



Report No. SH13080011R02

FCC RF TEST REPORT

Issued to

New Rock Technologies, Inc.

For

VoIP Gateway

Model Name : WROC3000
Trade Name : New Rock
Brand Name : New Rock
FCC ID : AJG-WROCB
Standard : 47 CFR Part 15, Subpart C
ANSI C63.4-2003
KDB Publication No. 558074
KDB Publication No. 662911
Test date : Nov. 06, 2013 to Nov. 26, 2013
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Shenzhen MORLAB Communication Technology Co., Ltd.



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CTIA Authorized Test Lab
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IEEE 1725 **OTA**

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Change History

Issue	Date	Reason for change
1.0	Dec.12,2013	First edition

1. General Information

1.1 Applicant

New Rock Technologies, Inc.
495 Shangzhong Rd, Building B, 2nd Floor, Shanghai

1.2 Manufacturer

New Rock Technologies, Inc.
495 Shangzhong Rd, Building B, 2nd Floor, Shanghai

1.3 Description of EUT

EUT Name.....: VoIP Gateway
Model Name.....: WROC3000 (*details please refer to Note2*)
Brand Name.....: New Rock
Trade Name.....: New Rock
Hardware Version.....: Ver1.0
Software Version.....: V1.0
Modulation Technology.....: DSSS, OFDM
Modulation Type.....: Please see section 4
Frequency Range.....: 2400MHz~2483.5MHz
Number of Channels.....: 11
Channel Spacing.....: 5MHz
Antenna Type.....: Omni Antenna
Antenna Gain.....: 5dBi
EUT Stage.....: Production Unit

NOTE 1:

The EUT supports 1T1R at the presence of 802.11b/g and MCS0-MCS7 for 802.11n(20MHz/40MHz). 2T2R is supported by the EUT at the presence of MCS8-MCS15 for 802.11n(20MHz/40MHz).

NOTE 2:

WROC3000 series contains model WROC3008, WROC3044, WROC3080, WROC3026, WROC3062. WROC3044 was tested in this report.

NOTE 3:

The EUT has two WIFI Antennas that are ANTENNA 1 and ANTENNA 2.

NOTE 4:

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

2. Facilities and Accreditations

2.1 Test Facility

Shenzhen Morlab Communications Technology Co., Ltd. Morlab Laboratory 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 L3572.

A 9*6*6(m) fully anechoic chamber was used for the radiated spurious emissions test.

2.2 Environmental Conditions

Ambient temperature: 20~25°C

Relative humidity: 40~60%

Atmosphere pressure: 96kPa

2.3 Measurement Uncertainty

The uncertainty is calculated using the methods suggested in the "Guide to the Expression of Uncertainty in Measurement" (GUM) published by ISO.

Uncertainty of Conducted Emission: $\pm 1.76\text{dB}$

Uncertainty of Radiated Emission: $\pm 3.16\text{dB}$

2.4 List of Equipments Used

Description	Manufacturer	Model	Serial No.	Cal. Date	Cal. Due
Test Receiver	Rohde & Schwarz	ESIB26	A0304218	2013.09	1year
Test Receiver	Schwarzbeck	FCKL1528	A0304230	2013.09	1year
Spectrum Analyzer	Agilent	E4440A	MY45304918	2013.09	1year
Spectrum Analyzer	Rohde & Schwarz	FSP30	101020	2013.09	1year
Spectrum Analyzer	Agilent	E4440A	MY46187763	2013.09	1year
Power Meter	Agilent	E4416A	MY45101575	2013.09	1year
Power Sensor	Agilent	E9327A	MY44421258	2013.09	1year
LISN	Schwarzbeck	NSLK8127	A0304233	2013.09	1year
Loop Antenna	Rohde & Schwarz	HFH2-Z2	A0304220	2013.09	1year
Ultra Broadband Ant.	Rohde & Schwarz	HL562	A0304224	2013.09	1year
Horn Ant.	Rohde & Schwarz	HF906	100150	2013.09	1year
Horn Ant.	SCHWARZBECK	BBHA 9170	235	2013.09	1year

NOTE:

Equipments listed above have been calibrated and are in the period of validation.

3. Test Standards and Results

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

- FCC Part 15 Subpart C §15.247
- ANSI C63.4-2003
- FCC KDB Publication No.558074
- FCC KDB Publication No.662911

Note:

1. *All test items were verified and recorded according to the standards and without any deviation during the test.*
2. *This EUT has also been tested and complied with the requirements of FCC Part 15, Subpart B, recorded in a separate test report.*

Test items and the results are as bellow:

No.	FCC Rules	Test Type	Limits	Result
1	§15.207	Conducted Emission	15.207(a)	PASS
2	§15.209 §15.247(d)	Radiated Emission	§15.209 §15.247(d)	PASS
3	§15.247(a)(2)	6dB Bandwidth	≥0.5MHz	PASS
4	§15.247(b)	Maximum Peak Output Power	≤30dBm	PASS
5	§15.247(d)	Band Edge	<20dBc	PASS
6	§15.247(d)	Conducted Spurious Emission	<20dBc	PASS
7	§15.247(e)	Power Spectrum Density	≤8dBm	PASS
8	§15.203 15.247(b)	Antenna Requirement	NA	PASS

4. Test Conditions Setting

Modulation technology	Modulation Type	Transfer Rate (Mbps)	The Frequency Equal to the Transmission Rate of Modulation Signal
DSSS (802.11b)	DBPSK	1	1MHz
	DQPSK	2	
	CCK	5.5/ 11	1.375MHz
OFDM (802.11g)	BPSK	6 / 9	1MHz
	QPSK	12 / 18	
	16QAM	24 / 36	
	64QAM	48 / 54	
OFDM (802.11n-20MHz)	BPSK	6.5	1MHz
	QPSK	13/19.5	
	16QAM	26/39	
	64QAM	52/58.5/65	
OFDM (802.11n-40MHz)	BPSK	13.5/27	1MHz
	QPSK	27/40.5/54/81	
	16QAM	54/81/108/162	
	64QAM	108/121.5/135/216/243/270	

Note: Preliminary tests were performed in different data rate in above table to find the worst radiated emission.

The following table is a list of the test modes shown in this test report.

Test Items	CHAIN	Mode	Data Rate
Conducted Test	ANTENNA1	11b / 11g/ 11n20/ 11n40	11/54/MCS15/MCS11
	ANTENNA2		11/54/MCS0/MCS11
Radiated Test	Simultaneous Transmission		11/54/MCS15/MCS11

5. Test Result

5.1 Conducted Emission Test

5.1.1 Limits of Conducted Emission

According to FCC §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 150 kHz to 30 MHz shall not exceed the limits in the following table, as measured using a 50 μ H/50 ohms line impedance stabilization network (LISN).

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

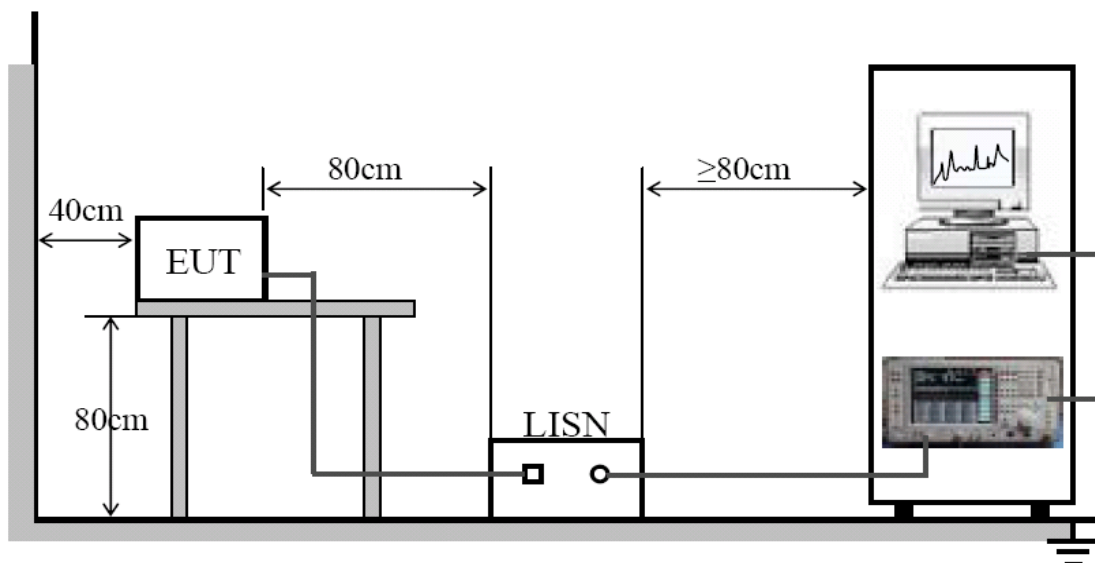
NOTE:

1. The lower limit shall apply at the band edges.
2. The limit decreases linearly with the logarithm of the frequency in the range 0.15MHz to 0.50MHz.

5.1.2 Test Procedure

- a. The EUT was placed on a 0.8m high insulating table and kept 0.4 meters from the conducting wall of shielded room.
- b. The EUT was connected to the power mains through a line impedance stabilization network (LISN). The LISN provide 50 Ω /50 μ H of coupling impedance for the measuring instrument.
- c. Both lines of the power mains connected to the EUT were checked for maximum conducted interference.
- d. The frequency range from 150 kHz to 30 MHz was searched using CISPR Quasi-Peak and Average detector.

5.1.3 Test Setup



For the actual test configuration, please refer to the related item - Photographs of the Test Configuration.

5.1.4 EUT Setup and Operating Conditions

The EUT configuration of the emission tests was MS + Power Supply.

During the measurement, the MS was powered by 120V 60Hz AC mains supply.

The Wi-Fi function of the MS was activated via a test program that provided by manufacturer. Enable EUT under transmission condition continuously at specific channel frequency.

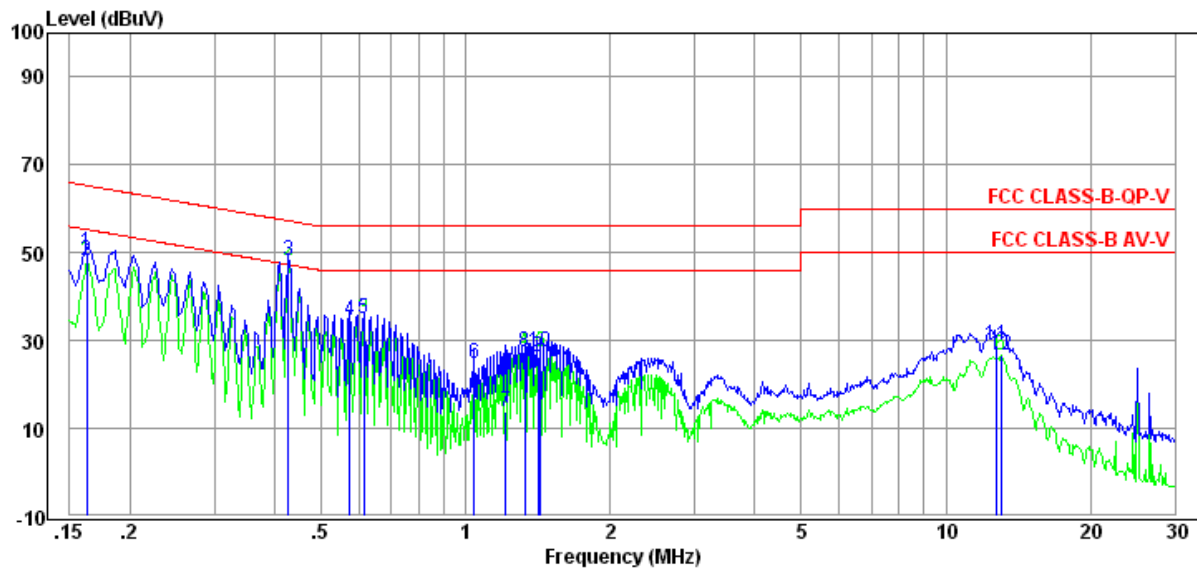
5.1.5 Test Result

Test Verdict Recorded for Suspicious Points:

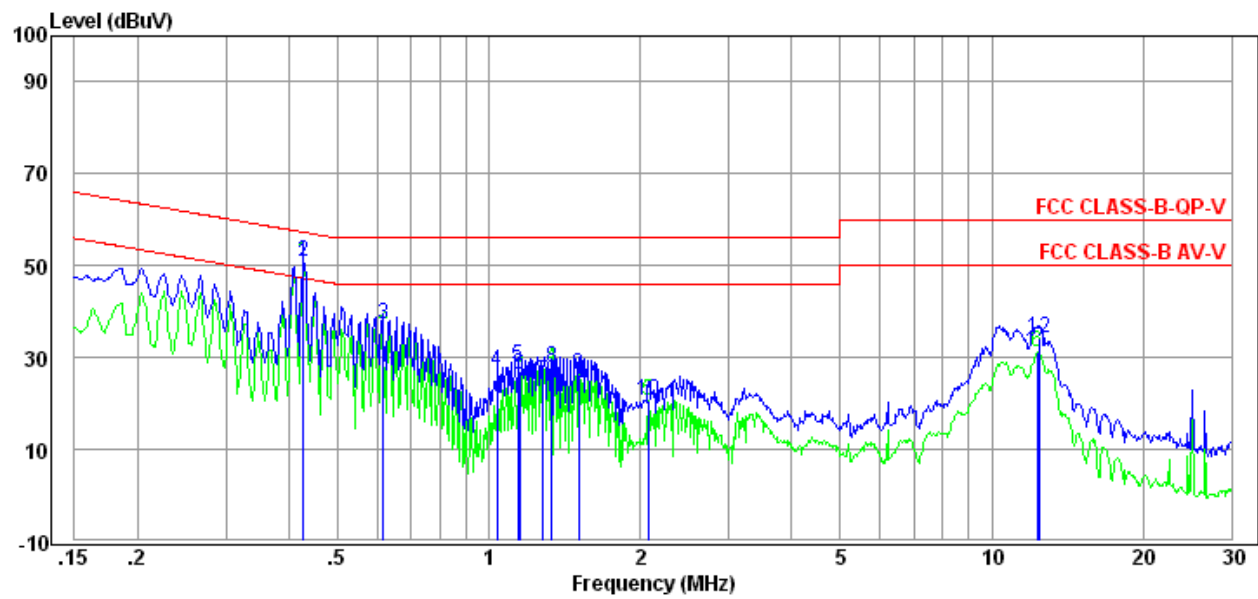
Line	Freq MHz	C.F dB	Result dBuV/m	Limit dBuV/m	Margin dB
QP	0.16	9.62	50.00	65.30	15.30
Average	0.16	9.62	48.06	55.30	7.24
Average	0.43	9.61	47.20	47.28	0.8
QP	0.57	9.68	34.71	56.00	21.29
Average	0.61	9.69	34.94	46.00	11.06
QP	1.04	9.61	24.84	56.00	31.16
QP	1.21	9.66	13.70	56.00	42.30
Average	1.33	9.68	27.44	46.00	18.56
QP	1.41	9.70	26.33	56.00	29.67
Average	1.44	9.70	27.41	46.00	18.59
QP	12.70	10.06	28.77	60.00	31.23
Average	13.03	10.05	26.50	50.00	23.50

Neutral	Freq MHz	C.F dB	Result dBuV/m	Limit dBuV/m	Margin dB
QP	0.43	9.61	50.46	57.30	6.84
Average	0.43	9.61	47.22	47.29	0.7
Average	0.62	9.68	37.30	46.00	8.70
QP	1.04	9.61	27.03	56.00	28.97
QP	1.14	9.64	28.04	56.00	27.96
Average	1.15	9.64	26.42	46.00	19.58
QP	1.28	9.67	24.72	56.00	31.28
Average	1.34	9.68	27.76	46.00	18.24
QP	1.51	9.73	26.40	56.00	29.60
Average	2.08	9.82	20.67	46.00	25.33

Test Plot:



(Plot A: L Phase)



(Plot B: N Phase)

5.2 Radiated Emission Test

5.2.1 Requirement of the standard

According to FCC §15.247(c), radiated emission outside the frequency band attenuation below the general limits specified in Section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a).

According to FCC §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:

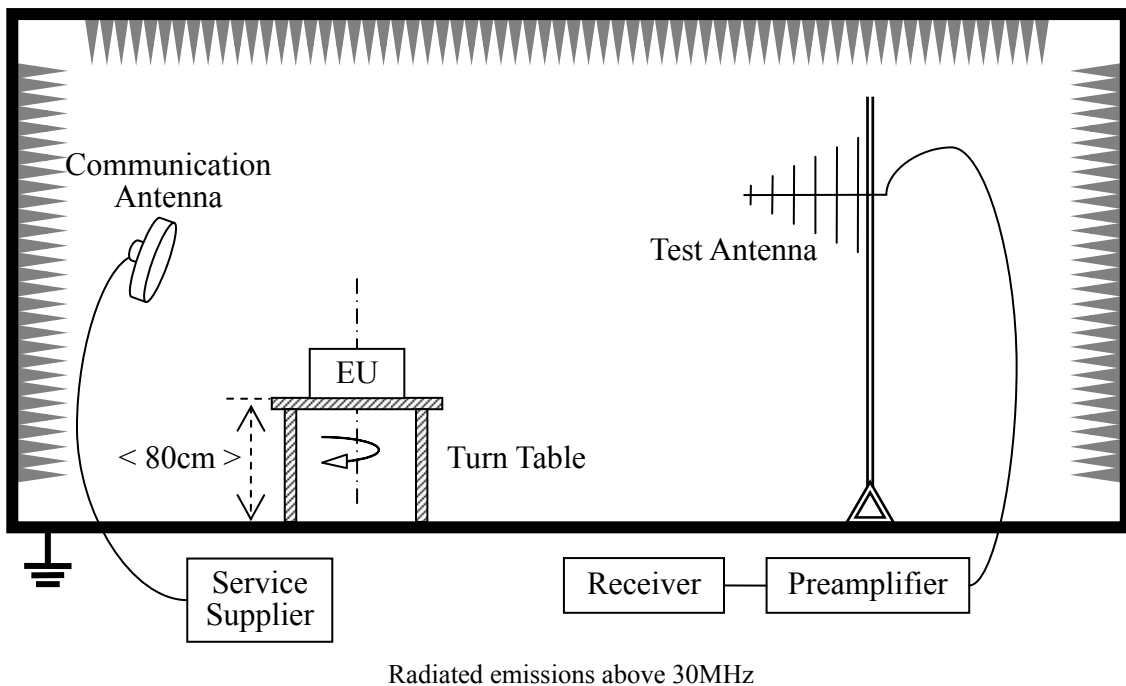
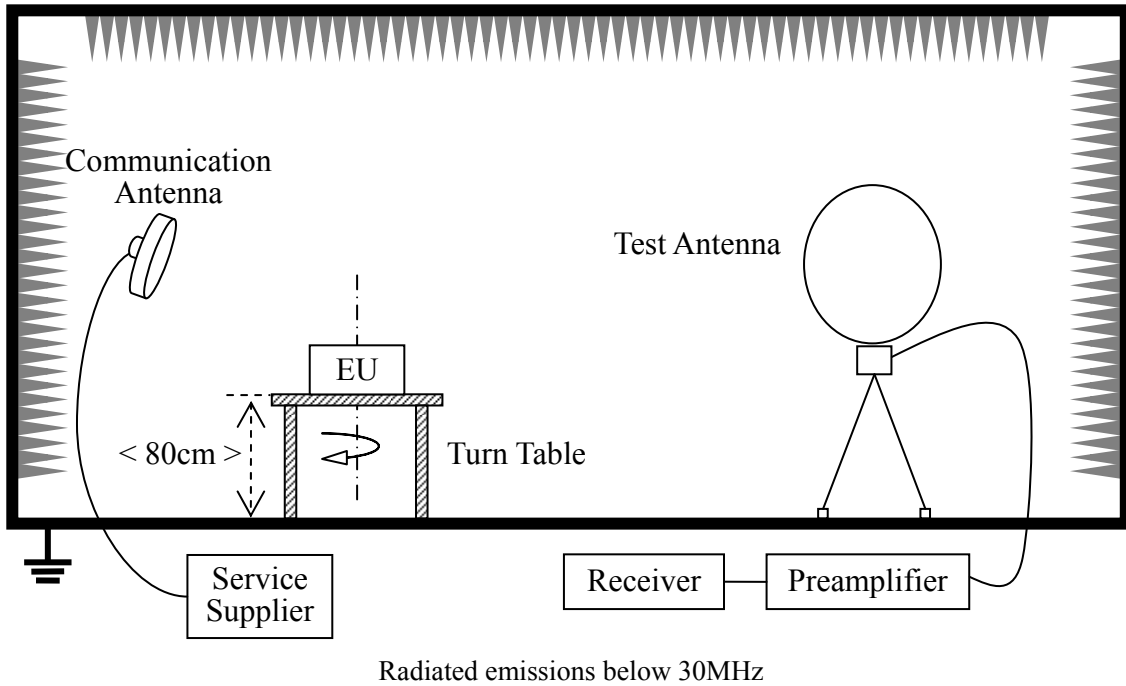
Frequency (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
0.009 - 0.490	2400/F(kHz)	300
0.490 - 1.705	24000/F(kHz)	30
1.705 - 30.0	30	30
30 - 88	100	3
88 - 216	150	3
216 - 960	200	3
Above 960	500	3

As shown in 15.35(b), for frequencies above 1000MHz, the field strength limits are based on average detector. When average radiated emission measurements are specified in this part, including emission measurements below 1000 MHz, there also is a limit on the radio frequency emissions, as measured using instrumentation with a peak detector function, corresponding to 20 dB above the maximum permitted average limit for the frequency being investigated unless a different peak emission limit is otherwise specified in the rules.

5.2.2 Test Procedure

1. The EUT was placed on the top of a ratable 0.8 meters above the ground at a semi-anechoic chamber. In the frequency range of 9 kHz to 30 MHz, magnetic field was measured with loop Antenna.
2. The Antenna was positioned with its plane vertical at 1 m distance from the EUT. The center of the loop was 1 m above the ground. During the measurement the loop Antenna rotated about its vertical axis for maximum response at each azimuth about the EUT.
3. In the frequency range above 30MHz, ultra-broadband bi-log Antenna (30 MHz to 1 GHz) and horn Antenna (above 1GHz) were used. Antenna was 3 meters away from the EUT. Antenna height was varied from one meter to four meter above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the Antenna are set to make the measurement.
4. The test-receiver system was set to Peak Detector Function and Specified Bandwidth with Maximum Hold Mode.
5. If the emission level of the EUT in peak mode was 10 dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emission that did not have 10 dB margins would be retested one by one using the quasi-peak method.

5.2.3 Test Setup



For the actual test configuration, please refer to the related item-Photographs of the Test Configuration.

5.2.4 Test Results

Test Results of Radiated Emissions (9 kHz ~ 30 MHz)

Frequency(MHz)	Level(dBuV)	Margin(dB)	Limit(dBuV)	Remark
--	--	>10	--	See note

Note:

The amplitude of spurious emissions that are attenuated by more than 10dB below the permissible value has no need to be reported.

Distance extrapolation factor = $40 \log (\text{specific distance} / \text{test distance})$ (dB);

Limit line = specific limits (dBuV) + distance extrapolation factor.

Test Result of Radiated Emission (30 MHz ~ 10th Harmonic)

802.11n(40M)

Channel 3 (2422MHz)

Frequency (MHz)	Level (dBuV)	Limit Line (dBuV)	Margin (dB)	Antenna Polarization	Result
35.578	--	40	>10	Horizontal	PASS
45.278	--	40	>10	Horizontal	PASS
1823.975	--	54	>10	Horizontal	PASS
4815.000	--	54	>10	Horizontal	PASS
35.214	--	40	>10	Vertical	PASS
44.698	--	40	>10	Vertical	PASS
1823.688	--	54	>10	Vertical	PASS
4815.000	--	54	>10	Vertical	PASS

Channel 6 (2437MHz)

Frequency (MHz)	Level (dBuV)	Limit Line (dBuV)	Margin (dB)	Antenna Polarization	Result
34.850	--	40	>10	Horizontal	PASS
61.723	--	43.5	>10	Horizontal	PASS
174.288	--	43.5	>10	Horizontal	PASS
605.574	--	46	>10	Horizontal	PASS
1849.850	--	54	>10	Horizontal	PASS
35.214	--	40	>10	Vertical	PASS
54.493	--	40	>10	Vertical	PASS
177.440	--	43.5	>10	Vertical	PASS
595.389	--	46	>10	Vertical	PASS
1849.706	--	54	>10	Vertical	PASS

Channel 9 (2452MHz)

Frequency (MHz)	Level (dBuV)	Limit Line (dBuV)	Margin (dB)	Antenna Polarization	Result
35.428	--	40	>10	Horizontal	PASS
45.102	--	40	>10	Horizontal	PASS
153.825	--	43.5	>10	Horizontal	PASS
1811.469	--	54	>10	Horizontal	PASS
36.456	--	40	>10	Vertical	PASS
49.035	--	40	>10	Vertical	PASS
164.918	--	43.5	>10	Vertical	PASS
1827.425	--	54	>10	Vertical	PASS

Note:

The amplitude of spurious emissions that are attenuated by more than 10dB below the permissible value has no need to be reported.

Only shows worst-case mode in the report.

5.3 6dB Bandwidth Measurement

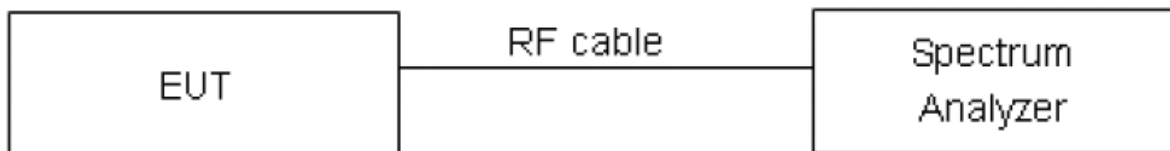
5.3.1 Definition

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

5.3.2 Test Procedure

- The EUT temporary Antenna port was coupled to the spectrum analyzer. The lost of the cables the test system is calibrated to correct the reading.
- The spectrum analyzer was set to Maxpeak Detector function and Maximum Hold mode.
- The resolution bandwidth of the spectrum analyzer was set to at least 1% of the EUT emission bandwidth. RBW=100 kHz, VBW=300 kHz.

5.3.3 Test Setup



For the actual test configuration, please refer to the related item-Photographs of the Test Configuration.

5.3.4 Setup and Operating Conditions

The EUT was connected to and controlled by a control unit provided by the applicant.

The EUT was set to continuous Wi-Fi transmitting at maximum power and maximum data rate, e.g.,

At each operating mode, lowest, middle and highest channels were measured respectively.

5.3.5 Test Result

ANTENNA1:

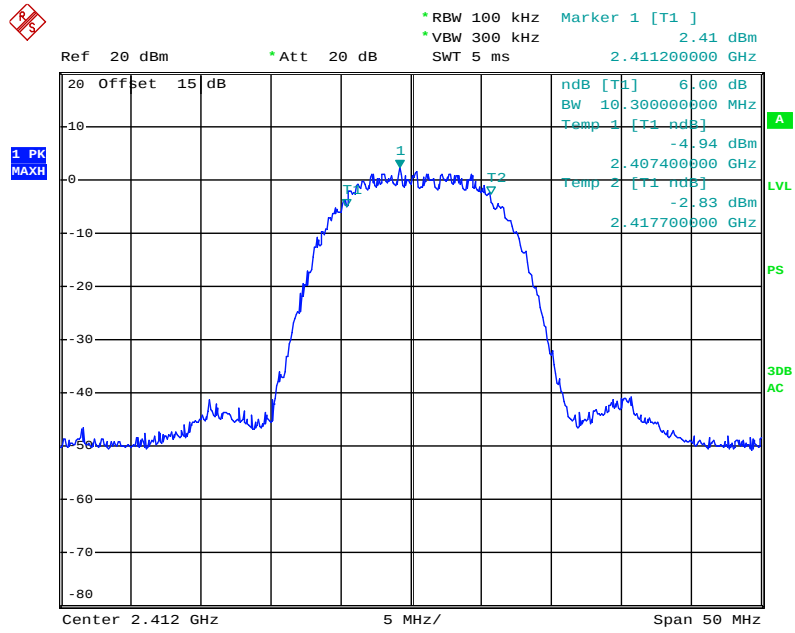
EUT Modulation	EUT Operating Frequency (MHz)	6dB Bandwidth (MHz)	FCC Requirement
802.11b	2412	10.3	>500 kHz
	2437	10.4	
	2462	10.3	
802.11g	2412	16.6	
	2437	16.6	
	2462	16.6	
802.11n(20M)	2412	17.3	
	2437	17.0	
	2462	17.3	
802.11n(40M)	2422	35.8	
	2437	36.0	
	2452	36.1	

ANTENNA2:

EUT Modulation	EUT Operating Frequency (MHz)	6dB Bandwidth (MHz)	FCC Requirement
802.11b	2412	10.3	>500 kHz
	2437	10.4	
	2462	10.4	
802.11g	2412	16.6	
	2437	16.5	
	2462	16.6	
802.11n(20M)	2412	17.2	
	2437	17.4	
	2462	17.5	
802.11n(40M)	2422	36.3	
	2437	36.3	
	2452	36.1	

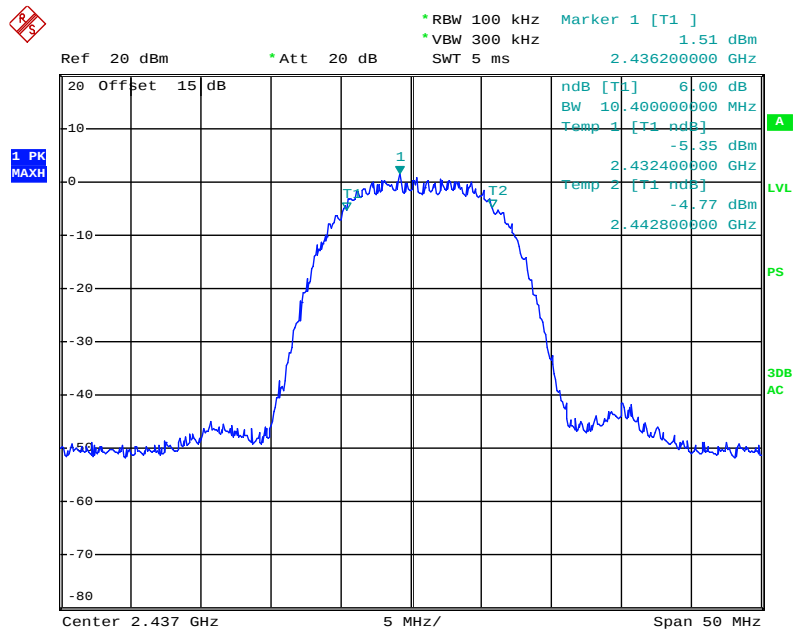
Test Plots:

1. ANTENNA1-802.11b -2412MHz



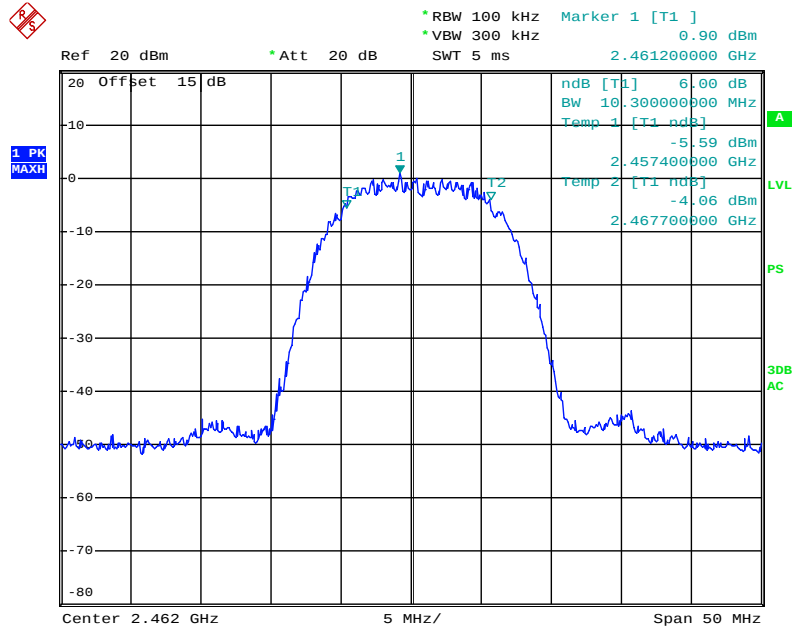
Date: 19.NOV.2013 16:02:08

2. ANTENNA1-802.11b -2437MHz



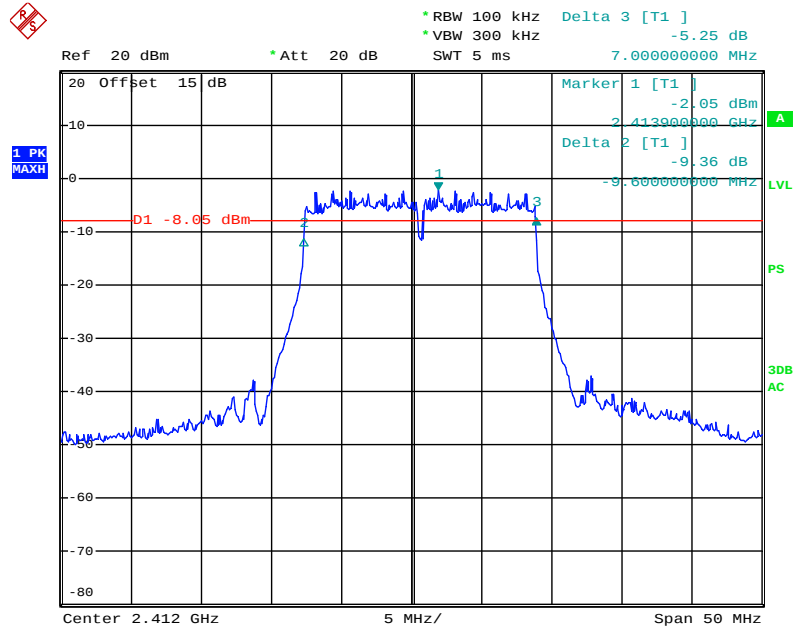
Date: 19.NOV.2013 16:03:12

3. ANTENNA1-802.11b -2462MHz



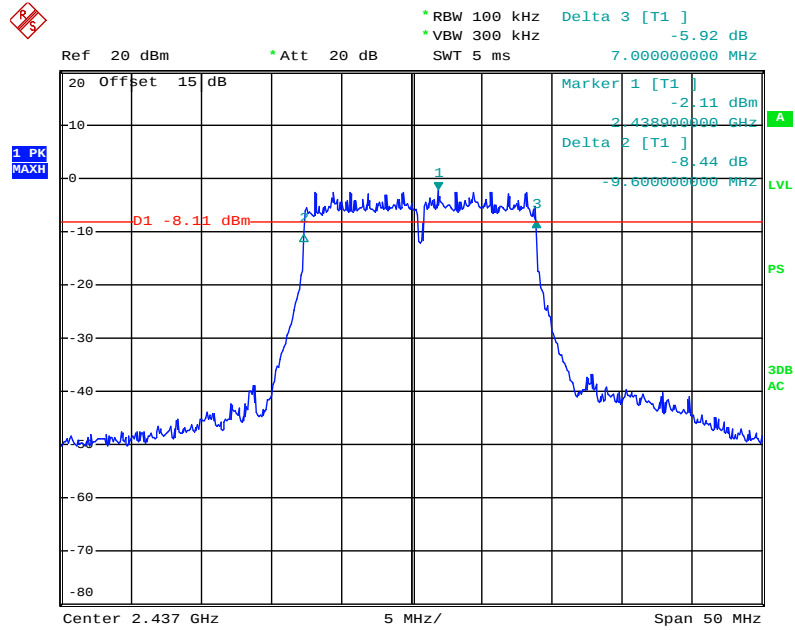
Date: 19.NOV.2013 16:03:45

4. ANTENNA1-802.11g -2412MHz



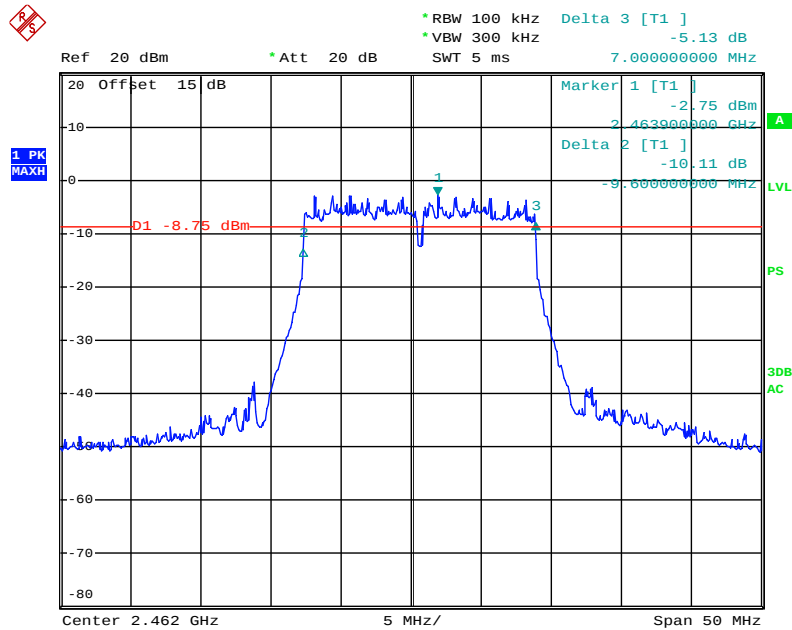
Date: 19.NOV.2013 16:11:08

5. ANTENNA1-802.11g -2437MHz



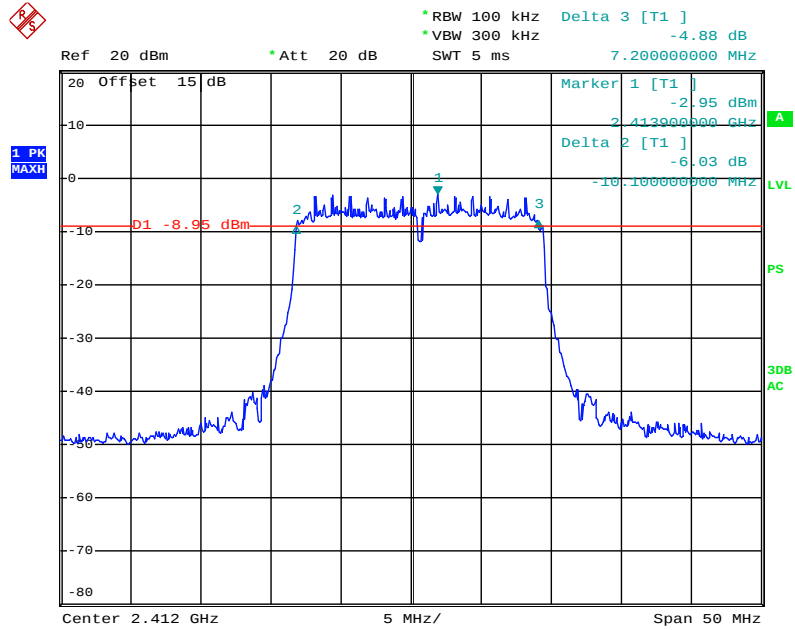
Date: 19.NOV.2013 16:12:53

6. ANTENNA1-802.11g-2462MHz



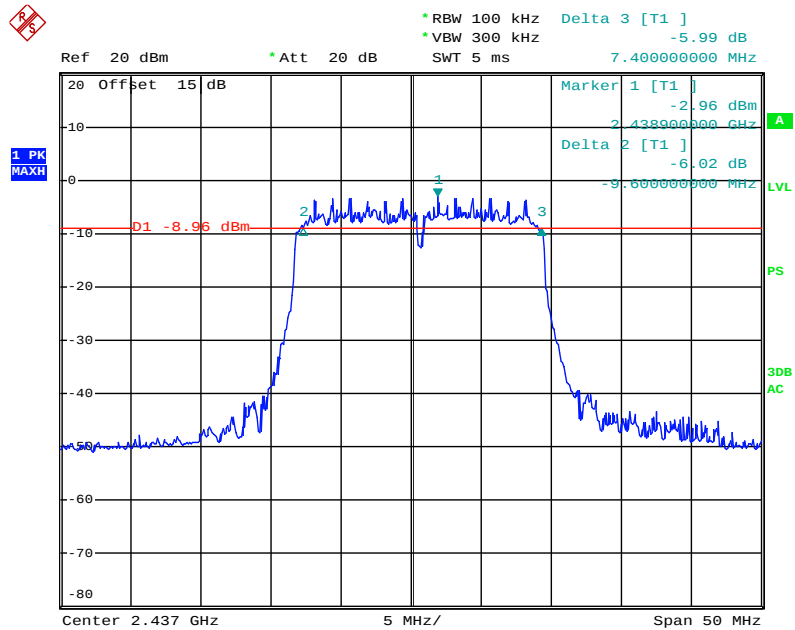
Date: 19.NOV.2013 16:13:51

7. ANTENNA1-802.11n(20M)-2412MHz



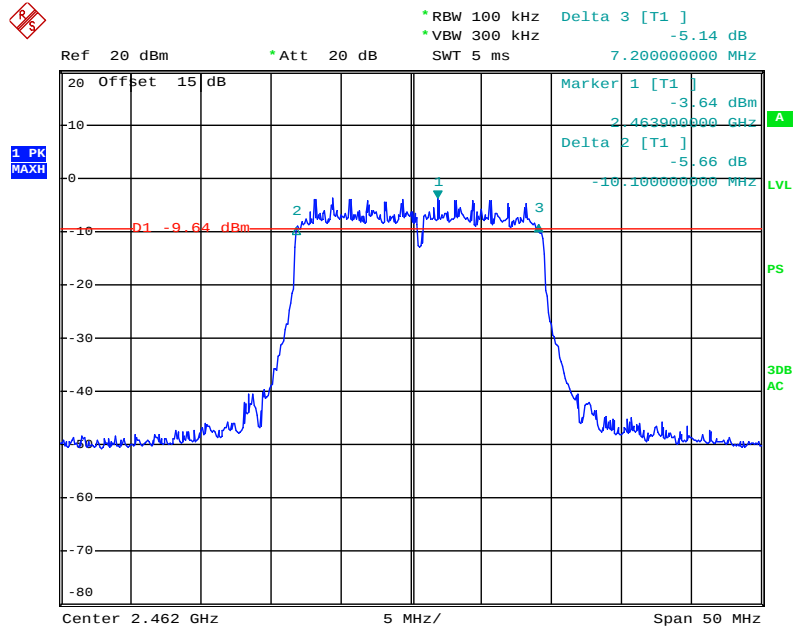
Date: 19.NOV.2013 16:17:21

8. ANTENNA1-802.11n(20M)-2437MHz



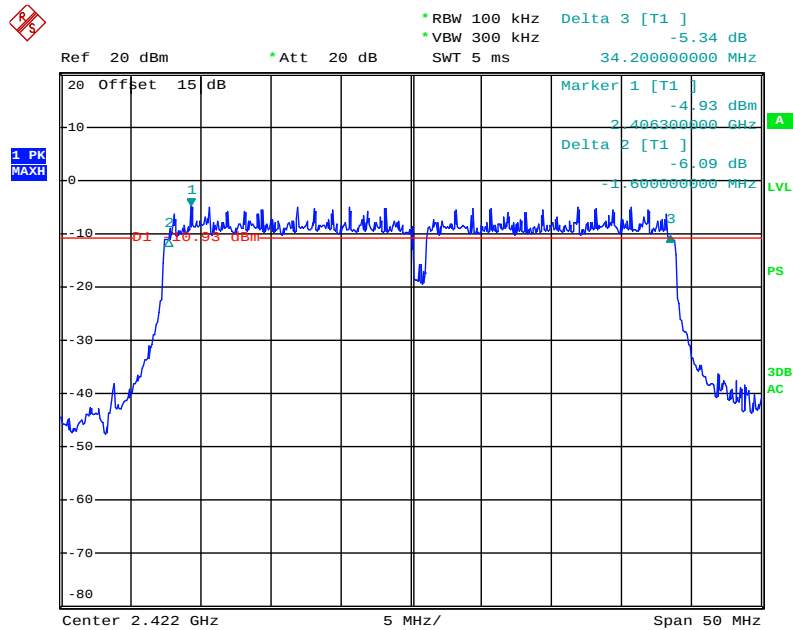
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9. ANTENNA1-802.11n(20M)-2462MHz



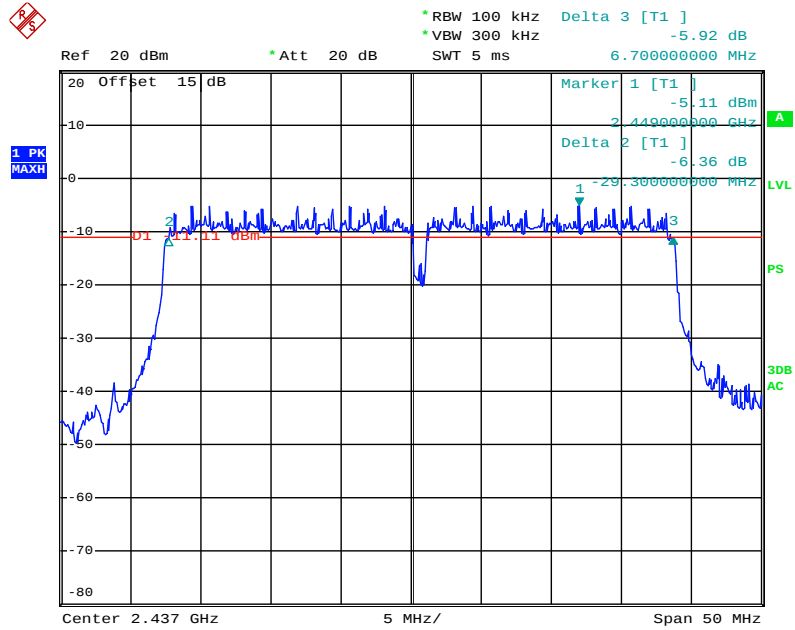
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10. ANTENNA1-802.11n(40M)-2422MHz



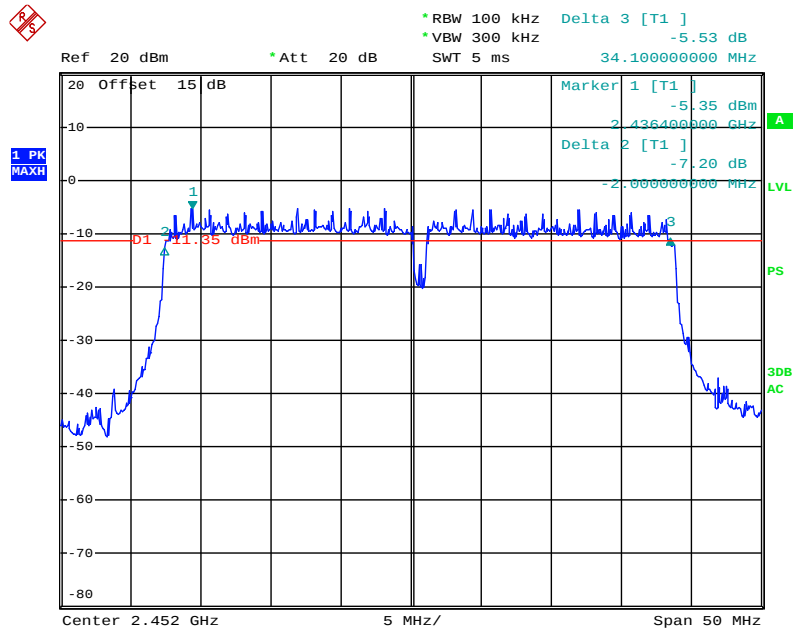
Date: 19.NOV.2013 16:21:49

11. ANTENNA1-802.11n(40M)-2437MHz



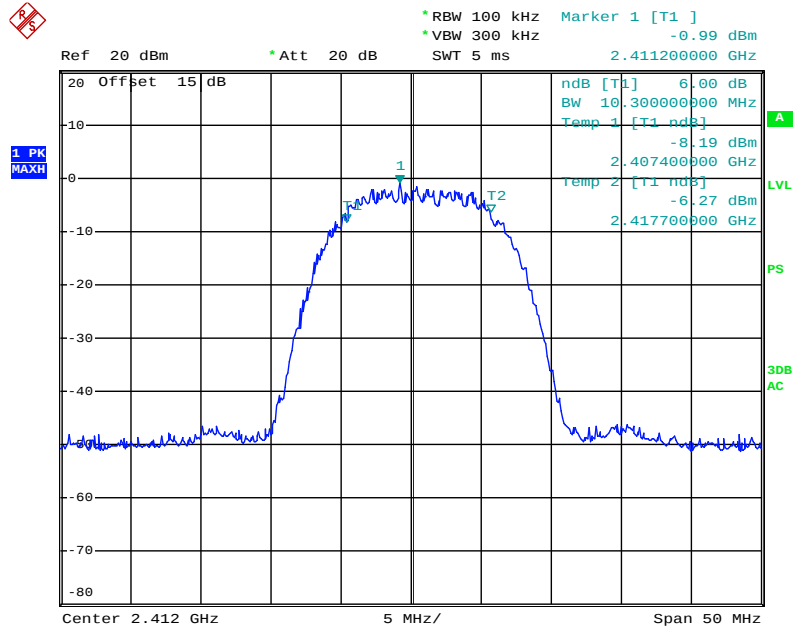
Date: 19.NOV.2013 16:22:58

12. ANTENNA1-802.11n(40M)-2452MHz



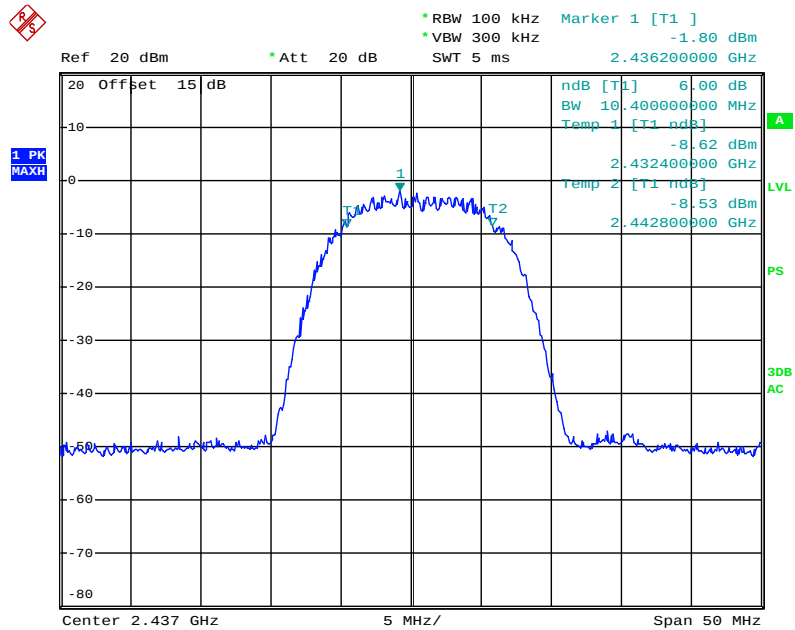
Date: 19.NOV.2013 16:24:32

13. ANTENNA2-802.11b -2412MHz



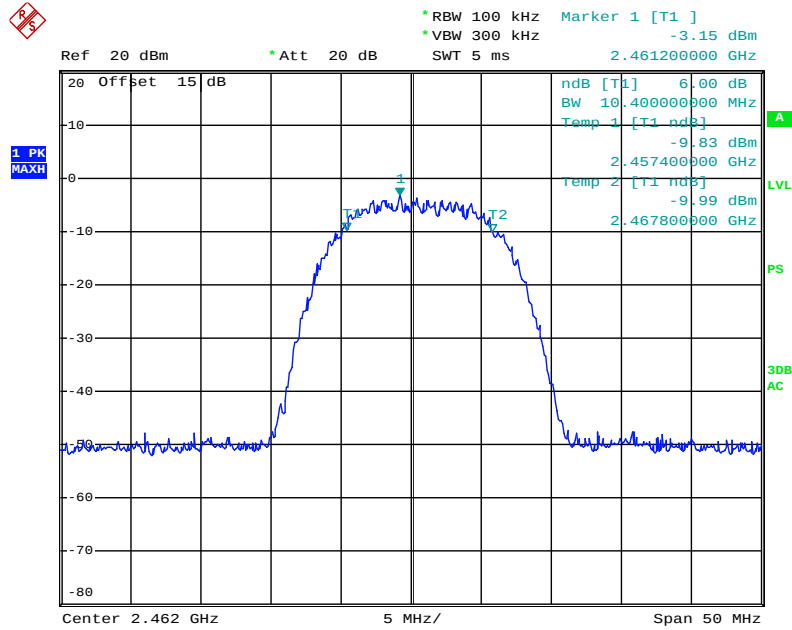
Date: 19.NOV.2013 16:57:11

14. ANTENNA2-802.11b -2437MHz



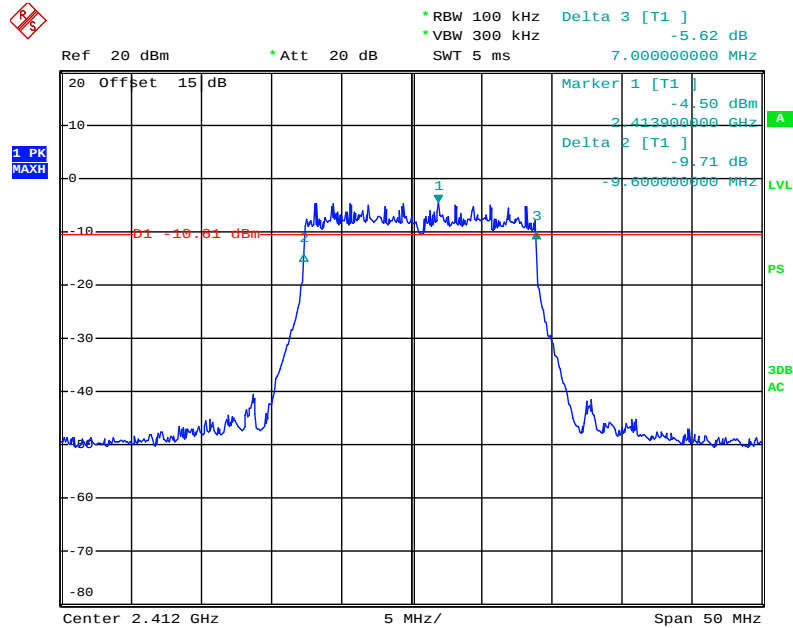
Date: 19.NOV.2013 16:57:40

15. ANTENNA2-802.11b -2462MHz



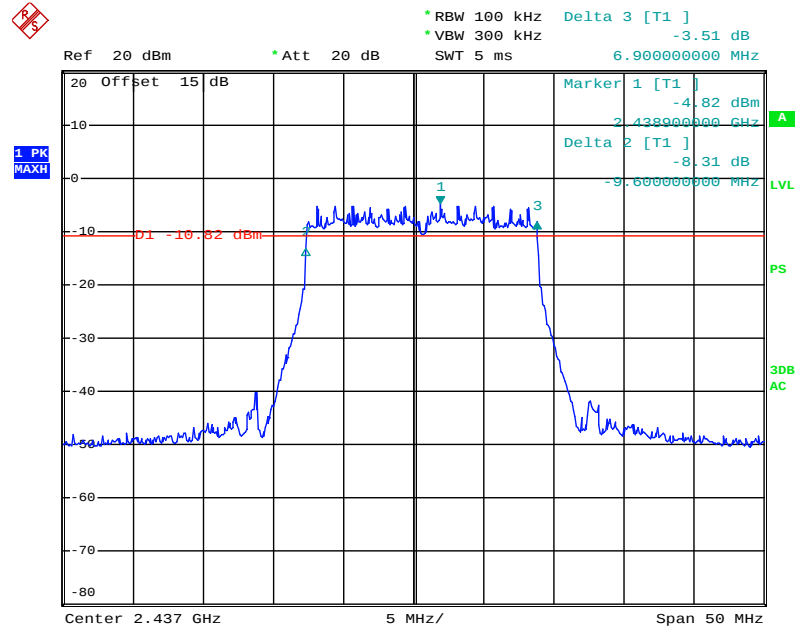
Date: 19.NOV.2013 16:58:15

16. ANTENNA2-802.11g -2412MHz



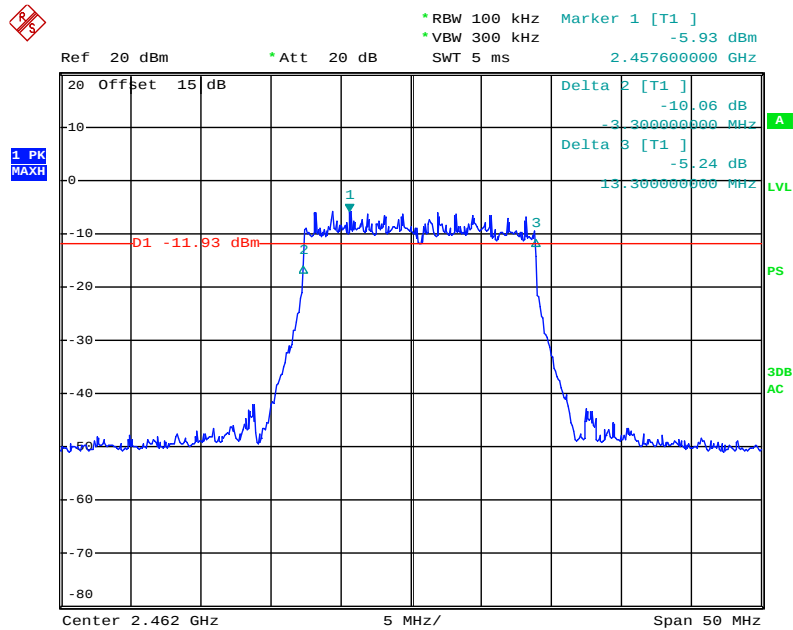
Date: 19.NOV.2013 16:59:44

17. ANTENNA2-802.11g -2437MHz



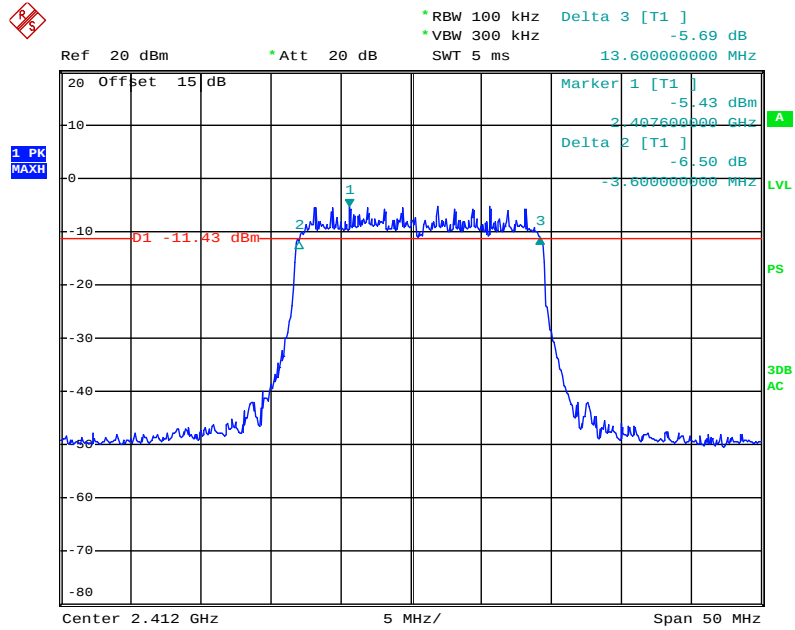
Date: 19.NOV.2013 17:09:07

18. ANTENNA2-802.11g-2462MHz



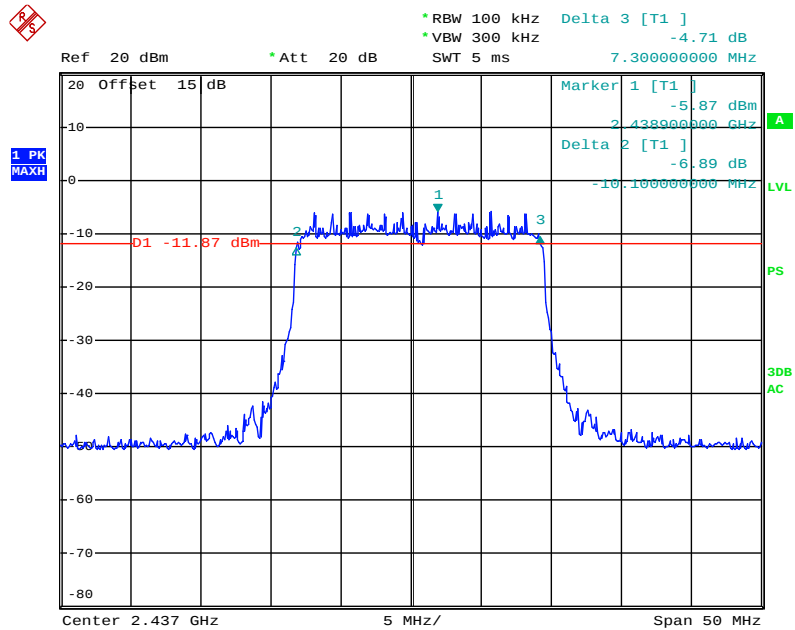
Date: 19.NOV.2013 17:10:01

19. ANTENNA2-802.11n(20M)-2412MHz



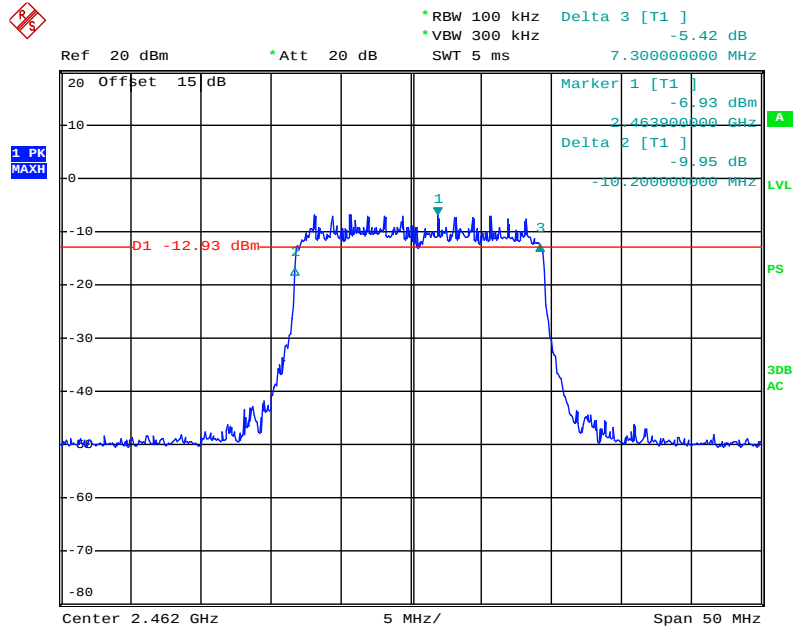
Date: 19.NOV.2013 17:12:27

20. ANTENNA2-802.11n(20M)-2437MHz



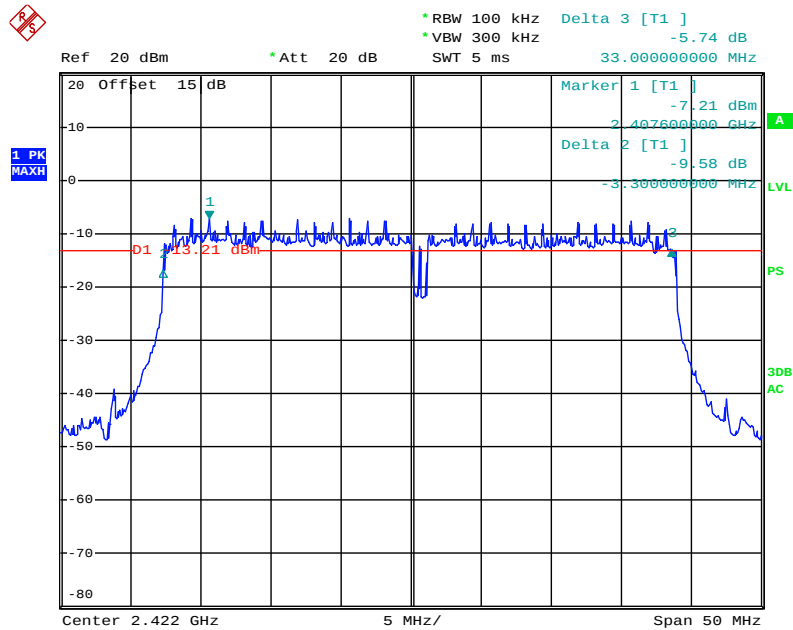
Date: 19.NOV.2013 17:13:53

21. ANTENNA2-802.11n(20M)-2462MHz



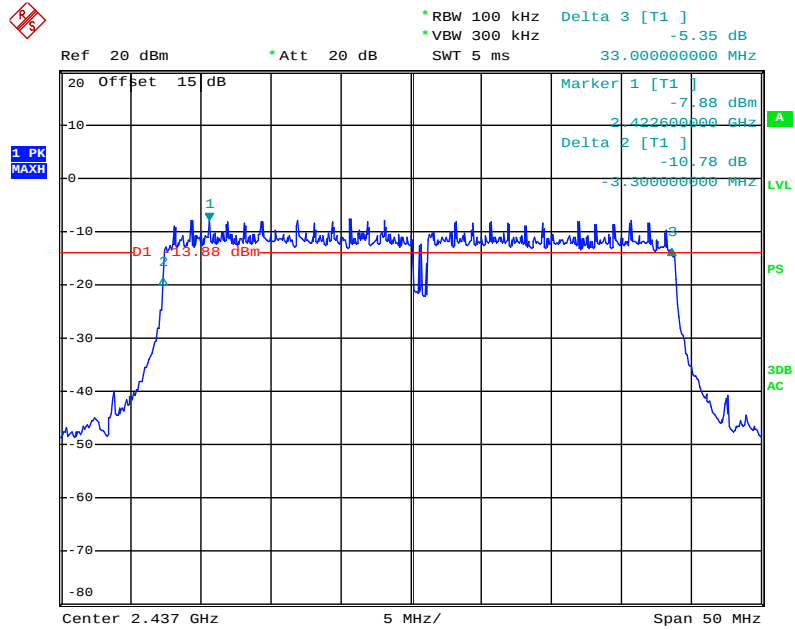
Date: 19.NOV.2013 17:15:33

22. ANTENNA2-802.11n(40M)-2422MHz



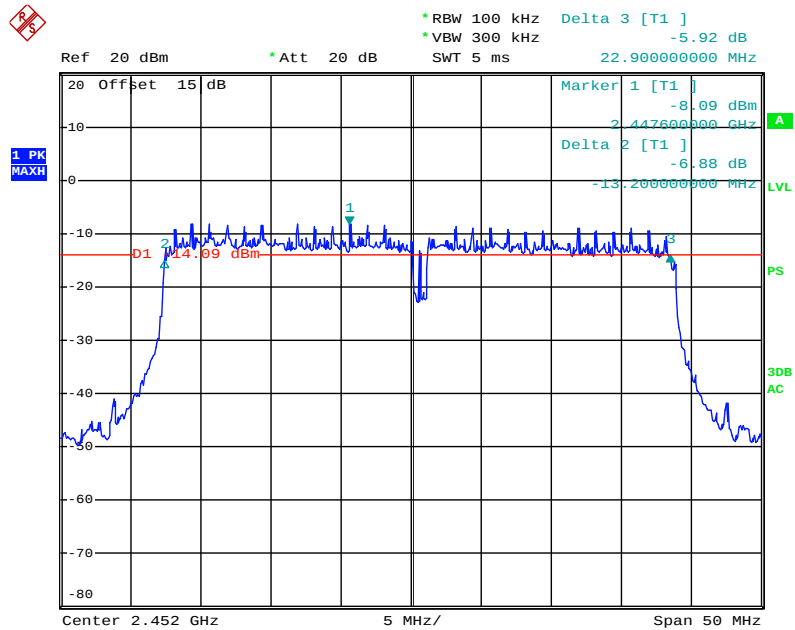
Date: 19.NOV.2013 17:16:36

23. ANTENNA2-802.11n(40M)-2437MHz



Date: 19.NOV.2013 17:17:52

24. ANTENNA2-802.11n(40M)-2452MHz



Date: 19.NOV.2013 17:18:40

5.4 Maximum Peak Output Power

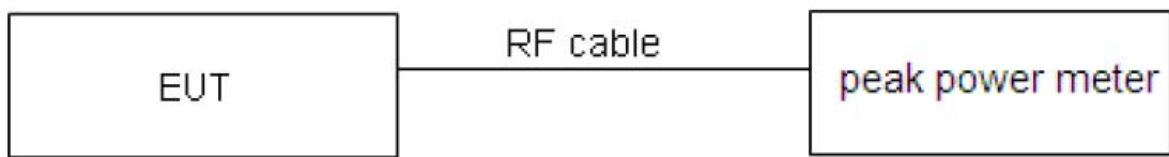
5.4.1 Requirement of the standard

According to FCC §15.247 (b) (3), the maximum peak output power of systems using digital modulation in the 2400-2483.5 MHz bands is 1 Watt.

5.4.2 Test Procedure

The EUT temporary Antenna port was coupled to the power meter. The radio frequency load attached to the EUT Antenna terminal was 50 Ohm. The lost of the cables the test system is calibrated to correct the reading.

5.4.3 Test Setup



5.4.4 EUT Setup and Operating Conditions

Same as 3.3.4

5.4.5 Test Results

ANTENNA1:

Modulation	Operating Frequency (MHz)	Peak Output Power		Limit (mW)
		(dBm)	(mW)	
802.11b	2412	12.26	16.83	1000
	2437	11.48	14.06	1000
	2462	11.11	12.91	1000
802.11g	2412	13.06	20.23	1000
	2437	12.93	19.63	1000
	2462	12.62	18.28	1000
802.11n(20M)	2412	12.01	15.89	1000
	2437	11.99	15.81	1000
	2462	11.67	14.69	1000
802.11n(40M)	2422	12.59	18.16	1000
	2437	12.29	16.94	1000
	2452	12.14	16.37	1000

ANTENNA2:

Modulation	Operating Frequency (MHz)	Peak Output Power		Limit (mW)
		(dBm)	(mW)	
802.11b	2412	10.63	11.56	1000
	2437	9.79	9.53	1000
	2462	8.89	7.74	1000
802.11g	2412	10.48	11.17	1000
	2437	10.20	10.47	1000
	2462	9.66	9.25	1000
802.11n(20M)	2412	10.08	10.19	1000
	2437	9.20	8.32	1000
	2462	8.21	6.62	1000
802.11n(40M)	2422	10.13	10.30	1000
	2437	9.62	9.16	1000
	2452	8.99	7.93	1000

Note:

Test mode please refer Page 7.

Total

Modulation	Operating Frequency (MHz)	Peak Output Power		Limit (mW)
		(dBm)	(mW)	
802.11n(20M)	2412	14.16	26.08	1000
	2437	13.83	24.13	1000
	2462	13.29	21.31	1000
802.11n(40M)	2422	14.55	28.46	1000
	2437	14.17	26.10	1000
	2452	13.86	24.30	1000

5.5 Band Edge

5.5.1 Requirement of the standard

According to FCC §15.247(c), In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement.

5.5.2 Test Procedure

1. For RF Conducted Measurement:

The EUT was tested according to DTS test procedure of April 2013 KDB558074 for compliance to FCC 47CFR 15.247 requirements.

Set RBW = 100 kHz, Span greater than RBW.

2. For RF Radiated Measurement:

The EUT was setup according to ANSI C63.4, 2003 and tested according to DTS test procedure of Oct 2002 KDB558074 for compliance to FCC 47CFR 15.247 requirements.

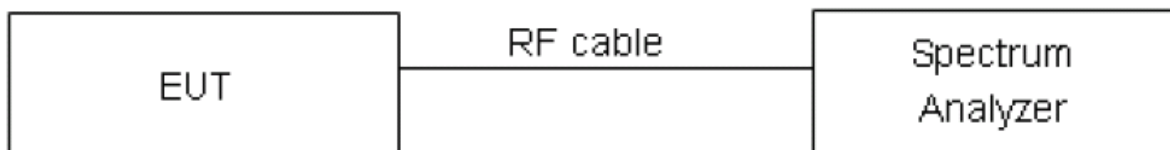
For measurements above 1GHz the resolution bandwidth is set to 1MHz, then the video bandwidth is set to 1MHz for peak measurements and 10Hz for average measurements.

The spectrum from 30MHz to 26GHz is investigated with the transmitter set to the lowest, middle and highest channels in the 2.4GHz band.

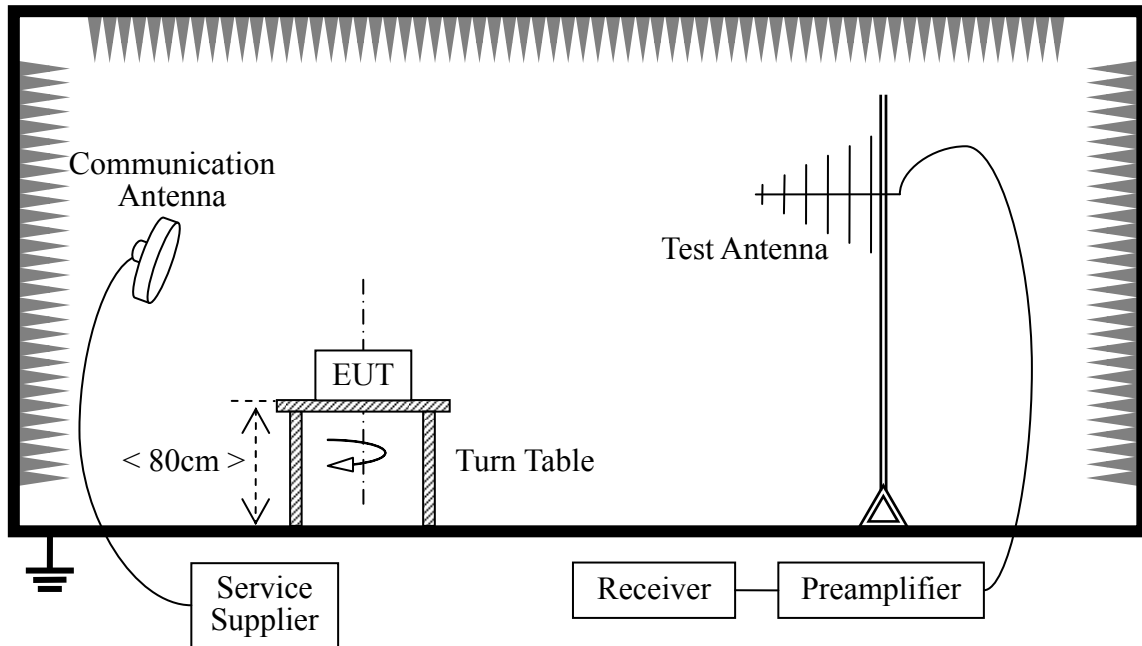
The frequency range of interest is monitored at a fixed Antenna height and EUT azimuth. The EUT is rotated through 360 degrees to maximize emissions received. The Antenna is scanned from 1 to 4 meters above the ground plane to further maximize the emission. Measurements are Made with the Antenna polarized in both the vertical and the horizontal positions.

5.5.3 Test Setup

Conducted Band Edge



Radiated Band Edge



5.5.4 EUT Setup and Operating Conditions

Same as 5.3.4

5.5.5 Test Results

The radio frequency power beyond the band edges was 20dB below the peak output power, measured with 100 kHz resolution bandwidth. Refer to the following test plots.

Conducted Band Edge

ANTENNA1

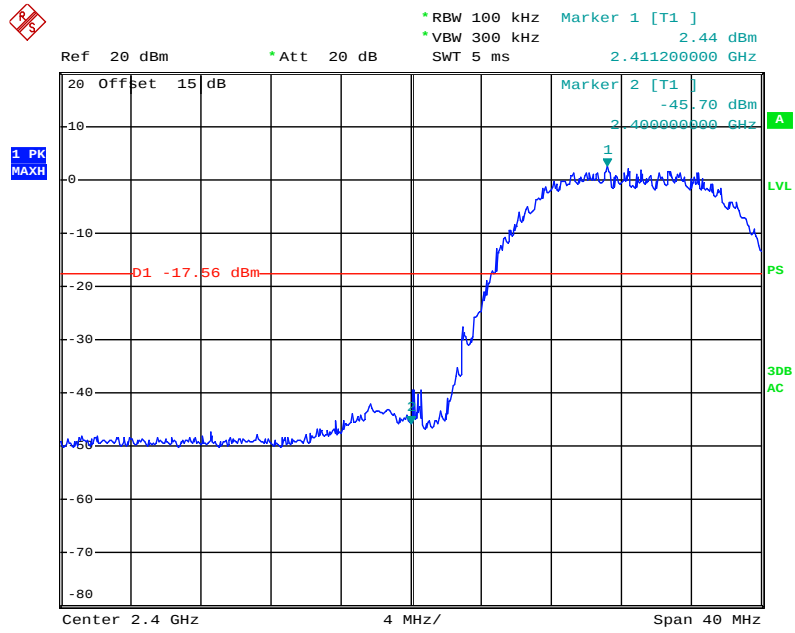
Modulation	Frequency (MHz)	Peak Power (dBm)	Max Spurious Level (dBm)	Limit (dBm)	Result
802.11b	2412	2.44	-45.70	-13.56	PASS
	2462	1.01	-45.89	-18.99	PASS
802.11g	2412	-2.40	-47.30	-22.46	PASS
	2462	-3.00	-42.21	-23.00	PASS
802.11n(20M)	2412	-3.35	-46.31	-23.35	PASS
	2462	-3.86	-41.36	-23.86	PASS
802.11n(40M)	2422	-5.20	-45.79	-25.20	PASS
	2452	-5.68	-41.02	-25.68	PASS

ANTENNA2

Modulation	Frequency (MHz)	Peak Power (dBm)	Max Spurious Level (dBm)	Limit (dBm)	Result
802.11b	2412	-0.31	-47.99	-20.31	PASS
	2462	-2.96	-53.41	-22.96	PASS
802.11g	2412	-4.55	-47.70	-24.55	PASS
	2462	-6.03	-46.64	-26.03	PASS
802.11n(20M)	2412	-5.58	-47.59	-25.58	PASS
	2462	-7.10	-45.87	-27.10	PASS
802.11n(40M)	2422	-7.34	-47.07	-27.34	PASS
	2452	-8.80	-45.50	-28.80	PASS

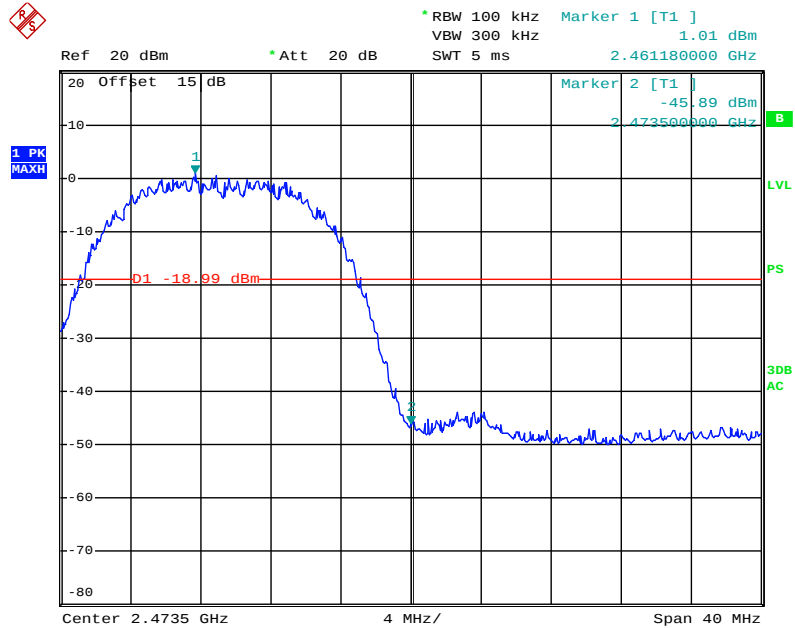
Test Plots:

1. ANTENNA1-802.11b -2412MHz



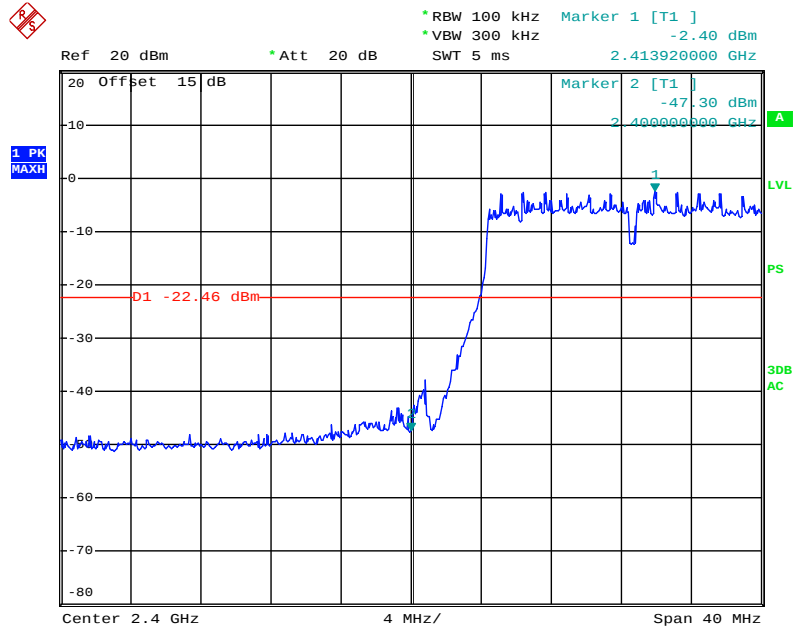
Date: 19.NOV.2013 16:29:16

2. ANTENNA1-802.11b -2462MHz



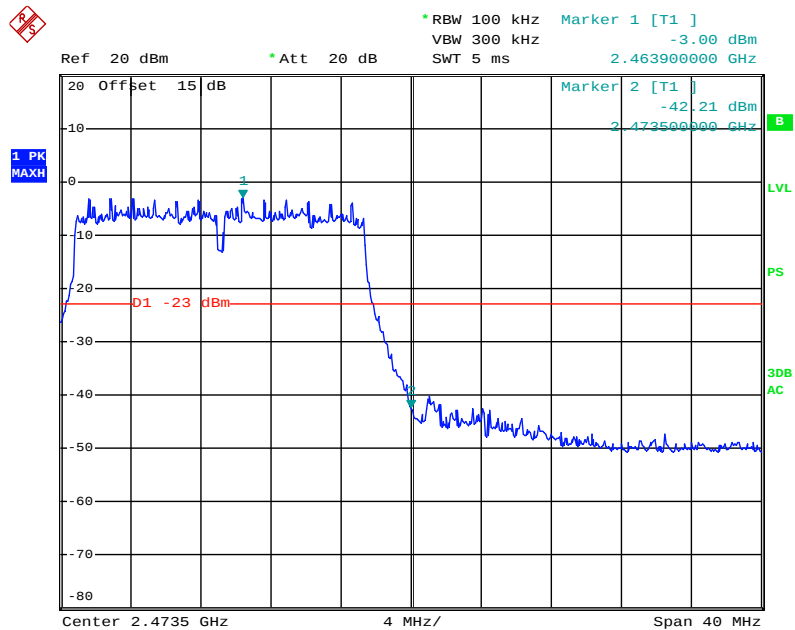
Date: 19.NOV.2013 16:32:26

3. ANTENNA1-802.11g -2412MHz



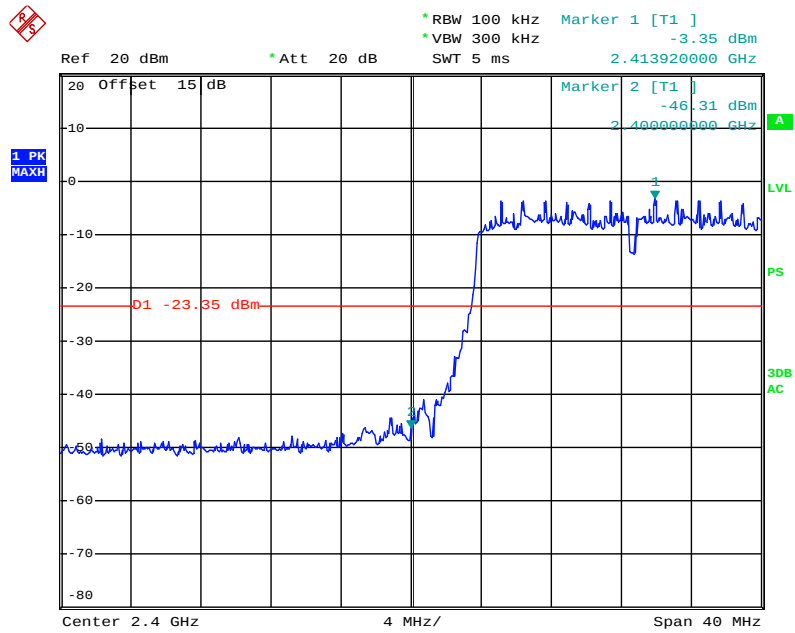
Date: 19.NOV.2013 16:33:27

4. ANTENNA1-802.11g -2462MHz



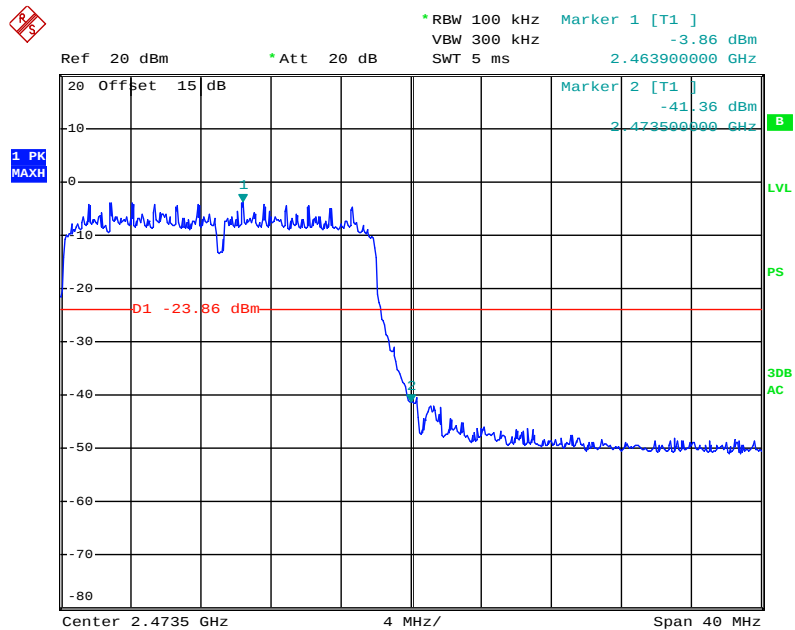
Date: 19.NOV.2013 16:34:08

5. ANTENNA1-802.11n(20M) -2412MHz



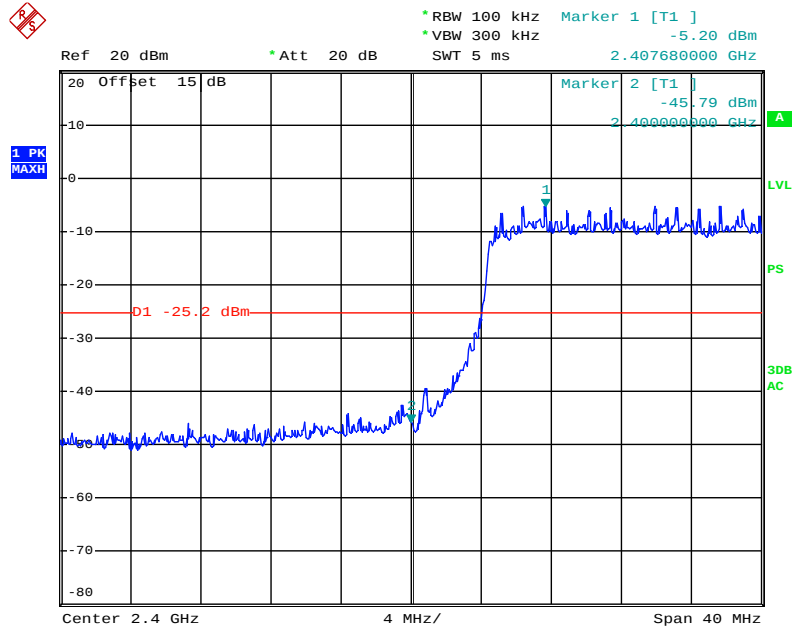
Date: 19.NOV.2013 16:34:53

6. ANTENNA1-802.11n(20M) -2462MHz



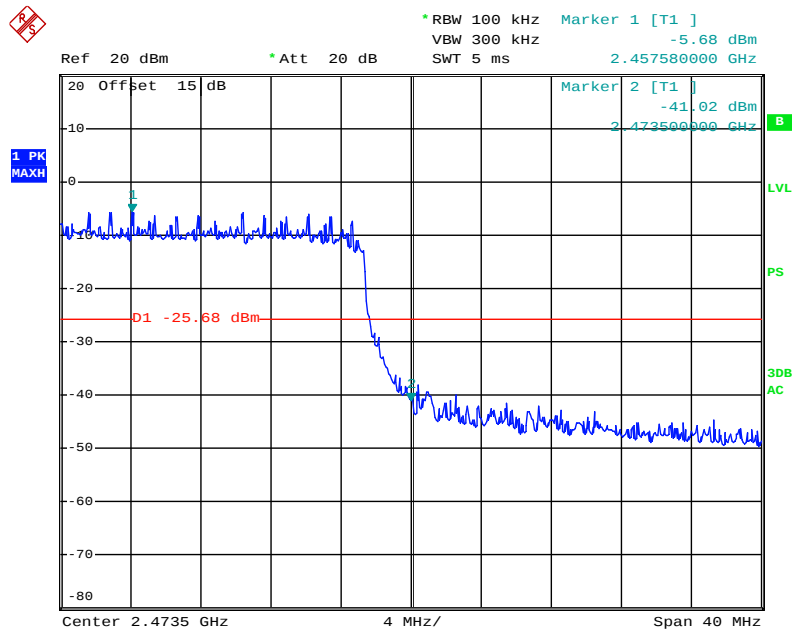
Date: 19.NOV.2013 16:35:58

7. ANTENNA1-802.11n(40M) -2422MHz



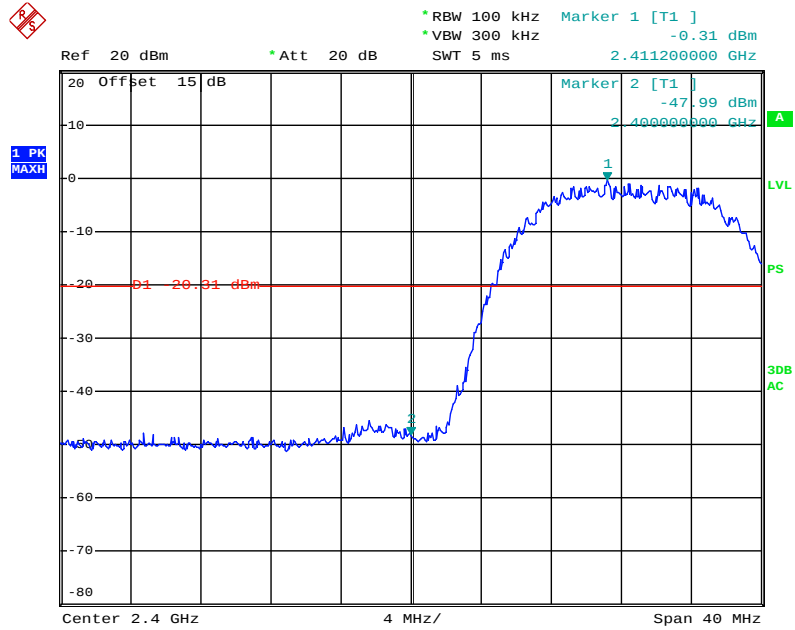
Date: 19.NOV.2013 16:37:00

8. ANTENNA1-802.11n(40M) -2452MHz



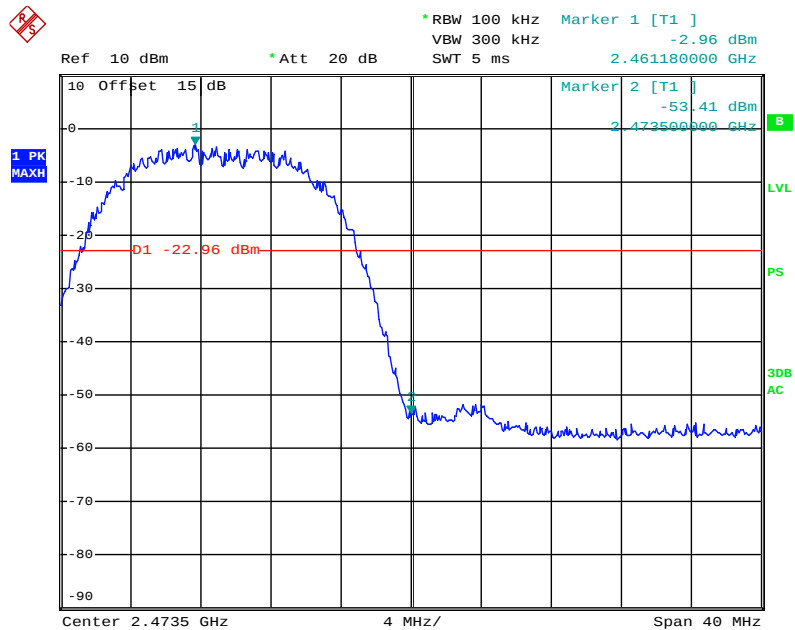
Date: 19.NOV.2013 16:37:34

9. ANTENNA2-802.11b -2412MHz



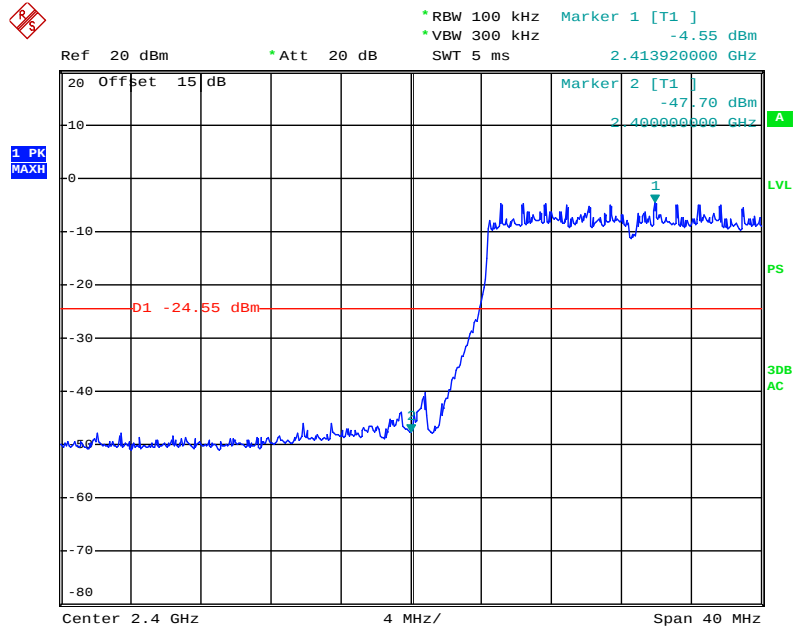
Date: 19.NOV.2013 17:20:04

10. ANTENNA2-802.11b -2462MHz



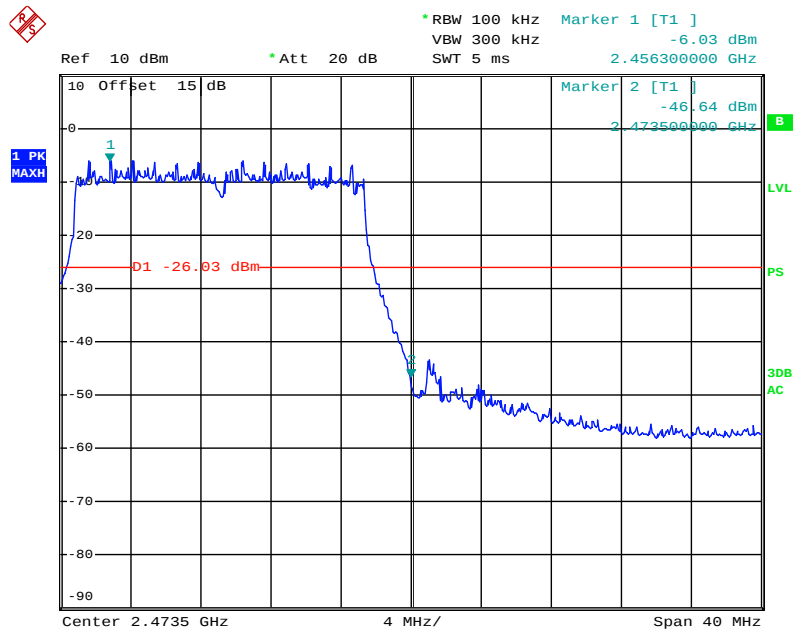
Date: 19.NOV.2013 17:21:12

11. ANTENNA2-802.11g -2412MHz



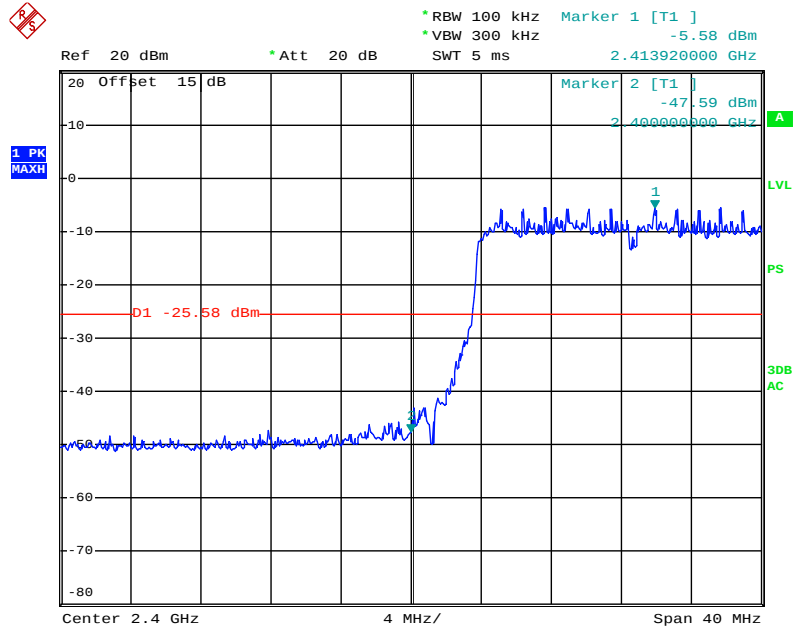
Date: 19.NOV.2013 17:22:13

12. ANTENNA2-802.11g -2462MHz



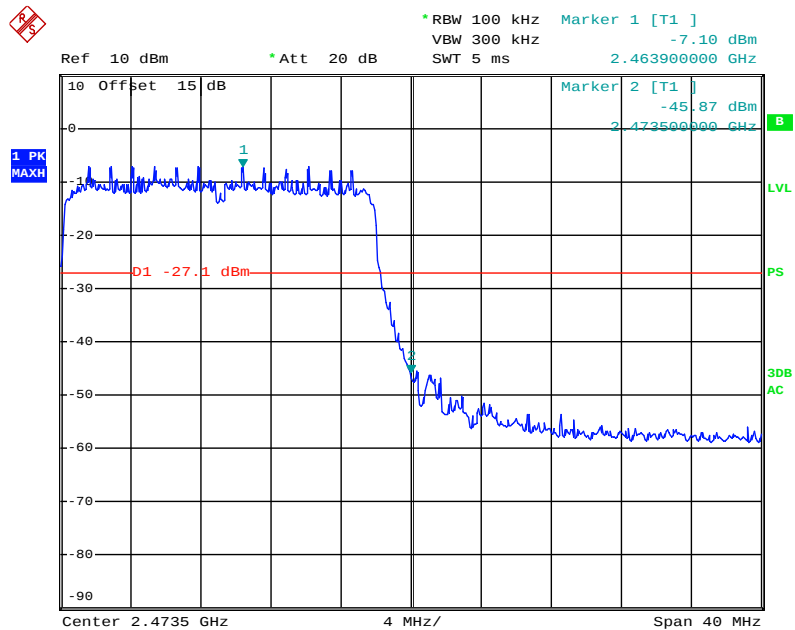
Date: 19.NOV.2013 17:23:31

13. ANTENNA2-802.11n(20M) -2412MHz



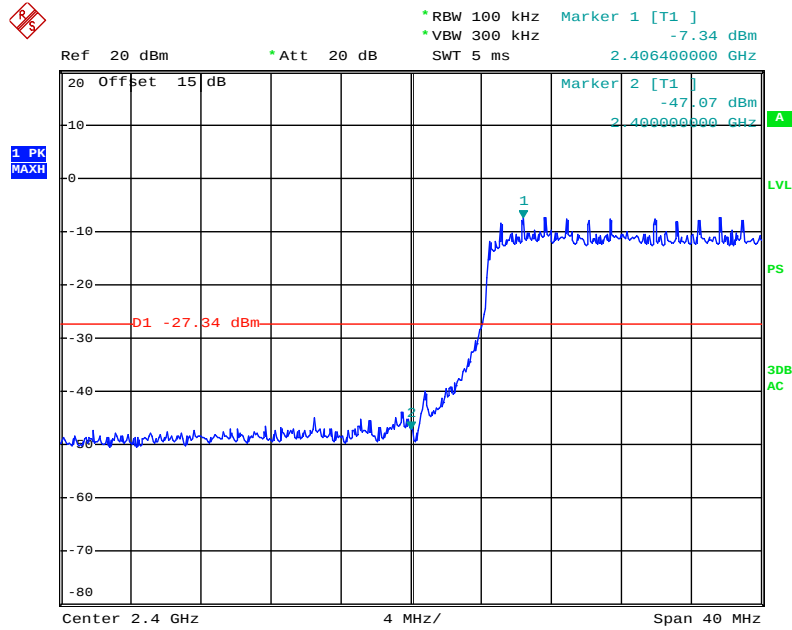
Date: 19.NOV.2013 17:24:38

14. ANTENNA2-802.11n(20M) -2462MHz



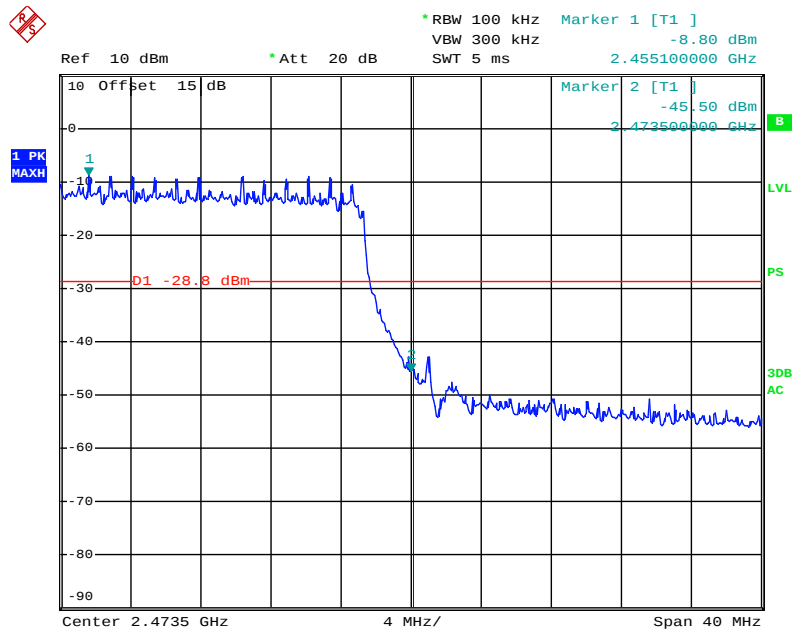
Date: 19.NOV.2013 17:25:28

15. ANTENNA2-802.11n(40M) -2422MHz



Date: 19.NOV.2013 17:26:24

16. ANTENNA2-802.11n(40M) -2452MHz



Date: 19.NOV.2013 17:27:36

Radiated Band Edge

ANTENNA1+ANTENNA2

Modulation	Frequency (MHz)	Measure Level (dBuV/m)	Correct Factor (dB)	Reading Level (dBuV)	Limit (dBuV/m)	Detector Type	Antenna Polarity
802.11b	2400	58.92	0.35	58.57	74	Peak	H
	2400	44.68	0.35	44.33	54	Average	
	2400	57.77	0.35	57.42	74	Peak	V
	2400	43.58	0.35	43.23	54	Average	
	2483.5	61.61	0.64	60.97	74	Peak	H
	2483.5	48.27	0.64	47.63	54	Average	
	2483.5	61.74	0.64	61.10	74	Peak	V
	2483.5	47.27	0.64	46.63	54	Average	
802.11g	2400	58.08	0.35	57.73	74	Peak	H
	2400	43.22	0.35	42.87	54	Average	
	2400	56.04	0.35	55.69	74	Peak	V
	2400	42.14	0.35	41.79	54	Average	
	2483.5	67.92	0.64	67.28	74	Peak	H
	2483.5	45.25	0.64	44.61	54	Average	
	2483.5	61.27	0.64	60.63	74	Peak	V
	2483.5	48.37	0.64	47.73	54	Average	
802.11n(20M)	2400	56.25	0.35	55.9	74	Peak	H
	2400	43.55	0.35	43.2	54	Average	
	2400	54.62	0.35	54.27	74	Peak	V
	2400	47.45	0.35	47.1	54	Average	
	2483.5	65.49	0.64	64.85	74	Peak	H
	2483.5	45.21	0.64	44.57	54	Average	
	2483.5	60.22	0.64	59.58	74	Peak	V
	2483.5	47.75	0.64	47.11	54	Average	
802.11n(40M)	2400	58.20	0.35	57.85	74	Peak	H
	2400	43.87	0.35	43.52	54	Average	
	2400	56.62	0.35	56.27	74	Peak	V
	2400	42.43	0.35	42.08	54	Average	
	2483.5	62.99	0.64	62.35	74	Peak	H
	2483.5	49.25	0.64	48.61	54	Average	
	2483.5	61.02	0.64	60.38	74	Peak	V
	2483.5	48.30	0.64	47.66	54	Average	

Note: Measurement Level = Reading Level + Correct Factor

5.6 Conducted Spurious Emission

5.6.1 Requirement of the standard

According to FCC §15.247(c), In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement.

5.6.2 Test Procedure

- a. The EUT was coupled to the spectrum analyzer and the base station simulator through a power divider. The radio frequency load attached to the EUT Antenna terminal was 50 Ohm. The loss of the cables the test system is calibrated to correct the reading.
- b. The spectrum analyzer was set to Maxpeak Detector function and Maximum Hold mode.
- c. The spurious Emissions from 9 KHz to 10th harmonic of the fundamental frequency were researched.
- d. According to the standard requirement, the resolution bandwidth of the spectrum analyzer was set to RBW=100 kHz, VBW=300 kHz.

5.6.3 Test Setup

Same as 5.3.3

5.6.4 EUT Setup and Operating Conditions

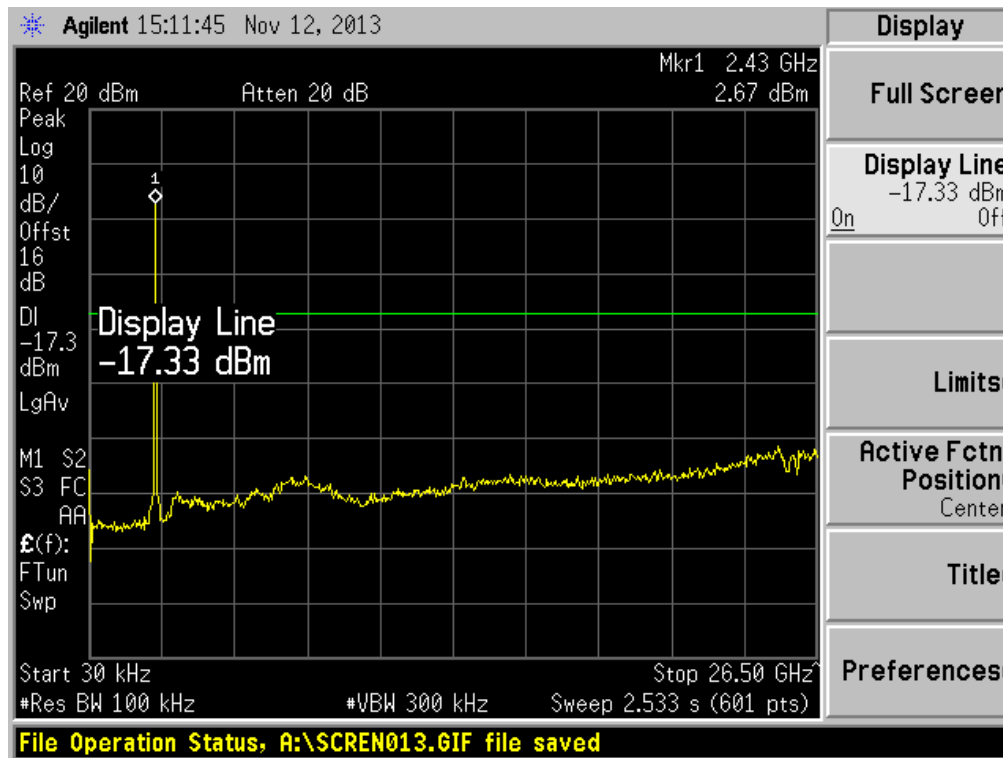
Same as 5.3.4

5.6.5 Test Results

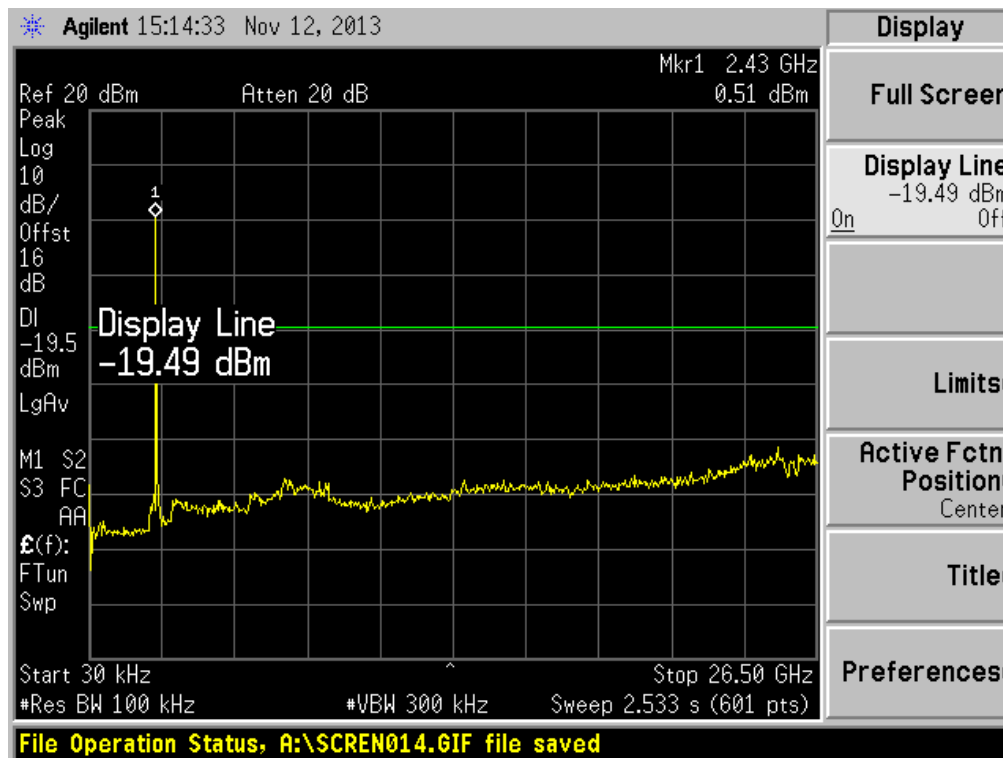
The following test plots shows that spurious emissions in the whole frequency range were below the 20dBc limit line.

Test Plots:

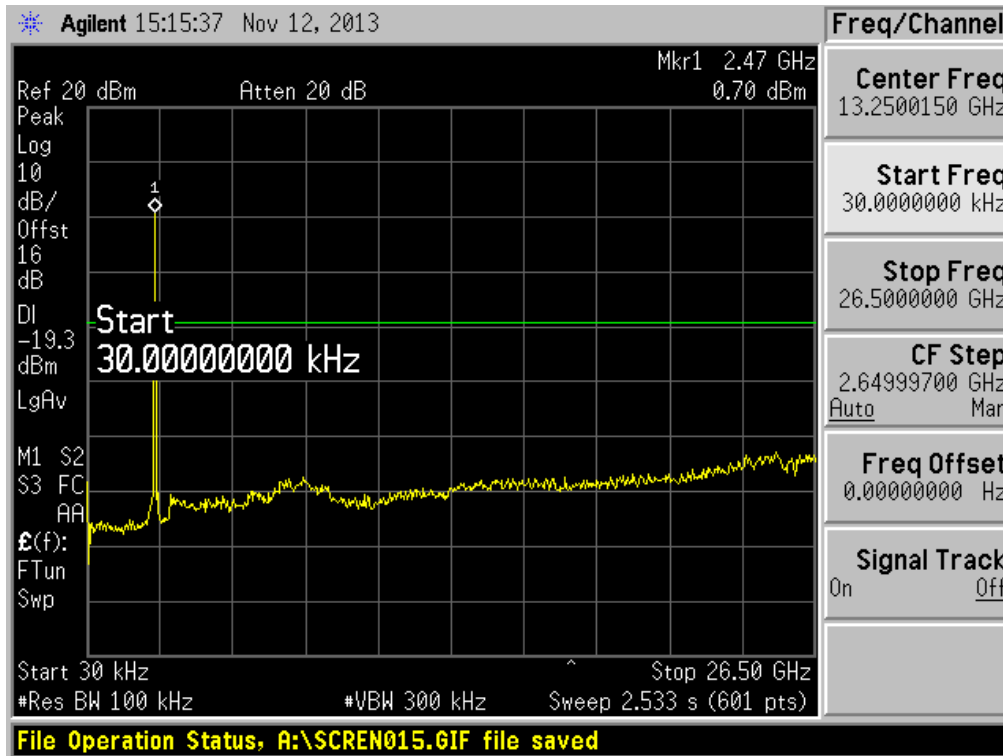
1. ANTENNA1-802.11b -2412MHz



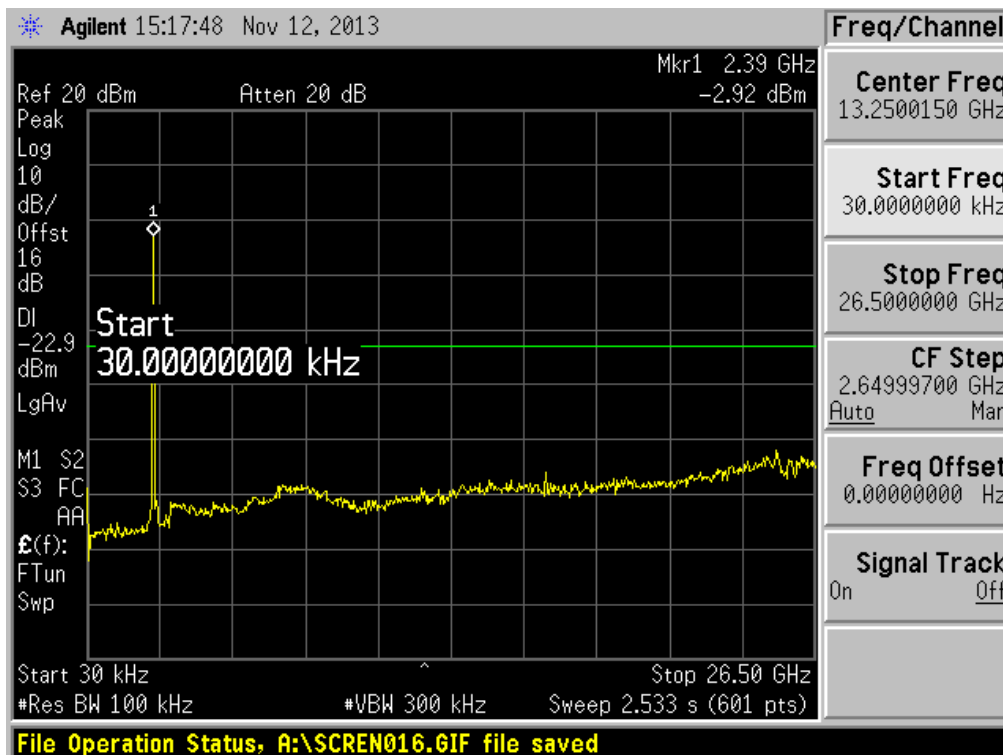
2. ANTENNA1-802.11b -2437MHz



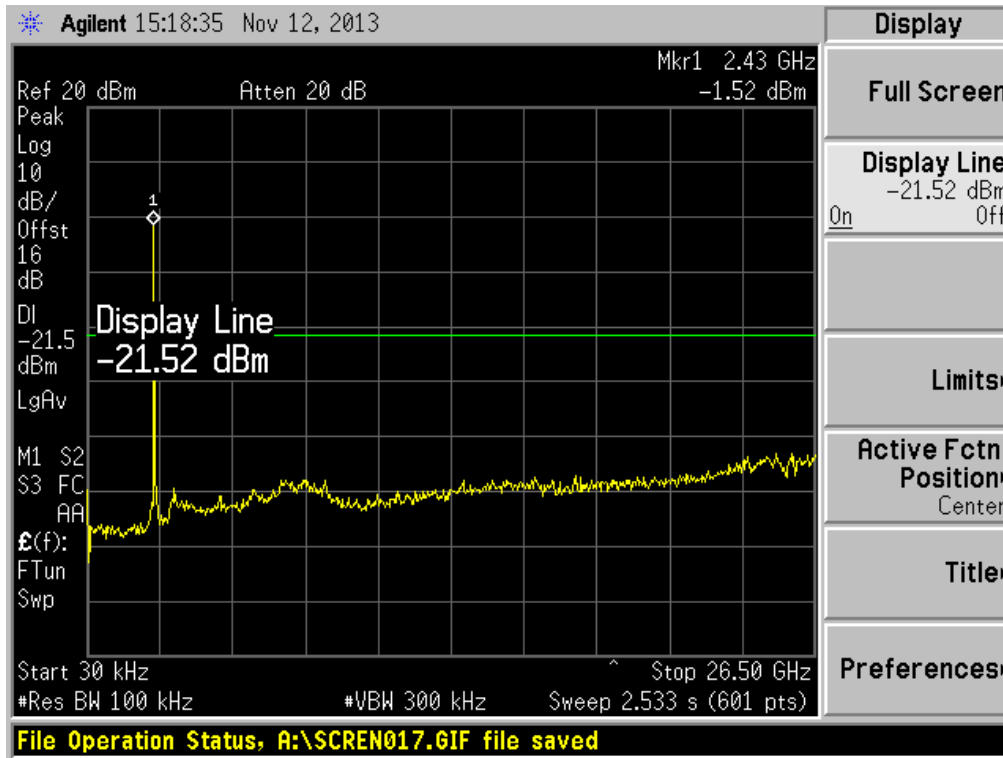
3. ANTENNA1-802.11b -2462MHz



4. ANTENNA1-802.11g -2412MHz



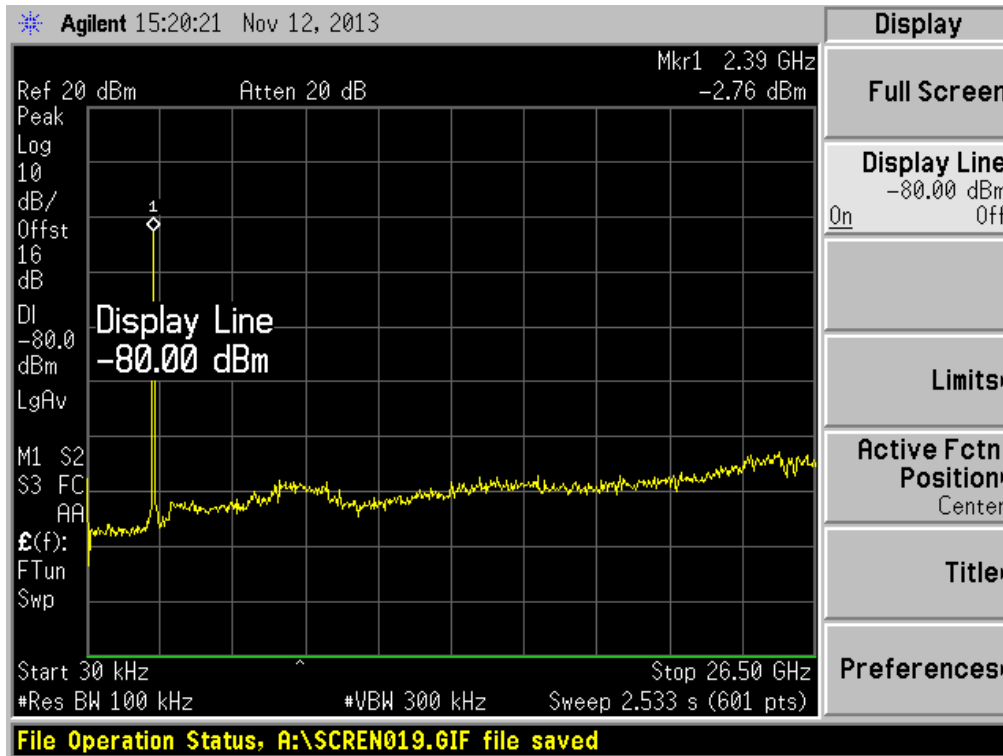
5. ANTENNA1-802.11g -2437MHz



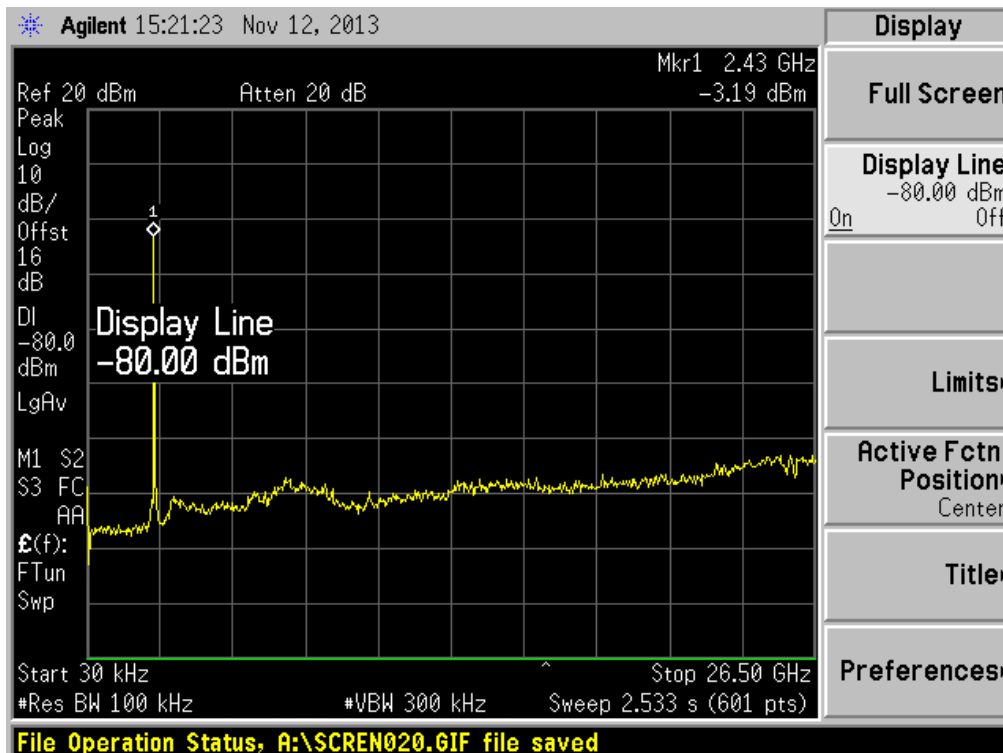
6. ANTENNA1-802.11g-2462MHz



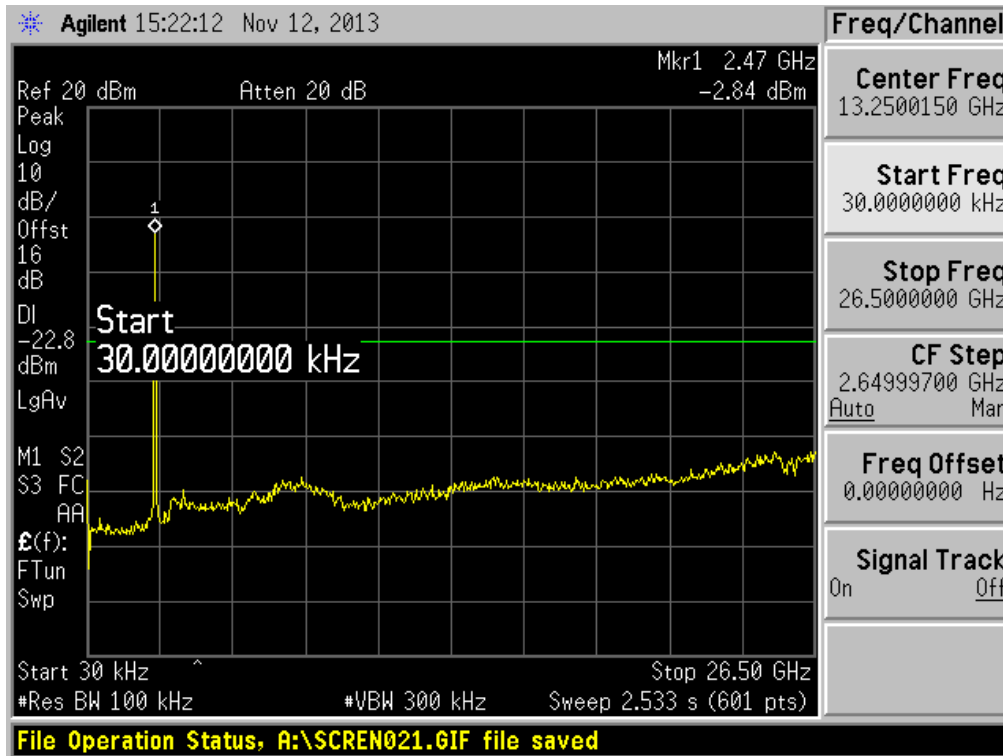
7. ANTENNA1-802.11n(20M)-2412MHz



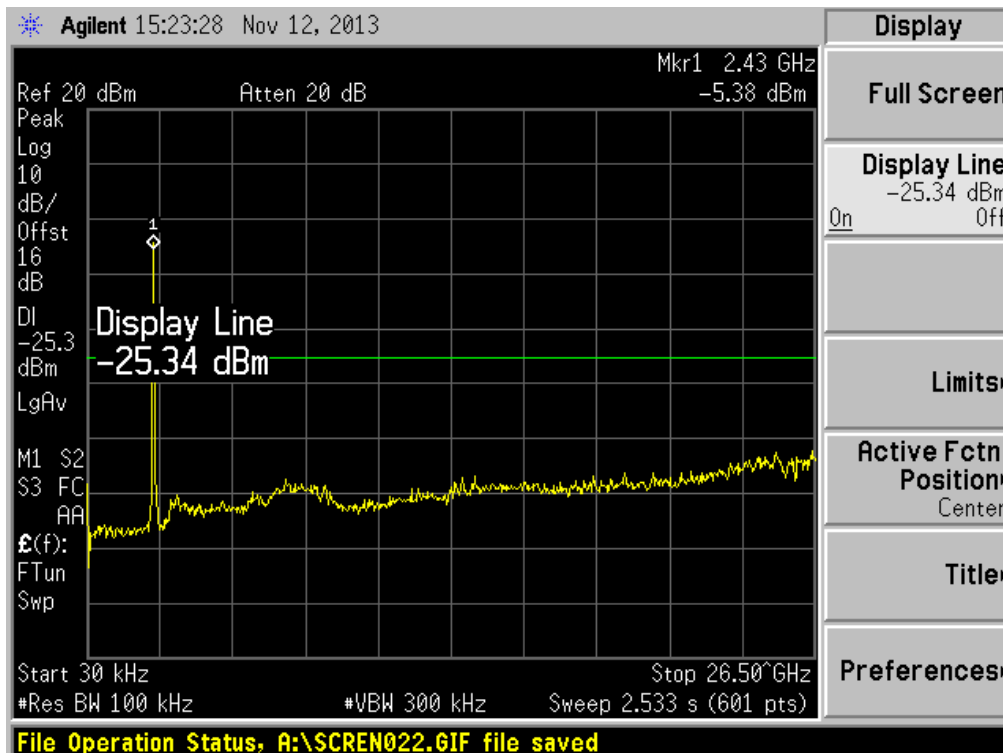
8. ANTENNA1-802.11n(20M)-2437MHz



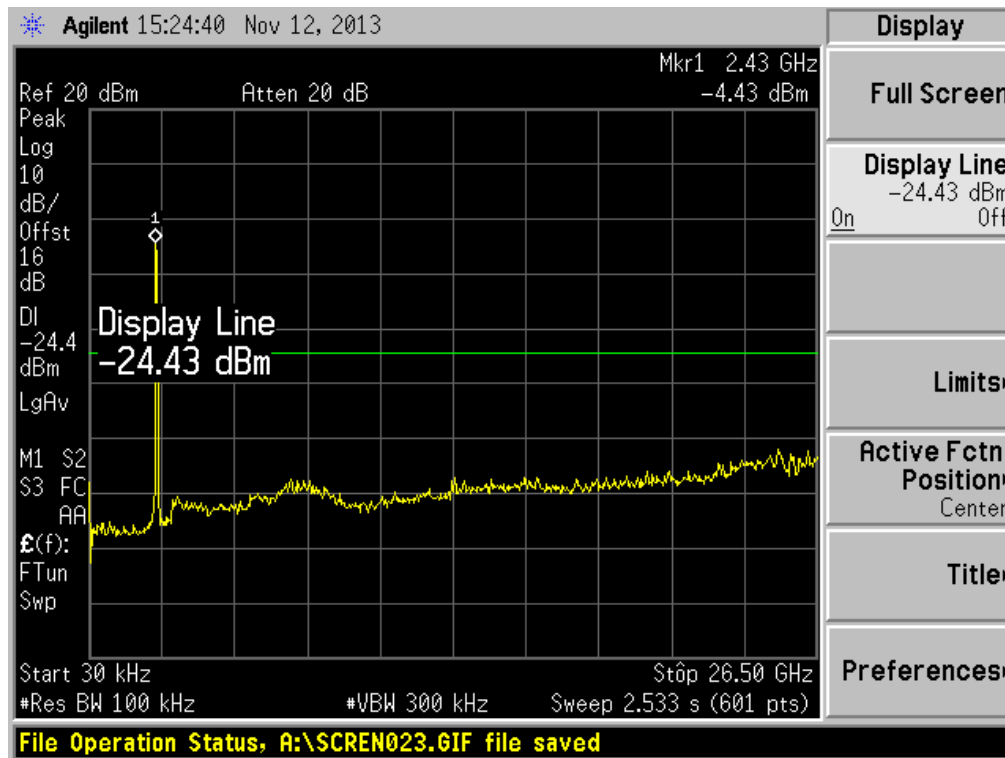
9. ANTENNA1-802.11n(20M)-2462MHz



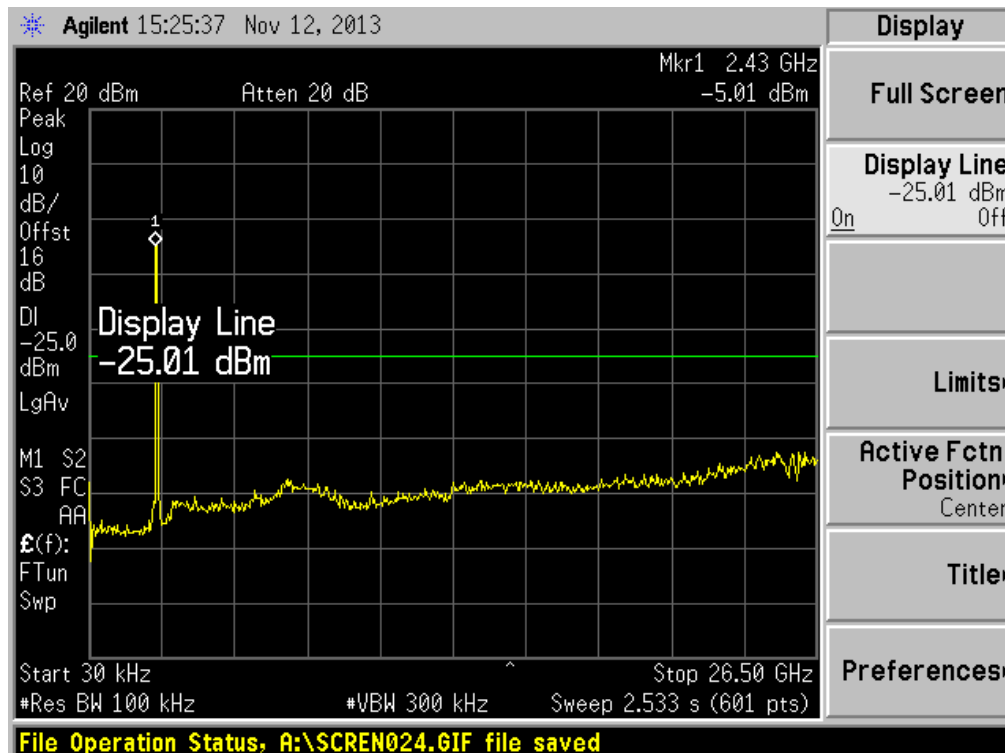
10. ANTENNA1-802.11n(40M)-2422MHz



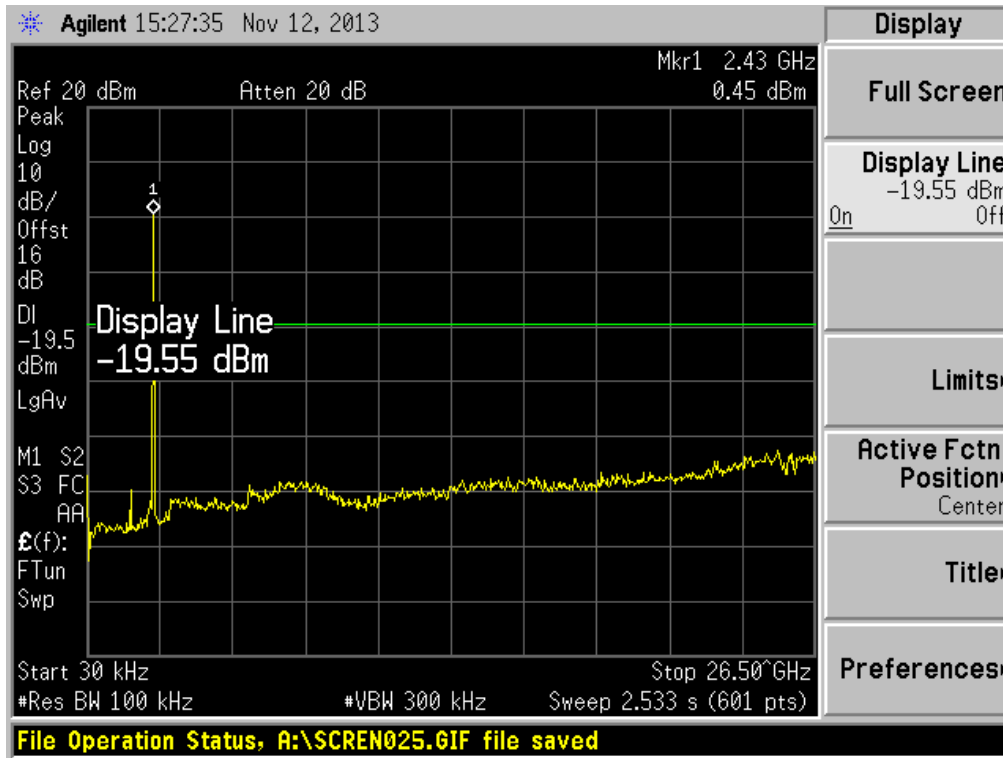
11. ANTENNA1-802.11n(40M)-2437MHz



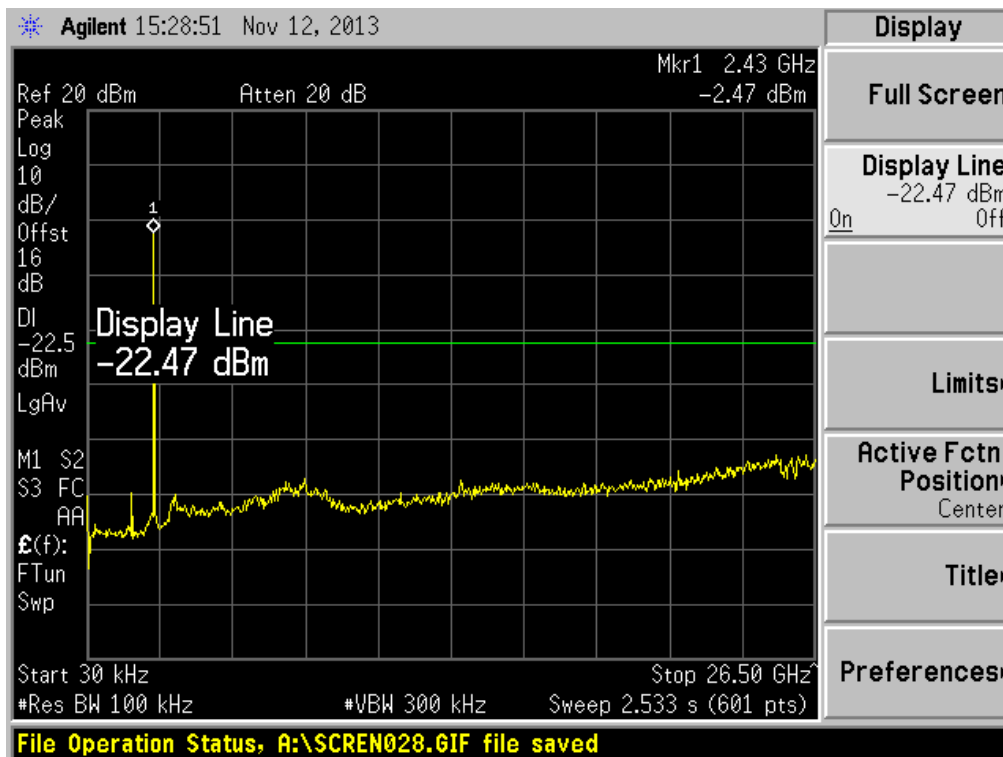
12. ANTENNA1-802.11n(40M)-2452MHz



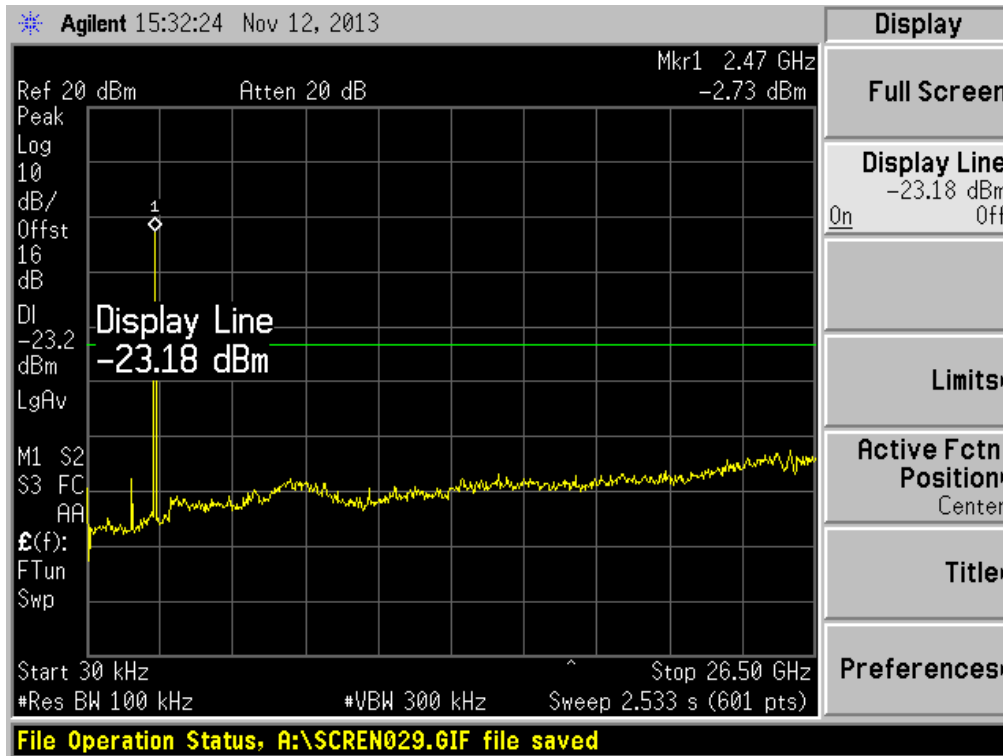
13. ANTENNA2-802.11b -2412MHz



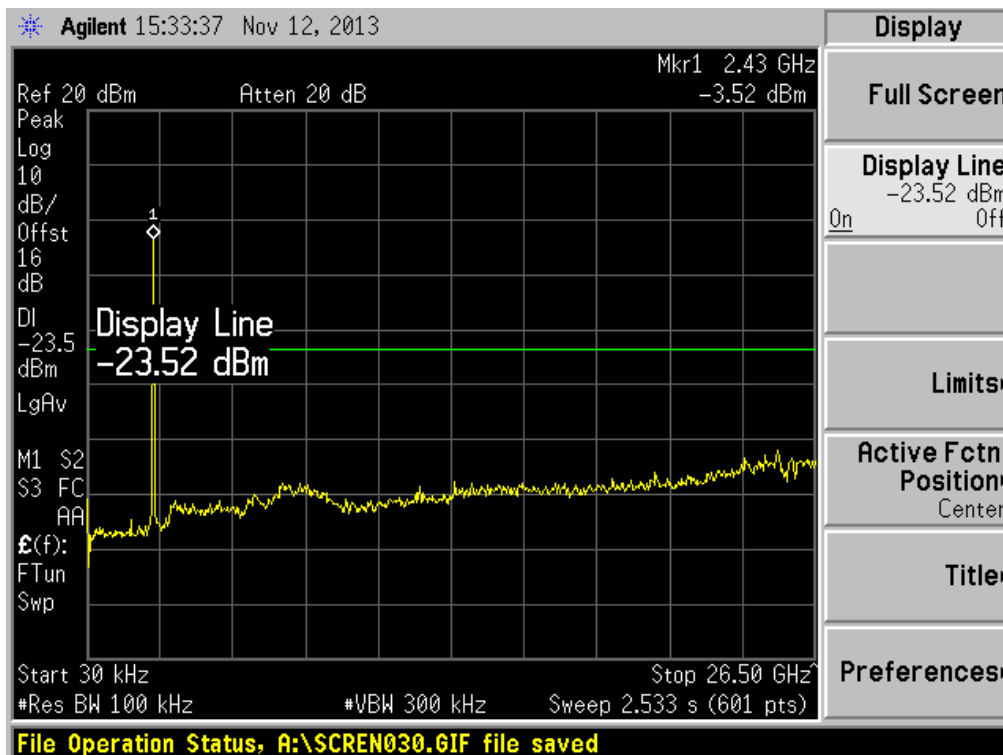
14. ANTENNA2-802.11b -2437MHz



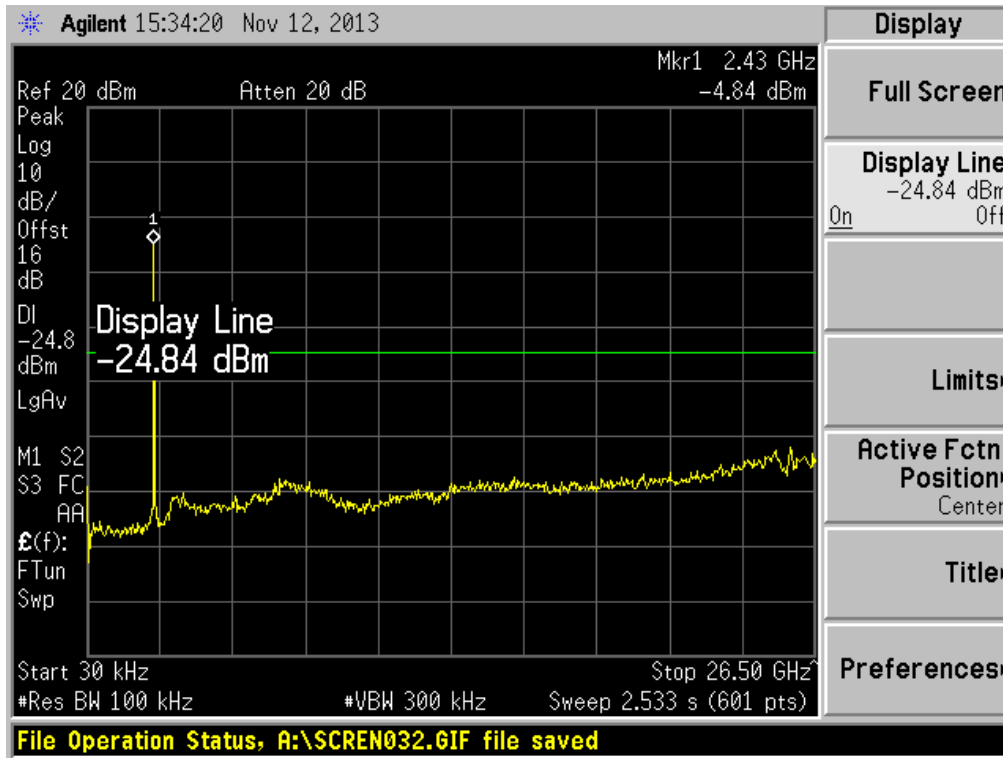
15. ANTENNA2-802.11b -2462MHz



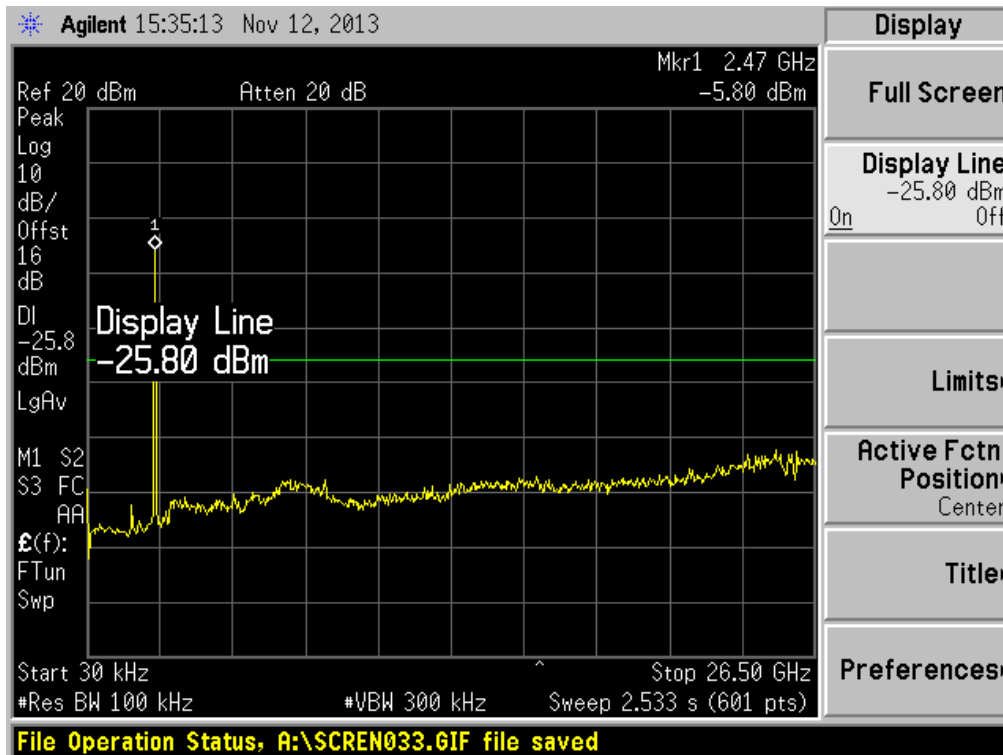
16. ANTENNA2-802.11g -2412MHz



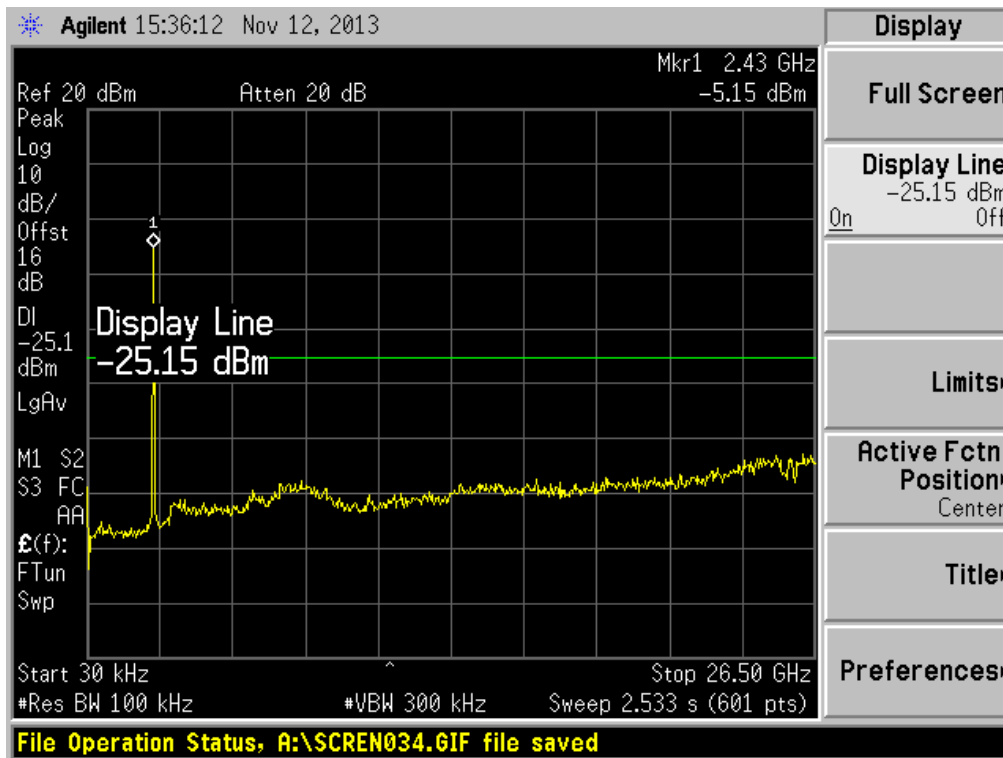
17. ANTENNA2-802.11g -2437MHz



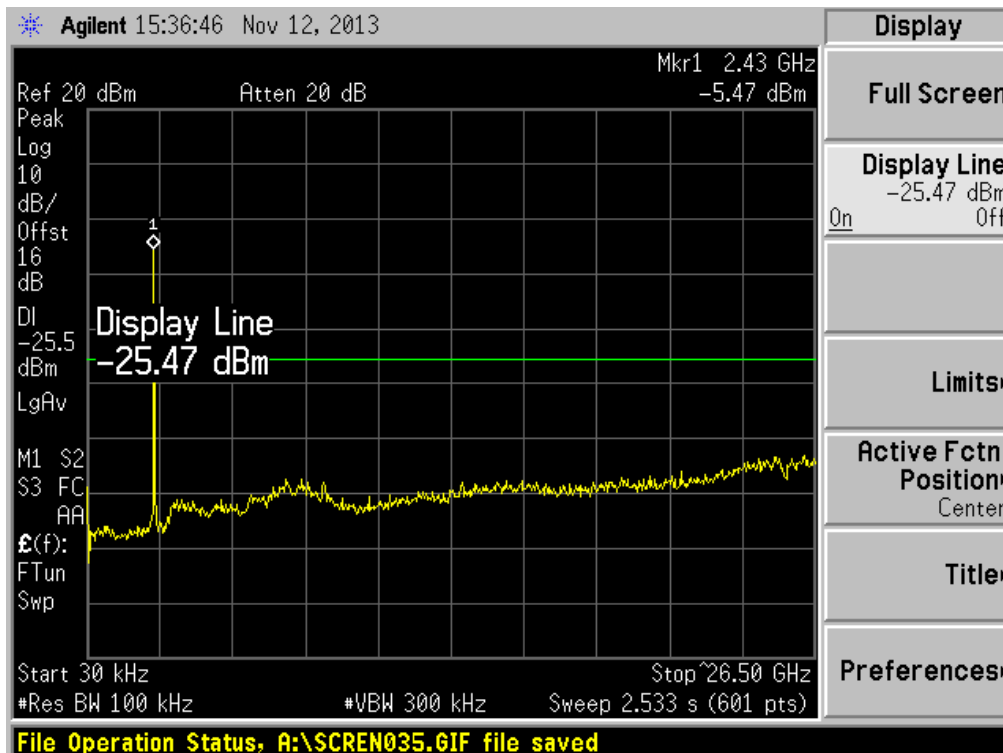
18. ANTENNA2-802.11g-2462MHz



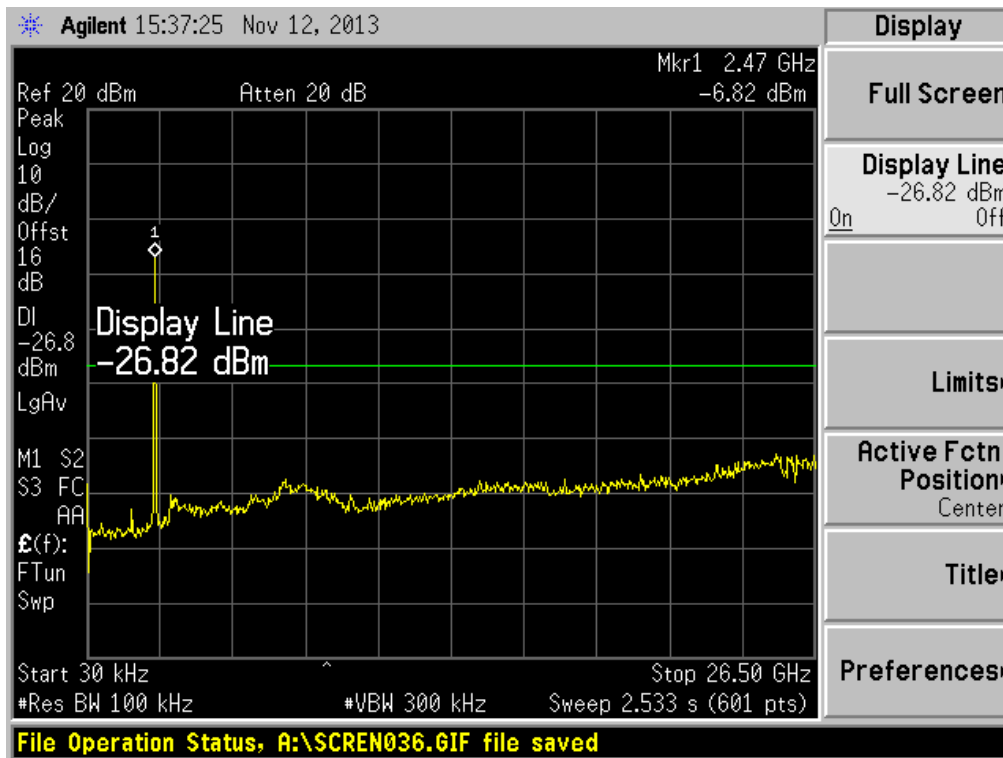
19. ANTENNA2-802.11n(20M)-2412MHz



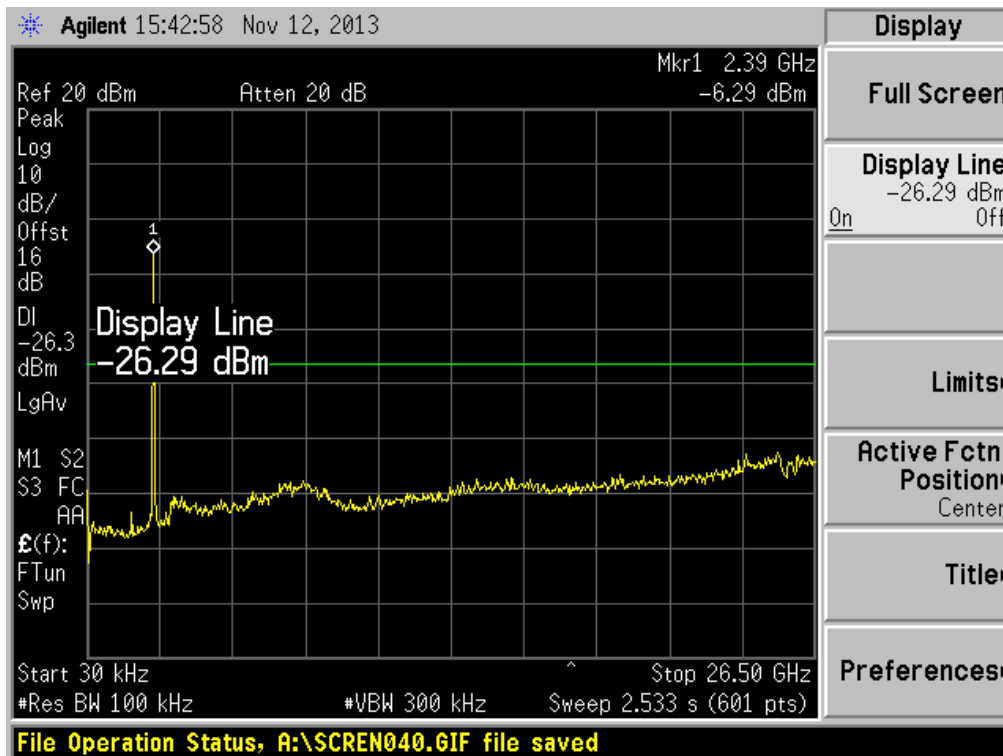
20. ANTENNA2-802.11n(20M)-2437MHz



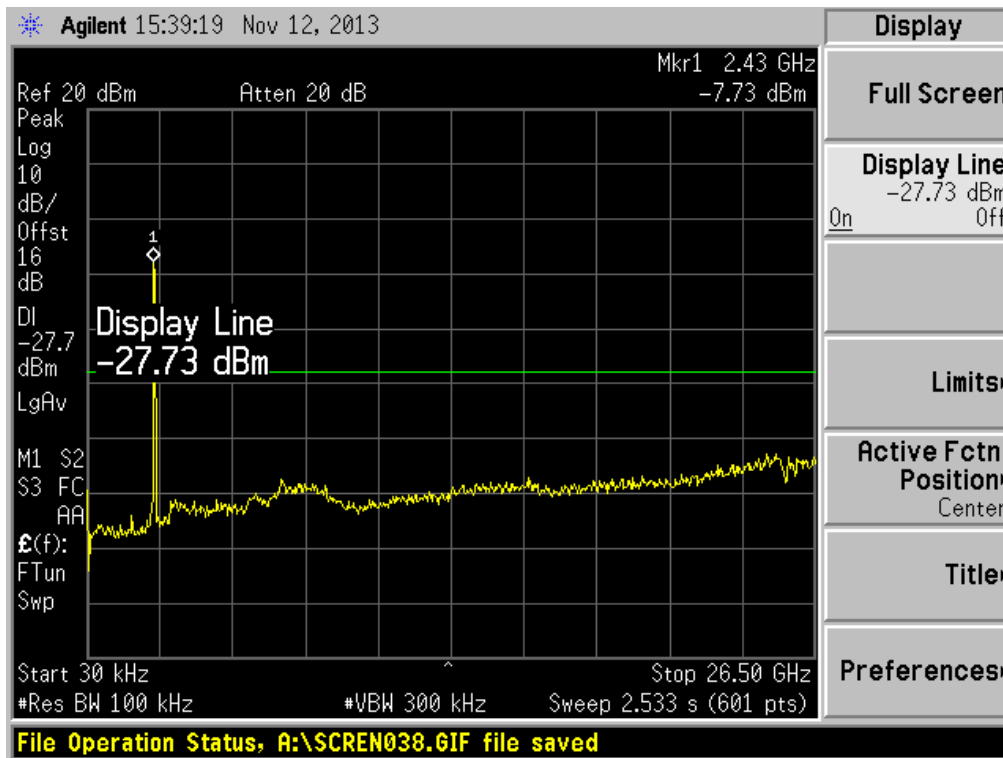
21. ANTENNA2-802.11n(20M)-2462MHz



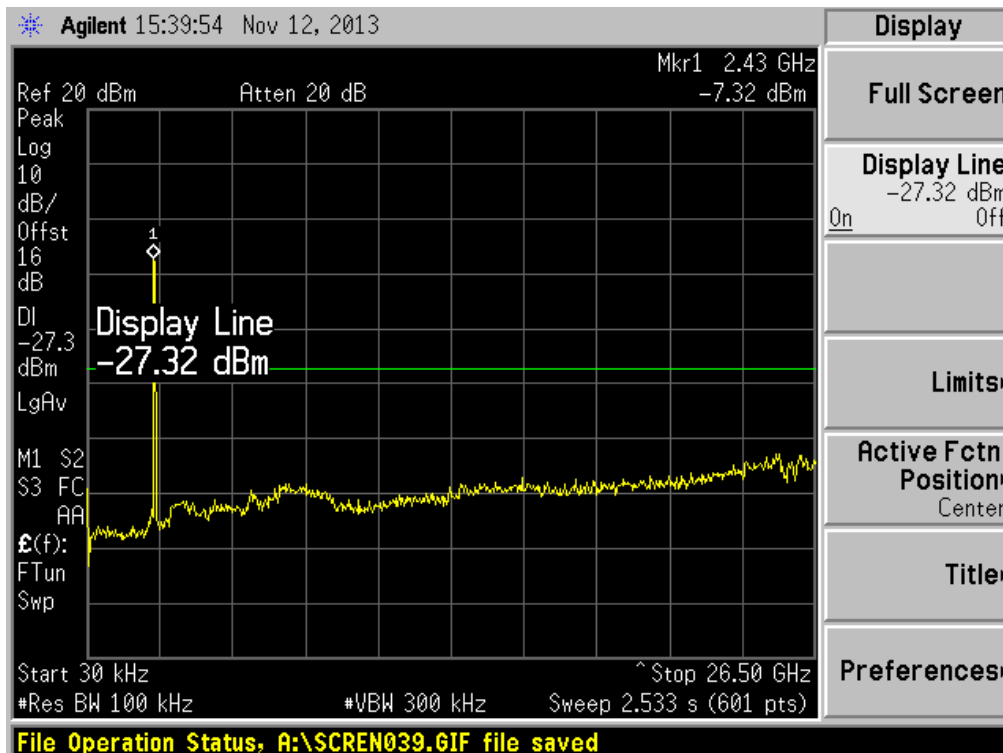
22. ANTENNA2-802.11n(40M)-2422MHz



23. ANTENNA2-802.11n(40M)-2437MHz



24. ANTENNA2-802.11n(40M)-2452MHz



5.7 Power Spectrum Density Measurement

5.7.1 Limits of Power Spectrum Density

The peak power spectral density conducted from the intentional radiator to the Antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

5.7.2 Test Procedure

- The test follows FCC KDB Publication No.558074 (Measurement Guidelines of DTS).
- The RF output of EUT was connected to the spectrum analyzer by a low loss cable.
- Take the measured data from spectrum analyzer.

5.7.3 Test Setup

Same as 5.3.3

5.7.4 EUT Setup and Operating Conditions

Same as 5.3.4

5.7.5 Test Results

ANTENNA1

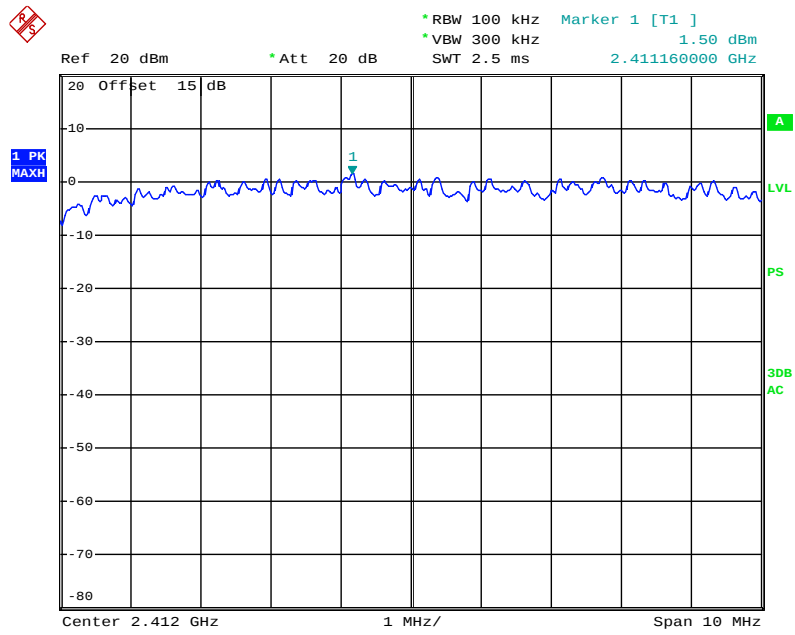
EUT Modulation	Operating Frequency (MHz)	Power spectrum density (dBm/100kHz)	BWCF (dB)	Power spectrum density (dBm/3kHz)	Limit (dBm/3kHz)
802.11b	2412	1.50	-15.2	-13.7	8
	2437	1.14		-14.06	
	2462	0.39		-14.81	
802.11g	2412	-2.08		-17.28	
	2437	-2.14		-17.34	
	2462	-2.86		-18.06	
802.11n(20M)	2412	-2.51		-17.71	
	2437	-2.65		-17.85	
	2462	-3.27		-18.47	
802.11n(40M)	2422	-5.15		-20.35	
	2437	-5.44		-20.64	
	2452	-5.39		-20.59	

ANTENNA2

EUT Modulation	Operating Frequency (MHz)	Power spectrum density (dBm/100kHz)	BWCF (dB)	Power spectrum density (dBm/3kHz)	Limit (dBm/3kHz)
802.11b	2412	-0.65	-15.2	-15.85	8
	2437	-1.58		-16.78	
	2462	-2.81		-18.01	
802.11g	2412	-4.73		-19.93	
	2437	-5.32		-20.52	
	2462	-6.16		-21.36	
802.11n(20M)	2412	-5.92		-21.12	
	2437	-6.63		-21.83	
	2462	-8.16		-23.36	
802.11n(40M)	2422	-8.00		-23.20	
	2437	-8.13		-23.33	
	2452	-8.34		-23.54	

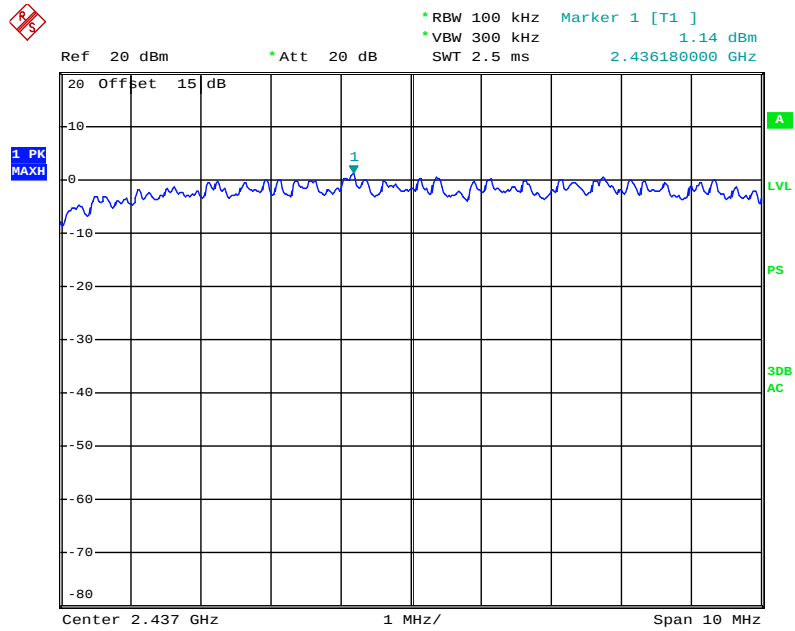
Test Plots:

1. ANTENNA1-802.11b-2412MHz



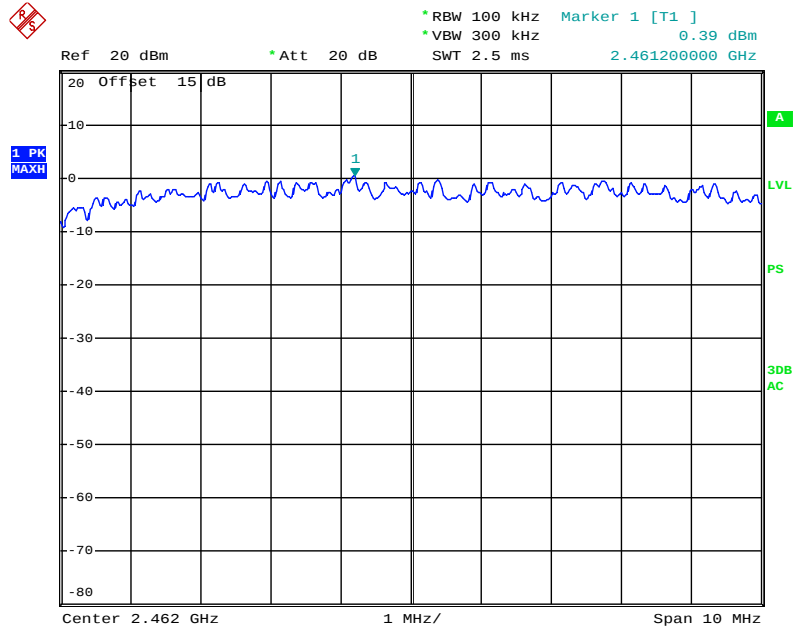
Date: 19.NOV.2013 16:41:28

2. ANTENNA1-802.11b-2437MHz



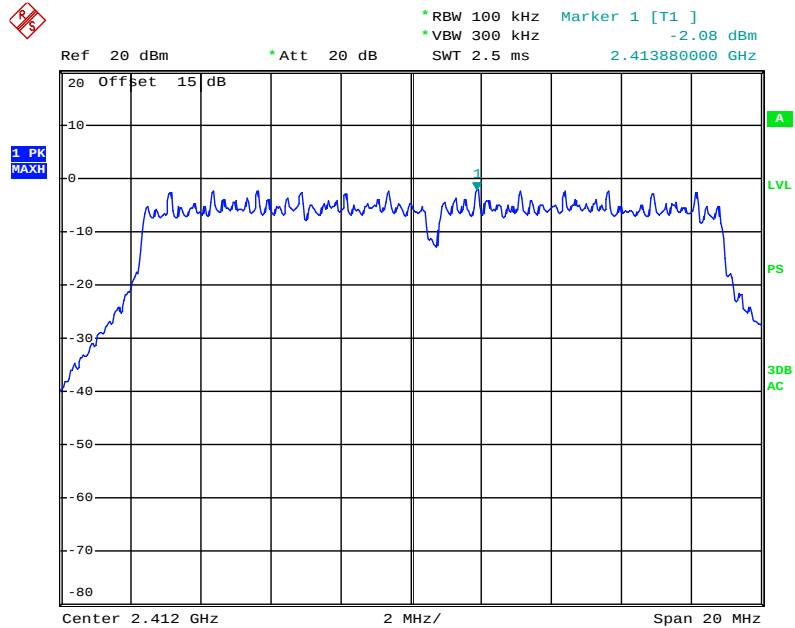
Date: 19.NOV.2013 16:41:57

3. ANTENNA1-802.11b-2462MHz



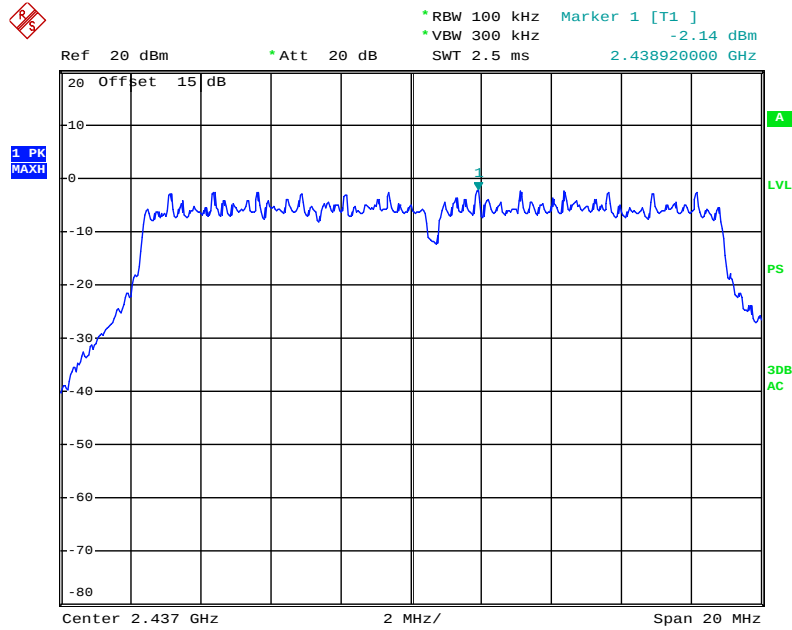
Date: 19.NOV.2013 16:42:26

4. ANTENNA1-802.11g-2412MHz



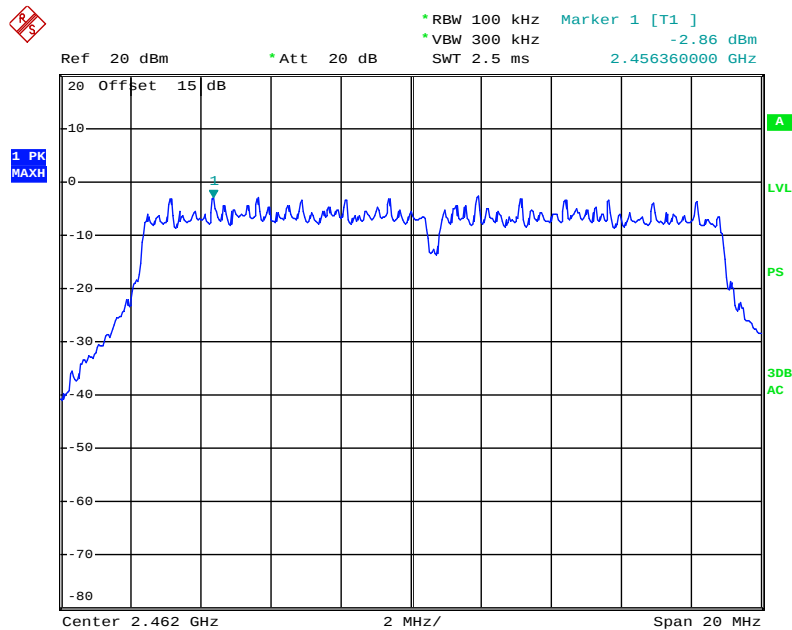
Date: 19.NOV.2013 16:48:39

5. ANTENNA1-802.11g-2437MHz



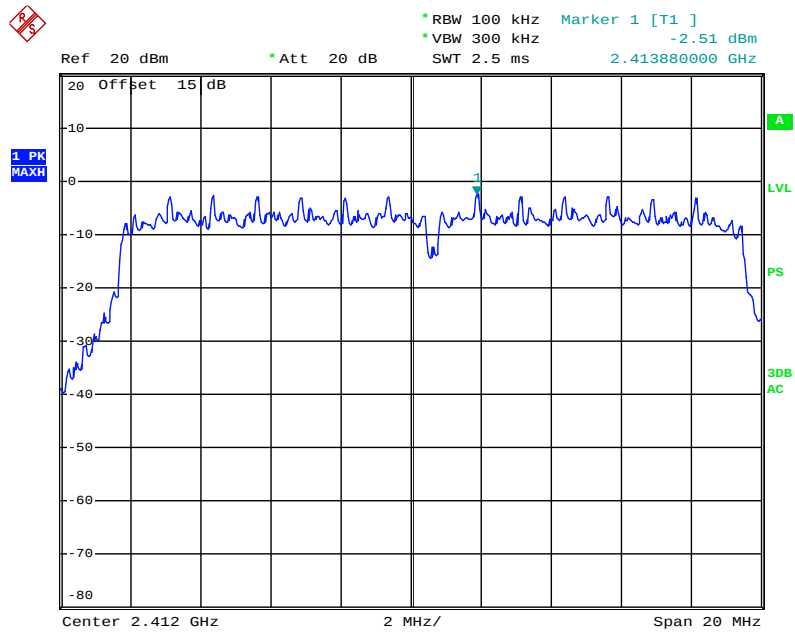
Date: 19.NOV.2013 16:49:19

6. ANTENNA1-802.11g-2462MHz



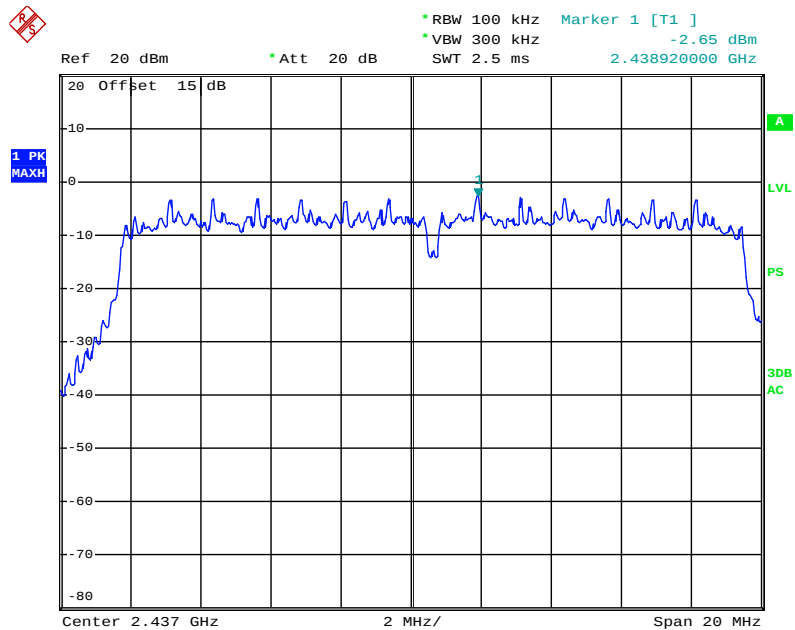
Date: 19.NOV.2013 16:49:45

7. ANTENNA1-802.11n(20M)-2412MHz



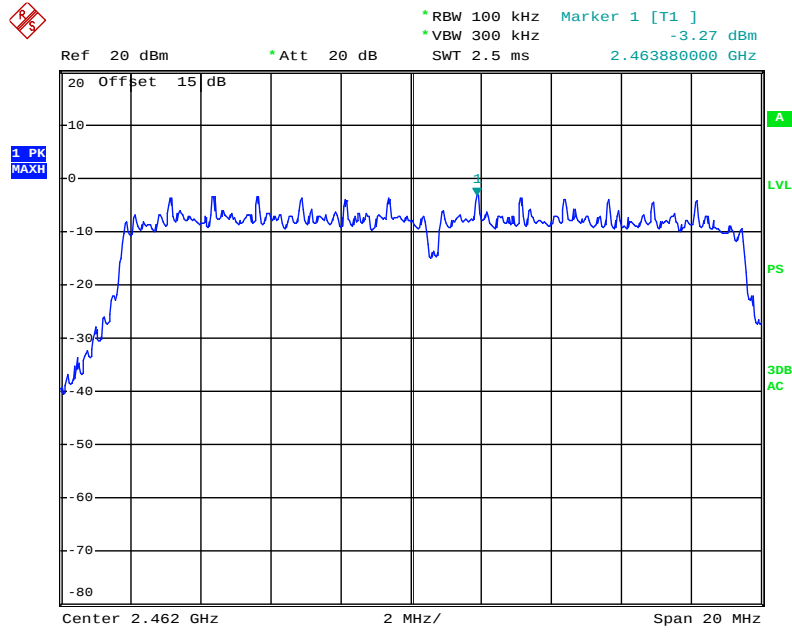
Date: 19.NOV.2013 16:50:26

8. ANTENNA1-802.11n(20M)-2437MHz



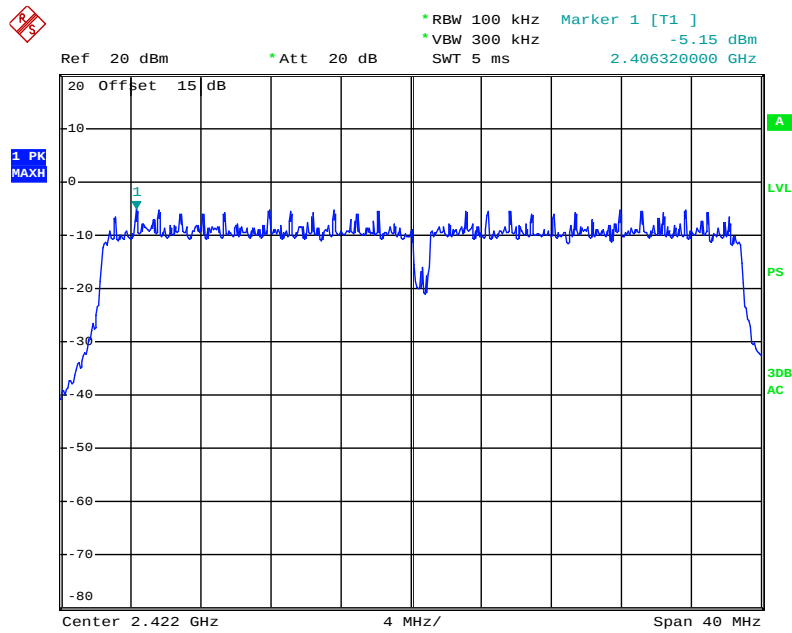
Date: 19.NOV.2013 16:50:55

9. ANTENNA1-802.11n(20M)-2462MHz



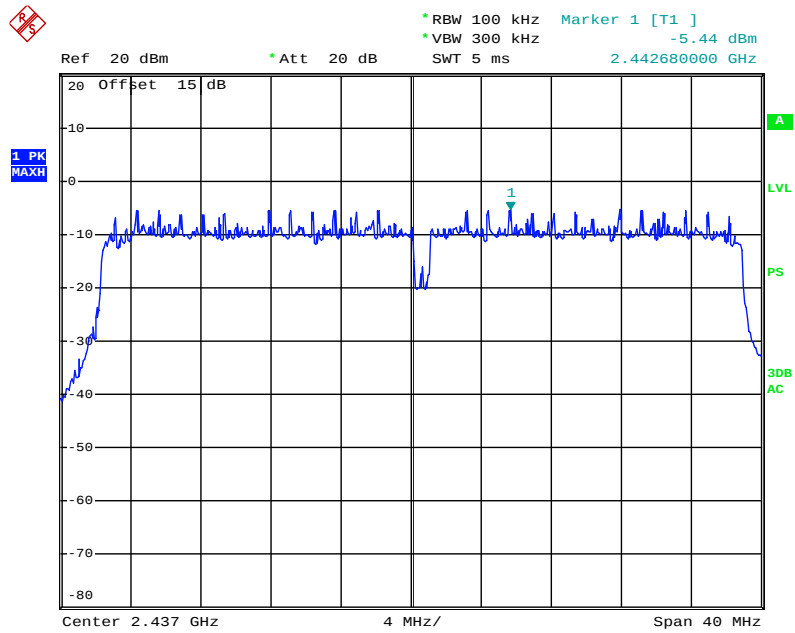
Date: 19.NOV.2013 16:51:19

10. ANTENNA1-802.11n(40M)-2412MHz



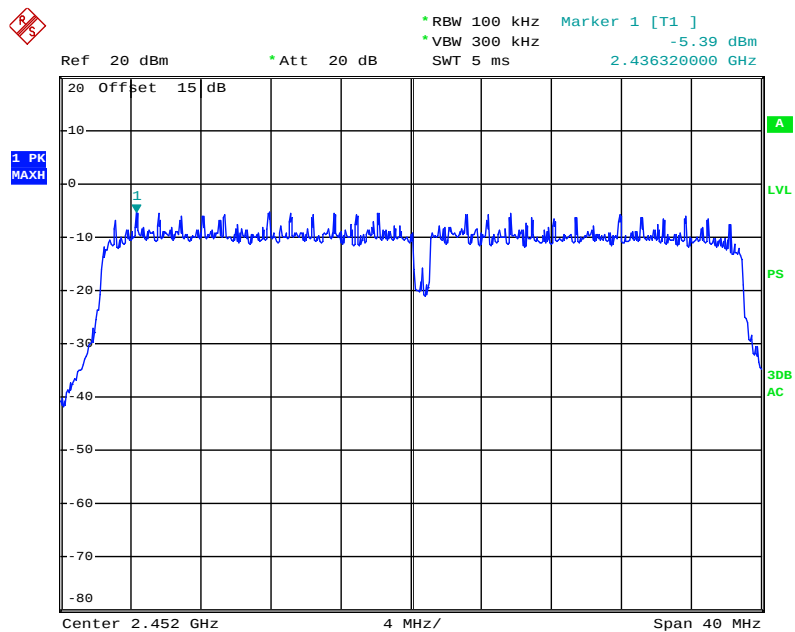
Date: 19.NOV.2013 16:52:43

11. ANTENNA1-802.11n(40M)-2437MHz



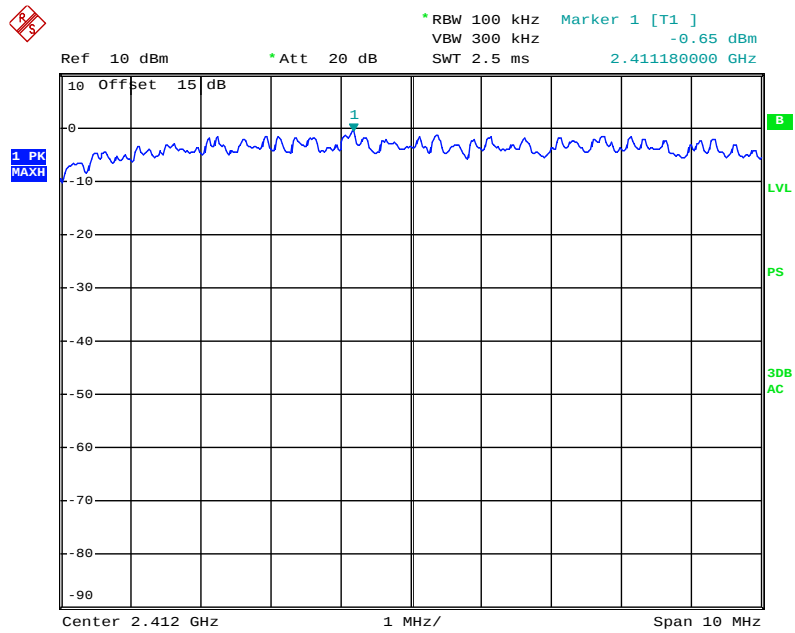
Date: 19.NOV.2013 16:53:09

12. ANTENNA1-802.11n(40M)-2462MHz



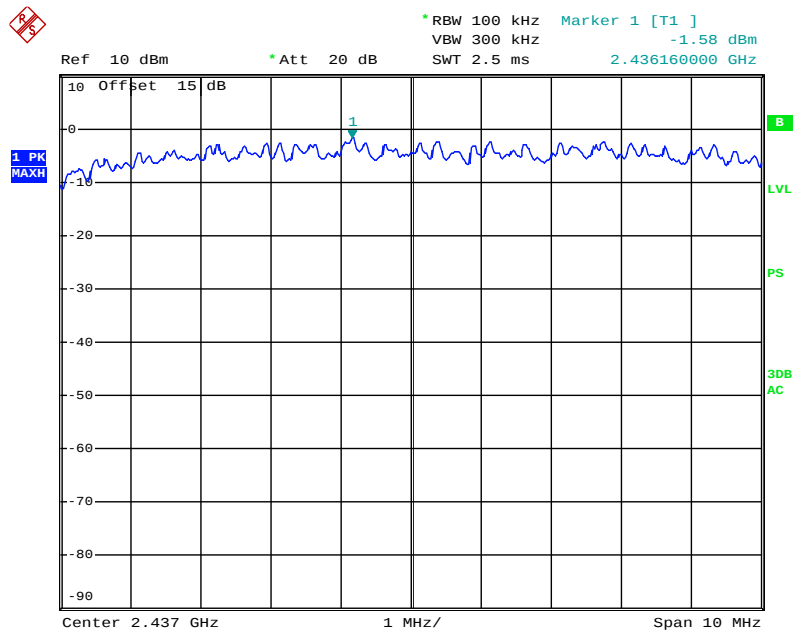
Date: 19.NOV.2013 16:53:32

13. ANTENNA2-802.11b-2412MHz



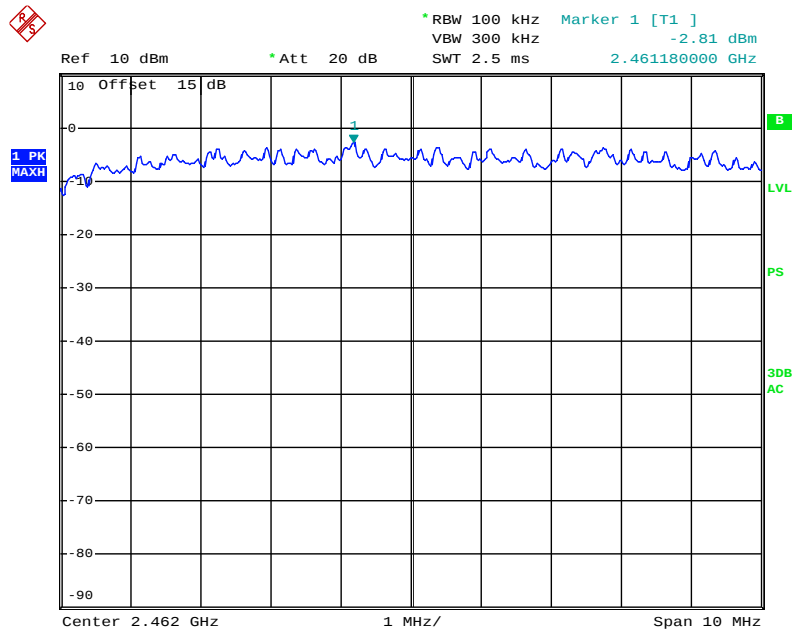
Date: 19.NOV.2013 17:28:31

14. ANTENNA2-802.11b-2437MHz



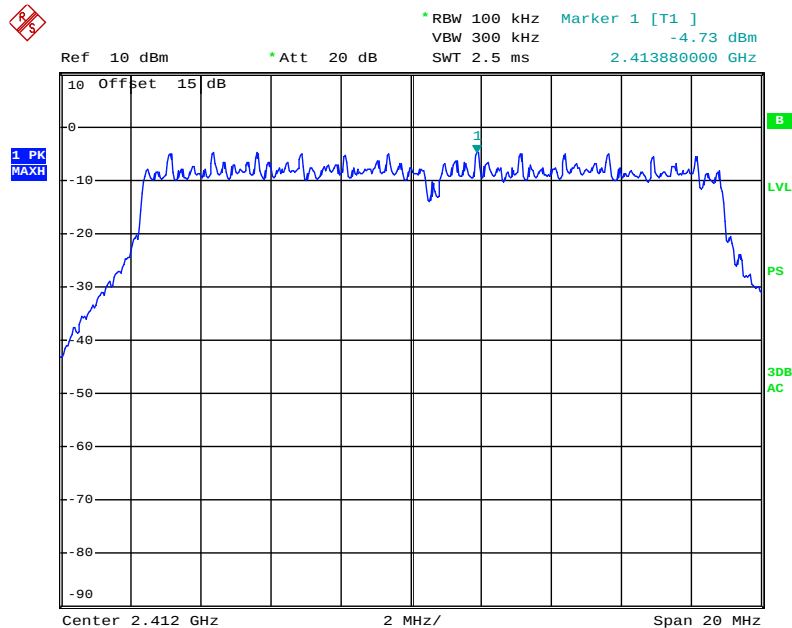
Date: 19.NOV.2013 17:28:56

15. ANTENNA2-802.11b-2462MHz



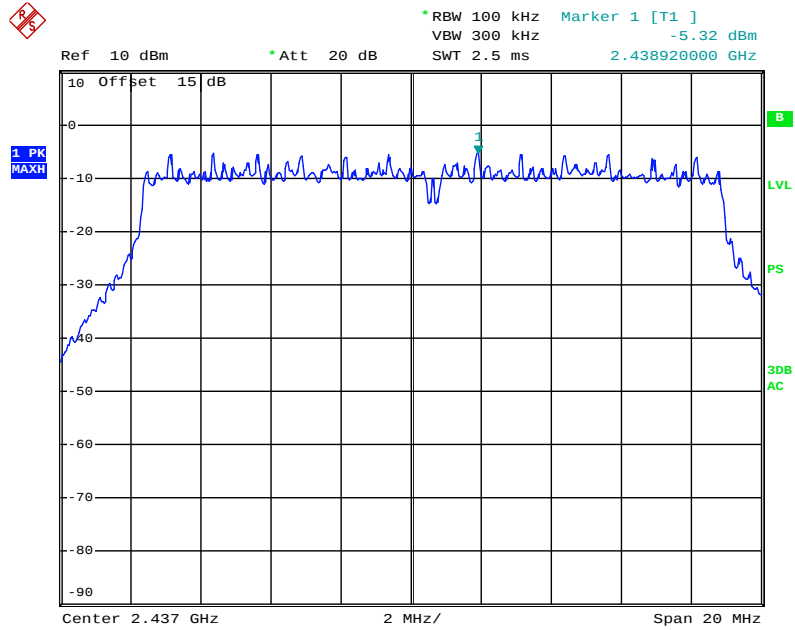
Date: 19.NOV.2013 17:29:20

16. ANTENNA2-802.11g-2412MHz



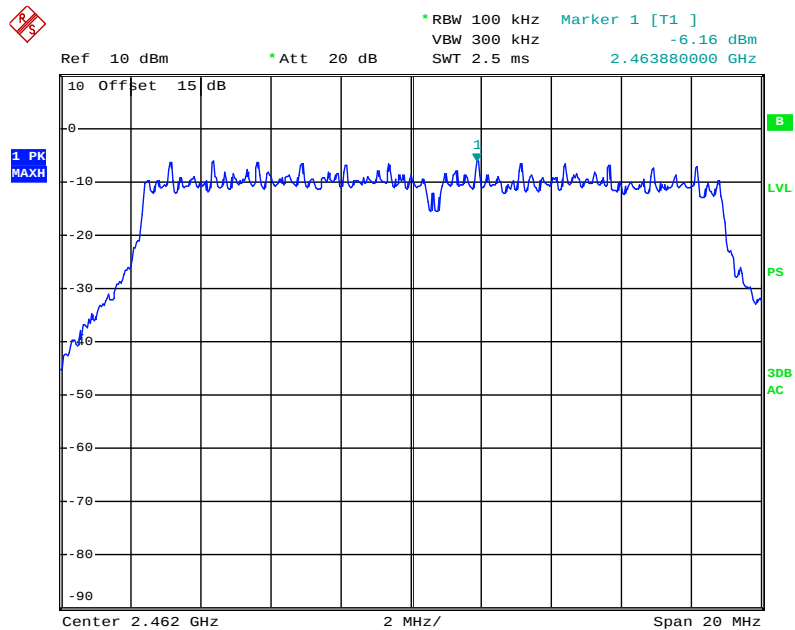
Date: 19.NOV.2013 17:30:08

17. ANTENNA2-802.11g-2437MHz



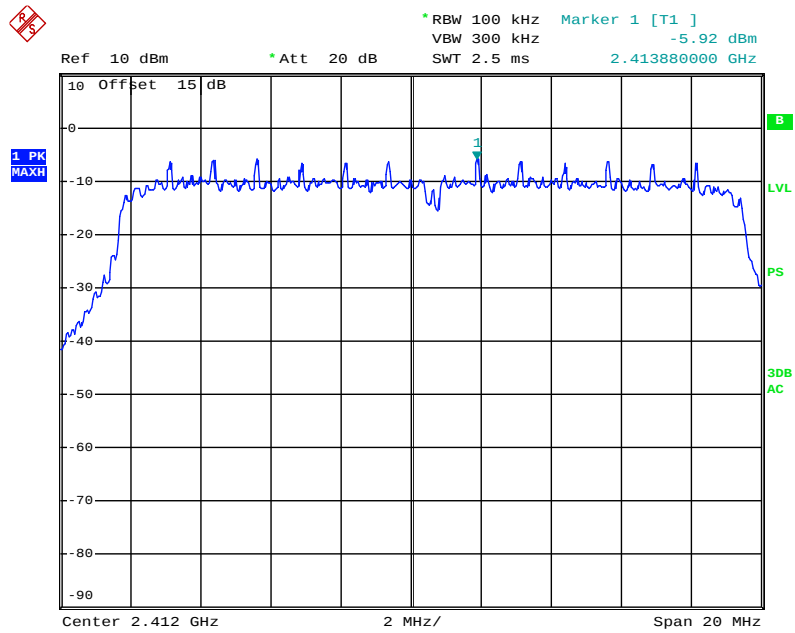
Date: 19.NOV.2013 17:30:33

18. ANTENNA2-802.11g-2462MHz



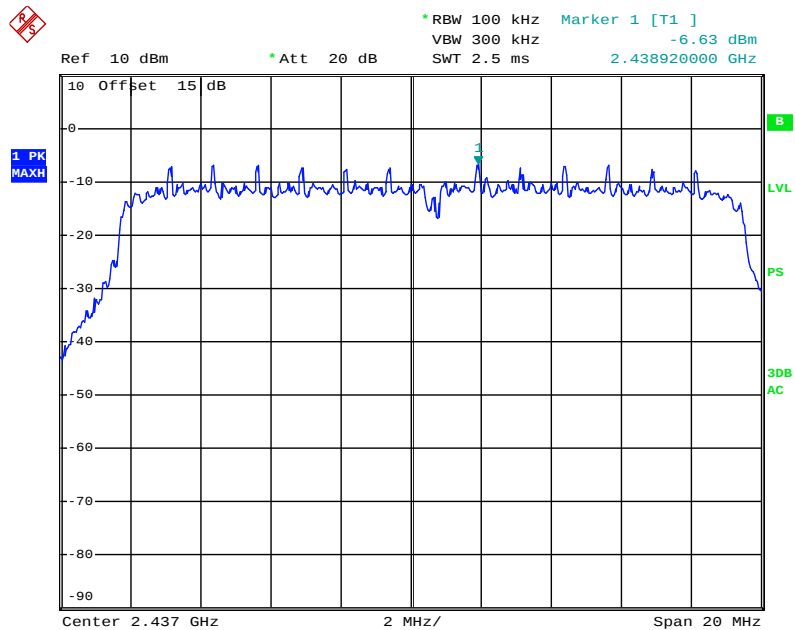
Date: 19.NOV.2013 17:30:56

19. ANTENNA2-802.11n(20M)-2412MHz



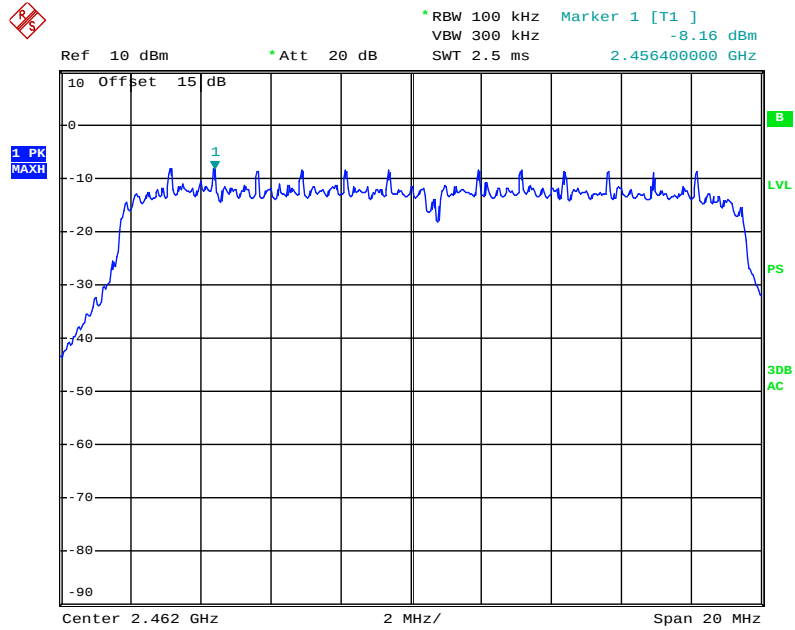
Date: 19.NOV.2013 17:31:37

20. ANTENNA2-802.11n(20M)-2437MHz



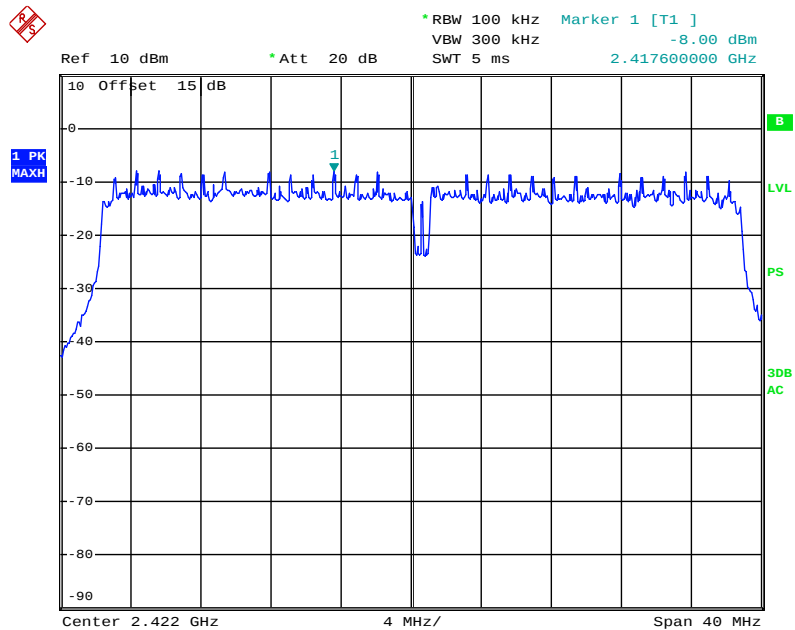
Date: 19.NOV.2013 17:32:04

21. ANTENNA2-802.11n(20M)-2462MHz



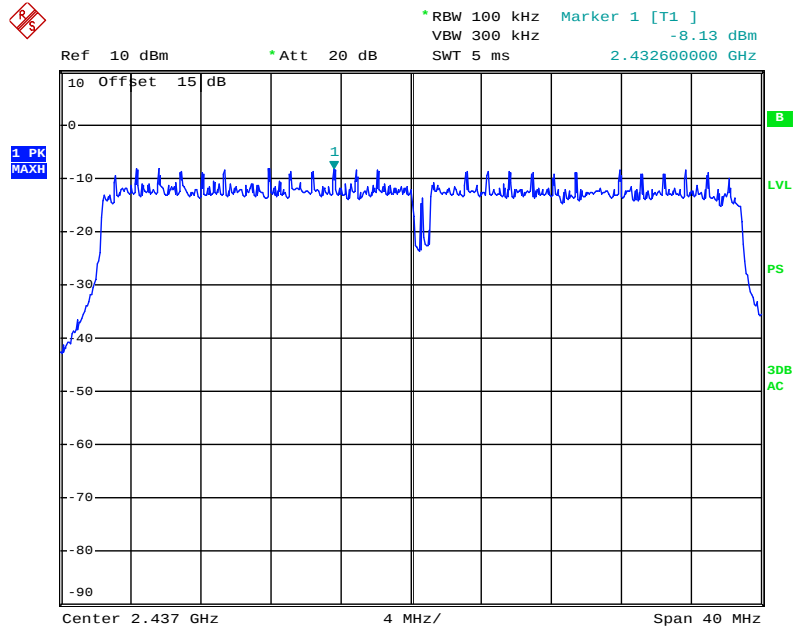
Date: 19.NOV.2013 17:32:28

22. ANTENNA2-802.11n(40M)-2412MHz



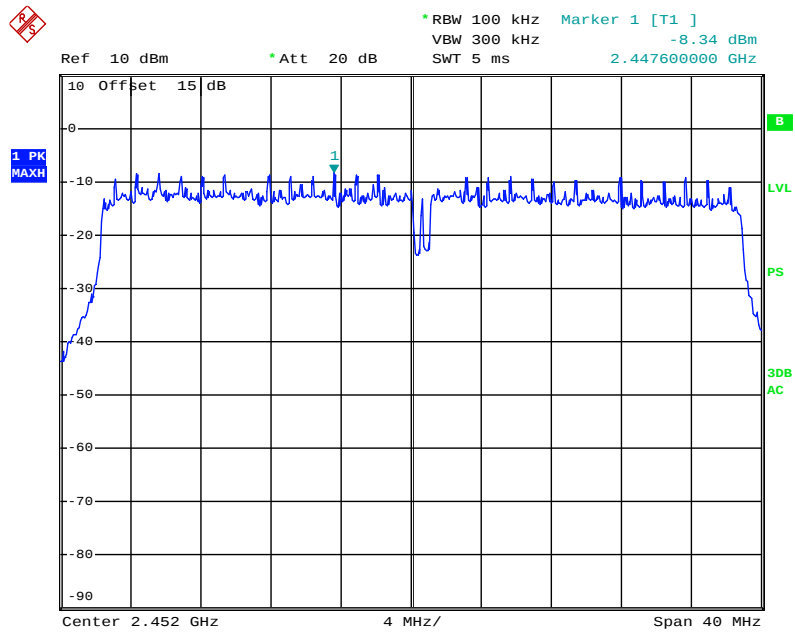
Date: 19.NOV.2013 17:33:09

23. ANTENNA2-802.11n(40M)-2437MHz



Date: 19.NOV.2013 17:33:38

24. ANTENNA2-802.11n(40M)-2462MHz



Date: 19.NOV.2013 17:34:03

5.8 Antenna Requirements

5.8.1 Requirement of the standard

If directional gain of transmitting Antennas is greater than 6dBi, the power shall be reduced by the same level in dB comparing to gain minus 6dBi. 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 FCC rule.

5.8.2 Antenna Connected Construction

The Antennas type used in this product is Omni Antenna and it is considered to meet Antenna requirement.

5.8.3 Antenna Gain

The Antenna peak gain of EUT is less than 6 dBi. Therefore, it is not necessary to reduce maximum peak output power limit.

**** END OF REPORT ****