

Test Report

Product	WLAN Transceiver in UPCS Base	
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-HNB600	
Rating	120V AC, 60Hz	
Trademark	Panasonic	
Serial number	/	
Additional information	IEEE 802.11b/g/n (HT20)	
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	258223	
Tested in period	2014.05.08 to 2014.05.09	
Issue date	2014.05.19	
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 [G.Suhanthakumar]	 Approved by [Frode Sveinsen]
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1 INFORMATION

1.1 Test Item

Name :	Panasonic
FCC ID :	ACJ96NKX-HNB600
Industry Canada ID :	216A-KXHNB600
Model/version :	KX-HNB600
Serial number :	/
Hardware identity and/or version:	PNLB2370xx
Software identity and/or version :	SW401
Frequency Range :	2412 – 2462 MHz
Number of Channels :	11
Operating Modes :	IEEE 802.11 b/g/n (HT20)
Type of Modulation :	Digital (DSSS, OFDM)
User Frequency Adjustment :	None
Conducted Output Power :	65 mW (Peak)
Type of Power Supply :	AC Adaptor Model: PNLV241
Antenna Connector :	None (Integral)
Number of Antennas :	1 for TX, 2 for RX
Antenna Diversity Supported :	Yes

Description of Test Item

The EUT is a digital cordless base unit integrated with WLAN and UPCS. This report covers only the WLAN part, the UPCS part is covered by a separate test report. The WLAN part operates in the 2.4GHz frequency band only and uses 802.11b/g/n (HT20) modulation. The WLAN mode is for connection to a WLAN router or access point only and can not be used with the associated UPCS base station.

Exposure Evaluation

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:	20.8 – 23.3 °C
Relative humidity:	23 - 43 %
Normal test voltage:	120V AC, 60Hz

The values are the limit registered during the test period.

1.3 Test Engineer(s)

G.Suhanthakumar

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 v03r01. 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.

- | | |
|---|---|
| <input checked="" type="checkbox"/> New Submission | <input checked="" type="checkbox"/> Production Unit |
| <input type="checkbox"/> Class II Permissive Change | <input type="checkbox"/> Pre-production Unit |
| DTS Equipment Code | <input type="checkbox"/> 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

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)

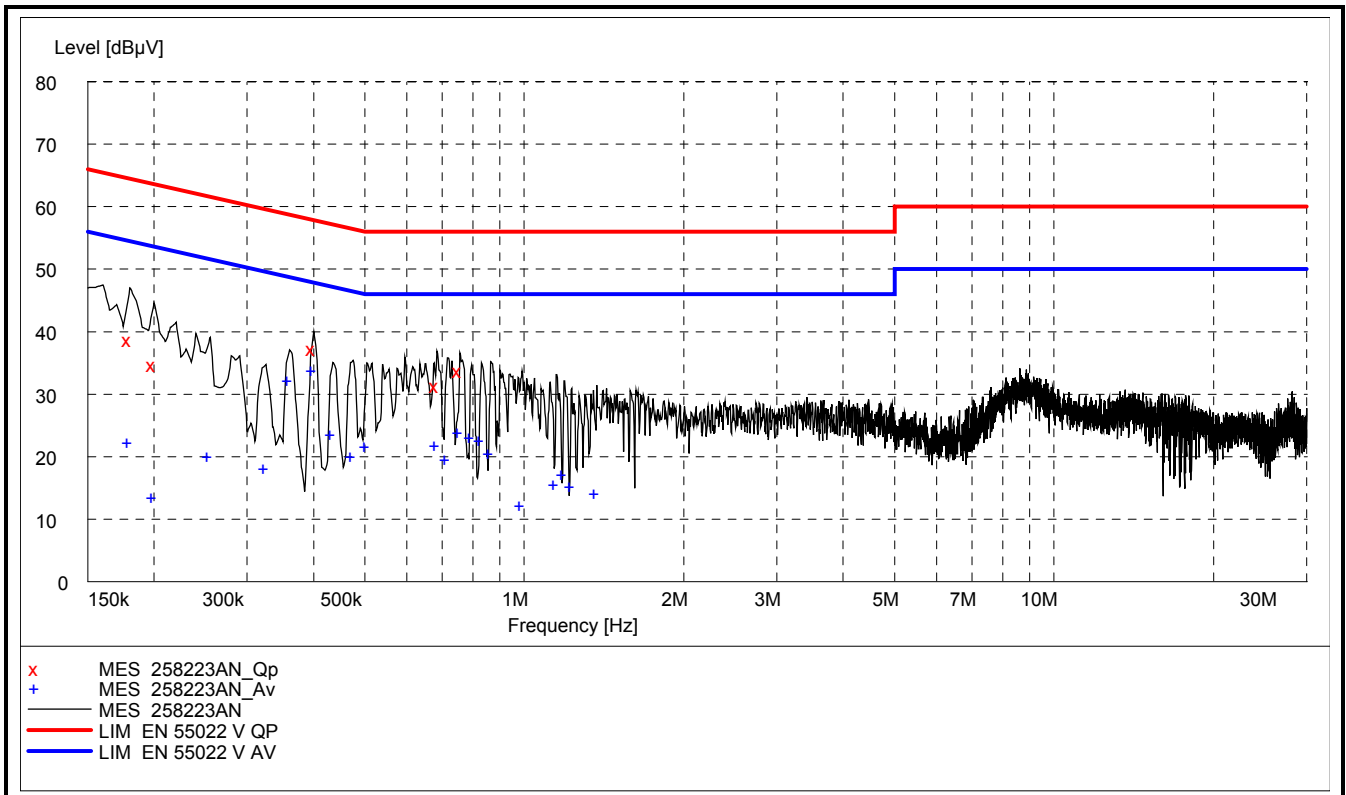
Test Performed By: G.Suwanthakumar	Date of Test: 09. May 2014
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Measurement procedure: ANSI C63.4-2009 using 50 μ H/50 ohms LISN.

Test Results: Complies

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

Charger PNL109 with Power Adaptor PNLV236, 120V 60Hz



Frequency [MHz]	Level [dBuV]	Af [dB]	Limit [dBuV]	Margin [dB]	Det	Position	Verdict [Pass/Fail]
0.180000	38.90	10.10	64.50	25.60	QP	N	Pass
0.200000	34.90	10.10	63.60	28.70	QP	N	Pass
0.400000	37.50	10.20	57.90	20.40	QP	N	Pass
0.685000	31.60	10.20	56.00	24.40	QP	L1	Pass
0.755000	34.00	10.20	56.00	22.00	QP	L1	Pass

Frequency [MHz]	Level [dBuV]	Af [dB]	Limit [dBuV]	Margin [dB]	Det	Position	Verdict [Pass/Fail]
0.180000	22.30	10.10	54.50	32.20	AV	N	Pass
0.200000	13.60	10.10	53.60	40.00	AV	N	Pass
0.255000	20.20	10.10	51.60	31.40	AV	N	Pass
0.325000	18.30	10.20	49.60	31.30	AV	L1	Pass
0.360000	32.30	10.20	48.70	16.40	AV	N	Pass
0.400000	34.00	10.20	47.90	13.90	AV	N	Pass
0.435000	23.70	10.20	47.20	23.50	AV	L1	Pass
0.475000	20.20	10.20	46.40	26.20	AV	L1	Pass
0.505000	21.70	10.20	46.00	24.30	AV	L1	Pass
0.685000	21.90	10.20	46.00	24.10	AV	L1	Pass
0.715000	19.70	10.20	46.00	26.30	AV	L1	Pass
0.755000	24.10	10.20	46.00	21.90	AV	L1	Pass
0.795000	23.30	10.20	46.00	22.70	AV	L1	Pass
0.830000	22.70	10.20	46.00	23.30	AV	L1	Pass
0.865000	20.60	10.20	46.00	25.40	AV	L1	Pass
0.990000	12.30	10.20	46.00	33.70	AV	L1	Pass
1.150000	15.60	10.20	46.00	30.40	AV	L1	Pass
1.190000	17.30	10.20	46.00	28.70	AV	L1	Pass
1.230000	15.30	10.20	46.00	30.70	AV	L1	Pass
1.370000	14.20	10.20	46.00	31.80	AV	L1	Pass

3.2 Occupied Bandwidth (99% BW)

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

Test Performed By: G.Suhandhakumar	Date of Test: 09.May 2014
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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	12.1
802.11b, 11 Mbps	12.3
802.11g, 6 Mbps	16.5
802.11g, 54 Mbps	16.5
802.11n, MCS0, 20MHz BW	17.6
802.11n, MCS7, 20MHz BW	17.6

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

See attached graph.

Requirements:

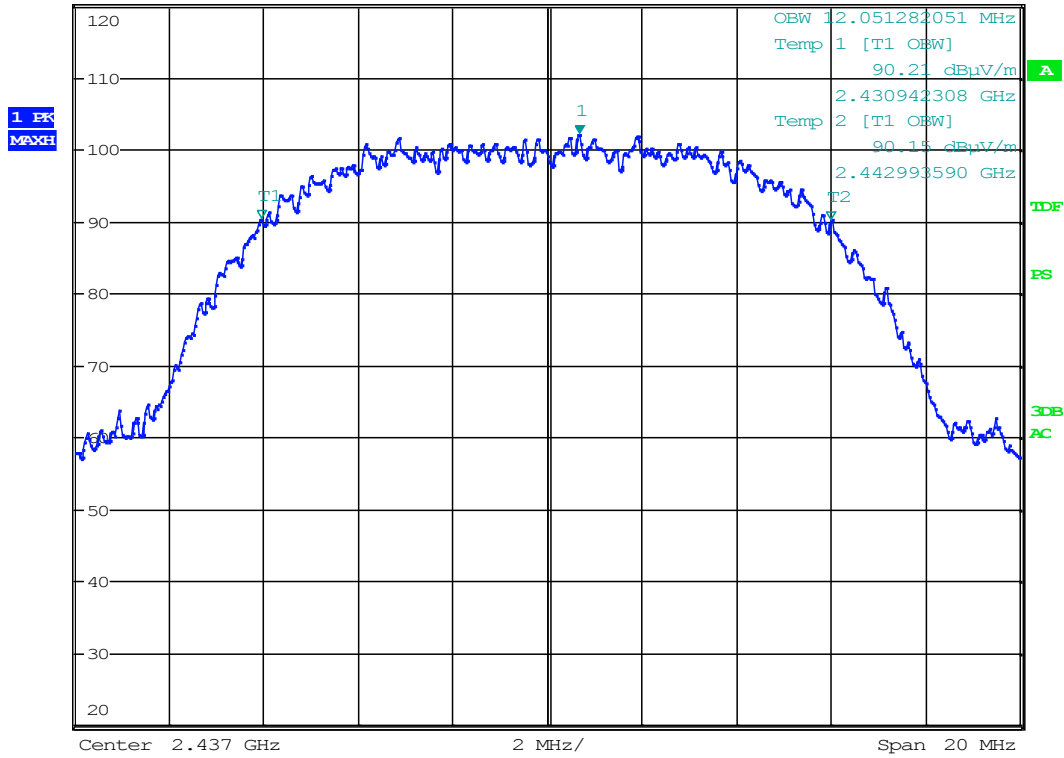
Frequency hopping systems in the 2400 - 2483.5 MHz band shall use at least 15 non-overlapping channels. No requirements for bandwidth for this frequency band.

No requirements for Digital Transmission Systems.



MARKER 1
 2.437673077 GHz
 Ref 120 dBµV/m *Att 15 dB

*RBW 100 kHz Marker 1 [T1]
 VBW 300 kHz 102.01 dBµV/m
 SWT 10 ms 2.437673077 GHz

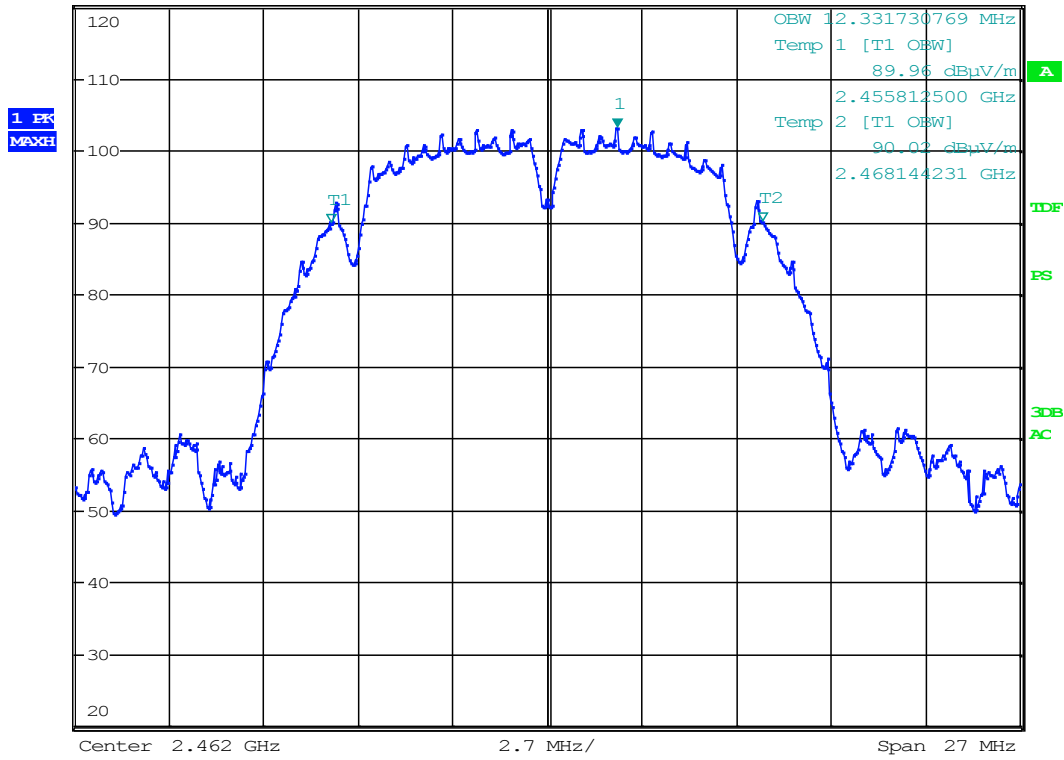


Date: 8.MAY.2014 12:52:25

Occupied Bandwidth, 2437 MHz, 802.11b, 1Mbps



MARKER 1
 2.463990385 GHz
 Ref 120 dBµV/m *Att 15 dB *REW 100 kHz VBW 300 kHz SWT 10 ms
 Marker 1 [T1]
 103.04 dBµV/m
 2.463990385 GHz

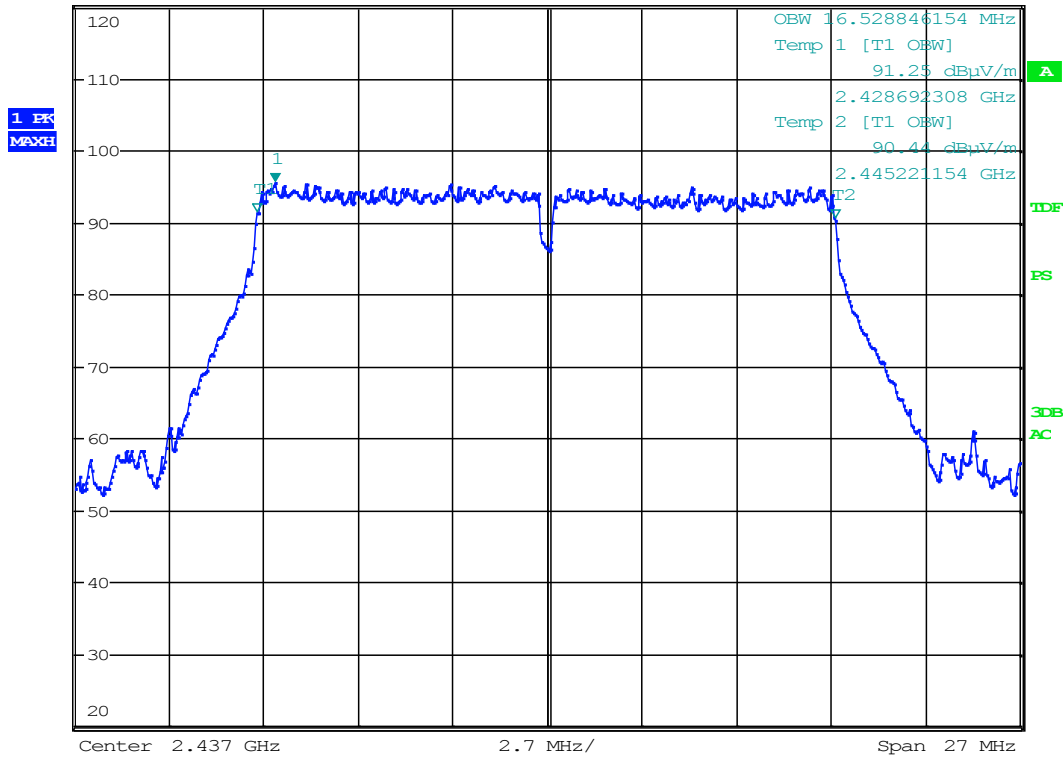


Date: 8.MAY.2014 12:36:44

Occupied Bandwidth, 2437 MHz, 802.11b, 11Mbps



MARKER 1
 2.429211538 GHz
 Ref 120 dBµV/m *Att 15 dB
 *RBW 100 kHz Marker 1 [T1]
 VBW 300 kHz 95.58 dBµV/m
 SWT 10 ms 2.429211538 GHz

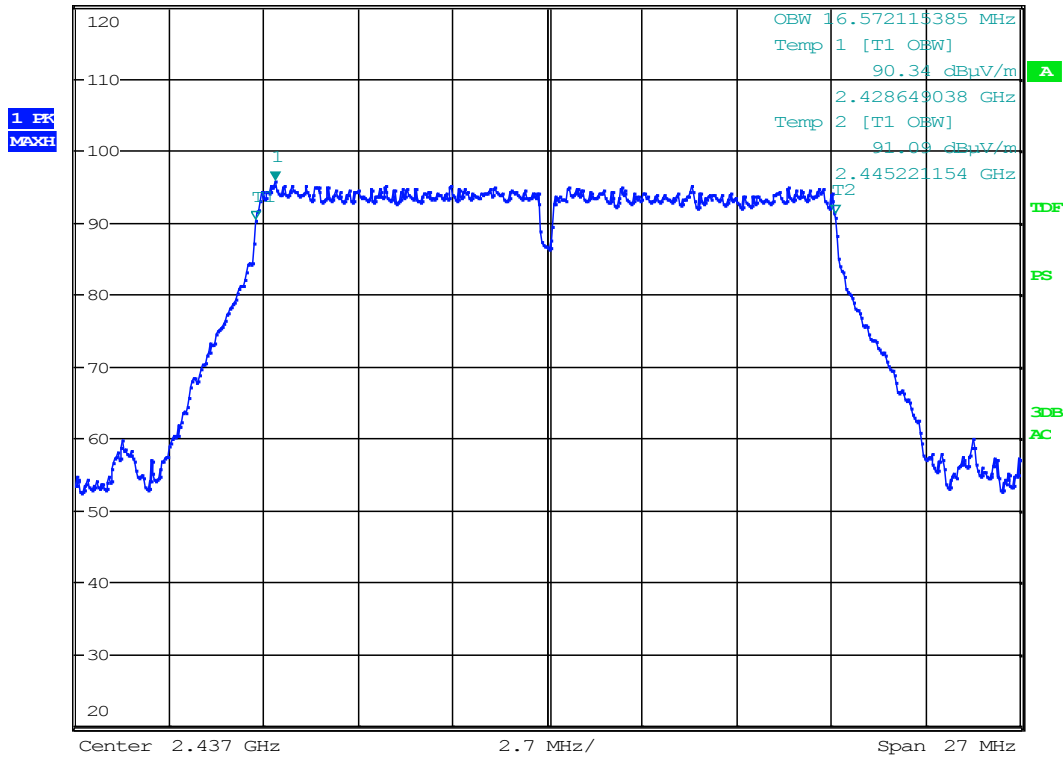


Date: 8.MAY.2014 11:03:49

Occupied Bandwidth, 2437 MHz, 802.11g, 6Mbps



MARKER 1
 2.429211538 GHz
 Ref 120 dBµV/m *Att 15 dB
 *RBW 100 kHz Marker 1 [T1]
 VBW 300 kHz 95.68 dBµV/m
 SWT 10 ms 2.429211538 GHz

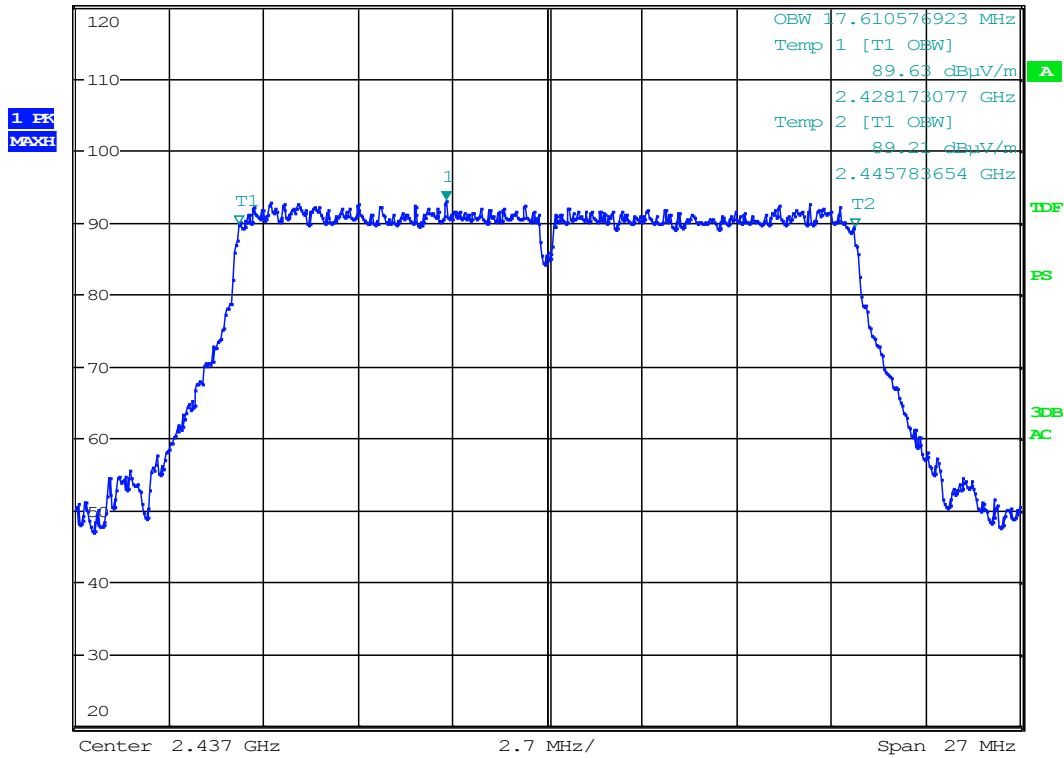


Date: 8.MAY.2014 11:16:32

Occupied Bandwidth, 2437 MHz, 802.11g, 54Mbps



MARKER 1
 2.434100962 GHz
 Ref 120 dBµV/m *Att 15 dB
 *RBW 100 kHz Marker 1 [T1]
 VBW 300 kHz 93.03 dBµV/m
 SWT 10 ms 2.434100962 GHz



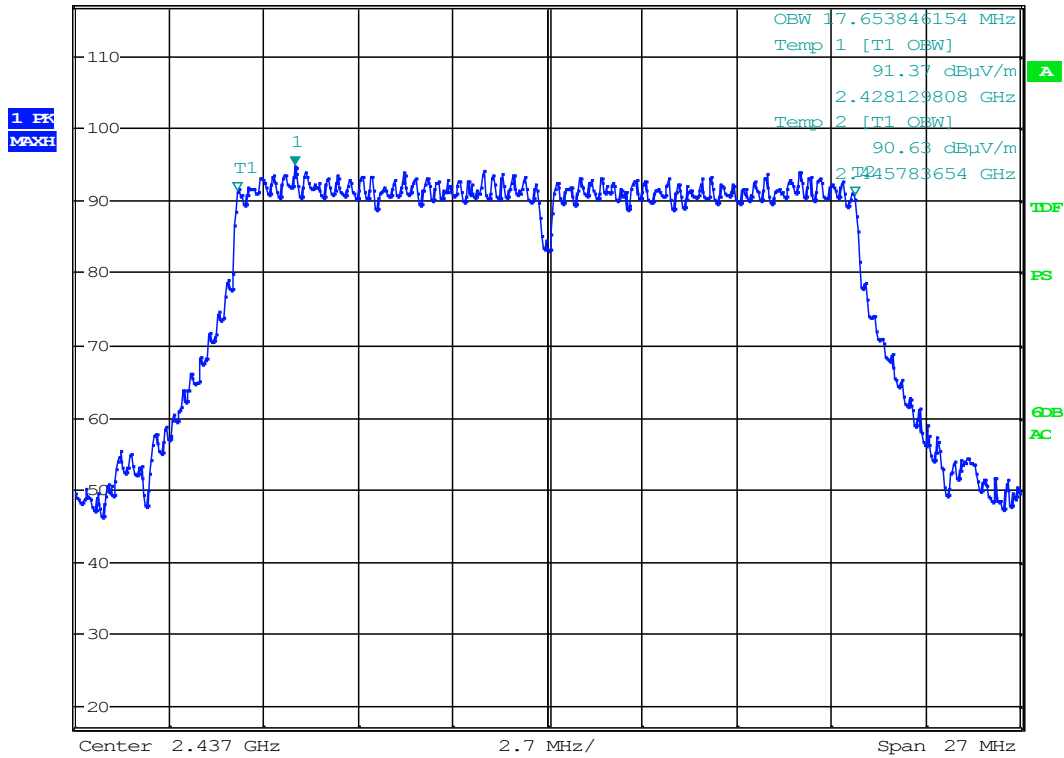
Date: 8.MAY.2014 13:40:06

Occupied Bandwidth, 2437 MHz, 802.11n, MCS0, 20MHz BW



MARKER 1
 2.429774038 GHz
 Ref 117 dBµV/m *Att 10 dB

*RBW 100 kHz Marker 1 [T1]
 VBW 300 kHz 94.77 dBµV/m
 SWT 10 ms 2.429774038 GHz



Date: 8.MAY.2014 13:50:33

Occupied Bandwidth, 2437 MHz, 802.11n, MCS7, 20MHz BW

3.3 Minimum 6 dB Bandwidth (DTS Bandwidth)

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

Test Performed By: G.Suhandhakumar	Date of Test: 09.May 2014
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Test Results: Complies

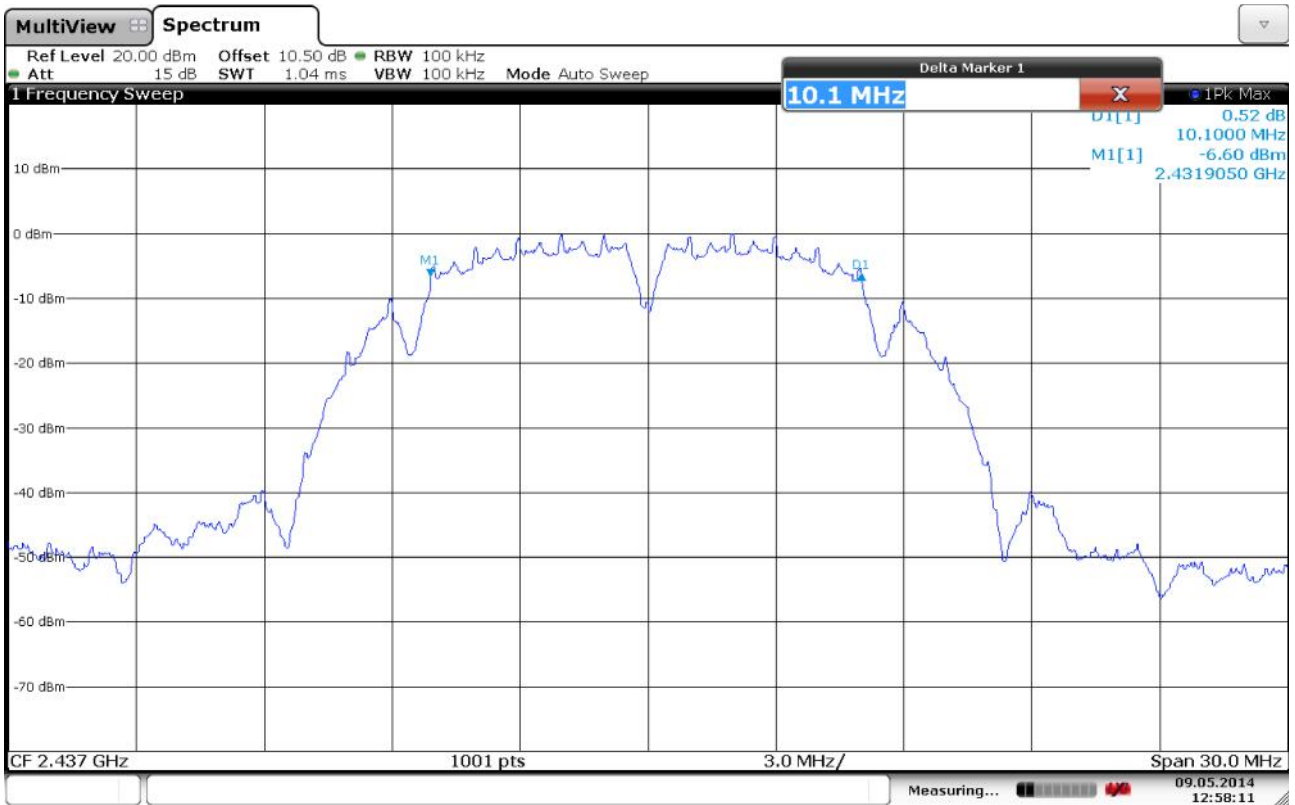
Measurement Data:

Modulation type and bitrate	Measured DTS Bandwidth (MHz)
	Ch 6, 2437 MHz
802.11b, 1 Mbps	10.1
802.11b, 11 Mbps	09.9
802.11g, 6 Mbps	16.6
802.11g, 54 Mbps	16.5
802.11n, MCS0, 20MHz BW	17.7
802.11n, MCS7, 20MHz BW	17.7

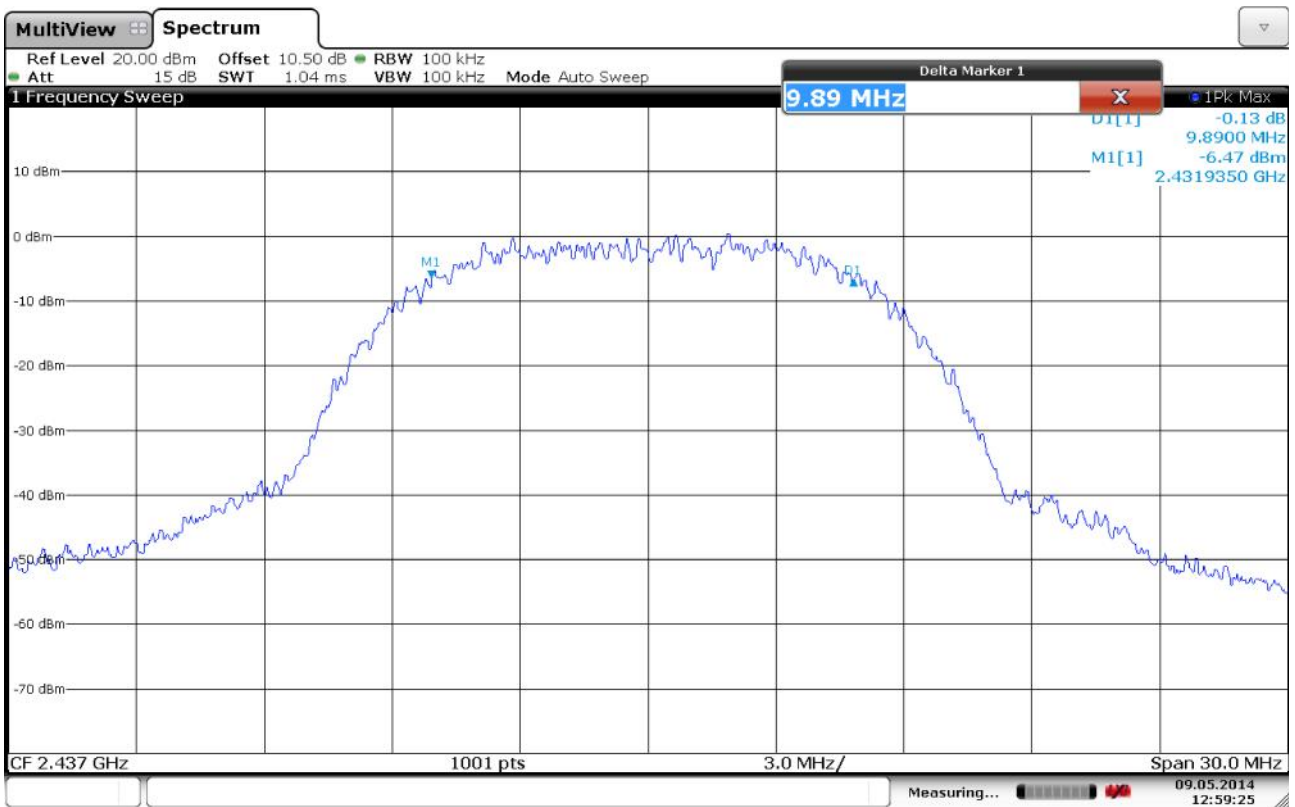
Tested according to KDB 558074 D01 DTS Meas Guidance v03r01, Section 8.1

Requirements:

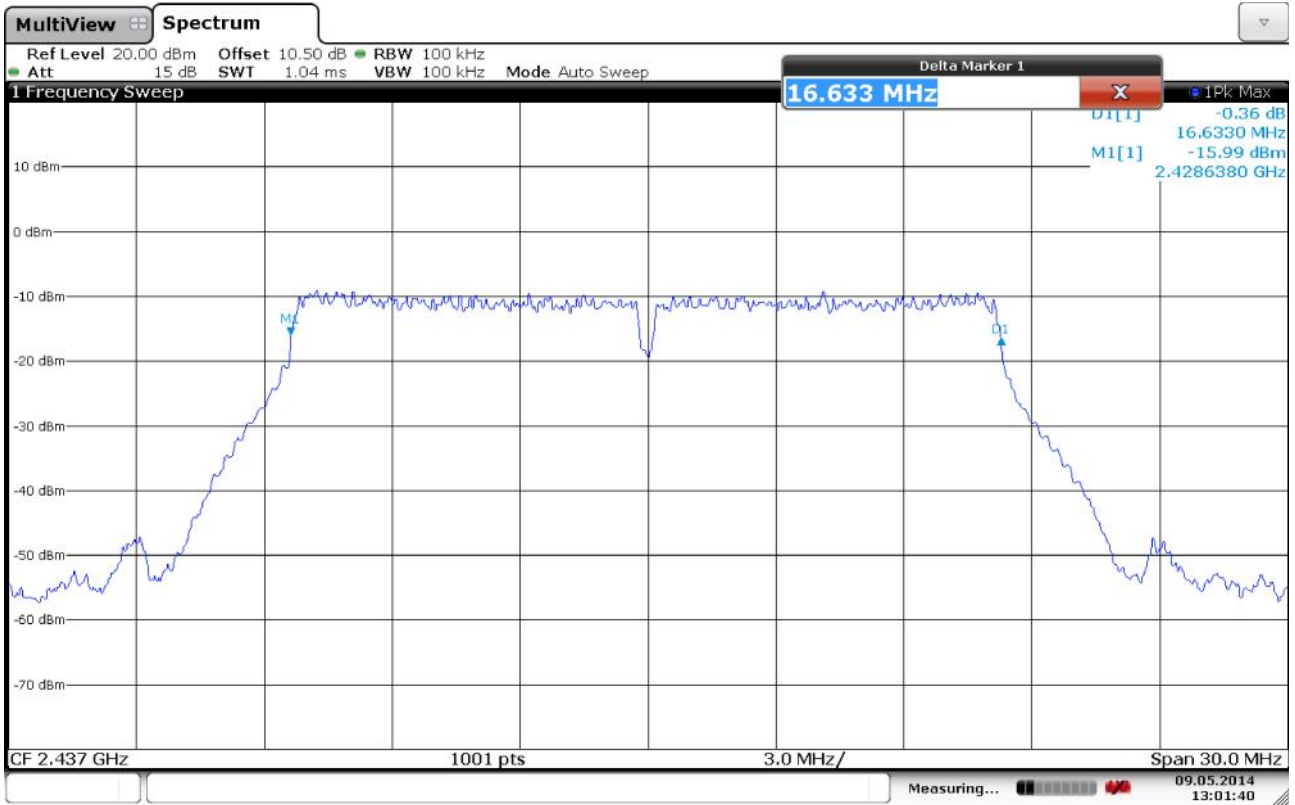
For Digital Transmission Systems in the 2400-2483.5 MHz band the minimum 6 dB bandwidth shall be at least 500 KHz.



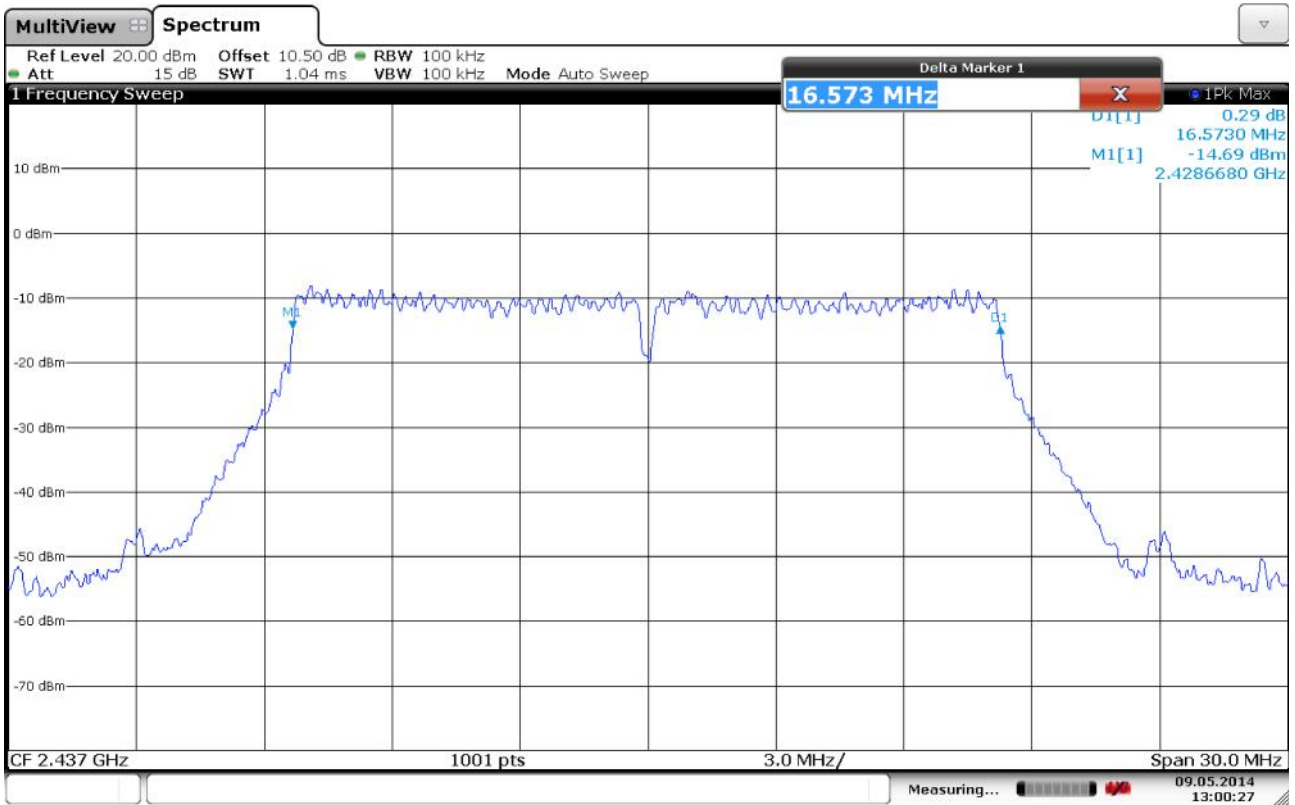
6 dB Bandwidth, 2437 MHz, 802.11b, 1Mbps



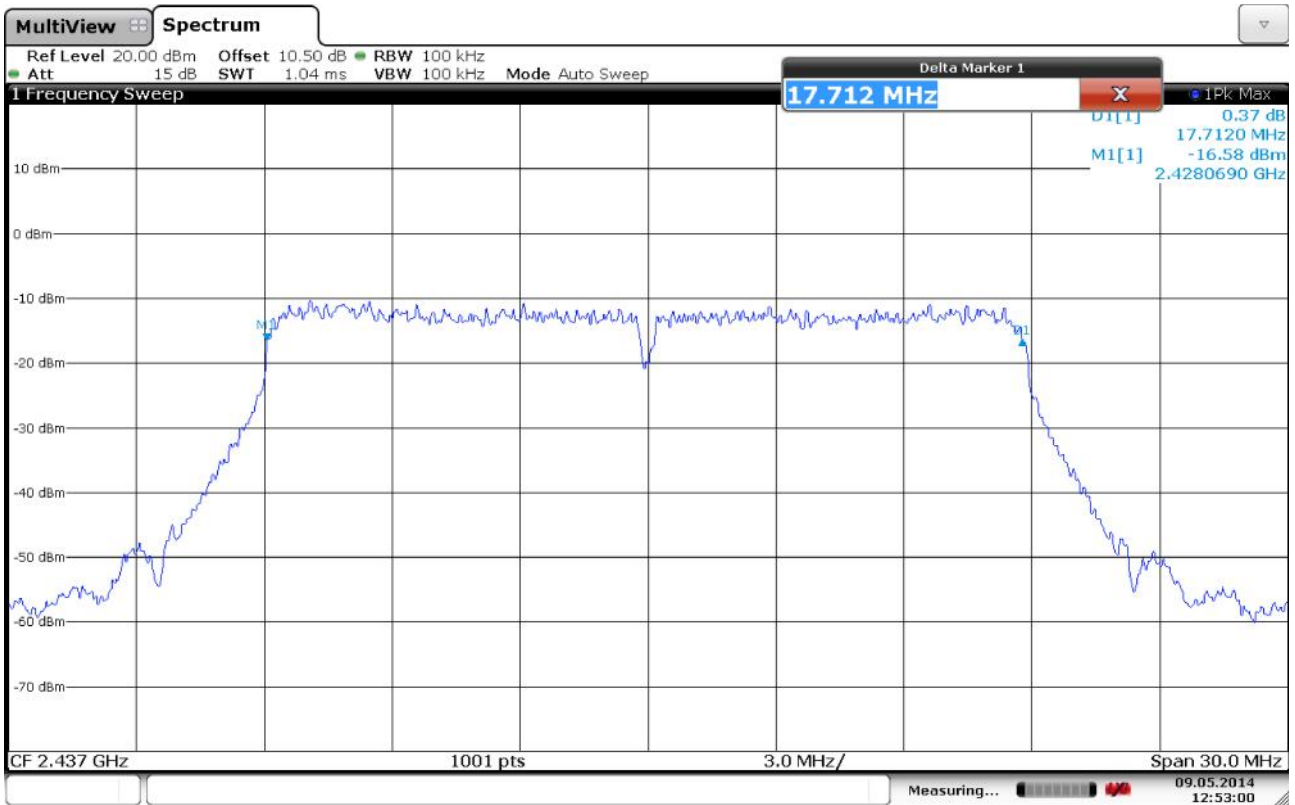
6 dB Bandwidth, 2437 MHz, 802.11b, 11Mbps



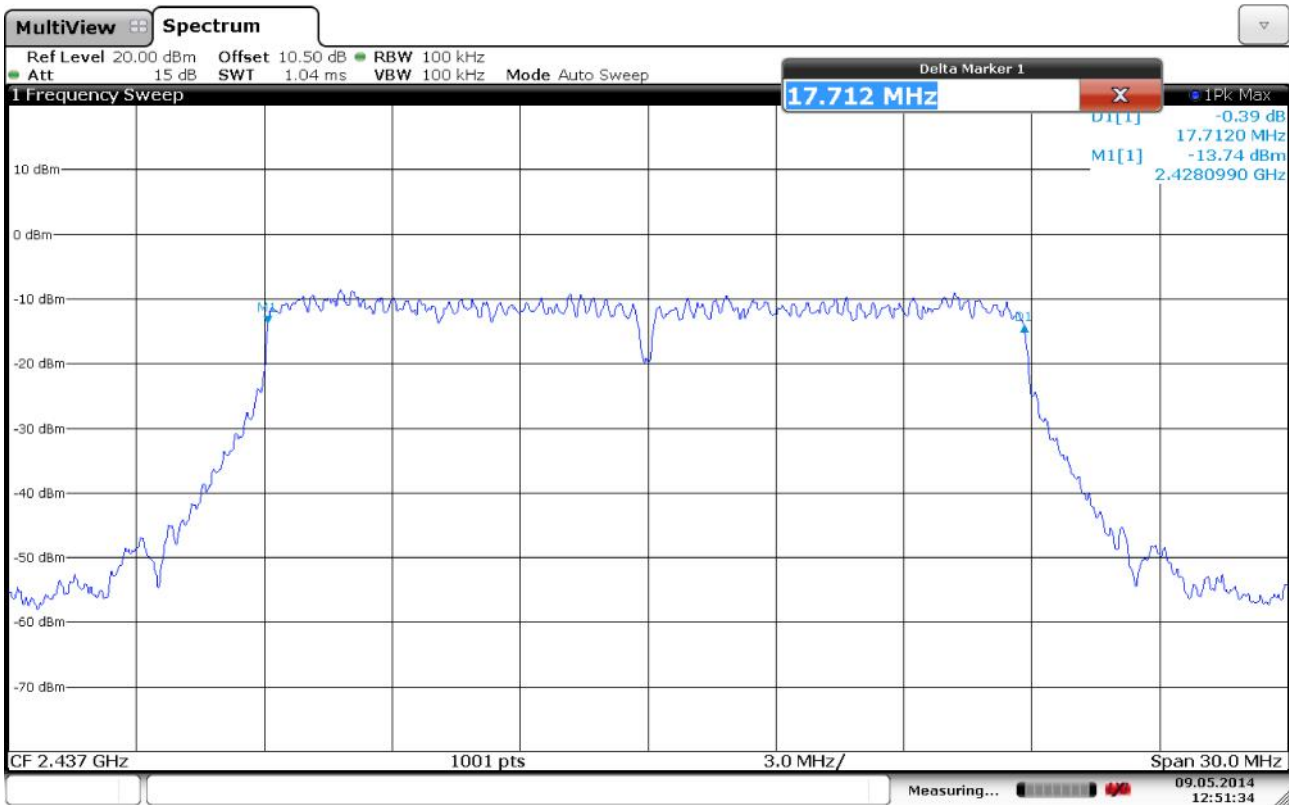
6 dB Bandwidth, 2437 MHz, 802.11g, 6Mbps



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



6 dB Bandwidth, 2437 MHz, 802.11n, MCS0, 20MHz BW



6 dB Bandwidth, 2437 MHz, 802.11n, MCS7, 20MHz BW

3.4 Peak Power Output

Para. No.: 15.247 (b)

Test Performed By: G.Suhanthakumar	Date of Test: 09.May 2014
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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, 20MHz BW
2412 MHz	18.1	16.0	13.3
2437 MHz	17.2	16.0	12.6
2462 MHz	16.1	14.5	12.0

Carrier Frequency	Maximum Field strength, dB μ V/m		
	802.11b, 11 Mbps	802.11g, 54 Mbps	802.11n, MCS7, 20MHz BW
2412 MHz	117.1	115.1	115.1
2437 MHz	118.8	117.7	116.6
2462 MHz	119.6	118.3	118.0

Carrier Frequency	EIRP, dBm		
	802.11b, 11 Mbps	802.11g, 54 Mbps	802.11n, MCS7, 20MHz BW
2412 MHz	21.84	19.84	19.84
2437 MHz	23.54	22.44	21.34
2462 MHz	24.34	23.04	22.74

Carrier Frequency	Maximum Antenna Gain, dBi		
	802.11b, 11 Mbps	802.11g, 54 Mbps	802.11n, MCS7, 20MHz BW
2412 MHz	3.74	3.84	6.54
2437 MHz	6.34	6.44	8.74
2462 MHz	8.24	8.54	10.74

Tested according to KDB 558074 D01 DTS Meas Guidance v03r01, Section 9.1.1

EIRP is calculated according to KDB 558074 D01 DTS Meas Guidance v03r01, Section 12.2.2. (e)

The maximum field strength is obtained in XZ plane and Vertical polarization

See attached plots.

Detachable antenna? Yes No

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

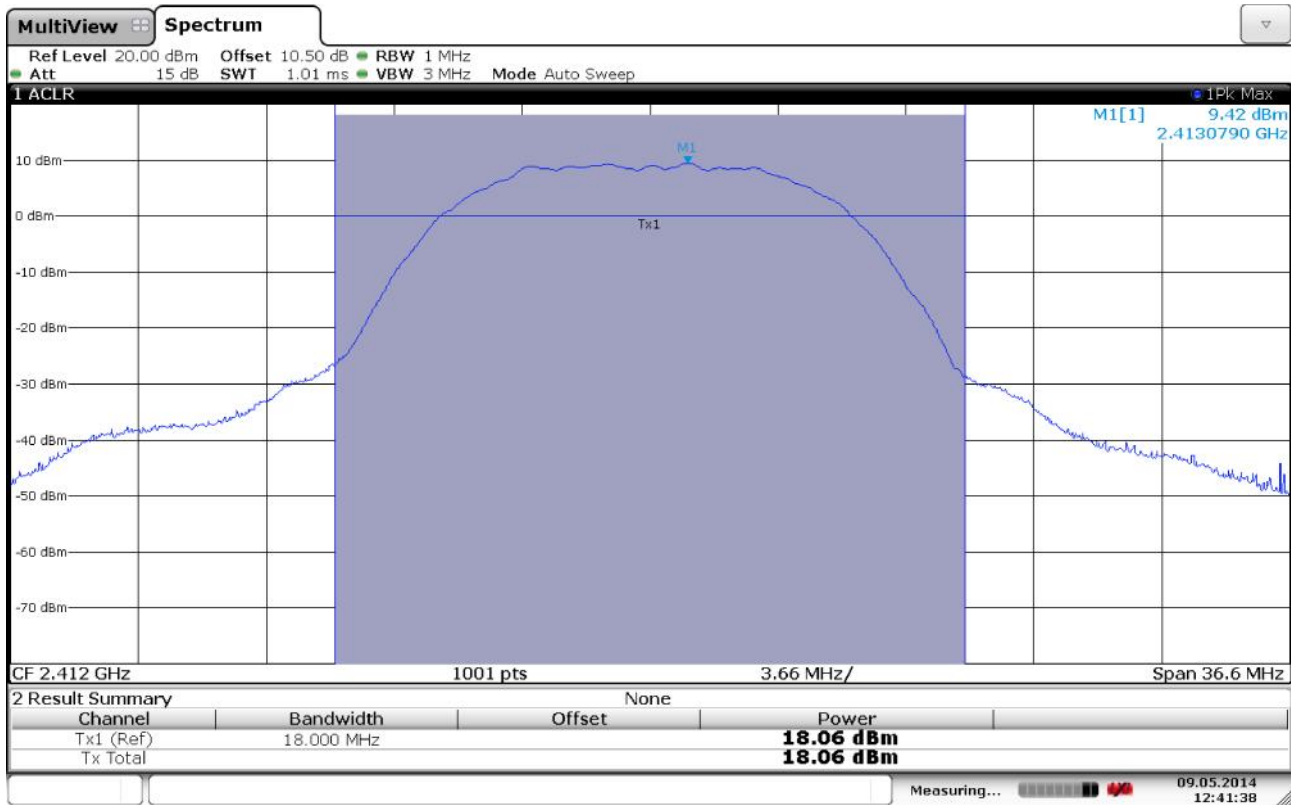
Type of antenna connector: N/A

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

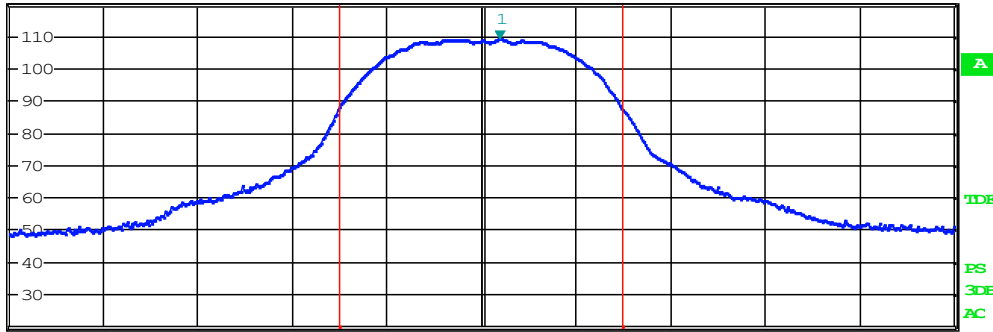


MARKER 1
 2.412961538 GHz

* RBW 1 MHz
 VEW 3 MHz
 SWT 2.5 ms

Marker 1 [T1]
 108.82 dBµV/m
 2.412961538 GHz

1 EK
 MAXH



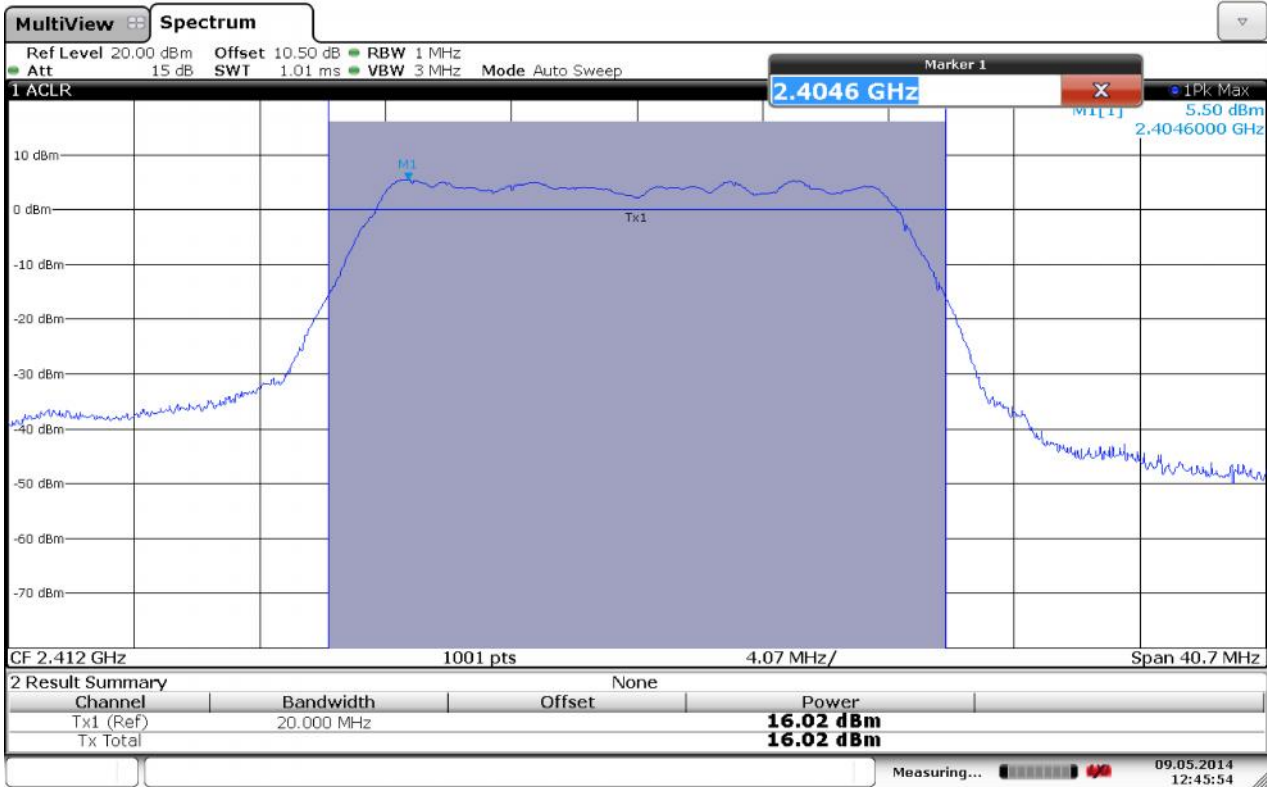
Center 2.412 GHz 5 MHz/ Span 50 MHz

Tx Channel

Bandwidth 15 MHz Power 117.11 dBµV/m

Date: 8.MAY.2014 13:21:21

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



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

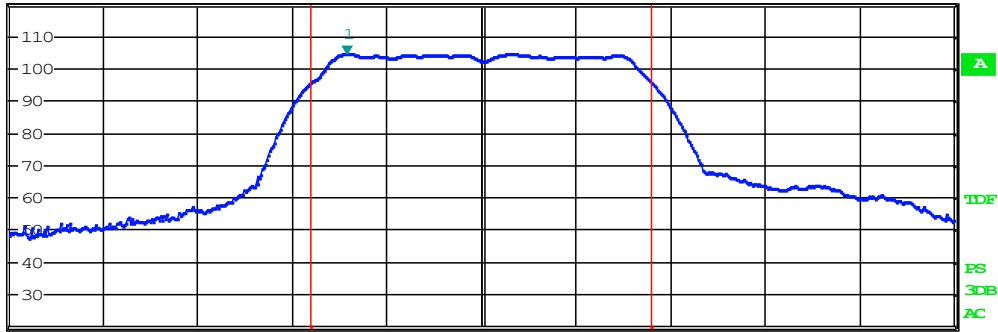


MARKER 1
 2.40486859 GHz

* RBW 1 MHz
 VEW 3 MHz
 SWT 2.5 ms

Marker 1 [T1]
 104.26 dBµV/m
 2.404868590 GHz

1 Ek
 MAXH



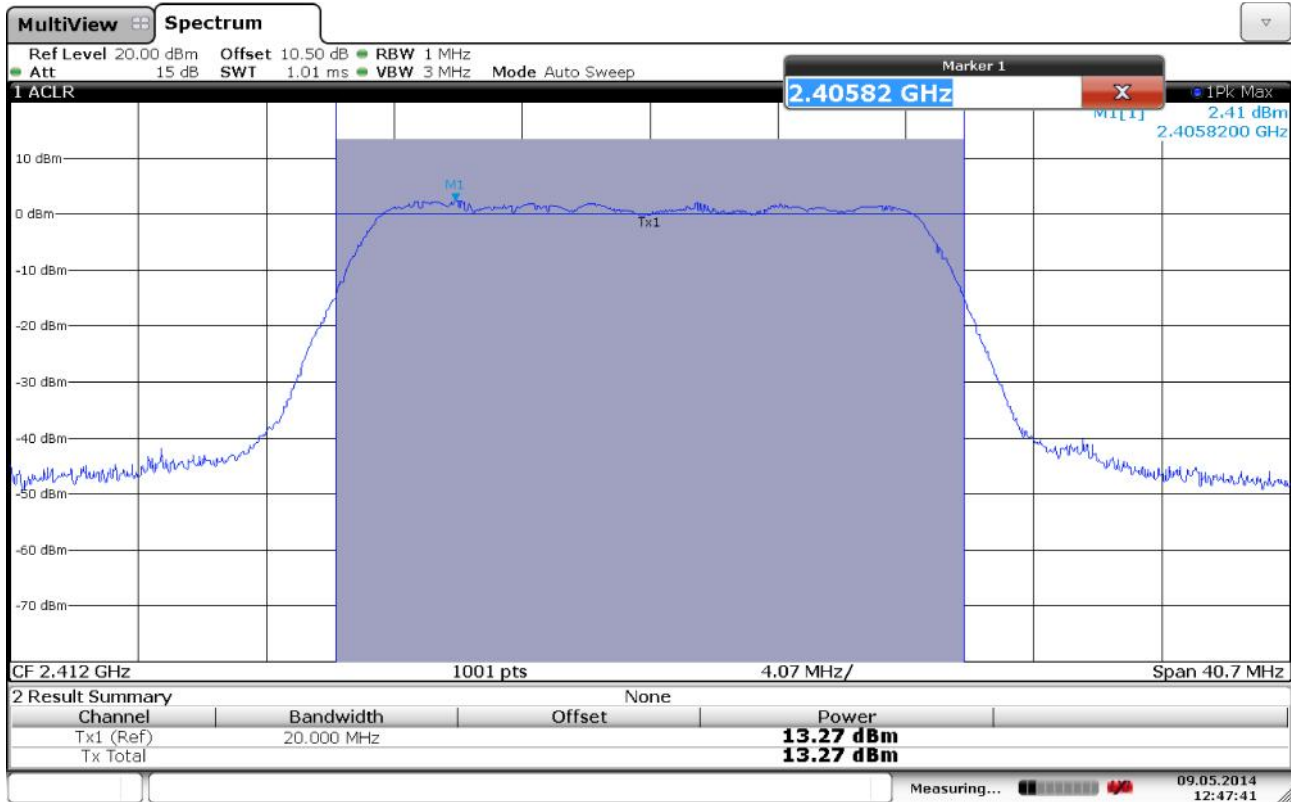
Center 2.412 GHz 5 MHz/ Span 50 MHz

Tx Channel

Bandwidth 18 MHz Power 115.07 dBµV/m

Date: 8.MAY.2014 12:11:37

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



Conducted Output Power, 2412 MHz, 802.11n, MCS7

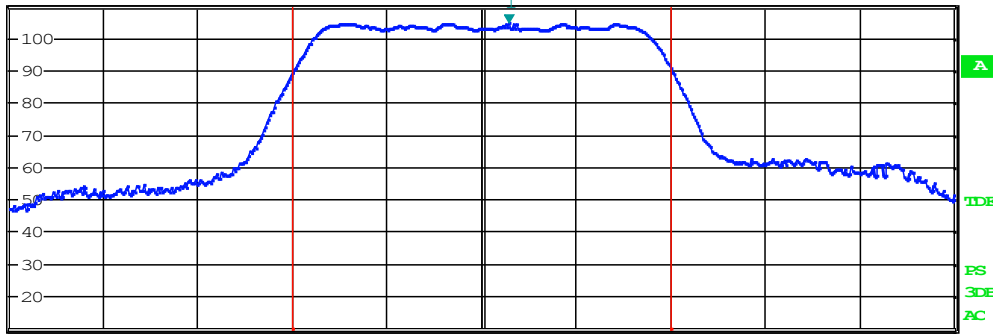


MARKER 1
 2.413442308 GHz

* RBW 1 MHz
 VEW 3 MHz
 SWT 2.5 ms

Marker 1 [T1]
 104.48 dBµV/m
 2.413442308 GHz

1 Ek
 MAXH



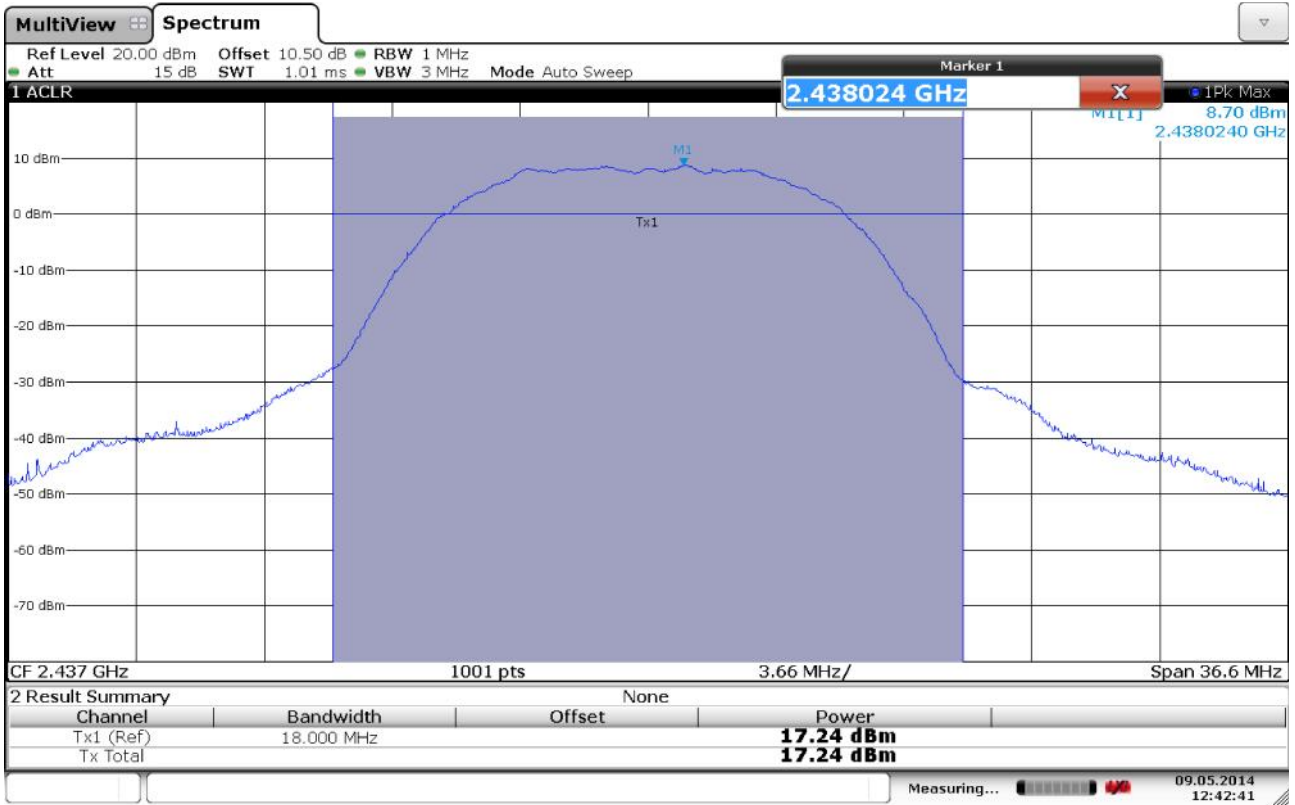
Center 2.412 GHz 5 MHz/ Span 50 MHz

Tx Channel

Bandwidth 20 MHz Power 115.12 dBµV/m

Date: 9.MAY.2014 08:52:23

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



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

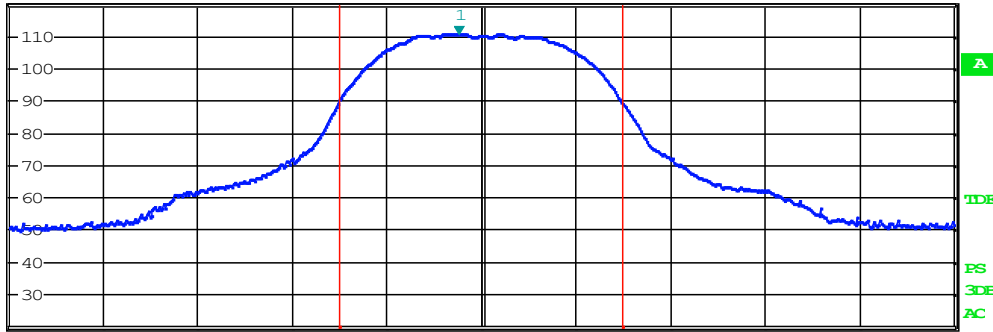


MARKER 1
 2.435798077 GHz

* RBW 1 MHz
 VEW 3 MHz
 SWT 2.5 ms

Marker 1 [T1]
 110.40 dBµV/m
 2.435798077 GHz

1 Ek
 MAXH



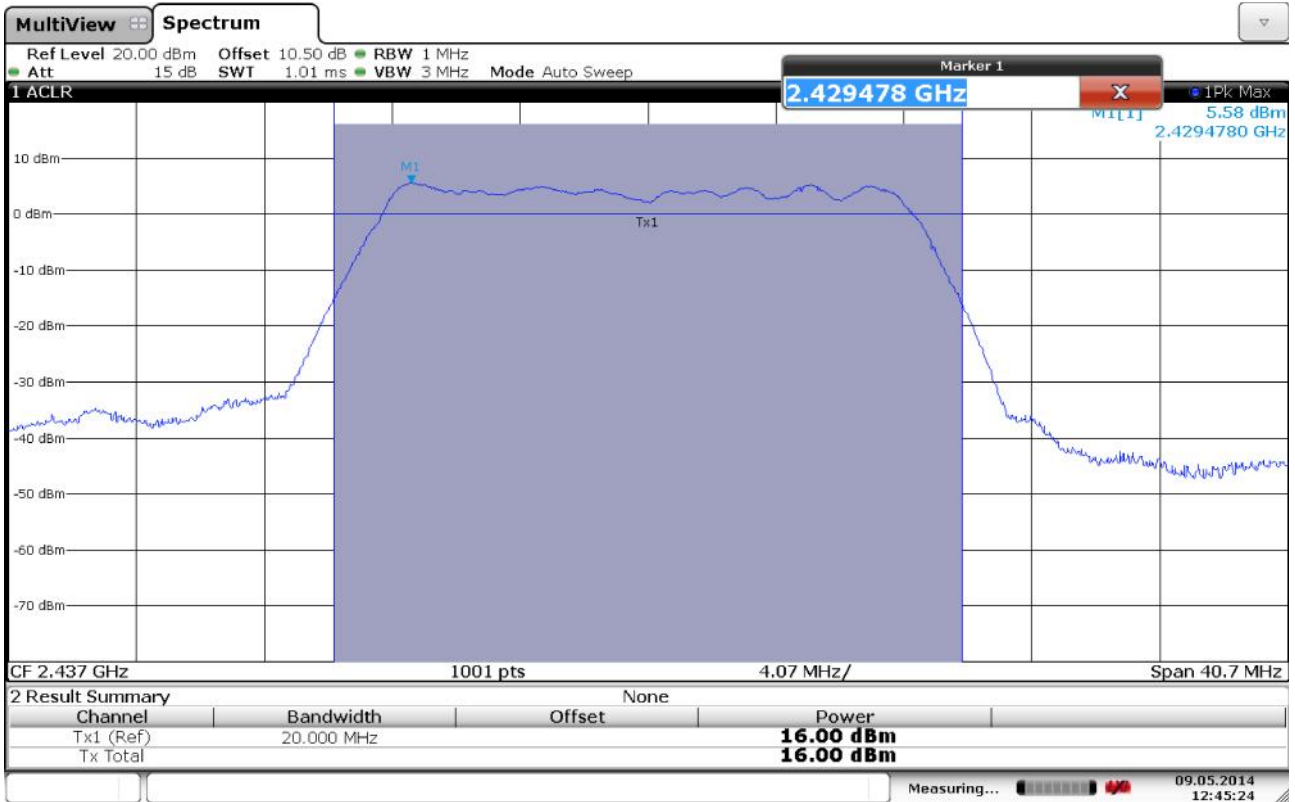
Center 2.437 GHz 5 MHz/ Span 50 MHz

Tx Channel

Bandwidth 15 MHz Power 118.82 dBµV/m

Date: 8.MAY.2014 13:02:18

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



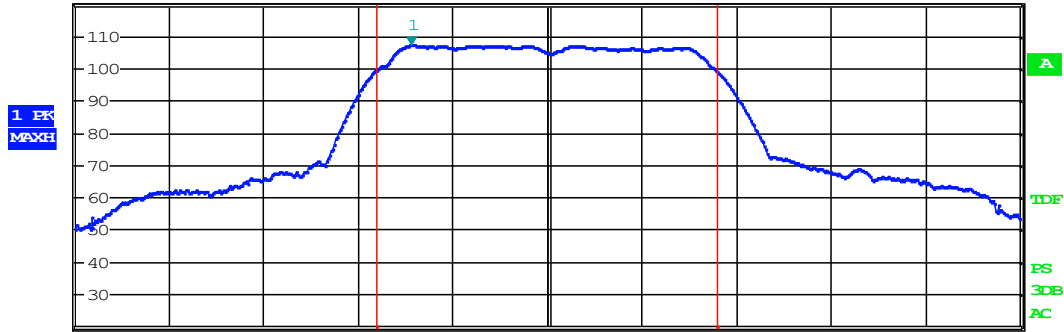
Conducted Output Power, 2437 MHz, 802.11g, 54Mbps



MARKER 1
 2.429788462 GHz

* RBW 1 MHz
 VEW 3 MHz
 SWT 2.5 ms

Marker 1 [T1]
 106.96 dBµV/m
 2.429788462 GHz

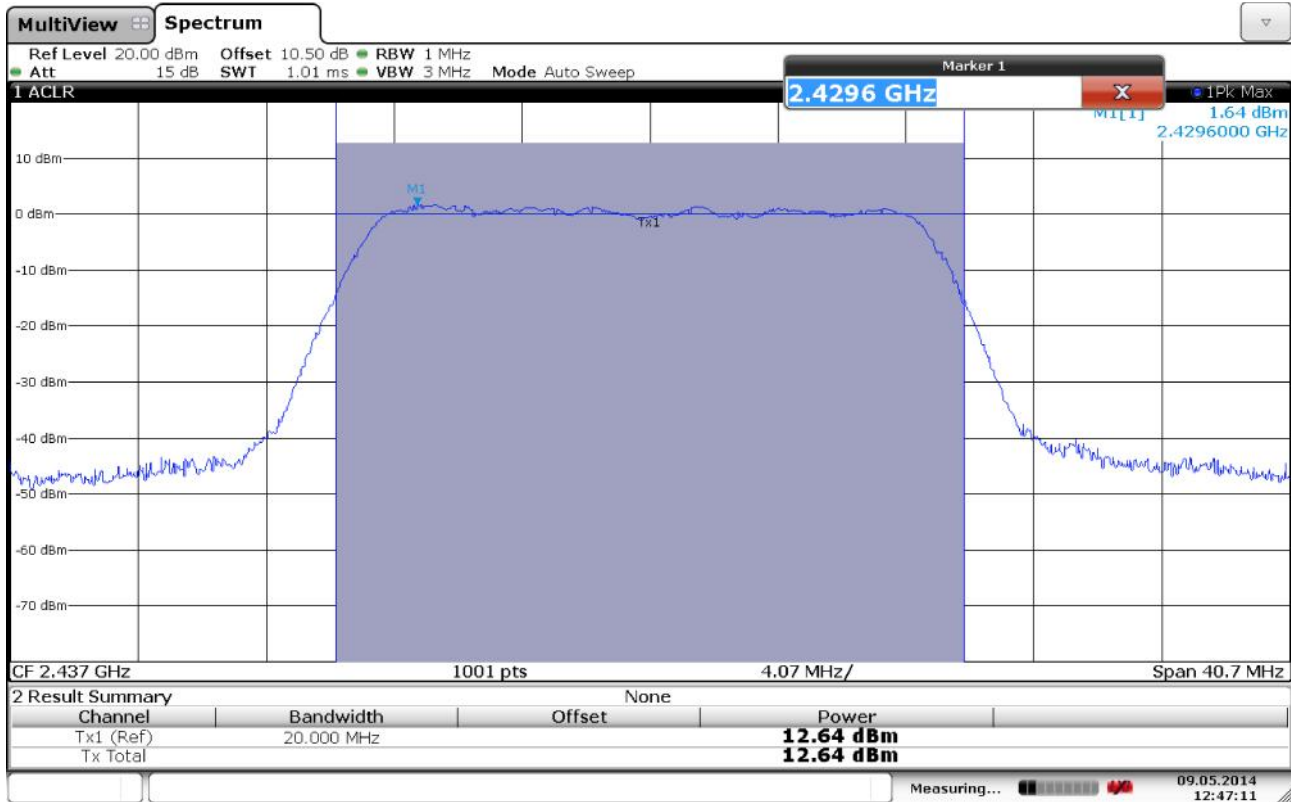


Center 2.437 GHz 5 MHz/ Span 50 MHz

Tx Channel
 Bandwidth 18 MHz Power 117.70 dBµV/m

Date: 8.MAY.2014 11:15:45

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



Conducted Output Power, 2437 MHz, 802.11n, MCS7

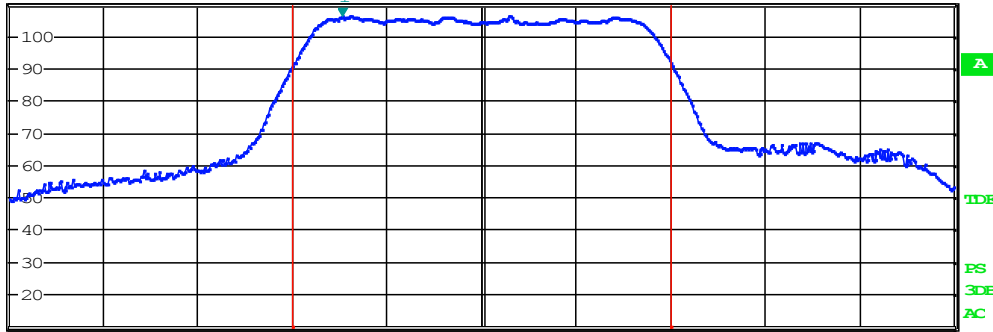


MARKER 1
 2.429628205 GHz

* RBW 1 MHz
 VEW 3 MHz
 SWT 2.5 ms

Marker 1 [T1]
 105.82 dBµV/m
 2.429628205 GHz

1 Ek
 MAXH



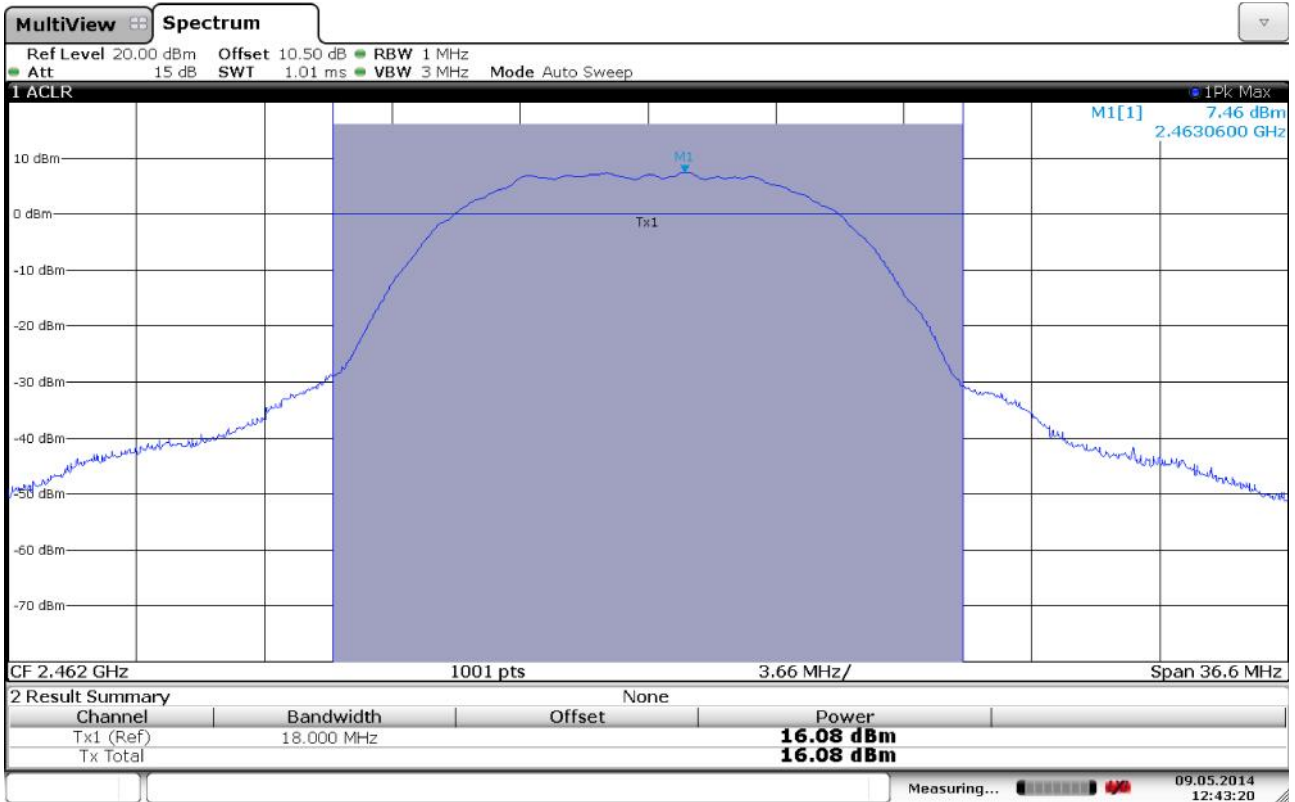
Center 2.437 GHz 5 MHz/ Span 50 MHz

Tx Channel

Bandwidth 20 MHz Power 116.57 dBµV/m

Date: 9.MAY.2014 09:28:01

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



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

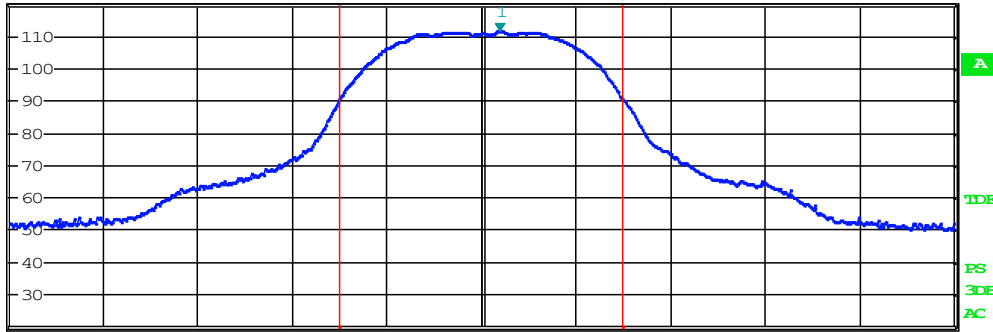


MARKER 1
 2.462961538 GHz

* RBW 1 MHz
 VEW 3 MHz
 SWT 2.5 ms

Marker 1 [T1]
 111.28 dBµV/m
 2.462961538 GHz

1 Ek
 MAXH



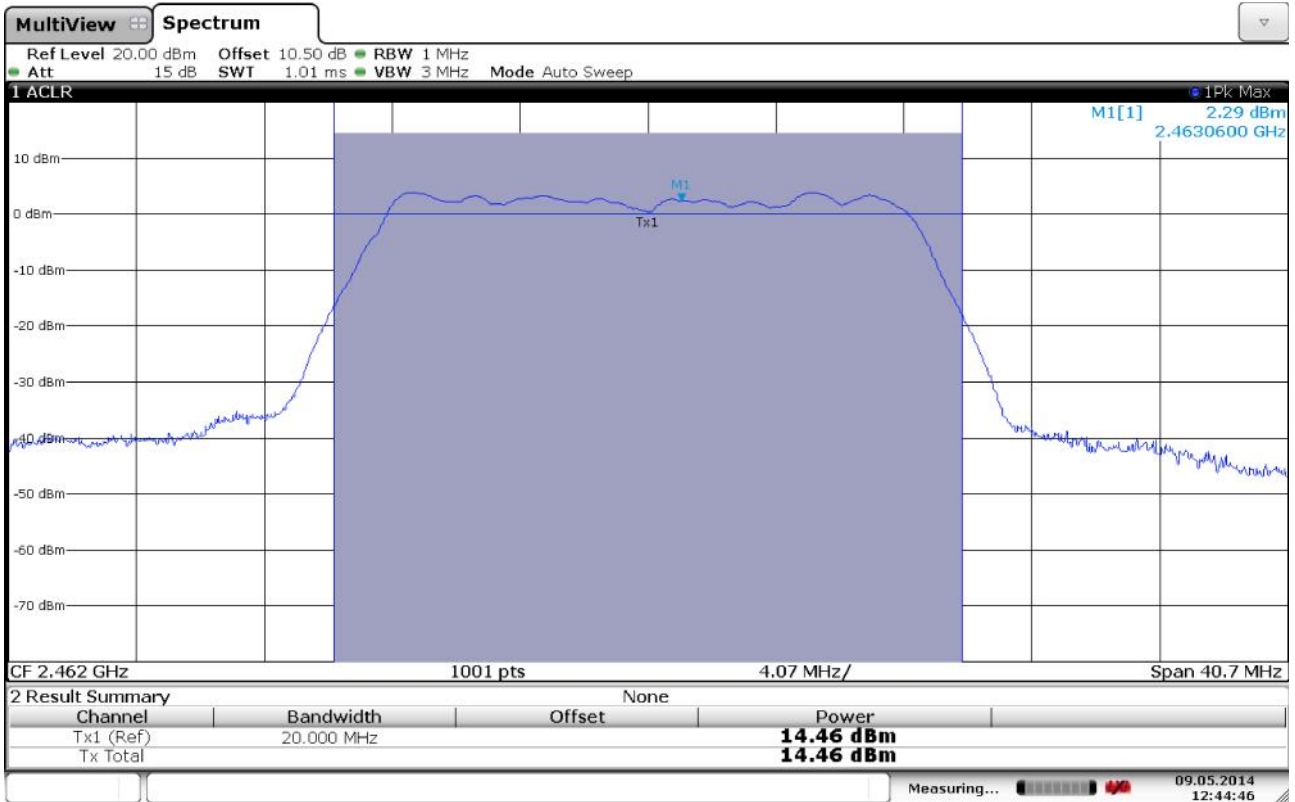
Center 2.462 GHz 5 MHz/ Span 50 MHz

Tx Channel

Bandwidth 15 MHz Power 119.62 dBµV/m

Date: 8.MAY.2014 12:47:55

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



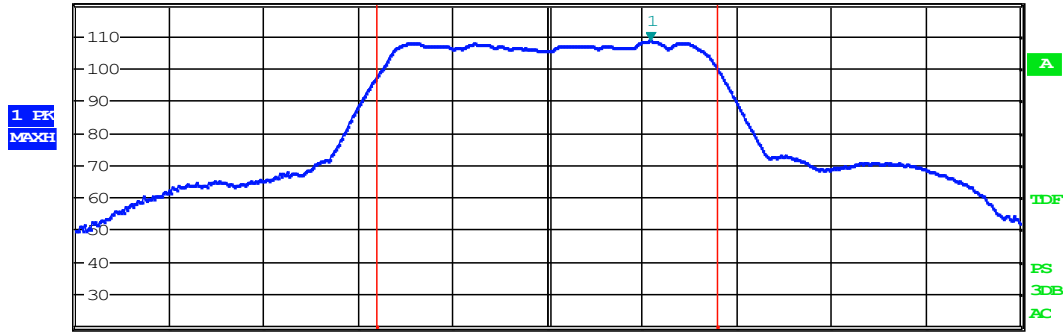
Conducted Output Power, 2462 MHz, 802.11g, 54Mbps



MARKER 1
 2.467448718 GHz

* RBW 1 MHz
 VEW 3 MHz
 SWT 2.5 ms

Marker 1 [T1]
 108.29 dBµV/m
 2.467448718 GHz

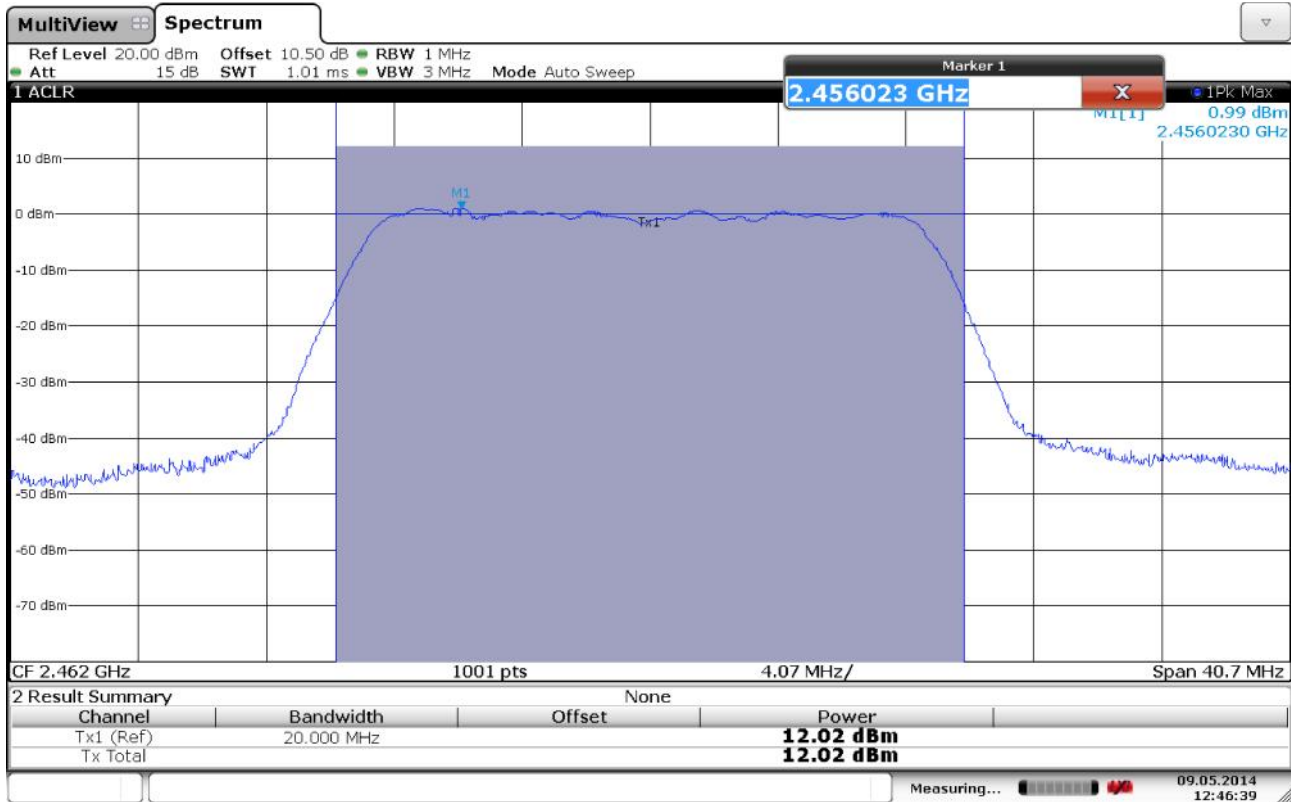


Center 2.462 GHz 5 MHz/ Span 50 MHz

Tx Channel
 Bandwidth 18 MHz Power 118.32 dBµV/m

Date: 8.MAY.2014 10:57:55

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



Conducted Output Power, 2462 MHz, 802.11n, MCS7

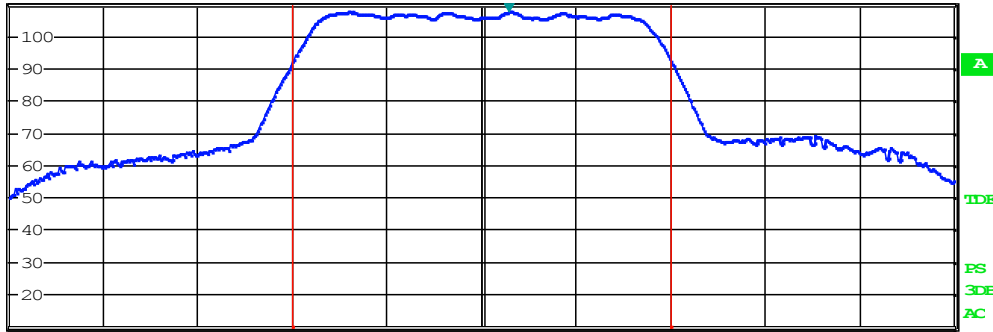


MARKER 1
 2.463442308 GHz

* RBW 1 MHz
 VEW 3 MHz
 1 SWT 2.5 ms

Marker 1 [T1]
 107.26 dBµV/m
 2.463442308 GHz

1 Ek
 MAXH



Center 2.462 GHz 5 MHz/ Span 50 MHz

Tx Channel

Bandwidth 20 MHz Power 117.99 dBµV/m

Date: 9.MAY.2014 09:13:50

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

3.5 Spurious Emissions (Radiated)

Para. No.: 15.247 (c)

Test Performed By: G.Suhanthakumar	Date of Test: 05. May 2014
------------------------------------	----------------------------

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	49.02	51.78	74	25.0	22.2
802.11g, 54Mbps	51.23	65.11	74	22.8	8.9
802.11n, MCS7, 20MHz BW	53.22	64.69	74	20.8	9.3

Average Detector:

Modulation and Bitrate	Measured field strength (dB μ V/m)		Limit dB	Margin dB	
	2390 MHz	2483.5 MHz			
802.11b, 11Mbps	40.80	43.07	54	13.2	10.9
802.11g, 54Mbps	40.21	50.29	54	13.8	3.7
802.11n, MCS7, 20MHz BW	41.10	52.60	54	12.9	1.4

Tested according to KDB 558074 D01 DTS Measurement Guidance v03r01, Section 13.1 & 13.3.2

Duty Cycle was 100% during all tests.

See attached plots.

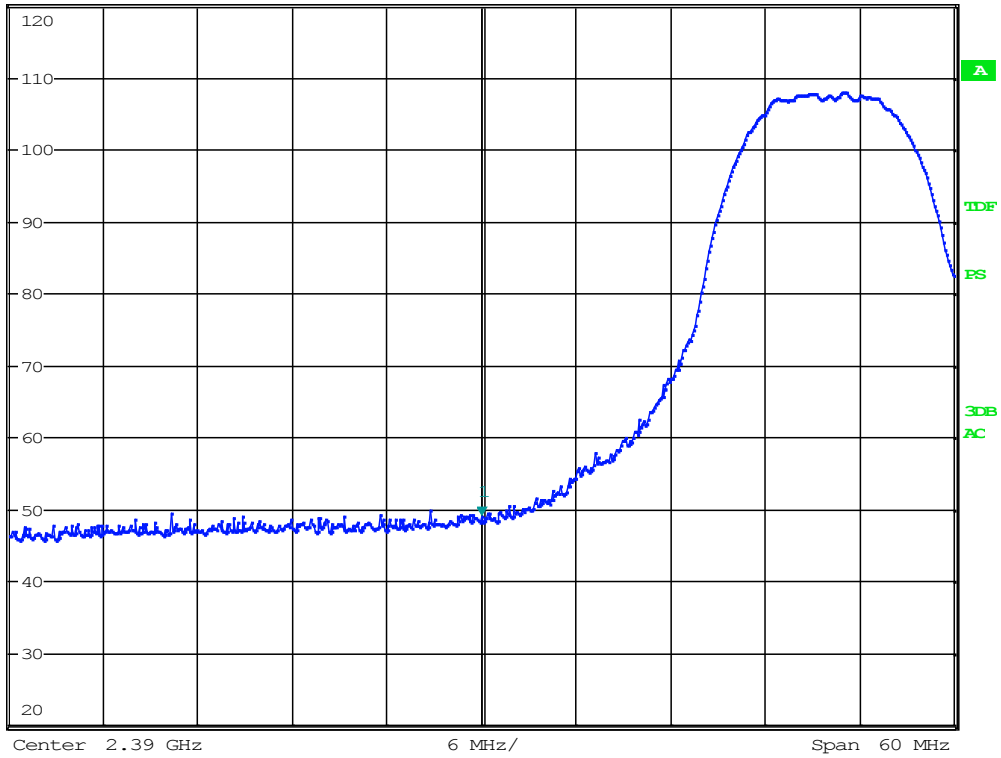


MARKER 1
 2.39 GHz
 Ref 120 dBµV/m *Att 15 dB

*RBW 1 MHz
 VBW 3 MHz
 SWT 2.5 ms

Marker 1 [T1]
 49.02 dBµV/m
 2.390000000 GHz

1 PK
 MAXH



Date: 8.MAY.2014 13:30:33

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

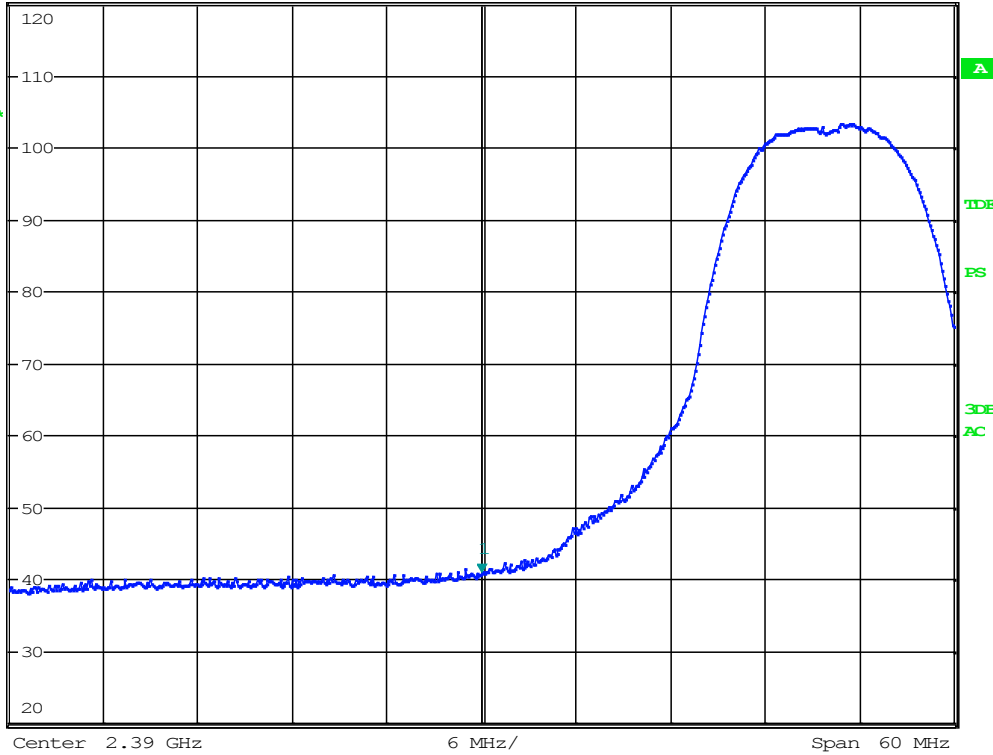


*RBW 1 MHz Marker 1 [T1]
 VBW 10 MHz 40.80 dBµV/m
 SWT 2.5 ms 2.390000000 GHz

Ref 120 dBµV/m

*Att 15 dB

1 FM
 MAXH



Date: 8.MAY.2014 13:30:58

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

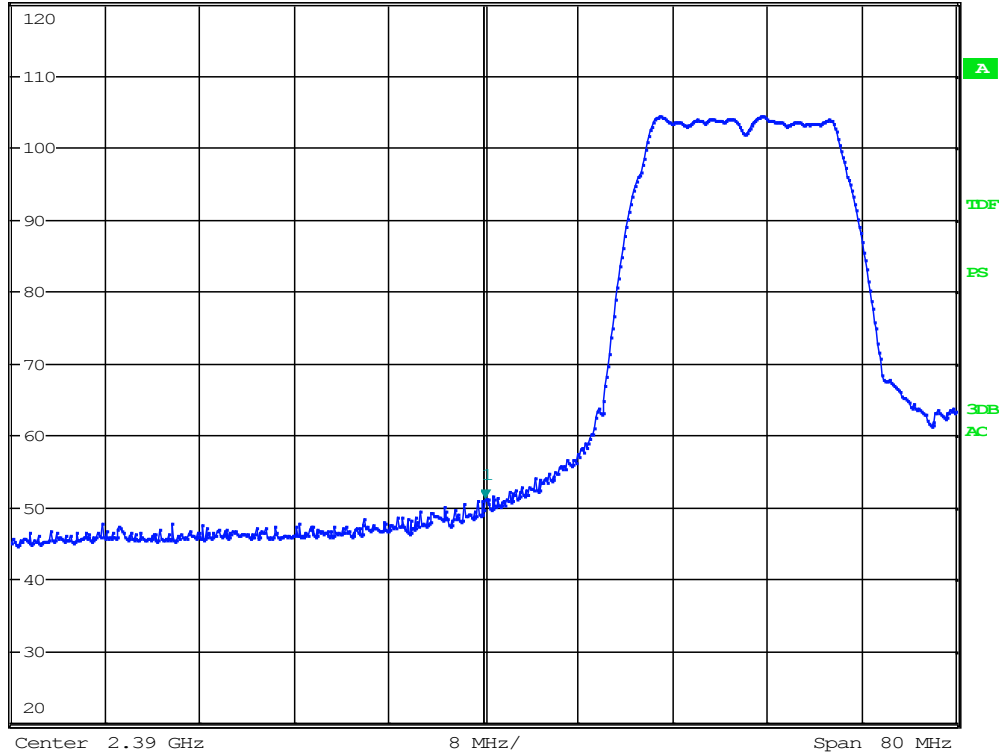


MARKER 1
 2.390128205 GHz
 Ref 120 dBµV/m *Att 15 dB

*RBW 1 MHz
 VBW 3 MHz
 SWT 2.5 ms

Marker 1 [T1]
 51.23 dBµV/m
 2.390128205 GHz

1 EK
 MAXH



Date: 8.MAY.2014 12:12:37

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

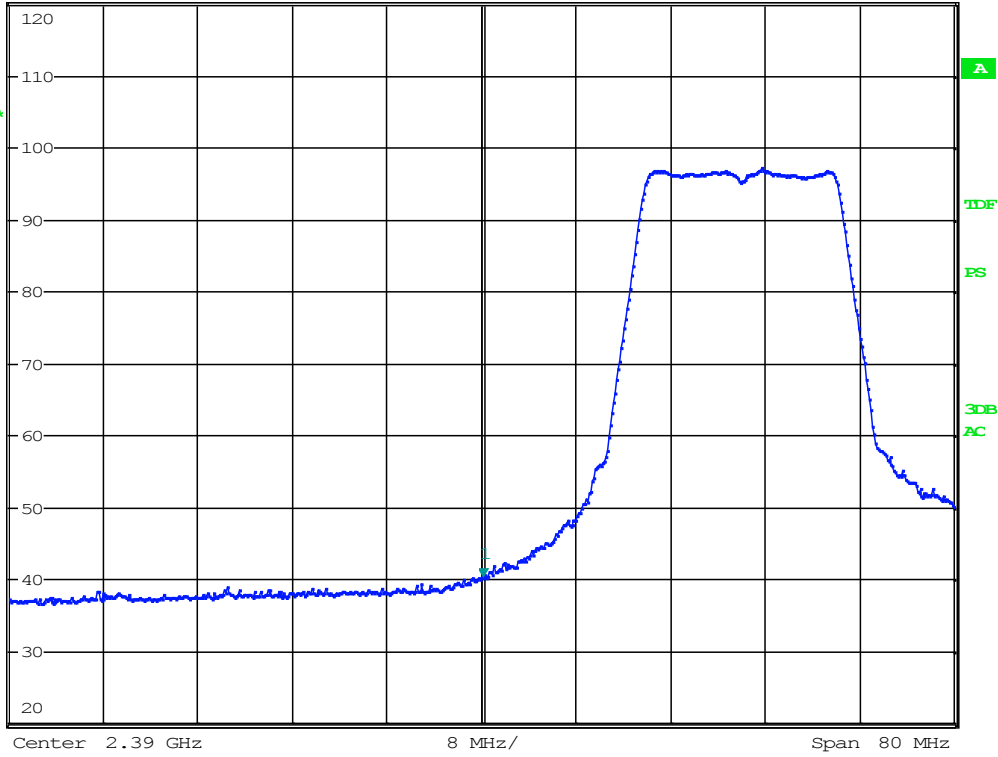


*RBW 1 MHz Marker 1 [T1]
 VBW 10 MHz 40.21 dBµV/m
 SWT 2.5 ms 2.390128205 GHz

Ref 120 dBµV/m

*Att 15 dB

1 FM
 MAXH



Date: 8.MAY.2014 12:13:04

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

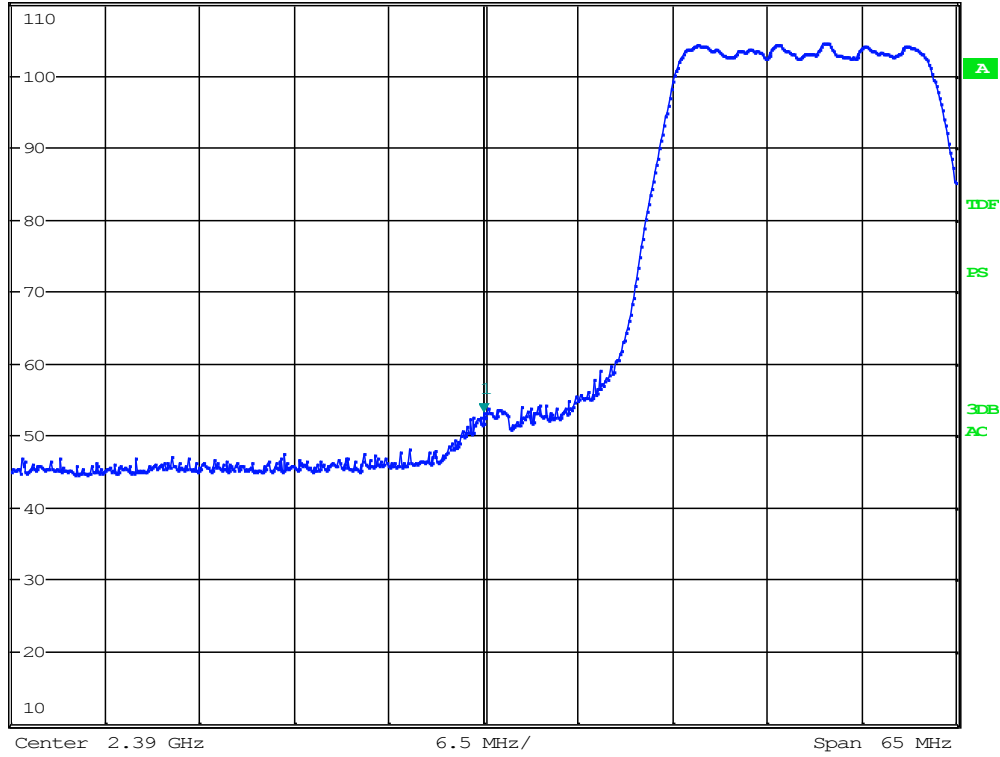


MARKER 1
 2.39 GHz
 Ref 110 dBµV/m *Att 15 dB

*RBW 1 MHz
 VBW 3 MHz
 SWT 2.5 ms

Marker 1 [T1]
 53.22 dBµV/m
 2.390000000 GHz

1 EK
 MAXH



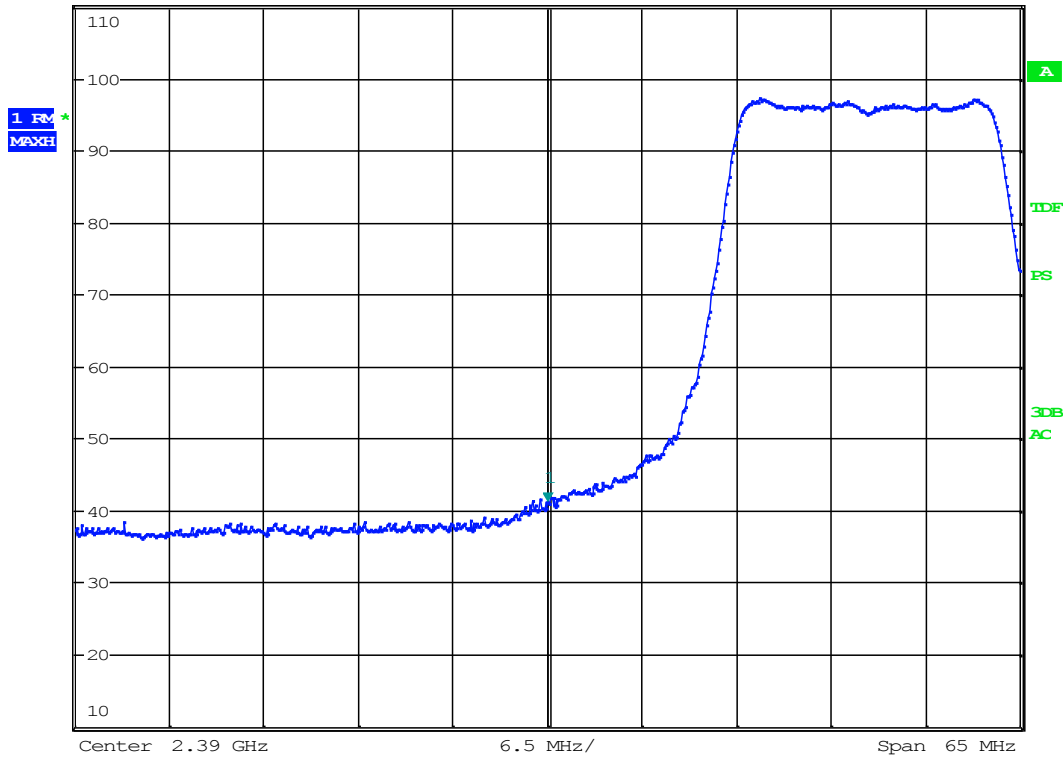
Date: 9.MAY.2014 08:53:11

Lower Band Edge, Radiated, Peak, 2412 MHz, 802.11n, MCS7, 20MHz BW



*RBW 1 MHz Marker 1 [T1]
 VBW 10 MHz 41.10 dBμV/m
 SWT 2.5 ms 2.390000000 GHz

Ref 110 dBμV/m *Att 15 dB



Date: 9.MAY.2014 08:53:31

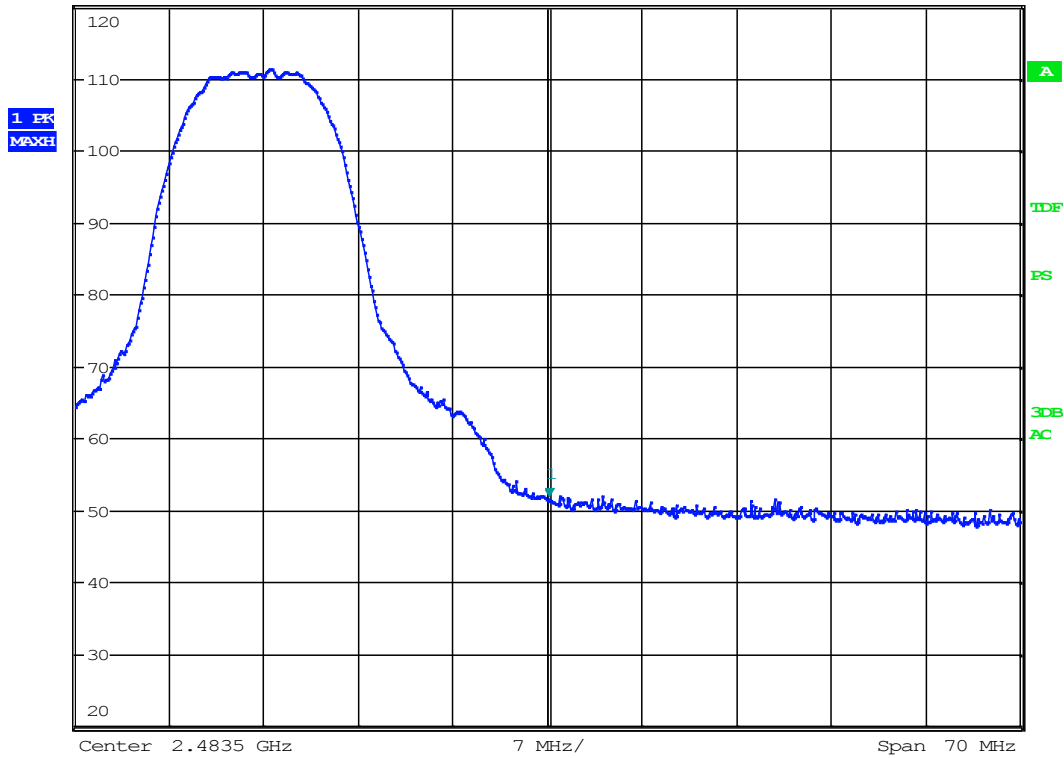
Lower Band Edge, Radiated, Average, 2412 MHz, 802.11n, MCS7, 20MHz BW



MARKER 1
 2.483612179 GHz
 Ref 120 dB μ V/m *Att 15 dB

*RBW 1 MHz
 VBW 3 MHz
 SWT 2.5 ms

Marker 1 [T1]
 51.78 dB μ V/m
 2.483612179 GHz



Date: 8.MAY.2014 12:48:42

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



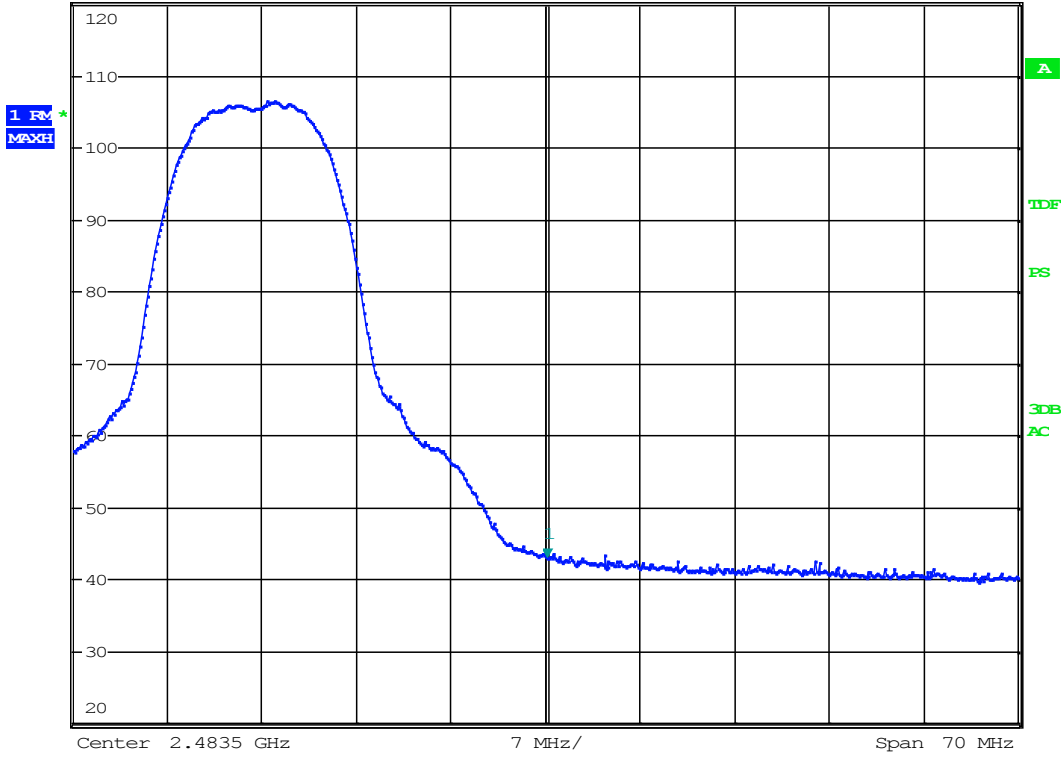
*RBW 1 MHz Marker 1 [T1]
 VBW 10 MHz 43.07 dBμV/m
 SWT 2.5 ms 2.483612179 GHz

Ref 120 dBμV/m

*Att 15 dB

SWT 2.5 ms

2.483612179 GHz



Date: 8.MAY.2014 12:49:04

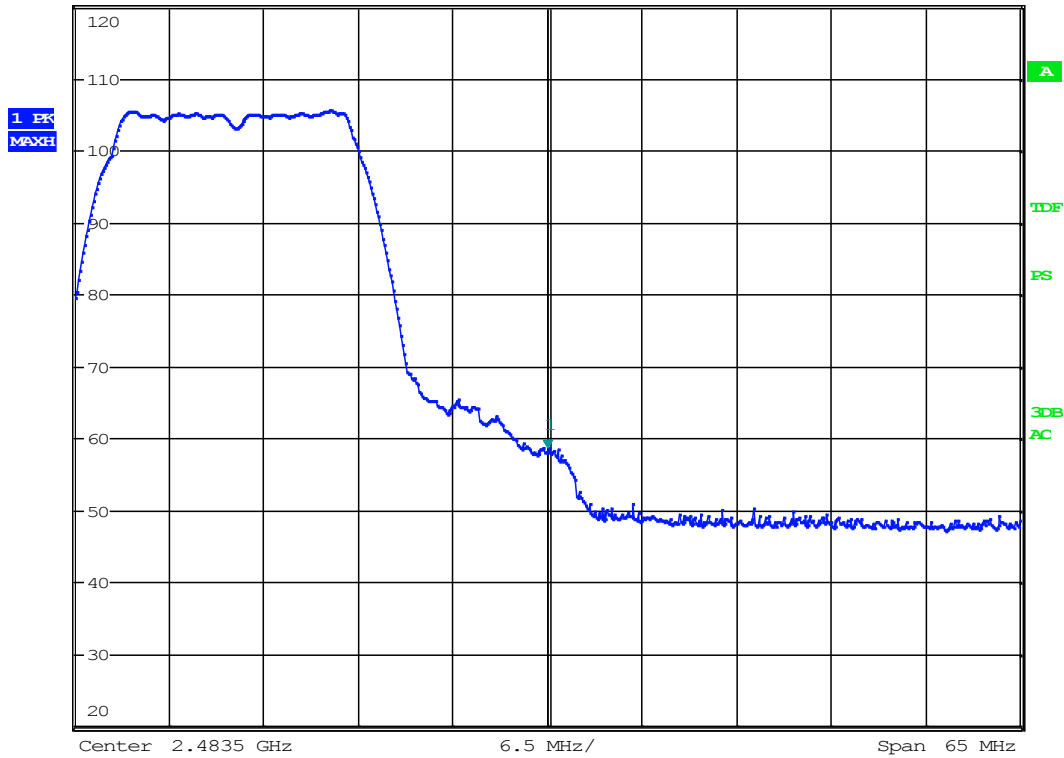
Upper Band Edge, Radiated, Average, 2462 MHz, 802.11b, 11Mbps



MARKER 1
 2.4835 GHz
 Ref 120 dBµV/m *Att 15 dB

*RBW 1 MHz
 VBW 3 MHz
 SWT 2.5 ms

Marker 1 [T1]
 58.61 dBµV/m
 2.483500000 GHz



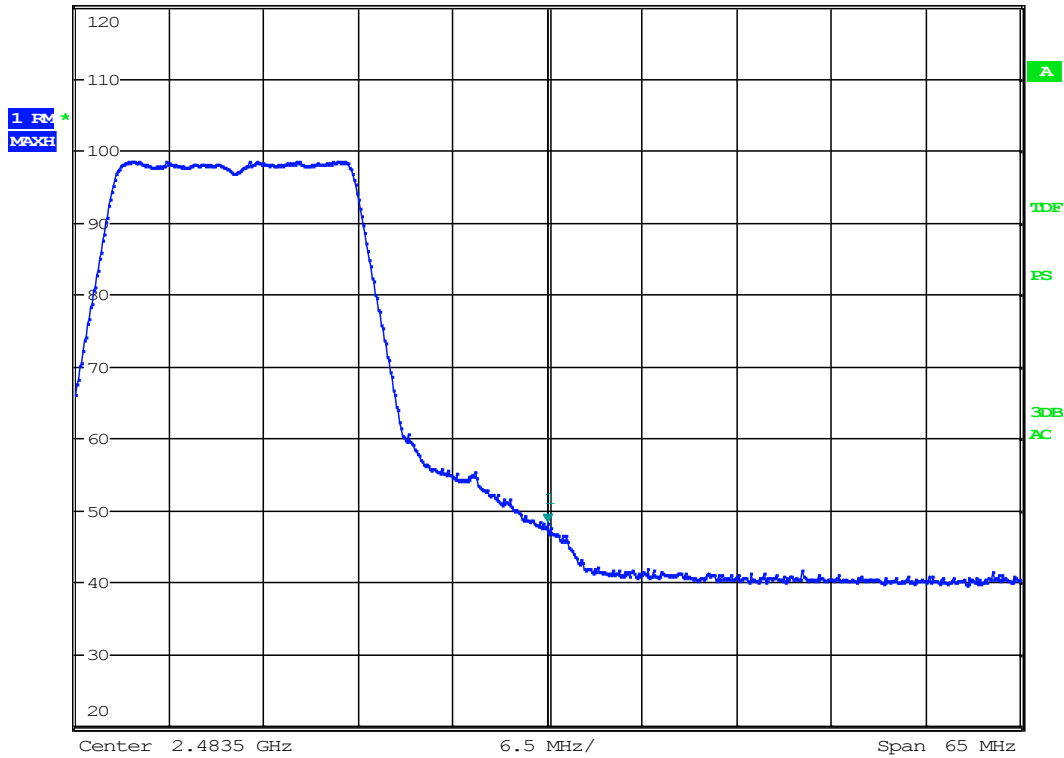
Date: 8.MAY.2014 12:19:24

Upper Band Edge, Radiated, Peak, 2462 MHz, 802.11g, 6Mbps



*RBW 1 MHz Marker 1 [T1]
 VBW 10 MHz 48.32 dBμV/m
 SWT 2.5 ms 2.483500000 GHz

Ref 120 dBμV/m *Att 15 dB



Date: 8.MAY.2014 12:20:37

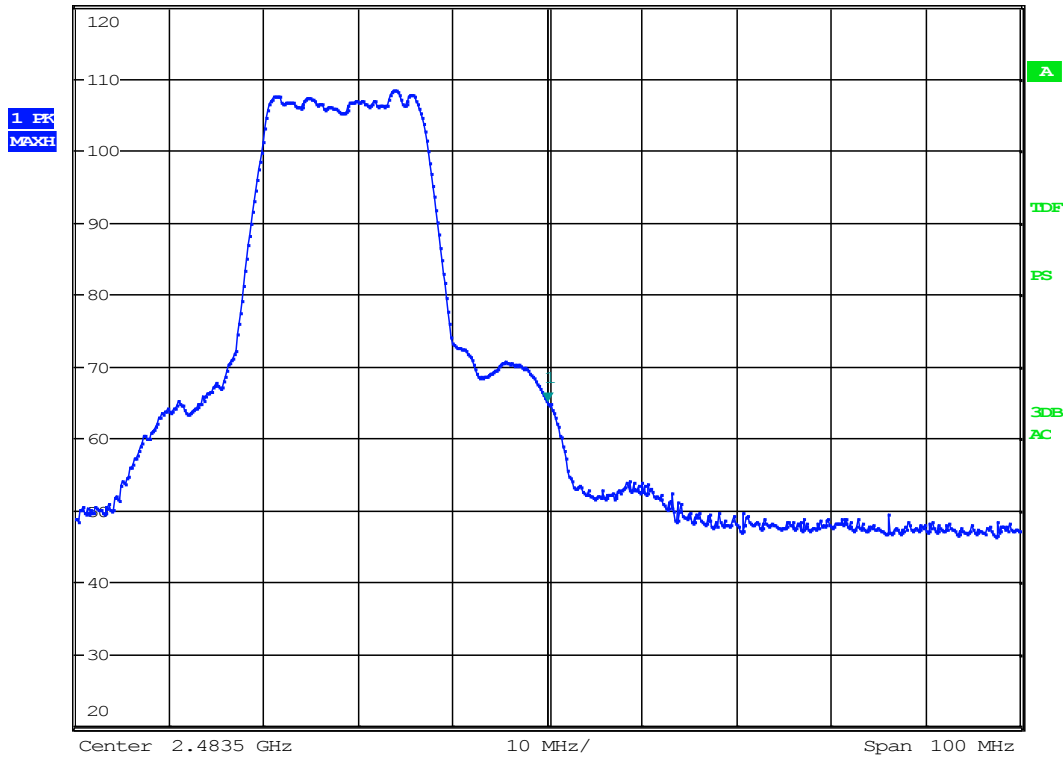
Upper Band Edge, Radiated, Average, 2462 MHz, 802.11g, 6Mbps



MARKER 1
 2.4835 GHz
 Ref 120 dBµV/m *Att 15 dB

*RBW 1 MHz
 VBW 3 MHz
 SWT 2.5 ms

Marker 1 [T1]
 65.11 dBµV/m
 2.483500000 GHz



Date: 8.MAY.2014 10:56:33

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

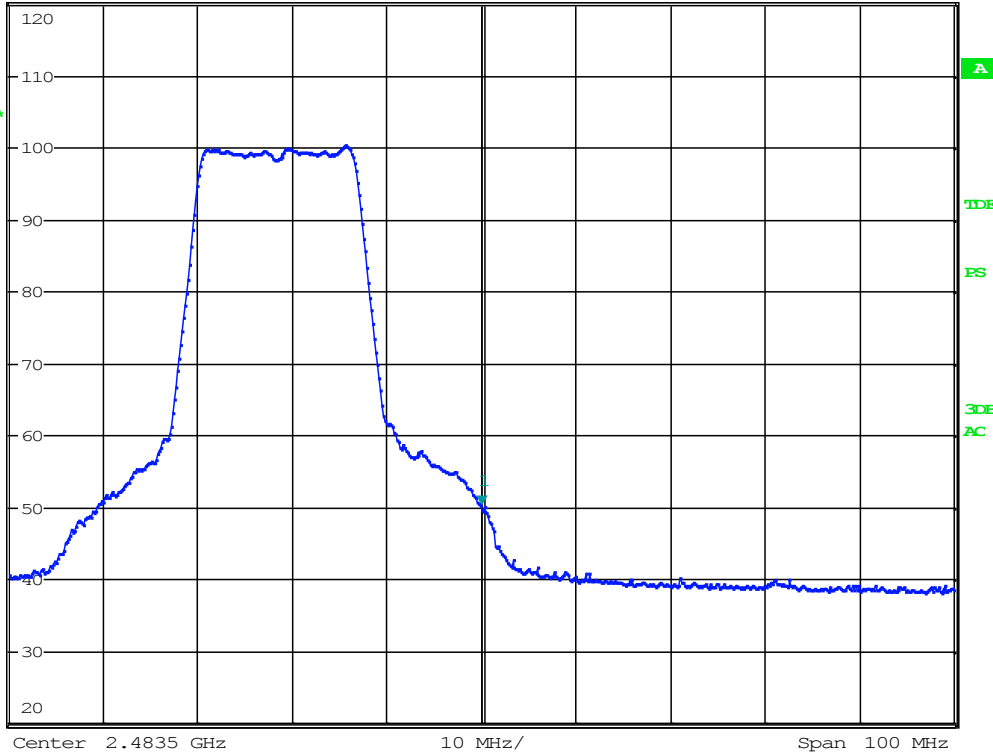


*RBW 1 MHz Marker 1 [T1]
 VBW 10 MHz 50.29 dBµV/m
 SWT 2.5 ms 2.483500000 GHz

Ref 120 dBµV/m

*Att 15 dB

1 FM
 MAXH

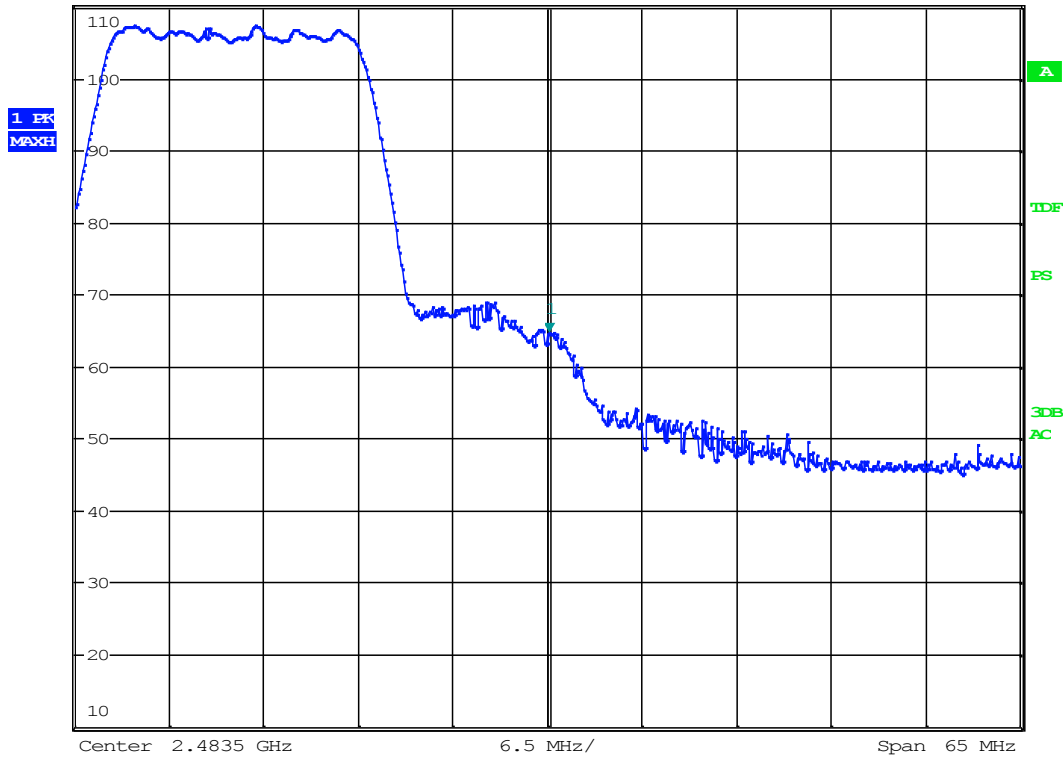


Date: 8.MAY.2014 10:56:57

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



MARKER 1
 2.483604167 GHz
 Ref 110 dBµV/m *Att 15 dB *REW 1 MHz Marker 1 [T1]
 VEW 3 MHz 64.69 dBµV/m
 SWT 2.5 ms 2.483604167 GHz



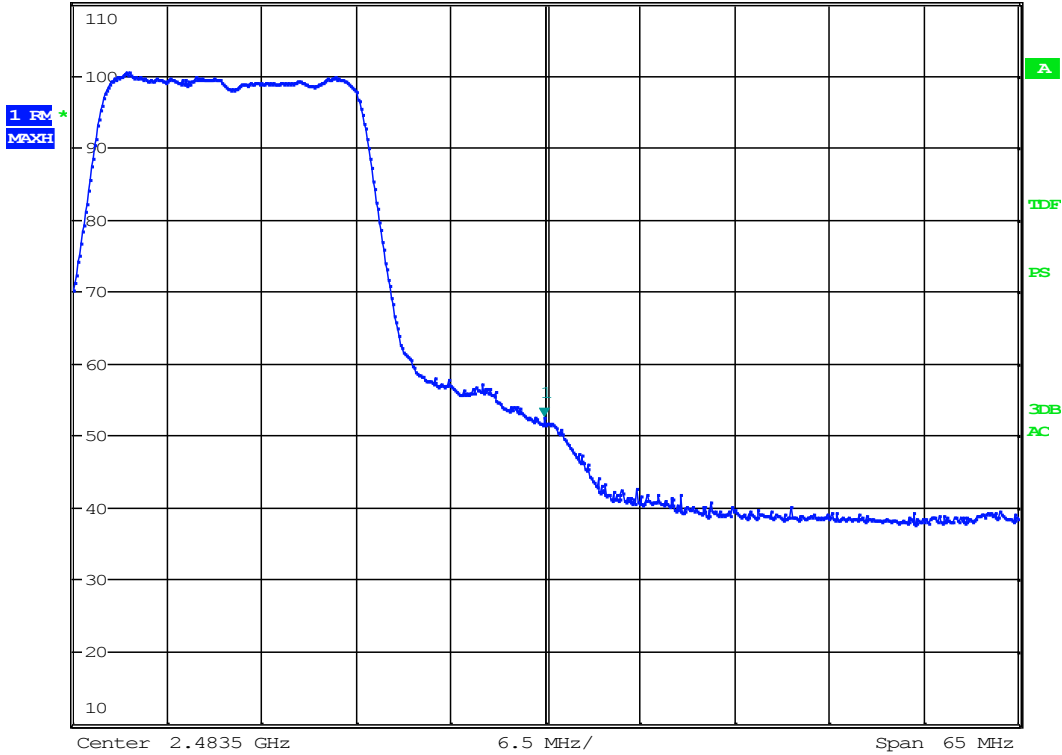
Date: 9.MAY.2014 08:58:20

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



*RBW 1 MHz Marker 1 [T1]
 VBW 10 MHz 52.60 dBμV/m
 SWT 2.5 ms 2.483395833 GHz

Ref 110 dBμV/m *Att 15 dB

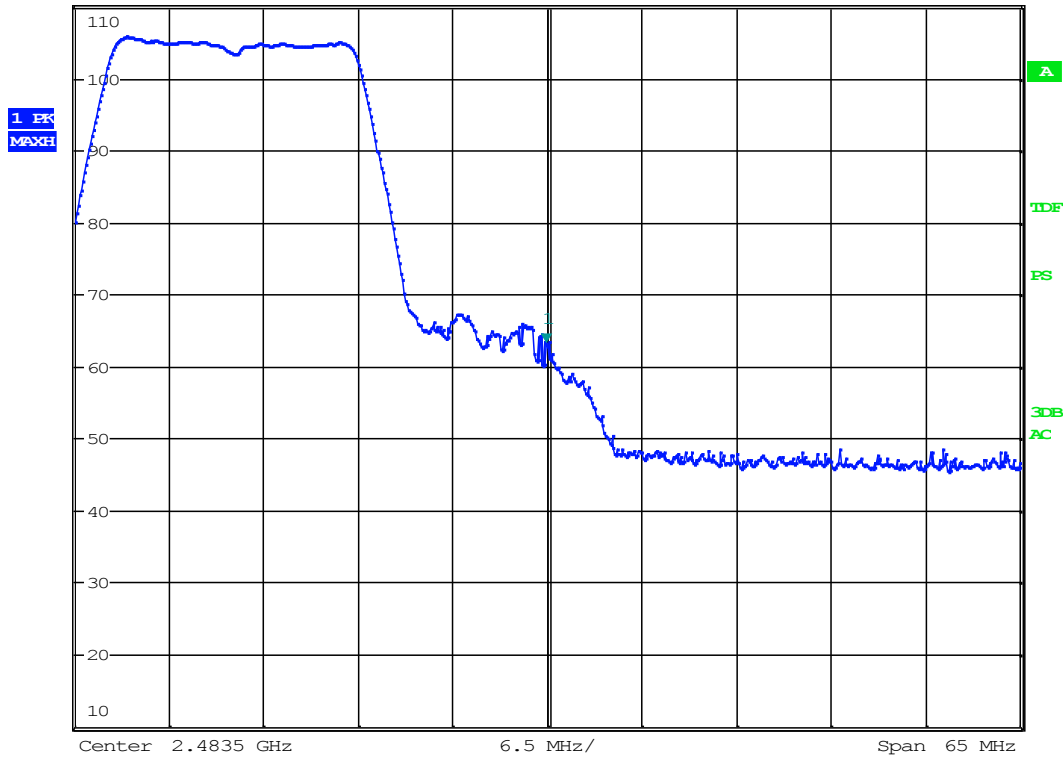


Date: 9.MAY.2014 08:58:00

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



MARKER 1
 2.483395833 GHz
 Ref 110 dBµV/m *Att 15 dB *REW 1 MHz Marker 1 [T1]
 VBW 3 MHz 63.16 dBµV/m
 SWT 2.5 ms 2.483395833 GHz



Date: 9.MAY.2014 09:08:51

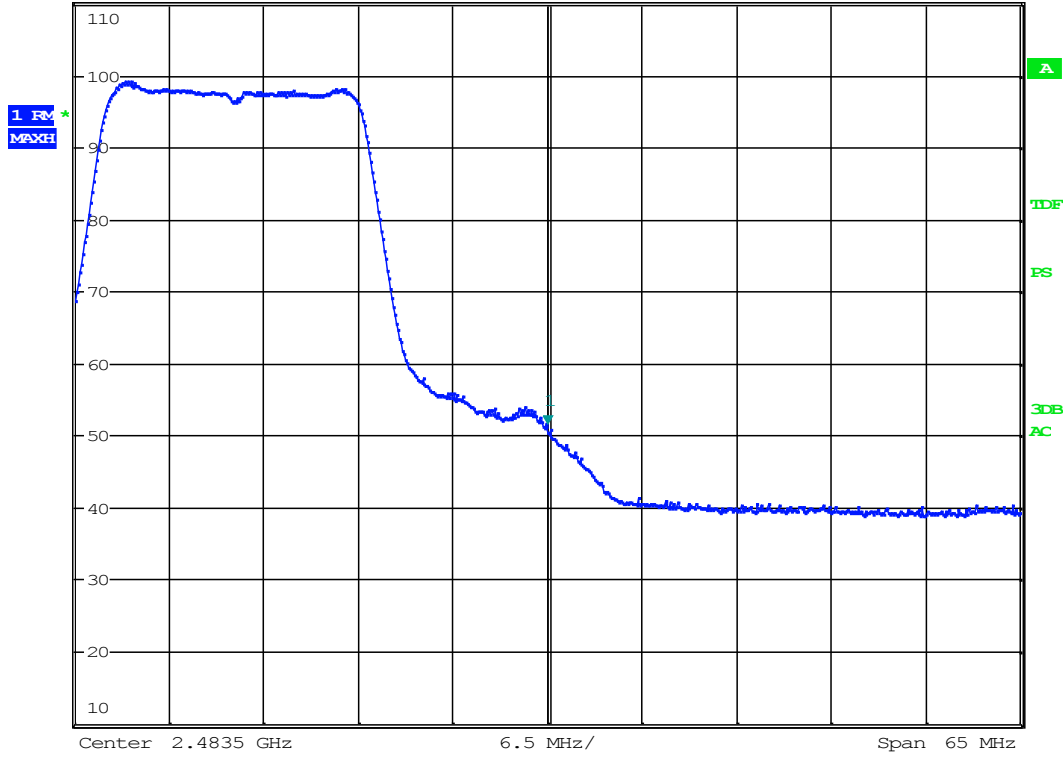
Upper Band Edge, Radiated, Peak, 2462 MHz, 802.11n, MCS0



MARKER 1
 2.4835 GHz
 Ref 110 dBµV/m *Att 15 dB

*REW 1 MHz
 VBW 10 MHz
 SWT 2.5 ms

Marker 1 [T1]
 51.49 dBµV/m
 2.483500000 GHz



Date: 9.MAY.2014 09:08:12

Upper Band Edge, Radiated, Average, 2462 MHz, 802.11n, MCS0

RF conducted power to 25 GHz see attached plots.

Maximum RF level outside operating band:

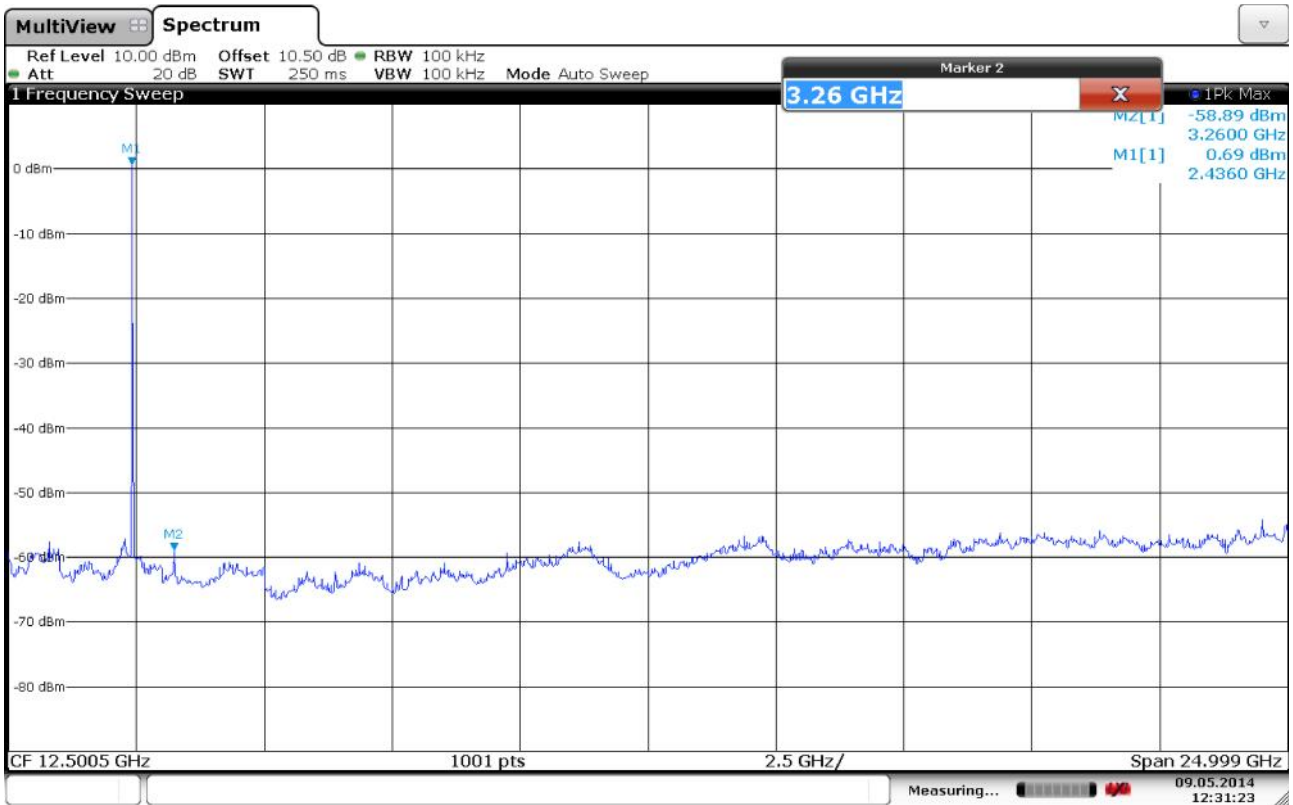
RF ch 1: >40 dB/C, margin >20 dB

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

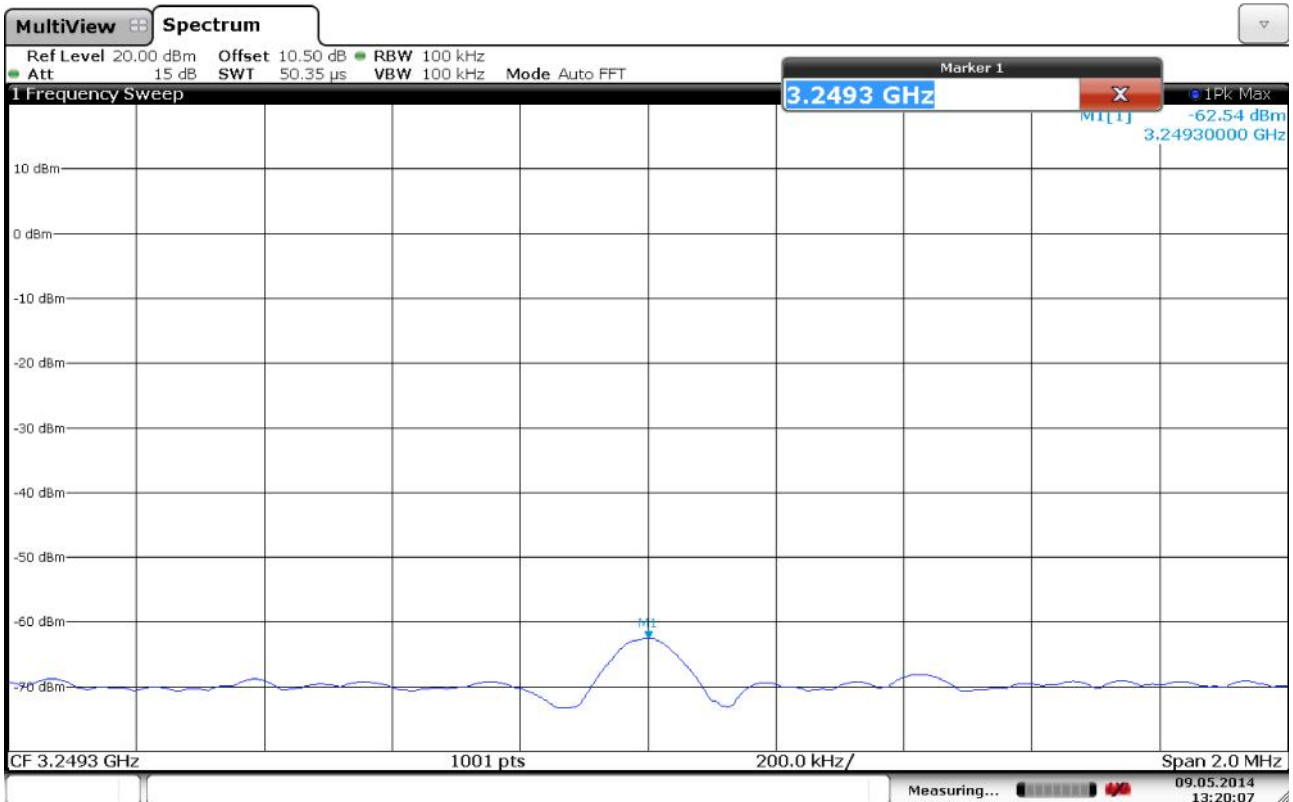
RF ch 11: >40 dB/C, margin >20 dB

Spurious emission detected at Non-restricted band (3260 – 3267MHz)

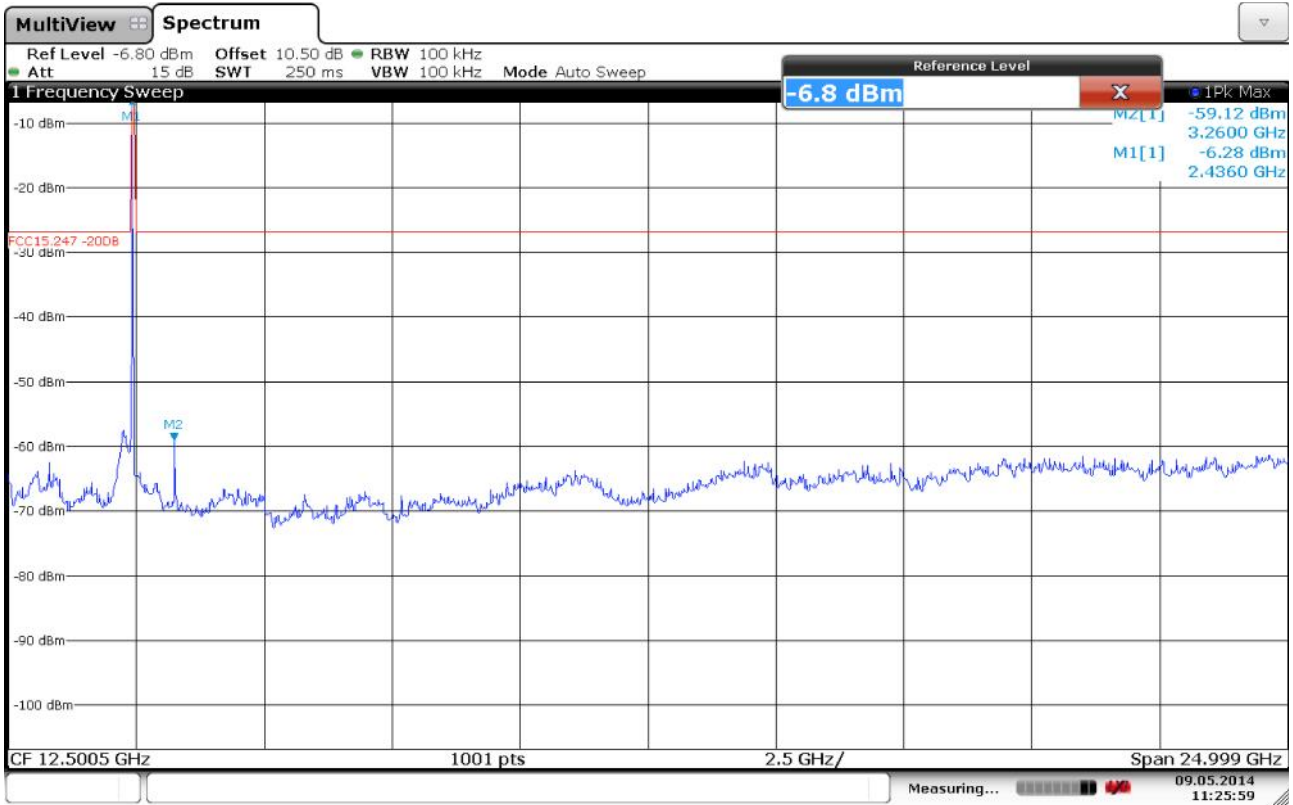
Channel (MHz)	Detected frequency(MHz)	Emission level(dBm)
2412	3215.9	< -58
2437	3249.3	< -56
2462	3282.6	< -58



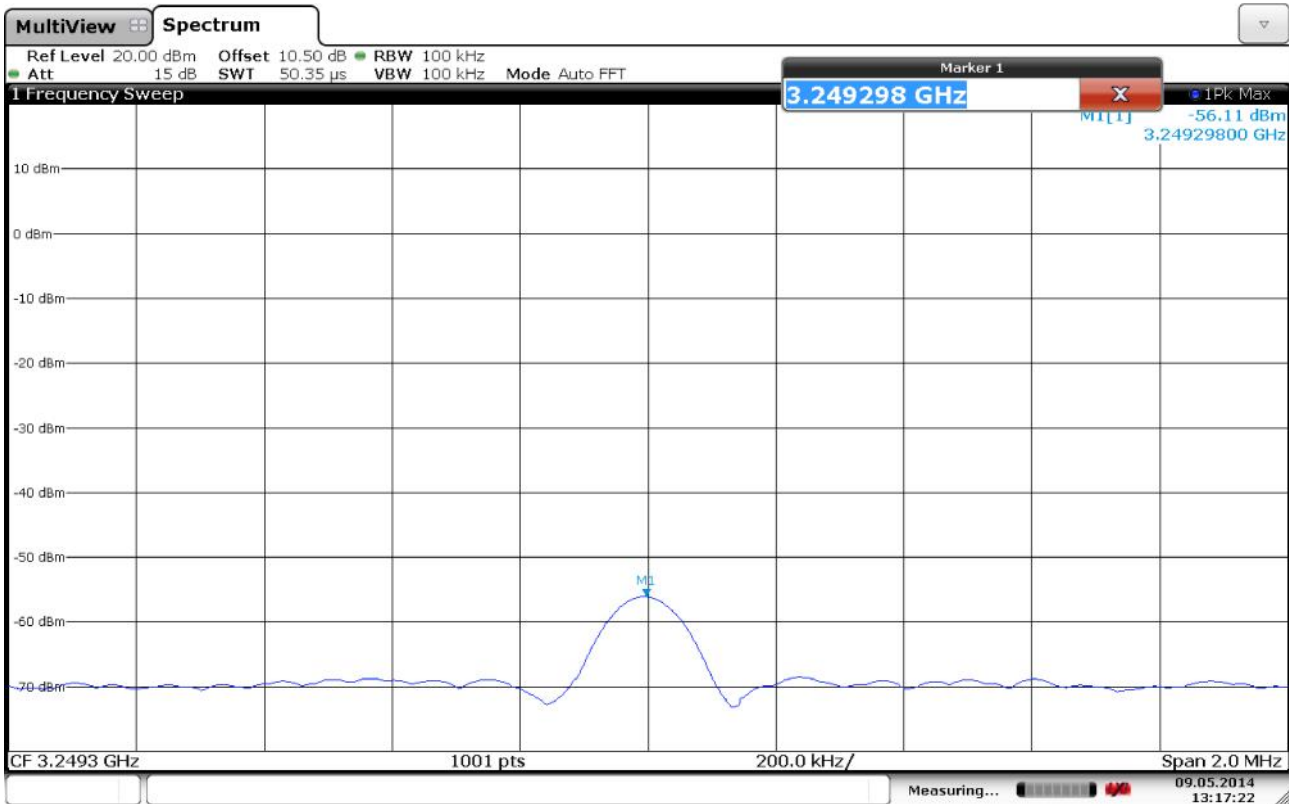
Conducted Emissions 1 MHz – 25 GHz, 2437 MHz, 802.11b, 1Mbps



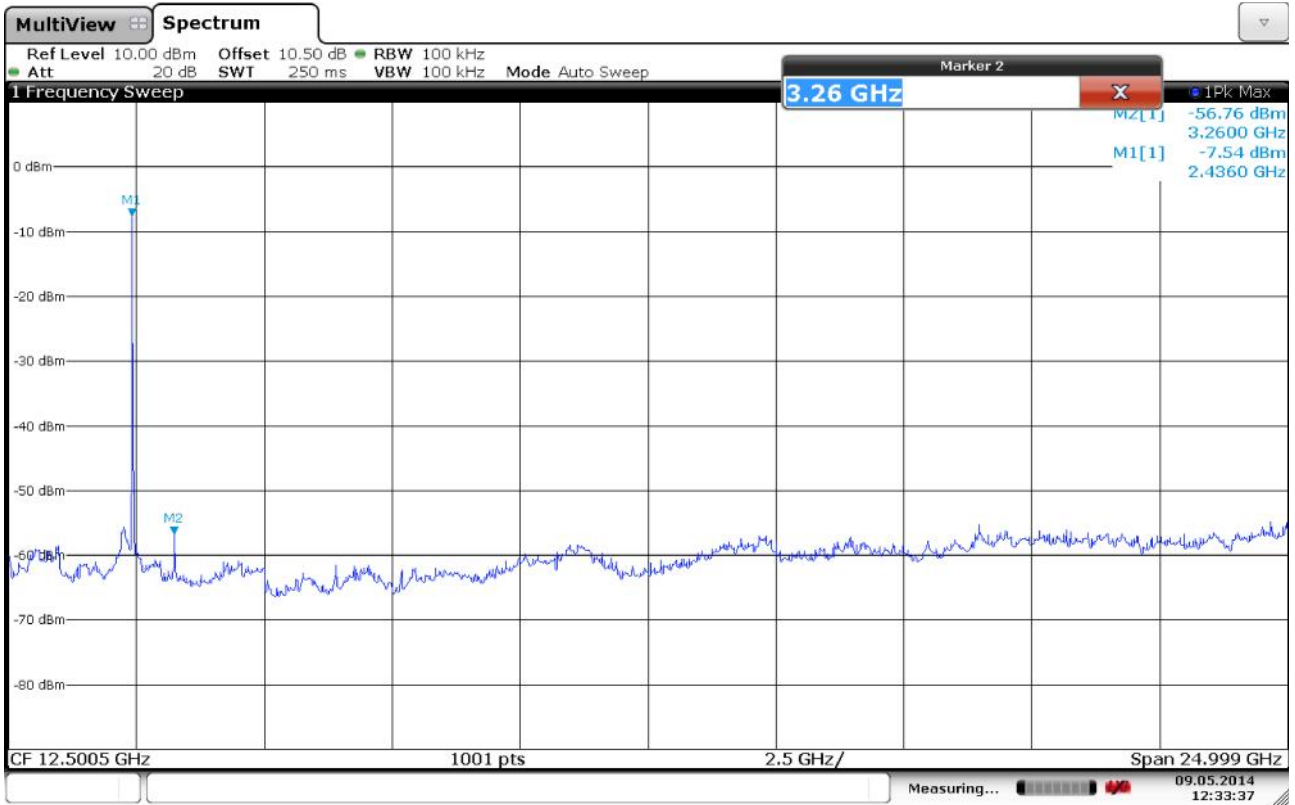
Conducted Emissions @3.249GHz , 2437 MHz, 802.11b, 1Mbps



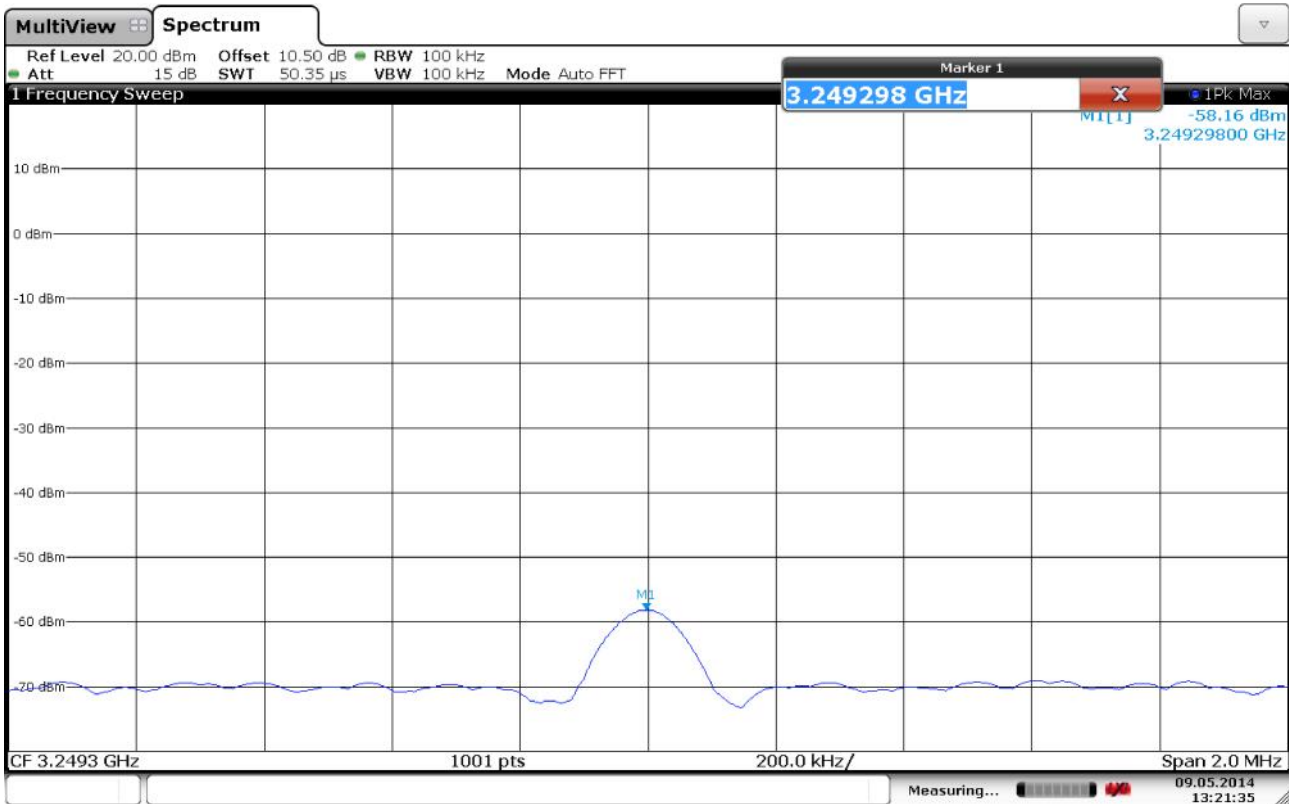
Conducted Emissions 1 MHz – 25 GHz, 2437 MHz, 802.11g, 6Mbps



Conducted Emissions @3.249GHz, 2437 MHz, 802.11g, 6Mbps



Conducted Emissions 1 MHz – 25 GHz, 2437 MHz, 802.11n, MCS0, 20MHz BW



Conducted Emissions @3.249 GHz, 2437 MHz, 802.11n, MCS0, 20MHz BW

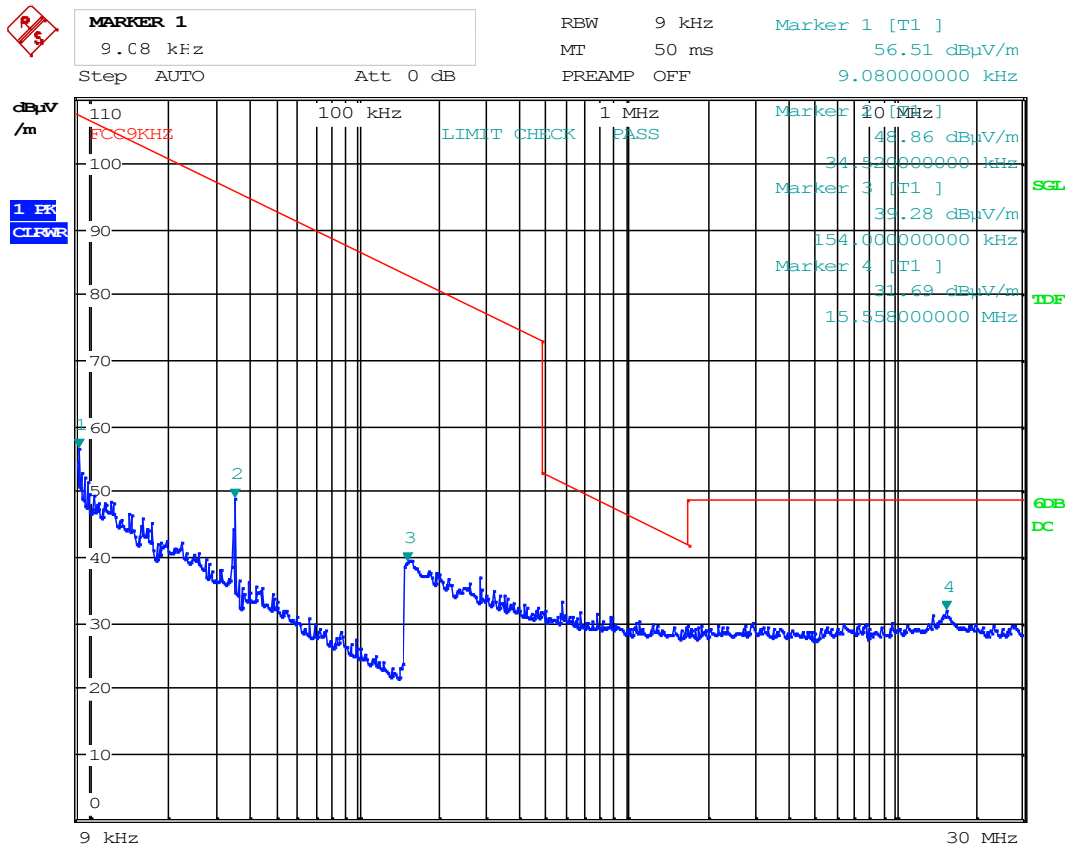
Radiated emissions 10 kHz-30 MHz.

Measuring distance 10 m, measured with Peak detector.

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

Frequency	Operational condition	Field strength	Measuring distance	Limit FCC15.209	Margin
		dB μ V/m	metres	dB μ V/m	dB
34.5 kHz	TX on	48.86	10	96	47.14

See plot.



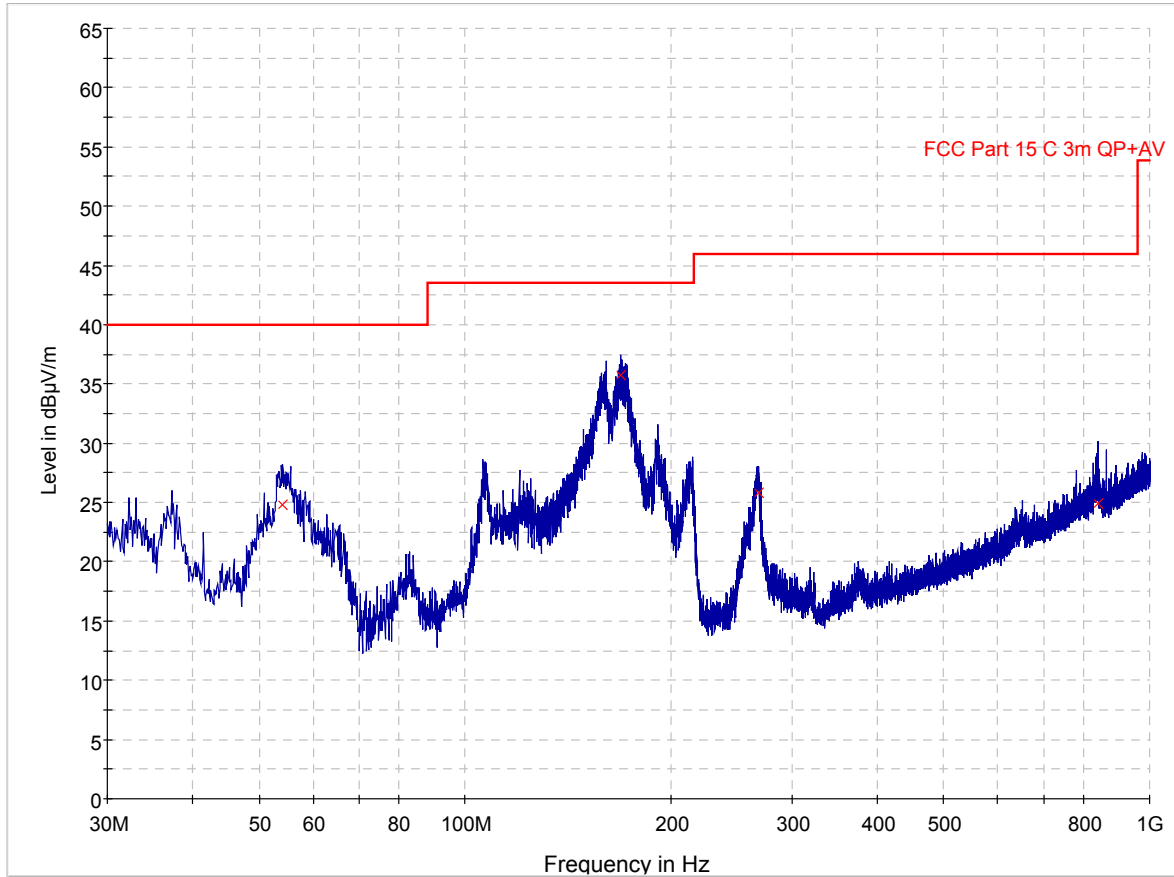
Date: 9.MAY.2014 10:53:51

Radiated emission 30 – 1000 MHz.

Detector: Quasi-Peak

Measuring distance 3 m.

All values are below the limit even when measured with Peak Detector, RBW=100kHz, VBW=300kHz.



Radiated Emissions, 30 -1000MHz, VP and HP @3m

Frequency (MHz)	QuasiPeak (dBµV/m)	Bandwidth (kHz)	Height (cm)	Polarization	Margin (dB)	Limit (dBµV/m)	Comment
54.168669	24.8	120.000	100.0	V	15.2	40.0	
168.653563	35.8	120.000	159.0	H	7.7	43.5	
268.410016	25.8	120.000	121.0	H	20.2	46.0	
840.378995	24.9	120.000	100.0	H	21.1	46.0	

Radiated Emissions, 1-25 GHz

Measuring distance: 3m (1 – 8.5 GHz)
 1m (8.5 – 25 GHz)

Peak Detector:

Frequency	RF channel	Field strength, Peak Detector, 3m,1m	Limit	Margin
GHz	all	dB μ V/m	dB μ V/m	dB
All freqs	-	None detected	74	-

AV Detector:

Frequency	RF channel	Field strength, Peak Detector, 3m,1m	Limit	Margin
GHz	all	dB μ V/m	dB μ V/m	dB
All freqs	-	None detected	54	-

None detected in the restricted band

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

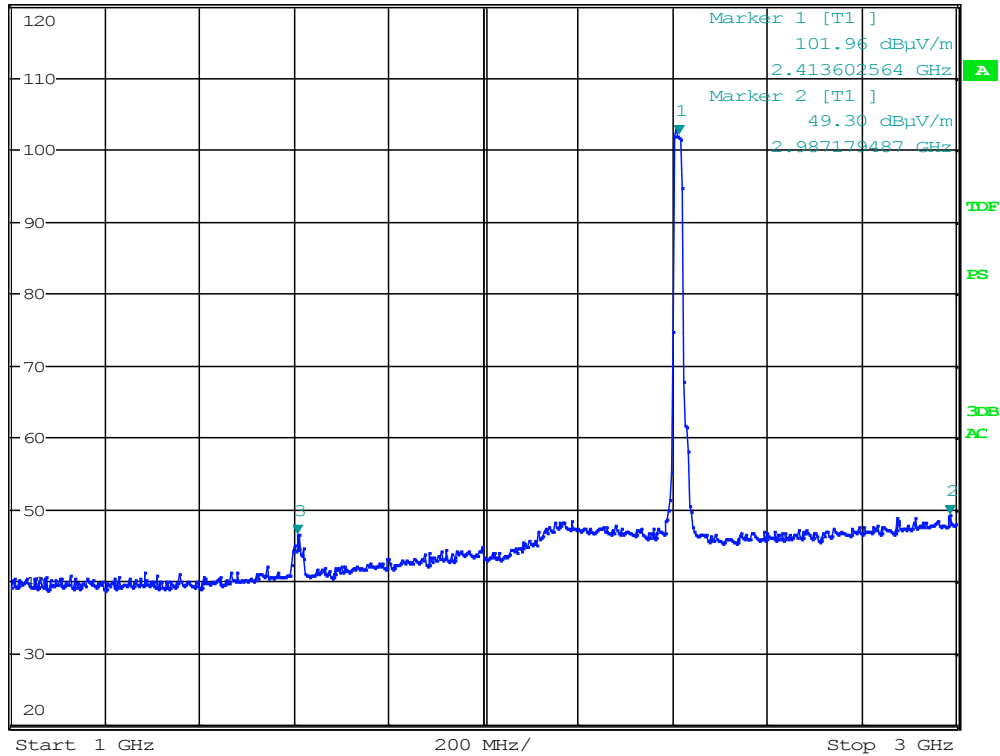


MARKER 3
 1.605769231 GHz
 Ref 120 dBµV/m *Att 15 dB

*RBW 1 MHz
 VBW 3 MHz
 SWT 5 ms

Marker 3 [T1]
 46.55 dBµV/m
 1.605769231 GHz

1 PK
 MAXH



Date: 8.MAY.2014 12:10:43

Radiated Emissions, 1000 -3000 MHz, VP, 802.11g, 54Mbps

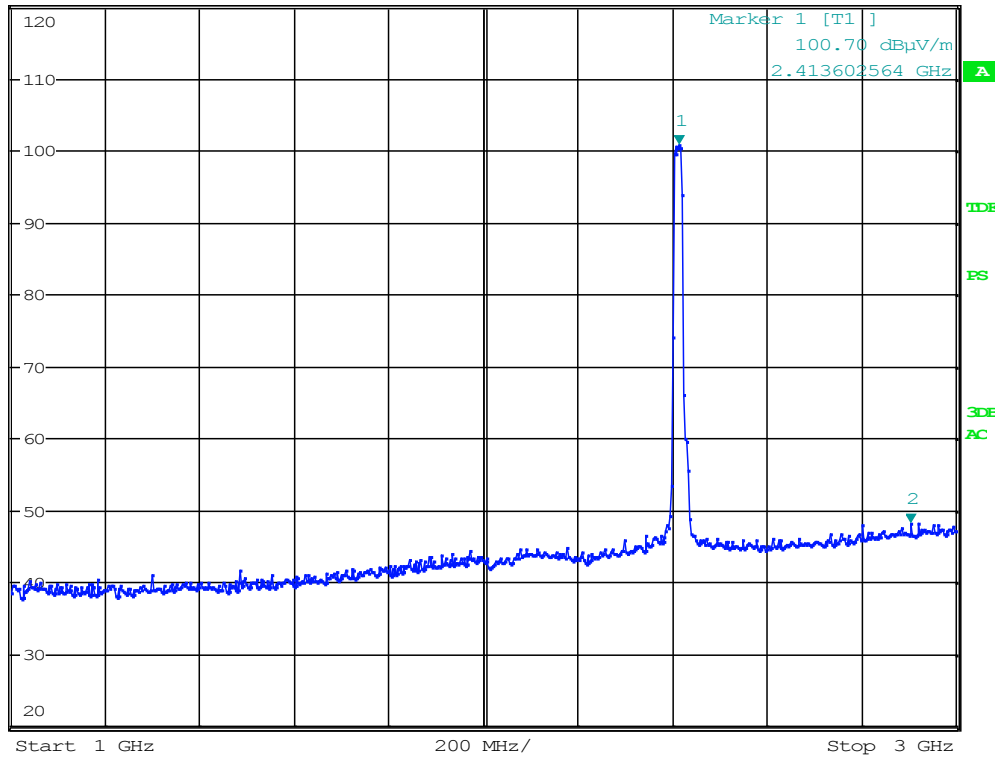


MARKER 2
 2.903846154 GHz
 Ref 120 dBµV/m *Att 15 dB

*RBW 1 MHz
 VBW 3 MHz
 SWT 5 ms

Marker 2 [T1]
 48.28 dBµV/m
 2.903846154 GHz

1 EK
 MAXH



Date: 8.MAY.2014 12:08:56

Radiated Emissions, 1000 -3000 MHz, HP, 802.11g, 54Mbps

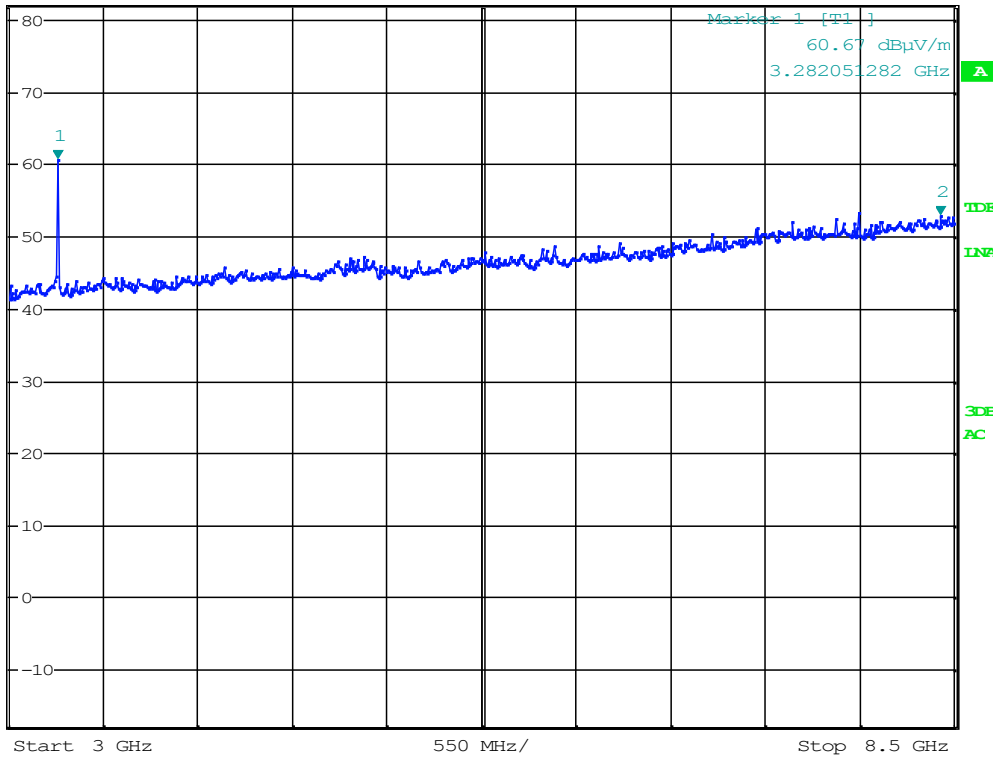


*RBW 1 MHz Marker 2 [T1]
 VEW 3 MHz 52.90 dBµV/m
 SWT 35 ms 8.420673077 GHz

Ref 82 dBµV/m

*Att 10 dB

1 PK
 MAXH

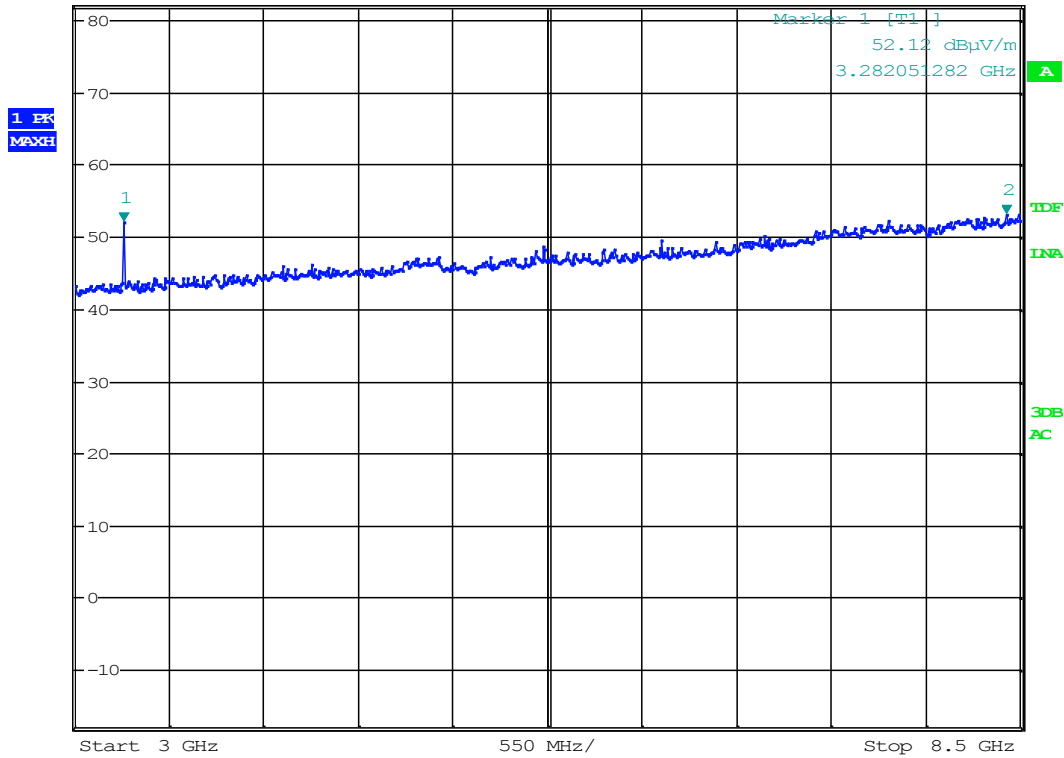


Date: 9.MAY.2014 08:14:38

Radiated Emissions, 3000 -8500 MHz, VP, 802.11g, 54Mbps



MARKER 2
 8.420673077 GHz
 Ref 82 dB μ V/m *Att 10 dB *REW 1 MHz VBW 3 MHz SWT 35 ms
 Marker 2 [T1]
 53.10 dB μ V/m
 8.420673077 GHz

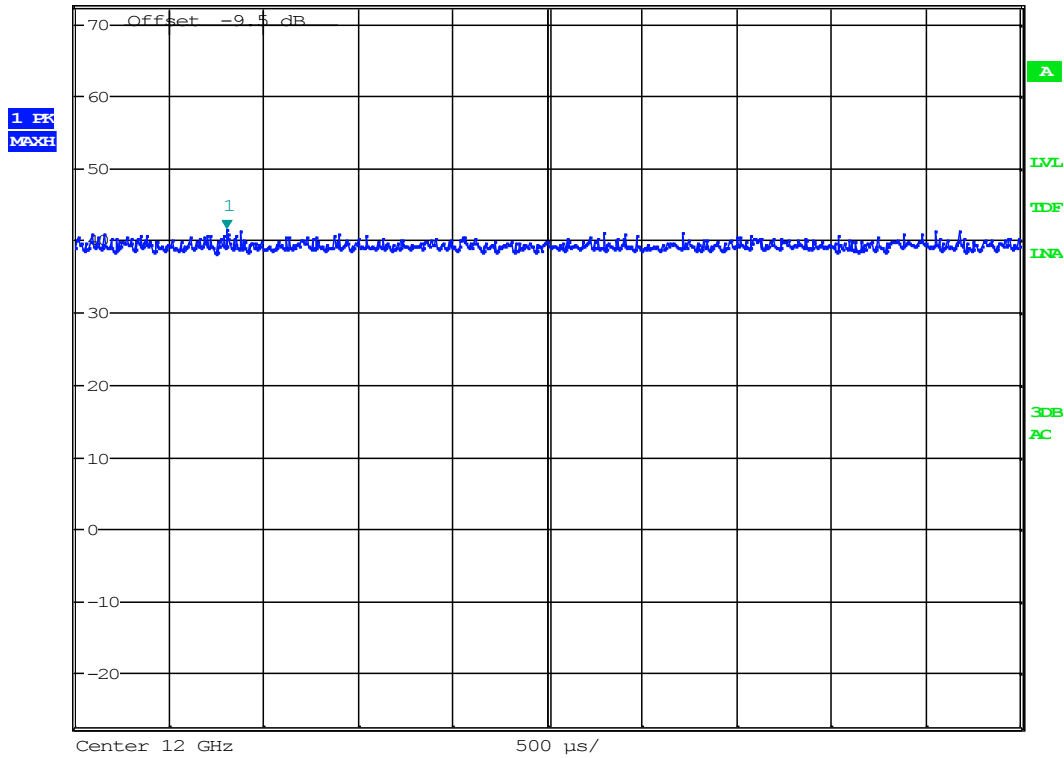


Date: 9.MAY.2014 08:13:36

Radiated Emissions, 3000 -8500 MHz, HP, 802.11g, 54Mbps



MARKER 1	REW 1 MHz	Marker 1 [T1]
801.2820513 μ s	VBW 3 MHz	41.56 dB μ V/m
Ref 72.5 dB μ V/m	SWT 5 ms	801.282051 μ s
*Att 10 dB		



Date: 9.MAY.2014 09:53:19

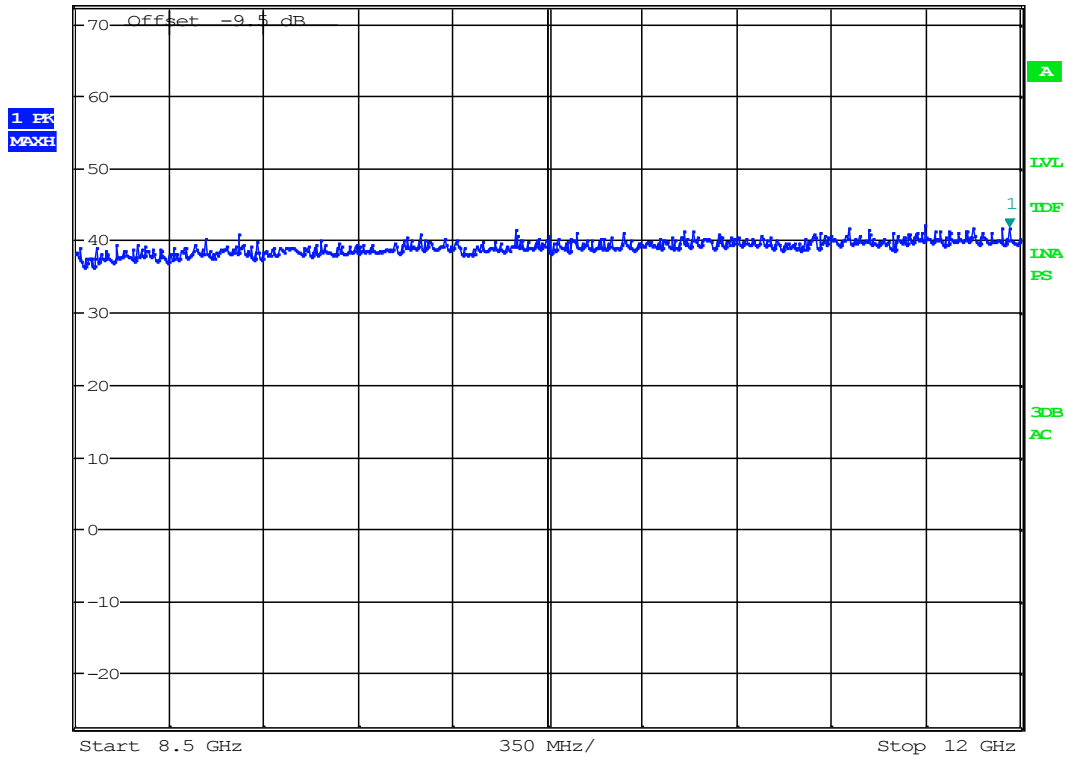
Radiated Emissions, 8.5 - 12GHz, VP, 802.11g, 54Mbps, @1m



MARKER 1
 11.96073718 GHz
 Ref 72.5 dBµV/m *Att 10 dB

*RBW 1 MHz
 VBW 3 MHz
 SWT 25 ms

Marker 1 [T1]
 41.72 dBµV/m
 11.960737179 GHz

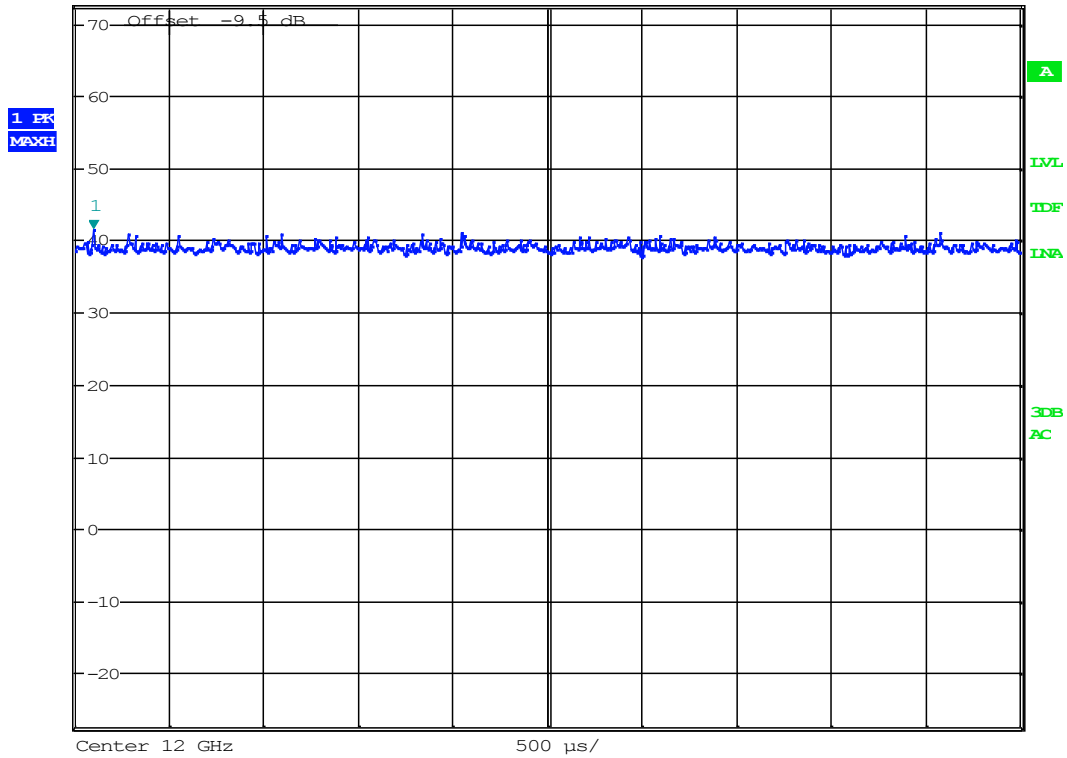


Date: 9.MAY.2014 09:42:53

Radiated Emissions, 8.5 - 12GHz, HP, 802.11g, 54Mbps, @1m



MARKER 1	REW 1 MHz	Marker 1 [T1]
96.15384615 μ s	VBW 3 MHz	41.55 dB μ V/m
Ref 72.5 dB μ V/m *Att 10 dB	SWT 5 ms	96.153846 μ s



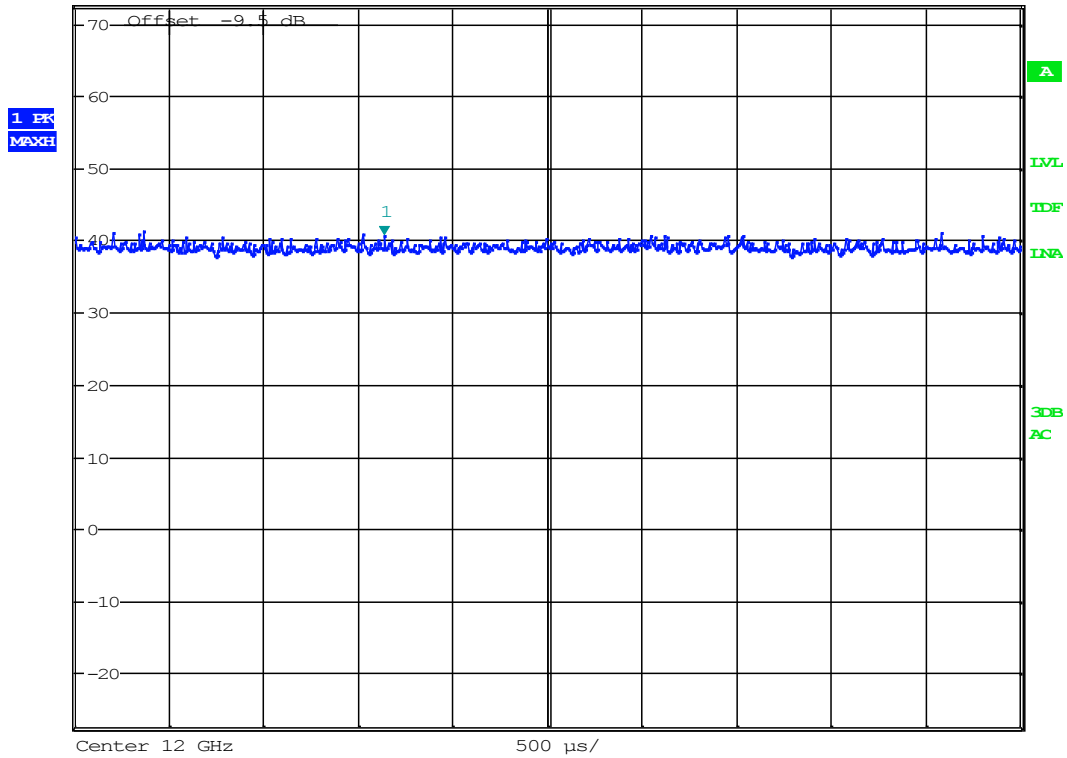
Date: 9.MAY.2014 09:54:38

Radiated Emissions, 12 - 18GHz, VP, 802.11g, 54Mbps, @1m



MARKER 1
 1.634615385 ms
 Ref 72.5 dBµV/m *Att 10 dB

REW 1 MHz Marker 1 [T1]
 VBW 3 MHz 40.60 dBµV/m
 SWT 5 ms 1.634615 ms



Date: 9.MAY.2014 09:53:52

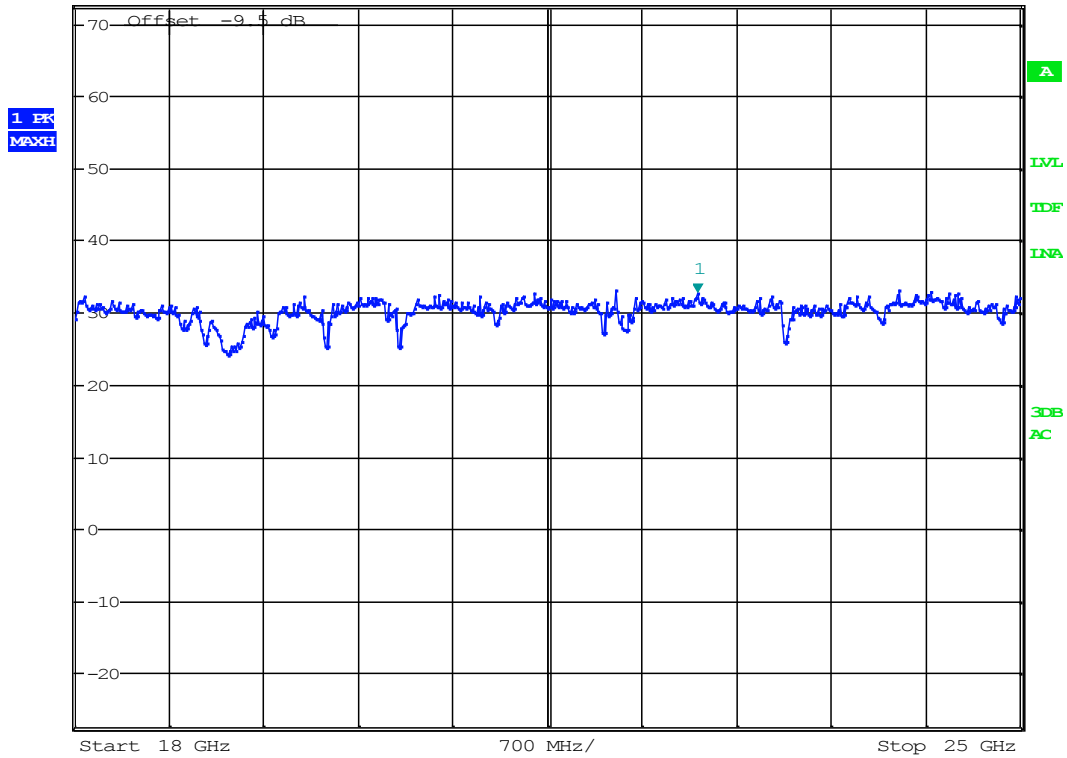
Radiated Emissions, 12 - 18GHz, HP, 802.11g, 54Mbps, @1m



MARKER 1
 22.61057692 GHz
 Ref 72.5 dBμV/m *Att 10 dB

*RBW 1 MHz
 VBW 3 MHz
 SWT 45 ms

Marker 1 [T1]
 32.70 dBμV/m
 22.610576923 GHz



Date: 9.MAY.2014 09:55:20

Pre-scan, 18 - 25GHz, 802.11g, 6Mbps

3.6 Power Spectral Density (PSD)

Para. No.: 15.247 (d)

Test Performed By: G.Suhandhakumar	Date of Test: 09.May 2014
------------------------------------	---------------------------

Test Results: Passed

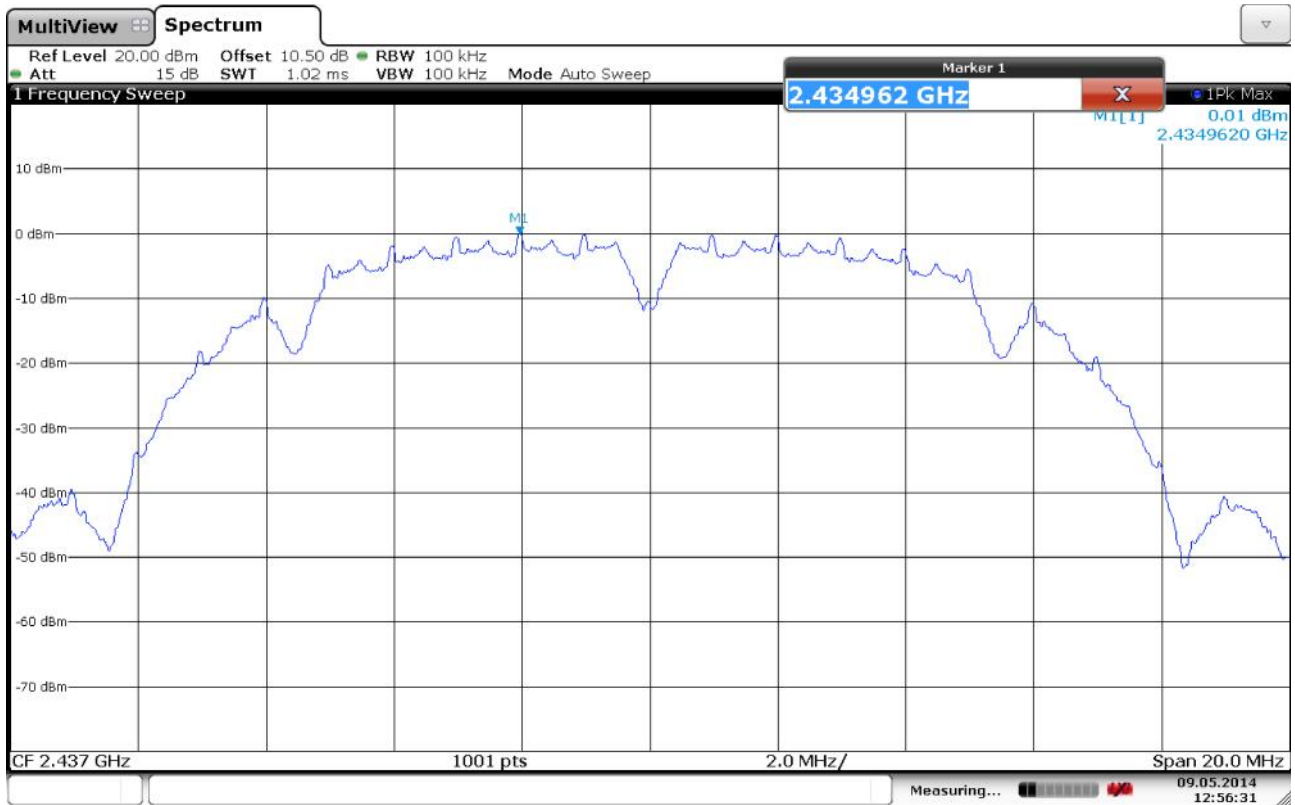
Measured and Calculated Data:

Carrier Frequency (MHz)	Power Spectral Density (dBm)		
	802.11b, 11Mbps	802.11g, 54Mbps	802.11n, MCS7, 20MHz BW
2437	0.26	-7.91	-8.45

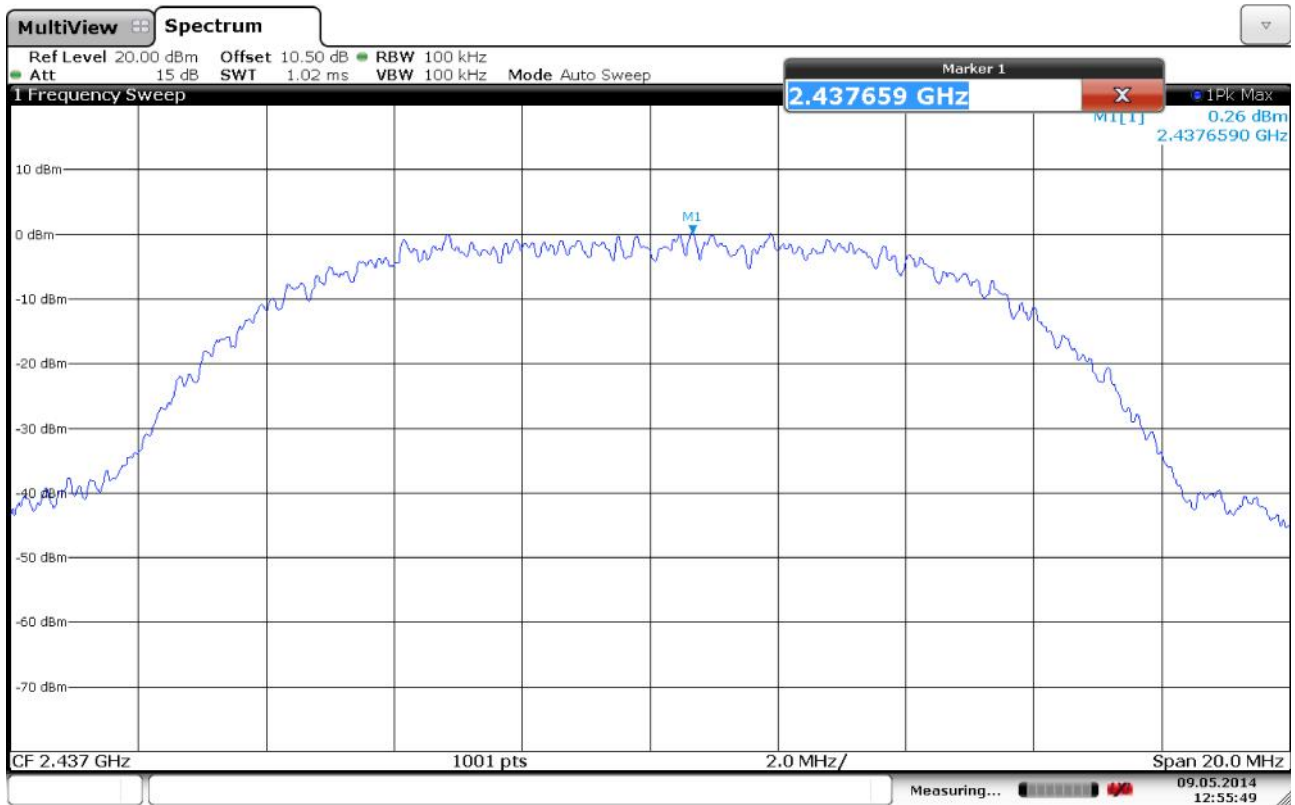
Tested according to KDB 558074 D01 DTS Meas Guidance v03r01, Section 10.2.

Requirements:

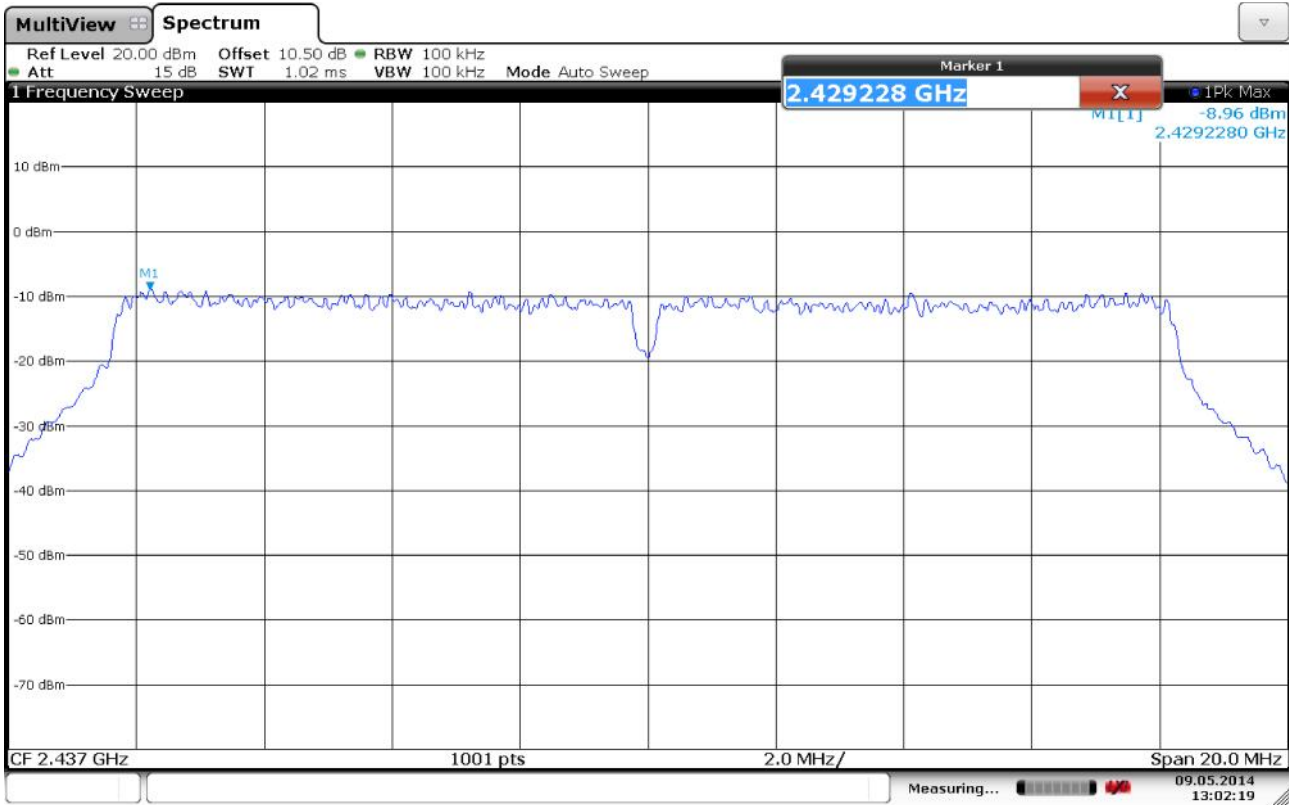
The Power Spectral Density of a Digital Transmission System shall be no greater than +8 dBm in any 3 kHz band



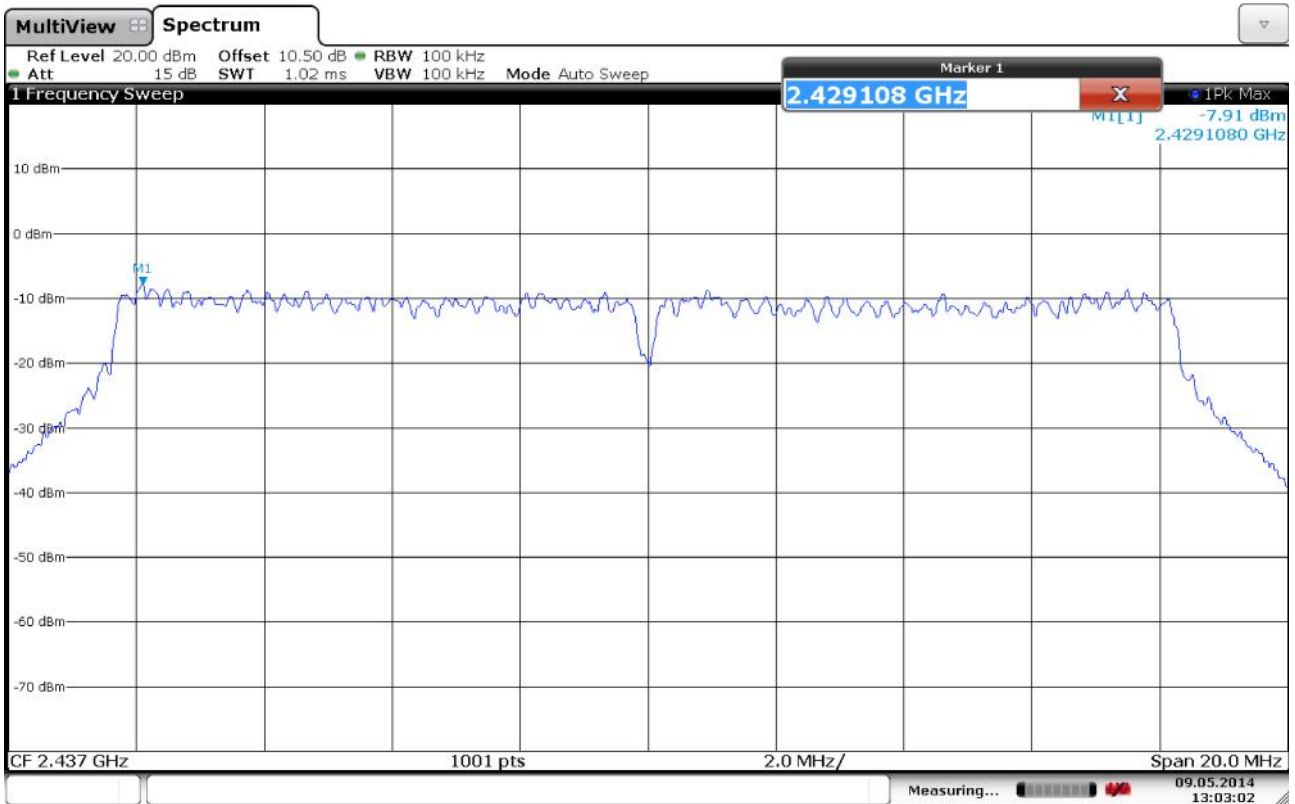
PSD, 2437 MHz, 802.11b, 1Mbps



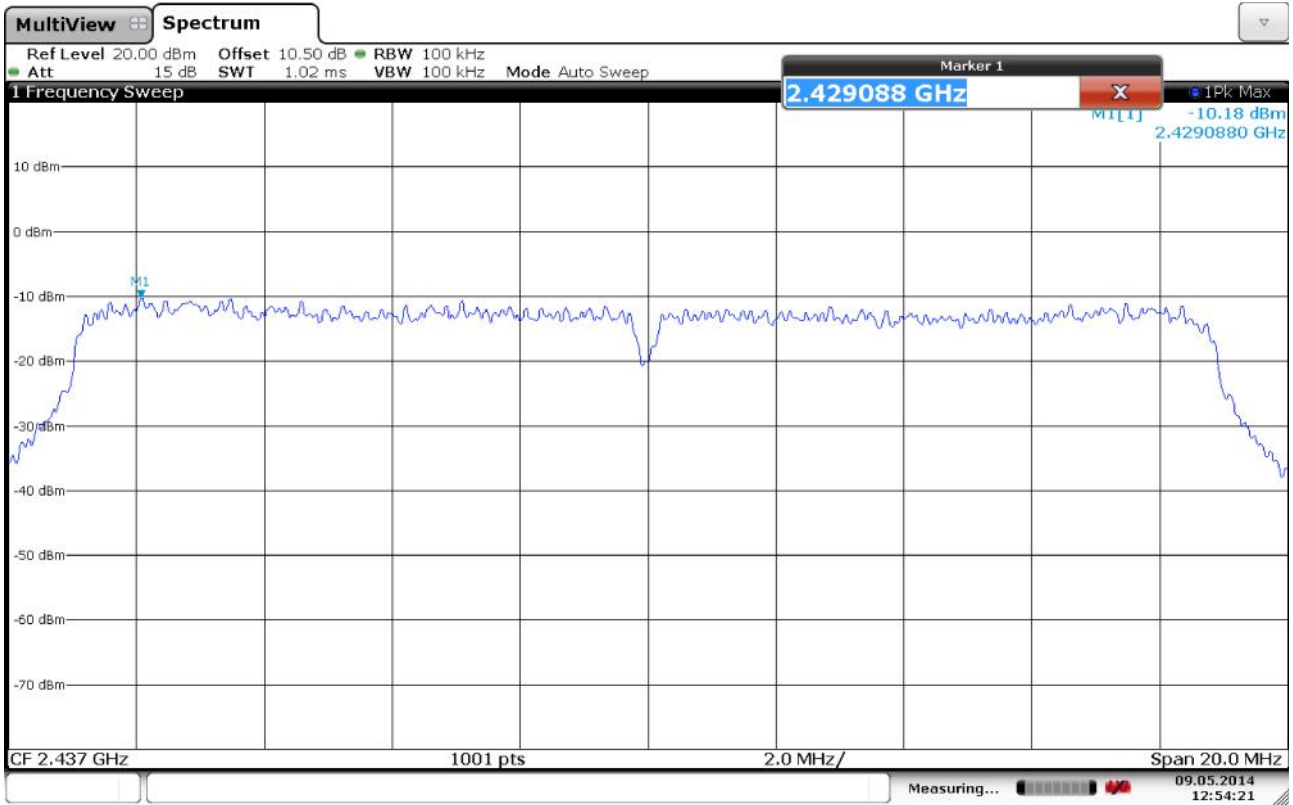
PSD, 2437 MHz, 802.11b, 11Mbps



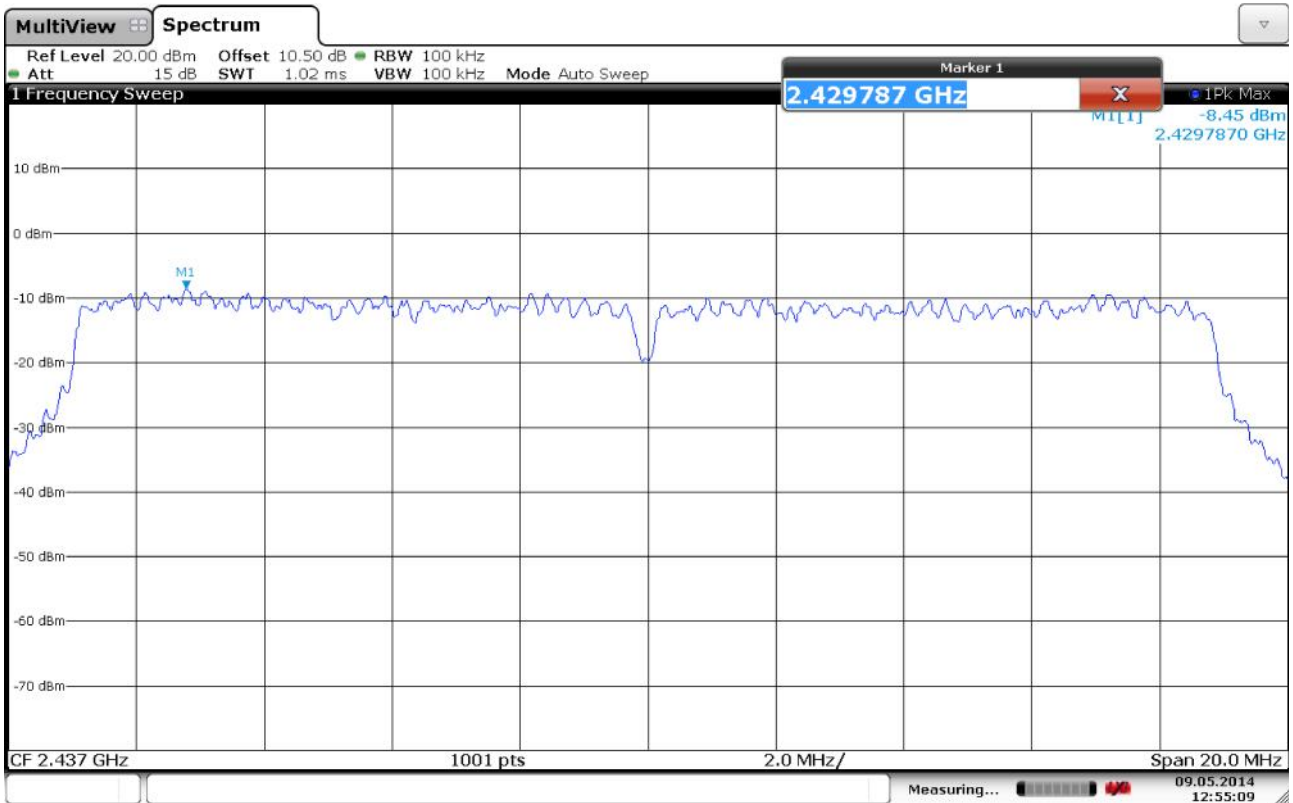
PSD, 2437 MHz, 802.11g, 6Mbps



PSD, 2437 MHz, 802.11g, 54Mbps



PSD, 2437 MHz, 802.11n, MCS0, 20MHz BW



PSD, 2437 MHz, 802.11n, MCS7, 20MHz BW

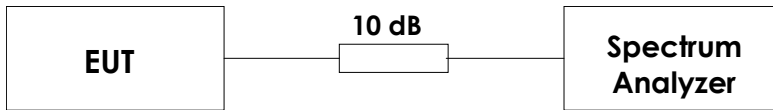
4 LIST OF TEST EQUIPMENT

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	ESU40	Spectrum Analyzer	Rohde & Schwarz	LR 1639	2013.09.24	2014.09.24
2	4768-10	Attenuator	Narda	LR1647	2013.06	2014.06
3	ESHS10	EMI receiver	Rohde & Schwarz	N3528	2013.09.09	2014.09.09
4	ESH3-Z5	Two Line V-Network	Rohde & Schwarz	LR 1076	Cal b4 use	
5	80S	Signal Generator	Powertron	LT 502	Cal b4 use	
6	6812B	AC Power Source	Agilent	LR 1515	2013.10.28	2014.10.28
7	ESH3-Z2	Pulse Limiter	Rohde & Schwarz	LR 1074	Cal b4 use	
8	ESCI	Measuring Receiver	Rohde & Schwarz	N-4259	2013.03.21	2015.03.21
9	JB3	BiLog Antenna	Sunol Sciences	N-4525	2011.09.07	2014.09.07
10	LNA6900	Preamplifier	Teseq	LR 1593	Cal b4 use	
11	3115	Horn Antenna	EMCO	LR 1226	2013.12.08	2015.12.08
12	8449B	Pre-amplifier	Hewlett Packard	LR 1322	2013.09	2014.09
13	HFH2-Z2	Loop Antenna	Rohde & Schwarz	LR 285	2013.12	2015.12
14	PM7320X	Standard Gain Horn	Siverts lab	LR 103	N/A	
15	DBF-520-20	Standard Gain Horn	Systron Donner	LR 101	N/A	
16	638	Standard Gain Horn	Narda	LR 1480	N/A	
18	Model 87 V	Multimeter	Fluke	LR 1599	2012.10.29	2014.10.29
19	6HC3000/18000	Highpass Filter	Trilithic	LR 1614	Cal b4 use	
20	FSW26	Spectrum Analyzer	Rohde & Schwarz	LR 1640	2013.08.30	2014.08.30
21	NRP-Z81	Wideband Power Sensor	Rohde & Schwarz	LR 1644	2014.04.05	2015.04.05

BLOCK DIAGRAM

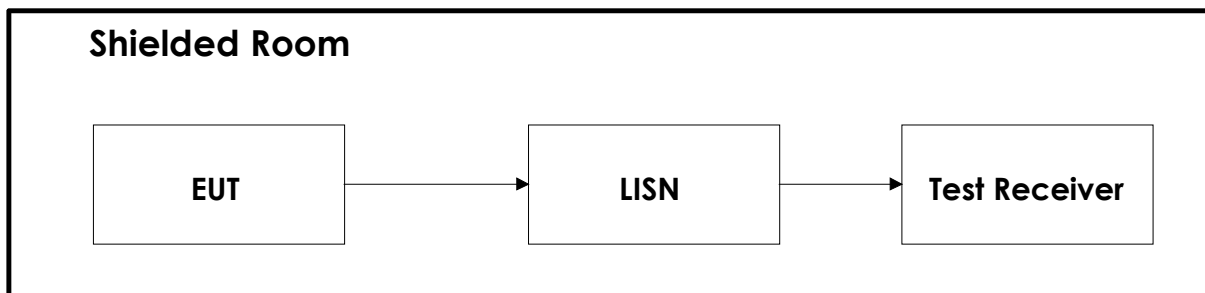
4.1 Conducted Tests



Test equipment included: 1, 2, 20, 21

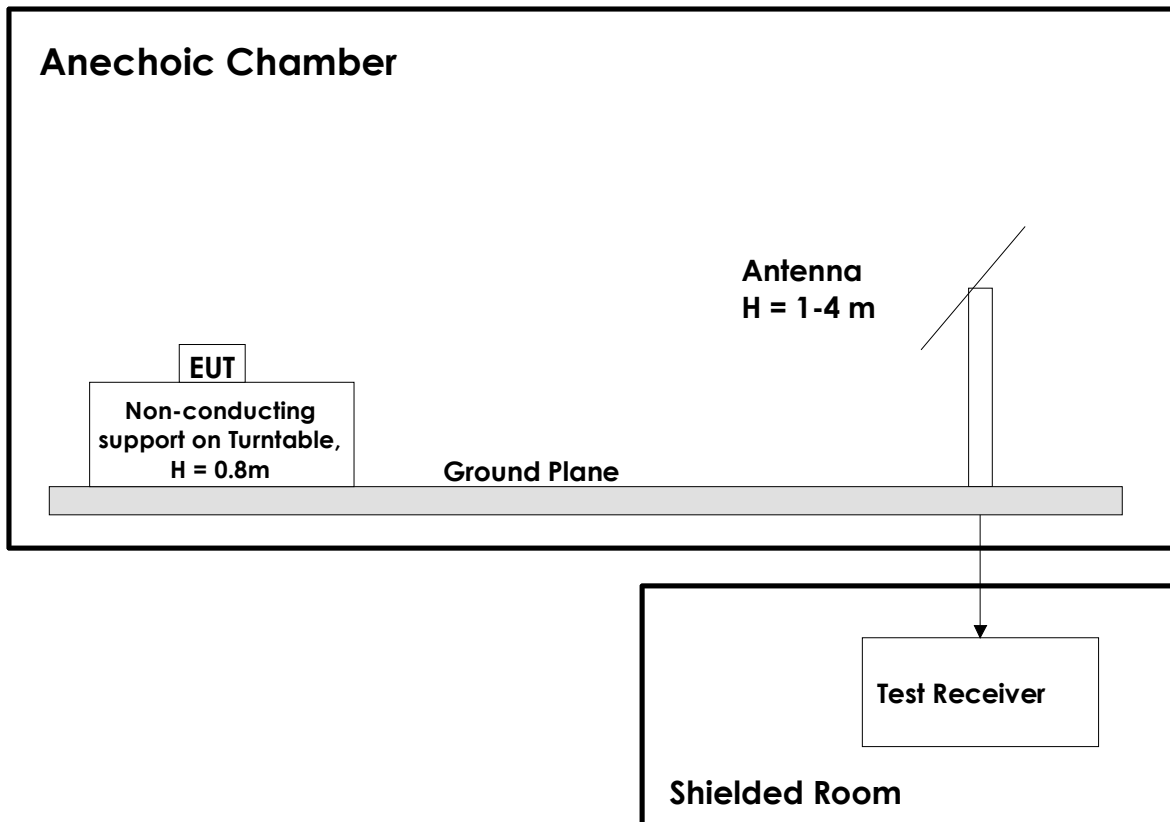
4.2 This setup is used for all measurements on 50 ohm antenna connector.

4.3 Power Line Conducted Emission



Test equipment: 3, 4, 6, 7, 18, 19

4.4 Test Site Radiated Emission



Test equipment: 1, 9, 10, 11, 12, 13, 14, 15, 16, 18

This test setup is used for all radiated emissions tests. For frequencies below 30 MHz the measuring distance is 10 m, for all other frequencies it is 3m or 1m. Emissions above 1 GHz were measured with a Spectrum Analyzer and Horn Antenna and with the preamplifier after the antenna. For measurements above 18 GHz the test receiver is moved inside the anechoic chamber and located next to the antenna to minimize the cable loss.