RF TEST REPORT

Report No.: SET2014-02419

Product Name: Xtreamer Mini Android PC

FCC ID: ZYASIDEWINDER4

Model No. : Xtreamer Sidewinder4

Applicant: XTREAMER LIMITED

Address: Flat A,15/F Hiller Commercial Building 65-67 Bonham Strand East,Sheung Wan,HongKong

Issued by: CCIC-SET

Lab Location: Electronic Testing Building, Shahe Road, Xili, Nanshan District, Shenzhen, 518055, P. R. China

Tel: 86 755 26627338 **Fax:** 86 755 26627238

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Test Report

Product Name ..... :	Xtreamer Mini Android PC
Brand Name ..... :	Xtreamer
Trade Name ..... :	Xtreamer
Applicant ..... :	XTREAMER LIMITED
Applicant Address ..... :	Flat A,15/F Hiller Commercial Building 65-67 Bonham Strand East,Sheung Wan,HongKong
Manufacturer..... :	XTREAMER LIMITED
Manufacturer Address ..... :	Flat A,15/F Hiller Commercial Building 65-67 Bonham Strand East,Sheung Wan,HongKong
Test Standards..... :	47 CFR Part 15 Subpart C：Radio Frequency Devices ANSI C63.10:2009：American National Standard for Testing Unlicensed Wireless Devices KDB558074 D01 DTS Meas Guidance v03r01
Test Result ..... :	PASS
Tested by ..... :	2014.03.26 Haigang He，Test Engineer
Reviewed by..... :	2014.03.26 Lu Lei , Senior Engineer
Approved by ..... :	2014.03.26 Wu Li'an，Manager

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Change History		
Issue	Date	Reason for change
1.0	Mar 26,2014	First edition

1. GENERAL INFORMATION

1.1 EUT Description

EUT Type ..... : Xtreamer Mini Android PC
Serial No. ..... : (n.a, marked #1 by test site)
Hardware Version..... : RM-MPEG-86G VER1.0-3 /93*95*1.6mm
Software Version ..... : N/A
Frequency Range..... : 802.11b/g/n-20MHz: 2.412GHz - 2.462GHz
802.11n-40MHz: 2.422GHz - 2.452GHz
Channel Number ..... : 802.11b/g/n-20MHz: 11
802.11n-40MHz: 7
Modulation Type ..... : DSSS (802.11b), OFDM (802.11g/n)
Antenna Type ..... : External Antenna
Antenna Gain ..... : 5dBi

Note 1: The EUT is Mini Android PC, it contains WIFI 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.

1.2 Support Equipment

No.	Equipment	Brand Name	Model Name	Manufacturer	Serial No.
1	Monitor	Samsung	S24D360HL	Samsung	H5697A03

1.3 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 Subpart C 2012	Radio Frequency Devices
2	ANSI C63.10 2009	American National Standard for Testing Unlicensed Wireless 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(c)	Radiated Emission	PASS
8	15.247(e)	Power spectral density (PSD)	PASS

The tests of Conducted Emission and Radiated Emission were performed according to the method of measurements prescribed in ANSI C63.10 2009.

Preliminary tests were performed in different data rate to find the worst radiated emission. The data rate shown in the table below is the worst-case rate with respect to the specific test item. Investigation has been done on all the possible configurations for searching the worst cases. The following table is a list of the test modes shown in this test report.

Test Items	Mode	Data Rate	Channel
Peak Conducted Output Power Power Spectral Density 6dB Bandwidth Spurious RF conducted emission Radiated Emission 9kHz~1GHz& Radiated Emission 1GHz~10th Harmonic	11b/DSSS	11 Mbps	1/6/11
	11g/OFDM	54 Mbps	1/6/11
	11n(20MHz)/OFDM	65Mbps	1/6/11
	11n(40MHz)/OFDM	150Mbps	3/6/9
Band Edge	11b/DSSS	11 Mbps	1/11
	11g/OFDM	54 Mbps	1/11
	11n(20MHz)/OFDM	65Mbps	1/11
	11n(40MHz)/OFDM	150Mbps	3/9

1.4 Facilities and Accreditations

1.4.1 Facilities

CNAS-Lab Code: L1659

CCIC Southern Electronic Product Testing (Shenzhen) Co., Ltd. CCIC is a third party testing organization accredited by China National Accreditation Service for Conformity Assessment (CNAS) according to ISO/IEC 17025. The accreditation certificate number is L1659. A 12.8*6.8*6.4 (m) fully anechoic chamber was used for the radiated spurious emissions test.

FCC-Registration No.: 406086

CCIC Southern Electronic Product Testing (Shenzhen) Co., Ltd. EMC Laboratory has been registered and fully described in a report filed with the FCC (Federal Communications Commission). The acceptance letter from the FCC is maintained in our files. Registration 406086, Renewal date Nov. 19, 2011, valid time is until Nov. 18, 2014.

IC-Registration No.: 11185A-1

CCIC Southern Electronic Product Testing (Shenzhen) Co., Ltd. EMC Laboratory has been registered by Certification and Engineering Bureau of Industry Canada for the performance of radiated measurements with Registration No. 11185A-1 on July. 15, 2013, valid time is until July. 15, 2016.

1.4.2 Test Environment Conditions

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

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

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.

And according to FCC 47 CFR Section 15.247(c), if transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

2.1.2 Antenna Information

Antenna Category: External antenna
An External antenna was soldered to the antenna port of EUT via an adaptor cable, can't be removed.

Antenna General Information:

No.	EUT Model	Ant. Cat.	Gain(dBi)
1	Xtreamer Mini Android PC	External Antenna	5.0

2.1.3 Result: comply

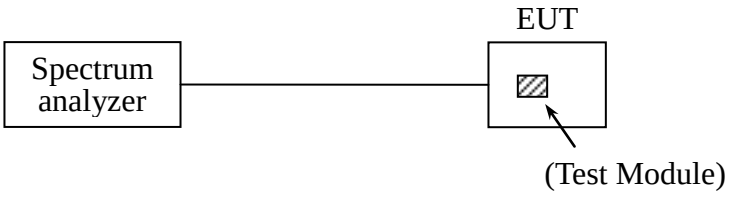
The EUT has a permanently and irreplaceable attached antenna. Please refer to the EUT internal photos.

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 spectrum analyzer and calibration.

A. Test Setup:

The EUT (Equipment under the test) 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, all test result in Spectrum analyzer.

B. Equipments List:

Description	Manufacturer	Model	Serial No.	Cal.Due Date
Spectrum Analyzer	R&S	FSP40	1164.4391.40	2014.06.10

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.

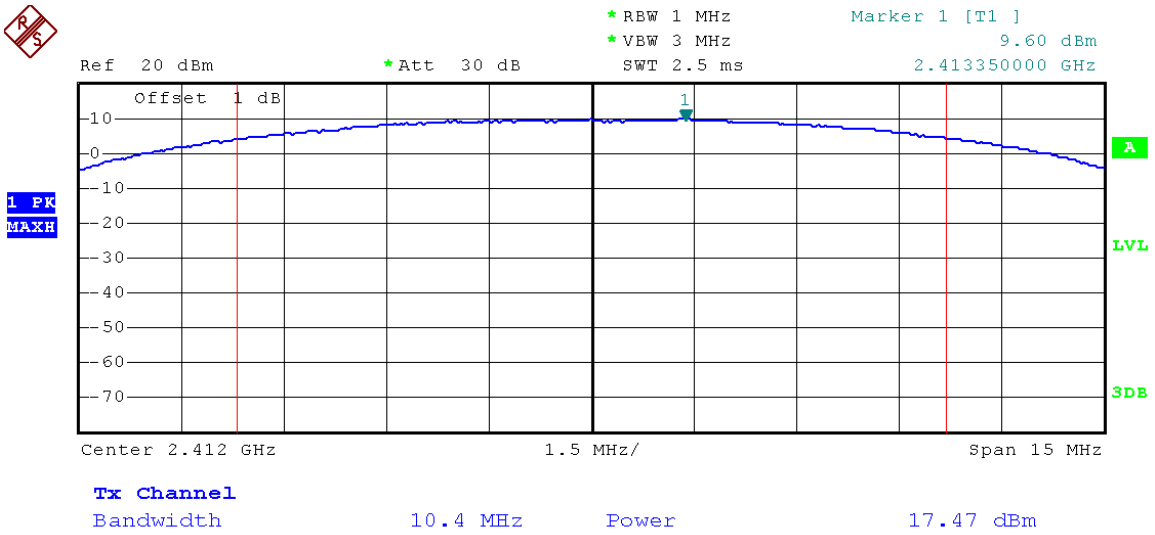
2.2.3.1 802.11b Test mode

A. Test Verdict:

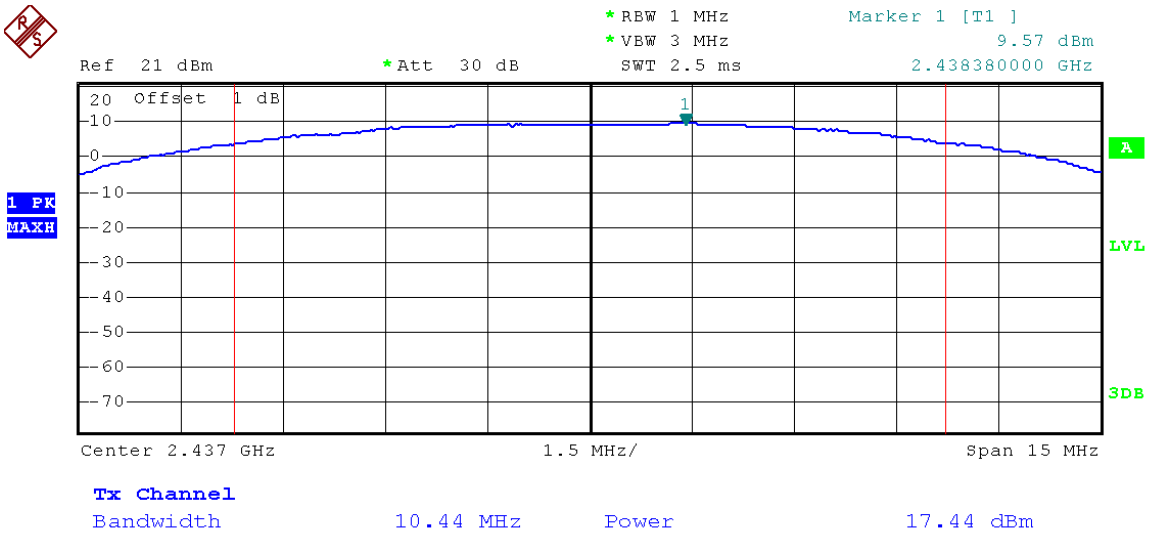
Channel	Frequency (MHz)	Measured Output Peak Power(dBm)	Refer to Plot	Limits (dBm)	Result
1	2412	17.47	Plot 2.2 A	30	PASS
6	2437	17.44	Plot 2.2 B	30	PASS
11	2462	17.46	Plot 2.2 C	30	PASS

Note: 1. For 802.11b mode at finial test to get the worst-case emission at 11Mbps.
2. The test results including the cable lose.

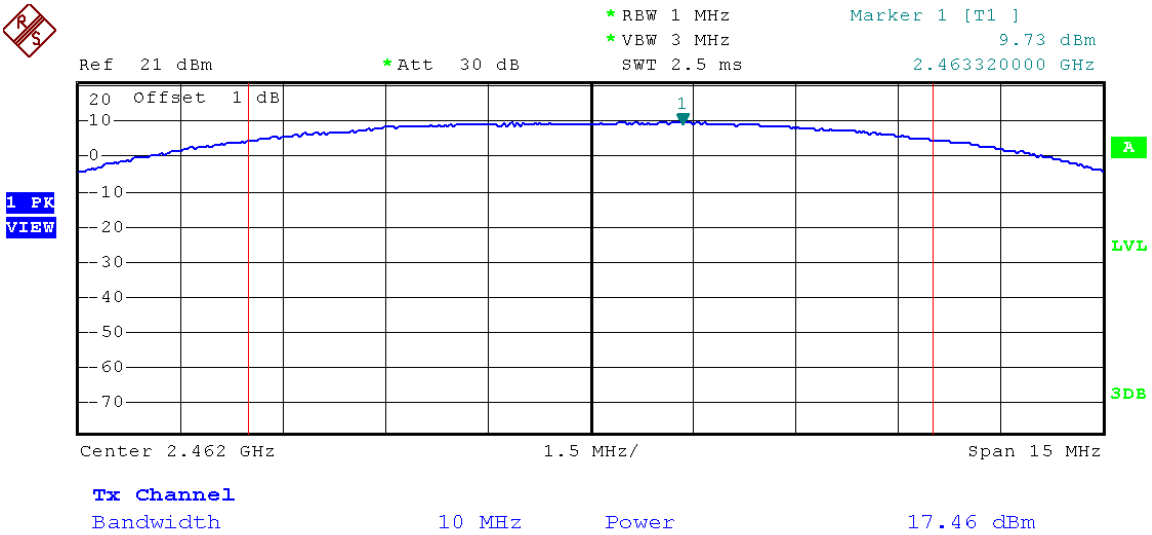
B. Test Plots:



(Plot 2.2 A: Channel 1: 2412MHz @ 802.11b)



(Plot 2.2 B: Channel 6: 2437MHz @ 802.11b)



(Plot 2.2 C: Channel 11: 2462MHz @ 802.11b)

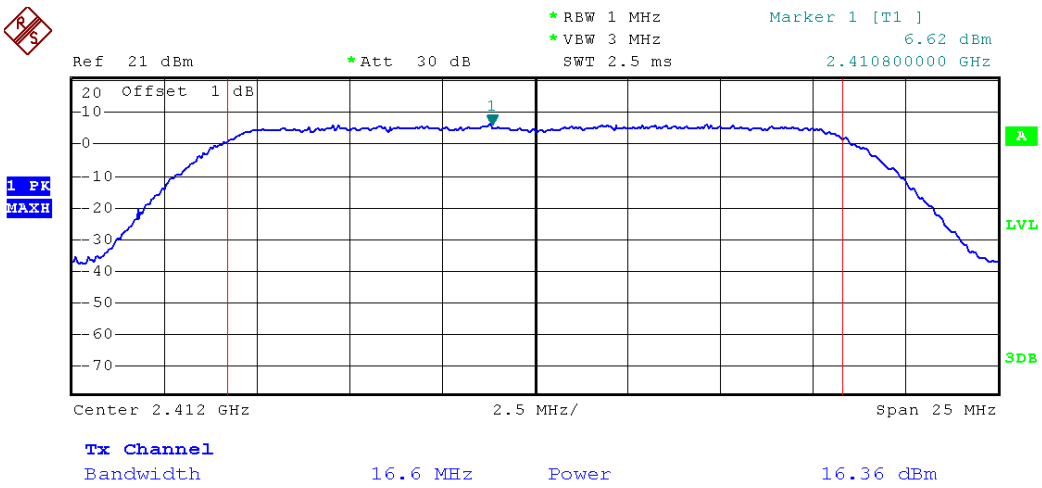
2.2.3.2 802.11g Test mode

A. Test Verdict:

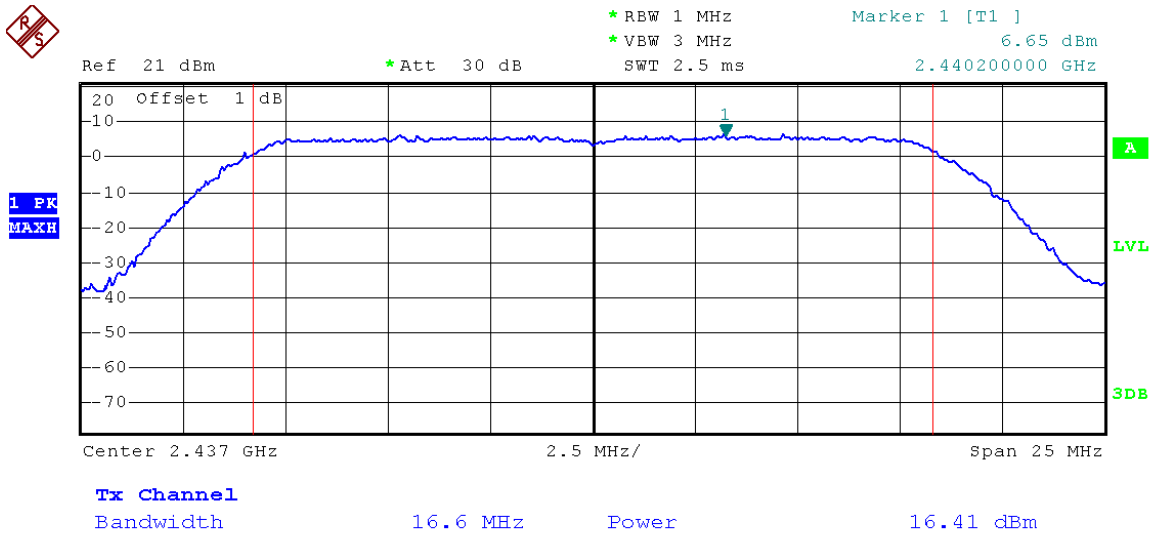
Channel	Frequency (MHz)	Measured Output Peak Power (dBm)	Refer to Plot	Limits (dBm)	Result
1	2412	16.36	Plot 2.2 D	30	PASS
6	2437	16.41	Plot 2.2 E	30	PASS
11	2462	16.49	Plot 2.2 F	30	PASS

Note: 1. For 802.11g mode at finial test to get the worst-case emission at 54Mbps.
2. The test results including the cable lose.

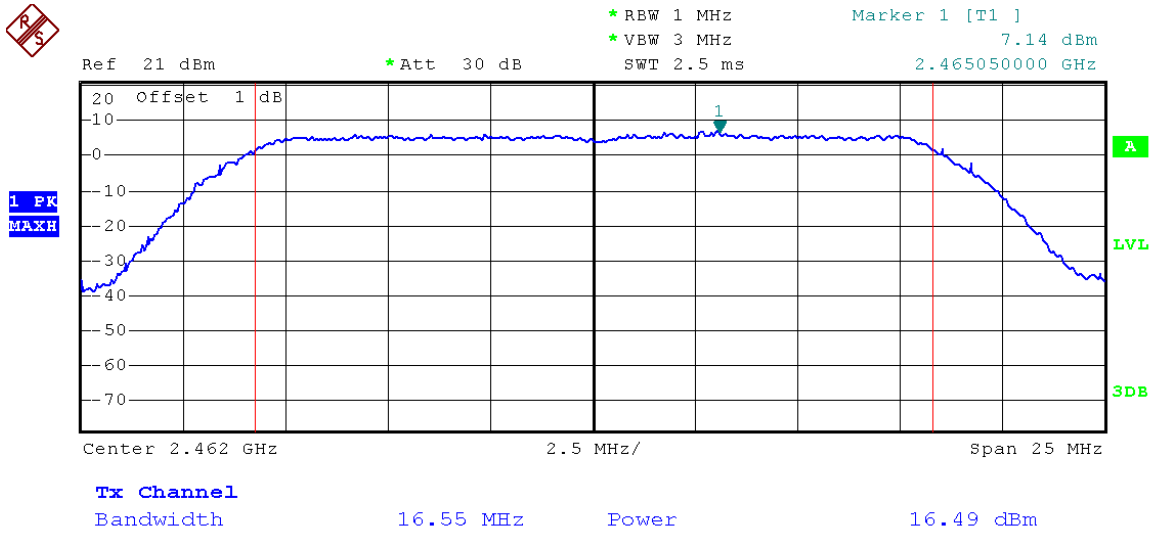
B. Test Plots:



(Plot 2.2 D: Channel 1: 2412MHz @ 802.11g)



(Plot 2.2 E: Channel 6: 2437MHz @ 802.11g)



(Plot 2.2 F: Channel 11: 2462MHz @ 802.11g)

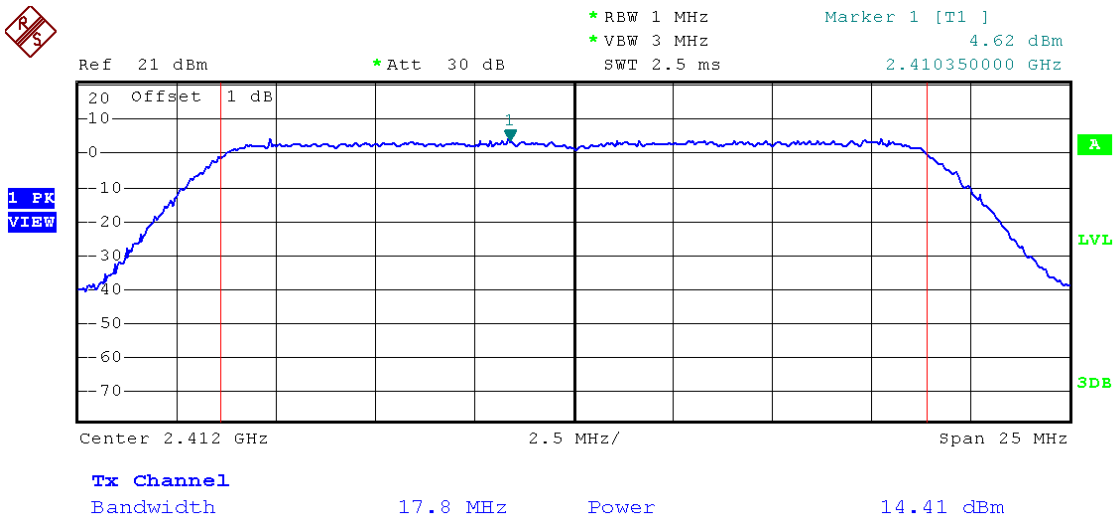
2.2.3.3 802.11n-20MHz Test mode

A. Test Verdict:

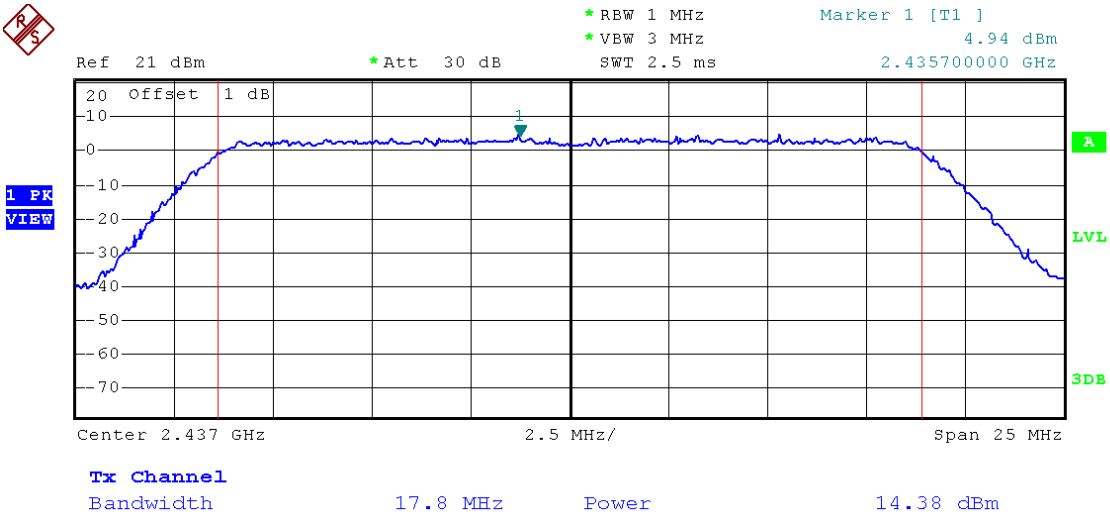
Channel	Frequency (MHz)	Measured Output Peak Power(dBm)	Refer to Plot	Limits (dBm)	Result
1	2412	14.41	Plot 2.2 G	30	PASS
6	2437	14.38	Plot 2.2 H	30	PASS
11	2462	14.45	Plot 2.2 I	30	PASS

Note: 1. For 802.11n-20 mode at finial test to get the worst-case emission at 65Mbps.
2. The test results including the cable lose.

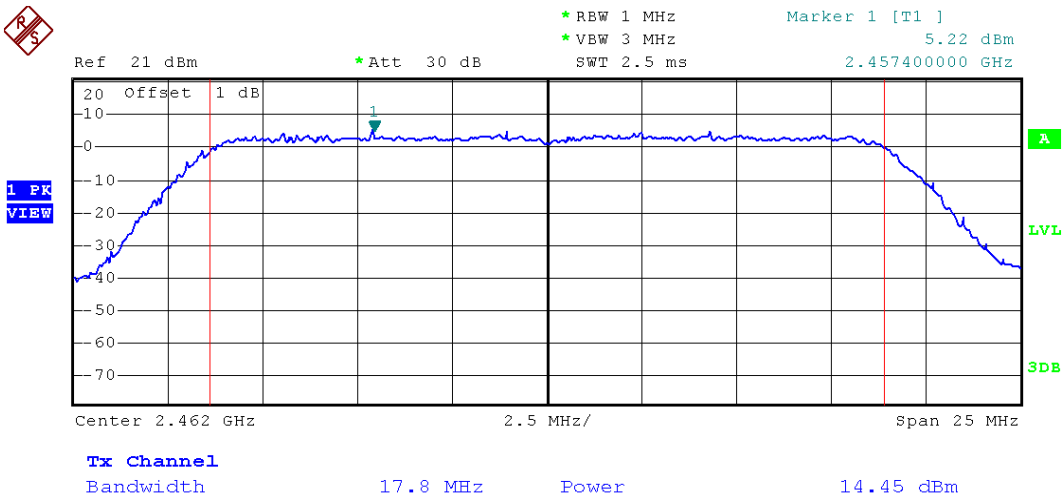
B. Test Plots:



(Plot 2.2 G: Channel 1: 2412MHz @ 802.11n20)



(Plot 2.2 H: Channel 6: 2437MHz @ 802.11n20)



(Plot 2.2 I: Channel 11: 2462MHz @ 802.11n20)

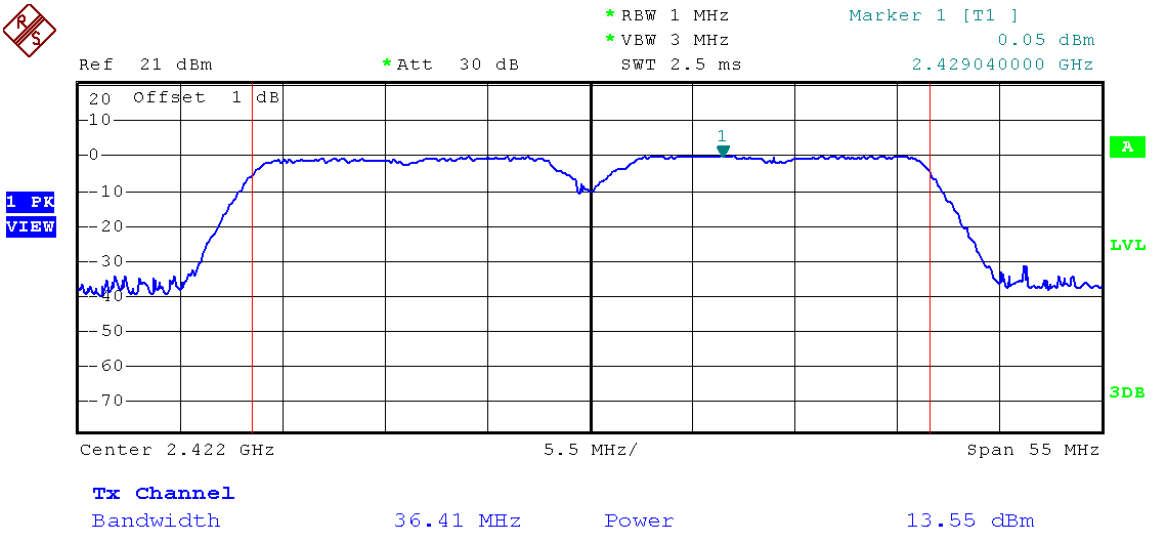
2.2.3.4 802.11n-40MHz Test mode

A. Test Verdict:

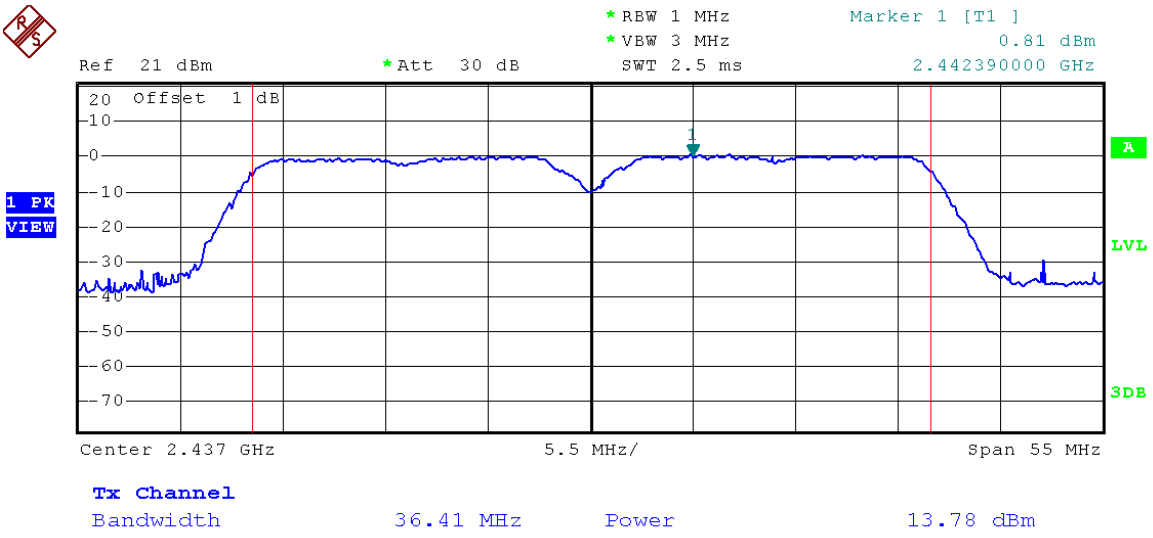
Channel	Frequency (MHz)	Measured Output Peak Power(dBm)	Refer to Plot	Limits (dBm)	Result
3	2422	13.55	Plot 2.2 J	30	PASS
6	2437	13.78	Plot 2.2 K	30	PASS
9	2452	13.77	Plot 2.2 L	30	PASS

Note: 1. For 802.11n-40 mode at finial test to get the worst-case emission at 150Mbps.
2. The test results including the cable lose.

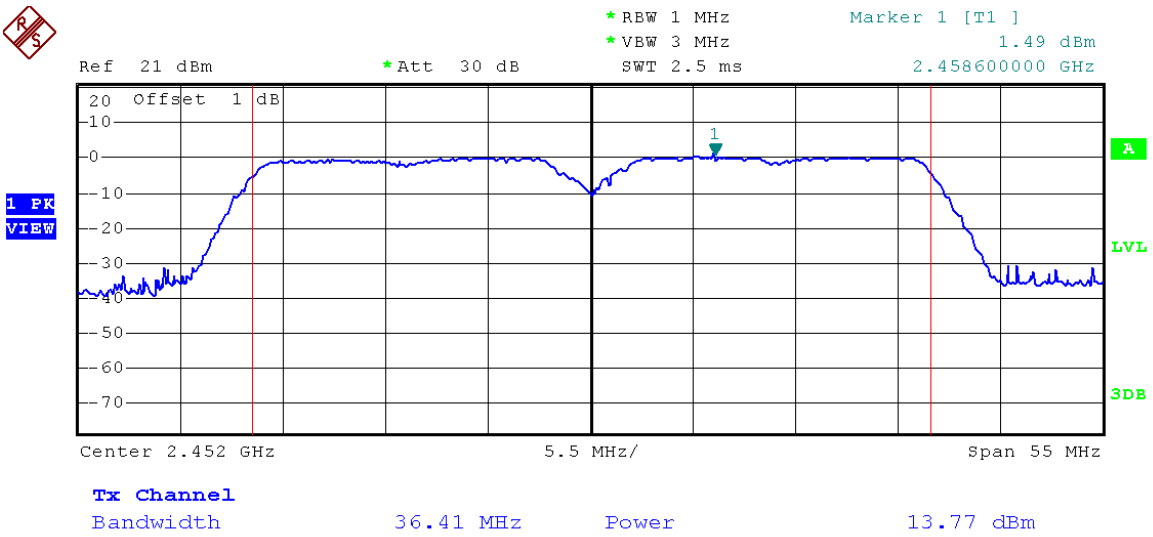
B. Test Plots:



(Plot 2.2 J: Channel 3: 2422MHz @ 802.11n40)



(Plot 2.2 K: Channel 6: 2437MHz @ 802.11n40)



(Plot 2.2 L: Channel 9: 2452MHz @ 802.11n40)

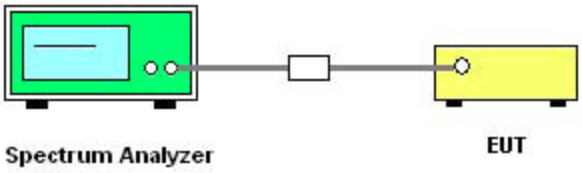
2.3 Bandwidth

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 and Atten 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.

C. Equipments List:

Description	Manufacturer	Model	Serial No.	Cal.Due Date
Spectrum Analyzer	R&S	FSP40	1164.4391.40	2014.06.10

2.3.3 Test Result

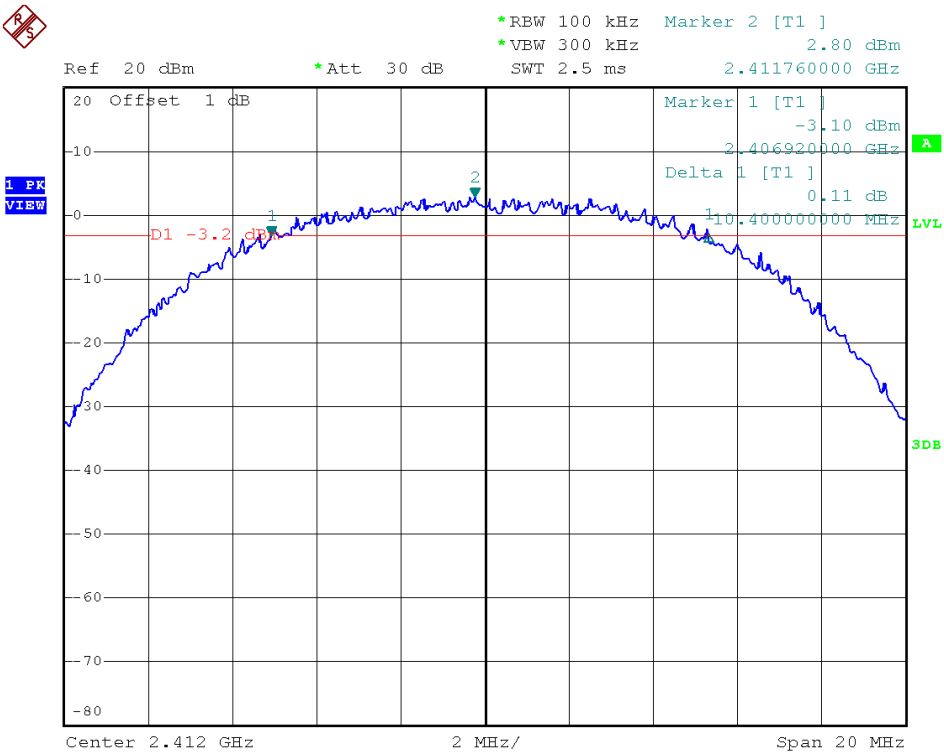
The lowest, middle and highest channels are selected to perform testing to record the 6 dB bandwidth of the Module.

2.3.3.1 802.11b Test mode

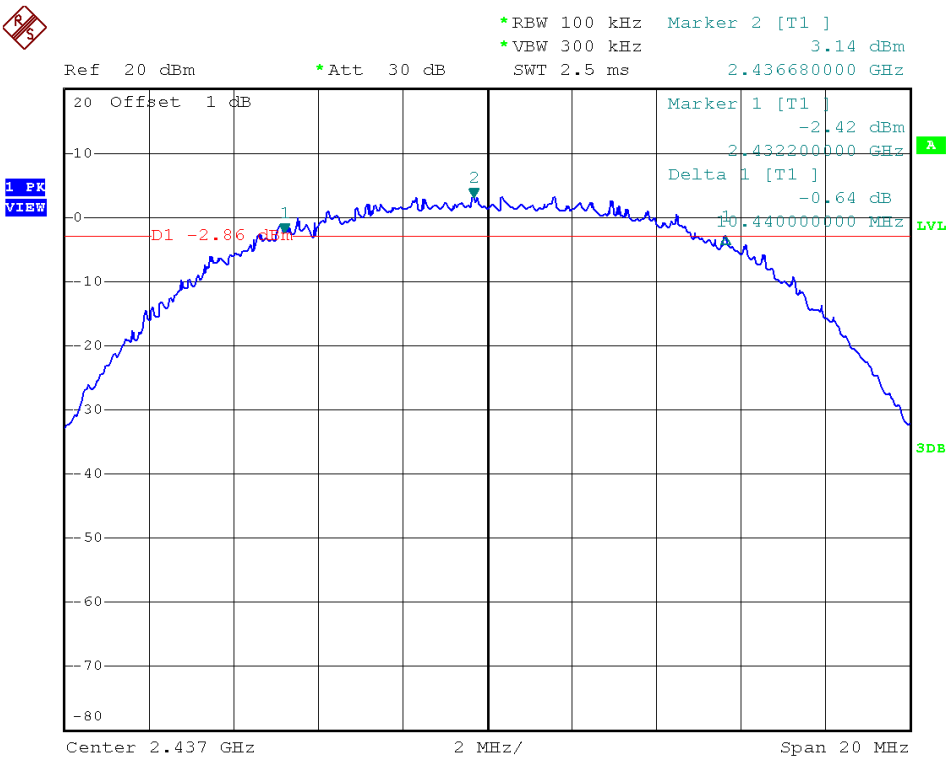
A. Test Verdict:

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Refer to Plot	Limits(kHz)	Result
1	2412	10.40	Plot 2.3 A	≥500	PASS
6	2437	10.44	Plot 2.3 B	≥500	PASS
11	2462	10.00	Plot 2.3 C	≥500	PASS

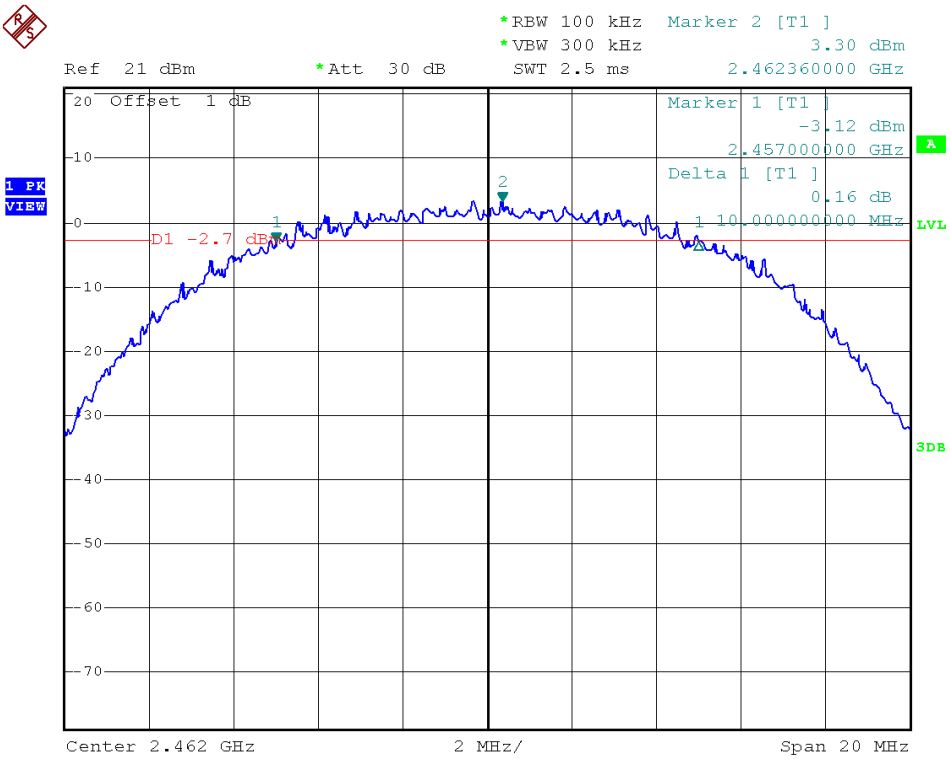
B. Test Plots:



(Plot 2.3 A: Channel 1: 2412MHz @ 802.11b)



(Plot 2.3 B: Channel 6: 2437 MHz @ 802.11b)



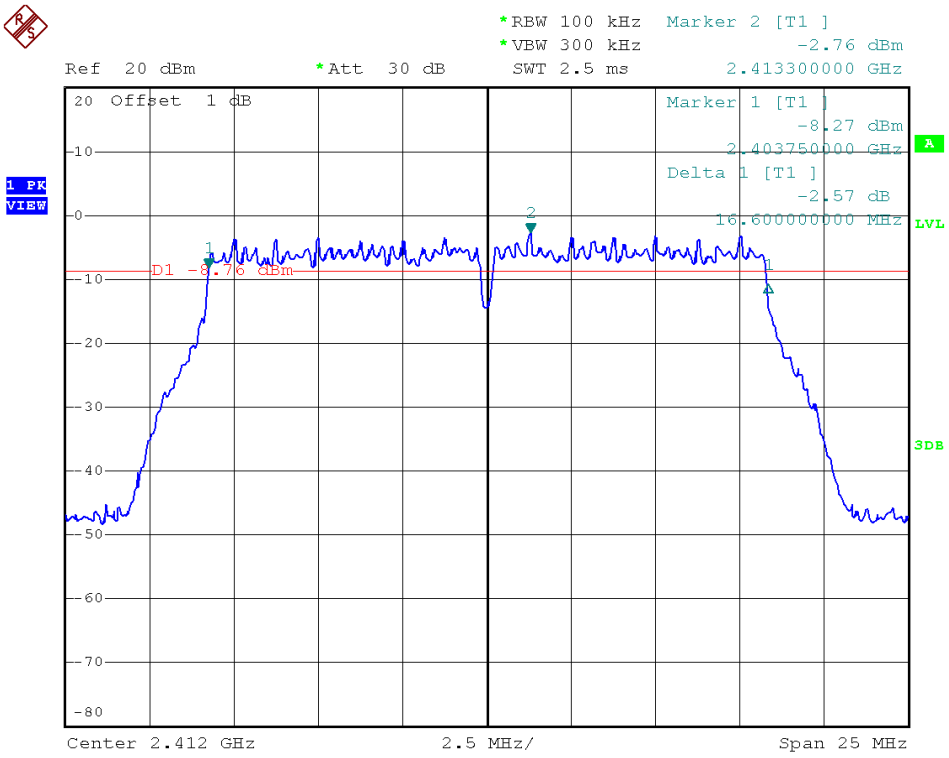
(Plot 2.3 C: Channel 11: 2462MHz @ 802.11b)

2.3.3.2 802.11g Test mode

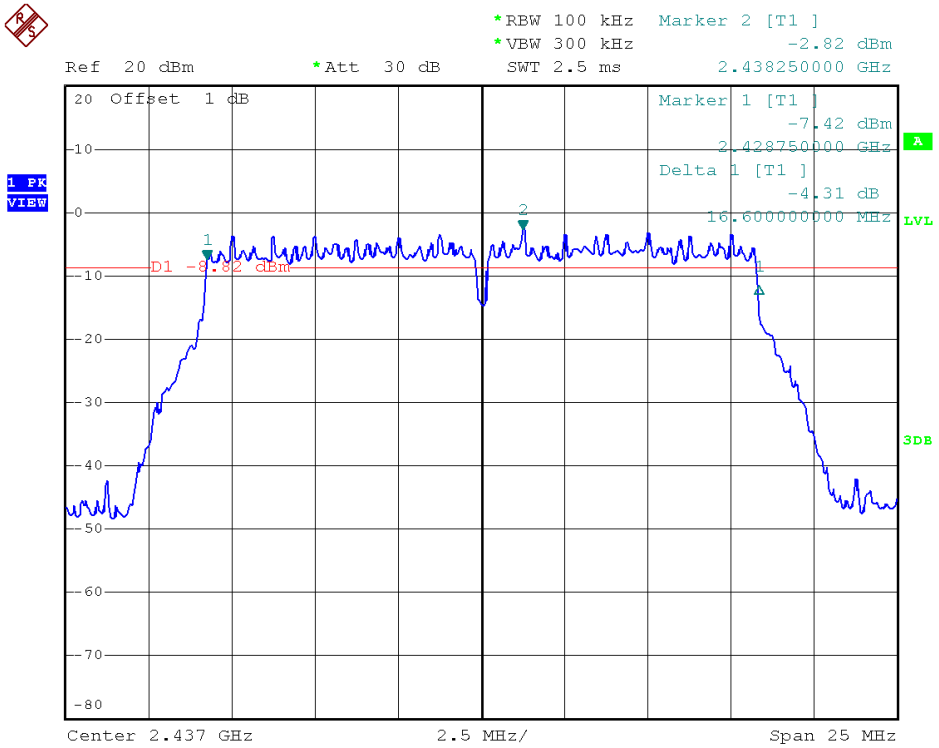
A. Test Verdict:

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Refer to Plot	Limits (kHz)	Result
1	2412	16.60	Plot 2.3 D	≥500	PASS
6	2437	16.60	Plot 2.3 E	≥500	PASS
11	2462	16.55	Plot 2.3 F	≥500	PASS

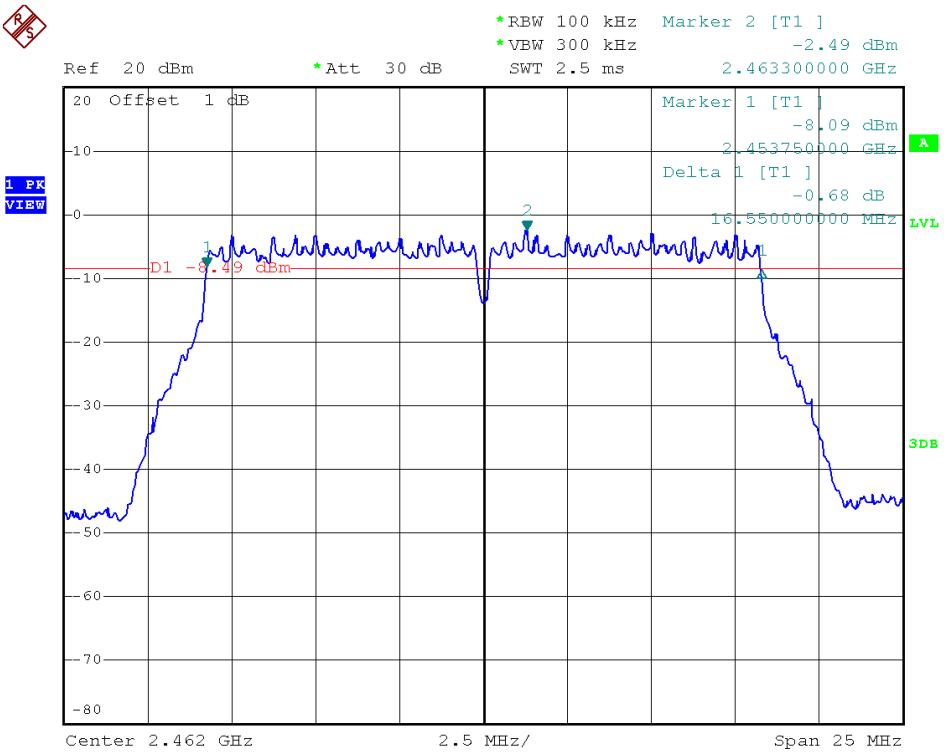
B. Test Plots:



(Plot 2.3 D: Channel 1: 2412MHz @ 802.11g)



(Plot 2.3 E: Channel 6: 2437MHz @ 802.11g)



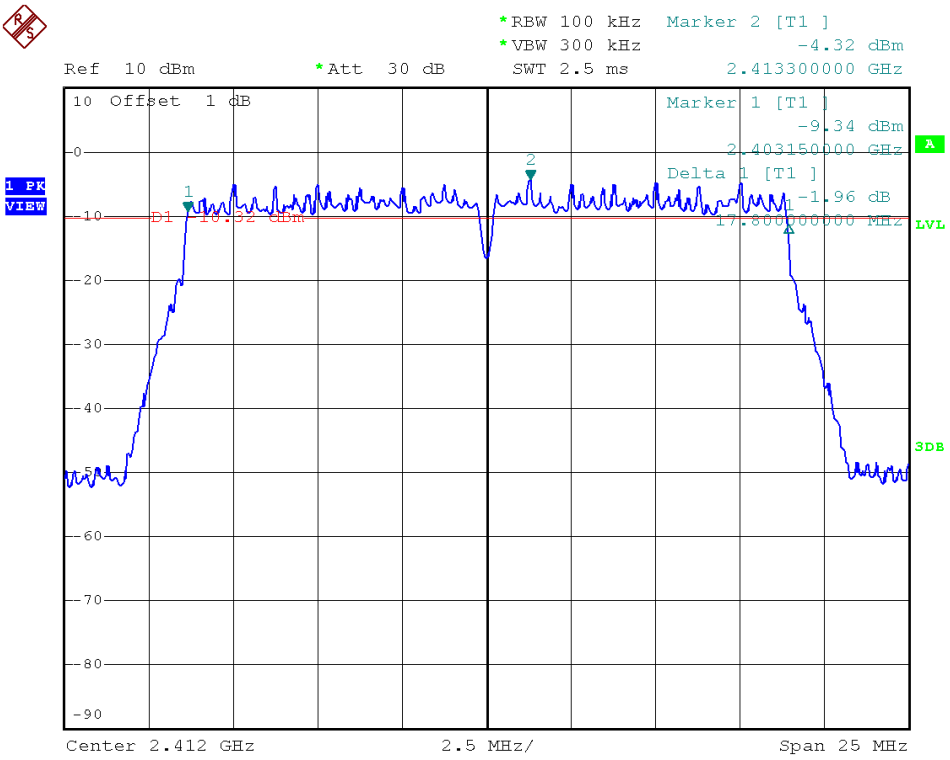
(Plot 2.3 F: Channel 11: 2462MHz @ 802.11g)

2.3.3.3 802.11n-20 Test mode

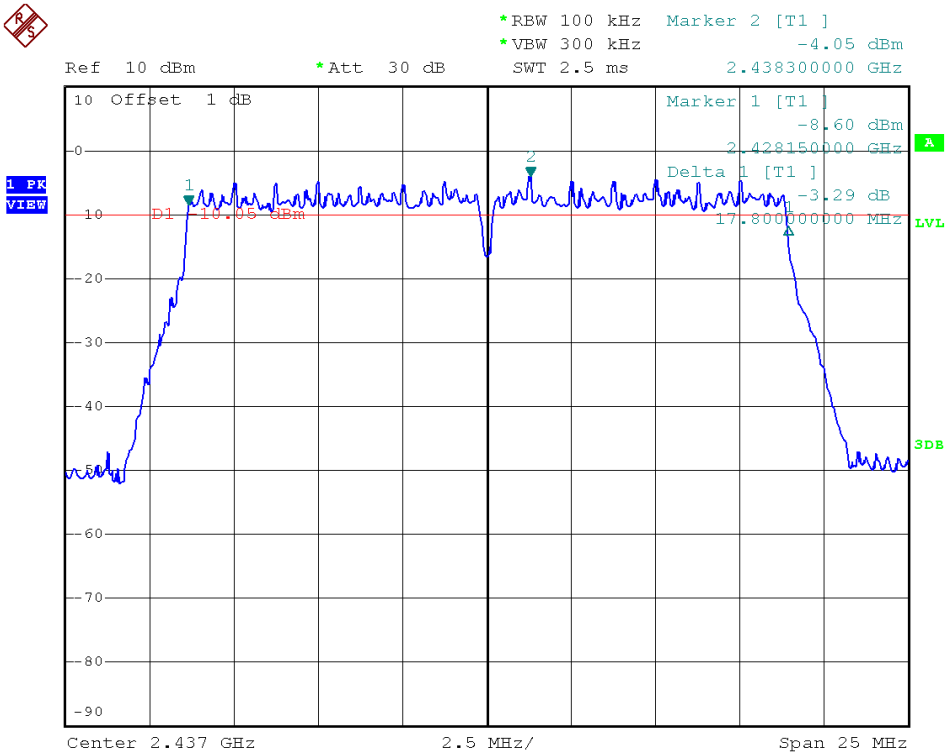
A. Test Verdict:

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Refer to Plot	Limits (kHz)	Result
1	2412	17.80	Plot 2.3 G	≥500	PASS
6	2437	17.80	Plot 2.3 H	≥500	PASS
11	2462	17.80	Plot 2.3 I	≥500	PASS

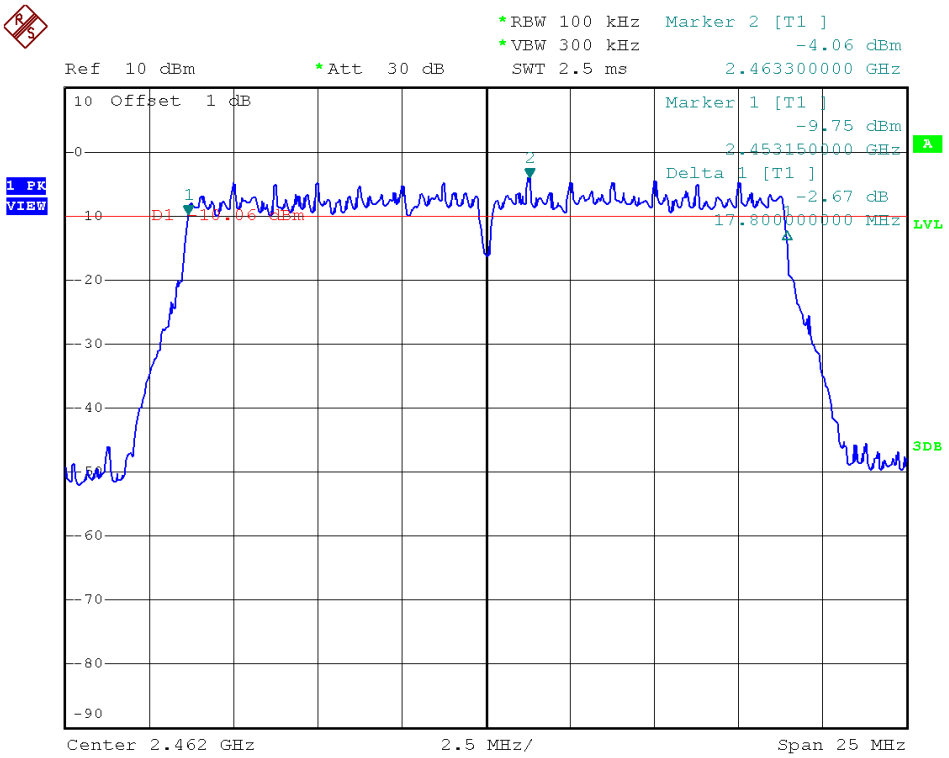
B. Test Plots:



(Plot 2.3 G: Channel 1: 2412MHz @ 802.11n-20)



(Plot 2.3 H: Channel 6: 2437MHz @ 802.11n-20)



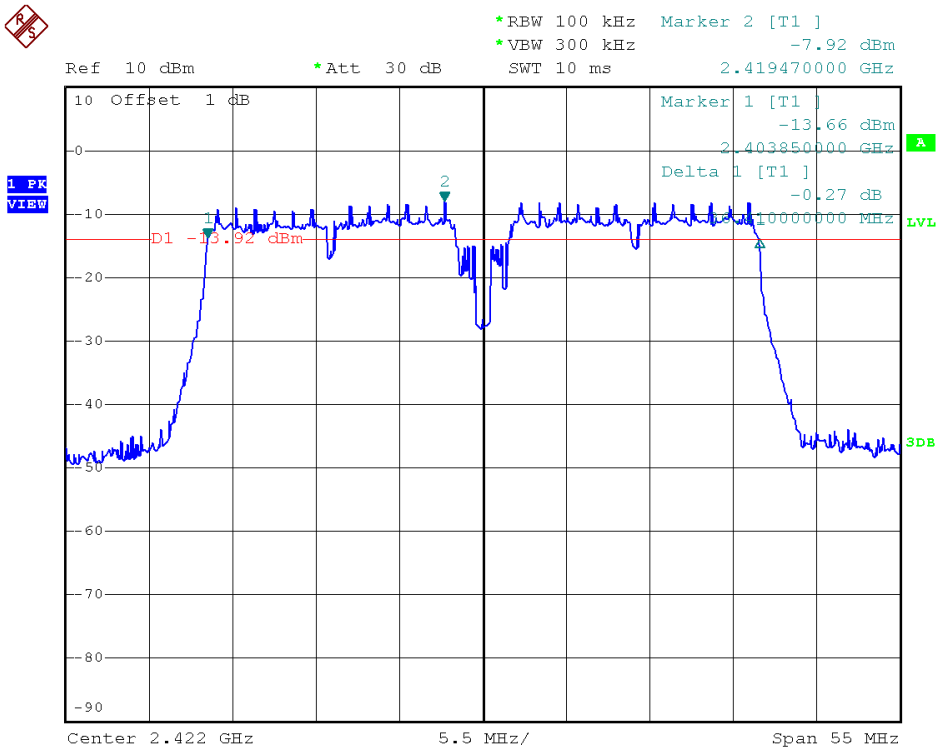
(Plot 2.3 I: Channel 11: 2462MHz @ 802.11n-20)

2.3.3.4 802.11n-40 Test mode

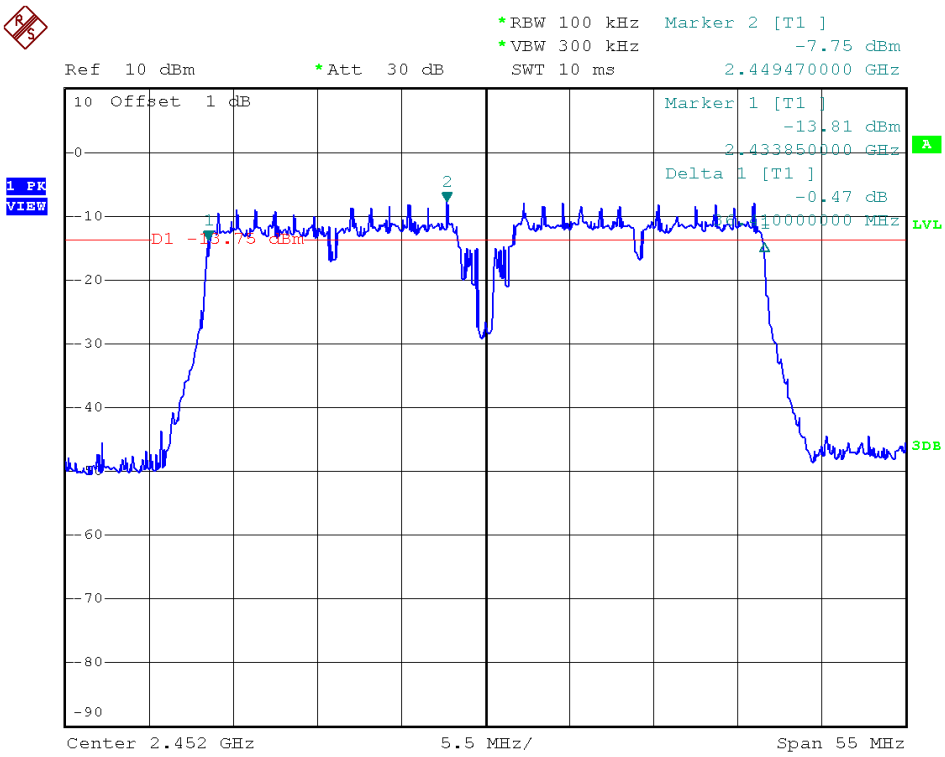
A. Test Verdict:

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Refer to Plot	Limits (kHz)	Result
3	2422	36.41	Plot 2.3 J	≥500	PASS
6	2437	36.41	Plot 2.3 K	≥500	PASS
9	2452	36.41	Plot 2.3 L	≥500	PASS

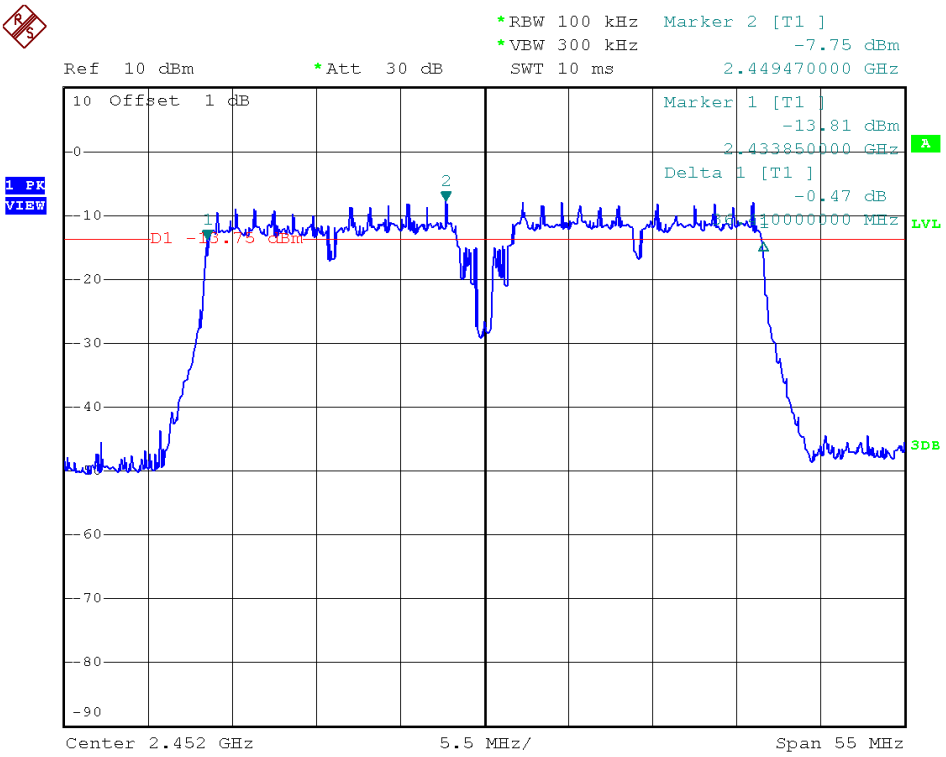
B. Test Plots:



(Plot 2.3 J: Channel 1: 2422MHz @ 802.11n-40)



(Plot 2.3 K: Channel 1: 2437MHz @ 802.11n-40)



(Plot 2.3 L: Channel 1: 2452MHz @ 802.11n-40)

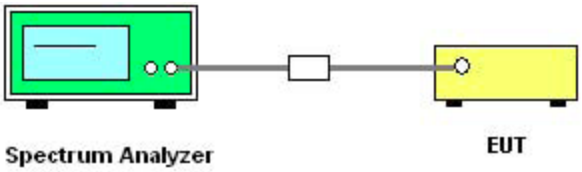
2.4 Conducted Spurious Emissions

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 and Atten 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.Due Date
Spectrum Analyzer	R&S	FSP40	1164.4391.40	2014.06.10

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.

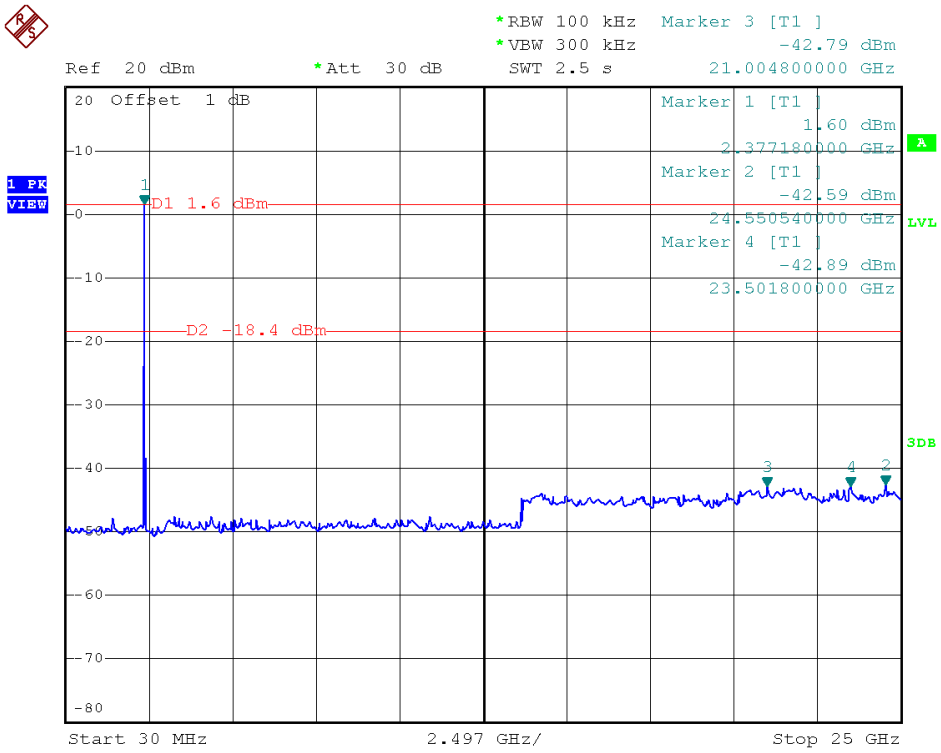
2.4.3.1 802.11b Test mode

A. Test Verdict:

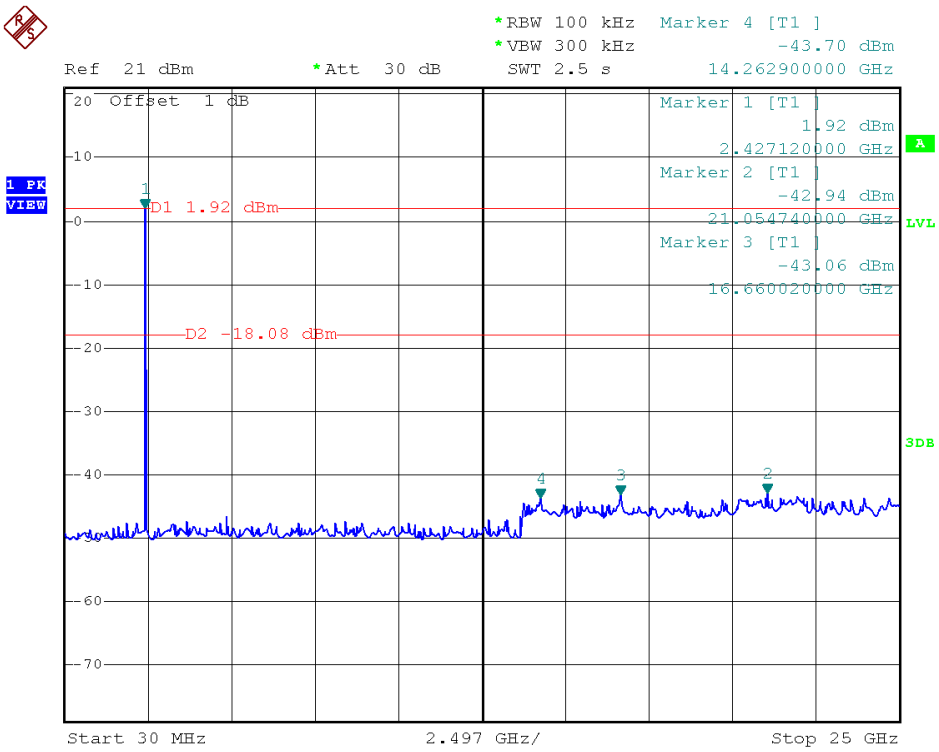
Channel	Frequency (MHz)	Refer to Plot	Limit (dBc)	Verdict
1	2412	Plot 2.4 A	-20	PASS
6	2437	Plot 2.4 B	-20	PASS
11	2462	Plot 2.4 C	-20	PASS

B. Test Plots:

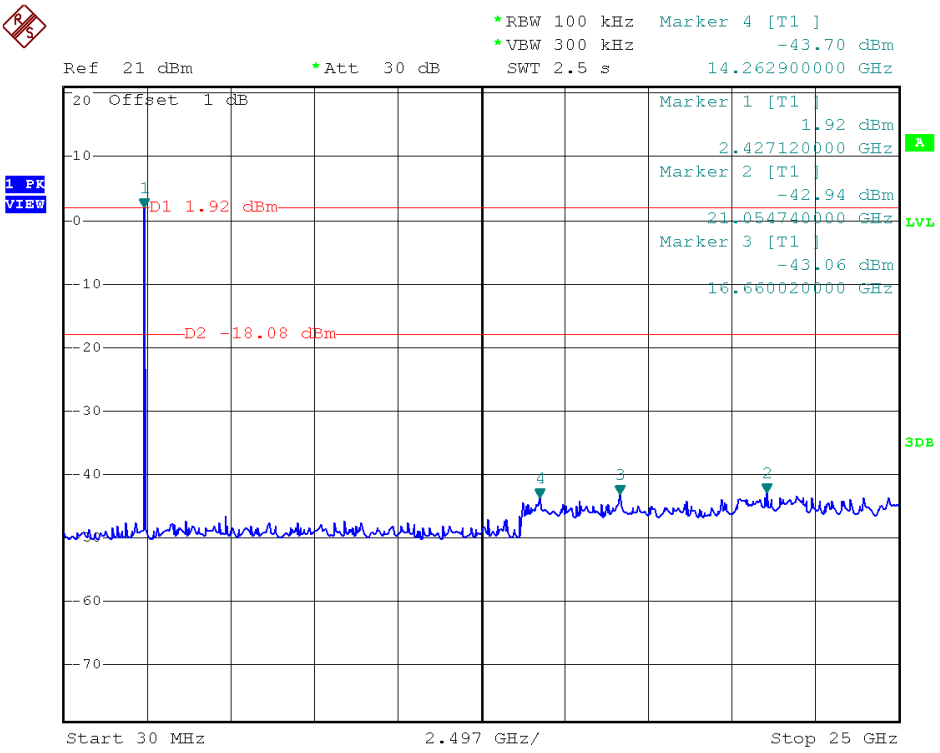
Note: the power of the Module transmitting frequency should be ignored.



(Plot 2.4 A: Channel = 1, 30MHz to 25GHz@ 802.11b)



(Plot 2.4 B: Channel = 6, 30MHz to 25GHz@ 802.11b)



(Plot 2.4 C: Channel = 11, 30MHz to 25GHz@ 802.11b)

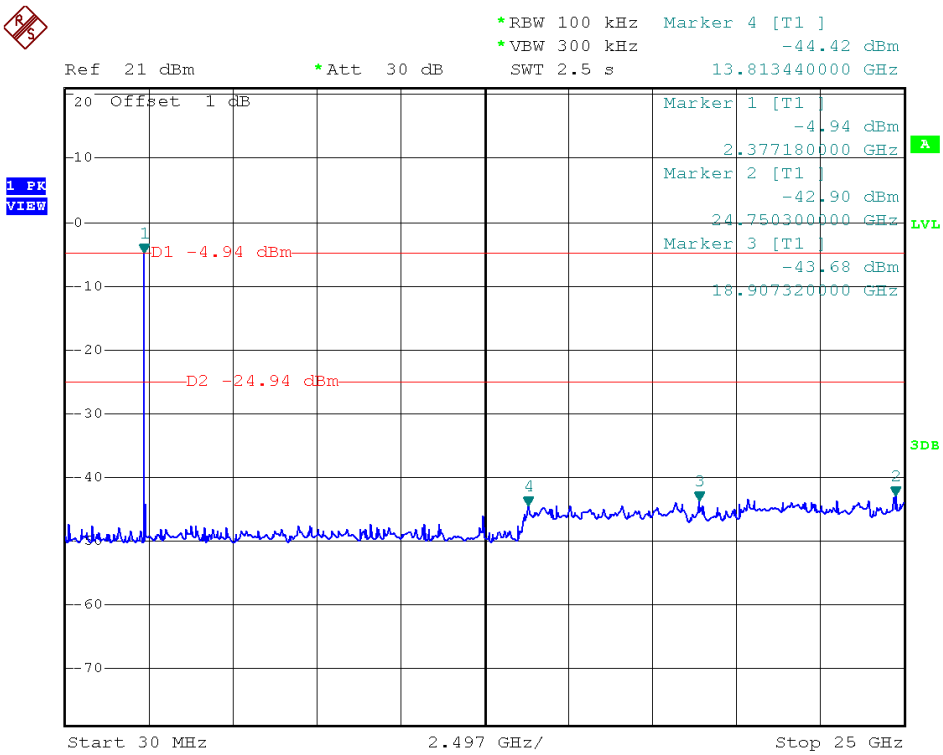
2.4.3.2 802.11g Test mode

A. Test Verdict:

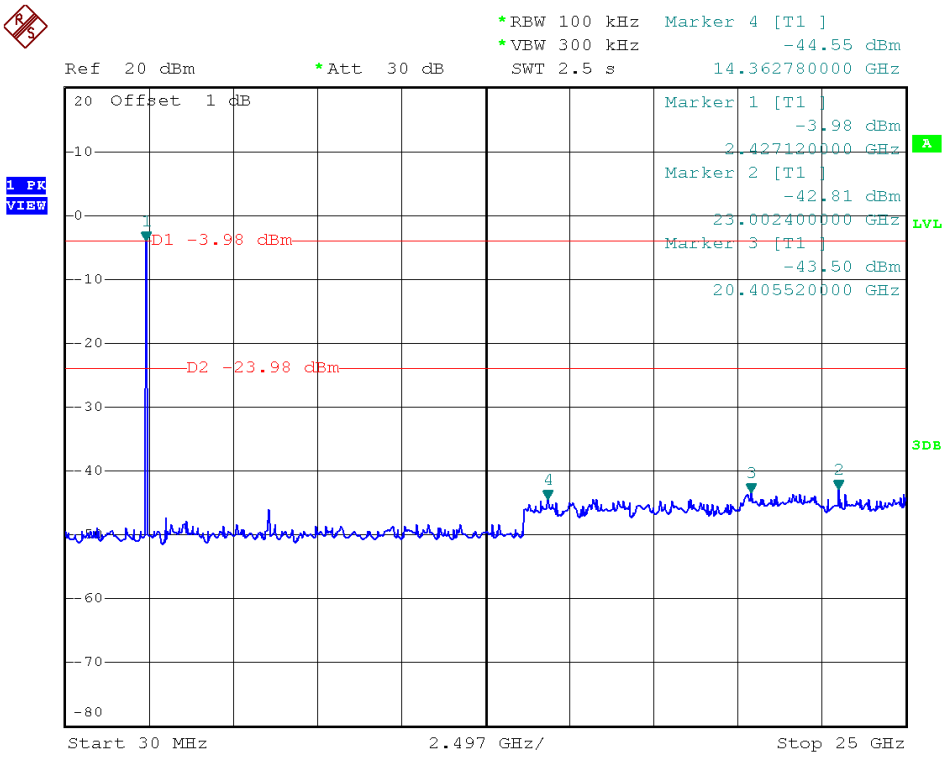
Channel	Frequency (MHz)	Refer to Plot	Limit (dBc)	Verdict
1	2412	Plot 2.4 D	-20	PASS
6	2437	Plot 2.4 E	-20	PASS
11	2462	Plot 2.4 F	-20	PASS

B. Test Plots:

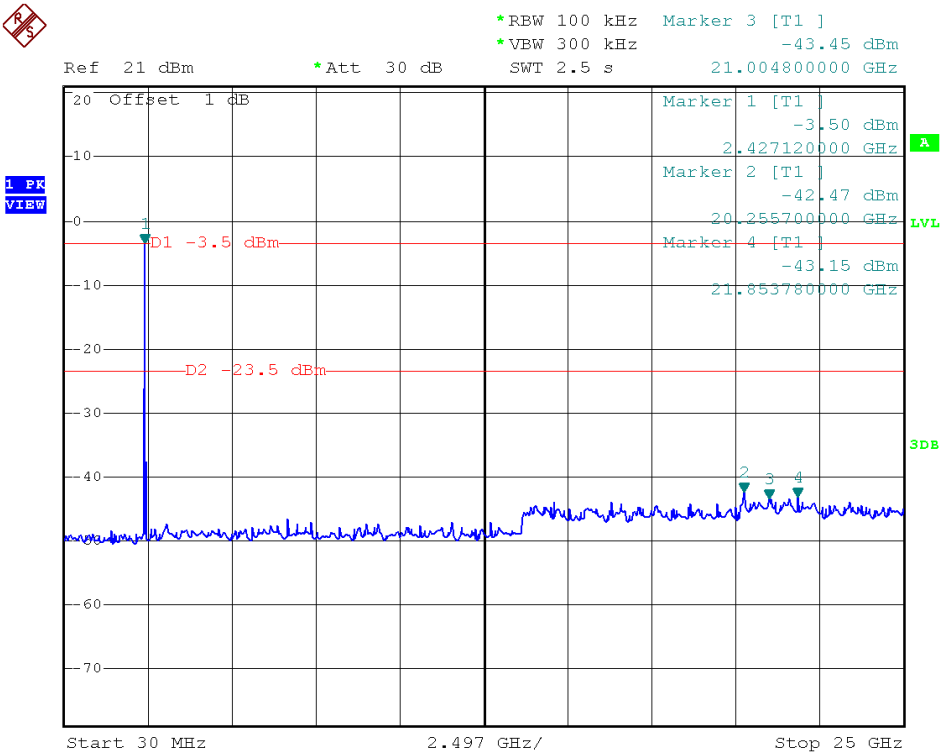
Note: the power of the Module transmitting frequency should be ignored.



(Plot 2.4 D: Channel = 1, 30MHz to 25GHz@ 802.11g)



(Plot 2.4 E: Channel = 6, 30MHz to 25GHz@ 802.11g)



(Plot 2.4 F: Channel = 11, 30MHz to 25GHz@ 802.11g)

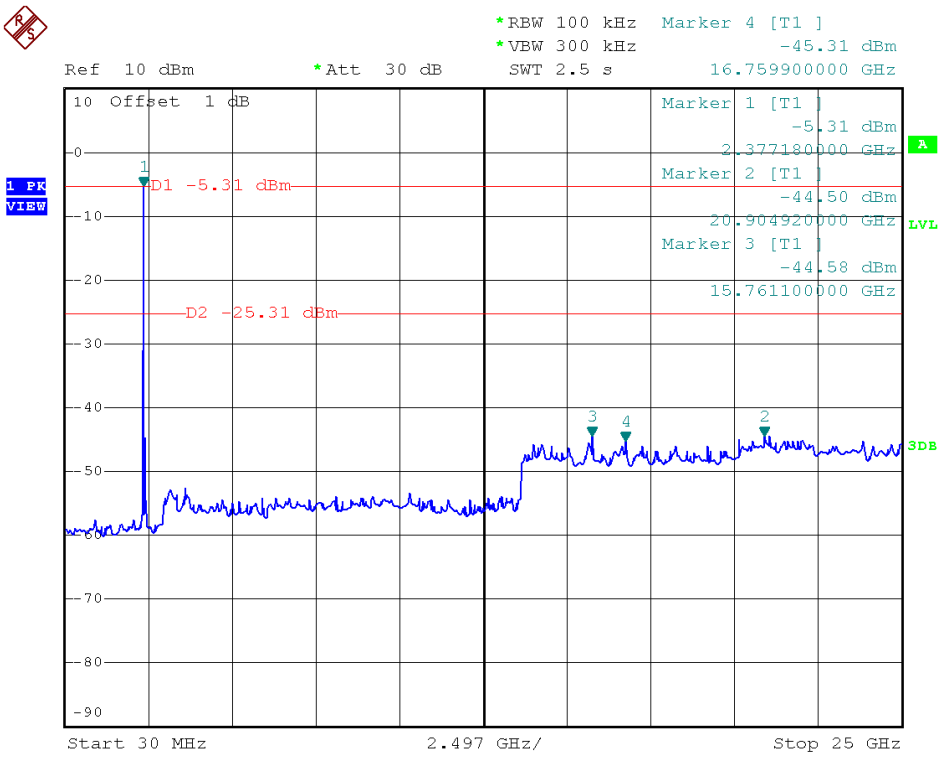
2.4.3.3 802.11n -20MHz Test mode

A. Test Verdict:

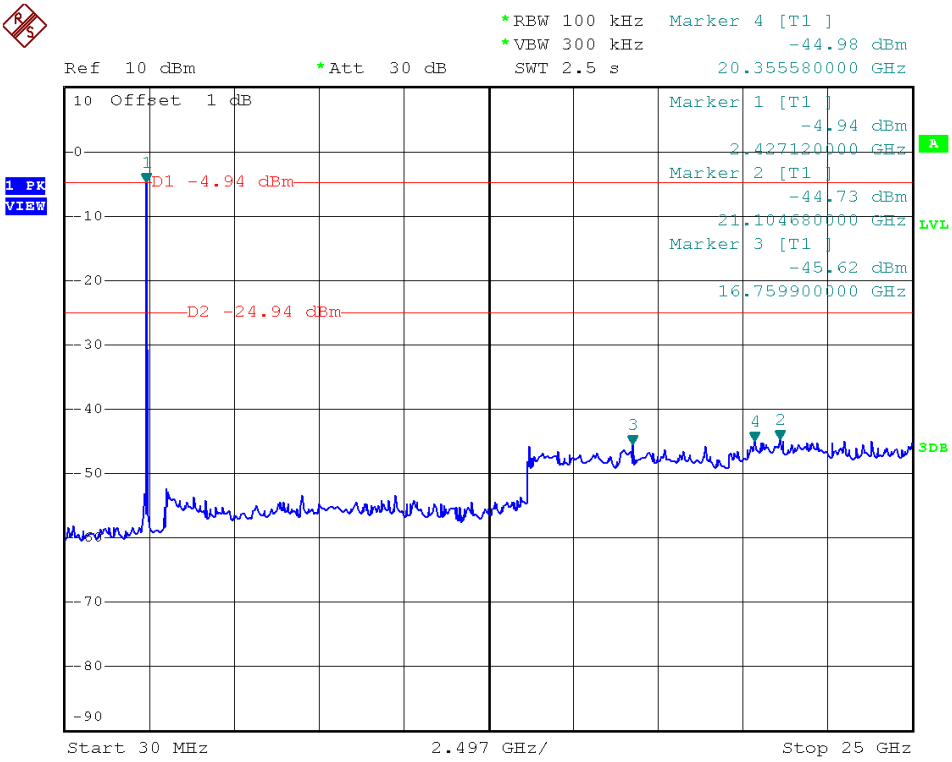
Channel	Frequency (MHz)	Refer to Plot	Limit (dBc)	Verdict
1	2412	Plot 2.4 G	-20	PASS
6	2437	Plot 2.4 H	-20	PASS
11	2462	Plot 2.4 I	-20	PASS

B. Test Plots:

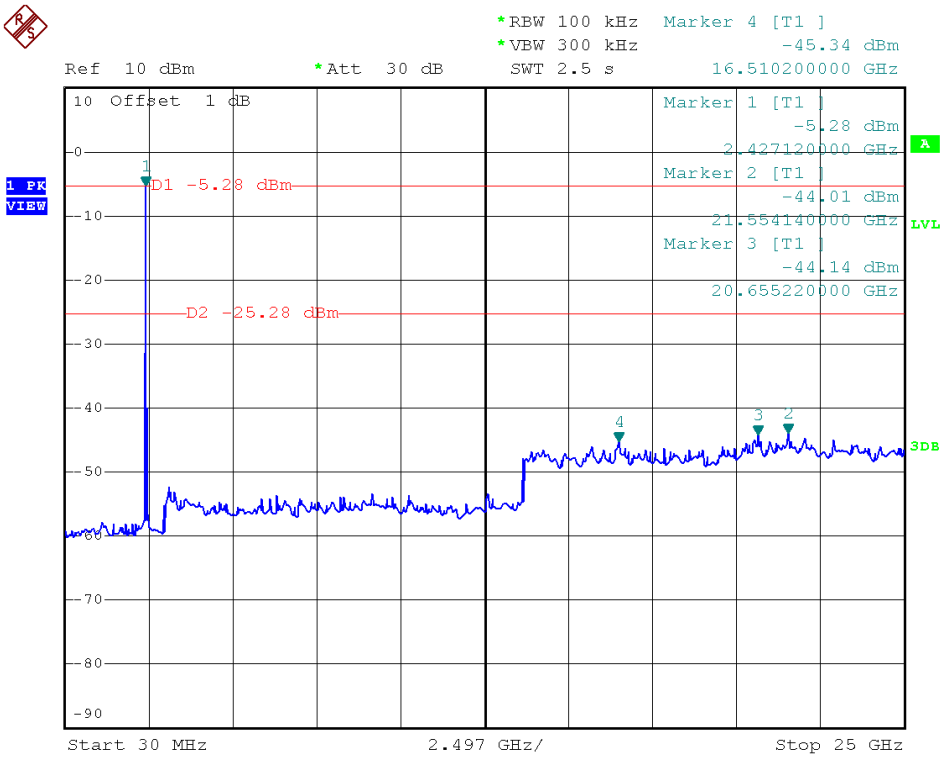
Note: the power of the Module transmitting frequency should be ignored.



(Plot 2.4 G: Channel = 1, 30MHz to 25GHz@ 802.11n-20)



(Plot 2.4 H: Channel = 6, 30MHz to 25GHz@ 802.11n-20)



(Plot 2.4 I: Channel = 11, 30MHz to 25GHz@ 802.11n-20)

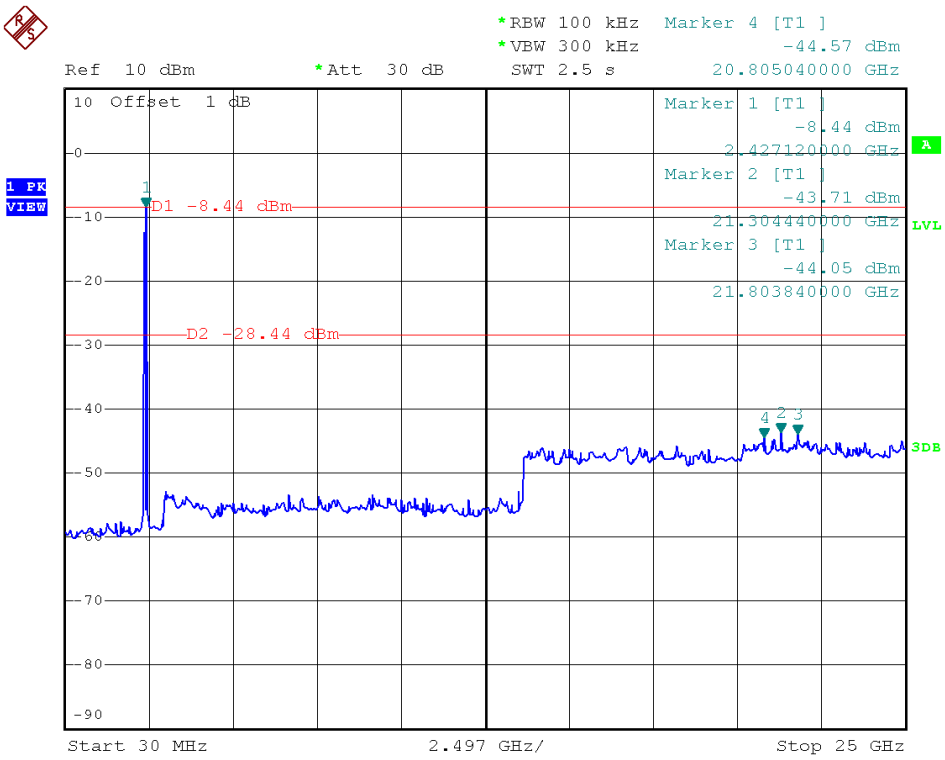
2.4.3.4 802.11n -40MHz Test mode

A. Test Verdict:

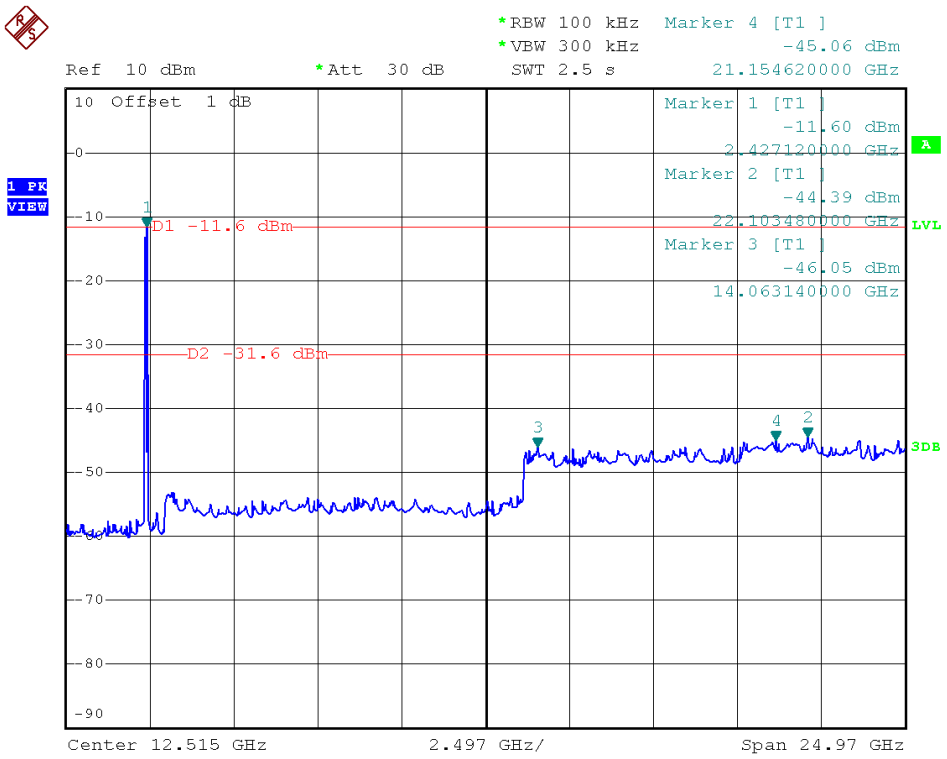
Channel	Frequency (MHz)	Refer to Plot	Limit (dBc)	Verdict
3	2422	Plot 2.4 J	-20	PASS
6	2437	Plot 2.4 K	-20	PASS
9	2452	Plot 2.4 L	-20	PASS

B. Test Plots:

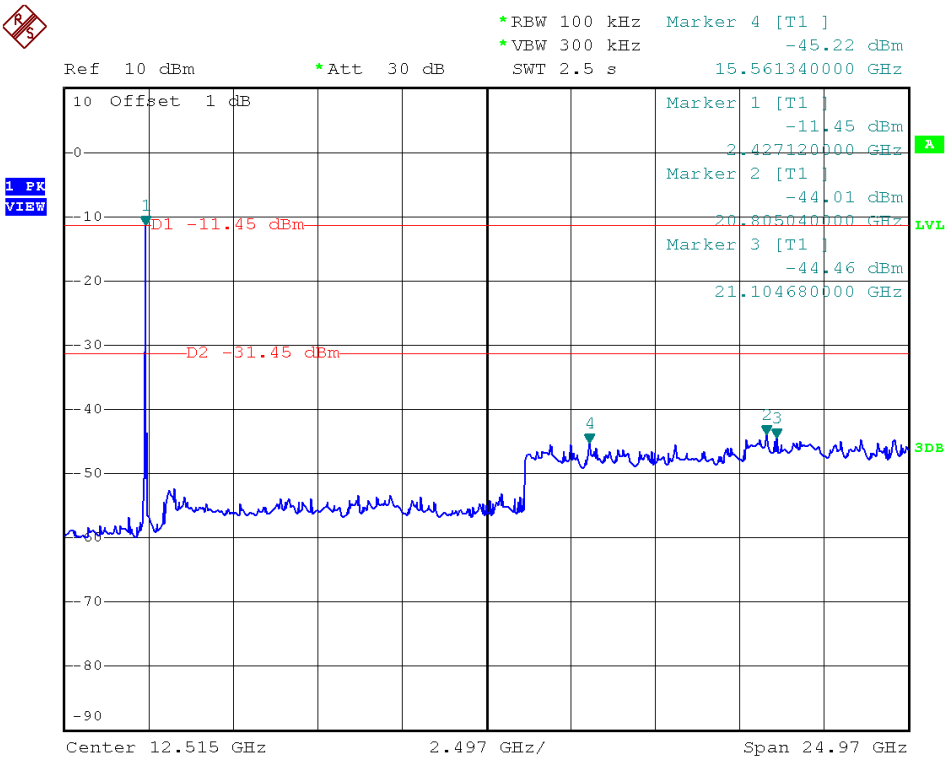
Note: the power of the Module transmitting frequency should be ignored.



(Plot 2.4 J: Channel = 3, 30MHz to 25GHz@ 802.11n-40)



(Plot 2.4 K: Channel = 6, 30MHz to 25GHz@ 802.11n-40)



(Plot 2.4 L: Channel = 9, 30MHz to 25GHz@ 802.11n-40)

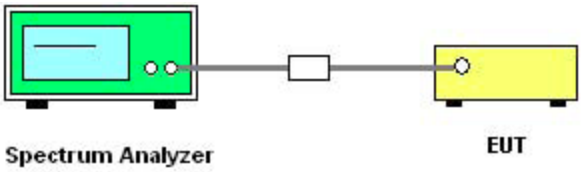
2.5 Power spectral density (PSD)

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 and Atten 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. Test Procedure

1. Set analyzer center frequency to DTS channel center frequency.
2. Set the span to 1.5 times the DTS channel bandwidth.
3. Set the RBW ⩾ 3 kHz.
4. Set the VBW ⩾ 3 x RBW.
5. Detector = peak.
6. Sweep time = auto couple
7. Trace mode = max hold.
8. Allow trace to fully stabilize.
9. Use the peak marker function to determine the maximum amplitude level.
10. If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

C. Equipments List:

Description	Manufacturer	Model	Serial No.	Cal.Due Date
Spectrum Analyzer	R&S	FSP40	1164.4391.40	2014.06.10

2.5.3 Test Result

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

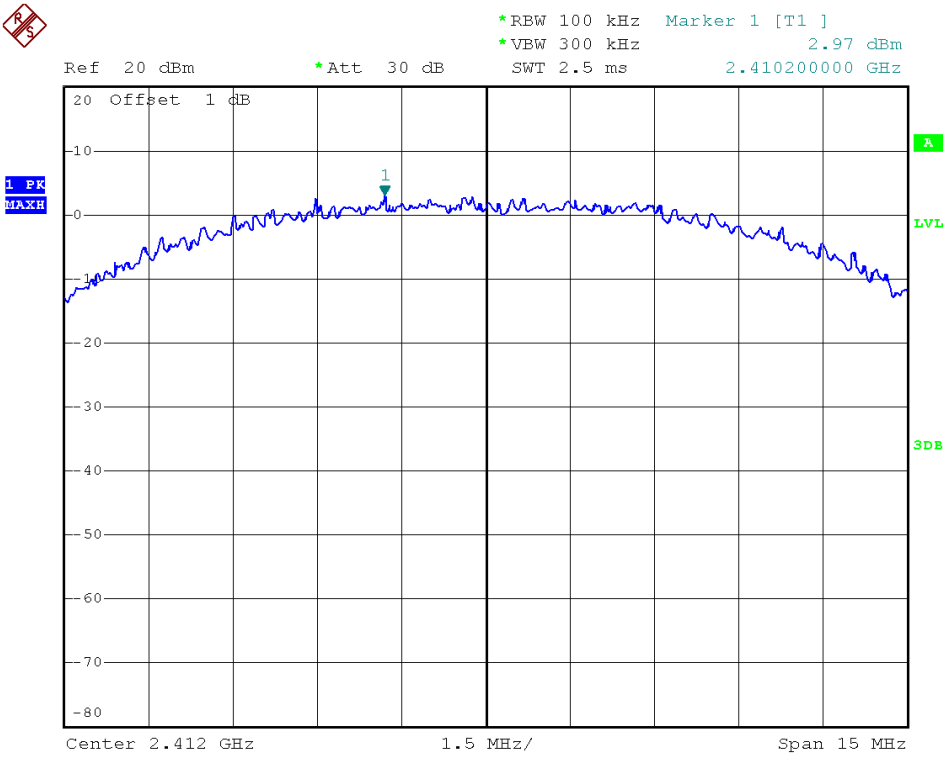
2.5.3.1 802.11b Test mode

A. Test Verdict:

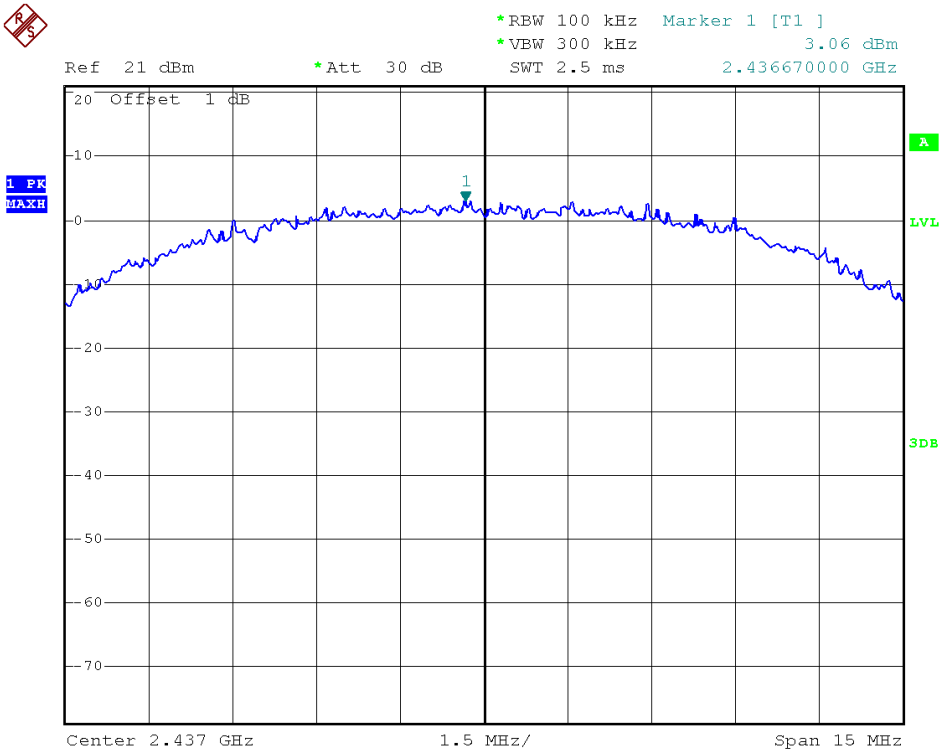
Spectral power density (dBm)					
Channel	Frequency (MHz)	Measured PSD (dBm)	Refer to Plot	Limit (dBm/3kHz)	Verdict
1	2412	2.97	Plot 2.5 A	8	PASS
6	2437	3.06	Plot 2.5 B	8	PASS
11	2462	3.37	Plot 2.5 C	8	PASS
Measurement uncertainty: ±1.3dB					

Note: 1. For 802.11b mode at finial test to get the worst-case emission at 11Mbps.
2. The test results including the cable lose.

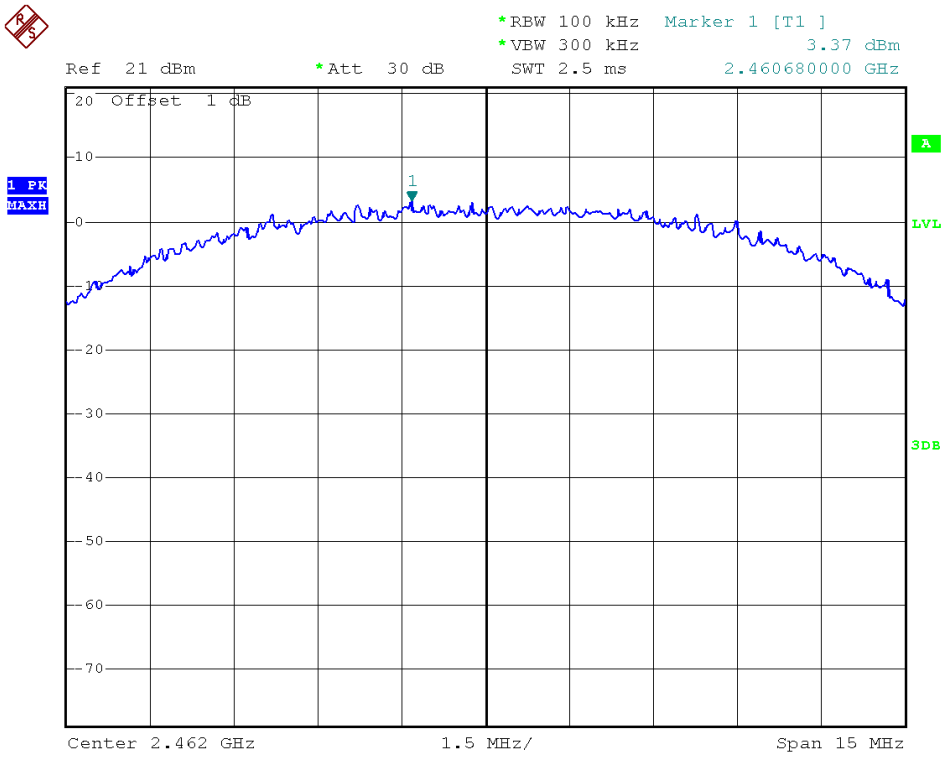
B. Test Plots:



(Plot 2.5 A: Channel = 1 @ 802.11b)



(Plot 2.5 B: Channel = 6 @ 802.11b)



(Plot 2.5 C: Channel = 11 @ 802.11b)

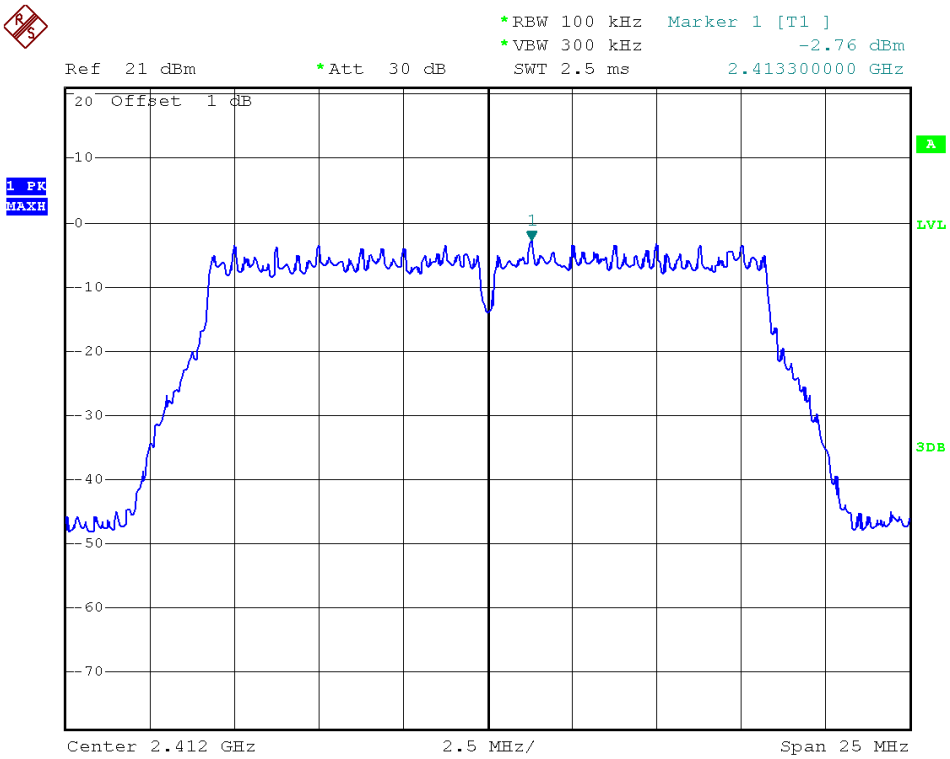
2.5.3.2 802.11g Test mode

A. Test Verdict:

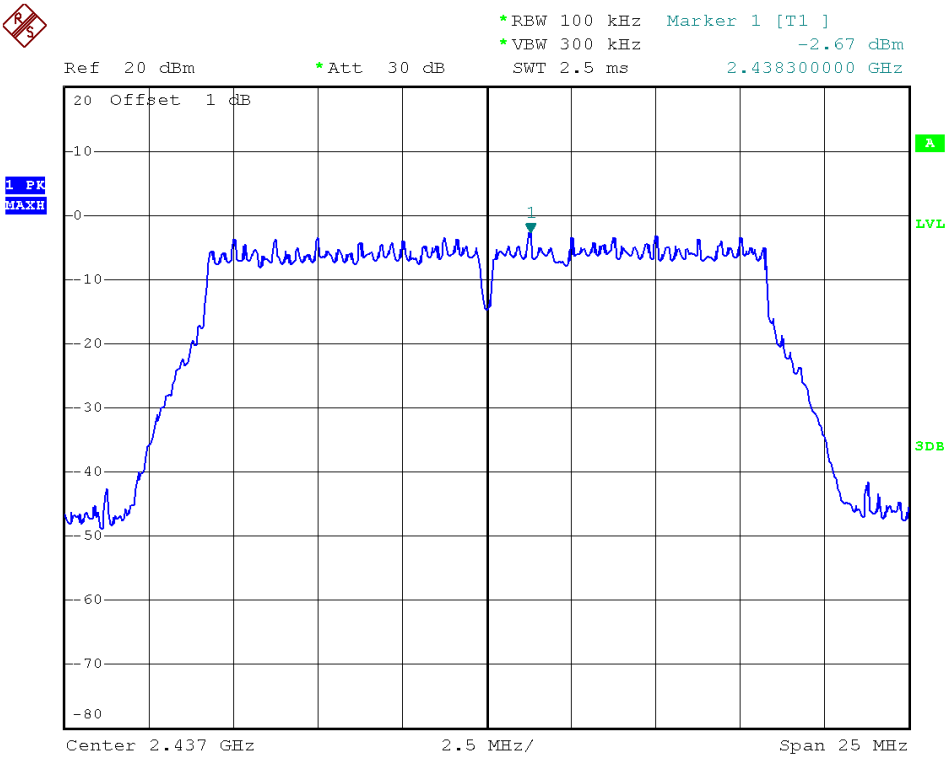
Spectral power density (dBm)					
Channel	Frequency (MHz)	Measured PSD (dBm)	Refer to Plot	Limit (dBm/3kHz)	Verdict
1	2412	-2.76	Plot 2.5 D	8	PASS
6	2437	-2.67	Plot 2.5 E	8	PASS
11	2462	-2.61	Plot 2.5 F	8	PASS
Measurement uncertainty: ±1.3dB					

Note: 1. For 802.11g mode at finial test to get the worst-case emission at 54 Mbps.
2. The test results including the cable lose.

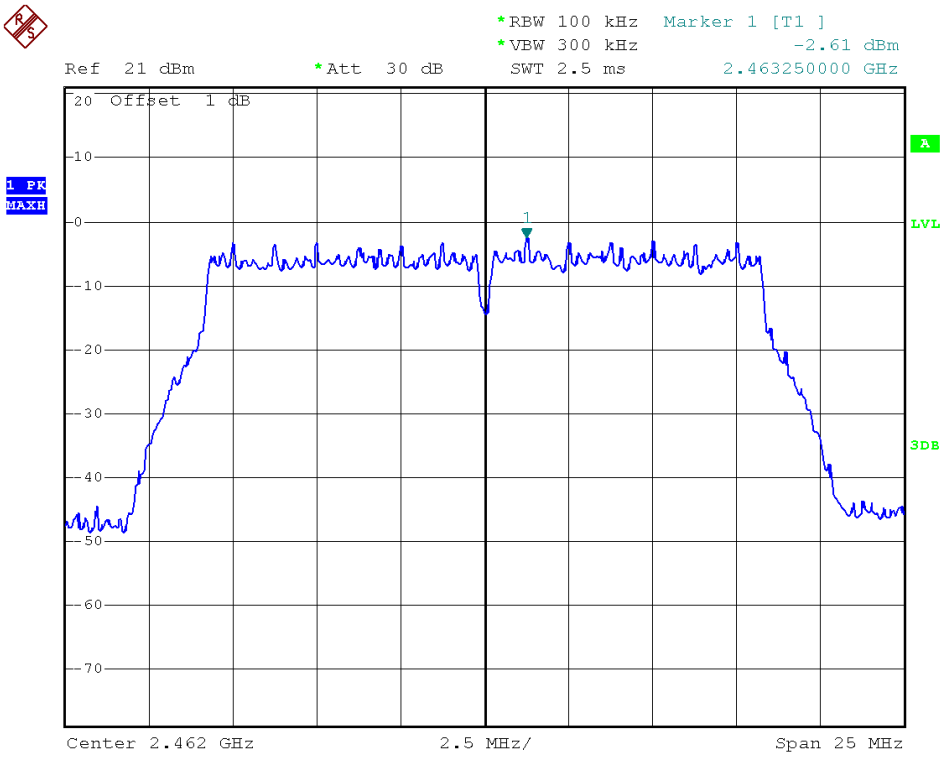
B. Test Plots:



(Plot 2.5 D: Channel = 1 @ 802.11g)



(Plot 2.5 E: Channel = 6 @ 802.11g)



(Plot 2.5 F: Channel = 11 @ 802.11g)

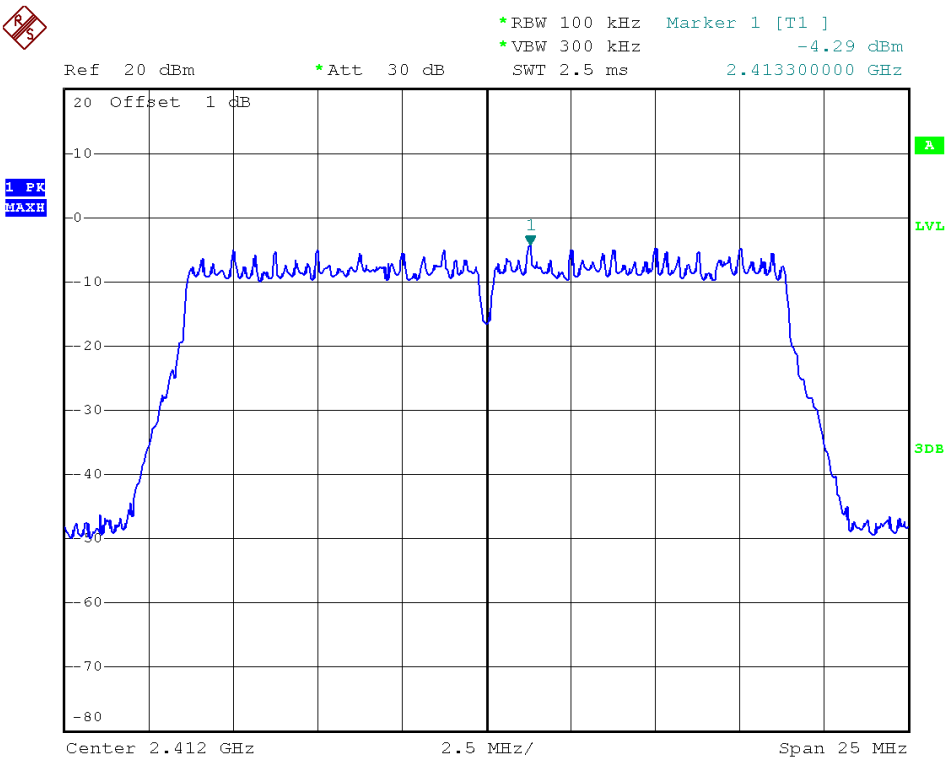
2.5.3.3 802.11n-20 Test mode

A. Test Verdict:

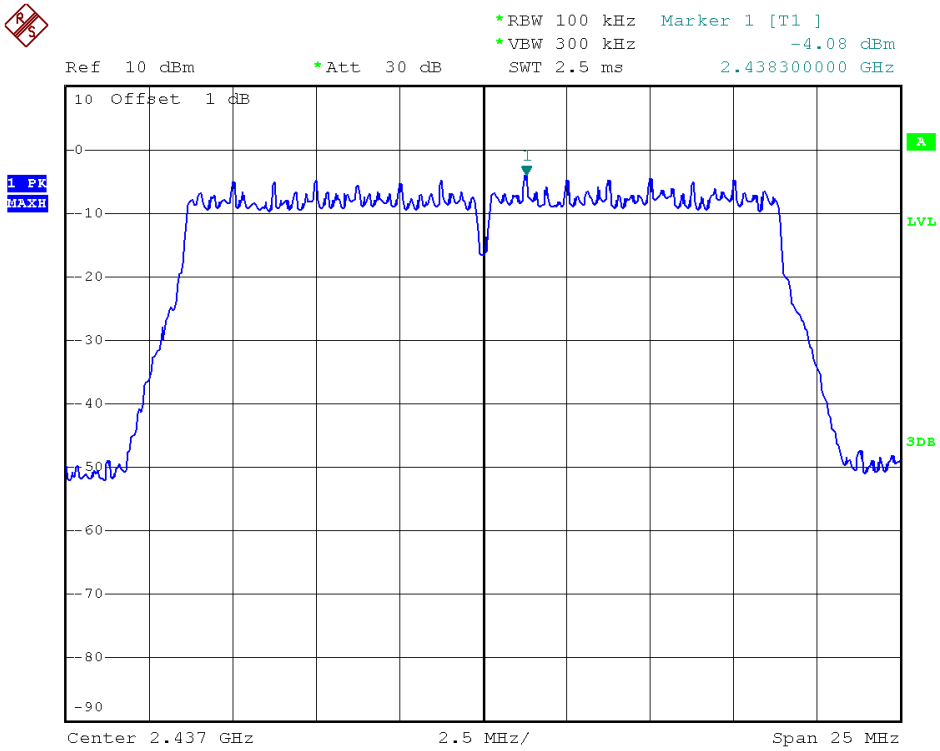
Spectral power density (dBm)					
Channel	Frequency (MHz)	Measured PSD (dBm)	Refer to Plot	Limit (dBm/3kHz)	Verdict
1	2412	-4.29	Plot2.5 G	8	PASS
6	2437	-4.08	Plot2.5 H	8	PASS
11	2462	-4.07	Plot2.5 I	8	PASS
Measurement uncertainty: ±1.3dB					

Note: 1. For 802.11n(20MHz) mode at finial test to get the worst-case emission at 65 Mbps.
2. The test results including the cable lose.

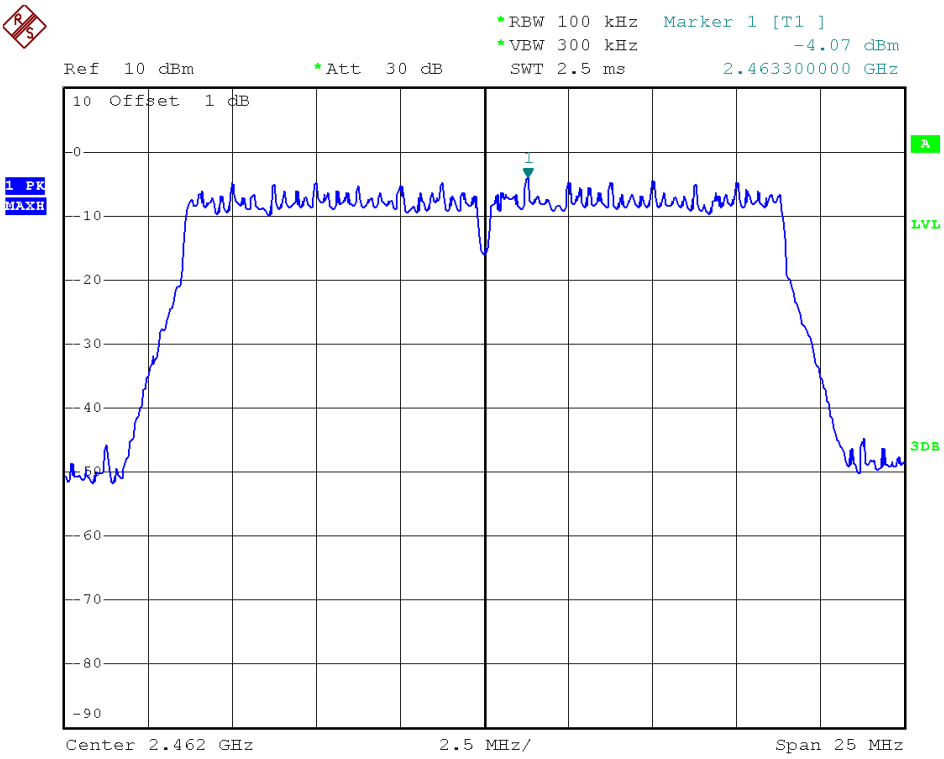
B. Test Plots:



(Plot 2.5 G: Channel = 1 @ 802.11n-20



(Plot 2.5 H: Channel = 6 @ 802.11n-20



(Plot 2.5 I: Channel = 11 @ 802.11n-20

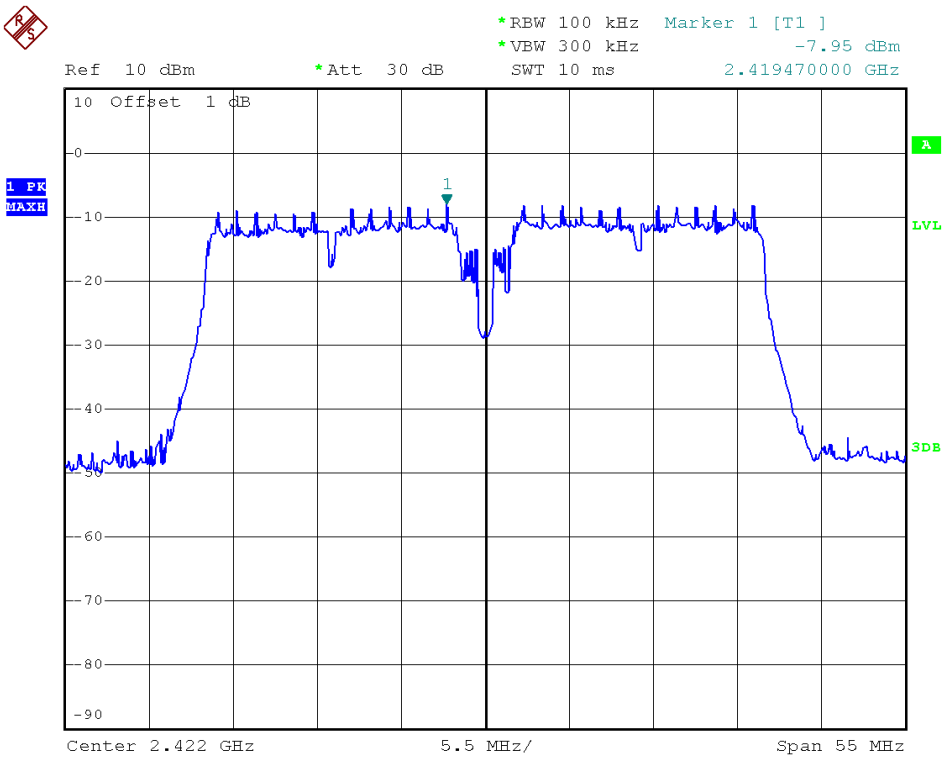
2.5.3.4 802.11n-40 Test mode

A. Test Verdict:

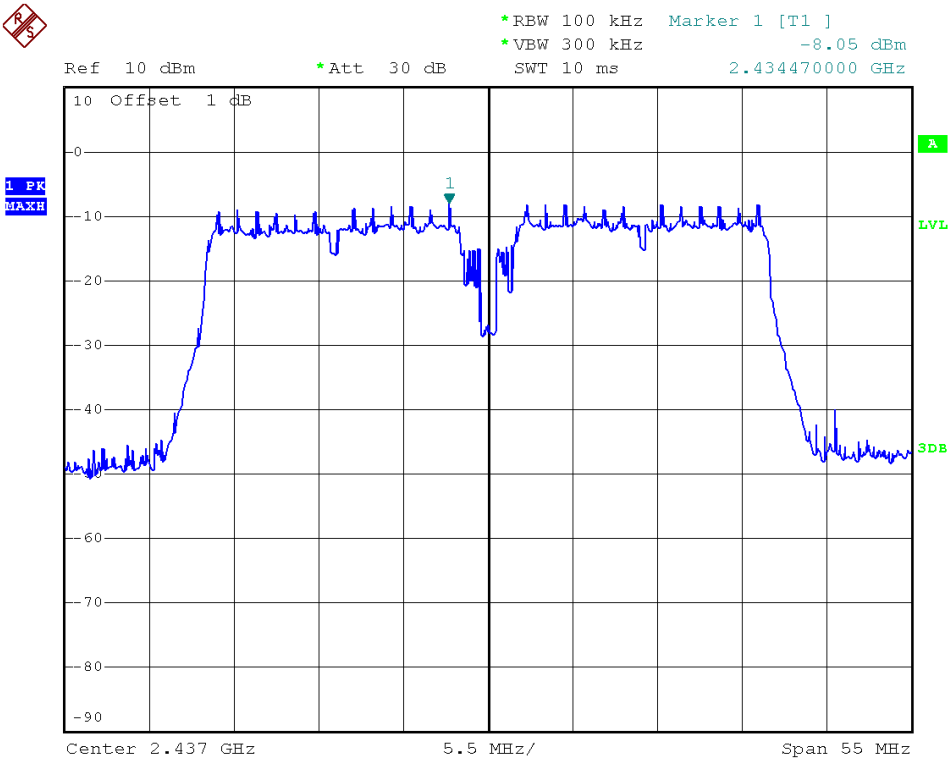
Spectral power density (dBm)					
Channel	Frequency (MHz)	Measured PSD (dBm)	Refer to Plot	Limit (dBm/3kHz)	Verdict
3	2422	-7.95	Plot2.5 J	8	PASS
6	2437	-8.05	Plot2.5 K	8	PASS
9	2452	-7.74	Plot2.5 L	8	PASS
Measurement uncertainty: ±1.3dB					

Note: 1. For 802.11n(40MHz) mode at finial test to get the worst-case emission at 150 Mbps.
2. The test results including the cable lose.

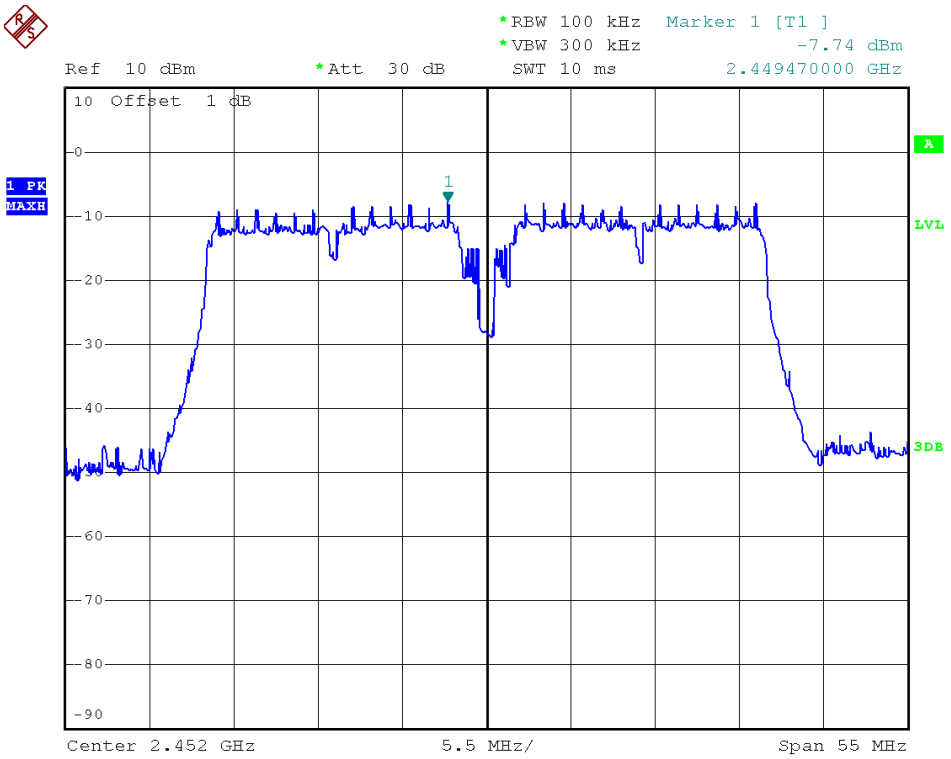
B. Test Plots:



(Plot 2.5 J: Channel = 3 @ 802.11n-40



(Plot 2.5 K: Channel = 6 @ 802.11n-40



(Plot 2.5 L: Channel = 9 @ 802.11n-40

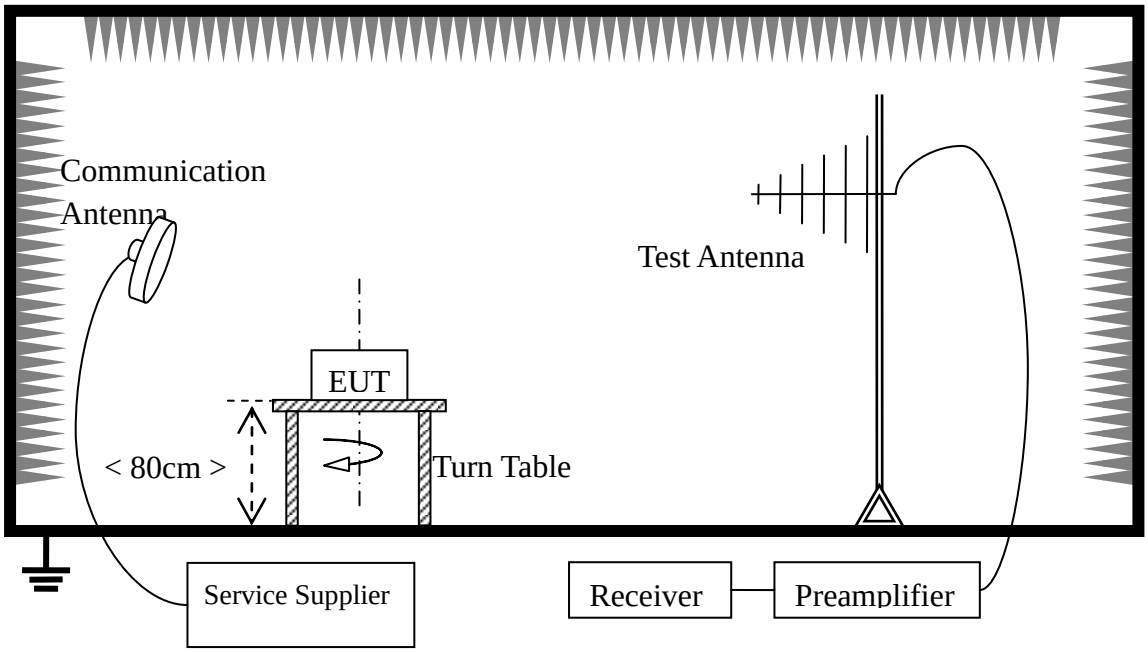
2.6 Band Edge

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. Due Date
Receiver	R&S	ESIB26	A0304218	2014.06.07
Full-Anechoic Chamber	Albatross	12.8m*6.8m*6.4m	A0412372	2014.06.07
Double ridge horn antenna	R&S	HF906	100150	2014.06.10
Ultra-wideband antenna	R&S	HL562	100089	2014.06.10
Ampilier 1G~18GHz	R&S	MITEQ AFS42-00101800	25-S-42	2014.06.05

2.6.3 Test Result

Band edge were measurement for 802.11b,802.11g, 802.11n(20MHz) and 802.11n(40MHz) mode at difference date, recording worst case in test report.

Radiated band edge Measurement:

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

The measurement results are obtained as below:
E [dBμV/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

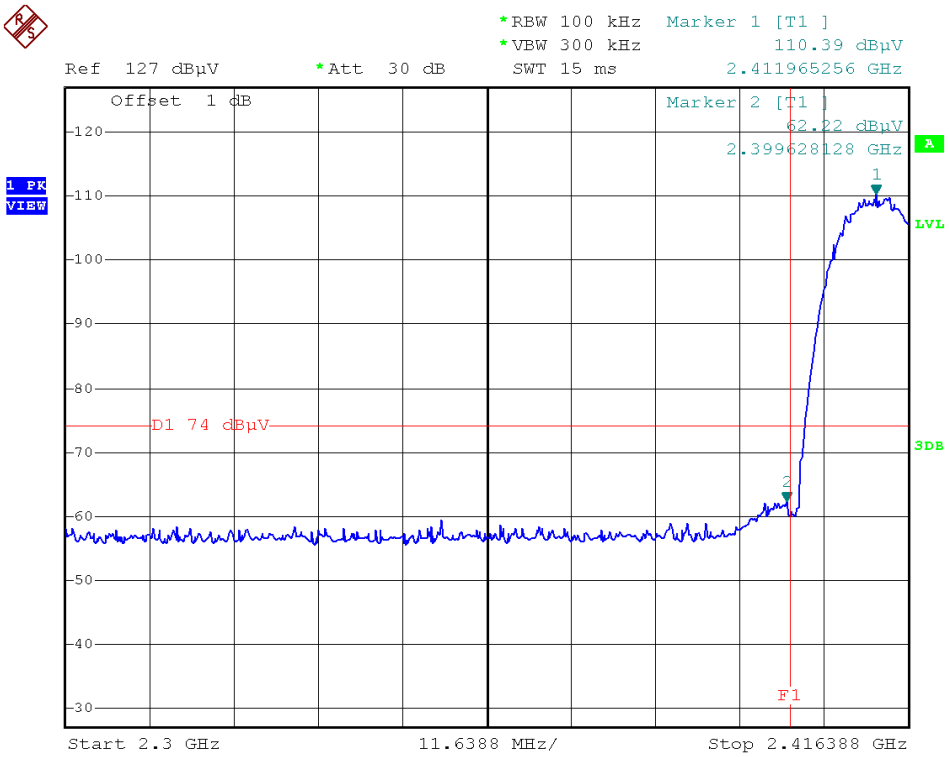
NOTE 1: The red vertical lines “F1” in the following charts is to indicate the frequencies 2400MHz and 2483.5MHz respectively
NOTE 2: Both horizontal and vertical polarity direction of the test antenna has been performed, only the worst case recorded in this report.

802.11b

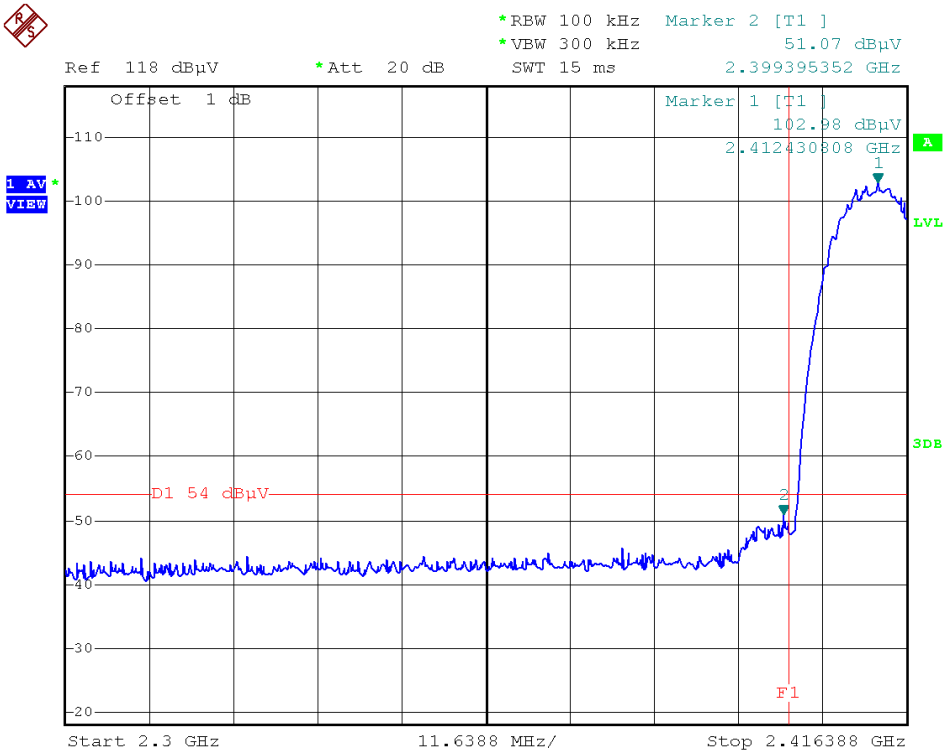
A. Test Verdict:

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	2399.628	PK	62.22	-31.7	28.3	58.82	74	Pass
1	2399.395	AV	51.07	-31.7	28.3	47.67	54	Pass
11	2493.650	PK	59.81	-29.45	29.2	59.56	74	Pass
11	2493.480	AV	49.02	-29.45	29.2	48.77	54	Pass

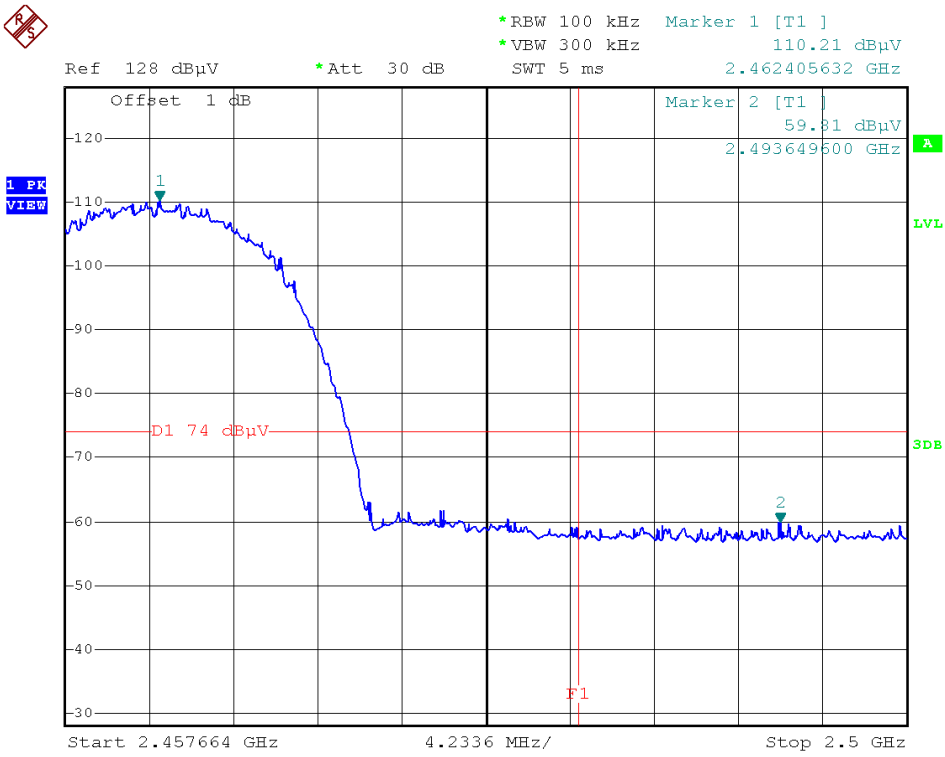
B. Test Plots:



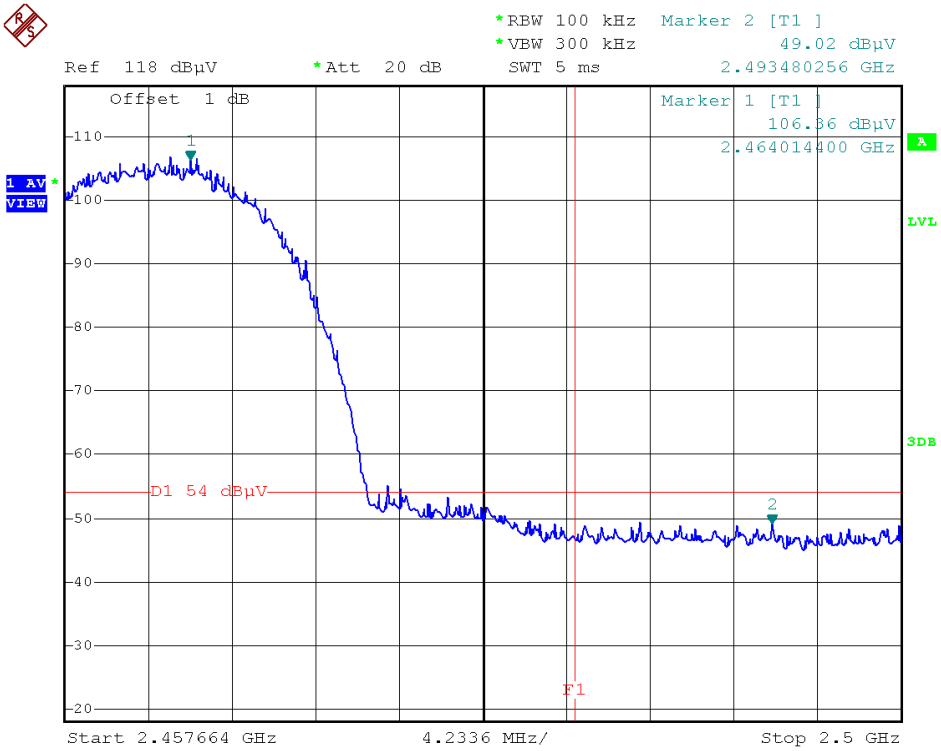
(Plot 2.6 A1: Channel = 1 Peak @ 802.11b)



(Plot 2.6 A2: Channel = 1 AVG @ 802.11b)



(Plot 2.6 A3: Channel = 11 Peak @ 802.11b)



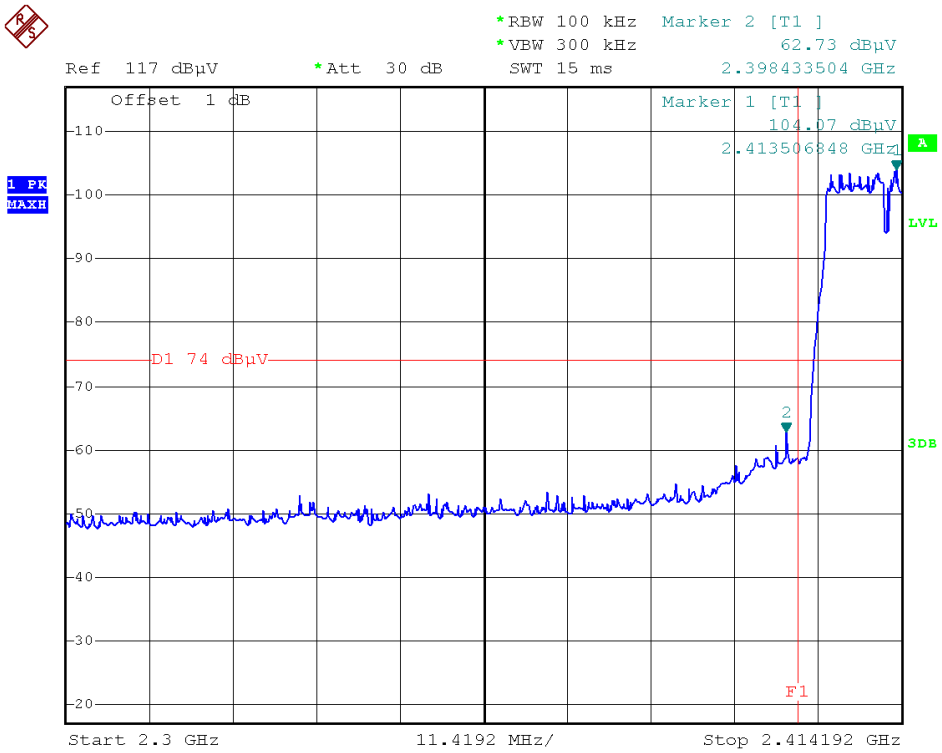
(Plot 2.6 A4: Channel = 11 AVG @ 802.11b)

802.11g

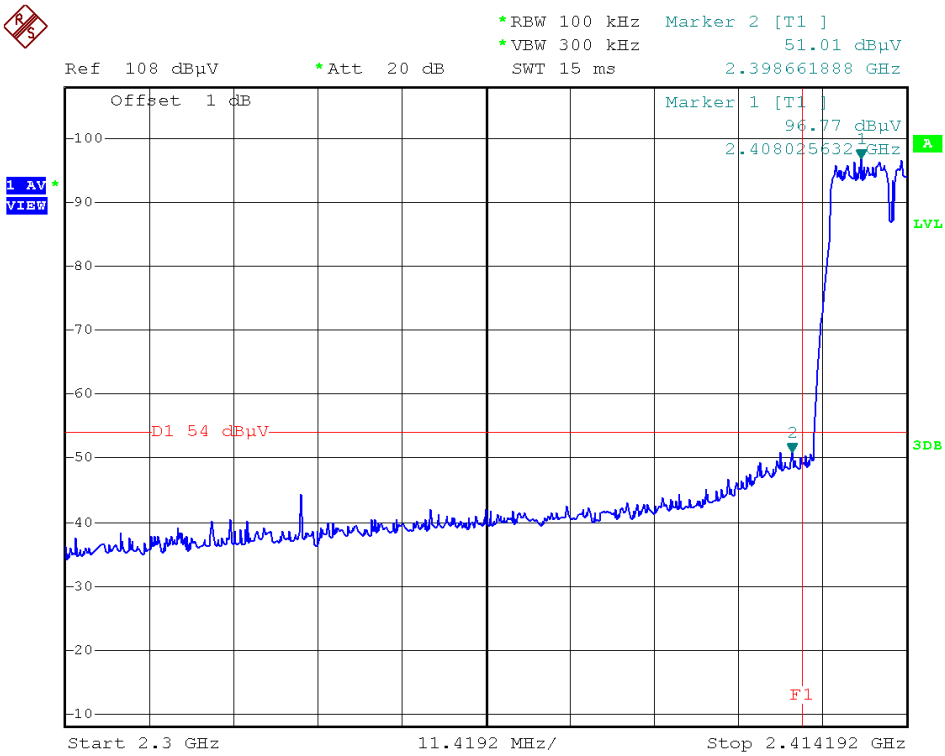
A. Test Verdict:

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	2398.434	PK	62.73	-31.7	28.3	59.33	74	Pass
1	2398.662	AV	51.01	-31.7	28.3	47.61	54	Pass
11	2483.856	PK	59.63	-29.45	29.2	59.38	74	Pass
11	2487.038	AV	51.30	-29.45	29.2	51.05	54	Pass

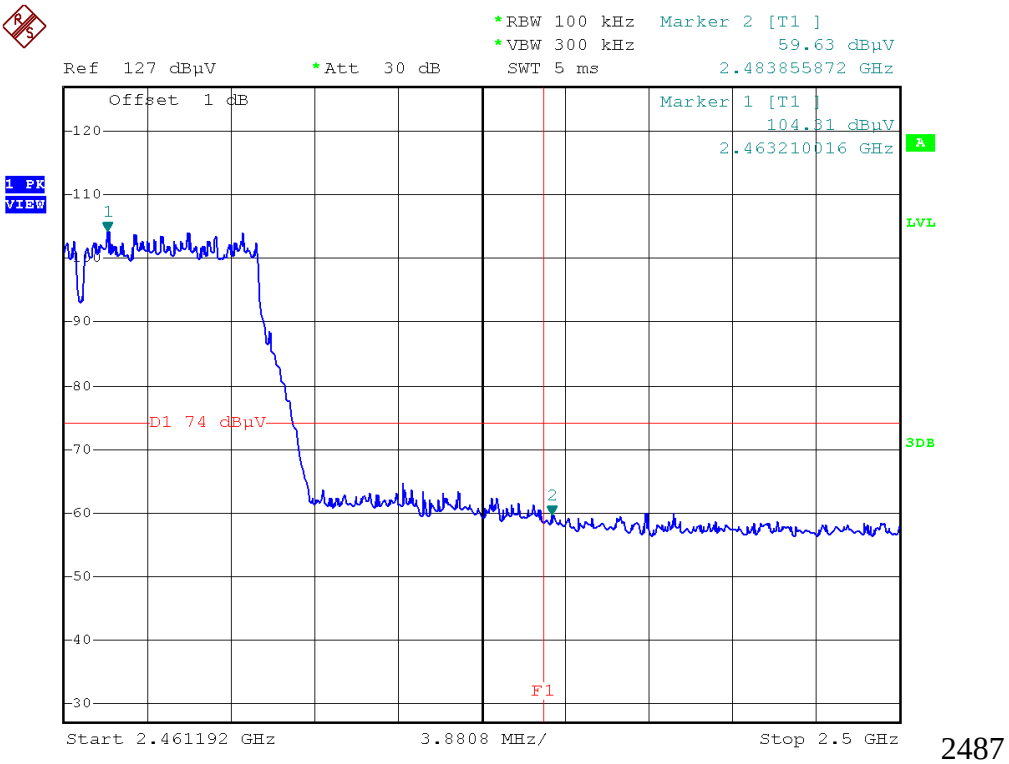
B. Test Plots:



(Plot 2.6 B1: Channel = 1 Peak @ 802.11g)

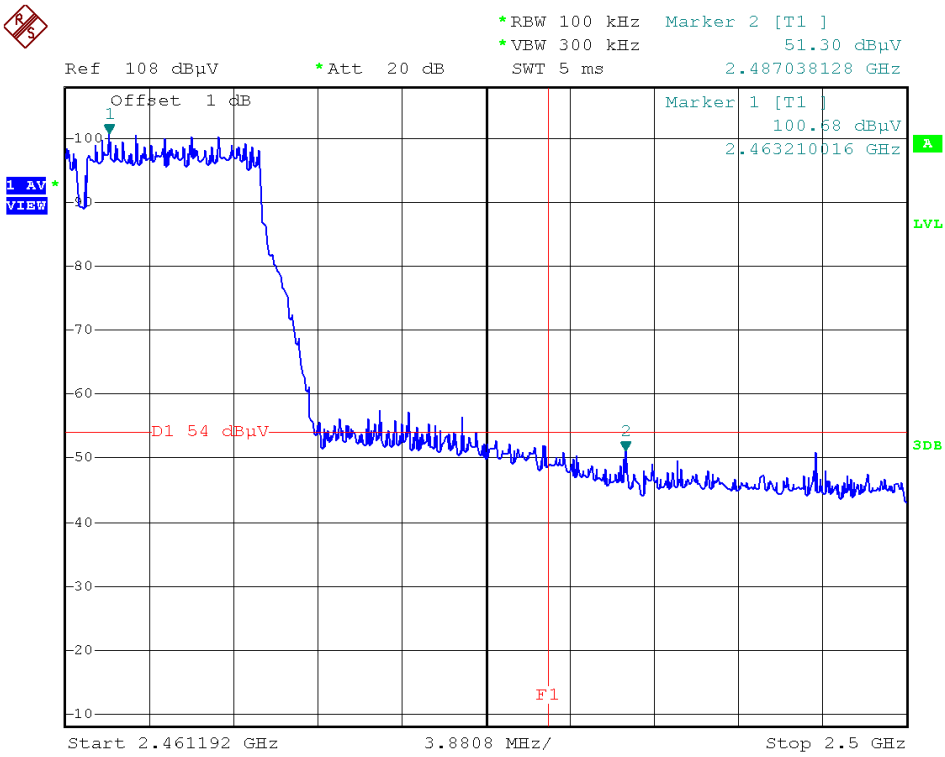


(Plot 2.6 B2: Channel = 1 AVG @ 802.11g)



2487

(Plot 2.6 B3: Channel = 11 Peak @ 802.11g)



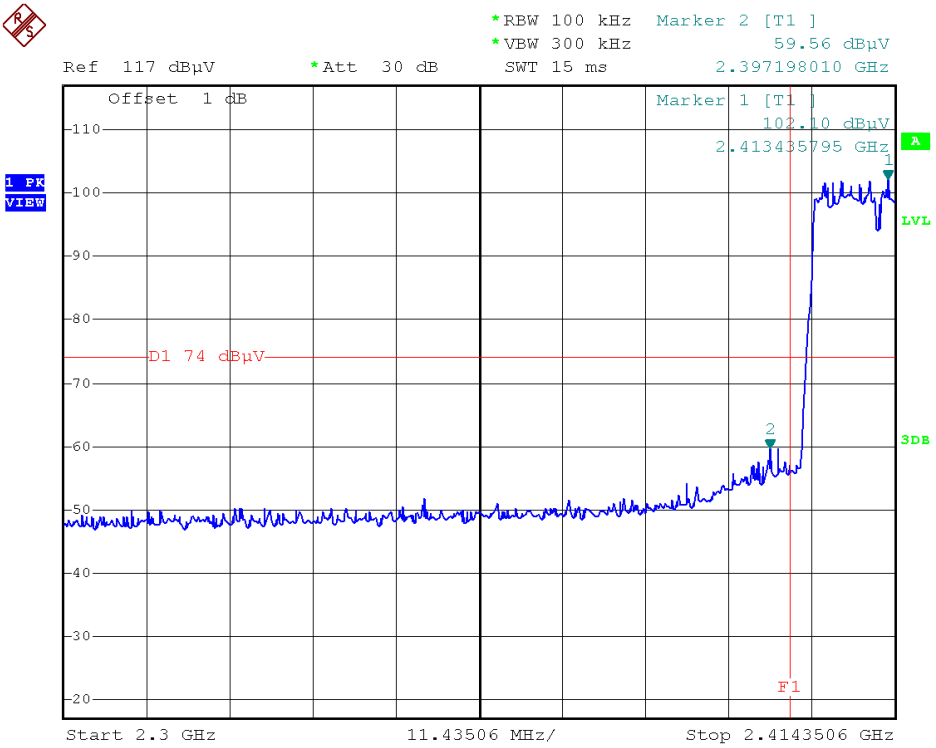
(Plot 2.6 B4: Channel = 11 AVG @ 802.11g)

802.11n-20

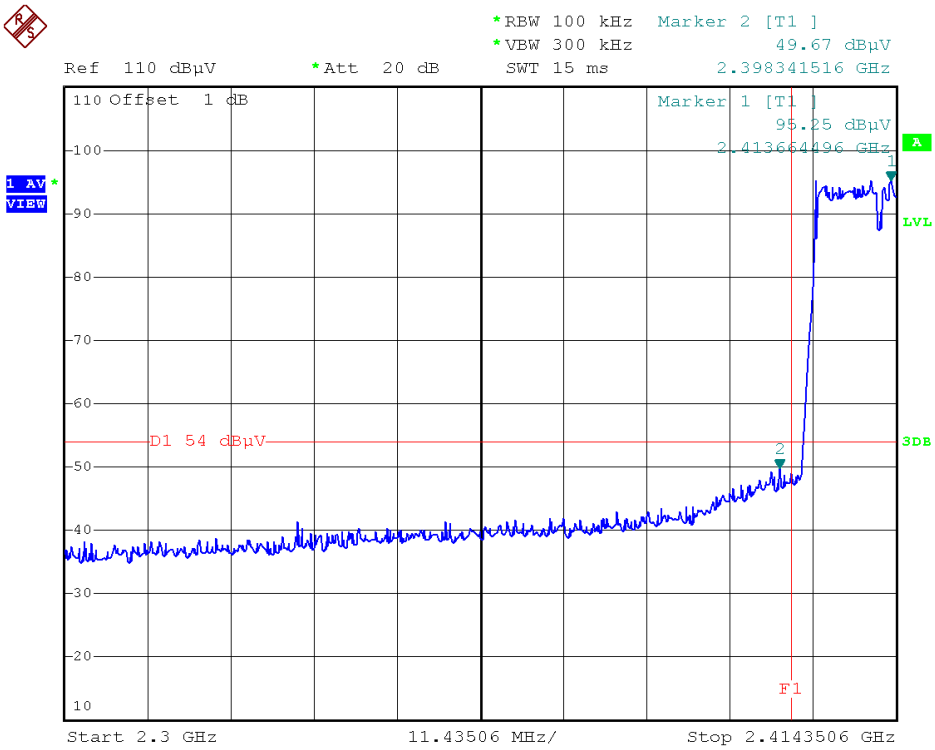
A. Test Verdict:

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	2397.198	PK	59.56	-31.70	28.30	56.16	74	Pass
1	2398.342	AV	49.67	-31.70	28.30	46.27	54	Pass
11	2489.569	PK	56.47	-29.45	29.20	56.22	74	Pass
11	2495.780	AV	50.32	-29.45	29.20	50.07	54	Pass

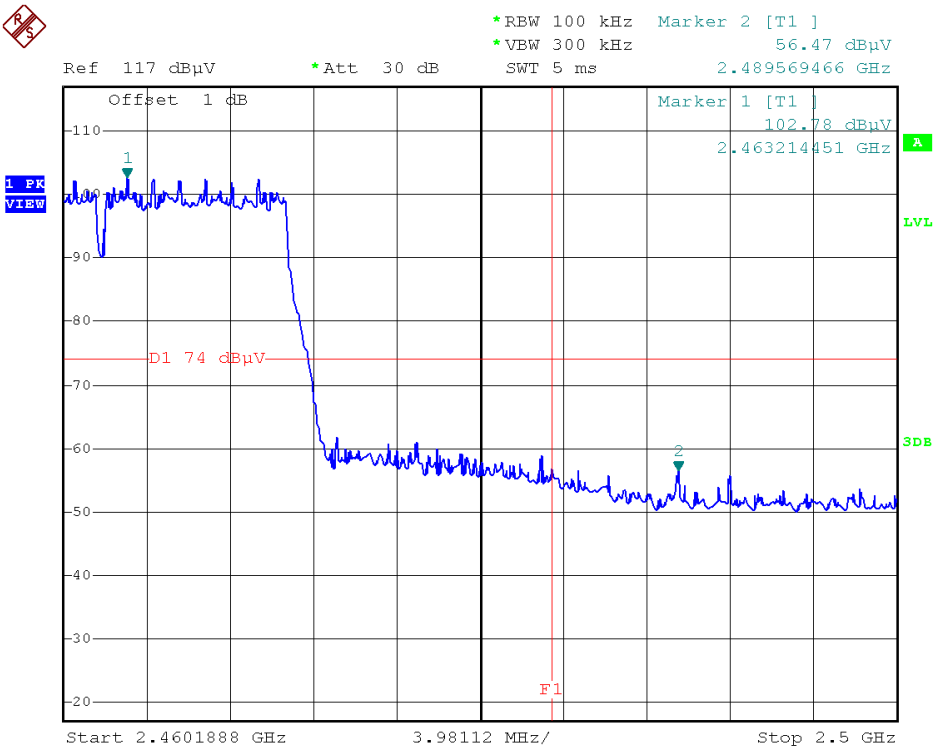
B. Test Plots:



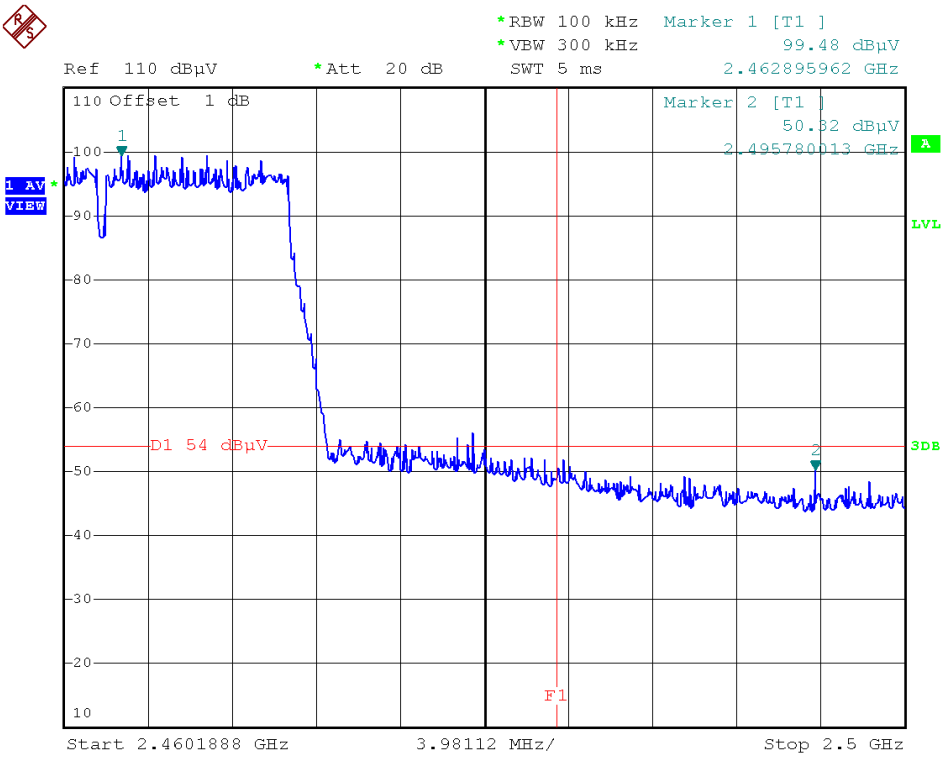
(Plot 2.6 C1: Channel = 1 Peak @ 802.11n-20)



(Plot 2.6 C2: Channel = 1 AVG @ 802.11n-20)



(Plot 2.6 C3: Channel = 11 Peak @ 802.11n-20)



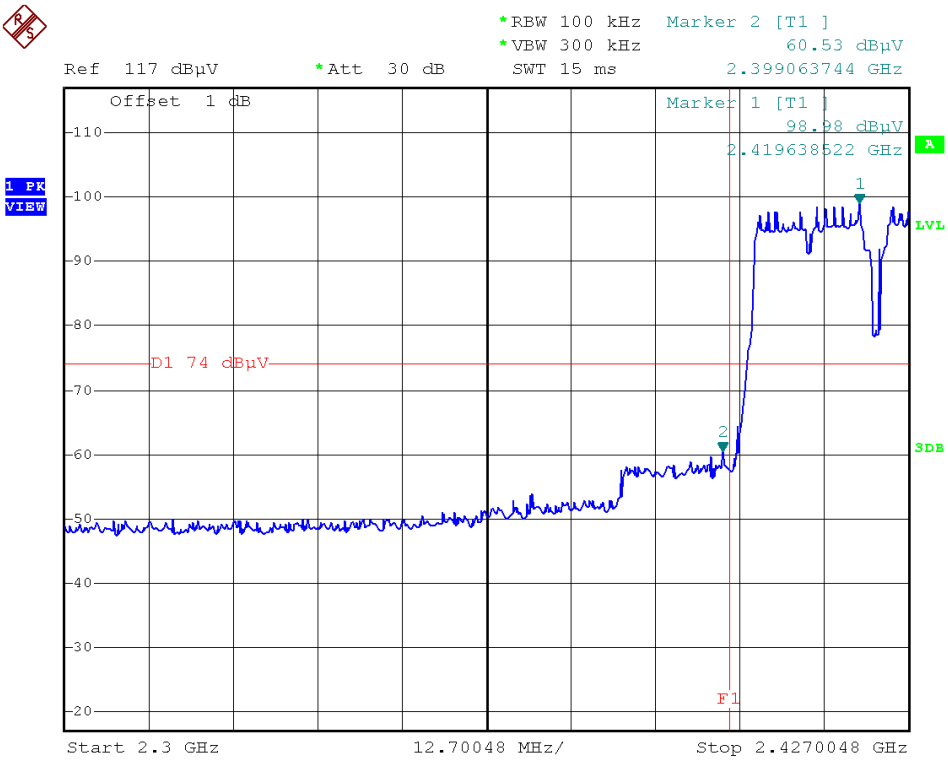
(Plot 2.6 C4: Channel = 11 AVG @ 802.11n-20)

802.11n-40

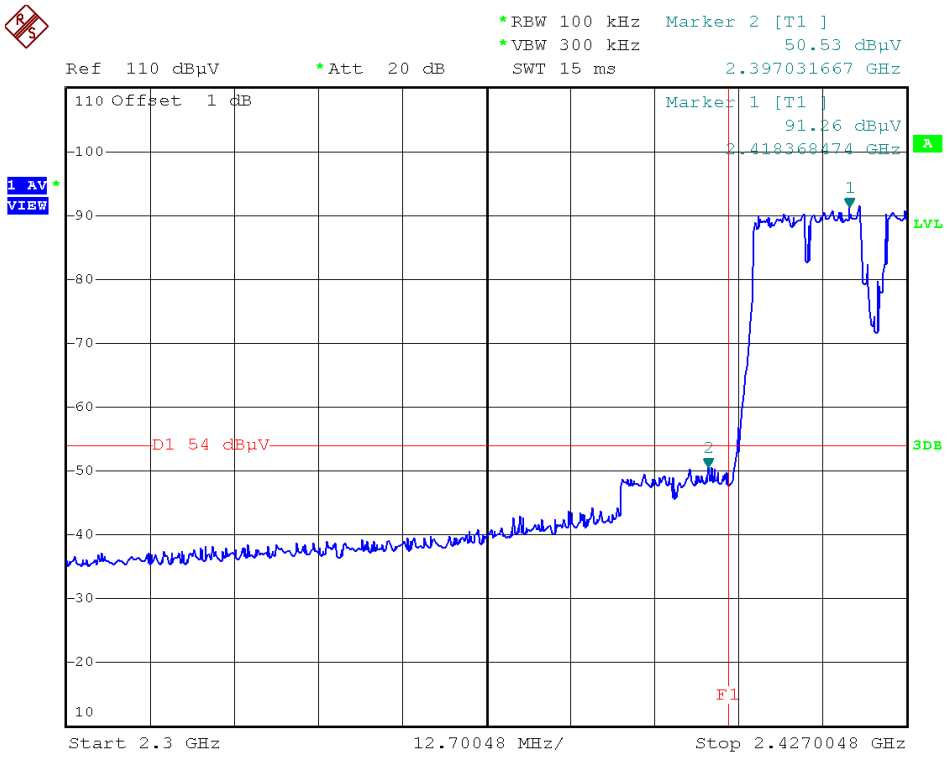
A. Test Verdict:

Channel	Frequency (MHz)	Detector PK/ AV	Receiver Reading UR (dBuV)	AT (dB)	AFactor (dB@3m)	Max. Emission E (dBµV/m)	Limit (dBµV/m)	Verdict
3	2399.064	PK	60.53	-31.7	28.3	57.13	74	Pass
3	2397.032	AV	50.53	-31.7	28.3	47.13	54	Pass
9	2489.564	PK	64.50	-29.45	29.2	64.25	74	Pass
9	2488.918	AV	50.40	-29.45	29.2	50.15	54	Pass

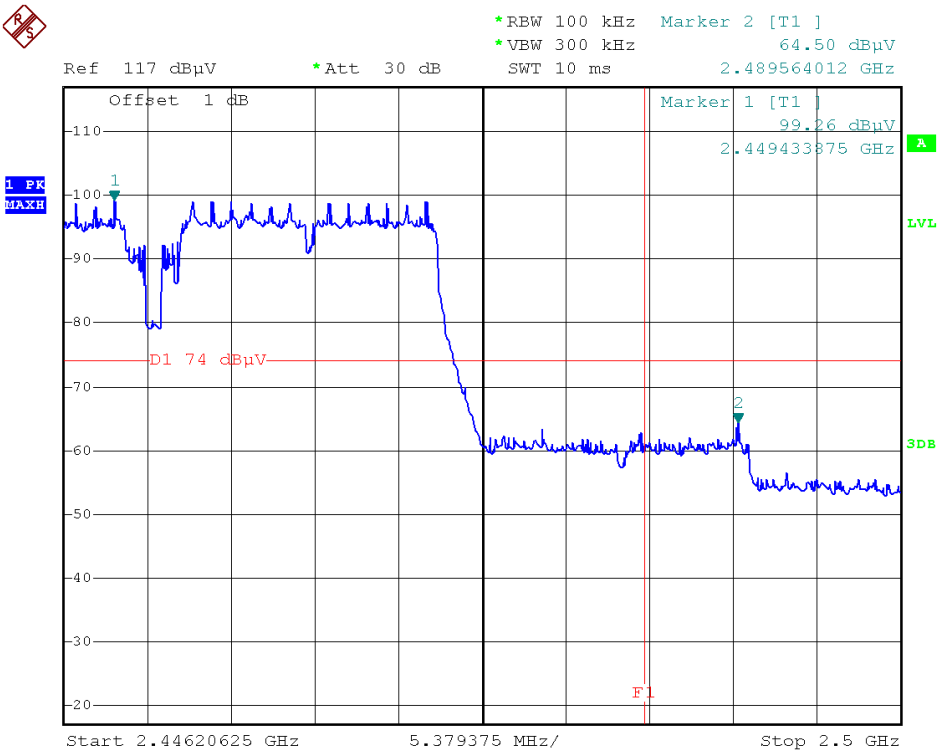
B. Test Plots:



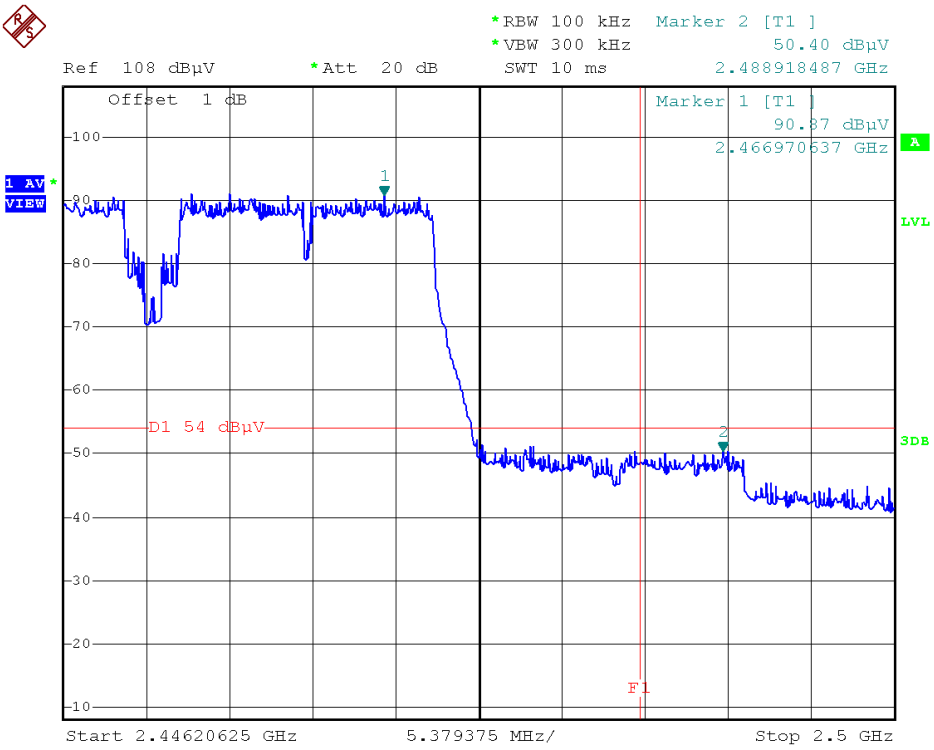
(Plot 2.6 D1: Channel = 3 Peak @ 802.11n-40)



(Plot 2.6 D2: Channel = 3 AVG @ 802.11n-40)



(Plot 2.6 D3: Channel = 9 Peak @ 802.11n-40)



(Plot 2.6 D4: Channel = 9 AVG @ 802.11n-40)

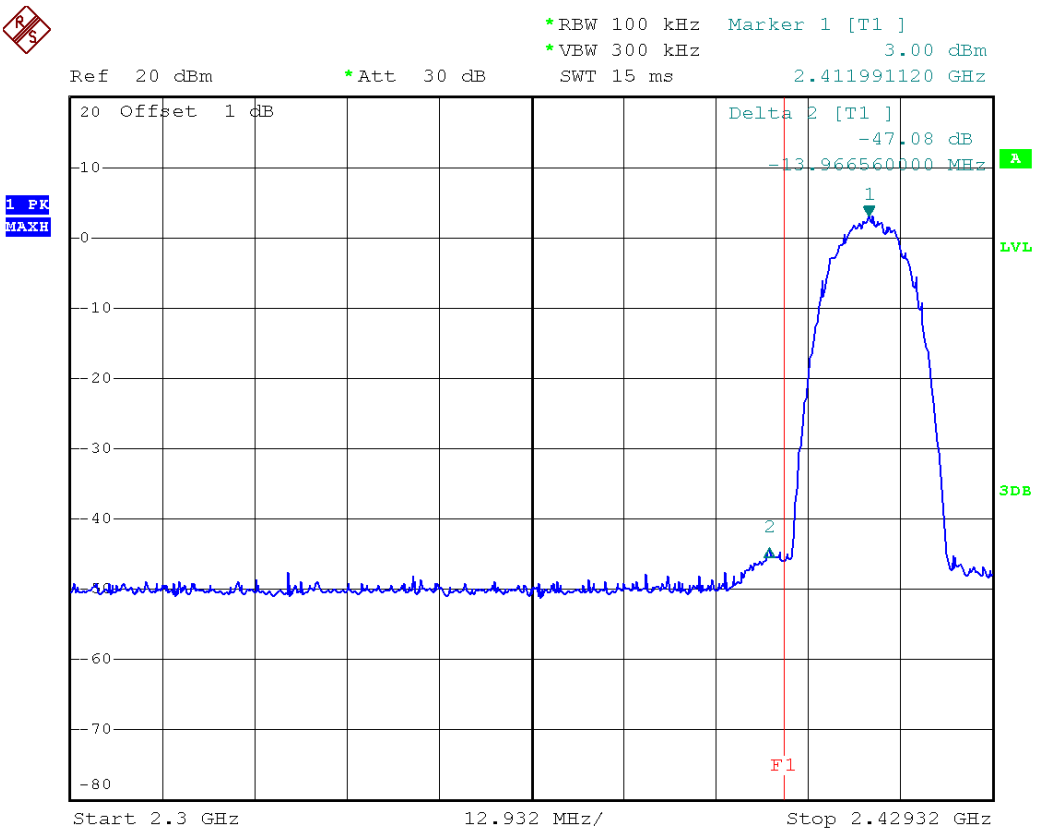
Conducted Band Edge Measurement

802.11b Test mode

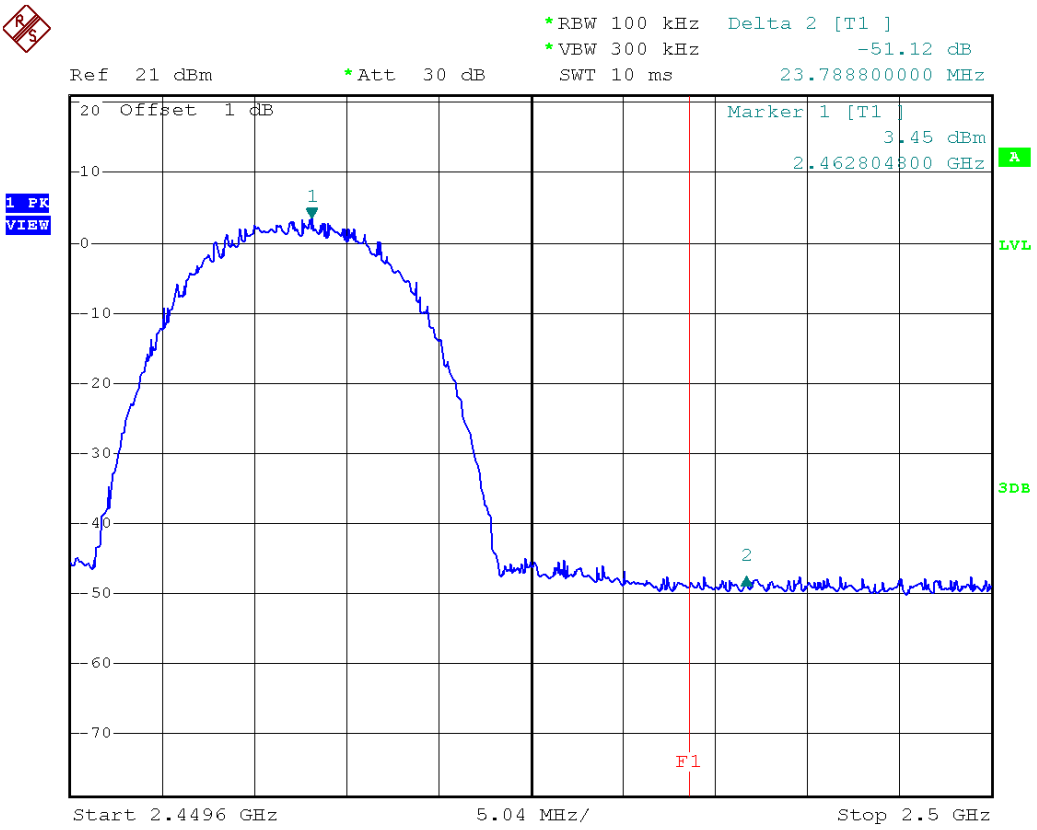
A. Test Verdict:

Frequency (MHz)	Delta Peak to Band emission (dBc)	Detector	Limit (dBc)	Refer to Plot	Verdict
Out of left side band					
2398.024	-47.08	PK	-20.00	Plot 2.6 E1	Pass
Out of right side band					
2486.594	-51.12	PK	-20.00	Plot 2.6 E2	Pass

B. Test Plots:



(Plot 2.6 E1: Channel =1 2412MHz @ 802.11b)



(Plot 2.6 E2: Channel =11 2462MHz @ 802.11b)

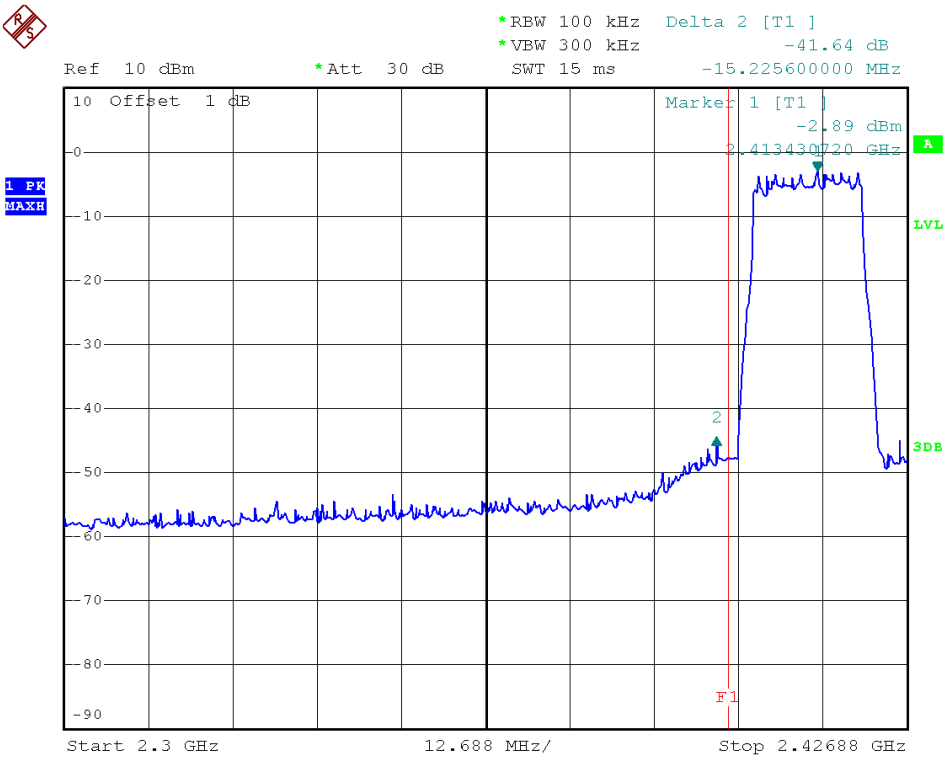
802.11g Test mode

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

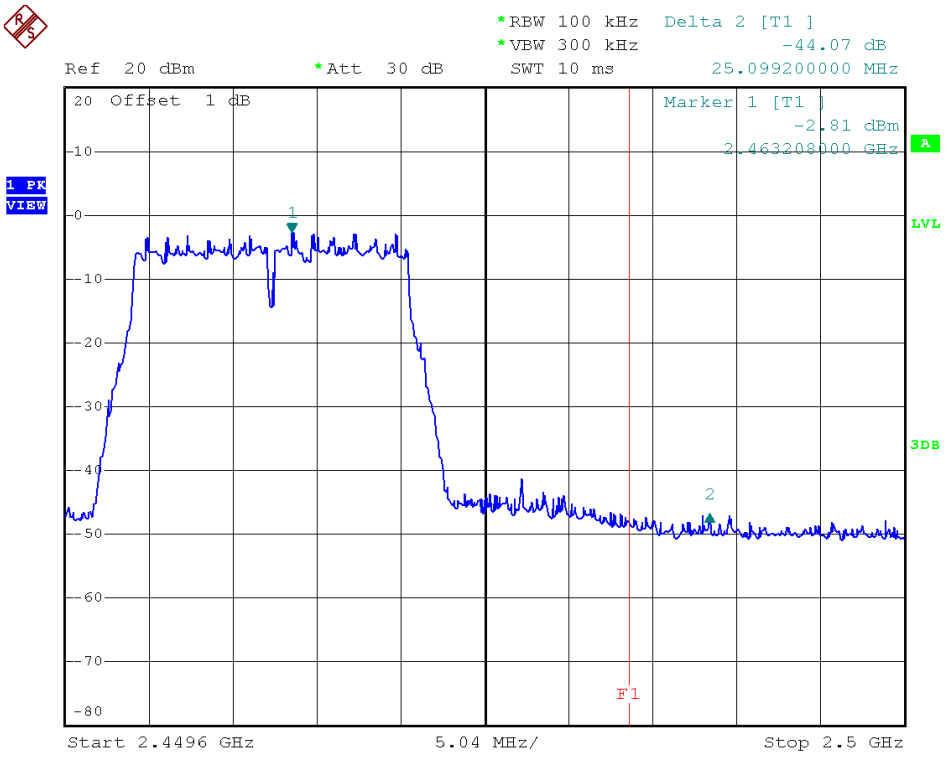
A. Test Verdict:

Frequency (MHz)	Delta Peak to Band emission (dBc)	Detector	Limit (dBc)	Refer to Plot	Verdict
Out of left side band					
2398.205	-41.64	PK	-20.00	Plot 2.6 F1	Pass
Out of right side band					
2488.307	-44.07	PK	-20.00	Plot 2.6 F2	Pass

B. Test Plots:



(Plot 2.5.2 F1: Channel =1 2412MHz @ 802.11g)



(Plot 2.6 F2: Channel =11 2462MHz @ 802.11g)

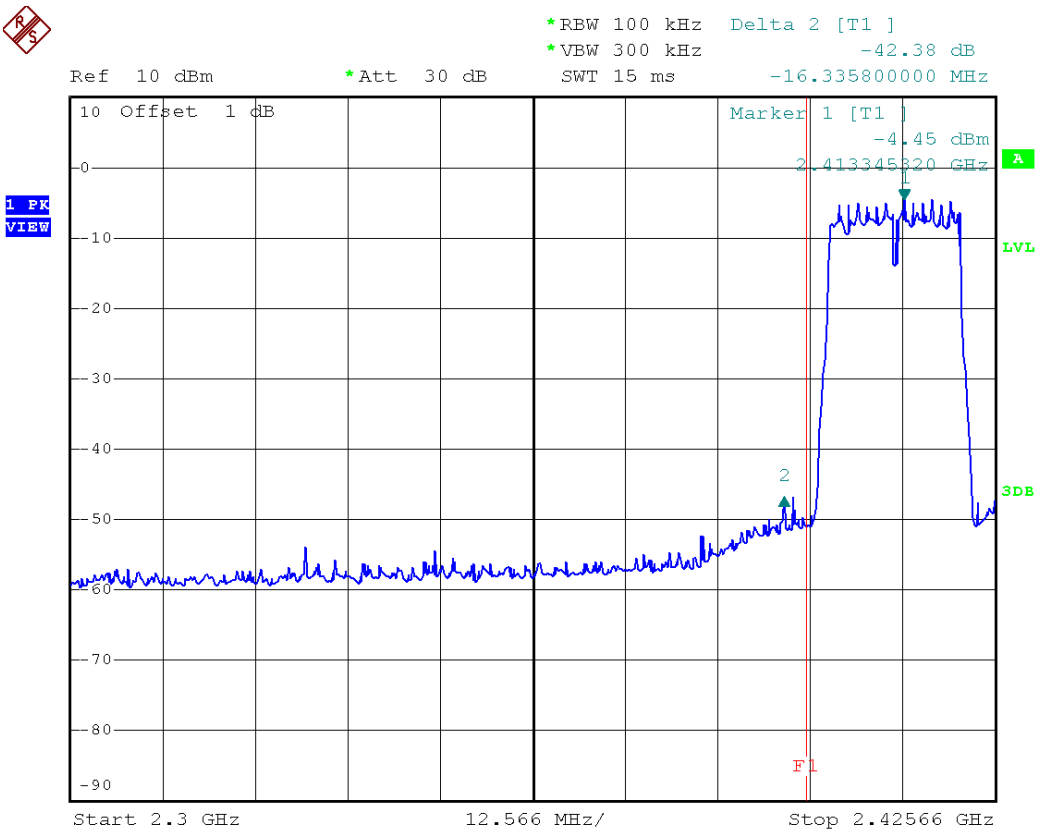
802.11n-20 Test mode

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

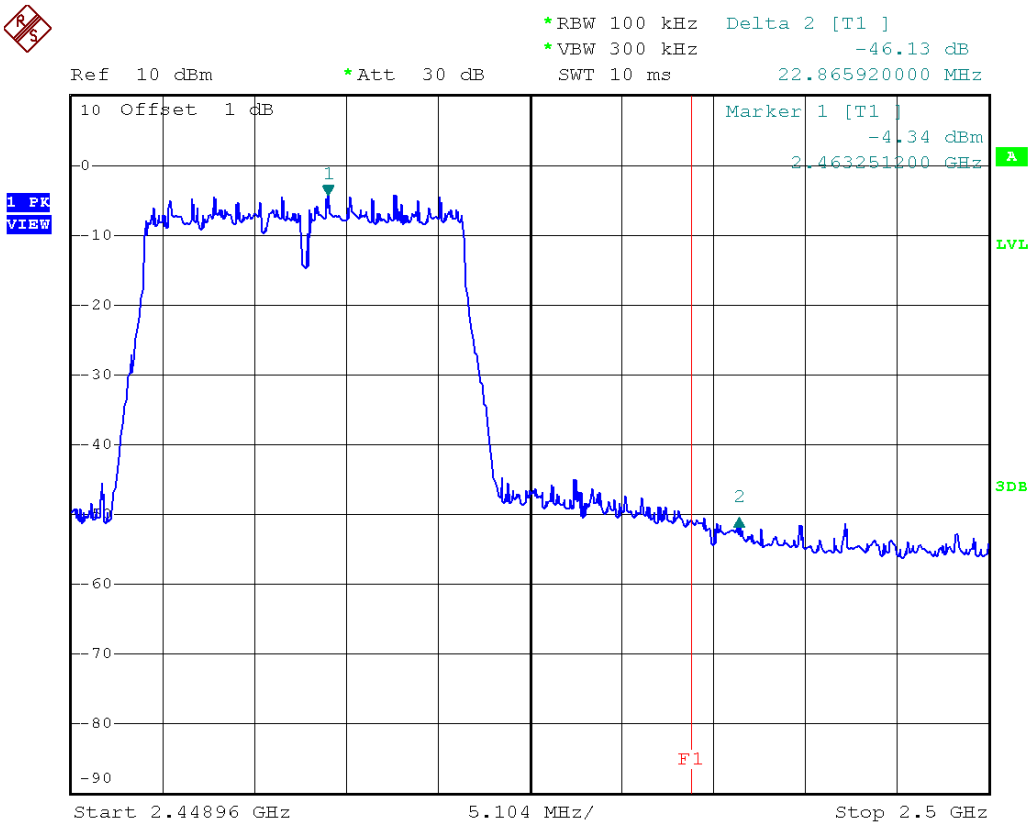
A. Test Verdict:

Frequency (MHz)	Delta Peak to Band emission (dBc)	Detector	Limit (dBc)	Refer to Plot	Verdict
Out of left side band					
2397.010	-42.38	PK	-20.00	Plot 2.6 G1	Pass
Out of right side band					
2486.117	-46.13	PK	-20.00	Plot 2.6 G2	Pass

B. Test Plots:



(Plot 2.6 G1: Channel =1 2412MHz @ 802.11n-20)



(Plot 2.6 G2: Channel =11 2462MHz @ 802.11n-20)

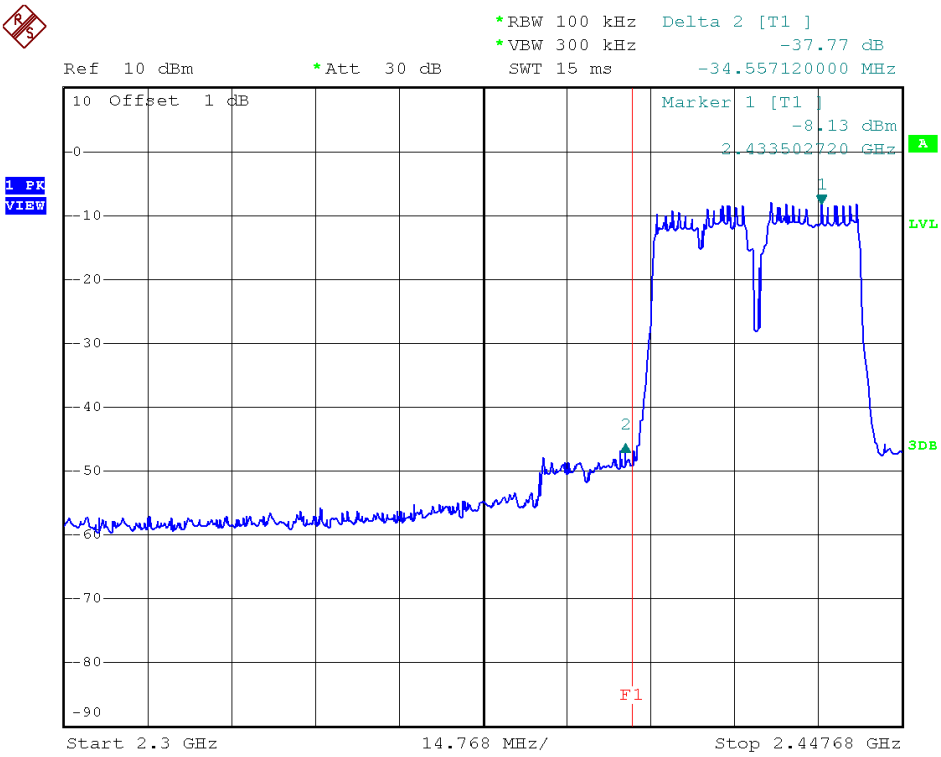
802.11n-40 Test mode

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

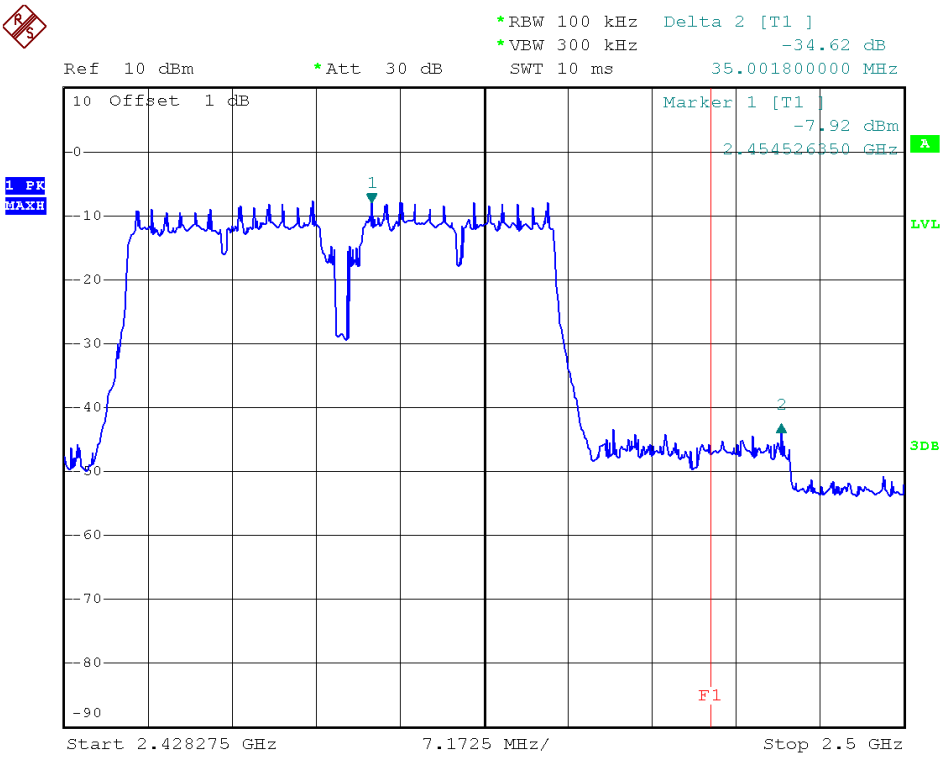
A. Test Verdict:

Frequency (MHz)	Delta Peak to Band emission (dBc)	Detector	Limit (dBc)	Refer to Plot	Verdict
Out of left side band					
2398.946	-37.77	PK	-20.00	Plot 2.6 H1	Pass
Out of right side band					
2489.529	-34.62	PK	-20.00	Plot 2.6 H2	Pass

B. Test Plots:



(Plot 2.6 H1: Channel =3 2422MHz @ 802.11n-40)



(Plot 2.6 H2: Channel =9 2452MHz @ 802.11n-40)

2.7 Conducted Emission

2.7.1 Requirement

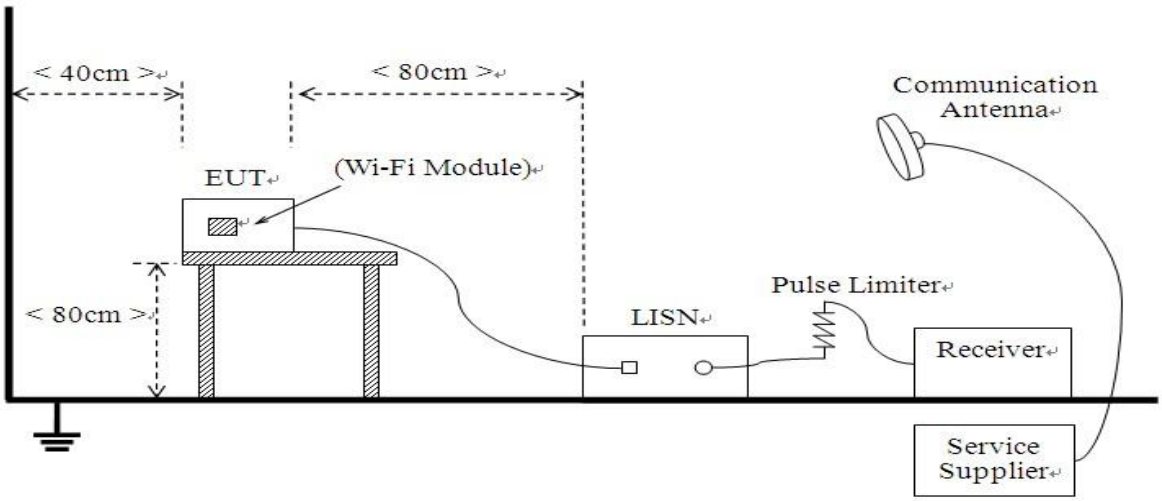
According to FCC section 15.207, for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency within the band 150kHz to 30MHz shall not exceed the limits in the following 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 a PC. 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.Due Date
Test Receiver	ROHDE&SCHWARZ	ESCS30	A0304260	2014.06.10
LISN	ROHDE&SCHWARZ	ESH2-Z5	A0304221	2014.06.10

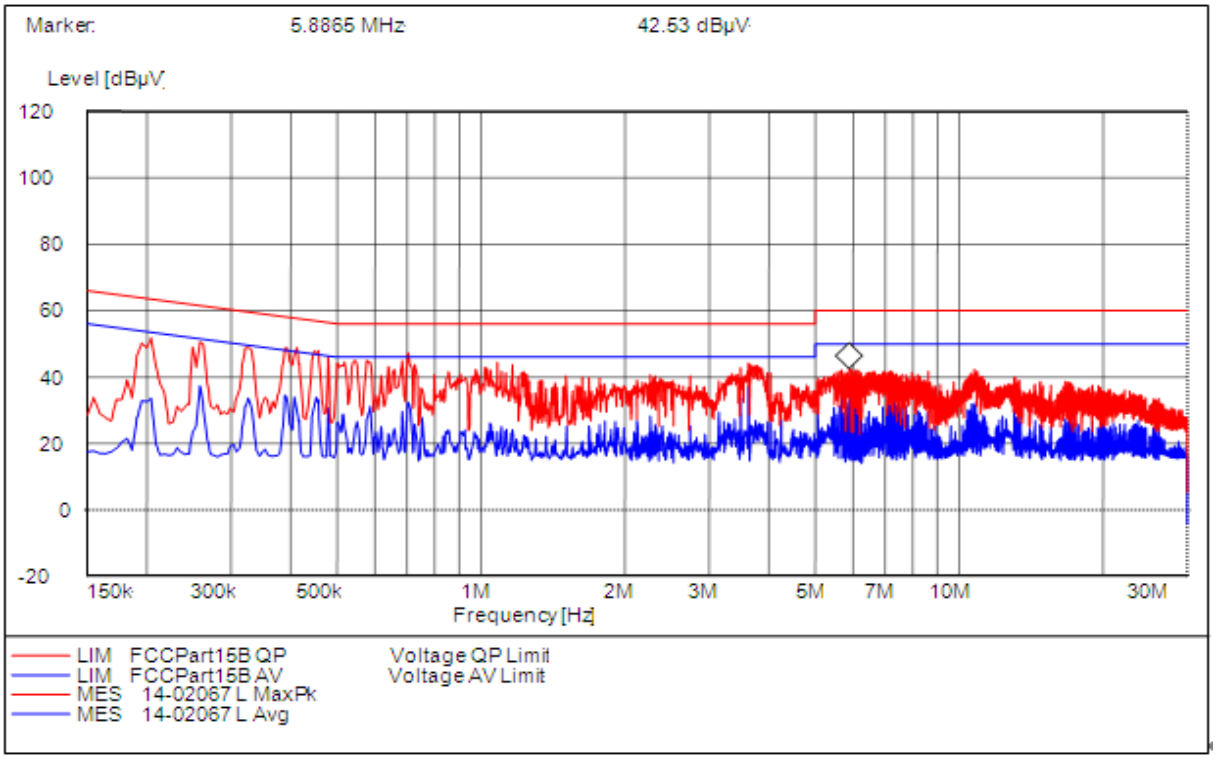
2.7.3 Test Result

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:

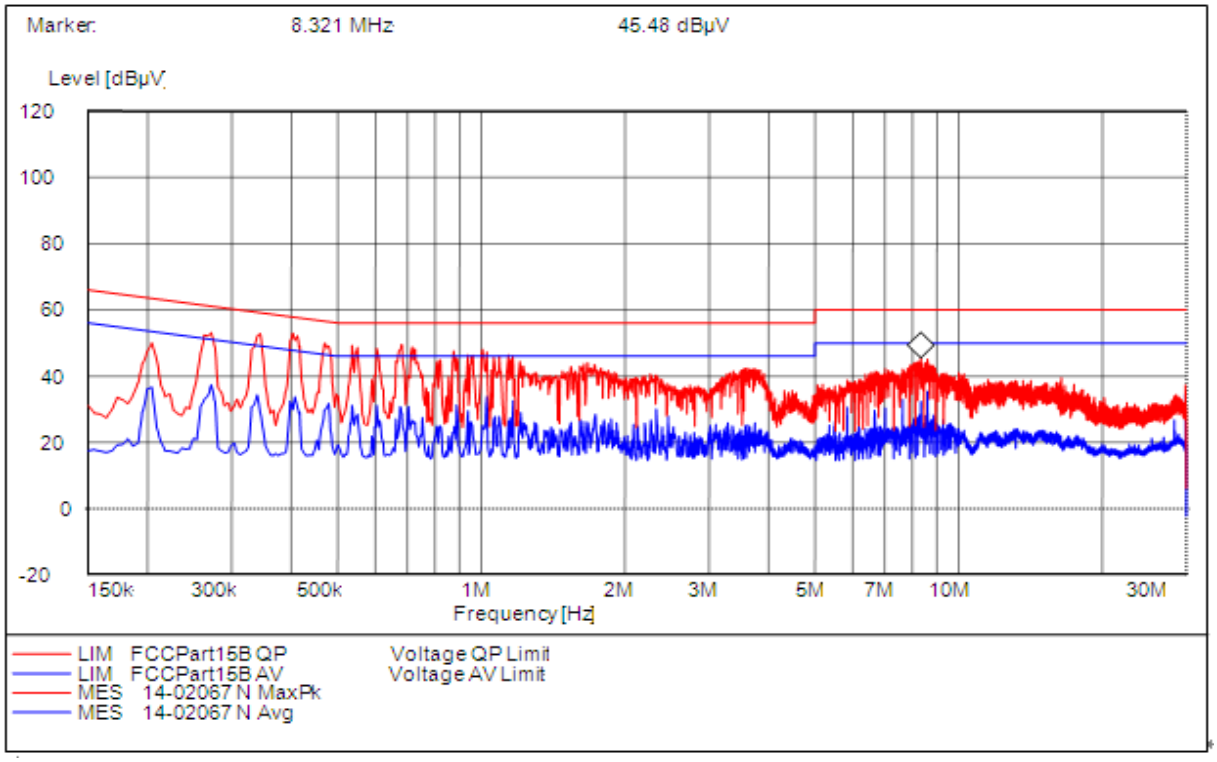
The EUT configuration of the emission tests is EUT + PC.

B. Test Plots:



Conducted Disturbance at Mains Terminals							
L Test Data							
QP				AV			
Frequency (MHz)	Limits (dBμV)	Measurement Value (dBμV)	Margin (dB)	Frequency (MHz)	Limits (dBμV)	Measurement Value (dBμV)	Margin (dB)
0.4110	57.60	46.94	10.66	0.4110	47.60	29.88	17.72
0.7025	56.00	44.87	11.13	0.7205	46.00	32.23	13.77
5.8865	60.00	42.53	17.47	5.8865	50.00	33.45	16.55
L Test Curve							

(Plot A: L Phase)



Conducted Disturbance at Mains Terminals							
N Test Data							
QP				AV			
Frequency (MHz)	Limits (dBμV)	Measurement Value (dBμV)	Margin (dB)	Frequency (MHz)	Limits (dBμV)	Measurement Value (dBμV)	Margin (dB)
0.3435	59.10	50.91	8.19	0.3435	49.10	28.92	20.18
0.6800	56.00	47.80	8.20	0.5000	46.00	28.88	17.12
8.3210	60.00	45.48	14.52	5.9012	50.00	32.34	17.66
N Test Curve							

(Plot B: N Phase)

Test Result: PASS

2.8 Radiated Emission

2.8.1 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 (μV/m)	Field Strength (dBμV/m)	Measurement Distance (m)
0.009 - 0.490	2400/F(kHz)	20log(2400/F(KHz))+80	300
0.490 - 1.705	24000/F(kHz)	20log(24000/F(KHz))+40	30
1.705 - 30.0	30	20log(30)+40	30
30 - 88	100	40.0	3
88 - 216	150	43.5	3
216 - 960	200	46.0	3
Above 960	500	54.0	3

Note:

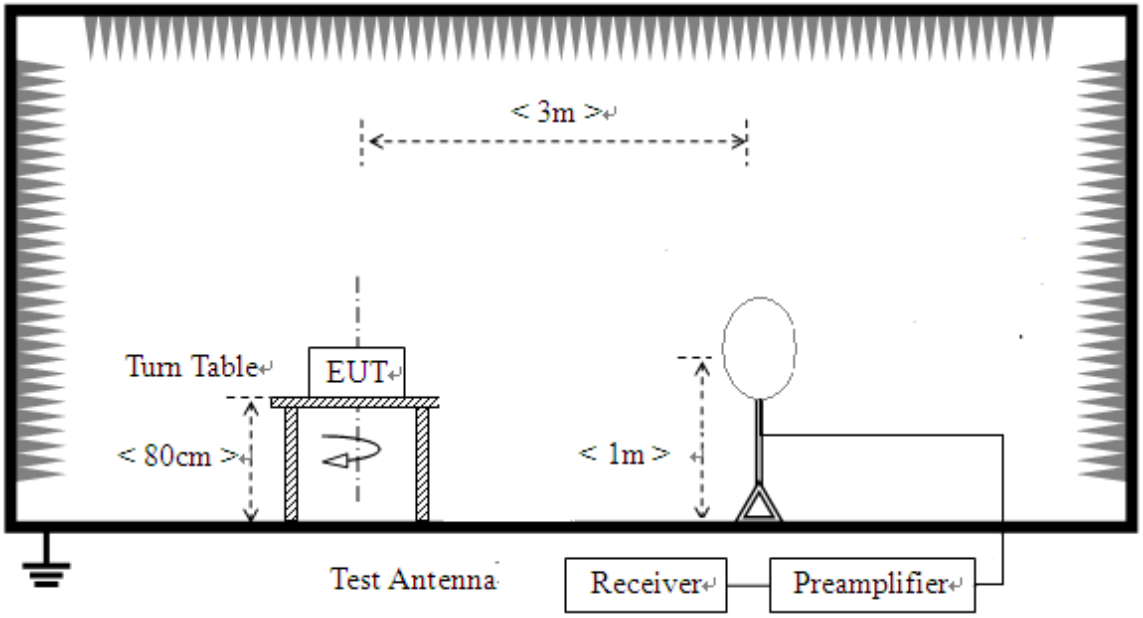
1. For Above 1000MHz, the emission limit in this paragraph is based on measurement instrumentation employing an average detector, measurement using instrumentation with a peak detector function, corresponding to 20dB above the maximum permitted average limit.
2. For above 1000MHz, limit field strength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

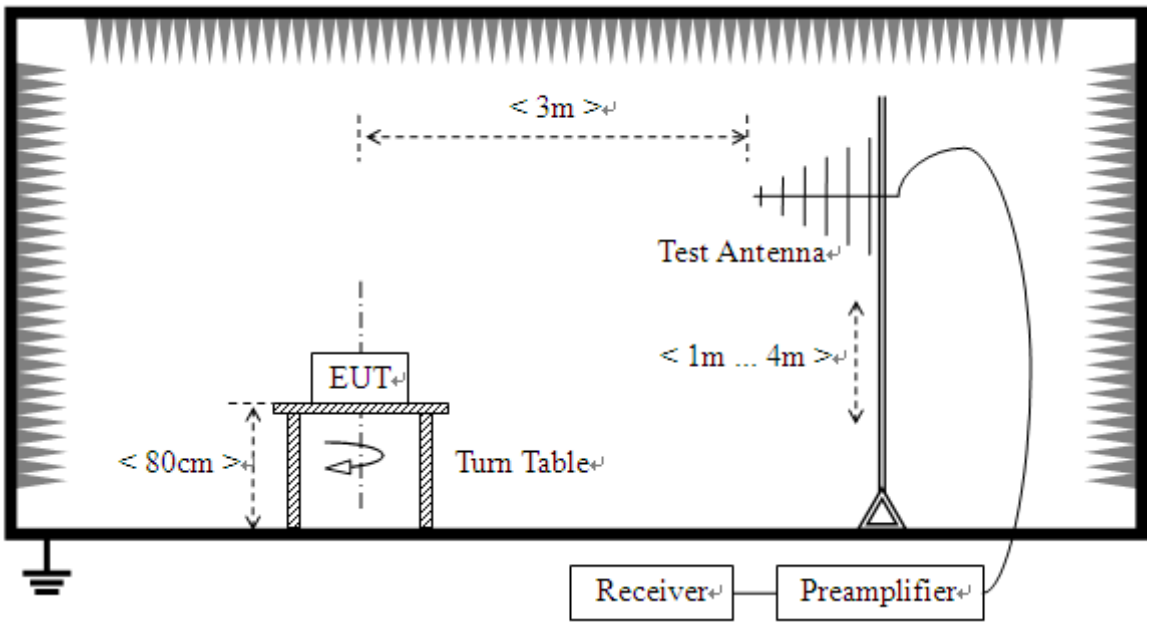
2.8.2 Test Description

A. Test Setup:

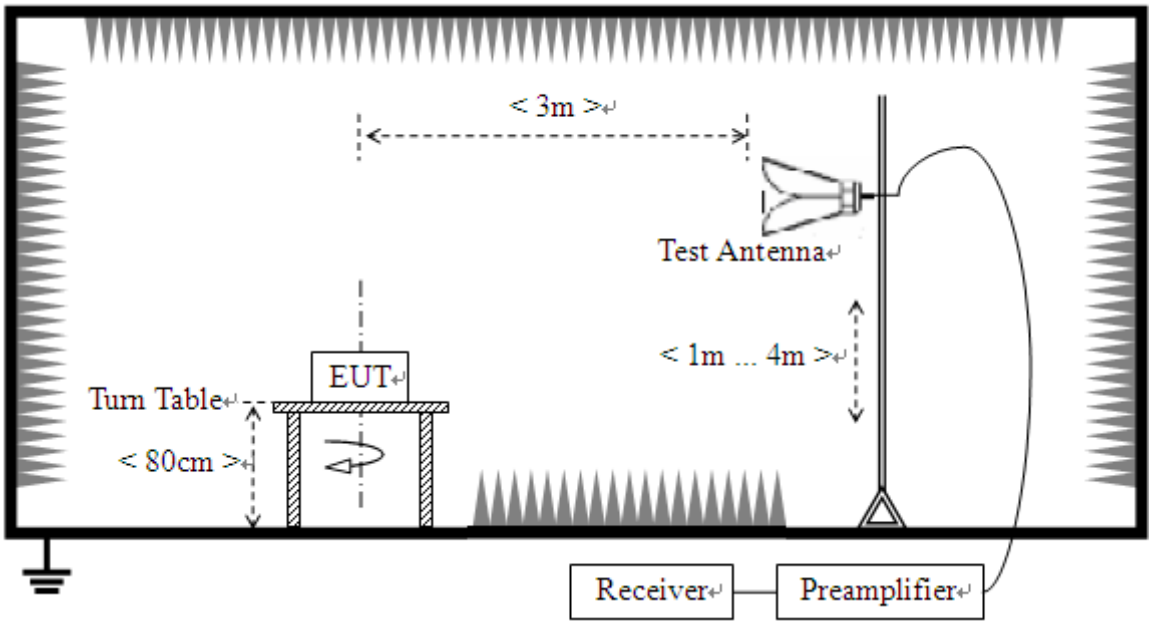
(1) For radiated emissions from 9kHz to 30MHz



(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 was powered by the PC. 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 digital modulation operation of the hybrid system, with the frequency hopping operation turned off, the EUT is activated and controlled by the PC, set to operate under WIFI 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.Due Date
Receiver	R&S	ESIB26	A0304218	2014.06.07
Full-Anechoic Chamber	Albatross	12.8m*6.8m*6.4m	A0412372	2014.06.07
Test Antenna - Bi-Log	Schwarzbeck	VULB 9163	9163-274	2014.06.09
Test Antenna - Horn	R&S	BBHA 9120D	9120C-963	2014.06.09
Test Antenna - Horn	R&S	HF960	100150	2014.06.09
Test Antenna – Horn (18-25GHz)	ETS	UG-596A/U	A0902607	2014.06.05
Test Antenna -Loop	Schwarzbeck	HFH2-Z2	100047	2014.06.02
Ampilier 1G~18GHz	R&S	MITEQ AFS42-00101800	25-S-42	2014.06.05
Ampilier 18G~40GHz	R&S	JS42-18002600-28-5A	12111.0980.00	2014.06.05
amplifier 20M~3GHz	R&S	PAP-0203H	22018	2014.06.10

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 [dBμV/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

$L_{Cable\ loss}$: Cable loss

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.
The minimum clock frequency was 24MHz,the radiated frequency range from 9KHz to 25GHz.

Note: 1.The radiated measurement are performed the each test mode (b/g/n) and channel (low/mid/high), the datum recorded below (802.11b mode, the middle channel) is the worst case for all the test mode and channel.

2. ULTRA-BROADBAND ANTENNA for the radiation emission test below 1G.

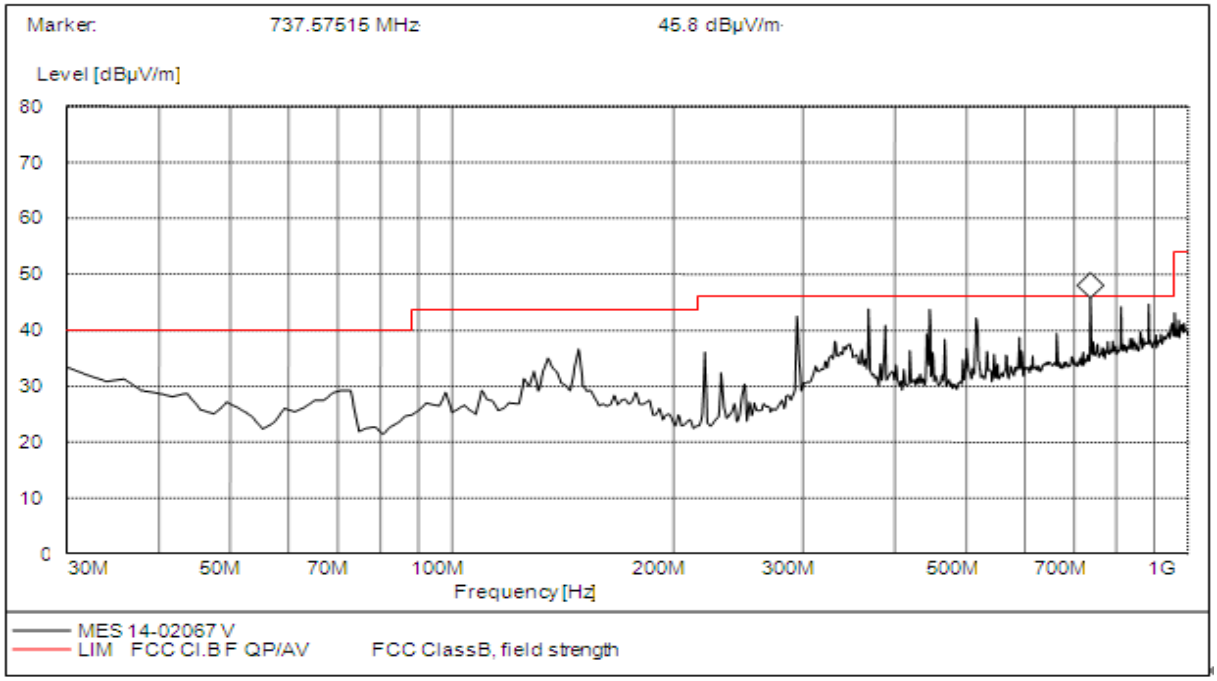
3. HORN ANTENNA for the radiation emission test above 1G.

Test plots for the whole measurement frequency range：

For 9KHz to 30MHz

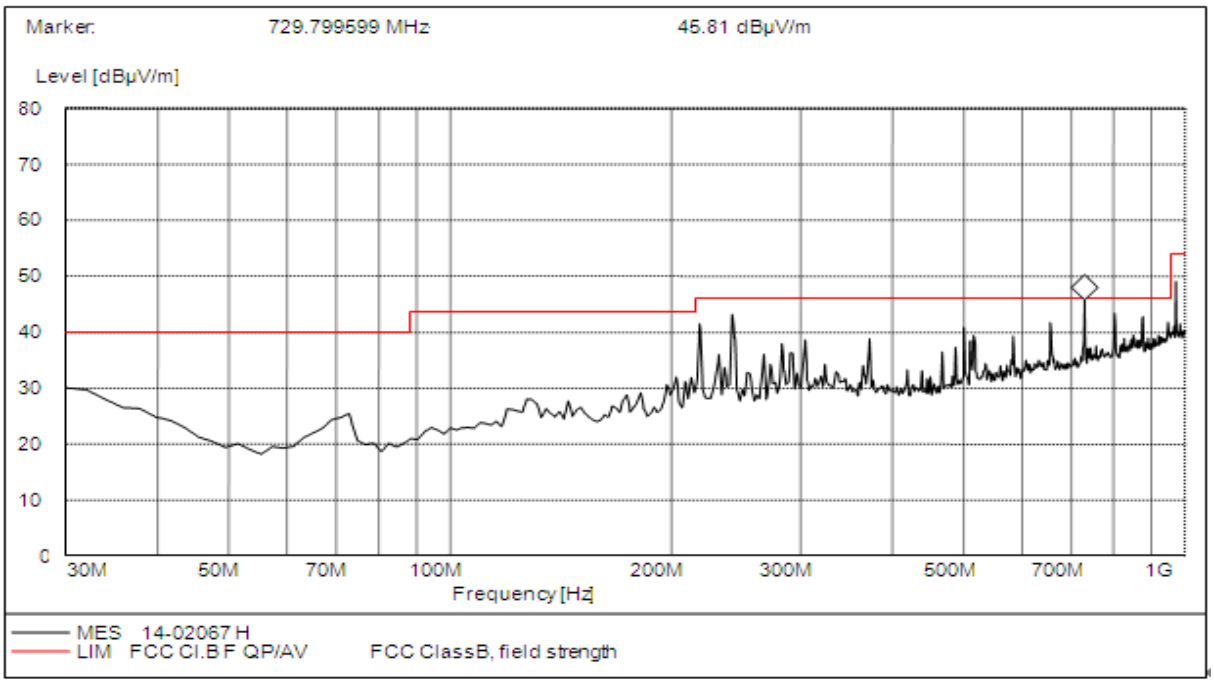
The test has been performed, and the Radiated Emission level is too low to the limit.

For 30MHz to 1000 MHz



(Plot A: 30MHz to 1GHz, Antenna Vertical)

Frequency (MHz)	QuasiPeak (dBµ V/m)	Bandwidth (kHz)	Antenna height (cm)	Limit (dBµ V/m)	Antenna	Verdict
30.000000	31.89	120.000	100.0	40.00	Vertical	Pass
156.080000	33.45	120.000	100.0	43.50	Vertical	Pass
737.380000	45.80	120.000	100.0	46.00	Vertical	Pass



(Plot B: 30MHz to 1GHz, Antenna Horizontal)

Frequency (MHz)	QuasiPeak (dBµV/m)	Bandwidth (kHz)	Antenna height (cm)	Limit (dBµV/m)	Antenna	Verdict
30.000000	29.45	120.000	100.0	40.00	Horizontal	Pass
213.080000	41.34	120.000	100.0	43.50	Horizontal	Pass
729.050000	45.81	120.000	100.0	46.00	Horizontal	Pass

For 1GHz to 25GHz

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M（802.11b--2412MHz）											
No.	Frequency (MHz)	Emssion Level		Limit (dBuV/m)	Margin (dB)	Antenna Height	Table Angle	Raw Value	Antenna Factor	Cable Factor	Pre-amplifier
1	*2412.00	108.67	PK	/	/	1.00 H	118	112.07	28.3	4.90	-36.6
1	*2412.00	98.01	AV	/	/	1.00 H	118	101.41	28.3	4.90	-36.6
2	4824.00	51.61	PK	74.00	22.39	1.00 H	24	48.41	32.7	7.00	-36.5
2	4824.00	46.14	AV	54.00	7.86	1.00 H	24	42.94	32.7	7.00	-36.5
3	7236.00	50.58	PK	74.00	23.42	1.00 H	107	41.18	35.8	8.90	-35.3
3	7236.00	43.44	AV	54.00	10.56	1.00 H	107	34.04	35.8	8.90	-35.3
4	9648.00	50.20	PK	74.00	23.80	1.00 H	39	37.60	37.2	10.20	-34.8
4	9648.00	44.55	AV	54.00	9.45	1.00 H	39	31.95	37.2	10.20	-34.8

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M（802.11b--2412MHz）											
No.	Frequency (MHz)	Emssion Level		Limit (dBuV/m)	Margin (dB)	Antenna Height	Table Angle	Raw Value	Antenna Factor	Cable Factor	Pre-amplifier
1	*2412.00	109.67	PK	/	/	1.00 V	109	113.07	28.3	4.90	-36.6
1	*2412.00	99.58	AV	/	/	1.00 V	109	102.98	28.3	4.90	-36.6
2	4824.00	52.52	PK	74.00	21.48	1.00 V	62	49.32	32.7	7.00	-36.5
2	4824.00	46.02	AV	54.00	7.98	1.00 V	62	42.82	32.7	7.00	-36.5
3	7236.00	51.51	PK	74.00	22.49	1.00 V	349	42.11	35.8	8.90	-35.3
3	7236.00	44.14	AV	54.00	9.86	1.00 V	349	34.74	35.8	8.90	-35.3
4	9648.00	55.05	PK	74.00	18.95	1.00 V	211	42.45	37.2	10.20	-34.8
4	9648.00	46.39	AV	54.00	7.61	1.00 V	211	33.79	37.2	10.20	-34.8

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M（802.11b--2437MHz）											
No.	Frequency (MHz)	Emssion Level		Limit (dBuV/m)	Margin (dB)	Antenna Height	Table Angle	Raw Value	Antenna Factor	Cable Factor	Pre-amplifier
1	*2437.00	107.00	PK	/	/	1.00 H	202	110.20	28.3	5.10	-36.6
1	*2437.00	99.33	AV	/	/	1.00 H	202	102.53	28.3	5.10	-36.6
2	4874.00	53.23	PK	74.00	20.77	1.00 H	187	49.83	32.3	7.60	-36.5
2	4874.00	47.50	AV	54.00	6.50	1.00 H	187	44.10	32.3	7.60	-36.5
3	7311.00	54.19	PK	74.00	19.81	1.00 H	107	44.79	36.1	8.60	-35.3
3	7311.00	48.12	AV	54.00	5.88	1.00 H	107	38.72	36.1	8.60	-35.3
4	9748.00	49.76	PK	74.00	24.24	1.00 H	144	37.16	37.2	10.20	-34.8
4	9748.00	42.84	AV	54.00	11.16	1.00 H	144	30.24	37.2	10.20	-34.8

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M（802.11b--2437MHz）											
No.	Frequency (MHz)	Emssion Level		Limit (dBuV/m)	Margin (dB)	Antenna Height	Table Angle	Raw Value	Antenna Factor	Cable Factor	Pre-amplifier
1	*2437.00	108.56	PK	/	/	1.00 V	104	111.76	28.3	5.10	-36.6
1	*2437.00	97.98	AV	/	/	1.00 V	104	101.18	28.3	5.10	-36.6
2	4874.00	51.68	PK	74.00	22.32	1.00 V	304	48.28	32.3	7.60	-36.5
2	4874.00	47.87	AV	54.00	6.13	1.00 V	304	44.47	32.3	7.60	-36.5
3	7311.00	49.78	PK	74.00	24.22	1.00 V	203	40.38	36.1	8.60	-35.3
3	7311.00	47.24	AV	54.00	6.76	1.00 V	203	37.84	36.1	8.60	-35.3
4	9748.00	49.35	PK	74.00	24.65	1.00 V	172	36.75	37.2	10.20	-34.8
4	9748.00	44.46	AV	54.00	9.54	1.00 V	172	31.86	37.2	10.20	-34.8

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M（802.11b--2462MHz）											
No.	Frequency (MHz)	Emssion Level		Limit (dBuV/m)	Margin (dB)	Antenna Height	Table Angle	Raw Value	Antenna Factor	Cable Factor	Pre-amplifier
1	*2462.00	110.86	PK	/	/	1.00 H	325	114.16	28.6	4.70	-36.6
1	*2462.00	99.95	AV	/	/	1.00 H	325	103.25	28.6	4.70	-36.6
2	4924.00	52.17	PK	74.00	21.83	1.00 H	311	48.37	33	7.00	-36.2
2	4924.00	47.24	AV	54.00	6.76	1.00 H	311	43.44	33	7.00	-36.2
3	7386.00	50.26	PK	74.00	23.74	1.00 H	330	40.86	36.2	8.50	-35.3
3	7386.00	46.86	AV	54.00	7.14	1.00 H	330	37.46	36.2	8.50	-35.3
4	9848.00	51.76	PK	74.00	22.24	1.00 H	42	39.16	37.2	10.20	-34.8
4	9848.00	48.81	AV	54.00	5.19	1.00 H	42	36.21	37.2	10.20	-34.8

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M（802.11b--2462MHz）											
No.	Frequency (MHz)	Emssion Level		Limit (dBuV/m)	Margin (dB)	Antenna Height	Table Angle	Raw Value	Antenna Factor	Cable Factor	Pre-amplifier
1	*2462.00	112.27	PK	/	/	1.00 V	34	115.57	28.6	4.70	-36.6
1	*2462.00	99.58	AV	/	/	1.00 V	34	102.88	28.6	4.70	-36.6
2	4924.00	50.49	PK	74.00	23.51	1.00 V	55	46.69	33	7.00	-36.2
2	4924.00	43.55	AV	54.00	10.45	1.00 V	55	39.75	33	7.00	-36.2
3	7386.00	50.89	PK	74.00	23.11	1.00 V	258	41.49	36.2	8.50	-35.3
3	7386.00	47.76	AV	54.00	6.24	1.00 V	258	38.36	36.2	8.50	-35.3
4	9848.00	50.36	PK	74.00	23.64	1.00 V	254	37.76	37.2	10.20	-34.8
4	9848.00	47.98	AV	54.00	6.02	1.00 V	254	35.38	37.2	10.20	-34.8

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M（802.11g--2412MHz）											
No.	Frequency (MHz)	Emssion Level		Limit (dBuV/m)	Margin (dB)	Antenna Height	Table Angle	Raw Value	Antenna Factor	Cable Factor	Pre-amplifier
1	*2412.00	109.29	PK	/	/	1.00 H	19	112.59	28.3	5.00	-36.6
1	*2412.00	99.51	AV	/	/	1.00 H	19	102.81	28.3	5.00	-36.6
2	4824.00	52.31	PK	74.00	21.69	1.00 H	321	48.51	32.7	7.30	-36.2
2	4824.00	47.13	AV	54.00	6.87	1.00 H	321	43.33	32.7	7.30	-36.2
3	7236.00	51.11	PK	74.00	22.89	1.00 H	207	41.71	35.8	8.90	-35.3
3	7236.00	47.97	AV	54.00	6.03	1.00 H	207	38.57	35.8	8.90	-35.3
4	9648.00	50.76	PK	74.00	23.24	1.00 H	304	38.16	37.2	10.20	-34.8
4	9648.00	44.28	AV	54.00	9.72	1.00 H	304	31.68	37.2	10.20	-34.8

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M（802.11g--2412MHz）											
No.	Frequency (MHz)	Emssion Level		Limit (dBuV/m)	Margin (dB)	Antenna Height	Table Angle	Raw Value	Antenna Factor	Cable Factor	Pre-amplifier
1	*2412.00	106.67	PK	/	/	1.00 V	174	109.97	28.3	5.00	-36.6
1	*2412.00	95.94	AV	/	/	1.00 V	174	99.24	28.3	5.00	-36.6
2	4824.00	53.32	PK	74.00	20.68	1.00 V	68	49.52	32.7	7.30	-36.2
2	4824.00	47.35	AV	54.00	6.65	1.00 V	68	43.55	32.7	7.30	-36.2
3	7236.00	51.99	PK	74.00	22.01	1.00 V	169	42.59	35.8	8.90	-35.3
3	7236.00	47.47	AV	54.00	6.53	1.00 V	169	38.07	35.8	8.90	-35.3
4	9648.00	50.09	PK	74.00	23.91	1.00 V	298	37.49	37.2	10.20	-34.8
4	9648.00	46.80	AV	54.00	7.20	1.00 V	298	34.20	37.2	10.20	-34.8

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M（802.11g--2437MHz）											
No.	Frequency (MHz)	Emssion Level		Limit (dBuV/m)	Margin (dB)	Antenna Height	Table Angle	Raw Value	Antenna Factor	Cable Factor	Pre-amplifier
1	*2437.00	107.97	PK	/	/	1.00 H	54	111.17	28.3	5.10	-36.6
1	*2437.00	97.38	AV	/	/	1.00 H	54	100.58	28.3	5.10	-36.6
2	4874.00	51.03	PK	74.00	22.97	1.00 H	117	47.63	32.8	7.10	-36.5
2	4874.00	46.77	AV	54.00	7.23	1.00 H	117	43.37	32.8	7.10	-36.5
3	7311.00	49.48	PK	74.00	24.52	1.00 H	328	40.08	36.1	8.60	-35.3
3	7311.00	44.75	AV	54.00	9.25	1.00 H	328	35.35	36.1	8.60	-35.3
4	9748.00	50.96	PK	74.00	23.04	1.00 H	19	38.36	37.2	10.20	-34.8
4	9748.00	44.87	AV	54.00	9.13	1.00 H	19	32.27	37.2	10.20	-34.8

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M（802.11g--2437MHz）											
No.	Frequency (MHz)	Emssion Level		Limit (dBuV/m)	Margin (dB)	Antenna Height	Table Angle	Raw Value	Antenna Factor	Cable Factor	Pre-amplifier
1	*2437.00	108.20	PK	/	/	1.00 V	122	111.40	28.3	5.10	-36.6
1	*2437.00	97.72	AV	/	/	1.00 V	122	100.92	28.3	5.10	-36.6
2	4874.00	51.48	PK	74.00	22.52	1.00 V	156	48.08	32.8	7.10	-36.5
2	4874.00	46.84	AV	54.00	7.16	1.00 V	156	43.44	32.8	7.10	-36.5
3	7311.00	49.92	PK	74.00	24.08	1.00 V	98	40.52	36.1	8.60	-35.3
3	7311.00	45.99	AV	54.00	8.01	1.00 V	98	36.59	36.1	8.60	-35.3
4	9748.00	49.48	PK	74.00	24.52	1.00 V	197	36.88	37.2	10.20	-34.8
4	9748.00	44.78	AV	54.00	9.22	1.00 V	197	32.18	37.2	10.20	-34.8

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M（802.11g--2462MHz）											
No.	Frequency (MHz)	Emssion Level		Limit (dBuV/m)	Margin (dB)	Antenna Height	Table Angle	Raw Value	Antenna Factor	Cable Factor	Pre-amplifier
1	*2462.00	106.83	PK	/	/	1.00 V	103	110.13	28.2	5.10	-36.6
1	*2462.00	99.61	AV	/	/	1.00 V	103	102.91	28.2	5.10	-36.6
2	4924.00	51.25	PK	74.00	22.75	1.00 V	342	47.45	33	7.00	-36.2
2	4924.00	44.39	AV	54.00	9.61	1.00 V	342	40.59	33	7.00	-36.2
3	7386.00	50.70	PK	74.00	23.30	1.00 V	179	41.30	36.2	8.50	-35.3
3	7386.00	45.92	AV	54.00	8.08	1.00 V	179	36.52	36.2	8.50	-35.3
4	9848.00	50.18	PK	74.00	23.82	1.00 V	293	37.58	37.3	10.10	-34.8
4	9848.00	45.75	AV	54.00	8.25	1.00 V	293	33.15	37.3	10.10	-34.8

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M（802.11g--2462MHz）											
No.	Frequency (MHz)	Emssion Level		Limit (dBuV/m)	Margin (dB)	Antenna Height	Table Angle	Raw Value	Antenna Factor	Cable Factor	Pre-amplifier
1	*2462.00	107.52	PK	/	/	1.00 H	220	110.82	28.2	5.10	-36.6
1	*2462.00	98.00	AV	/	/	1.00 H	220	101.30	28.2	5.10	-36.6
2	4924.00	51.77	PK	74.00	22.23	1.00 H	343	47.97	33	7.00	-36.2
2	4924.00	46.88	AV	54.00	7.12	1.00 H	343	43.08	33	7.00	-36.2
3	7386.00	50.31	PK	74.00	23.69	1.00 H	135	40.91	36.2	8.50	-35.3
3	7386.00	46.56	AV	54.00	7.44	1.00 H	135	37.16	36.2	8.50	-35.3
4	9848.00	48.89	PK	74.00	25.11	1.00 H	177	36.29	37.3	10.10	-34.8
4	9848.00	43.87	AV	54.00	10.13	1.00 H	177	31.27	37.3	10.10	-34.8

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M（802.11n-20--2412MHz）											
No.	Frequency (MHz)	Emssion Level		Limit (dBuV/m)	Margin (dB)	Antenna Height	Table Angle	Raw Value	Antenna Factor	Cable Factor	Pre-amplifier
1	*2412.00	106.50	PK	/	/	1.00 H	71	109.80	28.3	5.00	-36.6
1	*2412.00	96.53	AV	/	/	1.00 H	71	99.83	28.3	5.00	-36.6
2	4824.00	51.31	PK	74.00	22.69	1.00 H	150	47.51	32.7	7.30	-36.2
2	4824.00	45.54	AV	54.00	8.46	1.00 H	150	41.74	32.7	7.30	-36.2
3	7236.00	50.71	PK	74.00	23.29	1.00 H	337	41.31	35.8	8.90	-35.3
3	7236.00	46.46	AV	54.00	7.54	1.00 H	337	37.06	35.8	8.90	-35.3
4	9648.00	49.99	PK	74.00	24.01	1.00 H	12	37.39	37.2	10.20	-34.8
4	9648.00	44.65	AV	54.00	9.35	1.00 H	12	32.05	37.2	10.20	-34.8

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M（802.11n-20--2412MHz）											
No.	Frequency (MHz)	Emssion Level		Limit (dBuV/m)	Margin (dB)	Antenna Height	Table Angle	Raw Value	Antenna Factor	Cable Factor	Pre-amplifier
1	*2412.00	109.22	PK	/	/	1.00 V	189	112.52	28.3	5.00	-36.6
1	*2412.00	98.31	AV	/	/	1.00 V	189	101.61	28.3	5.00	-36.6
2	4824.00	50.76	PK	74.00	23.24	1.00 V	96	46.96	32.7	7.30	-36.2
2	4824.00	44.62	AV	54.00	9.38	1.00 V	96	40.82	32.7	7.30	-36.2
3	7236.00	50.95	PK	74.00	23.05	1.00 V	233	41.55	35.8	8.90	-35.3
3	7236.00	47.98	AV	54.00	6.02	1.00 V	233	38.58	35.8	8.90	-35.3
4	9648.00	49.07	PK	74.00	24.93	1.00 V	304	36.47	37.2	10.20	-34.8
4	9648.00	45.27	AV	54.00	8.73	1.00 V	304	32.67	37.2	10.20	-34.8

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M（802.11n-20--2437MHz）											
No.	Frequency (MHz)	Emssion Level		Limit (dBuV/m)	Margin (dB)	Antenna Height	Table Angle	Raw Value	Antenna Factor	Cable Factor	Pre-amplifier
1	*2437.00	108.08	PK	/	/	1.00 H	349	111.28	28.3	5.10	-36.6
1	*2437.00	99.46	AV	/	/	1.00 H	349	102.66	28.3	5.10	-36.6
2	4874.00	52.17	PK	74.00	21.83	1.00 H	309	48.77	32.3	7.60	-36.5
2	4874.00	48.22	AV	54.00	5.78	1.00 H	309	44.82	32.3	7.60	-36.5
3	7311.00	51.38	PK	74.00	22.62	1.00 H	188	41.98	36.1	8.60	-35.3
3	7311.00	48.81	AV	54.00	5.19	1.00 H	188	39.41	36.1	8.60	-35.3
4	9748.00	50.48	PK	74.00	23.52	1.00 H	74	37.88	37.2	10.20	-34.8
4	9748.00	46.11	AV	54.00	7.89	1.00 H	74	33.51	37.2	10.20	-34.8

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M（802.11n-20--2437MHz）											
No.	Frequency (MHz)	Emssion Level		Limit (dBuV/m)	Margin (dB)	Antenna Height	Table Angle	Raw Value	Antenna Factor	Cable Factor	Pre-amplifier
1	*2437.00	108.94	PK	/	/	1.00 V	205	112.14	28.3	5.10	-36.6
1	*2437.00	98.67	AV	/	/	1.00 V	205	101.87	28.3	5.10	-36.6
2	4874.00	53.16	PK	74.00	20.84	1.00 V	262	49.76	32.3	7.60	-36.5
2	4874.00	48.98	AV	54.00	5.02	1.00 V	262	45.58	32.3	7.60	-36.5
3	7311.00	51.77	PK	74.00	22.23	1.00 V	338	42.37	36.1	8.60	-35.3
3	7311.00	46.02	AV	54.00	7.98	1.00 V	338	36.62	36.1	8.60	-35.3
4	9748.00	50.62	PK	74.00	23.38	1.00 V	152	38.02	37.2	10.20	-34.8
4	9748.00	42.60	AV	54.00	11.40	1.00 V	152	30.00	37.2	10.20	-34.8

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M（802.11n-20--2462MHz）											
No.	Frequency (MHz)	Emssion Level		Limit (dBuV/m)	Margin (dB)	Antenna Height	Table Angle	Raw Value	Antenna Factor	Cable Factor	Pre-amplifier
1	*2462.00	108.90	PK	/	/	1.00 H	235	112.20	28.2	5.10	-36.6
1	*2462.00	99.65	AV	/	/	1.00 H	235	102.95	28.2	5.10	-36.6
2	4924.00	52.05	PK	74.00	21.95	1.00 H	104	48.25	33	7.00	-36.2
2	4924.00	46.35	AV	54.00	7.65	1.00 H	104	42.55	33	7.00	-36.2
3	7386.00	51.29	PK	74.00	22.71	1.00 H	329	41.89	36.2	8.50	-35.3
3	7386.00	46.31	AV	54.00	7.69	1.00 H	329	36.91	36.2	8.50	-35.3
4	9848.00	52.39	PK	74.00	21.61	1.00 H	190	39.79	37.3	10.10	-34.8
4	9848.00	46.70	AV	54.00	7.30	1.00 H	190	34.10	37.3	10.10	-34.8

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M（802.11n-20--2462MHz）											
No.	Frequency (MHz)	Emssion Level		Limit (dBuV/m)	Margin (dB)	Antenna Height	Table Angle	Raw Value	Antenna Factor	Cable Factor	Pre-amplifier
1	*2462.00	109.33	PK	/	/	1.00 V	176	112.63	28.2	5.10	-36.6
1	*2462.00	99.56	AV	/	/	1.00 V	176	102.86	28.2	5.10	-36.6
2	4924.00	50.11	PK	74.00	23.89	1.00 V	117	46.31	33	7.00	-36.2
2	4924.00	44.61	AV	54.00	9.39	1.00 V	117	40.81	33	7.00	-36.2
3	7386.00	51.59	PK	74.00	22.41	1.00 V	294	42.19	36.2	8.50	-35.3
3	7386.00	47.66	AV	54.00	6.34	1.00 V	294	38.26	36.2	8.50	-35.3
4	9848.00	49.68	PK	74.00	24.32	1.00 V	84	37.08	37.3	10.10	-34.8
4	9848.00	43.72	AV	54.00	10.28	1.00 V	84	31.12	37.3	10.10	-34.8

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M（802.11n-40--2422MHz）											
No.	Frequency (MHz)	Emssion Level		Limit (dBuV/m)	Margin (dB)	Antenna Height	Table Angle	Raw Value	Antenna Factor	Cable Factor	Pre-amplifier
1	*2422.00	106.50	PK	/	/	1.00 H	71	109.80	28.3	5.00	-36.6
1	*2422.00	96.53	AV	/	/	1.00 H	71	99.83	28.3	5.00	-36.6
2	4844.00	51.31	PK	74.00	22.69	1.00 H	150	47.51	32.7	7.30	-36.2
2	4844.00	45.54	AV	54.00	8.46	1.00 H	150	41.74	32.7	7.30	-36.2
3	7266.00	50.71	PK	74.00	23.29	1.00 H	337	41.31	35.8	8.90	-35.3
3	7266.00	46.46	AV	54.00	7.54	1.00 H	337	37.06	35.8	8.90	-35.3
4	9688.00	49.99	PK	74.00	24.01	1.00 H	12	37.39	37.2	10.20	-34.8
4	9688.00	44.65	AV	54.00	9.35	1.00 H	12	32.05	37.2	10.20	-34.8

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M（802.11n-40--2422MHz）											
No.	Frequency (MHz)	Emssion Level		Limit (dBuV/m)	Margin (dB)	Antenna Height	Table Angle	Raw Value	Antenna Factor	Cable Factor	Pre-amplifier
1	*2422.00	109.22	PK	/	/	1.00 V	189	112.52	28.3	5.00	-36.6
1	*2422.00	98.31	AV	/	/	1.00 V	189	101.61	28.3	5.00	-36.6
2	4844.00	50.76	PK	74.00	23.24	1.00 V	96	46.96	32.7	7.30	-36.2
2	4844.00	44.62	AV	54.00	9.38	1.00 V	96	40.82	32.7	7.30	-36.2
3	7266.00	50.95	PK	74.00	23.05	1.00 V	233	41.55	35.8	8.90	-35.3
3	7266.00	47.98	AV	54.00	6.02	1.00 V	233	38.58	35.8	8.90	-35.3
4	9688.00	49.07	PK	74.00	24.93	1.00 V	304	36.47	37.2	10.20	-34.8
4	9688.00	45.27	AV	54.00	8.73	1.00 V	304	32.67	37.2	10.20	-34.8

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M（802.11n-40--2437MHz）											
No.	Frequency (MHz)	Emssion Level		Limit (dBuV/m)	Margin (dB)	Antenna Height	Table Angle	Raw Value	Antenna Factor	Cable Factor	Pre-amplifier
1	*2437.00	108.08	PK	/	/	1.00 H	349	111.28	28.3	5.10	-36.6
1	*2437.00	99.46	AV	/	/	1.00 H	349	102.66	28.3	5.10	-36.6
2	4874.00	52.17	PK	74.00	21.83	1.00 H	309	48.77	32.3	7.60	-36.5
2	4874.00	48.22	AV	54.00	5.78	1.00 H	309	44.82	32.3	7.60	-36.5
3	7311.00	51.38	PK	74.00	22.62	1.00 H	188	41.98	36.1	8.60	-35.3
3	7311.00	48.81	AV	54.00	5.19	1.00 H	188	39.41	36.1	8.60	-35.3
4	9748.00	50.48	PK	74.00	23.52	1.00 H	74	37.88	37.2	10.20	-34.8
4	9748.00	46.11	AV	54.00	7.89	1.00 H	74	33.51	37.2	10.20	-34.8

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M（802.11n-40--2437MHz）											
No.	Frequency (MHz)	Emssion Level		Limit (dBuV/m)	Margin (dB)	Antenna Height	Table Angle	Raw Value	Antenna Factor	Cable Factor	Pre-amplifier
1	*2437.00	108.94	PK	/	/	1.00 V	205	112.14	28.3	5.10	-36.6
1	*2437.00	98.67	AV	/	/	1.00 V	205	101.87	28.3	5.10	-36.6
2	4874.00	53.16	PK	74.00	20.84	1.00 V	262	49.76	32.3	7.60	-36.5
2	4874.00	48.98	AV	54.00	5.02	1.00 V	262	45.58	32.3	7.60	-36.5
3	7311.00	51.77	PK	74.00	22.23	1.00 V	338	42.37	36.1	8.60	-35.3
3	7311.00	46.02	AV	54.00	7.98	1.00 V	338	36.62	36.1	8.60	-35.3
4	9748.00	50.62	PK	74.00	23.38	1.00 V	152	38.02	37.2	10.20	-34.8
4	9748.00	42.60	AV	54.00	11.40	1.00 V	152	30.00	37.2	10.20	-34.8

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M（802.11n-40--2452MHz）											
No.	Frequency (MHz)	Emssion Level		Limit (dBuV/m)	Margin (dB)	Antenna Height	Table Angle	Raw Value	Antenna Factor	Cable Factor	Pre-amplifier
1	*2452.00	108.90	PK	/	/	1.00 H	235	112.20	28.2	5.10	-36.6
1	*2452.00	99.65	AV	/	/	1.00 H	235	102.95	28.2	5.10	-36.6
2	4904.00	52.05	PK	74.00	21.95	1.00 H	104	48.25	33	7.00	-36.2
2	4904.00	46.35	AV	54.00	7.65	1.00 H	104	42.55	33	7.00	-36.2
3	7356.00	51.29	PK	74.00	22.71	1.00 H	329	41.89	36.2	8.50	-35.3
3	7356.00	46.31	AV	54.00	7.69	1.00 H	329	36.91	36.2	8.50	-35.3
4	9808.00	52.39	PK	74.00	21.61	1.00 H	190	39.79	37.3	10.10	-34.8
4	9808.00	46.70	AV	54.00	7.30	1.00 H	190	34.10	37.3	10.10	-34.8

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M（802.11n-40--2452MHz）											
No.	Frequency (MHz)	Emssion Level		Limit (dBuV/m)	Margin (dB)	Antenna Height	Table Angle	Raw Value	Antenna Factor	Cable Factor	Pre-amplifier
1	*2452.00	109.33	PK	/	/	1.00 V	176	112.63	28.2	5.10	-36.6
1	*2452.00	99.56	AV	/	/	1.00 V	176	102.86	28.2	5.10	-36.6
2	4904.00	50.11	PK	74.00	23.89	1.00 V	117	46.31	33	7.00	-36.2
2	4904.00	44.61	AV	54.00	9.39	1.00 V	117	40.81	33	7.00	-36.2
3	7356.00	51.59	PK	74.00	22.41	1.00 V	294	42.19	36.2	8.50	-35.3
3	7356.00	47.66	AV	54.00	6.34	1.00 V	294	38.26	36.2	8.50	-35.3
4	9808.00	49.68	PK	74.00	24.32	1.00 V	84	37.08	37.3	10.10	-34.8
4	9808.00	43.72	AV	54.00	10.28	1.00 V	84	31.12	37.3	10.10	-34.8

REMARKS: 1. Emission level (dBuV/m) =Raw Value (dBuV) +Antenna Factor (dB/m) + Cable Factor (dB) +Pre-amplifier Factor

2. The other emission levels were very low against the limit.

3. The other emission levels were very low against the limit.

4. Margin value = Limit value- Emission level.

5. The limit value is defined as per 15.247

6. “ * “ : Fundamental frequency

2.9 RF exposure evaluation

Equation from page 8 of OET Bulletin 65,Edition 97-01.

$$S = \frac{PG}{4\pi R^2}$$

Where：

S=power density

P=power input to the antenna

G=numeric gain of the antenna in the direction of interest relative to an isotropic radiator

R=distance to the centre of radiation of the antenna

2.9.1 . Limits For Maximum Permissible Exposure

According to FCC Part 1.1307,system operation under the provisions of this section shall be operated in a Manner the ensures that the pulic is not exposed to radio frequency energy level in excess of the commission's guidelines.
According to FCC Part 1.1310 RF exposure is calculated.

Limits for Occupational/controlled Exposure			
Frequency Range(MHz)	Electric Field Strength（E）（V/m）	Magnetic Field Strength （H） （A/m）	Power Density(S) （mW/cm2）
0.3-1.34	614	1.63	(100)*
1.34-30	1842/f	2.19/f	(180/f2)*
30-300	27.5	0.073	0.2
300-1500	--	--	f/1500
1500-100,000	--	--	1.0

2.9.2. Test Result

Maximum peak output power at antenna input terminal(dBm):	17.47
Maximum peak output power at antenna input terminal(mW):	55.85
Source-based time-averaged output power:	--
Prediction distance(cm):	20
Predication frequency(MHz):	2412
Antenna Gain (typical) (dBi):	5.0
Power density at predication frequency at 20 cm(mW/cm^2):	0.035
MPE limit for RF exposure at prediction frequency(mW/cm^2):	1.0

2.9.3. Conclusion

Since the test result is passed.

** END OF REPORT **