Test report no. : 151006-7

Item tested : WH1

Type of equipment : WLAN Handset

FCC ID : BXZWH1

Client : Ascom Sweden AB

FCC Part 15.247
Frequency Hopping Transmitters /
Digital Transmission System

RSS-210, Issue 7
Low Power Licence-Exempt
Radiocommunication Devices

4 November 2010

Authorized by : .....
Geir Antonsen
Technical Verificator

Nemko AS, Gaustadalléen 30, P.O.Box 73 Blindern, NO-0314 Oslo Norway **T** +47 22 96 03 30 **F** +47 22 96 05 50 Enterprise number NO974404532
Visiting address: Nemko Kjeller, Instituttveien 6, P.O.Box 96, NO-2027 Kjeller Norway **T** +47 64 84 57 00 **F** +47 64 84 57 05

CONTENTS

1 GENERAL INFORMATION

1.1 Testhouse Info

Name :	Nemko AS
Address :	Nemko Kjeller Instituttveien 6, Box 96 NO-2027 Kjeller, NORWAY
Telephone :	+47 64 84 57 00
Fax :	+47 64 84 57 05
E-mail:	comlab@nemko.com
FCC test firm :	994405
IC OATS :	2040D-1
Total Number of Pages:	88

1.2 Client Information

Name :	Ascom Sweden AB
Address :	P.O.Box 8783, SE-402 76 Gothenburg
Telephone :	+46 31 559300
Fax :	+46 31 552031

Contact:

Name :	Johan Comstedt
Telephone :	+46 31 559114
E-mail :	johan.comstedt@ascom.se

1.3 Manufacturer

Name :	/
Address :	/

2 Test Information

2.1 Test Item

Name :	ASCOM
Model/version :	WH1-AAAA; WH1-EABA; WH1-EACA
FCC ID :	BXZWH1
Industry Canada ID :	3724B-WH1
Serial number :	Radiated Sample: T26103XMG8 Conducted Sample: T26103XBN5
Hardware identity and/or version:	F1
Software identity and/or version :	2.1.3
Tested to IC Radio Standard (RSS) :	RSS-210 Issue 7, and RSS-GEN, Issue 2
Test Site IC Reg. Number :	2040D-1
Frequency Range :	2412 – 2462 MHz 5825 MHz
Number of Channels :	2.4 GHz band: 11 5.8 GHz band: 1
Operating Modes :	2.4 GHz band: 802.11b 802.11g 802.11n (20MHz BW) 5825 MHz: 802.11a 802.11n (20 MHz BW)
Type of Modulation :	Digital 802.11b: DSSS 802.11a/g/n: OFDM
Conducted Output Power :	2.4 GHz band: 0.043 Watt (Peak) 5825 MHz: 0.007 Watt (Peak)
Emission Designators :	802.11b: 12M3G1D 802.11g: 16M8W7D 802.11a: 16M7W7D 802.11n: 17M8W7D
Transmitter Spurious (worst case) :	72.0 dBµV/m (11.65 GHz, Pk Det.) 52.0 dBµV/m (11.65 GHz, Av Det.)
Receiver Spurious (worst case) :	< -73 dBm (Conducted)
Antenna Connector :	None
Number of Antennas :	1
Antenna Diversity Supported :	No
Power Supply :	Secondary Battery, 3.7V Li-Polymer
Desktop Charger :	DC3 with AC Adaptor FW7600

DSSS = Direct-sequence spread spectrum
OFDM = Orthogonal frequency-division multiplexing

Description of Test Item

The tested equipment is a cordless telephone handset using Voice over WiFi technology.

Exposure Evaluation

The EUT is a portable device and is designed to be held to ear or worn in a belt clip when used. A test reports with the measured SAR values for both configurations are submitted with the application.

2.2 Test Environment

2.2.1 Normal test condition

Temperature:	23.5 – 25.8 °C
Relative humidity:	31.4 – 40.4 %
Normal test voltage:	3.7 V DC

The values are the limit registered during the test period.

2.3 Test Period

Item received date:	2010-05-31
Test period :	from 2010-05-31 to 2010-07-28, and from 2010-10-18 to 2010-10-29

3 TEST REPORT SUMMARY

3.1 General

Manufacturer: Ascom Sweden AB

Model No.: WH1

All measurements are tracable to national standards.

The tests were conducted for the purpose of demonstrating compliance with FCC CFR 47 Part 15, paragraph 15.247, Industry Canada RSS-210 Issue 7, and RSS-GEN, Issue 2.

All tests were made in accordance with ANSI C63.4-2009 and ANSI C63.10-2009.

The radiated tests were made in a semi-anechoic chamber at measuring distances of 3m and 10m.

☒ 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".

TEST REPORT 151006-7

TESTED BY: _____ DATE: 27 October 2011

Frode Sveinsen, Chief Engineer

3.2 Test Summary

Name of test	FCC Part 15 reference	RSS-210 Issue 7 reference	Result
Supply Voltage Variations	15.31(e)	8 (RSS-GEN)	Pass
Number of Operating Frequencies	15.31(m)	A8.1	Pass
Antenna Requirement	15.203	7.1.4 (RSS-GEN)	Pass
Power Line Conducted Emission	15.107(a) 15.207(a)	7.2.2 (RSS-GEN)	Pass
Channel Separation	15.247(a)(1)	A8.1	Pass
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	15.247(a)(1)	A8.1	N/A
Minimum 6 dB Bandwidth	15.247(a)(2)	A8.2	Pass
Peak Power Output	15.247(b)	A8.4	Pass
Power Spectral Density	15.247(d)	A8.2	Pass
Spurious Emissions (Antenna Conducted)	15.247(c)	A8.5	Pass
Spurious Emissions (Radiated)	15.247(c) 15.109(a) 15.209(a)	A8.5	Pass

[1] The tested equipment has integrated antennas only.

3.3 Description of modification for Modification Filing

Not applicable.

3.4 Comments

All measurements were done with the EUT powered by a fully charged battery.

3.5 Family List Rational

Not Applicable.

3.6 Antenna Requirement

Is the antenna detachable? ☐ Yes ☒ No

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

Type of antenna connector: N/A

4 TEST RESULTS

4.1 Power Line Conducted Emissions

Para. No.: 15.207 (a)

Test Performed By: Tore Løvlien	**Date of Test: 31 May 2010**

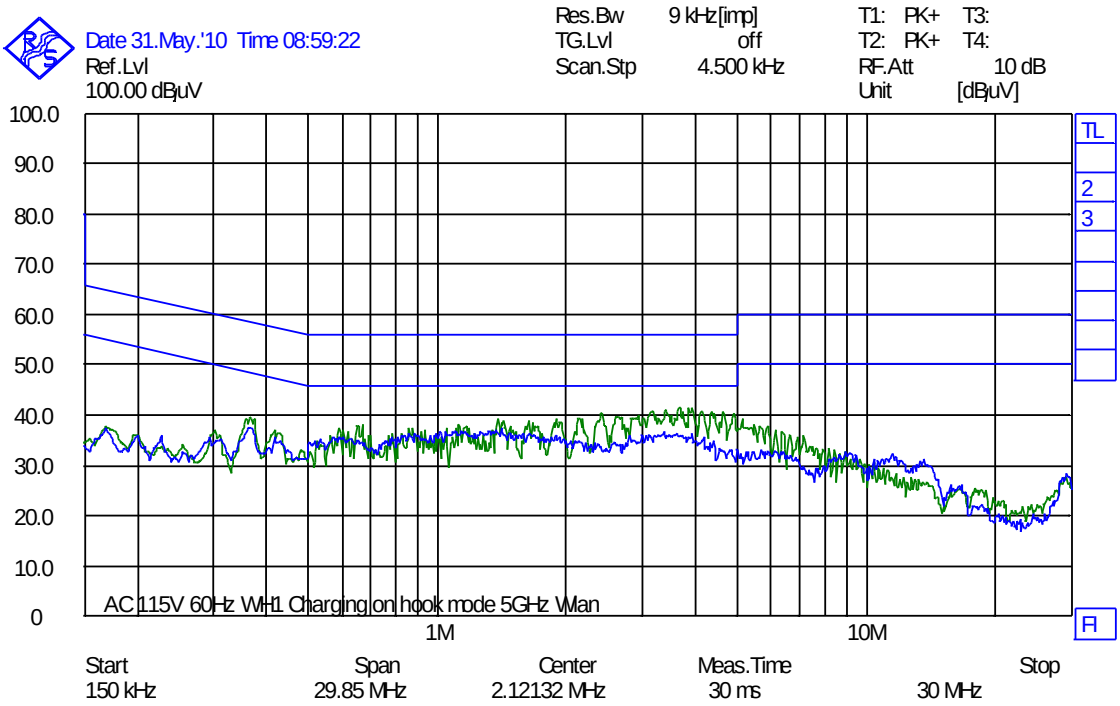
Measurement procedure: **ANSI C63.4-2009 using 50 µH/50 ohms LISN.**

Test Results: **Complies.**

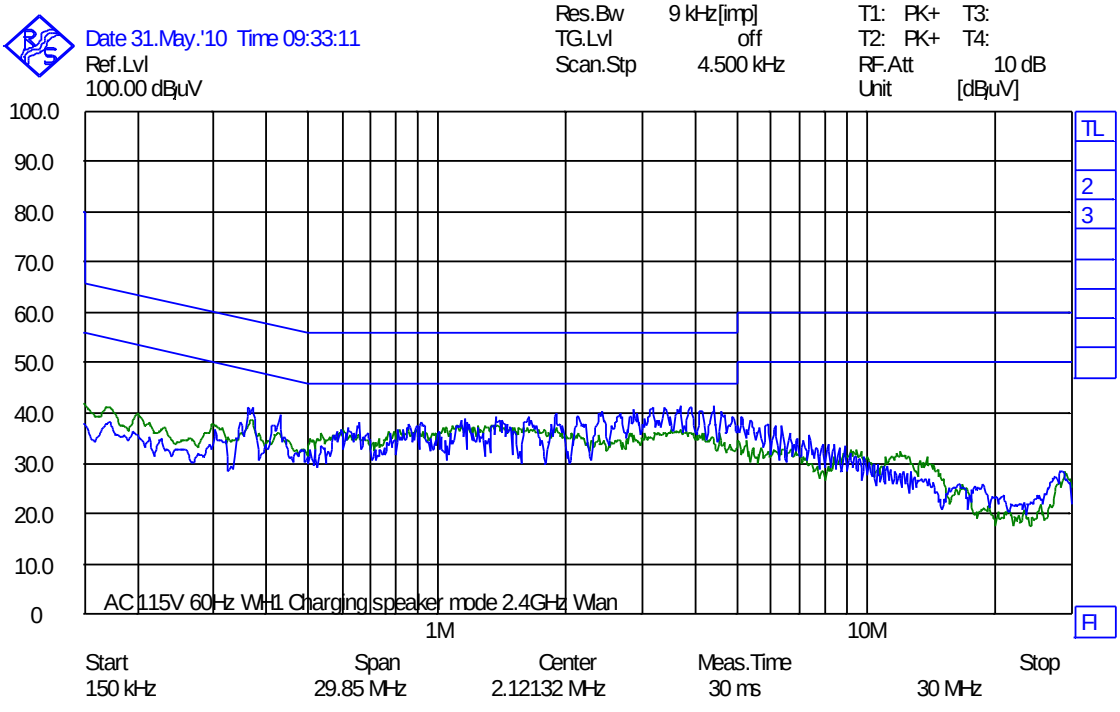
Measurement Data: **See attached graph, (Peak detector).**

Highest measured value (L1 and N): All emissions are below the Average Limit even when measured with Peak Detector.

Frequency	Detector	Measured value	Limit	Margin
KHz	Peak/QP/AV	dBµV	dBµV	dB
/	QP	/	/	/
/	AV	/	/	/
/	QP	/	/	/
/	AV	/	/	/



On Hook, Charging



Off-Hook, Speaker Mode, Charging

4.2 Minimum 6 dB Bandwidth

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

Test Performed By: Frode Sveinsen	**Date of Test: June - October 2010**

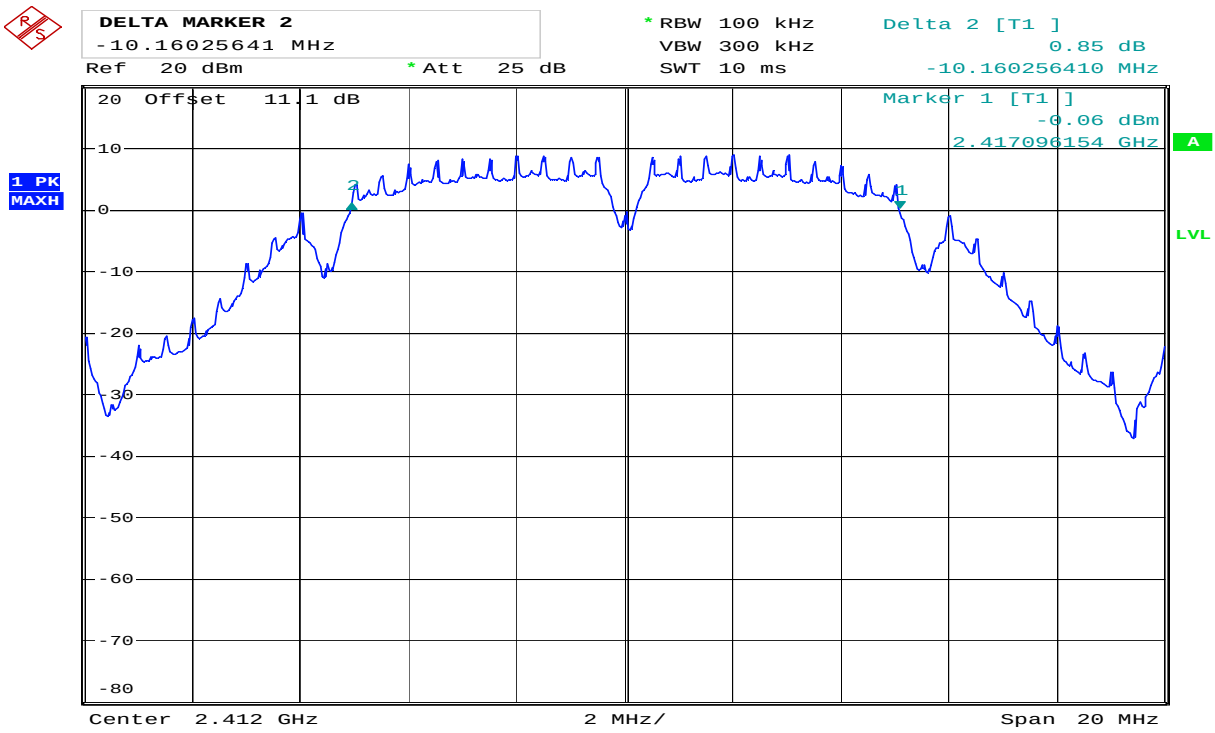
Test Results: Complies

Measurement Data:

Modulation type and bitrate	**Measured 6 dB Bandwidth (MHz)**			
	Ch 01 2412 MHz	Ch 06 2437 MHz	Ch 11 2462 MHz	Ch 165 5825 MHz
802.11b, 1 Mbps	10.2	10.2	10.2	N/A
802.11g, 6 Mbps	16.6	16.4	16.6	N/A
802.11a, 6 Mbps	N/A	N/A	N/A	16.6
802.11n, MCS0	17.8	17.7	17.8	17.8

Requirements:

For Digital Transmission Systems that operate in the 902–928 MHz, 2400–2483.5 MHz, and 5725–5850 MHz bands, the minimum 6 dB bandwidth shall be at least 500 KHz.



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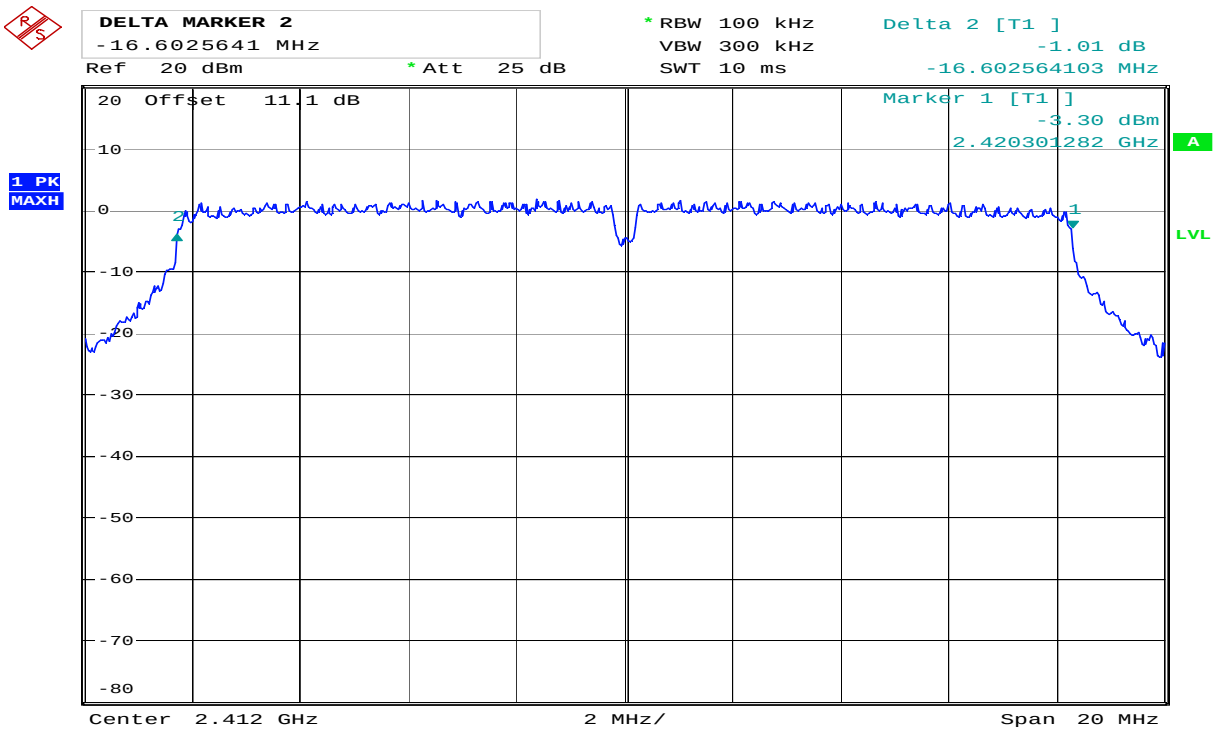
6 dB Bandwidth, 2412 MHz, 802.11b, 1 Mbps



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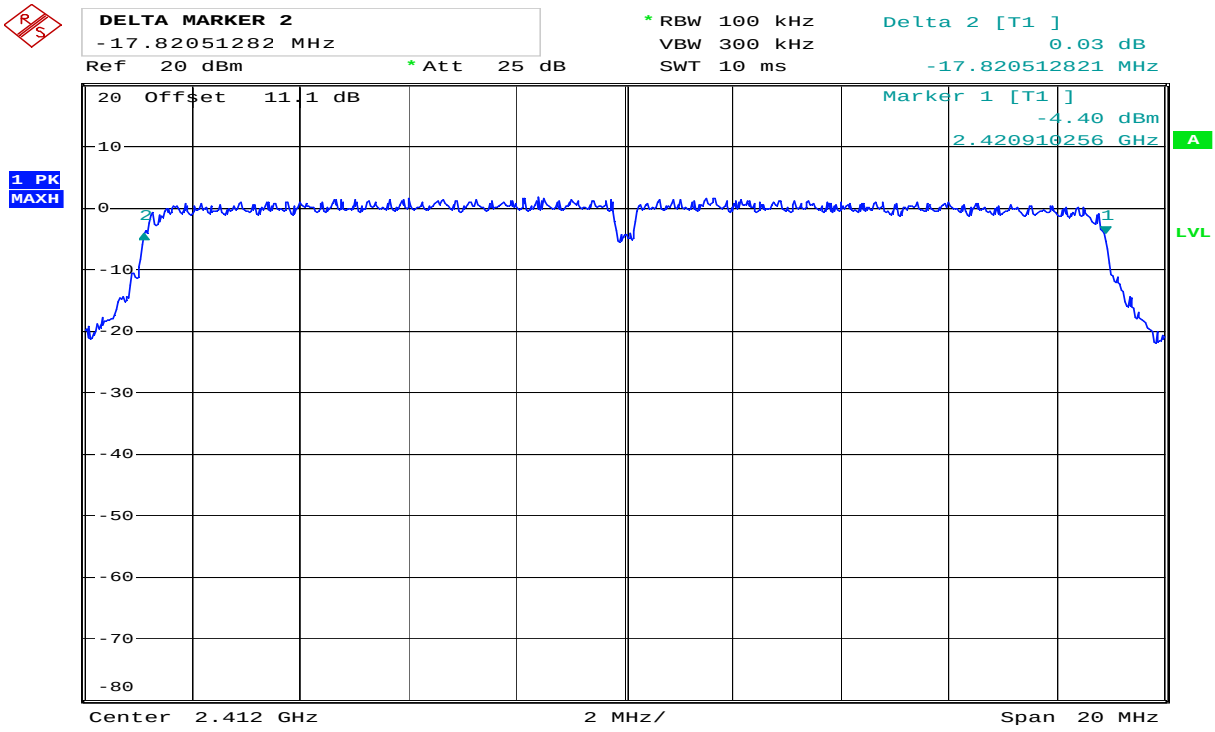

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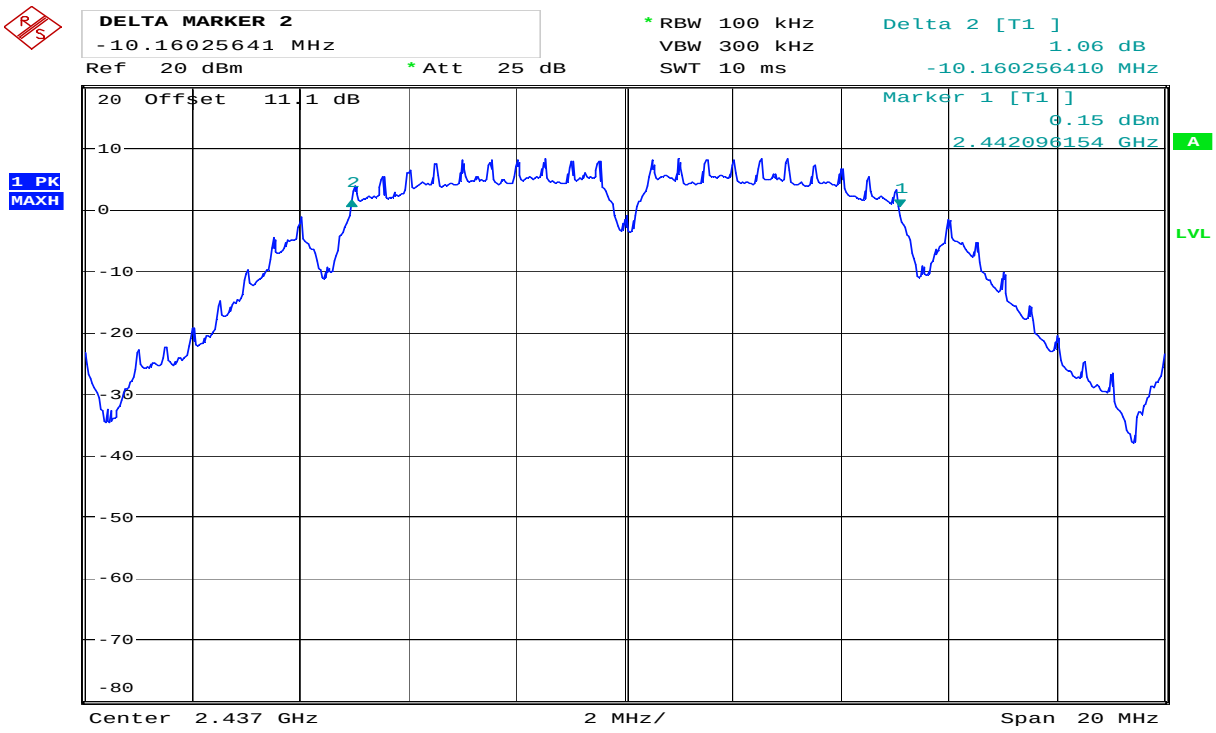

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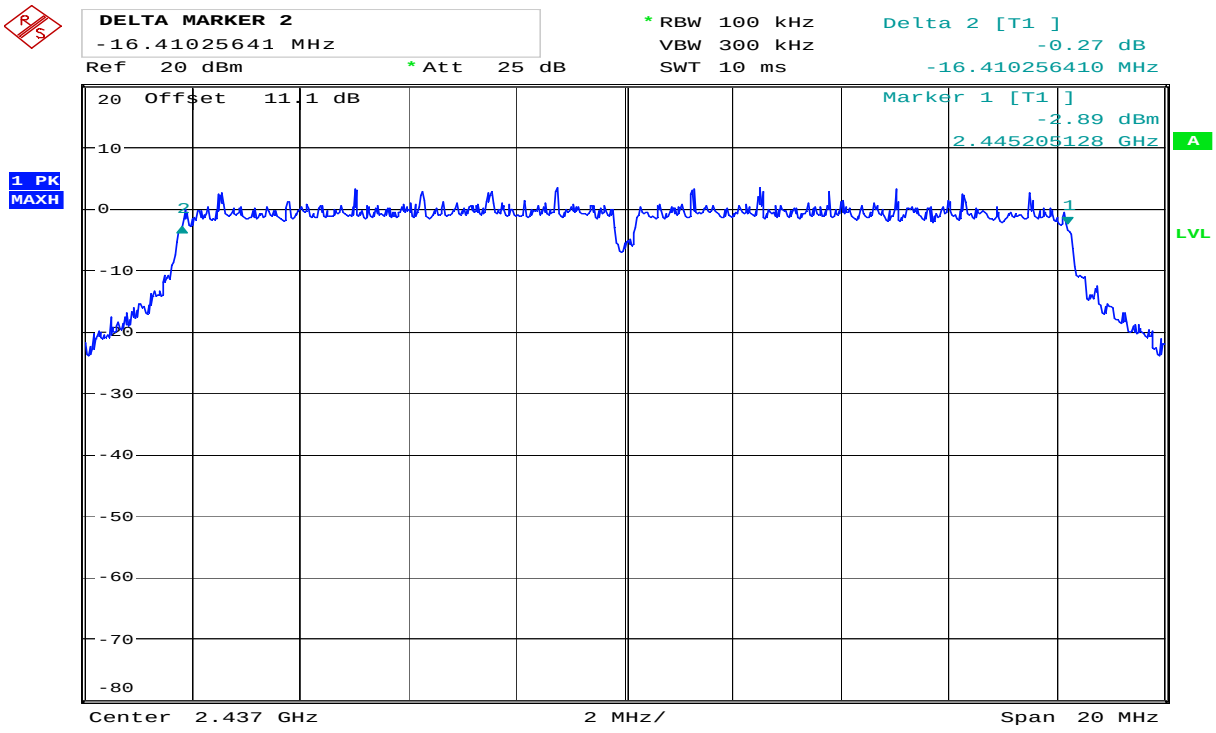
6 dB Bandwidth, 2437 MHz, 802.11b, 1 Mbps



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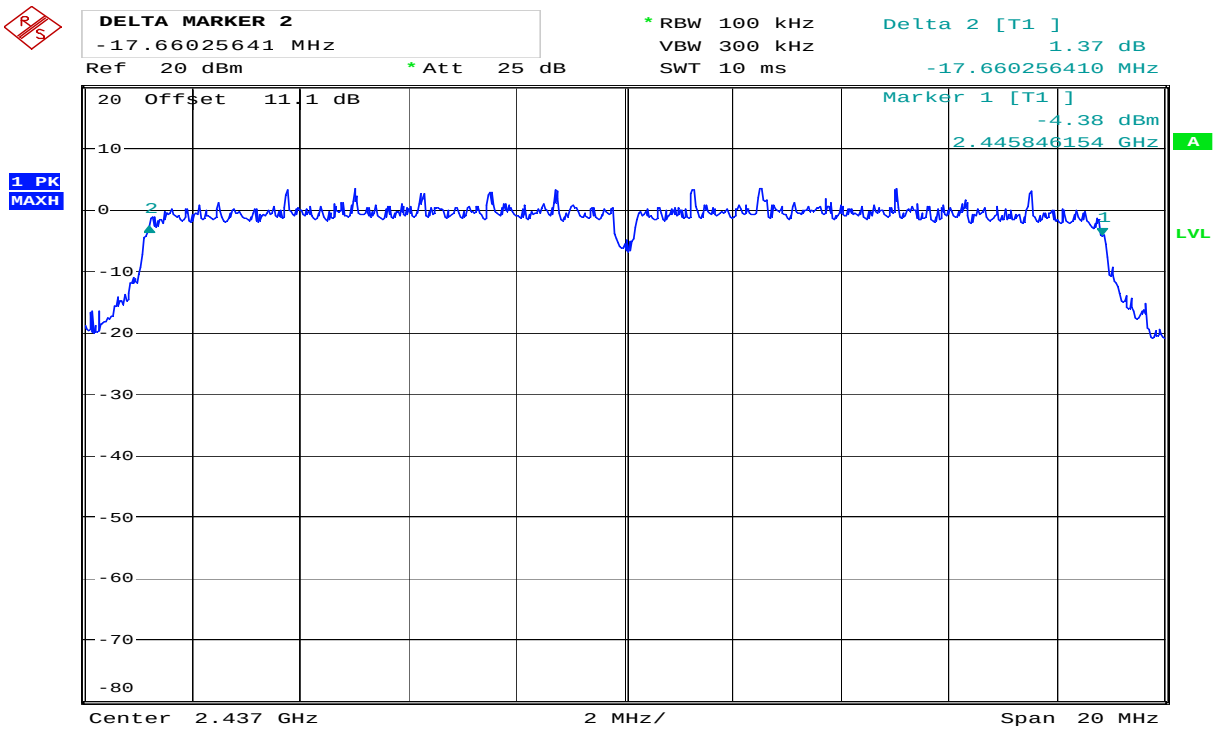
6 dB Bandwidth, 2437 MHz, 802.11g, 6 Mbps



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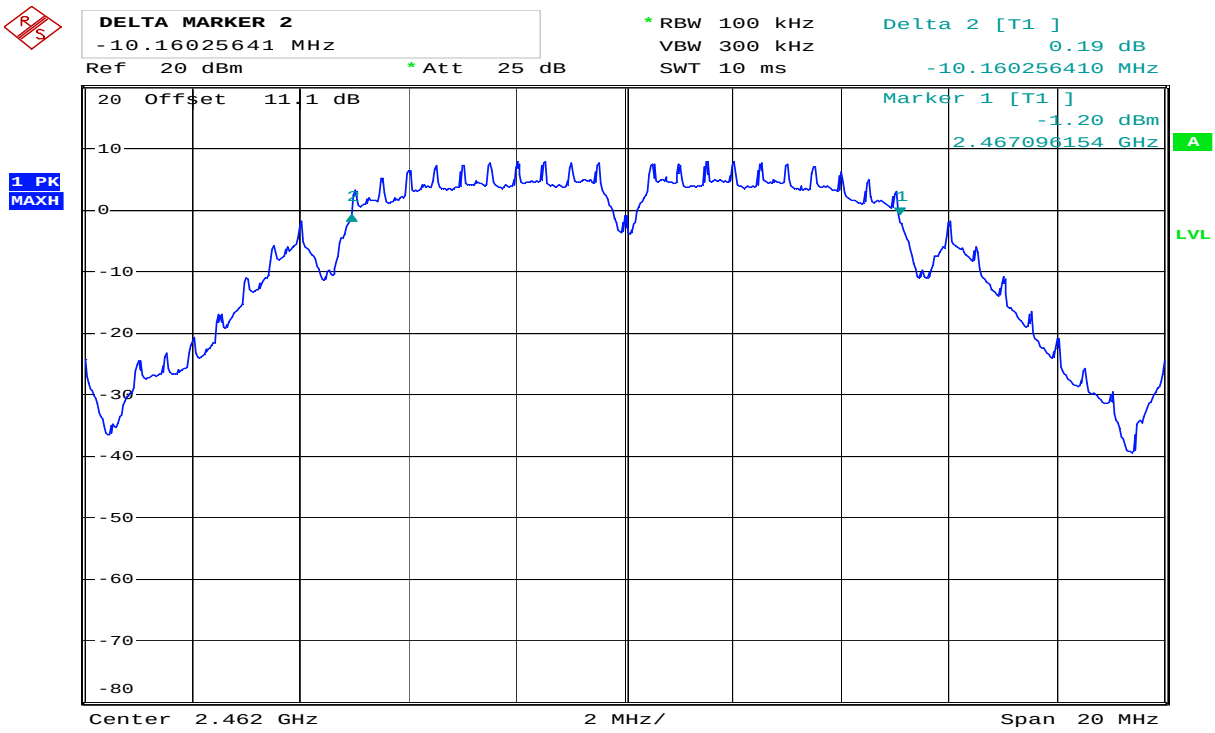
6 dB Bandwidth, 2437 MHz, 802.11n, MCS0



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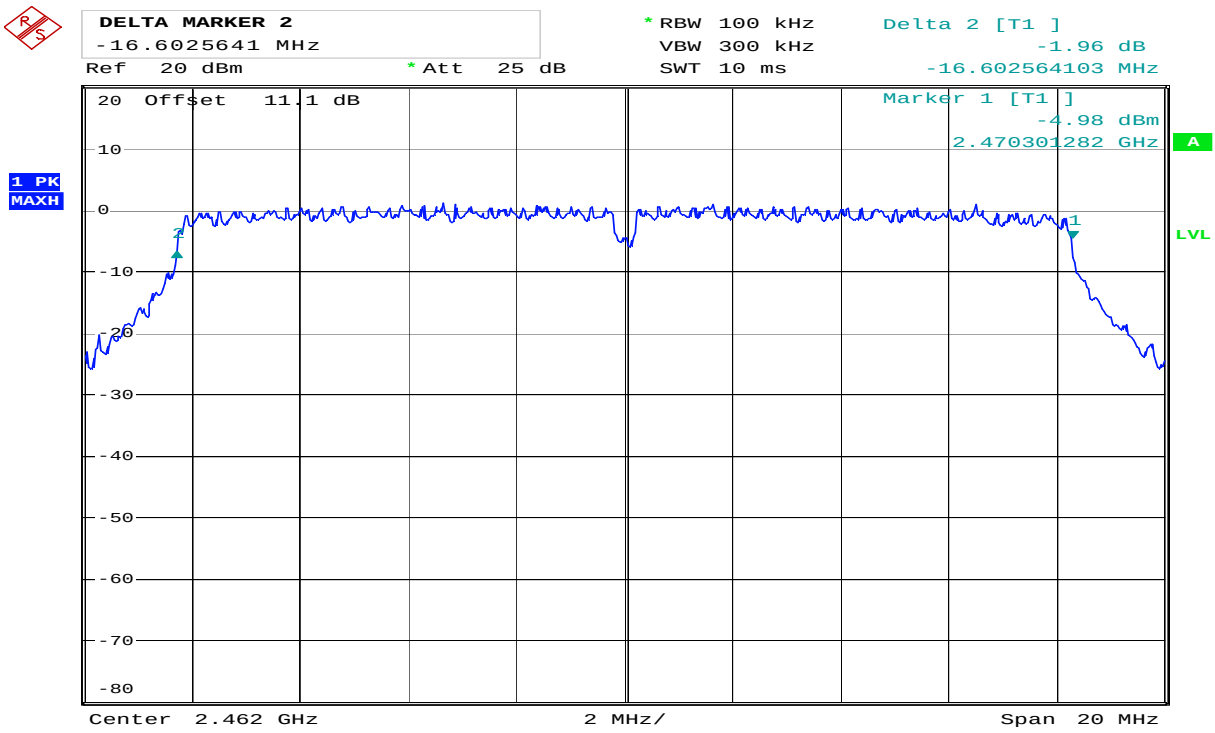
6 dB Bandwidth, 2462 MHz, 802.11b, 1 Mbps



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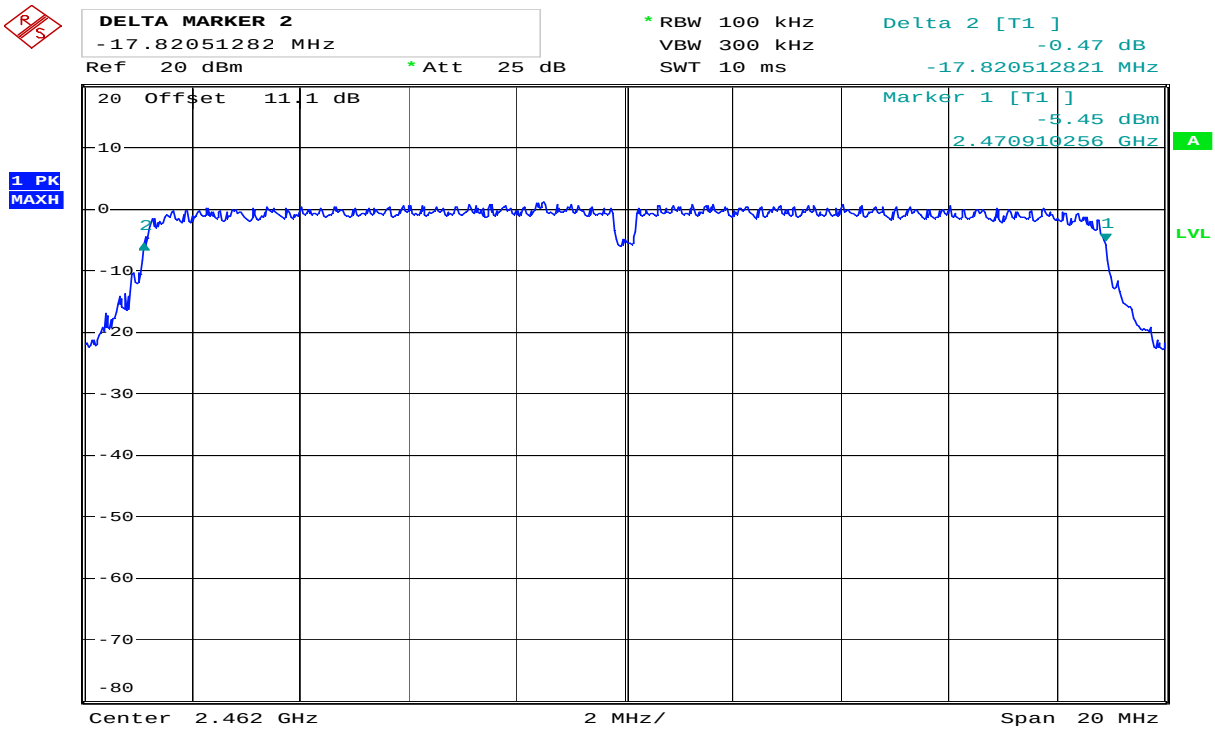
6 dB Bandwidth, 2462 MHz, 802.11g, 6 Mbps



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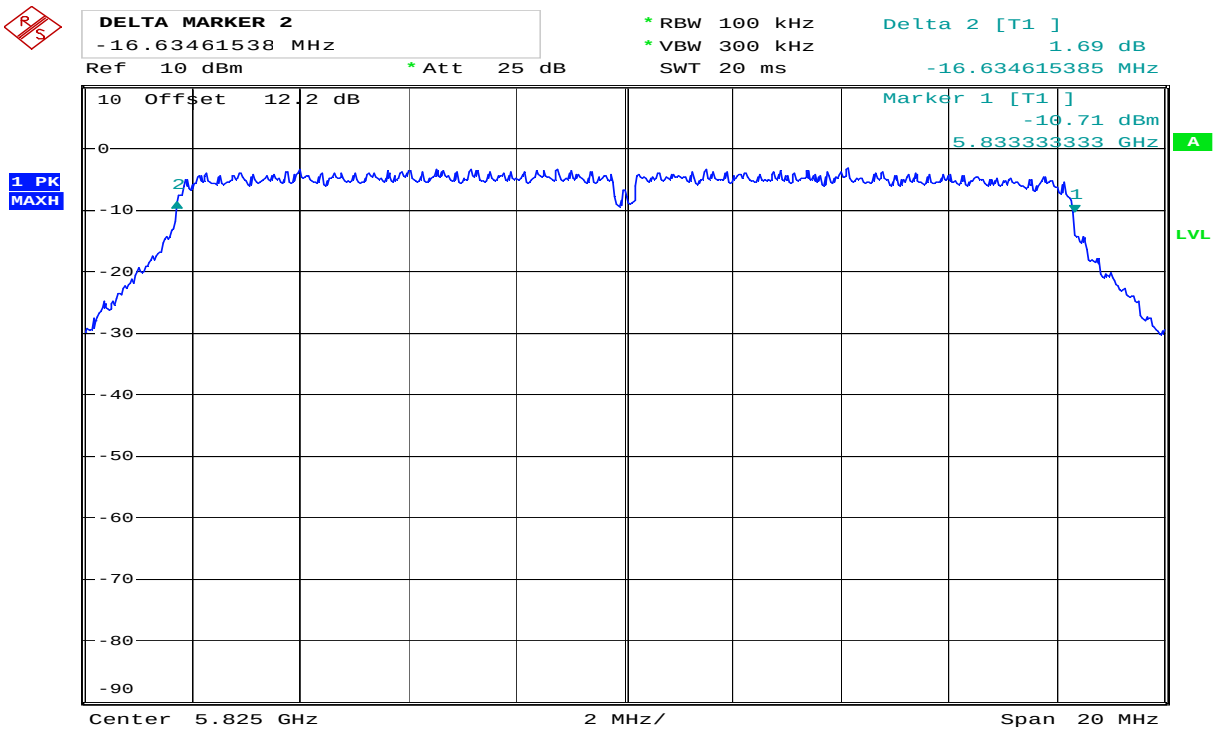
6 dB Bandwidth, 2462 MHz, 802.11n, MCS0



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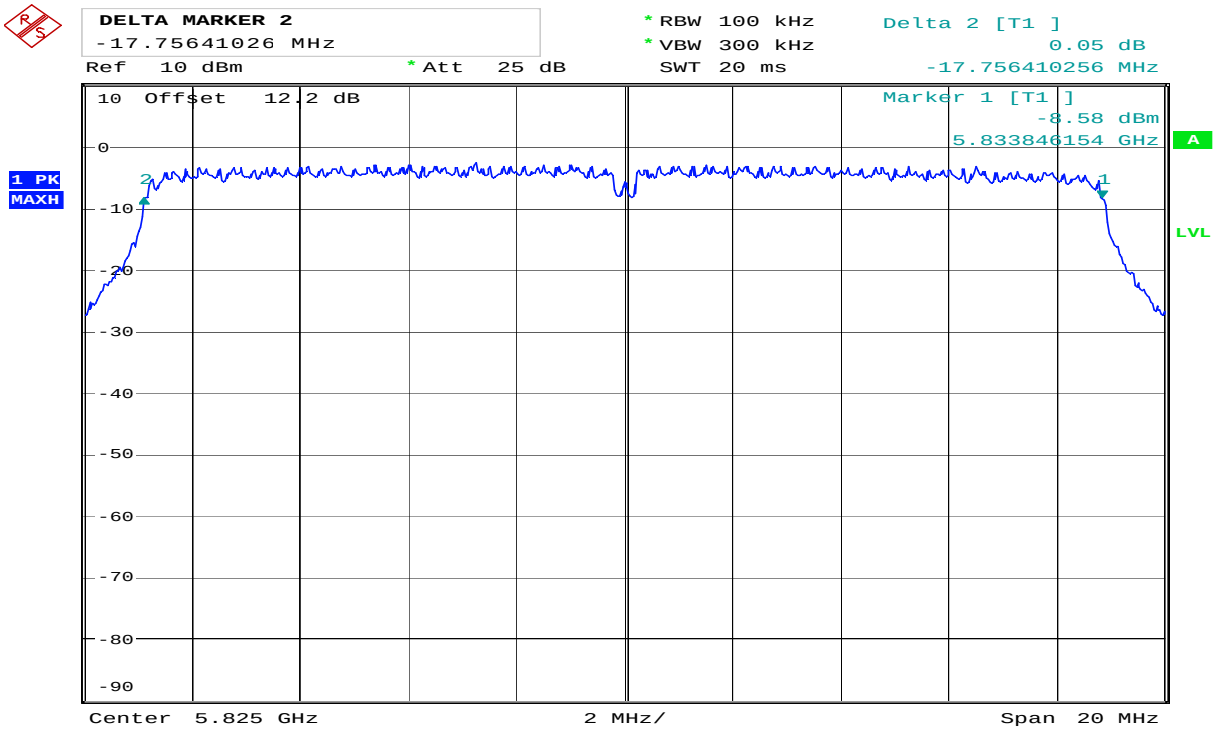
6 dB Bandwidth, 5825 MHz, 802.11a, 6 Mbps



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6 dB Bandwidth, 5825 MHz, 802.11n, MCS0

4.3 Output Power

Para. No.: 15.247 (b)

Test Results: Complies

Measurement Data:

Carrier Frequency	Maximum Conducted Output Power, Watts			
	802.11b, 1 Mbps	802.11g, 6 Mbps	802.11a, 6 Mbps	802.11n, MCS0
2412 MHz	0.043	0.020	N/A	0.021
2437 MHz	0.040	0.018	N/A	0.019
2462 MHz	0.037	0.017	N/A	0.018
5825 MHz	N/A	N/A	0.006	0.007

Carrier Frequency	Maximum EIRP, Watts			
	802.11b, 1 Mbps	802.11g, 6 Mbps	802.11a, 6 Mbps	802.11n, MCS0
2412 MHz	0.066	0.032	N/A	0.023
2437 MHz	0.063	0.031	N/A	0.024
2462 MHz	0.060	0.025	N/A	0.024
5825 MHz	N/A	N/A	0.004	0.004

Carrier Frequency	Maximum Antenna Gain, dBi			
	802.11b, 1 Mbps	802.11g, 6 Mbps	802.11a, 6 Mbps	802.11n, MCS0
2412 MHz	1.9	2.0	N/A	0.3
2437 MHz	2.0	2.2	N/A	0.9
2462 MHz	2.1	1.7	N/A	1.2
5825 MHz	N/A	N/A	-1.8	-2.3

Output Power was measured using UNII test method #1 -Spectral Trace Averaging- according to ANSI C63.10-2009 clause 6.10.3.1.

The EUT was transmitting continuously, number of sweep points was 625 (bin width = 30/625 MHz < 0.5 RBW).

Antenna gain = 10*log(EIRP/Conducted power) dBi.

The EIRP is calculated from measured field strength by the formula in DA00-705.

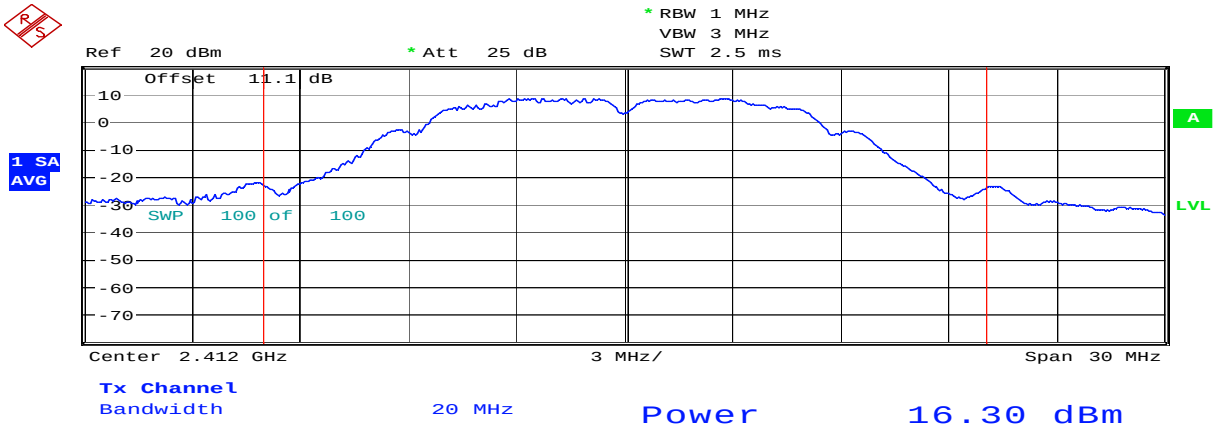
The radiated test was performed with spectrum analyzer using the UNII method, at 3m test distance in the semi-anechoic chamber with transducer factor programmed in the spectrum analyzer. The EUT was rotated in 3 planes for the field strength measurement. Spectrum Analyzer “Transducer factor” includes antenna factor, amplifier gain and cable loss.

See attached plots

Requirements:

The maximum peak output power shall not exceed the following limits:
For Digital Transmission Systems in the 902–928 MHz, 2400–2483.5 MHz, and 5725–5850 MHz bands: 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.



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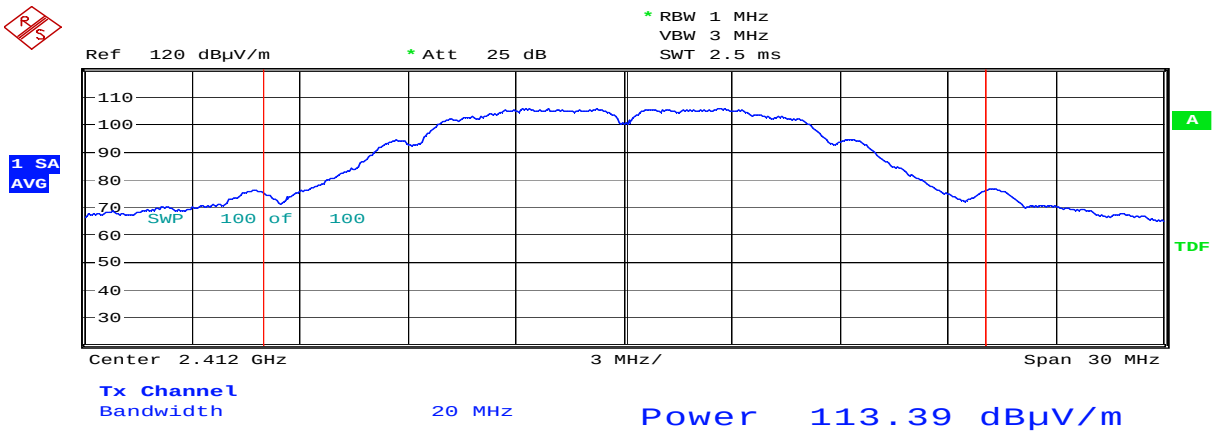
Conducted Output Power, 2412 MHz, 802.11b, 1 Mbps



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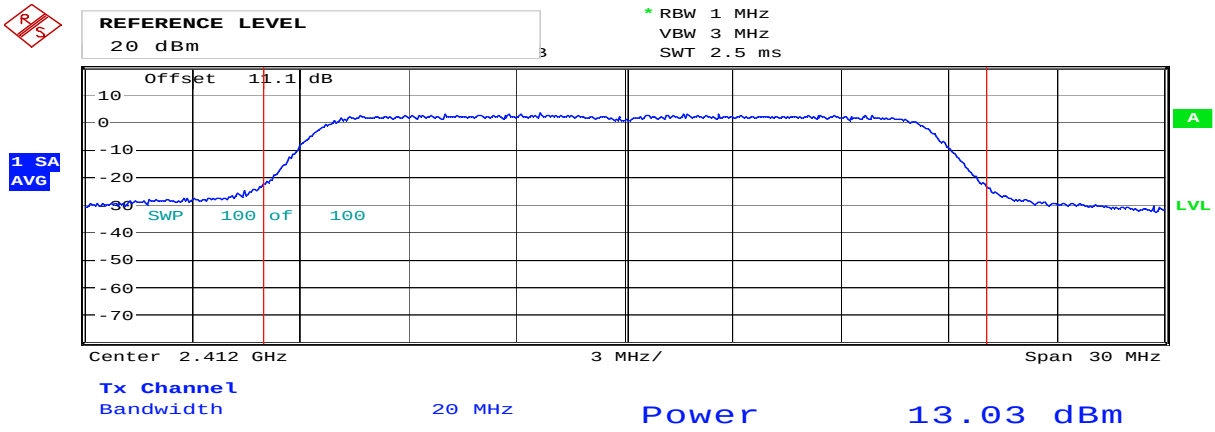
Radiated Output Power, 2412 MHz, 802.11b, 1 Mbps (Max: EUT H1, VP)



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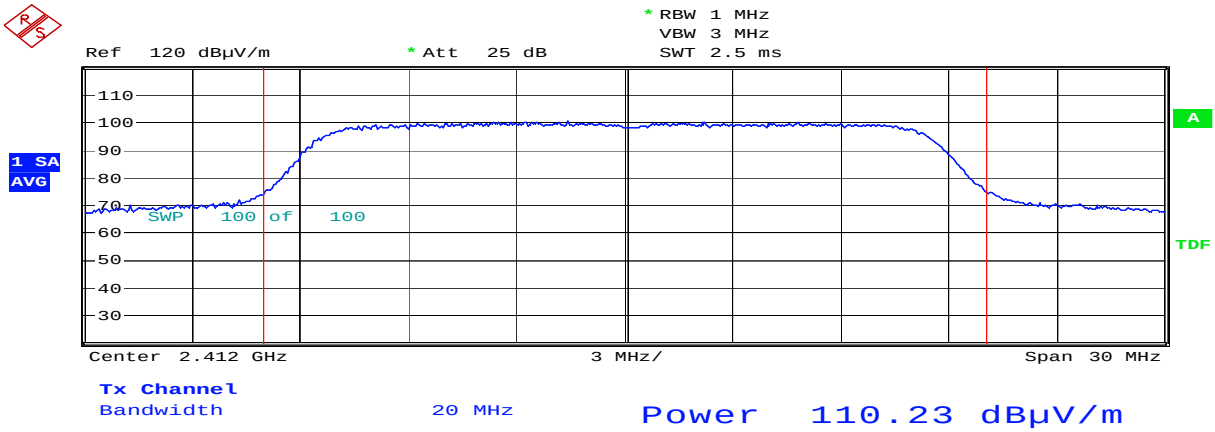

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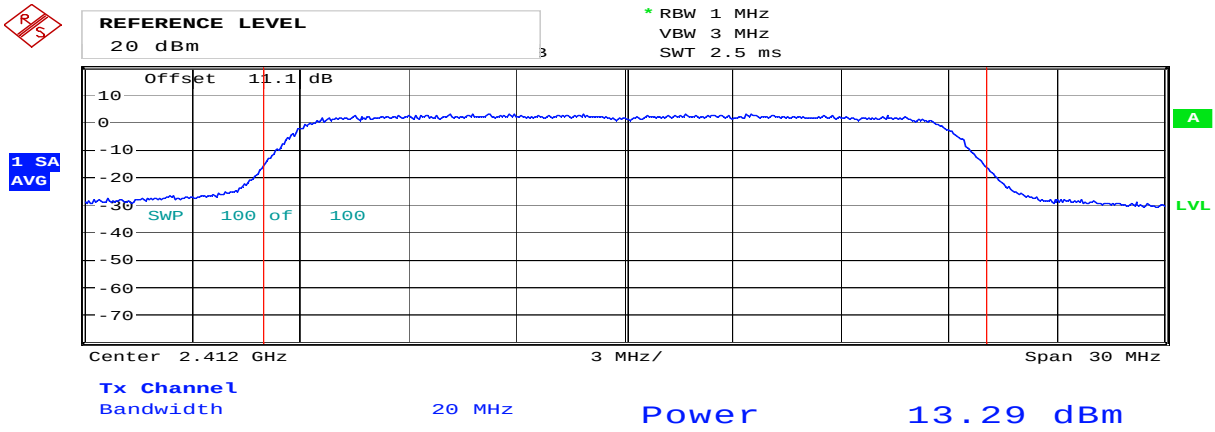

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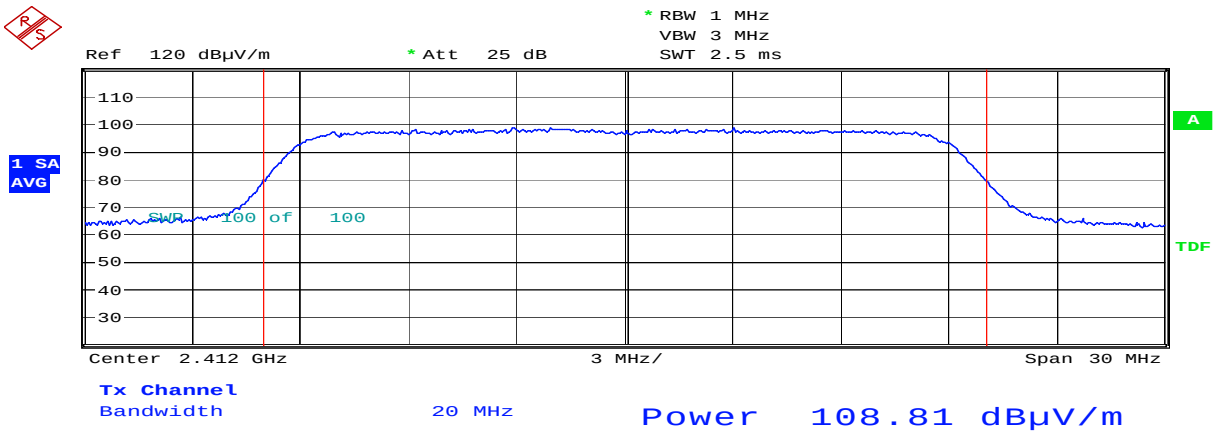

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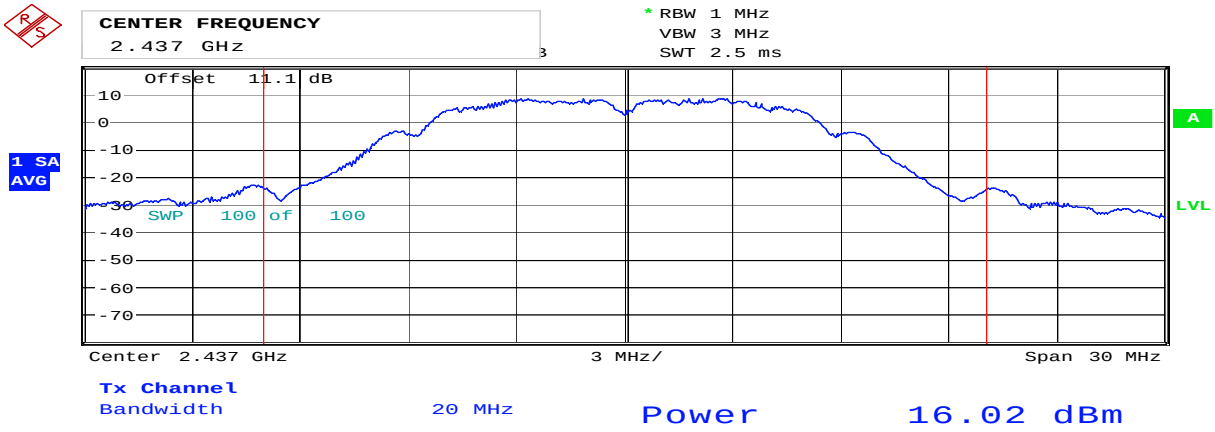

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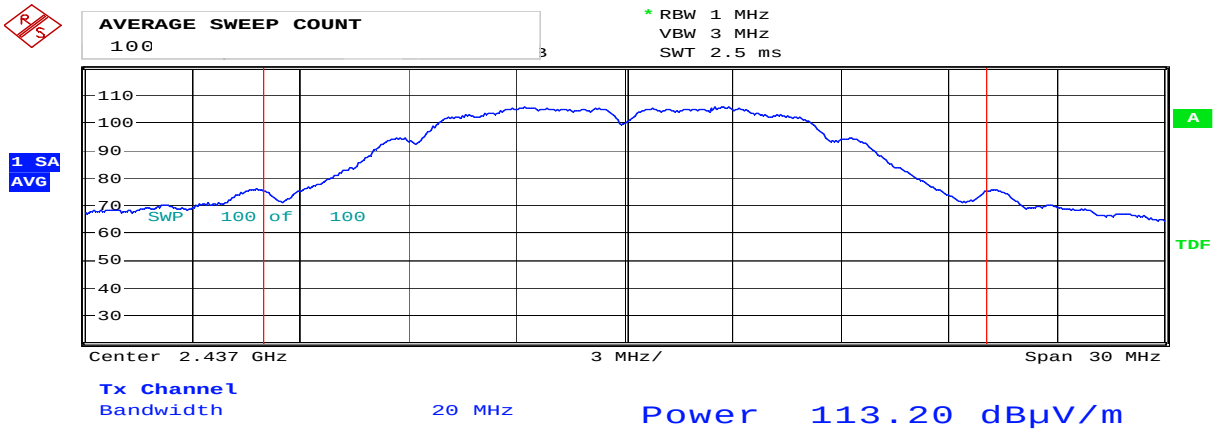
Conducted Output Power, 2437 MHz, 802.11b, 1 Mbps



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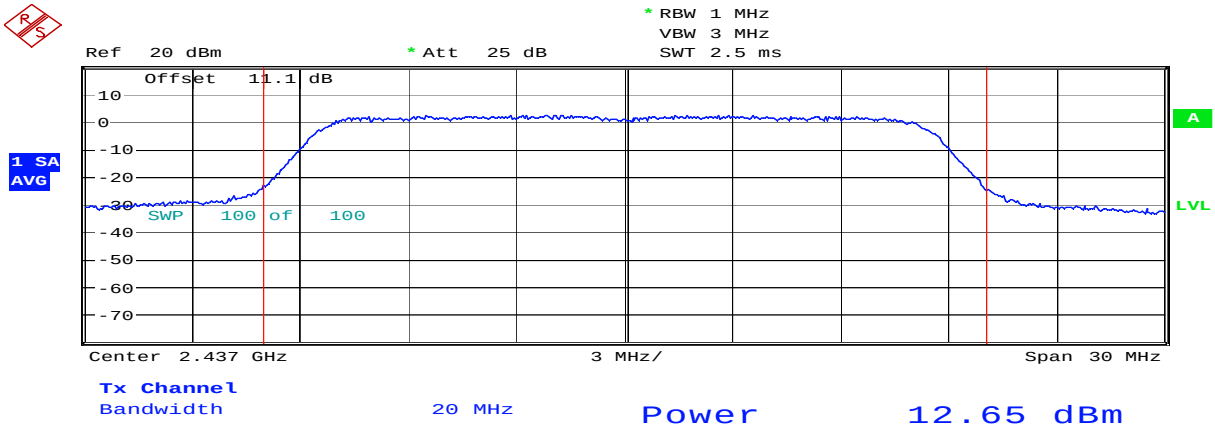

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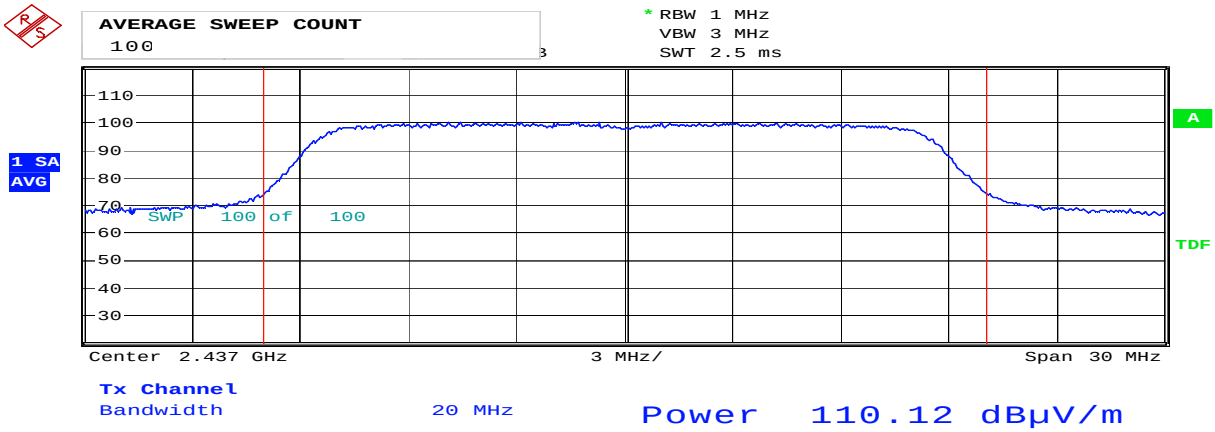
Conducted Output Power, 2437 MHz, 802.11g, 6 Mbps



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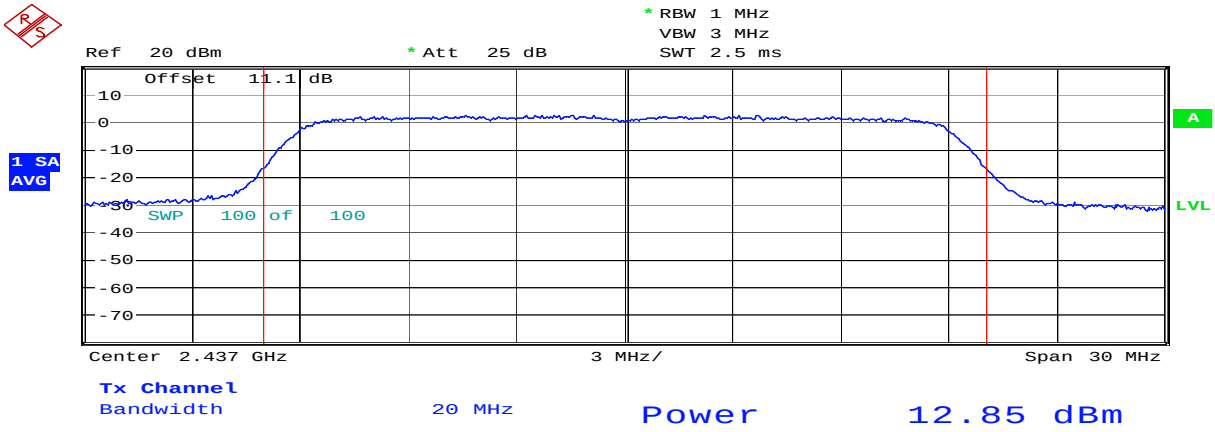

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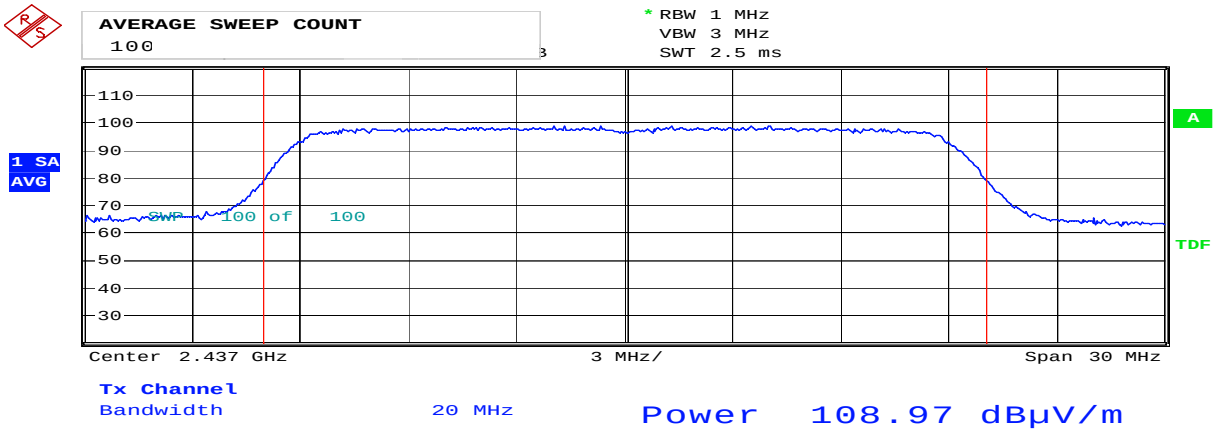

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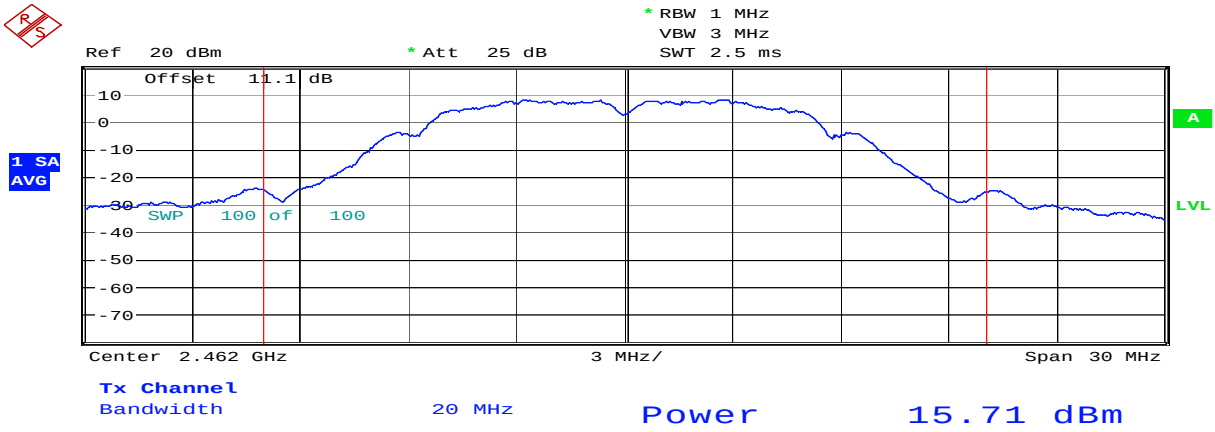

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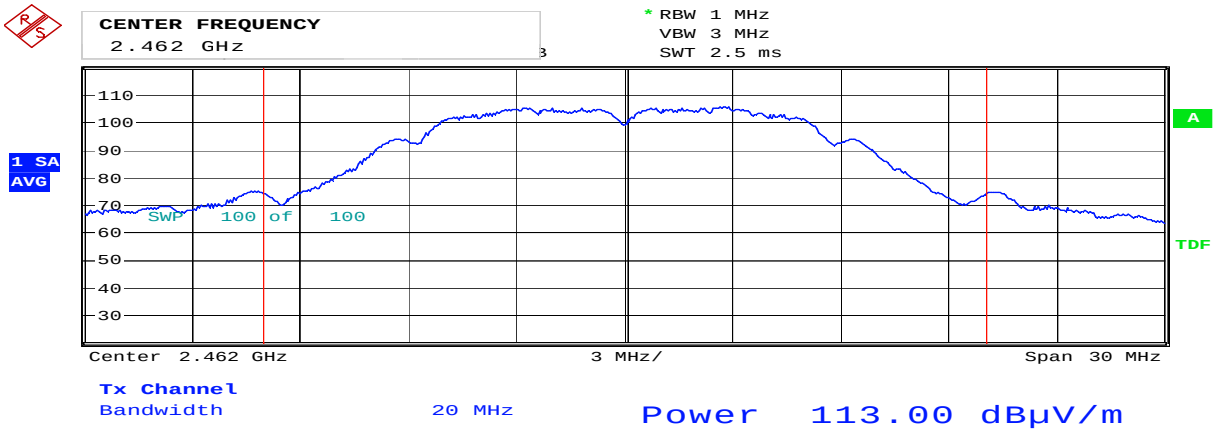
Conducted Output Power, 2462 MHz, 802.11b, 1 Mbps



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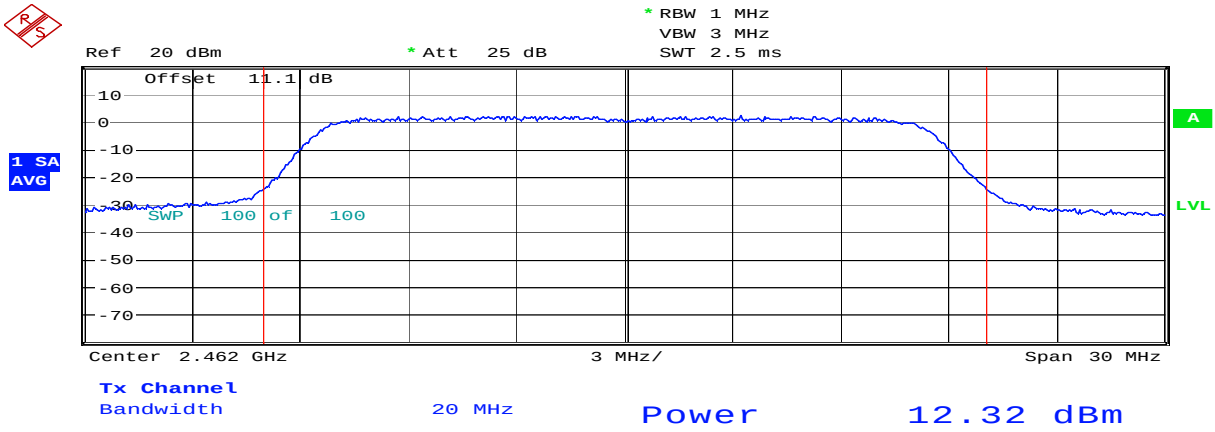

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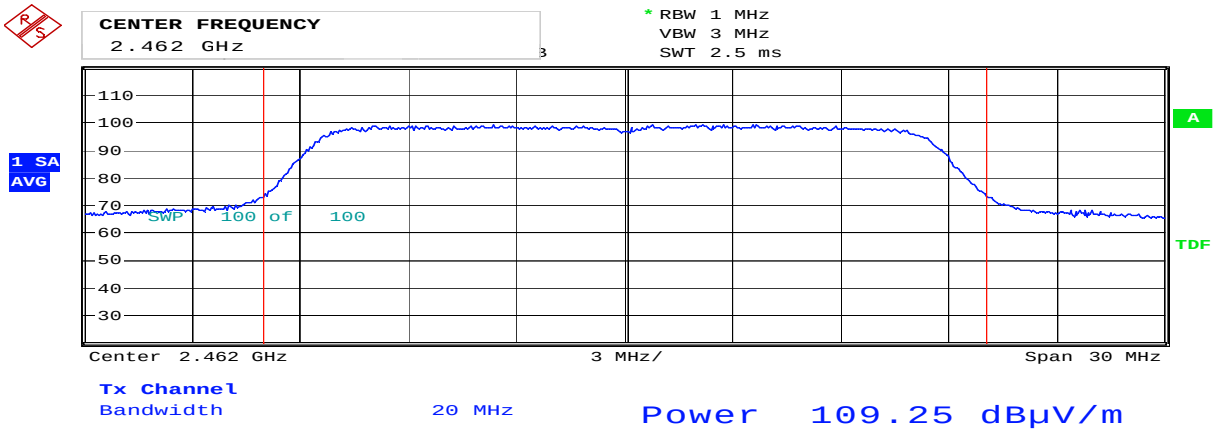

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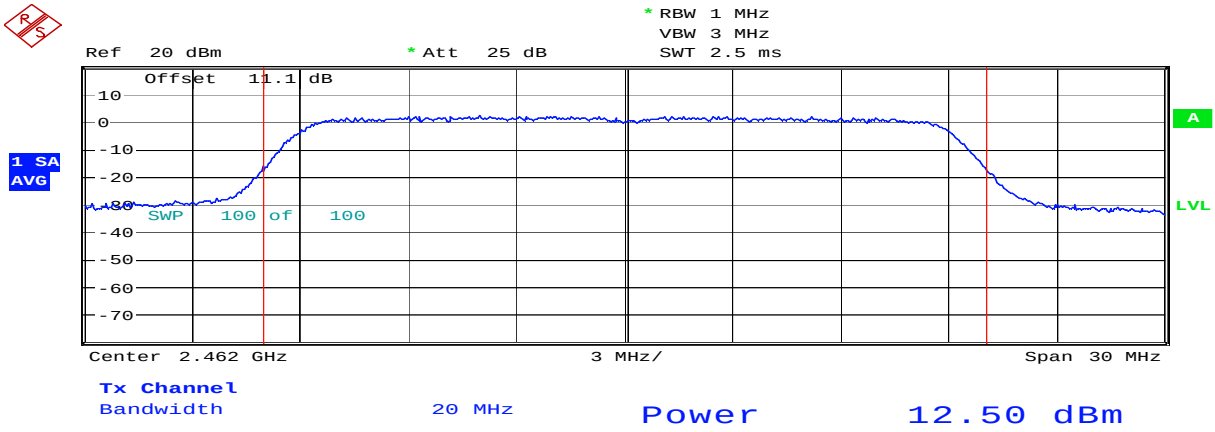

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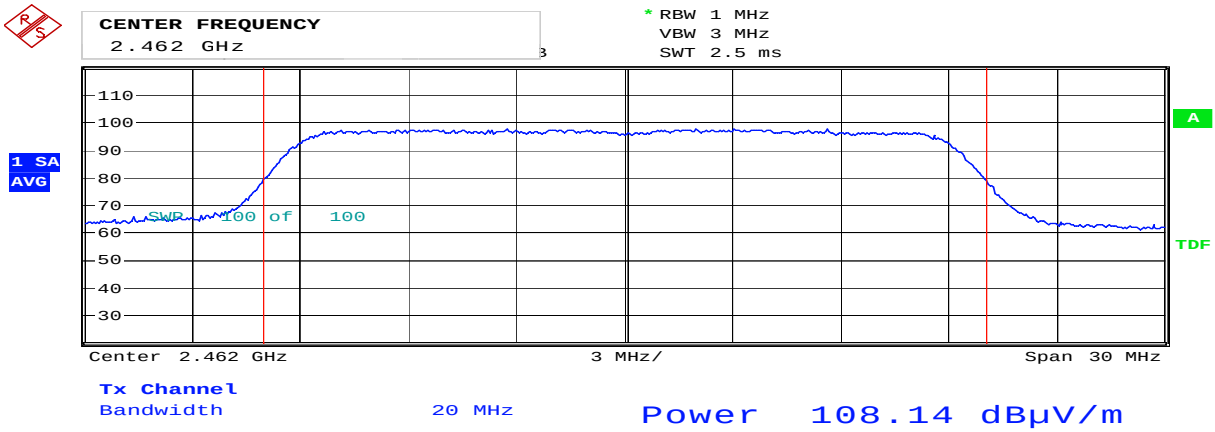
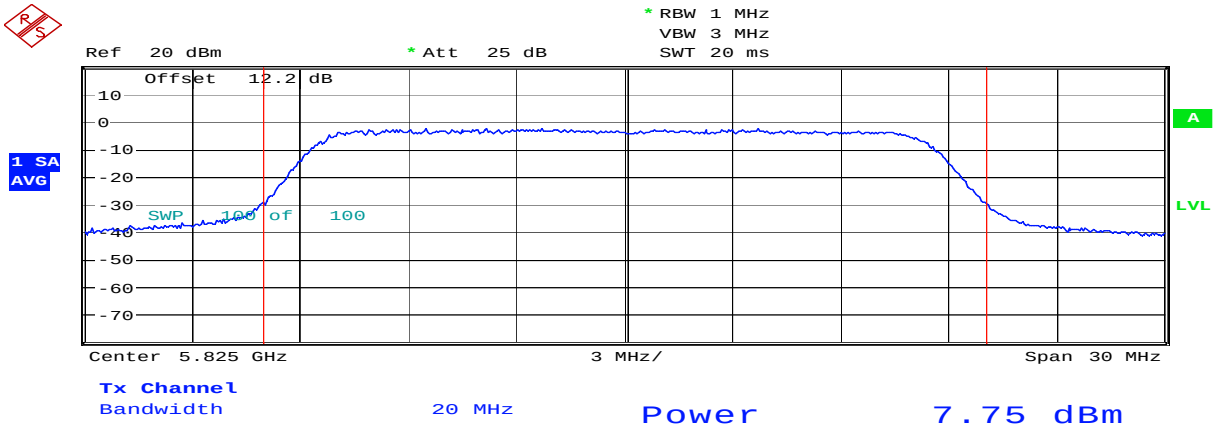


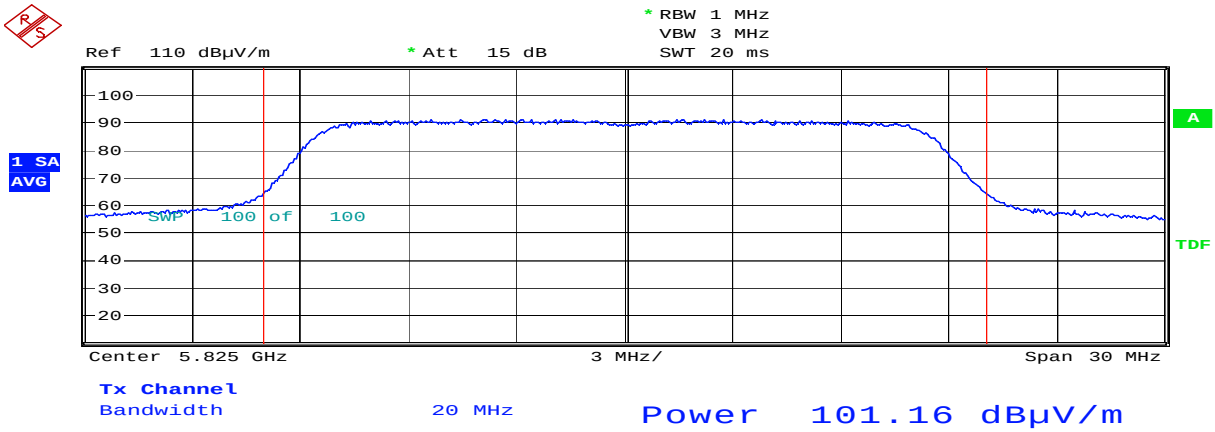
Date: 22.OCT.2010 12:46:02

Radiated Output Power, 2462 MHz, 802.11n, MCS0 (Max: EUT H1, VP)



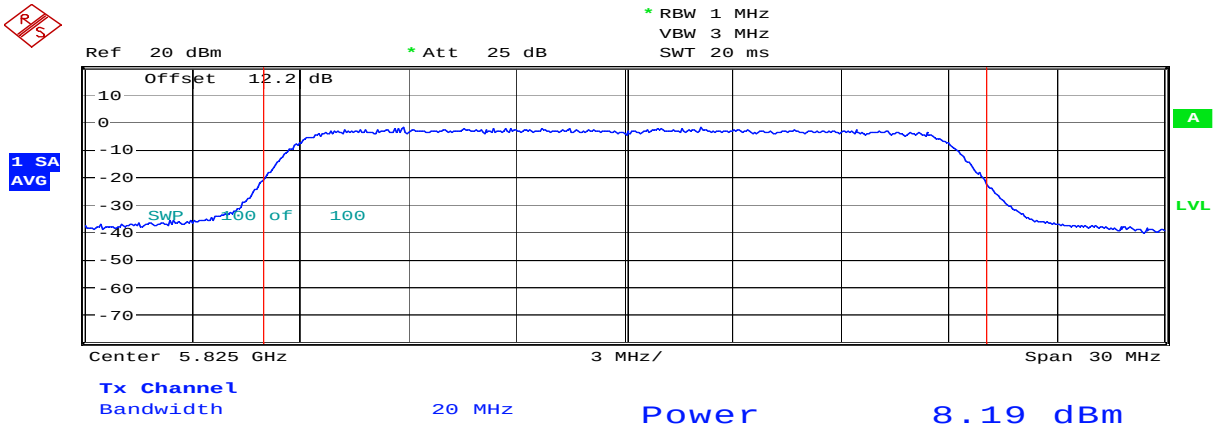
Date: 19.OCT.2010 10:48:15

Conducted Output Power, 5825 MHz, 802.11a, 6 Mbps



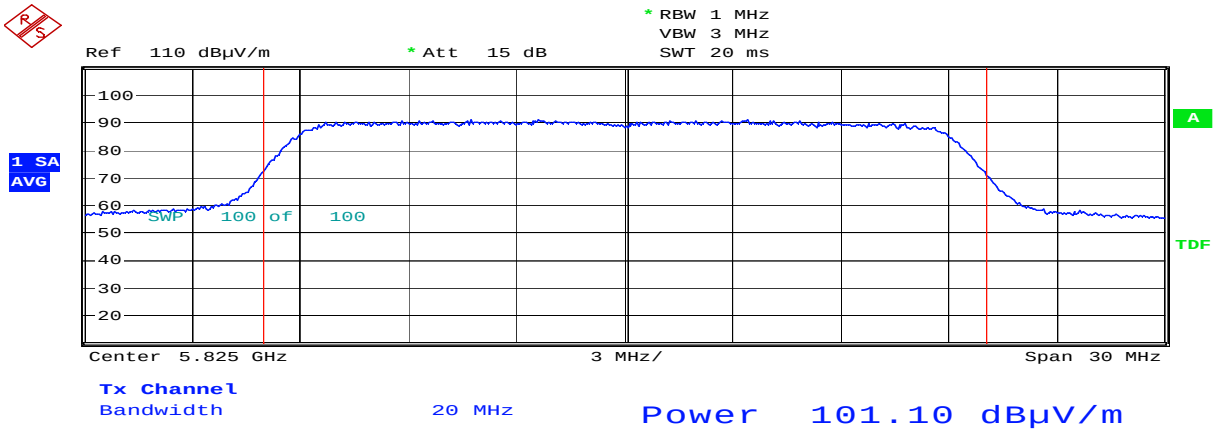
Date: 22.OCT.2010 12:55:44

Radiated Output Power, 5825 MHz, 802.11a, 6 Mbps (Max: EUT V, VP)



Date: 19.OCT.2010 10:49:31

Conducted Output Power, 5825 MHz, 802.11n, MCS0



Date: 22.OCT.2010 12:57:19

Radiated Output Power, 5825 MHz, 802.11n, MCS0 (Max: EUT V, VP)

4.4 Average Output Power

Measurement Data:

Carrier Frequency	Average Output Power, Conducted dBm			
	802.11b, 1 Mbps	802.11g, 6 Mbps	802.11a, 6 Mbps	802.11n, MCS0
2412 MHz	17.4	15.1	N/A	15.3
2437 MHz	17.1	14.7	N/A	15.0
2462 MHz	16.7	14.4	N/A	14.6
5825 MHz	N/A	N/A	11.5	11.8

This measurement was performed conducted with an Averaging Power Meter (Agilent U2000A).

The EUT was transmitting continuously during this test.

The results are reported only to show consistency with the SAR report.

4.5 Spurious Emissions (Radiated)

Para. No.: 15.247 (c)

Test Performed By: Frode Sveinsen	**Date of Test: June 2010**

Test Results: Complies

Restricted Band-edge, Measured Field Strength

Peak Detector:

Modulation and Bitrate	**Measured field strength (dBµV/m)**		**Limit**	**Margin**
	2390 Mhz	**2483.5 MHz**	**dB**	**dB**
802.11b, 1 Mbps	58.5	52.0	74	15.5
802.11g, 6 Mbps	71.4	71.5	74	2.5
802.11n, MCS0	70.6	72.5	74	2.5

Average Detector:

Modulation and Bitrate	**Measured field strength (dBµV/m)**		**Limit**	**Margin**
	2390 Mhz	**2483.5 MHz**	**dB**	**dB**
802.11b, 1 Mbps	41.6	35.6	54	12.4
802.11g, 6 Mbps	45.6	47.2	54	6.8
802.11n, MCS0	45.3	46.8	54	7.2

Marker Delta Method was used for 802.11g and 802.11n with Peak Detector at both Lower and Upper Restricted Band Edge (ref. FCC KDB pub. no. 913591). All other measurements were performed directly.

Measurements were performed with 100% duty cycle. Average Detector measurements have been corrected with Pulse Desensitization Factor.

See attached plots.

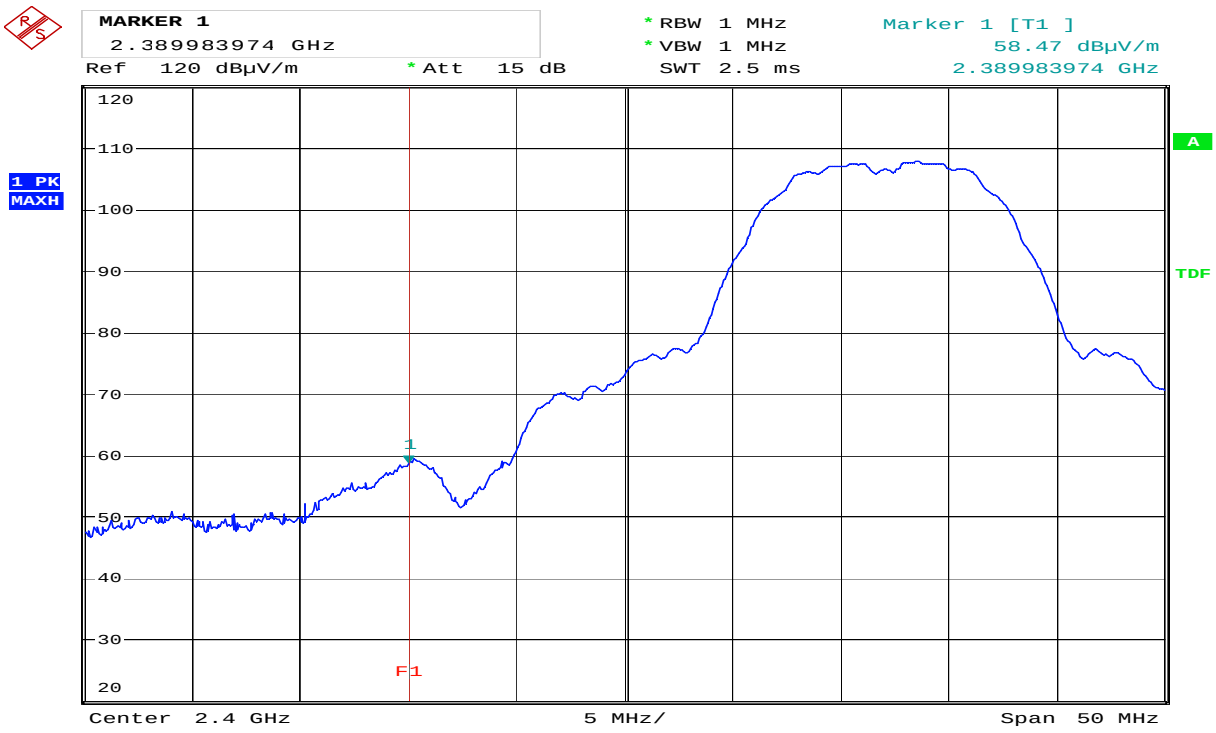
Duty Cycle / Pulse Desensitization Factor

The duty cycle values are manufactures values and are worst case with 3rd party call and with the lowest supported bit-rate for each modulation scheme.

The values below are used when calculating Average Detector values from measured Peak Detector values.

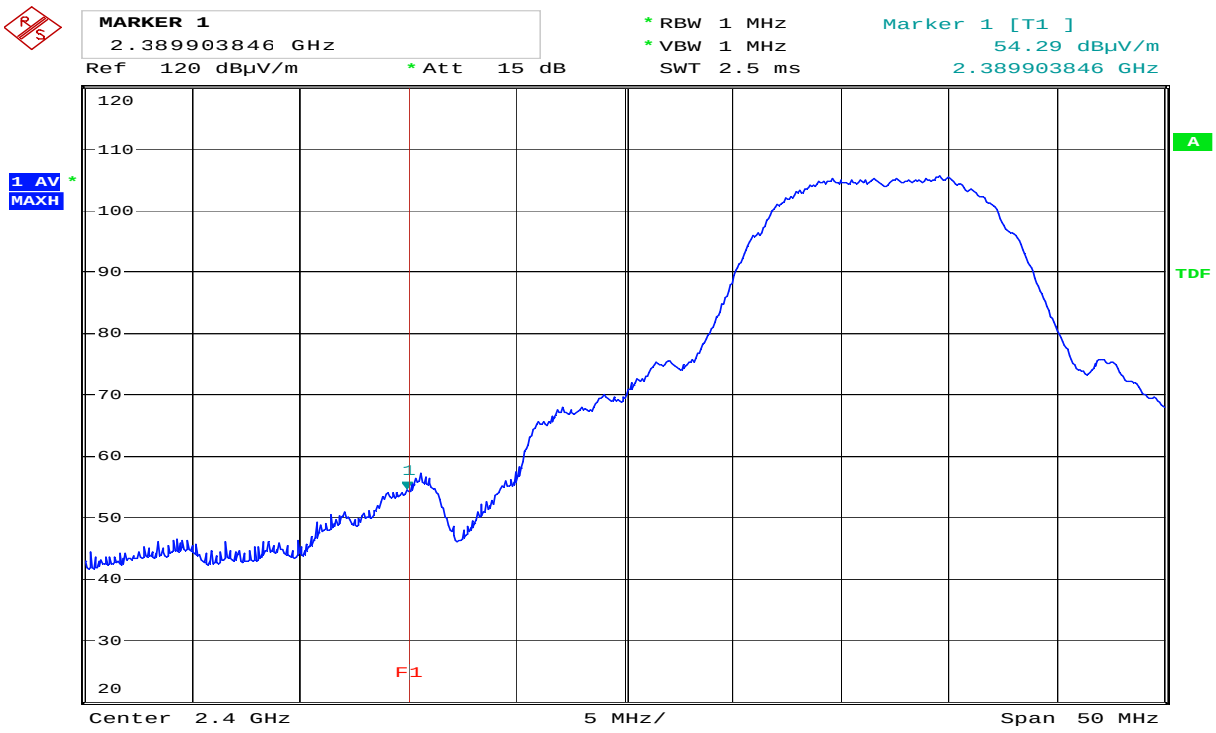
	802.11b 1 Mbps	**802.11a/g 6 Mbps**	**802.11n MCS0**
Duty Cycle	23%	3.7%	3.7%
Pulse Desensitisation Factor	12.7 dB	20 dB	20 dB

Pulse Desensitization Factor = $-20 \times \log_{10}$(Duty Cycle) (Maximum 20 dB)



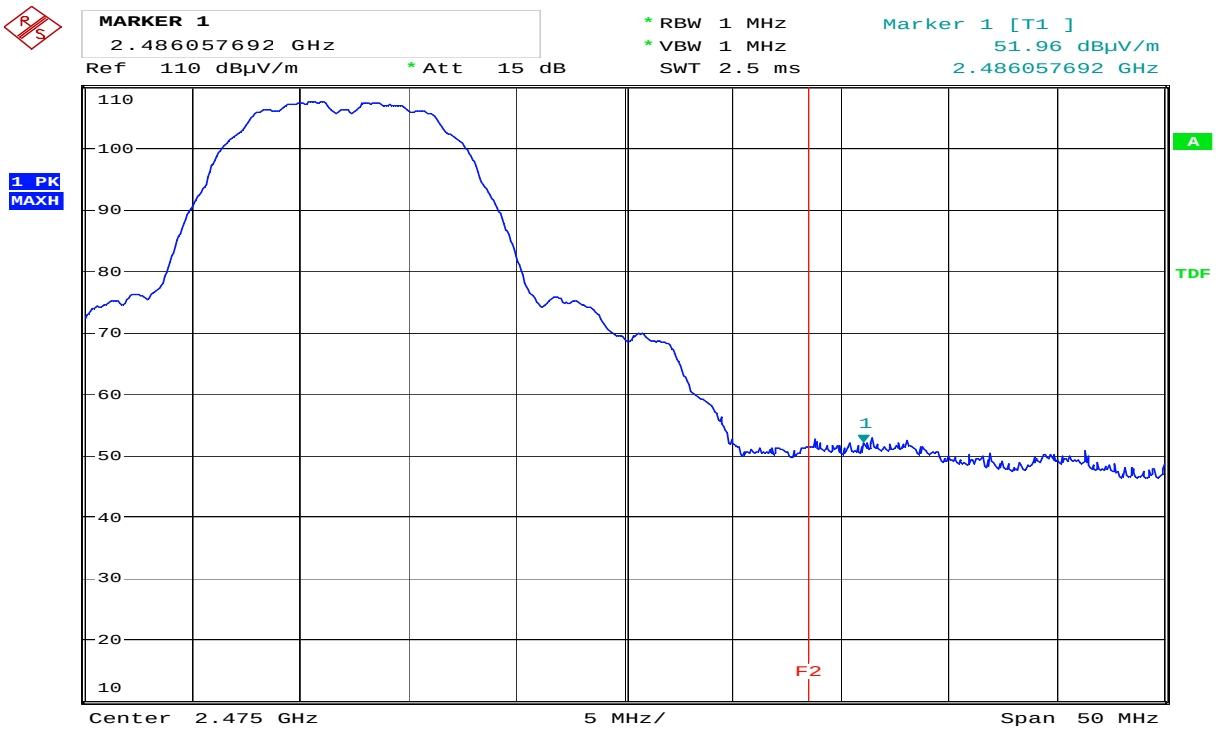
Date: 25.JUN.2010 12:45:04

Band Edge 2390 MHz, 802.11b, 1Mbps, Peak Det



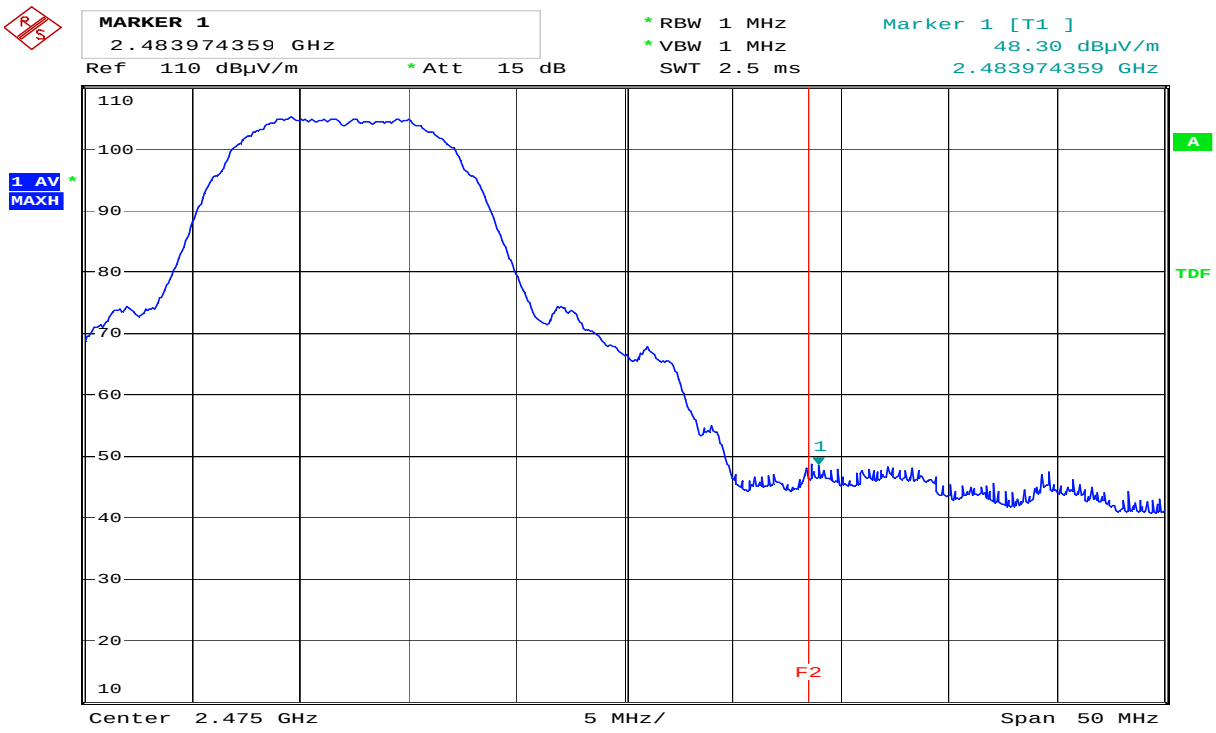
Date: 25.JUN.2010 12:46:35

Band Edge 2390 MHz, 802.11b, 1Mbps, Average Det



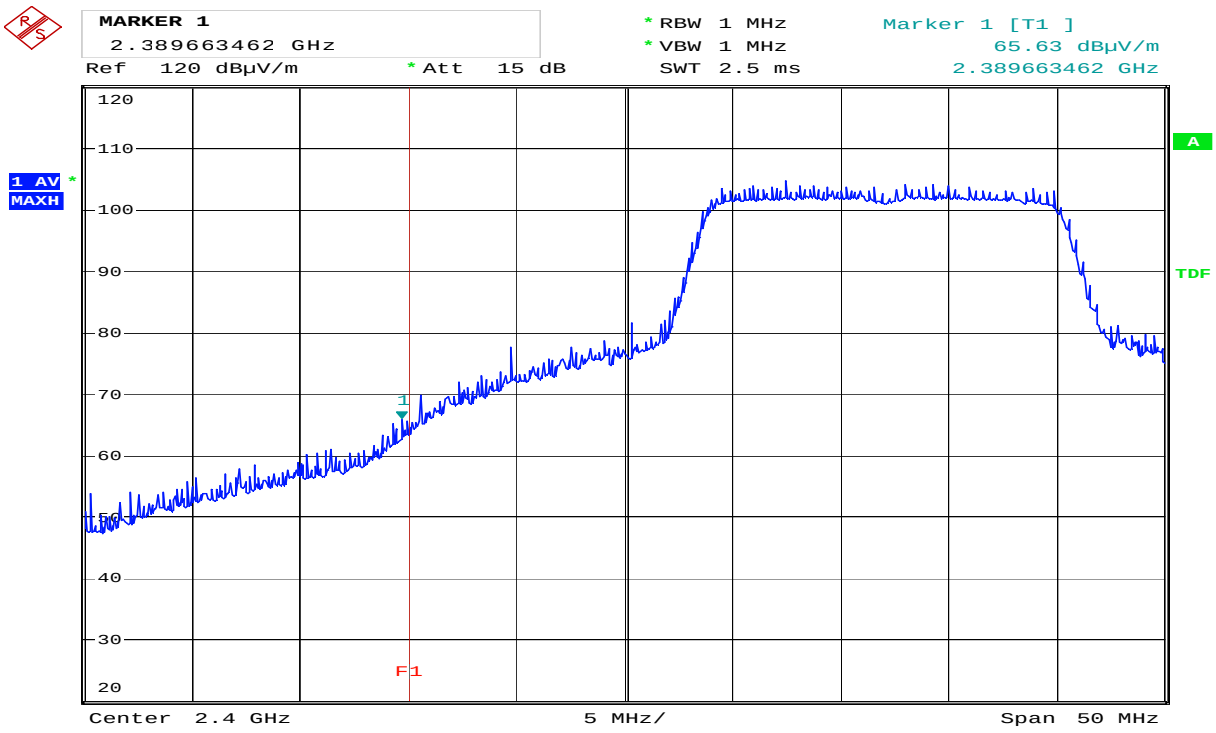
Date: 25.JUN.2010 12:19:50

Band Edge 2483.5 MHz, 802.11b, 1Mbps, Peak Det



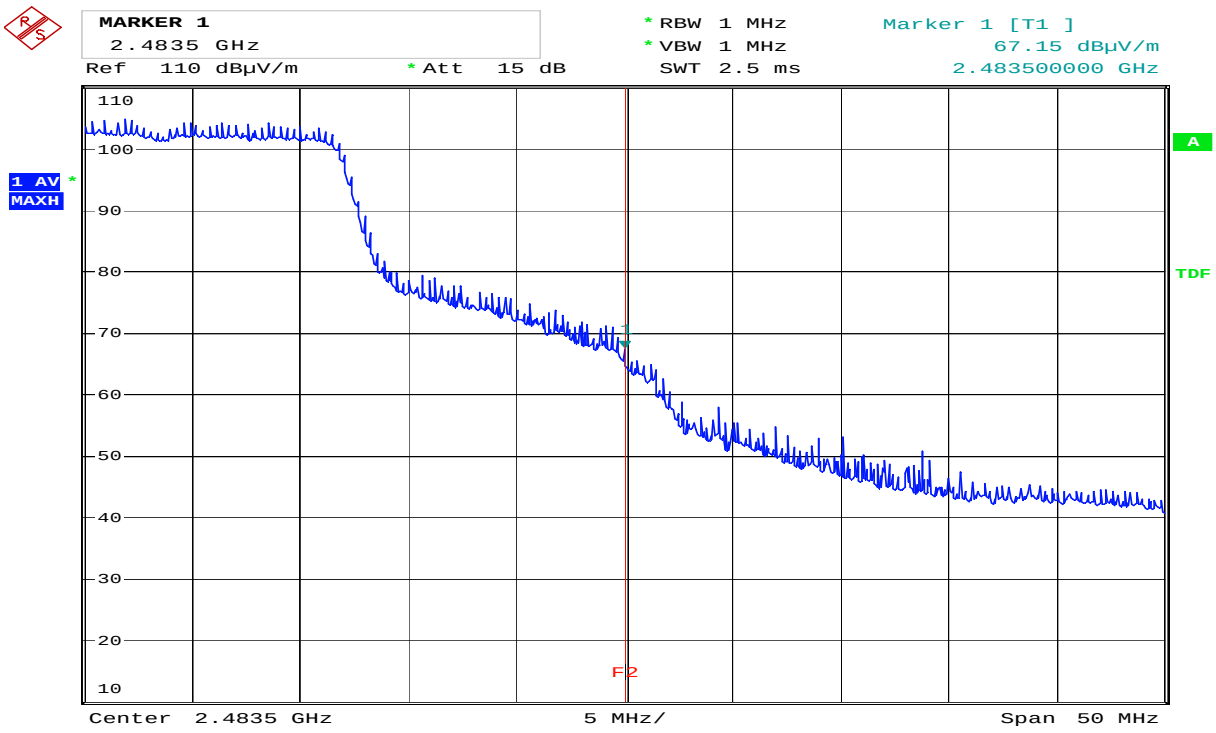
Date: 25.JUN.2010 12:18:24

Band Edge 2483.5 MHz, 802.11b, 1Mbps, Average Det



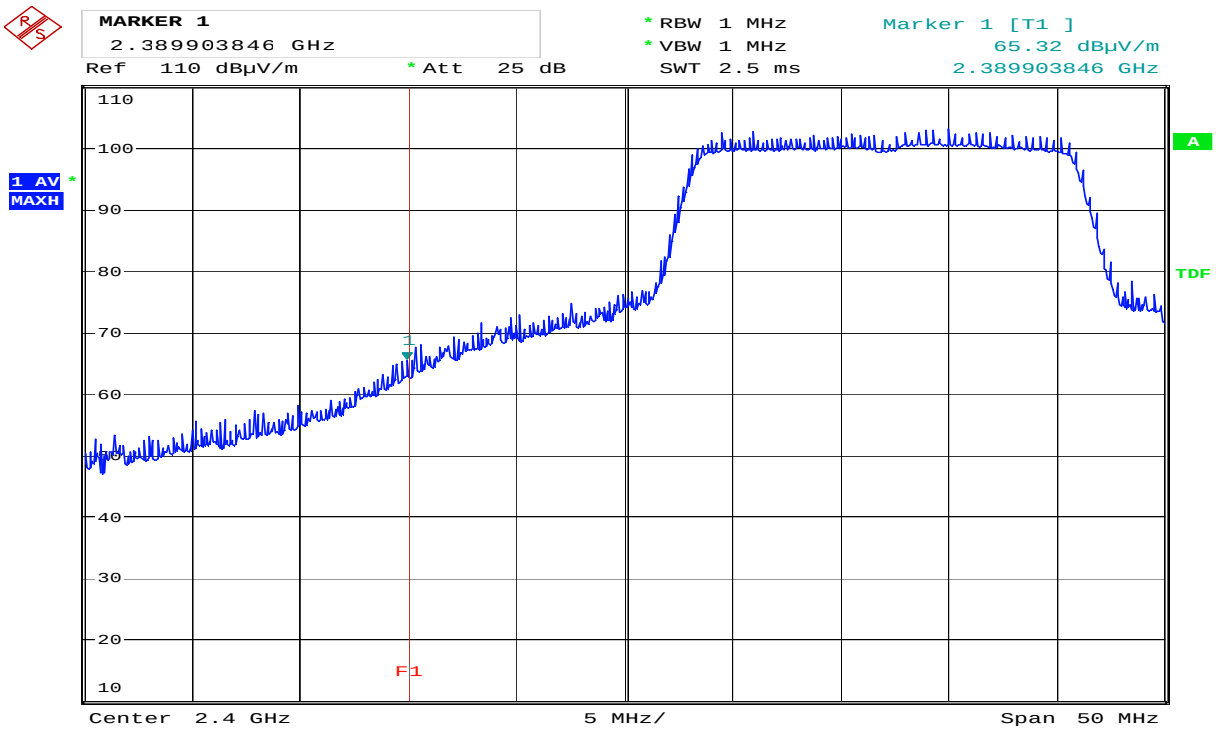
Date: 25.JUN.2010 12:48:24

Band Edge 2390 MHz, 802.11g, 6Mbps, Average Det



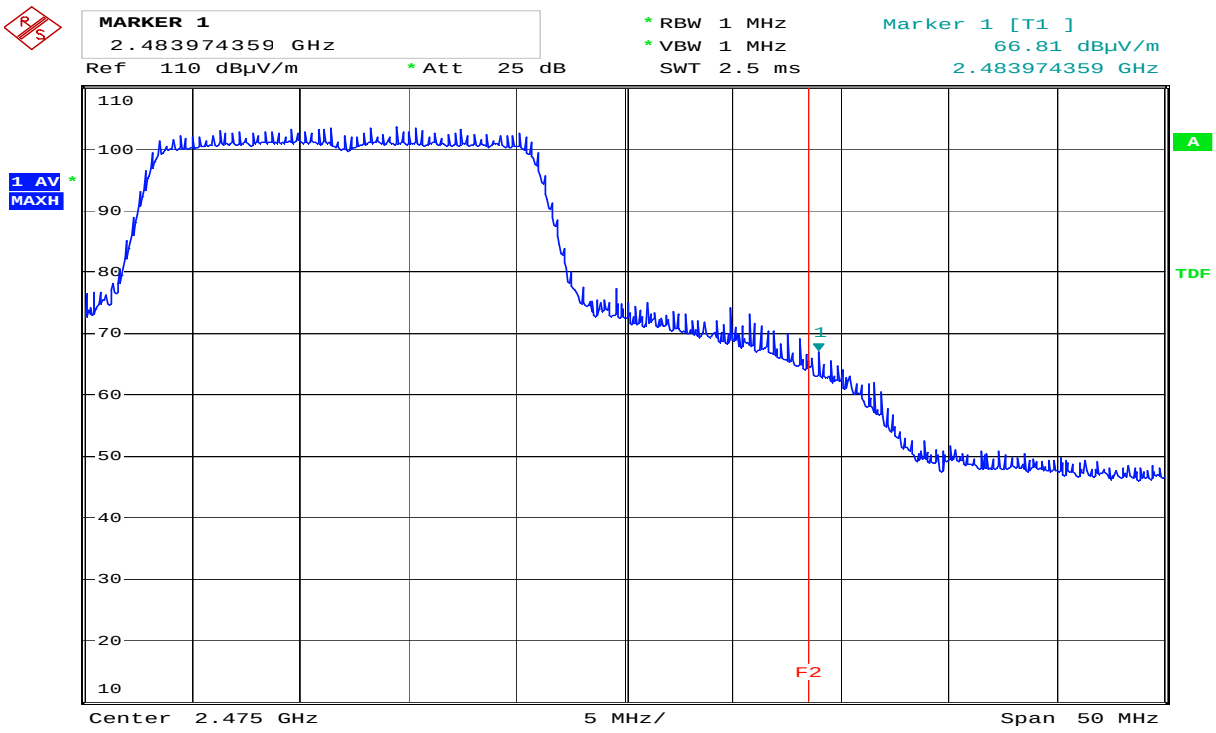
Date: 25.JUN.2010 12:14:05

Band Edge 2483.5 MHz, 802.11g, 6Mbps, Average Det



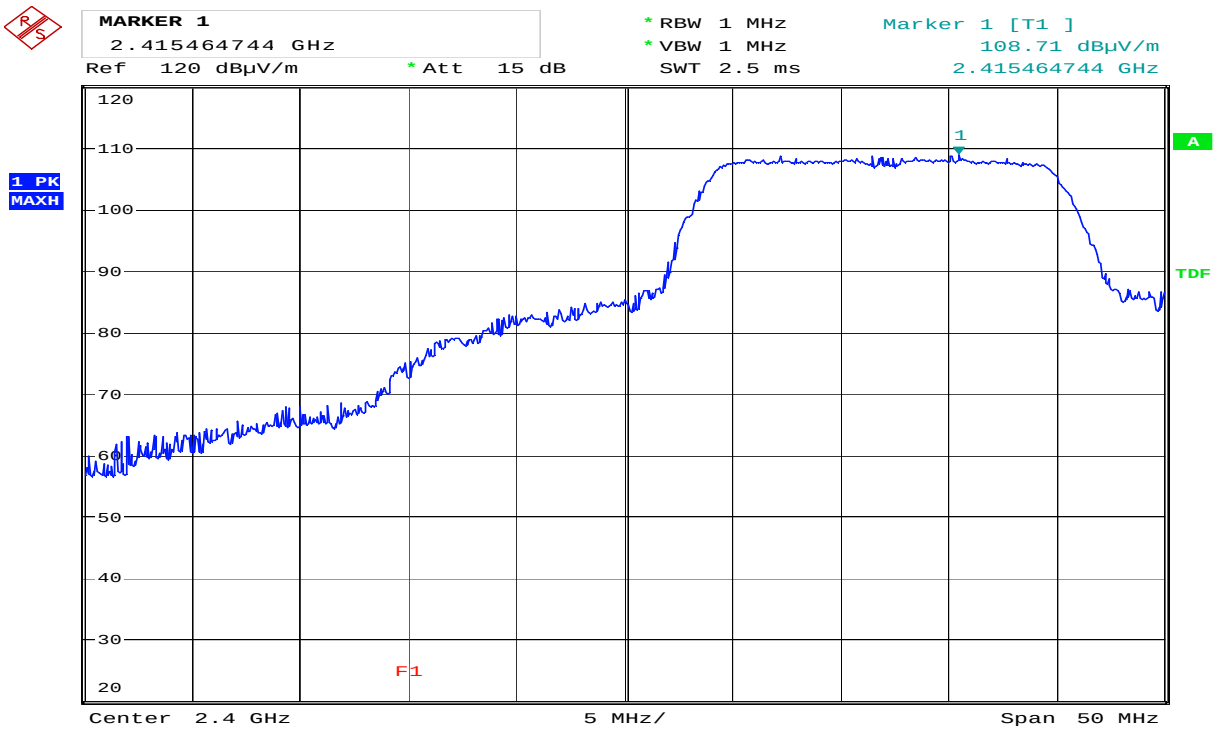
Date: 30.JUN.2010 16:25:09

Band Edge 2390 MHz, 802.11n, MCS0, Average Det



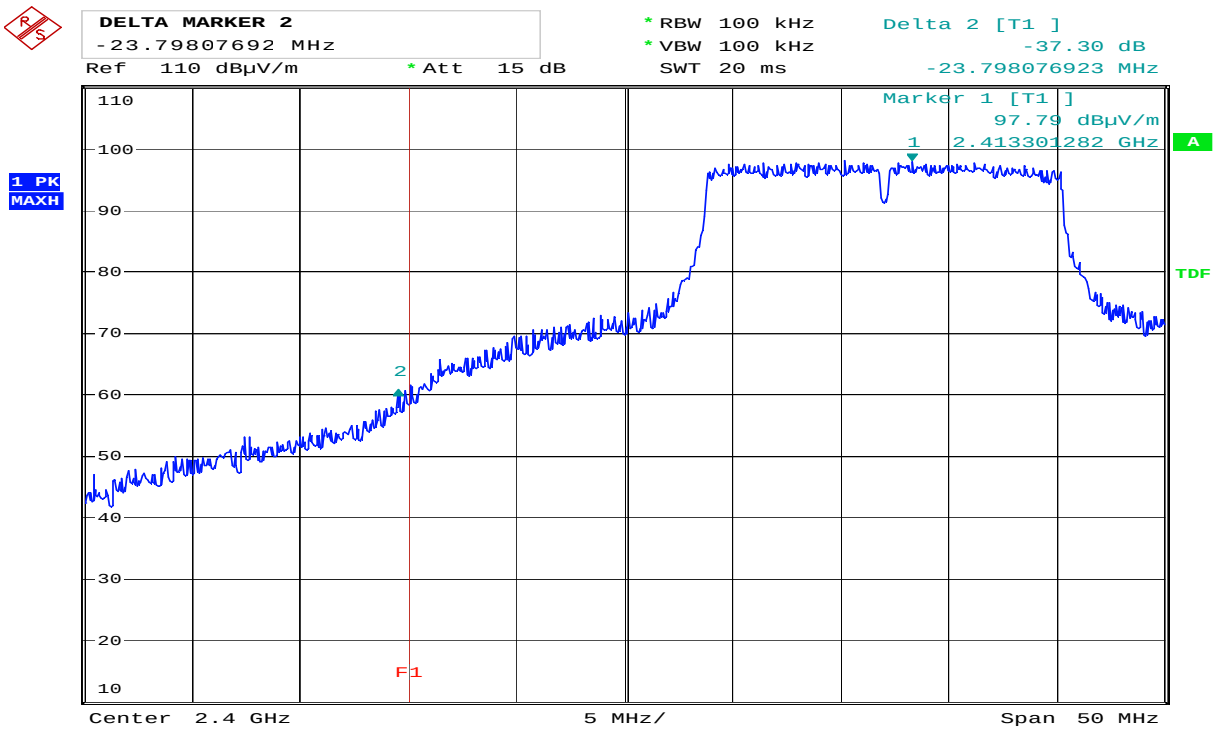
Date: 30.JUN.2010 16:27:56

Band Edge 2483.5 MHz, 802.11n, MCS0, Average Det



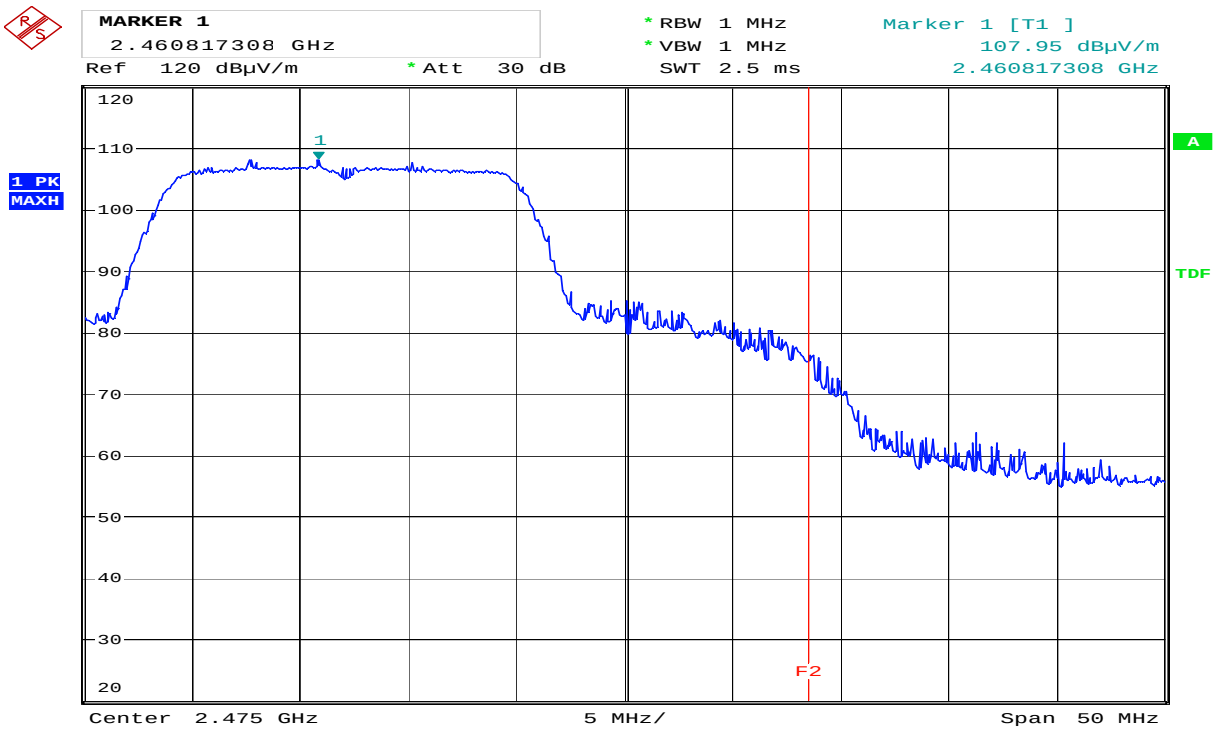
Date: 25.JUN.2010 12:49:25

Band Edge, Output Power, 2390 MHz, 802.11g, 6Mbps, Peak Det



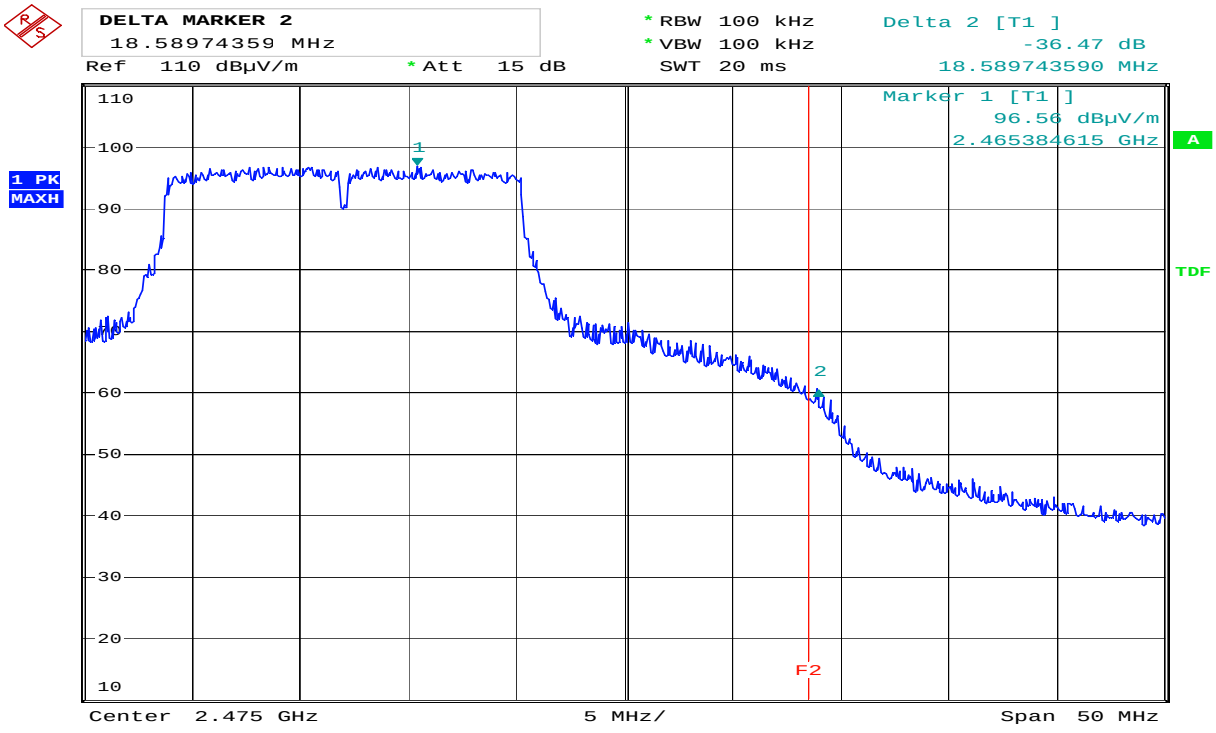
Date: 25.JUN.2010 12:51:17

Band Edge, Marker Delta, 2490 MHz, 802.11g, 6Mbps, Peak Det



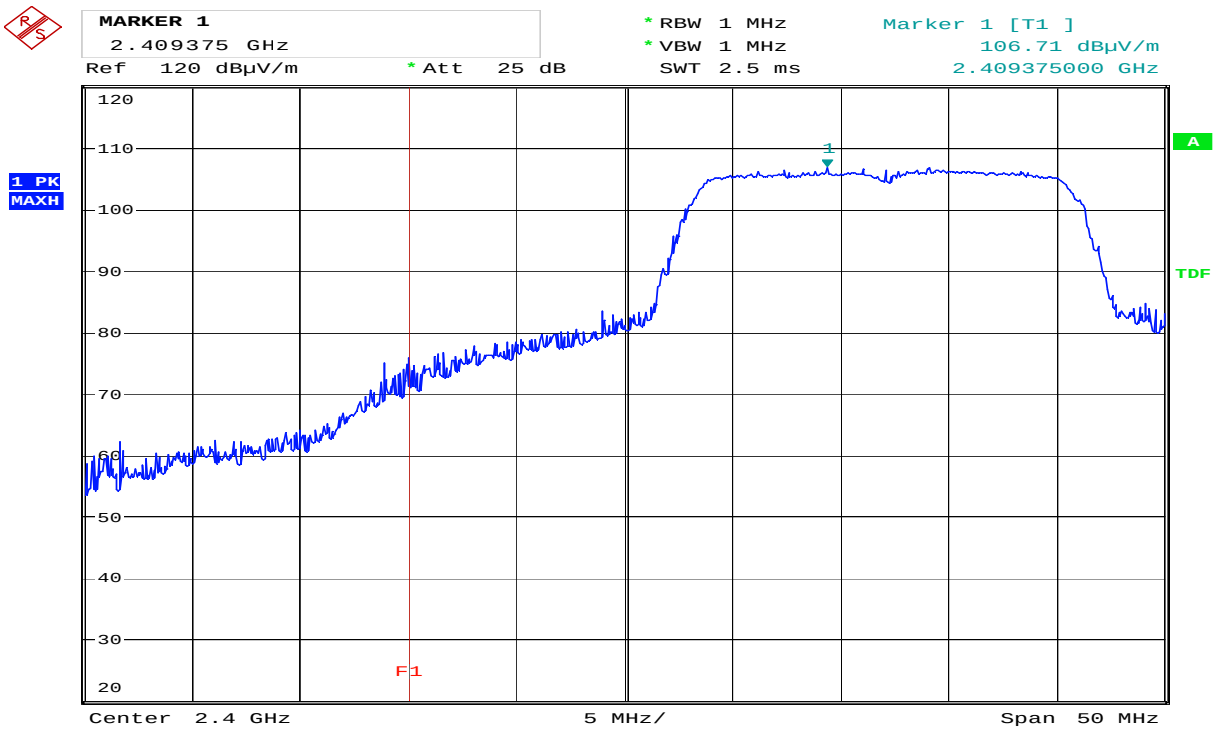
Date: 25.JUN.2010 11:32:40

Band Edge, Output Power, 2483.5 MHz, 802.11g, 6Mbps, Peak Det



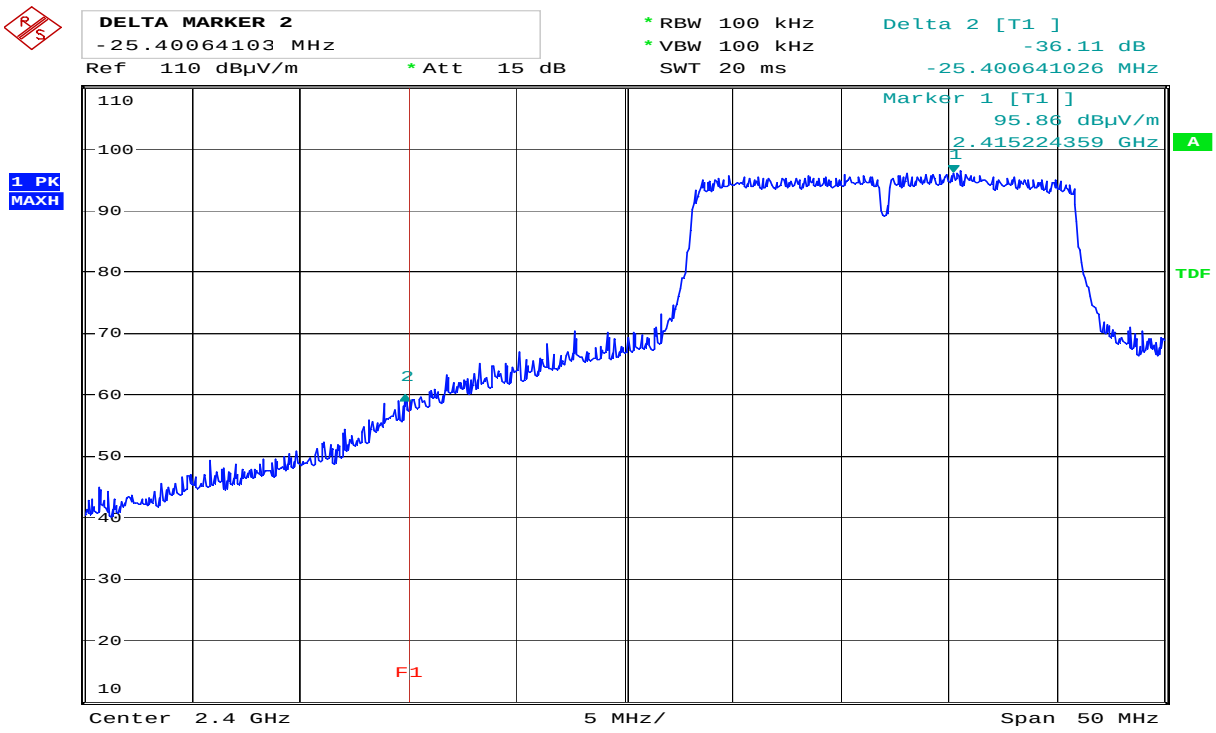
Date: 25.JUN.2010 11:38:17

Band Edge, Marker Delta, 2483.5 MHz, 802.11g, 6Mbps, Peak Det



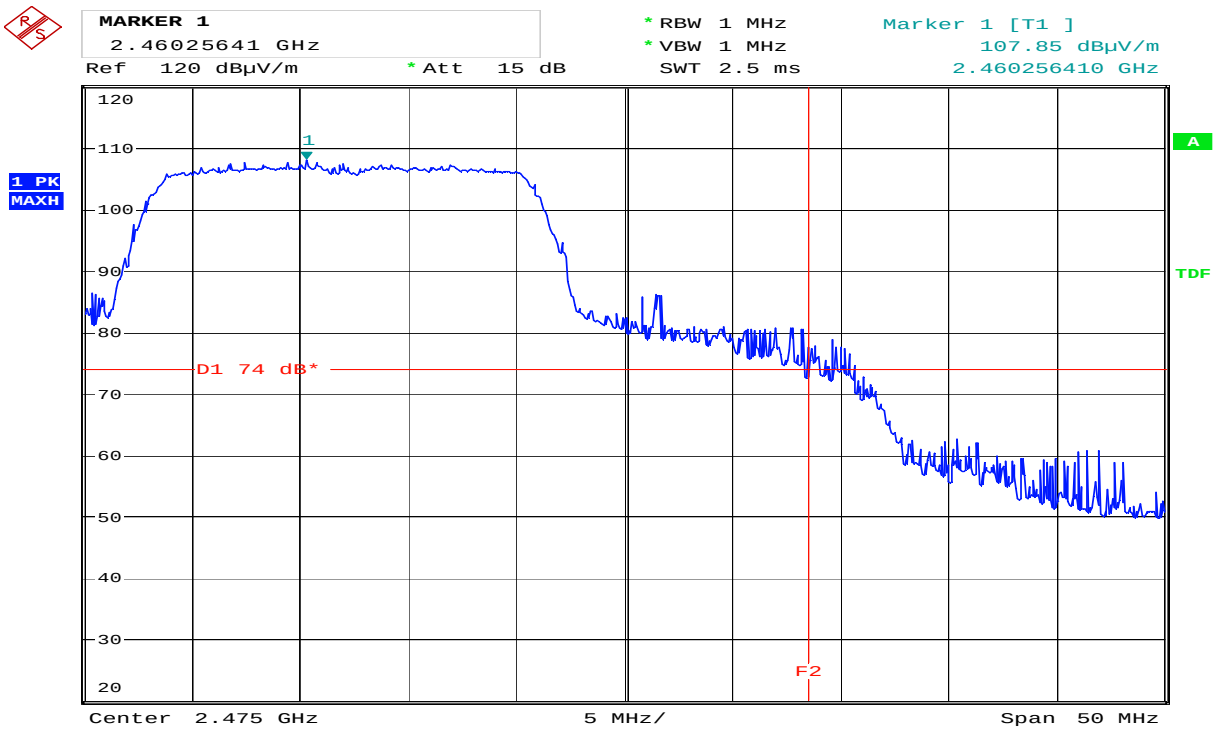
Date: 30.JUN.2010 16:21:37

Band Edge, Output Power, 2390 MHz, 802.11n, MCS0, Peak Det



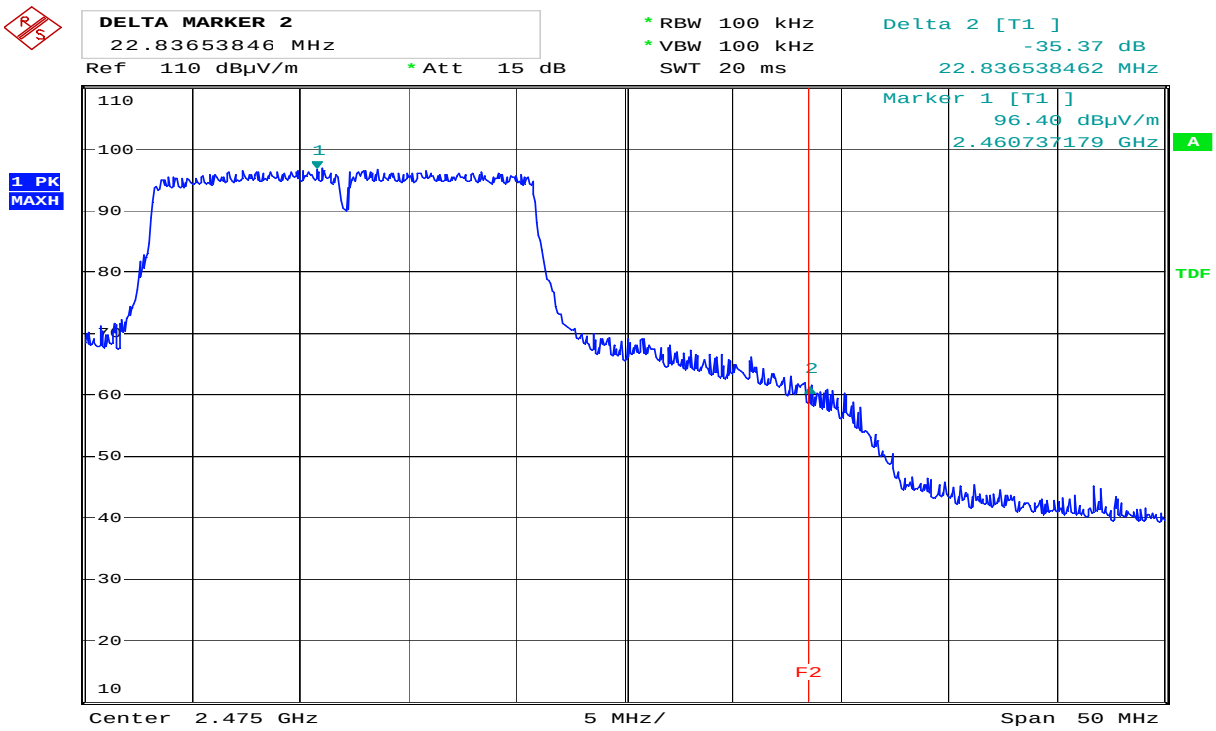
Date: 30.JUN.2010 16:20:18

Band Edge, Marker Delta, 2490 MHz, 802.11n, MCS0, Peak Det



Date: 30.JUN.2010 16:15:13

Band Edge, Output Power, 2483.5 MHz, 802.11n, MCS0, Peak Det



Date: 30.JUN.2010 16:17:33

Band Edge, Marker Delta, 2483.5 MHz, 802.11n, MCS0, Peak Det

RF conducted power to 25 GHz see attached graph.

Maximum RF level outside operating band:

802.11b 1Mbps: >40 dB/C, margin >20 dB

802.11g 6Mbps: >40 dB/C, margin >20 dB

802.11n MCS0: >40 dB/C, margin >20 dB

Radiated emissions 10 kHz-30 MHz.

Measuring distance 10m, measured with Peak detector.

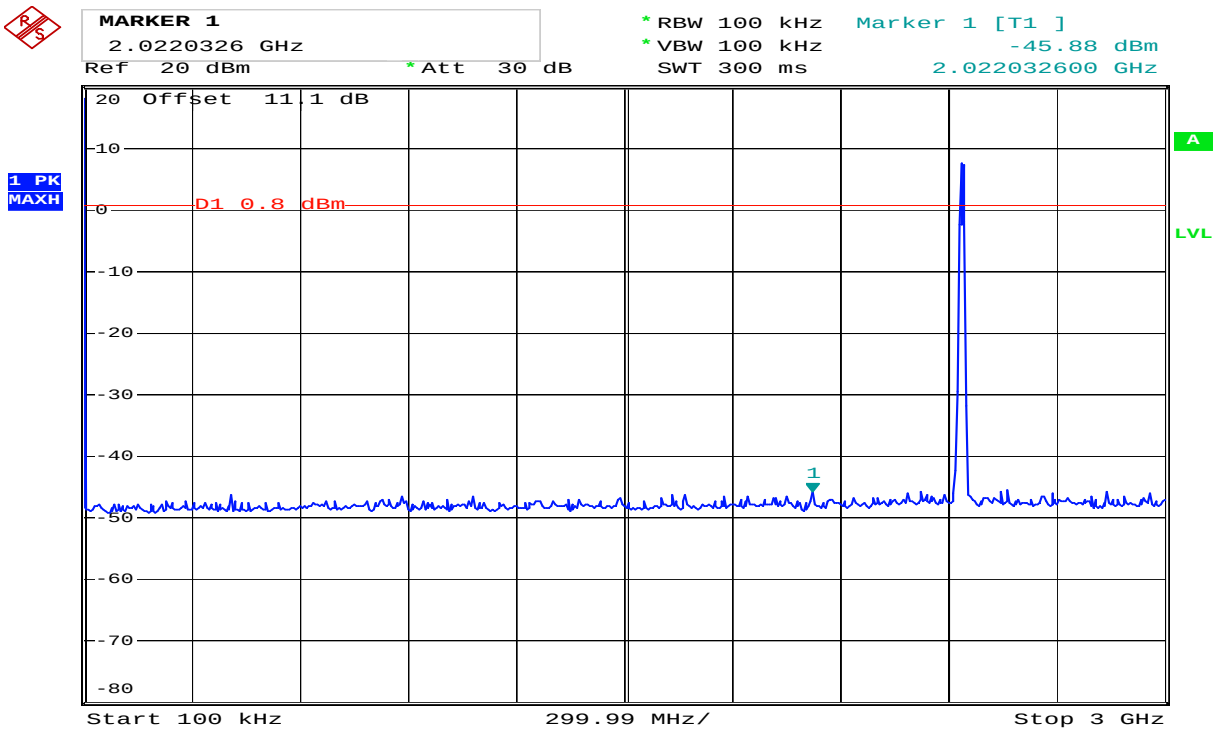
No component detected, see attached plots.

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

Radiated emission 30 – 1000 MHz.

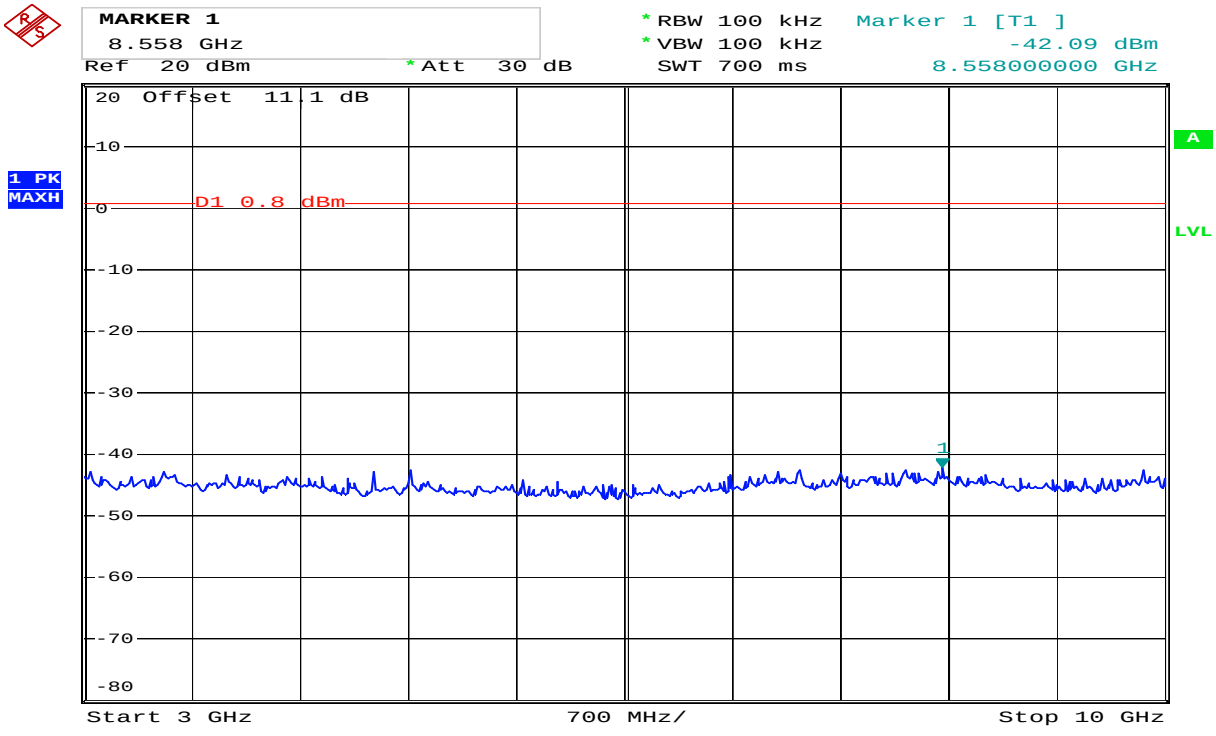
Measuring distance 10m, measured with Peak detector.

No component detected, see attached plots.



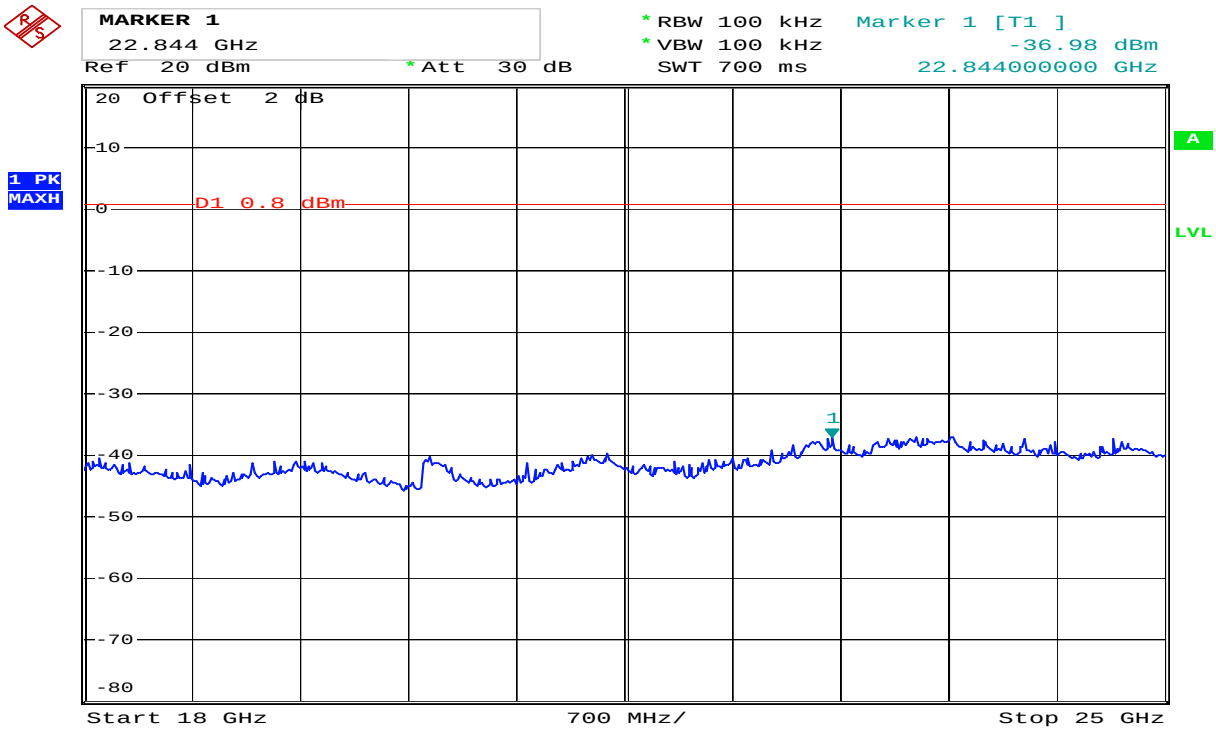
Date: 6.JUL.2010 12:37:31

RF Conducted Emissions, 100 kHz – 3.0 GHz, 802.11b, 1 Mbps



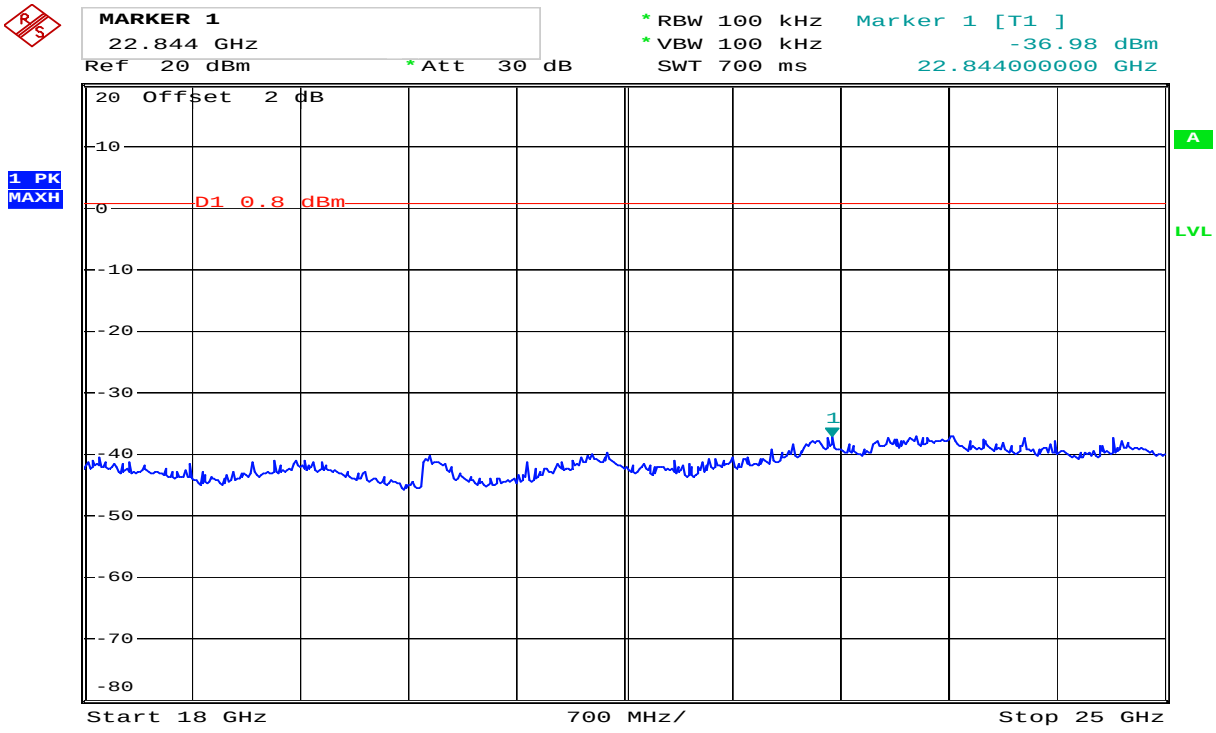
Date: 6.JUL.2010 12:38:40

RF Conducted Emissions, 3 - 10 GHz, 802.11b, 1 Mbps



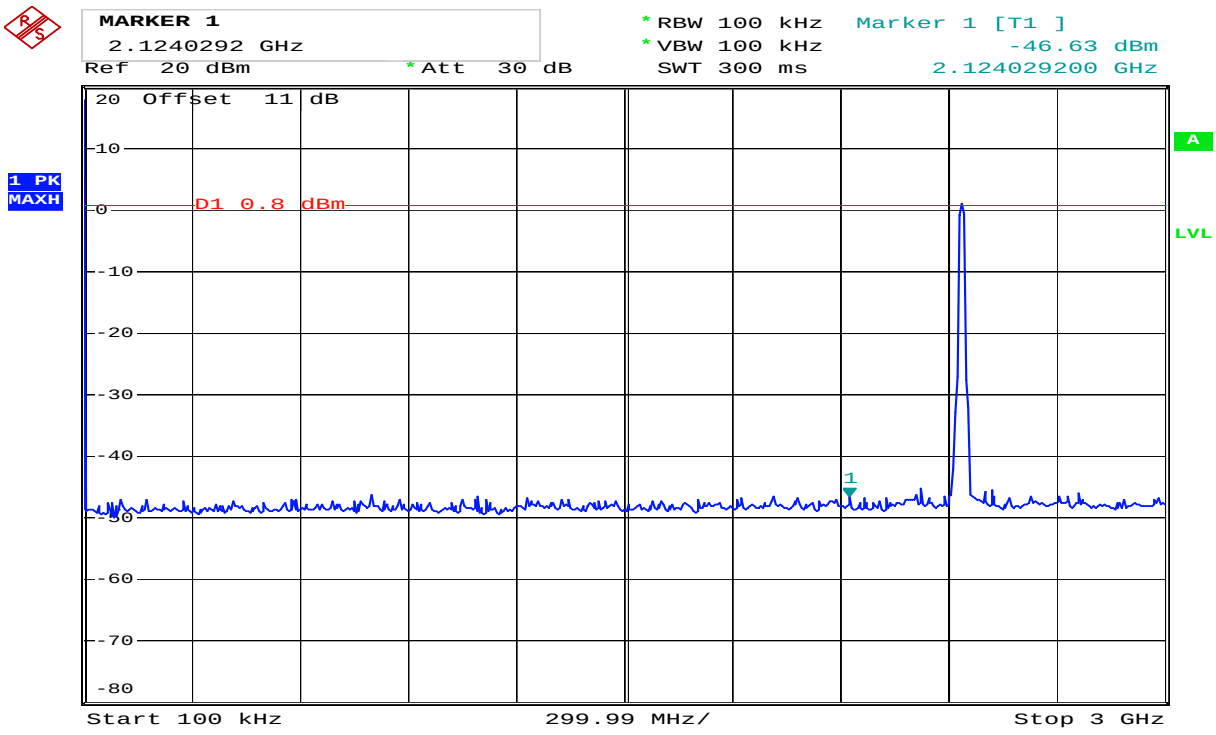
Date: 6.JUL.2010 12:42:13

RF Conducted Emissions, 10 - 18 GHz, 802.11b, 1 Mbps



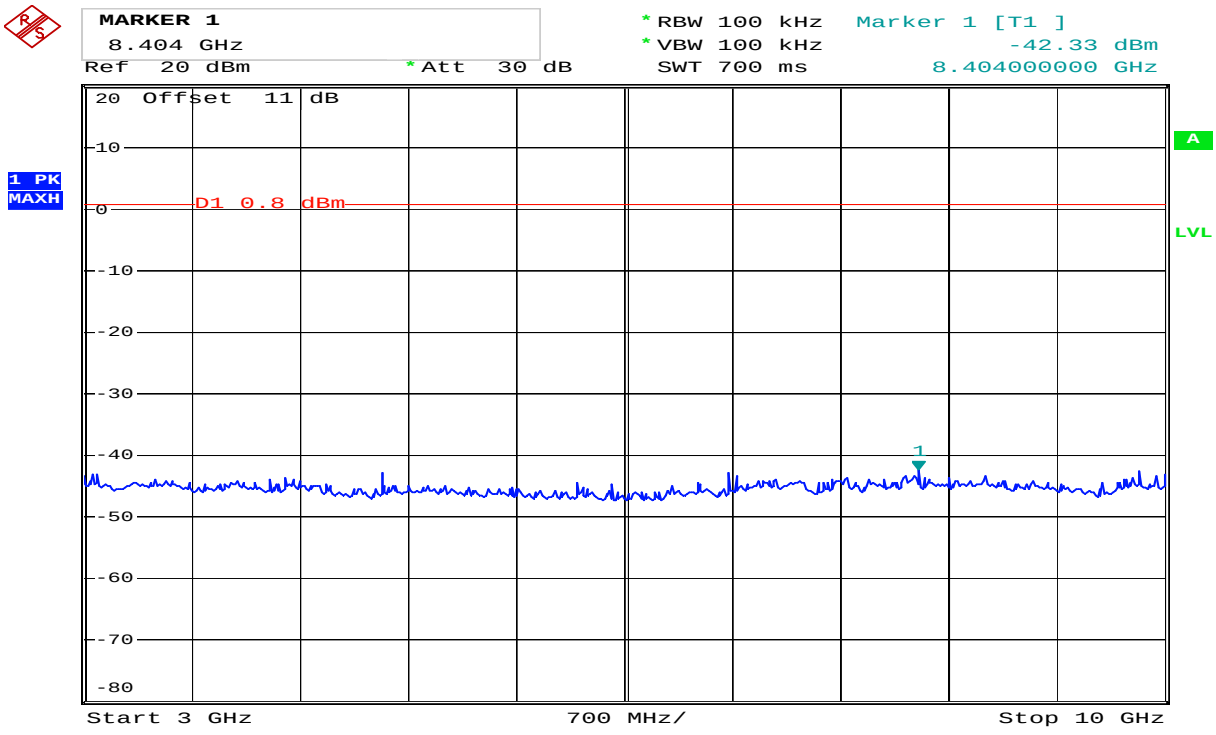
Date: 6.JUL.2010 12:42:13

RF Conducted Emissions, 18 - 25 GHz, 802.11b, 1 Mbps



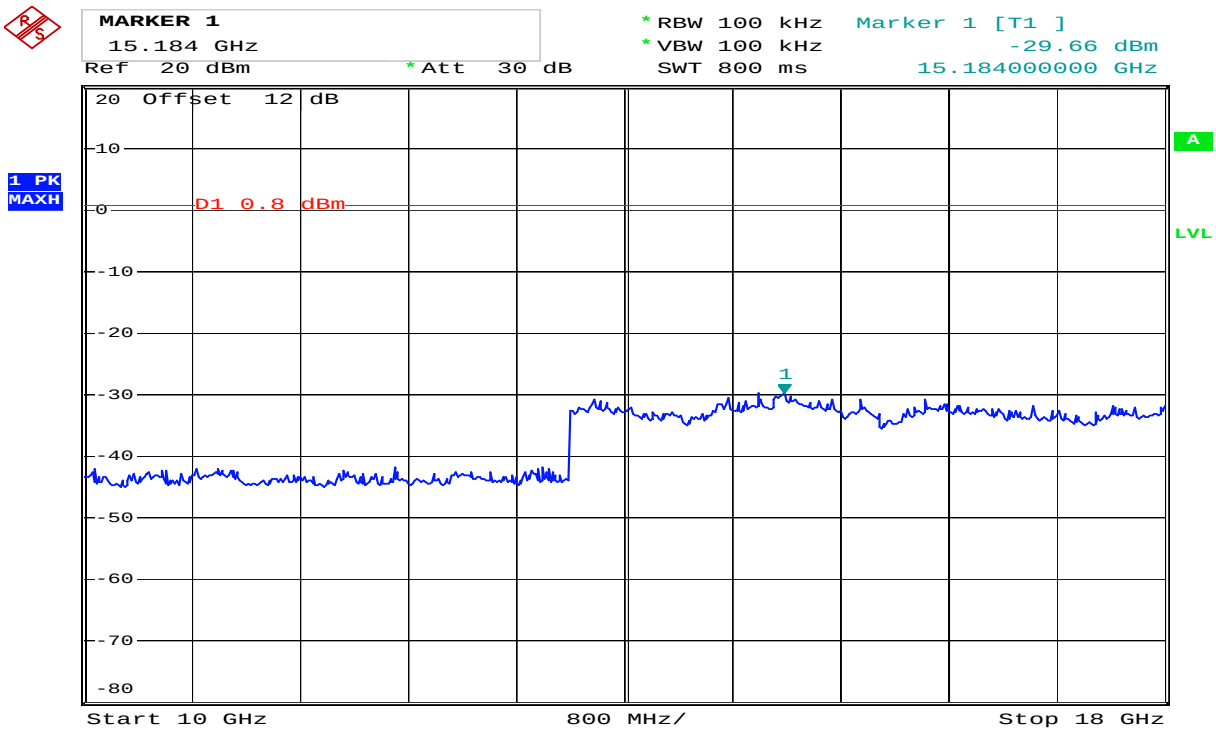
Date: 6.JUL.2010 12:48:00

RF Conducted Emissions, 100 kHz – 3.0 GHz, 802.11g, 6 Mbps



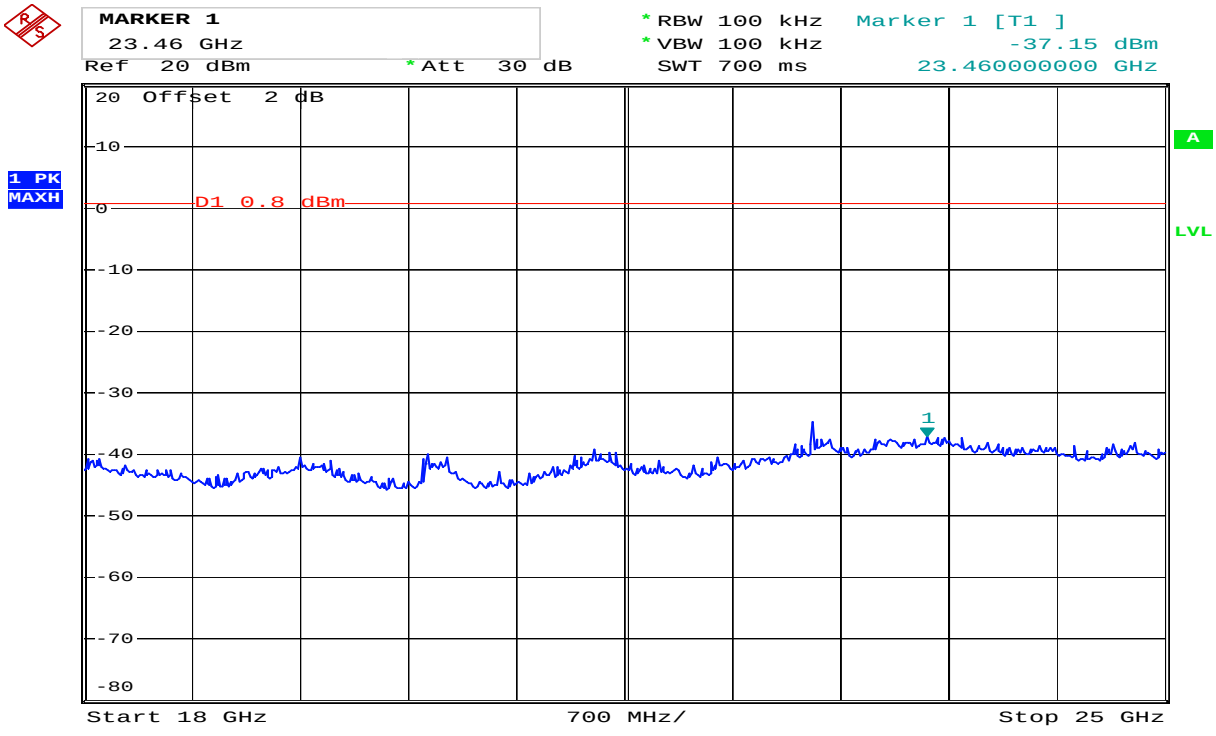
Date: 6.JUL.2010 12:46:40

RF Conducted Emissions, 3 - 10 GHz, 802.11g, 6 Mbps



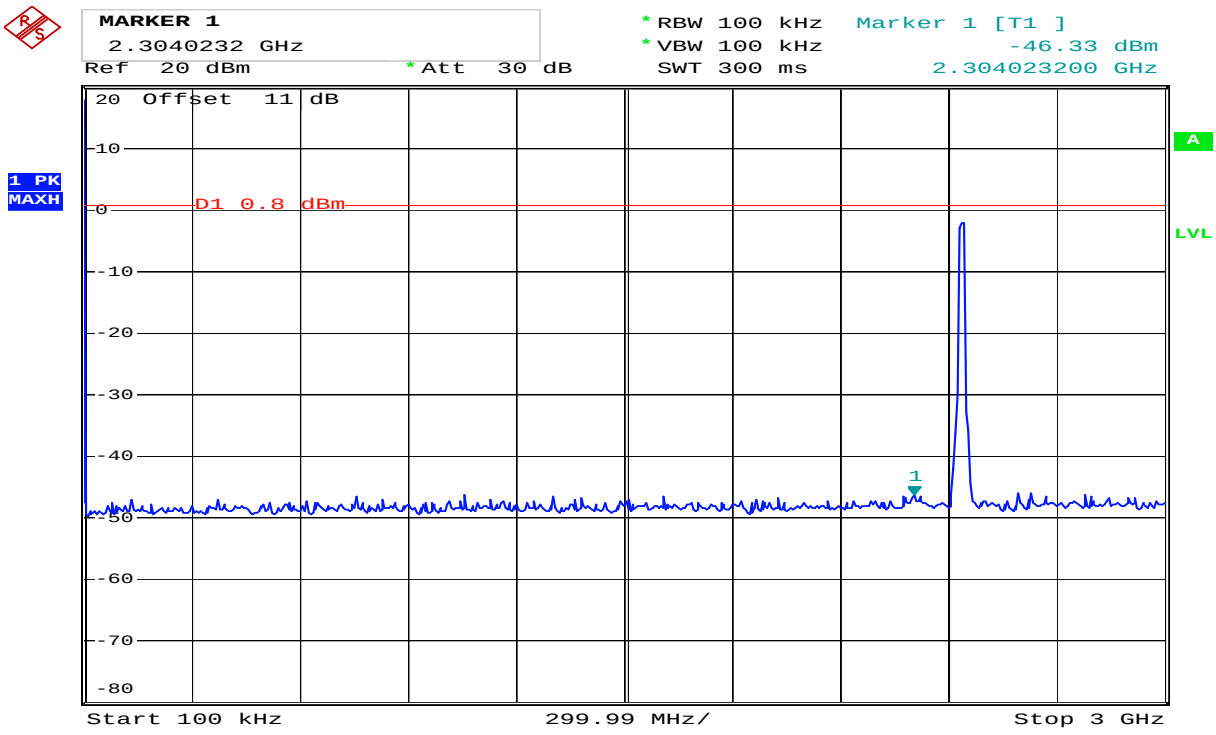
Date: 6.JUL.2010 12:45:31

RF Conducted Emissions, 10 - 18 GHz, 802.11g, 6 Mbps



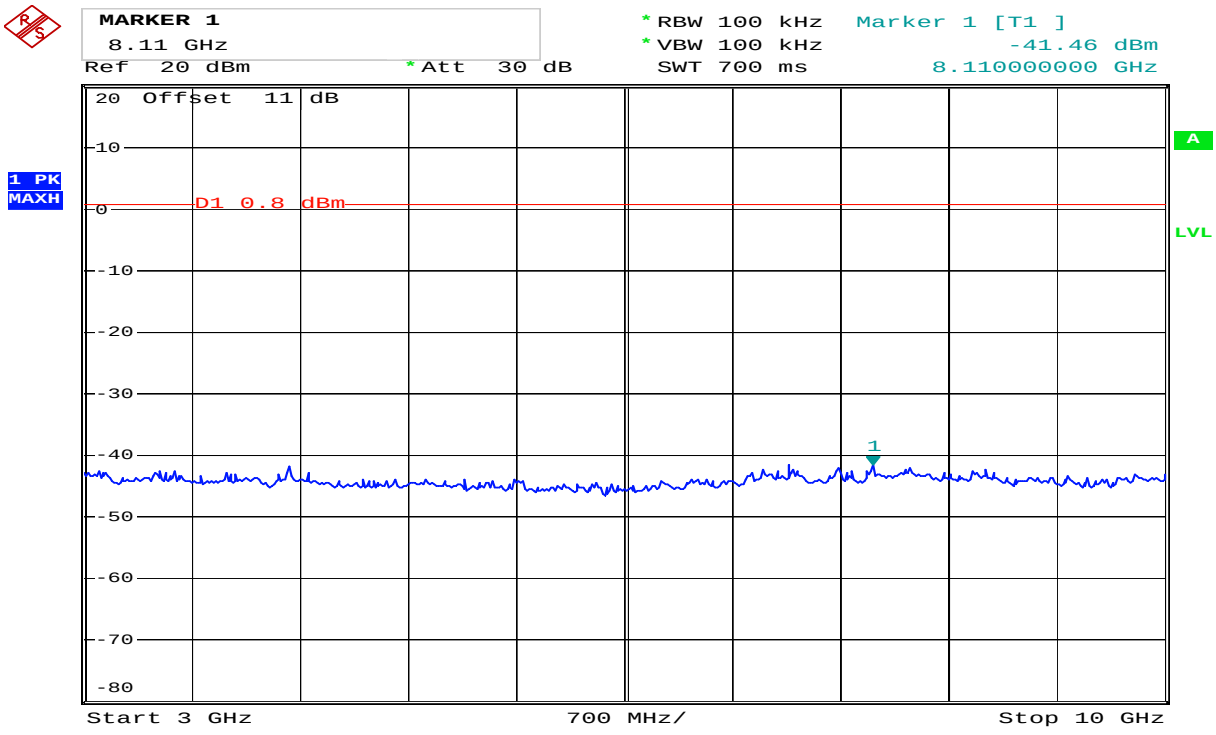
Date: 6.JUL.2010 12:43:19

RF Conducted Emissions, 18 - 25 GHz, 802.11g, 6 Mbps



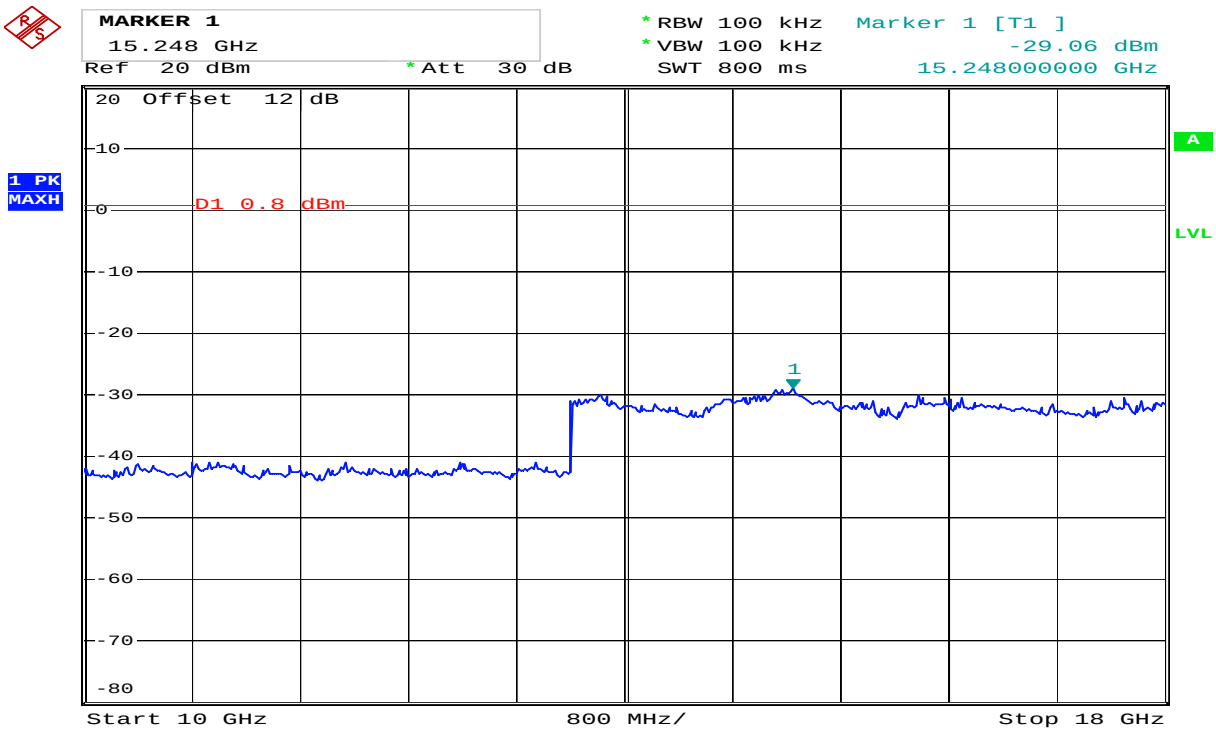
Date: 6.JUL.2010 12:49:37

RF Conducted Emissions, 100 kHz – 3.0 GHz, 802.11n, MCS0



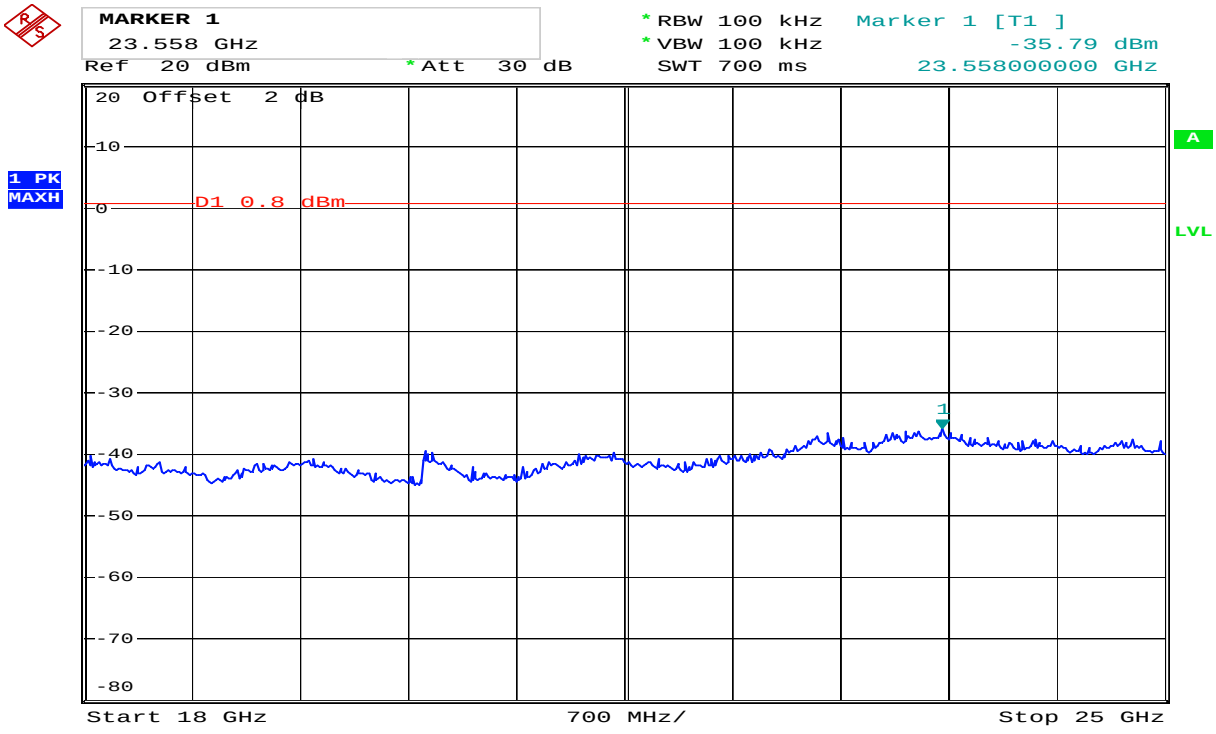
Date: 6.JUL.2010 12:52:51

RF Conducted Emissions, 3 - 10 GHz, 802.11n, MCS0



Date: 6.JUL.2010 12:59:52

RF Conducted Emissions, 10 - 18 GHz, 802.11n, MCS0



Date: 6.JUL.2010 13:02:32

RF Conducted Emissions, 18 - 25 GHz, 802.11n, MCS0

Nemko AS
Peak

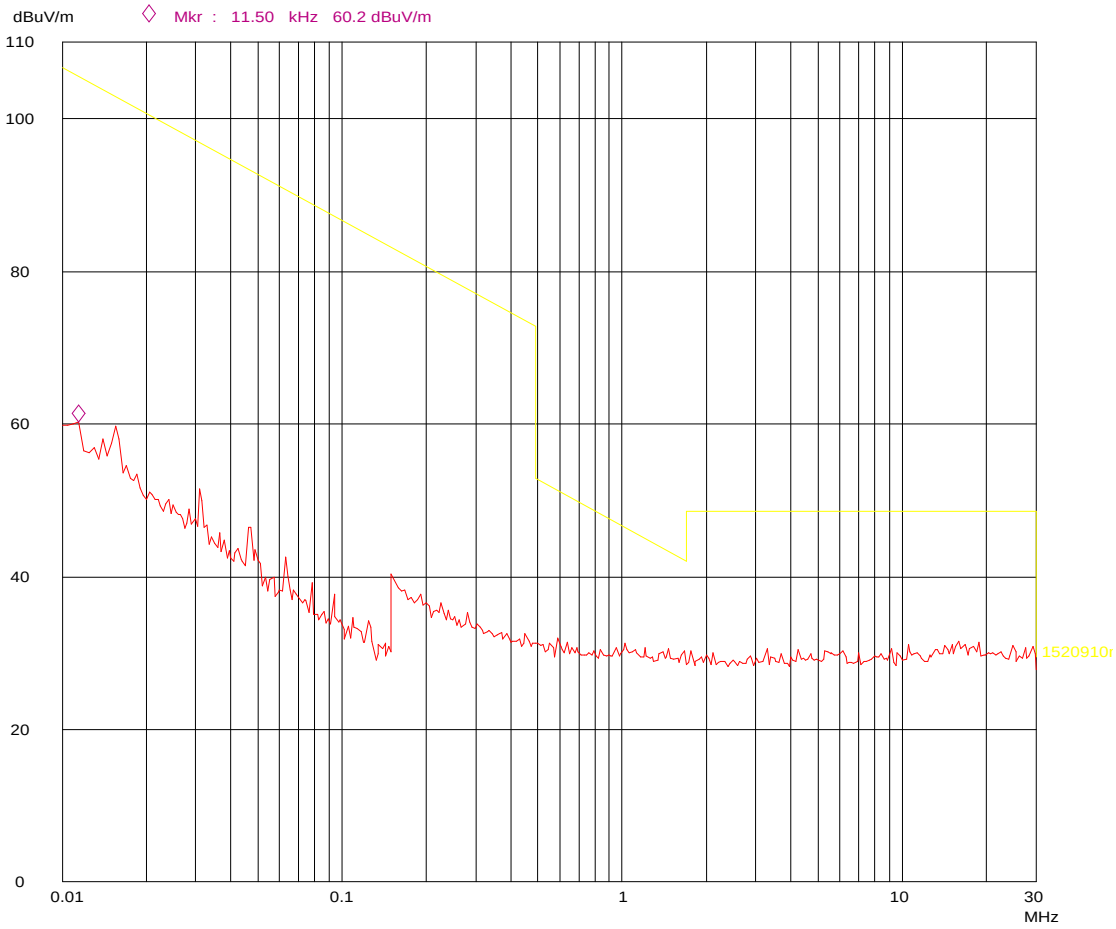
03. Jun 10 13:46

Operator: FS
Comment: ASCOM WH1 Cordless WLAN Phone
FCC 15.209
Dist 10m
802.11n, MCS0, 2.4GHz Operation
Nemko Ref: 151006
R&S HFH2-Z2

Scan Settings (2 Ranges)

Frequencies			Receiver Settings				
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp	OpRge
10k	150k	500Hz	1k	PK	50ms	AUTO	LN ON	60dB
150k	30M	4.5k	9k	PK	50ms	AUTO	LN OFF	60dB

Transducer No.	Start	Stop	Name
3	9k	30M	HFH2Z2uV



Radiated Emissions, 10 kHz - 30 MHz, 802.11n MCS0

Nemko AS

03. Jun 10 08:39

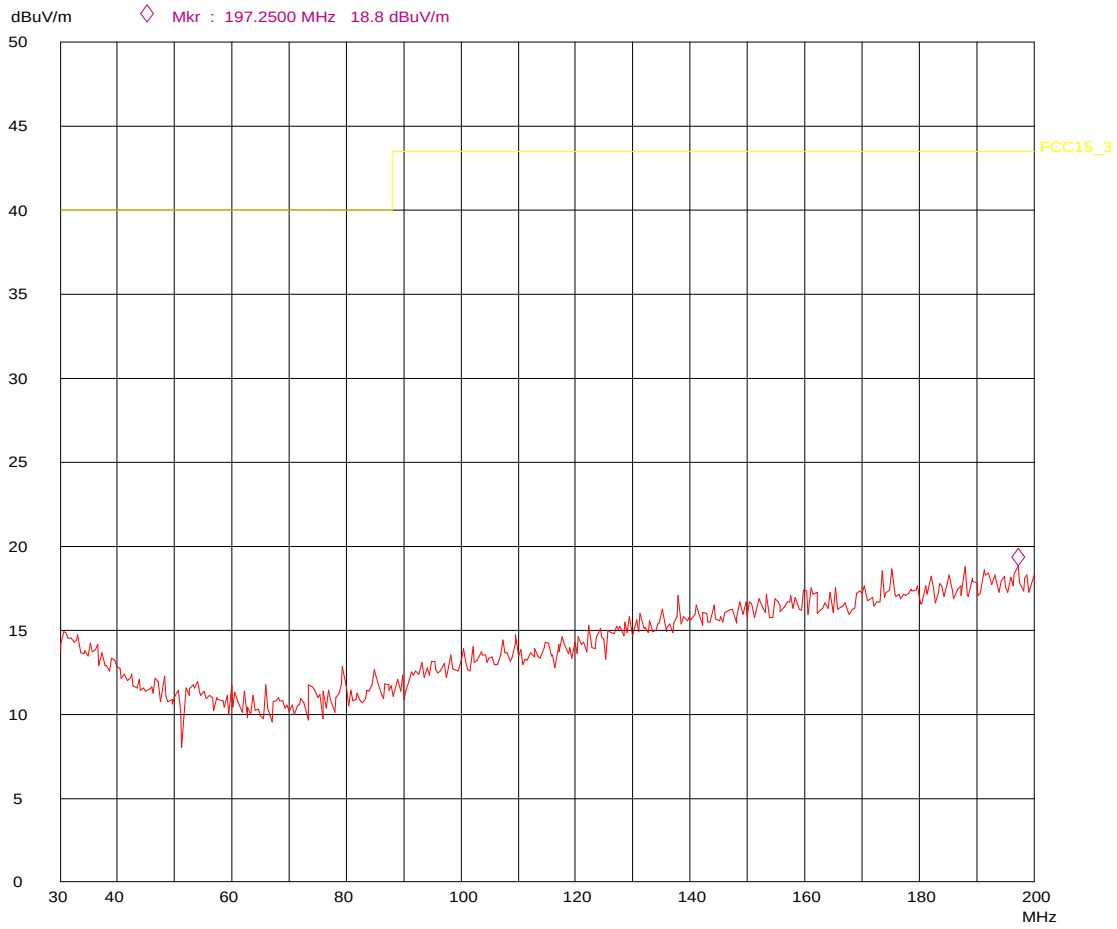
Peak

Operator: FS
Comment: ASCOM WH1 Cordless WLAN Phone
FCC 15.209
Dist 3m, VP
H: 1m
Nemko Ref: 151006

Scan Settings (1 Range)

Frequencies			Receiver Settings					
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp	OpRge
30M	200M	50k	120k	PK	50ms	AUTO	LN ON	60dB

Transducer No.	Start	Stop	Name
11	30M	200M	HK116



Radiated Emissions, 30 - 200 MHz, 802.11b 1 Mbps, VP

Nemko AS

03. Jun 10 08:51

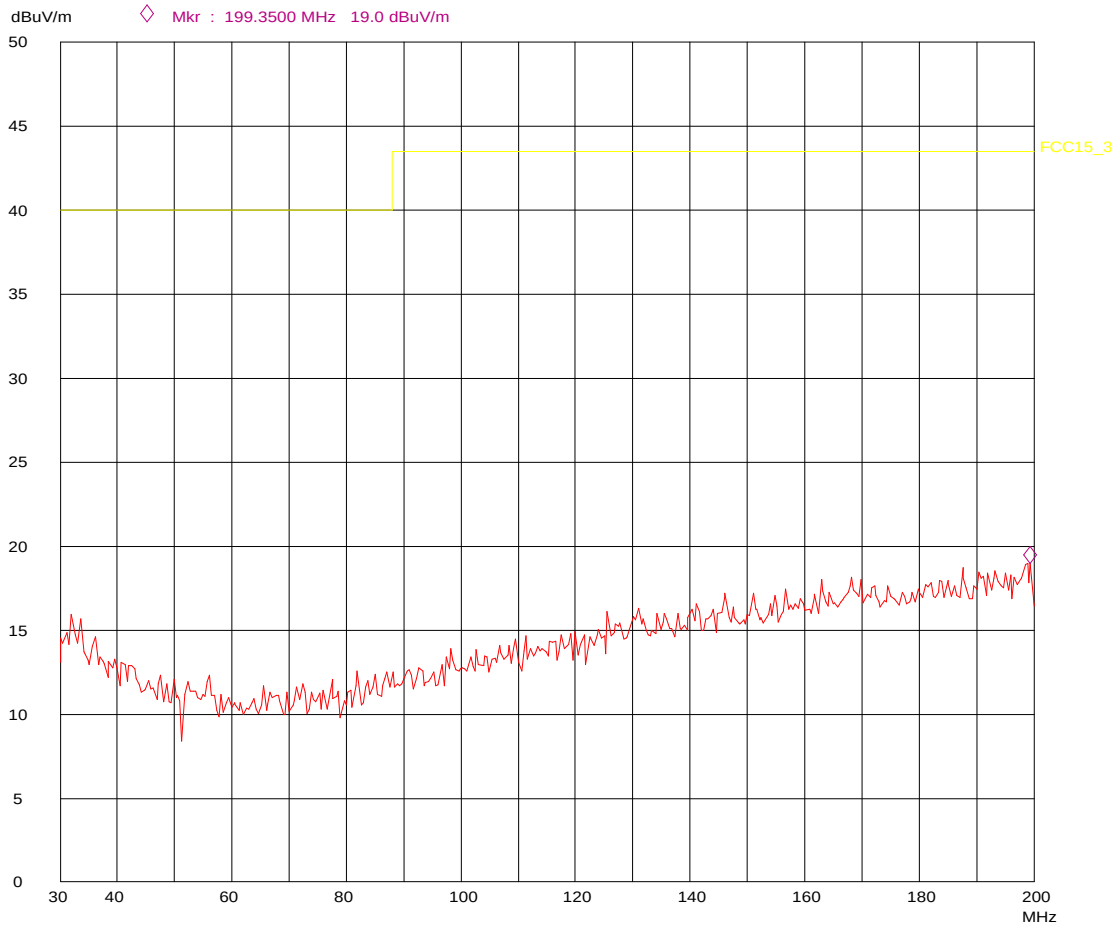
Peak

Operator: FS
Comment: ASCOM WH1 Cordless WLAN Phone
FCC 15.209
Dist 3m, HP
H: 2m
Nemko Ref: 151006

Scan Settings (1 Range)

Frequencies			Receiver Settings					
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp	OpRge
30M	200M	50k	120k	PK	50ms	AUTO	LN ON	60dB

Transducer No.	Start	Stop	Name
11	30M	200M	HK116



Radiated Emissions, 30 - 200 MHz, 802.11b 1 Mbps, HP

Nemko AS

03. Jun 10 09:02

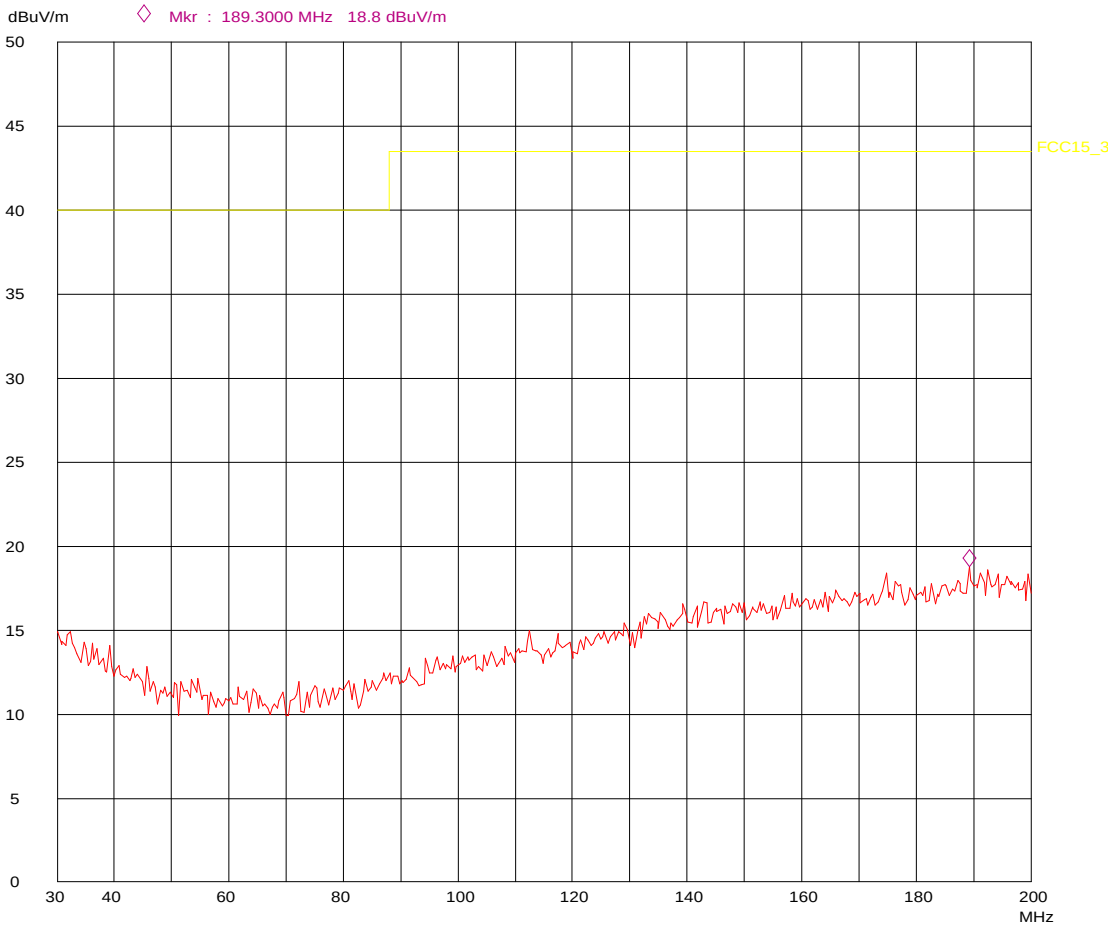
Peak

Operator: FS
Comment: ASCOM WH1 Cordless WLAN Phone
FCC 15.209
Dist 3m, H=1m, VP
802.11g, 6Mbps
Nemko Ref: 151006

Scan Settings (1 Range)

Frequencies			Receiver Settings					
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp	OpRge
30M	200M	50k	120k	PK	50ms	AUTO	LN ON	60dB

Transducer No.	Start	Stop	Name
11	30M	200M	HK116



Radiated Emissions, 30 - 200 MHz, 802.11g 6 Mbps, VP

Nemko AS

03. Jun 10 09:13

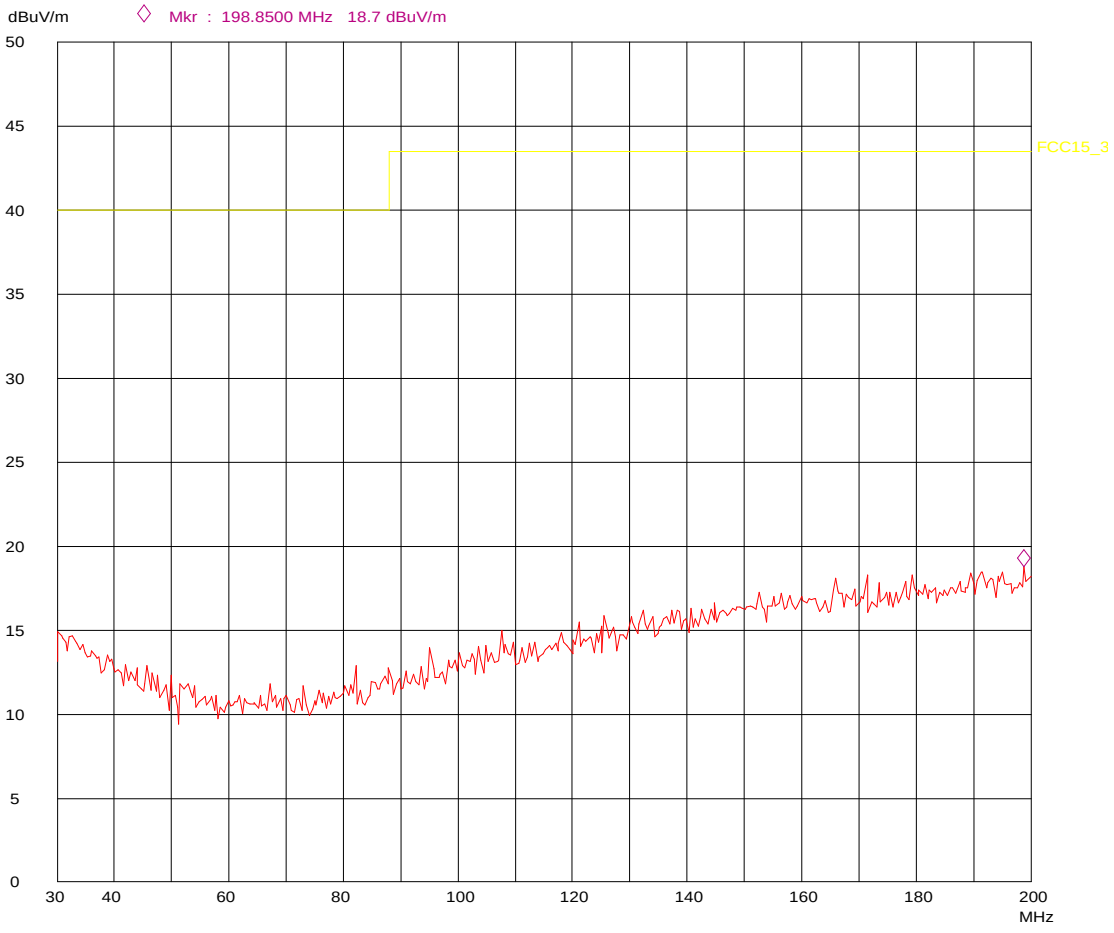
Peak

Operator: FS
Comment: ASCOM WH1 Cordless WLAN Phone
FCC 15.209
Dist 3m, H=2m, HP
802.11g, 6Mbps
Nemko Ref: 151006

Scan Settings (1 Range)

Frequencies			Receiver Settings					
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp	OpRge
30M	200M	50k	120k	PK	50ms	AUTO	LN ON	60dB

Transducer No.	Start	Stop	Name
11	30M	200M	HK116



Radiated Emissions, 30 - 200 MHz, 802.11g 6 Mbps, HP

Nemko AS

03. Jun 10 09:29

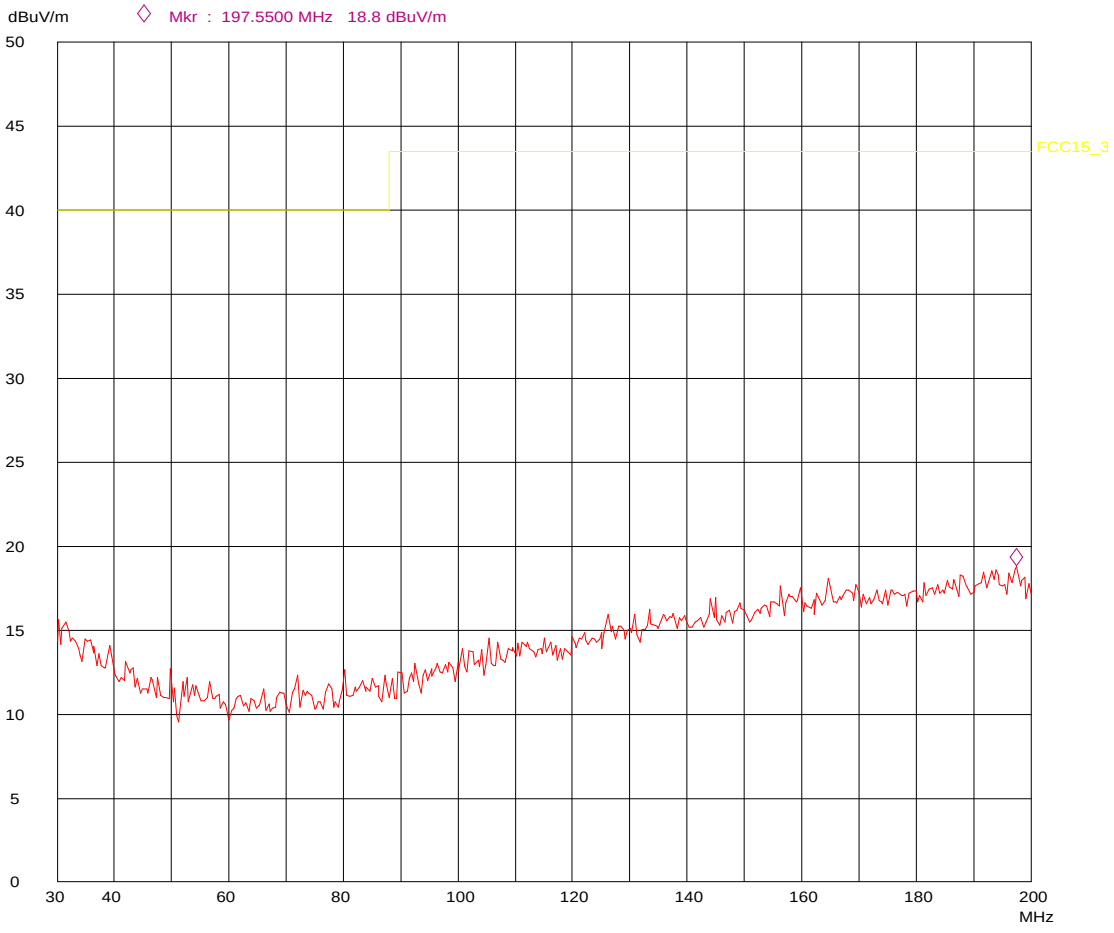
Peak

Operator: FS
Comment: ASCOM WH1 Cordless WLAN Phone
FCC 15.209
Dist 3m, H=1m, VP
802.11n, MCS0
Nemko Ref: 151006

Scan Settings (1 Range)

Frequencies			Receiver Settings					
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp	OpRge
30M	200M	50k	120k	PK	50ms	AUTO	LN ON	60dB

Transducer No.	Start	Stop	Name
11	30M	200M	HK116



Radiated Emissions, 30 - 200 MHz, 802.11n MCS0, VP

Nemko AS

03. Jun 10 09:38

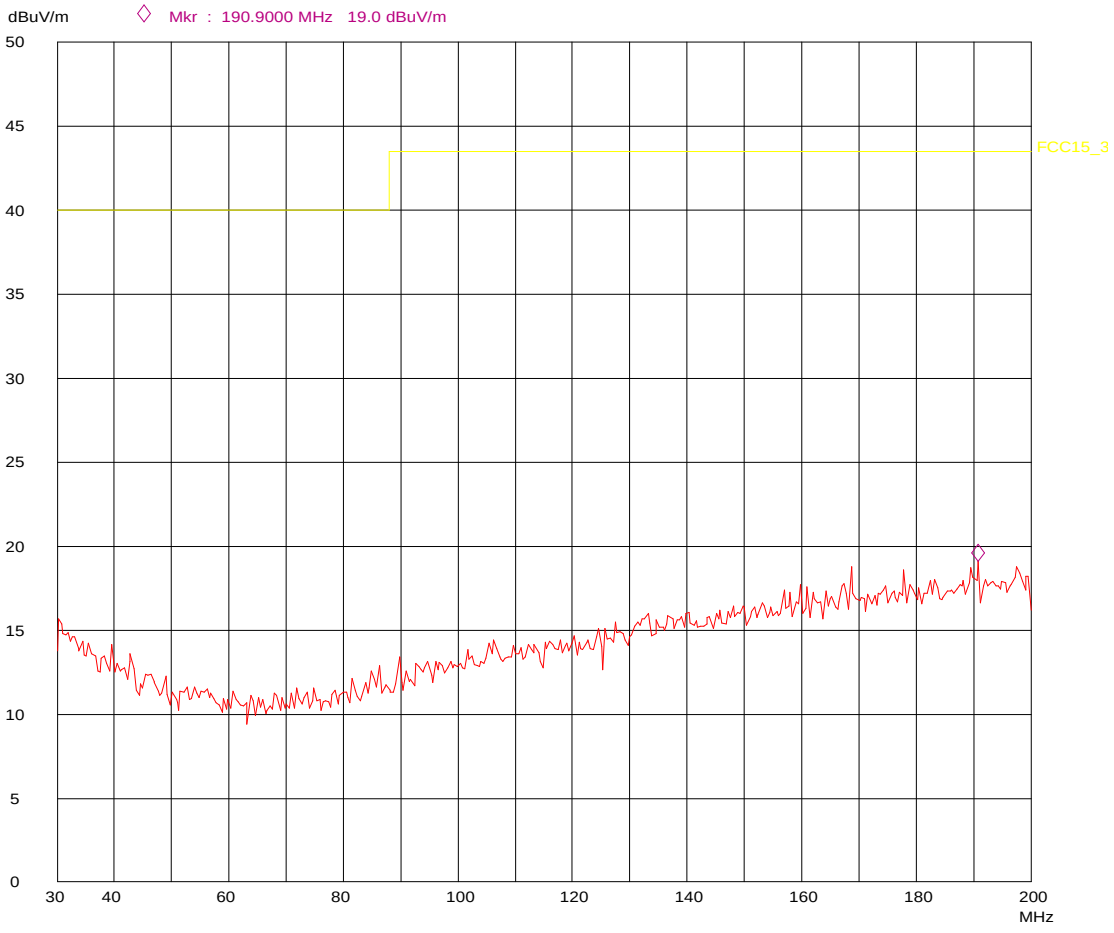
Peak

Operator: FS
Comment: ASCOM WH1 Cordless WLAN Phone
FCC 15.209
Dist 3m, H=2m, HP
802.11n, MCS0
Nemko Ref: 151006

Scan Settings (1 Range)

Frequencies			Receiver Settings					
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp	OpRge
30M	200M	50k	120k	PK	50ms	AUTO	LN ON	60dB

Transducer No.	Start	Stop	Name
11	30M	200M	HK116



Radiated Emissions, 30 - 200 MHz, 802.11n MCS0, HP

Nemko AS
Peak

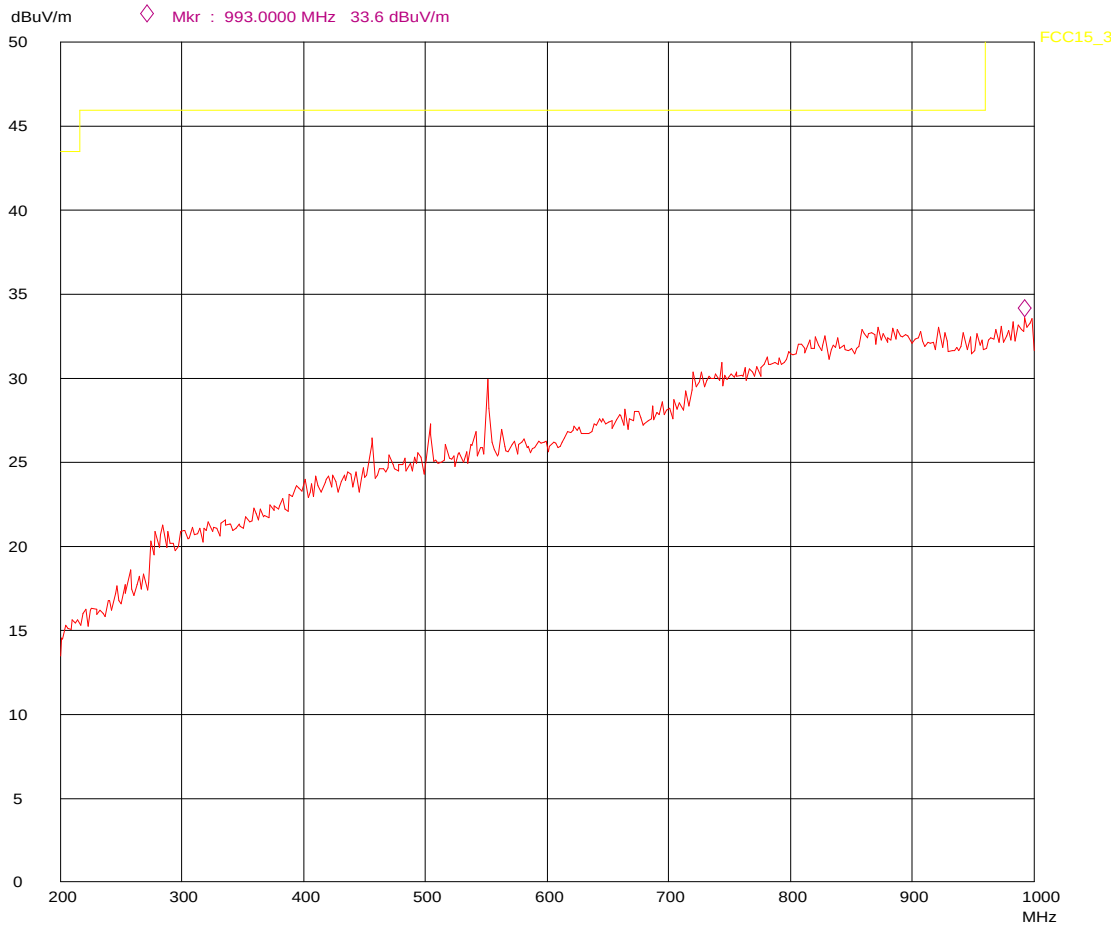
03. Jun 10 12:00

Operator: FS
Comment: ASCOM WH1 Cordless WLAN Phone
FCC 15.209
Dist 3m, H=1m, VP
802.11b, 1Mbps, 2.4GHz Operation
Nemko Ref: 151006
R&S HL223

Scan Settings (1 Range)
|--------- Frequencies ----------||---------- Receiver Settings ----------|

Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp	OpRge
200M	1000M	50k	120k	PK	50ms	AUTO	LN ON	60dB

Transducer No.	Start	Stop	Name
20	200M	1000M	HL223



Radiated Emissions, 200 - 1000 MHz, 802.11b 1 Mbps, VP

Nemko AS

03. Jun 10 12:18

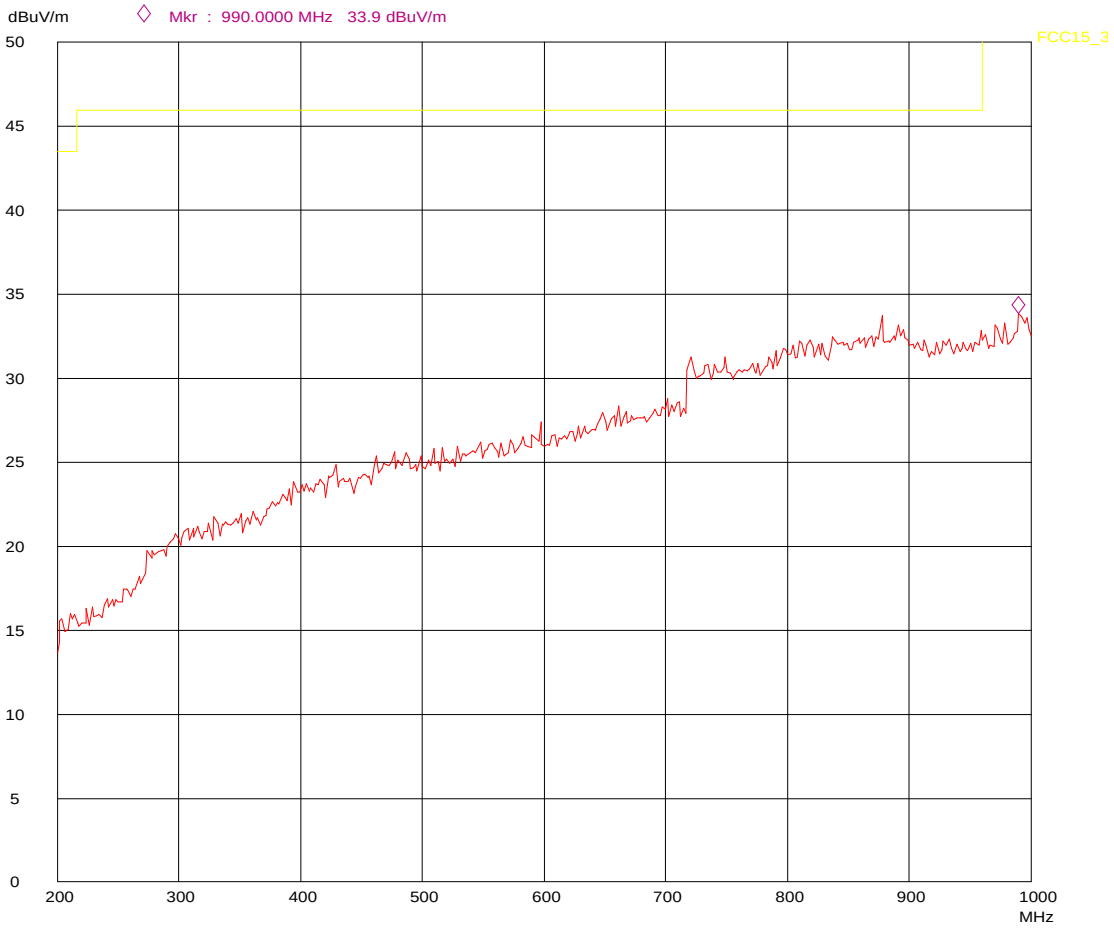
Peak

Operator: FS
Comment: ASCOM WH1 Cordless WLAN Phone
FCC 15.209
Dist 3m, H=2m, HP
802.11b, 1Mbps, 2.4GHz Operation
Nemko Ref: 151006
R&S HL223

Scan Settings (1 Range)

Frequencies			Receiver Settings					
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp	OpRge
200M	1000M	50k	120k	PK	50ms	AUTO	LN ON	60dB

Transducer No.	Start	Stop	Name
20	200M	1000M	HL223



Radiated Emissions, 200 - 1000 MHz, 802.11b 1 Mbps, HP

Nemko AS

03. Jun 10 12:48

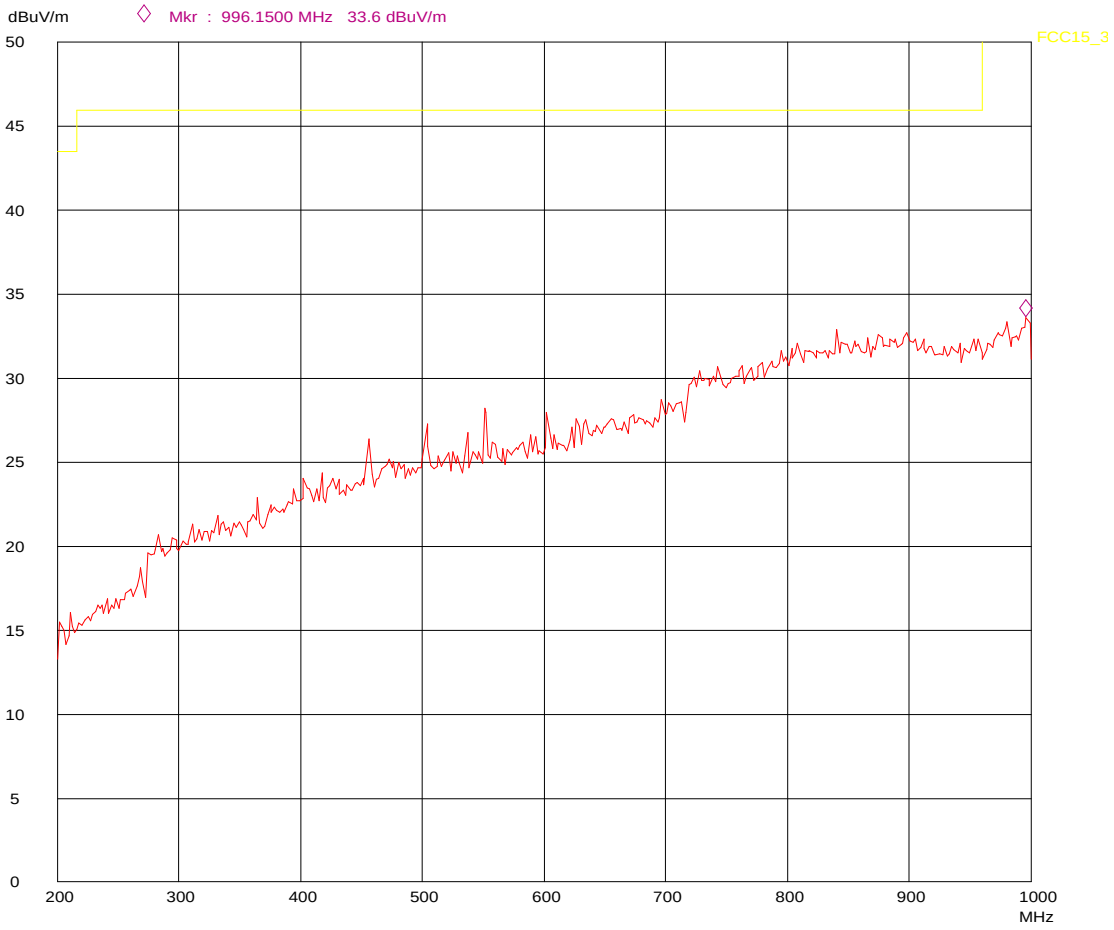
Peak

Operator: FS
Comment: ASCOM WH1 Cordless WLAN Phone
FCC 15.209
Dist 3m, H=1m, VP
802.11g, 6Mbps, 2.4GHz Operation
Nemko Ref: 151006
R&S HL223

Scan Settings (1 Range)

Frequencies			Receiver Settings					
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp	OpRge
200M	1000M	50k	120k	PK	20ms	AUTO	LN ON	60dB

Transducer No.	Start	Stop	Name
20	200M	1000M	HL223



Radiated Emissions, 200 - 1000 MHz, 802.11g 6 Mbps, VP

Nemko AS

03. Jun 10 12:59

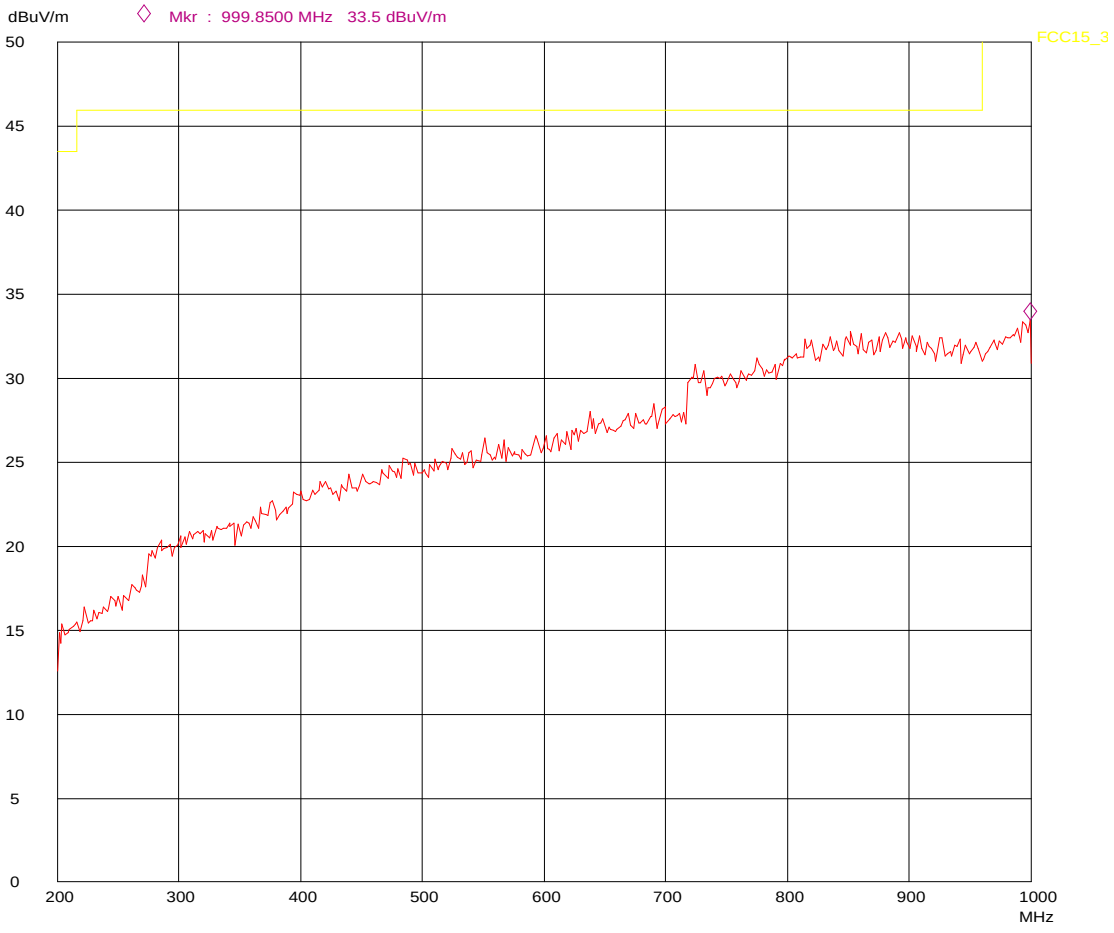
Peak

Operator: FS
Comment: ASCOM WH1 Cordless WLAN Phone
FCC 15.209
Dist 3m, H=2m, HP
802.11g, 6Mbps, 2.4GHz Operation
Nemko Ref: 151006
R&S HL223

Scan Settings (1 Range)

Frequencies			Receiver Settings					
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp	OpRge
200M	1000M	50k	120k	PK	20ms	AUTO	LN ON	60dB

Transducer No.	Start	Stop	Name
20	200M	1000M	HL223



Radiated Emissions, 200 - 1000 MHz, 802.11g 6 Mbps, HP

Nemko AS

03. Jun 10 13:11

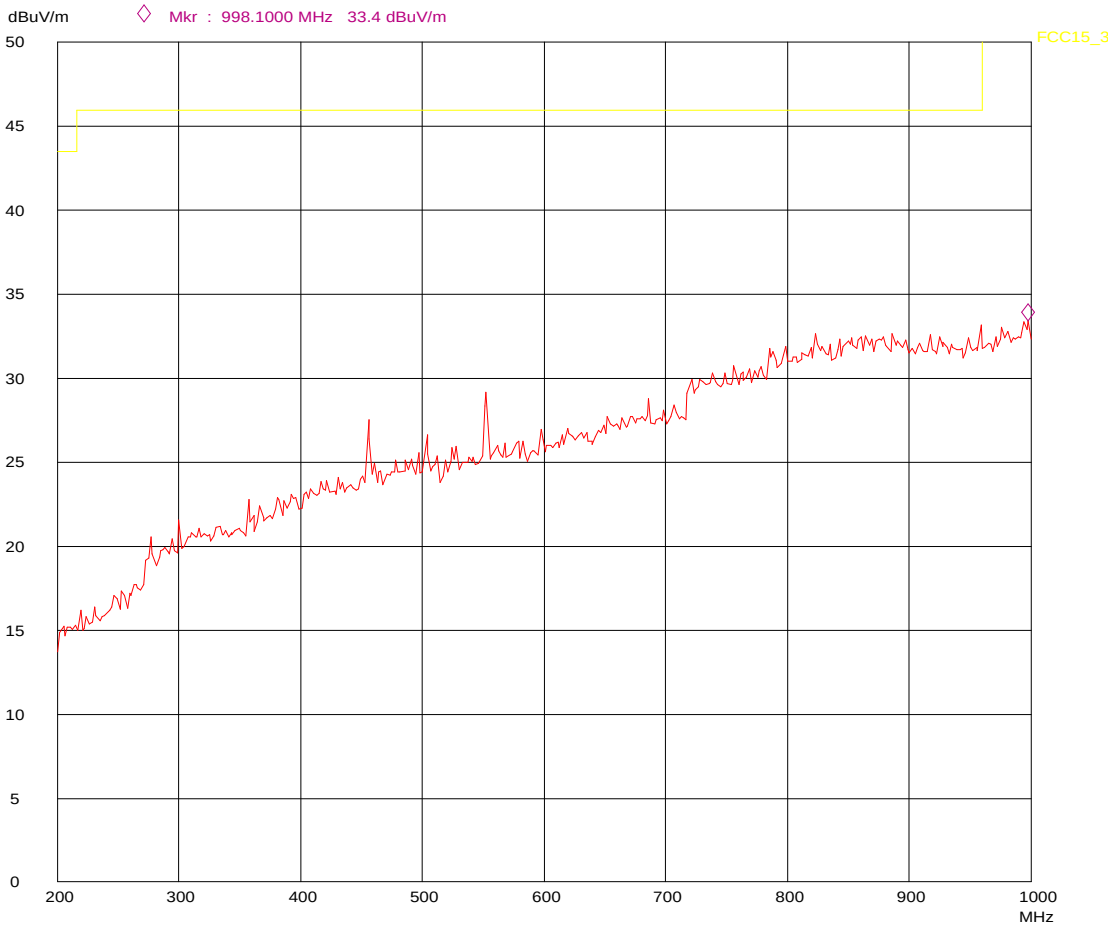
Peak

Operator: FS
Comment: ASCOM WH1 Cordless WLAN Phone
FCC 15.209
Dist 3m, H=1m, VP
802.11n, MCS0, 2.4GHz Operation
Nemko Ref: 151006
R&S HL223

Scan Settings (1 Range)

Frequencies			Receiver Settings					
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp	OpRge
200M	1000M	50k	120k	PK	20ms	AUTO	LN ON	60dB

Transducer No.	Start	Stop	Name
20	200M	1000M	HL223



Radiated Emissions, 200 - 1000 MHz, 802.11n MCS0, VP

Nemko AS

03. Jun 10 13:23

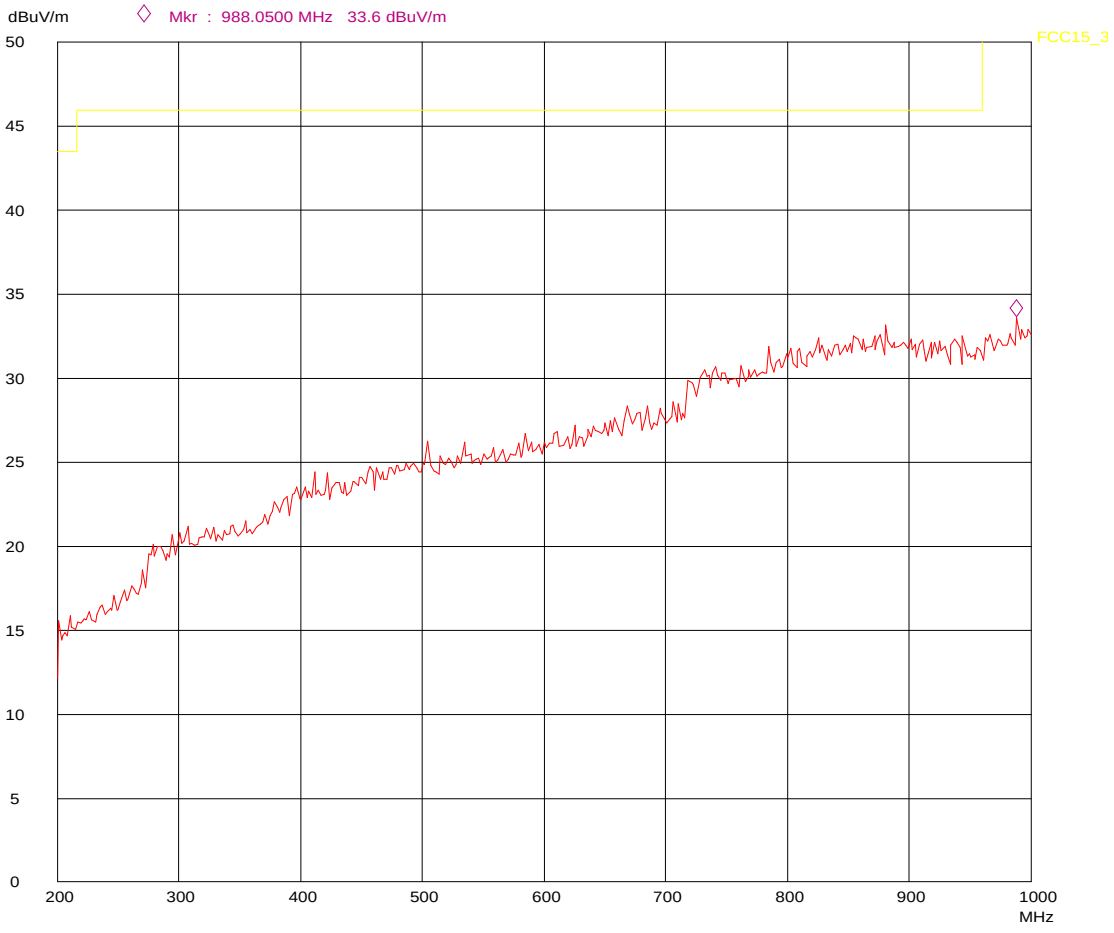
Peak

Operator: FS
Comment: ASCOM WH1 Cordless WLAN Phone
FCC 15.209
Dist 3m, H=2m, HP
802.11n, MCS0, 2.4GHz Operation
Nemko Ref: 151006
R&S HL223

Scan Settings (1 Range)

Frequencies			Receiver Settings					
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp	OpRge
200M	1000M	50k	120k	PK	20ms	AUTO	LN ON	60dB

Transducer No.	Start	Stop	Name
20	200M	1000M	HL223



Radiated Emissions, 200 - 1000 MHz, 802.11n MCS0, HP

Radiated Emissions, 1-25 GHz

Measuring distance 3m.

Peak Detector, RBW=1 MHz

Channel #	Measured Frequency (MHz)	Measured Emission (dBµV/m)	Transducer Factor dB	Limit (dBµV/m)	Margin (dB)
1	4824	54.0	10.7	74	20.0
1	All other	< 54	/	74	>20
6	4874	56.4	10.9	74	17.6
6	7311	53.7	17.1	74	20.3
11	4924	56.2	11.0	74	17.8
11	All other	< 54	/	74	>20

Average Detector, RBW=1 MHz

Channel #	Measured Frequency (MHz)	Measured Emission (dBµV/m)	Transducer Factor dB	Limit (dBµV/m)	Margin (dB)
1	4824	41.3	10.7	54	12.7
1	All other	< 44	/	54	>10
6	4874	43.7	10.9	54	10.3
6	7311	41.0	17.1	54	13.0
11	4924	43.5	11.0	54	10.5
11	All other	< 44	/	54	>10

Measured results are for 802.11b, 1 Mbps. It was checked that other modulations and/or bitrates did not produce higher emissions.

Antenna factor, amplifier gain and cable loss are included in Spectrum Analyzer “Transducer factor”.

Average detector values are calculated from the measured Peak Detector values by correcting for Duty-Cycle.

See attached plots.

Radiated Emissions, 1-40 GHz

Measuring distance 3m.

Peak Detector, RBW=1 MHz

Channel #	Measured Frequency (GHz)	Measured Emission (dBµV/m)	Transducer Factor dB	Limit (dBµV/m)	Margin (dB)
165	11.65	72.0	20.3	74	2.0
165	17.48	56.2	25.5	74	17.8
165	All other	< 54	/	74	>20

Average Detector, RBW=1 MHz

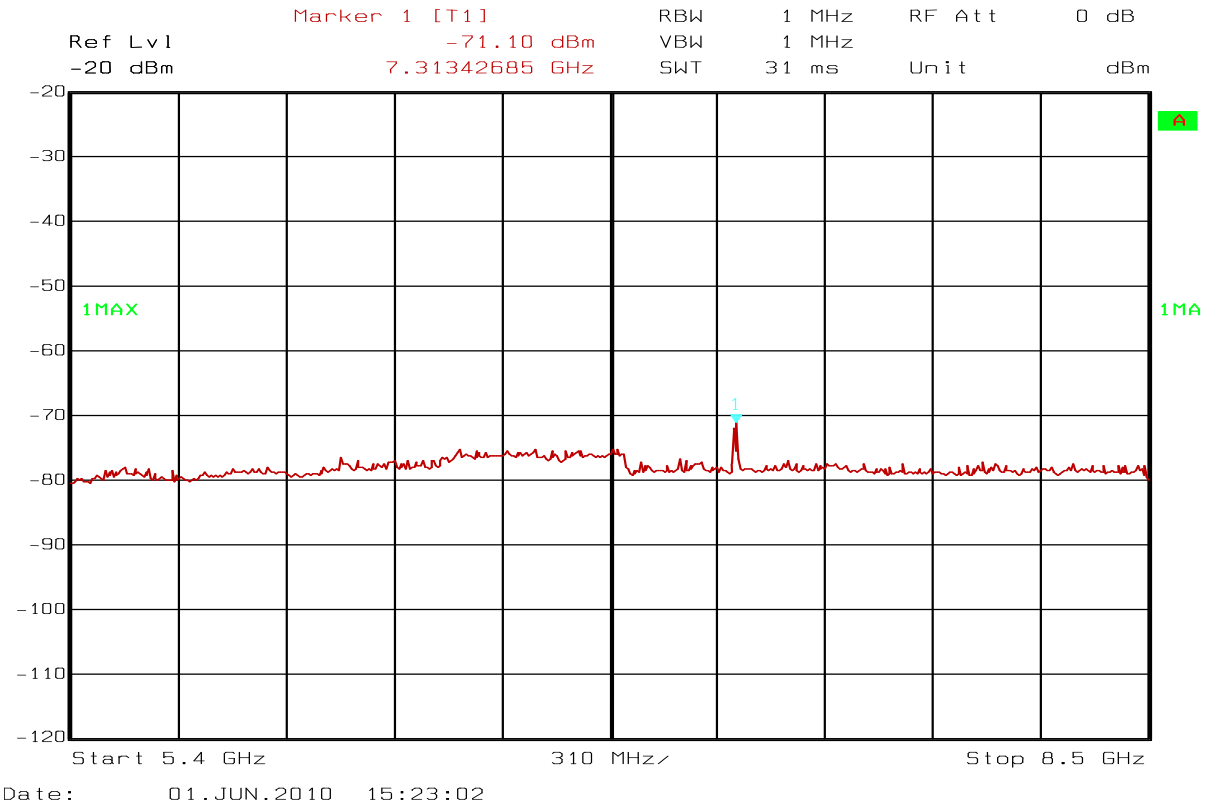
Channel #	Measured Frequency (GHz)	Measured Emission (dBµV/m)	Transducer Factor dB	Limit (dBµV/m)	Margin (dB)
165	11.65	52.0	20.3	54	2.0
165	17.48	36.2	25.5	54	17.8
165	All other	< 44	/	54	>10

Measured results are for 802.11a, 6 Mbps. It was checked that other modulations and/or bitrates did not produce higher emissions.

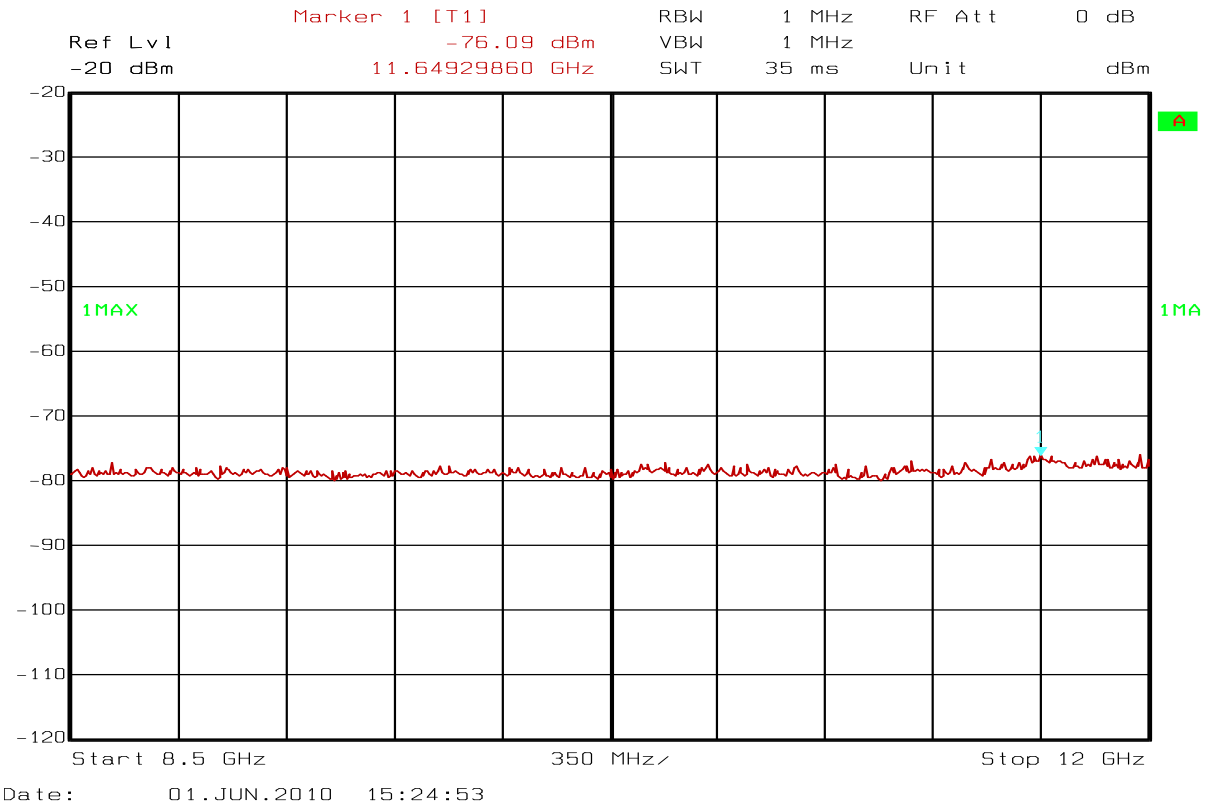
Antenna factor, amplifier gain and cable loss are included in Spectrum Analyzer “Transducer factor”.

Average detector values are calculated from the measured Peak Detector values by correcting for Duty-Cycle.

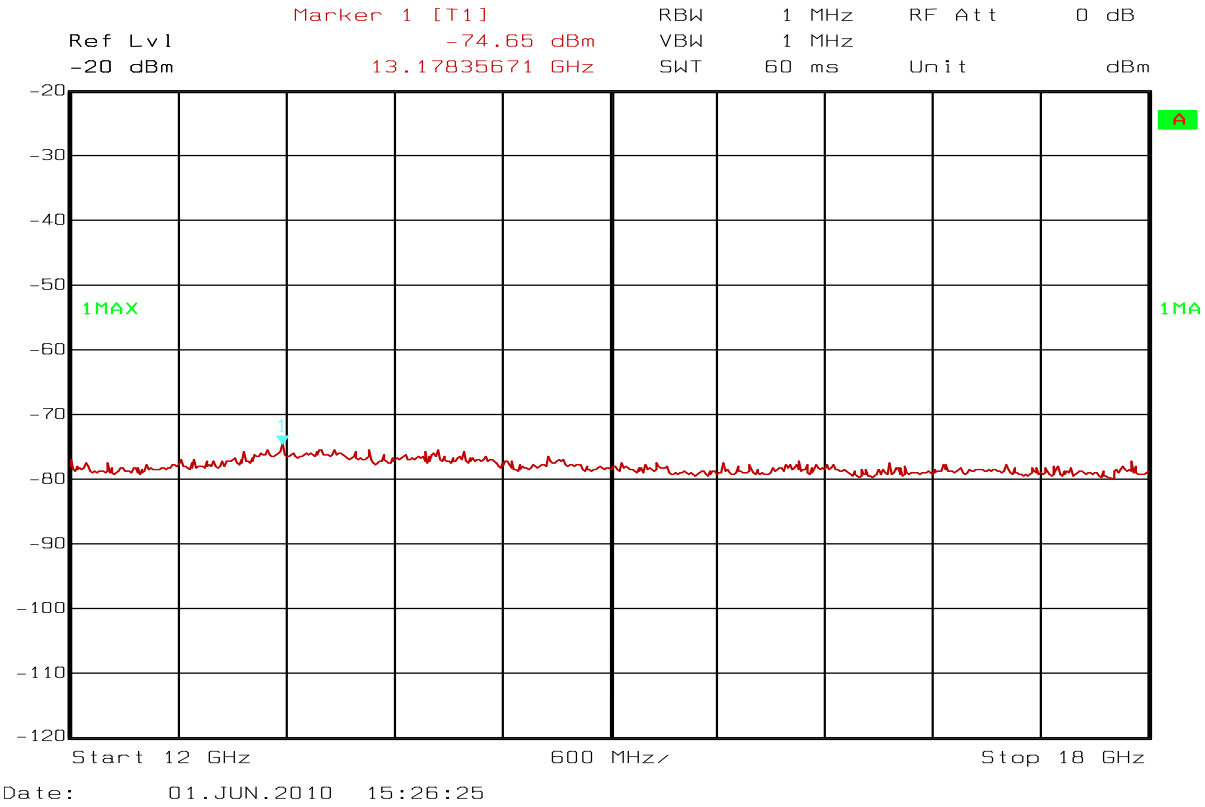
See attached plots.



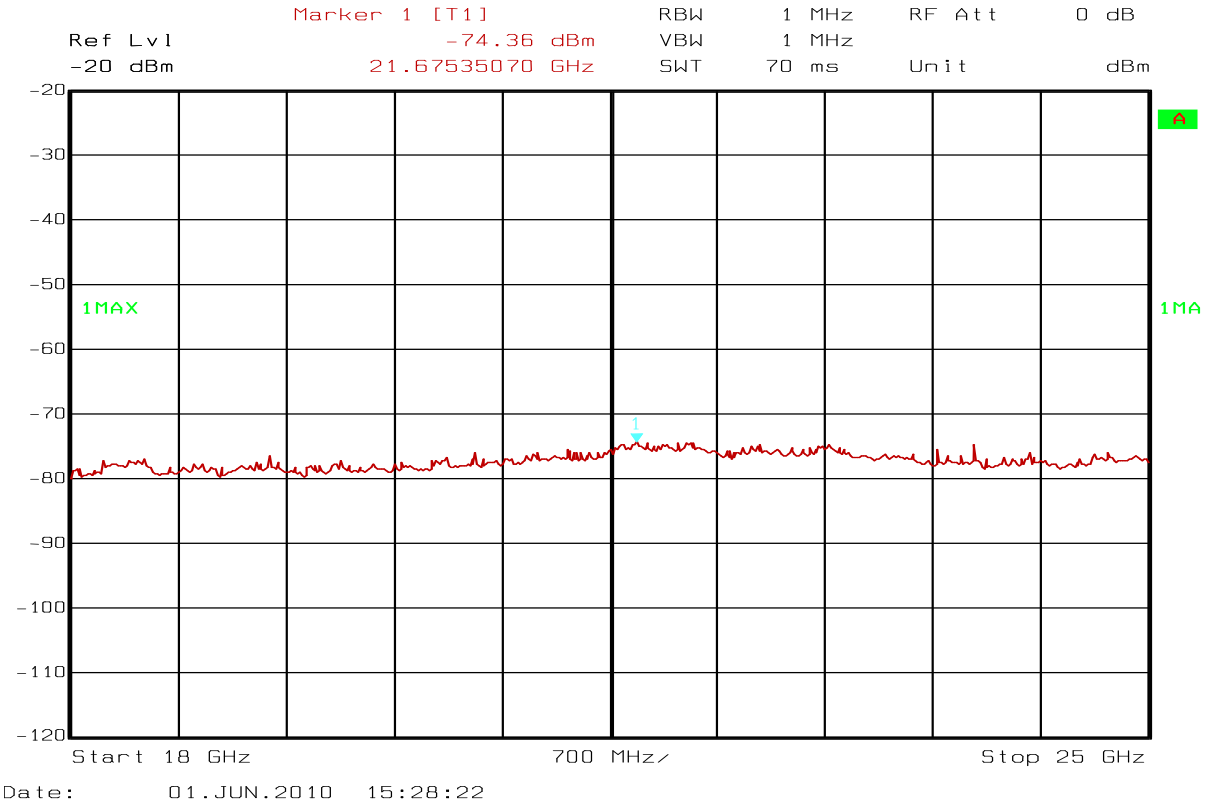
Prescan 5.4 - 8.5 GHz, 802.11b 1 Mbps



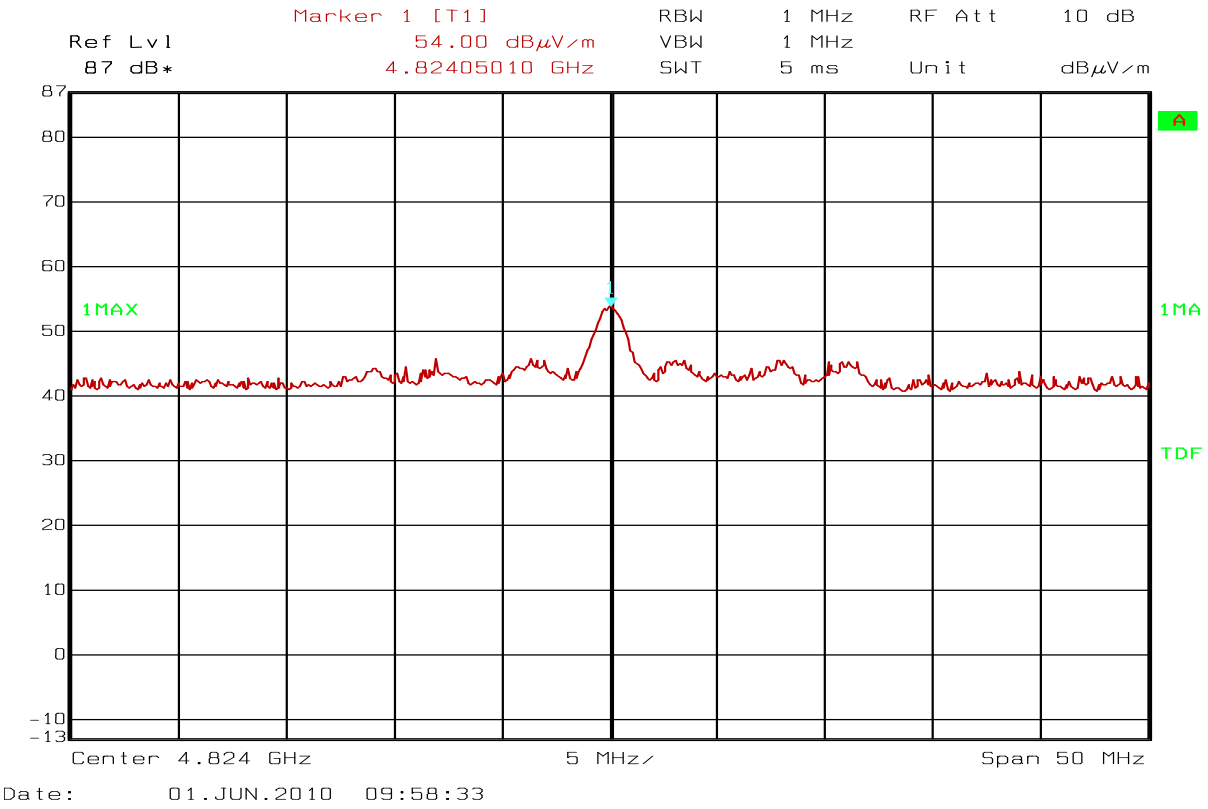
Prescan 8.5 - 12 GHz, 802.11b 1 Mbps



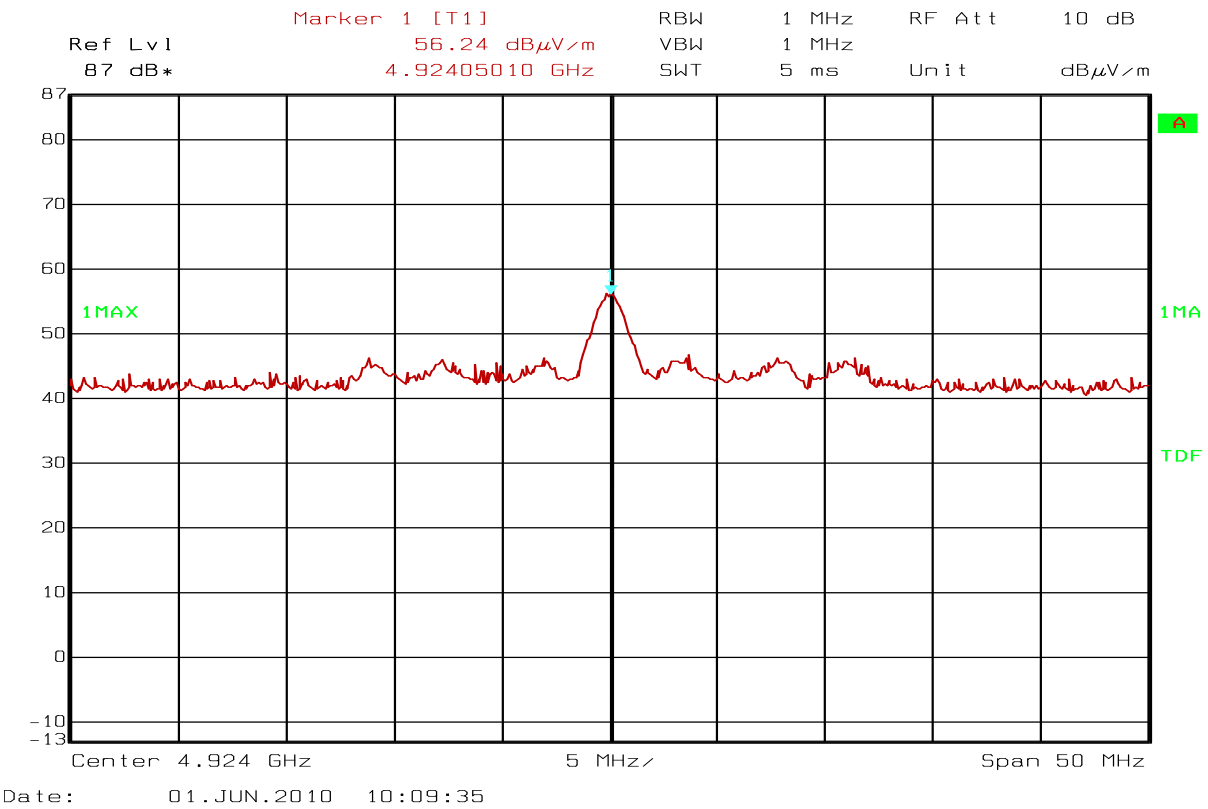
Prescan 12 - 18 GHz, 802.11b 1 Mbps



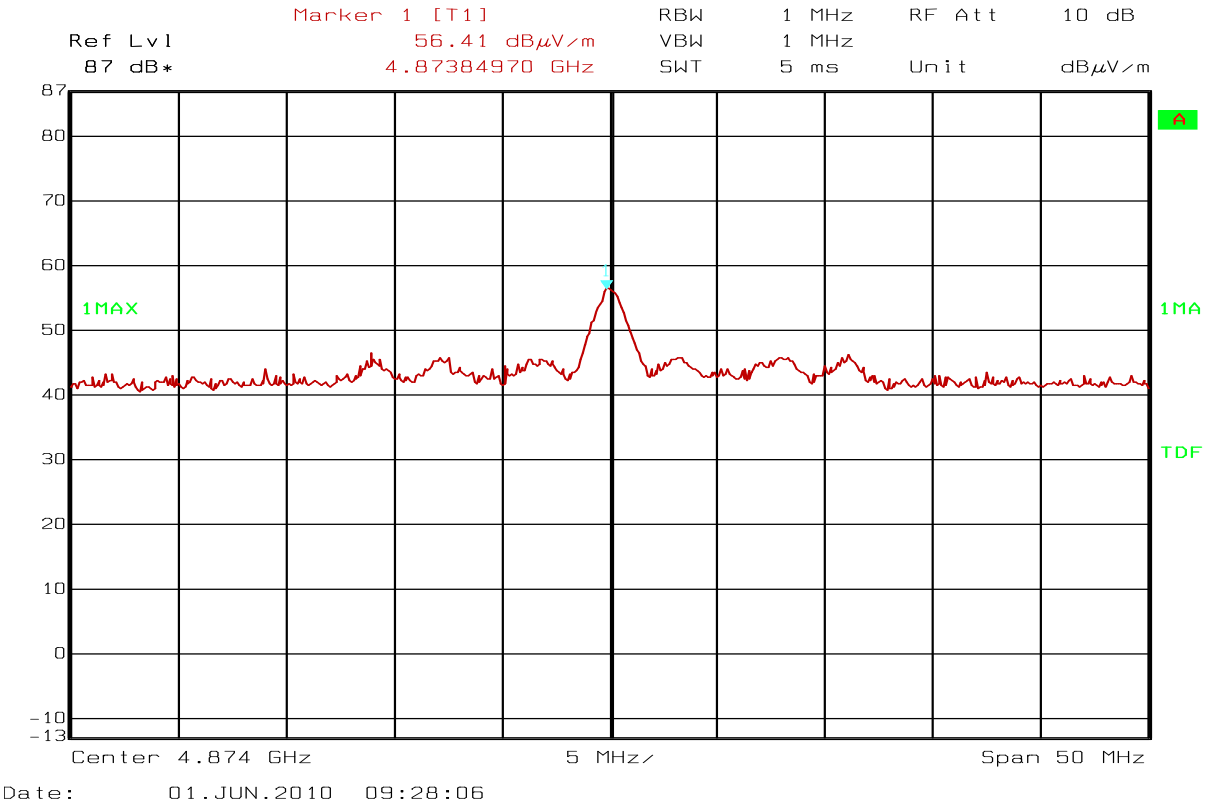
Prescan 18 - 25 GHz, 802.11b 1 Mbps



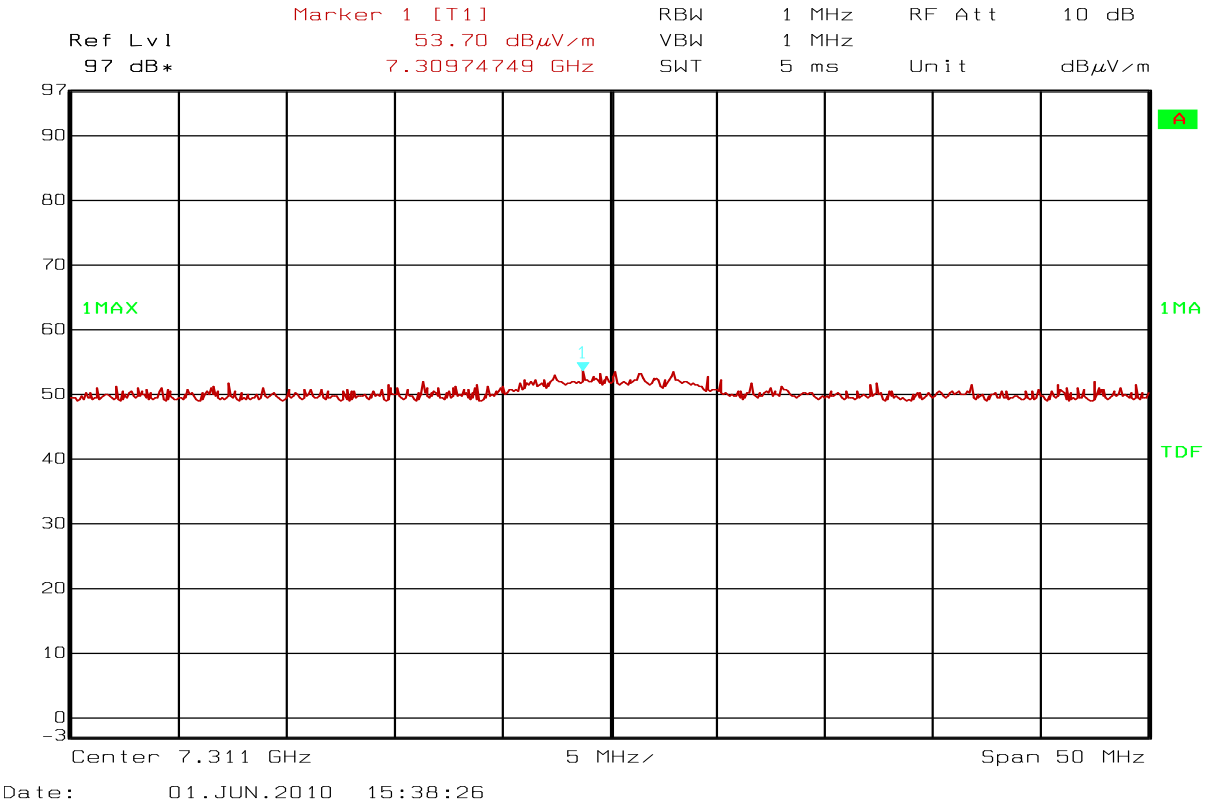
Radiated Emissions, Ch01, 4824 MHz, Peak det. (Max: EUT V, HP)



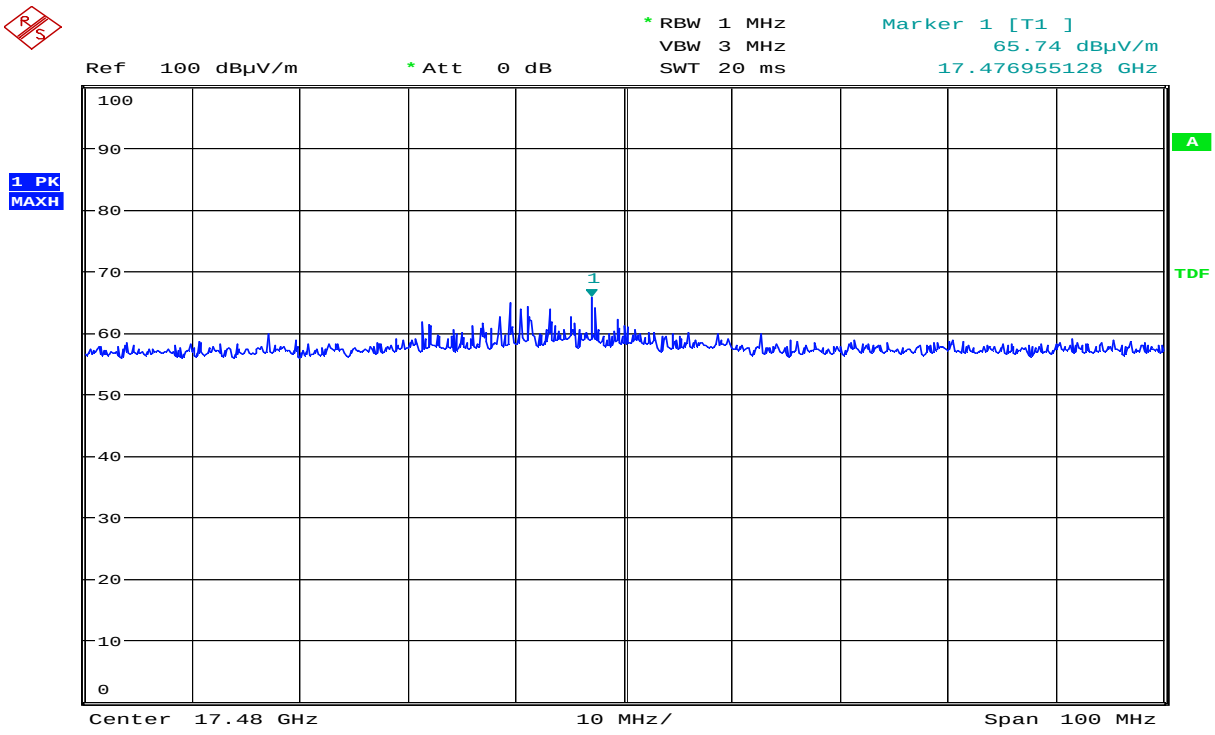
Radiated Emissions, Ch11, 4924 MHz, Peak det. (Max: EUT V, HP)



Radiated Emissions, Ch06, 4874 MHz, Peak det. (Max: EUT V, HP)



Radiated Emissions, Ch06, 7311 MHz, Peak det. (Max: EUT V, HP)



Date: 30.JUL.2010 12:42:25

Radiated Emissions, Ch165, 17.48 GHz, Peak det. (Max: EUT V, HP), d=1m uncorrected

4.6 Power Spectral Density (PSD)

Para. No.: 15.247 (d)

Test Performed By: Frode Sveinsen	Date of Test: 4 June 2010

Test Results: Passed

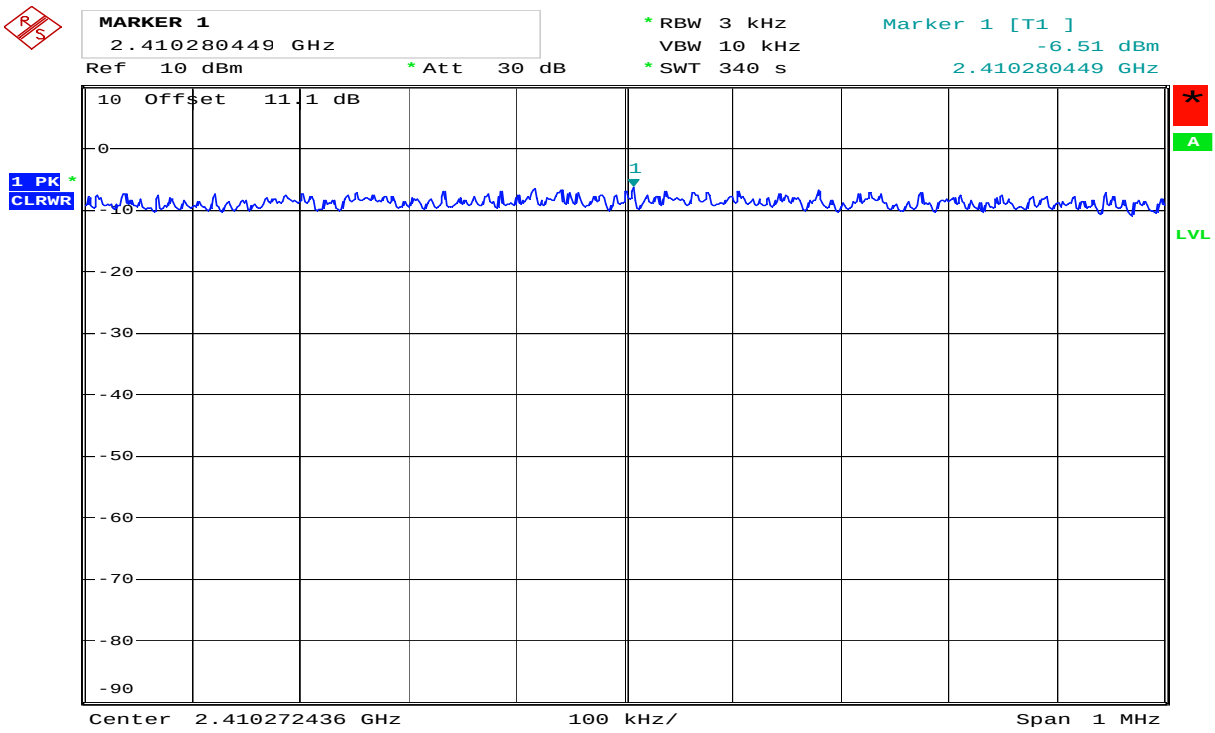
Measured and Calculated Data:

Carrier Frequency (MHz)	Power Spectral Density (dBm)			
	802.11b, 1 Mbps	802.11g, 6 Mbps	802.11a, 6 Mbps	802.11n, MCS0
2412	-6.5	-8.8	N/A	-9.8
2437	-5.7	-9.8	N/A	-9.1
2462	-6.7	-12.2	N/A	-10.8
5825	N/A	N/A	-11.1	-11.8

Measured according to PSD Option 1 described in guidance ”Measurement of Digital Transmission Systems Operating under Section 15.247, March 2005”.

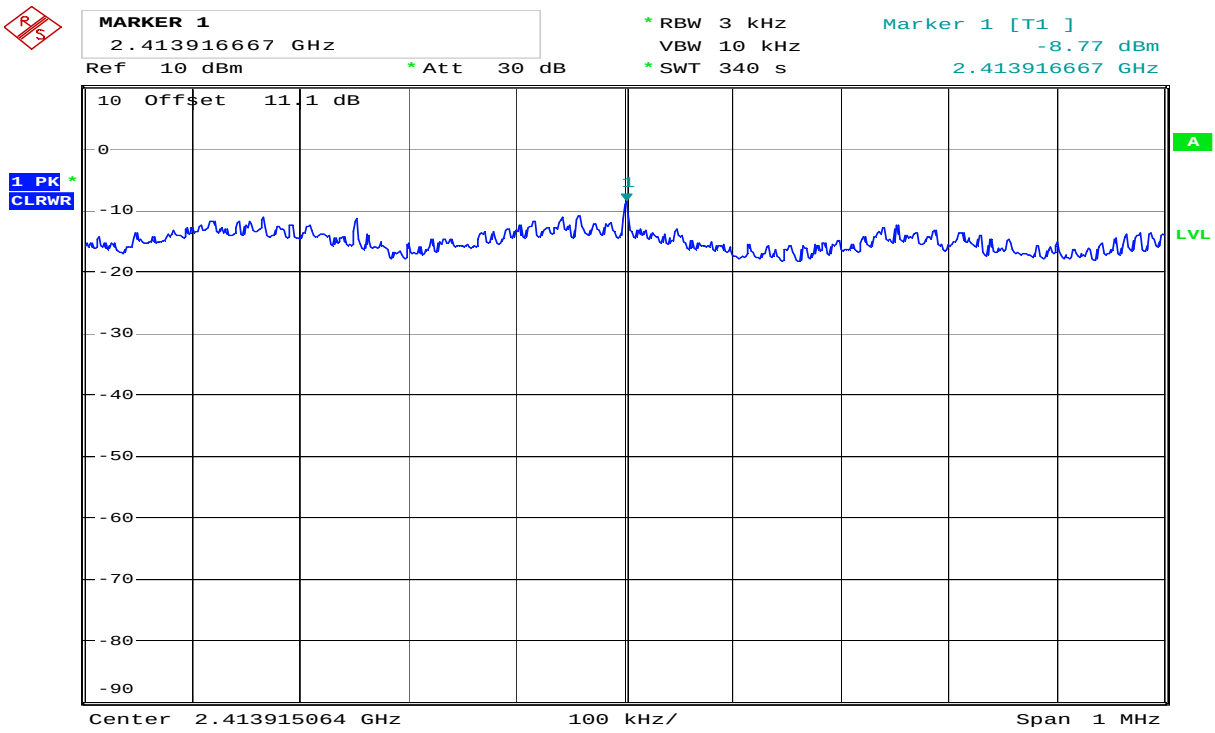
Requirements:

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



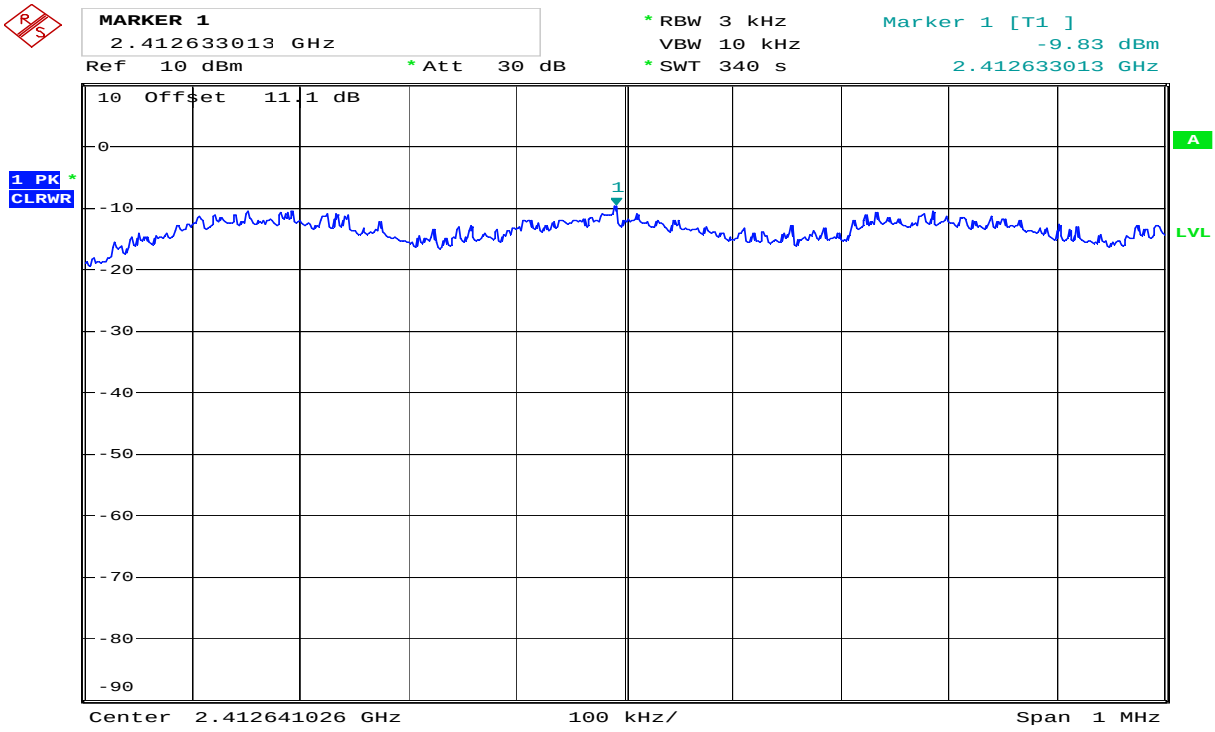
Date: 18.OCT.2010 14:43:00

Power Spectral Density, 2412MHz, Option 1, 802.11b, 1 Mbps



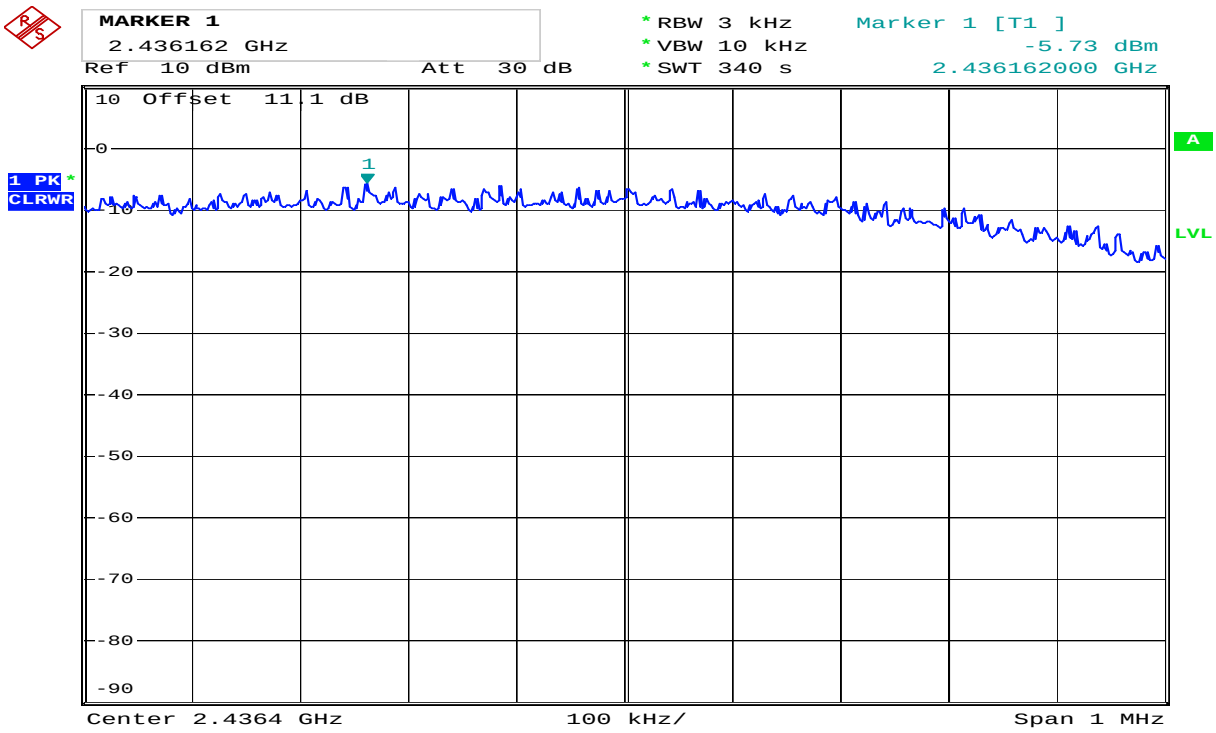
Date: 18.OCT.2010 15:02:42

Power Spectral Density, 2412MHz, Option 1, 802.11g, 6 Mbps



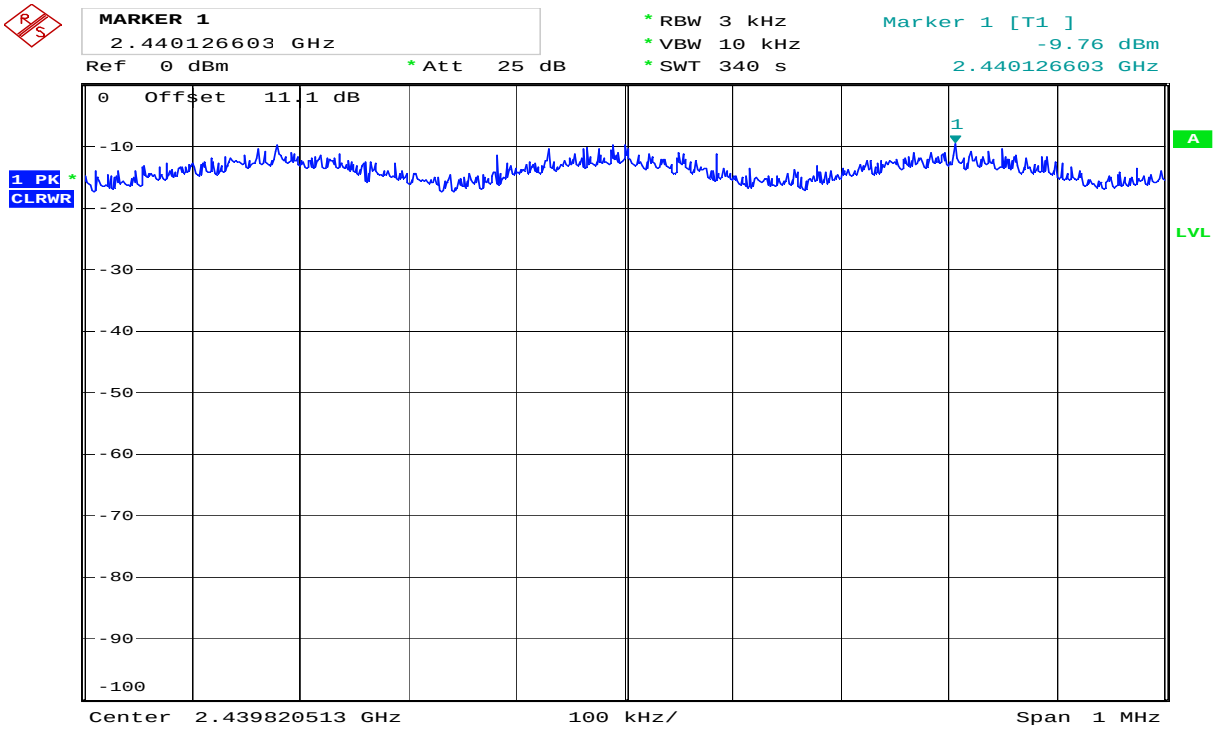
Date: 18.OCT.2010 15:25:08

Power Spectral Density, 2412MHz, Option 1, 802.11n, MCS0



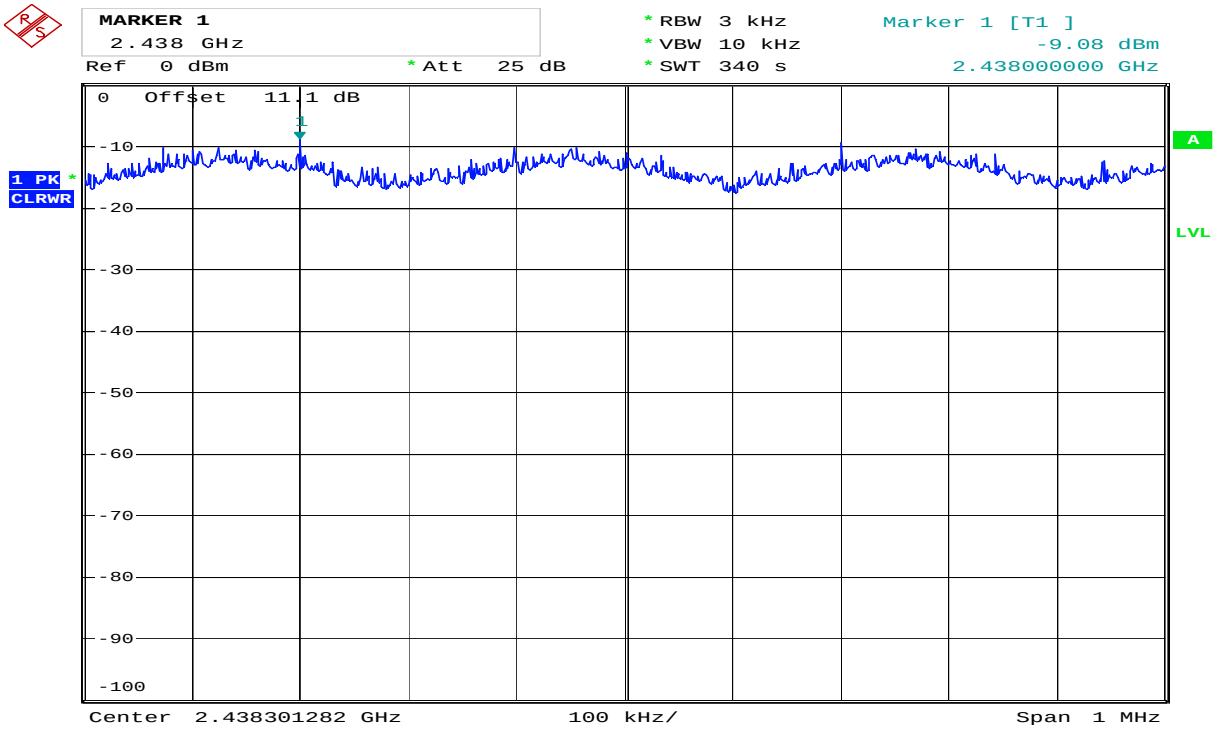
Date: 6.JUL.2010 12:32:01

Power Spectral Density, 2437MHz, Option 1, 802.11b, 1 Mbps



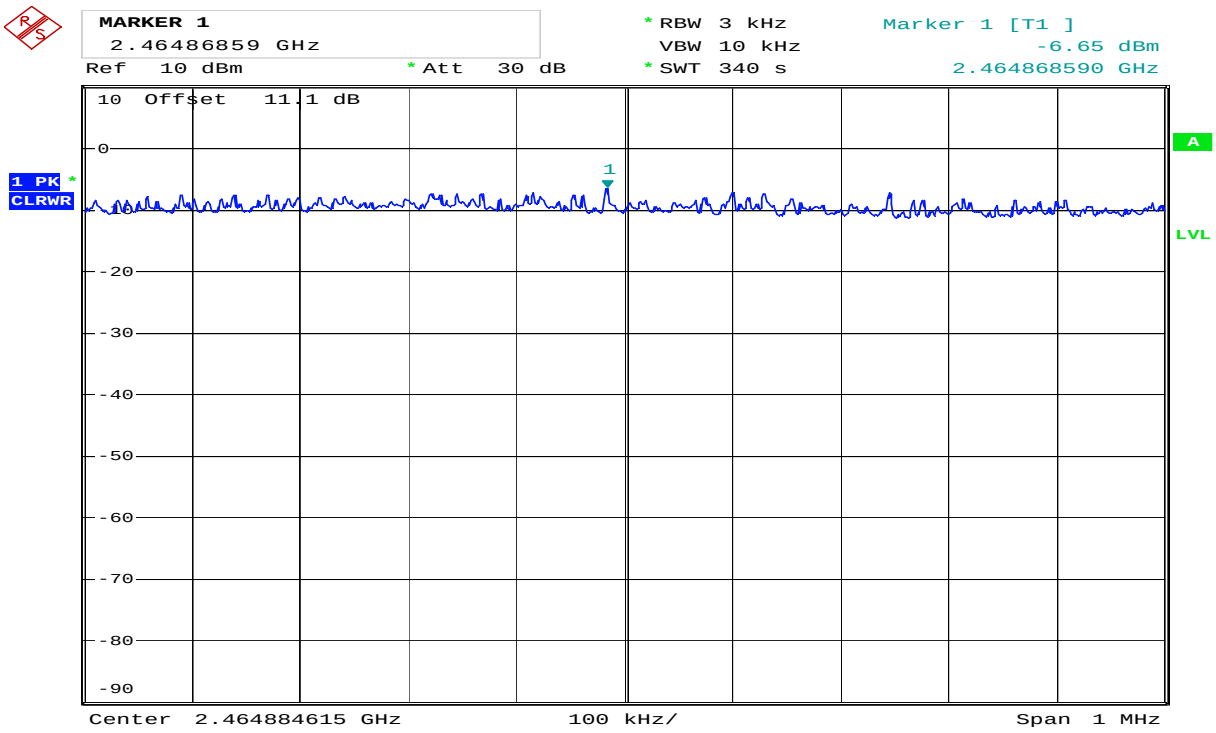
Date: 4.JUN.2010 12:11:15

Power Spectral Density, 2437MHz, Option 1, 802.11g, 6 Mbps



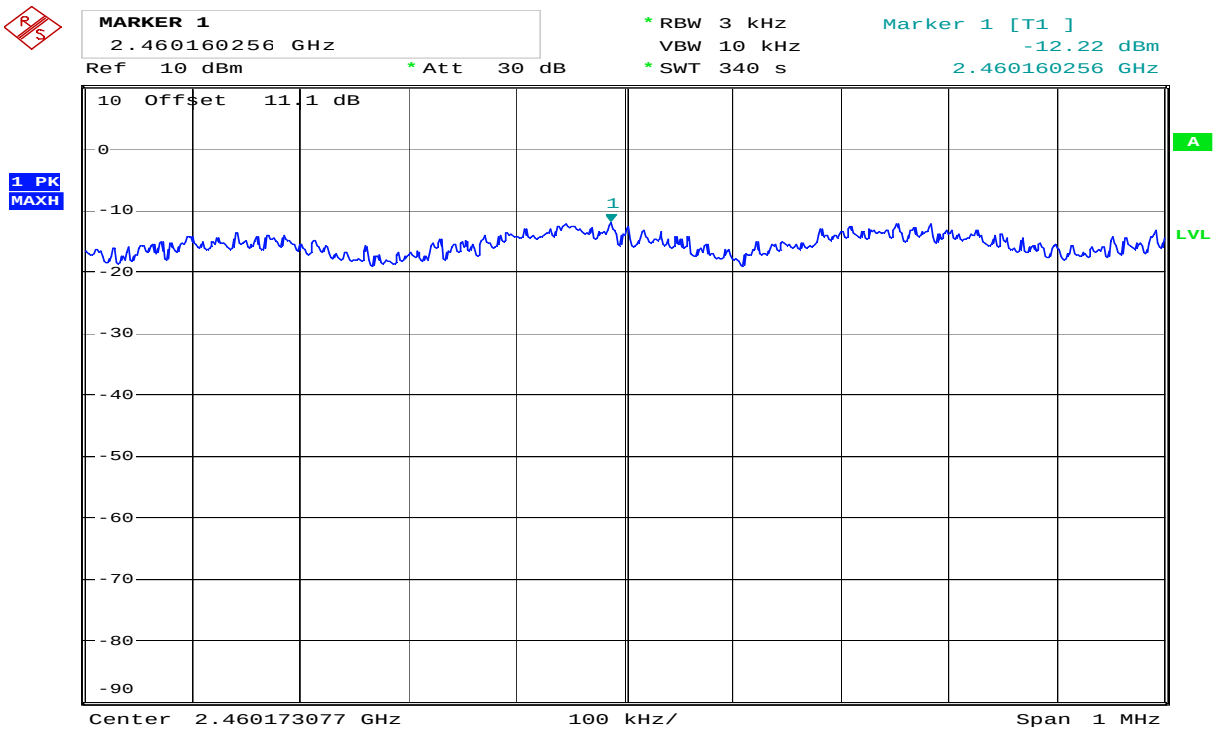
Date: 4.JUN.2010 11:39:20

Power Spectral Density, 2437MHz, Option 1, 802.11n, MCS0



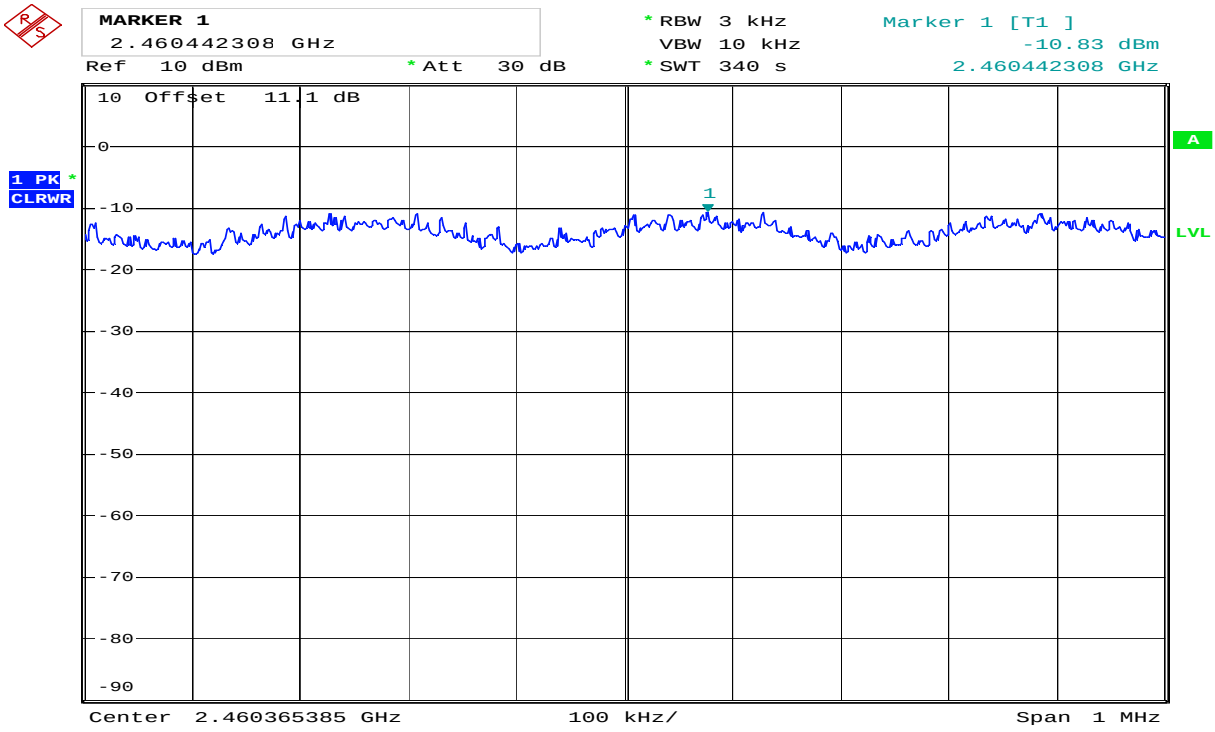
Date: 18.OCT.2010 15:40:53

Power Spectral Density, 2462MHz, Option 1, 802.11b, 1 Mbps



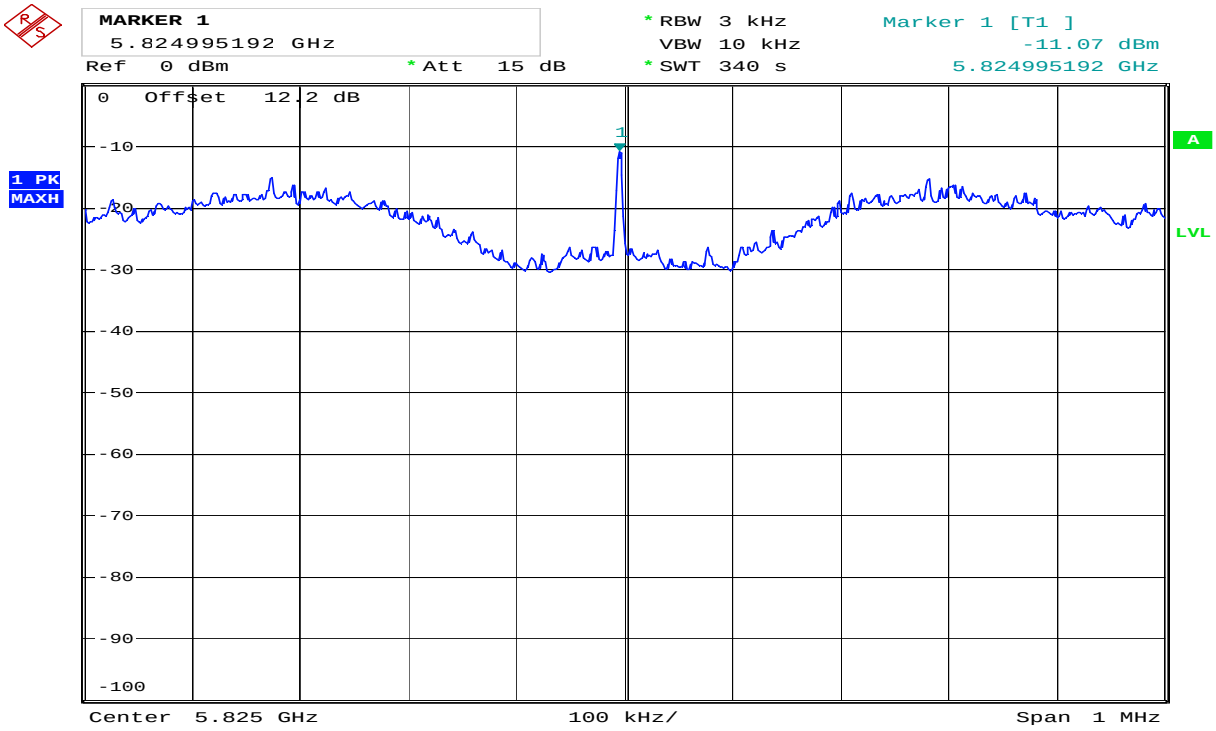
Date: 18.OCT.2010 15:54:35

Power Spectral Density, 2462MHz, Option 1, 802.11g, 6 Mbps



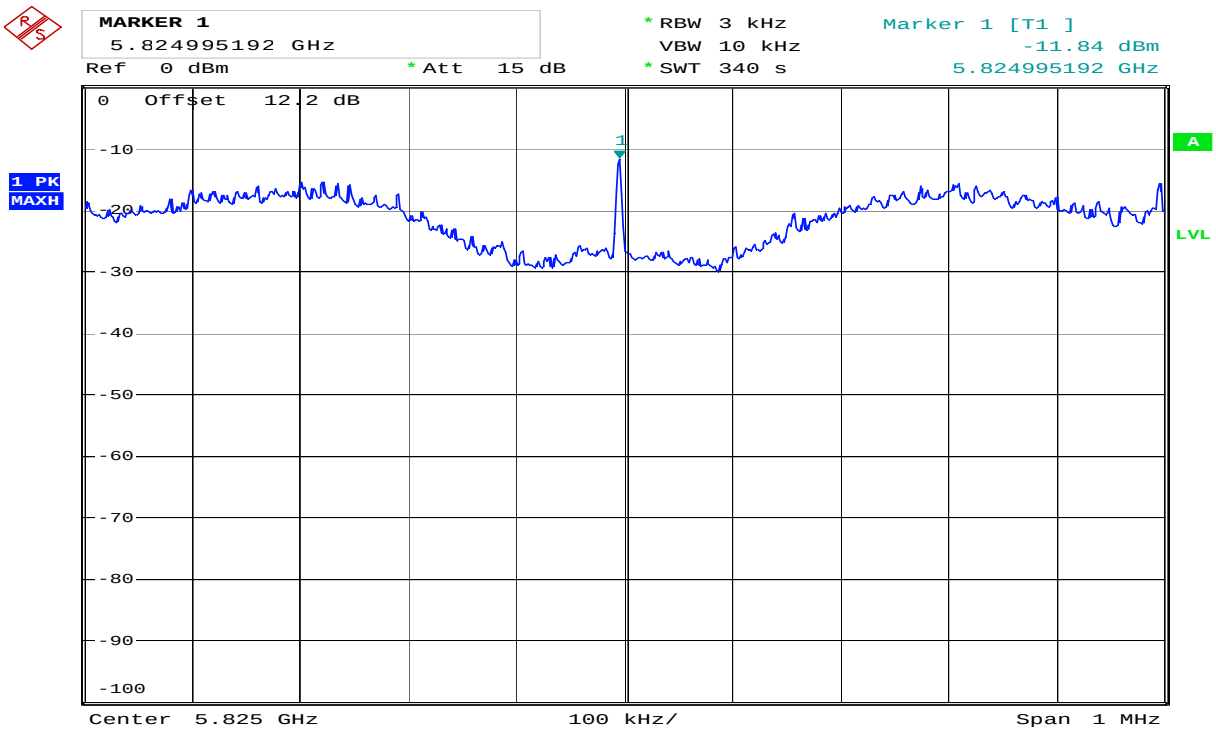
Date: 18.OCT.2010 16:09:57

Power Spectral Density, 2462MHz, Option 1, 802.11n, MCS0



Date: 14.JUL.2010 13:18:00

Power Spectral Density, 5825 MHz, Option 1, 802.11a, 6 Mbps



Date: 14.JUL.2010 13:36:53

Power Spectral Density, 5825 MHz, Option 1, 802.11n, MCS0

4.7 Receiver Spurious Emissions

Measurement Procedure:

Industry Canada RSS-213 paragraph 6.8 and RSS-GEN paragraphs 4.10 and 6.

Test results:

Frequency MHz	Carrier No.	Measured Value Conducted dBm	Conducted Limit dBm	Margin dB
30 – 1000	all	< -77	-57	>20
> 1000	all	< -73	-53	>20

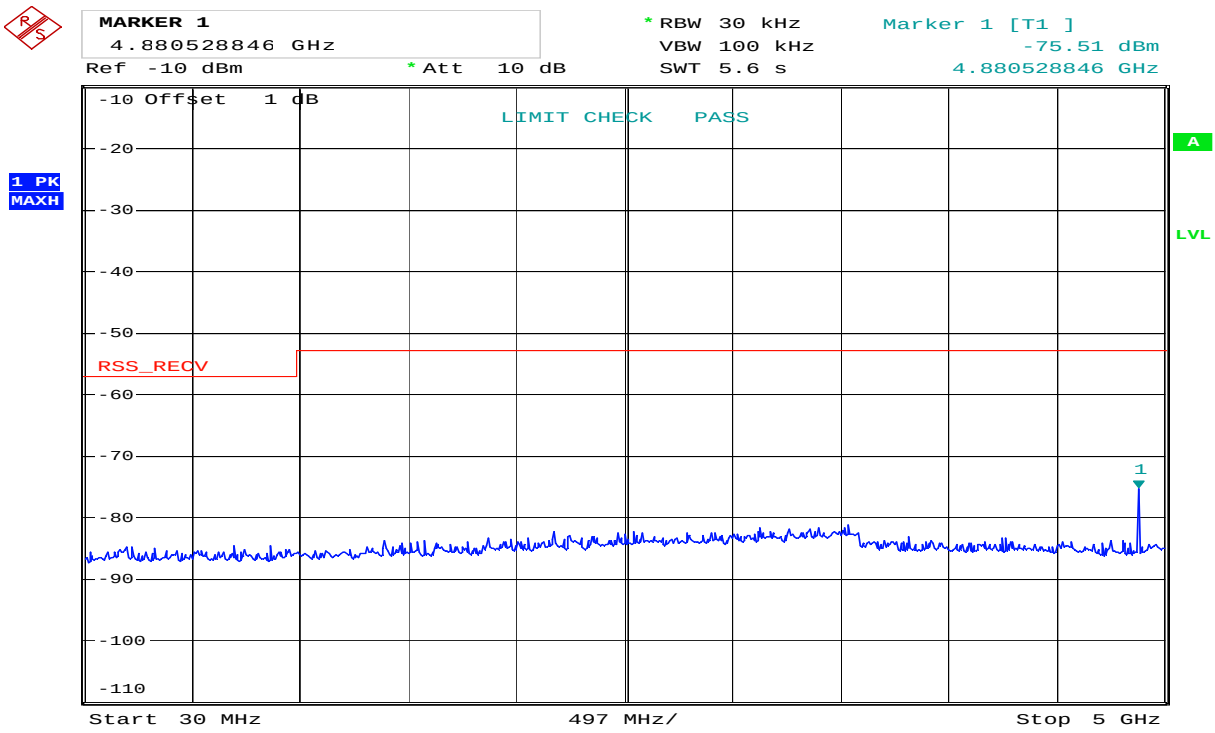
The measurement was performed conducted.

Requirements, RSS-GEN Issue 2, clause 6

The measurement can be performed either radiated or conducted.

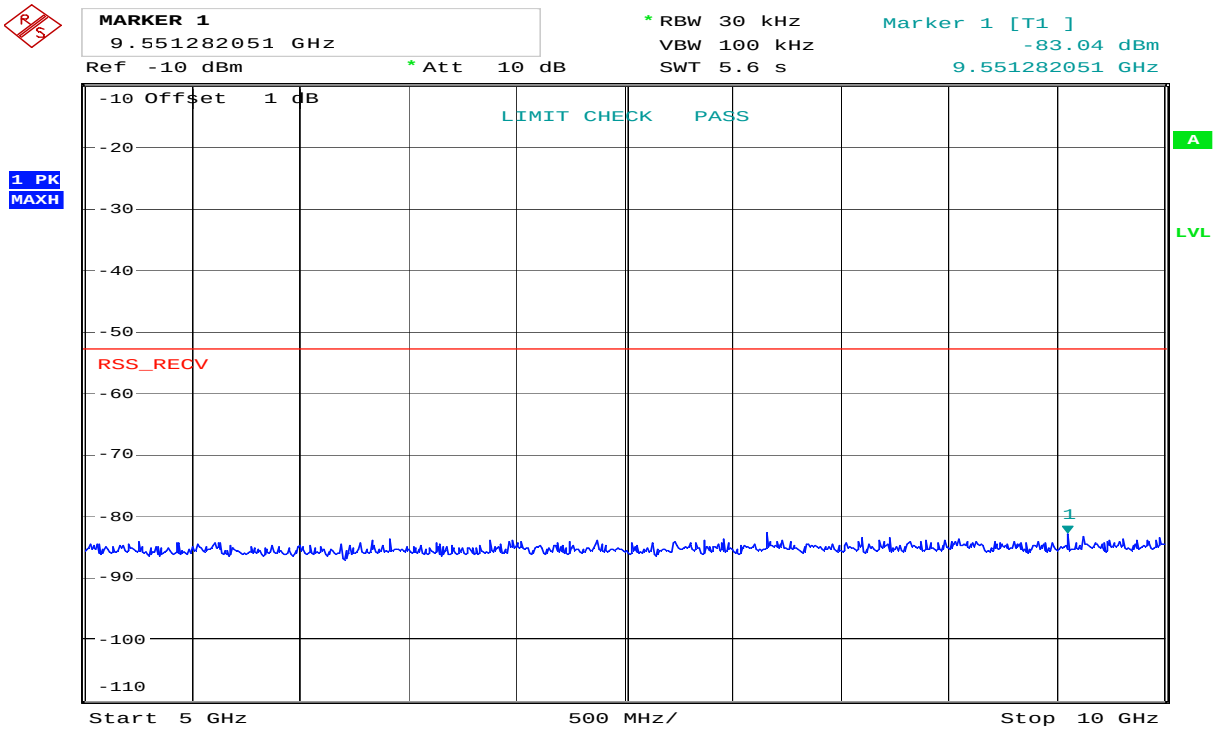
When measured Conducted*:* no spurious signals appearing at the antenna terminals shall exceed 2 nW per any 4 kHz spurious frequency in the band 30-1000 MHz, or 5 nW above 1 GHz.

When measured Radiated: See Table 1 in RSS-GEN Issue 2, clause 6.



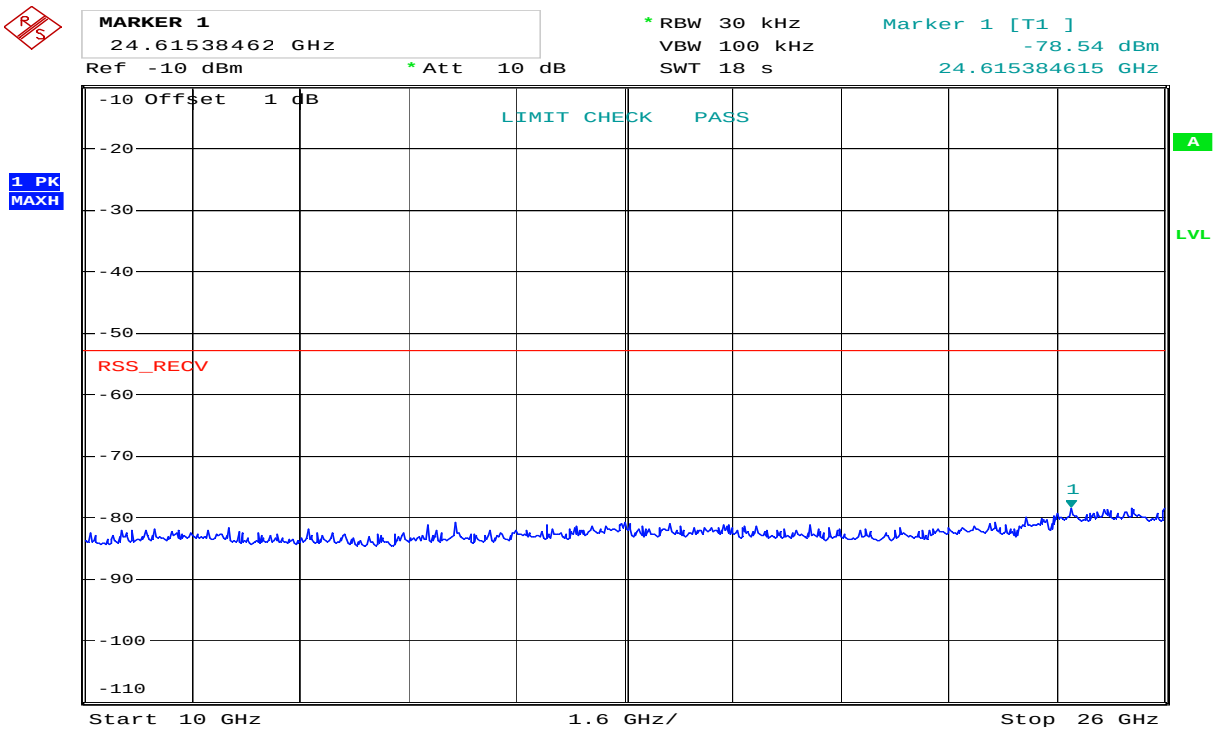
Date: 19.OCT.2010 11:42:30

Receiver Spurious Emissions, Conducted, 30 – 5000 MHz



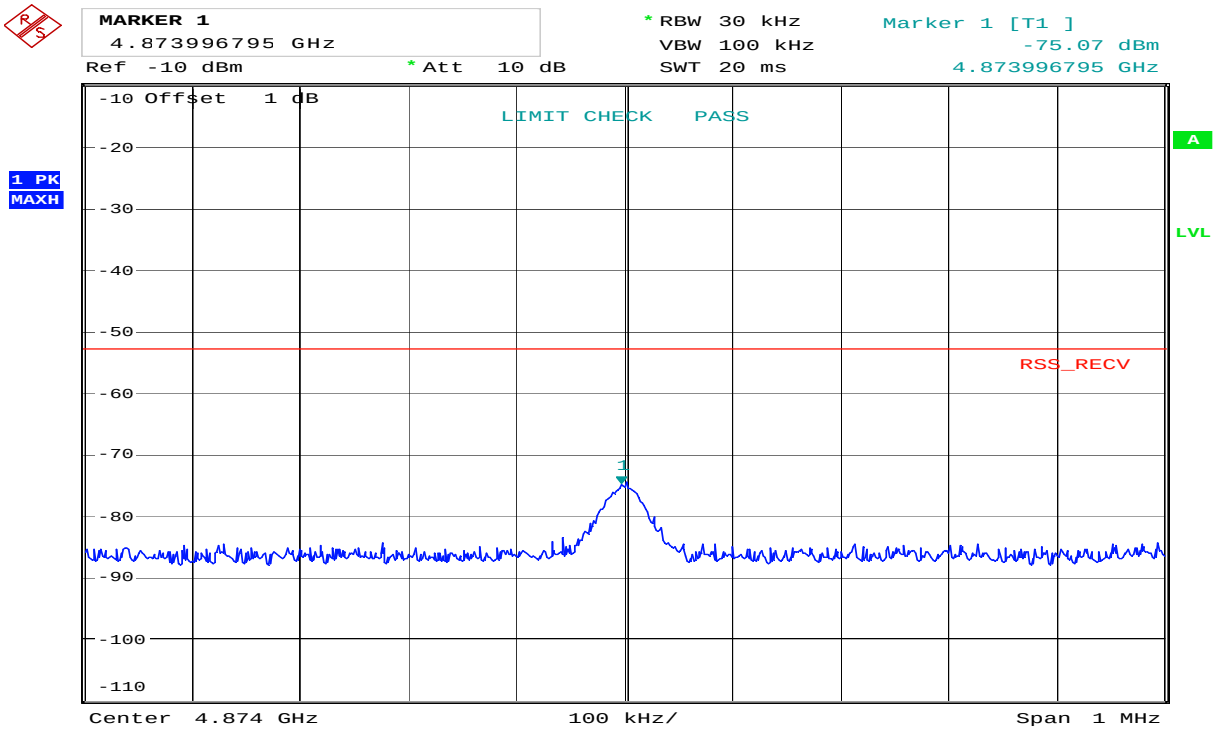
Date: 19.OCT.2010 11:40:52

Receiver Spurious Emissions, Conducted, 5 – 10 GHz



Date: 19.OCT.2010 11:39:12

Receiver Spurious Emissions, Conducted, 10 – 26 GHz



Date: 19.OCT.2010 11:43:18

Receiver Spurious Emissions, Conducted, 4.874 GHz

4.8 20dB Bandwidth,

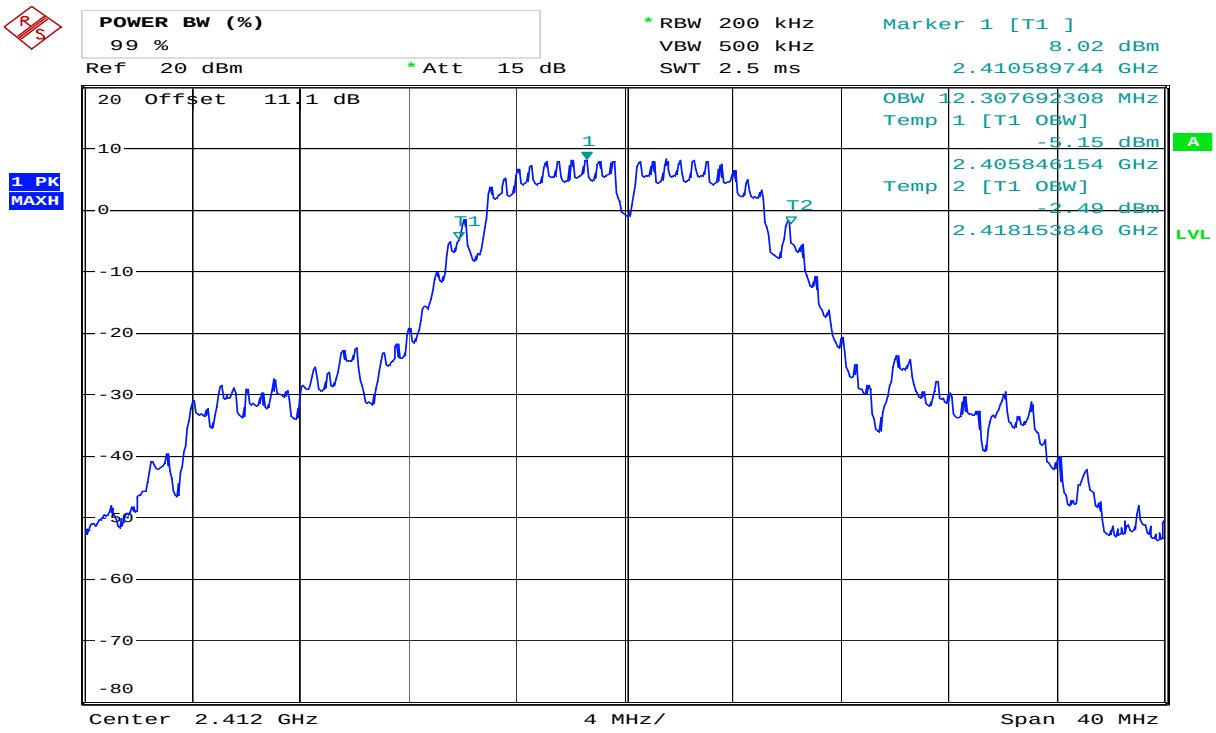
Test results:

Frequency	Measured 20dB Bandwidth MHz			
	802.11b	802.11g	802.11a	802.11n
2412 MHz	12.3	16.8	N/A	17.9
2437 MHz	12.2	16.7	N/A	17.8
2462 MHz	12.2	16.8	N/A	17.8
5825 MHz*	N/A	N/A	16.8	17.8

The measurement was performed conducted.

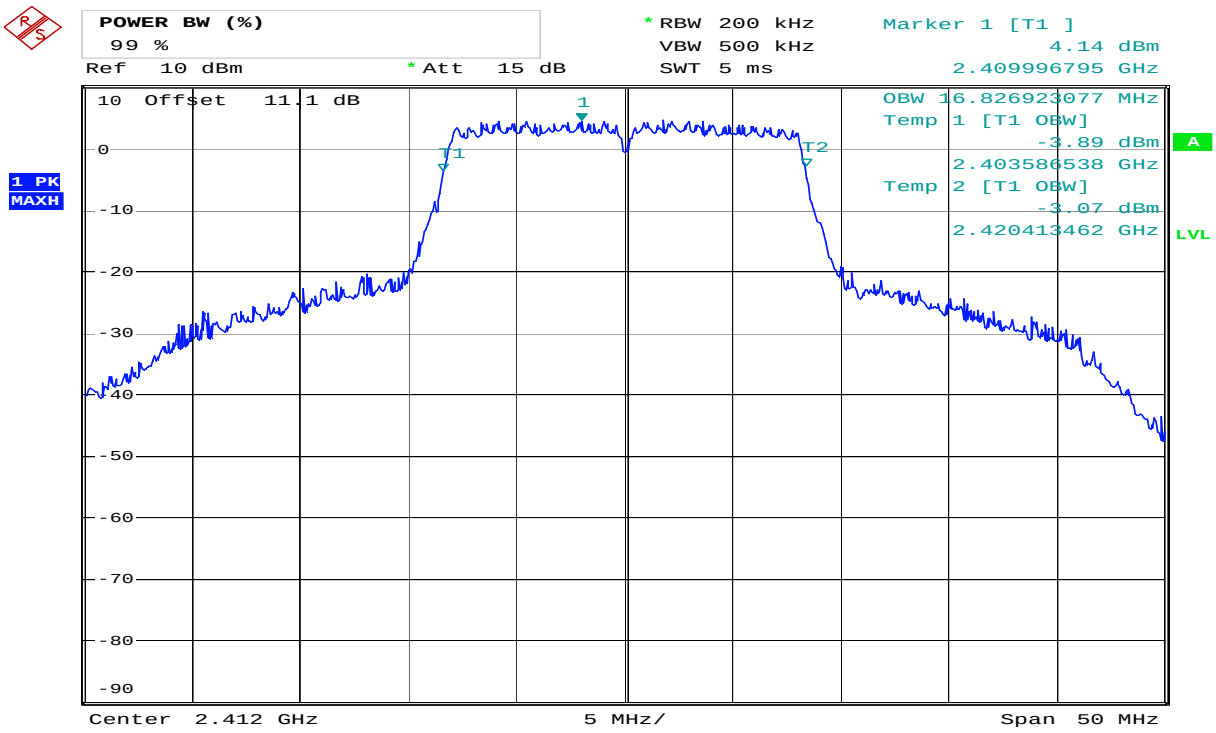
Requirements

No requirements, reported for information only.



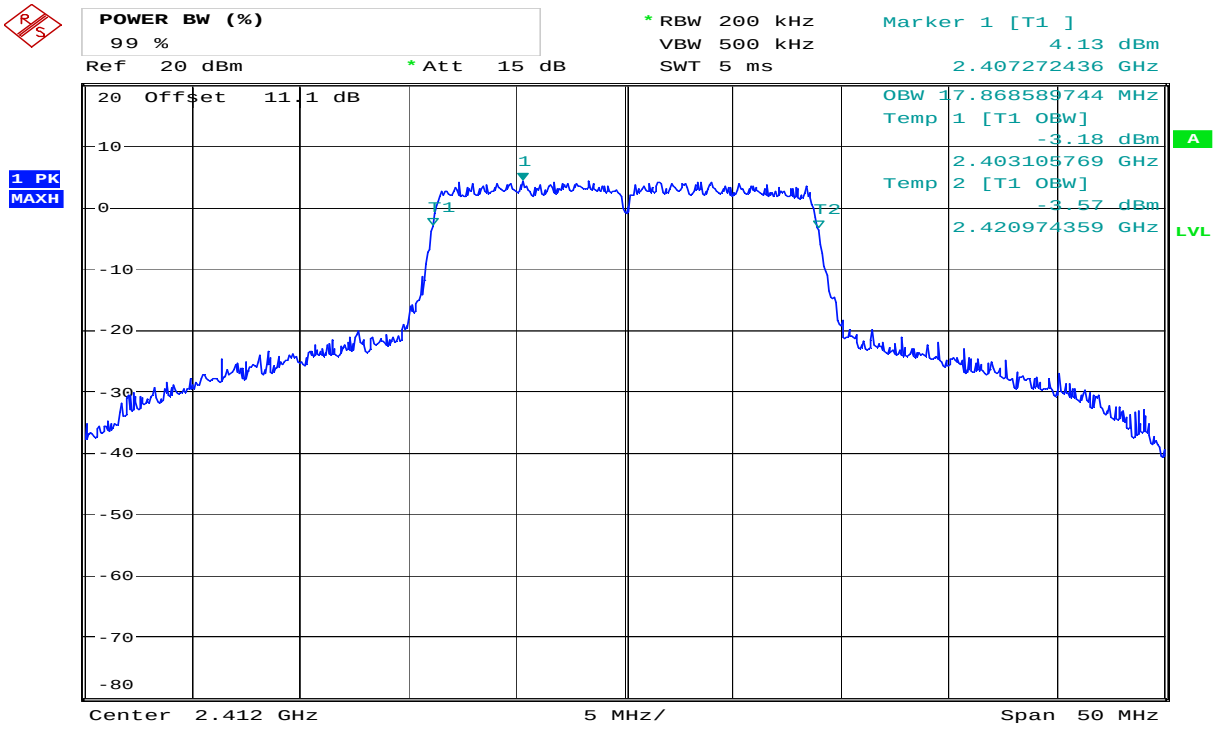
Date: 20.OCT.2010 13:22:45

20dB Bandwidth, 2412 MHz, 802.11b, 1Mbps



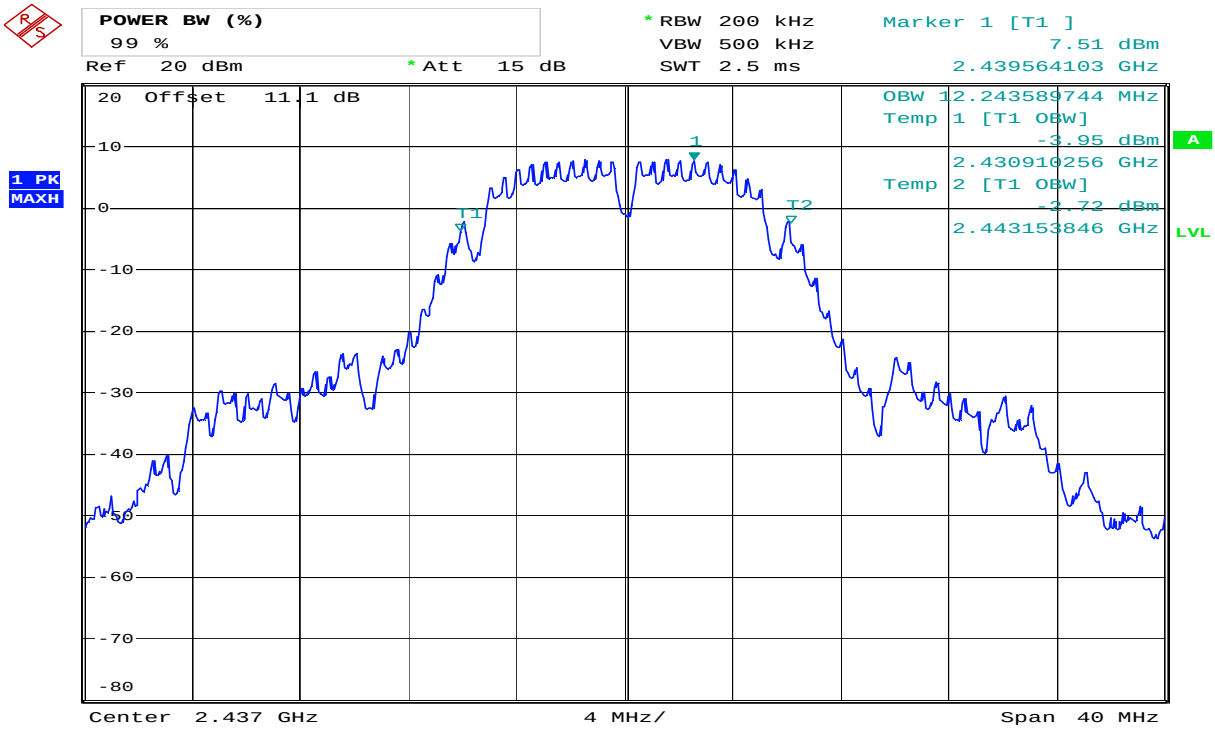
Date: 20.OCT.2010 13:18:43

20dB Bandwidth, 2412 MHz, 802.11g, 6Mbps



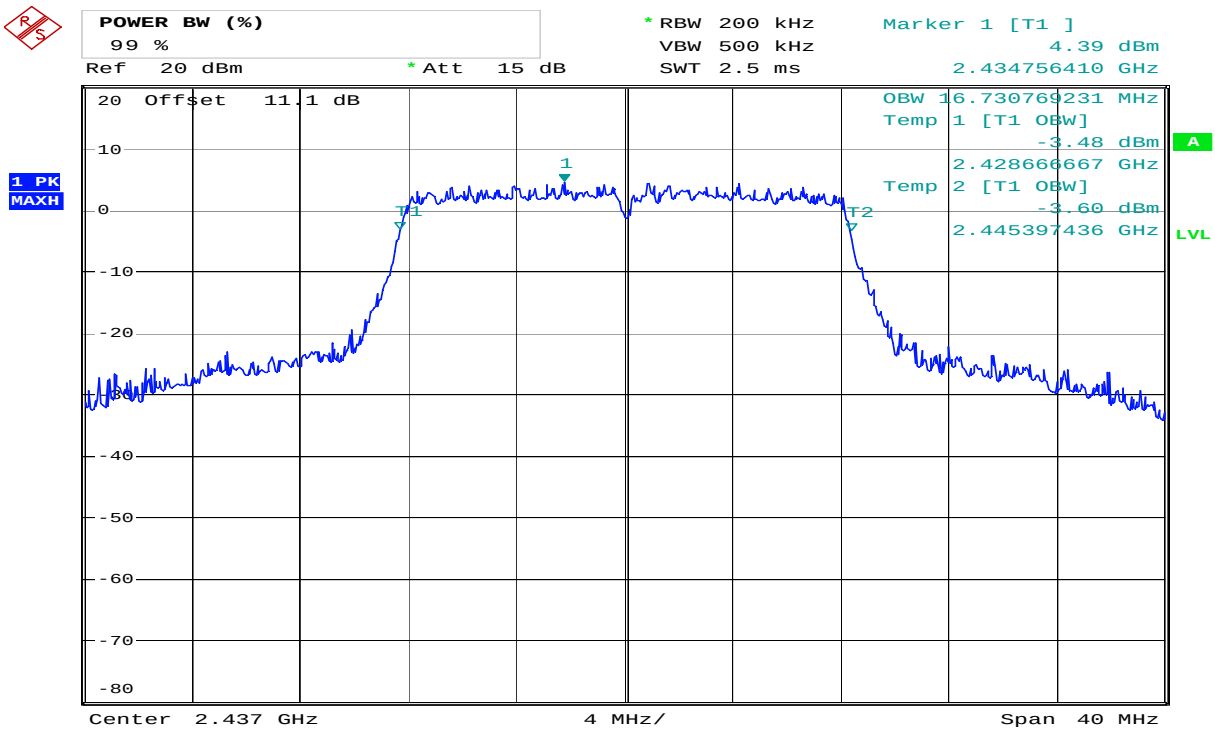
Date: 20.OCT.2010 13:20:12

20dB Bandwidth, 2412 MHz, 802.11n, MCS0



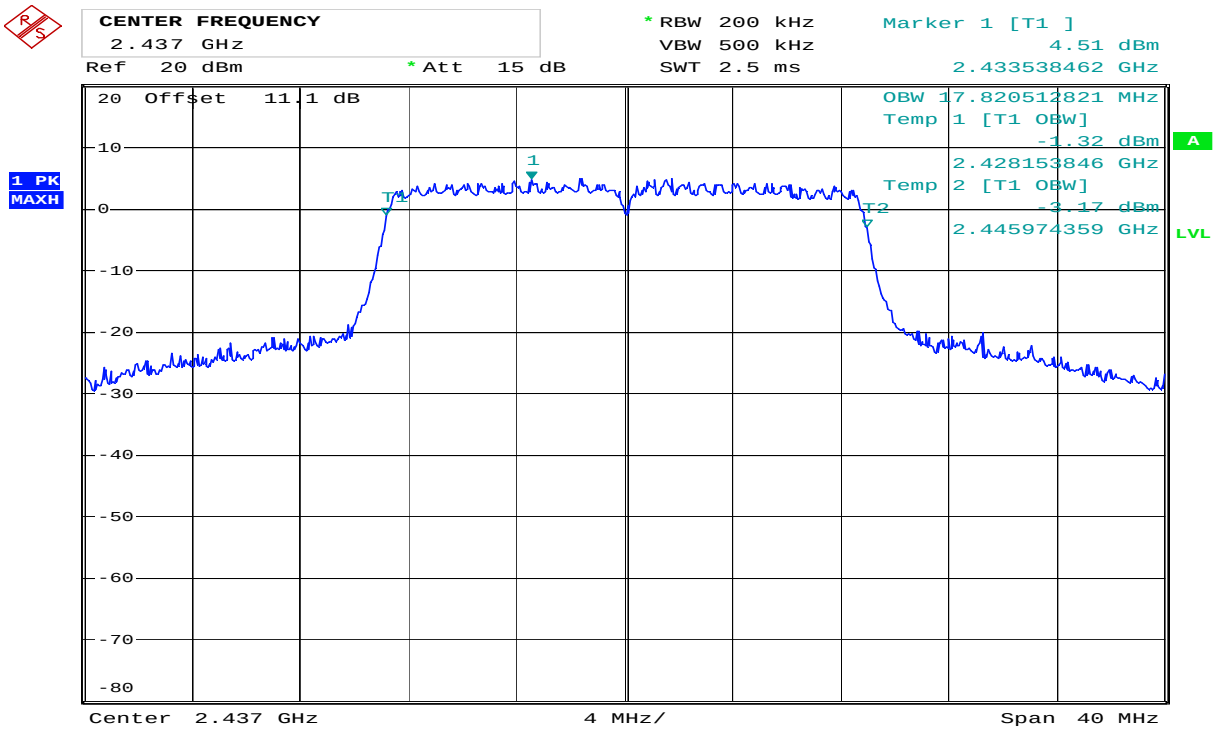
Date: 20.OCT.2010 13:21:58

20dB Bandwidth, 2437 MHz, 802.11b, 1Mbps



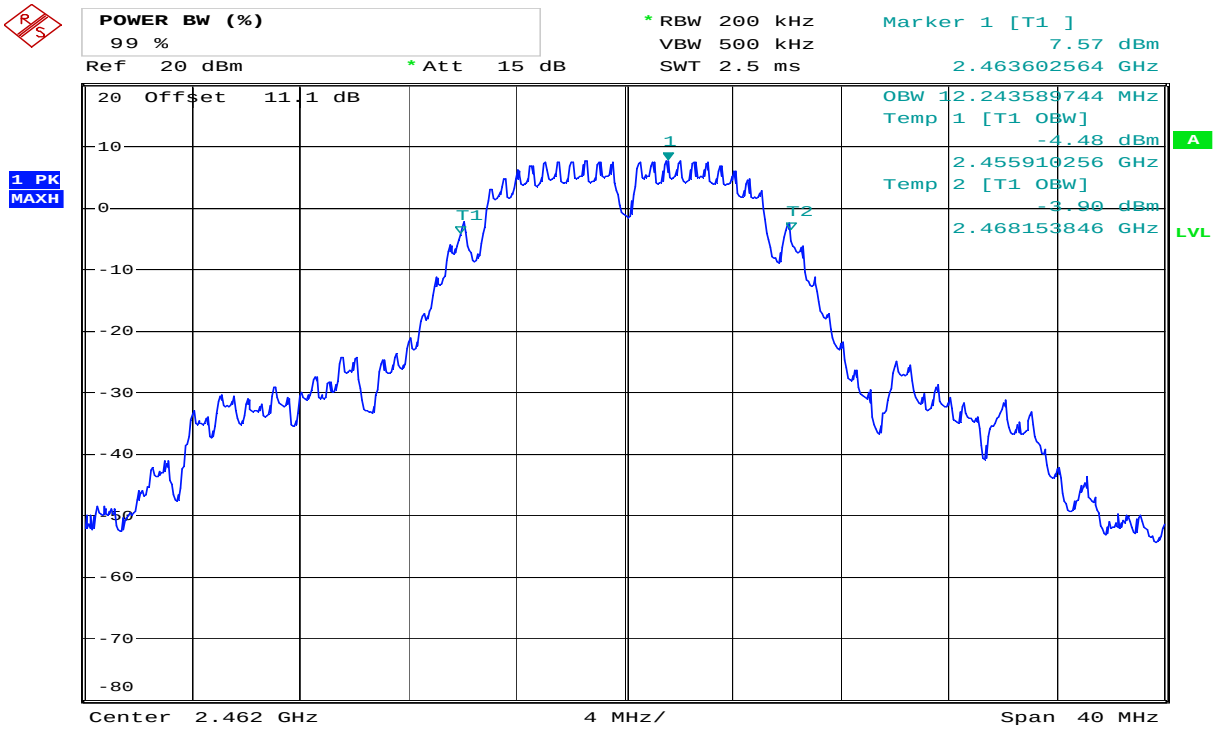
Date: 20.OCT.2010 13:24:33

20dB Bandwidth, 2437 MHz, 802.11g, 6Mbps



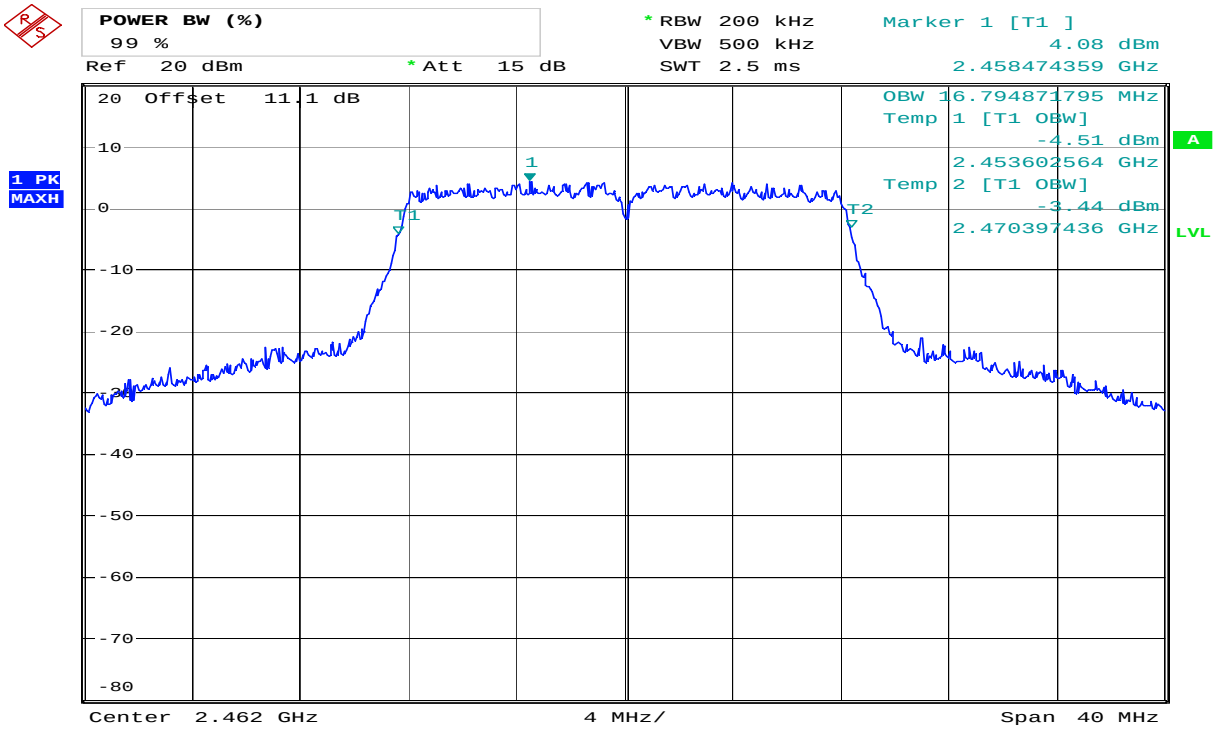
Date: 20.OCT.2010 13:26:55

20dB Bandwidth, 2437 MHz, 802.11n, MCS0



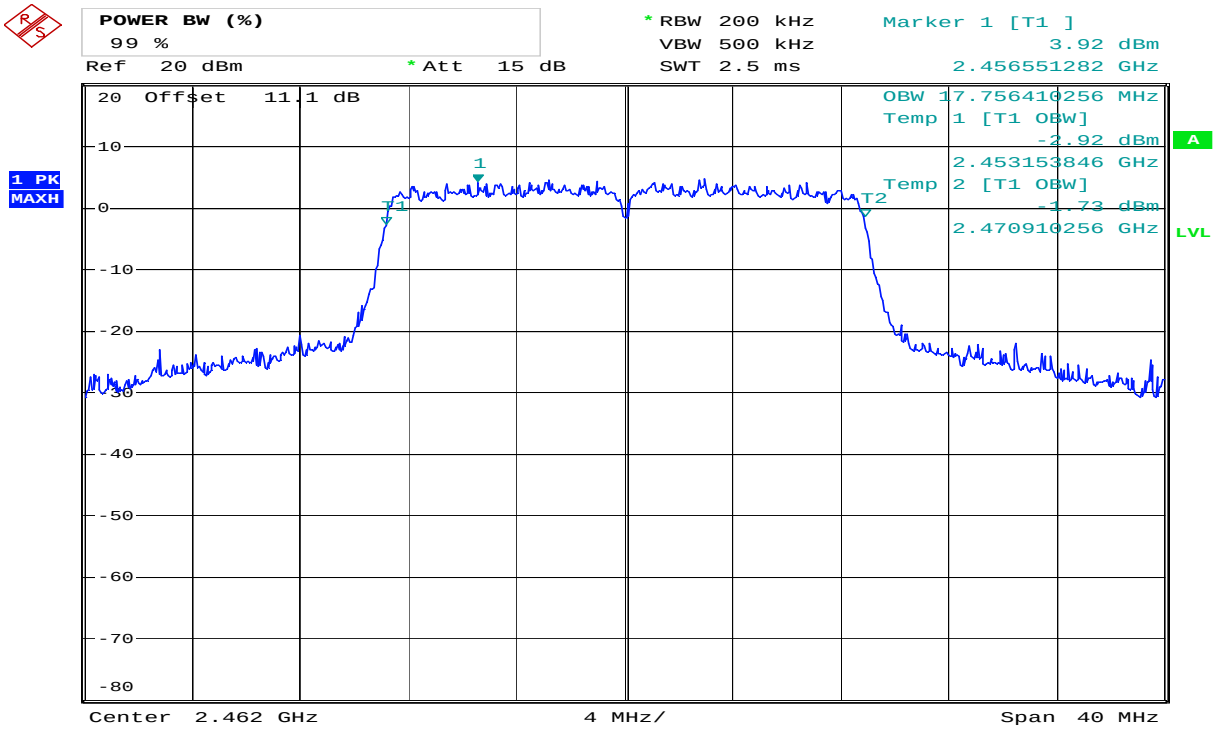
Date: 20.OCT.2010 13:30:05

20dB Bandwidth, 2462 MHz, 802.11b, 1Mbps



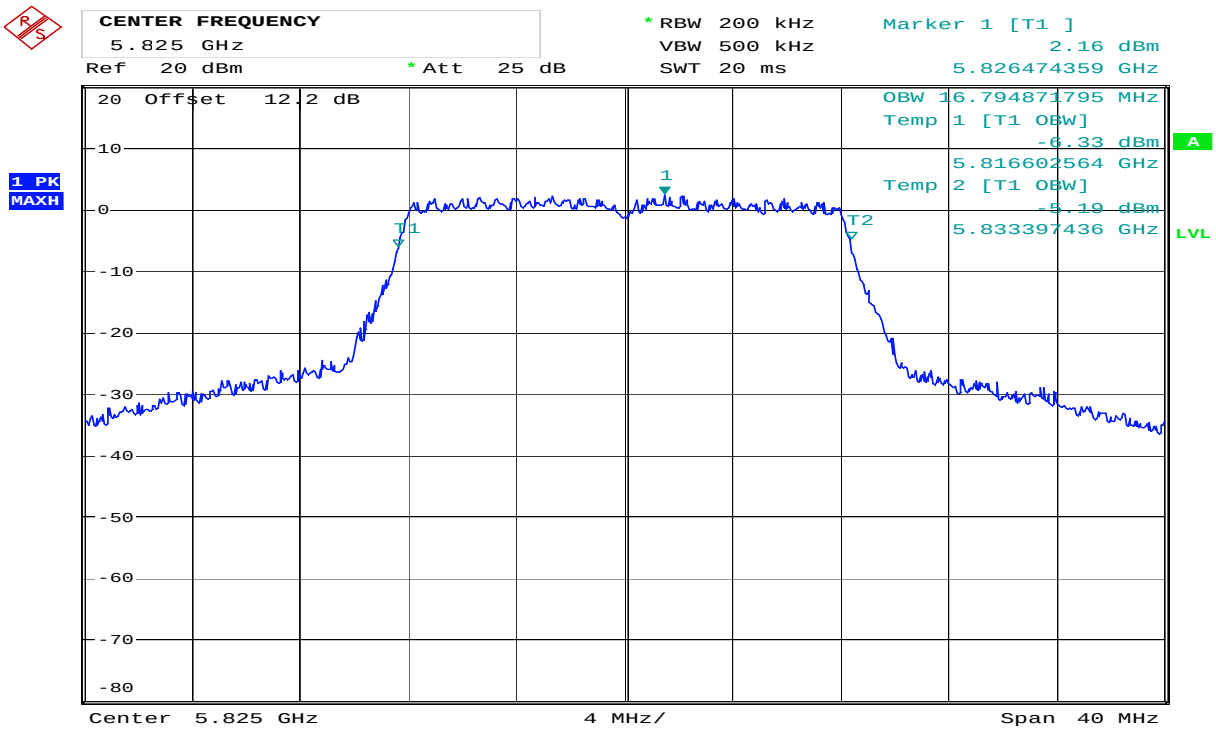
Date: 20.OCT.2010 13:31:20

20dB Bandwidth, 2462 MHz, 802.11g, 6Mbps



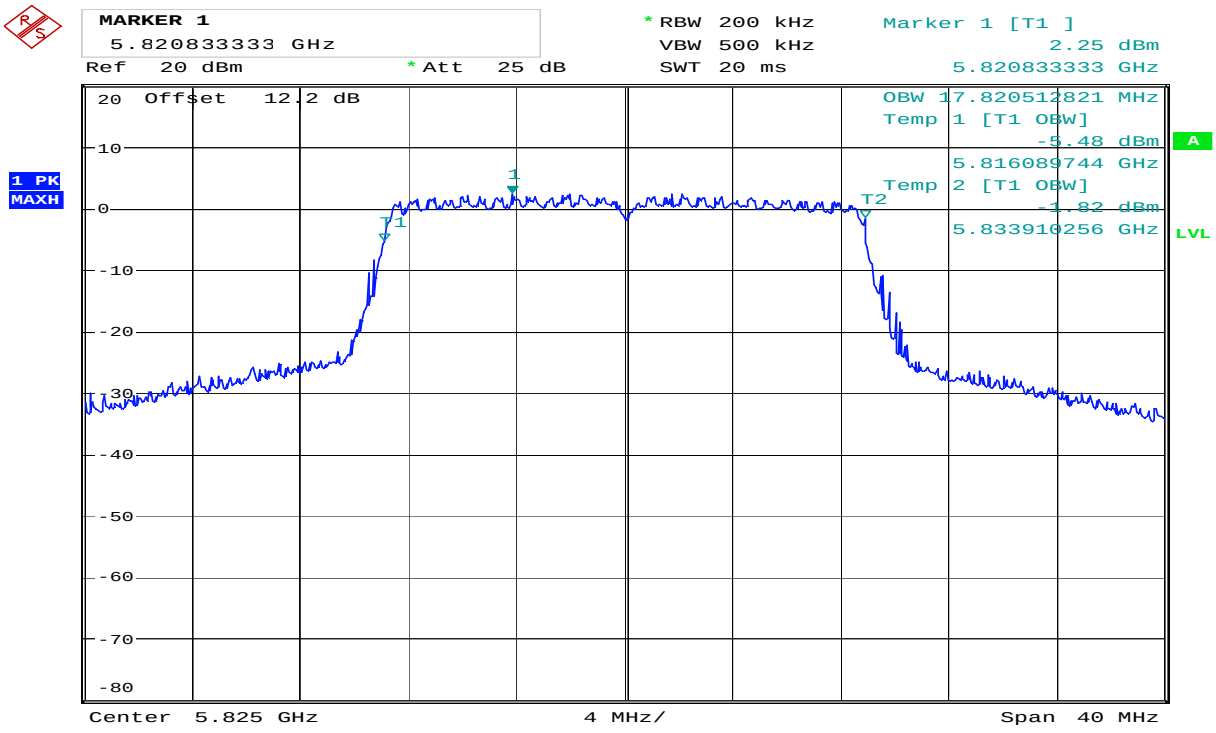
Date: 20.OCT.2010 13:32:41

20dB Bandwidth, 2462 MHz, 802.11n, MCS0



Date: 29.OCT.2010 16:15:04

20dB Bandwidth, 5825 MHz, 802.11a, 6Mbps



Date: 29.OCT.2010 16:16:46

20dB Bandwidth, 5825 MHz, 802.11n, MCS0

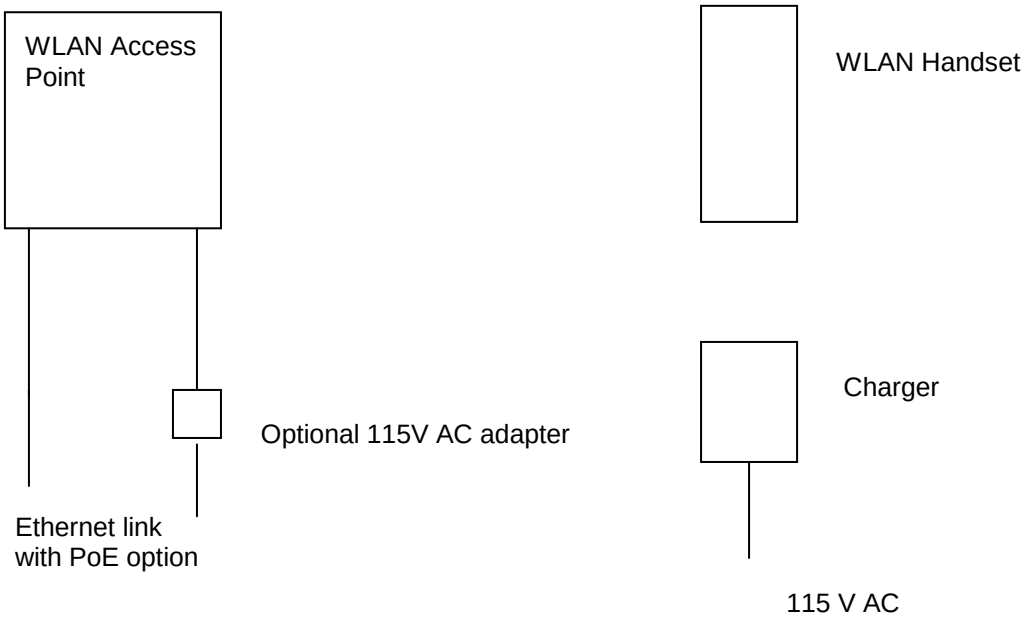
5 LIST OF TEST EQUIPMENT

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.

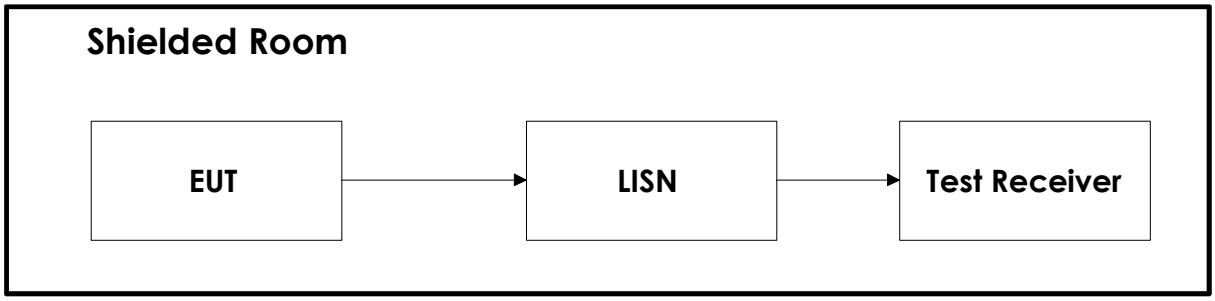
No.	Instrument/ ancillary	Type of instrument/ ancillary	Manufacturer	Ref. no.	Cal date	Cal due
1	FSEK	Spectrum Analyzer	Rohde & Schwarz	LR 1337	2009.12.23	2011.12.23
2	ESAI	Test Receiver	Rohde & Schwarz	LR 1090	2010.03.04	2011.03.04
3	3115	Antenna horn	EMCO	LR 1326	2008.11.06	2011.11.06
4	643	Antenna horn	Narda	LR 093	2009.01.26	2012.01.26
5	642	Antenna horn	Narda	LR 094	2009.01.26	2012.01.26
6	PM7320X	Antenna horn	Siverts lab	LR 103	2009.01.26	2012.01.26
7	DBF-520-20	Antenna horn	Systron Donner	LR 101	2009.01.26	2012.01.26
8	638	Antenna horn	Narda	LR 098	N/A	N/A
9	Model 7200	Signal Generator	Gigatronics	LR1188	2008.12.10	2010.12.10
10	ESH3-Z5	Two Line V-Network	Rohde & Schwarz	LR 1076	2008.11.06	2010.11.06
11	8449B	Pre-amplifier	Hewlett Packard	LR 1322	2009.08.04	2011.08.04
13	HFH2-Z2	Antenna loop	Rohde and Schwarz	LR 285	2007.07.31	2010.07.31
14	HL223	Antenna log.per	Rohde & Schwarz	LR 1261	2010.05.12	2013.05.12
15	HK116	Antenna biconical	Rohde & Schwarz	LR 1260	2010.05.12	2013.05.12
16	ESN	Test Receiver	Rohde & Schwarz	LR 1237	2009.10.22	2010.10.22
17	FSU26	Spectrum Analyzer	Rohde & Schwarz	LR 1504	2009.05.25	2011.05.25
					2010.09.22	2011.09.22
18	U2000A	USB Power Meter	Agilent	LR 1523	2010.01.15	2011.01.15
19	6810.17B	Attenuator	Suhner	LR 1212	2008.09.25	2010.09.25

6 BLOCK DIAGRAM

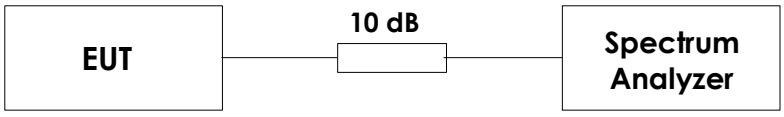
6.1 System set up



6.2 Power Line Conducted Emission



6.3 Conducted Tests



6.4 Test Site Radiated Emission