



FCC 47 CFR PART 15 SUBPART C

TEST REPORT

For

802.11a/b/g AP

Model: SS-200-AT

Trade Name: AirTight Networks

Issued to

AirTight Networks, Inc
339N. Bernardo Avenue, Suite 200 Mountain View,
CA 94043

Issued by

Compliance Certification Services Inc.
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1. TEST RESULT CERTIFICATION

Applicant: AirTight Networks, Inc
339N. Bernardo Avenue, Suite 200 Mountain View,
CA 94043

Equipment Under Test: 802.11a/b/g AP

Trade Name: AirTight Networks

Model: SS-200-AT

Date of Test: September 14 ~ October 7, 2005

APPLICABLE STANDARDS	
STANDARD	TEST RESULT
FCC 47 CFR Part 15 Subpart C	No non-compliance noted

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:

Gavin Lim
Section Manager
Compliance Certification Services Inc.

Reviewed by:

Amanda Wu
Section Manager
Compliance Certification Services Inc.



2. EUT DESCRIPTION

Product	802.11a/b/g AP					
Trade Name	AirTight Networks					
Model Number	SS-200-AT					
Model Discrepancy	N/A					
Power Supply	DELTA / ADP-15KB I/P: AC 100-240V, 0.5A, 50-60Hz O/P: DC 5.1V, 3.0A					
Frequency Range	IEEE 802.11a Base mode: 5.745~5.825 GHz Turbo mode: 5.760 GHz / 5.800 GHz IEEE 802.11b/g Base mode: 2.412~2.462 GHz IEEE 802.11g Turbo mode: 2.437 GHz					
Transmit Power		b Base mode (dBm)	g Base mode (dBm)	g Turbo mode (dBm)	a Base mode (dBm)	a Turbo mode (dBm)
	Omnidirectional antenna / 12.0 dBi for 2.4 GHz	19.68	14.76	16.1		
	Omnidirectional Panel antenna / 3.0 dBi for 2.4 GHz and 5 GHz	21.64	19.9	20.18	19.63	19.72
	Omnidirectional antenna / 6.0 dBi for 5 GHz				19.63	19.72
Modulation Technique	IEEE 802.11a: OFDM (QPSK, BPSK, 16-QAM, 64-QAM) IEEE 802.11b: DSSS (CCK, DQPSK, DBPSK) IEEE 802.11g: DSSS (CCK, DQPSK, DBPSK) + OFDM (QPSK, BPSK, 16-QAM, 64-QAM)					
Transmit Data Rate	IEEE 802.11a: 108, 54, 48, 36, 24, 18, 12, 9, 6 Mbps IEEE 802.11b: 11, 5.5, 2, 1 Mbps IEEE 802.11g: 108, 54, 48, 36, 24, 18, 12, 11, 9, 6, 5.5, 2, 1Mbps					
Number of Channels	IEEE 802.11a Base mode: 5 Channels Turbo mode: 2 Channels IEEE 802.11b/g Base mode: 11 Channels IEEE 802.11g Turbo mode: 1 Channel					
Enclosure Material Type	Metal					
Antenna Specification	The EUT comes with five different antennas: Omnidirectional antenna / 12.0 dBi for 2.4 GHz Omnidirectional antenna / 10.5 dBi for 2.4 GHz Omnidirectional antenna / 5.2 dBi for 2.4 GHz Omnidirectional Panel antenna / 3.0 dBi for 2.4 GHz and 5 GHz Omnidirectional antenna / 6.0 dBi for 5 GHz For detail descriptions, please refer to antenna specification and external photos.					

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: **TORSS-200-AT** 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 - 156.52525	2483.5 - 2500	17.7 - 21.4
8.37625 - 8.38675	156.7 - 156.9	2655 - 2900	22.01 - 23.12
8.41425 - 8.41475	162.0125 - 167.17	3260 - 3267	23.6 - 24.0
12.29 - 12.293	167.72 - 173.2	3332 - 3339	31.2 - 31.8
12.51975 - 12.52025	240 - 285	3345.8 - 3358	36.43 - 36.5
12.57675 - 12.57725	322 - 335.4	3600 - 4400	(²)
13.36 - 13.41			

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: SS-200-AT) comes with five different antennas.

The EUT with antenna as below had been tested under operating condition.

- 1. Omnidirectional antenna / 12.0 dBi for 2.4 GHz**
- 2. Omnidirectional Panel antenna / 3.0 dBi for 2.4 GHz and 5 GHz**
- 3. Omnidirectional antenna / 6.0 dBi for 5 GHz**

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, which worst case was in normal link mode only.

IEEE802.11a Base mode:

Channel Low(5745MHz), Channel Mid(5785MHz) and Channel High(5825MHz) with 6Mbps data rate were chosen for full testing.

IEEE802.11a Turbo mode:

Channel Low(5760MHz), Channel High(5800MHz) with 12Mbps data rate were chosen for full testing.

IEEE802.11b Base mode:

Channel Low(2412MHz), Channel Mid(2437MHz) and Channel High(2462MHz) with 11Mbps data rate were chosen for full testing.

IEEE802.11g Base mode:

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

IEEE802.11g Turbo mode:

Channel Mid(2437MHz) with 12Mbps data rate was chosen for full testing.



4. 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.

4.1 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	01/10/2006

3M Semi Anechoic Chamber				
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
Spectrum Analyzer	Agilent	E4446A	US42510252	07/25/2006
Test Receiver	Rohde&Schwarz	ESCI	100064	06/28/2006
Switch Controller	TRC	Switch Controller	SC94050010	05/05/2006
4 Port Switch	TRC	4 Port Switch	SC94050020	05/05/2006
Horn-Antenna	TRC	HA-0502	06	06/02/2006
Horn-Antenna	TRC	HA-0801	04	05/05/2006
Bilog- Antenna	Sunol Sciences	JB3	A030205	03/09/2006
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	965860	09/26/2008
Test S/W	LABVIEW (V 6.1)			

Remark: The measurement uncertainty is less than +/- 2.0065dB, which is evaluated as per the NAMAS NIS 81 and CISPR/A/291/CDV.



Powerline Conducted Emissions Test Site				
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
EMI TEST RECEIVER 9kHz-30MHz	ROHDE & SCHWARZ	ESHS30	828144/003	09/24/2006
TWO-LINE V-NETWORK 9kHz-30MHz	SCHAFFNER	NNB41	03/10013	06/11/2006
LISN 10kHz-100MHz	EMCO	3825/2	9106-1809	02/17/2006
Test S/W	LABVIEW (V 6.1)			

Remark: The measurement uncertainty is less than +/- 2.81dB, 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. 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.




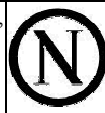



Calibrated wideband preamplifiers, coaxial cables, and coaxial attenuators are also used for making measurements.

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

5.3 LABORATORY ACCREDITATIONS AND LISTING

The test facilities used to perform radiated and conducted emissions tests are accredited by National Voluntary Laboratory Accreditation Program for the specific scope of accreditation under Lab Code: 200600-0 to perform Electromagnetic Interference tests according to FCC PART 15 AND CISPR 22 requirements. No part of this report may be used to claim or imply product endorsement by NVLAP or any agency of the US Government. In addition, the test facilities are listed with Federal Communications Commission (Registration no: 93105 and 90471).

5.4 TABLE OF ACCREDITATIONS AND LISTINGS

Country	Agency	Scope of Accreditation	Logo
USA	NVLAP*	EN 55011, EN 55014-1, AS/NZS 1044, CNS 13783-1, EN 55022, CNS 13438, EN 61000-3-2, EN 61000-3-3, ANSI C63.4, FCC OST/MP-5, AS/NZS CISPR 22, IEC 61000-4-2, IEC 61000-4-3, IEC 61000-4-4, IEC 61000-4-5, IEC 61000-4-6, IEC 61000-4-8, IEC 61000-4-11	 200600-0
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 300 328-2, 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	CNLA	EN 300 328-1/2, EN 300 220-1/2/3, EN 300 440-1/2, EN 61000-3-2, EN 61000-3-3, 47 CFR FCC Part 15 Subpart C/D/E, EN 55013, CNS 13439, EN 55014-1, CNS 13783-1, EN 55022, CNS 13438, CISPR 22, AS/NZS 3548, EN 61000-4-2/3/4/5/6/8/11, ENV 50204, IEEE Std 1528, FCC OET Bulletin, 65+Supplement C, EN50360, EN50361, EN50371, RSS102	 0363 ILAC MRA
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 3991-3, IC 3991-4) / 3M Semi Anechoic Chamber (IC 6106) to perform RSS 212 Issue 1	 IC 3991-3 IC 3991-4 IC 6106

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

* Australia: MRA of NVLAP AS/NZS 4771 &AS/NZS 4268.



6. SETUP OF EQUIPMENT UNDER TEST

6.1 SETUP CONFIGURATION OF EUT

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

6.2 SUPPORT EQUIPMENT

No.	Device Type	Brand	Model	Series No.	FCC ID	Data Cable	Power Cord
1.	Notebook PC (Remote)	IBM	2672(X31)	99PBTKB	FCC DoC	N/A	AC I/P: Unshielded, 1.8m DC O/P: Unshielded, 1.8m with a core

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.*



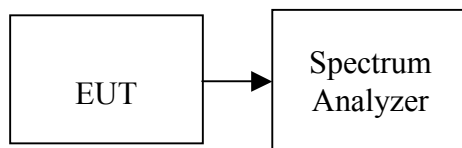
7. FCC PART 15.247 REQUIREMENTS

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****Omnidirectional antenna / 12.0 dBi for 2.4 GHz****Test mode: IEEE 802.11b mode**

Channel	Frequency (MHz)	Bandwidth (kHz)	Limit (kHz)	Test Result
Low	2412	11250	>500	PASS
Mid	2437	10170		PASS
High	2462	12250		PASS

Test mode: IEEE 802.11g mode

Channel	Frequency (MHz)		Bandwidth (kHz)	Limit (kHz)	Test Result
Low	Base mode	2412	16500	>500	PASS
Mid		2437	16500		PASS
High		2462	16420		PASS
Mid	Turbo mode	2437	32670		PASS

**Omnidirectional Panel antenna / 3.0 dBi for 2.4 GHz and 5 GHz****Test mode: IEEE 802.11b mode**

Channel	Frequency (MHz)	Bandwidth (kHz)	Limit (kHz)	Test Result
Low	2412	11080	>500	PASS
Mid	2437	10000		PASS
High	2462	12080		PASS

Test mode: IEEE 802.11g mode

Channel	Frequency (MHz)		Bandwidth (kHz)	Limit (kHz)	Test Result
Low	Base mode	2412	16420	>500	PASS
Mid		2437	16500		PASS
High		2462	16500		PASS
Mid	Turbo mode	2437	33080		PASS

Test mode: IEEE 802.11a mode

Channel	Frequency (MHz)		Bandwidth (kHz)	Limit (kHz)	Test Result
Low	Base mode	5745	16500	>500	PASS
Mid		5785	16500		PASS
High		5825	16500		PASS
Low	Turbo mode	5760	33000		PASS
High		5800	32920		PASS

Omnidirectional antenna / 6.0 dBi for 5 GHz**Test mode: IEEE 802.11a mode**

Channel	Frequency (MHz)		Bandwidth (kHz)	Limit (kHz)	Test Result
Low	Base mode	5745	16500	>500	PASS
Mid		5785	16500		PASS
High		5825	16500		PASS
Low	Turbo mode	5760	33000		PASS
High		5800	32920		PASS

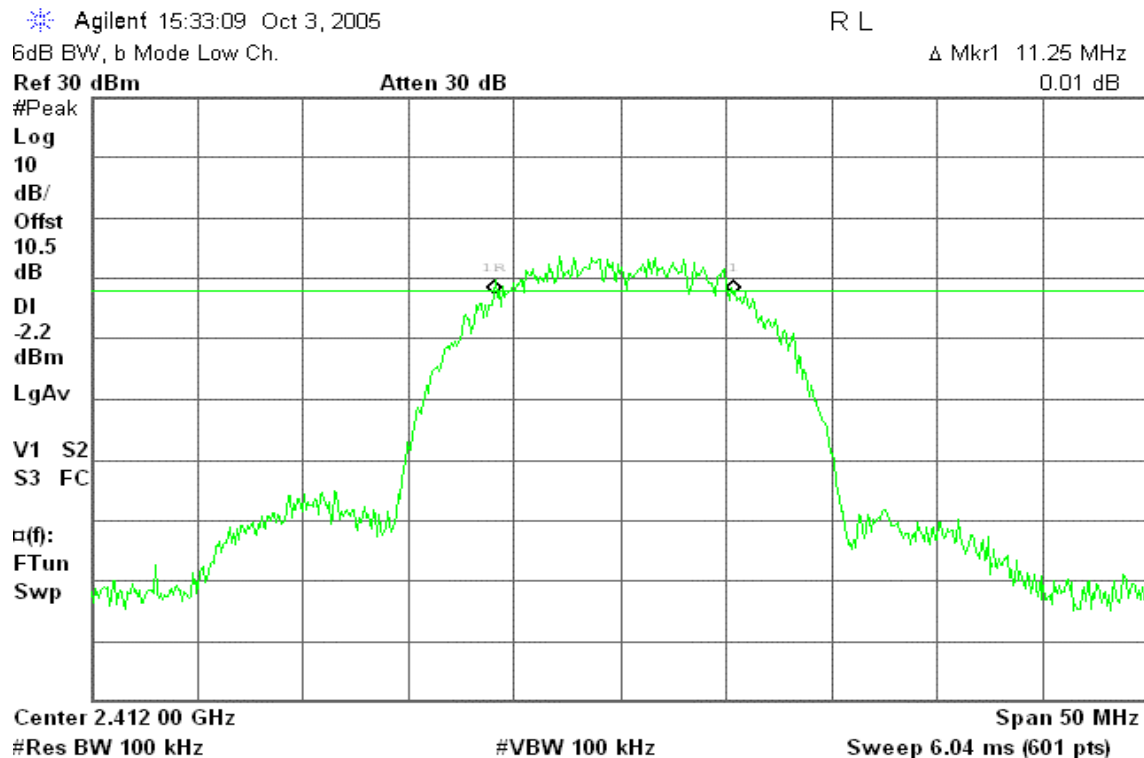


Test Plot

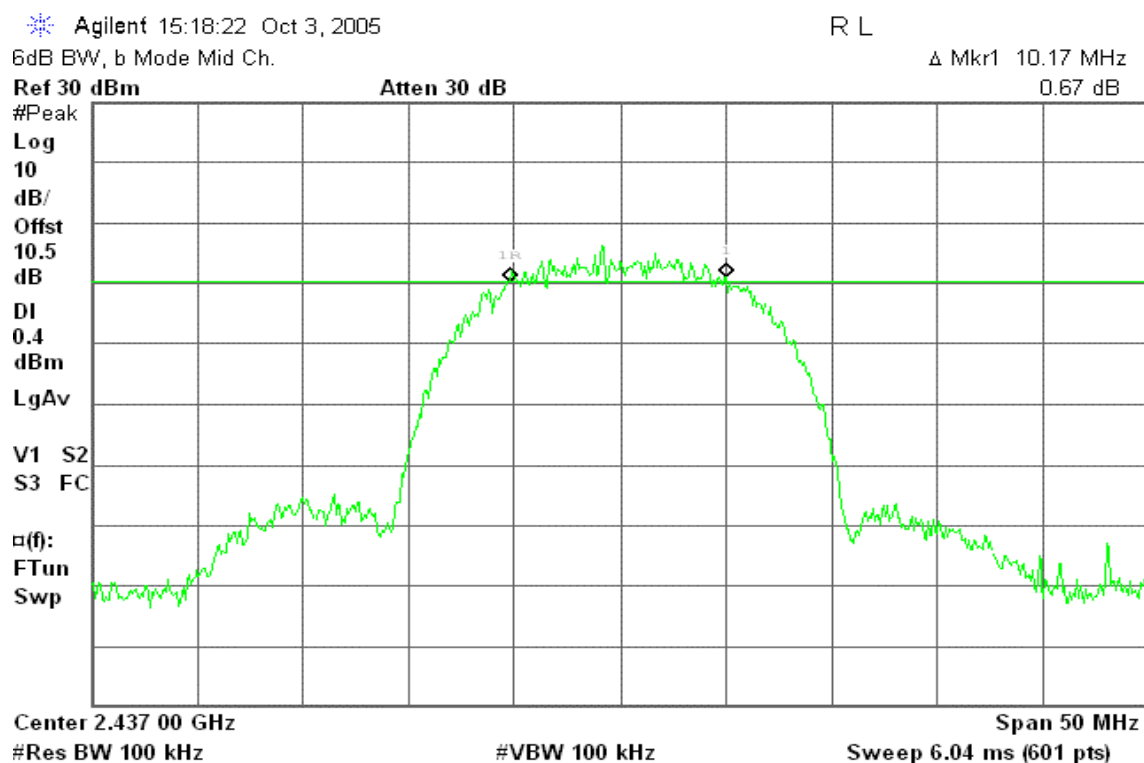
Omnidirectional antenna / 12.0 dBi for 2.4 GHz

IEEE 802.11b Base mode

CH Low



CH Mid





CH High

Agilent 15:10:15 Oct 3, 2005

R L

6dB BW, b Mode High Ch.

Δ Mkr1 12.25 MHz

Ref 30 dBm

Atten 30 dB

-0.31 dB

#Peak

Log

10

dB/

Offst

10.5

dB

DI

-1.2

dBm

LgAv

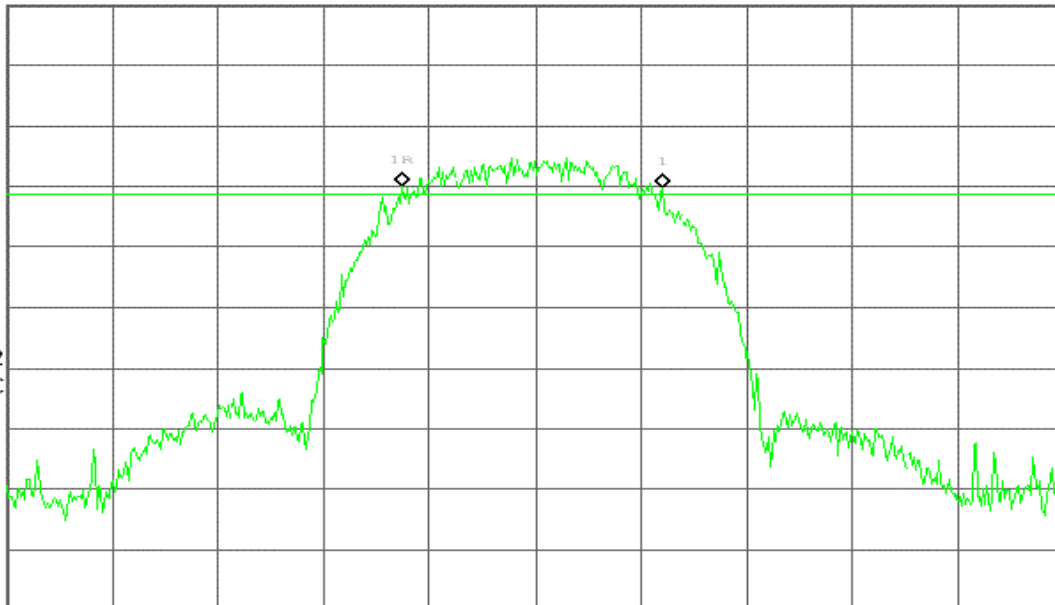
V1 S2

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 Base mode

CH Low

Agilent 14:47:14 Oct 3, 2005

R L

6dB BW, g Mode Low Ch.

Δ Mkr1 16.50 MHz

Ref 30 dBm

Atten 30 dB

0.28 dB

#Peak

Log

10

dB/

Offst

10.5

dB

DI

-7.5

dBm

LgAv

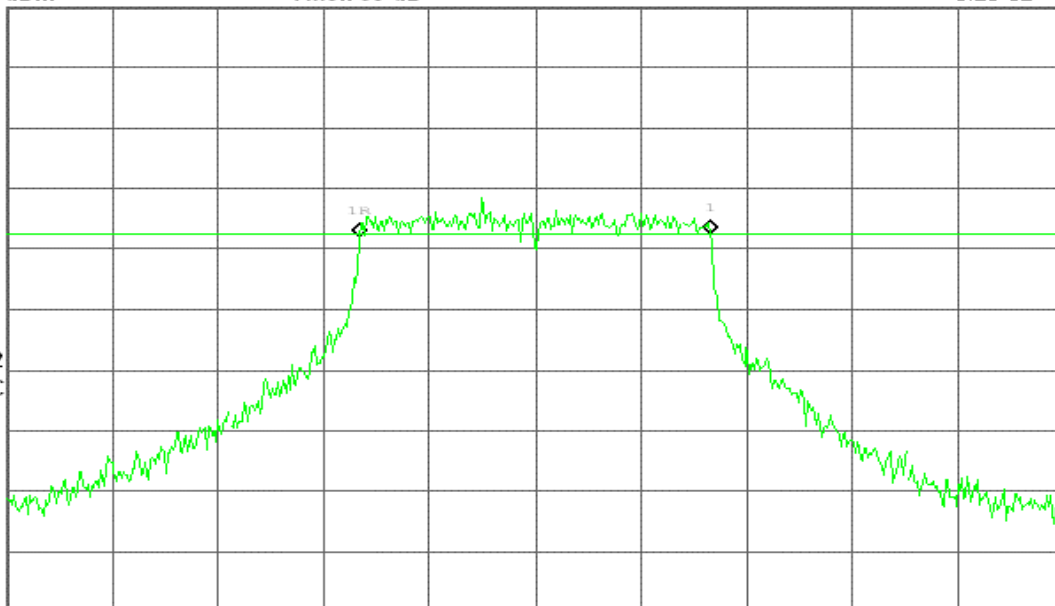
V1 S2

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)



CH Mid

Agilent 14:54:55 Oct 3, 2005

R L

6dB BW, g Mode Mid Ch.

Δ Mkr1 16.50 MHz

Ref 30 dBm

Atten 30 dB

0.80 dB

#Peak

Log

10

dB/

Offst

10.5

dB

DI

-8.0

dBm

LgAv

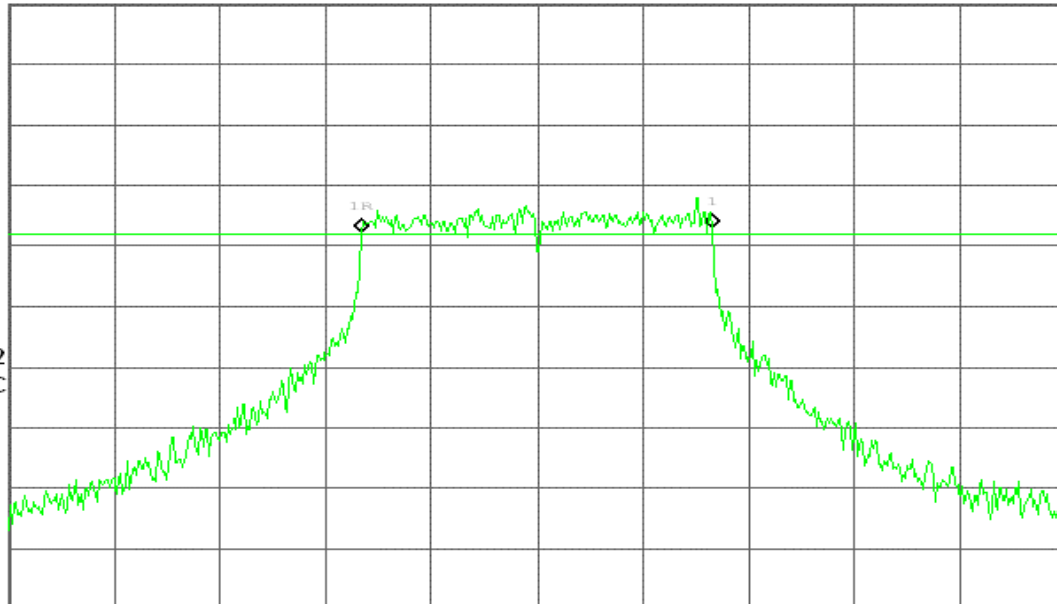
V1 S2

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)

CH High

Agilent 15:01:41 Oct 3, 2005

R L

6dB BW, g Mode High Ch.

Δ Mkr1 16.42 MHz

Ref 30 dBm

Atten 30 dB

-2.06 dB

#Peak

Log

10

dB/

Offst

10.5

dB

DI

-7.2

dBm

LgAv

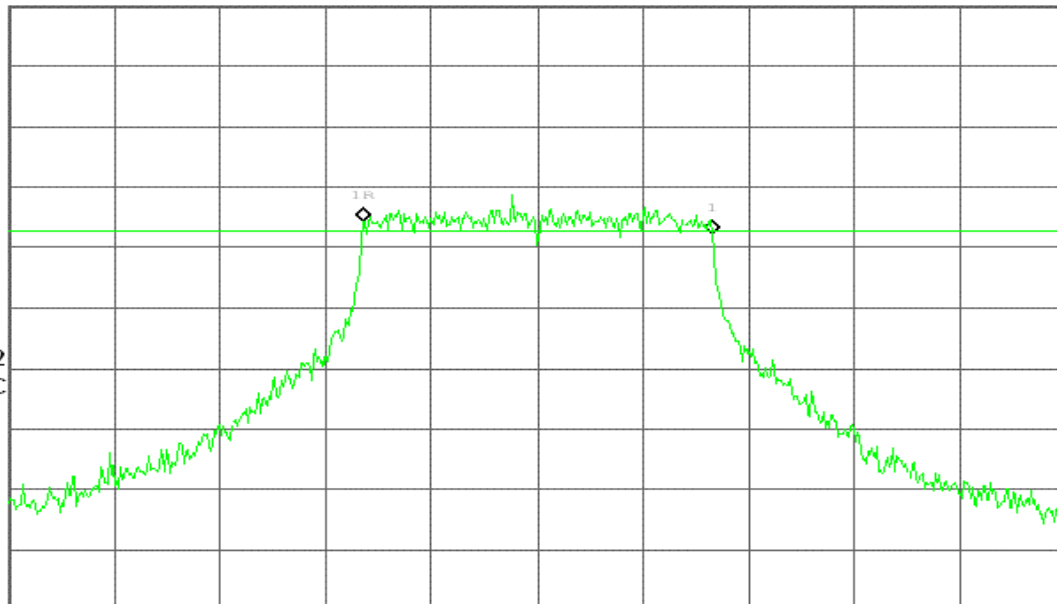
V1 S2

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 Turbo mode

CH Mid

Agilent 14:36:20 Oct 3, 2005

R L

6dB BW, g turbo Mode Mid Ch.

Δ Mkr1 32.67 MHz

Ref 30 dBm

Atten 30 dB

1.44 dB

#Peak

Log

10

dB/

Offst

10.5

dB

DI

-7.2

dBm

LgAv

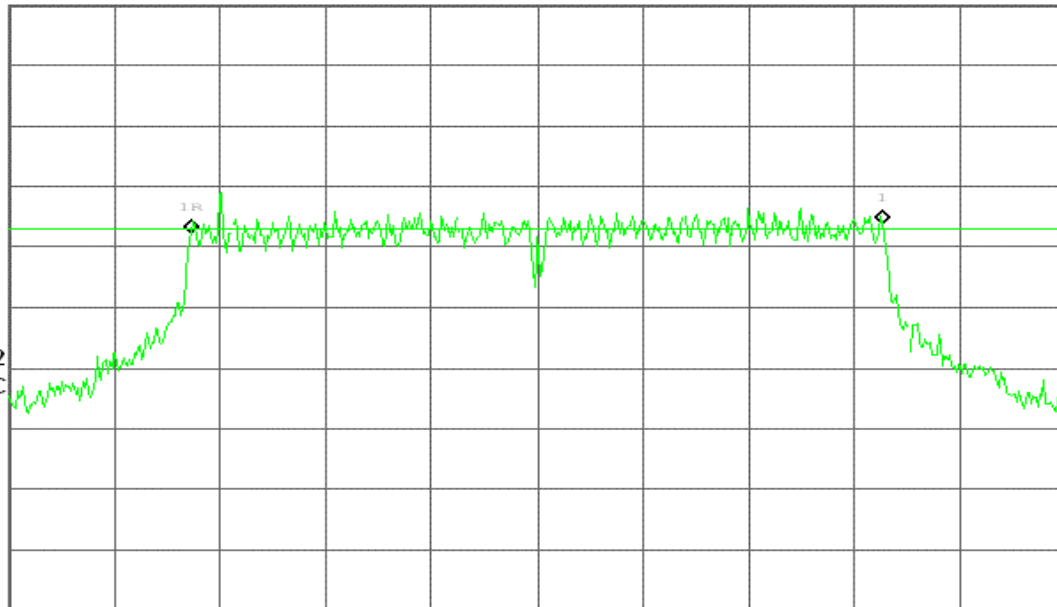
V1 S2

S3 FC

$\alpha(f)$:

FTun

Swp



Center 2.437 00 GHz

Span 50 MHz

#Res BW 100 kHz

#VBW 100 kHz

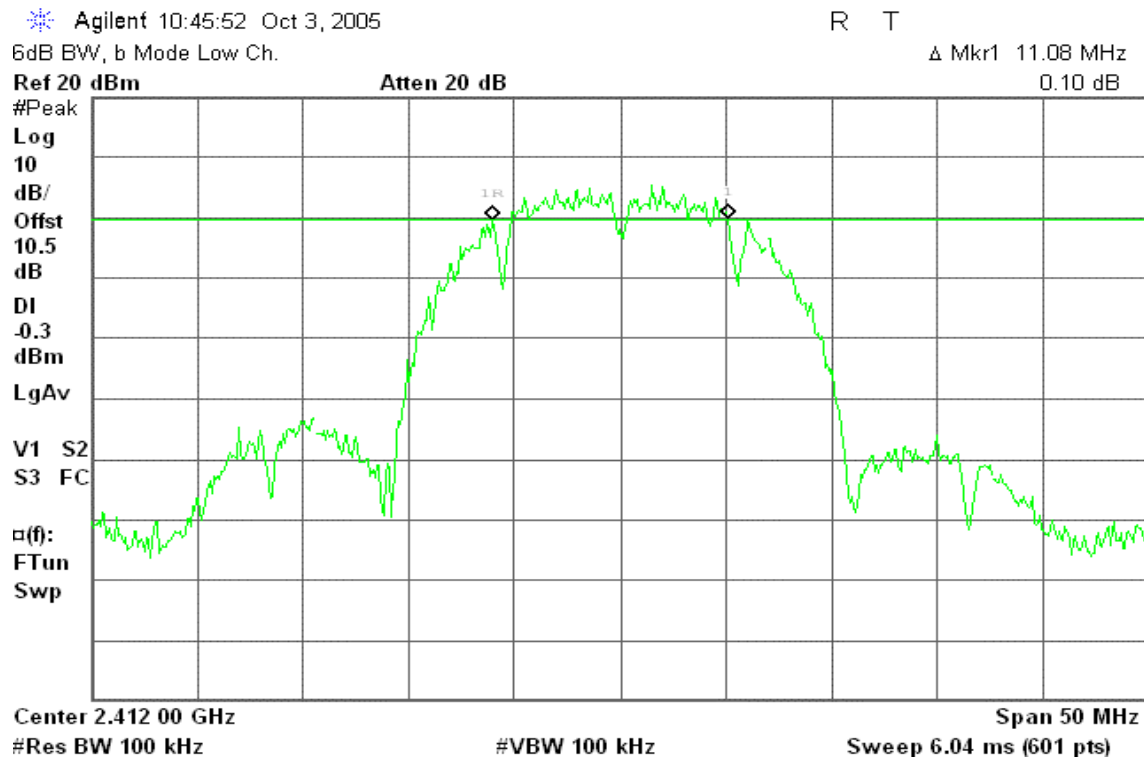
Sweep 6.04 ms (601 pts)



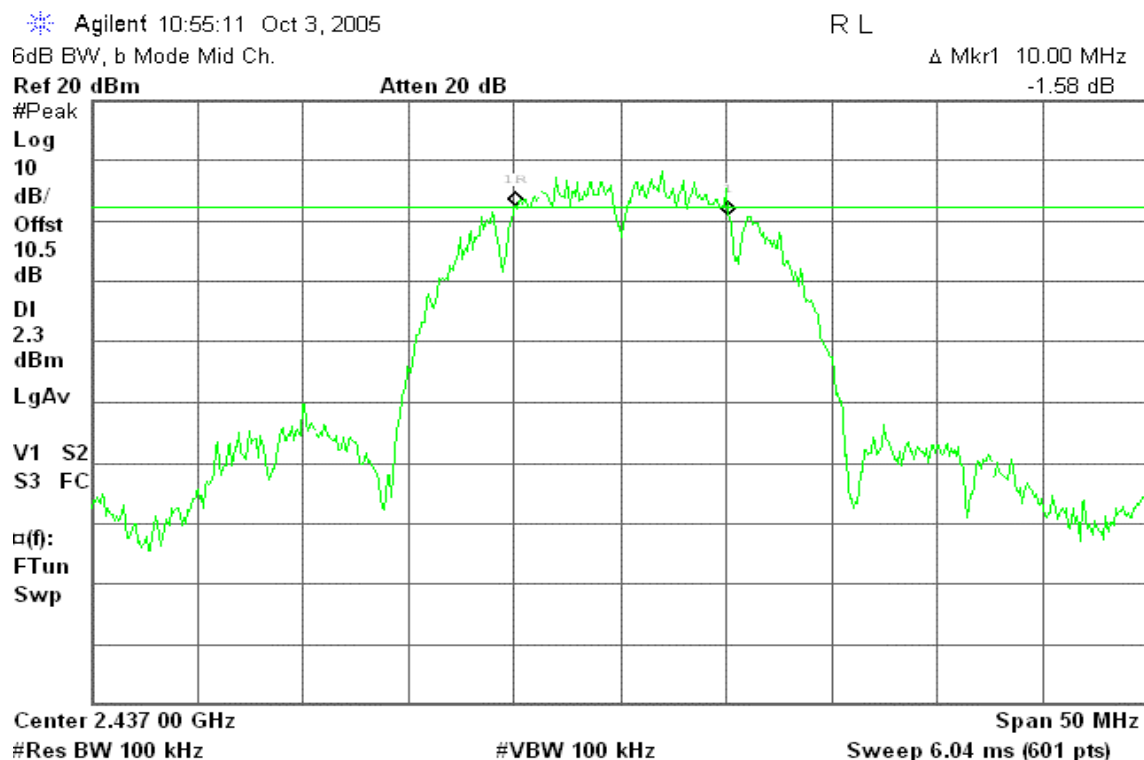
Omnidirectional Panel antenna / 3.0 dBi for 2.4 GHz and 5 GHz

IEEE 802.11b Base mode

CH Low



CH Mid





CH High

Agilent 11:26:39 Oct 3, 2005

R L

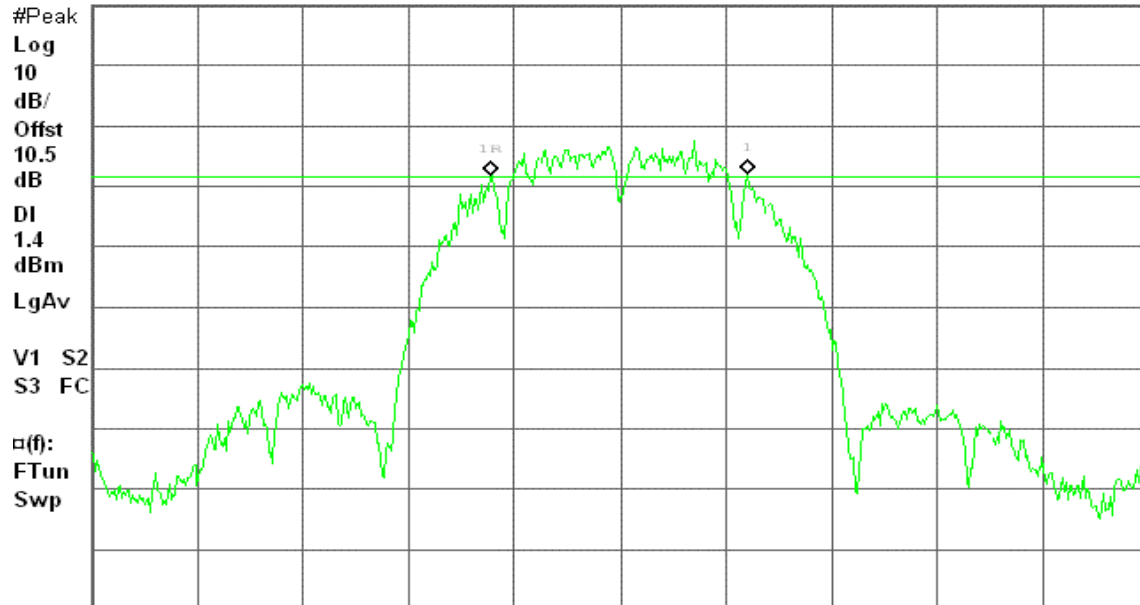
6dB BW, b Mode High Ch.

Δ Mkr1 12.08 MHz

Ref 30 dBm

Atten 30 dB

0.34 dB



Center 2.462 00 GHz

Span 50 MHz

#Res BW 100 kHz

#VBW 100 kHz

Sweep 6.04 ms (601 pts)

IEEE 802.11g Base mode

CH Low

Agilent 13:22:13 Oct 3, 2005

R L

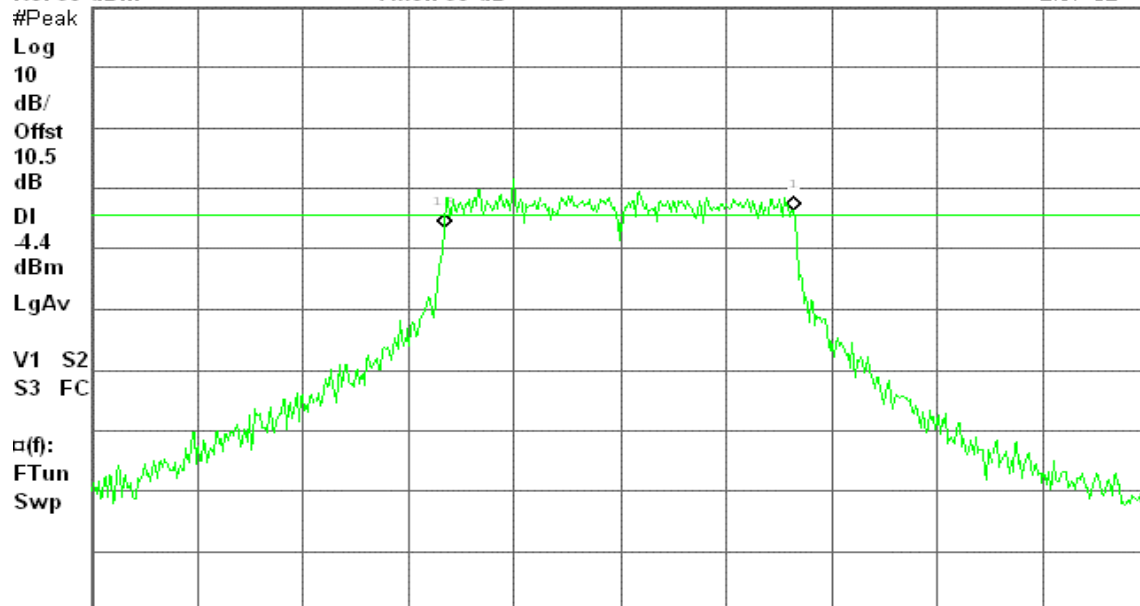
6dB BW, g Mode Low Ch.

Δ Mkr1 16.42 MHz

Ref 30 dBm

Atten 30 dB

2.97 dB



Center 2.412 00 GHz

Span 50 MHz

#Res BW 100 kHz

#VBW 100 kHz

Sweep 6.04 ms (601 pts)



CH Mid

Agilent 13:36:27 Oct 3, 2005

R L

6dB BW, g Mode Mid Ch.

Δ Mkr1 16.50 MHz

Ref 30 dBm

Atten 30 dB

0.39 dB

#Peak

Log

10

dB/

Offst

10.5

dB

DI

-2.2

dBm

LgAv

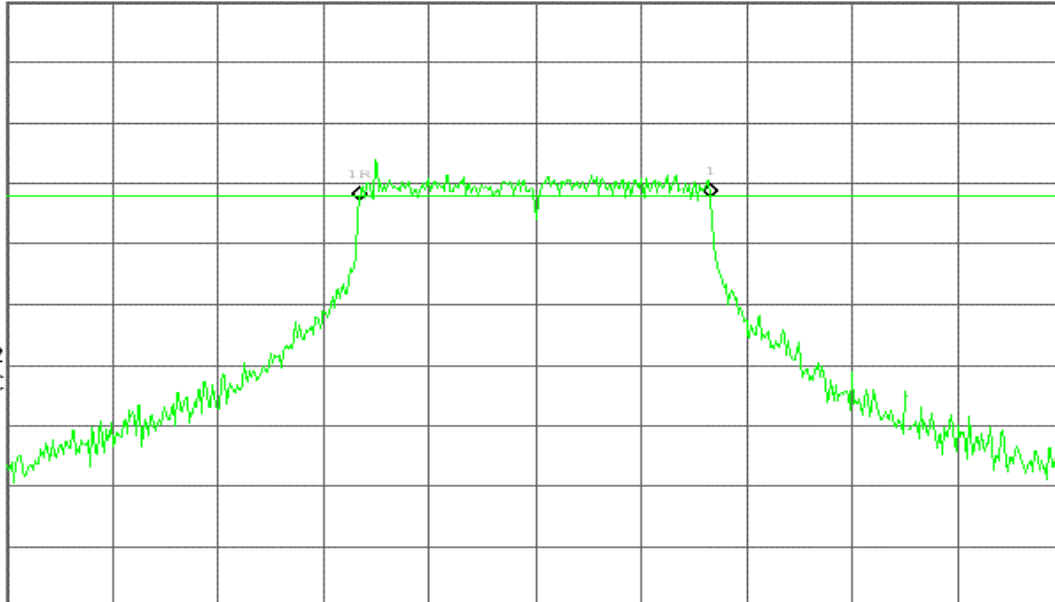
V1 S2

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)

CH High

Agilent 13:44:47 Oct 3, 2005

R L

6dB BW, g Mode High Ch.

Δ Mkr1 16.50 MHz

Ref 30 dBm

Atten 30 dB

-0.90 dB

#Peak

Log

10

dB/

Offst

10.5

dB

DI

-3.8

dBm

LgAv

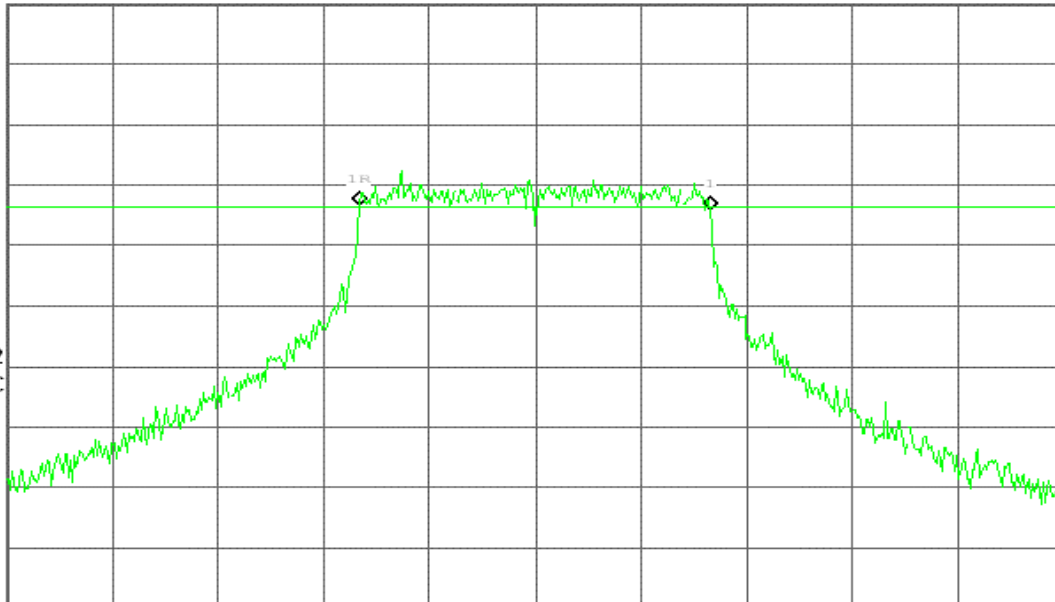
V1 S2

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 Turbo mode

CH Mid

Agilent 14:14:50 Oct 3, 2005

R L

6dB BW, g turbo Mode Mid Ch.

Δ Mkr1 33.08 MHz

Ref 30 dBm

Atten 30 dB

0.93 dB

#Peak

Log

10

dB/

Offst

10.5

dB

DI

-5.2

dBm

LgAv

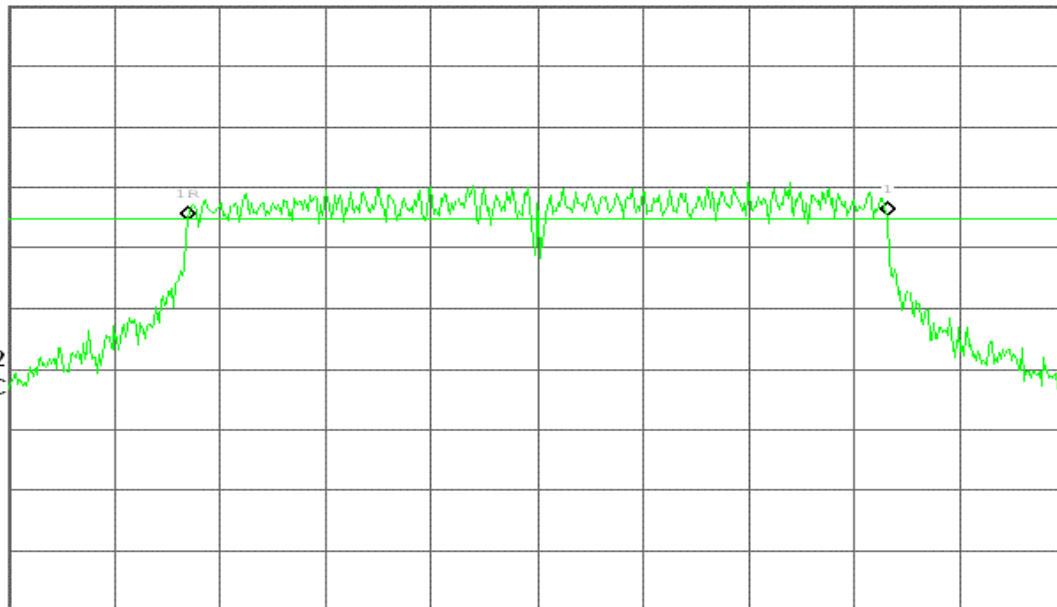
V1 S2

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)

IEEE 802.11a Base mode

CH Low

Agilent 15:59:28 Oct 3, 2005

R L

6dB BW, a Mode Low Ch.

Δ Mkr1 16.50 MHz

Ref 30 dBm

Atten 30 dB

2.67 dB

#Peak

Log

10

dB/

Offst

11

dB

DI

-5.0

dBm

LgAv

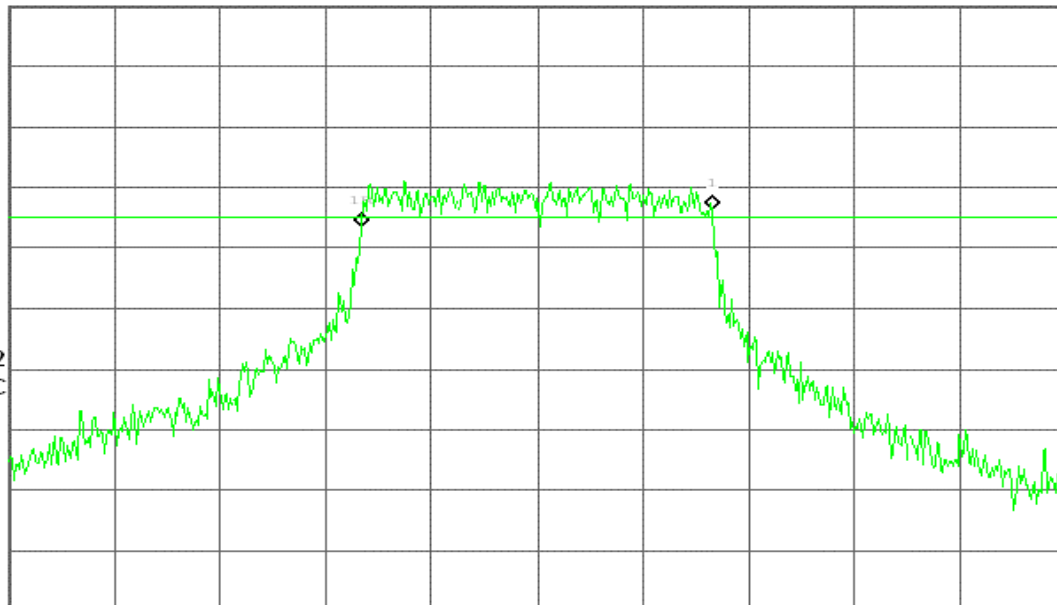
V1 S2

S3 FC

$\alpha(f)$:

FTun

Swp



Center 5.745 00 GHz

Span 50 MHz

#Res BW 100 kHz

#VBW 100 kHz

Sweep 6.04 ms (601 pts)



CH Mid

Agilent 16:14:09 Oct 3, 2005

R L

6dB BW, a Mode Mid Ch.

Δ Mkr1 16.50 MHz

Ref 30 dBm

Atten 30 dB

-0.03 dB

#Peak

Log

10

dB/

Offst

11

dB

DI

-5.8

dBm

LgAv

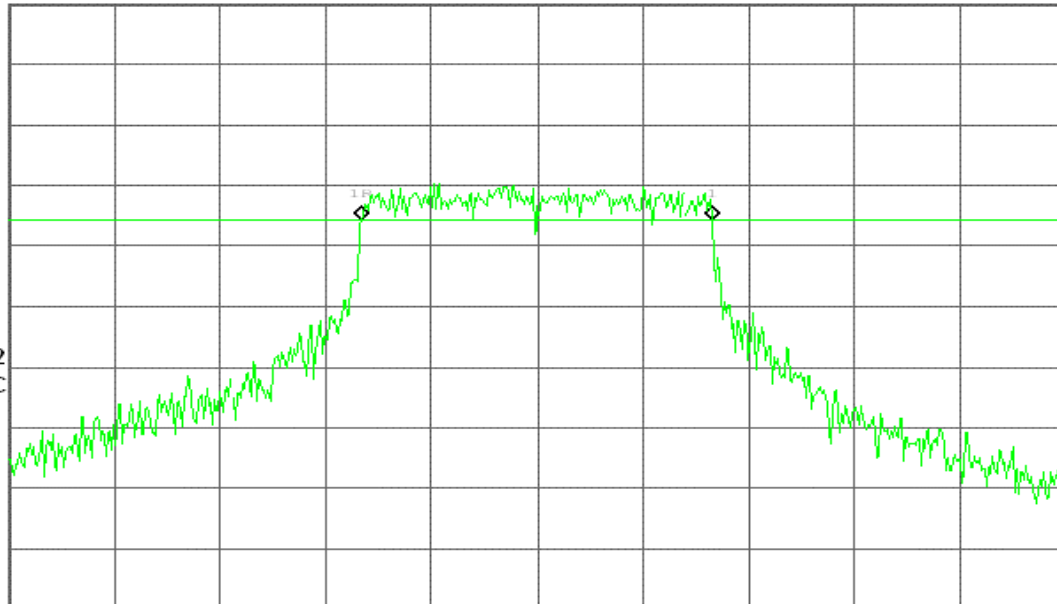
V1 S2

S3 FC

$\alpha(f)$:

FTun

Swp



Center 5.785 00 GHz

Span 50 MHz

#Res BW 100 kHz

#VBW 100 kHz

Sweep 6.04 ms (601 pts)

CH High

Agilent 16:25:13 Oct 3, 2005

R L

6dB BW, a Mode High Ch.

Δ Mkr1 16.50 MHz

Ref 30 dBm

Atten 30 dB

0.65 dB

#Peak

Log

10

dB/

Offst

11

dB

DI

-5.1

dBm

LgAv

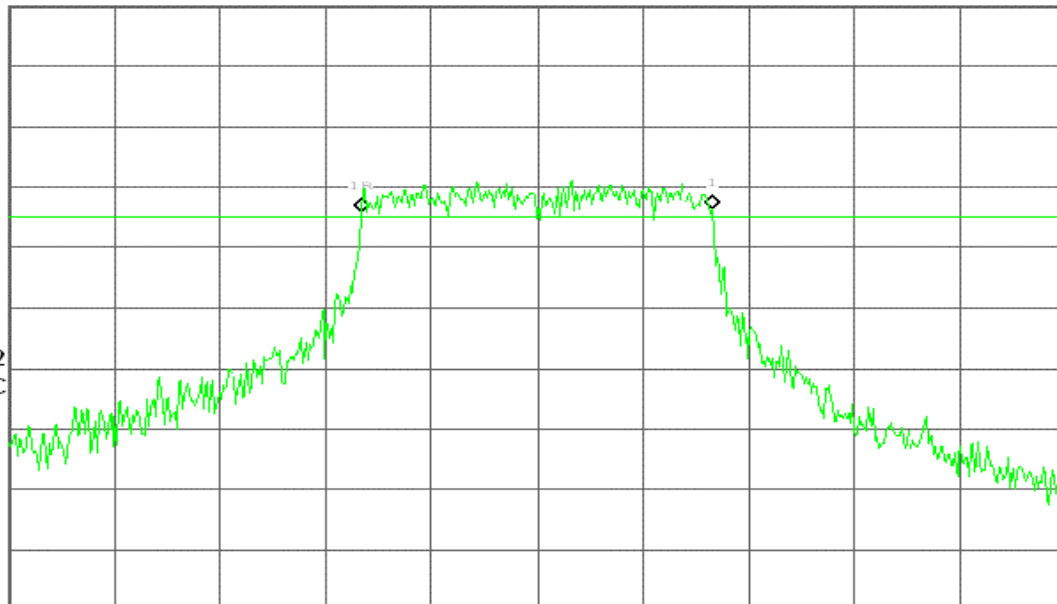
V1 S2

S3 FC

$\alpha(f)$:

FTun

Swp



Center 5.825 00 GHz

Span 50 MHz

#Res BW 100 kHz

#VBW 100 kHz

Sweep 6.04 ms (601 pts)



IEEE 802.11a Turbo mode

CH Low

Agilent 16:49:11 Oct 3, 2005

R L

6dB BW, a turbo Mode Low Ch.

Δ Mkr1 33.00 MHz

Ref 30 dBm

Atten 30 dB

2.77 dB

#Peak

Log

10

dB/

Offst

11

dB

DI

-5.9

dBm

LgAv

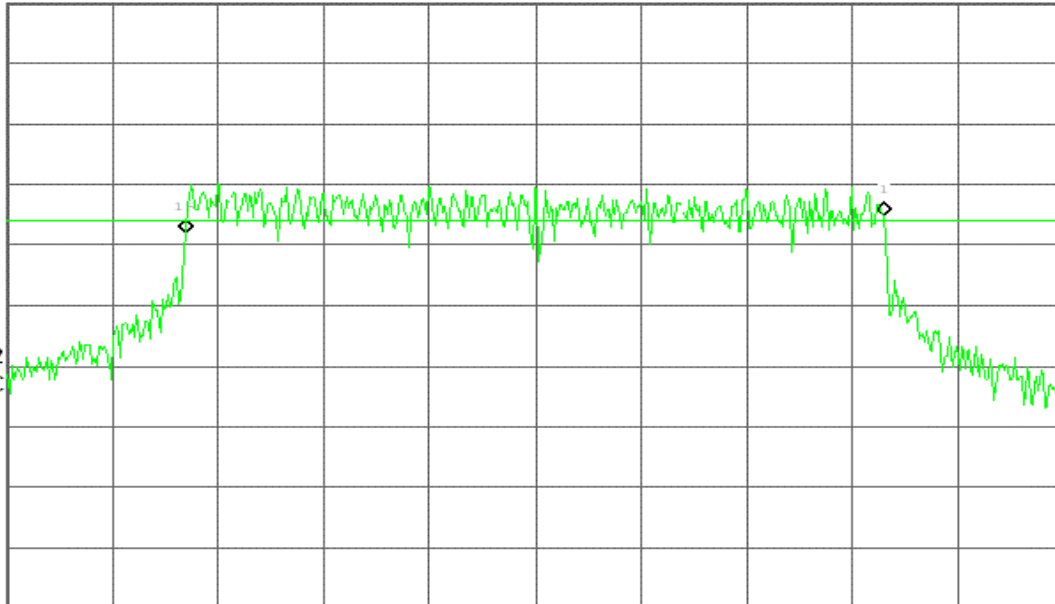
V1 S2

S3 FC

$\square(f)$:

FTun

Swp



Center 5.760 00 GHz

Span 50 MHz

#Res BW 100 kHz

#VBW 100 kHz

Sweep 6.04 ms (601 pts)

CH High

Agilent 16:41:43 Oct 3, 2005

R L

6dB BW, a turbo Mode High Ch.

Δ Mkr1 32.92 MHz

Ref 30 dBm

Atten 30 dB

-0.46 dB

#Peak

Log

10

dB/

Offst

11

dB

DI

-4.0

dBm

LgAv

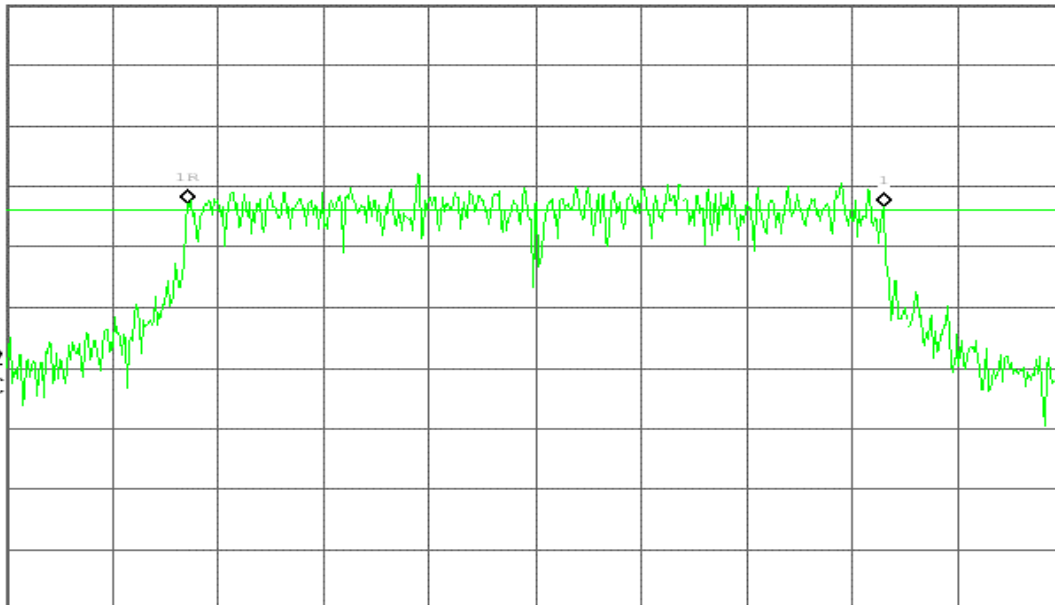
V1 S2

S3 FC

$\square(f)$:

FTun

Swp



Center 5.800 00 GHz

Span 50 MHz

#Res BW 100 kHz

#VBW 100 kHz

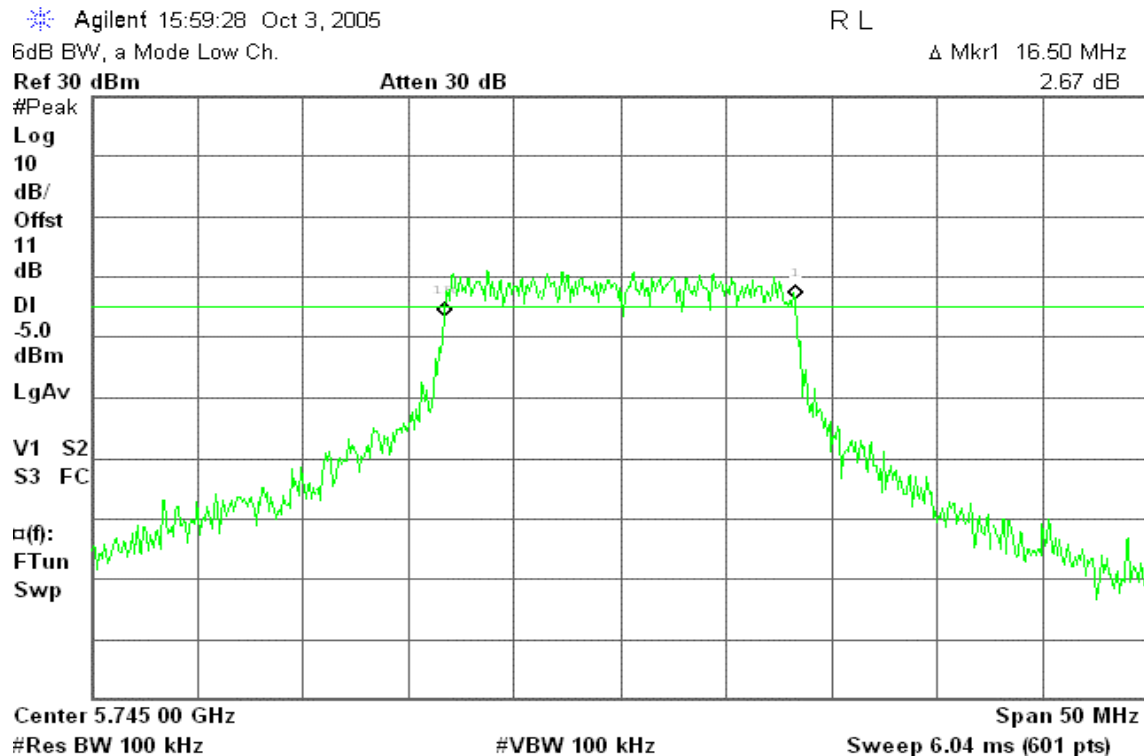
Sweep 6.04 ms (601 pts)



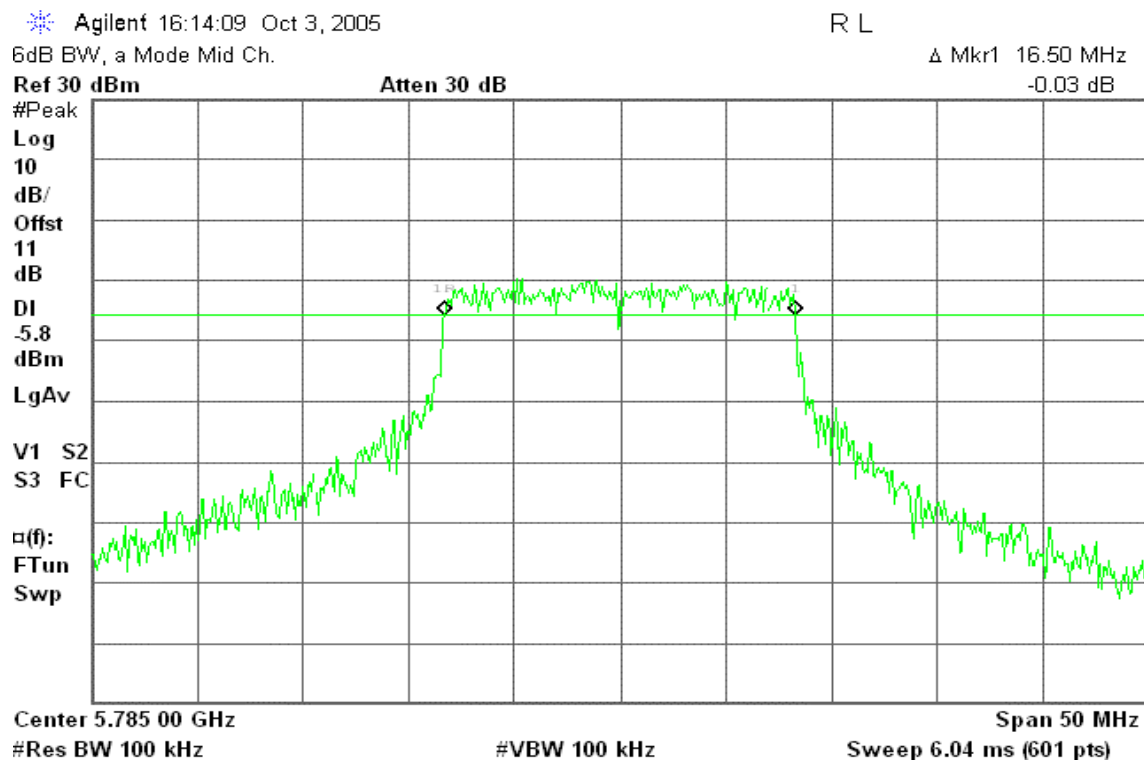
Omnidirectional antenna / 6.0 dBi for 5 GHz

IEEE 802.11a Base mode

CH Low



CH Mid





CH High

Agilent 16:25:13 Oct 3, 2005

R L

6dB BW, a Mode High Ch.

Δ Mkr1 16.50 MHz

Ref 30 dBm

Atten 30 dB

0.65 dB

#Peak

Log

10

dB/

Offst

11

dB

DI

-5.1

dBm

LgAv

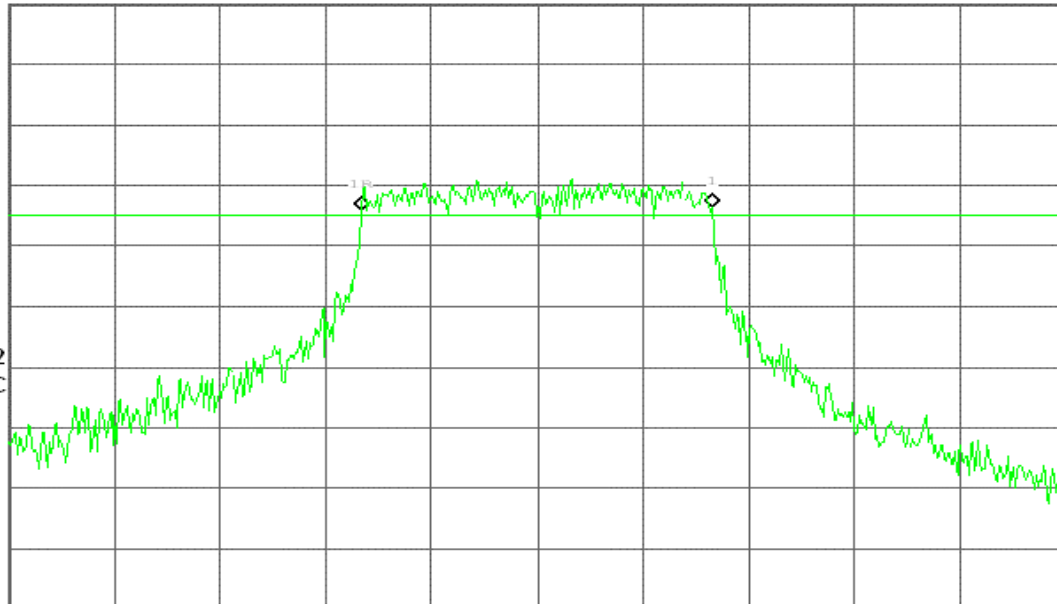
V1 S2

S3 FC

$\alpha(f)$:

FTun

Swp



Center 5.825 00 GHz

Span 50 MHz

#Res BW 100 kHz

#VBW 100 kHz

Sweep 6.04 ms (601 pts)

IEEE 802.11a Turbo mode

CH Low

Agilent 16:49:11 Oct 3, 2005

R L

6dB BW, a turbo Mode Low Ch.

Δ Mkr1 33.00 MHz

Ref 30 dBm

Atten 30 dB

2.77 dB

#Peak

Log

10

dB/

Offst

11

dB

DI

-5.9

dBm

LgAv

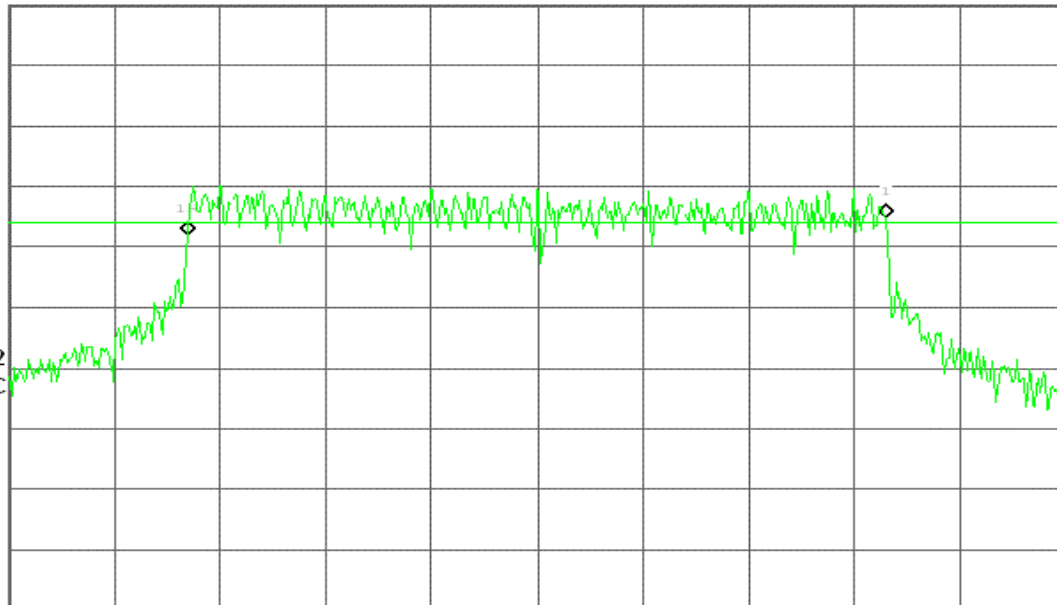
V1 S2

S3 FC

$\alpha(f)$:

FTun

Swp



Center 5.760 00 GHz

Span 50 MHz

#Res BW 100 kHz

#VBW 100 kHz

Sweep 6.04 ms (601 pts)



CH High

Agilent 16:41:43 Oct 3, 2005

R L

6dB BW, a turbo Mode High Ch.

Δ Mkr1 32.92 MHz

Ref 30 dBm

Atten 30 dB

-0.46 dB

#Peak

Log

10

dB/

Offst

11

dB

DI

-4.0

dBm

LgAv

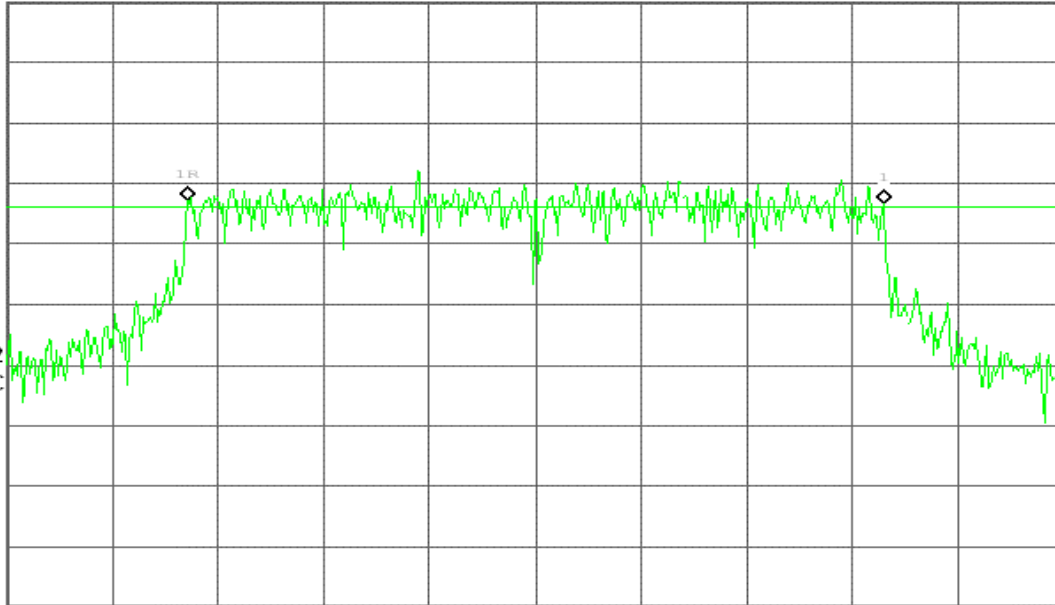
V1 S2

S3 FC

$\alpha(f)$:

FTun

Swp



Center 5.800 00 GHz

Span 50 MHz

#Res BW 100 kHz

#VBW 100 kHz

Sweep 6.04 ms (601 pts)



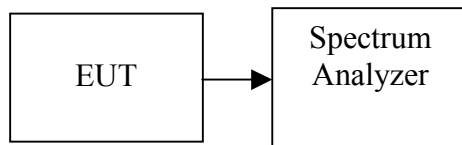
7.2 PEAK POWER

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

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

**TEST RESULTS**

No non-compliance noted.

Test Data**Omnidirectional antenna / 12.0 dBi for 2.4 GHz****Test mode: IEEE 802.11b mode**

Channel	Frequency (MHz)	Output Power (dBm)	Output Power (W)	Limit (W)	Result
Low	2412	18.48	0.07047	0.251	PASS
Mid	2437	19.23	0.08375		PASS
High	2462	19.68	0.09290		PASS

Remark: The maximum antenna gain is 12.0dBi; therefore the reduction due to antenna gain is 6.0dB, so the limit is 24.0dBm.

Test mode: IEEE 802.11g mode

Channel	Frequency (MHz)		Output Power (dBm)	Output Power (W)	Limit (W)	Result
Low	Base mode	2412	14.71	0.02958	0.251	PASS
Mid		2437	14.76	0.02992		PASS
High		2462	14.61	0.02891		PASS
Mid	Turbo mode	2437	16.10	0.04074		PASS

Remark: The maximum antenna gain is 12.0dBi; therefore the reduction due to antenna gain is 6.0dB, so the limit is 24.0dBm.

**Omnidirectional Panel antenna / 3.0 dBi for 2.4 GHz and 5 GHz****Test mode: IEEE 802.11b mode**

Channel	Frequency (MHz)	Output Power (dBm)	Output Power (W)	Limit (W)	Result
Low	2412	18.81	0.07603	1	PASS
Mid	2437	21.64	0.14588		PASS
High	2462	21.59	0.14421		PASS

Test mode: IEEE 802.11g mode

Channel	Frequency (MHz)		Output Power (dBm)	Output Power (W)	Limit (W)	Result
Low	Base mode	2412	17.18	0.05224	1	PASS
Mid		2437	19.90	0.09772		PASS
High		2462	18.73	0.07464		PASS
Mid	Turbo mode	2437	20.18	0.10423		PASS

Test mode: IEEE 802.11a mode

Channel	Frequency (MHz)		Output Power (dBm)	Output Power (W)	Limit (W)	Result
Low	Base mode	5745	19.42	0.08750	1	PASS
Mid		5785	19.21	0.08337		PASS
High		5825	19.63	0.09183		PASS
Low	Turbo mode	5760	19.30	0.08511		PASS
High		5800	19.72	0.09376		PASS

Omnidirectional antenna / 6.0 dBi for 5 GHz**Test mode: IEEE 802.11a mode**

Channel	Frequency (MHz)		Output Power (dBm)	Output Power (W)	Limit (W)	Result
Low	Base mode	5745	19.42	0.08750	1	PASS
Mid		5785	19.21	0.08337		PASS
High		5825	19.63	0.09183		PASS
Low	Turbo mode	5760	19.30	0.08511		PASS
High		5800	19.72	0.09376		PASS



Test Plot

Omnidirectional antenna / 12.0 dBi for 2.4 GHz

IEEE 802.11b Base mode

CH Low

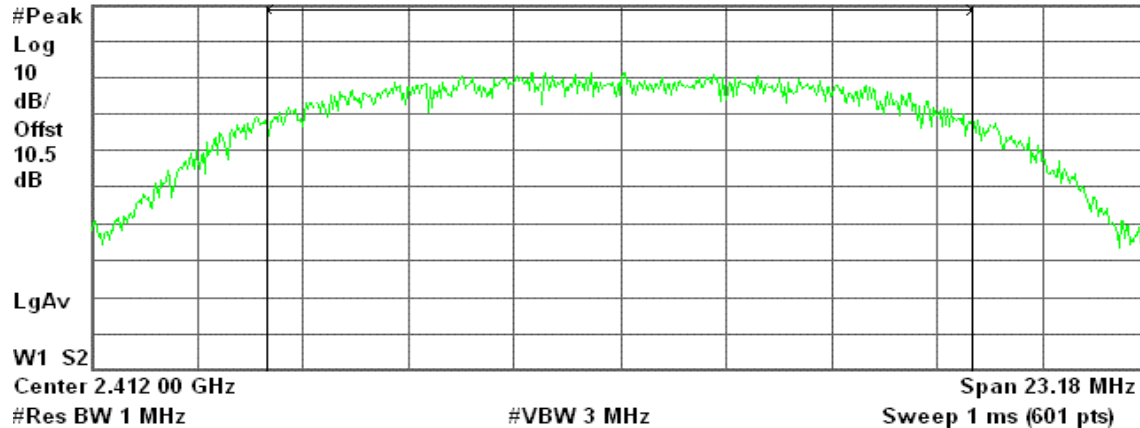
Agilent 15:34:05 Oct 3, 2005

R L

Peak Output Power , b Mode Low Ch.

Ref 30 dBm

Atten 30 dB



Channel Power

Power Spectral Density

18.48 dBm / 15.4530 MHz

-53.41 dBm/Hz

CH Mid

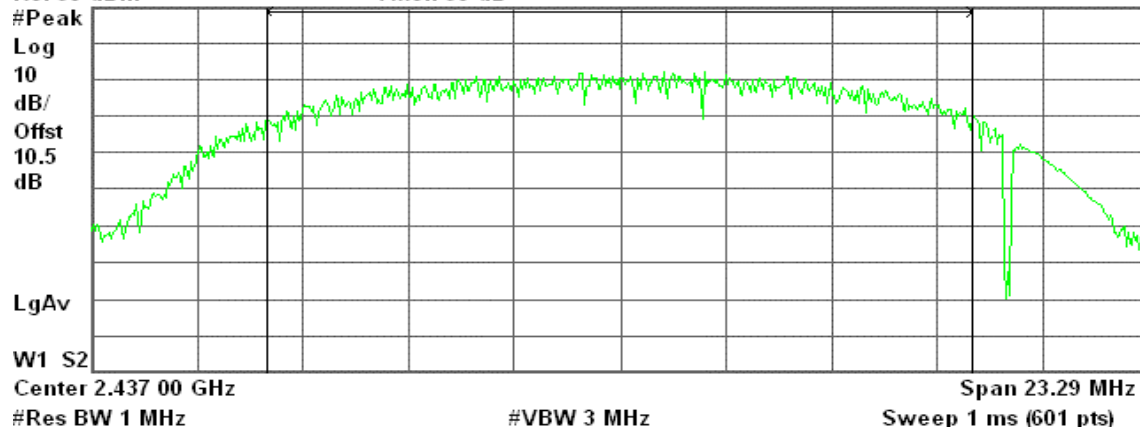
Agilent 15:19:13 Oct 3, 2005

R L

Peak Output Power , b Mode Mid Ch.

Ref 30 dBm

Atten 30 dB



Channel Power

Power Spectral Density

19.23 dBm / 15.5250 MHz

-52.68 dBm/Hz



CH High

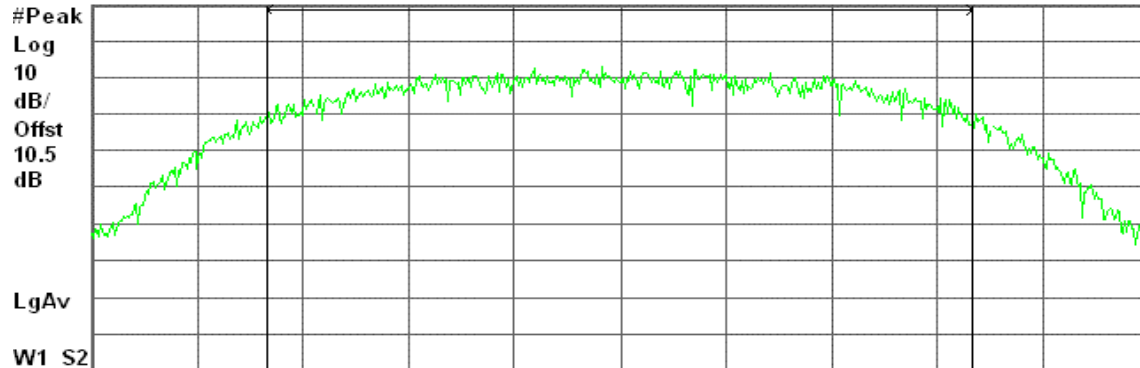
Agilent 15:11:31 Oct 3, 2005

R L

Peak Output Power , b Mode High Ch.

Ref 30 dBm

Atten 30 dB



Center 2.462 00 GHz

Span 23.13 MHz

#Res BW 1 MHz

#VBW 3 MHz

Sweep 1 ms (601 pts)

Channel Power

Power Spectral Density

19.68 dBm / 15.4220 MHz

-52.20 dBm/Hz

IEEE 802.11g Base mode

CH Low

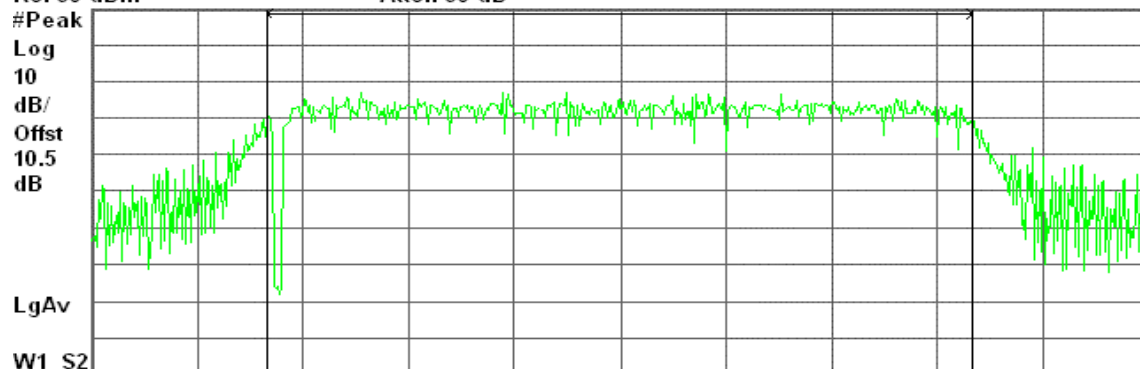
Agilent 14:52:57 Oct 3, 2005

R L

Peak Output Power , g Mode Low Ch.

Ref 30 dBm

Atten 30 dB



Center 2.412 00 GHz

Span 25.15 MHz

#Res BW 1 MHz

#VBW 3 MHz

Sweep 1 ms (601 pts)

Channel Power

Power Spectral Density

14.71 dBm / 16.7640 MHz

-57.54 dBm/Hz



CH Mid

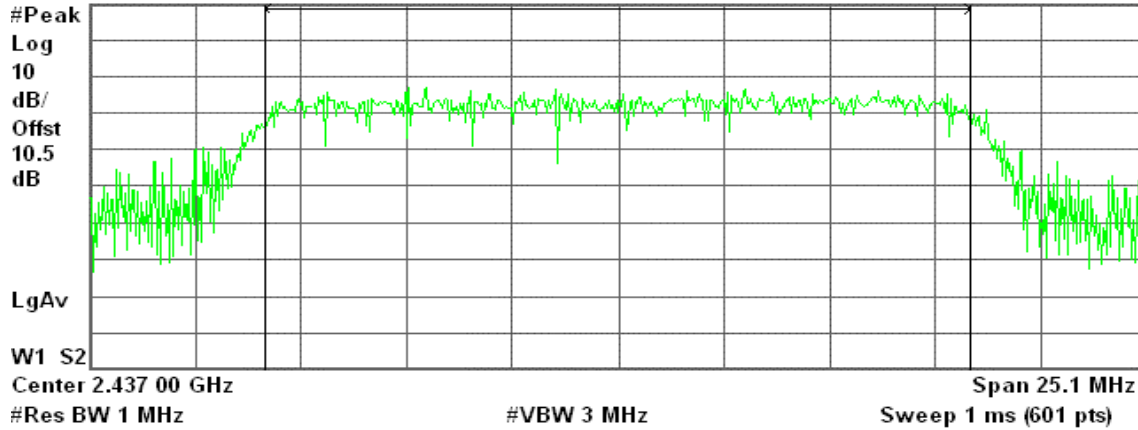
Agilent 14:55:47 Oct 3, 2005

R L

Peak Output Power , g Mode Mid Ch.

Ref 30 dBm

Atten 30 dB



Channel Power

Power Spectral Density

14.76 dBm / 16.7310 MHz

-57.47 dBm/Hz

CH High

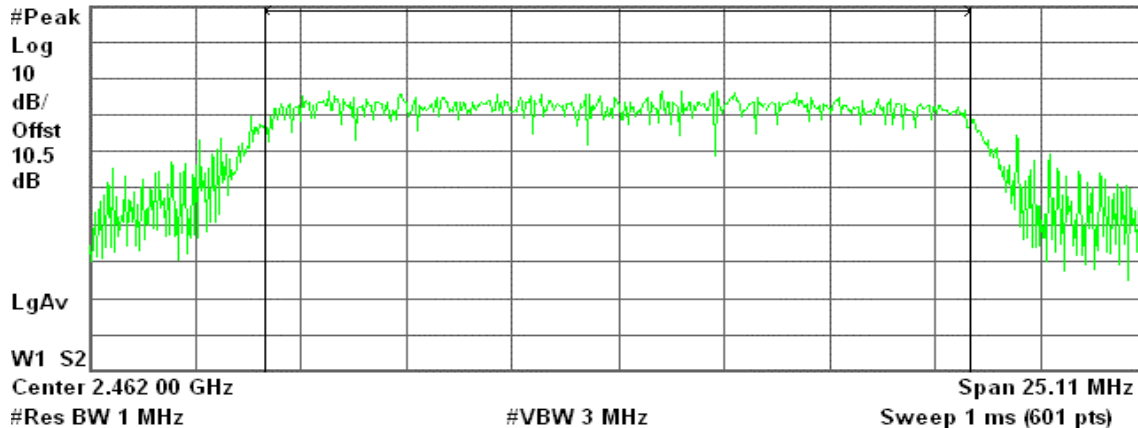
Agilent 15:02:34 Oct 3, 2005

R L

Peak Output Power , g Mode High Ch.

Ref 30 dBm

Atten 30 dB



Channel Power

Power Spectral Density

14.61 dBm / 16.7430 MHz

-57.63 dBm/Hz



IEEE 802.11g Turbo mode

CH Mid

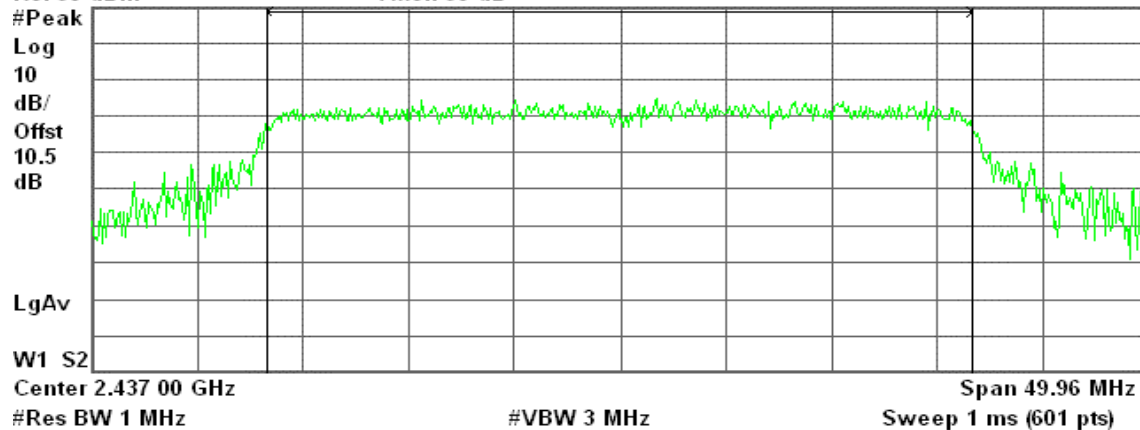
Agilent 14:37:14 Oct 3, 2005

R L

Peak Output Power , g turbo Mode Mid Ch.

Ref 30 dBm

Atten 30 dB



Channel Power

Power Spectral Density

16.10 dBm / 33.3090 MHz

-59.13 dBm/Hz



Omnidirectional Panel antenna / 3.0 dBi for 2.4 GHz and 5 GHz

IEEE 802.11b Base mode

CH Low

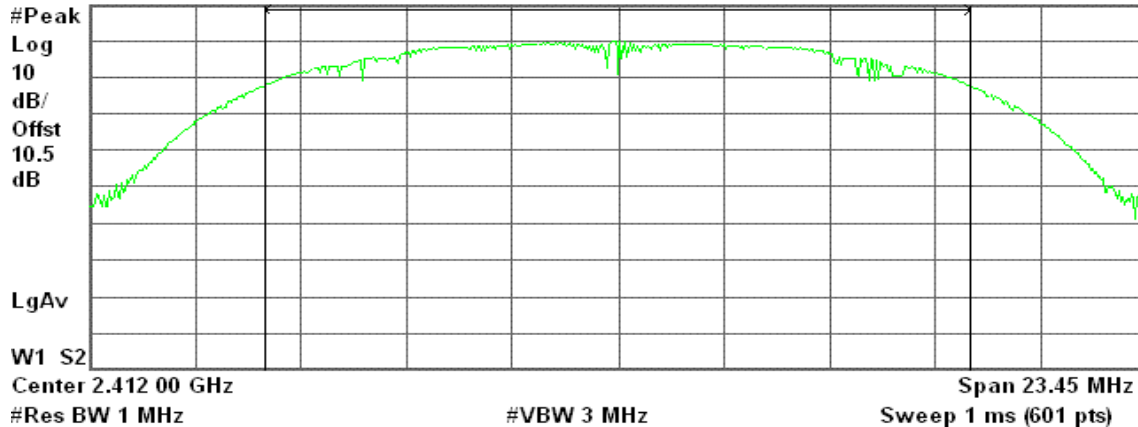
Agilent 10:47:07 Oct 3, 2005

R L

Peak Output Power , b Mode Low Ch.

Ref 20 dBm

Atten 20 dB



Channel Power

Power Spectral Density

18.81 dBm / 15.6330 MHz

-53.13 dBm/Hz

CH Mid

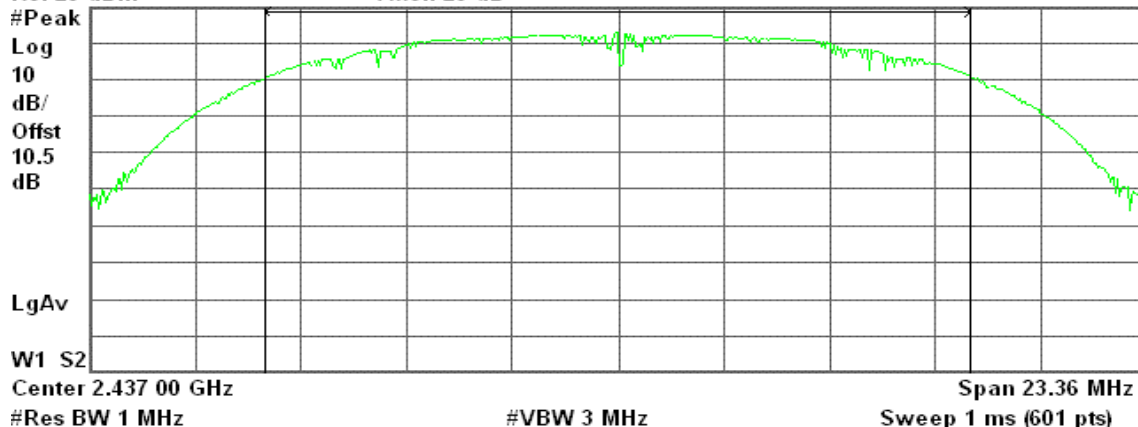
Agilent 10:56:26 Oct 3, 2005

R L

Peak Output Power , b Mode Mid Ch.

Ref 20 dBm

Atten 20 dB



Channel Power

Power Spectral Density

21.64 dBm / 15.5720 MHz

-50.28 dBm/Hz



CH High

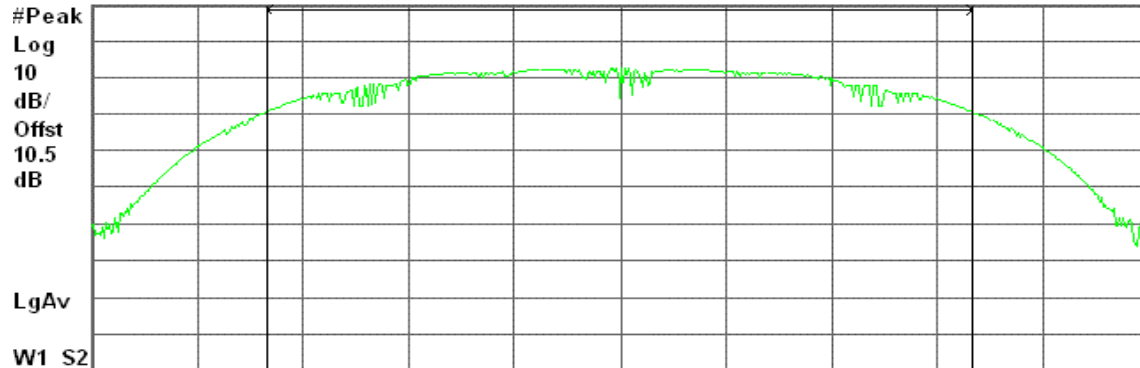
Agilent 11:28:03 Oct 3, 2005

R L

Peak Output Power , b Mode High Ch.

Ref 30 dBm

Atten 30 dB



Center 2.462 00 GHz

Span 23.33 MHz

#Res BW 1 MHz

#VBW 3 MHz

Sweep 1 ms (601 pts)

Channel Power

Power Spectral Density

21.59 dBm / 15.5540 MHz

-50.32 dBm/Hz

IEEE 802.11g Base mode

CH Low

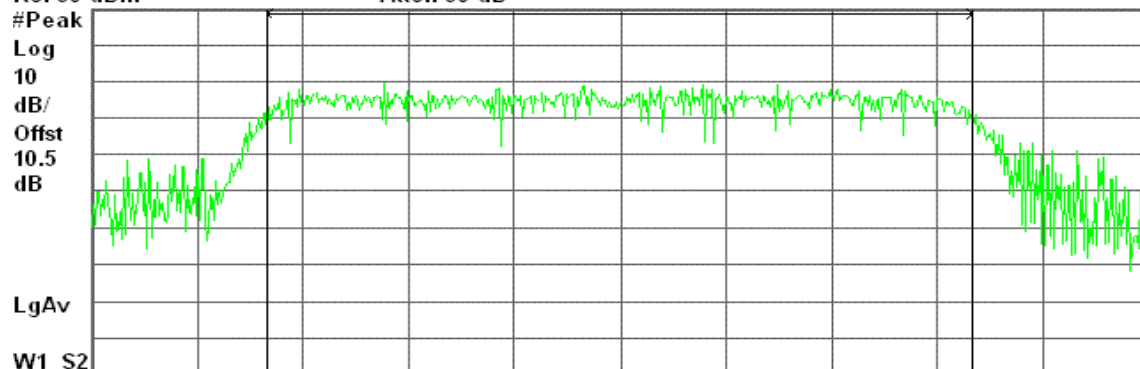
Agilent 13:23:18 Oct 3, 2005

R L

Peak Output Power , g Mode Low Ch.

Ref 30 dBm

Atten 30 dB



Center 2.412 00 GHz

Span 25.19 MHz

#Res BW 1 MHz

#VBW 3 MHz

Sweep 1 ms (601 pts)

Channel Power

Power Spectral Density

17.18 dBm / 16.7910 MHz

-55.07 dBm/Hz



CH Mid

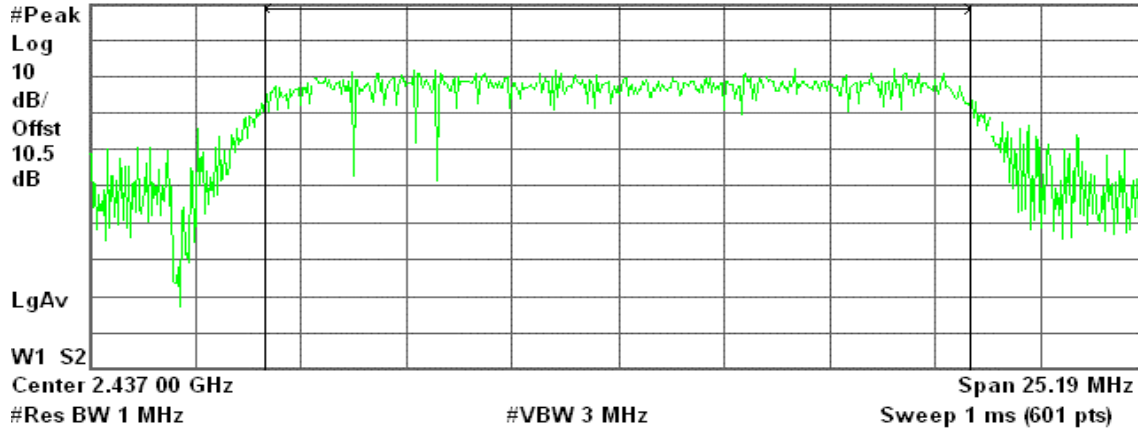
Agilent 13:37:49 Oct 3, 2005

R L

Peak Output Power , g Mode Mid Ch.

Ref 30 dBm

Atten 30 dB



Channel Power

Power Spectral Density

19.90 dBm / 16.7960 MHz

-52.35 dBm/Hz

CH High

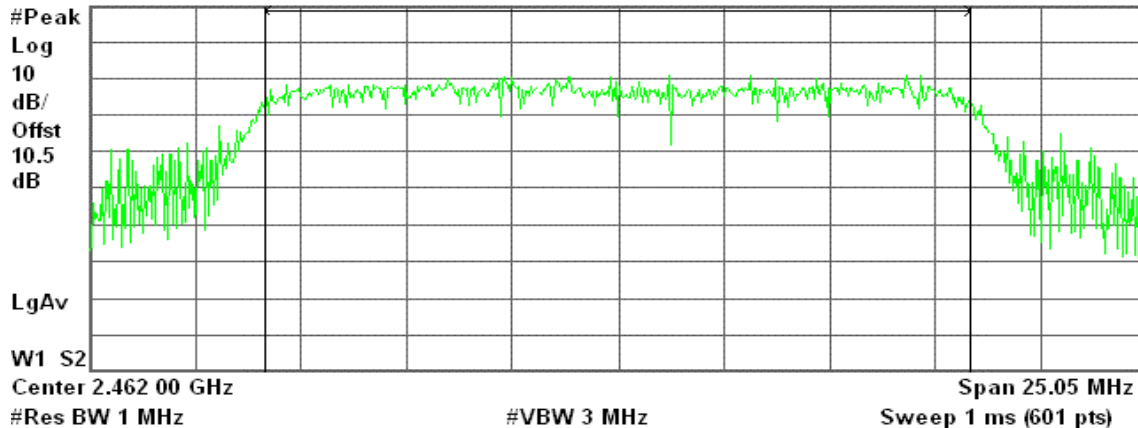
Agilent 13:45:39 Oct 3, 2005

R L

Peak Output Power , g Mode High Ch.

Ref 30 dBm

Atten 30 dB



Channel Power

Power Spectral Density

18.73 dBm / 16.7000 MHz

-53.50 dBm/Hz



IEEE 802.11g Turbo mode

CH Mid

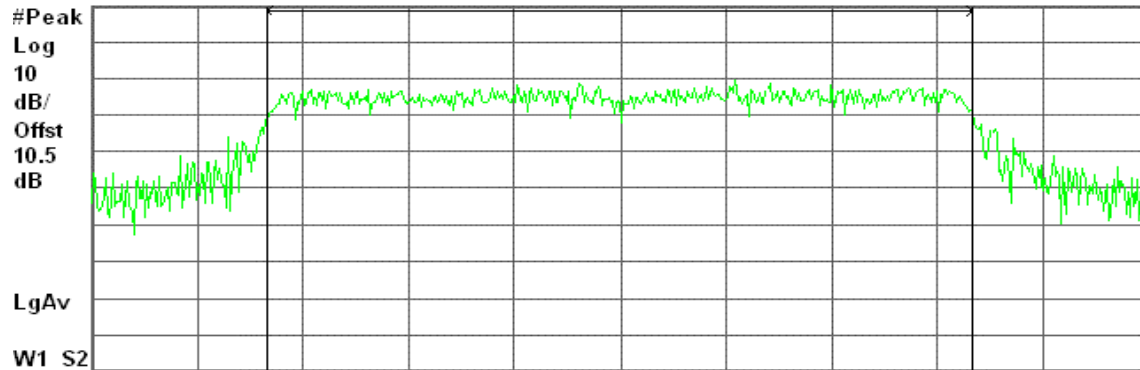
Agilent 14:15:48 Oct 3, 2005

R L

Peak Output Power , g turbo Mode Mid Ch.

Ref 30 dBm

Atten 30 dB



Center 2.437 00 GHz

Span 49.99 MHz

#Res BW 1 MHz

#VBW 3 MHz

Sweep 1 ms (601 pts)

Channel Power

Power Spectral Density

20.18 dBm / 33.3270 MHz

-55.05 dBm/Hz

IEEE 802.11a Base mode

CH Low

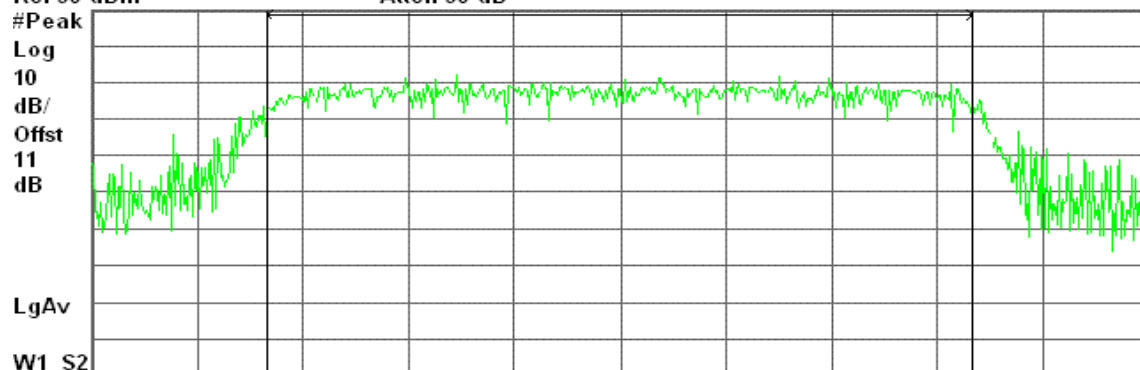
Agilent 16:00:56 Oct 3, 2005

R L

Peak Output Power , a Mode Low Ch.

Ref 30 dBm

Atten 30 dB



Center 5.745 00 GHz

Span 25.06 MHz

#Res BW 1 MHz

#VBW 3 MHz

Sweep 1 ms (601 pts)

Channel Power

Power Spectral Density

19.42 dBm / 16.7080 MHz

-52.81 dBm/Hz



CH Mid

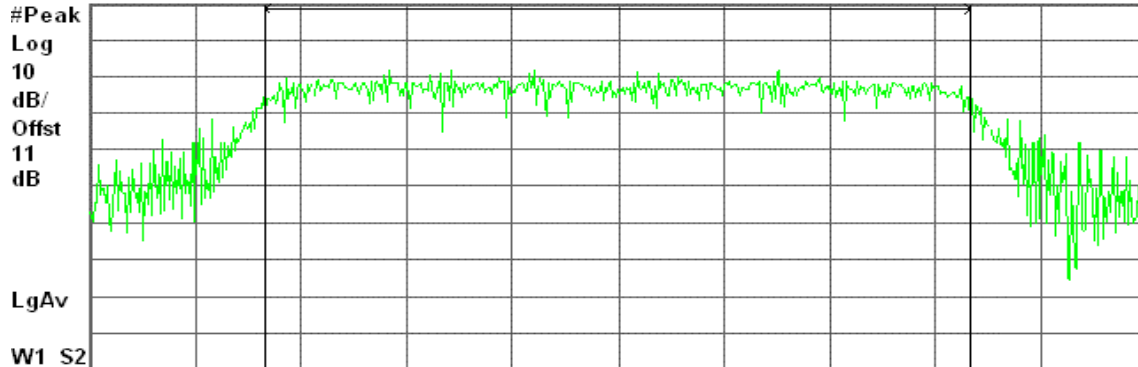
Agilent 16:15:09 Oct 3, 2005

R L

Peak Output Power , a Mode Mid Ch.

Ref 30 dBm

Atten 30 dB



Center 5.785 00 GHz

Span 25.04 MHz

#Res BW 1 MHz

#VBW 3 MHz

Sweep 1 ms (601 pts)

Channel Power

Power Spectral Density

19.21 dBm / 16.6930 MHz

-53.02 dBm/Hz

CH High

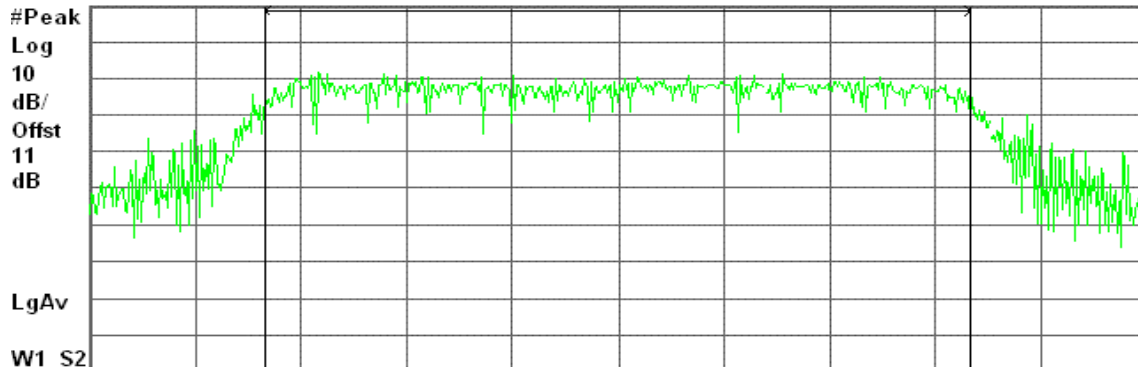
Agilent 16:26:13 Oct 3, 2005

R L

Peak Output Power , a Mode High Ch.

Ref 30 dBm

Atten 30 dB



Center 5.825 00 GHz

Span 25.06 MHz

#Res BW 1 MHz

#VBW 3 MHz

Sweep 1 ms (601 pts)

Channel Power

Power Spectral Density

19.63 dBm / 16.7040 MHz

-52.60 dBm/Hz



IEEE 802.11a Turbo mode

CH Low

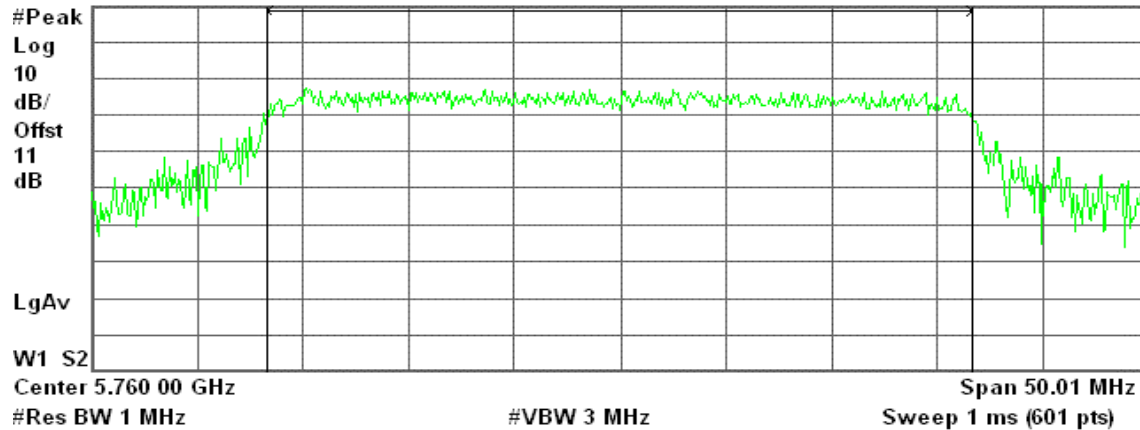
Agilent 16:49:58 Oct 3, 2005

R L

Peak Output Power , a turbo Mode Low Ch.

Ref 30 dBm

Atten 30 dB



Channel Power

Power Spectral Density

19.30 dBm / 33.3420 MHz

-55.93 dBm/Hz

CH High

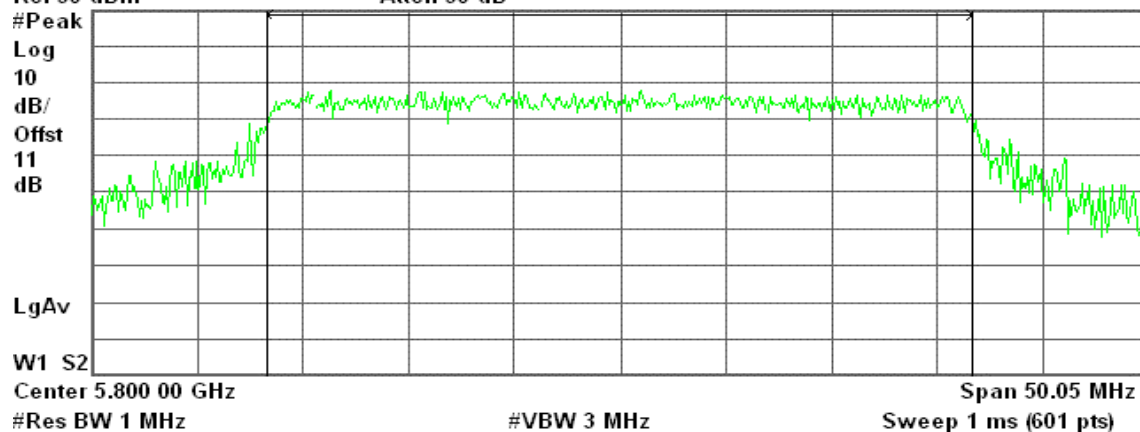
Agilent 16:42:39 Oct 3, 2005

R L

Peak Output Power , a turbo Mode High Ch.

Ref 30 dBm

Atten 30 dB



Channel Power

Power Spectral Density

19.72 dBm / 33.3640 MHz

-55.52 dBm/Hz



Omnidirectional antenna / 6.0 dBi for 5 GHz

IEEE 802.11a Base mode

CH Low

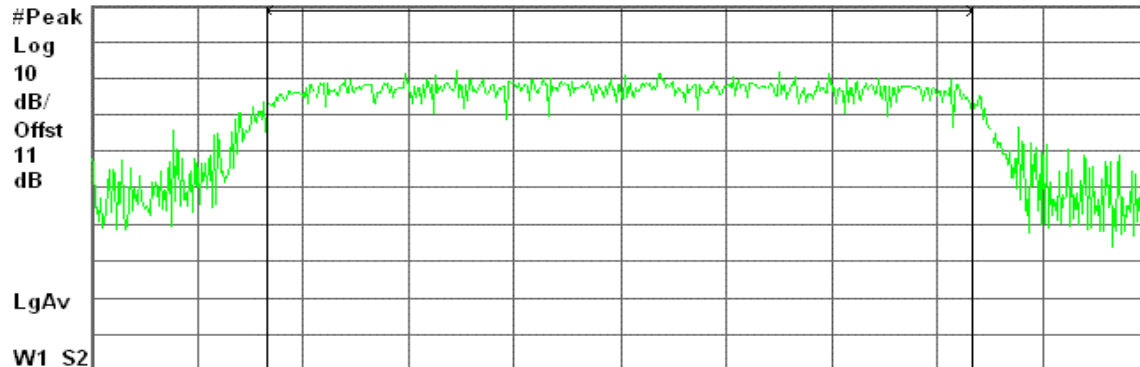
Agilent 16:00:56 Oct 3, 2005

R L

Peak Output Power , a Mode Low Ch.

Ref 30 dBm

Atten 30 dB



Center 5.745 00 GHz

Span 25.06 MHz

#Res BW 1 MHz

#VBW 3 MHz

Sweep 1 ms (601 pts)

Channel Power

Power Spectral Density

19.42 dBm / 16.7080 MHz

-52.81 dBm/Hz

CH Mid

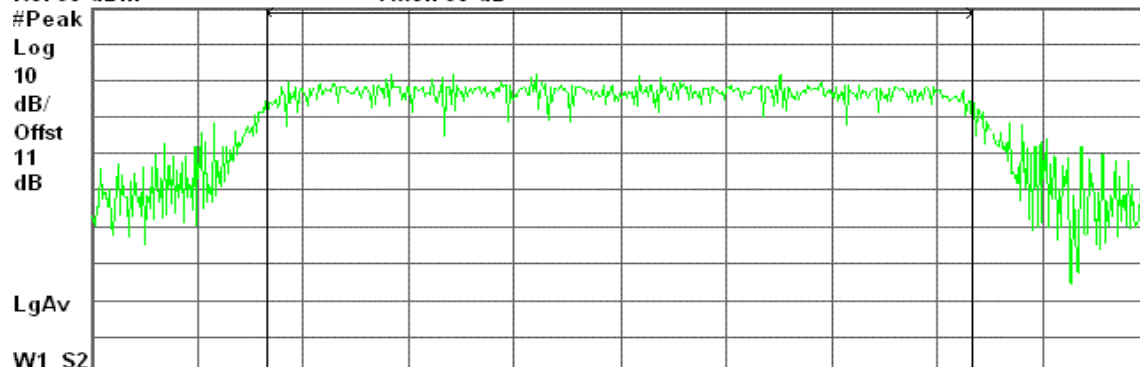
Agilent 16:15:09 Oct 3, 2005

R L

Peak Output Power , a Mode Mid Ch.

Ref 30 dBm

Atten 30 dB



Center 5.785 00 GHz

Span 25.04 MHz

#Res BW 1 MHz

#VBW 3 MHz

Sweep 1 ms (601 pts)

Channel Power

Power Spectral Density

19.21 dBm / 16.6930 MHz

-53.02 dBm/Hz



CH High

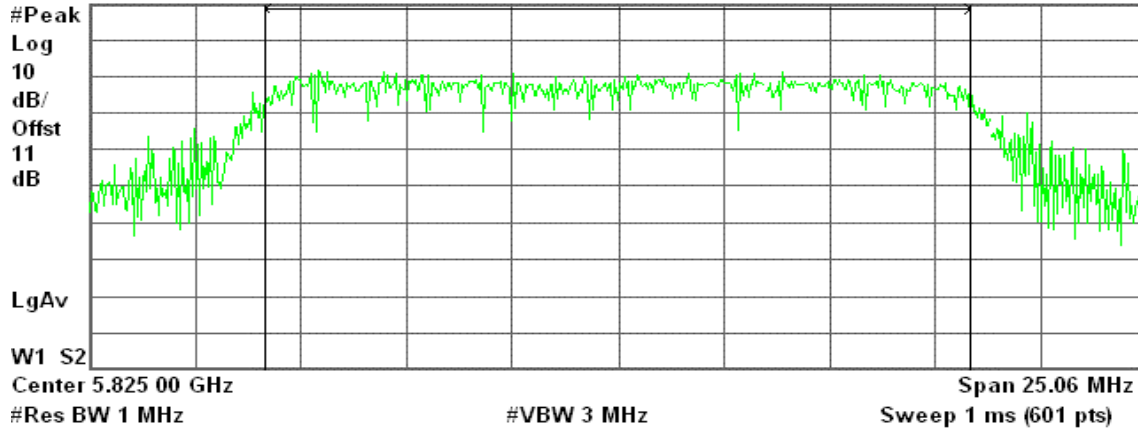
Agilent 16:26:13 Oct 3, 2005

R L

Peak Output Power , a Mode High Ch.

Ref 30 dBm

Atten 30 dB



Channel Power

19.63 dBm / 16.7040 MHz

Power Spectral Density

-52.60 dBm/Hz

IEEE 802.11a Turbo mode

CH Low

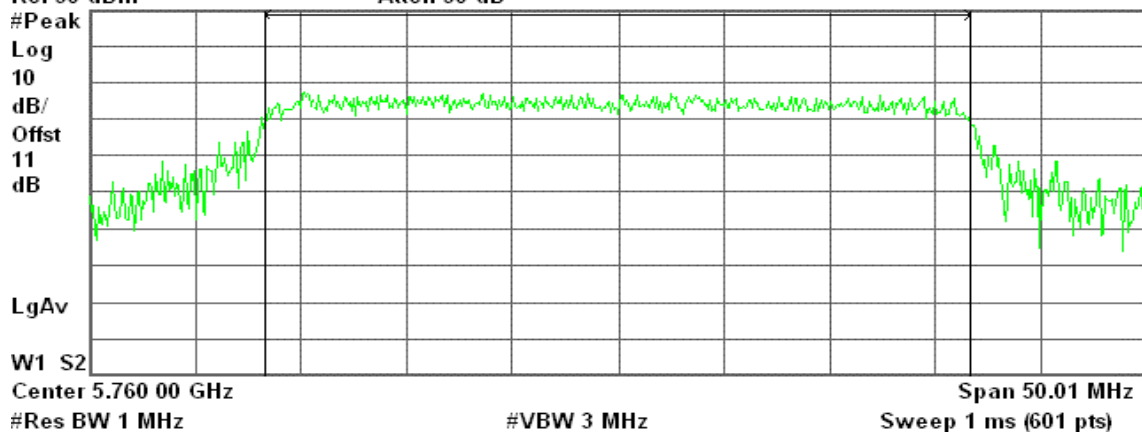
Agilent 16:49:58 Oct 3, 2005

R L

Peak Output Power , a turbo Mode Low Ch.

Ref 30 dBm

Atten 30 dB



Channel Power

19.30 dBm / 33.3420 MHz

Power Spectral Density

-55.93 dBm/Hz



CH High

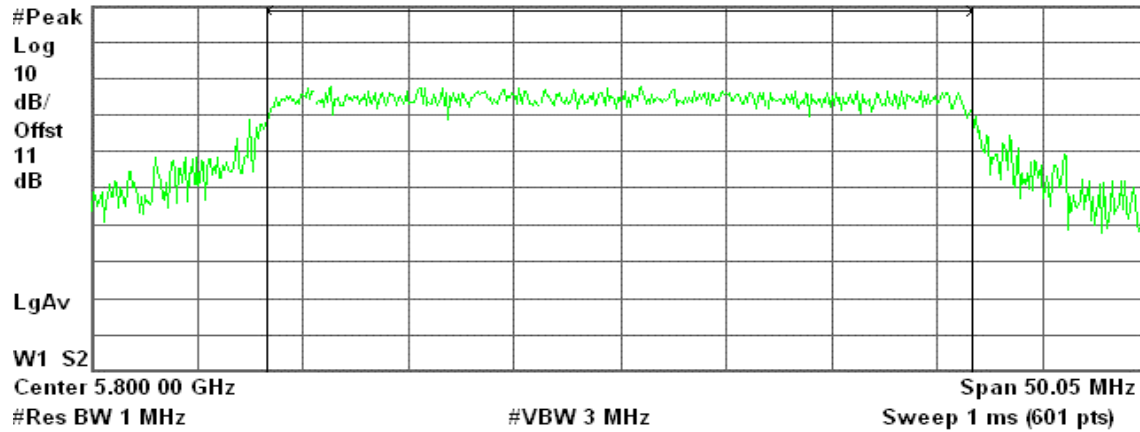
Agilent 16:42:39 Oct 3, 2005

R L

Peak Output Power , a turbo Mode High Ch.

Ref 30 dBm

Atten 30 dB



Channel Power

19.72 dBm / 33.3640 MHz

Power Spectral Density

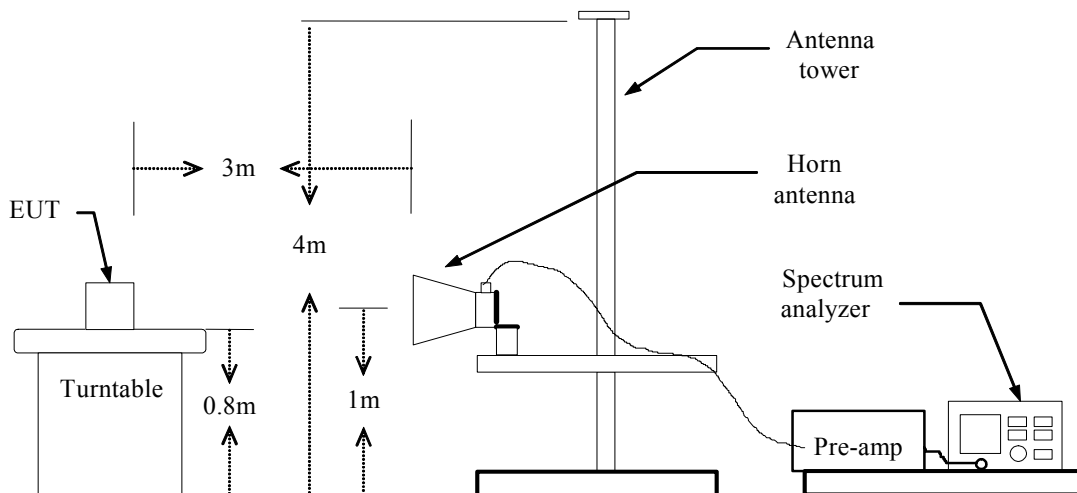
-55.52 dBm/Hz

7.3 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.

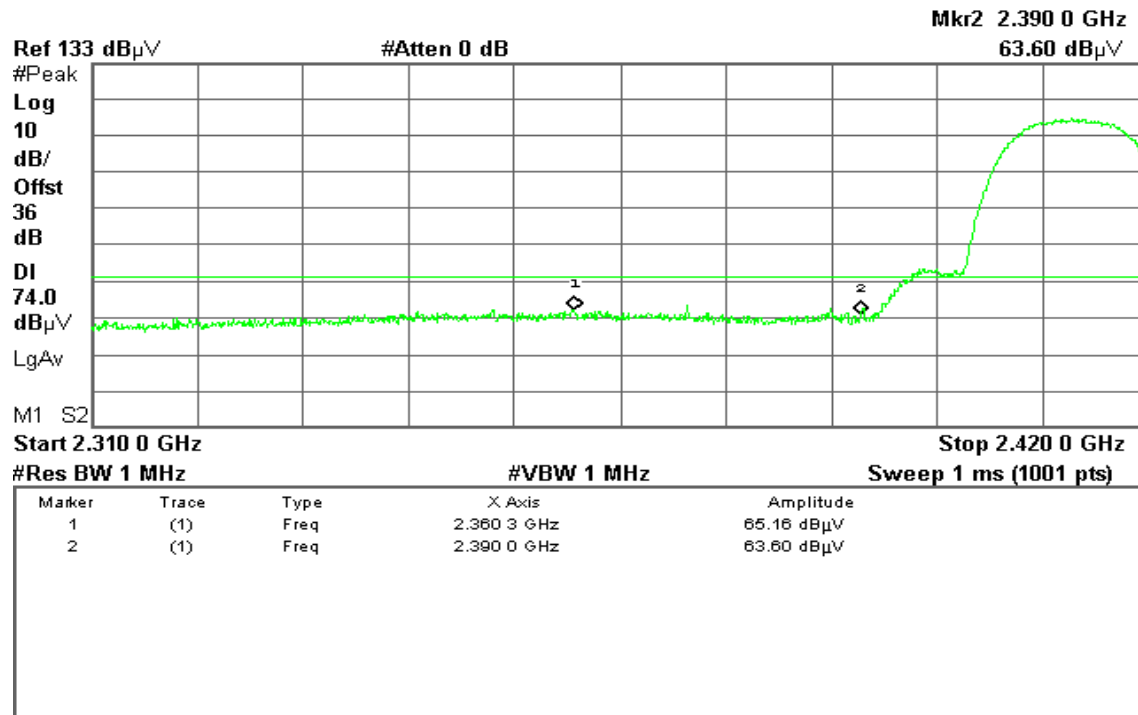
TEST RESULTS

Refer to attach spectrum analyzer data chart.

**Omnidirectional antenna / 12.0 dBi for 2.4 GHz****Band Edges (IEEE 802.11b Base mode / CH Low)****Detector mode: Peak****Polarity: Vertical**

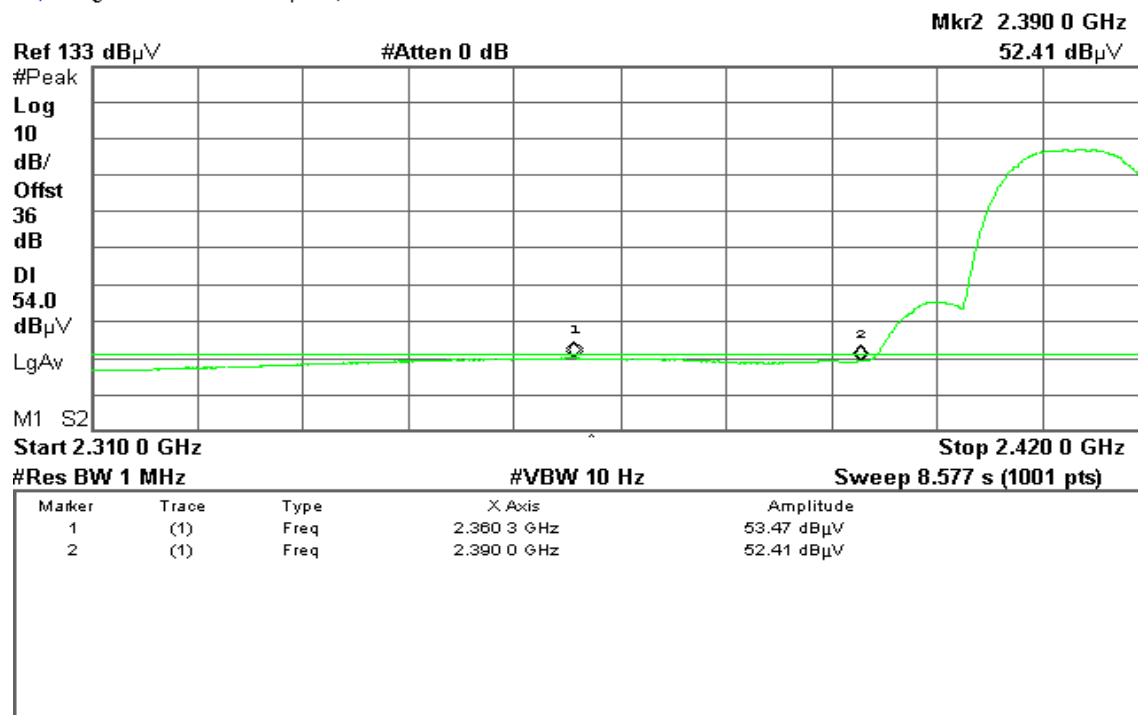
* Agilent 14:16:21 Sep 17, 2005

T

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

* Agilent 14:15:50 Sep 17, 2005

R T



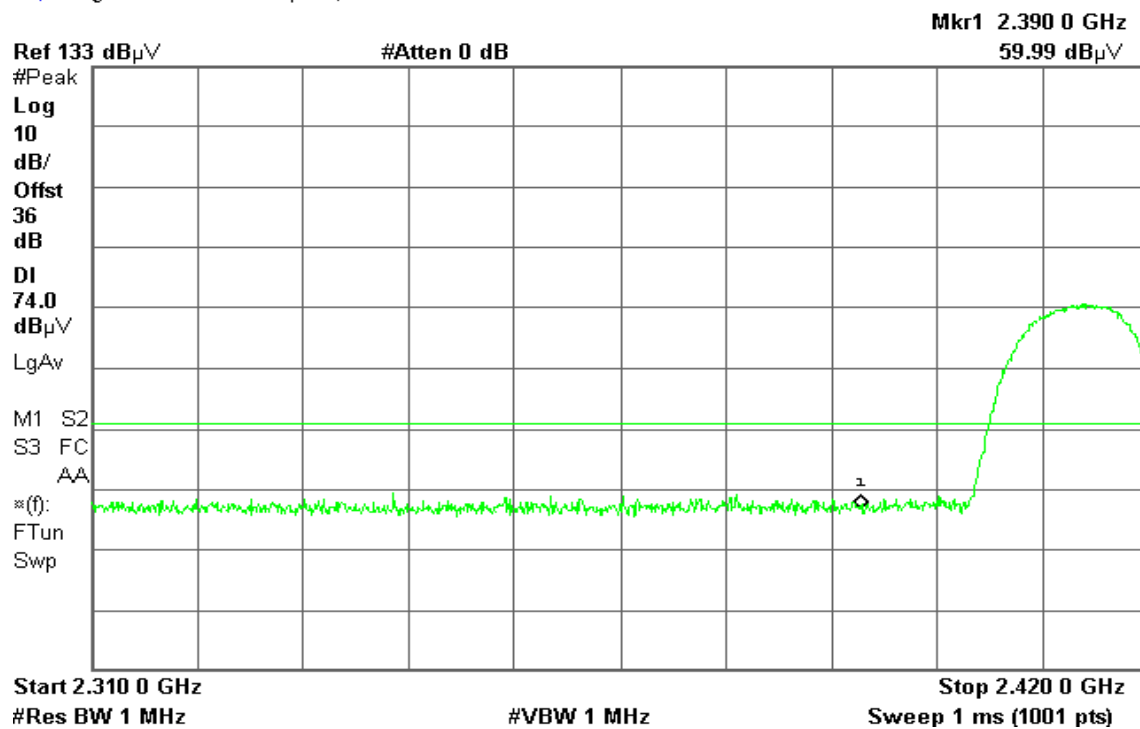


Detector mode: Peak

Polarity: Horizontal

Agilent 15:42:46 Sep 17, 2005

R L

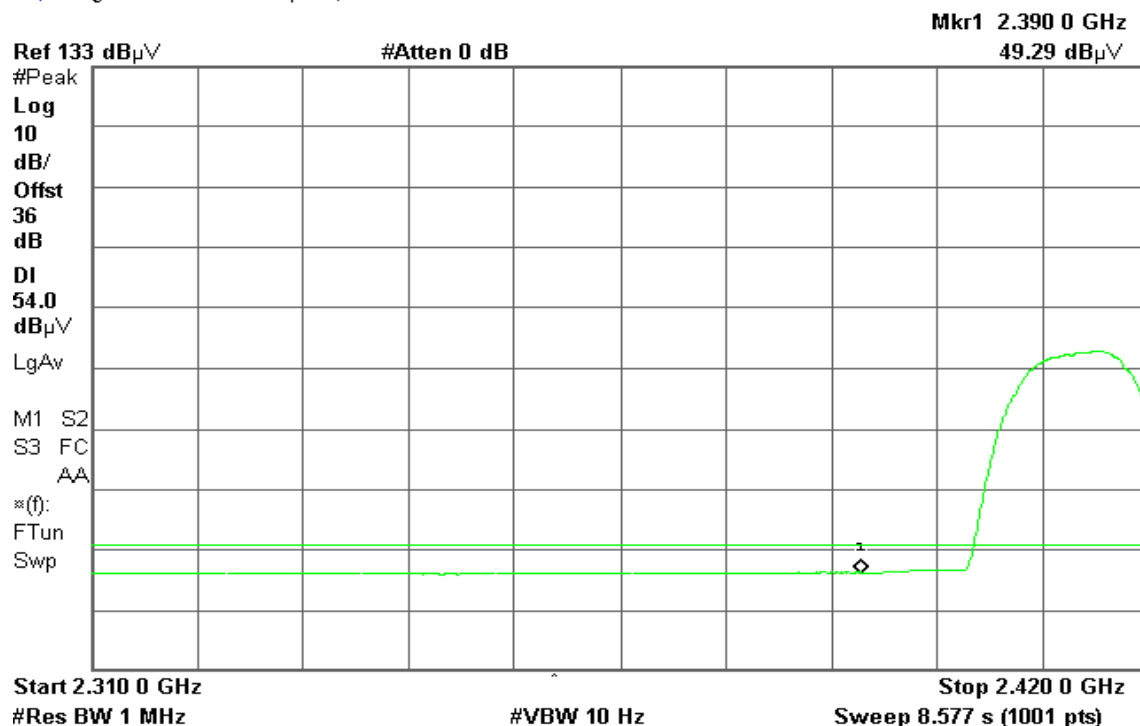


Detector mode: Average

Polarity: Horizontal

Agilent 15:42:03 Sep 17, 2005

T





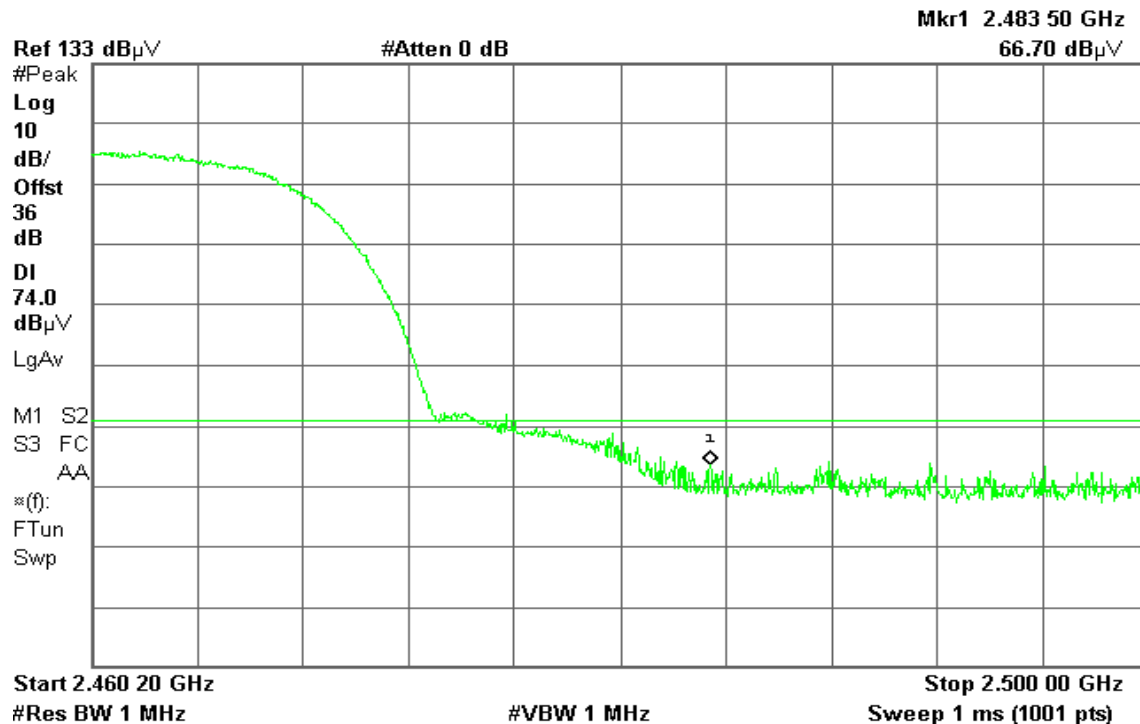
Band Edges (IEEE 802.11b Base mode / CH High)

Detector mode: Peak

Polarity: Vertical

Agilent 14:33:36 Sep 17, 2005

T

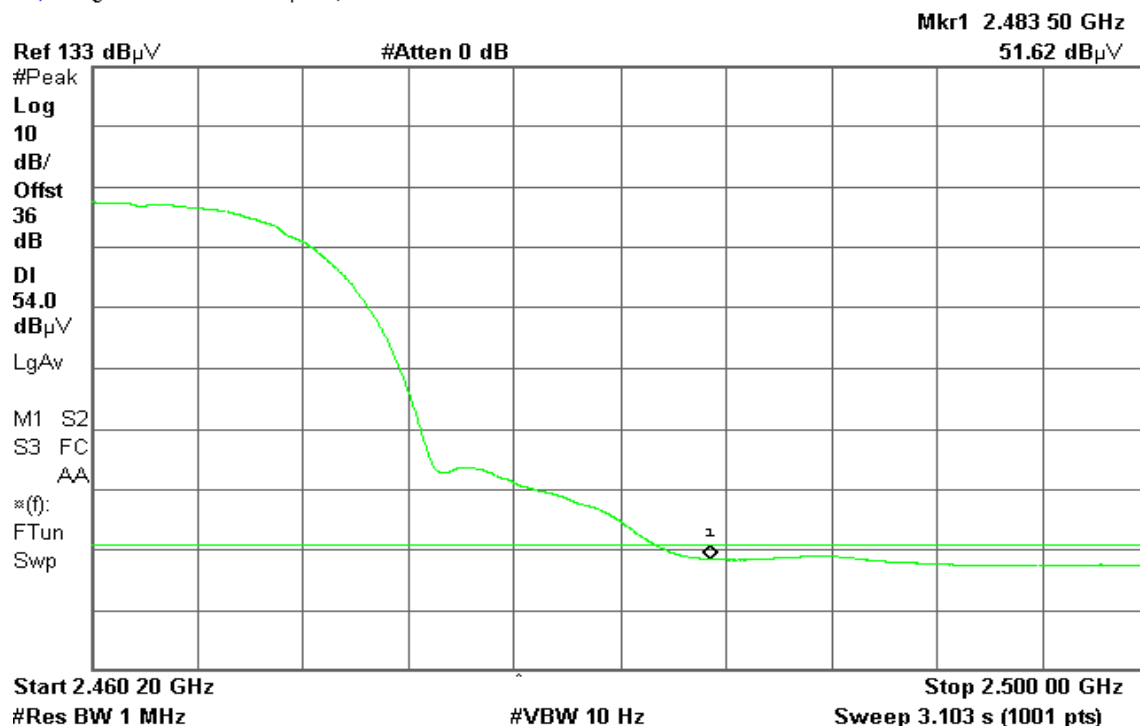


Detector mode: Average

Polarity: Vertical

Agilent 14:30:08 Sep 17, 2005

T



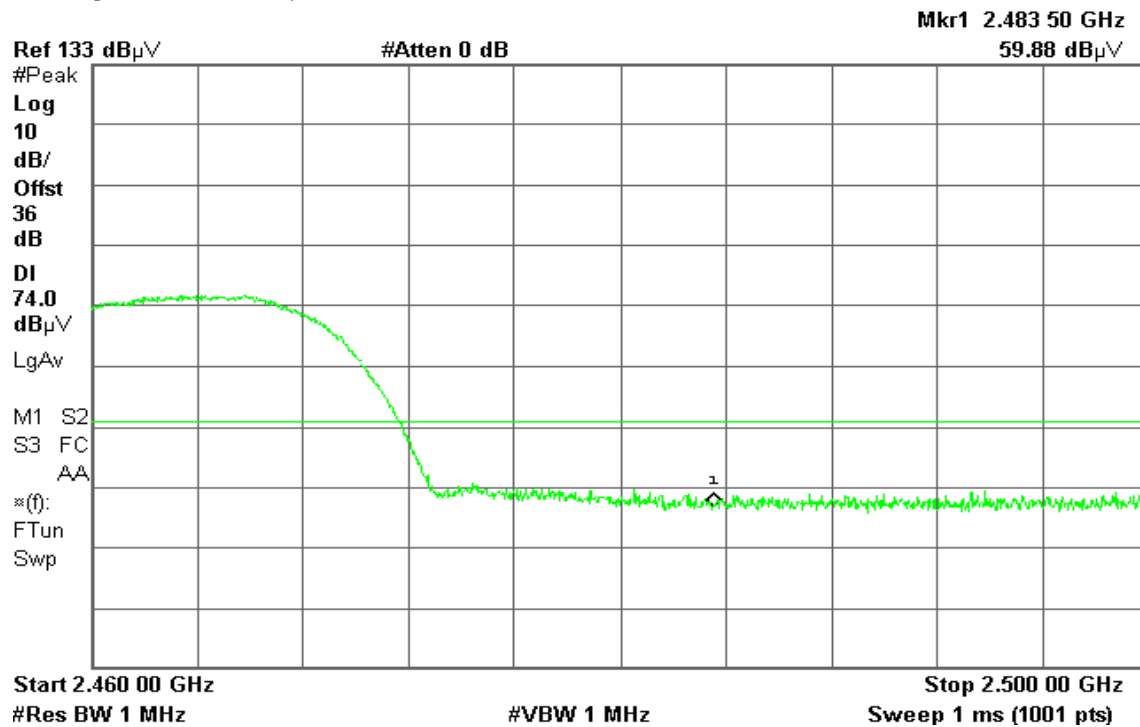


Detector mode: Peak

Polarity: Horizontal

Agilent 15:47:42 Sep 17, 2005

T

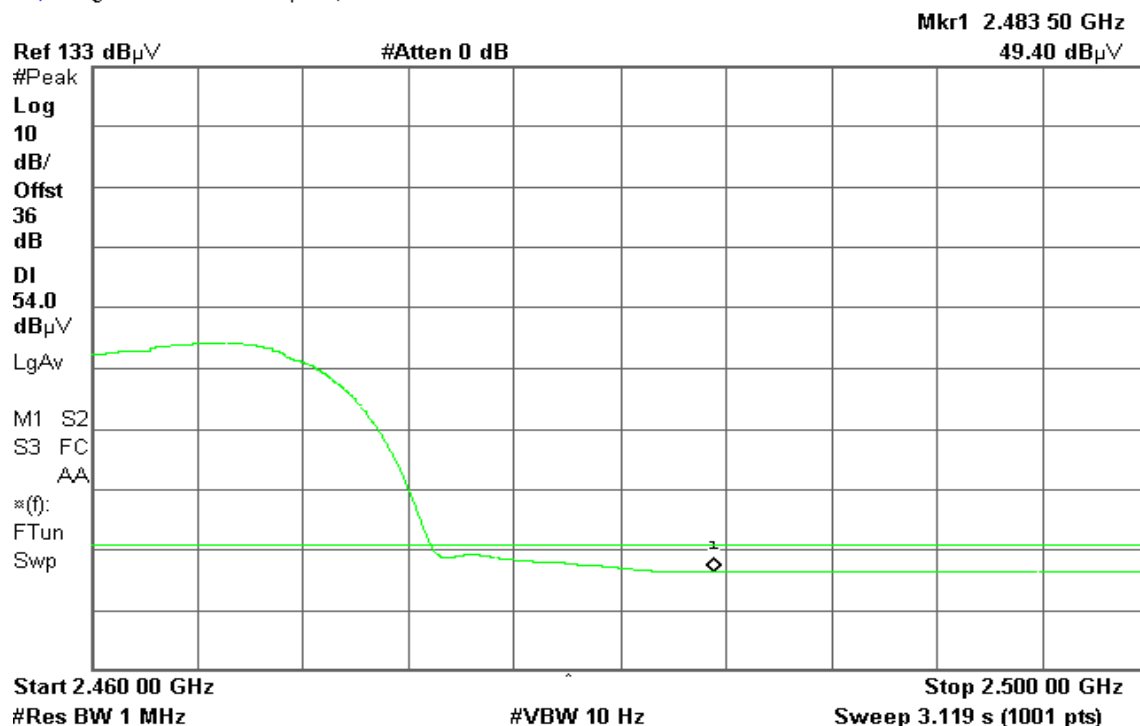


Detector mode: Average

Polarity: Horizontal

Agilent 15:46:39 Sep 17, 2005

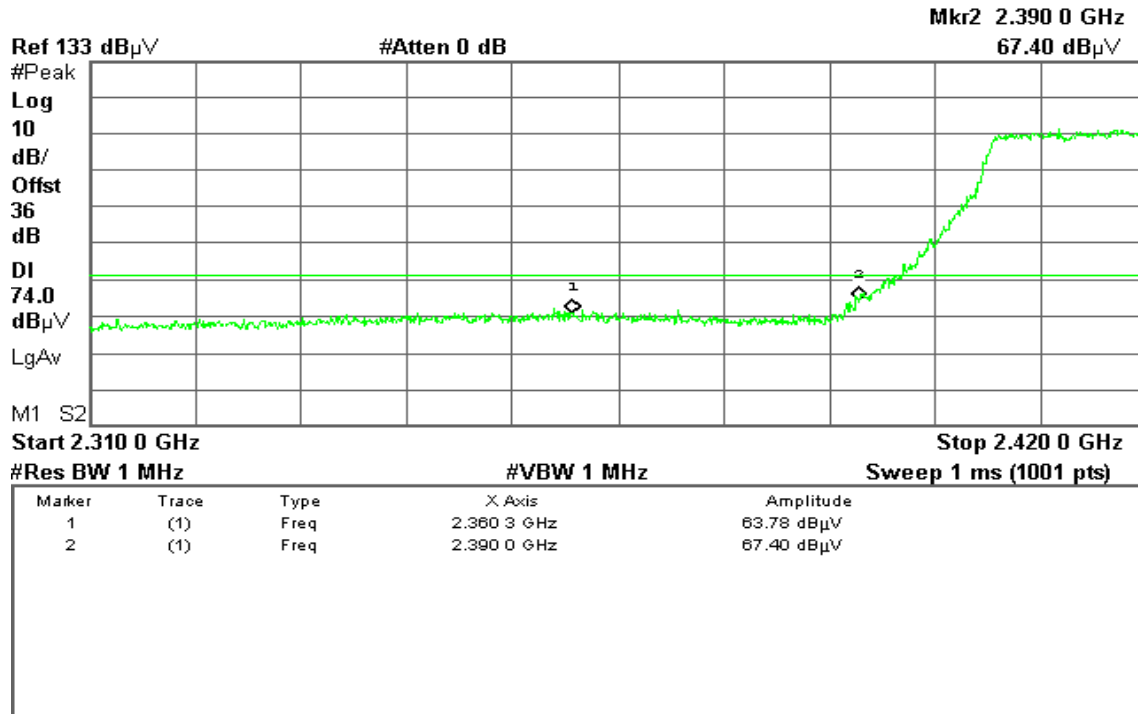
T



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

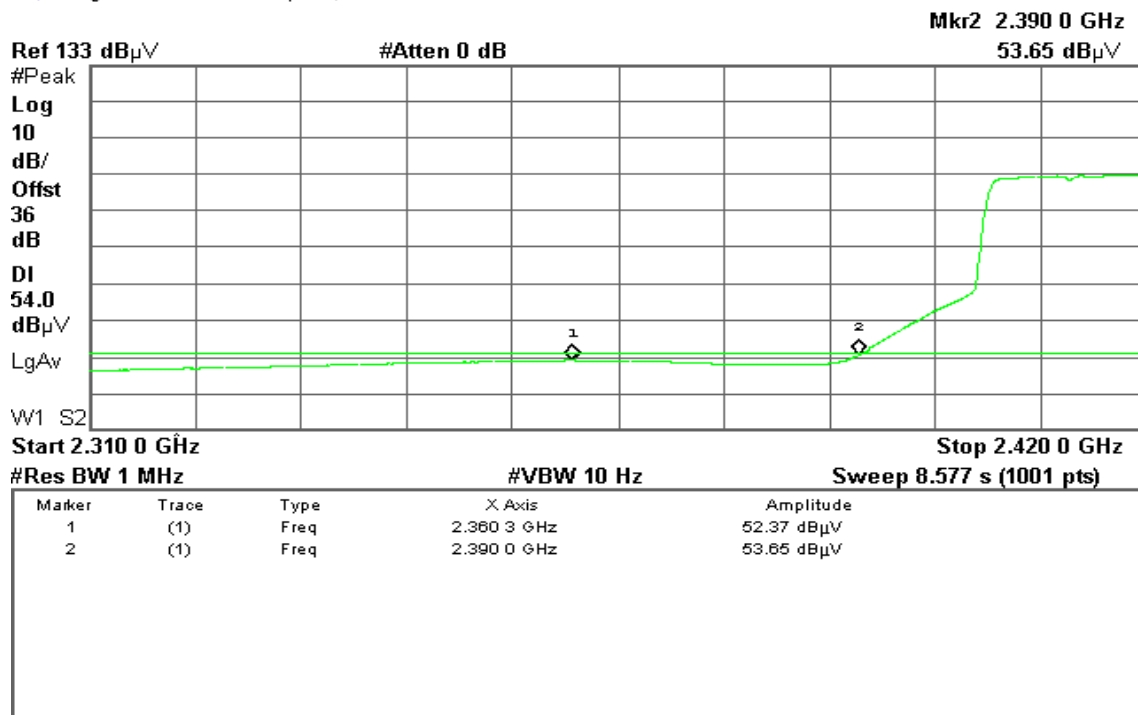
* Agilent 14:20:14 Sep 17, 2005

T

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

* Agilent 14:19:44 Sep 17, 2005

T



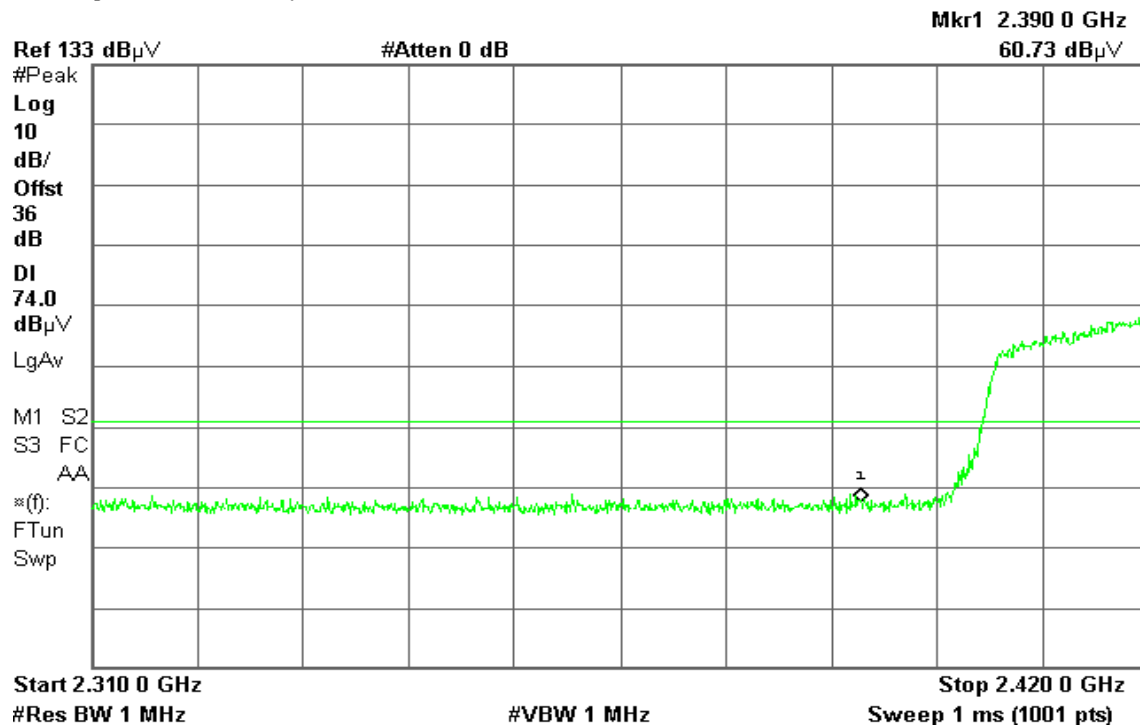


Detector mode: Peak

Polarity: Horizontal

Agilent 15:41:00 Sep 17, 2005

T

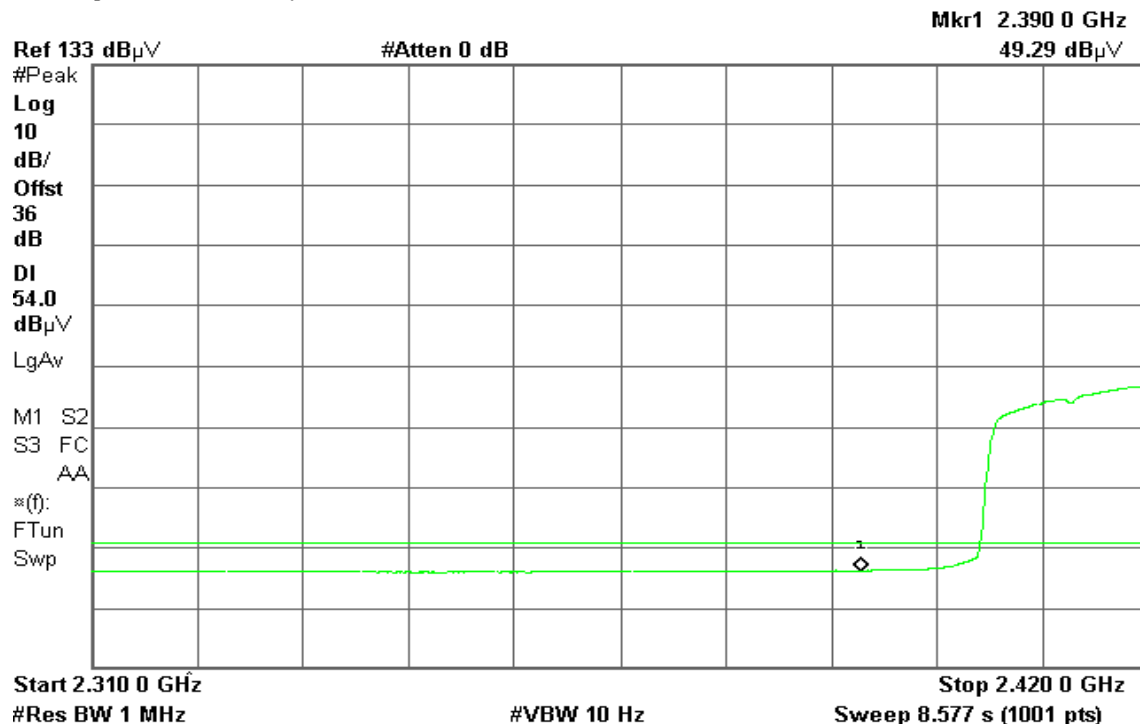


Detector mode: Average

Polarity: Horizontal

Agilent 15:40:34 Sep 17, 2005

T





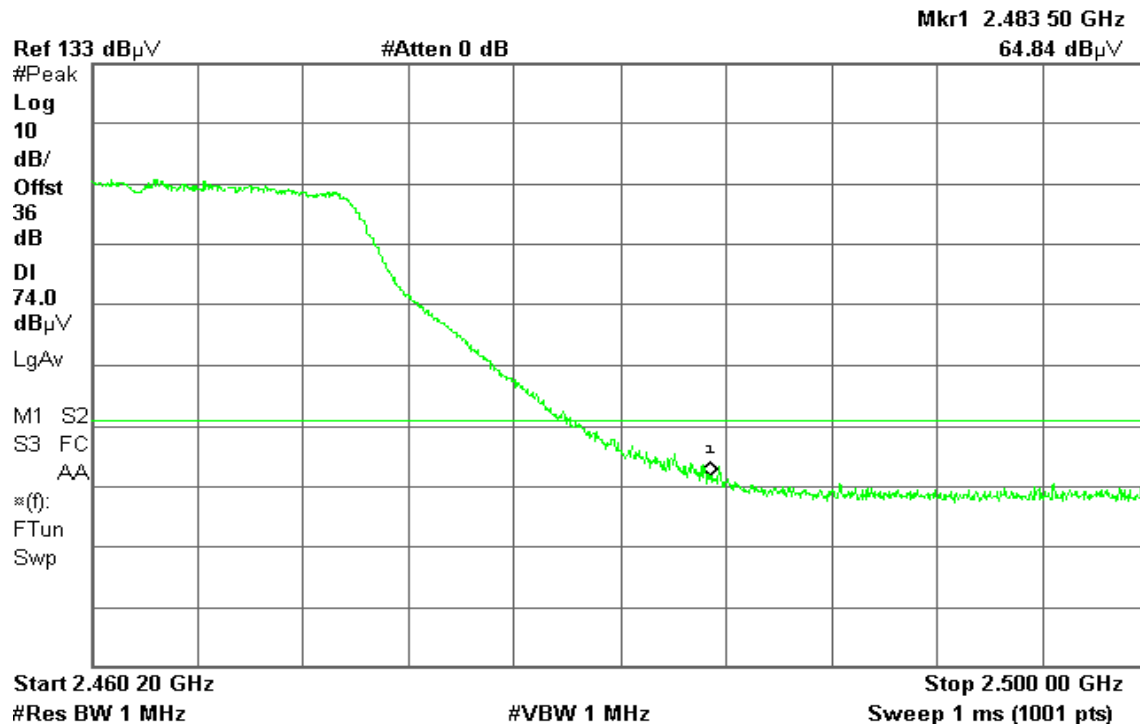
Band Edges (IEEE 802.11g Base mode / CH High)

Detector mode: Peak

Polarity: Vertical

Agilent 14:42:17 Sep 17, 2005

T

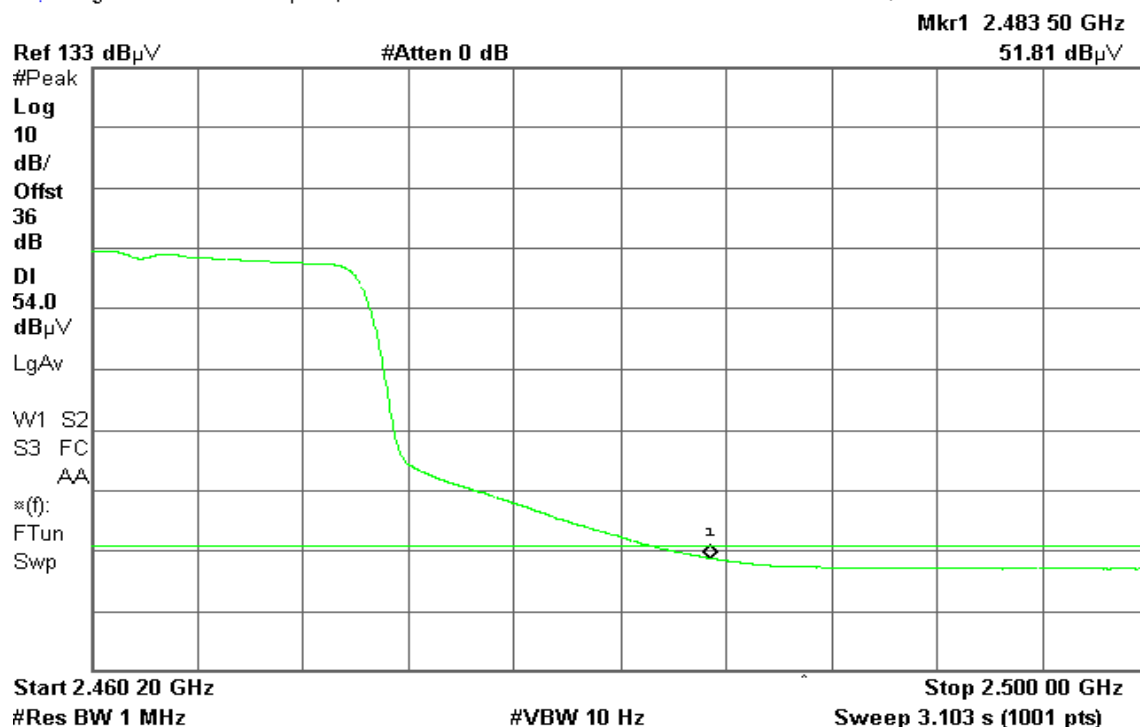


Detector mode: Average

Polarity: Vertical

Agilent 14:40:05 Sep 17, 2005

T



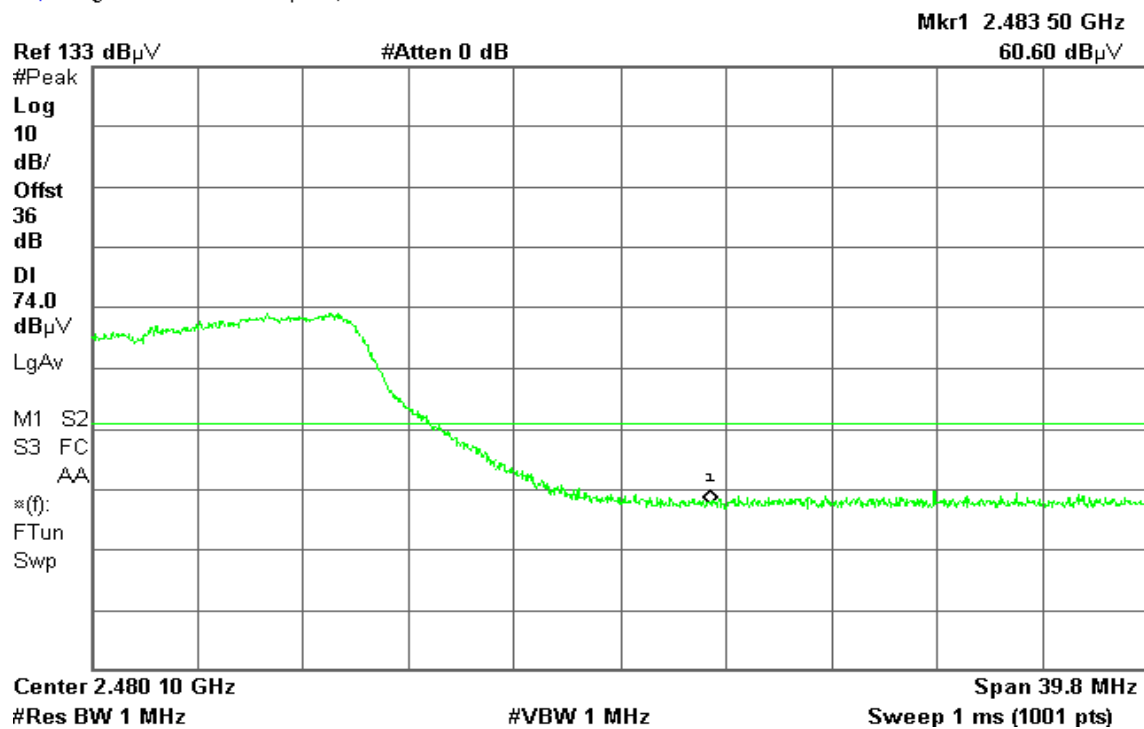


Detector mode: Peak

Polarity: Horizontal

Agilent 15:07:19 Sep 17, 2005

T

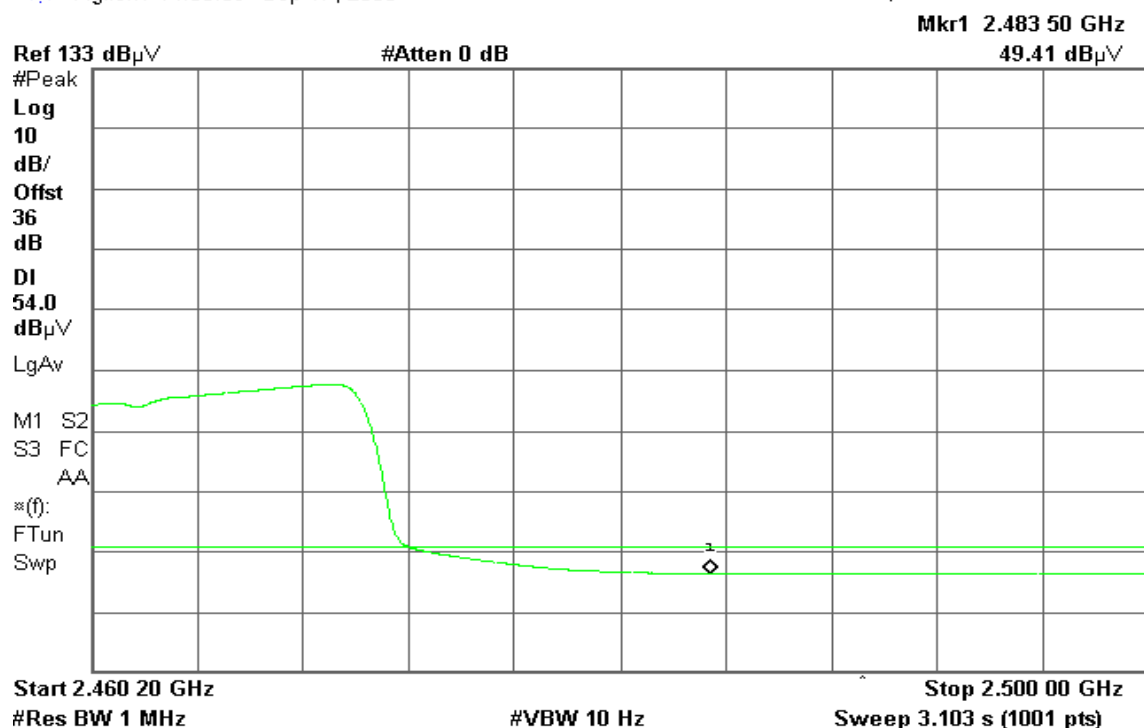


Detector mode: Average

Polarity: Horizontal

Agilent 14:56:09 Sep 17, 2005

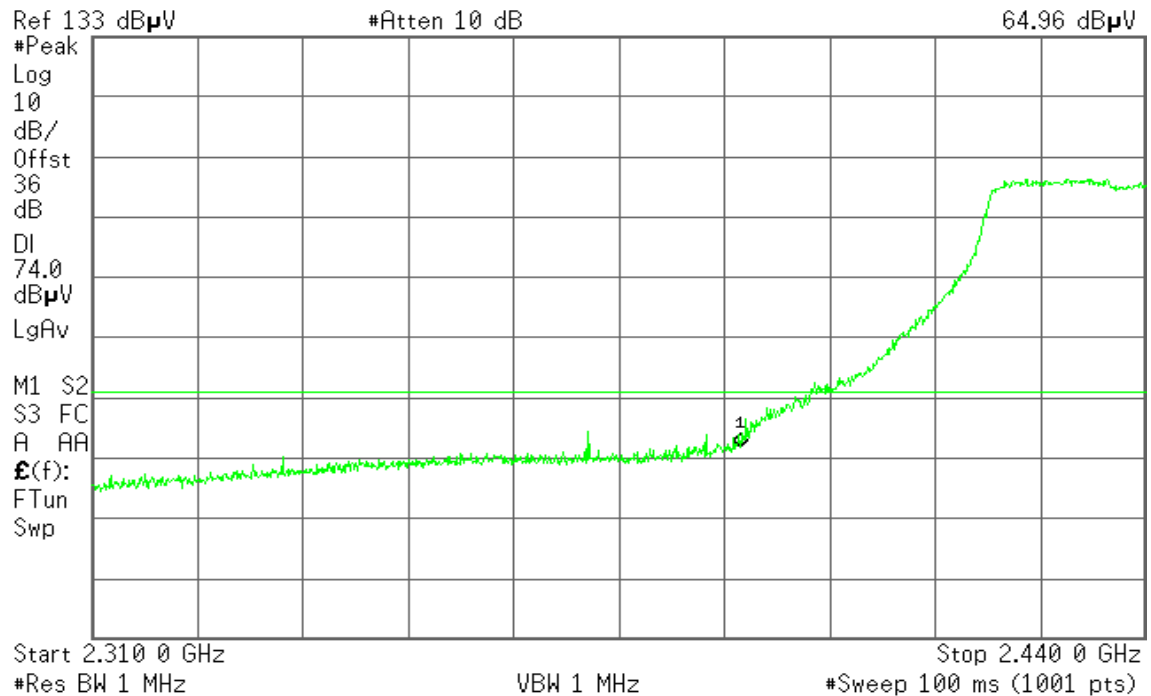
T



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

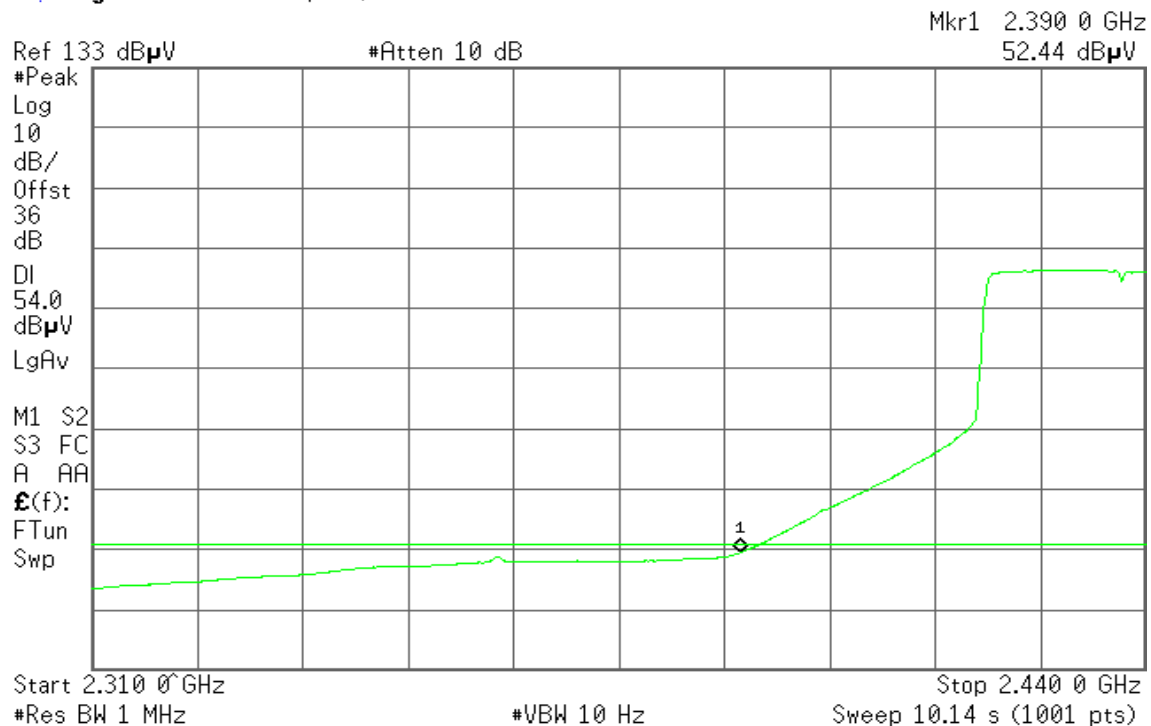
Agilent 15:30:47 Sep 24, 2005

T

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

Agilent 15:31:21 Sep 24, 2005

T





Detector mode: Peak

Polarity: Horizontal

Agilent 15:37:26 Sep 24, 2005

T

Mkr1 2.390 0 GHz
54.73 dB μ V

Ref 133 dB μ V

#Atten 10 dB

#Peak

Log

10

dB/

Offst

36

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 2.440 0 GHz

Sweep 1 ms (1001 pts)

Detector mode: Average

Polarity: Horizontal

Agilent 15:37:14 Sep 24, 2005

T

Mkr1 2.390 0 GHz
44.93 dB μ V

Ref 133 dB μ V

#Atten 10 dB

#Peak

Log

10

dB/

Offst

36

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

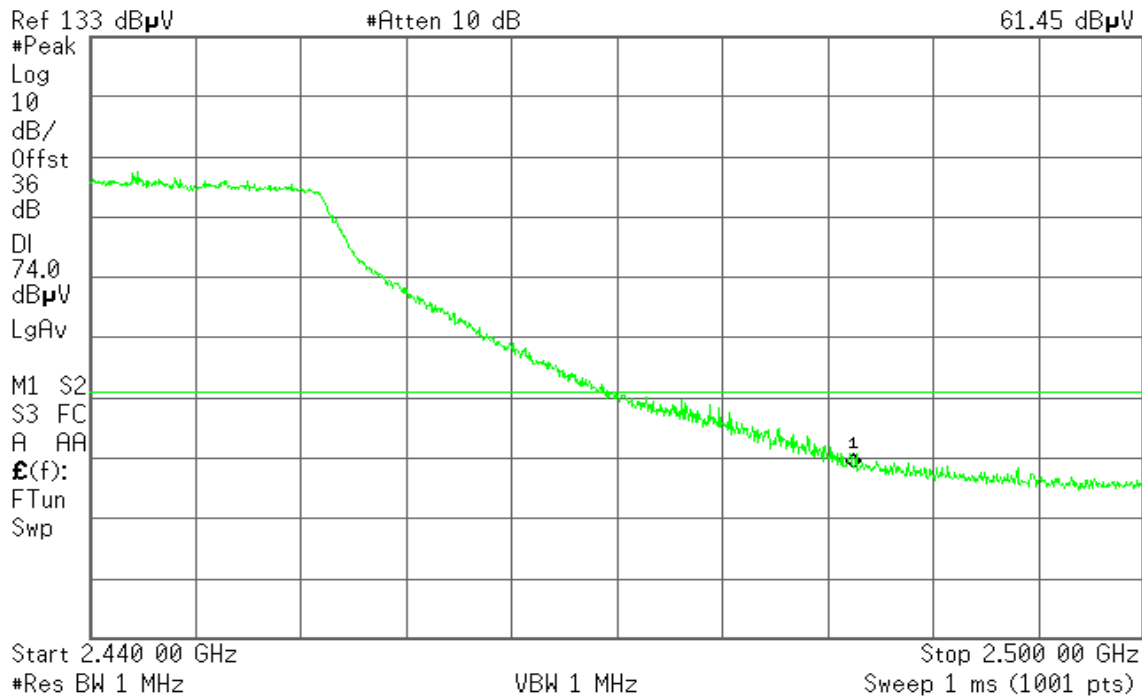
Stop 2.440 0 GHz

Sweep 10.14 s (1001 pts)

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

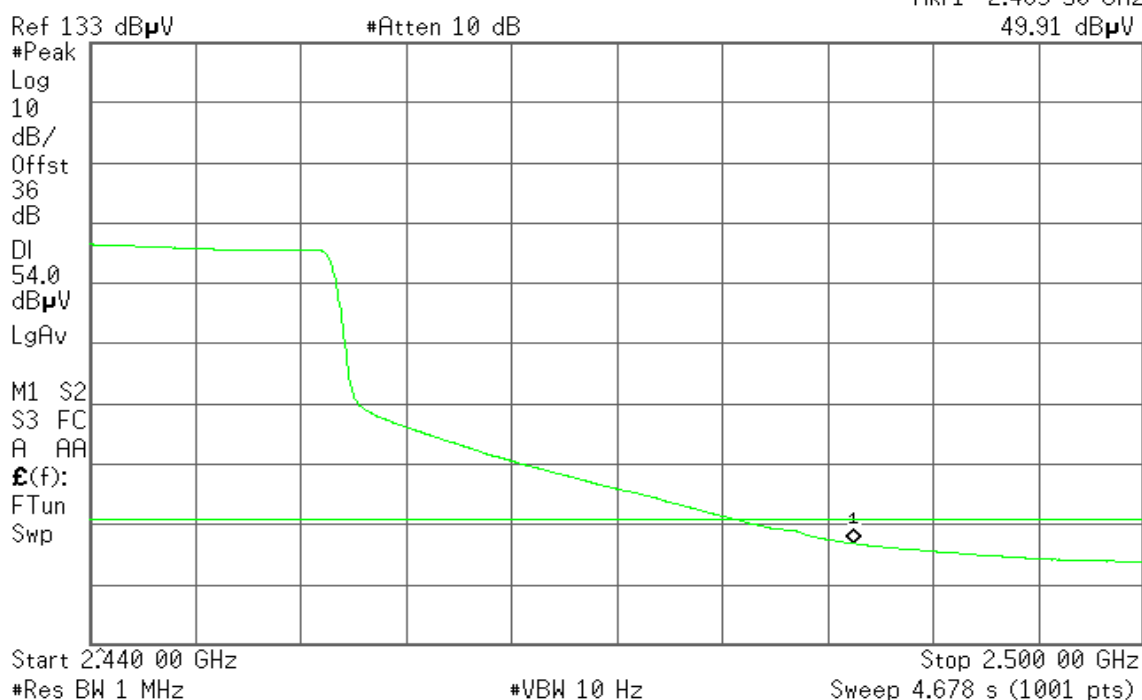
* Agilent 15:40:25 Sep 24, 2005

T

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

* Agilent 15:40:52 Sep 24, 2005

T

Mkr1 2.483 50 GHz
49.91 dB μ V



Detector mode: Peak

Polarity: Horizontal

Agilent 15:36:13 Sep 24, 2005

T

Mkr1 2.483 50 GHz
55.66 dB μ V

Ref 133 dB μ V

#Atten 10 dB

#Peak

Log

10

dB/

Offst

36

dB

DI

74.0

dB μ V

LgAv

M1 S2

S3 FC

A AA

$\mathcal{E}(f)$:

FTun

Swp

Start 2.440 00 GHz

#Res BW 1 MHz

VBW 1 MHz

Stop 2.500 00 GHz

Sweep 1 ms (1001 pts)

Detector mode: Average

Polarity: Horizontal

Agilent 15:36:37 Sep 24, 2005

T

Mkr1 2.483 50 GHz
44.68 dB μ V

Ref 133 dB μ V

#Atten 10 dB

#Peak

Log

10

dB/

Offst

36

dB

DI

54.0

dB μ V

LgAv

M1 S2

S3 FC

A AA

$\mathcal{E}(f)$:

FTun

Swp

Start 2.440 00 GHz

#Res BW 1 MHz

#VBW 10 Hz

Stop 2.500 00 GHz

Sweep 4.678 s (1001 pts)



Omnidirectional Panel antenna / 3.0 dBi for 2.4 GHz and 5 GHz

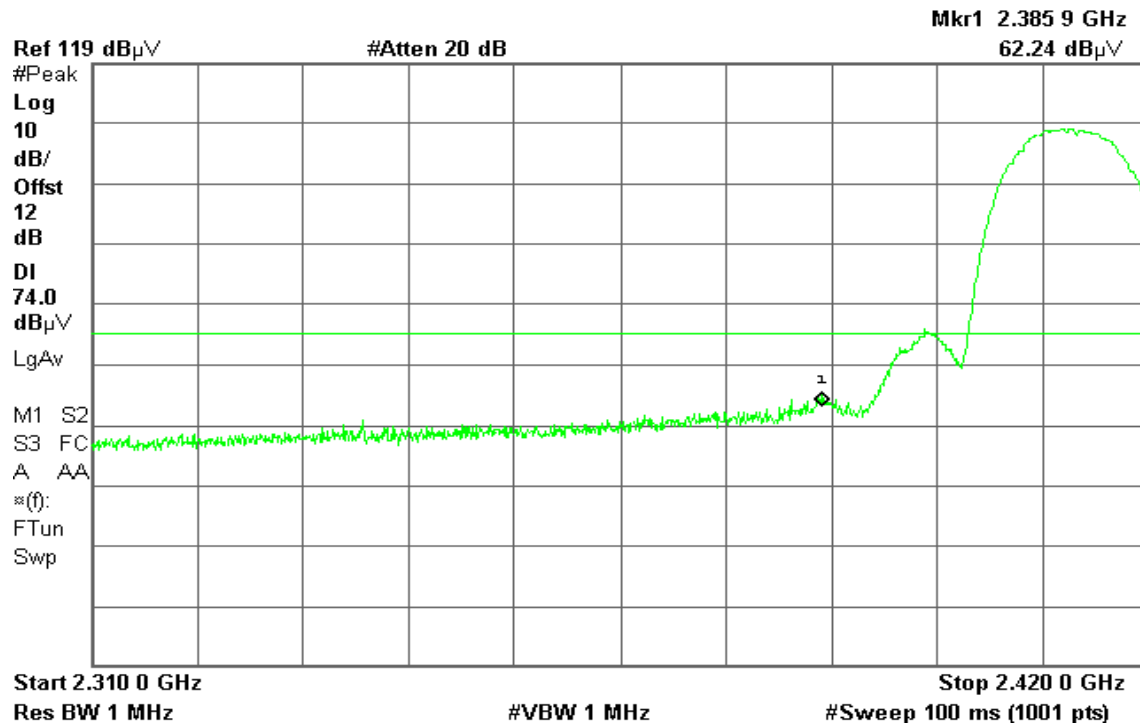
Band Edges (IEEE 802.11b Base mode / CH Low)

Detector mode: Peak

Polarity: Vertical

Agilent 13:39:25 Sep 14, 2005

T

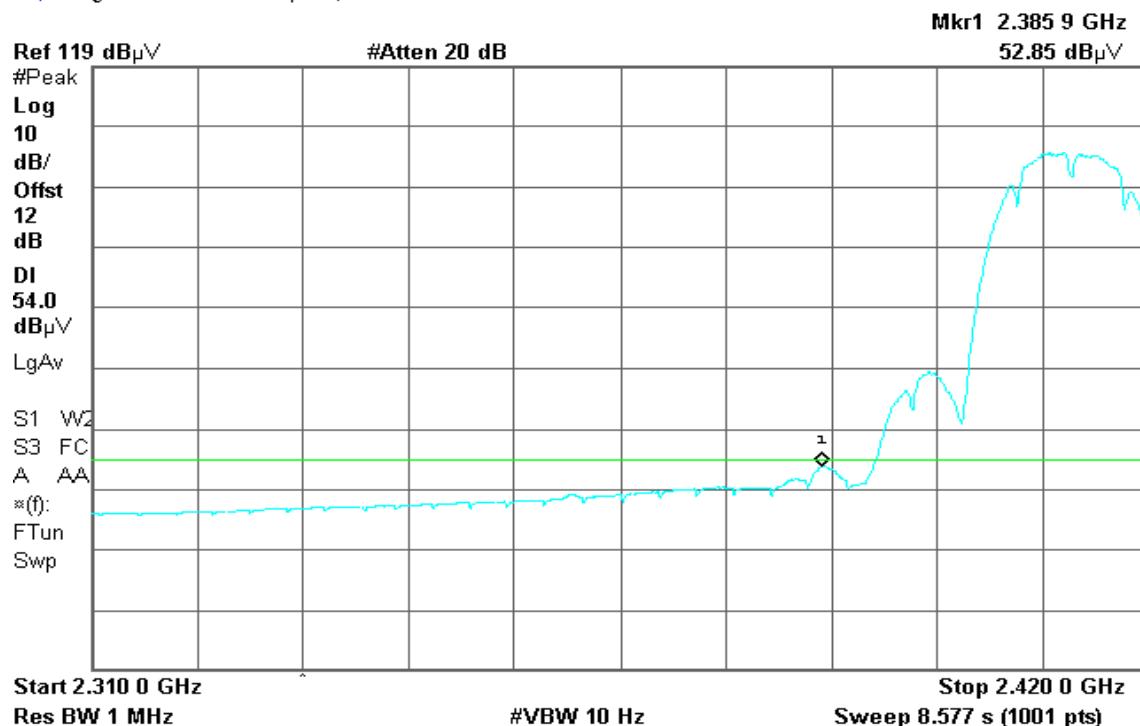


Detector mode: Average

Polarity: Vertical

Agilent 13:25:02 Sep 14, 2005

R T



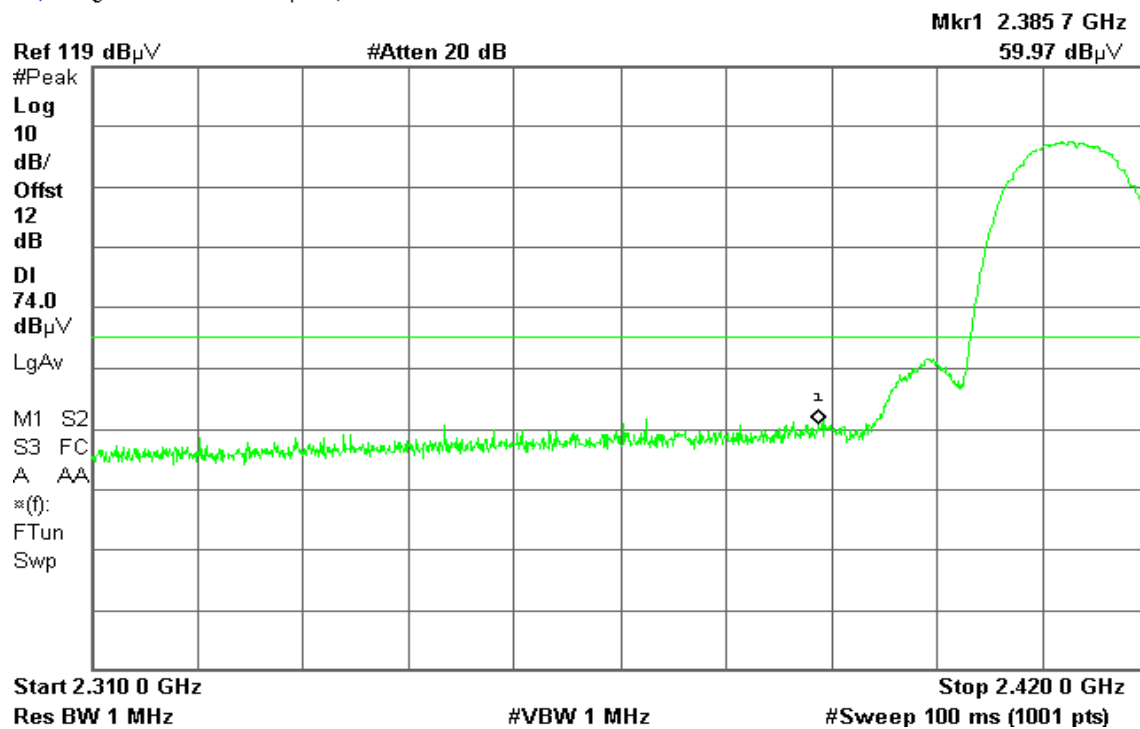


Detector mode: Peak

Polarity: Horizontal

Agilent 13:55:45 Sep 14, 2005

T

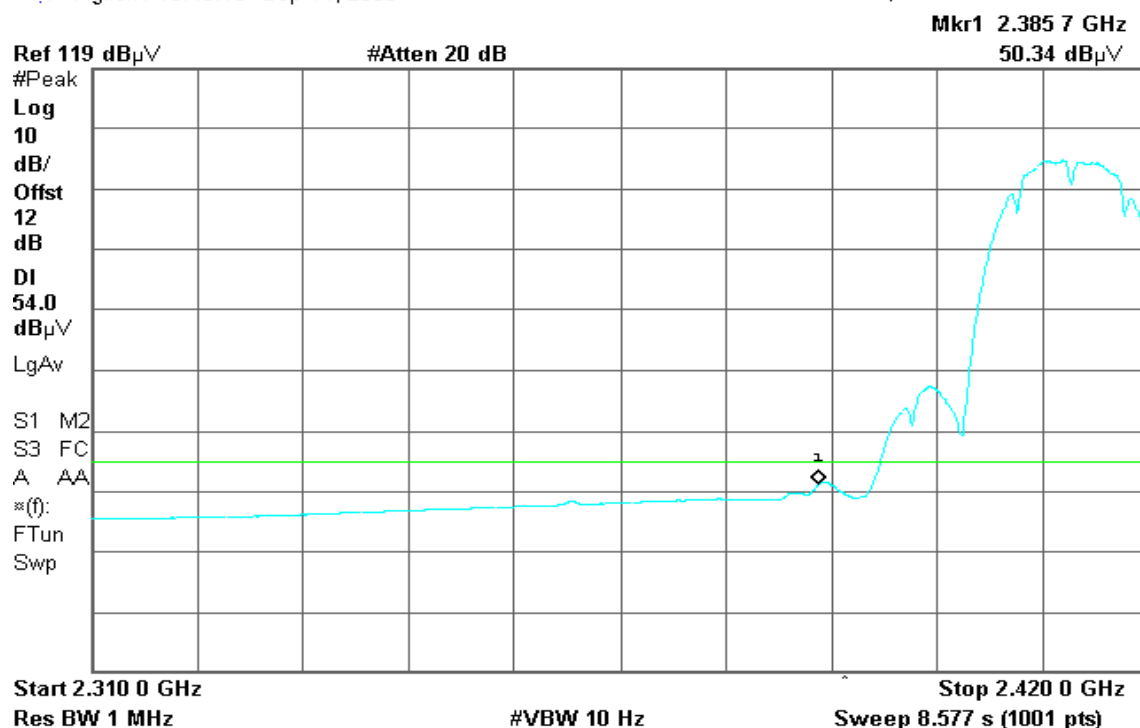


Detector mode: Average

Polarity: Horizontal

Agilent 13:48:13 Sep 14, 2005

T





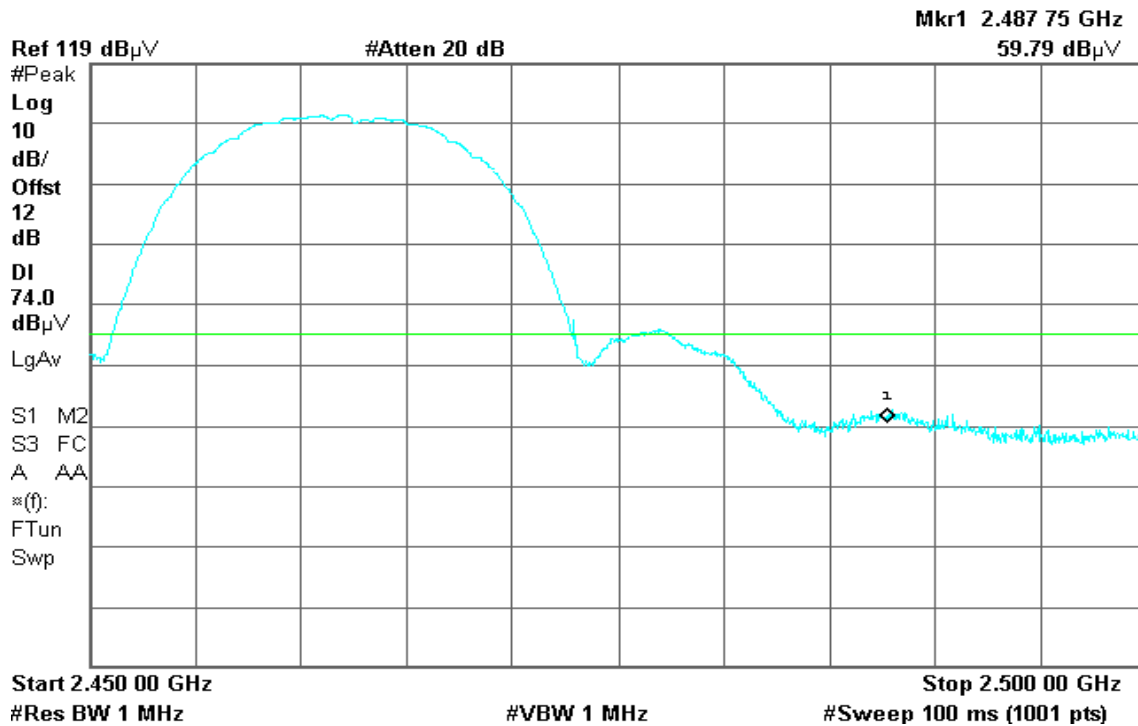
Band Edges (IEEE 802.11b Base mode / CH High)

Detector mode: Peak

Polarity: Vertical

Agilent 14:08:55 Sep 14, 2005

T

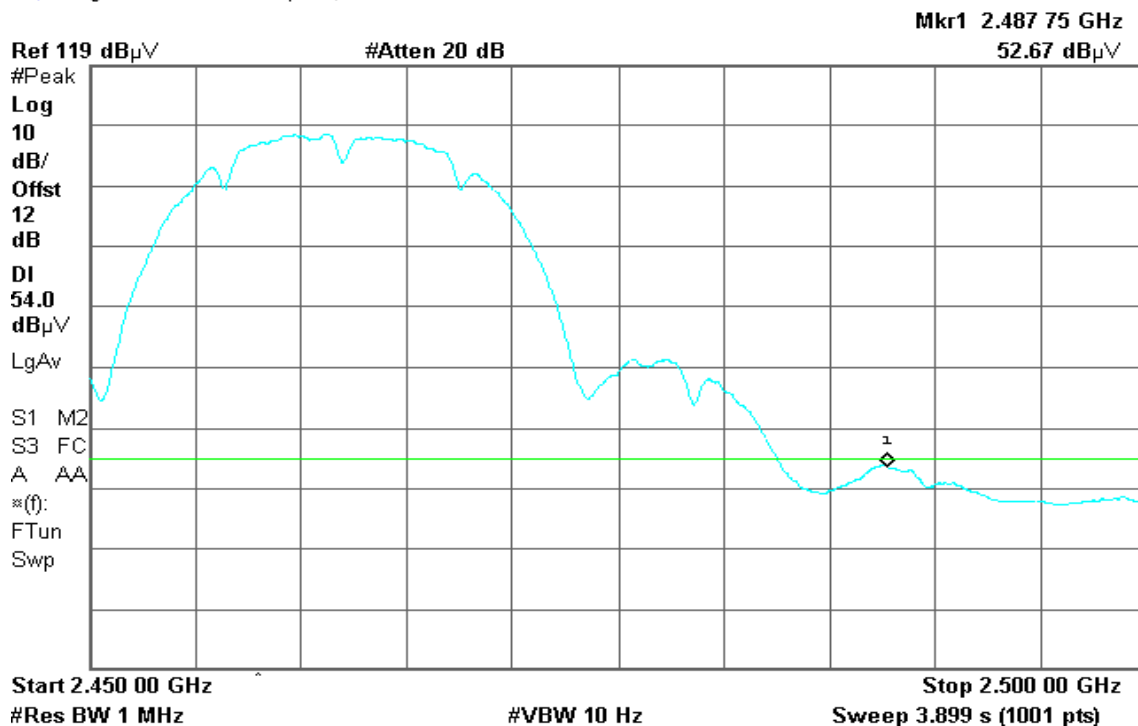


Detector mode: Average

Polarity: Vertical

Agilent 14:07:58 Sep 14, 2005

T





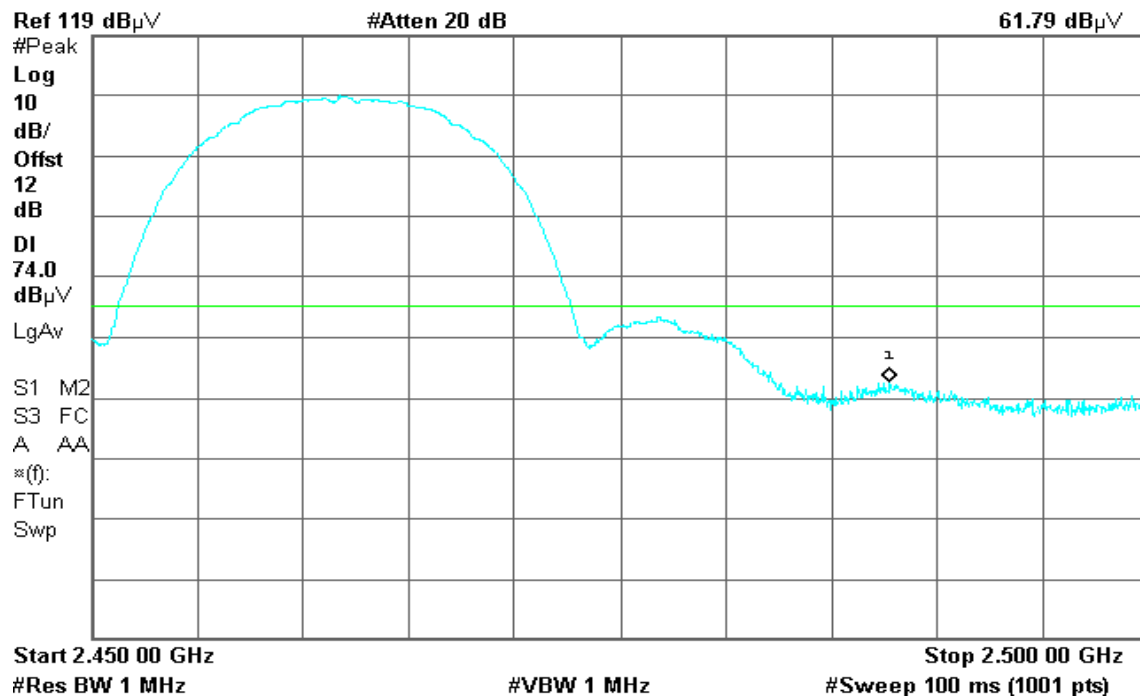
Detector mode: Peak

Polarity: Horizontal

Agilent 14:16:05 Sep 14, 2005

T

Mkr1 2.487 75 GHz
61.79 dB μ V



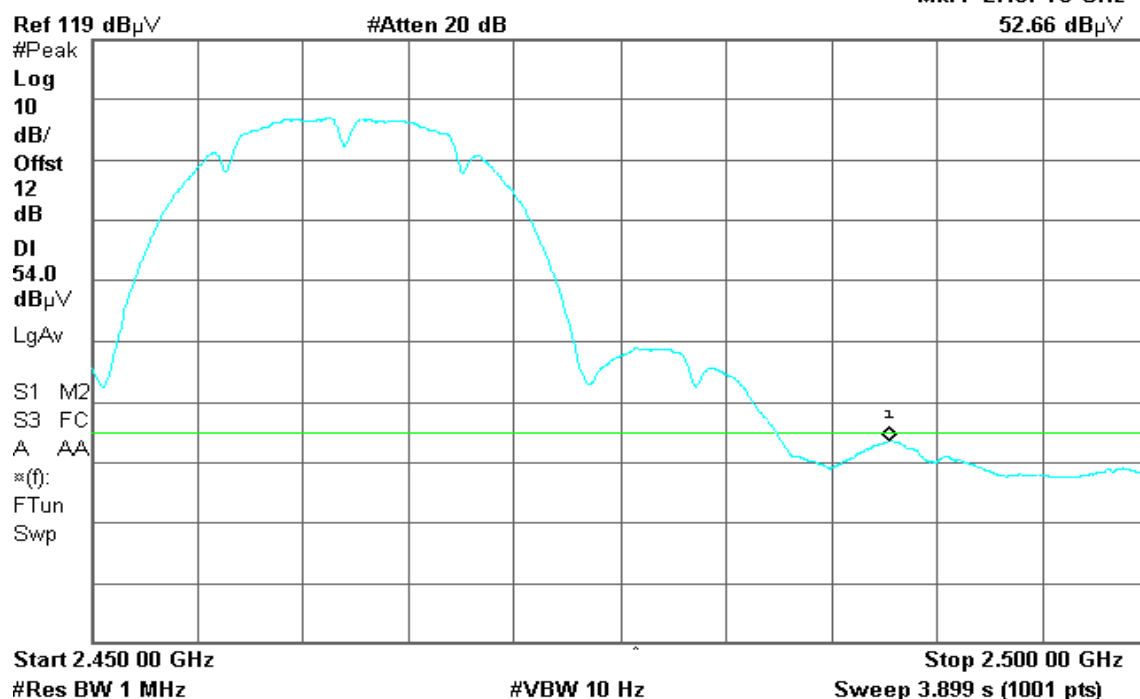
Detector mode: Average

Polarity: Horizontal

Agilent 14:14:32 Sep 14, 2005

T

Mkr1 2.487 75 GHz
52.66 dB μ V





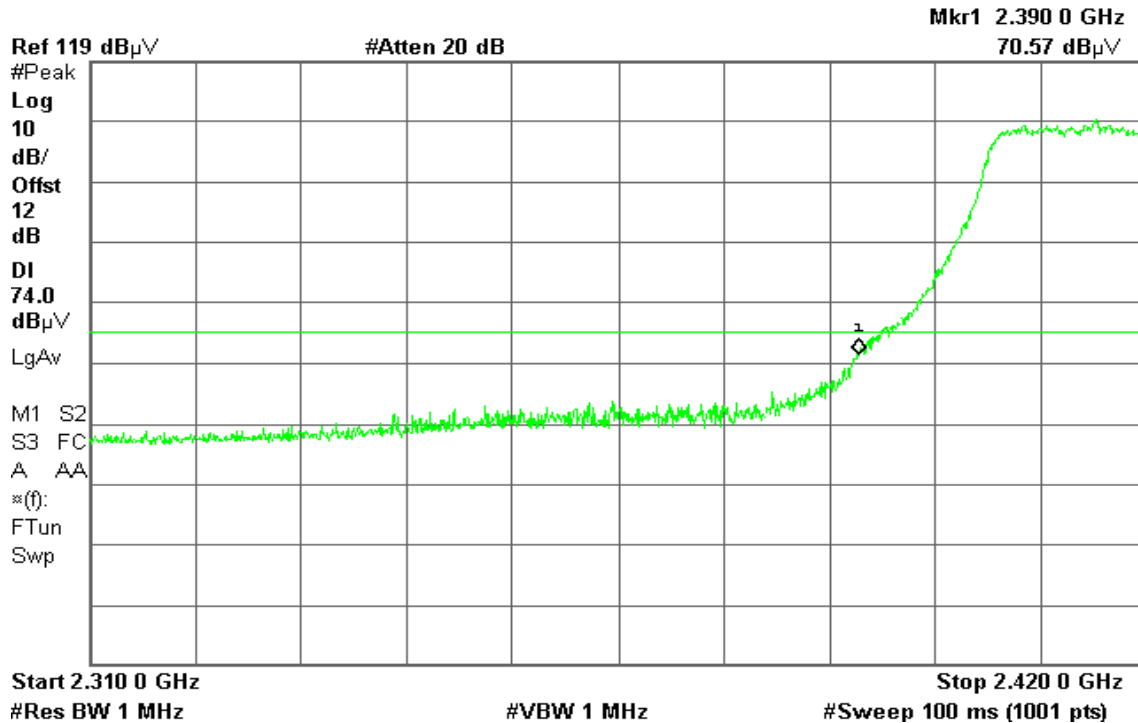
Band Edges (IEEE 802.11g Base mode / CH Low)

Detector mode: Peak

Polarity: Vertical

Agilent 11:39:57 Sep 14, 2005

T

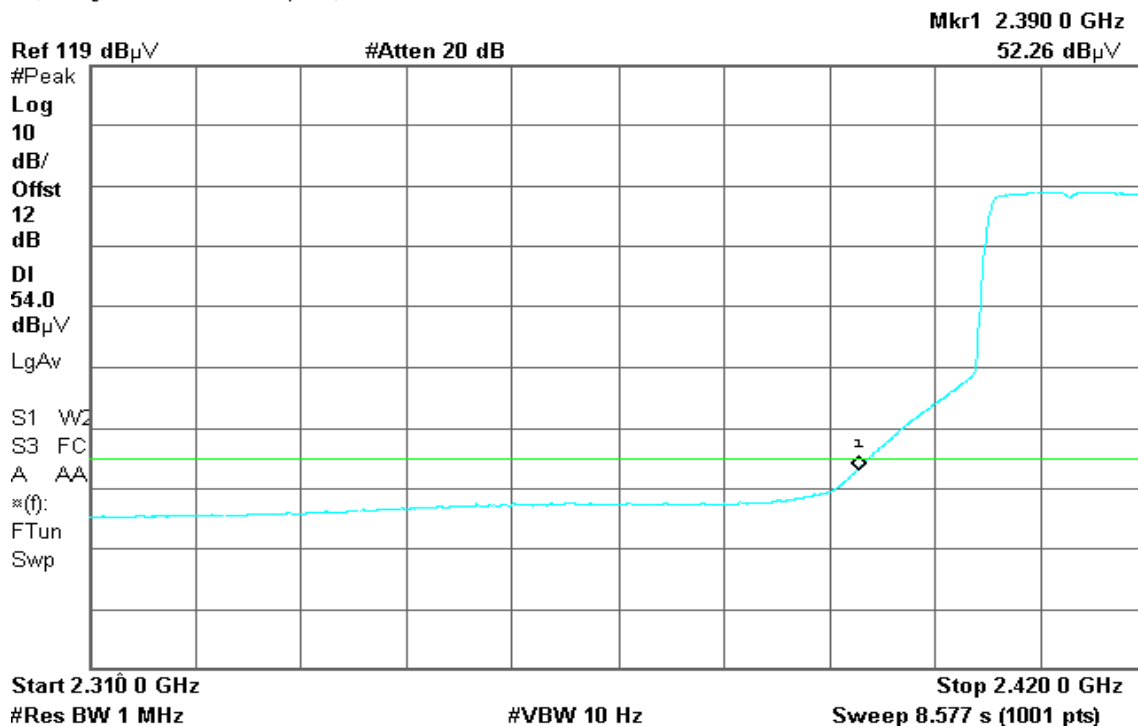


Detector mode: Average

Polarity: Vertical

Agilent 11:36:56 Sep 14, 2005

R T



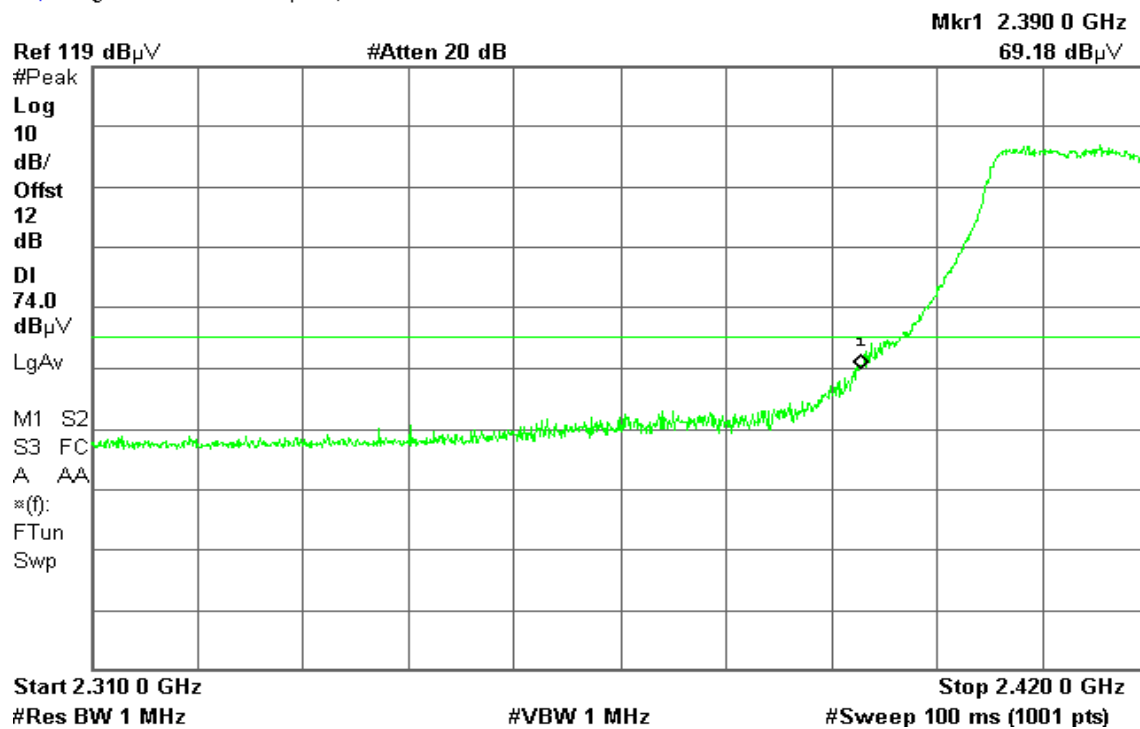


Detector mode: Peak

Polarity: Horizontal

Agilent 11:44:30 Sep 14, 2005

T

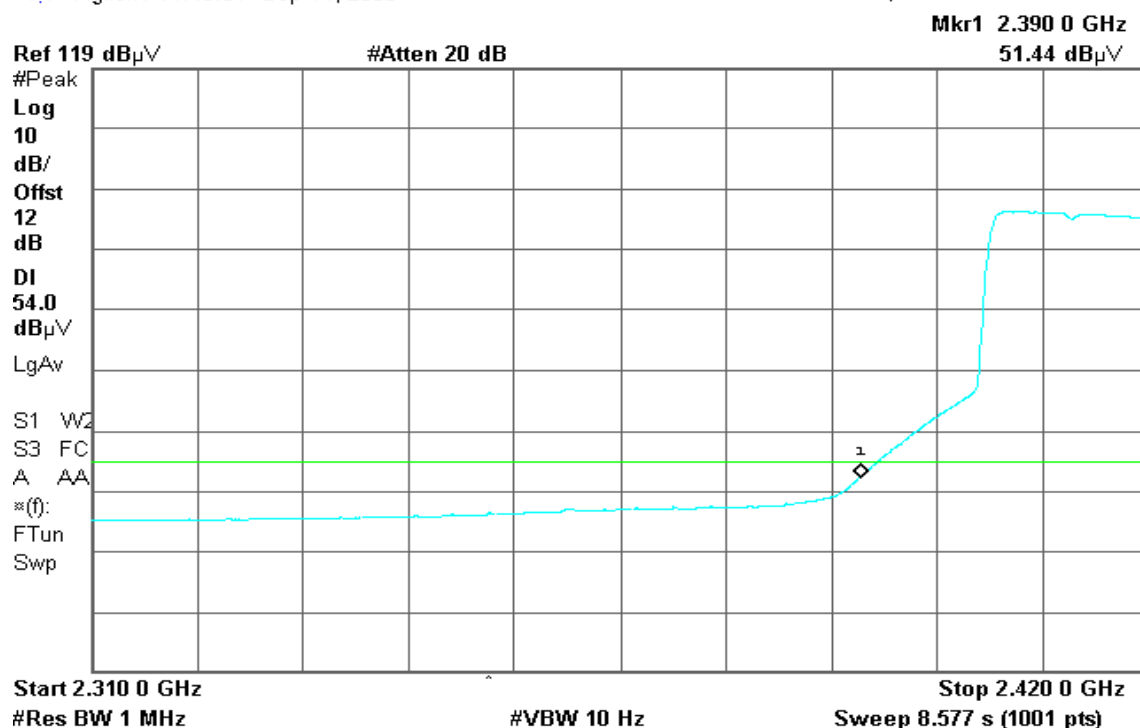


Detector mode: Average

Polarity: Horizontal

Agilent 11:43:31 Sep 14, 2005

T





Band Edges (IEEE 802.11g Base mode / CH High)

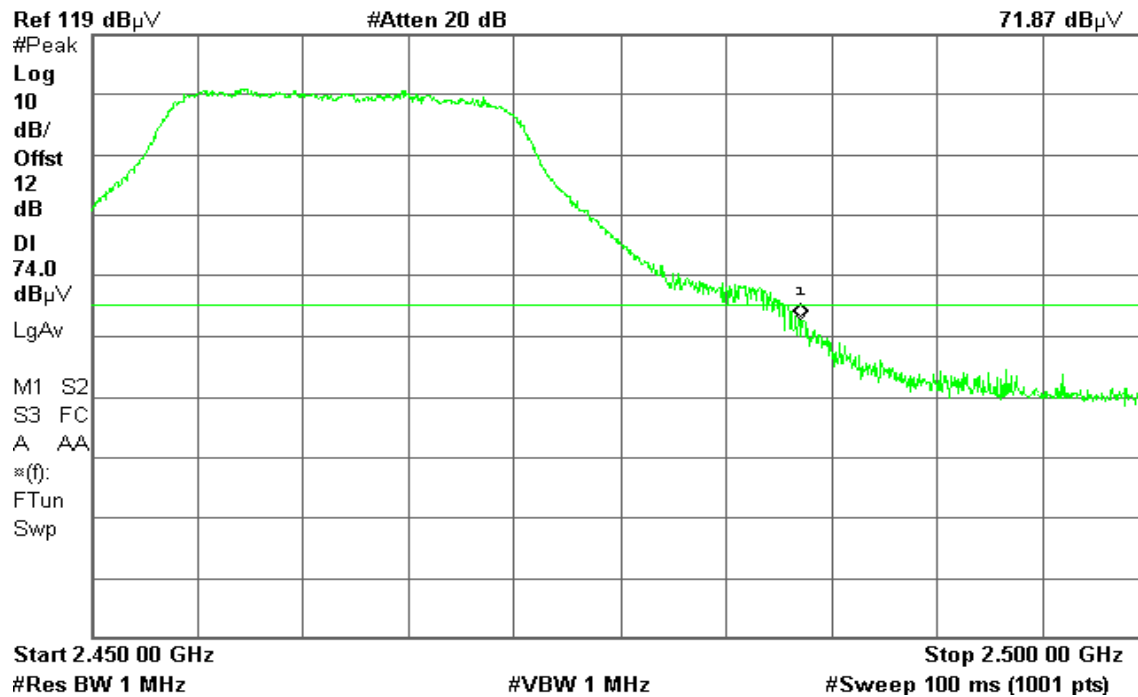
Detector mode: Peak

Polarity: Vertical

Agilent 11:57:07 Sep 14, 2005

T

Mkr1 2.483 50 GHz
71.87 dB μ V



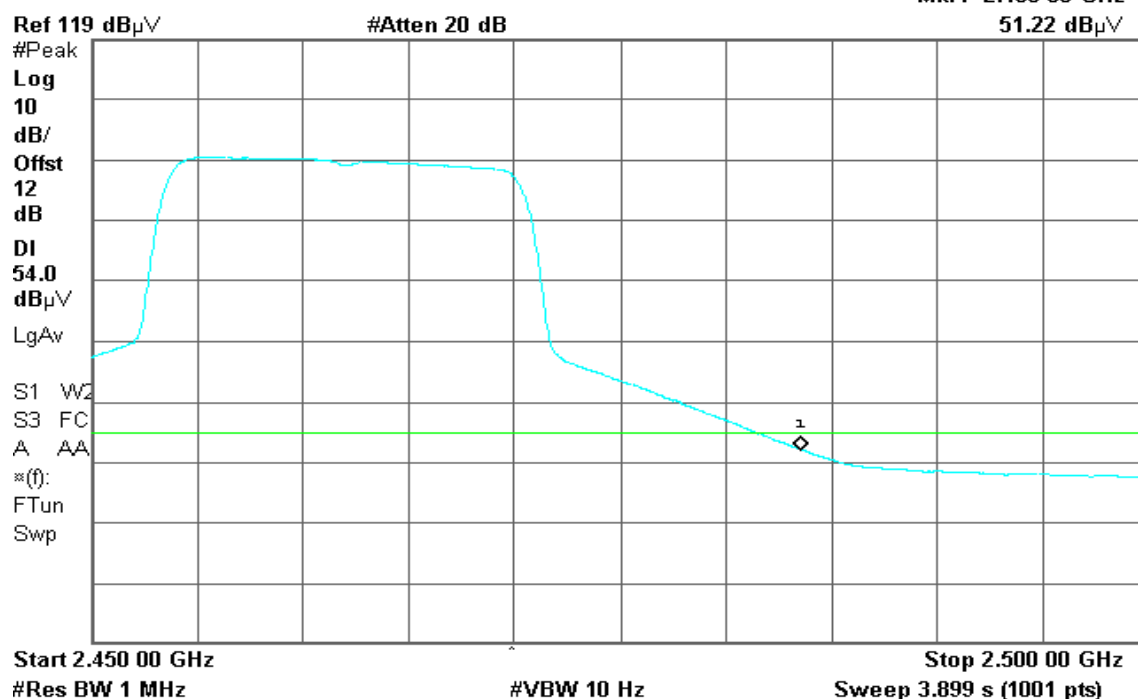
Detector mode: Average

Polarity: Vertical

Agilent 11:58:12 Sep 14, 2005

R L

Mkr1 2.483 50 GHz
51.22 dB μ V





Detector mode: Peak

Polarity: Horizontal

Agilent 15:17:00 Sep 14, 2005

T

Mkr1 2.483 50 GHz
58.16 dB μ V

Ref 109 dB μ V

#Atten 0 dB

Peak

Log

10

dB/

Offst

12

dB

DI

74.0

dB μ V

LgAv

M1 S2

S3 FC

$\mathcal{E}(f)$:

FTun

Swp

Center 2.480 00 GHz

#Res BW 1 MHz

VBW 1 MHz

Span 40 MHz
Sweep 1 ms (1001 pts)

Detector mode: Average

Polarity: Horizontal

Agilent 13:06:38 Sep 14, 2005

T

Mkr1 2.483 50 GHz
47.24 dB μ V

Ref 119 dB μ V

#Atten 20 dB

#Peak

Log

10

dB/

Offst

12

dB

DI

54.0

dB μ V

LgAv

S1 W2

S3 FC

A AA

$\mathcal{E}(f)$:

FTun

Swp

Start 2.450 00 GHz

#Res BW 1 MHz

#VBW 10 Hz

Stop 2.500 00 GHz
Sweep 3.899 s (1001 pts)



Band Edges (IEEE 802.11g Turbo mode / CH Mid)

Detector mode: Peak

Polarity: Vertical

Agilent 16:11:06 Sep 14, 2005

R L

Mkr1 2.390 1 GHz

68.66 dB μ V

Ref 119 dB μ V

#Atten 20 dB

#Peak

Log

10

dB/

Offst

12

dB

DI

74.0

dB μ V

LgAv

S1 M2

S3 FC

A AA

*(f):

FTun

Swp

Start 2.310 0 GHz

#Res BW 1 MHz

#VBW 1 MHz

Stop 2.445 0 GHz

#Sweep 100 ms (1001 pts)

Detector mode: Average

Polarity: Vertical

Agilent 16:18:21 Sep 14, 2005

T

Mkr1 2.390 1 GHz

52.41 dB μ V

Ref 119 dB μ V

#Atten 20 dB

#Peak

Log

10

dB/

Offst

12

dB

DI

54.0

dB μ V

LgAv

S1 M2

S3 FC

A AA

*(f):

FTun

Swp

Start 2.310 0 GHz

#Res BW 1 MHz

#VBW 10 Hz

Stop 2.445 0 GHz

Sweep 10.53 s (1001 pts)

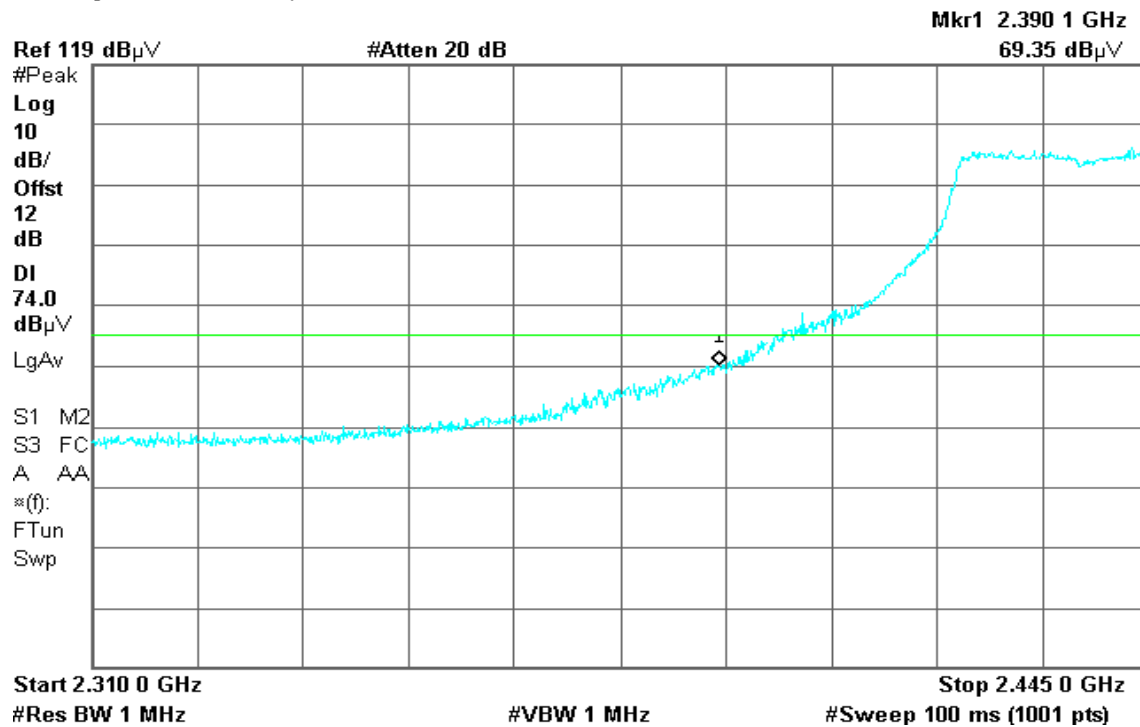


Detector mode: Peak

Polarity: Horizontal

Agilent 16:15:42 Sep 14, 2005

T

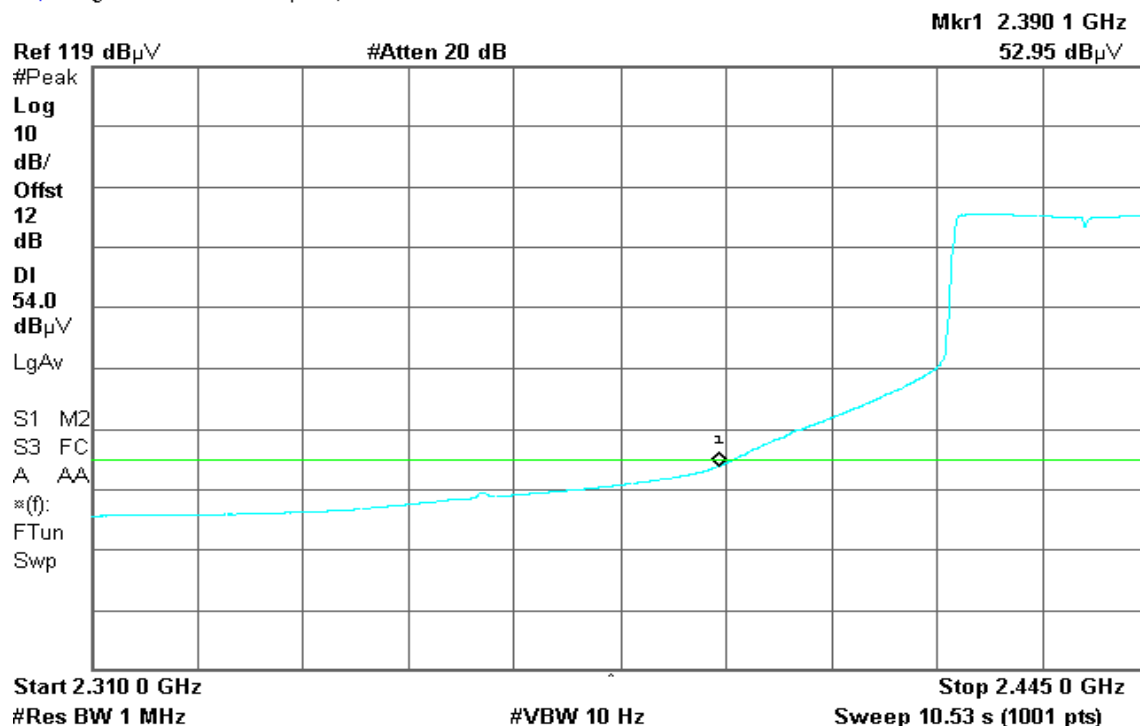


Detector mode: Average

Polarity: Horizontal

Agilent 16:15:05 Sep 14, 2005

T





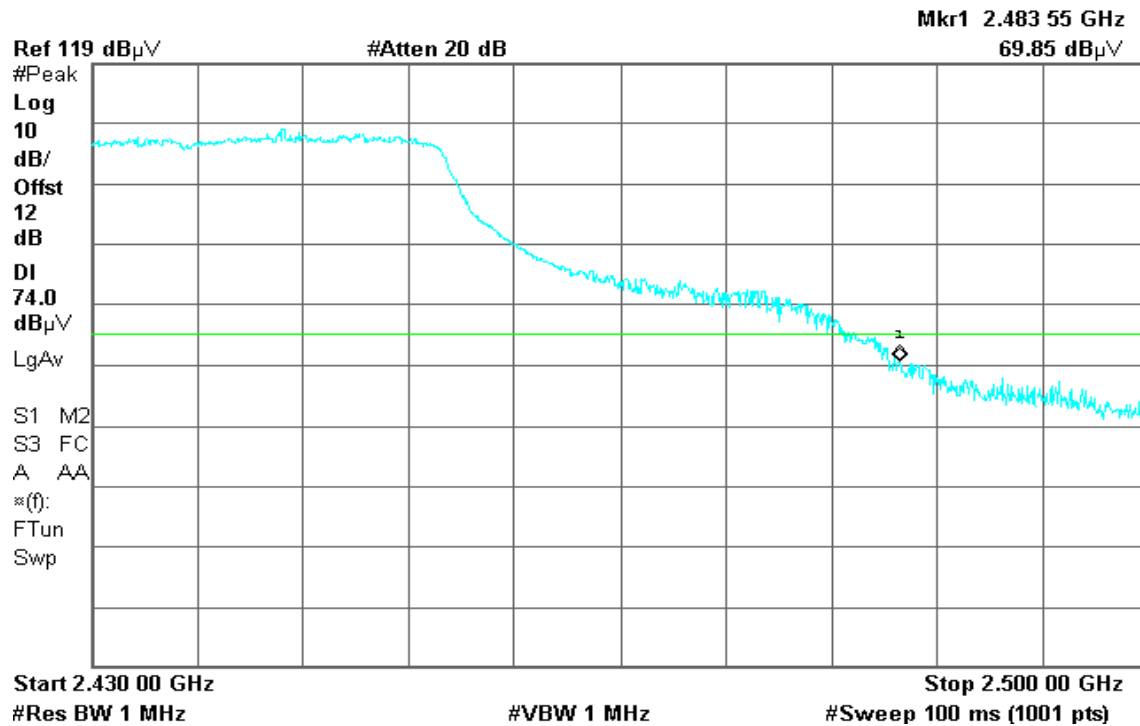
Band Edges (IEEE 802.11g Turbo mode / CH Mid)

Detector mode: Peak

Polarity: Vertical

Agilent 16:32:06 Sep 14, 2005

T

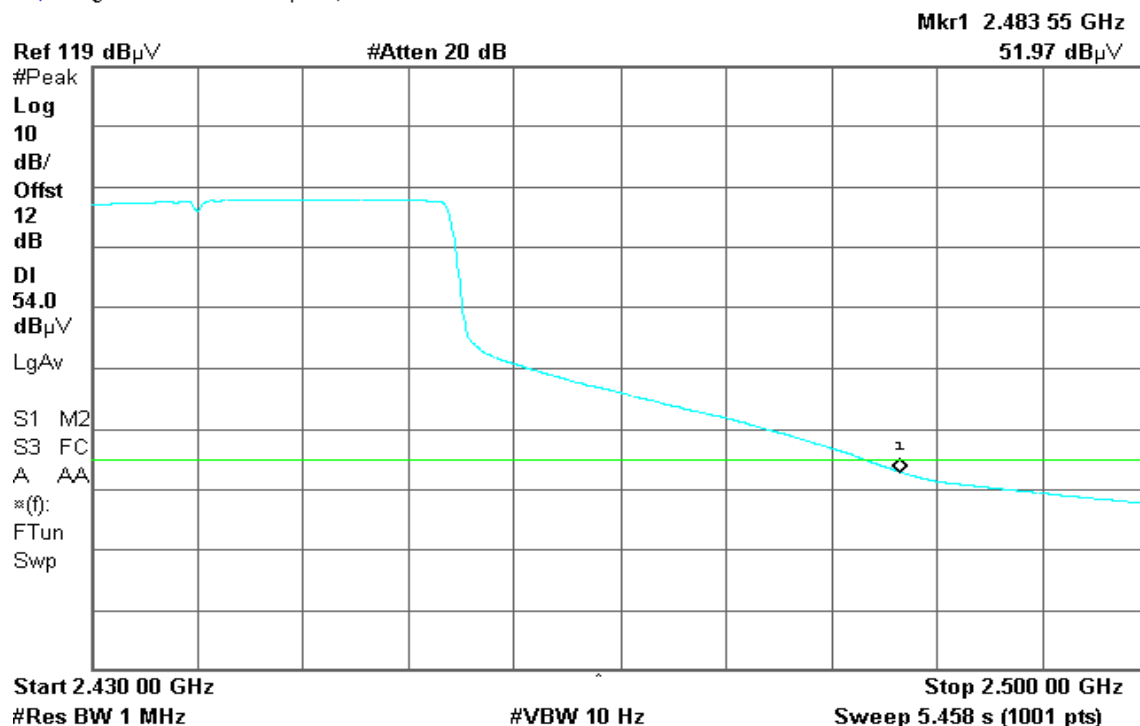


Detector mode: Average

Polarity: Vertical

Agilent 16:31:34 Sep 14, 2005

T



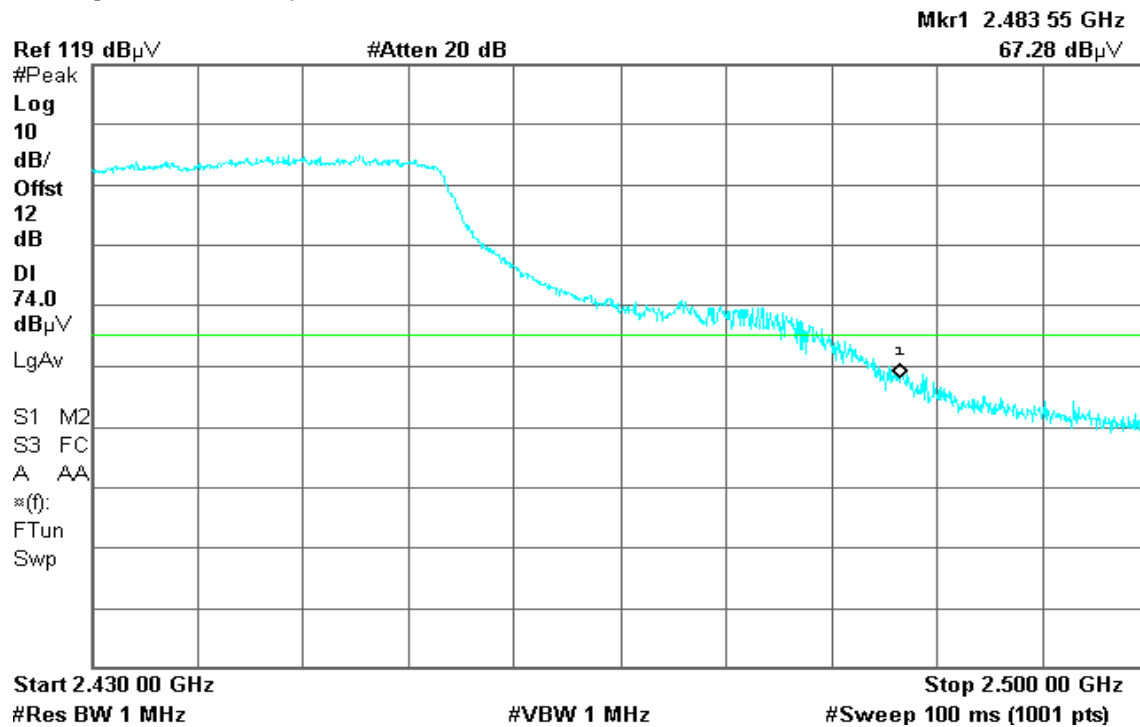


Detector mode: Peak

Polarity: Horizontal

Agilent 16:27:30 Sep 14, 2005

R L

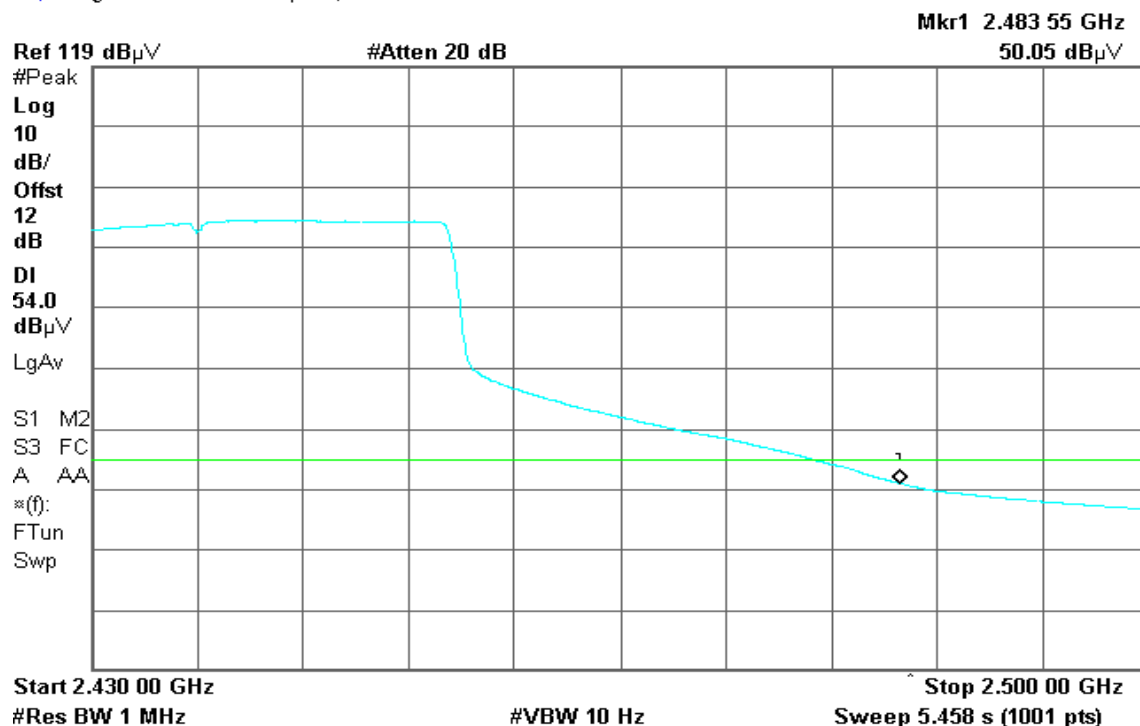


Detector mode: Average

Polarity: Horizontal

Agilent 16:27:00 Sep 14, 2005

T





Omnidirectional antenna / 6.0 dBi for 5 GHz

Not applicable.

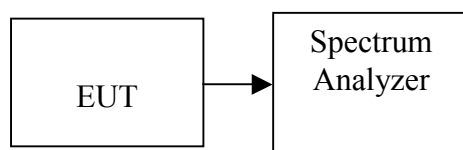


7.4 PEAK POWER SPECTRAL DENSITY

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 = 3kHz, VBW = 10kHz, Span = 300kHz, Sweep=100s.
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****Omnidirectional antenna / 12.0 dBi for 2.4 GHz****Test mode: IEEE 802.11b mode**

Channel	Frequency	PPSD (dBm)	Limit (dBm)	Result
Low	2412	-5.18	2.00	PASS
Mid	2437	-8.73		PASS
High	2462	-4.57		PASS

Remark: The maximum antenna gain is 12.0dBi; therefore the reduction due to antenna gain is 6.0dB, so the limit is 24.0dBm.

Test mode: IEEE 802.11g mode

Channel	Frequency		PPSD (dBm)	Limit (dBm)	Result
Low	Base mode	2412	-11.24	2.00	PASS
Mid		2437	-11.04		PASS
High		2462	-11.00		PASS
Mid	Turbo mode	2437	-11.07		PASS

Remark: The maximum antenna gain is 12.0dBi; therefore the reduction due to antenna gain is 6.0dB, so the limit is 24.0dBm.

**Omnidirectional Panel antenna / 3.0 dBi for 2.4 GHz and 5 GHz****Test mode: IEEE 802.11b mode**

Channel	Frequency	PPSD (dBm)	Limit (dBm)	Result
Low	2412	-6.83	8.00	PASS
Mid	2437	-4.58		PASS
High	2462	-4.35		PASS

Test mode: IEEE 802.11g mode

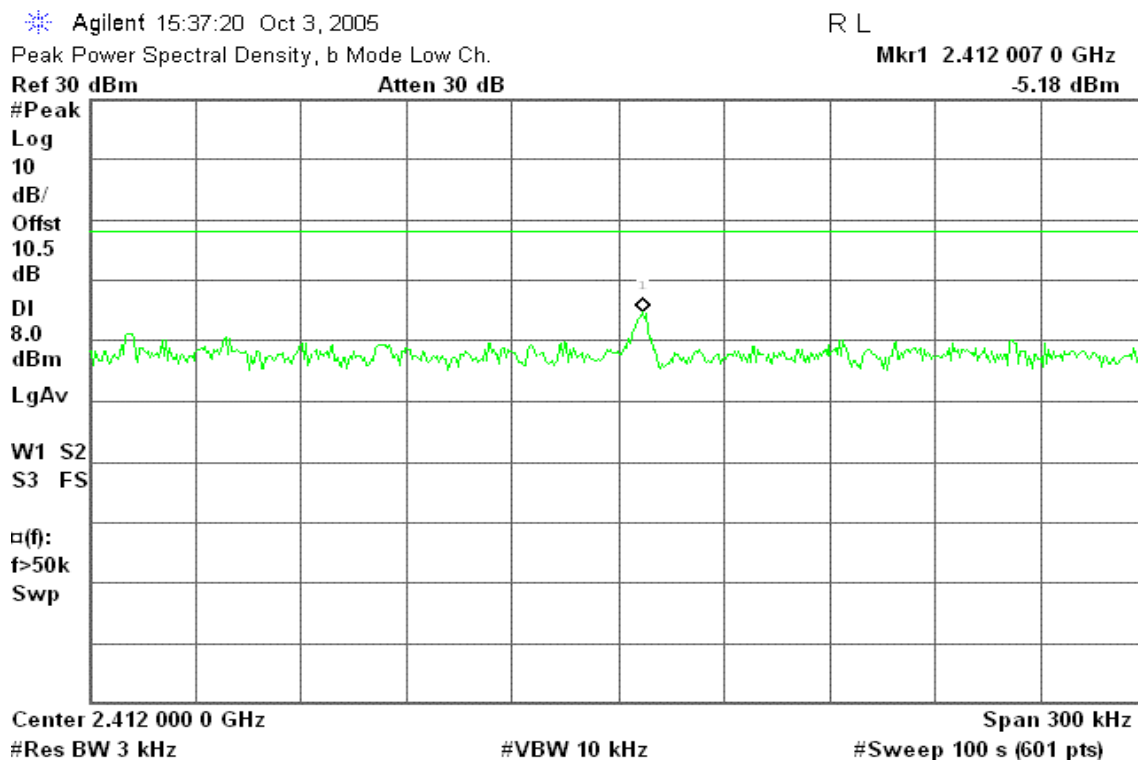
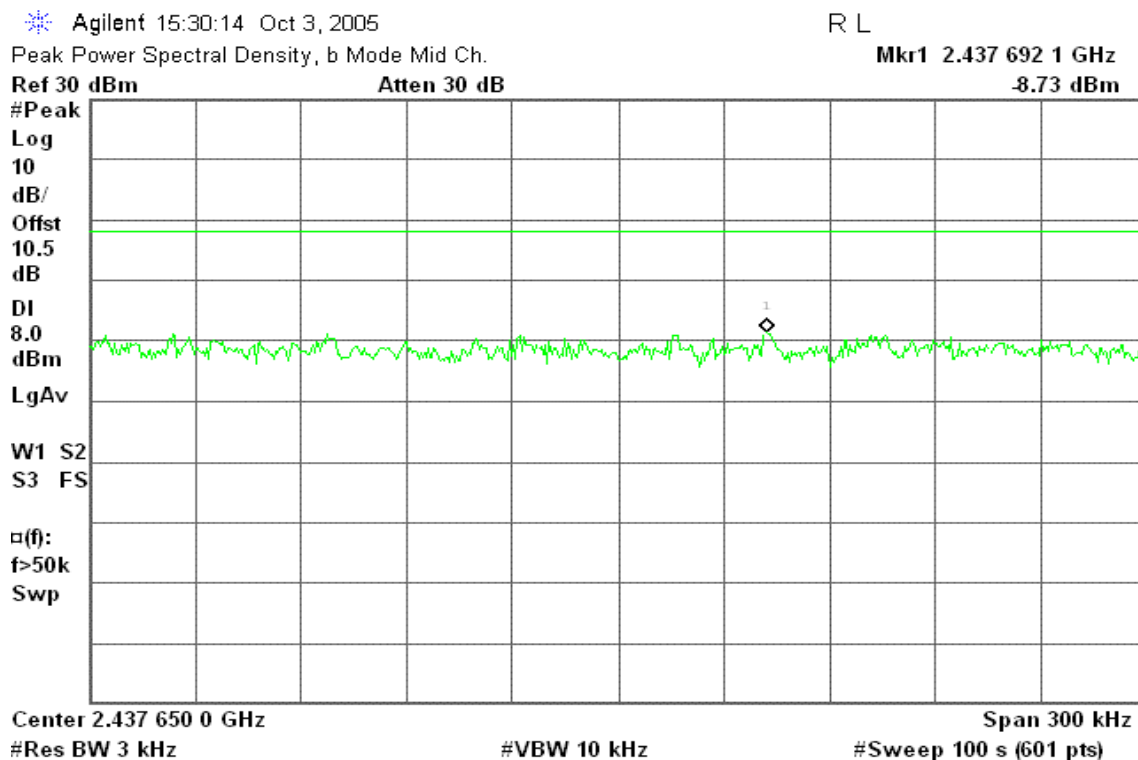
Channel	Frequency		PPSD (dBm)	Limit (dBm)	Result
Low	Base mode	2412	-8.59	8.00	PASS
Mid		2437	-7.89		PASS
High		2462	-8.02		PASS
Mid	Turbo mode	2437	-6.24		PASS

Test mode: IEEE 802.11a mode

Channel	Frequency		PPSD (dBm)	Limit (dBm)	Result
Low	Base mode	5745	-3.23	8.00	PASS
Mid		5785	-2.58		PASS
High		5825	-1.78		PASS
Low	Turbo mode	5760	-1.59		PASS
High		5800	-1.79		PASS

Omnidirectional antenna / 6.0 dBi for 5 GHz**Test mode: IEEE 802.11a mode**

Channel	Frequency		PPSD (dBm)	Limit (dBm)	Result
Low	Base mode	5745	-3.23	8.00	PASS
Mid		5785	-2.58		PASS
High		5825	-1.78		PASS
Low	Turbo mode	5760	-1.59		PASS
High		5800	-1.79		PASS

Test Plot**Omnidirectional antenna / 12.0 dBi for 2.4 GHz**IEEE 802.11b Base modeCH LowCH Mid



CH High

Agilent 15:14:43 Oct 3, 2005

R L

Peak Power Spectral Density, b Mode High Ch.

Mkr1 2.462 006 5 GHz

Ref 30 dBm

Atten 30 dB

-4.57 dBm

#Peak

Log

10

dB/

Offst

10.5

dB

DI

8.0

dBm

LgAv

W1 S2

S3 FS

α(f):

f>50k

Swp

Center 2.462 000 0 GHz

Span 300 kHz

#Res BW 3 kHz

#VBW 10 kHz

#Sweep 100 s (601 pts)

IEEE 802.11g Base mode

CH Low

Agilent 14:51:19 Oct 3, 2005

R L

Peak Power Spectral Density, g Mode Low Ch.

Mkr1 2.412 007 0 GHz

Ref 30 dBm

Atten 30 dB

-11.24 dBm

#Peak

Log

10

dB/

Offst

10.5

dB

DI

8.0

dBm

LgAv

W1 S2

S3 FS

α(f):

f>50k

Swp

Center 2.412 000 0 GHz

Span 300 kHz

#Res BW 3 kHz

#VBW 10 kHz

#Sweep 100 s (601 pts)



CH Mid

Agilent 14:59:26 Oct 3, 2005

R L

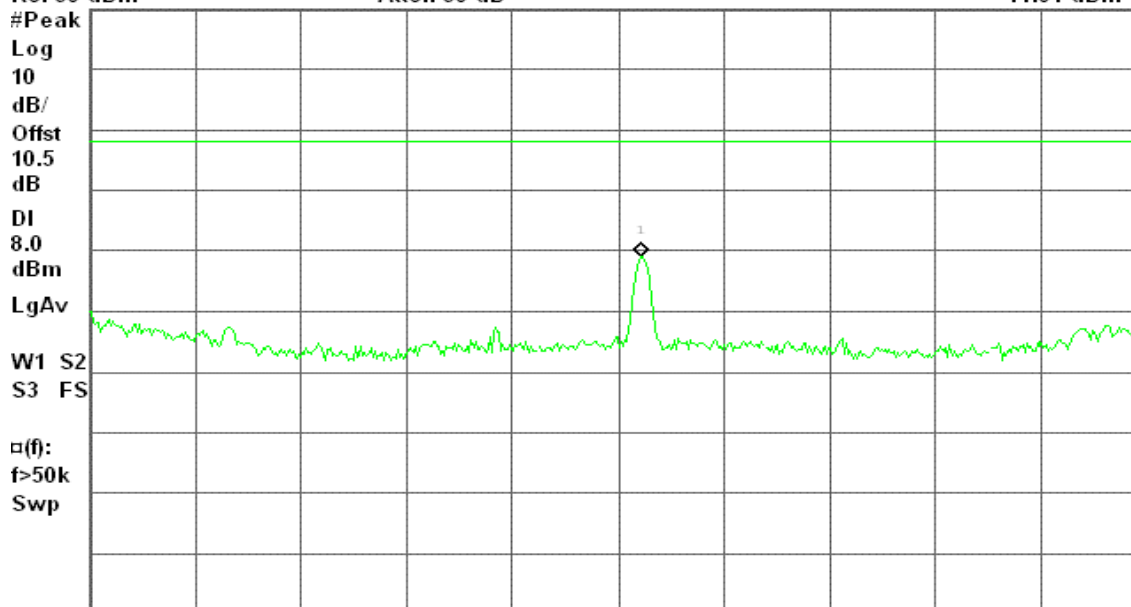
Peak Power Spectral Density, g Mode Mid Ch.

Mkr1 2.437 006 5 GHz

Ref 30 dBm

Atten 30 dB

-11.04 dBm



Center 2.437 000 0 GHz

Span 300 kHz

#Res BW 3 kHz

#VBW 10 kHz

#Sweep 100 s (601 pts)

CH High

Agilent 15:05:37 Oct 3, 2005

R L

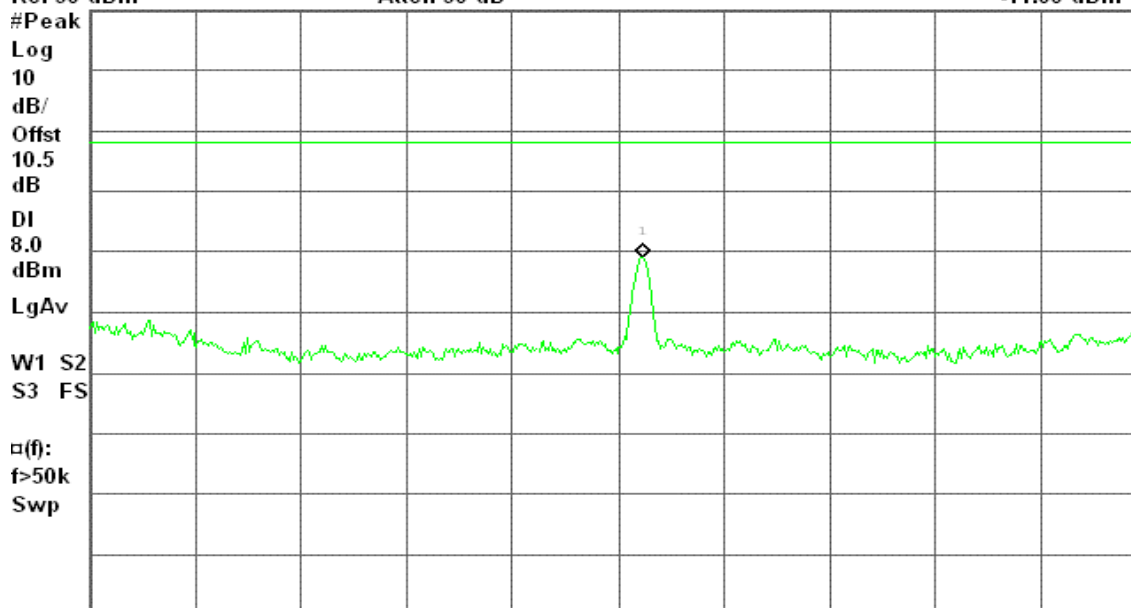
Peak Power Spectral Density, g Mode High Ch.

Mkr1 2.462 007 0 GHz

Ref 30 dBm

Atten 30 dB

-11.00 dBm



Center 2.462 000 0 GHz

Span 300 kHz

#Res BW 3 kHz

#VBW 10 kHz

#Sweep 100 s (601 pts)



IEEE 802.11g Turbo mode

CH Mid

Agilent 14:41:19 Oct 3, 2005

R L

Mkr1 2.437 006 5 GHz

-11.07 dBm

Ref 30 dBm

Atten 30 dB

#Peak

Log

10

dB/

Offst

10.5

dB

DI

8.0

dBm

LgAv

W1 S2

S3 FS

□(f):

f>50k

Swp

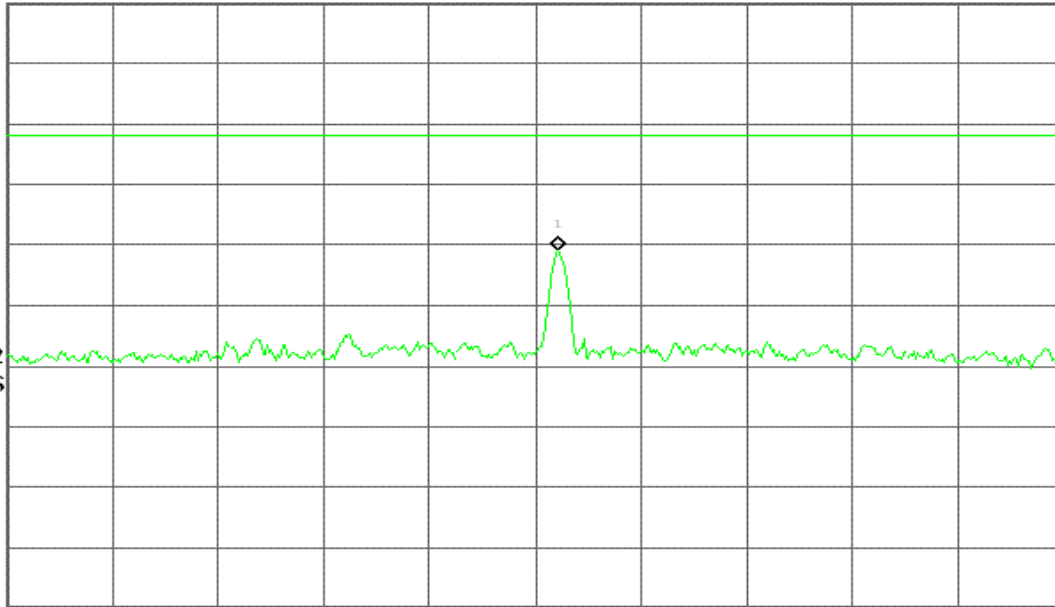
Center 2.437 000 0 GHz

#Res BW 3 kHz

#VBW 10 kHz

Span 300 kHz

#Sweep 100 s (601 pts)

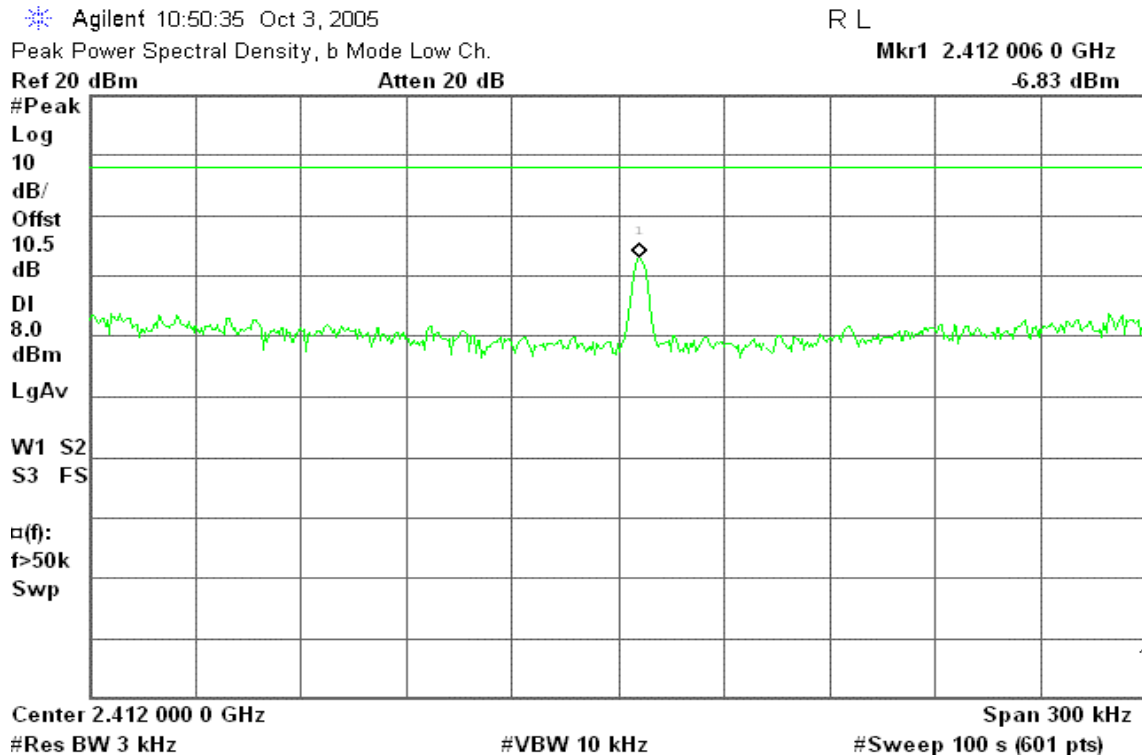




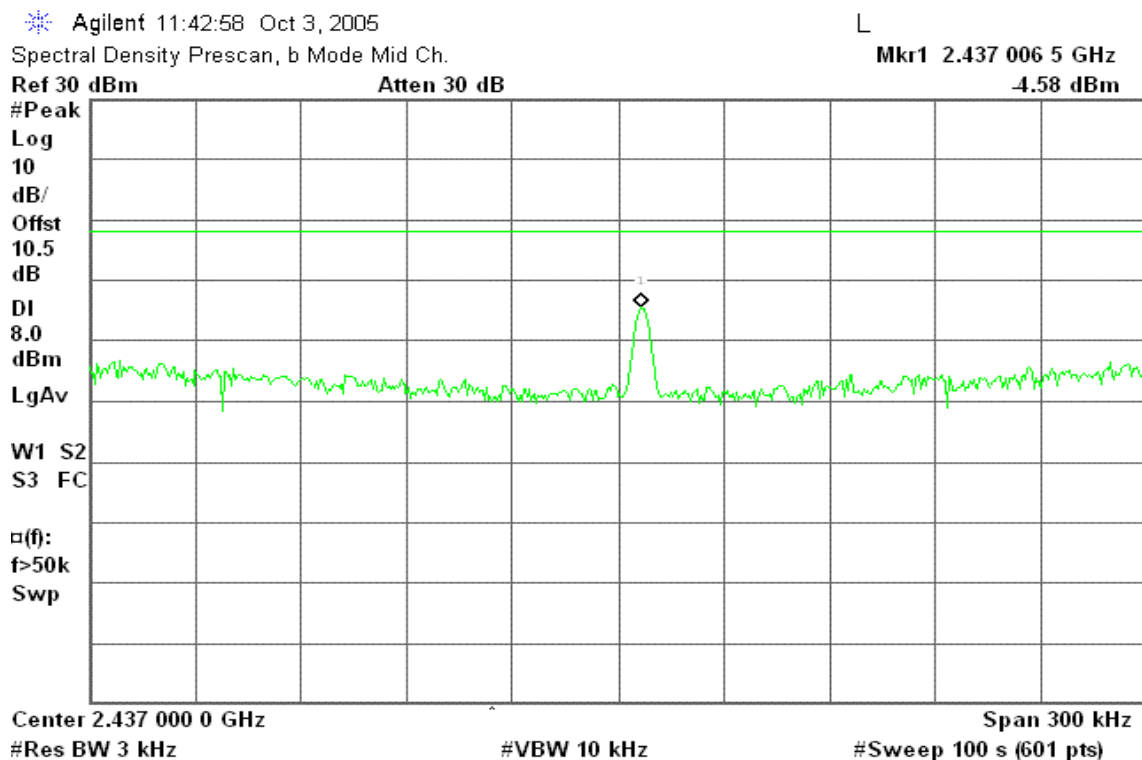
Omnidirectional Panel antenna / 3.0 dBi for 2.4 GHz and 5 GHz

IEEE 802.11b Base mode

CH Low

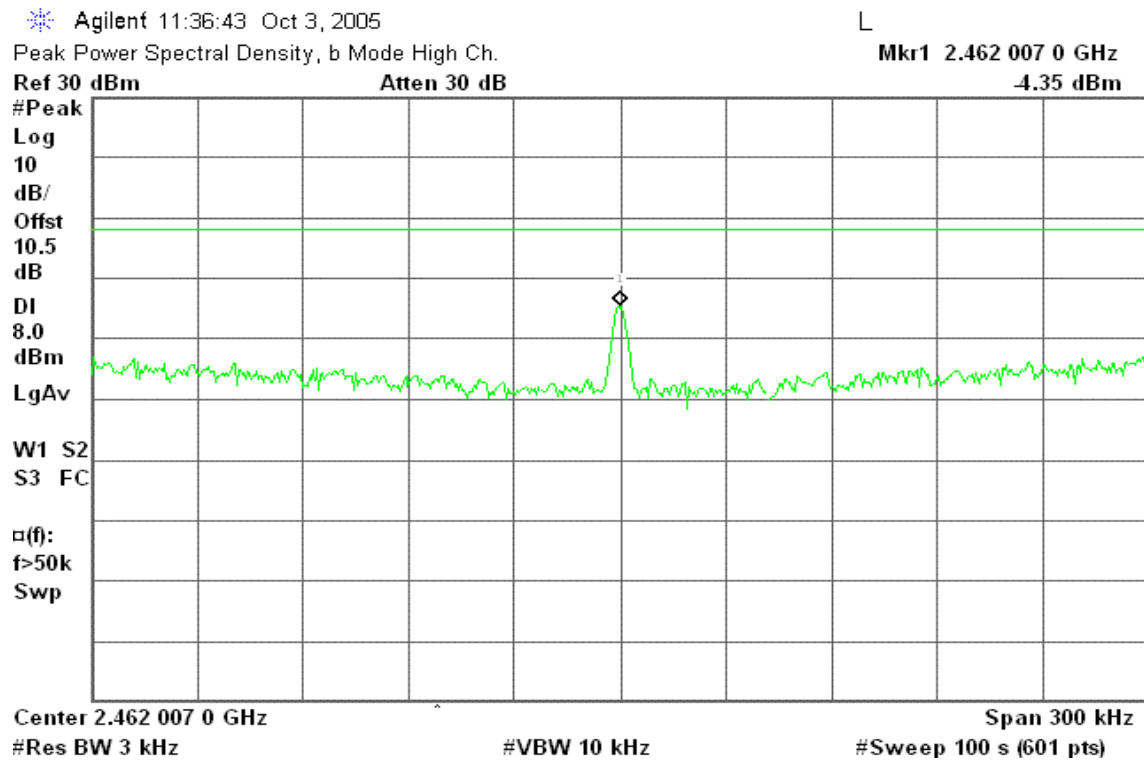


CH Mid



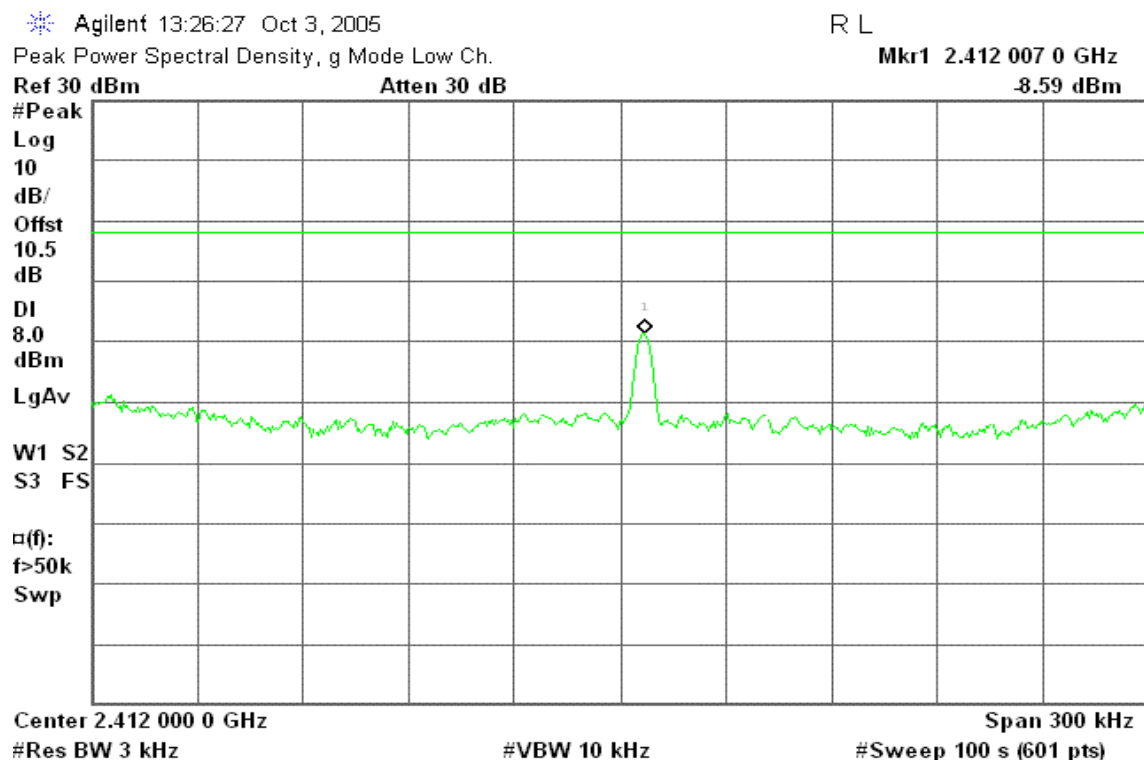


CH High



IEEE 802.11g Base mode

CH Low





CH Mid

Agilent 13:55:21 Oct 3, 2005

Peak Power Spectral Density, g Mode Mid Ch.

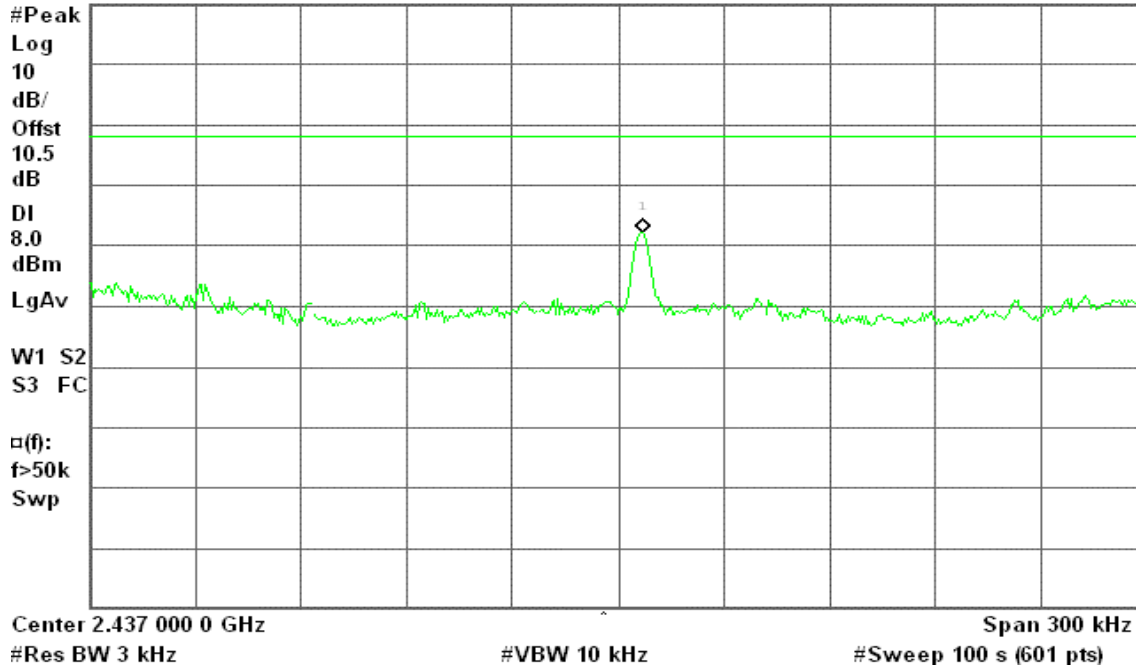
Ref 30 dBm

Atten 30 dB

L

Mkr1 2.437 007 0 GHz

-7.89 dBm



CH High

Agilent 13:51:08 Oct 3, 2005

Peak Power Spectral Density, g Mode High Ch.

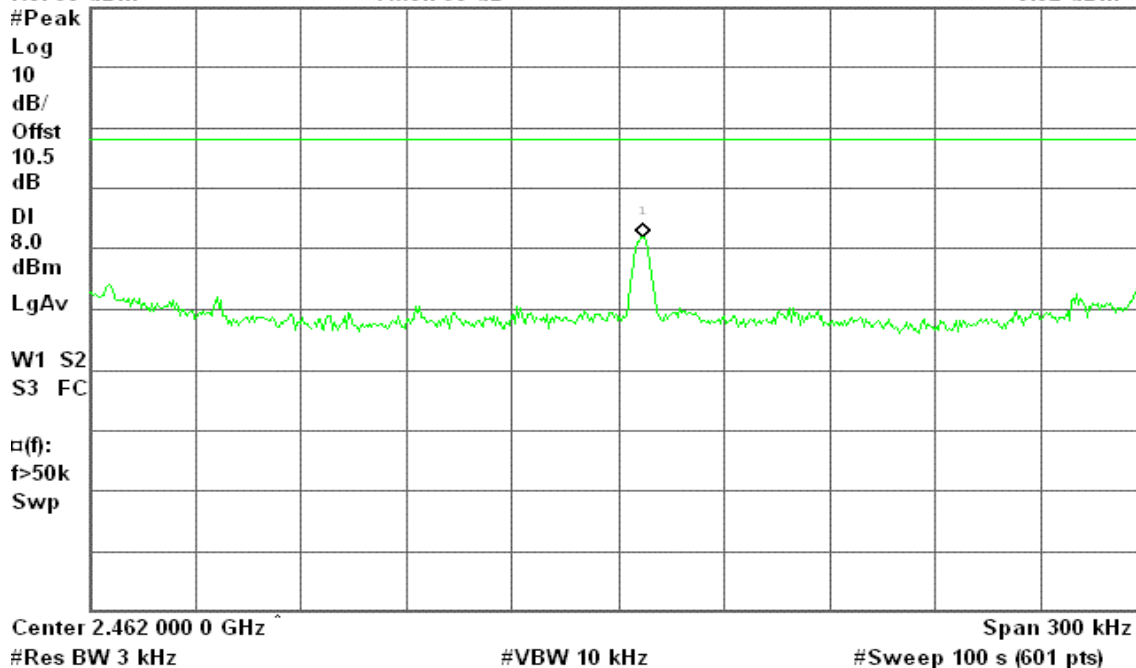
Ref 30 dBm

Atten 30 dB

L

Mkr1 2.462 007 0 GHz

-8.02 dBm





IEEE 802.11g Turbo mode

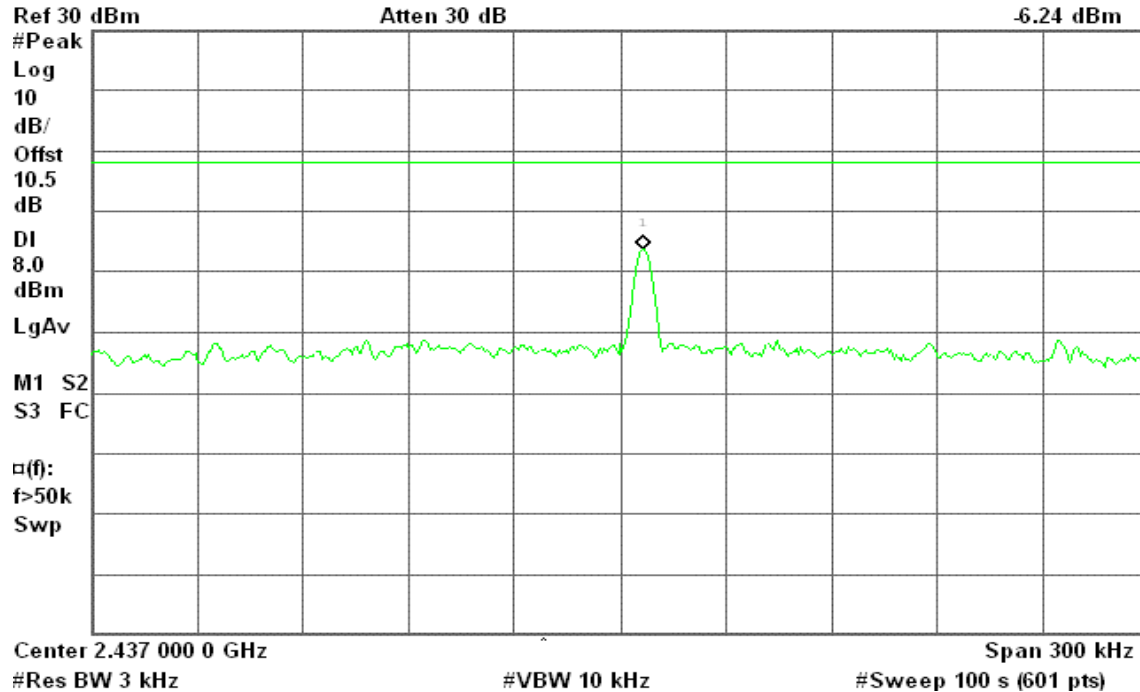
CH Mid

Agilent 14:20:17 Oct 3, 2005

L

Mkr1 2.437 006 5 GHz

-6.24 dBm



IEEE 802.11a Base mode

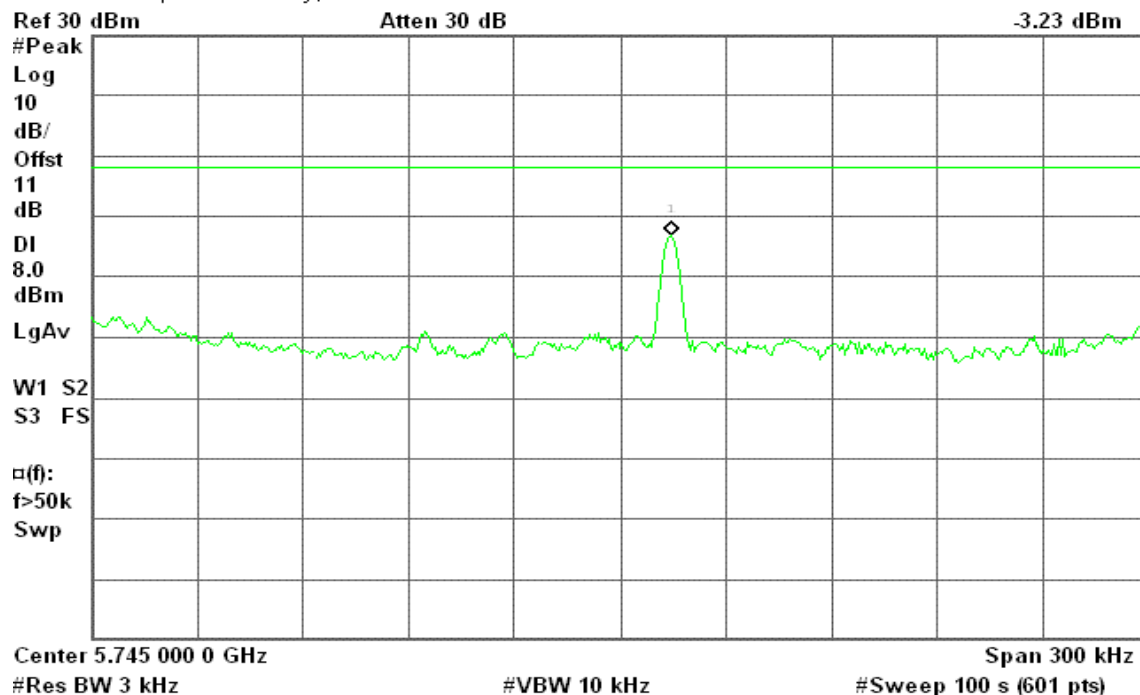
CH Low

Agilent 16:04:46 Oct 3, 2005

R L

Mkr1 5.745 014 6 GHz

-3.23 dBm





CH Mid

Agilent 16:18:26 Oct 3, 2005

R L

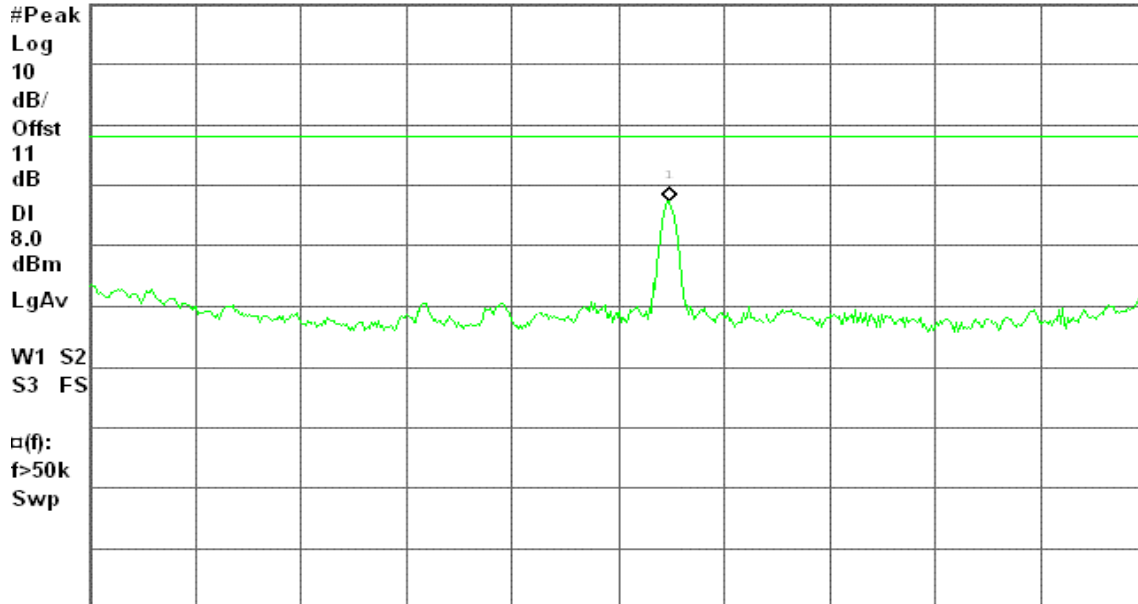
Peak Power Spectral Density, a Mode Mid Ch.

Mkr1 5.785 014 6 GHz

Ref 30 dBm

Atten 30 dB

-2.58 dBm



Center 5.785 000 0 GHz

Span 300 kHz

#Res BW 3 kHz

#VBW 10 kHz

#Sweep 100 s (601 pts)

CH High

Agilent 16:29:15 Oct 3, 2005

R L

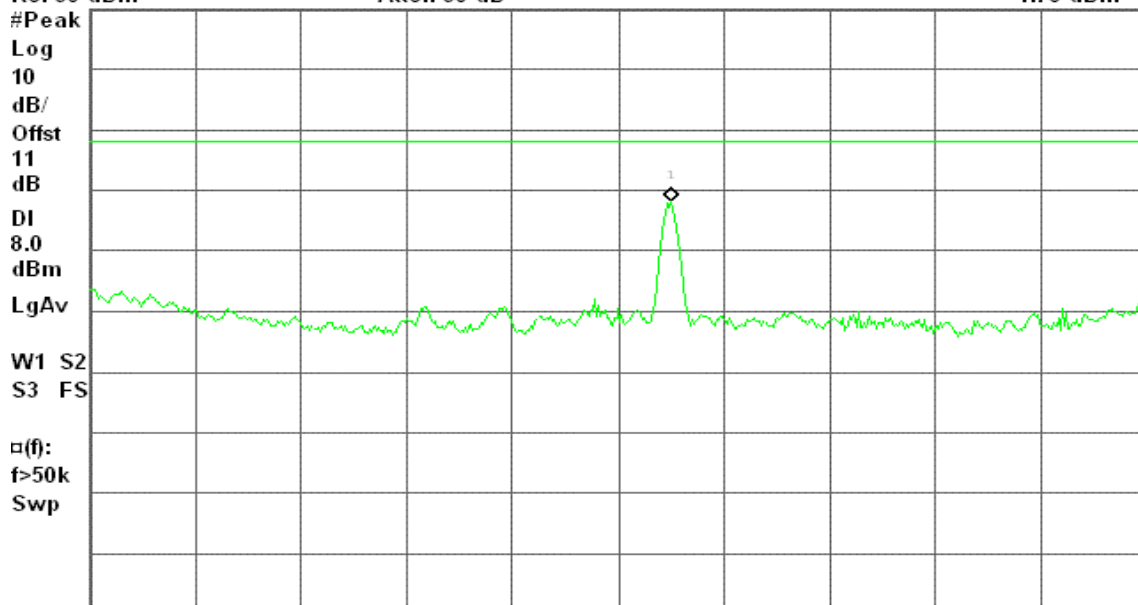
Peak Power Spectral Density, a Mode High Ch.

Mkr1 5.825 015 1 GHz

Ref 30 dBm

Atten 30 dB

-1.78 dBm



Center 5.825 000 0 GHz

Span 300 kHz

#Res BW 3 kHz

#VBW 10 kHz

#Sweep 100 s (601 pts)



IEEE 802.11a Turbo mode

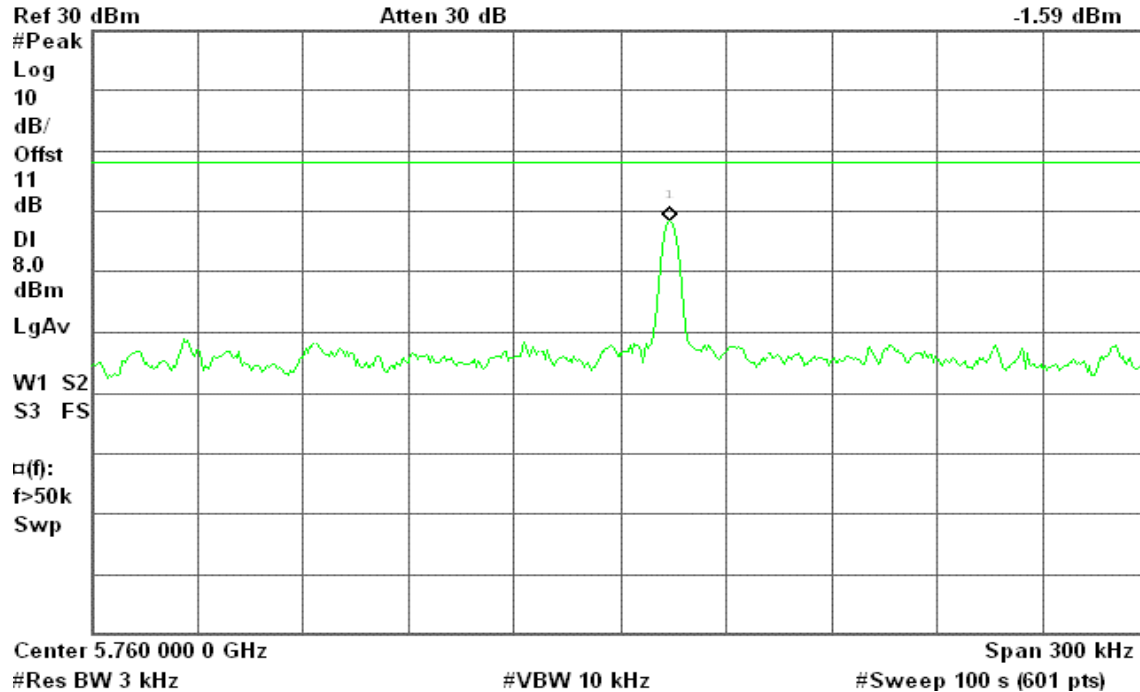
CH Low

Agilent 16:54:01 Oct 3, 2005

R L

Mkr1 5.760 014 1 GHz

-1.59 dBm



CH High

Agilent 16:45:50 Oct 3, 2005

R L

Mkr1 5.800 014 5 GHz

-1.79 dBm

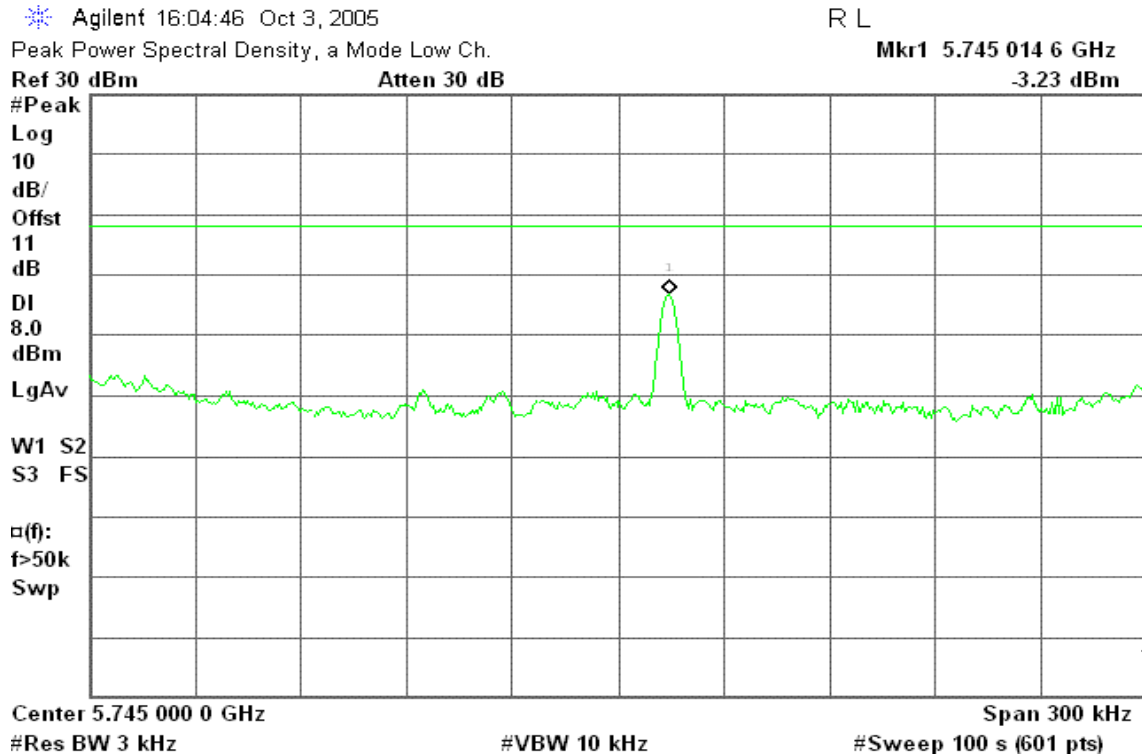




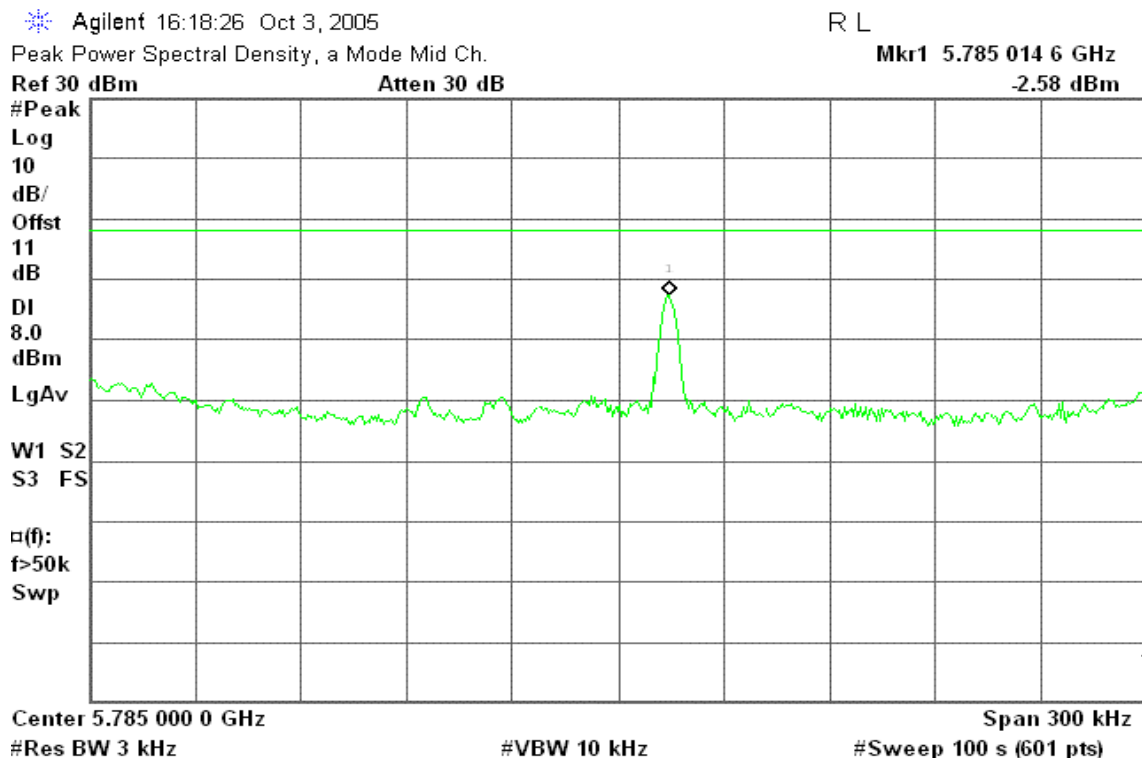
Omnidirectional antenna / 6.0 dBi for 5 GHz

IEEE 802.11a Base mode

CH Low



CH Mid





CH High

Agilent 16:29:15 Oct 3, 2005

R L

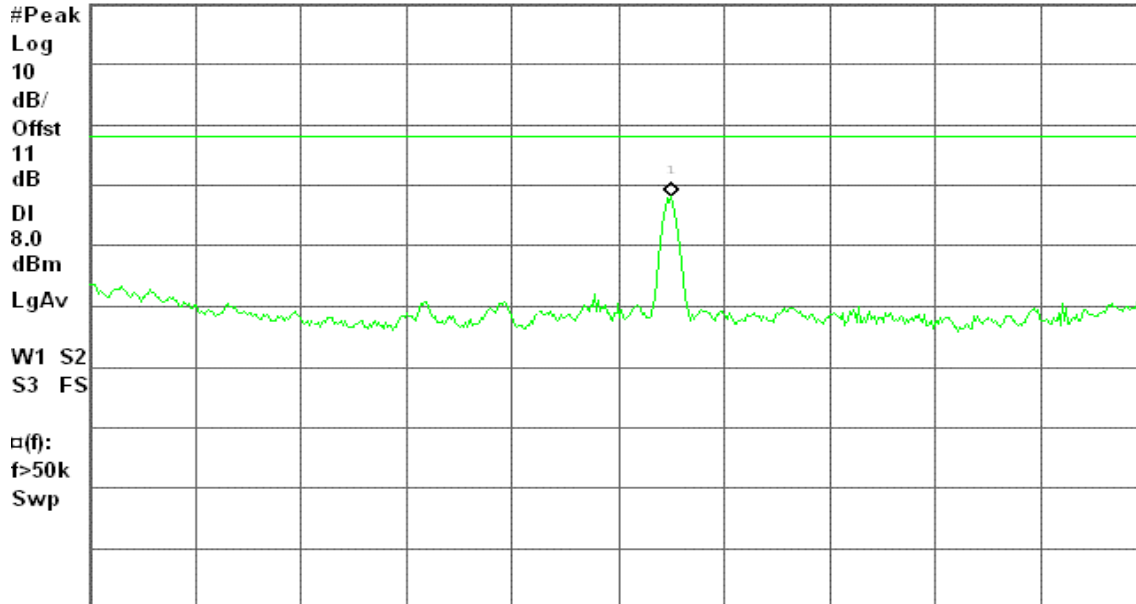
Peak Power Spectral Density, a Mode High Ch.

Mkr1 5.825 015 1 GHz

Ref 30 dBm

Atten 30 dB

-1.78 dBm



Center 5.825 000 0 GHz

Span 300 kHz

#Res BW 3 kHz

#VBW 10 kHz

#Sweep 100 s (601 pts)

IEEE 802.11a Turbo mode

CH Low

Agilent 16:54:01 Oct 3, 2005

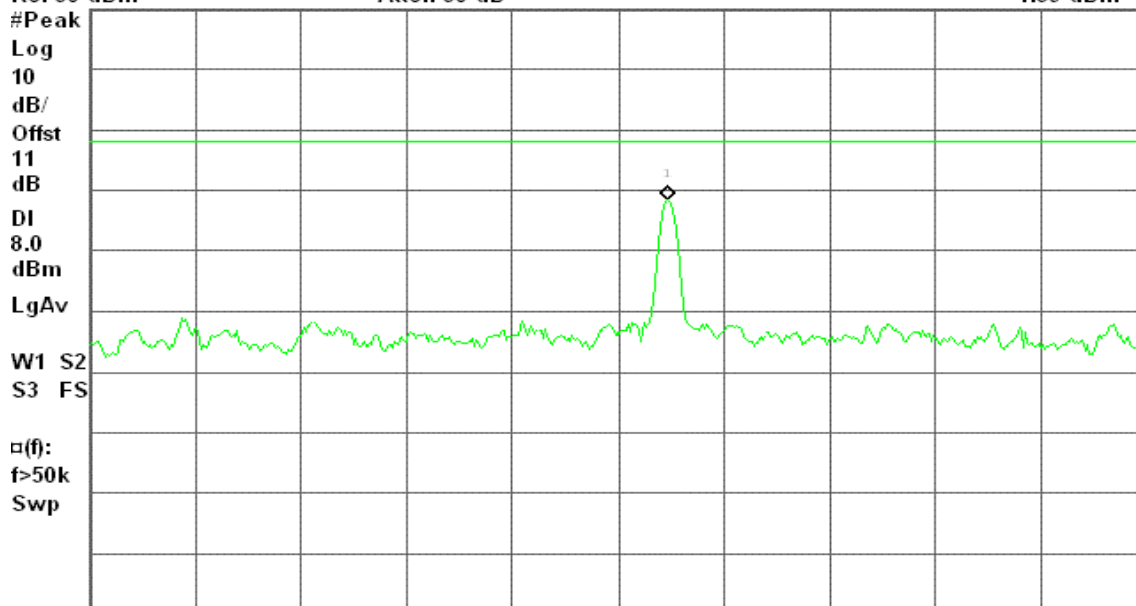
R L

Mkr1 5.760 014 1 GHz

Ref 30 dBm

Atten 30 dB

-1.59 dBm



Center 5.760 000 0 GHz

Span 300 kHz

#Res BW 3 kHz

#VBW 10 kHz

#Sweep 100 s (601 pts)



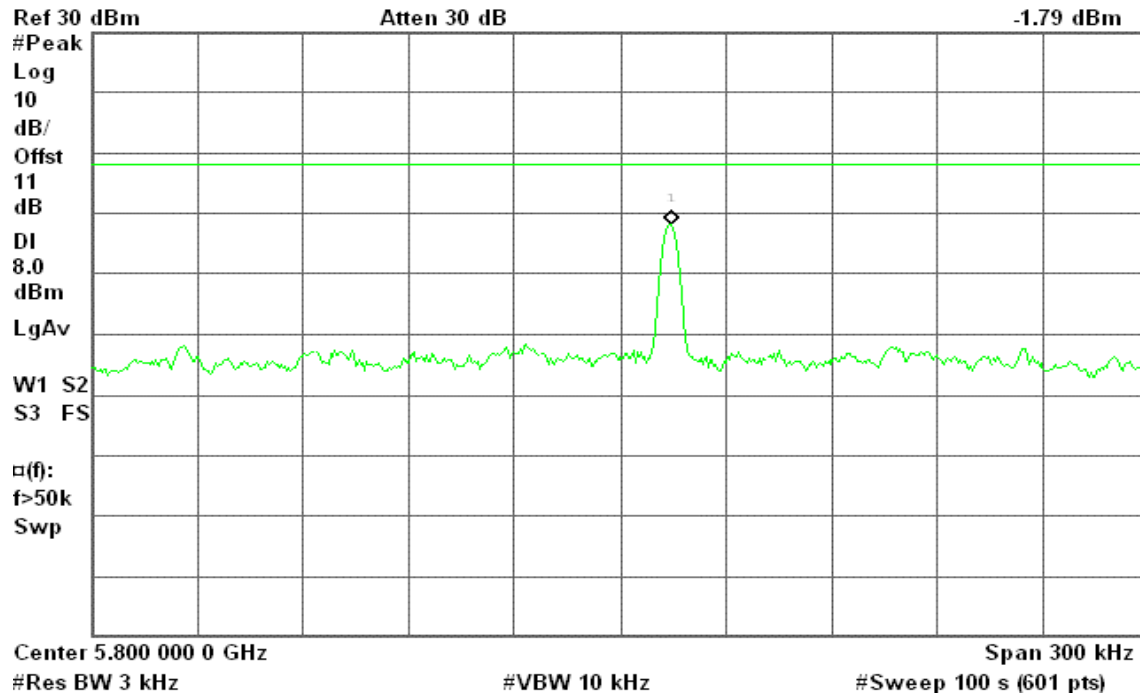
CH High

Agilent 16:45:50 Oct 3, 2005

R L

Mkr1 5.800 014 5 GHz

-1.79 dBm





7.5 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

Omnidirectional antenna / 12.0 dBi for 2.4 GHz

EUT	802.11a/b/g AP
Frequency band (Operating)	<input checked="" type="checkbox"/> WLAN: 2.412GHz ~ 2.462GHz <input type="checkbox"/> WLAN: 5.18GHz ~ 5.32GHz / 5.50GHz ~ 5.70GHz <input type="checkbox"/> WLAN: 5.745GHz ~ 5.825GHz <input type="checkbox"/> Others
Device category	<input type="checkbox"/> Portable (<20cm separation) <input checked="" type="checkbox"/> Mobile (>20cm separation) <input type="checkbox"/> Others
Exposure classification	<input type="checkbox"/> Occupational/Controlled exposure (S = 5mW/cm ²) <input checked="" type="checkbox"/> General Population/Uncontrolled exposure (S=1mW/cm ²)
Antenna diversity	<input type="checkbox"/> Single antenna <input checked="" type="checkbox"/> Multiple antennas <input type="checkbox"/> Tx diversity <input type="checkbox"/> Rx diversity <input checked="" type="checkbox"/> Tx/Rx diversity
Max. output power	IEEE 802.11b Base mode: 19.68 dBm (92.90mW) IEEE 802.11g Base mode: 14.76 dBm (29.92mW) IEEE 802.11g Turbo mode: 16.10 dBm (40.74mW)
Antenna gain (Max)	12.0 dBi (Numeric gain: 15.85)
Evaluation applied	<input checked="" type="checkbox"/> MPE Evaluation <input type="checkbox"/> SAR Evaluation

Remark:

- The maximum output power is 19.68dBm (92.90mW) at 2462MHz (with 15.85 numeric antenna gain.)*
- DTS device is not subject to routine RF evaluation; MPE estimate is used to justify the compliance.*
- 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

EUT output power = 92.90mW

Numeric Antenna gain = 15.85

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

$$\rightarrow \text{Power density} = 0.29302 \text{ mW} / \text{cm}^2$$

(For mobile or fixed location transmitters, the maximum power density is 1.0 mW/cm² even if the calculation indicates that the power density would be larger.)

**Omnidirectional Panel antenna / 3.0 dBi for 2.4 GHz and 5 GHz**

EUT	802.11a/b/g AP
Frequency band (Operating)	<input checked="" type="checkbox"/> WLAN: 2.412GHz ~ 2.462GHz <input type="checkbox"/> WLAN: 5.18GHz ~ 5.32GHz / 5.50GHz ~ 5.70GHz <input type="checkbox"/> WLAN: 5.745GHz ~ 5.825GHz <input type="checkbox"/> Others
Device category	<input type="checkbox"/> Portable (<20cm separation) <input checked="" type="checkbox"/> Mobile (>20cm separation) <input type="checkbox"/> Others
Exposure classification	<input type="checkbox"/> Occupational/Controlled exposure (S = 5mW/cm ²) <input checked="" type="checkbox"/> General Population/Uncontrolled exposure (S=1mW/cm ²)
Antenna diversity	<input type="checkbox"/> Single antenna <input checked="" type="checkbox"/> Multiple antennas <input type="checkbox"/> Tx diversity <input type="checkbox"/> Rx diversity <input checked="" type="checkbox"/> Tx/Rx diversity
Max. output power	IEEE 802.11b Base mode: 21.64 dBm (145.88mW) IEEE 802.11g Base mode: 19.90 dBm (97.72mW) IEEE 802.11g Turbo mode: 20.18 dBm (104.23mW)
Antenna gain (Max)	3.0 dBi (Numeric gain: 2.00)
Evaluation applied	<input checked="" type="checkbox"/> MPE Evaluation <input type="checkbox"/> SAR Evaluation

Remark:

1. The maximum output power is 21.64dBm (145.88mW) at 2437MHz (with 2.00 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**

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

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:

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

$$d \text{ (cm)} = d \text{ (m)} / 100$$

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

EUT output power = 145.88mW

Numeric Antenna gain = 2.00

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

$$\rightarrow \text{Power density} = 0.05806 \text{ mW} / \text{cm}^2$$

(For mobile or fixed location transmitters, the maximum power density is 1.0 mW/cm² even if the calculation indicates that the power density would be larger.)