



# FCC TEST REPORT

for

**NoteBook Computer**

**MODEL: M20\*\* ("\*" can be A-Z 0-9 or blank)**

**Test Report Number:**  
**KS090812A06-4-RP**

Issued for

**Fujitsu Limited**

1-1, Kamikodanaka 4-chome, Nakahara-ku, Kawasaki, 211-8588 JAPAN

Issued by:

**Compliance Certification Services Inc.**

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**Issued Date: August 19, 2009**



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## Revision History

Rev.	Issue Date	Revisions	Effect Page	Revised By
00	August 19, 2009	Initial Issue	ALL	Miro chueh

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## 1 TEST CERTIFICATION

Product: NoteBook Computer

Model: M20\*\* ("\*" can be A-Z 0-9 or blank)

Brand: FUJITSU

Tested: From August 14, 2009 to August 19, 2009

Applicant: Fujitsu Limited

1-1, Kamikodanaka 4-chome, Nakahara-ku, Kawasaki,211-8588 JAPAN

Manufacturer: Fujitsu Limited

1-1, Kamikodanaka 4-chome, Nakahara-ku, Kawasaki,211-8588 JAPAN

### APPLICABLE STANDARDS

Standard	Test Type	Standard	Test Type
15.207(a)	Power Line Conducted Emissions	15.247(d) 15.209(a)	● Spurious Emissions ● Conducted Measurement ● Radiated Emissions
15.247(a)(2)	6dB Bandwidth Measurement	15.247(b)(3) 15.247(b)(4)	Peak Power Measurement
15.247(d)	Band Edges Measurement	15.247(e)	Peak Power Spectral Density

### DEVIATION FROM APPLICABLE STANDARD

None

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.

Approved by:

Miro Chueh  
EMC Manager  
Compliance Certification Service Inc.

Reviewed by:

Lin Zhang  
EMC Section Manager  
Compliance Certification Service Inc.



## 2 TEST RESULT SUMMARY

<b>APPLICABLE STANDARDS</b>			
<b>Standard</b>	<b>Test Type</b>	<b>Result</b>	<b>Remark</b>
15.247(a)(2)	6dB Bandwidth Measurement	Pass	Meet the requirement of limit.
15.247(b)(3) 15.247(b)(4)	Peak Power Measurement	Pass	Meet the requirement of limit.
15.247(d)	Band Edges Measurement	Pass	Meet the requirement of limit.
15.247(e)	Peak Power Spectral Density	Pass	Meet the requirement of limit.
15.247(d) 15.209(a)	Spurious Emissions ● Conducted Measurement ● Radiated Emissions	Pass	Meet the requirement of limit.
15.207(a)	Power line Conducted Emissions	Pass	Meet the requirement of limit.

Note: 1. The test result judgment is decided by the limit of test standard  
2. The information of measurement uncertainty is available upon the customer's request.



### 3 EUT DESCRIPTION

<b>Product</b>	NoteBook Computer
<b>Trade Name</b>	FUJITSU
<b>Model Number</b>	M20 * * (" * " can be A-Z 0-9 or blank)
<b>Model Discrepancy</b>	All the above models are identical except the model designation for different market.
<b>Wireless LAN module Model Number</b>	AR5B95
<b>Wireless LAN module Brand name</b>	Atheros
<b>Power Adapter Power Rating</b>	Powered from an AC/DC power adapter (1) Model name: ADP-60ZH A Manufacturer: FUJITSU LIMITED Input: AC 100-240V, 50-60Hz, 1.5A Output: DC 19V, 3.16A Battery: FMVNBP173, DC 10.8V, 2.4Ah/25.92Wh
<b>AC Power Cord Type</b>	Unshielded, 1.8m (Detachable) to Power Adapter
<b>DC Power Cable Type</b>	Unshielded, 1.8m (Non-Detachable) at Power Adapter with a core
<b>Frequency Range</b>	2412 ~ 2462 MHz
<b>Transmit Power</b>	IEEE 802.11b: 16.61dBm IEEE 802.11g: 10.01dBm IEEE 802.11n-HT20n: 9.92dBm IEEE 802.11n-HT40n: 9.45dBm
<b>Modulation Technique</b>	IEEE 802.11b: DSSS (CCK, DQPSK, DBPSK) IEEE 802.11g/n: DSSS (CCK, DQPSK, DBPSK) + OFDM (QPSK, BPSK, 16-QAM, 64-QAM)
<b>Transmit Data Rate</b>	IEEE 802.11b: 11, 5.5, 2, 1 Mbps IEEE 802.11g: 54, 48, 36, 24, 18, 12, 11, 9, 6 Mbps IEEE 802.11n-HT20n: MCS 0~7 IEEE 802.11n-HT40n: MCS 0~7
<b>Number of Channels</b>	IEEE 802.11b, IEEE 802.11g, IEEE 802.11n-HT20n: 11 Channels IEEE 802.11n-HT40n: 7 Channel
<b>Antenna Specification</b>	PIFA Antenna 1.64dBi gain (Max)

**Note:**

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: **EJE-WB0075** filing to comply with Section 15.207, 15.209 and 15.247 of the FCC Part 15, Subpart C Rules.



## 4 TEST METHODOLOGY

### 4.1. DESCRIPTION OF TEST MODES

The EUT had been tested under operating condition.

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.

IEEE802.11b: Channel low(2412MHz), Channel middle(2437MHz) and Channel high (2462MHz) with preliminary test 11, 5.5, 2, and 1, After the preliminary scan , the following test mode 11Mbps highest data rate (the worst case) are chosen for the final testing.

IEEE802.11g: Channel low(2412MHz), Channel middle(2437MHz) and Channel high(2462MHz) with preliminary test 54/48/36/24/18/12/9/6, After the preliminary scan , the following test mode 6Mbps data rate (the worst case) are chosen for the final testing.

IEEE802.11n-HT20n: Channel low(2422MHz), Channel middle(2437MHz) and Channel high (2452MHz) with preliminary test MCS 0~7, After the preliminary scan , the following test mode MCS 0 data rate (the worst case) are chosen for the final testing.

IEEE802.11n-HT40n:Channel low(2422MHz), Channel middle(2437MHz) and Channel high(2452MHz) with preliminary test MCS 0~7, After the preliminary scan , the following test mode MCS 0 data rate (the worst case) are chosen for the final testing.



## 5 SETUP OF EQUIPMENT UNDER TEST

### 5.1. DESCRIPTION OF SUPPORT UNITS

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

No.	Equipment	Model No.	Serial No.	FCC ID	Trade Name	Data Cable	Power Cord
1	LCD Monitor	SDM-HX7 3	9014264	DoC	SONY	Shielded, 1.8m with a Core	Un-Shielded, 1.5m
2	HDD-1	IC25N0 10ATDA04 -0	173W3644	DoC	TeraSys	Shielded, 1.5m	N/A
3	HDD-2	IC25N0 10ATDA04 -0	173W3646	DoC	TeraSys	Shielded, 1.5m	N/A
4	HDD-3	IC25N0 10ATDA04 -0	173T4556	DoC	IBM	Shielded, 1.5m	N/A
5	Speaker-1	CD-371	N/A	DoC	JINLIAN	Un-Shielded, 2.0m	N/A
6	Notebook PC	M285	1824064-1B	DoC	LEO	Line cable: Un-Shielded 1.8m LAN cable: Un-Shielded 1.8m	Shielded, 1.8m

**Note:**

- 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.

### 5.2. CONFIGURATION OF SYSTEM UNDER TEST

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



## 6 FACILITIES AND ACCREDITATIONS

### 6.1. FACILITIES

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

**No.10Weiye Rd, Innovation park, Eco&Tec, Development Zone, Kunshan City, Jiangsu, P.R.O.C**

The sites are constructed in conformance with the requirements of ANSI C63.4 and CISPR Publication 22. All receiving equipment conforms to CISPR Publication 16-1, "Radio Interference Measuring Apparatus and Measurement Methods."

### 6.2. ACCREDITATIONS

Our laboratories are accredited and approved by the following approval agencies according to ISO/IEC 17025.

<b>USA</b>	FCC,A2LA
<b>Japan</b>	VCCI
<b>Canada</b>	INDUSTRY CANADA,
<b>Taiwan</b>	TAF

Copies of granted accreditation certificates are available for downloading from our web site, <http://www.ccsemc.com.tw>

### 6.3. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in ETR 028:

<b>Measurement</b>	<b>Frequency</b>	<b>Uncertainty</b>
Conducted emissions	9kHz~30MHz	+/- 1.13dB
Radiated emissions	30MHz ~ 200MHz	+/- 3.84dB
	200MHz ~1000MHz	+/- 3.82dB

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.



## 7 LIMITS AND RESULTS

### 7.1. POWER LINE CONDUCTED EMISSIONS MEASUREMENT

#### 7.1.1. LIMITS OF CONDUCTED EMISSIONS MEASUREMENT

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  $\mu$ 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 $\mu$ 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

**NOTE:**

- (1) The lower limit shall apply at the transition frequencies.
- (2) The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50 MHz.
- (3) All emanations from a class A/B digital device or system, including any network of conductors and apparatus connected thereto, shall not exceed the level of field strengths specified above.

## TEST INSTRUMENTS

Conducted Emission				
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
EMC Analyzer	Agilent	E7402A	US41160329	03/05/2010
V (V-LISN)	Schwarzbeck	NNLK 8129	8129-143	05/06/2010
LISN (EUT)	FCC	FCC-LISN-50/250-50-2-02	SN:05012	05/06/2010
TRANSIENT LIMITER	SCHAFFNER	CFL9206	1710	04/18/2010
RF Current Probe	FCC	F-65A	147	05/06/2010

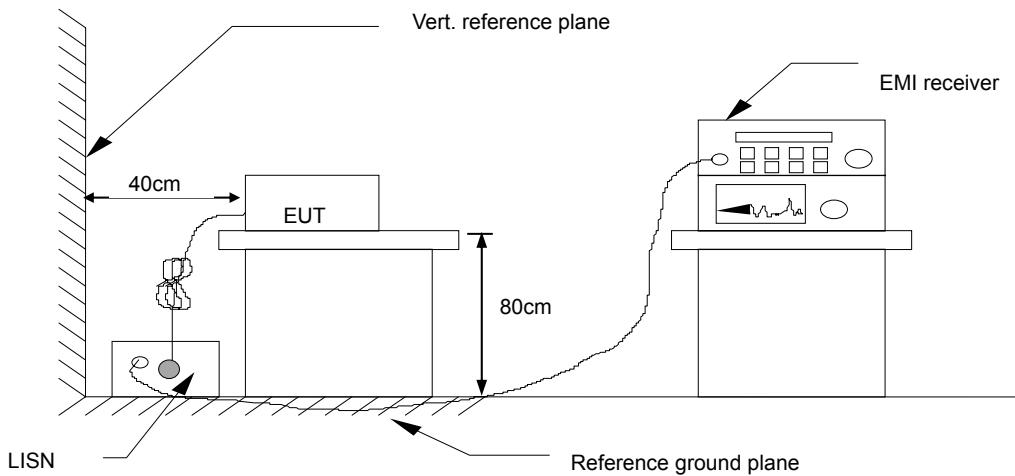
**NOTE:** 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.  
2. N.C.R = No Calibration Request.



## 7.1.2. TEST PROCEDURES (please refer to measurement standard)

- The EUT and Support equipment, if needed, was placed on a non-conducted table, which is 0.8m above the ground plane and 0.4m away from the conducted wall.
- The test equipment EUT installed received AC main power, through a Line Impedance Stabilization Network (LISN), which supplied power source and was grounded to the ground plane. All support equipment power received from a second LISN. The two LISNs provide 50 ohm/ 50uH of coupling impedance for the measuring instrument.
- The EUT test program was started. Emissions were measured on each current carrying line of the EUT using an EMI Test Receiver connected to the LISN powering the EUT.
- The frequency range from 150 kHz to 30 MHz was searched. The test data of the worst-case condition(s) was recorded. Emission levels under limit 20dB were not recorded.

### 7.1.3. TEST SETUP



- For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

### 7.1.4. Data Sample:

Frequency (MHz)	QP Reading (dBuV)	AV Reading (dBuV)	Correction factor (dB)	QP Result (dBuV)	AV Result (dBuV)	QP Limit (dBuV)	AV Limit (dBuV)	QP Margin (dB)	AV Margin (dB)	Note
XXX	37.58	35.11	10.10	47.68	45.21	63.49	53.49	-15.81	-8.28	L1

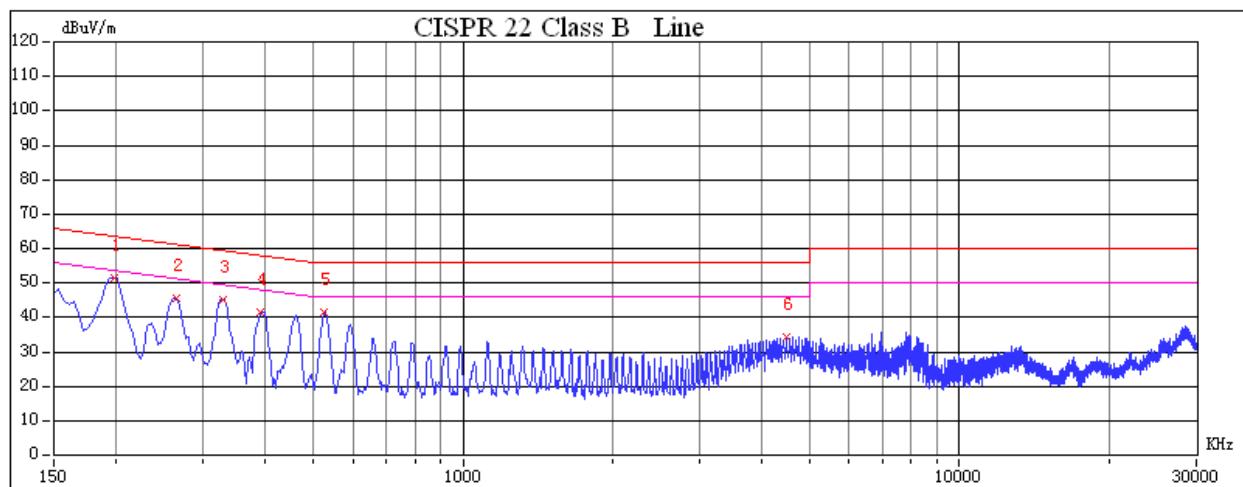
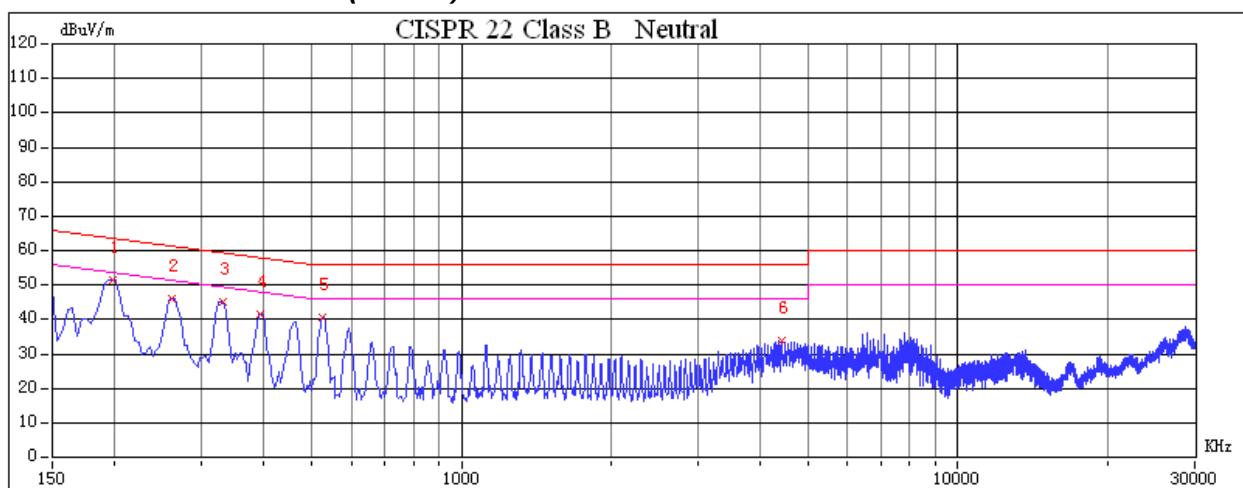
Frequency (MHz) = Emission frequency in MHz  
Reading (dBuV) = Uncorrected Analyzer/Receiver reading  
Correction factor (dB) = Insertion loss of LISN  
Limit (dBuV) = Limit stated in standard  
Margin (dB) = Reading (dBuV) – Limit (dBuV)  
Note = Current carrying line of reading

**7.1.5. TEST RESULTS****Adapter :FUJITSU**

<b>Model No.</b>	<b>M20**</b>	<b>Test Mode</b>	<b>Normal Link</b>
<b>Environmental Conditions</b>	<b>25deg.C,49% RH, 991 hPa</b>	<b>6dB BANDWIDTH</b>	<b>9 kHz</b>
<b>Tested by:</b>	<b>JEFF</b>		

<b>Freq. (MHz)</b>	<b>Q.P. Raw reading (dBuV)</b>	<b>AVG Raw reading (dBuV)</b>	<b>Correction factor(dB)</b>	<b>Q.P. Amptd. (dBuV)</b>	<b>AVG Amptd. (dBuV)</b>	<b>Q.P. Limit (dBuV)</b>	<b>AVG Limit (dBuV)</b>	<b>Q.P. Margin (dB)</b>	<b>AVG Margin (dB)</b>	<b>Line/Neutral</b>
0.198	39.79	32.83	10.11	49.90	42.94	64.62	54.62	-14.72	-11.68	Line
0.265	33.94	28.88	10.21	44.15	39.09	62.72	52.72	-18.57	-13.63	Line
0.328	33.37	28.72	10.31	43.68	39.03	60.92	50.92	-17.24	-11.89	Line
0.391	28.29	23.75	10.40	38.69	34.15	59.11	49.11	-20.42	-14.96	Line
0.524	28.27	22.25	10.83	39.10	33.08	56.00	46.00	-16.90	-12.92	Line
4.484	20.97	17.58	11.18	32.15	28.76	56.00	46.00	-23.85	-17.24	Line
0.198	39.44	32.69	10.18	49.62	42.87	64.62	54.62	-15.00	-11.75	Neutral
0.261	34.07	28.94	10.17	44.24	39.11	62.82	52.82	-18.58	-13.71	Neutral
0.332	33.56	29.04	10.15	43.71	39.19	60.81	50.81	-17.10	-11.62	Neutral
0.395	29.86	25.48	10.13	39.99	35.61	59.01	49.01	-19.02	-13.40	Neutral
0.524	27.98	21.87	10.14	38.12	32.01	56.00	46.00	-17.88	-13.99	Neutral
4.412	20.70	17.32	10.88	31.58	28.20	56.00	46.00	-24.42	-17.80	Neutral

**REMARKS:** L1 = Line One (Live Line) / L2 = Line Two (Neutral Line)

**Test Plots*****Conducted emissions (Line 1)******Conducted emissions (Line 2)***



## 7.2. SPURIOUS EMISSIONS MEASUREMENT

### 7.2.1. LIMITS OF CONDUCTED EMISSIONS MEASUREMENT

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)).

### 7.2.2. TEST INSTRUMENTS

Conducted Emissions Test Site				
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
Spectrum Analyzer	Agilent	E4446A	MY44020154	11/12/2009

### 7.2.3. TEST PROCEDURE (please refer to measurement standard)

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.

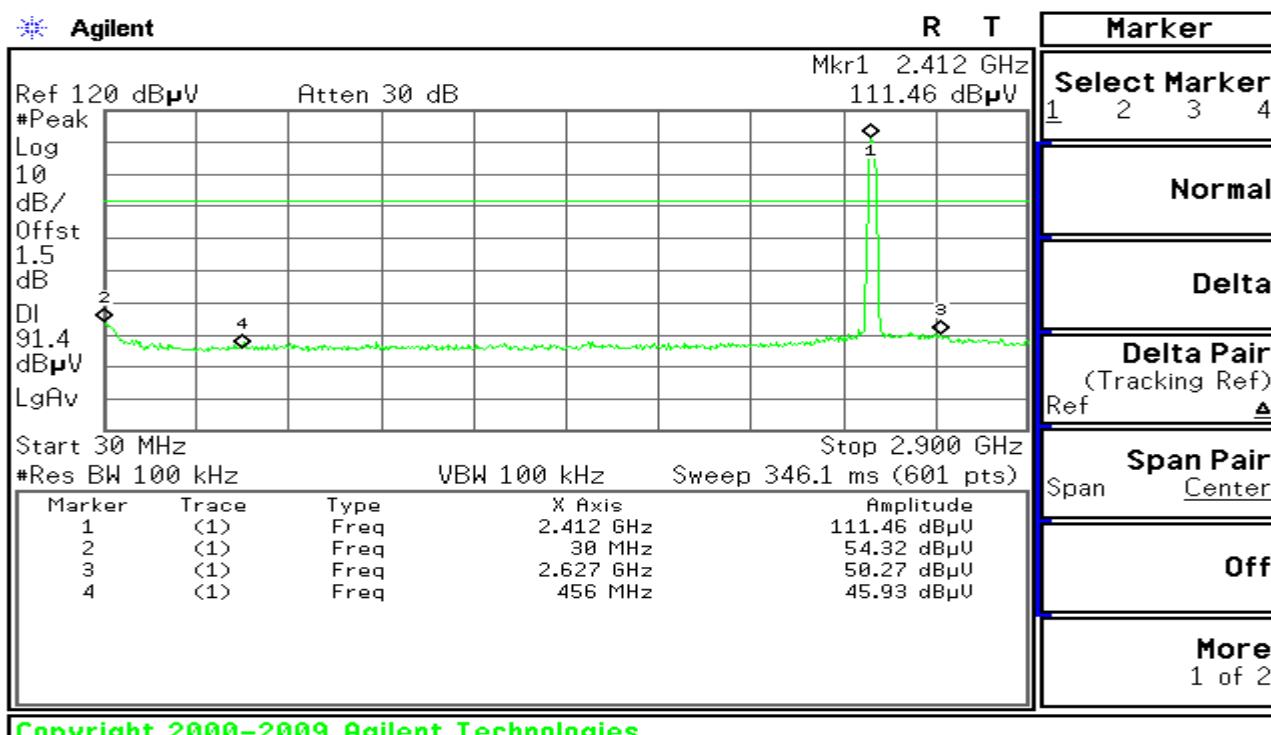
Measurements are made over the 30MHz to 26GHz range with the transmitter set to the lowest, middle, and highest channels.

## 7.2.4. TEST RESULTS

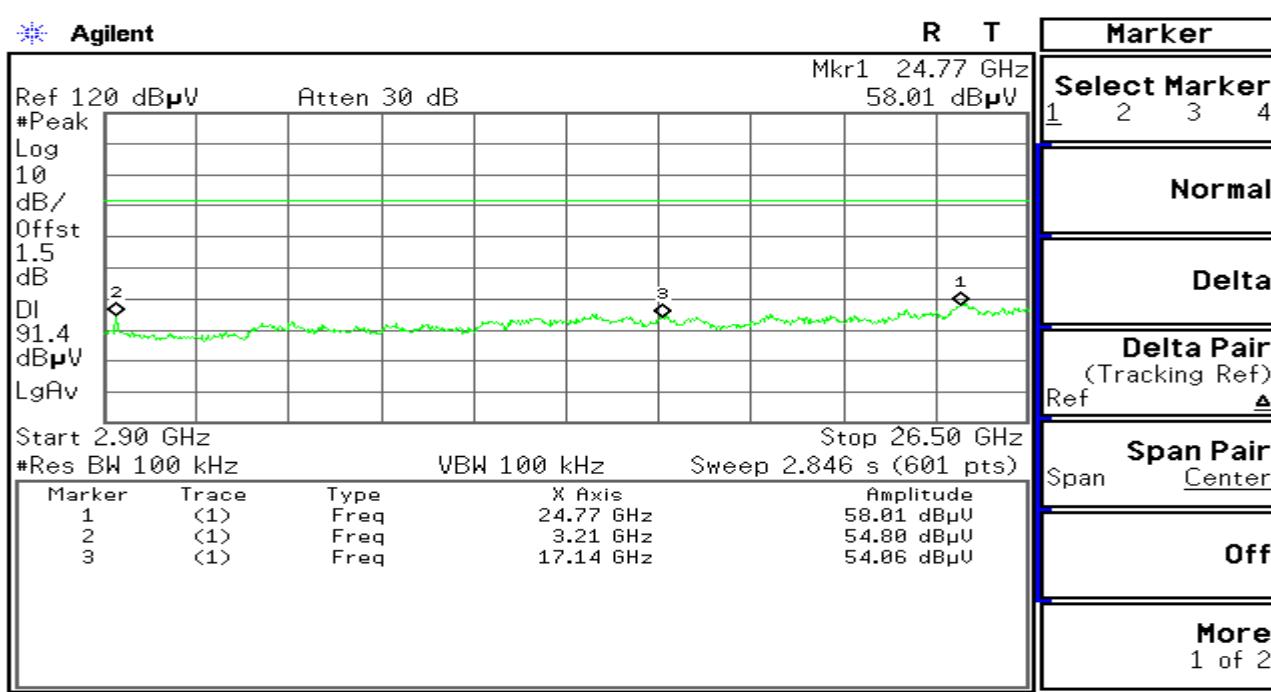
### Test Plot (IEEE 802.11b mode)

#### CH Low

30MHz ~ 2.9GHz

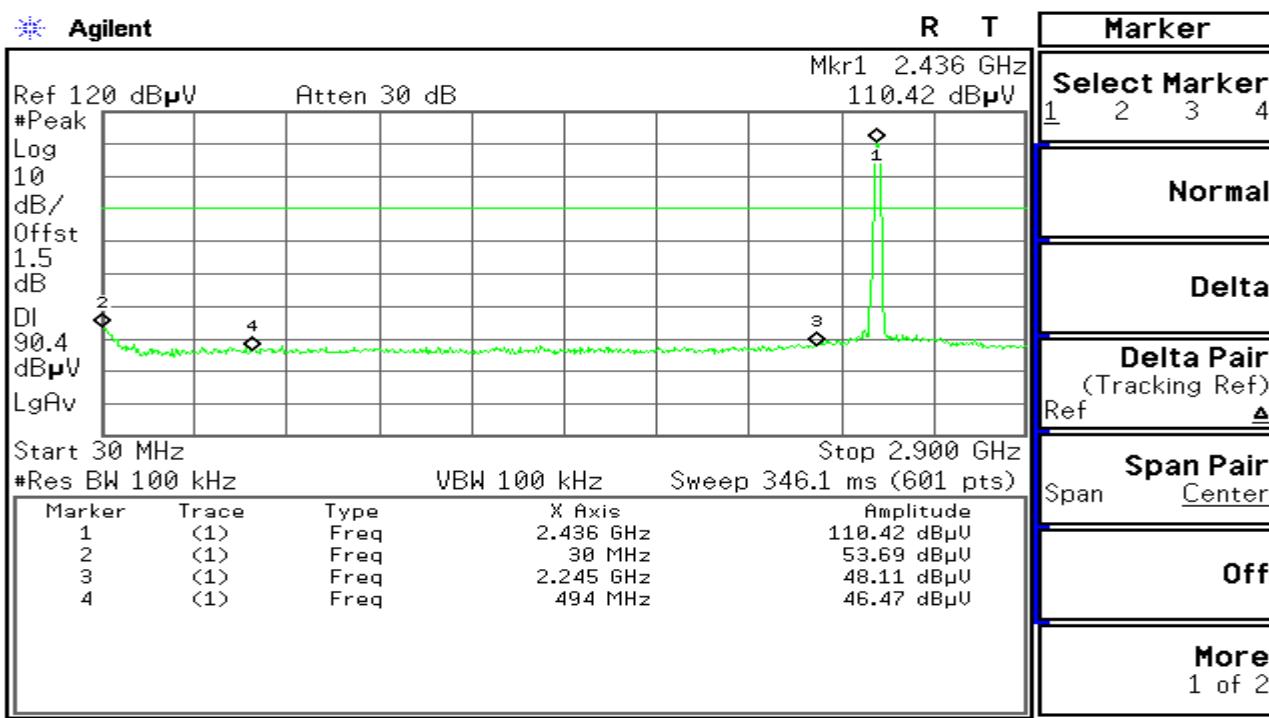


2.9GHz ~ 26.5GHz

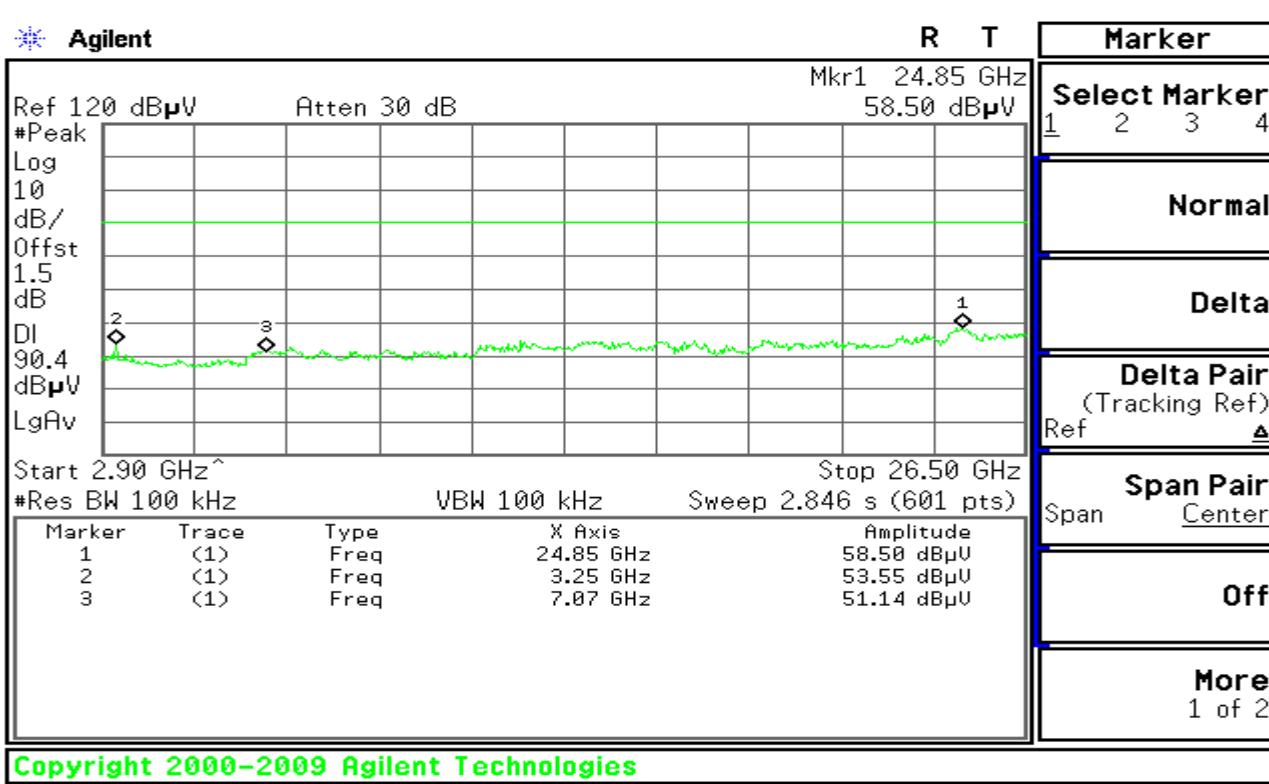


CH Mid

30MHz ~ 2.9GHz



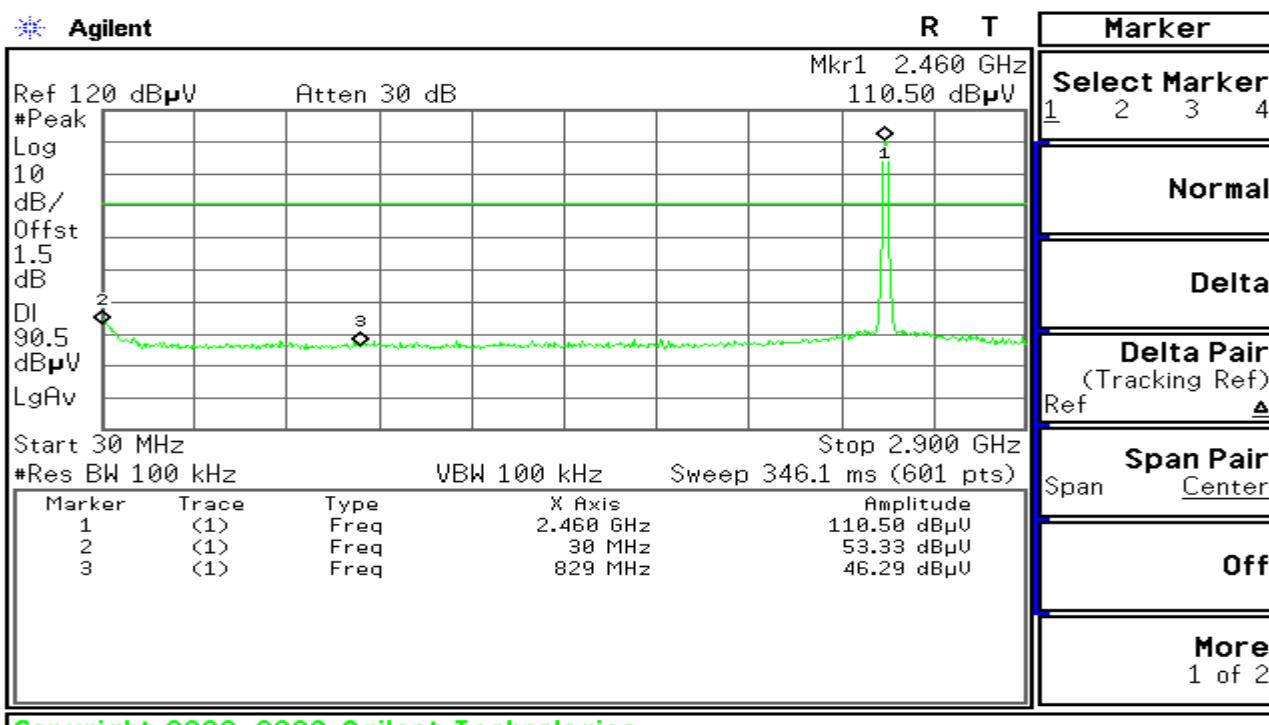
2.9GHz ~ 26.5GHz



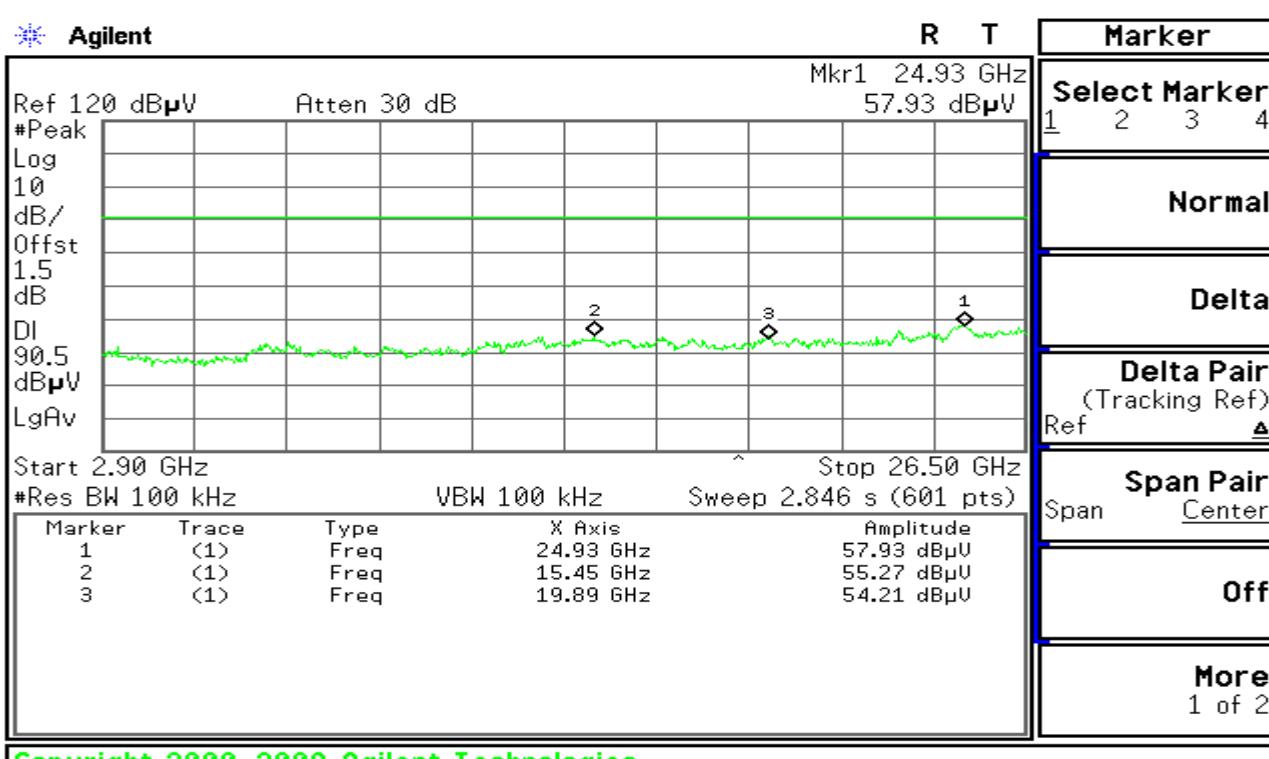


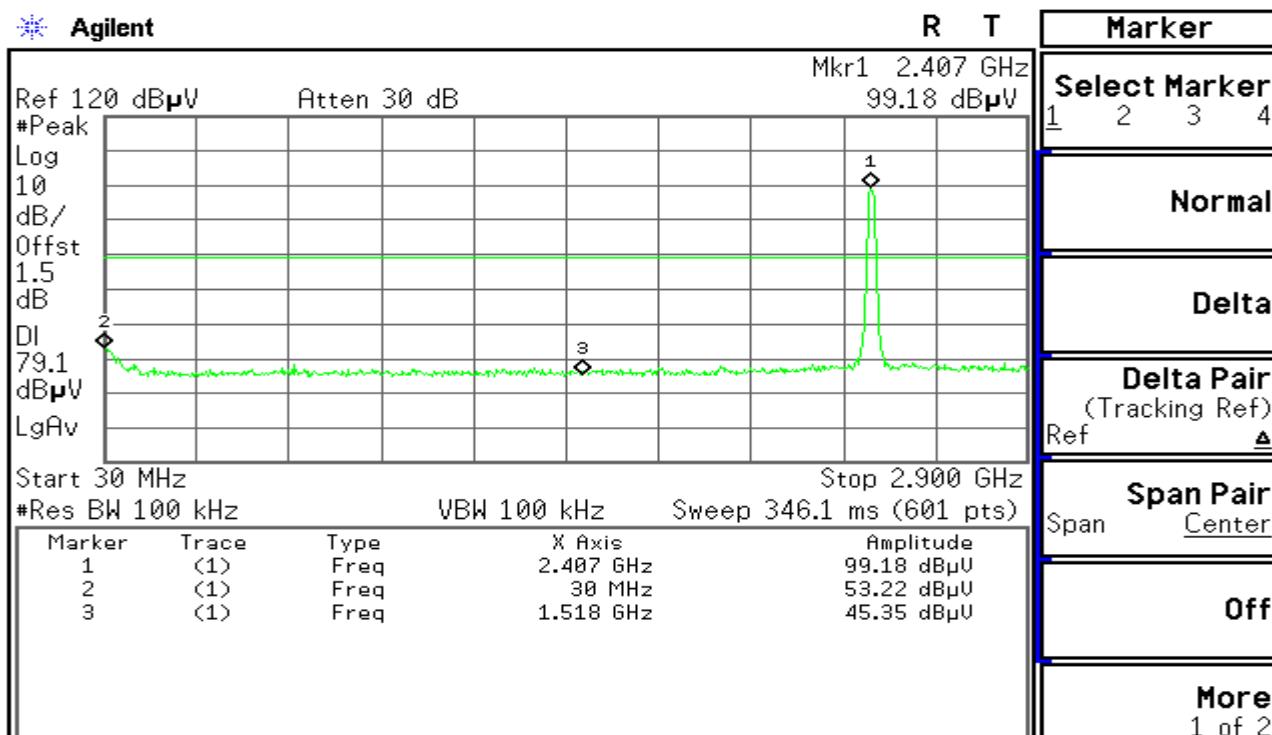
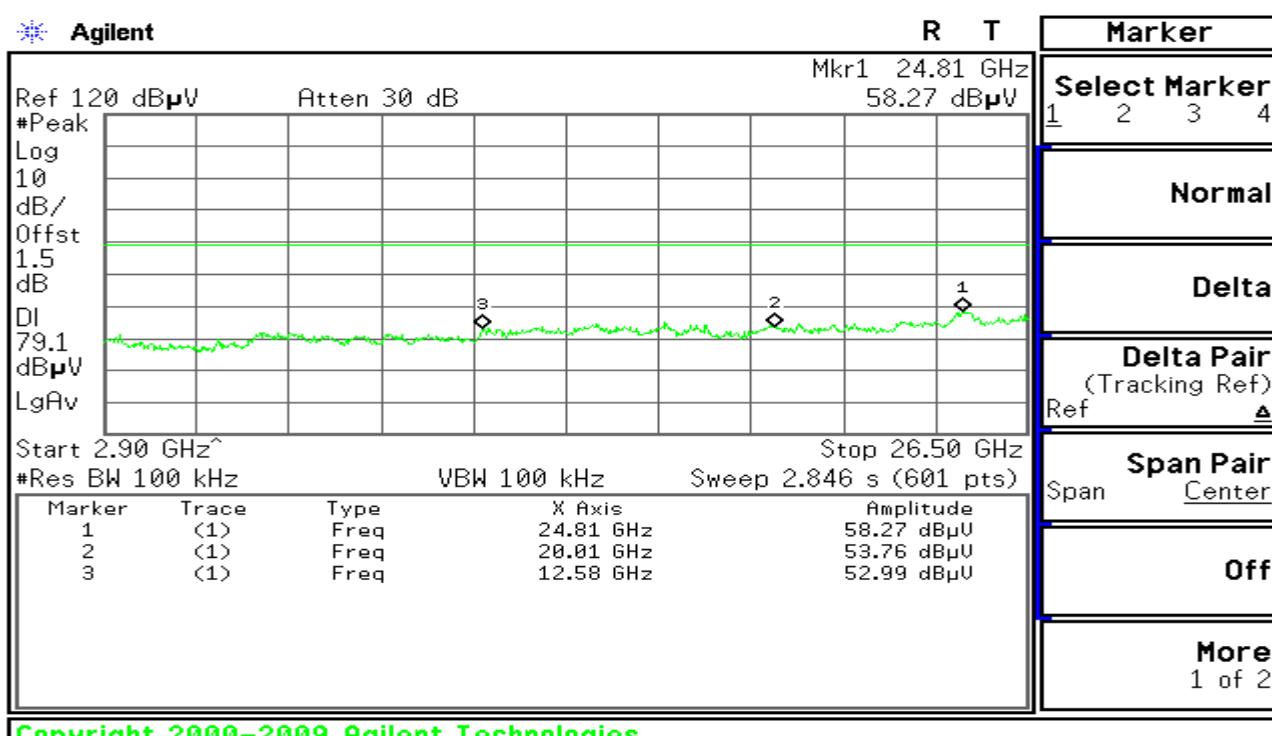
## CH High

30MHz ~ 2.9GHz



2.9GHz ~ 26.5GHz

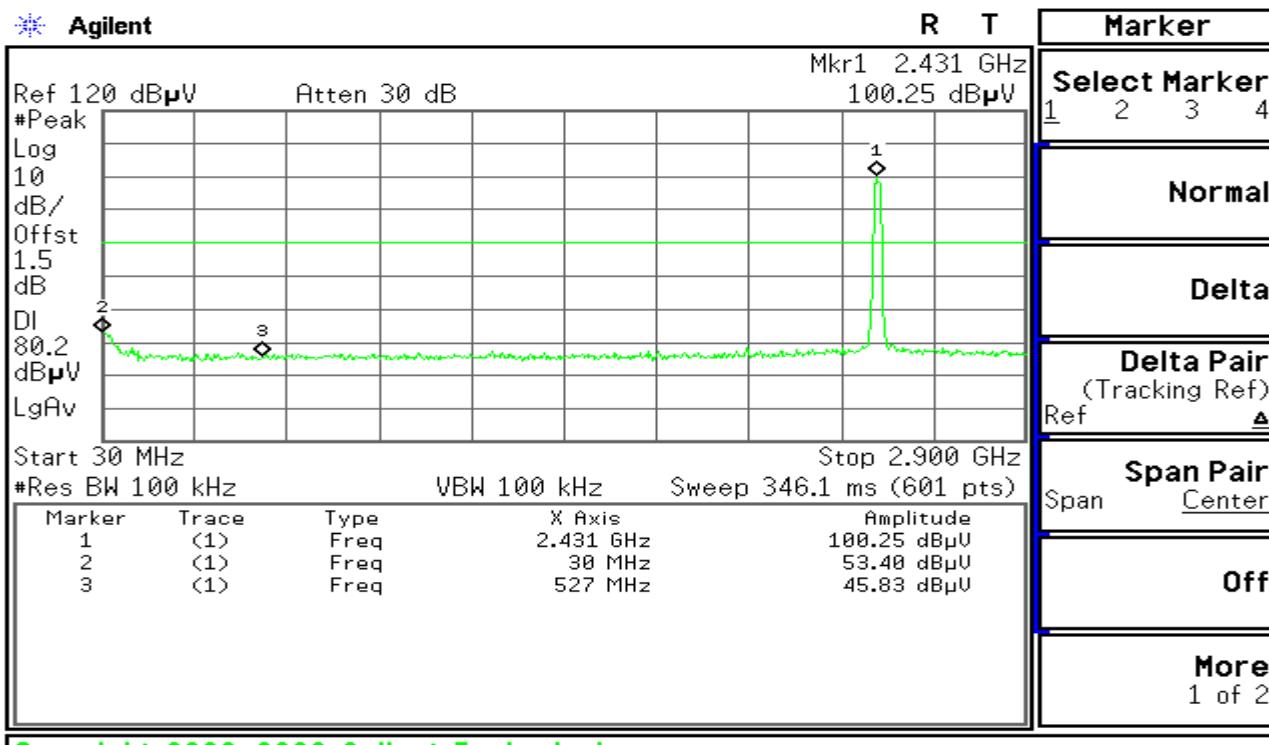


**Test Plot (IEEE 802.11g mode)****CH Low****30MHz ~ 2.9GHz****2.9GHz ~ 26.5GHz**

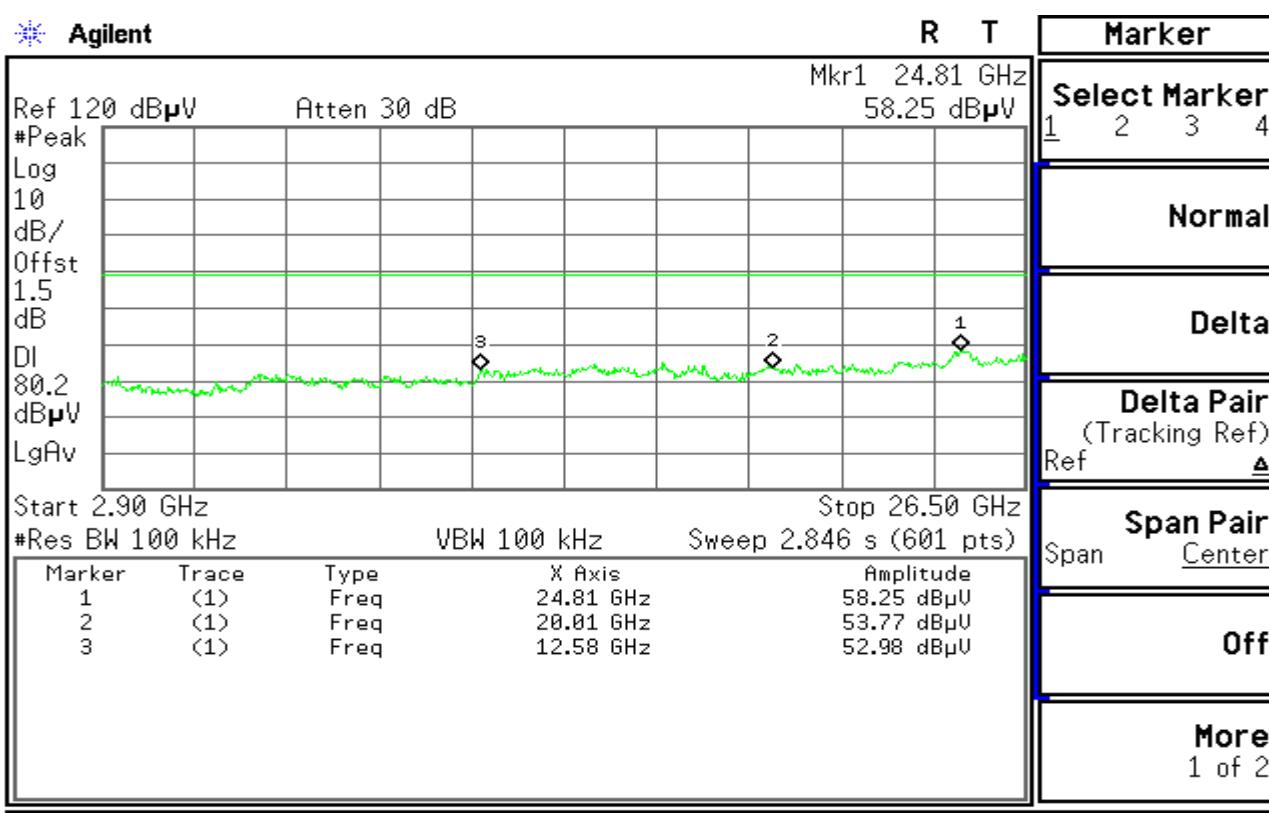


## CH Mid

30MHz ~ 2.9GHz



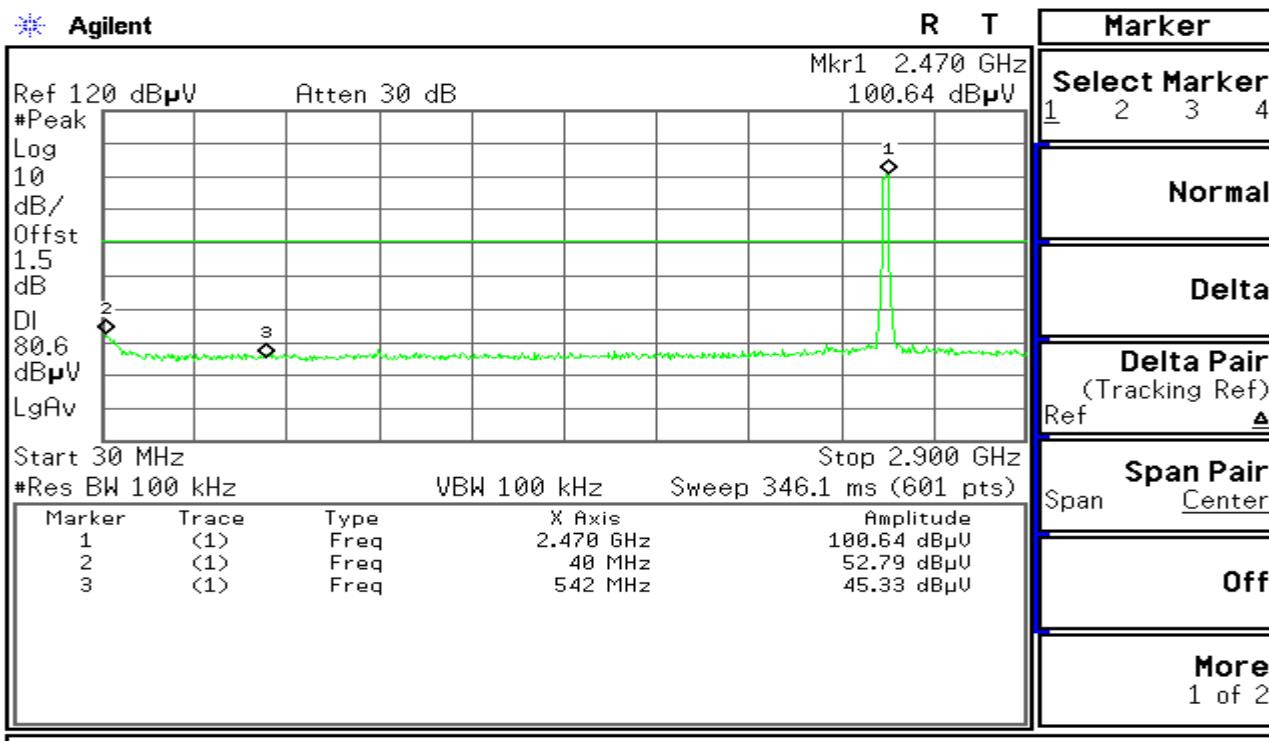
2.9GHz ~ 26.5GHz



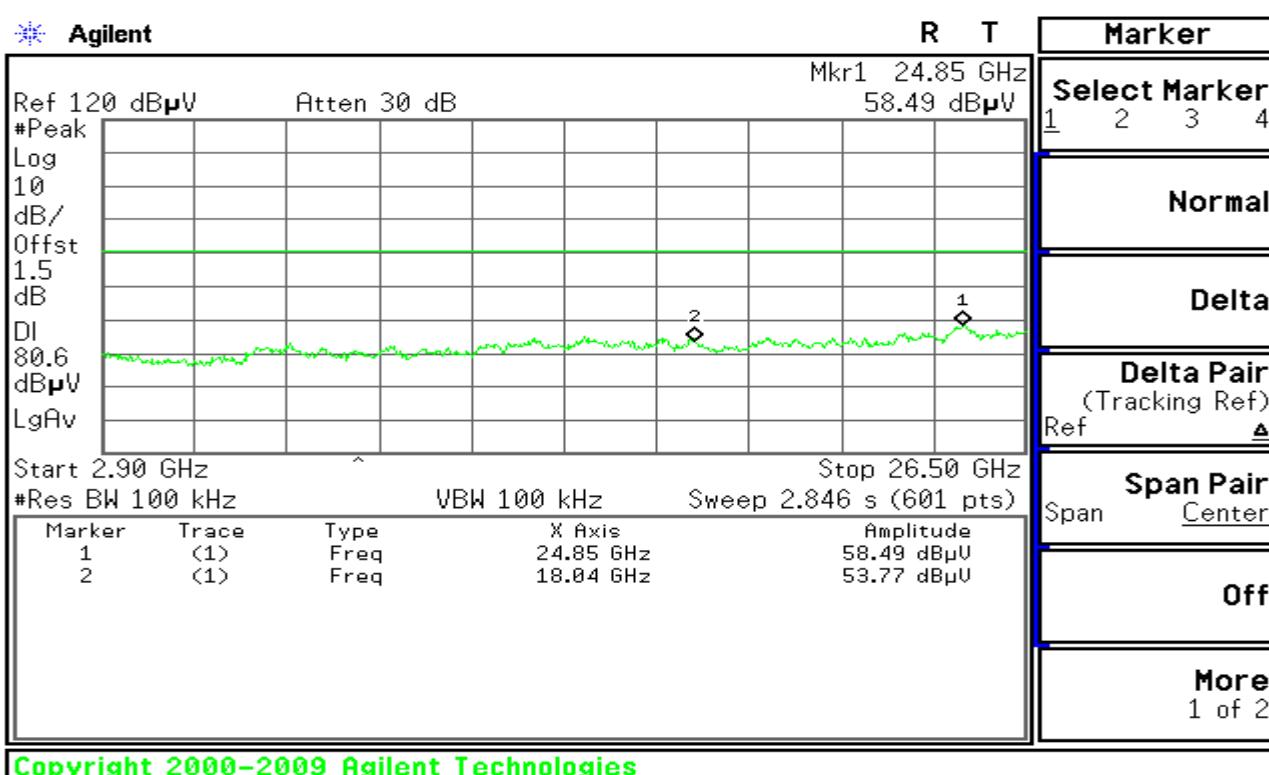


## CH High

30MHz ~ 2.9GHz

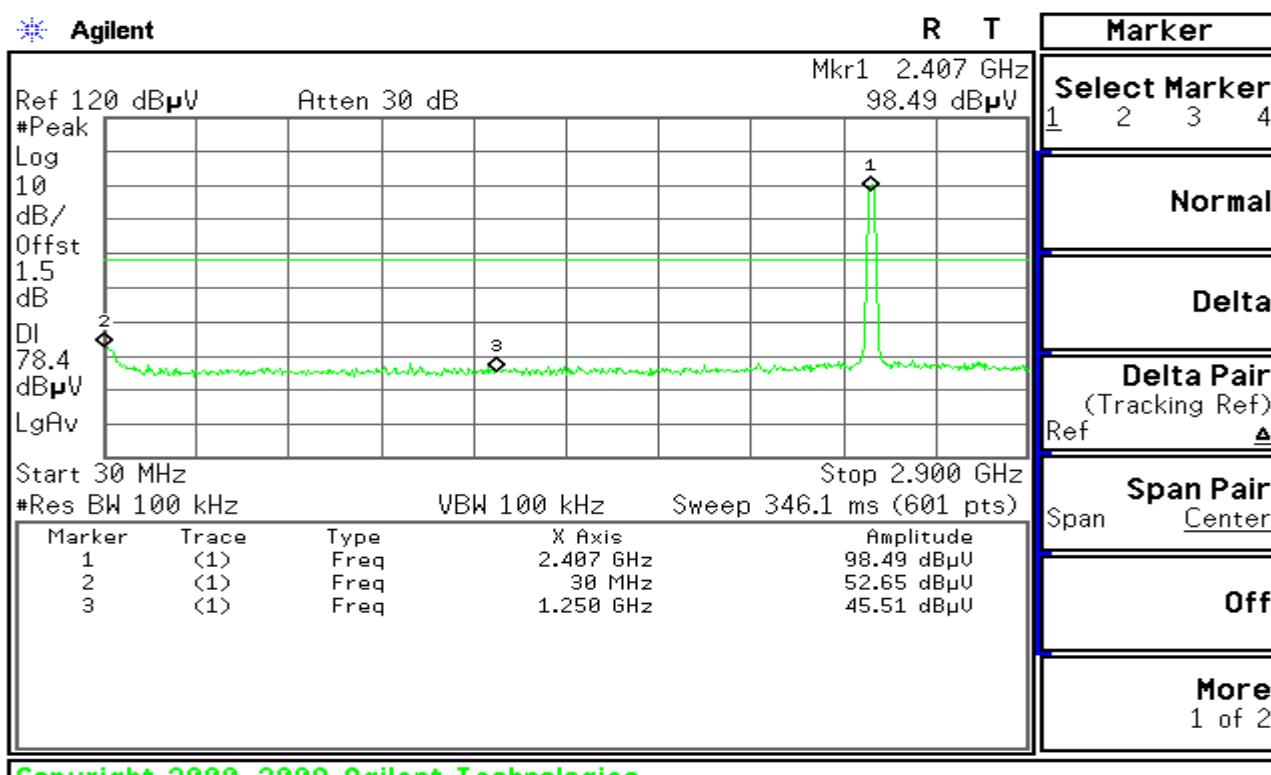


2.9GHz ~ 26.5GHz

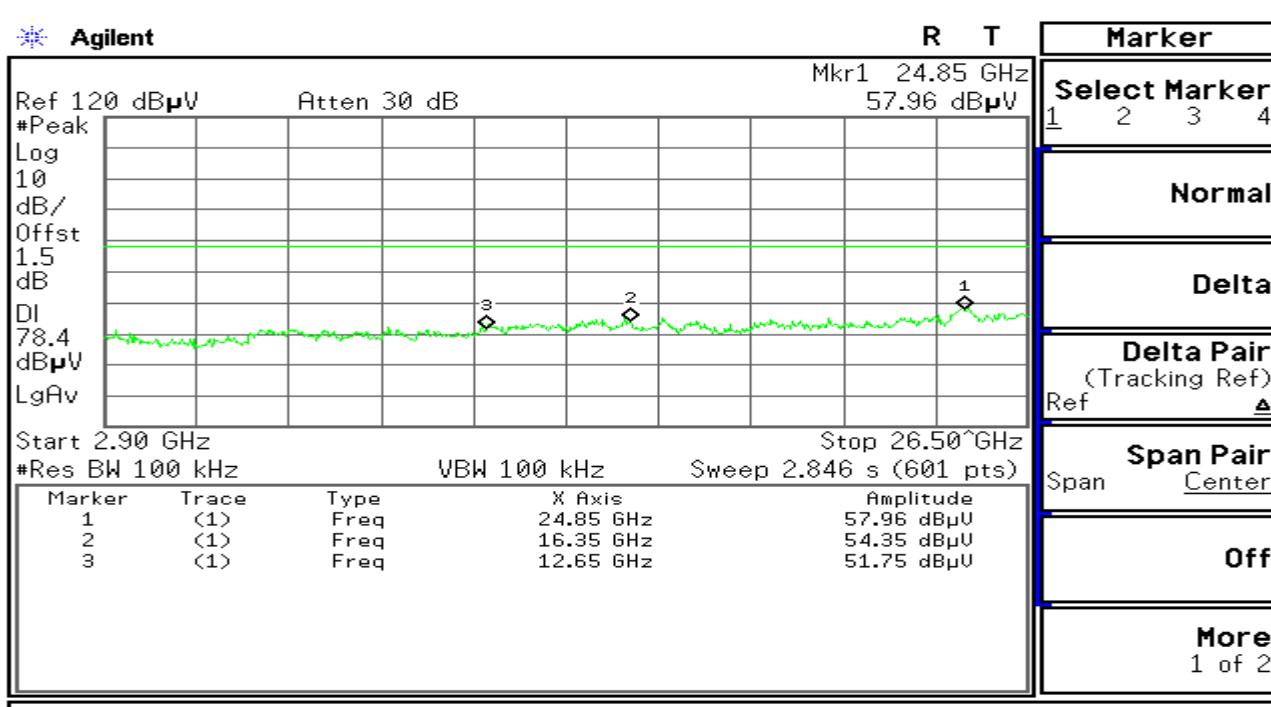


Test Plot (IEEE 802.11n-HT20n mode)CH Low

30MHz ~ 2.9GHz



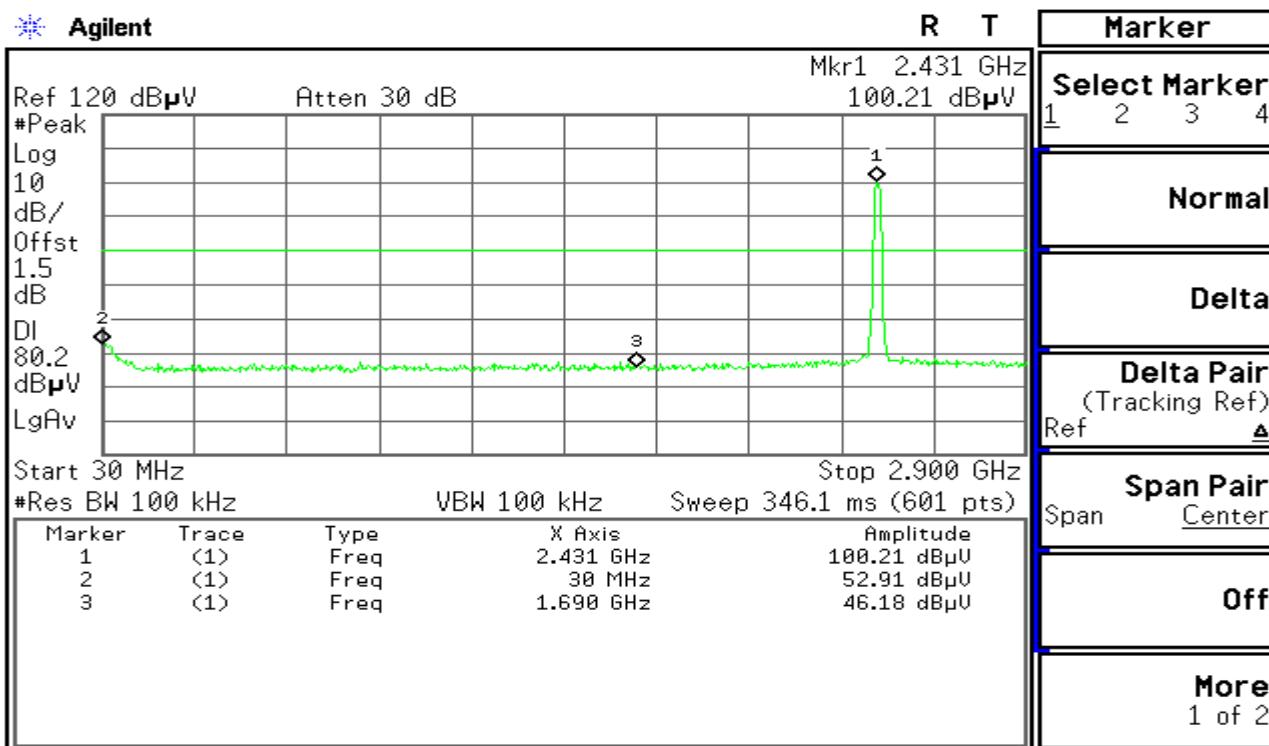
2.9GHz ~ 26.5GHz



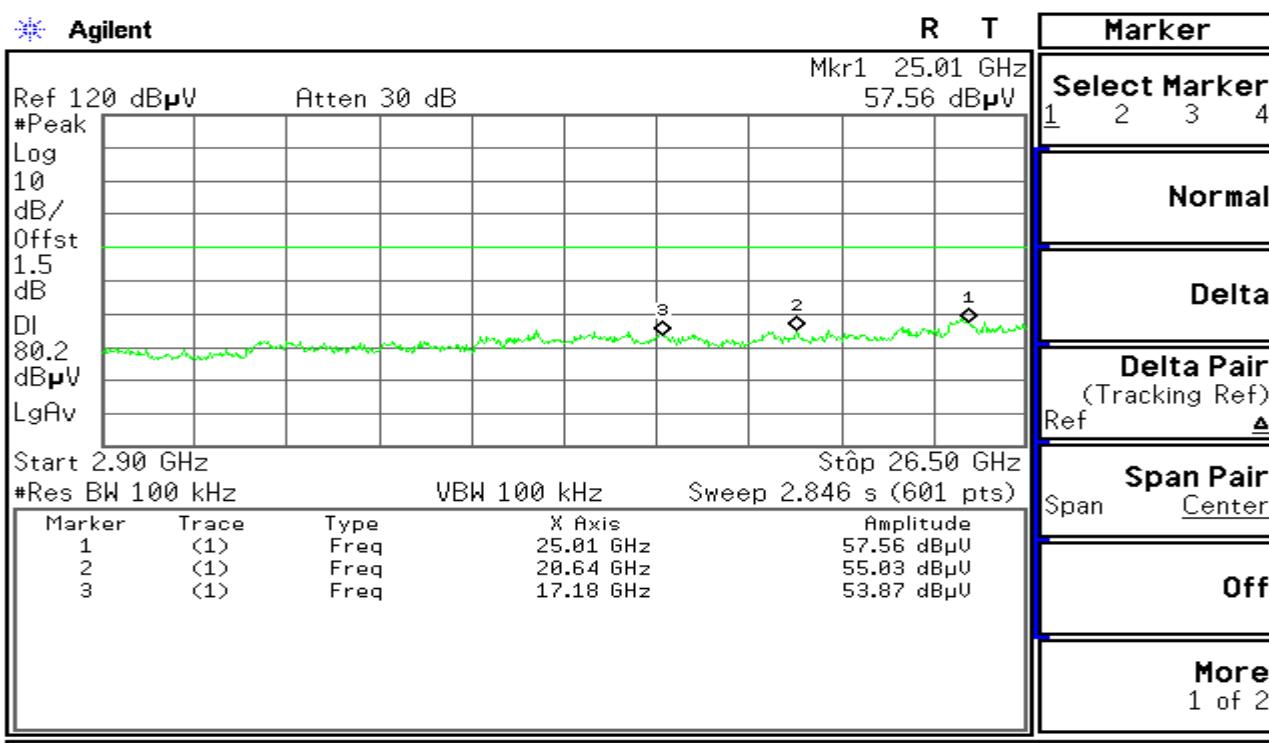


## CH Mid

### 30MHz ~ 2.9GHz



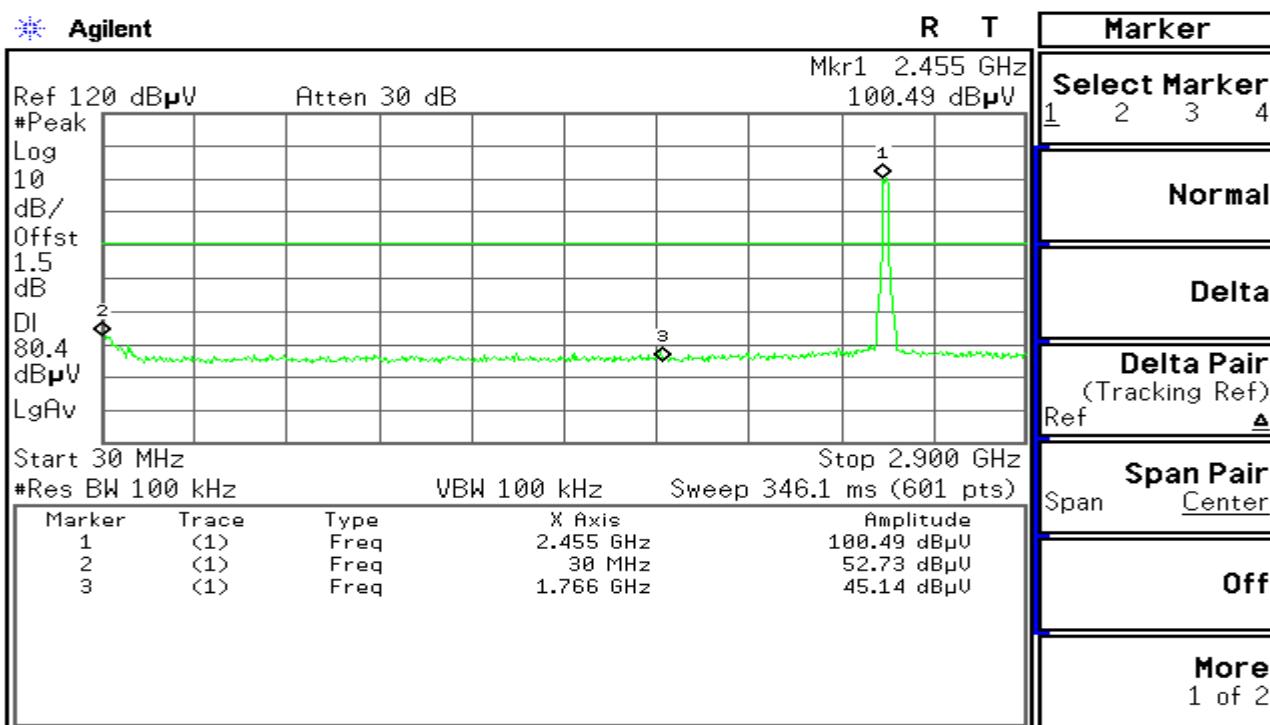
### 2.9GHz ~ 26.5GHz



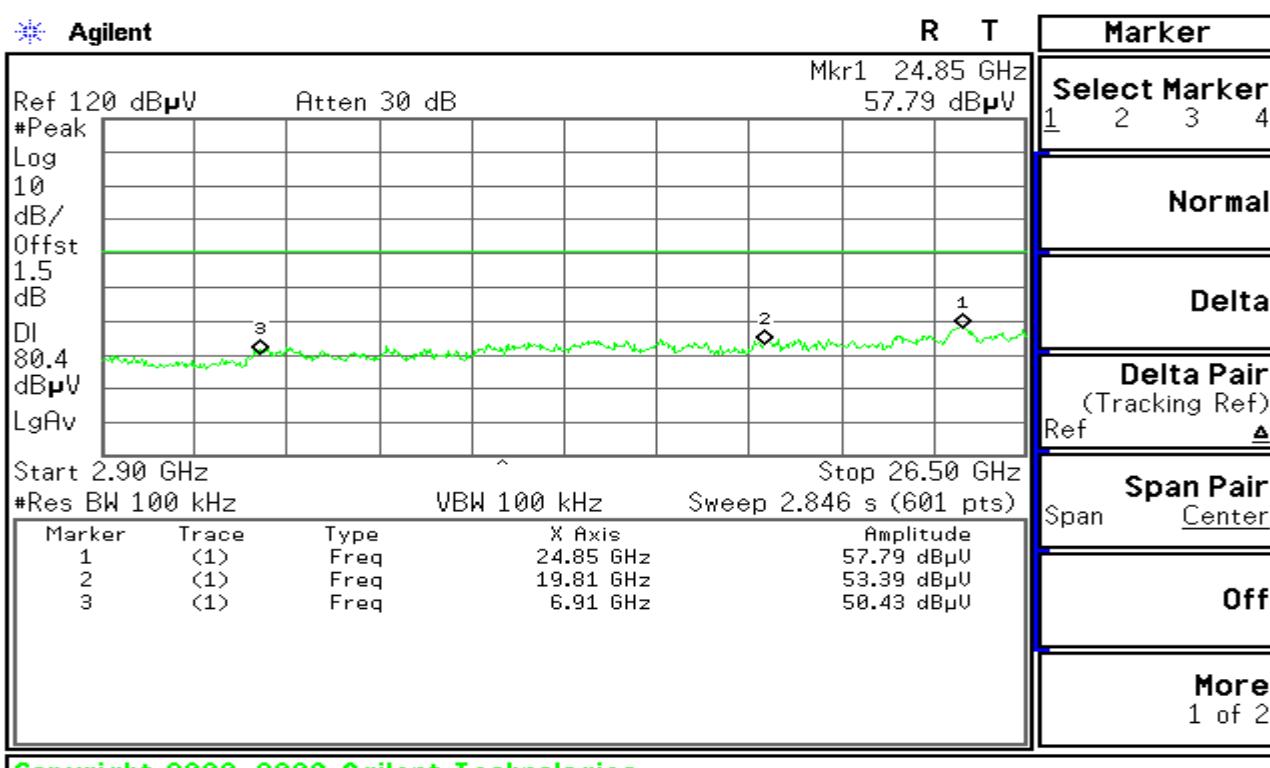


## CH High

### 30MHz ~ 2.9GHz



### 2.9GHz ~ 26.5GHz

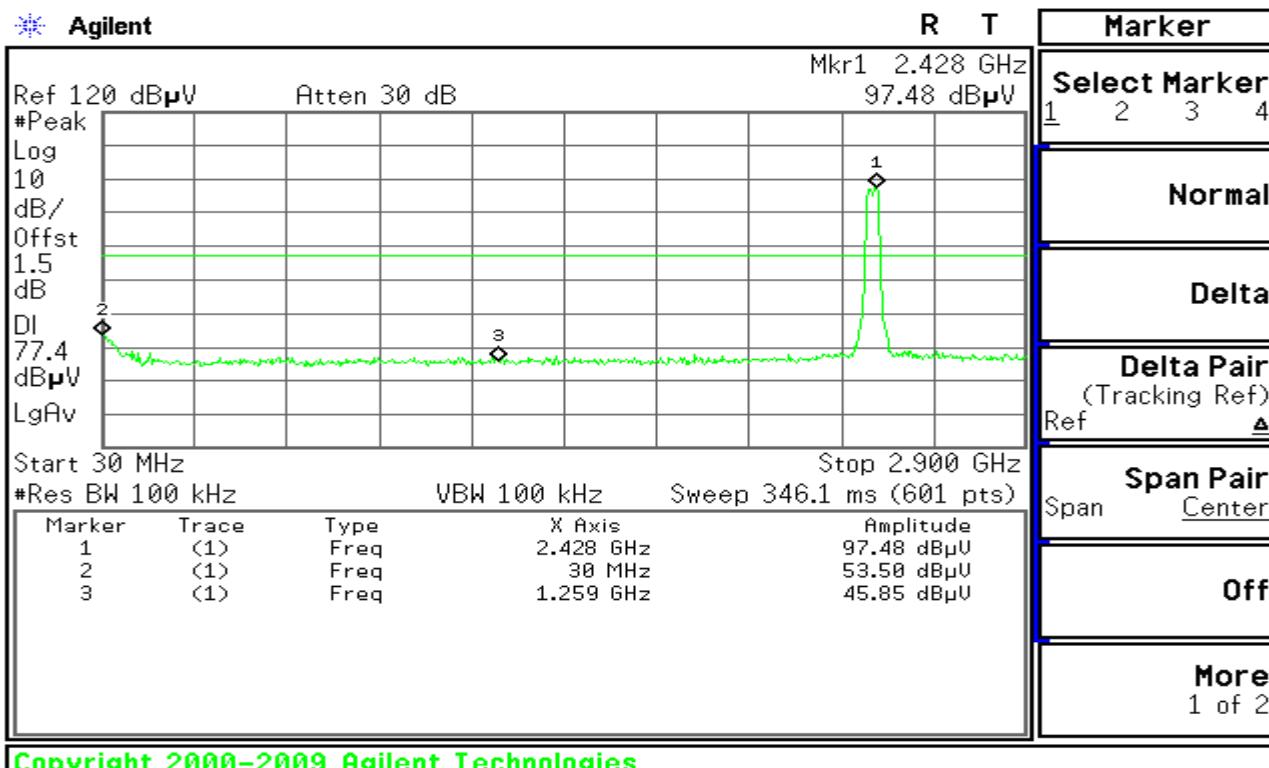




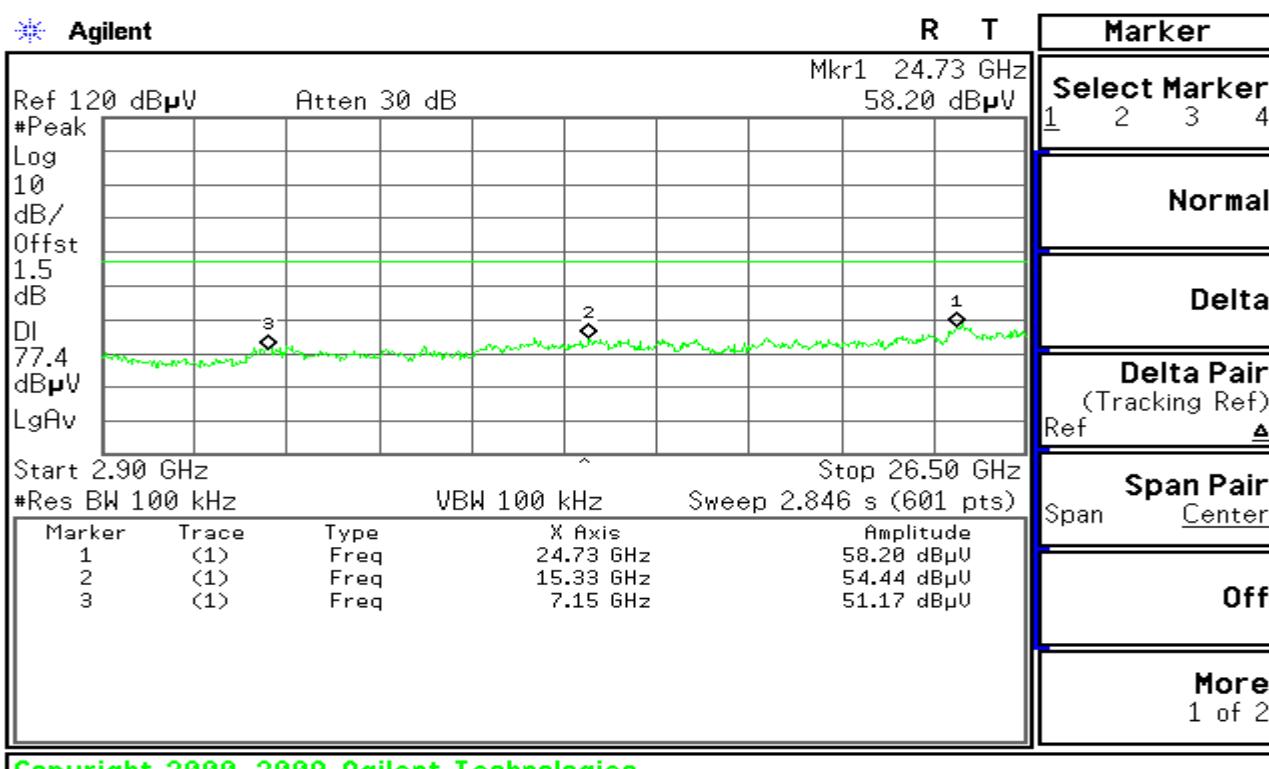
## Test Plot (IEEE 802.11n-HT40n mode)

CH Low

30MHz ~ 2.9GHz



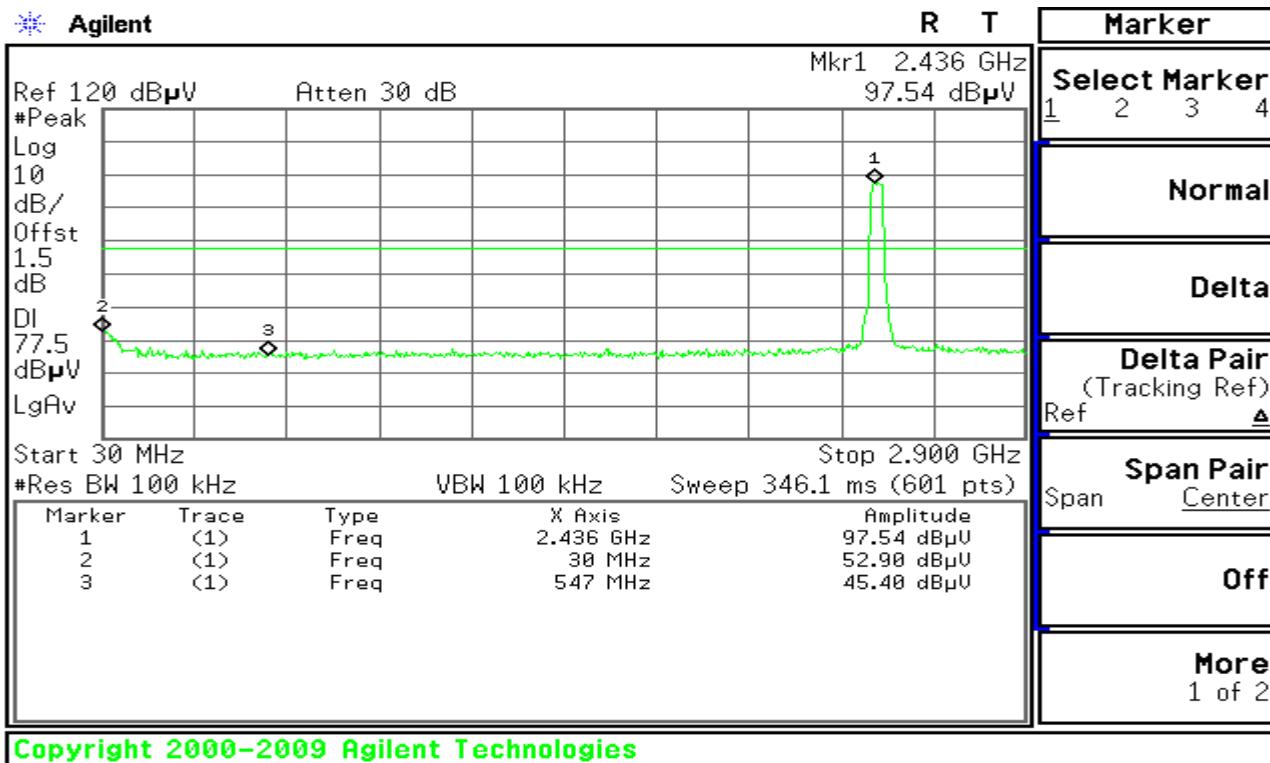
## 2.9GHz ~ 26.5GHz



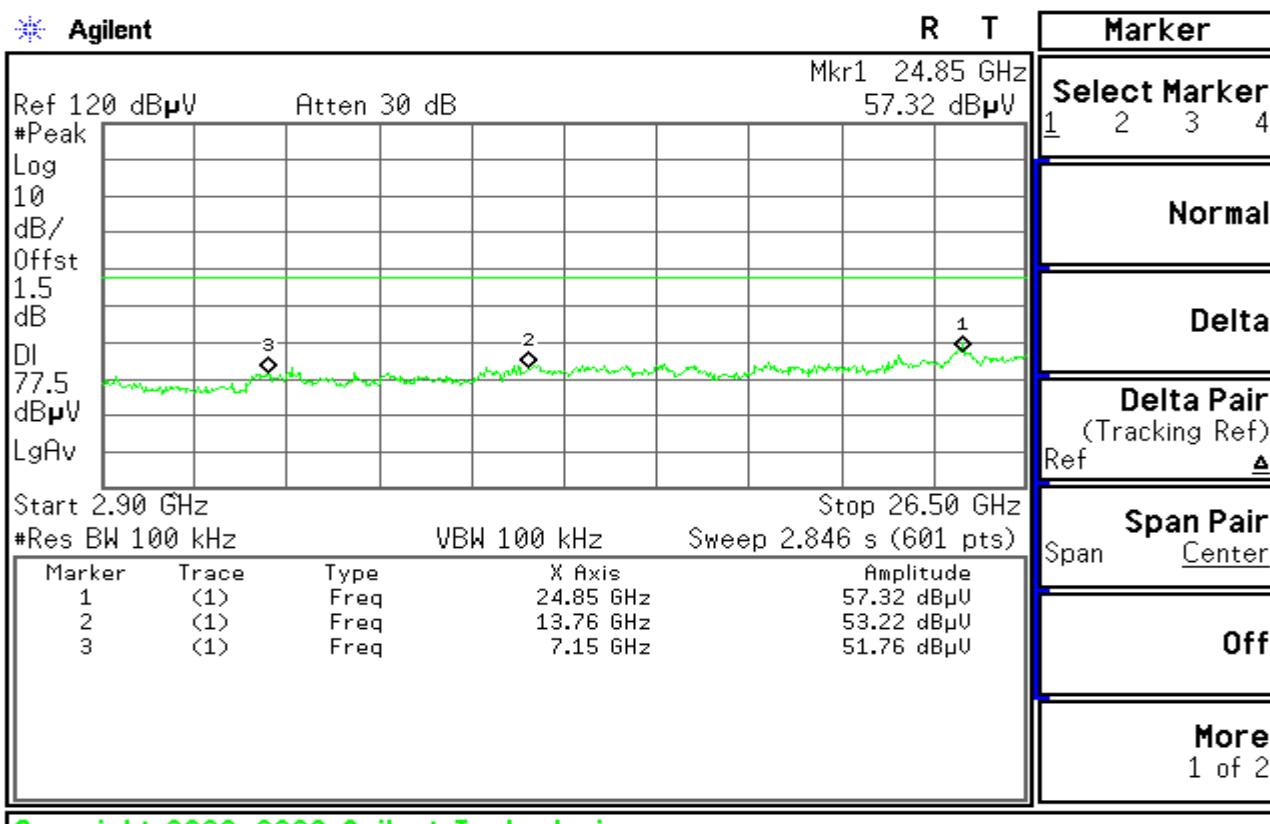


## CH Mid

### 30MHz ~ 2.9GHz



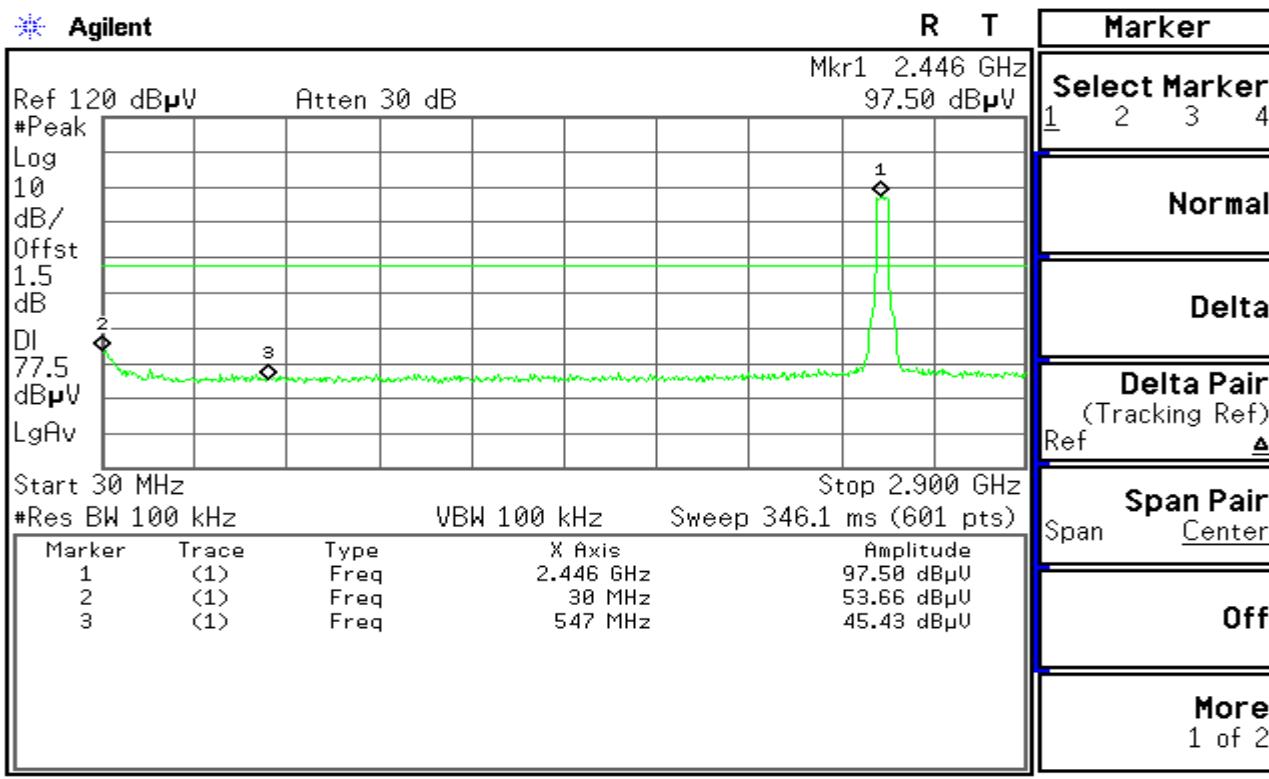
### 2.9GHz ~ 26.5GHz



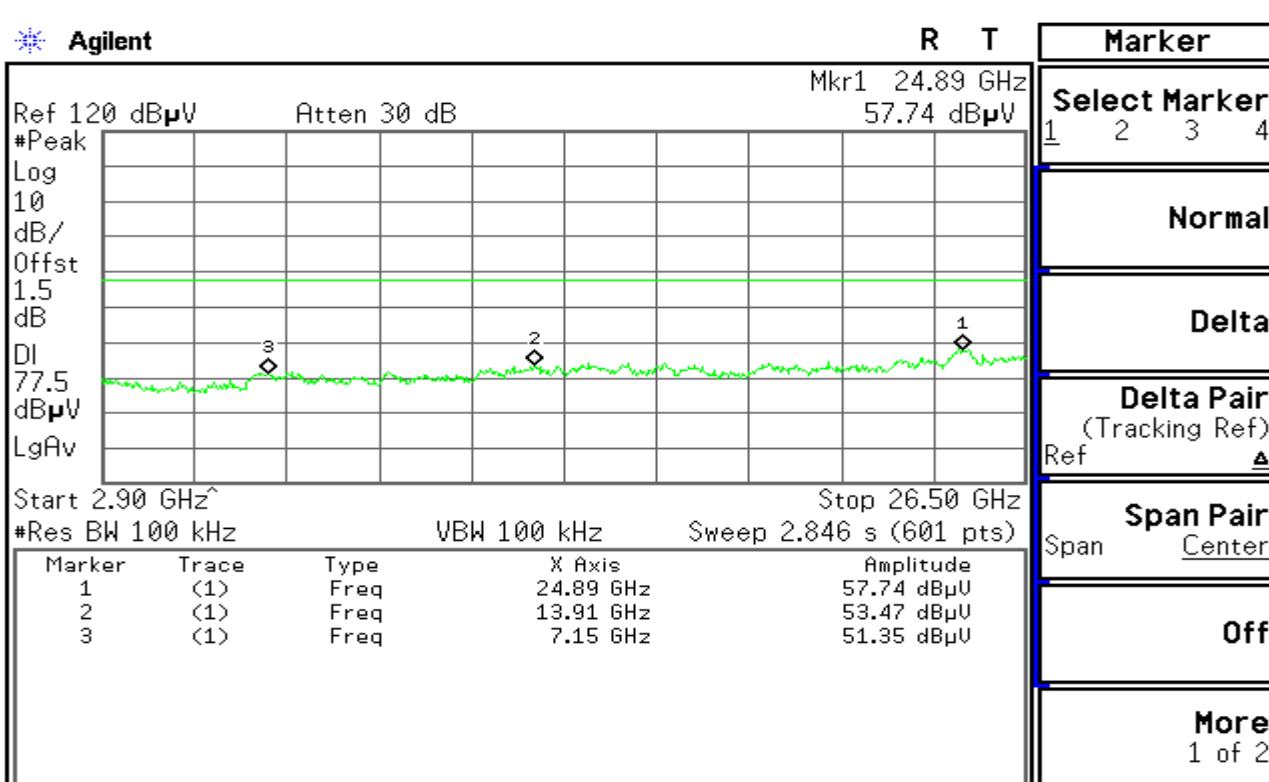


## CH High

### 30MHz ~ 2.9GHz



### 2.9GHz ~ 26.5GHz





## 7.2.5. Radiated Emissions

### 7.2.5.1. LIMITS OF RADIATED EMISSIONS MEASUREMENT

- 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 ( $\mu$ 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.

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

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

**NOTE:** (1) The lower limit shall apply at the transition frequencies.

(2) Emission level (dB $\mu$ V/m) = 20 log Emission level ( $\mu$ V/m).

**7.2.5.2. TEST INSTRUMENTS**

<b>3M Semi Anechoic Chamber (977)</b>				
<b>Name of Equipment</b>	<b>Manufacturer</b>	<b>Model</b>	<b>Serial Number</b>	<b>Calibration Due</b>
Spectrum Analyzer	Agilent	E4446A	MY44020154	11/12/2009
Spectrum Analyzer	Agilent	E4446A	US44300398	07/25/2010
EMI Test Receiver	R&S	ESPI3	101026	05/09/2010
Pre-Amplifier	MINI	ZFL-1000VH2	d041703	05/06/2010
Pre-Amplifier	Miteq	NSP4000-NF	870731	02/28/2010
Bilog Antenna	Sunol	JB1	A110204-2	11/22/2009
Horn-antenna	SCHWARZBECK	BBHA9120D	D:266	09/01/2009
PSG Analog Signal Generator	Agilent	E8257C	MY43321570	12/19/2009
Turn Table	CT	CT123	4165	N.C.R
Antenna Tower	CT	CTERG23	3256	N.C.R
Controller	CT	CT100	95637	N.C.R
Site NSA	CCS	N/A	N/A	04/06/2010

**NOTE:** 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

2. The FCC Site Registration number is 238958, 424105.

4. N.C.R = No Calibration Required.

**7.2.5.3. TEST PROCEDURE** (please refer to measurement standard)

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:

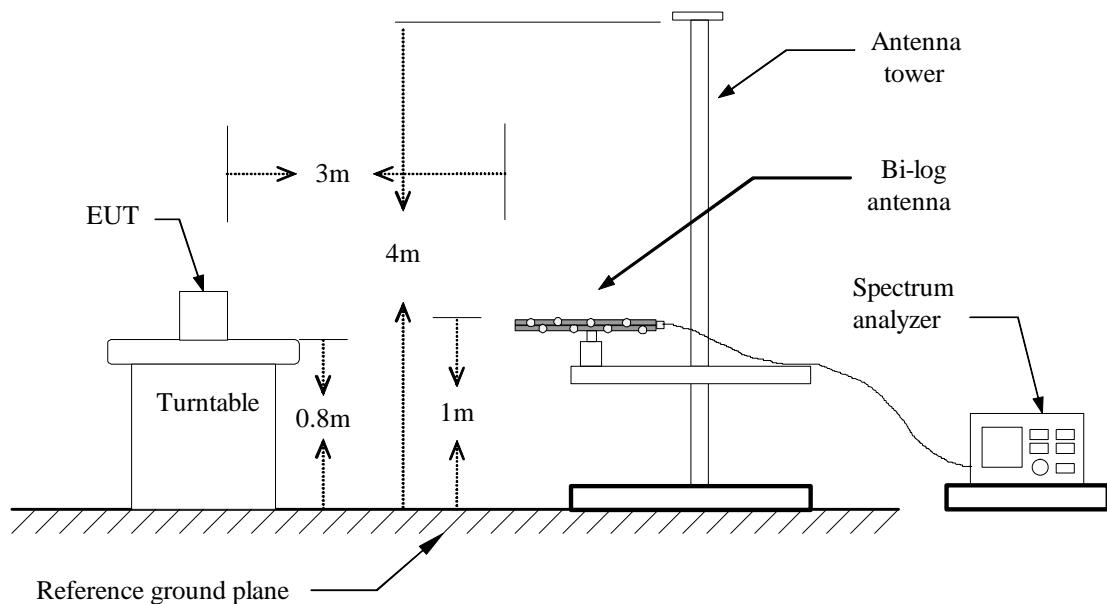
(a) PEAK: RBW=VBW=1MHz / Sweep=AUTO

(b) AVERAGE: RBW=1MHz / VBW=10Hz / Sweep=AUTO

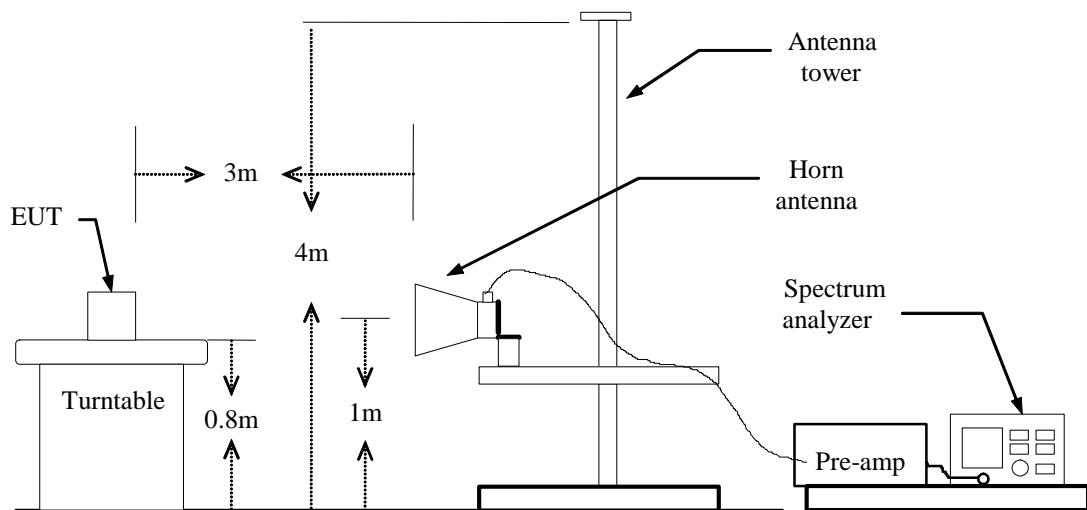
7. Repeat above procedures until the measurements for all frequencies are complete.

#### 7.2.5.4. TEST SETUP

##### Below 1 GHz



##### Above 1 GHz



For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

**7.2.5.5. Data Sample:****Below 1 GHz**

Frequency (MHz)	Ant.Pol. (H/V)	Reading (Remark) (dBuV)	Correction Factor (dB/m)	Result (Remark) (dBuV/m)	Limit (Peak) (dBuV/m)	Margin (dB)	Remark
xxx	V	12.12	10.21	22.33	37.00	-14.67	Peak

**Above 1 GHz**

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
xxx	V	65.45	63.00	-11.12	54.33	51.88	74.00	54.00	-2.12	AVG

Frequency (MHz)	= Emission frequency in MHz
Ant.Pol. (H/V)	= Antenna polarization
Reading (dBuV)	= Uncorrected Analyzer / Receiver reading
Correction Factor (dB/m)	= Antenna factor + Cable loss – Amplifier gain
Result (dBuV/m)	= Reading (dBuV) + Correction Factor (dB/m)
Limit (dBuV/m)	= Limit stated in standard
Margin (dB)	= Remark Result (dBuV/m) – Limit (dBuV/m)
Peak	= Peak Reading
QP	= Quasi-peak Reading
AVG	= Average Reading



### 7.2.5.6. TEST RESULTS

#### Below 1 GHz

**Operation Mode:** Normal Link

**Test Date:** August 18, 2009

**Temperature:** 25°C

**Tested by:** jeff

**Humidity:** 51 % RH

**Polarity:** Ver. / Hor.

Freq. (MHz)	Ant.Pol. H/V	Detector Mode (PK/QP)	Reading (dBuV)	Factor (dB)	Actual FS (dBuV/m)	Limit 3m (dBuV/m)	Safe Margin (dB)
36.49	V	Peak	38.86	-3.01	35.85	40.0	-4.15
200.44	V	Peak	33.77	-5.28	28.49	43.5	-15.01
347.69	V	Peak	34.82	-2.19	32.63	46.0	-13.37
590.38	V	Peak	30.63	3.24	33.87	46.0	-12.13
747.49	V	Peak	33.57	6.09	39.66	46.0	-6.34
854.11	V	Peak	33.44	7.29	40.73	46.0	-5.27
<hr/>							
31.08	H	Peak	30.75	0.97	31.72	40.0	-8.28
213.42	H	Peak	42.43	-6.83	35.6	43.5	-7.90
322.44	H	Peak	40.57	-3.09	37.48	46.0	-8.52
744.68	H	Peak	33.59	6.08	39.67	46.0	-6.33
834.46	H	Peak	32.82	7.21	40.03	46.0	-5.97
854.11	H	Peak	36.26	7.29	43.55	46.0	-2.45

#### **REMARKS:**

1. Measuring frequencies from 30 MHz to the 1GHz, No emission found between lowest internal used/generated frequency to 30 MHz.
2. Radiated emissions measured in frequency range from 30 MHz to 1000MHz were made with an instrument using peak/quasi-peak detector mode.
3. Quasi-peak test would be performed if the peak result were greater than the quasi-peak limit or as required by the applicant.
4. 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.
5. Margin (dB) = Remark result (dBuV/m) – Quasi-peak limit (dBuV/m).

**Above 1 GHz****Operation Mode:** TX / IEEE 802.11b / CH Low**Test Date:** August 19, 2009**Temperature:** 25°C**Tested by:** jeff**Humidity:** 51% 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
1600.00	V	61.45	36.77	0.77	62.22	37.54	74.00	54.00	-16.46	average
4825.21	V	29.26	20.41	12.37	41.63	32.78	74.00	54.00	-21.22	average
7233.42	V	36.41	25.75	19.48	55.89	45.23	74.00	54.00	-8.77	average
1600.01	H	57.35	35.44	0.77	58.12	36.21	74.00	54.00	-17.79	average
4825.12	H	30.84	21.45	12.37	43.21	33.82	74.00	54.00	-20.18	average
7234.32	H	35.74	24.64	19.48	55.22	44.12	74.00	54.00	-9.88	average

**REMARKS:**

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:** August 19, 2009**Temperature:** 25°C**Tested by:** jeff**Humidity:** 51% 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
1860.21	V	54.38	33.45	1.84	56.22	35.29	74.00	54.00	-18.71	average
4874.21	V	32.81	23.27	12.51	45.32	35.78	74.00	54.00	-18.22	average
7312.34	V	37.1	24.08	20.13	57.23	44.21	74.00	54.00	-9.79	average
1596.55	H	49.45	35.46	0.76	50.21	36.22	74.00	54.00	-17.78	average
4875.13	H	28.78	19.68	12.5	41.28	32.18	74.00	54.00	-21.82	average
7311.34	H	34.19	23.08	20.13	54.32	43.21	74.00	54.00	-10.79	average

**REMARKS:**

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:** August 19, 2009**Temperature:** 25°C**Tested by:** jeff**Humidity:** 51 % 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
1601.20	V	60.05	37.12	0.77	60.82	37.89	74.00	54.00	-16.11	average
4924.22	V	35.54	25.46	12.74	48.28	38.2	74.00	54.00	-15.80	average
7388.45	V	34.78	24.55	20.43	55.21	44.98	74.00	54.00	-9.02	average
1326.67	H	56.69	36.7	0.52	57.21	37.22	74.00	54.00	-16.78	average
4925.21	H	33.54	23.47	12.74	46.28	36.21	74.00	54.00	-17.79	average
7389.42	H	33.55	22.74	20.43	53.98	43.17	74.00	54.00	-10.83	average

**REMARKS:**

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:** August 19, 2009**Temperature:** 25°C**Tested by:** jeff**Humidity:** 51 % 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
1330.22	V	60.15	36.59	0.53	60.68	37.12	74.00	54.00	-16.88	average
4824.31	V	30.84	20.64	12.37	43.21	33.01	74.00	54.00	-20.99	average
7234.51	V	34.63	23.73	19.48	54.11	43.21	74.00	54.00	-10.79	average
1326.23	H	59.45	34.76	0.52	59.97	35.28	74.00	54.00	-18.72	average
4825.21	H	31.21	20.19	12.37	43.58	32.56	74.00	54.00	-21.44	average
7235.31	H	33.54	22.86	19.48	53.02	42.34	74.00	54.00	-11.66	average

**REMARKS:**

7. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
8. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
9. Average test would be performed if the peak result were greater than the average limit or as required by the applicant.
10. 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.
11. 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.
12. Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).

**Operation Mode:** TX / IEEE 802.11g / CH Mid**Test Date:** August 19, 2009**Temperature:** 25°C**Tested by:** jeff**Humidity:** 51 % 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
1600.33	V	59.14	36.01	0.77	59.91	36.78	74.00	54.00	-17.22	average
4873.67	V	31.7	21.38	12.51	44.21	33.89	74.00	54.00	-20.11	average
7312.56	V	35.65	24.76	20.13	55.78	44.89	74.00	54.00	-9.11	average
1233.33	H	56.29	35.26	-0.08	56.21	35.18	74.00	54.00	-18.82	average
4875.00	H	31.61	20.70	12.51	44.12	33.21	74.00	54.00	-20.79	average
7315.42	H	33.15	23.05	20.13	53.28	43.18	74.00	54.00	-10.82	average

**REMARKS:**

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:** August 19, 2009**Temperature:** 25°C**Tested by:** jeff**Humidity:** 51 % 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
1330.12	V	59.66	36.63	0.53	60.19	37.16	74.00	54.00	-16.84	average
4925.22	V	34.47	24.47	12.74	47.21	37.21	74.00	54.00	-16.79	average
7385.18	V	34.68	24.35	20.43	55.11	44.78	74.00	54.00	-9.22	average
1325.21	H	56.82	34.46	0.52	57.34	34.98	74.00	54.00	-19.02	average
4924.20	H	33.64	23.61	12.74	46.38	36.35	74.00	54.00	-17.65	average
7383.76	H	34.35	22.69	20.43	54.78	43.12	74.00	54.00	-10.88	average

**REMARKS:**

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 802.11n-HT20n / CH Low **Test Date:** August 19, 2009**Temperature:** 25°C**Tested by:** jeff**Humidity:** 51 % 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
1600.22	V	57.91	32.35	0.77	58.68	33.12	74.00	54.00	-20.88	average
4824.23	V	31.74	21.74	12.37	44.11	34.11	74.00	54.00	-19.89	average
7234.51	V	34.69	24.08	19.48	54.17	43.56	74.00	54.00	-10.44	average
1326.25	H	54.40	33.76	0.52	54.92	34.28	74.00	54.00	-19.72	average
4825.24	H	31.84	21.14	12.37	44.21	33.51	74.00	54.00	-20.49	average
7235.32	H	33.74	22.83	19.48	53.22	42.31	74.00	54.00	-11.69	average

**REMARKS:**

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 802.11n-HT20n / CH Mid **Test Date:** August 19, 2009**Temperature:** 25°C**Tested by:** jeff**Humidity:** 51 % 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
1600.11	V	57.66	35.45	0.77	58.43	36.22	74.00	54.00	-17.78	average
4873.43	V	32.7	20.31	12.51	45.21	32.82	74.00	54.00	-21.18	average
7312.53	V	34.65	23.08	20.13	54.78	43.21	74.00	54.00	-10.79	average
1233.54	H	57.30	35.85	-0.08	57.22	35.77	74.00	54.00	-18.23	average
4875.76	H	30.73	21.73	12.51	43.24	34.24	74.00	54.00	-19.76	average
7315.38	H	33.51	23.43	20.13	53.64	43.56	74.00	54.00	-10.44	average

**REMARKS:**

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 802.11n-HT20n / CH High **Test Date:** August 19, 2009**Temperature:** 25°C**Tested by:** jeff**Humidity:** 51 % 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
1331.22	V	60.49	36.8	0.53	61.02	37.33	74.00	54.00	-16.67	average
4925.17	V	34.55	24.43	12.74	47.29	37.17	74.00	54.00	-16.83	average
7385.13	V	34.59	23.61	20.43	55.02	44.04	74.00	54.00	-9.96	average
1325.30	H	55.91	33.80	0.52	56.43	34.32	74.00	54.00	-19.68	average
4924.32	H	32.69	22.82	12.74	45.43	35.56	74.00	54.00	-18.44	average
7383.71	H	34.22	22.66	20.43	54.65	43.09	74.00	54.00	-10.91	average

**REMARKS:**

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 802.11n-HT40n / CH Low **Test Date:** August 19, 2009**Temperature:** 25°C**Tested by:** jeff**Humidity:** 51 % 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
1326.25	V	56.8	33.15	0.52	57.32	33.67	74.00	54.00	-20.33	average
4824.23	V	31.76	21.95	12.37	44.13	34.32	74.00	54.00	-19.68	average
7234.51	V	33.86	24.07	19.48	53.34	43.55	74.00	54.00	-10.45	average
1326.25	H	54.35	31.84	0.52	54.87	32.36	74.00	54.00	-21.64	average
4825.24	H	29.84	19.77	12.37	42.21	32.14	74.00	54.00	-21.86	average
7235.32	H	33.70	22.78	19.48	53.18	42.26	74.00	54.00	-11.74	average

**REMARKS:**

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 802.11n-HT40n / CH Mid **Test Date:** August 19, 2009**Temperature:** 25°C**Tested by:** jeff**Humidity:** 51 % 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
1600.14	V	56.52	36.35	0.77	57.29	37.12	74.00	54.00	-16.88	average
4872.98	V	32.77	20.67	12.51	45.28	33.18	74.00	54.00	-20.82	average
7312.12	V	34.46	23.2	20.13	54.59	43.33	74.00	54.00	-10.67	average
1233.21	H	56.43	36.22	-0.08	56.35	36.14	74.00	54.00	-17.86	average
4875.43	H	30.65	21.66	12.51	43.16	34.17	74.00	54.00	-19.83	average
7315.13	H	33.46	22.08	20.13	53.59	42.21	74.00	54.00	-11.79	average

**REMARKS:**

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 802.11n-HT40n / CH High **Test Date:** August 19, 2009**Temperature:** 25°C**Tested by:** jeff**Humidity:** 51 % 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
1331.25	V	59.68	36.45	0.53	60.21	36.98	74.00	54.00	-17.02	average
4925.37	V	35.55	24.58	12.74	48.29	37.32	74.00	54.00	-16.68	average
7385.12	V	34.49	23.46	20.43	54.92	43.89	74.00	54.00	-10.11	average
1325.43	H	57.13	34.89	0.52	57.65	35.41	74.00	54.00	-18.59	average
4924.23	H	33.79	23.63	12.74	46.53	36.37	74.00	54.00	-17.63	average
7383.55	H	33.26	23.24	20.43	53.69	43.67	74.00	54.00	-10.33	average

**REMARKS:**

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).



### 7.3. 6dB BANDWIDTH MEASUREMENT

#### 7.3.1. LIMITS

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 6 dB bandwidth shall be at least 500 kHz.

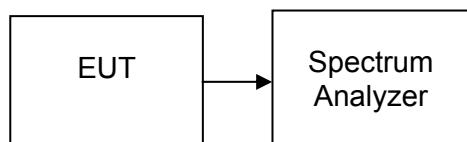
#### 7.3.2. TEST INSTRUMENTS

Conducted Emissions Test Site				
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
Spectrum Analyzer	Agilent	E4446A	MY44020154	11/12/2009

#### 7.3.3. TEST PROCEDURES (please refer to measurement standard)

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 = 20MHz, Sweep = auto.
4. Mark the peak frequency and -6dB (upper and lower) frequency.
5. Repeat until all the rest channels are investigated.

#### 7.3.4. TEST SETUP





## 7.3.5. TEST RESULTS

*No non-compliance noted*

### Test Data

#### Test mode: IEEE 802.11b

Channel	Frequency (MHz)	Bandwidth (kHz)	Limit (kHz)	Test Result
Low	2412	12103	>500	PASS
Mid	2437	12116		PASS
High	2462	11614		PASS

#### Test mode: IEEE 802.11g

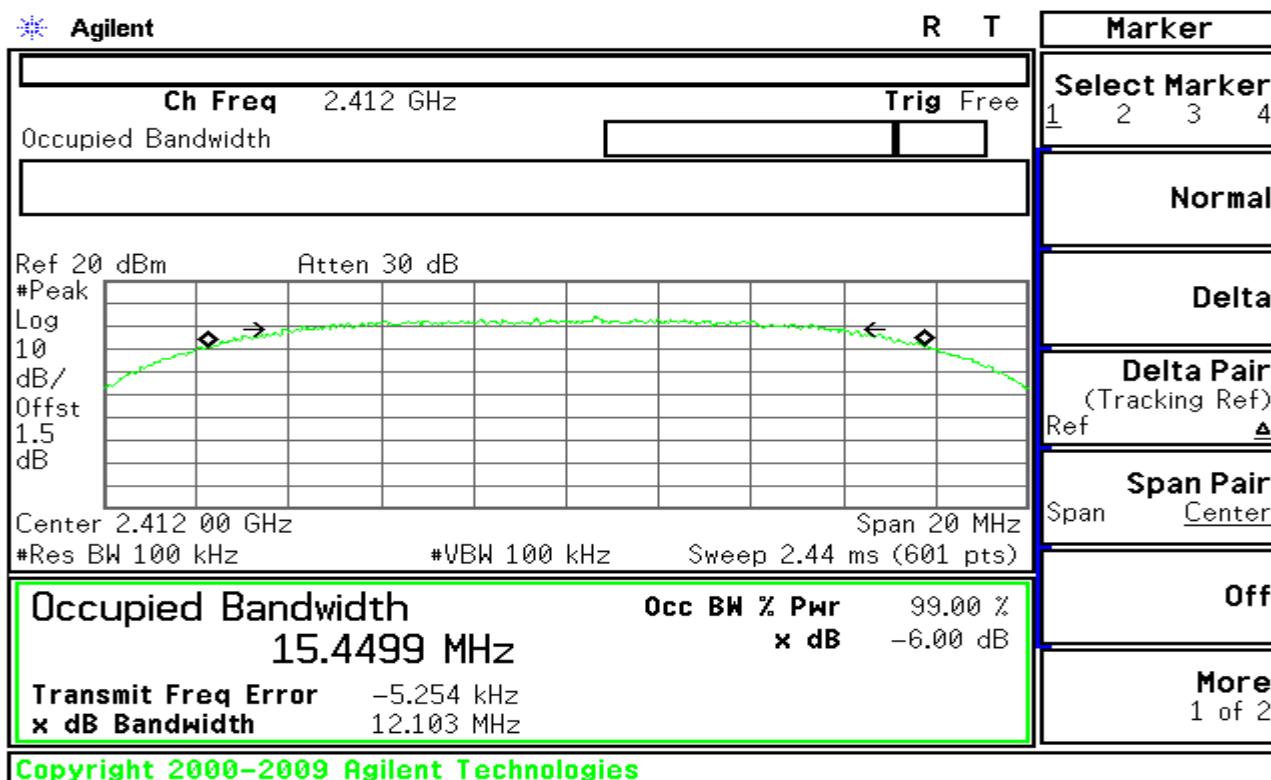
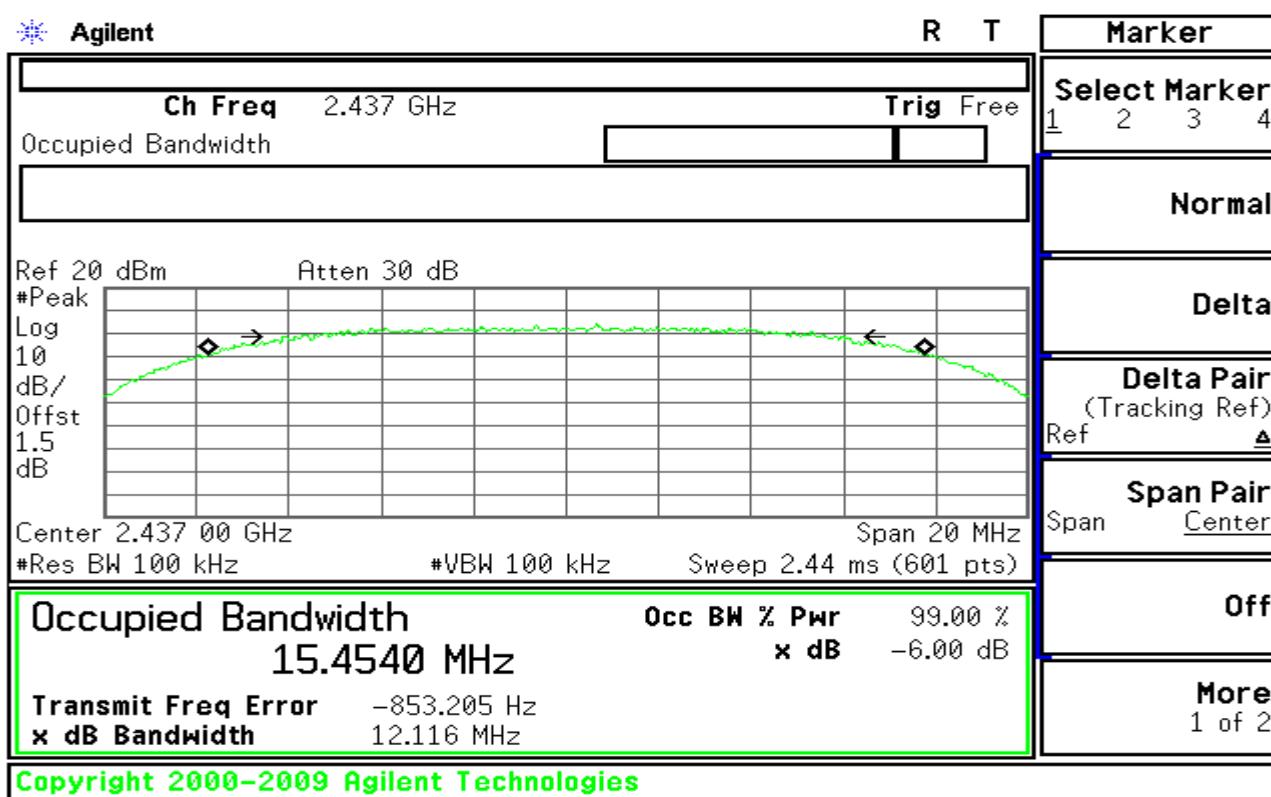
Channel	Frequency (MHz)	Bandwidth (kHz)	Limit (kHz)	Test Result
Low	2412	16501	>500	PASS
Mid	2437	16414		PASS
High	2462	16469		PASS

#### Test mode: IEEE 802.11n-HT20n

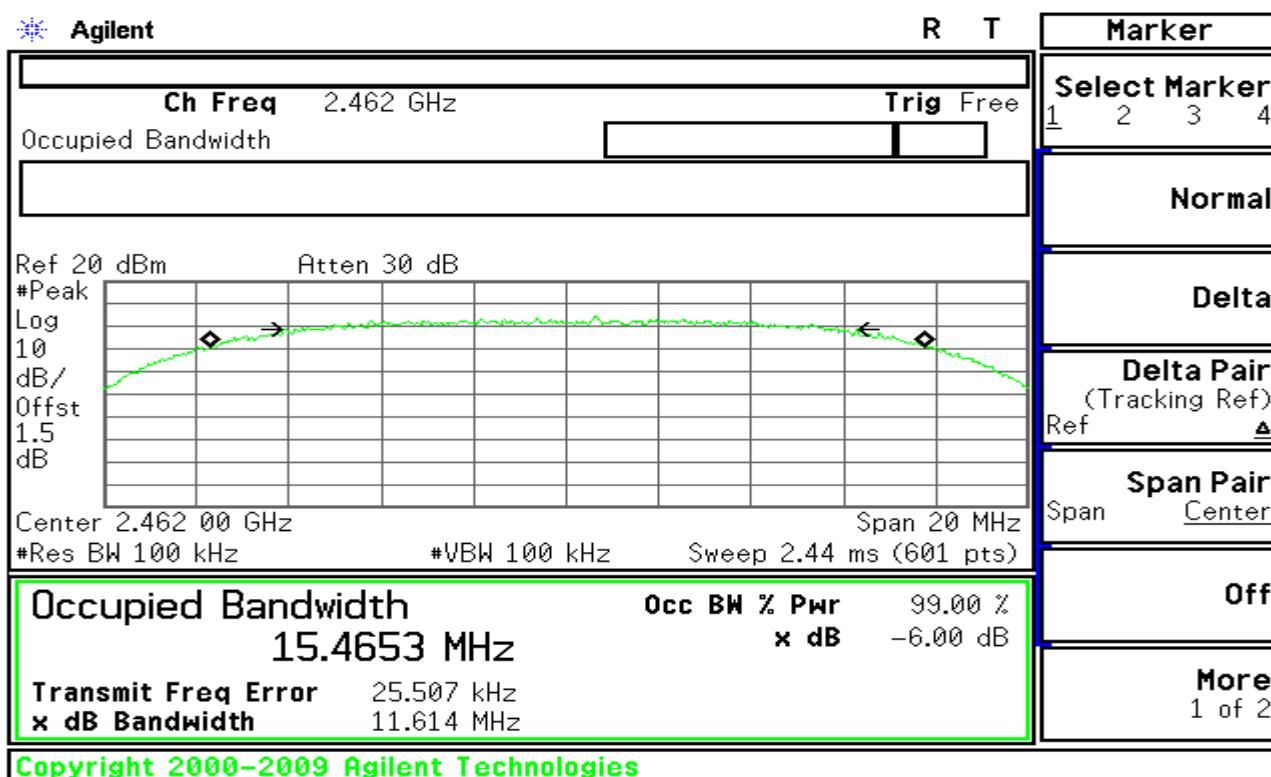
Channel	Frequency (MHz)	Bandwidth (kHz)	Limit (kHz)	Test Result
Low	2412	17654	>500	PASS
Mid	2437	17654		PASS
High	2462	17680		PASS

#### Test mode: IEEE 802.11g-HT40n

Channel	Frequency (MHz)	Bandwidth (kHz)	Limit (kHz)	Test Result
Low	2422	36.394	>500	PASS
Mid	2437	36.417		PASS
High	2452	36.413		PASS

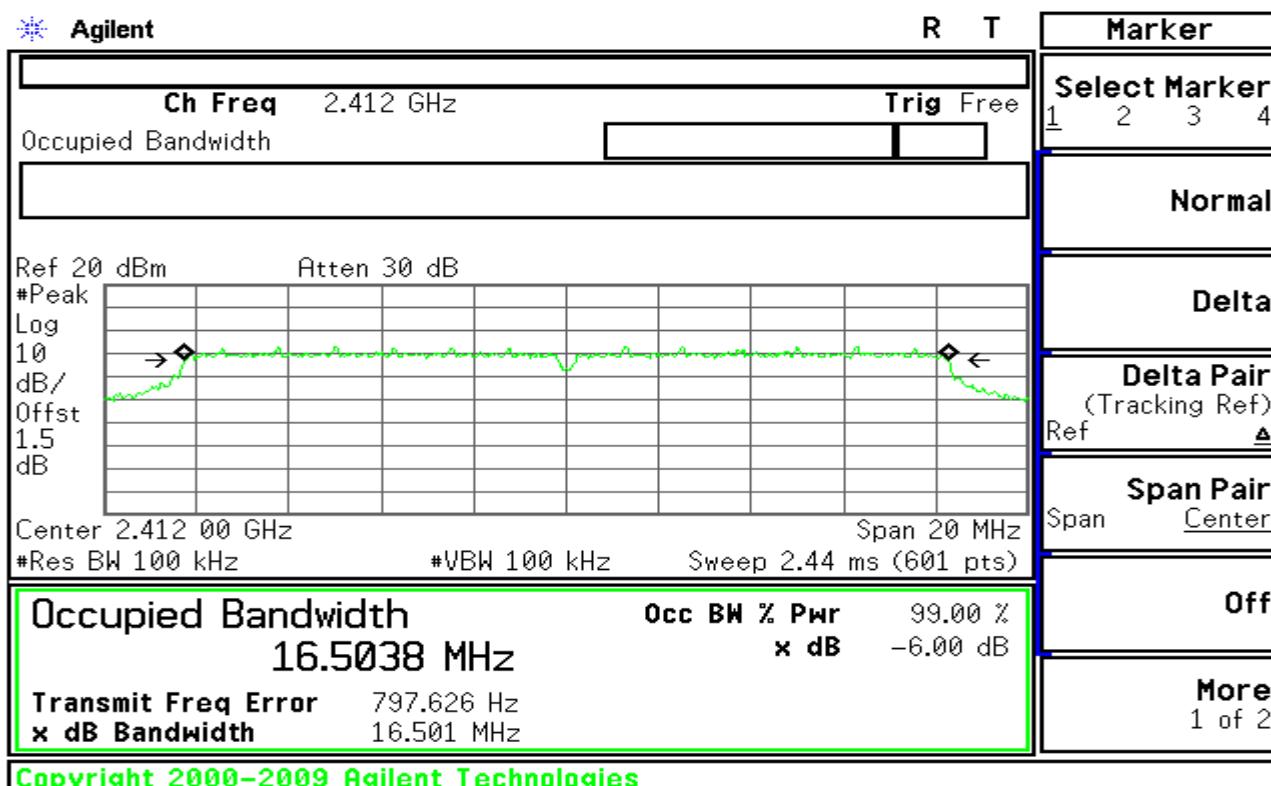
**Test Plot (IEEE 802.11b mode)****6dB Bandwidth (CH Low)****6dB Bandwidth (CH Mid)**

### 6dB Bandwidth (CH High)

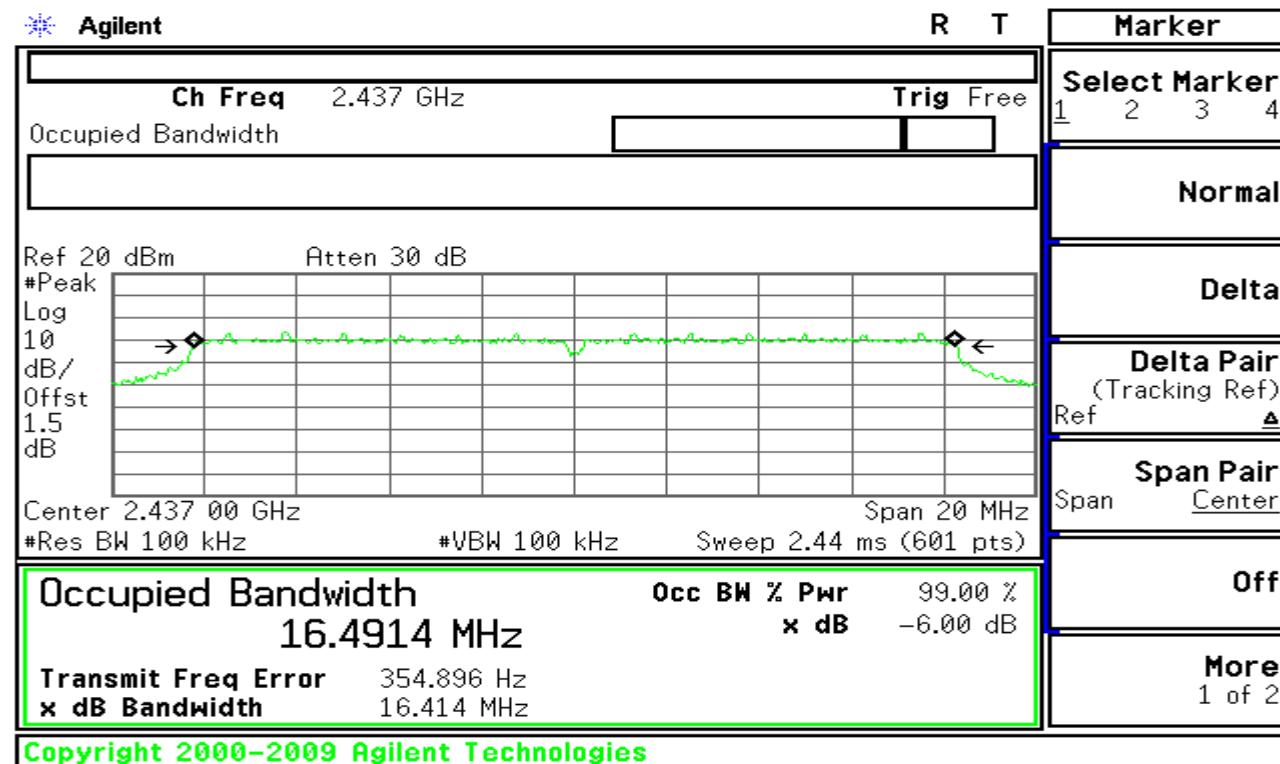


### Test Plot (IEEE 802.11g mode)

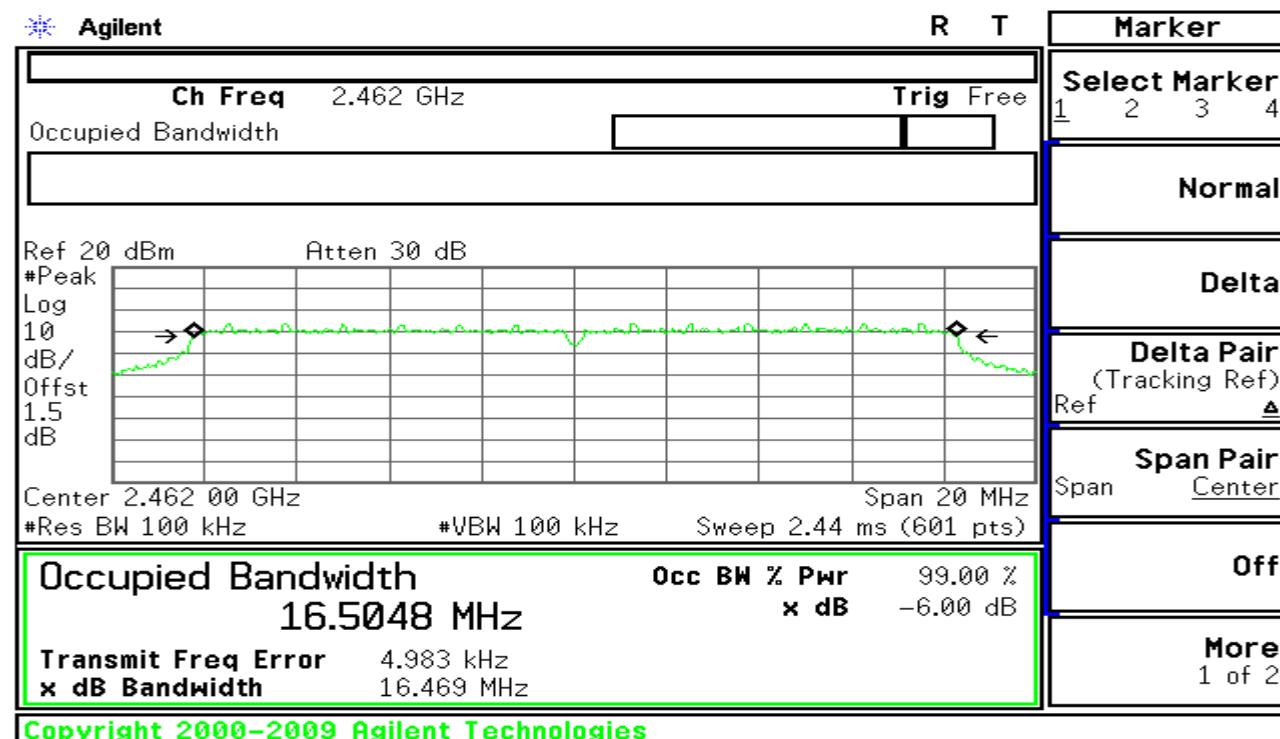
### 6dB Bandwidth (CH Low)

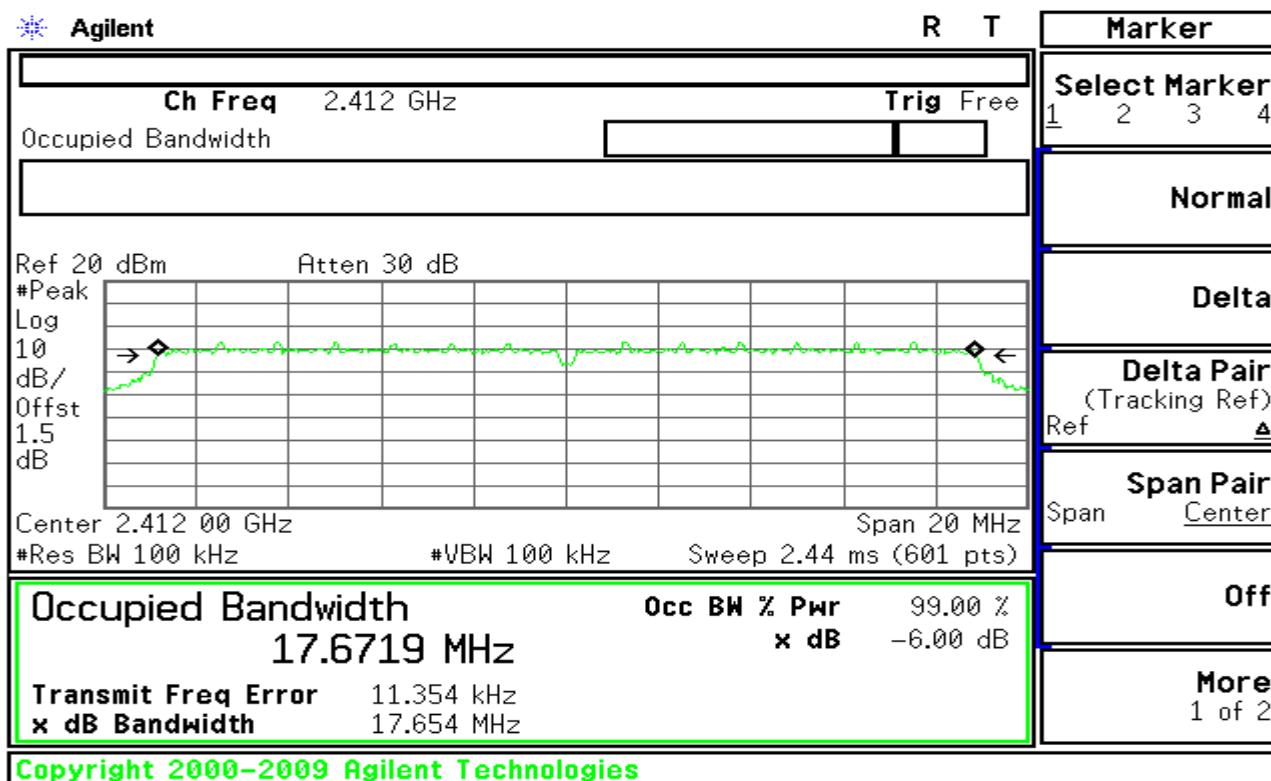
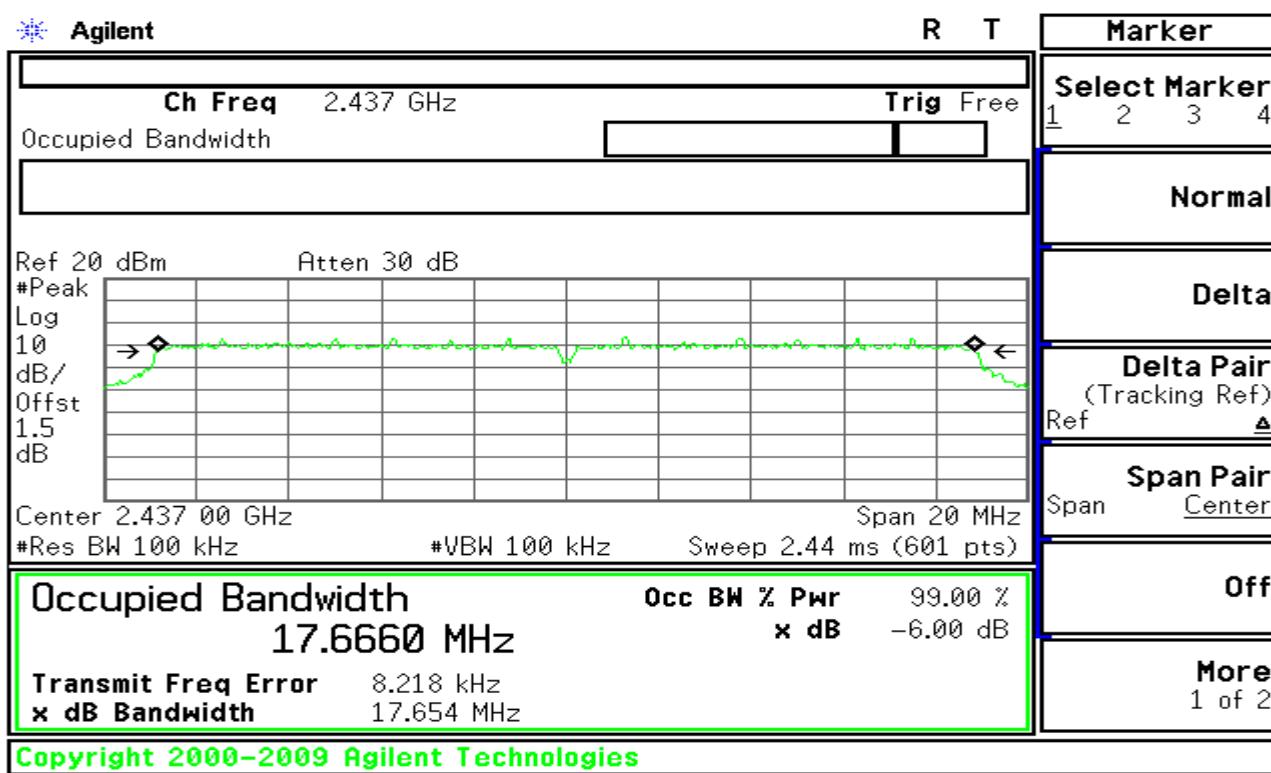


## 6dB Bandwidth (CH Mid)



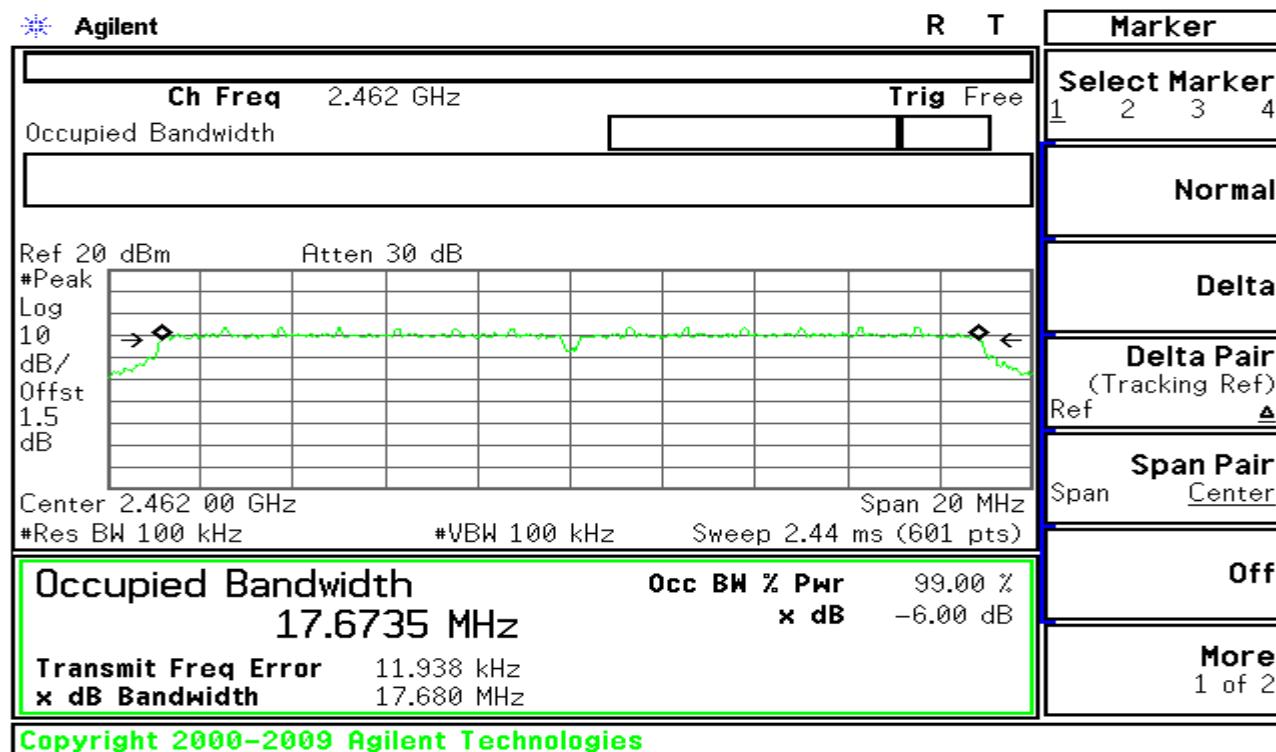
## 6dB Bandwidth (CH High)



**Test Plot (IEEE 802.11n-HT20n mode)****6dB Bandwidth (CH Low)****6dB Bandwidth (CH Mid)**

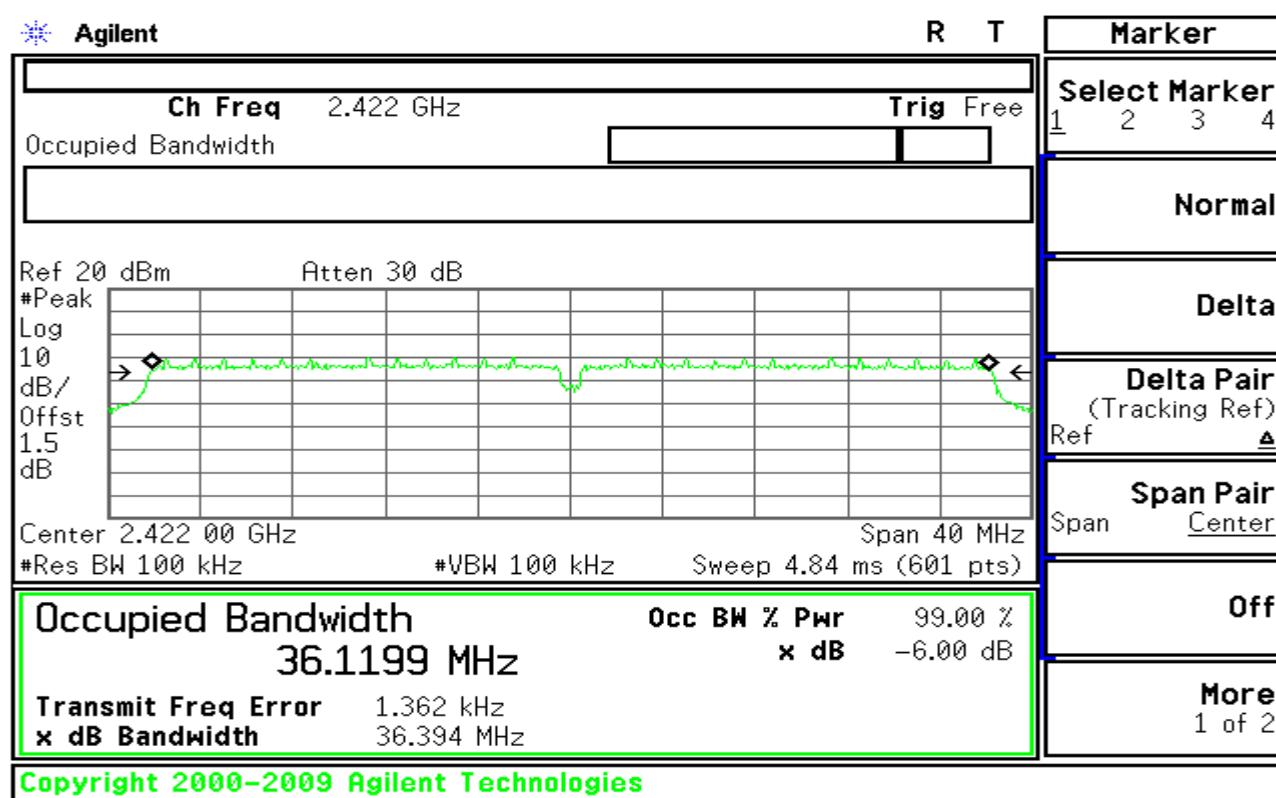


## 6dB Bandwidth (CH High)

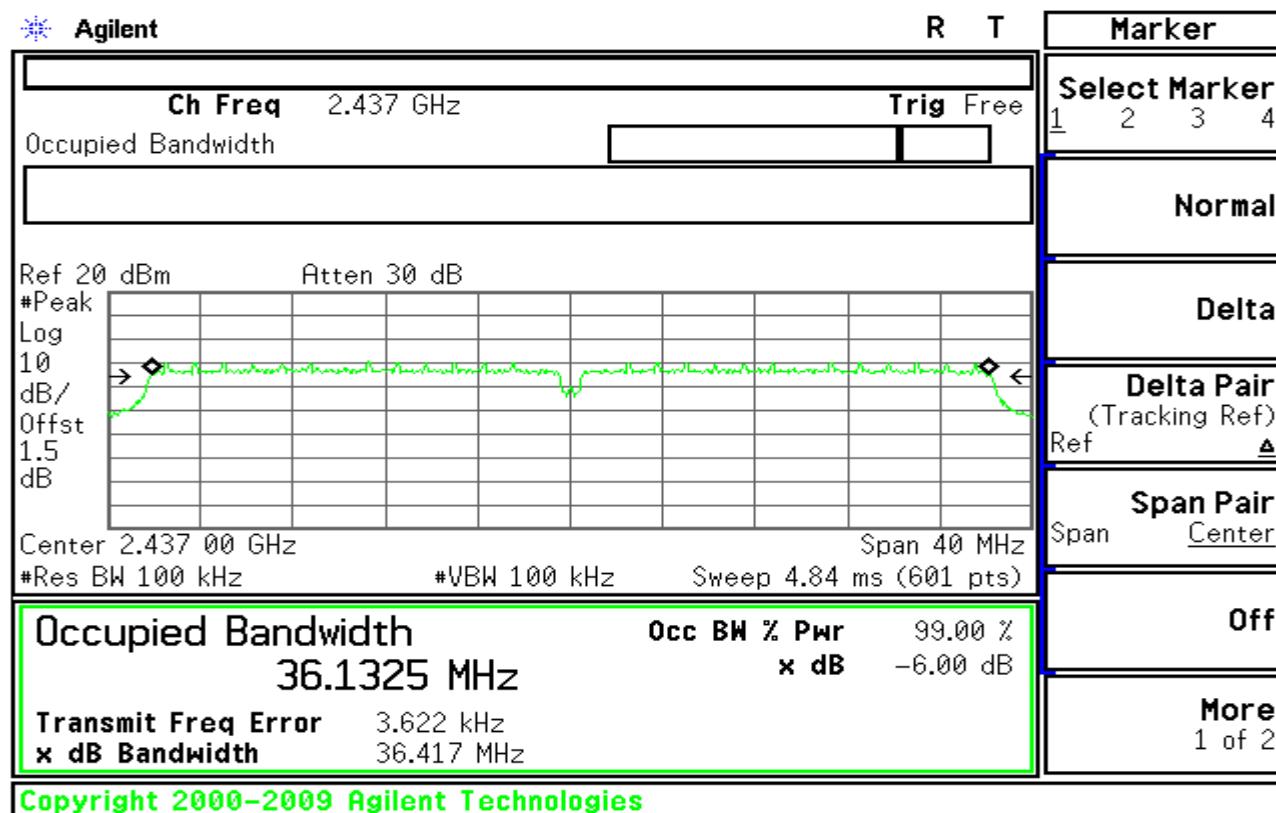


## Test Plot (IEEE 802.11n-HT40n mode)

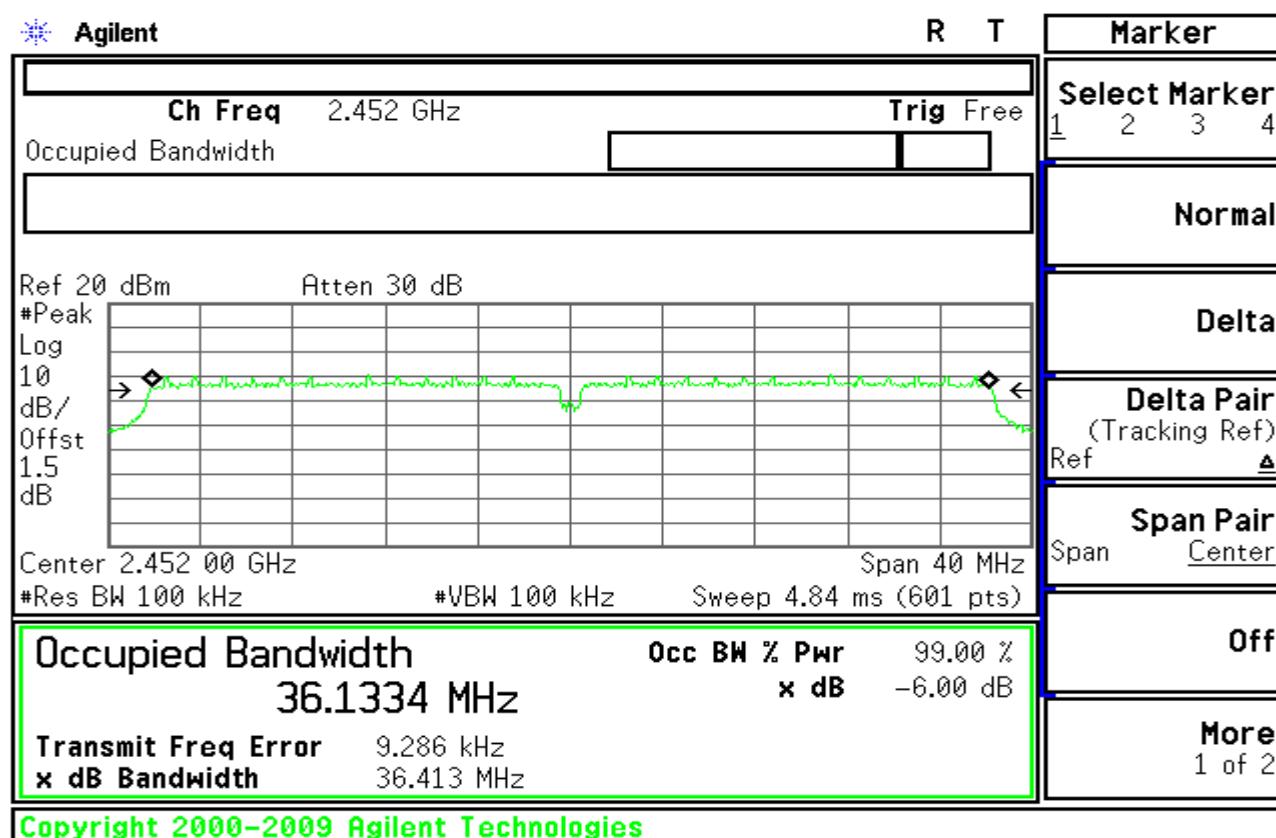
## 6dB Bandwidth (CH Low)



## 6dB Bandwidth (CH Mid)



## 6dB Bandwidth (CH High)





## 7.4. PEAK OUTPUT POWER

### 7.4.1. LIMITS

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

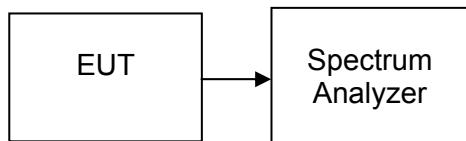
1. According to §15.247(b)(3), for systems using digital modulation in the bands of 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz: 1 Watt.
2. According to §15.247(b)(4), the conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains 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.

### 7.4.2. TEST INSTRUMENTS

Conducted Emissions Test Site				
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
Spectrum Analyzer	Agilent	E4446A	MY44020154	11/12/2009

### 7.4.3. TEST PROCEDURES (please refer to measurement standard)

- 1 Set span to encompass the entire emission bandwidth (EBW) of the signal.
- 2 Set RBW = 1 MHz.
- 3 Set VBW  $\geq$  3 MHz.
- 4 Use sample detector mode if bin width (i.e., span/number of points in spectrum display)  $< 0.5$  RBW. Otherwise use peak detector mode.
- 5 Use a video trigger with the trigger level set to enable triggering only on full power pulses. Transmitter must operate at full control power for entire sweep of every sweep. If the device transmits continuously, with no off intervals or reduced power intervals, the trigger may be set to ôhichfree runöhich.
- 6 Trace average 100 traces in power averaging mode.
- 7 Compute power by integrating the spectrum across the 26 dB EBW of the signal. The integration can be performed using the spectrum analyzer's band power measurement function with band limits set equal to the EBW band edges or by summing power levels in each 1 MHz band in linear power terms. The 1 MHz band power levels to be summed can be obtained by averaging, in linear power terms, power levels in each frequency bin across the 1 MHz.

**7.4.4. TEST SETUP****7.4.5. TEST RESULTS**

*No non-compliance noted*

**Test Data****Test mode: IEEE 802.11b**

Channel	Frequency (MHz)	Output Power (dBm)	Output Power (W)	Limit (W)	Result
Low	2412	16.21	0.04178	1	PASS
Mid	2437	16.25	0.04217		PASS
High	2462	16.61	0.04581		PASS

**Test mode: IEEE 802.11g**

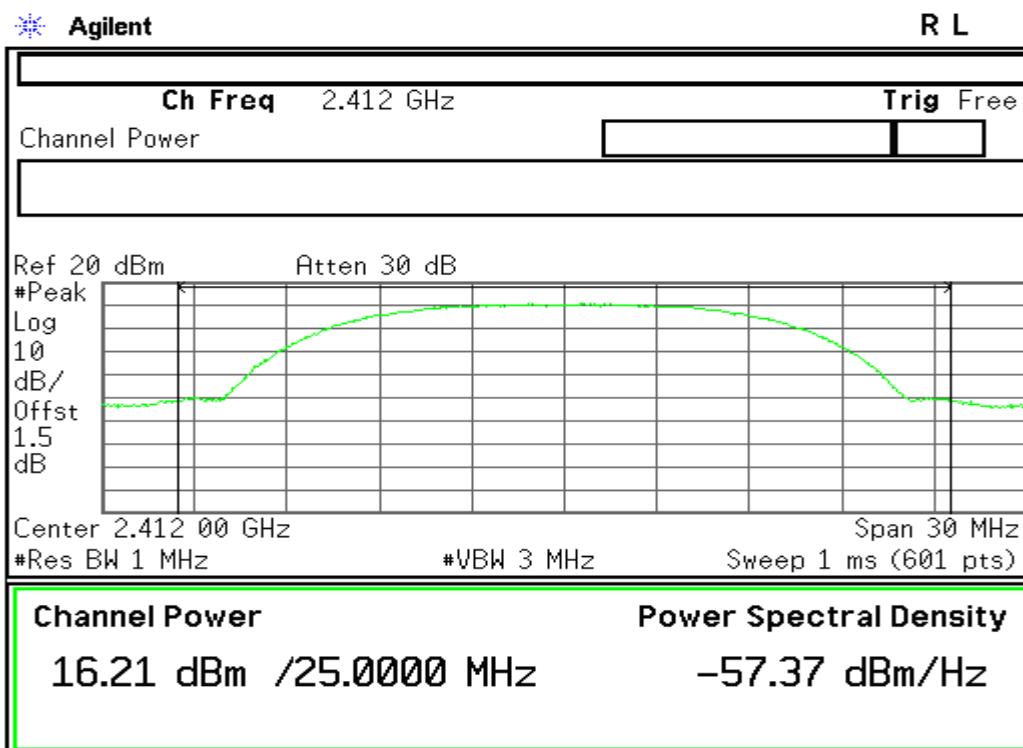
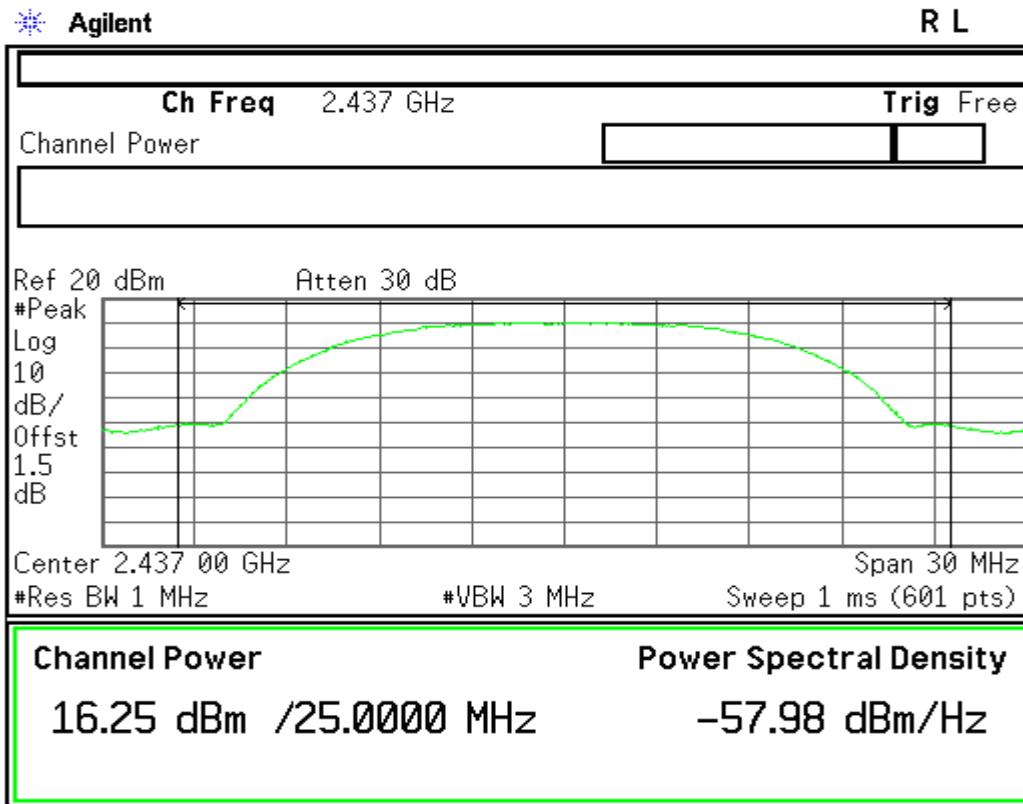
Channel	Frequency (MHz)	Output Power (dBm)	Output Power (W)	Limit (W)	Result
Low	2412	9.58	0.00908	1	PASS
Mid	2437	9.84	0.00964		PASS
High	2462	10.01	0.01002		PASS

**Test mode: IEEE 802.11n-HT20n**

Channel	Frequency (MHz)	Output Power (dBm)	Output Power (W)	Limit (W)	Result
Low	2412	9.57	0.00906	1	PASS
Mid	2437	9.72	0.00938		PASS
High	2462	9.92	0.00982		PASS

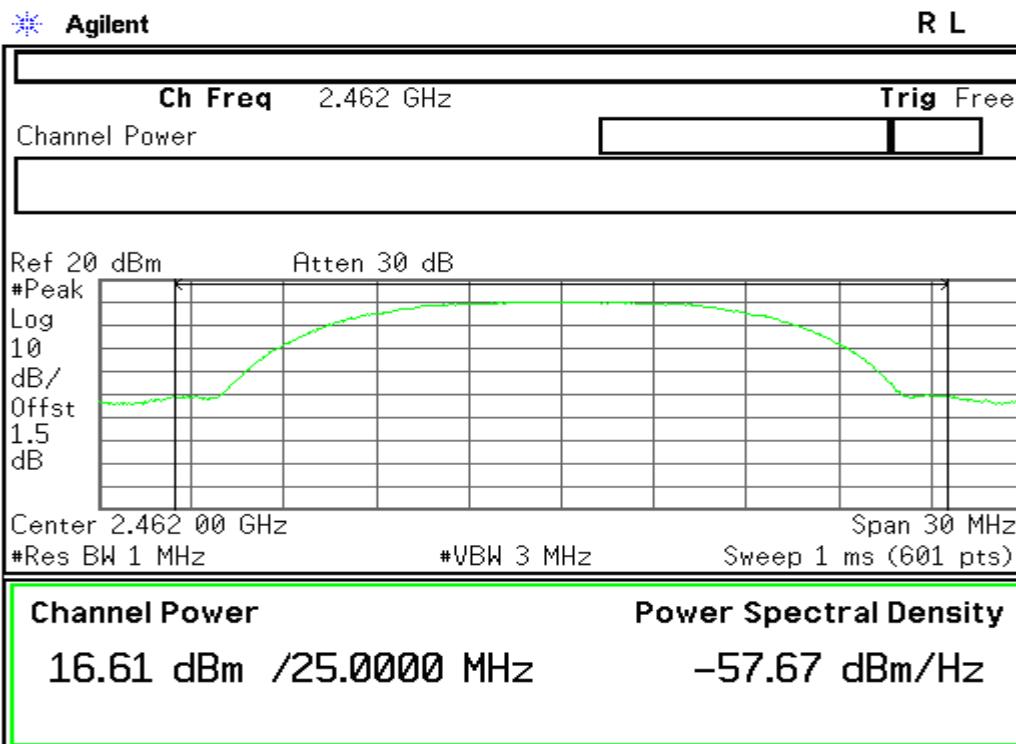
**Test mode: IEEE 802.11n-HT40n**

Channel	Frequency (MHz)	Output Power (dBm)	Output Power (W)	Limit (W)	Result
Low	2422	8.90	0.00776	1	PASS
Mid	2437	9.26	0.00843		PASS
High	2452	9.45	0.00881		PASS

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

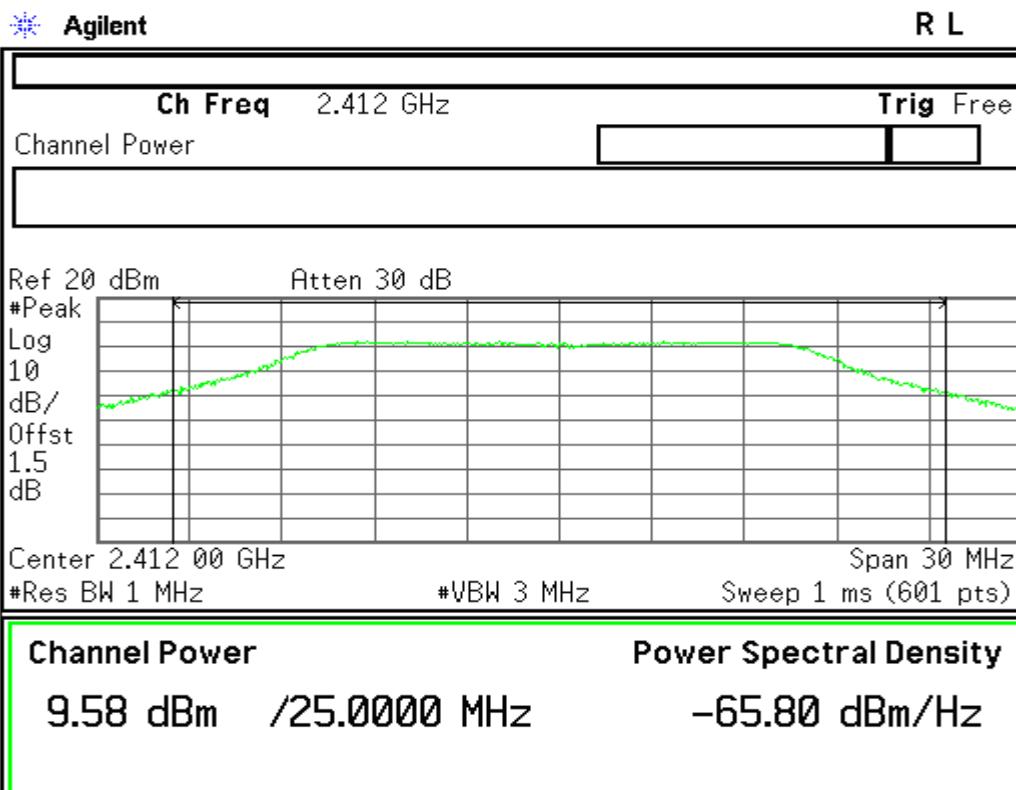


## Peak Power (CH High)



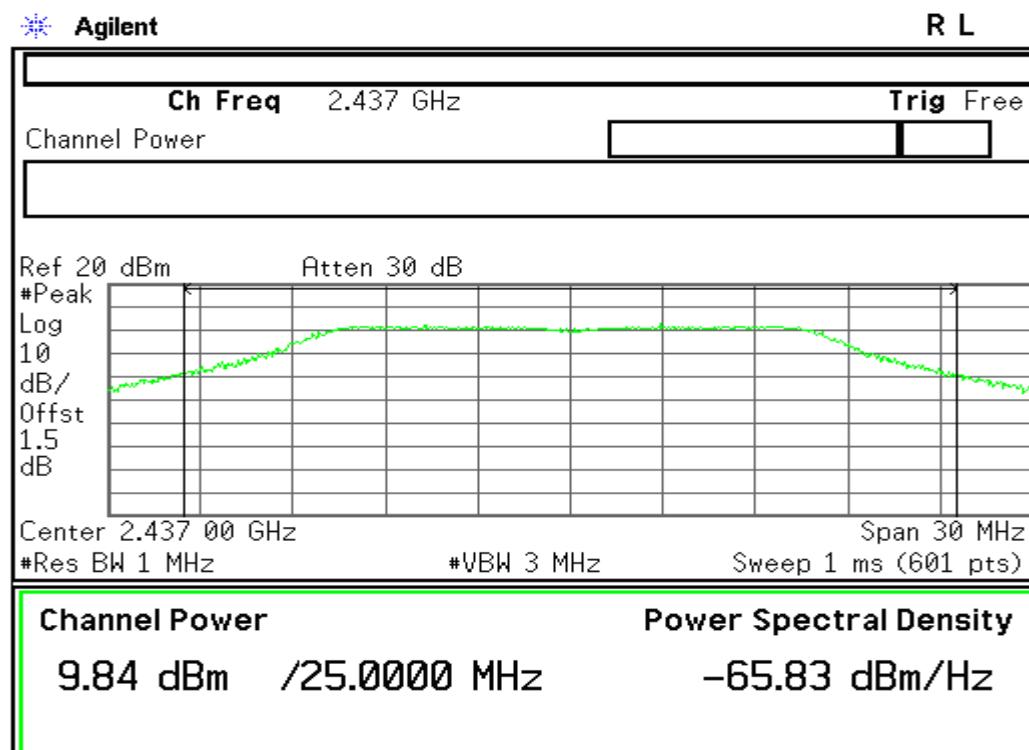
## Test Plot (IEEE 802.11g mode)

### Peak Power (CH Low)

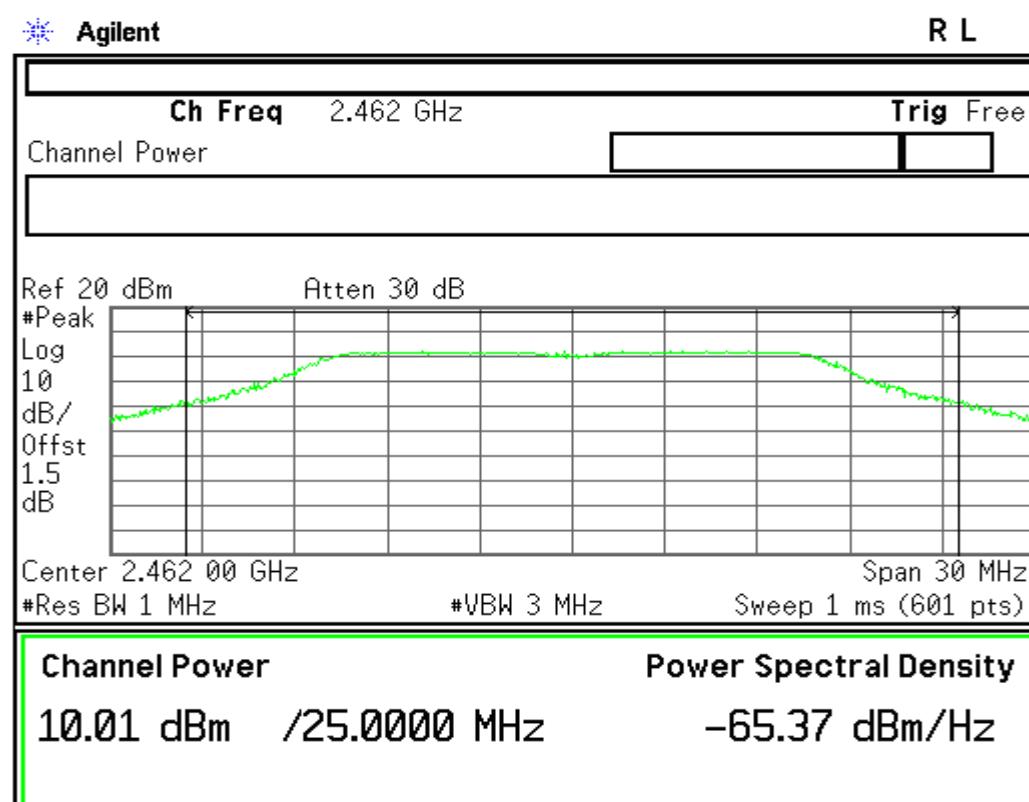


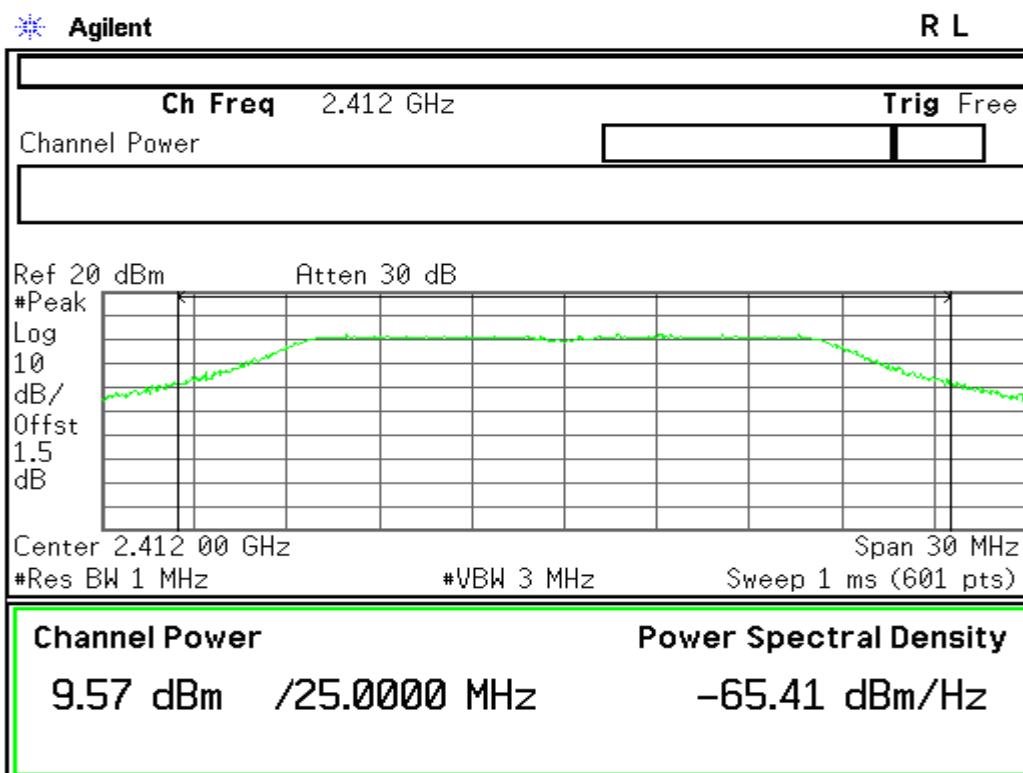
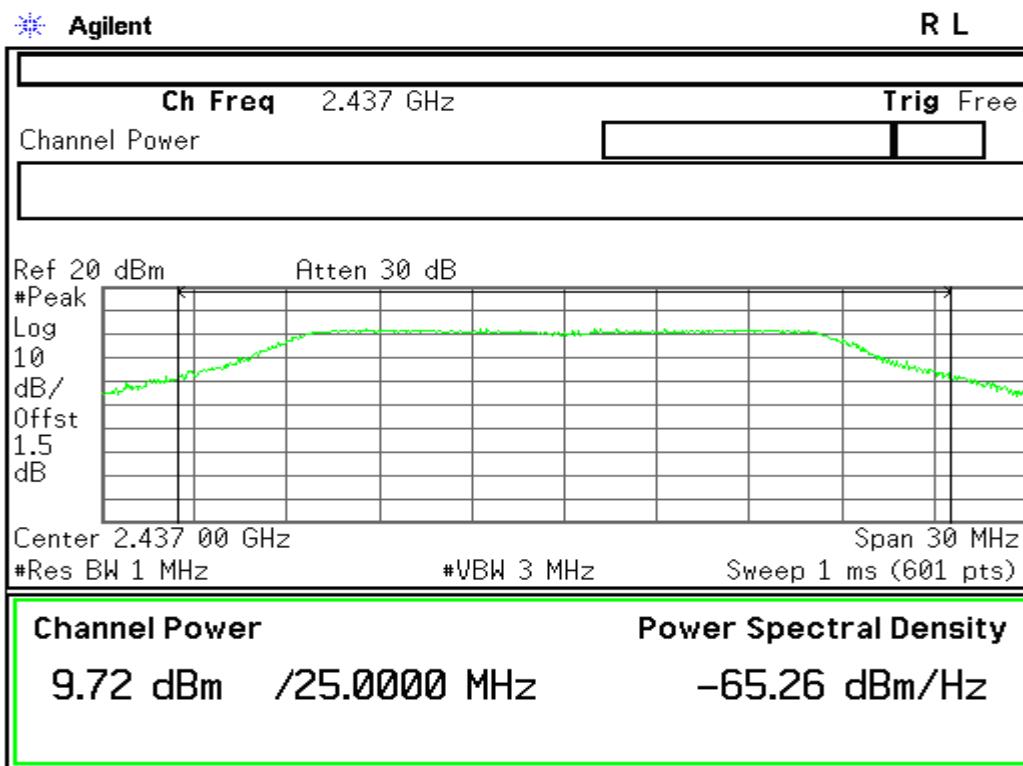


## Peak Power (CH Mid)



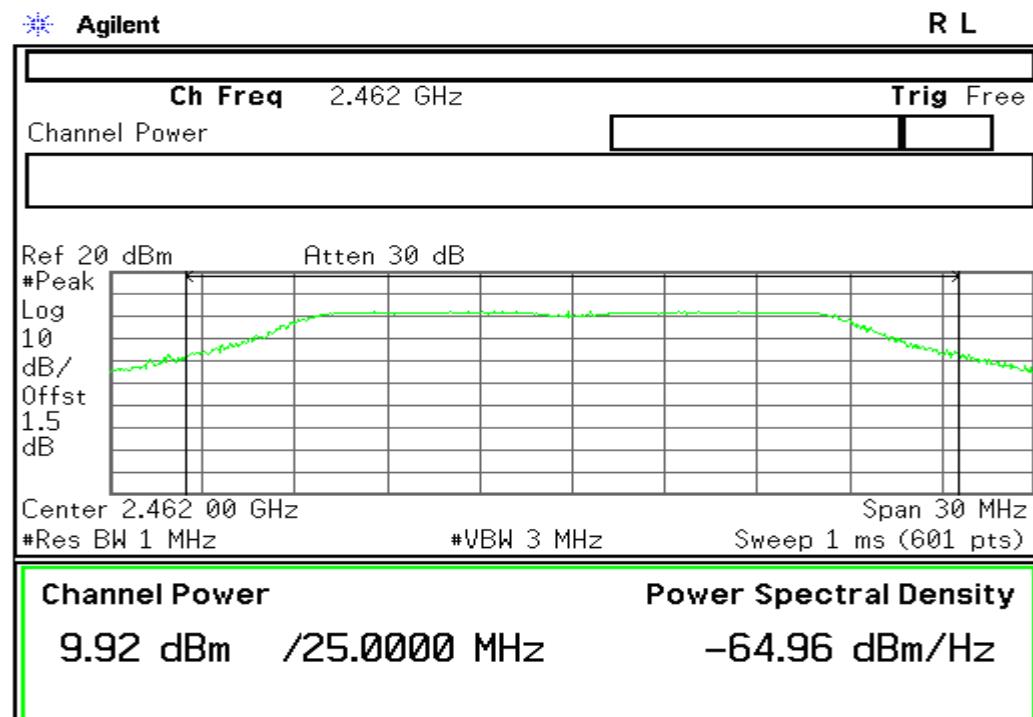
## Peak Power (CH High)



**Test Plot (IEEE 802.11n-HT20n mode)****Peak Power (CH Low)****Peak Power (CH Mid)**

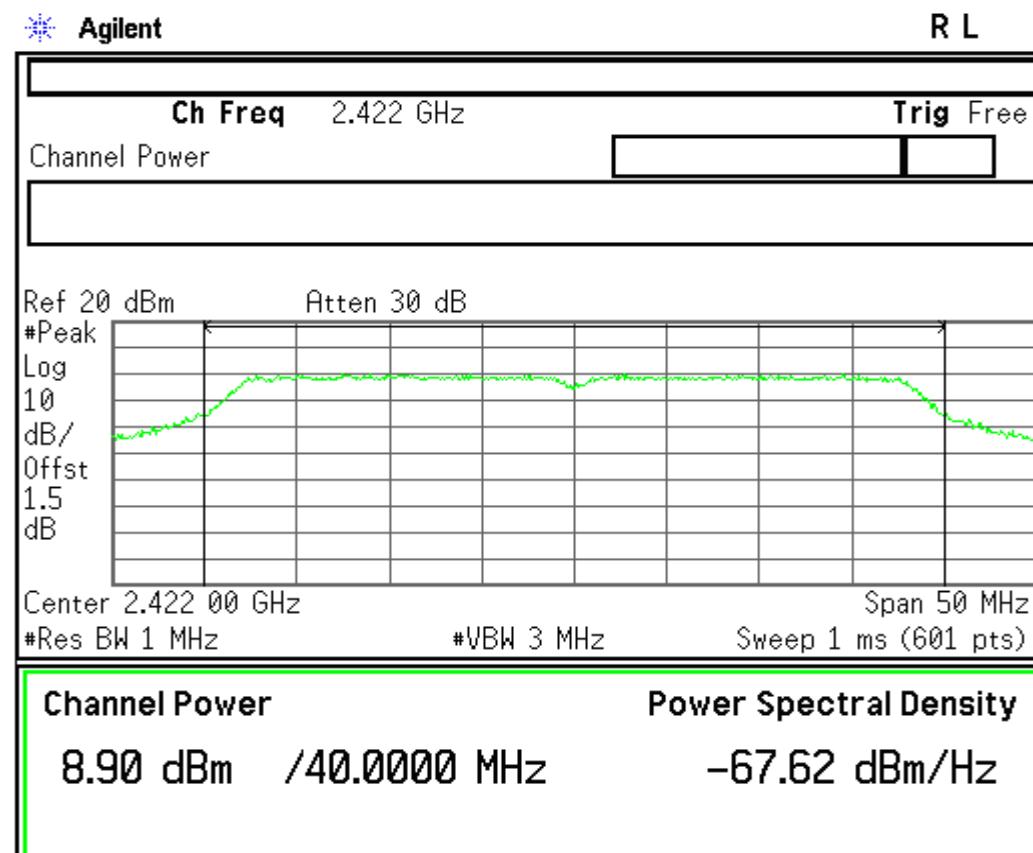


## Peak Power (CH High)



## Test Plot (IEEE 802.11n-HT40n mode)

### Peak Power (CH Low)

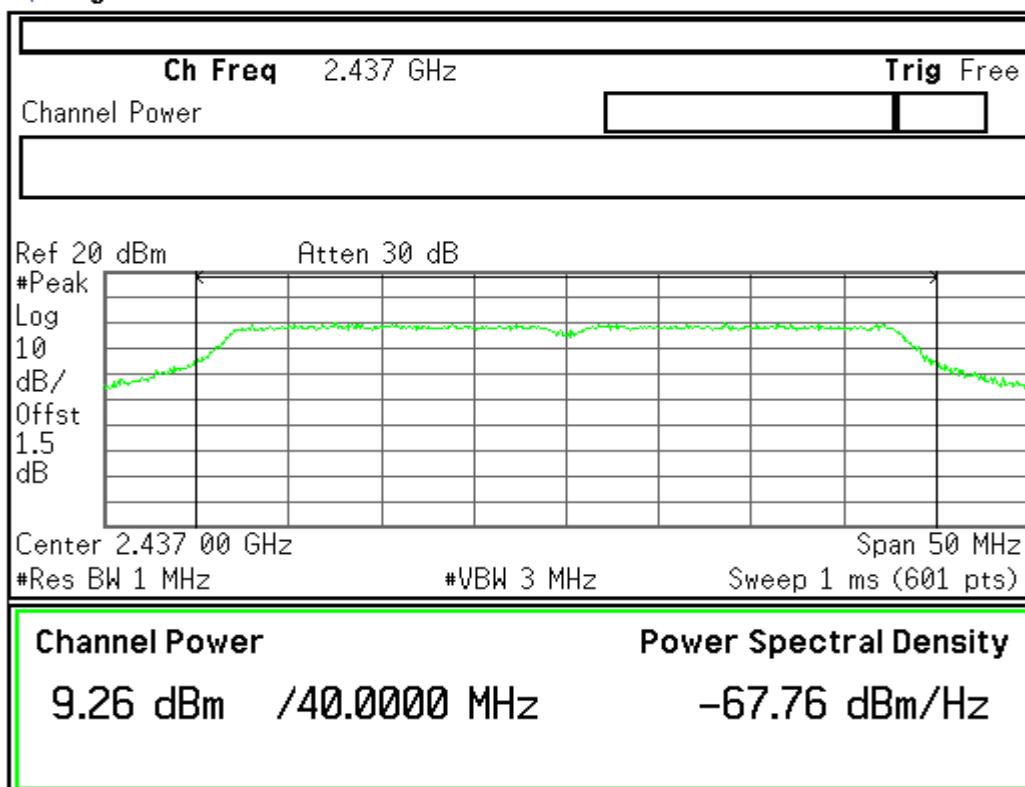




## Peak Power (CH Mid)

Agilent

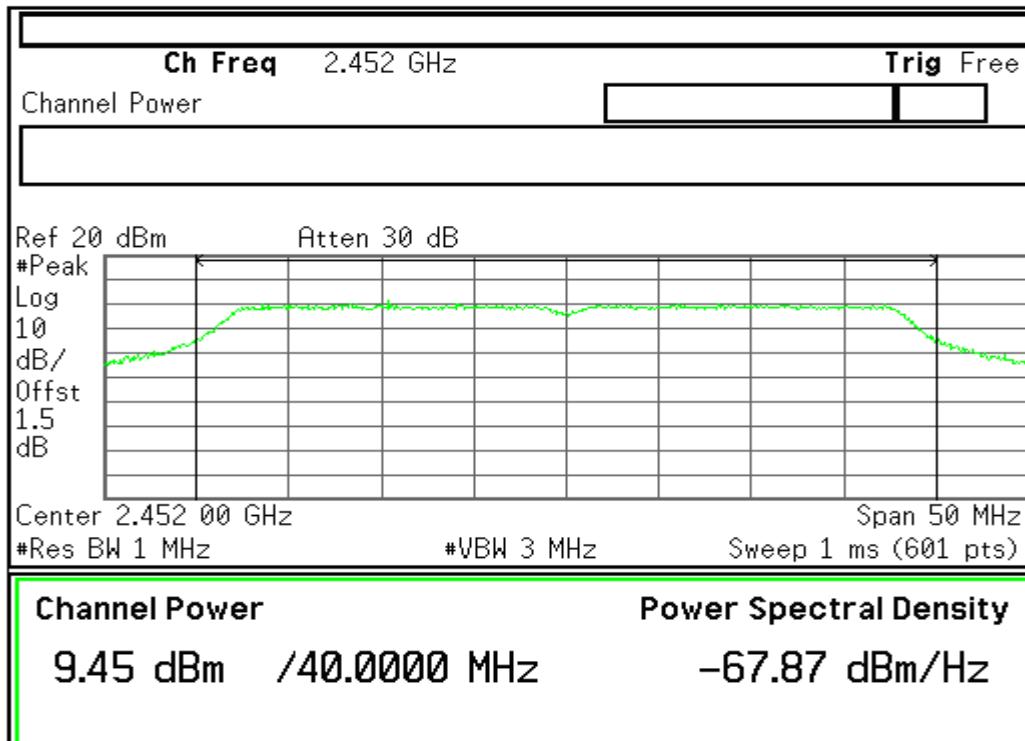
R L



## Peak Power (CH High)

Agilent

R L





## 7.5. AVERAGE POWER

### 7.5.1. LIMITS

None; for reporting purposes only

### 7.5.2. TEST INSTRUMENTS

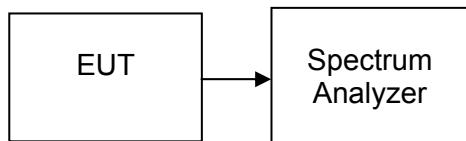
Conducted Emissions Test Site				
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
Spectrum Analyzer	Agilent	E4446A	MY44020154	11/12/2009

### 7.5.3. TEST PROCEDURES (please refer to measurement standard)

- 1 Set span to encompass the entire emission bandwidth (EBW) of the signal.
- 2 Set RBW = 1 MHz.
- 3 Set VBW  $\geq$  3 MHz.
- 4 Use sample detector mode if bin width (i.e., span/number of points in spectrum display)  $< 0.5$  RBW. Otherwise use peak detector mode.
- 5 Use a video trigger with the trigger level set to enable triggering only on full power pulses. Transmitter must operate at full control power for entire sweep of every sweep. If the device transmits continuously, with no off intervals or reduced power intervals, the trigger may be set to  $\text{ohichfree run}\text{ohich}$ .
- 6 Trace average 100 traces in power averaging mode.
- 7 Compute power by integrating the spectrum across the 26 dB EBW of the signal. The integration can be performed using the spectrum analyzer's band power measurement function with band limits set equal to the EBW band edges or by summing power levels in each 1 MHz band in linear power terms. The 1 MHz band power levels to be summed can be obtained by averaging, in linear power terms, power levels in each frequency bin across the 1 MHz.



## 7.5.4. TEST SETUP



## 7.5.5. TEST RESULTS

*No non-compliance noted*

### Test Data

#### Test mode: IEEE 802.11b

Channel	Frequency (MHz)	Output Power (dBm)	Output Power (W)	Limit (W)	Result
Low	2412	13.70	0.02344	1	PASS
Mid	2437	13.91	0.02460		PASS
High	2462	14.19	0.02624		PASS

#### Test mode: IEEE 802.11g

Channel	Frequency (MHz)	Output Power (dBm)	Output Power (W)	Limit (W)	Result
Low	2412	7.21	0.00526	1	PASS
Mid	2437	7.52	0.00565		PASS
High	2462	7.89	0.00615		PASS

#### Test mode: IEEE 802.11n-HT20

Channel	Frequency (MHz)	Output Power (dBm)	Output Power (W)	Limit (W)	Result
Low	2412	7.18	0.00522	1	PASS
Mid	2437	7.36	0.00545		PASS
High	2462	7.59	0.00574		PASS

#### Test mode: IEEE 802.11n-HT40

Channel	Frequency (MHz)	Output Power (dBm)	Output Power (W)	Limit (W)	Result
Low	2422	7.02	0.00504	1	PASS
Mid	2437	7.31	0.00538		PASS
High	2452	7.42	0.00552		PASS



## 7.6. BAND EDGES MEASUREMENT:

### 7.6.1. LIMITS

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)).

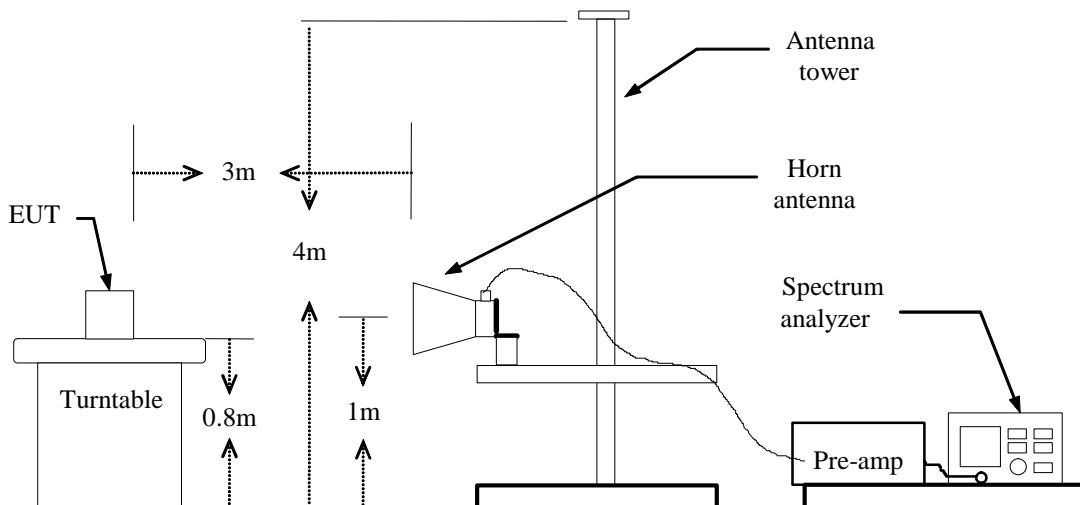
### 7.6.2. TEST INSTRUMENTS

3M Semi Anechoic Chamber (977)				
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
Spectrum Analyzer	Agilent	E4446A	MY44020154	11/12/2009
Spectrum Analyzer	Agilent	E4446A	US44300398	07/25/2010
EMI Test Receiver	R&S	ESPI3	101026	05/09/2010
Pre-Amplifier	MINI	ZFL-1000VH2	d041703	05/06/2010
Pre-Amplifier	Miteq	NSP4000-NF	870731	02/28/2010
Bilog Antenna	Sunol	JB1	A110204-2	11/22/2009
Horn-antenna	SCHWARZBECK	BBHA9120D	D:266	09/01/2009
PSG Analog Signal Generator	Agilent	E8257C	MY43321570	12/19/2009
Turn Table	CT	CT123	4165	N.C.R
Antenna Tower	CT	CTERG23	3256	N.C.R
Controller	CT	CT100	95637	N.C.R
Site NSA	CCS	N/A	N/A	04/06/2010

**NOTE:** 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.  
2. The FCC Site Registration number is 238958, 424105..  
4. N.C.R = No Calibration Required.

**7.6.3. TEST PROCEDURES** (please refer to measurement standard)

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

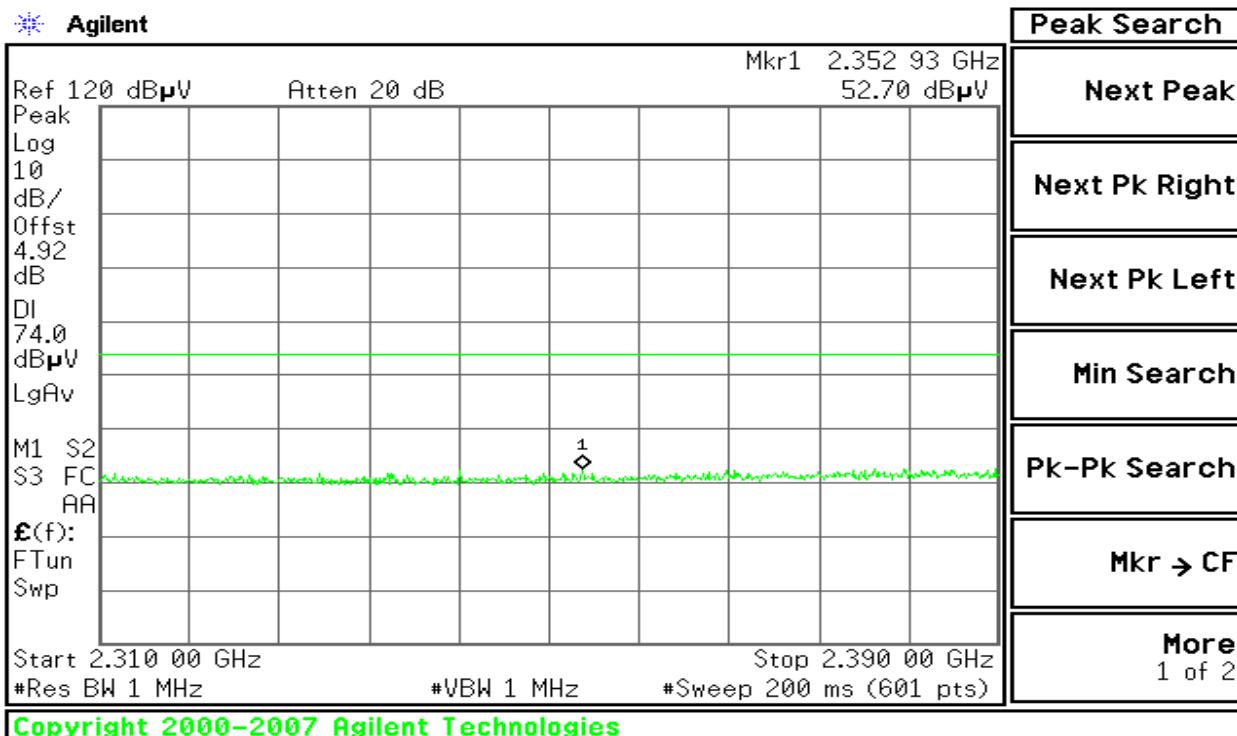
**7.6.4. TEST SETUP**



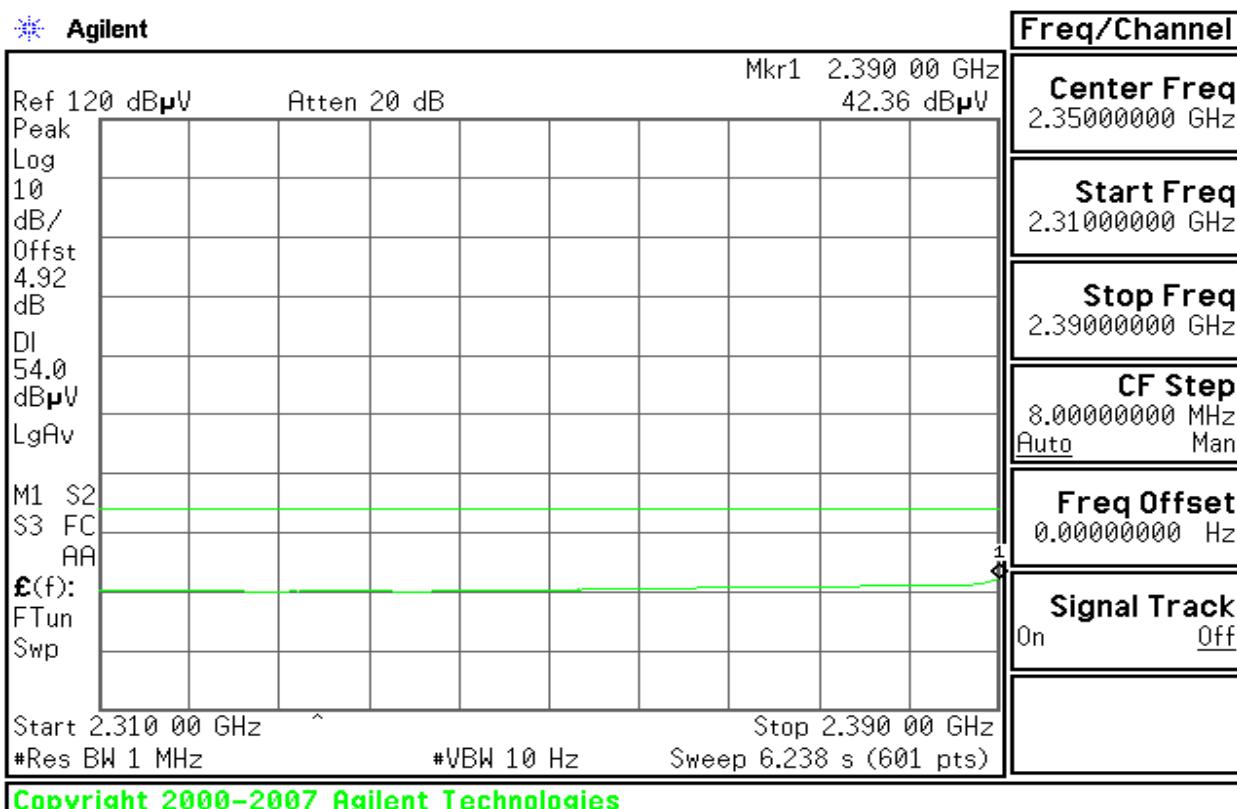
### 7.6.5. TEST RESULTS

#### RESTRICTED BANDEDGE (b Mode, Low Channel, Horizontal)

##### Peak



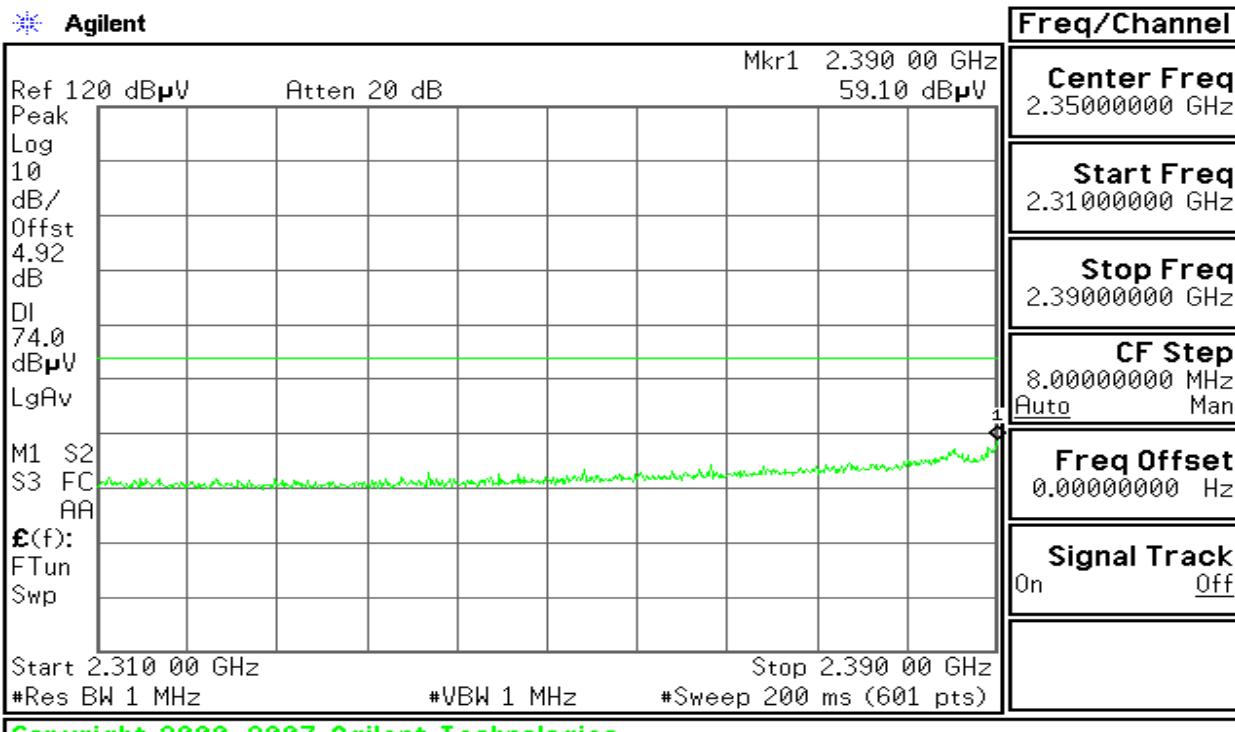
##### AVG



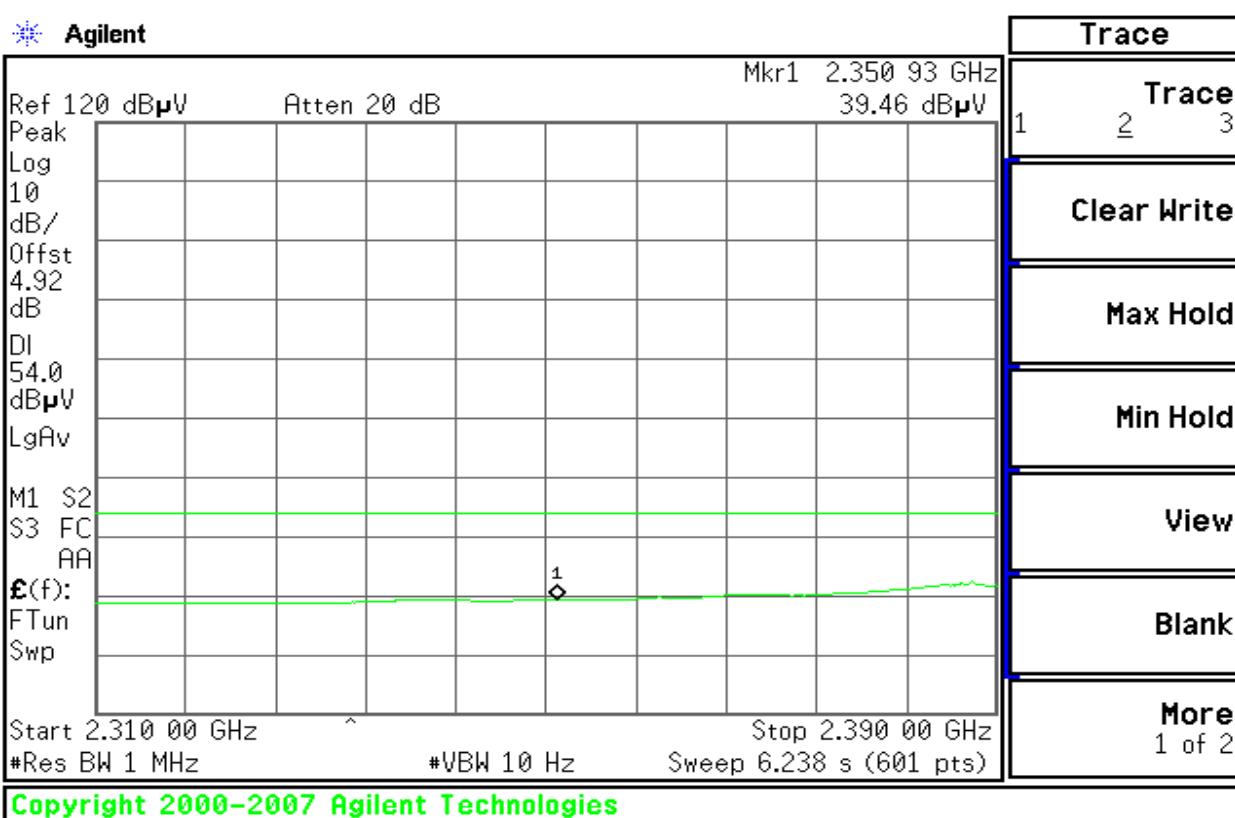


## RESTRICTED BANDEDGE (b Mode, Low Channel, Vertical)

### Peak



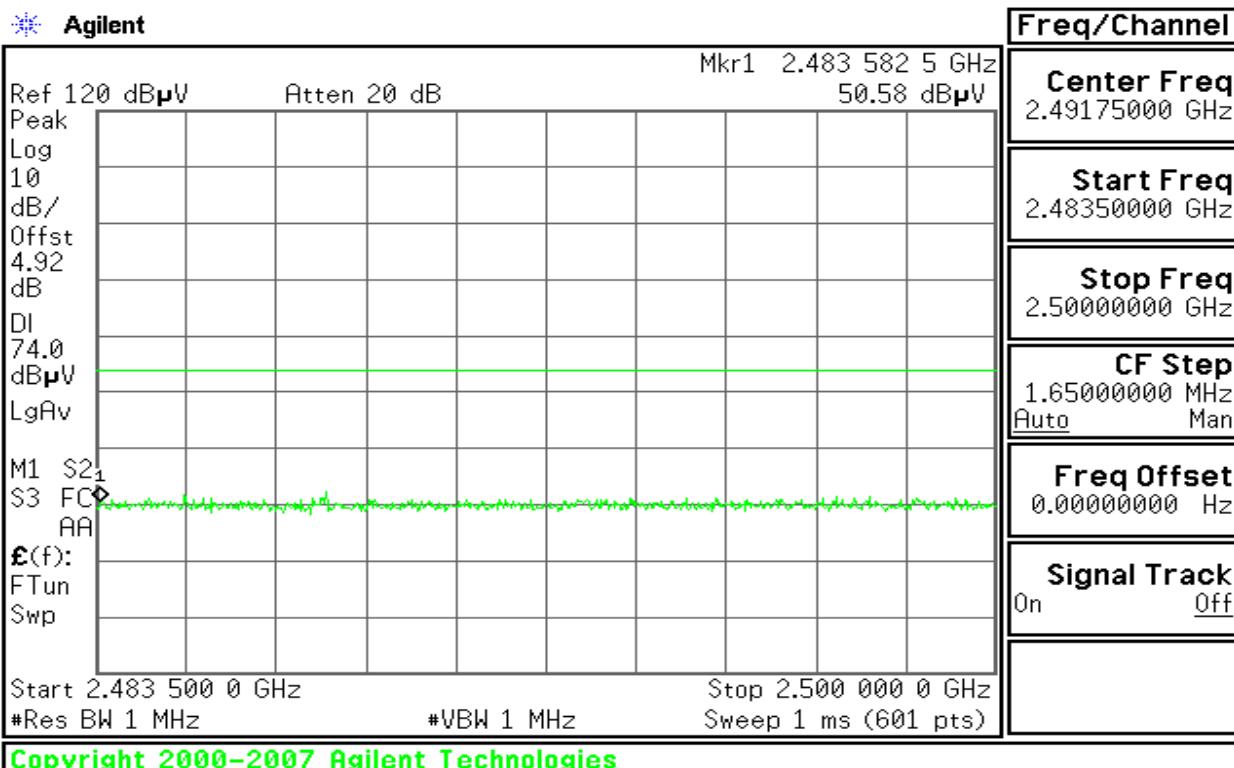
### AVG



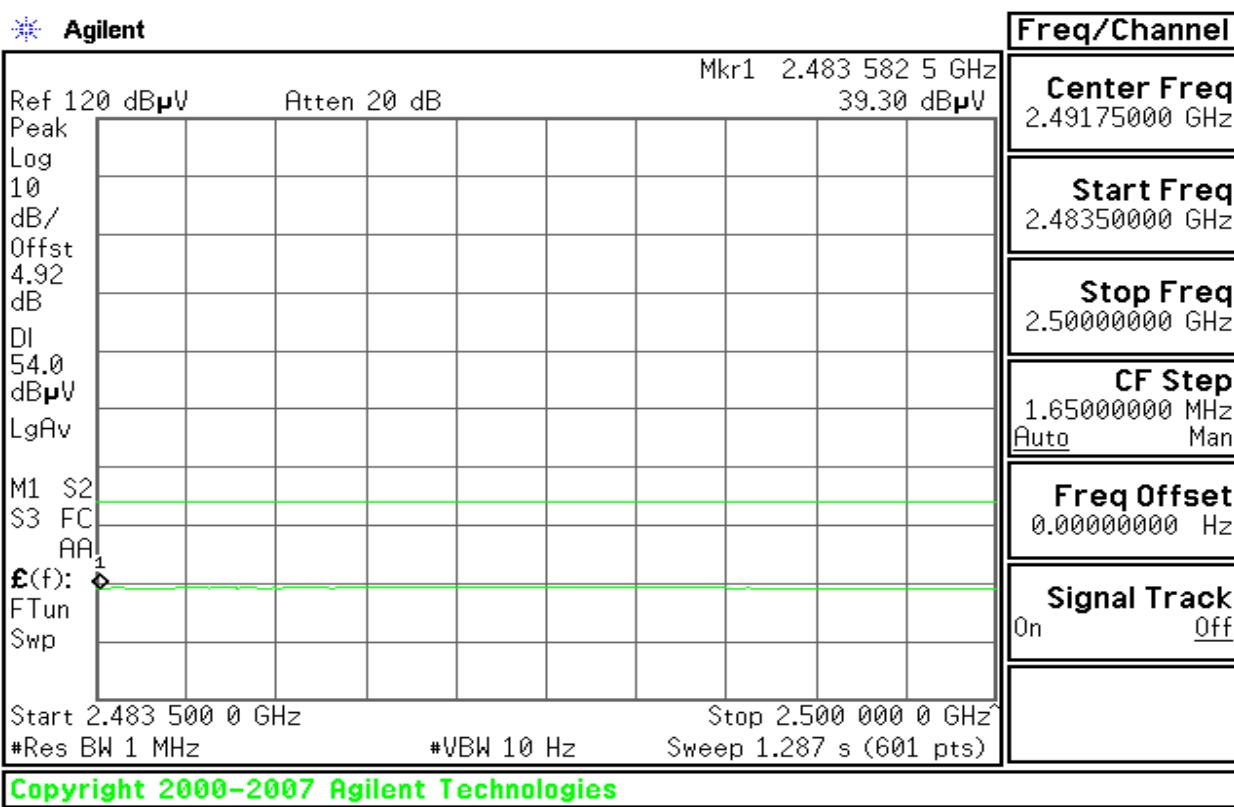


## RESTRICTED BANDEDGE (b Mode, High Channel, Horizontal)

## Peak



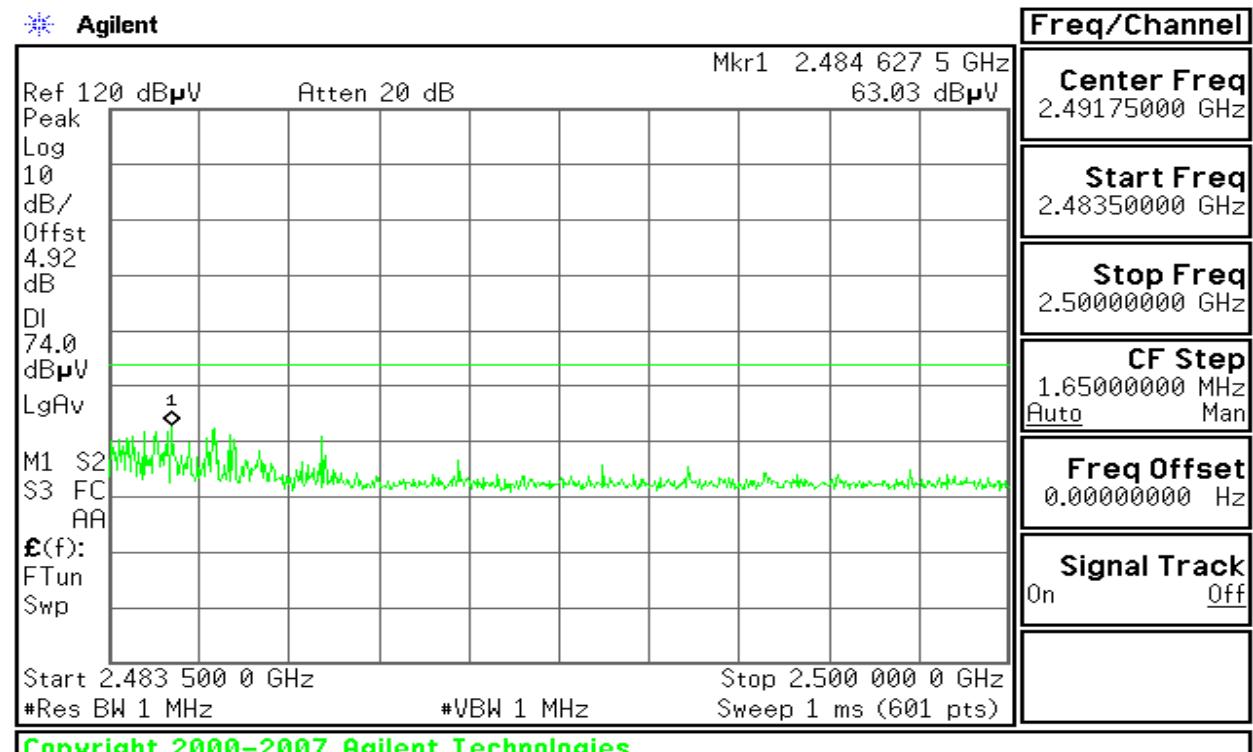
## AVG



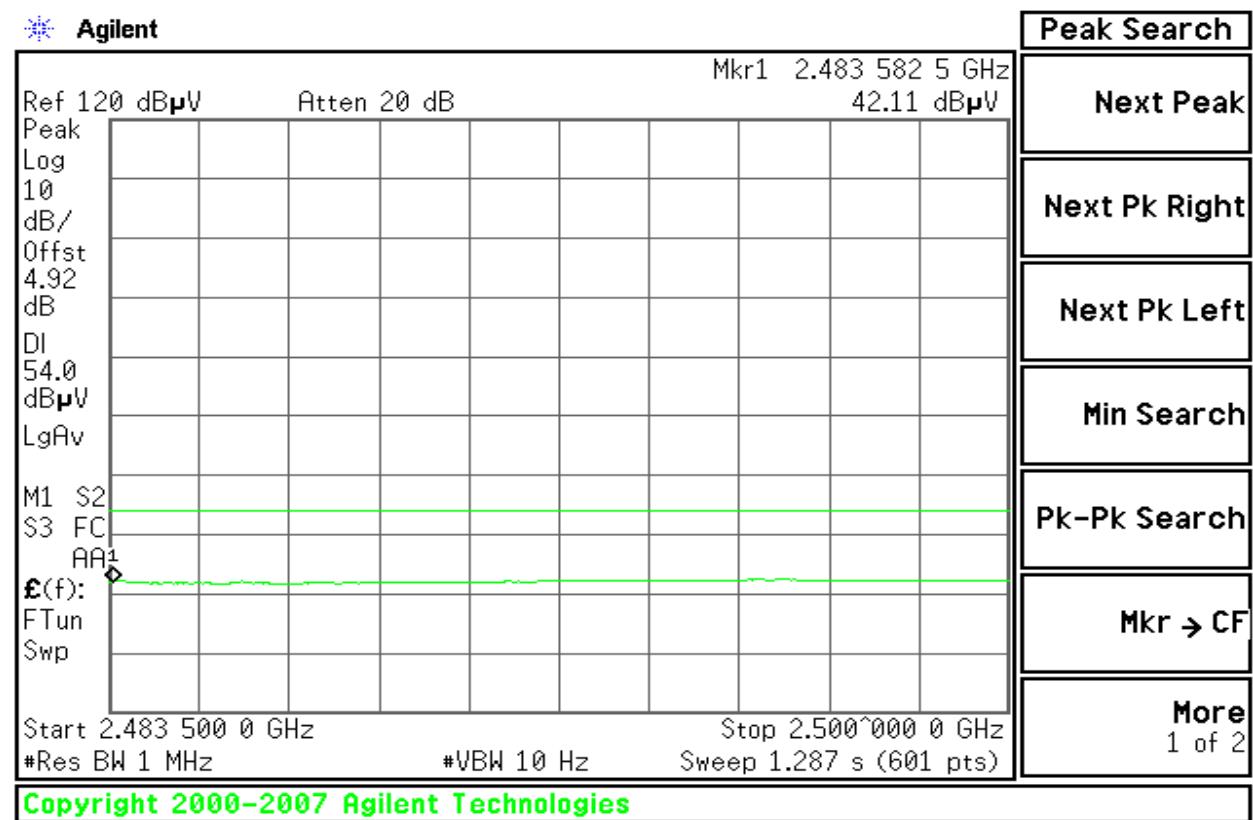


## RESTRICTED BANDEDGE (b Mode, High Channel, Vertical)

### Peak



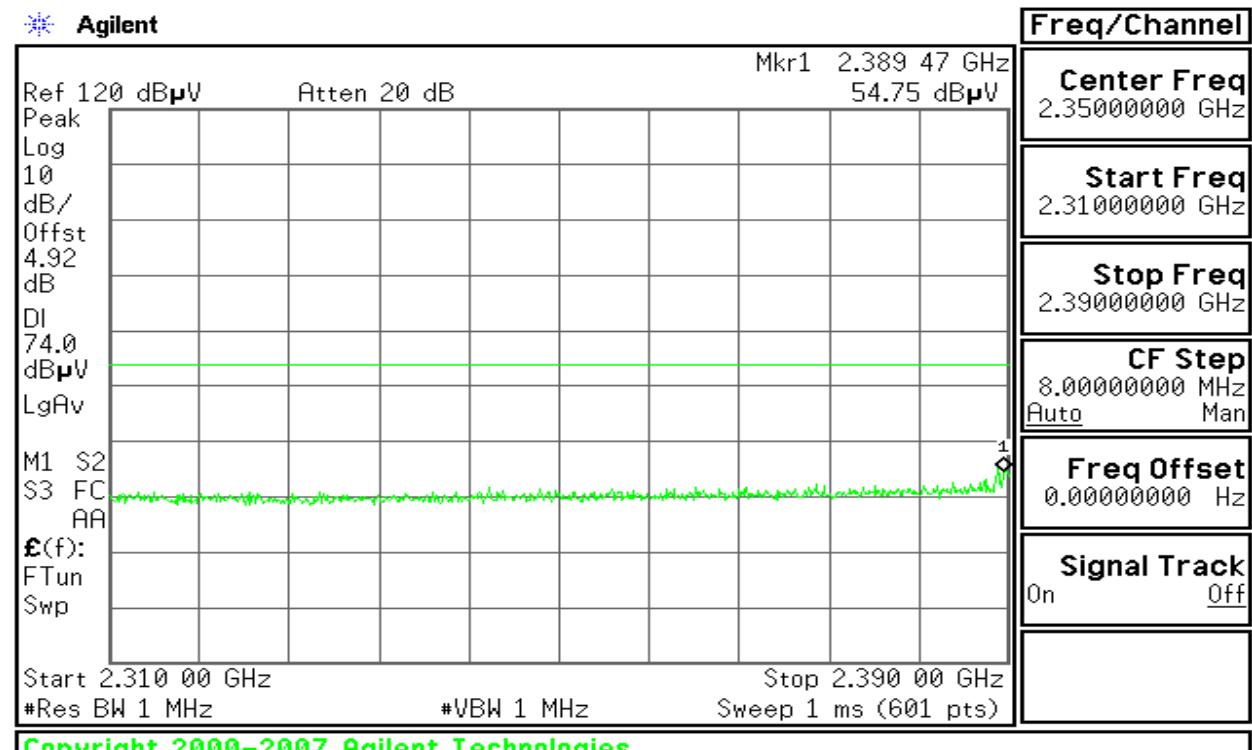
### AVG



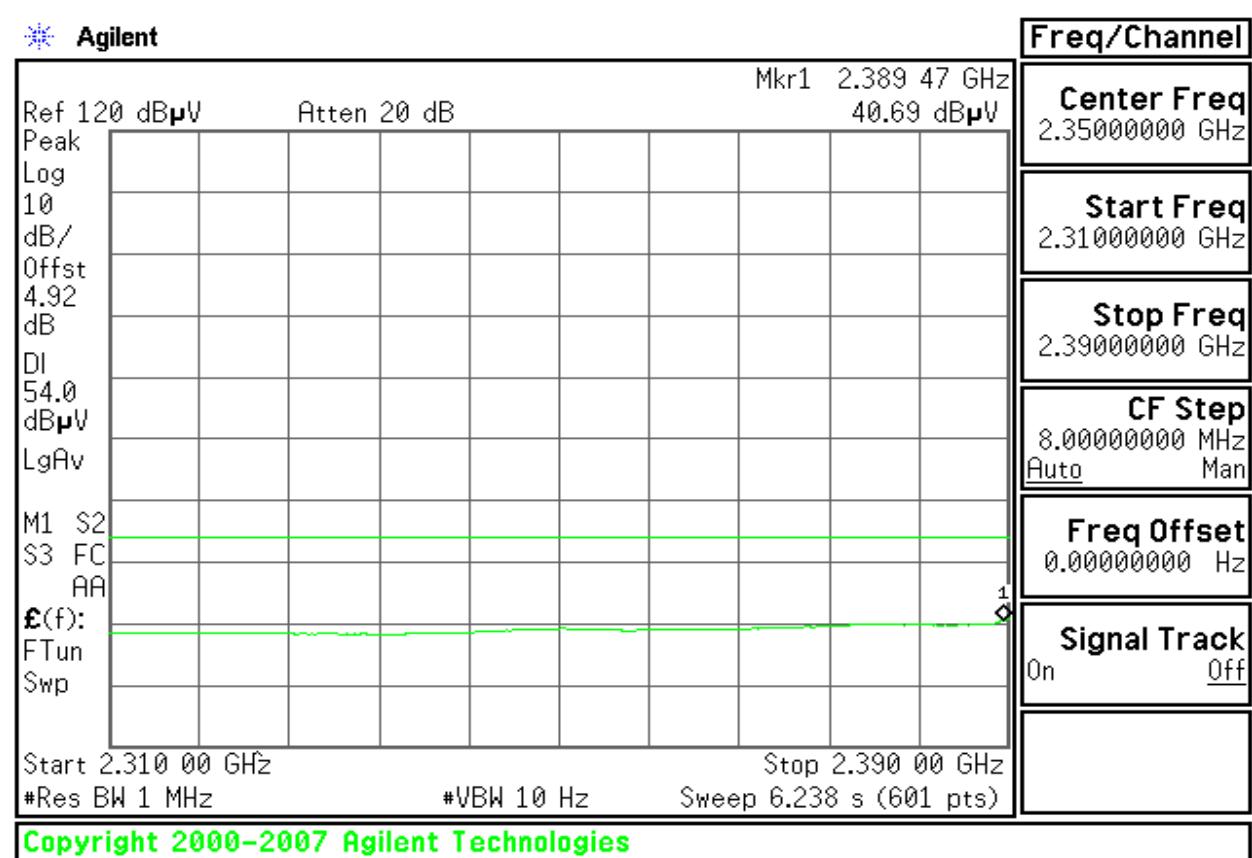


## RESTRICTED BANDEDGE (g Mode, Low Channel, Horizontal)

## Peak



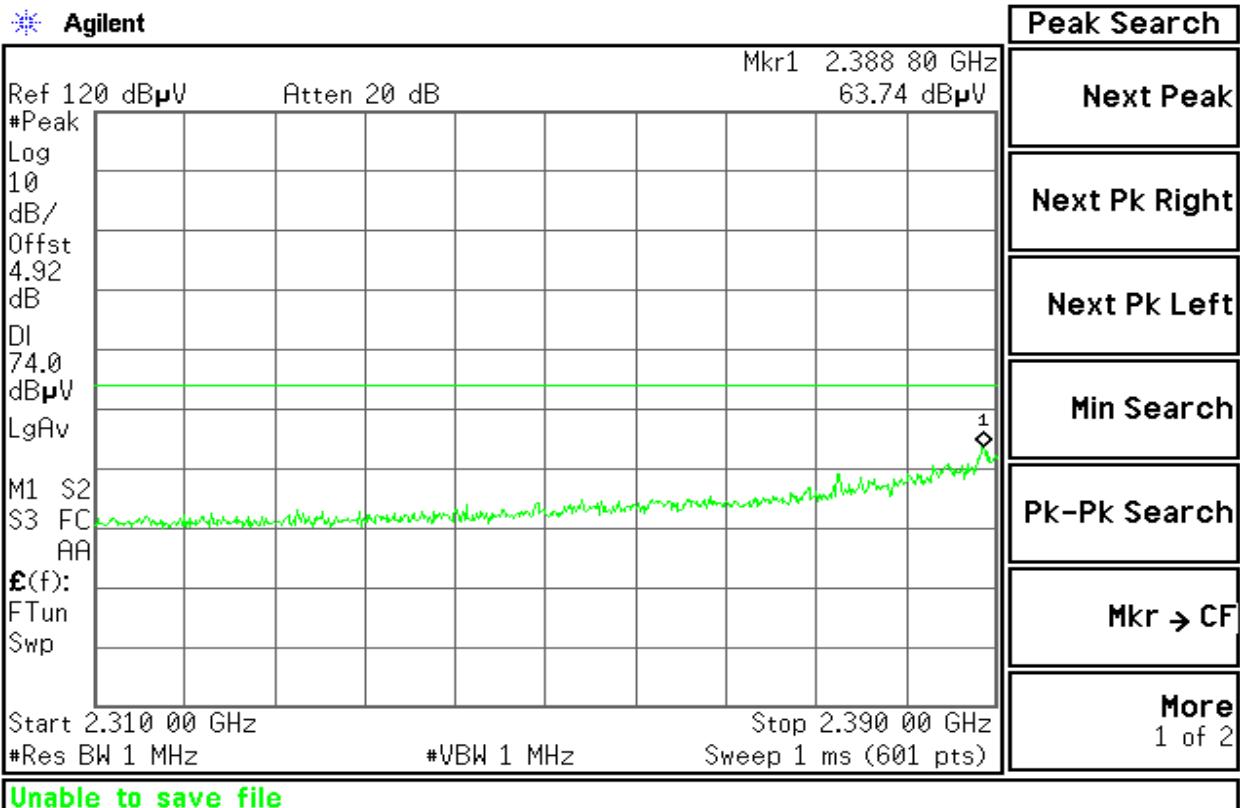
## AVG



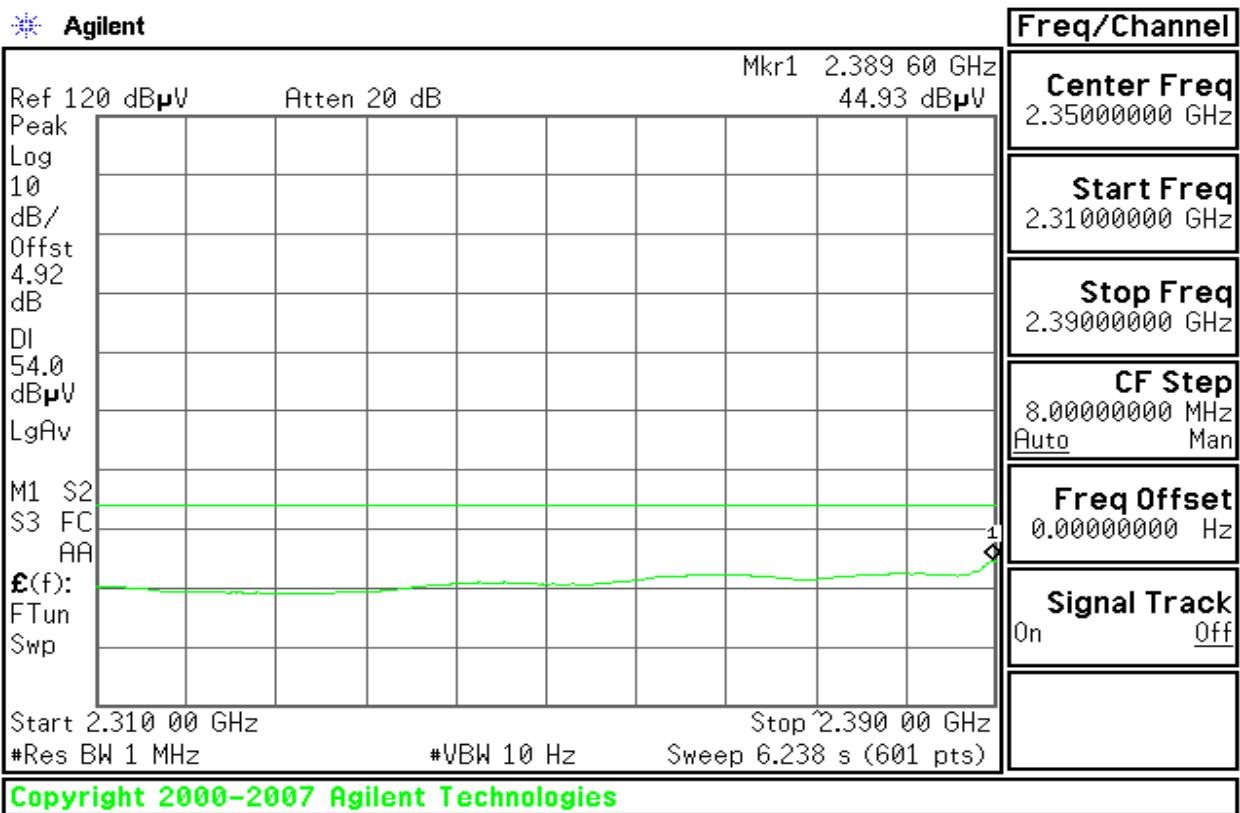


## RESTRICTED BANDEDGE (g Mode, Low Channel, Vertical)

### Peak



### AVG

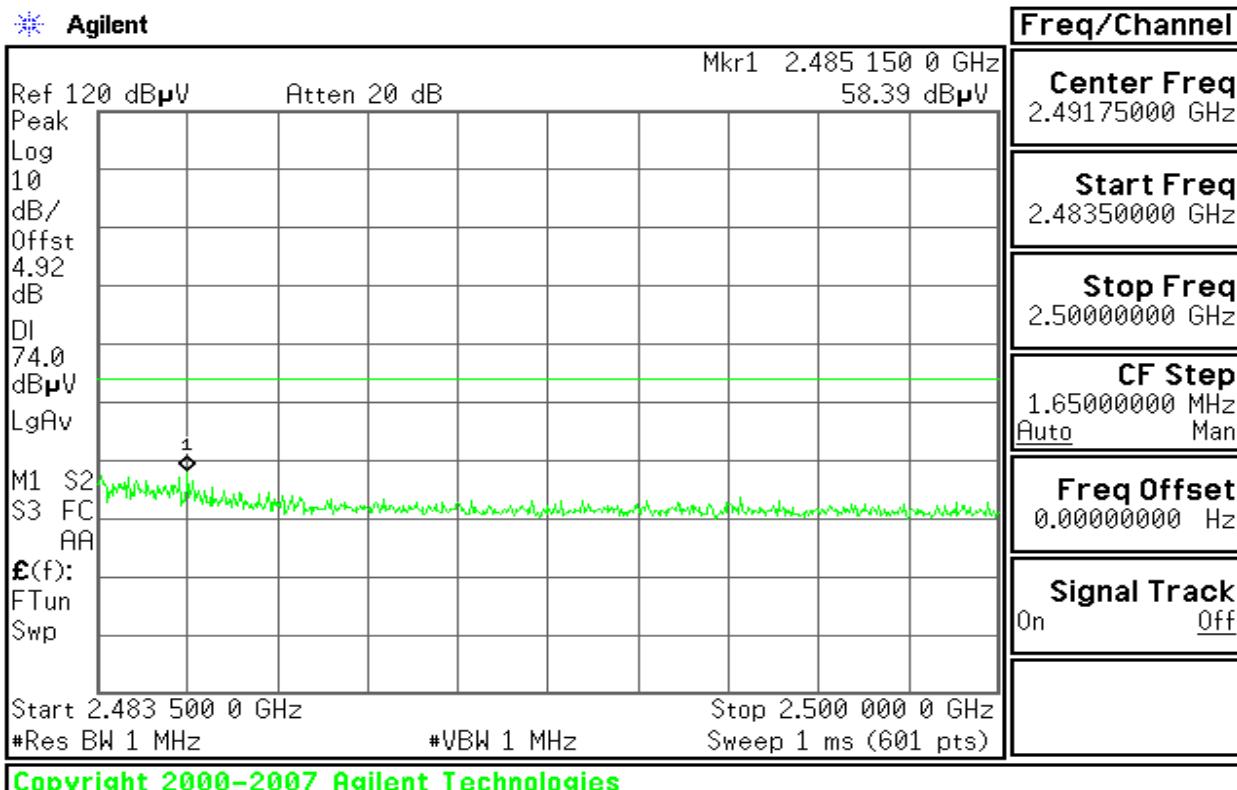


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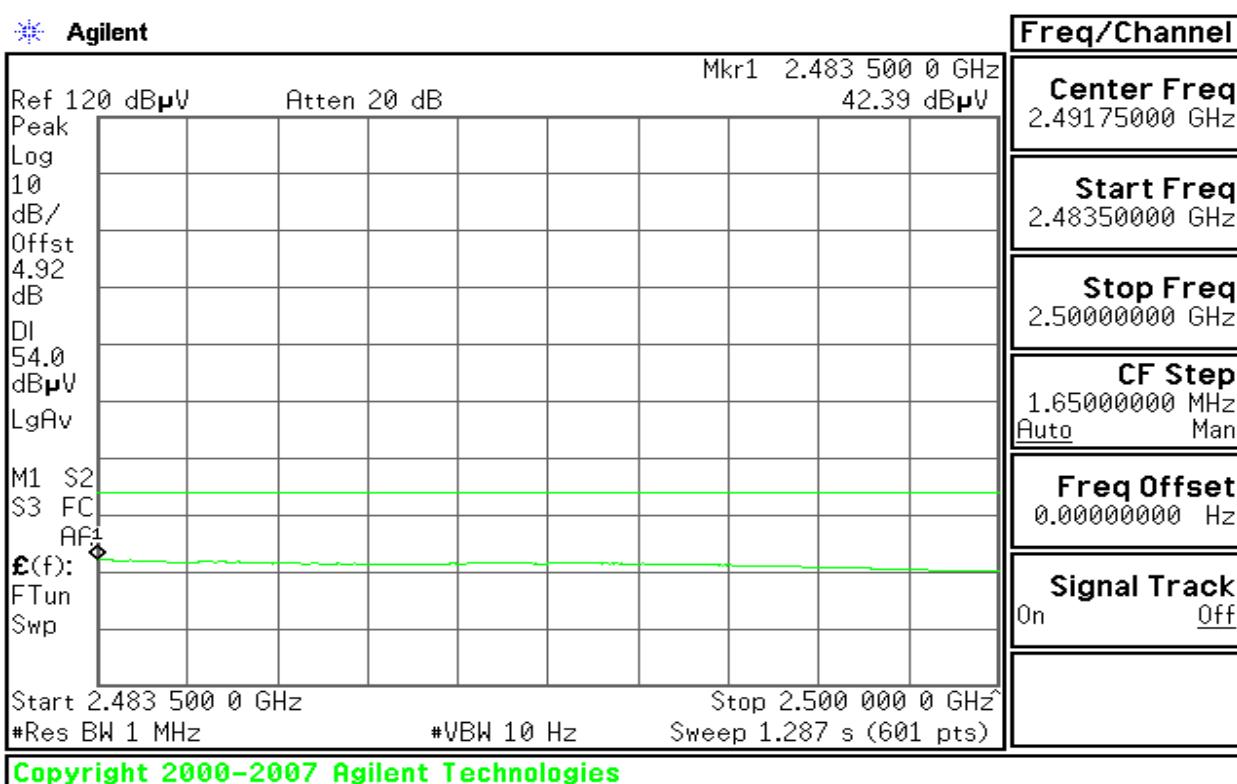


## RESTRICTED BANDEDGE (g Mode, High Channel, Horizontal)

### Peak



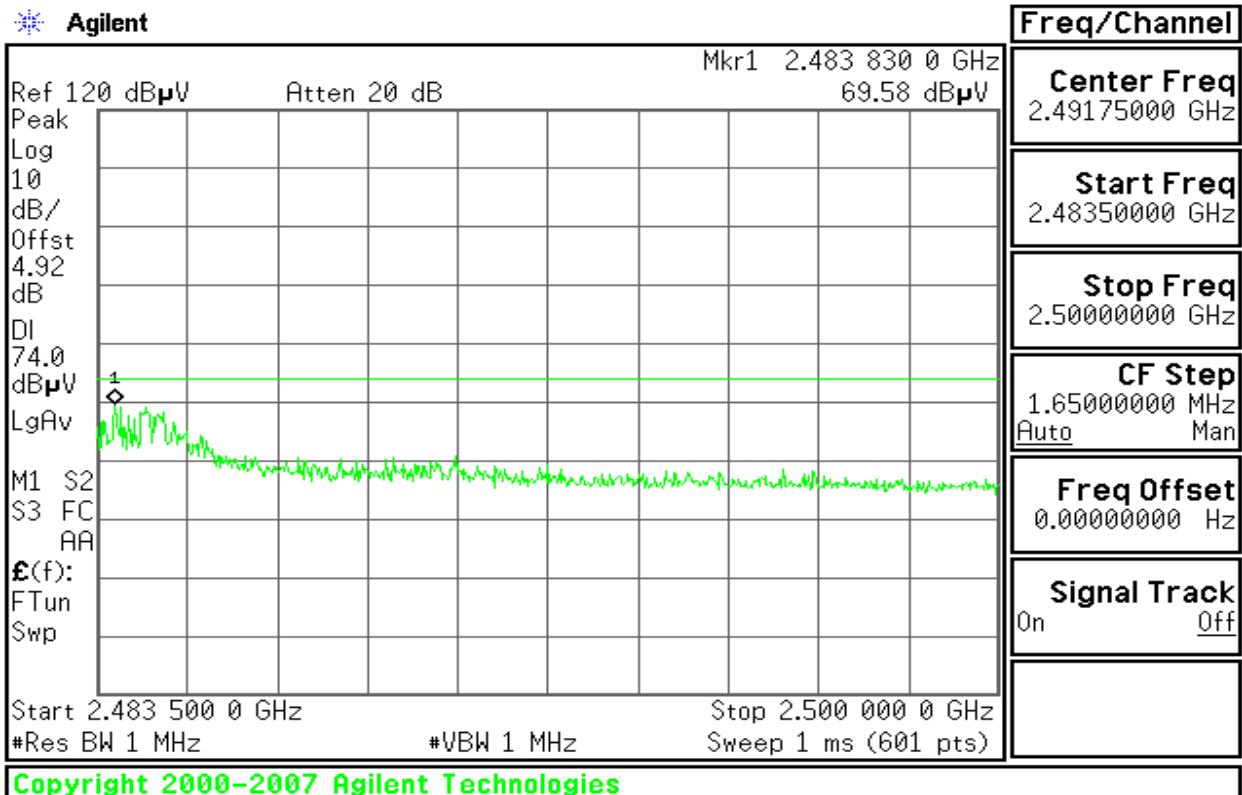
### AVG



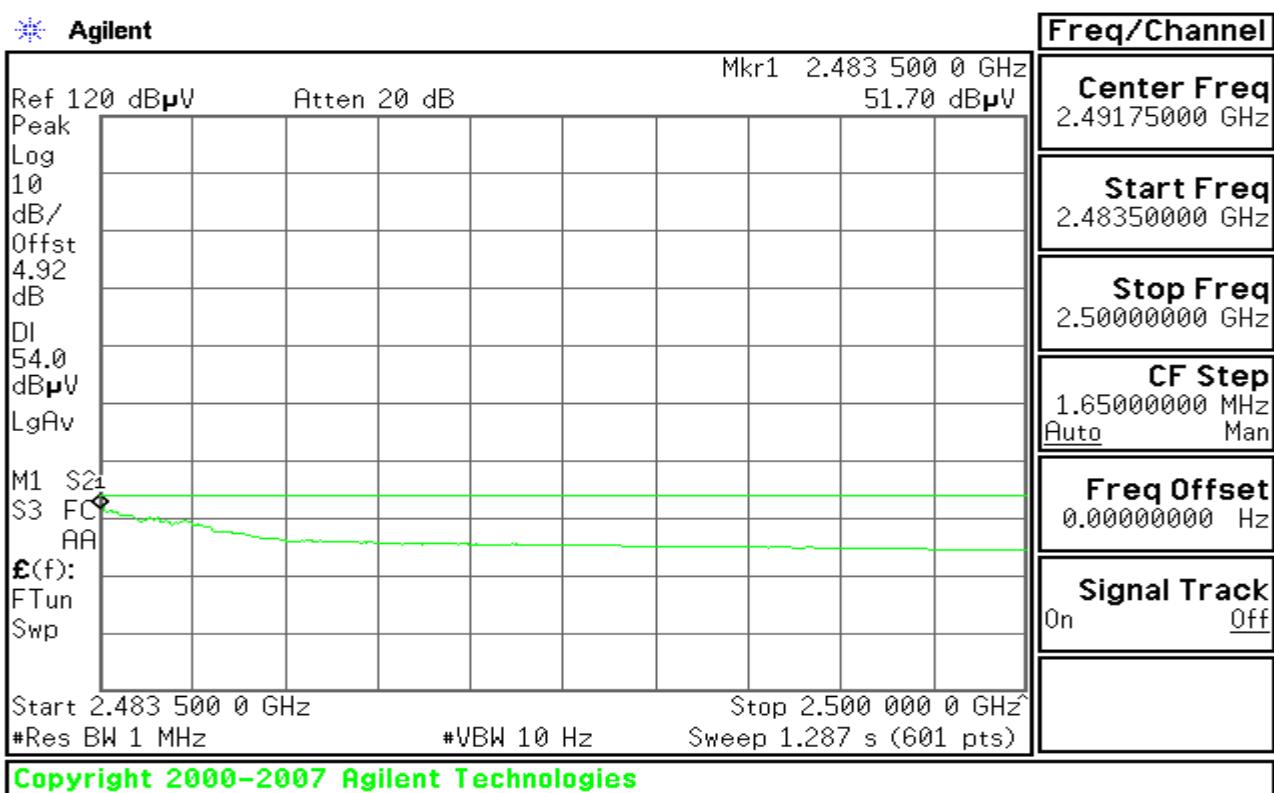


## RESTRICTED BANDEDGE (g Mode, High Channel, Vertical)

### Peak



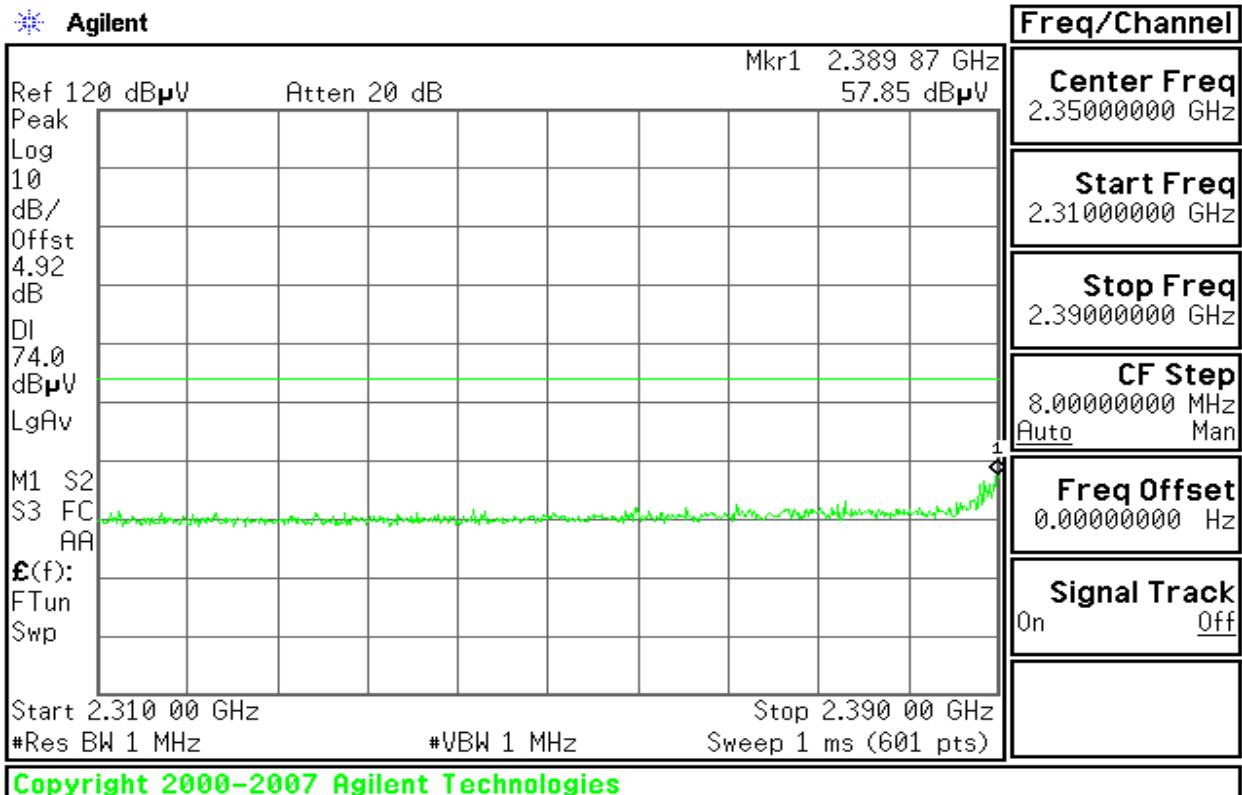
### AVG



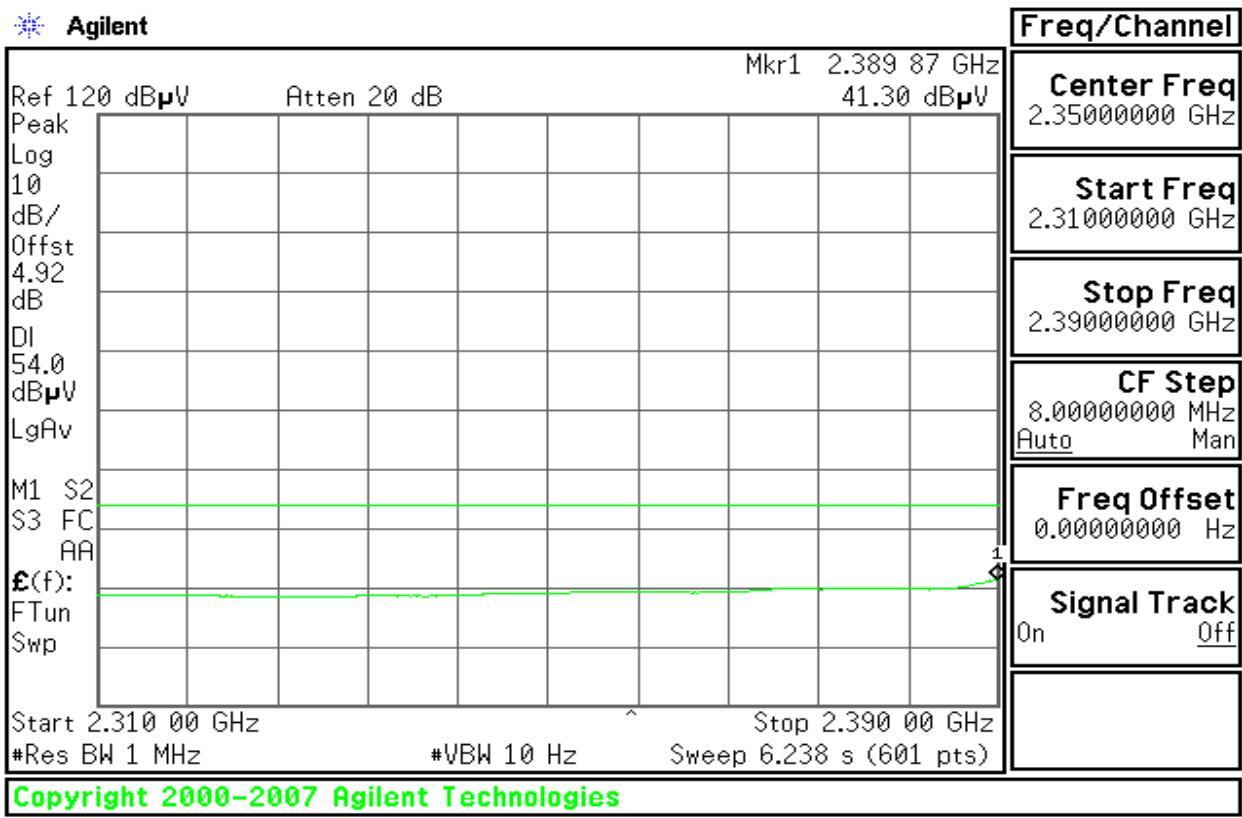


## RESTRICTED BANDEDGE (802.11n-HT20n mode, Low Channel, Horizontal)

### Peak



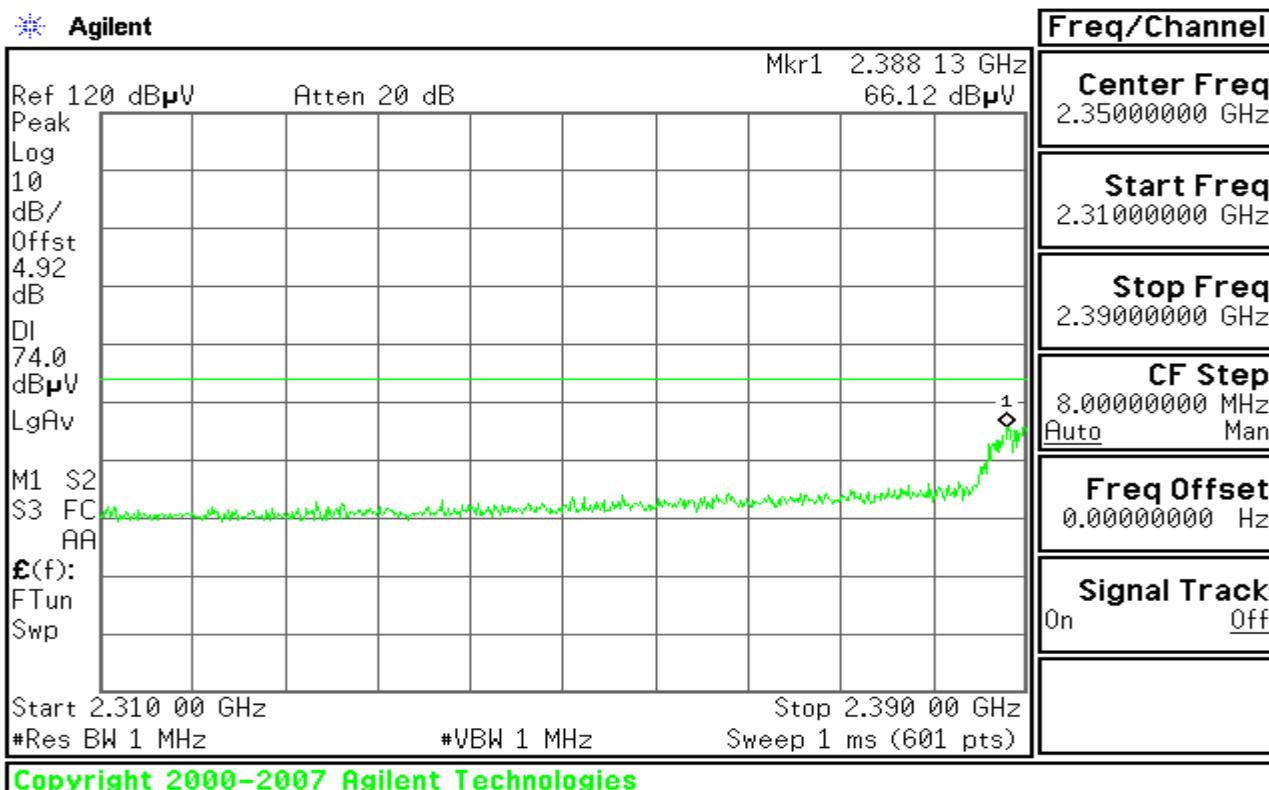
### AVG



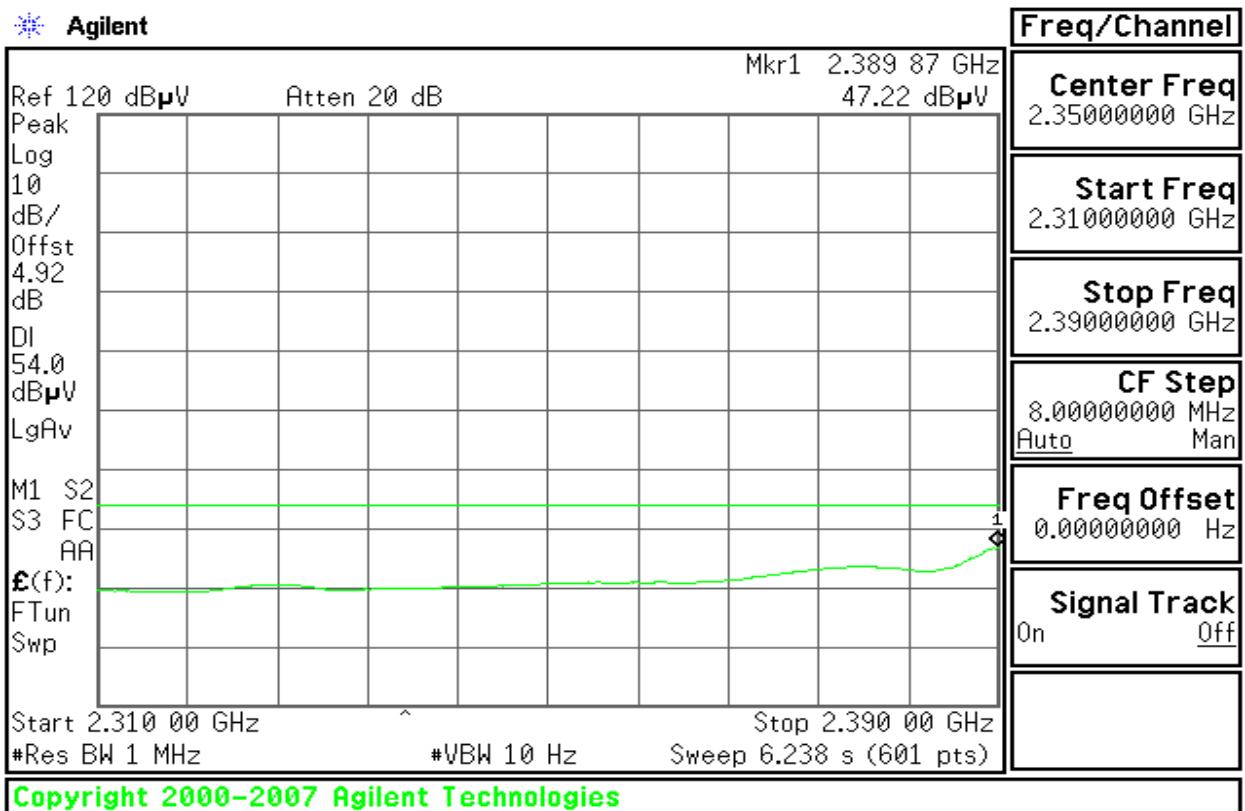


## RESTRICTED BANDEDGE (802.11n-HT20n mode, Low Channel, Vertical)

### Peak



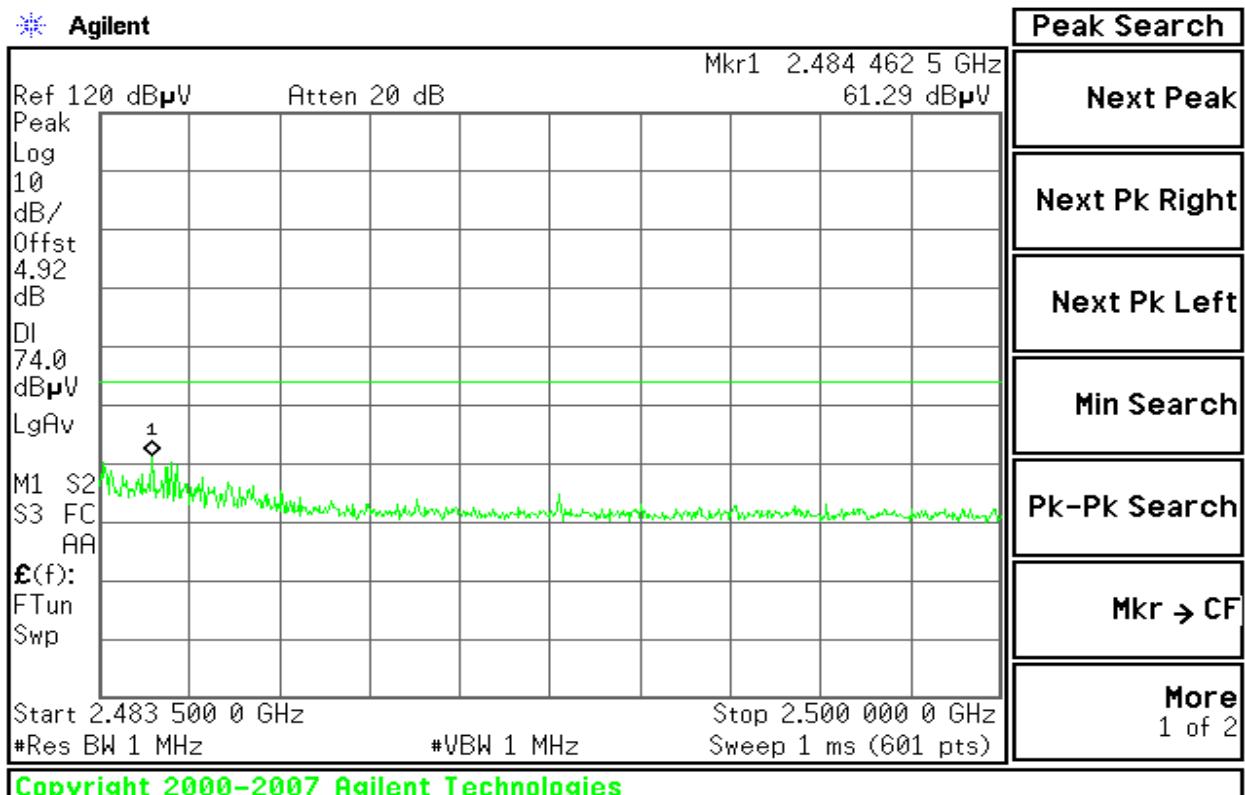
### AVG



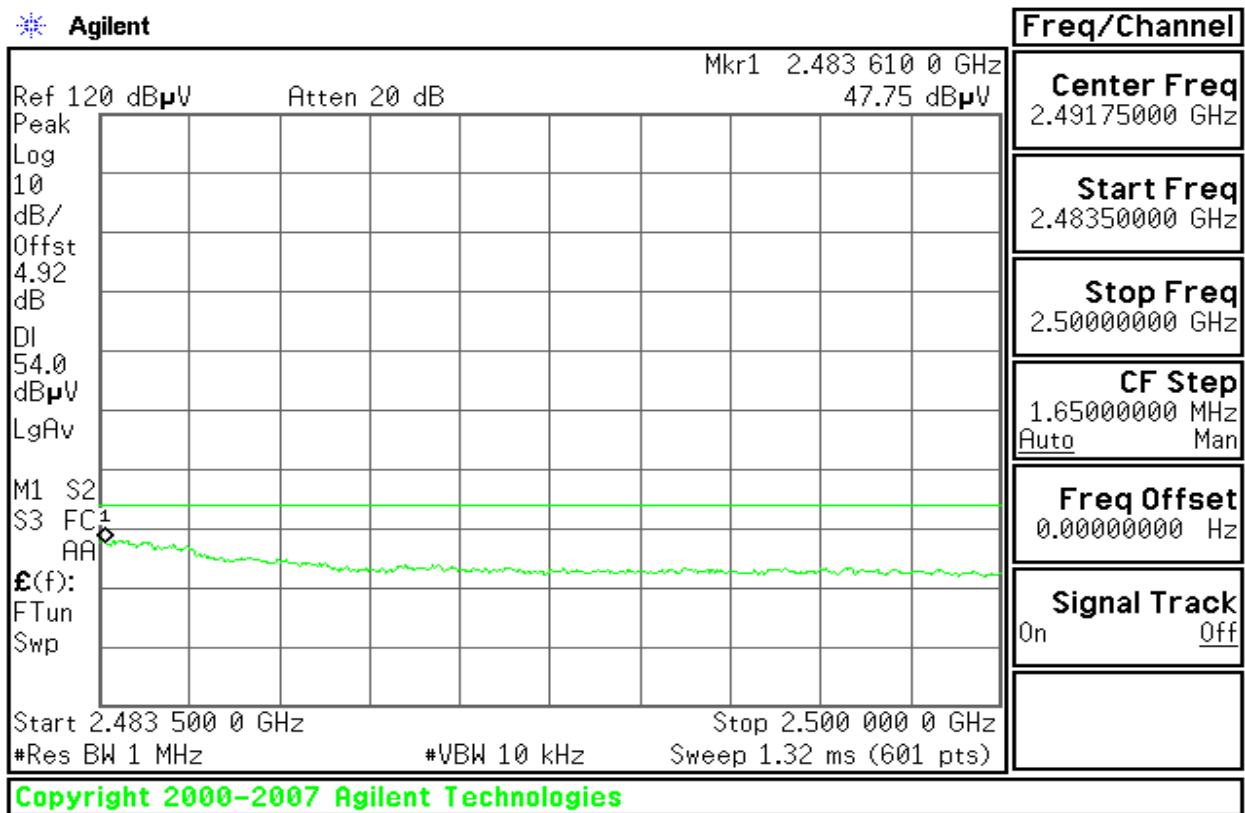


## RESTRICTED BANDEDGE (802.11n-HT20n mode, High Channel, Horizontal)

### Peak



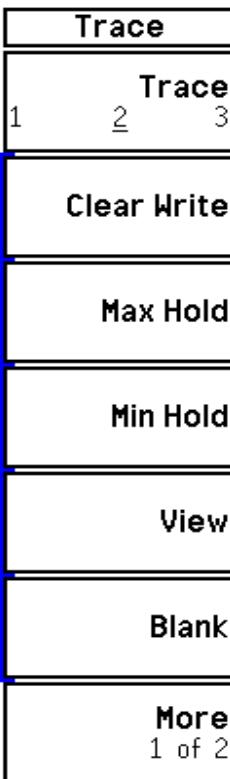
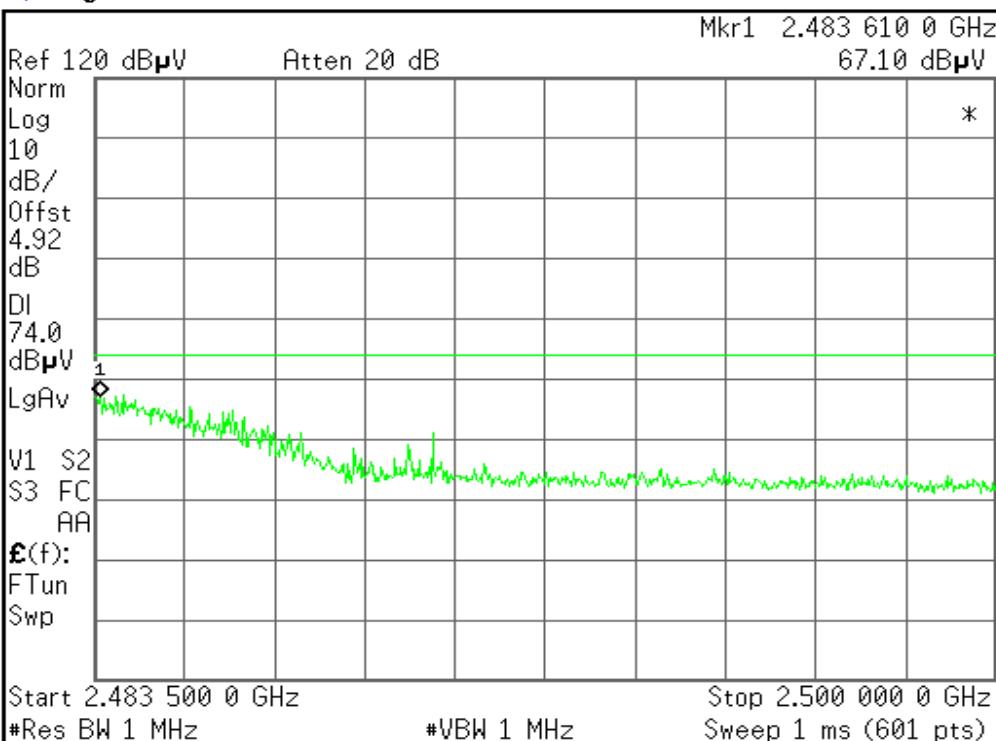
### AVG



## RESTRICTED BANDEDGE (802.11n-HT20n mode, High Channel, Vertical)

## Peak

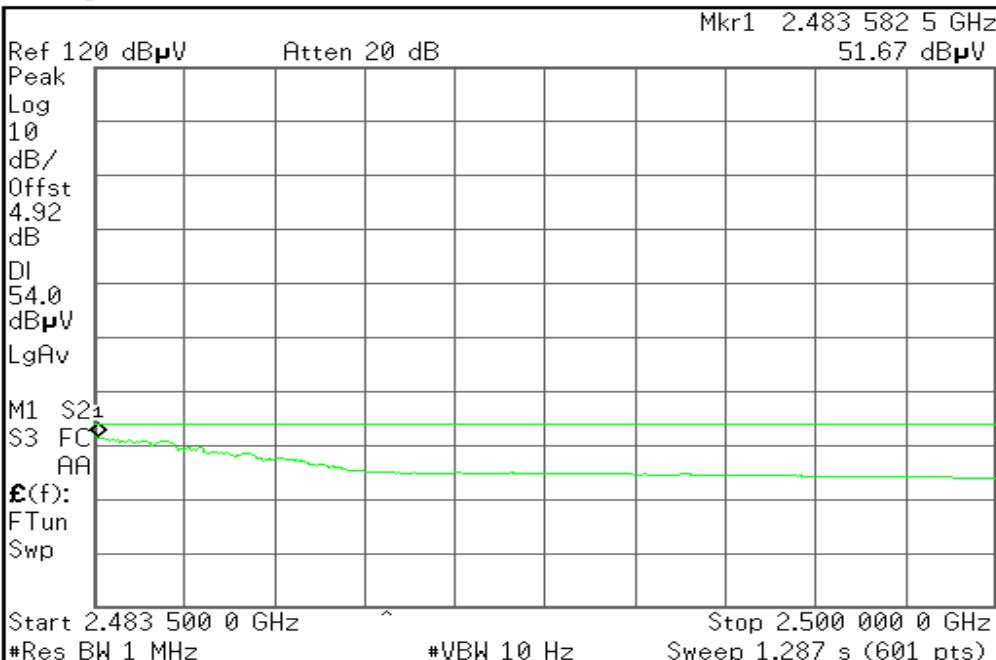
Agilent



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## AVG

Agilent



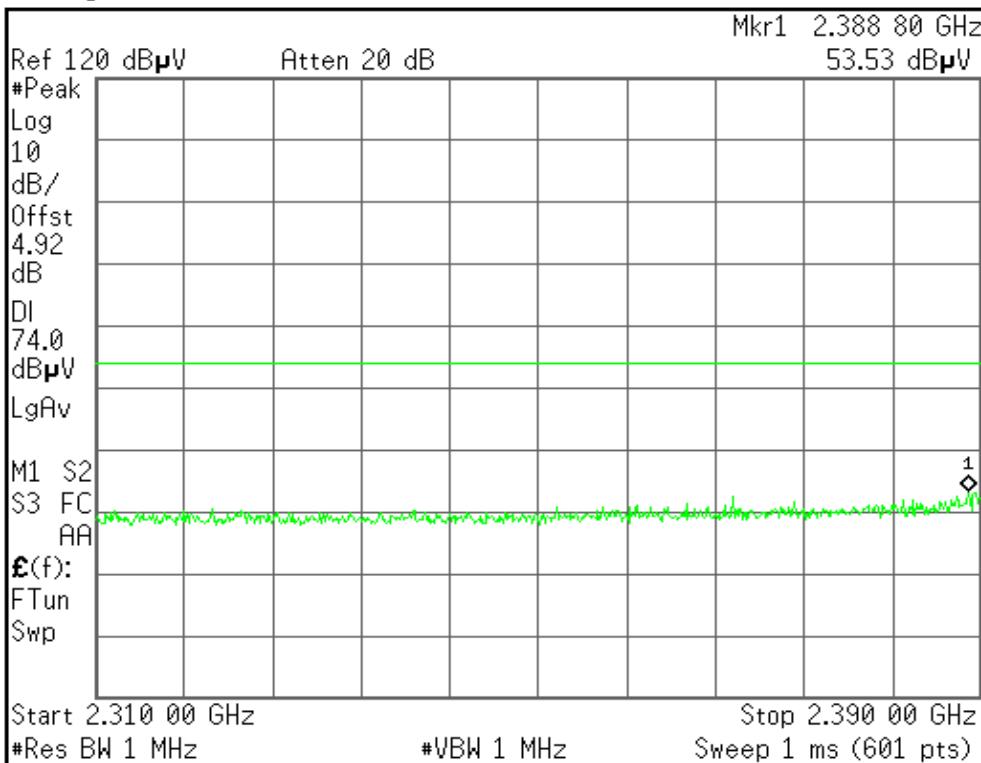
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## RESTRICTED BANDEDGE (802.11n-HT40n mode, Low Channel, Horizontal)

## Peak

\* Agilent



## Peak Search

### Next Peak

Next Pk Right

Next Pk Left

### Min Search

### Pk-Pk Search

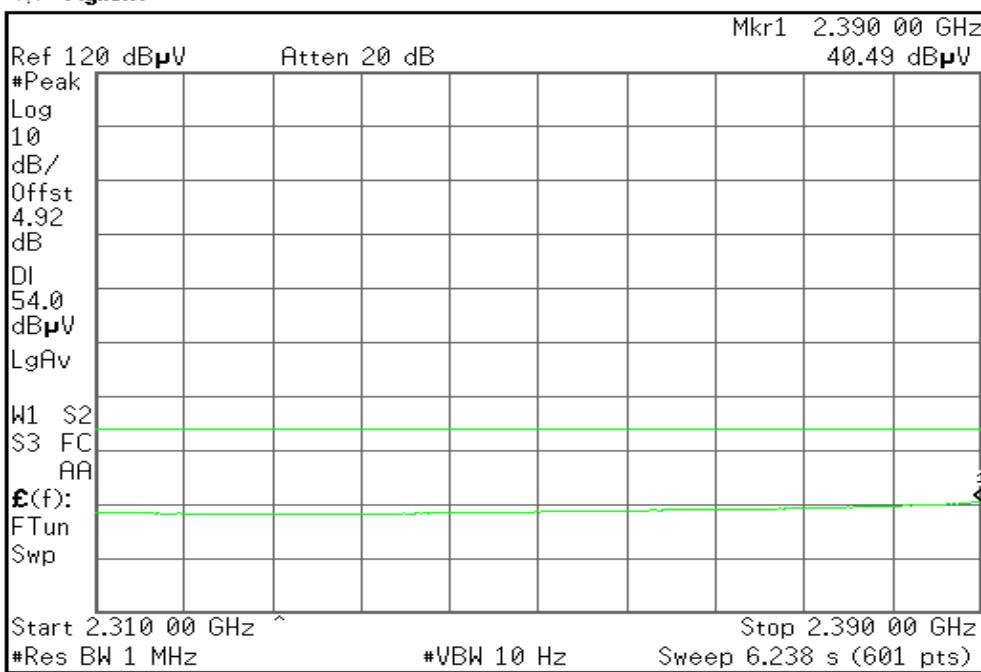
Mkr → CF

More

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AVG

Agilent



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## Display

Full Screen

Display Line  
54.00 dB $\mu$ V

## Limits

Active Fctn  
Position>  
Center

Title ➤

## Preferences ▾

---

ECC ID : EIE WR003E

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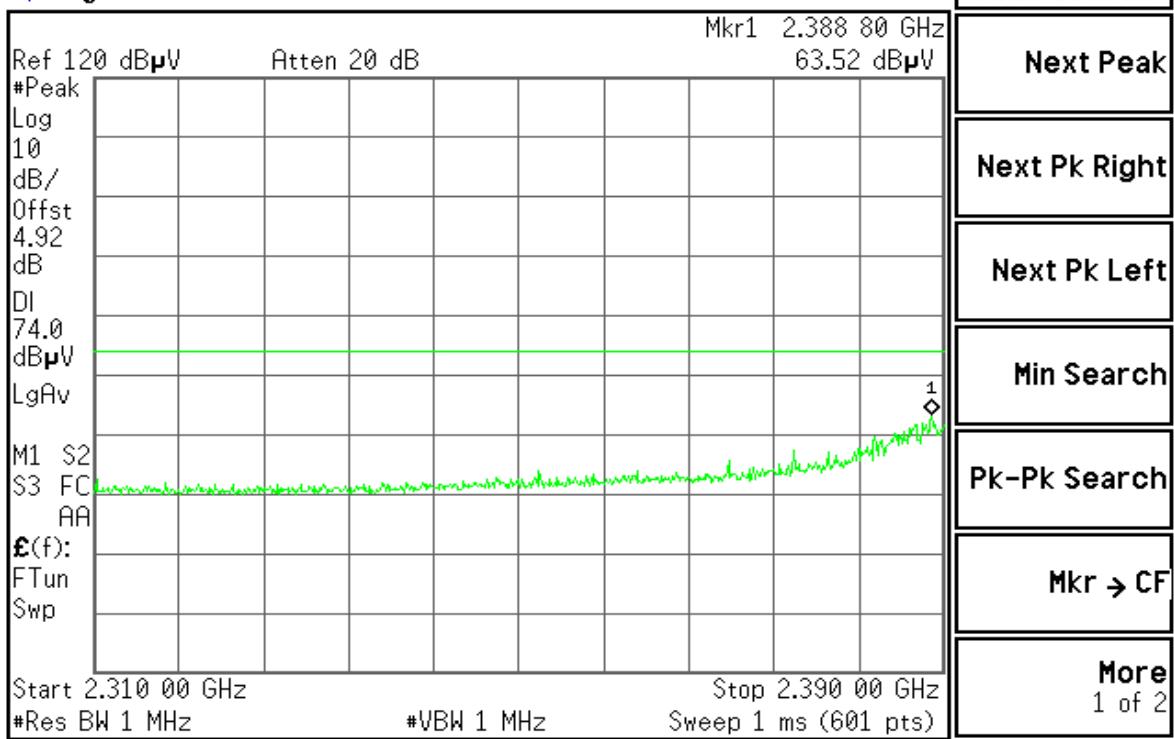
FCC ID: EJE-WB0075 Page 77  
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## RESTRICTED BANDEDGE (802.11n-HT40n mode, Low Channel, Vertical)

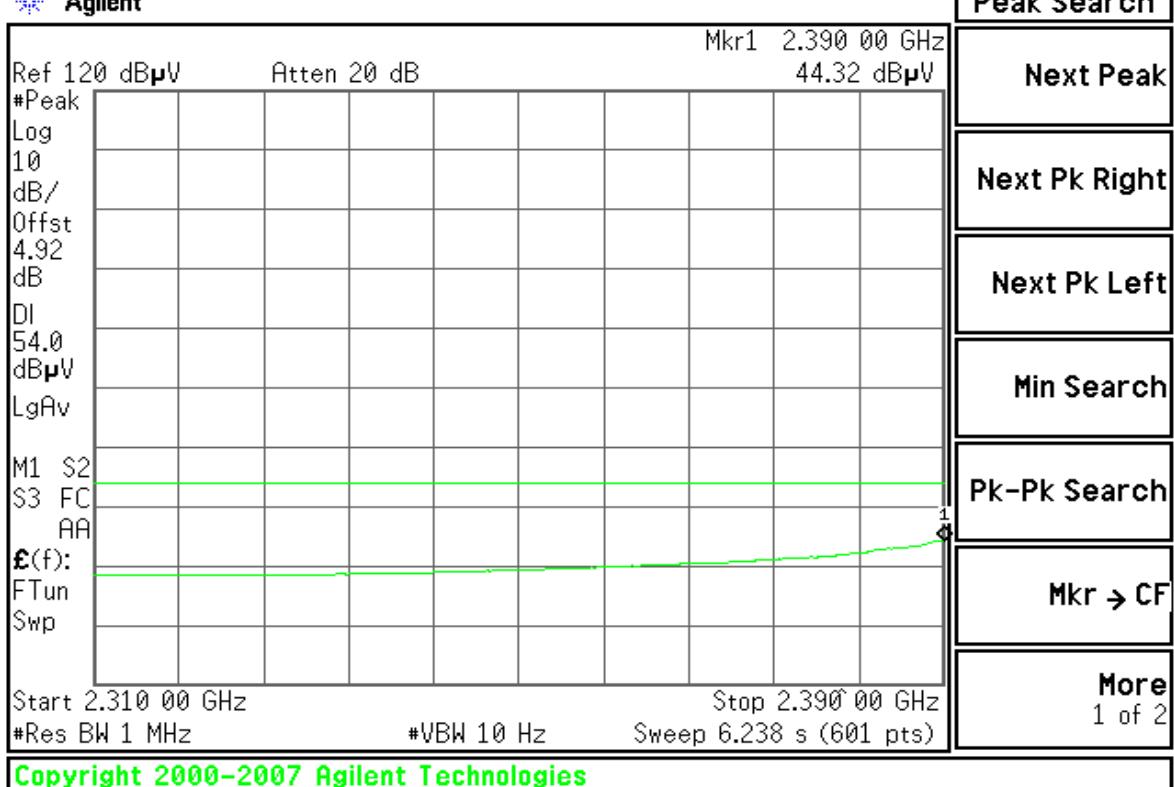
### Peak

\* Agilent



### AVG

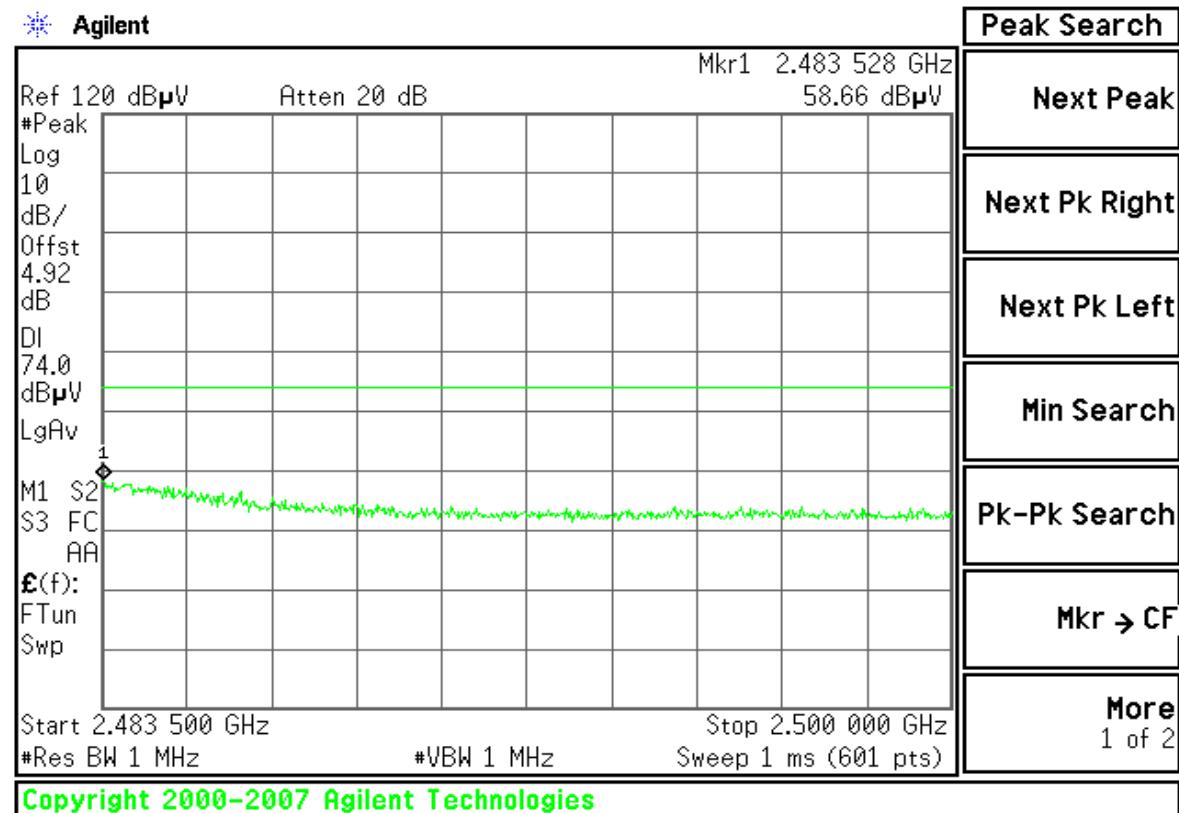
\* Agilent



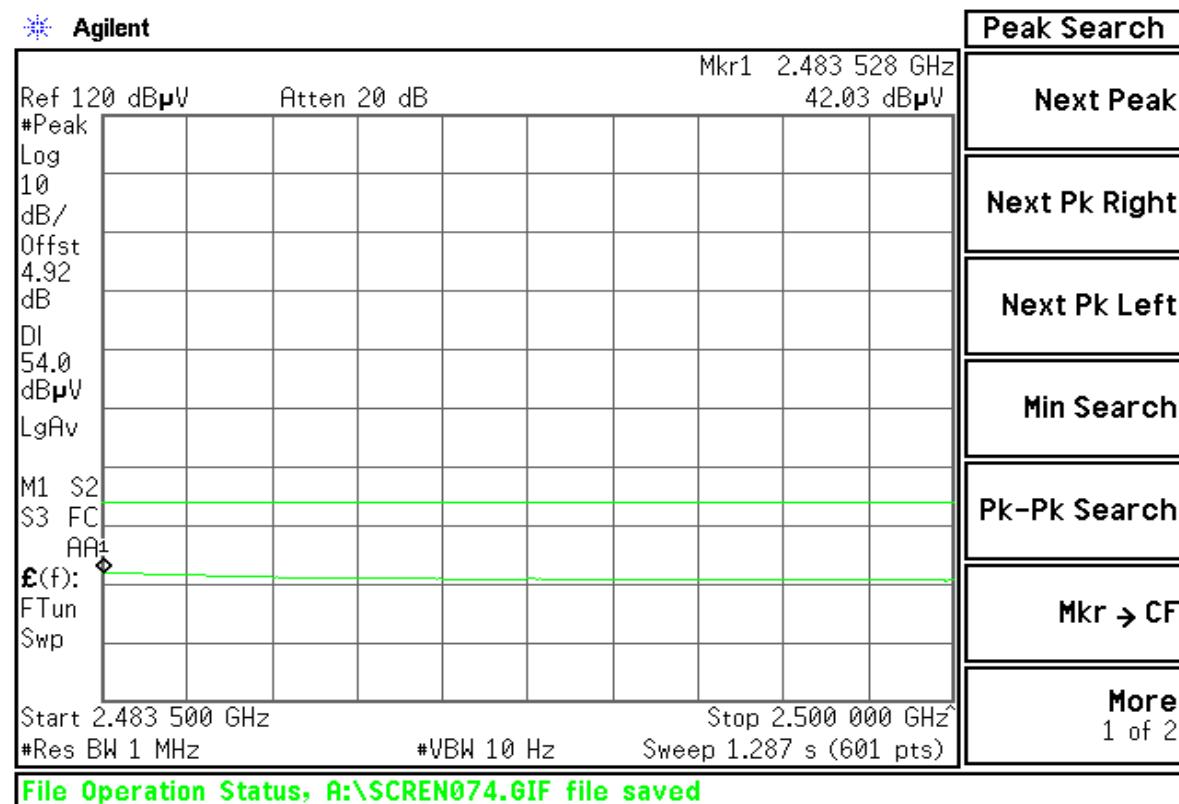


## RESTRICTED BANDEDGE (802.11n-HT40n mode, High Channel, Horizontal)

### Peak



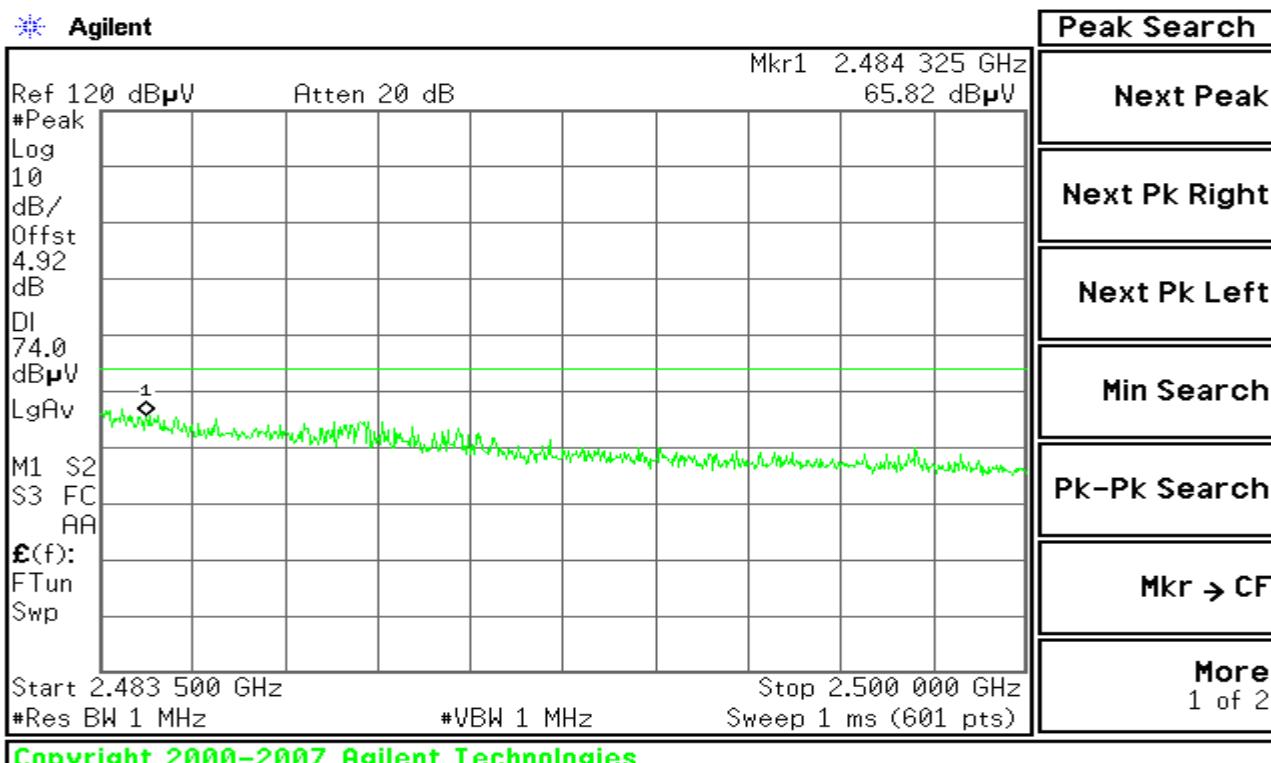
### AVG



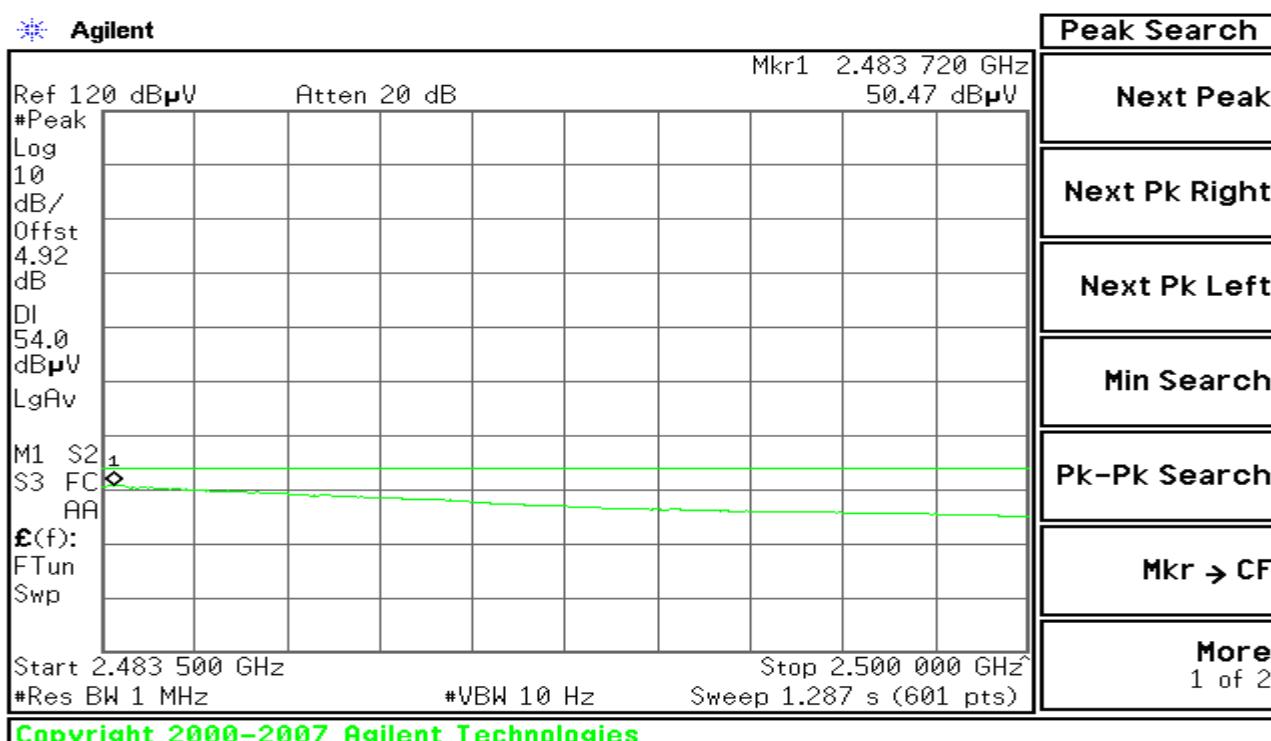


## RESTRICTED BANDEDGE (802.11n-HT40n mode, High Channel, Vertical)

### Peak



### AVG





## 7.7. PEAK POWER SPECTRAL DENSITY MEASUREMENT

### 7.7.1. LIMITS

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.

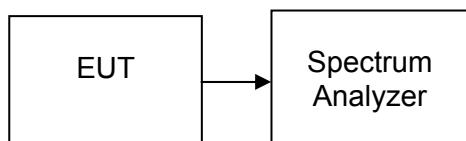
### 7.7.2. TEST INSTRUMENTS

Conducted Emissions Test Site				
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
Spectrum Analyzer	Agilent	E4446A	MY44020154	11/12/2009

### 7.7.3. TEST PROCEDURES (please refer to measurement standard)

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.

### 7.7.4. TEST SETUP





## 7.7.5. TEST RESULTS

*No non-compliance noted*

### Test Data

#### Test mode: IEEE 802.11b

Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Test Result
Low	2412	-5.61	8.00	PASS
Mid	2437	-5.33		PASS
High	2462	-5.02		PASS

### Test Data

#### Test mode: IEEE 802.11g

Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Test Result
Low	2412	-16.29	8.00	PASS
Mid	2437	-17.09		PASS
High	2462	-16.59		PASS

### Test Data

#### Test mode: IEEE 802.11n-HT20n

Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Test Result
Low	2412	-18.17	8.00	PASS
Mid	2437	-18.53		PASS
High	2462	-18.97		PASS

### Test Data

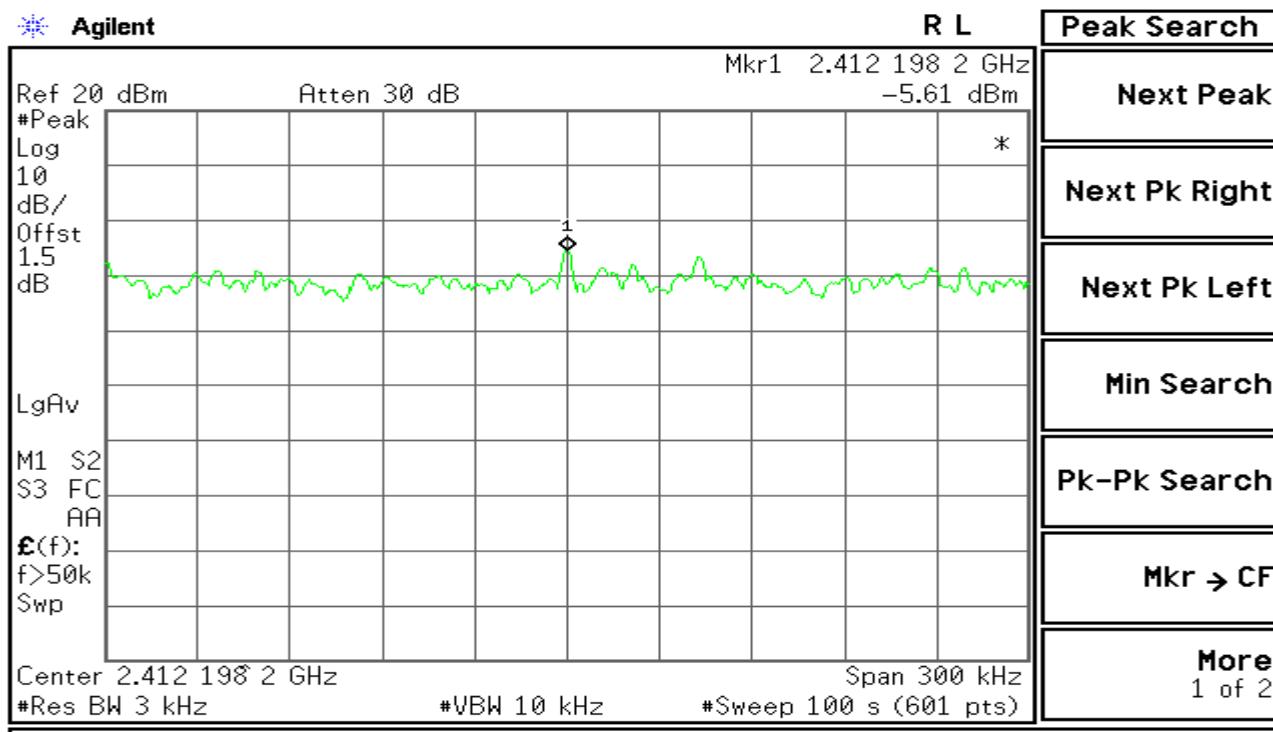
#### Test mode: IEEE 802.11n-HT40n

Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Test Result
Low	2422	-19.47	8.00	PASS
Mid	2437	-18.47		PASS
High	2452	-20.30		PASS

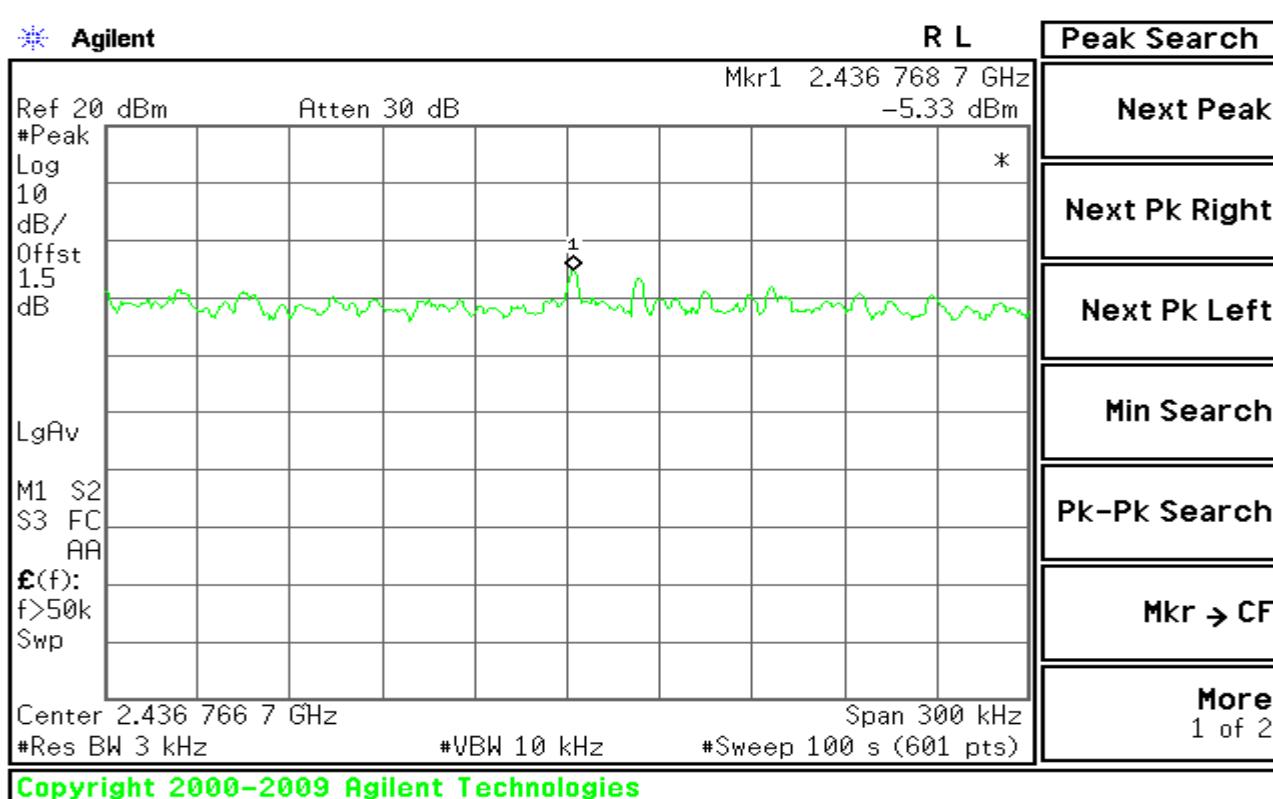


## Test Plot (IEEE 802.11b mode)

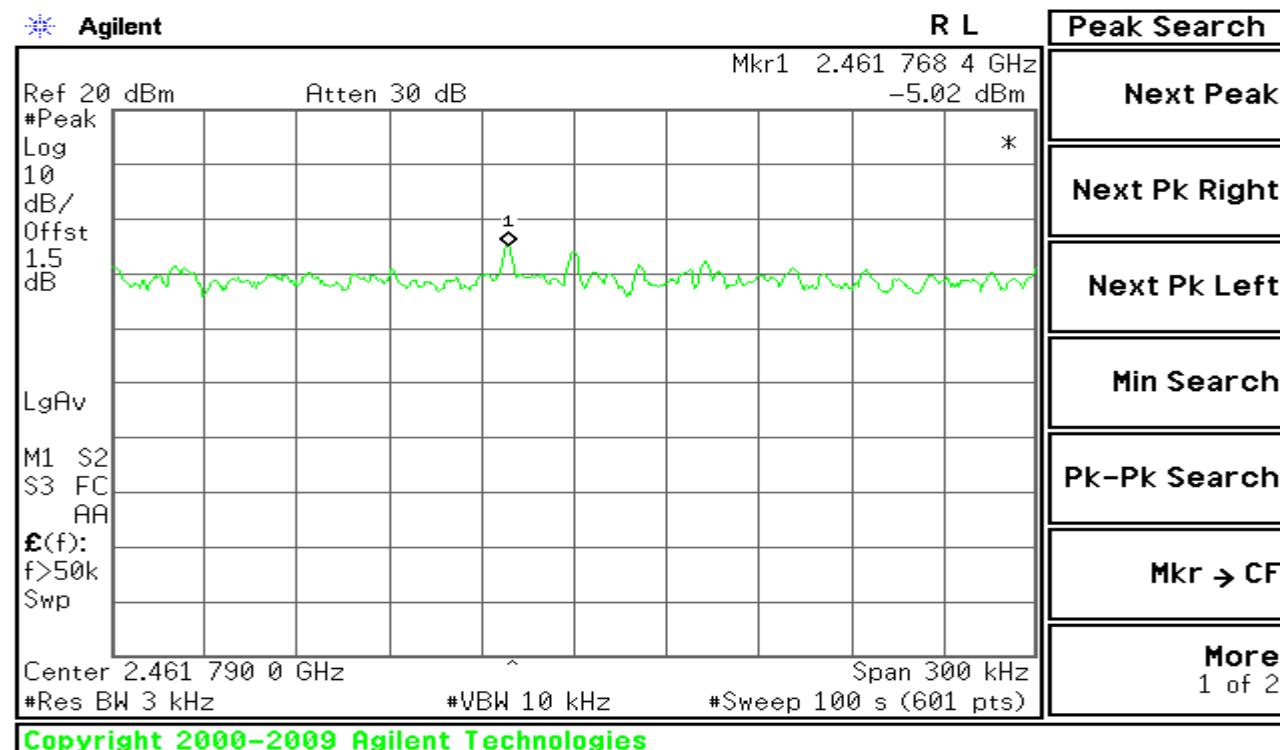
### PPSD (CH Low)



### PPSD (CH Mid)

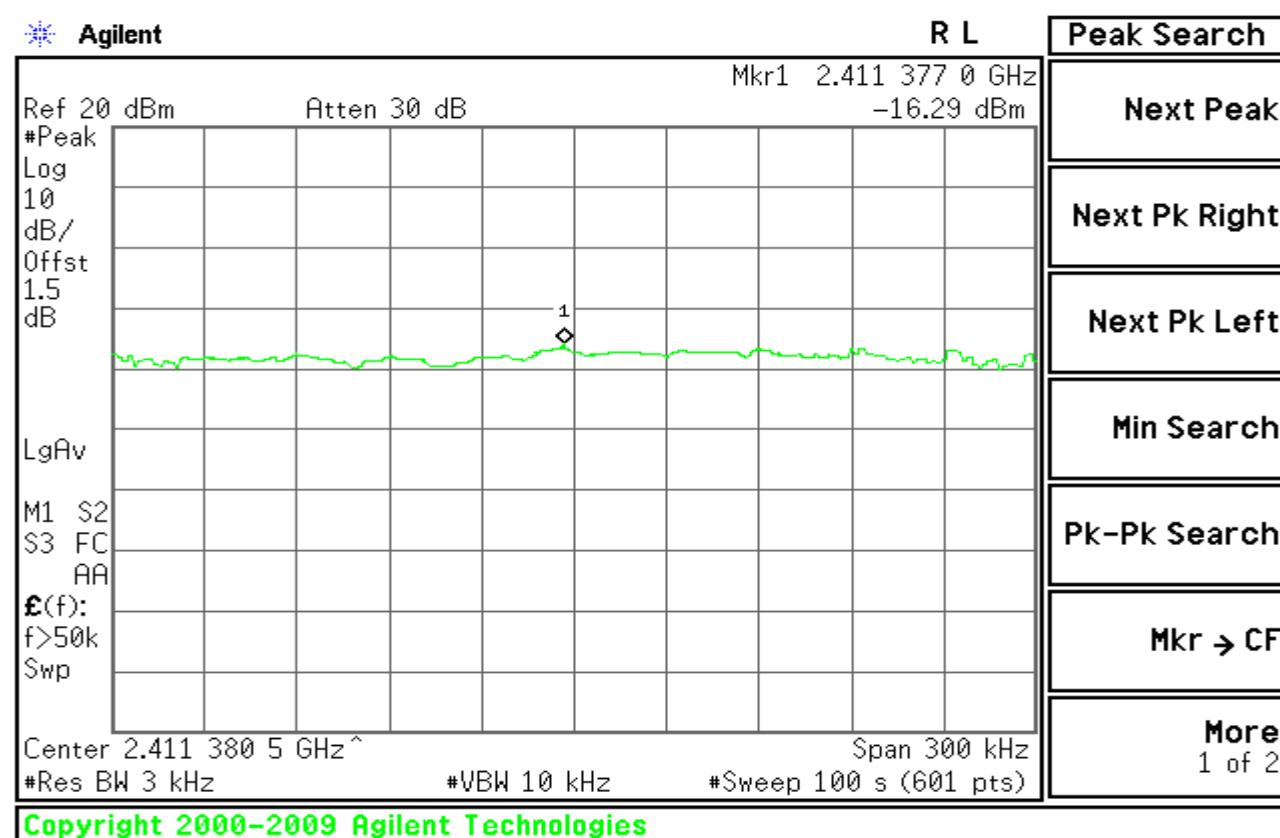


## PPSD (CH High)



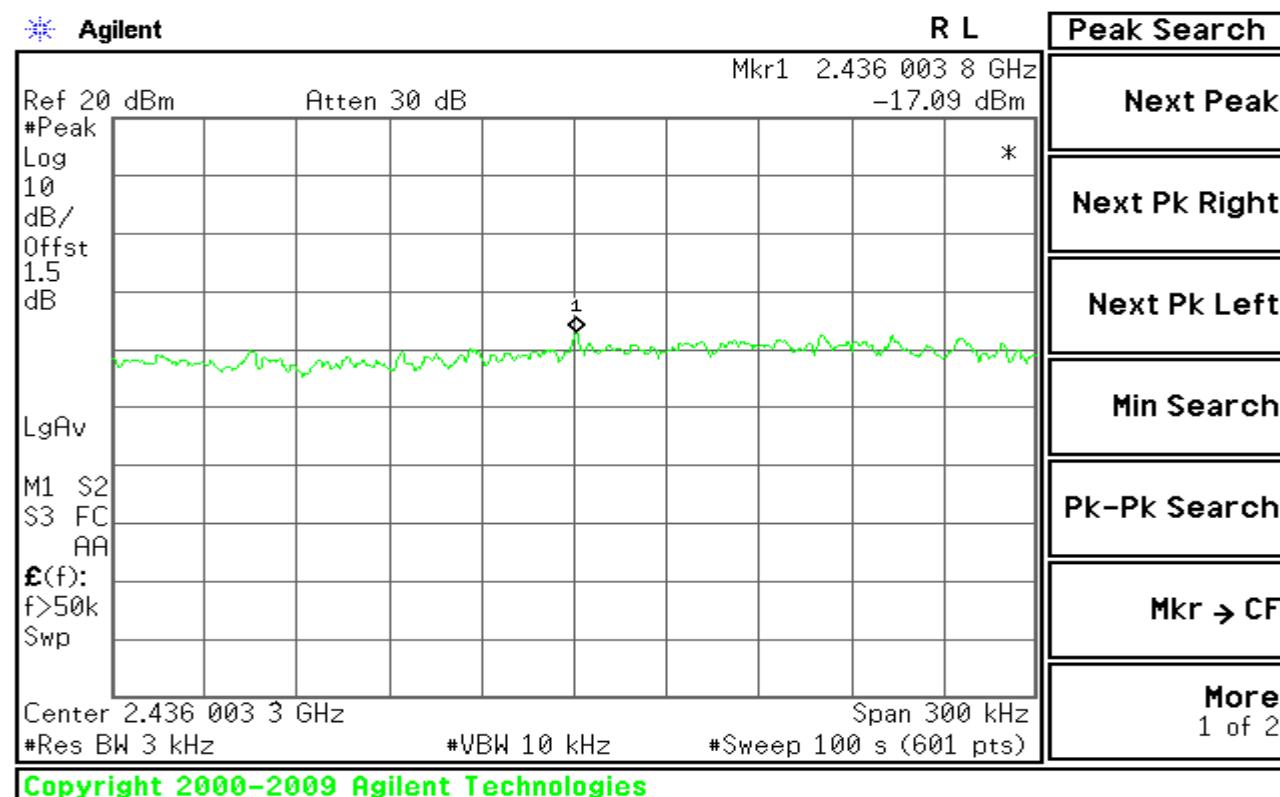
## Test Plot (IEEE 802.11g mode)

## PPSD (CH Low)

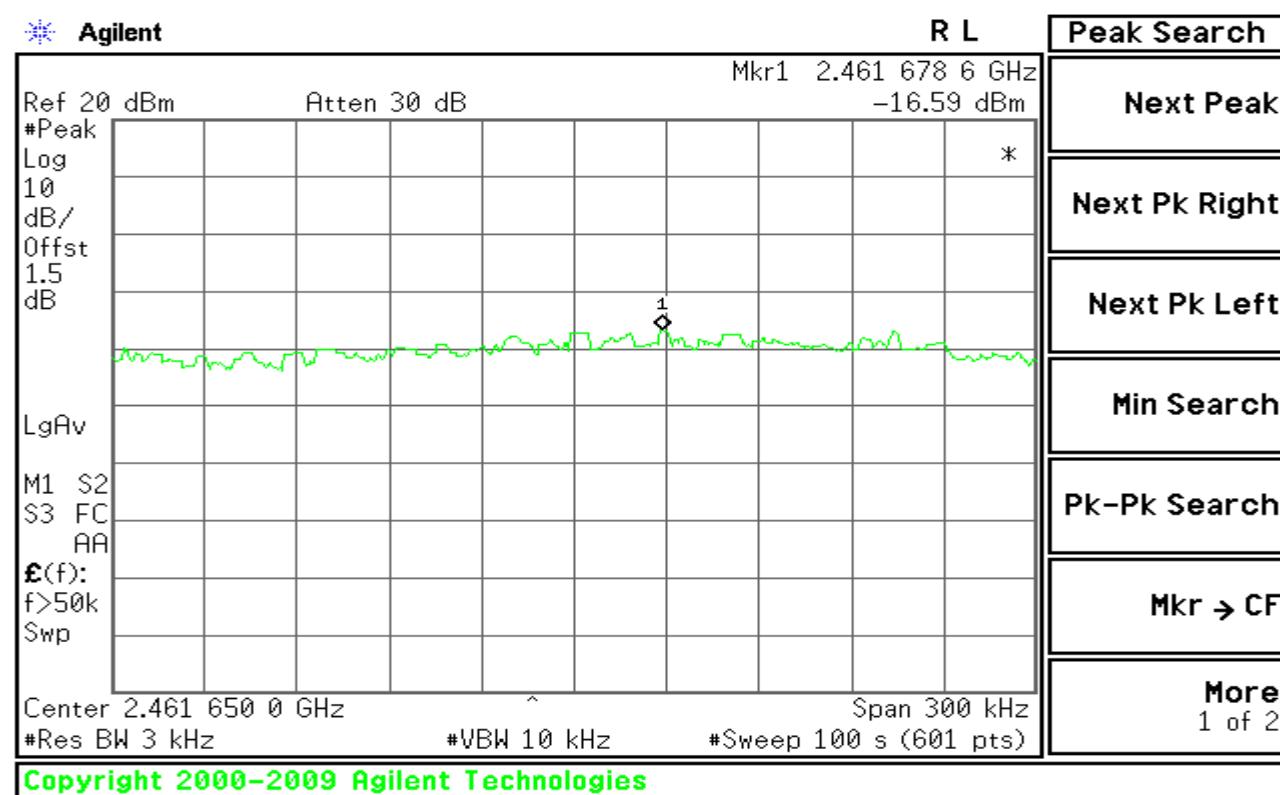




## PPSD (CH Mid)



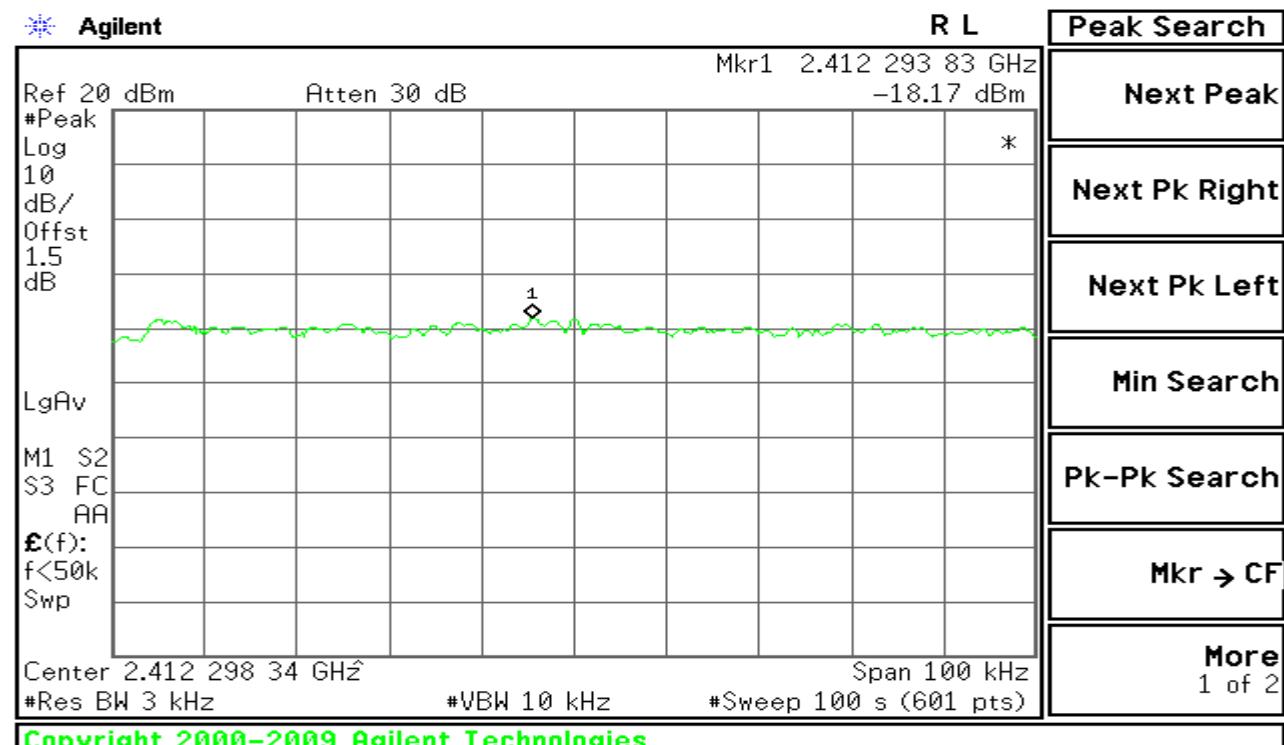
## PPSD (CH High)



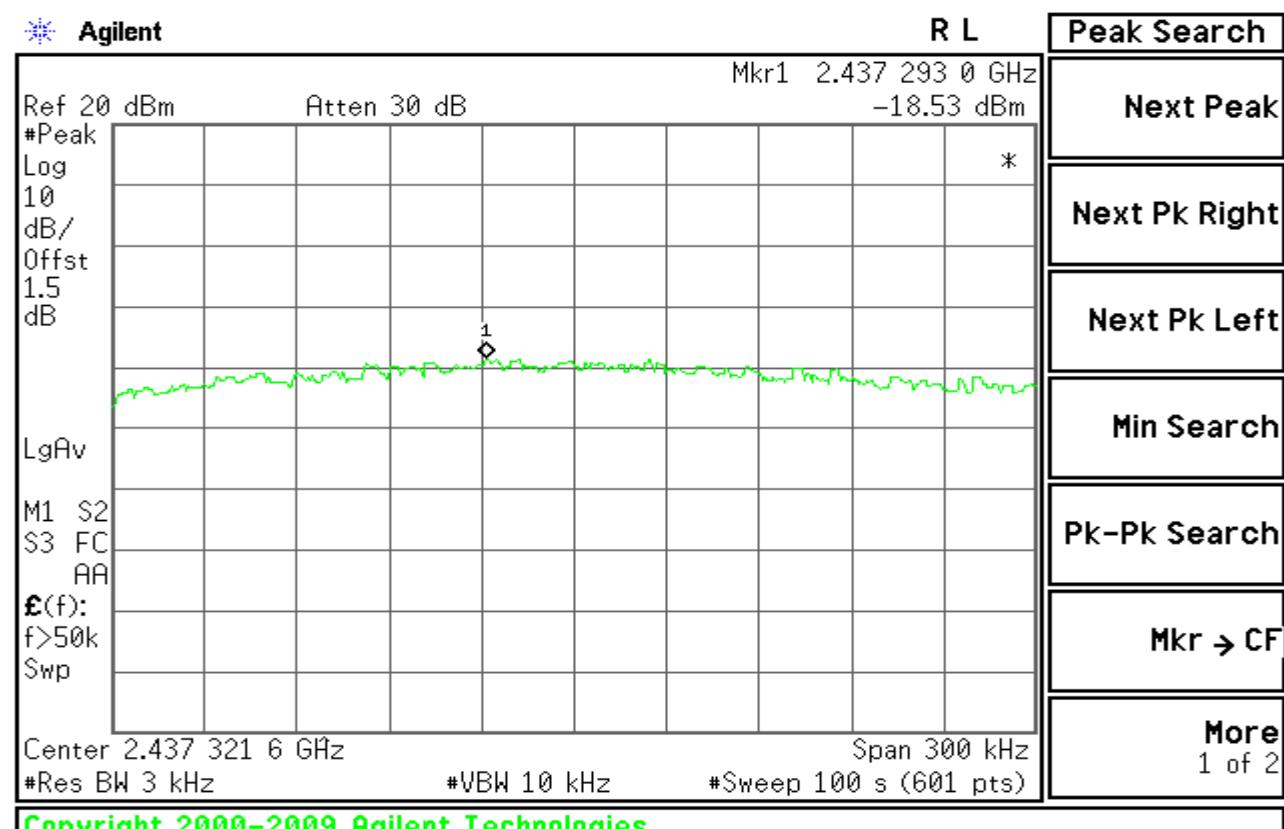


## Test Plot (IEEE 802.11n-HT20n mode)

### PPSD (CH Low)

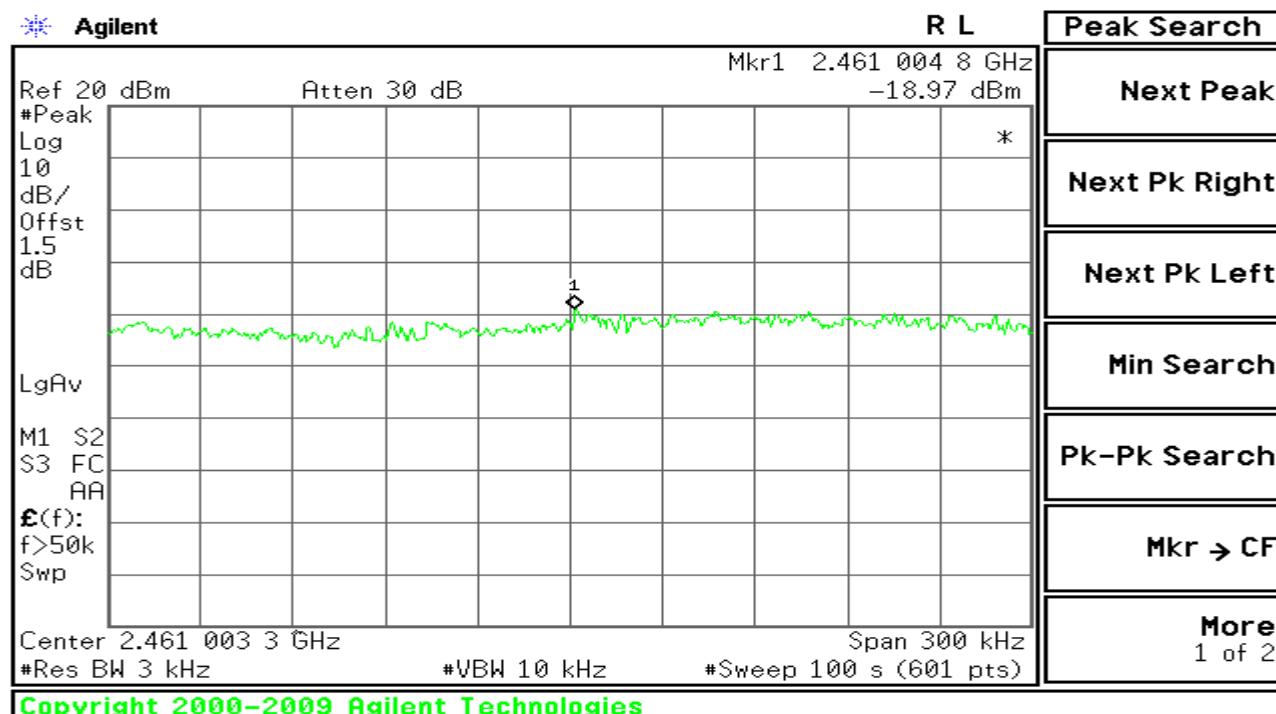


### PPSD (CH Mid)



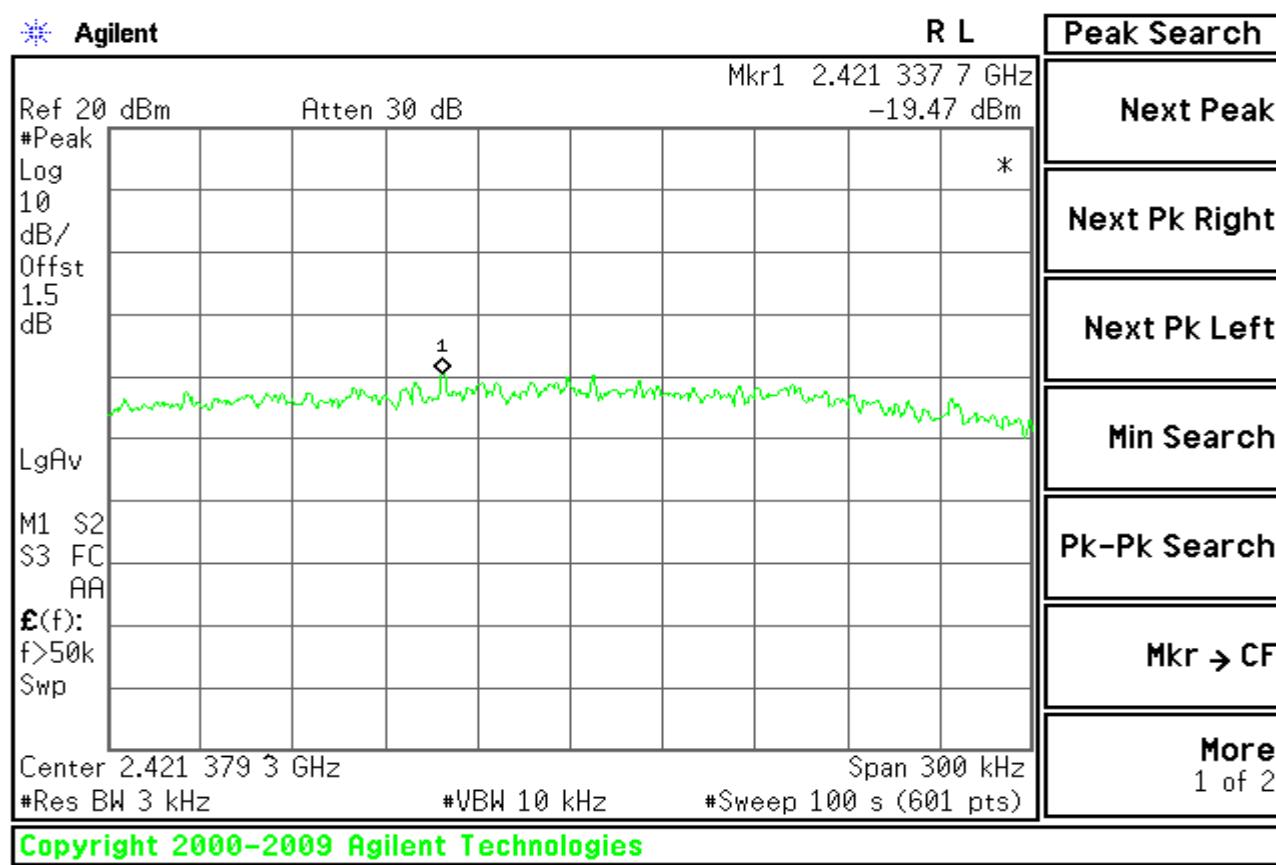


## PPSD (CH High)



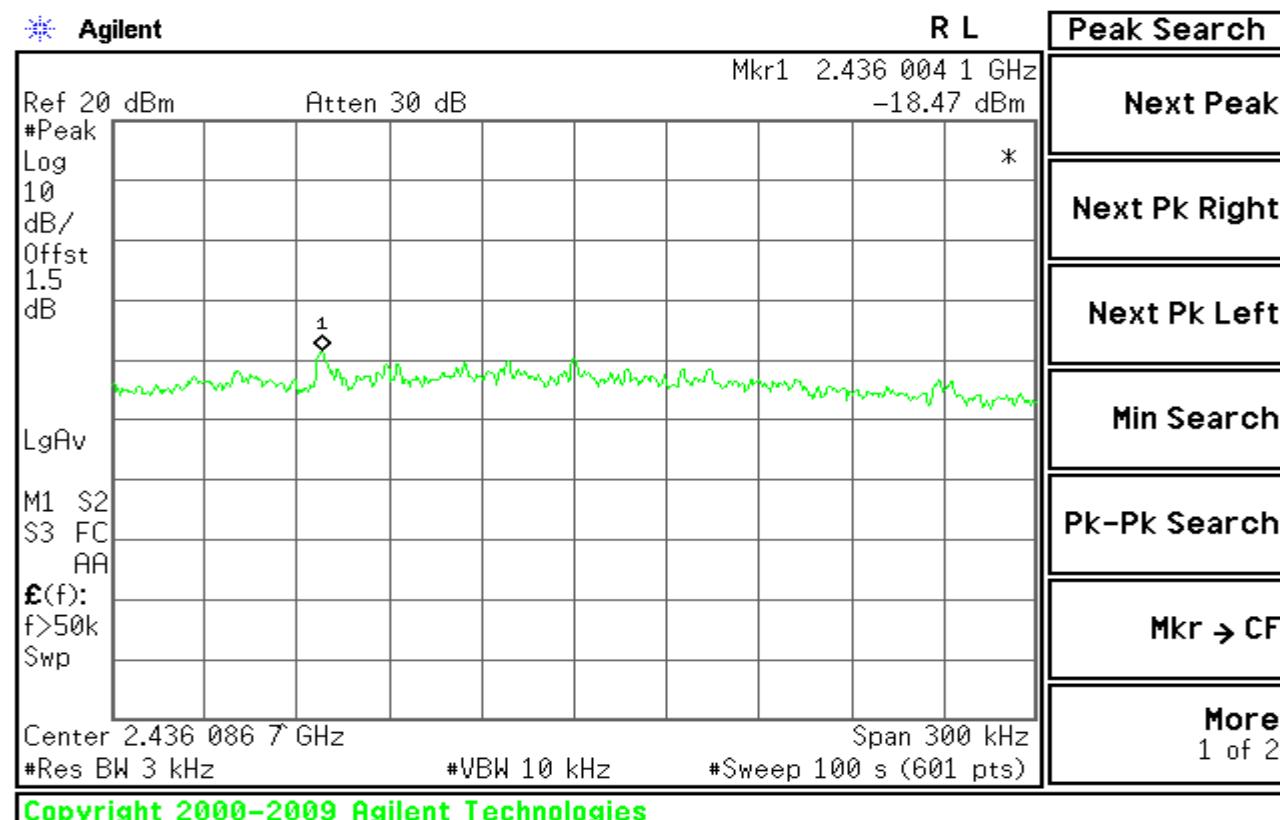
## Test Plot (IEEE 802.11n-HT40n mode)

## PPSD (CH Low)



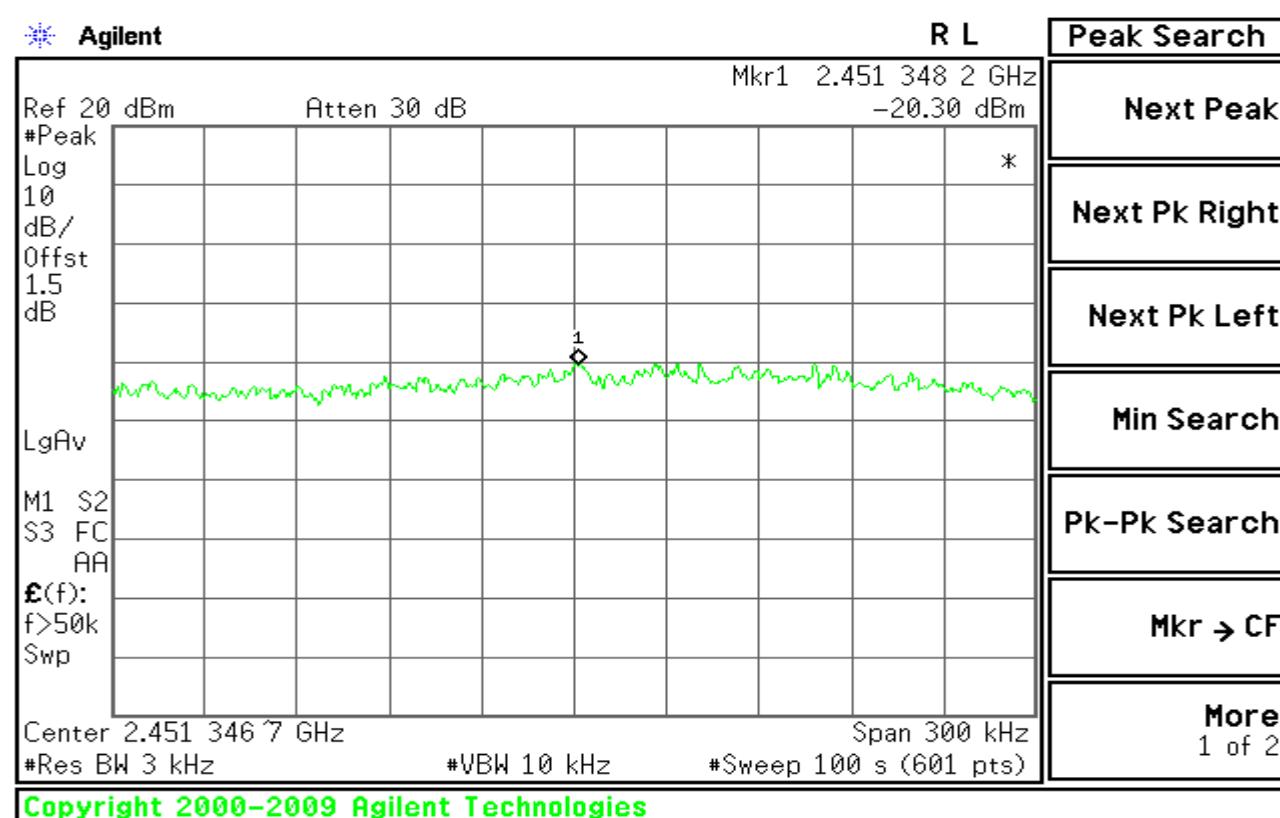


## PPSD (CH Mid)



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## PPSD (CH High)



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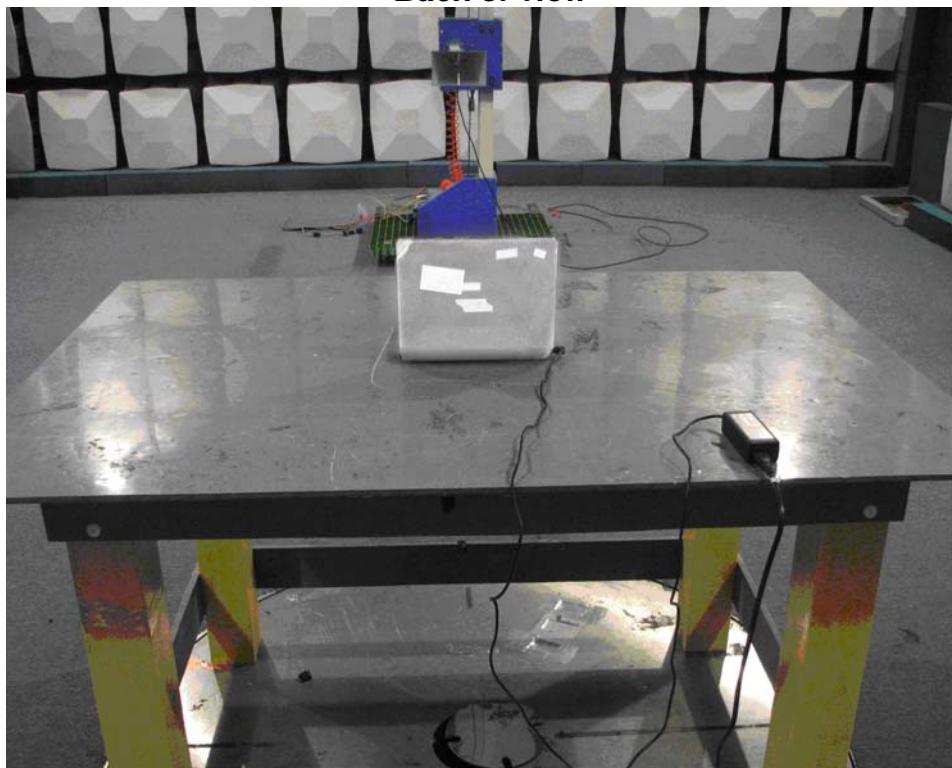
## APPENDIX I RADIO FREQUENCY EXPOSURE

### 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

<b>EUT</b>	NoteBook Computer
<b>Frequency band (Operating)</b>	<input checked="" type="checkbox"/> WLAN: 2.412GHz ~ 2.462GHz <input type="checkbox"/> WLAN: 5.18GHz ~ 5.32GHz / 5.50GHz ~ 5.70GHz <input type="checkbox"/> Bluetooth: 2.402GHz ~ 2.480 GHz
<b>Device category</b>	<input checked="" type="checkbox"/> Portable (<20cm separation) <input type="checkbox"/> Mobile (>20cm separation)
<b>Exposure classification</b>	<input type="checkbox"/> Occupational/Controlled exposure ( $S = 5\text{mW/cm}^2$ ) <input checked="" type="checkbox"/> General Population/Uncontrolled exposure ( $S=1\text{mW/cm}^2$ )
<b>Antenna diversity</b>	<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
<b>Max. output power</b>	IEEE 802.11b: 16.61 dBm (45.81mW) IEEE 802.11g: 10.01 dBm (10.02mW) IEEE 802.11n-HT20n:9.92dBm (9.82mW) IEEE 802.11n-HT40n:9.45dBm(8.81mW)
<b>Antenna gain (Max)</b>	1.64dBi (Numeric gain: 1.46)
<b>Evaluation applied</b>	<input type="checkbox"/> MPE Evaluation* <input checked="" type="checkbox"/> SAR Evaluation <input type="checkbox"/> N/A

**APPENDIX II PHOTOGRAPHS OF THE TEST CONFIGURATION****Radiated Emissions Setup Photos*****Front of view******Back of view***

**Power Line Conducted Emissions Setup Photos*****Front of view******Right of view***