



FCC 47 CFR PART 15 SUBPART C

TEST REPORT

For

Wireless-N Gigabit Security Router with VPN

Model: WRVS4400N V1.1

Trade Name: Linksys

Issued to

Cisco-Linksys LLC
121 Theory Drive
Irvine, CA 92617(USA)

Issued by

Compliance Certification Services Inc.
No. 81-1, Lane 210, Bade Rd. 2, Luchu Hsiang,
Taoyuan Hsien, (338) Taiwan, R.O.C.
<http://www.ccsemc.com.tw>
service@tw.ccsemc.com



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1. TEST RESULT CERTIFICATION

Applicant: Cisco-Linksys LLC
121 Theory Drive
Irvine, CA 92617(USA)

Equipment Under Test: Wireless-N Gigabit Security Router with VPN

Trade Name: Linksys

Model: WRVS4400N V1.1

Date of Test: April 14 ~ September 6, 2007

APPLICABLE STANDARDS	
STANDARD	TEST RESULT
FCC 47 CFR Part 15 Subpart C	No non-compliance noted
Deviation from Applicable Standard	
The Powerline Conducted Emissions was tested at Compliance Certification Services. (Hsintien Lab.) The test equipments were listed in page 8 and the test data were recorded in page 107~108.	

We hereby certify that:

The above equipment was tested by Compliance Certification Services Inc. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.4: 2003 and the energy emitted by the sample EUT tested as described in this report is in compliance with the requirements of FCC Rules Part 15.207, 15.209, 15.247.

The test results of this report relate only to the tested sample EUT identified in this report.

Approved by:

Rex Lai
Section Manager
Compliance Certification Services Inc.

Reviewed by:

Amanda Wu
Section Manager
Compliance Certification Services Inc.



2. EUT DESCRIPTION

Product	Wireless-N Gigabit Security Router with VPN
Trade Name	Linksys
Model Number	WRVS4400N V1.1
Model Discrepancy	N/A
Power Adapter	1. ENG Electronic / AD12V/1A-SW I/P: 100-240V, 50-60Hz, 0.5A O/P: 12V, 1.0A 2. LINKSYS / LS120V10AE I/P: 100-240V, 50-60Hz, 0.5A O/P: 12V, 1.0A 3. LEADER / MT12-4120100-A1 I/P: 120V, 60Hz, 0.3A O/P: 12V, 1A 4. DVE / DSA-12R-12 AUS 120120 I/P: 100-120V, 50-60Hz, 0.3A O/P: 12V, 1A
Frequency Range	2412 ~ 2462 MHz
Transmit Power	IEEE 802.11b mode: 9.04 dBm IEEE 802.11g mode: 8.43 dBm draft 802.11n Standard-20 MHz Channel mode: 14.70 dBm draft 802.11n Wide-40 MHz Channel mode: 4.81 dBm
Modulation Technique	IEEE 802.11b mode: DSSS (1, 2, 5.5 and 11 Mbps) IEEE 802.11g mode: OFDM (6, 9, 12, 18, 24, 36, 48 and 54 Mbps) draft 802.11n Standard-20 MHz Channel mode: OFDM (6.5, 7.2, 13, 14.4, 14.44, 19.5, 21.7, 26, 28.89, 28.9, 39, 43.3, 43.33, 52, 57.78, 57.8, 58.5, 65.0, 72.2, 78, 86.67, 104, 115.56, 117, 130, 144.44 Mbps) draft 802.11n Wide-40 MHz Channel mode: OFDM (13.5, 15, 27, 30, 40.5, 45, 54, 60, 81, 90, 108, 120, 121.5, 135, 150, 162, 180, 216, 240, 243, 270, 300 Mbps)
Number of Channels	IEEE 802.11b/g mode: 11 Channels draft 802.11n Standard-20 MHz Channel mode: 11 Channels draft 802.11n Wide-40 MHz Channel mode: 7 Channels
Antenna Specification	Dipole Antenna / Gain: 4.19dBi (including cable loss)

Remark:

1. The sample selected for test was engineering sample that approximated to production product and was provided by manufacturer.
2. This submittal(s) (test report) is intended for FCC ID: **Q87-WRVS4400NV11** filing to comply with Section 15.207, 15.209 and 15.247 of the FCC Part 15, Subpart C Rules.



3. TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.4 and FCC CFR 47 2.1046, 2.1047, 2.1049, 2.1051, 2.1053, 2.1055, 2.1057, 15.207, 15.209 and 15.247.

3.1 EUT CONFIGURATION

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner that intends to maximize its emission characteristics in a continuous normal application.

3.2 EUT EXERCISE

The EUT was operated in the engineering mode to fix the TX frequency that was for the purpose of the measurements.

According to its specifications, the EUT must comply with the requirements of the Section 15.207, 15.209 and 15.247 under the FCC Rules Part 15 Subpart C.

3.3 GENERAL TEST PROCEDURES

Conducted Emissions

The EUT is placed on the turntable, which is 0.8 m above ground plane. According to the requirements in Section 13.1.4.1 of ANSI C63.4 Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz using CISPR Quasi-peak and average detector modes.

Radiated Emissions

The EUT is placed on a turn table, which is 0.8 m above ground plane. The turntable shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3m away from the receiving antenna, which varied from 1m to 4m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the maximum emissions, exploratory radiated emission measurements were made according to the requirements in Section 13.1.4.1 of ANSI C63.4.



3.4 FCC PART 15.205 RESTRICTED BANDS OF OPERATIONS

- (a) Except as shown in paragraph (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
¹ 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
6.215 - 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 -	2483.5 - 2500	17.7 - 21.4
8.37625 - 8.38675	156.52525	2655 - 2900	22.01 - 23.12
8.41425 - 8.41475	156.7 - 156.9	3260 - 3267	23.6 - 24.0
12.29 - 12.293	162.0125 - 167.17	3332 - 3339	31.2 - 31.8
12.51975 - 12.52025	167.72 - 173.2	3345.8 - 3358	36.43 - 36.5
12.57675 - 12.57725	240 - 285	3600 - 4400	(²)
13.36 - 13.41	322 - 335.4		

¹ Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz.

² Above 38.6

- (b) Except as provided in paragraphs (d) and (e), the field strength of emissions appearing within these frequency bands shall not exceed the limits shown in Section 15.209. At frequencies equal to or less than 1000 MHz, compliance with the limits in Section 15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000 MHz, compliance with the emission limits in Section 15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in Section 15.35 apply to these measurements.



3.5 DESCRIPTION OF TEST MODES

The EUT (model: WRVS4400N V1.1) comes with four types of power adapter (AD12V/1A-SW / LS120V10AE / DSA-12R-12 AUS 120120 / MT12-4120100-A1) for sale. After the preliminary test, the power adapter with model number MT12-4120100-A1 was found to emit the worst conduction emissions, model number AD12V/1A-SW was found to emit the worst radiation emissions and therefore had been tested under operating condition.

The EUT is a 2x3 configuration spatial MIMO (2Tx & 3Rx) without beam forming function but with cyclic delay diversity function that operate in double TX chains and triple RX chains. The 2x3 configuration is implemented with two outside TX & RX chains (Chain 1 and the middle RX chain (chain 0)).

Software used to control the EUT for staying in continuous transmitting mode was programmed.

After verification, all tests were carried out with the worst-case test modes as shown below except radiated spurious emission below 1GHz, and power line conducted emissions below 30MHz, which worst case was in normal link mode only.

IEEE 802.11b mode:

Channel Low (2412MHz), Channel Mid (2437MHz) and Channel High (2462MHz) with 1Mbps data rate and cyclic delay diversity were chosen for full testing.

IEEE 802.11g mode:

Channel Low (2412MHz), Channel Mid (2437MHz) and Channel High (2462MHz) with 6Mbps data rate and cyclic delay diversity were chosen for full testing.

draft 802.11n Standard-20 MHz Channel mode:

Channel Low (2412MHz), Channel Mid (2437MHz) and Channel High (2462MHz) with 6.5Mbps data rate were chosen for full testing.

draft 802.11n Wide-40 MHz Channel mode:

Channel Low (2422MHz), Channel Mid (2437MHz) and Channel High (2452MHz) with 13.5Mbps data rate were chosen for full testing.



4. INSTRUMENT CALIBRATION

4.1 MEASURING INSTRUMENT CALIBRATION

The measuring equipment, which was utilized in performing the tests documented herein, has been calibrated in accordance with the manufacturer's recommendations for utilizing calibration equipment, which is traceable to recognized national standards.

4.2 MEASUREMENT EQUIPMENT USED

Equipment Used for Emissions Measurement

Remark: Each piece of equipment is scheduled for calibration once a year.

Conducted Emissions Test Site				
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
Spectrum Analyzer	Agilent	E4446A	MY43360131	01/30/2008

3M Semi Anechoic Chamber				
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
Spectrum Analyzer	Agilent	E4446A	US42510252	09/11/2008
Test Receiver	Rohde&Schwarz	ESCI	100064	11/13/2007
Switch Controller	TRC	Switch Controller	SC94050010	05/04/2008
4 Port Switch	TRC	4 Port Switch	SC94050020	05/04/2008
Horn-Antenna	TRC	HA-0502	06	06/05/2008
Horn-Antenna	TRC	HA-0801	04	06/20/2008
Horn-Antenna	TRC	HA-1201A	01	08/12/2008
Horn-Antenna	TRC	HA-1301A	01	08/12/2008
Bilog- Antenna	Sunol Sciences	JB3	A030205	03/29/2008
Turn Table	Max-Full	MFT-120S	T120S940302	N.C.R.
Antenna Tower	Max-Full	MFA-430	A440940302	N.C.R.
Controller	Max-Full	MF-CM886	CC-C-1F-13	N.C.R.
Site NSA	CCS	N/A	FCC: 965860 IC: IC 6106	09/25/2008
Test S/W	LABVIEW (V 6.1)			

Remark: The measurement uncertainty is less than $\pm 2.0065\text{dB}$ (30MHz ~ 1GHz), $\pm 3.0958\text{dB}$ (Above 1GHz) which is evaluated as per the NAMAS NIS 81 and CISPR/A/291/CDV.

Conducted Emission room # B				
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
TEST RECEIVER	R&S	ESHS10	843743/015	03/28/2008
LISN (EUT)	EMCO	3825/2	9106-1810	01/03/2008
LISN	EMCO	3825/2	1382	01/03/2008
BNC CABLE	MIYAZAKI	5D-FB	BNC B1	07/12/2008
Pulse Limiter	R&S	ESH3-Z2	100374	08/23/2008
THERMO-HYGRO METER	TOP	HA-202	9303-3	02/04/2008
Test S/W	LABVIEW (V 6.1)			

Remark: The measurement uncertainty is less than $\pm 3.4510\text{dB}$, which is evaluated as per the NAMAS NIS 81 and CISPR/A/291/CDV.



5. FACILITIES AND ACCREDITATIONS

5.1 FACILITIES

All measurement facilities used to collect the measurement data are located at

☐ No.199, Chunghsen Road, Hsintien City, Taipei Hsien, Taiwan, R.O.C.

Tel: 886-2-2217-0894 / Fax: 886-2-2217-1029

☒ No.11, Wugong 6th Rd., Wugu Industrial Park, Taipei Hsien 248, Taiwan

Tel: 886-2-2299-9720 / Fax: 886-2-2298-4045

☒ No.81-1, Lane 210, Bade 2nd Rd., Luchu Hsiang, Taoyuan Hsien 338, Taiwan

Tel: 886-3-324-0332 / Fax: 886-3-324-5235

The sites are constructed in conformance with the requirements of ANSI C63.7, ANSI C63.4 and CISPR Publication 22.

5.2 EQUIPMENT

Radiated emissions are measured with one or more of the following types of linearly polarized antennas: tuned dipole, biconical, log periodic, bi-log, and/or ridged waveguide, horn. Spectrum analyzers with pre-selectors and quasi-peak detectors are used to perform radiated measurements.

Conducted emissions are measured with Line Impedance Stabilization Networks and EMI Test Receivers.

Calibrated wideband preamplifiers, coaxial cables, and coaxial attenuators are also used for making measurements.

All receiving equipment conforms to CISPR Publication 16-1, "Radio Interference Measuring Apparatus and Measurement Methods."

5.3 TABLE OF ACCREDITATIONS AND LISTINGS

Country	Agency	Scope of Accreditation	Logo
USA	A2LA	EN 55011, EN 55014-1/2, CISPR 11, CISPR 14-1/2, EN 55022, EN 55015, CISPR 22, CISPR 15, AS/NZS 3548, VCCI V3 (2001), CFR 47, FCC Part 15/18, CNS 13783-1, CNS 13439, CNS 13438, CNS 13803, CNS 14115, EN 55024, IEC 801-2, IEC 801-3, IEC 801-4, IEC/EN 61000-3-2, IEC/EN 61000-3-3, IEC/EN 61000-4-2/3/4/5/6/8/11, EN 50081-1/ EN 61000-6-3, EN 50081-2/EN 61000-6-4, EN 50081-2/EN 61000-6-1: 2001	 ACCREDITED TESTING CERT #0824.01
USA	FCC	3/10 meter Open Area Test Sites (93105, 90471) / 3M Semi Anechoic Chamber (965860) to perform FCC Part 15/18 measurements	 93105, 90471 965860
Japan	VCCI	3/10 meter Open Area Test Sites to perform conducted/radiated measurements	 R-393/1066/725/879 C-402/747/912
Norway	NEMKO	EN 50081-1/2, EN 50082-1/2, IEC 61000-6-1/2, EN 50091-2, EN 50130-4, EN 55011, EN 55013, EN 55014-1/2, EN 55015, EN 55022, EN 55024, EN 61000-3-2/3, EN 61326-1, IEC 61000-4-2/3/4/5/6/8/11, EN 60601-1-2, EN 300 328, EN 300 422-2, EN 301 419-1, EN 301 489-01/03/07/08/09/17, EN 301 419-2/3, EN 300 454-2, EN 301 357-2	 ELA 124a ELA 124b ELA 124c
Taiwan	TAF	EN 300 328, EN 300 220-1, EN 300 220-2, EN 300 220-3, 47 CFR FCC Part 15 Subpart C, EN 61000-3-2, EN 61000-3-3, CNS 13439, CNS 13783-1, CNS 14115, CNS 13438, AS/NZS CISPR 22, CNS 13022-1, IEC 61000-4-2/3/4/5/6/8/11, CNS 13022-2/3	 Testing Laboratory 0363
Taiwan	BSMI	CNS 13438, CNS 13783-1, CNS 13439, CNS 14115	 SL2-IS-E-0014 SL2-IN-E-0014 SL2-A1-E-0014 SL2-R1-E-0014 SL2-R2-E-0014 SL2-L1-E-0014
Canada	Industry Canada	3/10 meter Open Area Test Sites (IC 2324C-3, IC 2324C-5) / 3M Semi Anechoic Chamber (IC 6106)	 IC 2324C-3 IC 2324C-5 IC 6106

* No part of this report may be used to claim or imply product endorsement by A2LA or any agency of the US Government.



6. SETUP OF EQUIPMENT UNDER TEST

6.1 SETUP CONFIGURATION OF EUT

See test photographs attached in Appendix II for the actual connections between EUT and support equipment.

6.2 SUPPORT EQUIPMENT

No	Equipment	Brand	Model	Series No.	FCC ID	Data Cable	Power Cord
1.	PC	HP	xw4400	N/A	FCC DoC	Unshielded, 1.0m	Unshielded, 1.8m
2.	LCD Monitor	SAMSUNG	710V	GS17H9NXA05853A	FCC DoC	Shielded, 1.8m with two cores	Unshielded, 1.8m
3.	PS/2 Keyboard	DELL	SK-8110	N/A	FCC DoC	Shielded, 1.8m	N/A
4.	PS/2 Mouse	DELL	M071KC	443029525	FCC DoC	Shielded, 1.8m	N/A
5.	Printer	EPSON	C60	N/A	N/A	Shielded, 1.8m	Unshielded, 1.8m
6.	Modem	TOP-SOLUTION	5JEG4033MKO	L0063CG2D007181	5RJTAI-35500-M5-E	Shielded, 1.0m	Unshielded, 1.8m
7.	LAN Cable *3	N/A	N/A	N/A	N/A	Unshielded, 20m	N/A
8.	Notebook PC	DELL	PP10L	50XP51J	WLAN: ANO20030400LEG Bluetooth: ANO20020100MTN	LAN Cable: Unshielded, 10m Line Cable: Unshielded, 10m	AC I/P: Unshielded, 1.8m DC O/P: Unshielded, 1.8m with a core
9.	Notebook PC (Remote)	Fox	M623	N/A	N/A	Unshielded, 20m	Unshielded, 1.8m

Remark:

1. All the equipment/cables were placed in the worst-case configuration to maximize the emission during the test.
2. Grounding was established in accordance with the manufacturer's requirements and conditions for the intended use.

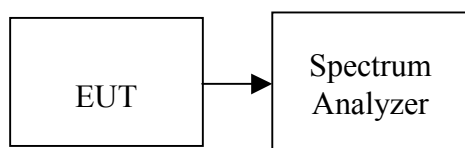
7. FCC PART 15.247 REQUIREMENTS

7.1 6DB BANDWIDTH

LIMIT

According to §15.247(a)(2), systems using digital modulation techniques may operate in the 902 - 928 MHz, 2400 - 2483.5 MHz, and 5725 - 5850 MHz bands. The minimum 6dB bandwidth shall be at least 500 kHz.

Test Configuration



TEST PROCEDURE

1. Place the EUT on the table and set it in the transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
3. Set the spectrum analyzer as RBW = 100kHz, VBW = RBW, Span = 50MHz, Sweep = auto.
4. Mark the peak frequency and -6dB (upper and lower) frequency.
5. Repeat until all the rest channels are investigated.



TEST RESULTS

No non-compliance noted

Test Data

Test mode: IEEE 802.11b mode

Channel	Frequency (MHz)	Bandwidth (MHz)	Limit (kHz)	Result
Low	2412	9.50	>500	PASS
Mid	2437	10.00		PASS
High	2462	9.75		PASS

Test mode: IEEE 802.11g mode

Channel	Frequency (MHz)	Bandwidth (MHz)	Limit (kHz)	Result
Low	2412	16.50	>500	PASS
Mid	2437	16.50		PASS
High	2462	16.50		PASS

Test mode: draft 802.11n Standard-20 MHz Channel mode / Chain 0

Channel	Frequency (MHz)	Bandwidth (MHz)	Limit (kHz)	Result
Low	2412	16.50	>500	PASS
Mid	2437	16.50		PASS
High	2462	16.50		PASS

Test mode: draft 802.11n Standard-20 MHz Channel mode / Chain 1

Channel	Frequency (MHz)	Bandwidth (MHz)	Limit (kHz)	Result
Low	2412	16.50	>500	PASS
Mid	2437	16.50		PASS
High	2462	16.50		PASS

Test mode: draft 802.11n Wide-40 MHz Channel mode / Chain 0

Channel	Frequency (MHz)	Bandwidth (MHz)	Limit (kHz)	Result
Low	2422	36.50	>500	PASS
Mid	2437	36.08		PASS
High	2452	36.50		PASS

Test mode: draft 802.11n Wide-40 MHz Channel mode / Chain 1

Channel	Frequency (MHz)	Bandwidth (MHz)	Limit (kHz)	Result
Low	2422	36.50	>500	PASS
Mid	2437	36.33		PASS
High	2452	36.42		PASS



Test Plot

IEEE 802.11b mode

6dB Bandwidth (CH Low)

Agilent 17:15:30 Sep 6, 2007

R T

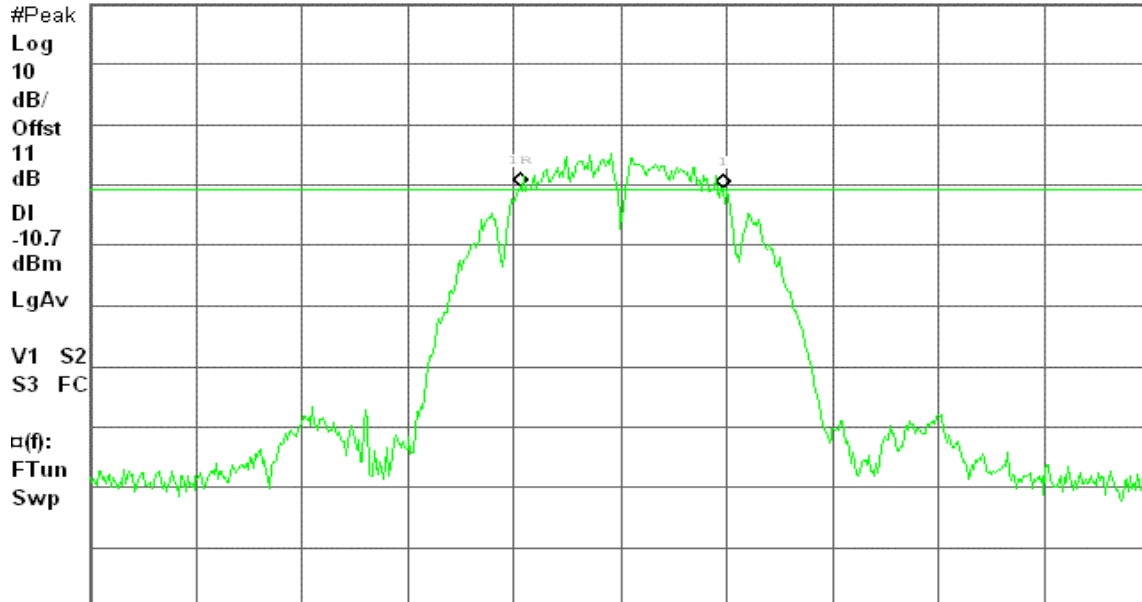
6dB BW, b Mode Low Ch.

 Δ Mkr1 9.50 MHz

Ref 20 dBm

Atten 20 dB

-0.30 dB



Center 2.412 00 GHz

#Res BW 100 kHz

#VBW 100 kHz

Span 50 MHz

Sweep 6.04 ms (601 pts)

6dB Bandwidth (CH Mid)

Agilent 17:20:48 Sep 6, 2007

R T

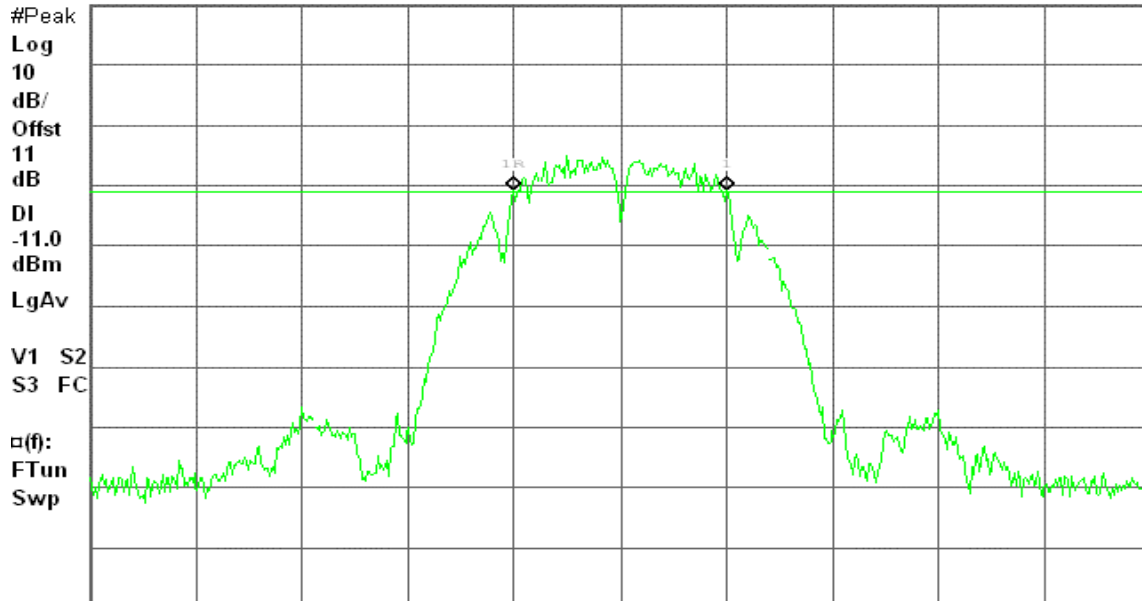
6dB BW, b Mode Mid Ch.

 Δ Mkr1 10.00 MHz

Ref 20 dBm

Atten 20 dB

0.09 dB



Center 2.437 00 GHz

#Res BW 100 kHz

#VBW 100 kHz

Span 50 MHz

Sweep 6.04 ms (601 pts)

**6dB Bandwidth (CH High)**

Agilent 17:28:17 Sep 6, 2007

R T

6dB BW, b Mode High Ch.

 Δ Mkr1 9.75 MHz

Ref 20 dBm

Atten 20 dB

0.13 dB

#Peak

Log

10

dB/

Offst

11

dB

DI

-10.8

dBm

LgAv

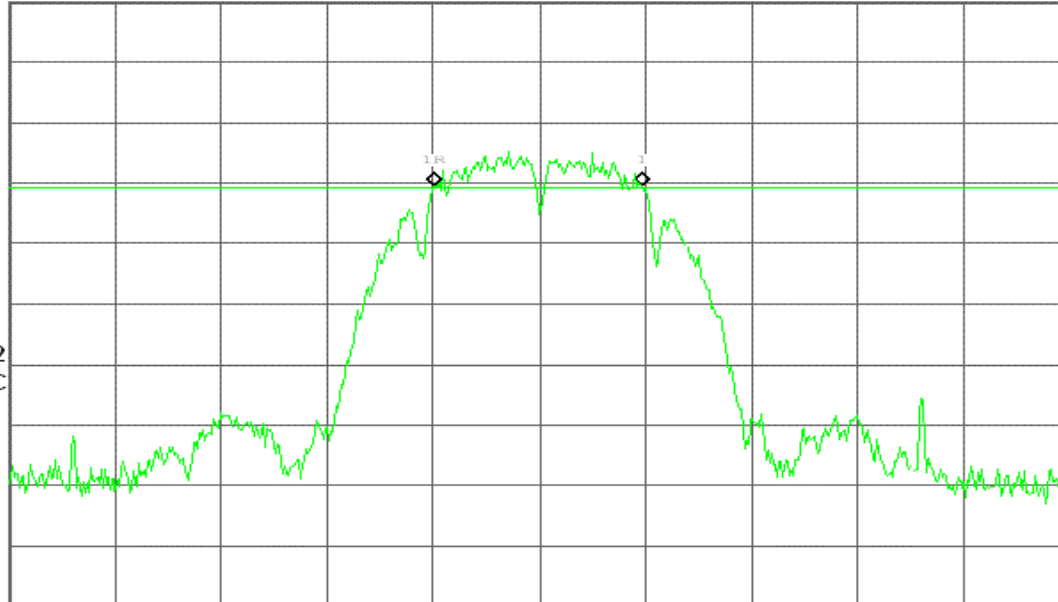
V1 S2

S3 FC

 $\alpha(f)$:

FTun

Swp



Center 2.462 00 GHz

Span 50 MHz

#Res BW 100 kHz

#VBW 100 kHz

Sweep 6.04 ms (601 pts)

IEEE 802.11g mode**6dB Bandwidth (CH Low)**

Agilent 17:09:10 Sep 6, 2007

R T

6dB BW, g Mode Low Ch.

 Δ Mkr1 16.50 MHz

Ref 20 dBm

Atten 20 dB

-1.57 dB

#Peak

Log

10

dB/

Offst

11

dB

DI

-14.8

dBm

LgAv

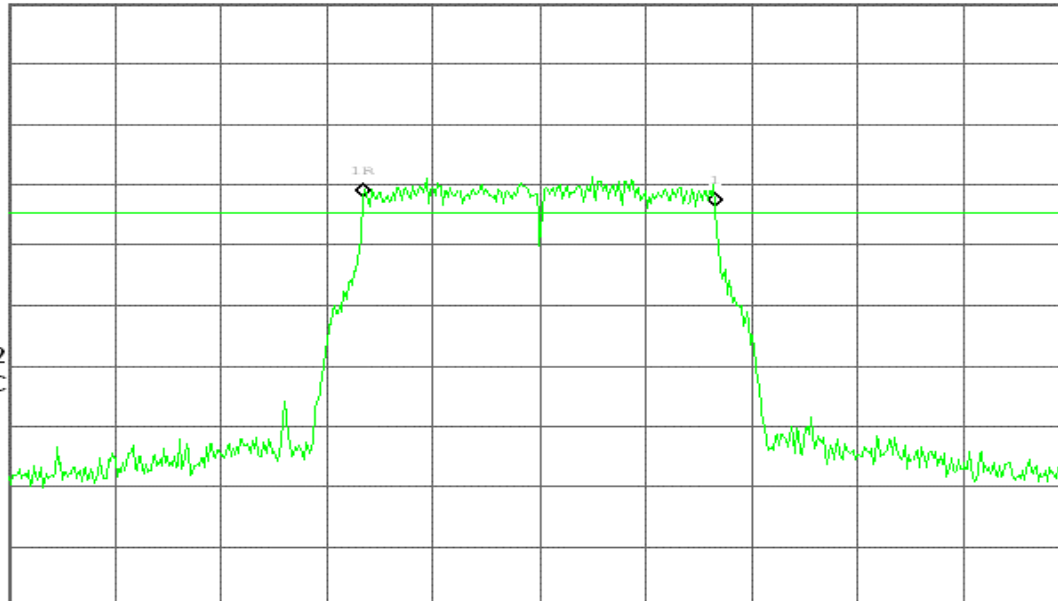
V1 S2

S3 FC

 $\alpha(f)$:

FTun

Swp



Center 2.412 00 GHz

Span 50 MHz

#Res BW 100 kHz

#VBW 100 kHz

Sweep 6.04 ms (601 pts)

**6dB Bandwidth (CH Mid)**

* Agilent 17:04:01 Sep 6, 2007

R T

6dB BW, g Mode Mid Ch.

 Δ Mkr1 16.50 MHz

Ref 20 dBm

Atten 20 dB

2.70 dB

#Peak

Log

10

dB/

Offst

11

dB

DI

-15.3

dBm

LgAv

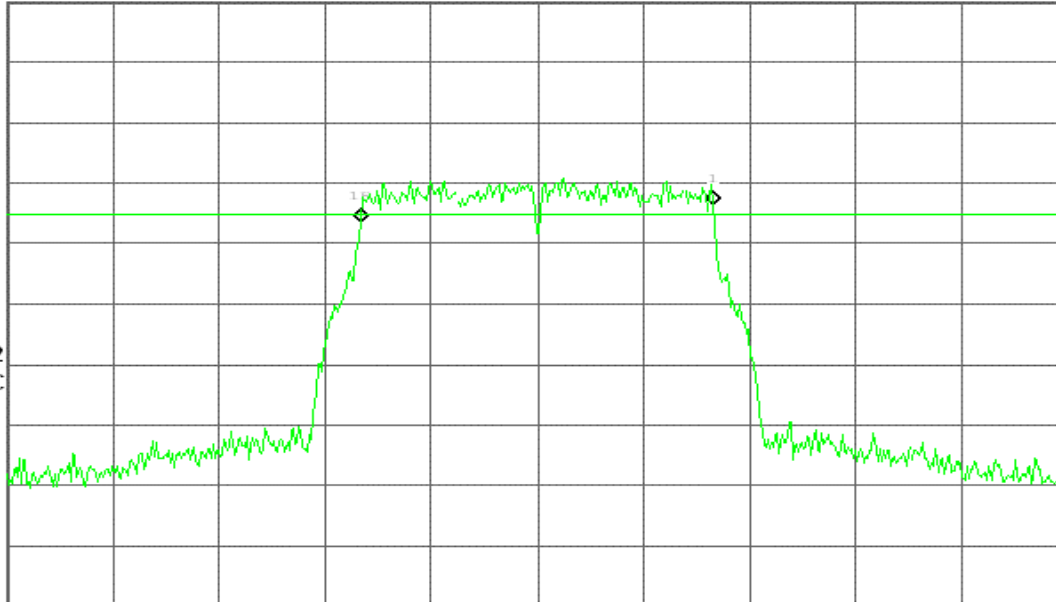
V1 S2

S3 FC

 $\alpha(f)$:

FTun

Swp



Center 2.437 00 GHz

Span 50 MHz

#Res BW 100 kHz

#VBW 100 kHz

Sweep 6.04 ms (601 pts)

6dB Bandwidth (CH High)

* Agilent 16:58:13 Sep 6, 2007

R T

6dB BW, g Mode High Ch.

 Δ Mkr1 16.50 MHz

Ref 20 dBm

Atten 20 dB

2.88 dB

#Peak

Log

10

dB/

Offst

11

dB

DI

-16.0

dBm

LgAv

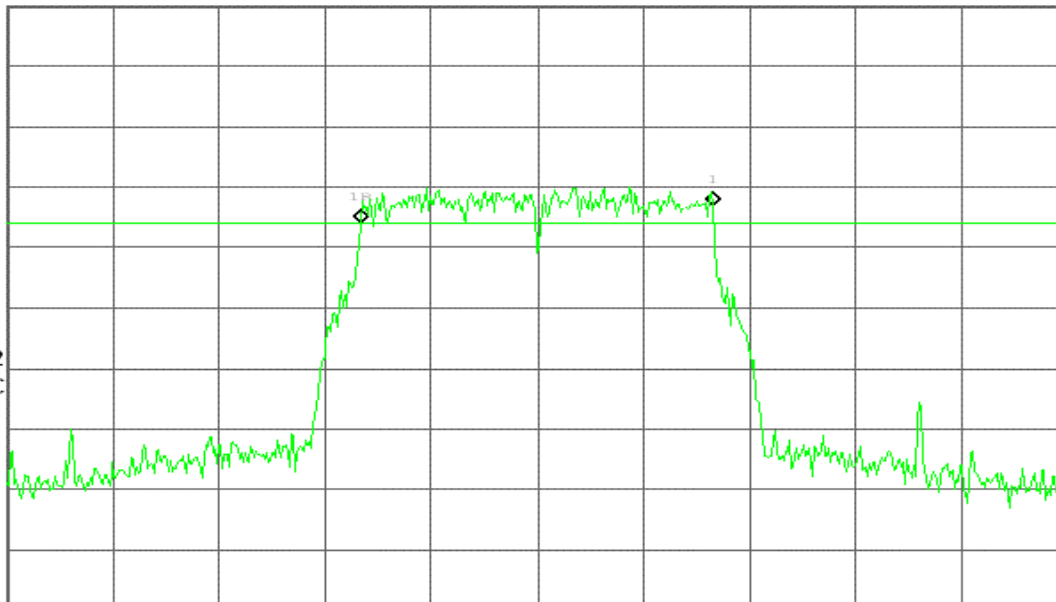
V1 S2

S3 FC

 $\alpha(f)$:

FTun

Swp



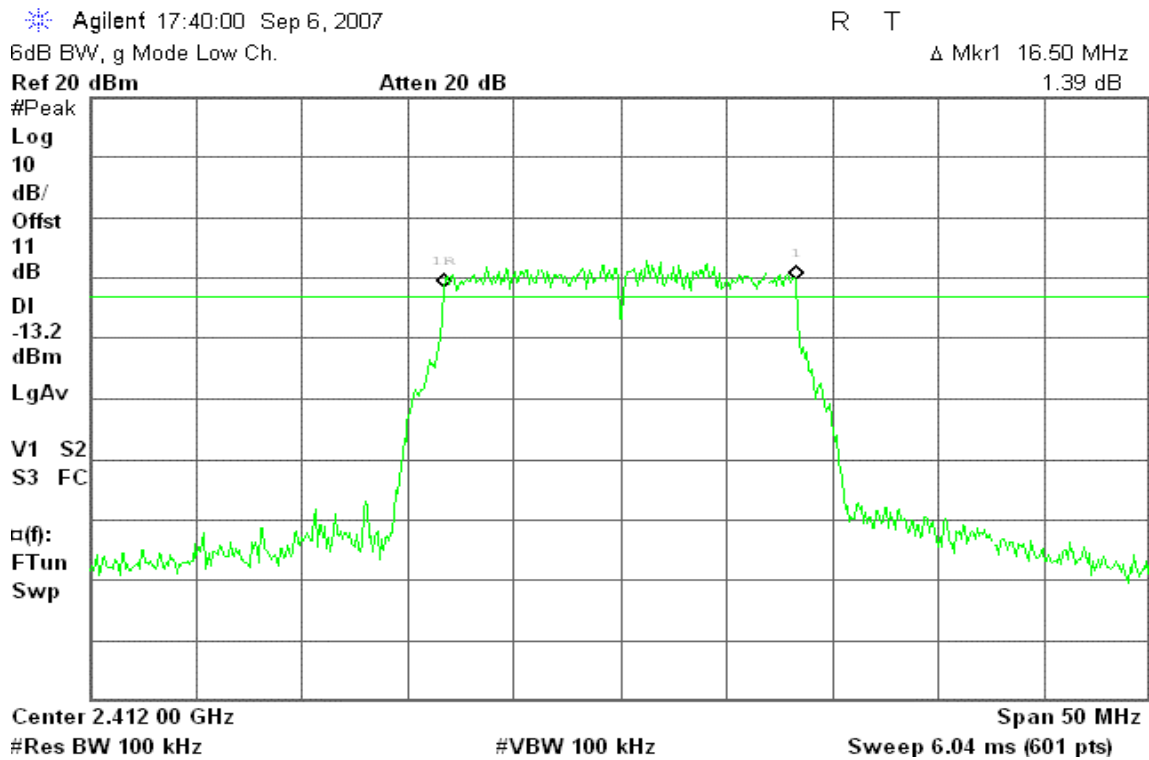
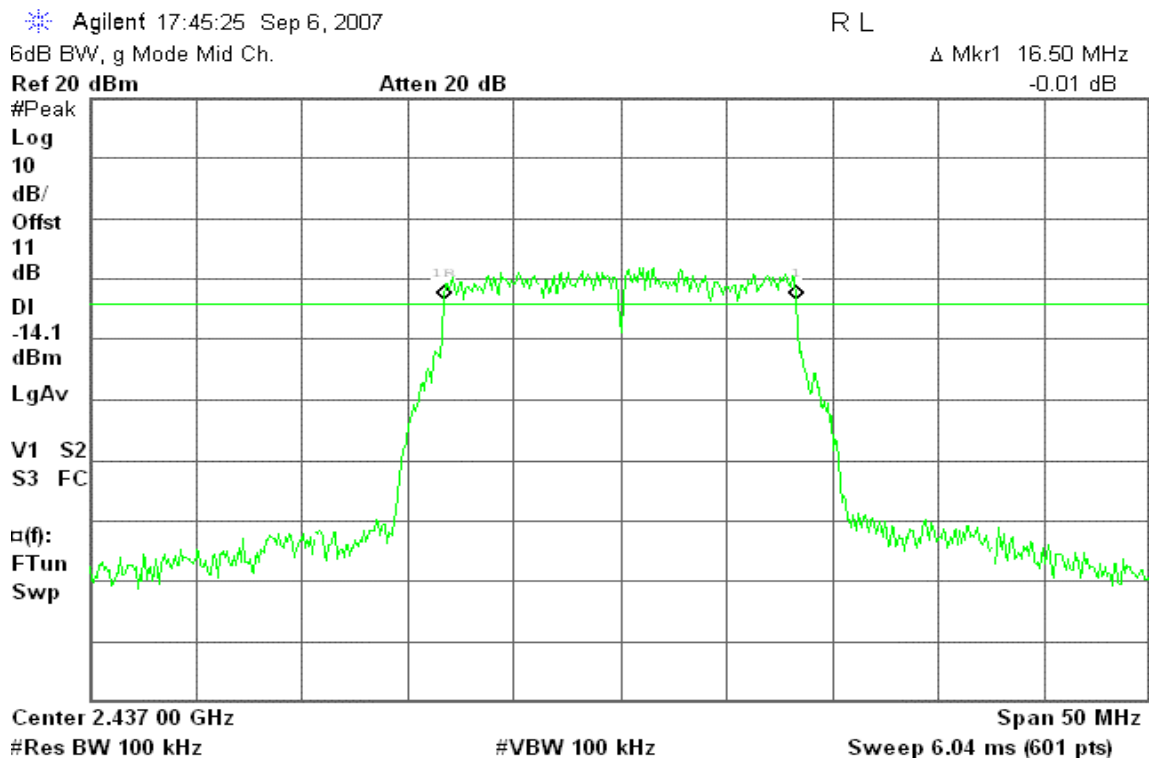
Center 2.462 00 GHz

Span 50 MHz

#Res BW 100 kHz

#VBW 100 kHz

Sweep 6.04 ms (601 pts)

**draft 802.11n Standard-20 MHz Channel mode / Chain 0****6dB Bandwidth (CH Low)****6dB Bandwidth (CH Mid)**

**6dB Bandwidth (CH High)**

* Agilent 17:50:47 Sep 6, 2007

R T

6dB BW, g Mode High Ch.

 Δ Mkr1 16.50 MHz

Ref 20 dBm

Atten 20 dB

-2.94 dB

#Peak

Log

10

dB/

Offst

11

dB

DI

-13.5

dBm

LgAv

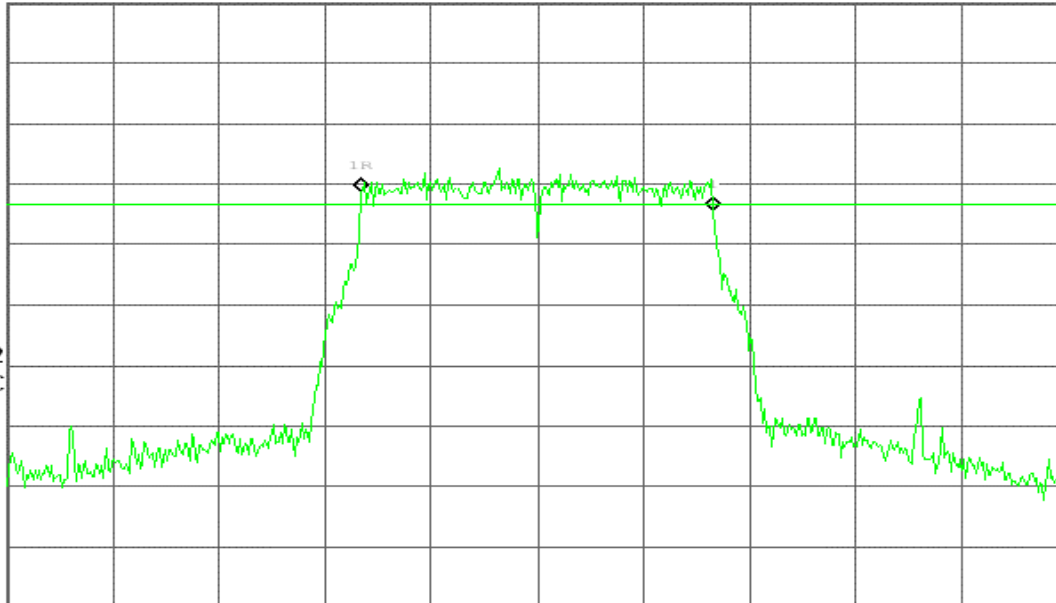
V1 S2

S3 FC

 $\alpha(f)$:

FTun

Swp



Center 2.462 00 GHz

Span 50 MHz

#Res BW 100 kHz

#VBW 100 kHz

Sweep 6.04 ms (601 pts)

draft 802.11n Standard-20 MHz Channel mode / Chain 1**6dB Bandwidth (CH Low)**

* Agilent 18:06:36 Sep 6, 2007

R T

6dB BW, g Mode Low Ch.

 Δ Mkr1 16.50 MHz

Ref 20 dBm

Atten 20 dB

2.65 dB

#Peak

Log

10

dB/

Offst

11

dB

DI

-14.4

dBm

LgAv

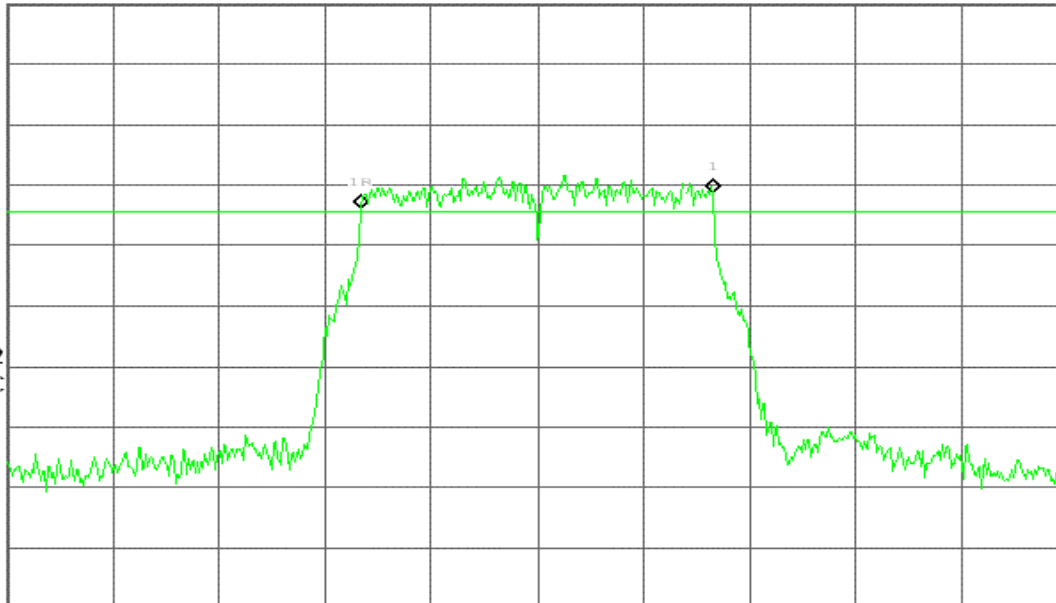
V1 S2

S3 FC

 $\alpha(f)$:

FTun

Swp



Center 2.412 00 GHz

Span 50 MHz

#Res BW 100 kHz

#VBW 100 kHz

Sweep 6.04 ms (601 pts)



6dB Bandwidth (CH Mid)

* Agilent 18:01:41 Sep 6, 2007

R T

6dB BW, g Mode Mid Ch.

 Δ Mkr1 16.50 MHz

Ref 20 dBm

Atten 20 dB

1.98 dB

#Peak

Log

10

dB/

Offst

11

dB

DI

-14.1

dBm

LgAv

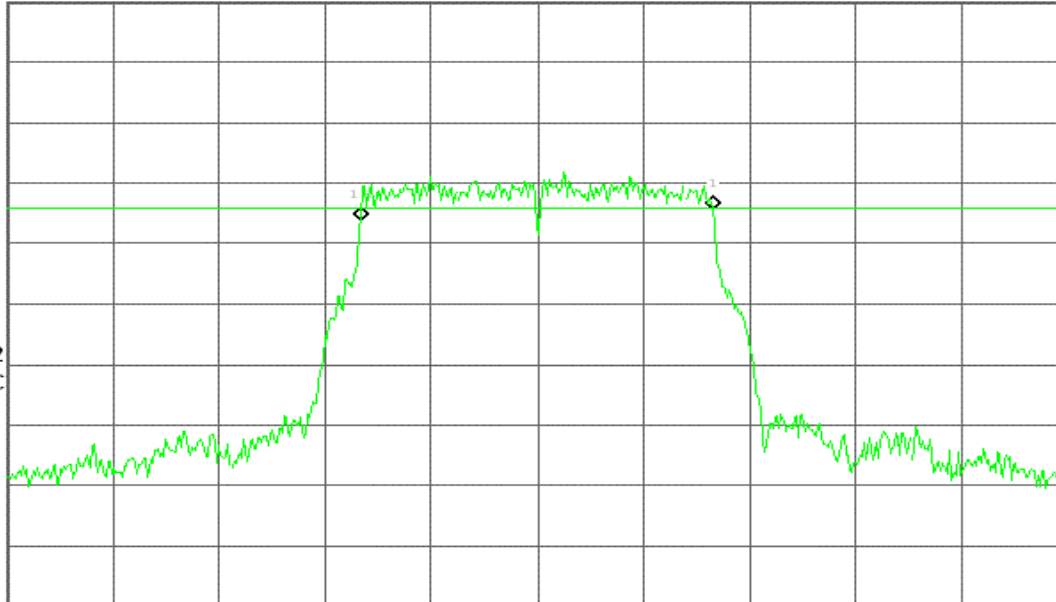
V1 S2

S3 FC

 $\alpha(f)$:

FTun

Swp



Center 2.437 00 GHz

Span 50 MHz

#Res BW 100 kHz

#VBW 100 kHz

Sweep 6.04 ms (601 pts)

6dB Bandwidth (CH High)

* Agilent 17:56:39 Sep 6, 2007

R T

6dB BW, g Mode High Ch.

 Δ Mkr1 16.50 MHz

Ref 20 dBm

Atten 20 dB

0.28 dB

#Peak

Log

10

dB/

Offst

11

dB

DI

-10.4

dBm

LgAv

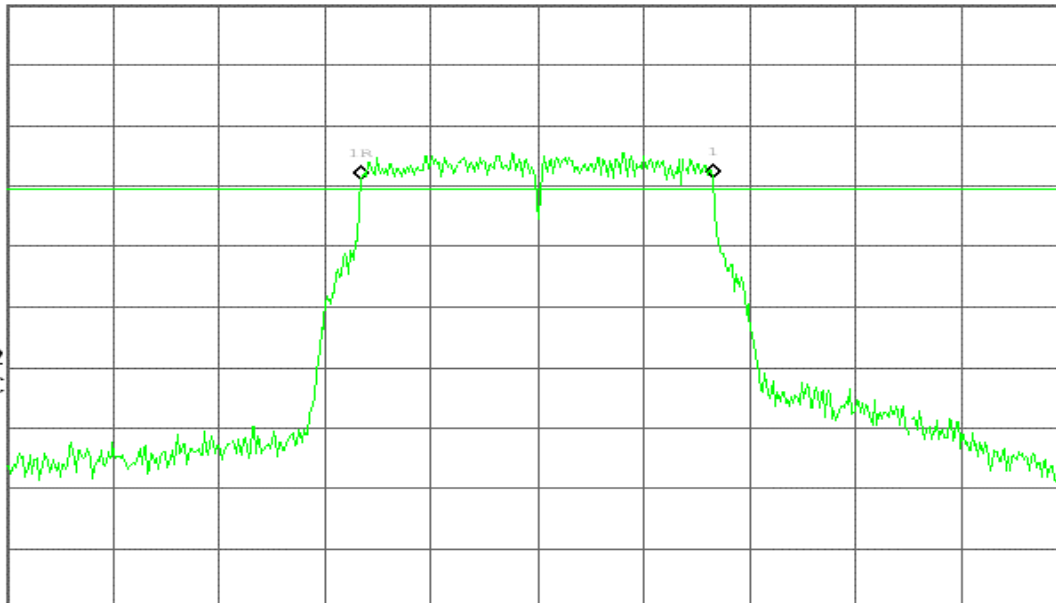
V1 S2

S3 FC

 $\alpha(f)$:

FTun

Swp



Center 2.462 00 GHz

Span 50 MHz

#Res BW 100 kHz

#VBW 100 kHz

Sweep 6.04 ms (601 pts)

**draft 802.11n Wide-40 MHz Channel mode / Chain 0****6dB Bandwidth (CH Low)**

Agilent 18:59:10 Sep 6, 2007

R T

6dB BW, g Mode Low Ch.

 Δ Mkr1 36.50 MHz

Ref 20 dBm

Atten 20 dB

-1.30 dB

#Peak

Log

10

dB/

Offst

11

dB

DI

-23.7

dBm

LgAv

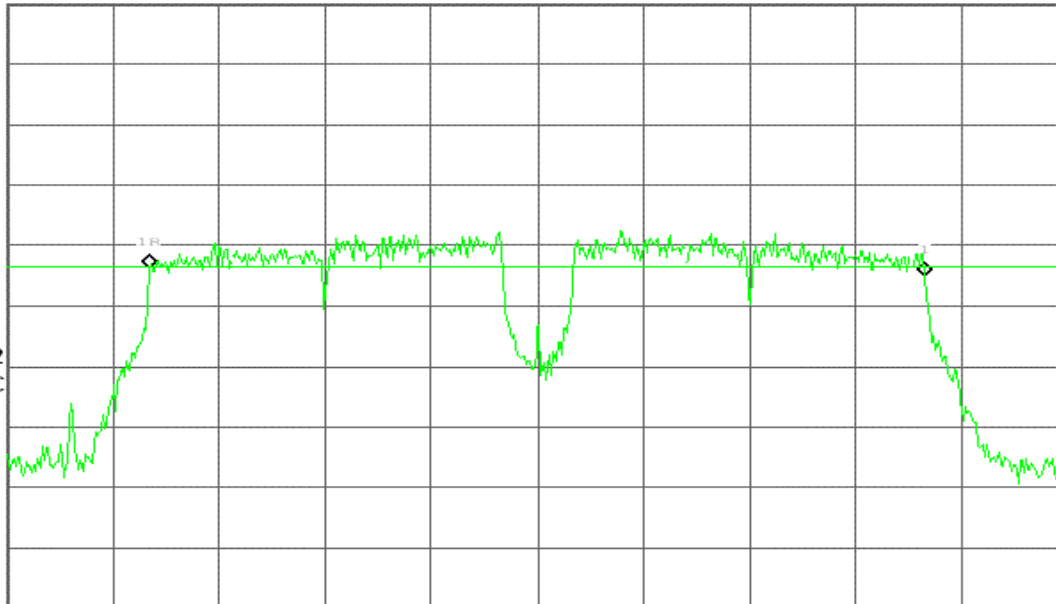
V1 S2

S3 FC

 $\alpha(f)$:

FTun

Swp



Center 2.422 00 GHz

#Res BW 100 kHz

#VBW 100 kHz

Span 50 MHz

Sweep 6.04 ms (601 pts)

6dB Bandwidth (CH Mid)

Agilent 18:53:02 Sep 6, 2007

R T

6dB BW, g Mode Mid Ch.

 Δ Mkr1 36.08 MHz

Ref 20 dBm

Atten 20 dB

2.03 dB

#Peak

Log

10

dB/

Offst

11

dB

DI

-23.3

dBm

LgAv

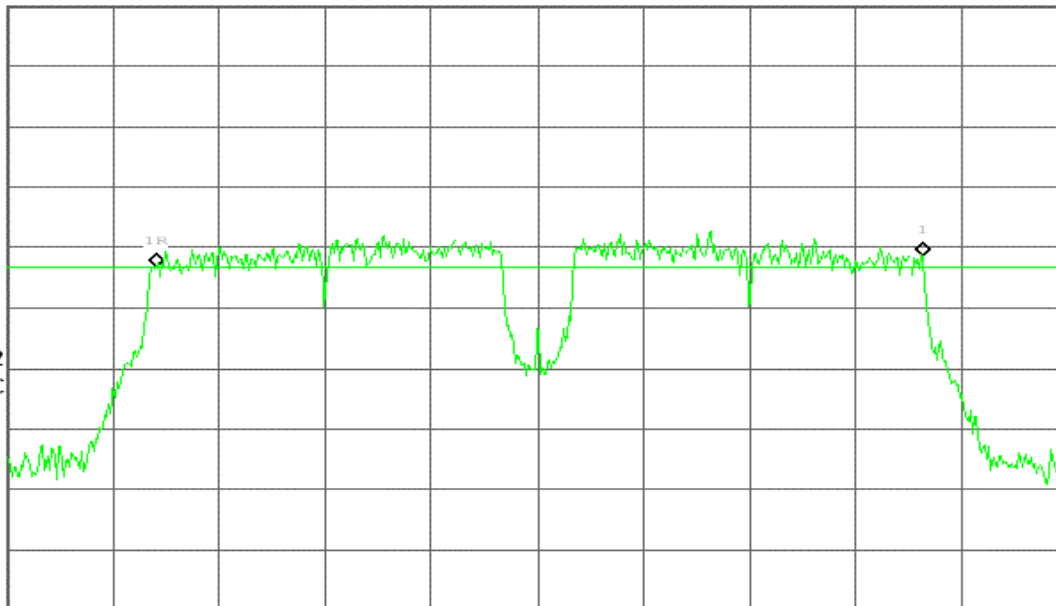
V1 S2

S3 FC

 $\alpha(f)$:

FTun

Swp



Center 2.437 00 GHz

#Res BW 100 kHz

#VBW 100 kHz

Span 50 MHz

Sweep 6.04 ms (601 pts)

**6dB Bandwidth (CH High)**

Agilent 18:47:14 Sep 6, 2007

R T

6dB BW, g Mode High Ch.

 Δ Mkr1 36.50 MHz

Ref 20 dBm

Atten 20 dB

-0.89 dB

#Peak

Log

10

dB/

Offst

11

dB

DI

-24.0

dBm

LgAv

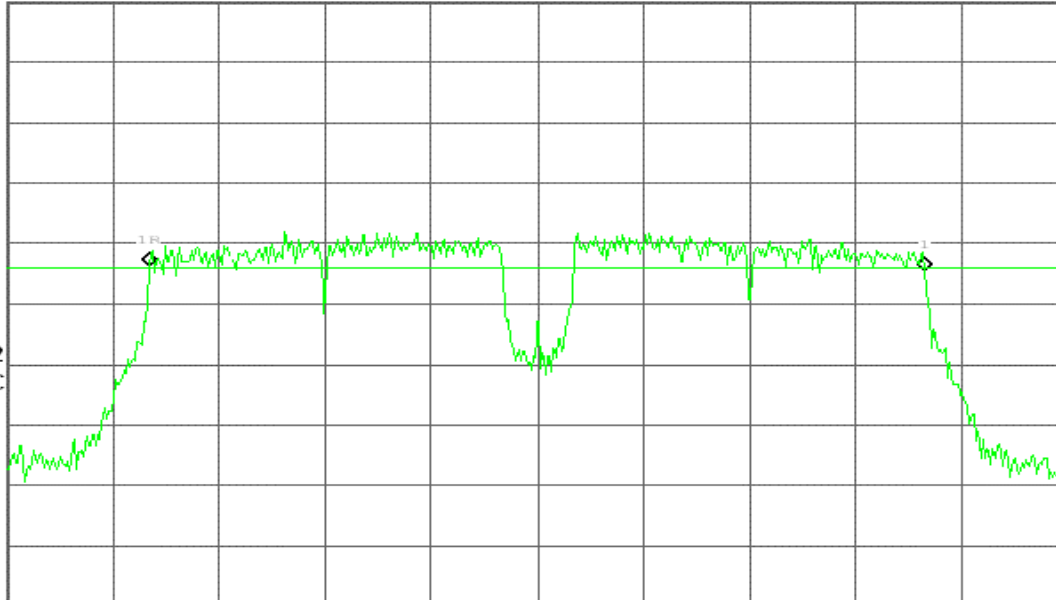
V1 S2

S3 FC

 $\alpha(f)$:

FTun

Swp



Center 2.452 00 GHz

Span 50 MHz

#Res BW 100 kHz

#VBW 100 kHz

Sweep 6.04 ms (601 pts)

draft 802.11n Wide-40 MHz Channel mode / Chain 1**6dB Bandwidth (CH Low)**

Agilent 18:28:20 Sep 6, 2007

R T

6dB BW, g Mode Low Ch.

 Δ Mkr1 36.50 MHz

Ref 20 dBm

Atten 20 dB

-0.65 dB

#Peak

Log

10

dB/

Offst

11

dB

DI

-24.6

dBm

LgAv

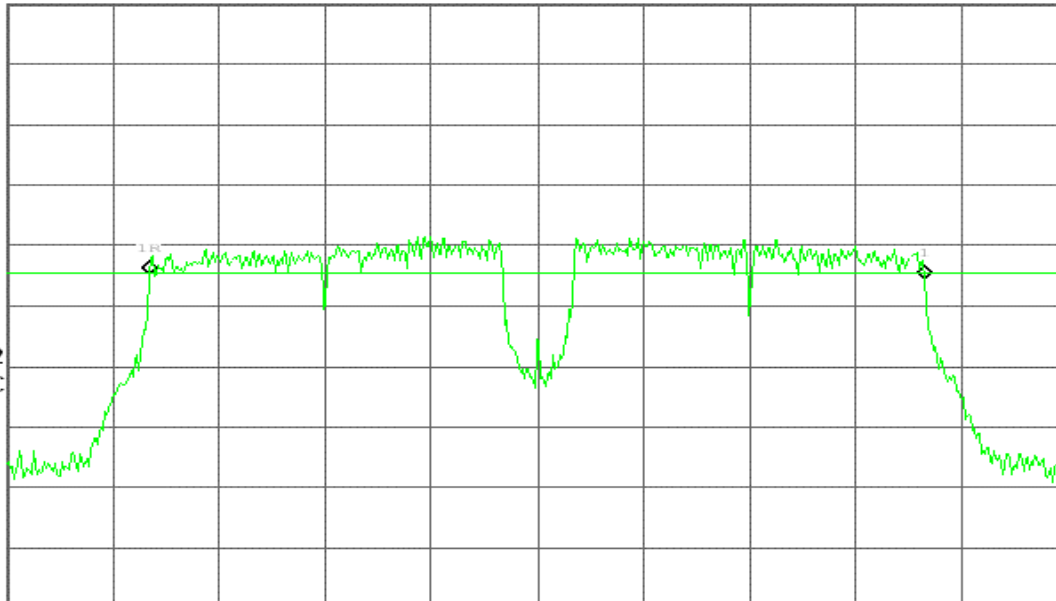
V1 S2

S3 FC

 $\alpha(f)$:

FTun

Swp



Center 2.422 00 GHz

Span 50 MHz

#Res BW 100 kHz

#VBW 100 kHz

Sweep 6.04 ms (601 pts)



6dB Bandwidth (CH Mid)

Agilent 18:33:24 Sep 6, 2007

R T

6dB BW, g Mode Mid Ch.

 Δ Mkr1 36.33 MHz

Ref 20 dBm

Atten 20 dB

0.84 dB

#Peak

Log

10

dB/

Offst

11

dB

DI

-24.3

dBm

LgAv

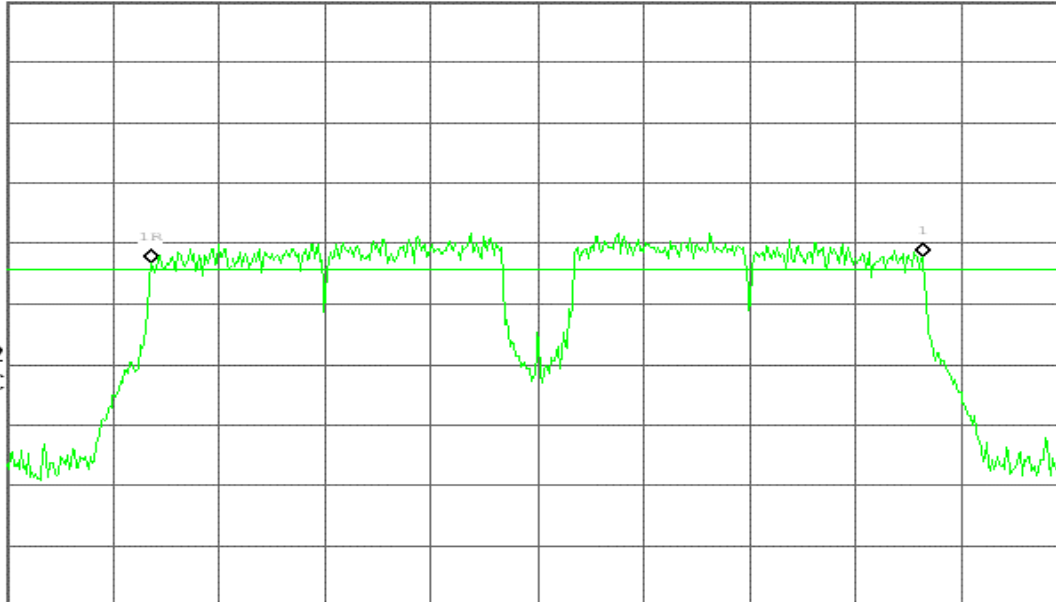
V1 S2

S3 FC

 $\alpha(f)$:

FTun

Swp



Center 2.437 00 GHz

Span 50 MHz

#Res BW 100 kHz

#VBW 100 kHz

Sweep 6.04 ms (601 pts)

6dB Bandwidth (CH High)

Agilent 18:40:39 Sep 6, 2007

R T

6dB BW, g Mode High Ch.

 Δ Mkr1 36.42 MHz

Ref 20 dBm

Atten 20 dB

0.97 dB

#Peak

Log

10

dB/

Offst

11

dB

DI

-24.2

dBm

LgAv

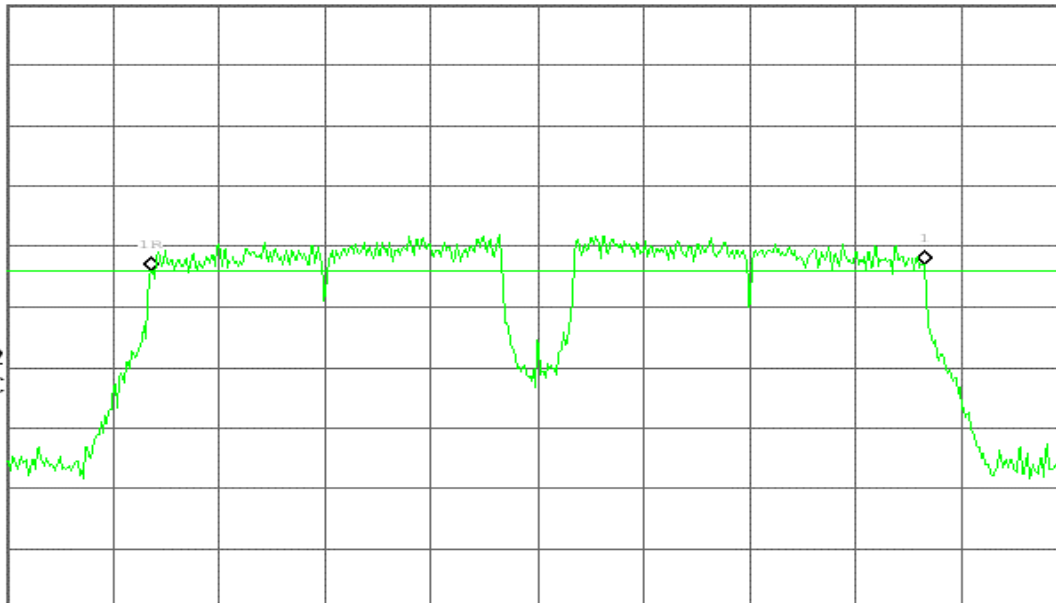
V1 S2

S3 FC

 $\alpha(f)$:

FTun

Swp



Center 2.452 00 GHz

Span 50 MHz

#Res BW 100 kHz

#VBW 100 kHz

Sweep 6.04 ms (601 pts)



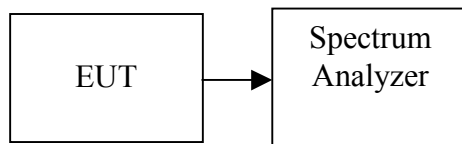
7.2 PEAK POWER

LIMIT

The maximum peak output power of the intentional radiator shall not exceed the following:

1. According to §15.247(b)(3), for systems using digital modulation in the bands of 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz: 1 Watt.
2. According to §15.247(b)(4), the conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

Test Configuration



TEST PROCEDURE

1. Place the EUT on the table and set it in transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
3. Set the spectrum analyzer as RBW = 1 MHz, VBW $\geq$ 3 MHz. in “Channel Power ” measurement.
4. Record the max reading.
5. Repeat the above procedure until the measurements for all frequencies are completed.



TEST RESULTS

No non-compliance noted

Test Data

Test mode: IEEE 802.11b mode

Channel	Frequency (MHz)	Output Power (dBm)	Output Power (W)	Limit (W)	Result
Low	2412	8.69	0.0074	1.00	PASS
Mid	2437	9.04	0.0080		PASS
High	2462	8.98	0.0079		PASS

Test mode: IEEE 802.11g mode

Channel	Frequency (MHz)	Output Power (dBm)	Output Power (W)	Limit (W)	Result
Low	2412	8.43	0.0070	1.00	PASS
Mid	2437	8.13	0.0065		PASS
High	2462	7.60	0.0058		PASS

Test mode: draft 802.11n Standard-20 MHz Channel mode

Channel	Frequency (MHz)	Chain 0 Output Power (dBm)	Chain 1 Output Power (dBm)	Total Output Power (dBm)	Output Power (W)	Limit (W)	Result
Low	2412	9.82	8.62	12.27	0.0169	1.00	PASS
Mid	2437	9.82	8.44	12.19	0.0166		PASS
High	2462	9.25	13.24	14.70	0.0295		PASS

Test mode: draft 802.11n Wide-40 MHz Channel mode

Channel	Frequency (MHz)	Chain 0 Output Power (dBm)	Chain 1 Output Power (dBm)	Total Output Power (dBm)	Output Power (W)	Limit (W)	Result
Low	2422	1.82	1.43	4.64	0.0029	1.00	PASS
Mid	2437	1.55	1.66	4.62	0.0029		PASS
High	2452	1.89	1.71	4.81	0.0030		PASS

Remark: Total Output Power (w) = Chain 1 (10^{^(Output Power /10)/1000}) + Chain 0 (10^{^(Output Power /10)/1000})

**Test Plot****IEEE 802.11b mode****Peak Power (CH Low)**

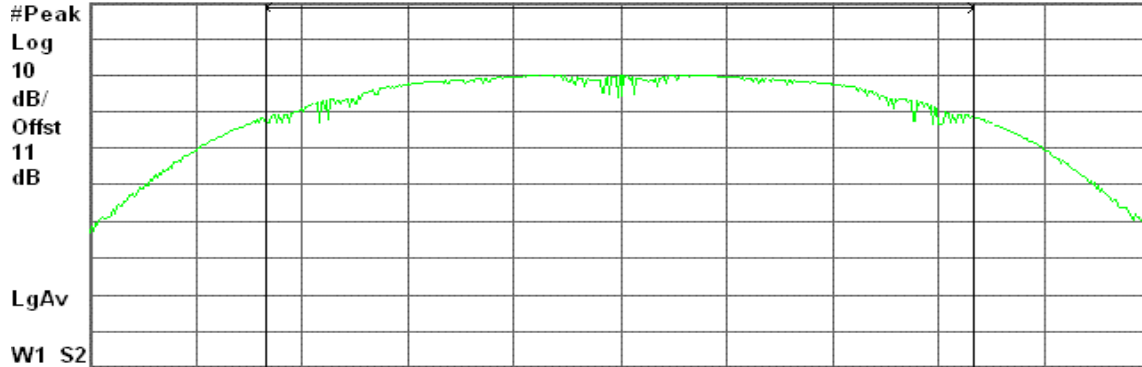
* Agilent 17:16:13 Sep 6, 2007

R T

Peak Output Power , b Mode Low Ch.

Ref 20 dBm

Atten 20 dB



Channel Power

Power Spectral Density

8.69 dBm / 13.2960 MHz

-62.55 dBm/Hz

Peak Power (CH Mid)

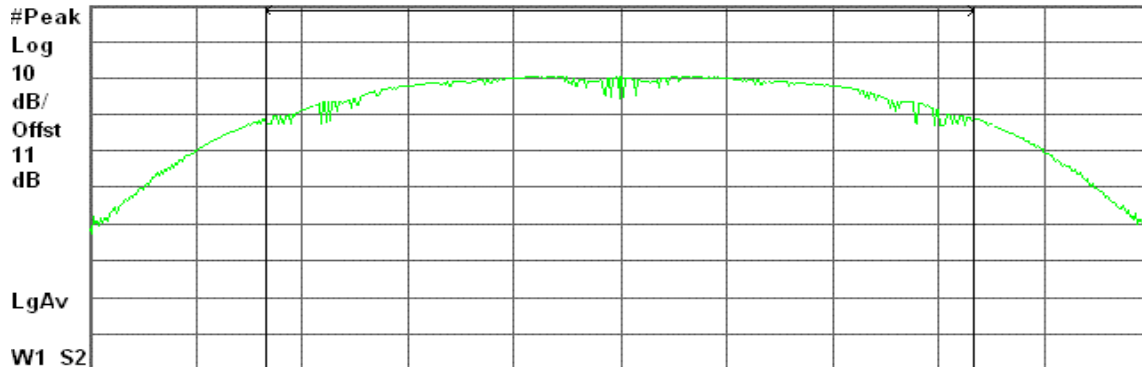
* Agilent 17:21:25 Sep 6, 2007

R T

Peak Output Power , b Mode Mid Ch.

Ref 20 dBm

Atten 20 dB



Channel Power

Power Spectral Density

9.04 dBm / 13.2890 MHz

-62.19 dBm/Hz

**Peak Power (CH High)**

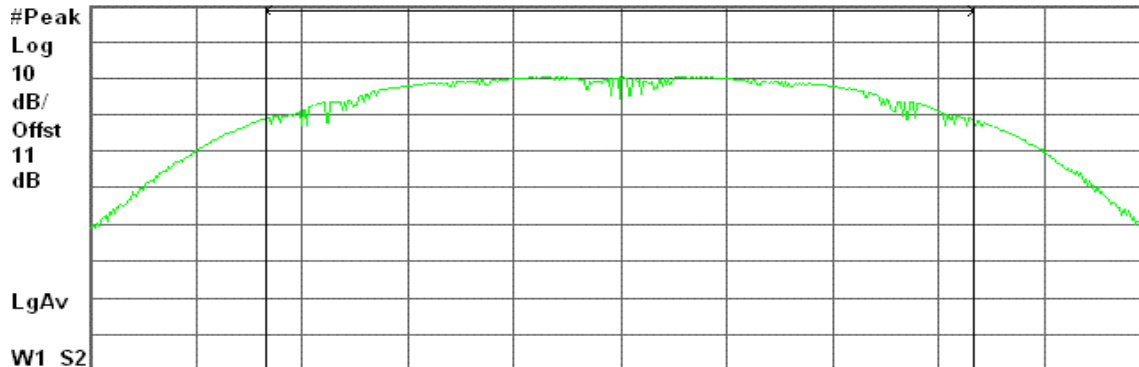
Agilent 17:29:08 Sep 6, 2007

R T

Peak Output Power , b Mode High Ch.

Ref 20 dBm

Atten 20 dB



Center 2.462 00 GHz

Span 19.92 MHz

#Res BW 1 MHz

#VBW 3 MHz

Sweep 1 ms (601 pts)

Channel Power

Power Spectral Density

8.98 dBm / 13.2800 MHz

-62.25 dBm/Hz

IEEE 802.11g mode**Peak Power (CH Low)**

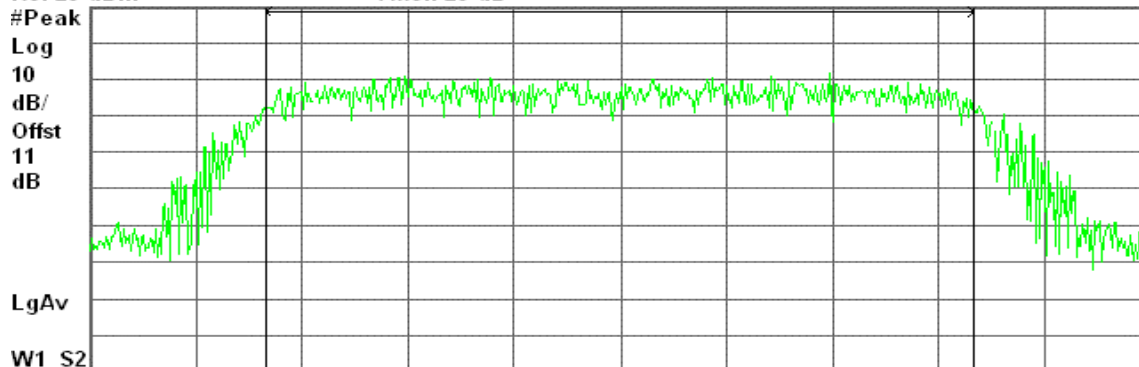
Agilent 17:09:46 Sep 6, 2007

R T

Peak Output Power , g Mode Low Ch.

Ref 20 dBm

Atten 20 dB



Center 2.412 00 GHz

Span 24.94 MHz

#Res BW 1 MHz

#VBW 3 MHz

Sweep 1 ms (601 pts)

Channel Power

Power Spectral Density

8.43 dBm / 16.6280 MHz

-63.78 dBm/Hz

**Peak Power (CH Mid)**

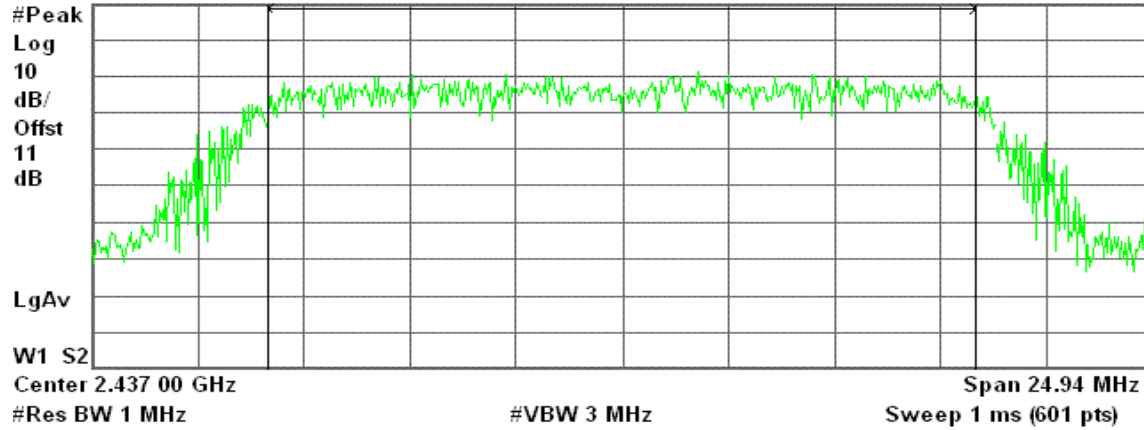
* Agilent 17:04:37 Sep 6, 2007

R T

Peak Output Power , g Mode Mid Ch.

Ref 20 dBm

Atten 20 dB



Channel Power

Power Spectral Density

8.13 dBm / 16.6280 MHz

-64.08 dBm/Hz

Peak Power (CH High)

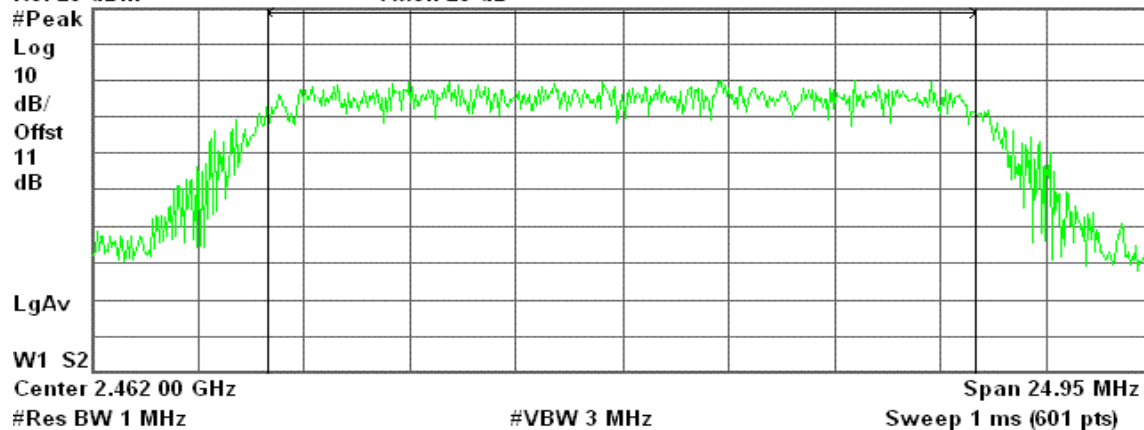
* Agilent 16:58:58 Sep 6, 2007

R T

Peak Output Power , g Mode High Ch.

Ref 20 dBm

Atten 20 dB



Channel Power

Power Spectral Density

7.60 dBm / 16.6320 MHz

-64.61 dBm/Hz

**draft 802.11n Standard-20 MHz Channel mode / Chain 0****Peak Power (CH Low)**

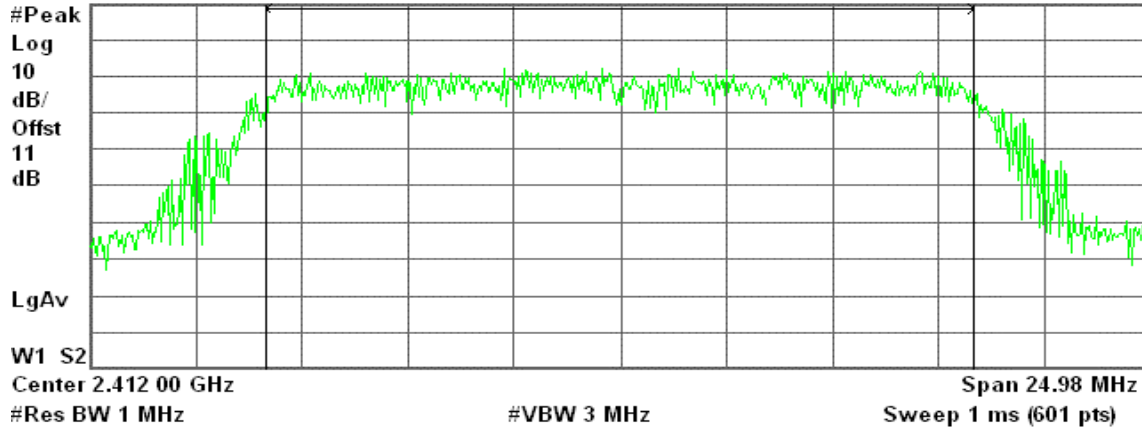
* Agilent 17:40:39 Sep 6, 2007

R T

Peak Output Power , g Mode Low Ch.

Ref 20 dBm

Atten 20 dB



Channel Power

Power Spectral Density

9.82 dBm / 16.6550 MHz

-62.39 dBm/Hz

Peak Power (CH Mid)

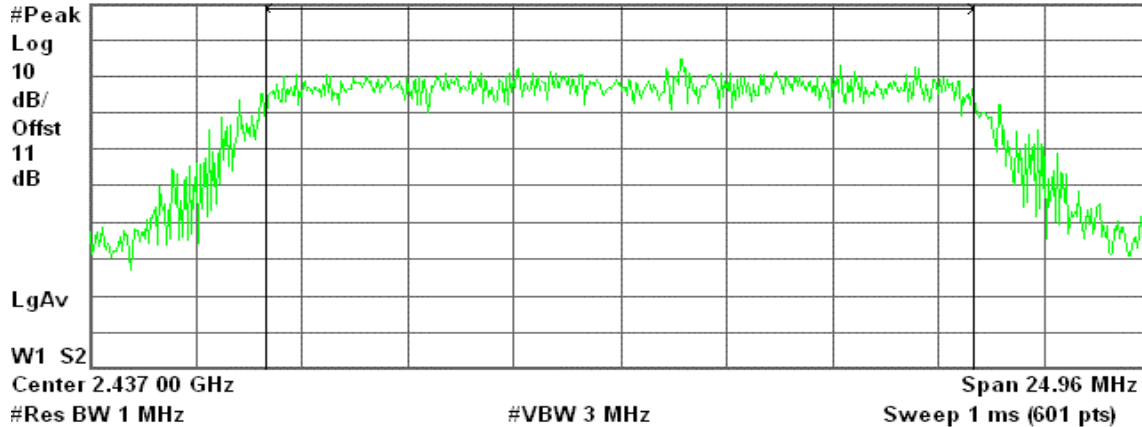
* Agilent 17:45:59 Sep 6, 2007

R T

Peak Output Power , g Mode Mid Ch.

Ref 20 dBm

Atten 20 dB



Channel Power

Power Spectral Density

9.82 dBm / 16.6370 MHz

-62.39 dBm/Hz

**Peak Power (CH High)**

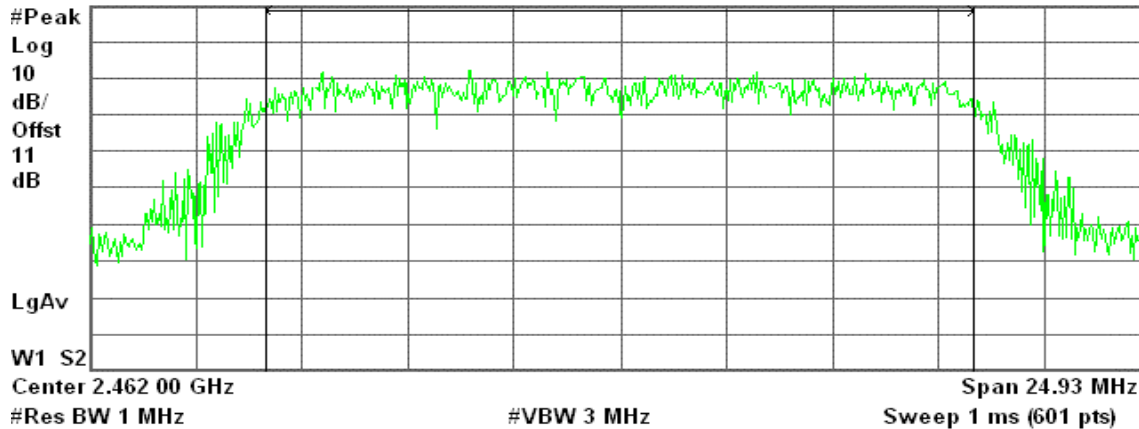
* Agilent 17:51:25 Sep 6, 2007

R T

Peak Output Power , g Mode High Ch.

Ref 20 dBm

Atten 20 dB



Channel Power

Power Spectral Density

9.25 dBm / 16.6170 MHz

-62.95 dBm/Hz

draft 802.11n Standard-20 MHz Channel mode / Chain 1**Peak Power (CH Low)**

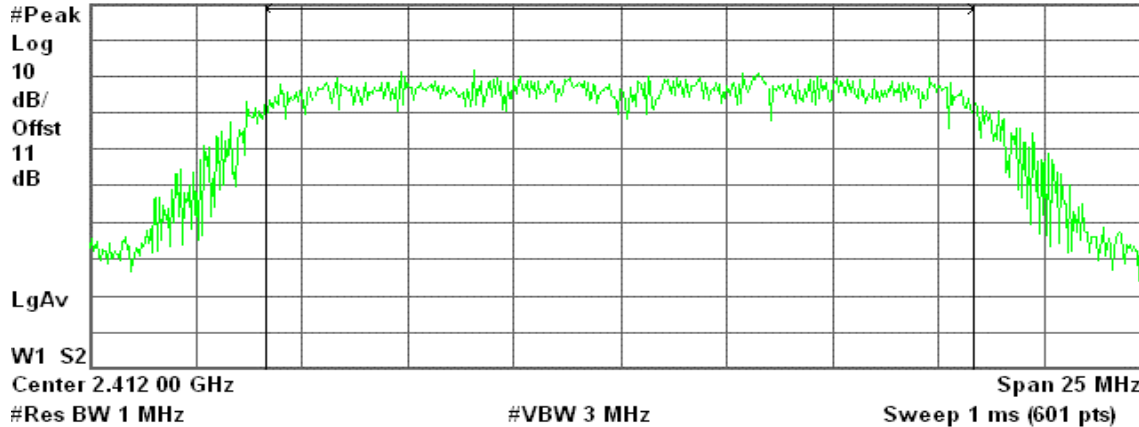
* Agilent 18:07:09 Sep 6, 2007

R T

Peak Output Power , g Mode Low Ch.

Ref 20 dBm

Atten 20 dB



Channel Power

Power Spectral Density

8.62 dBm / 16.6660 MHz

-63.60 dBm/Hz

**Peak Power (CH Mid)**

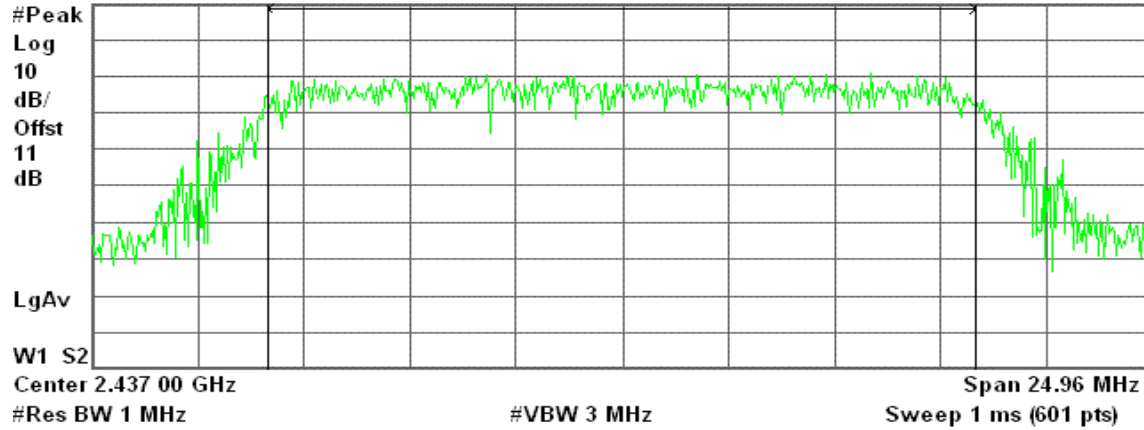
* Agilent 18:02:16 Sep 6, 2007

R T

Peak Output Power , g Mode Mid Ch.

Ref 20 dBm

Atten 20 dB



Channel Power

8.44 dBm / 16.6410 MHz

Power Spectral Density

-63.77 dBm/Hz

Peak Power (CH High)

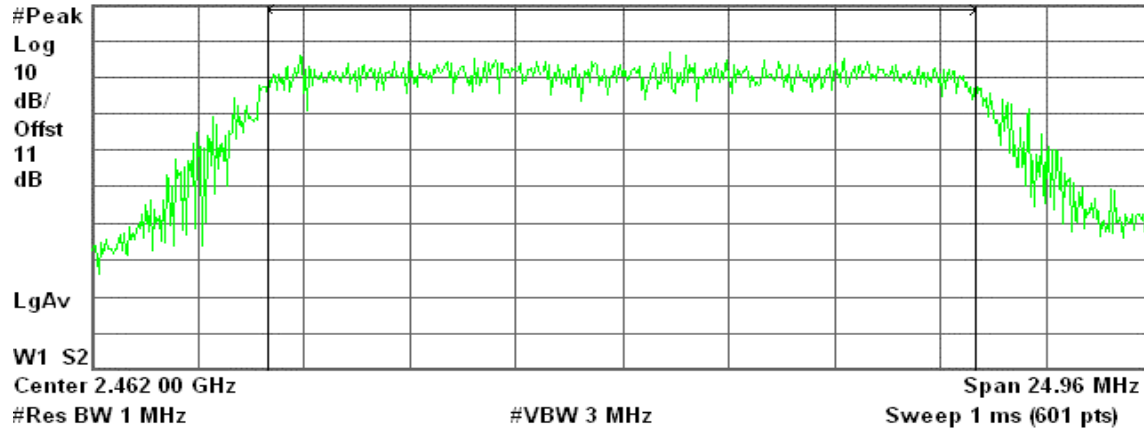
* Agilent 17:57:13 Sep 6, 2007

R T

Peak Output Power , g Mode High Ch.

Ref 20 dBm

Atten 20 dB



Channel Power

13.24 dBm / 16.6390 MHz

Power Spectral Density

-58.98 dBm/Hz

**draft 802.11n Wide-40 MHz Channel mode / Chain 0****Peak Power (CH Low)**

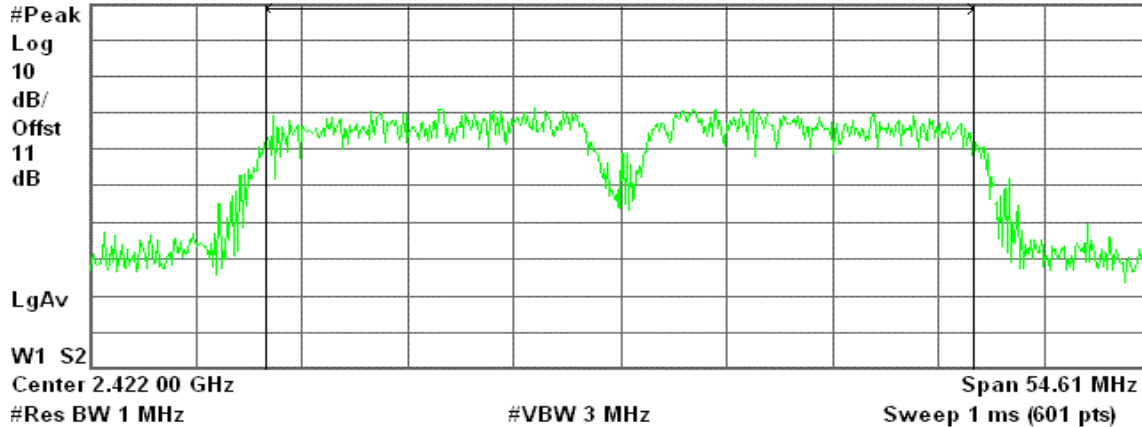
* Agilent 18:59:42 Sep 6, 2007

R T

Peak Output Power , g Mode Low Ch.

Ref 20 dBm

Atten 20 dB



Channel Power

Power Spectral Density

1.82 dBm / 36.4090 MHz

-73.80 dBm/Hz

Peak Power (CH Mid)

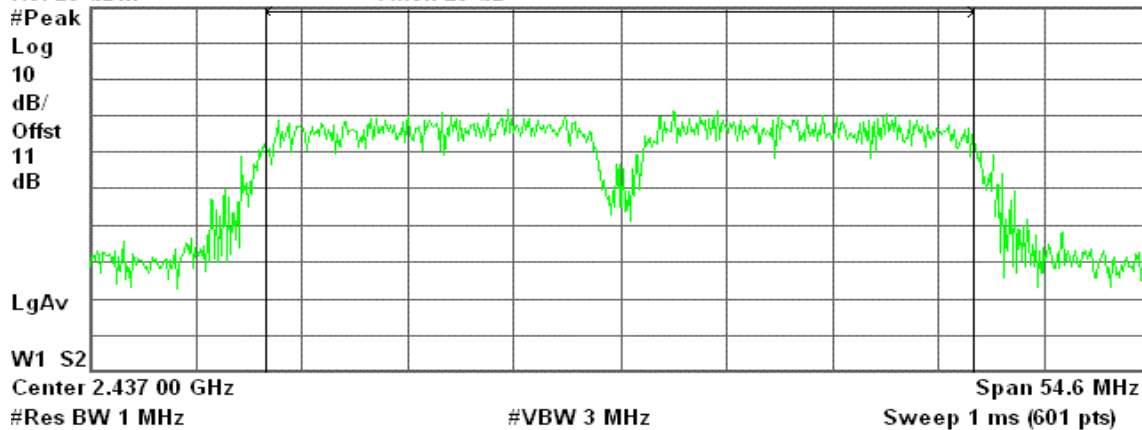
* Agilent 18:53:35 Sep 6, 2007

R T

Peak Output Power , g Mode Mid Ch.

Ref 20 dBm

Atten 20 dB



Channel Power

Power Spectral Density

1.55 dBm / 36.3990 MHz

-74.06 dBm/Hz

**Peak Power (CH High)**

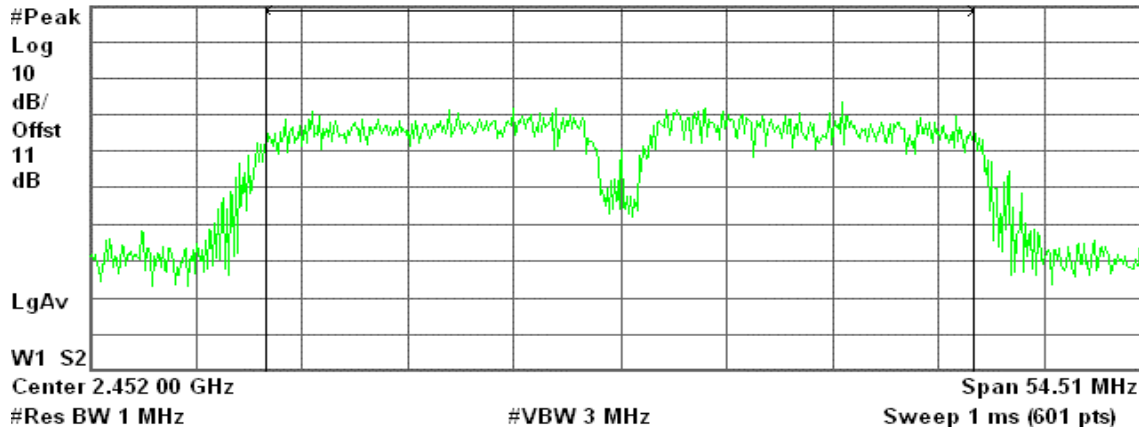
* Agilent 18:48:07 Sep 6, 2007

R T

Peak Output Power , g Mode High Ch.

Ref 20 dBm

Atten 20 dB



Channel Power

1.89 dBm / 36.3430 MHz

Power Spectral Density

-73.71 dBm/Hz

draft 802.11n Wide-40 MHz Channel mode / Chain 1**Peak Power (CH Low)**

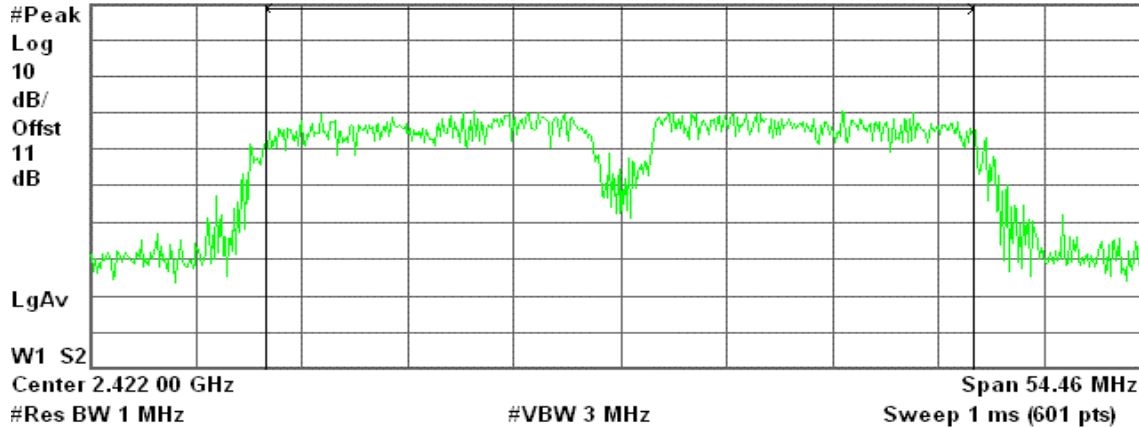
* Agilent 18:28:57 Sep 6, 2007

R T

Peak Output Power , g Mode Low Ch.

Ref 20 dBm

Atten 20 dB



Channel Power

1.43 dBm / 36.3050 MHz

Power Spectral Density

-74.17 dBm/Hz

**Peak Power (CH Mid)**

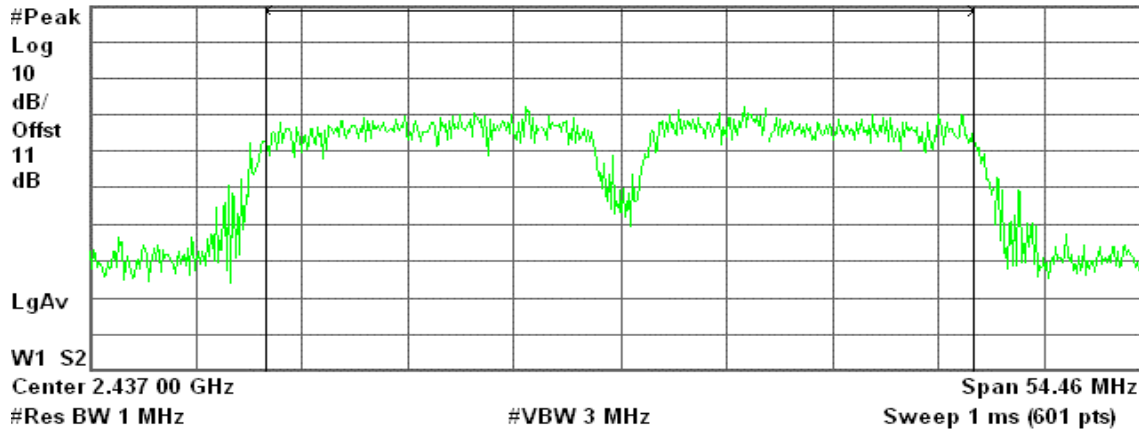
* Agilent 18:33:59 Sep 6, 2007

R T

Peak Output Power , g Mode Mid Ch.

Ref 20 dBm

Atten 20 dB



Channel Power

Power Spectral Density

1.66 dBm / 36.3060 MHz

-73.94 dBm/Hz

Peak Power (CH High)

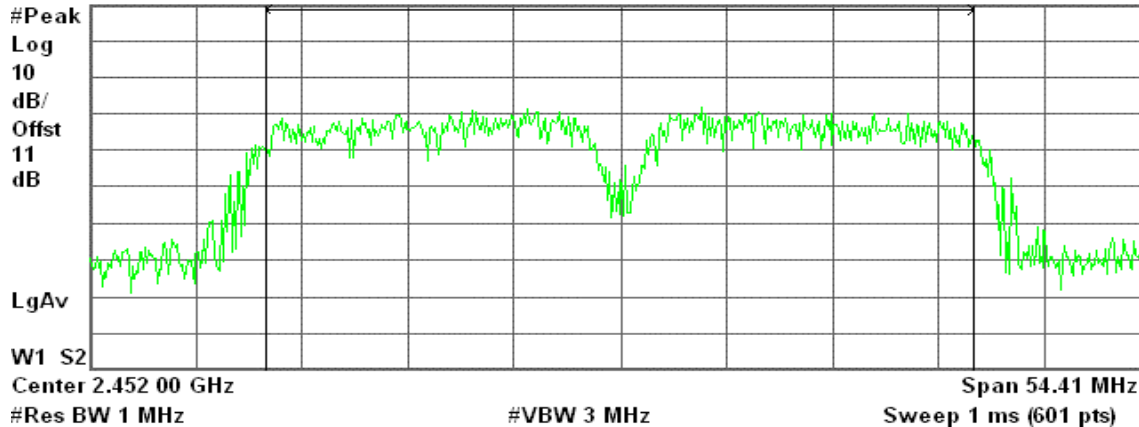
* Agilent 18:41:21 Sep 6, 2007

R T

Peak Output Power , g Mode High Ch.

Ref 20 dBm

Atten 20 dB



Channel Power

Power Spectral Density

1.71 dBm / 36.2730 MHz

-73.89 dBm/Hz

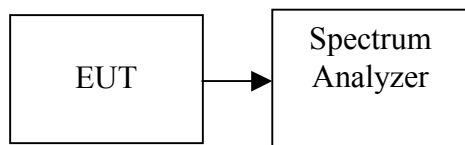


7.3 AVERAGE POWER

LIMIT

None; for reporting purposes only.

Test Configuration



TEST PROCEDURE

The transmitter output is connected to the Spectrum analyzer. The Spectrum analyzer is set to the average power detection.



TEST RESULTS

No non-compliance noted

Test Data

Test mode: IEEE 802.11b mode

Channel	Frequency (MHz)	Output Power (dBm)	Output Power (W)	Result
Low	2412	6.26	0.0042	PASS
Mid	2437	6.39	0.0044	PASS
High	2462	6.44	0.0044	PASS

Test mode: IEEE 802.11g mode

Channel	Frequency (MHz)	Output Power (dBm)	Output Power (W)	Result
Low	2412	4.59	0.0029	PASS
Mid	2437	4.59	0.0029	PASS
High	2462	4.36	0.0027	PASS

Test mode: draft 802.11n Standard-20 MHz Channel mode

Channel	Frequency (MHz)	Chain 0 Output Power (dBm)	Chain 1 Output Power (dBm)	Output Power (dBm)	Output Power (W)	Result
Low	2412	6.58	4.68	8.74	0.0075	PASS
Mid	2437	6.12	4.93	8.58	0.0072	PASS
High	2462	5.74	9.57	11.07	0.0128	PASS

Test mode: draft 802.11n Wide-40 MHz Channel mode

Channel	Frequency (MHz)	Chain 0 Output Power (dBm)	Chain 1 Output Power (dBm)	Output Power (dBm)	Output Power (W)	Result
Low	2422	-1.92	-1.99	1.06	0.0013	PASS
Mid	2437	-1.86	-1.95	1.11	0.0013	PASS
High	2452	-1.5	-1.96	1.29	0.0013	PASS

**Test Plot****IEEE 802.11b mode****Average Power (CH Low)**

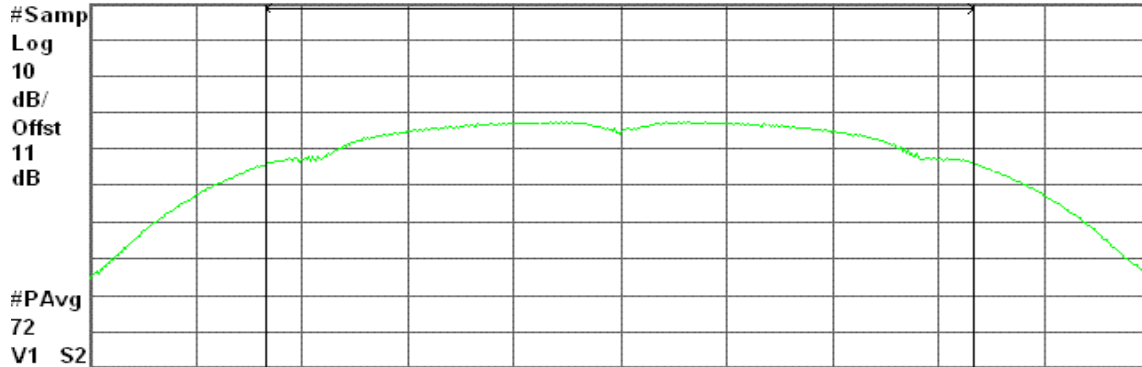
* Agilent 17:16:48 Sep 6, 2007

R T

AVG Output Power , b Mode Low Ch.

Ref 30 dBm

Atten 30 dB



Center 2.412 00 GHz

Span 19.94 MHz

#Res BW 1 MHz

#VBW 3 MHz

Sweep 1 ms (601 pts)

Channel Power

Power Spectral Density

6.26 dBm / 13.2960 MHz

-64.98 dBm/Hz

Average Power (CH Mid)

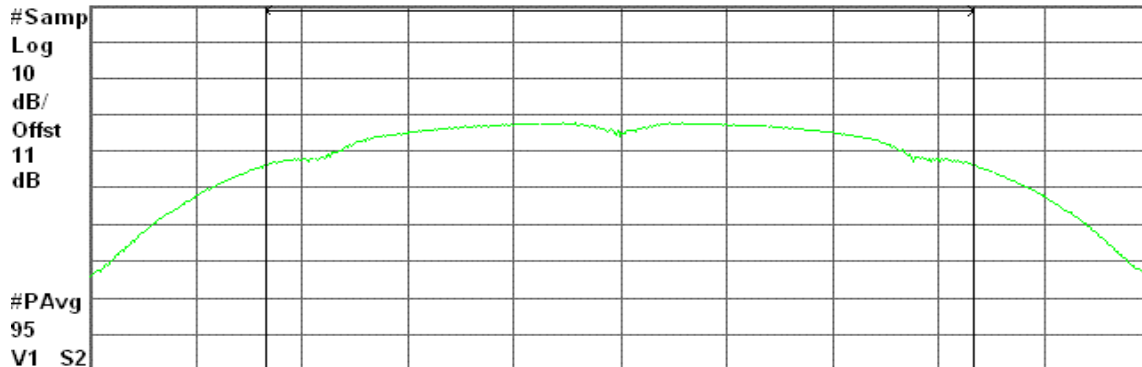
* Agilent 17:22:02 Sep 6, 2007

R T

AVG Output Power , b Mode Mid Ch.

Ref 30 dBm

Atten 30 dB



Center 2.437 00 GHz

Span 19.93 MHz

#Res BW 1 MHz

#VBW 3 MHz

Sweep 1 ms (601 pts)

Channel Power

Power Spectral Density

6.39 dBm / 13.2890 MHz

-64.84 dBm/Hz

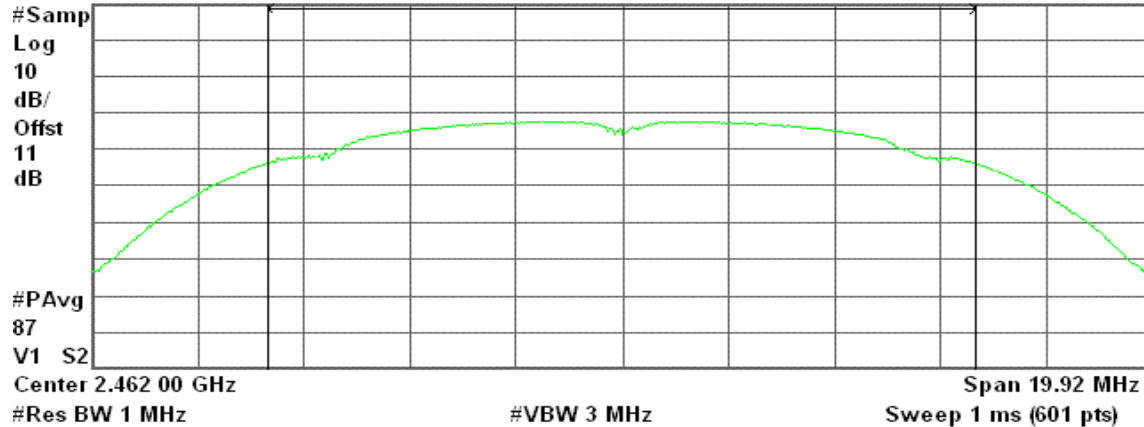
**Average Power (CH High)**

Agilent 17:29:53 Sep 6, 2007
AVG Output Power , b Mode High Ch.

R T

Ref 30 dBm

Atten 30 dB



Channel Power

Power Spectral Density

6.44 dBm / 13.2800 MHz

-64.79 dBm/Hz

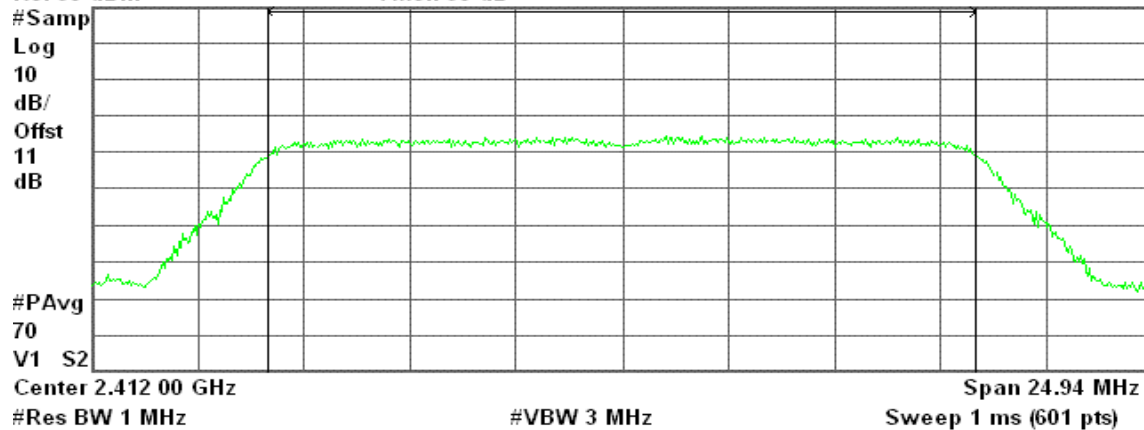
IEEE 802.11g mode**Average Power (CH Low)**

Agilent 17:10:25 Sep 6, 2007
AVG Output Power , g Mode Low Ch.

R T

Ref 30 dBm

Atten 30 dB



Channel Power

Power Spectral Density

4.59 dBm / 16.6280 MHz

-67.62 dBm/Hz

**Average Power (CH Mid)**

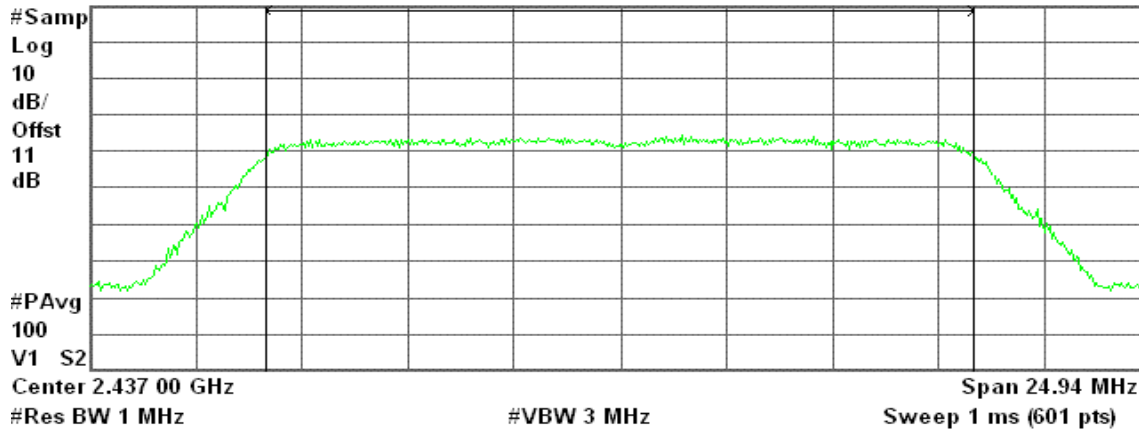
* Agilent 17:05:21 Sep 6, 2007

R T

AVG Output Power , g Mode Mid Ch.

Ref 30 dBm

Atten 30 dB



Channel Power

Power Spectral Density

4.59 dBm / 16.6280 MHz

-67.62 dBm/Hz

Average Power (CH High)

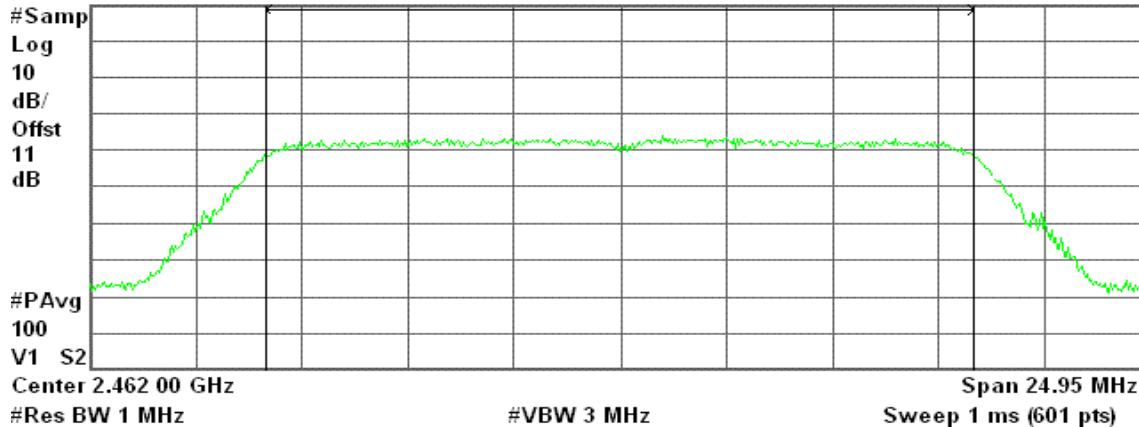
* Agilent 16:59:44 Sep 6, 2007

R L

AVG Output Power , g Mode High Ch.

Ref 30 dBm

Atten 30 dB



Channel Power

Power Spectral Density

4.36 dBm / 16.6320 MHz

-67.85 dBm/Hz

**draft 802.11n Standard-20 MHz Channel mode / Chain 0****Average Power (CH Low)**

* Agilent 17:41:19 Sep 6, 2007

R T

AVG Output Power , g Mode Low Ch.

Ref 30 dBm

Atten 30 dB

#Samp

Log

10

dB/

Offst

11

dB

#PAvg

74

V1 S2

Center 2.412 00 GHz

Span 24.98 MHz

#Res BW 1 MHz

#VBW 3 MHz

Sweep 1 ms (601 pts)

Channel Power

Power Spectral Density

6.58 dBm / 16.6550 MHz

-65.64 dBm/Hz

Average Power (CH Mid)

* Agilent 17:46:36 Sep 6, 2007

R T

AVG Output Power , g Mode Mid Ch.

Ref 30 dBm

Atten 30 dB

#Samp

Log

10

dB/

Offst

11

dB

#PAvg

67

V1 S2

Center 2.437 00 GHz

Span 24.96 MHz

#Res BW 1 MHz

#VBW 3 MHz

Sweep 1 ms (601 pts)

Channel Power

Power Spectral Density

6.12 dBm / 16.6370 MHz

-66.09 dBm/Hz

**Average Power (CH High)**

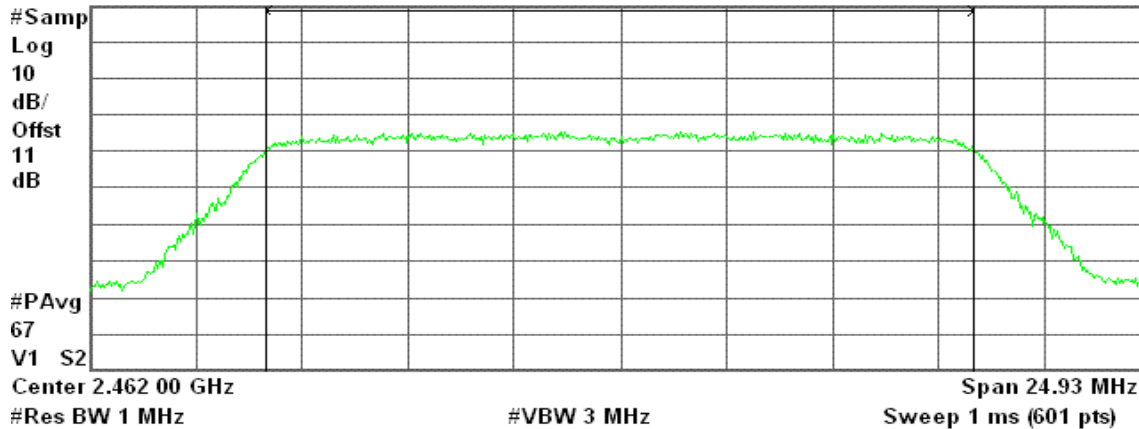
* Agilent 17:52:02 Sep 6, 2007

R T

AVG Output Power , g Mode High Ch.

Ref 30 dBm

Atten 30 dB



Channel Power

Power Spectral Density

5.74 dBm / 16.6170 MHz

-66.46 dBm/Hz

draft 802.11n Standard-20 MHz Channel mode / Chain 1**Average Power (CH Low)**

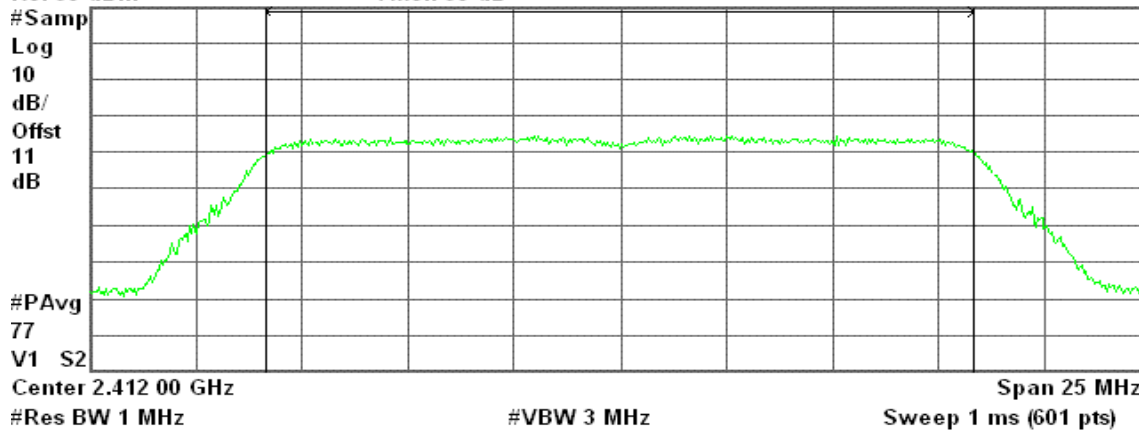
* Agilent 18:07:42 Sep 6, 2007

R T

AVG Output Power , g Mode Low Ch.

Ref 30 dBm

Atten 30 dB



Channel Power

Power Spectral Density

4.68 dBm / 16.6660 MHz

-67.54 dBm/Hz

**Average Power (CH Mid)**

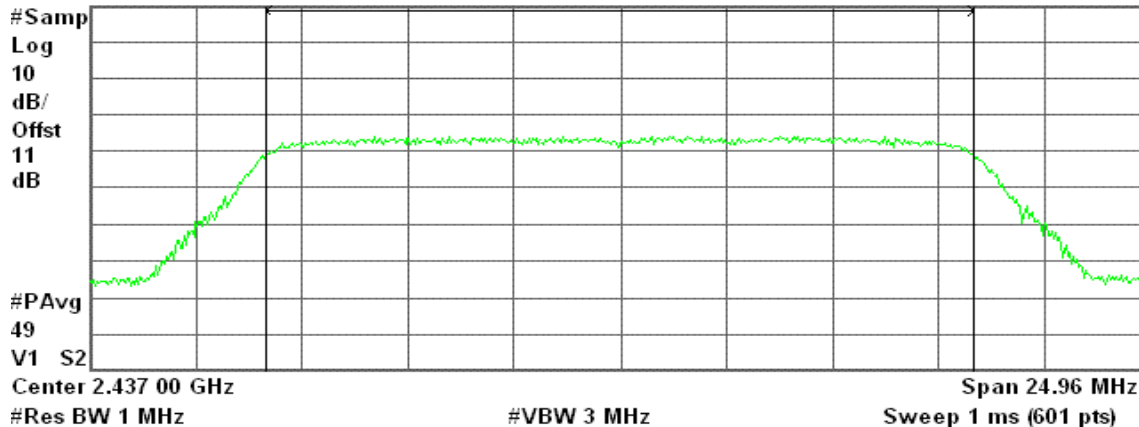
* Agilent 18:02:48 Sep 6, 2007

R T

AVG Output Power , g Mode Mid Ch.

Ref 30 dBm

Atten 30 dB



Channel Power

4.93 dBm / 16.6410 MHz

Power Spectral Density

-67.28 dBm/Hz

Average Power (CH High)

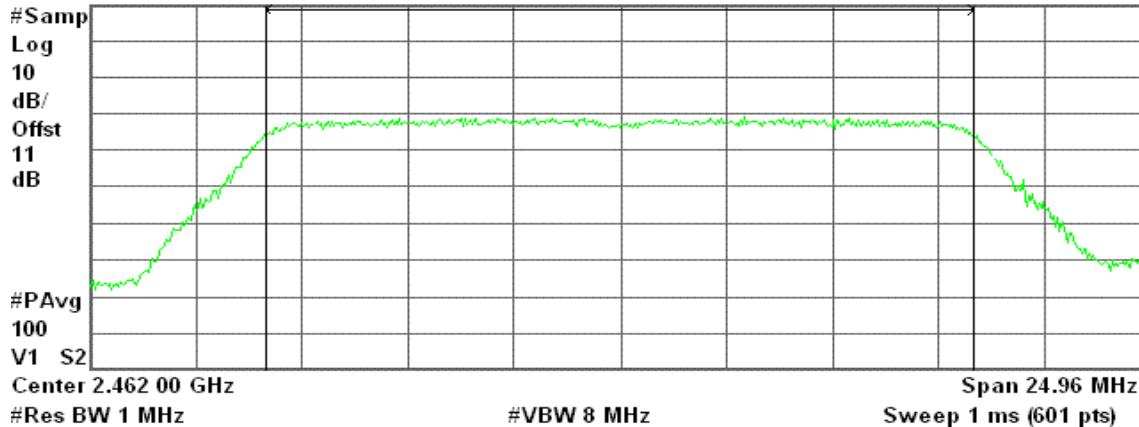
* Agilent 17:57:38 Sep 6, 2007

R T

AVG Output Power , g Mode High Ch.

Ref 30 dBm

Atten 30 dB



Channel Power

9.57 dBm / 16.6390 MHz

Power Spectral Density

-62.64 dBm/Hz

**draft 802.11n Wide-40 MHz Channel mode / Chain 0****Average Power (CH Low)**

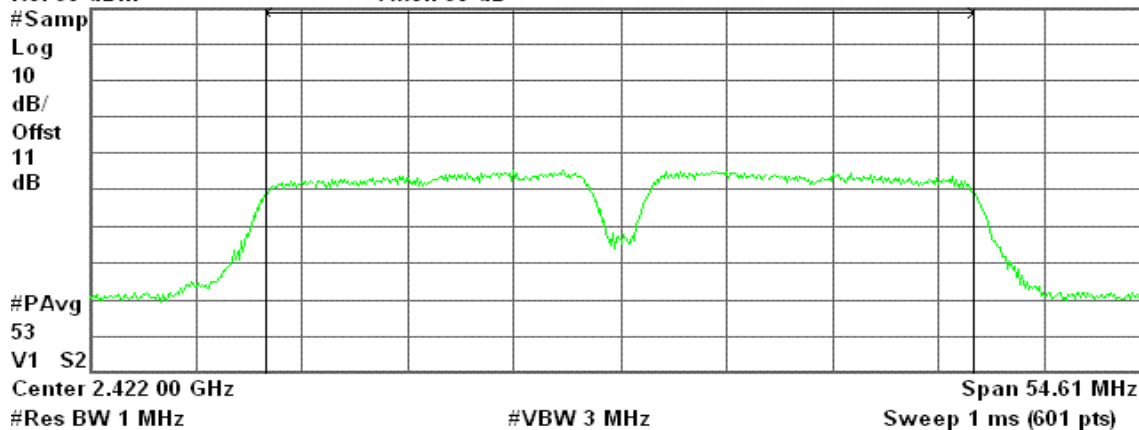
* Agilent 19:00:16 Sep 6, 2007

R T

AVG Output Power , g Mode Low Ch.

Ref 30 dBm

Atten 30 dB



Channel Power

Power Spectral Density

-1.92 dBm / 36.4090 MHz

-77.53 dBm/Hz

Average Power (CH Mid)

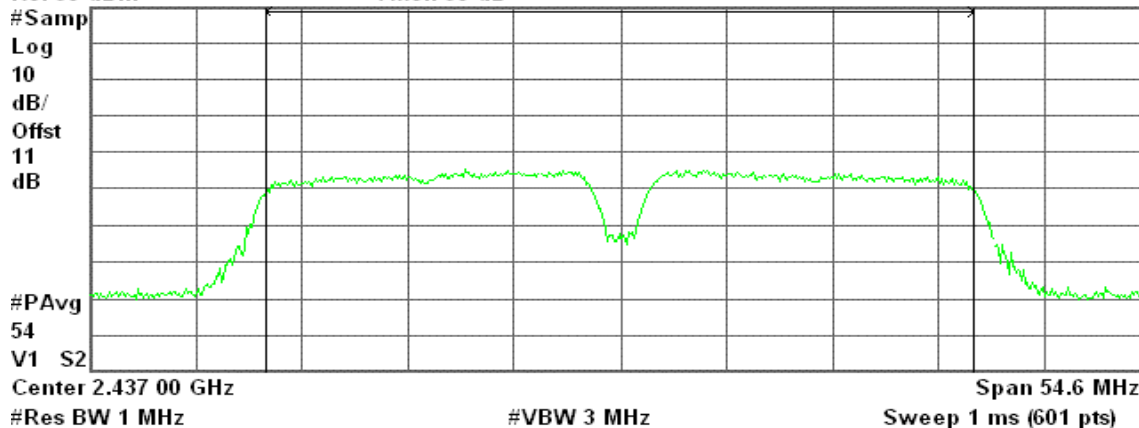
* Agilent 18:54:06 Sep 6, 2007

R T

AVG Output Power , g Mode Mid Ch.

Ref 30 dBm

Atten 30 dB



Channel Power

Power Spectral Density

-1.86 dBm / 36.3990 MHz

-77.47 dBm/Hz

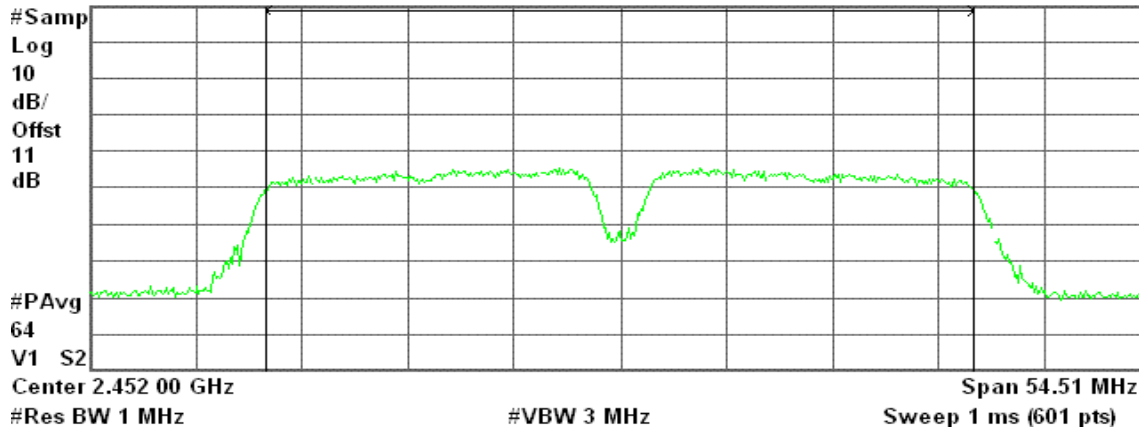
**Average Power (CH High)**

Agilent 18:48:42 Sep 6, 2007
AVG Output Power , g Mode High Ch.

R T

Ref 30 dBm

Atten 30 dB



Channel Power

-1.50 dBm / 36.3430 MHz

Power Spectral Density

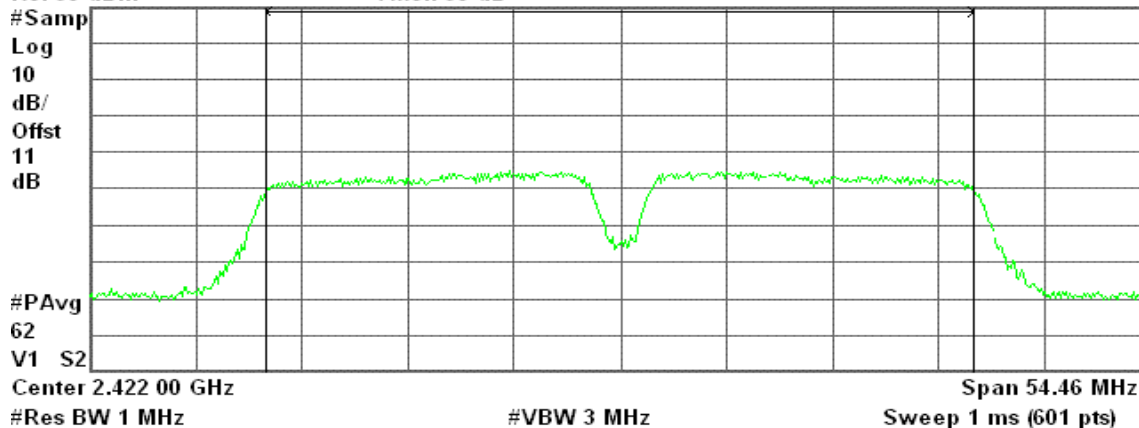
-77.10 dBm/Hz**draft 802.11n Wide-40 MHz Channel mode / Chain 1****Average Power (CH Low)**

Agilent 18:29:30 Sep 6, 2007
AVG Output Power , g Mode Low Ch.

R T

Ref 30 dBm

Atten 30 dB



Channel Power

-1.99 dBm / 36.3050 MHz

Power Spectral Density

-77.59 dBm/Hz

**Average Power (CH Mid)**

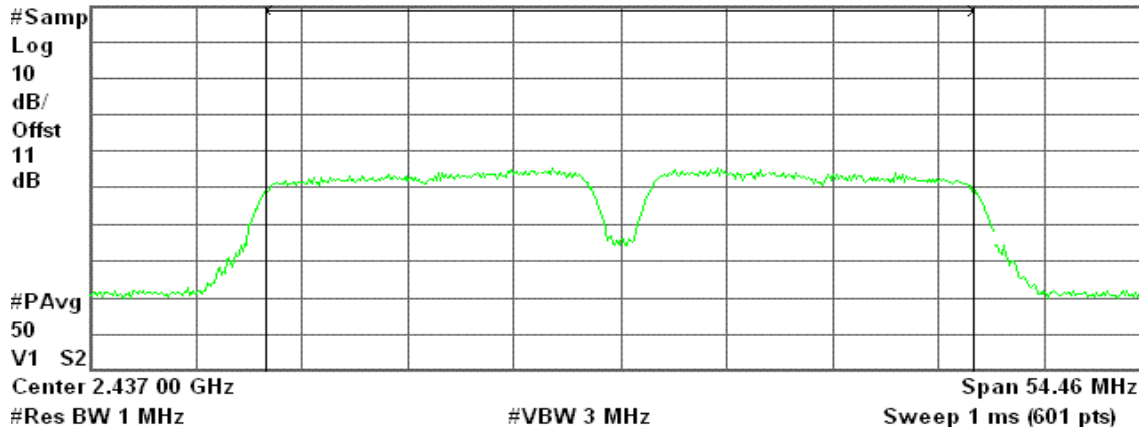
* Agilent 18:34:37 Sep 6, 2007

R T

AVG Output Power , g Mode Mid Ch.

Ref 30 dBm

Atten 30 dB



Channel Power

-1.95 dBm / 36.3060 MHz

Power Spectral Density

-77.55 dBm/Hz

Average Power (CH High)

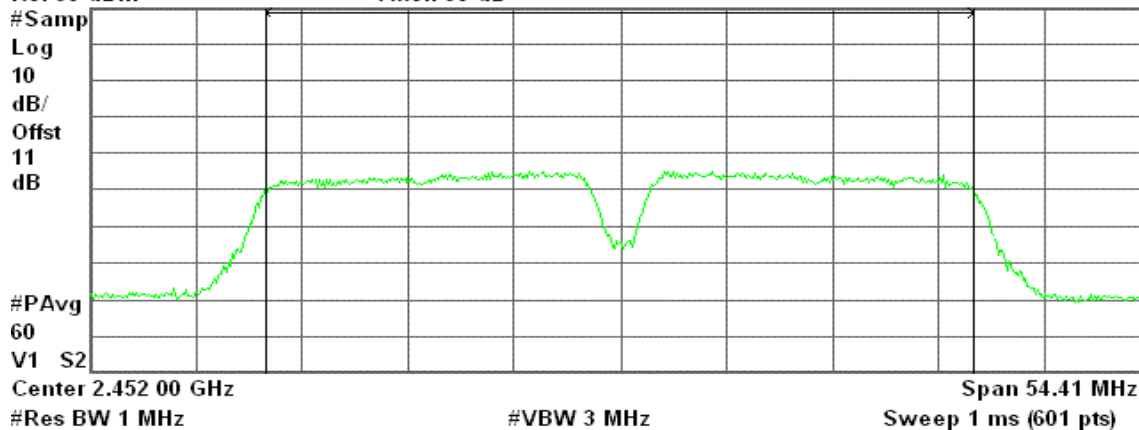
* Agilent 18:41:56 Sep 6, 2007

R T

AVG Output Power , g Mode High Ch.

Ref 30 dBm

Atten 30 dB



Channel Power

-1.96 dBm / 36.2730 MHz

Power Spectral Density

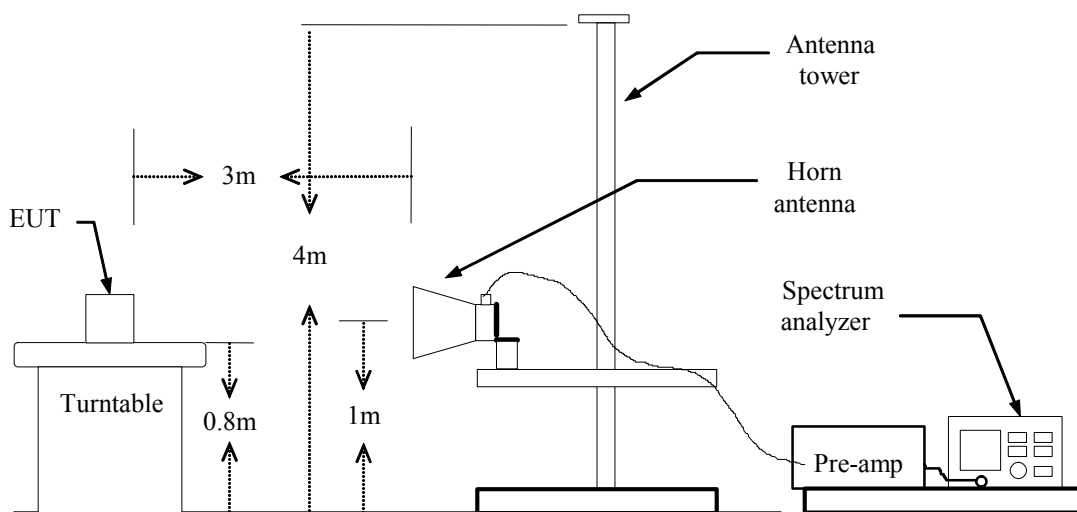
-77.55 dBm/Hz

7.4 BAND EDGES MEASUREMENT

LIMIT

According to §15.247(d), in any 100 kHz bandwidth outside the frequency bands in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in 15.209(a) (see Section 15.205(c)).

Test Configuration



TEST PROCEDURE

1. The EUT is placed on a turntable, which is 0.8m above the ground plane.
2. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
3. EUT is set 3m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emission.
4. Set the spectrum analyzer in the following setting in order to capture the lower and upper band-edges of the emission:
 - (a) PEAK: RBW=VBW=1MHz / Sweep=AUTO
 - (b) AVERAGE: RBW=1MHz / VBW=10Hz / Sweep=AUTO
5. Repeat the procedures until all the PEAK and AVERAGE versus POLARIZATION are measured.

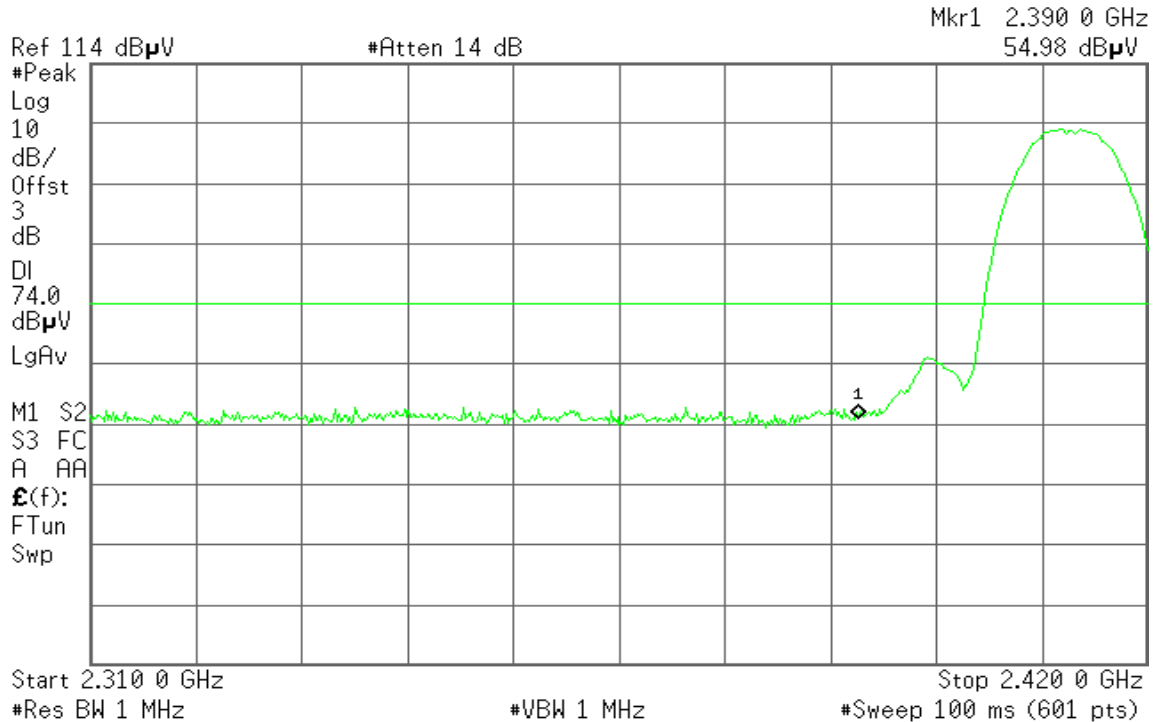
TEST RESULTS

Refer to attach spectrum analyzer data chart.

**Band Edges (IEEE 802.11b mode / CH Low)****Detector mode: Peak****Polarity: Vertical**

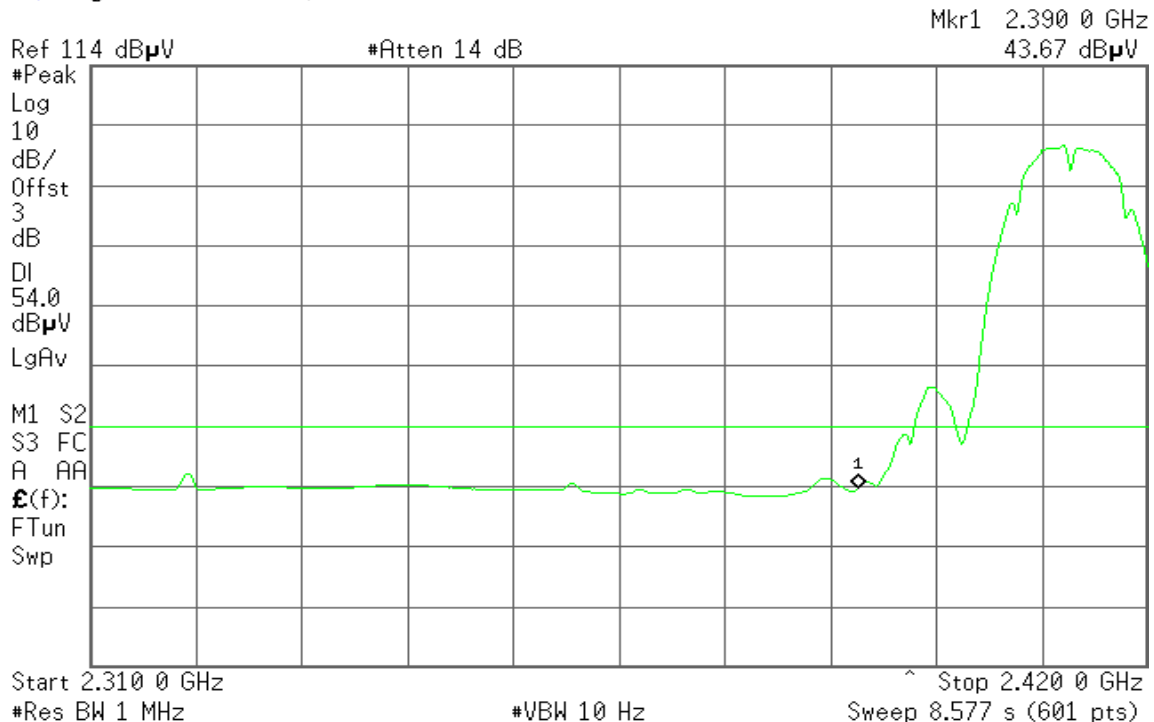
* Agilent 19:49:53 Sep 4, 2007

R T

**Detector mode: Average****Polarity: Vertical**

* Agilent 19:49:06 Sep 4, 2007

R T



**Detector mode: Peak****Polarity: Horizontal**

* Agilent 19:47:41 Sep 4, 2007

R T

Mkr1 2.390 0 GHz
49.06 dB μ VRef 114 dB μ V

#Atten 14 dB

#Peak

Log

10

dB/

Offst

3

dB

DI

74.0

dB μ V

LgAv

M1 S2

S3 FC

A AA

 $\mathcal{E}(f)$:

FTun

Swp

Start 2.310 0 GHz

#Res BW 1 MHz

#VBW 1 MHz

Stop 2.420 0 GHz

#Sweep 100 ms (601 pts)

Detector mode: Average**Polarity: Horizontal**

* Agilent 19:48:12 Sep 4, 2007

R T

Mkr1 2.390 0 GHz
36.97 dB μ VRef 114 dB μ V

#Atten 14 dB

#Peak

Log

10

dB/

Offst

3

dB

DI

54.0

dB μ V

LgAv

M1 S2

S3 FC

A AA

 $\mathcal{E}(f)$:

FTun

Swp

Start 2.310 0 GHz

#Res BW 1 MHz

#VBW 10 Hz

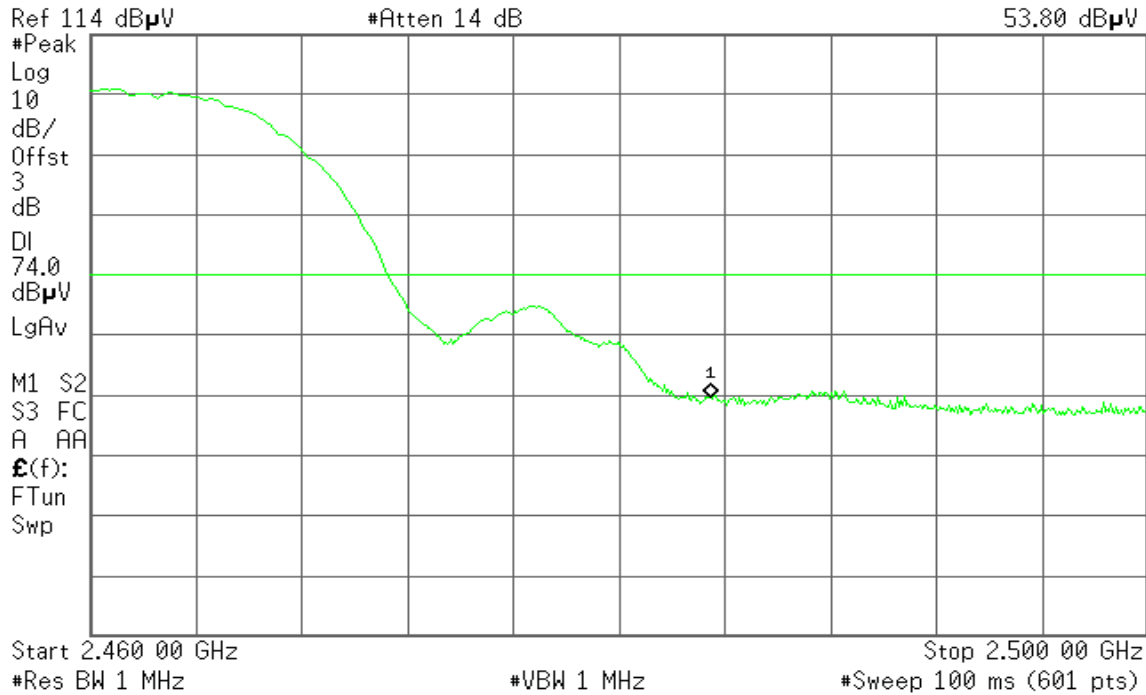
Stop 2.420 0 GHz

Sweep 8.577 s (601 pts)

**Band Edges (IEEE 802.11b mode / CH High)****Detector mode: Peak****Polarity: Vertical**

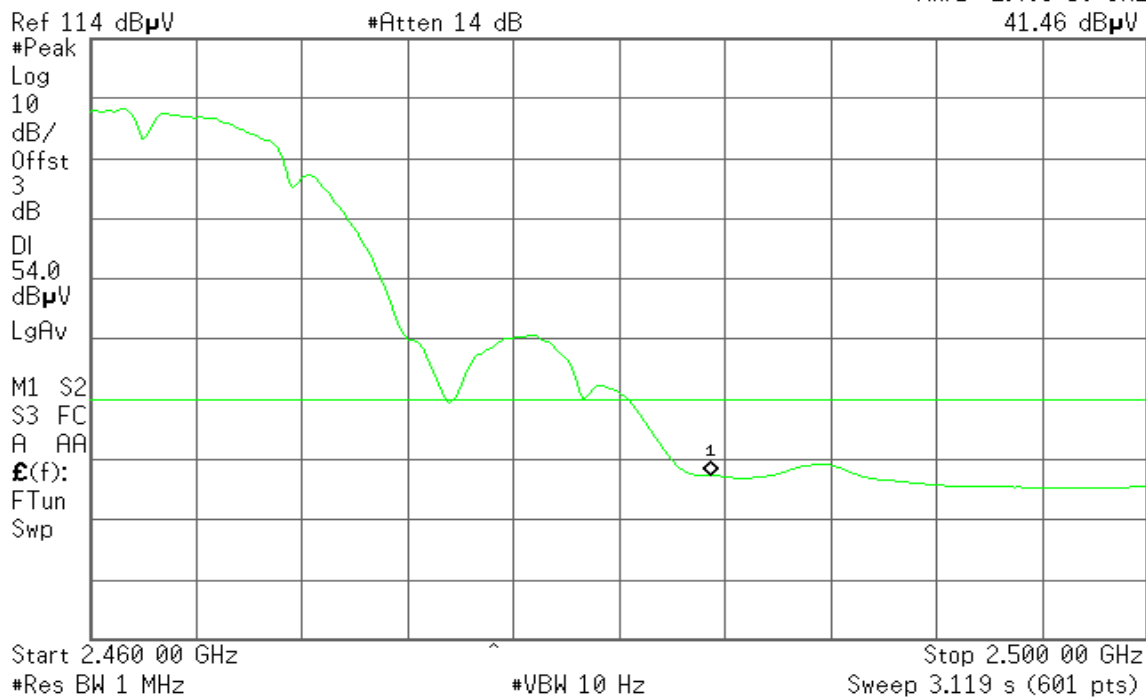
* Agilent 19:41:58 Sep 4, 2007

R T

Mkr1 2.483 50 GHz
53.80 dB μ V**Detector mode: Average****Polarity: Vertical**

* Agilent 19:42:32 Sep 4, 2007

R T

Mkr1 2.483 50 GHz
41.46 dB μ V

**Detector mode: Peak****Polarity: Horizontal**

* Agilent 19:44:26 Sep 4, 2007

R T

Mkr1 2.483 50 GHz
47.94 dB μ VRef 114 dB μ V

#Atten 14 dB

#Peak

Log

10

dB/

Offst

3

dB

DI

74.0

dB μ V

LgAv

M1 S2

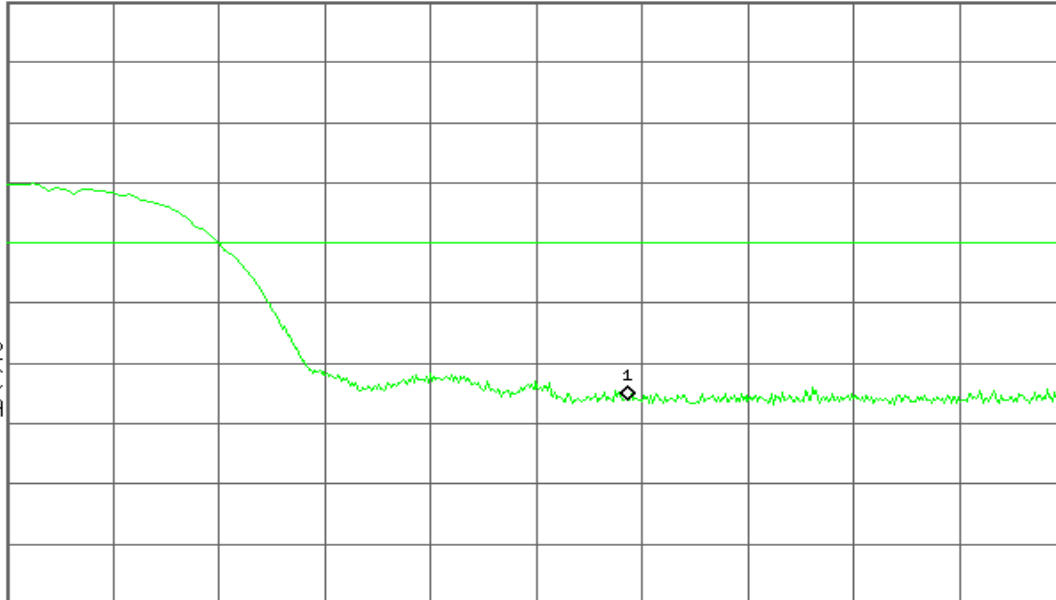
S3 FC

A AA

£(f):

FTun

Swp



Start 2.460 00 GHz

Stop 2.500 00 GHz

#Res BW 1 MHz

#VBW 1 MHz

#Sweep 100 ms (601 pts)

Detector mode: Average**Polarity: Horizontal**

* Agilent 19:43:53 Sep 4, 2007

R T

Mkr1 2.483 50 GHz
36.24 dB μ VRef 114 dB μ V

#Atten 14 dB

#Peak

Log

10

dB/

Offst

3

dB

DI

54.0

dB μ V

LgAv

M1 S2

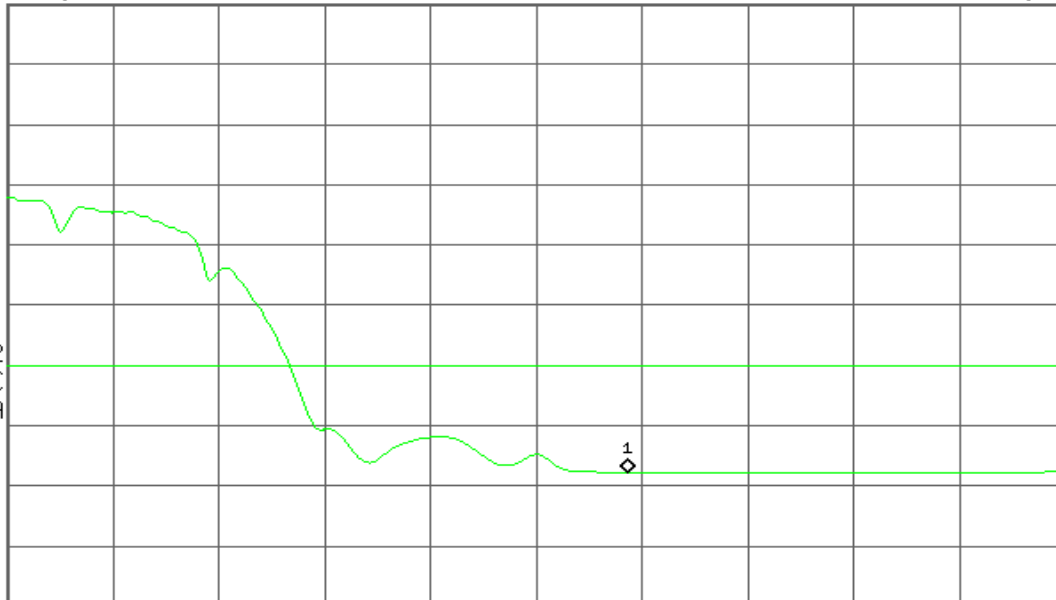
S3 FC

A AA

£(f):

FTun

Swp



Start 2.460 00 GHz

Stop 2.500 00 GHz

#Res BW 1 MHz

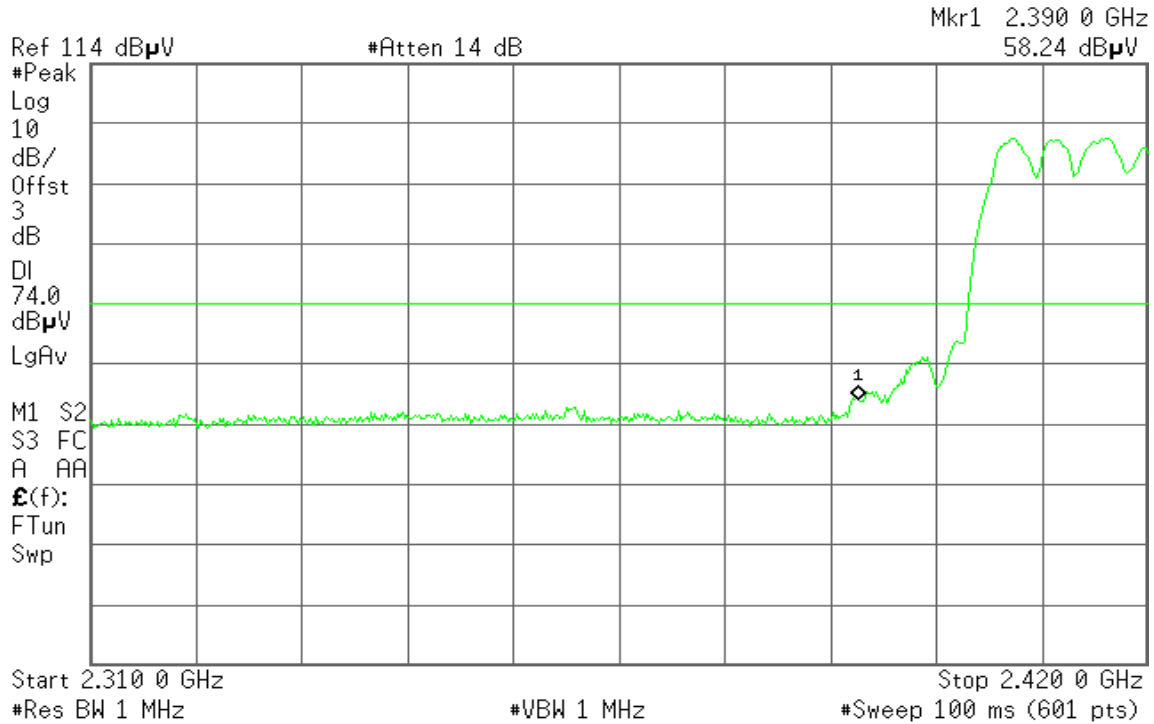
#VBW 10 Hz

Sweep 3.119 s (601 pts)

**Band Edges (IEEE 802.11g mode / CH Low)****Detector mode: Peak****Polarity: Vertical**

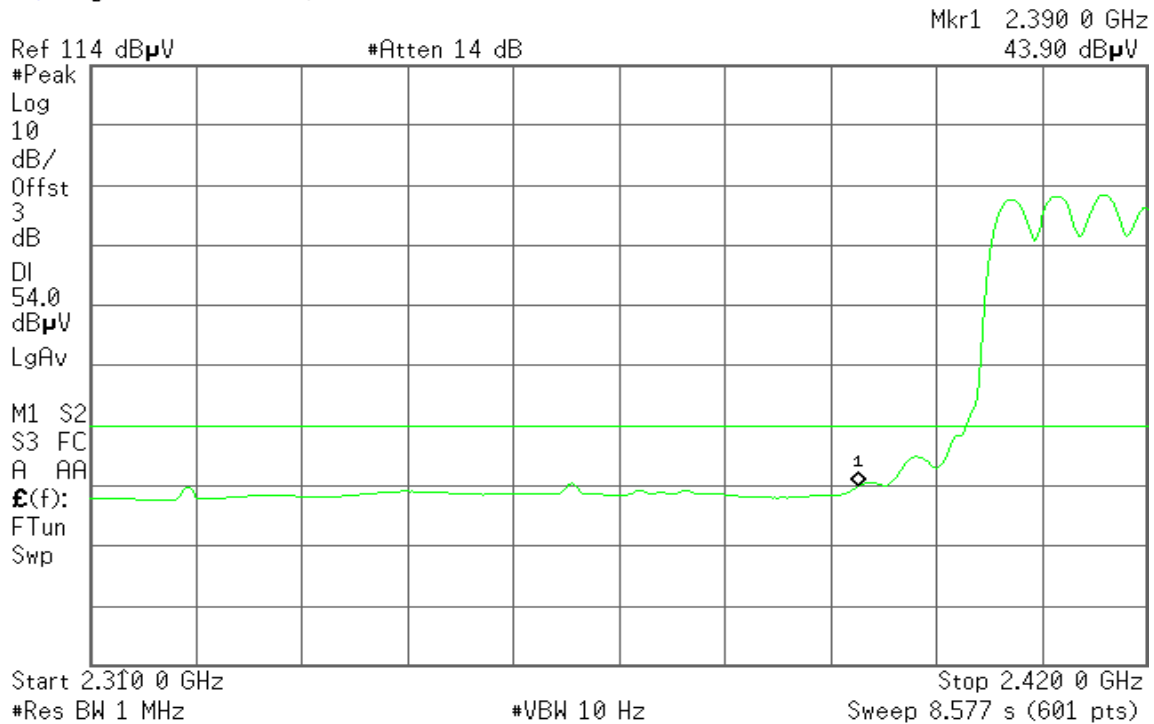
* Agilent 19:26:02 Sep 4, 2007

R T

**Detector mode: Average****Polarity: Vertical**

* Agilent 19:26:47 Sep 4, 2007

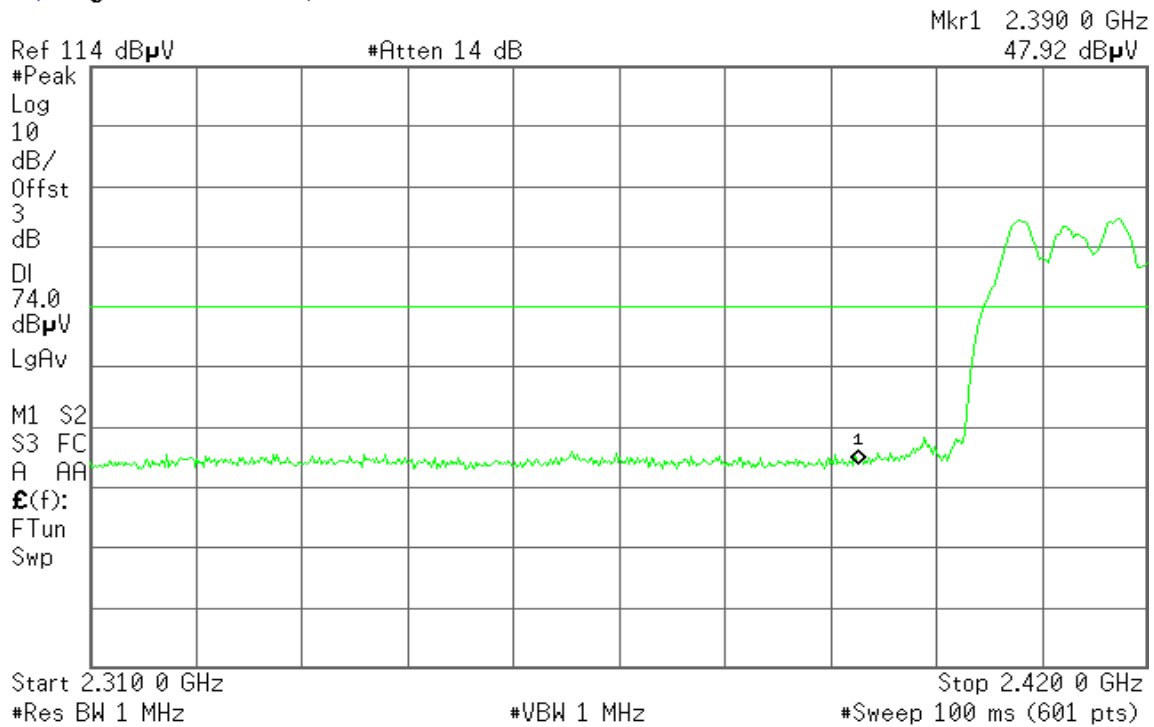
R T



**Detector mode: Peak****Polarity: Horizontal**

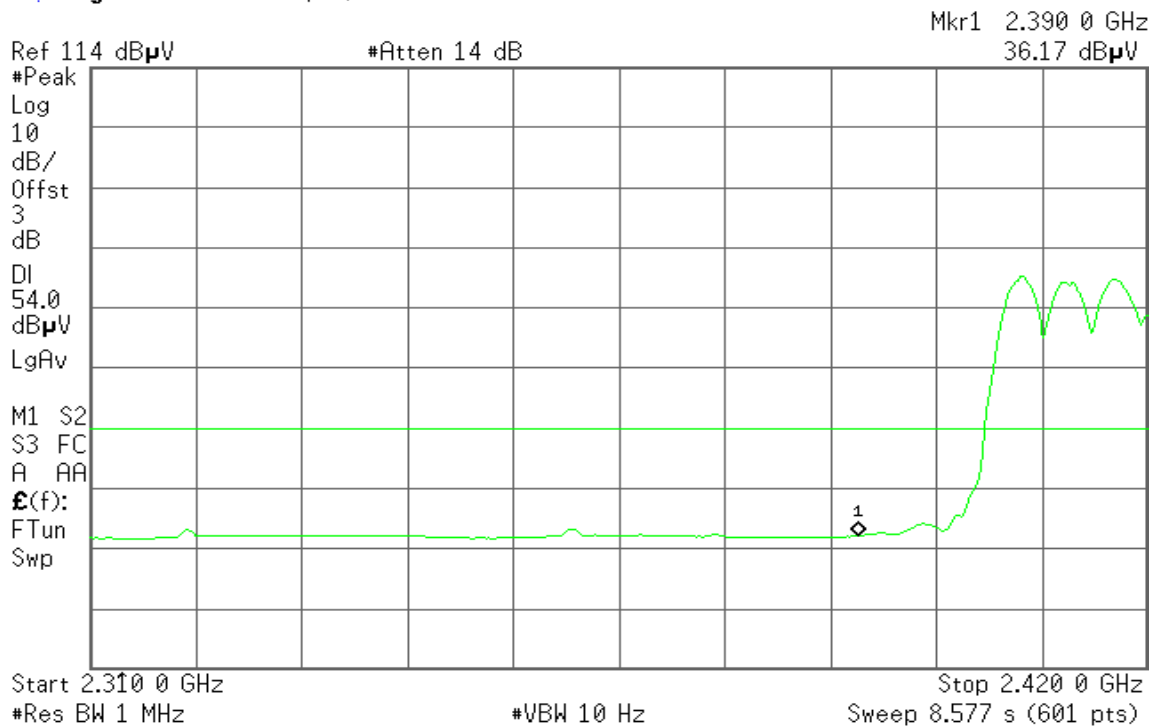
* Agilent 19:30:43 Sep 4, 2007

R L

**Detector mode: Average****Polarity: Horizontal**

* Agilent 19:31:38 Sep 4, 2007

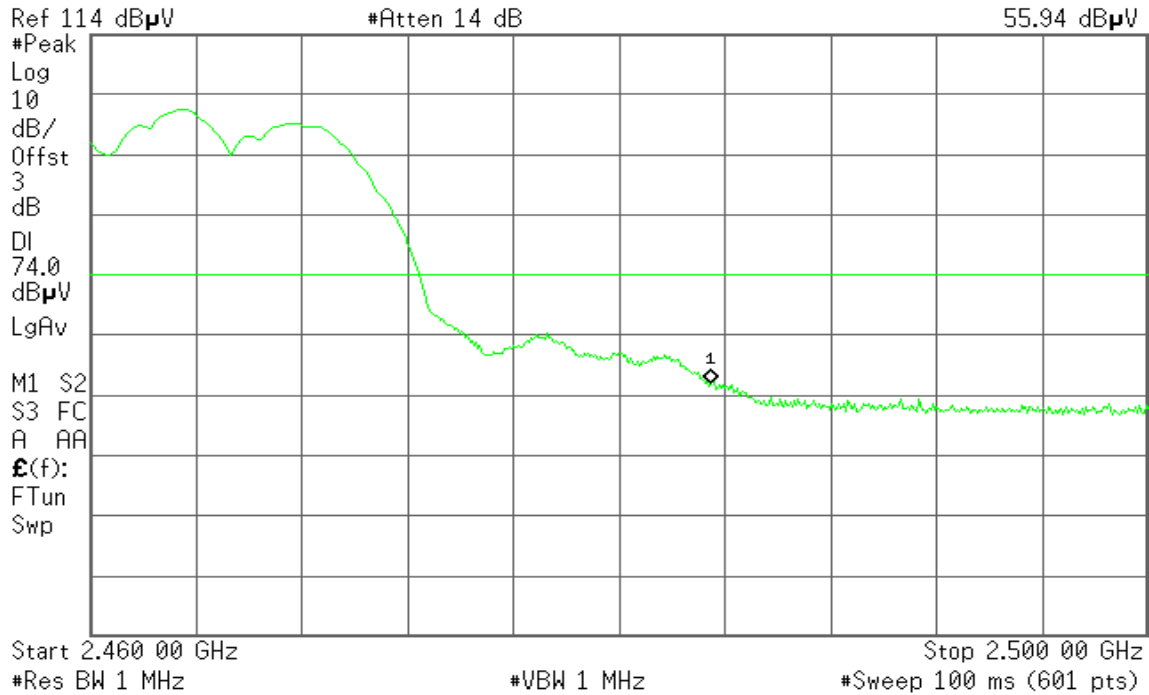
R T



**Band Edges (IEEE 802.11g mode / CH High)****Detector mode: Peak****Polarity: Vertical**

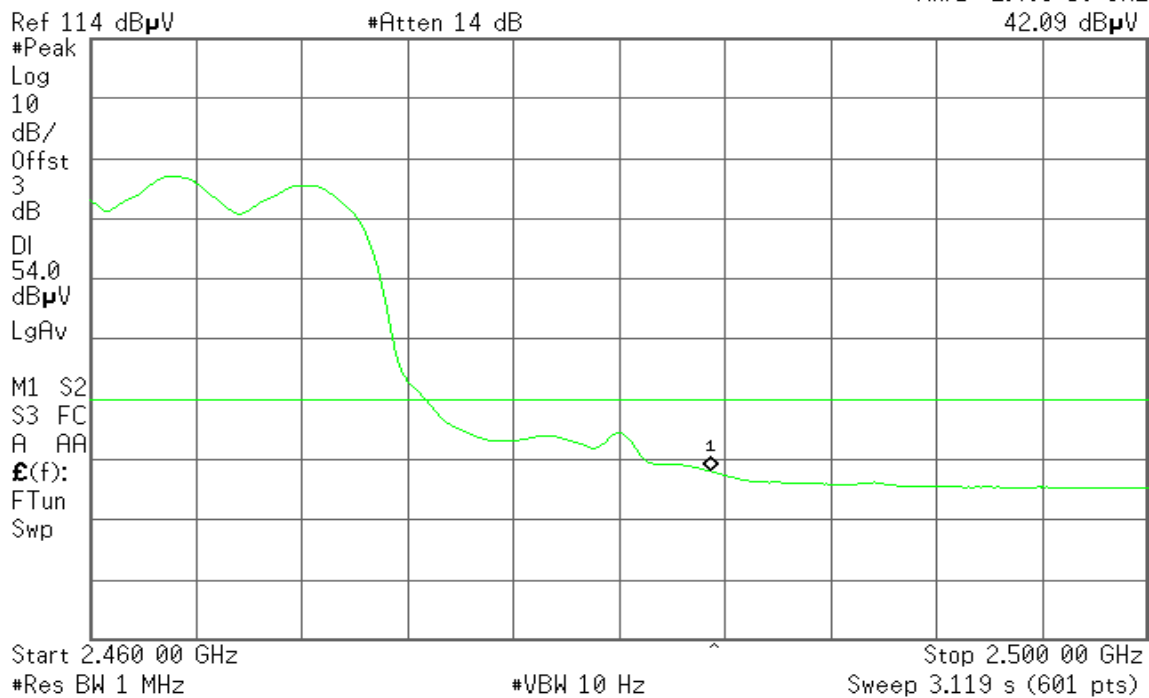
* Agilent 19:39:57 Sep 4, 2007

R T

Mkr1 2.483 50 GHz
55.94 dB μ V**Detector mode: Average****Polarity: Vertical**

* Agilent 19:39:16 Sep 4, 2007

R T

Mkr1 2.483 50 GHz
42.09 dB μ V



Detector mode: Peak

Polarity: Horizontal

* Agilent 19:37:07 Sep 4, 2007

R T

Mkr1 2.483 50 GHz
49.15 dB μ VRef 114 dB μ V

#Atten 14 dB

#Peak

Log

10

dB/

Offst

3

dB

DI

74.0

dB μ V

LgAv

M1 S2

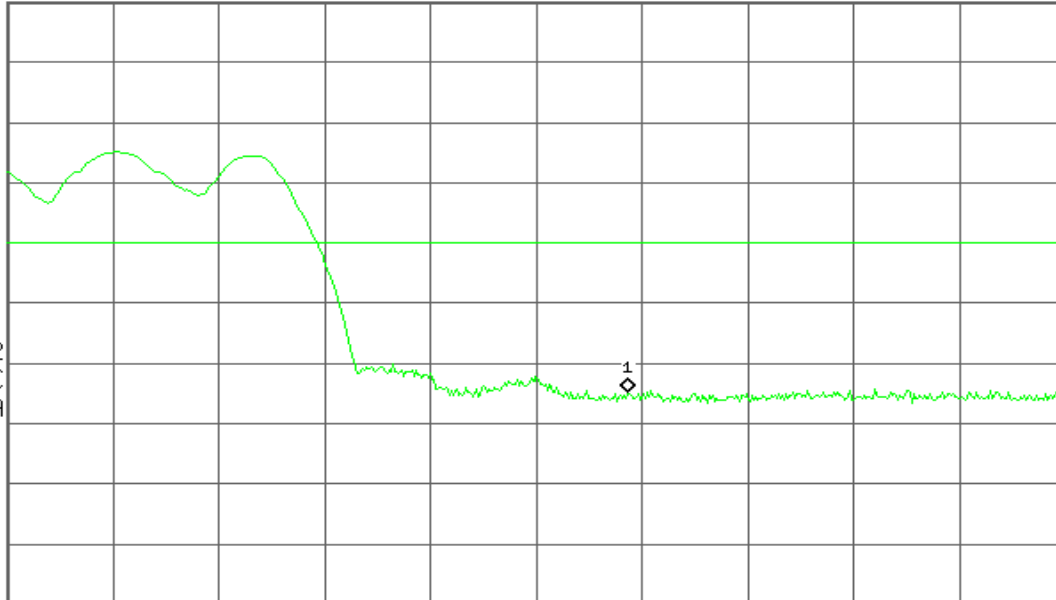
S3 FC

A AA

£(f):

FTun

Swp



Start 2.460 00 GHz

Stop 2.500 00 GHz

#Res BW 1 MHz

#VBW 1 MHz

#Sweep 100 ms (601 pts)

Detector mode: Average

Polarity: Horizontal

* Agilent 19:37:41 Sep 4, 2007

R T

Mkr1 2.483 50 GHz
36.11 dB μ VRef 114 dB μ V

#Atten 14 dB

#Peak

Log

10

dB/

Offst

3

dB

DI

54.0

dB μ V

LgAv

M1 S2

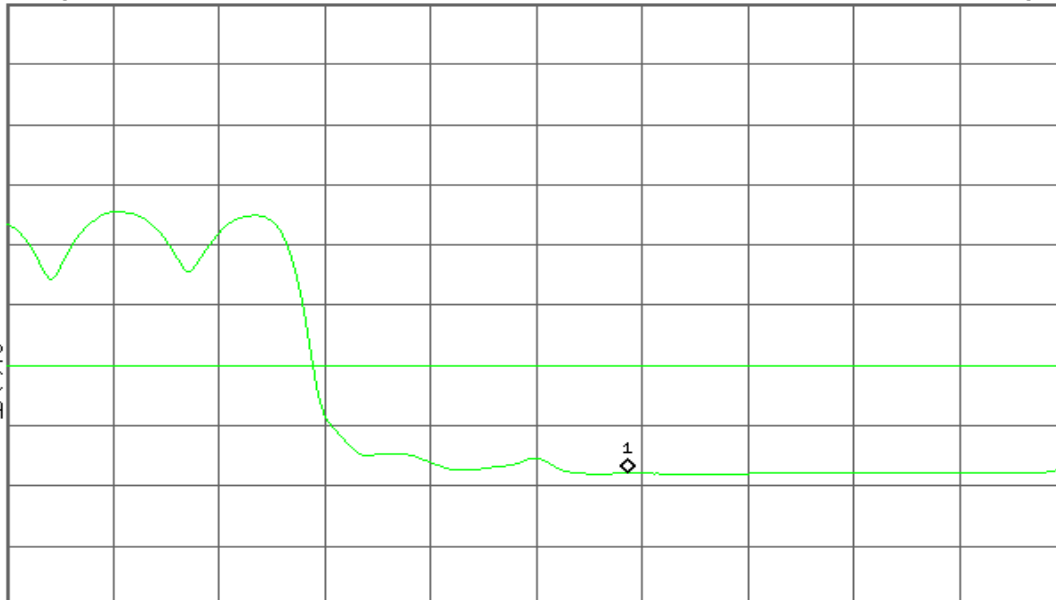
S3 FC

A AA

£(f):

FTun

Swp



Start 2.460 00 GHz

Stop 2.500 00 GHz

#Res BW 1 MHz

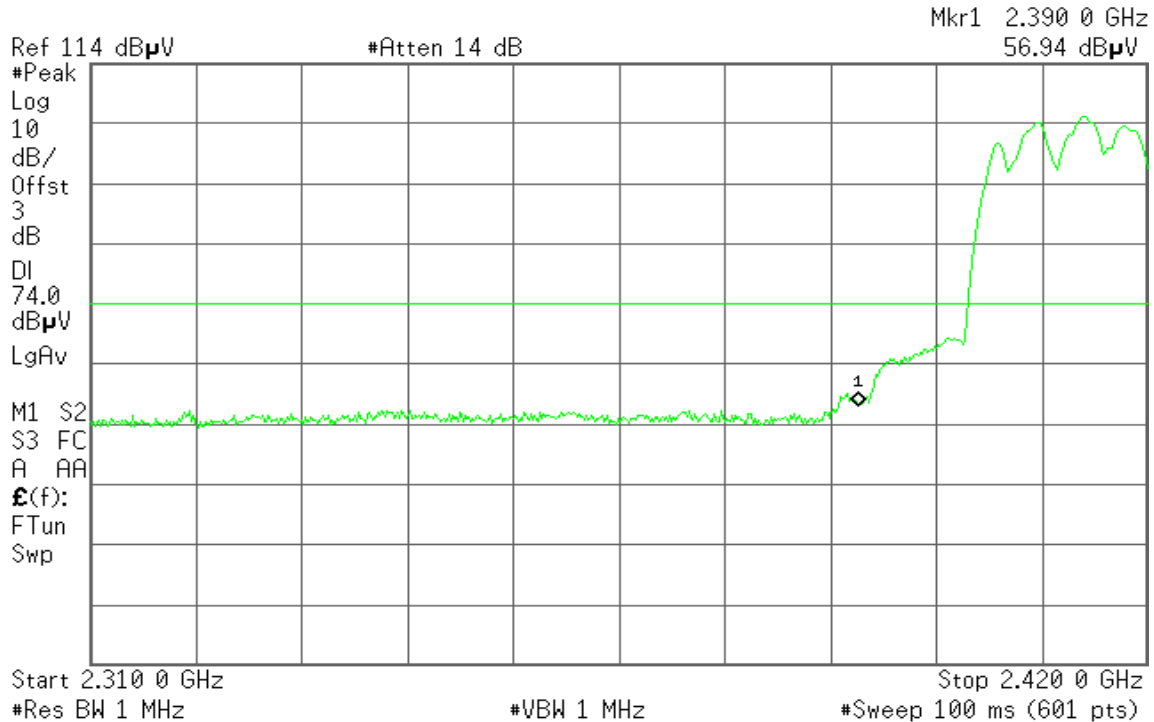
#VBW 10 Hz

Sweep 3.119 s (601 pts)

**Band Edges (draft 802.11n Standard-20 MHz Channel mode / CH Low)****Detector mode: Peak****Polarity: Vertical**

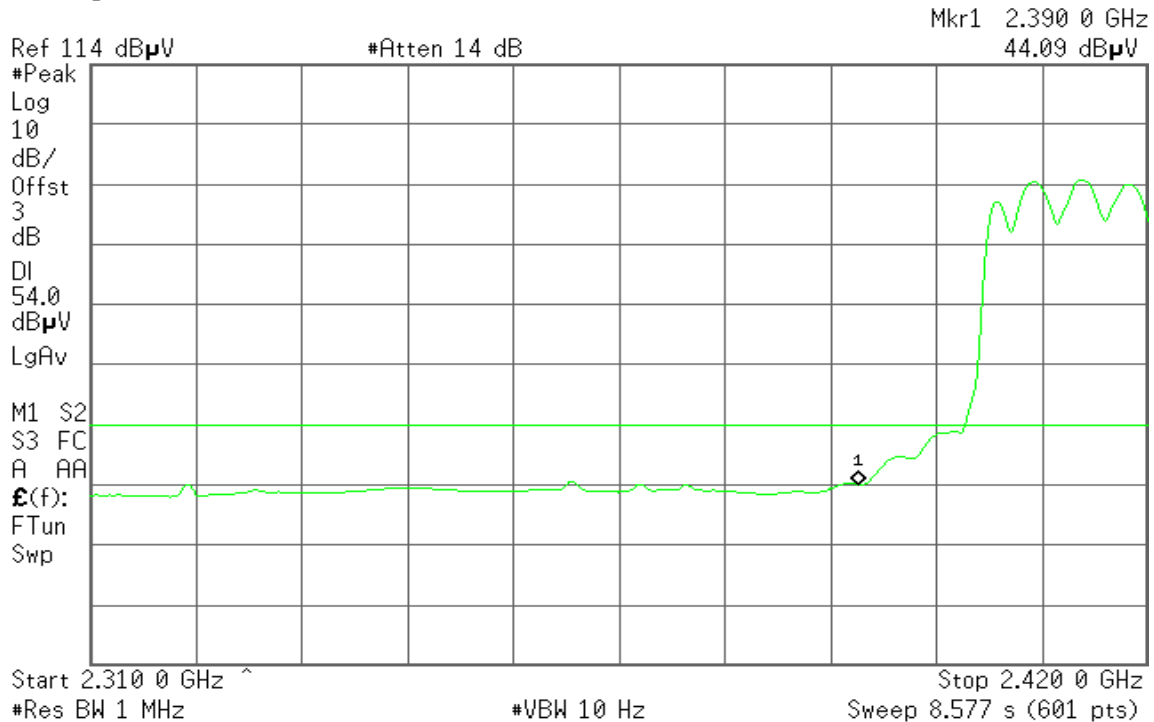
* Agilent 19:52:32 Sep 4, 2007

R T

**Detector mode: Average****Polarity: Vertical**

* Agilent 19:54:38 Sep 4, 2007

R T



**Detector mode: Peak****Polarity: Horizontal**

* Agilent 19:57:11 Sep 4, 2007

R T

Mkr1 2.390 0 GHz
48.98 dB μ VRef 114 dB μ V

#Atten 14 dB

#Peak

Log

10

dB/

Offst

3

dB

DI

74.0

dB μ V

LgAv

M1 S2

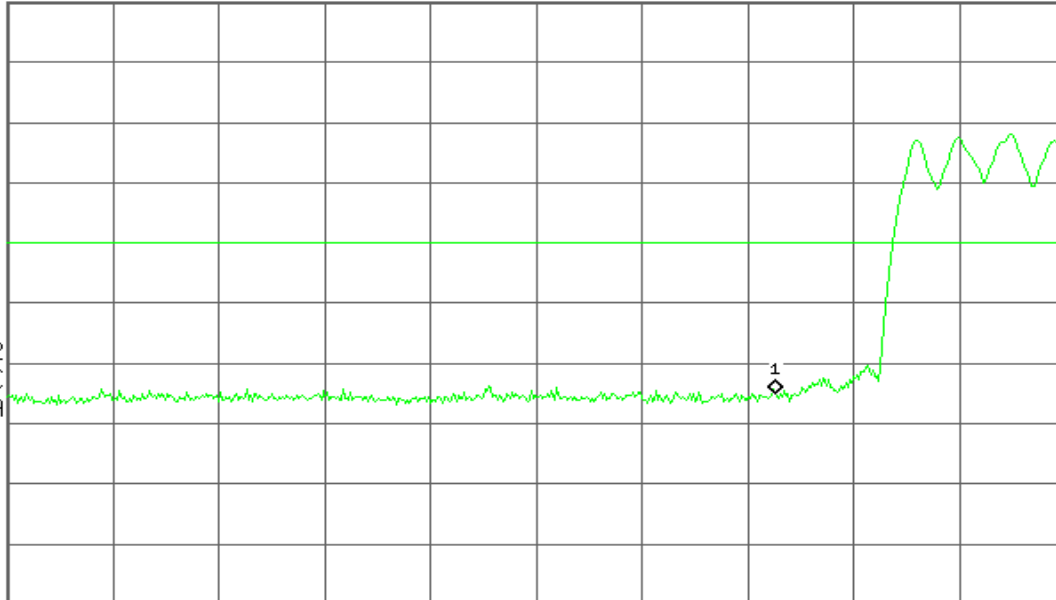
S3 FC

A AA

£(f):

FTun

Swp



Start 2.310 0 GHz

Stop 2.420 0 GHz

#Res BW 1 MHz

#VBW 1 MHz

#Sweep 100 ms (601 pts)

Detector mode: Average**Polarity: Horizontal**

* Agilent 19:57:47 Sep 4, 2007

R T

Mkr1 2.390 0 GHz
36.60 dB μ VRef 114 dB μ V

#Atten 14 dB

#Peak

Log

10

dB/

Offst

3

dB

DI

54.0

dB μ V

LgAv

M1 S2

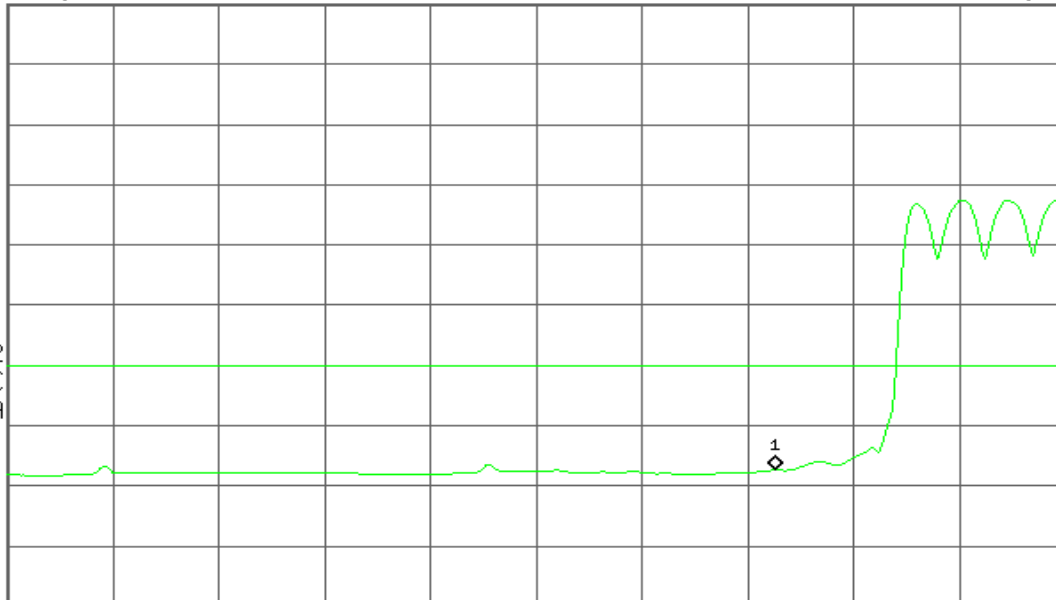
S3 FC

A AA

£(f):

FTun

Swp



Start 2.310 0 GHz ^

Stop 2.420 0 GHz

#Res BW 1 MHz

#VBW 10 Hz

Sweep 8.577 s (601 pts)

**Band Edges (draft 802.11n Standard-20 MHz Channel mode / CH High)****Detector mode: Peak****Polarity: Vertical**

* Agilent 20:01:33 Sep 4, 2007

R T

Mkr1 2.483 50 GHz

57.42 dB μ VRef 114 dB μ V

#Atten 14 dB

#Peak

Log

10

dB/

Offst

3

dB

DI

74.0

dB μ V

LgAv

M1 S2

S3 FC

A AA

 $\mathcal{E}(f)$:

FTun

Swp

Start 2.460 00 GHz

#Res BW 1 MHz

#VBW 1 MHz

Stop 2.500 00 GHz

#Sweep 100 ms (601 pts)

Detector mode: Average**Polarity: Vertical**

* Agilent 20:02:11 Sep 4, 2007

R T

Mkr1 2.483 50 GHz

43.08 dB μ VRef 114 dB μ V

#Atten 14 dB

#Peak

Log

10

dB/

Offst

3

dB

DI

54.0

dB μ V

LgAv

M1 S2

S3 FC

A AA

 $\mathcal{E}(f)$:

FTun

Swp

Start 2.460 00 GHz

#Res BW 1 MHz

#VBW 10 Hz

Stop 2.500 00 GHz

Sweep 3.119 s (601 pts)

**Detector mode: Peak****Polarity: Horizontal**

* Agilent 20:00:29 Sep 4, 2007

R T

Mkr1 2.483 50 GHz
49.15 dB μ VRef 114 dB μ V

#Atten 14 dB

#Peak

Log

10

dB/

Offst

3

dB

DI

74.0

dB μ V

LgAv

M1 S2

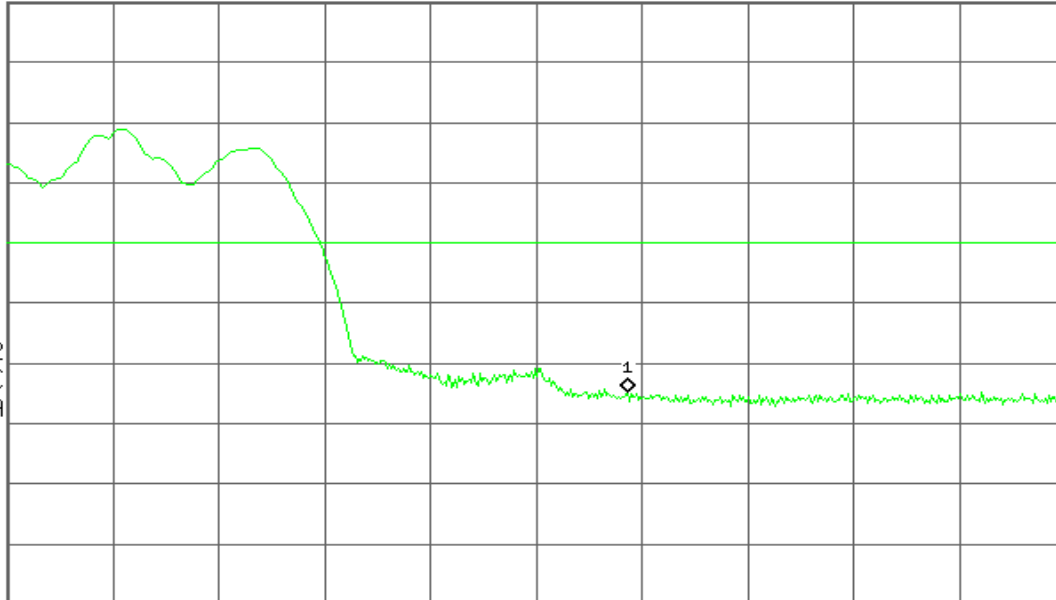
S3 FC

A AA

E(f):

FTun

Swp



Start 2.460 00 GHz

Stop 2.500 00 GHz

#Res BW 1 MHz

#VBW 1 MHz

#Sweep 100 ms (601 pts)

Detector mode: Average**Polarity: Horizontal**

* Agilent 19:59:59 Sep 4, 2007

R T

Mkr1 2.483 50 GHz
36.39 dB μ VRef 114 dB μ V

#Atten 14 dB

#Peak

Log

10

dB/

Offst

3

dB

DI

54.0

dB μ V

LgAv

M1 S2

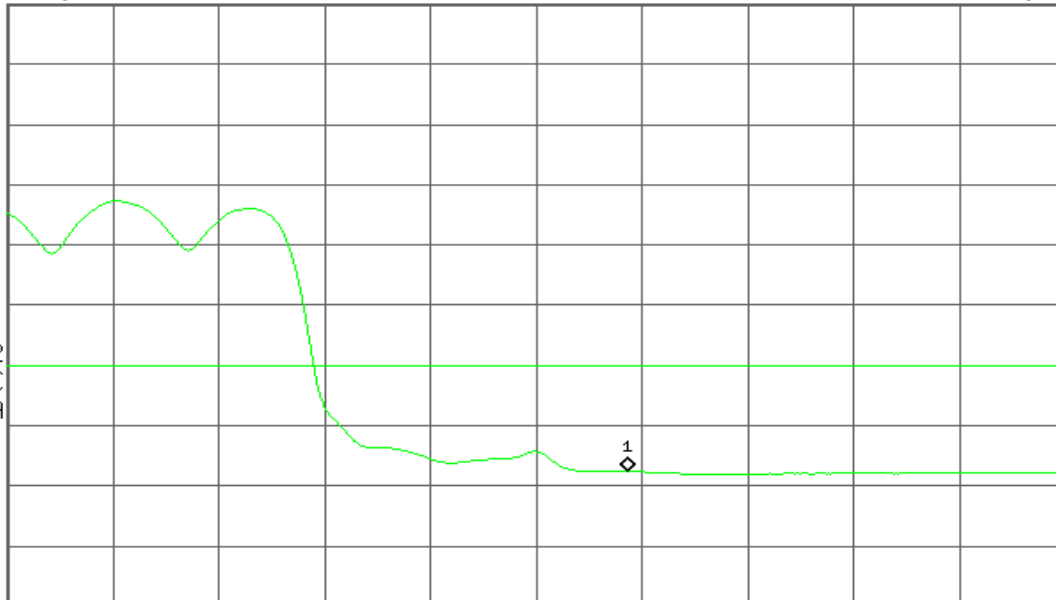
S3 FC

A AA

E(f):

FTun

Swp



Start 2.460 00 GHz

Stop 2.500 00 GHz

#Res BW 1 MHz

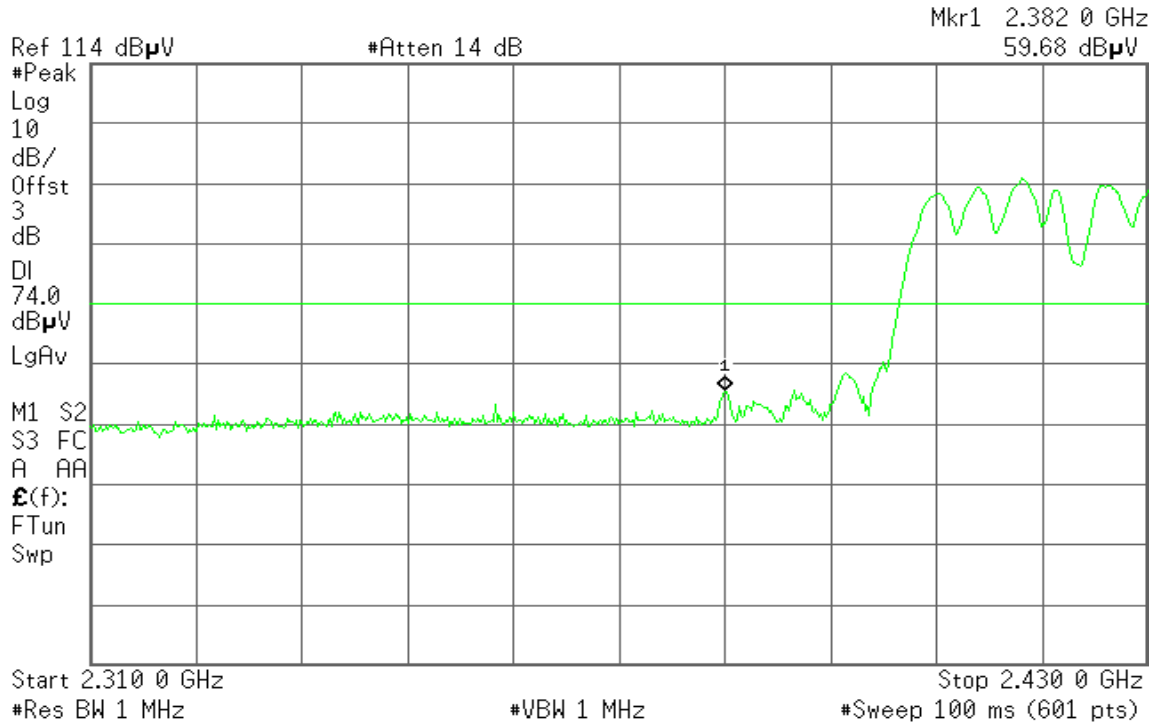
#VBW 10 Hz

Sweep 3.119 s (601 pts)

**Band Edges (draft 802.11n Wide-40 MHz Channel mode / CH Low)****Detector mode: Peak****Polarity: Vertical**

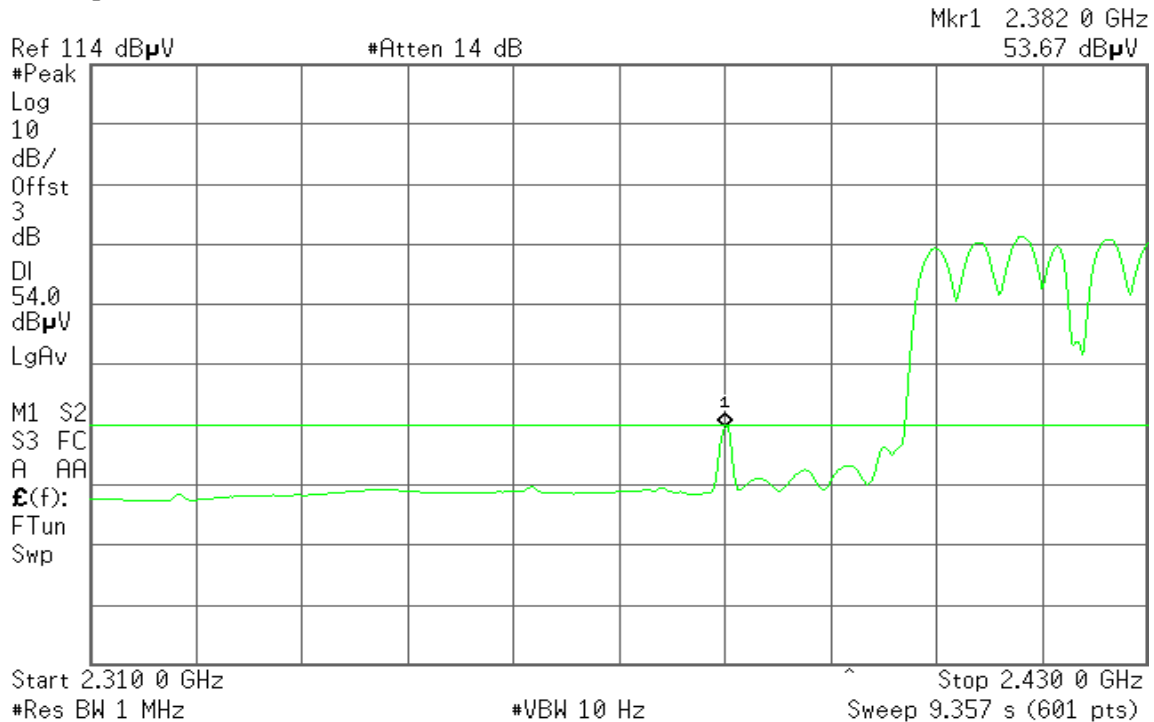
* Agilent 20:25:30 Sep 4, 2007

R T

**Detector mode: Average****Polarity: Vertical**

* Agilent 20:24:55 Sep 4, 2007

R T



**Detector mode: Peak****Polarity: Horizontal**

* Agilent 20:27:31 Sep 4, 2007

R T

Mkr1 2.382 0 GHz
47.51 dB μ VRef 114 dB μ V

#Atten 14 dB

#Peak

Log

10

dB/

Offst

3

dB

DI

74.0

dB μ V

LgAv

M1 S2

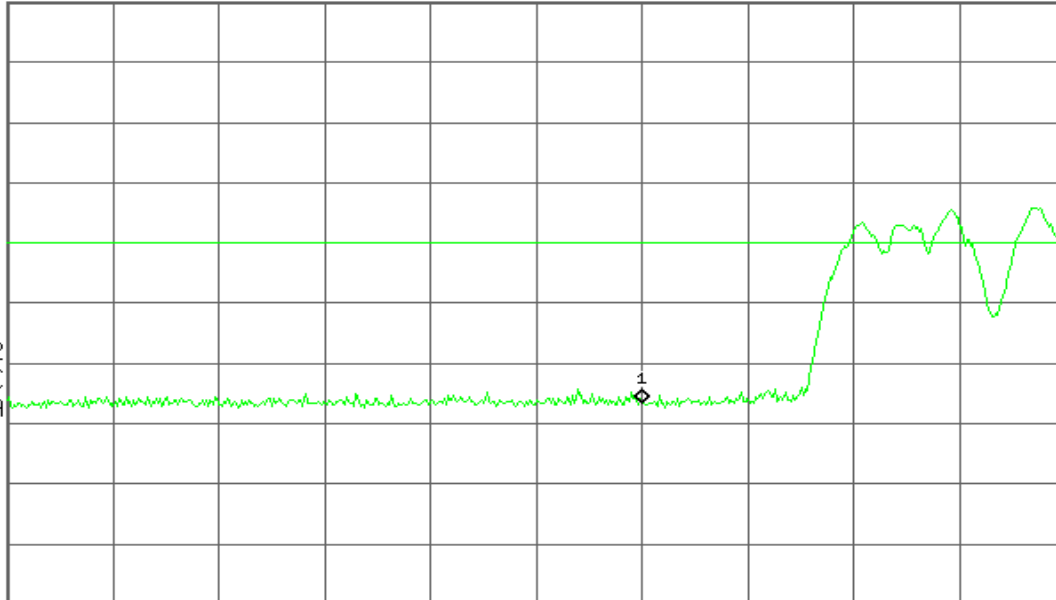
S3 FC

A AA

£(f):

FTun

Swp



Start 2.310 0 GHz

Stop 2.430 0 GHz

#Res BW 1 MHz

#VBW 1 MHz

#Sweep 100 ms (601 pts)

Detector mode: Average**Polarity: Horizontal**

* Agilent 20:28:12 Sep 4, 2007

R T

Mkr1 2.382 0 GHz
35.77 dB μ VRef 114 dB μ V

#Atten 14 dB

#Peak

Log

10

dB/

Offst

3

dB

DI

54.0

dB μ V

LgAv

M1 S2

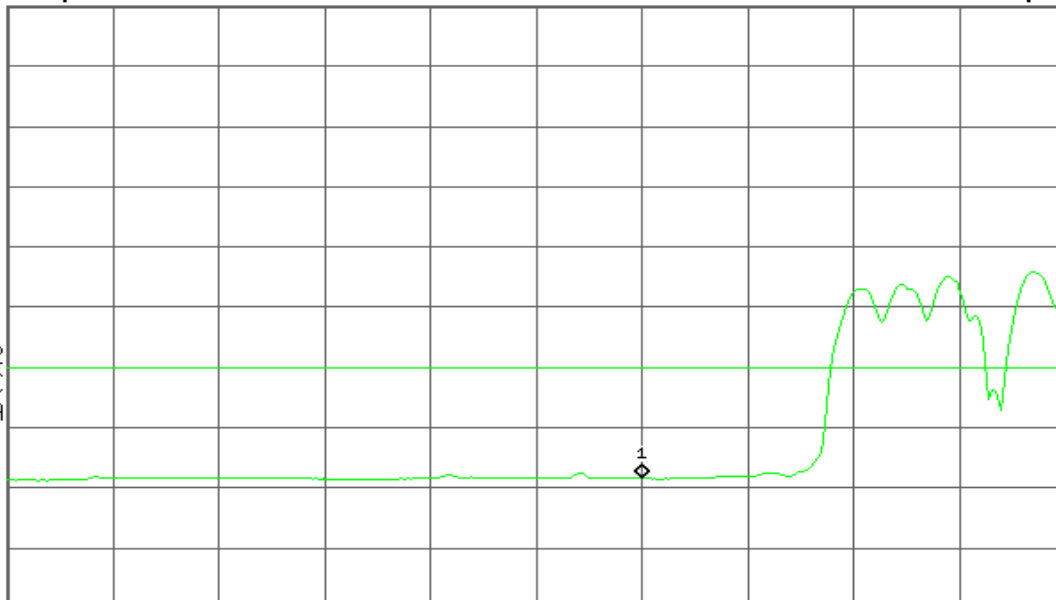
S3 FC

A AA

£(f):

FTun

Swp



Start 2.310 0 GHz

Stop 2.430 0 GHz

#Res BW 1 MHz

#VBW 10 Hz

Sweep 9.357 s (601 pts)

**Band Edges (draft 802.11n Wide-40 MHz Channel mode / CH High)****Detector mode: Peak****Polarity: Vertical**

* Agilent 20:09:45 Sep 4, 2007

R T

Mkr1 2.492 04 GHz

58.42 dB μ VRef 114 dB μ V

#Atten 14 dB

#Peak

Log

10

dB/

Offst

3

dB

DI

74.0

dB μ V

LgAv

M1 S2

S3 FC

A AA

E(f):

FTun

Swp

Start 2.450 00 GHz

#Res BW 1 MHz

#VBW 1 MHz

Stop 2.500 00 GHz

#Sweep 100 ms (601 pts)

Detector mode: Average**Polarity: Vertical**

* Agilent 20:08:47 Sep 4, 2007

R T

Mkr1 2.492 04 GHz

53.76 dB μ VRef 114 dB μ V

#Atten 14 dB

#Peak

Log

10

dB/

Offst

3

dB

DI

54.0

dB μ V

LgAv

M1 S2

S3 FC

A AA

E(f):

FTun

Swp

Start 2.450 00 GHz

#Res BW 1 MHz

#VBW 10 Hz

Stop 2.500 00 GHz

Sweep 3.899 s (601 pts)

**Detector mode: Peak****Polarity: Horizontal**

* Agilent 20:11:37 Sep 4, 2007

R T

Mkr1 2.492 04 GHz
50.05 dB μ VRef 114 dB μ V

#Atten 14 dB

#Peak

Log

10

dB/

Offst

3

dB

DI

74.0

dB μ V

LgAv

M1 S2

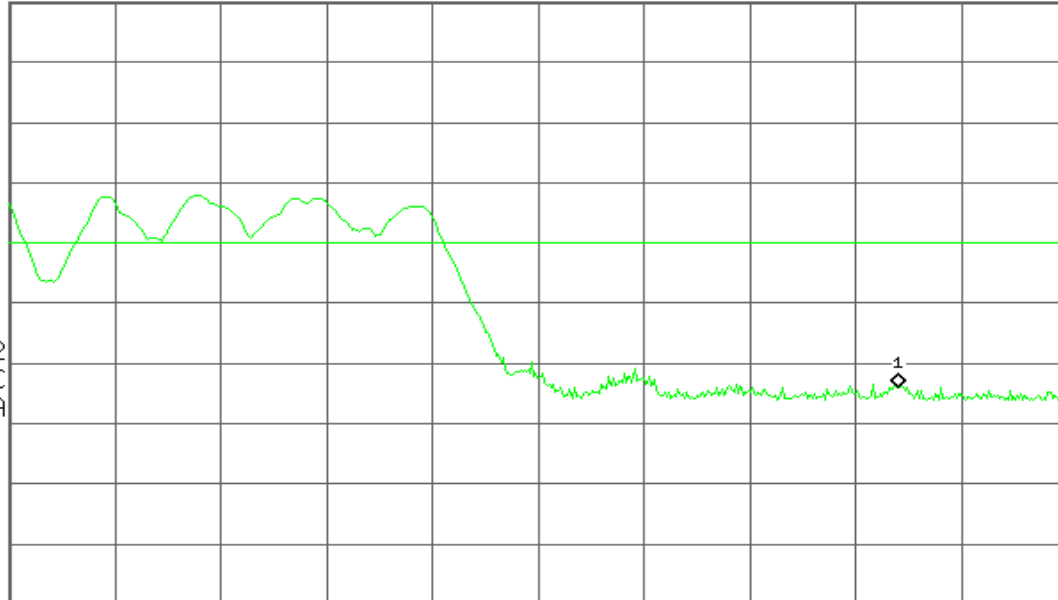
S3 FC

A AA

E(f):

FTun

Swp



Start 2.450 00 GHz

Stop 2.500 00 GHz

#Res BW 1 MHz

#VBW 1 MHz

#Sweep 100 ms (601 pts)

Detector mode: Average**Polarity: Horizontal**

* Agilent 20:12:12 Sep 4, 2007

R T

Mkr1 2.492 04 GHz
39.61 dB μ VRef 114 dB μ V

#Atten 14 dB

#Peak

Log

10

dB/

Offst

3

dB

DI

54.0

dB μ V

LgAv

M1 S2

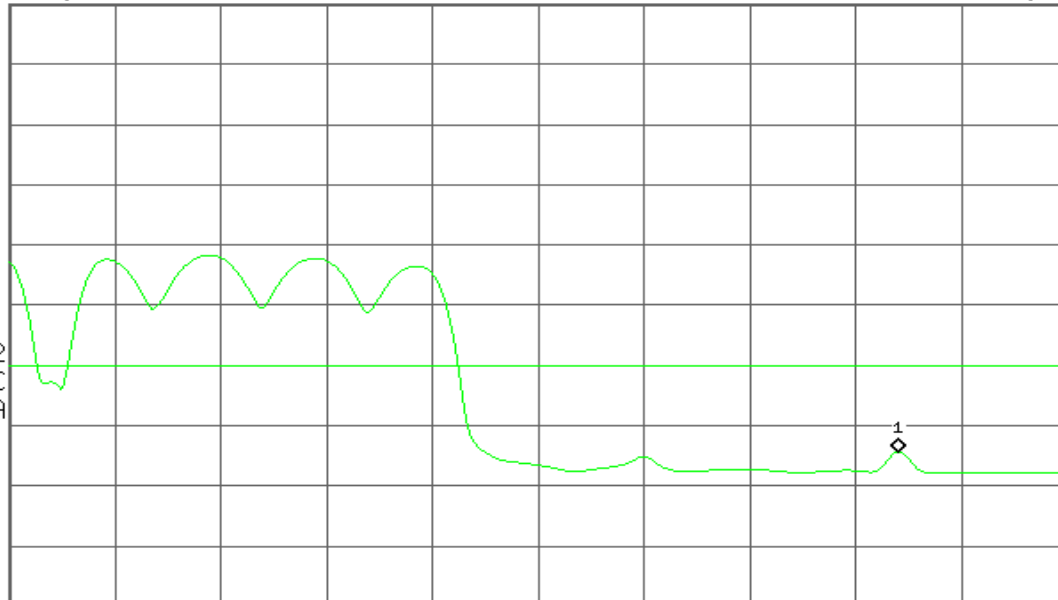
S3 FC

A AA

E(f):

FTun

Swp



Start 2.450 00 GHz

Stop 2.500 00 GHz

#Res BW 1 MHz

#VBW 10 Hz

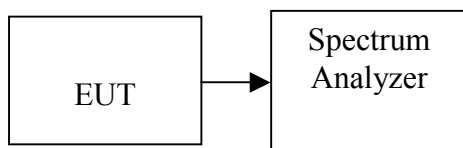
Sweep 3.899 s (601 pts)

7.5 PEAK POWER SPECTRAL DENSITY

LIMIT

1. According to §15.247(e), for digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.
2. According to §15.247(f), the digital modulation operation of the hybrid system, with the frequency hopping turned off, shall comply with the power density requirements of paragraph (d) of this section.

Test Configuration



TEST PROCEDURE

1. Place the EUT on the table and set it in transmitting mode.
Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
2. Set the spectrum analyzer as RBW = 3 kHz, VBW = 10 kHz, Span = 300 kHz, Sweep time = 100 s
3. Record the max reading.
4. Repeat the above procedure until the measurements for all frequencies are completed.

**TEST RESULTS***No non-compliance noted***Test Data****Test mode: IEEE 802.11b mode**

Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Result
Low	2412	-22.85	8.00	PASS
Mid	2437	-22.53		PASS
High	2462	-22.57		PASS

Test mode: IEEE 802.11g mode

Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Result
Low	2412	-21.75	8.00	PASS
Mid	2437	-22.41		PASS
High	2462	-22.80		PASS

Test mode: draft 802.11n Standard-20 MHz Channel mode

Channel	Frequency (MHz)	Chain 0 PSD (dBm)	Chain 1 PSD (dBm)	PPSD (dBm)	Limit (dBm)	Result
Low	2412	-20.25	-22.09	-18.06	8.00	PASS
Mid	2437	-20.71	-21.61	-18.13		PASS
High	2462	-20.67	-17.05	-15.48		PASS

Test mode: draft 802.11n Wide-40 MHz Channel mode

Channel	Frequency (MHz)	Chain 0 PSD (dBm)	Chain 1 PSD (dBm)	PPSD (dBm)	Limit (dBm)	Result
Low	2422	-29.93	-30.50	-27.20	8.00	PASS
Mid	2437	-30.30	-30.33	-27.30		PASS
High	2452	-30.38	-30.28	-27.32		PASS

Remark: Total PSD (dBm) = $10 \cdot \log(10^{\text{Chain 1 PSD} / 10} + 10^{\text{Chain 0 PSD} / 10})$



Test mode: draft 802.11n Standard-20 MHz Channel mode with combiner

Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Result
Low	2412	-15.53	8.00	PASS
Mid	2437	-16.03		PASS
High	2462	-15.65		PASS

Test mode: draft 802.11n Wide-40 MHz Channel mode with combiner

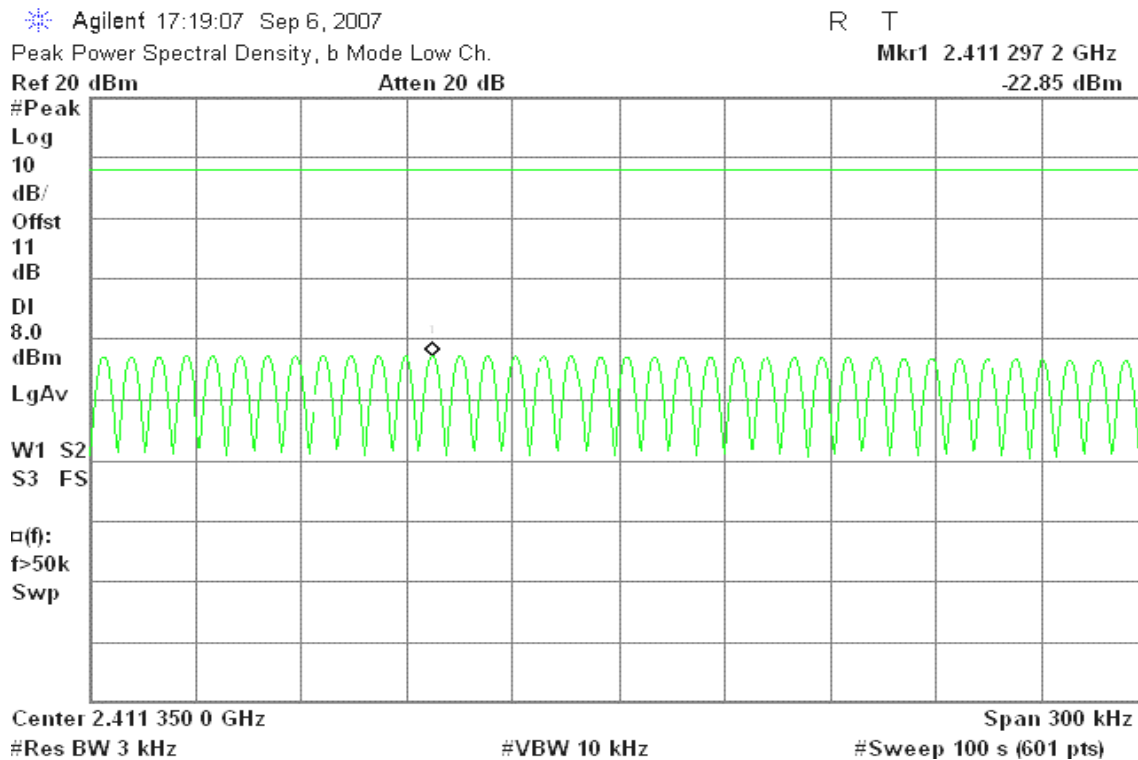
Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Result
Low	2422	-25.10	8.00	PASS
Mid	2437	-23.80		PASS
High	2452	-23.78		PASS



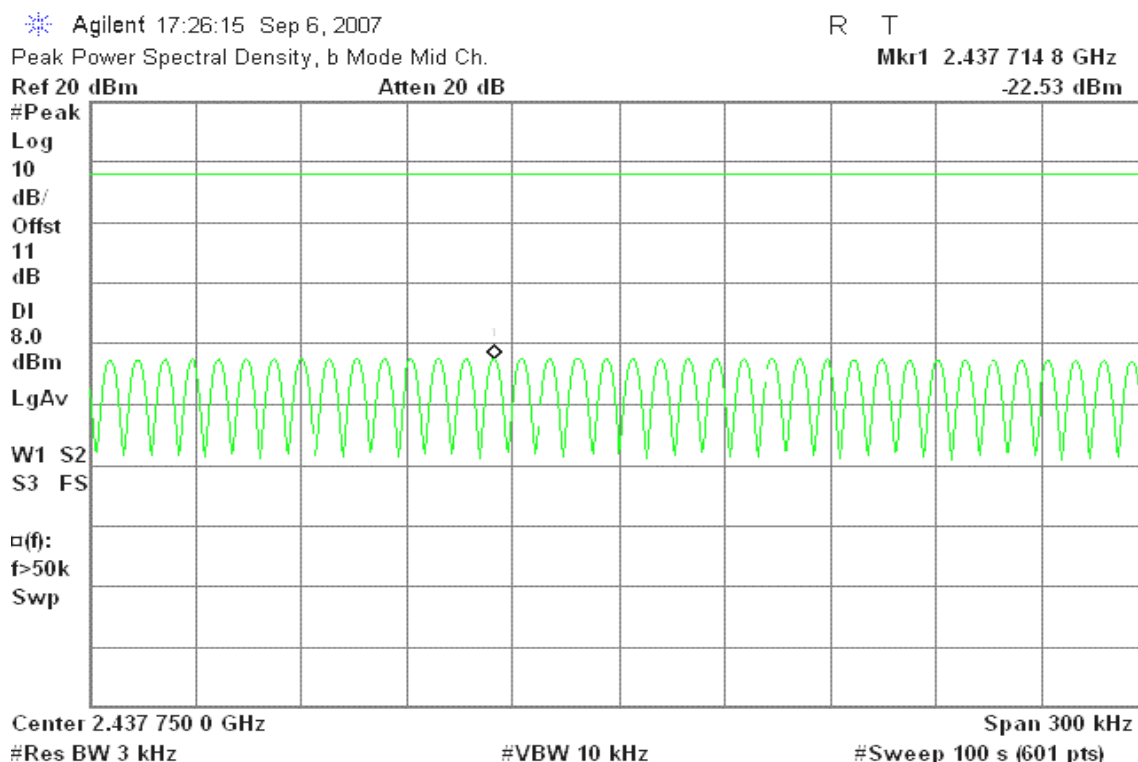
Test Plot

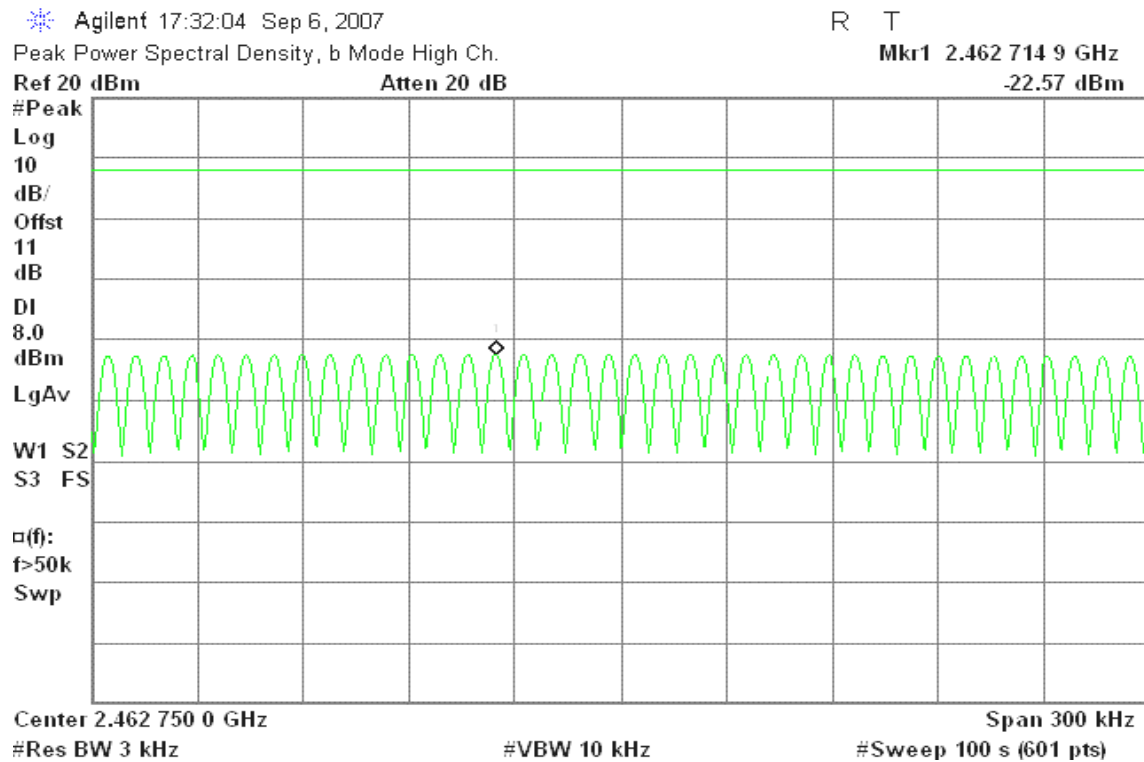
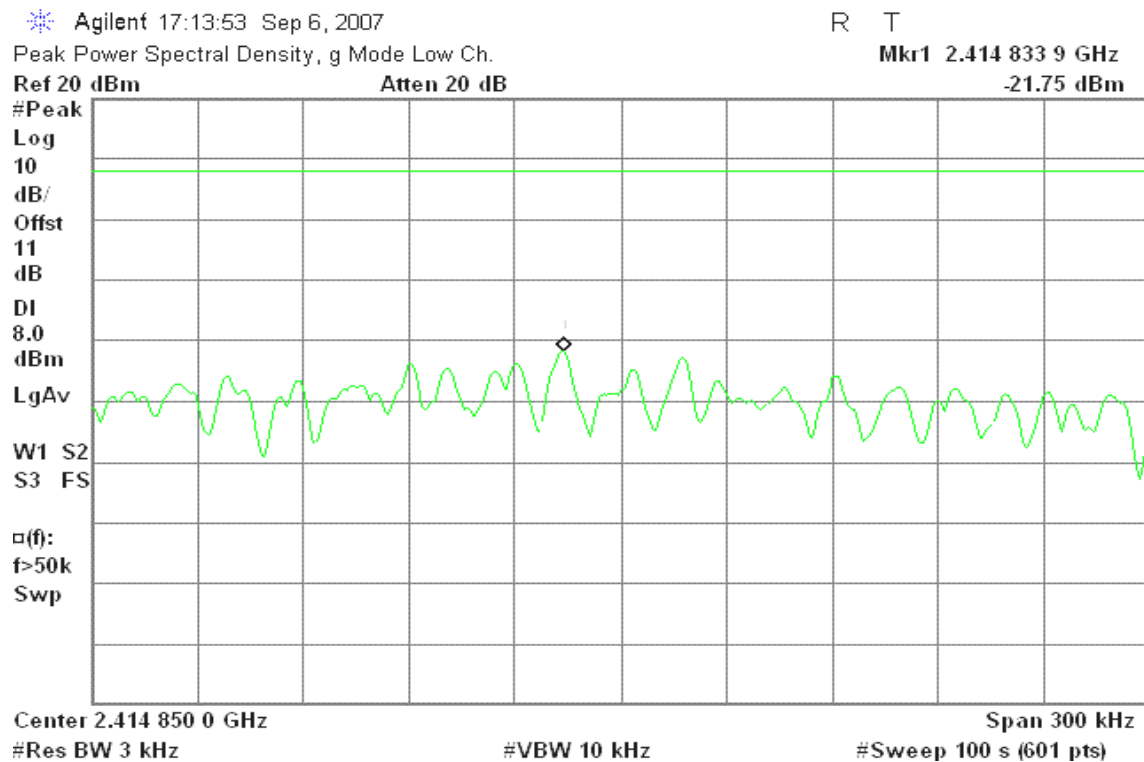
IEEE 802.11b mode

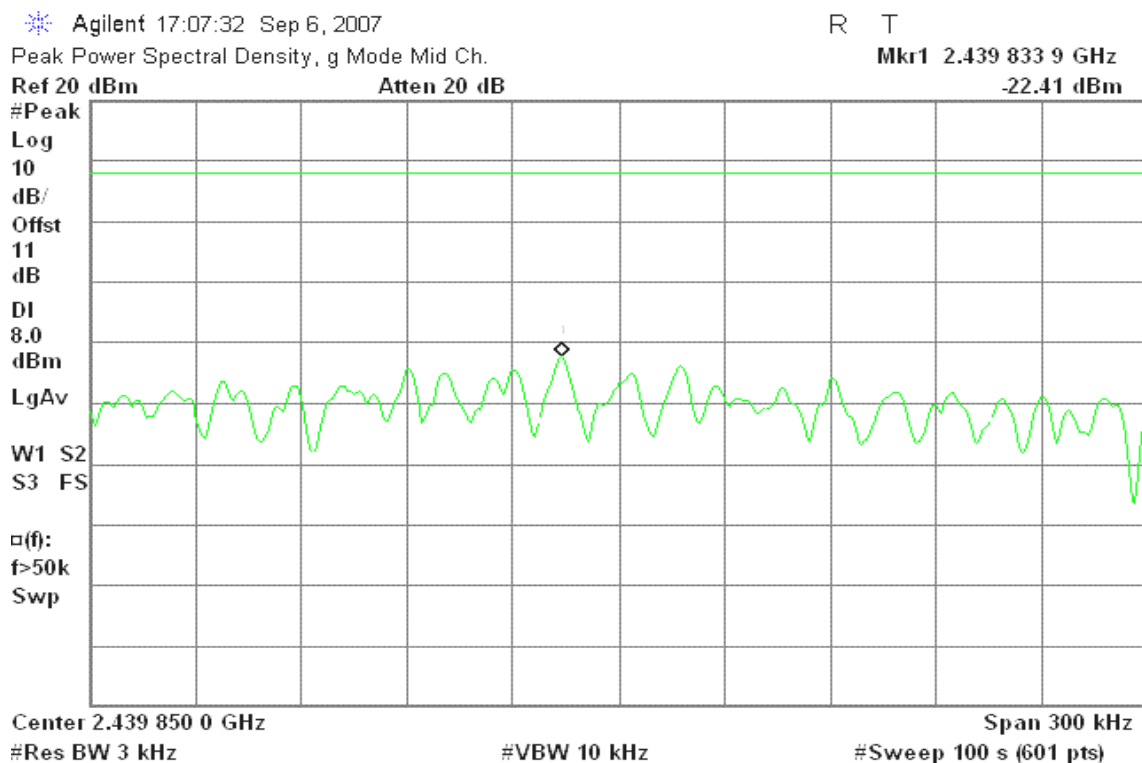
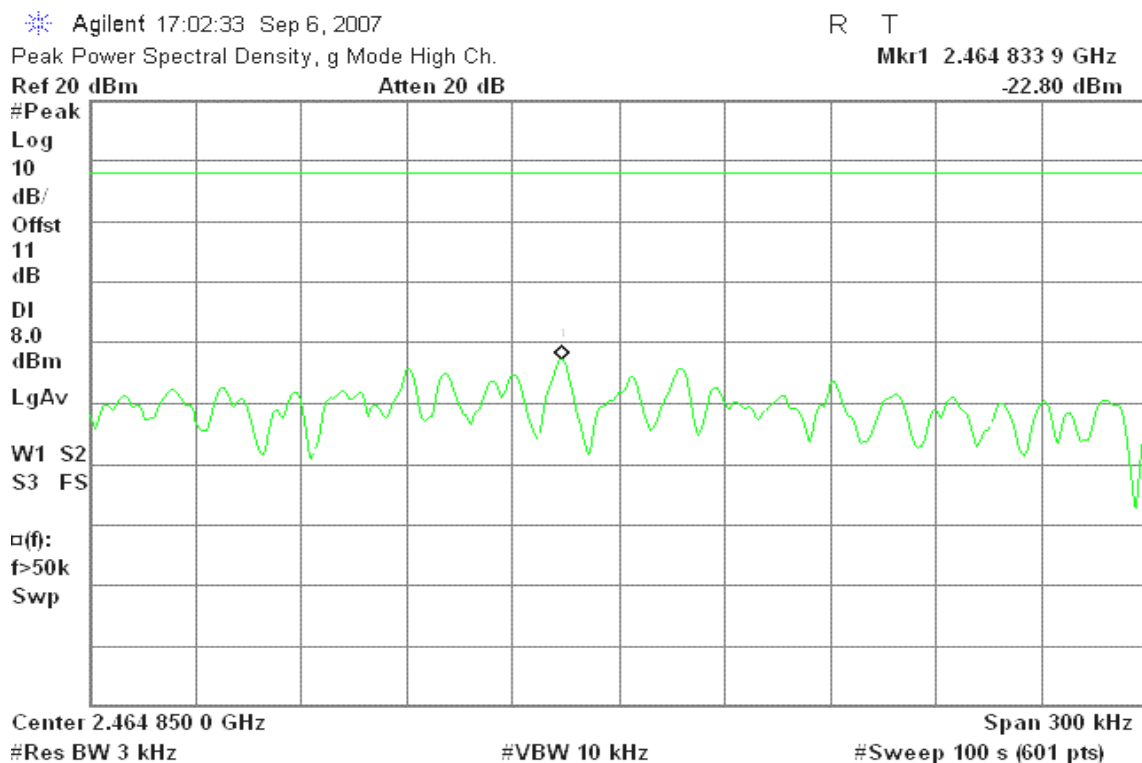
PPSD (CH Low)

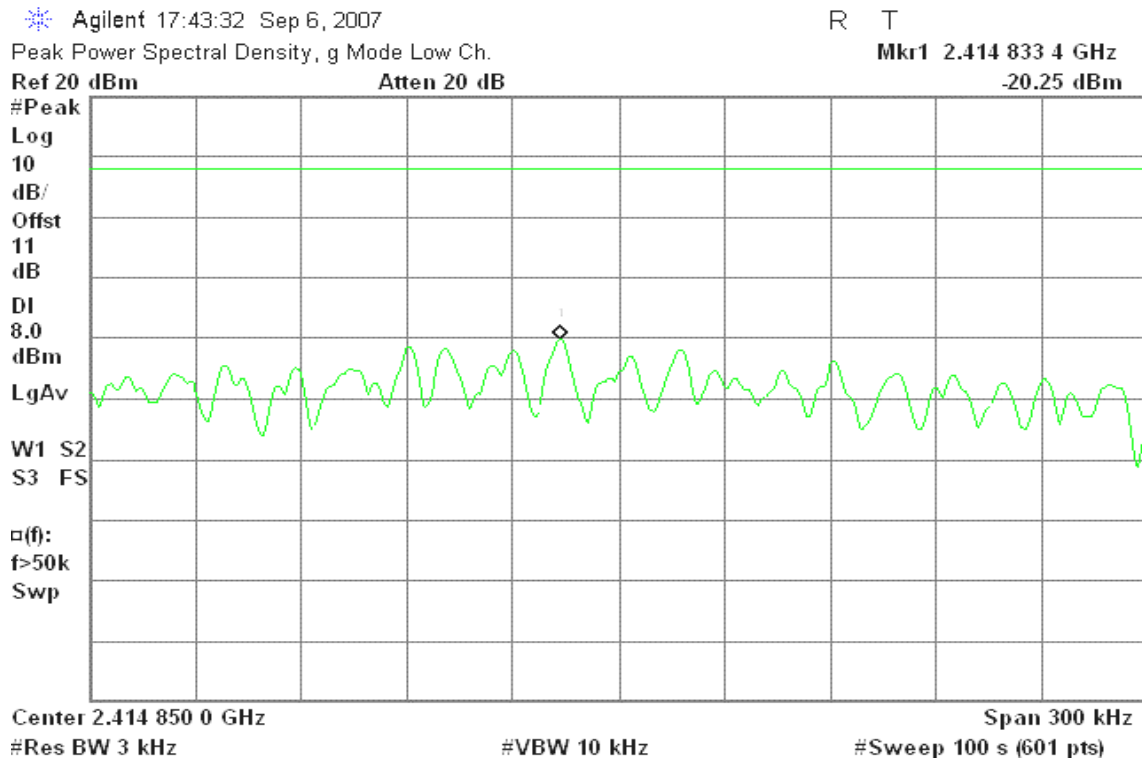
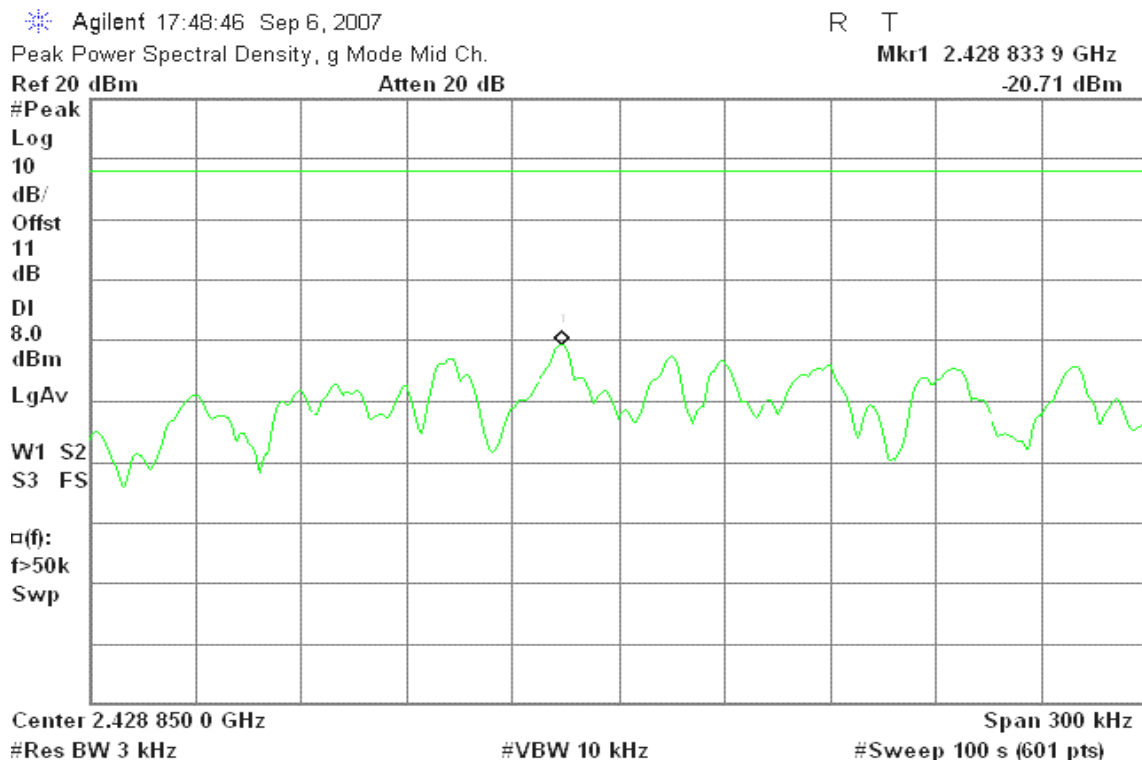


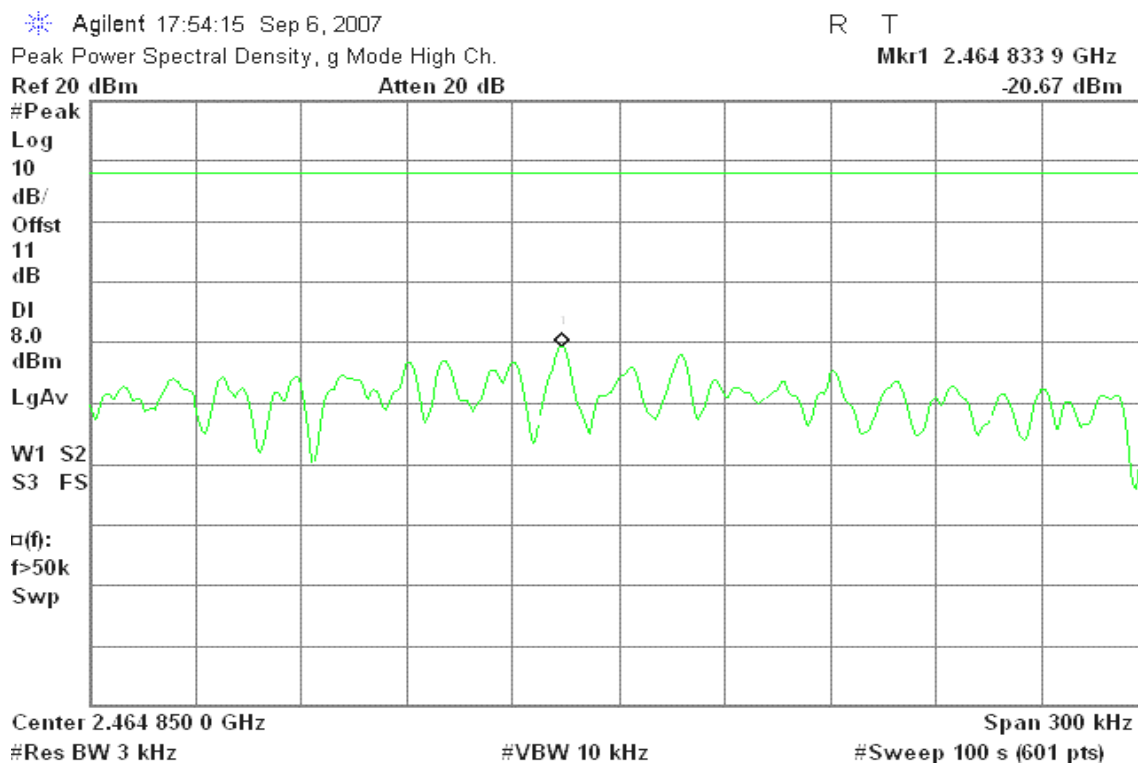
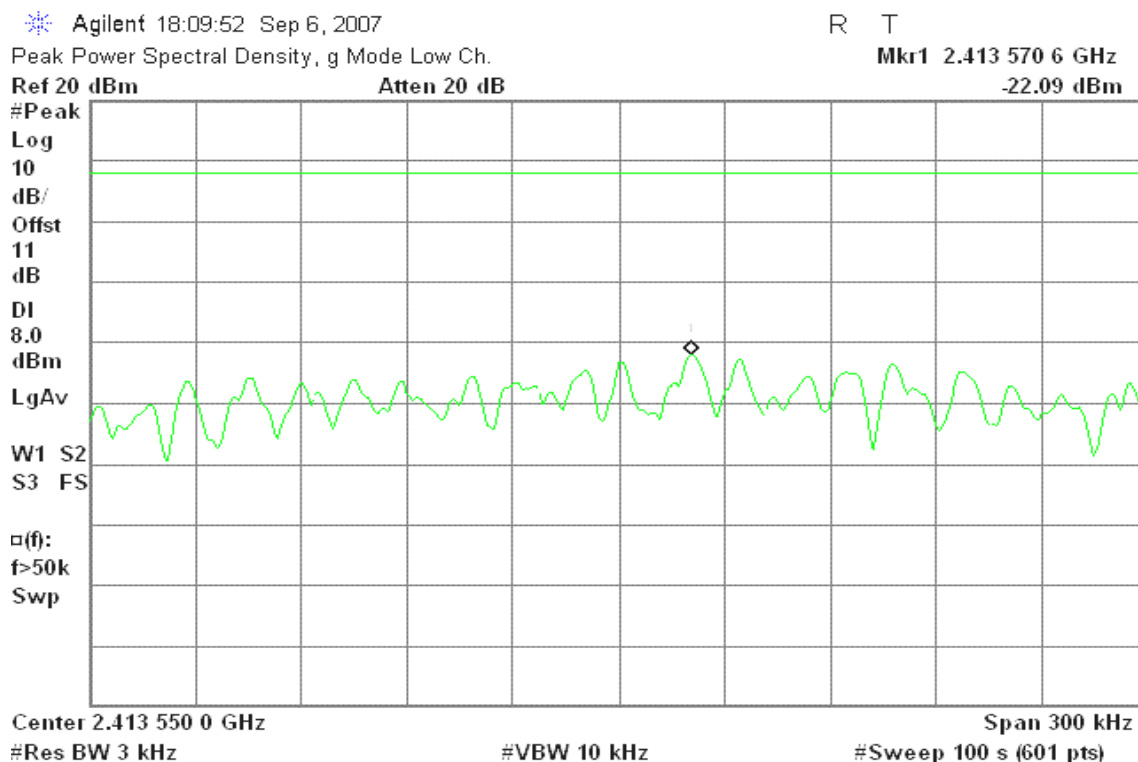
PPSD (CH Mid)



**PPSD (CH High)****IEEE 802.11g mode****PPSD (CH Low)**

**PPSD (CH Mid)****PPSD (CH High)**

**draft 802.11n Standard-20 MHz Channel mode / Chain 0****PPSD (CH Low)****PPSD (CH Mid)**

**PPSD (CH High)****draft 802.11n Standard-20 MHz Channel mode / Chain 1****PPSD (CH Low)**

**PPSD (CH Mid)**

* Agilent 18:04:58 Sep 6, 2007

R T

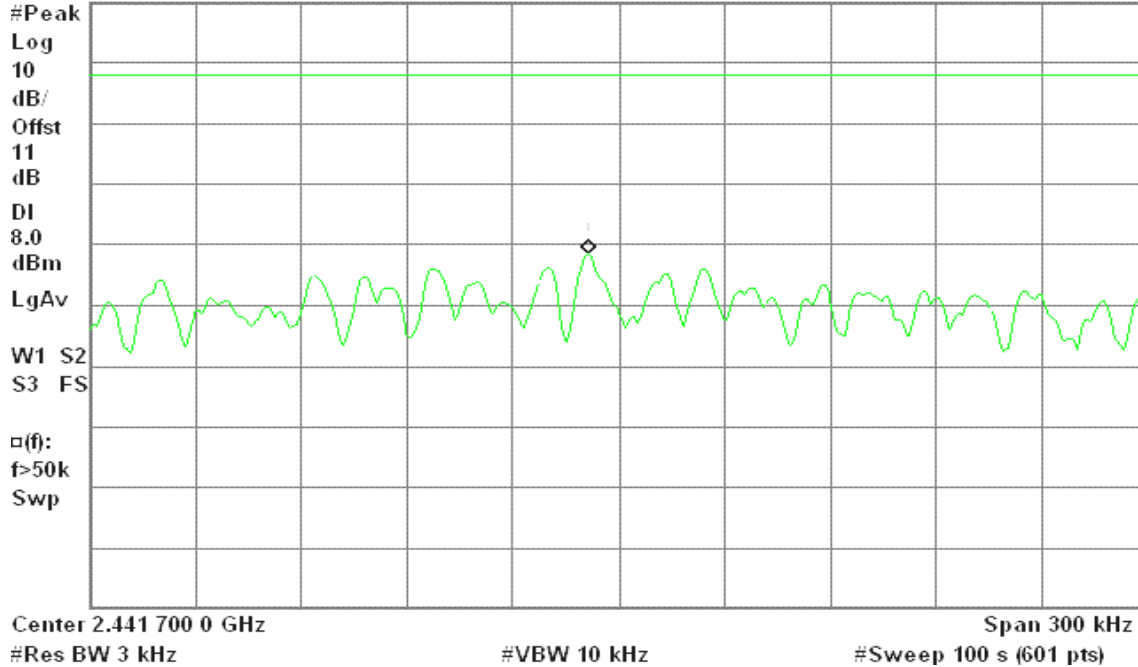
Peak Power Spectral Density, g Mode Mid Ch.

Mkr1 2.441 691 0 GHz

Ref 20 dBm

Atten 20 dB

-21.61 dBm

**PPSD (CH High)**

* Agilent 17:59:50 Sep 6, 2007

R T

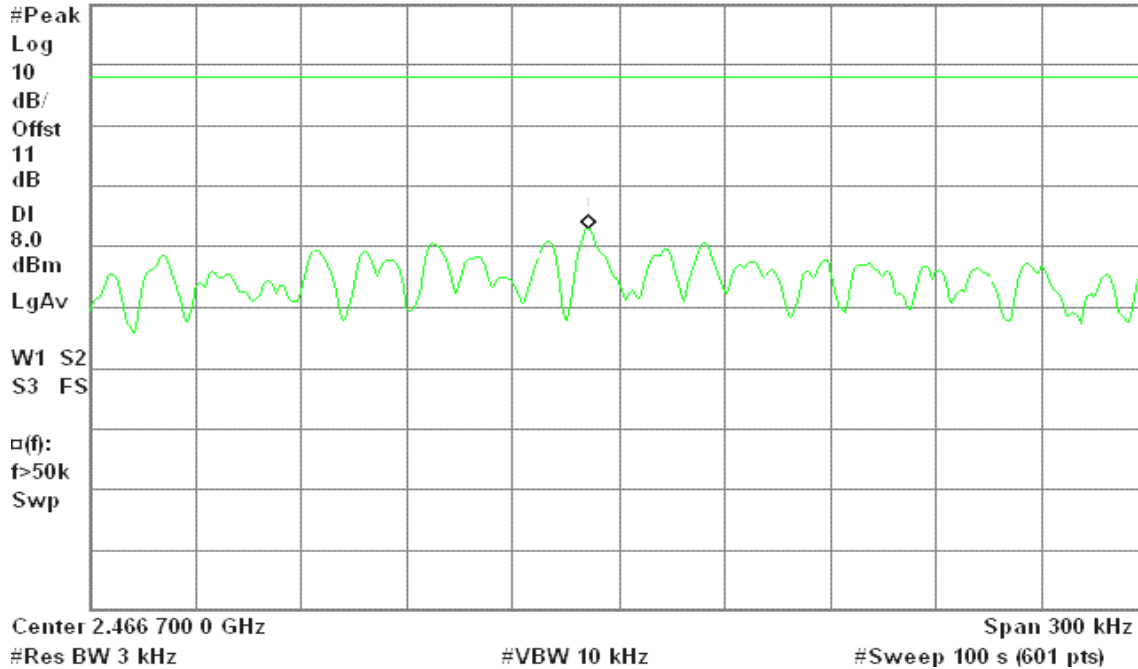
Peak Power Spectral Density, g Mode High Ch.

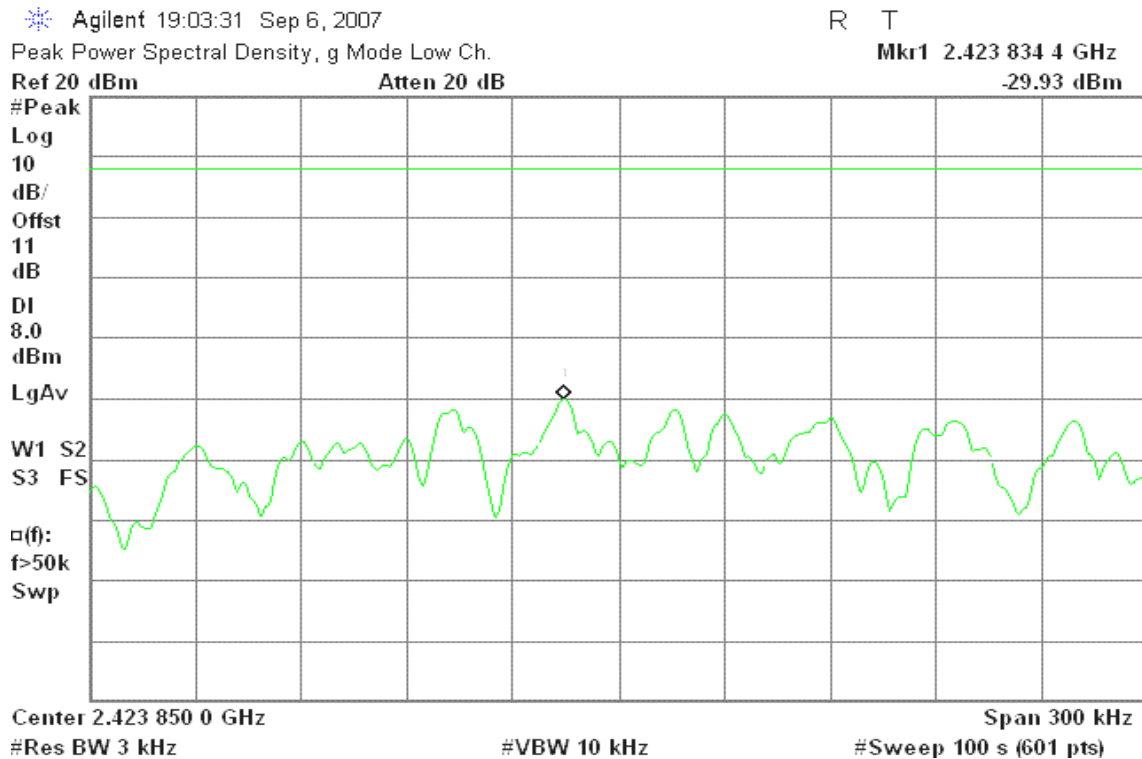
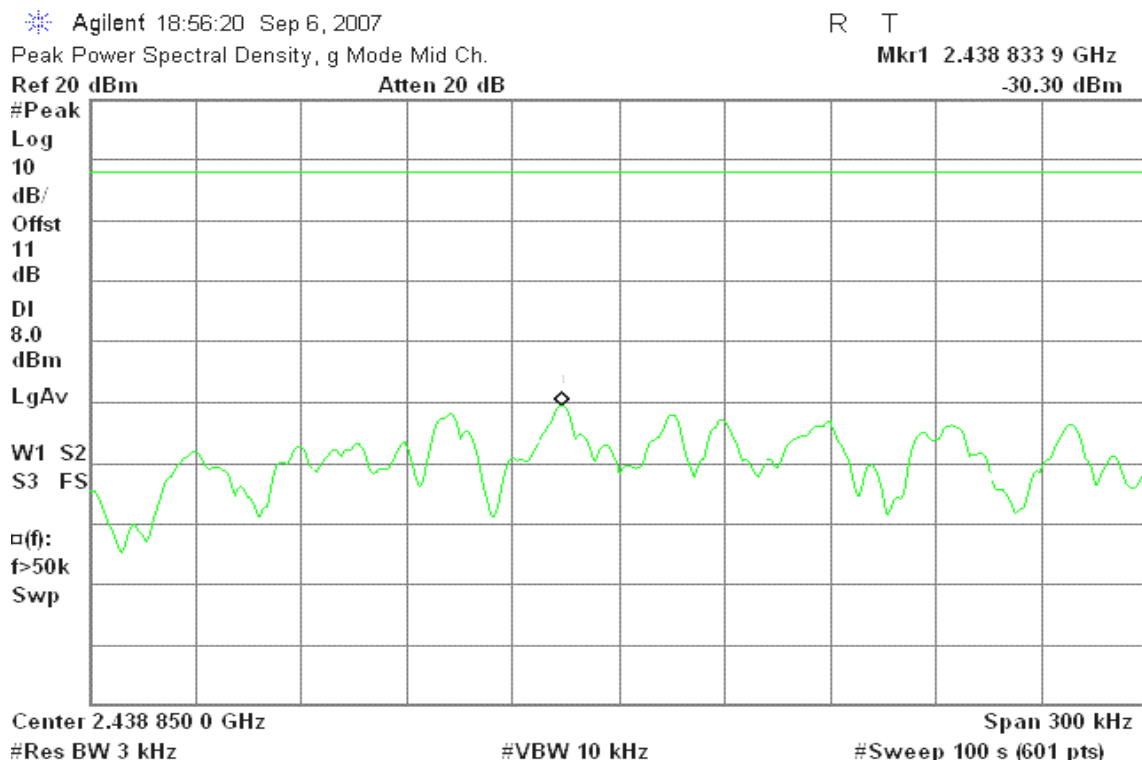
Mkr1 2.466 691 0 GHz

Ref 20 dBm

Atten 20 dB

-17.05 dBm



**draft 802.11n Wide-40 MHz Channel mode / Chain 0****PPSD (CH Low)****PPSD (CH Mid)**

**PPSD (CH High)**

* Agilent 18:51:20 Sep 6, 2007

R T

Peak Power Spectral Density, g Mode High Ch.

Mkr1 2.453 833 4 GHz

Ref 20 dBm

Atten 20 dB

-30.38 dBm

#Peak

Log

10

dB/

Offst

11

dB

DI

8.0

dBm

LgAv

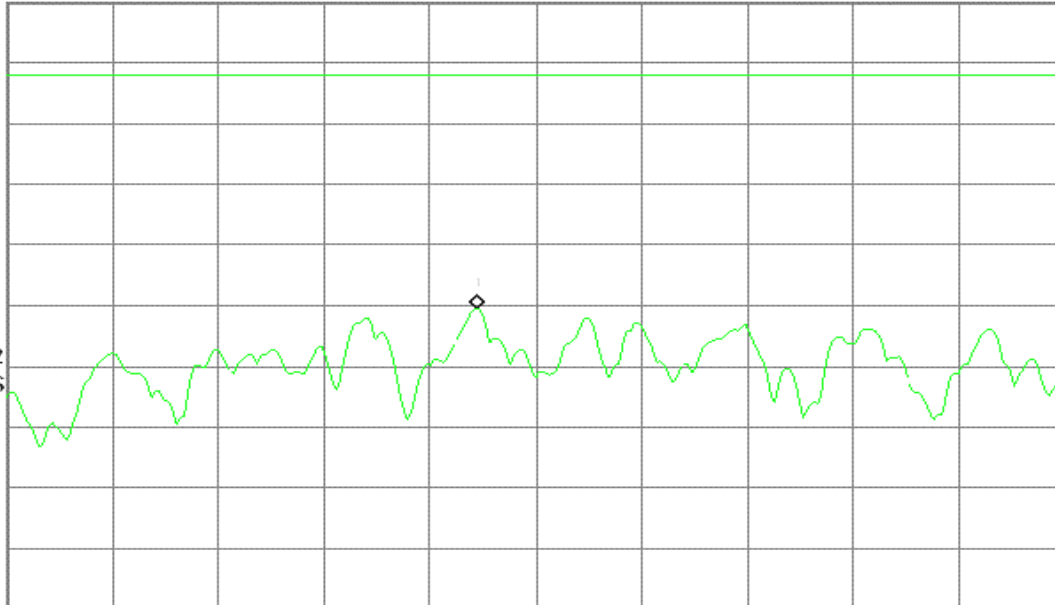
W1 S2

S3 FS

□(f):

f>50k

Swp



Center 2.453 850 0 GHz

Span 300 kHz

#Res BW 3 kHz

#VBW 10 kHz

#Sweep 100 s (601 pts)

draft 802.11n Wide-40 MHz Channel mode / Chain 1**PPSD (CH Low)**

* Agilent 18:31:45 Sep 6, 2007

R T

Peak Power Spectral Density, g Mode Low Ch.

Mkr1 2.423 834 4 GHz

Ref 20 dBm

Atten 20 dB

-30.50 dBm

#Peak

Log

10

dB/

Offst

11

dB

DI

8.0

dBm

LgAv

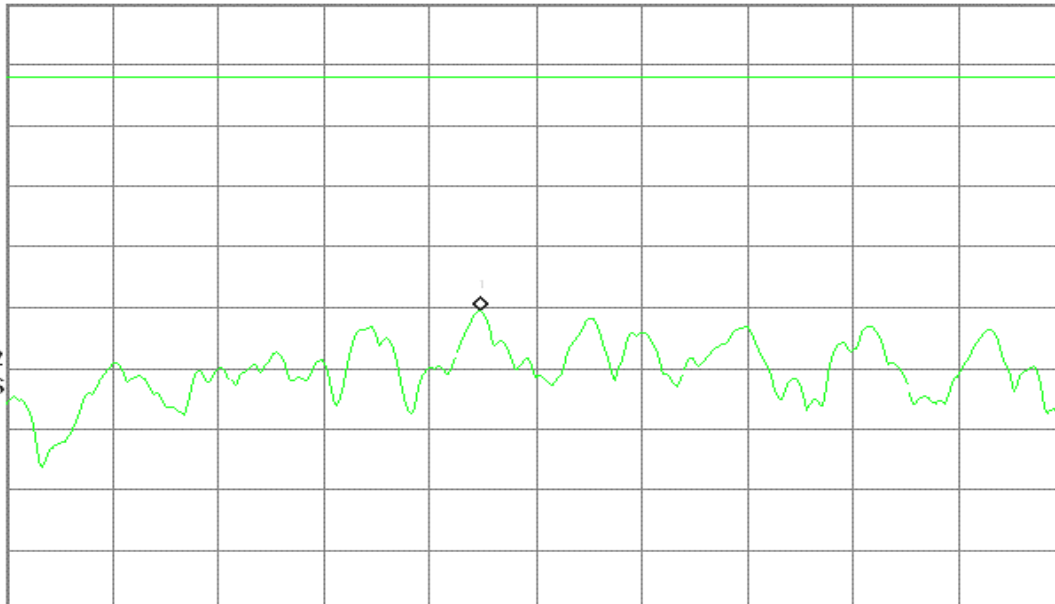
W1 S2

S3 FS

□(f):

f>50k

Swp



Center 2.423 850 0 GHz

Span 300 kHz

#Res BW 3 kHz

#VBW 10 kHz

#Sweep 100 s (601 pts)

**PPSD (CH Mid)**

* Agilent 18:37:42 Sep 6, 2007

R T

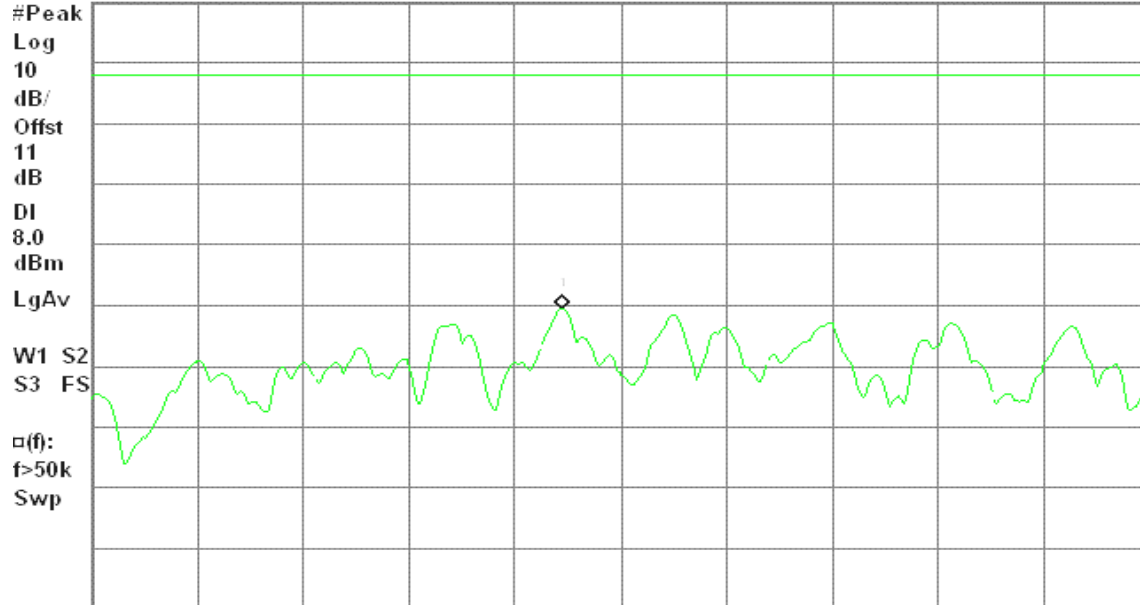
Peak Power Spectral Density, g Mode Mid Ch.

Mkr1 2.438 833 4 GHz

Ref 20 dBm

Atten 20 dB

-30.33 dBm



Center 2.438 850 0 GHz

Span 300 kHz

#Res BW 3 kHz

#VBW 10 kHz

#Sweep 100 s (601 pts)

PPSD (CH High)

* Agilent 18:44:07 Sep 6, 2007

R T

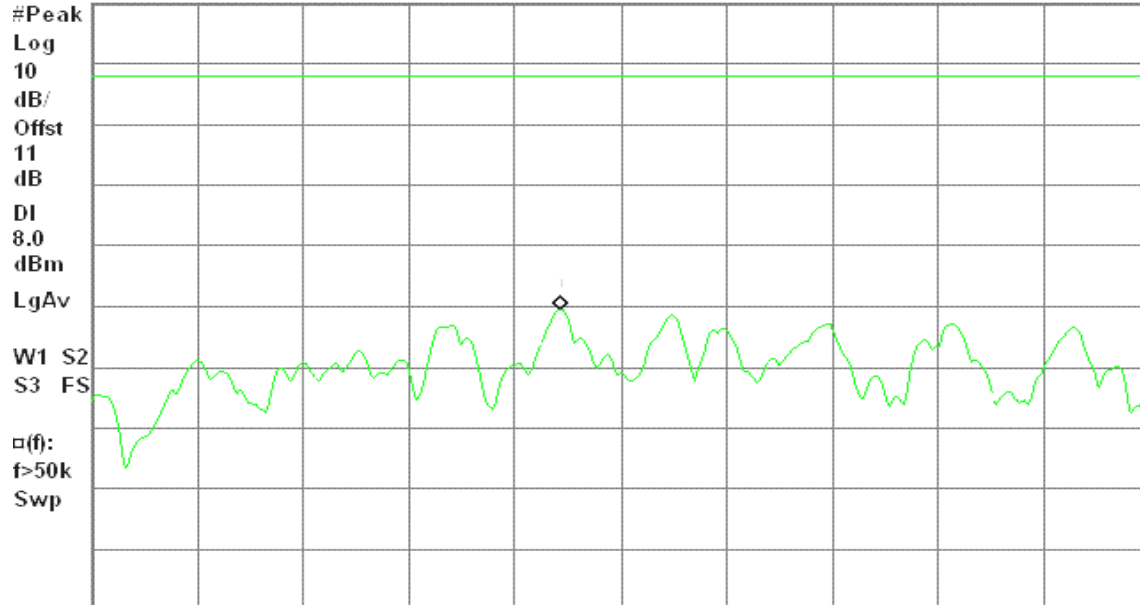
Peak Power Spectral Density, g Mode High Ch.

Mkr1 2.453 832 9 GHz

Ref 20 dBm

Atten 20 dB

-30.28 dBm



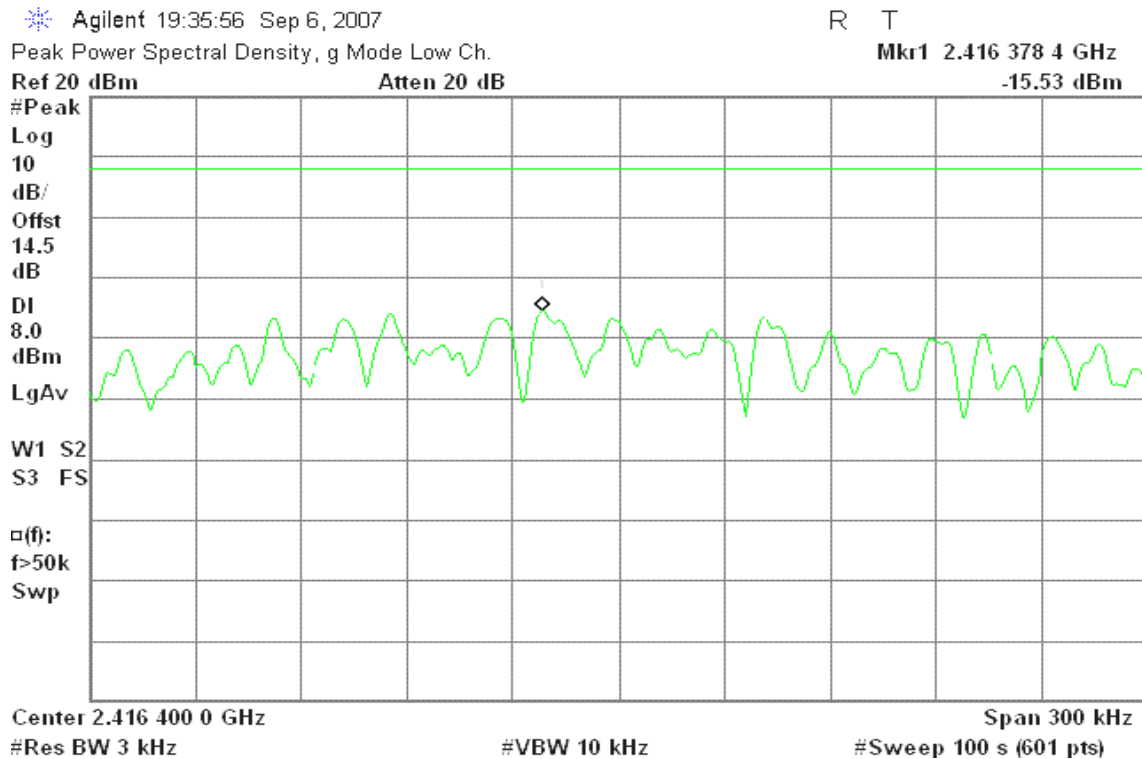
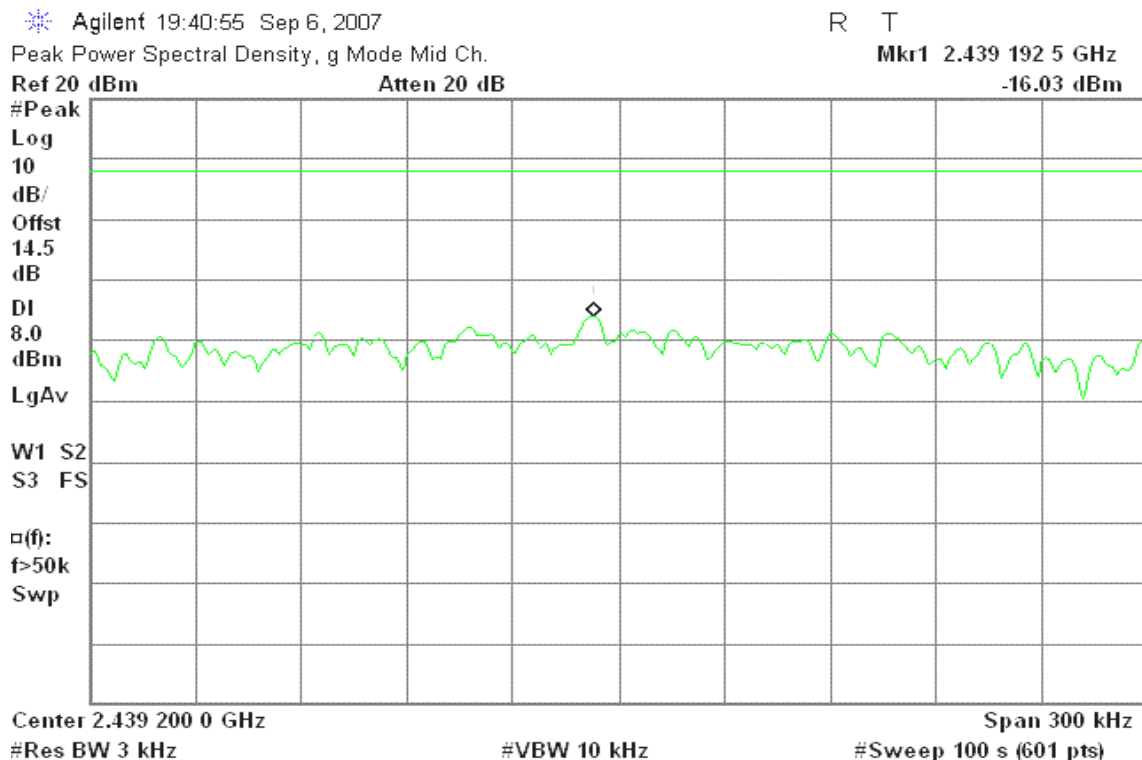
Center 2.453 850 0 GHz

Span 300 kHz

#Res BW 3 kHz

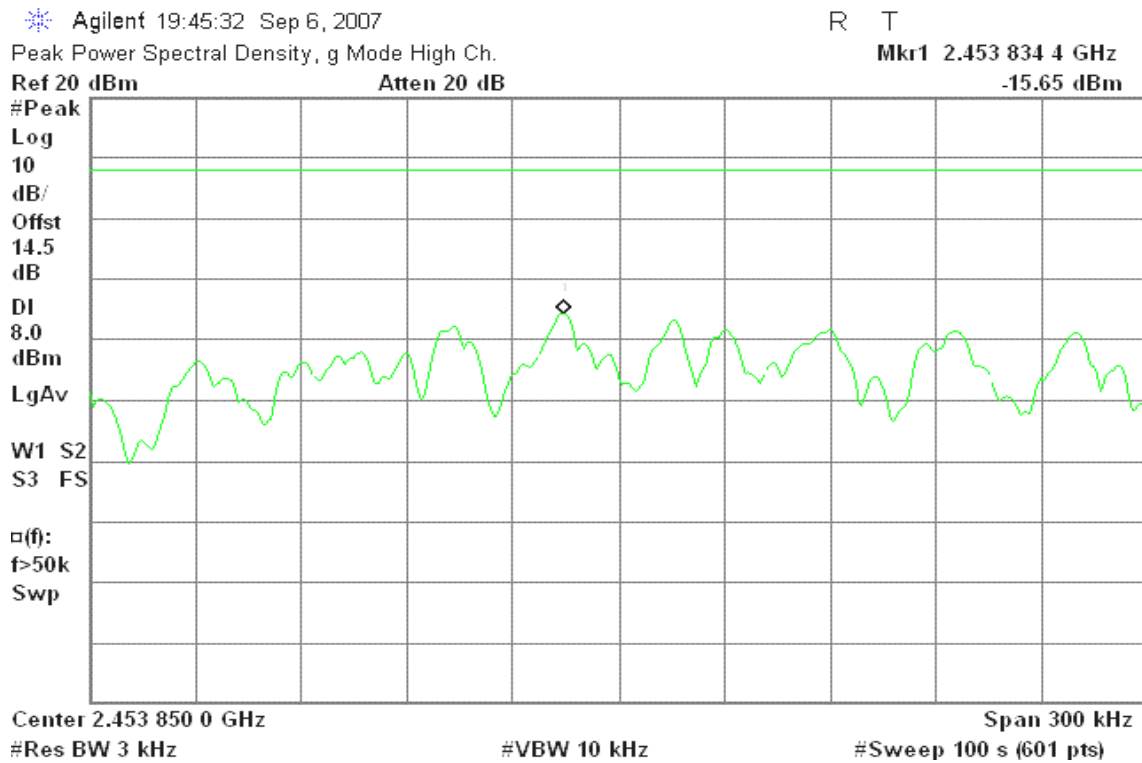
#VBW 10 kHz

#Sweep 100 s (601 pts)

**draft 802.11n Standard-20 MHz Channel mode with combiner****PPSD (CH Low)****PPSD (CH Mid)**

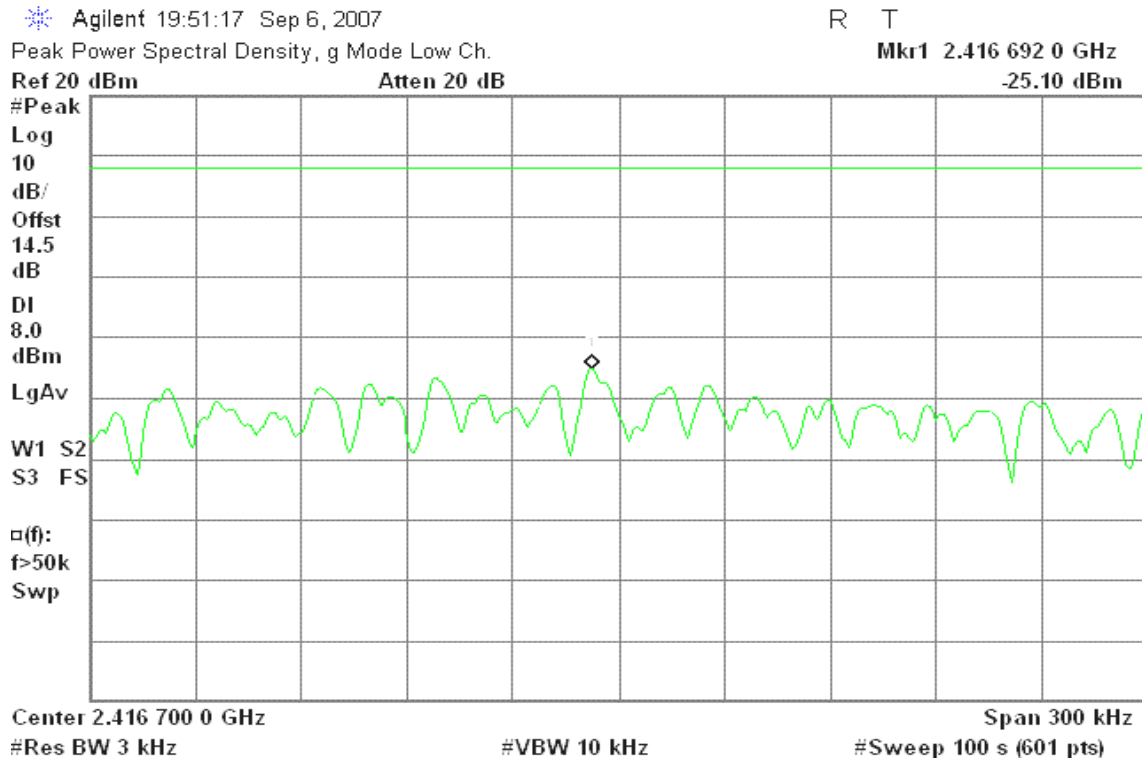


PPSD (CH High)



draft 802.11n Wide-40 MHz Channel mode with combiner

PPSD (CH Low)



**PPSD (CH Mid)**

* Agilent 19:56:10 Sep 6, 2007

R T

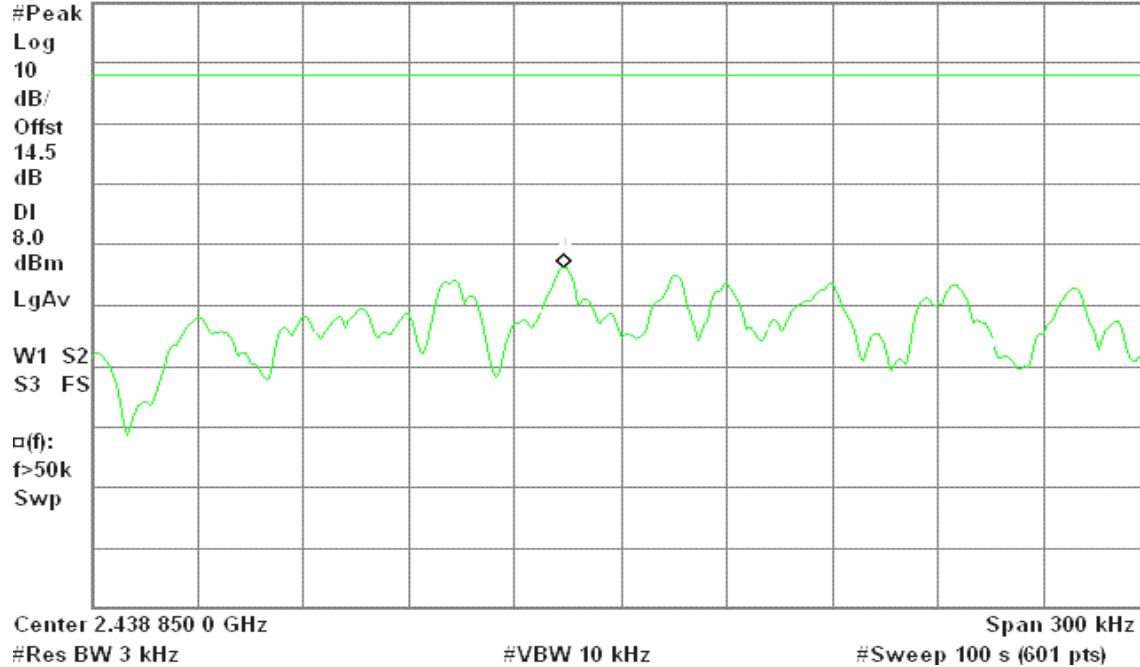
Peak Power Spectral Density, g Mode Mid Ch.

Mkr1 2.438 833 9 GHz

Ref 20 dBm

Atten 20 dB

-23.80 dBm

**PPSD (CH High)**

* Agilent 20:03:46 Sep 6, 2007

R T

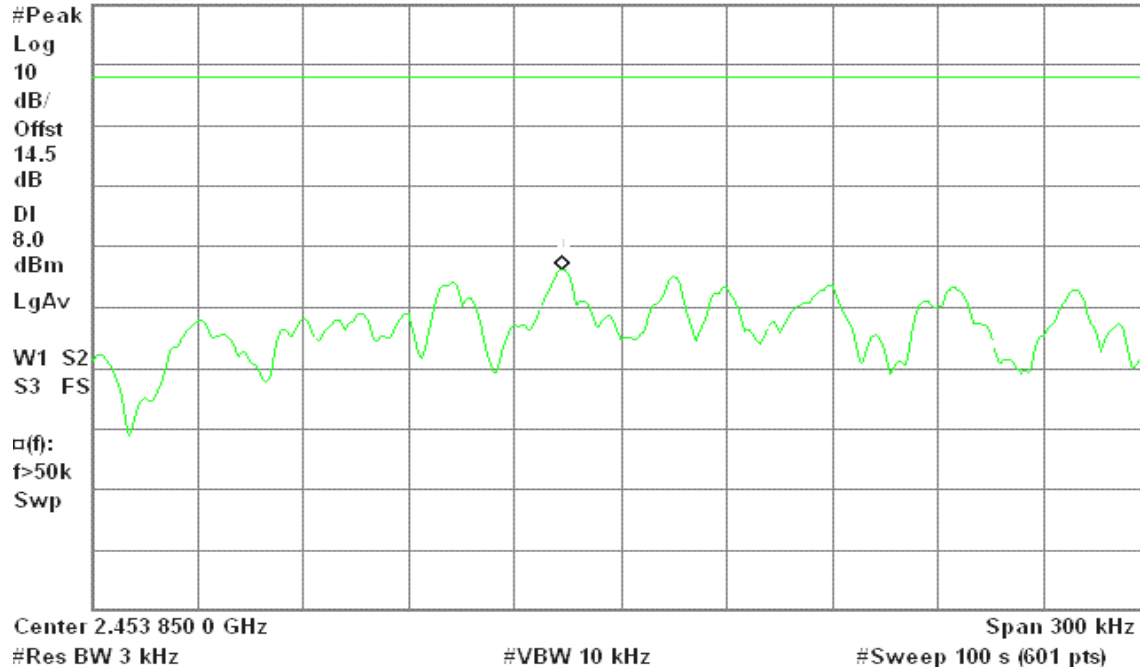
Peak Power Spectral Density, g Mode High Ch.

Mkr1 2.453 833 4 GHz

Ref 20 dBm

Atten 20 dB

-23.78 dBm



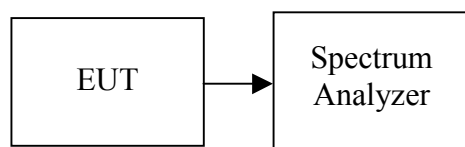
7.6 SPURIOUS EMISSIONS

7.6.1 Conducted Measurement

LIMIT

According to §15.247(d), in any 100 kHz bandwidth outside the frequency bands in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in 15.209(a) (see Section 15.205(c)).

Test Configuration



TEST PROCEDURE

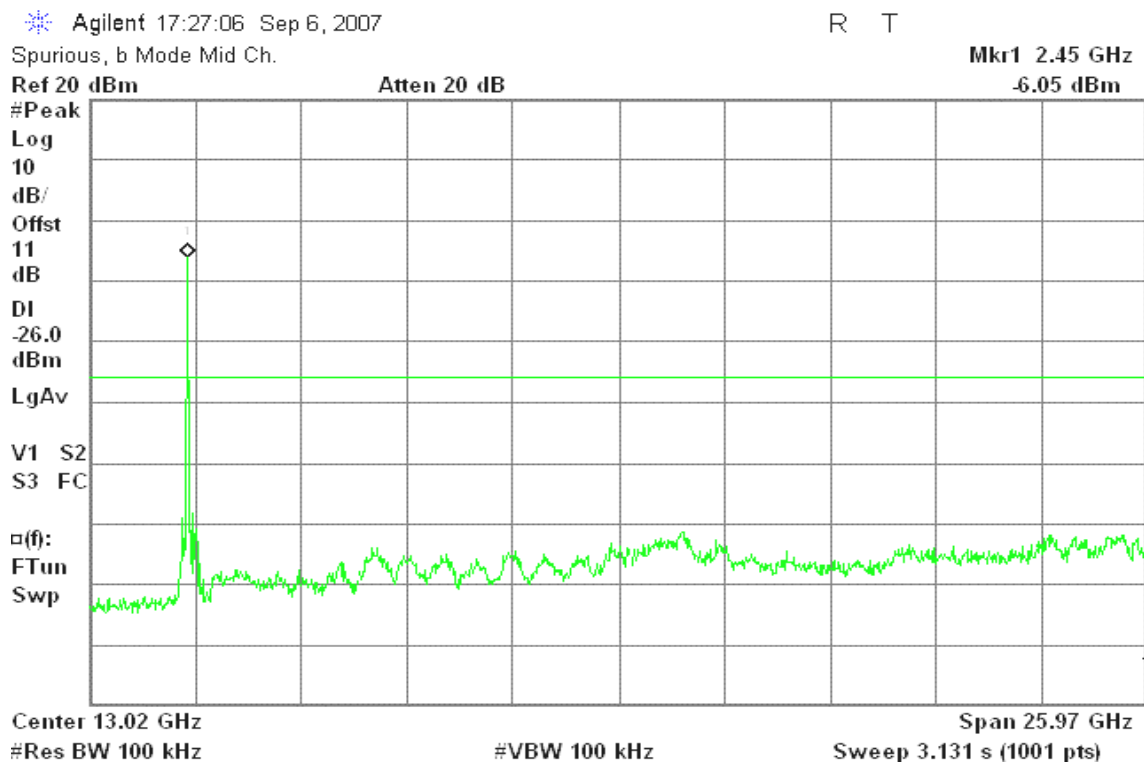
Conducted RF measurements of the transmitter output were made to confirm that the EUT antenna port conducted emissions meet the specified limit and to identify any spurious signals that require further investigation or measurements on the radiated emissions site.

The transmitter output is connected to the spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 100 kHz.

Measurements are made over the 30MHz to 26GHz range with the transmitter set to the lowest, middle, and highest channels.

TEST RESULTS

No non-compliance noted

**Test Plot****IEEE 802.11b mode****CH Low****CH Mid**

**CH High**

* Agilent 17:32:57 Sep 6, 2007

R T

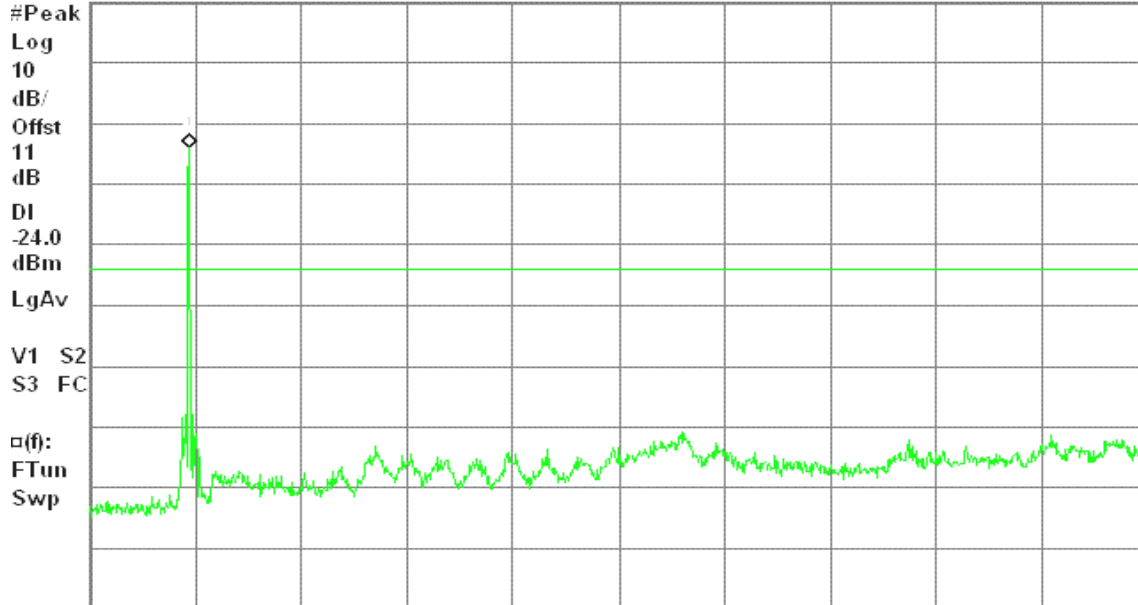
Spurious, b Mode High Ch.

Mkr1 2.47 GHz

Ref 20 dBm

Atten 20 dB

-4.04 dBm



Center 13.02 GHz

Span 25.97 GHz

#Res BW 100 kHz

#VBW 100 kHz

Sweep 3.131 s (1001 pts)

IEEE 802.11g mode**CH Low**

* Agilent 17:14:40 Sep 6, 2007

R T

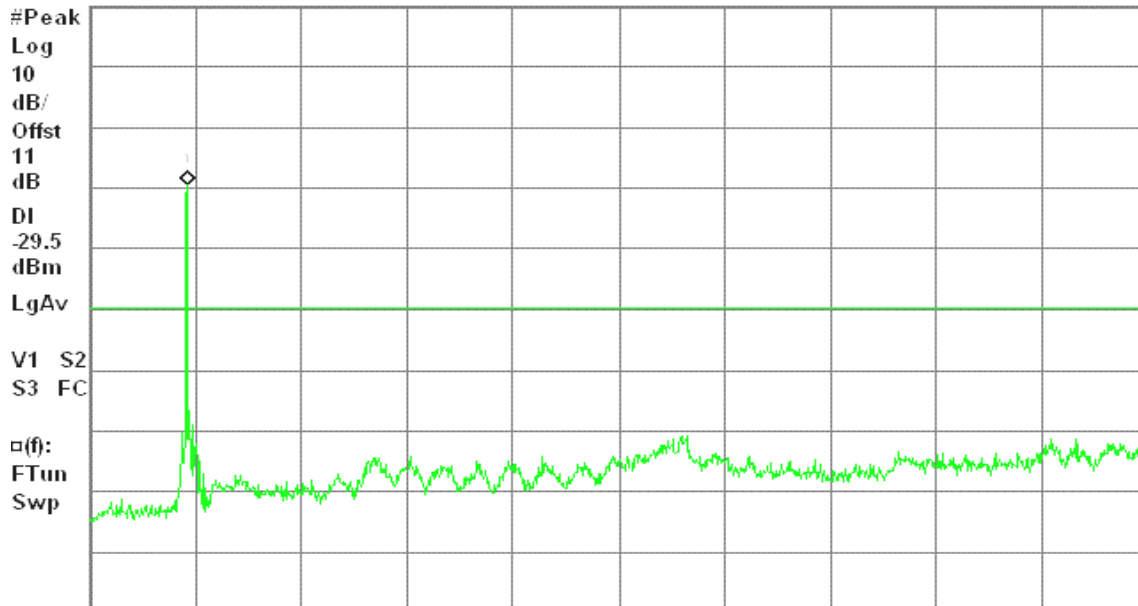
Spurious, g Mode Low Ch.

Mkr1 2.42 GHz

Ref 20 dBm

Atten 20 dB

-9.54 dBm



Center 13.02 GHz

Span 25.97 GHz

#Res BW 100 kHz

#VBW 100 kHz

Sweep 3.131 s (1001 pts)



CH Mid

* Agilent 17:08:24 Sep 6, 2007

R T

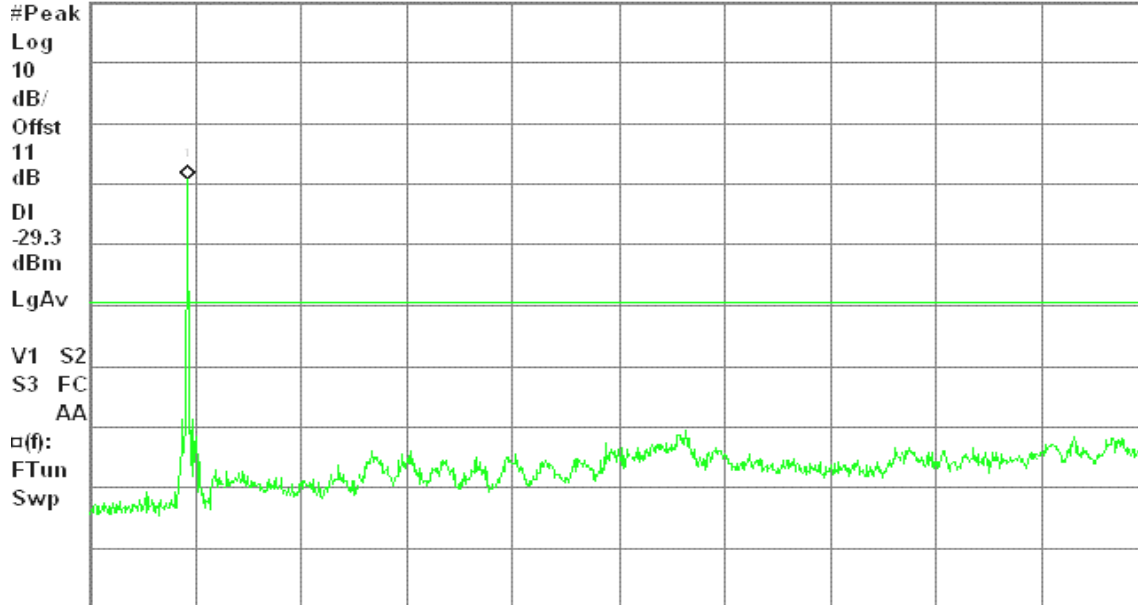
Spurious, g Mode Mid Ch.

Mkr1 2.45 GHz

Ref 20 dBm

Atten 20 dB

-9.26 dBm



Center 13.02 GHz

Span 25.97 GHz

#Res BW 100 kHz

#VBW 100 kHz

Sweep 3.131 s (1001 pts)

CH High

* Agilent 17:03:22 Sep 6, 2007

R T

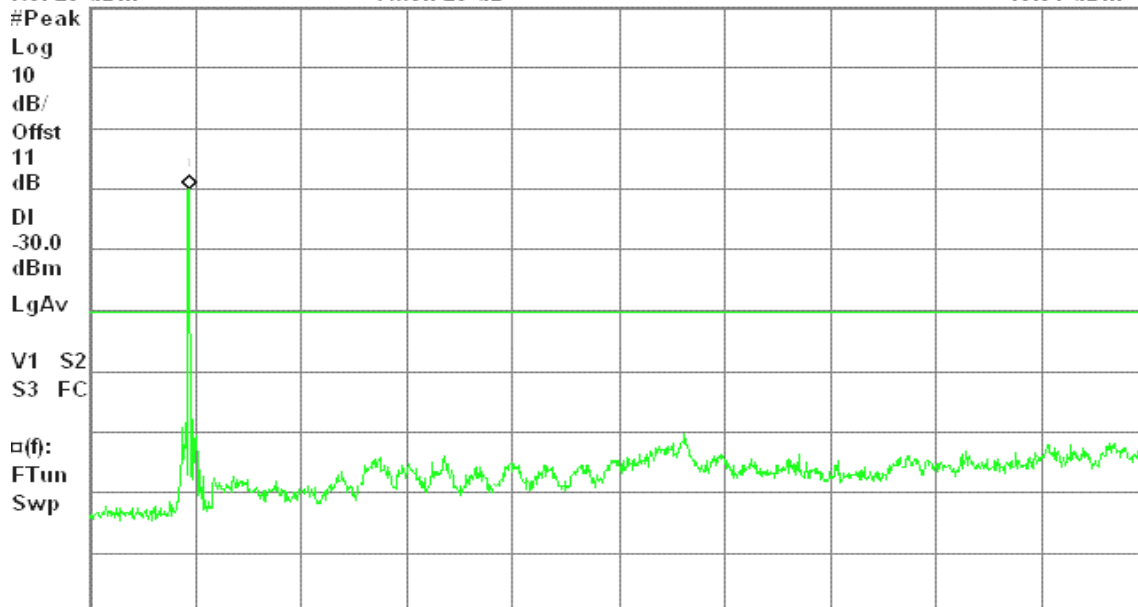
Spurious, g Mode High Ch.

Mkr1 2.47 GHz

Ref 20 dBm

Atten 20 dB

-10.01 dBm



Center 13.02 GHz

Span 25.97 GHz

#Res BW 100 kHz

#VBW 100 kHz

Sweep 3.131 s (1001 pts)

**draft 802.11n Standard-20 MHz Channel mode / Chain 0****CH Low**

* Agilent 17:44:21 Sep 6, 2007

R T

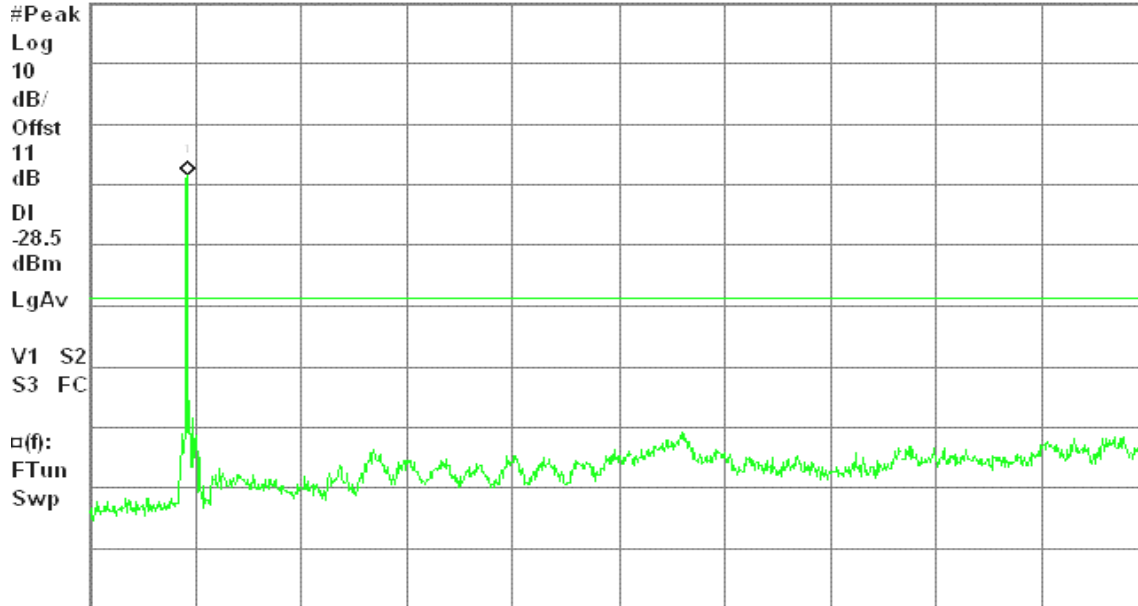
Spurious, g Mode Low Ch.

Mkr1 2.42 GHz

Ref 20 dBm

Atten 20 dB

-8.51 dBm



Center 13.02 GHz

Span 25.97 GHz

#Res BW 100 kHz

#VBW 100 kHz

Sweep 3.131 s (1001 pts)

CH Mid

* Agilent 17:49:38 Sep 6, 2007

R T

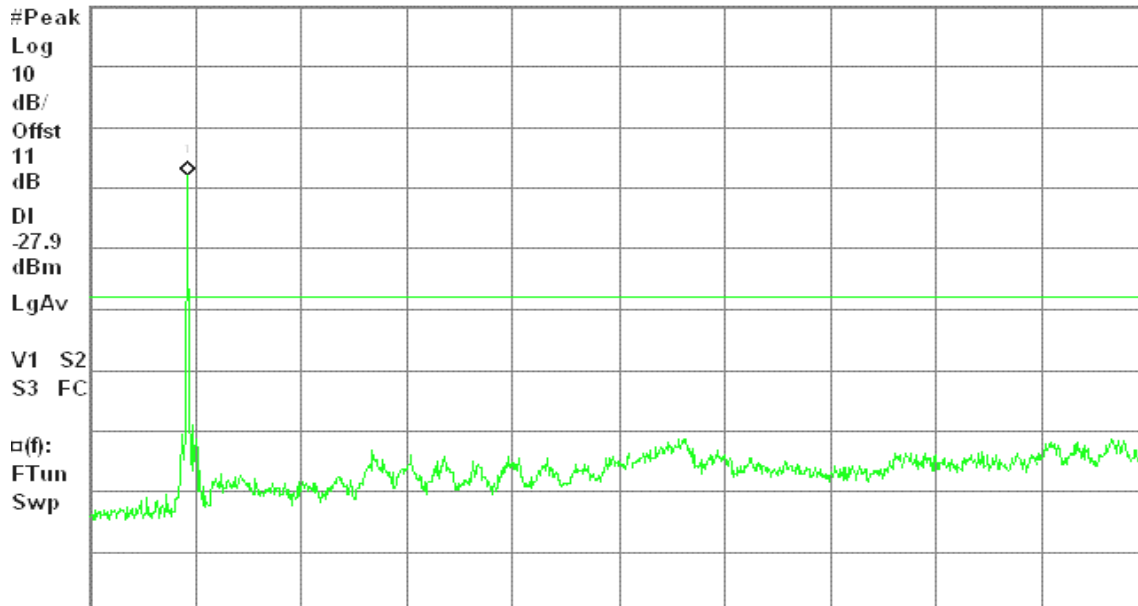
Spurious, g Mode Mid Ch.

Mkr1 2.45 GHz

Ref 20 dBm

Atten 20 dB

-7.89 dBm



Center 13.02 GHz

Span 25.97 GHz

#Res BW 100 kHz

#VBW 100 kHz

Sweep 3.131 s (1001 pts)

**CH High**

* Agilent 17:54:56 Sep 6, 2007

R T

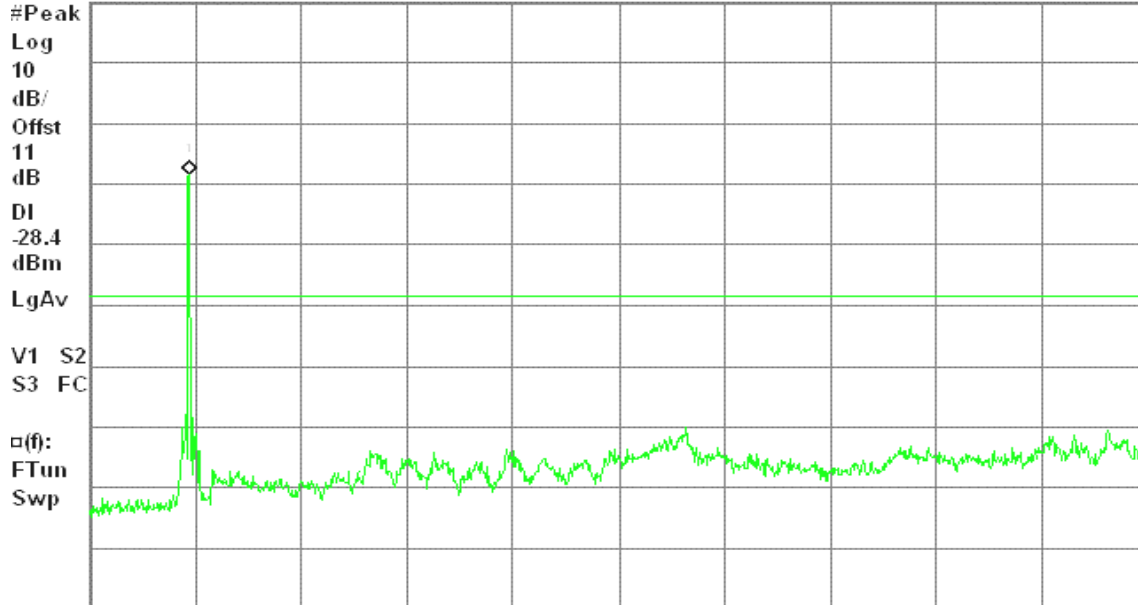
Spurious, g Mode High Ch.

Mkr1 2.47 GHz

Ref 20 dBm

Atten 20 dB

-8.35 dBm



Center 13.02 GHz

Span 25.97 GHz

#Res BW 100 kHz

#VBW 100 kHz

Sweep 3.131 s (1001 pts)

draft 802.11n Standard-20 MHz Channel mode / Chain 1**CH Low**

* Agilent 18:10:32 Sep 6, 2007

R T

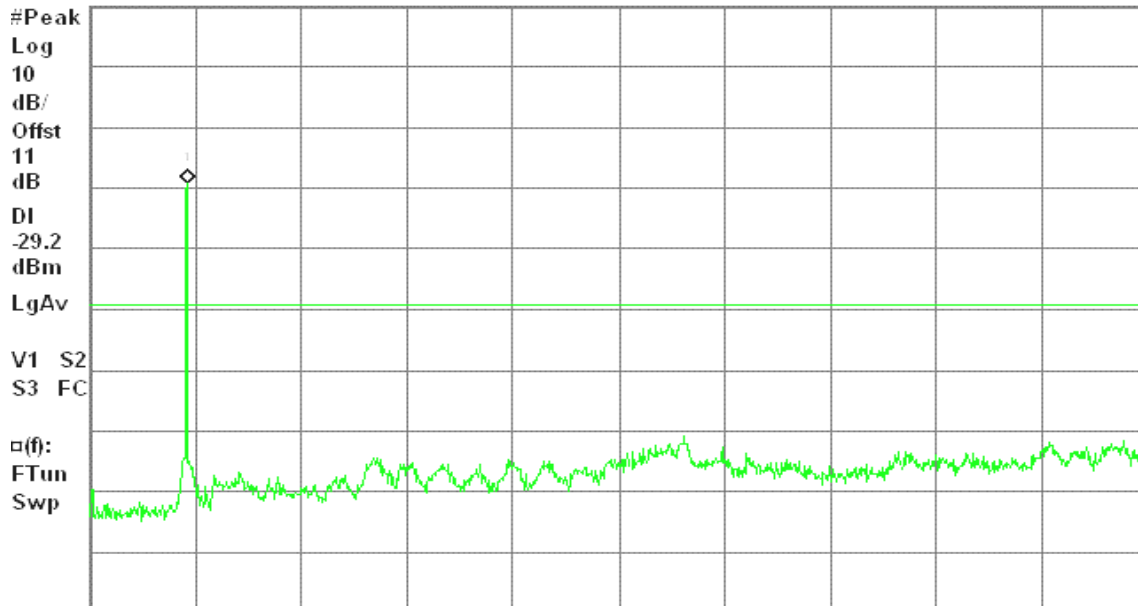
Spurious, g Mode Low Ch.

Mkr1 2.42 GHz

Ref 20 dBm

Atten 20 dB

-9.20 dBm



Center 13.02 GHz

Span 25.97 GHz

#Res BW 100 kHz

#VBW 100 kHz

Sweep 3.131 s (1001 pts)



CH Mid

* Agilent 18:05:43 Sep 6, 2007

R T

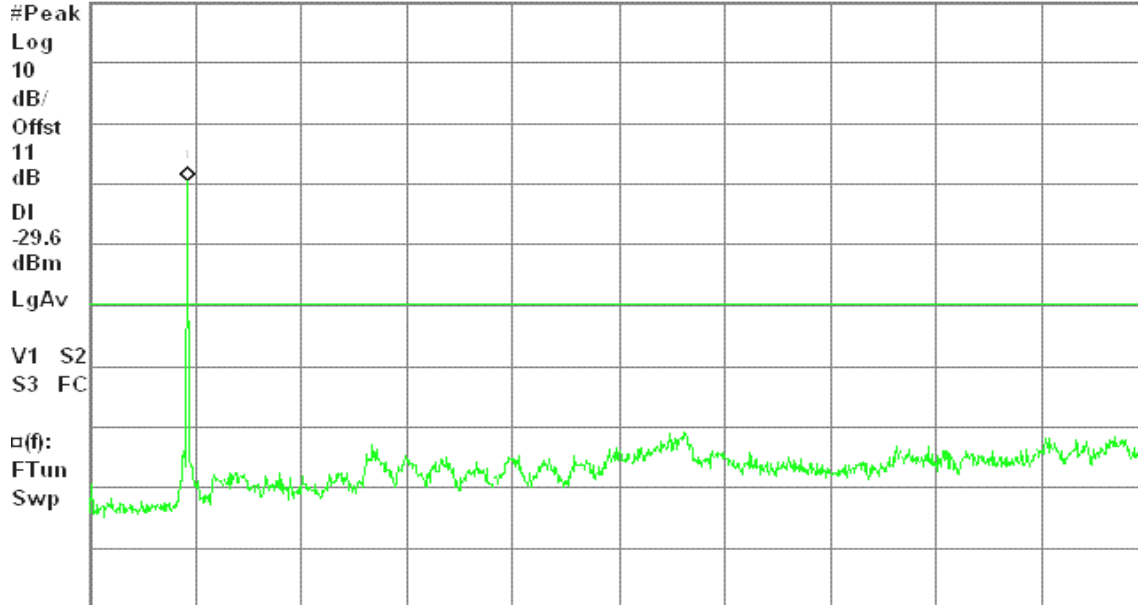
Spurious, g Mode Mid Ch.

Mkr1 2.45 GHz

Ref 20 dBm

Atten 20 dB

-9.60 dBm



Center 13.02 GHz

Span 25.97 GHz

#Res BW 100 kHz

#VBW 100 kHz

Sweep 3.131 s (1001 pts)

CH High

* Agilent 18:00:47 Sep 6, 2007

R T

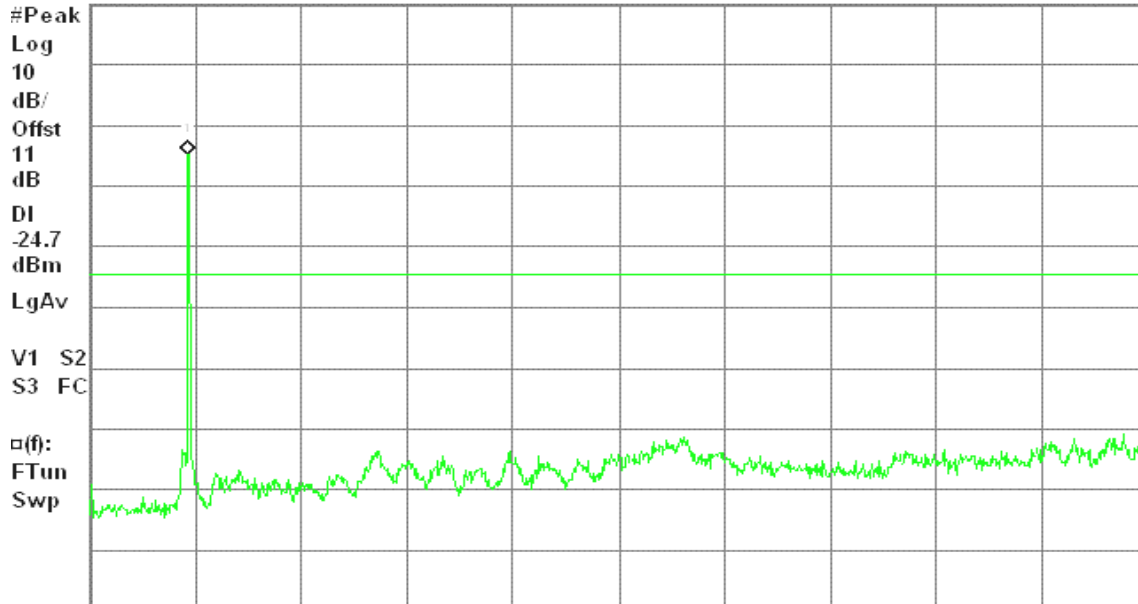
Spurious, g Mode High Ch.

Mkr1 2.45 GHz

Ref 20 dBm

Atten 20 dB

-4.70 dBm



Center 13.02 GHz

Span 25.97 GHz

#Res BW 100 kHz

#VBW 100 kHz

Sweep 3.131 s (1001 pts)

**draft 802.11n Wide-40 MHz Channel mode / Chain 0****CH Low**

* Agilent 19:04:14 Sep 6, 2007

R T

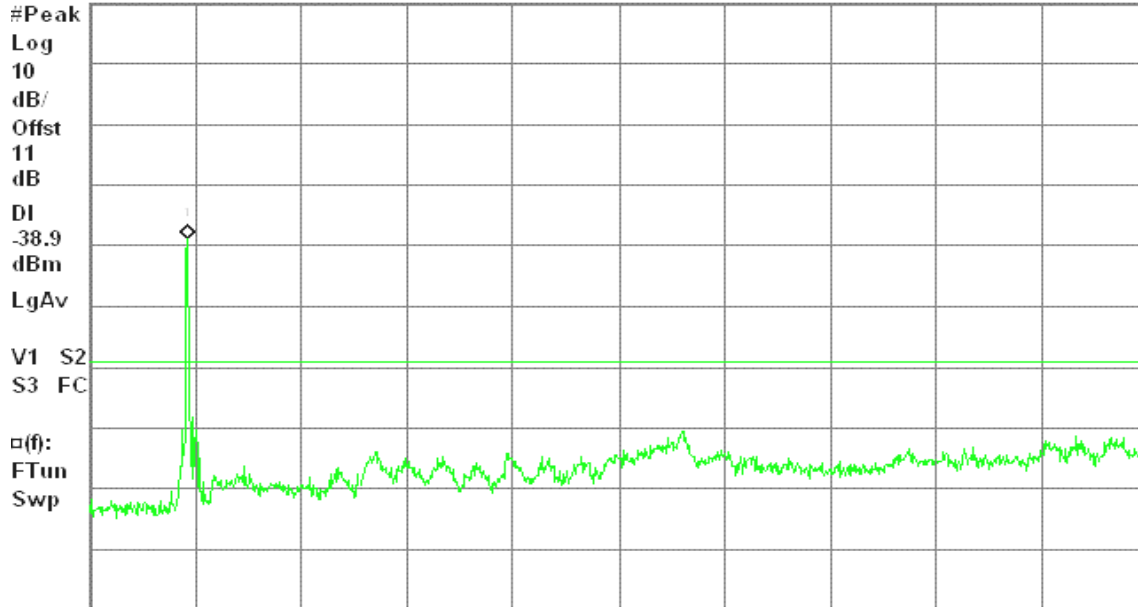
Spurious, g Mode Low Ch.

Mkr1 2.45 GHz

Ref 20 dBm

Atten 20 dB

-18.94 dBm



Center 13.02 GHz

Span 25.97 GHz

#Res BW 100 kHz

#VBW 100 kHz

Sweep 3.131 s (1001 pts)

CH Mid

* Agilent 18:57:05 Sep 6, 2007

R T

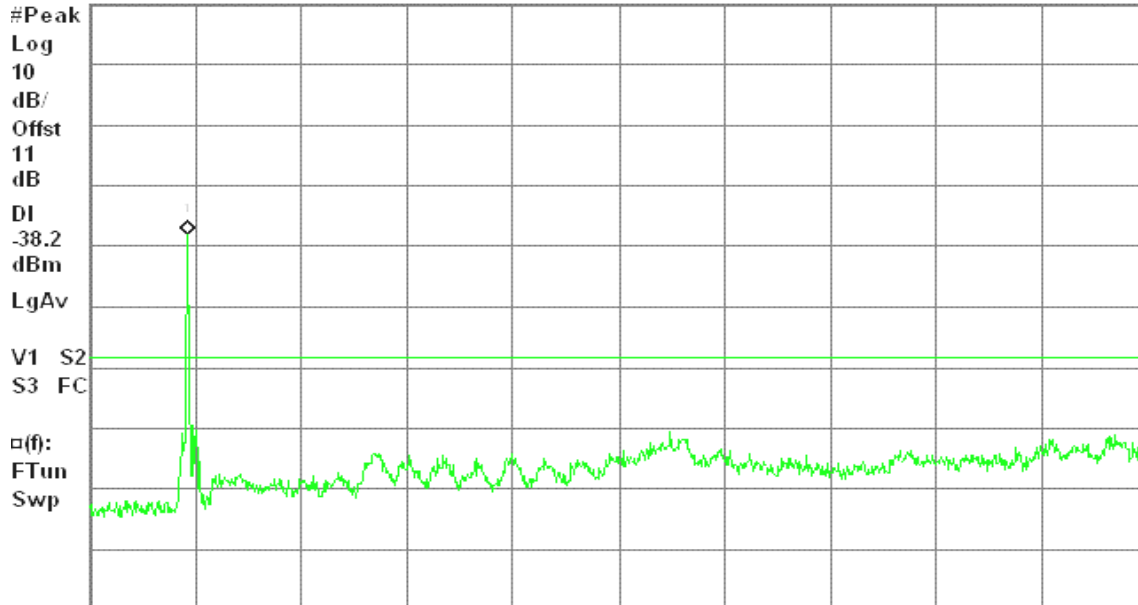
Spurious, g Mode Mid Ch.

Mkr1 2.45 GHz

Ref 20 dBm

Atten 20 dB

-18.19 dBm



Center 13.02 GHz

Span 25.97 GHz

#Res BW 100 kHz

#VBW 100 kHz

Sweep 3.131 s (1001 pts)

**CH High**

* Agilent 18:51:58 Sep 6, 2007

R T

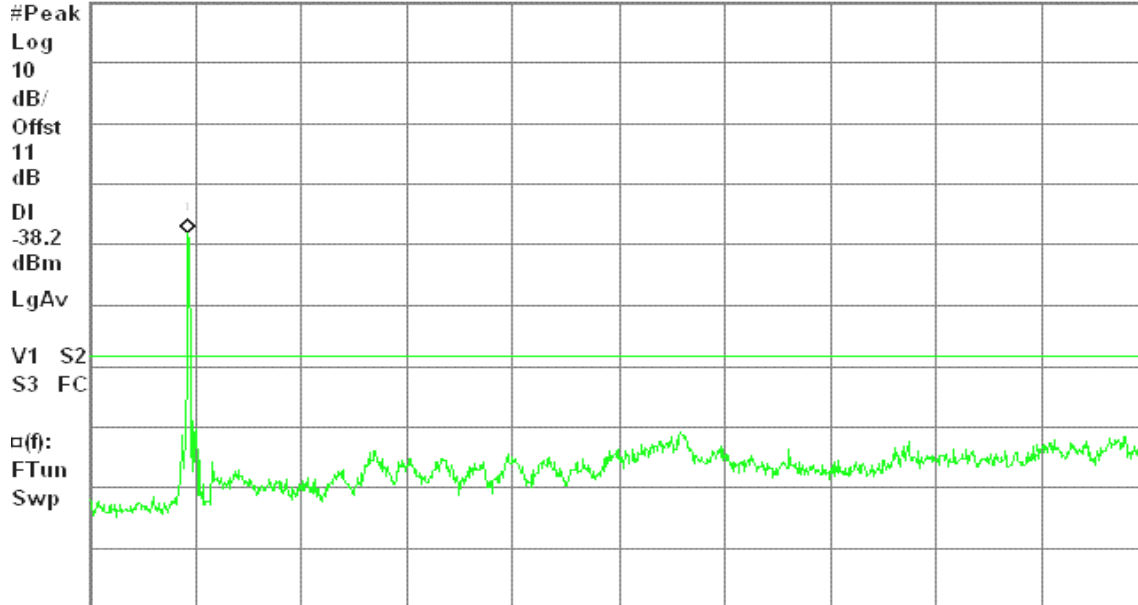
Spurious, g Mode High Ch.

Mkr1 2.45 GHz

Ref 20 dBm

Atten 20 dB

-18.16 dBm



Center 13.02 GHz

Span 25.97 GHz

#Res BW 100 kHz

#VBW 100 kHz

Sweep 3.131 s (1001 pts)

draft 802.11n Wide-40 MHz Channel mode / Chain 1**CH Low**

* Agilent 18:32:34 Sep 6, 2007

R T

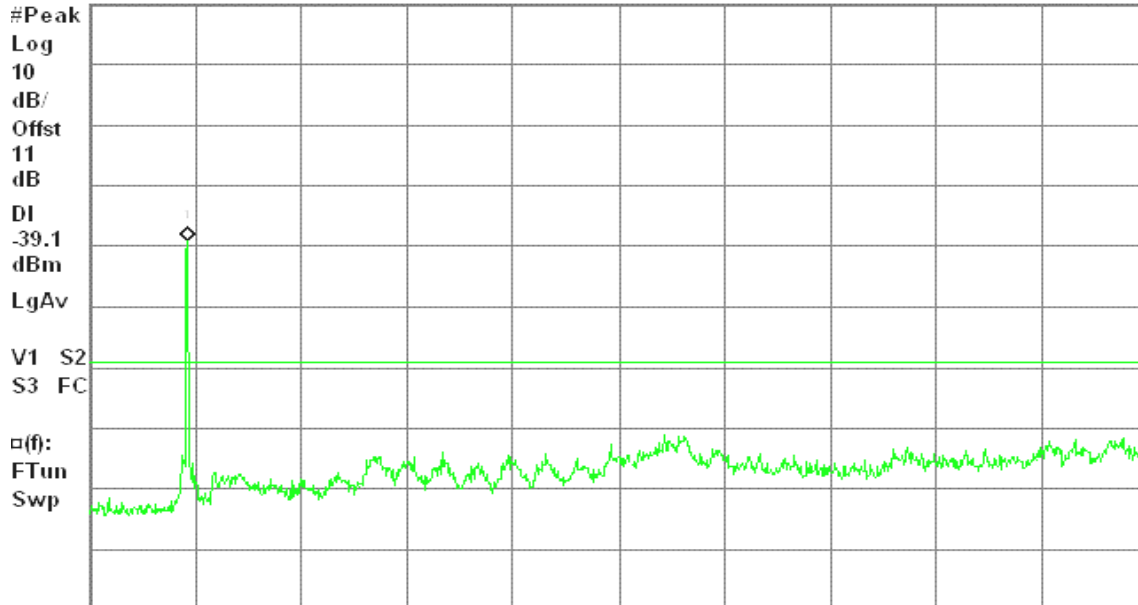
Spurious, g Mode Low Ch.

Mkr1 2.42 GHz

Ref 20 dBm

Atten 20 dB

-19.10 dBm



Center 13.02 GHz

Span 25.97 GHz

#Res BW 100 kHz

#VBW 100 kHz

Sweep 3.131 s (1001 pts)



CH Mid

* Agilent 18:38:32 Sep 6, 2007

R T

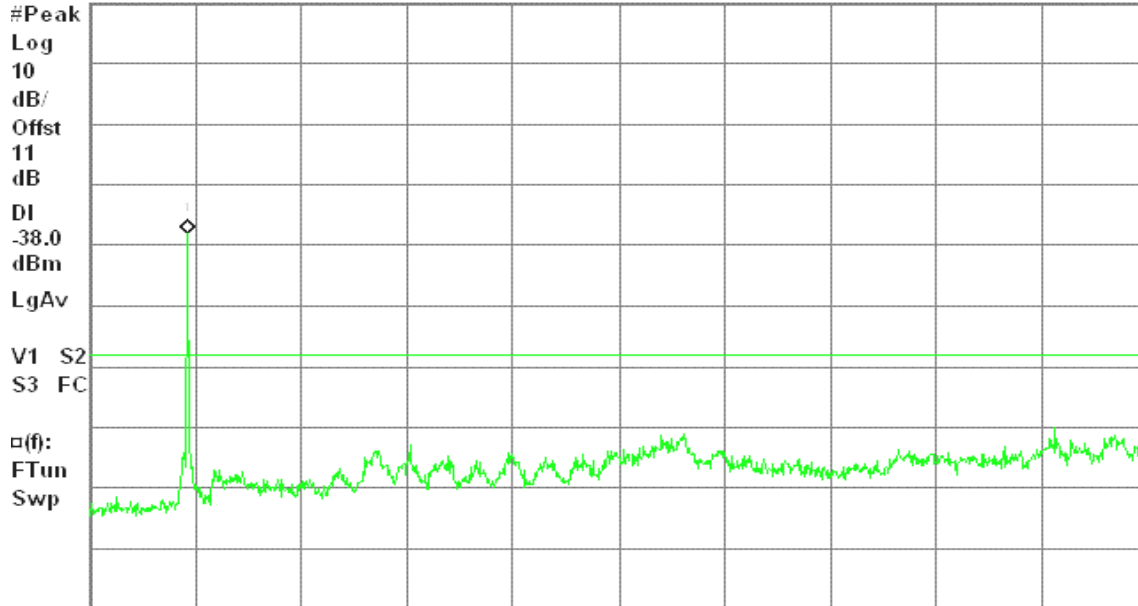
Spurious, g Mode Mid Ch.

Mkr1 2.45 GHz

Ref 20 dBm

Atten 20 dB

-18.02 dBm



Center 13.02 GHz

Span 25.97 GHz

#Res BW 100 kHz

#VBW 100 kHz

Sweep 3.131 s (1001 pts)

CH High

* Agilent 18:44:48 Sep 6, 2007

R T

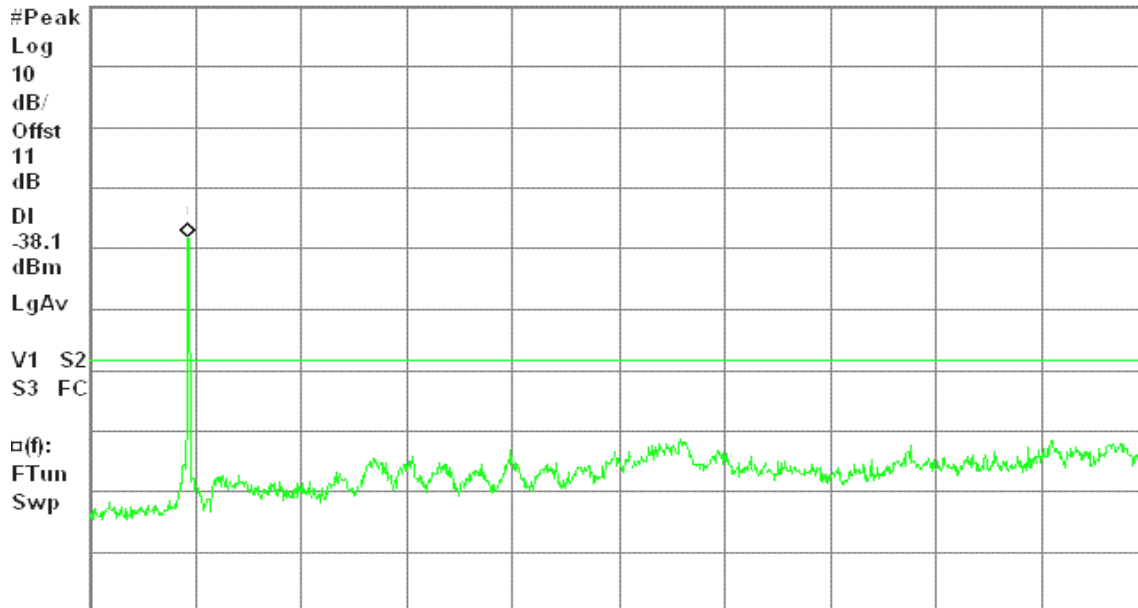
Spurious, g Mode High Ch.

Mkr1 2.45 GHz

Ref 20 dBm

Atten 20 dB

-18.12 dBm



Center 13.02 GHz

Span 25.97 GHz

#Res BW 100 kHz

#VBW 100 kHz

Sweep 3.131 s (1001 pts)

**draft 802.11n Standard-20 MHz Channel mode with combiner****CH Low**

* Agilent 19:36:36 Sep 6, 2007

R T

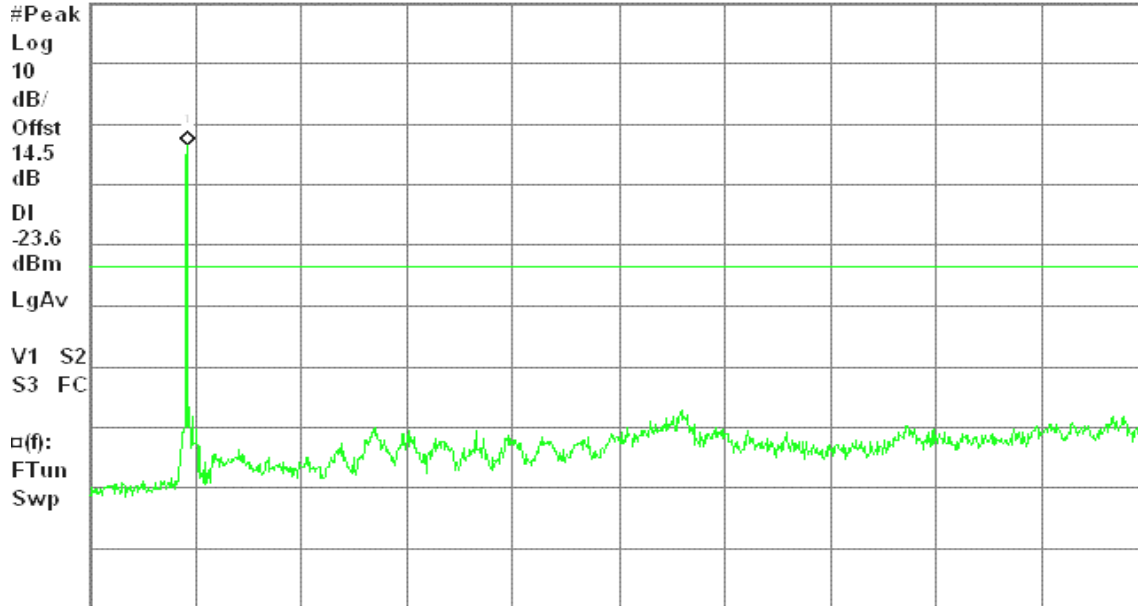
Spurious, g Mode Low Ch.

Mkr1 2.42 GHz

Ref 20 dBm

Atten 20 dB

-3.62 dBm



Center 13.02 GHz

Span 25.97 GHz

#Res BW 100 kHz

#VBW 100 kHz

Sweep 3.131 s (1001 pts)

CH Mid

* Agilent 19:41:32 Sep 6, 2007

R T

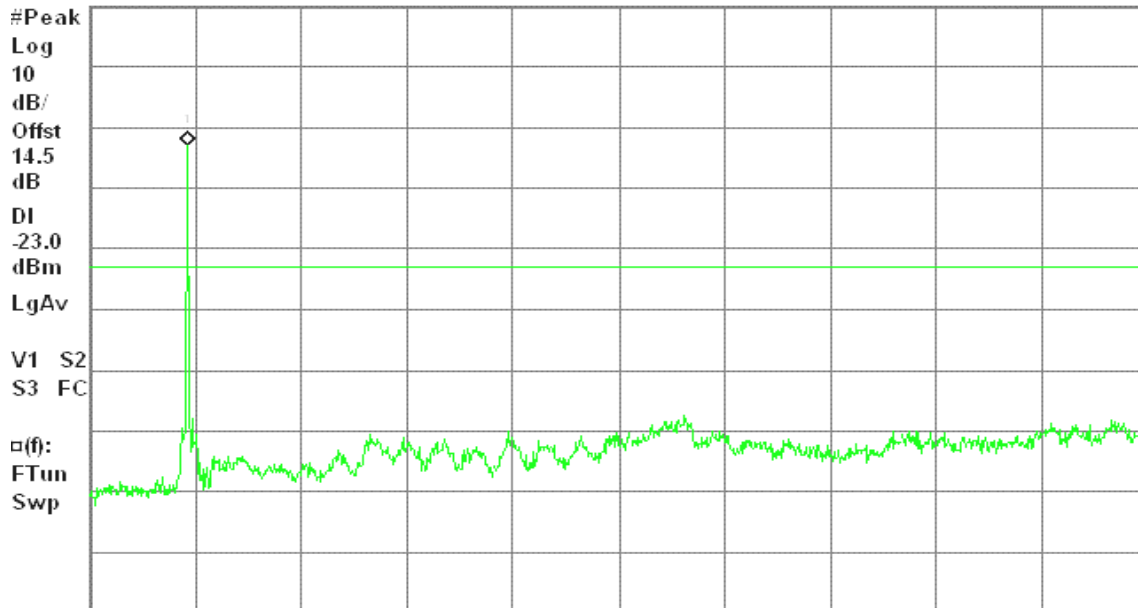
Spurious, g Mode Mid Ch.

Mkr1 2.45 GHz

Ref 20 dBm

Atten 20 dB

-3.00 dBm



Center 13.02 GHz

Span 25.97 GHz

#Res BW 100 kHz

#VBW 100 kHz

Sweep 3.131 s (1001 pts)

**CH High**

* Agilent 19:46:14 Sep 6, 2007

R T

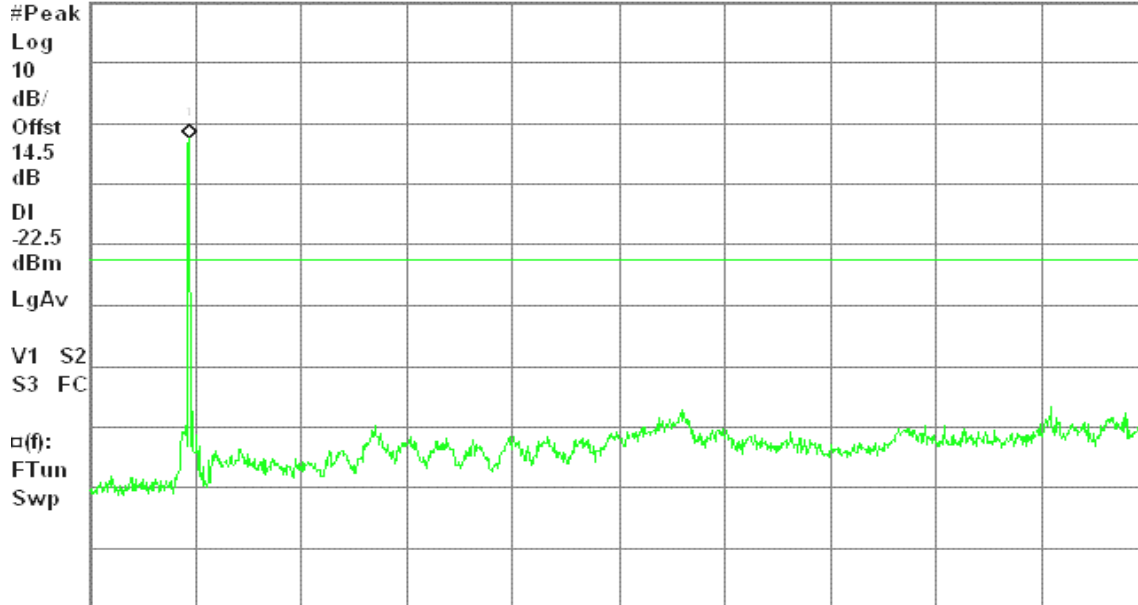
Spurious, g Mode High Ch.

Mkr1 2.47 GHz

Ref 20 dBm

Atten 20 dB

-2.54 dBm



Center 13.02 GHz

Span 25.97 GHz

#Res BW 100 kHz

#VBW 100 kHz

Sweep 3.131 s (1001 pts)

draft 802.11n Wide-40 MHz Channel mode with combiner**CH Low**

* Agilent 19:51:57 Sep 6, 2007

R T

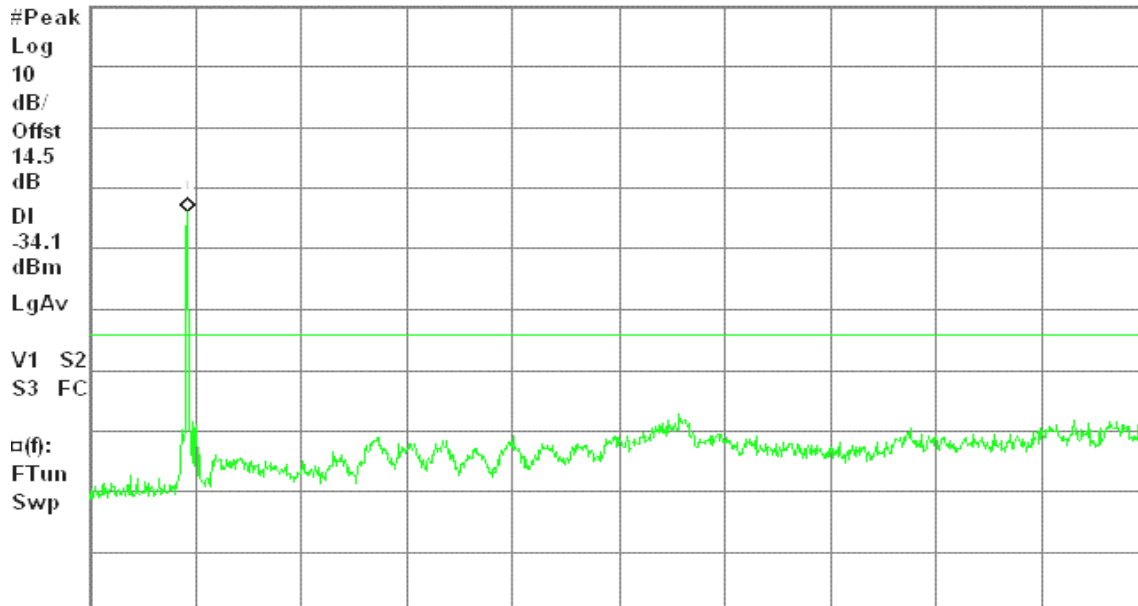
Spurious, g Mode Low Ch.

Mkr1 2.42 GHz

Ref 20 dBm

Atten 20 dB

-14.06 dBm



Center 13.02 GHz

Span 25.97 GHz

#Res BW 100 kHz

#VBW 100 kHz

Sweep 3.131 s (1001 pts)



CH Mid

Agilent 19:57:35 Sep 6, 2007

R T

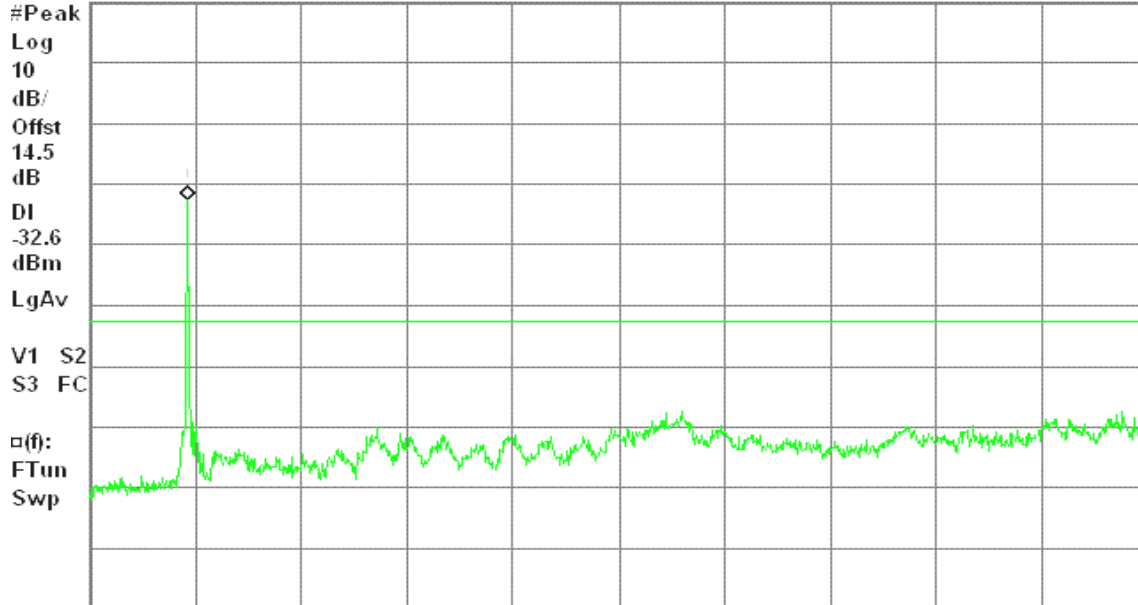
Spurious, g Mode Mid Ch.

Mkr1 2.45 GHz

Ref 20 dBm

Atten 20 dB

-12.58 dBm



Center 13.02 GHz

Span 25.97 GHz

#Res BW 100 kHz

#VBW 100 kHz

Sweep 3.131 s (1001 pts)

CH High

Agilent 20:04:27 Sep 6, 2007

R T

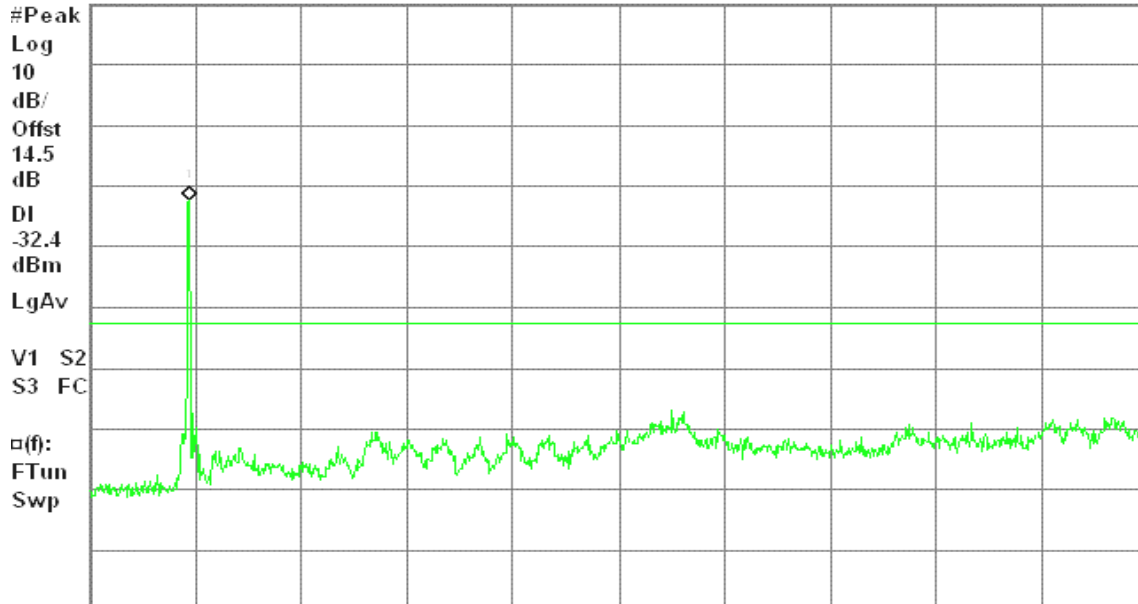
Spurious, g Mode High Ch.

Mkr1 2.47 GHz

Ref 20 dBm

Atten 20 dB

-12.44 dBm



Center 13.02 GHz

Span 25.97 GHz

#Res BW 100 kHz

#VBW 100 kHz

Sweep 3.131 s (1001 pts)



7.7 RADIATED EMISSIONS

LIMIT

1. According to §15.209(a), except as provided elsewhere in this Subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency (MHz)	Field Strength ($\mu\text{V/m}$)	Measurement Distance (m)
30-88	100*	3
88-216	150*	3
216-960	200*	3
Above 960	500	3

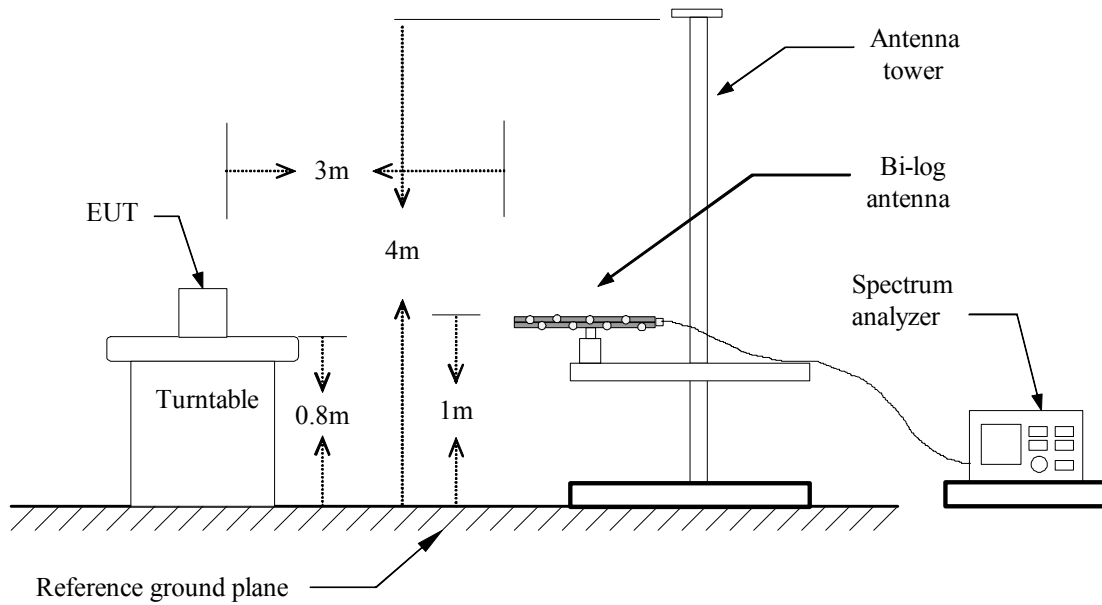
Remark: Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this Part, e.g., Sections 15.231 and 15.241.

2. In the emission table above, the tighter limit applies at the band edges.

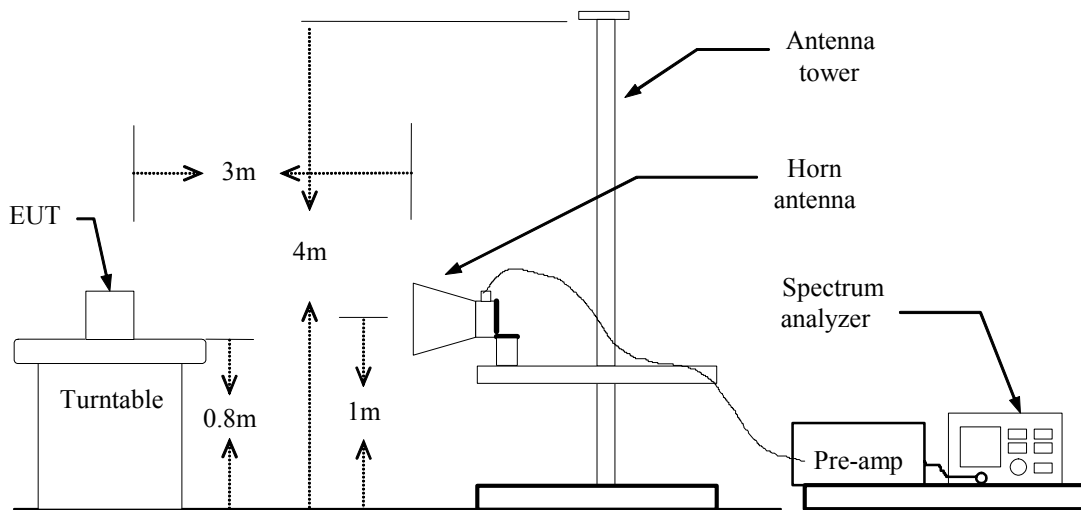
Frequency (MHz)	Field Strength ($\mu\text{V/m}$ at 3-meter)	Field Strength (dB $\mu\text{V/m}$ at 3-meter)
30-88	100	40
88-216	150	43.5
216-960	200	46
Above 960	500	54

Test Configuration

Below 1 GHz



Above 1 GHz





TEST PROCEDURE

1. The EUT is placed on a turntable, which is 0.8m above ground plane.
2. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
3. EUT is set 3m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emissions.
4. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
5. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
6. Set the spectrum analyzer in the following setting as:
Below 1GHz:
RBW=100kHz / VBW=300kHz / Sweep=AUTO
Above 1GHz:
(a) PEAK: RBW=VBW=1MHz / Sweep=AUTO
(b) AVERAGE: RBW=1MHz / VBW=10Hz / Sweep=AUTO
7. Repeat above procedures until the measurements for all frequencies are complete.

**TEST RESULTS****Below 1GHz****Operation Mode:** Normal Link**Test Date:** August 25, 2007**Temperature:** 20°C**Tested by:** Wolf Huang**Humidity:** 50% RH**Polarity:** Ver. / Hor.

Frequency (MHz)	Ant. Pol. (H/V)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
128.62	V	45.75	-13.22	32.53	43.50	-10.97	Peak
198.13	V	49.61	-13.63	35.97	43.50	-7.53	Peak
395.37	V	49.50	-10.01	39.48	46.00	-6.52	Peak
479.43	V	45.20	-7.71	37.50	46.00	-8.50	Peak
726.78	V	42.69	-4.15	38.54	46.00	-7.46	Peak
959.58	V	40.88	-1.04	39.84	46.00	-6.16	Peak
30.00	H	39.34	-4.65	34.69	40.00	-5.31	Peak
264.42	H	49.33	-13.46	35.86	46.00	-10.14	Peak
395.37	H	55.50	-10.01	45.49	46.00	-0.51	Peak
461.65	H	47.71	-8.23	39.48	46.00	-6.52	Peak
479.43	H	47.81	-7.71	40.11	46.00	-5.89	Peak
799.53	H	45.49	-3.16	42.33	46.00	-3.67	Peak

Remark:

1. Measuring frequencies from 30 MHz to the 1GHz.
2. Radiated emissions measured in frequency range from 30 MHz to 1000MHz were made with an instrument using peak/quasi-peak detector mode.
3. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
4. Margin (dB) = Result (dBuV/m) – Limit (dBuV/m).

**Above 1 GHz****Operation Mode:** TX / IEEE 802.11b / CH Low**Test Date:** September 5, 2007**Temperature:** 25°C**Tested by:** Ivan Tsai**Humidity:** 55 % RH**Polarity:** Ver. / Hor.

Frequency (MHz)	Ant. Pol. (H/V)	Reading (Peak) (dBuV)	Reading (Average) (dBuV)	Correction Factor (dB/m)	Result (Peak) (dBuV/m)	Result (Average) (dBuV/m)	Limit (Peak) (dBuV/m)	Limit (Average) (dBuV/m)	Margin (dB)	Remark
1126.67	V	63.83	---	-10.58	53.24	---	74.00	54.00	-0.76	Peak
1830.00	V	58.78	---	-6.69	52.09	---	74.00	54.00	-1.91	Peak
2366.67	V	62.71	48.22	-4.09	58.63	44.13	74.00	54.00	-9.87	AVG
4825.00	V	47.63	---	0.55	48.18	---	74.00	54.00	-5.82	Peak
N/A										
1126.67	H	59.71	---	-10.58	49.13	---	74.00	54.00	-4.87	Peak
1846.67	H	61.68	46.21	-6.53	55.15	39.68	74.00	54.00	-14.32	AVG
7041.67	H	48.12	---	3.92	52.04	---	74.00	54.00	-1.96	Peak
N/A										

Remark:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit or as required by the applicant.
4. Data of measurement within this frequency range shown " --- " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
5. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
6. Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).

**Operation Mode:** TX / IEEE 802.11b / CH Mid**Test Date:** September 5, 2007**Temperature:** 25°C**Tested by:** Ivan Tsai**Humidity:** 55 % RH**Polarity:** Ver. / Hor.

Frequency (MHz)	Ant. Pol. (H/V)	Reading (Peak) (dBuV)	Reading (Average) (dBuV)	Correction Factor (dB/m)	Result (Peak) (dBuV/m)	Result (Average) (dBuV/m)	Limit (Peak) (dBuV/m)	Limit (Average) (dBuV/m)	Margin (dB)	Remark
1126.67	V	65.57	42.91	-10.58	54.98	32.33	74.00	54.00	-21.67	AVG
1626.67	V	58.56	---	-8.72	49.84	---	74.00	54.00	-4.16	Peak
1830.00	V	58.19	---	-6.69	51.50	---	74.00	54.00	-2.50	Peak
2640.00	V	56.82	---	-3.39	53.44	---	74.00	54.00	-0.56	Peak
6300.00	V	48.05	---	2.63	50.68	---	74.00	54.00	-3.32	Peak
N/A										
1126.67	H	59.91	---	-10.58	49.32	---	74.00	54.00	-4.68	Peak
1626.67	H	61.01	---	-8.72	52.30	---	74.00	54.00	-1.70	Peak
1876.67	H	55.80	---	-6.23	49.57	---	74.00	54.00	-4.43	Peak
7191.67	H	47.75	---	3.63	51.38	---	74.00	54.00	-2.62	Peak
N/A										

Remark:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit or as required by the applicant.
4. Data of measurement within this frequency range shown " --- " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
5. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin > 20dB from the applicable limit) and considered that's already beyond the background noise floor.
6. Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).

**Operation Mode:** TX / IEEE 802.11b / CH High**Test Date:** September 5, 2007**Temperature:** 25°C**Tested by:** Ivan Tsai**Humidity:** 55 % RH**Polarity:** Ver. / Hor.

Frequency (MHz)	Ant. Pol. (H/V)	Reading (Peak) (dBuV)	Reading (Average) (dBuV)	Correction Factor (dB/m)	Result (Peak) (dBuV/m)	Result (Average) (dBuV/m)	Limit (Peak) (dBuV/m)	Limit (Average) (dBuV/m)	Margin (dB)	Remark
1123.33	V	65.43	42.67	-10.59	54.84	32.08	74.00	54.00	-21.92	AVG
1626.67	V	57.58	---	-8.72	48.86	---	74.00	54.00	-5.14	Peak
1830.00	V	58.00	---	-6.69	51.31	---	74.00	54.00	-2.69	Peak
1876.67	V	55.75	---	-6.23	49.52	---	74.00	54.00	-4.48	Peak
6608.33	V	47.89	---	3.21	51.10	---	74.00	54.00	-2.90	Peak
N/A										
1123.33	H	59.74	---	-10.59	49.15	---	74.00	54.00	-4.85	Peak
1626.67	H	59.96	---	-8.72	51.25	---	74.00	54.00	-2.75	Peak
1876.67	H	56.07	---	-6.23	49.84	---	74.00	54.00	-4.16	Peak
7550.00	H	47.65	---	3.31	50.97	---	74.00	54.00	-3.03	Peak
N/A										

Remark:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit or as required by the applicant.
4. Data of measurement within this frequency range shown " --- " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
5. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
6. Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).

**Operation Mode:** TX / IEEE 802.11g / CH Low**Test Date:** September 5, 2007**Temperature:** 25°C**Tested by:** Ivan Tsai**Humidity:** 55 % RH**Polarity:** Ver. / Hor.

Frequency (MHz)	Ant. Pol. (H/V)	Reading (Peak) (dBuV)	Reading (Average) (dBuV)	Correction Factor (dB/m)	Result (Peak) (dBuV/m)	Result (Average) (dBuV/m)	Limit (Peak) (dBuV/m)	Limit (Average) (dBuV/m)	Margin (dB)	Remark
1126.67	V	63.66	---	-10.58	53.08	---	74.00	54.00	-0.92	Peak
1623.33	V	57.63	---	-8.75	48.89	---	74.00	54.00	-5.11	Peak
1830.00	V	58.00	---	-6.69	51.30	---	74.00	54.00	-2.70	Peak
N/A										
1123.33	H	59.85	---	-10.59	49.26	---	74.00	54.00	-4.74	Peak
1623.33	H	60.24	---	-8.75	51.49	---	74.00	54.00	-2.51	Peak
6916.67	H	48.34	---	3.83	52.16	---	74.00	54.00	-1.84	Peak
N/A										

Remark:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit or as required by the applicant.
4. Data of measurement within this frequency range shown " --- " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
5. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin > 20dB from the applicable limit) and considered that's already beyond the background noise floor.
6. Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).

**Operation Mode:** TX / IEEE 802.11g / CH Mid**Test Date:** September 5, 2007**Temperature:** 25°C**Tested by:** Ivan Tsai**Humidity:** 55 % RH**Polarity:** Ver. / Hor.

Frequency (MHz)	Ant. Pol. (H/V)	Reading (Peak) (dBuV)	Reading (Average) (dBuV)	Correction Factor (dB/m)	Result (Peak) (dBuV/m)	Result (Average) (dBuV/m)	Limit (Peak) (dBuV/m)	Limit (Average) (dBuV/m)	Margin (dB)	Remark
1126.67	V	65.08	42.37	-10.58	54.50	31.79	74.00	54.00	-22.21	AVG
1623.33	V	58.05	---	-8.75	49.30	---	74.00	54.00	-4.70	Peak
1876.67	V	56.86	---	-6.23	50.63	---	74.00	54.00	-3.37	Peak
5258.33	V	47.62	---	1.08	48.70	---	74.00	54.00	-5.30	Peak
N/A										
1123.33	H	59.37	---	-10.59	48.78	---	74.00	54.00	-5.22	Peak
1626.67	H	60.44	---	-8.72	51.72	---	74.00	54.00	-2.28	Peak
6966.67	H	47.83	---	3.93	51.76	---	74.00	54.00	-2.24	Peak
N/A										

Remark:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit or as required by the applicant.
4. Data of measurement within this frequency range shown " --- " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
5. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin > 20dB from the applicable limit) and considered that's already beyond the background noise floor.
6. Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).

**Operation Mode:** TX / IEEE 802.11g / CH High**Test Date:** September 5, 2007**Temperature:** 25°C**Tested by:** Ivan Tsai**Humidity:** 55 % RH**Polarity:** Ver. / Hor.

Frequency (MHz)	Ant. Pol. (H/V)	Reading (Peak) (dBuV)	Reading (Average) (dBuV)	Correction Factor (dB/m)	Result (Peak) (dBuV/m)	Result (Average) (dBuV/m)	Limit (Peak) (dBuV/m)	Limit (Average) (dBuV/m)	Margin (dB)	Remark
1126.67	V	65.14	43.44	-10.58	54.55	32.86	74.00	54.00	-21.14	AVG
1623.33	V	57.38	---	-8.75	48.64	---	74.00	54.00	-5.36	Peak
1830.00	V	57.68	---	-6.69	50.98	---	74.00	54.00	-3.02	Peak
1876.67	V	56.00	---	-6.23	49.77	---	74.00	54.00	-4.23	Peak
6716.67	V	48.64	---	3.42	52.06	---	74.00	54.00	-1.94	Peak
N/A										
1126.67	H	59.67	---	-10.58	49.08	---	74.00	54.00	-4.92	Peak
1623.33	H	60.07	---	-8.75	51.32	---	74.00	54.00	-2.68	Peak
1836.67	H	57.06	---	-6.63	50.43	---	74.00	54.00	-3.57	Peak
7191.67	H	48.26	---	3.63	51.89	---	74.00	54.00	-2.11	Peak
N/A										

Remark:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit or as required by the applicant.
4. Data of measurement within this frequency range shown " --- " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
5. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
6. Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).



Operation Mode: TX / draft 802.11n Standard-20 MHz Channel mode / CH Low

Test Date: September 5, 2007

Temperature: 25°C

Tested by: Ivan Tsai

Humidity: 55 % RH

Polarity: Ver. / Hor.

Frequency (MHz)	Ant. Pol. (H/V)	Reading (Peak) (dBuV)	Reading (Average) (dBuV)	Correction Factor (dB/m)	Result (Peak) (dBuV/m)	Result (Average) (dBuV/m)	Limit (Peak) (dBuV/m)	Limit (Average) (dBuV/m)	Margin (dB)	Remark
1123.33	V	64.92	42.58	-10.59	54.33	31.99	74.00	54.00	-22.01	AVG
1466.67	V	56.44	---	-10.03	46.41	---	74.00	54.00	-7.59	Peak
1626.67	V	57.59	---	-8.72	48.87	---	74.00	54.00	-5.13	Peak
1830.00	V	57.64	---	-6.69	50.94	---	74.00	54.00	-3.06	Peak
7841.67	V	48.57	---	4.86	53.43	---	74.00	54.00	-0.57	Peak
N/A										
1126.67	H	59.30	---	-10.58	48.72	---	74.00	54.00	-5.28	Peak
1623.33	H	60.08	---	-8.75	51.33	---	74.00	54.00	-2.67	Peak
1830.00	H	56.67	---	-6.69	49.98	---	74.00	54.00	-4.02	Peak
4833.33	H	43.68	---	0.56	44.24	---	74.00	54.00	-9.76	Peak
N/A										

Remark:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit or as required by the applicant.
4. Data of measurement within this frequency range shown " --- " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
5. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin > 20dB from the applicable limit) and considered that's already beyond the background noise floor.
6. Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).



Operation Mode: TX / draft 802.11n Standard-20 MHz Channel mode / CH Mid

Test Date: September 5, 2007

Temperature: 25°C

Tested by: Ivan Tsai

Humidity: 55 % RH

Polarity: Ver. / Hor.

Frequency (MHz)	Ant. Pol. (H/V)	Reading (Peak) (dBuV)	Reading (Average) (dBuV)	Correction Factor (dB/m)	Result (Peak) (dBuV/m)	Result (Average) (dBuV/m)	Limit (Peak) (dBuV/m)	Limit (Average) (dBuV/m)	Margin (dB)	Remark
1123.33	V	64.91	42.38	-10.59	54.32	31.79	74.00	54.00	-22.21	AVG
1626.67	V	58.09	---	-8.72	49.38	---	74.00	54.00	-4.62	Peak
1830.00	V	57.31	---	-6.69	50.62	---	74.00	54.00	-3.38	Peak
6658.33	V	47.71	---	3.31	51.01	---	74.00	54.00	-2.99	Peak
N/A										
1126.67	H	59.82	---	-10.58	49.23	---	74.00	54.00	-4.77	Peak
1626.67	H	59.64	---	-8.72	50.92	---	74.00	54.00	-3.08	Peak
1846.67	H	56.44	---	-6.53	49.91	---	74.00	54.00	-4.09	Peak
7083.33	H	47.80	---	3.84	51.64	---	74.00	54.00	-2.36	Peak
N/A										

Remark:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit or as required by the applicant.
4. Data of measurement within this frequency range shown " --- " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
5. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin > 20dB from the applicable limit) and considered that's already beyond the background noise floor.
6. Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).



Operation Mode: TX / draft 802.11n Standard-20 MHz Channel mode / CH High

Test Date: September 5, 2007

Temperature: 25°C

Tested by: Ivan Tsai

Humidity: 55 % RH

Polarity: Ver. / Hor.

Frequency (MHz)	Ant. Pol. (H/V)	Reading (Peak) (dBuV)	Reading (Average) (dBuV)	Correction Factor (dB/m)	Result (Peak) (dBuV/m)	Result (Average) (dBuV/m)	Limit (Peak) (dBuV/m)	Limit (Average) (dBuV/m)	Margin (dB)	Remark
1126.67	V	65.58	42.87	-10.58	55.00	32.29	74.00	54.00	-21.71	AVG
1623.33	V	57.26	---	-8.75	48.51	---	74.00	54.00	-5.49	Peak
1830.00	V	57.65	---	-6.69	50.96	---	74.00	54.00	-3.04	Peak
5216.67	V	48.18	---	1.02	49.20	---	74.00	54.00	-4.80	Peak
N/A										
1126.67	H	59.75	---	-10.58	49.17	---	74.00	54.00	-4.83	Peak
1626.67	H	60.83	---	-8.72	52.12	---	74.00	54.00	-1.88	Peak
1846.67	H	56.30	---	-6.53	49.77	---	74.00	54.00	-4.23	Peak
7725.00	H	48.55	---	4.24	52.79	---	74.00	54.00	-1.21	Peak
N/A										

Remark:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit or as required by the applicant.
4. Data of measurement within this frequency range shown " --- " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
5. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin > 20dB from the applicable limit) and considered that's already beyond the background noise floor.
6. Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).



Operation Mode: TX / draft 802.11n Wide-40 MHz Channel mode
/ CH Low

Test Date: September 5, 2007

Temperature: 25°C

Tested by: Ivan Tsai

Humidity: 55 % RH

Polarity: Ver. / Hor.

Frequency (MHz)	Ant. Pol. (H/V)	Reading (Peak) (dBuV)	Reading (Average) (dBuV)	Correction Factor (dB/m)	Result (Peak) (dBuV/m)	Result (Average) (dBuV/m)	Limit (Peak) (dBuV/m)	Limit (Average) (dBuV/m)	Margin (dB)	Remark
1126.67	V	63.63	---	-10.58	53.05	---	74.00	54.00	-0.95	Peak
1746.67	V	59.93	---	-7.52	52.40	---	74.00	54.00	-1.60	Peak
1830.00	V	58.98	---	-6.69	52.29	---	74.00	54.00	-1.71	Peak
4825.00	V	46.32	---	0.55	46.87	---	74.00	54.00	-7.13	Peak
N/A										
1126.67	H	59.75	---	-10.58	49.17	---	74.00	54.00	-4.83	Peak
1626.67	H	56.88	---	-8.72	48.17	---	74.00	54.00	-5.83	Peak
1846.67	H	60.12	---	-6.53	53.59	---	74.00	54.00	-0.41	Peak
2123.33	H	52.28	---	-4.70	47.58	---	74.00	54.00	-6.42	Peak
7291.67	H	45.85	---	3.44	49.30	---	74.00	54.00	-4.70	Peak
N/A										

Remark:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit or as required by the applicant.
4. Data of measurement within this frequency range shown " --- " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
5. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin > 20dB from the applicable limit) and considered that's already beyond the background noise floor.
6. Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).



Operation Mode: TX / draft 802.11n Wide-40 MHz Channel mode
/ CH Mid

Test Date: September 5, 2007

Temperature: 25°C

Tested by: Ivan Tsai

Humidity: 55 % RH

Polarity: Ver. / Hor.

Frequency (MHz)	Ant. Pol. (H/V)	Reading (Peak) (dBuV)	Reading (Average) (dBuV)	Correction Factor (dB/m)	Result (Peak) (dBuV/m)	Result (Average) (dBuV/m)	Limit (Peak) (dBuV/m)	Limit (Average) (dBuV/m)	Margin (dB)	Remark
1126.67	V	64.02	---	-10.58	53.44	---	74.00	54.00	-0.56	Peak
1626.67	V	55.18	---	-8.72	46.46	---	74.00	54.00	-7.54	Peak
1876.67	V	55.91	---	-6.23	49.68	---	74.00	54.00	-4.32	Peak
2433.33	V	93.88	---	-3.92	89.96	---	74.00	54.00	35.96	Peak
4875.00	V	46.12	---	0.60	46.73	---	74.00	54.00	-7.27	Peak
N/A										
1126.67	H	59.17	---	-10.58	48.59	---	74.00	54.00	-5.41	Peak
1626.67	H	56.36	---	-8.72	47.65	---	74.00	54.00	-6.35	Peak
1846.67	H	60.34	---	-6.53	53.81	---	74.00	54.00	-0.19	Peak
4866.67	H	45.51	---	0.59	46.10	---	74.00	54.00	-7.90	Peak
N/A										

Remark:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit or as required by the applicant.
4. Data of measurement within this frequency range shown " --- " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
5. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin > 20dB from the applicable limit) and considered that's already beyond the background noise floor.
6. Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).



Operation Mode: TX / draft 802.11n Wide-40 MHz Channel mode
/ CH High

Test Date: September 5, 2007

Temperature: 25°C

Tested by: Ivan Tsai

Humidity: 55 % RH

Polarity: Ver. / Hor.

Frequency (MHz)	Ant. Pol. (H/V)	Reading (Peak) (dBuV)	Reading (Average) (dBuV)	Correction Factor (dB/m)	Result (Peak) (dBuV/m)	Result (Average) (dBuV/m)	Limit (Peak) (dBuV/m)	Limit (Average) (dBuV/m)	Margin (dB)	Remark
1126.67	V	64.00	---	-10.58	53.42	---	74.00	54.00	-0.58	Peak
1830.00	V	59.39	---	-6.69	52.70	---	74.00	54.00	-1.30	Peak
4525.00	V	46.04	---	0.26	46.30	---	74.00	54.00	-7.70	Peak
N/A										
1123.33	H	59.79	---	-10.59	49.20	---	74.00	54.00	-4.80	Peak
2126.67	H	52.60	---	-4.69	47.91	---	74.00	54.00	-6.09	Peak
4525.00	H	45.71	---	0.26	45.98	---	74.00	54.00	-8.02	Peak
N/A										

Remark:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit or as required by the applicant.
4. Data of measurement within this frequency range shown " --- " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
5. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin > 20dB from the applicable limit) and considered that's already beyond the background noise floor.
6. Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).

7.8 POWERLINE CONDUCTED EMISSIONS

LIMIT

According to §15.207(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 μ H/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 Range (MHz)	Limits (dB μ V)	
	Quasi-peak	Average
0.15 to 0.50	66 to 56*	56 to 46*
0.50 to 5	56	46
5 to 30	60	50

* Decreases with the logarithm of the frequency.

Test Configuration

See test photographs attached in Appendix 1 for the actual connections between EUT and support equipment.

TEST PROCEDURE

1. The EUT was placed on a table, which is 0.8m above ground plane.
2. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
3. Repeat above procedures until all frequency measured were complete.



TEST RESULTS

The initial step in collecting conducted data is a spectrum analyzer peak scan of the measurement range. Significant peaks are then marked as shown on the following data page, and these signals are then quasi-peaked.

Test Data

Operation Mode: Normal Link **Test Date:** April 14, 2007
Temperature: 18°C **Tested by:** Benson Yang
Humidity: 70% RH

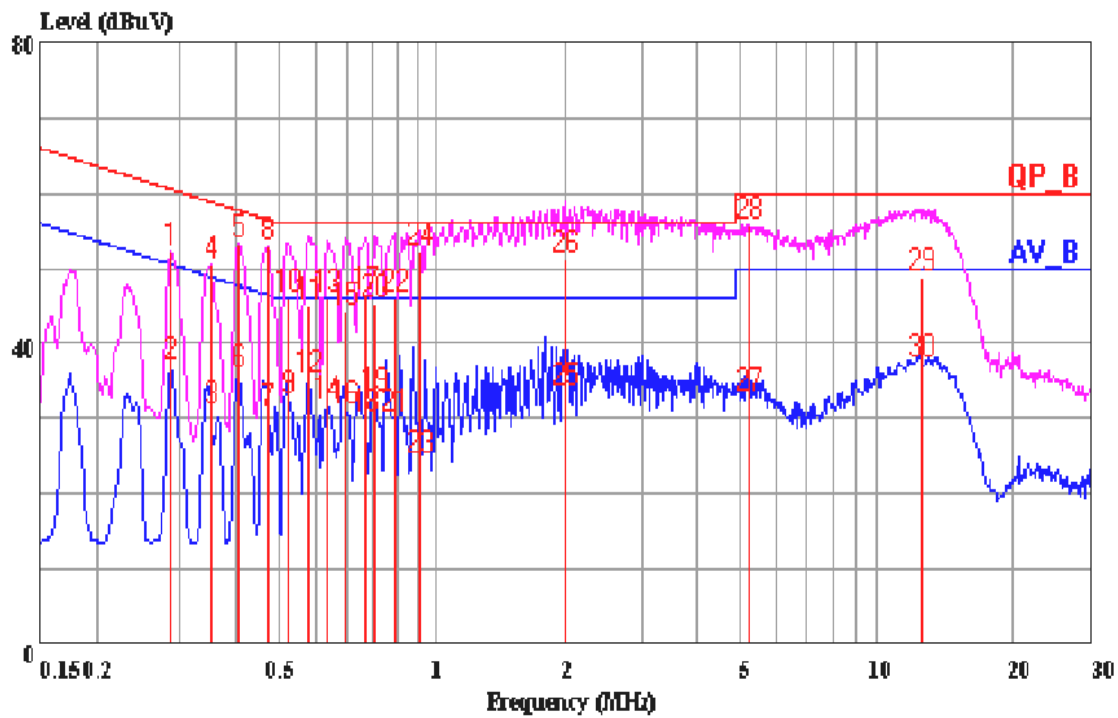
Freq. (MHz)	QP Reading (dBuV)	AV Reading (dBuV)	Corr. factor (dB/m)	QP Result (dBuV/m)	AV Result (dBuV/m)	QP Limit (dBuV)	AV Limit (dBuV)	QP Margin (dB)	AV Margin (dB)	Note
0.288	42.41	27.28	9.86	52.27	37.14	60.59	50.59	-8.32	-13.45	L1
0.354	40.69	21.40	9.86	50.55	31.26	58.87	48.87	-17.61	-8.32	L1
0.404	43.37	26.02	9.86	53.23	35.88	57.77	47.77	-4.54	-11.89	L1
0.474	43.28	20.90	9.87	53.15	30.76	56.45	46.45	-3.30	-15.69	L1
1.016	42.30	14.78	9.86	52.16	24.64	56.00	46.00	-3.84	-21.36	L1
5.333	45.69	22.79	9.97	55.66	32.76	60.00	50.00	-4.34	-17.24	L1
0.389	42.28	23.66	9.86	52.14	33.52	58.08	48.08	-5.93	-14.55	L2
0.479	43.22	17.38	9.87	53.09	27.25	56.36	46.36	-3.27	-19.11	L2
1.367	42.10	23.42	9.88	51.98	33.30	56.00	46.00	-4.02	-12.70	L2
2.384	43.80	27.81	9.91	53.71	37.72	56.00	46.00	-2.29	-8.28	L2
3.603	42.30	29.27	9.93	52.23	39.20	56.00	46.00	-3.77	-6.80	L2
5.362	46.77	22.54	10.00	56.77	32.54	60.00	50.00	-3.23	-17.46	L2

Remark:

1. Measuring frequencies from 0.15 MHz to 30MHz.
2. The emissions measured in frequency range from 0.15 MHz to 30MHz were made with an instrument using Quasi-peak detector and average detector.
3. The IF bandwidth of SPA between 0.15MHz and 30MHz was 10 kHz; the IF bandwidth of Test Receiver between 0.15MHz and 30MHz was 9 kHz;
4. L1 = Line One (Live Line) / L2 = Line Two (Neutral Line)

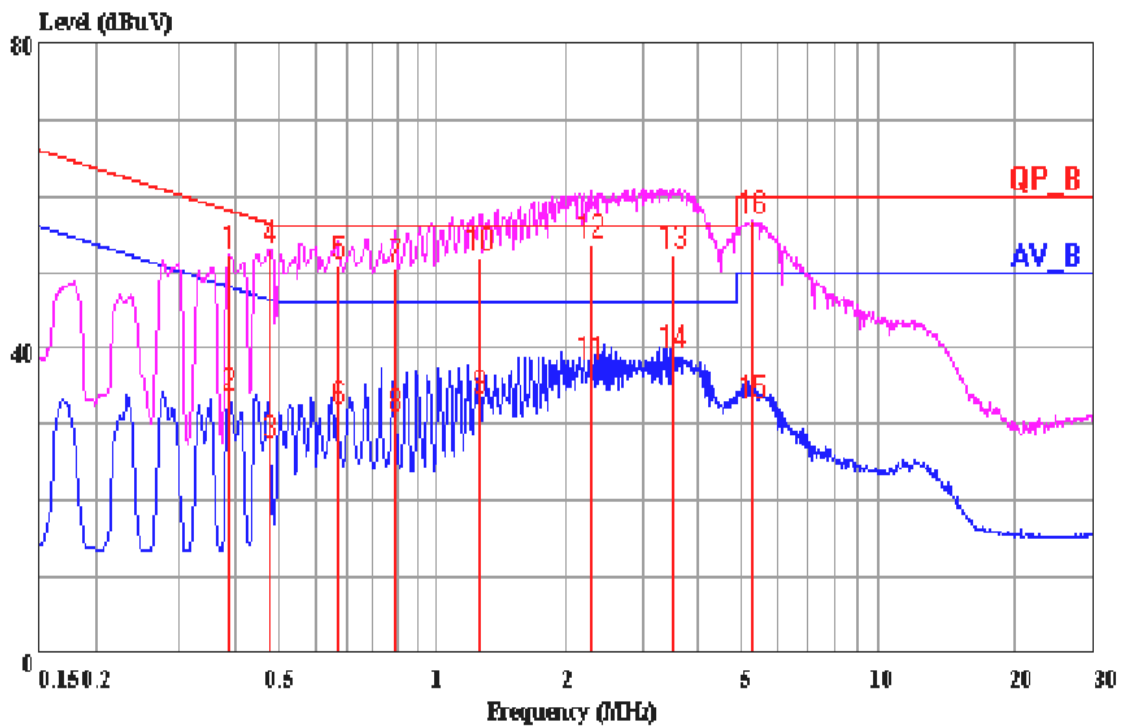
Test Plots

Conducted emissions (Line 1)



(CCS Conduction B)

Conducted emissions (Line 2)



(CCS Conduction B)



APPENDIX I

RADIO FREQUENCY EXPOSURE

LIMIT

According to §15.247(i), systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy levels in excess of the Commission's guidelines. See § 1.1307(b)(1) of this chapter.

EUT Specification

EUT	Wireless-N Gigabit Security Router with VPN
Frequency band (Operating)	☒ WLAN: 2.412GHz ~ 2.462GHz ☐ WLAN: 5.18GHz ~ 5.32GHz / 5.50GHz ~ 5.70GHz ☐ WLAN: 5.745GHz ~ 5.825GHz ☐ Others
Device category	☐ Portable (<20cm separation) ☒ Mobile (>20cm separation) ☐ Others
Exposure classification	☐ Occupational/Controlled exposure ($S = 5\text{mW/cm}^2$) ☒ General Population/Uncontrolled exposure ($S=1\text{mW/cm}^2$)
Antenna diversity	☐ Single antenna ☒ Multiple antennas ☐ Tx diversity ☐ Rx diversity ☒ Tx/Rx diversity
Max. output power	IEEE 802.11b mode: 9.04 dBm (8.02 mW) IEEE 802.11g mode: 8.43dBm (6.97 mW) draft 802.11n Standard-20 MHz Channel mode: 14.70 dBm (29.51 mW) draft 802.11n Wide-40 MHz Channel mode: 4.81 dBm (3.03 mW)
Antenna gain (Max)	4.19dBi (including cable loss) (Numeric gain: 2.62)
Evaluation applied	☒ MPE Evaluation* ☐ SAR Evaluation ☐ N/A

Remark:

1. The maximum output power is 14.70dBm (29.51mW) at 2462MHz (with 3.08 numeric antenna gain.)
2. DTS device is not subject to routine RF evaluation; MPE estimate is used to justify the compliance.
3. For mobile or fixed location transmitters, no SAR consideration applied. The maximum power density is 1.0 mW/cm² even if the calculation indicates that the power density would be larger.

TEST RESULTS

No non-compliance noted.

**Calculation**

Given $E = \frac{\sqrt{30 \times P \times G}}{d}$ & $S = \frac{E^2}{3770}$

Where E = Field strength in Volts / meter

P = Power in Watts

G = Numeric antenna gain

d = Distance in meters

S = Power density in milliwatts / square centimeter

Combining equations and re-arranging the terms to express the distance as a function of the remaining variables yields:

$$S = \frac{30 \times P \times G}{3770 d^2}$$

Changing to units of mW and cm, using:

$$P (mW) = P (W) / 1000 \text{ and}$$

$$d (cm) = d(m) / 100$$

Yields

$$S = \frac{30 \times (P/1000) \times G}{3770 \times (d/100)^2} = 0.0796 \times \frac{P \times G}{d^2} \quad \text{Equation 1}$$

Where d = Distance in cm

P = Power in mW

G = Numeric antenna gain

S = Power density in mW / cm²

Maximum Permissible Exposure

Substituting the MPE safe distance using $d = 20$ cm into Equation 1:

Yields

$$S = 0.000199 \times P \times G$$

Where P = Power in mW

G = Numeric antenna gain

S = Power density in mW / cm²



IEEE 802.11b mode:

EUT output power = 8.02mW

Numeric Antenna gain = 2.62

→ Power density = $0.0042 \text{ mW} / \text{cm}^2$

IEEE 802.11g mode:

EUT output power = 6.97 mW

Numeric Antenna gain = 2.62

→ Power density = $0.0036 \text{ mW} / \text{cm}^2$

draft 802.11n Standard-20 MHz Channel mode:

EUT output power = 29.51 mW

Numeric Antenna gain = 2.62

→ Power density = $0.0154 \text{ mW} / \text{cm}^2$

draft 802.11n Wide-40 MHz Channel mode:

EUT output power = 3.03mW

Numeric Antenna gain = 2.62

→ Power density = $0.0016 \text{ mW} / \text{cm}^2$

(For mobile or fixed location transmitters, the maximum power density is 1.0 mW/cm^2 even if the calculation indicates that the power density would be larger.)