RF TEST REPORT

Report No.: SET2015-03041

Product Name: Xtreamer Mini Android PC

FCC ID: ZYAPRODIGY4K

Model No. : Xtreamer Prodigy 4k

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
Model No. ……:	Xtreamer Prodigy 4k
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 v03r02
Test Result ..... :	PASS
Tested by ..... :	Haigang He 2015.03.12 Haigang He, Test Engineer
Reviewed by..... :	Zhu Qi 2015.03.12 Zhu Qi, Senior Egineer
Approved by ..... :	Wu Lian 2015.03.12 Wu Li'an, Manager

TABLE OF CONTENTS

GENERAL INFORMATION **5**

1.1 EUT Description **5**

1.2 Test Standards and Results **6**

1.3 Facilities and Accreditations **7**

1.3.1 Facilities 7

1.3.2 Test Environment Conditions 7

2. 47 CFR PART 15C REQUIREMENTS **8**

2.1 Antenna requirement **8**

2.1.1 Applicable Standard 8

2.1.2 Antenna Information 8

2.1.3 Result: comply 8

2.2 Peak Output Power **9**

2.2.1 Requirement 9

2.2.2 Test Description 9

2.2.3 Test Result 9

2.3 Bandwidth **11**

2.3.1 Requirement 11

2.3.2 Test Description 11

2.3.3 Test Result 11

2.4 Conducted Spurious Emissions **20**

2.4.1 Requirement 20

2.4.2 Test Description 20

2.4.3 Test Result 20

2.5 Power spectral density (PSD) **35**

2.5.1 Requirement 35

2.5.2 Test Description 35

2.5.3 Test Result 36

2.6 Band Edge **44**

2.6.1 Requirement 44

2.6.2 Test Description 44

2.6.3 Test Procedure 45
2.6.4 Test Result 45
2.7 Conducted Emission 52
2.7.1 Requirement 52
2.7.2 Test Description 52
2.7.3 Test Result 53
2.8 Radiated Emission 55
2.8.1 Requirement 55
2.8.2 Test Description 56
2.8.3 Test Result 58
2.9 RF exposure evaluation 68
2.9.1 . Limits For Maximum Permissible Exposure 68
2.9.2. Test Result 68
2.9.3. Conclusion 69

Change History		
Issue	Date	Reason for change
1.0	Mar 12,2015	First edition

GENERAL INFORMATION

1.1 EUT Description

EUT Type ..... :	Xtreamer Mini Android PC
FCC ID ..... :	ZYAPRODIGY4K
Hardware Version ..... :	MS0918-M34H-V1.10-0
Software Version ..... :	V5.1.30
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 ..... :	Exposed antenna
Antenna Gain ..... :	5 dBi

Note 1: The EUT is a 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) for 802.11b/g/n-20MHz and 3(2422MHz), 6 (2437MHz) and 9 (2452MHz) for 802.11n-40MHz

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

Note 3: The EUT was programmed to be in continuously transmitting mode and the transmit duty cycle is not less than 98%.

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 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	72Mbps	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	72Mbps	1/11
	11n(40MHz)/OFDM	150 Mbps	3/9

1.3 Facilities and Accreditations

1.3.1 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, valid time is until October 28, 2017.

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.

1.3.2 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 connected to the antenna port of EUT, can be removed.

Antenna General Information:

No.	EUT Model	Ant. Cat.	Ant. Type	Gain(dBi)
1	Xtreamer Mini Android PC	External	Exposed antenna	5

2.1.3 Result: comply

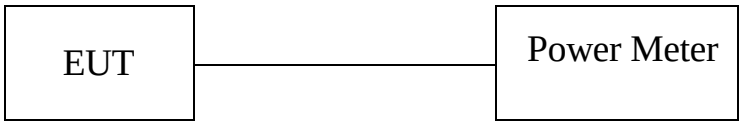
The EUT has a permanently and irreplaceable attached antenna. Please refer to the EUT internal photos.

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 was directly connected to the power meter by 20dB Atten and antenna output port as show in the block diagram as TEST CONFIGURATION shows.

B. Equipments List:

Description	Manufacturer	Model	Serial No.	Cal. Date	Cal. Due Date
Power Meter	R&S	NRVS	1020.1809.02	2014.06.07	2015.06.06
Power Sensor	R&S	NRV-Z4	823.3618.03	2014.06.07	2015.06.06

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

Test Verdict:

Channel	Frequency (MHz)	Measured Output Peak Power(dBm)	Limits (dBm)	Result
1	2412	17.75	30	PASS
6	2437	17.53	30	PASS
11	2462	17.24	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.

2.2.3.2 802.11g Test mode

Test Verdict:

Channel	Frequency (MHz)	Measured Output Peak Power (dBm)	Limits (dBm)	Result
1	2412	15.21	30	PASS
6	2437	15.46	30	PASS
11	2462	15.67	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.

2.2.3.3 802.11n-20MHz Test mode

Test Verdict:

Channel	Frequency (MHz)	Measured Output Peak Power(dBm)	Limits (dBm)	Result
1	2412	13.97	30	PASS
6	2437	14.37	30	PASS
11	2462	14.01	30	PASS

Note: 1. For 802.11n-20 mode at finial test to get the worst-case emission at 72Mbps.
2. The test results including the cable lose.

2.2.3.4 802.11n-40MHz Test mode

Test Verdict:

Channel	Frequency (MHz)	Measured Output Peak Power(dBm)	Limits (dBm)	Result
3	2422	12.60	30	PASS
6	2437	12.72	30	PASS
9	2452	13.21	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.

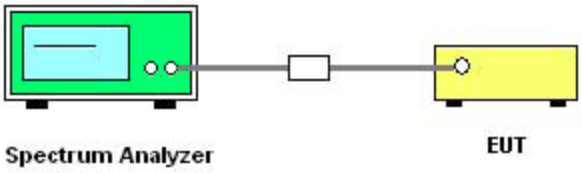
2.3 Bandwidth

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 AC adapter, 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. Date	Cal. Due Date
Spectrum Analyzer	R&S	FSP40	1164.4391.40	2014.07.07	2015.07.06

2.3.3 Test Result

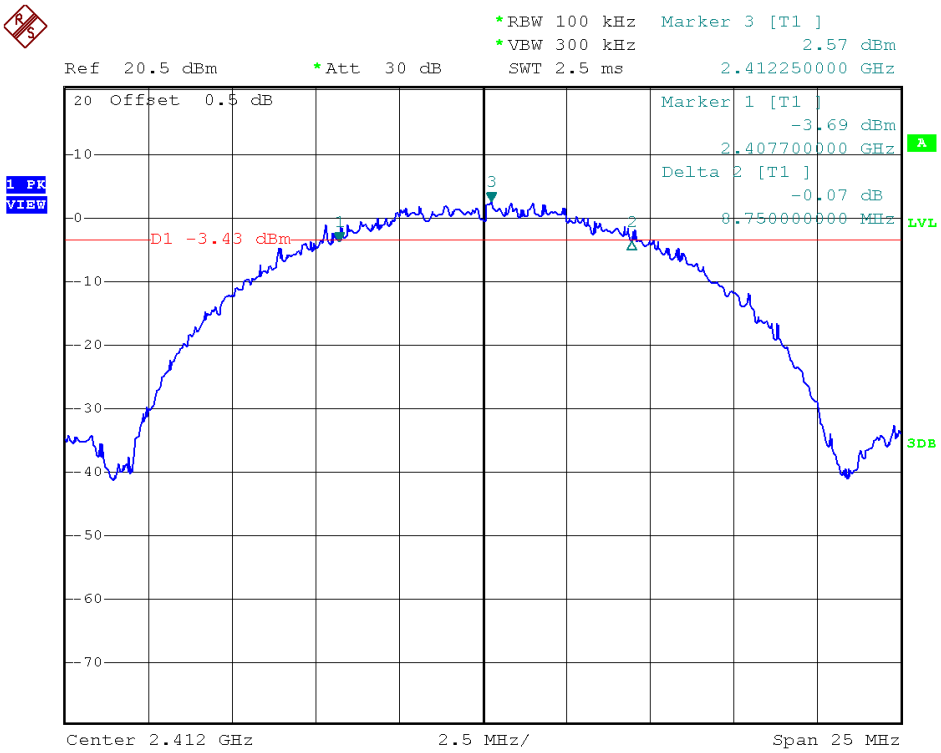
The lowest, middle and highest channels are selected to perform testing to record the 6 dB bandwidth of the Module.

2.3.3.1 802.11b Test mode

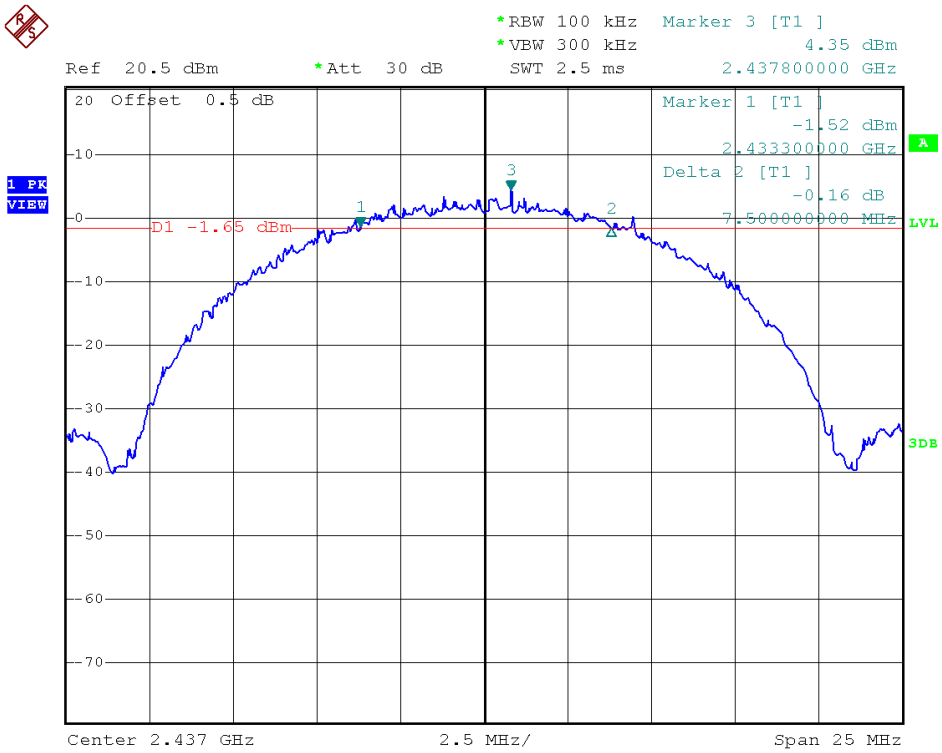
A. Test Verdict:

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Refer to Plot	Limits(kHz)	Result
1	2412	8.75	Plot 2.3 A	≥500	PASS
6	2437	7.50	Plot 2.3 B	≥500	PASS
11	2462	8.75	Plot 2.3 C	≥500	PASS

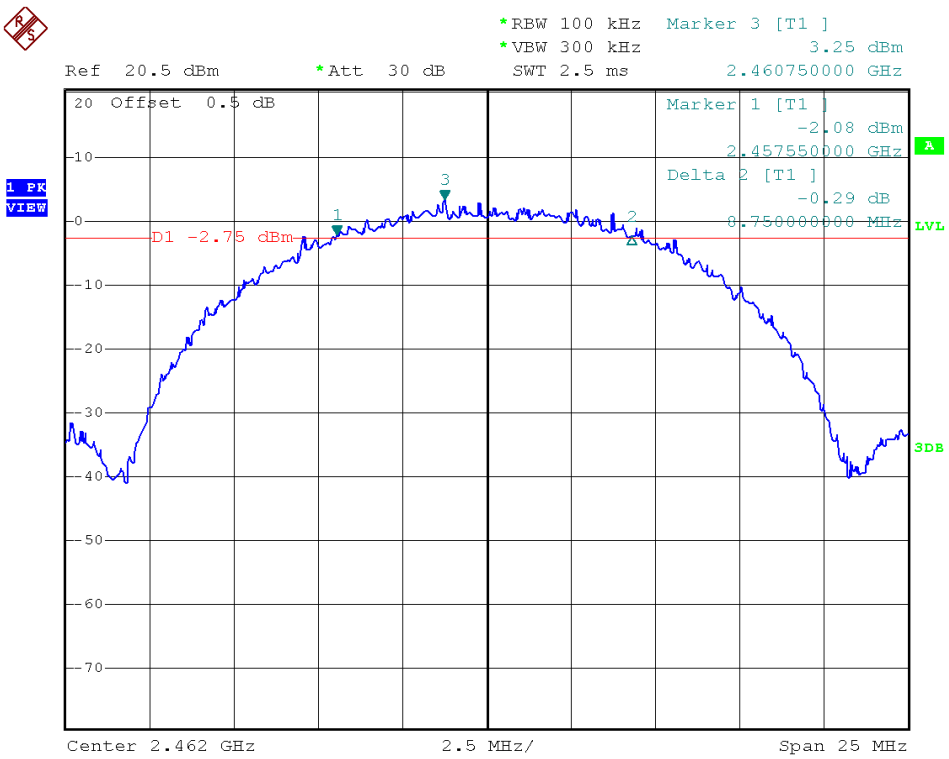
B. Test Plots:



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



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



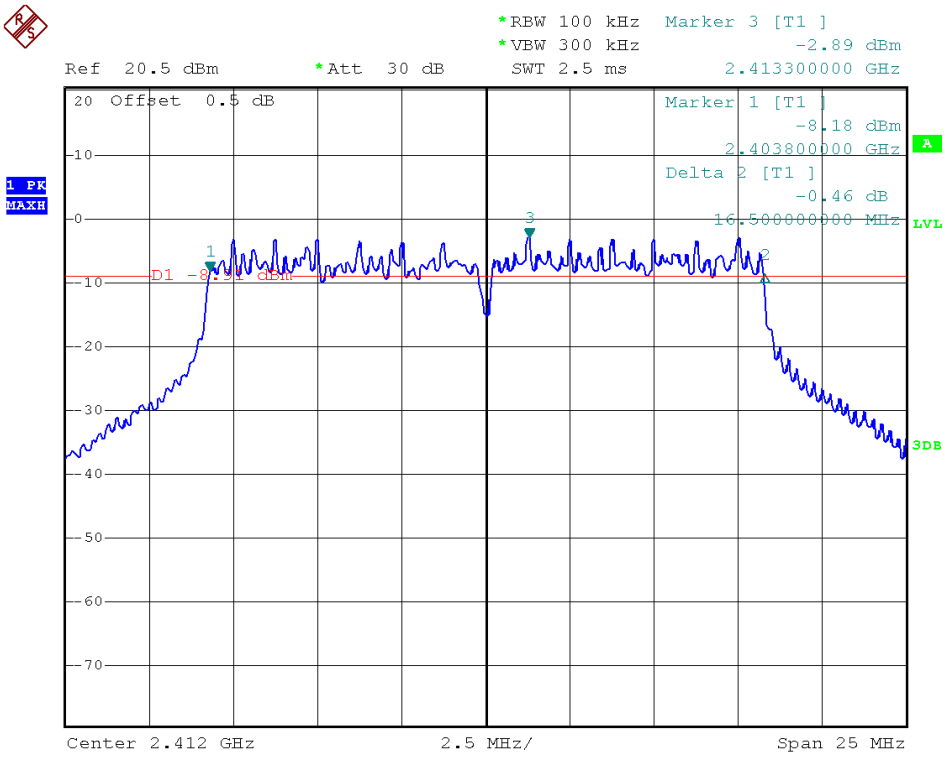
(Plot 2.3 C: Channel 11: 2462MHz @ 802.11b)

2.3.3.2 802.11g Test mode

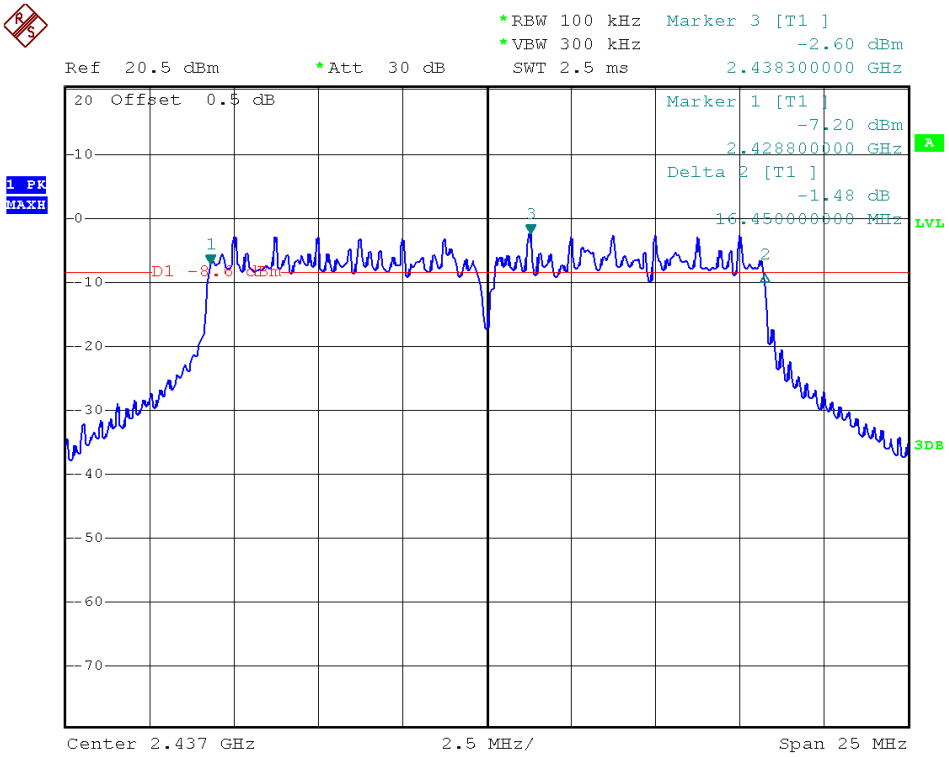
A. Test Verdict:

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Refer to Plot	Limits (kHz)	Result
1	2412	16.50	Plot 2.3 D	≥500	PASS
6	2437	16.45	Plot 2.3 E	≥500	PASS
11	2462	16.55	Plot 2.3 F	≥500	PASS

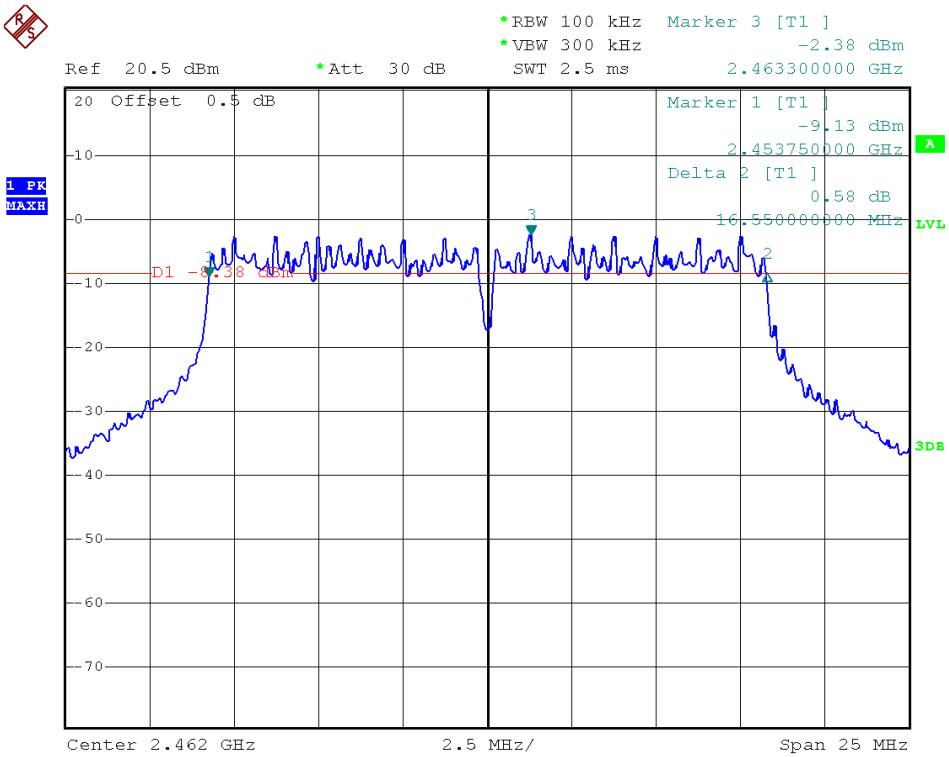
B. Test Plots:



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



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



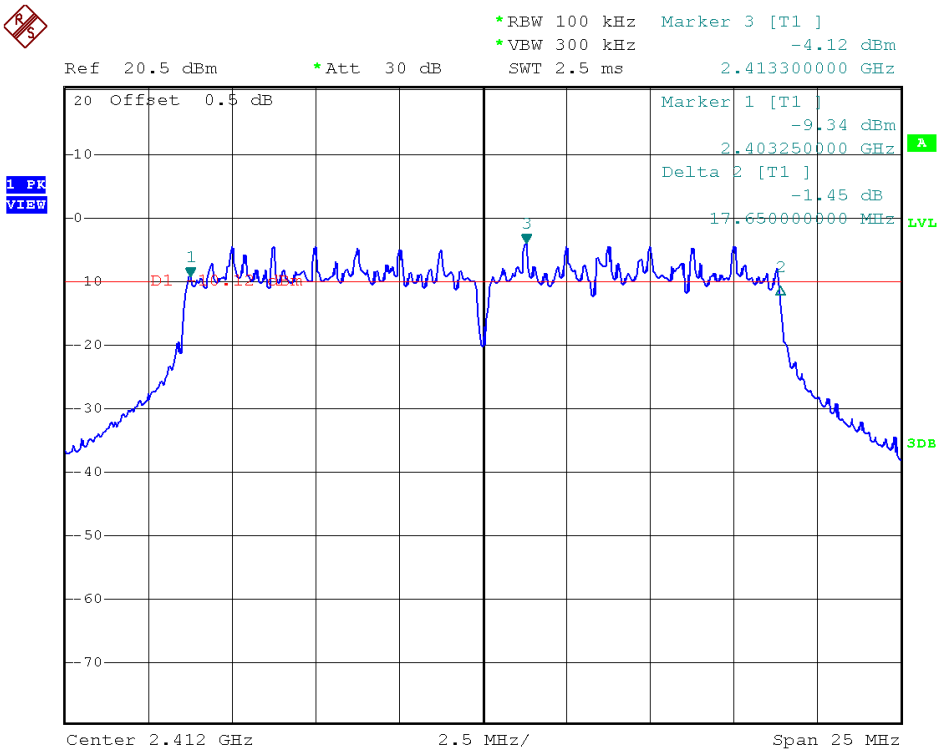
(Plot 2.3 F: Channel 11: 2462MHz @ 802.11g)

2.3.3.3 802.11n-20 Test mode

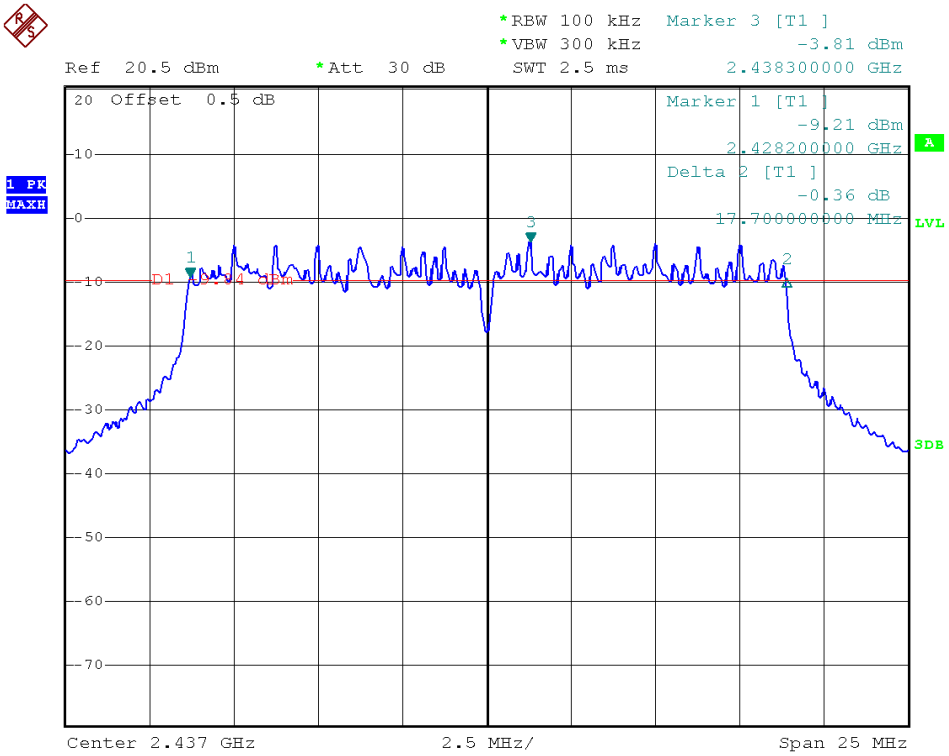
A. Test Verdict:

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Refer to Plot	Limits (kHz)	Result
1	2412	17.65	Plot 2.3 G	≥500	PASS
6	2437	17.70	Plot 2.3 H	≥500	PASS
11	2462	17.75	Plot 2.3 I	≥500	PASS

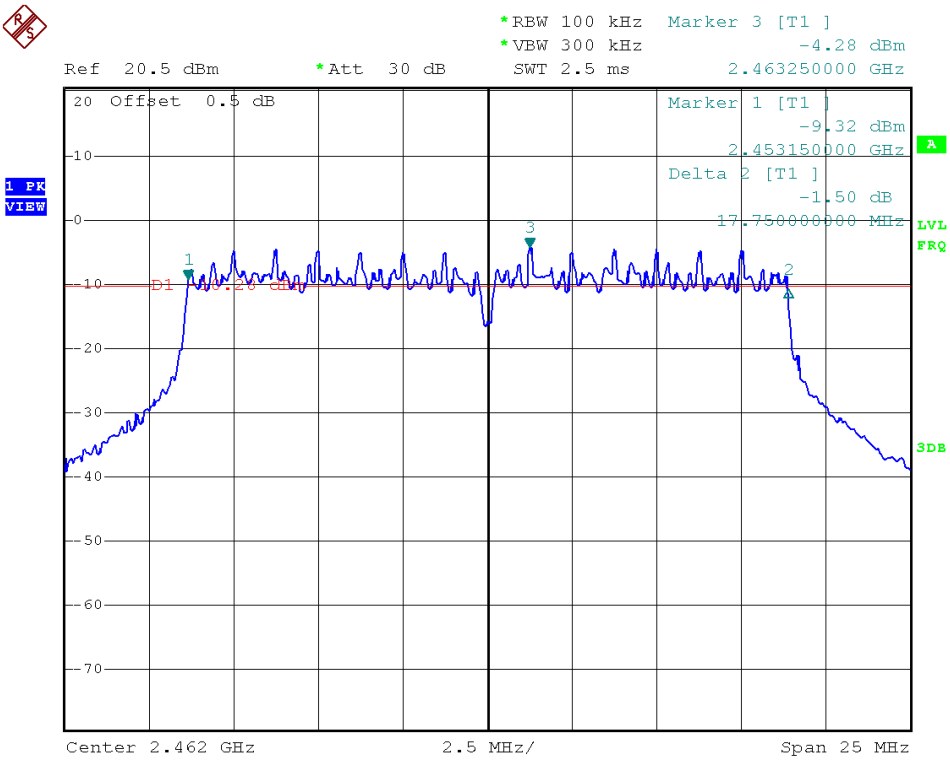
B. Test Plots:



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



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



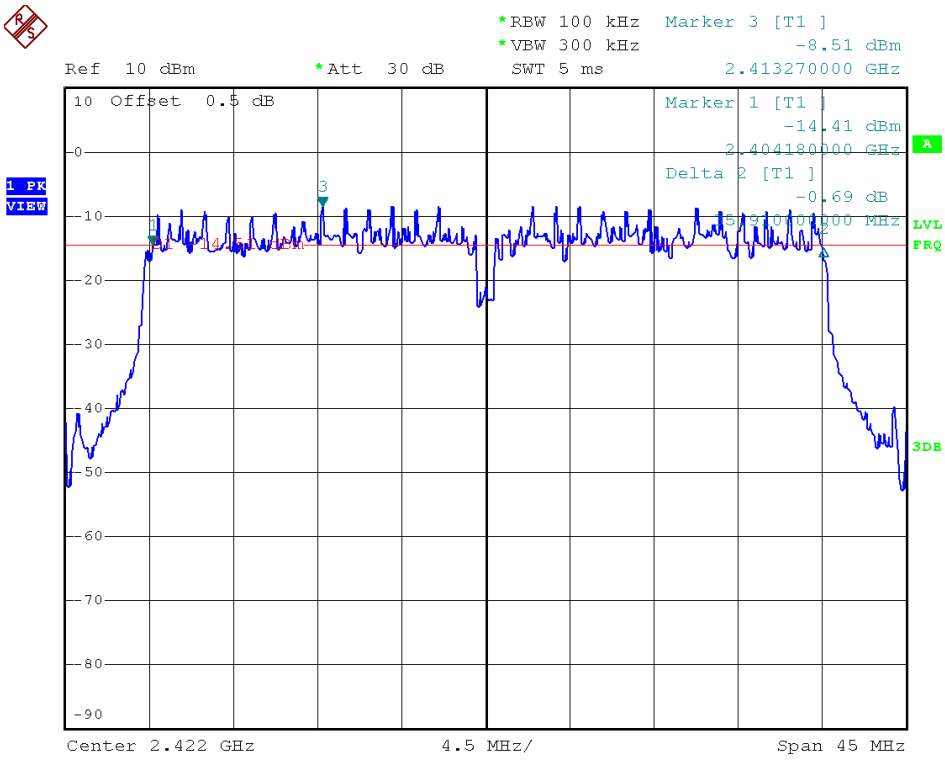
(Plot 2.3 I: Channel 11: 2462MHz @ 802.11n-20)

2.3.3.4 802.11n-40 Test mode

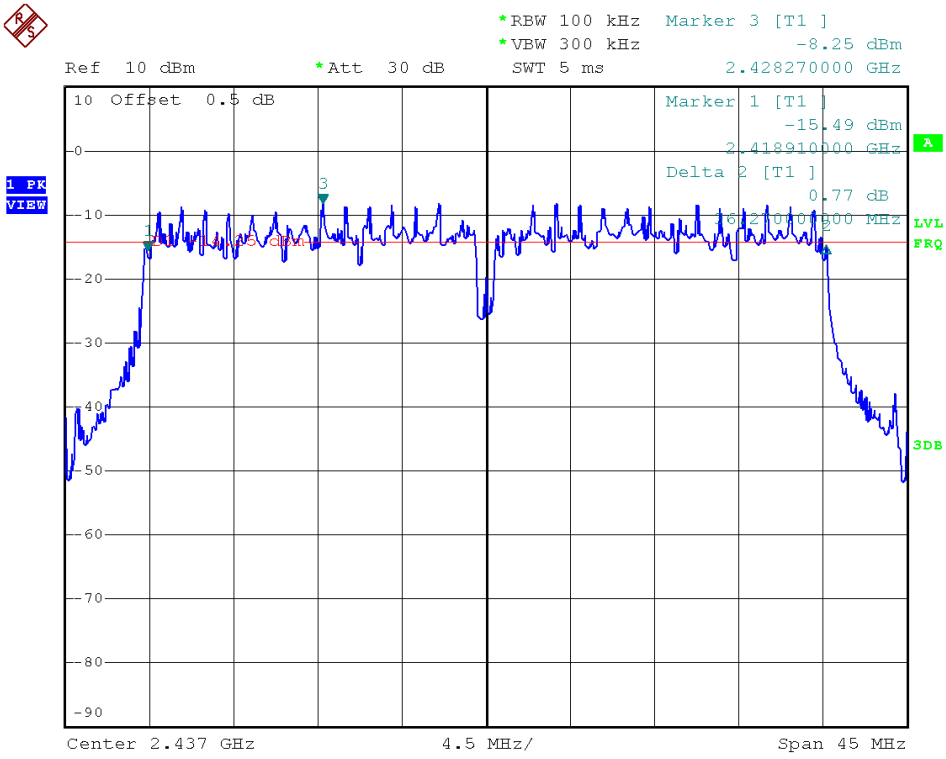
A. Test Verdict:

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Refer to Plot	Limits (kHz)	Result
3	2422	35.91	Plot 2.3 J	≥500	PASS
6	2437	36.27	Plot 2.3 K	≥500	PASS
9	2452	35.73	Plot 2.3 L	≥500	PASS

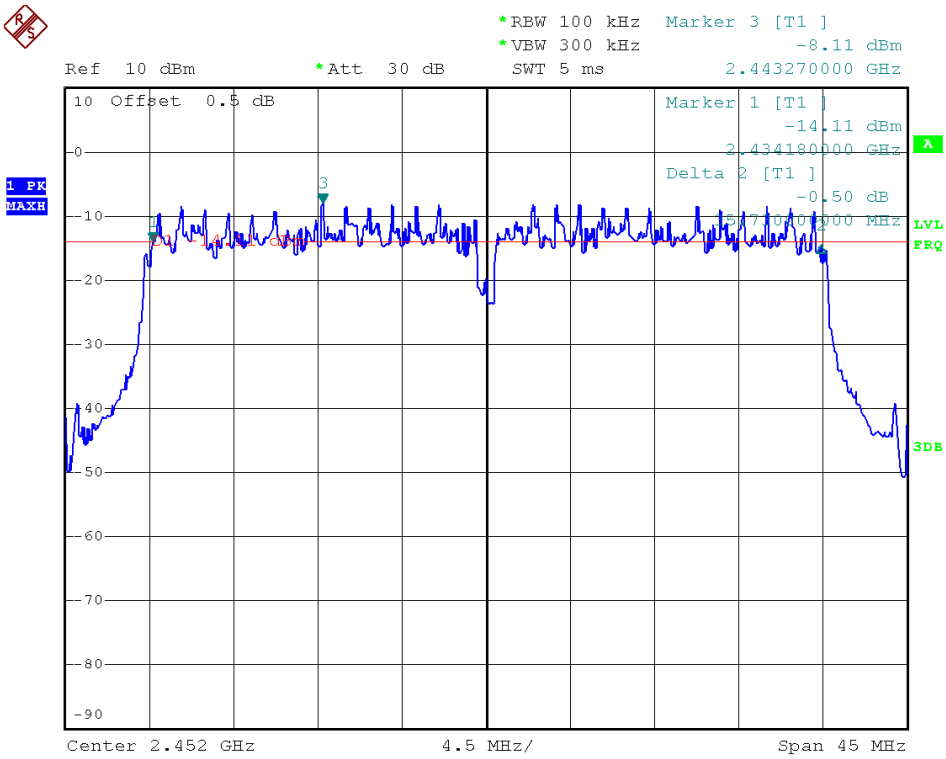
B. Test Plots:



(Plot 2.3 J: Channel 3: 2422MHz @ 802.11n-40)



(Plot 2.3 K: Channel 6: 2437MHz @ 802.11n-40)



(Plot 2.3 L: Channel 9: 2452MHz @ 802.11n-40)

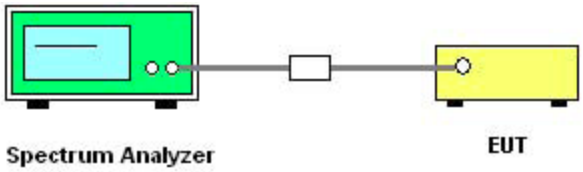
2.4 Conducted Spurious Emissions

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 AC adapter, 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. Date	Cal. Due Date
Spectrum Analyzer	R&S	FSP40	1164.4391.40	2014.07.07	2015.07.06

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.

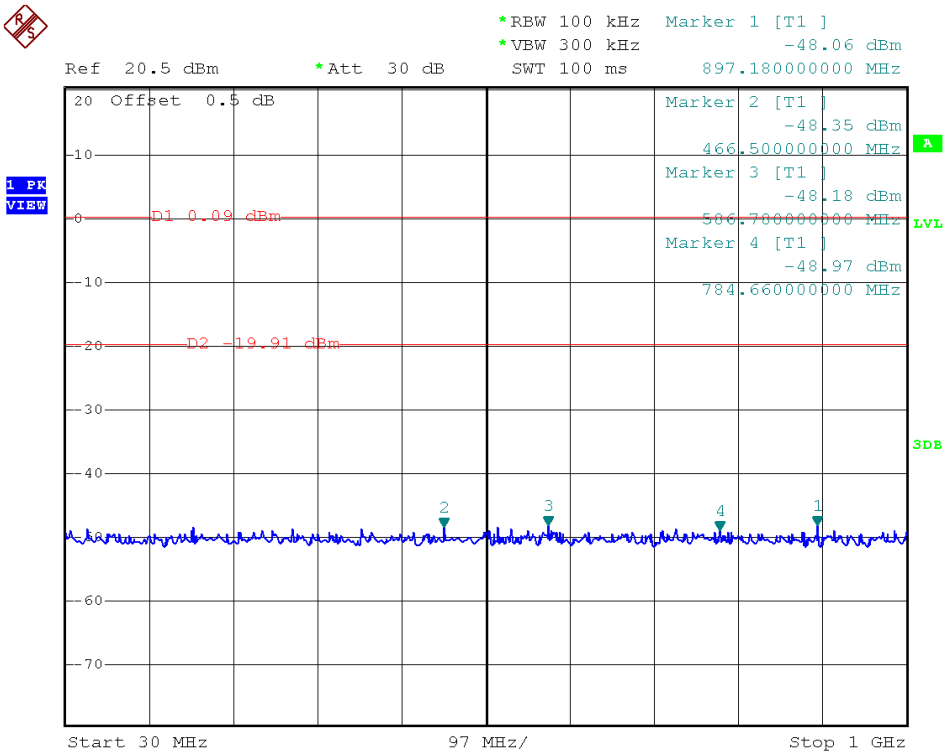
2.4.3.1 802.11b Test mode

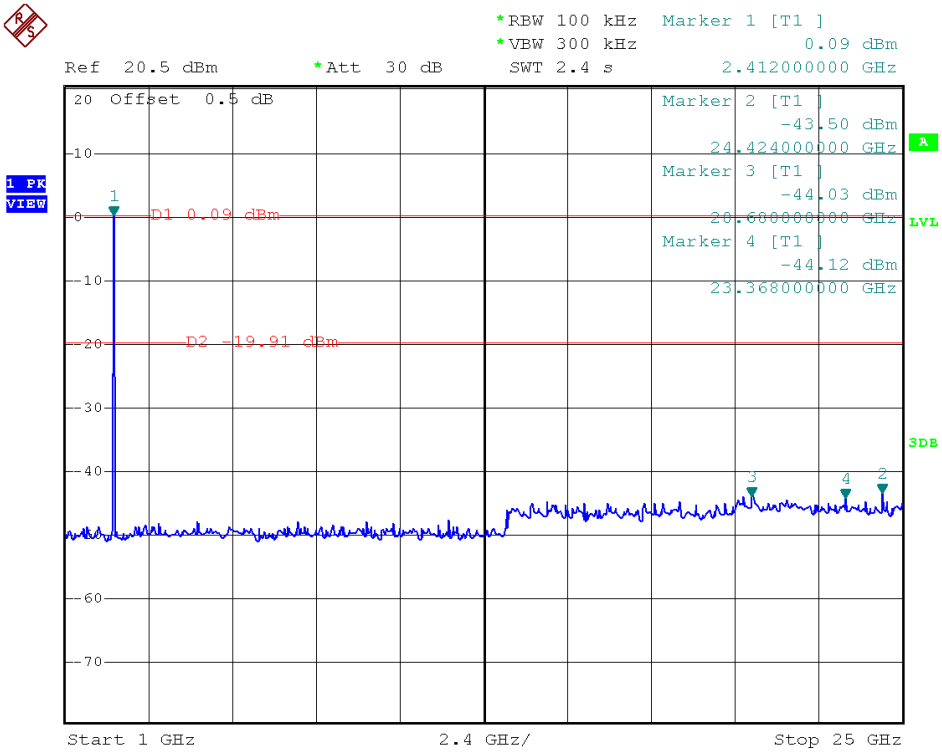
A. Test Verdict:

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

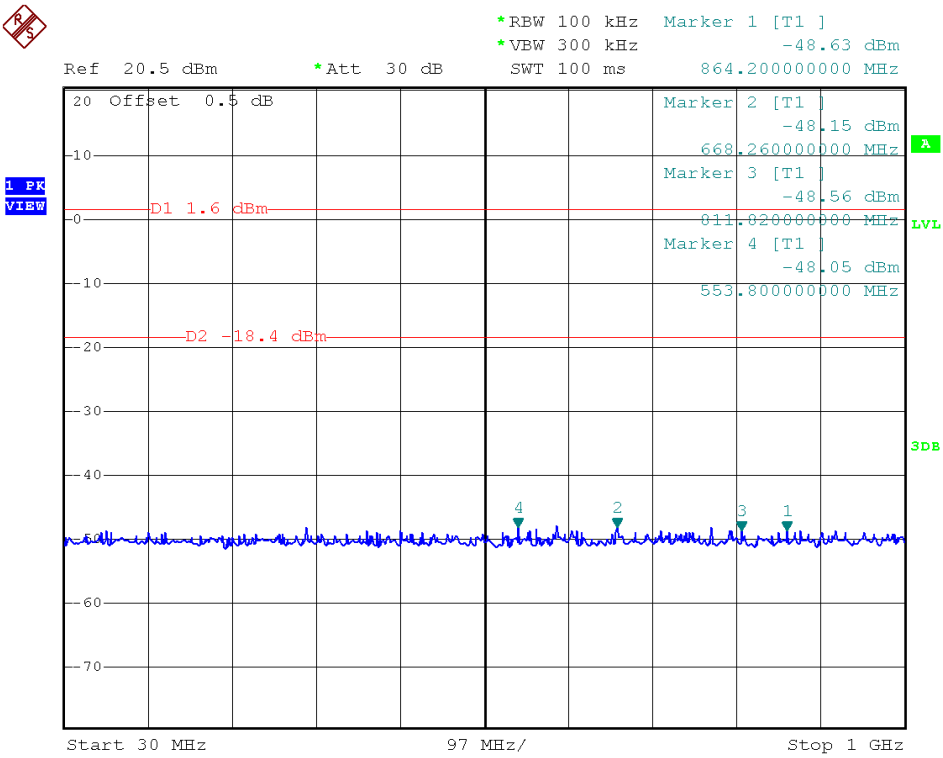
B. Test Plots:

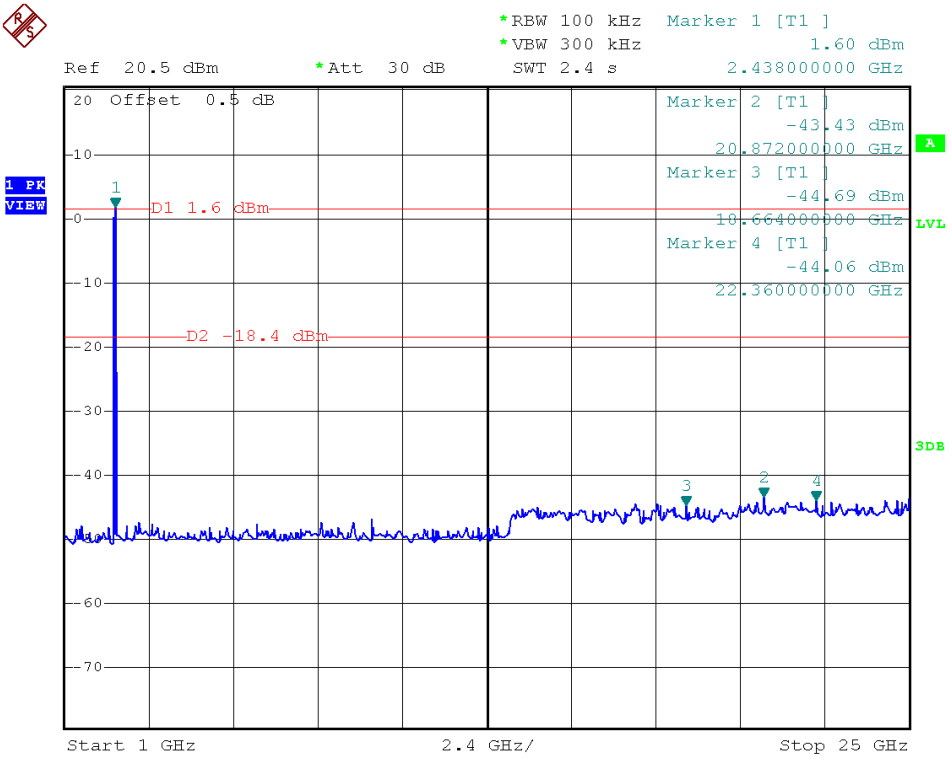
Note: the power of the Module transmitting frequency should be ignored.



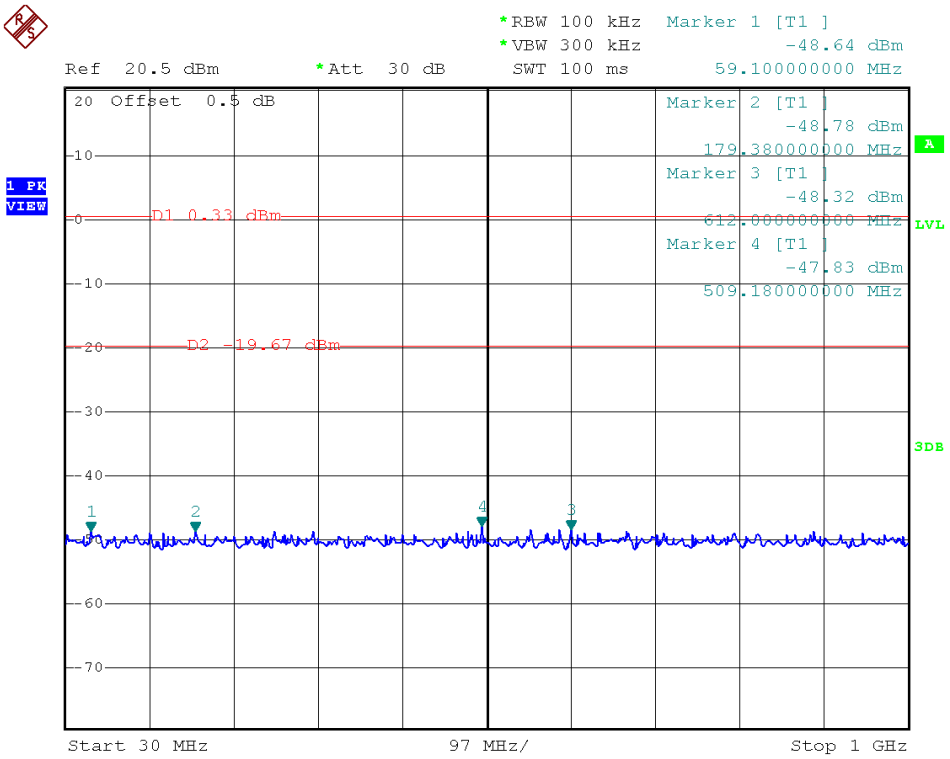


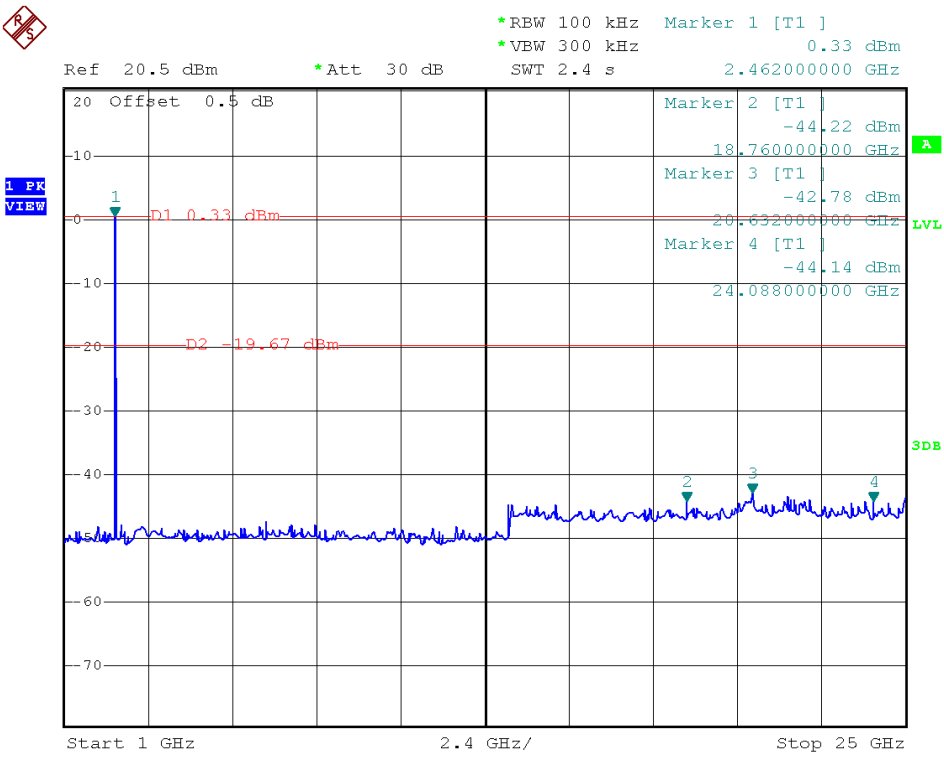
(Plot 2.4 A: Channel = 1, 30MHz to 25GHz@ 802.11b)





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





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

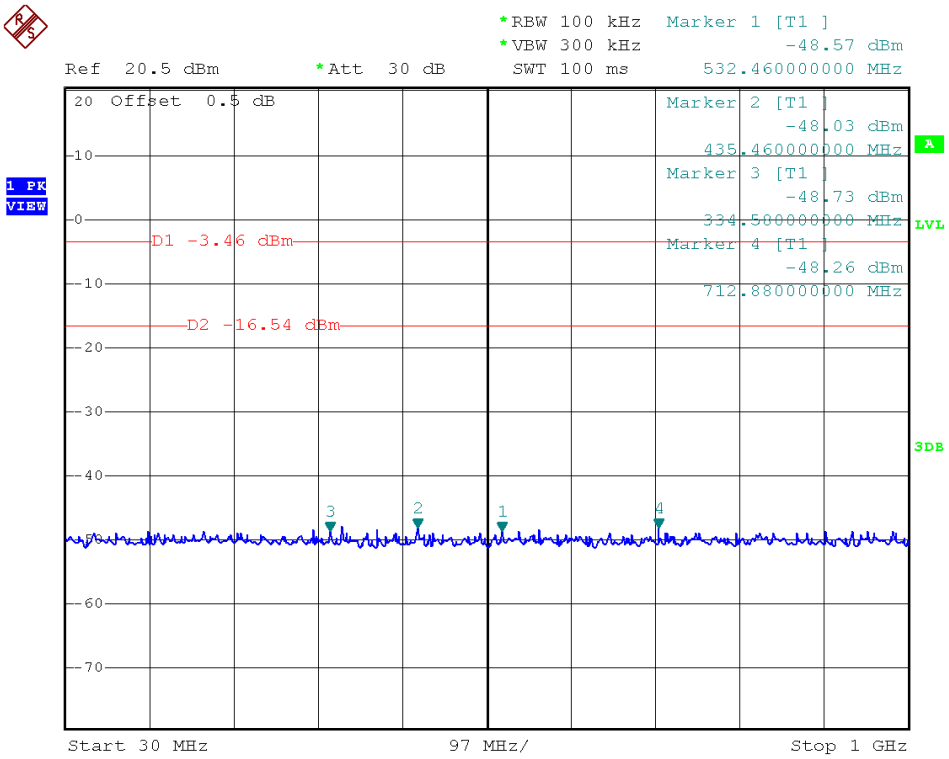
2.4.3.2 802.11g Test mode

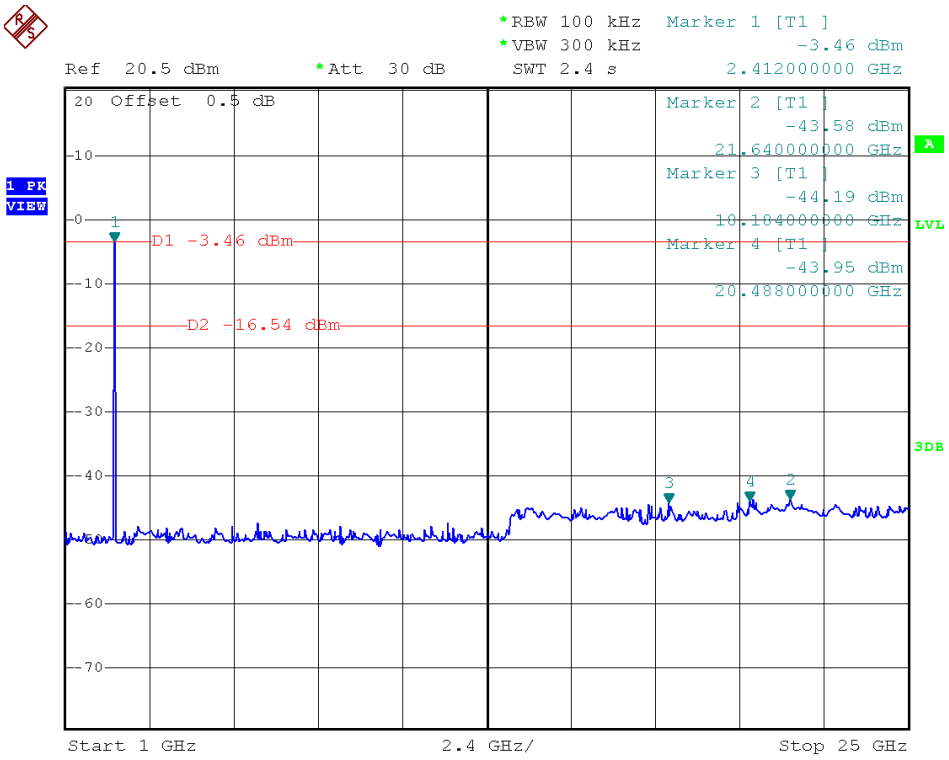
A. Test Verdict:

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

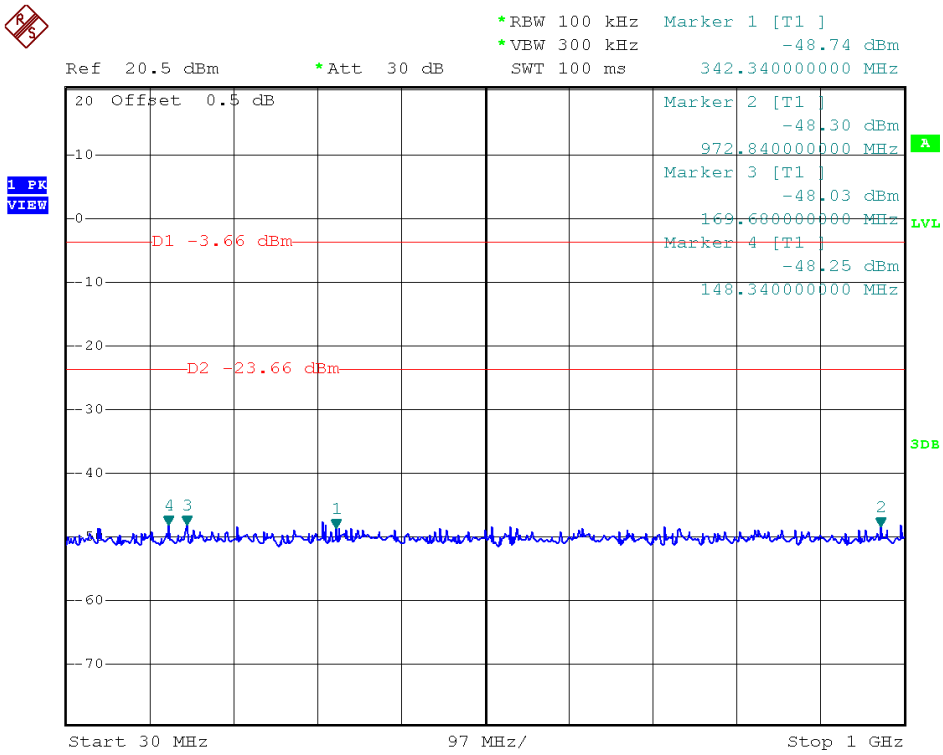
B. Test Plots:

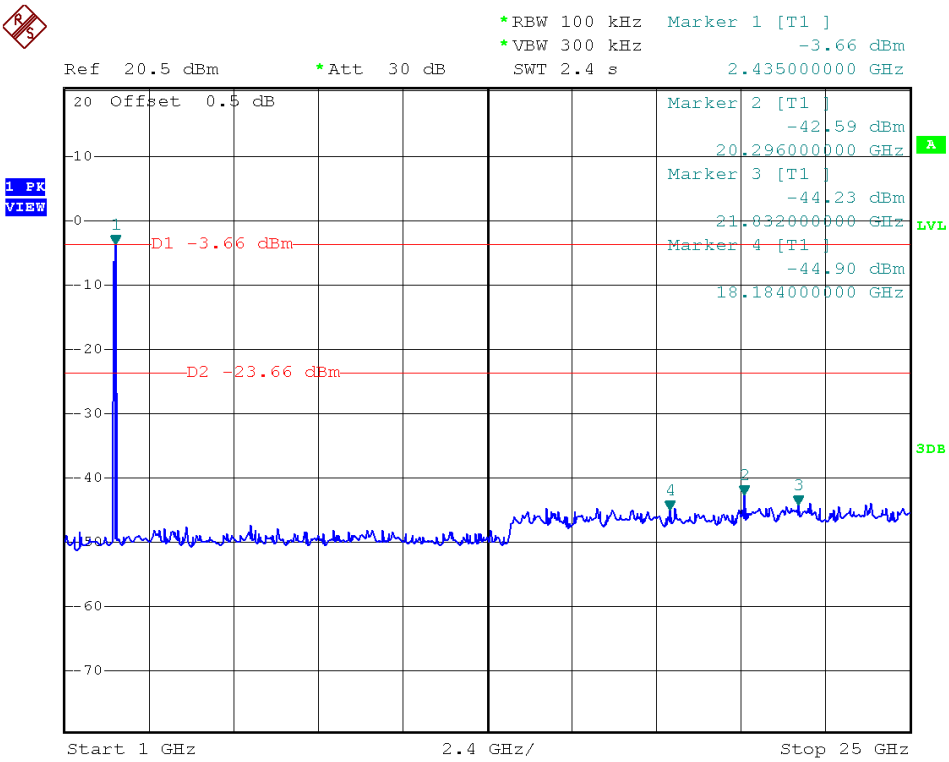
Note: the power of the Module transmitting frequency should be ignored.



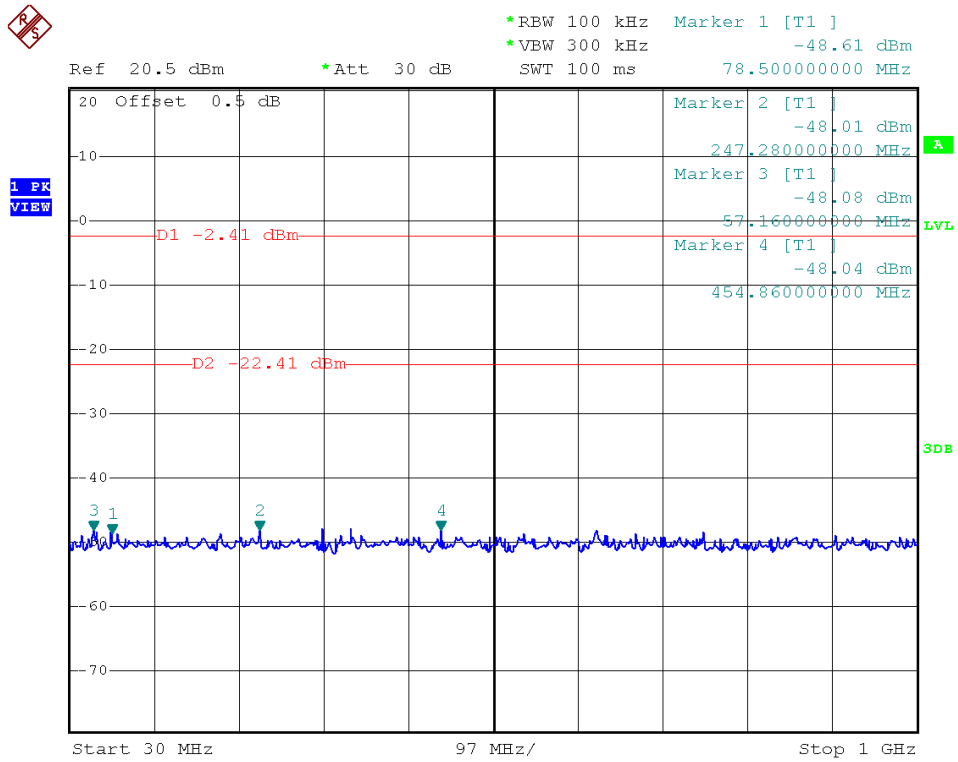


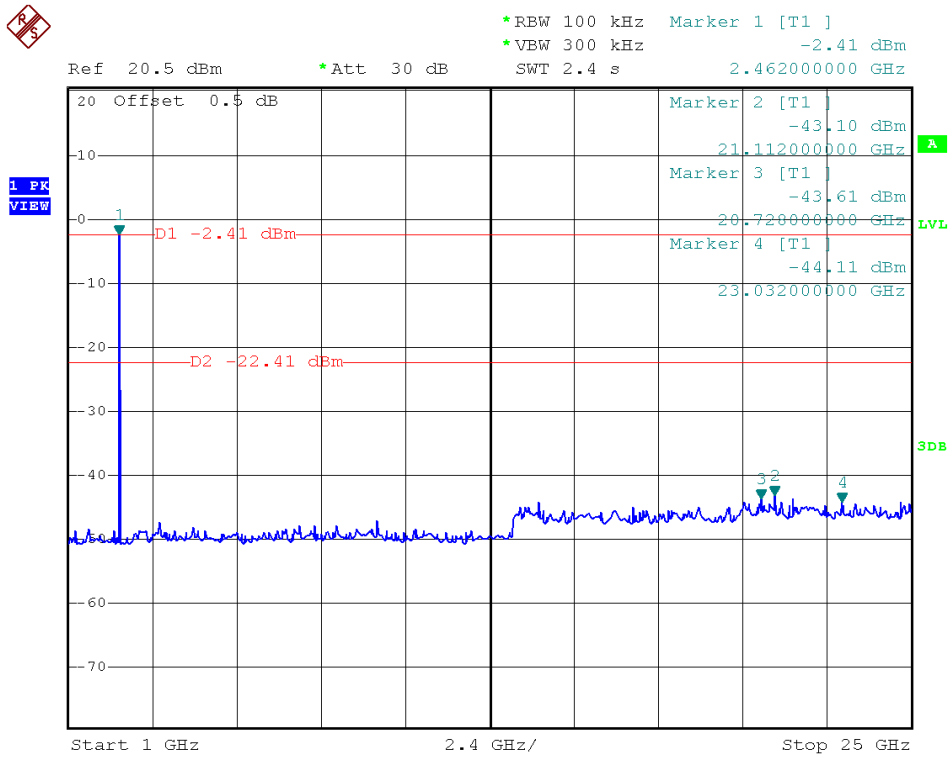
(Plot 2.4 D: Channel = 1, 30MHz to 25GHz@ 802.11g)





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





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

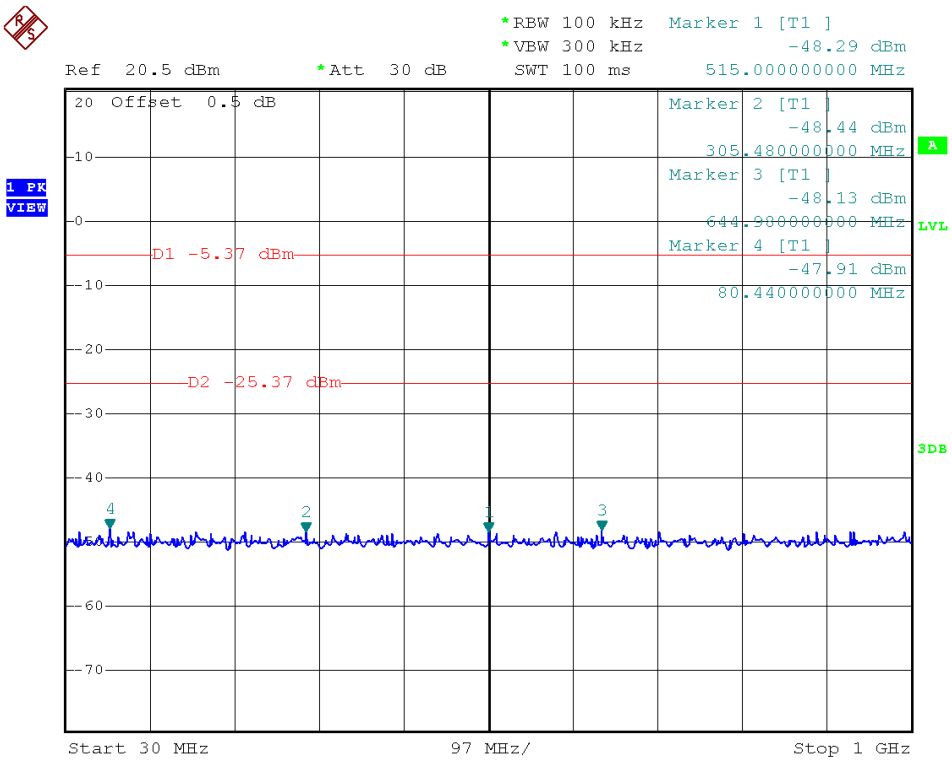
2.4.3.3 802.11n -20MHz Test mode

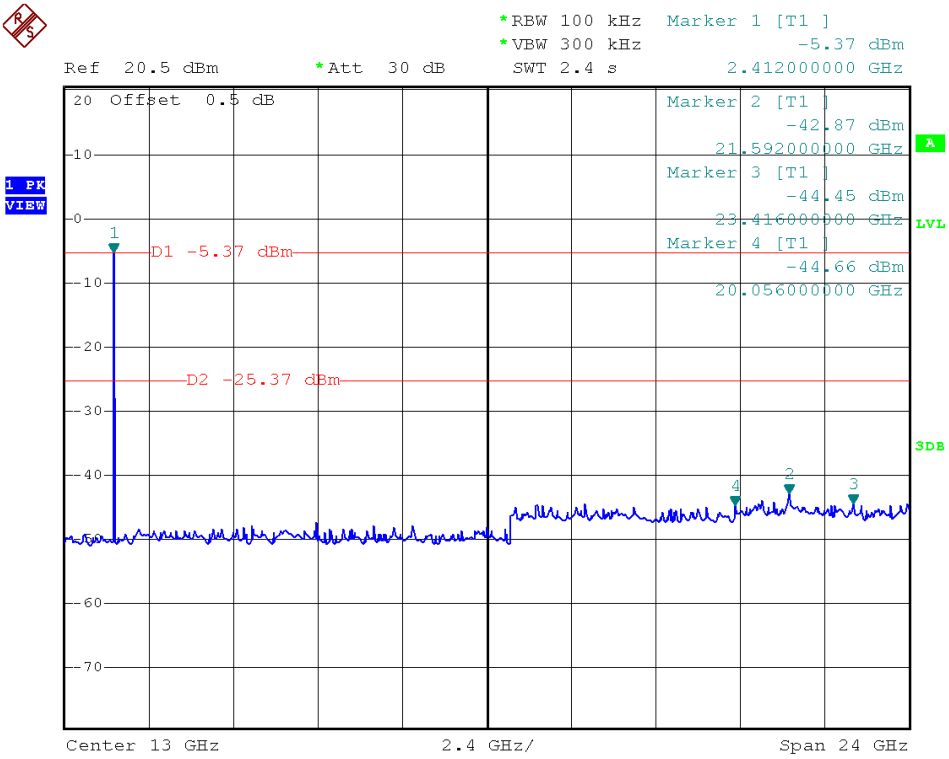
A. Test Verdict:

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

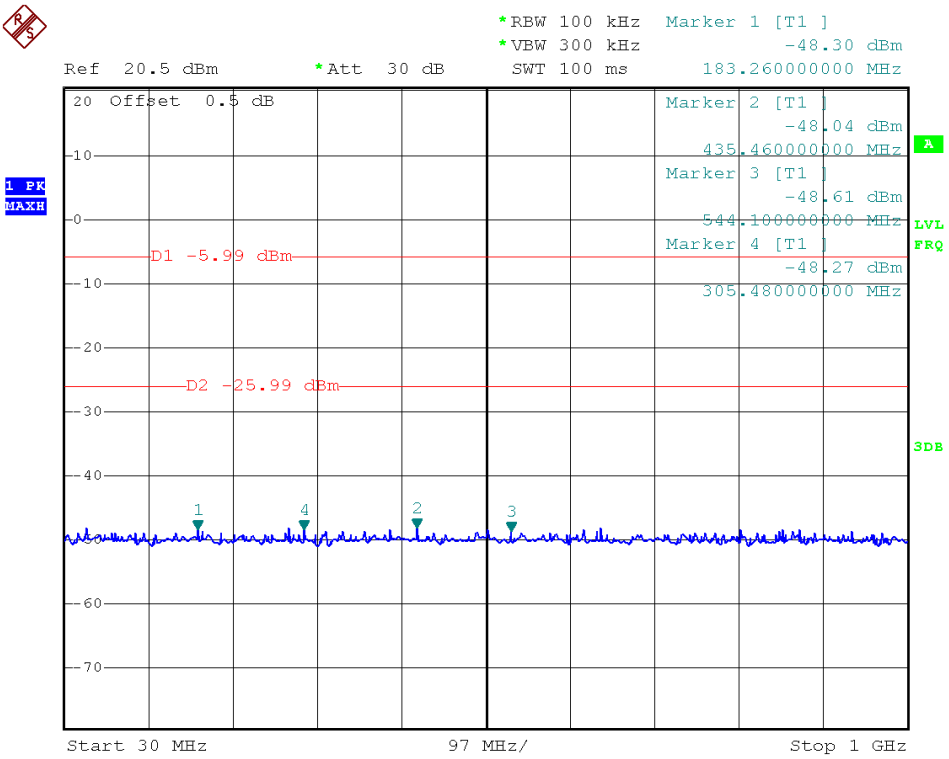
B. Test Plots:

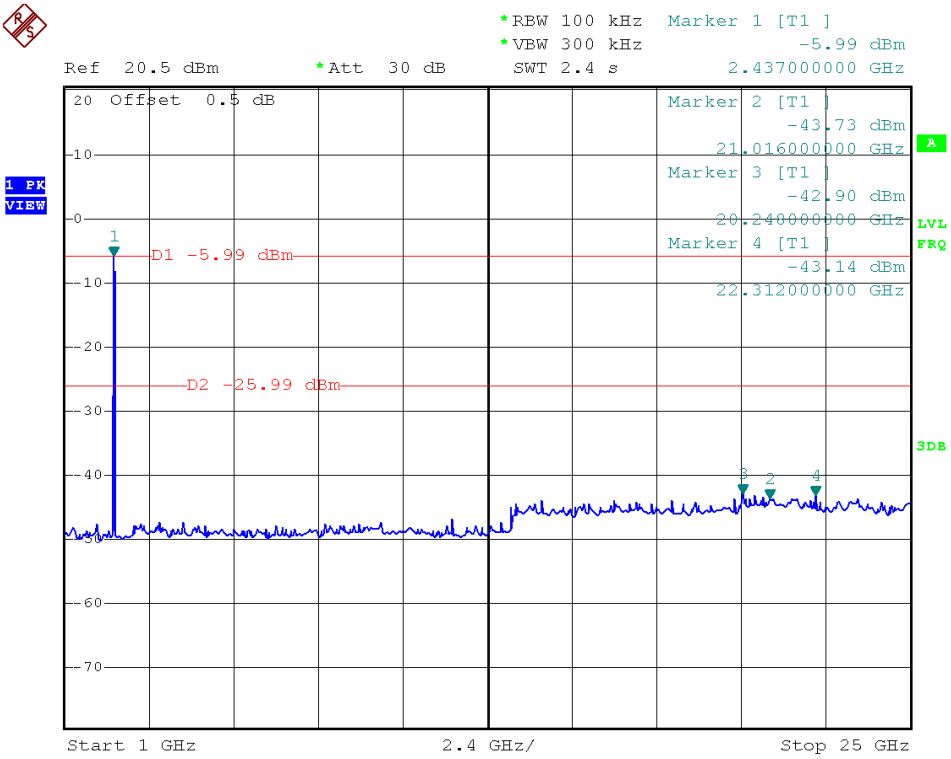
Note: the power of the Module transmitting frequency should be ignored.



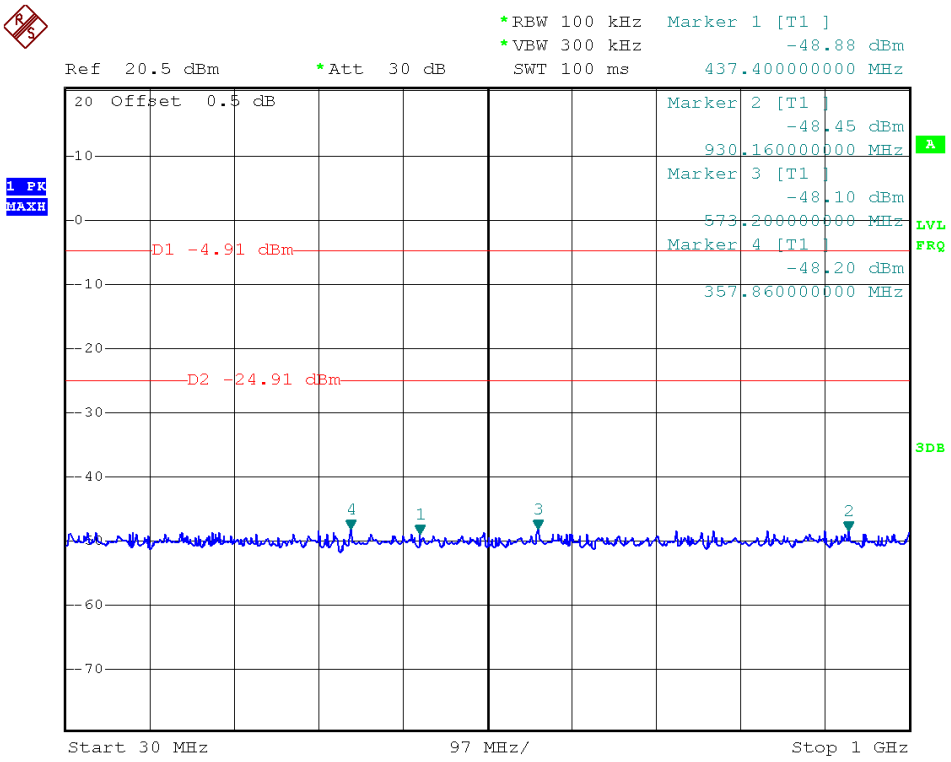


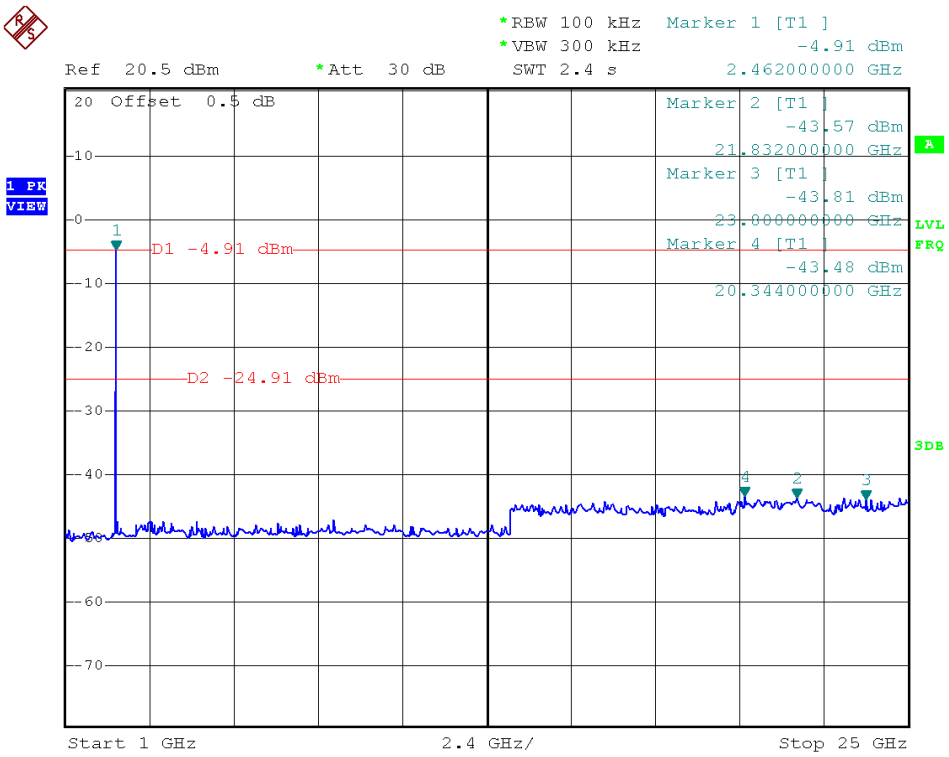
(Plot 2.4 G: Channel = 1, 30MHz to 25GHz@ 802.11n-20)





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





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

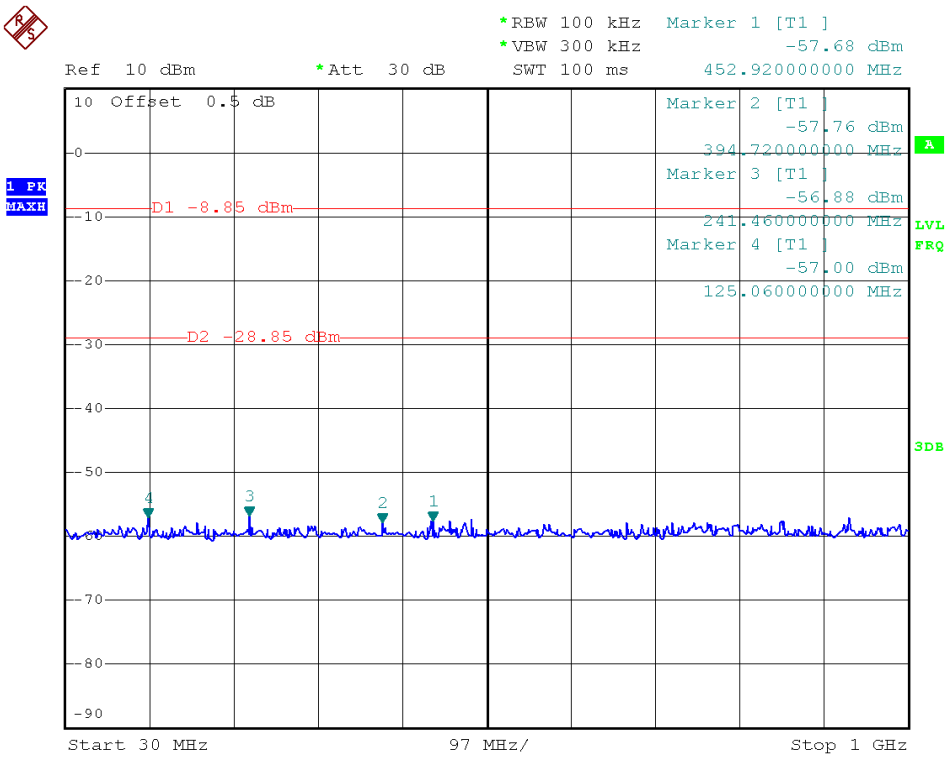
2.4.3.4 802.11n -40MHz Test mode

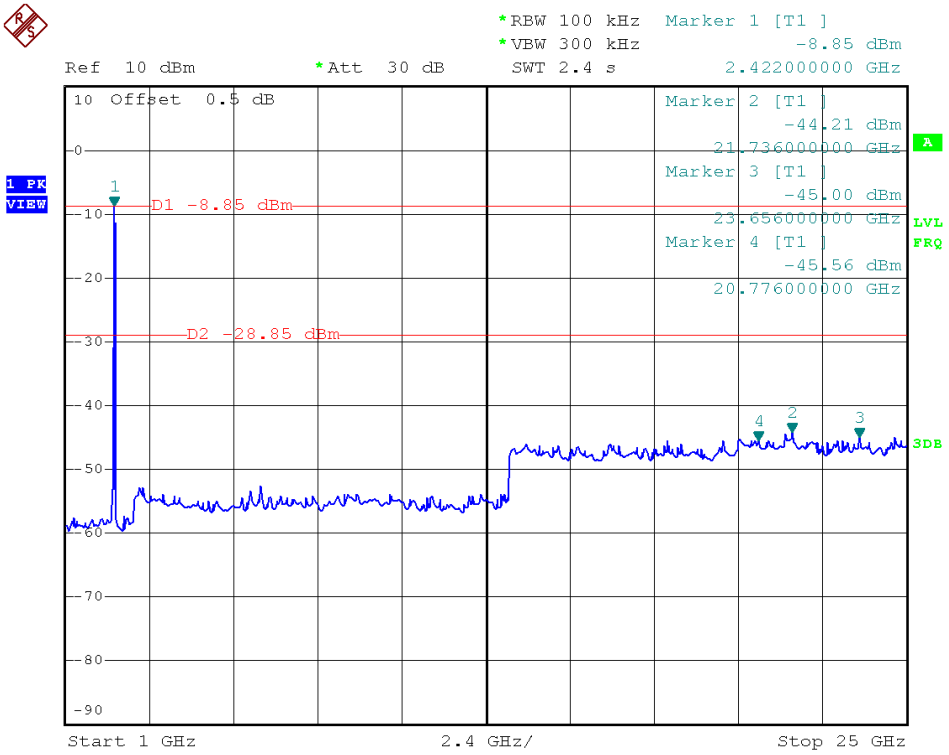
A. Test Verdict:

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

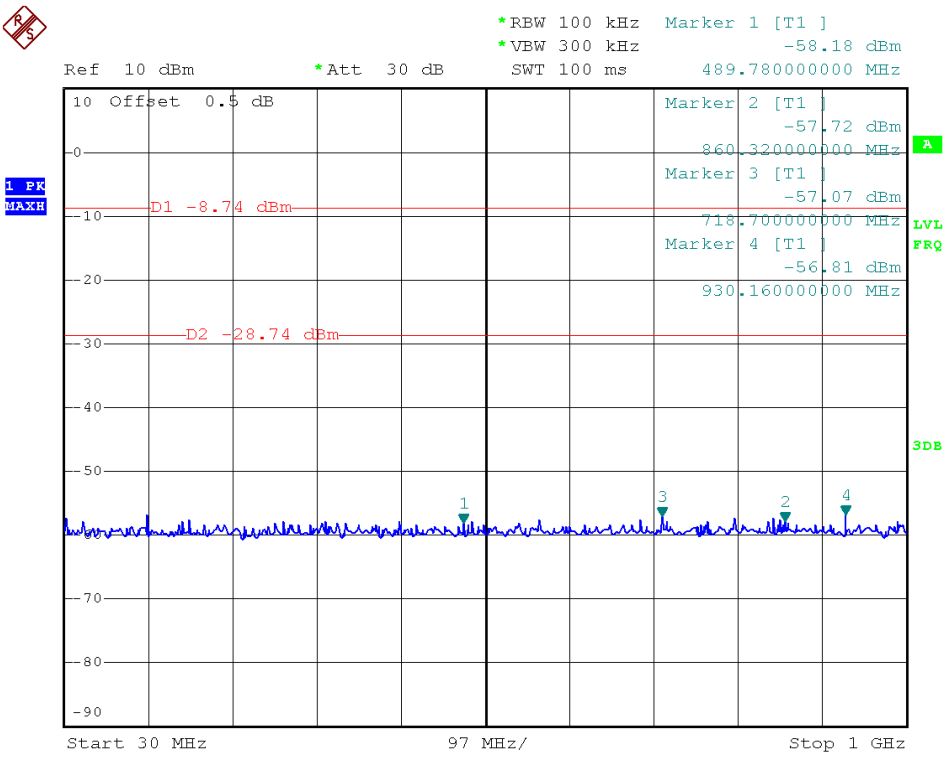
B. Test Plots:

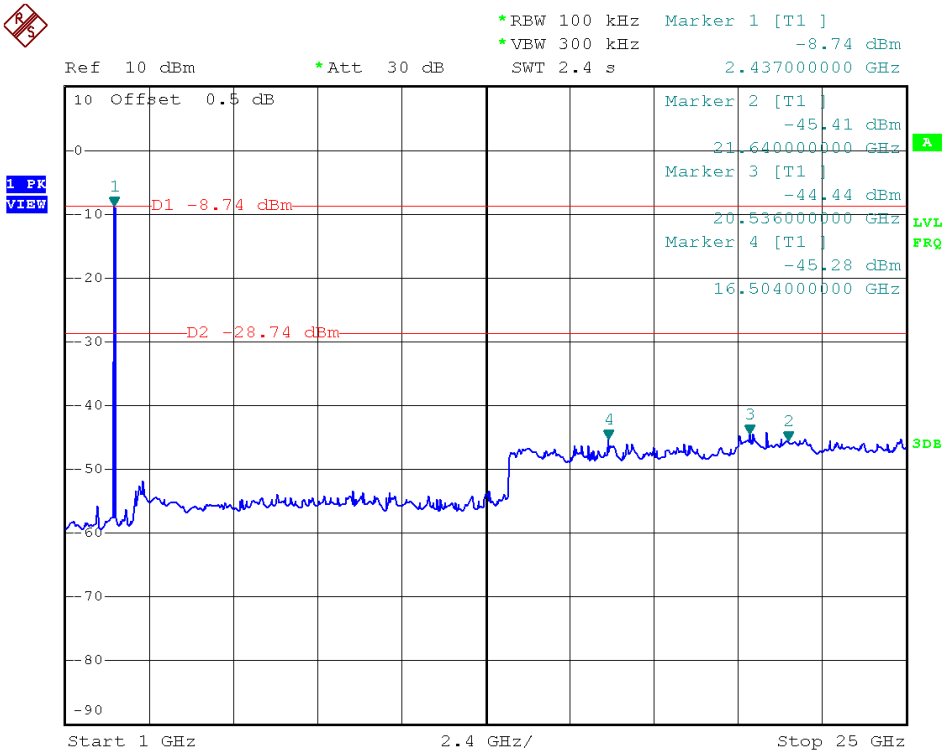
Note: the power of the Module transmitting frequency should be ignored.



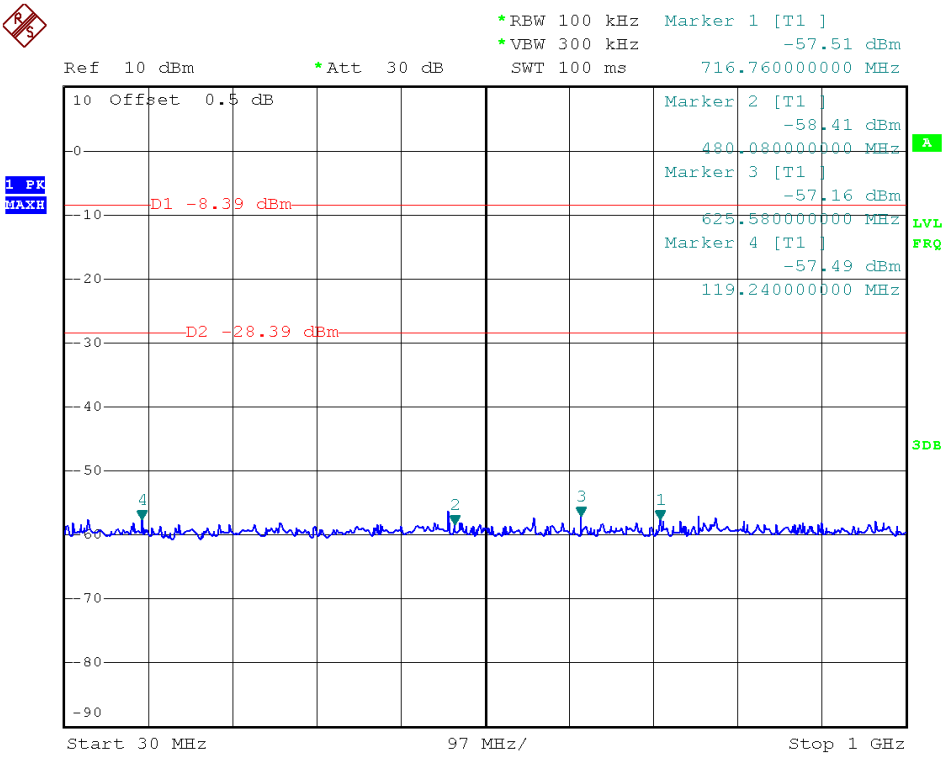


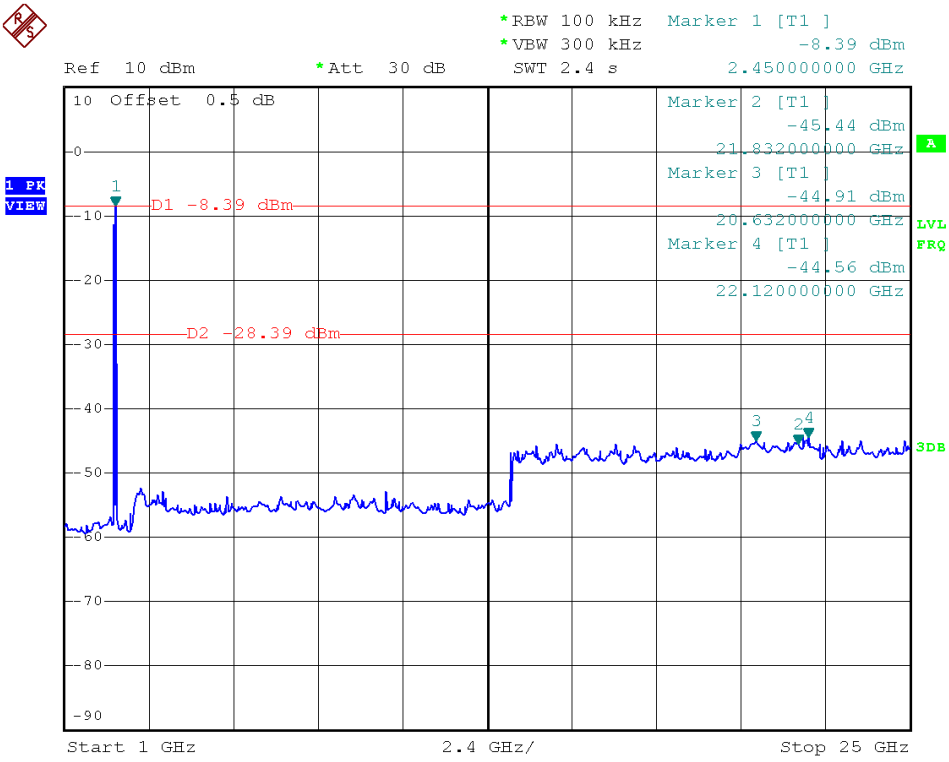
(Plot 2.4 J: Channel = 3, 30MHz to 25GHz@ 802.11n-40)





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





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

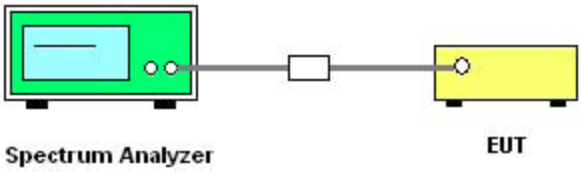
2.5 Power spectral density (PSD)

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 AC adapter, 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. Date	Cal. Due Date
Spectrum Analyzer	R&S	FSP40	1164.4391.40	2014.07.07	2015.07.06

2.5.3 Test Result

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

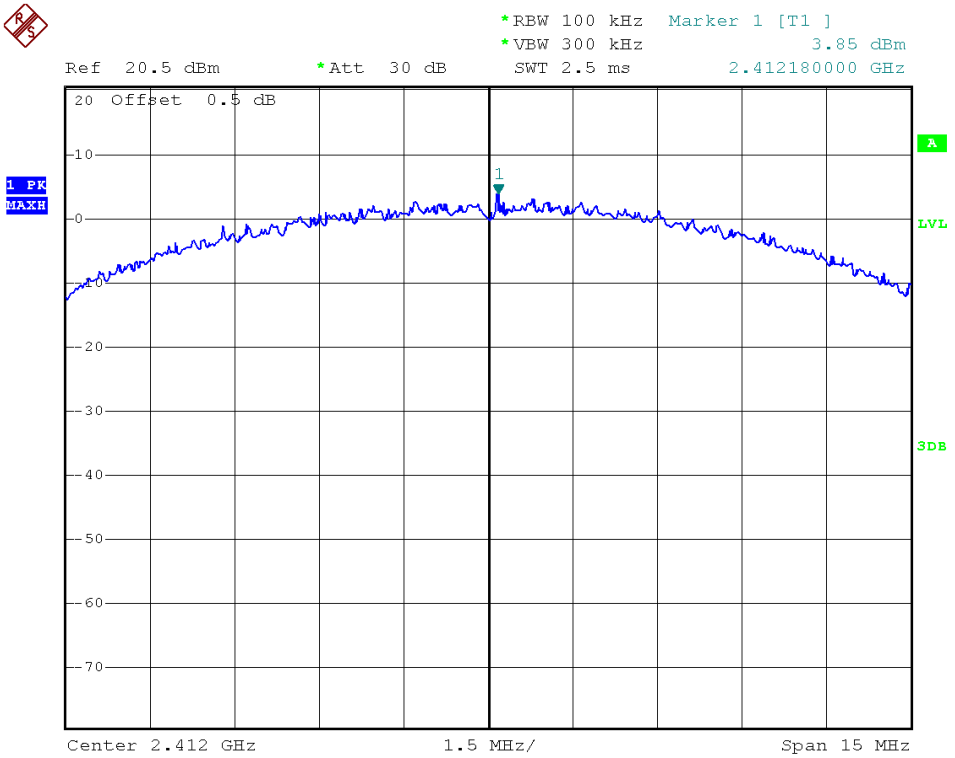
2.5.3.1 802.11b Test mode

A. Test Verdict:

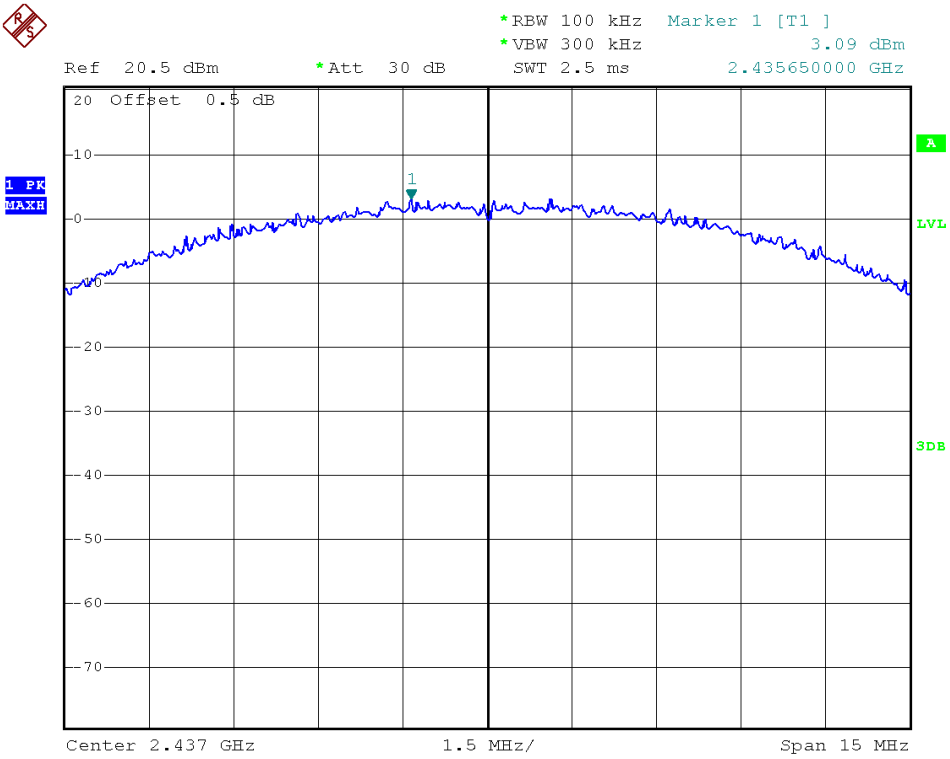
Spectral power density (dBm/3kHz)					
Channel	Frequency (MHz)	Measured PSD (dBm)	Refer to Plot	Limit (dBm/3kHz)	Verdict
1	2412	3.85	Plot 2.5 A	8	PASS
6	2437	3.09	Plot 2.5 B	8	PASS
11	2462	3.66	Plot 2.5 C	8	PASS
Measurement uncertainty: ±1.3dB					

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.

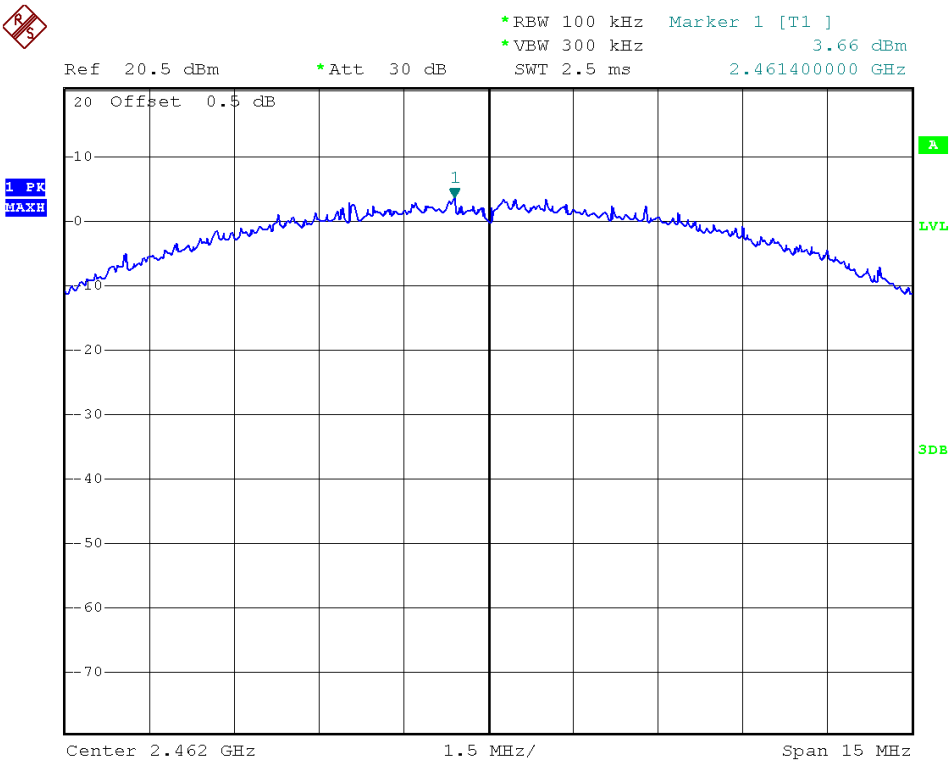
B. Test Plots:



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



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



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

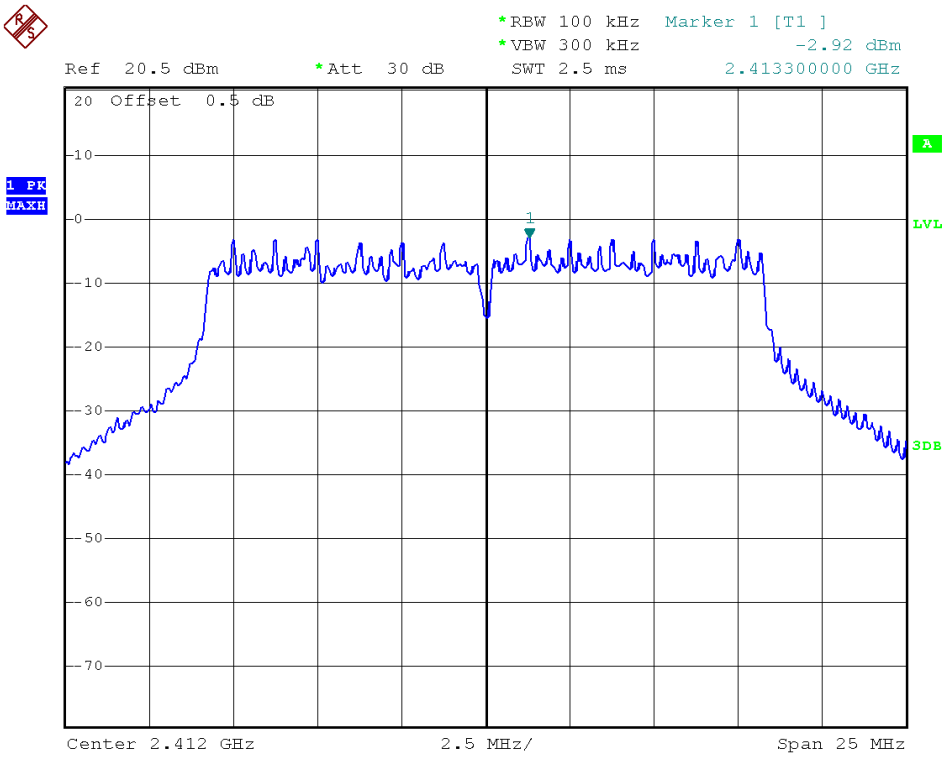
2.5.3.2 802.11g Test mode

A. Test Verdict:

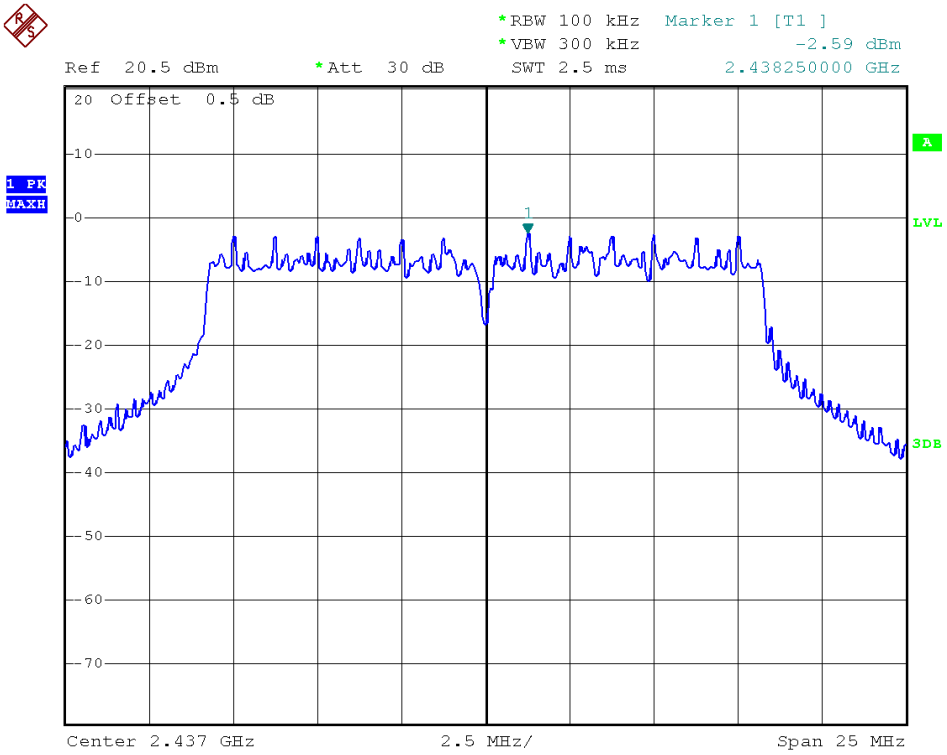
Spectral power density (dBm/3kHz)					
Channel	Frequency (MHz)	Measured PSD (dBm/3kHz)	Refer to Plot	Limit (dBm/3kHz)	Verdict
1	2412	-2.92	Plot 2.5 D	8	PASS
6	2437	-2.59	Plot 2.5 E	8	PASS
11	2462	-2.39	Plot 2.5 F	8	PASS
Measurement uncertainty: ±1.3dB					

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.

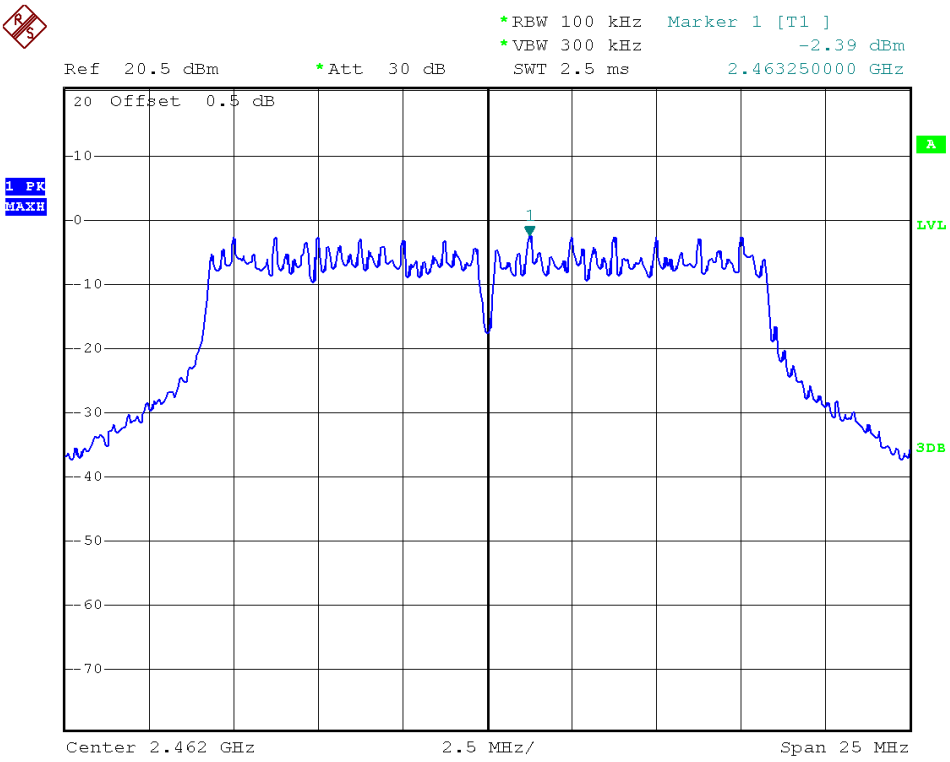
B. Test Plots:



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



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



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

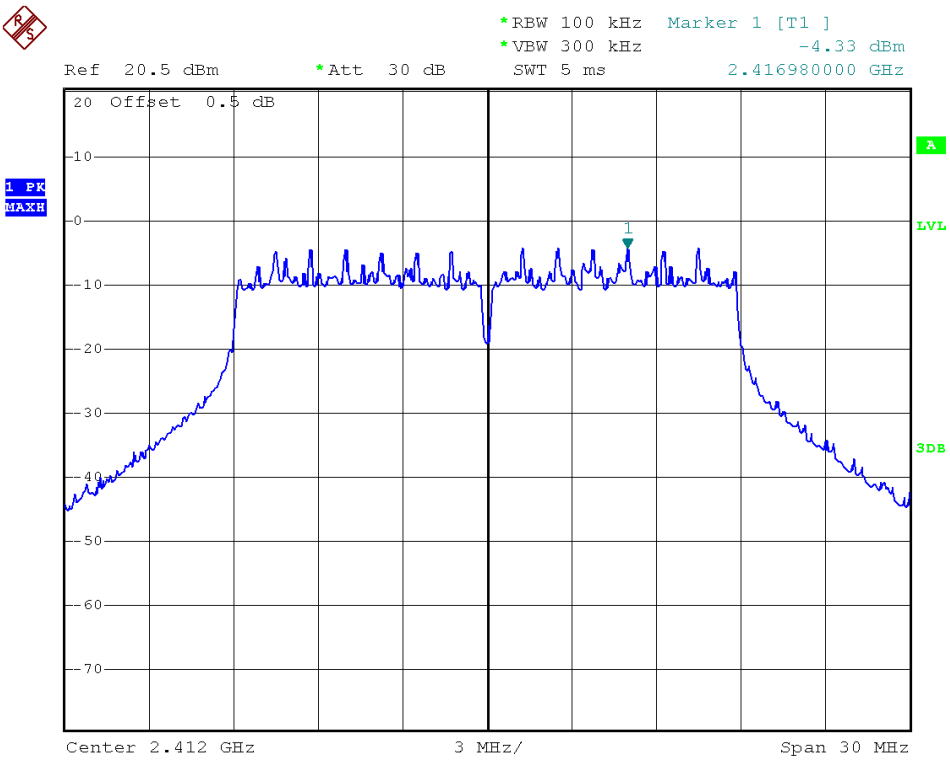
2.5.3.3 802.11n-20 Test mode

A. Test Verdict:

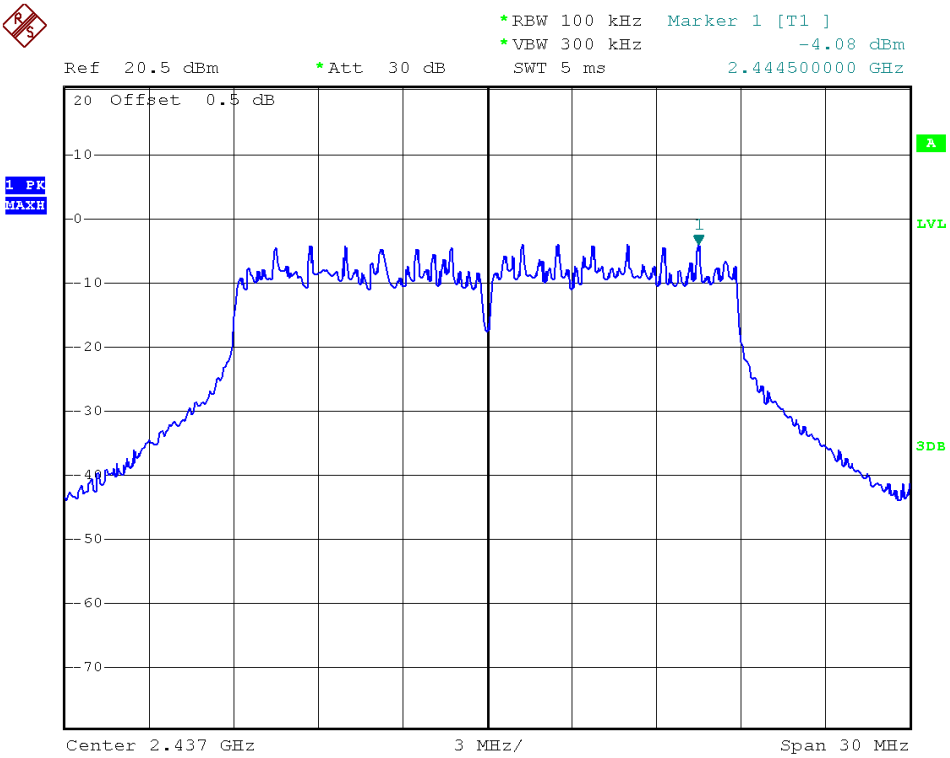
Spectral power density (dBm/3kHz)					
Channel	Frequency (MHz)	Measured PSD (dBm/3kHz)	Refer to Plot	Limit (dBm/3kHz)	Verdict
1	2412	-4.33	Plot2.5 G	8	PASS
6	2437	-4.08	Plot2.5 H	8	PASS
11	2462	-4.33	Plot2.5 I	8	PASS
Measurement uncertainty: ±1.3dB					

Note: 1. For 802.11n(20MHz) mode at finial test to get the worst-case emission at 72 Mbps.
2. The test results including the cable lose.

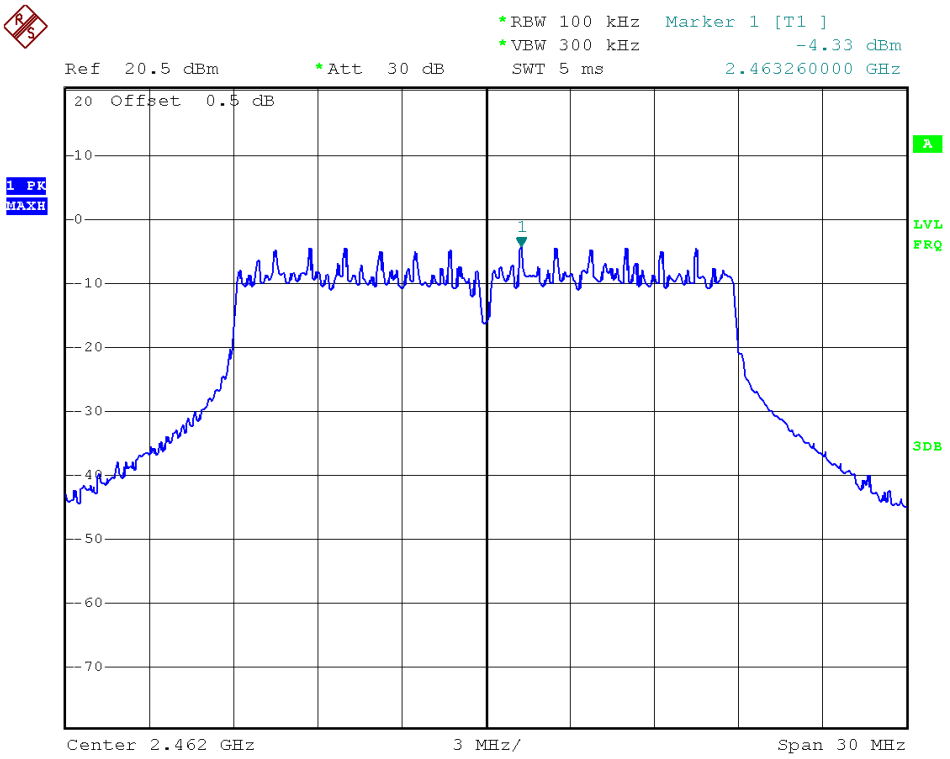
B. Test Plots:



(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

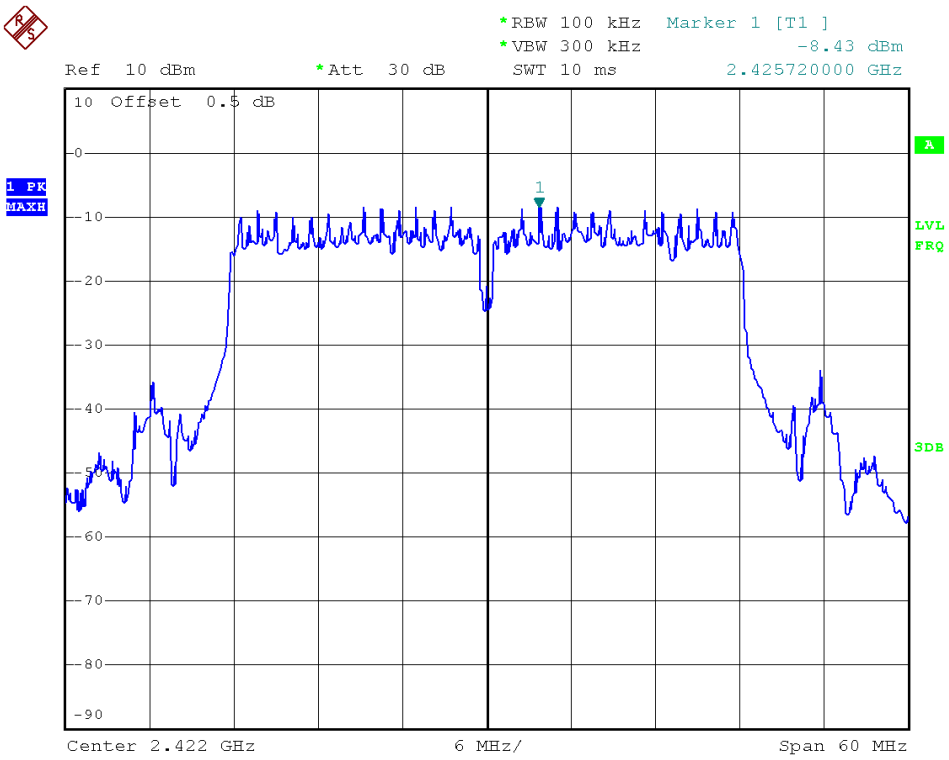
2.5.3.4 802.11n-40 Test mode

A. Test Verdict:

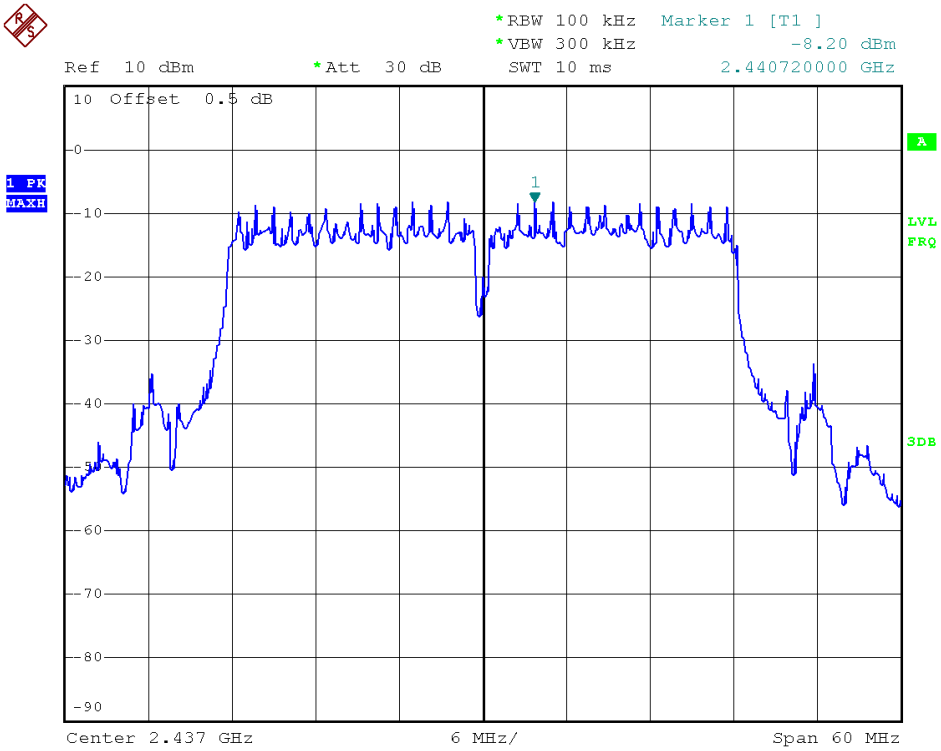
Spectral power density (dBm/3kHz)					
Channel	Frequency (MHz)	Measured PSD (dBm)	Refer to Plot	Limit (dBm/3kHz)	Verdict
3	2422	-8.43	Plot 2.5 J	8	PASS
6	2437	-8.20	Plot 2.5 K	8	PASS
9	2452	-8.06	Plot 2.5 L	8	PASS
Measurement uncertainty: ±1.3dB					

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.

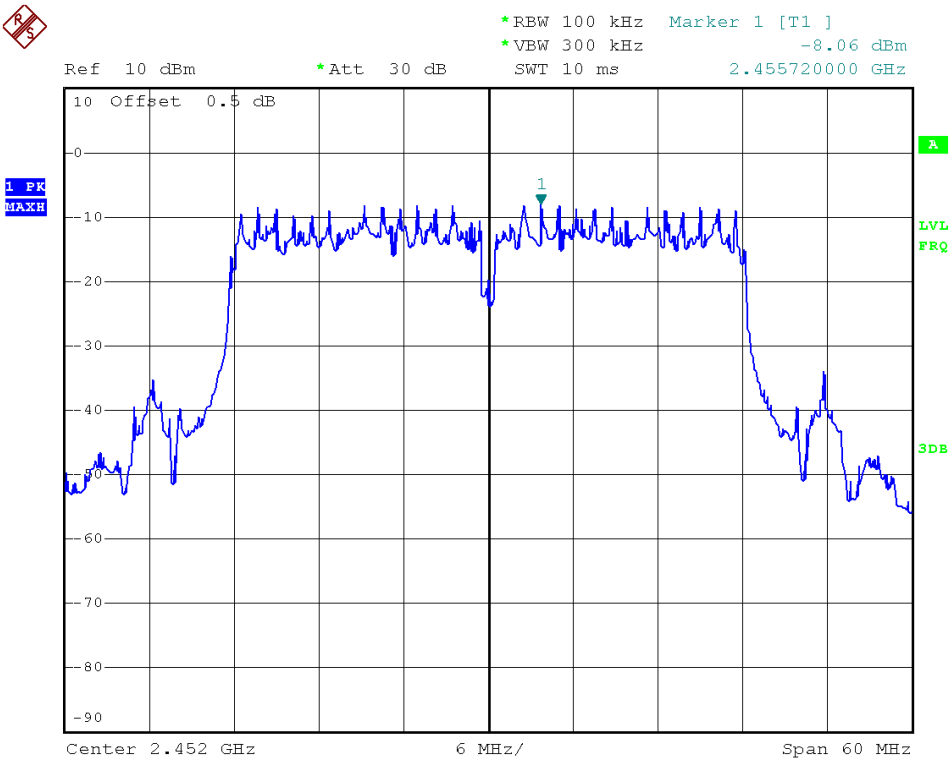
B. Test Plots:



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



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



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

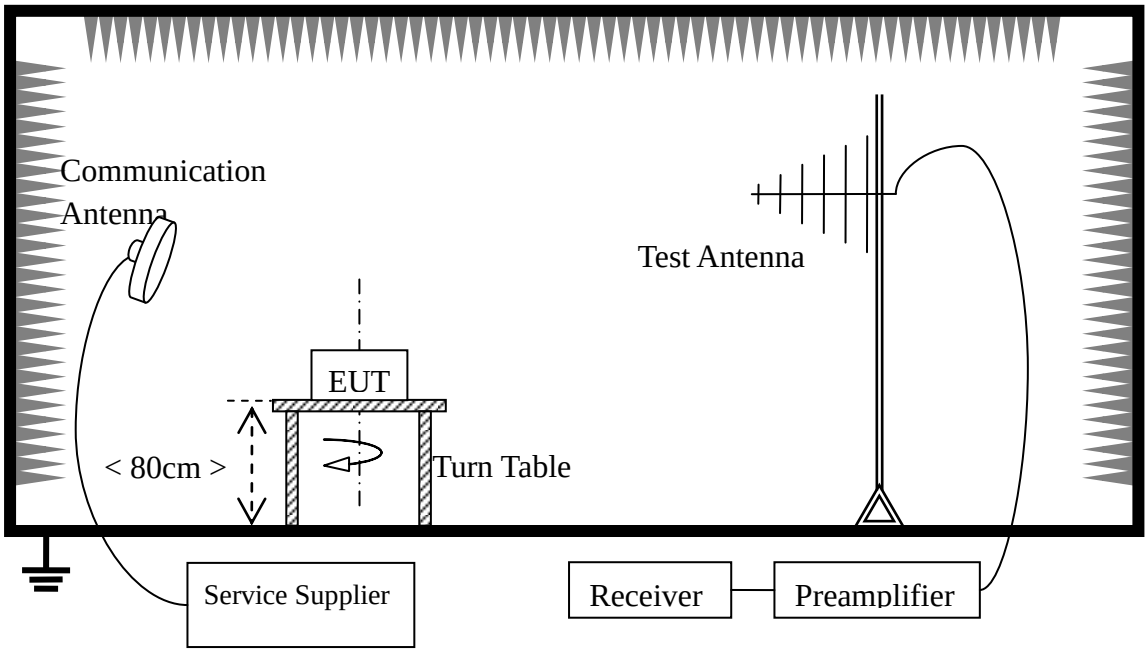
2.6 Band Edge

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 EUT is powered by the AC Adapter. The EUT 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 Date
Receiver	R&S	ESIB26	A0304218	2014.06.07	2015.06.06
Full-Anechoic Chamber	Albatross	12.8m*6.8m *6.4m	A0412372	2014.06.07	2015.06.06
Double ridge horn antenna	R&S	HF906	100150	2014.06.10	2015.06.09
Ultra-wideband antenna	R&S	HL562	100089	2014.06.10	2015.06.09
Ampilier 1G~18GHz	R&S	MITEQ AFS42-001 01800	25-S-42	2014.06.05	2015.06.04
Cable	SUNHNER	SUCOFLE X 100	/	2014.06.05	2015.06.04
Cable	SUNHNER	SUCOFLE X 104	/	2014.06.05	2015.06.04

2.6.3 Test Procedure

Span = wide enough to capture the peak level of the emission operating on the channel closest to the bandedge, as well as any modulation products which fall outside of the authorized band of operation

For radiated test

RBW =1MHz ,VBW=3MHz PK detector for PK value ，

RBW=1MHz VBW=10Hz ， PK detector for AV value

Trace = max hold

Allow the trace to stabilize

2.6.4 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.

<u>Radiated band edge Measurement:</u>

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

The measurement results are obtained as below:

E [dBμ 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

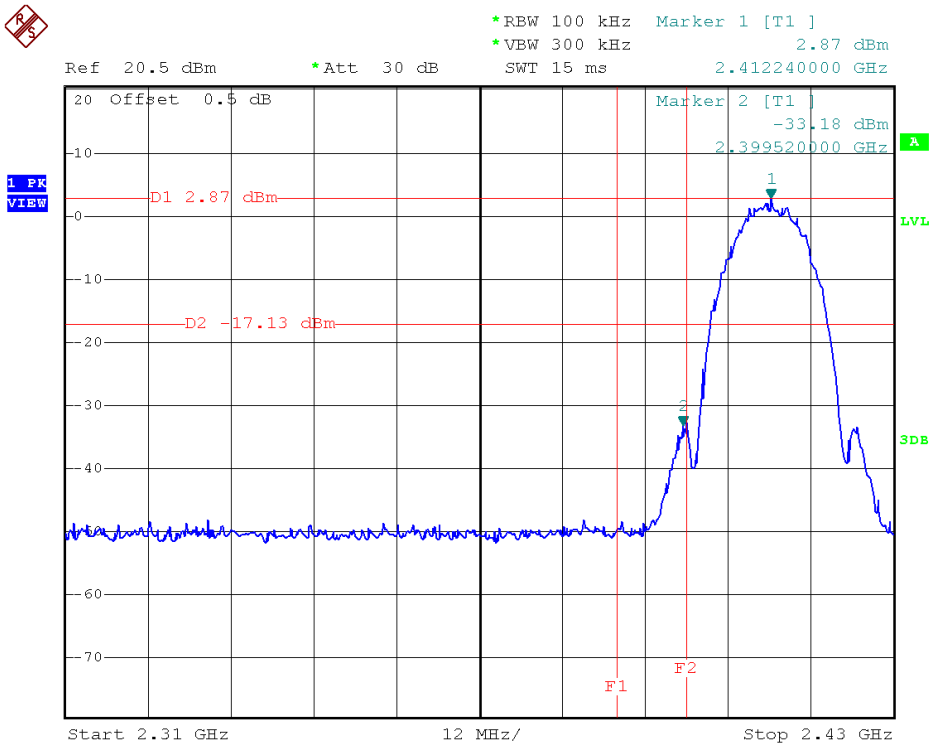
U_R: Receiver Reading
G_{preamp}: Preamplifier Gain
A_{Factor}: Antenna Factor at 3m
NOTE 1: The red vertical lines "F1" in the following charts is to indicate the frequencies 2400MHz and 2483.5MHz respectively
NOTE 2: Both horizontal and vertical polarity direction of the test antenna has been performed, only the worst case recorded in this report.

802.11b

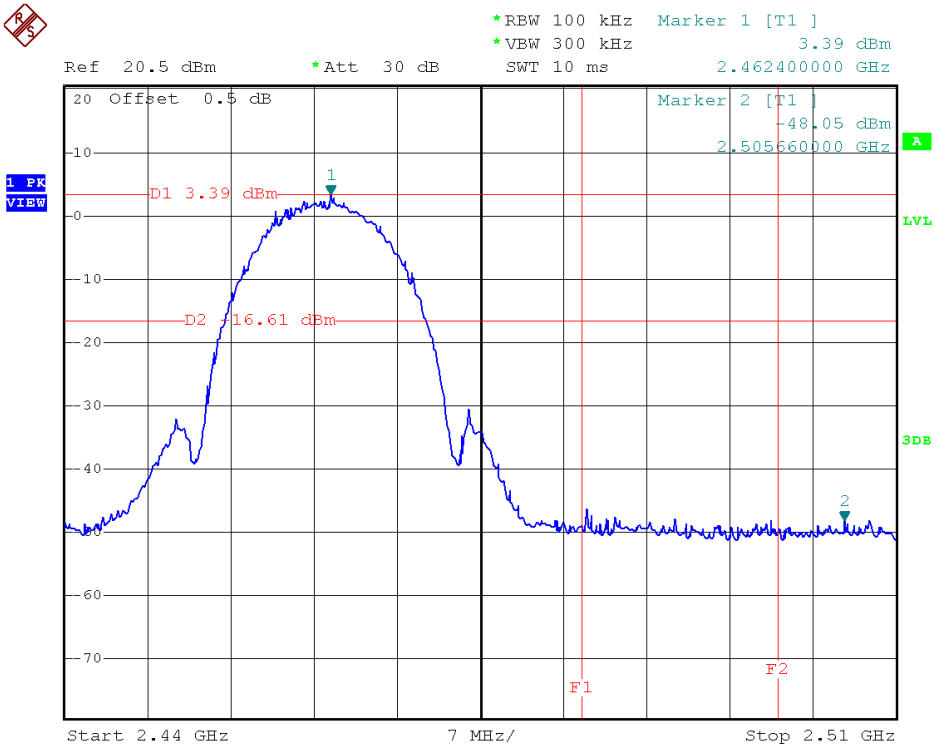
A. Test Verdict:

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	2388.479	PK	50.33	-31.70	28.30	46.93	74.00	Pass
1	2388.479	AV	39.67	-31.70	28.30	36.27	54.00	Pass
11	2493.262	PK	50.82	-29.45	29.20	50.57	74.00	Pass
11	2493.262	AV	40.04	-29.45	29.20	39.79	54.00	Pass

B. Test Plots:



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



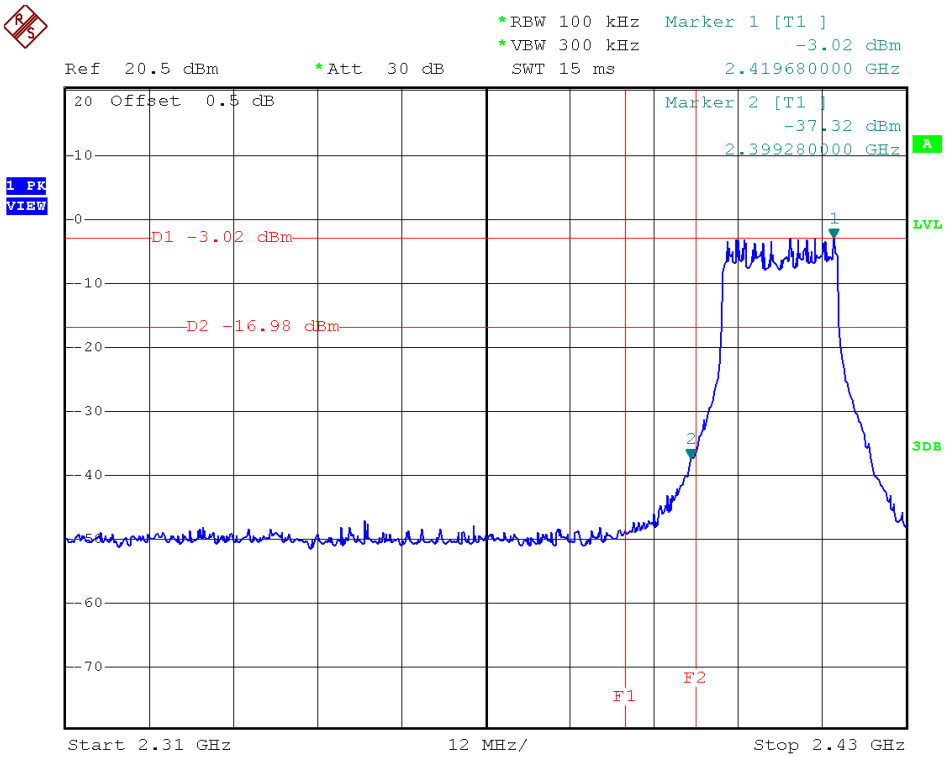
(Plot 2.6 A2: Channel = 11 @ 802.11b)

802.11g

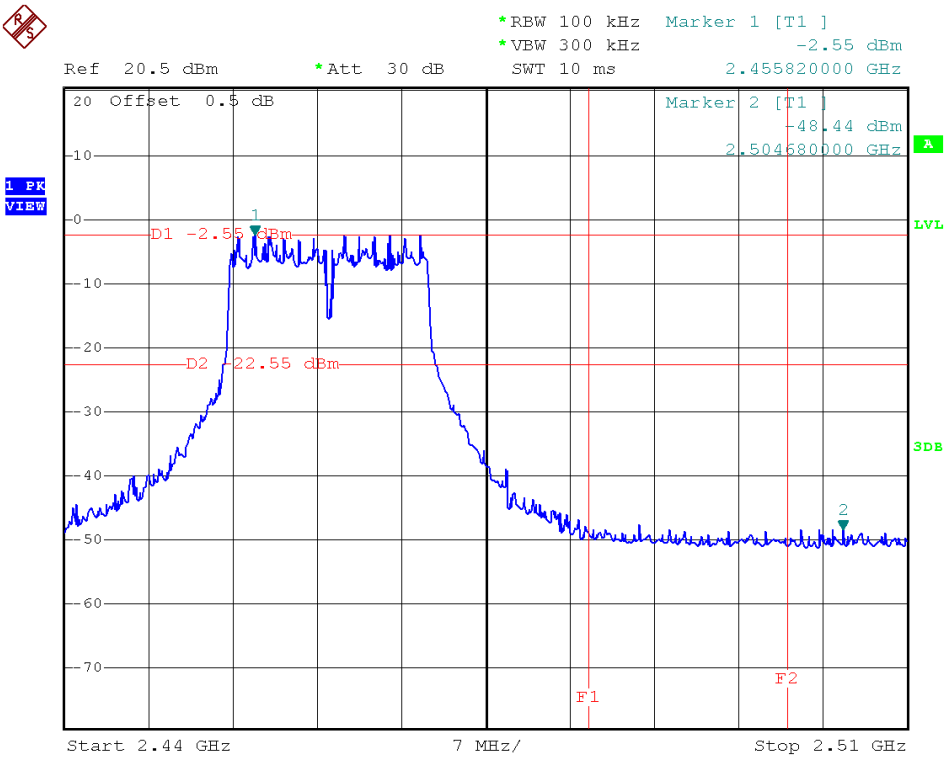
A. Test Verdict:

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	2373.679	PK	51.07	-31.70	28.30	47.67	74.00	Pass
1	2373.679	AV	40.28	-31.70	28.30	36.88	54.00	Pass
11	2495.137	PK	50.29	-29.45	29.20	50.04	74.00	Pass
11	2495.137	AV	40.37	-29.45	29.20	40.12	54.00	Pass

B. Test Plots:



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



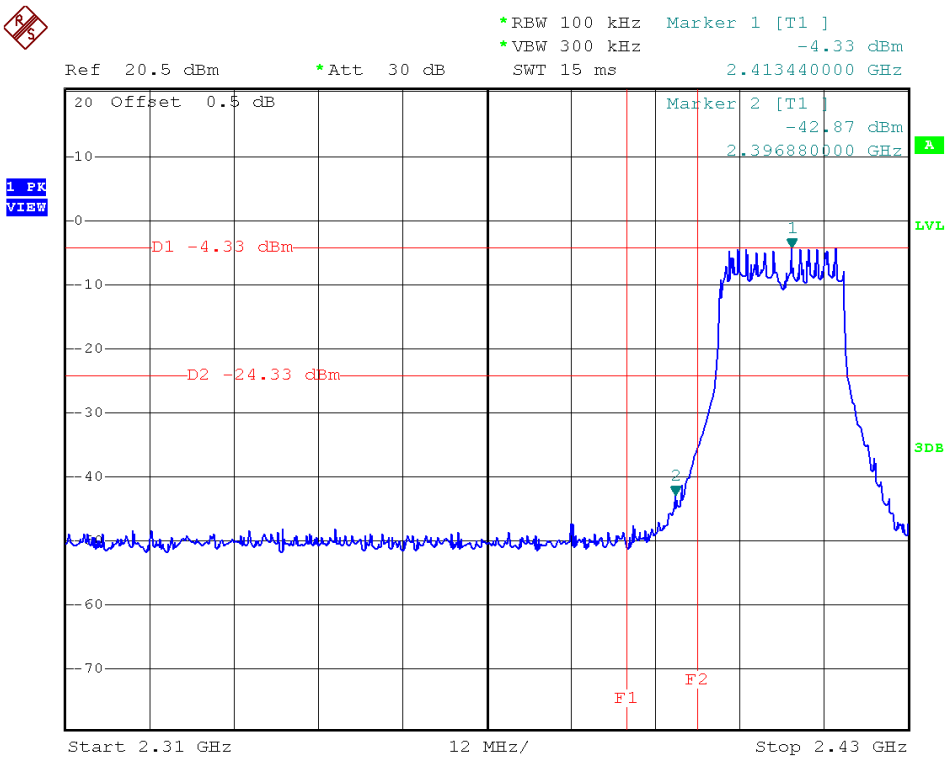
(Plot 2.6 B2: Channel = 11 @ 802.11g)

802.11n-20

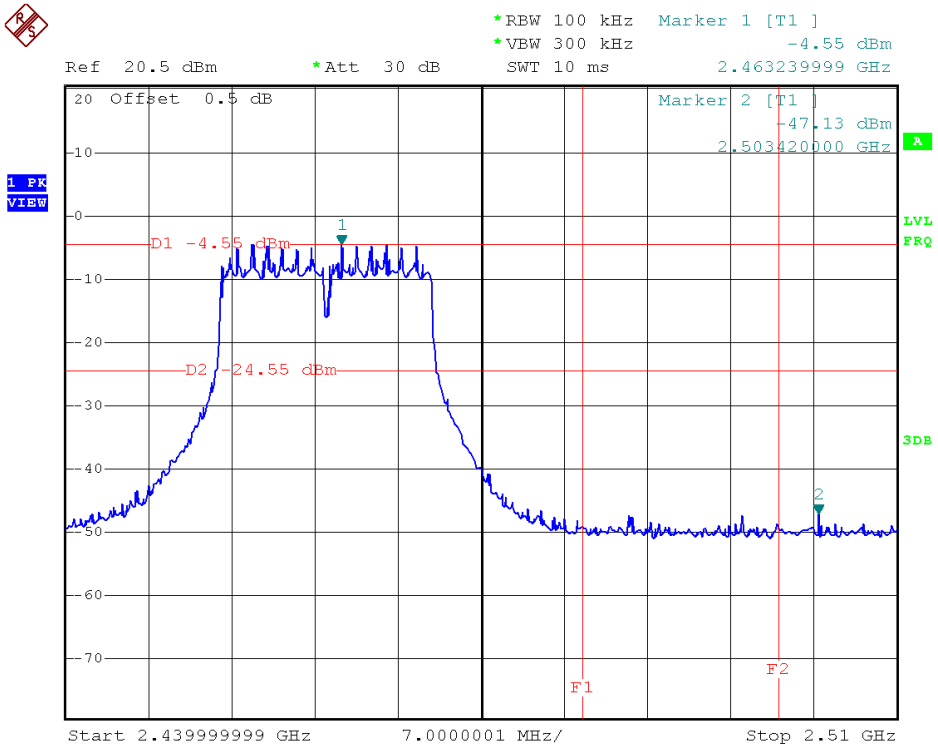
A. Test Verdict:

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	2388.276	PK	50.97	-31.70	28.30	47.57	74.00	Pass
1	2388.276	AV	40.23	-31.70	28.30	36.83	54.00	Pass
11	2496.159	PK	50.23	-29.45	29.20	49.98	74.00	Pass
11	2496.159	AV	39.93	-29.45	29.20	39.68	54.00	Pass

B. Test Plots:



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



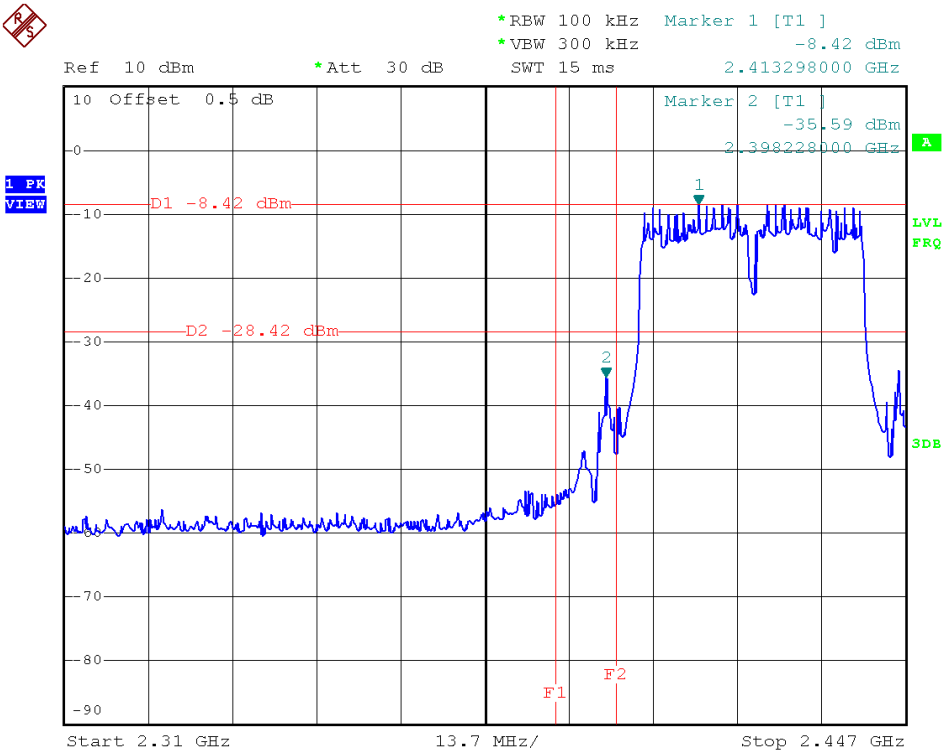
(Plot 2.6 C2: Channel = 11 @ 802.11n-20)

802.11n-40

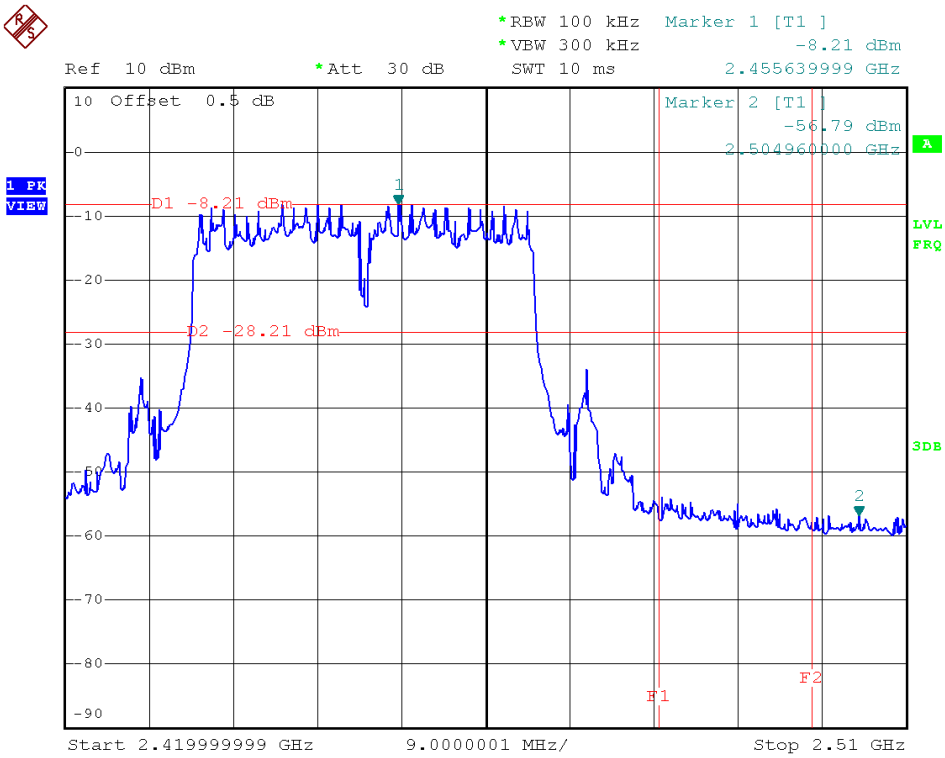
A. Test Verdict:

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	2355.60	PK	51.07	-31.70	28.30	47.67	74.00	Pass
3	2355.60	AV	40.93	-31.70	28.30	37.53	54.00	Pass
9	2489.97	PK	50.95	-29.45	29.20	50.70	74.00	Pass
9	2489.97	AV	39.89	-29.45	29.20	39.64	54.00	Pass

B. Test Plots:



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



(Plot 2.6 D2: Channel = 9 @ 802.11n-40)

2.7 Conducted Emission

2.7.1 Requirement

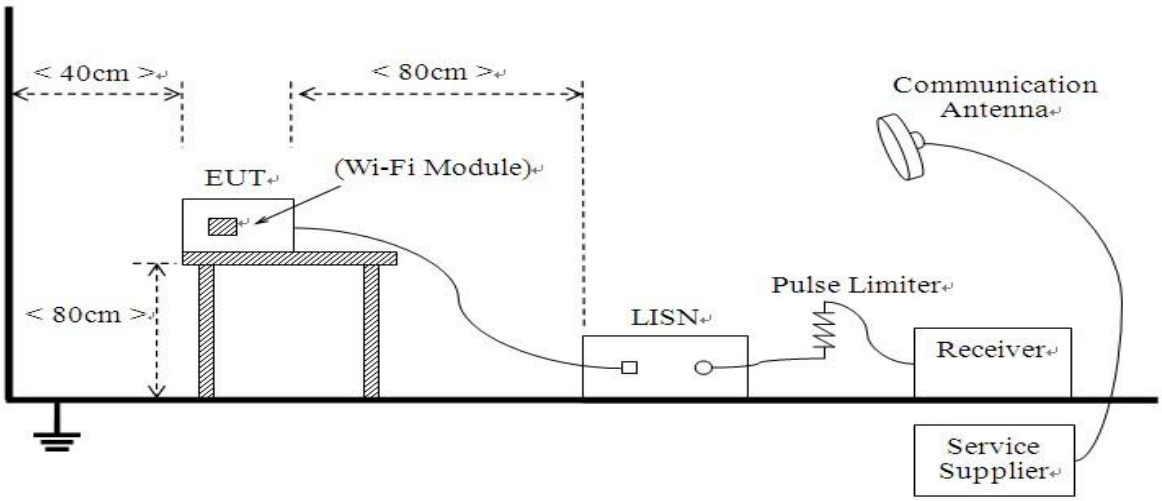
According to FCC section 15.207, for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency within the band 150kHz to 30MHz shall not exceed the limits in the following 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. Date	Cal. Due Date
Test Receiver	ROHDE&SCHWARZ	ESCS30	A0304260	2014.06.10	2015.06.09
LISN	ROHDE&SCHWARZ	ESH2-Z5	A0304221	2014.06.10	2015.06.09
Cable	MATCHING PAD	W7	/	2014.06.05	2015.06.04

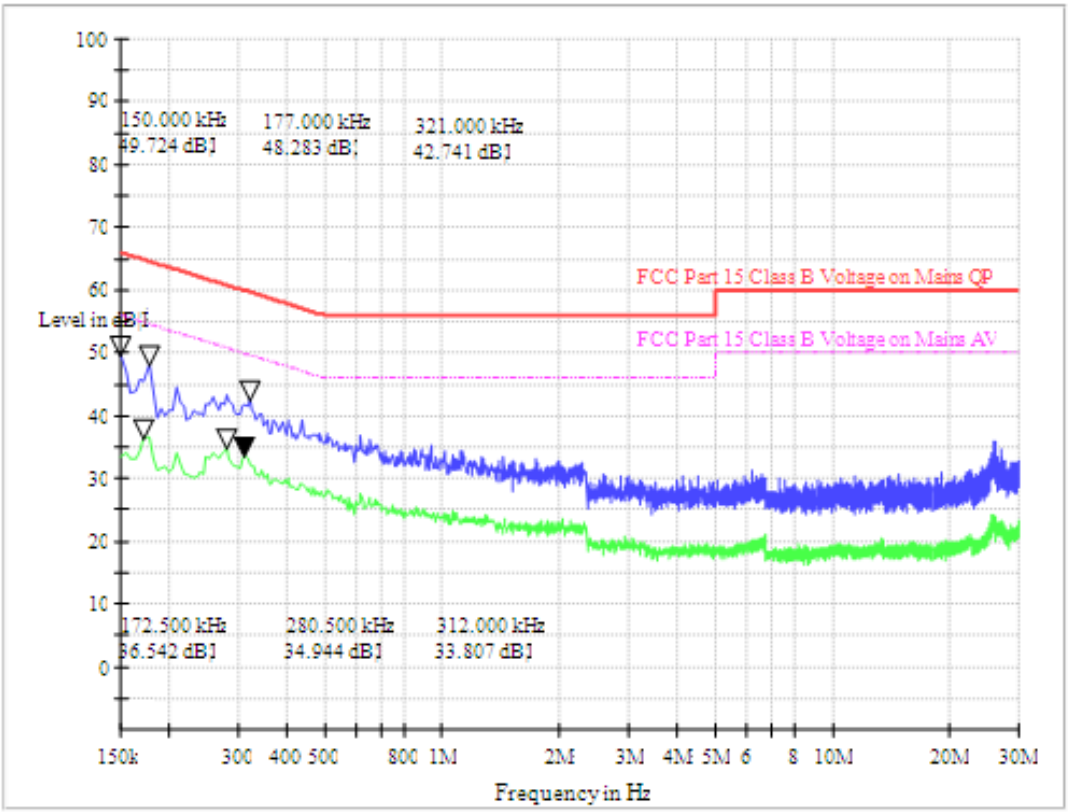
2.7.3 Test Result

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.

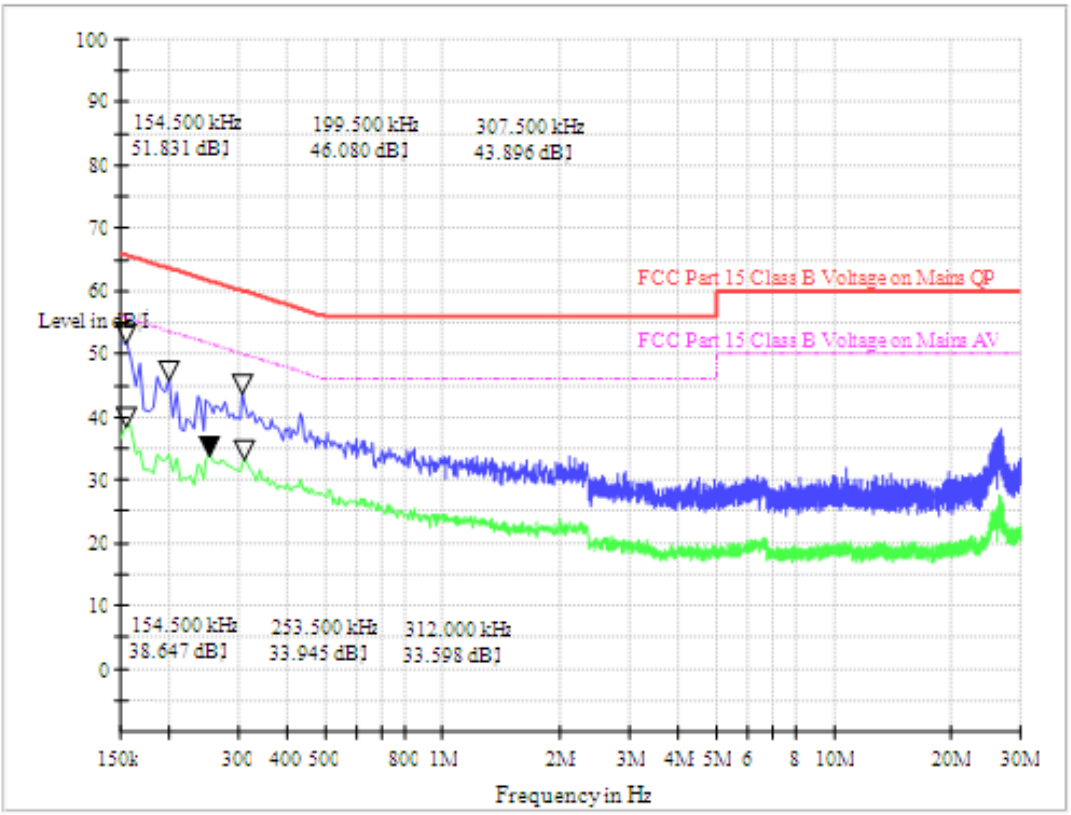
A. Test setup:

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

B. Test Plots:



(Plot A: L Phase)



(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:

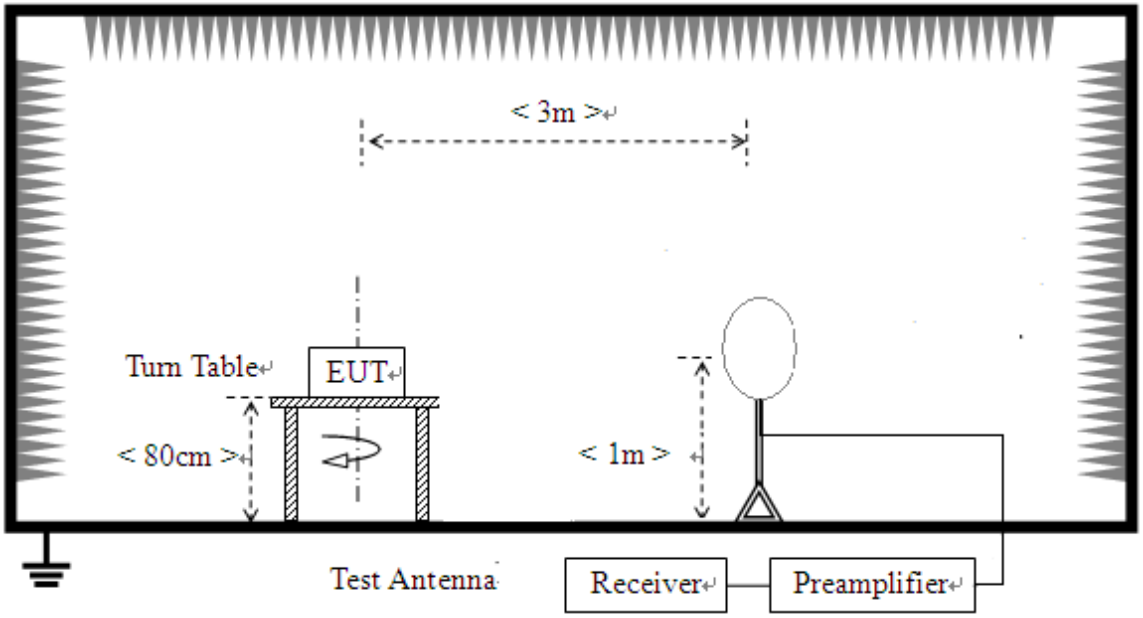
1. For Above 1000MHz, the emission limit in this paragraph is based on measurement instrumentation employing an average detector, measurement using instrumentation with a peak detector function, corresponding to 20dB above the maximum permitted average limit.
2. For above 1000MHz, limit field strength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

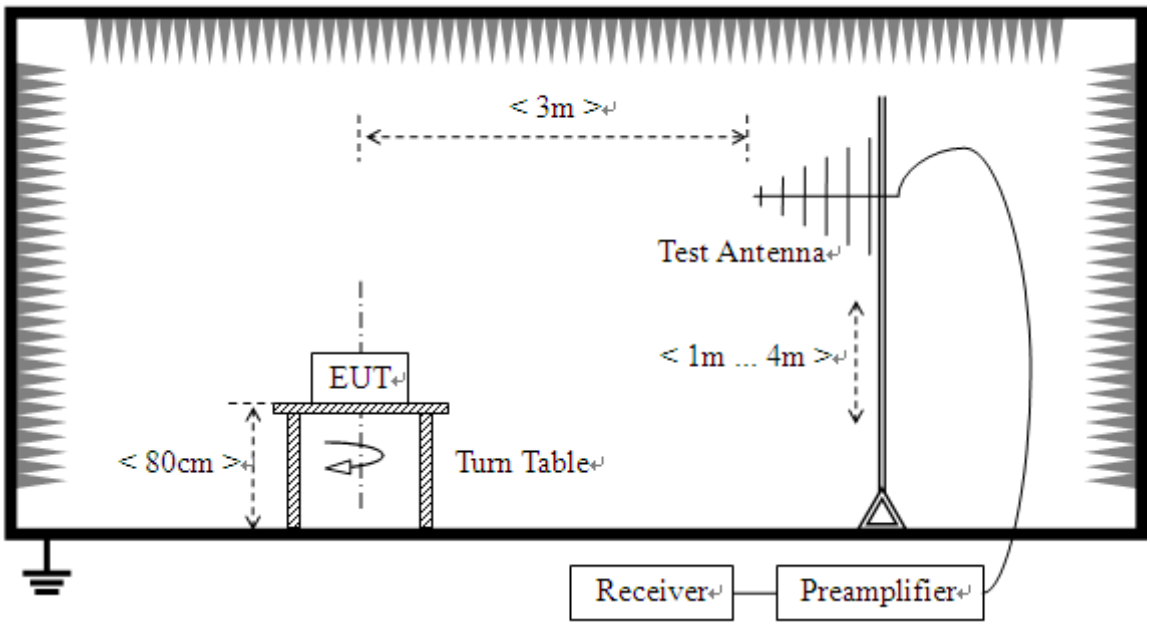
2.8.2 Test Description

A. Test Setup:

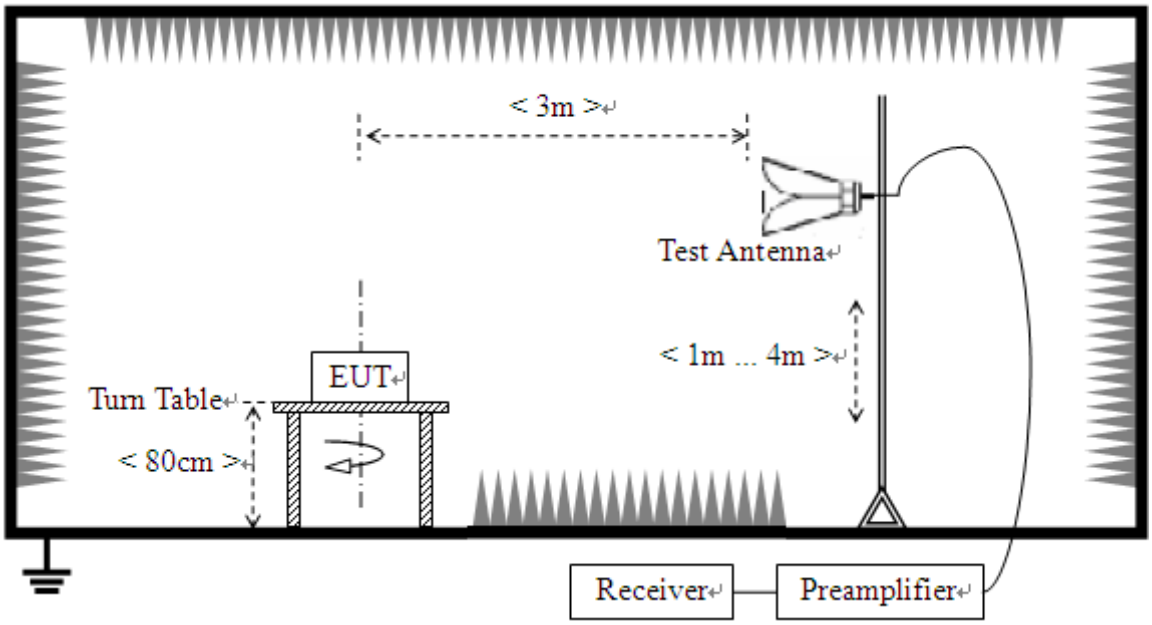
(1) For radiated emissions from 9kHz to 30MHz



(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 AC adapter. The EUT 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. Date	Cal. Due Date
Receiver	R&S	ESIB26	A0304218	2014.06.07	2015.06.06
Full-Anechoic Chamber	Albatross	12.8m*6.8m*6.4m	A0412372	2014.06.07	2015.06.06
Test Antenna - Bi-Log	Schwarzbeck	VULB 9163	9163-274	2014.06.09	2015.06.08
Test Antenna - Horn	R&S	BBHA 9120D	9120C-963	2014.06.09	2015.06.08
Test Antenna - Horn	R&S	HF960	100150	2014.06.09	2015.06.08
Test Antenna – Horn (18-25GHz)	ETS	UG-596A/U	A0902607	2014.06.05	2015.06.04
Test Antenna -Loop	Schwarzbeck	HFH2-Z2	100047	2014.06.02	2015.06.01
Ampilier 1G~18GHz	R&S	MITEQ AFS42-00101800	25-S-42	2014.06.05	2015.06.04
Ampilier 18G~40GHz	R&S	JS42-18002600-28-5A	12111.0980.00	2014.06.05	2015.06.04
amplifier 20M~3GHz	R&S	PAP-0203H	22018	2014.06.10	2015.06.09
Cable	SUNHNER	SUCOFLEX 100	/	2014.06.05	2015.06.04
Cable	SUNHNER	SUCOFLEX 104	/	2014.06.05	2015.06.04

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 [dBμ 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

$L_{Cable\ loss}$: 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.

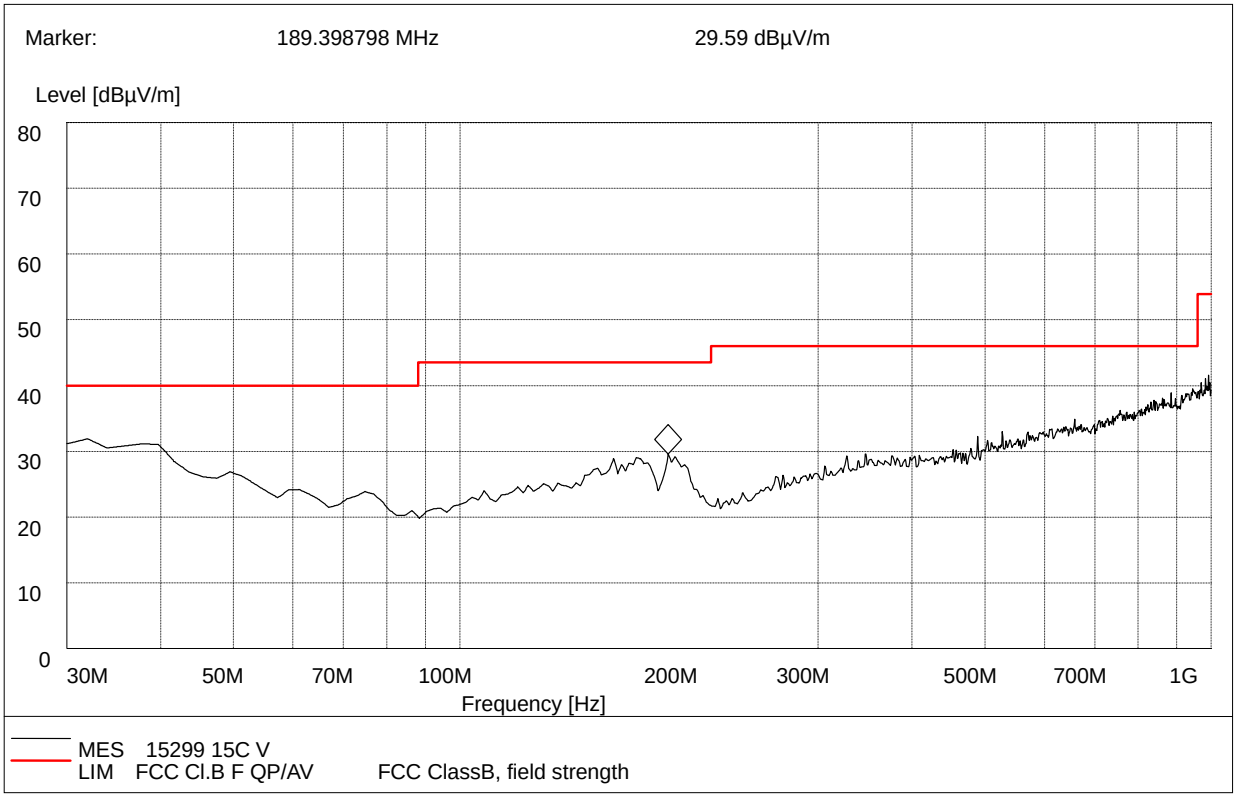
3. HORN ANTENNA for the radiation emission test above 1G.

Test plots for the whole measurement frequency range：

For 9KHz to 30MHz

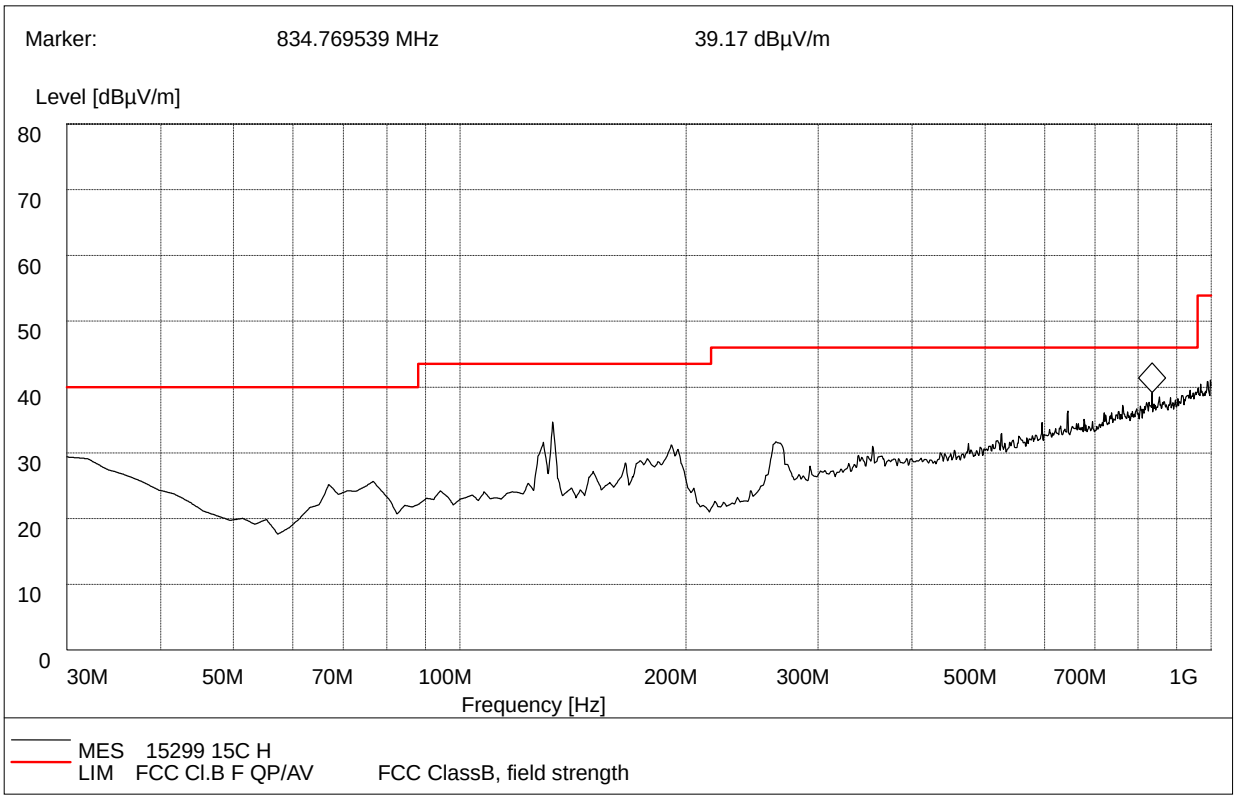
The test has been performed, and the Radiated Emission level is too low to the limit.

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
37.4900	30.41	120.000	100.0	40.0	Vertical	Pass
189.1500	29.43	120.000	100.0	43.5	Vertical	Pass



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

Frequency (MHz)	QuasiPeak (dBµV/m)	Bandwidth (kHz)	Antenna height (cm)	Limit (dBµV/m)	Antenna	Verdict
133.0200	33.17	120.000	100.0	43.5	Horizontal	Pass
263.2500	30.47	120.000	100.0	46.0	Horizontal	Pass

For 1GHz to 25GHz

802.11b Mode

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	108.88	PK	/	/	1.00 H	118	112.28	28.30	4.90	-36.60
1	*2412.00	98.22	AV	/	/	1.00 H	118	101.62	28.30	4.90	-36.60
2	4824.00	52.08	PK	74.00	21.92	1.00 H	24	48.88	32.70	7.00	-36.50
2	4824.00	46.31	AV	54.00	7.69	1.00 H	24	43.11	32.70	7.00	-36.50
3	7236.00	50.86	PK	74.00	23.14	1.00 H	107	41.46	35.80	8.90	-35.30
3	7236.00	43.62	AV	54.00	10.38	1.00 H	107	34.22	35.80	8.90	-35.30
4	9648.00	50.64	PK	74.00	23.36	1.00 H	39	38.04	37.20	10.20	-34.80
4	9648.00	44.53	AV	54.00	9.47	1.00 H	39	31.93	37.20	10.20	-34.80

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	109.43	PK	/	/	1.00 V	109	112.83	28.30	4.90	-36.60
1	*2412.00	98.74	AV	/	/	1.00 V	109	102.14	28.30	4.90	-36.60
2	4824.00	52.23	PK	74.00	21.77	1.00 V	62	49.03	32.70	7.00	-36.50
2	4824.00	45.76	AV	54.00	8.24	1.00 V	62	42.56	32.70	7.00	-36.50
3	7236.00	51.35	PK	74.00	22.65	1.00 V	349	41.95	35.80	8.90	-35.30
3	7236.00	44.07	AV	54.00	9.93	1.00 V	349	34.67	35.80	8.90	-35.30
4	9648.00	55.18	PK	74.00	18.82	1.00 V	211	42.58	37.20	10.20	-34.80
4	9648.00	46.11	AV	54.00	7.89	1.00 V	211	33.51	37.20	10.20	-34.80

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	107.54	PK	/	/	1.00 H	202	110.74	28.30	5.10	-36.60
1	*2437.00	99.89	AV	/	/	1.00 H	202	103.09	28.30	5.10	-36.60
2	4874.00	53.62	PK	74.00	20.38	1.00 H	187	50.22	32.30	7.60	-36.50
2	4874.00	47.41	AV	54.00	6.59	1.00 H	187	44.01	32.30	7.60	-36.50
3	7311.00	54.09	PK	74.00	19.91	1.00 H	107	44.69	36.10	8.60	-35.30
3	7311.00	47.61	AV	54.00	6.39	1.00 H	107	38.21	36.10	8.60	-35.30
4	9748.00	49.44	PK	74.00	24.56	1.00 H	144	36.84	37.20	10.20	-34.80
4	9748.00	43.49	AV	54.00	10.51	1.00 H	144	30.89	37.20	10.20	-34.80

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	108.01	PK	/	/	1.00 V	104	111.21	28.30	5.10	-36.60
1	*2437.00	97.82	AV	/	/	1.00 V	104	101.02	28.30	5.10	-36.60
2	4874.00	51.12	PK	74.00	22.88	1.00 V	304	47.72	32.30	7.60	-36.50
2	4874.00	46.92	AV	54.00	7.08	1.00 V	304	43.52	32.30	7.60	-36.50
3	7311.00	49.84	PK	74.00	24.16	1.00 V	203	40.44	36.10	8.60	-35.30
3	7311.00	47.41	AV	54.00	6.59	1.00 V	203	38.01	36.10	8.60	-35.30
4	9748.00	49.38	PK	74.00	24.62	1.00 V	172	36.78	37.20	10.20	-34.80
4	9748.00	44.39	AV	54.00	9.61	1.00 V	172	31.79	37.20	10.20	-34.80

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	110.57	PK	/	/	1.00 H	325	113.87	28.60	4.70	-36.60

1	*2462.00	99.81	AV	/	/	1.00 H	325	103.11	28.60	4.70	-36.60
2	4924.00	52.64	PK	74.00	21.36	1.00 H	311	48.84	33.00	7.00	-36.20
2	4924.00	47.46	AV	54.00	6.54	1.00 H	311	43.66	33.00	7.00	-36.20
3	7386.00	50.36	PK	74.00	23.64	1.00 H	330	40.96	36.20	8.50	-35.30
3	7386.00	46.79	AV	54.00	7.21	1.00 H	330	37.39	36.20	8.50	-35.30
4	9848.00	51.80	PK	74.00	22.20	1.00 H	42	39.20	37.20	10.20	-34.80
4	9848.00	48.49	AV	54.00	5.51	1.00 H	42	35.89	37.20	10.20	-34.80

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	112.47	PK	/	/	1.00 V	34	115.77	28.60	4.70	-36.60
1	*2462.00	99.89	AV	/	/	1.00 V	34	103.19	28.60	4.70	-36.60
2	4924.00	50.76	PK	74.00	23.24	1.00 V	55	46.96	33.00	7.00	-36.20
2	4924.00	43.52	AV	54.00	10.48	1.00 V	55	39.72	33.00	7.00	-36.20
3	7386.00	51.57	PK	74.00	22.43	1.00 V	258	42.17	36.20	8.50	-35.30
3	7386.00	47.87	AV	54.00	6.13	1.00 V	258	38.47	36.20	8.50	-35.30
4	9848.00	50.25	PK	74.00	23.75	1.00 V	254	37.65	37.20	10.20	-34.80
4	9848.00	48.56	AV	54.00	5.44	1.00 V	254	35.96	37.20	10.20	-34.80

802.11g Mode

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	109.21	PK	/	/	1.00 H	19	112.51	28.30	5.00	-36.60
1	*2412.00	99.03	AV	/	/	1.00 H	19	102.33	28.30	5.00	-36.60
2	4824.00	52.84	PK	74.00	21.16	1.00 H	321	49.04	32.70	7.30	-36.20
2	4824.00	47.60	AV	54.00	6.40	1.00 H	321	43.80	32.70	7.30	-36.20
3	7236.00	51.57	PK	74.00	22.43	1.00 H	207	42.17	35.80	8.90	-35.30
3	7236.00	47.47	AV	54.00	6.53	1.00 H	207	38.07	35.80	8.90	-35.30
4	9648.00	50.96	PK	74.00	23.04	1.00 H	304	38.36	37.20	10.20	-34.80
4	9648.00	44.38	AV	54.00	9.62	1.00 H	304	31.78	37.20	10.20	-34.80
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	106.98	PK	/	/	1.00 V	174	110.28	28.30	5.00	-36.60
1	*2412.00	96.40	AV	/	/	1.00 V	174	99.70	28.30	5.00	-36.60
2	4824.00	53.40	PK	74.00	20.60	1.00 V	68	49.60	32.70	7.30	-36.20
2	4824.00	47.77	AV	54.00	6.23	1.00 V	68	43.97	32.70	7.30	-36.20
3	7236.00	52.35	PK	74.00	21.65	1.00 V	169	42.95	35.80	8.90	-35.30
3	7236.00	47.33	AV	54.00	6.67	1.00 V	169	37.93	35.80	8.90	-35.30
4	9648.00	50.76	PK	74.00	23.24	1.00 V	298	38.16	37.20	10.20	-34.80
4	9648.00	47.33	AV	54.00	6.67	1.00 V	298	34.73	37.20	10.20	-34.80

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	108.54	PK	/	/	1.00 H	54	111.74	28.30	5.10	-36.60
1	*2437.00	97.75	AV	/	/	1.00 H	54	100.95	28.30	5.10	-36.60
2	4874.00	51.24	PK	74.00	22.76	1.00 H	117	47.84	32.80	7.10	-36.50
2	4874.00	46.37	AV	54.00	7.63	1.00 H	117	42.97	32.80	7.10	-36.50
3	7311.00	50.20	PK	74.00	23.80	1.00 H	328	40.80	36.10	8.60	-35.30
3	7311.00	45.14	AV	54.00	8.86	1.00 H	328	35.74	36.10	8.60	-35.30
4	9748.00	51.16	PK	74.00	22.84	1.00 H	19	38.56	37.20	10.20	-34.80
4	9748.00	45.31	AV	54.00	8.69	1.00 H	19	32.71	37.20	10.20	-34.80

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	108.12	PK	/	/	1.00 V	122	111.32	28.30	5.10	-36.60
1	*2437.00	97.60	AV	/	/	1.00 V	122	100.80	28.30	5.10	-36.60
2	4874.00	51.90	PK	74.00	22.10	1.00 V	156	48.50	32.80	7.10	-36.50
2	4874.00	47.34	AV	54.00	6.66	1.00 V	156	43.94	32.80	7.10	-36.50
3	7311.00	50.24	PK	74.00	23.76	1.00 V	98	40.84	36.10	8.60	-35.30
3	7311.00	46.23	AV	54.00	7.77	1.00 V	98	36.83	36.10	8.60	-35.30
4	9748.00	49.31	PK	74.00	24.69	1.00 V	197	36.71	37.20	10.20	-34.80
4	9748.00	45.21	AV	54.00	8.79	1.00 V	197	32.61	37.20	10.20	-34.80

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	107.23	PK	/	/	1.00 V	103	110.53	28.20	5.10	-36.60
1	*2462.00	99.78	AV	/	/	1.00 V	103	103.08	28.20	5.10	-36.60
2	4924.00	50.92	PK	74.00	23.08	1.00 V	342	47.12	33.00	7.00	-36.20
2	4924.00	44.21	AV	54.00	9.79	1.00 V	342	40.41	33.00	7.00	-36.20
3	7386.00	51.03	PK	74.00	22.97	1.00 V	179	41.63	36.20	8.50	-35.30
3	7386.00	46.11	AV	54.00	7.89	1.00 V	179	36.71	36.20	8.50	-35.30
4	9848.00	50.59	PK	74.00	23.41	1.00 V	293	37.99	37.30	10.10	-34.80
4	9848.00	46.10	AV	54.00	7.90	1.00 V	293	33.50	37.30	10.10	-34.80

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	107.69	PK	/	/	1.00 H	220	110.99	28.20	5.10	-36.60
1	*2462.00	98.24	AV	/	/	1.00 H	220	101.54	28.20	5.10	-36.60
2	4924.00	52.30	PK	74.00	21.70	1.00 H	343	48.50	33.00	7.00	-36.20
2	4924.00	47.17	AV	54.00	6.83	1.00 H	343	43.37	33.00	7.00	-36.20
3	7386.00	50.34	PK	74.00	23.66	1.00 H	135	40.94	36.20	8.50	-35.30
3	7386.00	46.45	AV	54.00	7.55	1.00 H	135	37.05	36.20	8.50	-35.30
4	9848.00	48.24	PK	74.00	25.76	1.00 H	177	35.64	37.30	10.10	-34.80
4	9848.00	44.44	AV	54.00	9.56	1.00 H	177	31.84	37.30	10.10	-34.80

802.11n-20 Mode

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	28.30	5.00	-36.60
1	*2412.00	97.15	AV	/	/	1.00 H	71	100.45	28.30	5.00	-36.60
2	4824.00	51.85	PK	74.00	22.15	1.00 H	150	48.05	32.70	7.30	-36.20
2	4824.00	45.83	AV	54.00	8.17	1.00 H	150	42.03	32.70	7.30	-36.20
3	7236.00	51.01	PK	74.00	22.99	1.00 H	337	41.61	35.80	8.90	-35.30
3	7236.00	47.23	AV	54.00	6.77	1.00 H	337	37.83	35.80	8.90	-35.30
4	9648.00	50.42	PK	74.00	23.58	1.00 H	12	37.82	37.20	10.20	-34.80
4	9648.00	45.02	AV	54.00	8.98	1.00 H	12	32.42	37.20	10.20	-34.80
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	109.89	PK	/	/	1.00 V	189	113.19	28.30	5.00	-36.60
1	*2412.00	98.27	AV	/	/	1.00 V	189	101.57	28.30	5.00	-36.60
2	4824.00	50.65	PK	74.00	23.35	1.00 V	96	46.85	32.70	7.30	-36.20
2	4824.00	44.66	AV	54.00	9.34	1.00 V	96	40.86	32.70	7.30	-36.20
3	7236.00	51.63	PK	74.00	22.37	1.00 V	233	42.23	35.80	8.90	-35.30
3	7236.00	47.33	AV	54.00	6.67	1.00 V	233	37.93	35.80	8.90	-35.30
4	9648.00	49.30	PK	74.00	24.70	1.00 V	304	36.70	37.20	10.20	-34.80
4	9648.00	45.60	AV	54.00	8.40	1.00 V	304	33.00	37.20	10.20	-34.80

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	108.19	PK	/	/	1.00 H	349	111.39	28.30	5.10	-36.60
1	*2437.00	99.71	AV	/	/	1.00 H	349	102.91	28.30	5.10	-36.60
2	4874.00	52.56	PK	74.00	21.44	1.00 H	309	49.16	32.30	7.60	-36.50
2	4874.00	48.67	AV	54.00	5.33	1.00 H	309	45.27	32.30	7.60	-36.50
3	7311.00	51.58	PK	74.00	22.42	1.00 H	188	42.18	36.10	8.60	-35.30
3	7311.00	47.56	AV	54.00	6.44	1.00 H	188	38.16	36.10	8.60	-35.30

4	9748.00	50.17	PK	74.00	23.83	1.00 H	74	37.57	37.20	10.20	-34.80
4	9748.00	46.49	AV	54.00	7.51	1.00 H	74	33.89	37.20	10.20	-34.80

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	109.52	PK	/	/	1.00 V	205	112.72	28.30	5.10	-36.60
1	*2437.00	99.08	AV	/	/	1.00 V	205	102.28	28.30	5.10	-36.60
2	4874.00	53.44	PK	74.00	20.56	1.00 V	262	50.04	32.30	7.60	-36.50
2	4874.00	49.24	AV	54.00	4.76	1.00 V	262	45.84	32.30	7.60	-36.50
3	7311.00	51.94	PK	74.00	22.06	1.00 V	338	42.54	36.10	8.60	-35.30
3	7311.00	46.31	AV	54.00	7.69	1.00 V	338	36.91	36.10	8.60	-35.30
4	9748.00	50.55	PK	74.00	23.45	1.00 V	152	37.95	37.20	10.20	-34.80
4	9748.00	42.55	AV	54.00	11.45	1.00 V	152	29.95	37.20	10.20	-34.80

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	108.88	PK	/	/	1.00 H	235	112.18	28.20	5.10	-36.60
1	*2462.00	100.03	AV	/	/	1.00 H	235	103.33	28.20	5.10	-36.60
2	4924.00	51.93	PK	74.00	22.07	1.00 H	104	48.13	33.00	7.00	-36.20
2	4924.00	46.86	AV	54.00	7.14	1.00 H	104	43.06	33.00	7.00	-36.20
3	7386.00	51.95	PK	74.00	22.05	1.00 H	329	42.55	36.20	8.50	-35.30
3	7386.00	46.81	AV	54.00	7.19	1.00 H	329	37.41	36.20	8.50	-35.30
4	9848.00	52.69	PK	74.00	21.31	1.00 H	190	40.09	37.30	10.10	-34.80
4	9848.00	46.93	AV	54.00	7.07	1.00 H	190	34.33	37.30	10.10	-34.80

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	109.82	PK	/	/	1.00 V	176	113.12	28.20	5.10	-36.60
1	*2462.00	99.87	AV	/	/	1.00 V	176	103.17	28.20	5.10	-36.60
2	4924.00	50.59	PK	74.00	23.41	1.00 V	117	46.79	33.00	7.00	-36.20
2	4924.00	44.47	AV	54.00	9.53	1.00 V	117	40.67	33.00	7.00	-36.20
3	7386.00	51.94	PK	74.00	22.06	1.00 V	294	42.54	36.20	8.50	-35.30
3	7386.00	47.73	AV	54.00	6.27	1.00 V	294	38.33	36.20	8.50	-35.30
4	9848.00	50.02	PK	74.00	23.98	1.00 V	84	37.42	37.30	10.10	-34.80
4	9848.00	44.18	AV	54.00	9.82	1.00 V	84	31.58	37.30	10.10	-34.80

802.11n-40 Mode

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	106.91	PK	/	/	1.00 H	71	110.21	28.30	5.00	-36.60
1	*2422.00	96.75	AV	/	/	1.00 H	71	100.05	28.30	5.00	-36.60
2	4844.00	51.96	PK	74.00	22.04	1.00 H	150	48.16	32.70	7.30	-36.20
2	4844.00	46.36	AV	54.00	7.64	1.00 H	150	42.56	32.70	7.30	-36.20
3	7266.00	51.50	PK	74.00	22.50	1.00 H	337	42.10	35.80	8.90	-35.30
3	7266.00	46.95	AV	54.00	7.05	1.00 H	337	37.55	35.80	8.90	-35.30
4	9688.00	50.14	PK	74.00	23.86	1.00 H	12	37.54	37.20	10.20	-34.80
4	9688.00	45.04	AV	54.00	8.96	1.00 H	12	32.44	37.20	10.20	-34.80

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	109.80	PK	/	/	1.00 V	189	113.10	28.30	5.00	-36.60
1	*2422.00	98.72	AV	/	/	1.00 V	189	102.02	28.30	5.00	-36.60
2	4844.00	51.23	PK	74.00	22.77	1.00 V	96	47.43	32.70	7.30	-36.20
2	4844.00	45.03	AV	54.00	8.97	1.00 V	96	41.23	32.70	7.30	-36.20
3	7266.00	51.28	PK	74.00	22.72	1.00 V	233	41.88	35.80	8.90	-35.30
3	7266.00	47.63	AV	54.00	6.37	1.00 V	233	38.23	35.80	8.90	-35.30
4	9688.00	49.45	PK	74.00	24.55	1.00 V	304	36.85	37.20	10.20	-34.80
4	9688.00	46.00	AV	54.00	8.00	1.00 V	304	33.40	37.20	10.20	-34.80

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	108.17	PK	/	/	1.00 H	349	111.37	28.30	5.10	-36.60
1	*2437.00	100.18	AV	/	/	1.00 H	349	103.38	28.30	5.10	-36.60
2	4874.00	52.70	PK	74.00	21.30	1.00 H	309	49.30	32.30	7.60	-36.50
2	4874.00	47.67	AV	54.00	6.33	1.00 H	309	44.27	32.30	7.60	-36.50
3	7311.00	52.10	PK	74.00	21.90	1.00 H	188	42.70	36.10	8.60	-35.30
3	7311.00	47.49	AV	54.00	6.51	1.00 H	188	38.09	36.10	8.60	-35.30
4	9748.00	50.55	PK	74.00	23.45	1.00 H	74	37.95	37.20	10.20	-34.80
4	9748.00	45.92	AV	54.00	8.08	1.00 H	74	33.32	37.20	10.20	-34.80

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	109.55	PK	/	/	1.00 V	205	112.75	28.30	5.10	-36.60

1	*2437.00	98.93	AV	/	/	1.00 V	205	102.13	28.30	5.10	-36.60
2	4874.00	53.89	PK	74.00	20.11	1.00 V	262	50.49	32.30	7.60	-36.50
2	4874.00	49.45	AV	54.00	4.55	1.00 V	262	46.05	32.30	7.60	-36.50
3	7311.00	52.24	PK	74.00	21.76	1.00 V	338	42.84	36.10	8.60	-35.30
3	7311.00	46.77	AV	54.00	7.23	1.00 V	338	37.37	36.10	8.60	-35.30
4	9748.00	51.81	PK	74.00	22.19	1.00 V	152	39.21	37.20	10.20	-34.80
4	9748.00	43.34	AV	54.00	10.66	1.00 V	152	30.74	37.20	10.20	-34.80

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	109.28	PK	/	/	1.00 H	235	112.58	28.20	5.10	-36.60
1	*2452.00	99.75	AV	/	/	1.00 H	235	103.05	28.20	5.10	-36.60
2	4904.00	52.41	PK	74.00	21.59	1.00 H	104	48.61	33.00	7.00	-36.20
2	4904.00	47.01	AV	54.00	6.99	1.00 H	104	43.21	33.00	7.00	-36.20
3	7356.00	51.91	PK	74.00	22.09	1.00 H	329	42.51	36.20	8.50	-35.30
3	7356.00	47.05	AV	54.00	6.95	1.00 H	329	37.65	36.20	8.50	-35.30
4	9808.00	53.23	PK	74.00	20.77	1.00 H	190	40.63	37.30	10.10	-34.80
4	9808.00	47.38	AV	54.00	6.62	1.00 H	190	34.78	37.30	10.10	-34.80

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	109.74	PK	/	/	1.00 V	176	113.04	28.20	5.10	-36.60
1	*2452.00	100.07	AV	/	/	1.00 V	176	103.37	28.20	5.10	-36.60
2	4904.00	50.81	PK	74.00	23.19	1.00 V	117	47.01	33.00	7.00	-36.20
2	4904.00	45.31	AV	54.00	8.69	1.00 V	117	41.51	33.00	7.00	-36.20
3	7356.00	52.06	PK	74.00	21.94	1.00 V	294	42.66	36.20	8.50	-35.30
3	7356.00	47.05	AV	54.00	6.95	1.00 V	294	37.65	36.20	8.50	-35.30
4	9808.00	50.10	PK	74.00	23.90	1.00 V	84	37.50	37.30	10.10	-34.80
4	9808.00	44.19	AV	54.00	9.81	1.00 V	84	31.59	37.30	10.10	-34.80

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):	17.75
Maximum peak output power at antenna input terminal(mW):	59.57
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):	0.037
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 **