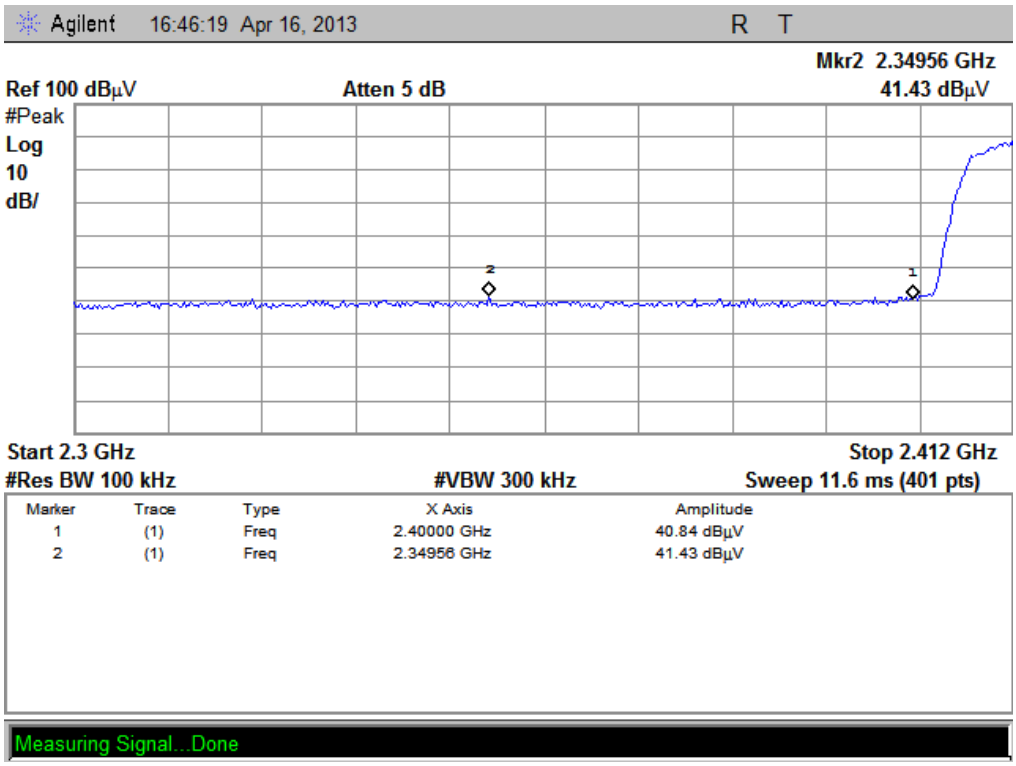
2.6.3.1. 802.11b Test mode

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

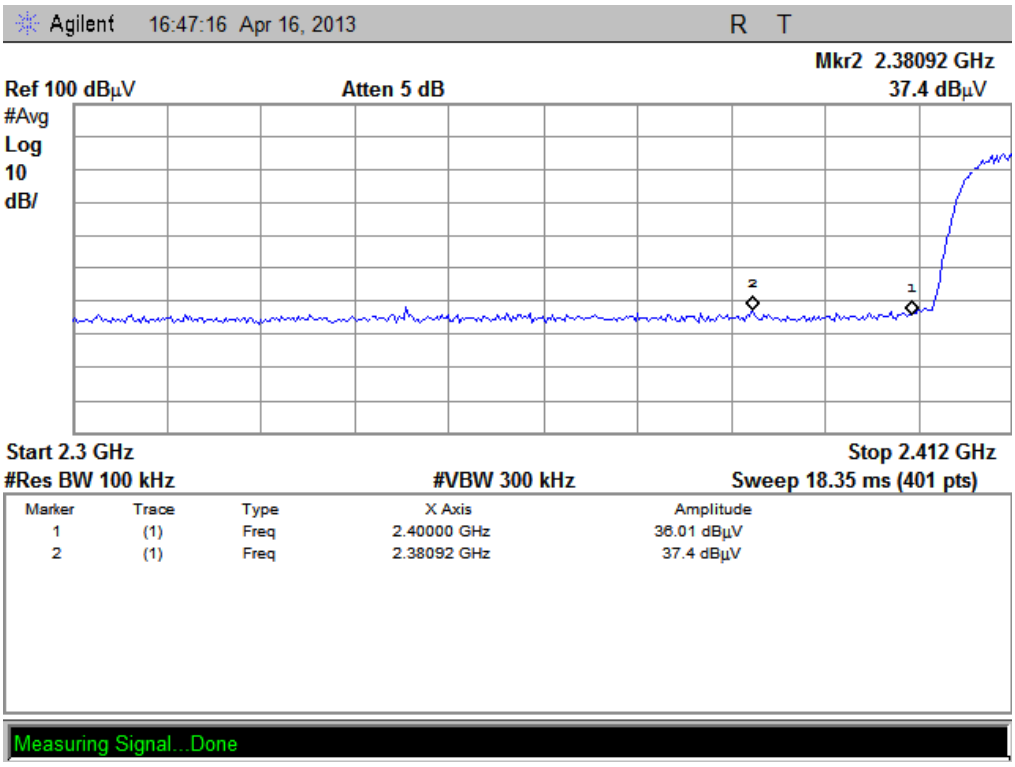
A. Test Verdict:

Channel	Frequency (MHz)	Detector PK/ AV	Receiver Reading UR (dBuV)	AT (dB)	AFactor (dB@3m)	Max. Emission E (dBµV/m)	Limit (dBµV/m)	Verdict
1	2349.56	PK	41.43	-30.93	32.56	43.06	74	Pass
1	2380.92	AV	37.40	-30.93	32.56	39.03	54	Pass
11	2493.45	PK	40.16	-29.05	32.50	43.61	74	Pass
11	2486.89	AV	38.37	-29.05	32.50	41.82	54	Pass

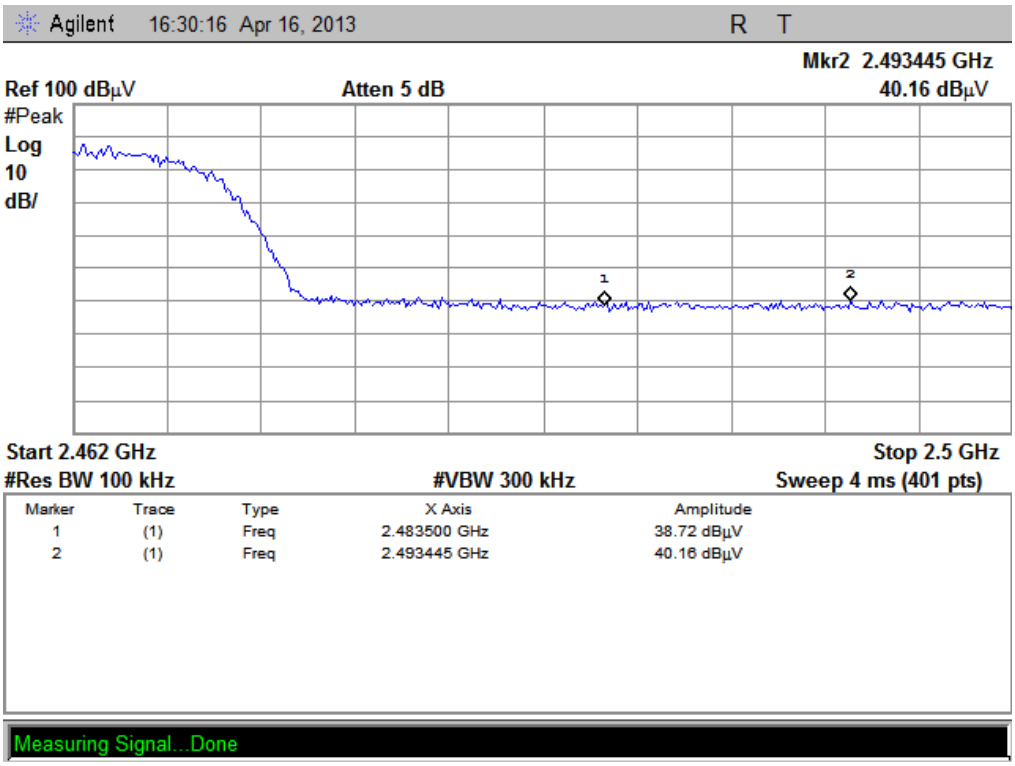
B. Test Plots:



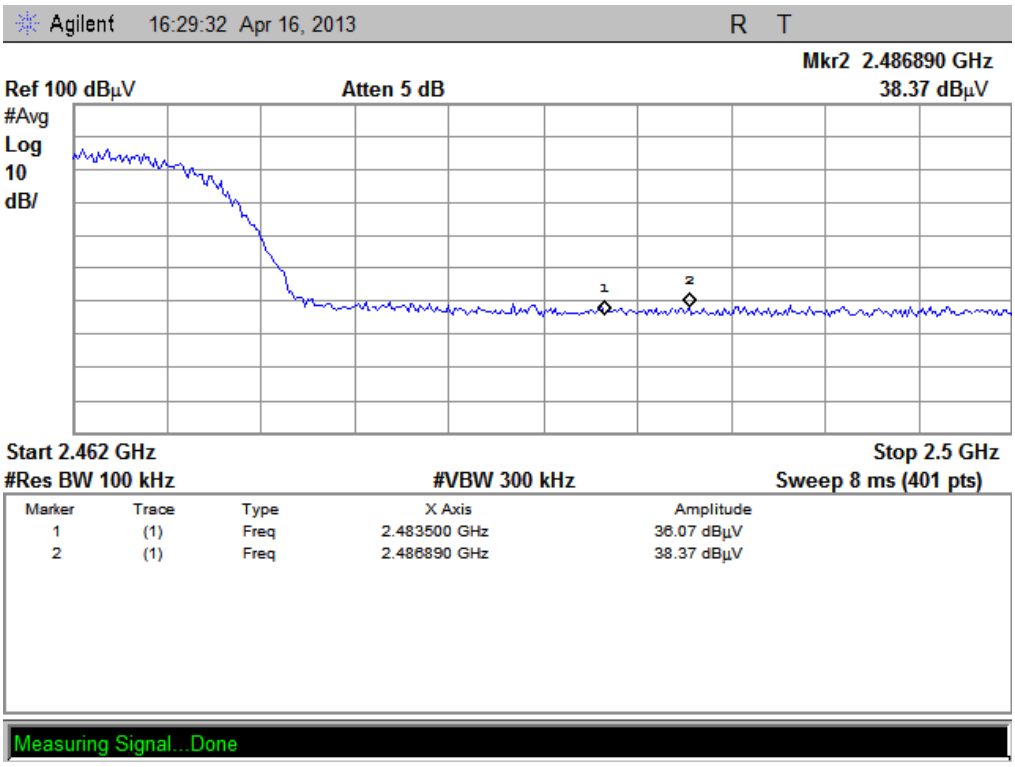
(Plot A1: Channel = 1 PEAK @ 802.11b)



(Plot A2: Channel = 1 AVG @ 802.11b)



(Plot B1: Channel = 11 PEAK @ 802.11b)



(Plot B2: Channel = 11 AVG @ 802.11b)

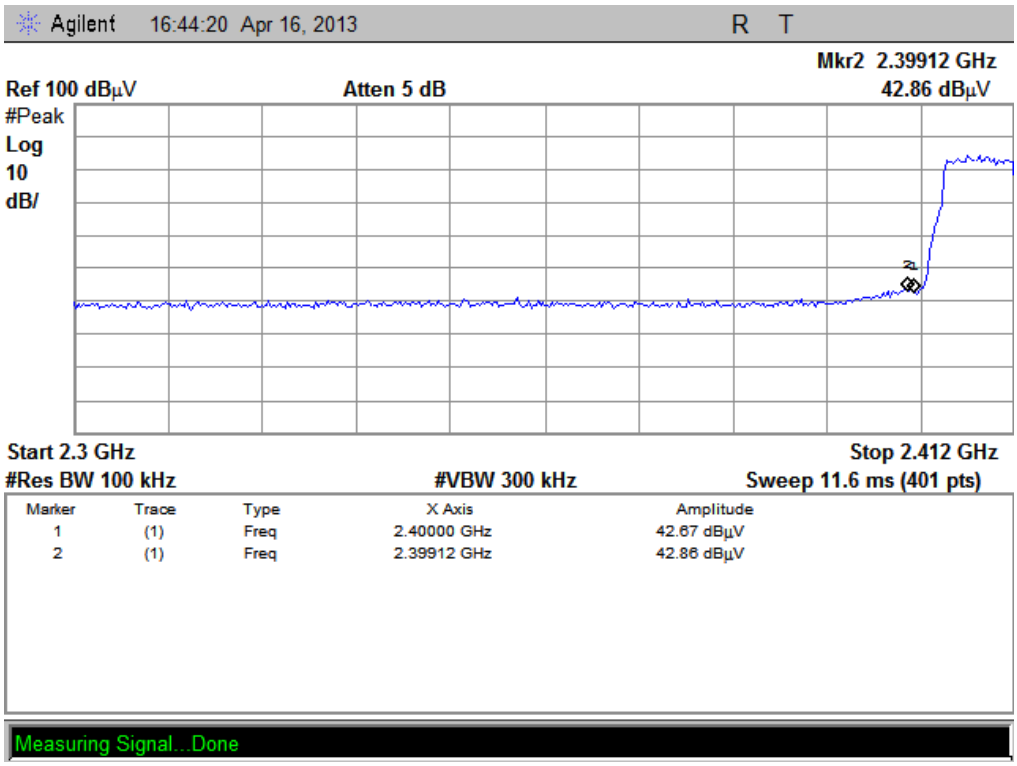
2.6.3.2. 802.11g Test mode

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

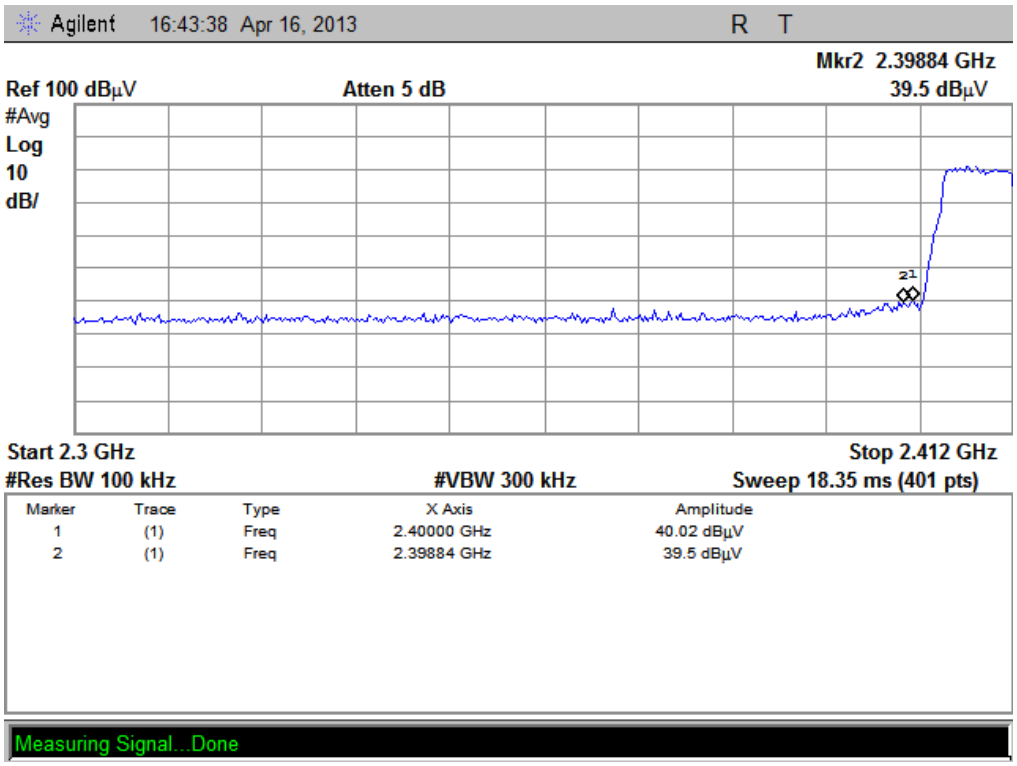
A. Test Verdict:

Channel	Frequency (MHz)	Detector PK/ AV	Receiver Reading UR (dBuV)	AT (dB)	AFactor (dB@3m)	Max. Emission E (dBµV/m)	Limit (dBµV/m)	Verdict
1	2399.12	PK	42.86	-30.93	32.56	44.49	74	Pass
1	2398.84	AV	39.50	-30.93	32.56	41.13	54	Pass
11	2484.42	PK	41.42	-29.05	32.50	44.87	74	Pass
11	2485.85	AV	38.54	-29.05	32.50	41.99	54	Pass

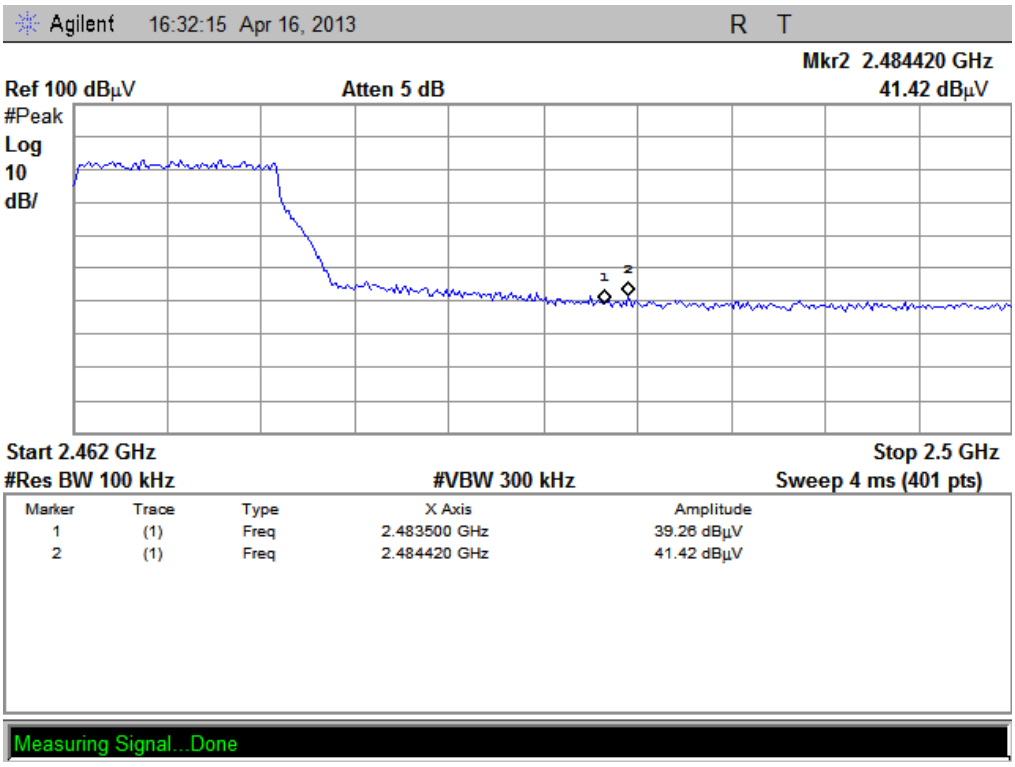
B. Test Plots:



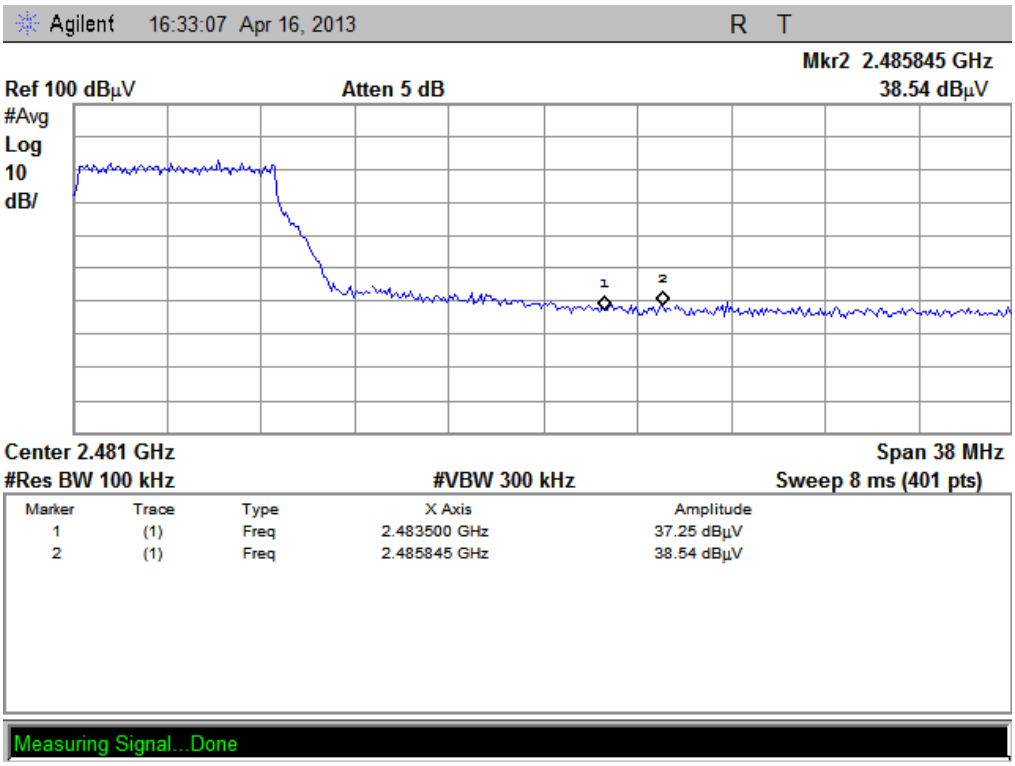
(Plot C1: Channel = 1 PEAK @ 802.11g)



(Plot C2: Channel = 1 AVG @ 802.11g)



(Plot D1: Channel = 11 PEAK @ 802.11g)



(Plot D2: Channel = 11 AVG @ 802.11g)

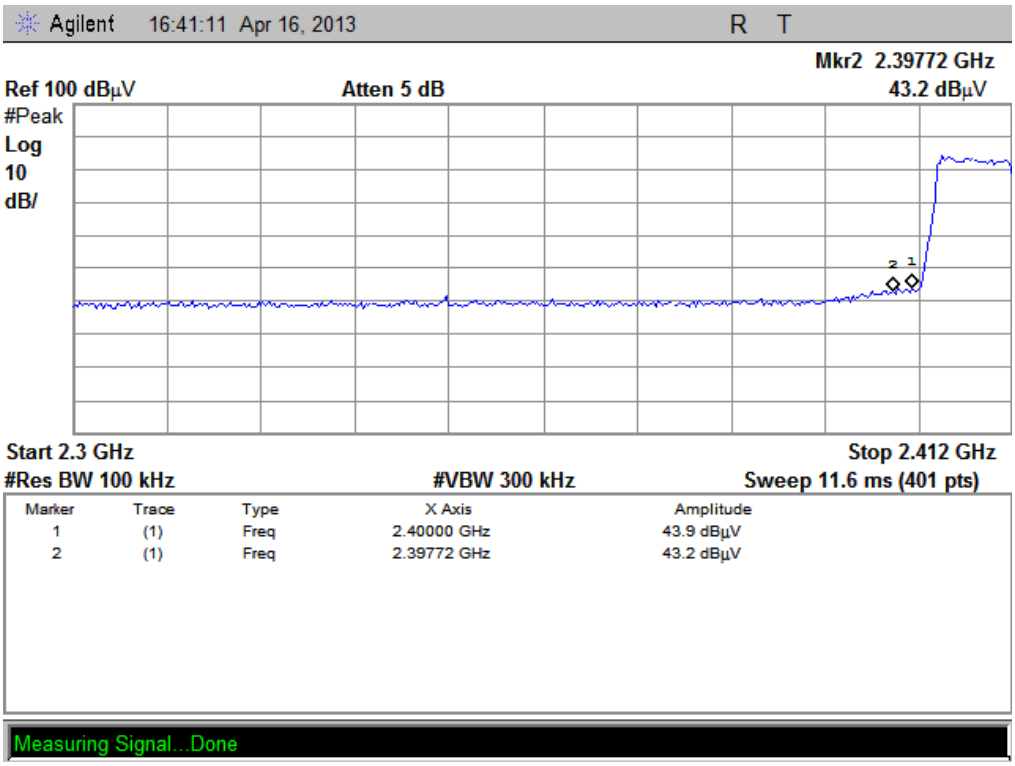
2.6.3.3. 802.11n-20MHz Test mode

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

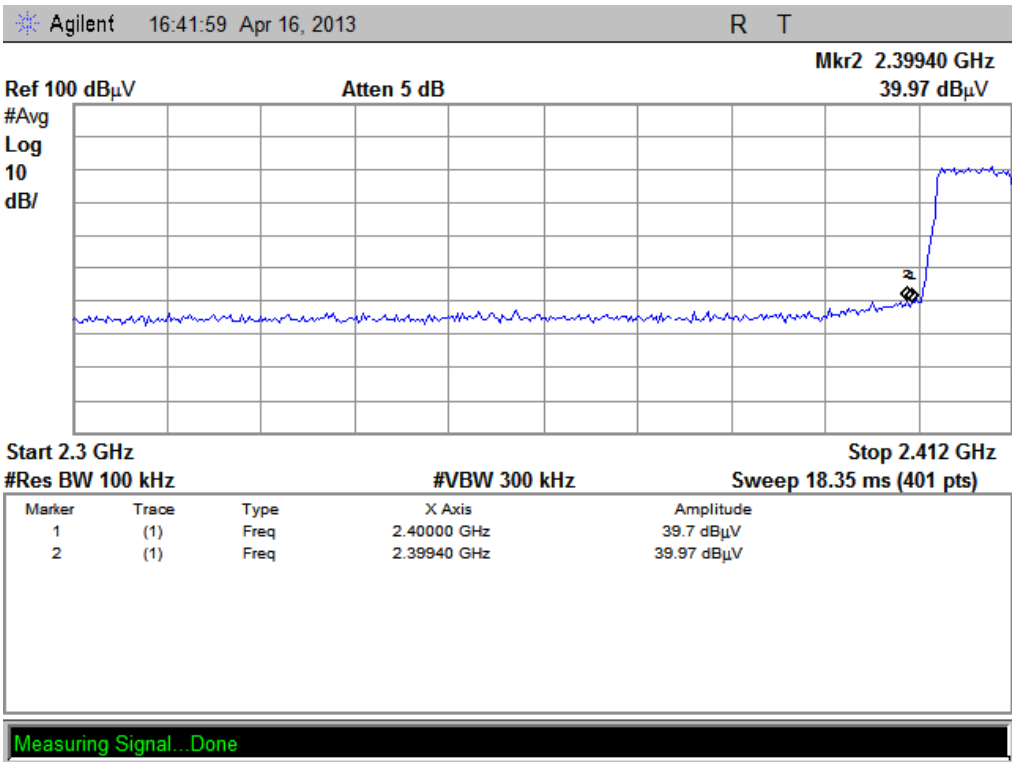
A. Test Verdict:

Channel	Frequency (MHz)	Detector PK/ AV	Receiver Reading UR (dBuV)	AT (dB)	AFactor (dB@3m)	Max. Emission E (dBµV/m)	Limit (dBµV/m)	Verdict
1	2397.72	PK	43.20	-30.93	32.56	44.83	74	Pass
1	2399.40	AV	39.97	-30.93	32.56	41.60	54	Pass
11	2486.70	PK	41.10	-29.05	32.50	44.55	74	Pass
11	2492.02	AV	39.73	-29.05	32.50	43.18	54	Pass

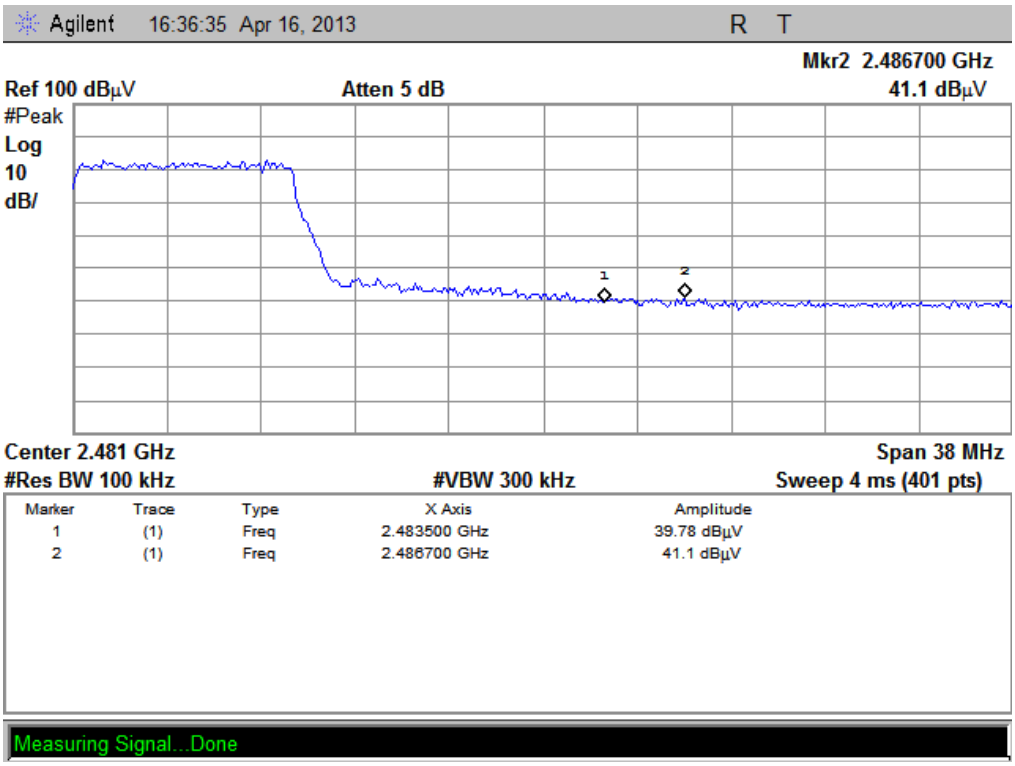
B. Test Plots:



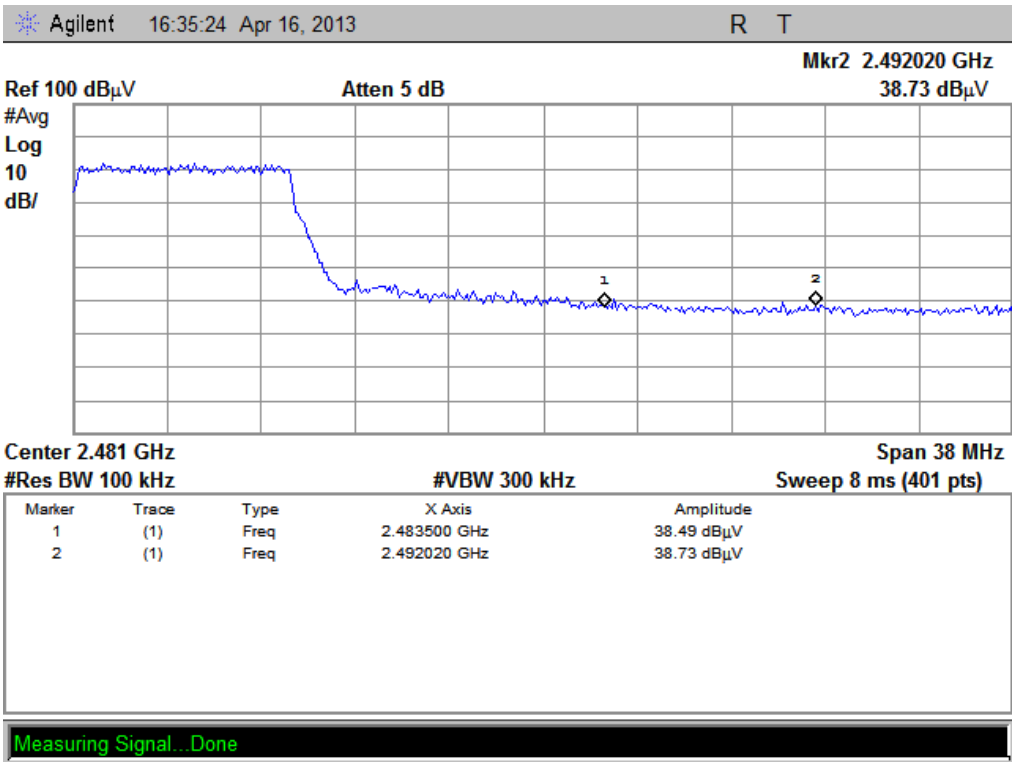
(Plot E1: Channel = 1 PEAK @ 802.11n-20)



(Plot E2: Channel = 1 AVG @ 802.11n-20)



(Plot F1: Channel = 11 PEAK @ 802.11n-20)



(Plot F2: Channel = 11 AVG @ 802.11n-20)

2.7. Conducted Emission

2.7.1. Requirement

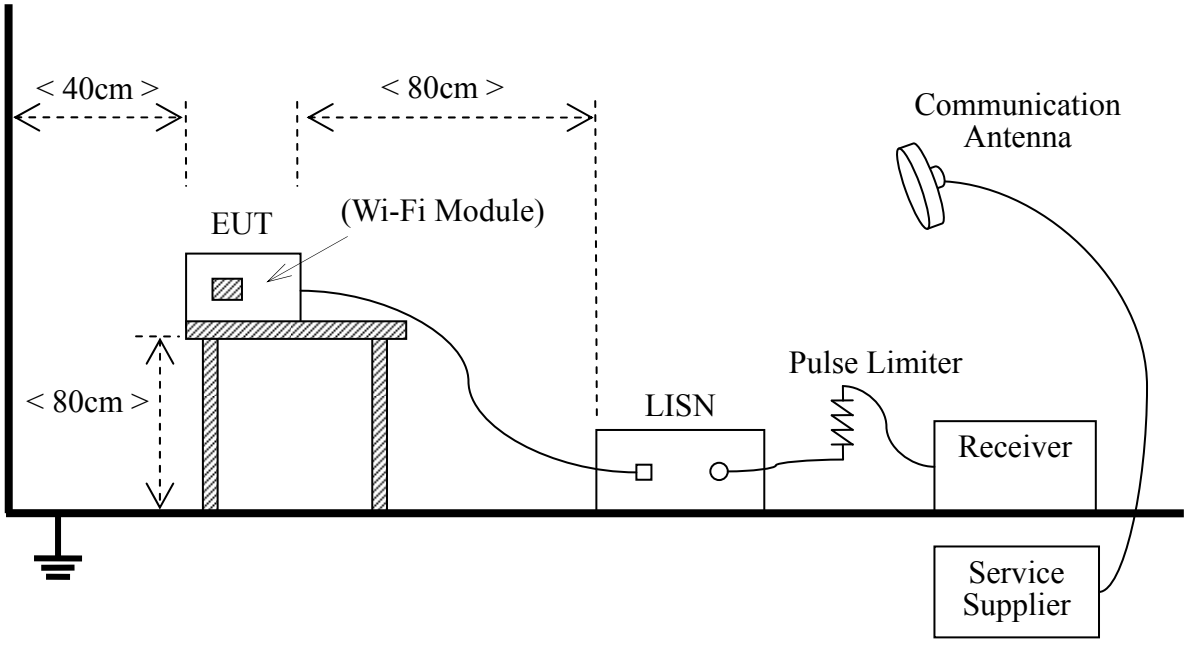
According to FCC section 15.207, for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency within the band 150kHz to 30MHz shall not exceed the limits in the following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

Frequency range (MHz)	Conducted Limit (dBμV)	
	Quai-peak	Average
0.15 - 0.50	66 to 56	56 to 46
0.50 - 5	56	46
5 - 30	60	50

NOTE:
(a) The lower limit shall apply at the band edges.
(b) The limit decreases linearly with the logarithm of the frequency in the range 0.15 - 0.50MHz.

2.7.2. Test Description

A. Test Setup:



The Table-top EUT was placed upon a non-metallic table 0.8m above the horizontal metal reference ground plane. EUT was connected to LISN and LISN was connected to reference Ground Plane. EUT was 80cm from LISN. The set-up and test methods were according to ANSI C63.4:2009

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.

B. Equipments List:

Description	Manufacturer	Model	Serial No.	Cal. Date	Cal. Due
Receiver	Agilent	E7405A	US44210471	2012.05	2013.05
LISN	Schwarzbeck	NSLK 8127	812744	2012.05	2013.05
Service Supplier	R&S	CMU200	100448	2012.05	2013.05
Pulse Limiter (20dB)	Schwarzbeck	VTSD 9561-D	9391	(n.a.)	(n.a.)

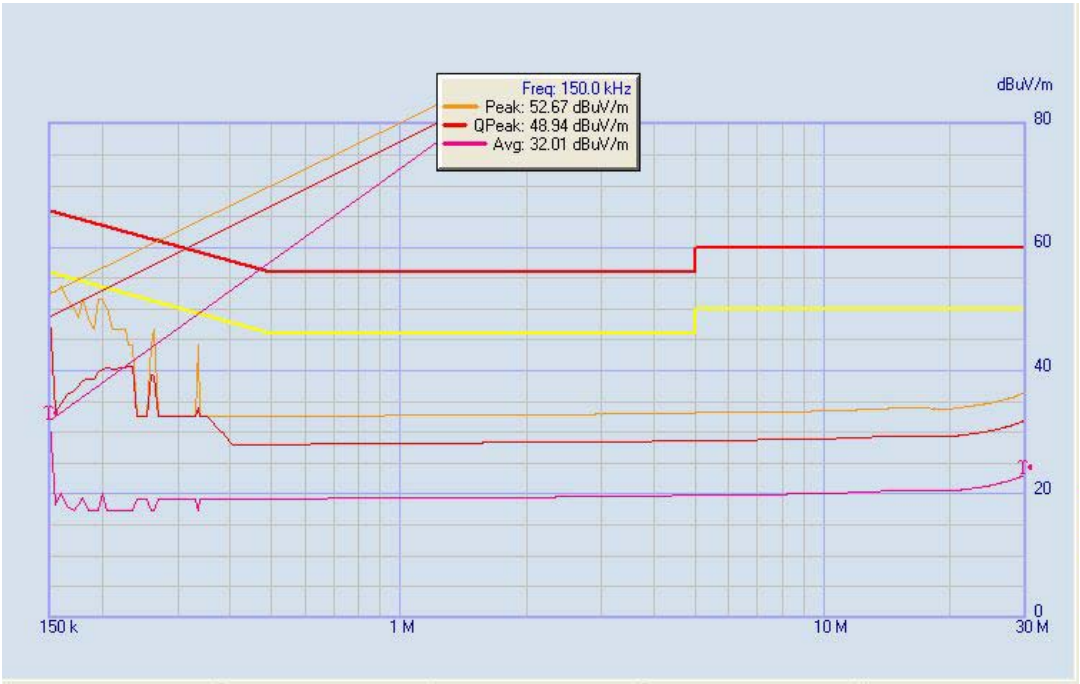
2.7.3. Test Result

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.

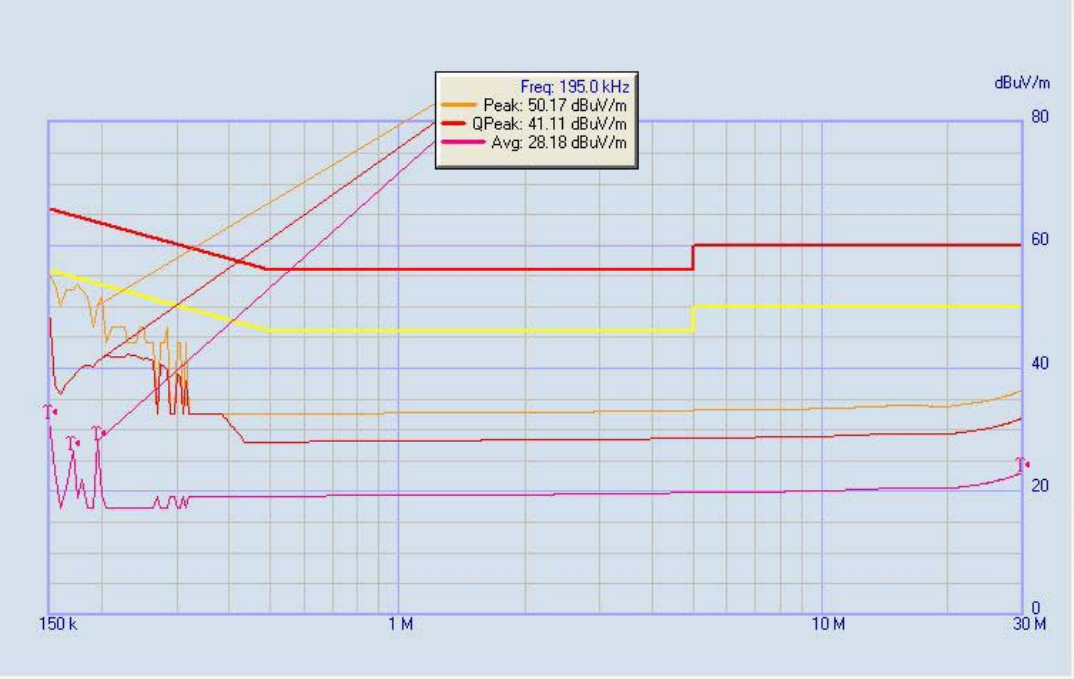
A. Test setup:

The EUT configuration of the emission tests is EUT + Link.

B. Test Plots:



(Plot A: L Phase)



(Plot B: N Phase)

2.8. Radiated Emission

2.8.1. Requirement

According to FCC section 15.247(d), 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 (μV/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:

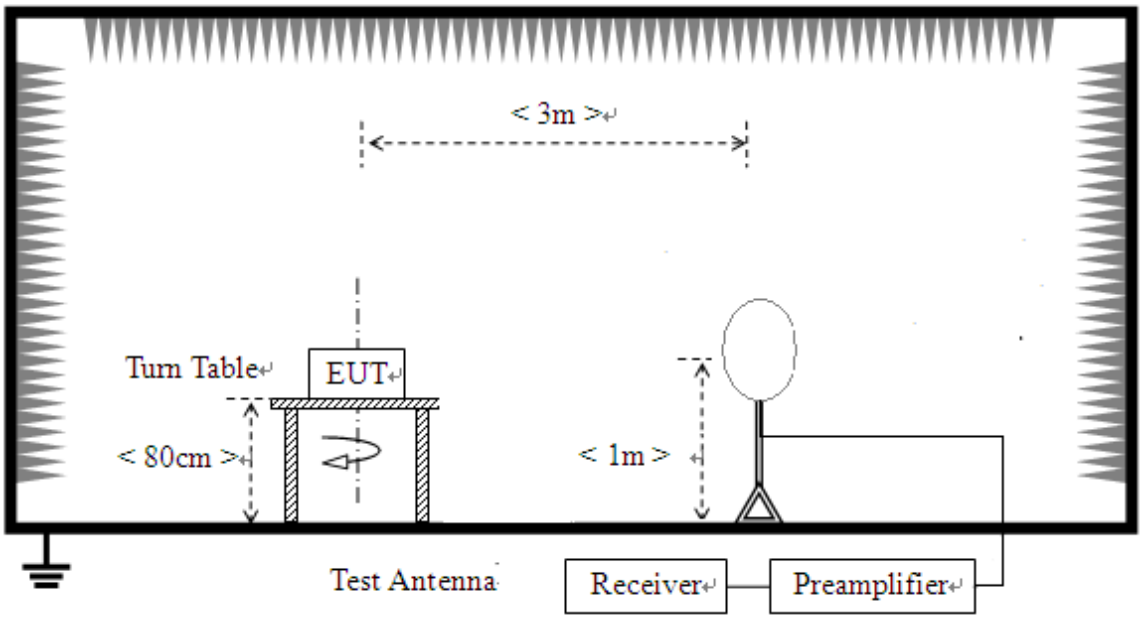
1. For Above 1000MHz, the emission limit in this paragraph is based on measurement instrumentation employing an average detector, measurement using instrumentation with a peak detector function, corresponding to 20dB above the maximum permitted average limit.
2. For above 1000MHz, limit field strength 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)

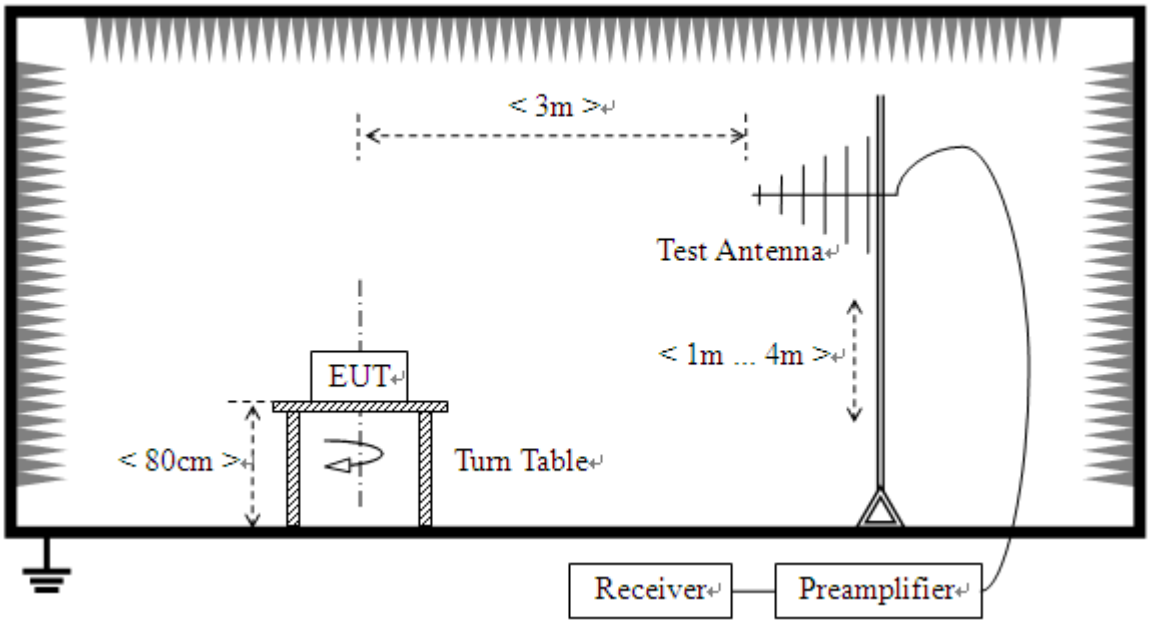
2.8.2. Test Description

A. Test Setup:

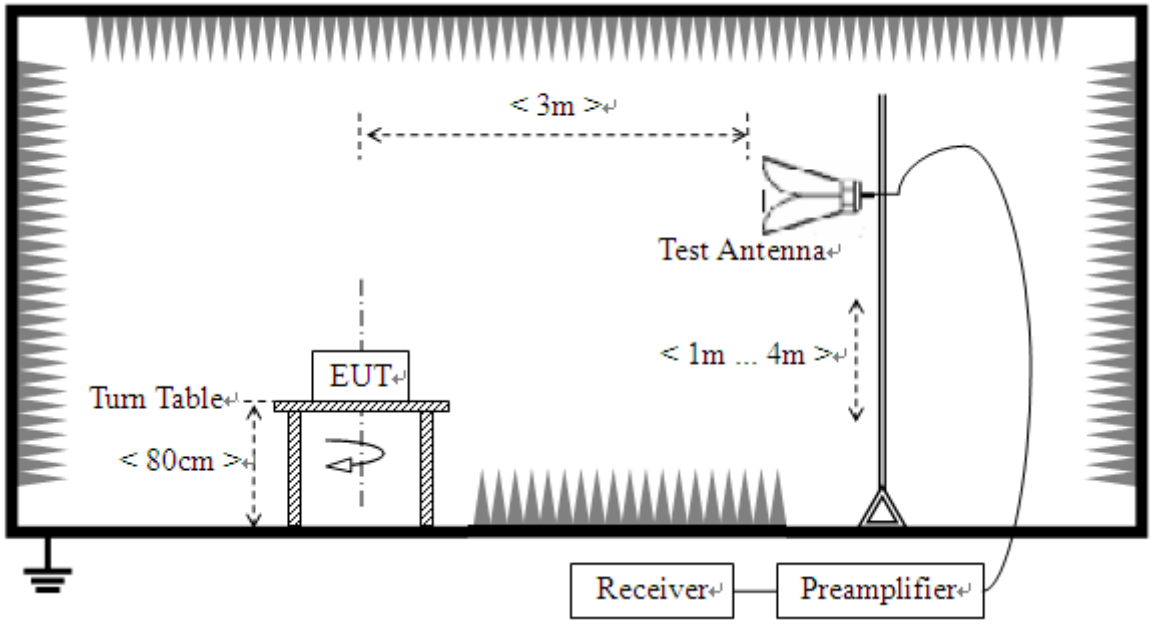
1) For radiated emissions from 9kHz to 30MHz



2) For radiated emissions from 30MHz to1GHz



3) For radiated emissions above 1GHz



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 2GHz) and Horn Test Antenna (above 2GHz) 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	2012.05	2013.05
Receiver	Agilent	E7405A	US44210471	2012.05	2013.05
Full-Anechoic Chamber	Albatross	9m*6m*6m	(n.a.)	2012.05	2014.05
Test Antenna - Bi-Log	Schwarzbeck	VULB 9163	9163-274	2012.05	2013.05

Description	Manufacturer	Model	Serial No.	Cal. Date	Cal. Due
Test Antenna - Horn	Schwarzbeck	BBHA 9120D	9120C-963	2012.05	2013.05
Test Antenna - Horn	R&S	HL050S7	71688	2012.05	2013.05
Test Antenna -Loop	Schwarzbeck	FMZB 1519	1519-022	2012.05	2013.05

2.8.3. 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:

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

A_T: Total correction Factor except Antenna

U_R: Receiver Reading

G_{preamp}: Preamplifier Gain

A_{Factor}: Antenna Factor at 3m

During the test, the total correction Factor AT and A_{Factor} were built in test software.

Note: All radiated emission tests were performed in X, Y, Z axis direction. And only the worst axis test condition was recorded in this test report.

2.8.3.1. 802.11b Test mode

A. Test Verdict for Harmonics:

The Fundamental Emissions

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

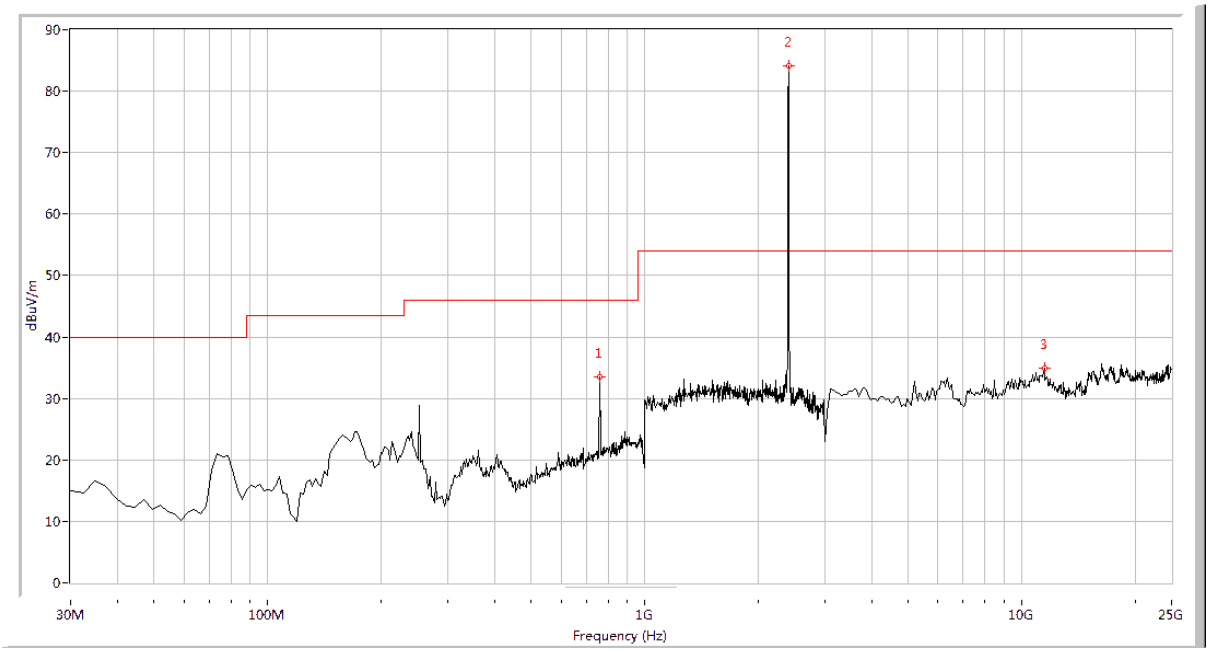
Channel	Frequency (MHz)	Fundamental Emission (dBμV/m)		Antenna Polarization	Refer to Plot
		PK	AV		
1	2412	84.03	N/A	Horizontal	Plot A.2
		84.45	N/A	Vertical	Plot A.3
6	2437	80.80	N/A	Horizontal	Plot B.2
		81.33	N/A	Vertical	Plot B.3
11	2462	78.08	N/A	Horizontal	Plot C.2
		78.14	N/A	Vertical	Plot C.3

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

B. Test Plots for the Whole Measurement Frequency Range:

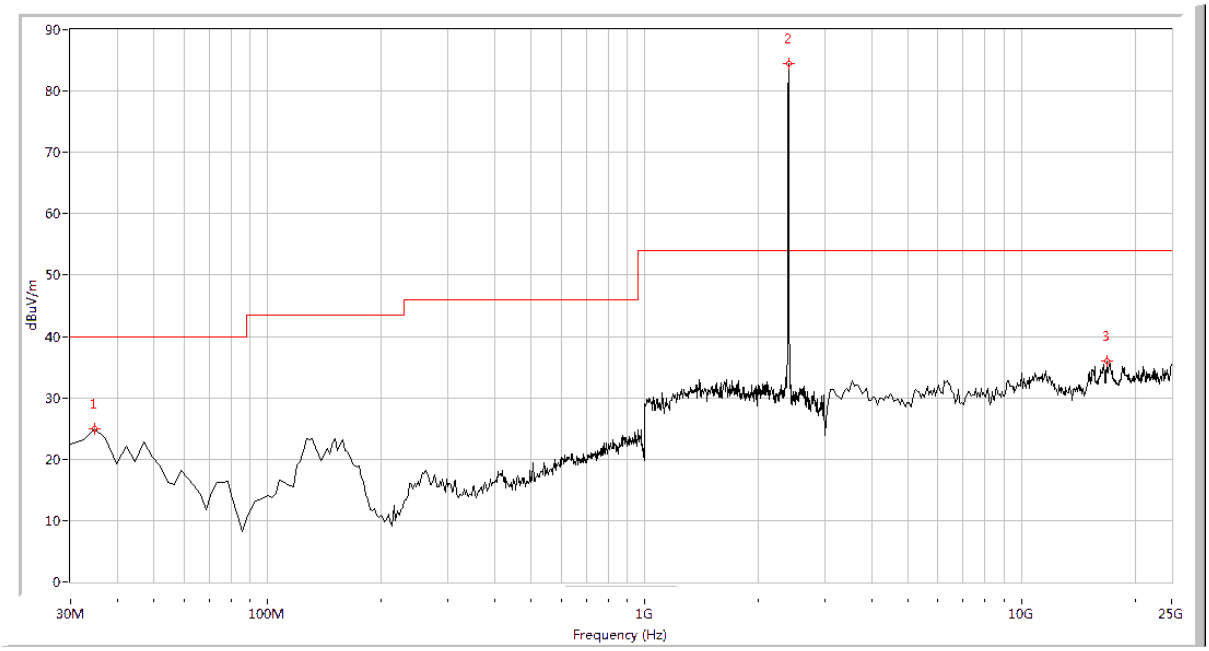
Plots for Channel = 1

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



Fre. (MHz)	Pk	QP	AV	Limit-PK	Limit-QP	Limit-AV	Antenna	Verdict
758.105	33.57	N.A	N.A	N.A	46.0	N.A	Horizontal	PASS
2412.000	84.03	N.A	N.A	N.A	N.A	N.A	Horizontal	N.A
11503.741	34.90	N.A	N.A	74.0	N.A	54.0	Horizontal	PASS

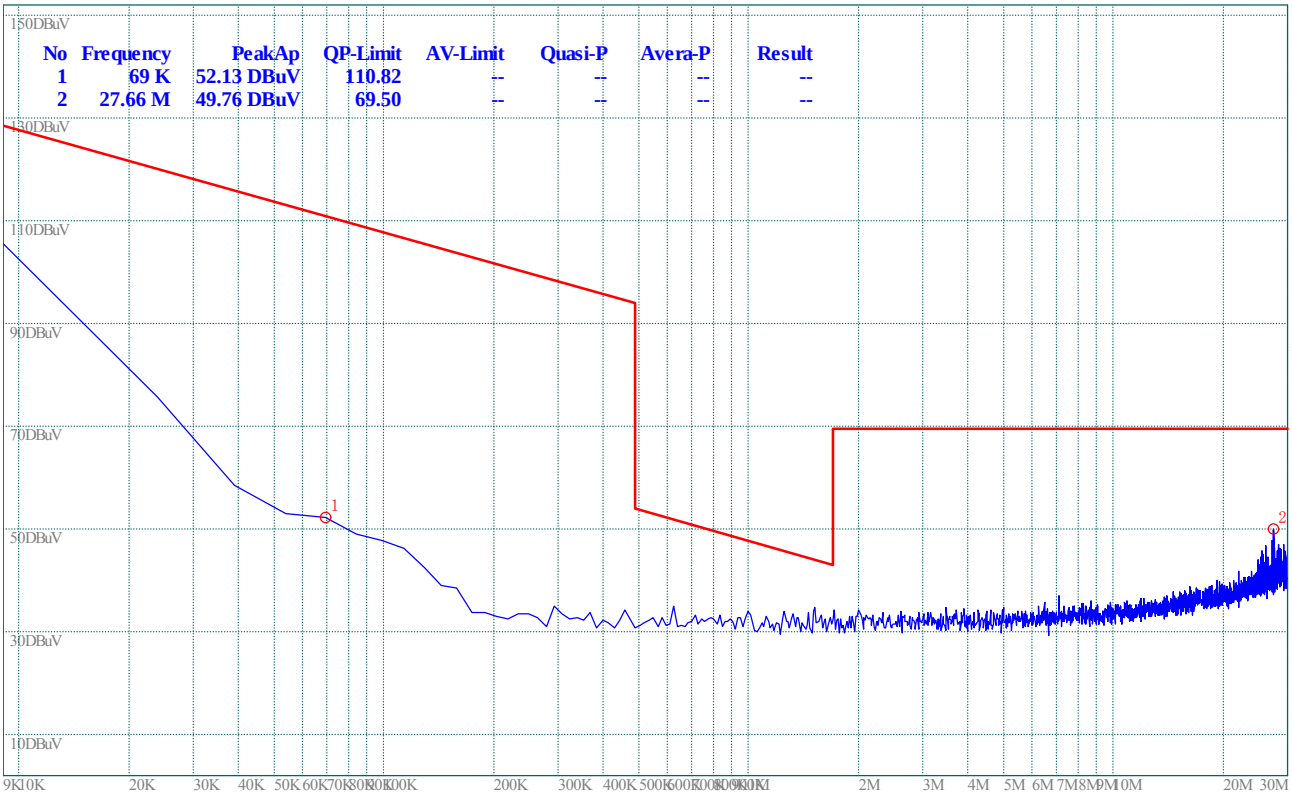
(Plot A.2: Antenna Horizontal, 30MHz to 25GHz)



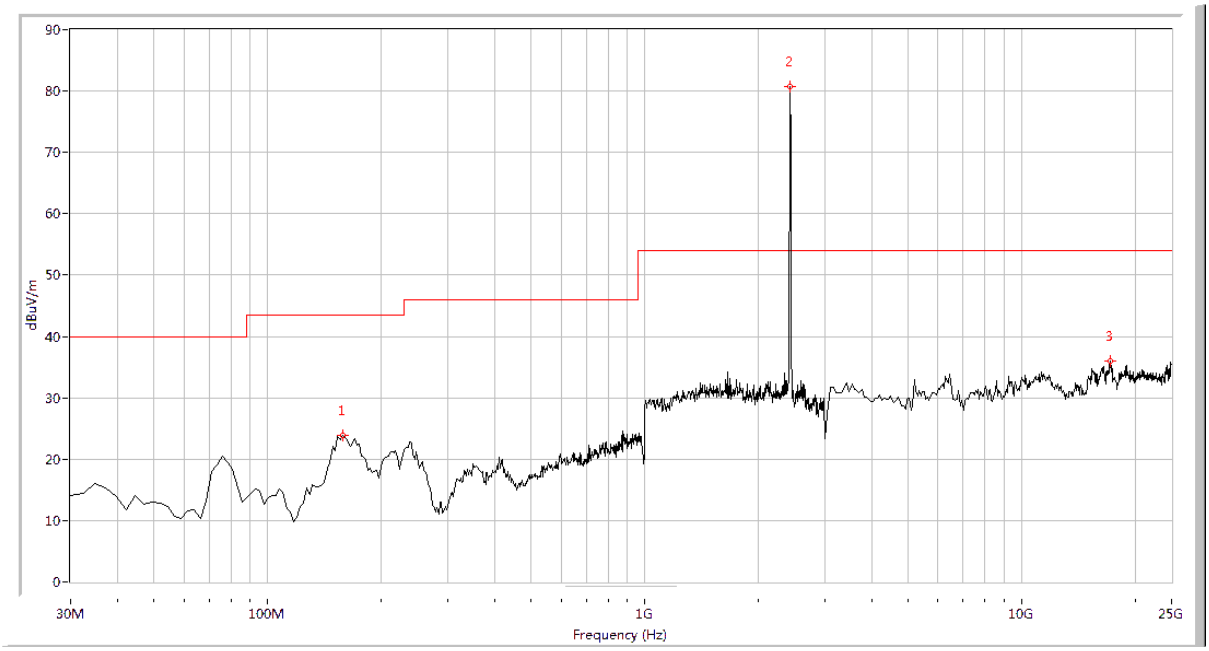
Fre. (MHz)	Pk	QP	AV	Limit-PK	Limit-QP	Limit-AV	Antenna	Verdict
34.838	24.99	N.A	N.A	N.A	40.0	N.A	Vertical	PASS
2412.000	84.45	N.A	N.A	N.A	N.A	N.A	Vertical	N.A
16825.436	36.05	N.A	N.A	74.0	N.A	54.0	Vertical	PASS

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

Plot for Channel = 6

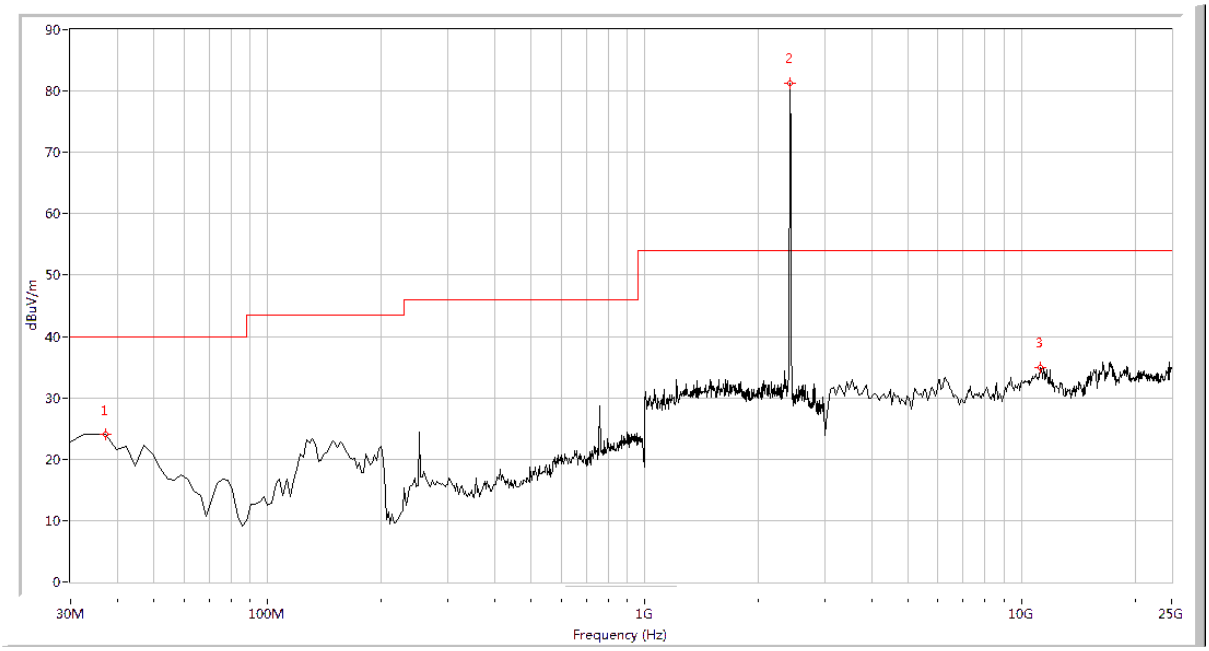


(Plot B.1: 9kHz to 30MHz)



Fre. (MHz)	Pk	QP	AV	Limit-PK	Limit-QP	Limit-AV	Antenna	Verdict
158.204	23.81	N.A	N.A	N.A	43.5	N.A	Horizontal	PASS
2437.000	80.80	N.A	N.A	N.A	N.A	N.A	Horizontal	N.A
17154.613	35.93	N.A	N.A	74.0	N.A	54.0	Horizontal	PASS

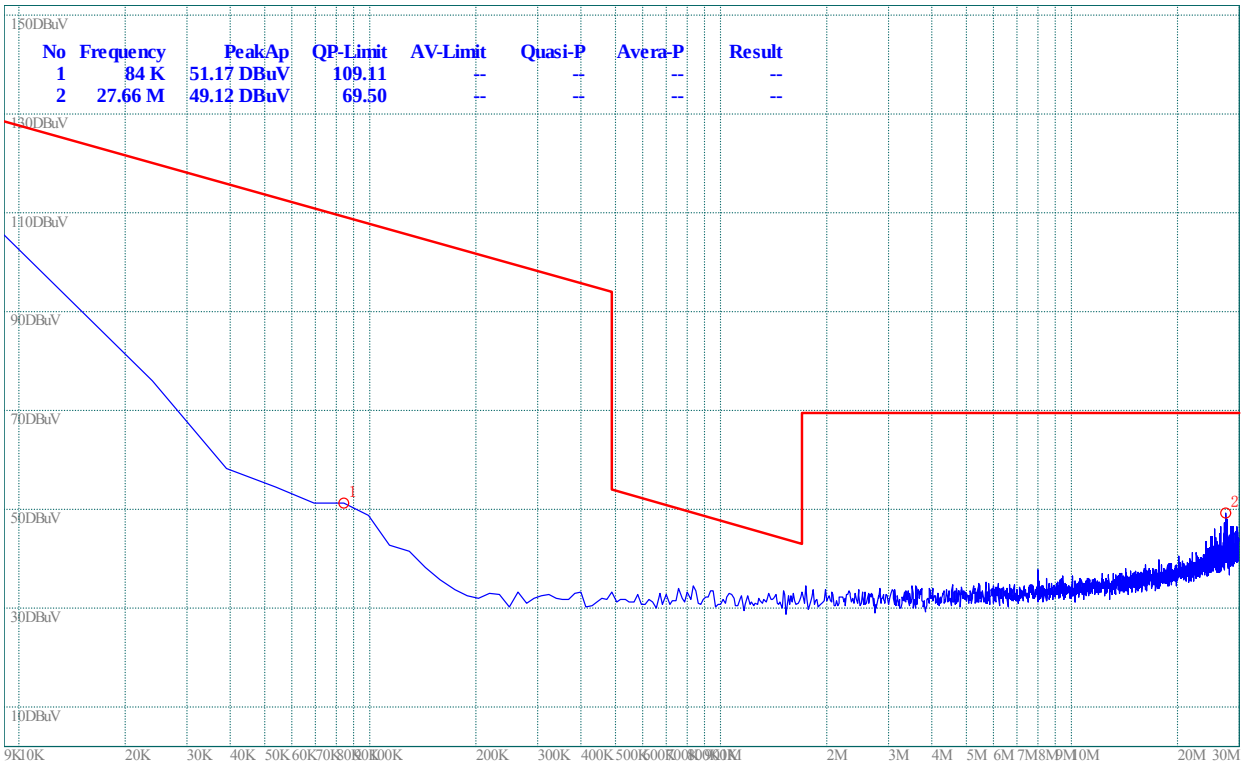
(Plot B.2: Antenna Horizontal, 30MHz to 25GHz)



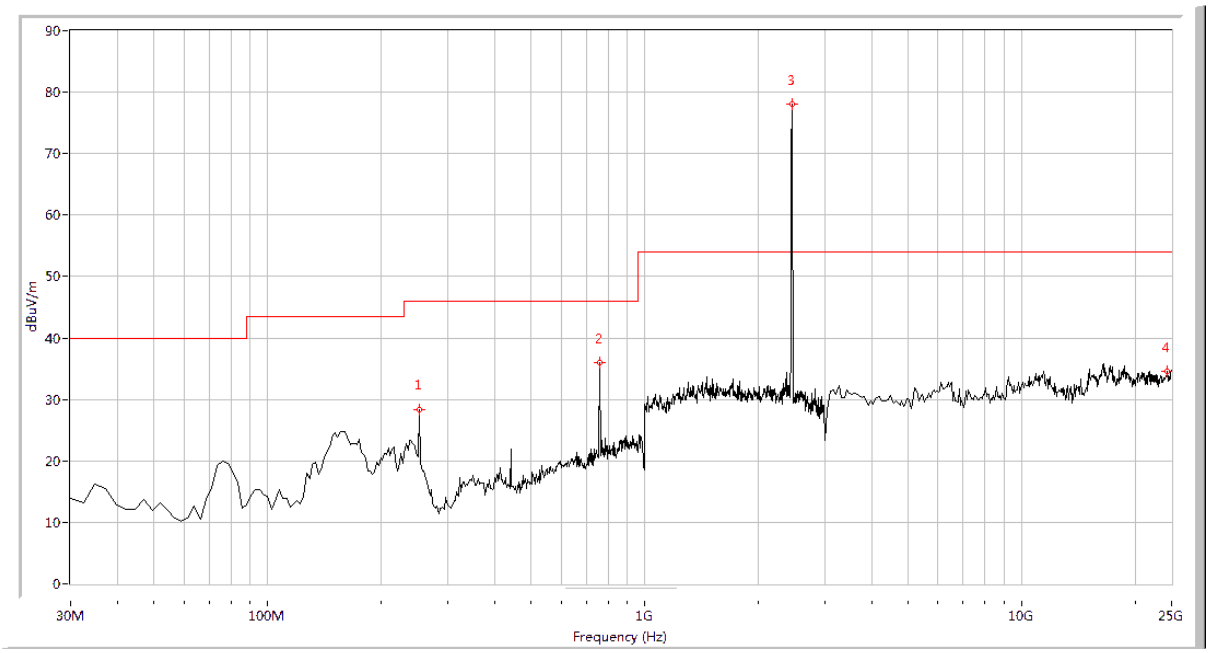
Fre. (MHz)	Pk	QP	AV	Limit-PK	Limit-QP	Limit-AV	Antenna	Verdict
37.257	24.09	N.A	N.A	N.A	40.0	N.A	Vertical	PASS
2437.000	81.33	N.A	N.A	N.A	N.A	N.A	Vertical	N.A
11229.426	34.97	N.A	N.A	74.0	N.A	54.0	Vertical	PASS

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

Plot for Channel = 11

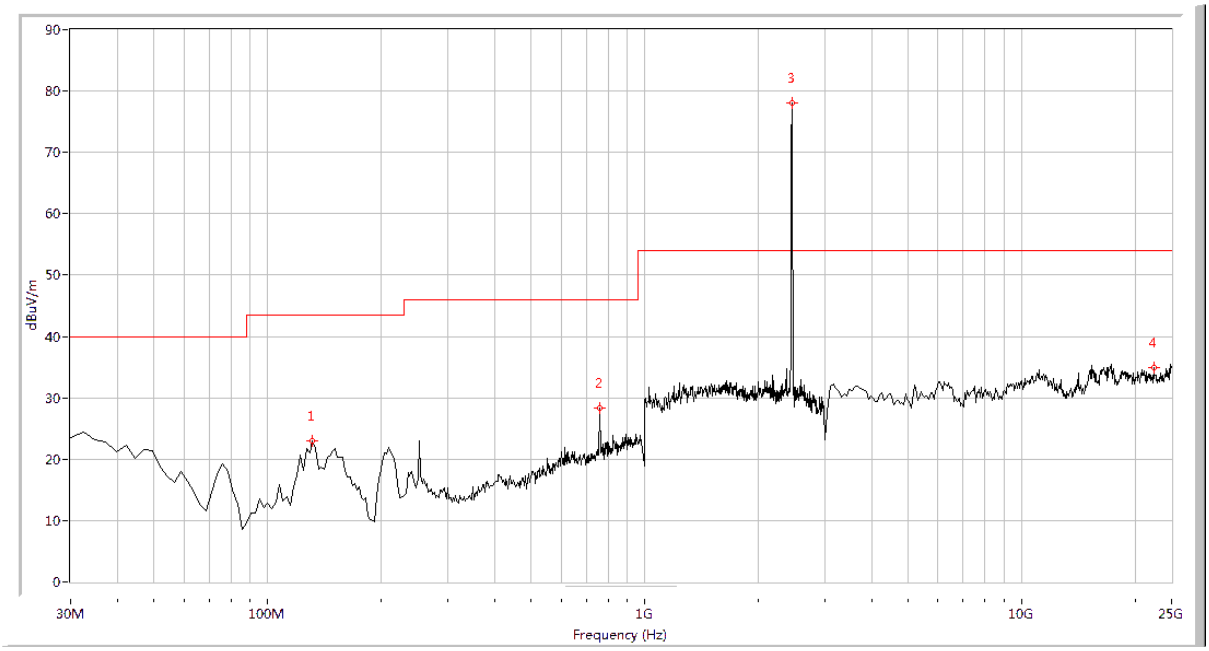


(Plot C.1: 9kHz to 30MHz)



Fre. (MHz)	Pk	QP	AV	Limit-PK	Limit-QP	Limit-AV	Antenna	Verdict
252.544	28.34	N.A	N.A	N.A	46.0	N.A	Horizontal	PASS
758.105	35.97	N.A	N.A	N.A	46.0	N.A	Horizontal	PASS
2462.000	78.08	N.A	N.A	N.A	N.A	N.A	Horizontal	N.A
24341.646	34.65	N.A	N.A	74.0	N.A	54.0	Horizontal	PASS

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



Fre. (MHz)	Pk	QP	AV	Limit-PK	Limit-QP	Limit-AV	Antenna	Verdict
131.596	22.91	N.A	N.A	N.A	43.5	N.A	Vertical	PASS
758.105	28.30	N.A	N.A	N.A	46.0	N.A	Vertical	PASS
2462.000	78.14	N.A	N.A	N.A	N.A	N.A	Vertical	N.A
22421.446	34.91	N.A	N.A	74.0	N.A	54.0	Vertical	PASS

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

2.8.3.2. 802.11g Test mode

A. Test Verdict for Harmonics:

The Fundamental Emissions

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

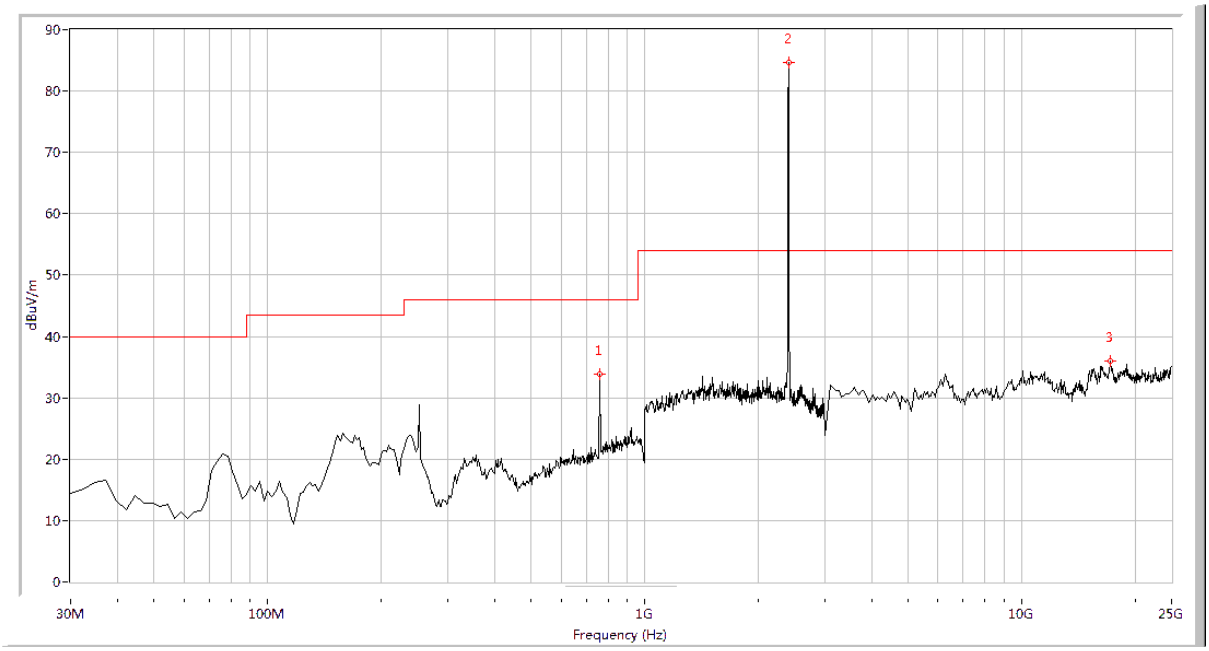
Channel	Frequency (MHz)	Fundamental Emission (dBμV/m)		Antenna Polarization	Refer to Plot
		PK	AV		
1	2412	84.62	N/A	Horizontal	Plot D.2
		84.08	N/A	Vertical	Plot D.3
6	2437	80.70	N/A	Horizontal	Plot E.2
		82.05	N/A	Vertical	Plot E.3
11	2462	77.08	N/A	Horizontal	Plot F.2
		78.05	N/A	Vertical	Plot F.3

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

B. Test Plots for the Whole Measurement Frequency Range:

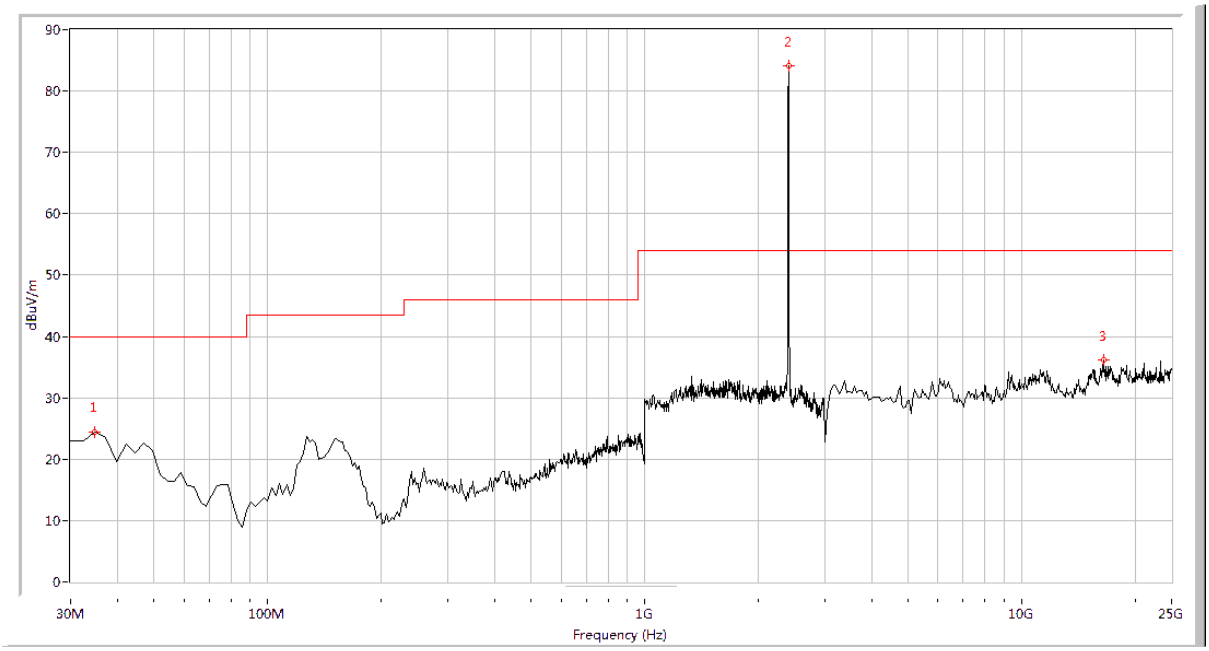
Plots for Channel = 1

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



Fre. (MHz)	Pk	QP	AV	Limit-PK	Limit-QP	Limit-AV	Antenna	Verdict
758.105	33.80	N.A	N.A	N.A	46.0	N.A	Horizontal	PASS
2412.000	84.62	N.A	N.A	N.A	N.A	N.A	Horizontal	N.A
17209.476	36.03	N.A	N.A	74.0	N.A	54.0	Horizontal	PASS

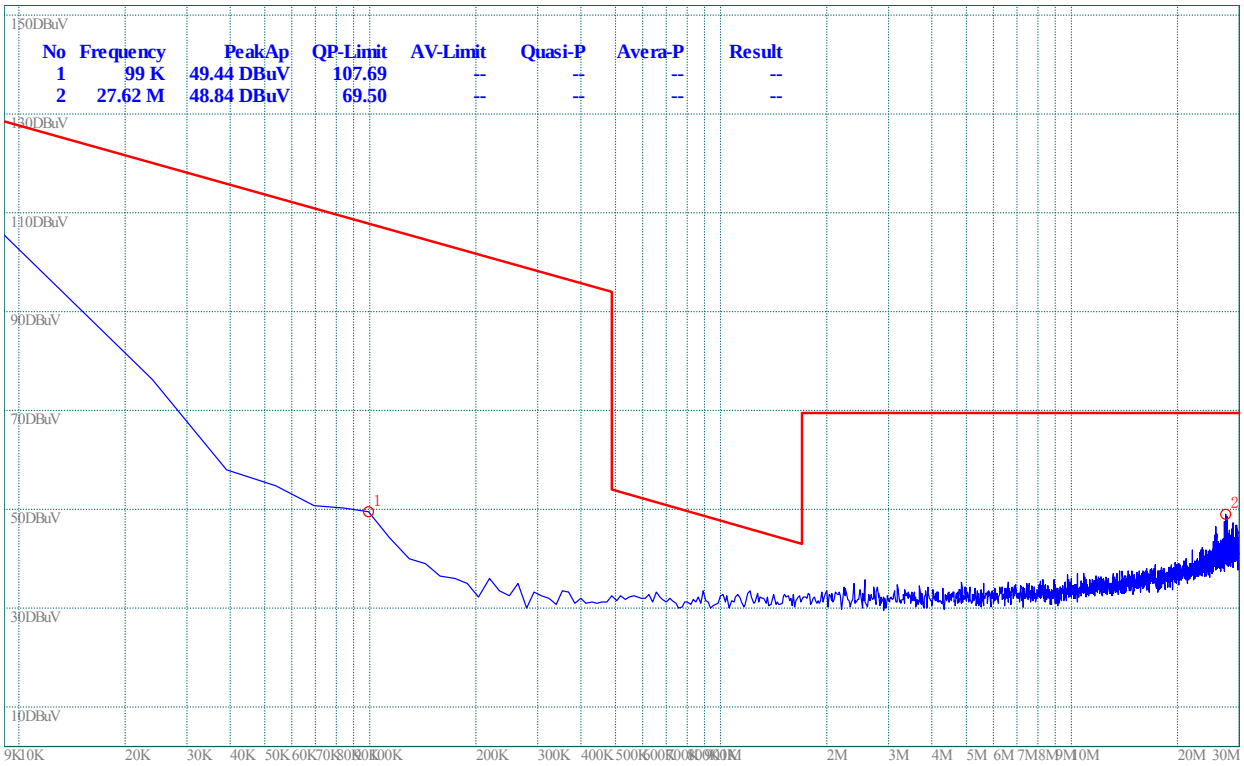
(Plot D.2: Antenna Horizontal, 30MHz to 25GHz)



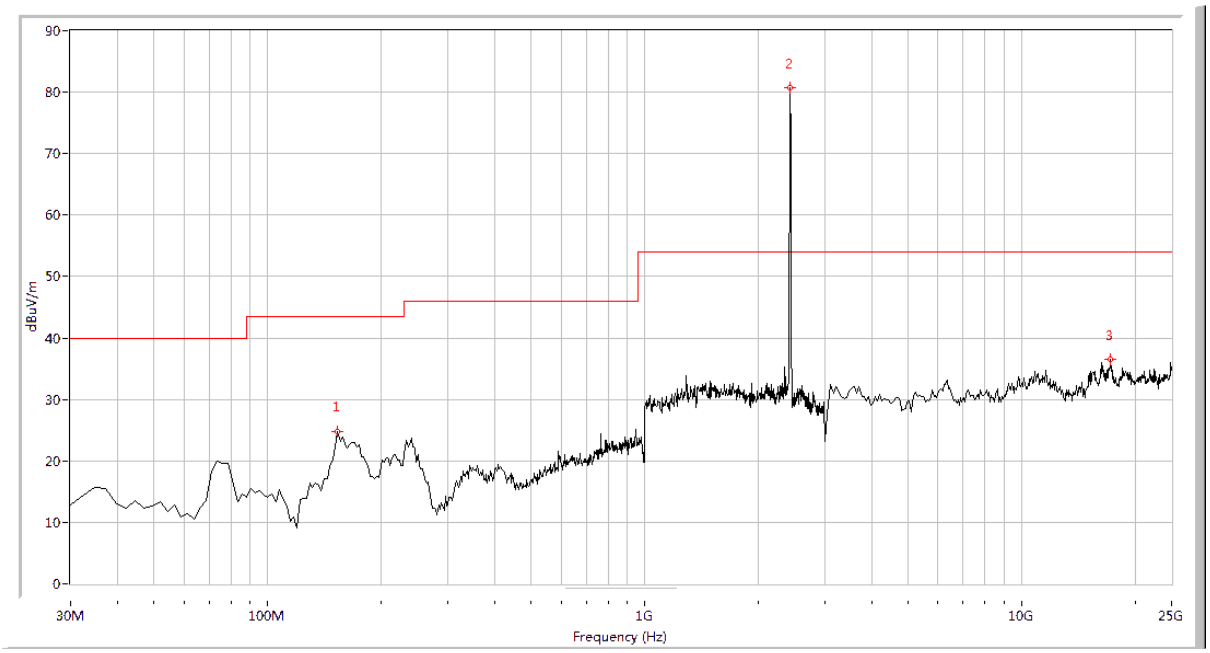
Fre. (MHz)	Pk	QP	AV	Limit-PK	Limit-QP	Limit-AV	Antenna	Verdict
34.838	24.48	N.A	N.A	N.A	40.0	N.A	Vertical	PASS
2412.000	84.08	N.A	N.A	N.A	N.A	N.A	Vertical	N.A
16496.259	36.19	N.A	N.A	74.0	N.A	54.0	Vertical	PASS

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

Plot for Channel = 6

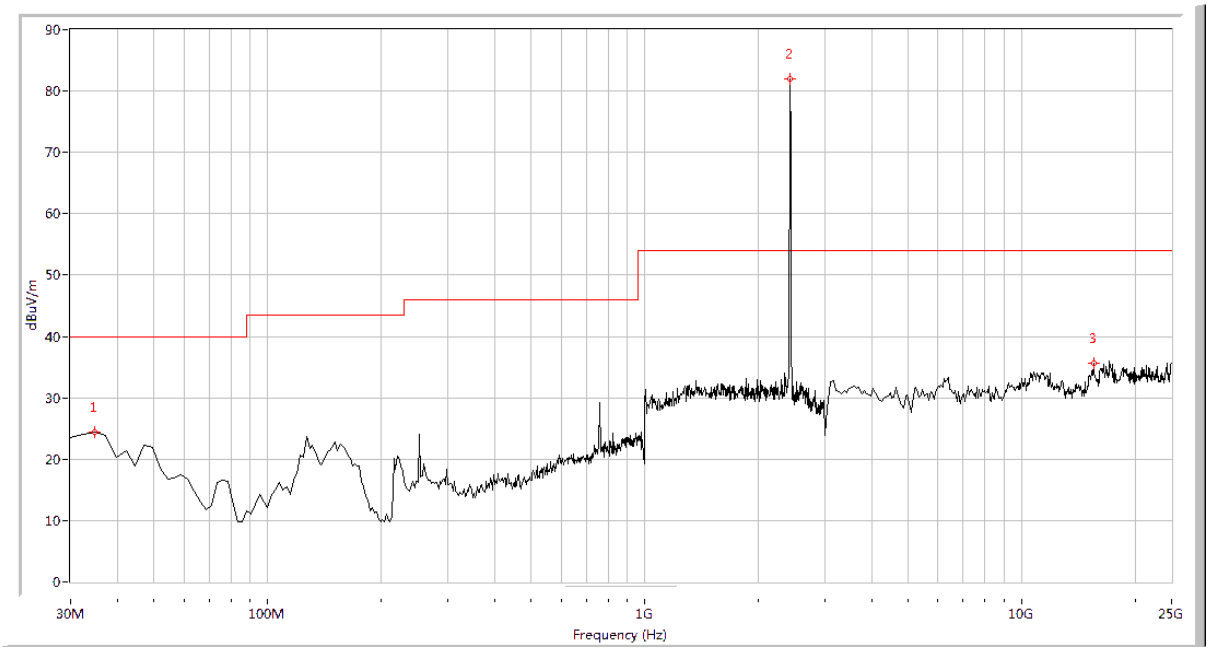


(Plot E.1: 9kHz to 30MHz)



Fre. (MHz)	Pk	QP	AV	Limit-PK	Limit-QP	Limit-AV	Antenna	Verdict
153.367	24.69	N.A	N.A	N.A	43.5	N.A	Horizontal	PASS
2437.000	80.70	N.A	N.A	N.A	N.A	N.A	Horizontal	N.A
17209.476	36.53	N.A	N.A	74.0	N.A	54.0	Horizontal	PASS

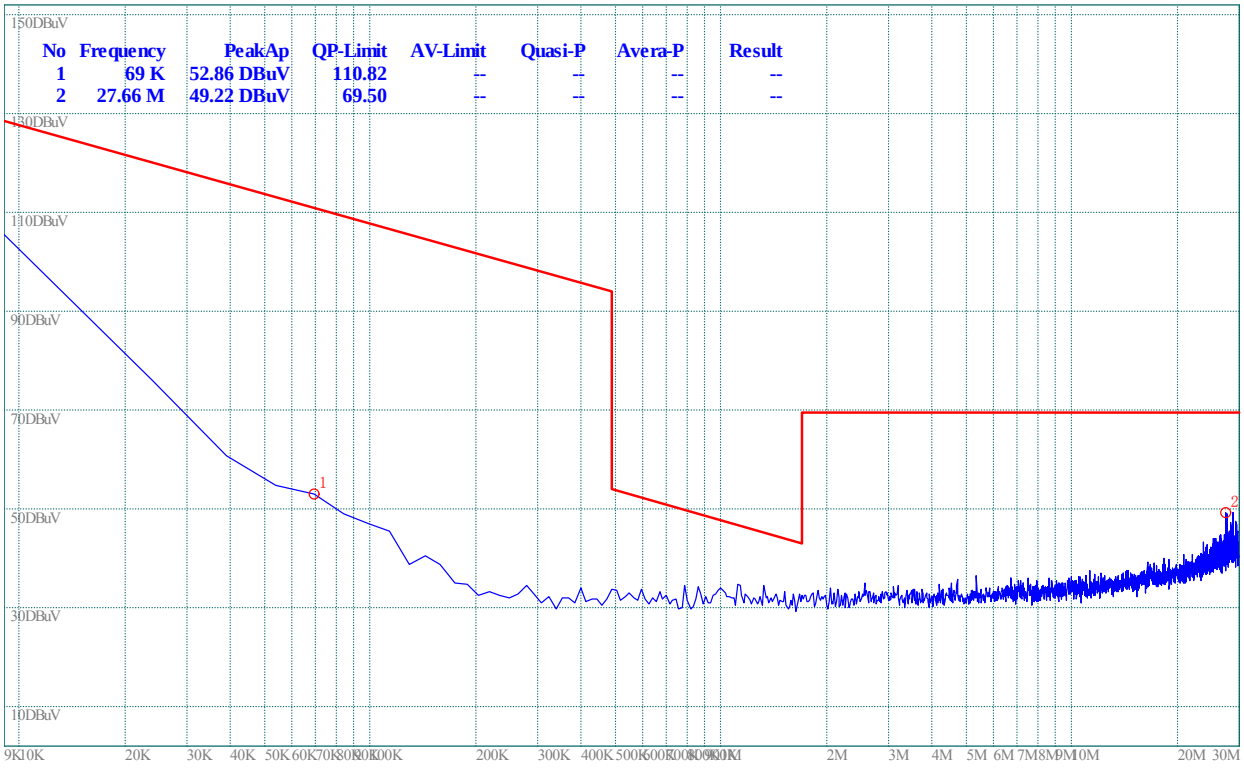
(Plot E.2: Antenna Horizontal, 30MHz to 25GHz)



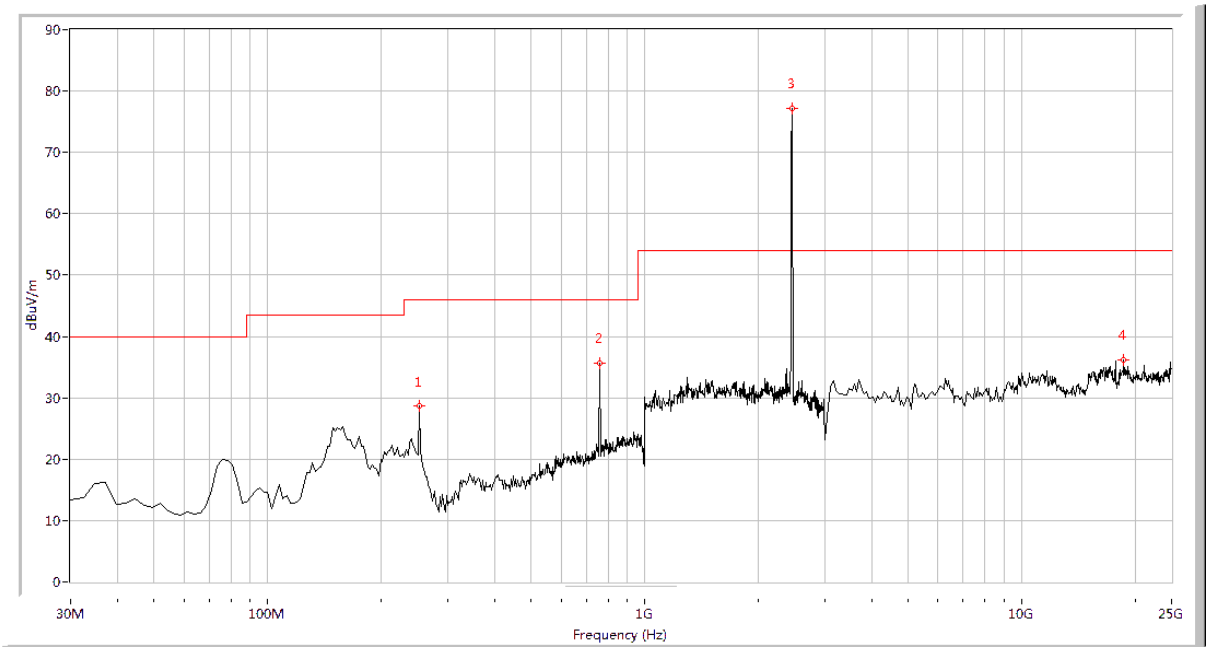
Fre. (MHz)	Pk	QP	AV	Limit-PK	Limit-QP	Limit-AV	Antenna	Verdict
34.838	24.38	N.A	N.A	N.A	40.0	N.A	Vertical	PASS
2437.000	82.05	N.A	N.A	N.A	N.A	N.A	Vertical	N.A
15508.728	35.66	N.A	N.A	74.0	N.A	54.0	Vertical	PASS

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

Plot for Channel = 11

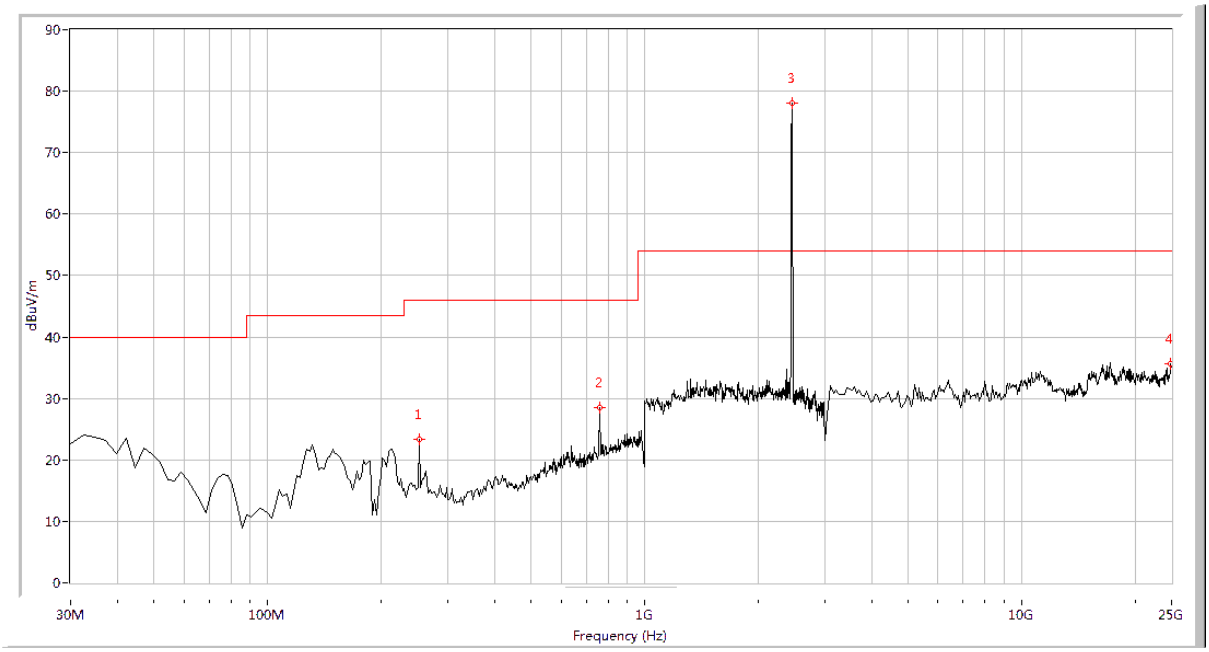


(Plot F.1: 9kHz to 30MHz)



Fre. (MHz)	Pk	QP	AV	Limit-PK	Limit-QP	Limit-AV	Antenna	Verdict
252.544	28.66	N.A	N.A	N.A	46.0	N.A	Horizontal	PASS
758.105	35.58	N.A	N.A	N.A	46.0	N.A	Horizontal	PASS
2462.000	77.08	N.A	N.A	N.A	N.A	N.A	Horizontal	N.A
18690.773	36.11	N.A	N.A	74.0	N.A	54.0	Horizontal	PASS

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



Fre. (MHz)	Pk	QP	AV	Limit-PK	Limit-QP	Limit-AV	Antenna	Verdict
252.544	23.37	N.A	N.A	N.A	46.0	N.A	Vertical	PASS
758.105	28.56	N.A	N.A	N.A	46.0	N.A	Vertical	PASS
2462.000	78.05	N.A	N.A	N.A	N.A	N.A	Vertical	N.A
24835.411	35.68	N.A	N.A	74.0	N.A	54.0	Vertical	PASS

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

2.8.3.3. 802.11n-20MHz Test mode

A. Test Verdict for Harmonics:

The Fundamental Emissions

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

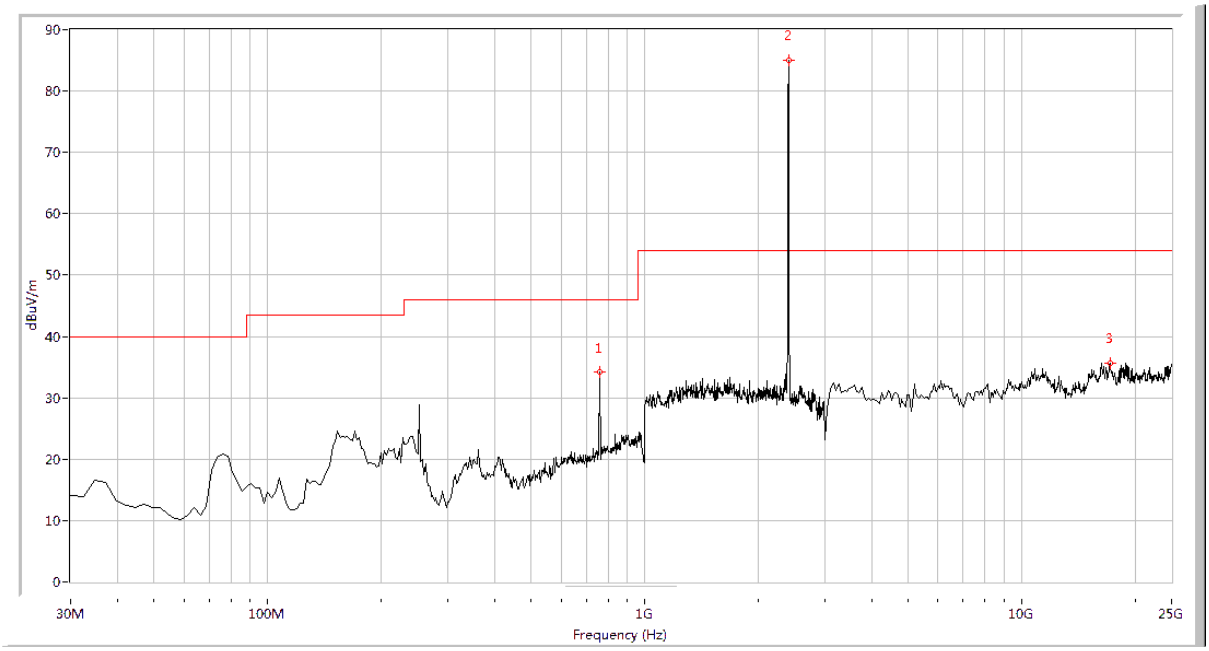
Channel	Frequency (MHz)	Fundamental Emission (dBμV/m)		Antenna Polarization	Refer to Plot
		PK	AV		
1	2412	84.93	N/A	Horizontal	Plot G.2
		84.21	N/A	Vertical	Plot G.3
6	2437	81.54	N/A	Horizontal	Plot H.2
		82.14	N/A	Vertical	Plot H.3
11	2462	77.50	N/A	Horizontal	Plot I.2
		77.88	N/A	Vertical	Plot I.3

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

B. Test Plots for the Whole Measurement Frequency Range:

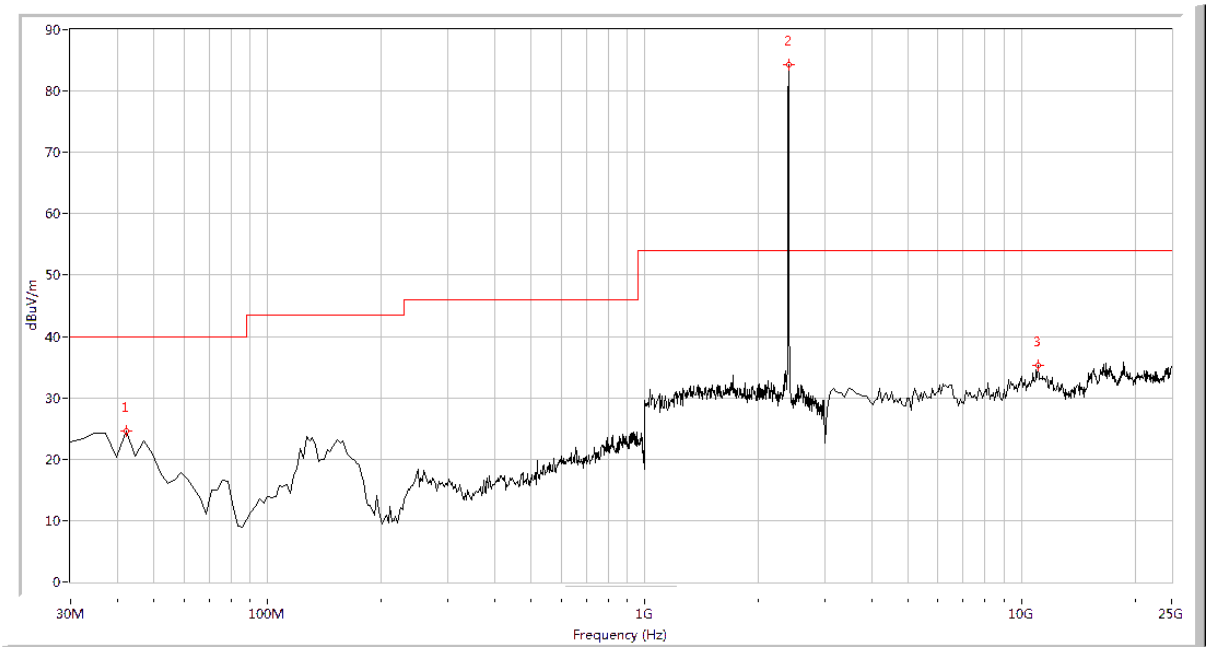
Plots for Channel = 1

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



Fre. (MHz)	Pk	QP	AV	Limit-PK	Limit-QP	Limit-AV	Antenna	Verdict
758.105	34.14	N.A	N.A	N.A	46.0	N.A	Horizontal	PASS
2412.00	84.93	N.A	N.A	N.A	N.A	N.A	Horizontal	N.A
17154.613	35.60	N.A	N.A	74.0	N.A	54.0	Horizontal	PASS

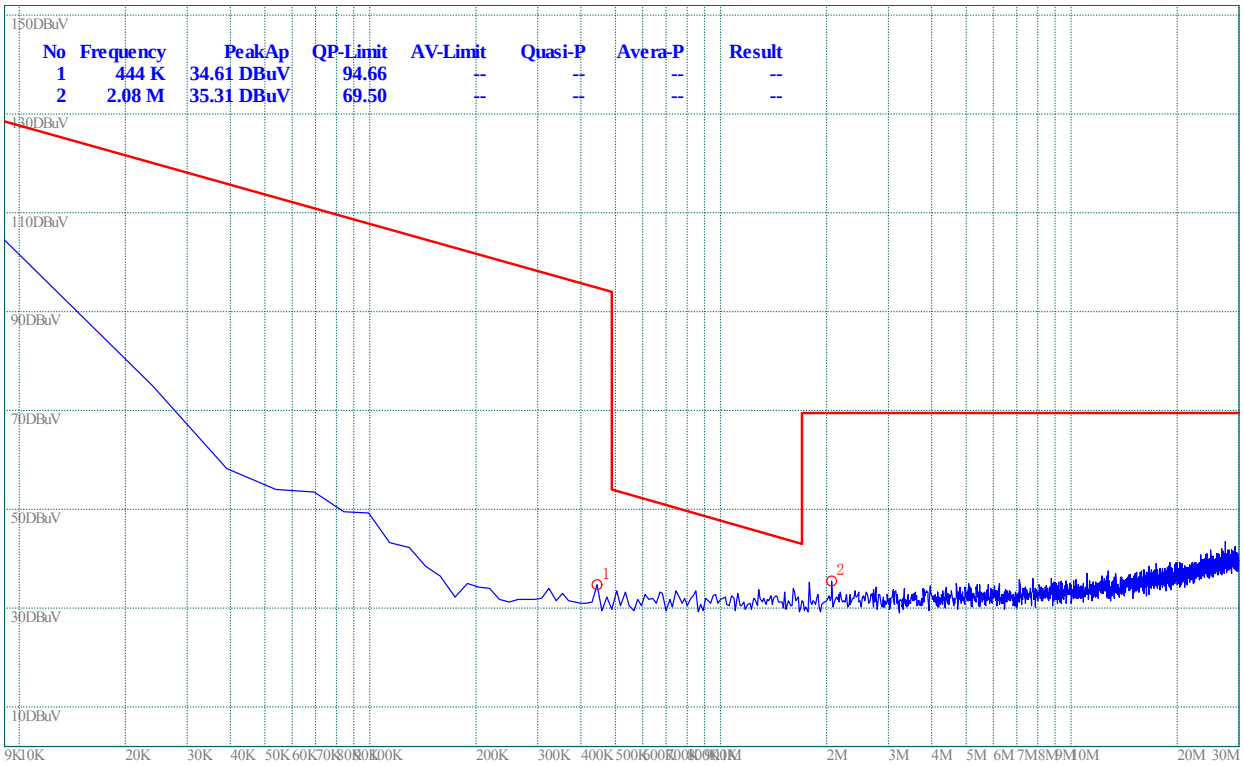
(Plot G.2: Antenna Horizontal, 30MHz to 25GHz)



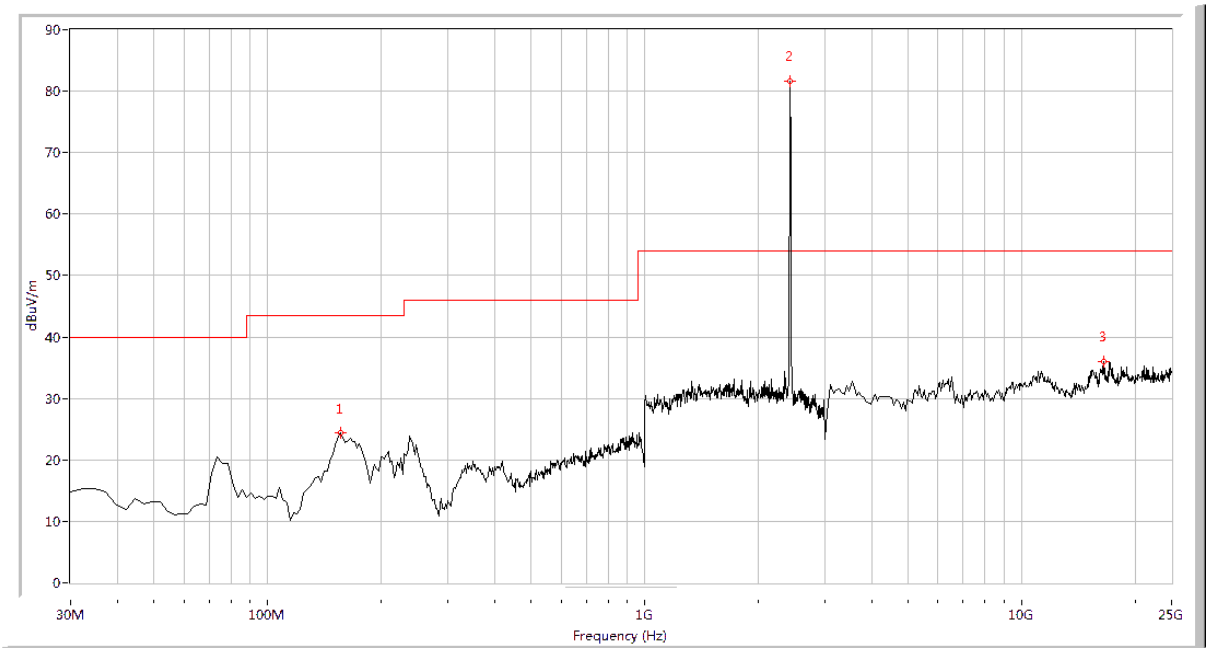
Fre. (MHz)	Pk	QP	AV	Limit-PK	Limit-QP	Limit-AV	Antenna	Verdict
42.095	24.53	N.A	N.A	N.A	40.0	N.A	Vertical	PASS
2412.000	84.21	N.A	N.A	N.A	N.A	N.A	Vertical	N.A
11064.838	35.23	N.A	N.A	74.0	N.A	54.0	Vertical	PASS

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

Plot for Channel = 6

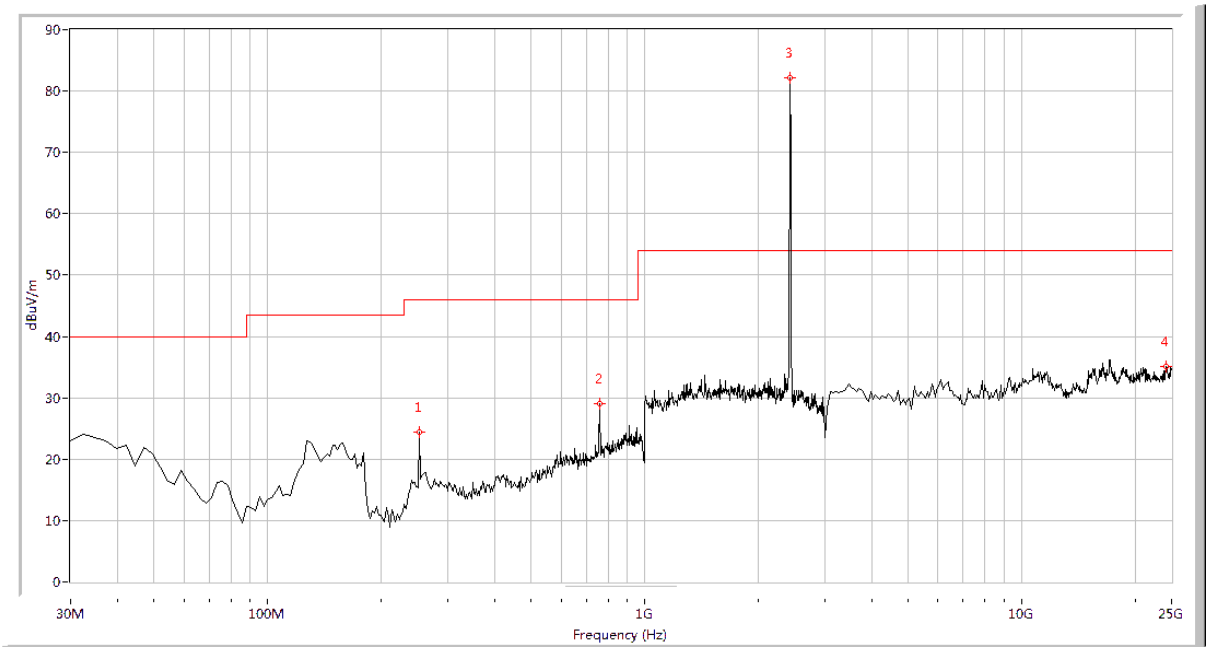


(Plot H.1: 9kHz to 30MHz)



Fre. (MHz)	Pk	QP	AV	Limit-PK	Limit-QP	Limit-AV	Antenna	Verdict
155.786	24.47	N.A	N.A	N.A	43.5	N.A	Horizontal	PASS
2437.000	81.54	N.A	N.A	N.A	N.A	N.A	Horizontal	N.A
16551.122	35.96	N.A	N.A	74.0	N.A	54.0	Horizontal	PASS

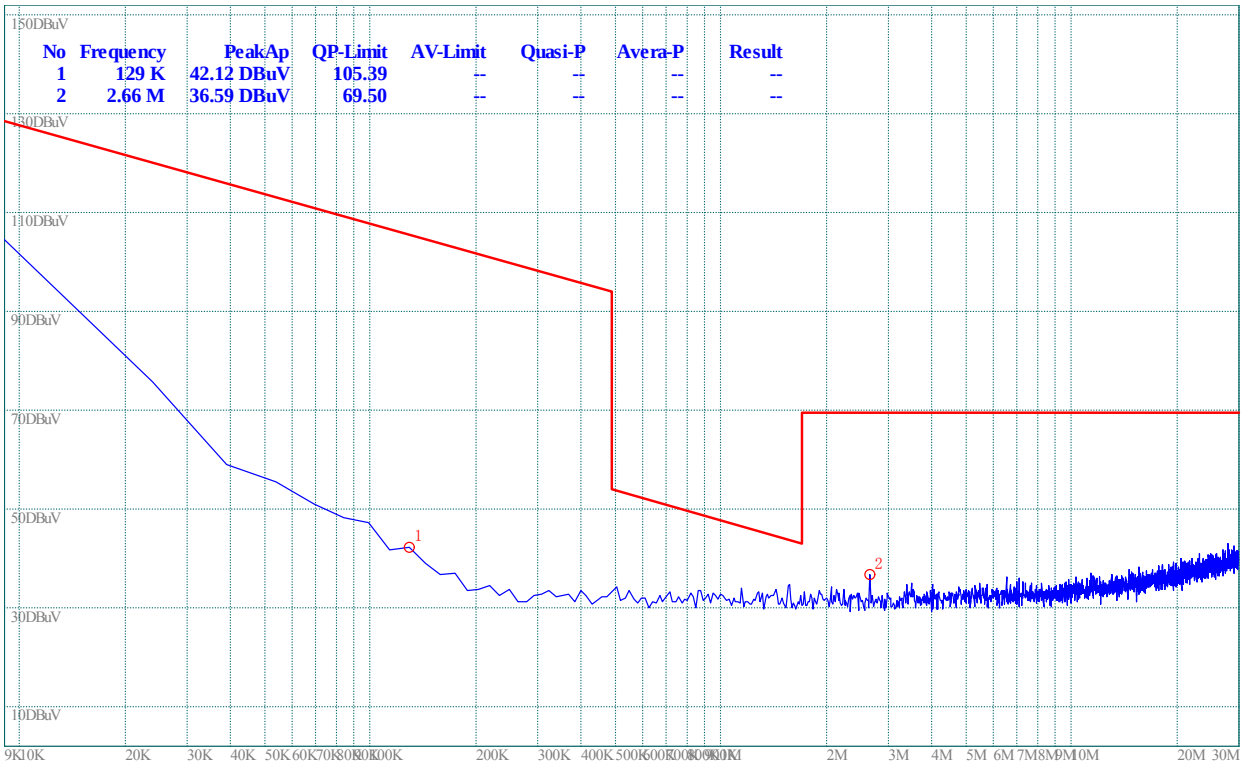
(Plot H.2: Antenna Horizontal, 30MHz to 25GHz)



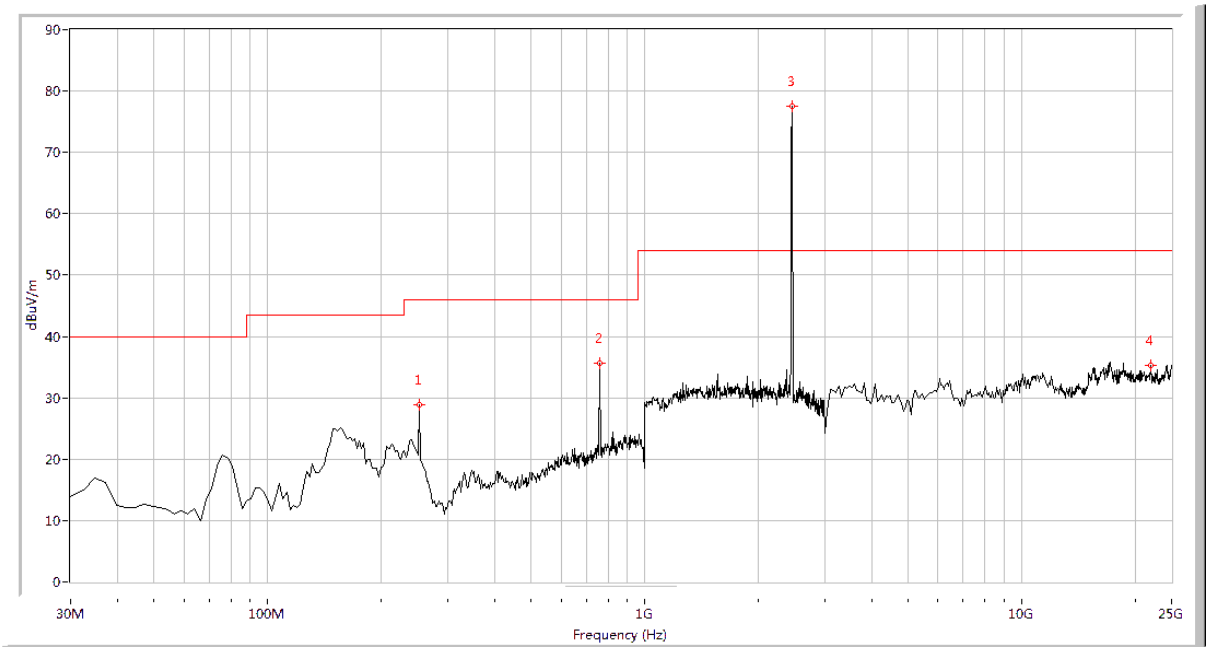
Fre. (MHz)	Pk	QP	AV	Limit-PK	Limit-QP	Limit-AV	Antenna	Verdict
252.544	24.39	N.A	N.A	N.A	46.0	N.A	Vertical	PASS
758.105	28.98	N.A	N.A	N.A	46.0	N.A	Vertical	PASS
2437.000	82.14	N.A	N.A	N.A	N.A	N.A	Vertical	N.A
24231.920	35.03	N.A	N.A	74.0	N.A	54.0	Vertical	PASS

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

Plot for Channel = 11

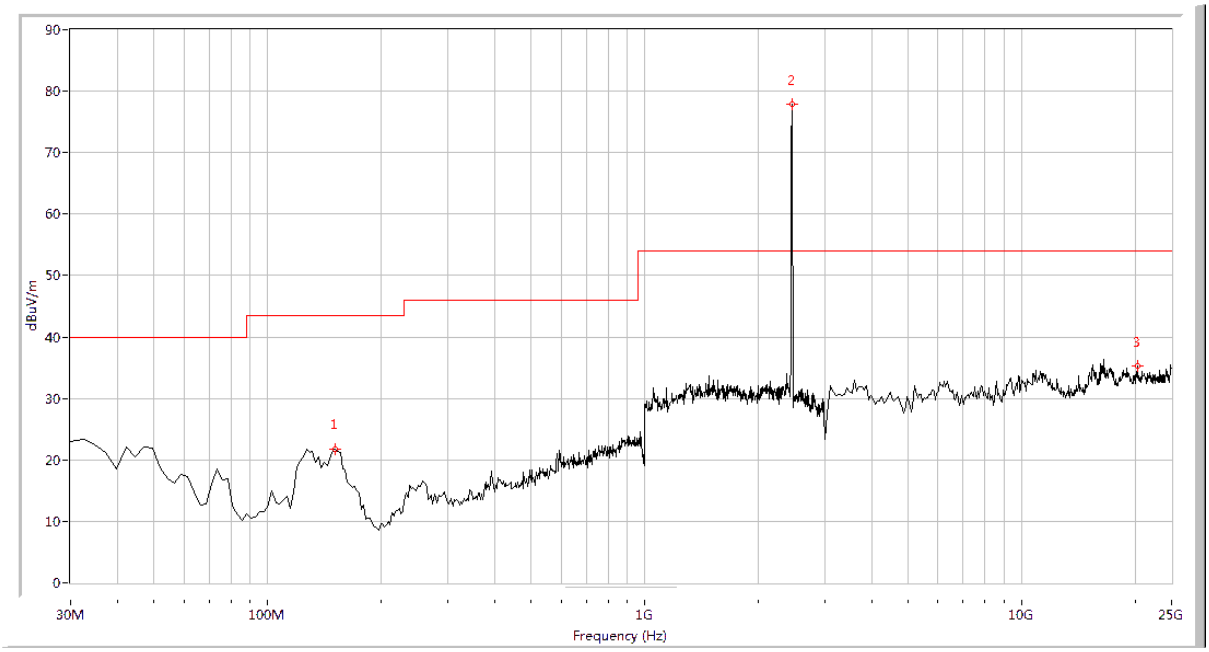


(Plot I.1: 9kHz to 30MHz)



Fre. (MHz)	Pk	QP	AV	Limit-PK	Limit-QP	Limit-AV	Antenna	Verdict
252.544	28.90	N.A	N.A	N.A	46.0	N.A	Horizontal	PASS
758.105	35.59	N.A	N.A	N.A	46.0	N.A	Horizontal	PASS
2462.000	77.50	N.A	N.A	N.A	N.A	N.A	Horizontal	N.A
22092.269	35.29	N.A	N.A	74.0	N.A	54.0	Horizontal	PASS

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



Fre. (MHz)	Pk	QP	AV	Limit-PK	Limit-QP	Limit-AV	Antenna	Verdict
150.948	21.83	N.A	N.A	N.A	43.5	N.A	Vertical	PASS
2462.000	77.88	N.A	N.A	N.A	N.A	N.A	Vertical	N.A
20281.796	35.22	N.A	N.A	74.0	N.A	54.0	Vertical	PASS

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

2.9. RF exposure evaluation

2.9.1. Requirement

According to § 1.1307(b)(1), systems operating under the provisions of this section shall be operated in a manner that ensure that the public is not exposed to radio frequency energy lever in excess of Commission's guideline.

2.9.2. Result:

Please refer to SAR report.

** END OF REPORT **