

Test Report

Product	WLAN in UPCS Base station	
Name and address of the applicant	Panasonic Corporation of North America	
Name and address of the manufacturer	Panasonic System Networks Co., Ltd. 1-62, 4-chome, Minoshima, Hakata-ku Fukuoka 812-8531, Japan	
Model	KX-PRW130	
Rating	120 V AC (Mains Powered)	
Trademark	Panasonic	
Serial number	/	
Additional information	/	
Tested according to	FCC Part 15.247 Frequency Hopping Transmitters / Digital Transmission Systems Industry Canada RSS-210, Issue 8 Low Power Licence-Exempt Radiocommunications Devices	
Order number	243527	
Tested in period	2013.11.04 to 2013.11.20	
Issue date	2013.11.26	
Name and address of the testing laboratory	 FCC No: 994405 IC OATS: 2040D-1 Instituttveien 6 Kjeller, Norway TEL: (+47) 22 96 03 30 FAX: (+47) 22 96 05 50	
		
	Prepared by [Frode Sveinsen]	Approved by [G.Suhanthakumar]
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1 INFORMATION

1.1 Test Item

Name :	Panasonic
FCC ID :	ACJ96NKX-PRW130
Industry Canada ID :	216A-KXPRW130
Model/version :	KX-PRW130
Serial number :	/
Hardware identity and/or version:	/
Software identity and/or version :	/
Frequency Range :	2412 – 2462 MHz
Number of Channels :	11
Operating Modes :	IEEE 802.11 b/g/n (20MHz BW only)
Type of Modulation :	Digital (DSSS, OFDM)
User Frequency Adjustment :	None
Conducted Output Power :	98 mW (Peak)
Type of Power Supply :	AC Adaptor PNLV236(UC)
Antenna Connector :	None
Number of Antennas :	1
Antenna Diversity Supported :	No

Description of Test Item

The EUT is a UPCS Base Station with an integrated WLAN Base Station.

Exposure Evaluation

The EUT is designed to be fixed to a wall etc. and the user manual contains text that it shall be mounted with a separation distance of at least 20 cm from any humans. For the purposes of exposure evaluation this EUT is a mobile or fixed device. MPE Calculation at 20 cm satisfying FCC requirements is submitted as a separate document.

The EUT is exempted from RF Exposure Evaluation to Industry Canada requirements since the output power complies with the power levels of section 2.5.2 of RSS-102 Issue 4.

1.2 Test Environment

1.2.1 *Normal test condition*

Temperature:	20.4 – 23.3 °C
Relative humidity:	28 – 43 %
Normal test voltage:	120 V AC

The values are the limit registered during the test period.

1.3 Test Engineer(s)

Frode Sveinsen
Thomas Dangle

1.4 Test Equipment

See list of test equipment in clause 6.

2 TEST REPORT SUMMARY

2.1 General

All measurements are traceable to national standards.

The tests were conducted for the purpose of demonstrating compliance with FCC CFR 47 Part 15, paragraph 15.247 and Industry Canada RSS-210 Issue 8.

Radiated tests were conducted in accordance with ANSI C63.4-2003 and KDB 558074 D01 DTS Measurement Guidance v03. The radiated tests were made in a semi-anechoic chamber at measuring distances of 3m and 10m.

A description of the test facility is on file with the FCC and Industry Canada.

New Submission

Production Unit

Class II Permissive Change

Pre-production Unit

DTS Equipment Code

Family Listing



THIS TEST REPORT APPLIES ONLY TO THE ITEM(S) AND CONFIGURATIONS TESTED.

Deviations from, additions to, or exclusions from the test specifications are described in "Summary of Test Data".

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2.2 Test Summary

Name of test	FCC Part 15 reference	RSS-210 Issue 8 reference	Result
Supply Voltage Variations	15.31(e)	8 (RSS-GEN)	Complies
Number of Operating Frequencies	15.31(m)	A8.1	Complies
Antenna Requirement	15.203	7.1.4 (RSS-GEN)	Complies
Power Line Conducted Emission	15.107(a) 15.207(a)	7.2.2 (RSS-GEN)	Complies
Channel Separation	15.247(a)(1)	A8.1	N/A
Pseudorandom Hopping Algorithm	15.247(a)(1)	A8.1	N/A
Time of Occupancy	15.247(a)(1)(iii)	A8.1	N/A
Occupied Bandwidth	N/A	A8.1	No requirement
Minimum 6 dB Bandwidth	15.247(a)(2)	A8.2	Complies
Peak Power Output	15.247(b)	A8.4	Complies
Power Spectral Density	15.247(d)	A8.2	Complies
Spurious Emissions (Antenna Conducted)	15.247(c)	A8.5	Complies ¹
Spurious Emissions (Radiated)	15.247(c) 15.109(a) 15.209(a)	A8.5	Complies

¹ The tested equipment has integrated antennas only.

2.3 Description of modification for Modification Filing

Not applicable.

2.4 Comments

The measurements were done with the EUT powered by 120 V AC. It was checked that power variations between 85% and 115% did not have any influence on the measurements.

All ports were populated during spurious emission measurements.

2.5 Family List Rational

Not Applicable.

3 TEST RESULTS

3.1 Power Line Conducted Emissions

Para. No.: 15.207 (a)

Test Performed By: Thomas Dangle	Date of Test: 4-Nov-2013
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Measurement procedure: ANSI C63.4-2009 using 50 μ H/50 ohms LISN.

Test Results: Complies

Measurement Data: See attached graph, (Peak detector).

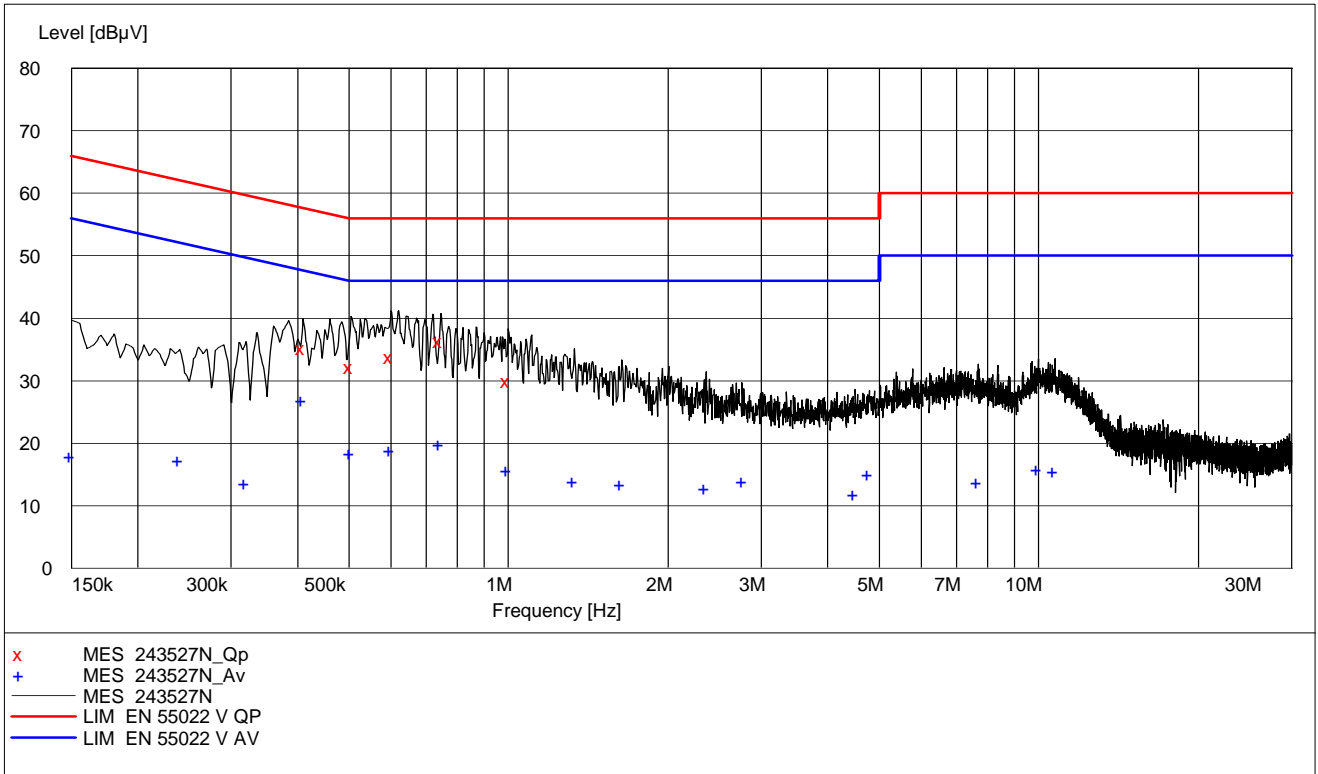
Highest measured value (L1 and N):

Off-Hook, Speech Mode, AC Adaptor PNLV236(UC), 120V 60Hz:

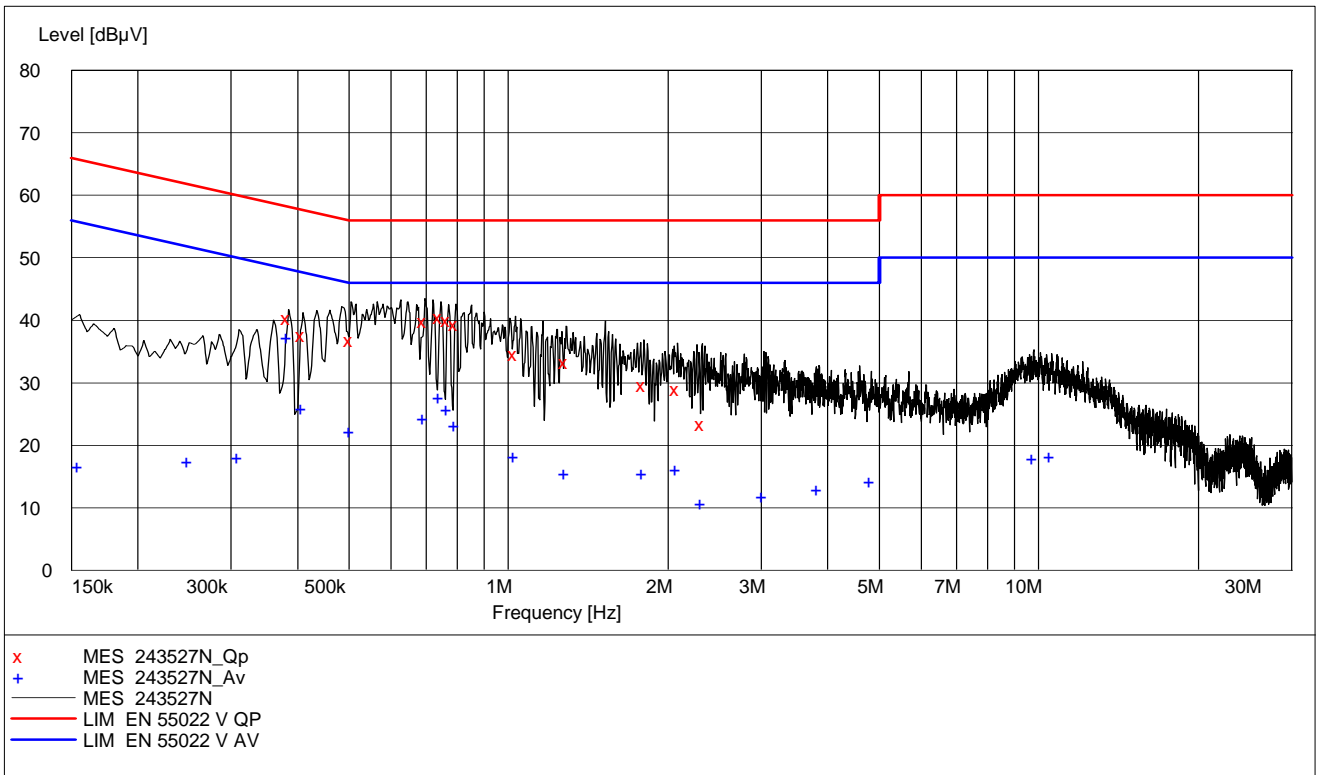
Frequency [MHz]	Level [dBuV]	Af [dB]	Limit [dBuV]	Margin [dB]	Det	Position	Verdict [Pass/Fail]
0.410000	35.30	10.20	57.60	22.30	QP	L1	Pass
0.505000	32.10	10.20	56.00	23.90	QP	L1	Pass
0.600000	33.80	10.20	56.00	22.20	QP	L1	Pass
0.745000	36.30	10.20	56.00	19.70	QP	L1	Pass
1.000000	29.90	10.20	56.00	26.10	QP	L1	Pass
0.150000	18.00	10.10	56.00	38.00	AV	N	Pass
0.240000	17.40	10.10	52.10	34.70	AV	L1	Pass
0.320000	13.60	10.10	49.70	36.10	AV	L1	Pass
0.410000	26.90	10.20	47.60	20.70	AV	L1	Pass
0.505000	18.40	10.20	46.00	27.60	AV	L1	Pass
0.600000	18.90	10.20	46.00	27.10	AV	L1	Pass
0.745000	19.80	10.20	46.00	26.20	AV	L1	Pass
1.000000	15.70	10.20	46.00	30.30	AV	L1	Pass
1.330000	14.00	10.20	46.00	32.00	AV	L1	Pass
1.635000	13.40	10.30	46.00	32.60	AV	L1	Pass
2.360000	12.80	10.30	46.00	33.20	AV	L1	Pass
2.780000	14.00	10.30	46.00	32.00	AV	L1	Pass
4.505000	11.80	10.40	46.00	34.20	AV	N	Pass
4.790000	15.00	10.40	46.00	31.00	AV	L1	Pass
7.695000	13.80	10.50	50.00	36.20	AV	L1	Pass
10.000000	15.80	10.60	50.00	34.20	AV	L1	Pass
10.735000	15.50	10.60	50.00	34.50	AV	L1	Pass

On-Hook, Charging Mode, AC Adaptor PNLV236(UC), 120V 60Hz:

Frequency [MHz]	Level [dBuV]	Af [dB]	Limit [dBuV]	Margin [dB]	Det	Position	Verdict [Pass/Fail]
0.385000	40.40	10.20	58.20	17.80	QP	L1	Pass
0.410000	37.70	10.20	57.60	19.90	QP	L1	Pass
0.505000	36.90	10.20	56.00	19.10	QP	L1	Pass
0.695000	39.80	10.20	56.00	16.20	QP	L1	Pass
0.745000	40.60	10.20	56.00	15.40	QP	L1	Pass
0.770000	40.10	10.20	56.00	15.90	QP	L1	Pass
0.795000	39.40	10.20	56.00	16.60	QP	L1	Pass
1.030000	34.60	10.20	56.00	21.40	QP	L1	Pass
1.285000	33.30	10.20	56.00	22.70	QP	L1	Pass
1.800000	29.70	10.20	56.00	26.30	QP	L1	Pass
2.085000	29.00	10.30	56.00	27.00	QP	L1	Pass
2.320000	23.40	10.30	56.00	32.60	QP	L1	Pass
0.155000	16.70	10.10	55.70	39.00	AV	L1	Pass
0.250000	17.60	10.10	51.80	34.20	AV	N	Pass
0.310000	18.10	10.10	50.00	31.90	AV	L1	Pass
0.385000	37.30	10.20	48.20	10.90	AV	L1	Pass
0.410000	26.00	10.20	47.60	21.60	AV	L1	Pass
0.505000	22.20	10.20	46.00	23.80	AV	L1	Pass
0.695000	24.40	10.20	46.00	21.60	AV	L1	Pass
0.745000	27.60	10.20	46.00	18.40	AV	L1	Pass
0.770000	25.80	10.20	46.00	20.20	AV	L1	Pass
0.795000	23.20	10.20	46.00	22.80	AV	L1	Pass
1.030000	18.30	10.20	46.00	27.70	AV	L1	Pass
1.285000	15.60	10.20	46.00	30.40	AV	L1	Pass
1.800000	15.50	10.20	46.00	30.50	AV	L1	Pass
2.085000	16.20	10.30	46.00	29.80	AV	L1	Pass
2.320000	10.80	10.30	46.00	35.20	AV	L1	Pass
3.035000	11.90	10.30	46.00	34.10	AV	L1	Pass
3.855000	13.00	10.30	46.00	33.00	AV	L1	Pass
4.830000	14.30	10.40	46.00	31.70	AV	L1	Pass
9.805000	17.90	10.60	50.00	32.10	AV	L1	Pass
10.575000	18.30	10.60	50.00	31.70	AV	L1	Pass



Off-Hook, Speech Mode, AC Adaptor PNLV236(UC), 120V 60Hz



On-Hook, Charging Mode, AC Adaptor PNLV236(UC), 120V 60Hz

3.2 Occupied Bandwidth (99% BW)

Para. No.: 15.247 (a)(1)(iii)

Test Performed By: Frode Sveinsen	Date of Test: 20-Nov-2013
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Test Results: Complies

Measurement Data: 11 RF channels in use

Modulation type and bitrate	Occupied Bandwidth / 99% BW (MHz)
	Ch 06, 2437 MHz
802.11b, 1 Mbps	14.9
802.11b, 11 Mbps	14.7
802.11g, 6 Mbps	16.4
802.11g, 54 Mbps	16.4
802.11n, MCS0	17.5
802.11n, MCS7	17.6

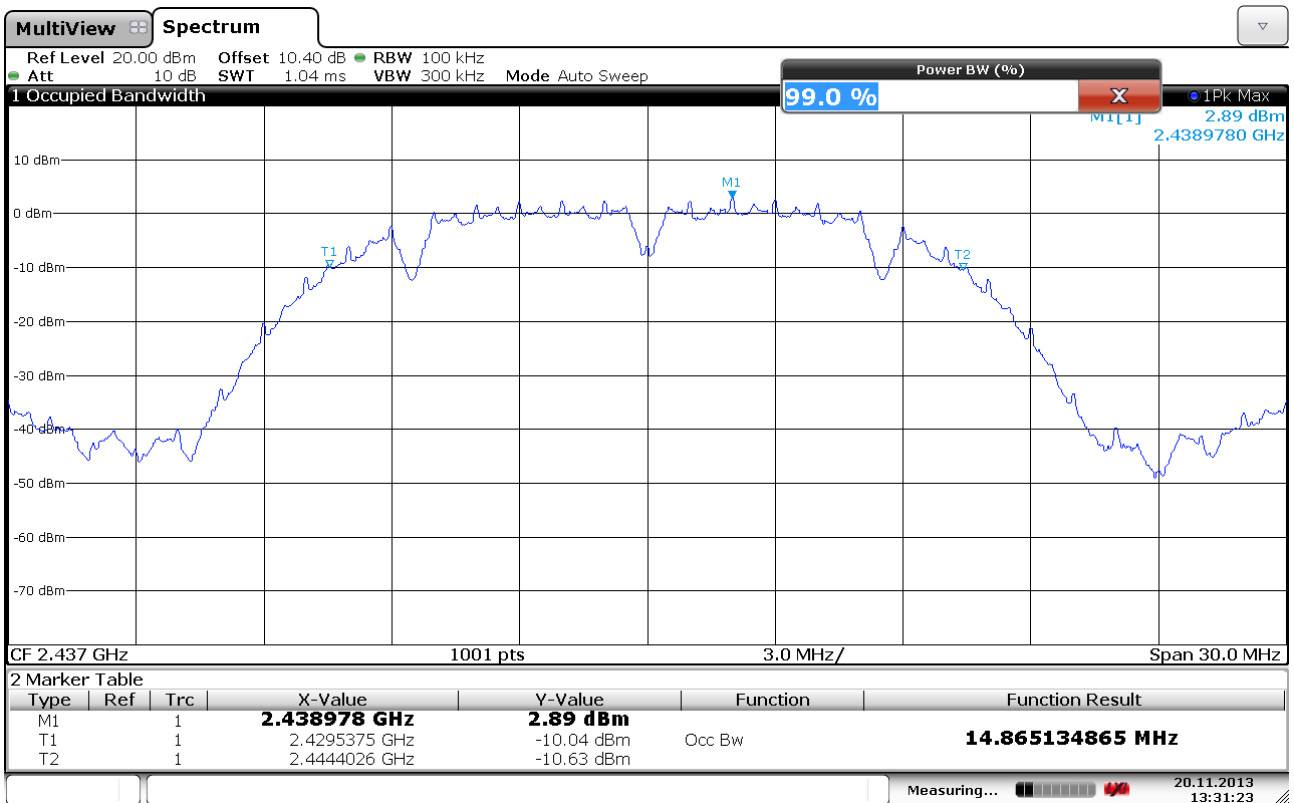
Occupied Bandwidth (99% BW) is reported for information only.

See attached graph.

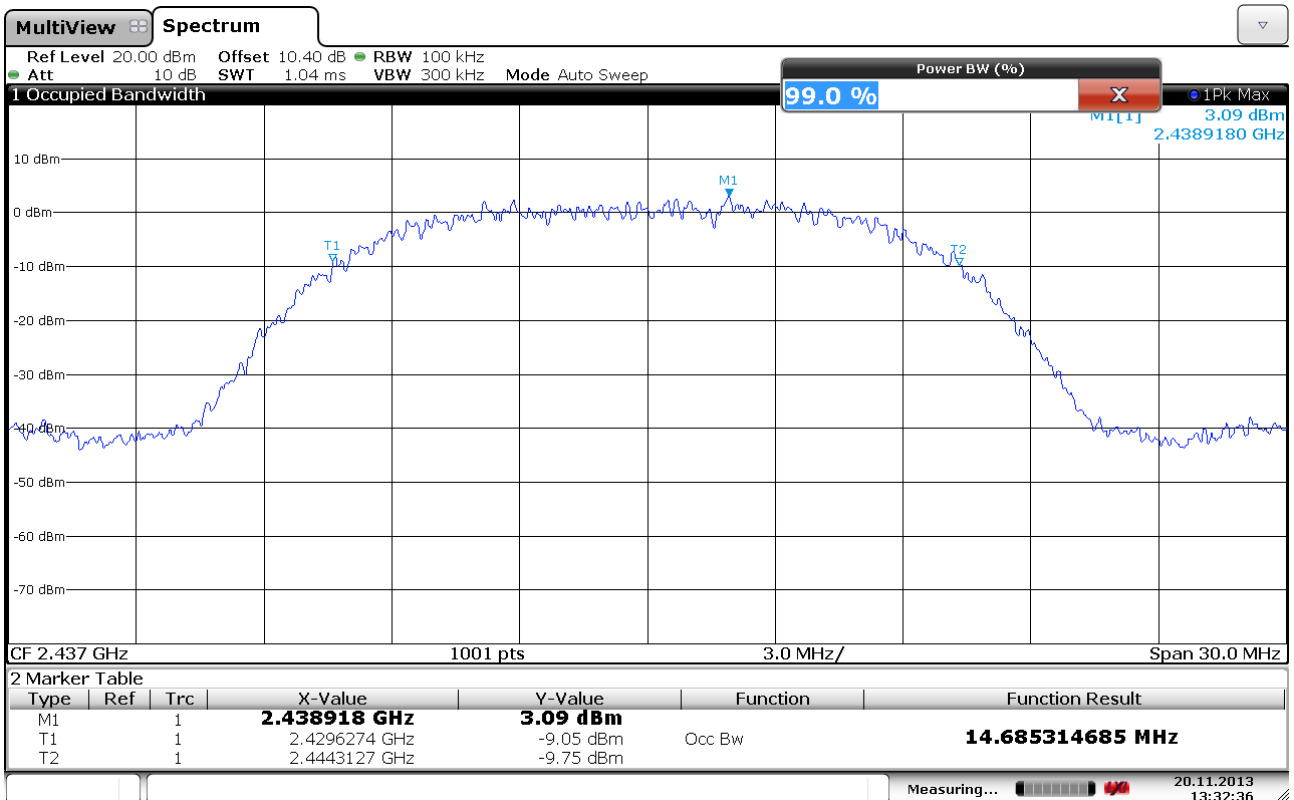
Requirements:

Frequency hopping systems in the 2400 - 2483.5 MHz band shall use at least 15 non-overlapping channels. No requirements for bandwidth for this frequency band.

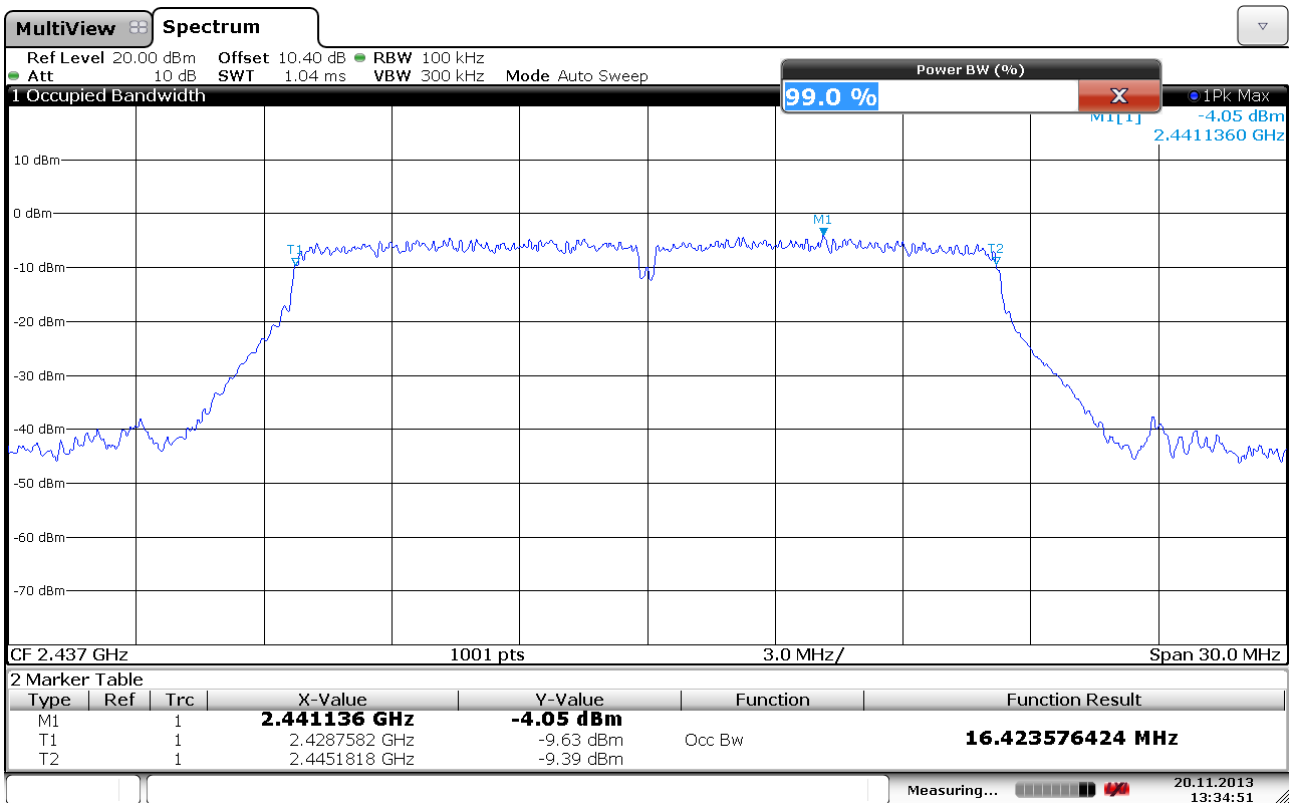
No requirements for Digital Transmission Systems.



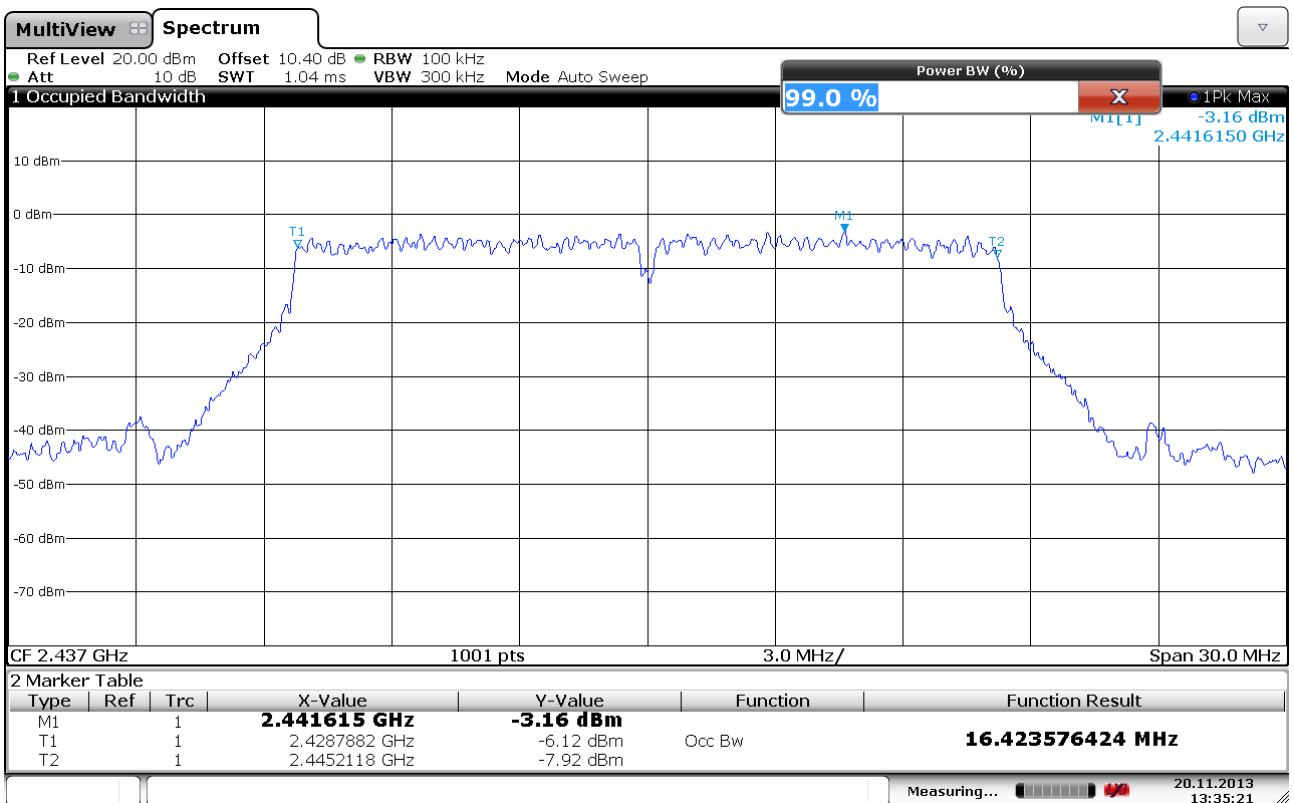
Occupied Bandwidth, 2437 MHz, 802.11b, 1Mbps



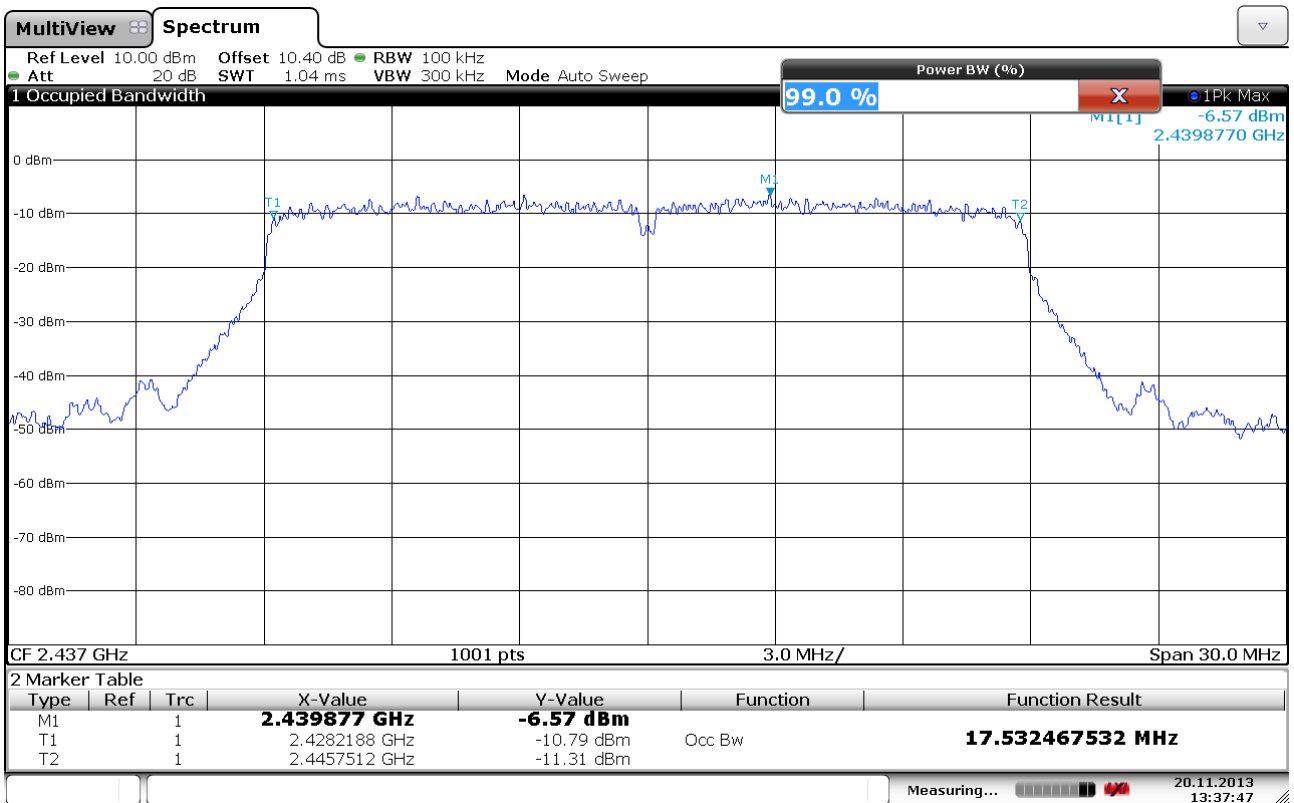
Occupied Bandwidth, 2437 MHz, 802.11b, 11Mbps



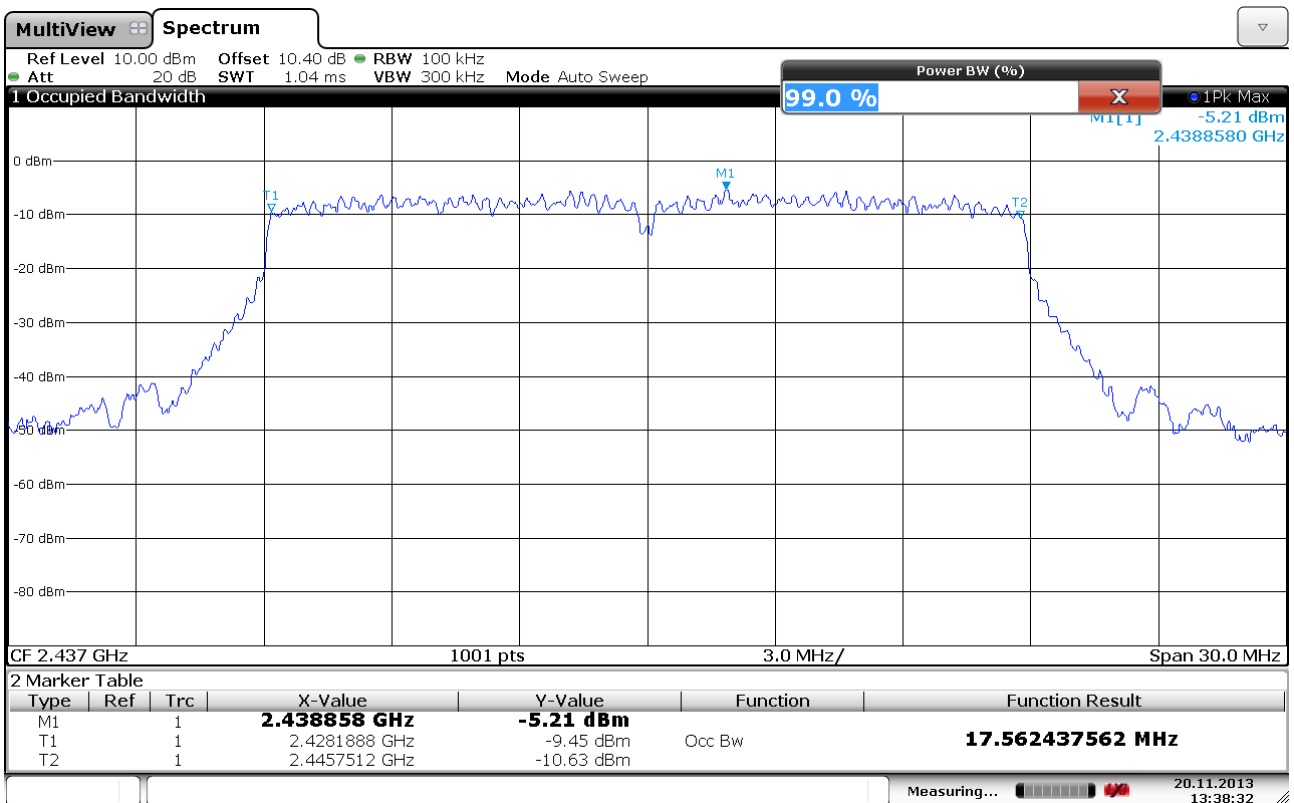
Occupied Bandwidth, 2437 MHz, 802.11g, 6Mbps



Occupied Bandwidth, 2437 MHz, 802.11g, 54Mbps



Occupied Bandwidth, 2437 MHz, 802.11n, MCS0



Occupied Bandwidth, 2437 MHz, 802.11n, MCS7

3.3 Minimum 6 dB Bandwidth (DTS Bandwidth)

Para. No.: 15.247 (a)(2)

Test Performed By: Frode Sveinsen	Date of Test: 20-Nov-2013
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Test Results: Complies

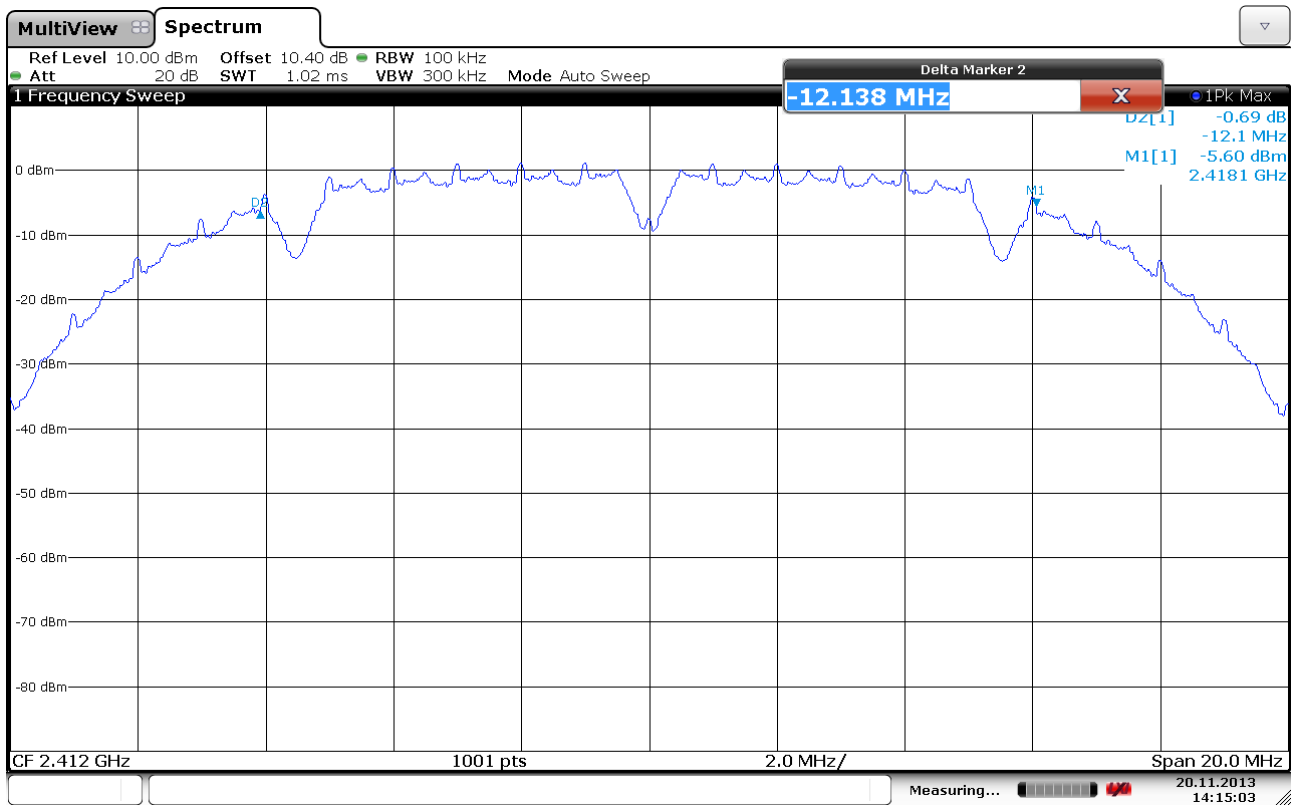
Measurement Data:

Modulation type and bitrate	Measured DTS Bandwidth (MHz)		
	Ch 1, 2412 MHz	Ch 6, 2437 MHz	Ch 11, 2462 MHz
802.11b, 1 Mbps	12.1	12.1	12.1
802.11b, 11 Mbps	11.5	11.7	12.1
802.11g, 6 Mbps	16.5	16.5	16.5
802.11g, 54 Mbps	16.6	16.5	16.6
802.11n, MCS0	17.7	17.7	17.7
802.11n, MCS7	17.7	17.7	17.7

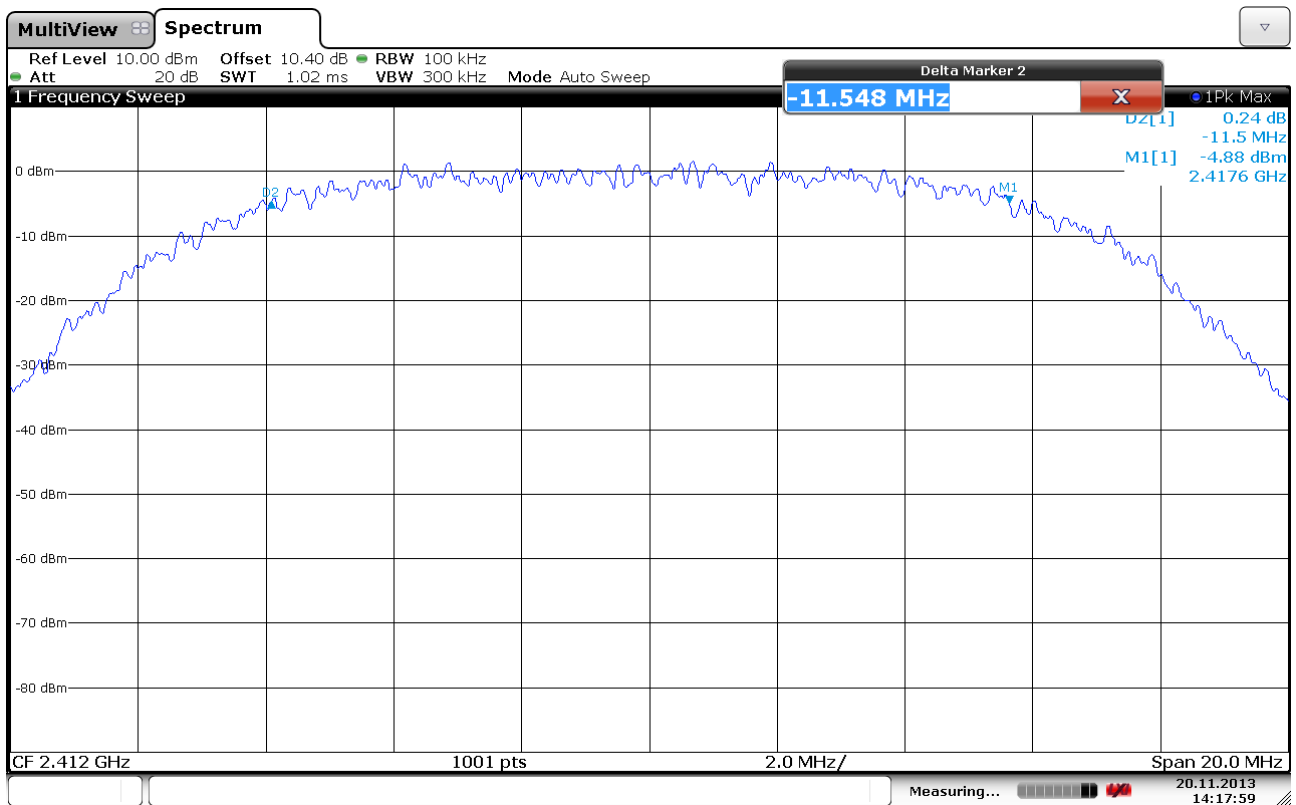
Power supply variation within 85 % to 115% of nominal value has no influence on measured value.

Requirements:

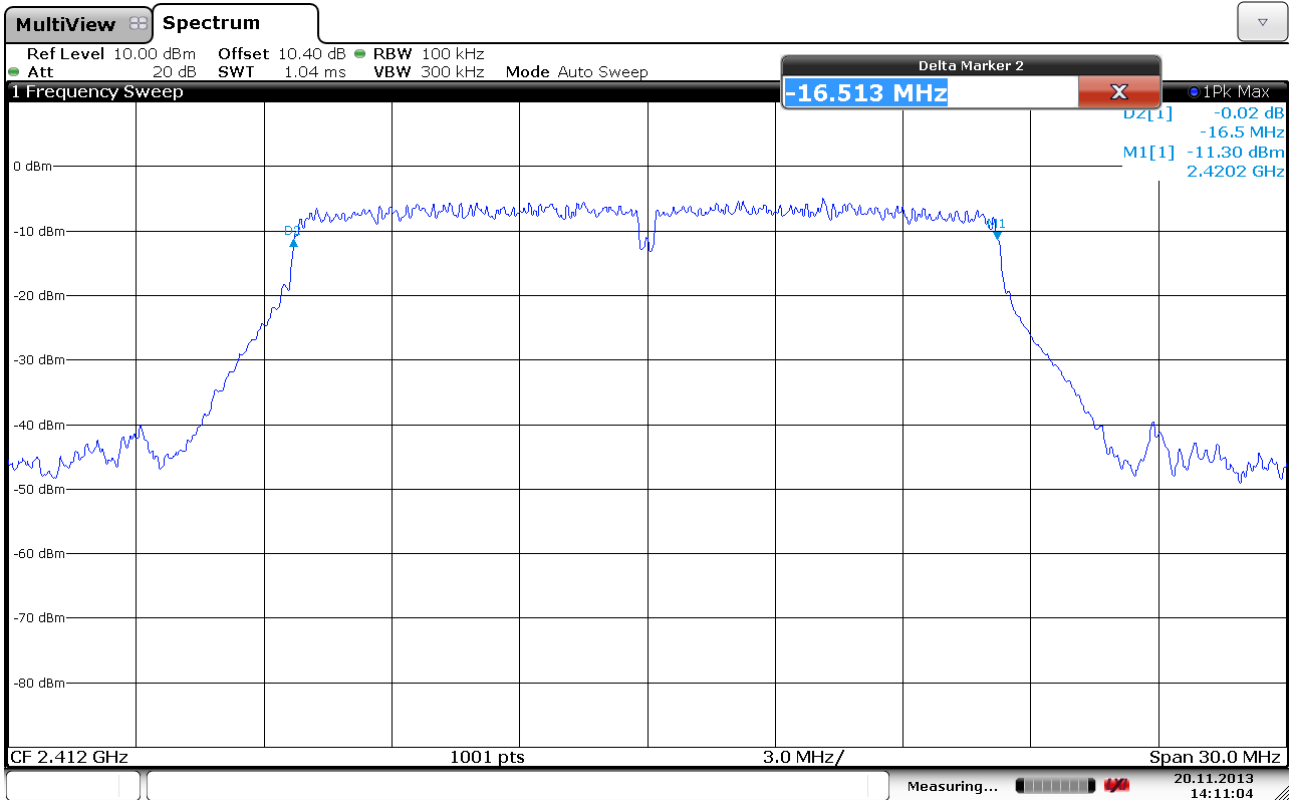
For Digital Transmission Systems in the 2400-2483.5 MHz band the minimum 6 dB bandwidth shall be at least 500 KHz.



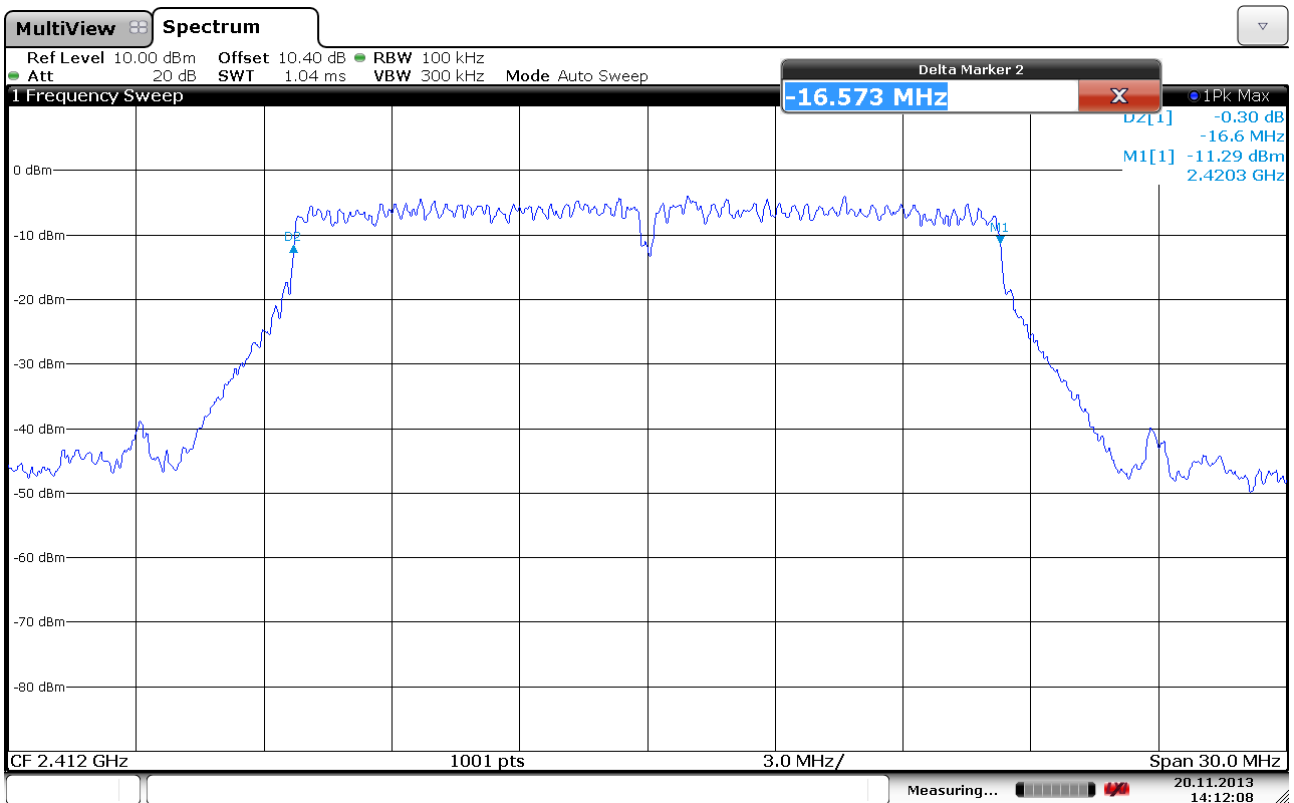
6 dB Bandwidth, 2412MHz, 802.11b, 1Mbps, Option 1



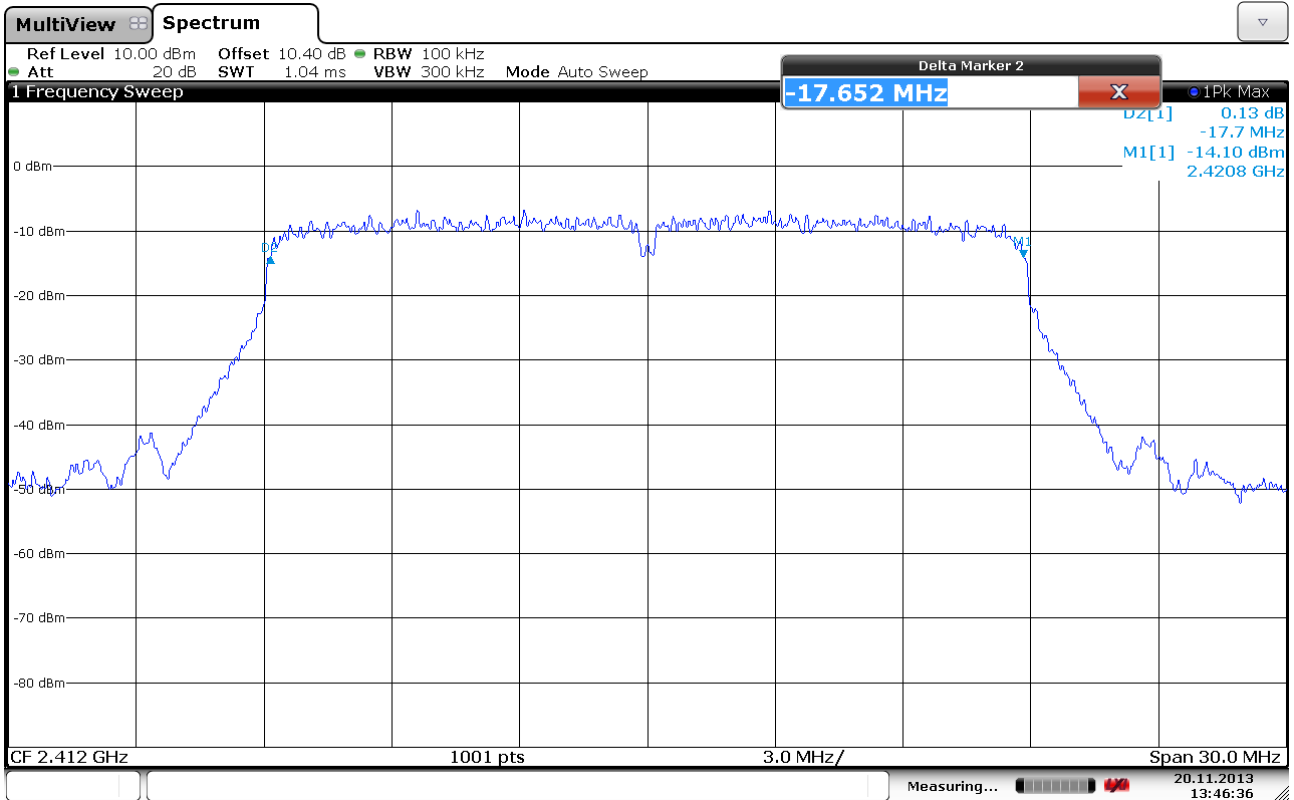
6 dB Bandwidth, 2412MHz, 802.11b, 11Mbps, Option 1



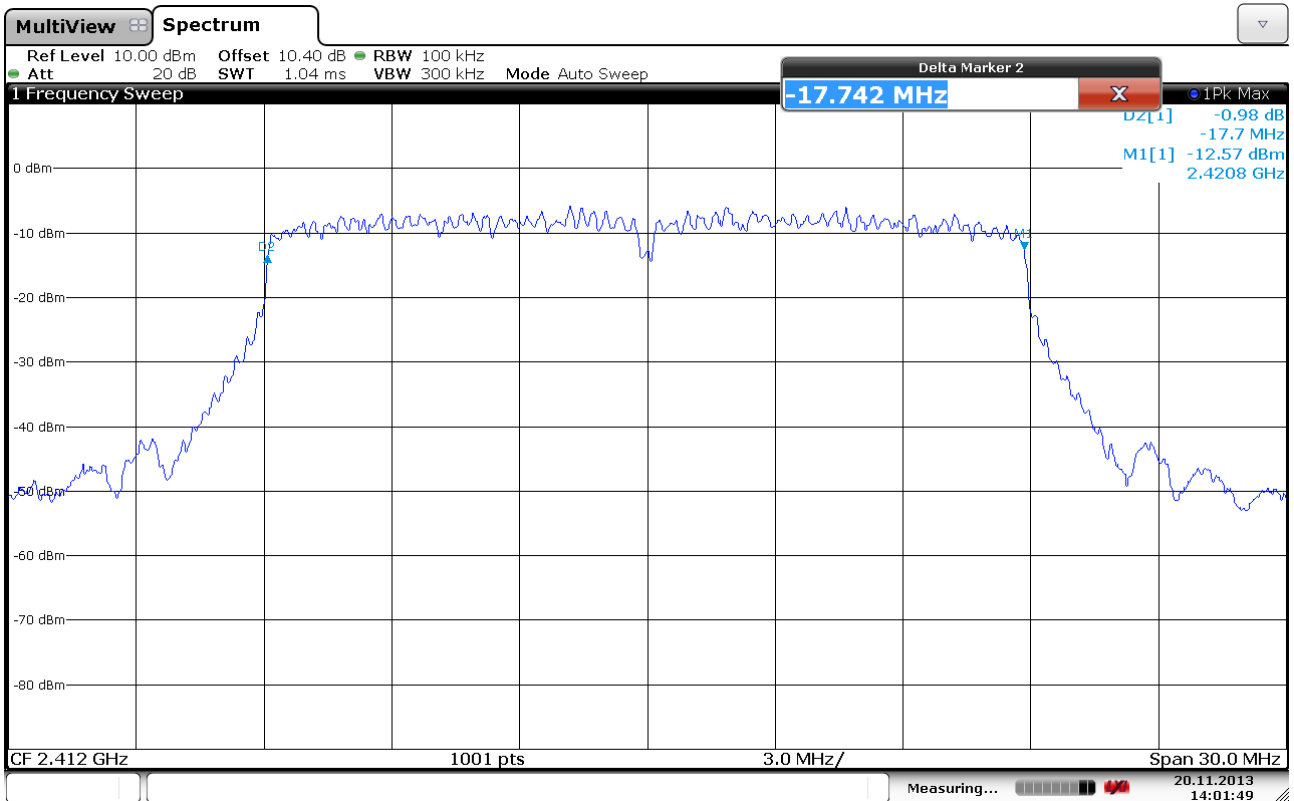
6 dB Bandwidth, 2412MHz, 802.11g, 6Mbps, Option 1



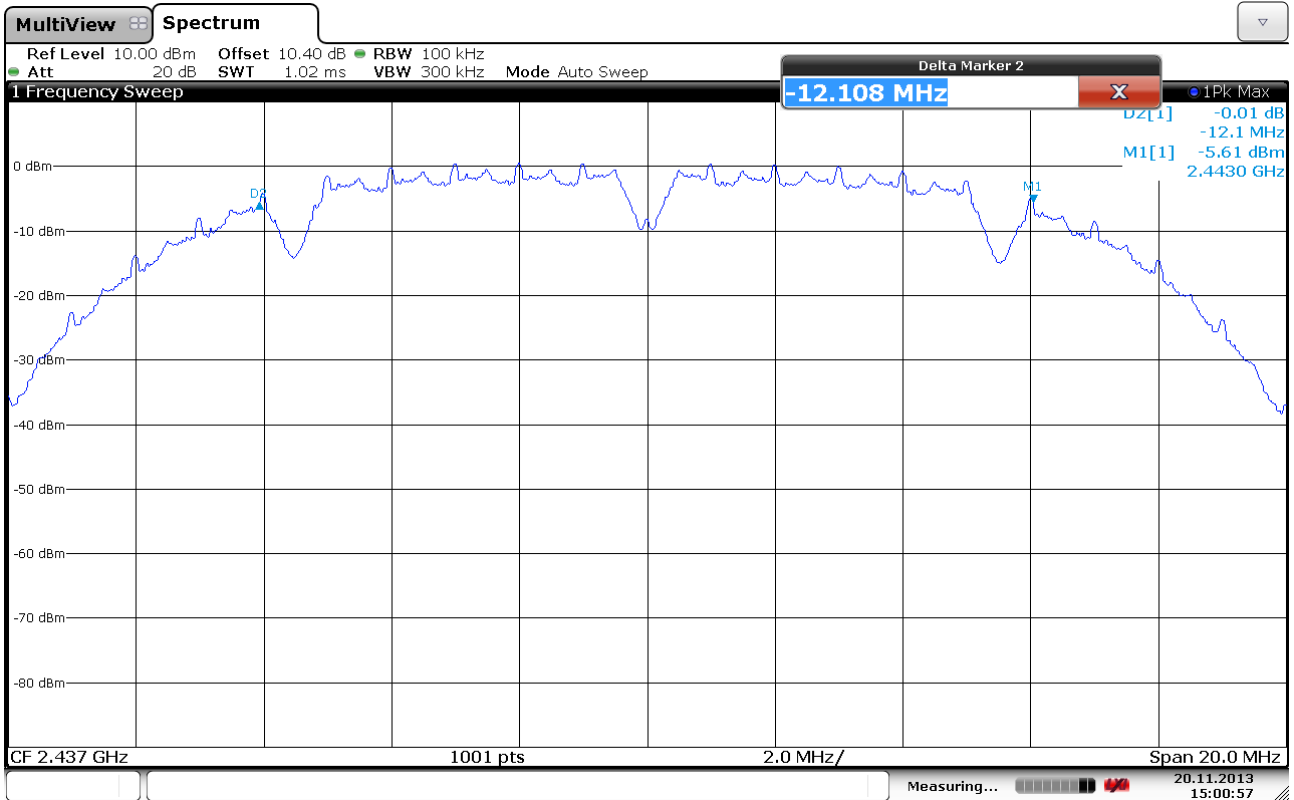
6 dB Bandwidth, 2412MHz, 802.11g, 54Mbps, Option 1



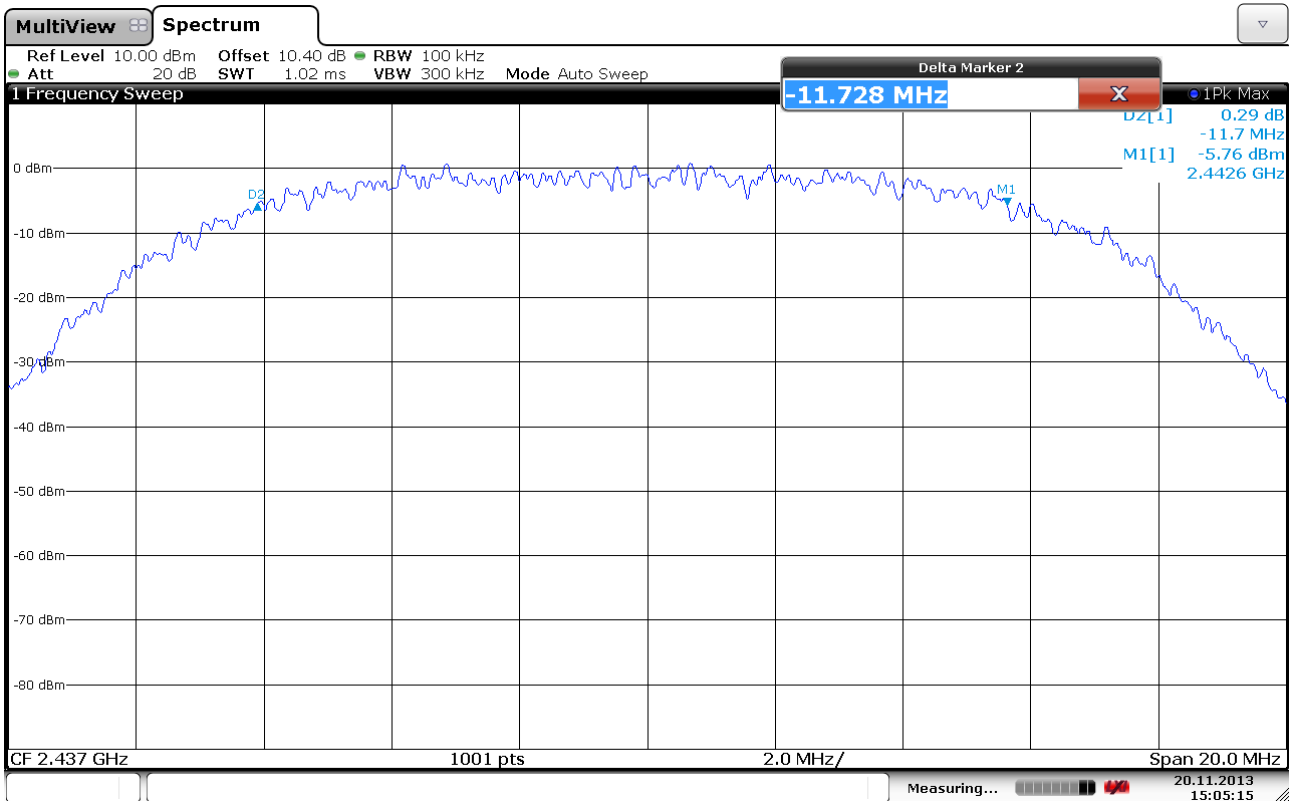
6 dB Bandwidth, 2412MHz, 802.11n, MCS0, Option 1



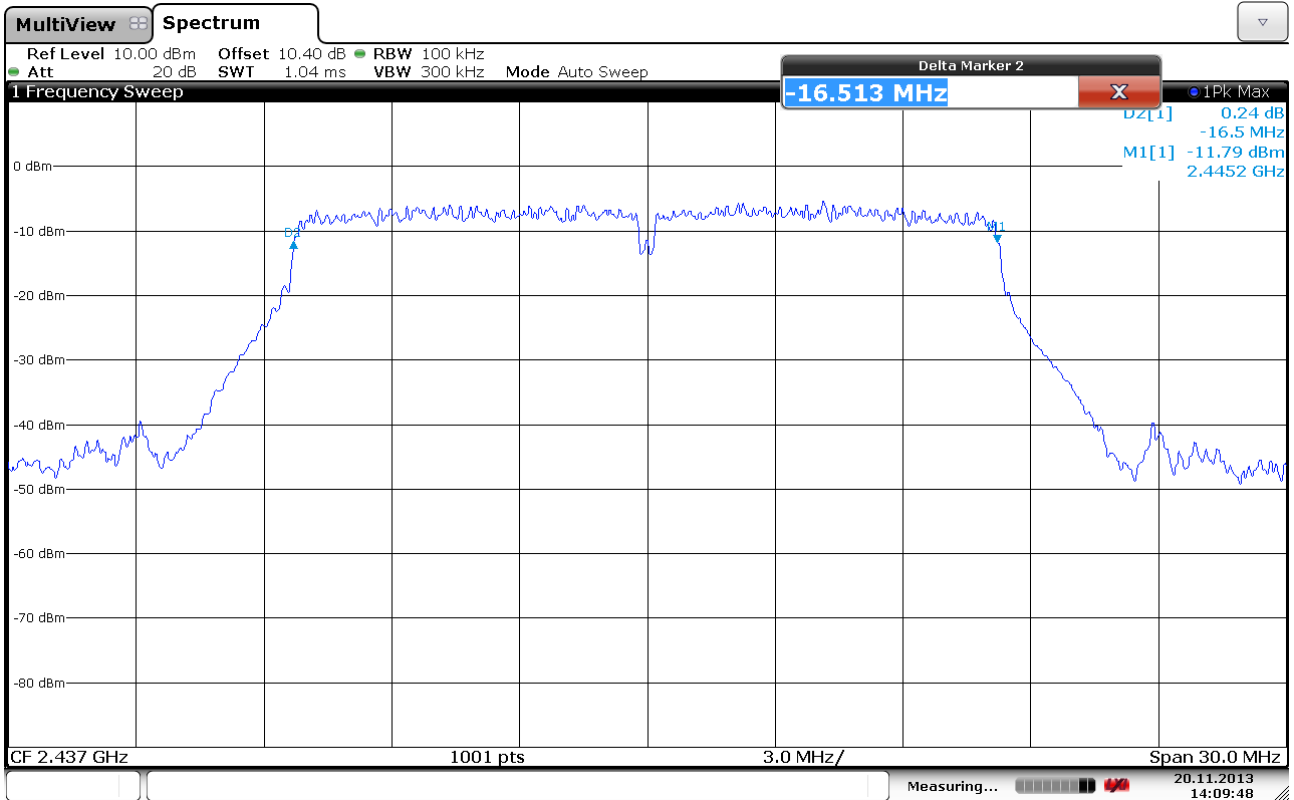
6 dB Bandwidth, 2412MHz, 802.11n, MCS7, Option 1



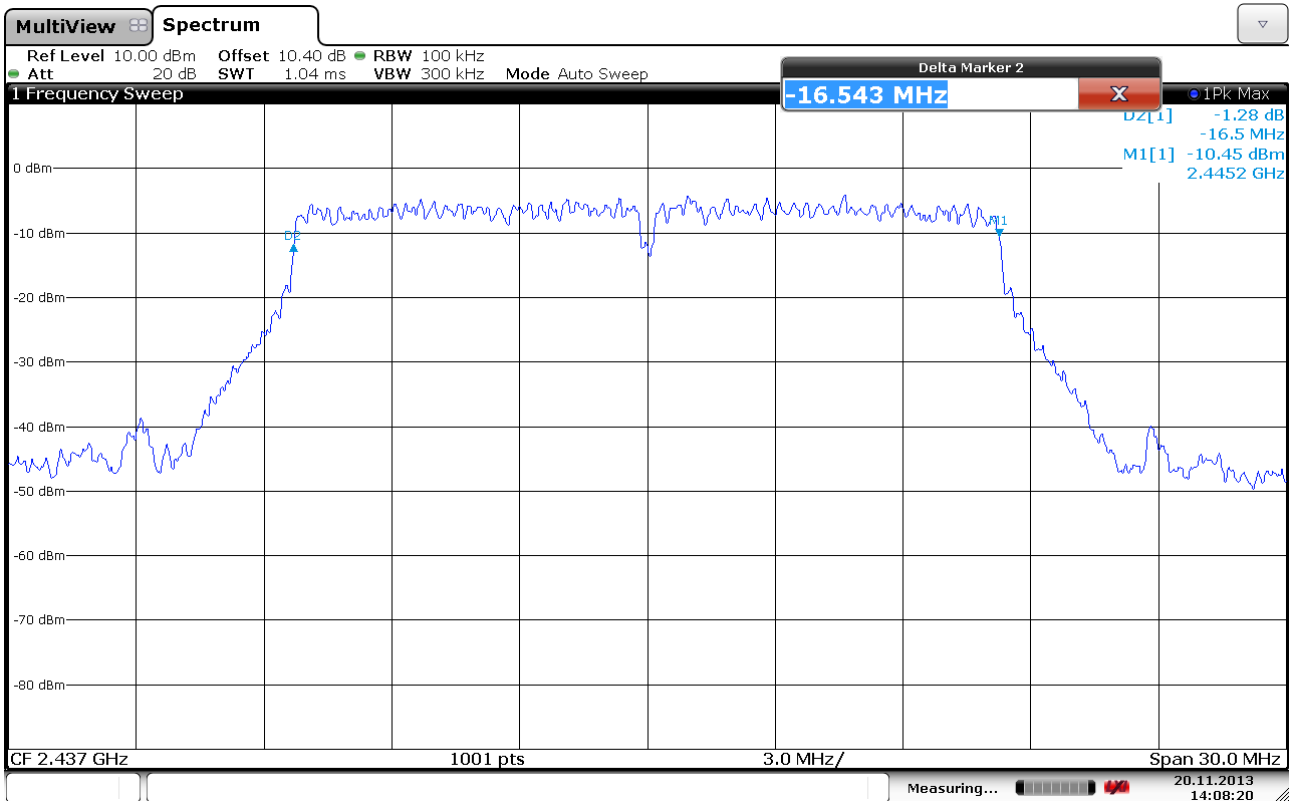
6 dB Bandwidth, 2437MHz, 802.11b, 1Mbps, Option 1



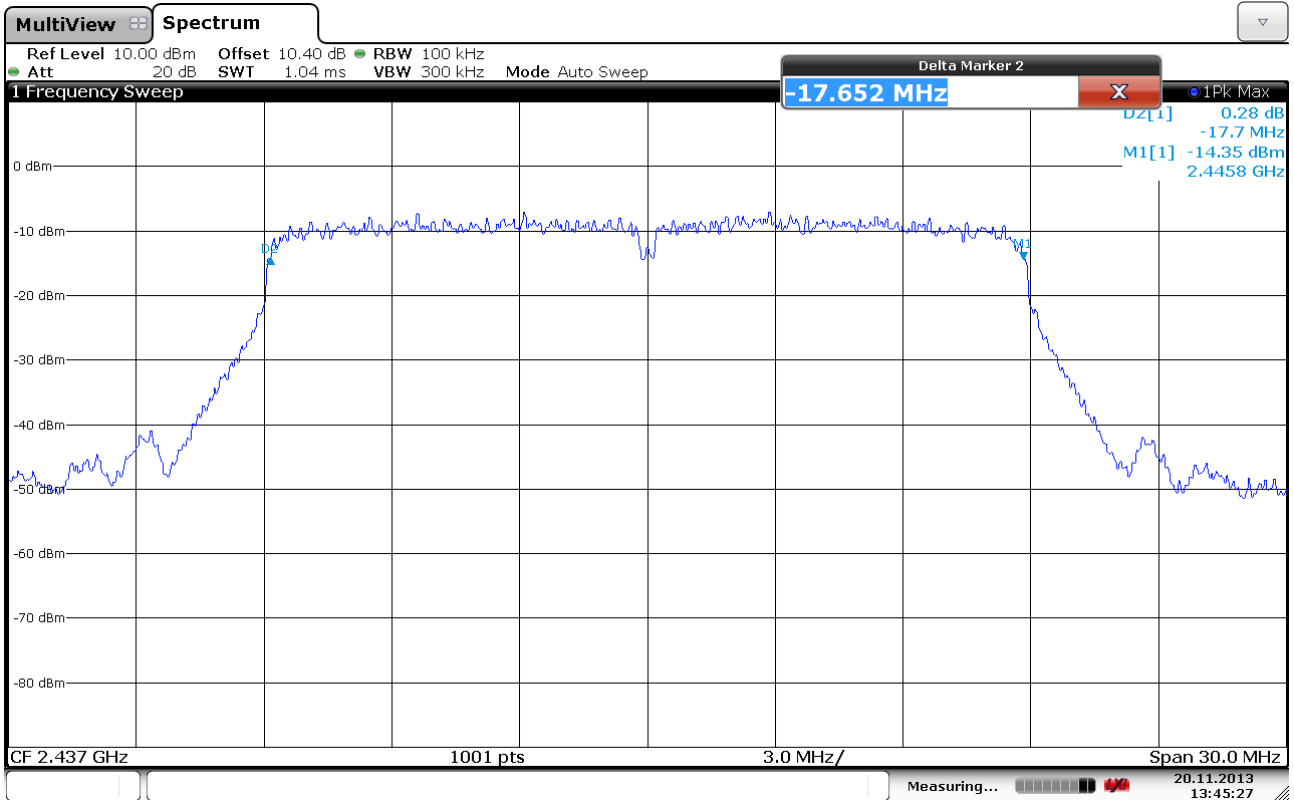
6 dB Bandwidth, 2437MHz, 802.11b, 11Mbps, Option 1



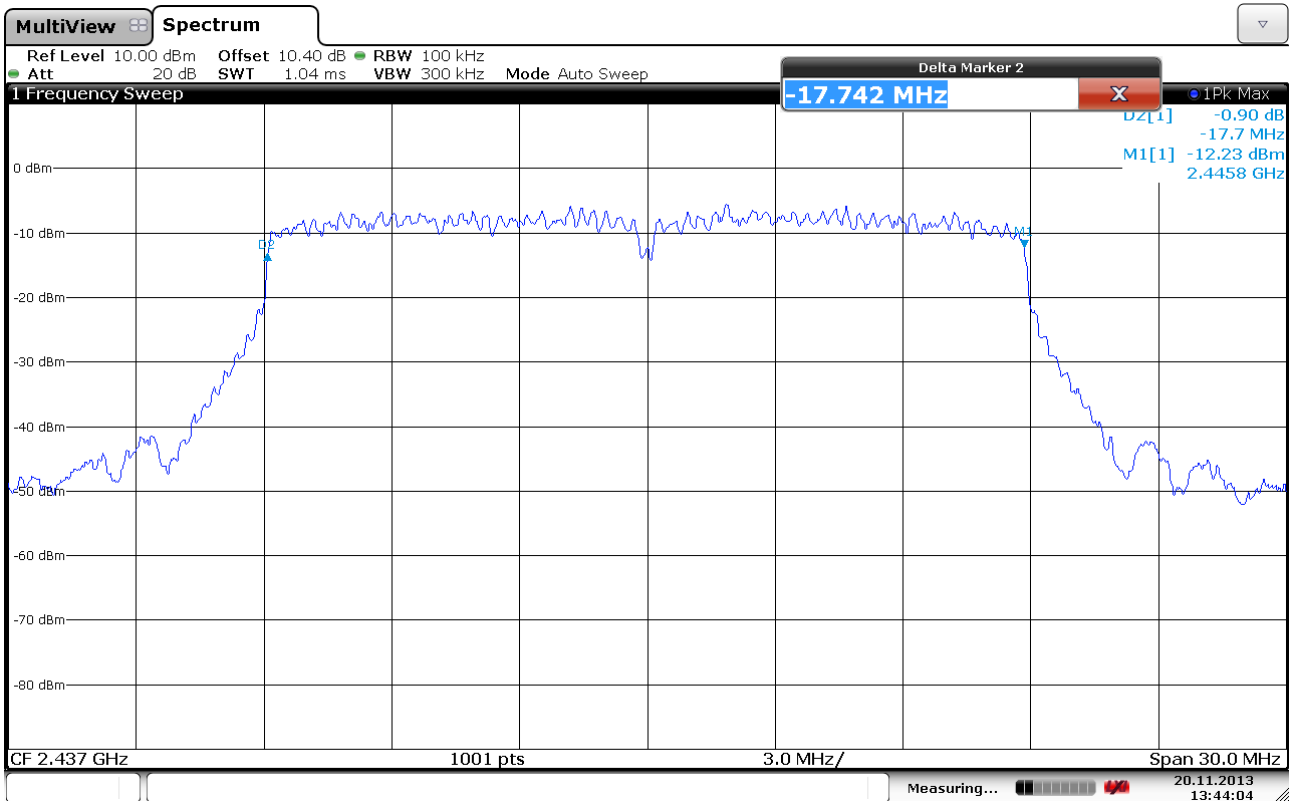
6 dB Bandwidth, 2437MHz, 802.11g, 6Mbps, Option 1



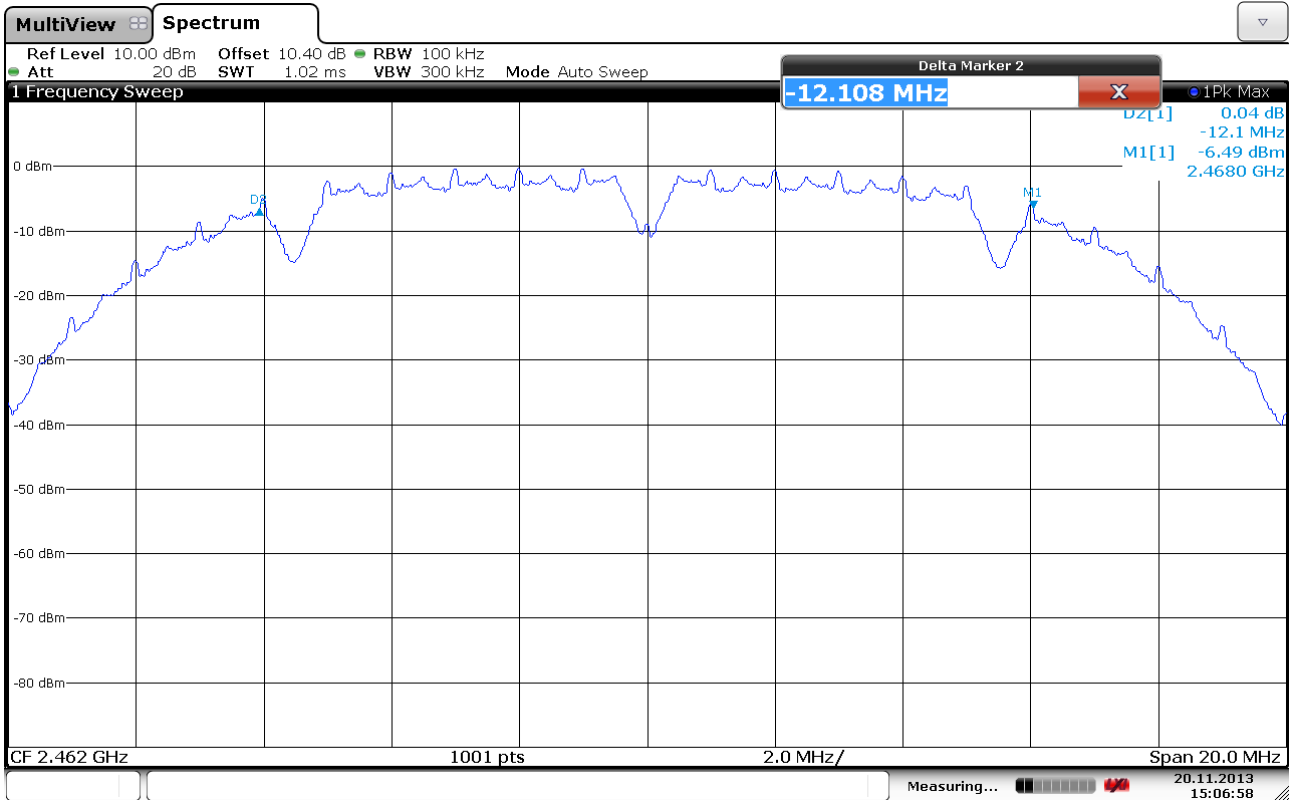
6 dB Bandwidth, 2437MHz, 802.11g, 54Mbps, Option 1



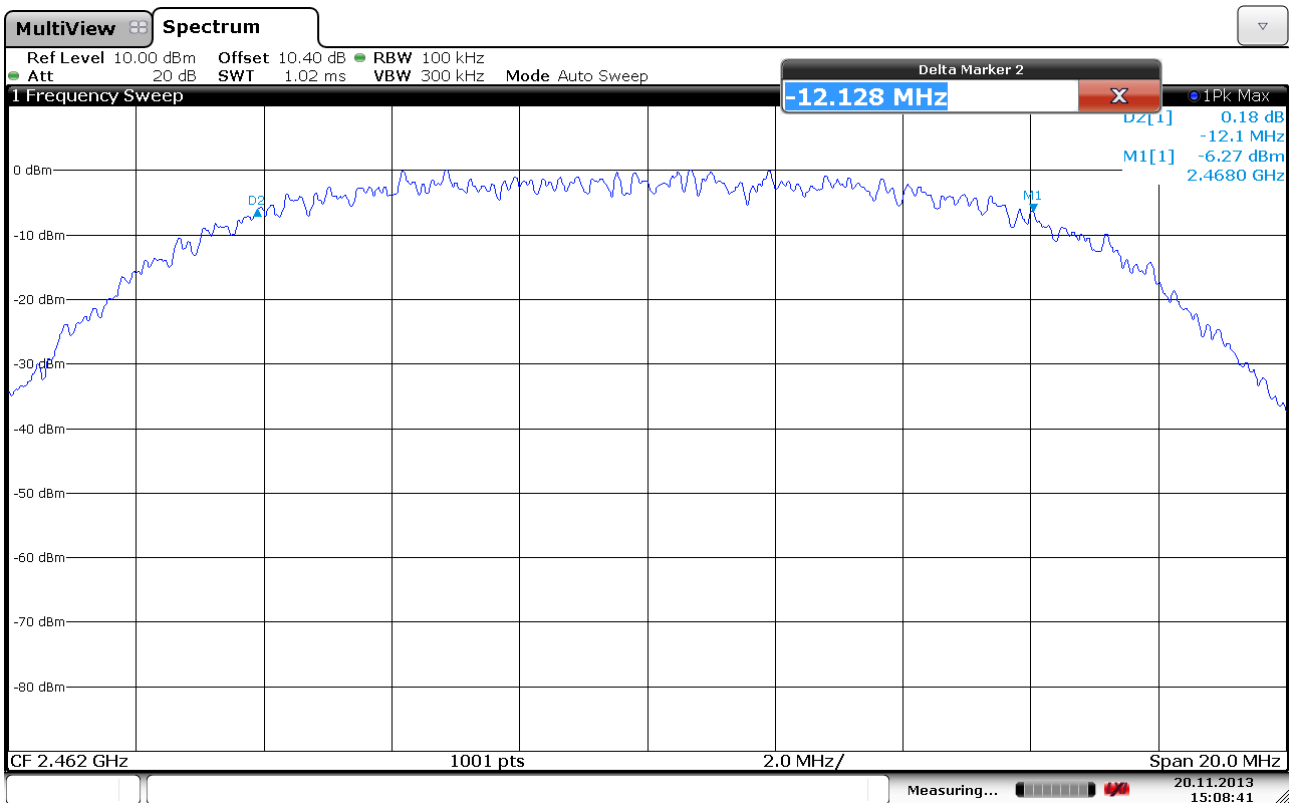
6 dB Bandwidth, 2437MHz, 802.11n, MCS0, Option 1



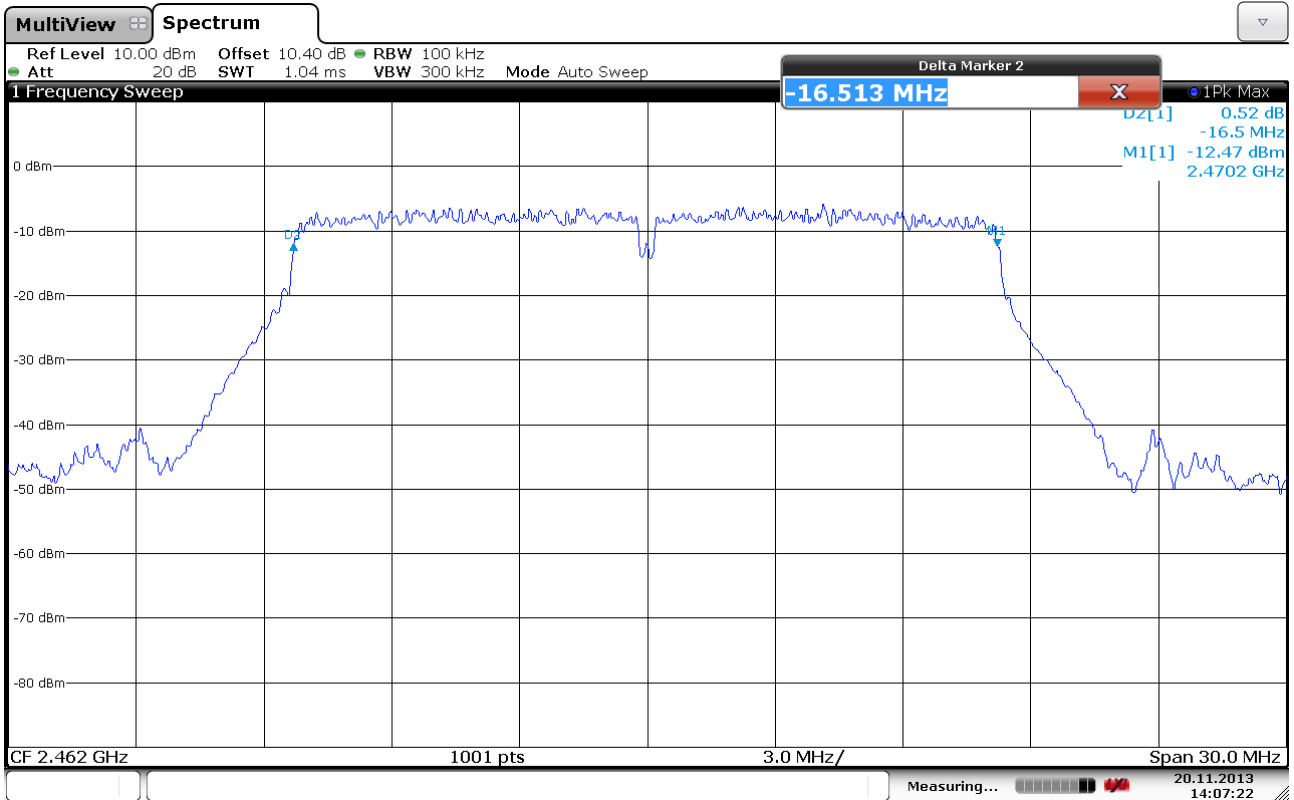
6 dB Bandwidth, 2437MHz, 802.11n, MCS7, Option 1



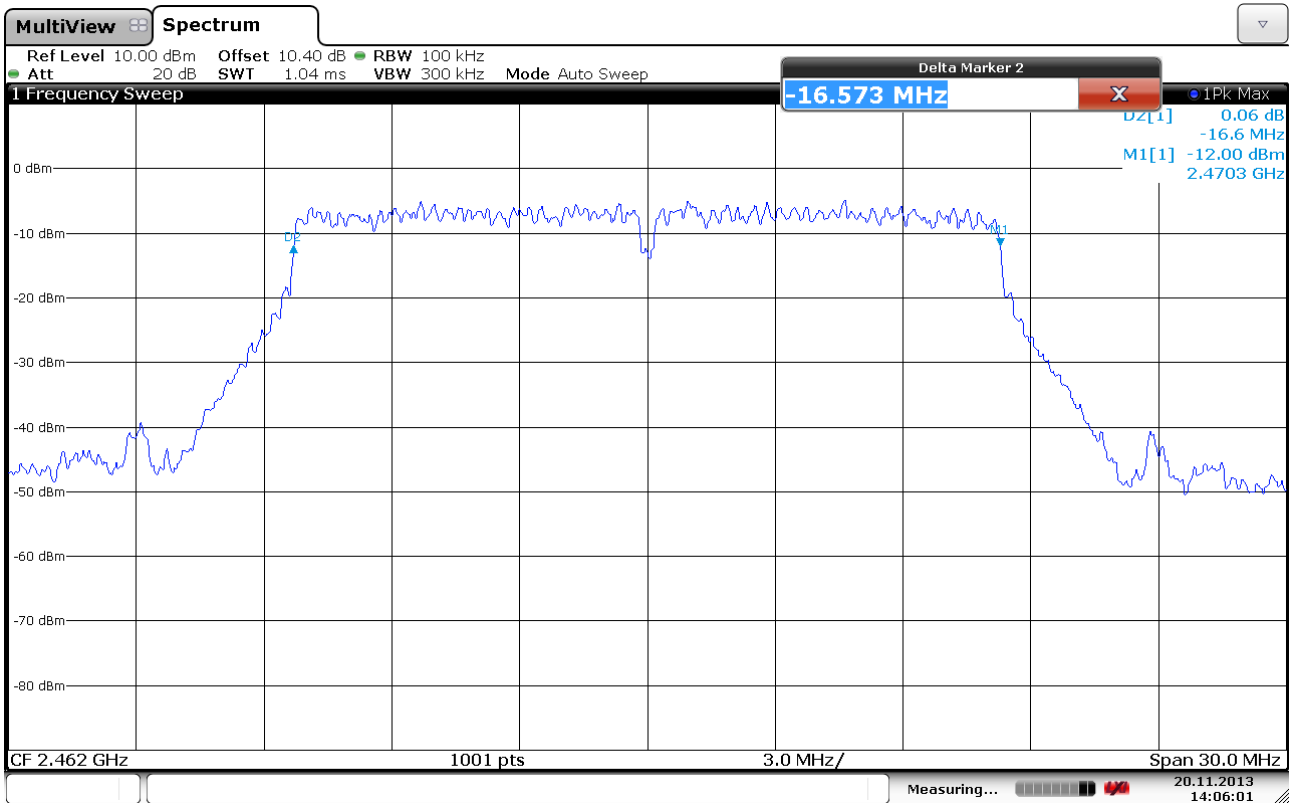
6 dB Bandwidth, 2462MHz, 802.11b, 1Mbps, Option 1



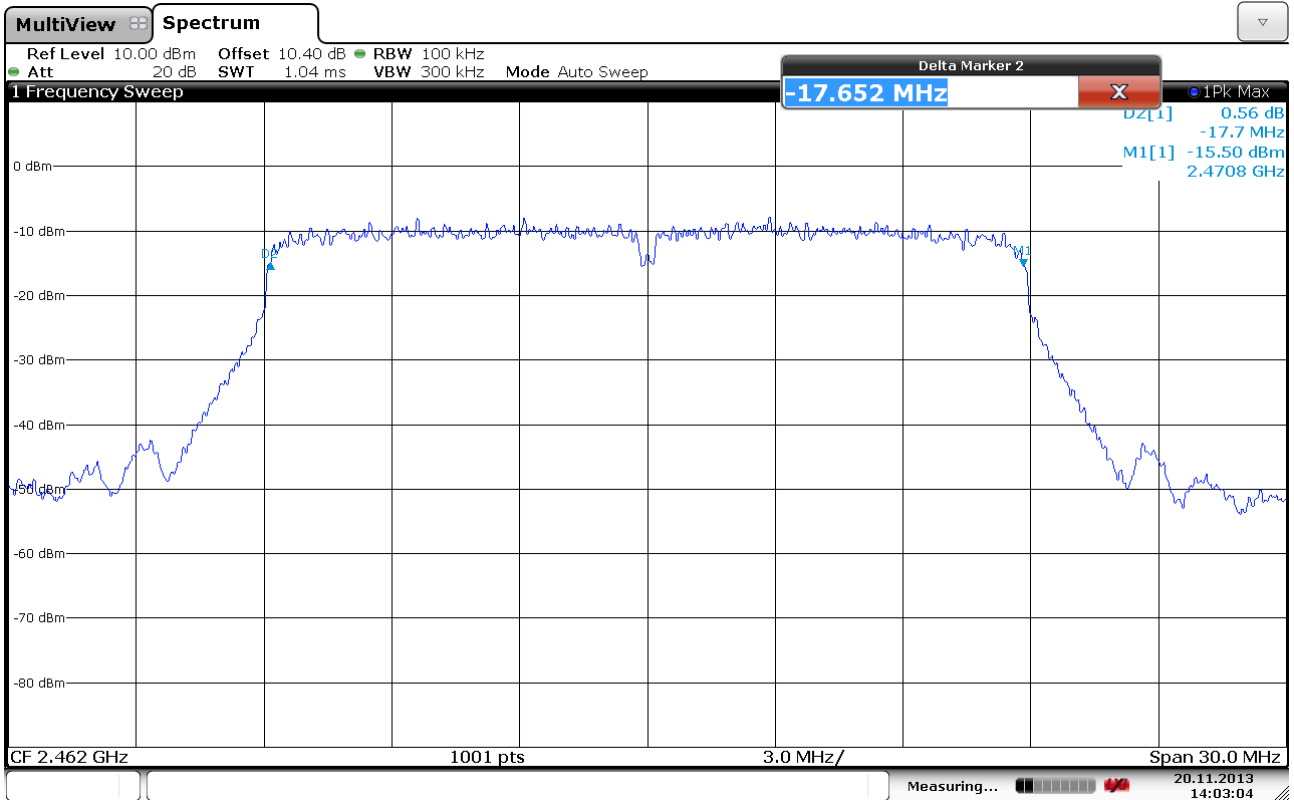
6 dB Bandwidth, 2462MHz, 802.11b, 11Mbps, Option 1



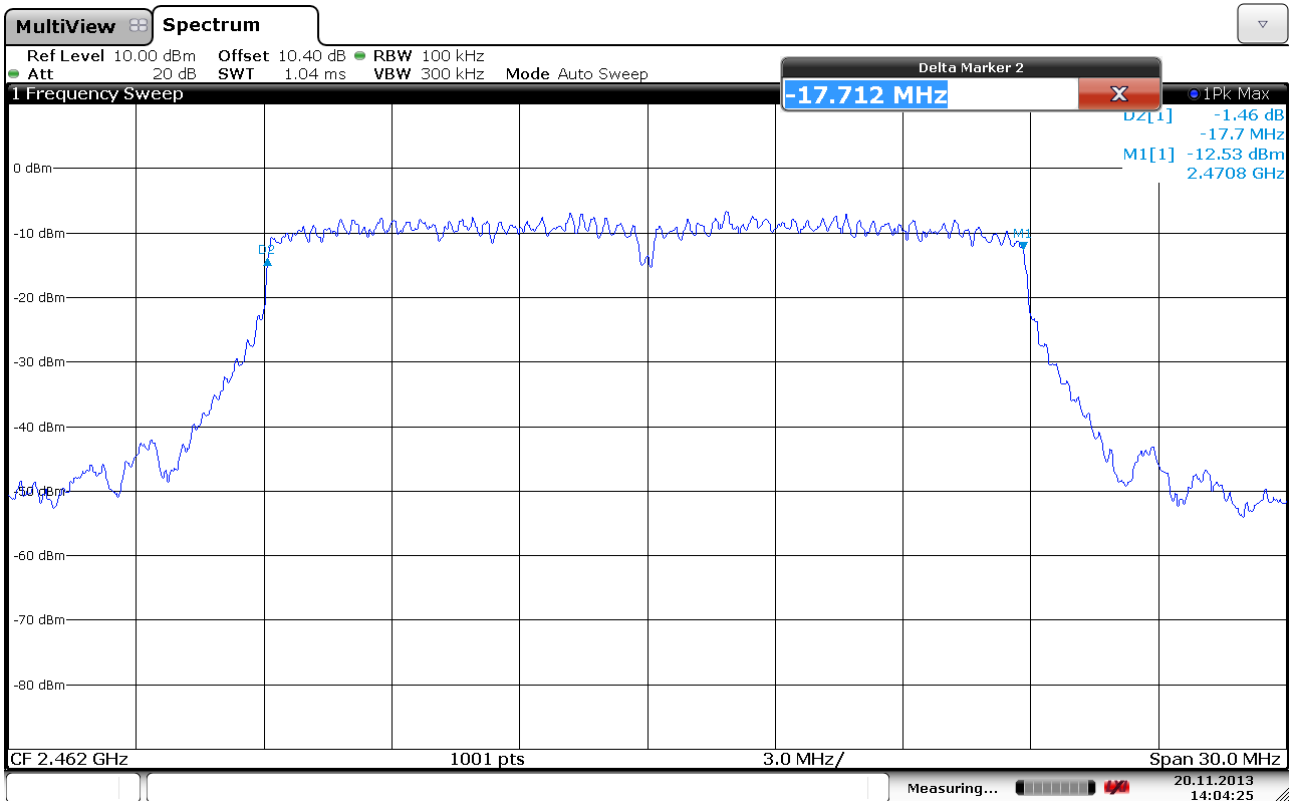
6 dB Bandwidth, 2462MHz, 802.11g, 6Mbps, Option 1



6 dB Bandwidth, 2462MHz, 802.11g, 54Mbps, Option 1



6 dB Bandwidth, 2462MHz, 802.11n, MCS0, Option 1



6 dB Bandwidth, 2462MHz, 802.11n, MCS7, Option 1

3.4 Peak Power Output

Para. No.: 15.247 (b)

Test Performed By: Frode Sveinsen	Date of Test: 12/14/18 Nov 2013
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Test Results: Complies

Measurement Data:

Carrier Frequency	Maximum Conducted Output Power, dBm		
	802.11b, 11 Mbps	802.11g, 54 Mbps	802.11n, MCS7
2412 MHz	19.9	17.4	15.4
2437 MHz	19.5	17.1	15.0
2462 MHz	18.6	16.4	14.5

Carrier Frequency	Maximum EIRP, dBm		
	802.11b, 11 Mbps	802.11g, 54 Mbps	802.11n, MCS7
2412 MHz	19.5	18.7	16.8
2437 MHz	18.6	17.1	15.5
2462 MHz	16.5	18.3	13.8

Carrier Frequency	Maximum Antenna Gain, dBi		
	802.11b, 11 Mbps	802.11g, 54 Mbps	802.11n, MCS7
2412 MHz	-0.4	1.3	1.4
2437 MHz	-0.9	0.1	0.5
2462 MHz	-2.1	1.9	-0.6

Antenna gain = $10 \cdot \log(\text{EIRP}/\text{Conducted power})$ dBi

EIRP is calculated from measured field strength by the formulas in KDB 412172 D01 Determining ERP and EIRP v01.

See attached plots.

Detachable antenna? Yes No

If detachable, is the antenna connector non-standard? Yes No

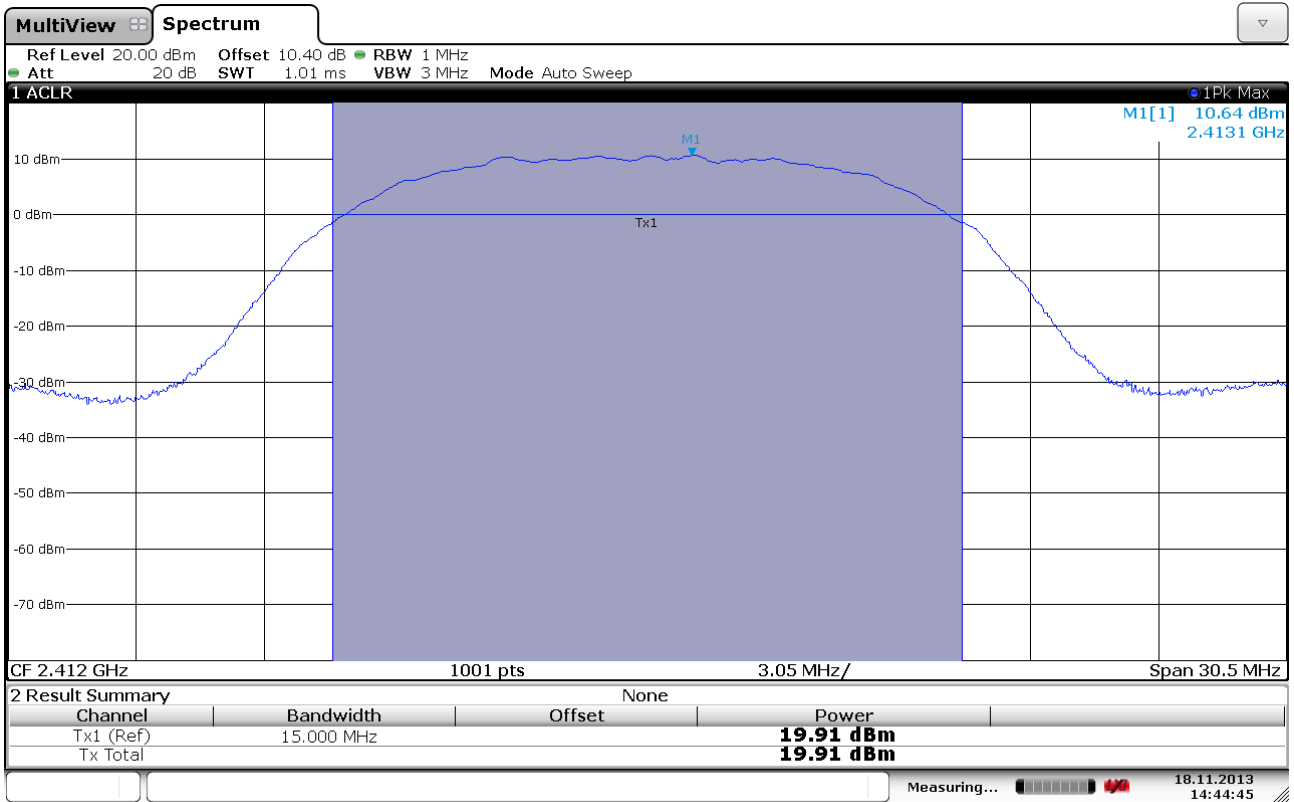
Type of antenna connector: N/A

Requirements:

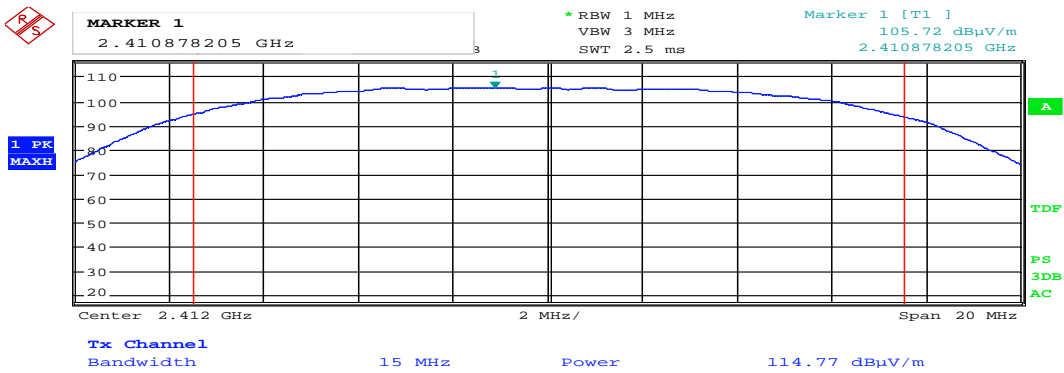
The maximum peak output power shall not exceed the following limits:

For Digital Transmission Systems in the 2400 - 2483.5 MHz band: 1 Watt

If transmitting antennas of directional gain greater than 6 dBi are used, the peak output power from the intentional radiator shall be reduced below the stated value above by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

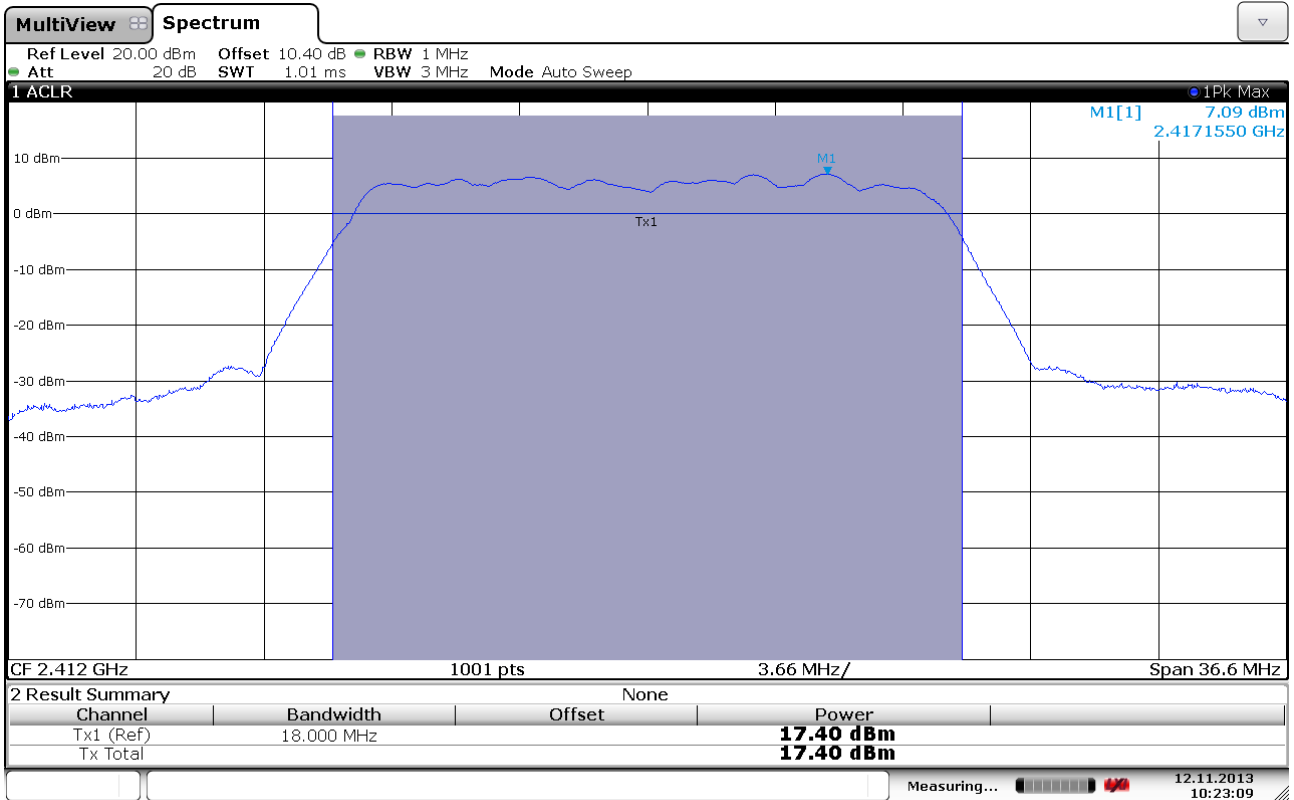


Conducted Output Power, 2412 MHz, 802.11b, 11Mbps

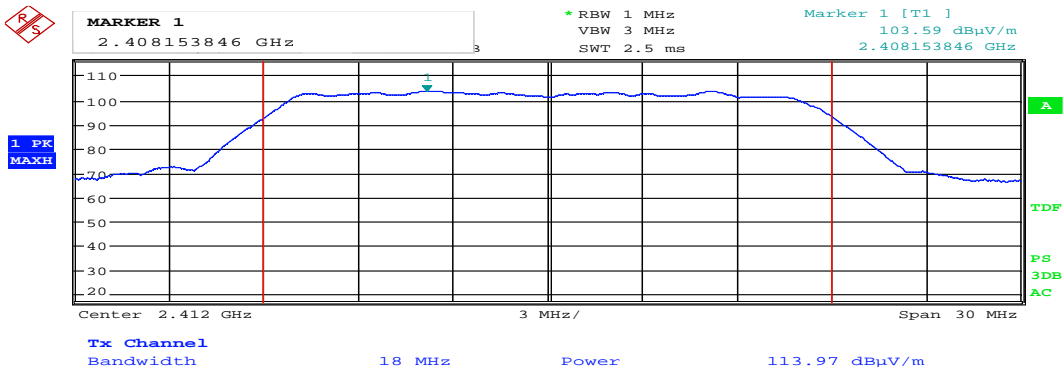


Date: 13.NOV.2013 16:39:39

Radiated Output Power, 2412 MHz, 802.11b, 11Mbps (Max: VP)

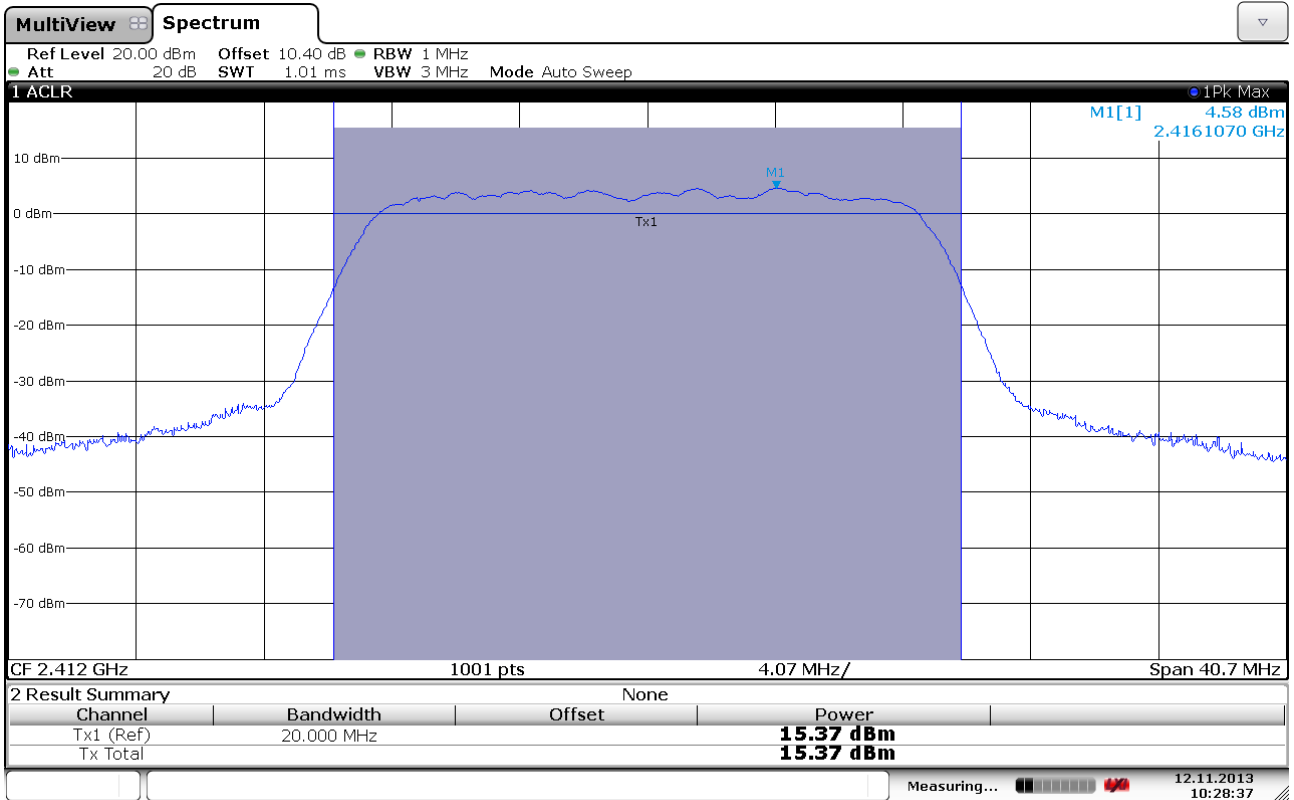


Conducted Output Power, 2412 MHz, 802.11g, 54Mbps

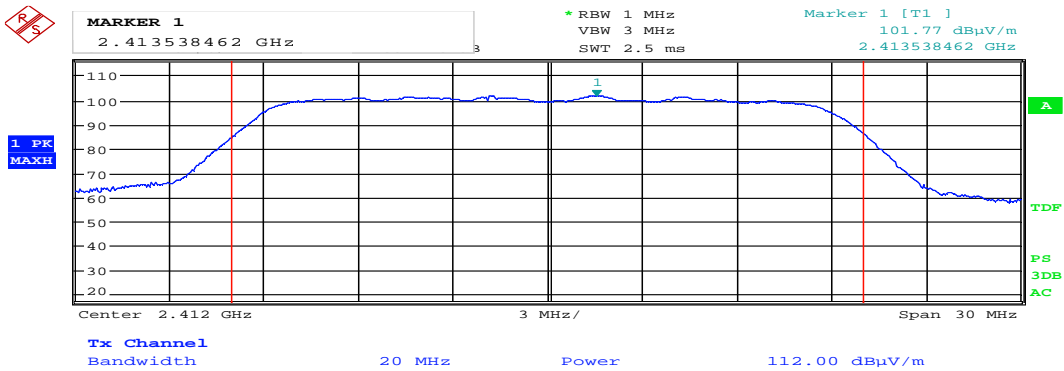


Date: 13.NOV.2013 16:55:27

Radiated Output Power, 2412 MHz, 802.11g, 54Mbps (Max: VP)

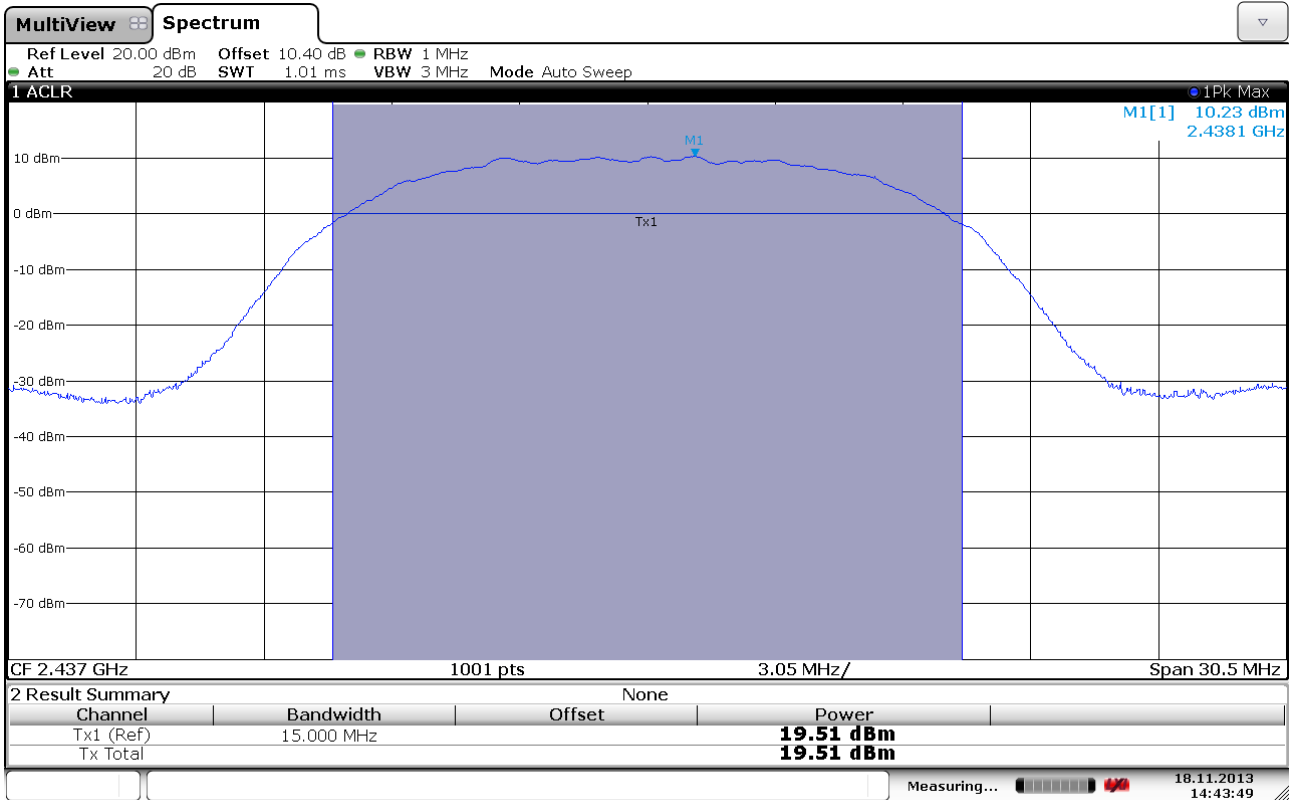


Conducted Output Power, 2412 MHz, 802.11n, MCS7

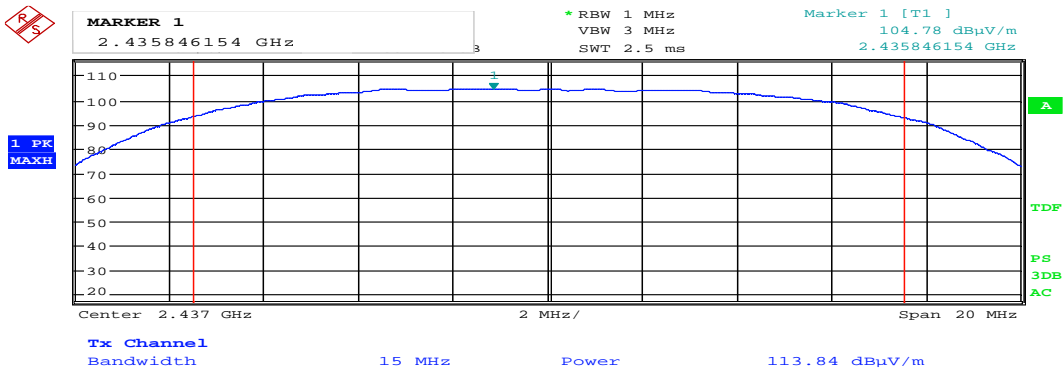


Date: 13.NOV.2013 17:04:24

Radiated Output Power, 2412 MHz, 802.11n, MCS7 (Max: VP)

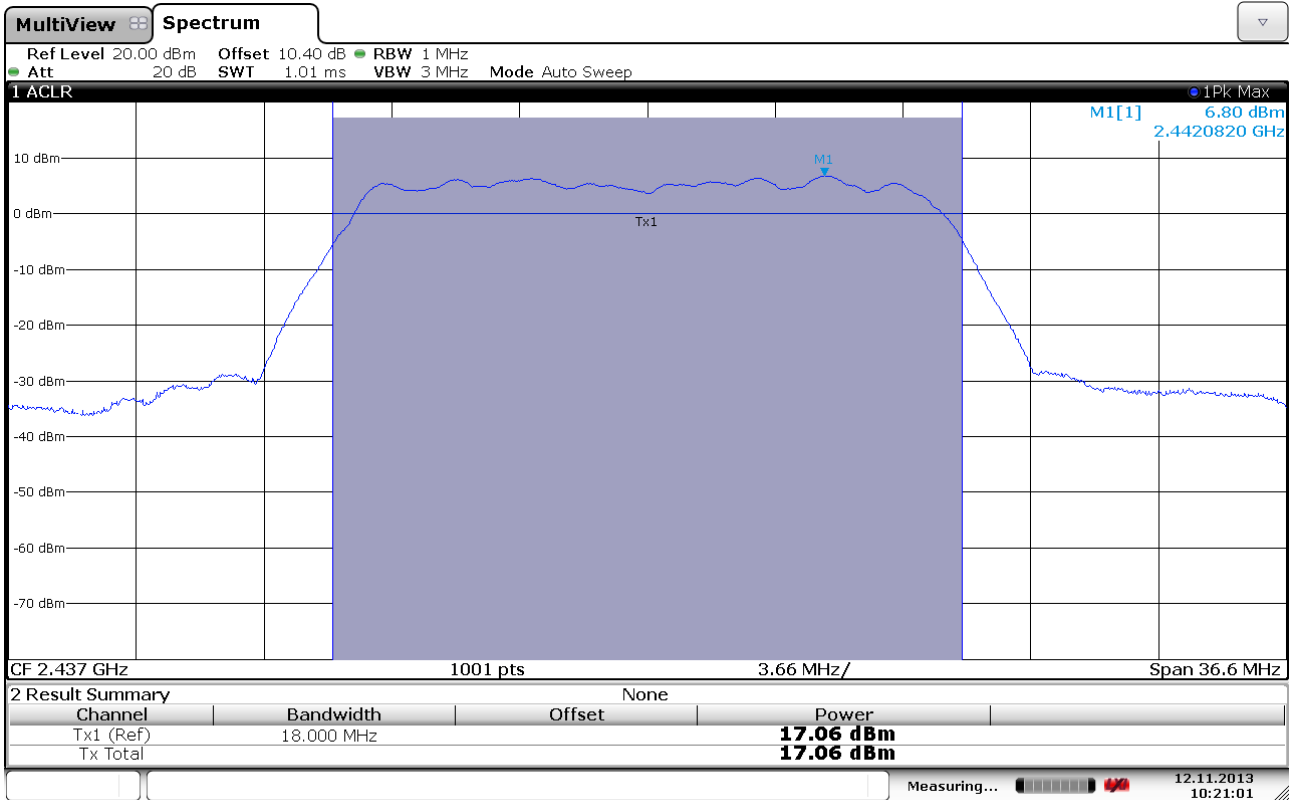


Conducted Output Power, 2437 MHz, 802.11b, 11Mbps

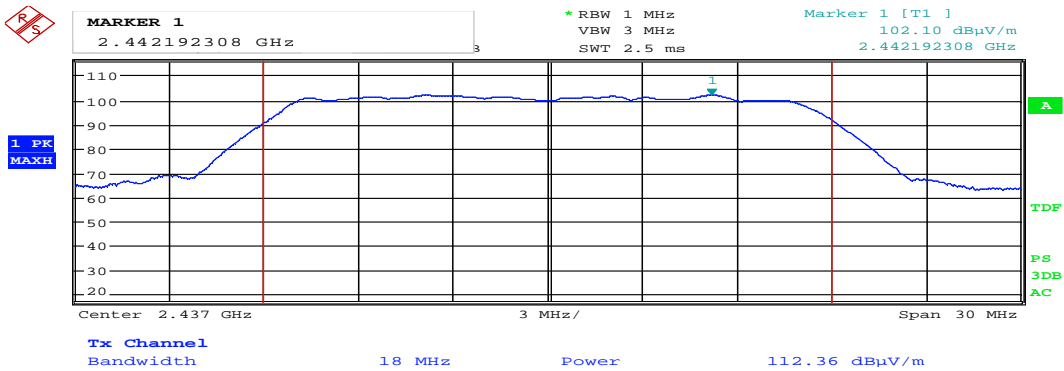


Date: 13.NOV.2013 16:21:41

Radiated Output Power, 2437 MHz, 802.11b, 11Mbps (Max: VP)

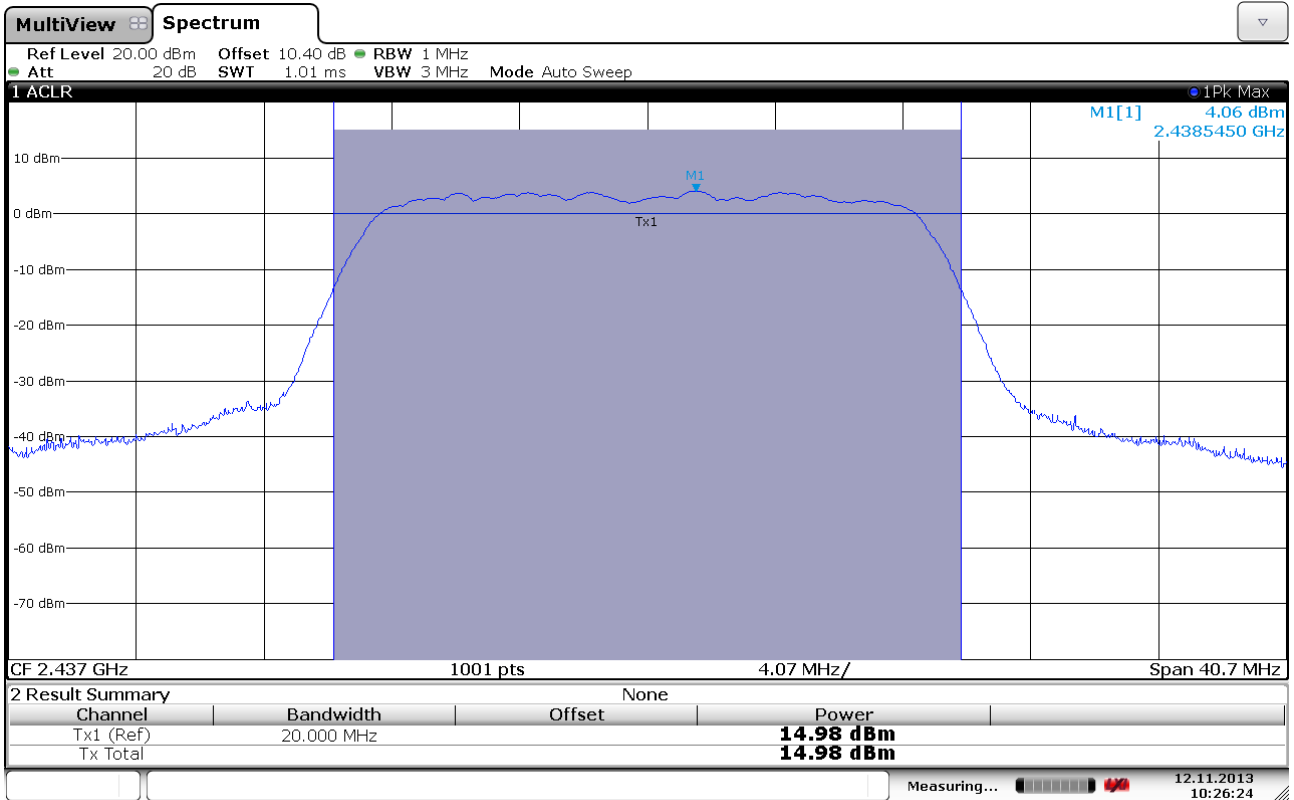


Conducted Output Power, 2437 MHz, 802.11g, 54Mbps

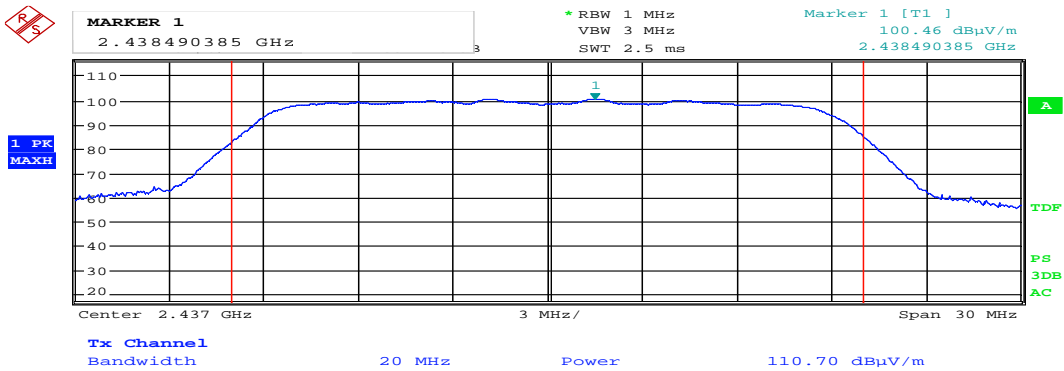


Date: 13.NOV.2013 16:53:33

Radiated Output Power, 2437 MHz, 802.11g, 54Mbps (Max: VP)

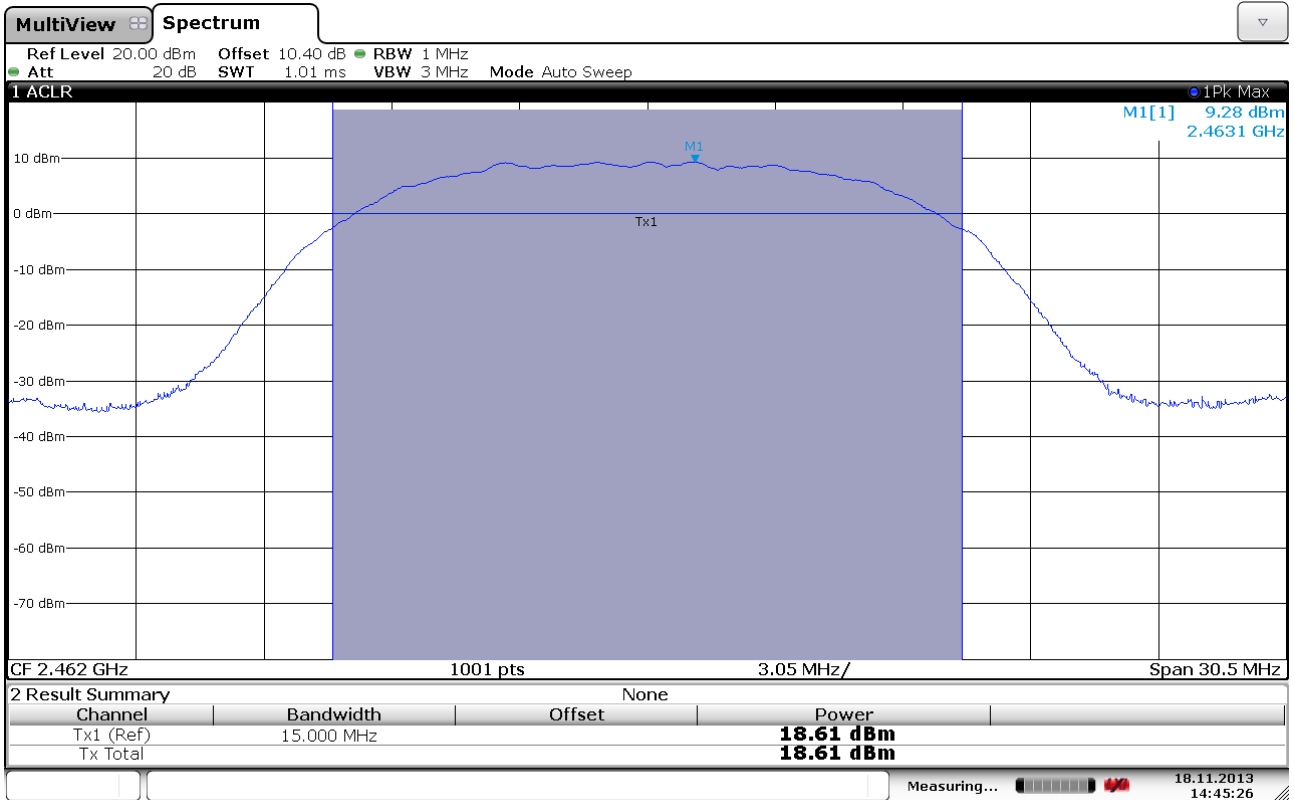


Conducted Output Power, 2437 MHz, 802.11n, MCS7

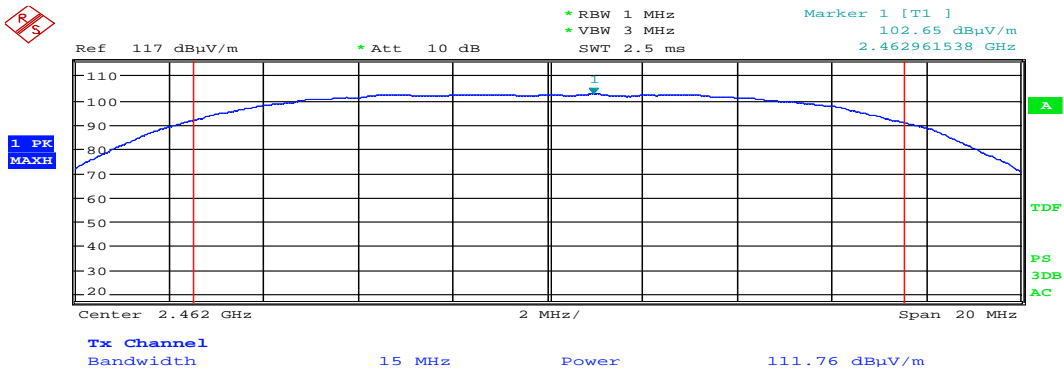


Date: 13.NOV.2013 17:06:39

Radiated Output Power, 2437 MHz, 802.11n, MCS7 (Max: VP)

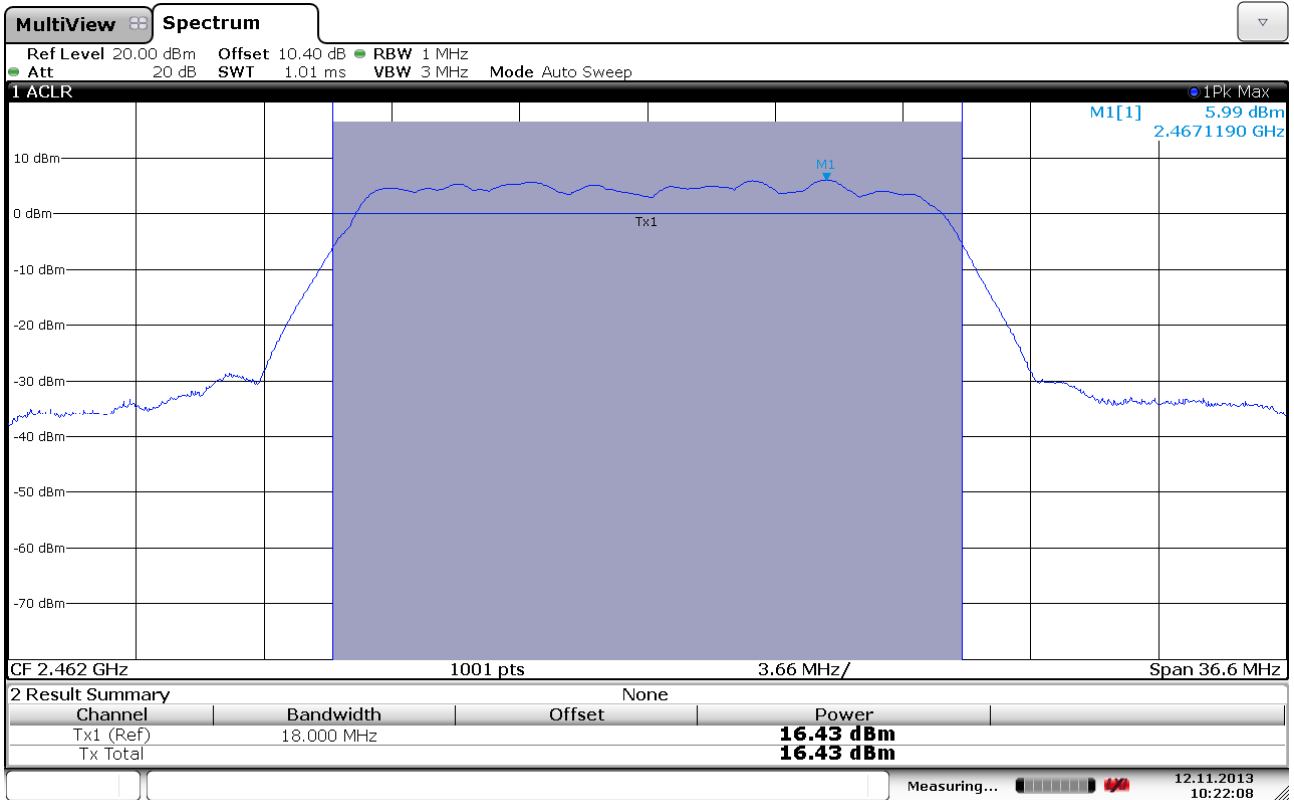


Conducted Output Power, 2462 MHz, 802.11b, 11Mbps

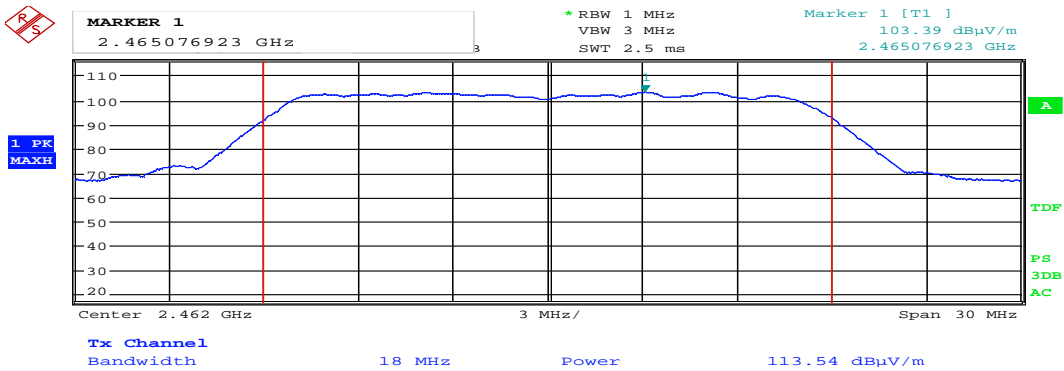


Date: 14.NOV.2013 09:51:02

Radiated Output Power, 2462 MHz, 802.11b, 11Mbps (Max: VP)

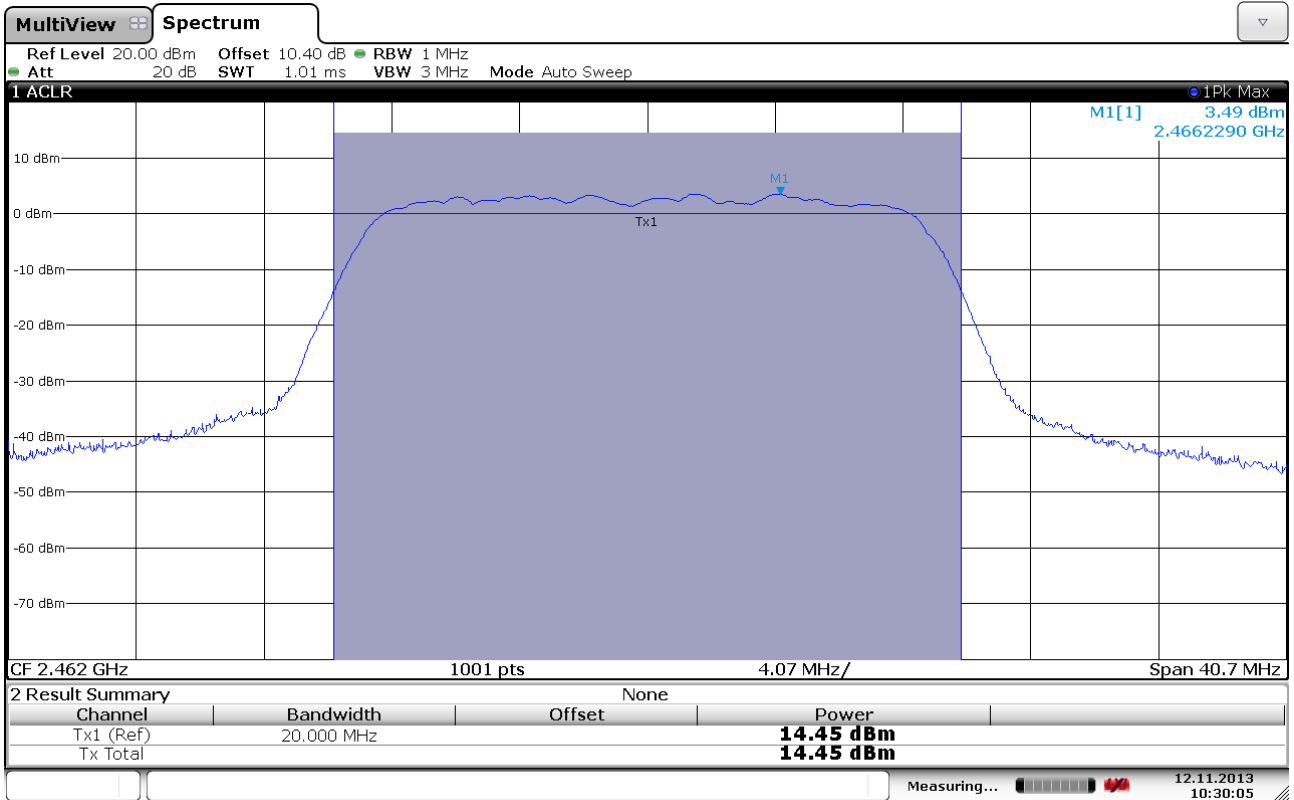


Conducted Output Power, 2462 MHz, 802.11g, 54Mbps

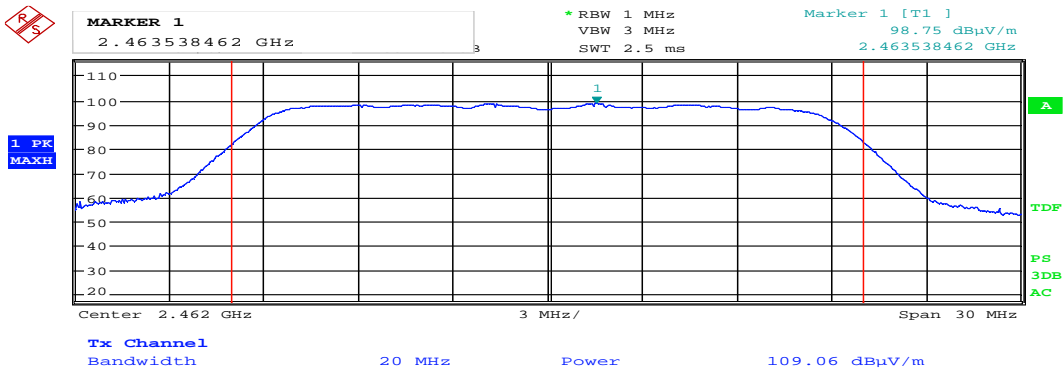


Date: 14.NOV.2013 09:27:34

Radiated Output Power, 2462 MHz, 802.11g, 54Mbps (Max: VP)



Conducted Output Power, 2462 MHz, 802.11n, MCS7



Date: 13.NOV.2013 17:08:31

Radiated Output Power, 2462 MHz, 802.11n, MCS7 (Max: VP)

3.5 Spurious Emissions (Radiated)

Para. No.: 15.247 (c)

Test Performed By: Frode Sveinsen	Date of Test: 13 Nov 2013
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Test Results: Complies

Measurement Data:

Peak Detector:

Modulation and Bitrate	Measured field strength (dB μ V/m)		Limit dB	Margin dB	
	2390 MHz	2483.5 MHz			
802.11b, 11Mbps	54.2	49.7	74	19.8	24.3
802.11g, 54Mbps	59.9	56.4	74	14.1	17.6
802.11n, MCS7	58.8	48.5	74	15.2	25.5

Average Detector:

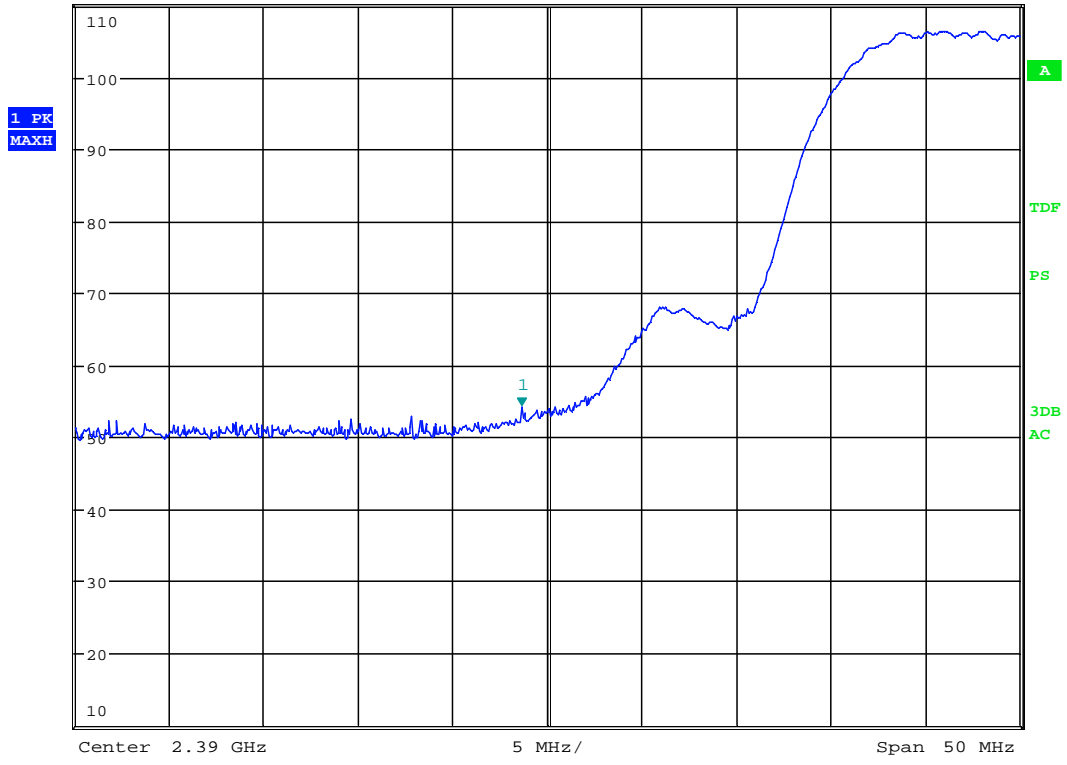
Modulation and Bitrate	Measured field strength (dB μ V/m)		Limit dB	Margin dB	
	2390 MHz	2483.5 MHz			
802.11b, 11Mbps	46.1	41.6	54	7.9	12.4
802.11g, 54Mbps	49.4	44.8	54	4.6	9.2
802.11n, MCS7	47.6	40.4	54	6.4	13.6

Duty Cycle was 100% during all tests. No Duty Cycle Correction Factor has been applied.

See plots.



MARKER 1	*RBW 1 MHz	Marker 1 [T1]
2.388637821 GHz	VBW 3 MHz	54.21 dBuV/m
Ref 110 dBuV/m	SWT 2.5 ms	2.388637821 GHz
*Att 10 dB		

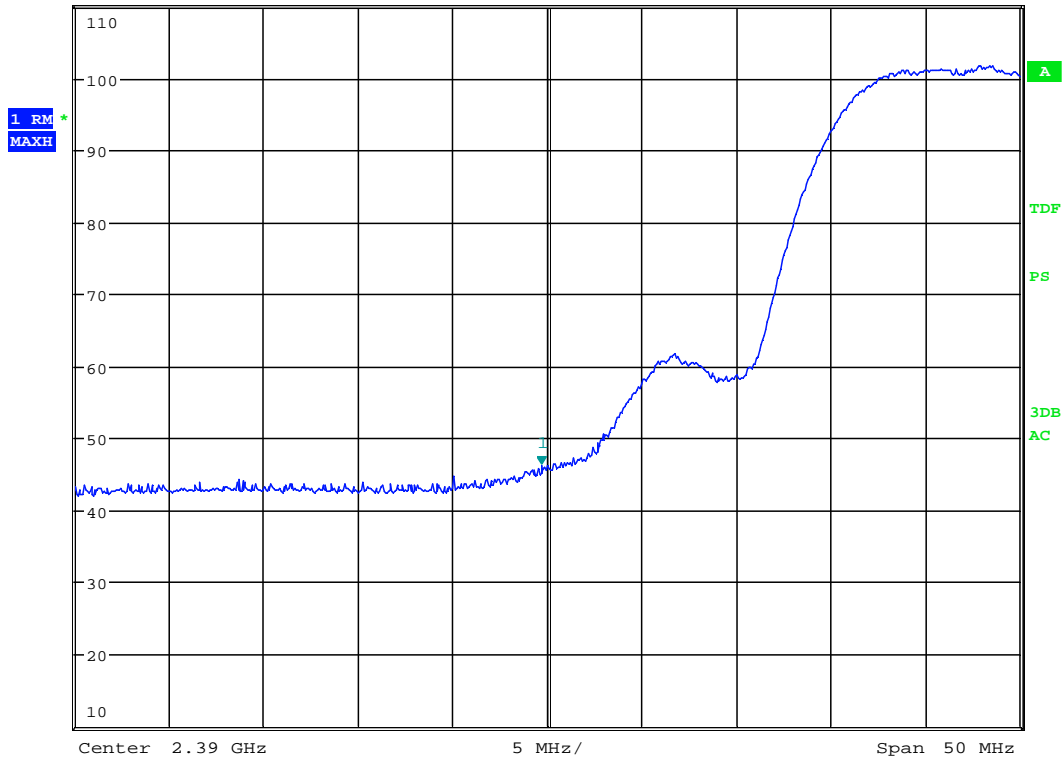


Date: 13.NOV.2013 17:16:08

Lower Band Edge, Radiated, Peak, 2412 MHz, 802.11b, 11Mbps



MARKER 1	* RBW 1 MHz	Marker 1 [T1]
2.389679487 GHz	VBW 10 MHz	46.14 dBuV/m
Ref 110 dBuV/m	* Att 10 dB	SWT 2.5 ms
		2.389679487 GHz



Date: 13.NOV.2013 17:17:00

Lower Band Edge, Radiated, Average, 2412 MHz, 802.11b, 11Mbps



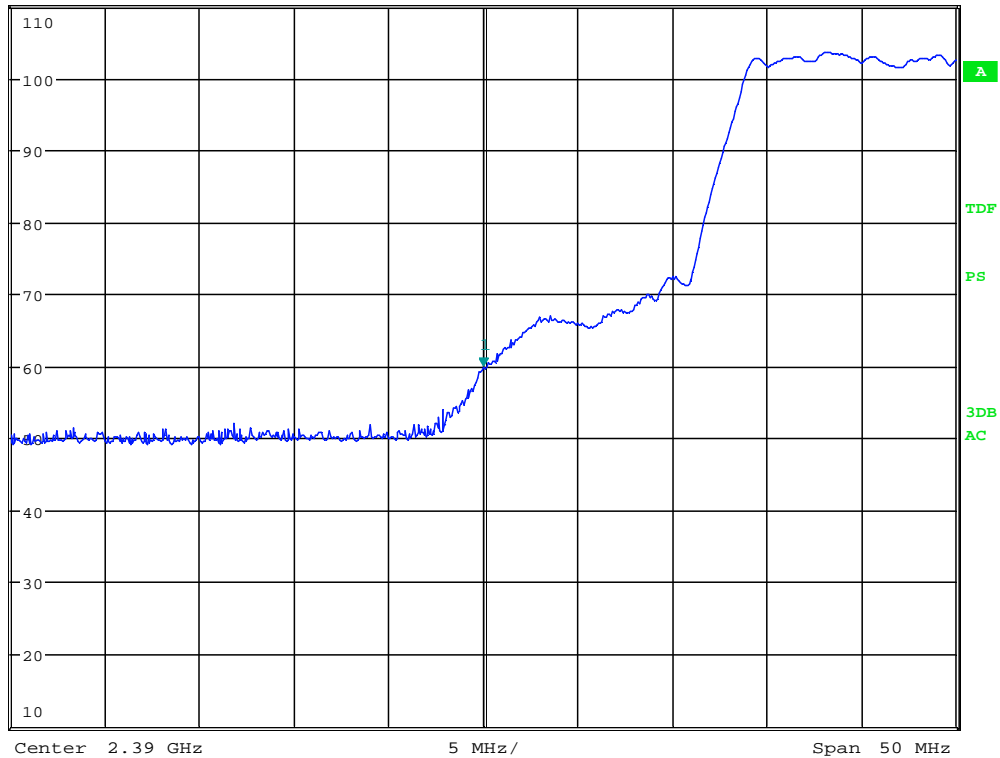
MARKER 1
 2.39 GHz

*RBW 1 MHz
 VBW 3 MHz
 SWT 2.5 ms

Marker 1 [T1]
 59.87 dBuV/m
 2.390000000 GHz

Ref 110 dBuV/m *Att 10 dB

1 PK
 MAXH

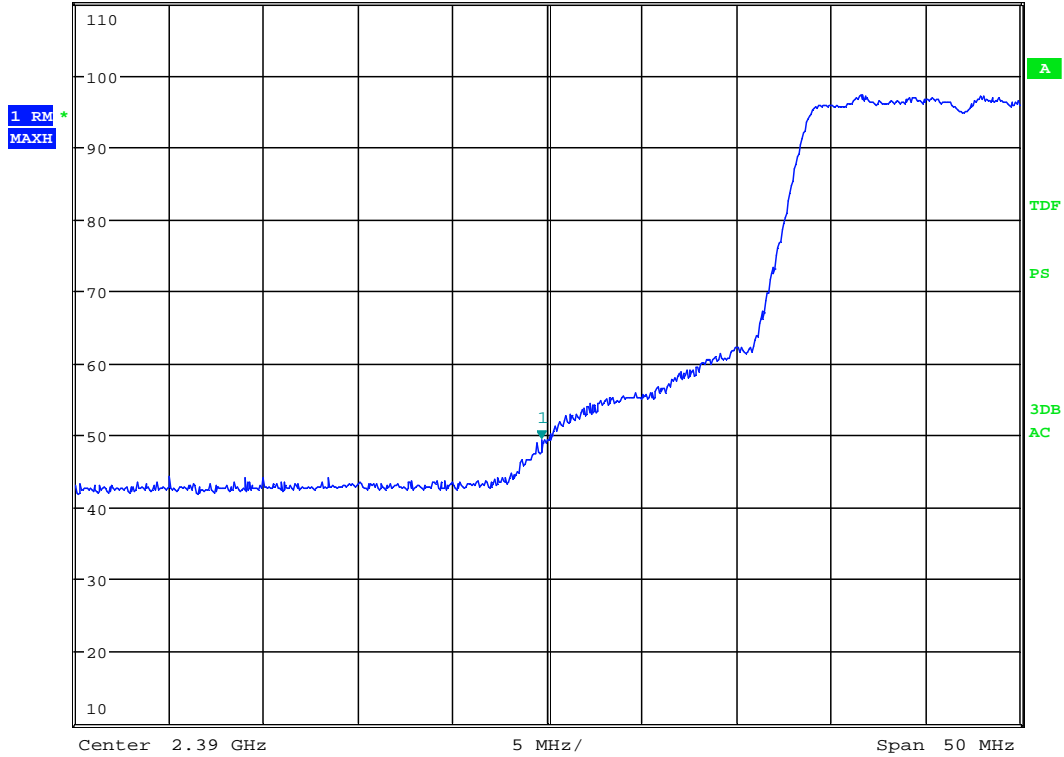


Date: 13.NOV.2013 16:57:52

Lower Band Edge, Radiated, Peak, 2412 MHz, 802.11g, 54Mbps



MARKER 1	* RBW 1 MHz	Marker 1 [T1]
2.389679487 GHz	VBW 10 MHz	49.35 dBµV/m
Ref 110 dBµV/m	* Att 10 dB	SWT 2.5 ms
		2.389679487 GHz



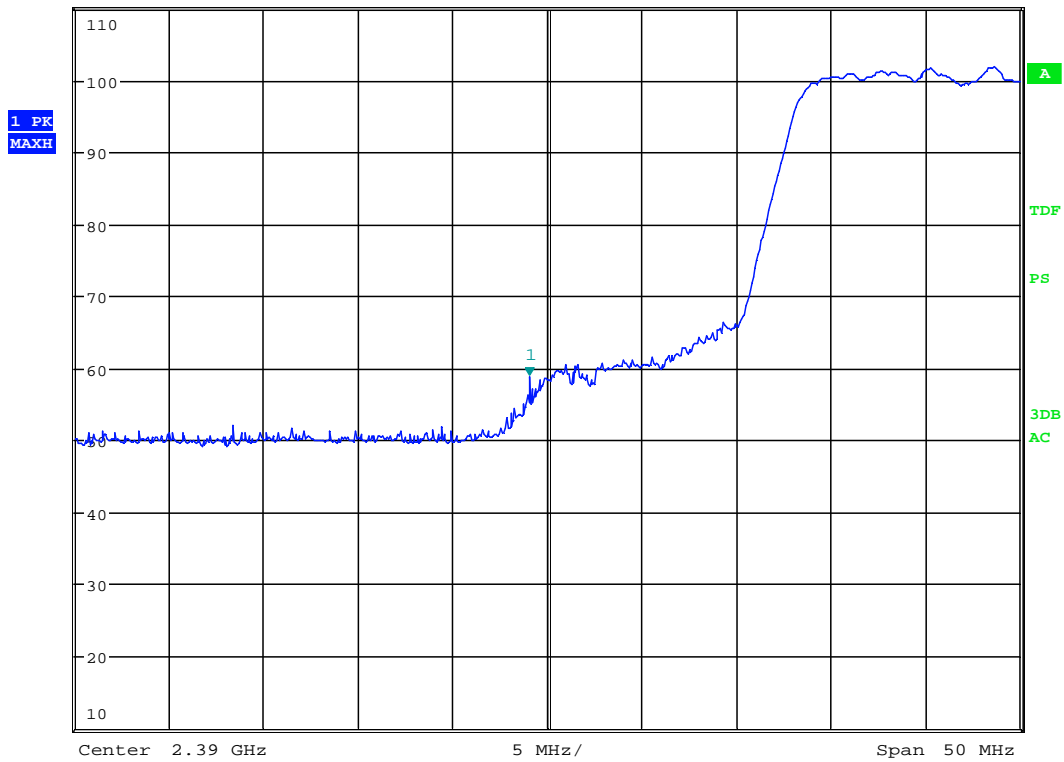
Date: 13.NOV.2013 16:58:54

Lower Band Edge, Radiated, Average, 2412 MHz, 802.11g, 54Mbps



MARKER 1
 2.389038462 GHz
 Ref 110 dBuV/m * Att 10 dB

* RBW 1 MHz Marker 1 [T1]
 VBW 3 MHz 58.77 dBuV/m
 SWT 2.5 ms 2.389038462 GHz

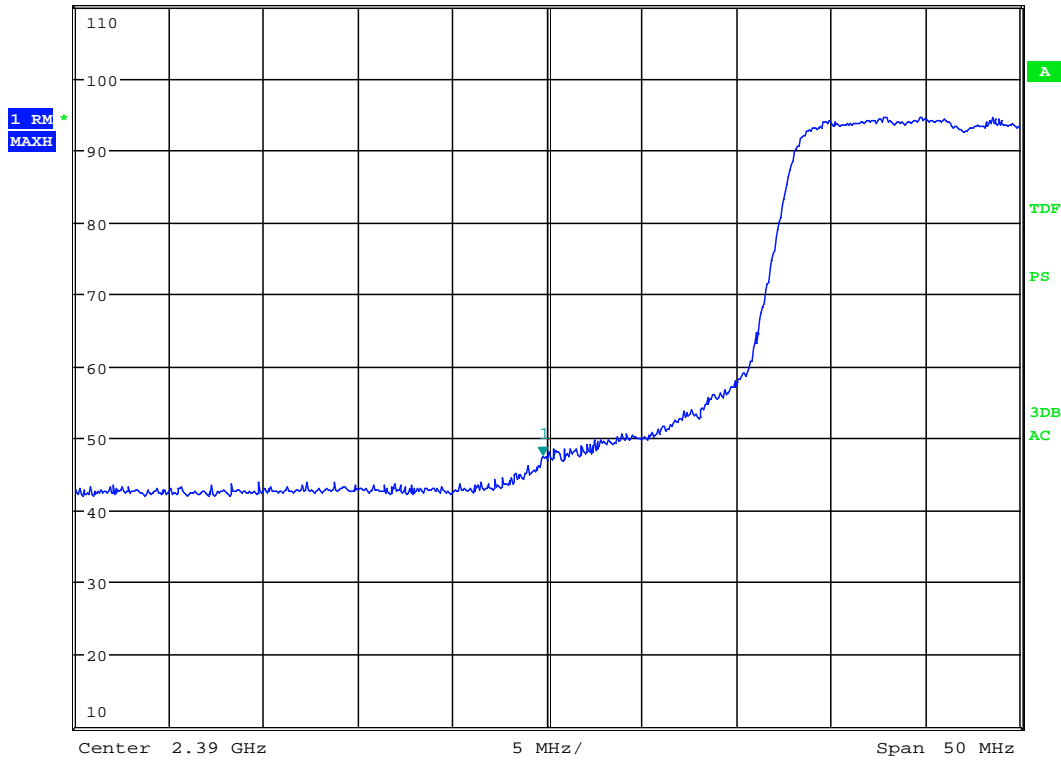


Date: 13.NOV.2013 17:02:58

Lower Band Edge, Radiated, Peak, 2412 MHz, 802.11n, MCS7



MARKER 1	*RBW 1 MHz	Marker 1 [T1]
2.389759615 GHz	VBW 10 MHz	47.58 dBµV/m
Ref 110 dBµV/m	SWT 2.5 ms	2.389759615 GHz
*Att 10 dB		

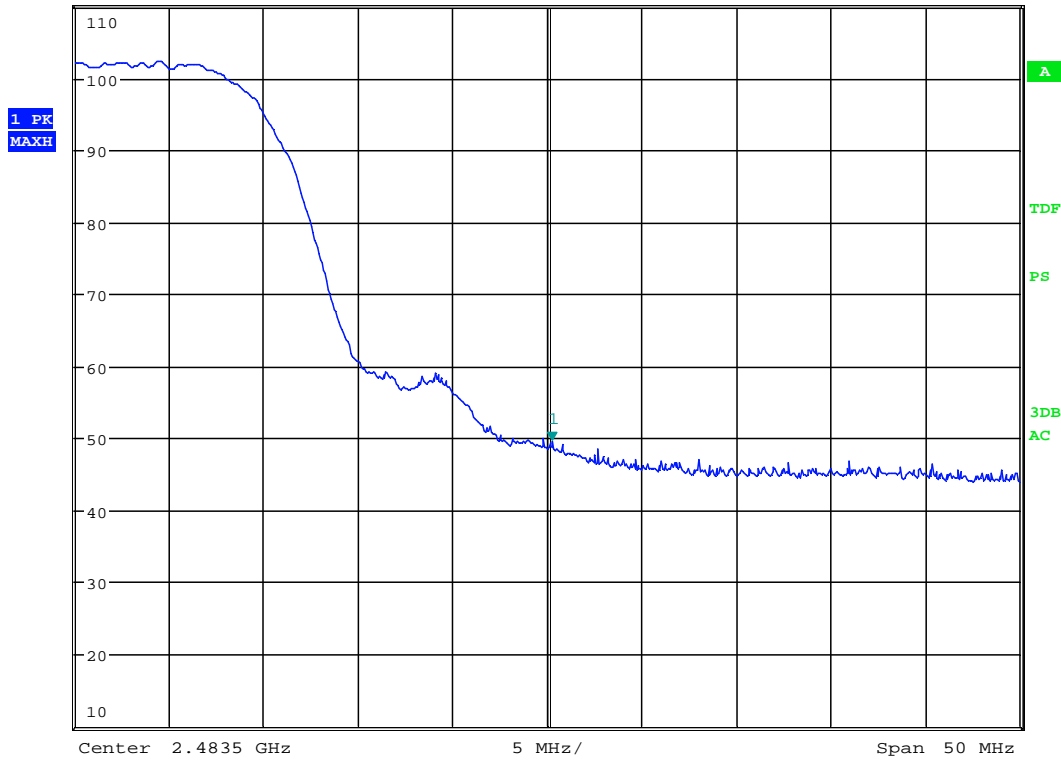


Date: 13.NOV.2013 17:02:14

Lower Band Edge, Radiated, Average, 2412 MHz, 802.11n, MCS7



MARKER 1	* RBW 1 MHz	Marker 1 [T1]
2.483740385 GHz	VBW 3 MHz	49.67 dBuV/m
Ref 110 dBuV/m	* Att 10 dB	SWT 2.5 ms
		2.483740385 GHz

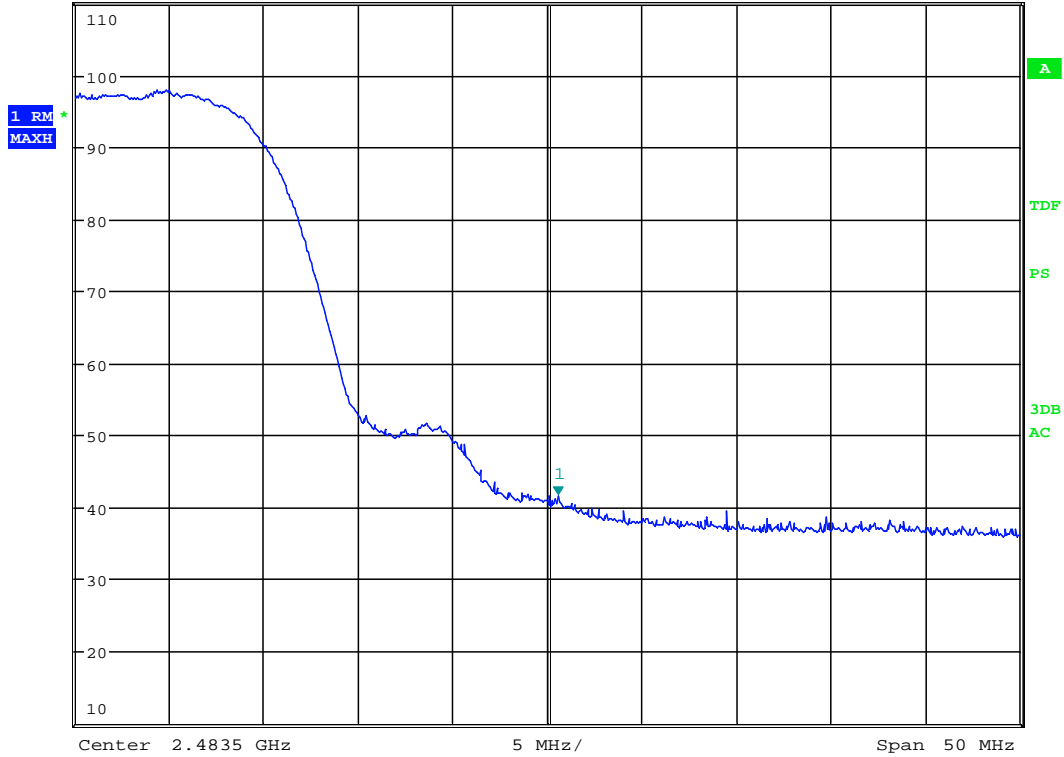


Date: 13.NOV.2013 16:44:58

Upper Band Edge, Radiated, Peak, 2462 MHz, 802.11b, 11Mbps



MARKER 1	* RBW 1 MHz	Marker 1 [T1]
2.484060897 GHz	VBW 10 MHz	41.63 dBµV/m
Ref 110 dBµV/m	* Att 10 dB	SWT 2.5 ms
		2.484060897 GHz

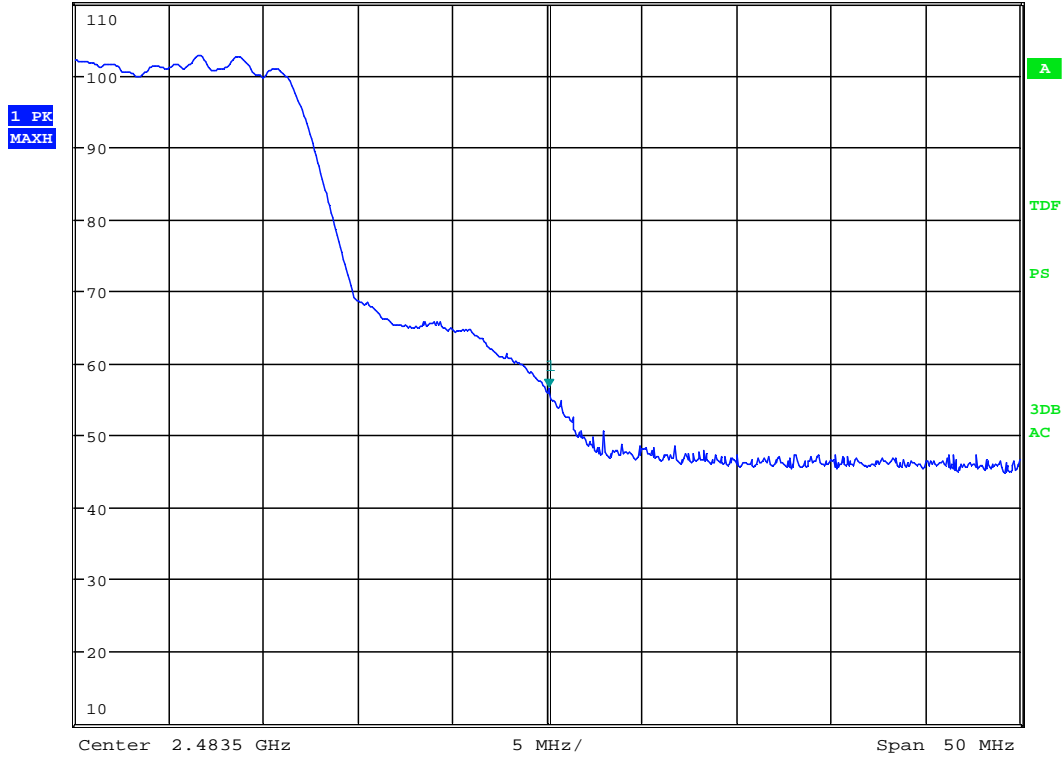


Date: 13.NOV.2013 16:45:24

Upper Band Edge, Radiated, Average, 2462 MHz, 802.11b, 11Mbps



MARKER 1	*RBW 1 MHz	Marker 1 [T1]
2.483586538 GHz	VBW 3 MHz	56.43 dBuV/m
Ref 110 dBuV/m	SWT 2.5 ms	2.483586538 GHz
*Att 10 dB		

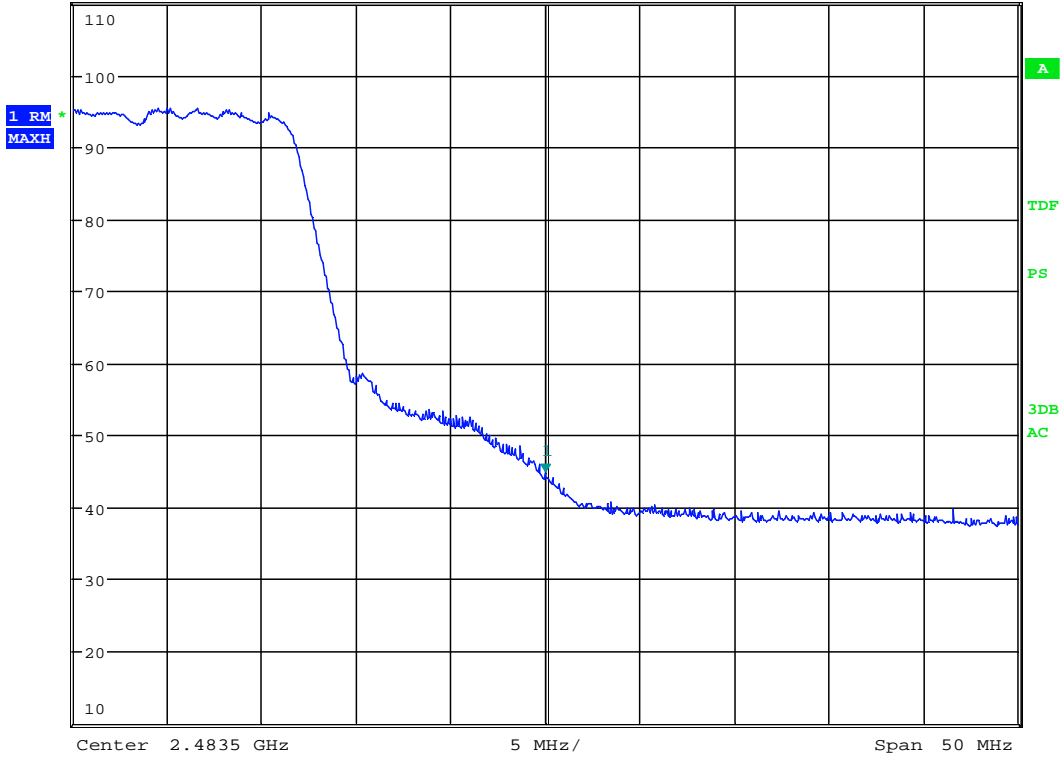


Date: 14.NOV.2013 09:29:41

Upper Band Edge, Radiated, Peak, 2462 MHz, 802.11g, 54Mbps



MARKER 1	* RBW 1 MHz	Marker 1 [T1]
2.48350641 GHz	VBW 10 MHz	44.84 dBuV/m
Ref 110 dBuV/m	* Att 10 dB	SWT 2.5 ms
		2.483506410 GHz

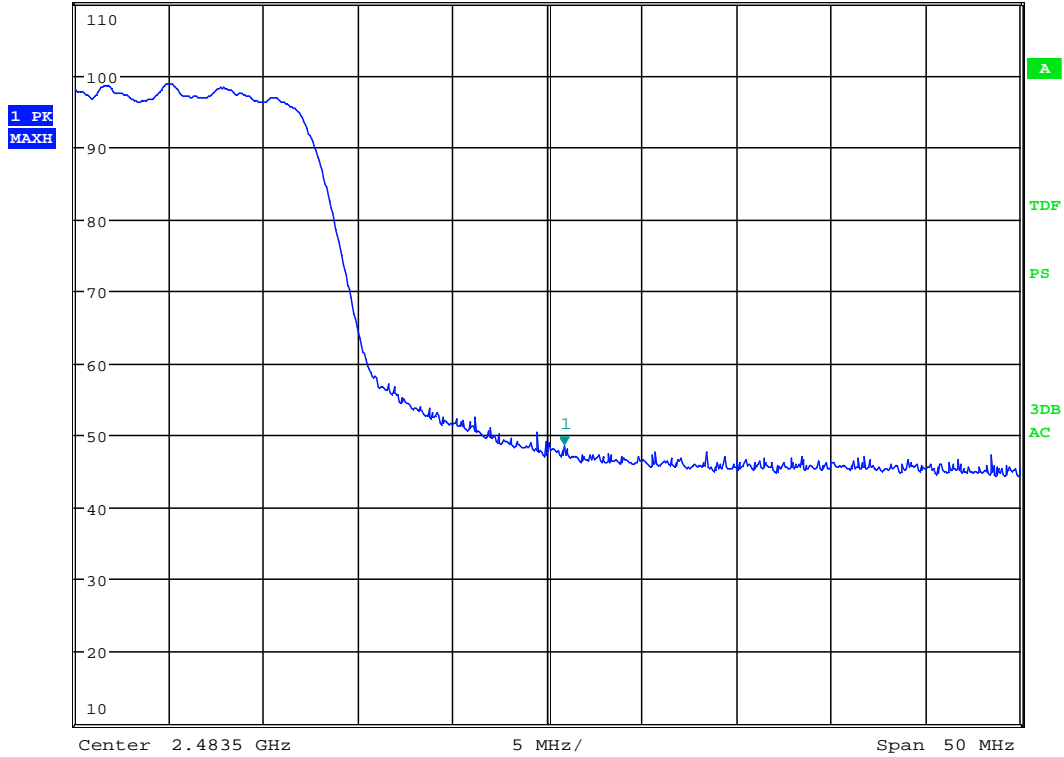


Date: 14.NOV.2013 09:30:15

Upper Band Edge, Radiated, Average, 2462 MHz, 802.11g, 54Mbps



MARKER 1	* RBW 1 MHz	Marker 1 [T1]
2.48438141 GHz	VBW 3 MHz	48.53 dBuV/m
Ref 110 dBuV/m	* Att 10 dB	SWT 2.5 ms
		2.484381410 GHz

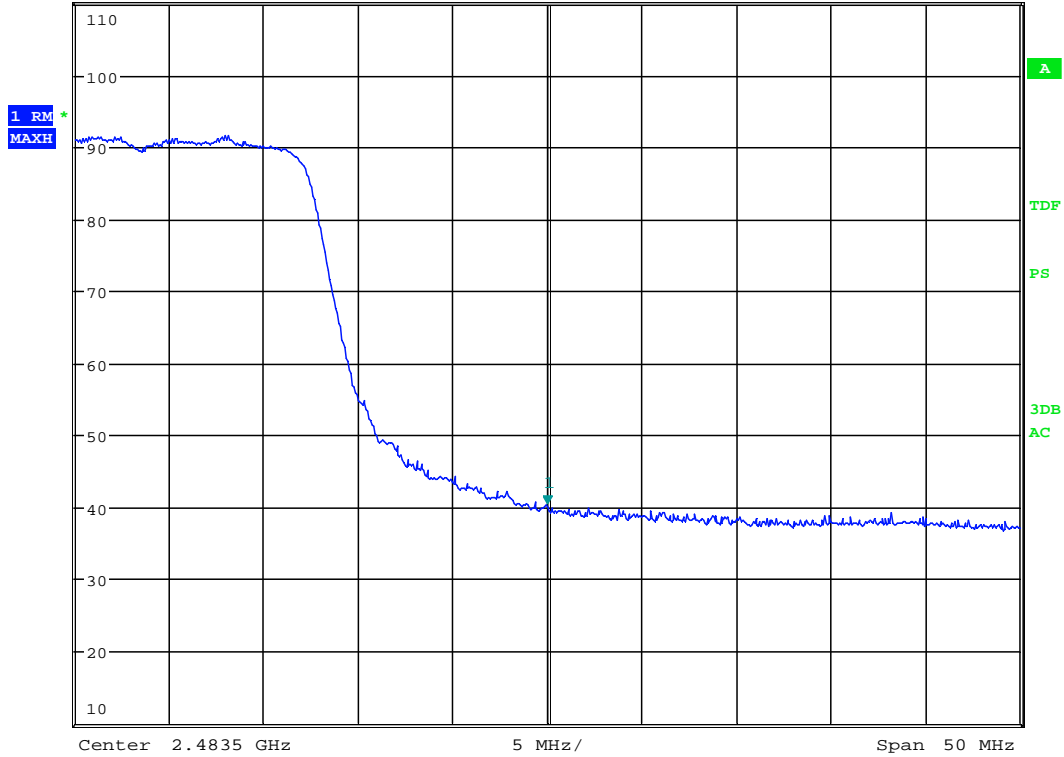


Date: 13.NOV.2013 17:09:56

Upper Band Edge, Radiated, Peak, 2462 MHz, 802.11n, MCS7



MARKER 1	* RBW 1 MHz	Marker 1 [T1]
2.4835 GHz	VBW 10 MHz	40.37 dBµV/m
Ref 110 dBµV/m	* Att 10 dB	SWT 2.5 ms
		2.483500000 GHz



Date: 13.NOV.2013 17:10:53

Upper Band Edge, Radiated, Average, 2462 MHz, 802.11n, MCS7

RF conducted power to 25 GHz

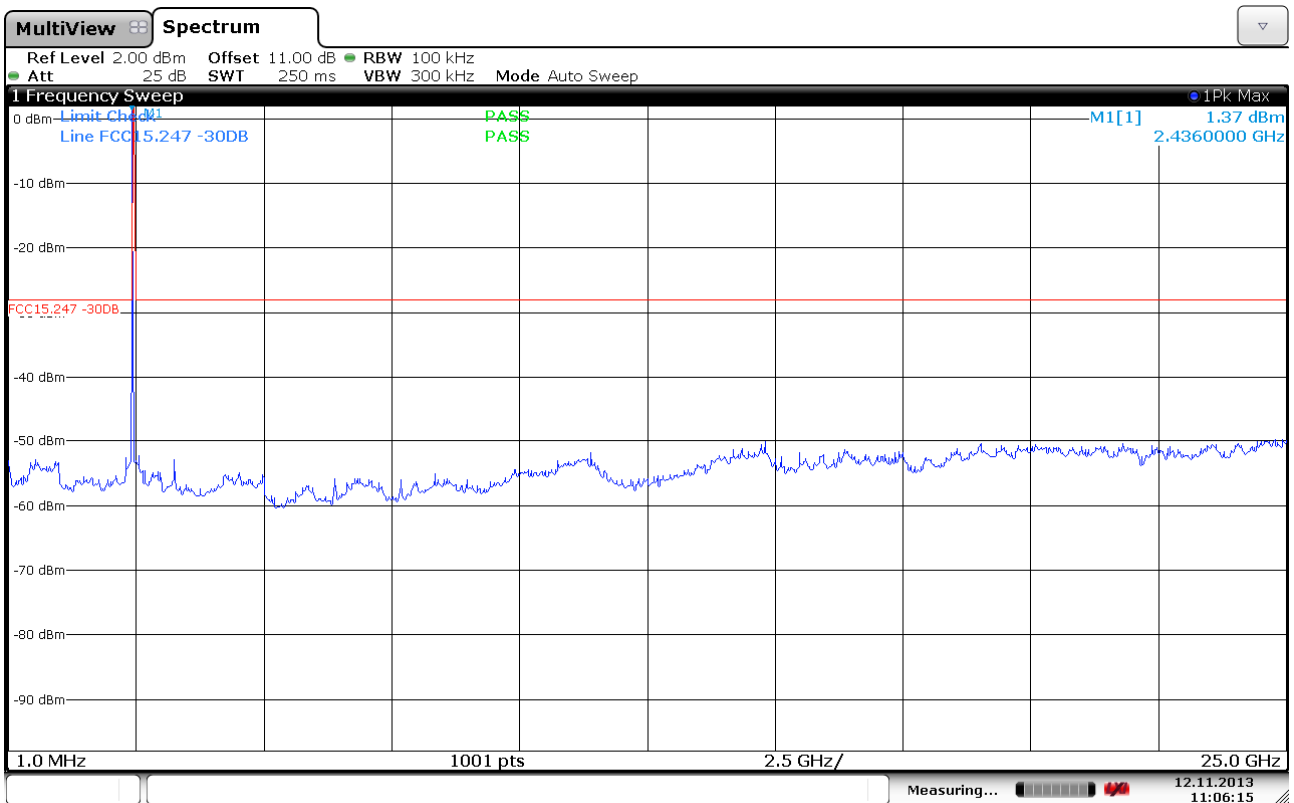
Maximum RF level outside operating band:

RF ch 1: >30 dB/C, margin >10 dB

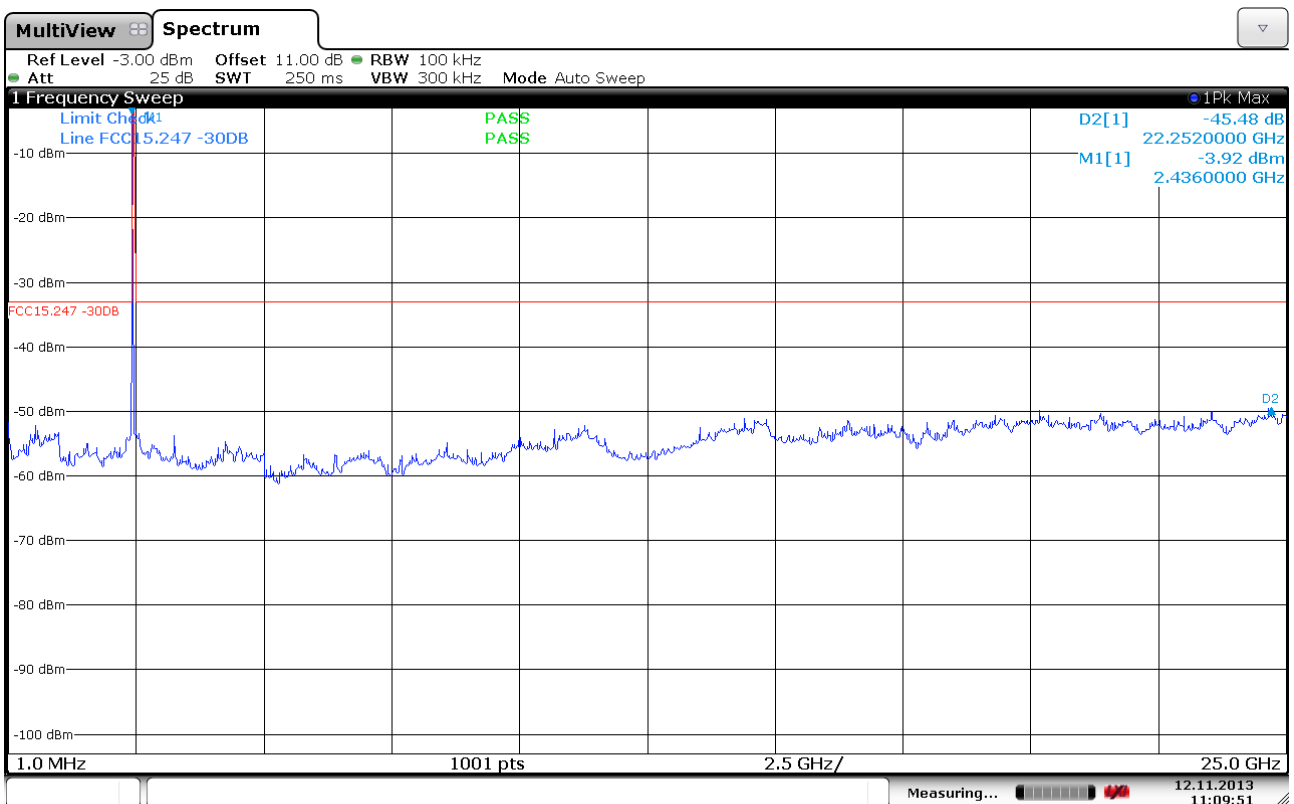
RF ch 6: >40 dB/C, margin >20 dB

RF ch 11: >30 dB/C, margin >10 dB

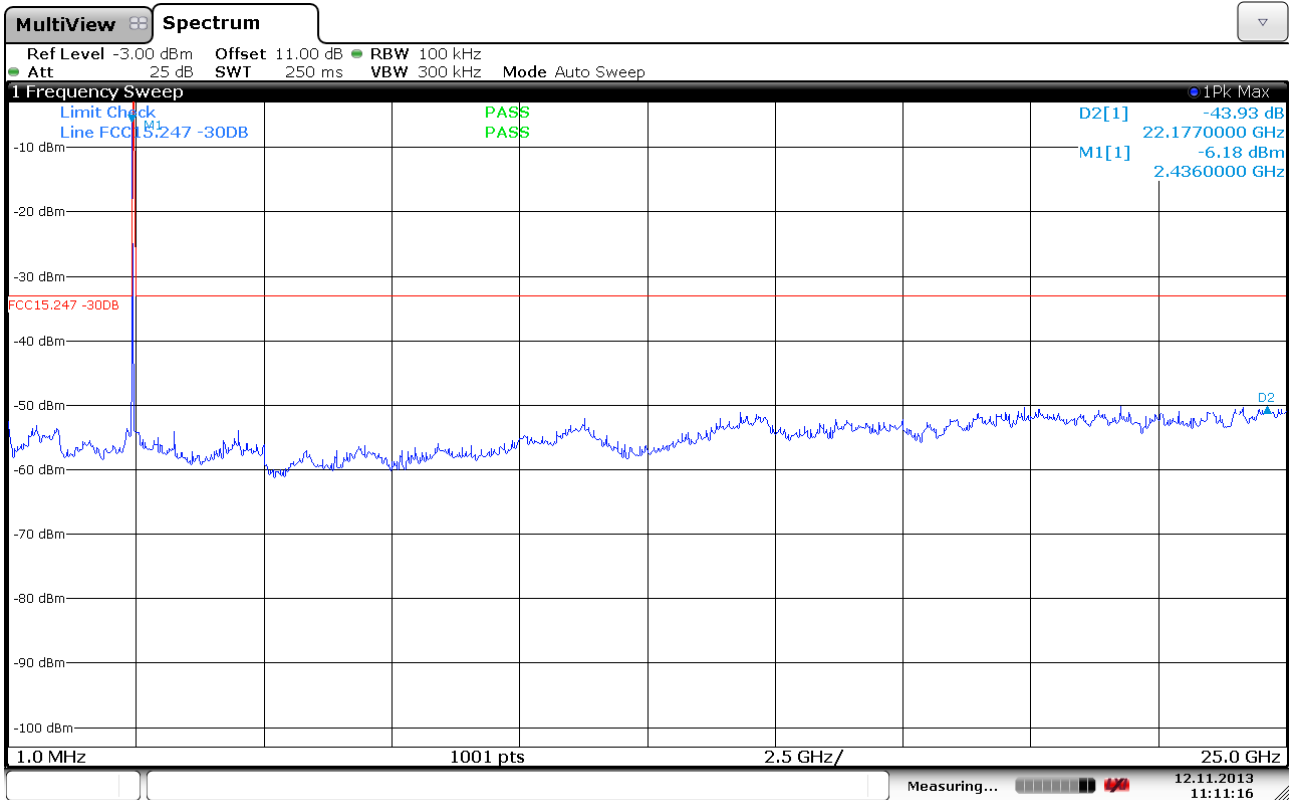
See plots.



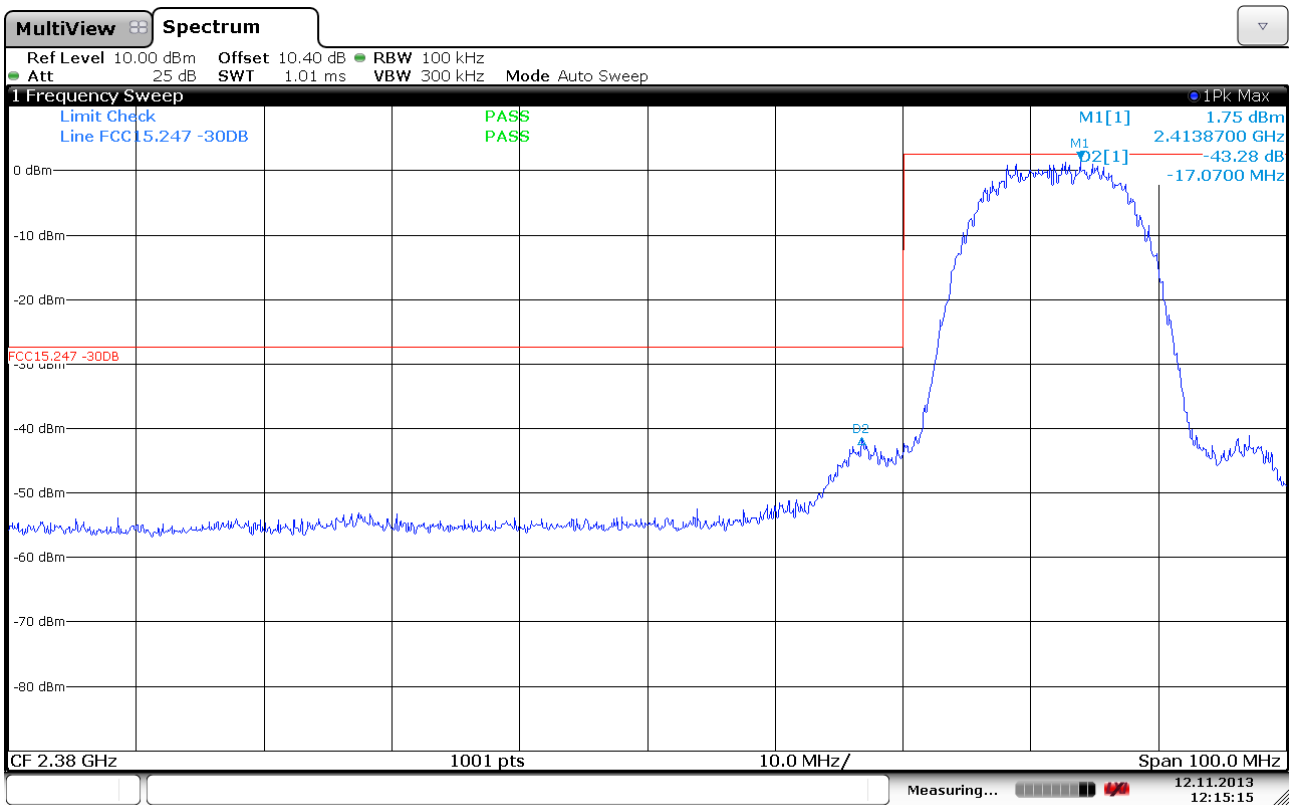
Conducted Emissions 1 MHz – 25 GHz, Ch06, 802.11b, 11Mbps



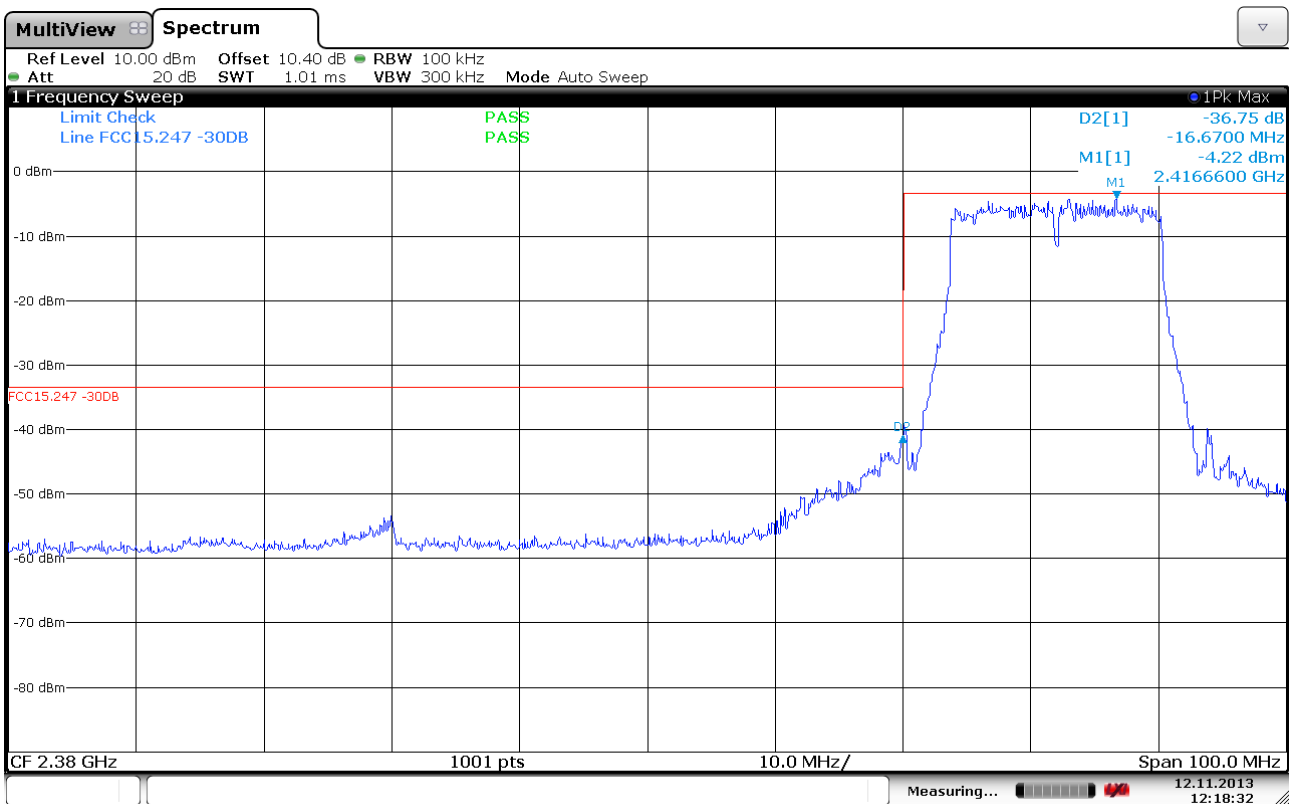
Conducted Emissions 1 MHz – 25 GHz, Ch06, 802.11g, 6Mbps



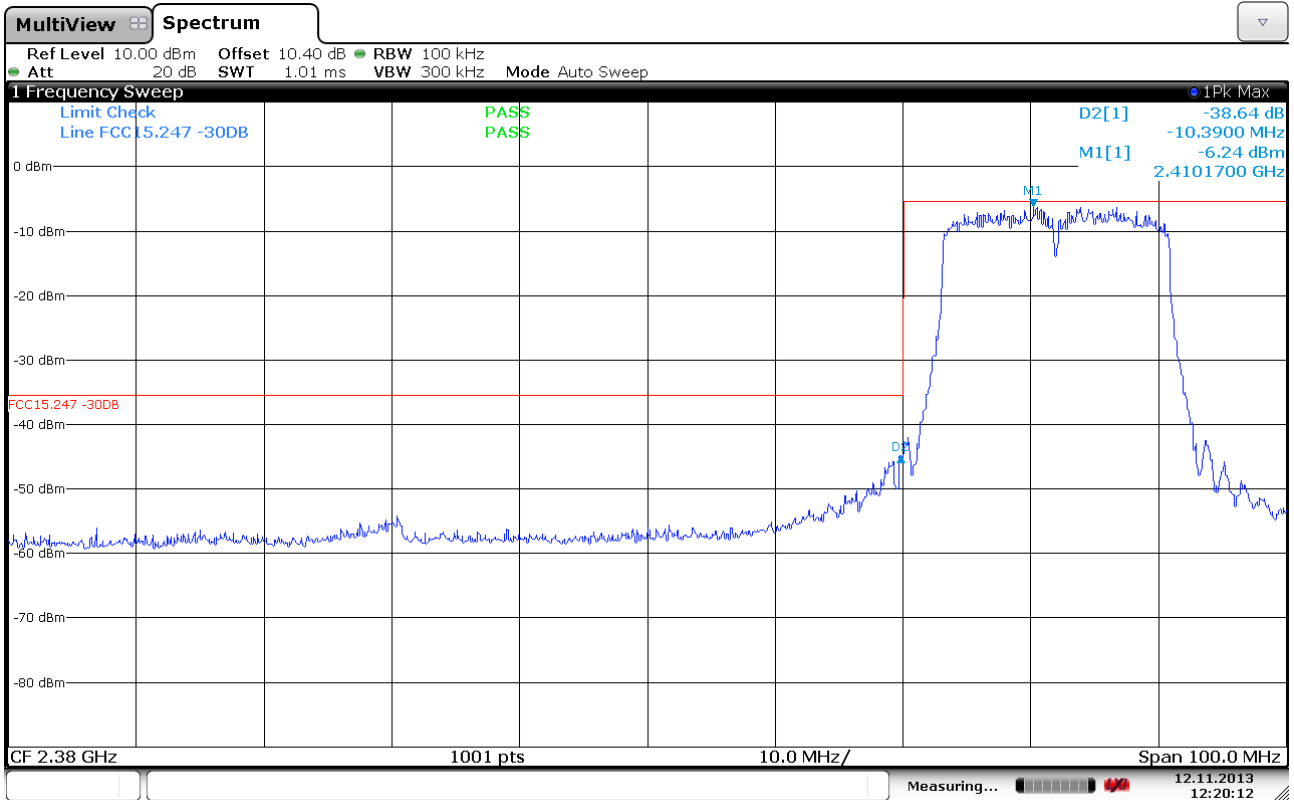
Conducted Emissions 1 MHz – 25 GHz, Ch06, 802.11n, MCS0



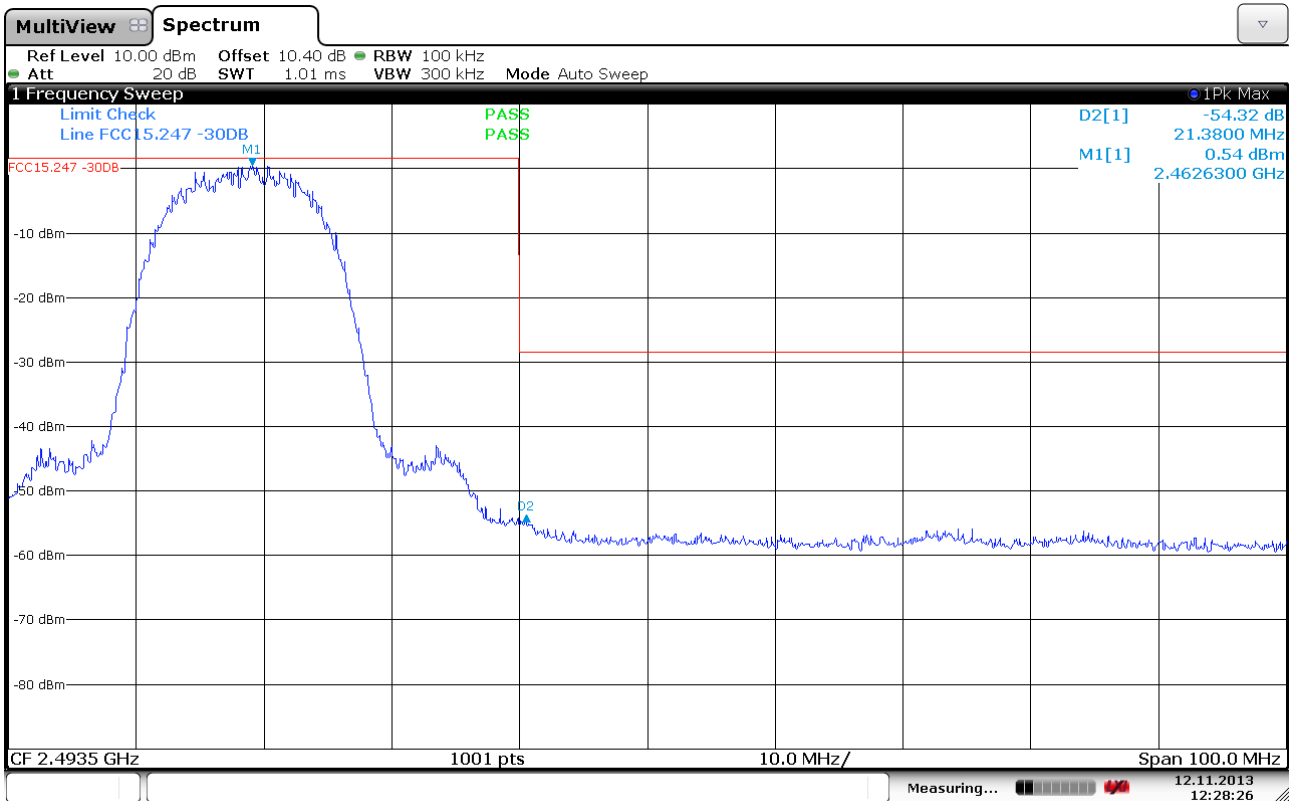
Lower Band Edge 1, Conducted, Ch01, 802.11b, 11Mbps



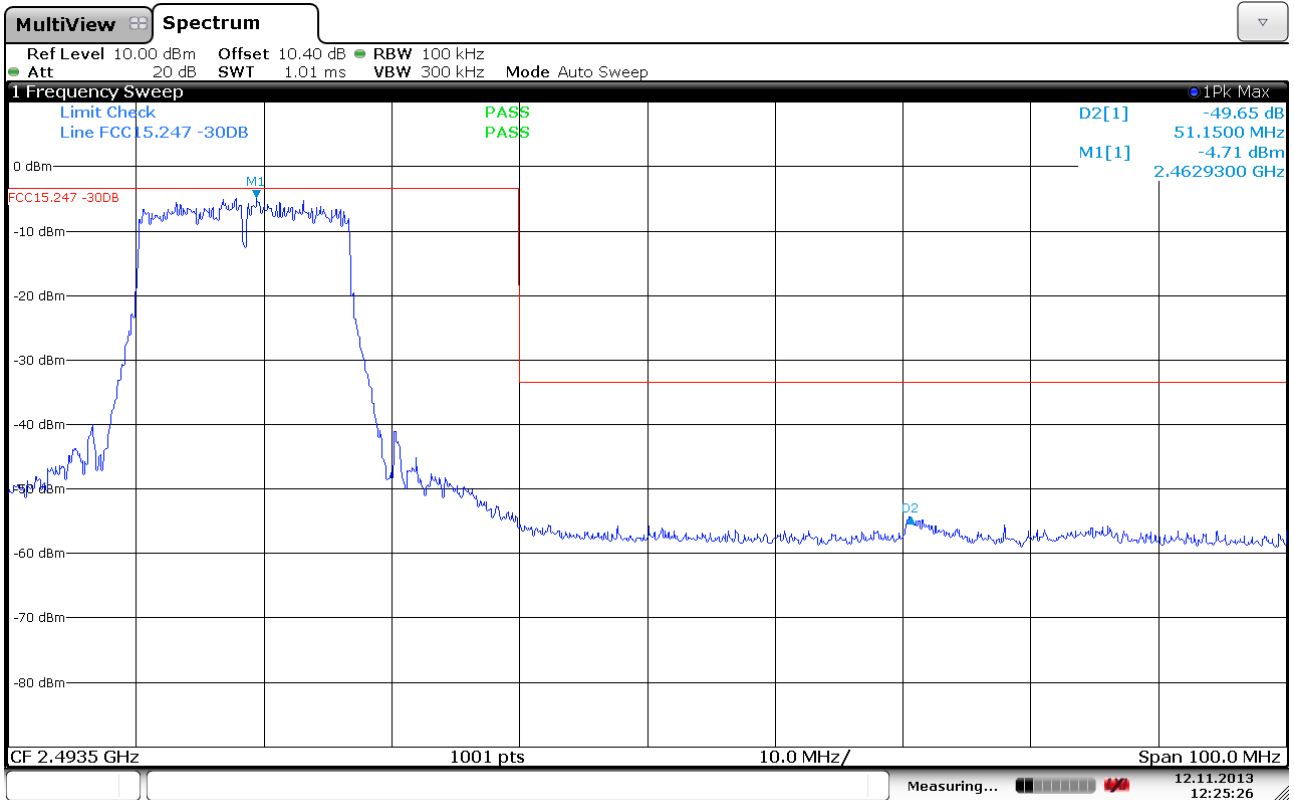
Lower Band Edge 1, Conducted, Ch01, 802.11g, 54Mbps



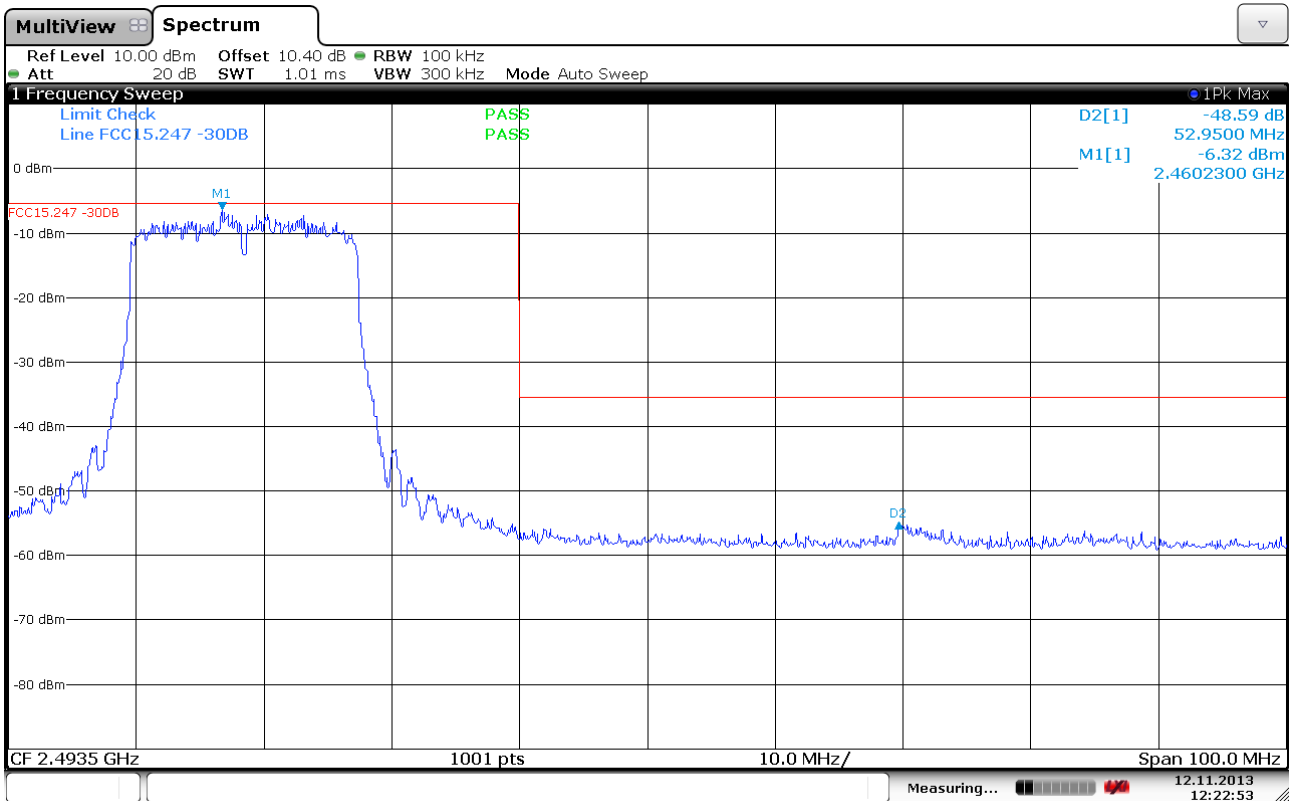
Lower Band Edge 1, Conducted, Ch01, 802.11n, MCS7



Upper Band Edge, Conducted, Ch11, 802.11b, 11Mbps



Upper Band Edge, Conducted, Ch11, 802.11g, 54Mbps



Upper Band Edge, Conducted, Ch11, 802.11n, MCS7

Radiated emissions 10 kHz-30 MHz.

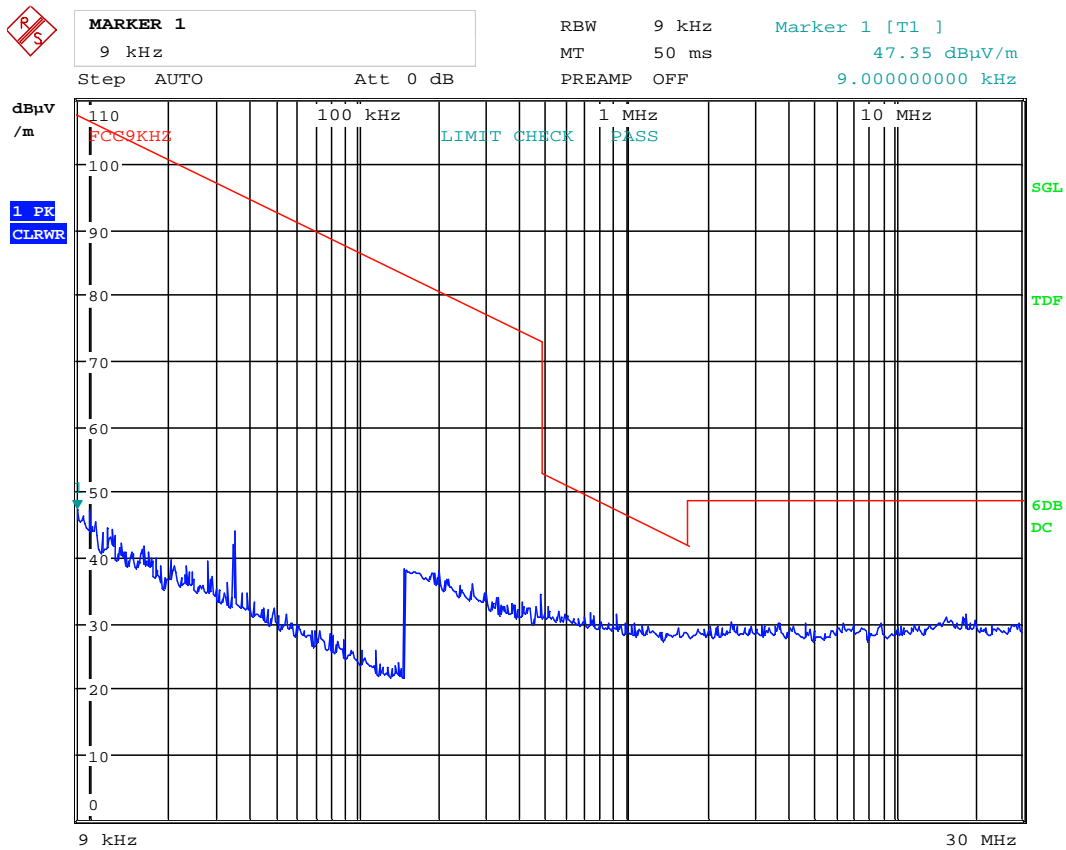
Measuring distance: 10m

Measured with Peak detector.

Limit is converted to 10m using 40 dB/decade according to 15.31 (f) (2).

No emissions were found.

See plot below.



Date: 14.NOV.2013 17:47:32

Radiated emission 30 – 1000 MHz.

Detector: Quasi-Peak

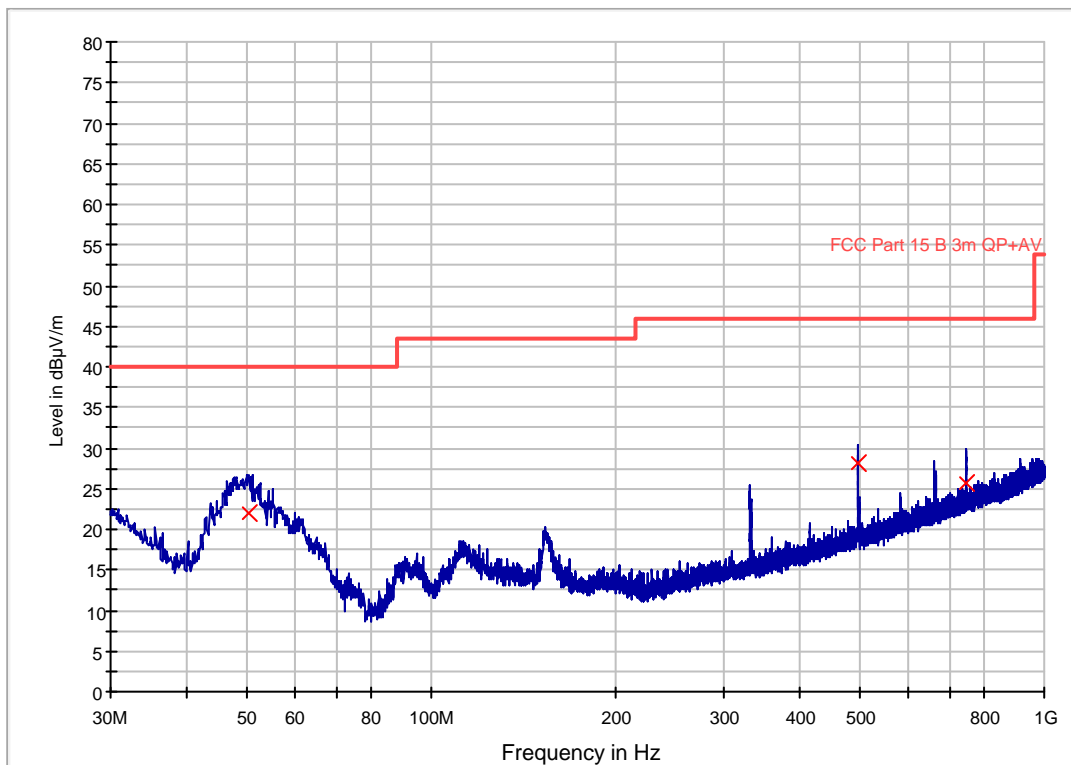
Measuring distance 10 m according to CISPR 22.

Tested in speech mode with active connection.

Frequency (MHz)	QuasiPeak (dBµV/m)	Bandwidth (kHz)	Polarization	Margin (dB)	Limit (dBµV/m)	Comment
50.255189	22.0	120.000	V	18.0	40.0	
497.438122	28.1	120.000	H	17.9	46.0	
746.537083	25.7	120.000	H	20.3	46.0	

See plot.

NTC FCC Pt15 Class B 30-1000M 3m



Radiated Emissions, 1-25 GHz

Measuring distance: 3m (1 – 8.5 GHz)
 1m (5.5 – 18 GHz)

A pre-scan was performed above 18 GHz and no spurious emissions were detected.

Peak Detector:

Frequency	RF channel	Dist. corr. factor	Field strength, Peak Detector, 3m	Duty cycle corr. factor	Limit	Margin
MHz	Ch	dB	dB μ V/m	dB	dB μ V/m	dB
2896	01	0	56.6	0	74	17.4
2947	06	0	52.9	0	74	21.1
2997	11	0	49.1	0	74	24.9
Other freqs	L,M,H	0	None detected	0	74	>20

Average Detector:

Frequency	RF channel	Dist. corr. factor	Field strength, Peak Detector, 3m	Duty cycle corr. factor	Limit	Margin
MHz	Ch	dB	dB μ V/m	dB	dB μ V/m	dB
2896	01	0	49.5	0	54	4.5
2947	06	0	45.3	0	54	8.7
2997	11	0	41.4	0	54	12.6
Other freqs	L,M,H	/	None detected	0	54	>10

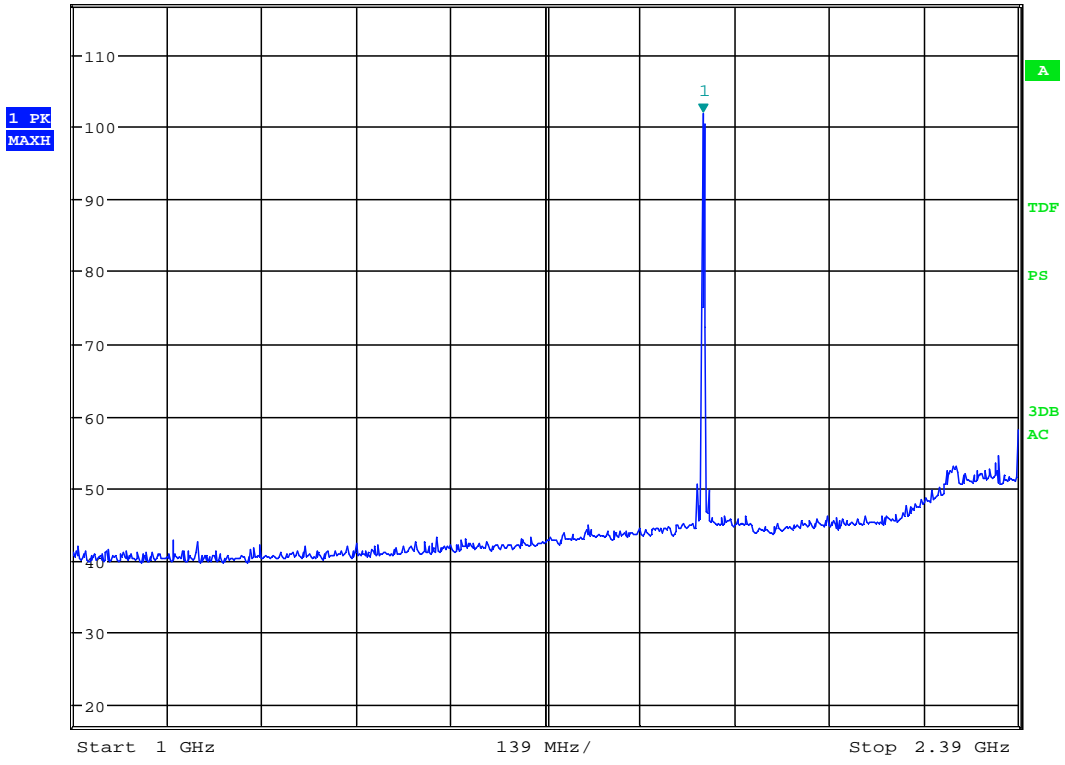
Antenna factor, amplifier gain and cable loss are included in spectrum analyzer “Transducer factor”.

Distance correction factor is included on the plot for measurements @1m.

See plots.



*RBW 1 MHz Marker 1 [T1]
 *VBW 3 MHz 101.97 dBμV/m
 Ref 117 dBμV/m *Att 20 dB SWT 5 ms 1.926666667 GHz

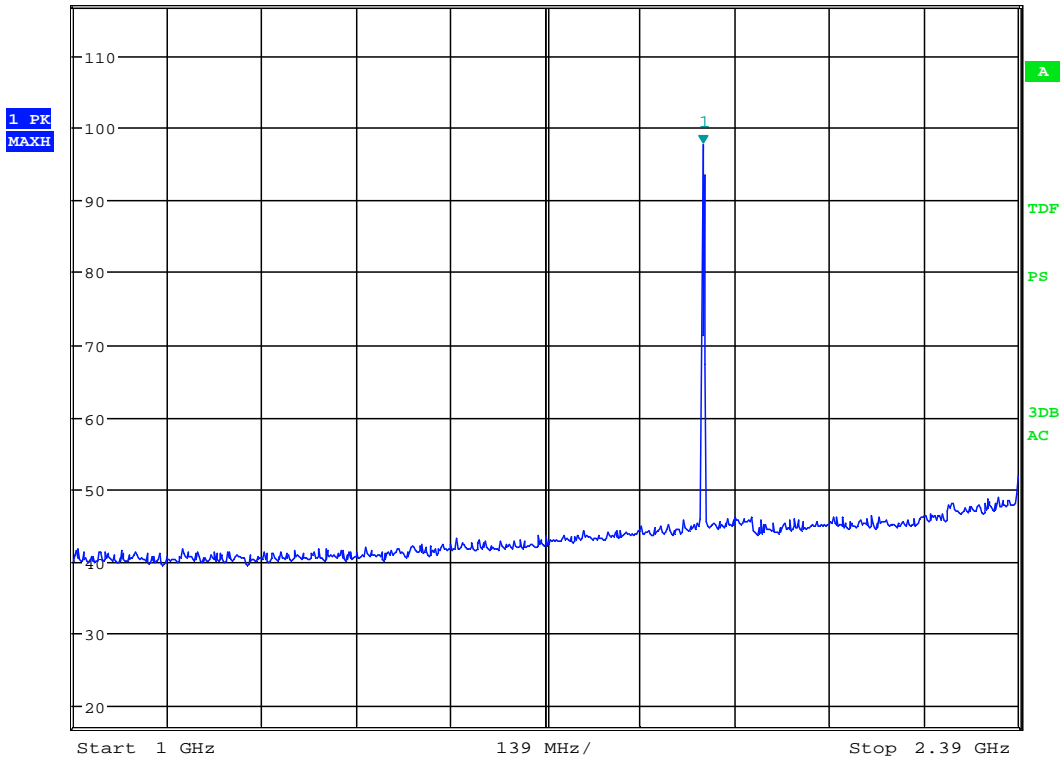


Date: 14.NOV.2013 10:25:17

Radiated Emissions, 1000 -2390 MHz, Ch01, VP, 802.11g, 54Mbps
 (strong signal in plot is the UPCS part)



*RBW 1 MHz Marker 1 [T1]
 *VBW 3 MHz 97.84 dBuV/m
 Ref 117 dBuV/m *Att 20 dB SWT 5 ms 1.926666667 GHz

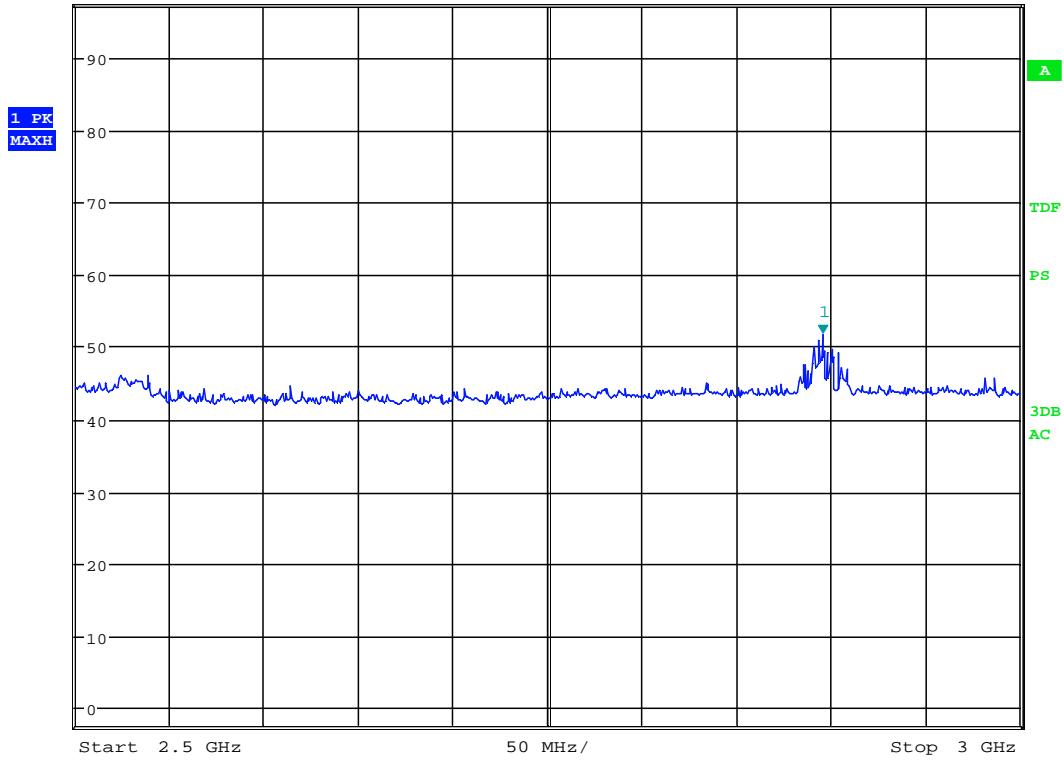


Date: 14.NOV.2013 10:27:08

Radiated Emissions, 1000 -2390 MHz, Ch01, HP, 802.11g, 54Mbps
 (strong signal in plot is the UPCS part)



MARKER 1
 2.895833333 GHz
 Ref 97.5 dB μ V/m *Att 10 dB *RBW 1 MHz *VBW 3 MHz SWT 2.5 ms
 Marker 1 [T1] 51.71 dB μ V/m 2.895833333 GHz

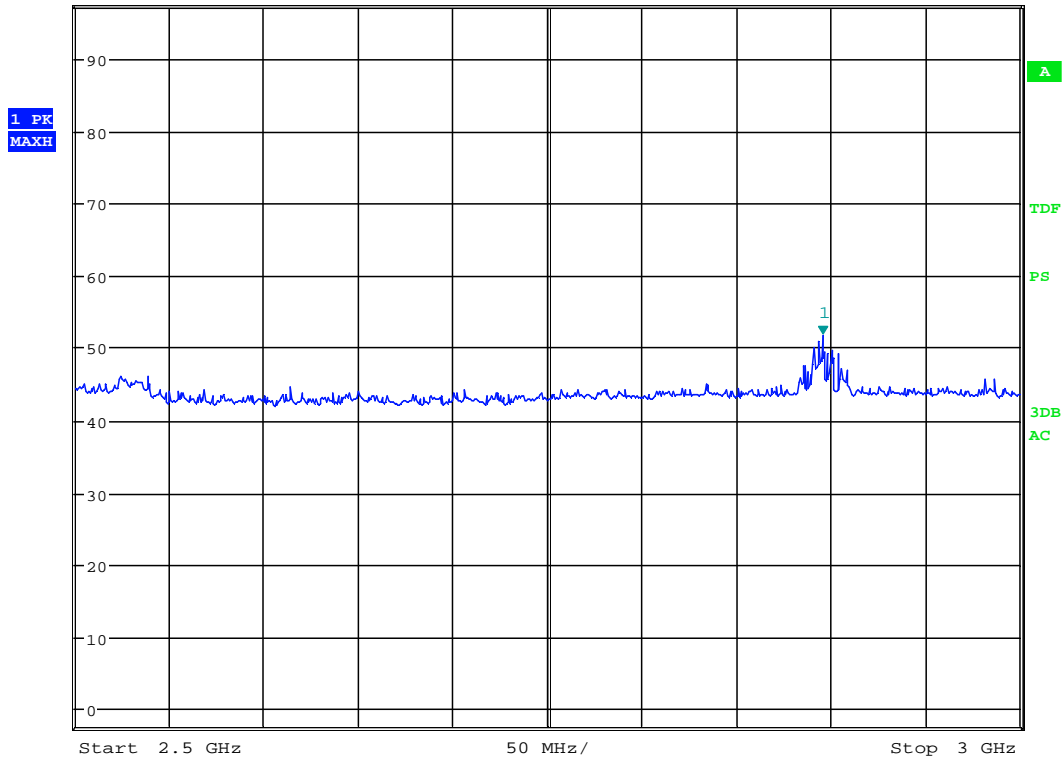


Date: 14.NOV.2013 10:42:03

Radiated Emissions, 2500 -3000 MHz, Ch01, VP, 802.11n, MCS7



MARKER 1	* RBW 1 MHz	Marker 1 [T1]
2.895833333 GHz	* VBW 3 MHz	51.71 dBµV/m
Ref 97.5 dBµV/m * Att 10 dB	SWT 2.5 ms	2.895833333 GHz



Date: 14.NOV.2013 10:42:03

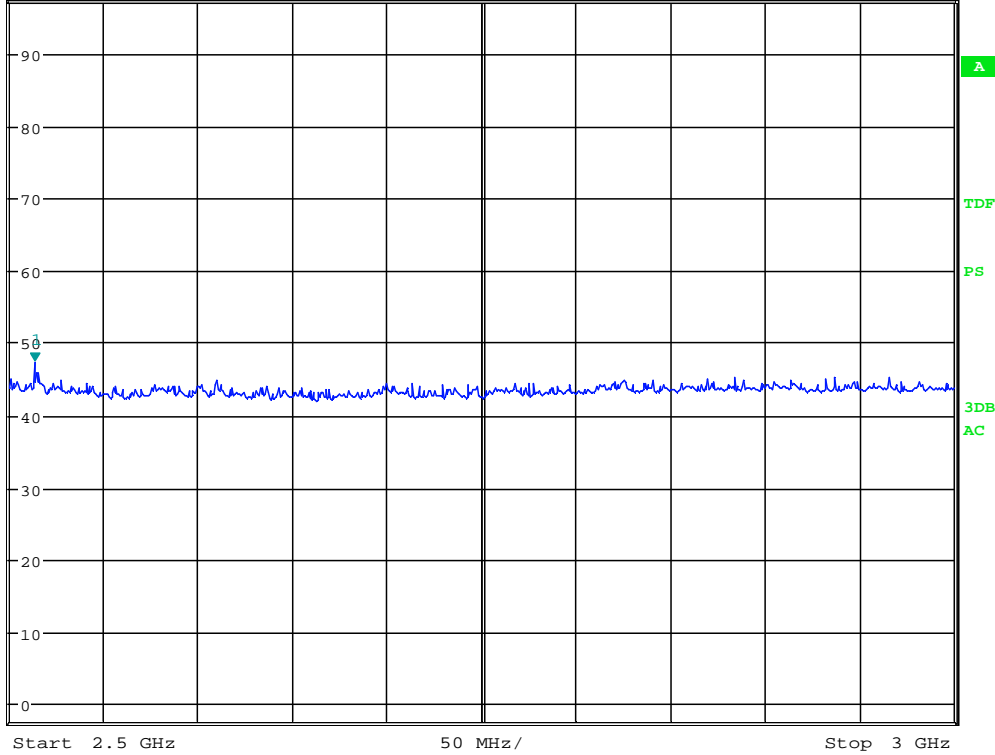
Radiated Emissions, 2500 -3000 MHz, Ch01, HP, 802.11n, MCS7



*RBW 1 MHz Marker 1 [T1]
*VBW 3 MHz 47.48 dBμV/m
SWT 2.5 ms 2.513621795 GHz

Ref 97.5 dBμV/m *Att 10 dB

1 PK
MAXH



Date: 14.NOV.2013 09:56:13

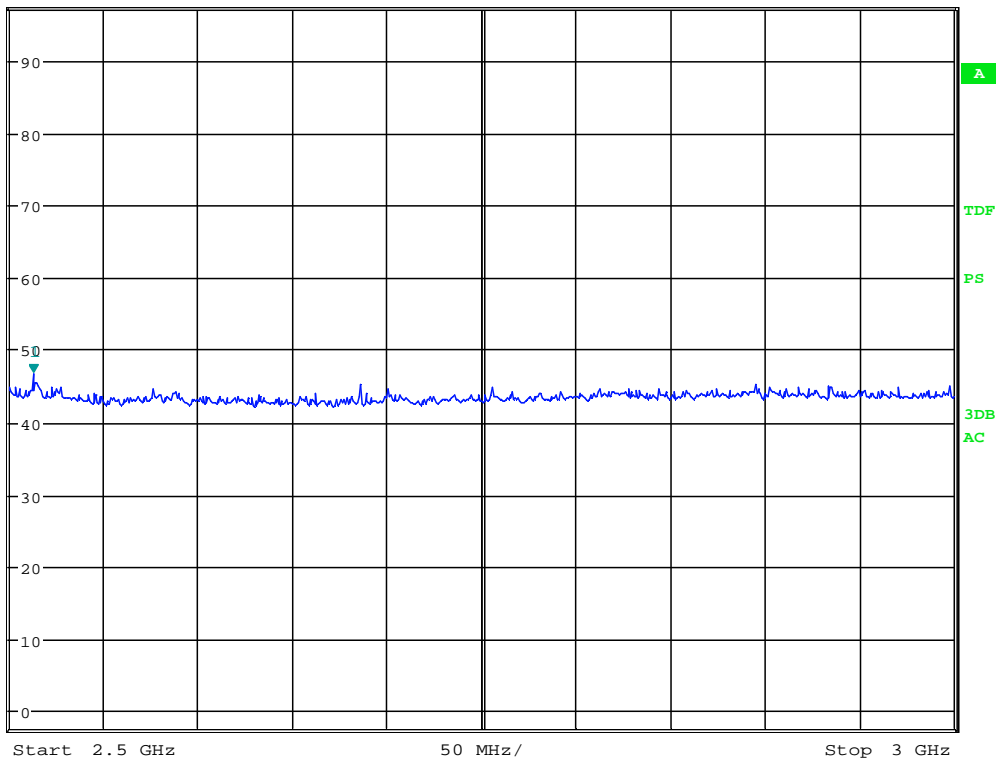
Radiated Emissions, 2500 -3000 MHz, Ch11, VP, 802.11n, MCS7



*RBW 1 MHz Marker 1 [T1]
*VBW 3 MHz 46.81 dBμV/m
SWT 2.5 ms 2.512820513 GHz

Ref 97.5 dBμV/m *Att 10 dB

1 PK
MAXH



Date: 14.NOV.2013 09:59:23

Radiated Emissions, 2500 -3000 MHz, Ch11, HP, 802.11n, MCS7

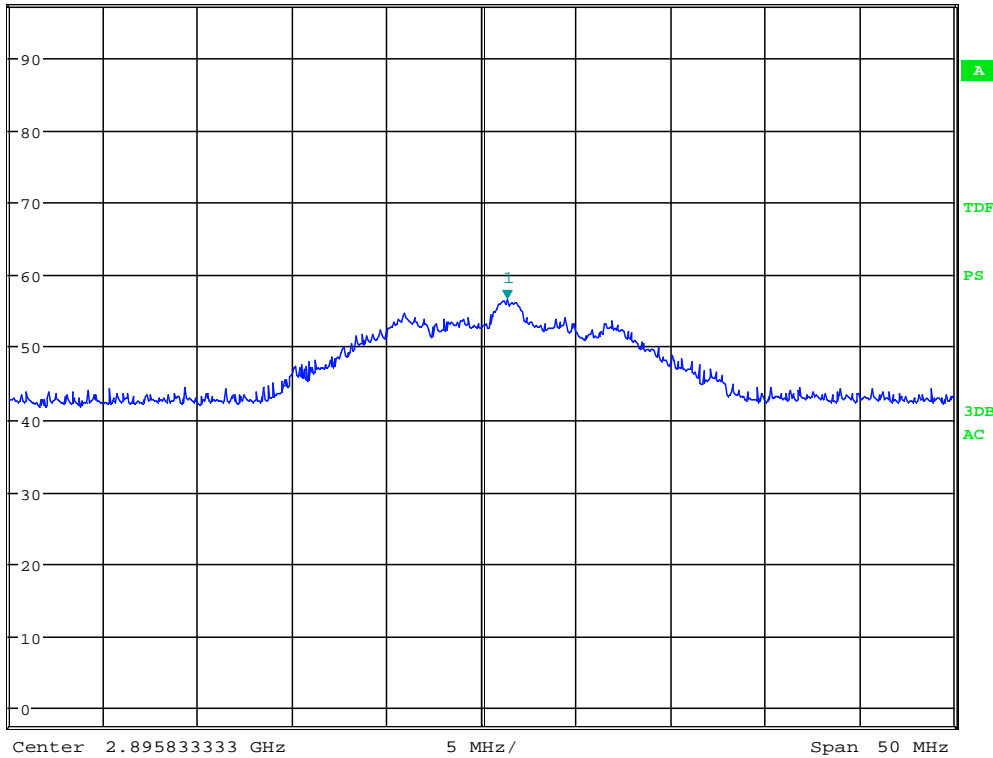


MARKER 1
 2.897195513 GHz
 Ref 97.5 dBµV/m *Att 10 dB

*RBW 1 MHz
 *VBW 3 MHz
 SWT 2.5 ms

Marker 1 [T1]
 56.56 dBµV/m
 2.897195513 GHz

1 PK
 MAXH



Date: 14.NOV.2013 11:01:46

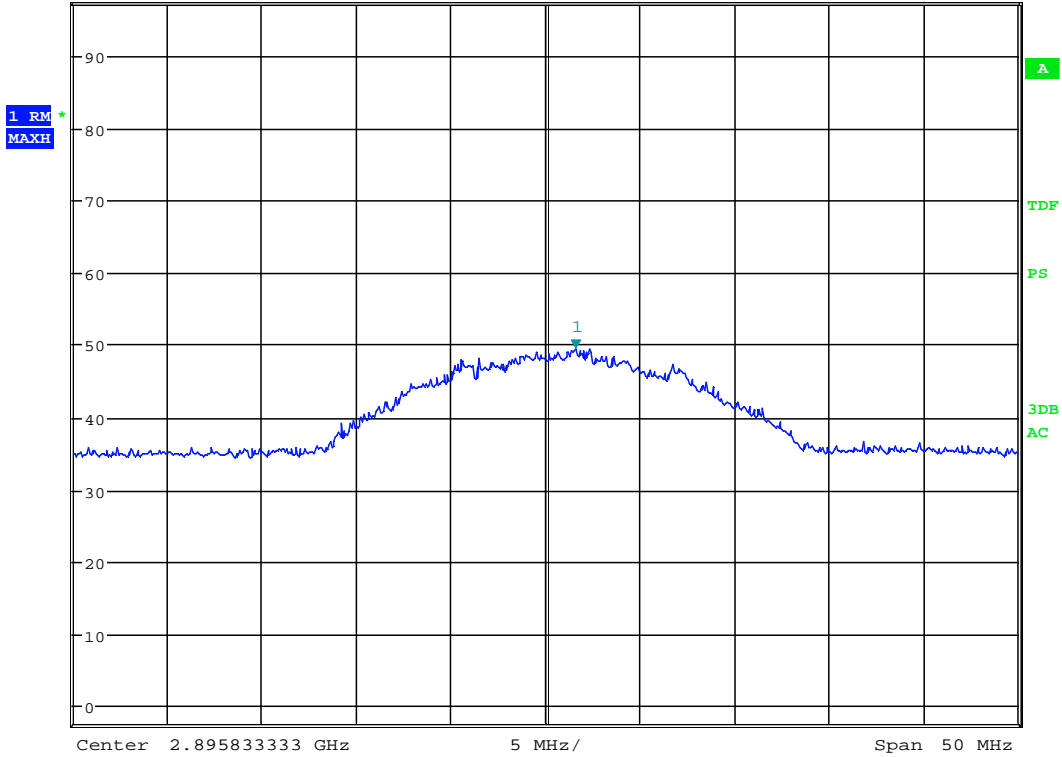
Radiated Emissions, 2896 MHz, Ch01, VP, 802.11b, 11Mbps, Pk Det



MARKER 1
 2.897435897 GHz
 Ref 97.5 dBµV/m * Att 10 dB

* RBW 1 MHz
 * VBW 3 MHz
 SWT 2.5 ms

Marker 1 [T1]
 49.49 dBµV/m
 2.897435897 GHz

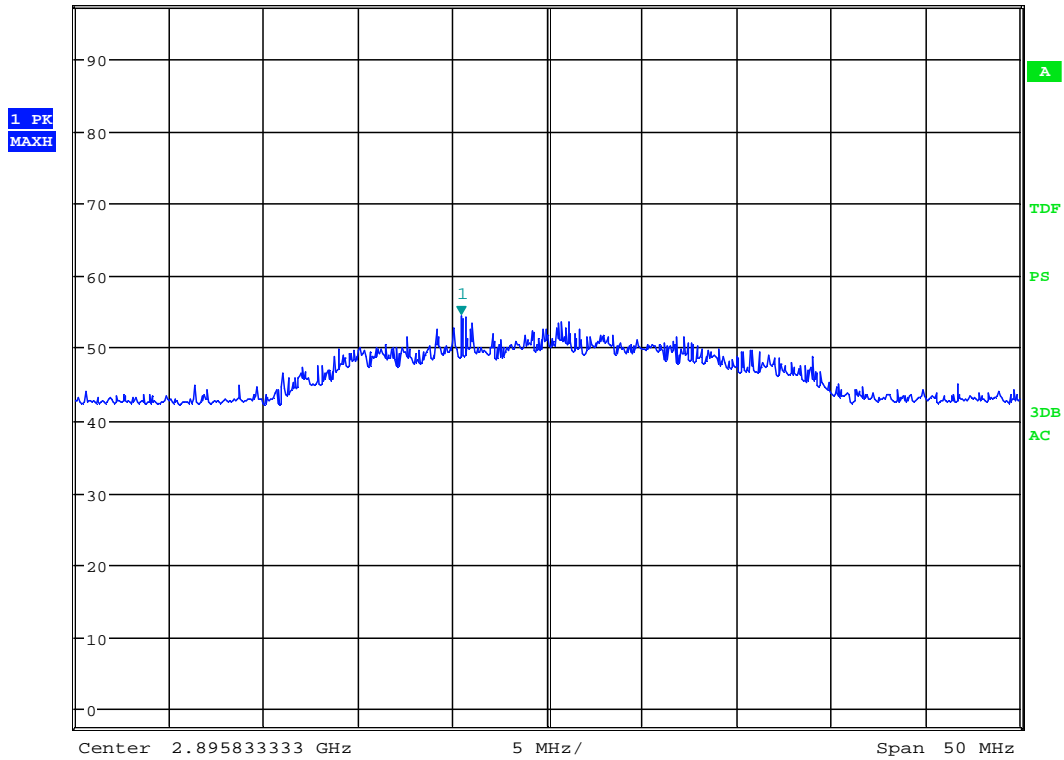


Date: 14.NOV.2013 11:01:01

Radiated Emissions, 2896 MHz, Ch01, VP, 802.11b, 11Mbps, Av Det



MARKER 1	* RBW 1 MHz	Marker 1 [T1]
2.891266026 GHz	* VBW 3 MHz	54.64 dBµV/m
Ref 97.5 dBµV/m	* Att 10 dB	SWT 2.5 ms
		2.891266026 GHz

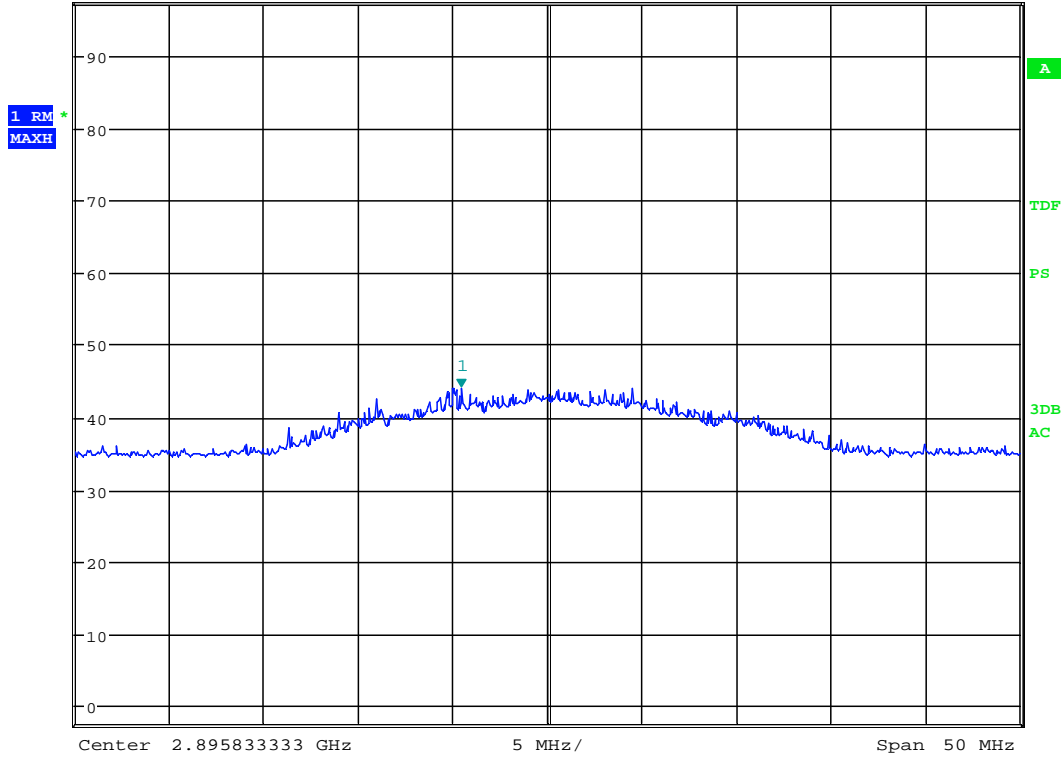


Date: 14.NOV.2013 10:57:59

Radiated Emissions, 2896 MHz, Ch01, VP, 802.11g, 54Mbps, Pk Det



MARKER 1	* RBW 1 MHz	Marker 1 [T1]
2.891266026 GHz	* VBW 3 MHz	44.02 dBµV/m
Ref 97.5 dBµV/m	* Att 10 dB	SWT 2.5 ms
		2.891266026 GHz

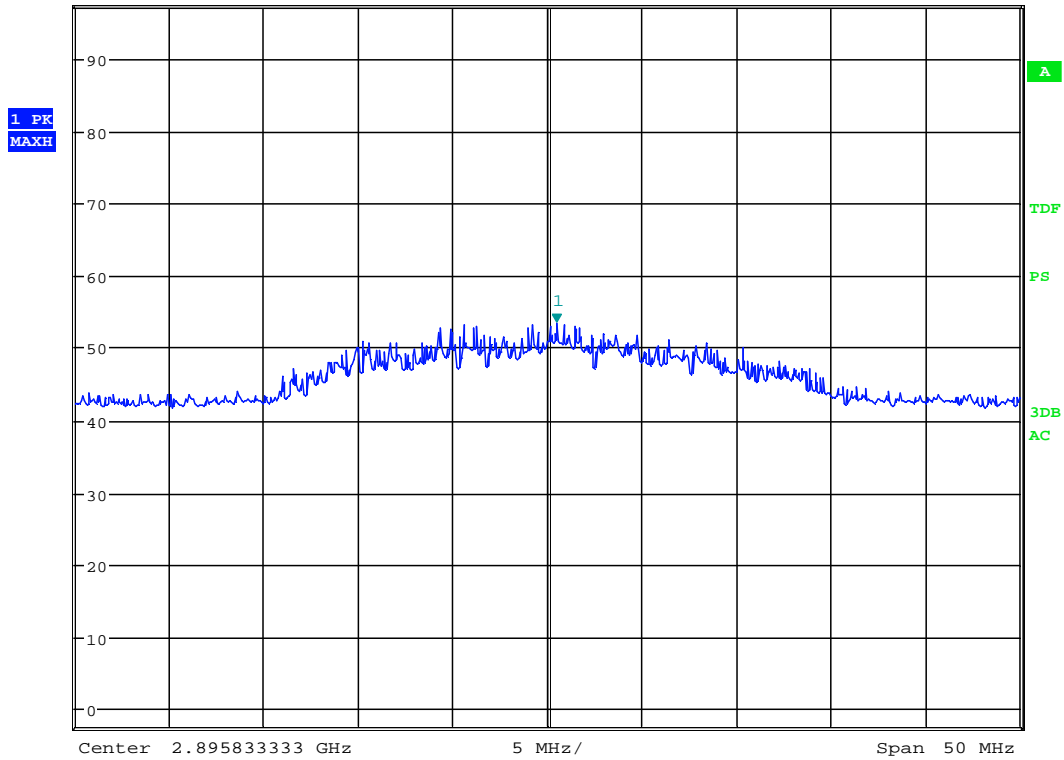


Date: 14.NOV.2013 10:58:34

Radiated Emissions, 2896 MHz, Ch01, VP, 802.11g, 54Mbps, Av Det



MARKER 1	* RBW 1 MHz	Marker 1 [T1]
2.896314103 GHz	* VBW 3 MHz	53.54 dBµV/m
Ref 97.5 dBµV/m	* Att 10 dB	2.896314103 GHz
	SWT 2.5 ms	

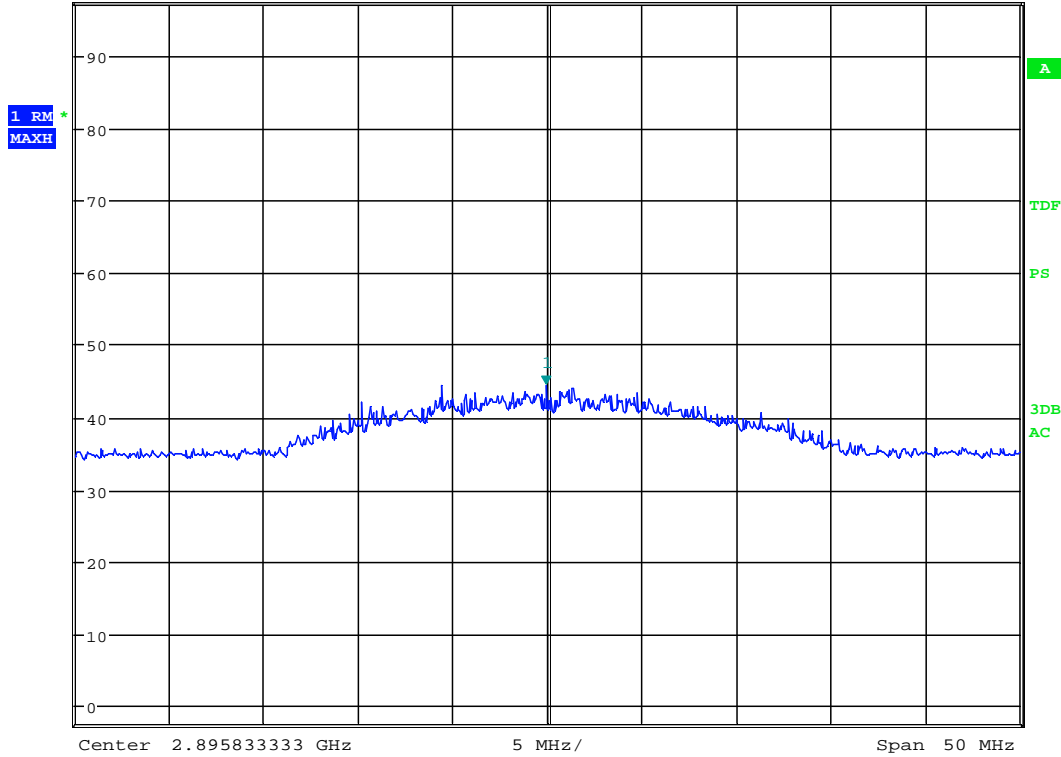


Date: 14.NOV.2013 10:55:59

Radiated Emissions, 2896 MHz, Ch01, VP, 802.11n, MCS7, Pk Det



MARKER 1	* RBW 1 MHz	Marker 1 [T1]
2.895753205 GHz	* VBW 3 MHz	44.41 dBµV/m
Ref 97.5 dBµV/m	* Att 10 dB	SWT 2.5 ms
		2.895753205 GHz



Date: 14.NOV.2013 10:55:24

Radiated Emissions, 2896 MHz, Ch01, VP, 802.11n, MCS7, Av Det

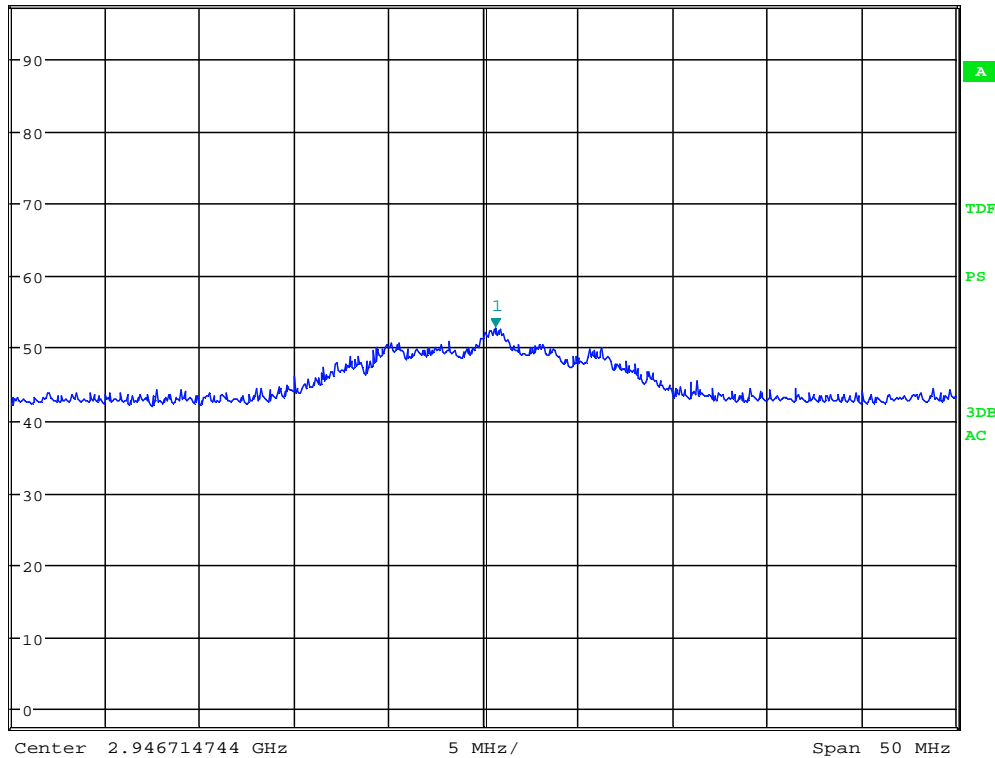


MARKER 1
 2.947355769 GHz
 Ref 97.5 dBµV/m * Att 10 dB

* RBW 1 MHz
 * VBW 3 MHz
 SWT 2.5 ms

Marker 1 [T1]
 52.93 dBµV/m
 2.947355769 GHz

1 PK
 MAXH

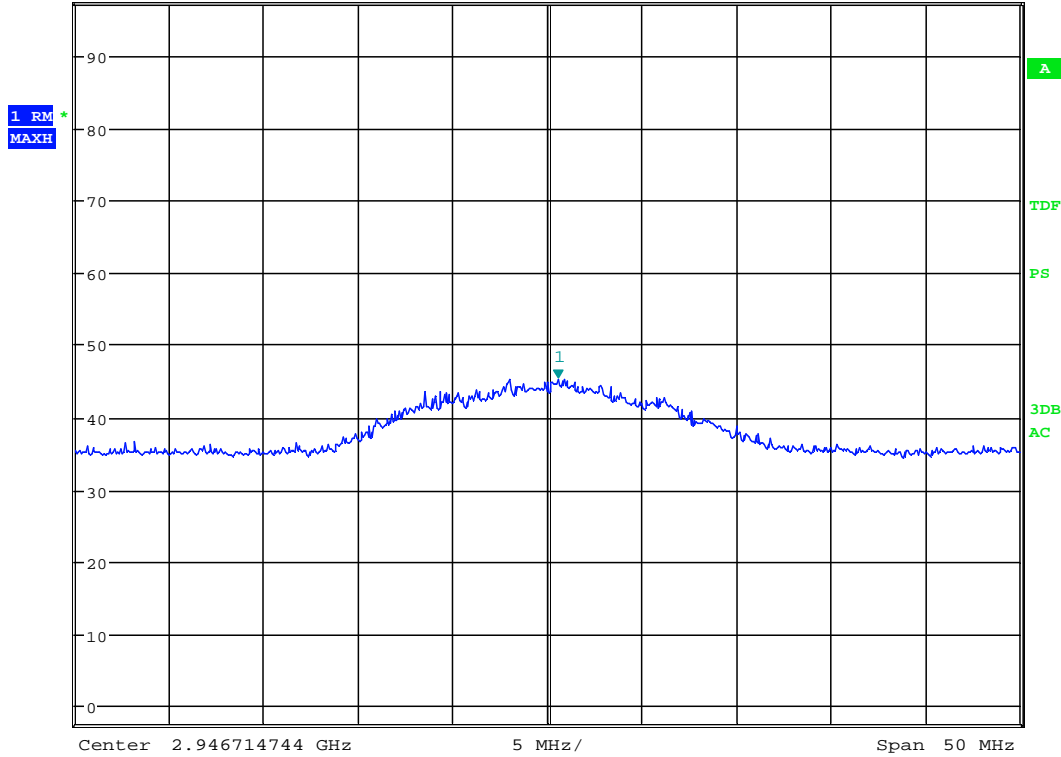


Date: 14.NOV.2013 11:04:20

Radiated Emissions, 2947 MHz, Ch06, VP, 802.11b, 11Mbps, Pk Det



MARKER 1	* RBW 1 MHz	Marker 1 [T1]
2.947275641 GHz	* VBW 3 MHz	45.31 dBµV/m
Ref 97.5 dBµV/m	* Att 10 dB	SWT 2.5 ms
		2.947275641 GHz

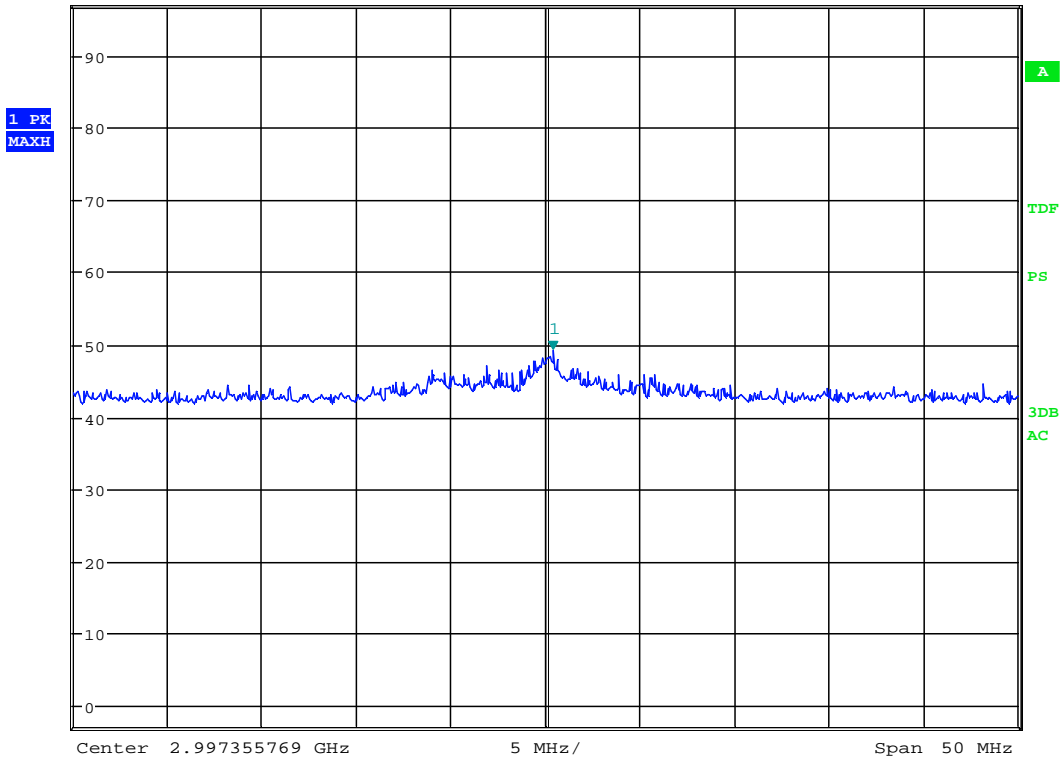


Date: 14.NOV.2013 11:05:12

Radiated Emissions, 2947 MHz, Ch06, VP, 802.11b, 11Mbps, Av Det



MARKER 1	* RBW 1 MHz	Marker 1 [T1]
2.99775641 GHz	* VBW 3 MHz	49.10 dBµV/m
Ref 97 dBµV/m	* Att 10 dB	SWT 2.5 ms
		2.997756410 GHz

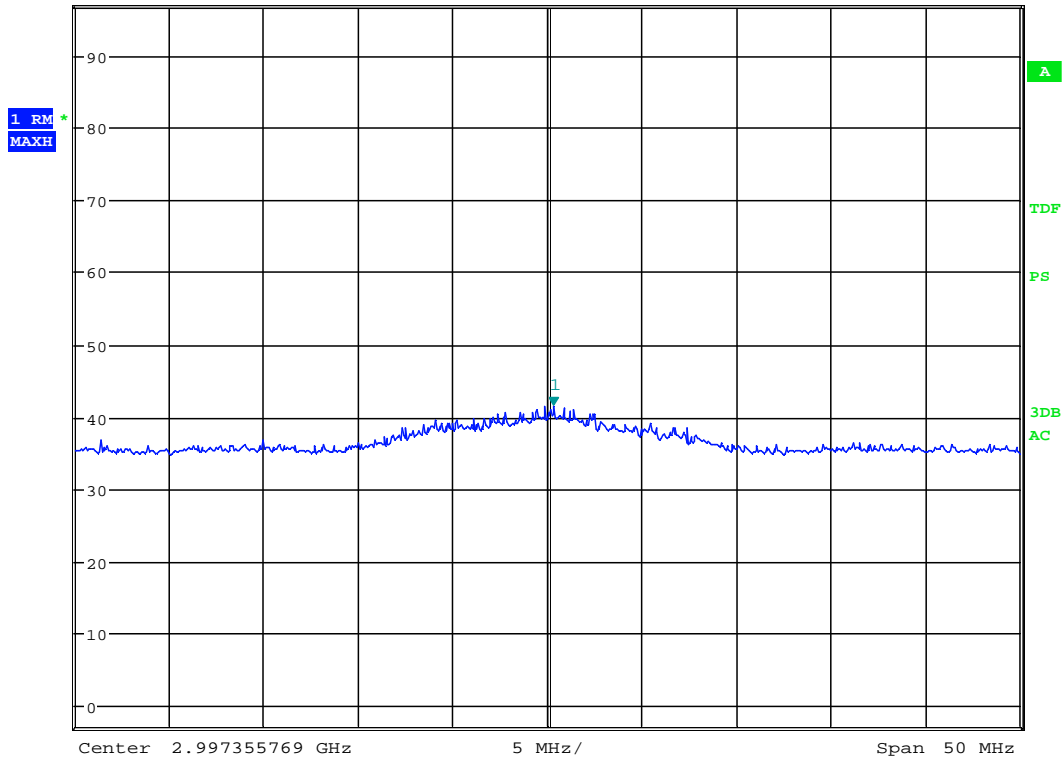


Date: 14.NOV.2013 11:08:59

Radiated Emissions, 2997 MHz, Ch06, VP, 802.11b, 11Mbps, Pk Det



MARKER 1	* RBW 1 MHz	Marker 1 [T1]
2.997676282 GHz	* VBW 3 MHz	41.37 dBµV/m
Ref 97 dBµV/m	* Att 10 dB	SWT 2.5 ms
		2.997676282 GHz

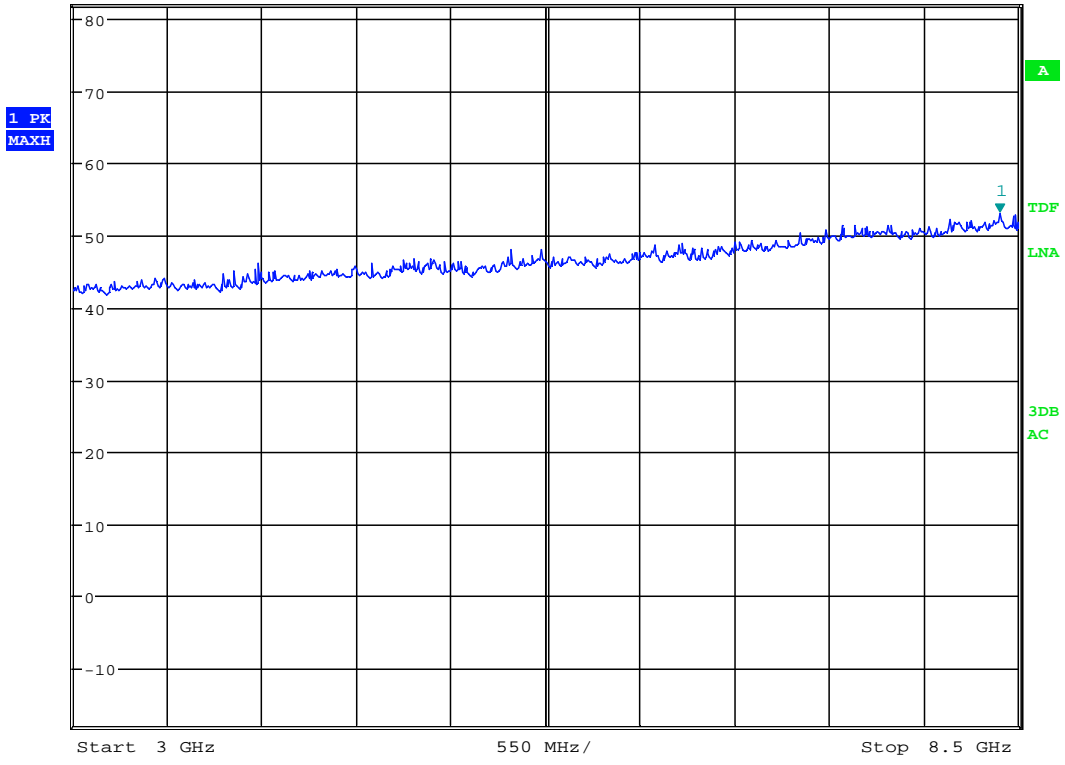


Date: 14.NOV.2013 11:10:23

Radiated Emissions, 2997 MHz, Ch06, VP, 802.11b, 11Mbps, Av Det



*RBW 1 MHz Marker 1 [T1]
 *VBW 3 MHz 53.01 dBμV/m
 Ref 82 dBμV/m *Att 10 dB SWT 35 ms 8.394230769 GHz



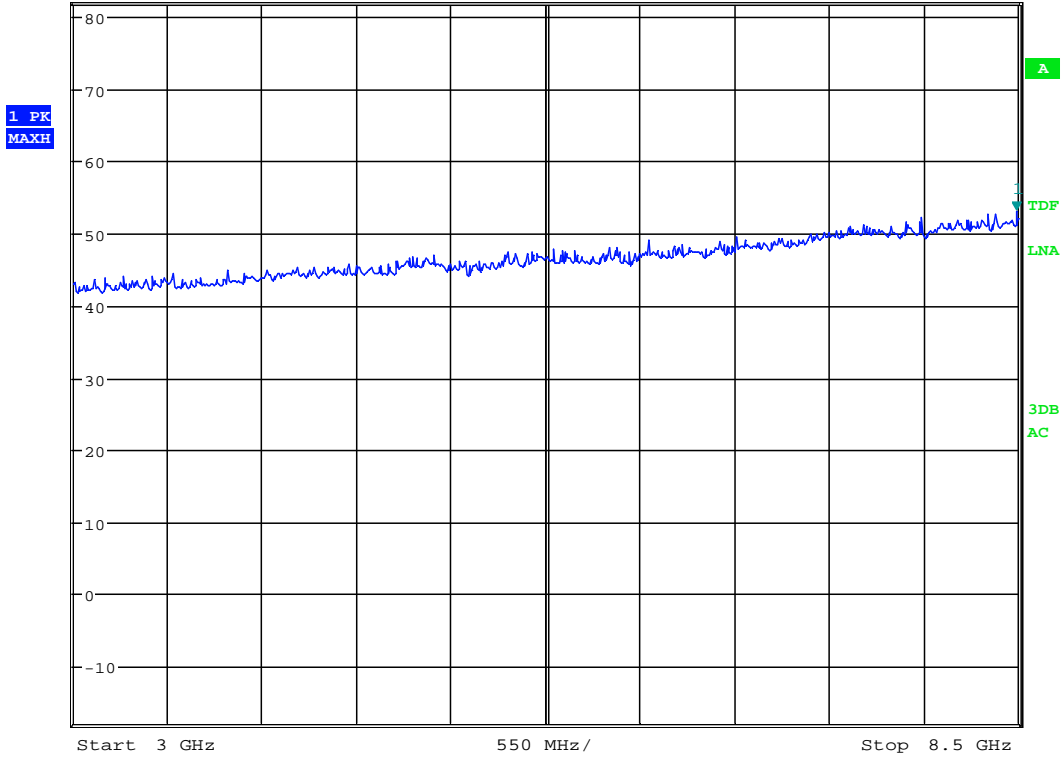
Date: 14.NOV.2013 11:57:58

Radiated Emissions, 3000 -8500 MHz, Ch01, VP, 802.11b, 11Mbps



*RBW 1 MHz Marker 1 [T1]
 *VBW 3 MHz 53.08 dBμV/m
 SWT 35 ms 8.491185897 GHz

Ref 82 dBμV/m *Att 10 dB



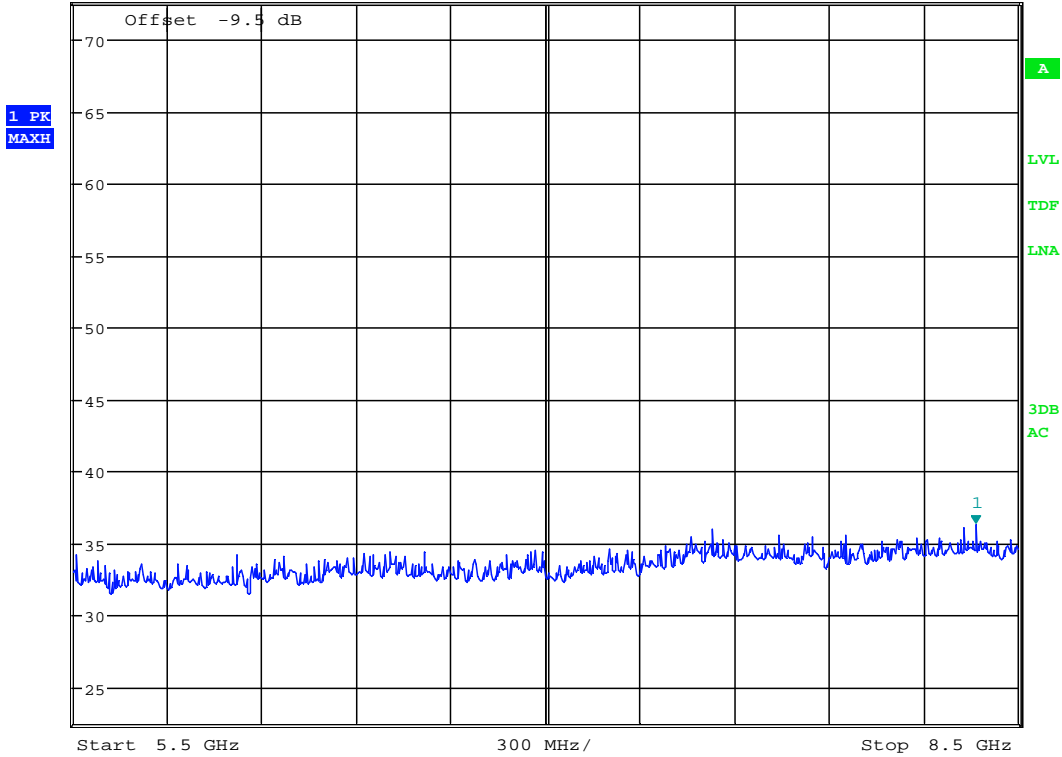
Date: 14.NOV.2013 11:59:40

Radiated Emissions, 3000 -8500 MHz, Ch01, HP, 802.11b, 11Mbps



*RBW 1 MHz Marker 1 [T1]
 *VBW 3 MHz 36.32 dBµV/m
 SWT 20 ms 8.365384615 GHz

Ref 72.5 dBµV/m *Att 10 dB



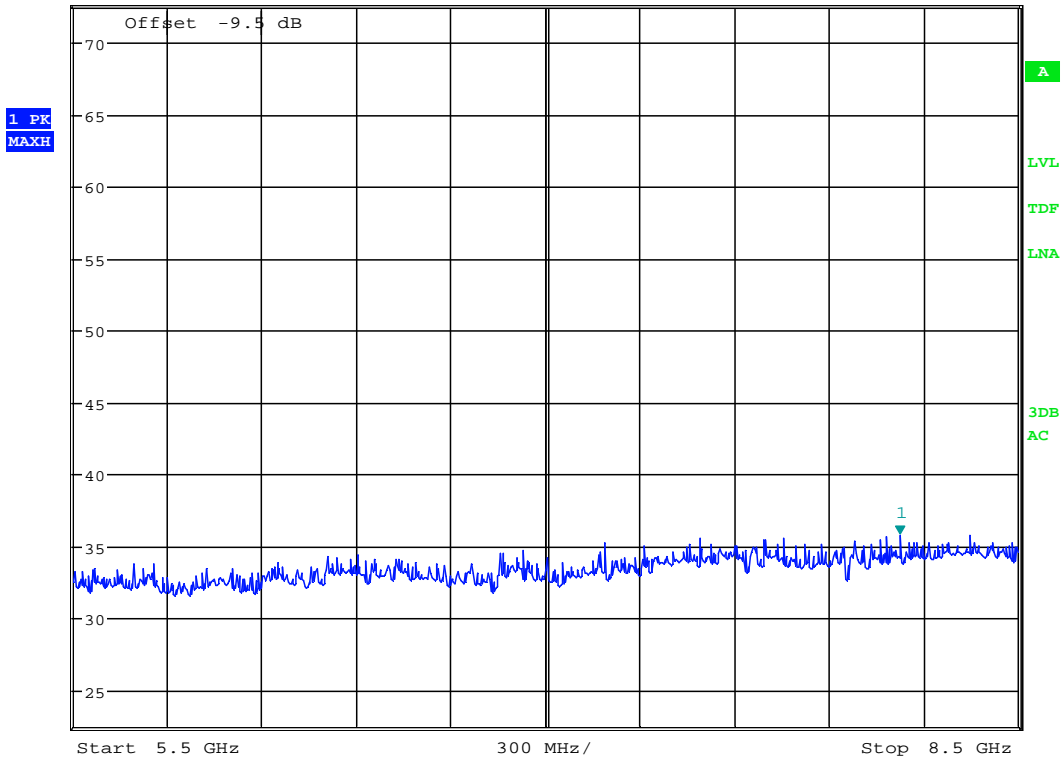
Date: 14.NOV.2013 12:12:15

Radiated Emissions, 5500 -8500 MHz, Ch01, VP, 802.11b, 11Mbps, @1m



*RBW 1 MHz Marker 1 [T1]
 *VBW 3 MHz 35.81 dBμV/m
 SWT 20 ms 8.125000000 GHz

Ref 72.5 dBμV/m *Att 10 dB

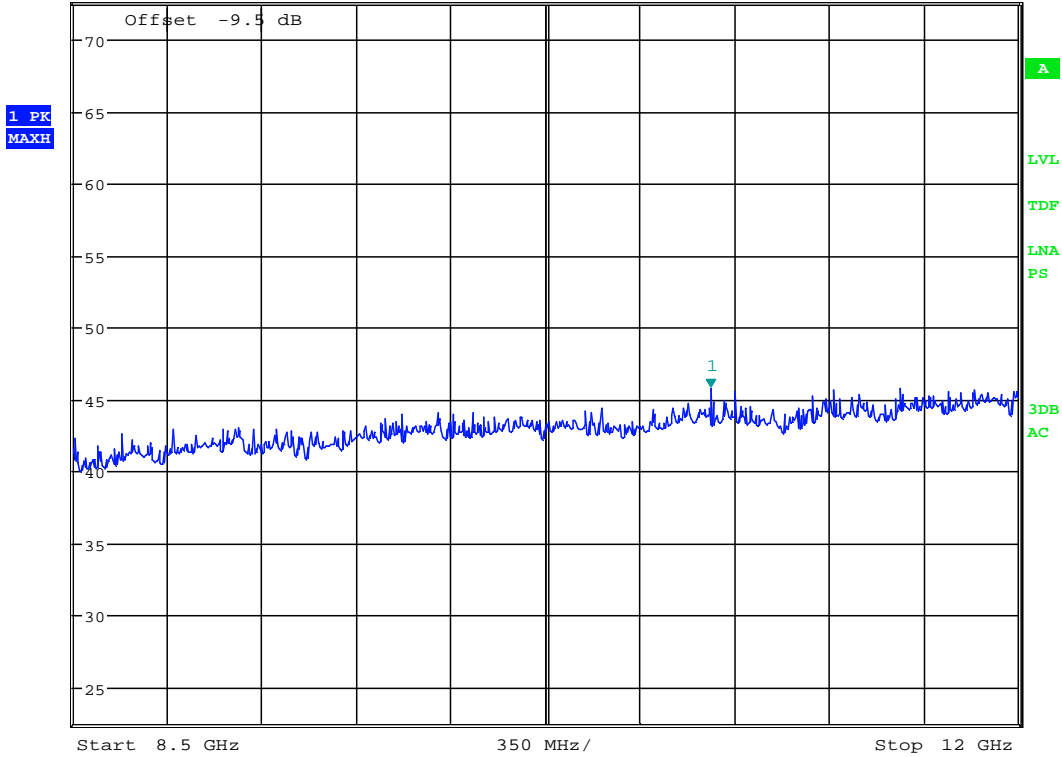


Date: 14.NOV.2013 12:13:57

Radiated Emissions, 5500 -8500 MHz, Ch01, HP, 802.11b, 11Mbps, @1m



*RBW 1 MHz Marker 1 [T1]
 *VBW 3 MHz 45.78 dBμV/m
 Ref 72.5 dBμV/m *Att 10 dB SWT 25 ms 10.861378205 GHz



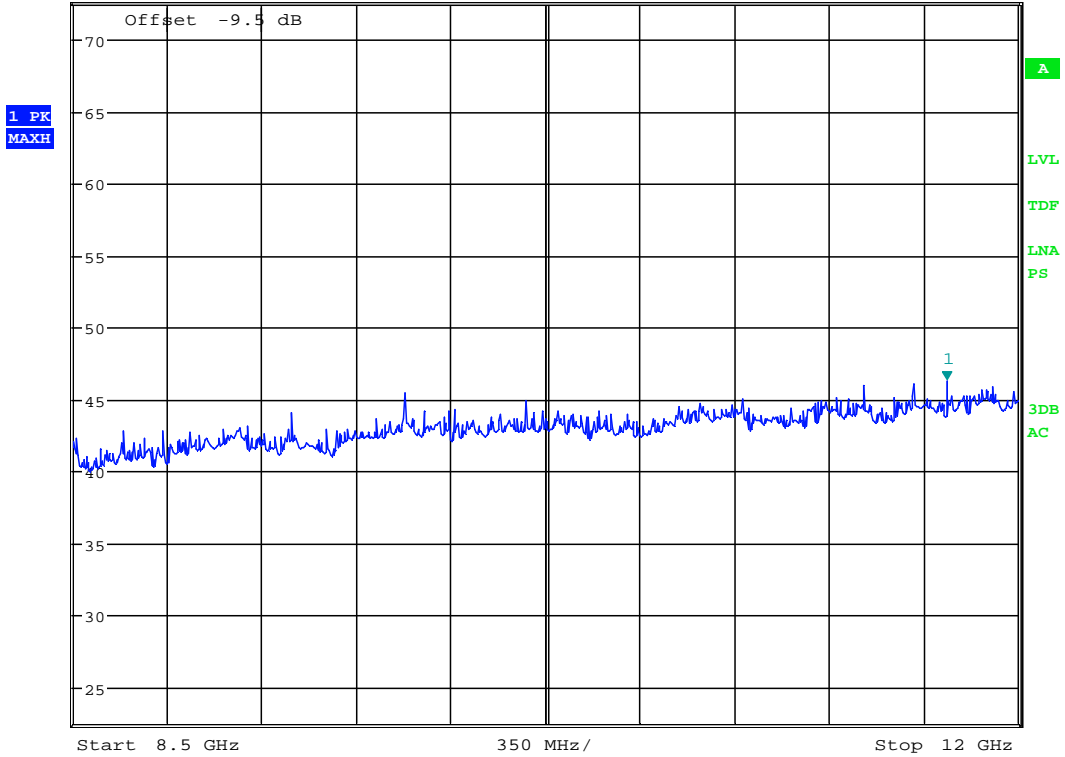
Date: 14.NOV.2013 12:21:53

Radiated Emissions, 8500 -12000 MHz, Ch01, VP, 802.11b, 11Mbps, @1m



*RBW 1 MHz Marker 1 [T1]
 *VBW 3 MHz 46.33 dBμV/m
 SWT 25 ms 11.736378205 GHz

Ref 72.5 dBμV/m *Att 10 dB



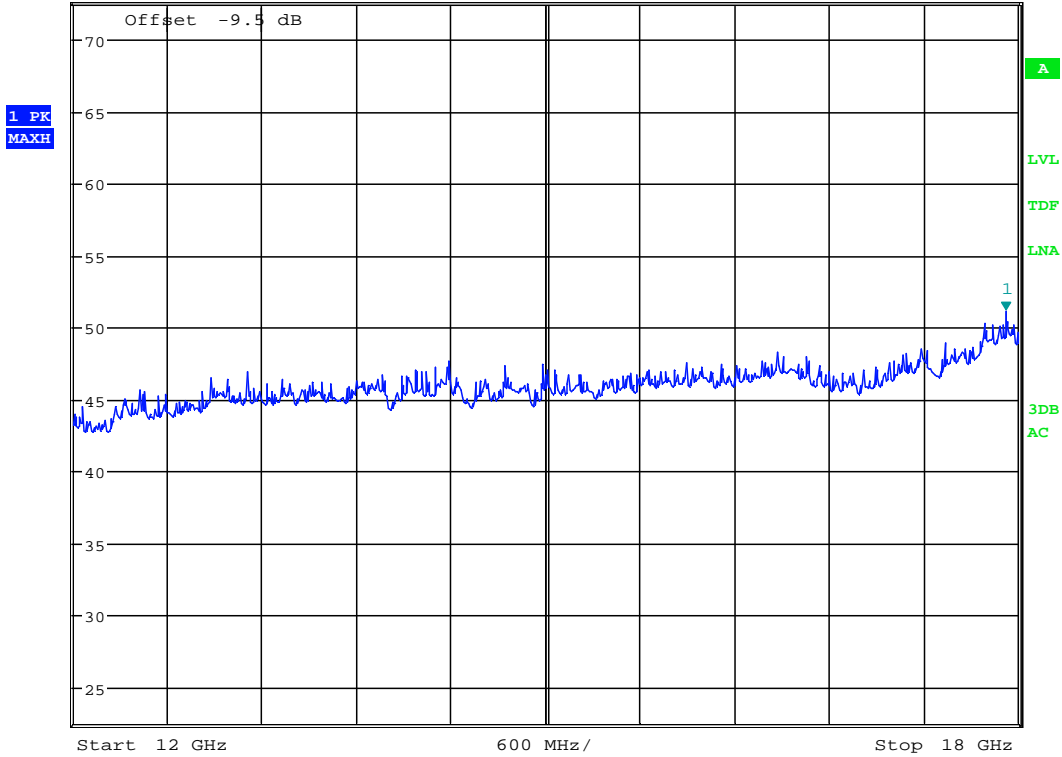
Date: 14.NOV.2013 12:23:34

Radiated Emissions, 8500 -12000 MHz, Ch01, HP, 802.11b, 11Mbps, @1m



*RBW 1 MHz Marker 1 [T1]
 *VBW 3 MHz 51.11 dBµV/m
 SWT 35 ms 17.923076923 GHz

Ref 72.5 dBµV/m *Att 10 dB



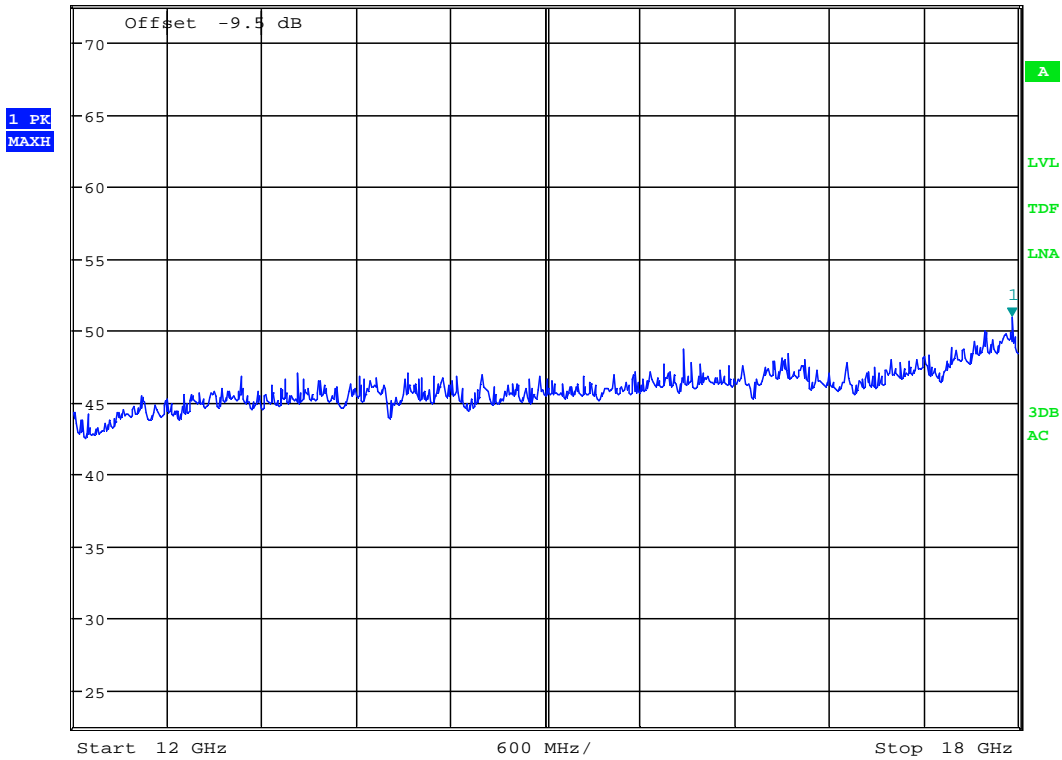
Date: 14.NOV.2013 12:30:30

Radiated Emissions, 12000 -18000 MHz, Ch01, VP, 802.11b, 11Mbps, @1m



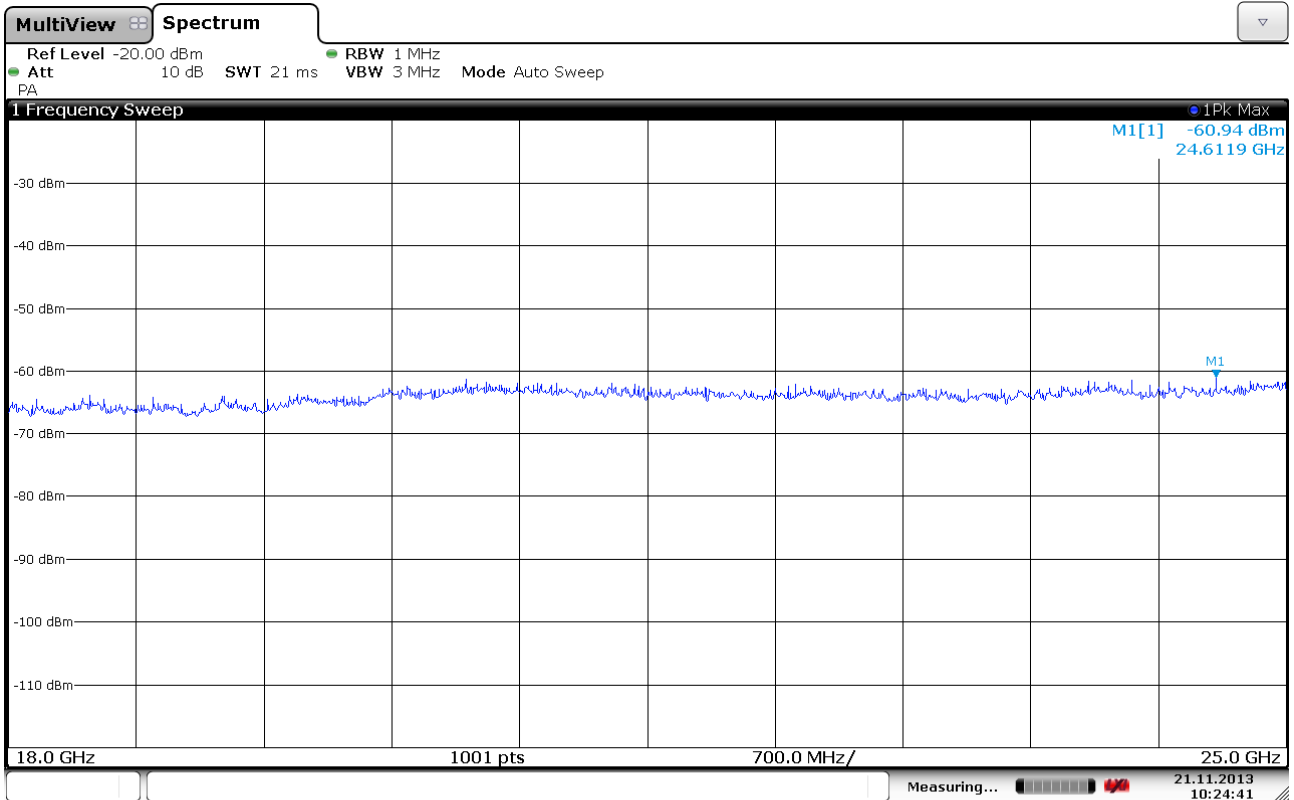
*RBW 1 MHz Marker 1 [T1]
 *VBW 3 MHz 50.86 dBµV/m
 SWT 35 ms 17.961538462 GHz

Ref 72.5 dBµV/m *Att 10 dB



Date: 14.NOV.2013 12:32:11

Radiated Emissions, 12000 -18000 MHz, Ch01, HP, 802.11b, 11Mbps, @1m



2487.000MHZ

Pre-scan, 18000 -25000 MHz, 802.11g, 54Mbps, @10cm

3.6 Power Spectral Density (PSD)

Para. No.: 15.247 (d)

Test Performed By: Frode Sveinsen	Date of Test: 13-Aug-2013
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Test Results: Passed

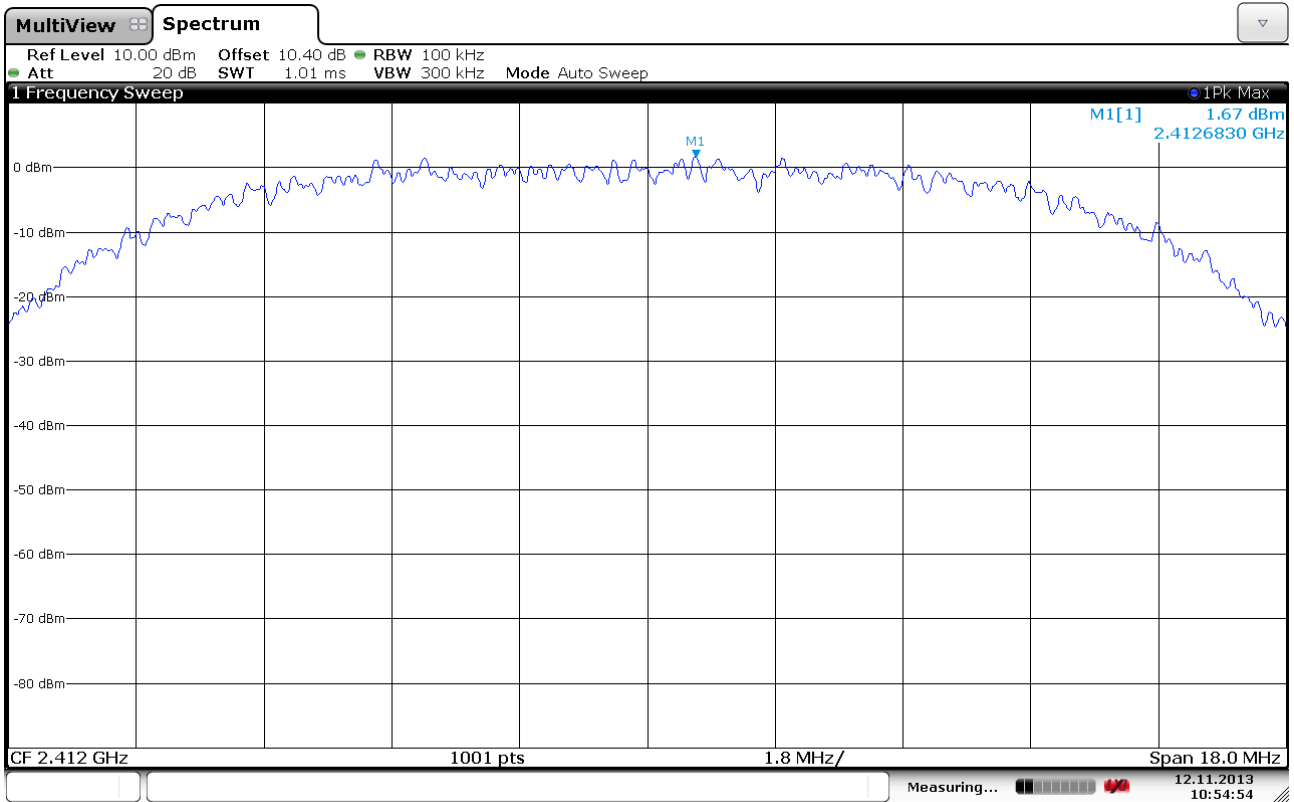
Measured and Calculated Data:

The measurement procedures PKPSD described in KDB 558074 D01 v03 was used.

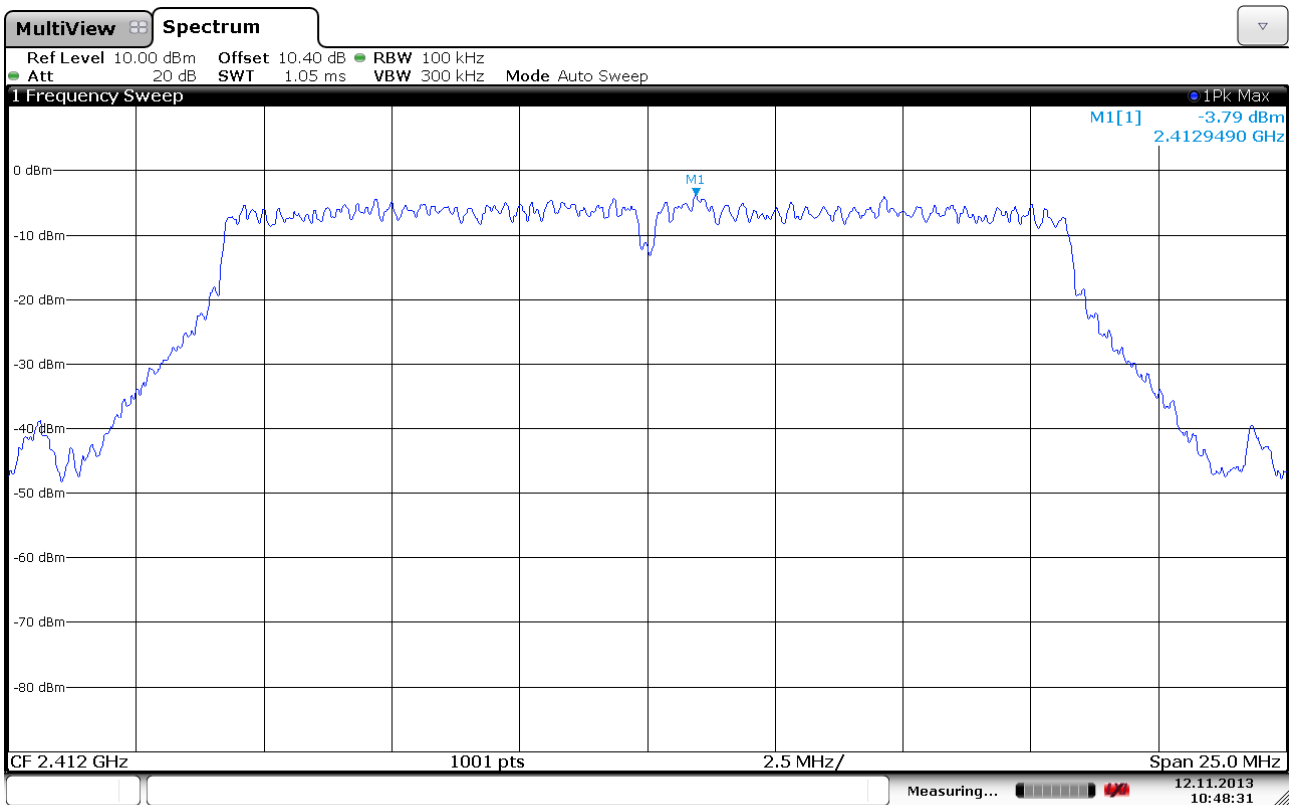
Carrier Frequency (MHz)	Power Spectral Density (dBm)		
	802.11b, 11Mbps	802.11g, 54Mbps	802.11n, MCS0
2412	1.7	-3.8	-6.1
2437	0.9	-4.4	-6.5
2462	0.2	-5.2	-7.1

Requirements:

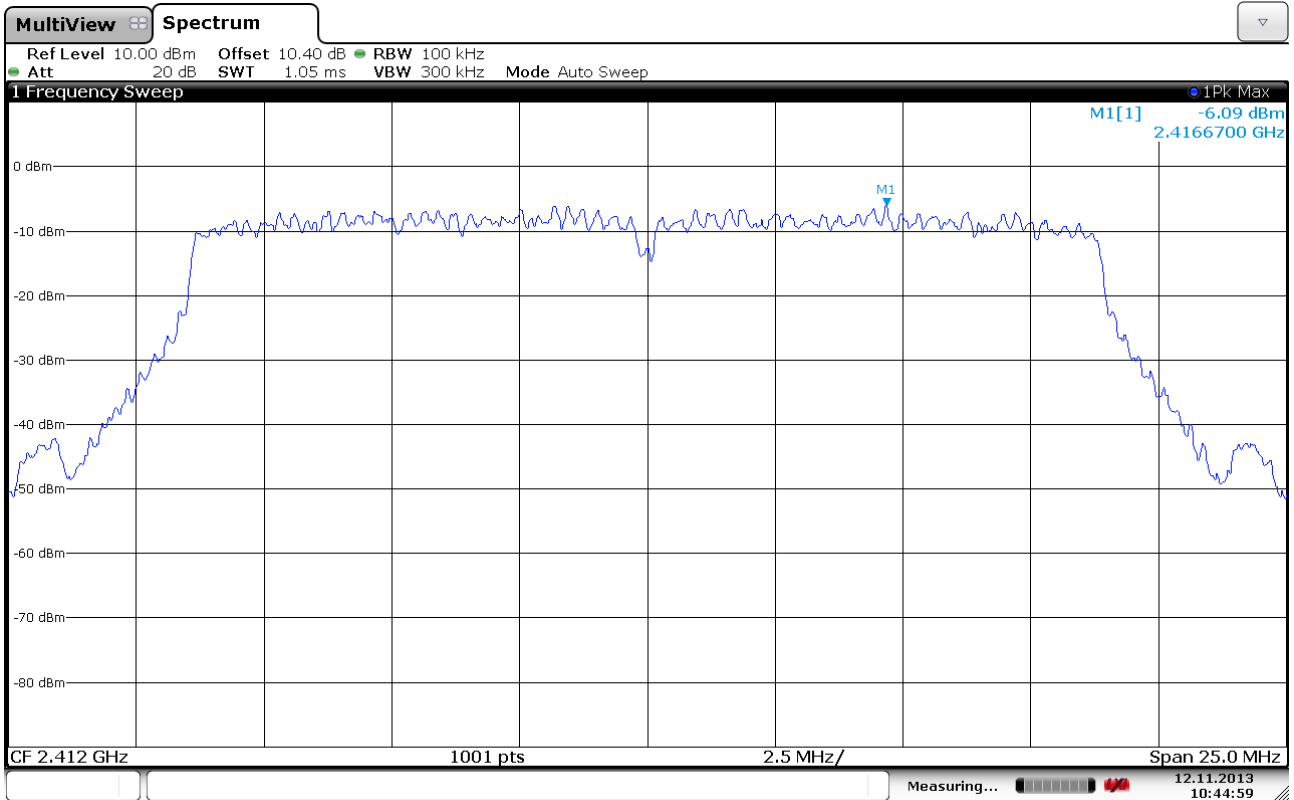
The Power Spectral Density of a Digital Transmission System shall be no greater than +8 dBm in any 3 kHz band



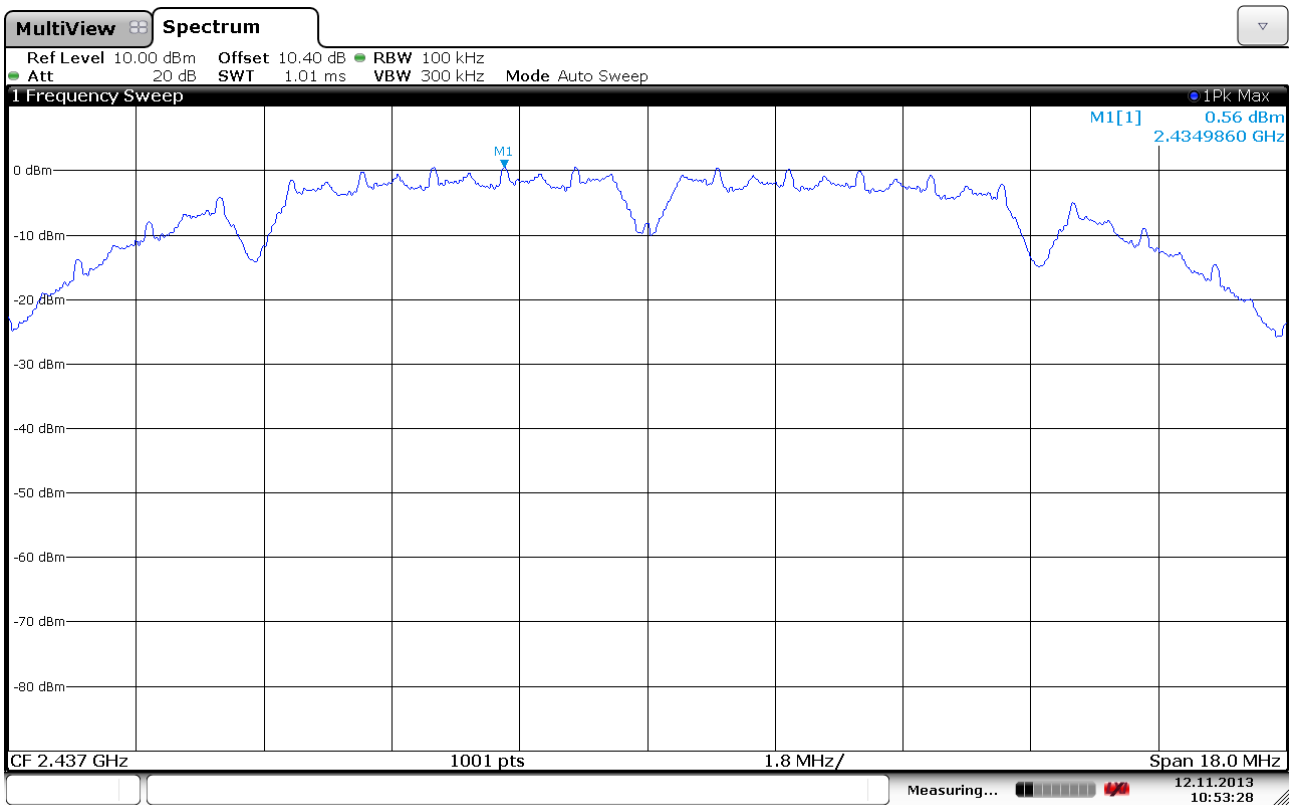
PSD, 2412 MHz, 802.11b, 11Mbps



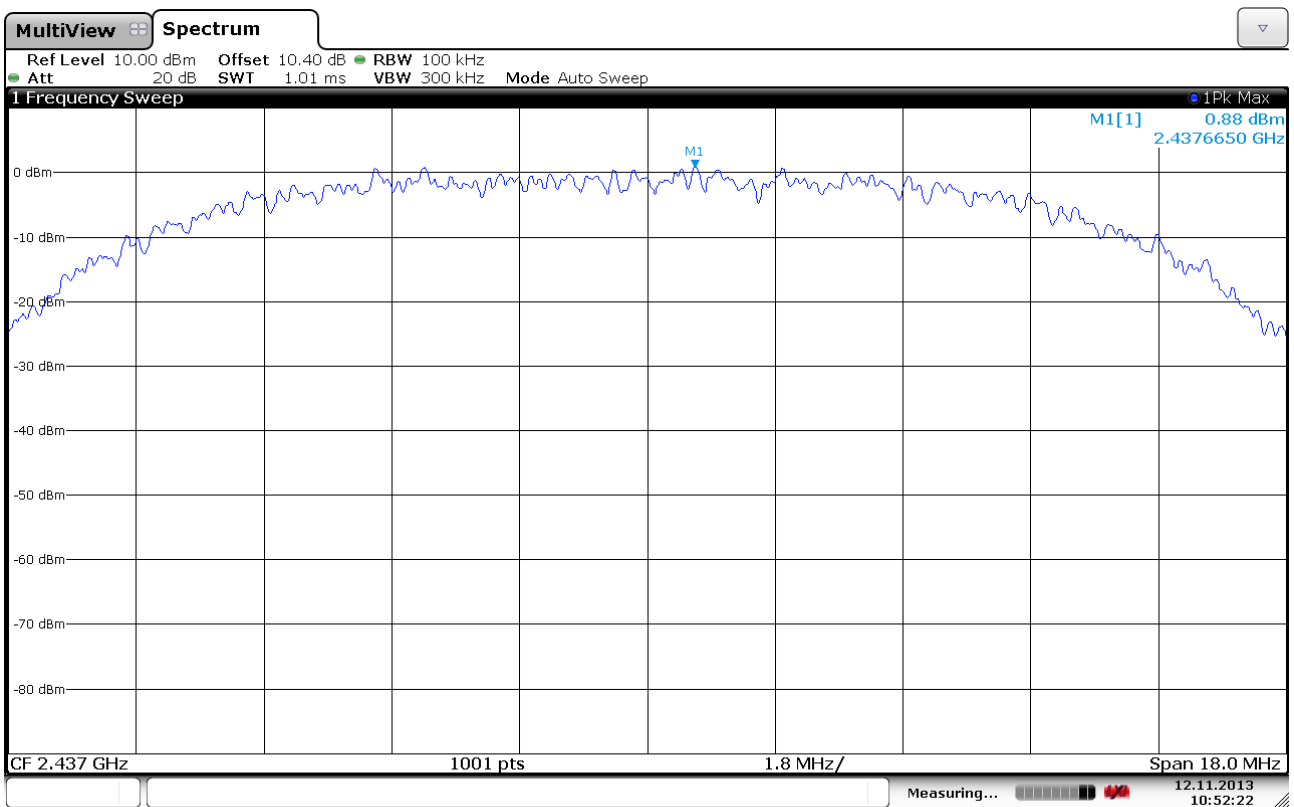
PSD, 2412 MHz, 802.11g, 54Mbps



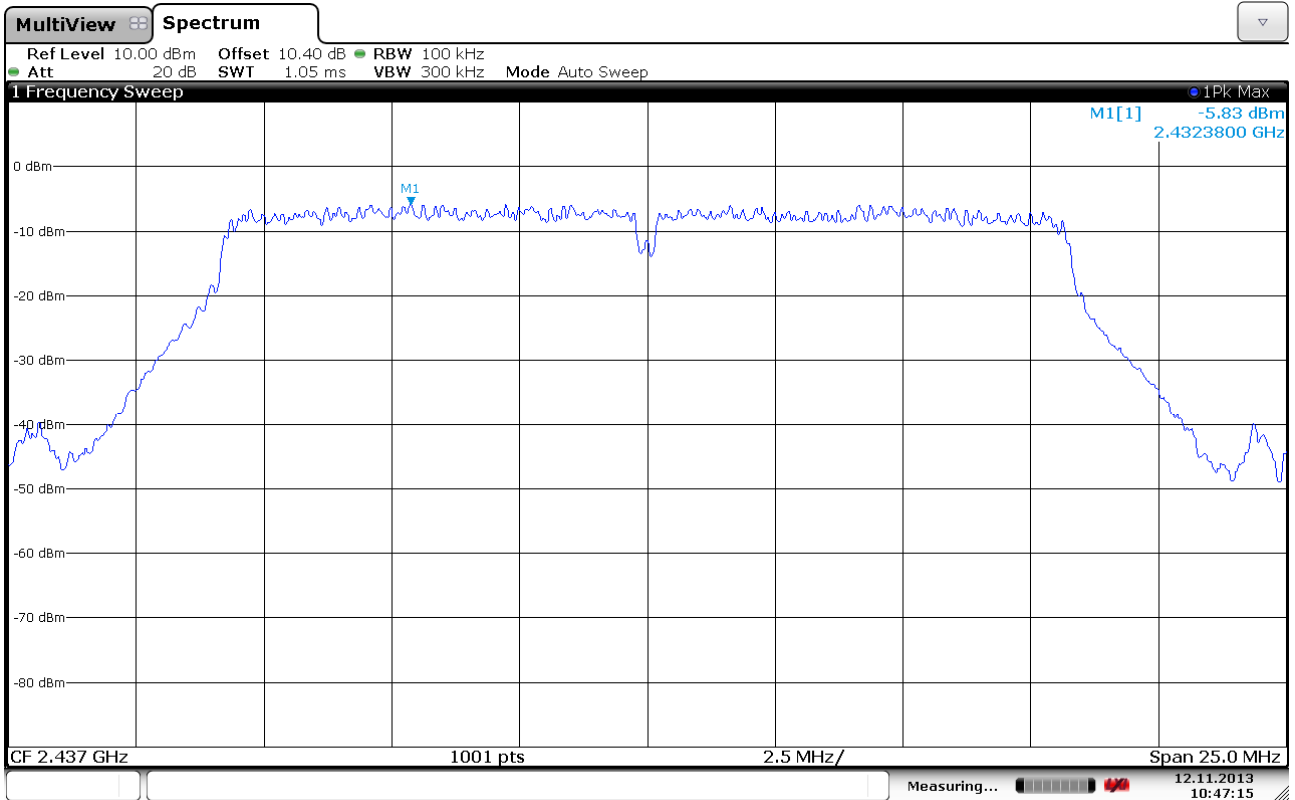
PSD, 2412 MHz, 802.11n, MCS7



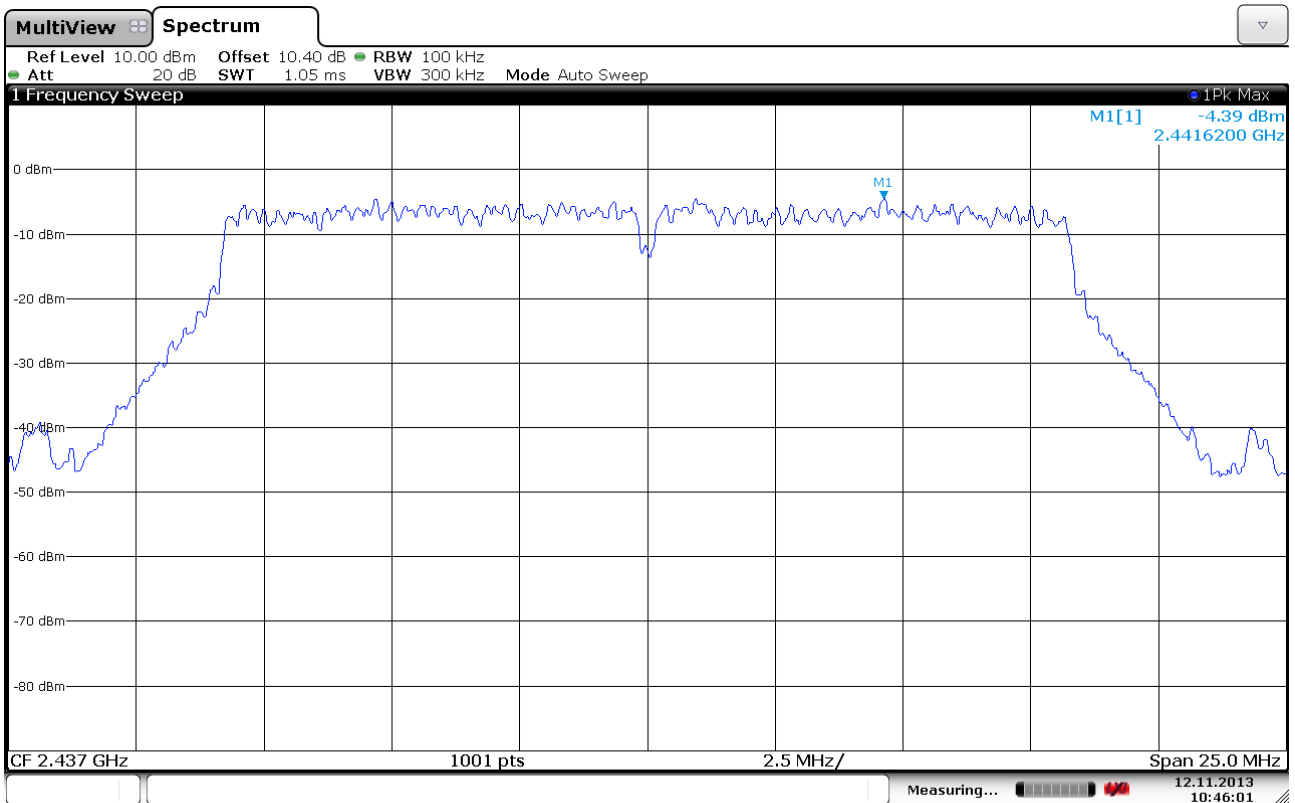
PSD, 2437 MHz, 802.11b, 1Mbps



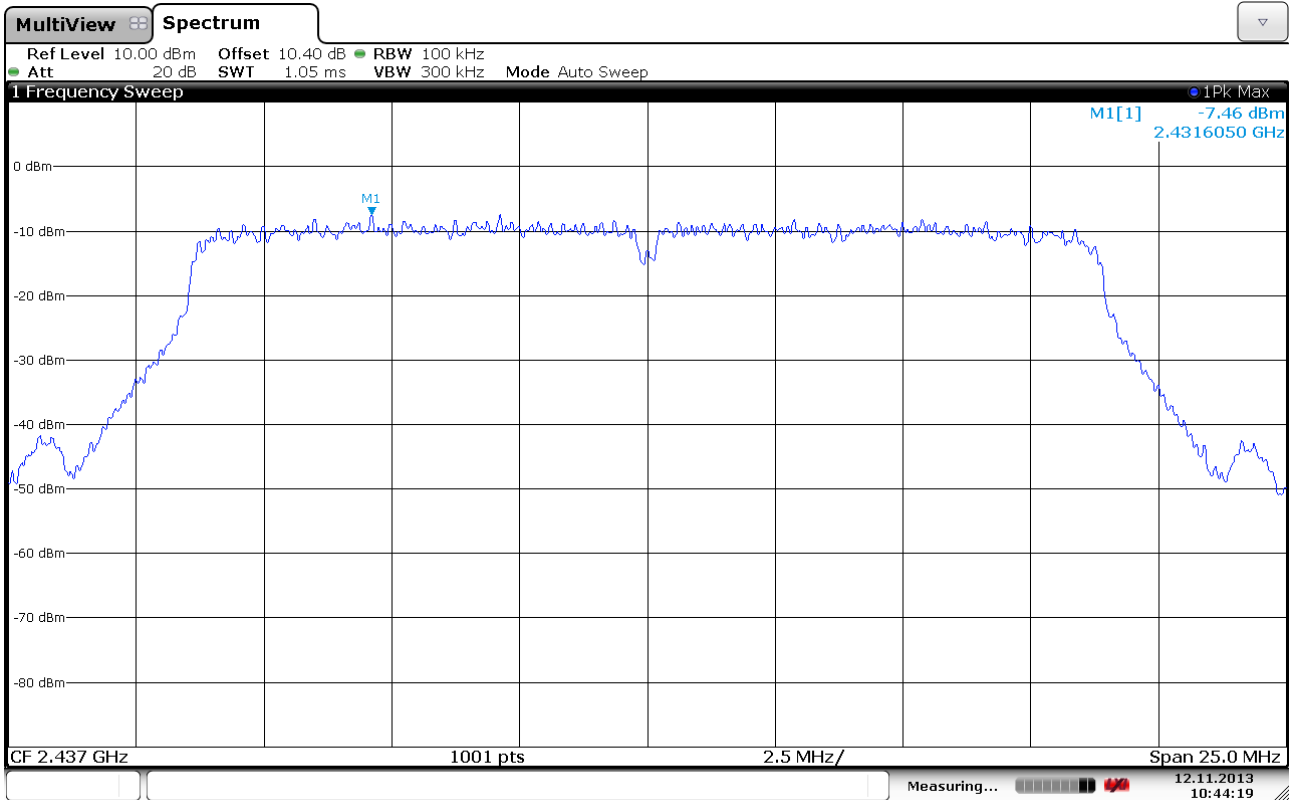
PSD, 2437 MHz, 802.11b, 11Mbps



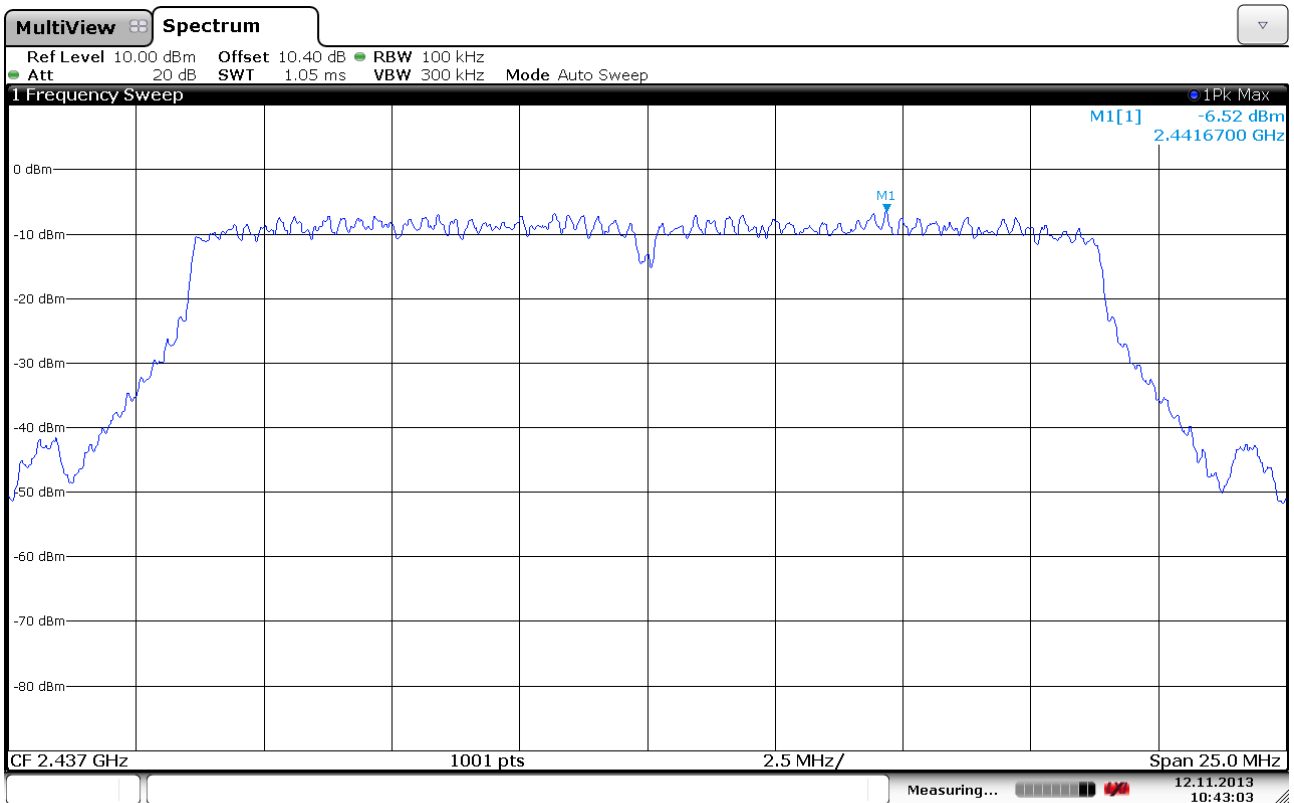
PSD, 2437 MHz, 802.11g, 6Mbps



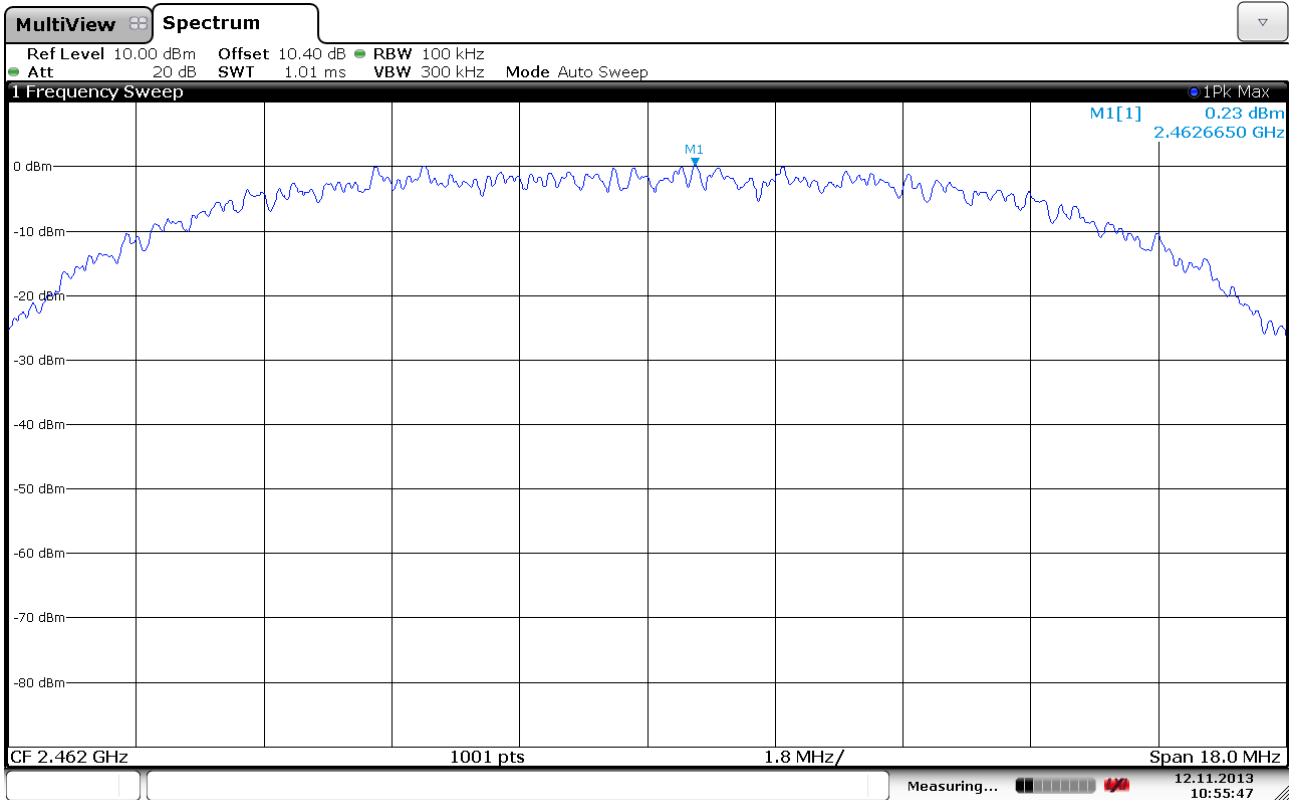
PSD, 2437 MHz, 802.11g, 54Mbps



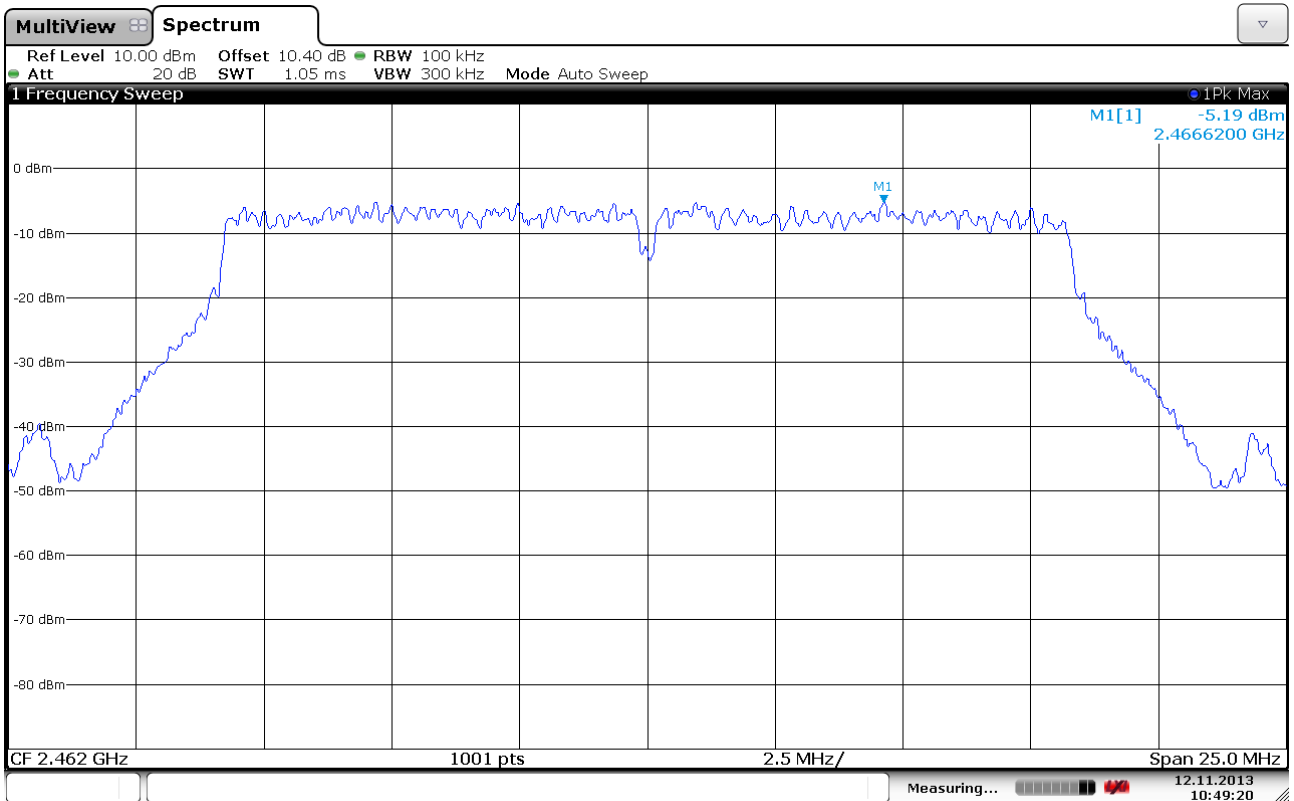
PSD, 2437 MHz, 802.11n, MCS0



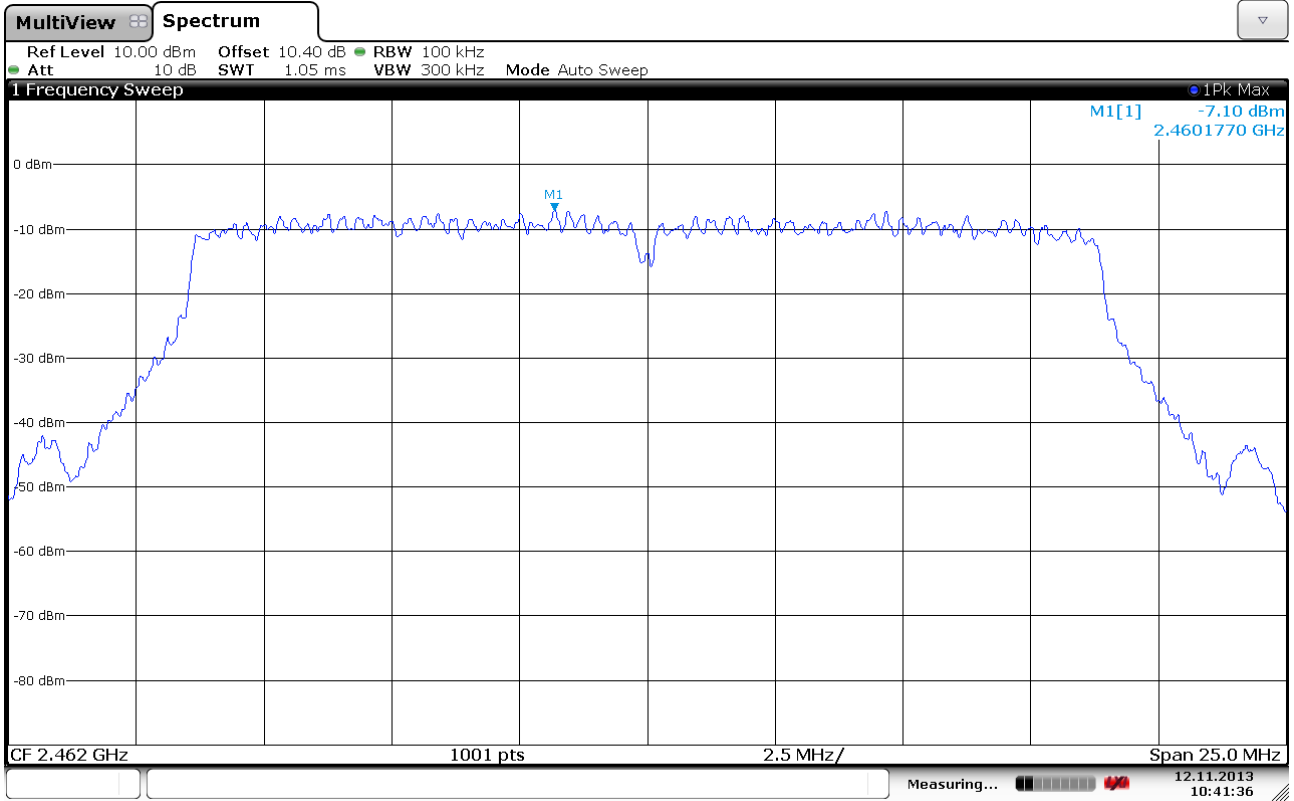
PSD, 2437 MHz, 802.11n, MCS7



PSD, 2462 MHz, 802.11b, 11Mbps



PSD, 2462 MHz, 802.11g, 54Mbps



PSD, 2462 MHz, 802.11n, MCS7

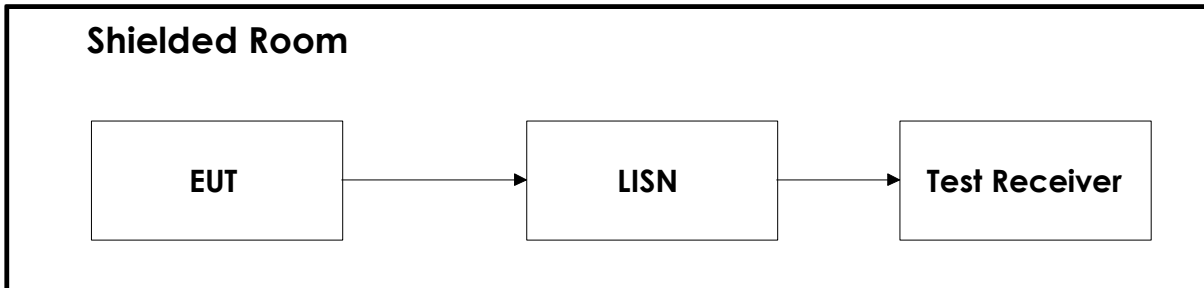
4 LIST OF TEST EQUIPMENT

To facilitate inclusion on each page of the test equipment used for related tests, each item of test equipment and ancillaries are identified (numbered) by the Test Laboratory.

No.	Model number	Description	Manufacturer	Ref. no.	Cal. date	Cal. Due
1	FSW26	Spectrum Analyzer	Rohde & Schwarz	LR 1640	2013.08.30	2014.08.30
2	ESU40	Measuring Receiver	Rohde & Schwarz	LR 1639	2013.09.24	2014.09.24
3	4768-10	Attenuator	Narda	LR 1356	Cal b4 use	
4	6HC3000/18000	Highpass Filter	Trilithic	LR 1614	Cal b4 use	
5	JB3	BiLog Antenna	Sunol Sciences	N-4525	2012.10.11	2015.10.11
6	LNA6900	Preamplifier	Teseq	LR 1593	2011.11.24	2013.11.24
7	3115	Horn Antenna	EMCO	LR 1330	2010.08.05	2015.08.05
8	8449A	Pre-amplifier	Hewlett Packard	LR 1322	2013-09	2015-09
9	643	Antenna Horn	Narda	LR 093	2009.01.26	2014.01.26
10	PM7320X	Antenna Horn	Sivers Lab	LR 102	2009.01.26	2014.01.26
11	DBF-520-20	Antenna Horn	Systron Donner	LR 100	2009.01.26	2014.01.26
12	638	Antenna Horn	Narda	LR 1480	2010.06.17	2015.06.17
14	HFH2-Z2	Loop Antenna	Rohde & Schwarz	LR 285	2010.10.08	2015.10.08
15	Model 87V	Multimeter	Fluke	LR 1599	2012.10.29	2014.10.29
16	6812B	AC Power Source	Agilent	LR 1515	2013.10.28	2014.10.28
17	ESHS10	Measuring Receiver	Rohde & Schwarz	N- 3528	2012.06.28	2014.06.28
18	ESH3-Z2	Pulse Limiter	Rohde & Schwarz	LR 1074	2012.04.24	2014.04.24
19	ESH3-Z5	Two Line V-Network	Rohde & Schwarz	LR 1076	2011.11	2013.11

5 BLOCK DIAGRAM

5.1 Power Line Conducted Emission



5.2 Test Site Radiated Emission

