



**Nemko Test Report:** 10219978RUS1


**Applicant:** SyChip LLC  
2805 N. Dallas Parkway, Ste 400  
Plano, TX 75093  
USA


**Equipment Under Test:  
(E.U.T.)** SN8200

FCC ID.: QPU8200  
IC: 4523A-8200

**In Accordance With:** **FCC Part 15, Subpart C, 15.247 and  
Industry Canada RSS-210, Issue 8**  
Digital Transmission Systems

**Tested By:** Nemko USA, Inc.  
802 N. Kealy  
Lewisville, Texas 75057-3136

**TESTED BY:**   
\_\_\_\_\_  
David Light, Senior Wireless Engineer **DATE:** 02 February 2012

**APPROVED BY:**   
\_\_\_\_\_  
Michael Cantwell **DATE:** 15 February 2012

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**Section 1. Summary of Test Results**

Manufacturer: Sychip LLC

Model No.: SN8200

Serial No.: SN8200-FCC-8

General: **All measurements are traceable to national standards.**

These tests were conducted on a sample of the equipment for the purpose of demonstrating compliance with CFR 47 Part 15, Subpart C, Paragraph 15.247 and Industry Canada RSS-210, Issue 8 for Digital Transmission Systems. Radiated tests were conducted in accordance with ANSI C63.4-2003. Radiated emissions are made on an open area test site. 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 |

THIS TEST REPORT RELATES ONLY TO THE ITEM(S) TESTED.

THE FOLLOWING DEVIATIONS FROM, ADDITIONS TO, OR EXCLUSIONS FROM THE TEST SPECIFICATIONS HAVE BEEN MADE.

See " Summary of Test Data".



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**Summary Of Test Data**

<b>NAME OF TEST</b>	<b>PARA. NO.</b>	<b>RESULT</b>
Powerline Conducted Emissions	15.207(a) /RSS-Gen 7.2.4	Complies
Minimum 6 dB Bandwidth	15.247(a)(2) / RSS-210 A8.2(a)	Complies
Maximum Peak Power Output	15.247(b)(3) / RSS-210 A8.4(4)	Complies
Spurious Emissions (Antenna Conducted)	15.247(d) / RSS-210 A8.5	Complies
Spurious Emissions (Restricted Bands)	15.247(d)/15.209(a) RSS-Gen 7.2.2	Complies
Peak Power Spectral Density	15.247(e) / RSS-210 A8.2(b)	Complies

**Footnotes:**

**Section 2. Equipment Under Test (E.U.T.)**

**General Equipment Information**

<b>Frequency Band (MHz):</b>	902-928	2400-2483.5	5725-5850
	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

**Operating Frequency of Test Sample:** 2412 to 2462 MHz

**Channel Spacing:** 5 MHz

**User Frequency Adjustment:** Software controlled

**Description of EUT**

2400 MHz 802.11b/g/n serial to WiFi module.

**Section 3. Occupied Bandwidth**

NAME OF TEST: Occupied Bandwidth	PARA. NO.: FCC 15.247(a)(2) RSS-210 A8.2(a)
TESTED BY: David Light	DATE: 31 January 2012

**Test Results:** Complies.

**Measurement Data:** See 6 dB BW plot  
Measured 6 dB bandwidth: 802.11b – 9.7 MHz  
802.11g – 16.5 MHz  
802.11n – 17.8 MHz

**Test Conditions:** 48 %RH  
23 °C


**Measurement Uncertainty:** +/-1x10<sup>-7</sup> ppm

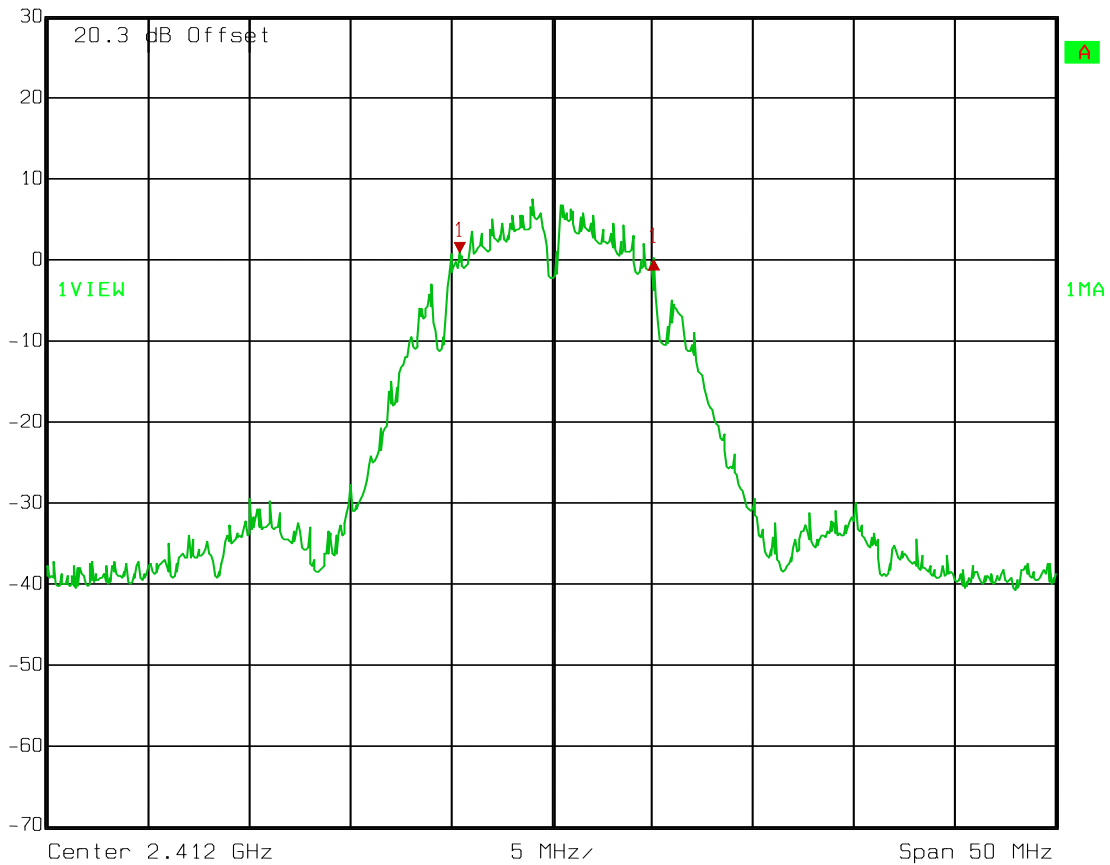
**Test Equipment Used:** 1036-1082-1472

Test Data – Occupied Bandwidth

802.11b

Low Channel

 Delta 1 [T1] RBW 100 kHz RF Att 30 dB  
Ref Lvl -0.66 dB VBW 100 kHz  
30 dBm 9.61923848 MHz SWT 12.5 ms Unit dBm



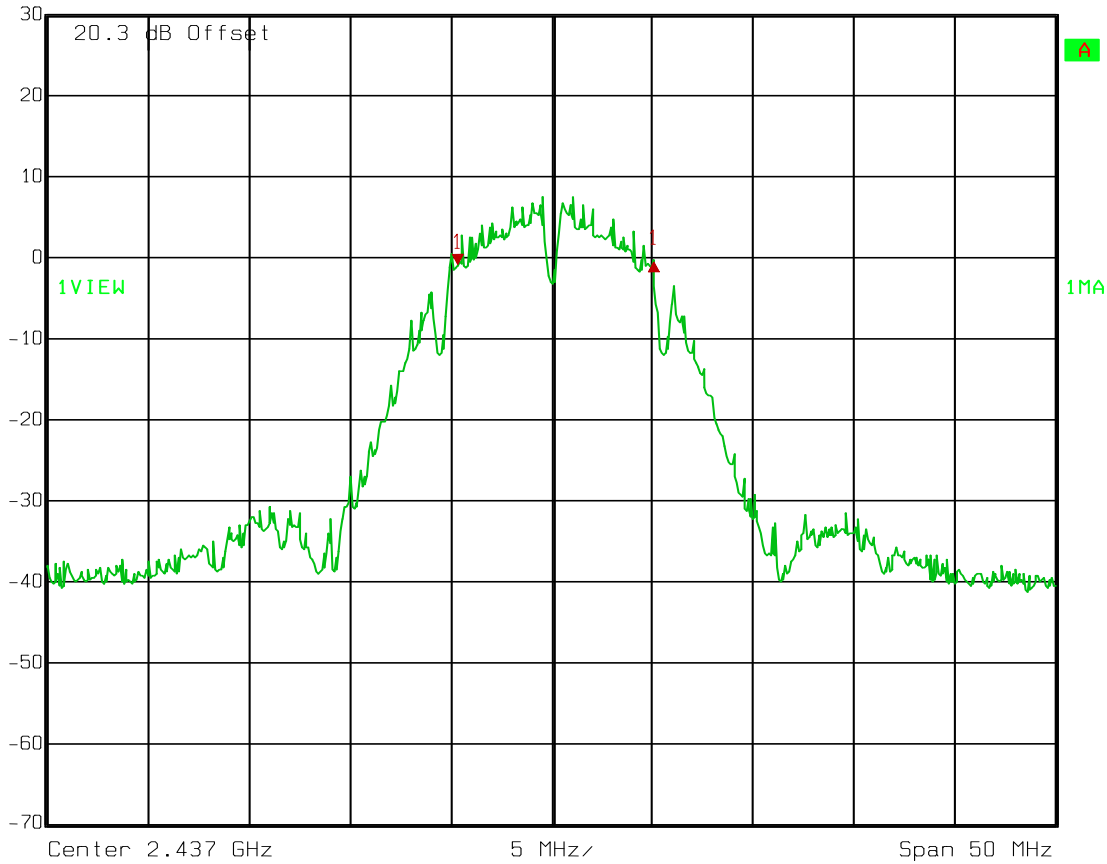
Date: 31.JAN.2012 10:48:59

Test Data – Occupied Bandwidth

802.11b  
Mid Channel



Delta 1 [T1] RBW 100 kHz RF Att 30 dB  
Ref Lvl 0.43 dB VBW 100 kHz  
30 dBm 9.69939880 MHz SWT 12.5 ms Unit dBm



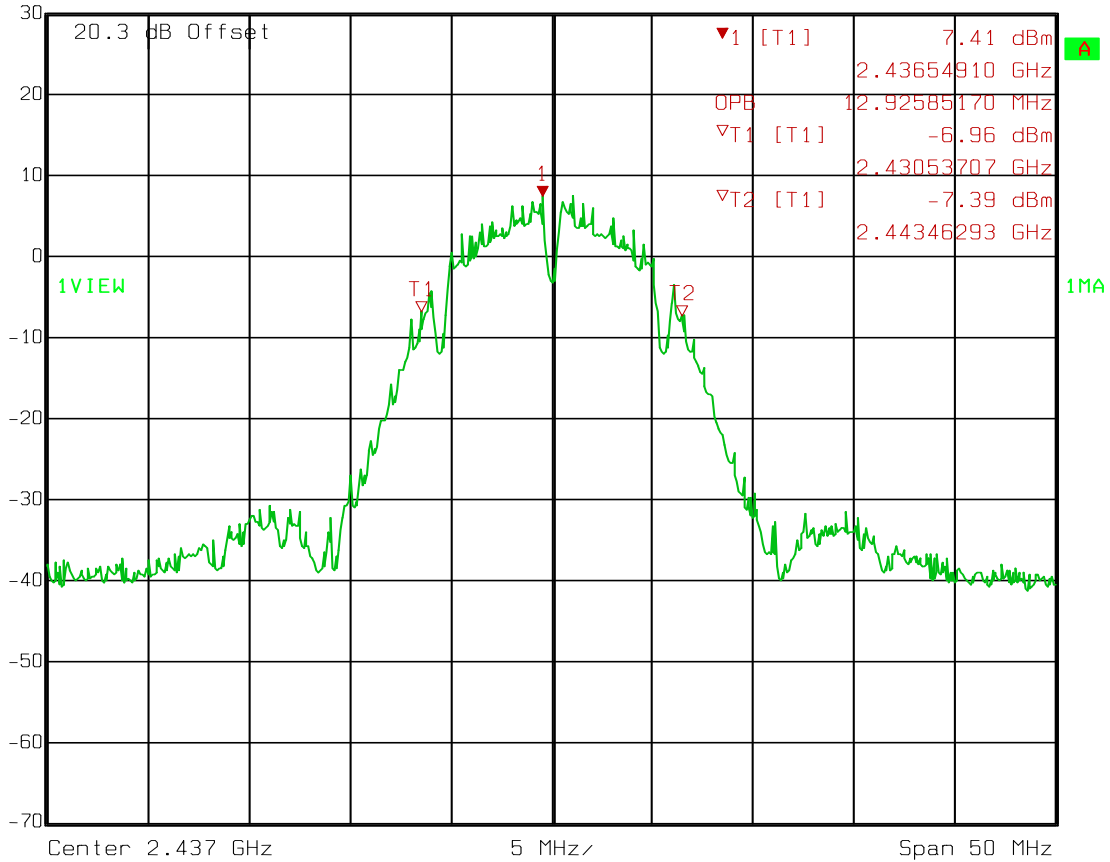
Date: 31.JAN.2012 10:50:16



Test Data – Occupied Bandwidth

802.11b  
 Mid Channel  
 99% Bandwidth for RSS-210


 Marker 1 [T1] RBW 100 kHz RF Att 30 dB  
 Ref Lvl 7.41 dBm VBW 100 kHz  
 30 dBm 2.43654910 GHz SWT 12.5 ms Unit dBm

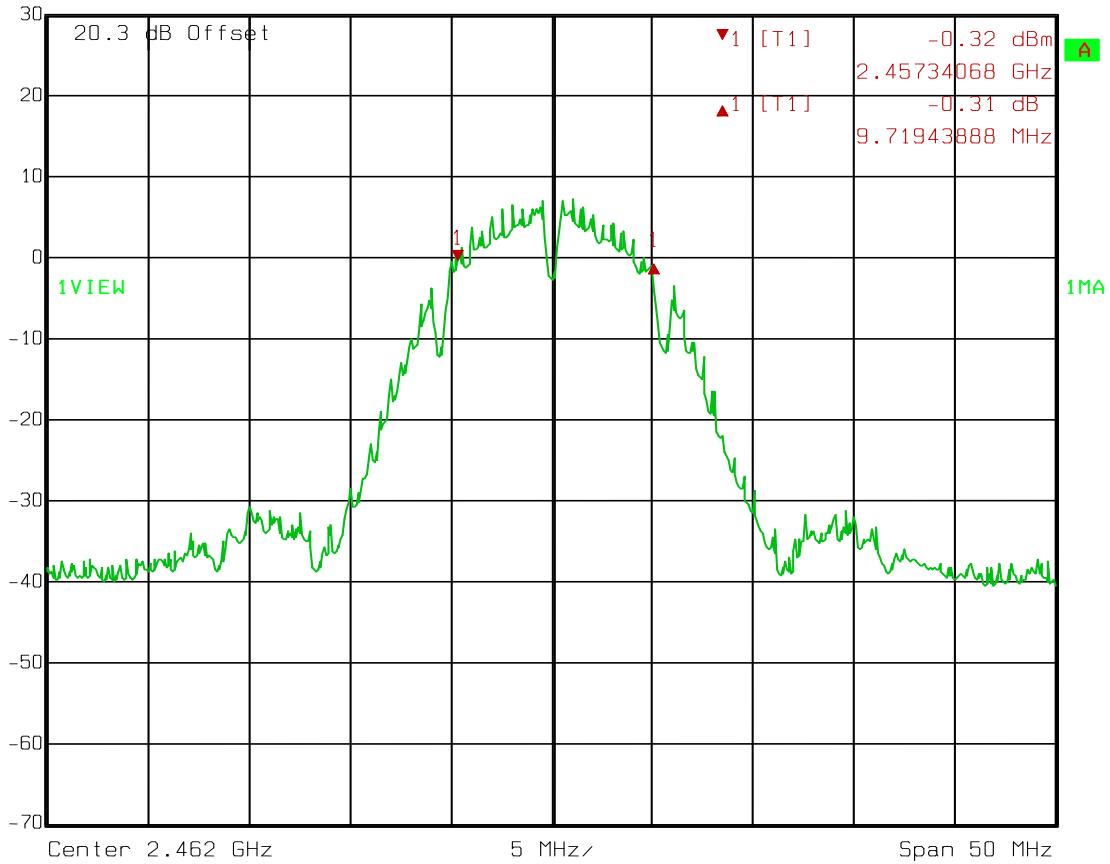


Date: 31.JAN.2012 10:51:01

Test Data – Occupied Bandwidth

802.11b  
High Channel

 Delta 1 [T1] RBW 100 kHz RF Att 30 dB  
Ref Lvl -0.31 dB VBW 100 kHz  
30 dBm 9.71943888 MHz SWT 12.5 ms Unit dBm

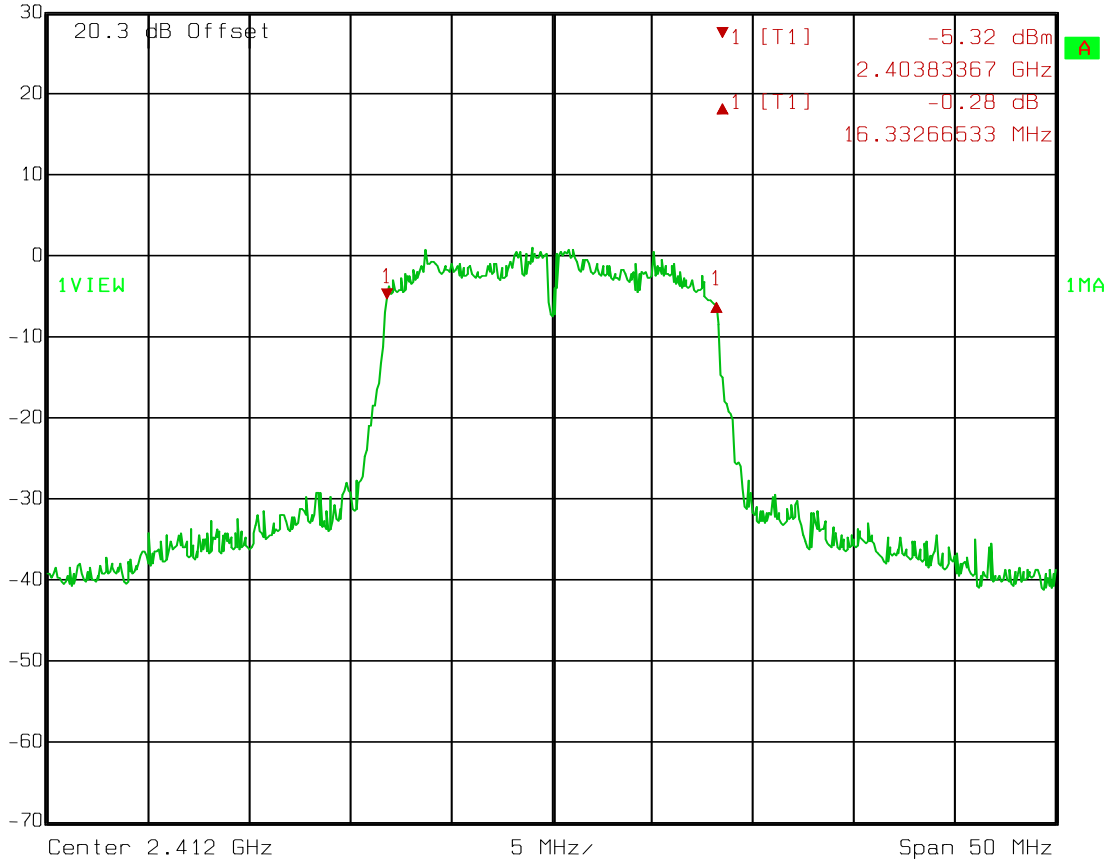


Date: 31.JAN.2012 10:52:10

Test Data – Occupied Bandwidth

802.11g  
Low Channel

 Delta 1 [T1] RBW 100 kHz RF Att 30 dB  
Ref Lvl -0.28 dB VBW 100 kHz  
30 dBm 16.33266533 MHz SWT 12.5 ms Unit dBm

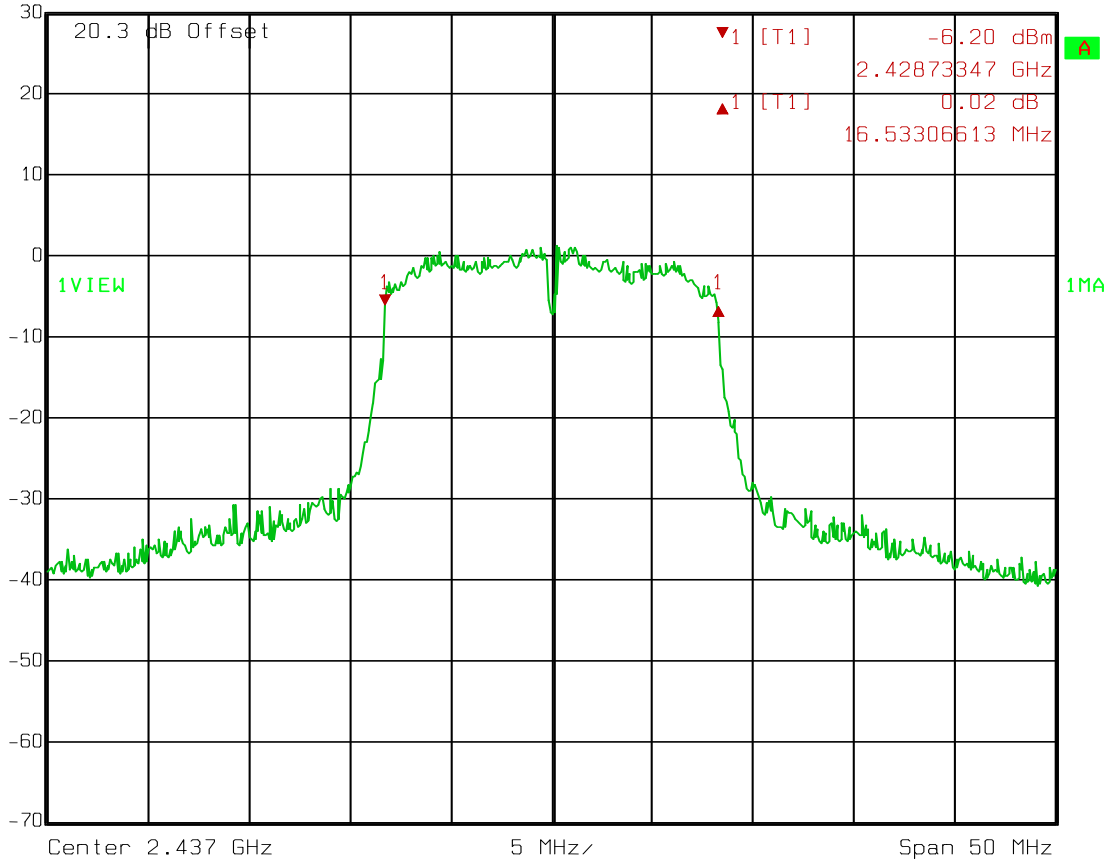


Date: 31.JAN.2012 10:53:29

Test Data – Occupied Bandwidth

802.11g  
Mid Channel

	Delta 1 [T1]	RBW	100 kHz	RF Att	30 dB
	Ref Lvl	0.02 dB	VBW	100 kHz	
	30 dBm	16.53306613 MHz	SWT	12.5 ms	Unit dBm

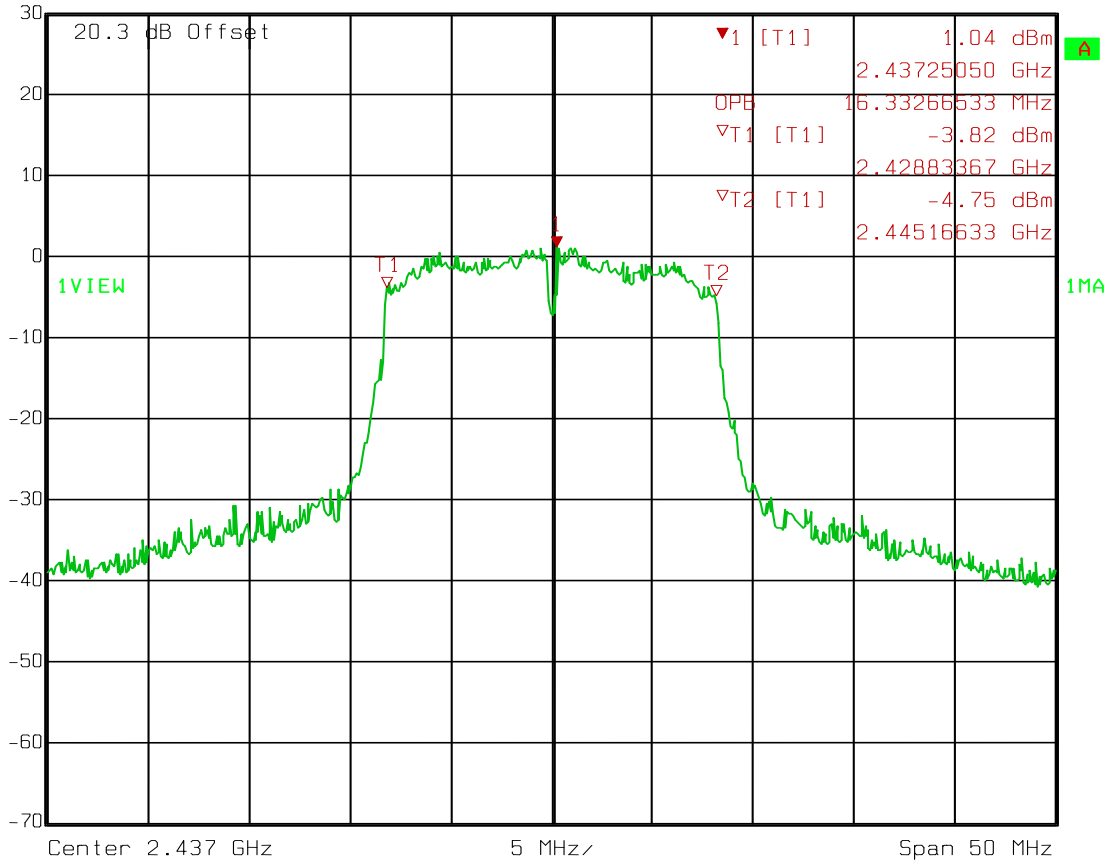


Date: 31.JAN.2012 10:54:33

**Test Data – Occupied Bandwidth**

802.11g  
 Mid Channel  
 99% Bandwidth for RSS-210

	Marker 1 [T1]	RBW	100 kHz	RF Att	30 dB
	Ref Lvl	1.04 dBm	VBW	100 kHz	
	30 dBm	2.43725050 GHz	SWT	12.5 ms	Unit dBm



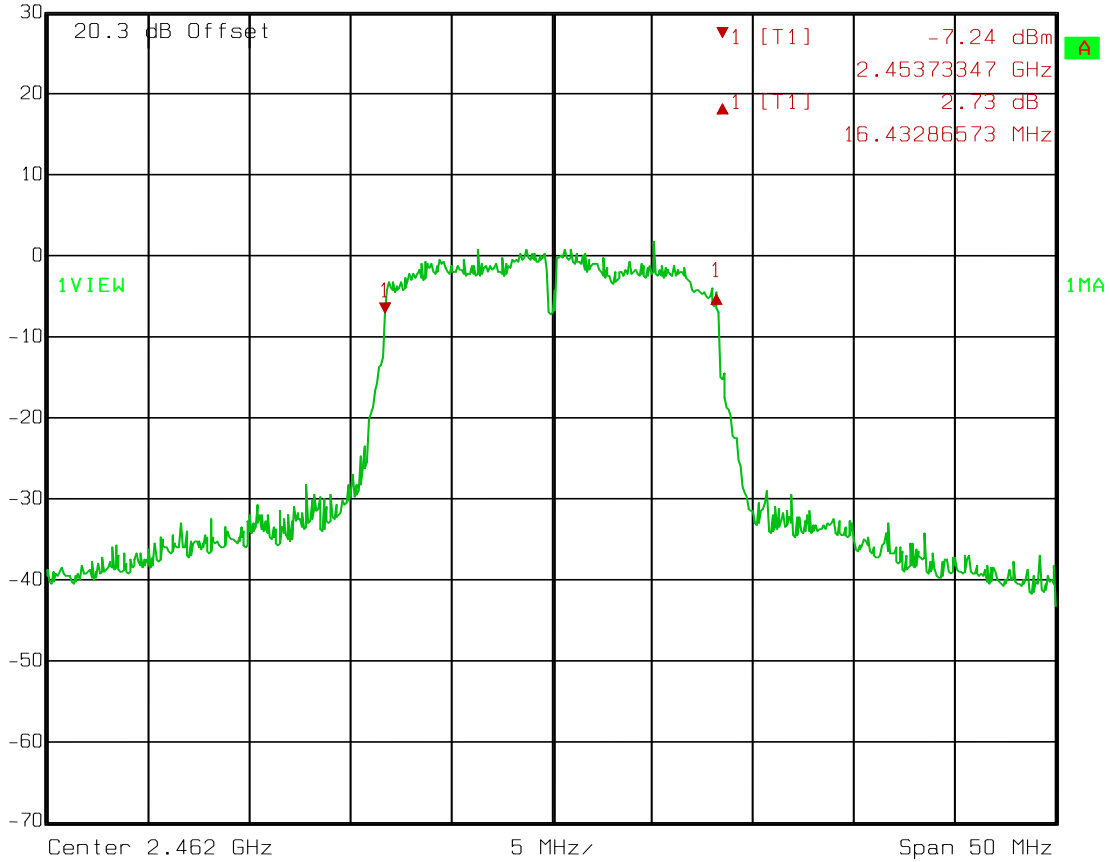
Date: 31.JAN.2012 10:55:13

Test Data – Occupied Bandwidth

802.11g  
High Channel



Delta 1 [T1] RBW 100 kHz RF Att 30 dB  
 Ref Lvl 2.73 dB VBW 100 kHz  
 30 dBm 16.43286573 MHz SWT 12.5 ms Unit dBm



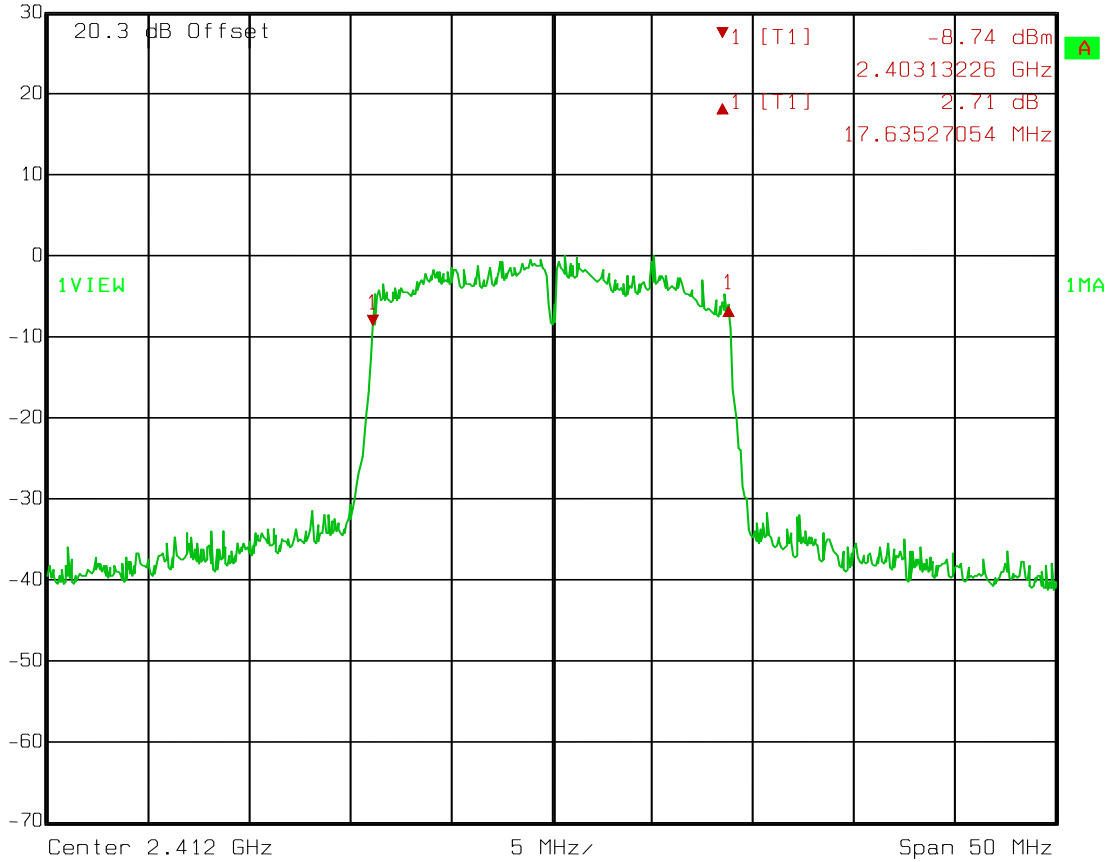
Date: 31.JAN.2012 10:56:18

Test Data – Occupied Bandwidth

802.11n  
Low Channel



Delta 1 [T1] RBW 100 kHz RF Att 30 dB  
Ref Lvl 2.71 dB VBW 100 kHz  
30 dBm 17.63527054 MHz SWT 12.5 ms Unit dBm



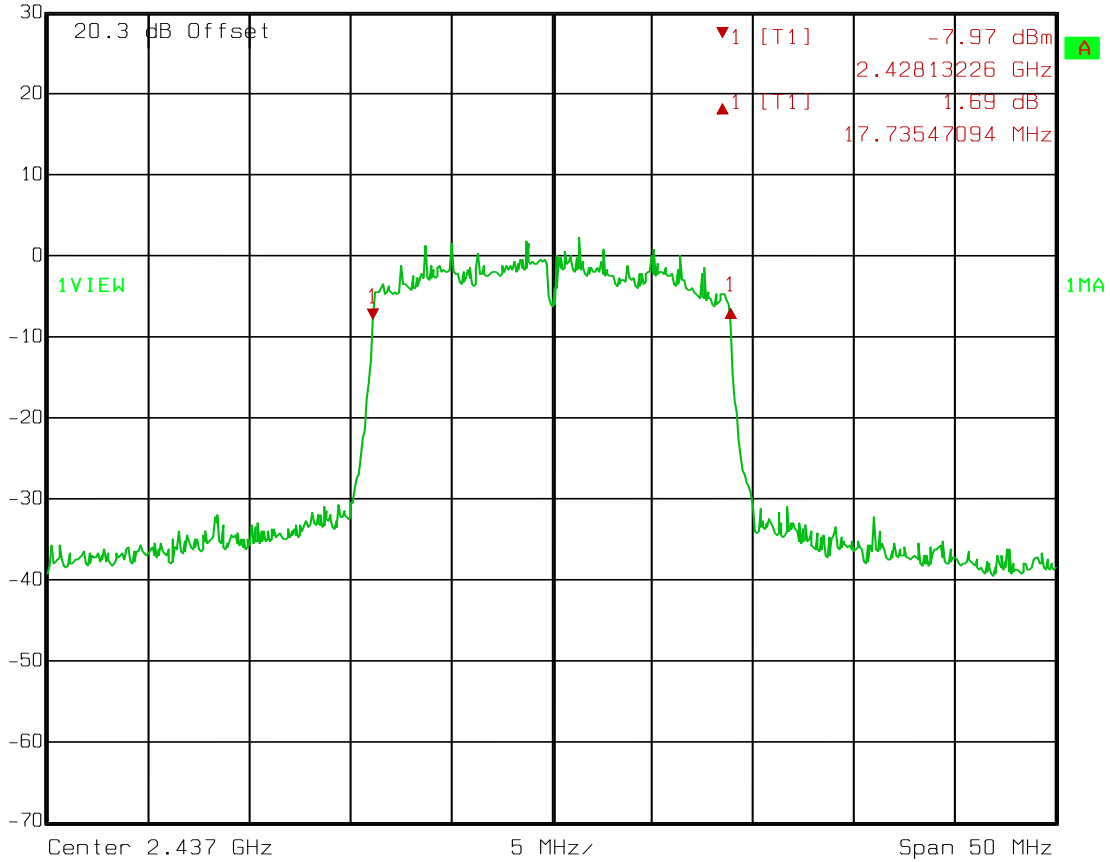
Date: 31.JAN.2012 10:57:30

Test Data – Occupied Bandwidth

802.11n  
Mid Channel



Delta 1 [T1] RBW 100 kHz RF Att 30 dB  
 Ref Lvl 1.69 dB VBW 100 kHz  
 30 dBm 17.73547094 MHz SWT 12.5 ms Unit dBm



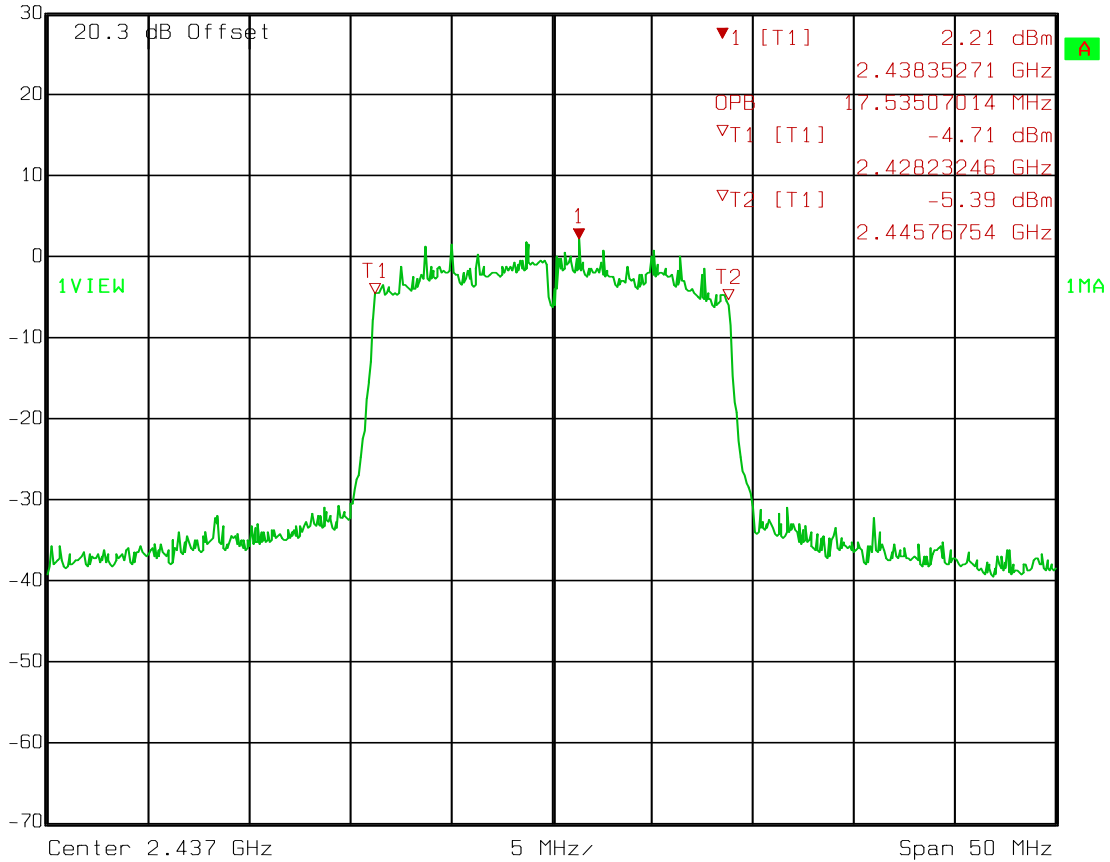
Date: 31.JAN.2012 10:58:23



Test Data – Occupied Bandwidth

802.11n  
 Mid Channel  
 99% Bandwidth for RSS-210


 Ref Lvl 30 dBm  
 Marker 1 [T1] 2.21 dBm  
 2.43835271 GHz  
 RBW 100 kHz RF Att 30 dB  
 VBW 100 kHz  
 SWT 12.5 ms Unit dBm



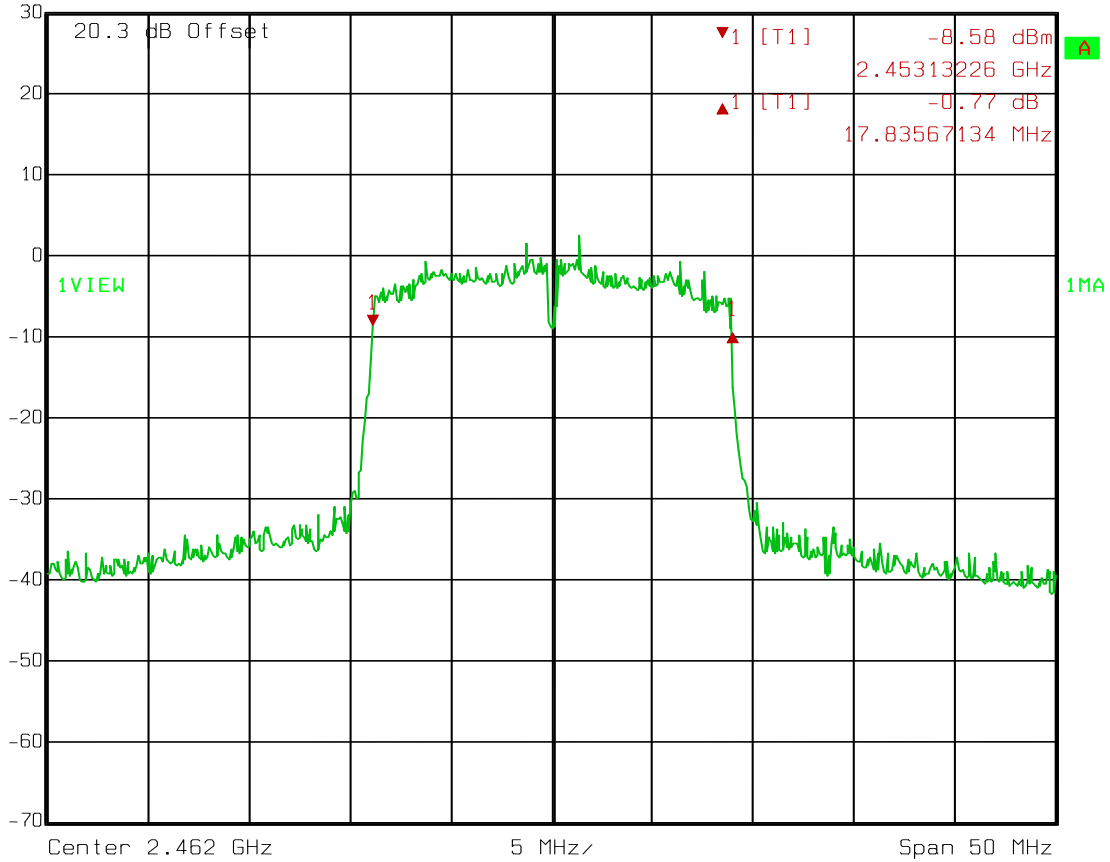
Date: 31.JAN.2012 10:58:47

Test Data – Occupied Bandwidth

802.11n  
High Channel



Delta 1 [T1] RBW 100 kHz RF Att 30 dB  
Ref Lvl -0.77 dB VBW 100 kHz  
30 dBm 17.83567134 MHz SWT 12.5 ms Unit dBm



Date: 31.JAN.2012 10:59:55

**Section 4. Maximum Peak Output Power**

NAME OF TEST: Maximum Peak Output power	PARA. NO.: FCC 15.247(b)(3) RSS-210 A8.4(4)
TESTED BY: David Light	DATE: 31 January 2012

**Test Results:** Complies.

**Measurement Data:** Refer to attached data

**Test Conditions:** 48 %RH  
23 °C

**Measurement Uncertainty:** +/-1.7 dB

**Test Equipment Used:** 1036-1082-1472

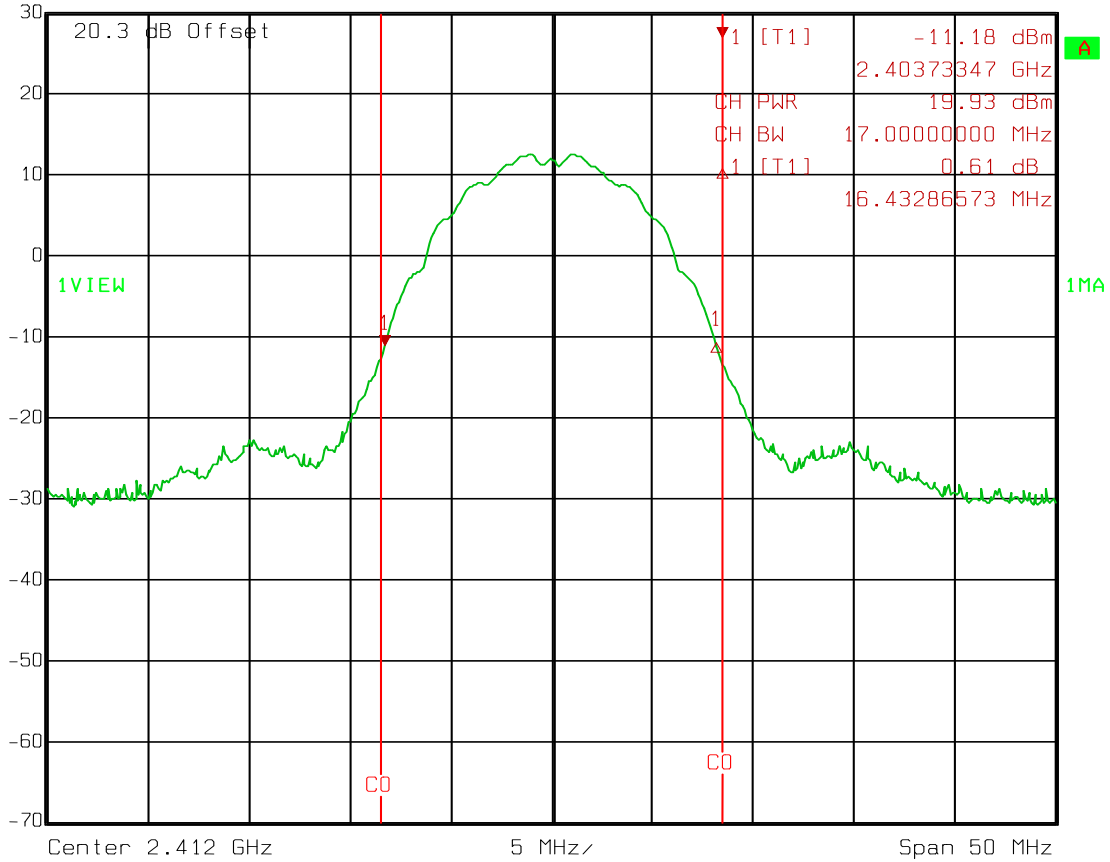
- This device was tested at +/- 15% input power per 15.31(e), with no variation in output power.
- For battery powered equipment, the device was tested with a fresh battery per 15.31(e).
- The device was tested on three channels per 15.31(l).
- This test was performed radiated.

**Test Data – Peak Power**

802.11b  
 Low Channel  
 Power



Ref Lvl	Marker 1 [T1]	RBW	1 MHz	RF Att	30 dB
30 dBm	-11.18 dBm	VBW	3 MHz		
	2.40373347 GHz	SWT	5 ms	Unit	dBm

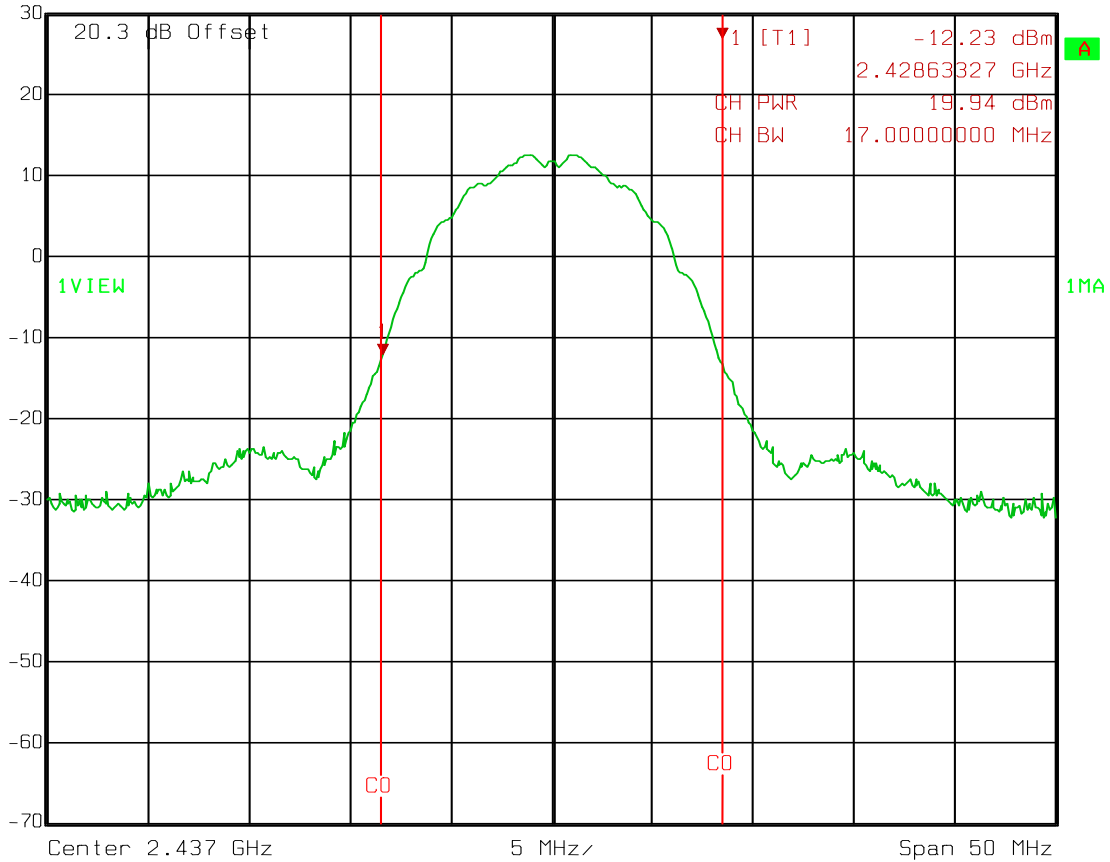


Date: 31.JAN.2012 11:58:46

Test Data – Peak Power

802.11b  
Mid Channel  
Power

	Marker 1 [T1]	RBW	1 MHz	RF Att	30 dB
	Ref Lvl	-12.23 dBm	VBW	3 MHz	
	30 dBm	2.42863327 GHz	SWT	5 ms	Unit dBm

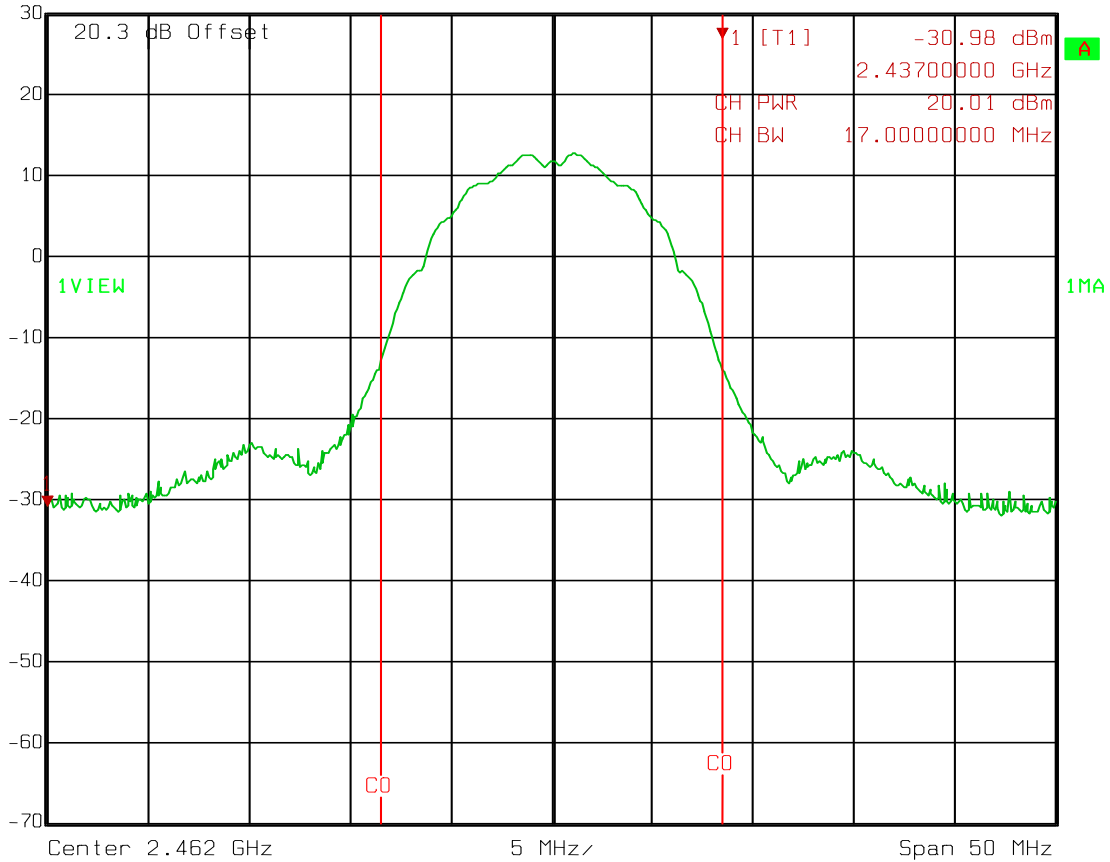


Date: 31.JAN.2012 11:59:40

Test Data – Peak Power

802.11b  
High Channel  
Power

 Marker 1 [T1] RBW 1 MHz RF Att 30 dB  
Ref Lvl -30.98 dBm VBW 3 MHz  
30 dBm 2.43700000 GHz SWT 5 ms Unit dBm

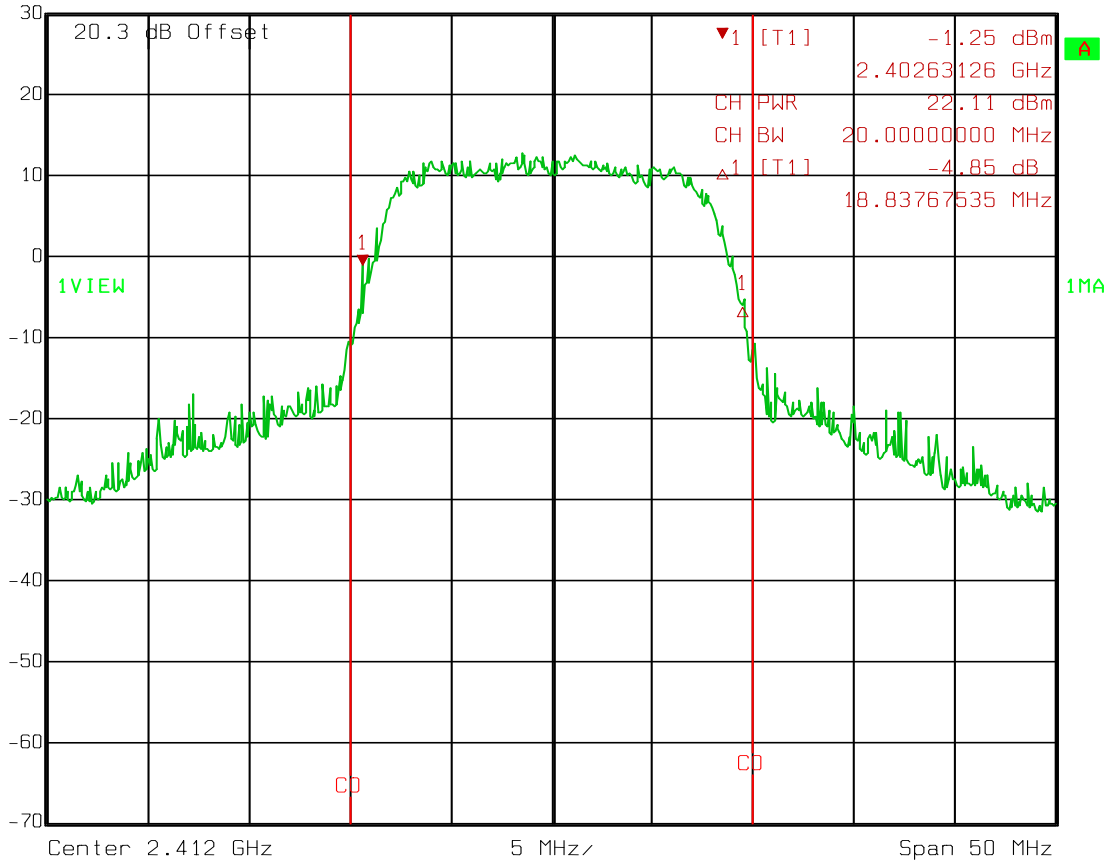


Date: 31.JAN.2012 12:00:13

Test Data – Peak Power

802.11g  
Low Channel  
Power

	Marker 1 [T1]	RBW	1 MHz	RF Att	30 dB
	Ref Lvl	-1.25 dBm	VBW	3 MHz	
	30 dBm	2.40263126 GHz	SWT	5 ms	Unit dBm

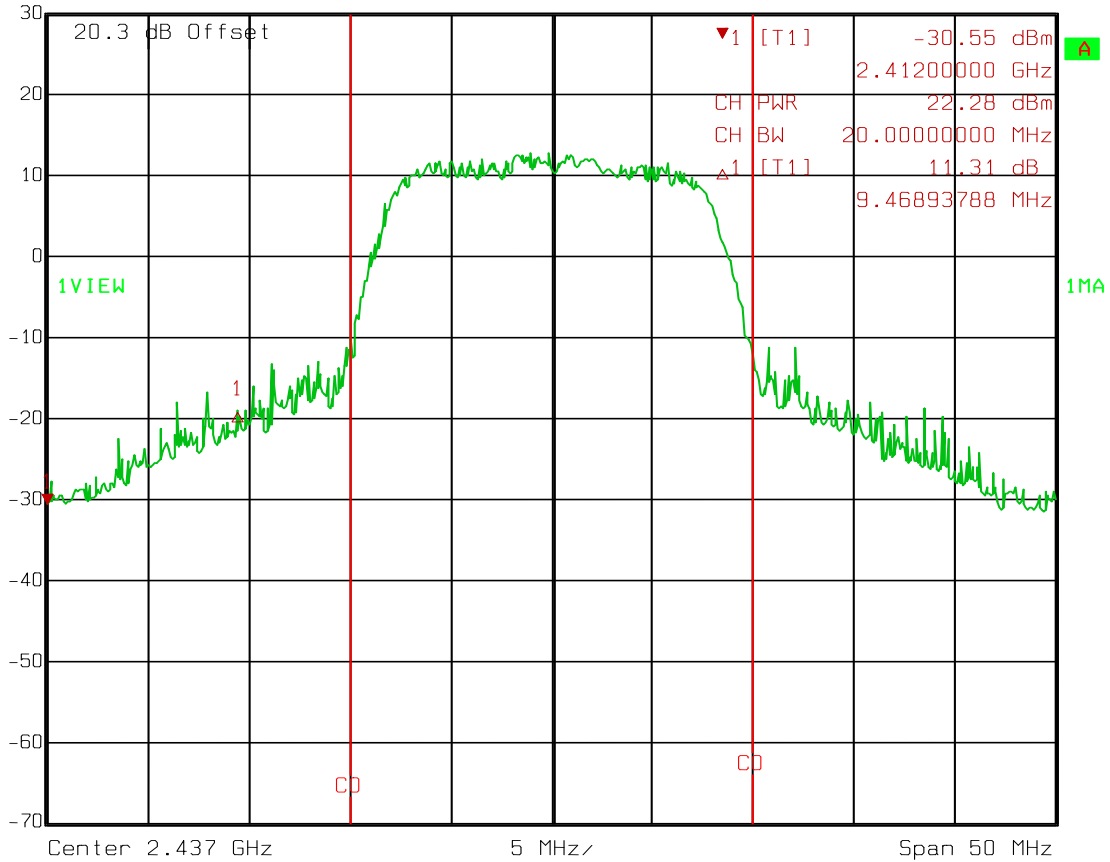


Date: 31.JAN.2012 12:02:16

Test Data – Peak Power

802.11g  
Mid Channel  
Power

 Ref Lvl 30 dBm  
Marker 1 [T1] -30.55 dBm 2.41200000 GHz  
RBW 1 MHz RF Att 30 dB  
VBW 3 MHz  
SWT 5 ms Unit dBm



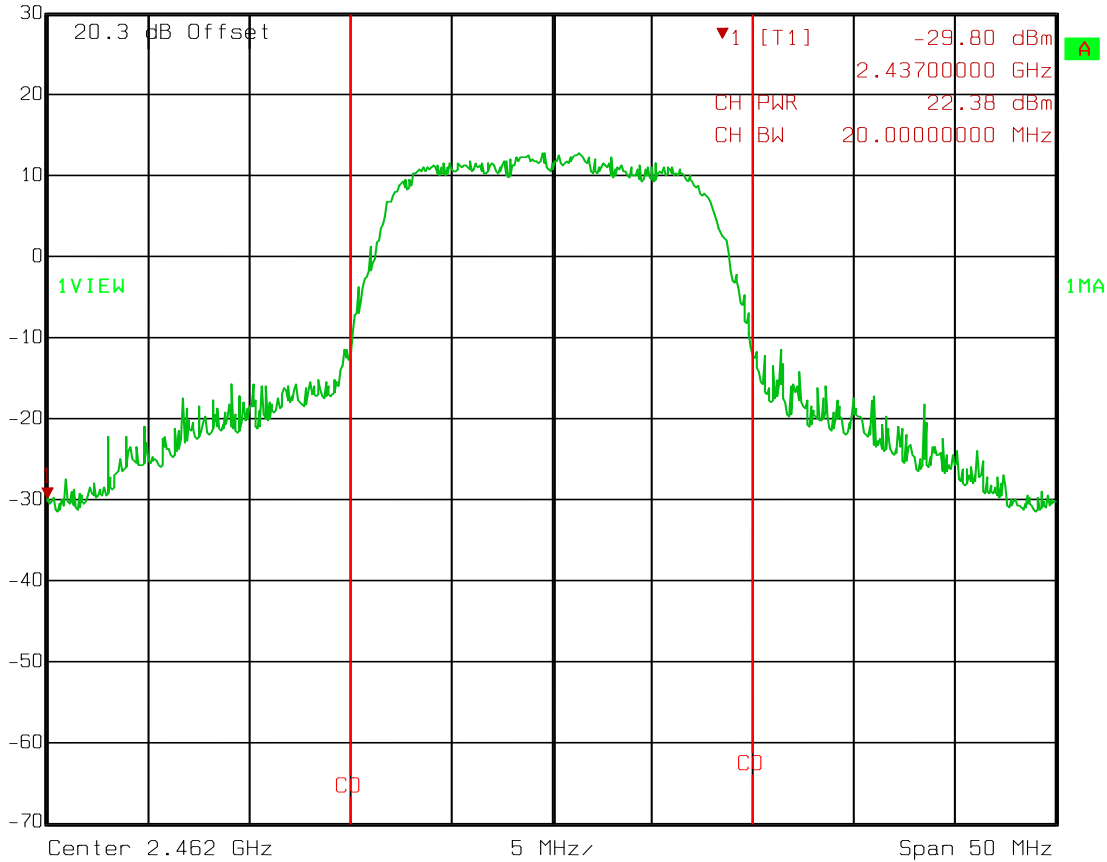
Date: 31.JAN.2012 12:02:46



Test Data – Peak Power

802.11g  
High Channel  
Power

 Marker 1 [T1] RBW 1 MHz RF Att 30 dB  
Ref Lvl -29.80 dBm VBW 3 MHz  
30 dBm 2.43700000 GHz SWT 5 ms Unit dBm

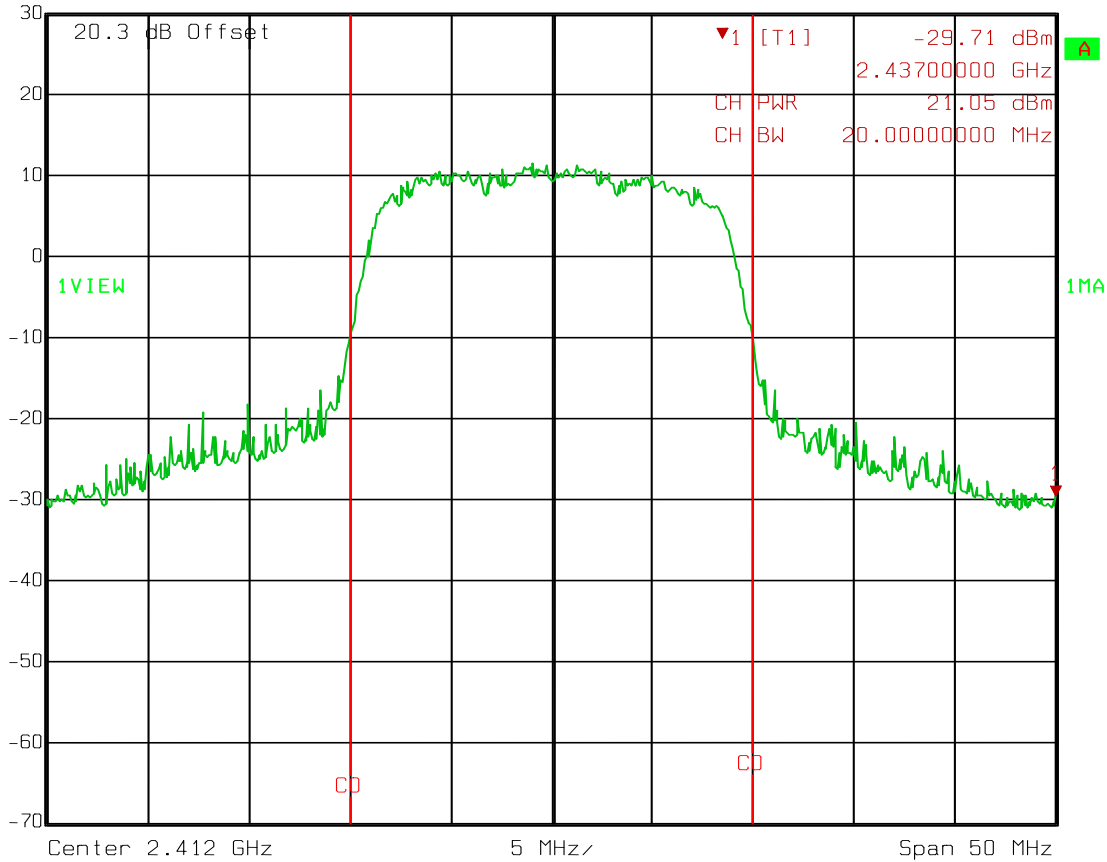


Date: 31.JAN.2012 12:03:18

Test Data – Peak Power

802.11n  
Low Channel  
Power

 Marker 1 [T1] RBW 1 MHz RF Att 30 dB  
Ref Lvl -29.71 dBm VBW 3 MHz  
30 dBm 2.43700000 GHz SWT 5 ms Unit dBm

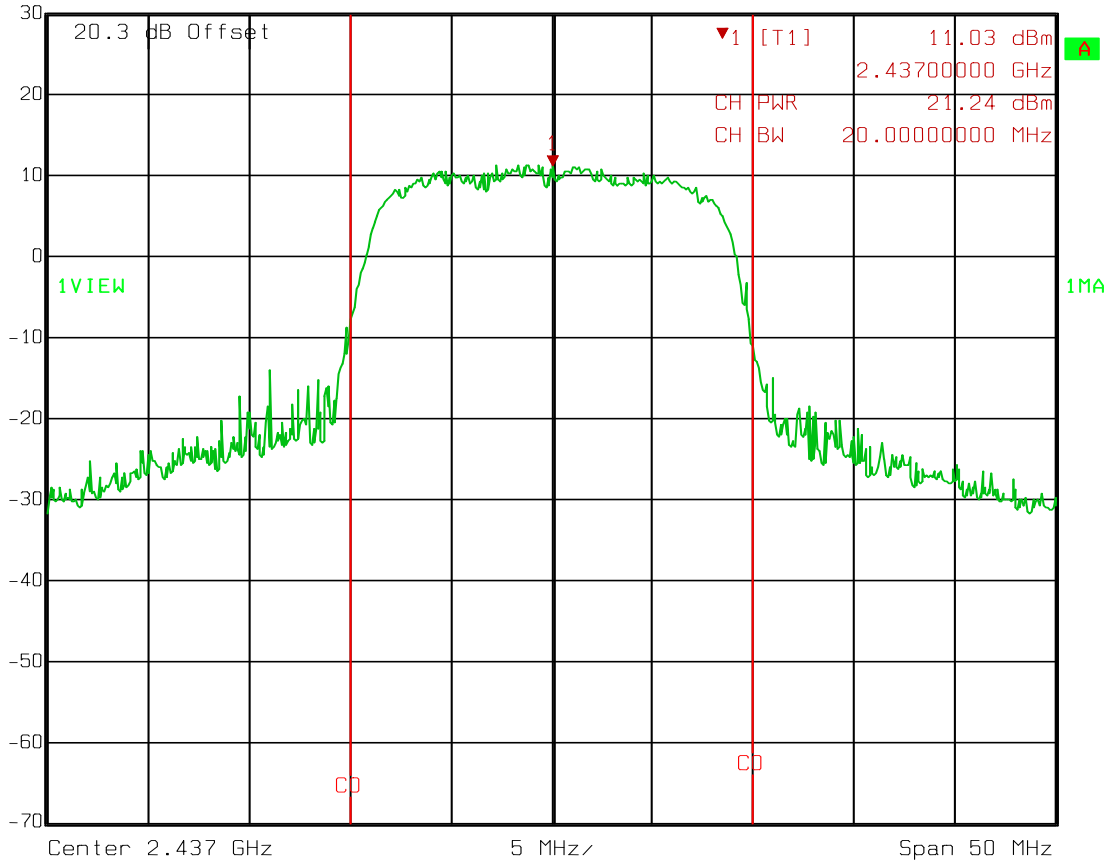


Date: 31.JAN.2012 12:03:51

Test Data – Peak Power

802.11n  
Mid Channel  
Power

Ref Lvl 30 dBm  
Marker 1 [T1] 11.03 dBm  
2.43700000 GHz  
RBW 1 MHz RF Att 30 dB  
VBW 3 MHz  
SWT 5 ms Unit dBm

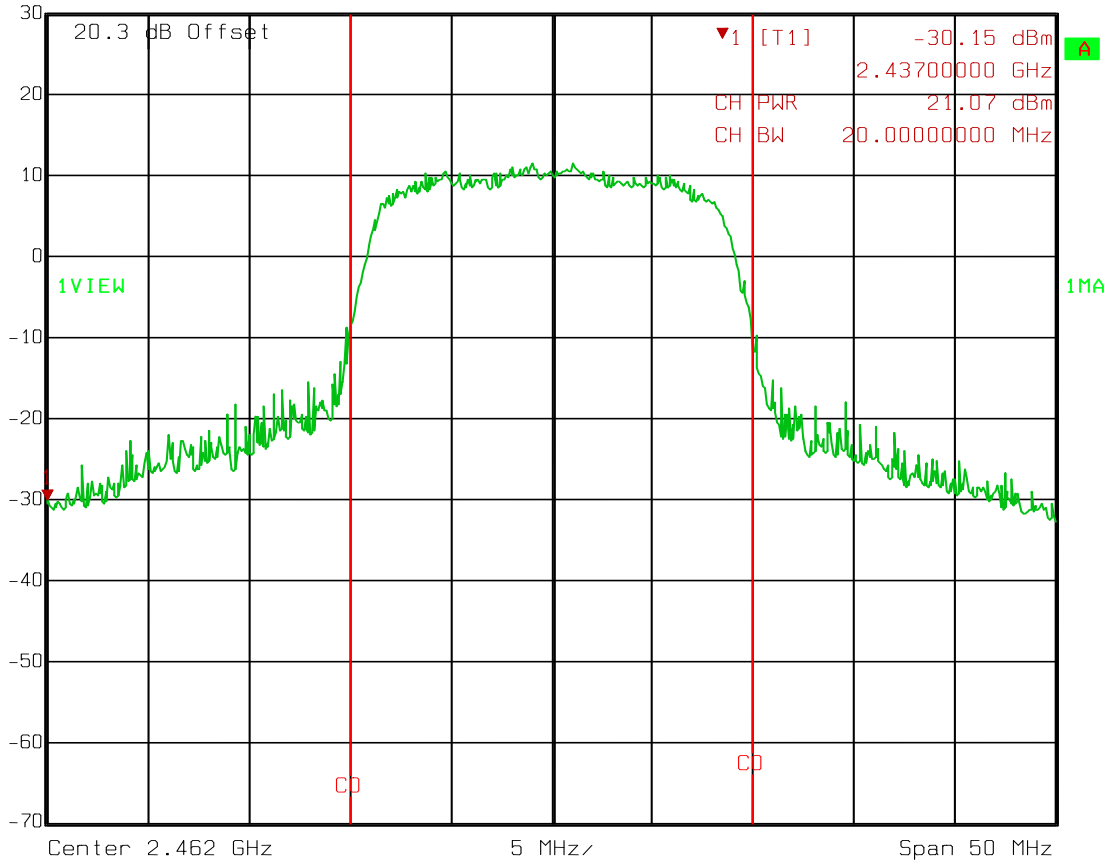


Date: 31.JAN.2012 12:04:23

Test Data – Peak Power

802.11n  
High Channel  
Power

 Ref Lvl 30 dBm  
Marker 1 [T1] -30.15 dBm 2.43700000 GHz  
RBW 1 MHz RF Att 30 dB  
VBW 3 MHz  
SWT 5 ms Unit dBm



Date: 31.JAN.2012 12:04:49

**Section 5      Spurious Emissions (Conducted)**

NAME OF TEST: Spurious Emissions (Conducted)	PARA. NO.: FCC 15.247 (d) RSS-210 A8.5
TESTED BY: David Light	DATE: 31 January 2012

**Test Results:**                      Complies.

**Measurement Data:**    See attached plots.

**Test Conditions:**      48            %RH  
                                 23            °C

**Measurement Uncertainty:**    +/-1.7    dB

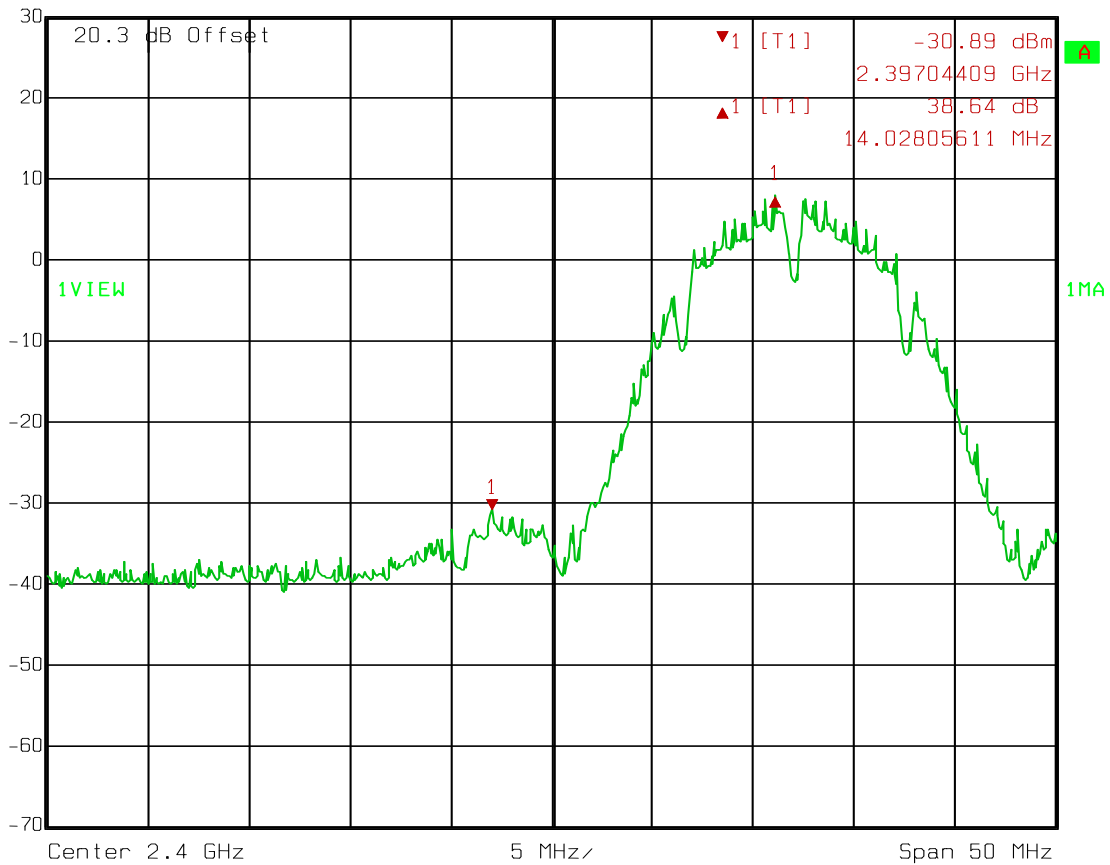
**Test Equipment Used:**    1036-1472-1082

Test Data – Spurious Emissions at Antenna Terminals

802.11b

Lower Band Edge

 Delta 1 [T1] RBW 100 kHz RF Att 30 dB  
Ref Lvl 38.64 dB VBW 100 kHz  
30 dBm 14.02805611 MHz SWT 12.5 ms Unit dBm



Date: 31.JAN.2012 11:02:53

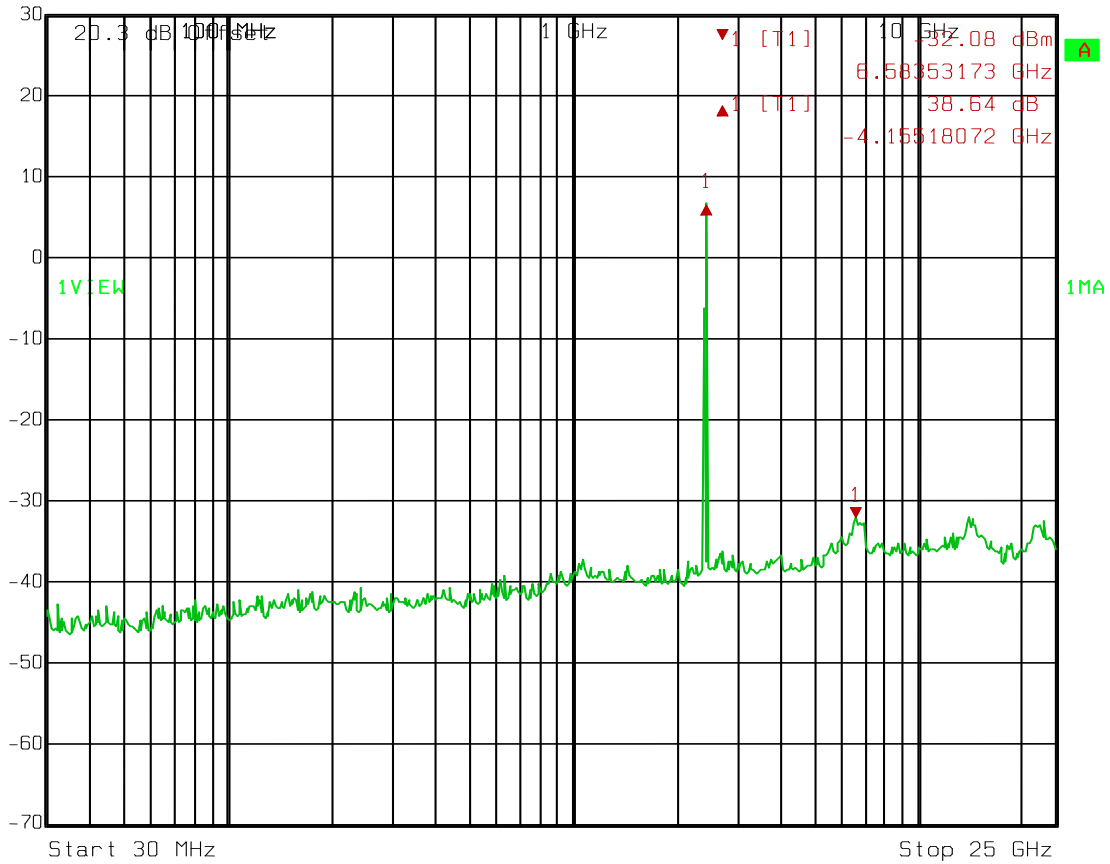
Test Data – Spurious Emissions at Antenna Terminals

802.11b

Low Channel Spurious Emissions



Delta 1 [T1] RBW 100 kHz RF Att 30 dB  
Ref Lvl 38.64 dB VBW 100 kHz  
30 dBm -4.15518072 GHz SWT 6.4 s Unit dBm

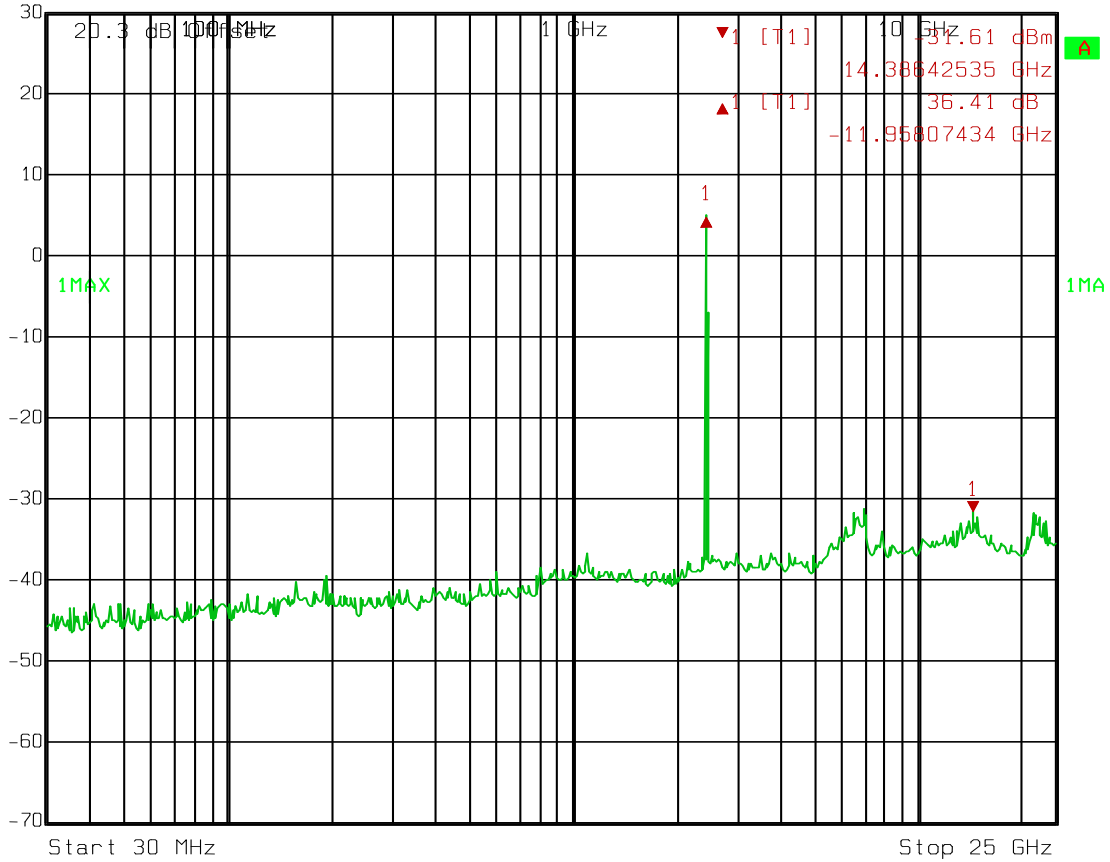


Date: 31.JAN.2012 11:04:11

Test Data – Spurious Emissions at Antenna Terminals

802.11b  
Mid Channel Spurious Emissions

 Delta 1 [T1] RBW 100 kHz RF Att 30 dB  
Ref Lvl 36.41 dB VBW 100 kHz  
30 dBm -11.95807434 GHz SWT 6.4 s Unit dBm



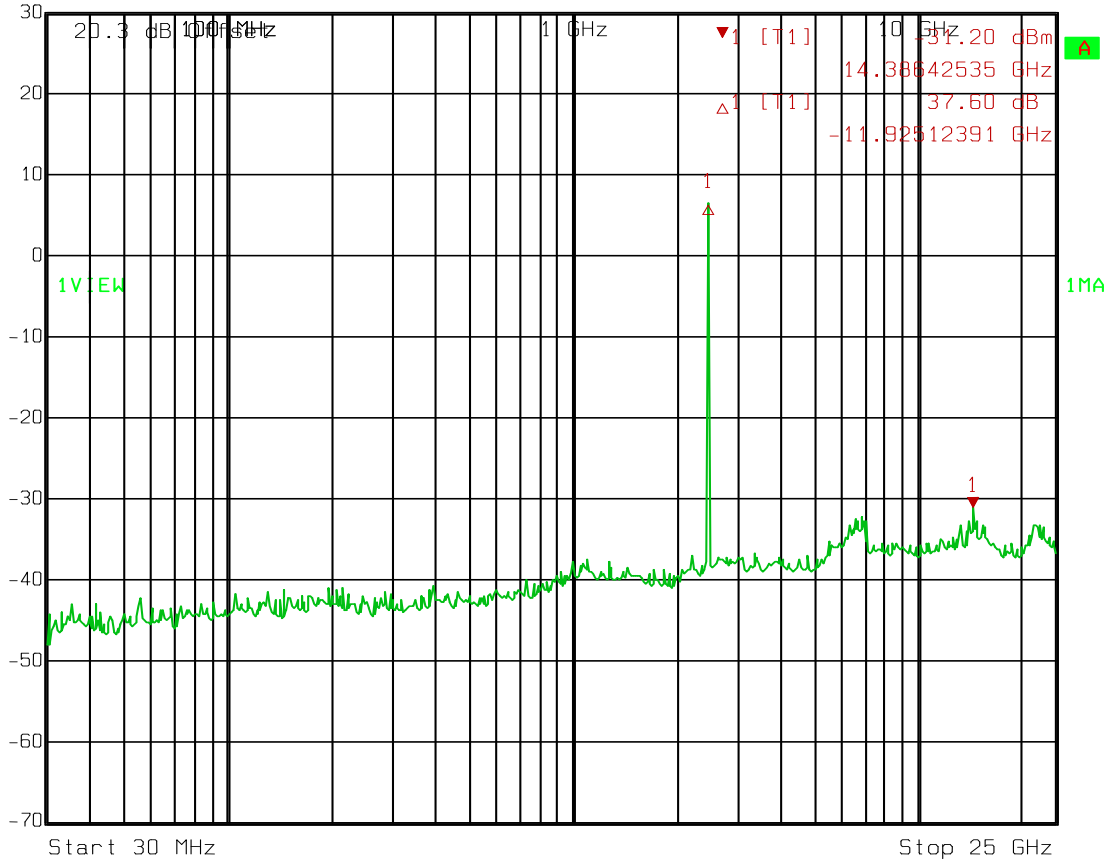
Date: 31.JAN.2012 11:04:55



Test Data – Spurious Emissions at Antenna Terminals

802.11b  
Highest Channel Spurious Emissions

Ref Lvl 30 dBm  
Marker 1 [T1] -31.20 dBm  
14.38642535 GHz  
RBW 100 kHz RF Att 30 dB  
VBW 100 kHz  
SWT 6.4 s Unit dBm

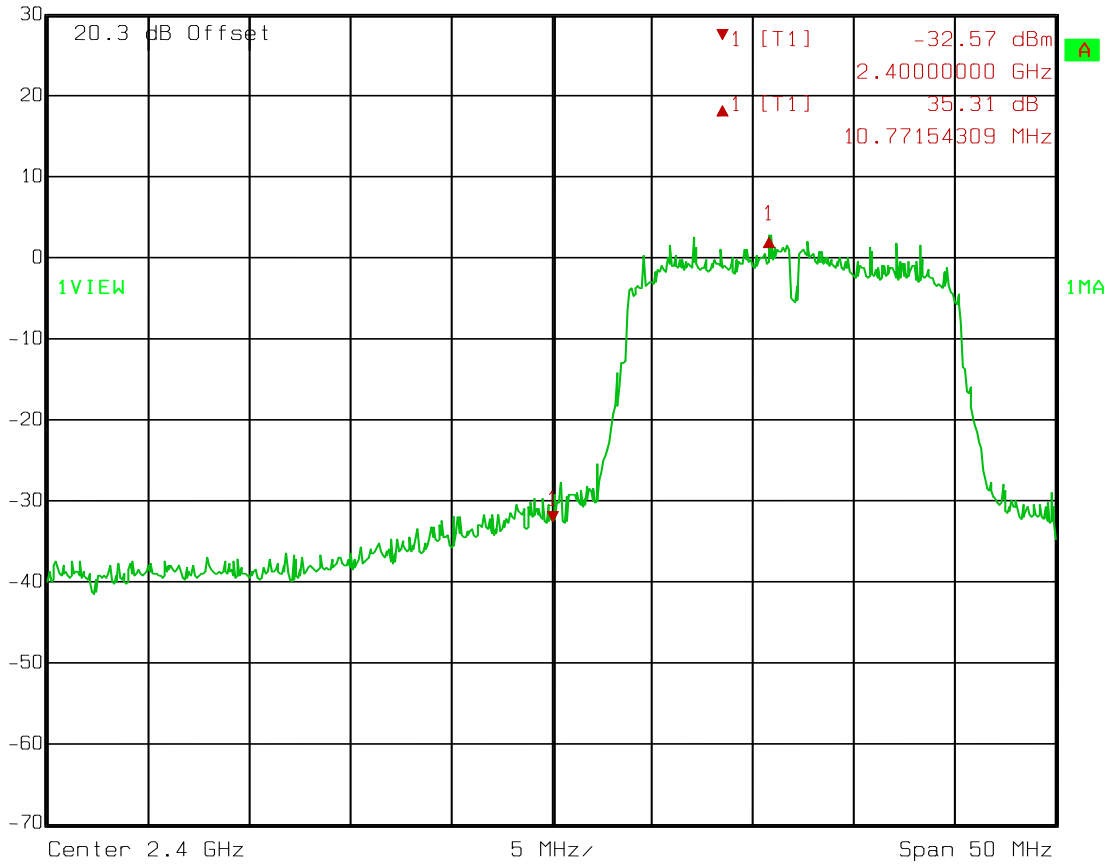


Date: 31.JAN.2012 11:05:50

Test Data – Spurious Emissions at Antenna Terminals

802.11g  
Lower Band Edge

 Delta 1 [T1] RBW 100 kHz RF Att 30 dB  
Ref Lvl 35.31 dB VBW 100 kHz  
30 dBm 10.77154309 MHz SWT 12.5 ms Unit dBm



Date: 31.JAN.2012 11:06:56

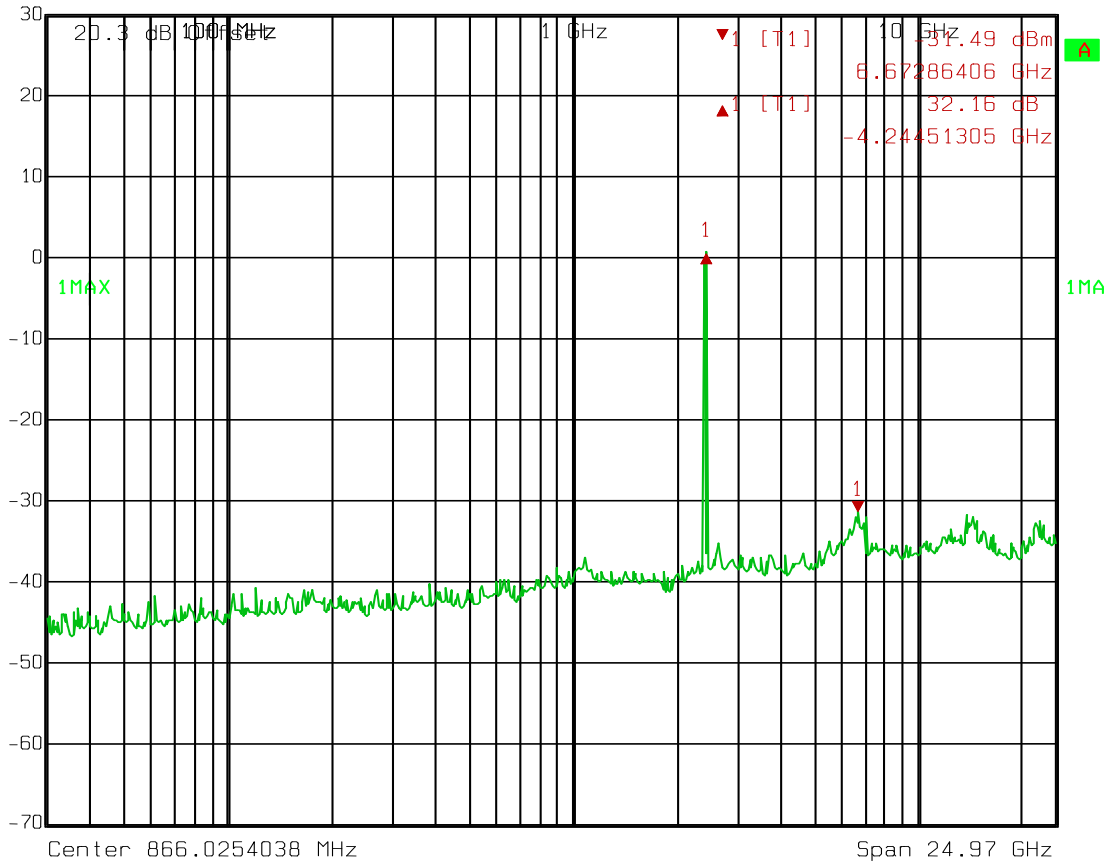
Test Data – Spurious Emissions at Antenna Terminals

802.11g

Lower Channel Spurious Emissions



Delta 1 [T1] RBW 100 kHz RF Att 30 dB  
Ref Lvl 32.16 dB VBW 100 kHz  
30 dBm -4.24451305 GHz SWT 6.4 s Unit dBm

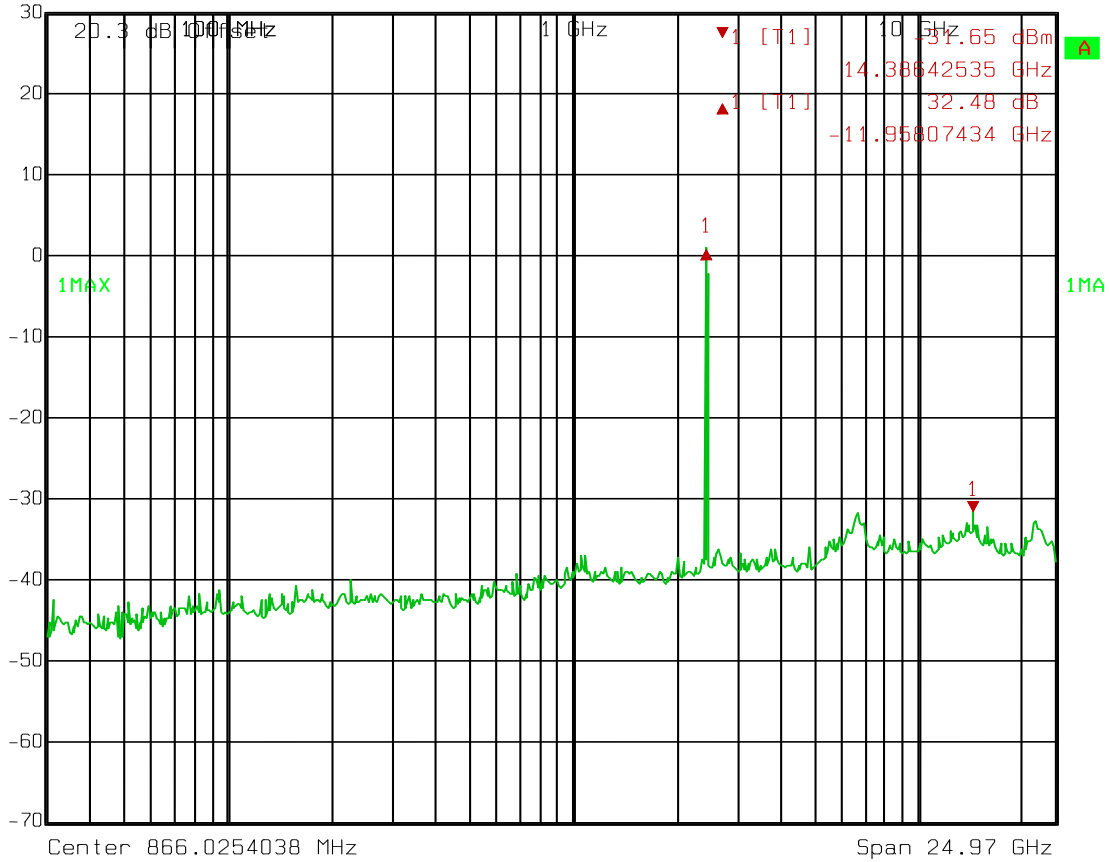


Date: 31.JAN.2012 11:08:39

Test Data – Spurious Emissions at Antenna Terminals

802.11g  
Mid Channel Spurious Emissions

Ref Lvl 30 dBm  
Delta 1 [T1] 32.48 dB  
-11.95807434 GHz  
RBW 100 kHz  
RF Att 30 dB  
VBW 100 kHz  
SWT 6.4 s  
Unit dBm

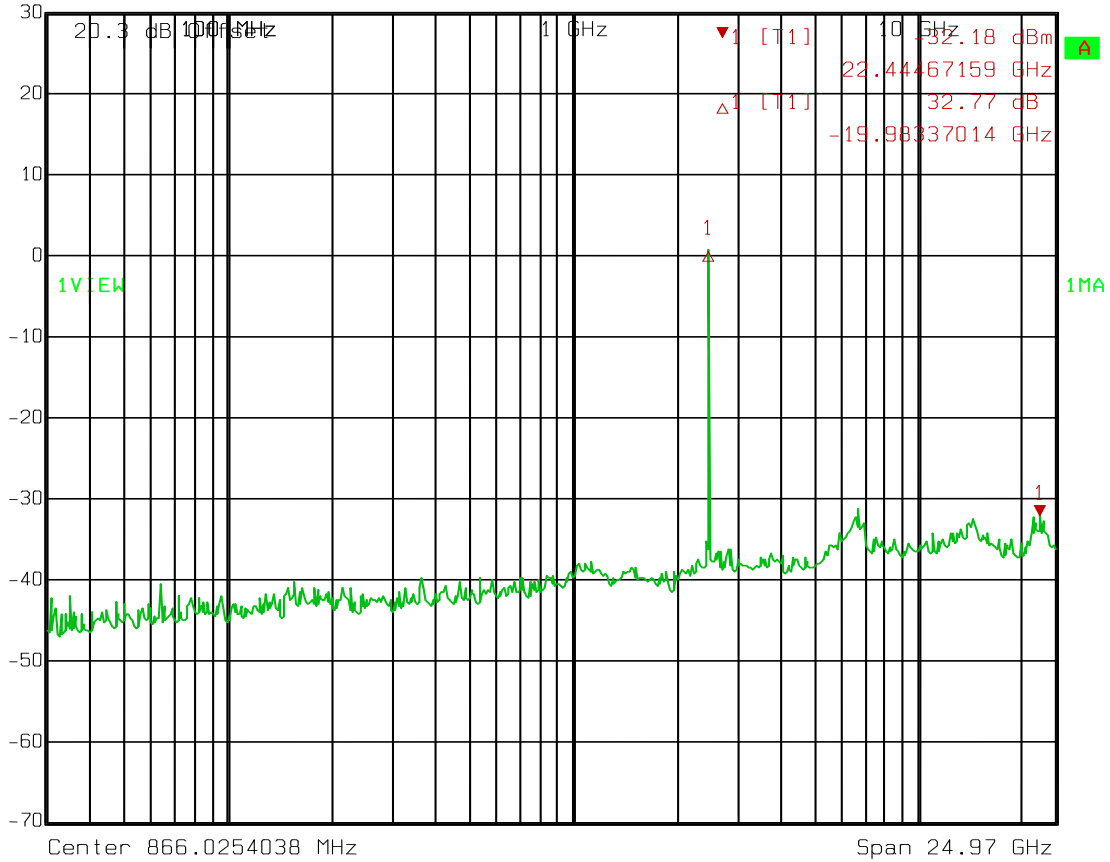


Date: 31.JAN.2012 11:09:22

Test Data – Spurious Emissions at Antenna Terminals

802.11g  
Upper Channel Spurious Emissions

Ref Lvl 30 dBm  
Marker 1 [T1] 22.44467159 GHz  
RBW 100 kHz RF Att 30 dB  
VBW 100 kHz  
SWT 6.4 s Unit dBm

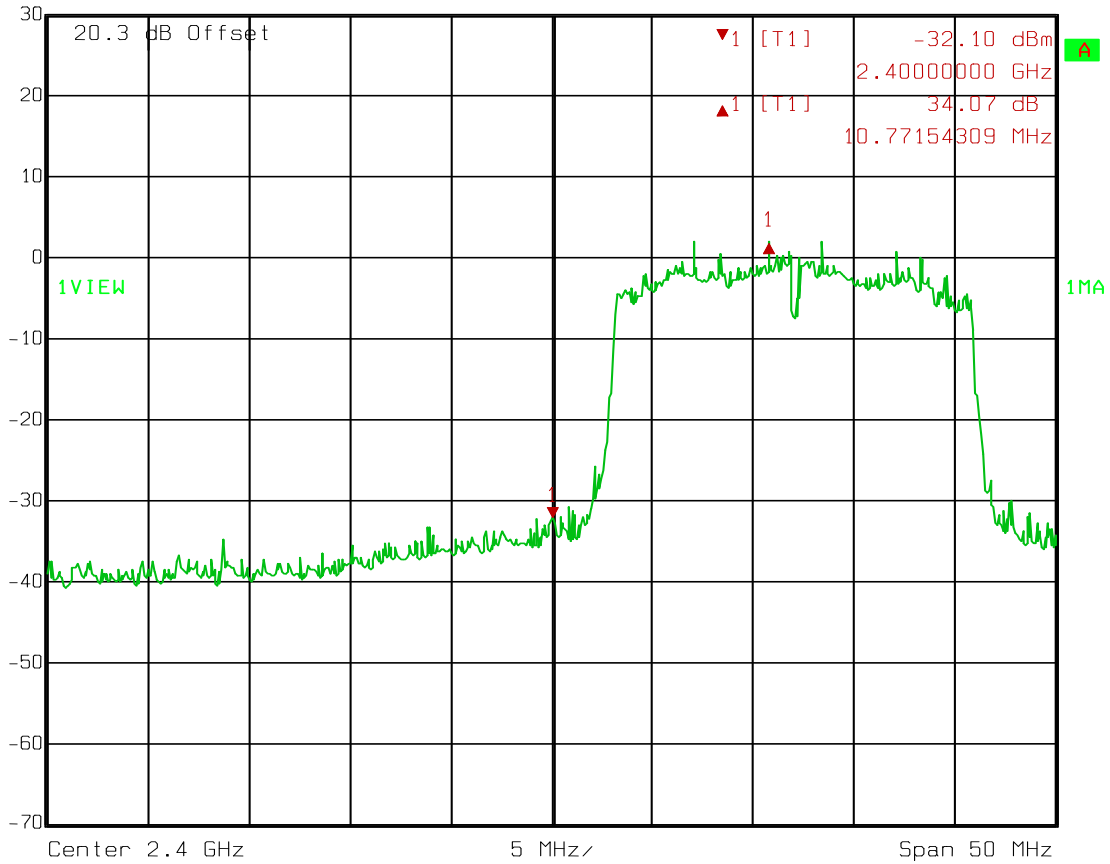


Date: 31.JAN.2012 11:10:10

Test Data – Spurious Emissions at Antenna Terminals

802.11n  
Lower Band Edge

 Delta 1 [T1] RBW 100 kHz RF Att 30 dB  
Ref Lvl 34.07 dB VBW 100 kHz  
30 dBm 10.77154309 MHz SWT 12.5 ms Unit dBm



Date: 31.JAN.2012 11:12:14

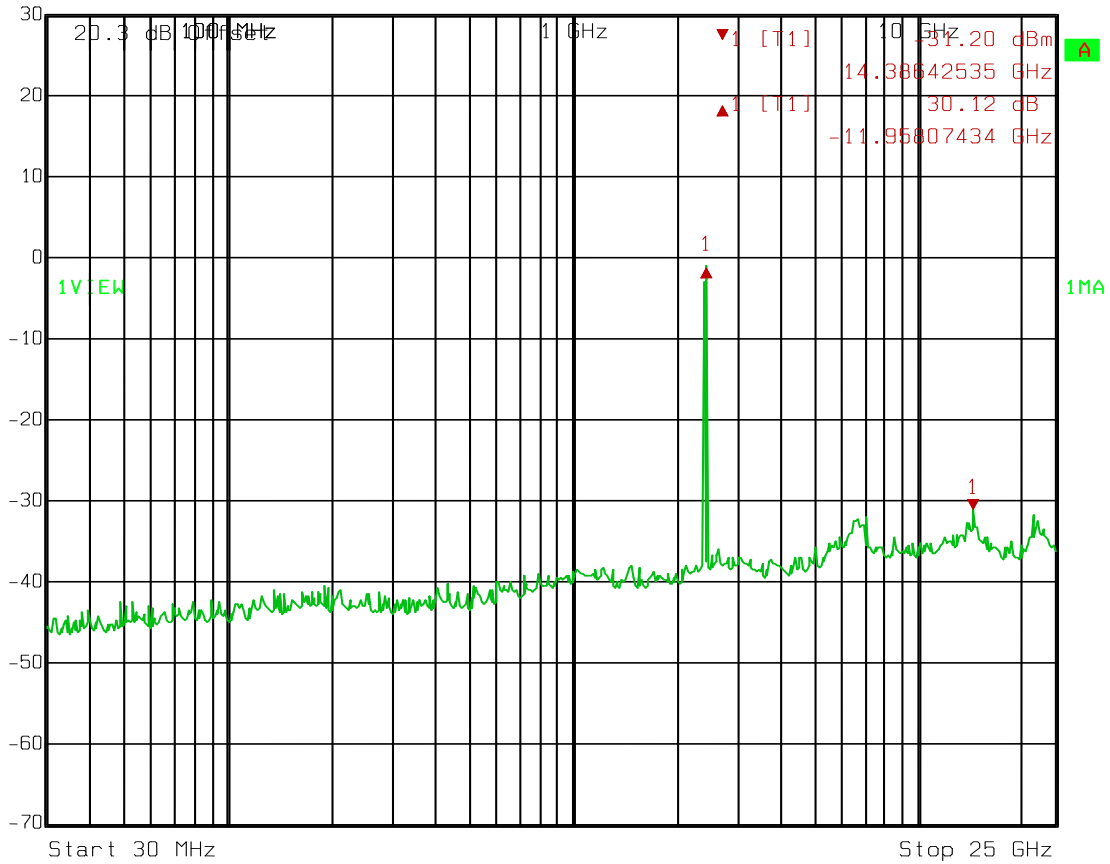
Test Data – Spurious Emissions at Antenna Terminals

802.11n

Low Channel Spurious Emissions



Delta 1 [T1] RBW 100 kHz RF Att 30 dB  
Ref Lvl 30 dBm Delta 1 [T1] 30.12 dB VBW 100 kHz  
30 dBm -11.95807434 GHz SWT 6.4 s Unit dBm

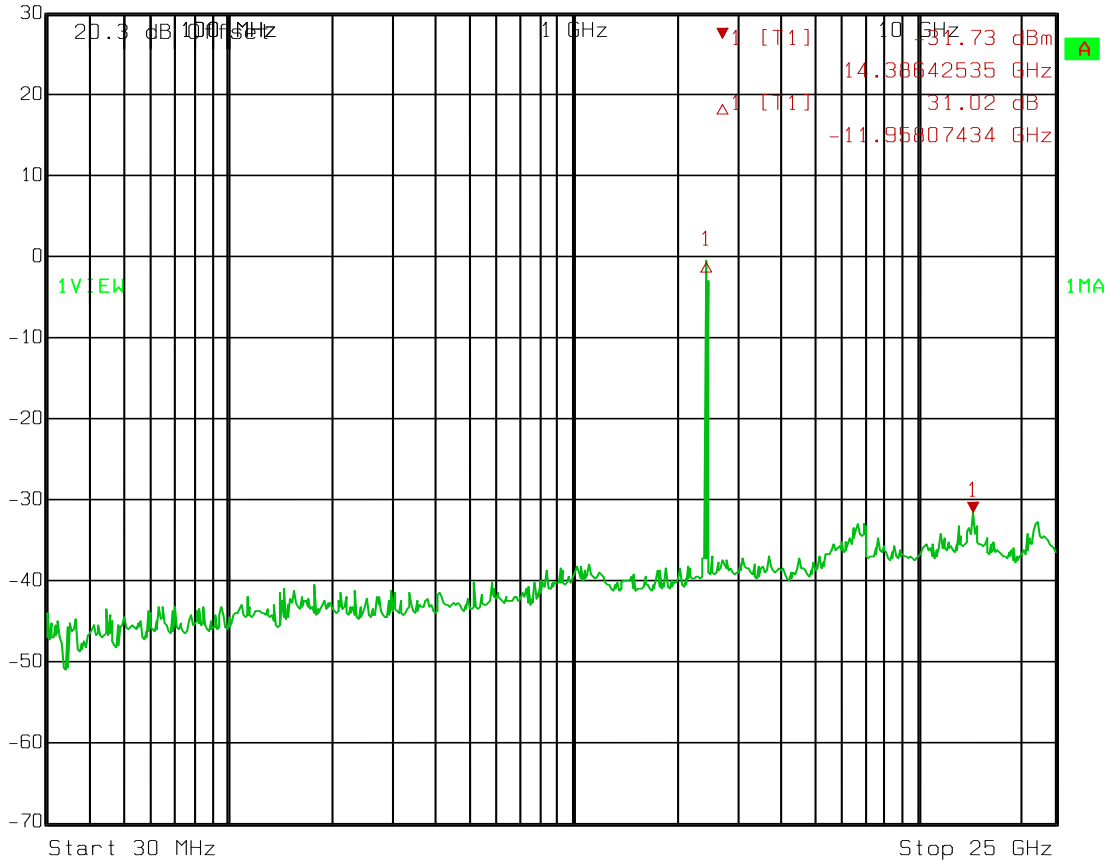


Date: 31.JAN.2012 11:13:03

Test Data – Spurious Emissions at Antenna Terminals

802.11n  
Mid Channel Spurious Emissions

Marker 1 [T1] RBW 100 kHz RF Att 30 dB  
Ref Lvl -31.73 dBm VBW 100 kHz  
30 dBm 14.38642535 GHz SWT 6.4 s Unit dBm



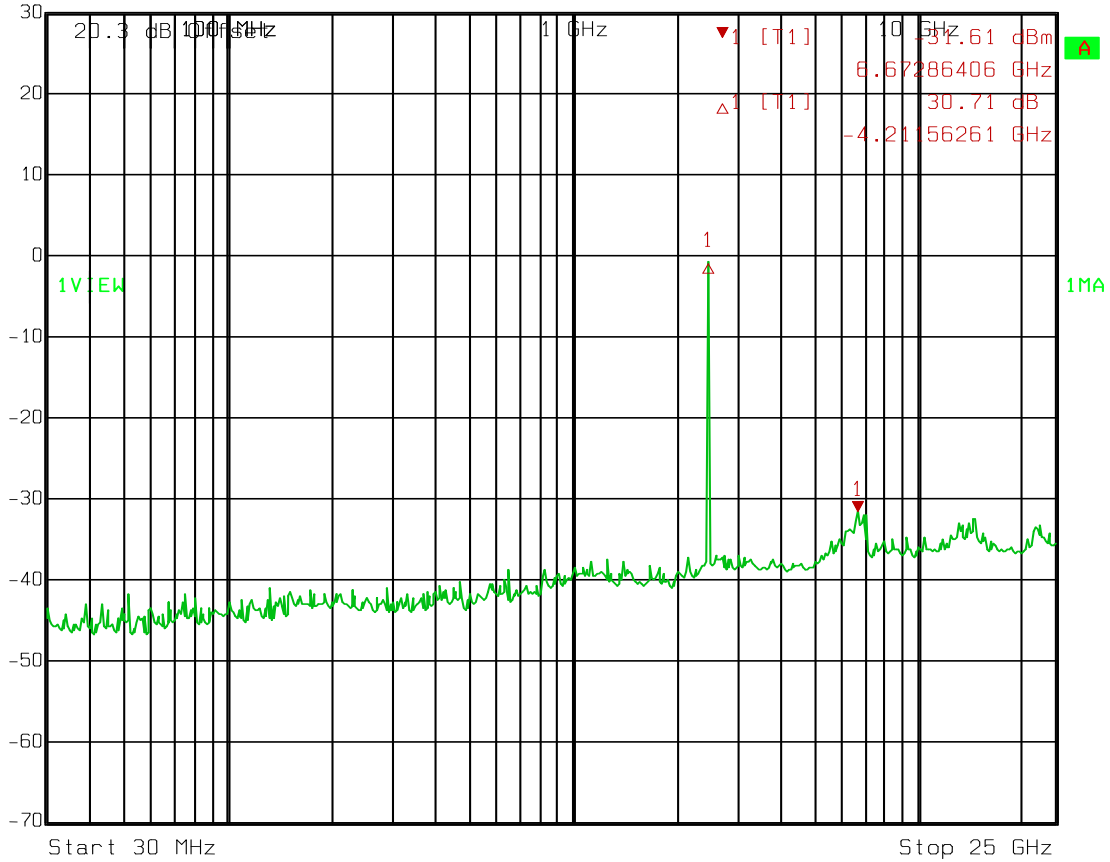
Date: 31.JAN.2012 11:13:52



Test Data – Spurious Emissions at Antenna Terminals

802.11n  
High Channel Spurious Emissions

Marker 1 [T1] RBW 100 kHz RF Att 30 dB  
Ref Lvl -31.61 dBm VBW 100 kHz  
30 dBm 6.67286406 GHz SWT 6.4 s Unit dBm



Date: 31.JAN.2012 11:14:39

**Section 6. Radiated Emissions**

NAME OF TEST: Radiated Emissions	PARA. NO.: FCC 15.247 (d) RSS-Gen 7.2.2
TESTED BY: David Light	DATE: 31 January 2012

**Test Results:** Complies.

**Measurement Data:** See attached table.

**Test Conditions:** 48 %RH  
23 °C

**Measurement Uncertainty:** +/-1.7 dB

**Test Equipment Used:** 1763-993-1016-1025-1783-1464

Notes:

- For handheld devices, the EUT was tested on three orthogonal axis'
- The device was tested from 30 MHz to the tenth harmonic of the highest fundamental frequency per 15.33
- The device was tested on three channels per 15.31(l).
- No emissions were detected within 20 dB of the specification limit therefore none are reported per 15.31(o). Band edge data is presented below.

RBW=VBW=100 kHz below 1000 MHz  
 RBW=VBW=1 MHz above 1000 MHz (Peak)  
 RBW= 1 MHz VBW=10Hz (Average)

**Radiated Emissions**

Meas. Freq. (MHz)	Ant. Pol. (H/V)	Det. Atten. (dB)	Meter Reading (dBuV)	Antenna Factor (dB)	Path Loss (dB)	RF Gain (dB)	Corrected Reading (dBuV/m)	Spec. limit (dBuV/m)	CR/SL Diff. (dB)	Pass Fail Unc.	Comment
											802.11b
											Channel 11
											1 Mbps
2483.5	V	0	47.3	29	3.1	33.0	46.4	54.0	-7.6	Pass	Peak
2483.5	H	0	48.6	29	3.1	33.0	47.7	54.0	-6.3	Pass	Peak
											802.11g
											Channel 11
											6 Mbps
2483.5	V	0	57	29	3.1	33.0	56.1	74.0	-17.9	Pass	Peak
2483.5	V	0	43	29	3.1	33.0	42.1	54.0	-11.9	Pass	Average
2483.5	H	0	58.5	29	3.1	33.0	57.6	74.0	-16.4	Pass	Peak
2483.5	H	0	44	33.8	4.3	32.1	50.0	54.0	-4.0	Pass	Average
											802.11n
											Channel 11
											6.5 Mbps (MCS0)
2483.5	V	0	56.8	29	3.1	33.0	55.9	74.0	-18.1	Pass	Peak
2483.5	V	0	42.6	29	3.1	33.0	41.7	54.0	-12.3	Pass	Average
2483.5	H	0	58.5	29	3.1	33.0	57.6	74.0	-16.4	Pass	Peak
2483.5	H	0	44.5	33.8	4.3	32.1	50.5	54.0	-3.5	Pass	Average

**Section 7. Peak Power Spectral Density**

NAME OF TEST: Peak Power Spectral Density	PARA. NO.: FCC 15.247(e) RSS-210 A8.2(b)
TESTED BY: David Light	DATE: 31 January 2012

**Test Results:** Complies.

**Measurement Data:** See attached data..

**Test Conditions:** 48 %RH  
23 °C

**Measurement Uncertainty:** +/-1.7 dB

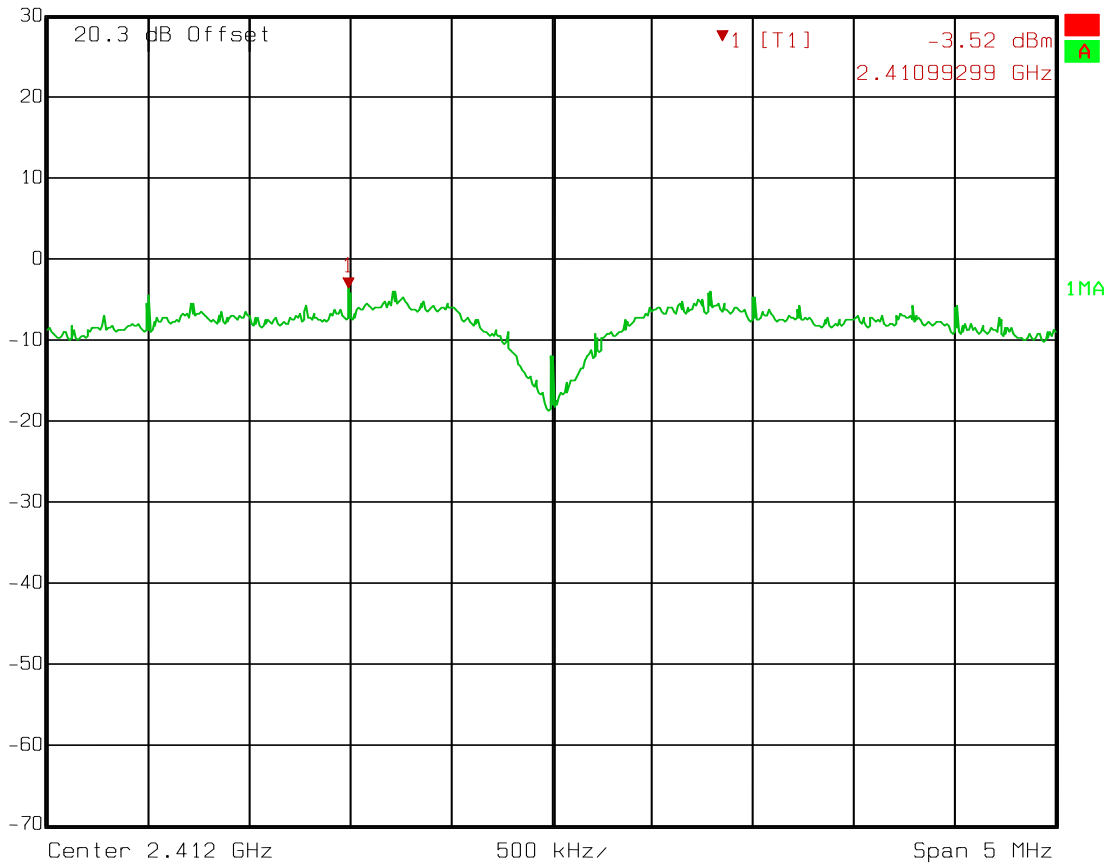
**Test Equipment Used:** 1036-1082-1472

### Peak Power Spectral Density

802.11b

Low Channel Density

 Marker 1 [T1] RBW 3 kHz RF Att 30 dB  
Ref Lvl -3.52 dBm VBW 3 kHz  
30 dBm 2.41099299 GHz SWT 1700 s Unit dBm



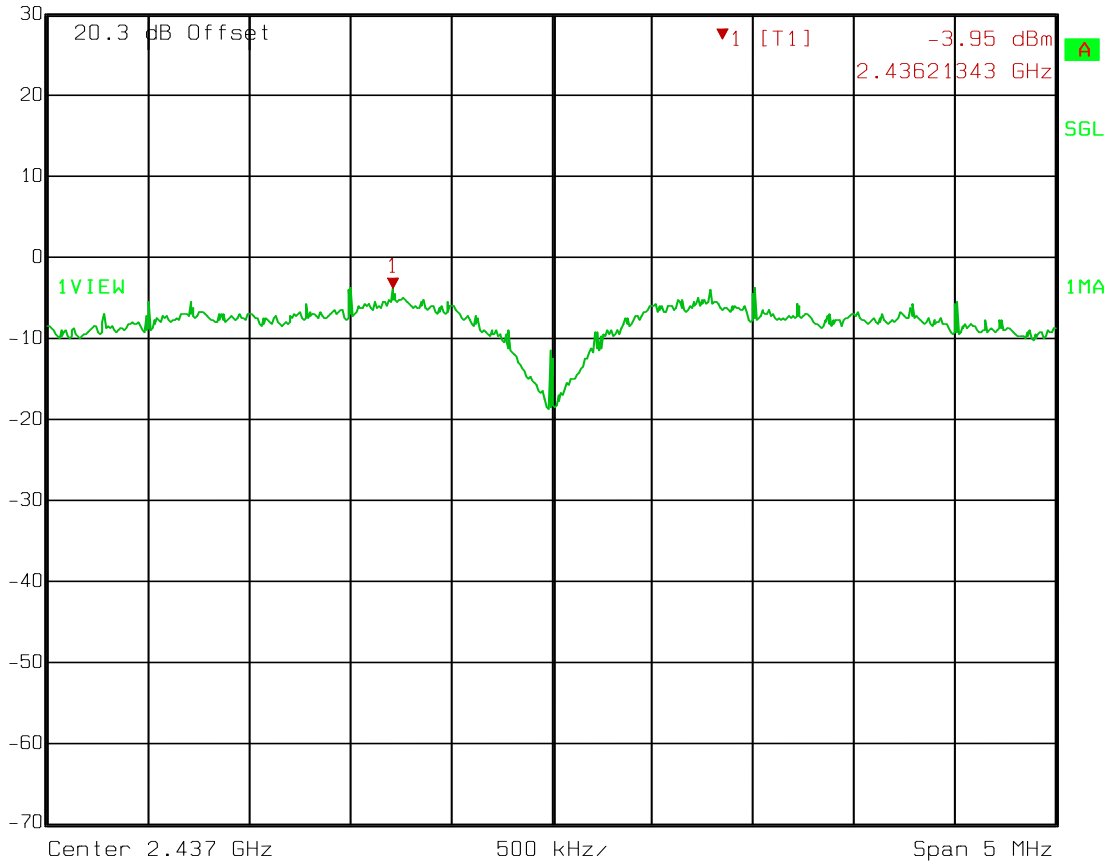
Date: 31.JAN.2012 12:37:47

### Peak Power Spectral Density

802.11b

Mid Channel Density

 Ref Lvl 30 dBm      Marker 1 [T1] 2.43621343 GHz      RBW 3 kHz      RF Att 30 dB      VBW 3 kHz      Unit dBm      SWT 1700 s



Date: 31.JAN.2012 13:44:17

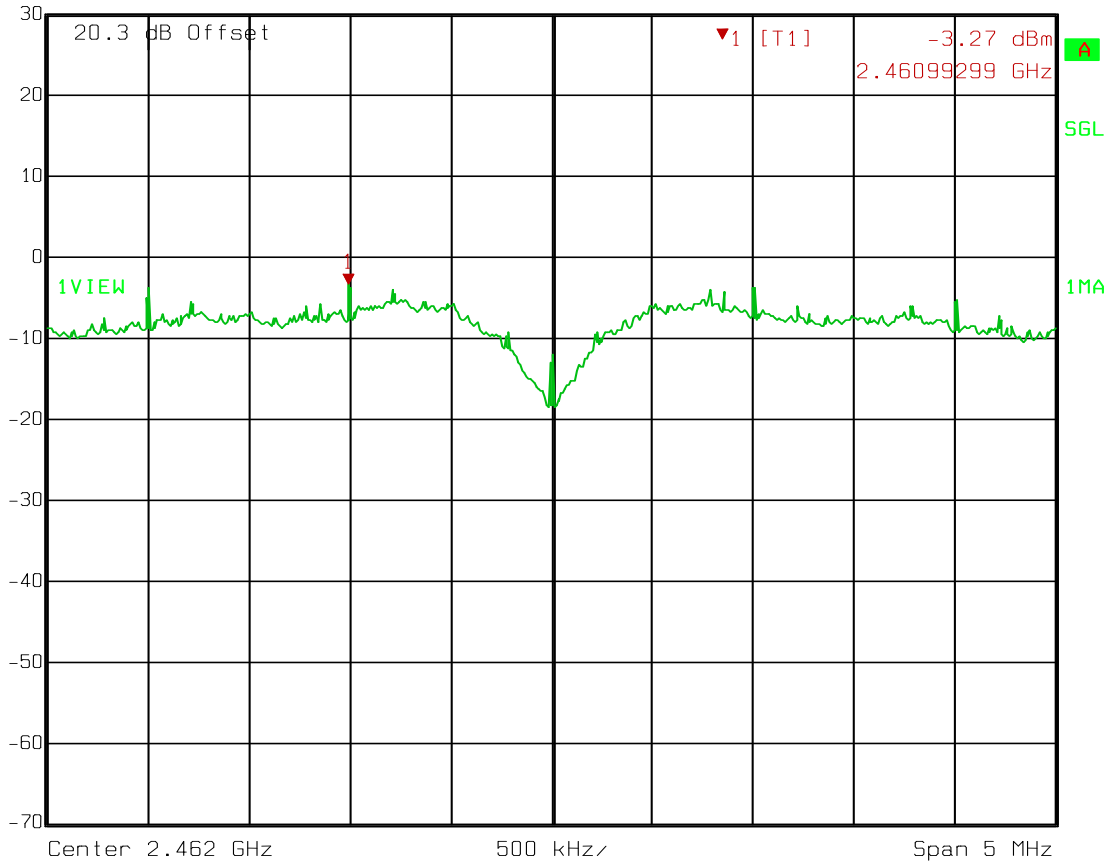
### Peak Power Spectral Density

802.11b

High Channel Density



Ref Lvl 30 dBm  
Marker 1 [T1] 2.46099299 GHz  
RBW 3 kHz RF Att 30 dB  
VBW 3 kHz  
SWT 1700 s Unit dBm



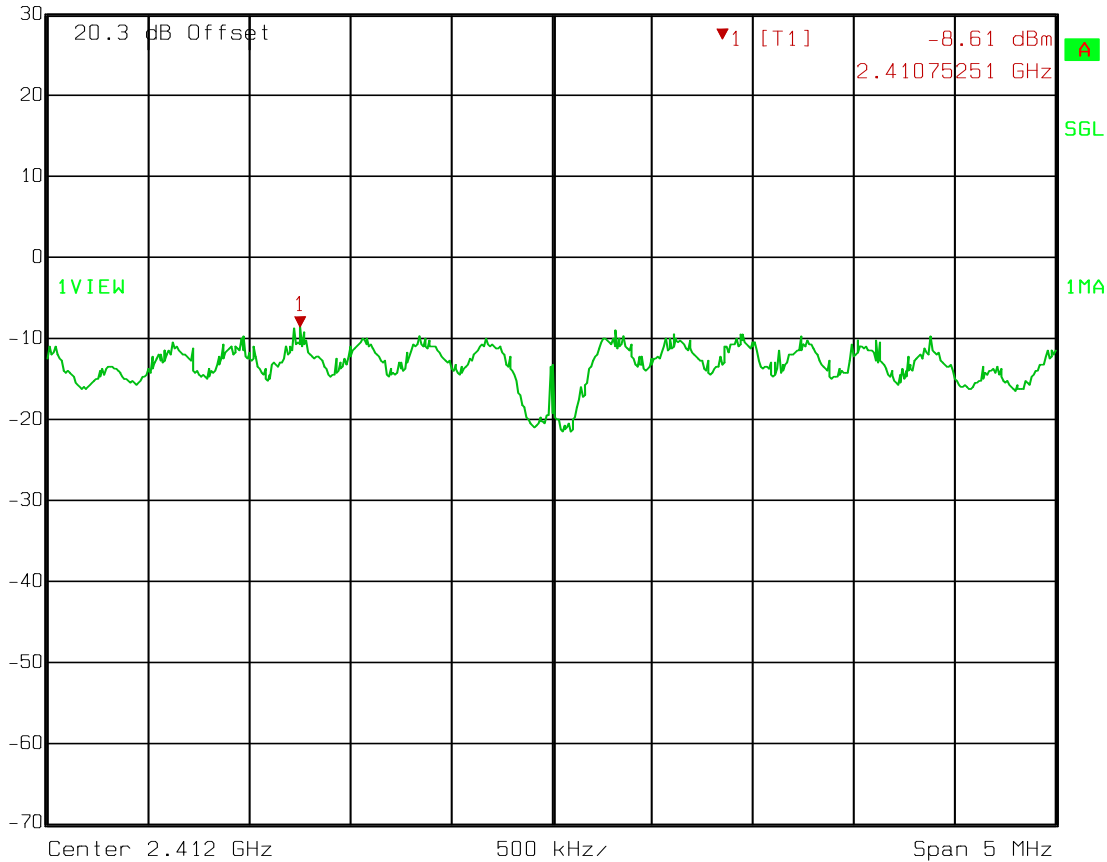
Date: 31.JAN.2012 14:13:17

### Peak Power Spectral Density

802.11g

Low Channel Density

 Ref Lvl 30 dBm      Marker 1 [T1] 2.41075251 GHz      RBW 3 kHz      RF Att 30 dB      VBW 3 kHz      Unit dBm      SWT 1700 s



Date: 01.FEB.2012 06:21:08

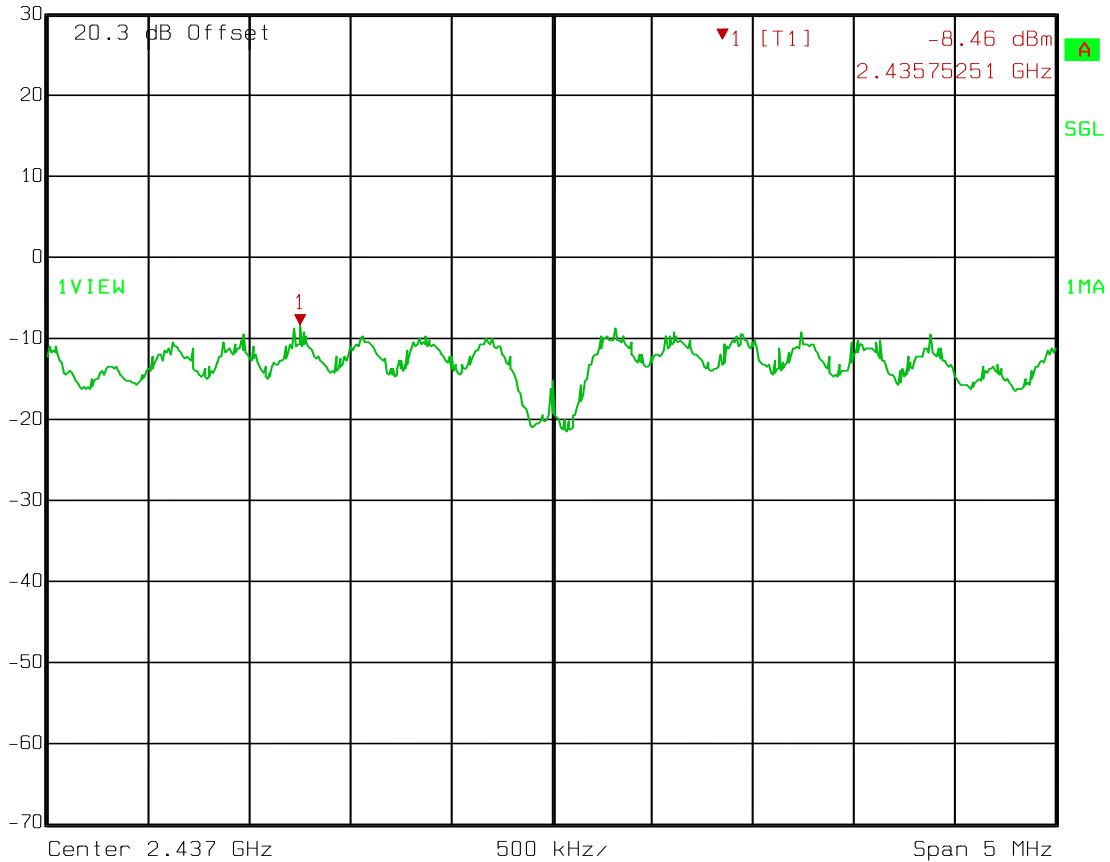


### Peak Power Spectral Density

802.11g

Mid Channel Density

 Ref Lvl 30 dBm      Marker 1 [T1] 2.43575251 GHz      RBW 3 kHz      RF Att 30 dB  
-8.46 dBm      VBW 3 kHz      Unit dBm  
SWT 1700 s



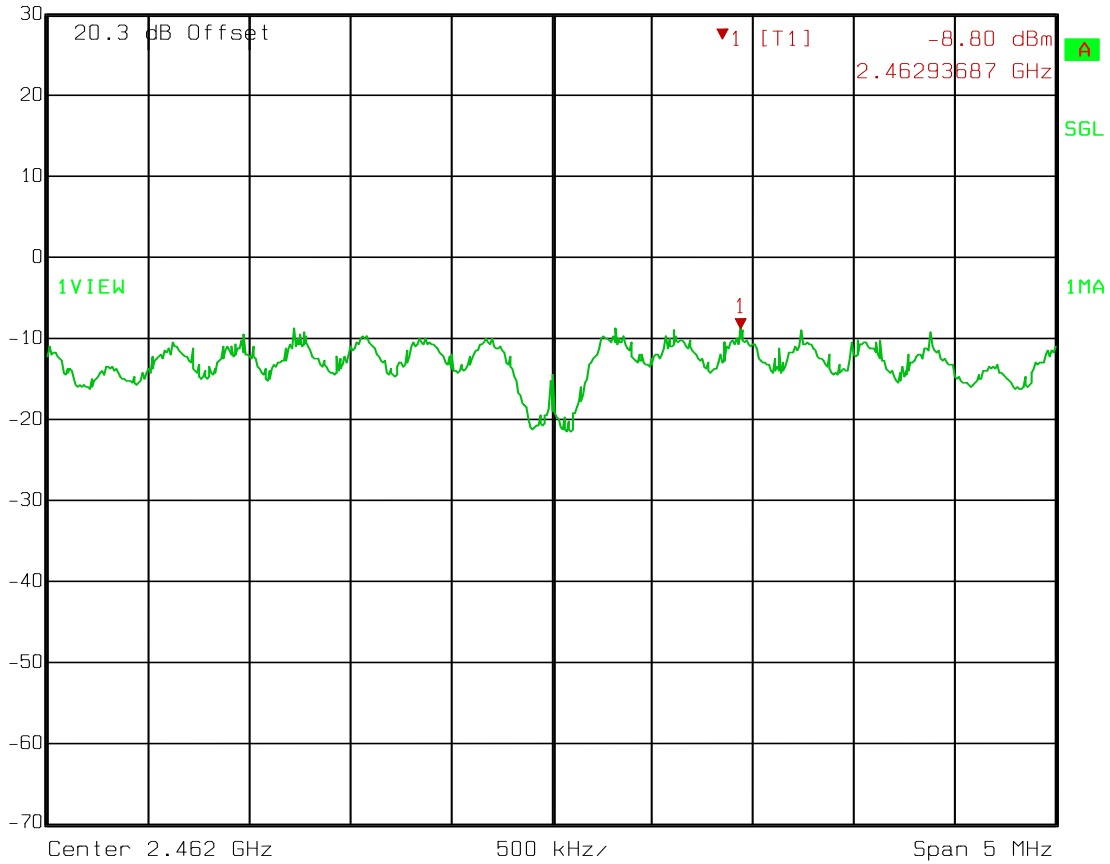
Date: 01.FEB.2012 06:53:35

### Peak Power Spectral Density

802.11g

High Channel Density

 Marker 1 [T1] RBW 3 kHz RF Att 30 dB  
Ref Lvl -8.80 dBm VBW 3 kHz  
30 dBm 2.46293687 GHz SWT 1700 s Unit dBm



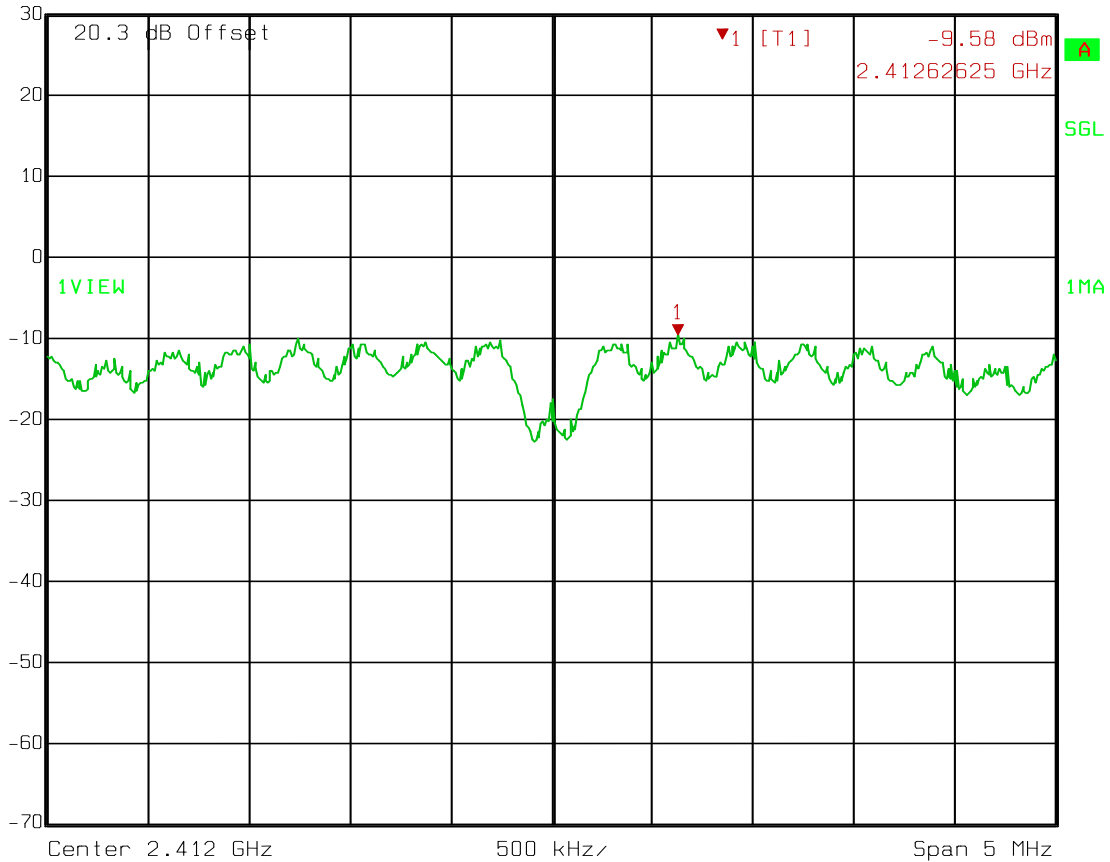
Date: 01.FEB.2012 07:22:35

### Peak Power Spectral Density

802.11n

Low Channel Density

 Ref Lvl 30 dBm      Marker 1 [T1] -9.58 dBm      RBW 3 kHz      RF Att 30 dB  
30 dBm      2.41262625 GHz      VBW 3 kHz      Unit dBm  
SWT 1700 s



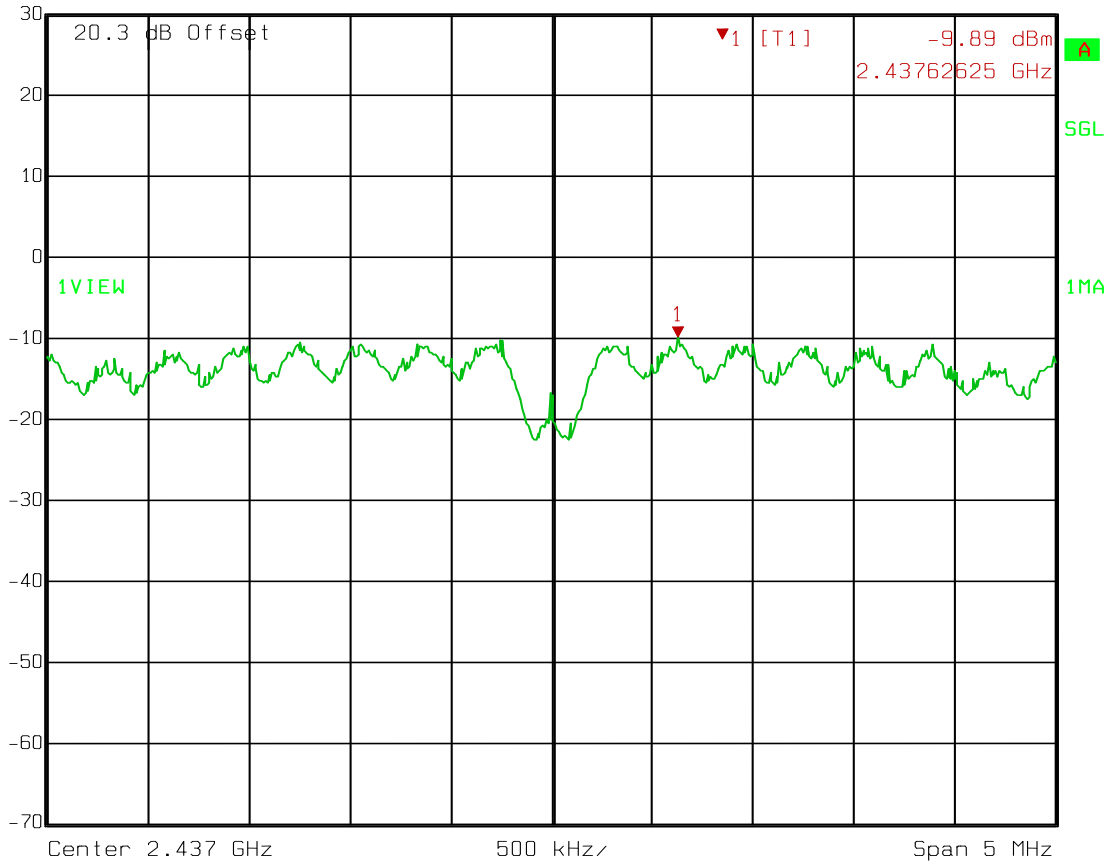
Date: 01.FEB.2012 07:51:35

### Peak Power Spectral Density

802.11n

Mid Channel Density

 Ref Lvl 30 dBm      Marker 1 [T1] 2.43762625 GHz      RBW 3 kHz      RF Att 30 dB      VBW 3 kHz      Unit dBm      SWT 1700 s



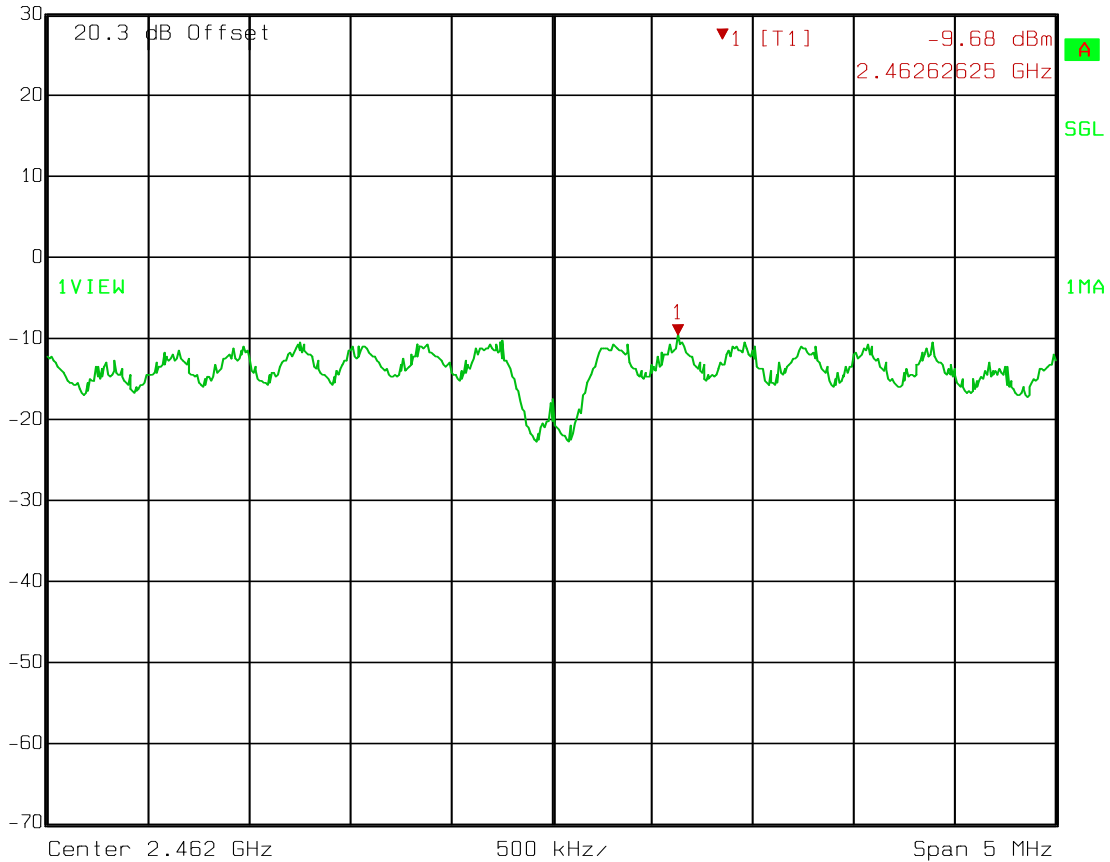
Date: 01.FEB.2012 08:21:55

### Peak Power Spectral Density

802.11n

High Channel Density

Ref Lvl 30 dBm  
Marker 1 [T1] -9.68 dBm  
2.46262625 GHz  
RBW 3 kHz RF Att 30 dB  
VBW 3 kHz  
SWT 1700 s Unit dBm



Date: 01.FEB.2012 08:56:36

**Section 8. Powerline Conducted Emissions**

NAME OF TEST: Powerline Conducted Emissions	PARA. NO.: FCC 15.207(a)
	RSS-Gen 7.2.4
TESTED BY: Brian Boyea	DATE: 30 January 2012

**Test Results:** Complies.

**Measurement Data:** See below.

**Measurement Uncertainty:** +/- 1.7 dB

**Test Equipment:** 1663-674-1555-1080-1188

**Test Data**

LINE 1

Frequency	FCCB	FCCB	AVG	AVG	QP	QP
	QP	AVG				
MHz	LIMIT	LIMIT	Meas	Margin	Meas	Margin
24.075	60.0	50.0	41.9	-8.1	43.1	-16.9

Line 2

Frequency	FCCB	FCCB	AVG	AVG	QP	QP
	QP	AVG				
MHz	Limit	Limit	Meas	Margin	Meas	Margin
24.045	60	50	40.144	-9.856	42.189	-17.811

Resolution BW: 10 kHz

Video BW: 10 kHz

## Section 9. Test Equipment List

Asset Tag	Description	Manufacturer	Model	Serial #	Last Cal	Next Cal
674	Limiter	Hewlett Packard	11947A	3107A02200	01-Nov-2011	01-Nov-2012
993	Antenna, Horn	A.H. Systems	SAS-200/571	162	22-Sep-2011	22-Sep-2013
1016	Preamplifier	Hewlett Packard	8449A	2749A00159	20-Jul-2011	20-Jul-2012
1025	Preamplifier, 25dB	Nemko USA, Inc.	LNA25	399	23-Feb-2011	23-Feb-2012
1036	Spectrum Analyzer	Rohde & Schwartz	FSEK30	830844/006	23-Dec-2011	23-Dec-2013
1080	Cable, 3m	Nemko USA, Inc.	RG223		VB4 Use	NR
1082	Cable, 2m	Astrolab	32027-2-29094-72TC		VB4 Use	NR
1188	LISN	EMCO	3825/2	1214	22-Nov-2011	22-Nov-2012
1464	Spectrum Analyzer	Hewlett Packard	8563E	3551A04428	16-May-2011	16-May-2013
1472	Attenuator, 20dB,	Omni Spectra	20600-20db		VB4 Use	NR
1555	High Pass Filter	Solar Electronics	7930-5.0	933125	19-May-2011	19-May-2012
1663	Spectrum Analyzer	Rohde & Schwartz	FSP3	100073	02-Sep-2011	02-Sep-2013
1763	Antenna, Bilog	Schaffner	CBL 6111D	22926	11-Feb-2011	11-Feb-2012
1783	Cable Assy,	Nemko	Chamber		26-Sep-2011	26-Sep-2012

## **ANNEX A - TEST DETAILS**



NAME OF TEST: Powerline Conducted Emissions	PARA. NO.: 15.207(a) / RSS-Gen 7.2.4
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**Minimum Standard:** Conducted limits.

(a) Except as shown in paragraphs (b) and (c) of this section, for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 kHz to 30 MHz, shall not exceed the limits in the following table, as measured using a 50 mH/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the boundary between the frequency ranges.

Frequency of Conducted Emission (MHz)	Limit (dBmV)	
	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

\* Decreases with the logarithm of the frequency.

(b) The limit shown in paragraph (a) of this section shall not apply to carrier current systems operating as intentional radiators on frequencies below 30 MHz. In lieu thereof, these carrier current systems shall be subject to the following standards:

(1) For carrier current systems containing their fundamental emission within the frequency band 535-1705 kHz and intended to be received using a standard AM broadcast receiver: no limit on conducted emissions.

(2) For all other carrier current systems: 1000 mV within the frequency band 535-1705 kHz, as measured using a 50 mH/50 ohms LISN.

(3) Carrier current systems operating below 30 MHz are also subject to the radiated emission limits as provided in §15.205 and §§15.209, 15.221, 15.223, 15.225 or 15.227, as appropriate.

(c) Measurements to demonstrate compliance with the conducted limits are not required for devices which only employ battery power for operation and which do not operate from the AC power lines or contain provisions for operation while connected to the AC power lines. Devices that include, or make provision for, the use of battery chargers which permit operating while charging, AC adaptors or battery eliminators or that connect to the AC power lines indirectly, obtaining their power through another device which is connected to the AC power lines, shall be tested to demonstrate compliance with the conducted limits.

NAME OF TEST: Occupied Bandwidth

PARA. NO.: 15.247(a)(2) / A8.2(a)

**Minimum Standard:** The minimum 6 dB bandwidth shall be at least 500 kHz

NAME OF TEST: Maximum Peak Output Power	PARA. NO.: 15.247(b)(3) / A8.4(4)
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**Minimum Standard:** The maximum peak output power shall not exceed 1 watt.

If transmitting antennas of directional gain greater than 6 dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

Systems operating in the 2400-2483.5 MHz band that are used exclusively for fixed, point to point operation may employ transmitting antennas with directional gain greater than 6 dBi provided the maximum peak output power is reduced by 1 dB for every 3 dB that the directional gain of the antenna exceed 6 dBi.

Systems operating in the 5725 – 5850 MHz band that are used exclusively for fixed, point-to-point operation may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter peak output power.

**Direct Measurement Method For Detachable Antennas:**

If the antenna is detachable, a peak power meter is used to measure the power output with the transmitter operating into a 50 ohm load. The dBi gain of the antenna(s) employed shall be reported.

**Substitution Antenna Method for Integral Antennas:**

The peak field strength of the carrier is measured in a worst-case configuration with a RBW > 5 times the occupied bandwidth of the transmitted waveform. For cases where the RBW of the test instrument is not sufficient, the power is measured using a peak power meter instead of the spectrum analyzer.

The RBW of the spectrum analyzer shall be set to a value greater than the measured 6 dB occupied bandwidth of the E.U.T.

Number of channels tested:

Tuning range	Number of channels tested	Channel location in band
1 MHz or less	1	middle
1 to 10 MHz	2	top and bottom
more than 10 MHz	3	top, middle, bottom

NAME OF TEST: Spurious Emissions(conducted)      PARA. NO.: 15.247(d) / A8.5

**Minimum Standard:** In any 100kHz bandwidth outside the frequency band in which the transmitter is operating, emissions shall be at least 20 dB below the fundamental emission or shall not exceed the following field strength limits. Emissions falling in the restricted bands of 15.205 shall not exceed the following field strength limits:

Frequency (MHz)	Field Strength (µV/m @ 3m)	Field Strength (dB @ 3m)
30 - 88	100	40.0
88 - 216	150	43.5
216 - 960	200	46.0
Above 960	500	54.0

**THE SPECTRUM IS SEARCHED TO THE 10th HARMONIC OF THE HIGHEST FREQUENCY GENERATED IN THE EUT.**

**Method Of Measurement:**

30 MHz - 10th harmonic plot

RBW: 100 kHz

VBW: 300 kHz

Sweep: Auto

Display line: -20 dBc

Lower Band Edge

RBW: At least 1% of span/div.

VBW: >RBW

Span: As necessary to display any spurious at band edge.

Sweep: Auto

Center Frequency: 902 MHz, 2400 MHz, or 5725 MHz

Marker: Peak of fundamental emission

Marker Δ: Peak of highest spurious level below center frequency.

Upper Band Edge

RBW: At least 1% of span/div.

VBW: >RBW

Span: As necessary to display any spurious at band edge.

Sweep: Auto

Center Frequency: 928 MHz, 2483.5 MHz, or 5850 MHz

Marker: Peak of fundamental emission

Marker Δ: Peak of highest spurious level above center frequency.

Number of channels tested:

Tuning range	Number of channels tested	Channel location in band
1 MHz or less	1	middle
1 to 10 MHz	2	top and bottom
more than 10 MHz	3	top, middle, bottom

NAME OF TEST: Radiated Emissions

PARA. NO.: 15.247(c) /RSS-Gen 7.2.2

**Minimum Standard:** Emissions falling in the restricted bands shall not exceed the following field strength limits:

Frequency (MHz)	Field Strength (µV/m @ 3m)	Field Strength (dB @ 3m)
30 - 88	100	40.0
88 - 216	150	43.5
216 - 960	200	46.0
Above 960	500	54.0

**THE SPECTRUM WAS SEARCHED TO THE 10th HARMONIC**

**15.205 Restricted Bands**

MHz	MHz	MHz	GHz
0.09-0.11	16.42-16.423	399.9-410	4.5-5.25
0.495-0.505	16.69475-16.69525	608-614	5.35-5.46
2.1735-2.1905	16.80425-16.80475	960-1240	7.25-7.75
4.125-4.128	25.5-25.67	1300-1427	8.025-8.5
4.17725-4.17775	37.5-38.25	1435-1626.5	9.0-9.2
4.20725-4.20775	73-74.6	1645.5-1646.5	9.3-9.5
6.125-6.218	74.8-75.2	1660-1710	10.6-12.7
6.26775-6.26825	108-121.94	1718.8-1722.2	13.25-13.4
6.31175-6.31225	123-138	2200-2300	14.47-14.5
8.291-8.294	149.9-150.05	2310-2390	15.35-16.2
8.362-8.366	156.52475-156.52525	2483.5-2500	17.7-21.4
8.37625-8.38675	156.7-156.9	2655-2900	22.01-23.12
8.41425-8.41475	162.0125-167.17	3260-3267	23.6-24.0
12.29-12.293	167.72-173.2	3332-3339	31.2-31.8
12.51975-12.52025	240-285	3345.8-3358	36.43-36.5
12.57675-12.57725	322-335.4	3600-4400	Above 38.6
13.36-13.41	1718		

Number of channels tested:

Tuning range	Number of channels tested	Channel location in band
1 MHz or less	1	middle
1 to 10 MHz	2	top and bottom
more than 10 MHz	3	top, middle, bottom

NAME OF TEST: Transmitter Power Density	PARA. NO.: 15.247(d) / A8.2(b)
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**Minimum Standard:** The transmitted power density averaged over any 1 second interval shall not be greater than +8 dBm in any 3 kHz bandwidth.

**Method Of Measurement:** The spectrum analyzer is set as follows:

- RBW: 3 kHz
- VBW: >3 kHz
- Span: => measured 6 dB bandwidth
- Sweep: Span(kHz)/3 (i.e. for a span of 1.5 MHz the sweep rate is 1500/3 = 500 sec.
- LOG dB/div.: 2 dB

**Note:** For devices with spectrum line spacing  $\leq 3$  kHz, the RBW of the analyzer is reduced until the spectral lines are resolved. The measurement data is normalized to 3 kHz by summing the power of all the individual spectral lines within a 3 kHz band in linear power units.

**For Devices With Integral Antenna:**

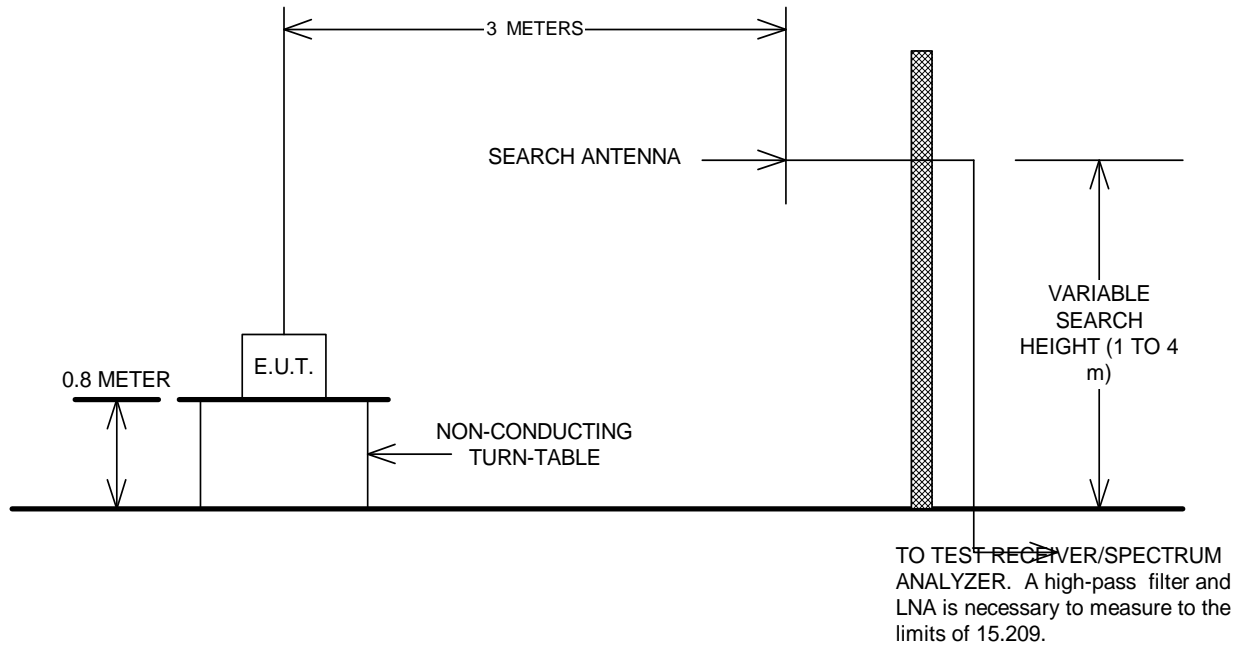
For devices with non-detachable antennas, the received field strength is peaked and the spectrum analyzer is set as above. The peak emission level is then measured and converted to a field strength by adding the appropriate antenna factor and cable loss. This field strength is then converted to an equivalent isotropic radiated power using the same method as described for Peak Power output.

Number of channels tested:

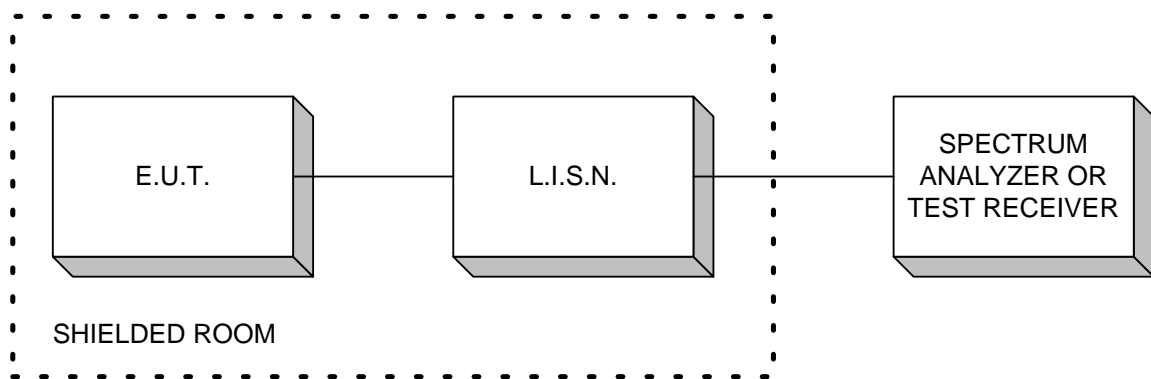
Tuning Range	Number Of Channels Tested	Channel Location In Band
1 MHz or Less	1	Middle
1 to 10 MHz	2	Top And Bottom
More Than 10 MHz	3	Top, Middle, Bottom

**ANNEX B - TEST DIAGRAMS**

**Test Site For Radiated Emissions**

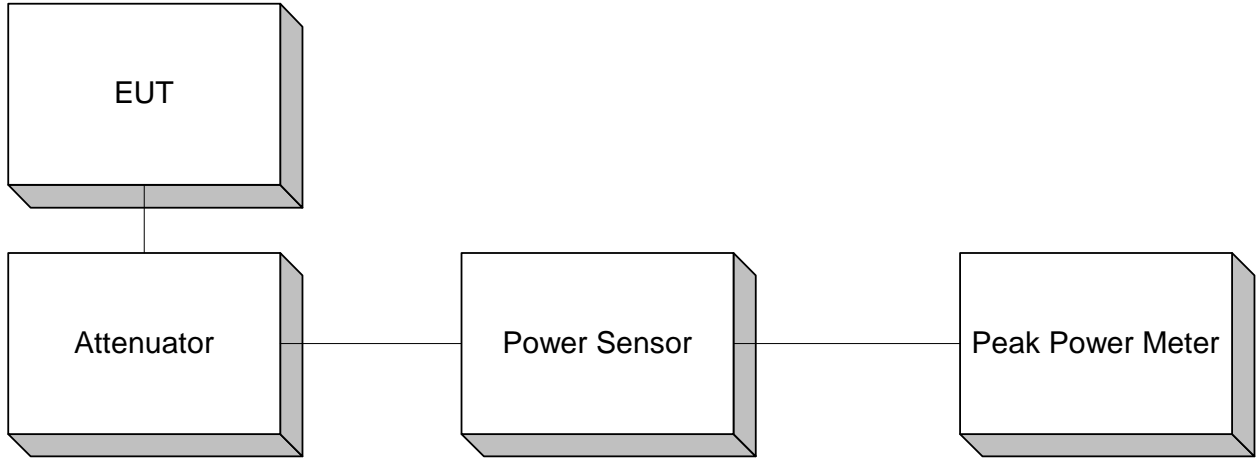


**Conducted Emissions**





**Peak Power At Antenna Terminals**



Note: A spectrum analyzer may be substituted for Peak Power Meter given that the measurement bandwidth is sufficient to capture the 6 dB bandwidth of the transmitter.

**Minimum 6 dB Bandwidth  
Peak Power Spectral Density  
Spurious Emissions (conducted)**

