



Product Service

FCC - TEST REPORT

Report Number : **68.850.10.058.01** Date of Issue: 17 January 2011

Model : **RG-AP220-E, RG-AP220-SE**

Product Type : Wireless Access Point

Applicant : Fujian Ruijie Networks Co., Ltd.

Address : 19#Building, Juyuanzhou Industrial Park, No.618 Jinshan Avenue

Cangshan District, Fuzhou

Production Facility : WNC (Kunshan) Corporation

Address : No.88, Central Avenue, Export Processing Zone, Kunshan

: Development Area, Kunshan City, Jiangzhou

Test Result : ☒ **Positive** ☐ **Negative**

Total pages including
Appendices : 84

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1 Table of Contents

1	Table of Contents.....	2
2	Details about the Test Laboratory.....	3
3	Description of the Equipment Under Test.....	4
4	Summary of Test Standards.....	5
5	Summary of Test Results.....	6
6	General Remarks.....	7
7	Technical Requirements.....	8
7.1	Conducted Emission AC Power Port.....	8
7.2	Conducted Peak Power.....	12
7.3	Restricted Band compliance of RF emission.....	15
7.4	Spurious radiated emissions.....	18
7.5	26dB bandwidth.....	37
7.6	Power spectral density.....	52
7.7	Peak Excursion.....	69
8	System Measurement Uncertainty.....	84

2 Details about the Test Laboratory

Details about the Test Laboratory

Test site 1:

Company name: Jiangsu TÜV Product Service Ltd. – Shenzhen Branch
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Century Craftwork Culture Square,
No. 4001, Fuqiang Road,
Futian District 518048,
Shenzhen, P.R.C.

Telephone: 86 755 8828 6998

Fax: 86 755 8828 5299

Test site 2:

Company name: Audix Technology (shenzhen) Co., Ltd
Block Shenzhen, Science & Industry Park,
Nantou, Shenzhen,
Guangdong,
China

Telephone: 86 755 2663 9496

Fax: 86 755 2663 2877

3 Description of the Equipment Under Test

Description of the Equipment Under Test

Product: Wireless Access Point

Model no.: RG-AP220-E, RG-AP220-SE

Brand Name: Ruijie

Options and accessories: NIL

Rating: DC 48V, 25W

RF Transmission Frequency: 5180-5240 MHz

Description of the EUT: Wireless Device

Remark: Test with adaptor : FSP025-1ADF07B made by FSP Group Inc
Input: AC 100-240V, 50-60Hz, 0.8A
Output: DC 48V, 0.52A

Auxiliary Equipment Used during Test:

DESCRIPTION	MANUFACTURER	MODEL NO.(SHIELD)	S/N(LENGTH)
Notebook pc	DELL	D430	----
Serial line	----	Unshielded	90cm

4 Summary of Test Standards

Test Standards	
FCC Part 15 Subpart E, Oct. 1, 2009	PART 15 - RADIO FREQUENCY DEVICES Subpart E - Unlicensed National Information Infrastructure Devices

5 Summary of Test Results

Technical Requirements					
FCC Part 15 Subpart E					
Test Condition	Pages	Test Result			Test location
		Pass	Fail	N/A	
15.207&15.407(b) Conducted Emission AC Power Port	8	☒	☐	☐	Test site 2
15.407 (a) (1) Conducted peak output power	12	☒	☐	☐	Test site 2
15.407(b)(7)&15.205(a) Restrict band edge compliance	15	☒	☐	☐	Test site 2
15.407(b)&15.209 Spurious radiated emissions	18	☒	☐	☐	Test site 2
15.407(a)(1) 26 dB bandwidth	37	☒	☐	☐	Test site 2
15.407(b)(1)&(5) Power spectral density	52	☒	☐	☐	Test site 2
15.407(a) (6) Peak excursion	69	☒	☐	☐	Test site 2
15.407(h) Dynamic Frequency Selection (DFS). ^a	---	☐	☐	☒	Test site 2

NOTE 1^a: According to 15.407(h) this requirement only applies to transmitters operating in the 5.25–5.35 GHz and 5.47–5.725 GHz bands.

6 General Remarks

Remarks

The only difference between two models is that RG-AP220-E has two same radio modules, RG-AP220-SE only has one radio module. So all the tests were applied on RG-AP220-E, RG-AP220-SE is deemed to fulfill relevant all requirement without further testing.

This submittal(s) (test report) is intended for the Class 2 permissive change of WLAN a/b/g/n mini-PCI Module, Model No.: DNMA-83, FCC ID: NKR-DNMA83.

SUMMARY:

All tests according to the regulations cited on page 5 were

☒ - Performed

☐ - Not Performed

The Equipment Under Test

☒ - **Fulfills** the general approval requirements.

☐ - **Does not** fulfill the general approval requirements.

Sample Received Date: 30 September 2010

Testing Start Date: 31 September 2011

Testing End Date: 11 January 2011

- Jiangsu TÜV Product Service Ltd. – Shenzhen Branch -

Tested By	<u>2011-03-02</u>	<u>Sunny Lu</u>	
Test Lab Engineer	Date	Name	Signature

Prepared By	<u>2011-03-02</u>	<u>Cookies Bu</u>	
Project Engineer	Date	Name	Signature

Reviewed By	<u>2011-03-02</u>	<u>Paul Yu</u>	
Assistant EMC Manager	Date	Name	Signature

7 Technical Requirement

7.1 Conducted Emission

Test Method

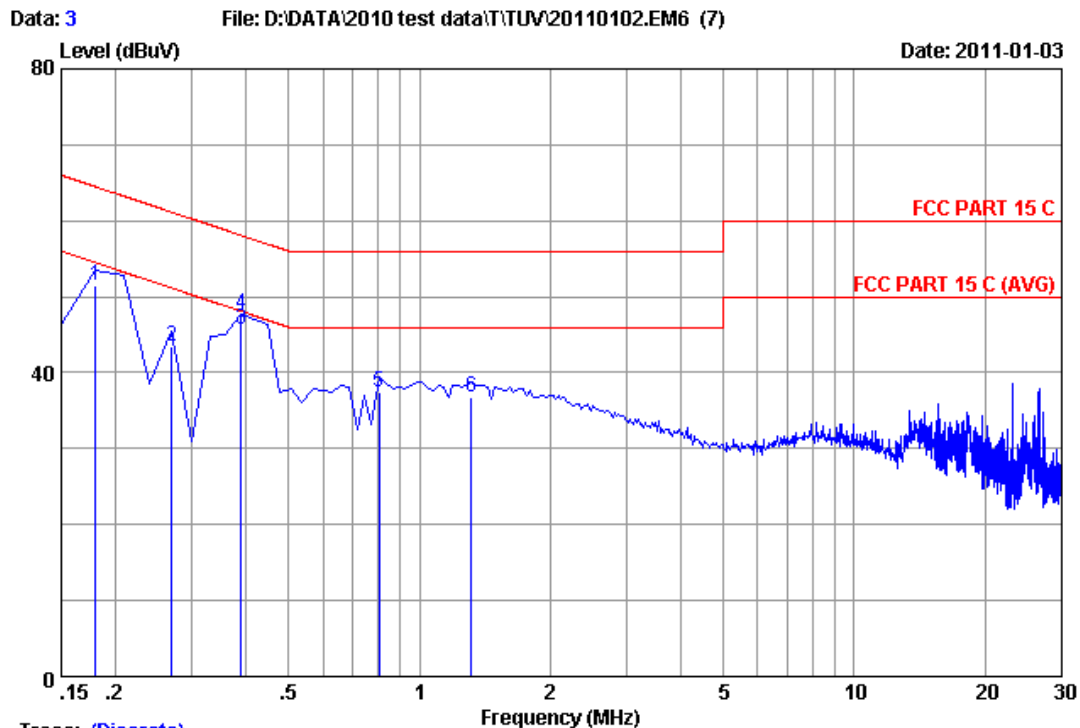
- 1 The EUT was placed on a table, which is 0.8m above ground plane
- 2 The power line of the EUT is connected to the AC mains through a Artificial Mains Network (A.M.N.).
- 3 Maximum procedure was performed to ensure EUT compliance
- 4 A EMI test receiver (R&S Test Receiver ESCS30) is used to test the emissions from both sides of AC line

Limit

Frequency MHz	QP Limit dB μ V	AV Limit dB μ V
0.150-0.500	66-56*	56-46*
0.500-5	56	46
5-30	60	50

Decreasing linearly with logarithm of the frequency

Conducted Emission



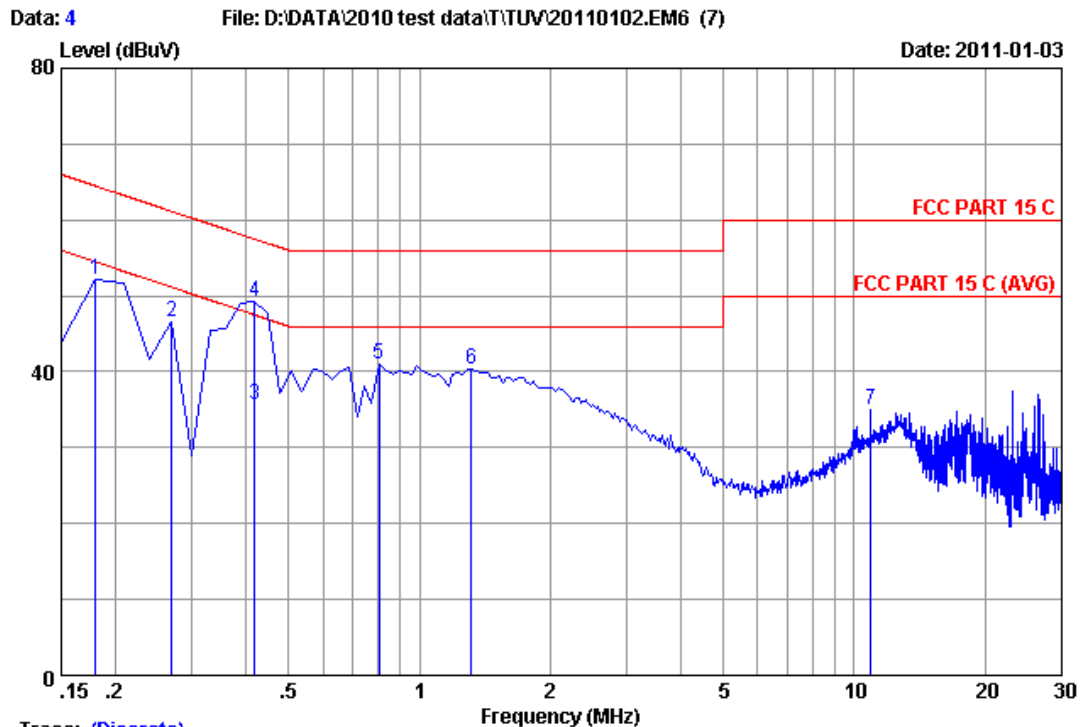
Trace: (Discrete)

Site no : 1#conduction Data No : 3
 Dis./Ant. : ** 2010 ESH2-Z5 LINE
 Limit : FCC PART 15 C
 Env./Ins. : 29.5°C/55% Engineer : Paul Tian
 EUT : AP220-E
 Power Rating : AC 120V/60Hz
 Test Mode : Tx Mode

No	Freq (MHz)	LISN Factor (dB)	Cable Loss (dB)	Reading (dBuV)	Emission Level (dBuV)	Limits (dBuV)	Margin (dB)	Remark
1	0.17985	0.22	9.88	41.35	51.45	64.49	13.04	QP
2	0.26940	0.22	9.88	33.30	43.40	61.14	17.74	QP
3	0.38880	0.24	9.88	35.47	45.59	58.09	12.50	QP
4	0.38880	0.24	9.88	37.47	47.59	58.09	10.50	QP
5	0.80670	0.24	9.89	27.26	37.39	56.00	18.61	QP
6	1.314	0.23	9.89	26.72	36.84	56.00	19.16	QP

Remarks: 1. Emission Level=LISN Factor+Cable Loss (Include 10dB pulse limit)
 +Reading.
 2. If the average limit is met when using a quasi-peak detector,
 the EUT shall be deemed to meet both limits and measurement
 with average detector is unnecessary.

Conducted Emission



Trace: (Discrete)

Site no : 1#conduction Data No : 4
 Dis./Ant. : ** 2010 ESH2-Z5 NEUTRAL
 Limit : FCC PART 15 C
 Env./Ins. : 29.5°C/55% Engineer : Paul Tian
 EUT : AP220-E
 Power Rating : AC 120V/60Hz
 Test Mode : Tx Mode

No	Freq (MHz)	LISN Factor (dB)	Cable Loss (dB)	Reading (dBuV)	Emission Level (dBuV)	Limits (dBuV)	Margin (dB)	Remark
1	0.17985	0.21	9.88	42.14	52.23	64.49	12.26	QP
2	0.26940	0.21	9.88	36.56	46.65	61.14	14.49	QP
3	0.41865	0.22	9.88	25.60	35.70	47.47	11.77	Average
4	0.41865	0.22	9.88	39.15	49.25	57.47	8.22	QP
5	0.80670	0.24	9.89	30.97	41.10	56.00	14.90	QP
6	1.314	0.25	9.89	30.25	40.39	56.00	15.61	QP
7	10.896	0.45	10.00	24.60	35.05	60.00	24.95	QP

Remarks: 1. Emission Level = LISN Factor + Cable Loss (Include 10dB pulse limit) + Reading.
 2. If the average limit is met when using a quasi-peak detector, the EUT shall be deemed to meet both limits and measurement with average detector is unnecessary.

Test Equipment List

DESCRIPTION	MANUFACTURER	MODEL NO.	SERIAL NO.	CAL. DUE DATE
Test Receiver	Rohde & Schwarz	ESHS10	838693/001	Dec.18, 11
L.I.S.N.#1	Rohde & Schwarz	ESH2-Z5	834066/011	Mar.30, 11
L.I.S.N.#3	Kyoritsu	KNW-242C	8-1920-1	May.08, 11
Terminator	Hubersuhner	50Ω	No. 1	May.08, 11
Terminator	Hubersuhner	50Ω	No. 2	May.08, 11
RF Cable	Fujikura	3D-2W	LISN Cable 1#	May.08, 11
Coaxial Switch	Anritsu	MP59B	M55367	May.08, 11
Passive Probe	Rohde & Schwarz	ESH2-Z3	299.7810.52	May.08, 11
Pulse Limiter	Rohde & Schwarz	ESH3-Z2	100341	May.08, 11

7.2 Conducted peak output power

Test Method

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

Limits for conducted peak output power measurements:

According to 15.407(a) (1) For the band 5.15–5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed the lesser of 50 mW or 4 dBm + 10 log B, where B is the 26–dB emission bandwidth in MHz.

Conducted peak output power

IEEE 802.11a modulation (6Mbps) Test Result

Channel	Channel Frequency (MHz)	Antenna Port	Output Power (dBm)	Lesser Limit (dBm)	Result
CH36	5180	Chain0	10.38	17	Pass
CH36	5180	Chain1	10.85	17	Pass
CH36	5180	Chain2	10.64	17	Pass
CH40	5200	Chain0	10.89	17	Pass
CH40	5200	Chain1	10.48	17	Pass
CH40	5200	Chain2	10.69	17	Pass
CH48	5240	Chain0	11.28	17	Pass
CH48	5240	Chain1	10.57	17	Pass
CH48	5240	Chain2	10.97	17	Pass

IEEE 802.11n HT20 modulation (6.5Mbps) Test Result

Channel	Channel Frequency (MHz)	Antenna Port	Output Power (dBm)	Total Power (dBm)	Lesser Limit (dBm)	Result
CH36	5180	Chain0	10.30	15.29	17	Pass
CH36	5180	Chain1	10.45			
CH36	5180	Chain2	10.79			
CH40	5200	Chain0	10.69	15.41	17	Pass
CH40	5200	Chain1	10.51			
CH40	5200	Chain2	10.71			
CH48	5240	Chain0	11.38	15.61	17	Pass
CH48	5240	Chain1	10.48			
CH48	5240	Chain2	10.59			

Conducted peak output power

IEEE 802.11n HT40 modulation (13.5Mbps) Test Result

Channel	Channel Frequency (MHz)	Antenna Port	Output Power (dBm)	Total Power (dBm)	Limit (dBm)	Result
CH38	5190	Chain0	11.80	16.41	17	Pass
CH38	5190	Chain1	11.77			
CH38	5190	Chain2	11.33			
CH46	5230	Chain0	11.72	16.08	17	Pass
CH46	5230	Chain1	10.88			
CH46	5230	Chain2	11.30			



Product Service

Test Equipment

DESCRIPTION	MANUFACTURER	MODEL NO.	SERIAL NO.	CAL DUE DATE
Spectrum Analyzer	Agilent	E4446A	US44300459	May 08 2011

7.3 Restricted Band compliance of RF emissions

Test Method

The restrict band compliance of RF radiated emission should be measured by following the guidance in ANSI C63.4 with respect to maximizing the emission by rotating the EUT, measuring the emission while the EUT is situated in three orthogonal planes (if appropriate), adjusting the measurement antenna height and polarization etc. Set RBW and VBW to 1MHz to measure the peak field strength and set RBW to 1MHz and VBW to 10Hz to measure the average radiated field strength.

Limits:

According to 15.407 (b) (7): The provisions of §15.205 apply to intentional radiators operating under this section.

Frequency MHz	Limit Average dBuV/m	Limit Peak dBuV/m
4500–5150	54	74
5350–5460	54	74

Restricted Band compliance of RF emissions

IEEE 802.11a modulation (6 Mbps) Test Result

Indicated		Detector (AV)	Polar (H/V)	Correction Factor				FCC Part 15.247/15.209			
Frequency (MHz)	Receiver Reading (dBμV/m)			Ant. Factor (dB/m)	Cable Loss (dB)	Pre-Amp. Gain (dB)	Duty Cycle Factor (dB)	Emission Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Result
4500MHz–5150MHz											
5150	38.78	PK	V	33.88	10.32	35.35	-5.46	47.63	74	26.37	Pass
5150	35.32	AV	V	33.88	10.32	35.35	-5.46	49.63	54	4.37	Pass
5350MHz–5460MHz											
5350	38.23	PK	V	35.58	11.24	34.68	-5.46	50.37	74	23.63	Pass
5350	34.12	AV	V	35.58	11.24	34.68	-5.46	51.72	54	2.28	Pass

IEEE 802.11n HT20 modulation (6.5 Mbps) Test Result

Indicated		Detector (AV)	Polar (H/V)	Correction Factor				FCC Part 15.247/15.209			
Frequency (MHz)	Receiver Reading (dBμV/m)			Ant. Factor (dB/m)	Cable Loss (dB)	Pre-Amp. Gain (dB)	Duty Cycle Factor (dB)	Emission Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Result
4500MHz–5150MHz											
5150	39.46	PK	V	33.88	10.32	35.35	-6.76	48.31	74	25.69	Pass
5150	34.25	AV	V	33.88	10.32	35.35	-6.76	49.86	54	4.14	Pass
5350MHz–5460MHz											
5350	38.46	PK	V	35.58	11.24	34.68	-6.76	50.60	74	23.40	Pass
5350	34.11	AV	V	35.58	11.24	34.68	-6.76	52.01	54	1.99	Pass

IEEE 802.11n HT40 modulation (13.5 Mbps) Test Result

Indicated		Detector (AV)	Polar (H/V)	Correction Factor				FCC Part 15.247/15.209			
Frequency (MHz)	Receiver Reading (dBμV/m)			Ant. Factor (dB/m)	Cable Loss (dB)	Pre-Amp. Gain (dB)	Duty Cycle Factor (dB)	Emission Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Result
4500MHz–5150MHz											
5150	38.60	PK	V	33.88	10.32	35.35	-9.15	47.45	74	26.55	Pass
5150	33.22	AV	V	33.88	10.32	35.35	-9.15	51.22	54	2.78	Pass
5350MHz–5460MHz											
5350	37.98	PK	V	35.58	11.24	34.68	-9.15	49.72	74	24.28	Pass
5350	34.09	AV	V	35.58	11.24	34.68	-9.15	53.38	54	0.62	Pass

Remark:

- (1) PK Emission Level= Reading +Cable Loss+ Antenna Factor - Amplifier factor
AV Emission Level= Reading +Cable Loss+ Antenna Factor - Amplifier factor-Duty Cycle factor
- (2) The worse polar for all channels and mode.



Product Service

Test Equipment List

DESCRIPTION	MANUFACTURER	MODEL NO.	SERIAL NO.	CAL DUE DATE
Spectrum	Agilent	E4446A	US44300459	May 08, 2011
Amp	HP	8449B	3008A02495	May 08, 2011
Antenna	EMCO	3115	9607-4877	May 17, 2011
Bilog Antenna	Schaffner	CBL6111C	2598	Dec.14, 2011
HF Cable	Hubersuhne	Sucoflex104	---	May 08, 2011

7.4 Spurious radiated emissions

Test Method

- 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 Each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.

Limit

Below 1GHz:

Frequency MHz	Field Strength uV/m	Field Strength dBμV/m	Detector
30-88	100	40	QP
88-216	150	43.5	QP
216-960	200	46	QP
960-1000	500	54	QP

Above 1GHz:

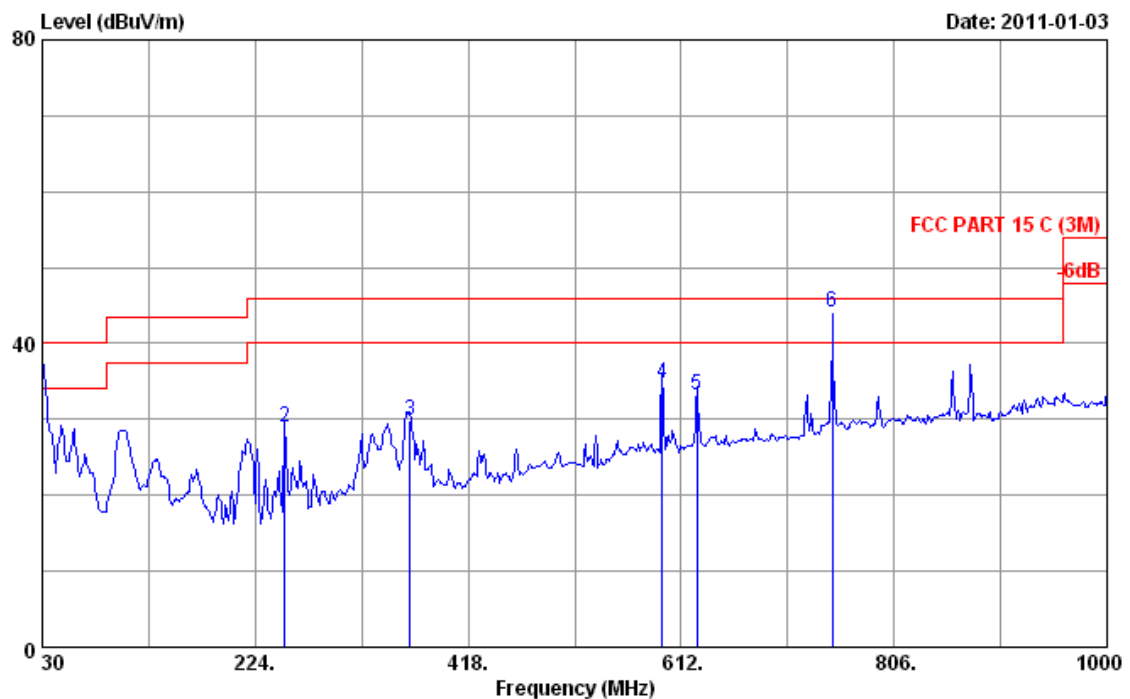
Frequency MHz	Field Strength dBm/MHz	Detector
Above 1GHz	-27	PK

Radiated Emission

Note: The worse polar for all channels and mode.

30-1000 MHz:

Worse case: IEEE 802.11n HT20 modulation 5200MHz (Ch40) Test Result:



Site no.	: 3m Chamber	Data no.	: 17
Dis. / Ant.	: 3m 2010 CBL6111C	Ant. pol.	: HORIZONTAL
Limit	: FCC PART 15 C (3M)	Engineer	: Sunny-lu
Env. / Ins.	: 24°C/56%		
EUT	: AP220-E		
Power rating	: AC 120V/60Hz		
Test Mode	: Ping Mode		

No.	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	30.000	20.00	0.61	15.09	35.70	40.00	4.30	QP
2	251.160	12.90	2.18	13.86	28.94	46.00	17.06	QP
3	364.650	15.55	2.76	11.58	29.89	46.00	16.11	QP
4	594.540	19.85	4.09	10.88	34.82	46.00	11.18	QP
5	626.550	20.13	4.22	8.90	33.25	46.00	12.75	QP
6	750.000	22.00	4.70	17.50	44.20	46.00	1.80	QP

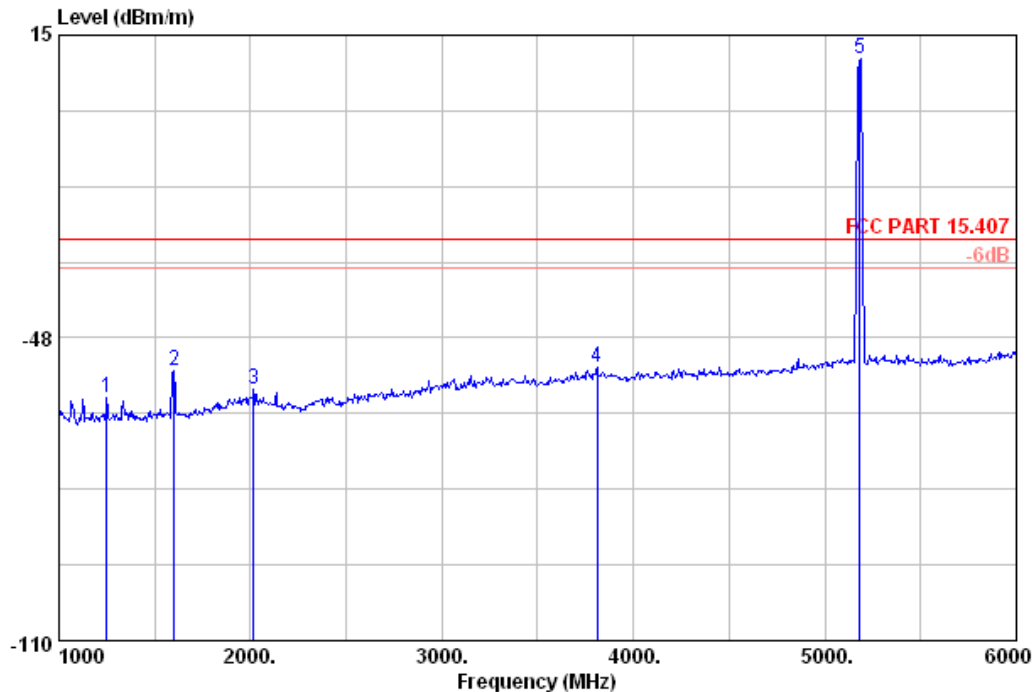
Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading.
2. The emission levels that are 20dB below the official limit are not reported.

Radiated Emission

Above 1GHz:

IEEE 802.11a modulation (6 Mbps) Test Result:

5180 MHz: (1-6GHz)



Site no.	: RF Chamber	Data no.	: 1
Dis. / Ant.	: 3m 3115(0911)	Ant. pol.	: VERTICAL
Limit	: FCC PART 15.407		
Env. / Ins.	: 23°C/54%	Engineer	: Sunny-lu
EUT	: AP220-E		
Power supply	: AC 120V/60Hz		
Test mode	: IEEE802.11a CH36 5180MHz Tx		
M/N:	:		

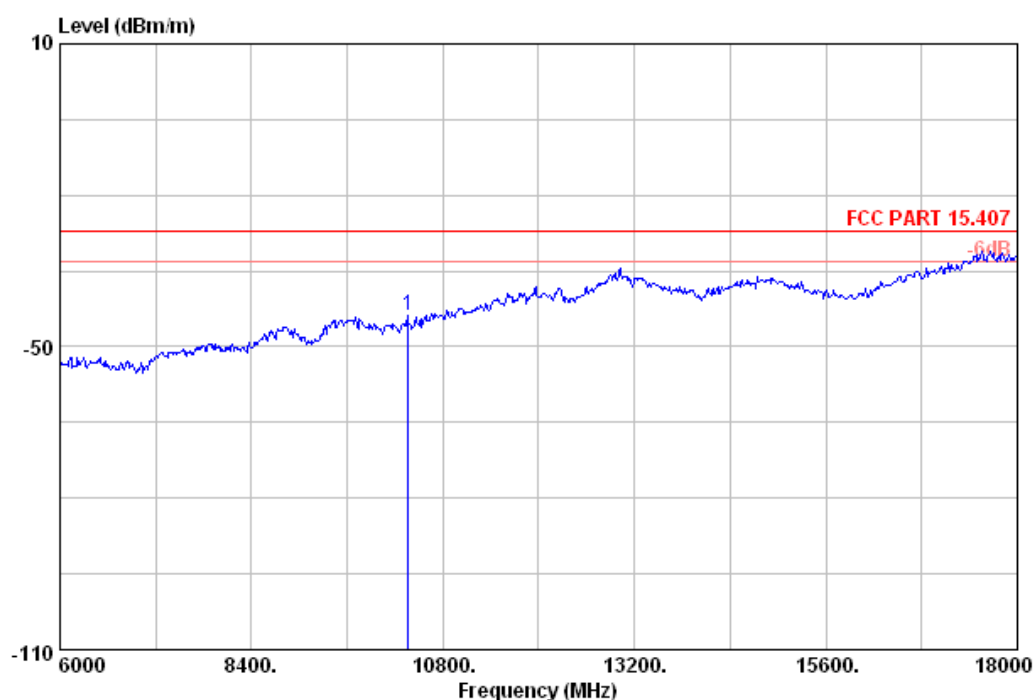
	Frequency (MHz)	Radiated Emission Level (dBm)	Radiated Emission Limit (dBm)	Margin (dB)
1	1250.000	-59.99	-27.00	32.99
2	1600.000	-54.43	-27.00	27.43
3	2015.000	-58.08	-27.00	31.08
4	3810.000	-53.62	-27.00	26.62
5	5180.000	10.01	-27.00	-37.01

Remarks:

1. Margin= Limit - Level
2. The emission levels that are 20dB below the official limit are not reported.

5180 MHz: (6-18GHz)

:



Site no. : RF Chamber Data no. : 5
 Dis. / Ant. : 3m 3115(0911) Ant. pol. : VERTICAL
 Limit : FCC PART 15.407
 Env. / Ins. : 23°C/54% Engineer : Sunny-lu
 EUT : AP220-E
 Power supply : AC 120V/60Hz
 Test mode : IEEE802.11a CH36 5180MHz Tx
 M/N: :

	Frequency (MHz)	Radiated Emission Level (dBm)	Radiated Emission Limit (dBm)	Margin (dB)
1	10360.000	-43.94	-27.00	16.94

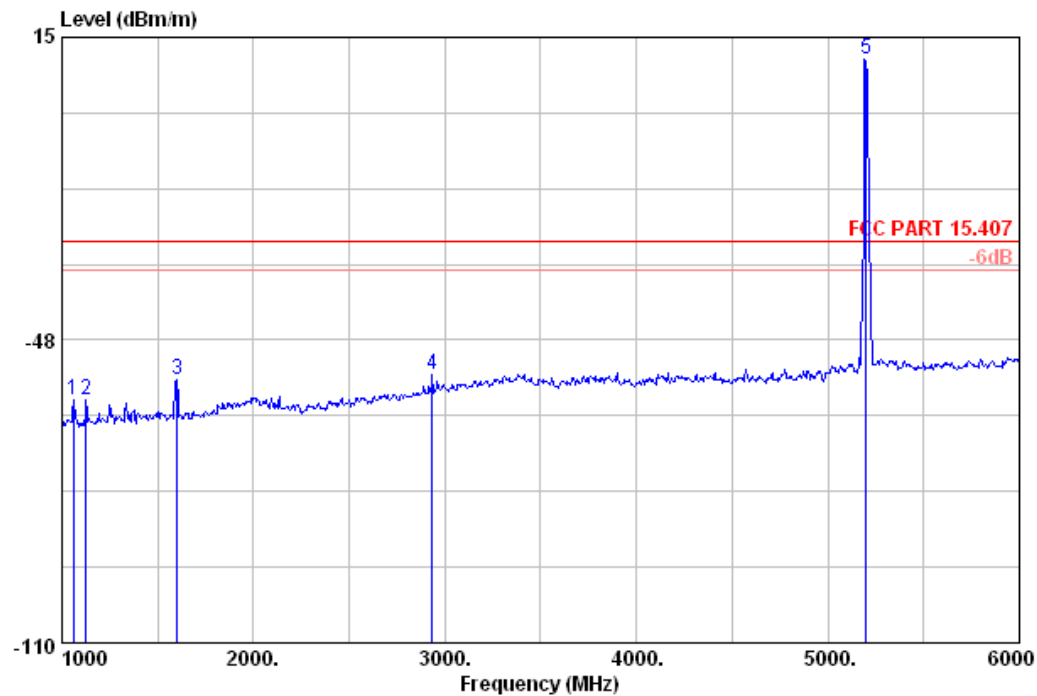
Remarks:

1.Margin= Limit - Level

2.The emission levels that are 20dB below the official limit are not reported.

5200 MHz :(1-6GHz)

Data: 8 File: E:\2010 report data\T\TUV\FCC 15.407.EM6 (44)



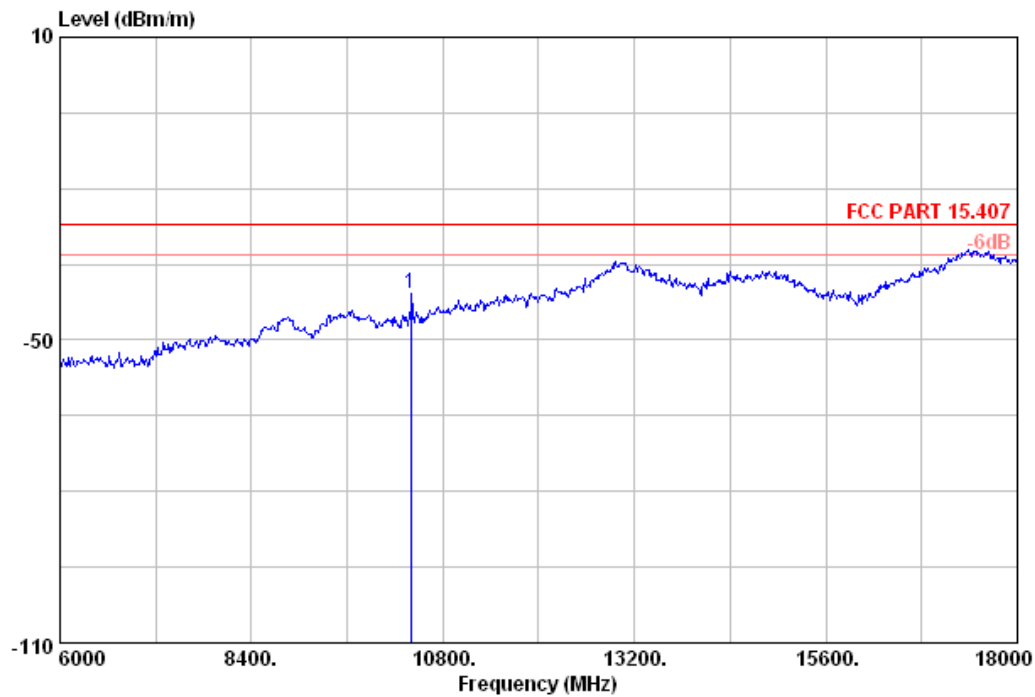
Site no. : RF Chamber Data no. : 8
Dis. / Ant. : 3m 3115(0911) Ant. pol. : VERTICAL
Limit : FCC PART 15.407
Env. / Ins. : 23°C/54% Engineer : Sunny-lu
EUT : AP220-E
Power supply : AC 120V/60Hz
Test mode : IEEE802.11a CH40 5200MHz Tx
M/N: :

	Frequency (MHz)	Radiated Emission Level (dBm)	Radiated Emission Limit (dBm)	Margin (dB)
1	1060.000	-59.91	-27.00	32.91
2	1125.000	-59.87	-27.00	32.87
3	1600.000	-55.59	-27.00	28.59
4	2935.000	-54.70	-27.00	27.70
5	5200.000	10.34	-27.00	-37.34

Remarks:

- 1.Margin= Limit - Level
- 2.The emission levels that are 20dB below the official limit are not reported.

5200 MHz :(6-18GHz)



Site no. : RF Chamber Data no. : 9
Dis. / Ant. : 3m 3115(0911) Ant. pol. : VERTICAL
Limit : FCC PART 15.407
Env. / Ins. : 23°C/54% Engineer :Sunny-lu
EUT : AP220-E
Power supply : AC 120V/60Hz
Test mode : IEEE802.11a CH40 5200MHz Tx
M/N: :

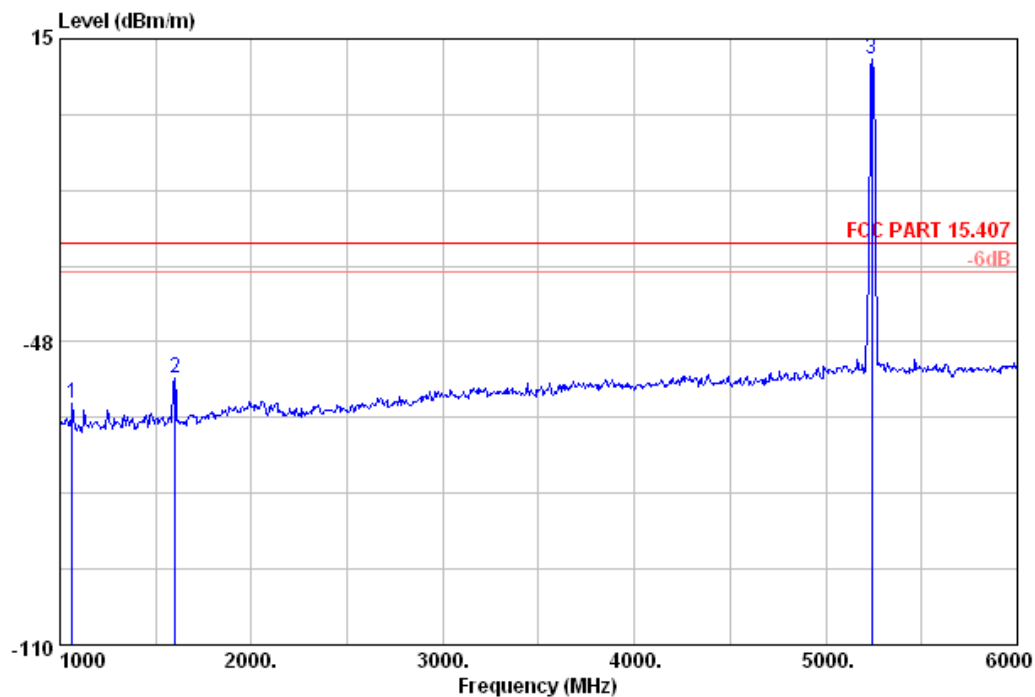
	Frequency (MHz)	Radiated Emission Level (dBm)	Radiated Emission Limit (dBm)	Margin (dB)
1	10400.000	-40.71	-27.00	13.71

Remarks:

1.Margin= Limit - Level

2.The emission levels that are 20dB below the official limit are not reported.

5240 MHz :(1-6GHz)



Site no. : RF Chamber Data no. : 12
Dis. / Ant. : 3m 3115(0911) Ant. pol. : VERTICAL
Limit : FCC PART 15.407
Env. / Ins. : 23°C/54% Engineer : Sunny-lu
EUT : AP220-E
Power supply : AC 120V/60Hz
Test mode : IEEE802.11a CH48 5240MHz Tx
M/N: :

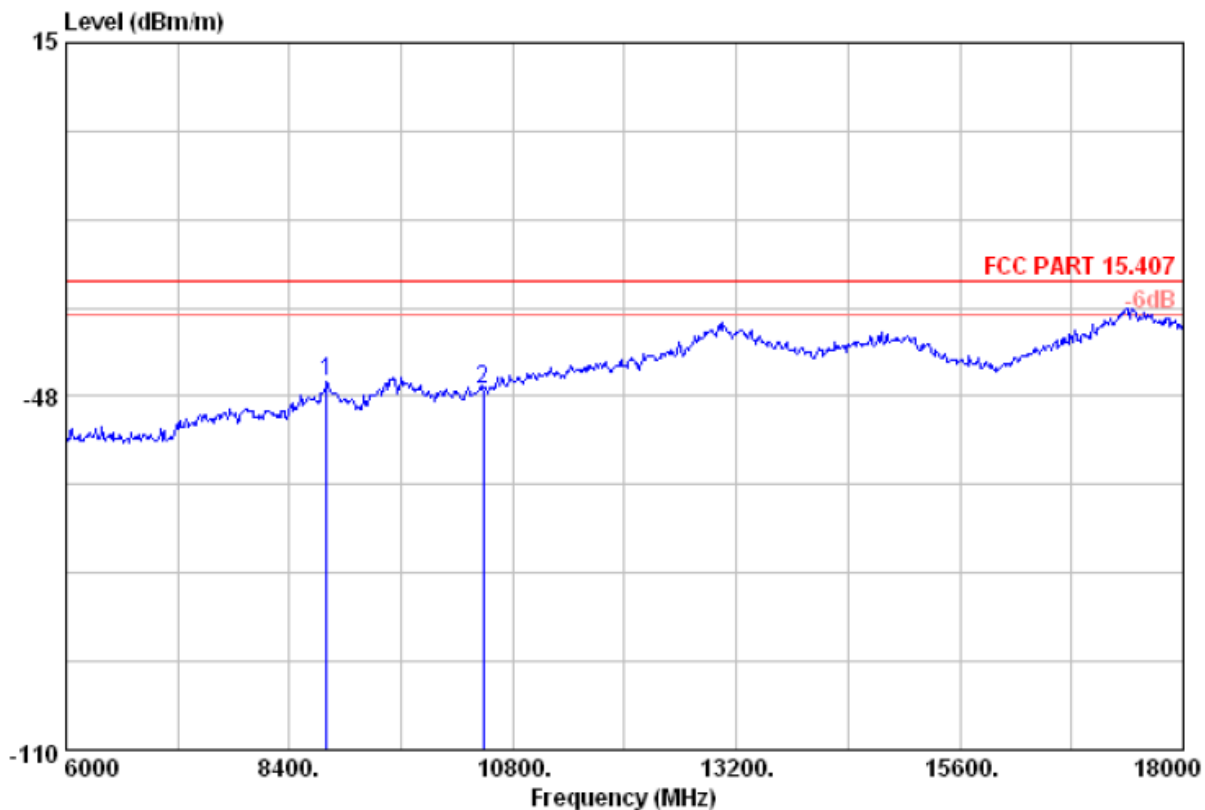
	Frequency (MHz)	Radiated Emission Level (dBm)	Radiated Emission Limit (dBm)	Margin (dB)
1	1065.000	-60.12	-27.00	33.12
2	1600.000	-54.96	-27.00	27.96
3	5240.000	10.66	-27.00	-37.66

Remarks:

1.Margin= Limit - Level

2.The emission levels that are 20dB below the official limit are not reported.

5240 MHz :(6-18GHz)



Site no. : RF Chamber Data no. : 15
 Dis. / Ant. : 3m 3115(0911) Ant. pol. : HORIZONTAL
 Limit : FCC PART 15.407
 Env. / Ins. : 23°C/54% Engineer : Sunny-lu
 EUT : AP220-E
 Power supply : AC 120V/60Hz
 Test mode : IEEE802.11a CH48 5240MHz Tx
 M/N: :

	Frequency (MHz)	Radiated Emission Level (dBm)	Radiated Emission Limit (dBm)	Margin (dB)
1	8796.000	-44.72	-27.00	17.72
2	10480.000	-46.25	-27.00	19.25

Remarks:

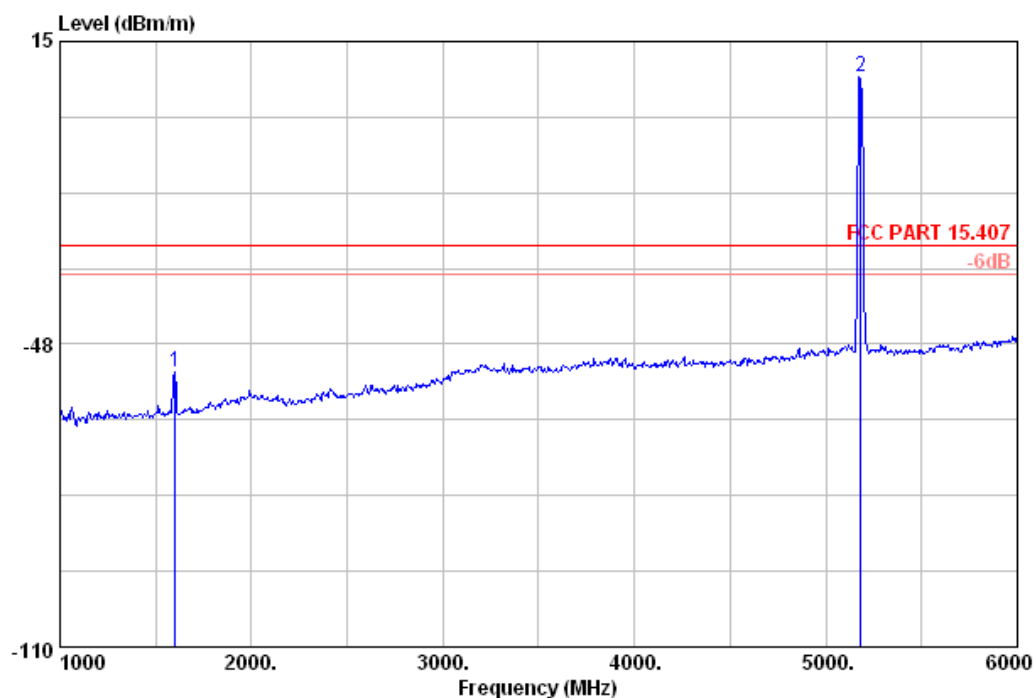
1.Margin= Limit - Level

2.The emission levels that are 20dB below the official limit are not reported.

Radiated Emission

IEEE 802.11n HT20 modulation (6.5 Mbps) Test Result:

5180 MHz: (1-6GHz)



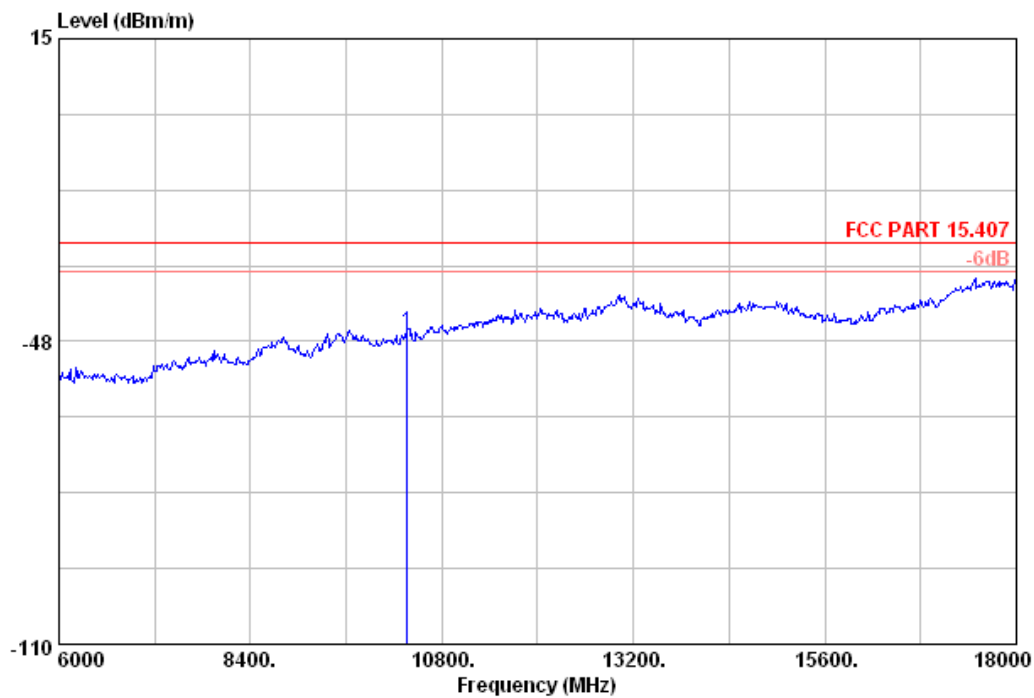
Site no. : RF Chamber Data no. : 17
 Dis. / Ant. : 3m 3115(0911) Ant. pol. : VERTICAL
 Limit : FCC PART 15.407
 Env. / Ins. : 23°C/54% Engineer : Sunny-lu
 EUT : AP220-E
 Power supply : AC 120V/60Hz
 Test mode : IEEE802.11nHT20 CH36 5180MHz Tx
 M/N: :

	Frequency (MHz)	Radiated Emission Level (dBm)	Radiated Emission Limit (dBm)	Margin (dB)
1	1600.000	-53.11	-27.00	26.11
2	5180.000	7.80	-27.00	-34.80

Remarks:

1. Margin= Limit - Level
2. The emission levels that are 20dB below the official limit are not reported.

5180 MHz: (6-18GHz)



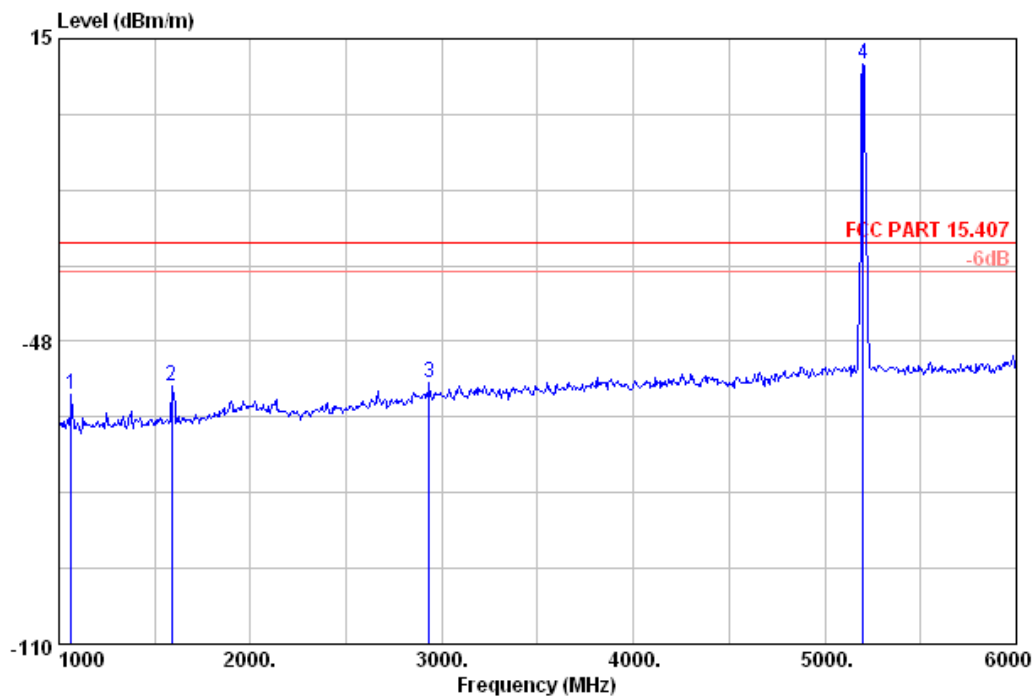
Site no. : RF Chamber Data no. : 21
Dis. / Ant. : 3m 3115(0911) Ant. pol. : VERTICAL
Limit : FCC PART 15.407
Env. / Ins. : 23°C/54% Engineer : Sunny-lu
EUT : AP220-E
Power supply : AC 120V/60Hz
Test mode : IEEE802.11nHT20 CH36 5180MHz Tx
M/N: :

	Frequency (MHz)	Radiated Emission Level (dBm)	Radiated Emission Limit (dBm)	Margin (dB)
1	10360.000	-45.52	-27.00	18.52

Remarks:

1. Margin = Limit - Level
2. The emission levels that are 20dB below the official limit are not reported.

5200 MHz: (1-6GHz)



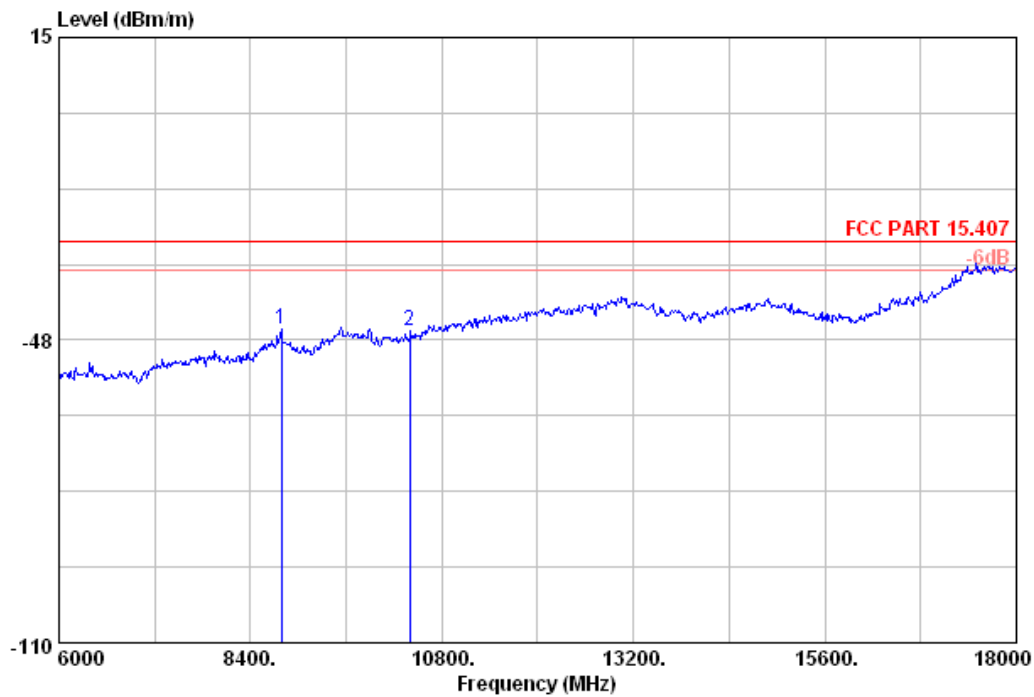
Site no. : RF Chamber Data no. : 24
Dis. / Ant. : 3m 3115(0911) Ant. pol. : VERTICAL
Limit : FCC PART 15.407
Env. / Ins. : 23°C/54% Engineer : Sunny-lu
EUT : AP220-E
Power supply : AC 120V/60Hz
Test mode : IEEE802.11nHT20 CH40 5200MHz Tx
M/N: :

	Frequency (MHz)	Radiated Emission Level (dBm)	Radiated Emission Limit (dBm)	Margin (dB)
1	1065.000	-58.57	-27.00	31.57
2	1590.000	-56.73	-27.00	29.73
3	2935.000	-55.90	-27.00	28.90
4	5200.000	9.82	-27.00	-36.82

Remarks:

1. Margin= Limit - Level
2. The emission levels that are 20dB below the official limit are not reported.

5200 MHz: (6-18GHz)



Site no. : RF Chamber Data no. : 25
 Dis. / Ant. : 3m 3115(0911) Ant. pol. : VERTICAL
 Limit : FCC PART 15.407
 Env. / Ins. : 23°C/54% Engineer : Sunny-lu
 EUT : AP220-E
 Power supply : AC 120V/60Hz
 Test mode : IEEE802.11nHT20 CH40 5200MHz Tx
 M/N: :

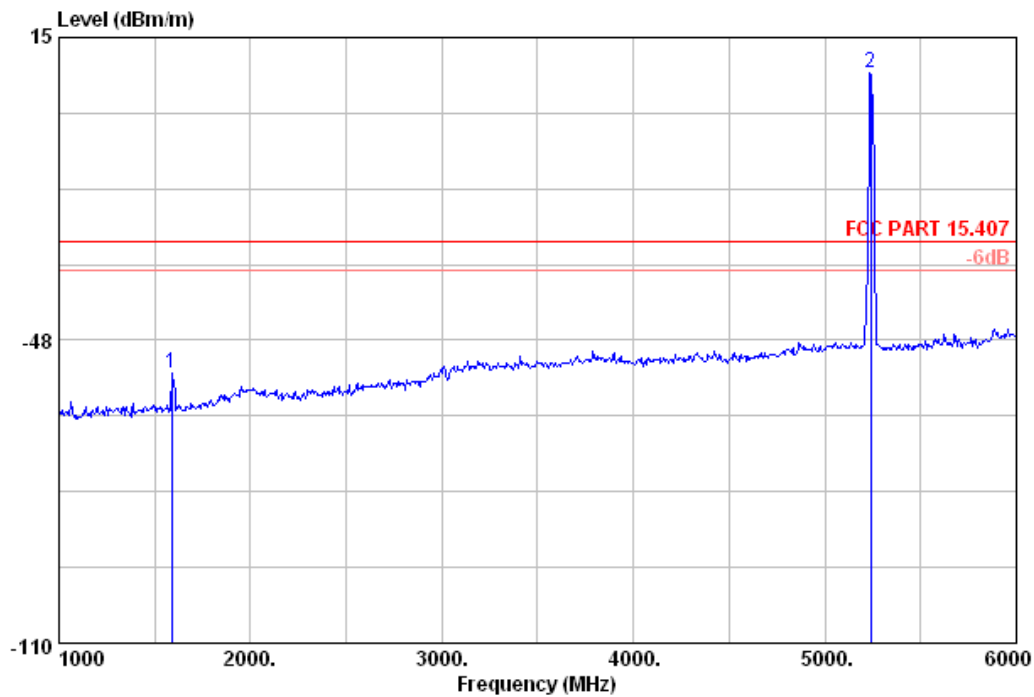
	Frequency (MHz)	Radiated Emission Level (dBm)	Radiated Emission Limit (dBm)	Margin (dB)
1	8784.000	-45.26	-27.00	18.26
2	10400.000	-45.69	-27.00	18.69

Remarks:

1.Margin= Limit - Level

2.The emission levels that are 20dB below the official limit are not reported.

5240 MHz: (1-6GHz)



Site no. : RF Chamber Data no. : 28
 Dis. / Ant. : 3m 3115(0911) Ant. pol. : VERTICAL
 Limit : FCC PART 15.407
 Env. / Ins. : 23°C/54% Engineer : Sunny-lu
 EUT : AP220-E
 Power supply : AC 120V/60Hz
 Test mode : IEEE802.11nHT20 CH48 5240MHz Tx
 M/N: :

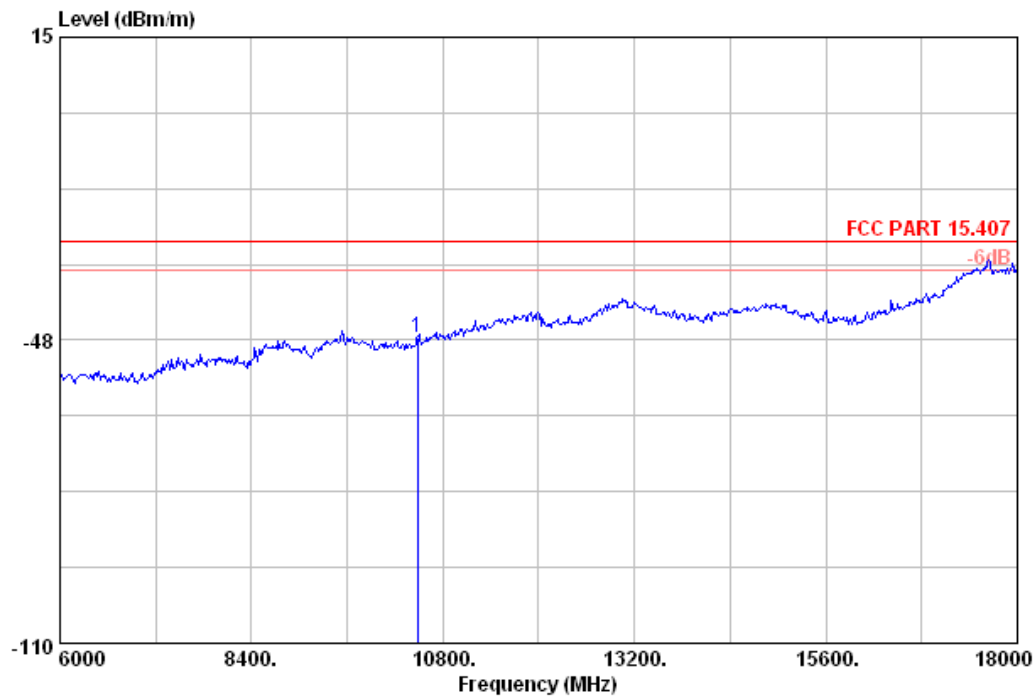
	Frequency (MHz)	Radiated Emission Level (dBm)	Radiated Emission Limit (dBm)	Margin (dB)
1	1590.000	-54.34	-27.00	27.34
2	5240.000	7.74	-27.00	-34.74

Remarks:

1.Margin= Limit - Level

2.The emission levels that are 20dB below the official limit are not reported.

5240 MHz: (6-18GHz)



Site no. : RF Chamber Data no. : 32
 Dis. / Ant. : 3m 3115(0911) Ant. pol. : VERTICAL
 Limit : FCC PART 15.407
 Env. / Ins. : 23°C/54% Engineer : Sunny-lu
 EUT : AP220-E
 Power supply : AC 120V/60Hz
 Test mode : IEEE802.11nHT20 CH48 5240MHz Tx
 M/N: :

	Frequency (MHz)	Radiated Emission Level (dBm)	Radiated Emission Limit (dBm)	Margin (dB)
1	10480.000	-47.10	-27.00	20.10

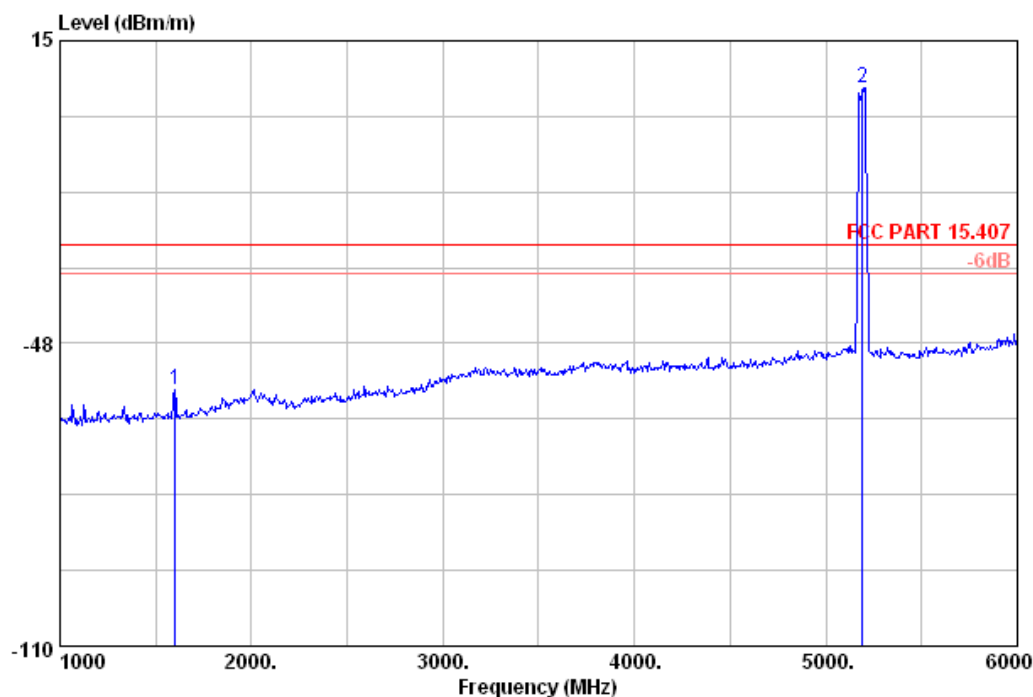
Remarks:

- 1.Margin= Limit - Level
- 2.The emission levels that are 20dB below the official limit are not reported.

Radiated Emission

IEEE 802.11n HT40 modulation (13.5 Mbps) Test Result:

5190MHz: (1-6GHz)



Site no. : RF Chamber Data no. : 33
 Dis. / Ant. : 3m 3115(0911) Ant. pol. : VERTICAL
 Limit : FCC PART 15.407
 Env. / Ins. : 23°C/54% Engineer : Sunny-lu
 EUT : AP220-E
 Power supply : AC 120V/60Hz
 Test mode : IEEE802.11nHT40 CH38 5190MHz Tx
 M/N: :

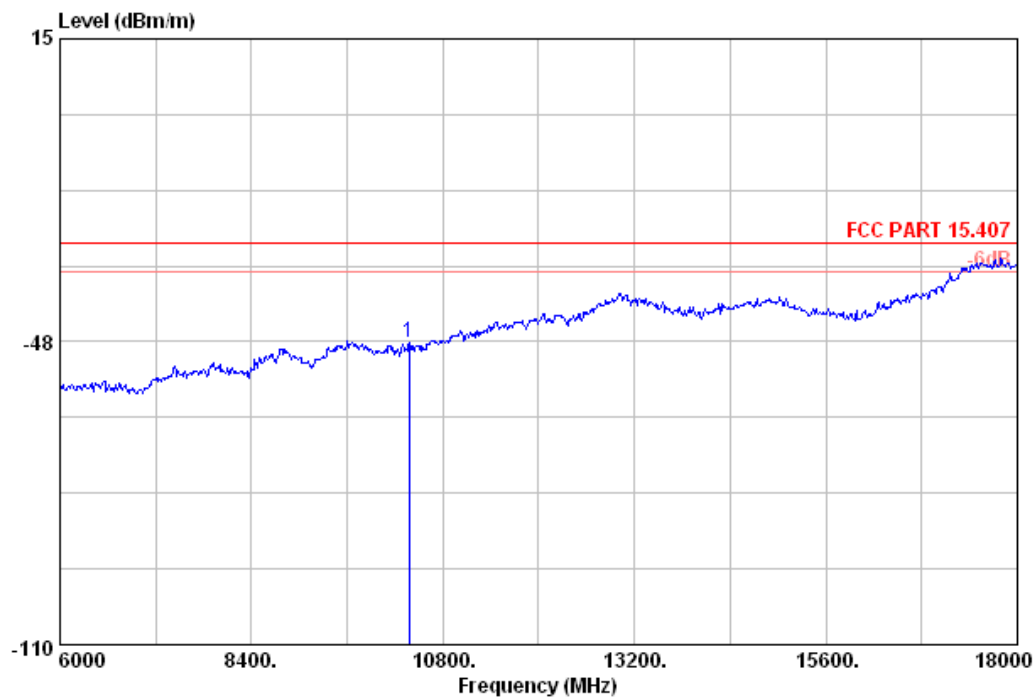
	Frequency (MHz)	Radiated Emission Level (dBm)	Radiated Emission Limit (dBm)	Margin (dB)
1	1600.000	-57.14	-27.00	30.14
2	5190.000	5.39	-27.00	-32.39

Remarks:

1. Margin= Limit - Level

2. The emission levels that are 20dB below the official limit are not reported.

5190MHz: (6-18GHz)



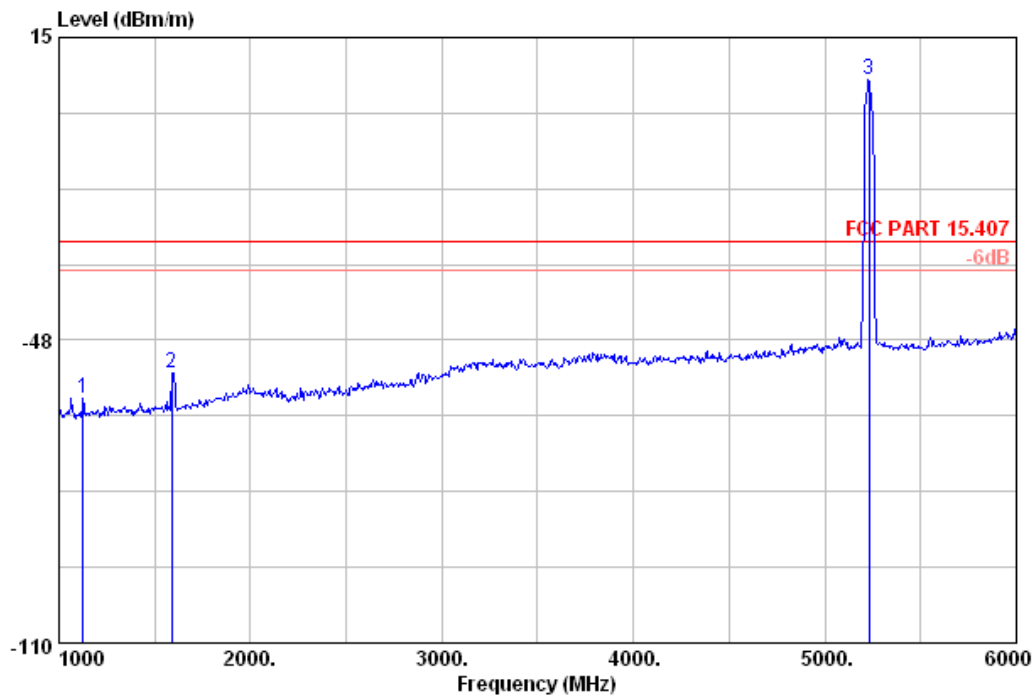
Site no. : RF Chamber Data no. : 37
 Dis. / Ant. : 3m 3115(0911) Ant. pol. : VERTICAL
 Limit : FCC PART 15.407
 Env. / Ins. : 23°C/54% Engineer : Sunny-lu
 EUT : AP220-E
 Power supply : AC 120V/60Hz
 Test mode : IEEE802.11nHT40 CH38 5190MHz Tx
 M/N: :

	Frequency (MHz)	Radiated Emission Level (dBm)	Radiated Emission Limit (dBm)	Margin (dB)
1	10380.000	-47.64	-27.00	20.64

Remarks:

- 1.Margin= Limit - Level
- 2.The emission levels that are 20dB below the official limit are not reported.

5230MHz: (6-18GHz)



Site no. : RF Chamber
 Dis. / Ant. : 3m 3115(0911)
 Limit : FCC PART 15.407
 Env. / Ins. : 23°C/54%
 EUT : AP220-E
 Power supply : AC 120V/60Hz
 Test mode : IEEE802.11nHT40 CH46 5230MHz Tx
 M/N: :
 Data no. : 40
 Ant. pol. : VERTICAL
 Engineer : Sunny-lu

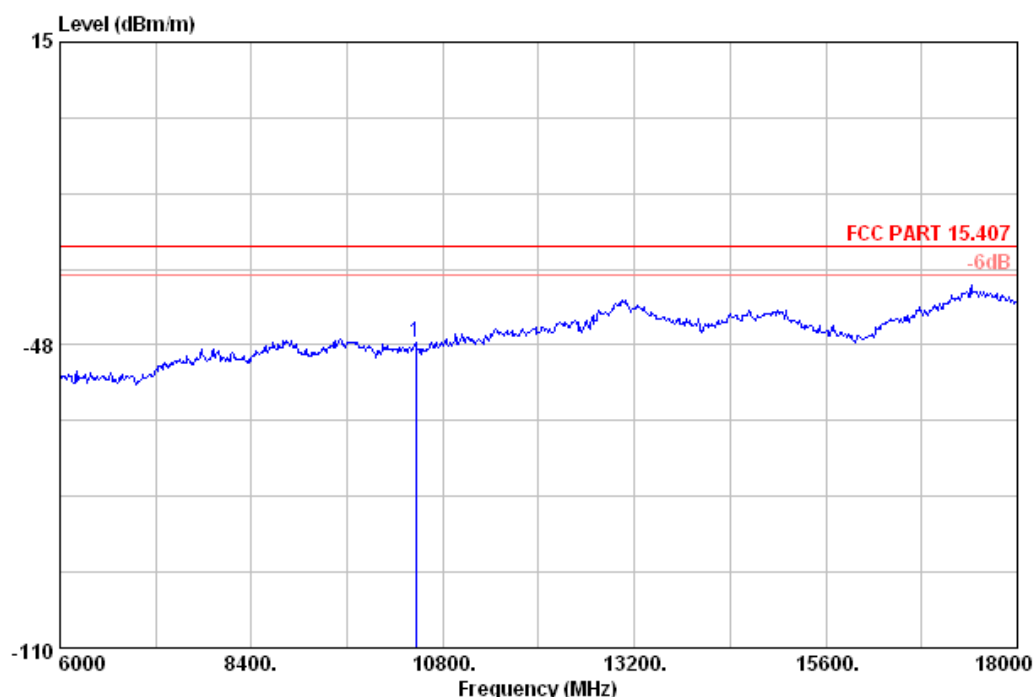
	Frequency (MHz)	Radiated Emission Level (dBm)	Radiated Emission Limit (dBm)	Margin (dB)
1	1125.000	-59.37	-27.00	32.37
2	1590.000	-54.17	-27.00	27.17
3	5230.000	6.36	-27.00	-33.36

Remarks:

1.Margin= Limit - Level

2.The emission levels that are 20dB below the official limit are not reported.

5230MHz: (6-18GHz)



Site no. : RF Chamber Data no. : 44
 Dis. / Ant. : 3m 3115(0911) Ant. pol. : VERTICAL
 Limit : FCC PART 15.407
 Env. / Ins. : 23°C/54% Engineer : Sunny-lu
 EUT : AP220-E
 Power supply : AC 120V/60Hz
 Test mode : IEEE802.11nHT40 CH46 5230MHz Tx
 M/N: :

	Frequency (MHz)	Radiated Emission Level (dBm)	Radiated Emission Limit (dBm)	Margin (dB)
1	10460.000	-47.02	-27.00	20.02

Remarks:

1.Margin= Limit - Level

2.The emission levels that are 20dB below the official limit are not reported.



Product Service

Test Equipment List

DESCRIPTION	MANUFACTURER	MODEL NO.	SERIAL NO.	CAL DUE DATE
Spectrum	Agilent	E4446A	US44300459	May 08, 2011
Amp	HP	8449B	3008A02495	May 08, 2011
Antenna	EMCO	3115	9607-4877	May 17, 2011
Bilog Antenna	Schaffner	CBL6111C	2598	Dec.14, 2011
HF Cable	Hubersuhne	Sucoflex104	---	May 08, 2011

7.5 26 dB bandwidth

Test Method

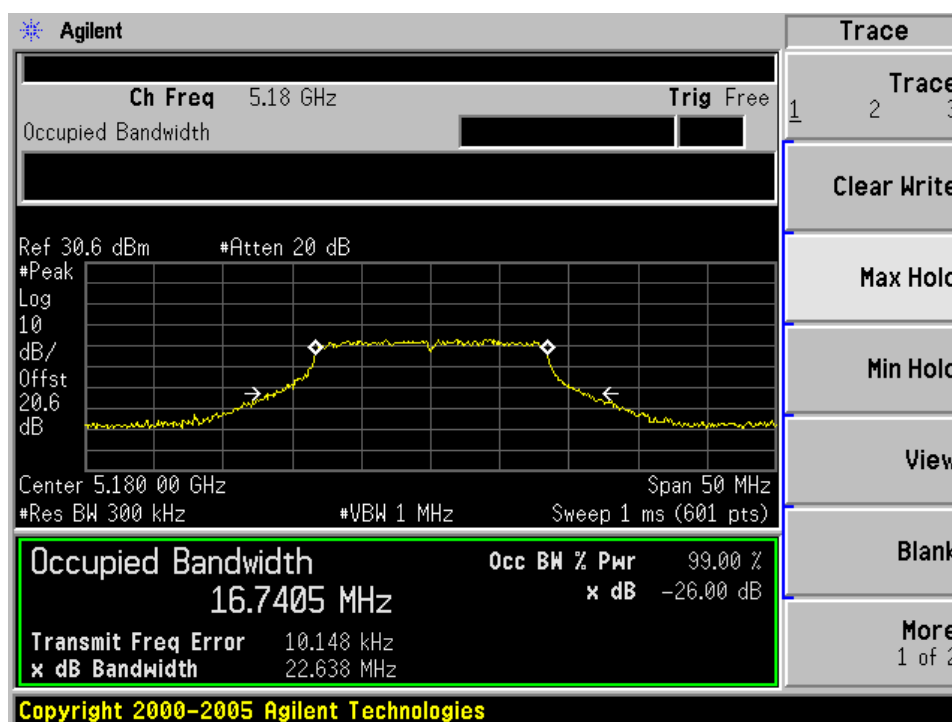
- 1 Place the EUT on the table and set it in the transmitting mode.
- 2 Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
- 3 Mark the peak frequency and –26dB (upper and lower) frequency.

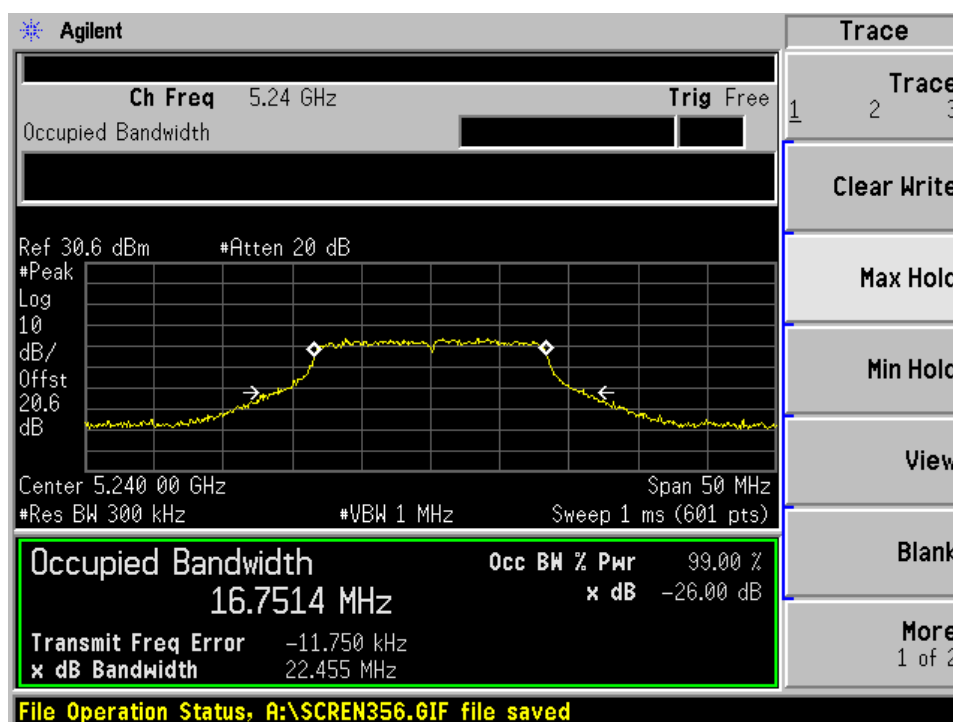
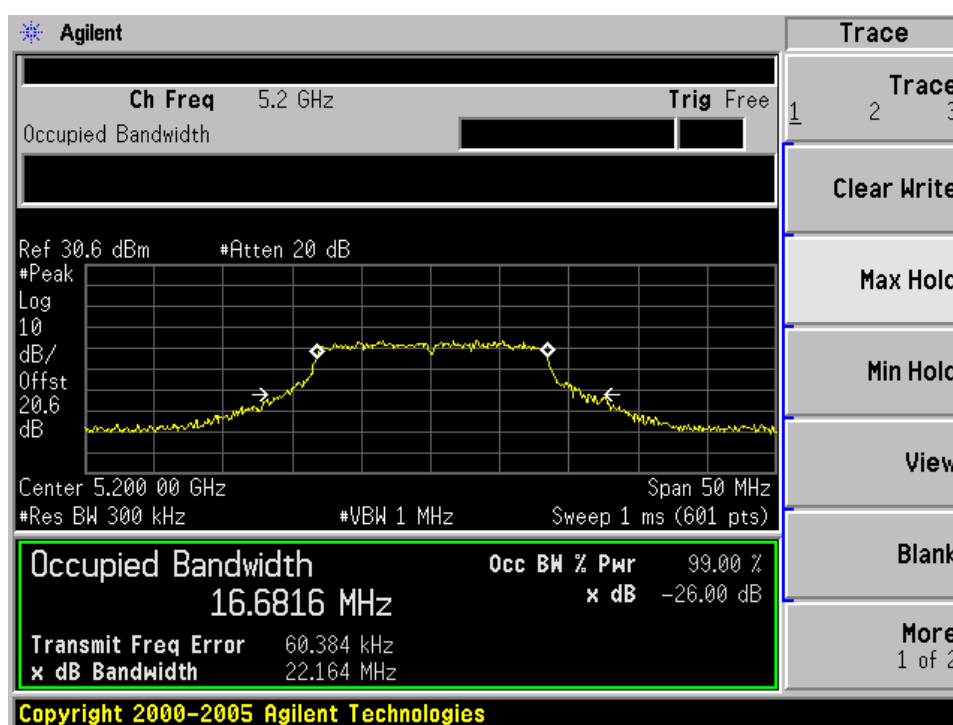
26 dB bandwidth

IEEE 802.11a modulation (6Mbps) Test Result

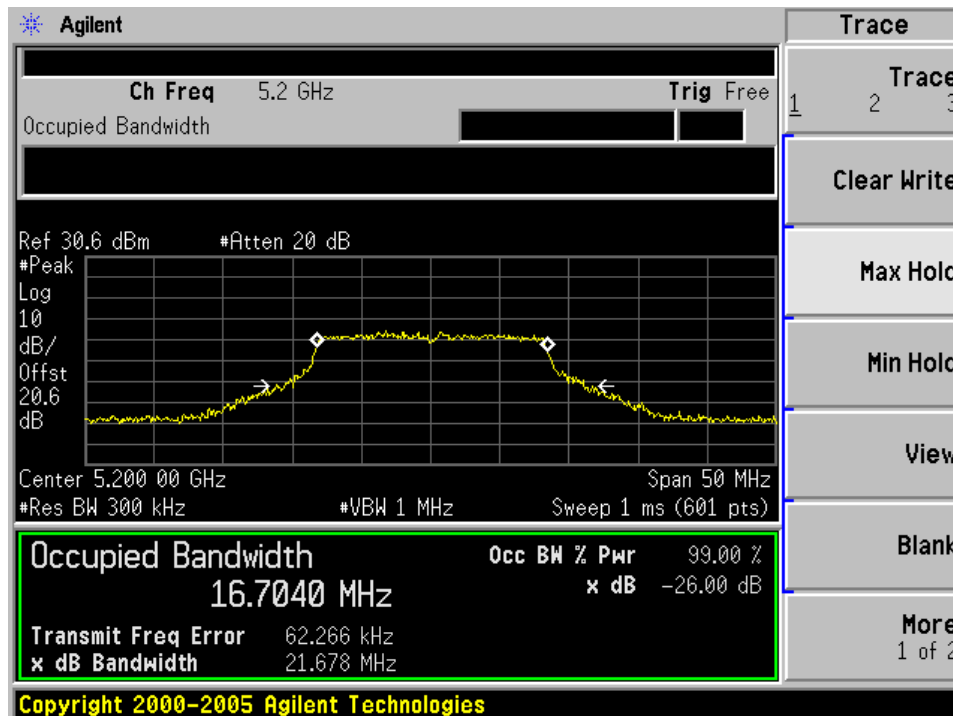
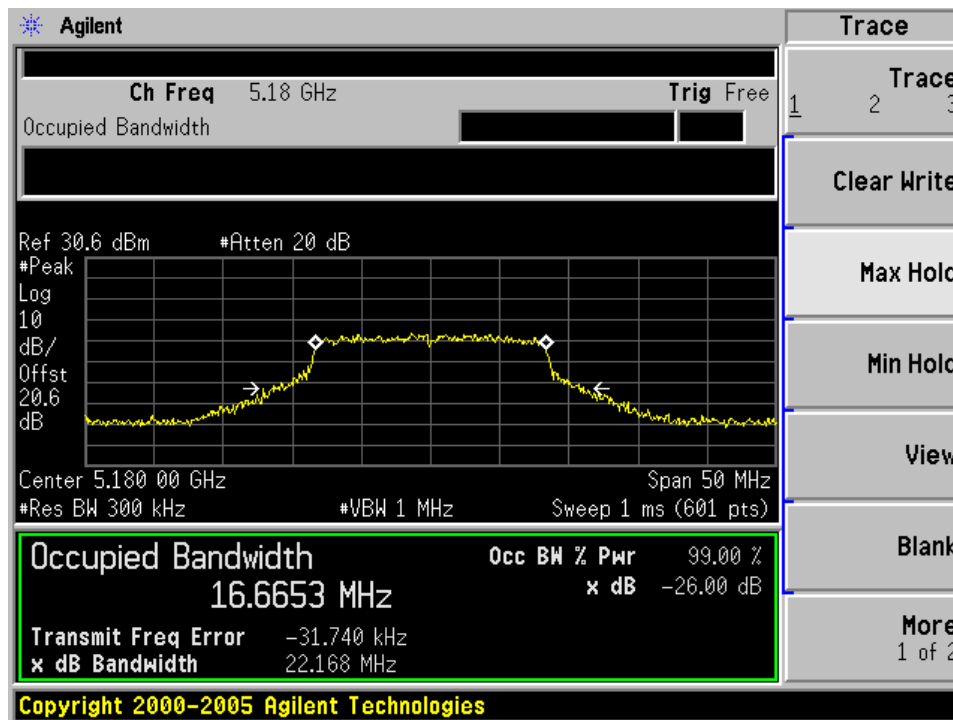
Channel	Channel Frequency (MHz)	Antenna Port	Measured 99% Bandwidth (MHz)	Measured 26dB Bandwidth (MHz)
Ch36	5180	Chain0	16.7405	22.636
Ch40	5200	Chain1	16.6816	22.164
Ch48	5240	Chain2	16.7451	22.455
Ch36	5180	Chain0	16.6653	22.168
Ch40	5200	Chain1	16.7040	21.678
Ch48	5240	Chain2	16.7220	21.852
Ch36	5180	Chain0	16.7585	22.165
Ch40	5200	Chain1	16.7408	22.824
Ch48	5240	Chain2	16.7329	21.939

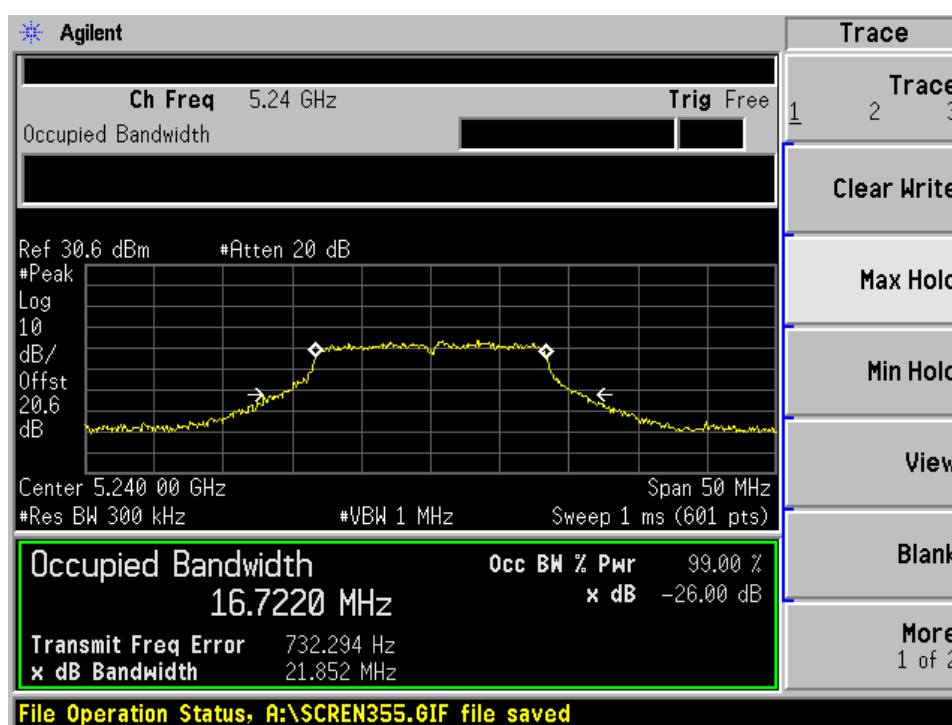
Chain0:



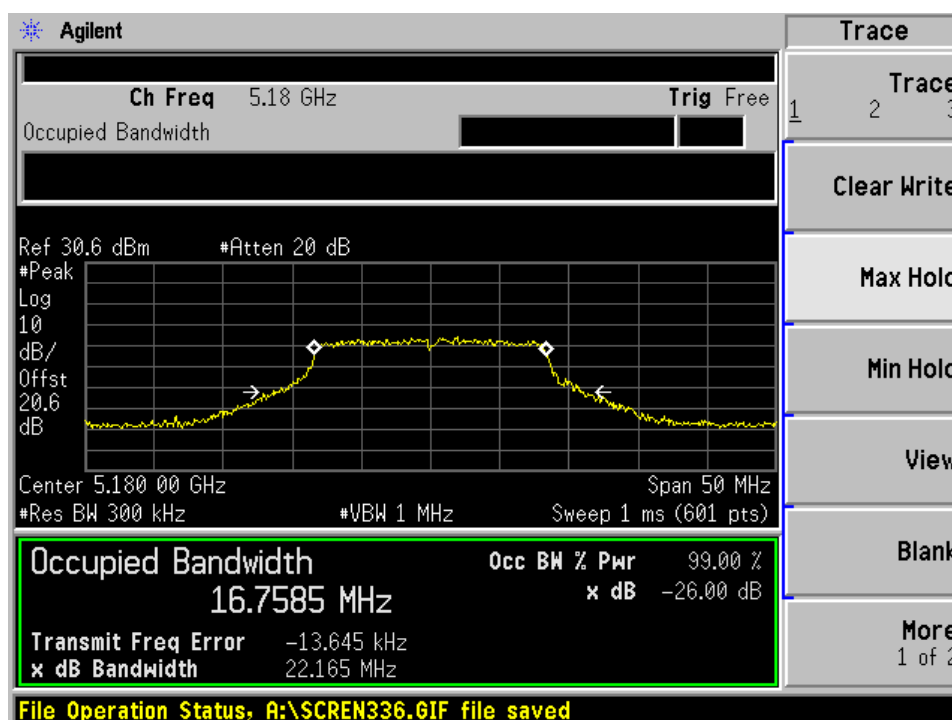


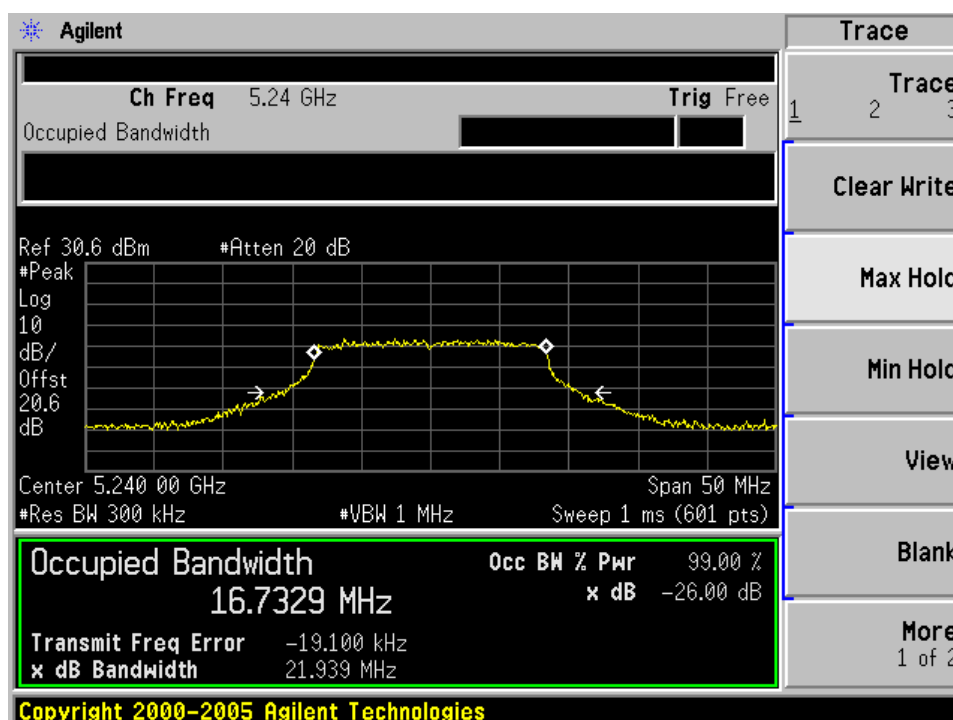
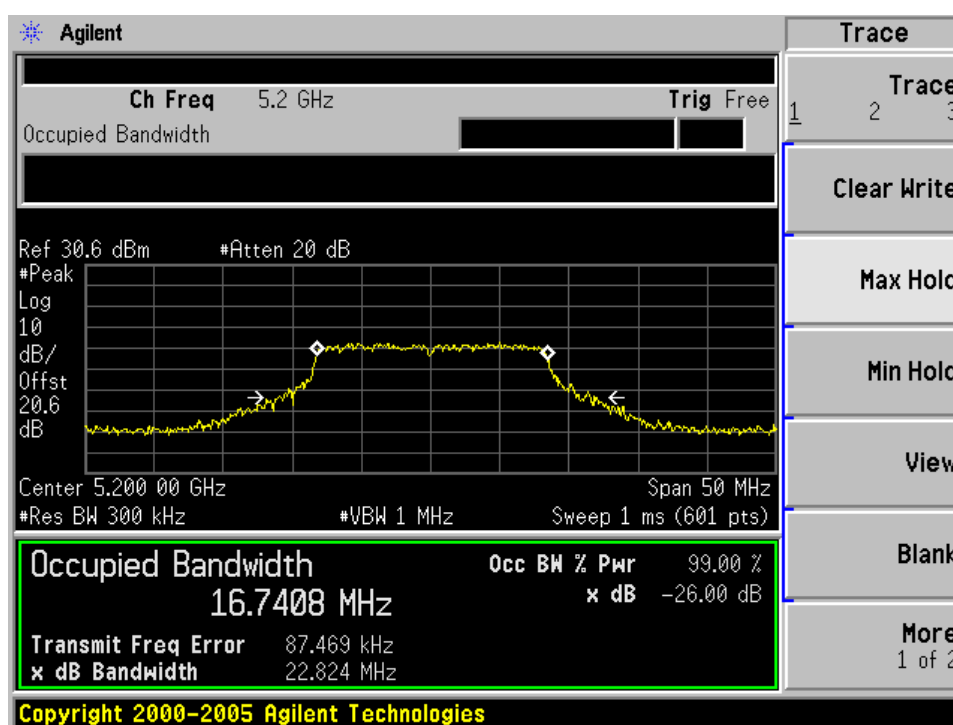
Chain1:





Chain2:



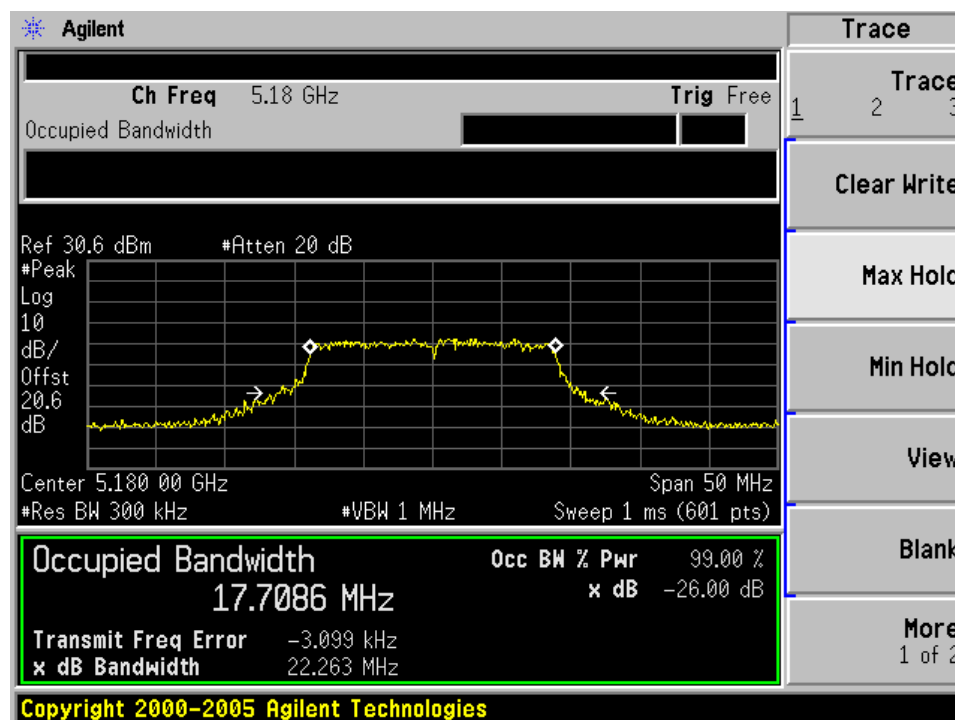


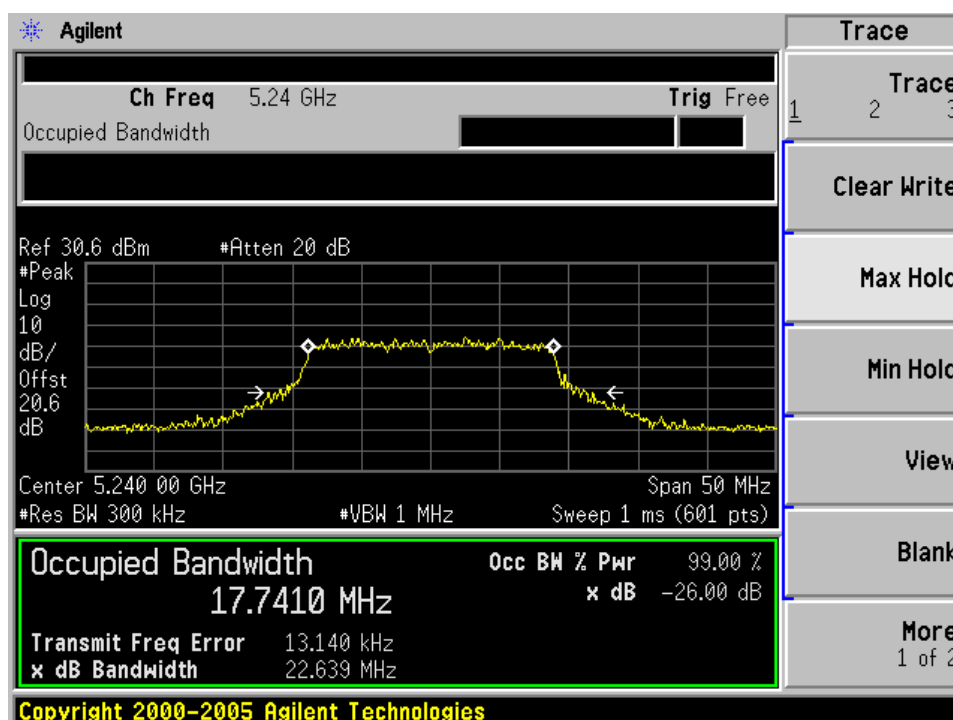
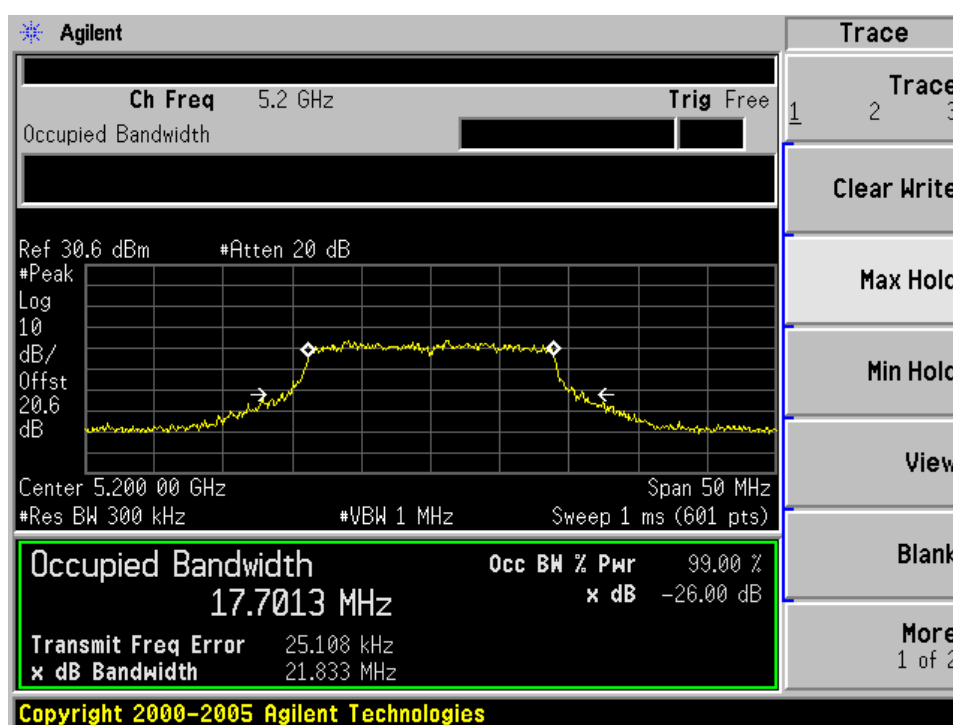
26 dB bandwidth

IEEE 802.11HTn20 modulation (6.5Mbps) Test Result:

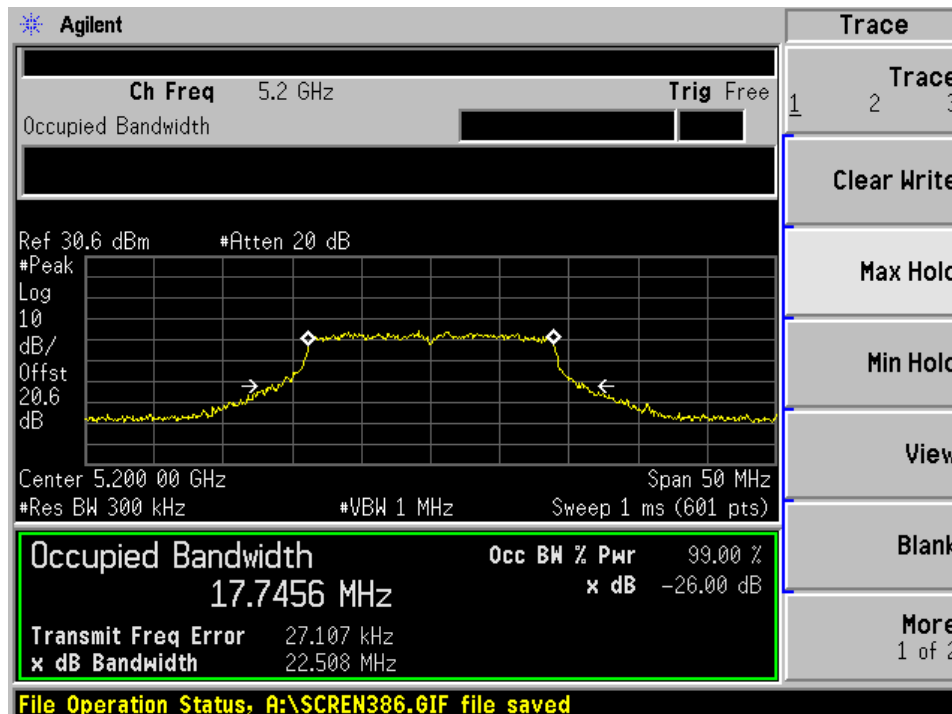
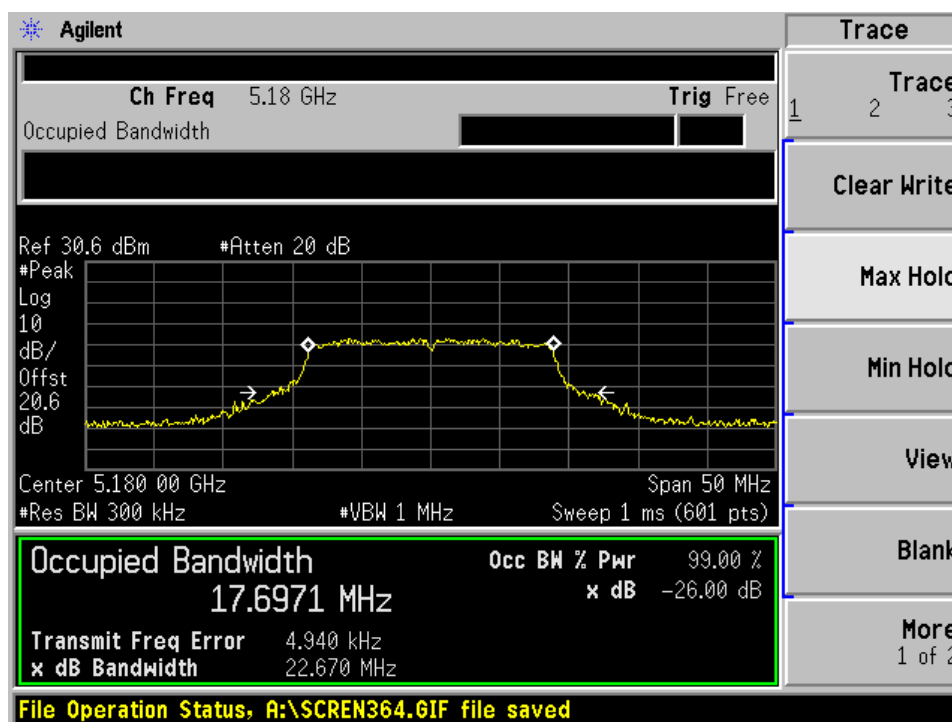
Channel	Channel Frequency (MHz)	Antenna Port	Measured 99% Bandwidth (MHz)	Measured 26dB Bandwidth (MHz)
Ch36	5180	Chain0	17.7086	22.263
Ch40	5200	Chain1	17.7013	21.833
Ch48	5240	Chain2	17.7410	22.639
Ch36	5180	Chain0	17.6971	22.670
Ch40	5200	Chain1	17.7456	22.508
Ch48	5240	Chain2	17.8304	22.441
Ch36	5180	Chain0	17.7284	22.334
Ch40	5200	Chain1	17.7676	22.508
Ch48	5240	Chain2	17.7931	21.646

Chain0:

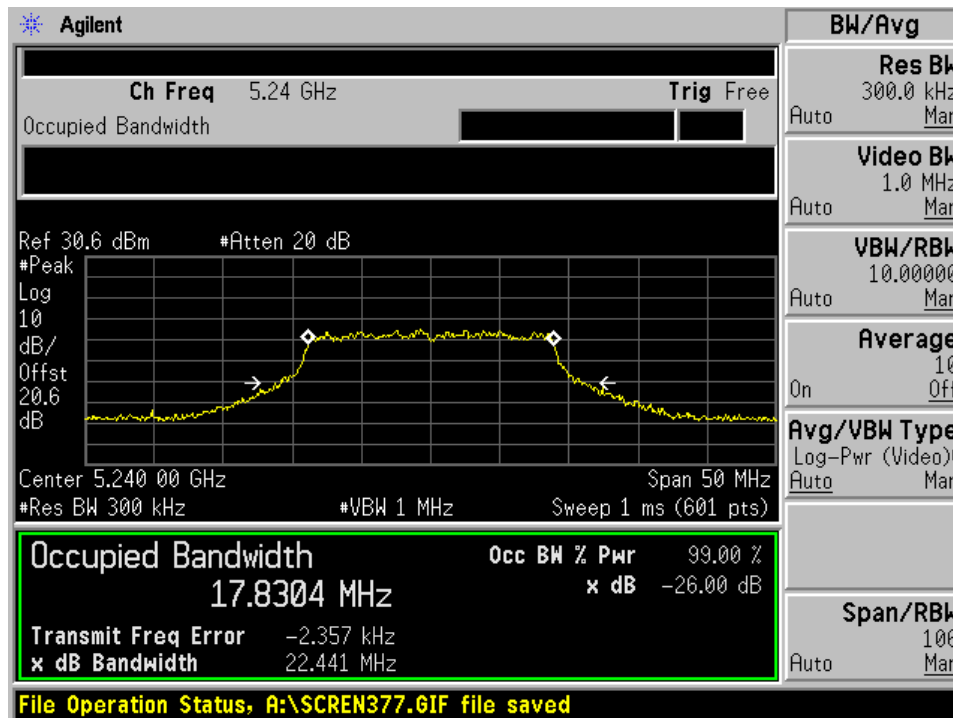




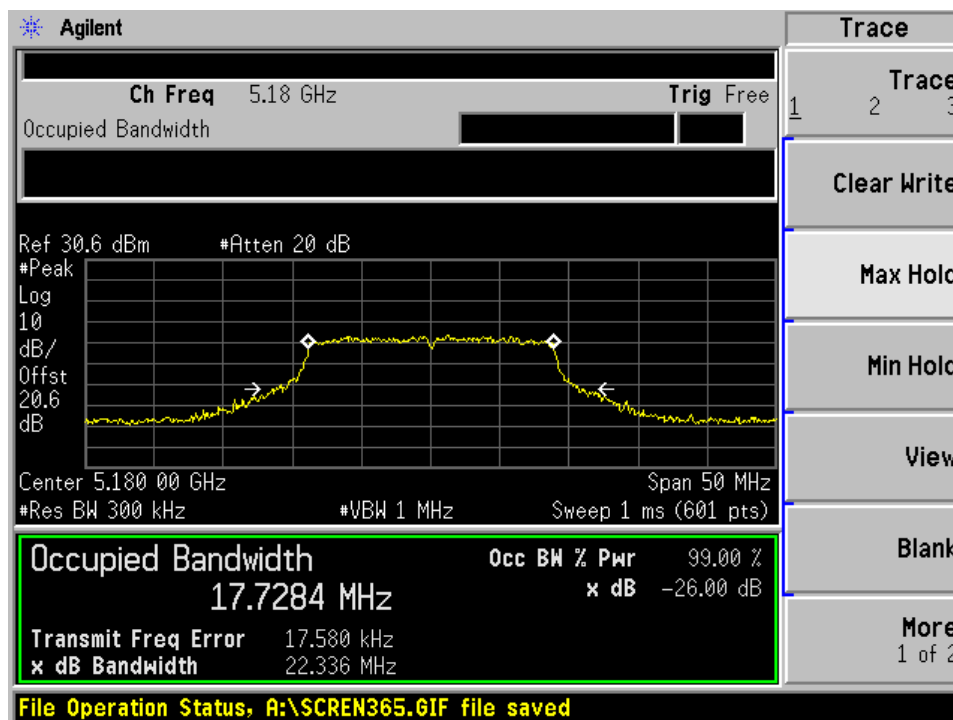
Chain1:

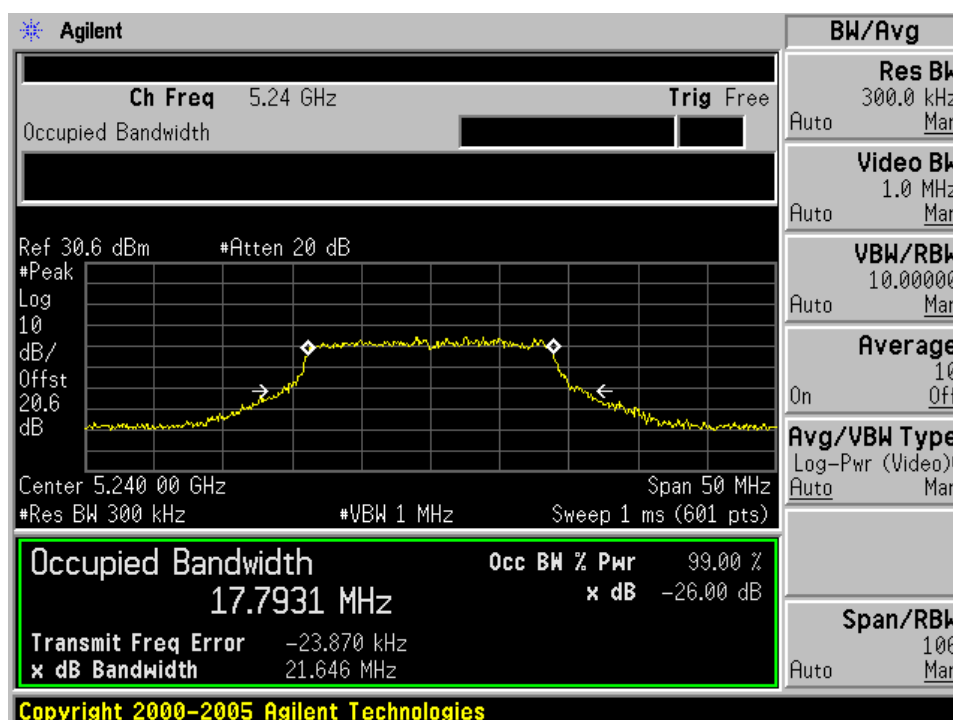
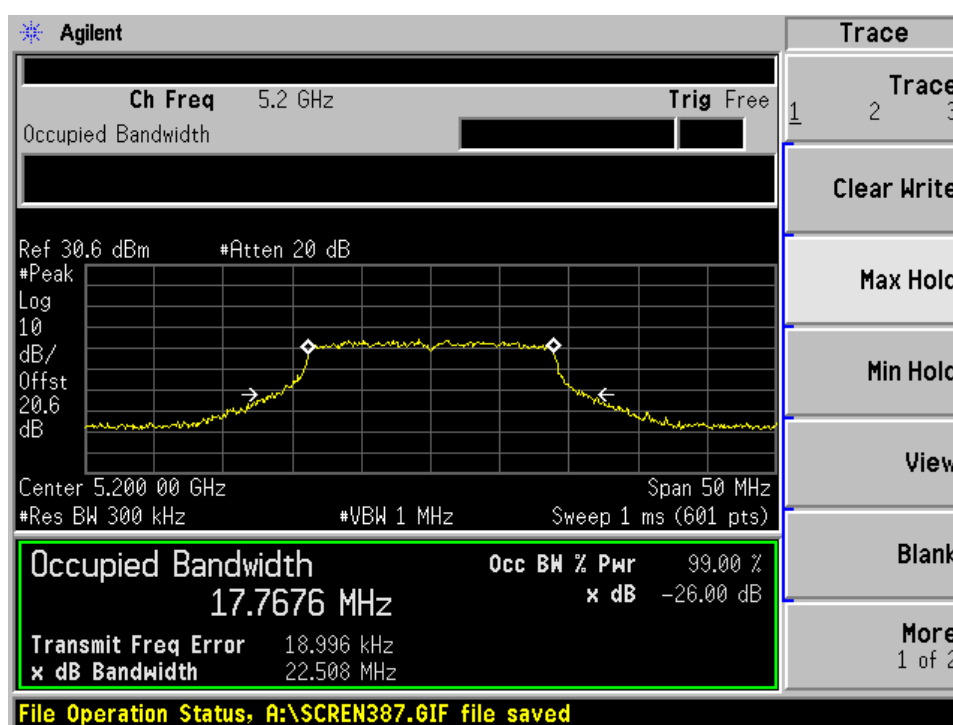


26 dB bandwidth



Chain2:



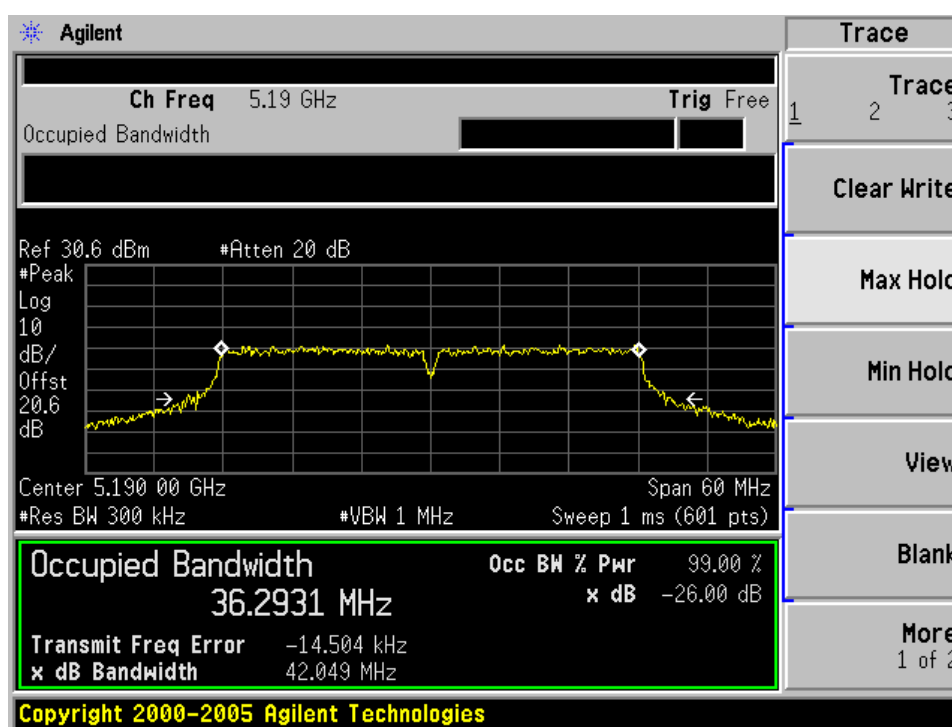


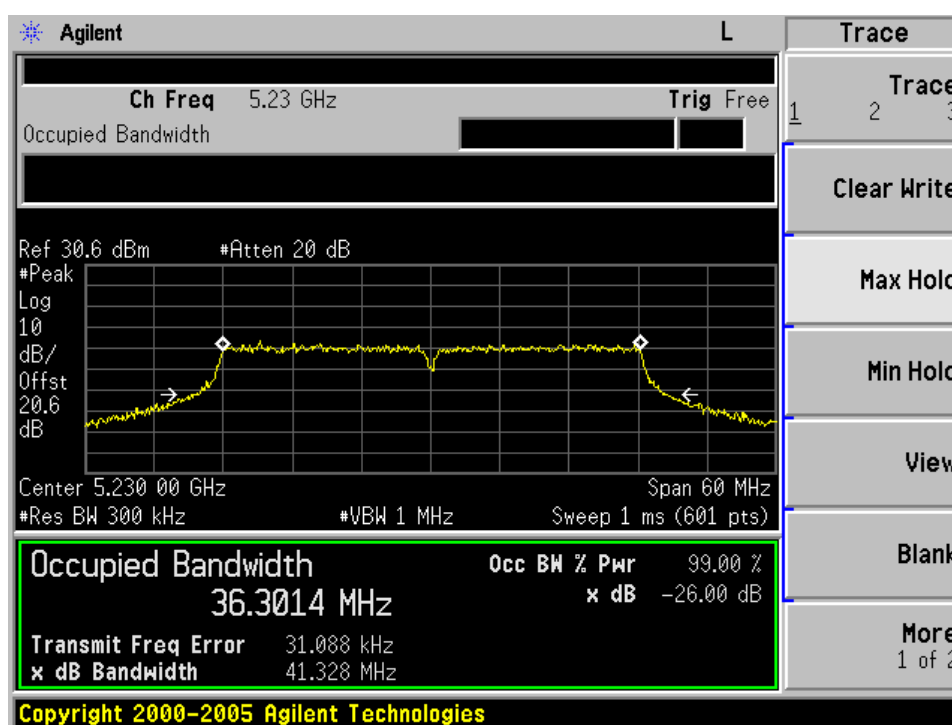
26 dB bandwidth

IEEE 802.11n HT40 modulation (13.5Mbps) Test Result:

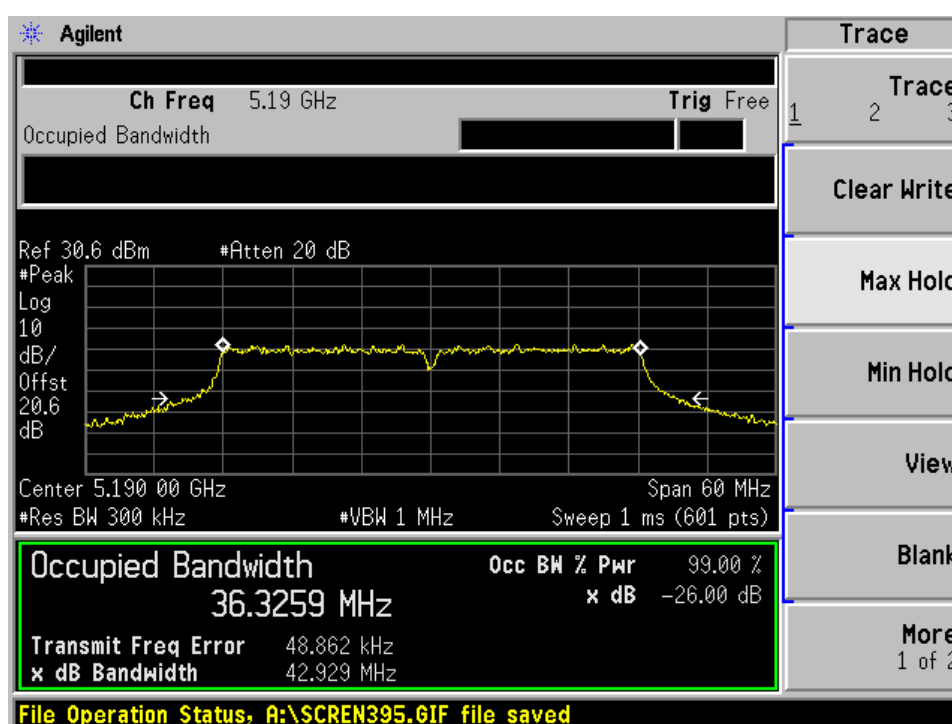
Channel	Channel Frequency (MHz)	Antenna Port	Measured 99% Bandwidth (MHz)	Measured 26dB Bandwidth (MHz)
Ch38	5190	Chain0	36.2931	42.049
Ch46	5230	Chain1	36.3014	41.328
Ch38	5190	Chain2	36.3259	42.929
Ch46	5230	Chain0	36.3510	42.902
Ch38	5190	Chain1	36.3261	42.929
Ch46	5230	Chain2	36.3463	41.820

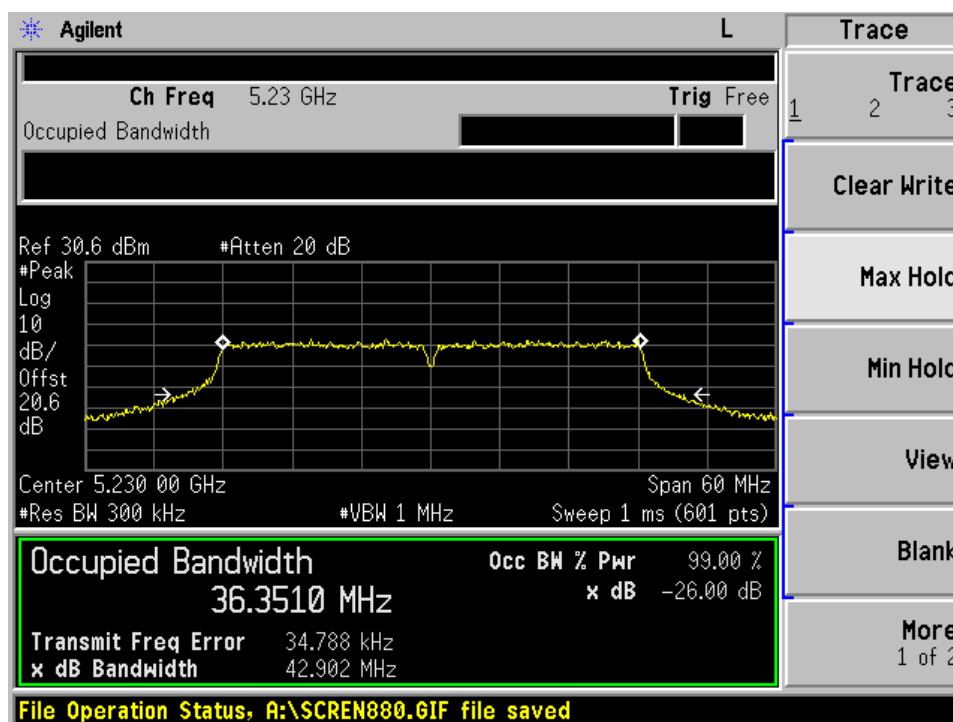
Chain0:



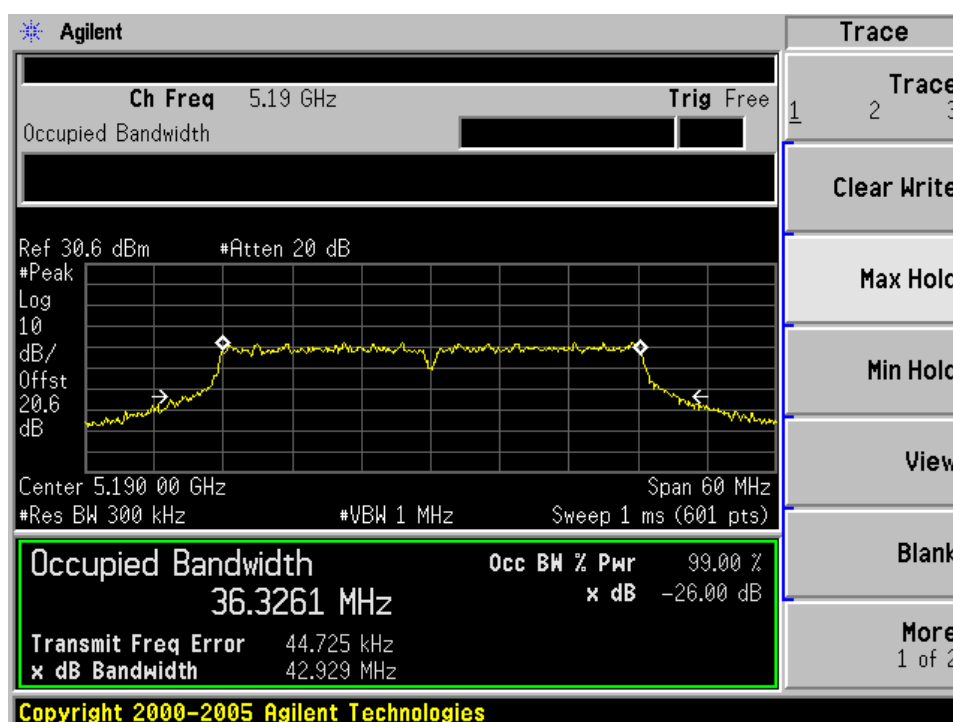


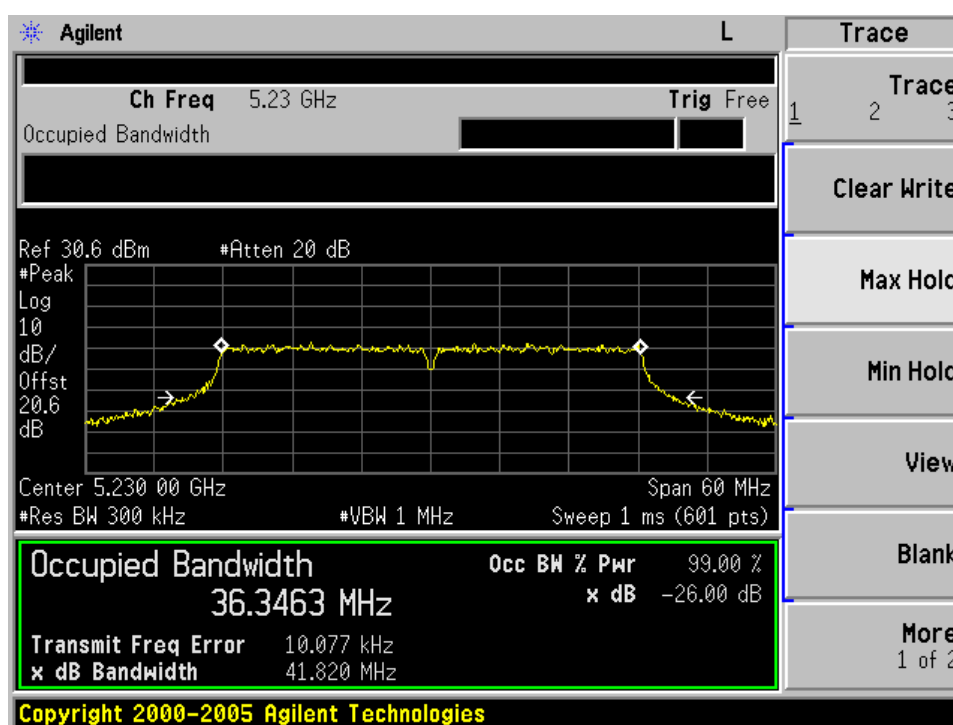
Chain1:





Chain2:







Product Service

Test Equipment

DESCRIPTION	MANUFACTURER	MODEL NO.	SERIAL NO.	CAL.DUE.DATE
Spectrum Analyzer	Agilent	E4446A	MY41440292	May 08, 2010

7.6 Power spectral density

Test Method

- 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 = 1 MHz, VBW = 3 MHz, Sweep = 1ms, SPAN > emission bandwidth (>20 MHz)
- 3 Record the max reading.

Limit

Limit
dBm / MHz

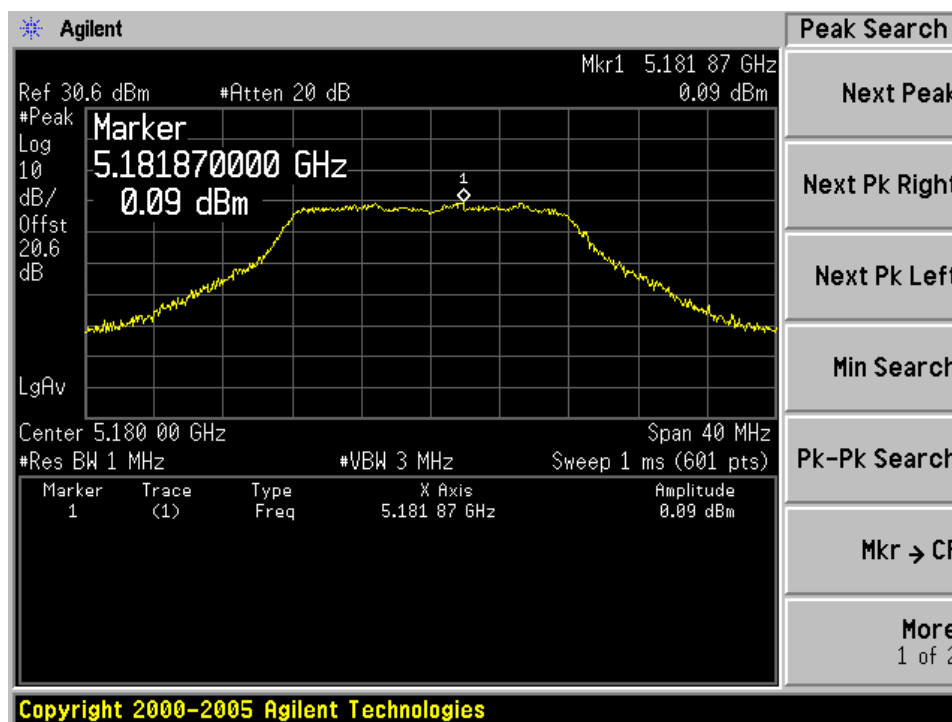
4

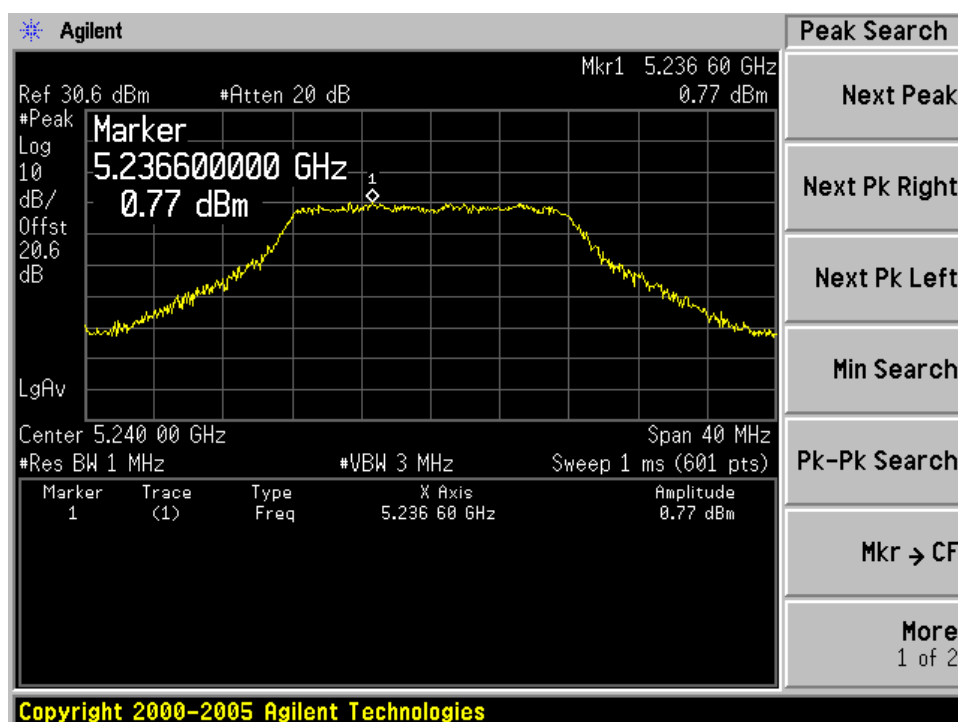
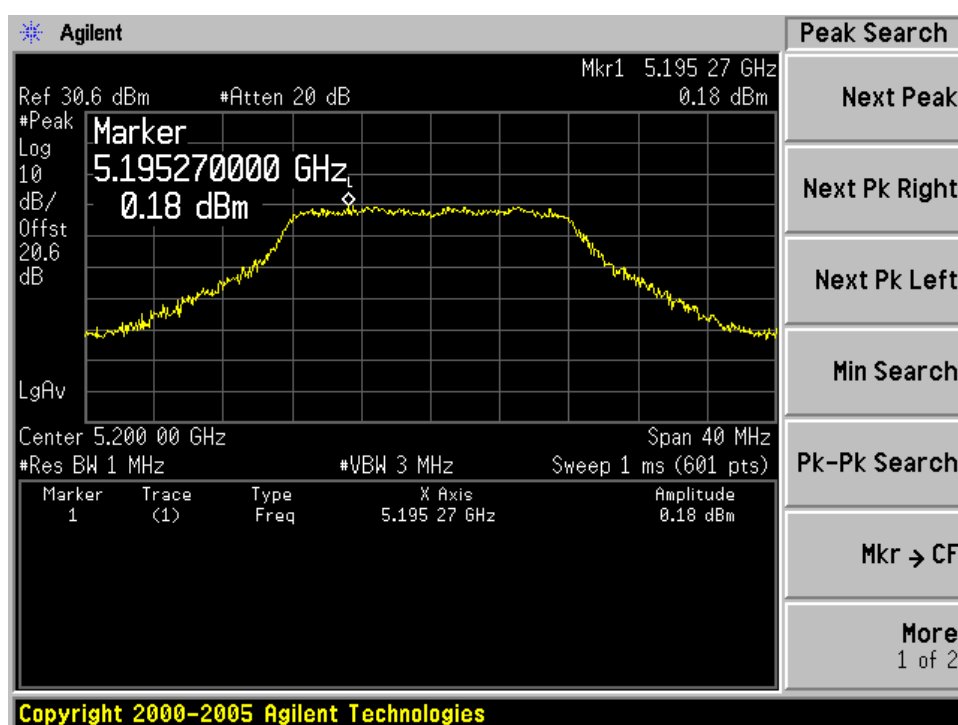
Power spectral density

IEEE 802.11a modulation (1Mbps) Test Result

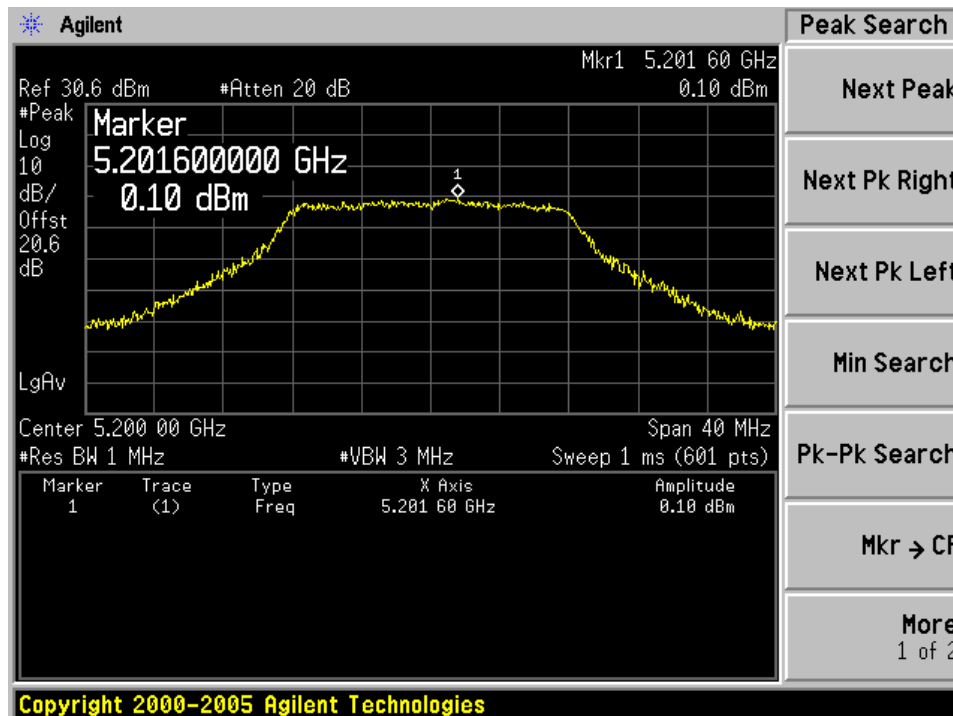
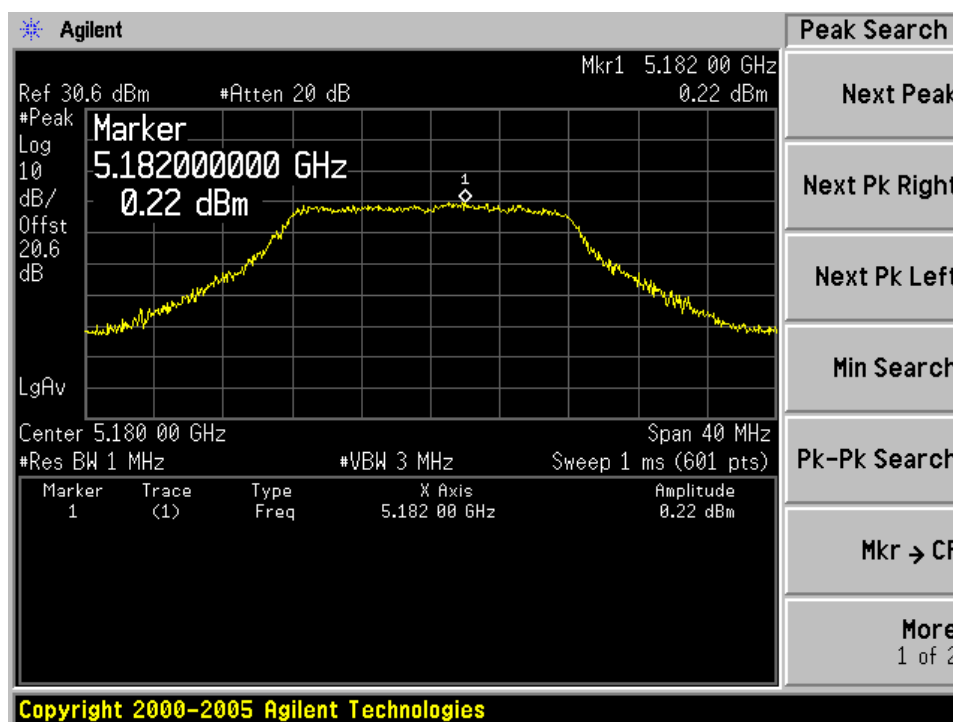
Channel	Channel Frequency (MHz)	Antenna Port	Power Spectral Density (dBm/MHz)	Part 15.407 Limit (dBm/MHz)	Result
Ch36	5180	Chain0	0.09	4	Pass
Ch36	5180	Chain1	0.22	4	Pass
Ch36	5180	Chain2	0.21	4	Pass
Ch40	5200	Chain0	0.18	4	Pass
Ch40	5200	Chain1	0.10	4	Pass
Ch40	5200	Chain2	0.15	4	Pass
Ch48	5240	Chain0	0.77	4	Pass
Ch48	5240	Chain1	-0.05	4	Pass
Ch48	5240	Chain2	0.61	4	Pass

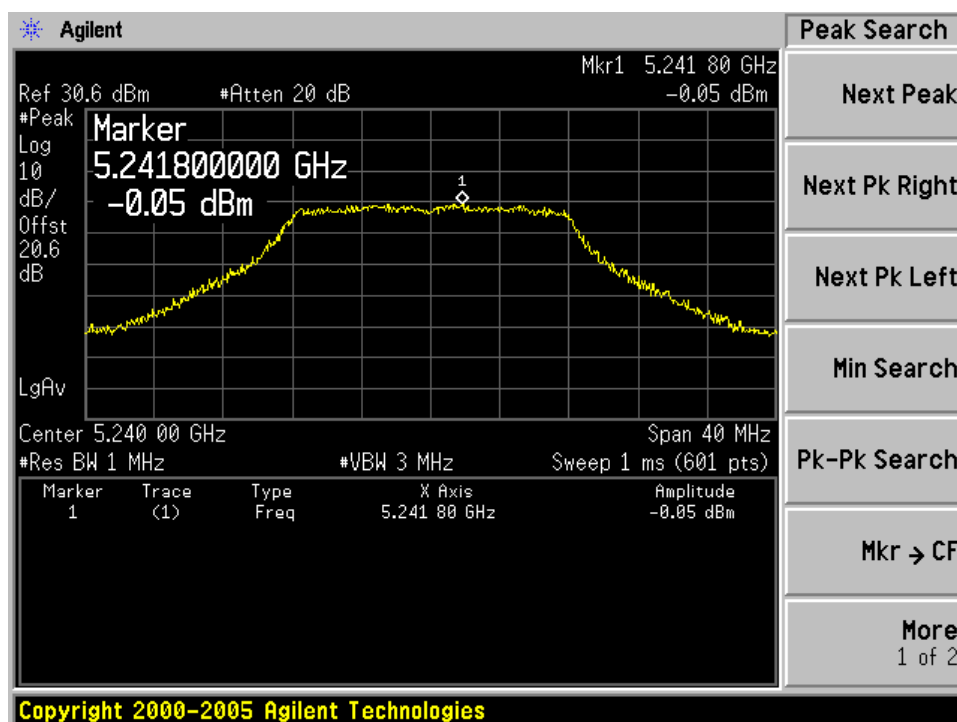
Chain0:



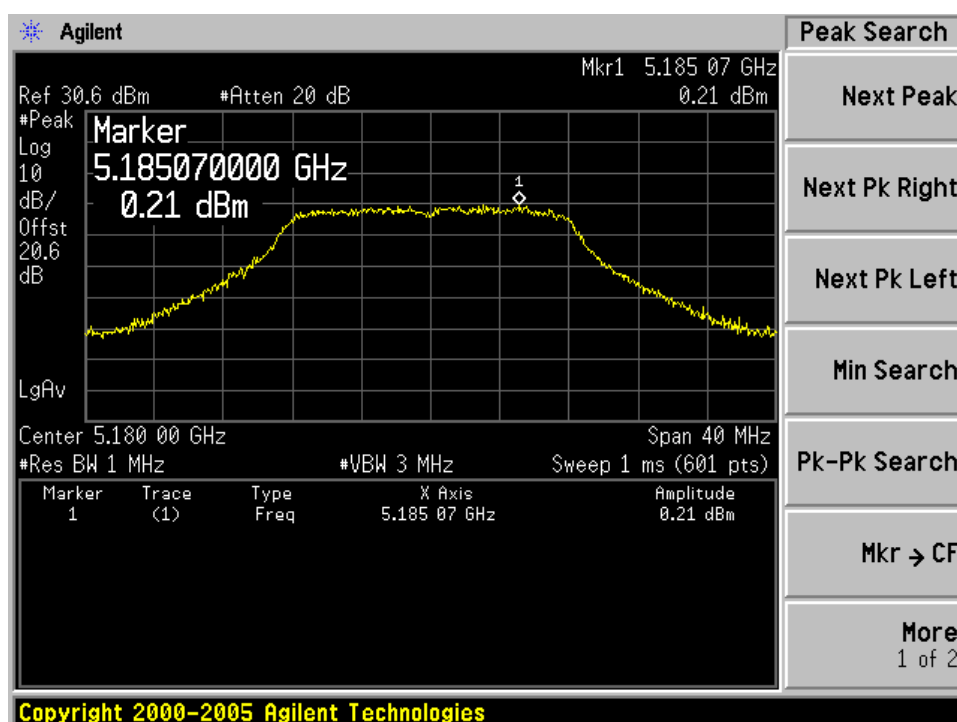


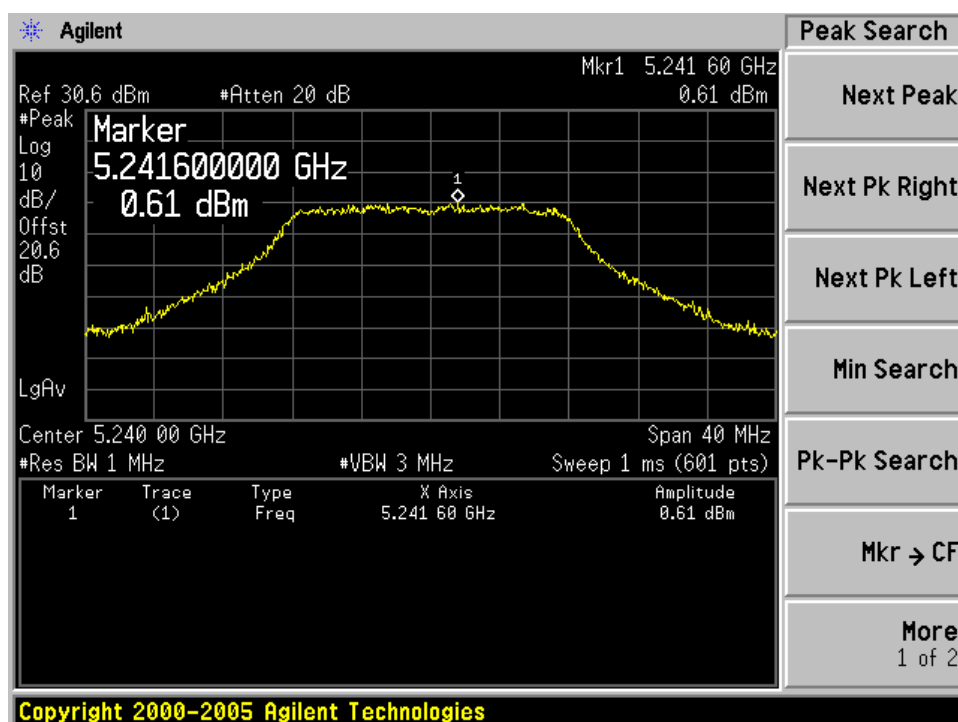
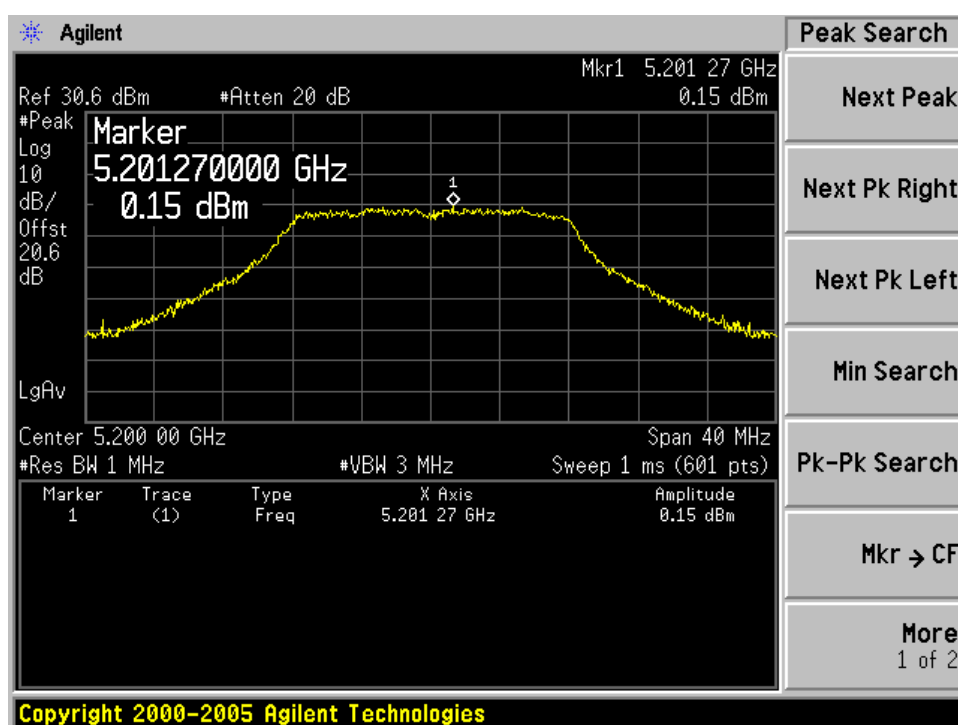
Chain1:





Chain1:



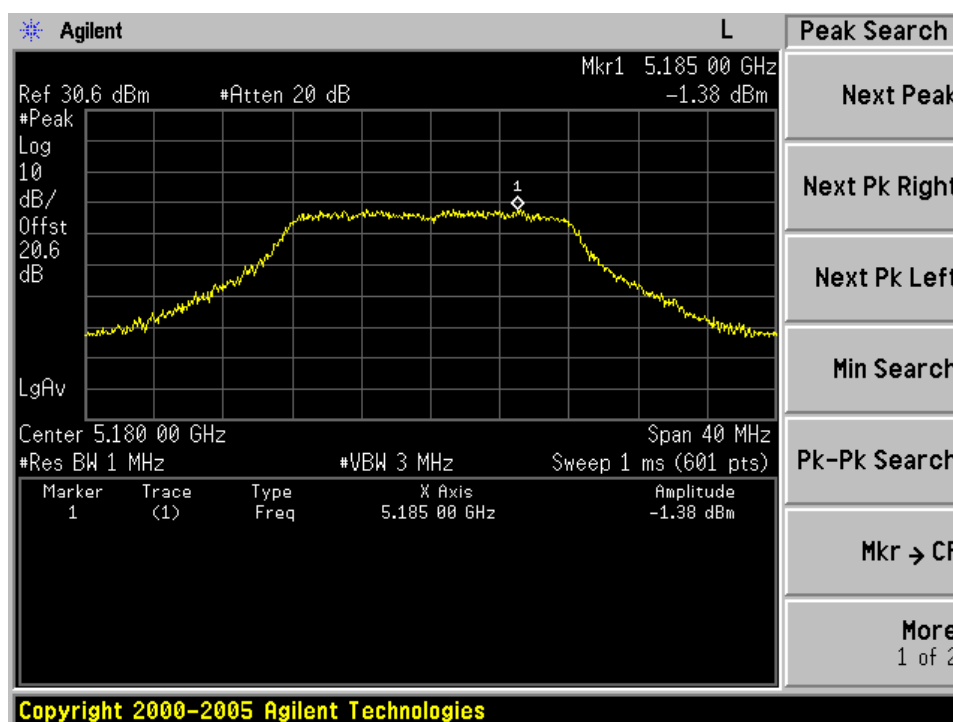


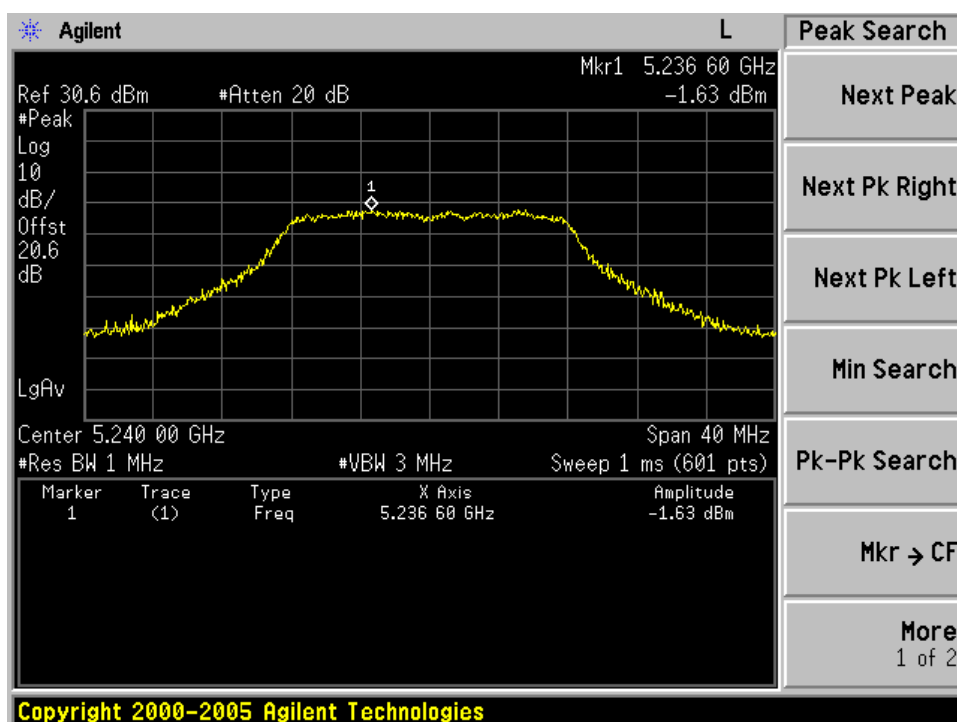
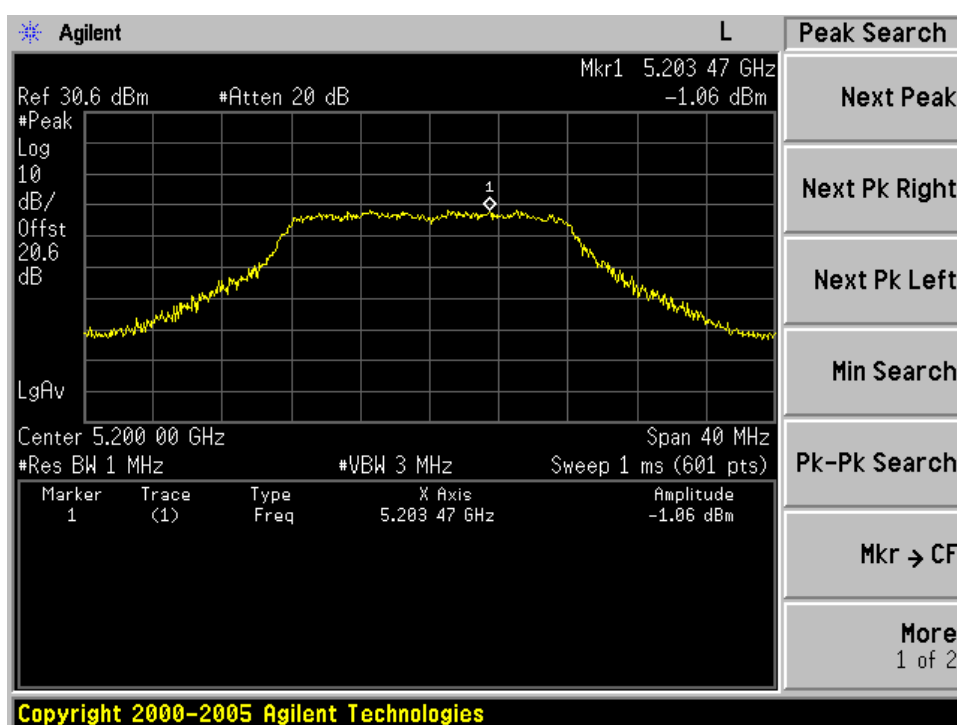
Power spectral density

IEEE 802.11n HT20 modulation (6.5Mbps) Test Result:

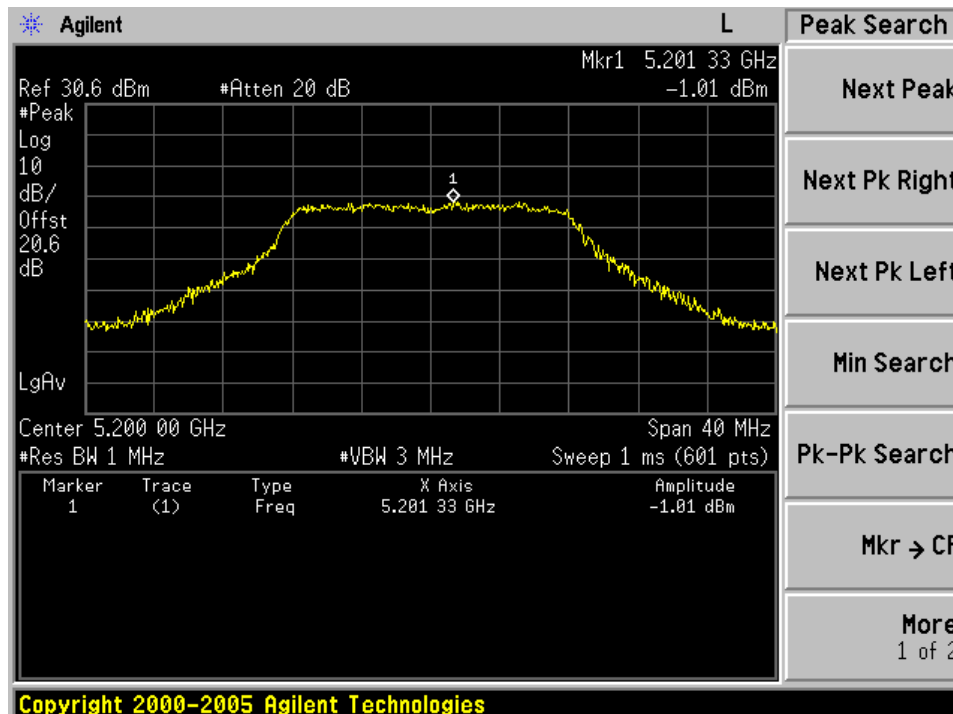
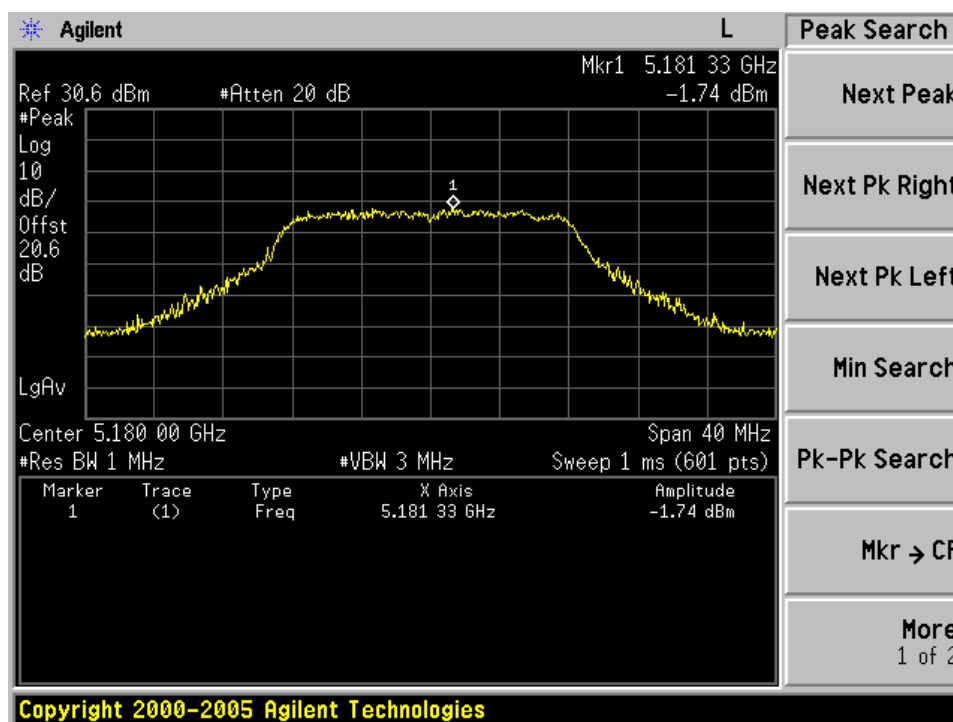
Channel	Channel Frequency (MHz)	Antenna Port	Power Spectral Density (dBm/MHz)	Total Power Spectral Density (dBm/MHz)	Part 15.407 Limit (dBm/MHz)	Result
Ch36	5180	Chain0	-1.38	3.38	4	Pass
Ch36	5180	Chain1	-1.74			
Ch36	5180	Chain2	-1.08			
Ch40	5200	Chain0	-1.06	3.55	4	Pass
Ch40	5200	Chain1	-1.01			
Ch40	5200	Chain2	-1.62			
Ch48	5240	Chain0	-1.63	3.23	4	Pass
Ch48	5240	Chain1	-1.67			
Ch48	5240	Chain2	-1.33			

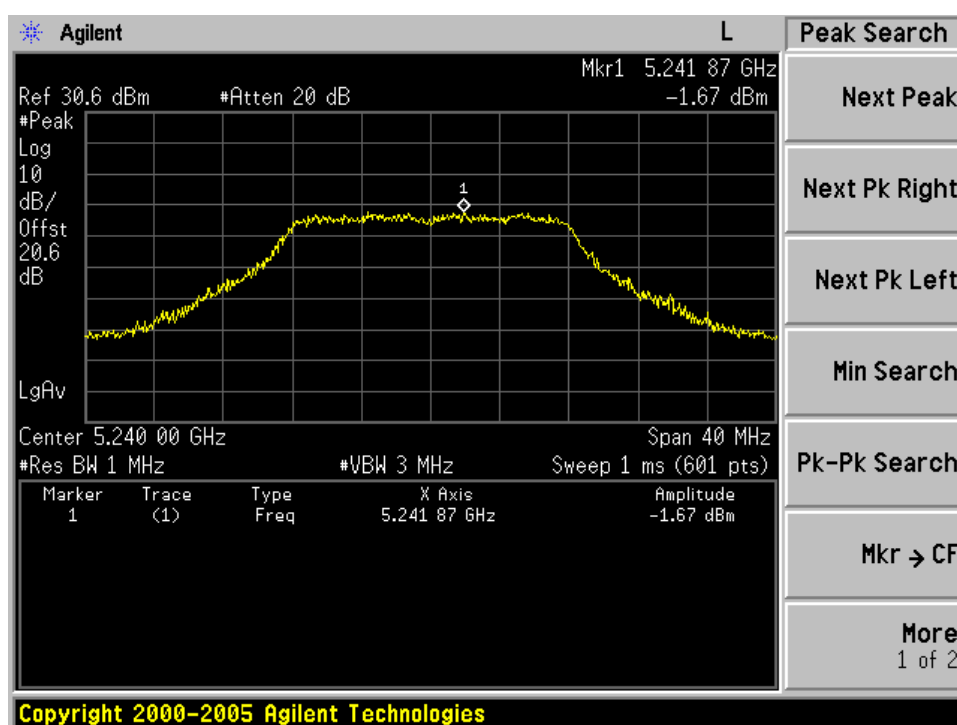
Chain0:



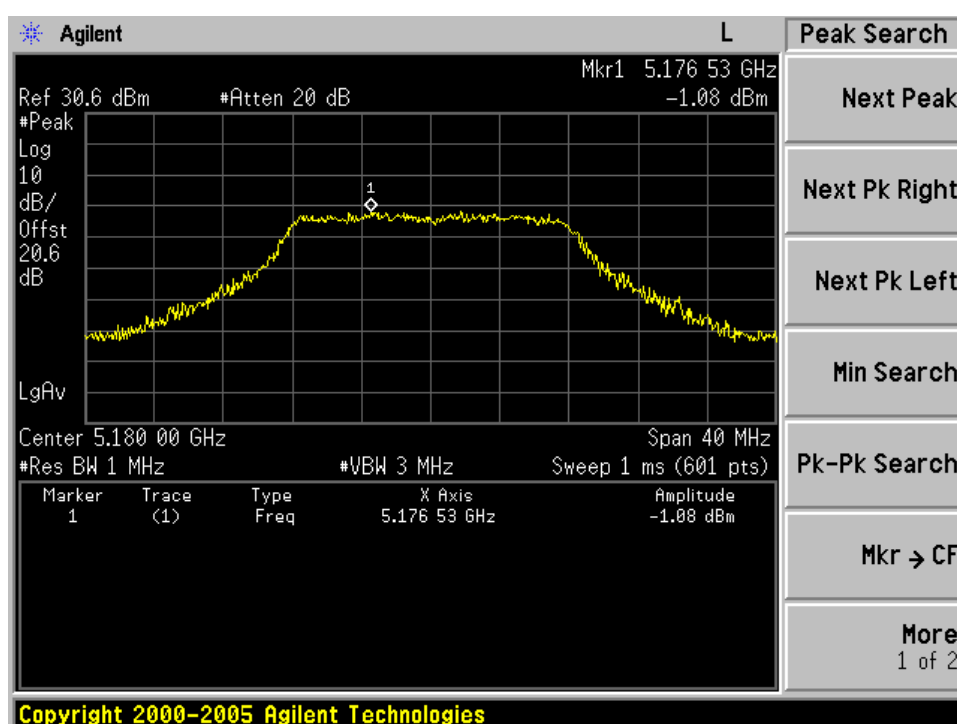


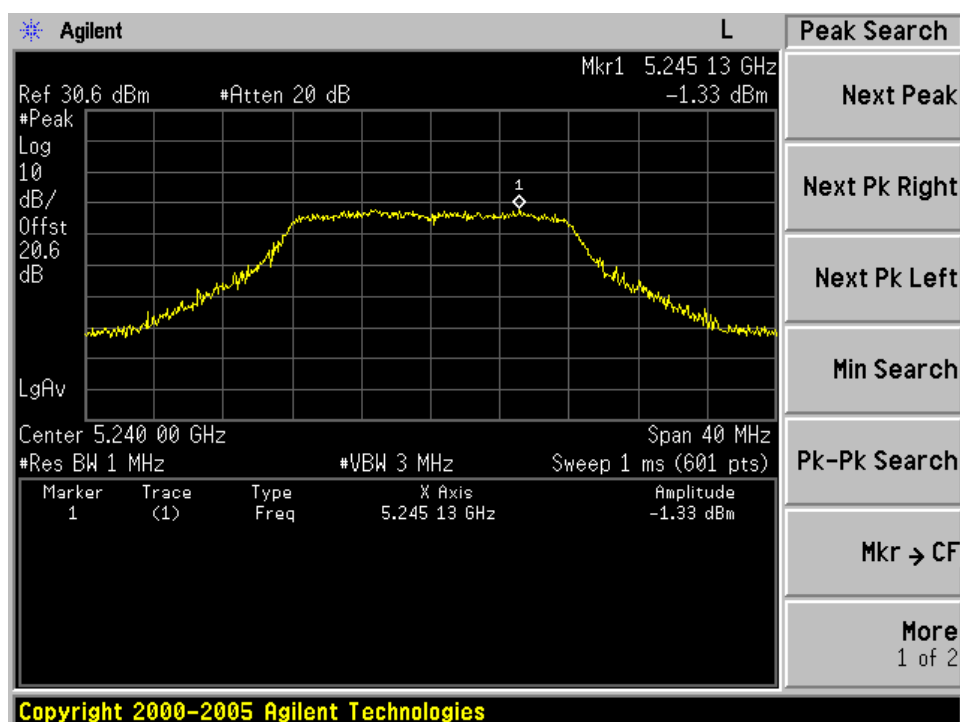
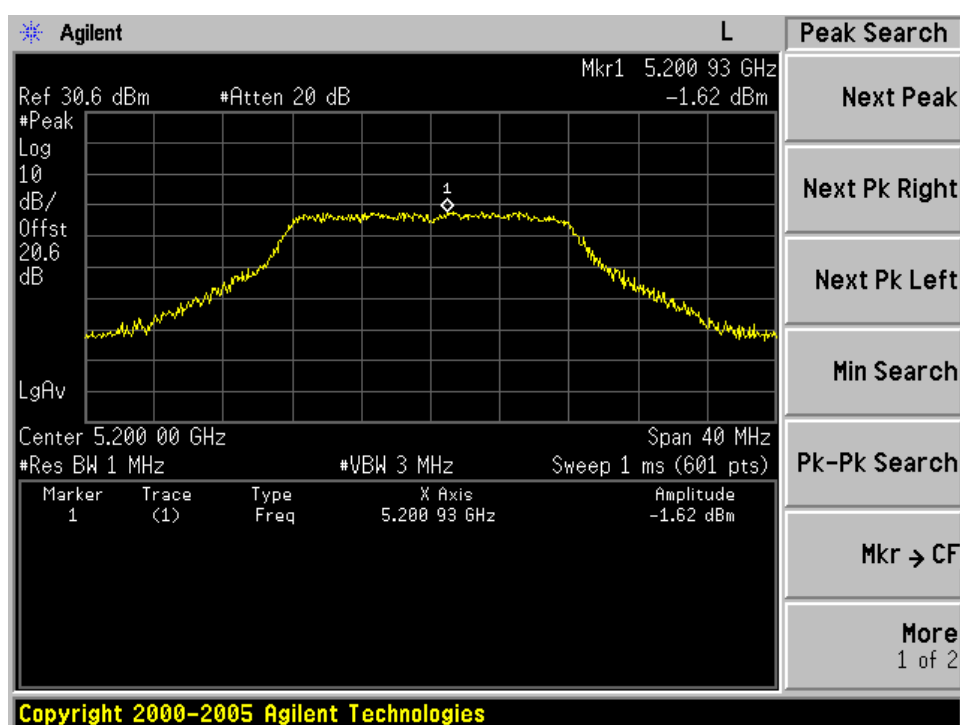
Chain1:





Chain2:



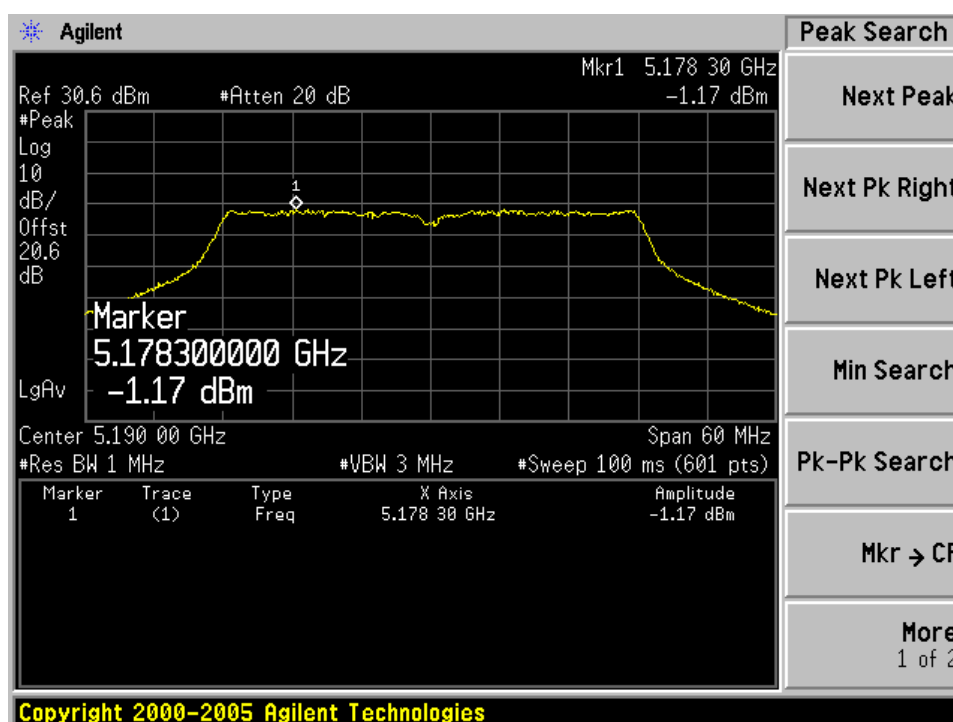


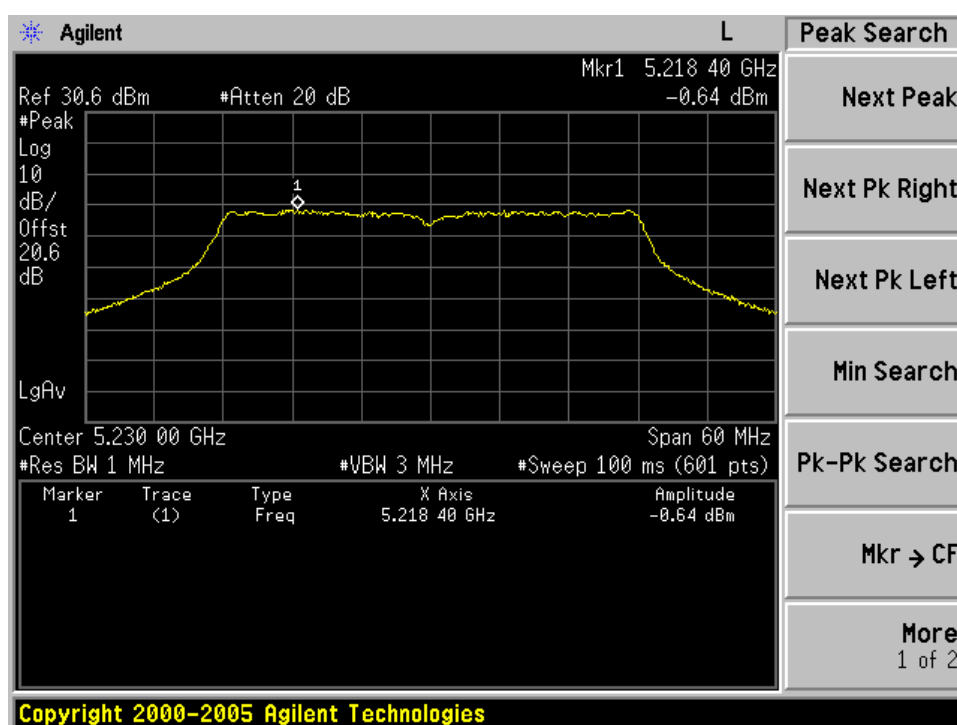
Power spectral density

IEEE 802.11n HT40 modulation (13.5Mbps) Test Result:

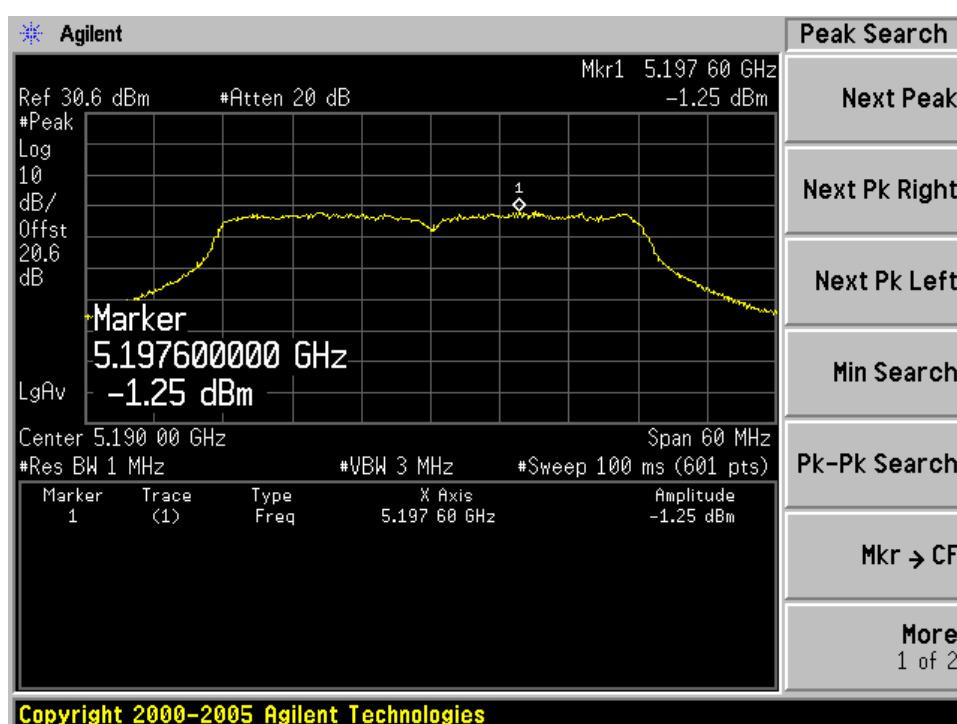
Channel	Channel Frequency (MHz)	Antenna Port	Power Spectral Density (dBm/MHz)	Total Power Spectral Density (dBm/MHz)	Part 15.407 Limit (dBm/MHz)	Result
Ch38	5190	Chain0	-1.17	3.4	4	Pass
Ch38	5190	Chain1	-1.25			
Ch38	5190	Chain2	-1.69			
Ch46	5230	Chain0	-0.64	3.8	4	Pass
Ch46	5230	Chain1	-1.21			
Ch46	5230	Chain2	-0.94			

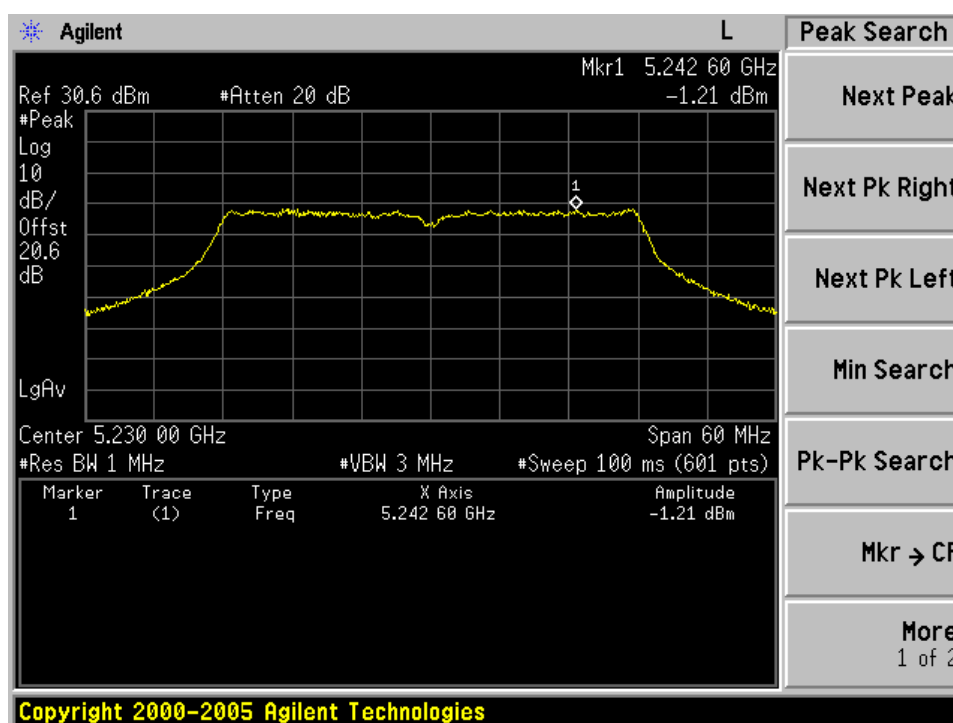
Chain0:



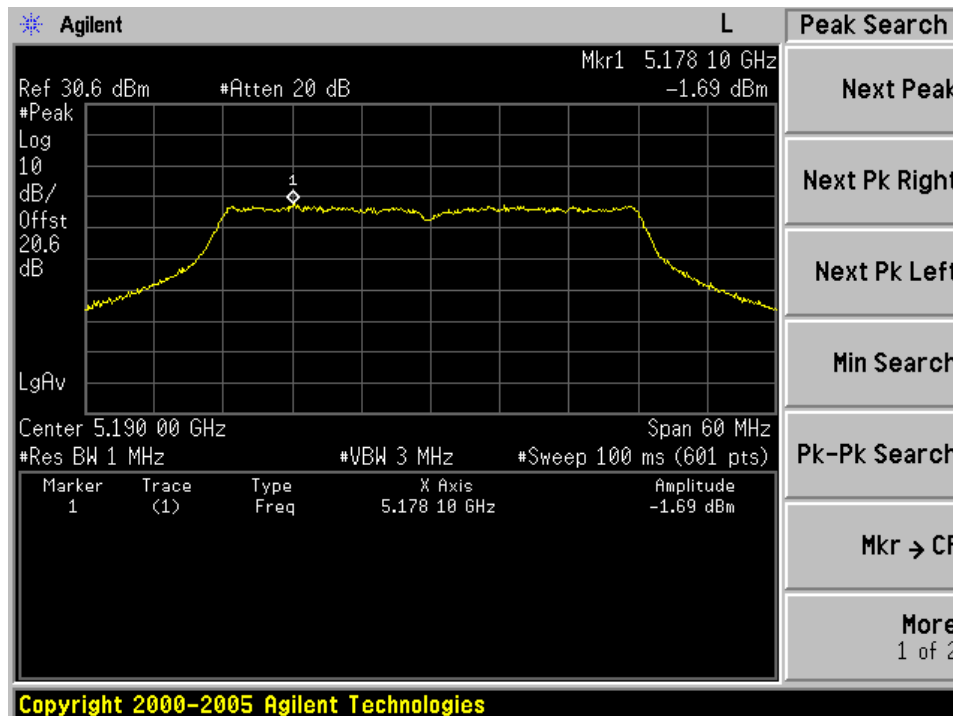


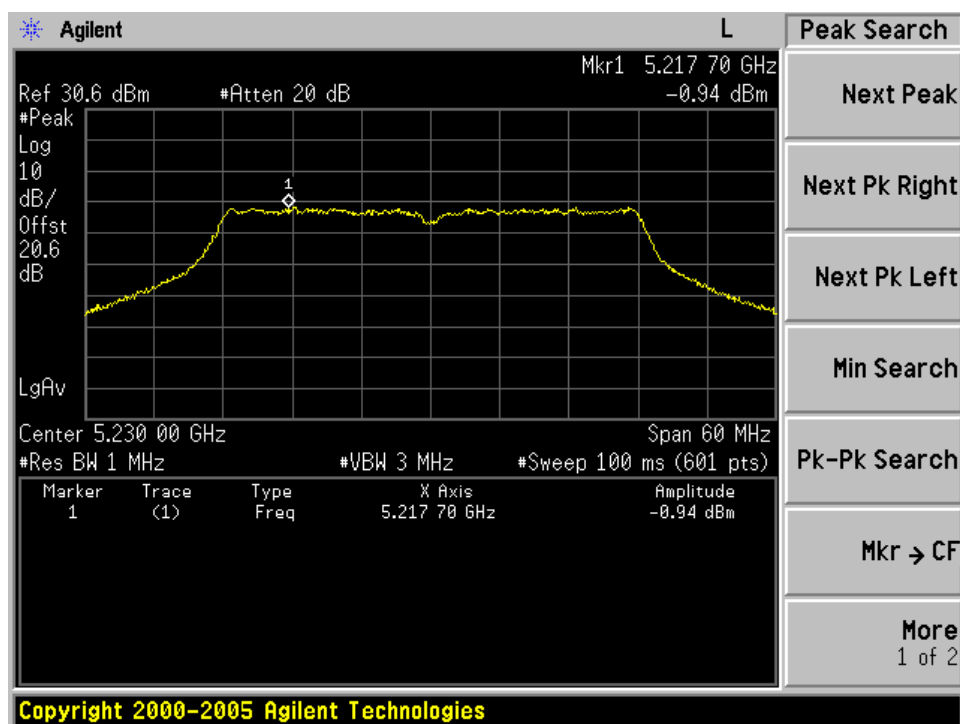
Chain1:





Chain2:







Product Service

Test Equipment

DESCRIPTION	MANUFACTURER	MODEL NO.	SERIAL NO.	CAL.DUE.DATE
Spectrum Analyzer	Agilent	E4407B	MY41440292	May 8, 2011

7.7 Peak Excursion

Test Method

- 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 span to view the entire emission bandwidth.
3. Set RBW = 1 MHz, VBW = 300 KHz with peak detector and max hold settings with trace A, then view for the average value for trace B, the delta from the peak value and average value should not exceed 13 dB across any 1 MHz bandwidth.

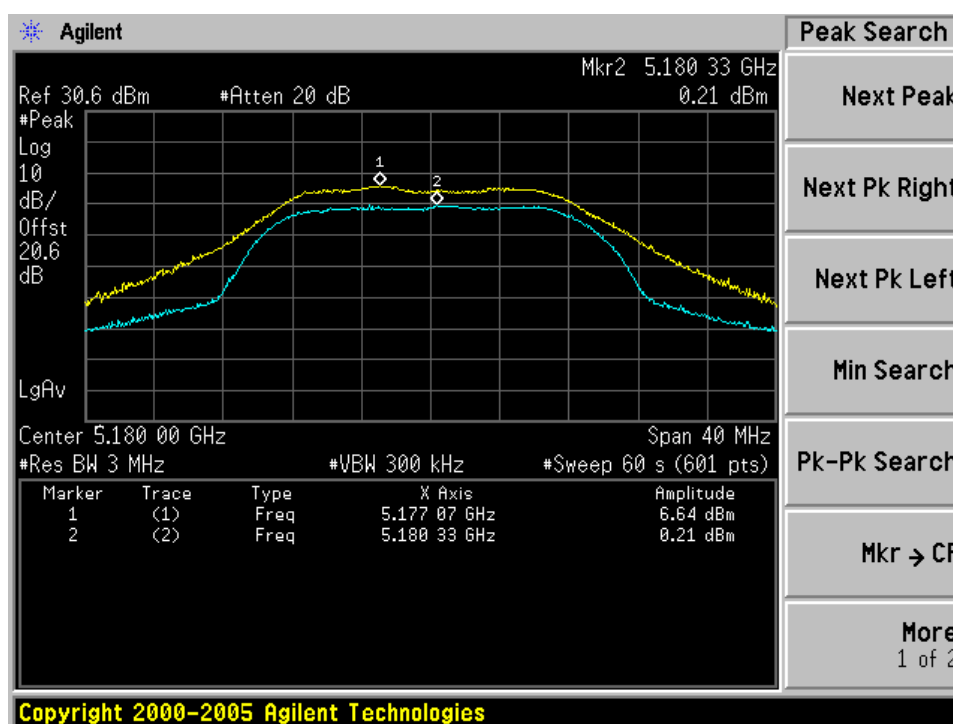
Limit: According to 15.407(a) (6) the ratio of the peak excursion of the modulation envelope (measured using a peak hold function) to the maximum conducted output power (measured as specified above) shall not exceed 13 dB across any 1 MHz bandwidth or the emission bandwidth whichever is less.

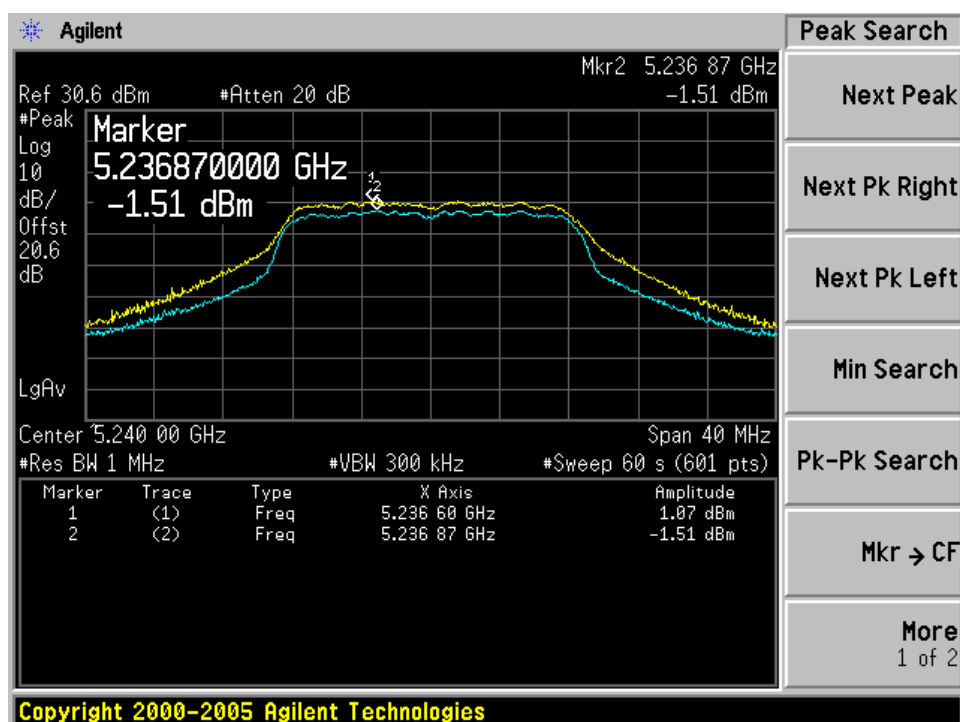
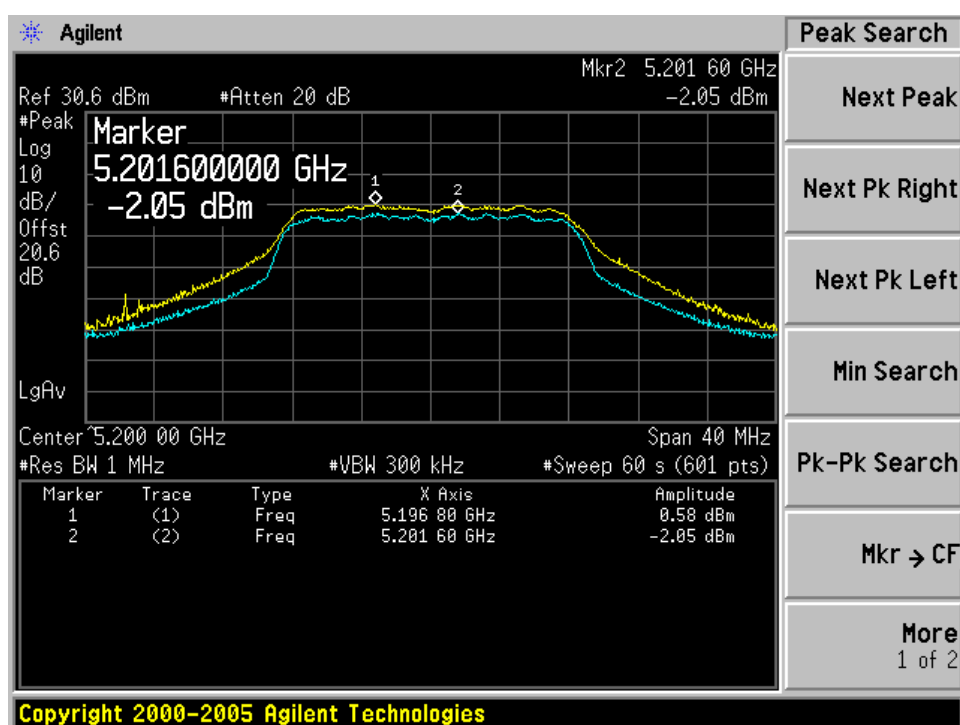
Peak Excursion

IEEE 802.11a modulation (6 Mbps) Test Result:

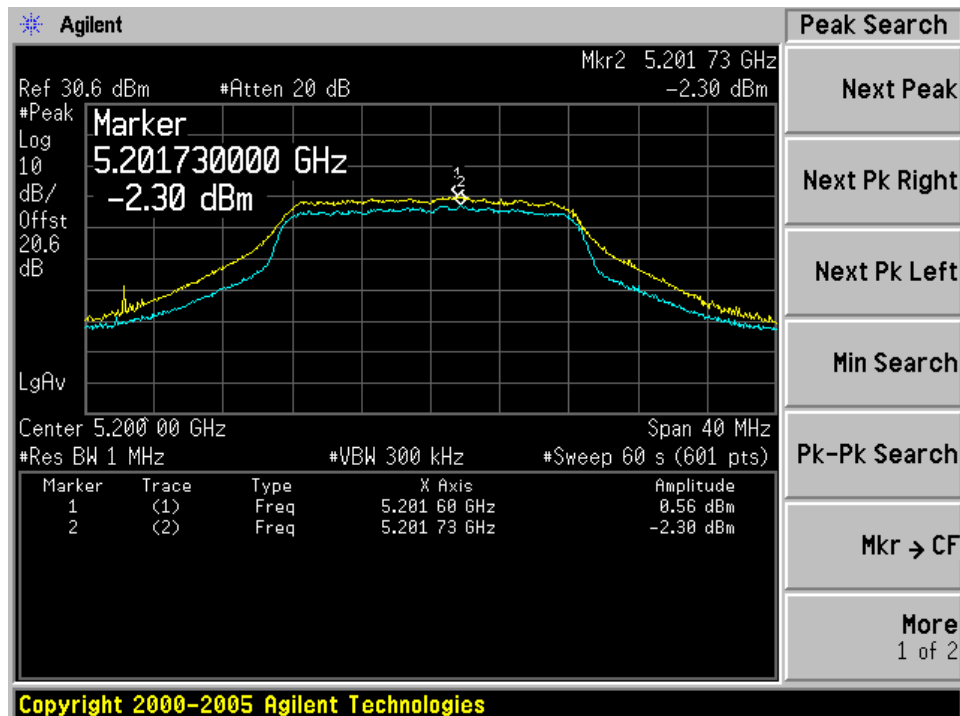
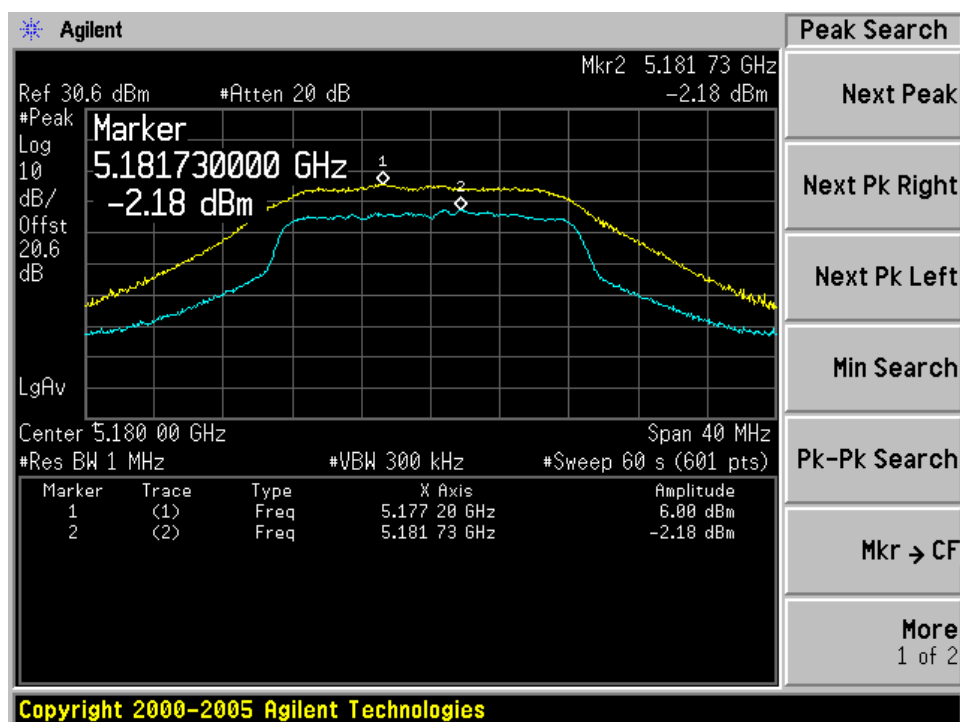
Channel	Channel Frequency (MHz)	Antenna Port	Measured (dB)	Part 15.407 Limit (dB)	Result
Ch36	5180	Chain0	6.43	13	Pass
Ch36	5180	Chain1	8.18	13	Pass
Ch36	5180	Chain2	3.21	13	Pass
Ch40	5200	Chain0	3.63	13	Pass
Ch40	5200	Chain1	2.86	13	Pass
Ch40	5200	Chain2	2.98	13	Pass
Ch48	5240	Chain0	2.58	13	Pass
Ch48	5240	Chain1	2.85	13	Pass
Ch48	5240	Chain2	2.96	13	Pass

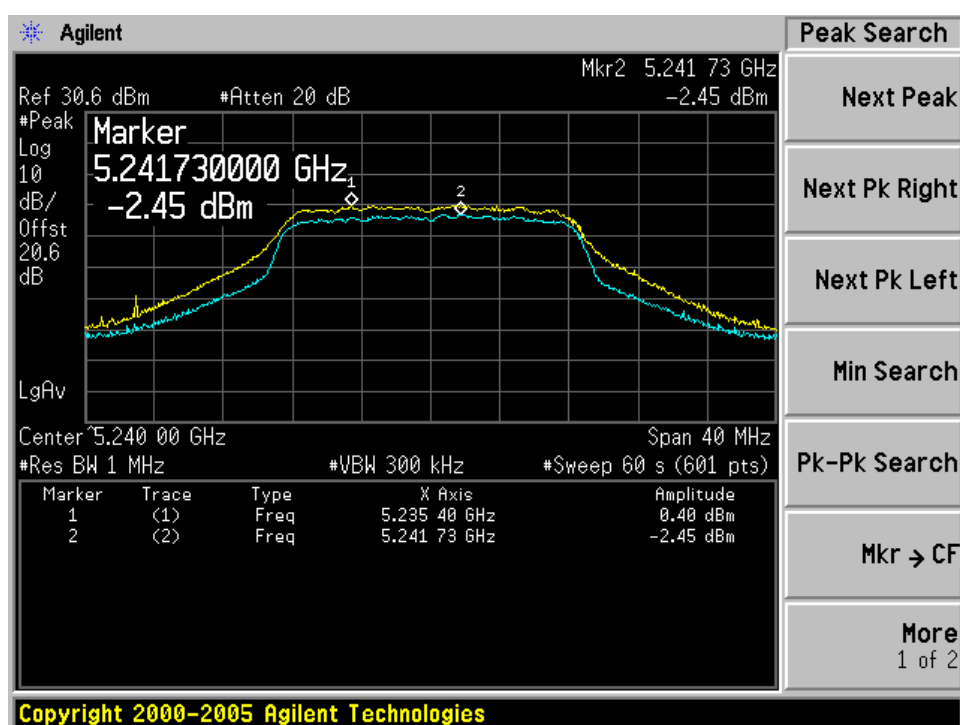
Chain0:



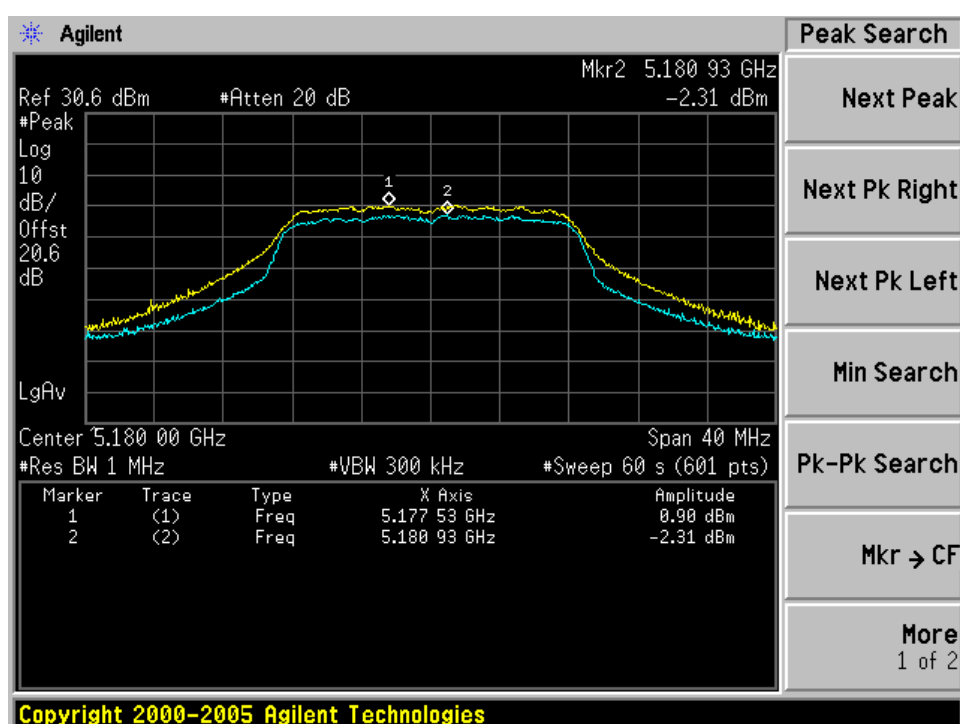


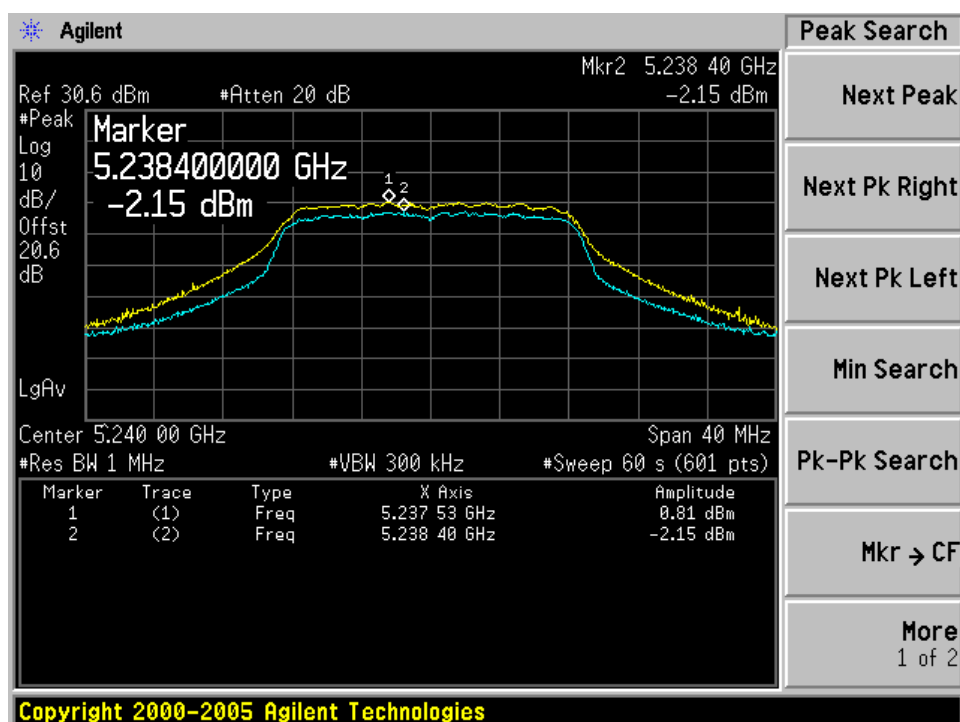
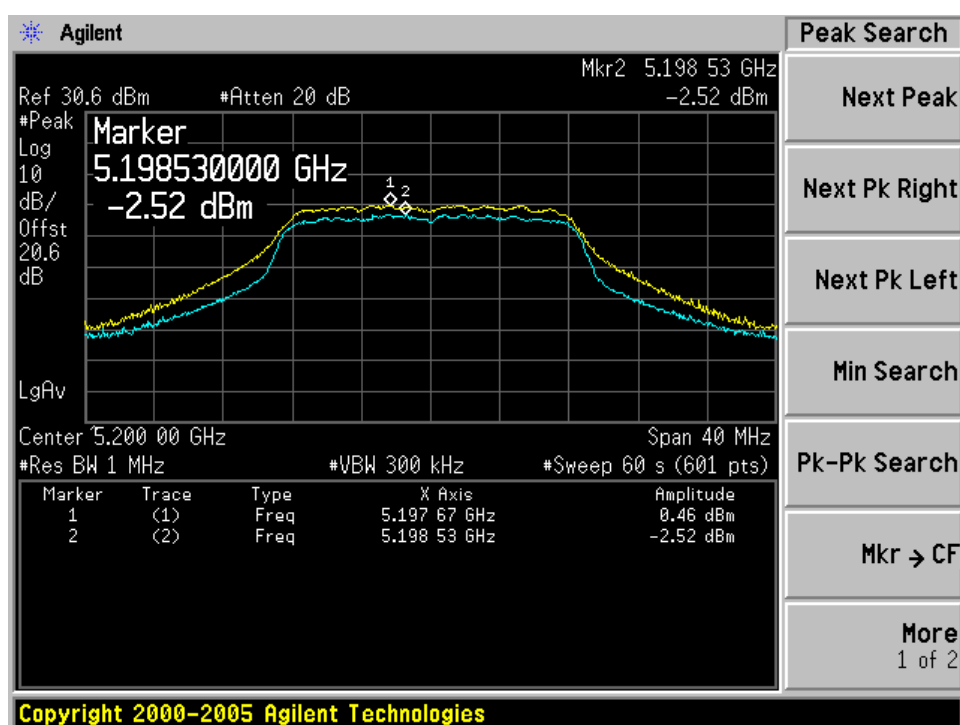
Chain1:





Chain2:



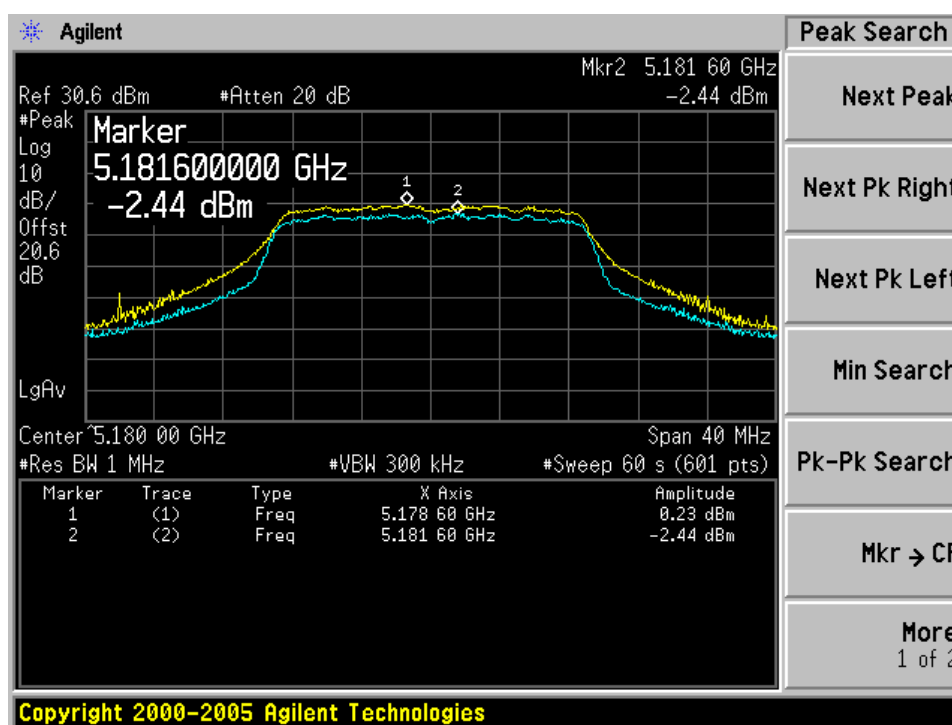


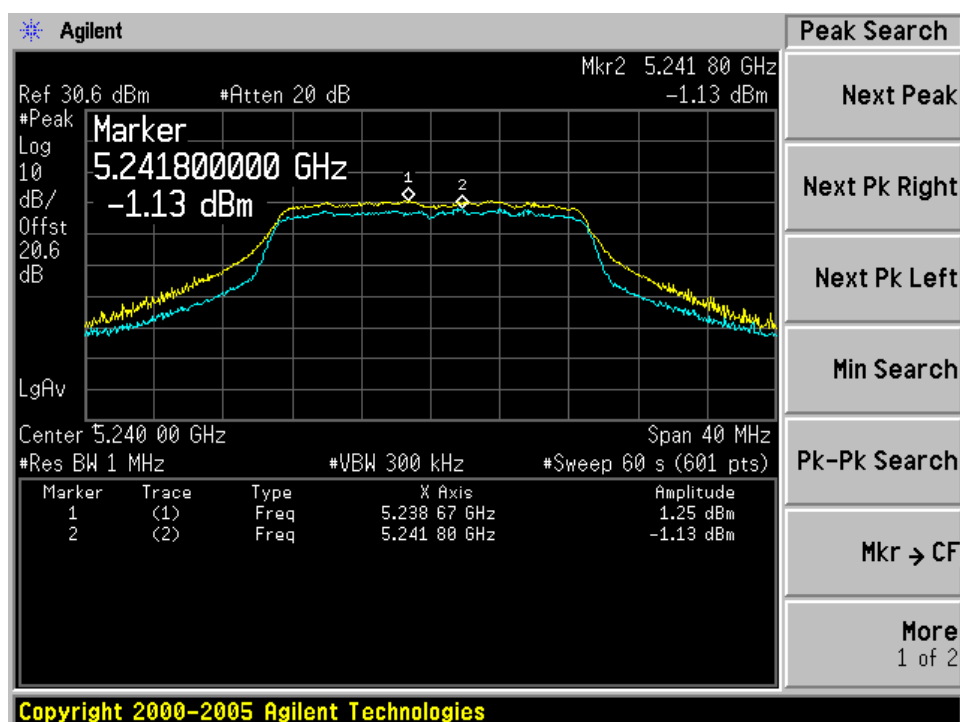
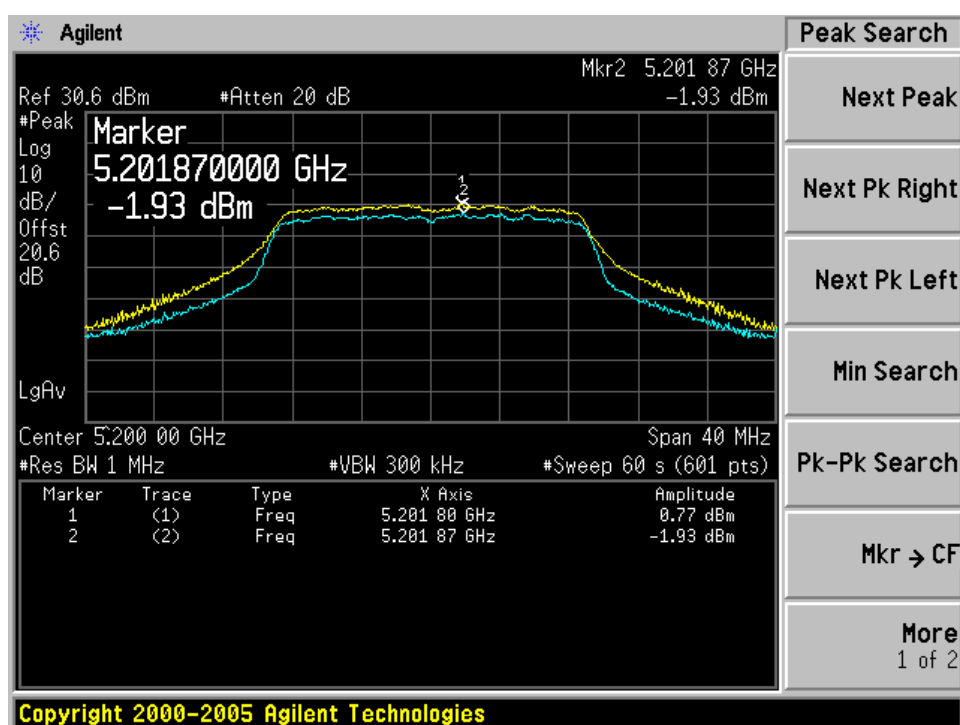
Peak Excursion

IEEE 802.11a modulation (6.5 Mbps) Test Result

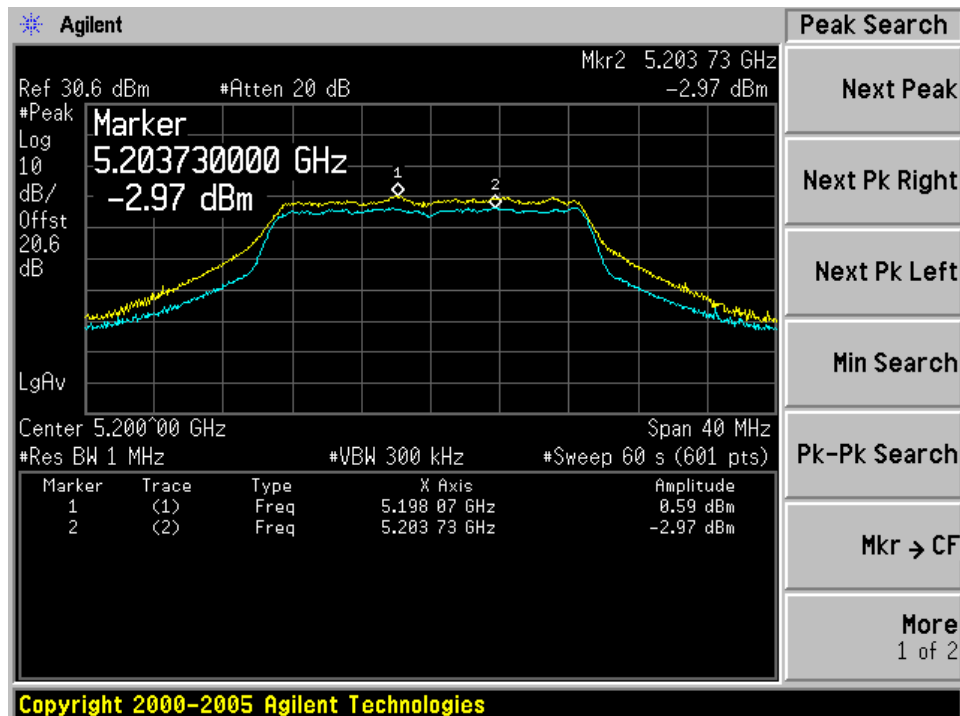
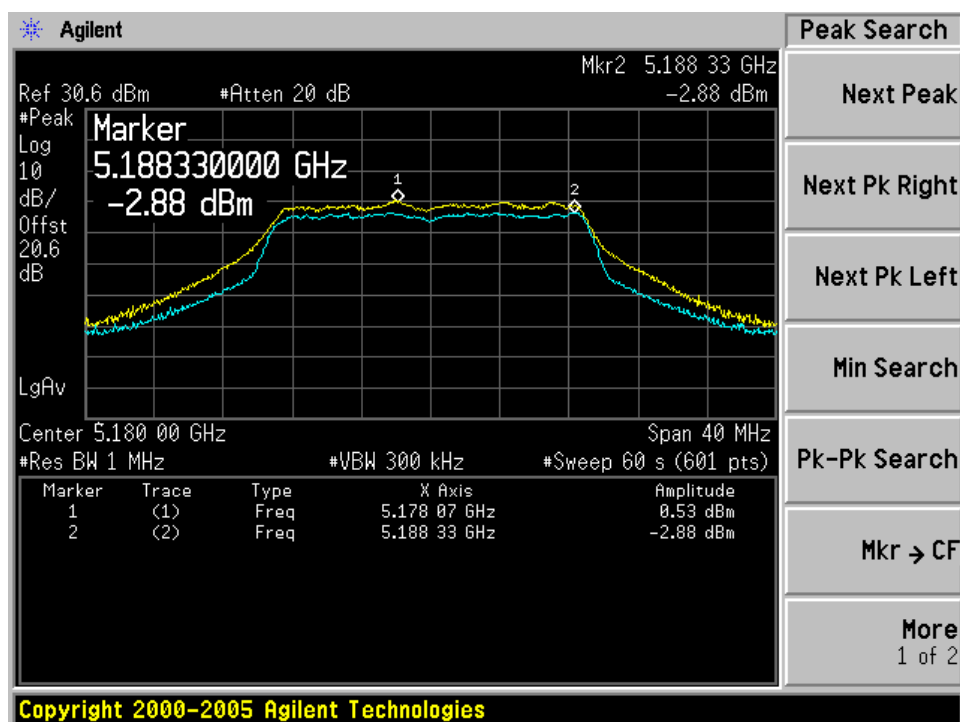
Channel	Channel Frequency (MHz)	Antenna Port	Measured (dB)	Part 15.407 Limit (dB)	Result
Ch36	5180	Chain0	2.67	13	Pass
Ch36	5180	Chain1	3.41	13	Pass
Ch36	5180	Chain2	2.95	13	Pass
Ch40	5200	Chain0	2.60	13	Pass
Ch40	5200	Chain1	3.56	13	Pass
Ch40	5200	Chain2	3.37	13	Pass
Ch48	5240	Chain0	2.38	13	Pass
Ch48	5240	Chain1	4.02	13	Pass
Ch48	5240	Chain2	3.62	13	Pass

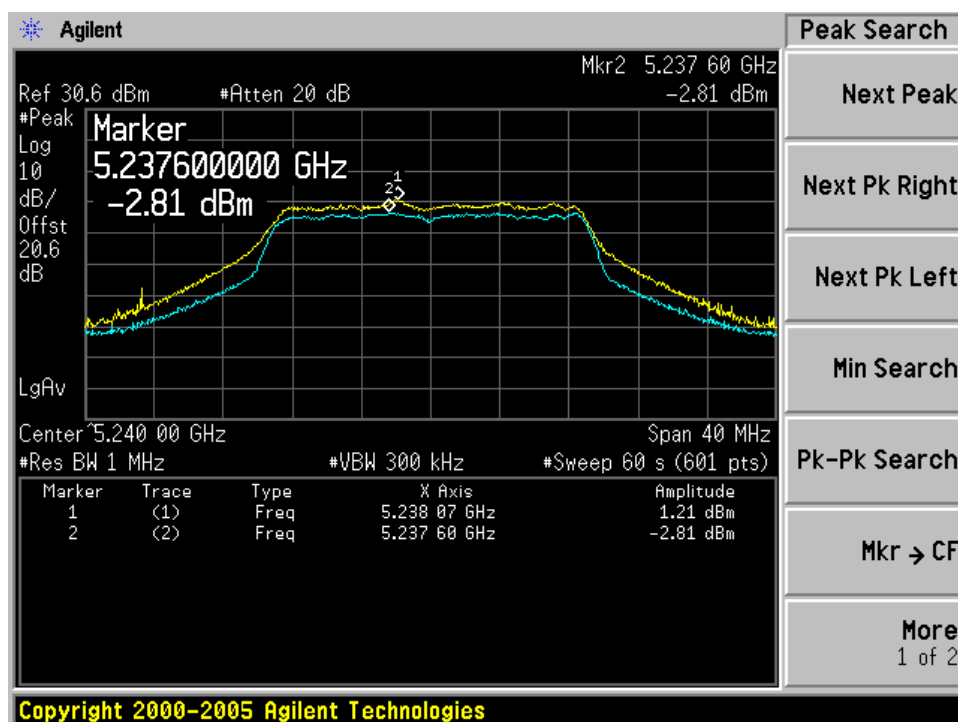
Chain1:



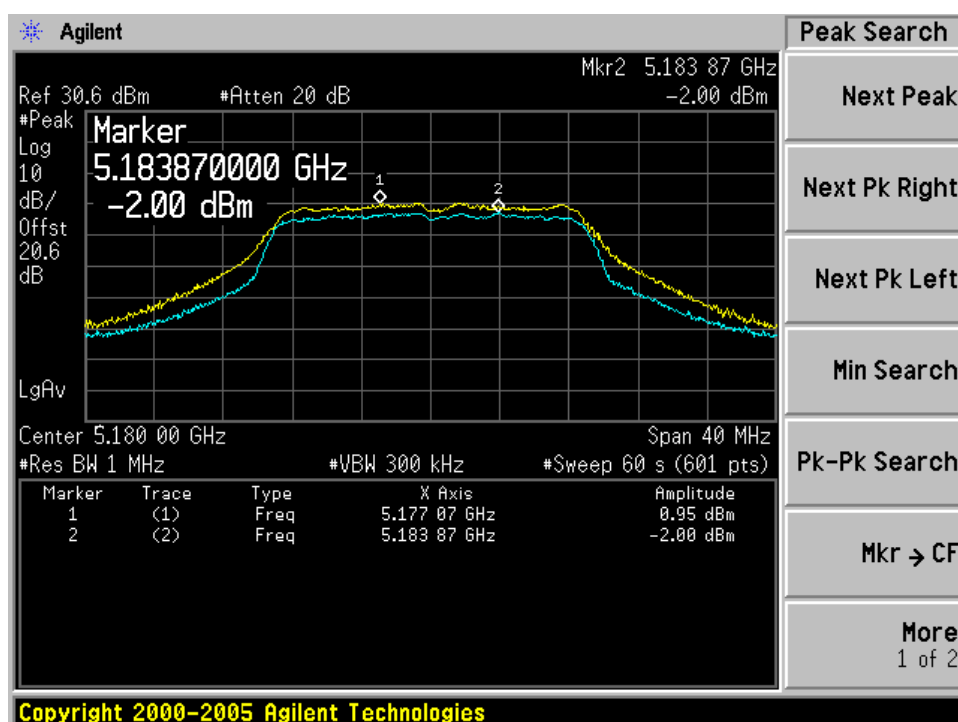


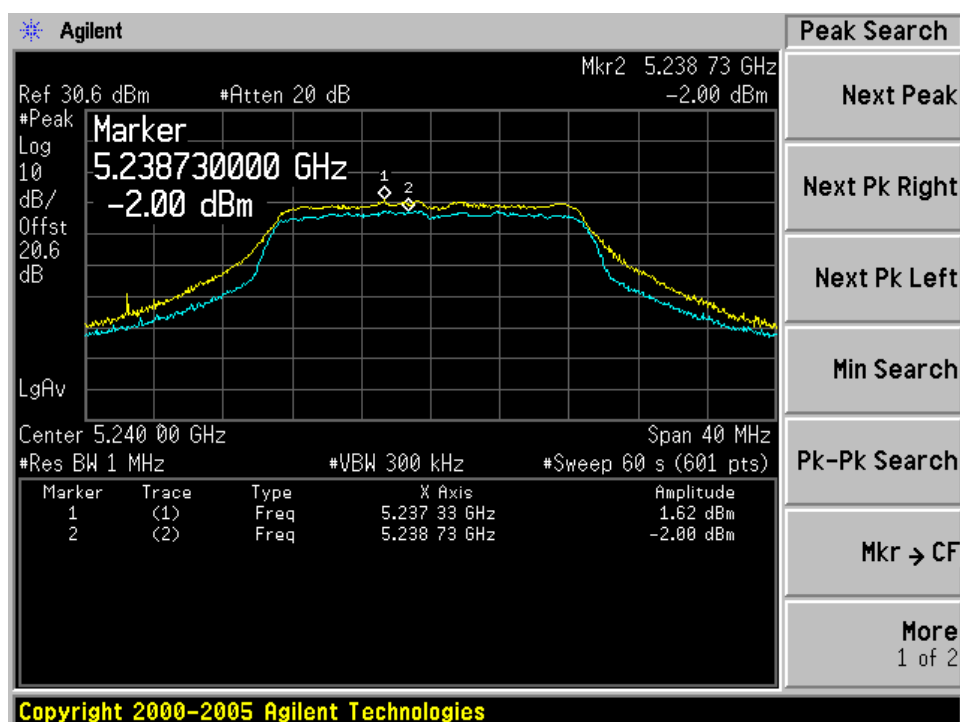
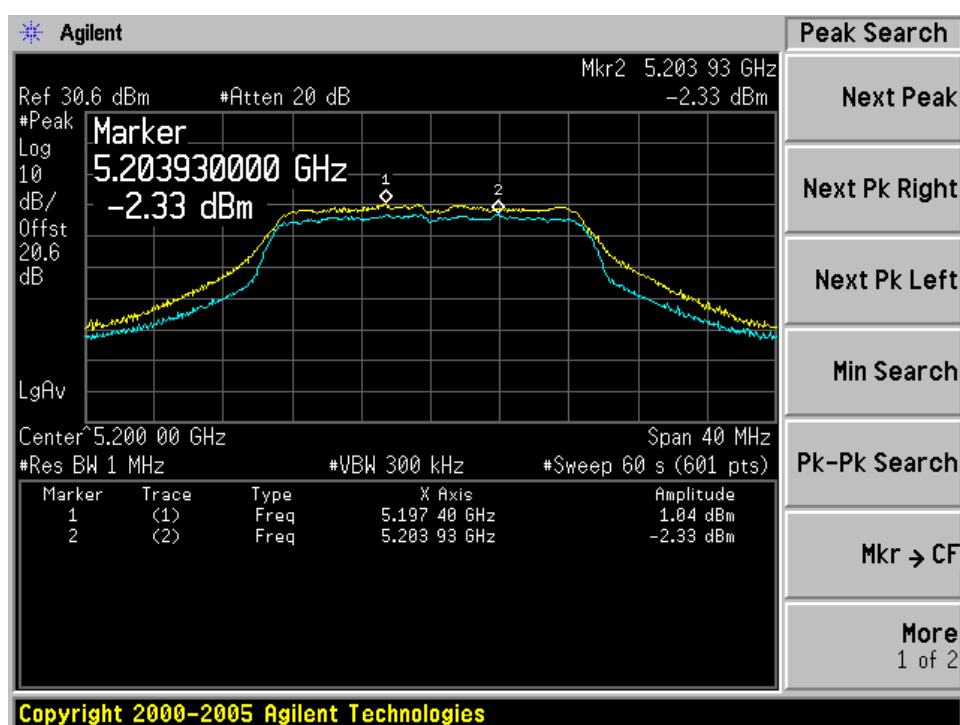
Chain1:





Chain2:



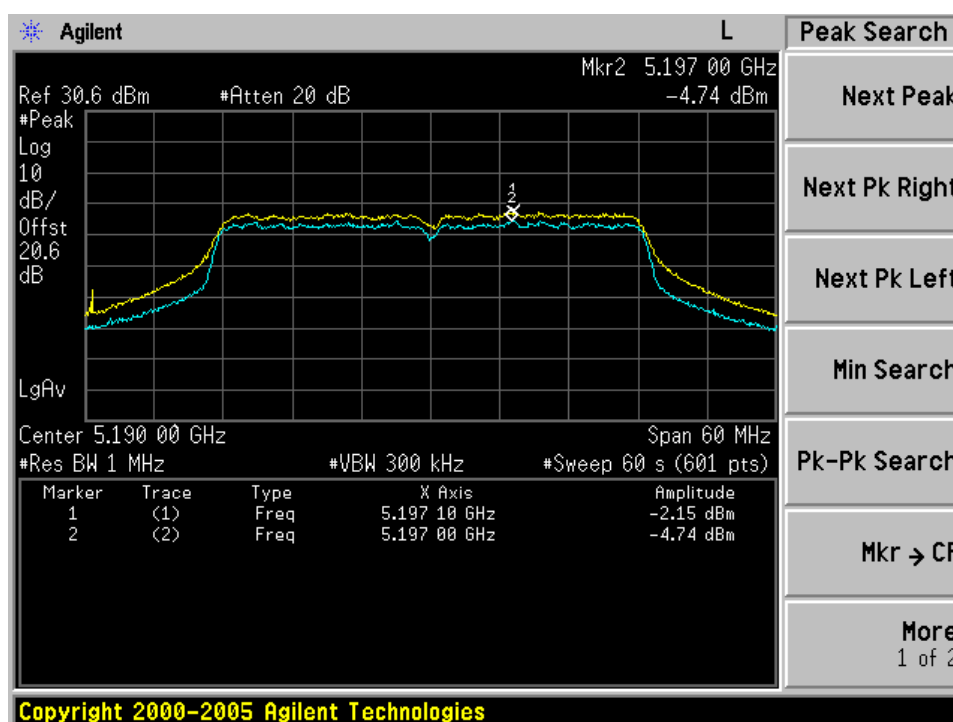


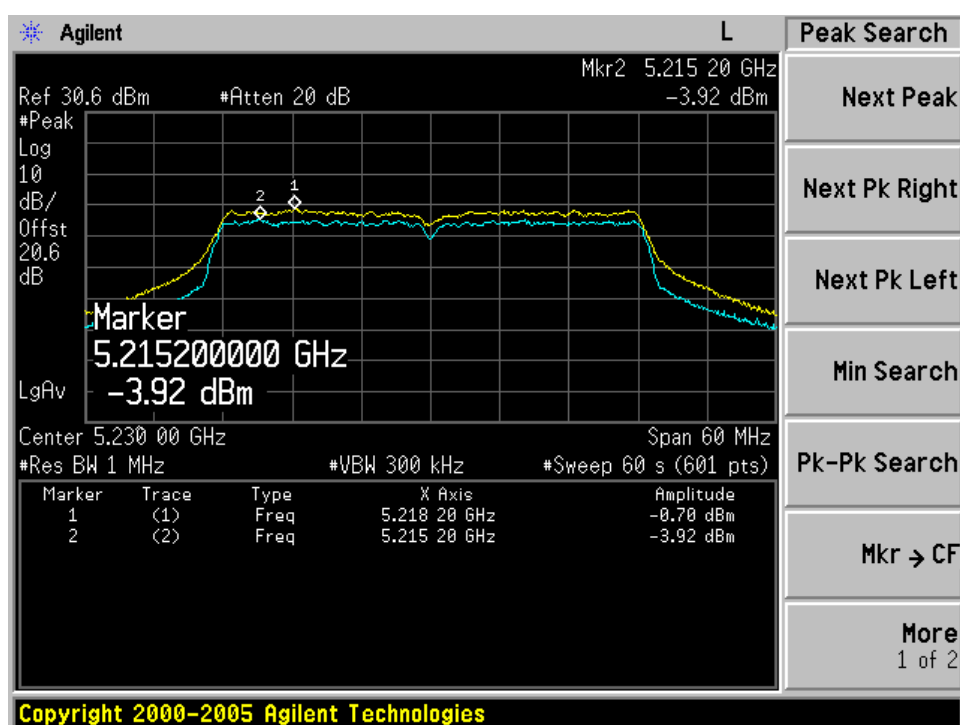
Peak Excursion

IEEE 802.11n HT40 modulation (13.5Mbps) Test Result

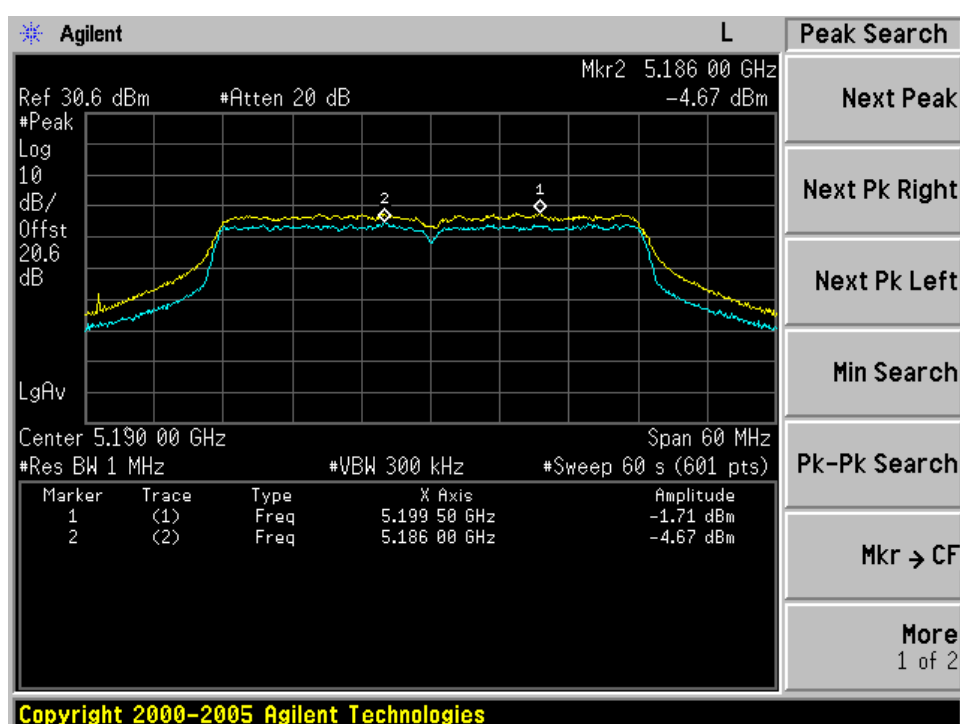
Channel	Channel Frequency (MHz)	Antenna Port	Measured (dB)	Part 15.407 Limit (dB)	Result
Ch38	5190	Chain0	2.59	13	Pass
Ch38	5190	Chain1	3.05	13	Pass
Ch38	5190	Chain2	3.59	13	Pass
Ch46	5230	Chain0	3.22	13	Pass
Ch46	5230	Chain1	3.15	13	Pass
Ch46	5230	Chain2	2.98	13	Pass

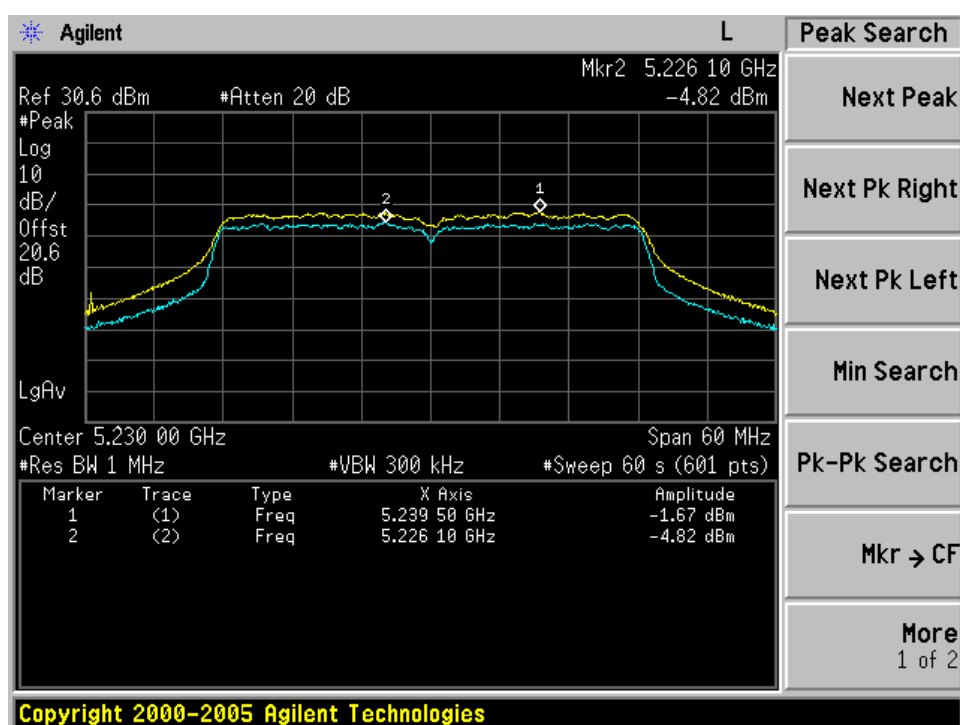
Chain0:



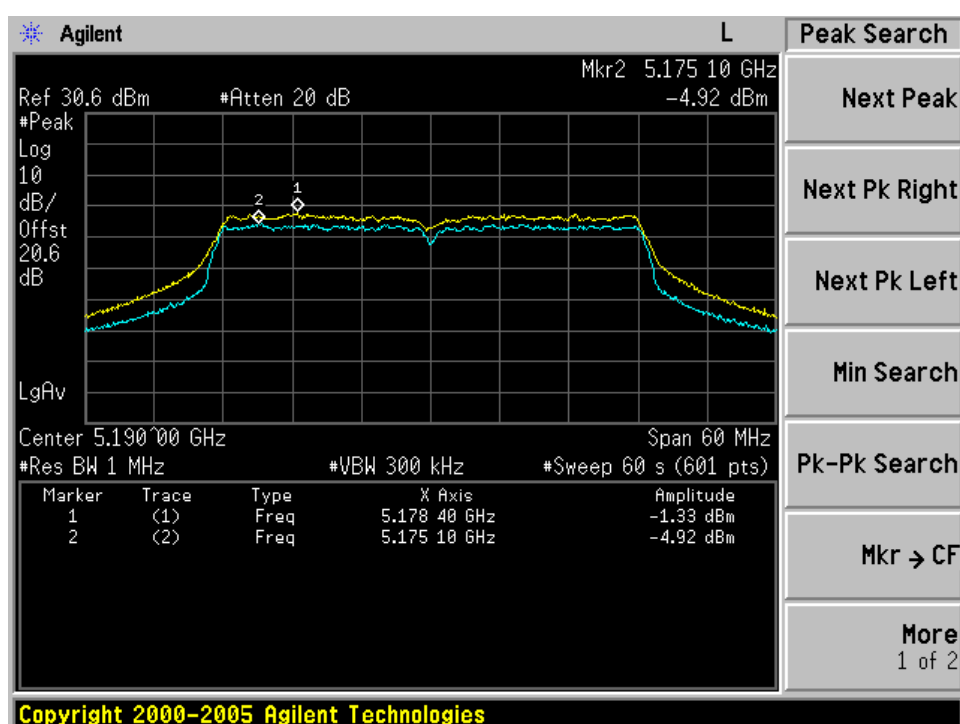


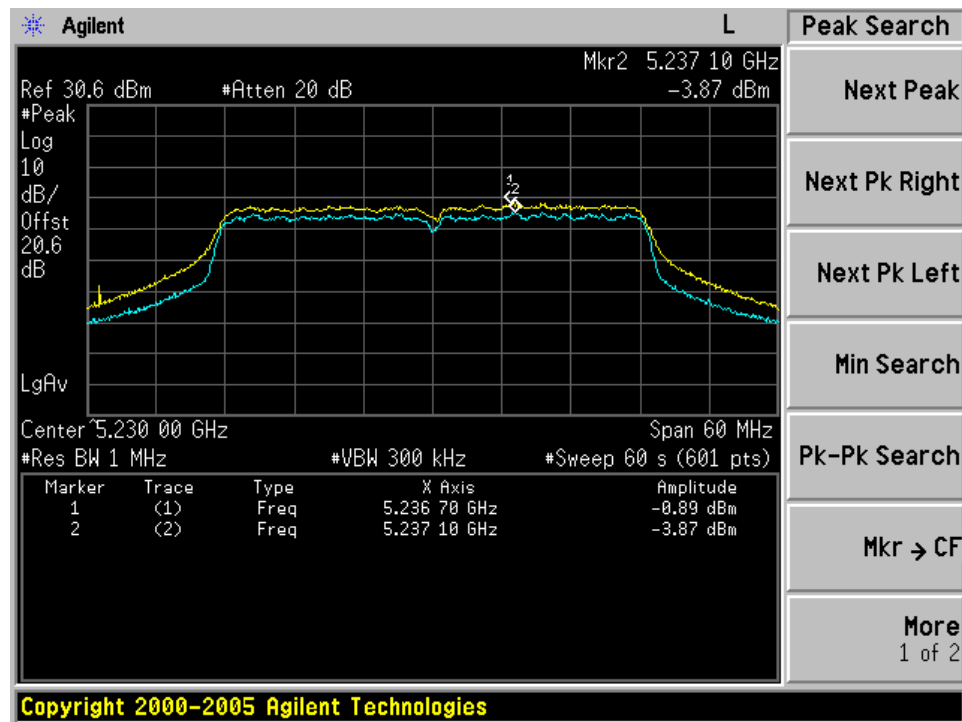
Chain1:





Chain2:





8 System Measurement Uncertainty

For a 95% confidence level, the measurement expanded uncertainties for defined systems, in accordance with the recommendations of ISO 17025 were:

System Measurement Uncertainty

Items		Extended Uncertainty
RE	Field strength (dB μ V/m)	U=4.32dB (30MHz-40GHz)
CE	Disturbance Voltage (dB μ V)	U=2.4dB