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: _____ **DATE:** **02 February 2012**
David Light, Senior Wireless Engineer

APPROVED BY: _____ **DATE:** **15 February 2012**
Michael Cantwell

Number of Pages: 66

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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 is 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.

☒ New Submission ☒ Production Unit

☐ Class II Permissive Change ☐ 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".

NVLAP Lab Code 100426-0

Summary Of Test Data

NAME OF TEST	PARA. NO.	RESULT
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

Frequency Band (MHz):	902-928	2400-2483.5	5725-5850
	☐	☒	☐

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

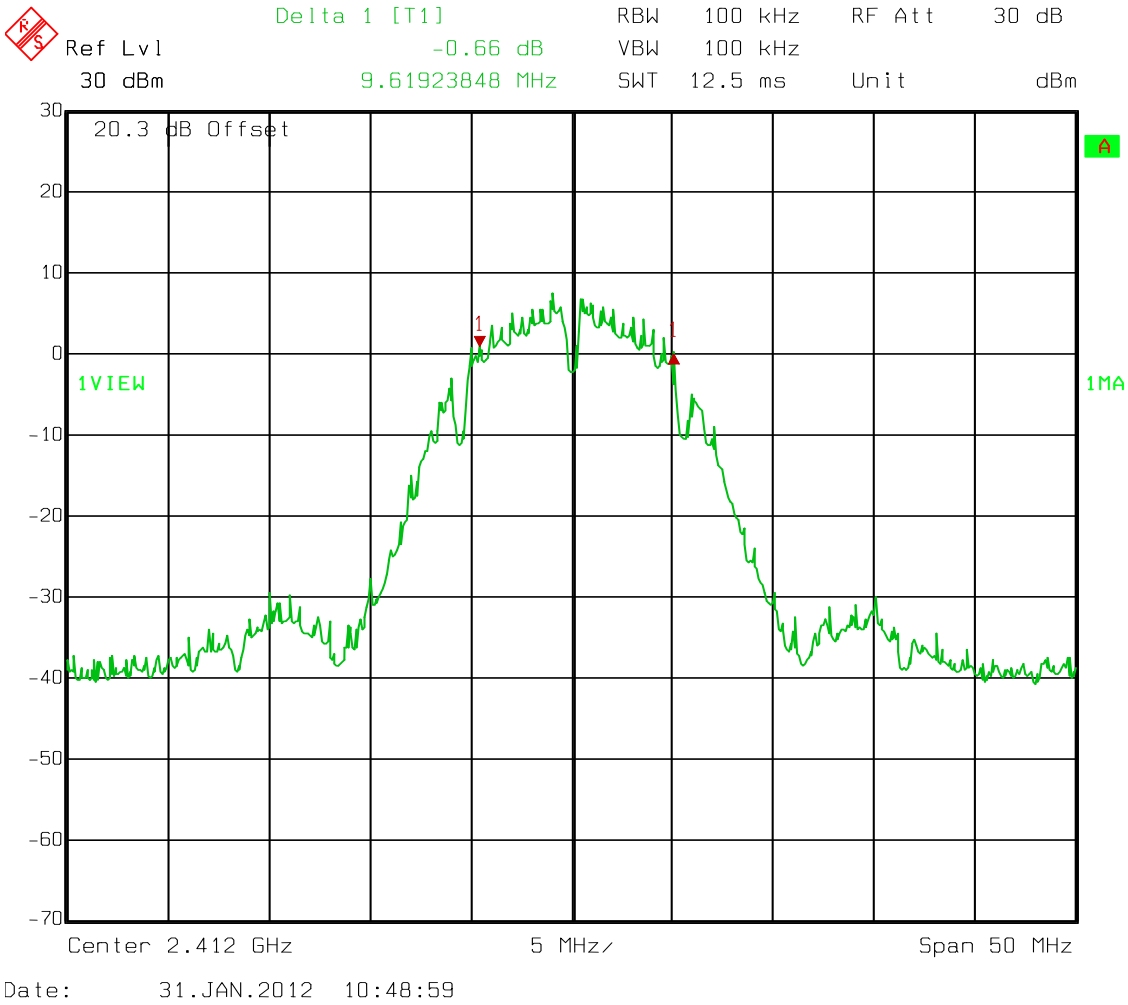
Measurement Uncertainty: +/-1x10^{-7} ppm

Test Equipment Used: 1036-1082-1472

Test Data – Occupied Bandwidth

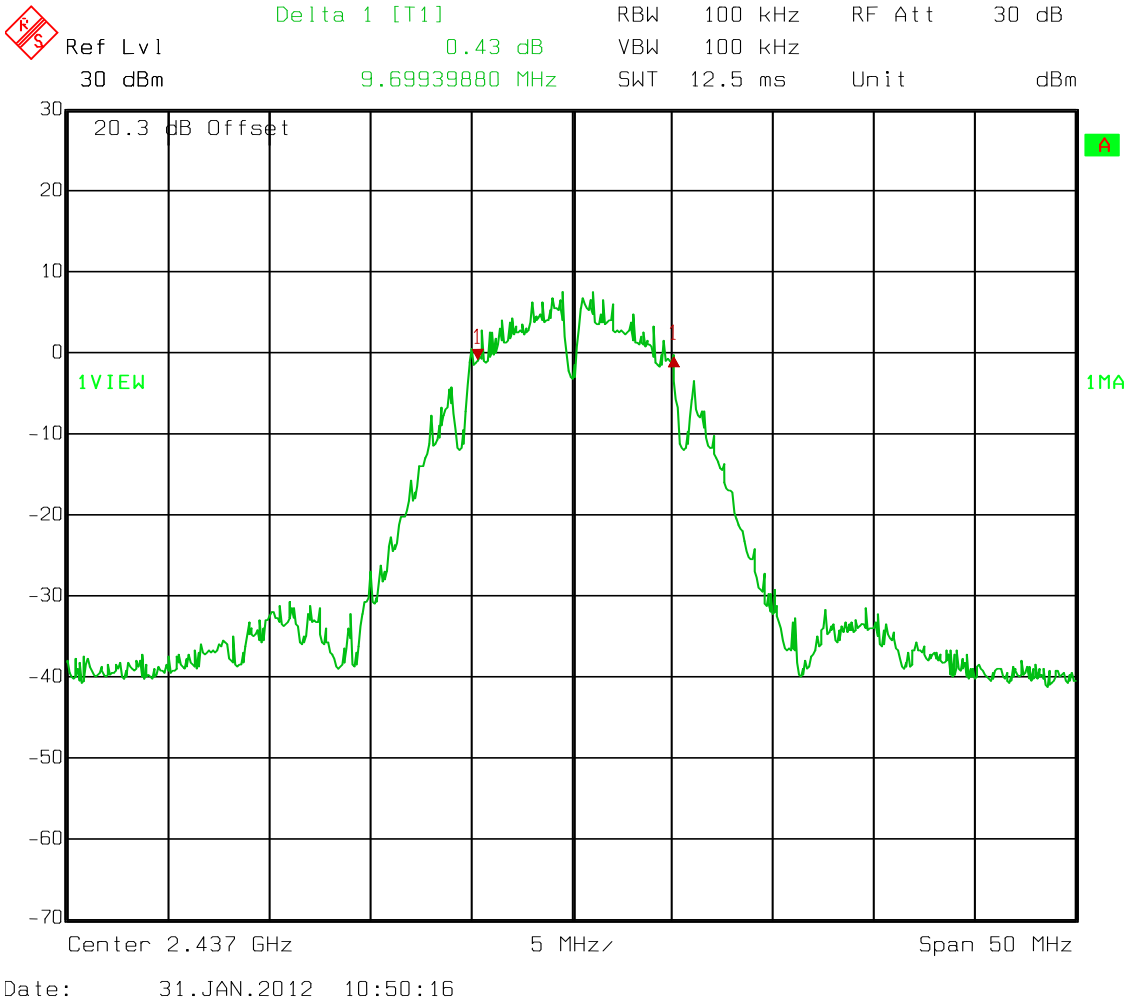
802.11b

Low Channel



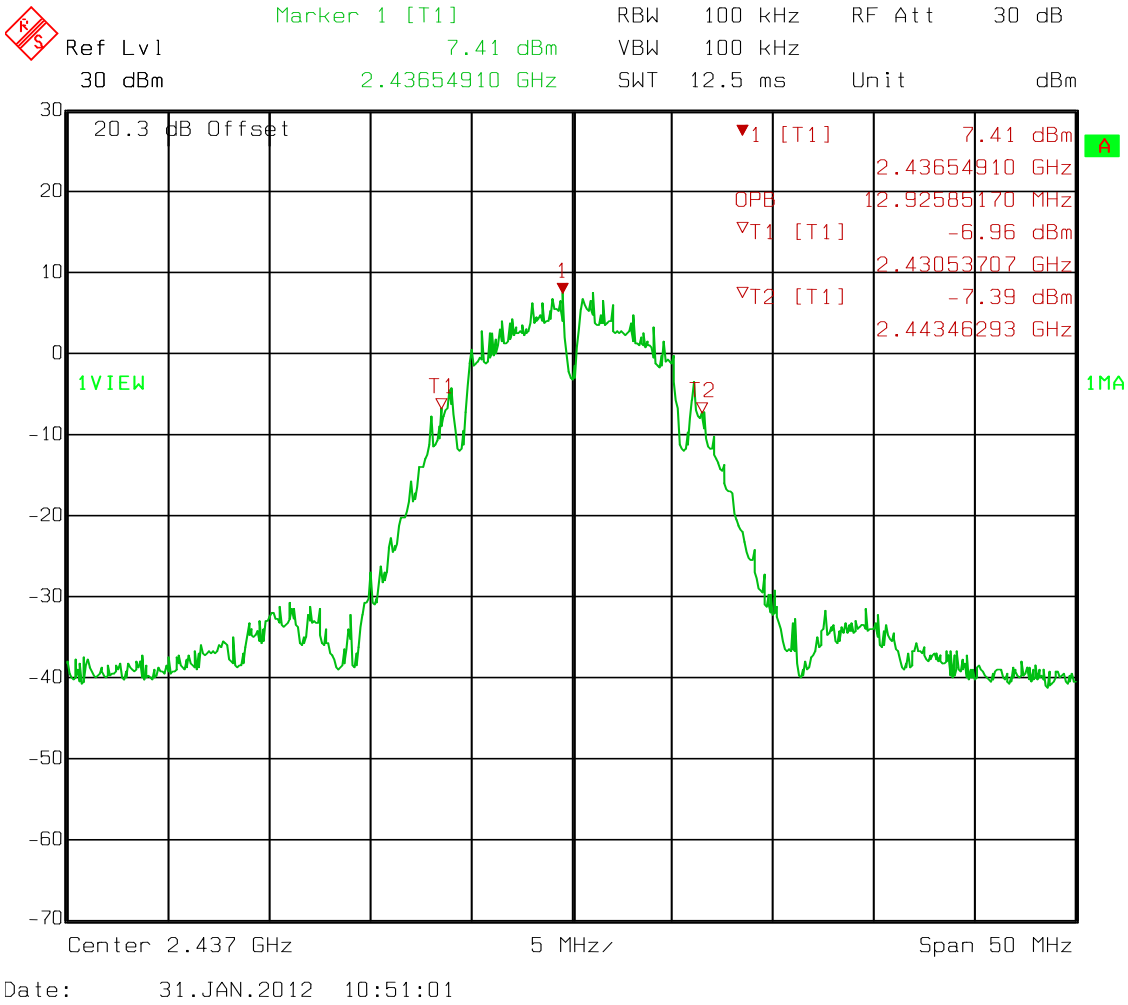
Test Data – Occupied Bandwidth

802.11b
Mid Channel



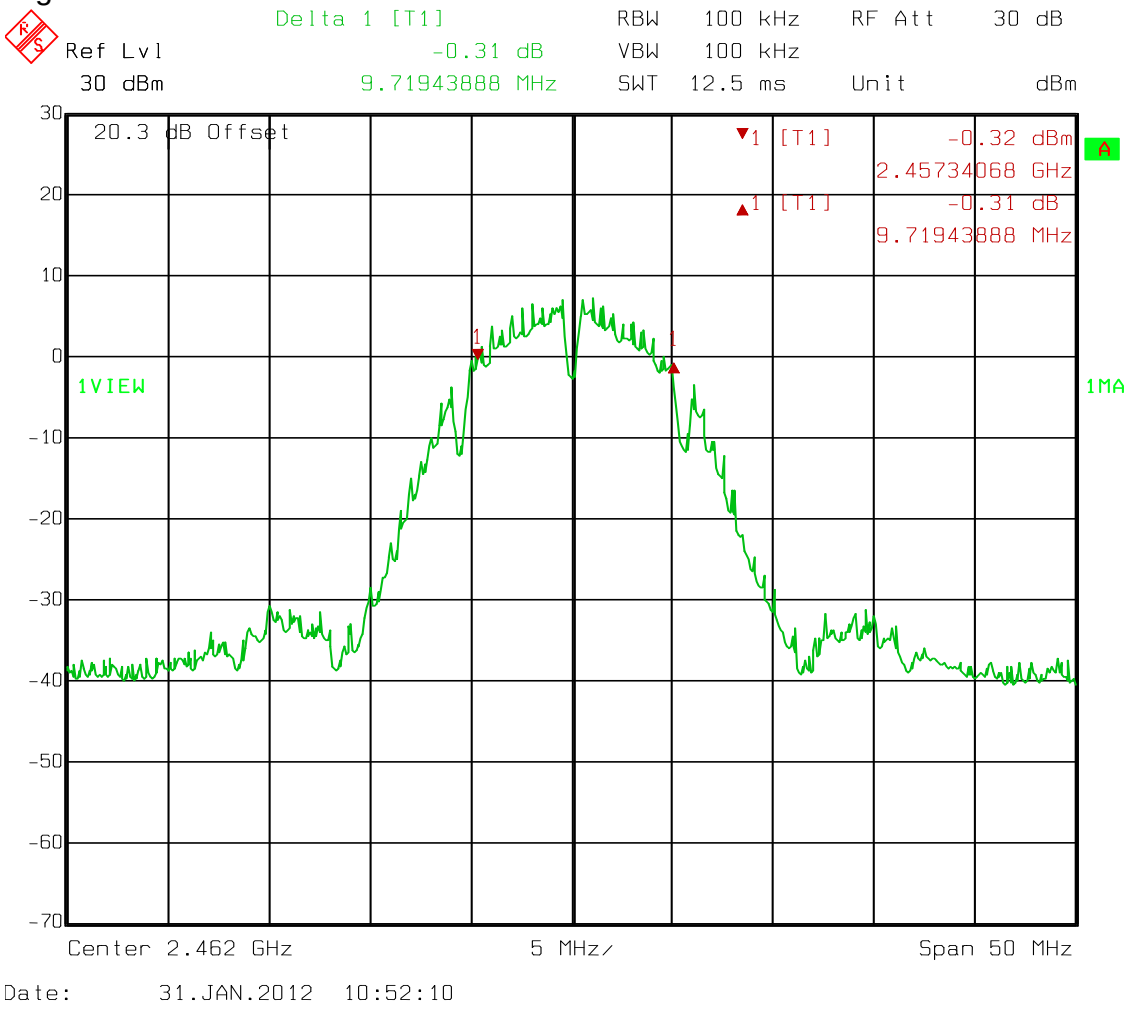
Test Data – Occupied Bandwidth

802.11b
Mid Channel
99% Bandwidth for RSS-210



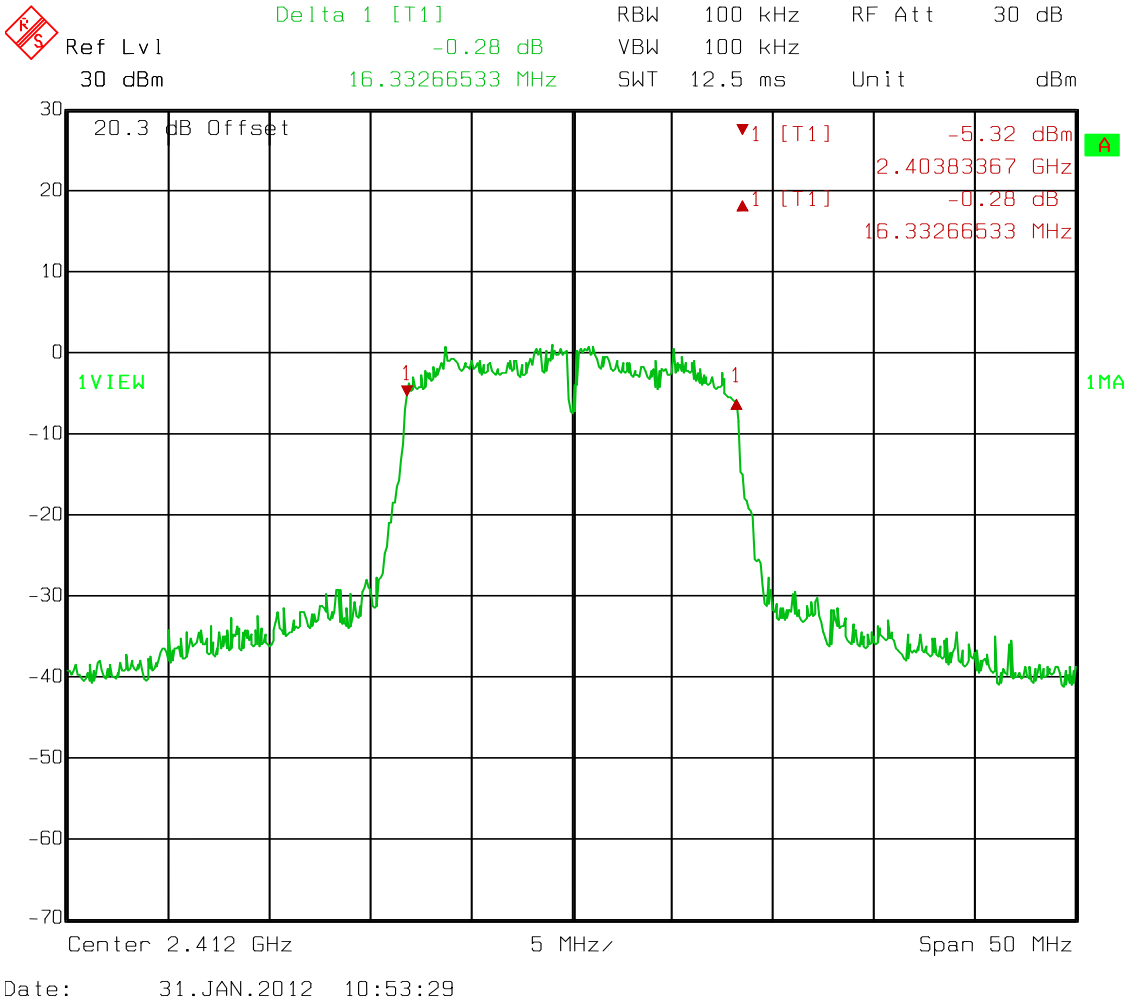
Test Data – Occupied Bandwidth

802.11b
High Channel



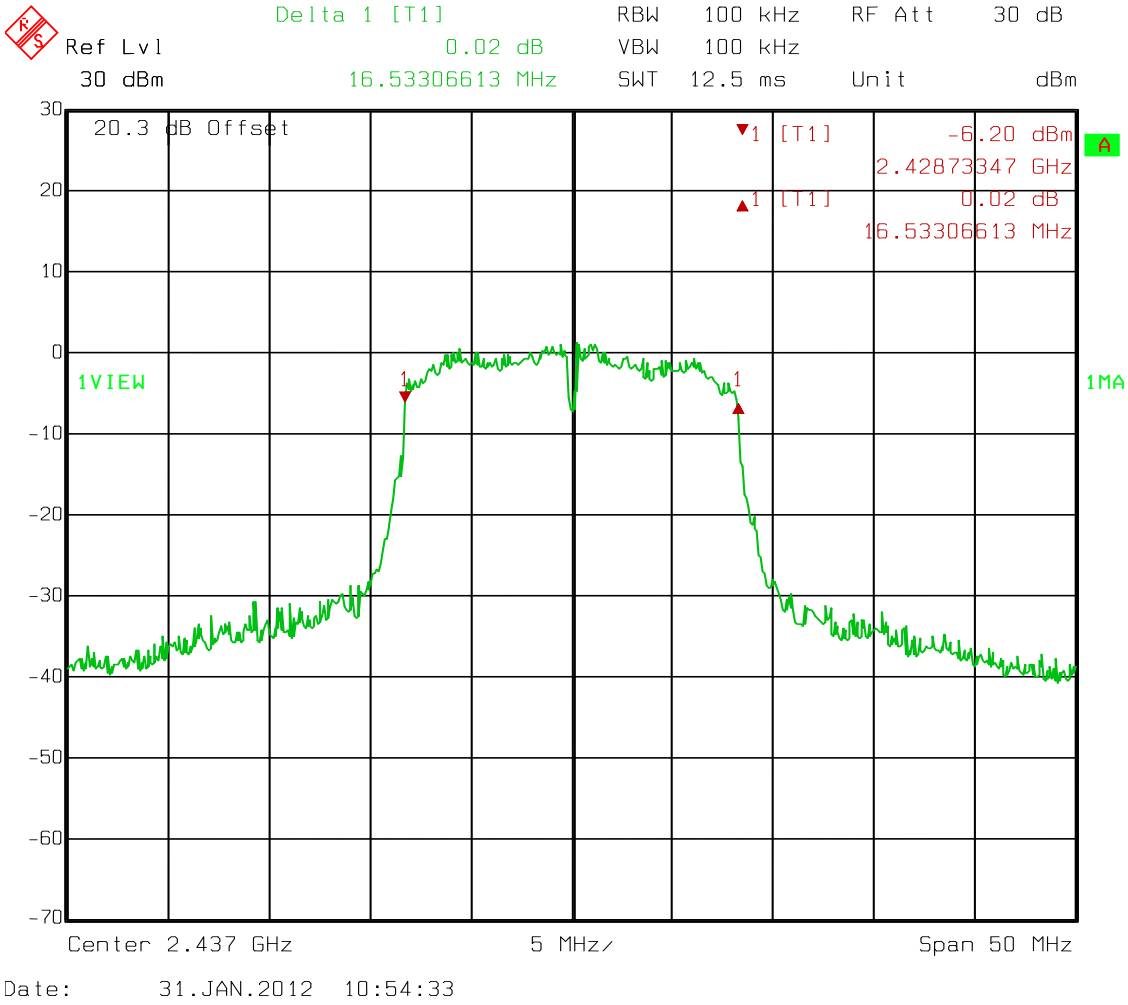
Test Data – Occupied Bandwidth

802.11g
Low Channel



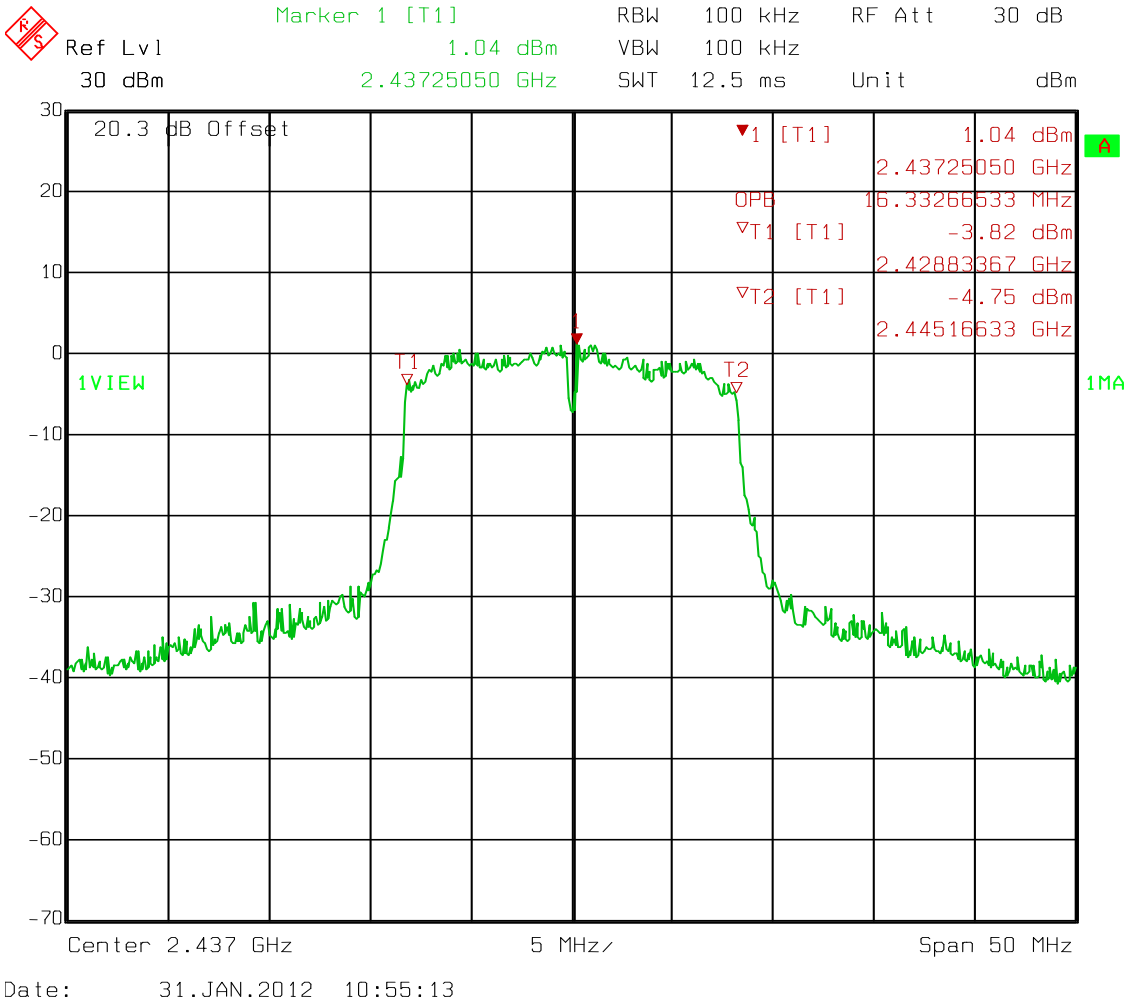
Test Data – Occupied Bandwidth

802.11g
Mid Channel



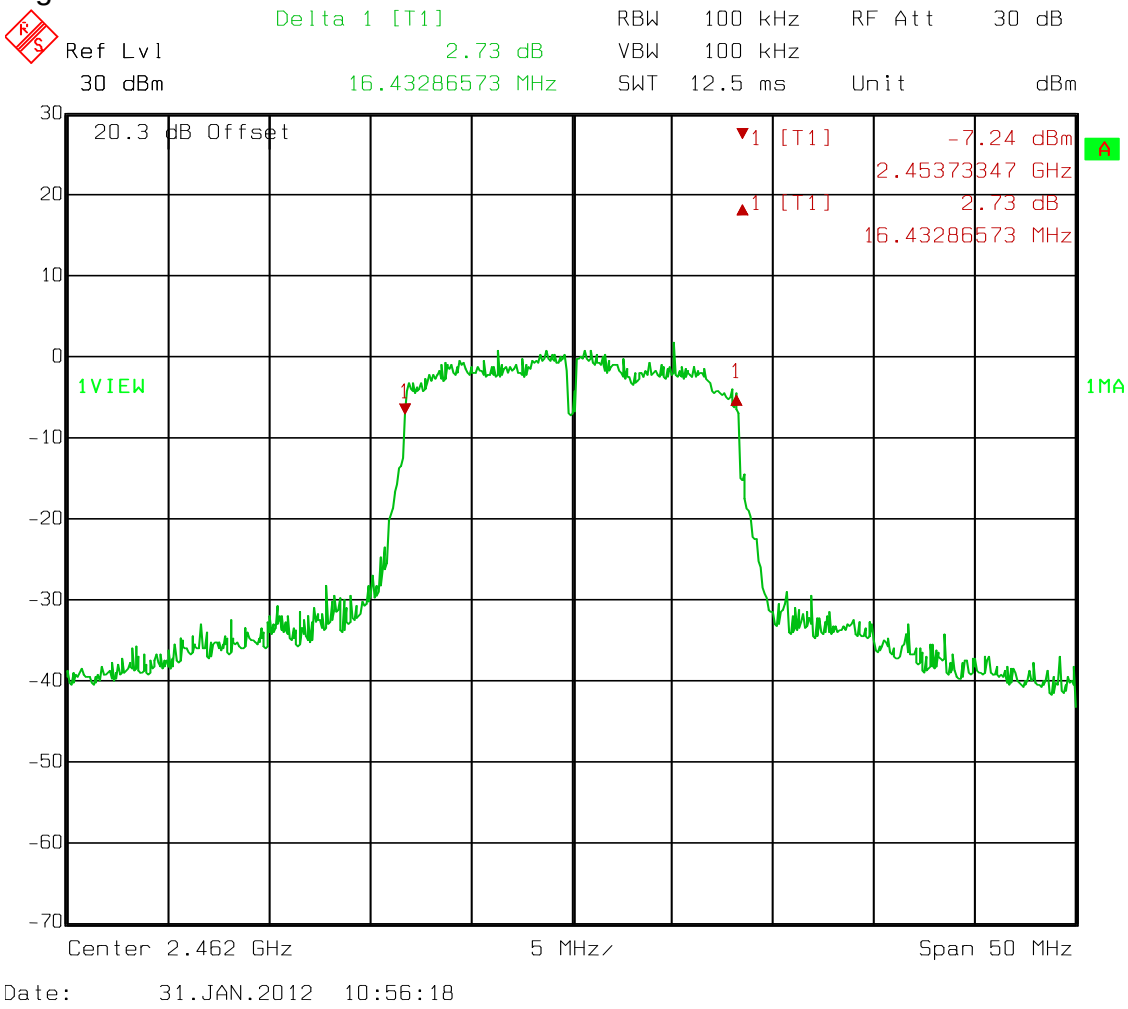
Test Data – Occupied Bandwidth

802.11g
Mid Channel
99% Bandwidth for RSS-210



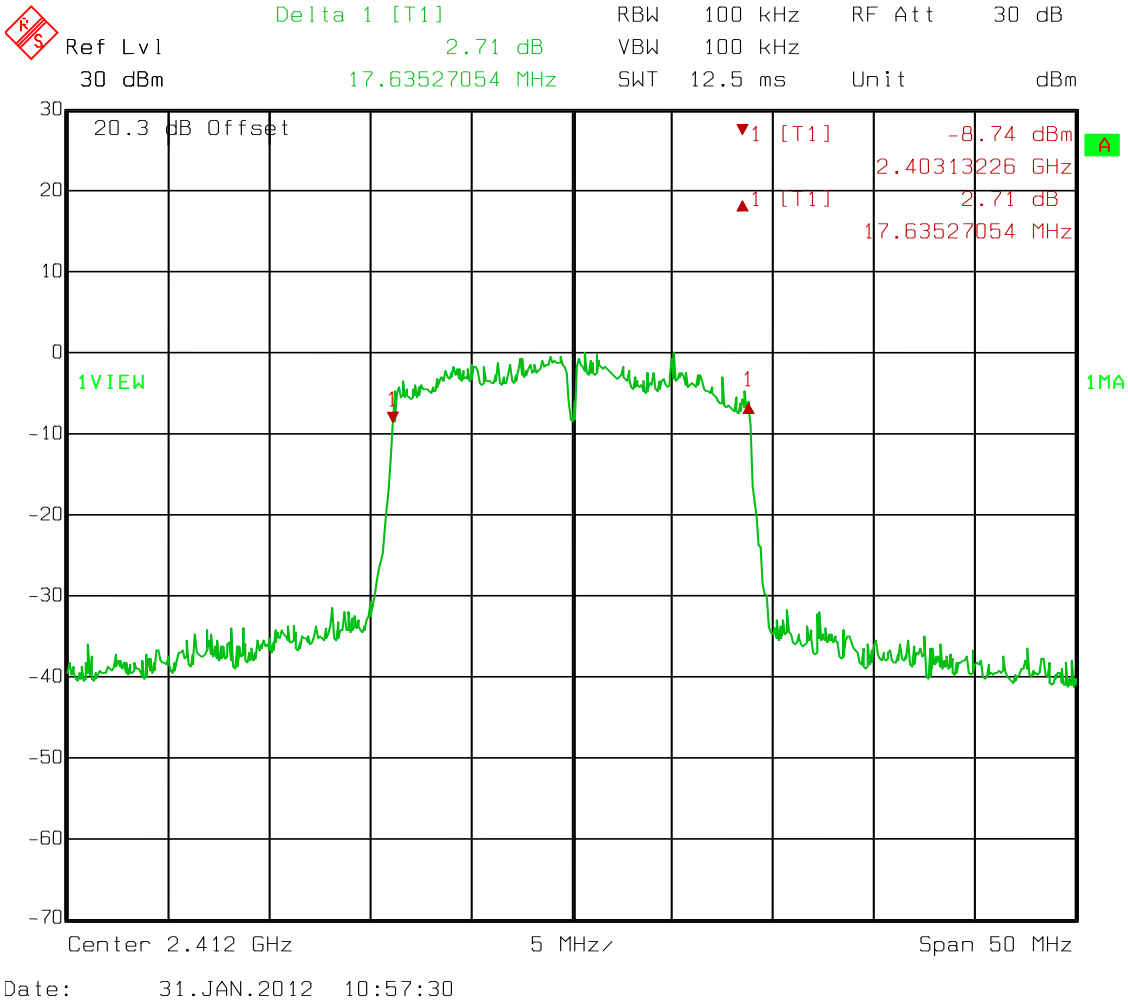
Test Data – Occupied Bandwidth

802.11g
High Channel



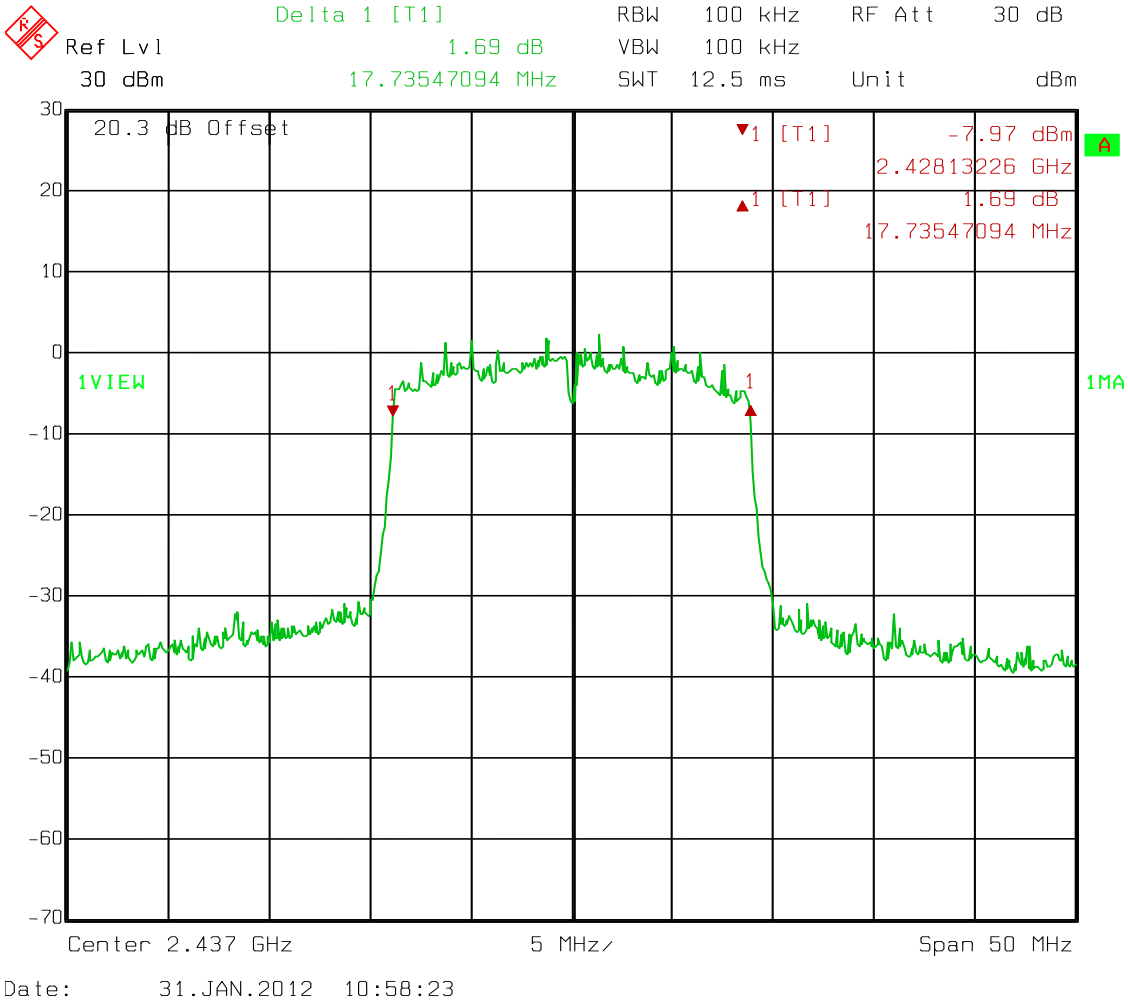
Test Data – Occupied Bandwidth

802.11n
Low Channel



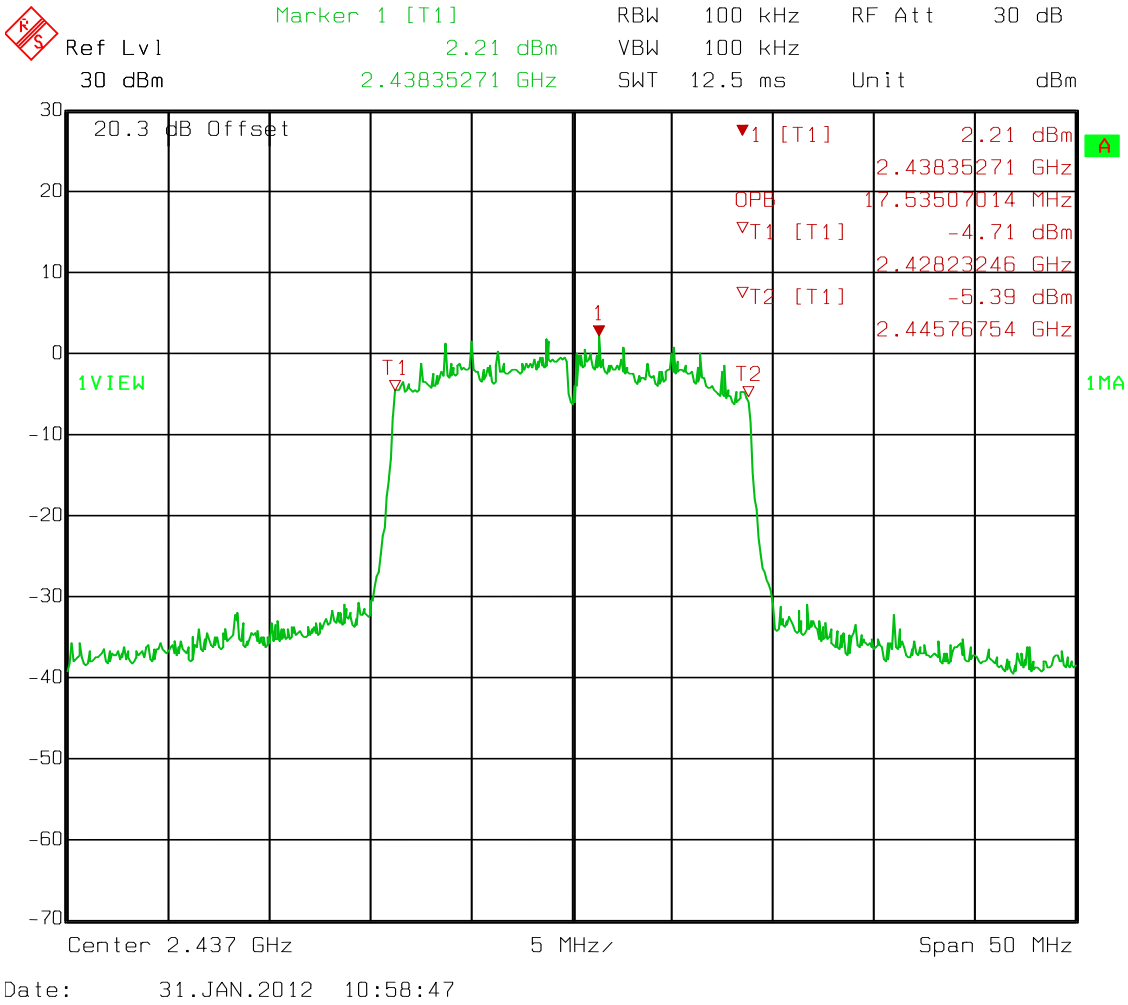
Test Data – Occupied Bandwidth

802.11n
Mid Channel



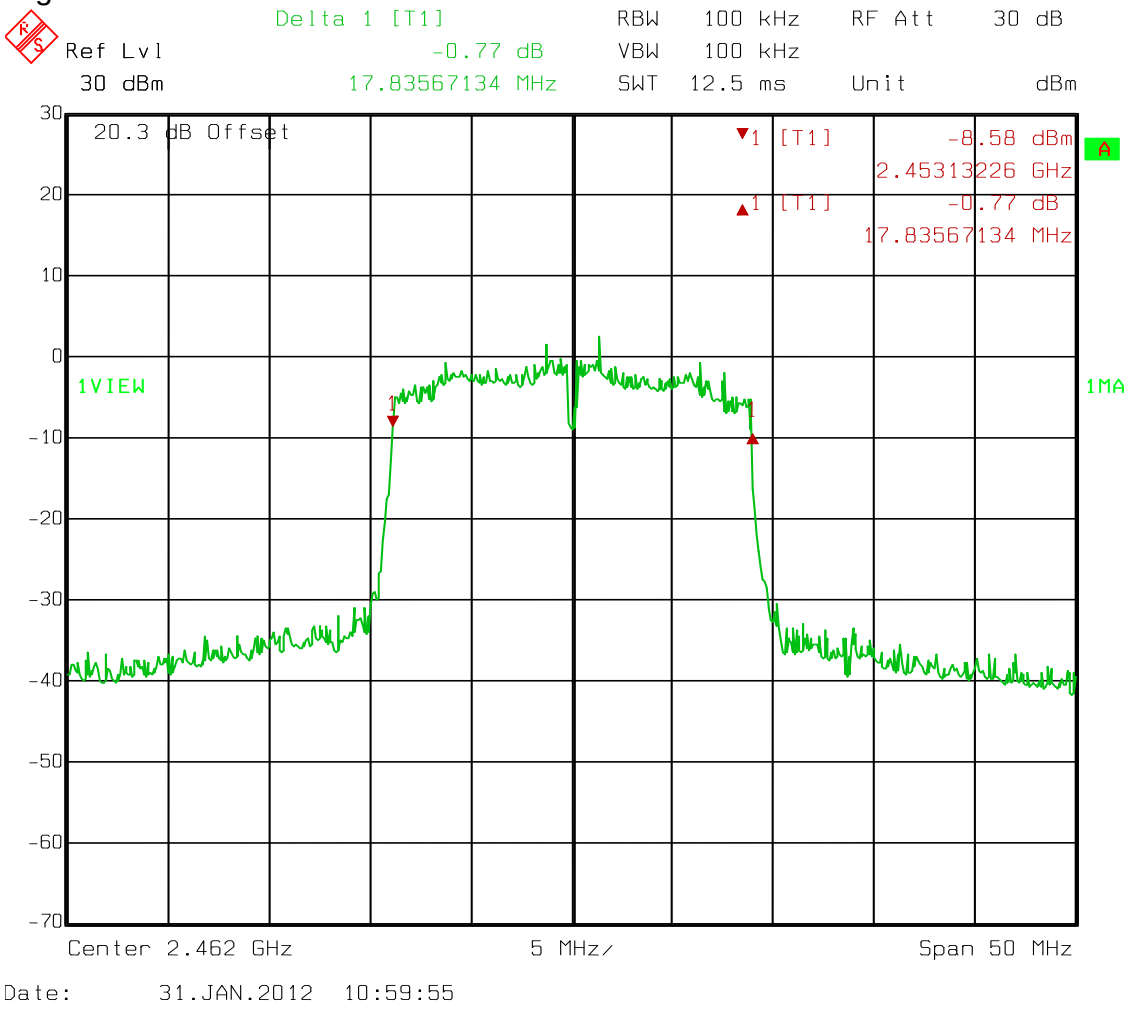
Test Data – Occupied Bandwidth

802.11n
Mid Channel
99% Bandwidth for RSS-210



Test Data – Occupied Bandwidth

802.11n
High Channel



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.

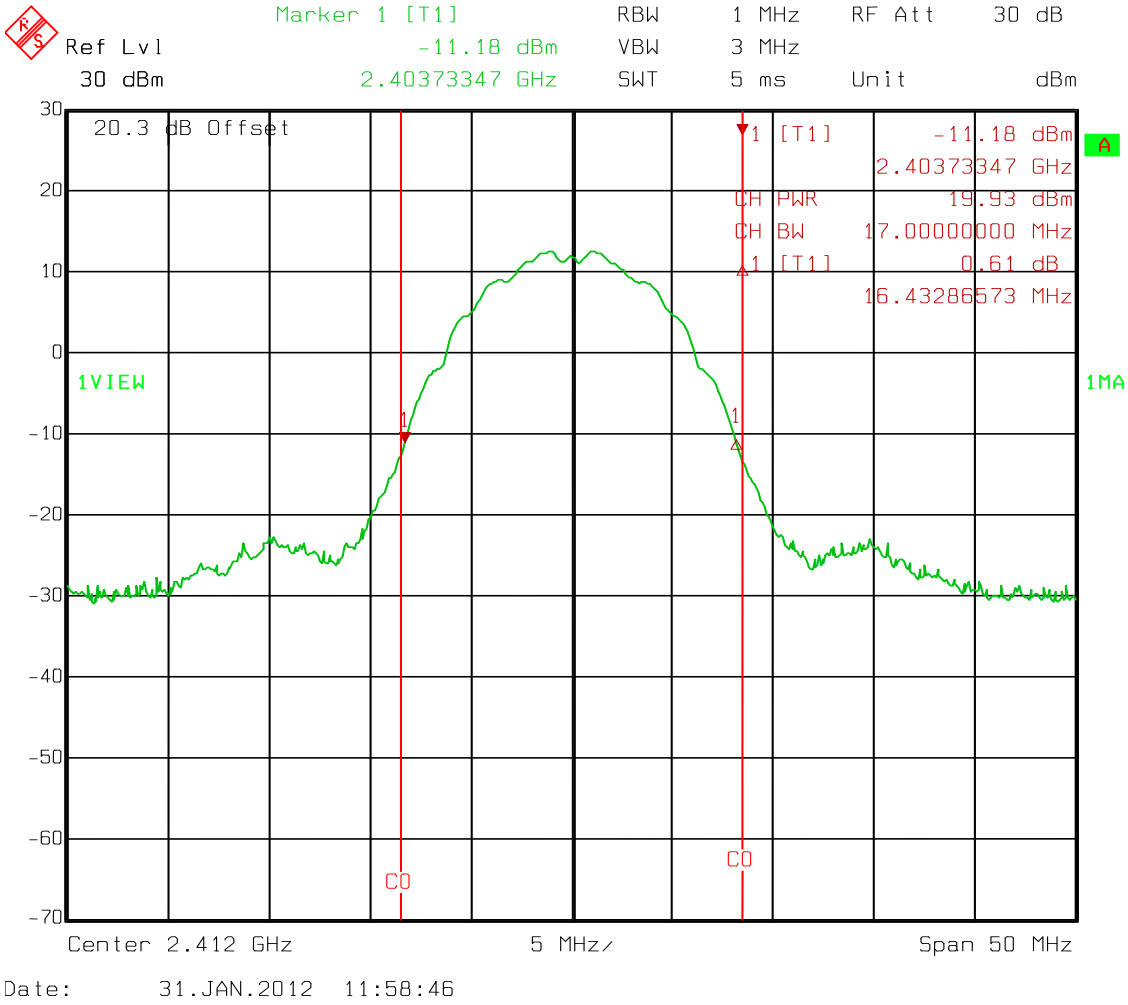
☐ For battery powered equipment, the device was tested with a fresh battery per 15.31(e).

☒ The device was tested on three channels per 15.31(l).

☐ This test was performed radiated.

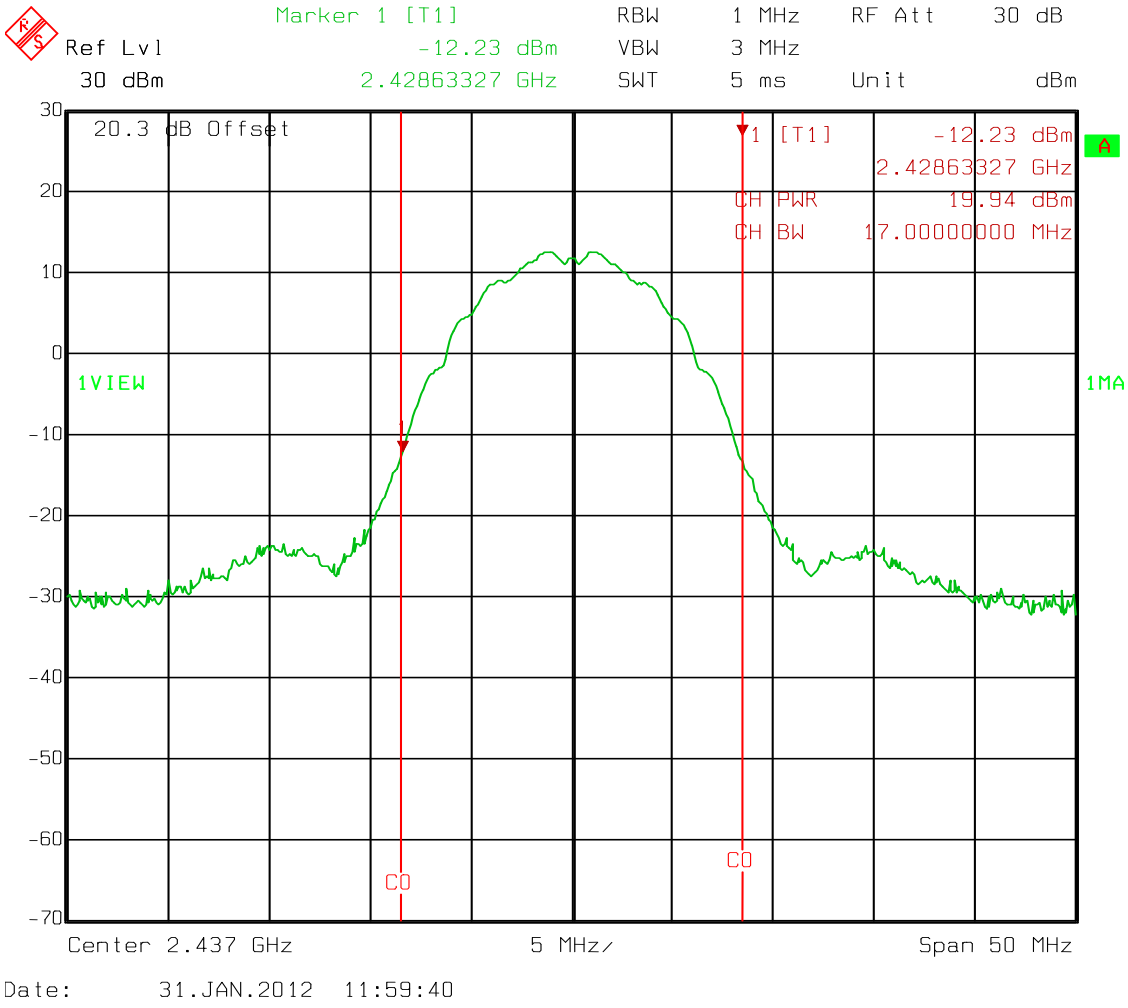
Test Data – Peak Power

802.11b
Low Channel
Power



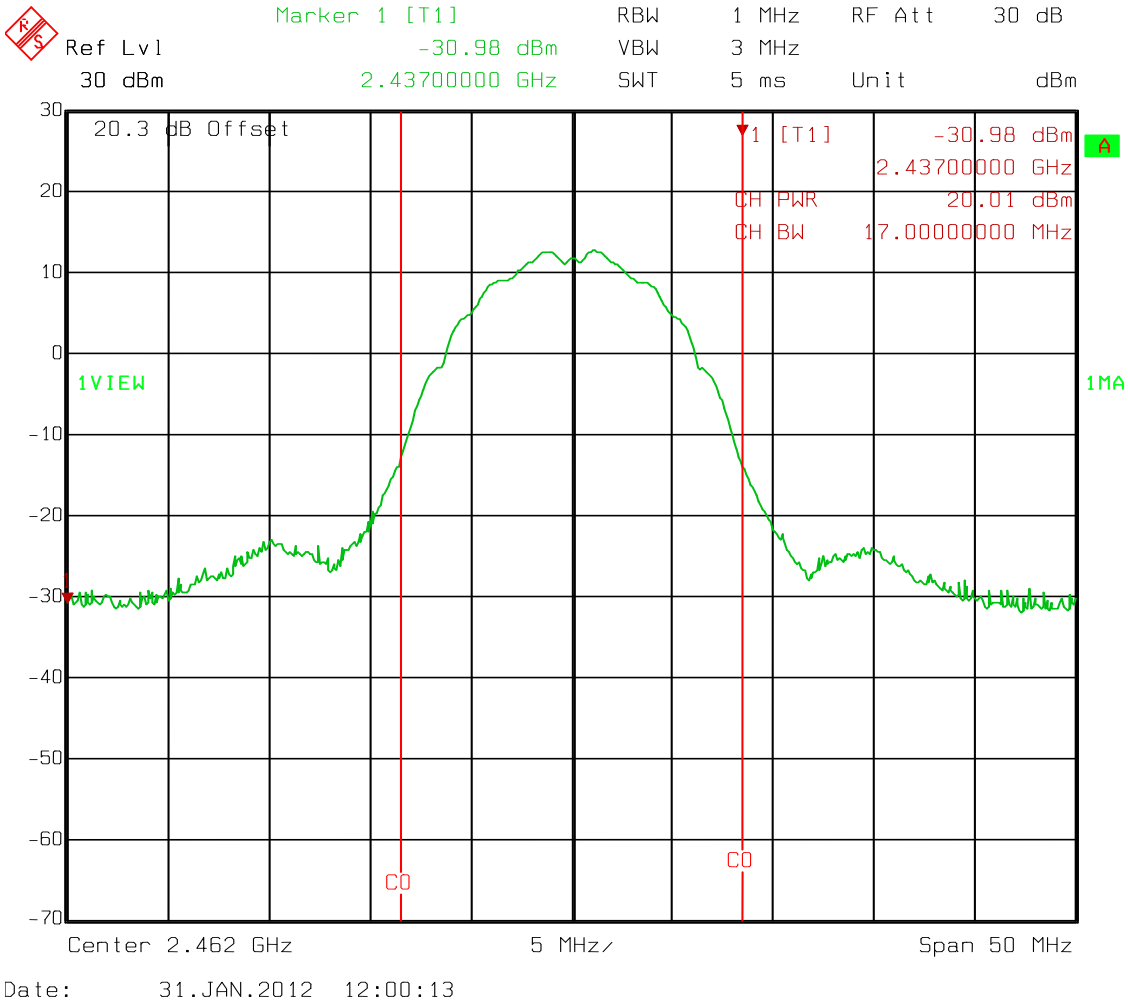
Test Data – Peak Power

802.11b
Mid Channel
Power



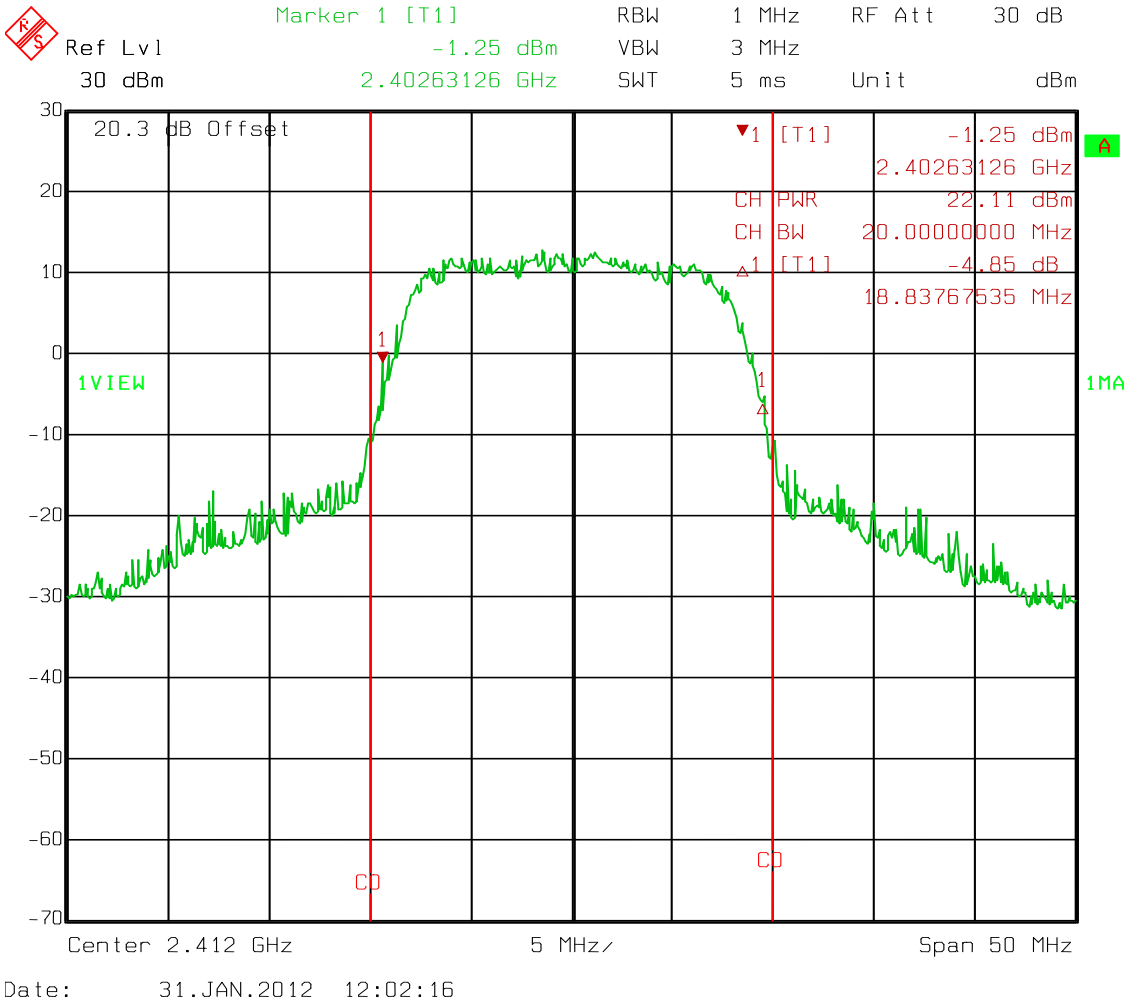
Test Data – Peak Power

802.11b
High Channel
Power



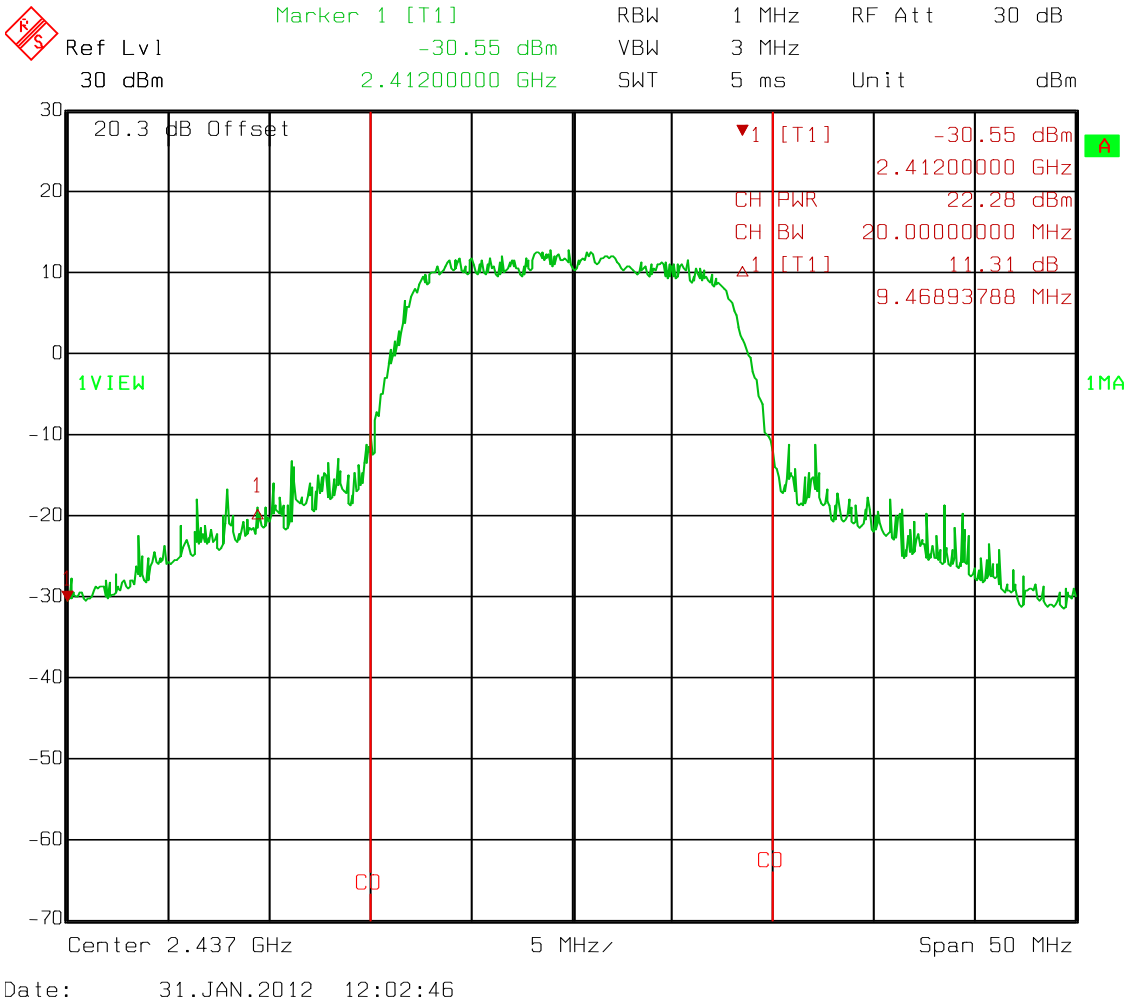
Test Data – Peak Power

802.11g
Low Channel
Power



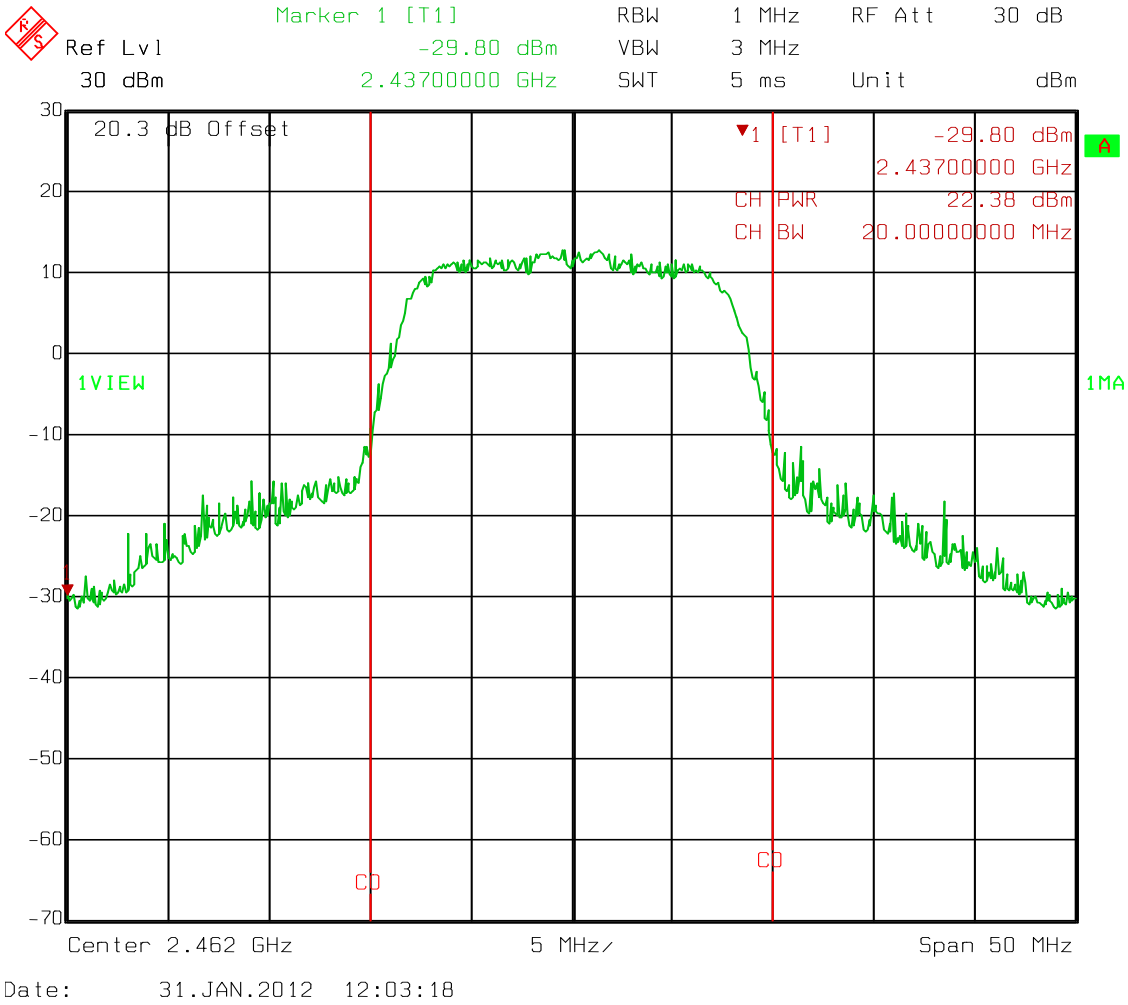
Test Data – Peak Power

802.11g
Mid Channel
Power



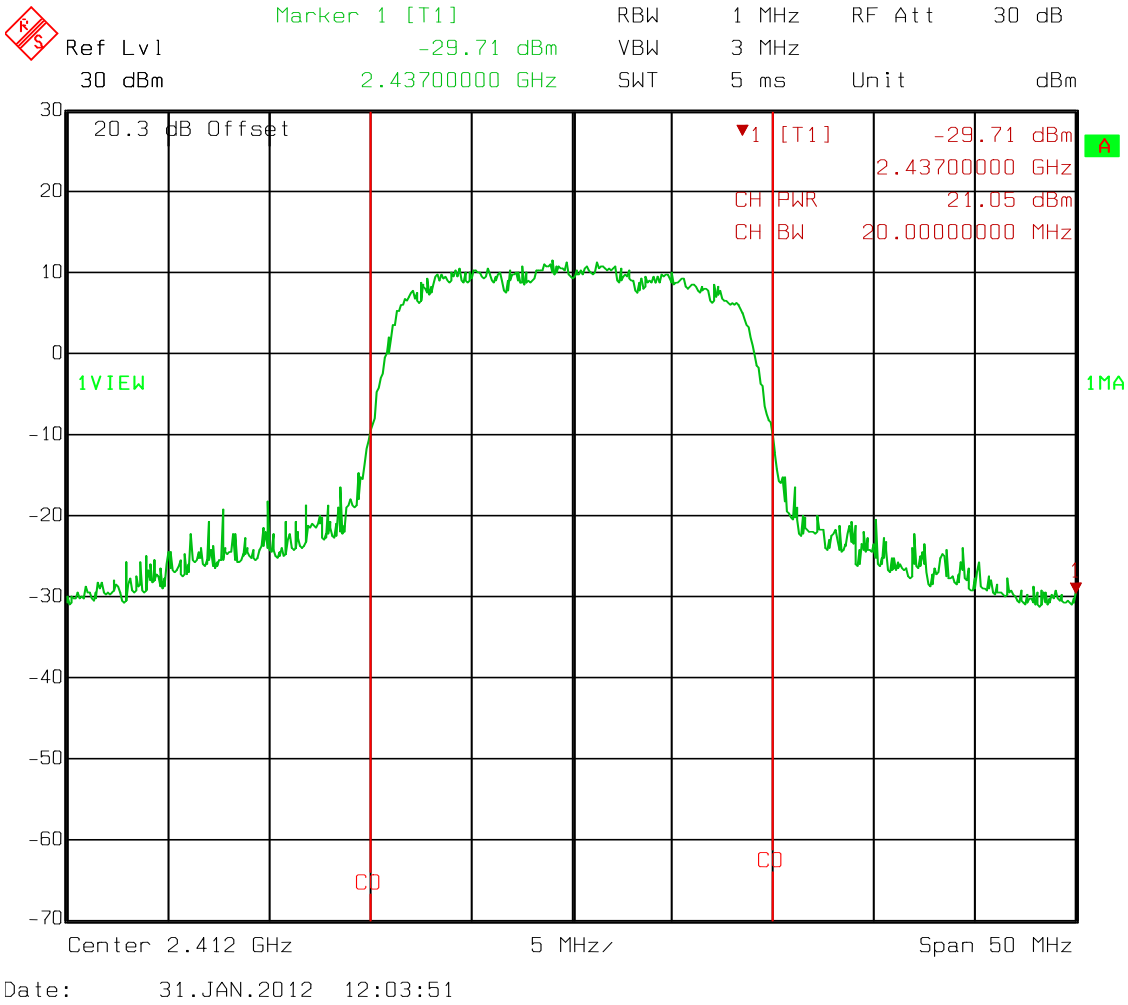
Test Data – Peak Power

802.11g
High Channel
Power



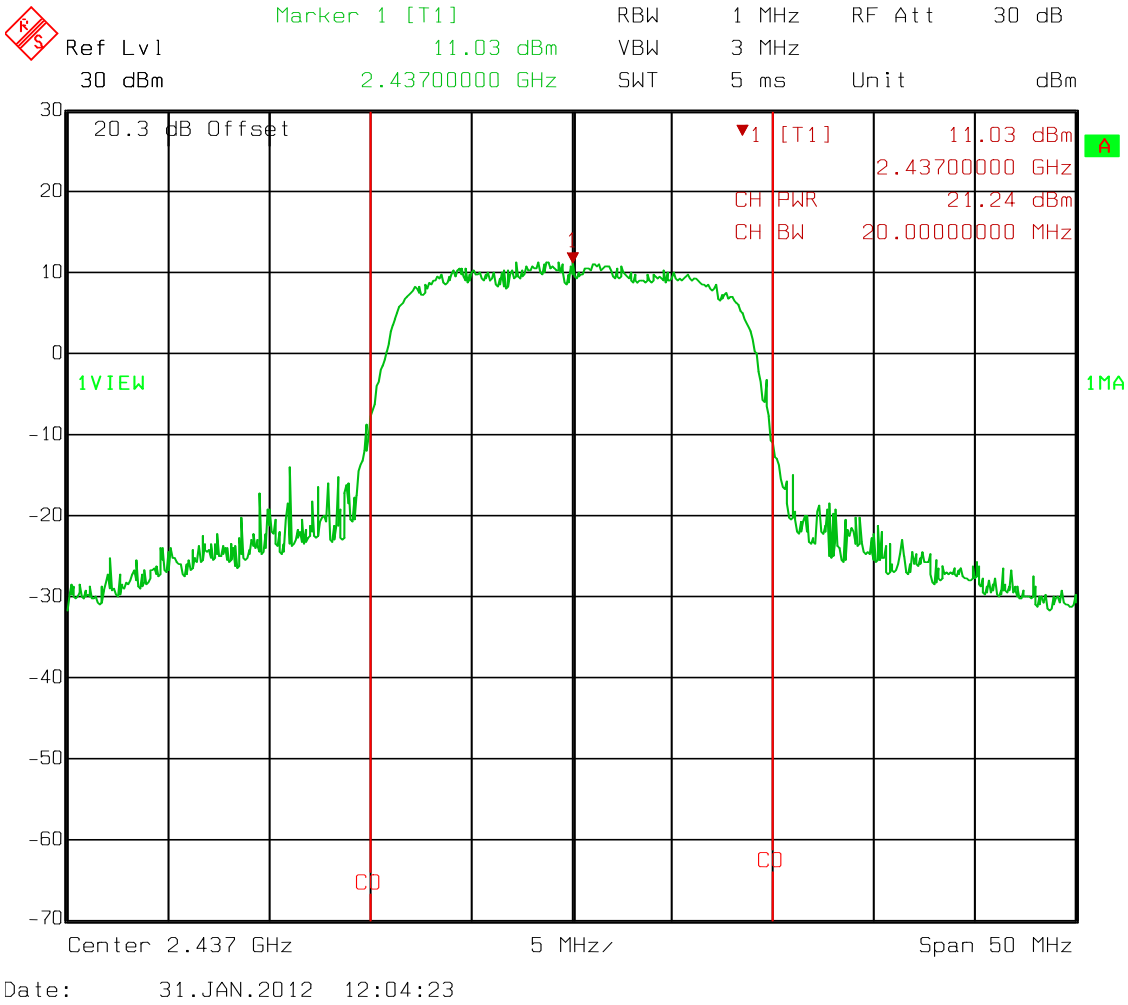
Test Data – Peak Power

802.11n
Low Channel
Power



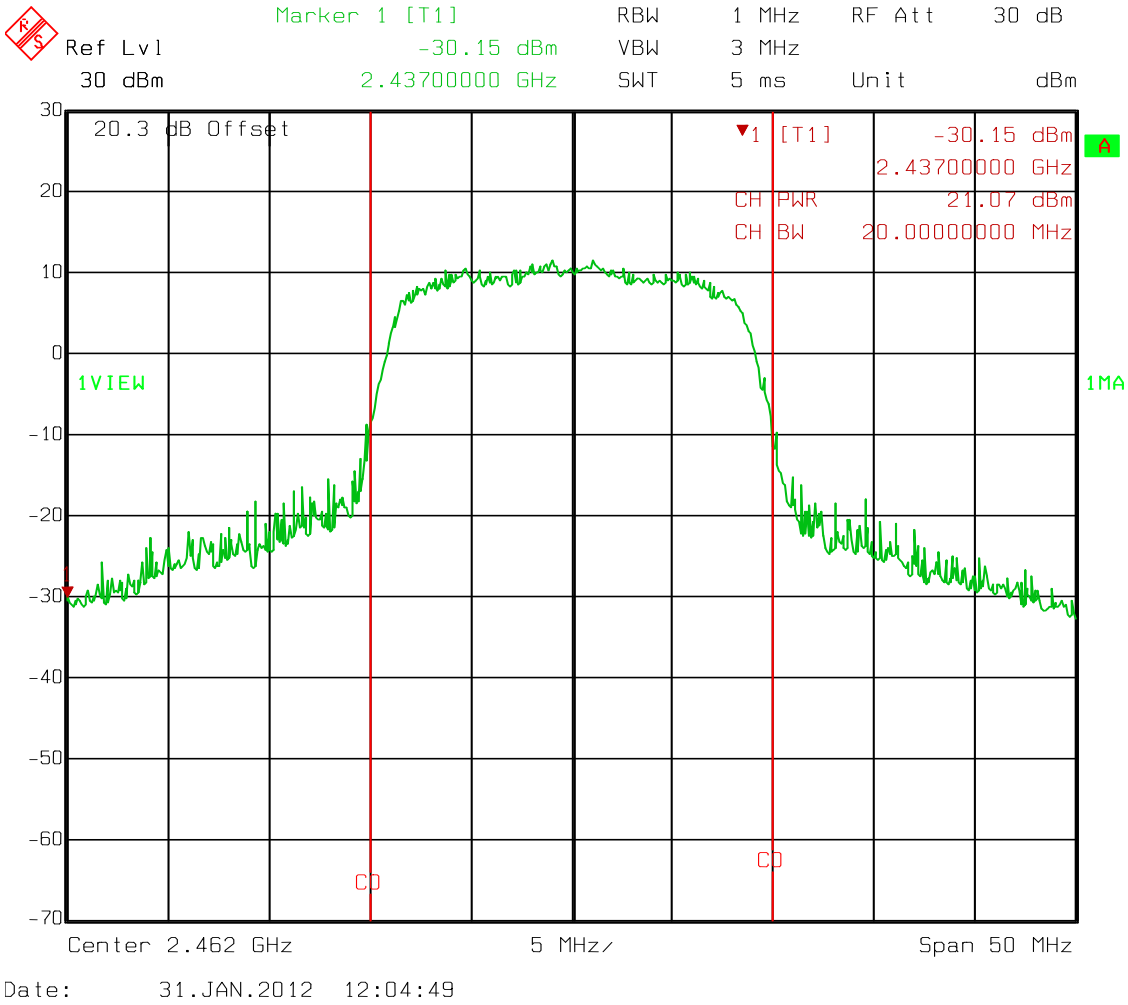
Test Data – Peak Power

802.11n
Mid Channel
Power



Test Data – Peak Power

802.11n
High Channel
Power



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

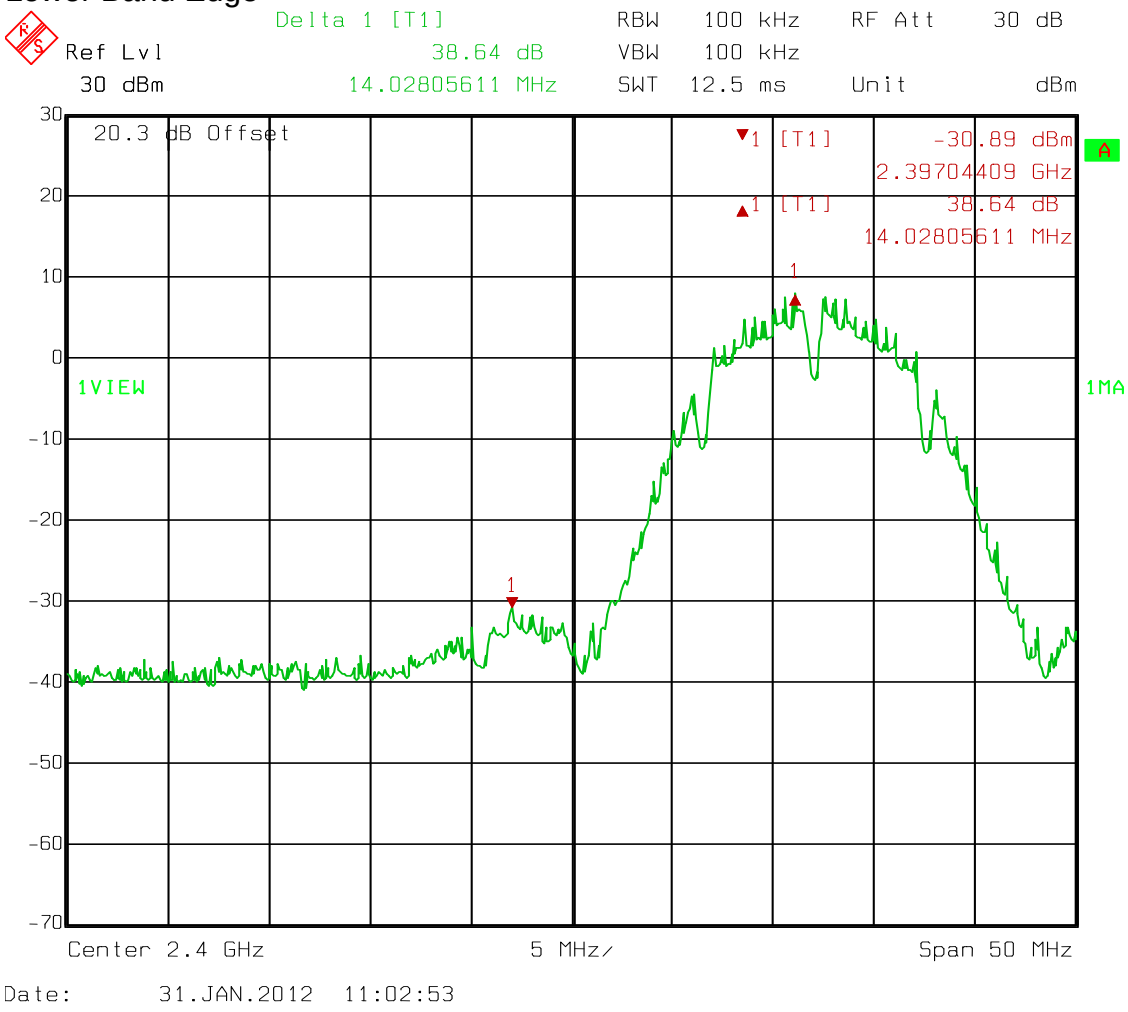
Measurement Uncertainty: +/-1.7 dB

Test Equipment Used: 1036-1472-1082

Test Data – Spurious Emissions at Antenna Terminals

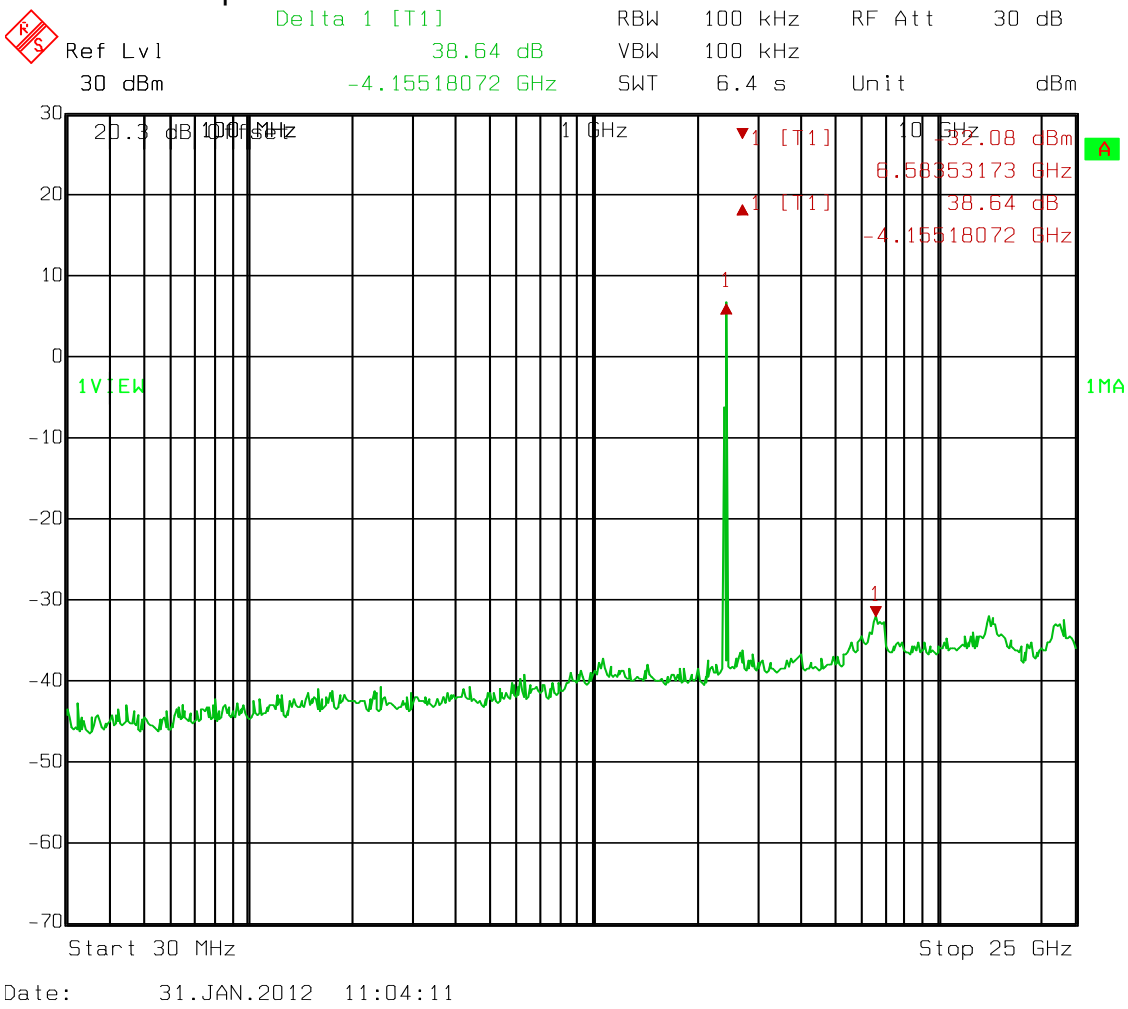
802.11b

Lower Band Edge



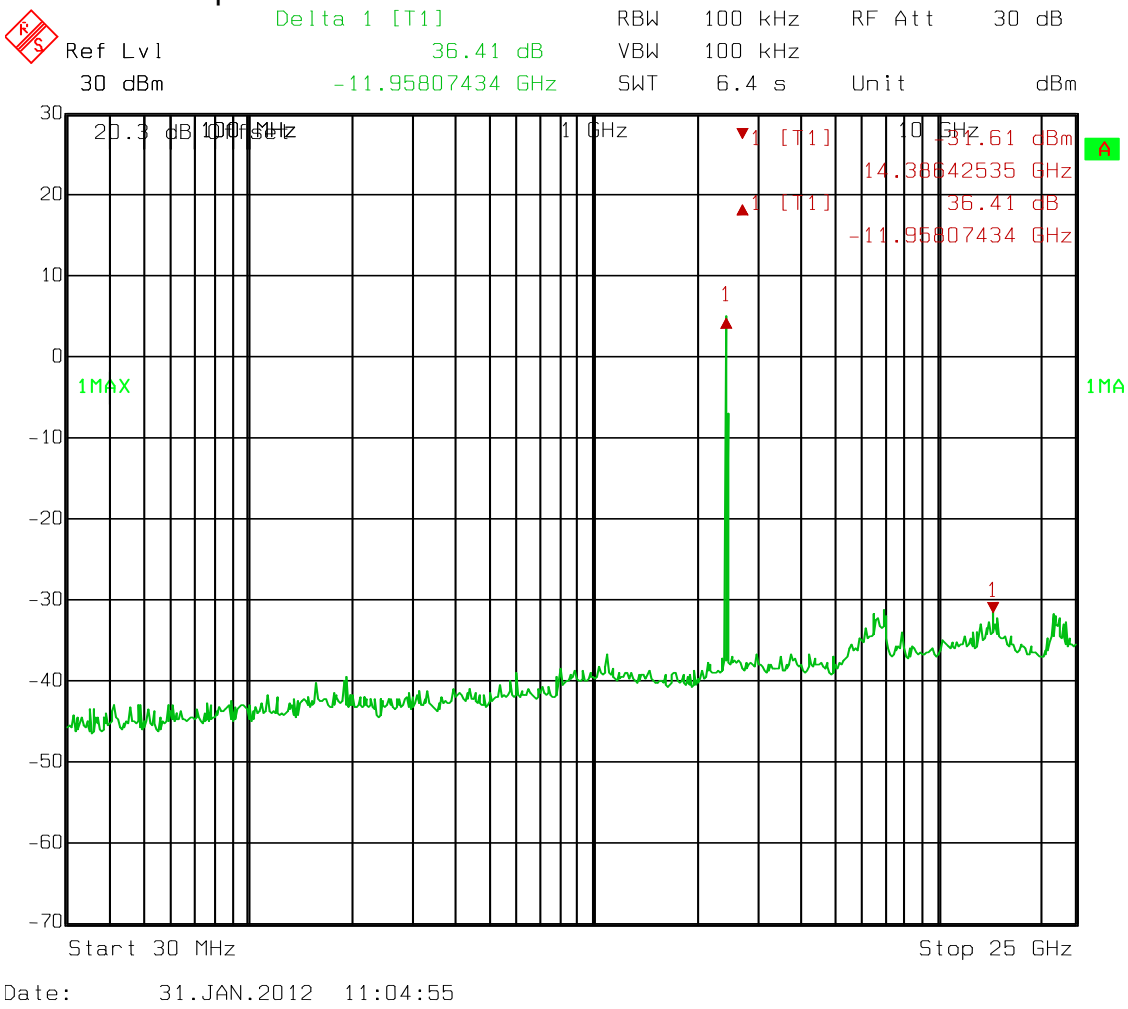
Test Data – Spurious Emissions at Antenna Terminals

802.11b
Low Channel Spurious Emissions



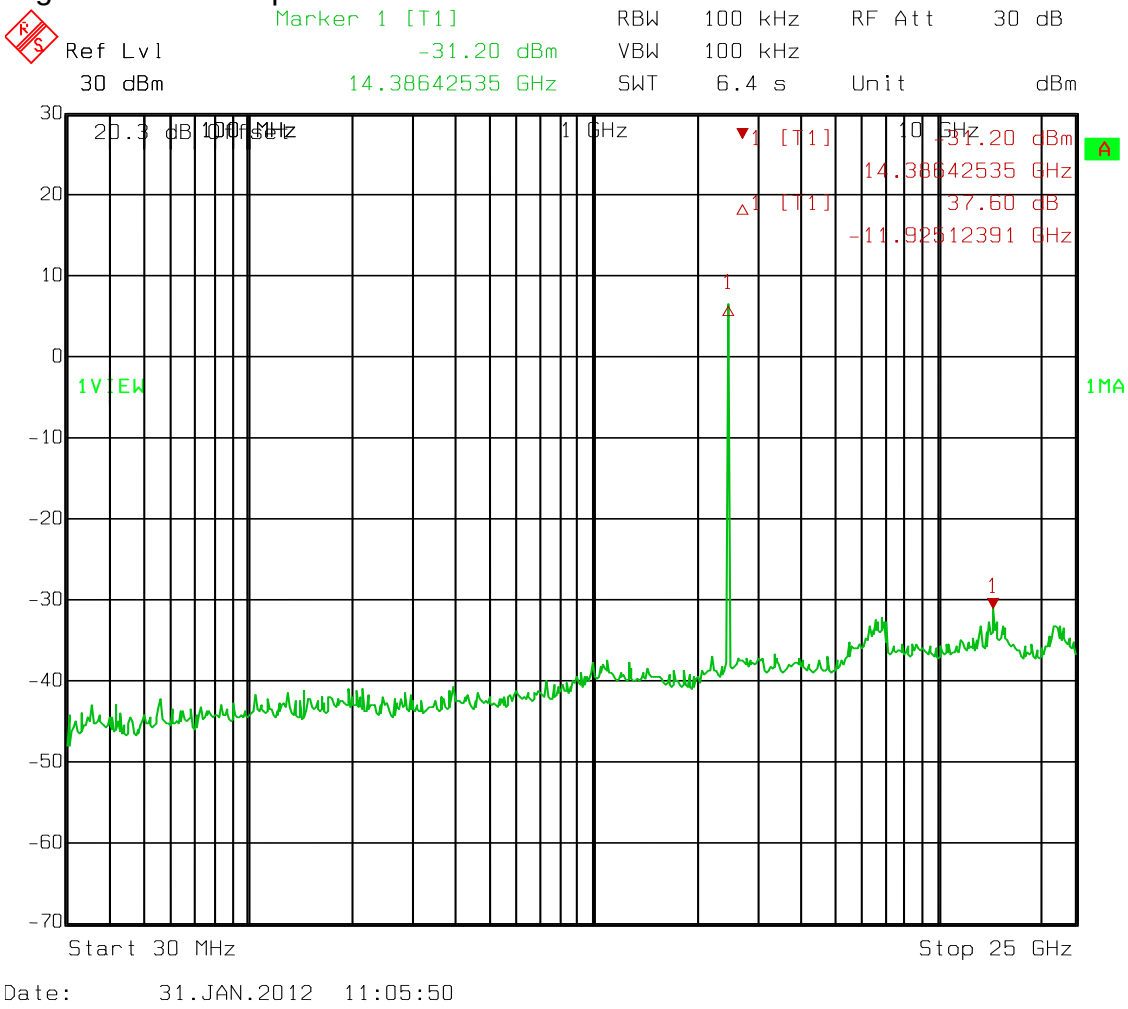
Test Data – Spurious Emissions at Antenna Terminals

802.11b
Mid Channel Spurious Emissions



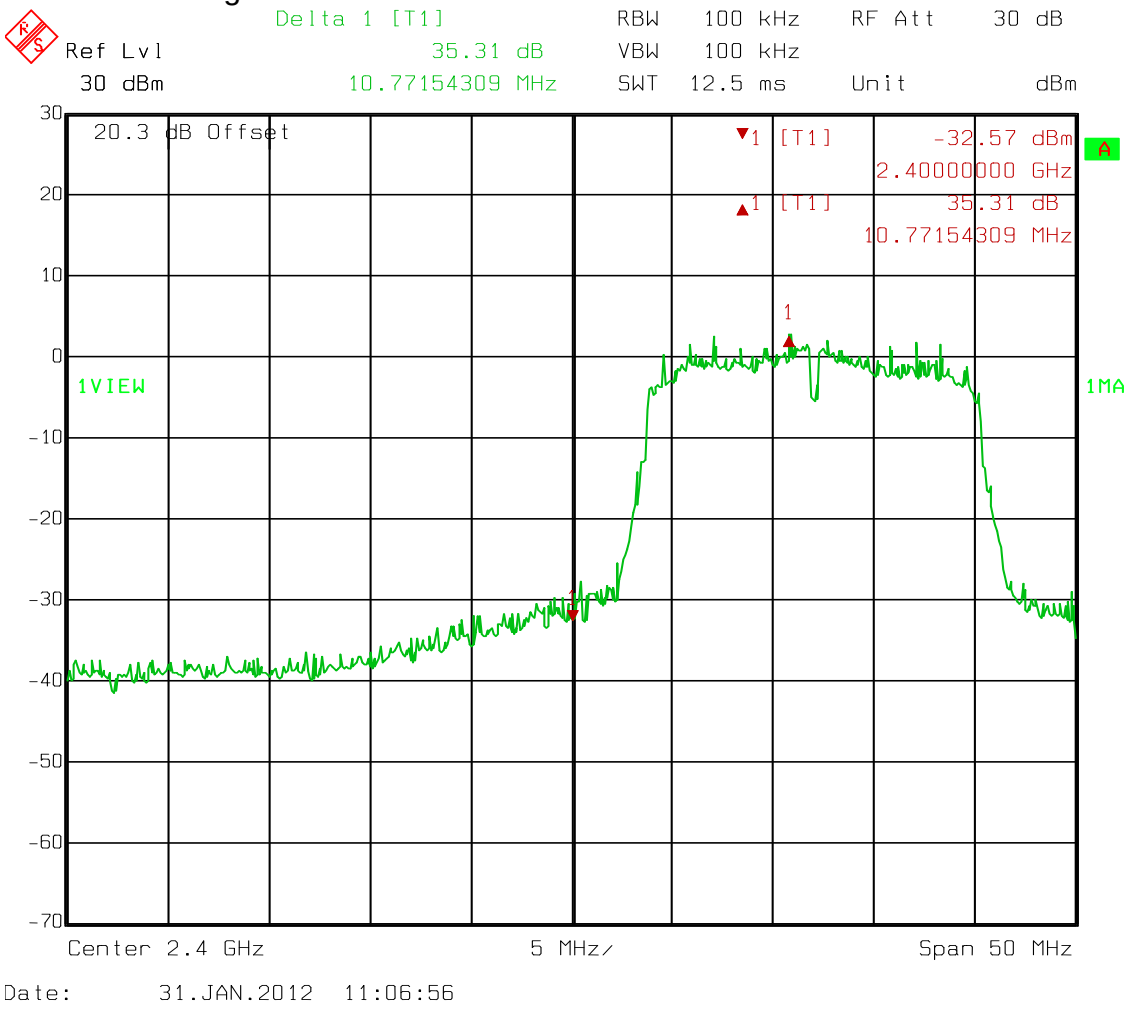
Test Data – Spurious Emissions at Antenna Terminals

802.11b
Highest Channel Spurious Emissions



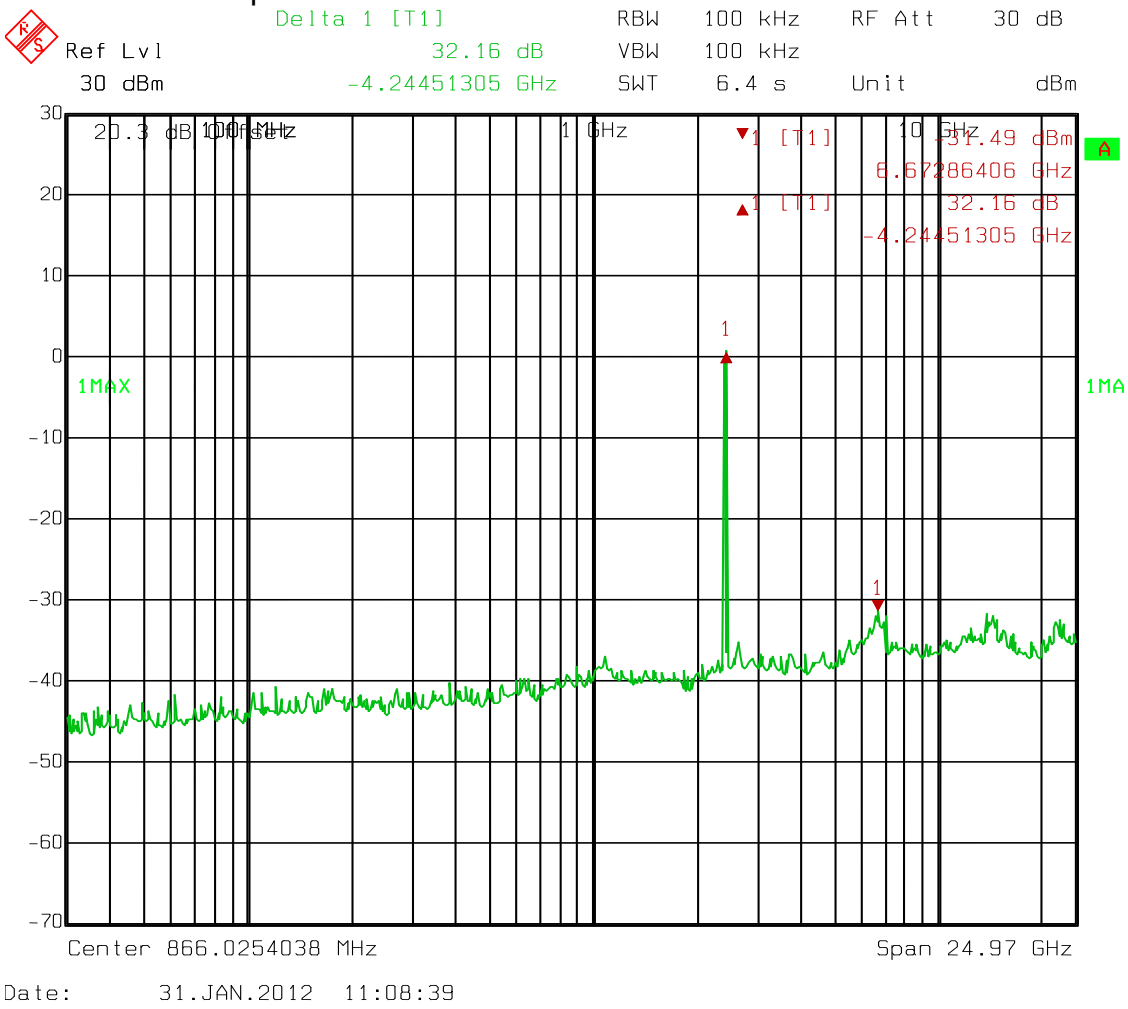
Test Data – Spurious Emissions at Antenna Terminals

802 11g
Lower Band Edge



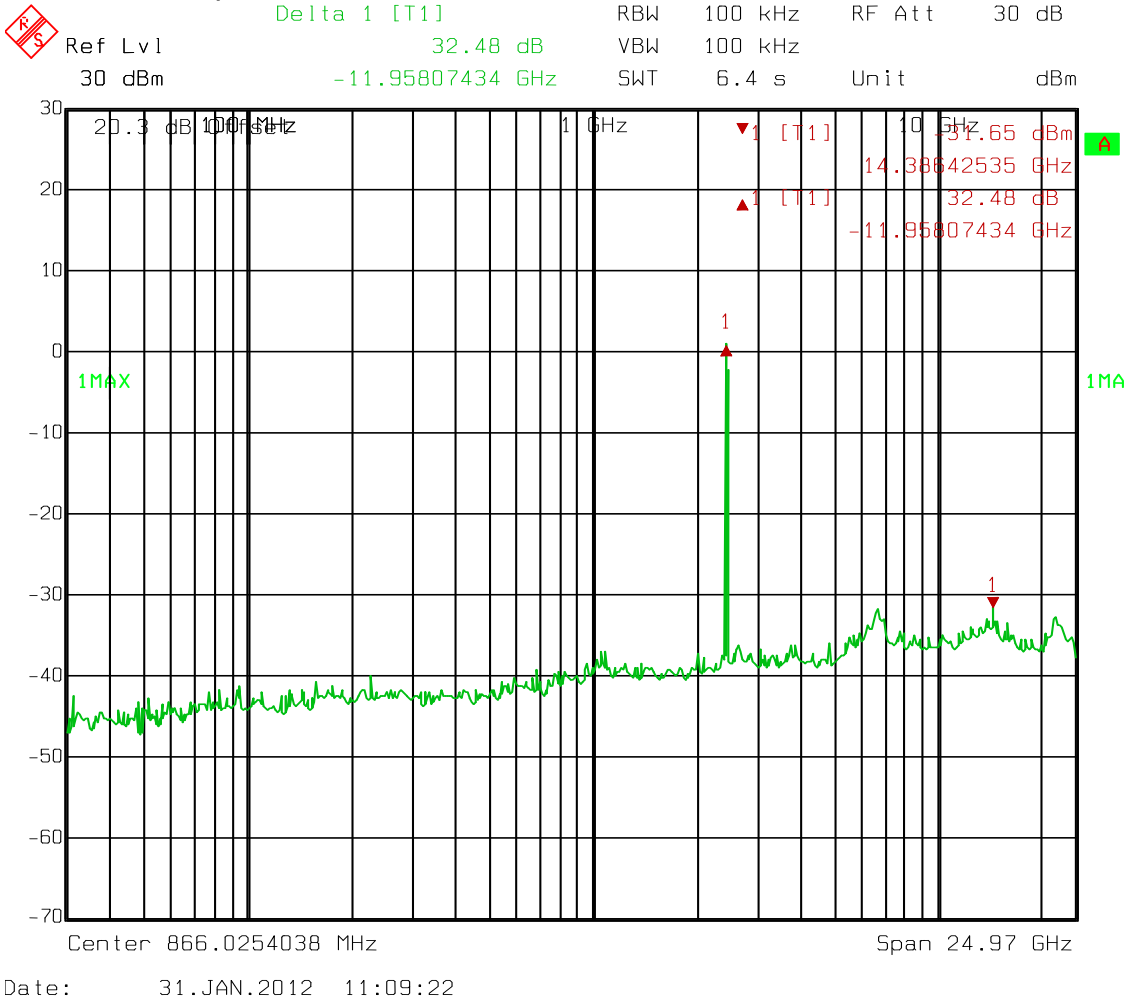
Test Data – Spurious Emissions at Antenna Terminals

802.11g
Lower Channel Spurious Emissions



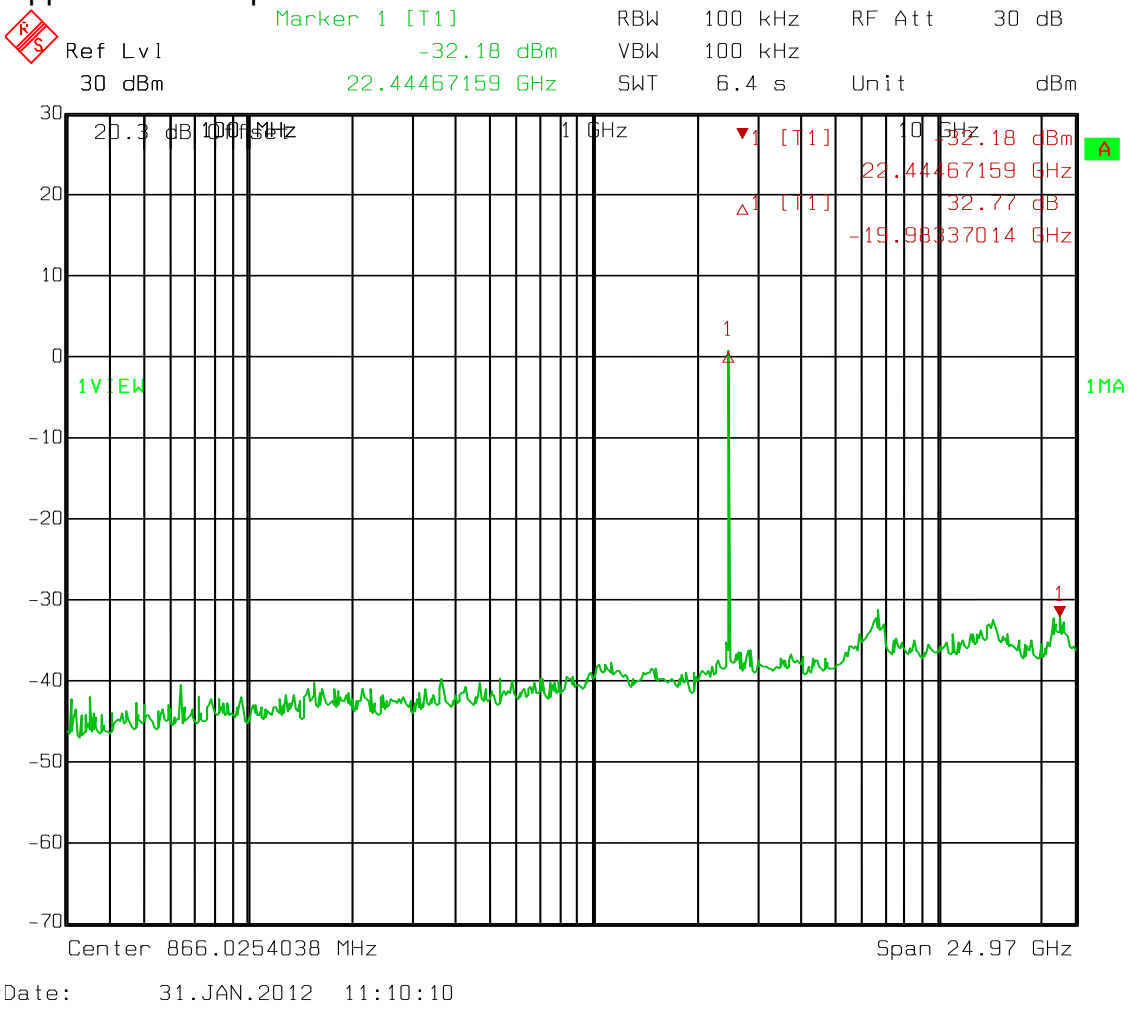
Test Data – Spurious Emissions at Antenna Terminals

802.11g
Mid Channel Spurious Emissions



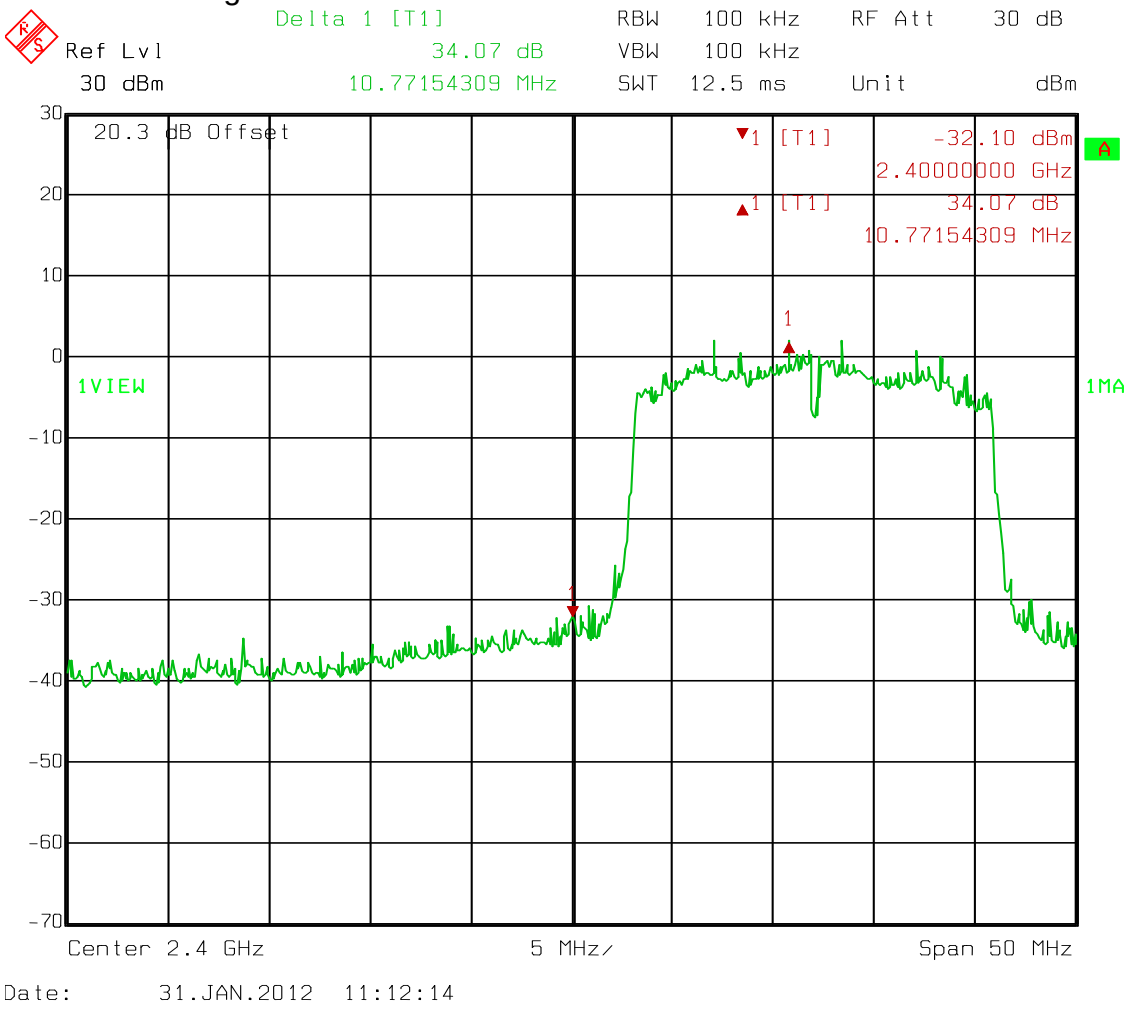
Test Data – Spurious Emissions at Antenna Terminals

802.11g
Upper Channel Spurious Emissions



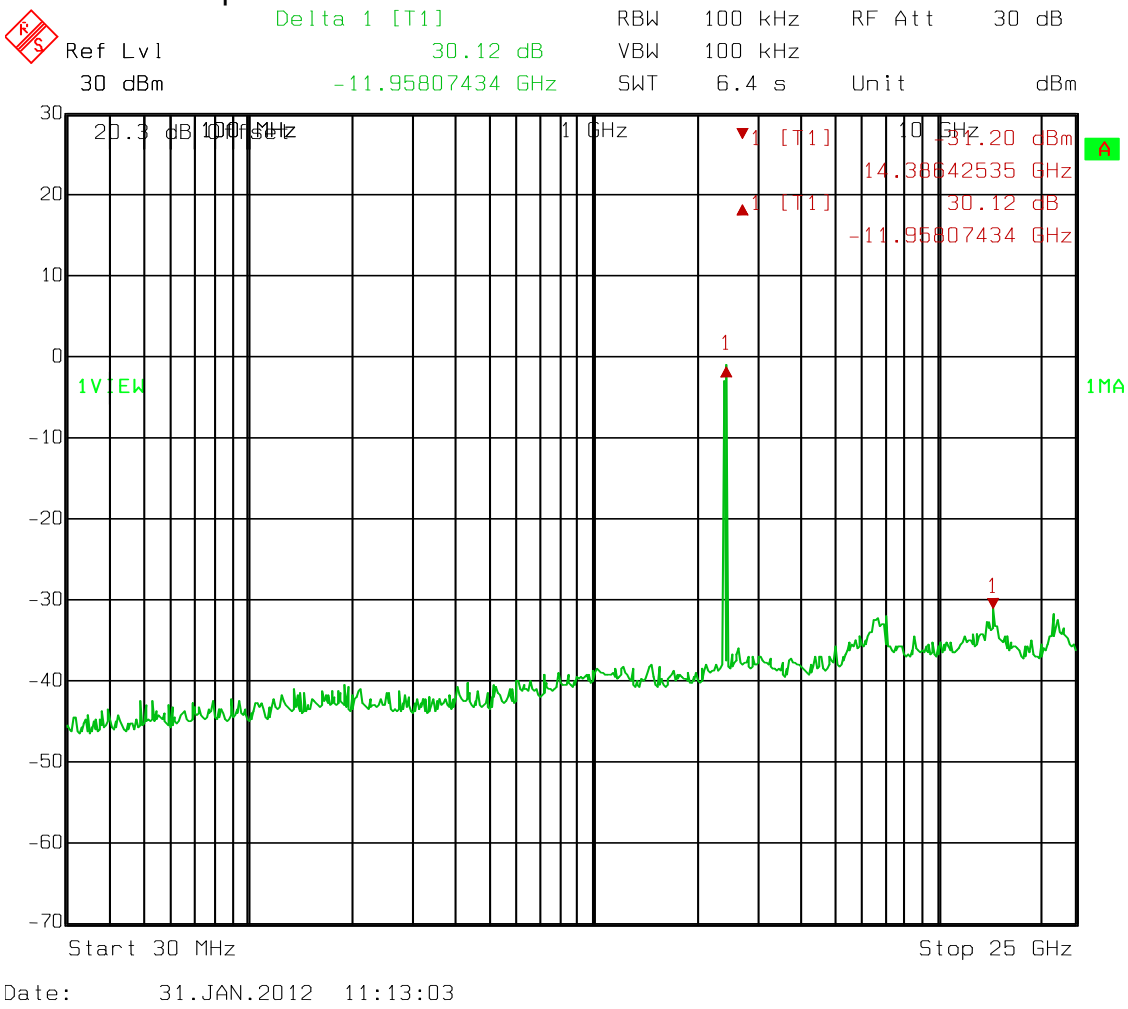
Test Data – Spurious Emissions at Antenna Terminals

802.11n
Lower Band Edge



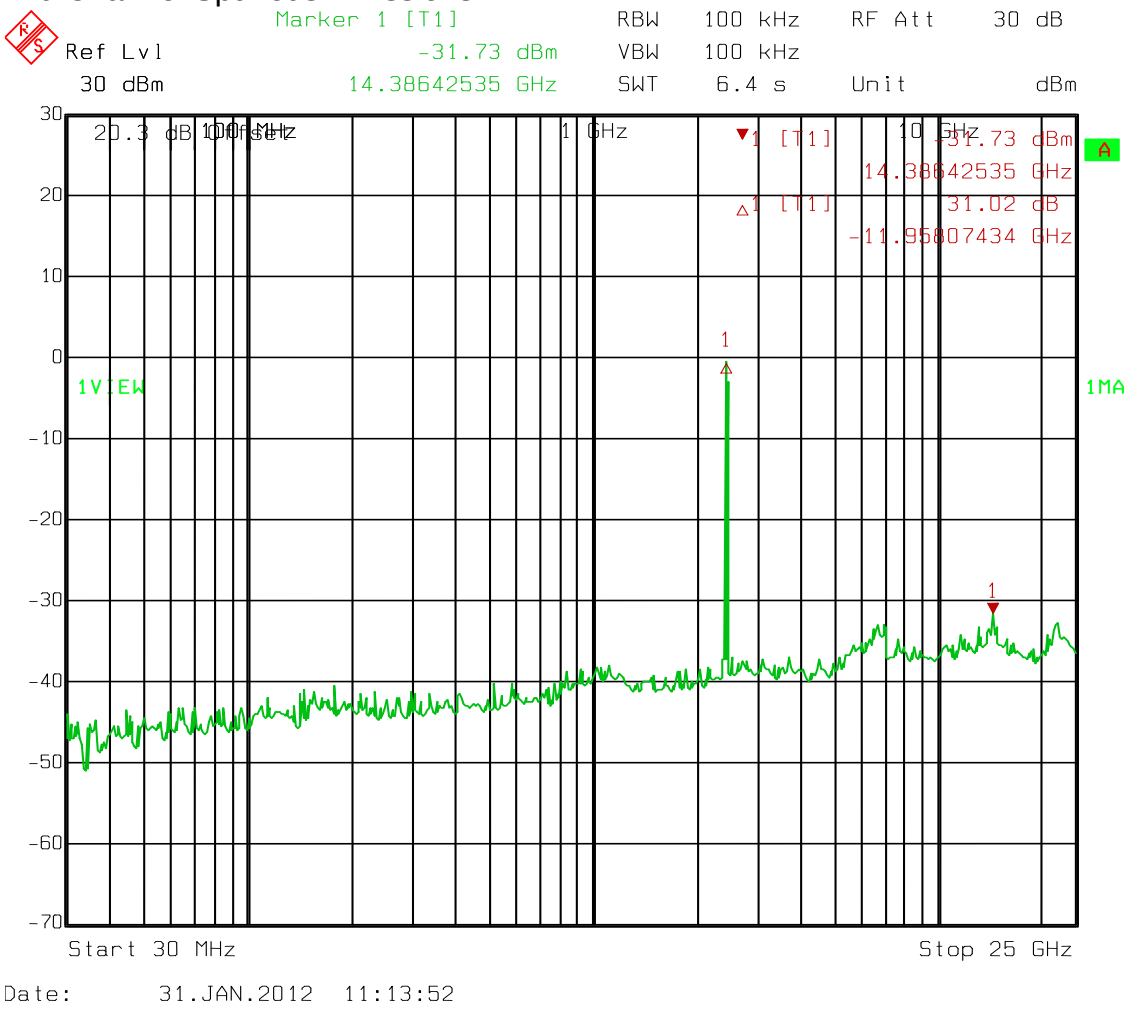
Test Data – Spurious Emissions at Antenna Terminals

802.11n
Low Channel Spurious Emissions



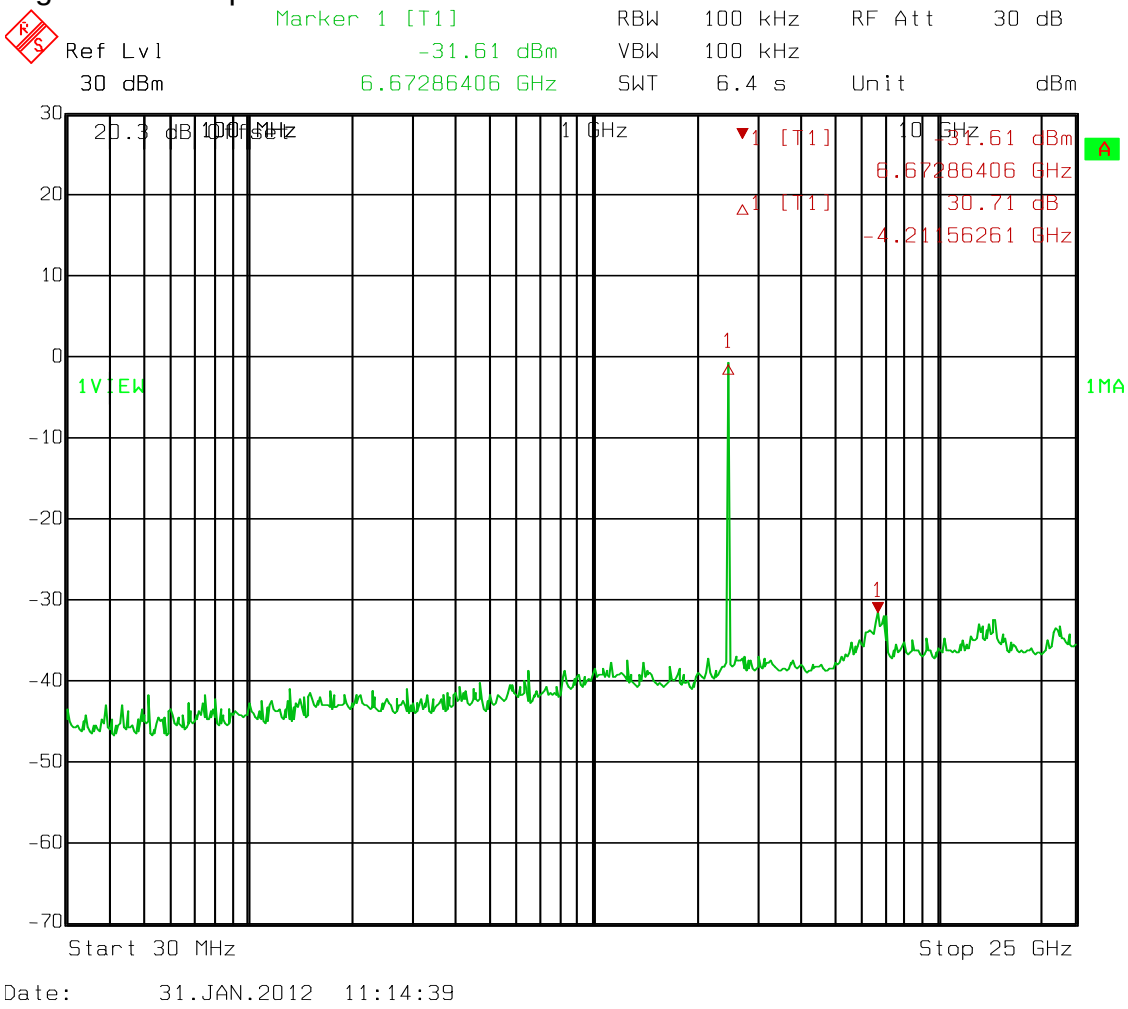
Test Data – Spurious Emissions at Antenna Terminals

802.11n
Mid Channel Spurious Emissions



Test Data – Spurious Emissions at Antenna Terminals

802.11n
High Channel Spurious Emissions



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 Mpbs (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

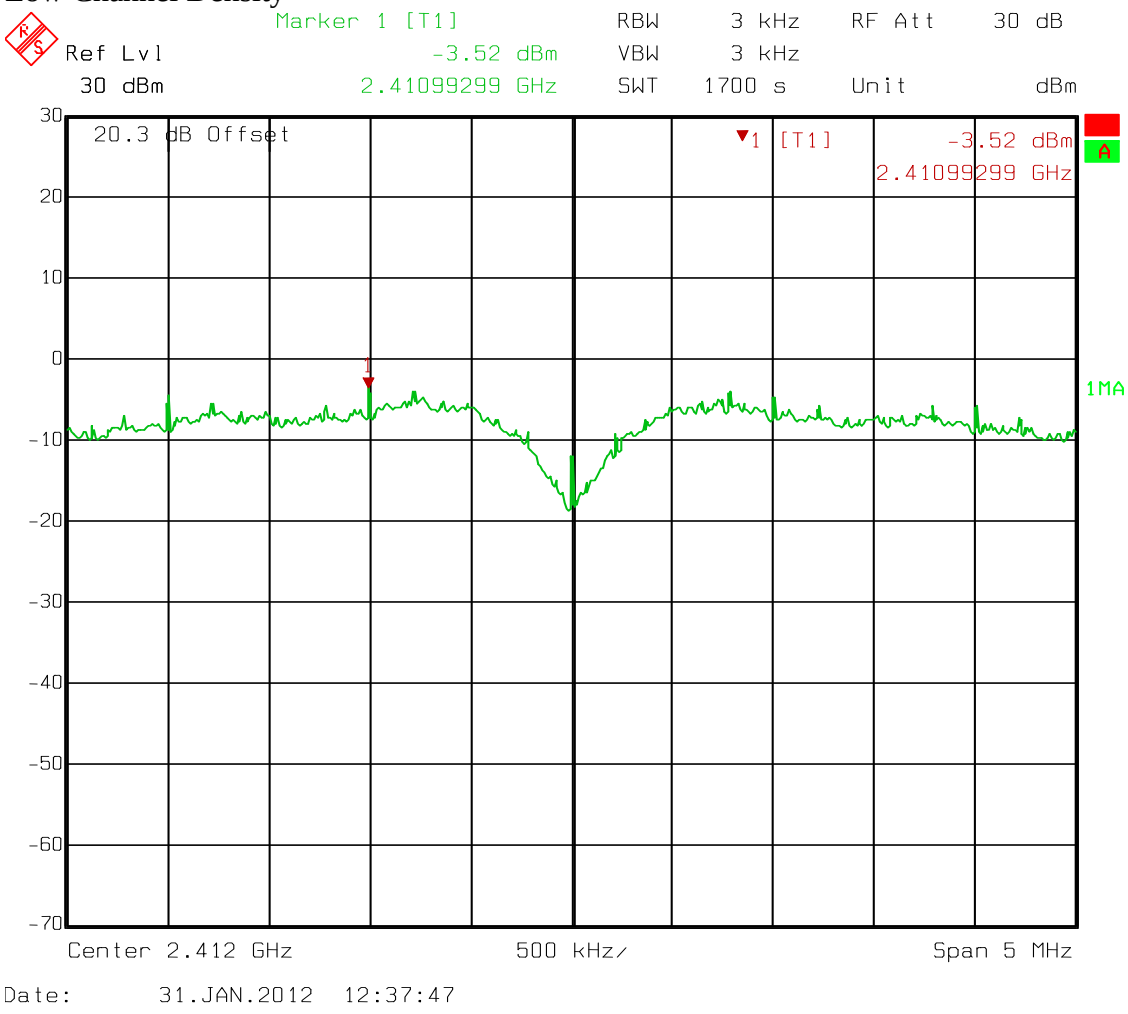
Measurement Uncertainty: +/-1.7 dB

Test Equipment Used: 1036-1082-1472

Peak Power Spectral Density

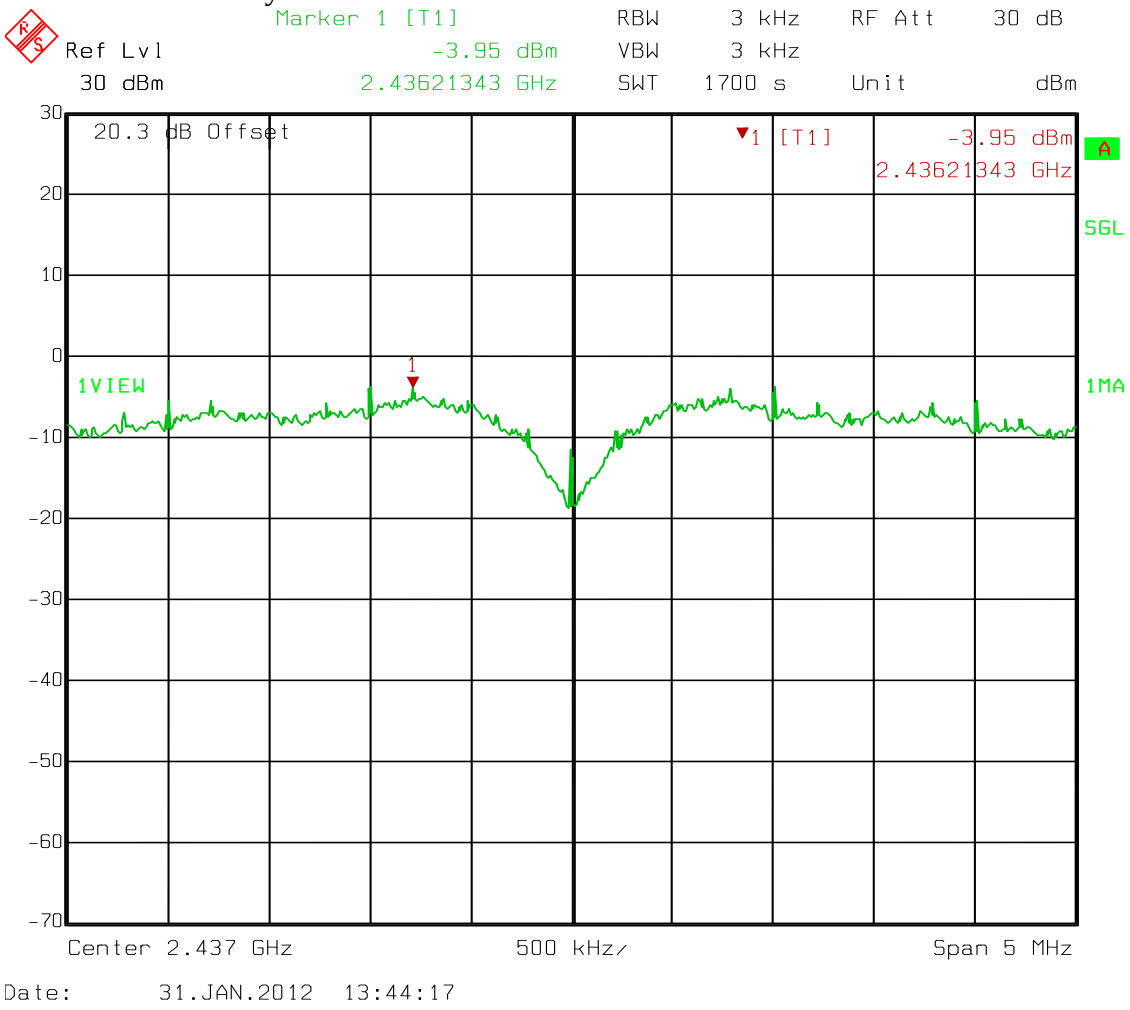
802.11b

Low Channel Density



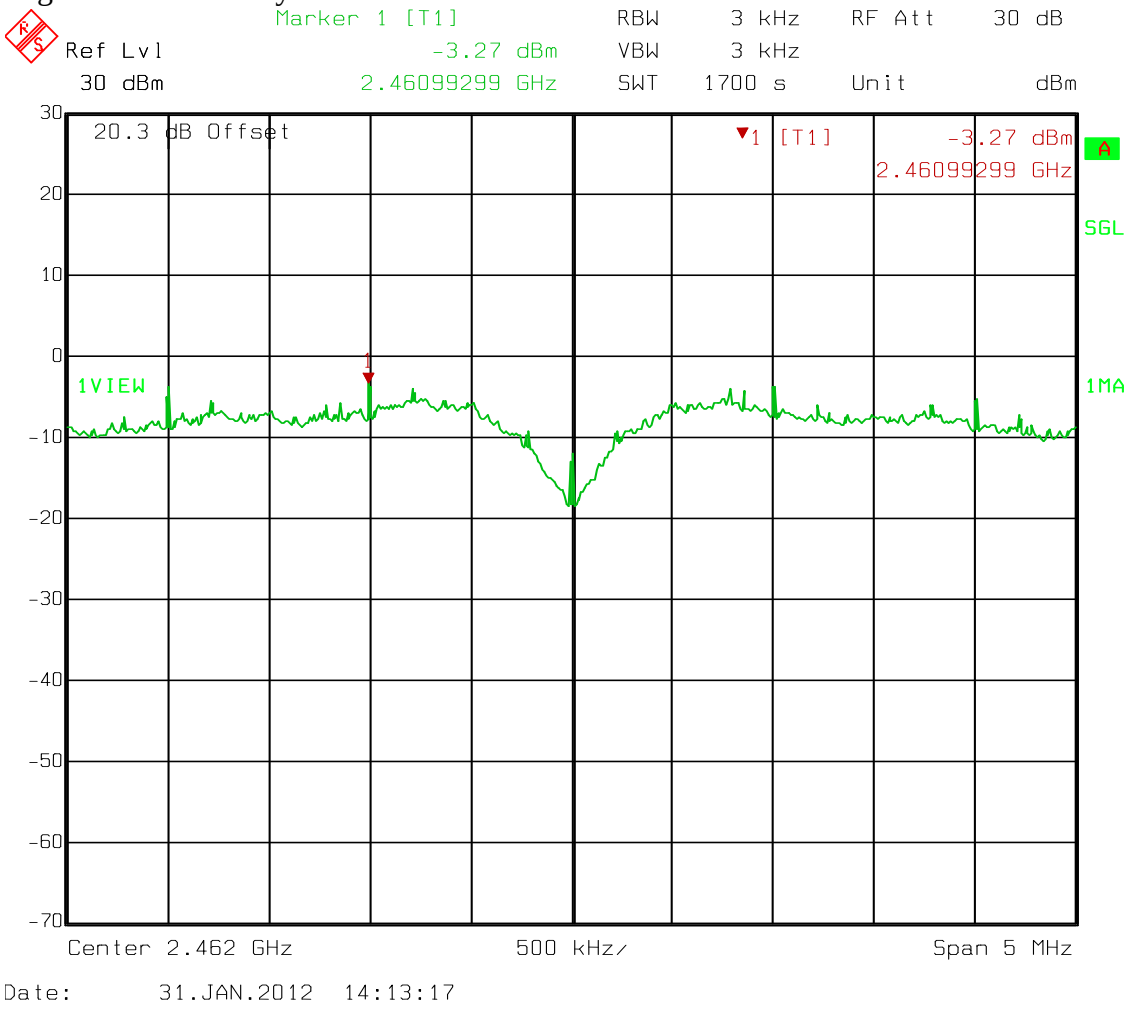
Peak Power Spectral Density

802.11b
Mid Channel Density



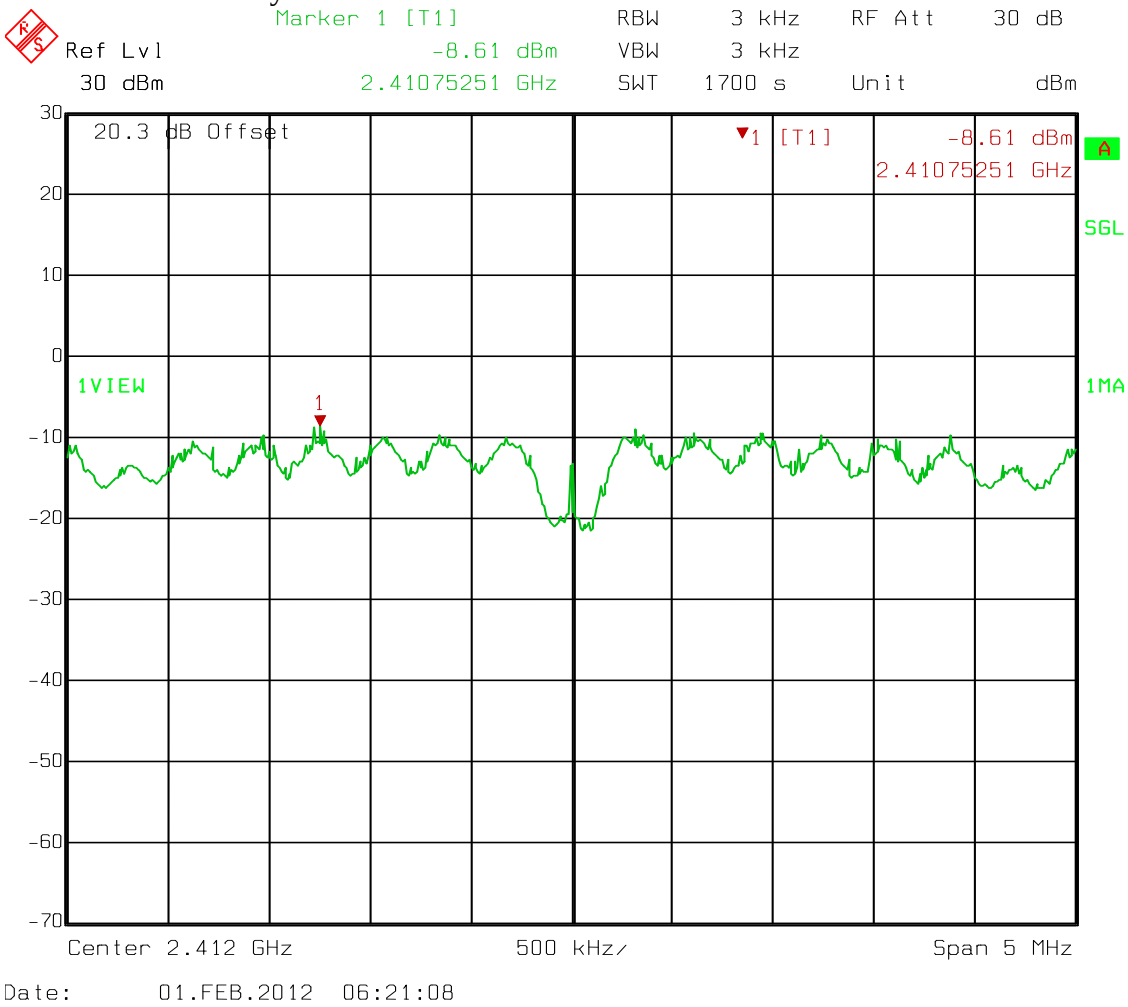
Peak Power Spectral Density

802.11b
High Channel Density



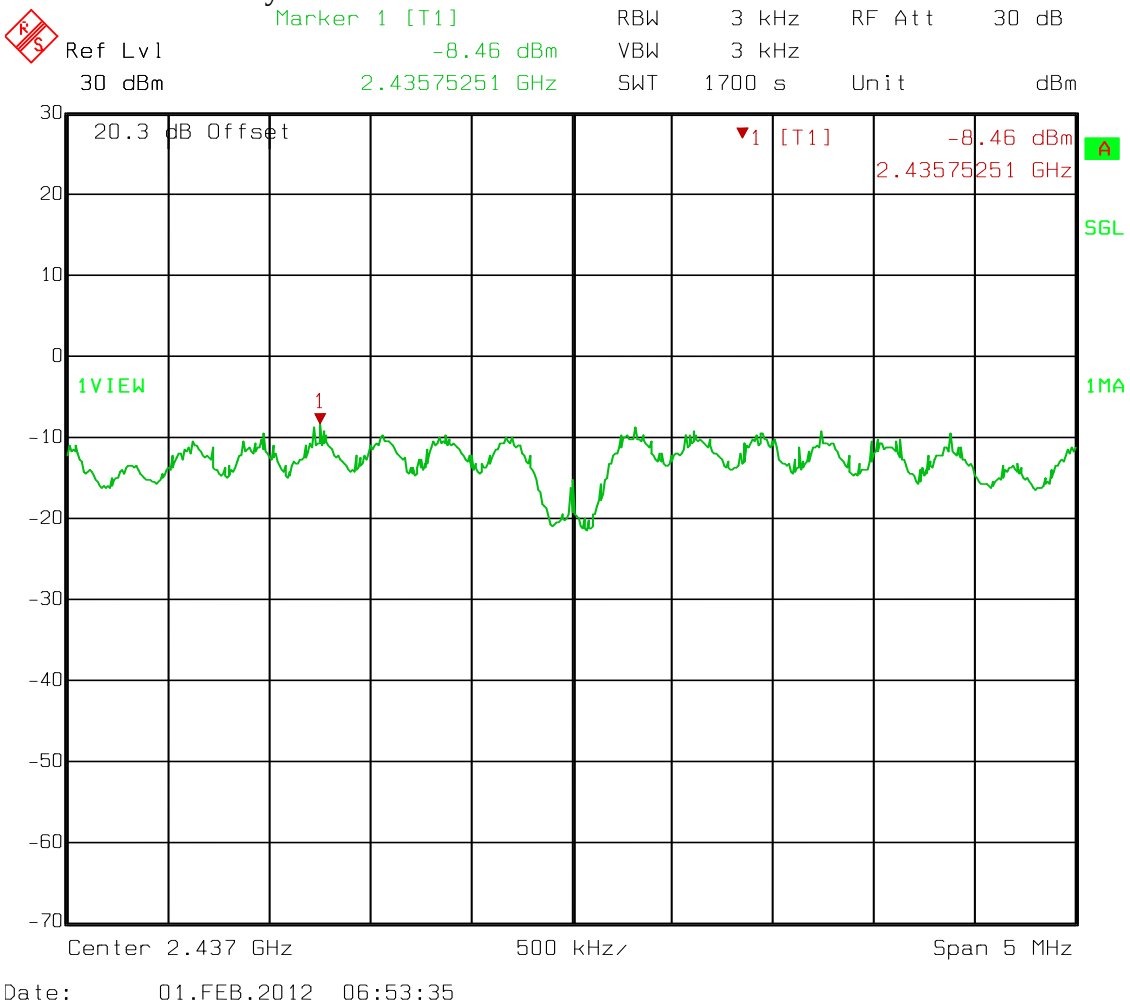
Peak Power Spectral Density

802.11g
Low Channel Density



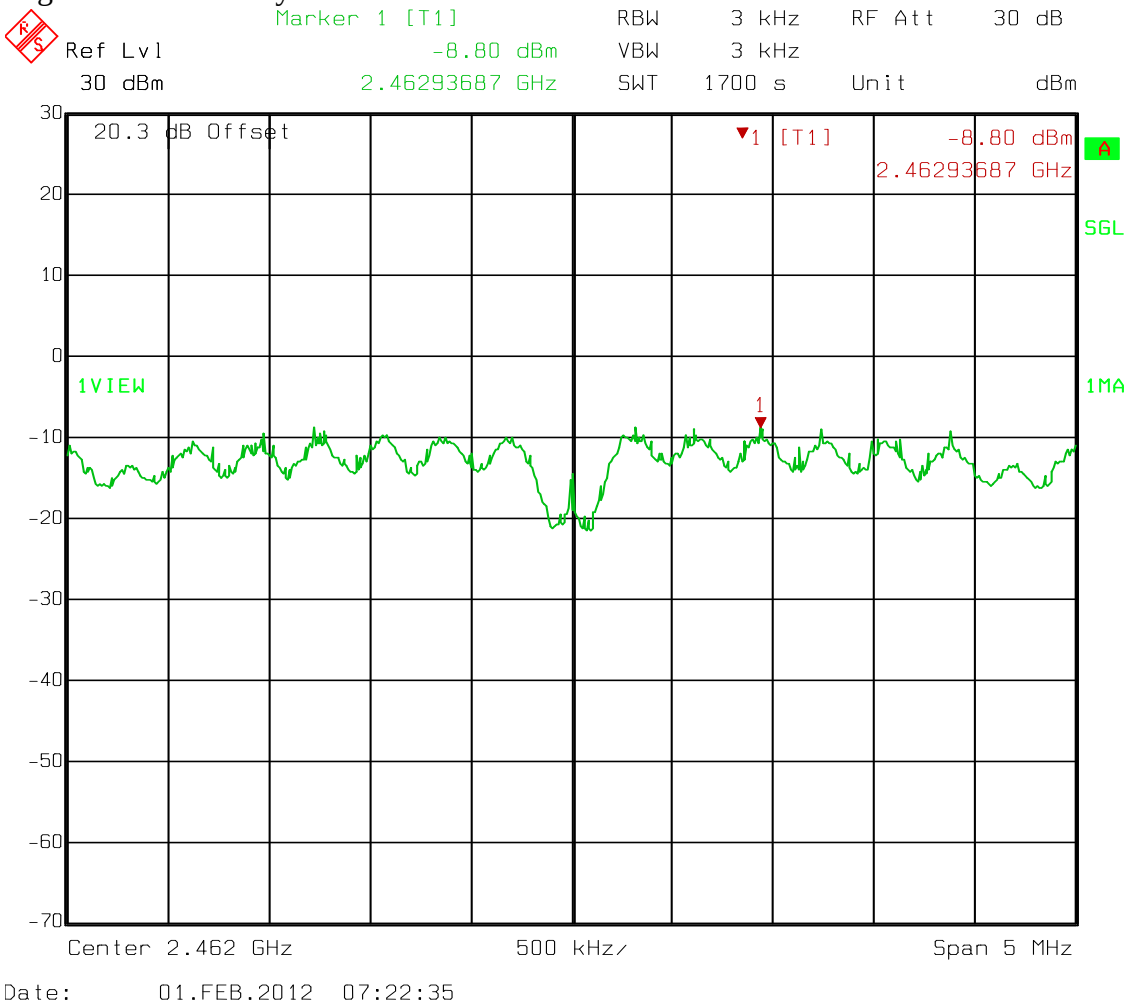
Peak Power Spectral Density

802.11g
Mid Channel Density



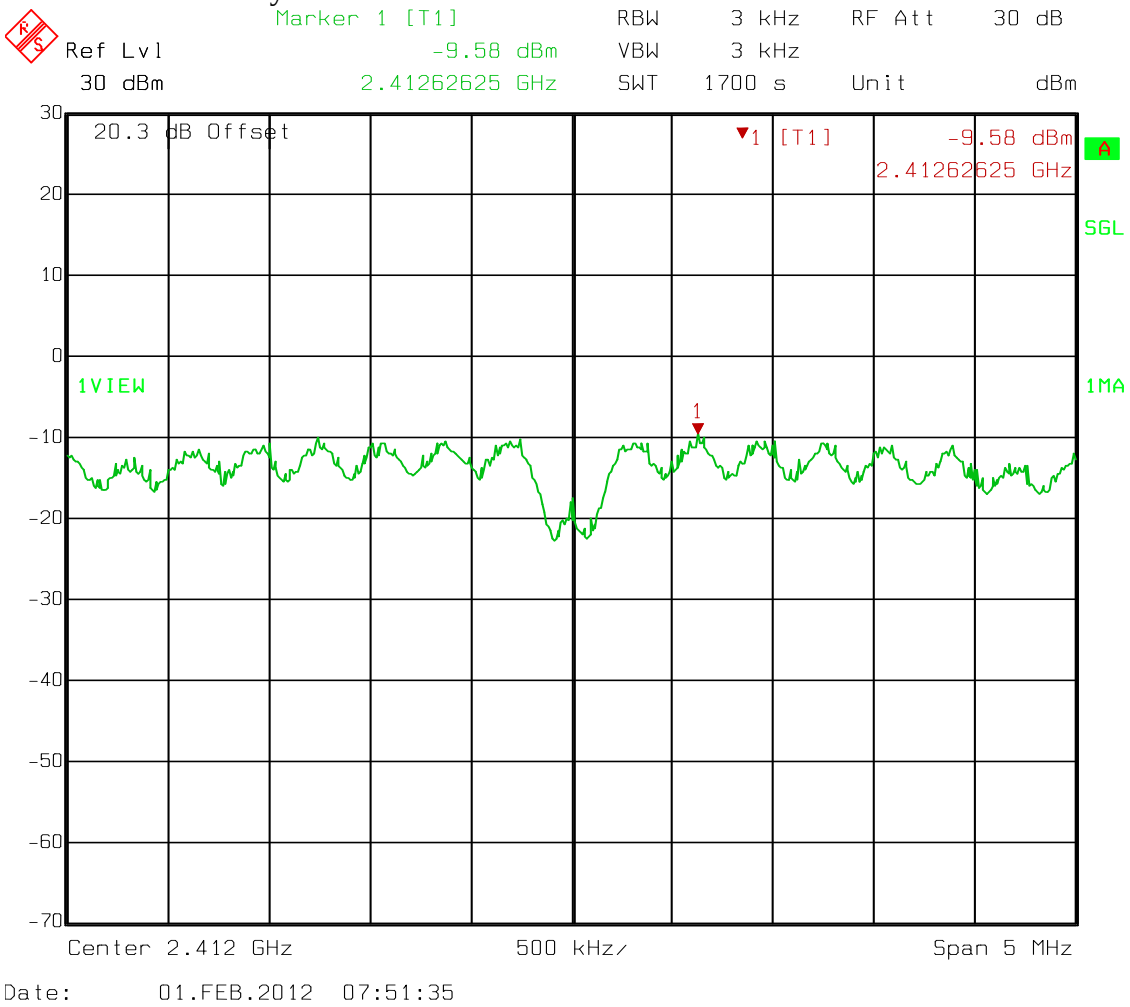
Peak Power Spectral Density

802.11g
High Channel Density



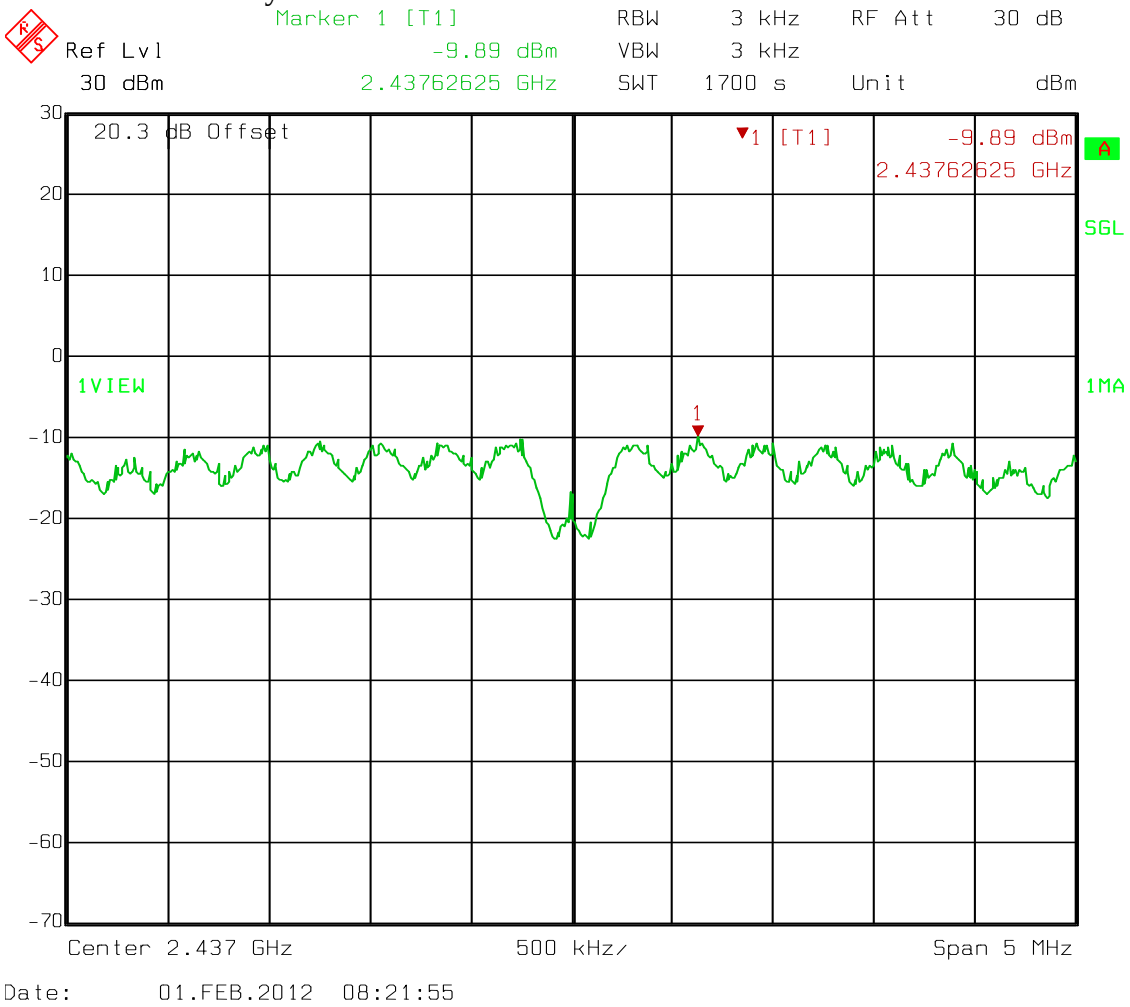
Peak Power Spectral Density

802.11n
Low Channel Density



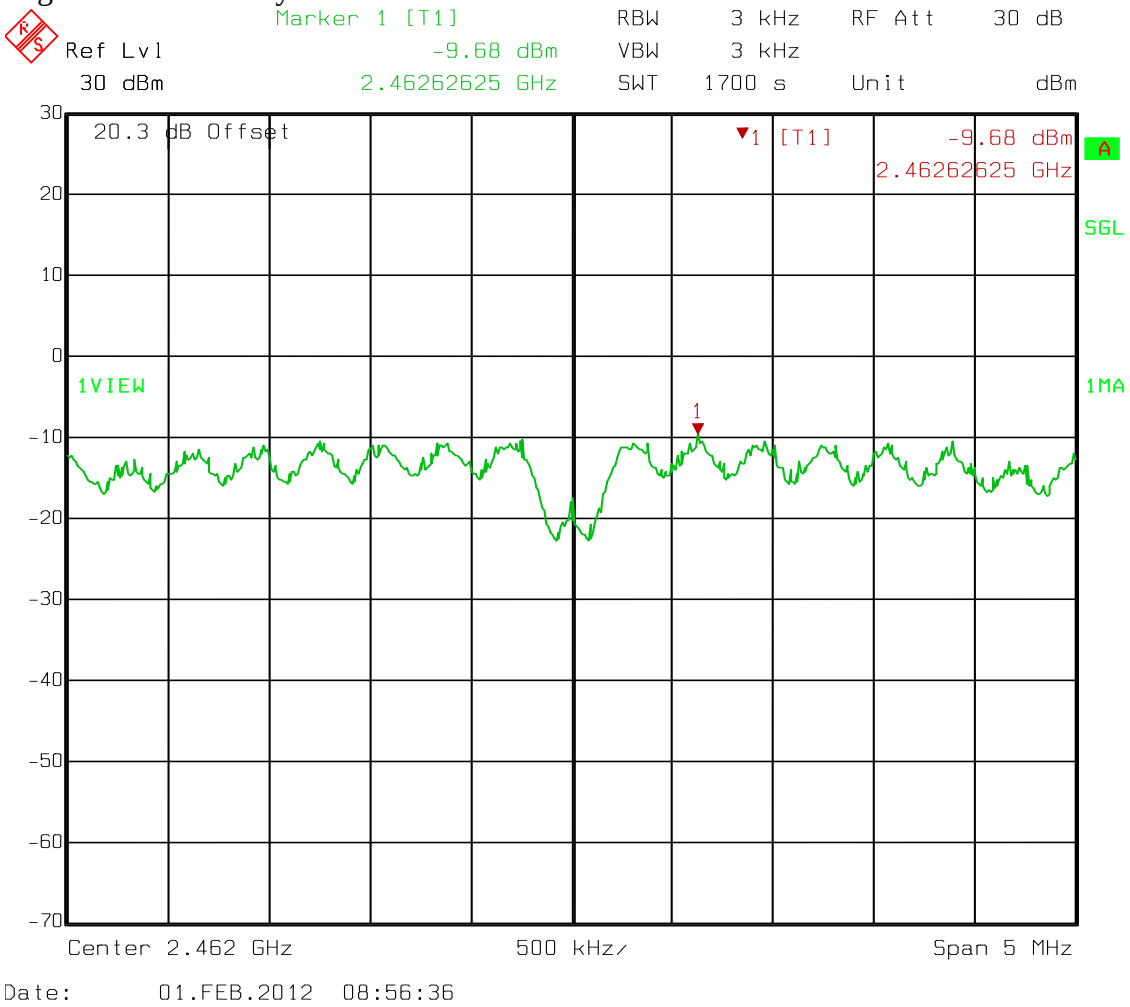
Peak Power Spectral Density

802.11n
Mid Channel Density



Peak Power Spectral Density

802.11n
High Channel Density



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 QP	FCCB AVG	AVG	AVG	QP	QP
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 QP	FCCB AVG	AVG	AVG	QP	QP
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

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)

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)

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 =< 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:

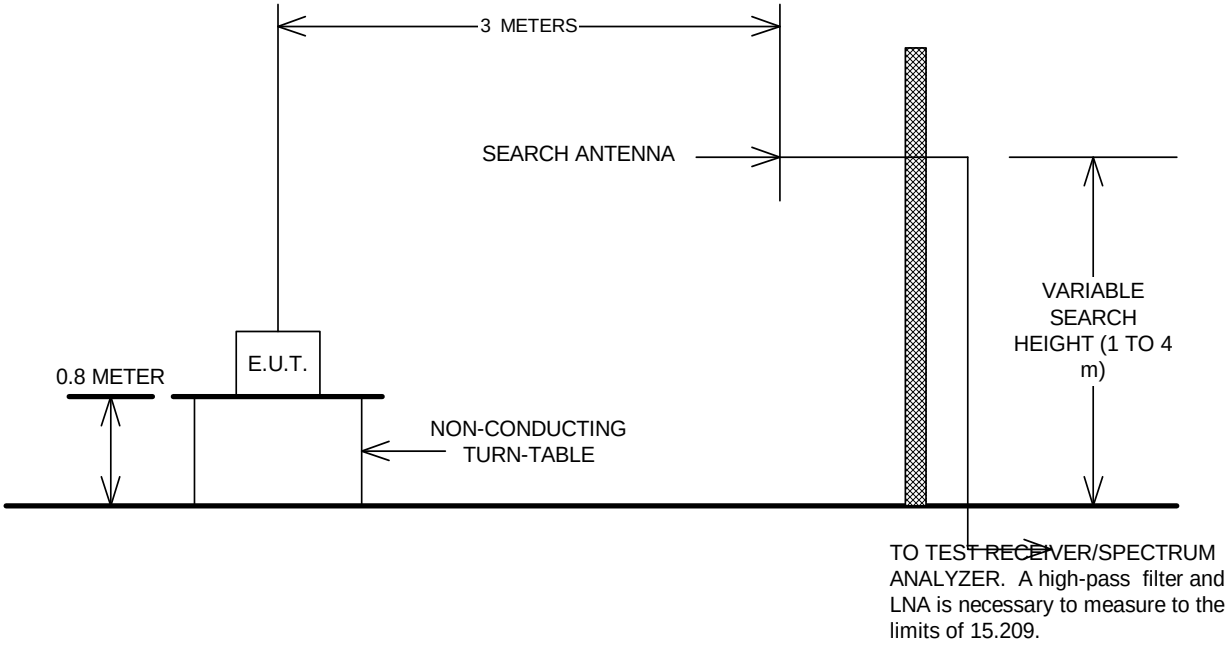
For devices with non-detachable antennas, the received field strength is peaked and the spectrum analyzer is set as above. The peak emission level is then measured and converted to a field strength by adding the appropriate antenna factor and cable loss. This field strength is then converted to an equivalent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

Number of channels tested:

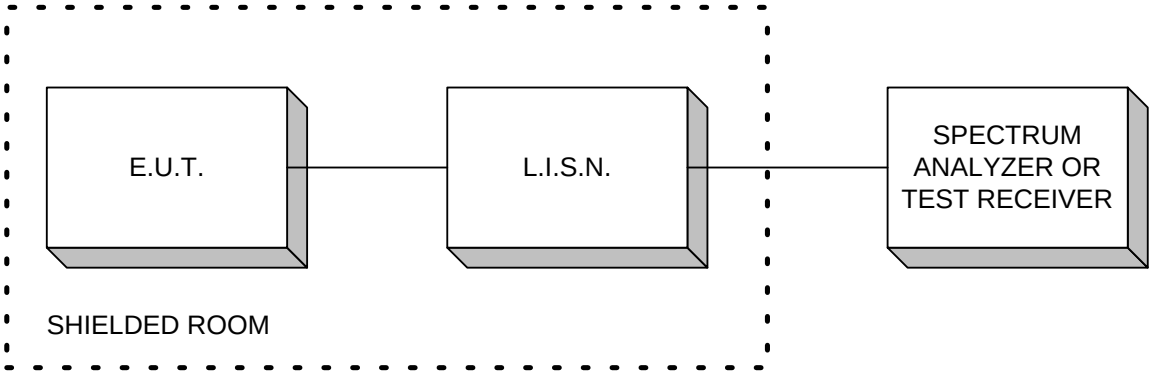
Tuning Range	Number Of Channels Tested	Channel Location In Band
1 MHz or Less	1	Middle
1 to 10 MHz	2	Top And Bottom
More Than 10 MHz	3	Top, Middle, Bottom

ANNEX B - TEST DIAGRAMS

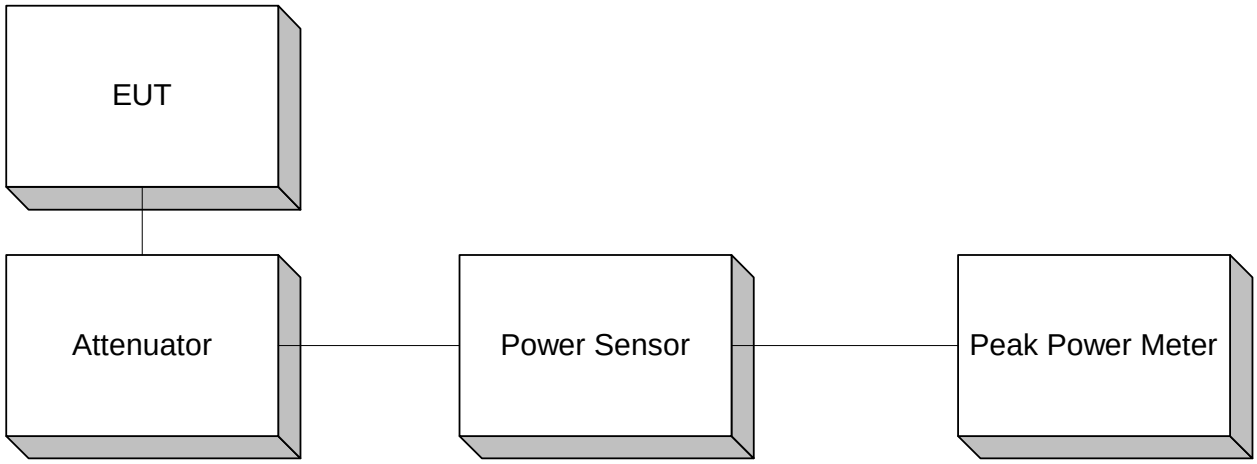
Test Site For Radiated Emissions



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)