

RF TEST REPORT

Test item : Cellular/PCS GSM/GPRS/EDGE Phone with Bluetooth, WLAN and NFC
Model No. : LG-E974, E974, LGE974
Order No. : DEMC1208-01562
Date of receipt : 2012-08-22
Test duration : 2012-09-03 ~ 2012-09-17
Date of issue : 2012-10-02
Use of report : Original Grant

Applicant : LG Electronics MobileComm U.S.A., Inc.
1000 Sylvan Avenue, Englewood Cliffs NJ 07632

Test laboratory : Digital EMC Co., Ltd.
683-3, Yubang-Dong, Cheoin-Gu, Yongin-Si, Kyunggi-Do, 449-080, Korea

Test specification : FCC Part 15.407 Subpart E
ANSI C63.4-2003, KDB 789033

Test environment : See appended test report

Test result : Pass Fail

The test results presented in this test report are limited only to the sample supplied by applicant and the use of this test report is inhibited other than its purpose. This test report shall not be reproduced except in full, without the written approval of Digital EMC Co., Ltd.

Tested by:

Witnessed by:

Reviewed by:



Engineer
J.J.LEE

N/A



Technical Director
Harvey sung

CONTENTS

1. EUT information 3

 1.1 EUT description 3

 1.2 Ancillary equipment 3

2. Information about test items 4

 2.1 Test mode / Channel Information 4

 2.2 Tested Channel Information 4

 2.3 Auxiliary equipment 4

 2.4 Tested environment 5

 2.5 EMI Suppression Device(s)/Modifications 5

3. Test Report 6

 3.1 Summary of tests 6

 3.2 Transmitter requirements 7

 3.2.1 26 dB Bandwidth 7

 3.2.2 Output Power 24

 3.2.3 Peak Power Spectral Density 42

 3.2.4 Peak Excursion Ratio 60

 3.2.5 Frequency Stability 77

 3.2.6 Radiated Spurious Emission Measurements 80

 3.2.7 AC Conducted Emissions 92

 3.2.8 Antenna Requirements 99

 3.2.9 Occupied Bandwidth 100

4. LIST OF TEST EQUIPMENT 101

APPENDIX I 102

APPENDIX II 103

1. EUT information

1.1 EUT description

FCC Equipment Class	Unlicensed National Information Infrastructure (UNII)
Product	Cellular/PCS GSM/GPRS/EDGE Phone with Bluetooth, WLAN and NFC
Model Name	LG-E974
Add Model Name	E974, LGE974
Equipment serial no.	Identical prototype
Frequency Range	802.11a/n(20MHz) : Band I: 5180 ~ 5240MHz Band II: 5260 ~ 5320MHz Band III: 5500 ~ 5700MHz
	802.11n(40MHz) : Band I: 5190 ~ 5230MHz Band II: 5270 ~ 5310MHz Band III: 5510 ~ 5670MHz
Channels	802.11a/n(20MHz): 4 (Band I) / 4 (Band II) / 8 (Band III) 802.11n(40MHz): 2 (Band I) / 2 (Band II) / 3 (Band III)
Modulation type	802.11a/n : OFDM
Data rate	802.11a/g: 6, 9, 12, 18, 24, 36, 48, 54 Mbps 802.11n(20MHz): 6.5, 7.2, 13, 14.4, 19.5, 21.7, 26, 28.9, 39, 43.3, 52, 57.8, 58.5, 65, 72.2 Mbps 802.11n(40MHz): 13.5, 15, 27, 30, 40.5, 45, 54, 60, 81, 90, 108, 120, 121.5, 135, 150 Mbps
Antenna Specification	Internal Antenna (1TX / 1RX) / Max. peak gain: -1.19 dBi
Power Supply	DC 3.8 V

1.2 Ancillary equipment

Equipment	Model No.	Serial No.	Manufacturer	Note
-	-	-	-	-
-	-	-	-	-

2. Information about test items

2.1 Test mode / Channel Information

5GHz Band	Mode	Data Rate
Band I	802.11a	6Mbps
	802.11n(20MHz)	MCS0
	802.11n(40MHz)	MCS0
Band II	802.11a	6Mbps
	802.11n(20MHz)	MCS0
	802.11n(40MHz)	MCS0
Band III	802.11a	6Mbps
	802.11n(20MHz)	MCS0
	802.11n(40MHz)	MCS0

For all test items, the low, middle and high channels of the modes were tested with above worst case data rate.

2.2 Tested Channel Information

5GHz Band	802.11a/n(20MHz)		802.11n(40MHz)	
	Channel	Frequency [MHz]	Channel	Frequency [MHz]
Band I	36	5180	38	5190
	40	5200	-	-
	48	5240	46	5230
Band II	52	5260	54	5270
	60	5300	-	-
	64	5320	62	5310
Band III	100	5500	102	5510
	116	5580	110	5550
	140	5700	134	5670

2.3 Auxiliary equipment

Equipment	Model No.	Serial No.	Manufacturer	Note
-	-	-	-	-
-	-	-	-	-

2.4 Tested environment

Temperature	: 21~26 °C
Relative humidity content	: 50 ~ 54 % R.H.
Details of power supply	: DC 3.8 V

2.5 EMI Suppression Device(s)/Modifications

EMI suppression device(s) added and/or modifications made during testing
→ None

3. Test Report

3.1 Summary of tests

FCC Part Section(s)	RSS Section(s)	Parameter	Limit	Test Condition	Status Note 1
I. Transmitter Mode (TX)					
15.407(a)	N/A	26 dB Bandwidth for FCC	N/A	Conducted	C
15.407(a)	RSS-210 [A9.2]	Maximum Conducted Output Power	< 4 + 10log ₁₀ (B) dBm (5150-5250) < 11 + 10log ₁₀ (B) dBm (5250-5350) < 11 + 10log ₁₀ (B) dBm (5470-5725)		C
15.407(a)	RSS-210 [A9.2]	Peak Power Spectral Density	< 4 dBm/MHz (5150-5250) < 11 dBm/MHz (5250-5350) < 11 dBm/MHz (5470-5725)		C
15.407(a)	N/A	Peak Excursion	< 13 dB/MHz maximum difference		C
15.407(g)	N/A	Frequency Stability	N/A		C
-	RSS Gen [4.6.1]	Occupied Bandwidth (99%)	N/A		NA
15.407(b)	RSS-210 [A9.2]	Undesirable Emissions	< -27 dBm/MHz EIRP (5150-5725)	Radiated	C
15.205 15.209 15.407(b)	RSS-Gen [7.2.5]	General Field Strength Limits (Restricted Bands and Radiated Emission Limits)	Emissions in restricted bands must meet the radiated limits detailed in 15.209		C
15.407(h)	RSS-210 [A9.3]	Dynamic Frequency Selection	See DFS Test Report		C ^{Note3}
15.207	RSS-Gen [7.2.4]	AC Conducted Emissions	FCC 15.207	AC Line Conducted	C
15.203	RSS-Gen [7.1.2]	Antenna Requirements	FCC 15.203	-	C
Note 1: C =Comply NC =Not Comply NT =Not Tested NA =Not Applicable Note 2: These test items were performed in each axis and the worst case data was reported. Note 3: Refer to the DFS Test Report.					

3.2 Transmitter requirements

3.2.1 26 dB Bandwidth

Test Requirements

The bandwidth at 26 dB down from the highest in-band spectral density is measured with a spectrum analyzer connected to the antenna terminal while the EUT is operating in transmission mode at the appropriate frequencies. The 26dB bandwidth is used to determine the conducted output power limit.

■ TEST CONFIGURATION

Refer to the APPENDIX I.

■ TEST PROCEDURE

The transmitter output is connected to the Spectrum Analyzer and used following test procedure of **KDB789033**.

1. Set resolution bandwidth (RBW) = approximately 1 % of the EBW.
2. Set the video bandwidth (VBW) > RBW.
3. Detector = **Peak**.
4. Trace mode = **max hold**.

Measure the maximum width of the emission that is 26 dB down from the peak of the emission. Compare this with the RBW setting of the analyzer. Readjust RBW and repeat measurement as needed until the RBW/EBW ratio is approximately 1%.

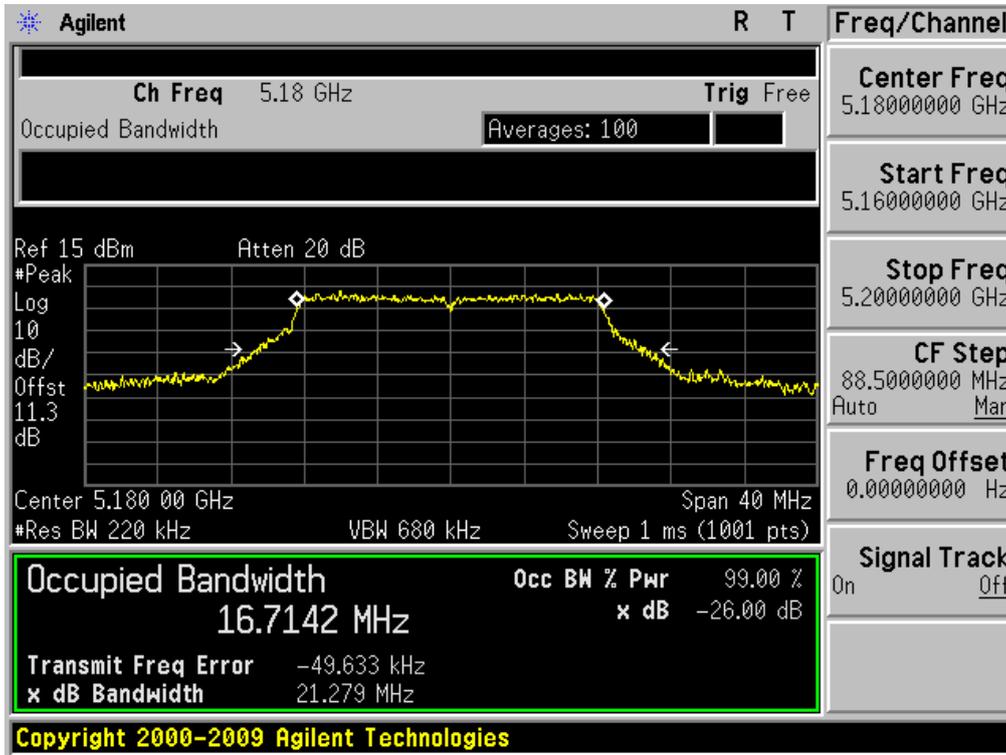
■ TEST RESULTS: **Comply**

Mode	Band	Channel	Frequency [MHz]	Test Result [MHz]
802.11a	Band I	36	5180	21.279
		40	5200	21.954
		48	5240	21.416
	Band II	52	5260	20.870
		60	5300	21.185
		64	5320	21.193
	Band III	100	5500	21.449
		116	5580	21.096
		140	5700	21.234
802.11n (20MHz)	Band I	36	5180	21.233
		40	5200	21.597
		48	5240	21.830
	Band II	52	5260	21.571
		60	5300	21.536
		64	5320	21.768
	Band III	100	5500	21.561
		116	5580	21.666
		140	5700	21.335
802.11n (40MHz)	Band I	38	5190	42.876
		46	5230	42.229
	Band II	54	5270	42.286
		62	5310	42.780
	Band III	102	5510	42.615
		110	5550	42.264
		134	5670	42.829

RESULT PLOTS

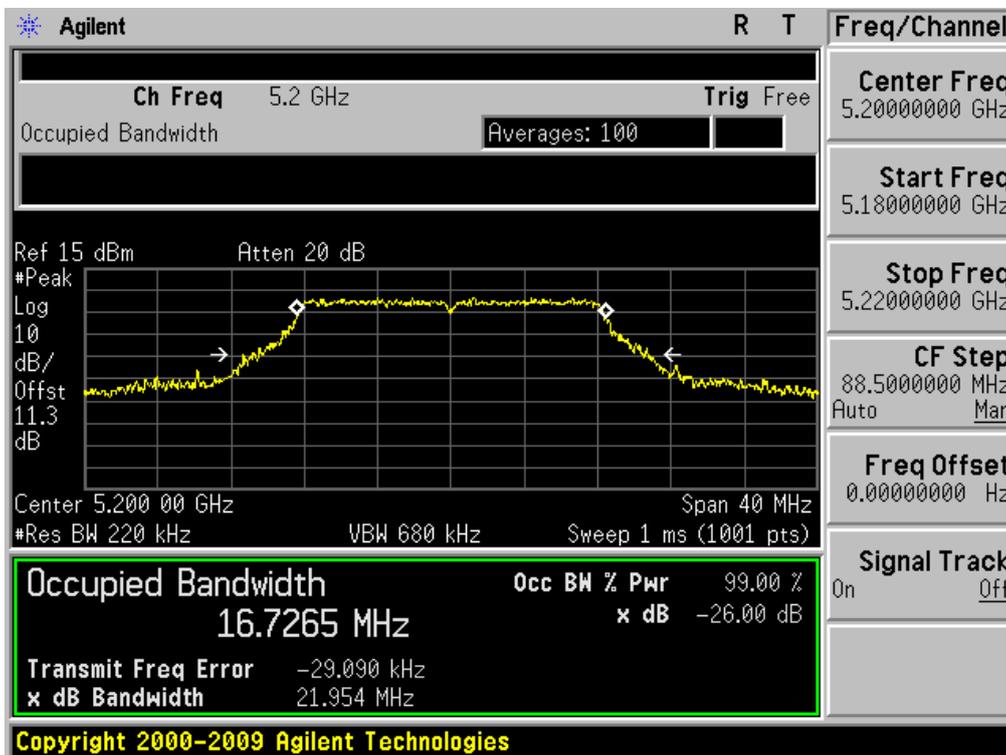
26 dB Bandwidth

Test Mode: 802.11a & Ch.36



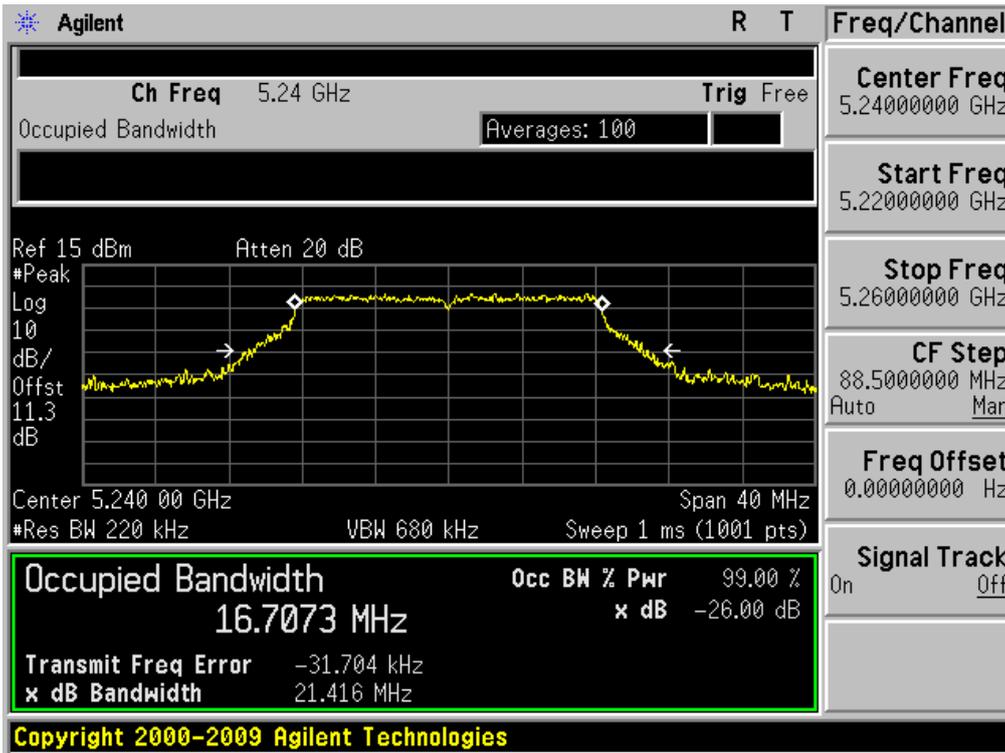
26 dB Bandwidth

Test Mode: 802.11a & Ch.40



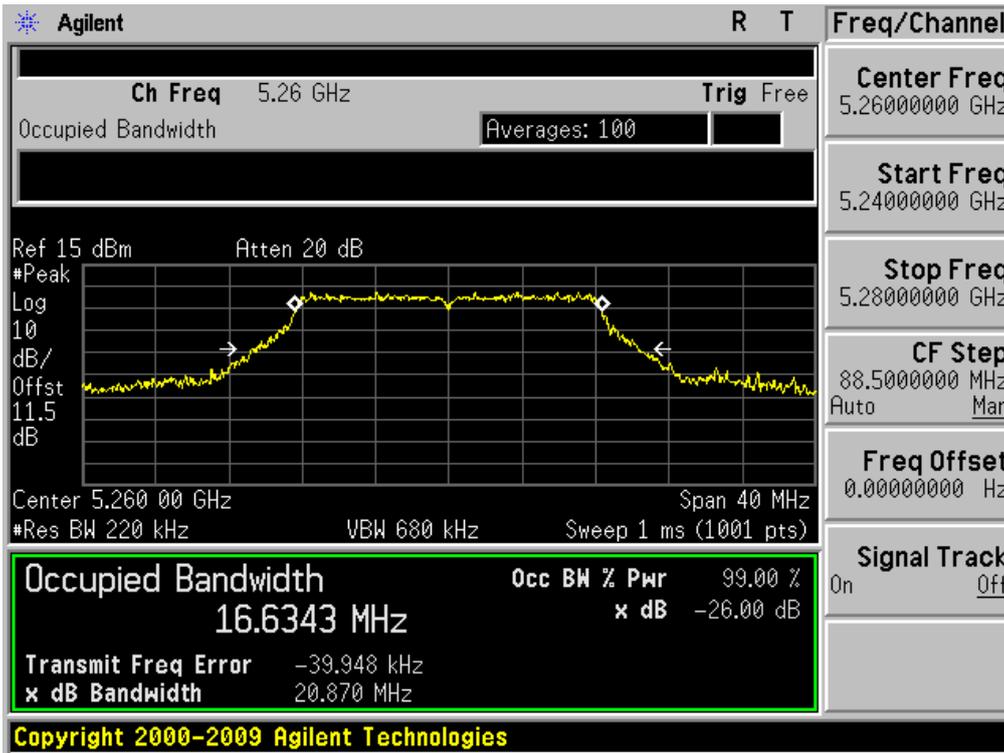
26 dB Bandwidth

Test Mode: 802.11a & Ch.48



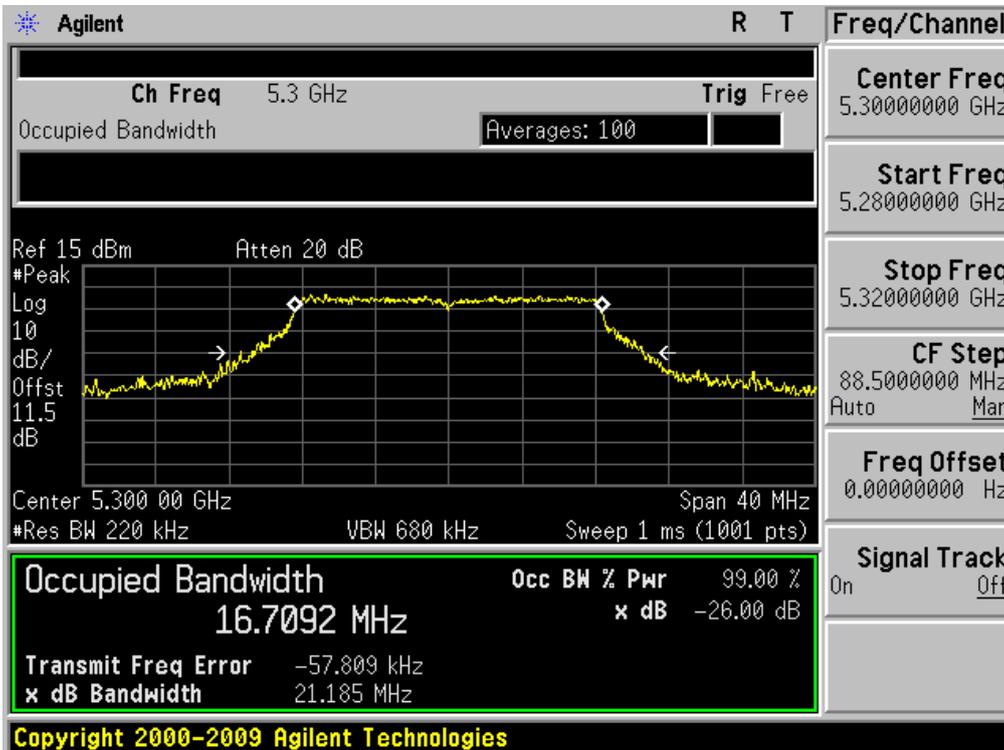
26 dB Bandwidth

Test Mode: 802.11a & Ch.52



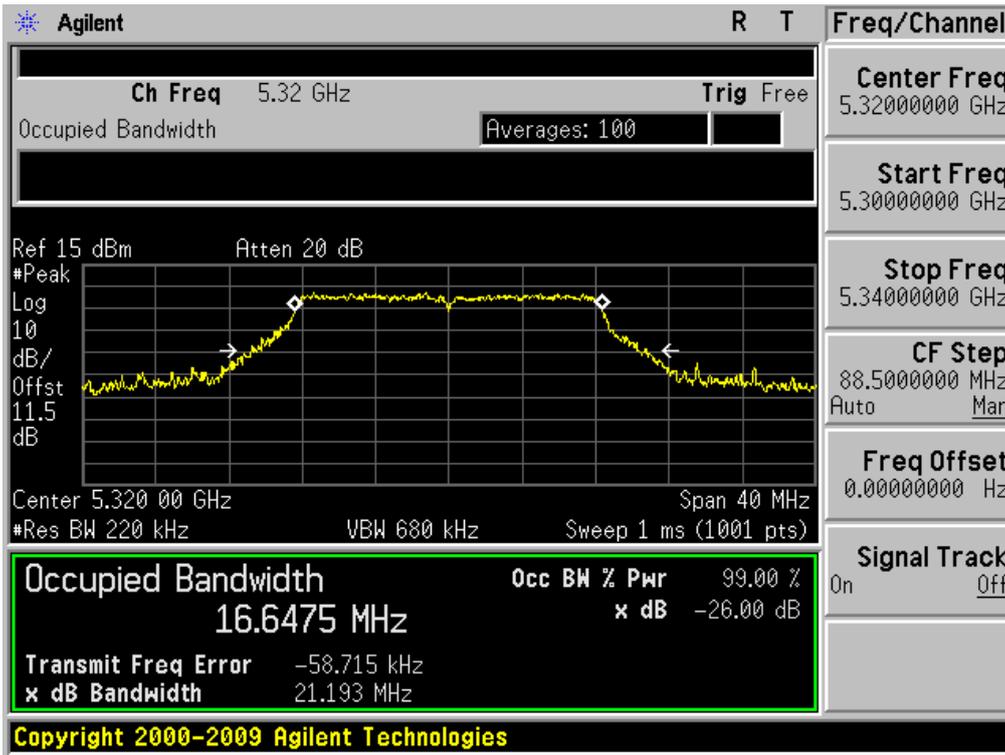
26 dB Bandwidth

Test Mode: 802.11a & Ch.60



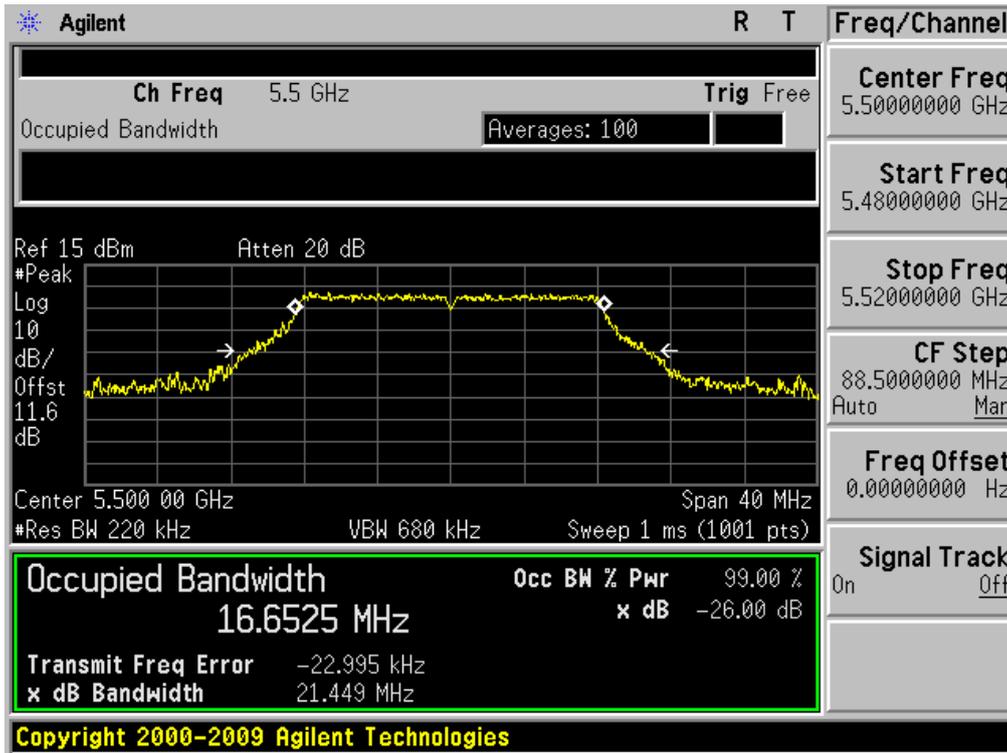
26 dB Bandwidth

Test Mode: 802.11a & Ch.64



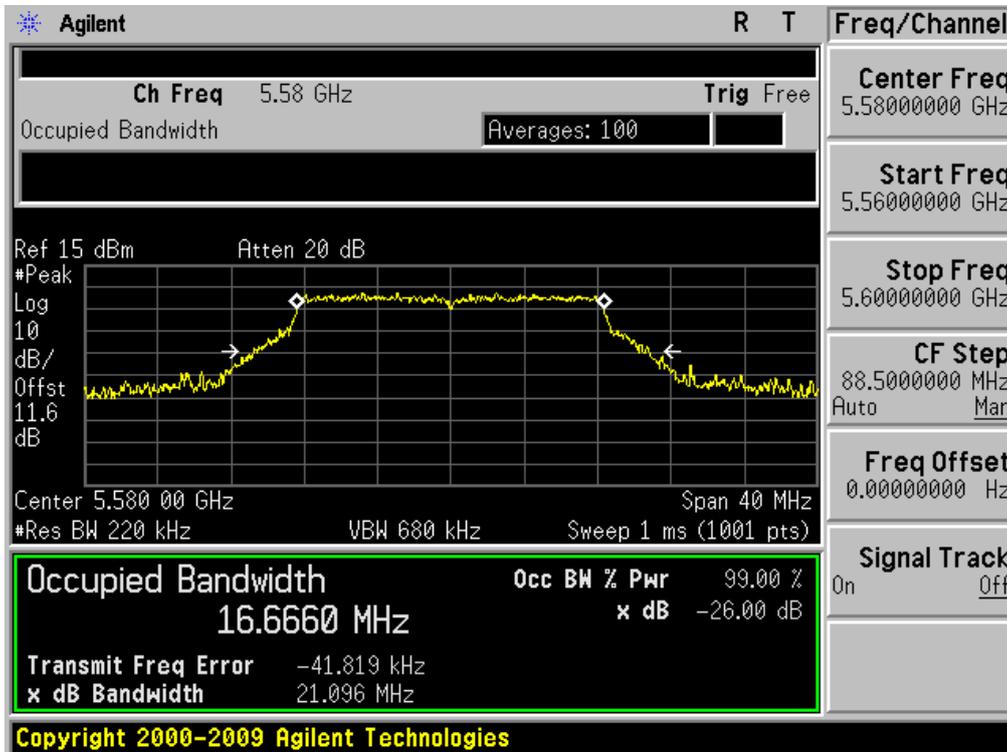
26 dB Bandwidth

Test Mode: 802.11a & Ch.100



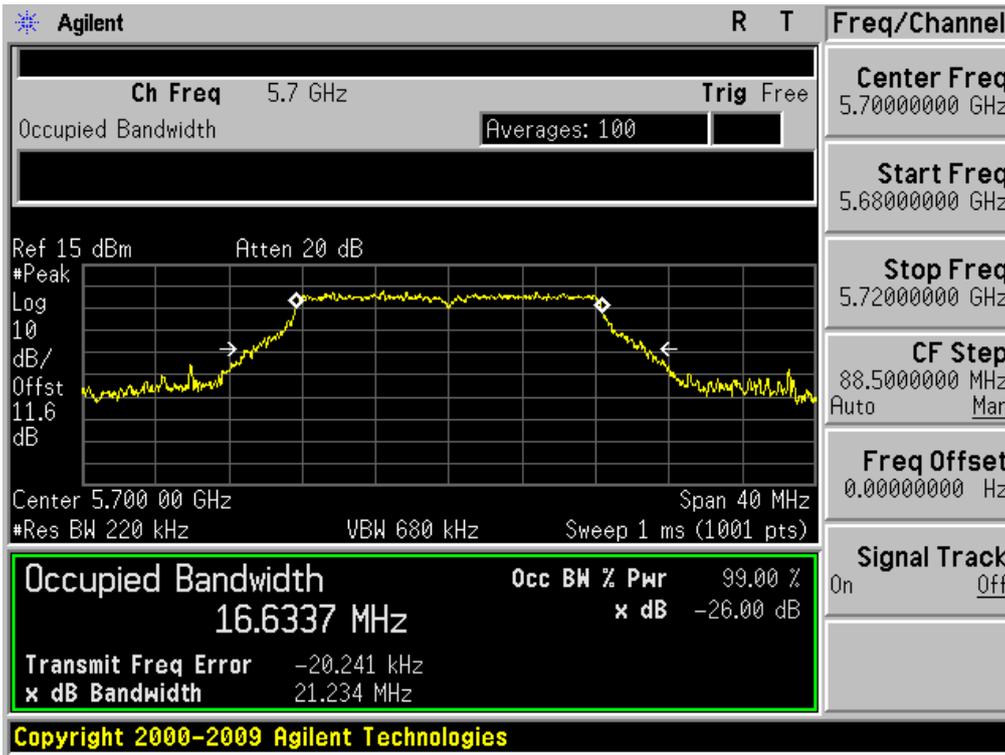
26 dB Bandwidth

Test Mode: 802.11a & Ch.116



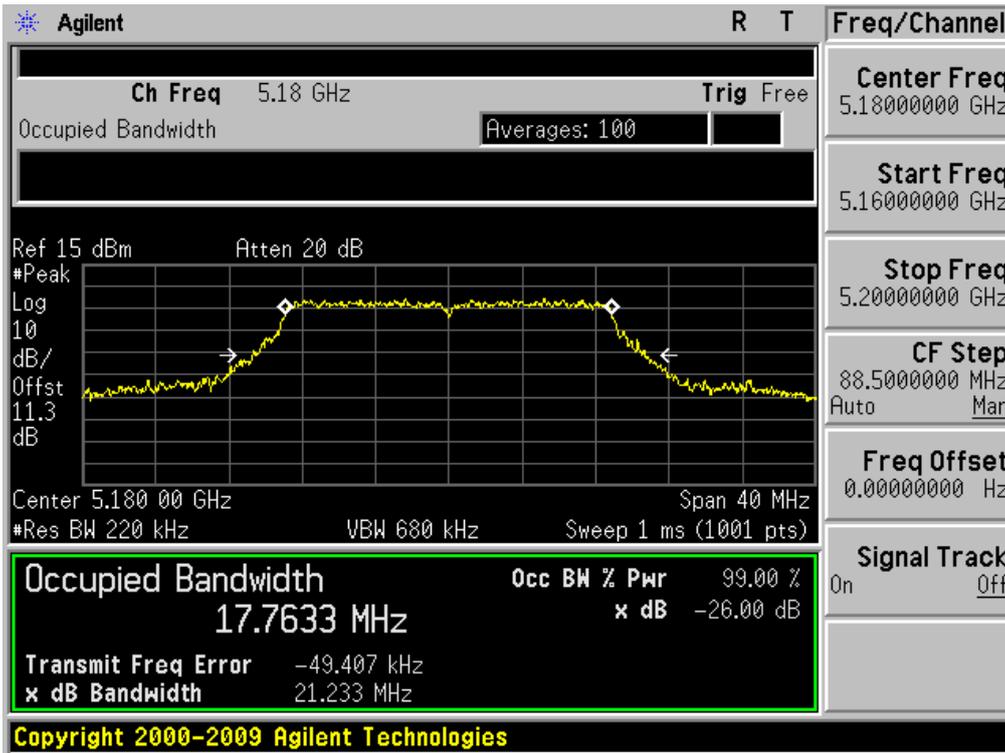
26 dB Bandwidth

Test Mode: 802.11a & Ch.140



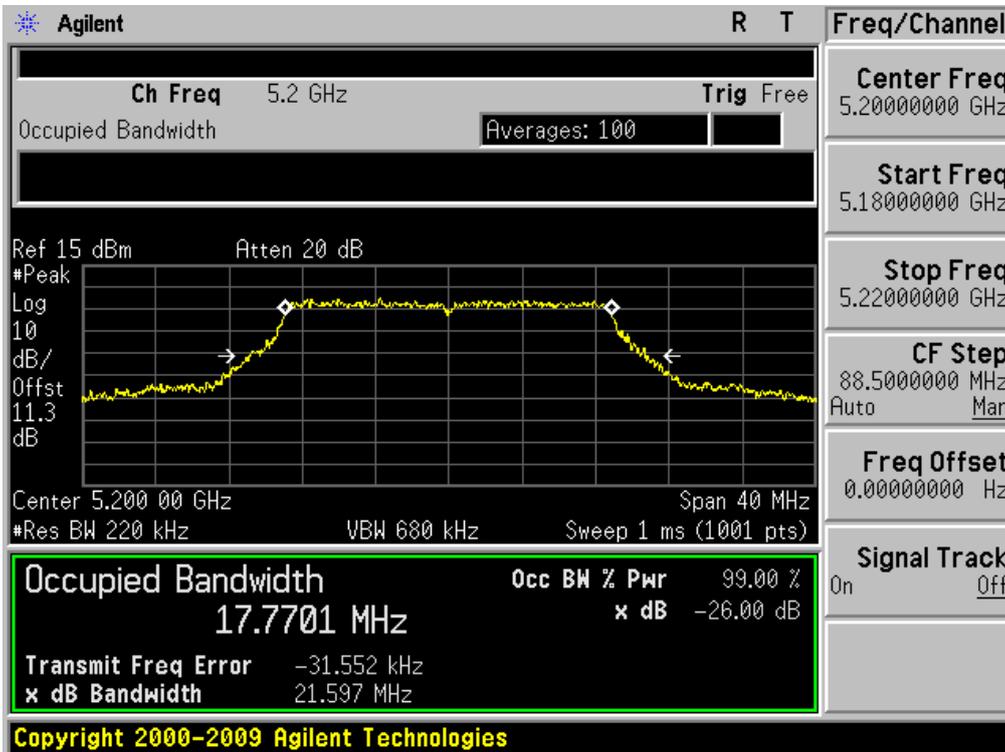
26 dB Bandwidth

Test Mode: 802.11n-HT20 & Ch.36



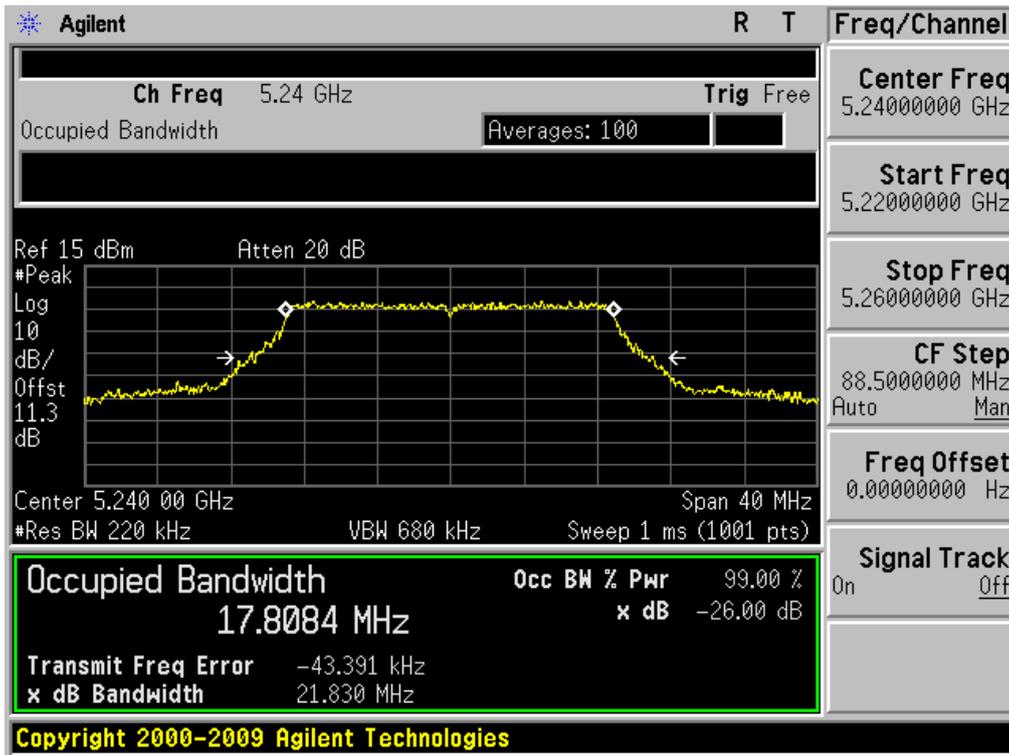
26 dB Bandwidth

Test Mode: 802.11n-HT20 & Ch.40



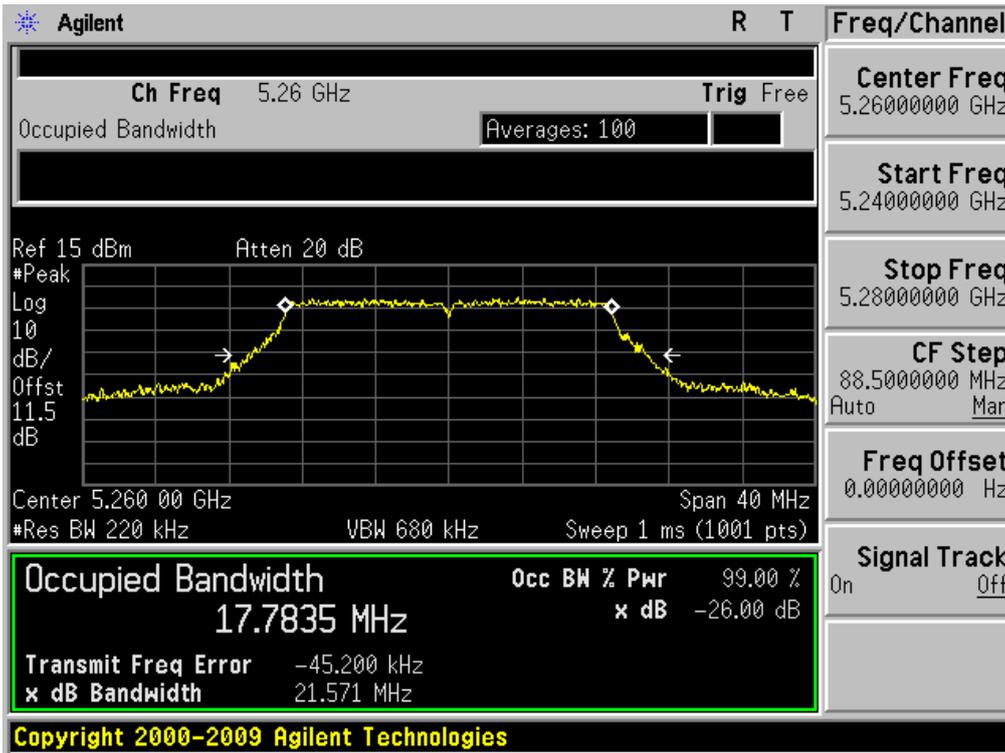
26 dB Bandwidth

Test Mode: 802.11n-HT20 & Ch.48



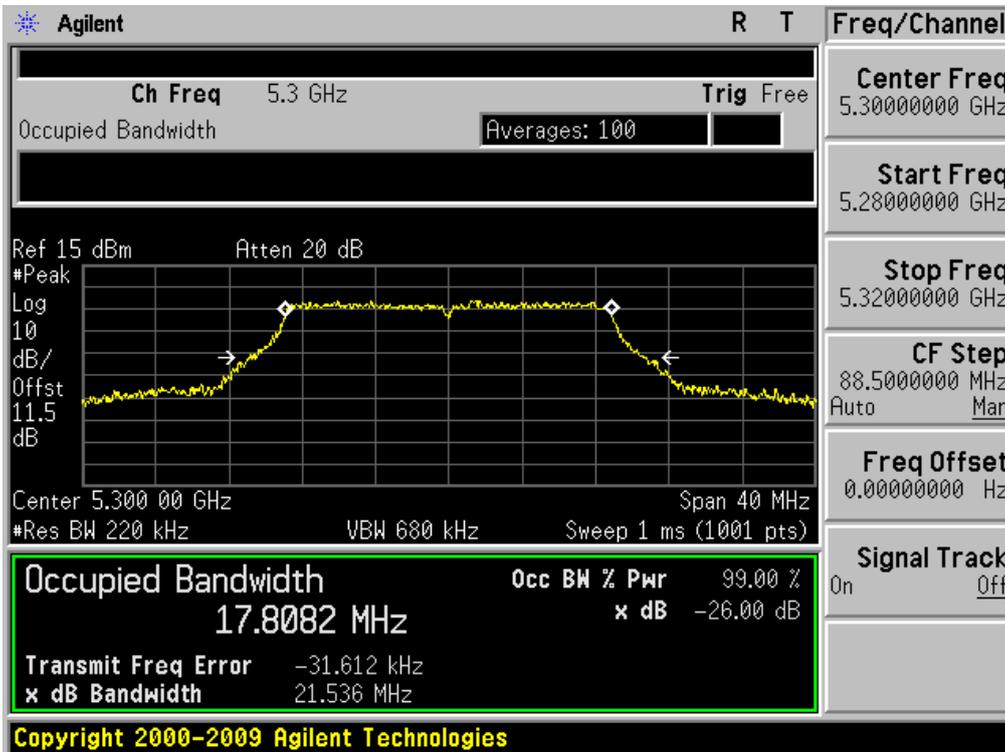
26 dB Bandwidth

Test Mode: 802.11n-HT20 & Ch.52



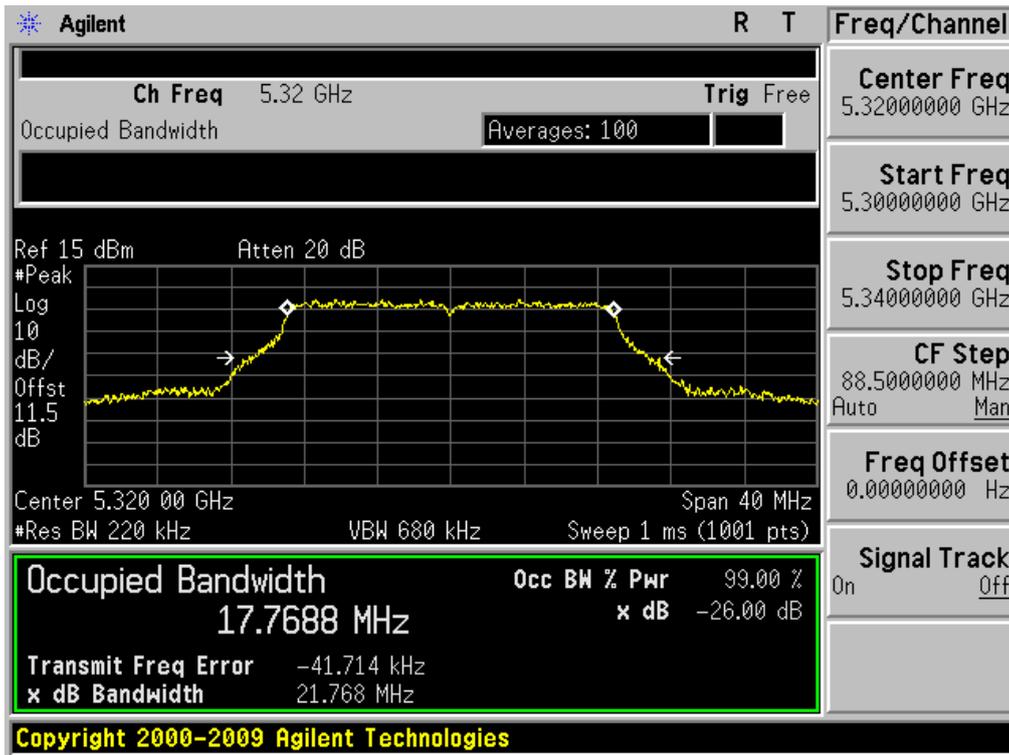
26 dB Bandwidth

Test Mode: 802.11n-HT20 & Ch.60



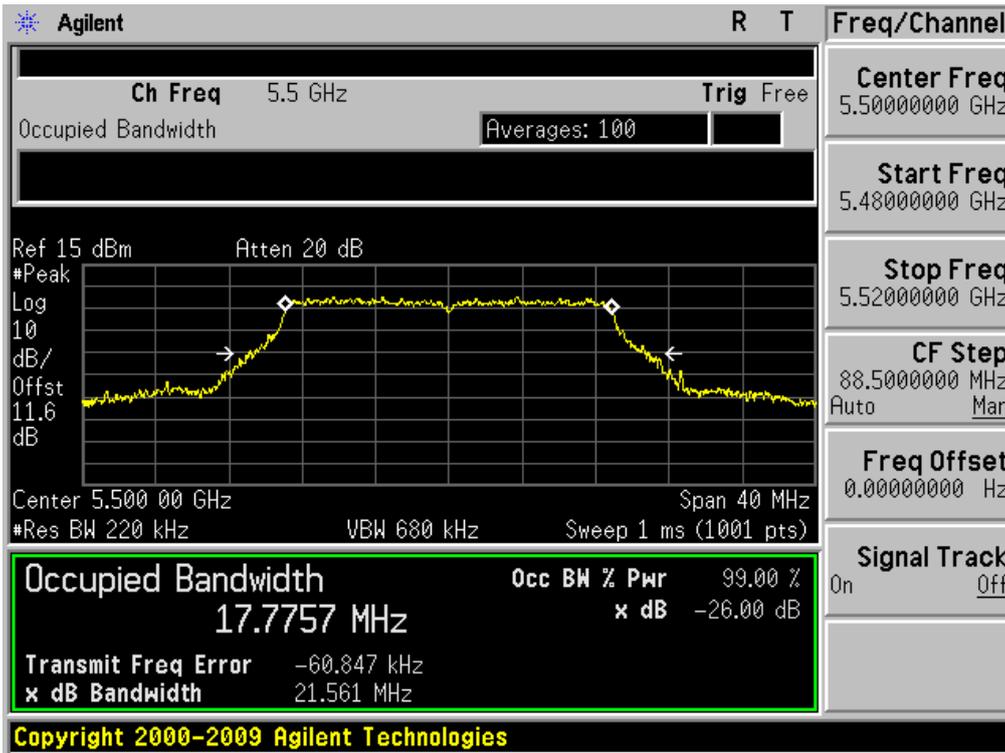
26 dB Bandwidth

Test Mode: 802.11n-HT20 & Ch.64



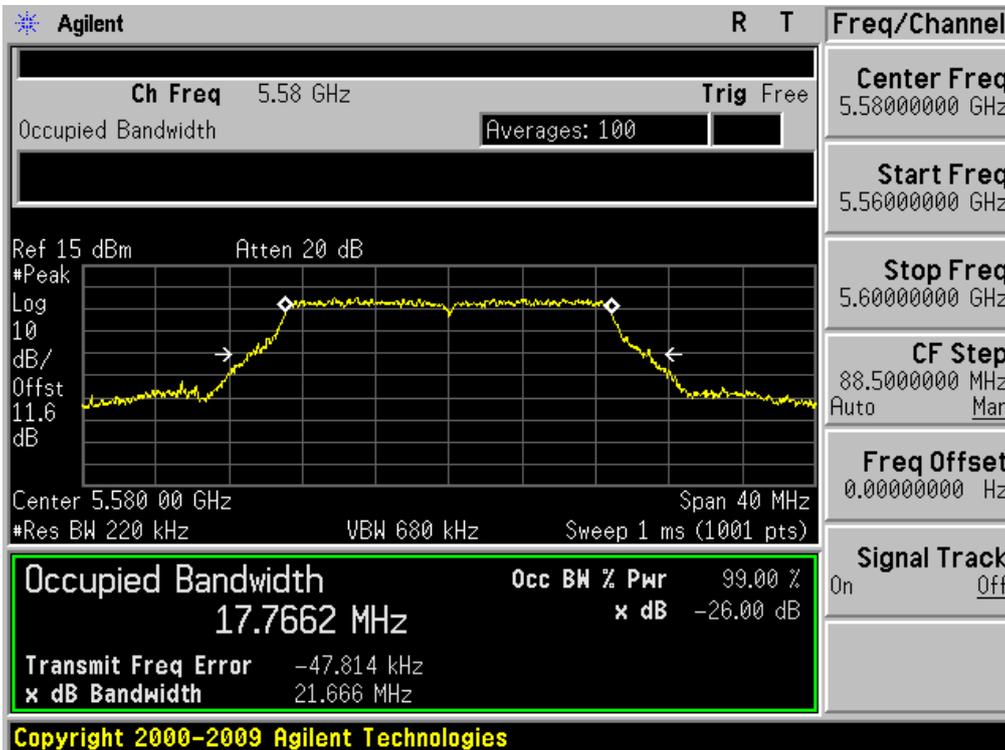
26 dB Bandwidth

Test Mode: 802.11n-HT20 & Ch.100



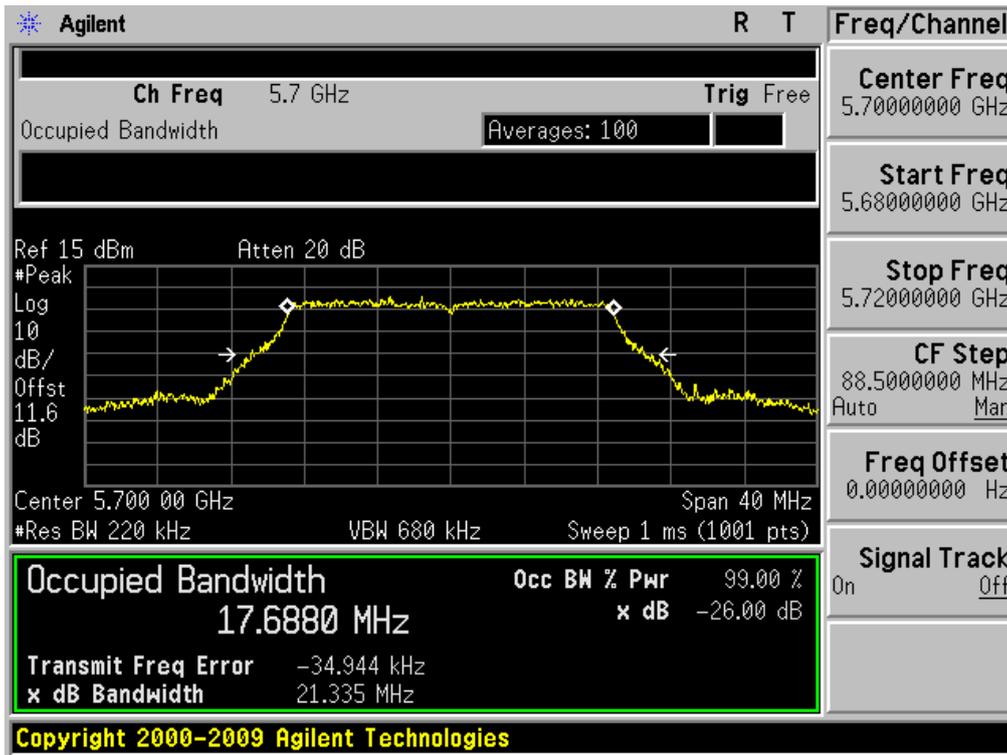
26 dB Bandwidth

Test Mode: 802.11n-HT20 & Ch.116



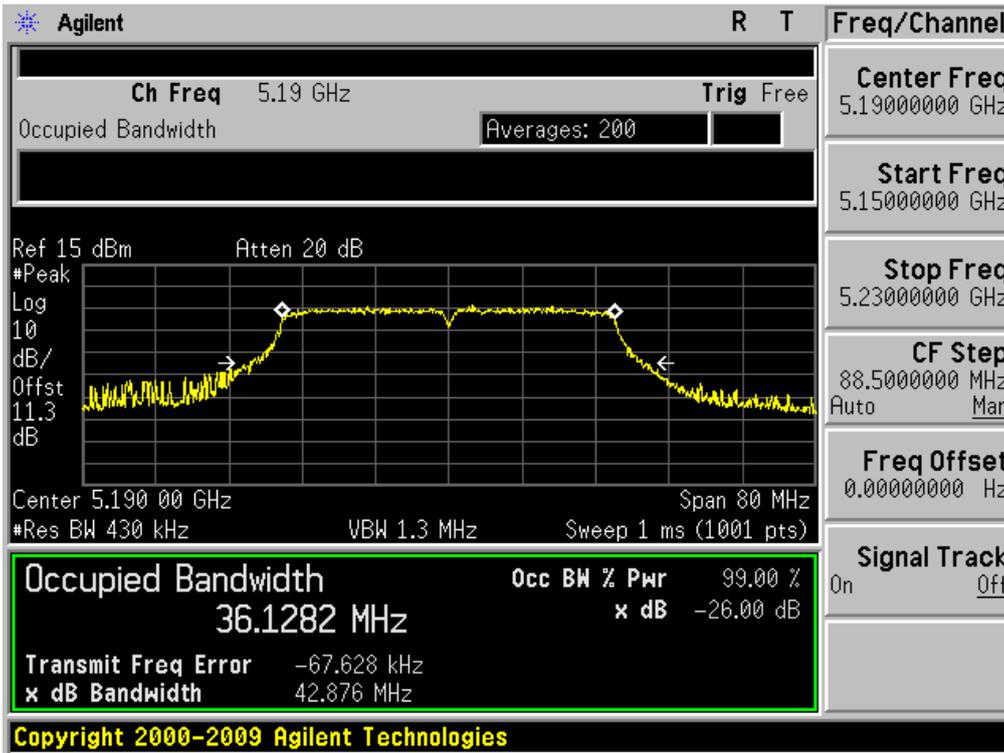
26 dB Bandwidth

Test Mode: 802.11n-HT20 & Ch.140



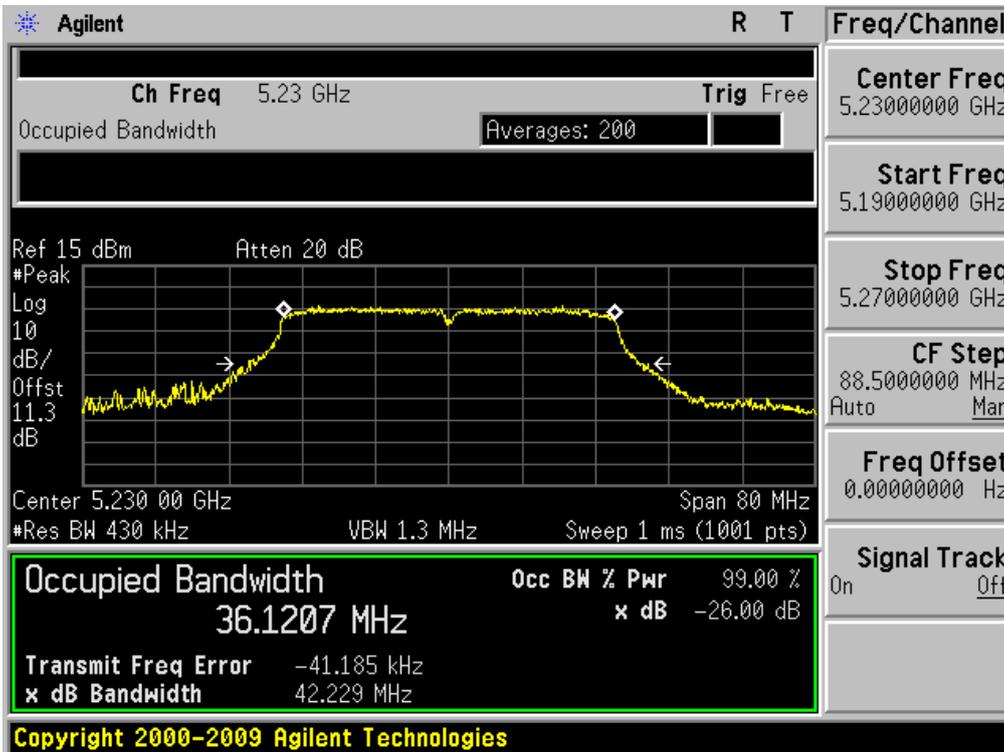
26 dB Bandwidth

Test Mode: 802.11n-HT40 & Ch.38



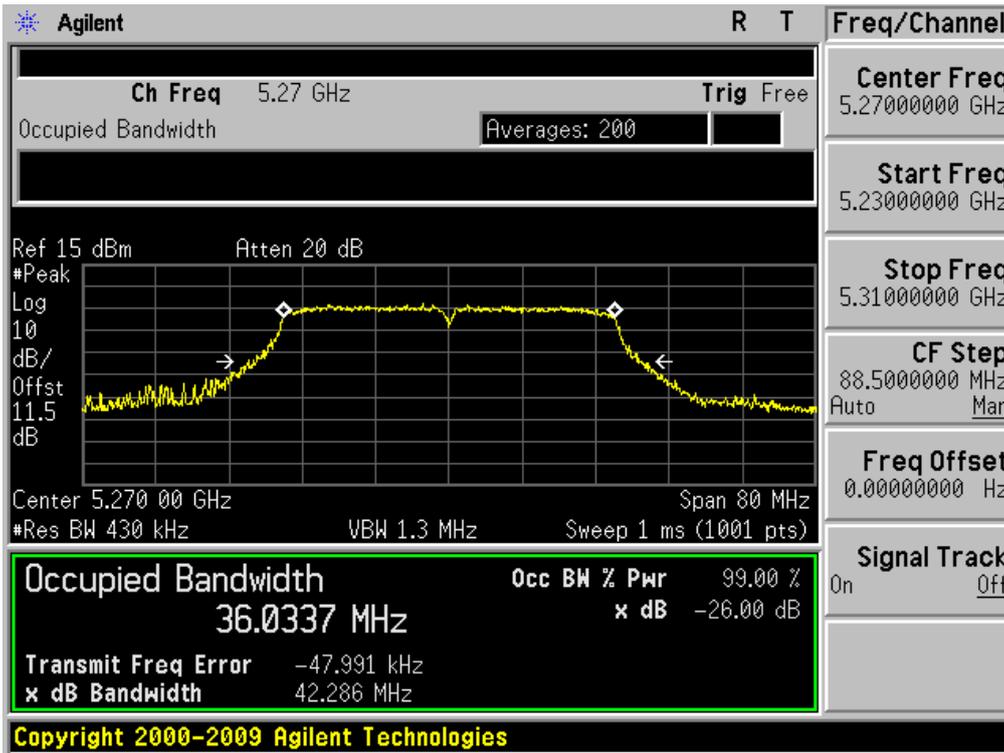
26 dB Bandwidth

Test Mode: 802.11n-HT40 & Ch.46



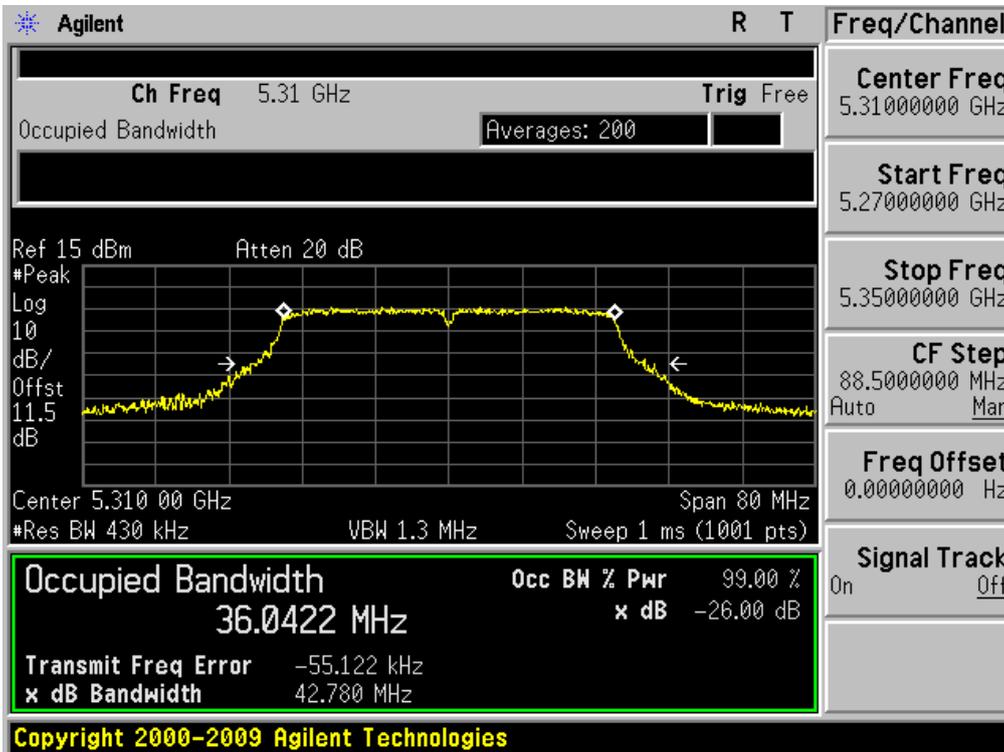
26 dB Bandwidth

Test Mode: 802.11n-HT40 & Ch.54



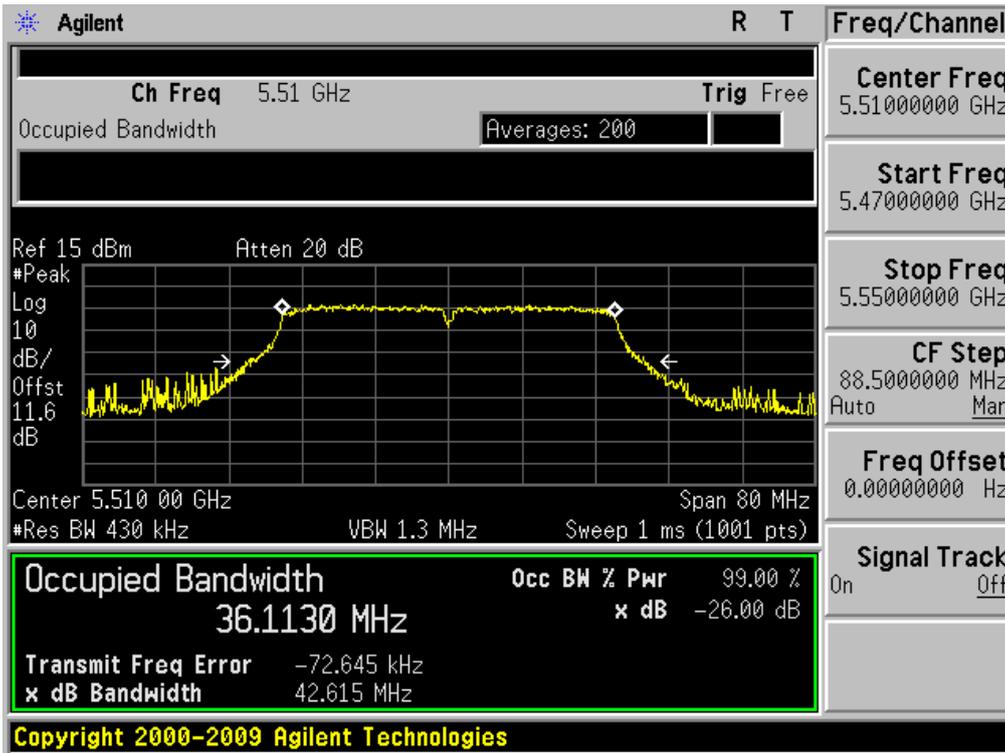
26 dB Bandwidth

Test Mode: 802.11n-HT40 & Ch.62



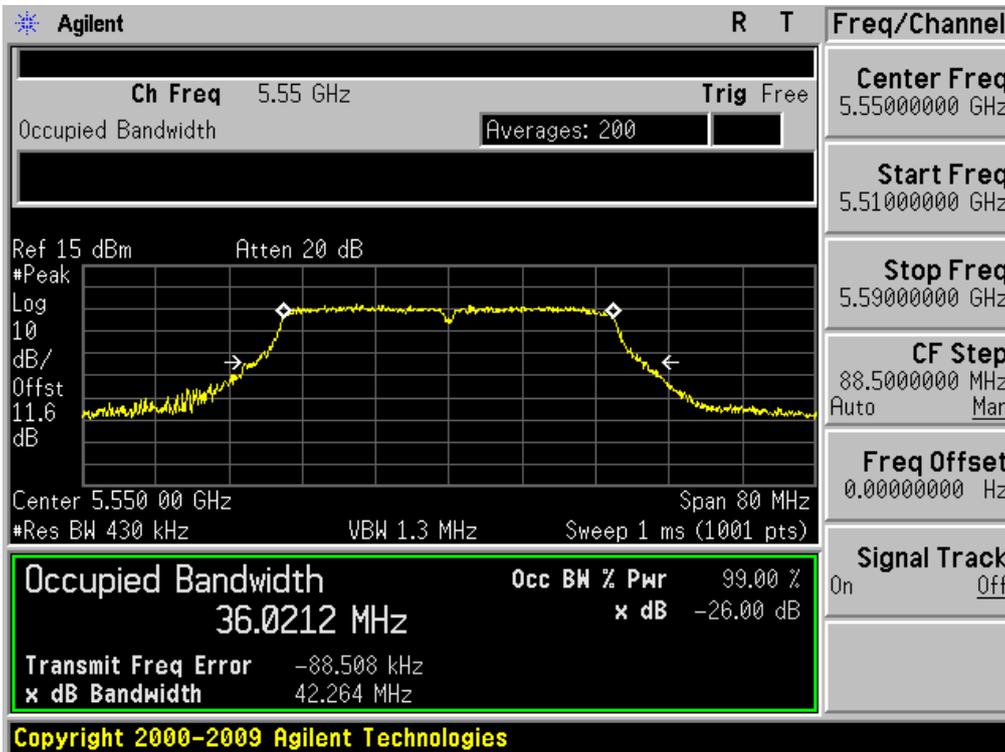
26 dB Bandwidth

Test Mode: 802.11n-HT40 & Ch.102



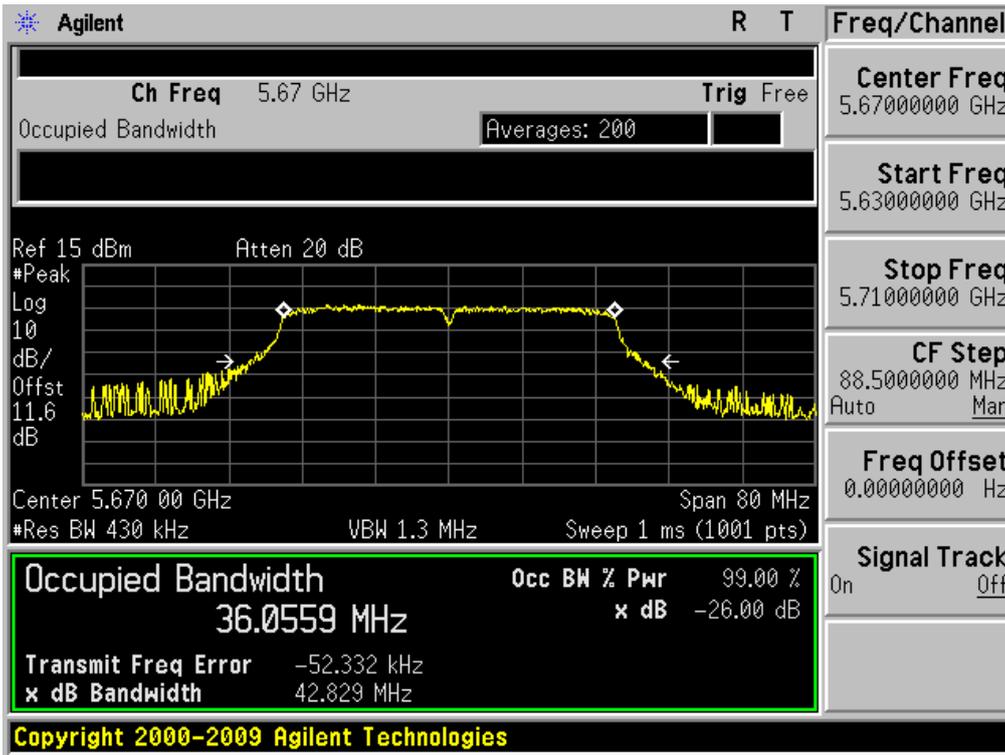
26 dB Bandwidth

Test Mode: 802.11n-HT40 & Ch.110



26 dB Bandwidth

Test Mode: 802.11n-HT40 & Ch.134



3.2.2 Output Power

Test Requirements

- (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 + 10log B, where B is the 26 dB emission bandwidth in MHz. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.
- (2) For the 5.25-5.35 GHz and 5.47-5.725 GHz bands, the maximum conducted output power over the frequency bands of operation shall not exceed the lesser of 250 mW or 11 dBm + 10log B, where B is the 26 dB emission bandwidth in megahertz. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

- Output power Limit Calculation

Bands	Mode	Power Limit [mW]	Calculated Limit [dBm]	ANT Gain	Determined Limit [dBm]
		Least 26dBC BW [MHz]			
Band I	802.11a	50	16.98	-1.19	16.98
		21.279	17.27		
	802.11n HT20	50	16.98		16.98
		21.233	17.27		
	802.11n HT40	50	16.98		16.98
		42.229	20.25		

Bands	Mode	Power Limit [mW]	Calculation Limit [dBm]	ANT Gain	Determined Limit [dBm]
		Least 26dBC BW [MHz]			
Band II	802.11a	250	23.97	-1.19	23.97
		20.870	24.19		
	802.11n HT20	250	23.97		23.97
		21.536	24.33		
	802.11n HT40	250	23.97		23.97
		42.286	27.26		
Band III	802.11a	250	23.97	-1.19	23.97
		21.096	24.24		
	802.11n HT20	250	23.97		23.97
		21.335	24.29		
	802.11n HT40	250	23.97		23.97
		42.264	27.25		

■ TEST CONFIGURATION

Refer to the APPENDIX I.

■ TEST PROCEDURE:

Maximum Conducted Output Power is measured using Measurement Procedure **Method SA-2 of KDB789033**

1. Set the **RBW = 1 MHz**.
2. Set the **VBW ≥ 3 MHz**.
3. Set **SPAN to encompass the entire EBW** of signal.
4. Detector = **RMS (power averaging)**
5. Sweep time = **auto couple**.
6. **Trace average at least 100 traces in power averaging.**
7. **Compute power by integrating the spectrum across the 26 dB EBW** of the signal using the spectrum analyzer's band power measurement function with band limits set equal to the EBW band edges.
8. **Add 10 log(1/x), where x is the duty cycle**, to the measured power in order to compute the average power during the actual transmission times (because the measurement represents an average over both the on and off times of the transmission)

■ TEST RESULTS : **Comply**

Mode	Channel	Frequency [MHz]	Reading [dBm]	Duty Cycle			DCF [dB]	Test Result [dBm]
				On Time[ms]	On+Off Time[ms]	X		
802.11a	36	5180	12.050	2.030	2.140	0.94	0.27	12.320
	40	5200	11.750					12.020
	48	5240	11.610					11.880
	52	5260	11.880	2.030	2.140	0.94		12.150
	60	5300	12.090					12.360
	64	5320	12.140					12.410
	100	5500	12.750	2.030	2.140	0.94		13.020
	116	5580	12.330					12.600
140	5700	12.500	12.770					

Mode	Channel	Frequency [MHz]	Reading [dBm]	Duty Cycle			DCF [dB]	Result
				On Time[ms]	On+Off Time[ms]	X		
802.11n (20MHz)	36	5180	9.520	1.890	1.990	0.94	0.27	9.790
	40	5200	9.450					9.720
	48	5240	9.060					9.330
	52	5260	8.950	1.890	1.990	0.94		9.220
	60	5300	9.000					9.270
	64	5320	9.700					9.970
	100	5500	10.350	1.890	1.990	0.94		10.620
	116	5580	10.240					10.510
140	5700	10.300	10.570					
802.11n (40MHz)	38	5190	7.090	0.930	0.984	0.94	0.27	7.360
	46	5230	6.910					7.180
	54	5270	7.040	0.930	0.984	0.94		7.310
	62	5310	7.210					7.480
	102	5510	7.150	0.930	0.984	0.94		7.420
	110	5550	6.990					7.260
134	5670	6.830	7.100					

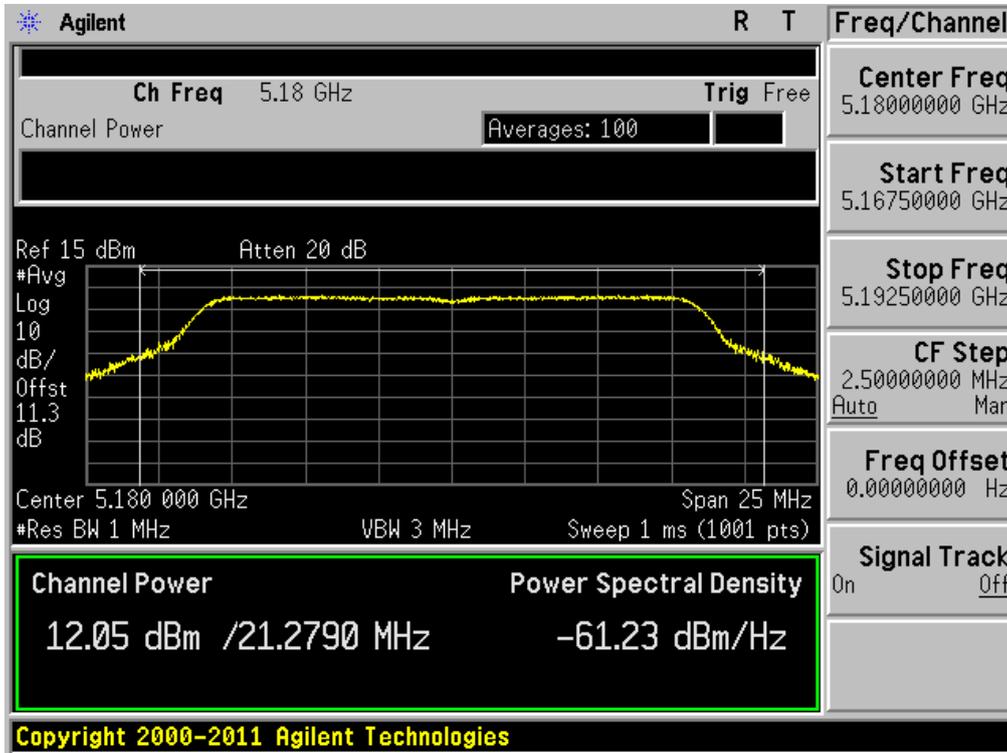
Note 1 : $DCF = 10\log(1/X)$, $X = \text{On Time} / (\text{On+Off time})$

Note 2 : Test Result = Measurement Data + DCF

Measurement Data PLOTS

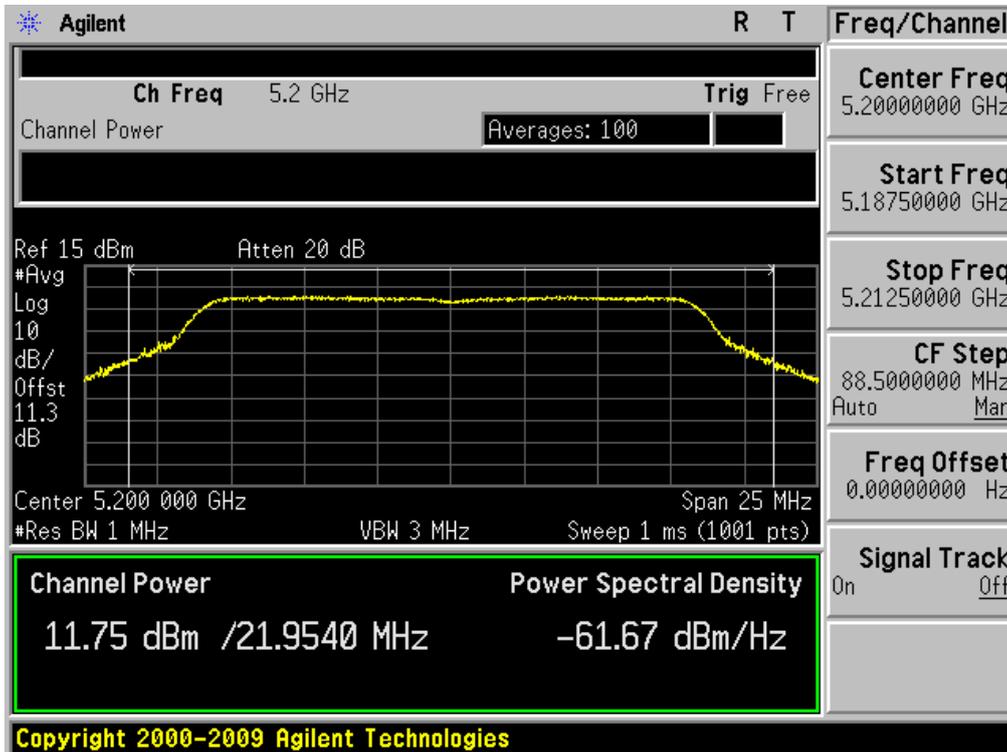
Output Power

Test Mode: 802.11a & Ch.36



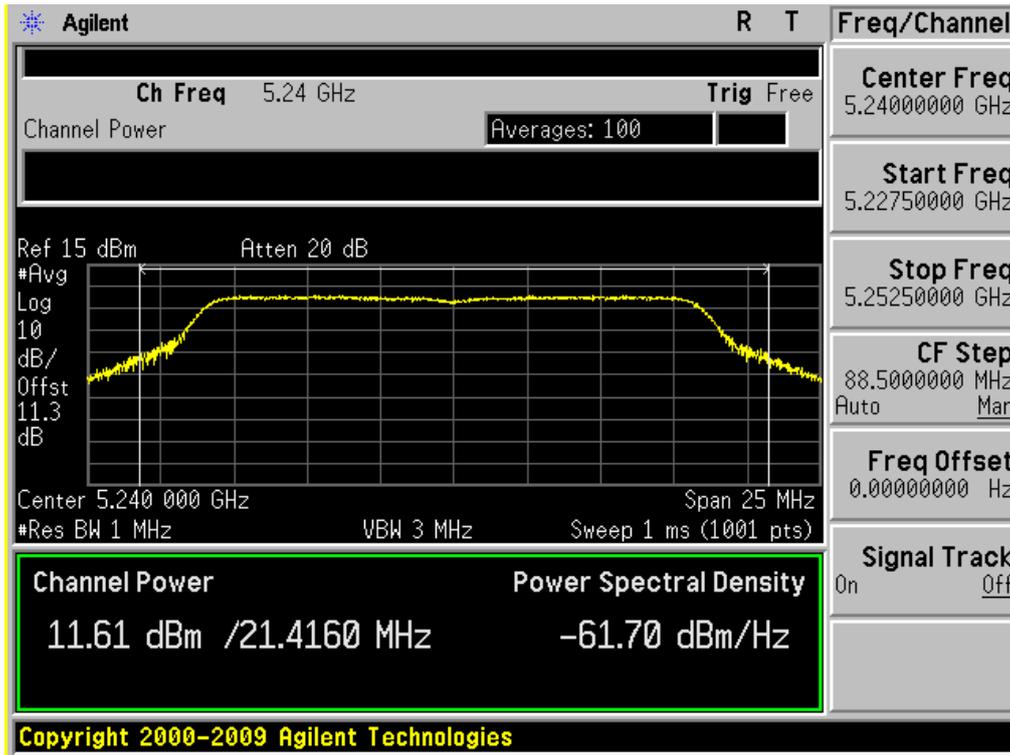
Output Power

Test Mode: 802.11a & Ch.40



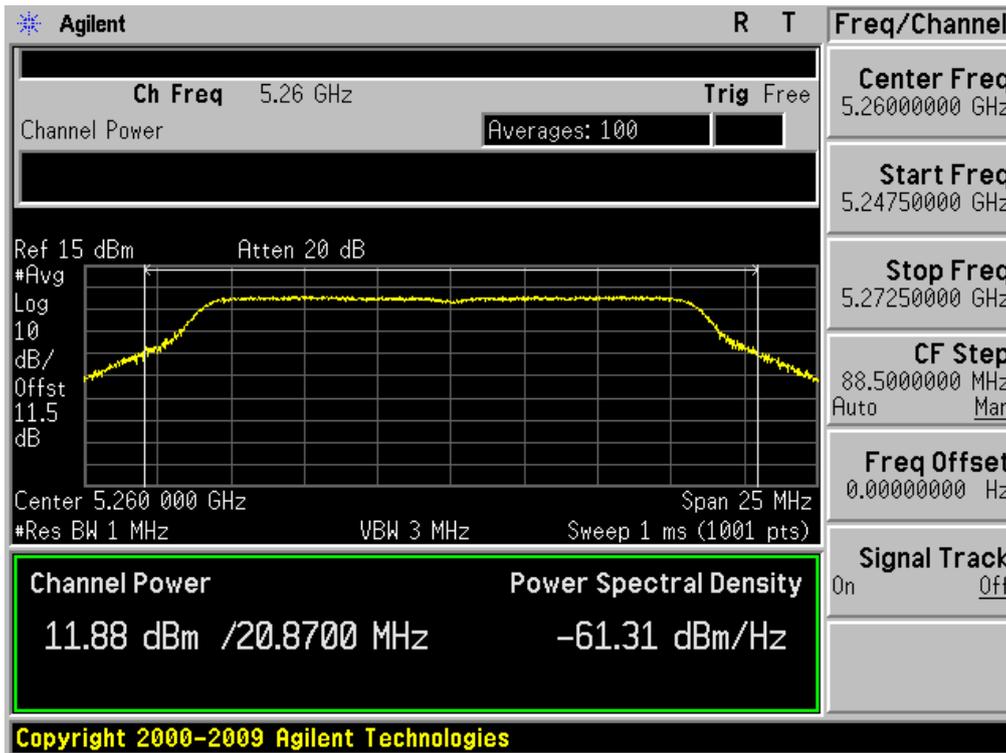
Output Power

Test Mode: 802.11a & Ch.48



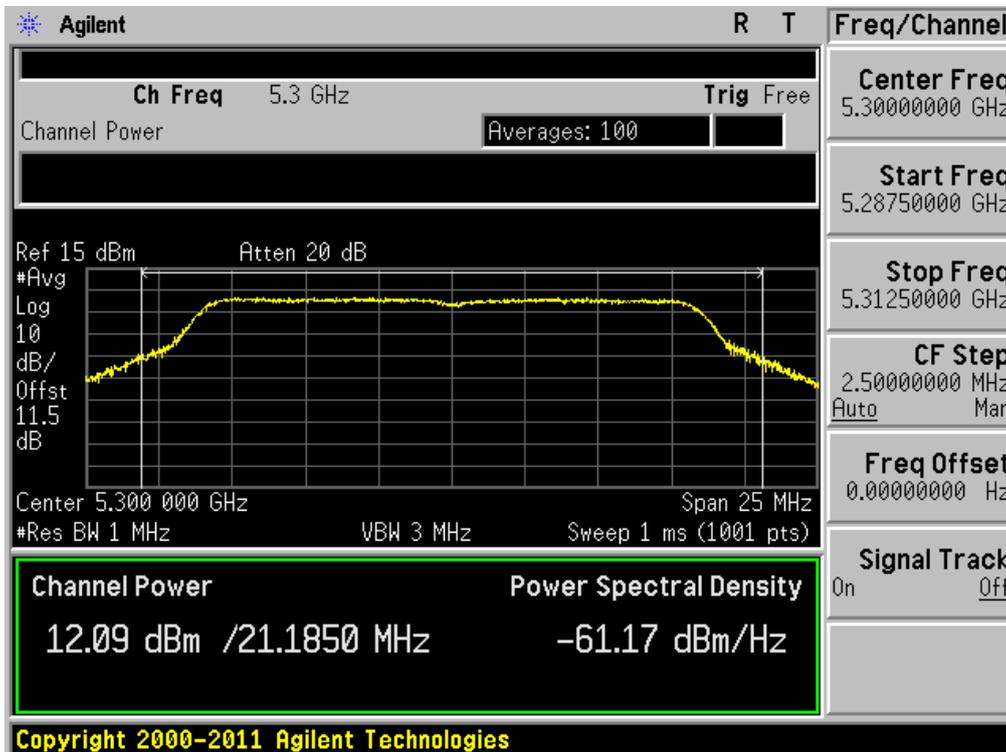
Output Power

Test Mode: 802.11a & Ch.52



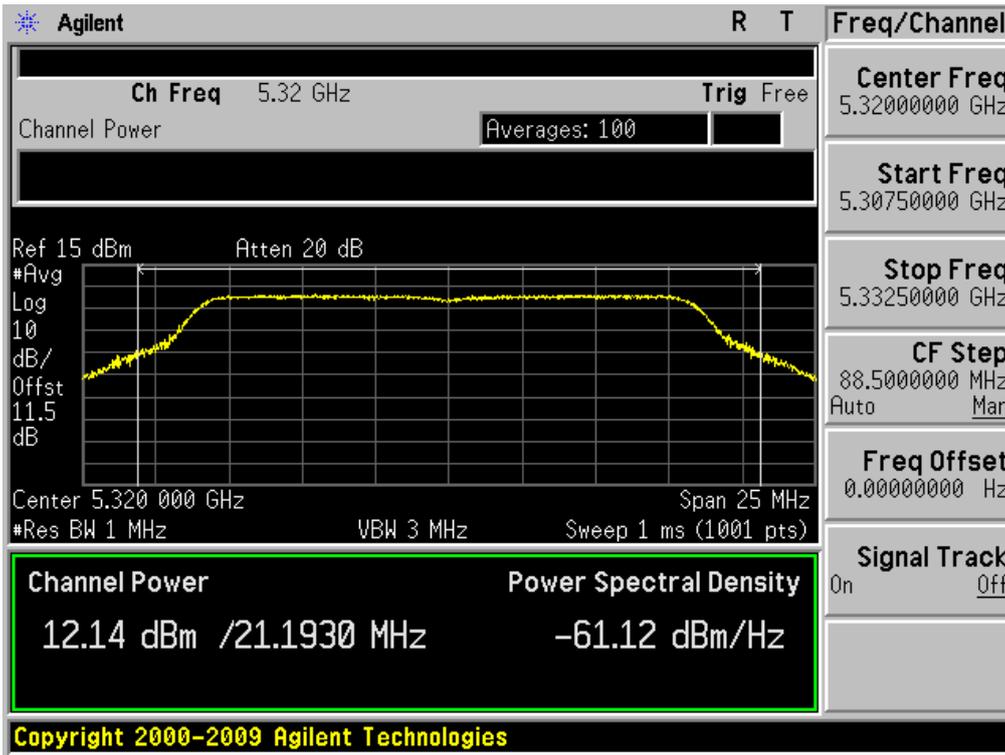
Output Power

Test Mode: 802.11a & Ch.60



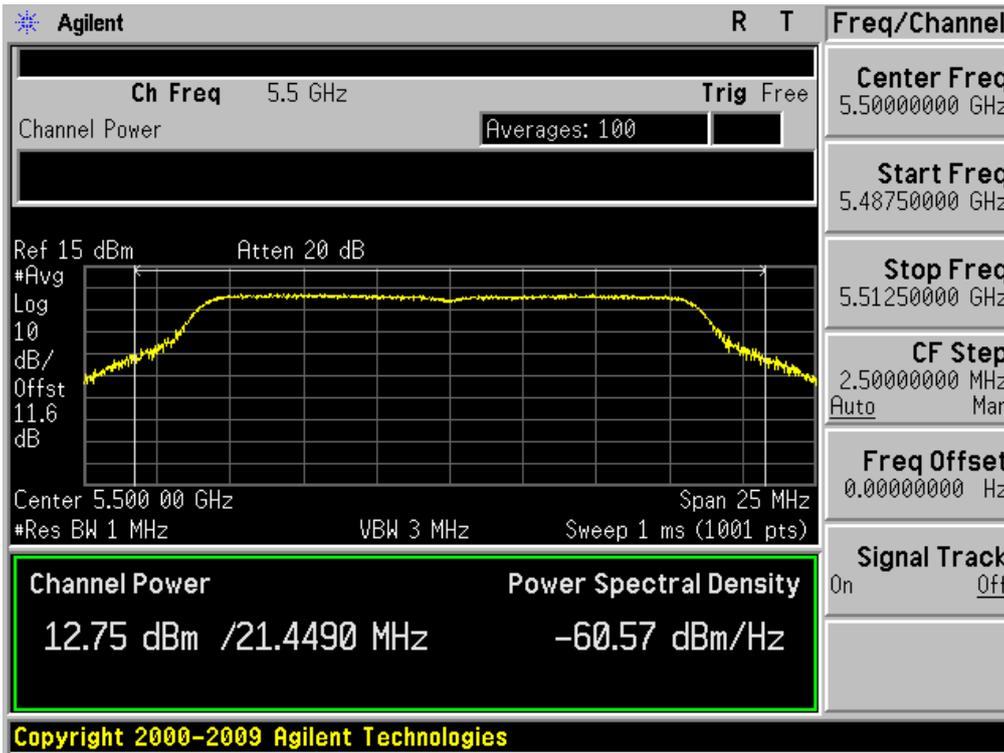
Output Power

Test Mode: 802.11a & Ch.64



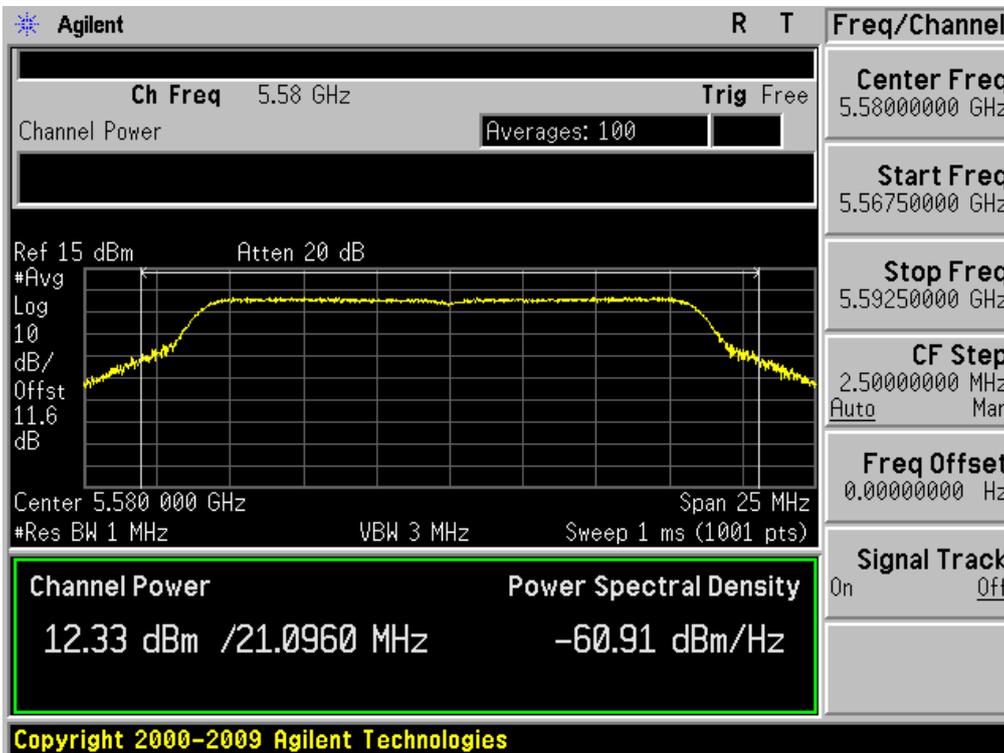
Output Power

Test Mode: 802.11a & Ch.100



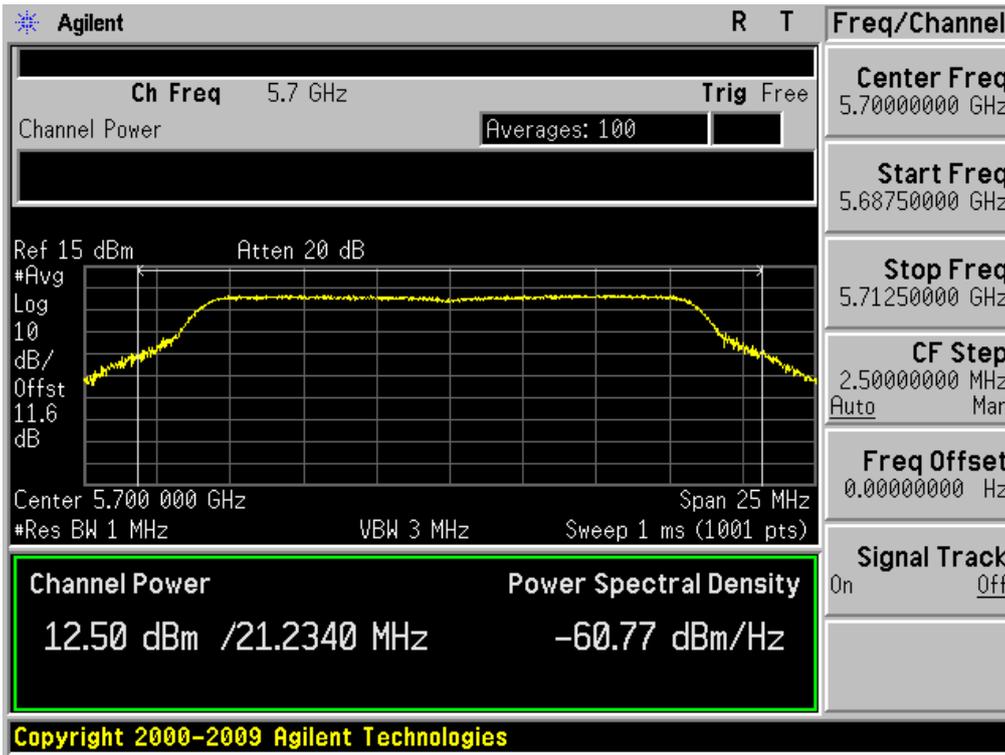
Output Power

Test Mode: 802.11a & Ch.116



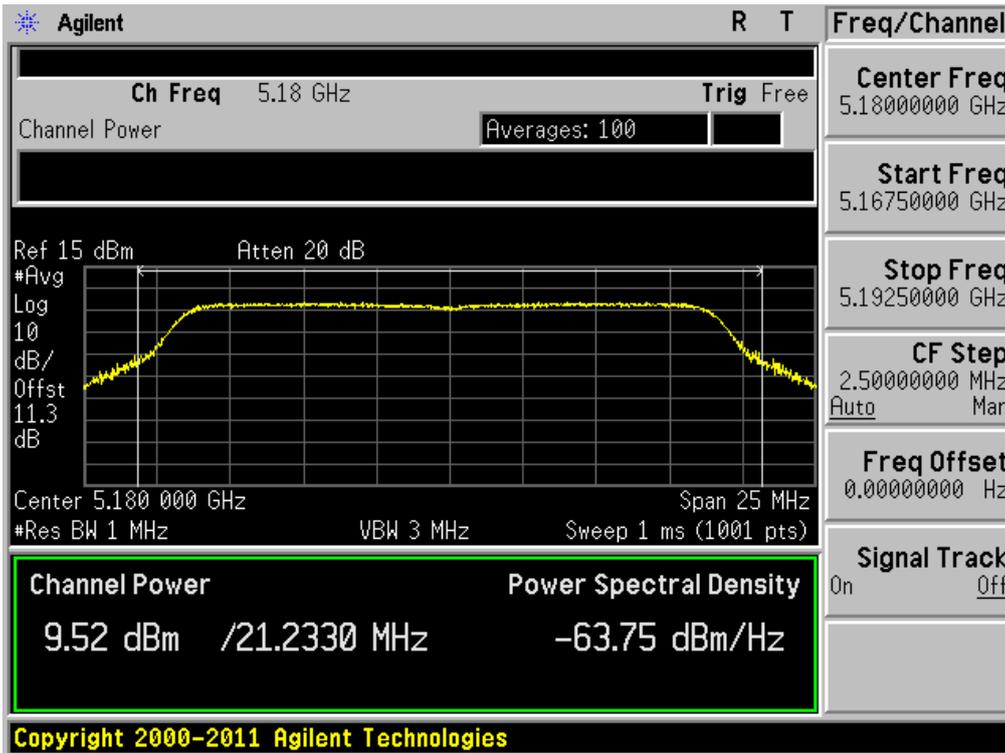
Output Power

Test Mode: 802.11a & Ch.140



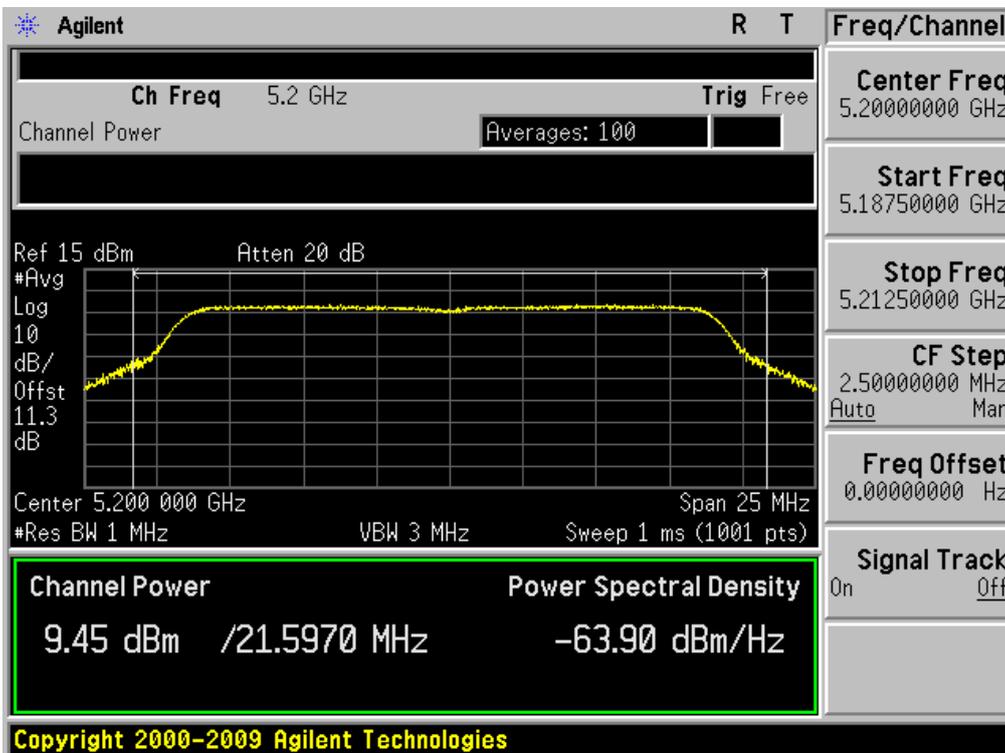
Output Power

Test Mode: 802.11n HT20 & Ch.36



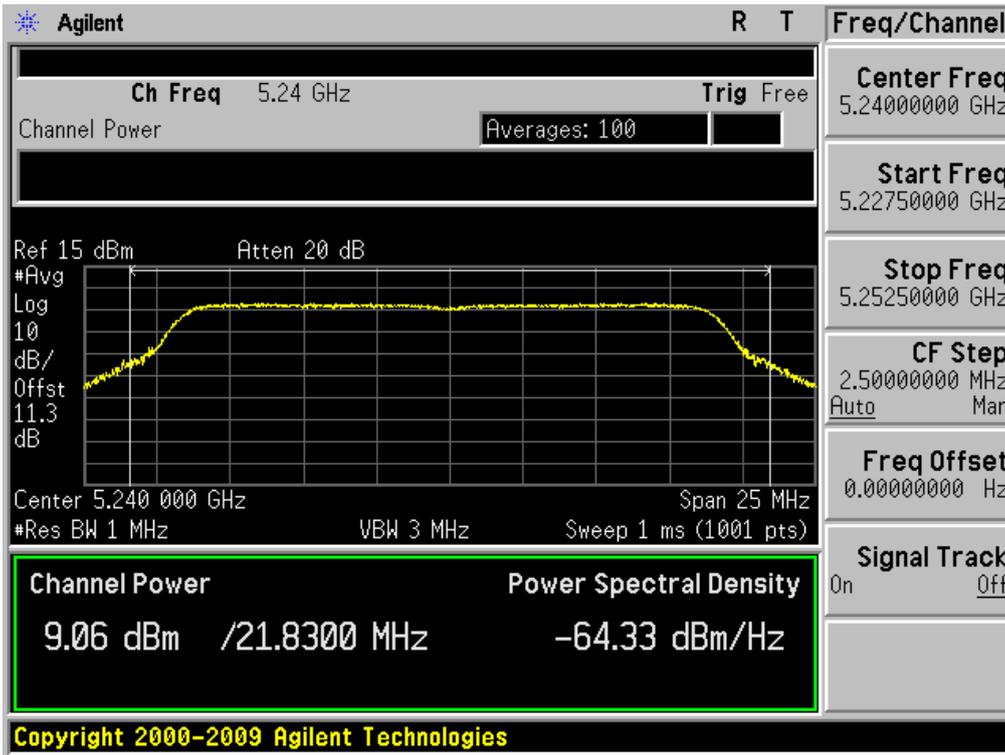
Output Power

Test Mode: 802.11n HT20 & Ch.40



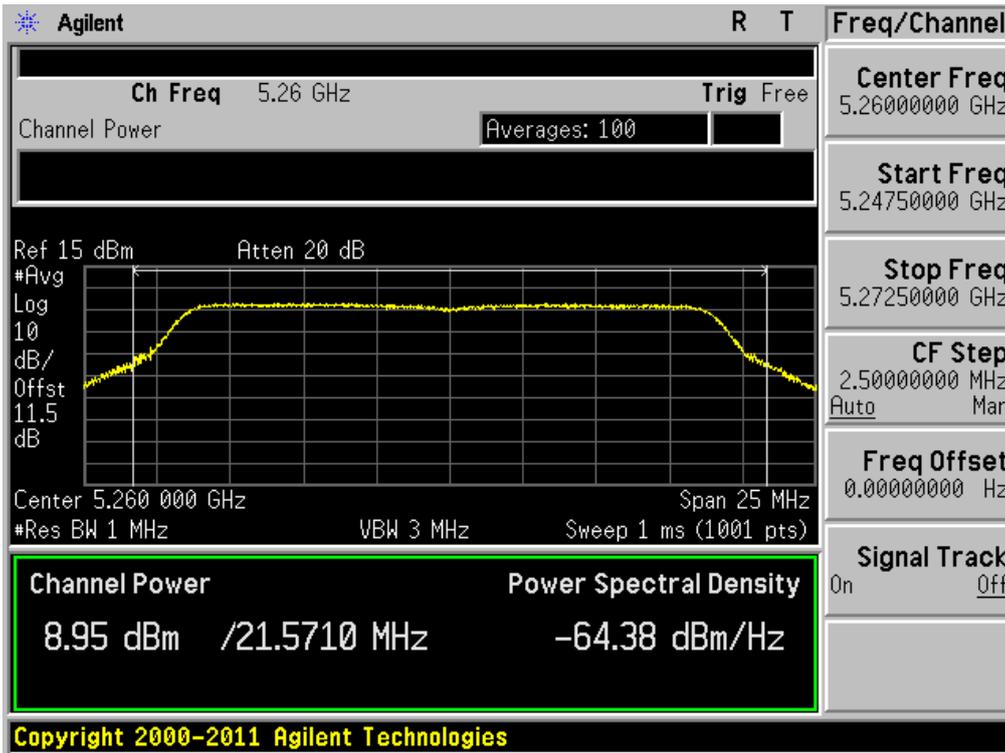
Output Power

Test Mode: 802.11n HT20 & Ch.48



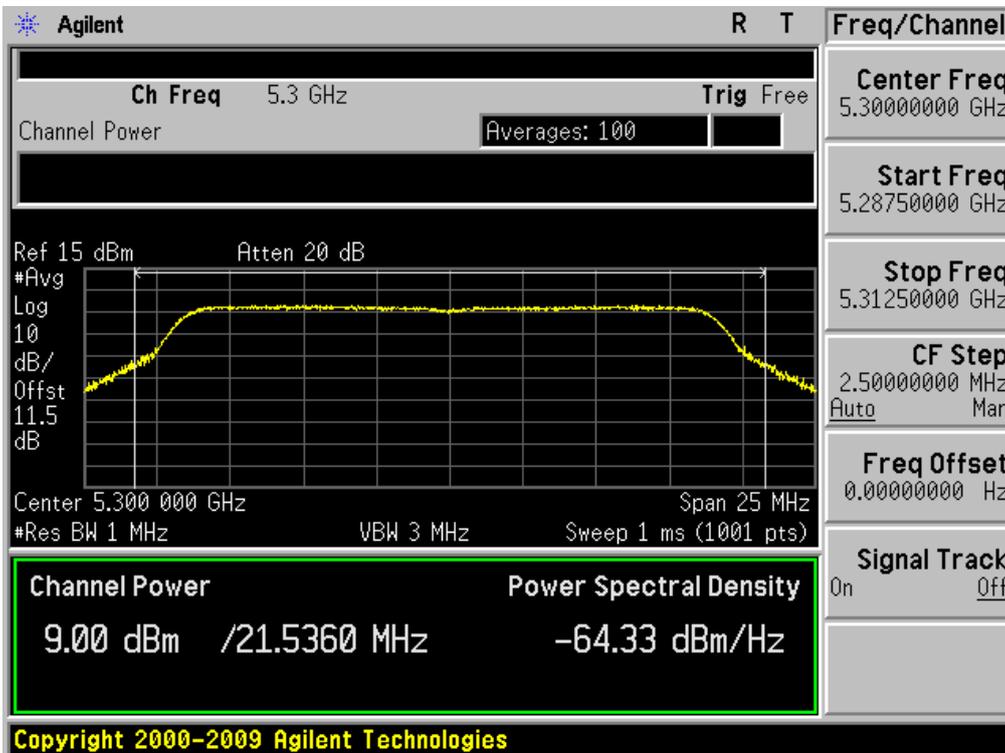
Output Power

Test Mode: 802.11n HT20 & Ch.52



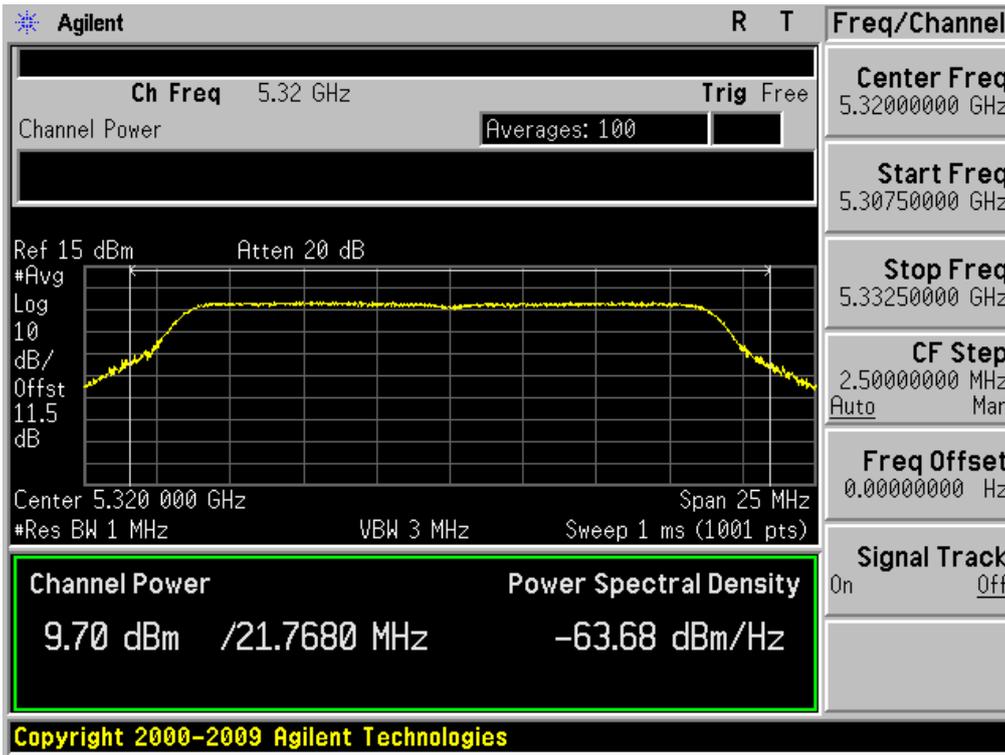
Output Power

Test Mode: 802.11n HT20 & Ch.60



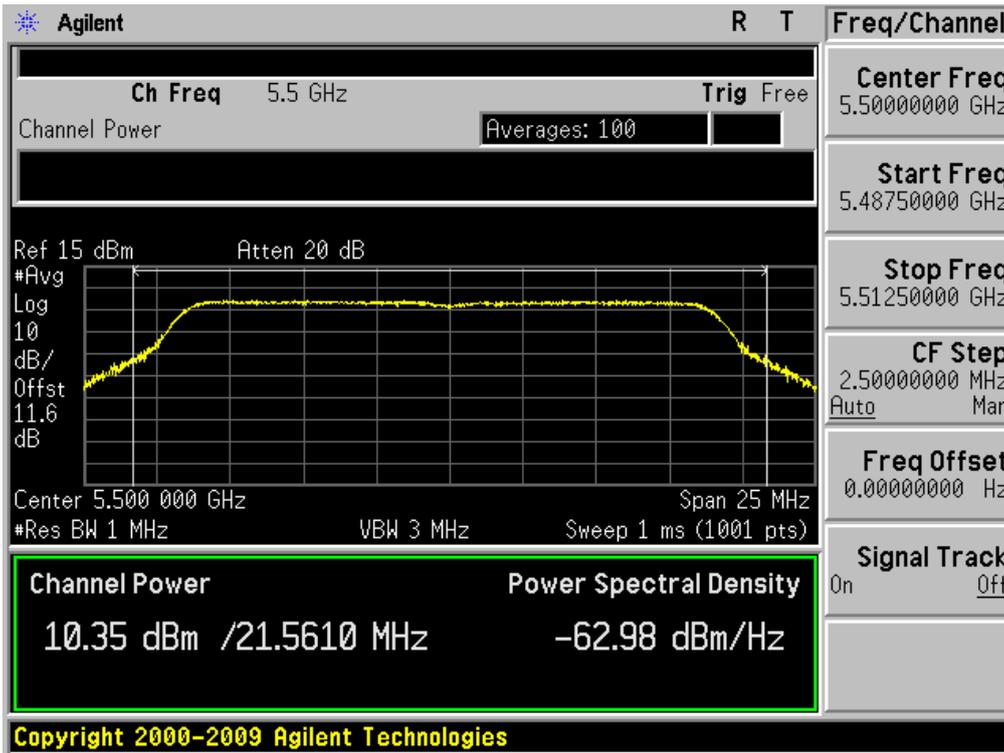
Output Power

Test Mode: 802.11n HT20 & Ch.64



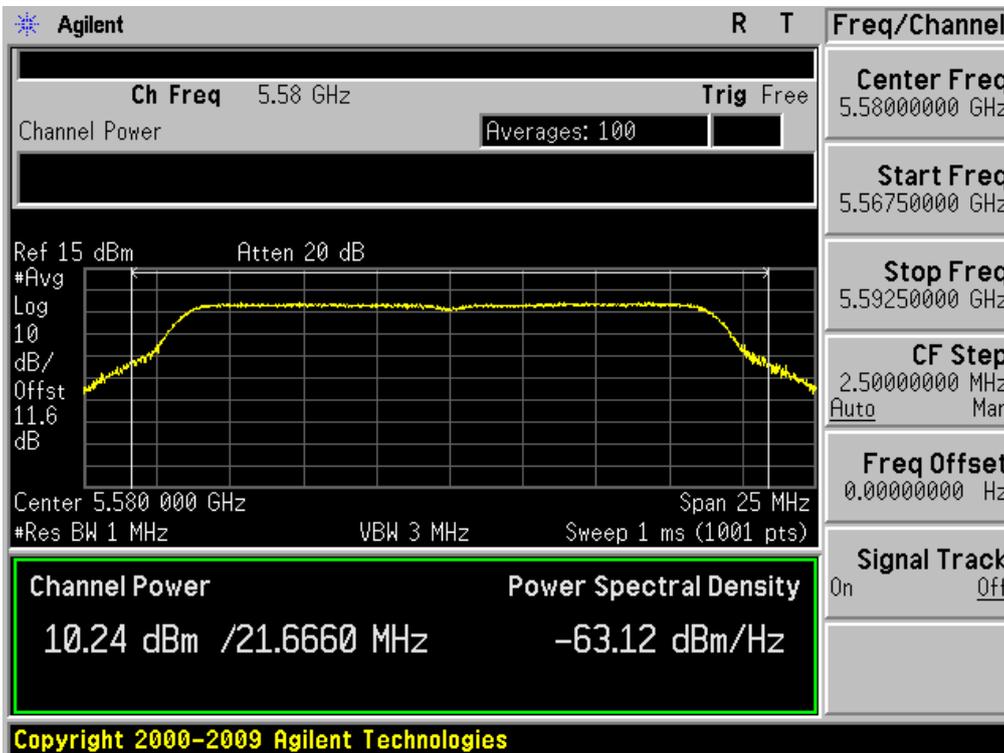
Output Power

Test Mode: 802.11n HT20 & Ch.100



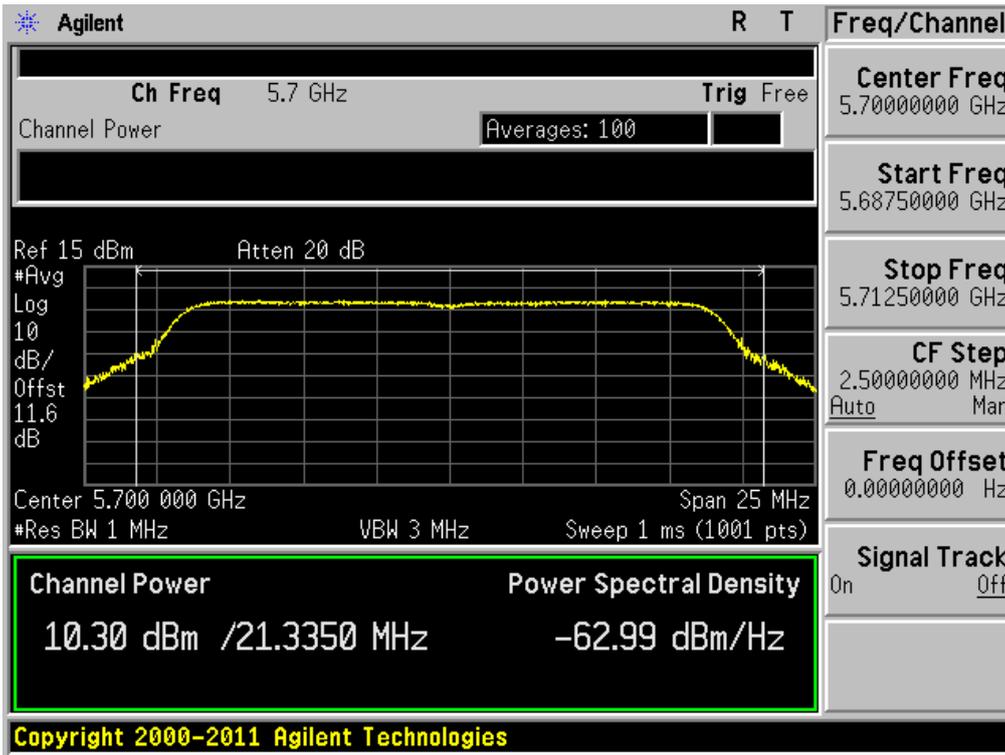
Output Power

Test Mode: 802.11n HT20 & Ch.116



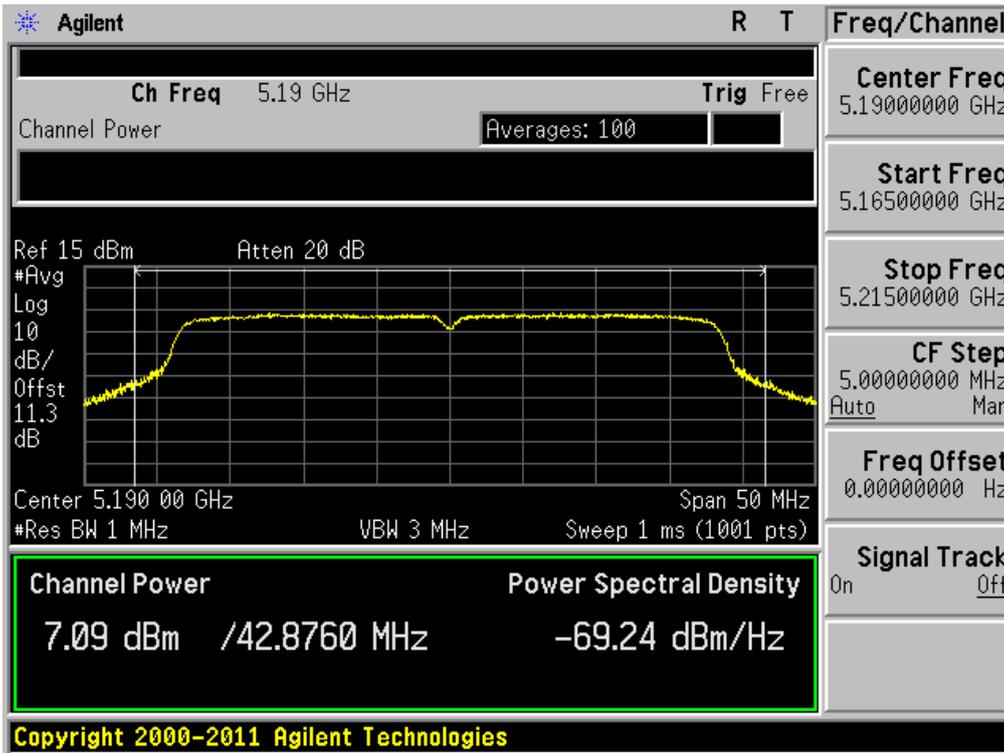
Output Power

Test Mode: 802.11n HT20 & Ch.140



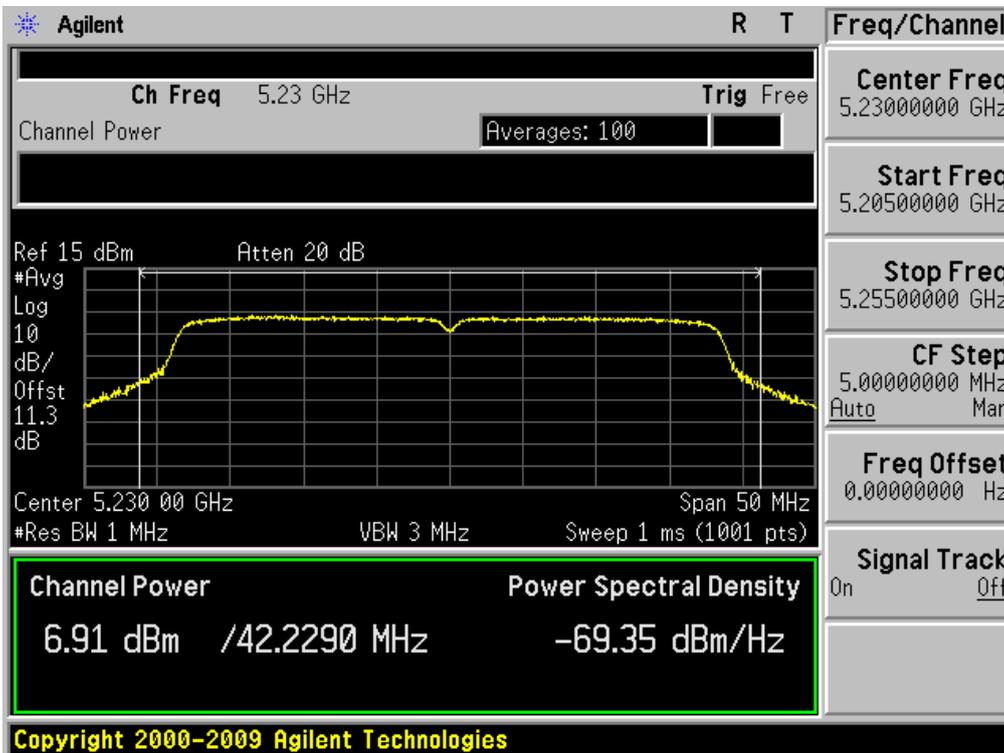
Output Power

Test Mode: 802.11n HT40 & Ch.38



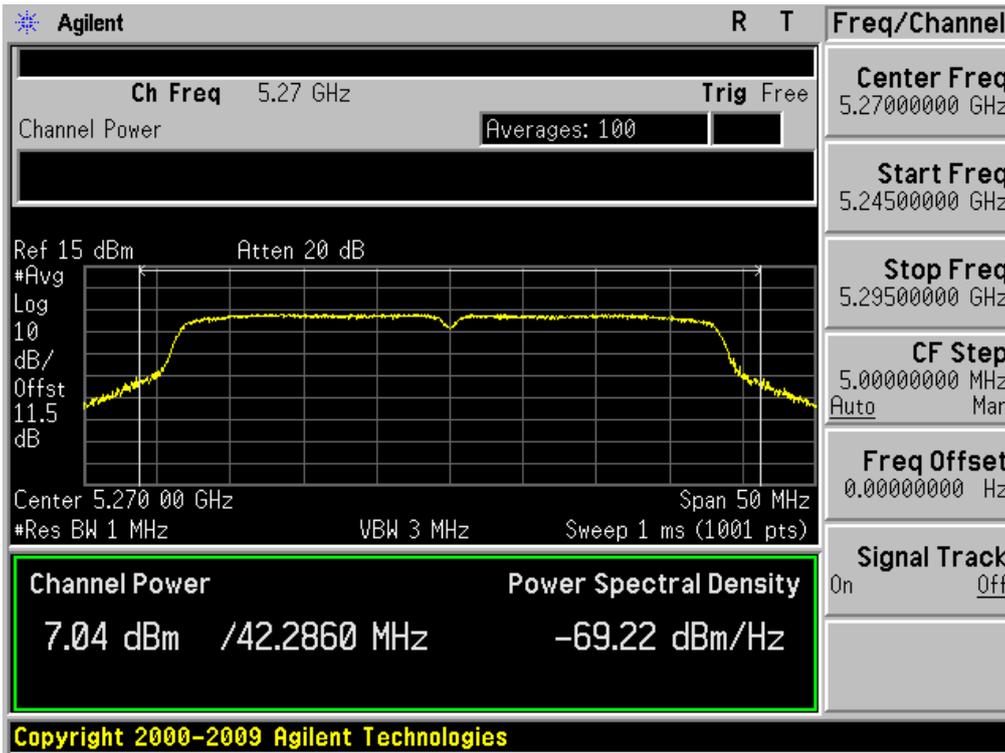
Output Power

Test Mode: 802.11n HT40 & Ch.46



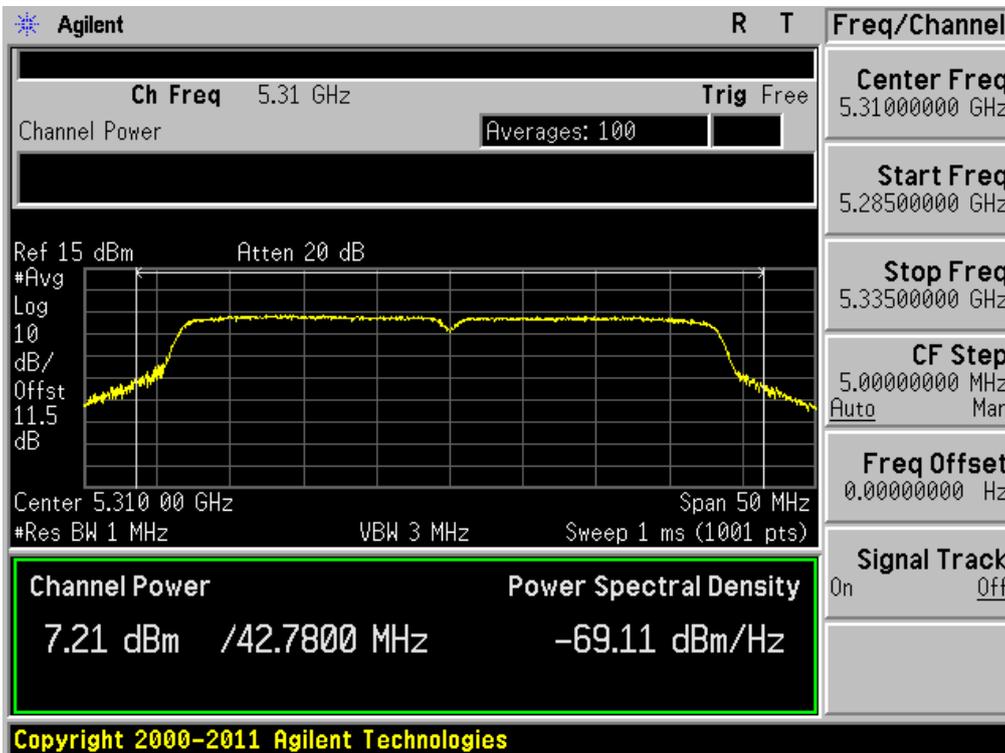
Output Power

Test Mode: 802.11n HT40 & Ch.54



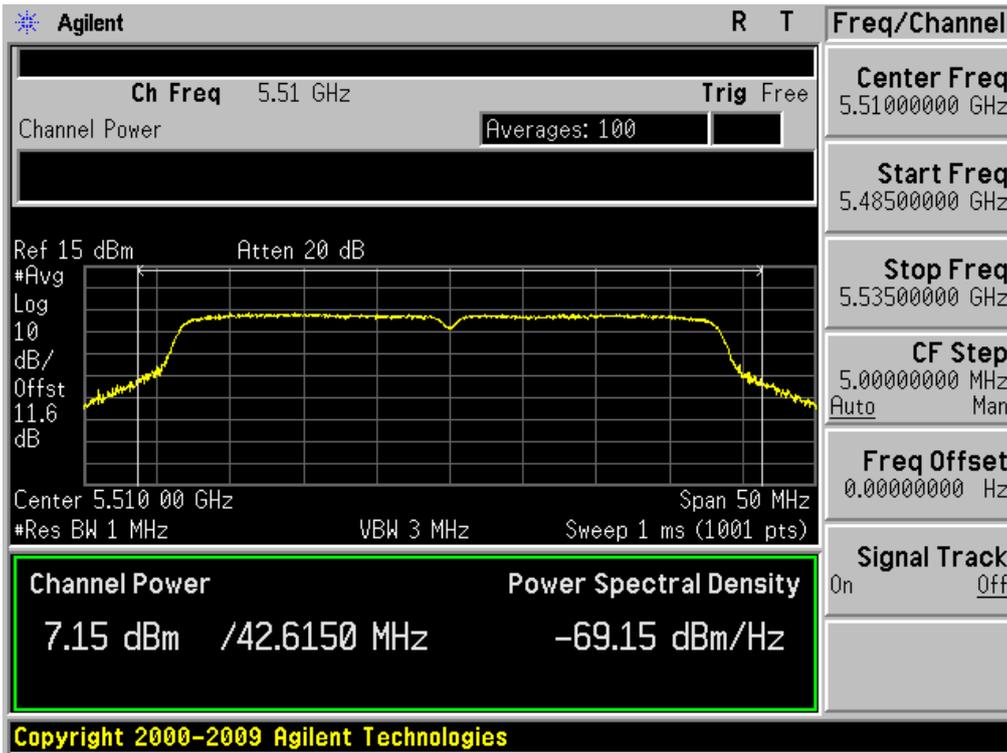
Output Power

Test Mode: 802.11n HT40 & Ch.62



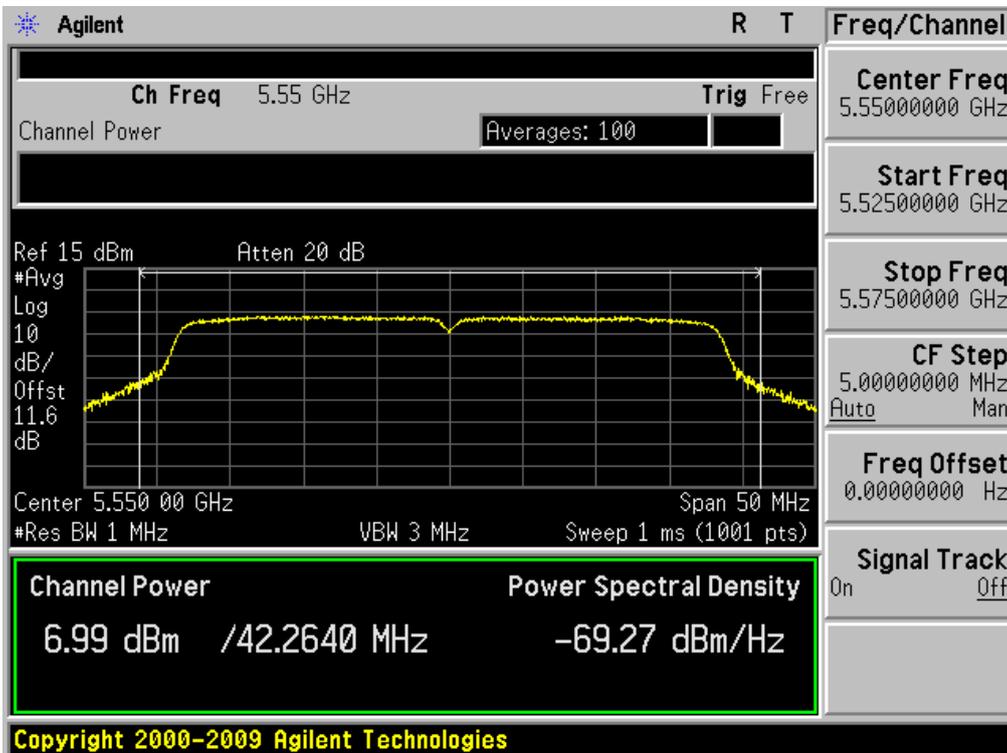
Output Power

Test Mode: 802.11n HT40 & Ch.102



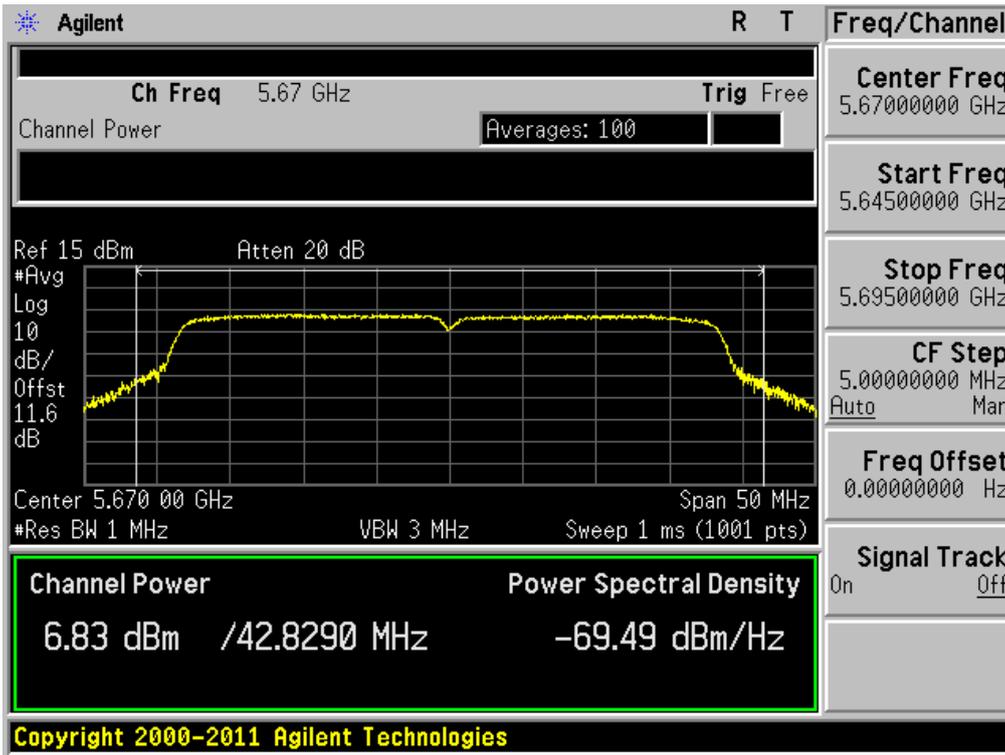
Output Power

Test Mode: 802.11n HT40 & Ch.110



Output Power

Test Mode: 802.11n HT40 & Ch.134



3.2.3 Peak Power Spectral Density

Test requirements

- (1) For the band 5.15-5.25 GHz, the peak power spectral density shall not exceed 4 dBm in any 1MHz band.
- (2) For the 5.25-5.35 GHz and 5.47-5.725 GHz bands, the peak power spectral density shall not exceed 11 dBm in any 1 MHz band.

If transmitting antennas of directional gain greater than 6 dBi are used, the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

- Peak Power Spectral Density Limit Calculation

Band	Limit [dBm]	ANT Gain [dBi]	Determined Limit [dBm]
Band I	4	-1.19	4
Band II	11	-1.19	11
Band III	11	-1.19	11

■ TEST CONFIGURATION

Refer to the APPENDIX I.

■ TEST PROCEDURE

Peak Power Spectral Density is measured using Measurement Procedure of **KDB789033**

- 1) Create an average power spectrum for the EUT operating mode being tested by following the instructions in section C)3) for measuring maximum conducted output power using a spectrum analyzer: select the appropriate test method (SA-1, SA-2, SA-3, or alternatives to each) and apply it up to, but not including, the step labeled, "Compute power...". (This procedure is required even if the maximum conducted output power measurement was performed using a power meter, method PM.)
- 2) Use the peak search function on the spectrum analyzer to find the peak of the spectrum.
- 3) Make the following adjustments to the peak value of the spectrum, if applicable:
 - a) **If Method SA-2 or SA-2 Alternative was used, add 10 log(1/x), where x is the duty cycle, to the peak of the spectrum.**
 - b) If Method SA-3 Alternative was used and the linear mode was used in step C)3)g)(viii), add 1 dB to the final result to compensate for the difference between linear averaging and power averaging.
- 4) The result is the PPSD.

■ TEST RESULT : **Comply**

Mode	Channel	Frequency [MHz]	Reading [dBm]	Duty Cycle			DCF [dB]	Test Result [dBm]
				On Time[ms]	On+Off Time[ms]	X		
802.11a	36	5180	1.262	2.030	2.140	0.94	0.27	1.532
	40	5200	1.123					1.393
	48	5240	1.189					1.459
	52	5260	1.514	2.030	2.140	0.94	0.27	1.784
	60	5300	1.516					1.786
	64	5320	1.711					1.981
	100	5500	1.939	2.030	2.140	0.94	0.27	2.209
	116	5580	1.963					2.233
140	5700	2.127	2.397					

Mode	Channel	Frequency [MHz]	Reading [dBm]	Duty Cycle			DCF [dB]	Test Result [dBm]
				On Time[ms]	On+Off Time[ms]	X		
802.11n (20MHz)	36	5180	-1.356	1.890	1.990	0.94	0.27	-1.086
	40	5200	-1.140					-0.870
	48	5240	-1.599					-1.329
	52	5260	-0.724	1.890	1.990	0.94	0.27	-0.454
	60	5300	-1.496					-1.226
	64	5320	-0.911					-0.641
	100	5500	-0.361	1.890	1.990	0.94	0.27	-0.091
	116	5580	-0.588					-0.318
140	5700	-0.926	-0.656					
802.11n (40MHz)	38	5190	-7.524	0.930	0.984	0.94	0.27	-7.254
	46	5230	-7.555					-7.285
	54	5270	-7.829	0.930	0.984	0.94	0.27	-7.559
	62	5310	-7.960					-7.690
	102	5510	-7.059	0.930	0.984	0.94	0.27	-6.789
	110	5550	-7.233					-6.963
134	5670	-7.132	-6.862					

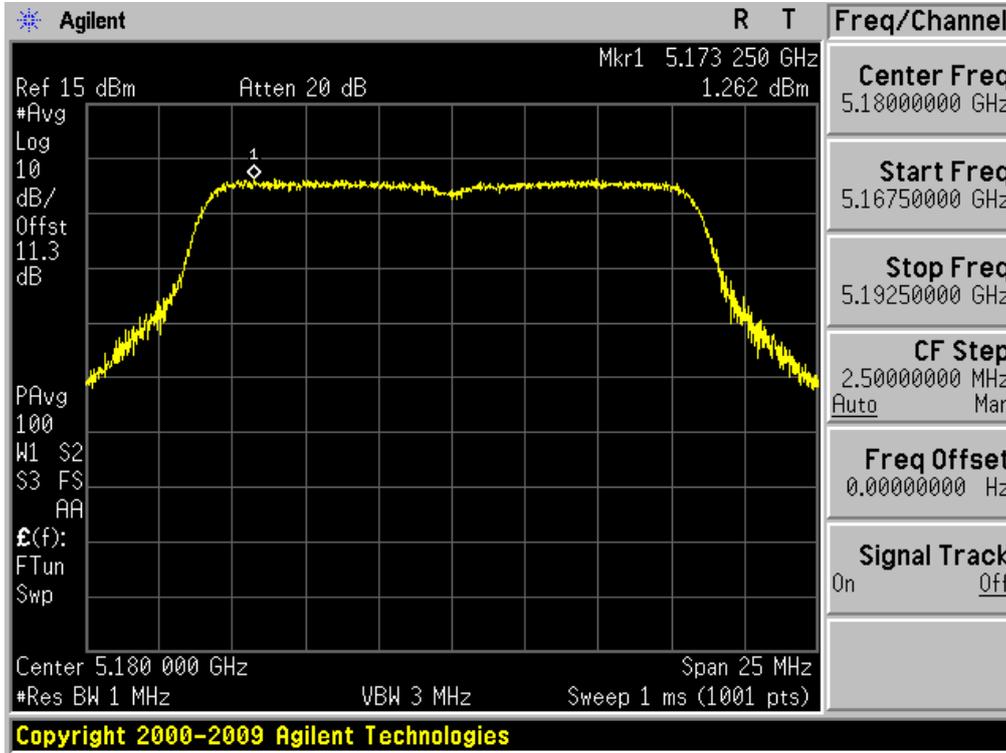
Note 1 : DCF = 10log(1 / X), X = On Time / (On+Off time)

Note 2 : Test Result = Measurement Data + DCF

Measurement Data PLOTS

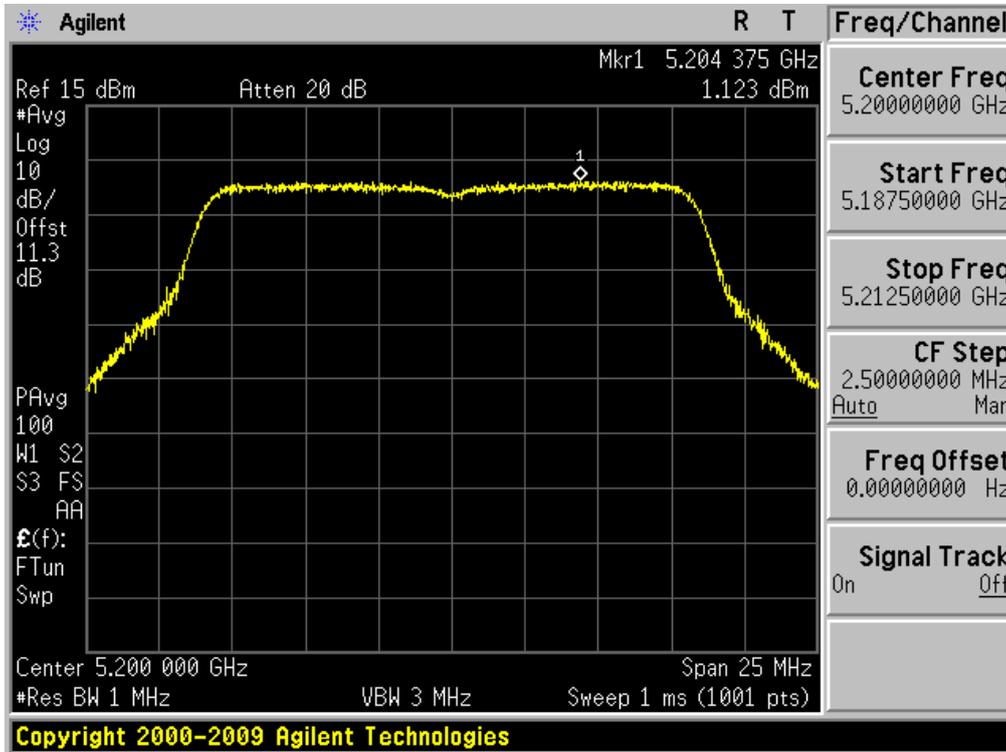
Peak Power Spectral Density

Test Mode: 802.11a & Ch.36



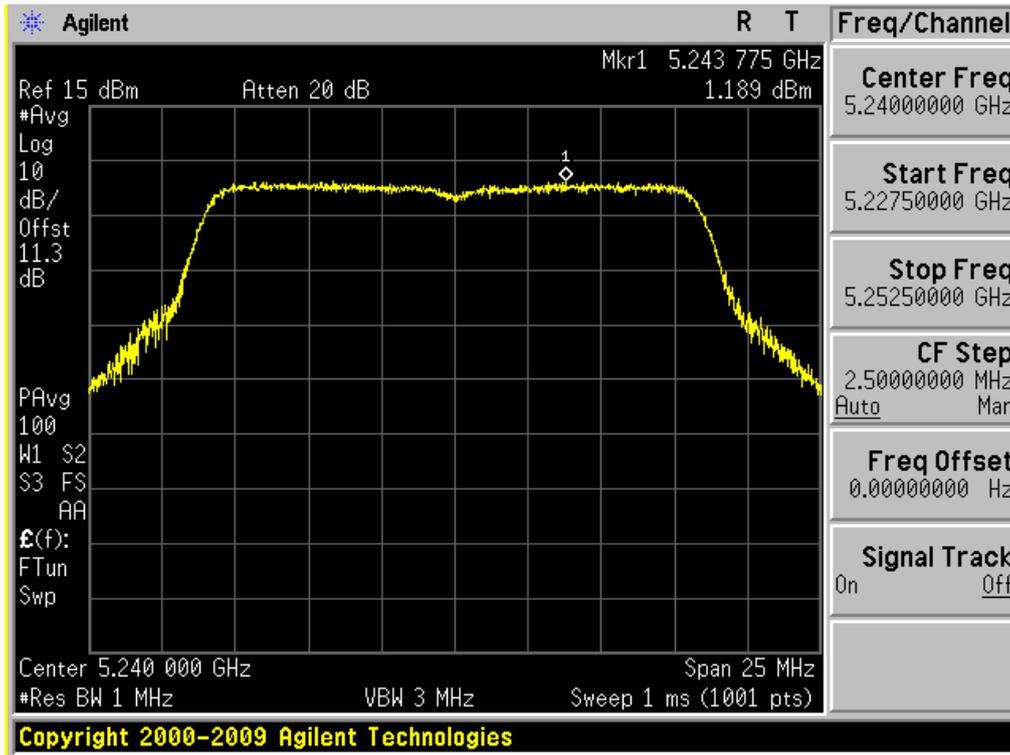
Peak Power Spectral Density

Test Mode: 802.11a & Ch.40



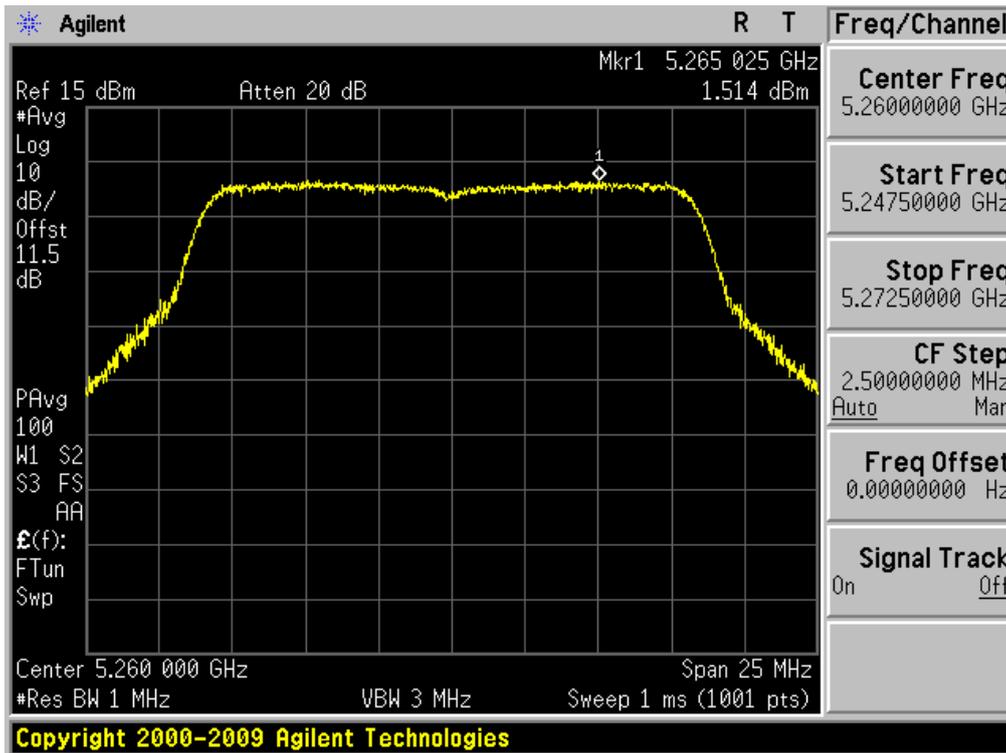
Peak Power Spectral Density

Test Mode: 802.11a & Ch.48



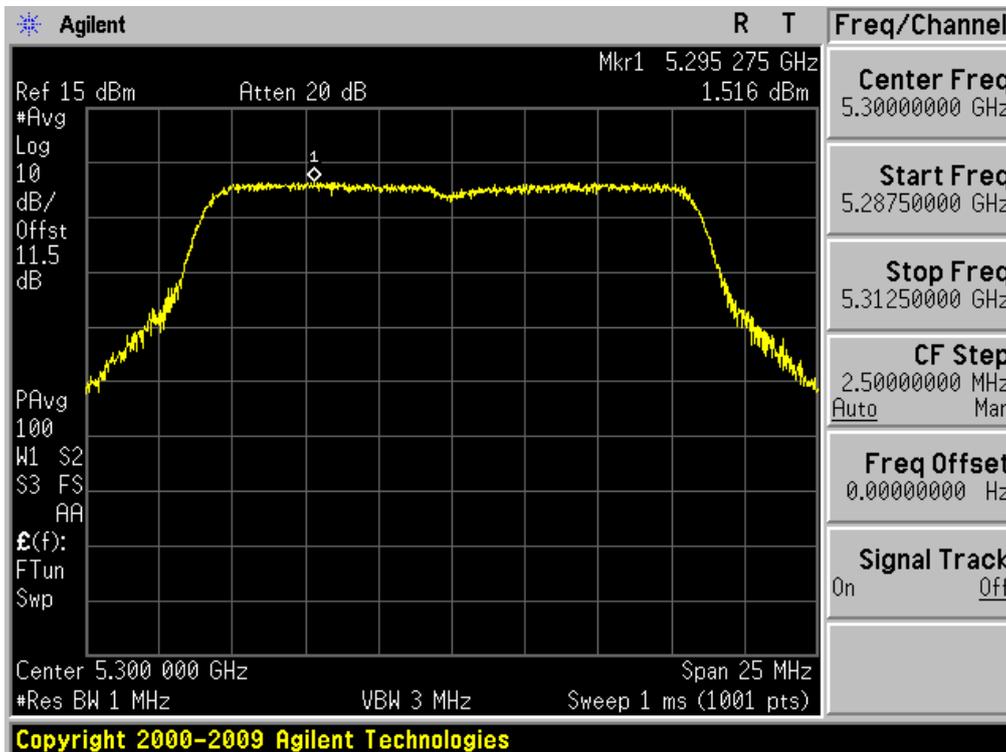
Peak Power Spectral Density

Test Mode: 802.11a & Ch.52



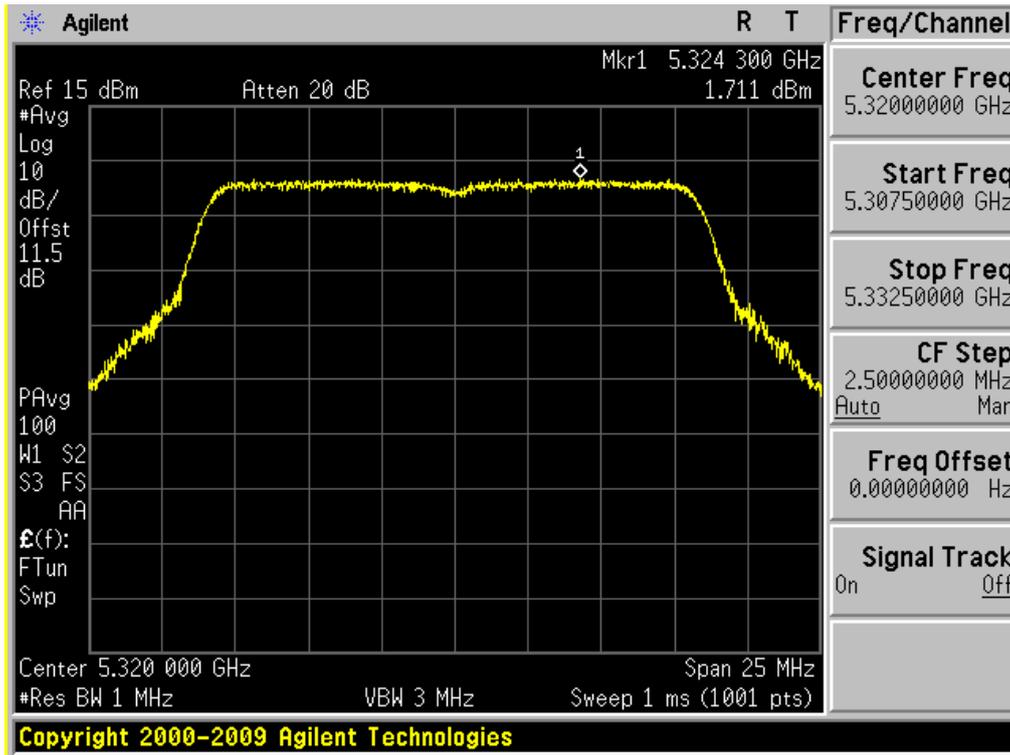
Peak Power Spectral Density

Test Mode: 802.11a & Ch.60



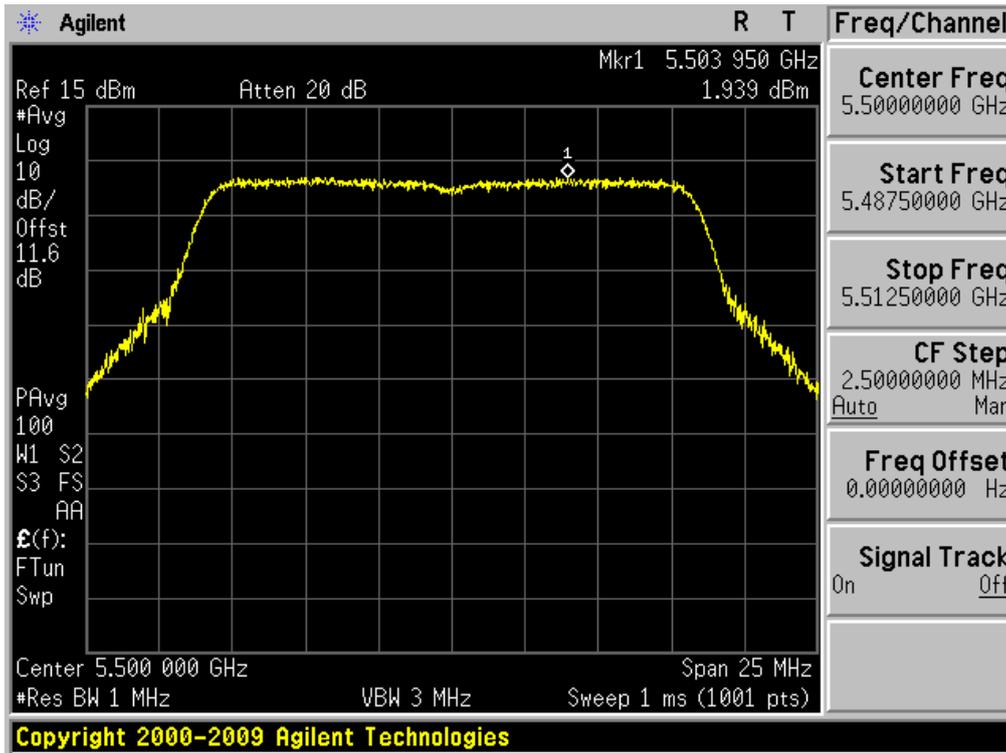
Peak Power Spectral Density

Test Mode: 802.11a & Ch.64



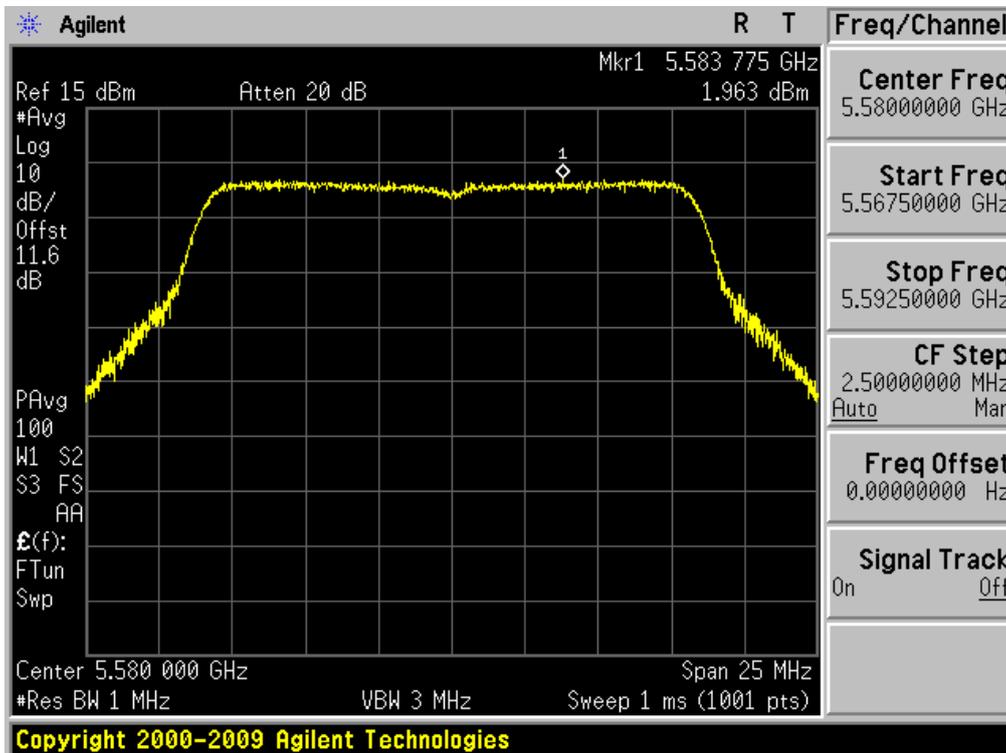
Peak Power Spectral Density

Test Mode: 802.11a & Ch.100



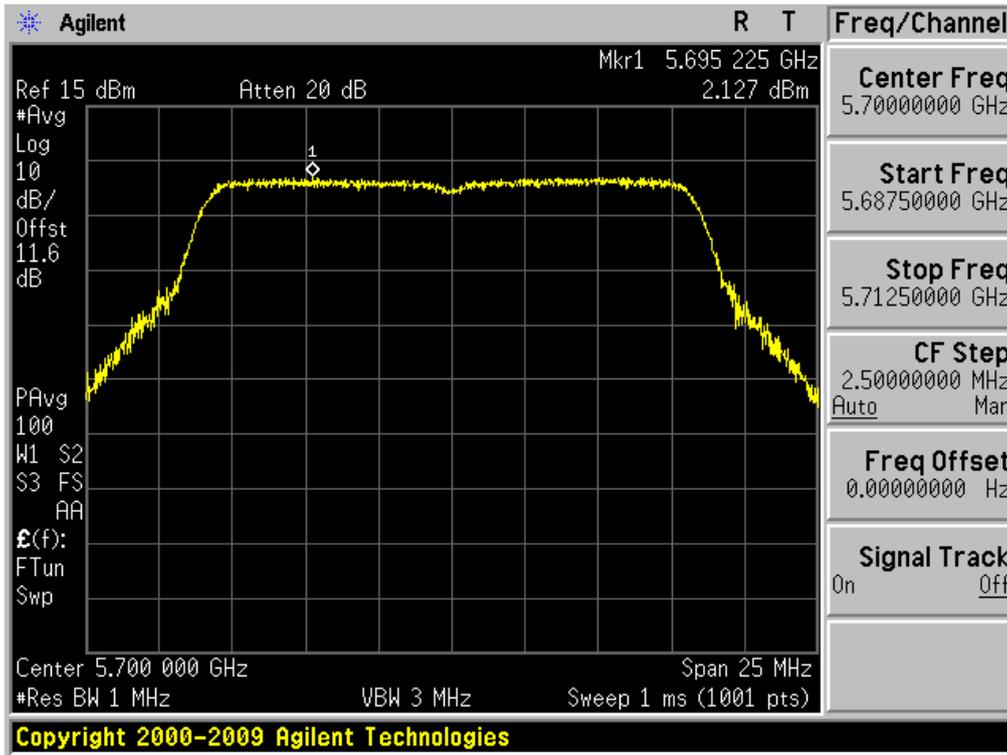
Peak Power Spectral Density

Test Mode: 802.11a & Ch.116



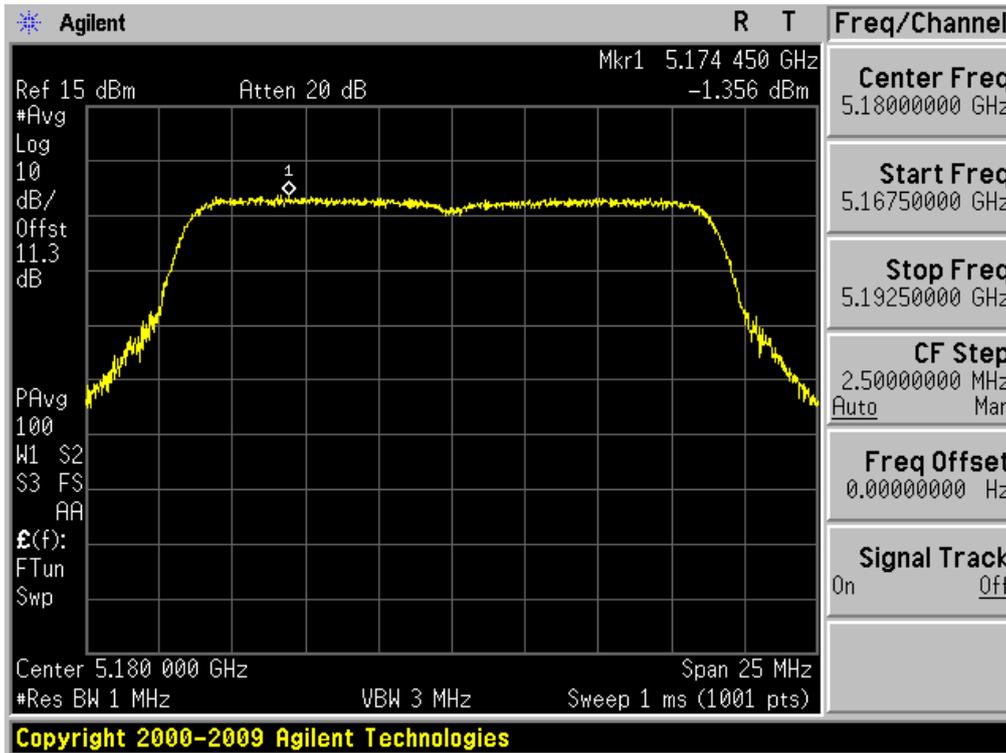
Peak Power Spectral Density

Test Mode: 802.11a & Ch.140



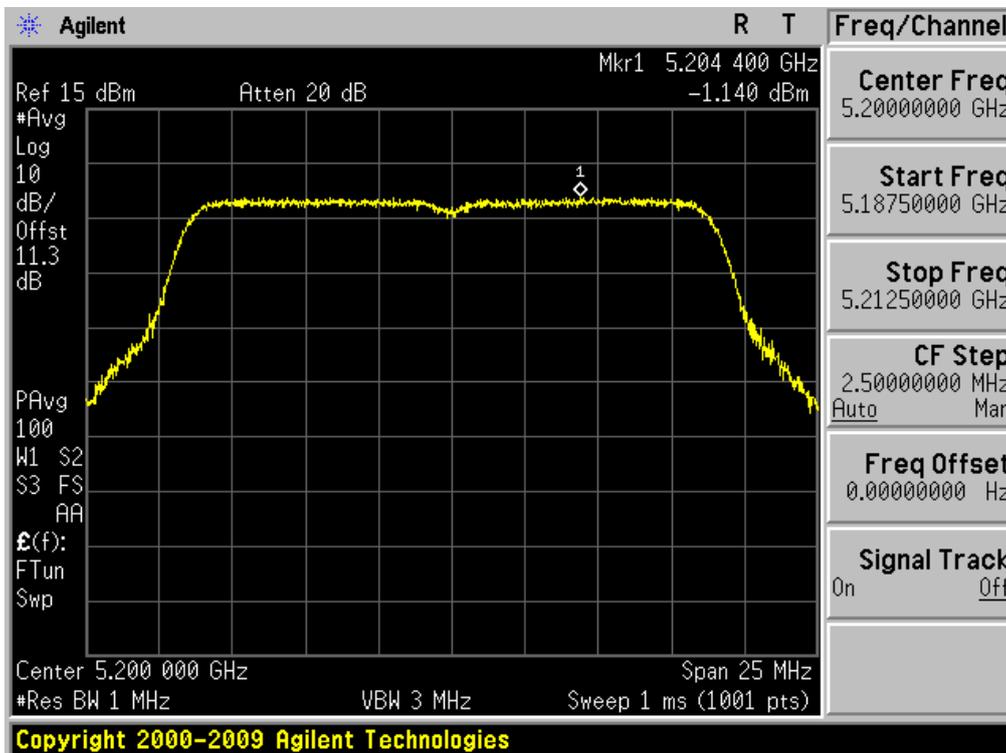
Peak Power Spectral Density

Test Mode: 802.11n HT20 & Ch.36



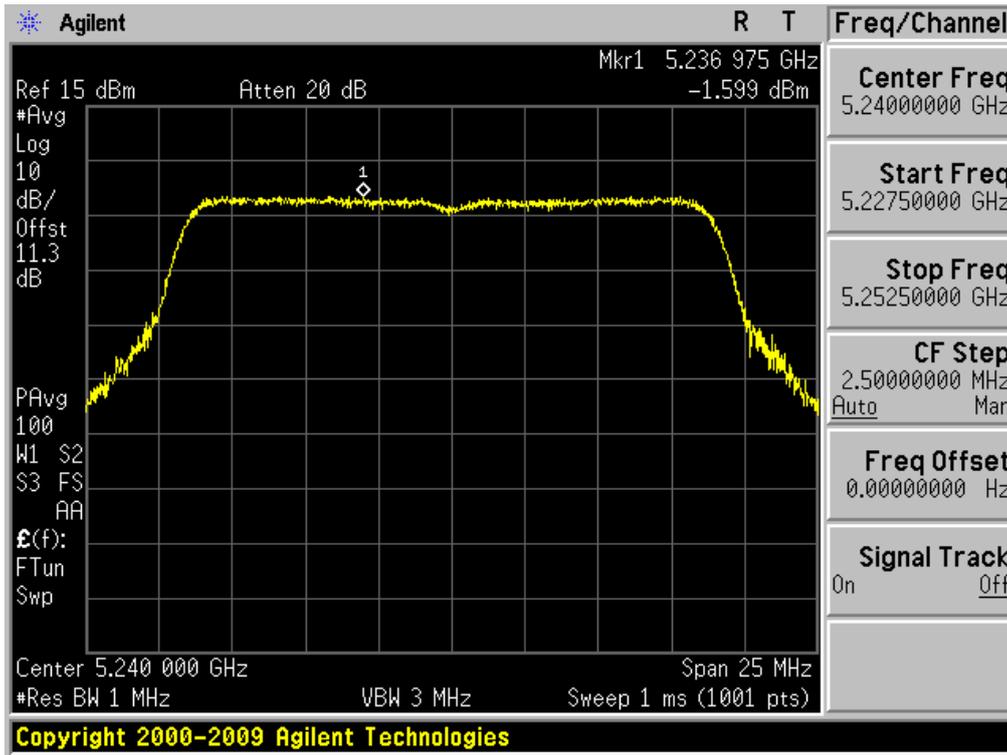
Peak Power Spectral Density

Test Mode: 802.11n HT20 & Ch.40



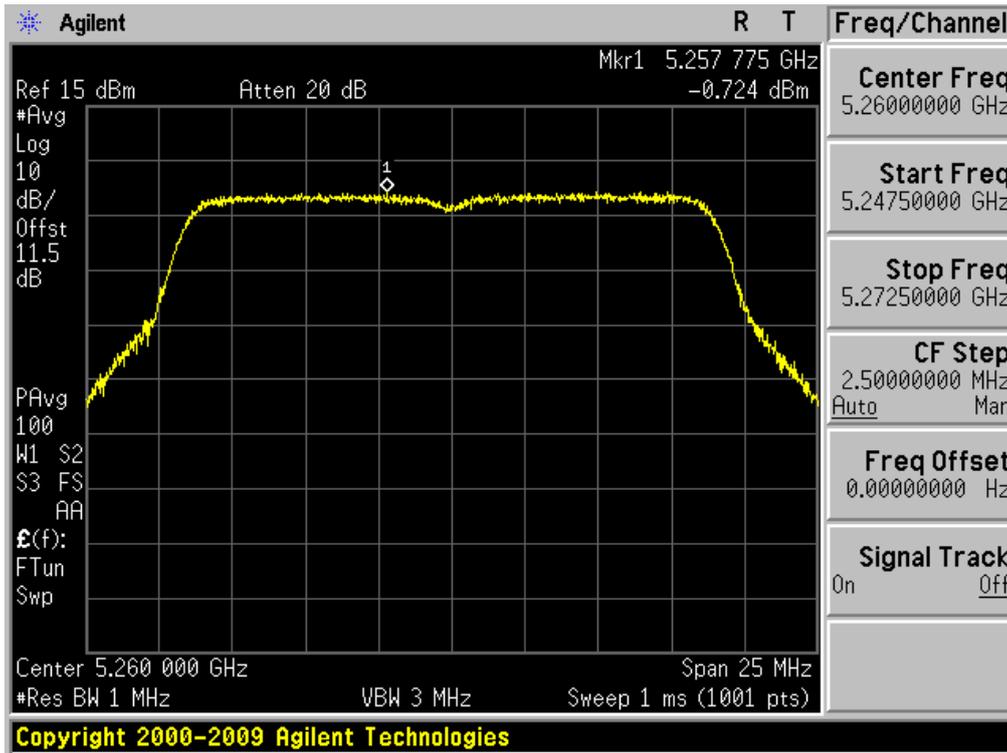
Peak Power Spectral Density

Test Mode: 802.11n HT20 & Ch.48



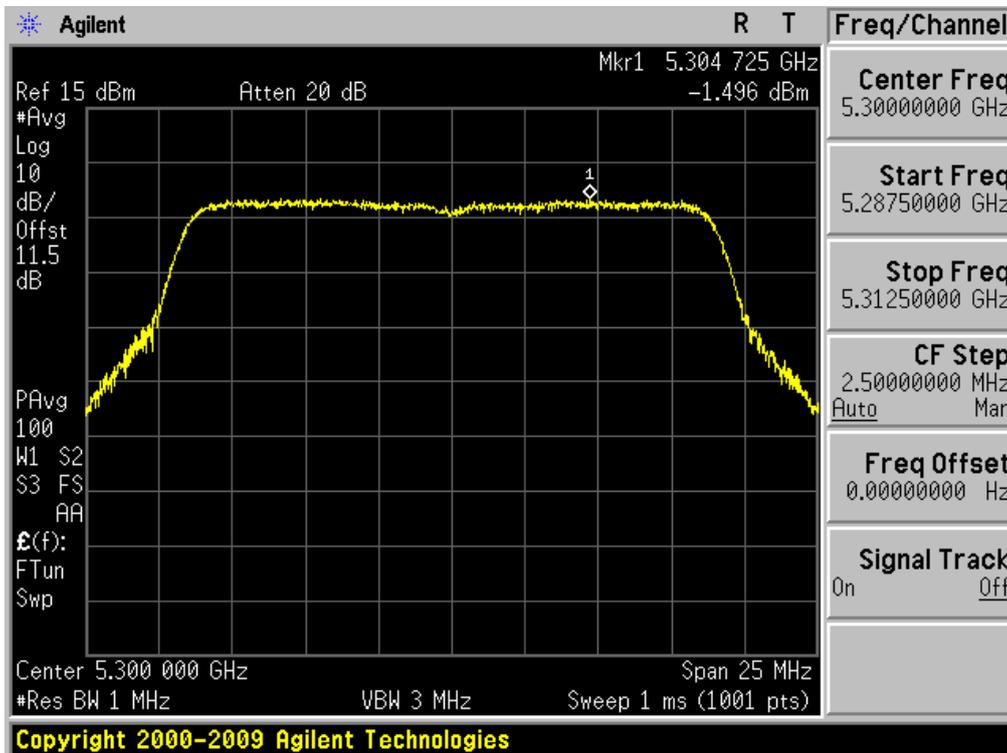
Peak Power Spectral Density

Test Mode: 802.11n HT20 & Ch.52



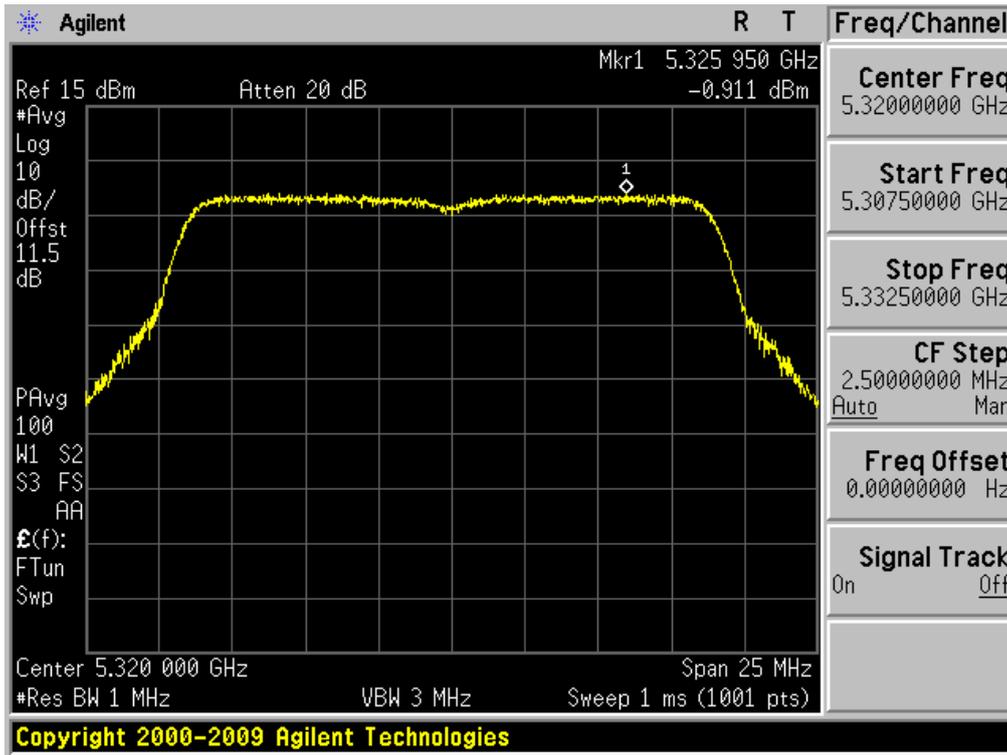
Peak Power Spectral Density

Test Mode: 802.11n HT20 & Ch.60



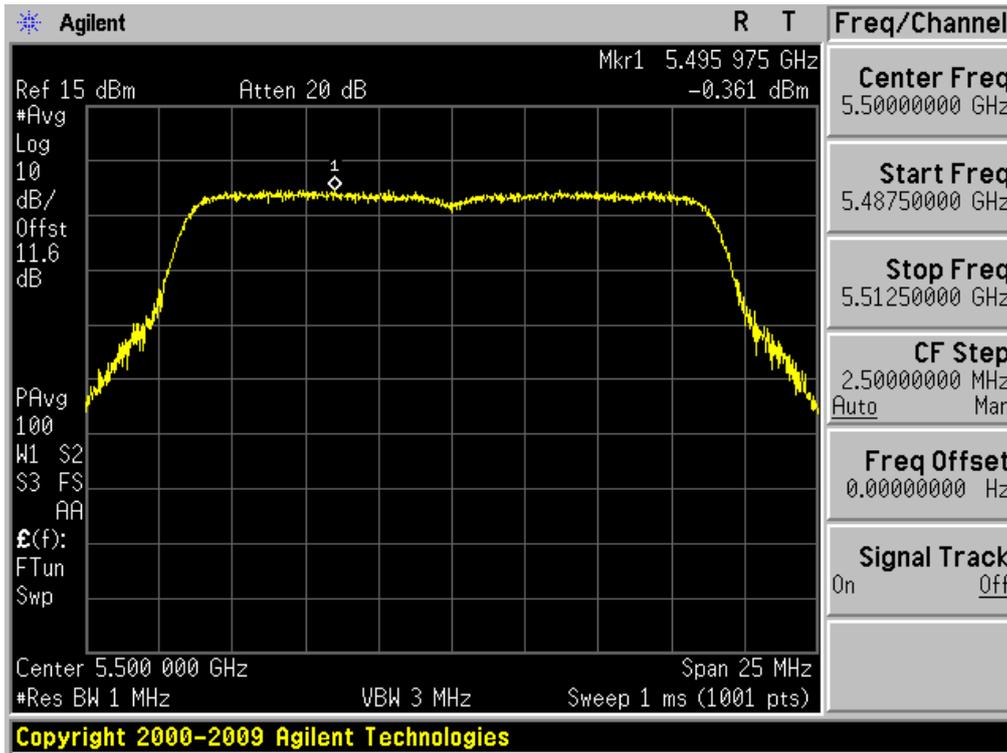
Peak Power Spectral Density

Test Mode: 802.11n HT20 & Ch.64



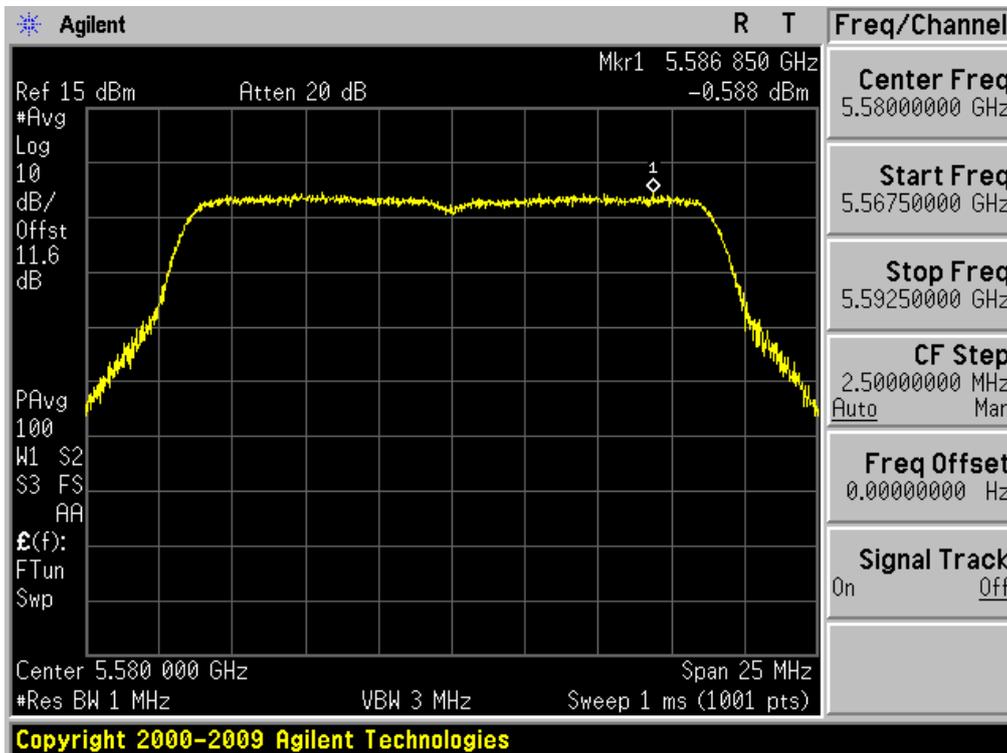
Peak Power Spectral Density

Test Mode: 802.11n HT20 & Ch.100



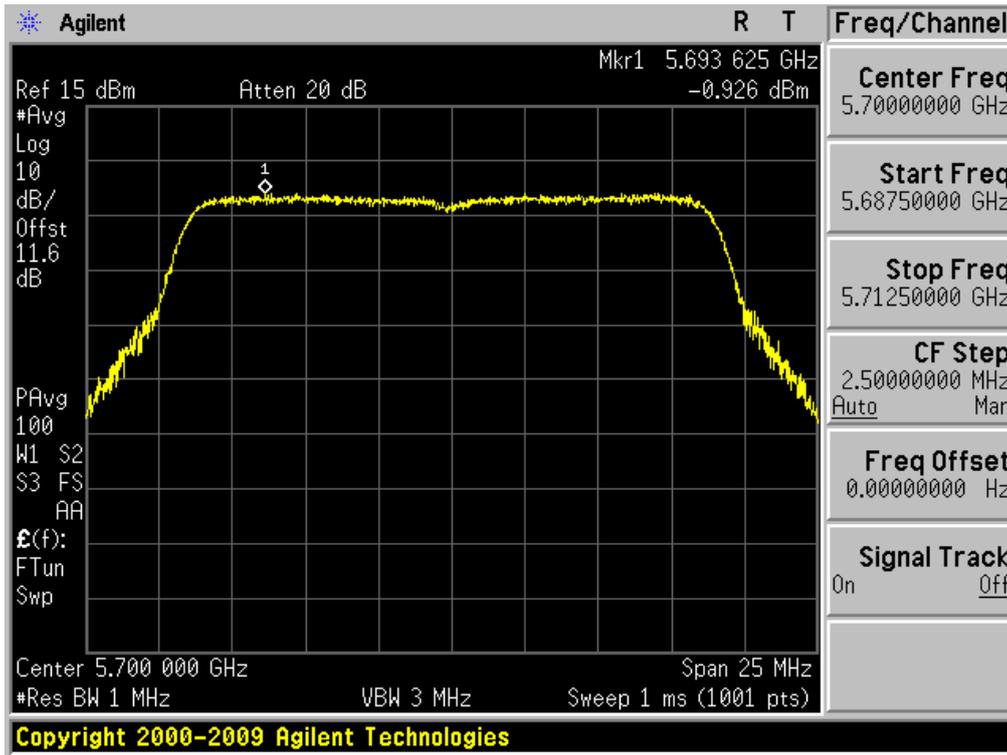
Peak Power Spectral Density

Test Mode: 802.11n HT20 & Ch.116



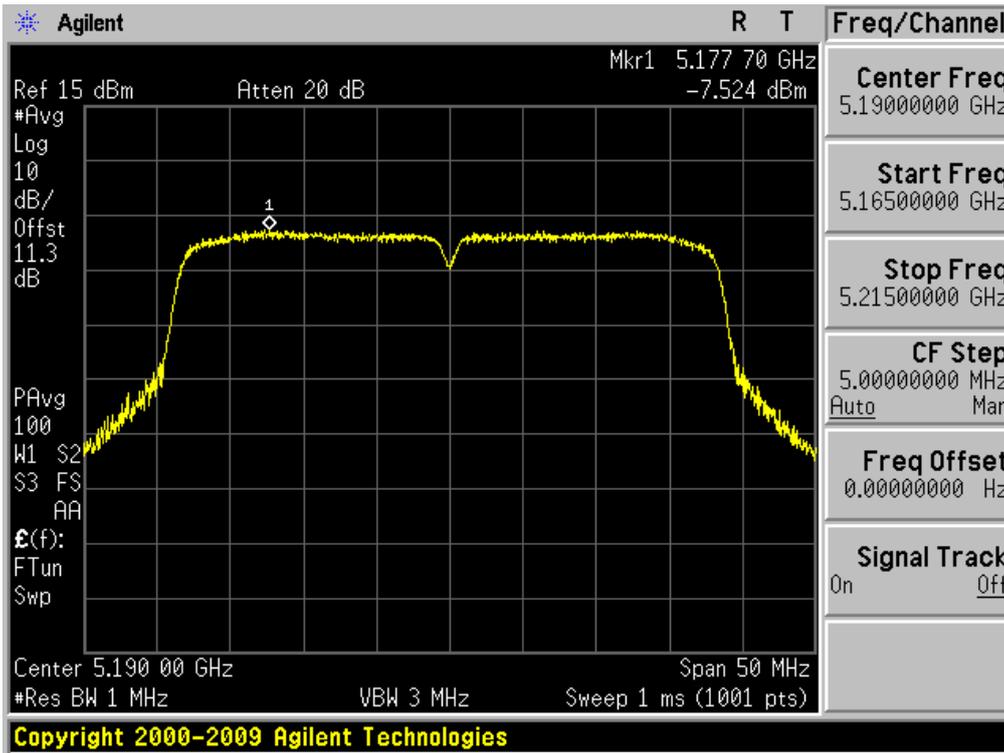
Peak Power Spectral Density

Test Mode: 802.11n HT20 & Ch.140



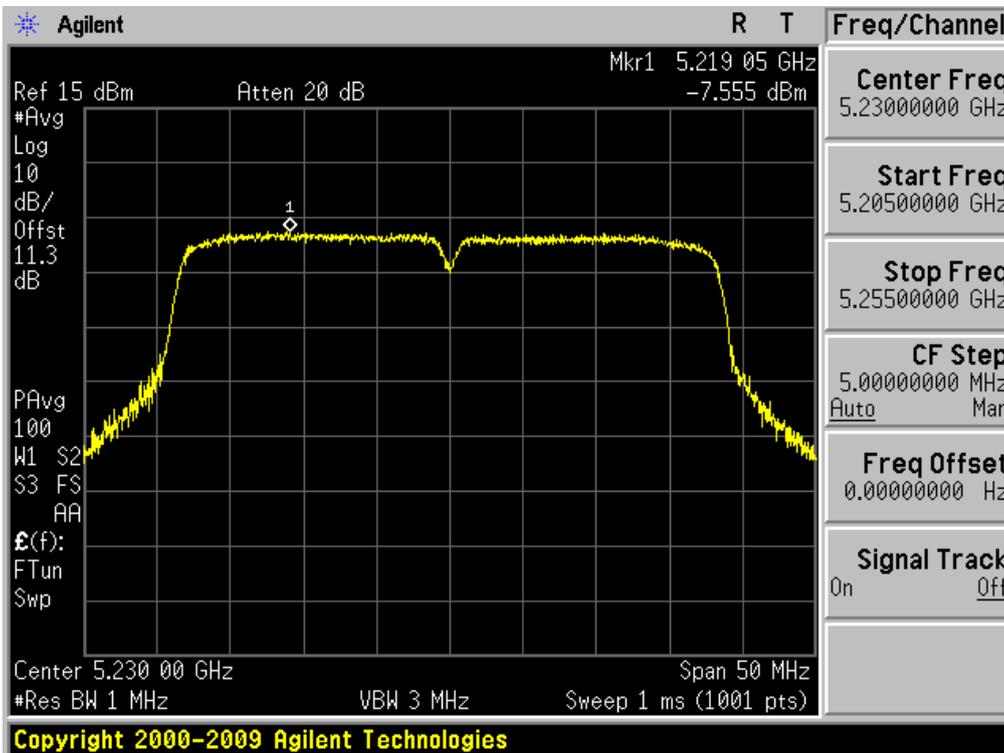
Peak Power Spectral Density

Test Mode: 802.11n HT40 & Ch.38



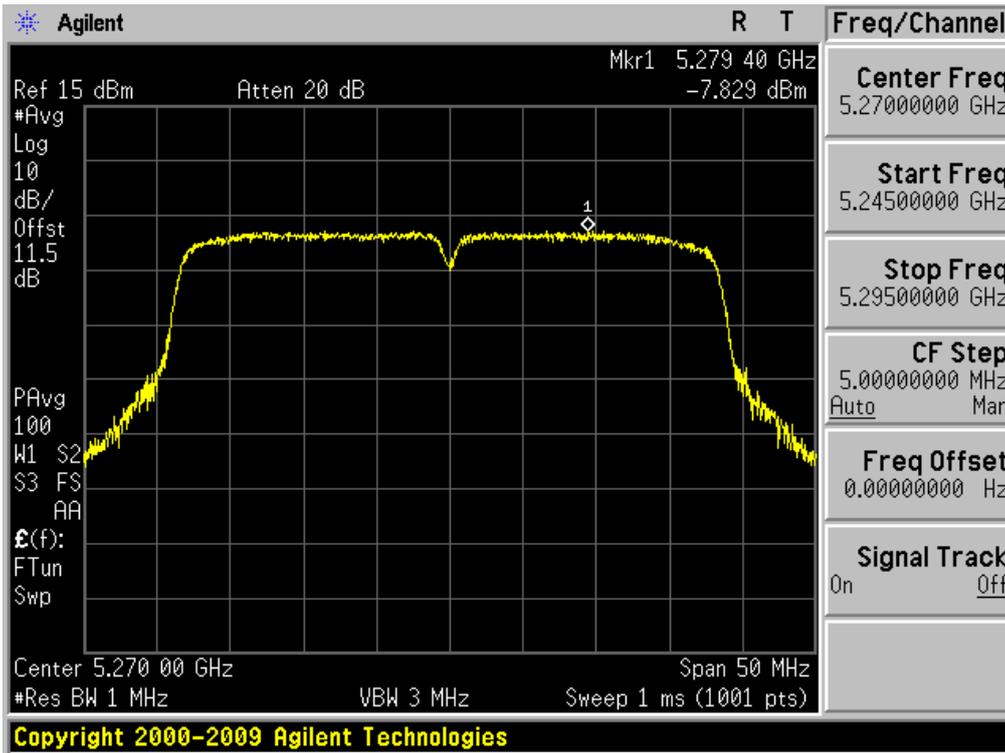
Peak Power Spectral Density

Test Mode: 802.11n HT40 & Ch.46



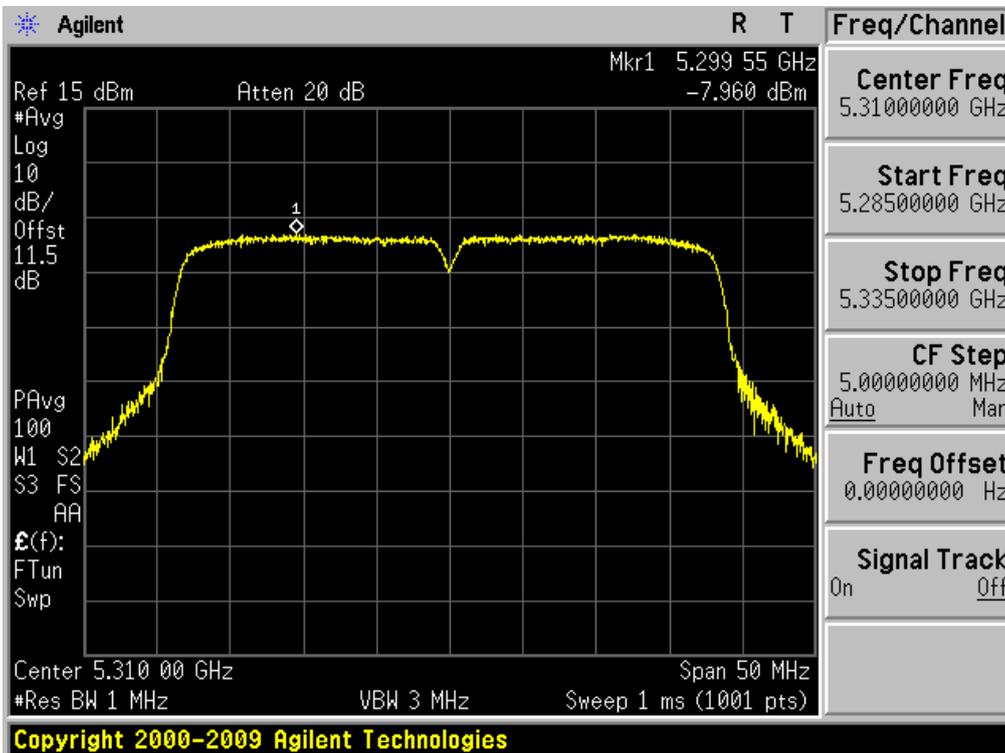
Peak Power Spectral Density

Test Mode: 802.11n HT40 & Ch.54



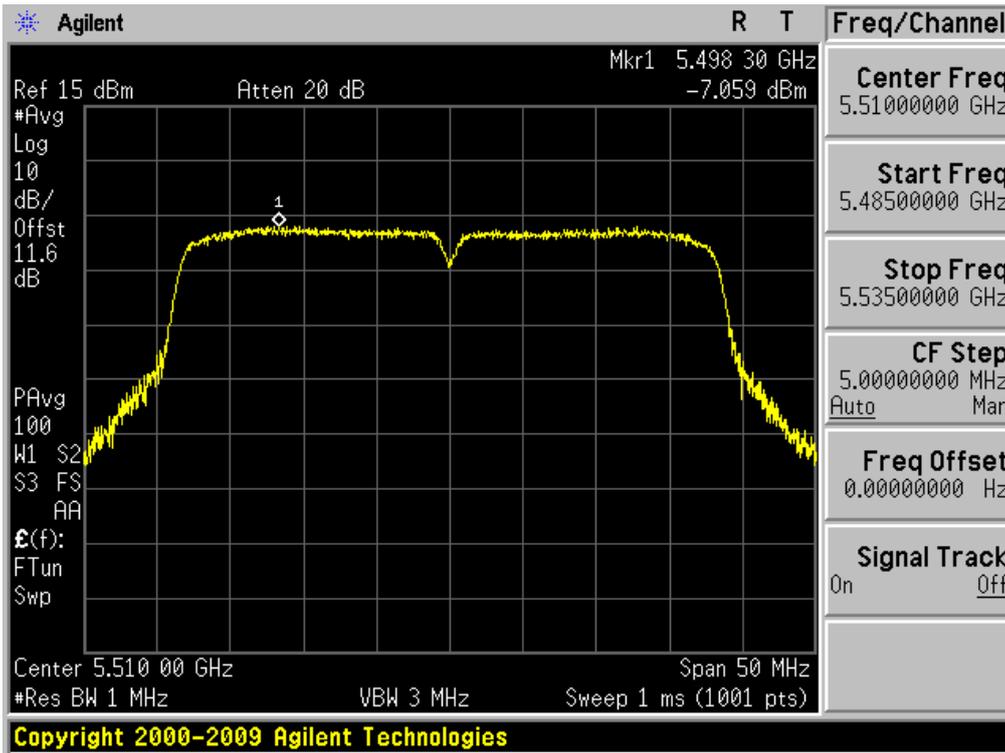
Peak Power Spectral Density

Test Mode: 802.11n HT40 & Ch.62



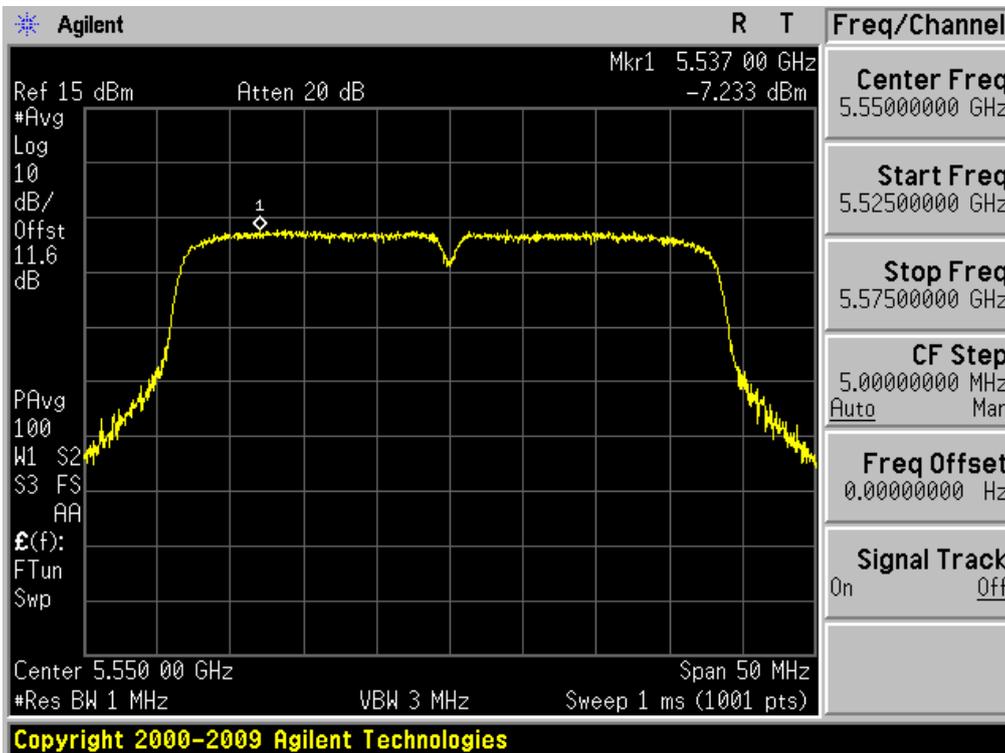
Peak Power Spectral Density

Test Mode: 802.11n HT40 & Ch.102



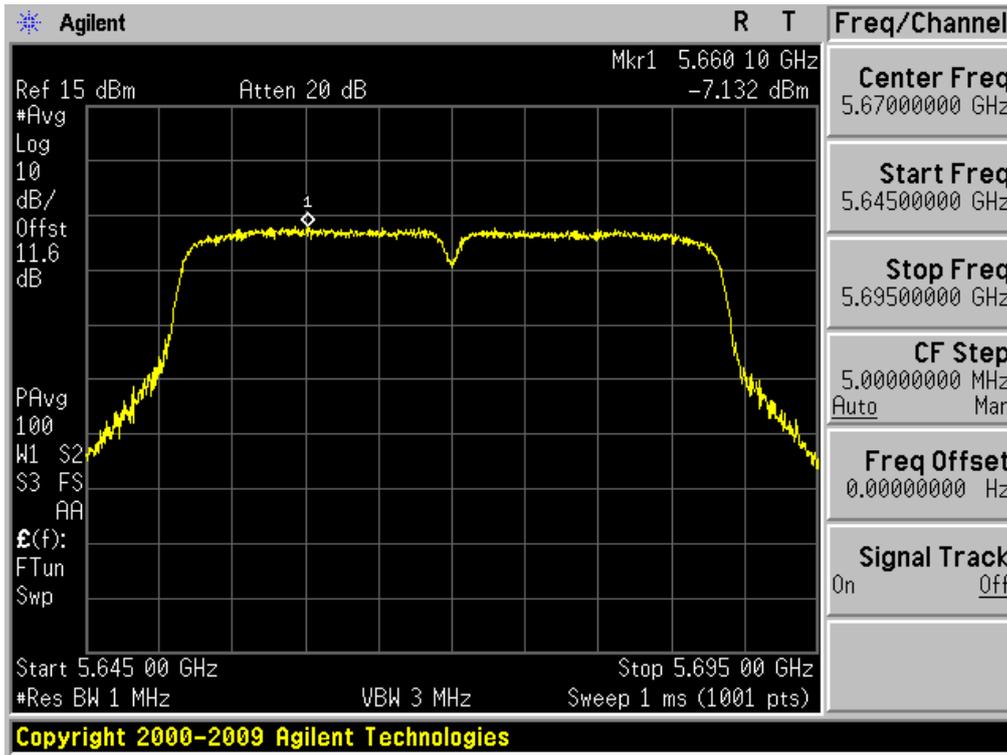
Peak Power Spectral Density

Test Mode: 802.11n HT40 & Ch.110



Peak Power Spectral Density

Test Mode: 802.11n HT40 & Ch.134



3.2.4 Peak Excursion Ratio

Test requirements

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/MHz**.

■ TEST CONFIGURATION

Refer to the APPENDIX I.

■ TEST PROCEDURE

Peak Excursion Ratio is measured using Measurement Procedure of **KDB789033**

- 1) Compliance with the peak excursion requirement of Section 15.407(a)(6) shall be demonstrated by confirming that the ratio of the maximum of the peak-max-hold spectrum to the maximum of the average spectrum for continuous transmission does not exceed 13 dB. (Earlier procedures that required computing the ratio of the two spectra at each frequency across the emission bandwidth can lead to unintended failures at band edges and will no longer be required.)
- 2) Set the spectrum analyzer span to view the entire emission bandwidth.
- 3) Find the maximum of the peak-max-hold spectrum.
 - a) Set **RBW = 1 MHz**.
 - b) **VBW ≥ 3 MHz**.
 - c) **Detector = peak**.
 - d) **Trace mode = max-hold**.
 - e) Allow the sweeps to continue until the trace stabilizes.
 - f) Use the peak search function to find the peak of the spectrum.
- 4) **Use the procedure found under E) to measure the PPSD.**
- 5) Compute the ratio of the maximum of the peak-max-hold spectrum to the PPSD.

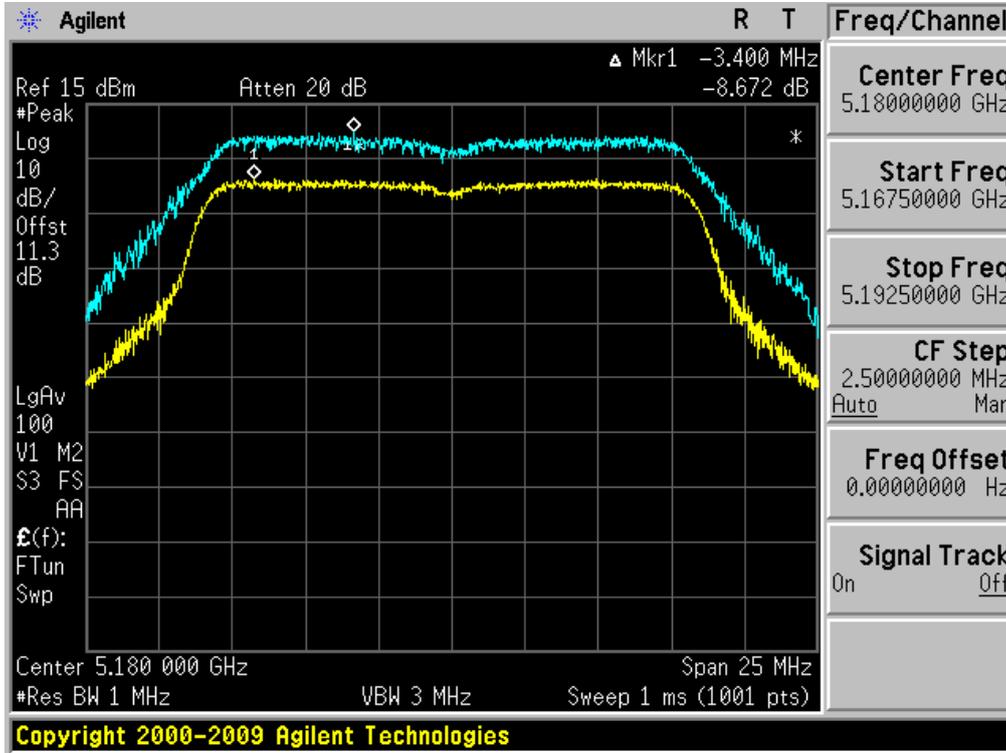
■ TEST RESULT : **Comply**

Mode	Band	Channel	Frequency [MHz]	Test Result [dB/MHz]	Limit [dB/MHz]
802.11a	Band I	36	5180	8.672	13.000
		40	5200	8.254	
		48	5240	7.720	
	Band II	52	5260	8.615	
		60	5300	7.992	
		64	5320	7.829	
	Band III	100	5500	8.352	
		116	5580	7.865	
		140	5700	7.880	
802.11n (20MHz)	Band I	36	5180	8.120	
		40	5200	8.035	
		48	5240	9.017	
	Band II	52	5260	8.425	
		60	5300	8.026	
		64	5320	7.897	
	Band III	100	5500	9.222	
		116	5580	8.588	
		140	5700	8.089	
802.11n (40MHz)	Band I	38	5190	8.488	
		46	5230	7.655	
	Band II	54	5270	8.753	
		62	5310	8.279	
	Band III	102	5510	8.790	
		110	5550	8.733	
		134	5670	8.440	

Measurement Data PLOTS

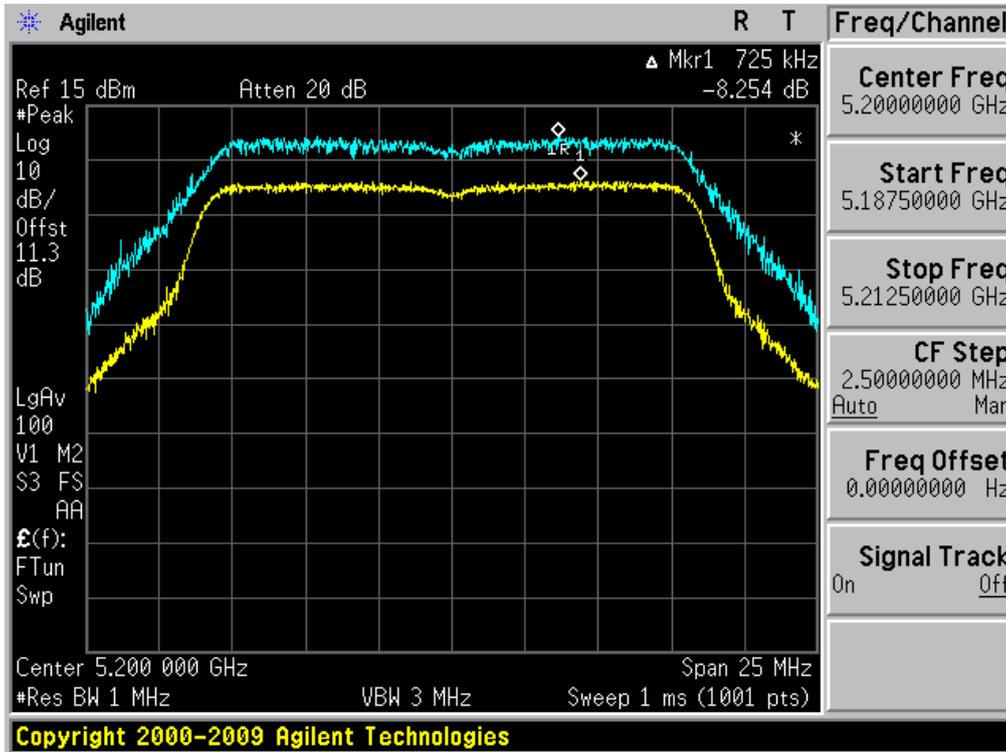
Peak Excursion Ratio

Test Mode: 802.11a & Ch.36



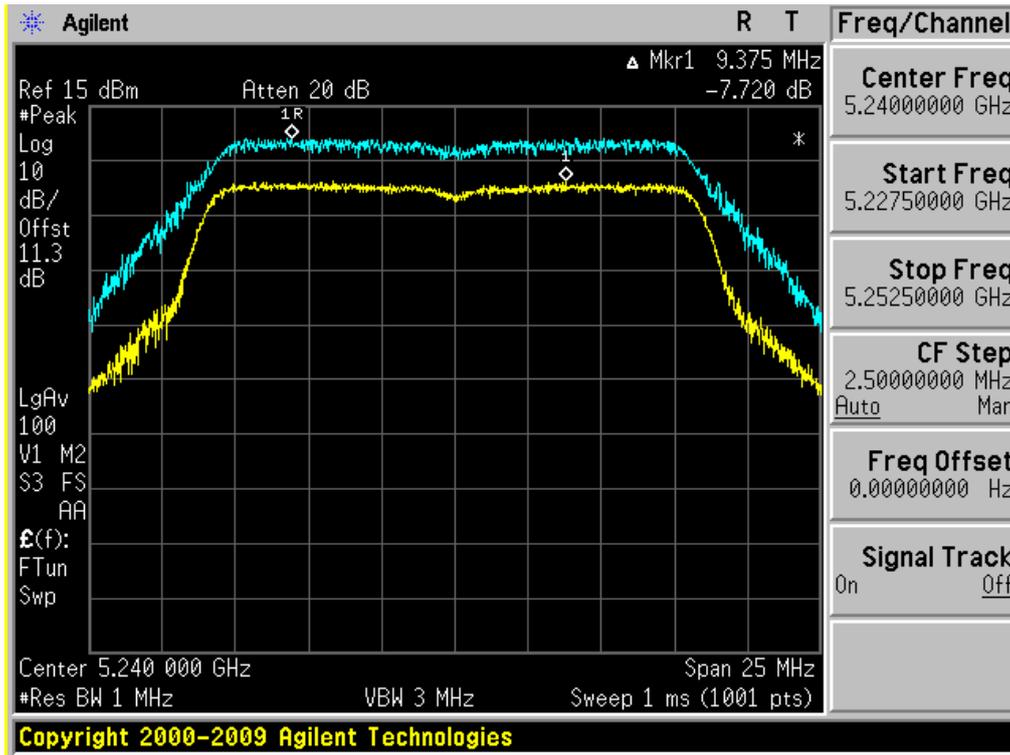
Peak Excursion Ratio

Test Mode: 802.11a & Ch.40



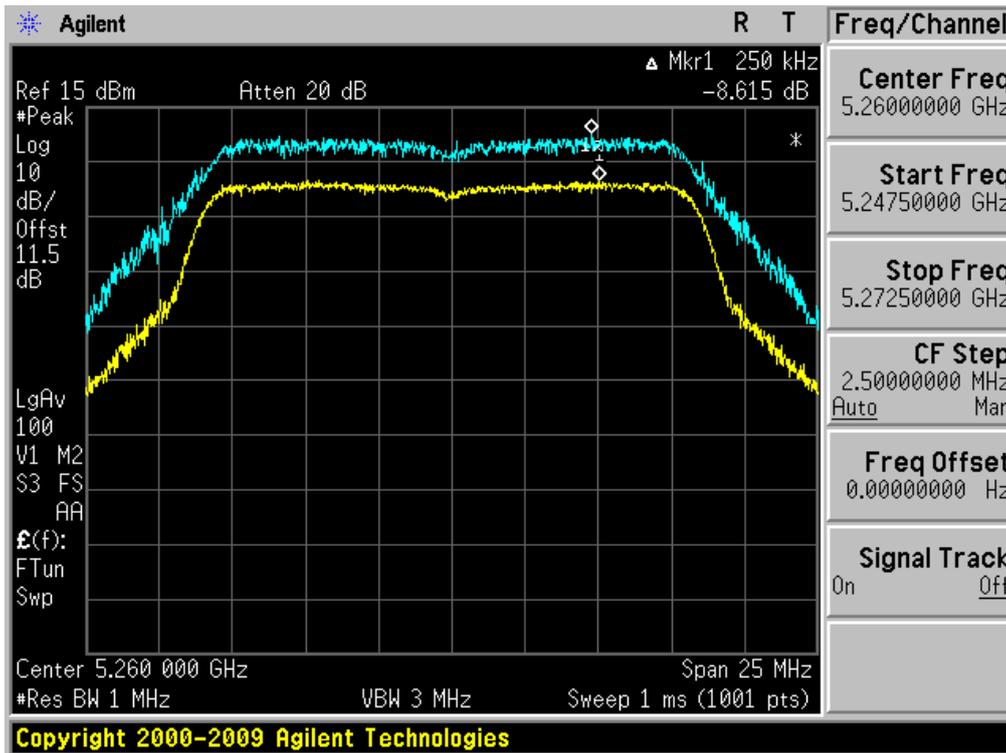
Peak Excursion Ratio

Test Mode: 802.11a & Ch.48



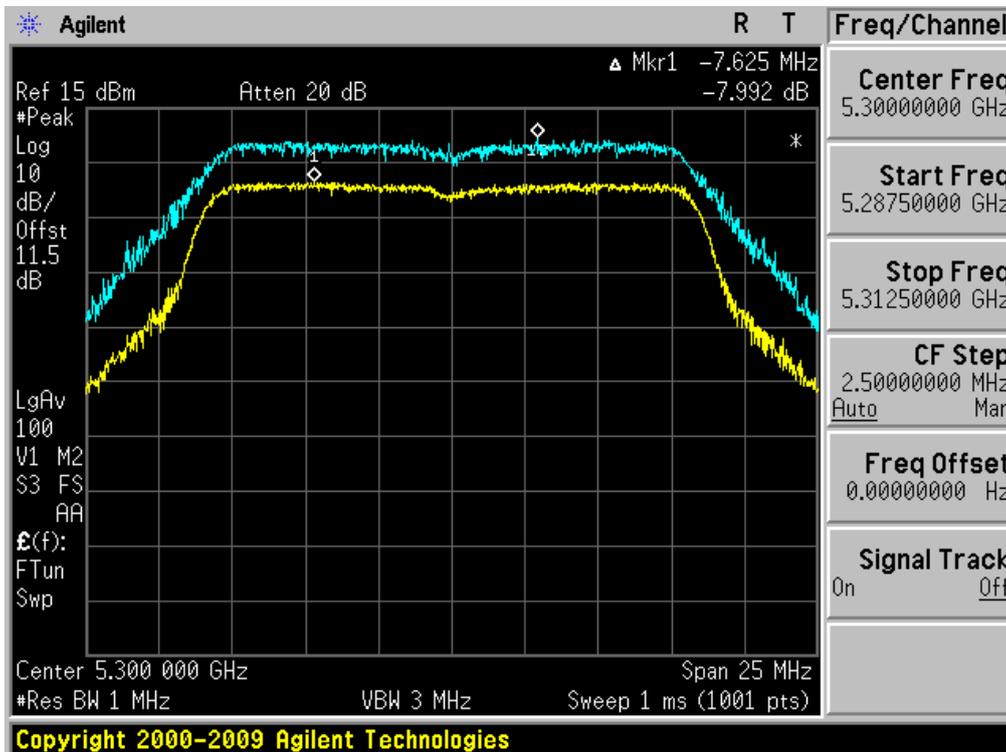
Peak Excursion Ratio

Test Mode: 802.11a & Ch.52



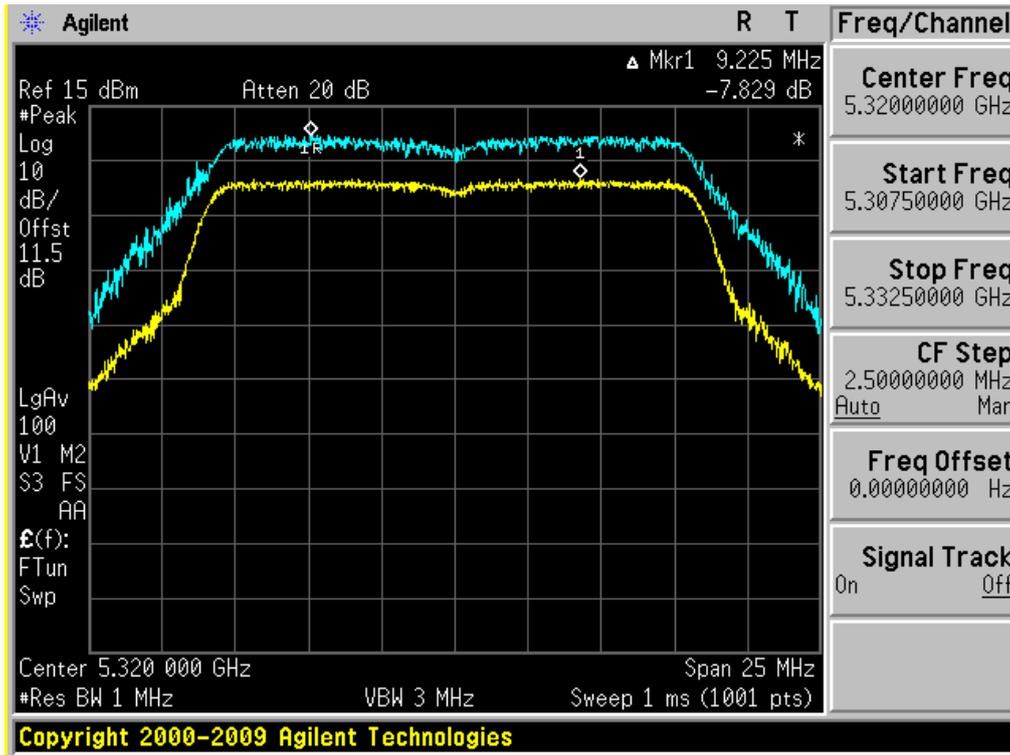
Peak Excursion Ratio

Test Mode: 802.11a & Ch.60



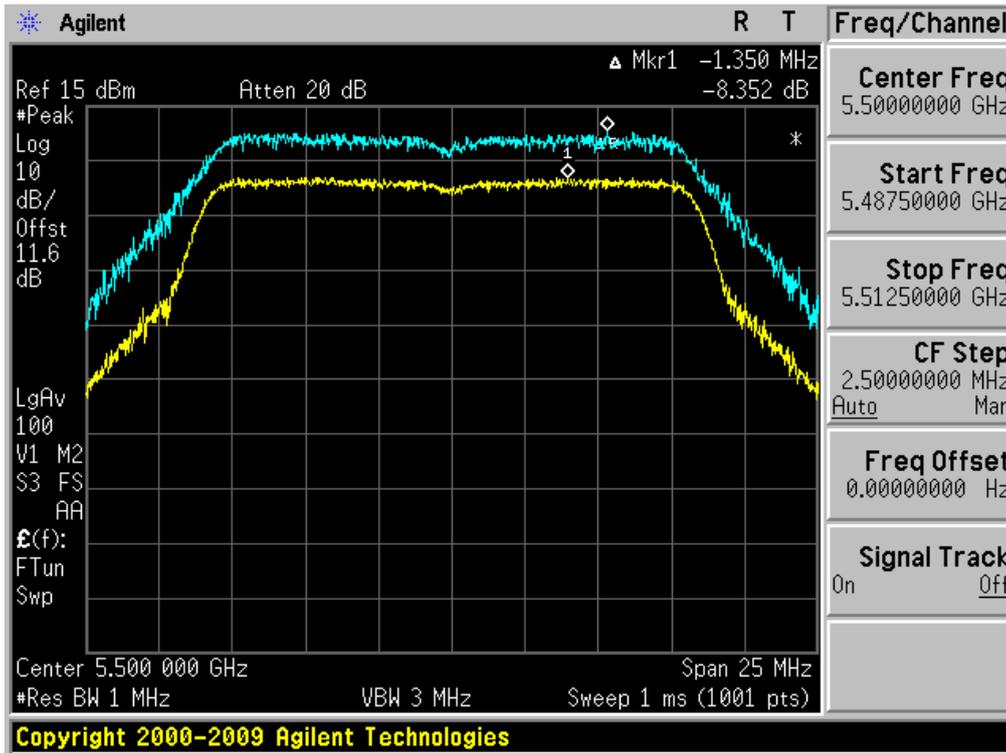
Peak Excursion Ratio

Test Mode: 802.11a & Ch.64



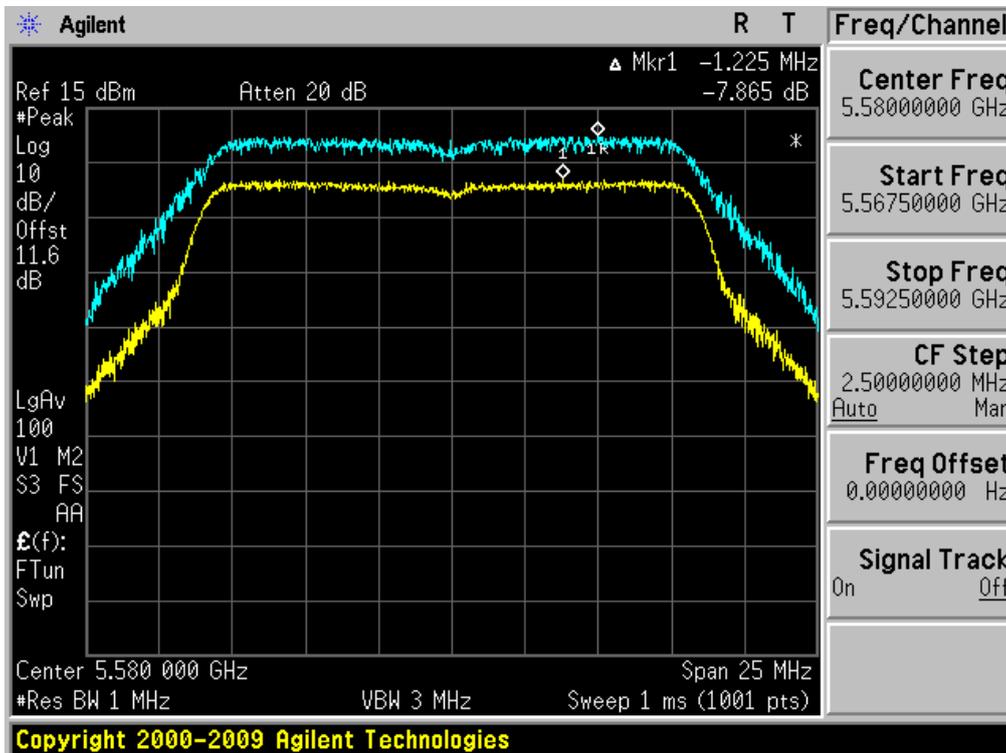
Peak Excursion Ratio

Test Mode: 802.11a & Ch.100



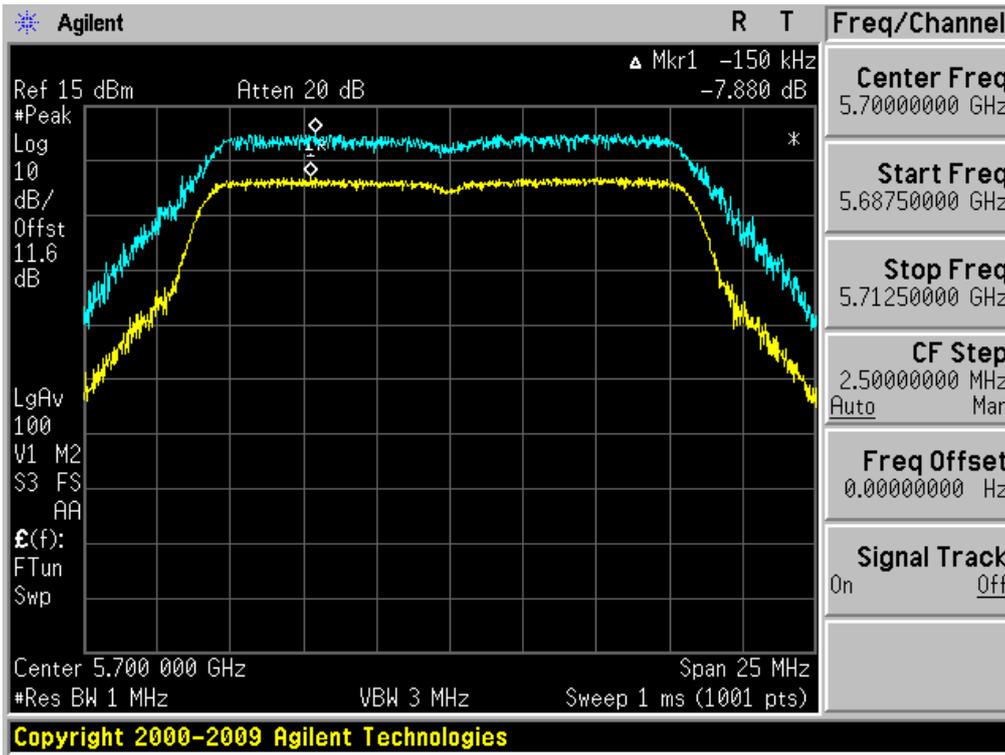
Peak Excursion Ratio

Test Mode: 802.11a & Ch.116



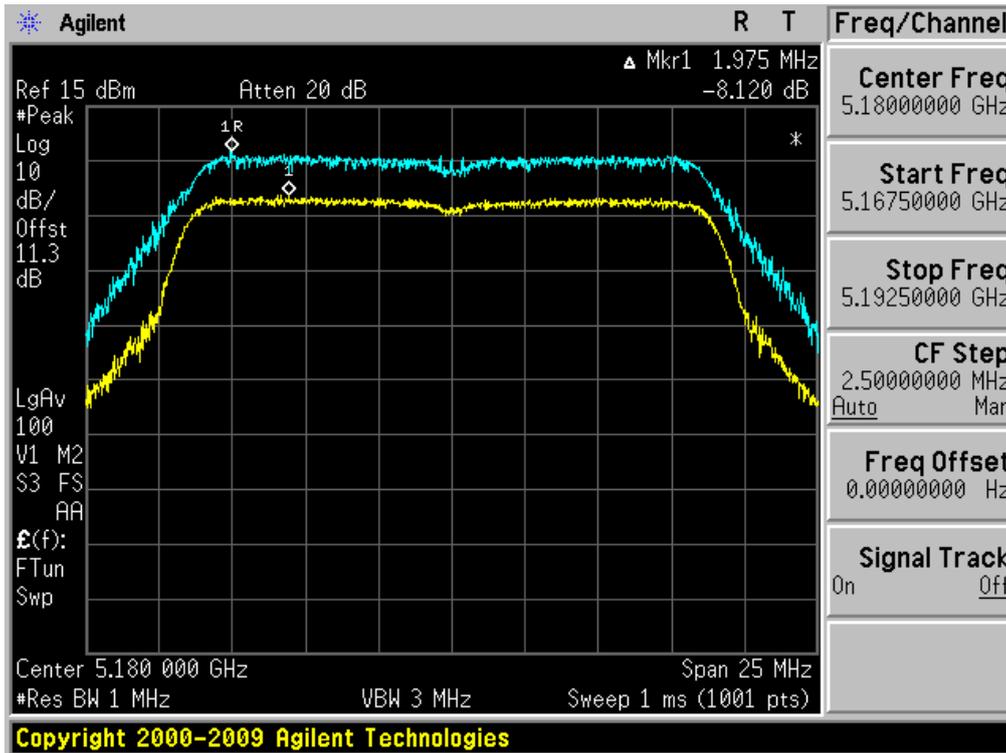
Peak Excursion Ratio

Test Mode: 802.11a & Ch.140



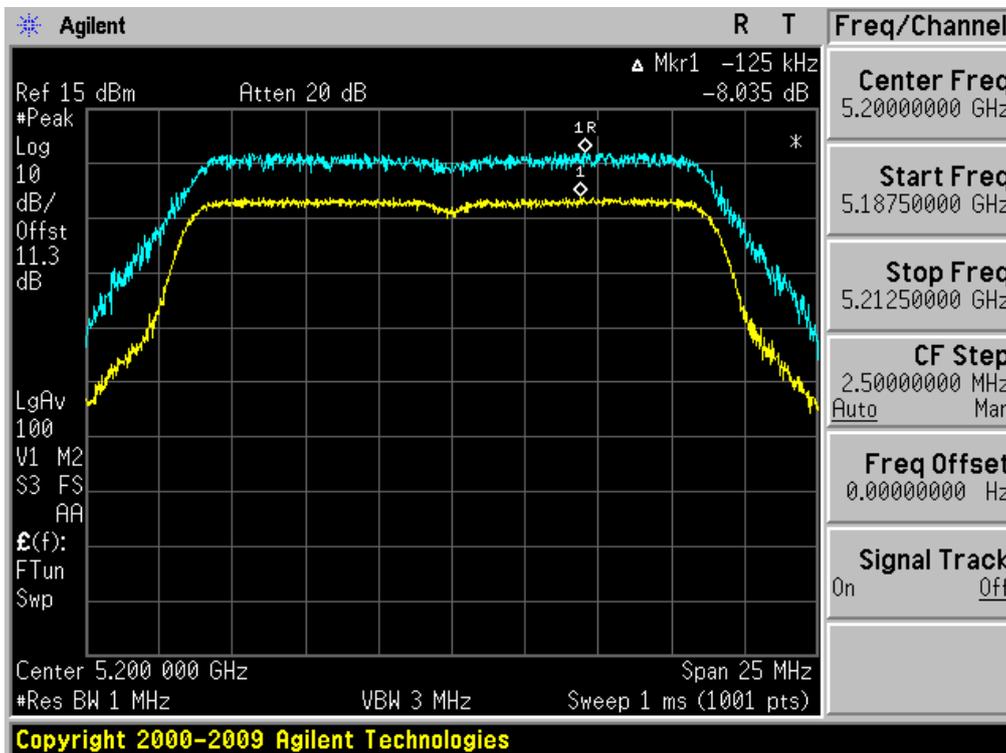
Peak Excursion Ratio

Test Mode: 802.11n HT20 & Ch.36



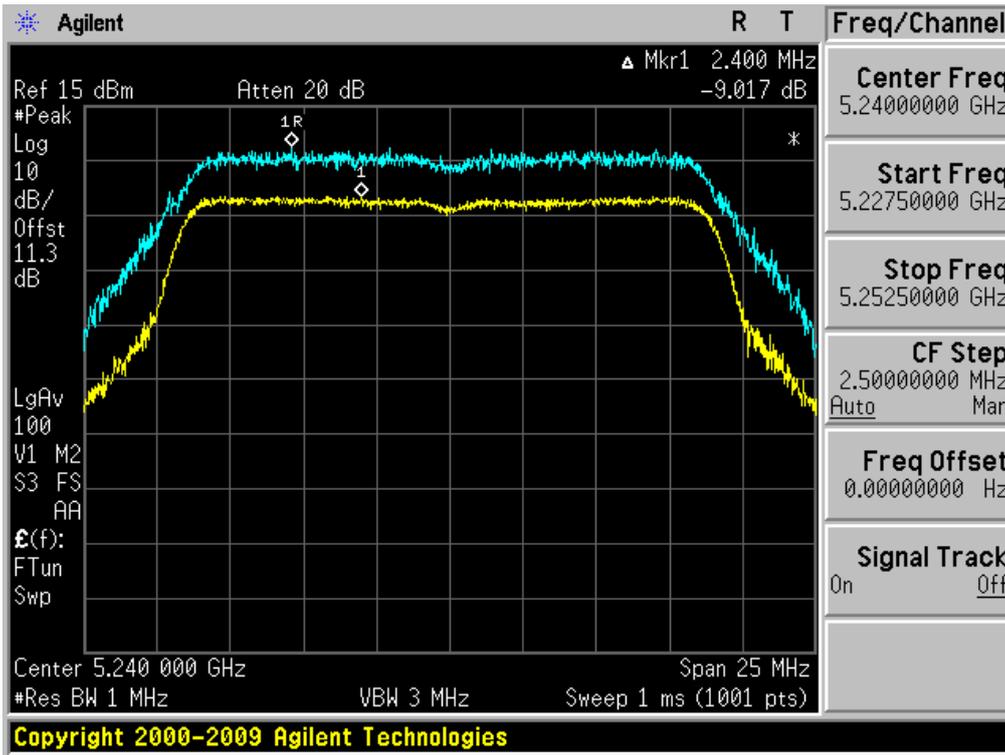
Peak Excursion Ratio

Test Mode: 802.11n HT20 & Ch.40



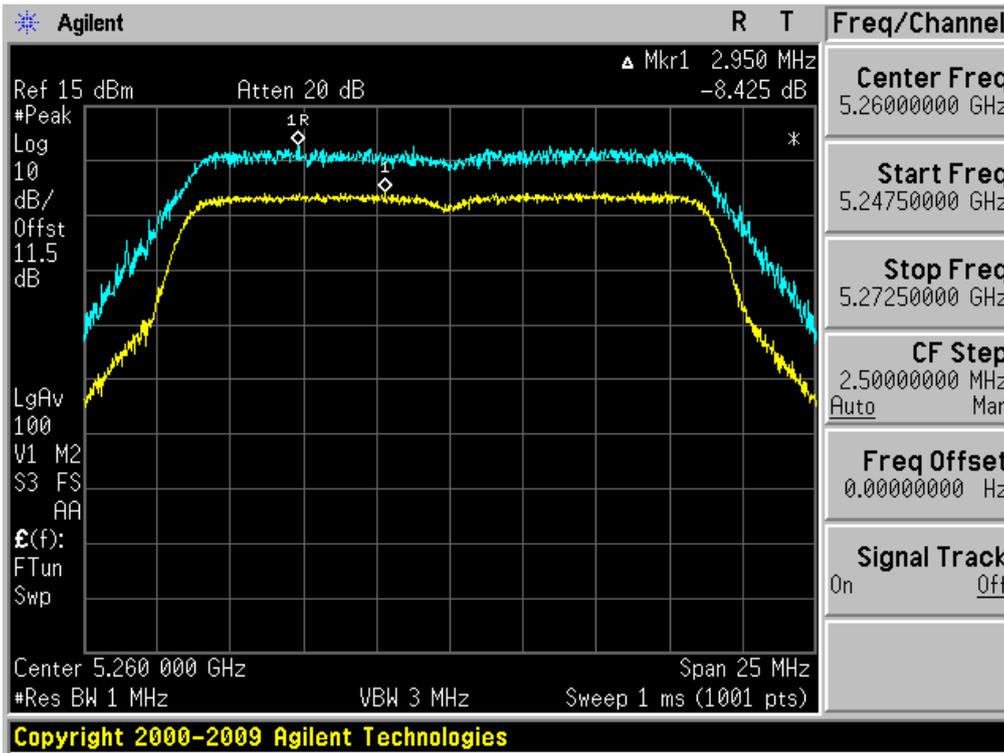
Peak Excursion Ratio

Test Mode: 802.11n HT20 & Ch.48



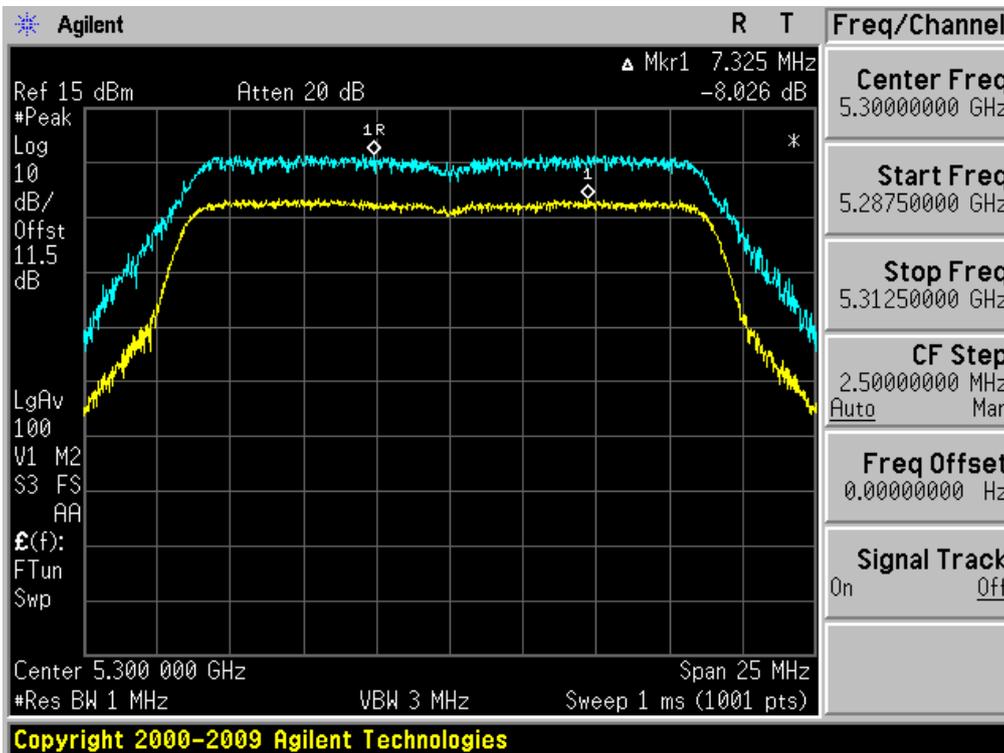
Peak Excursion Ratio

Test Mode: 802.11n HT20 & Ch.52



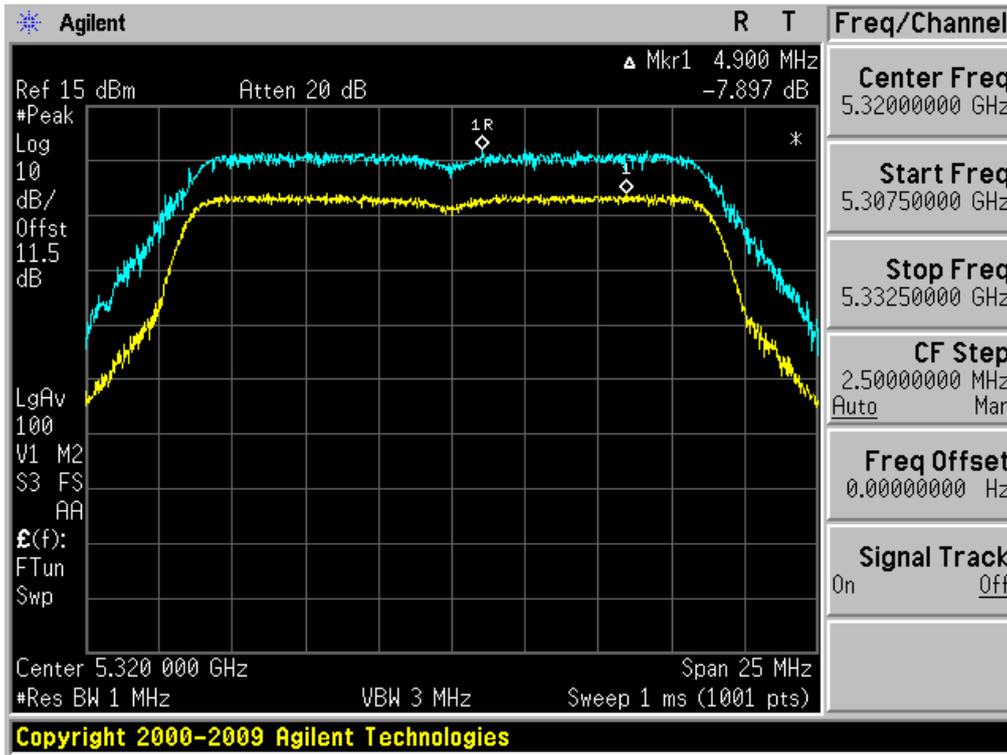
Peak Excursion Ratio

Test Mode: 802.11n HT20 & Ch.60



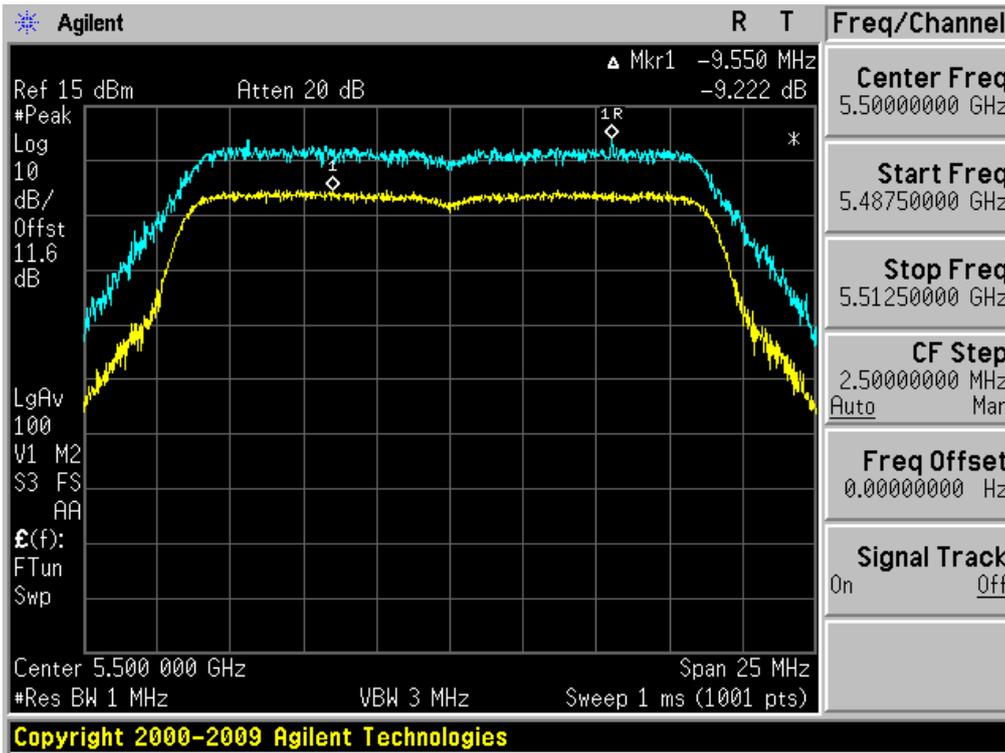
Peak Excursion Ratio

Test Mode: 802.11n HT20 & Ch.64



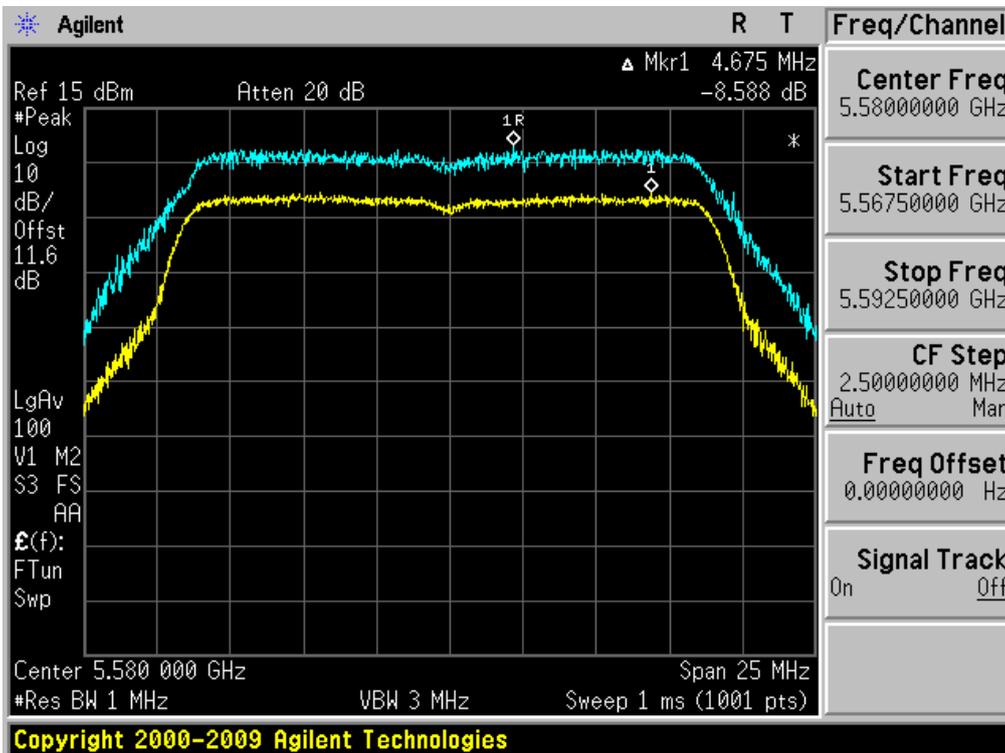
Peak Excursion Ratio

Test Mode: 802.11n HT20 & Ch.100



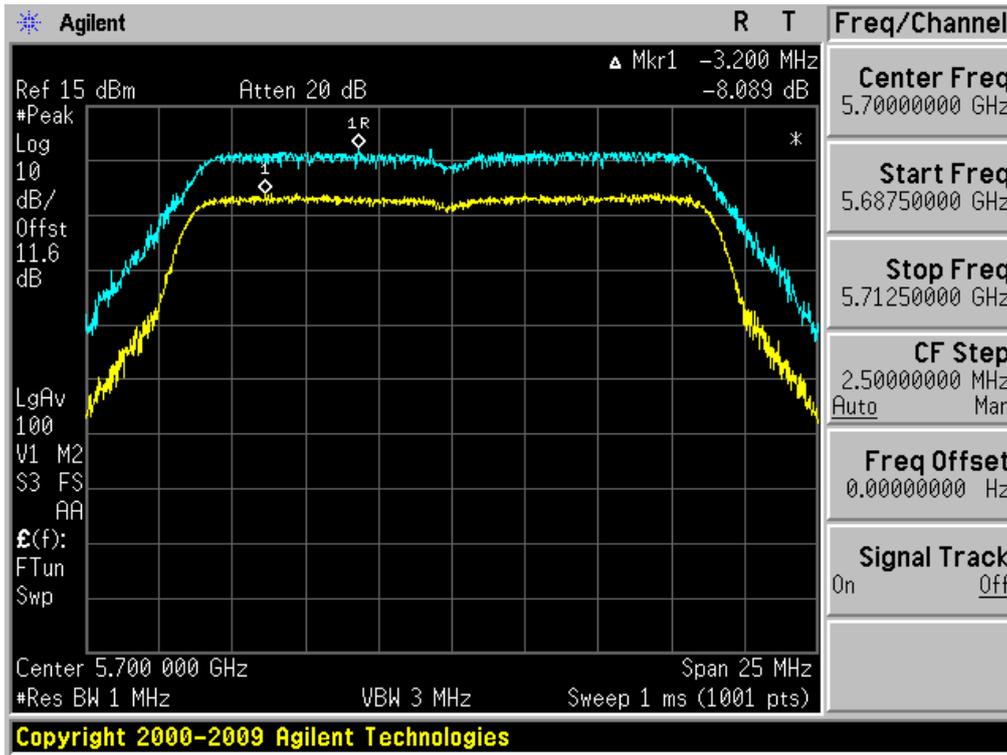
Peak Excursion Ratio

Test Mode: 802.11n HT20 & Ch.116



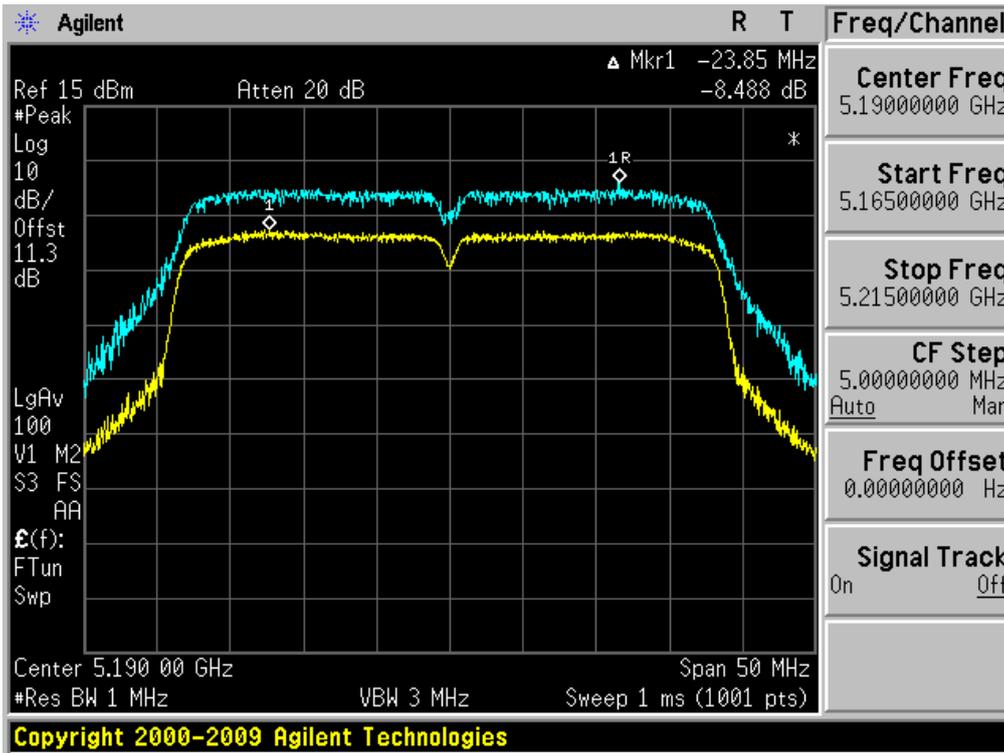
Peak Excursion Ratio

Test Mode: 802.11n HT20 & Ch.140



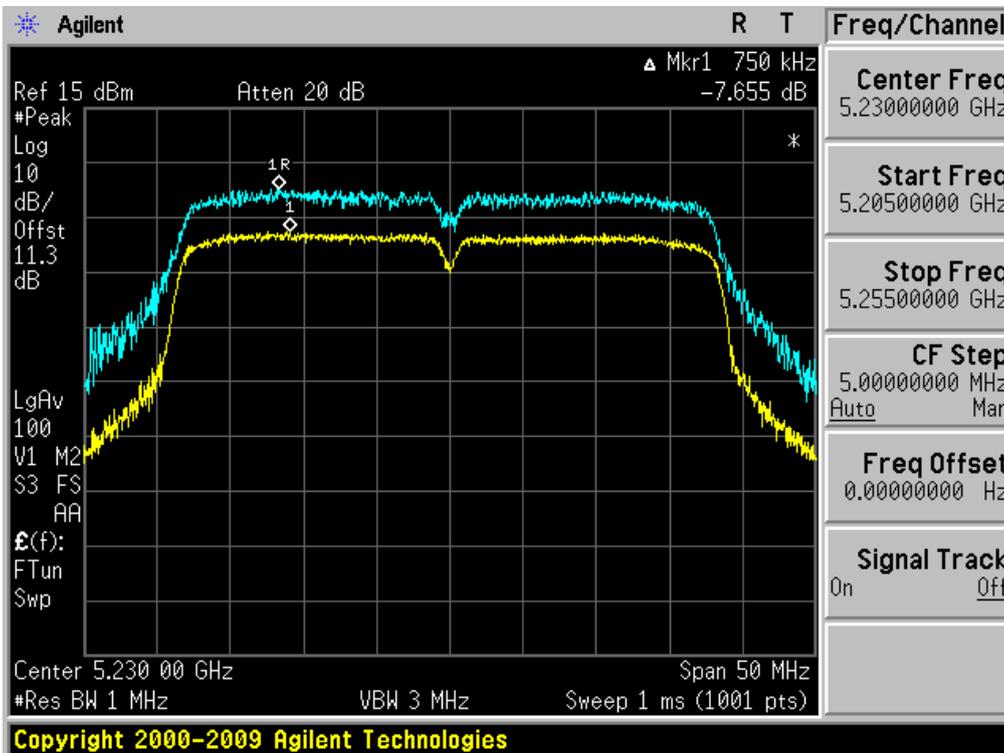
Peak Excursion Ratio

Test Mode: 802.11n HT40 & Ch.38



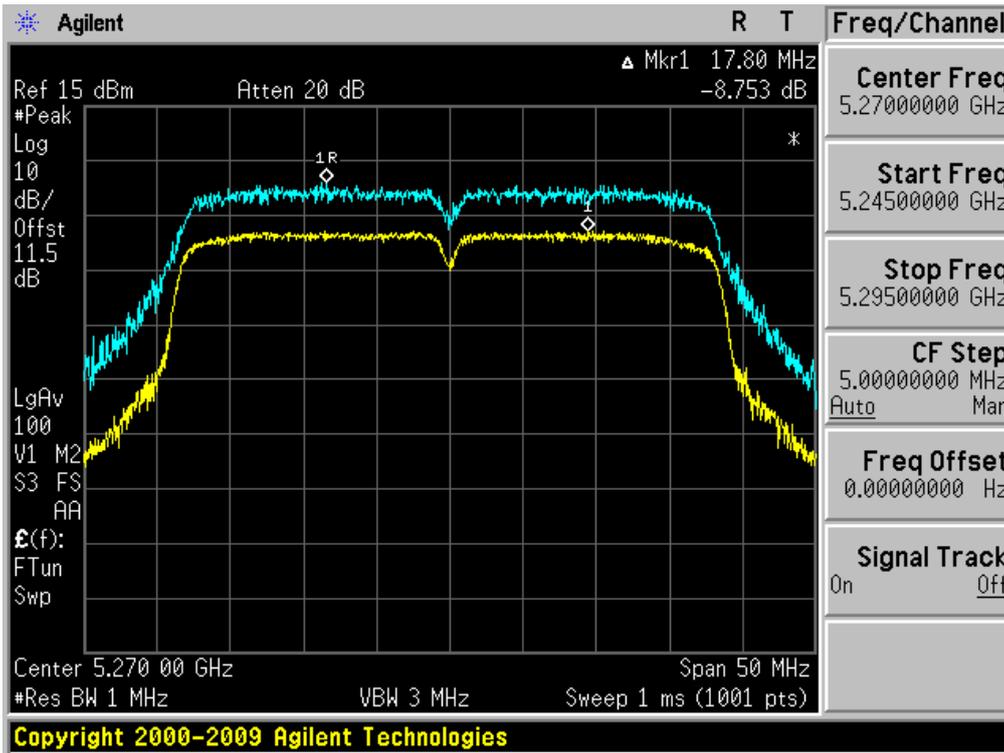
Peak Excursion Ratio

Test Mode: 802.11n HT40 & Ch.46



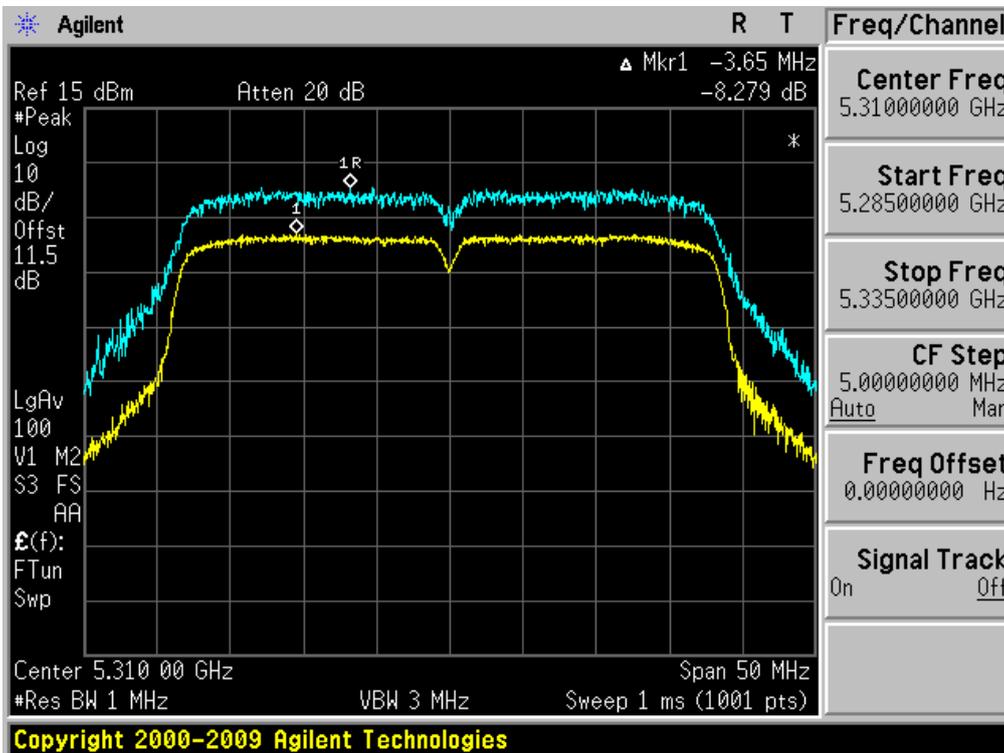
Peak Excursion Ratio

Test Mode: 802.11n HT40 & Ch.54



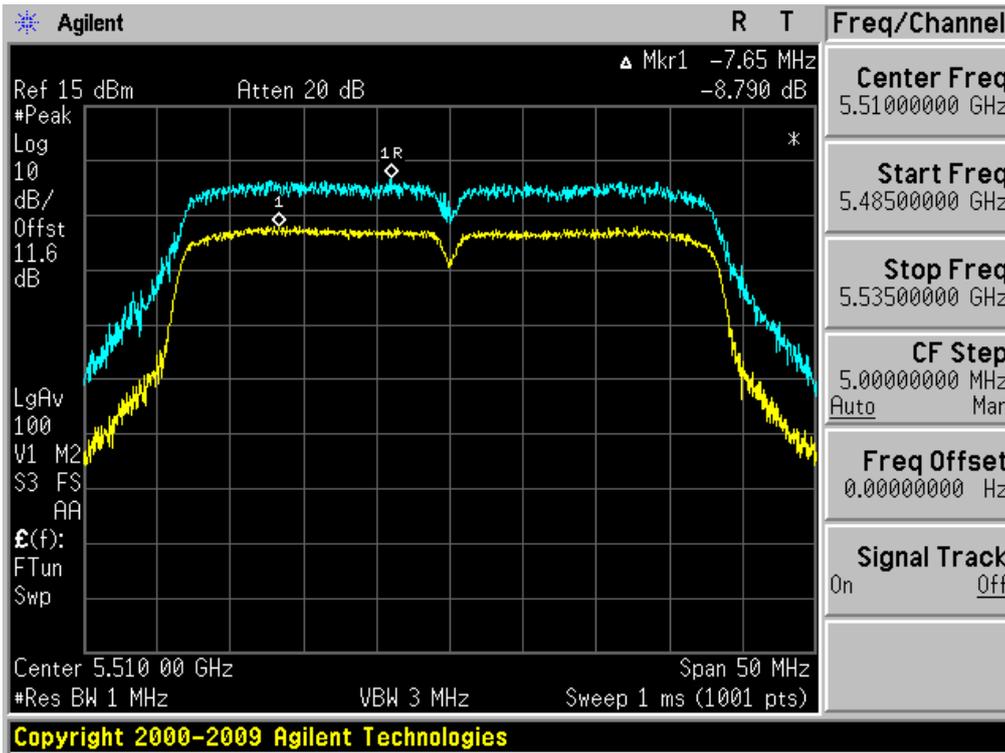
Peak Excursion Ratio

Test Mode: 802.11n HT40 & Ch.62



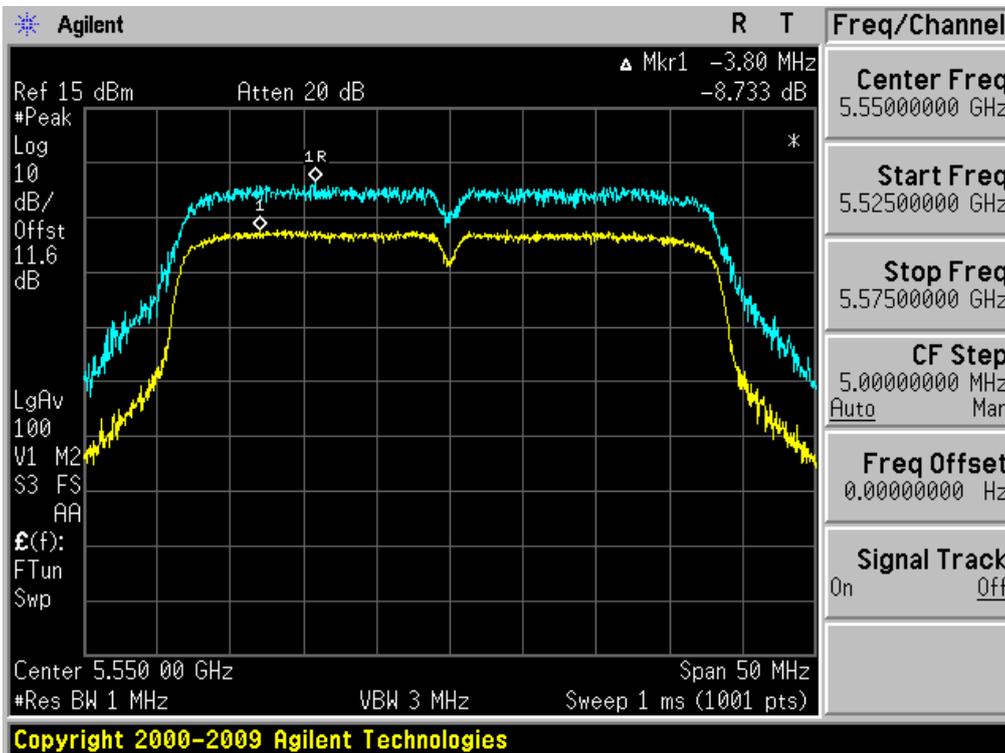
Peak Excursion Ratio

Test Mode: 802.11n HT40 & Ch.102



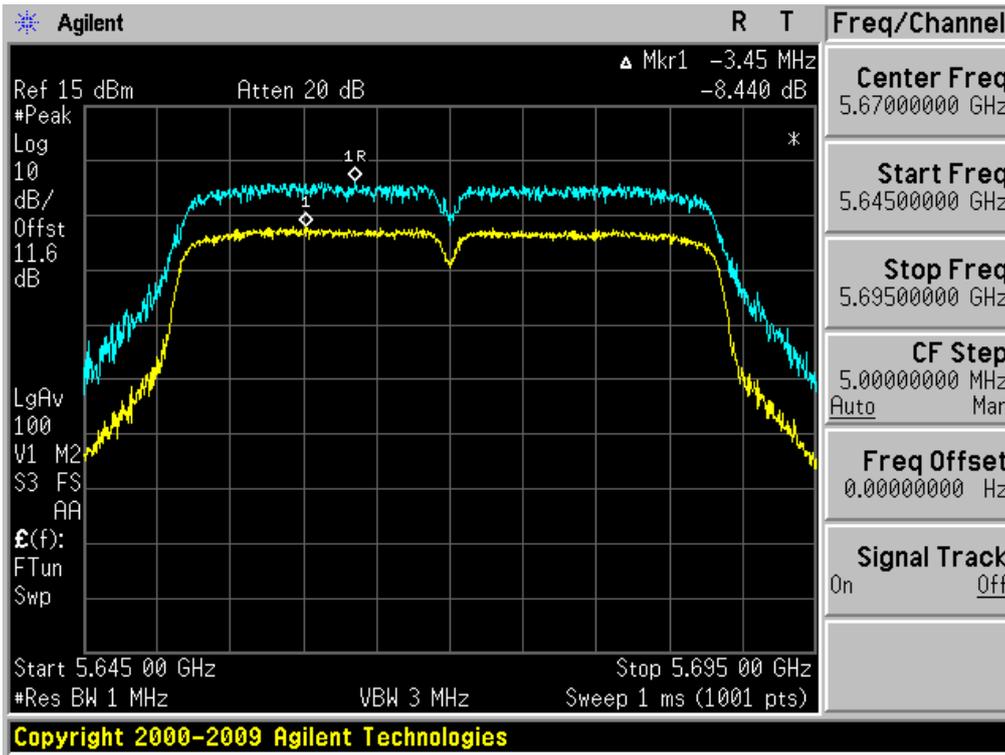
Peak Excursion Ratio

Test Mode: 802.11n HT40 & Ch.110



Peak Excursion Ratio

Test Mode: 802.11n HT40 & Ch.134



3.2.5 Frequency Stability

Test requirements

Manufacturers of U-NII devices are responsible for ensuring frequency stability such that an emission is maintained within the band of operation under all conditions of normal operation as specified in the user's manual.

■ TEST PROCEDURE

The EUT was placed inside of an environmental chamber as the temperature in the chamber was varied between -30°C and +50°C. The temperature was incremented by 10°C intervals and the unit was allowed to stabilize at each measurement. The center frequency of the transmitting channel was evaluated at each temperature and the frequency deviation from the channel's center frequency was recorded.

■ TEST RESULT : **Comply**

- Measurement Data:

OPERATING FREQUENCY : 5,200,000,000 Hz
 CHANNEL : 40
 REFERENCE VOLTAGE : 3.800 V DC

VOLTAGE (%)	POWER (V DC)	TEMP (°C)	FREQ (Hz)	Deviation (%)
100%	3.800	+25(Ref)	5,199,966,639	-0.000642
100%		-30	5,200,019,484	0.000375
100%		-20	5,200,014,323	0.000275
100%		-10	5,200,006,501	0.000125
100%		0	5,200,003,469	0.000067
100%		+10	5,199,991,346	-0.000166
100%		+20	5,199,980,754	-0.000370
100%		+30	5,199,973,661	-0.000507
100%		+40	5,199,960,355	-0.000762
100%		+50	5,199,970,695	-0.000564
100%		+60	5,199,973,312	-0.000513
85%		3.230	+25	5,199,967,089
115%	4.370	+25	5,199,967,474	-0.000626
BATT.ENDPOINT	3.200	+25	5,199,968,146	-0.000613

- Minimum Standard: The emission is maintained within the band of the operation.

- Measurement Data:

OPERATING FREQUENCY : 5,300,000,000 Hz
 CHANNEL : 60
 REFERENCE VOLTAGE : 3.800 V DC

VOLTAGE (%)	POWER (V DC)	TEMP (°C)	FREQ (Hz)	Deviation (%)
100%	3.800	+25(Ref)	5,299,964,052	-0.000678
100%		-30	5,300,020,064	0.000379
100%		-20	5,300,014,650	0.000276
100%		-10	5,300,005,987	0.000113
100%		0	5,300,003,015	0.000057
100%		+10	5,299,992,672	-0.000138
100%		+20	5,299,981,657	-0.000346
100%		+30	5,299,974,168	-0.000487
100%		+40	5,299,959,758	-0.000759
100%		+50	5,299,966,481	-0.000632
100%		+60	5,299,967,509	-0.000613
85%		3.230	+25	5,299,967,169
115%	4.370	+25	5,299,968,210	-0.000600
BATT.ENDPOINT	3.200	+25	5,299,968,357	-0.000597

- Minimum Standard: The emission is maintained within the band of the operation.

- Measurement Data:

OPERATING FREQUENCY : 5,580,000,000 Hz
 CHANNEL : 116
 REFERENCE VOLTAGE : 3.800 V DC

VOLTAGE (%)	POWER (V DC)	TEMP (°C)	FREQ (Hz)	Deviation (%)
100%	3.800	+25(Ref)	5,579,962,206	-0.000677
100%		-30	5,580,023,361	0.000419
100%		-20	5,580,016,456	0.000295
100%		-10	5,580,010,432	0.000187
100%		0	5,580,004,179	0.000075
100%		+10	5,579,992,805	-0.000129
100%		+20	5,579,980,490	-0.000350
100%		+30	5,579,976,143	-0.000428
100%		+40	5,579,958,610	-0.000742
100%		+50	5,579,966,714	-0.000597
100%		+60	5,579,965,489	-0.000618
85%		3.230	+25	5,579,967,242
115%	4.370	+25	5,579,968,713	-0.000561
BATT.ENDPOINT	3.200	+25	5,579,968,696	-0.000561

- Minimum Standard: The emission is maintained within the band of the operation.

3.2.6 Radiated Spurious Emission Measurements

■ TEST PROCEDURE

The EUT was placed on a 0.8m high wooden table inside a shielded enclosure. An antenna was placed near the EUT and measurements of frequencies and amplitudes of field strengths were recorded for reference during final measurements. For final radiated testing, measurements were performed in semi anechoic chamber. Measurements were performed with the EUT oriented in 3 orthogonal axis and rotated 360 degrees to determine the worst-case orientation for maximum emissions.

Radiated spurious emission measured using following Measurement Procedure of **KDB789033**

● Measurements Below 1000MHz

- a) Follow the requirements in section G)3), "General Requirements for Unwanted Emissions Measurements"
- b) Compliance shall be demonstrated using **CISPR quasi-peak detection**; however, **peak detection** is permitted as an alternative to quasi-peak detection.

G)3), General Requirements for Unwanted Emissions Measurements. The following requirements apply to all unwanted emissions measurements, both in and outside of the restricted bands:

a) EUT Duty Cycle

- (1) The EUT shall be configured or modified to **transmit continuously** except as stated in (ii), below. The intent is to test at 100 percent duty cycle; however a small reduction in duty cycle (**to no lower than 98 percent**) is permitted if required by the EUT for amplitude control purposes. Manufacturers are expected to provide software to the test lab to permit such continuous operation.
- (2) If **continuous transmission (or at least 98 percent duty cycle) cannot be achieved** due to hardware limitations of the EUT (e.g., overheating), the following additions to the measurement and reporting procedures are required:
 - The EUT shall be configured to operate at the maximum achievable duty cycle.
 - Measure the duty cycle, x, of the transmitter output signal.
 - Adjustments to measurement procedures (e.g., increasing test time and number of traces averaged) shall be performed as described in the procedures below.
 - The test report shall include the following additional information:
 - The reason for the duty cycle limitation.
 - The duty cycle achieved for testing and the associated transmit duration and interval between transmissions.
 - The sweep time and the amount of time used for trace stabilization during max-hold measurements for peak emission measurements.
- (3) **Reduction of the measured emission amplitude levels to account for operational duty factor is not permitted. Compliance is based on emission levels occurring during transmission - not on an average across on and off times of the transmitter.**

● Measurements Above 1000MHz (Peak)

- a) Follow the requirements in section G)3), "General Requirements for Unwanted Emissions Measurements".
b) Peak emission levels are measured by setting the analyzer as follows:

- (1) **RBW = 1 MHz.**
- (2) **VBW ≥ 3 MHz.**
- (3) **Detector = Peak.**
- (4) Sweep time = auto.
- (5) Trace mode = max hold.
- (6) **Allow sweeps to continue until the trace stabilizes.**

Note that if the transmission is not continuous, the time required for the **trace to stabilize will increase by a factor of approximately 1/x, where x is the duty cycle.**

For example, at 50 percent duty cycle, the measurement time will increase by a factor of two relative to measurement time for continuous transmission.

● Measurements Above 1000MHz (Method AD)

- (1) **RBW = 1 MHz.**
- (2) **VBW ≥ 3 MHz.**
- (3) **Detector = RMS**, if $\text{span}/(\# \text{ of points in sweep}) \leq \text{RBW}/2$. Satisfying this condition may require increasing the number of points in the sweep or reducing the span. If the condition is not satisfied, the detector mode shall be set to peak.
- (4) Averaging type = power (i.e., RMS)
 - As an alternative, the detector and averaging type may be set for linear voltage averaging. Some analyzers require linear display mode in order to use linear voltage averaging. Log or dB averaging shall not be used.
- (5) Sweep time = auto.
- (6) Perform a trace average of **at least 100 traces** if the transmission is continuous. If the transmission is not continuous, **the number of traces shall be increased by a factor of 1/x, where x is the duty cycle**. For example, with 50 percent duty cycle, at least 200 traces should be averaged.
- (7) If tests are performed with the EUT transmitting at a duty cycle less than 98 percent, a correction factor shall be added to the measurement results prior to comparing to the emission limit in order to compute the emission level that would have been measured had the test been performed at 100 percent duty cycle. The correction factor is computed as follows:
 - If power averaging (RMS) mode was used in step (iv) above, the correction factor is $10 \log(1/x)$, where x is the duty cycle. For example, if the transmit duty cycle was 50 percent, then 3 dB must be added to the measured emission levels.
 - **If linear voltage averaging mode was used in step (iv) above, the correction factor is $20 \log(1/x)$, where x is the duty cycle.** For example, if the transmit duty cycle was 50 percent, then 6 dB must be added to the measured emission levels.

■ **Minimum Standard:**

▪ **FCC Part 15.209(a) and (b)**

Frequency (MHz)	Limit (uV/m) @ 3m
30 ~ 88	100 **
88 ~ 216	150 **
216 ~ 960	200 **
Above 960	500

** Except as provided in 15.209(g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72 MHz, 76-88MHz, 174-216MHz or 470-806MHz. However, operation within these frequency bands is permitted under other sections of this Part, e.g. 15.231 and 15.241.

▪ **FCC Part 15.205 (a):** Only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	MHz	GHz	GHz
0.009 ~ 0.110	8.41425 ~ 8.41475	108 ~ 121.94	1300 ~ 1427	3600 ~ 4400	14.47 ~ 14.5
0.495 ~ 0.505	12.29 ~ 12.293	123 ~ 138	1435 ~ 1626.5	4.5 ~ 5.15	15.35 ~ 16.2
2.1735 ~ 2.1905	12.51975 ~	149.9 ~ 150.05	1645.5 ~ 1646.5	5.35 ~ 5.46	17.7 ~ 21.4
4.125 ~ 4.128	12.52025	156.52475 ~	1660 ~ 1710	7.25 ~ 7.75	22.01 ~ 23.12
4.17725 ~ 4.17775	12.57675 ~	156.52525	1718.8 ~ 1722.2	8.025 ~ 8.5	23.6 ~ 24.0
4.20725 ~ 4.20775	12.57725	156.7 ~ 156.9	2200 ~ 2300	9.0 ~ 9.2	31.2 ~ 31.8
6.215 ~ 6.218	13.36 ~ 13.41	162.0125 ~ 167.17	2310 ~ 2390	9.3 ~ 9.5	36.43 ~ 36.5
6.26775 ~ 6.26825	16.42 ~ 16.423	167.72 ~ 173.2	2483.5 ~ 2500	10.6 ~ 12.7	Above 38.6
6.31175 ~ 6.31225	16.69475 ~	240 ~ 285	2655 ~ 2900	13.25 ~ 13.4	
8.291 ~ 8.294	16.69525	322 ~ 335.4	3260 ~ 3267		
8.362 ~ 8.366	16.80425 ~	399.90 ~ 410	3332 ~ 3339		
8.37625 ~ 8.38675	16.80475	608 ~ 614	3345.8 ~ 3358		
	25.5 ~ 25.67	960 ~ 1240			
	37.5 ~ 38.25				
	73 ~ 74.6				
	74.8 ~ 75.2				

▪ **FCC Part 15.205(b):** The field strength of emissions appearing within these frequency bands shall not exceed the limits shown in §15.209. At frequencies equal to or less than 1000 MHz, compliance with the limits in §15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000 MHz, compliance with the emission limits in §15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in §15.35 apply to these measurements.

▪ **FCC Part 15.407 (b):** Undesirable Emission Limits: Except as shown in Paragraph (b)(6) of this section, the peak emissions outside of the frequency bands of operation shall be attenuated in accordance with the following limits:

- (1) For transmitters operating in the **5.15-5.25 GHz band**: all emissions outside of the **5.15-5.35 GHz band** shall not exceed an **EIRP of -27 dBm/MHz**.
- (2) For transmitters operating in the **5.25-5.35 GHz band**: all emissions outside of the **5.15-5.35 GHz band** shall not exceed an **EIRP of -27 dBm/MHz**. Devices operating in the 5.25-5.35 GHz band that generate emissions in the 5.15-5.25 GHz band must meet all applicable technical requirements for operation in the 5.15-5.25 GHz band (including indoor use) or alternatively meet an out-of-band emission EIRP limit of -27 dBm/MHz in the 5.15-5.25 GHz band.
- (3) For transmitters operating in the **5.47-5.725 GHz band**: all emissions outside of the **5.47-5.725 GHz band** shall not exceed an **EIRP of -27 dBm/MHz**.
- (4) For transmitters operating in the 5.725-5.825 GHz band: all emissions within the frequency range from the band edge to 10 MHz above or below the band edge shall not exceed an EIRP of -17 dBm/MHz; for frequencies 10 MHz or greater above or below the band edge, emissions shall not exceed an EIRP of -27 dBm/MHz.
- (5) The above emission measurements shall be performed using a minimum resolution bandwidth of 1 MHz. A lower resolution bandwidth may be employed near the band edge, when necessary, provided the measured energy is integrated to show the total power over 1 MHz.
- (6) Unwanted emissions **below 1 GHz** must comply with the general field strength limits set forth in **Section 15.209**. Further, any U-NII devices using an **AC power line** are required to comply also with the conducted limits set forth in **Section 15.207**.

■ Measurement Data:

30MHz ~ 40GHz Radiated Spurious Emissions: 802.11a & 5180MHz(Ch. 36)

Frequency (MHz)	ANT Pol	The worst case EUT Position (Axis)	Detector	Reading (dBuV)	T.F (dB/m)	DUTY Correction Factor (dB)	Distance Correction Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
5128.400	H	Z	PK	51.66	3.08	-	-	54.74	74.00	19.26
5127.650	H	Z	AV	43.94	3.08	0.54	-	47.56	54.00	6.44
10359.450	H	Z	PK	42.13	11.39	-	-6.02	47.50	68.20	20.70

30MHz ~ 40GHz Radiated Spurious Emissions: 802.11a & 5200MHz(Ch. 40)

Frequency (MHz)	ANT Pol	The worst case EUT Position (Axis)	Detector	Reading (dBuV)	T.F (dB/m)	DUTY Correction Factor (dB)	Distance Correction Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
10400.120	H	Z	PK	41.95	11.98	-	-6.02	47.91	68.20	20.29
-	-	-	-	-	-	-	-	-	-	-

30MHz ~ 40GHz Radiated Spurious Emissions: 802.11a & 5240MHz(Ch. 48)

Frequency (MHz)	ANT Pol	The worst case EUT Position (Axis)	Detector	Reading (dBuV)	T.F (dB/m)	DUTY Correction Factor (dB)	Distance Correction Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
10480.870	H	Z	PK	41.76	12.36	-	-6.02	48.10	68.20	20.10
-	-	-	-	-	-	-	-	-	-	-

Note.

- This test item was performed in each axis and the worst case data were reported.
- Sample Calculation.
 Margin = Limit – Result
 Result = Reading + T.F + DUTY Correction Factor + Distance Correction Factor
 T.F = AF + CL – AG
 DUTY Correction Factor : 0.54 dB = 20*log(1/0.94) for Method AD.
- Measurement Distance above 10 GHz = 1.5 m. So Distance Correction Factor : -6.02dB = 20*log(1.5m/3m)

■ Measurement Data:

30MHz ~ 40GHz Radiated Spurious Emissions: 802.11a & 5260MHz(Ch. 52)

Frequency (MHz)	ANT Pol	The worst case EUT Position (Axis)	Detector	Reading (dBuV)	T.F (dB/m)	DUTY Correction Factor (dB)	Distance Correction Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
10520.100	H	Z	PK	41.8	12.08	-	-6.02	47.86	68.20	20.34
-	-	-	-	-	-	-	-	-	-	-

30MHz ~ 40GHz Radiated Spurious Emissions: 802.11a & 5300MHz(Ch. 60)

Frequency (MHz)	ANT Pol	The worst case EUT Position (Axis)	Detector	Reading (dBuV)	T.F (dB/m)	DUTY Correction Factor (dB)	Distance Correction Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
10600.160	H	Z	PK	42.29	12.21	-	-6.02	48.48	74.00	25.52
10600.030	H	Z	AV	34.64	12.21	0.54	-6.02	41.37	54.00	12.63

30MHz ~ 40GHz Radiated Spurious Emissions: 802.11a & 5320MHz(Ch. 64)

Frequency (MHz)	ANT Pol	The worst case EUT Position (Axis)	Detector	Reading (dBuV)	T.F (dB/m)	DUTY Correction Factor (dB)	Distance Correction Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
5371.550	H	X	PK	49.78	3.61	-	-	53.39	74.00	20.61
5371.900	H	X	AV	42.18	3.61	0.54	-	46.33	54.00	7.67
10640.260	H	Z	PK	42.18	12.53	-	-6.02	48.69	74.00	25.31
10639.840	H	Z	AV	34.96	12.53	0.54	-6.02	42.01	54.00	11.99

Note.

- This test item was performed in each axis and the worst case data were reported.
- Sample Calculation.
Margin = Limit – Result
Result = Reading + T.F + DUTY Correction Factor + Distance Correction Factor
T.F = AF + CL – AG
DUTY Correction Factor : 0.54 dB = 20*log(1/0.94) for Method AD.
- Measurement Distance above 10 GHz = 1.5 m. So Distance Correction Factor : -6.02dB = 20*log(1.5m/3m)

■ Measurement Data:

30MHz ~ 40GHz Radiated Spurious Emissions: 802.11a & 5500MHz(Ch. 100)

Frequency (MHz)	ANT Pol	The worst case EUT Position (Axis)	Detector	Reading (dBuV)	T.F (dB/m)	DUTY Correction Factor (dB)	Distance Correction Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
5467.000	H	Z	PK	45.68	3.4	-	-	49.08	68.20	19.12
11000.020	H	Z	PK	42.03	12.92	-	-6.02	48.93	74.00	25.07
11000.030	H	Z	AV	34.95	12.92	0.54	-6.02	42.39	54.00	11.61

30MHz ~ 40GHz Radiated Spurious Emissions: 802.11a & 5580MHz(Ch. 116)

Frequency (MHz)	ANT Pol	The worst case EUT Position (Axis)	Detector	Reading (dBuV)	T.F (dB/m)	DUTY Correction Factor (dB)	Distance Correction Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
11159.940	H	Z	PK	42.57	14.65	-	-6.02	51.20	74.00	22.80
11159.880	H	Z	AV	34.46	14.65	0.54	-6.02	43.63	54.00	10.37

30MHz ~ 40GHz Radiated Spurious Emissions: 802.11a & 5700MHz(Ch. 140)

Frequency (MHz)	ANT Pol	The worst case EUT Position (Axis)	Detector	Reading (dBuV)	T.F (dB/m)	DUTY Correction Factor (dB)	Distance Correction Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
5725.420	H	Z	PK	45.11	3.8	-	-	48.91	68.20	19.29
11400.120	H	Z	PK	42.48	14.65	-	-6.02	51.11	74.00	22.89
11400.030	H	Z	AV	35.95	14.65	0.54	-6.02	45.12	54.00	8.88

Note.

- This test item was performed in each axis and the worst case data were reported.
- Sample Calculation.
Margin = Limit – Result
Result = Reading + T.F + DUTY Correction Factor + Distance Correction Factor
T.F = AF + CL – AG
DUTY Correction Factor : 0.54 dB = 20*log(1/0.94) for Method AD.
- Measurement Distance above 10 GHz = 1.5 m. So Distance Correction Factor : -6.02dB = 20*log(1.5m/3m)

■ Measurement Data:

30MHz ~ 40GHz Radiated Spurious Emissions: 802.11n HT20 & 5180MHz(Ch. 36)

Frequency (MHz)	ANT Pol	The worst case EUT Position (Axis)	Detector	Reading (dBuV)	T.F (dB/m)	DUTY Correction Factor (dB)	Distance Correction Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
5127.600	H	X	PK	49.86	3.08	-	-	52.94	74.00	21.06
5128.150	H	X	AV	43.07	3.08	0.54	-	46.69	54.00	7.31
10360.160	H	Z	PK	41.92	11.39	N/A	-6.02	47.29	68.20	20.91

30MHz ~ 40GHz Radiated Spurious Emissions: 802.11n HT20 & 5200MHz(Ch. 40)

Frequency (MHz)	ANT Pol	The worst case EUT Position (Axis)	Detector	Reading (dBuV)	T.F (dB/m)	DUTY Correction Factor (dB)	Distance Correction Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
10399.690	H	Z	PK	41.76	11.98	-	-6.02	47.72	68.20	20.48
-	-	-	-	-	-	-	-	-	-	-

30MHz ~ 40GHz Radiated Spurious Emissions: 802.11n HT20 & 5240MHz(Ch. 48)

Frequency (MHz)	ANT Pol	The worst case EUT Position (Axis)	Detector	Reading (dBuV)	T.F (dB/m)	DUTY Correction Factor (dB)	Distance Correction Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
10479.010	H	Z	PK	42	12.36	-	-6.02	48.34	68.20	19.86
-	-	-	-	-	-	-	-	-	-	-

Note.

- This test item was performed in each axis and the worst case data were reported.
- Sample Calculation.
Margin = Limit – Result
Result = Reading + T.F + DUTY Correction Factor + Distance Correction Factor
T.F = AF + CL – AG
DUTY Correction Factor : 0.54 dB = 20*log(1/0.94) for Method AD.
- Measurement Distance above 10 GHz = 1.5 m. So Distance Correction Factor : -6.02dB = 20*log(1.5m/3m)

■ Measurement Data:

30MHz ~ 40GHz Radiated Spurious Emissions: 802.11n HT20 & 5260MHz(Ch. 52)

Frequency (MHz)	ANT Pol	The worst case EUT Position (Axis)	Detector	Reading (dBuV)	T.F (dB/m)	DUTY Correction Factor (dB)	Distance Correction Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
10519.850	H	Z	PK	42.17	12.08	-	-6.02	48.23	68.20	19.97
-	-	-	-	-	-	-	-	-	-	-

30MHz ~ 40GHz Radiated Spurious Emissions: 802.11n HT20 & 5300MHz(Ch. 60)

Frequency (MHz)	ANT Pol	The worst case EUT Position (Axis)	Detector	Reading (dBuV)	T.F (dB/m)	DUTY Correction Factor (dB)	Distance Correction Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
10600.200	H	Z	PK	41.36	12.21	-	-6.02	47.55	74.00	26.45
10600.000	H	Z	AV	35	12.21	0.54	-6.02	41.73	54.00	12.27

30MHz ~ 40GHz Radiated Spurious Emissions: 802.11n HT20 & 5320MHz(Ch. 64)

Frequency (MHz)	ANT Pol	The worst case EUT Position (Axis)	Detector	Reading (dBuV)	T.F (dB/m)	DUTY Correction Factor (dB)	Distance Correction Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
5371.600	H	X	PK	50.03	3.61	-	-	53.64	74.00	20.36
5371.500	H	X	AV	42.70	3.61	0.54	-	46.85	54.00	7.15
10640.110	H	Z	PK	41.26	12.53	-	-6.02	47.77	74.00	26.23
10639.850	H	Z	AV	34.65	12.53	0.54	-6.02	41.70	54.00	12.30

Note.

- This test item was performed in each axis and the worst case data were reported.
- Sample Calculation.
Margin = Limit – Result
Result = Reading + T.F + DUTY Correction Factor + Distance Correction Factor
T.F = AF + CL – AG
DUTY Correction Factor : 0.54 dB = 20*log(1/0.94) for Method AD.
- Measurement Distance above 10 GHz = 1.5 m. So Distance Correction Factor : -6.02dB = 20*log(1.5m/3m)

■ Measurement Data:

30MHz ~ 40GHz Radiated Spurious Emissions: 802.11n HT20 & 5500MHz(Ch. 100)

Frequency (MHz)	ANT Pol	The worst case EUT Position (Axis)	Detector	Reading (dBuV)	T.F (dB/m)	DUTY Correction Factor (dB)	Distance Correction Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
5467.230	H	Z	PK	47.40	3.4	-	-	50.80	68.20	17.40
11000.510	H	Z	PK	41.91	12.92	-	-6.02	48.81	74.00	25.19
10999.750	H	Z	AV	34.2	12.92	0.54	-6.02	41.64	54.00	12.36

30MHz ~ 40GHz Radiated Spurious Emissions: 802.11n HT20 & 5580MHz(Ch. 116)

Frequency (MHz)	ANT Pol	The worst case EUT Position (Axis)	Detector	Reading (dBuV)	T.F (dB/m)	DUTY Correction Factor (dB)	Distance Correction Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
11160.240	H	Z	PK	42.15	14.65	-	-6.02	50.78	74.00	23.22
11160.000	H	Z	AV	34.87	14.65	0.54	-6.02	44.04	54.00	9.96

30MHz ~ 40GHz Radiated Spurious Emissions: 802.11n HT20 & 5700MHz(Ch. 140)

Frequency (MHz)	ANT Pol	The worst case EUT Position (Axis)	Detector	Reading (dBuV)	T.F (dB/m)	DUTY Correction Factor (dB)	Distance Correction Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
5725.380	H	Z	PK	45.99	3.8	-	-	49.79	68.20	18.41
11400.200	H	Z	PK	42.65	14.65	-	-6.02	51.28	74.00	22.72
11400.000	H	Z	AV	35.76	14.65	0.54	-6.02	44.93	54.00	9.07

Note.

- This test item was performed in each axis and the worst case data were reported.
- Sample Calculation.
Margin = Limit – Result
Result = Reading + T.F + DUTY Correction Factor + Distance Correction Factor
T.F = AF + CL – AG
DUTY Correction Factor : 0.54 dB = 20*log(1/0.94) for Method AD.
- Measurement Distance above 10 GHz = 1.5 m. So Distance Correction Factor : -6.02dB = 20*log(1.5m/3m)

■ **Measurement Data:**

30MHz ~ 40GHz Radiated Spurious Emissions: 802.11n HT40 & 5190MHz(Ch. 38)

Frequency (MHz)	ANT Pol	The worst case EUT Position (Axis)	Detector	Reading (dBuV)	T.F (dB/m)	DUTY Correction Factor (dB)	Distance Correction Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
5149.050	H	Z	PK	63.37	3.08	-	-	66.45	74.00	7.55
5149.900	H	Z	AV	46.45	3.08	0.54	-	50.07	54.00	3.93
10380.460	H	Z	PK	40.21	11.39	-	-6.02	45.58	68.20	22.62

30MHz ~ 40GHz Radiated Spurious Emissions: 802.11n HT40 & 5230MHz(Ch. 46)

Frequency (MHz)	ANT Pol	The worst case EUT Position (Axis)	Detector	Reading (dBuV)	T.F (dB/m)	DUTY Correction Factor (dB)	Distance Correction Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
10460.150	H	Z	PK	41.87	12.36	-	-6.02	48.21	68.20	19.99
-	-	-	-	-	-	-	-	-	-	-

Note.

- This test item was performed in each axis and the worst case data were reported.
- Sample Calculation.
 Margin = Limit – Result
 Result = Reading + T.F + DUTY Correction Factor + Distance Correction Factor
 T.F = AF + CL – AG
 DUTY Correction Factor : 0.54 dB = 20*log(1/0.94) for Method AD.
- Measurement Distance above 10 GHz = 1.5 m. So Distance Correction Factor : -6.02dB = 20*log(1.5m/3m)

■ Measurement Data:

30MHz ~ 40GHz Radiated Spurious Emissions: 802.11n HT40 & 5270MHz(Ch. 54)

Frequency (MHz)	ANT Pol	The worst case EUT Position (Axis)	Detector	Reading (dBuV)	T.F (dB/m)	DUTY Correction Factor (dB)	Distance Correction Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
10539.860	H	Z	PK	41.78	12.08	-	-6.02	47.84	68.20	20.36
-	-	-	-	-	-	-	-	-	-	-

30MHz ~ 40GHz Radiated Spurious Emissions: 802.11n HT40 & 5310MHz(Ch. 62)

Frequency (MHz)	ANT Pol	The worst case EUT Position (Axis)	Detector	Reading (dBuV)	T.F (dB/m)	DUTY Correction Factor (dB)	Distance Correction Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
5351.250	H	Z	PK	60.08	3.61	-	-	63.69	74.00	10.31
5350.050	H	Z	AV	45.62	3.61	0.54	-	49.77	54.00	4.23
10619.890	H	Z	PK	41.67	12.53	-	-6.02	48.18	74.00	25.82
10620.040	H	Z	AV	34.02	12.53	0.54	-6.02	41.07	54.00	12.93

Note.

- This test item was performed in each axis and the worst case data were reported.
- Sample Calculation.
 Margin = Limit – Result
 Result = Reading + T.F + DUTY Correction Factor + Distance Correction Factor
 T.F = AF + CL – AG
 DUTY Correction Factor : 0.54 dB = 20*log(1/0.94) for Method AD.
- Measurement Distance above 10 GHz = 1.5 m. So Distance Correction Factor : -6.02dB = 20*log(1.5m/3m)

■ Measurement Data:

30MHz ~ 40GHz Radiated Spurious Emissions: 802.11n HT40 & 5510MHz(Ch. 102)

Frequency (MHz)	ANT Pol	The worst case EUT Position (Axis)	Detector	Reading (dBuV)	T.F (dB/m)	DUTY Correction Factor (dB)	Distance Correction Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
5467.640	H	Z	PK	59.17	3.4	-	-	62.57	68.20	5.63
11019.960	H	Z	PK	41.51	12.92	-	-6.02	48.41	74.00	25.59
11020.180	H	Z	AV	34.01	12.92	0.54	-6.02	41.45	54.00	12.55

30MHz ~ 40GHz Radiated Spurious Emissions: 802.11n HT40 & 5550MHz(Ch. 110)

Frequency (MHz)	ANT Pol	The worst case EUT Position (Axis)	Detector	Reading (dBuV)	T.F (dB/m)	DUTY Correction Factor (dB)	Distance Correction Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
11100.180	H	Z	PK	41.84	14.65	-	-6.02	50.47	74.00	23.53
11100.080	H	Z	AV	34.62	14.65	0.54	-6.02	43.79	54.00	10.21

30MHz ~ 40GHz Radiated Spurious Emissions: 802.11n HT40 & 5670MHz(Ch. 134)

Frequency (MHz)	ANT Pol	The worst case EUT Position (Axis)	Detector	Reading (dBuV)	T.F (dB/m)	DUTY Correction Factor (dB)	Distance Correction Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
5725.320	H	Z	PK	58.54	3.8	-	-	62.34	68.20	5.86
11339.920	H	Z	PK	42.6	14.65	-	-6.02	51.23	74.00	22.77
11339.860	H	Z	AV	35.09	14.65	0.54	-6.02	44.26	54.00	9.74

Note.

1. This test item was performed in each axis and the worst case data were reported.
2. Sample Calculation.
Margin = Limit – Result
Result = Reading + T.F + DUTY Correction Factor + Distance Correction Factor
T.F = AF + CL – AG
DUTY Correction Factor : 0.54 dB = 20*log(1/0.94) for Method AD.
3. Measurement Distance above 10 GHz = 1.5 m. So Distance Correction Factor : -6.02dB = 20*log(1.5m/3m)

3.2.7 AC Conducted Emissions

■ **TEST PROCEDURE :**

The conducted emissions are measured in the shielded room with a spectrum analyzer in peak hold. Emissions closest to the limit are measured in the quasi-peak mode (QP) and average mode (AV) with the tuned receiver using a bandwidth of 9 kHz. The emissions are maximized further by cable manipulation and Exerciser operation. The highest emissions relative to the limit are listed.

■ **Measurement Data: Comply**

Note 1: See next pages for actual measured spectrum plots and data.

■ **Minimum Standard: FCC Part 15.207(a)/EN 55022**

Frequency Range (MHz)	Conducted Limit (dBuV)	
	Quasi-Peak	Average
0.15 ~ 0.5	66 to 56 *	56 to 46 *
0.5 ~ 5	56	46
5 ~ 30	60	50

* Decreases with the logarithm of the frequency

AC Line Conducted Emissions (Graph)

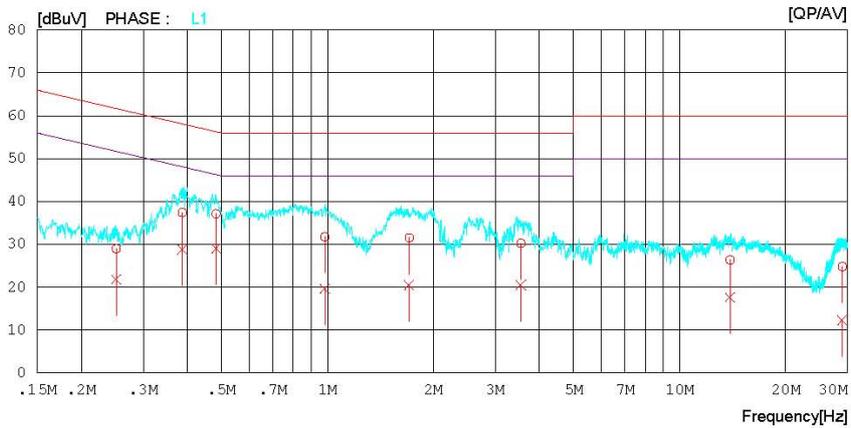
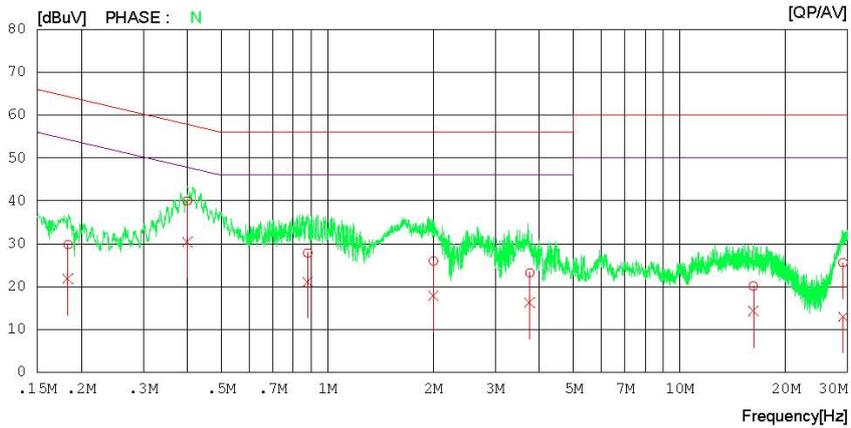
Test Mode: 802.11a_5.1G



Results of Conducted Emission

Digital EMC
Date : 2012-09-06

Model No.	: LG-E974	Reference No.	:
Type	:	Power Supply	: 120 V 60 Hz
Serial No.	: Identical prototype	Temp/Humi.	: 24 °C 50 % R.H.
Test Condition	: WLAN	Operator	: J.J.LEE
Memo	: 15.407 / BAND1		
LIMIT	: CISPR22_B_QP		
	: CISPR22_B_AV		



AC Line Conducted Emissions (Data List)

Test Mode: 802.11a_5.1G

Results of Conducted Emission

Digital EMC
 Date : 2012-09-06

Model No.	: LG-E974	Reference No.	:
Type	:	Power Supply	: 120 V 60 Hz
Serial No.	: Identical prototype	Temp/Humi.	: 24 °C 50 % R.H.
Test Condition	: WLAN	Operator	: J.J.LEE

Memo : 15.407 / BAND1

LIMIT : CISPR22_B QP
 CISPR22_B AV

NO	FREQ [MHz]	READING		C. FACTOR [dB]	RESULT		LIMIT		MARGIN		PHASE
		QP [dBuV]	AV [dBuV]		QP [dBuV]	AV [dBuV]	QP [dBuV]	AV [dBuV]			
1	0.18336	29.6	21.6	0.2	29.8	21.8	64.3	54.3	34.5	32.5	N
2	0.40083	39.7	30.1	0.3	40.0	30.4	57.8	47.8	17.8	17.4	N
3	0.87905	27.5	20.8	0.3	27.8	21.1	56.0	46.0	28.2	24.9	N
4	2.00000	25.6	17.5	0.3	25.9	17.8	56.0	46.0	30.1	28.2	N
5	3.75600	22.8	15.9	0.4	23.2	16.3	56.0	46.0	32.8	29.7	N
6	16.21750	19.1	13.3	1.0	20.1	14.3	60.0	50.0	39.9	35.7	N
7	29.11850	24.2	11.6	1.3	25.5	12.9	60.0	50.0	34.5	37.1	N
8	0.25174	28.8	21.6	0.2	29.0	21.8	61.7	51.7	32.7	29.9	L1
9	0.38750	37.1	28.5	0.3	37.4	28.8	58.1	48.1	20.7	19.3	L1
10	0.48338	36.9	28.8	0.2	37.1	29.0	56.3	46.3	19.2	17.3	L1
11	0.98268	31.5	19.3	0.3	31.8	19.6	56.0	46.0	24.2	26.4	L1
12	1.70800	31.2	20.2	0.3	31.5	20.5	56.0	46.0	24.5	25.5	L1
13	3.54650	29.8	20.1	0.4	30.2	20.5	56.0	46.0	25.8	25.5	L1
14	13.91950	25.5	16.7	0.9	26.4	17.6	60.0	50.0	33.6	32.4	L1
15	28.99450	23.5	11.0	1.3	24.8	12.3	60.0	50.0	35.2	37.7	L1

AC Line Conducted Emissions (Graph)

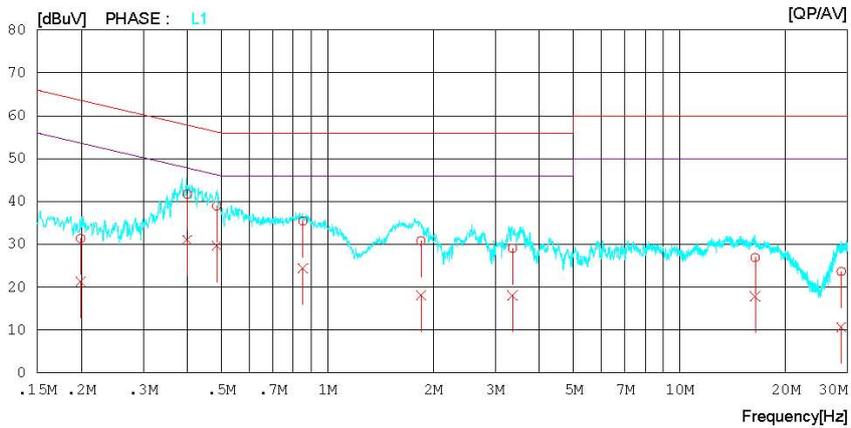
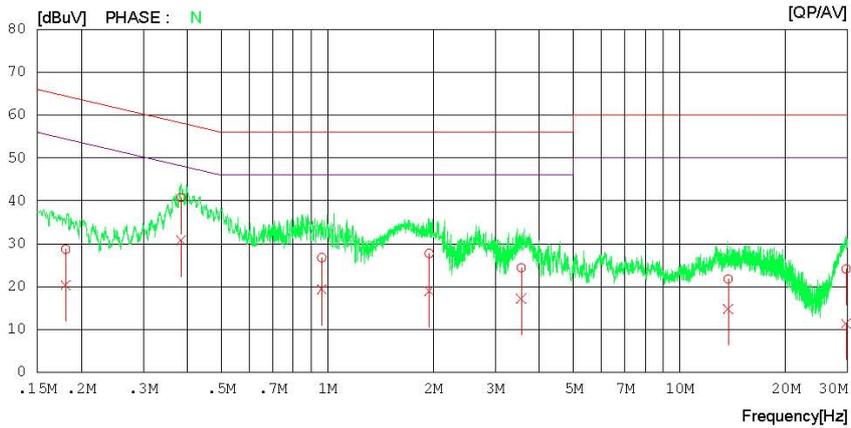
Test Mode: 802.11a_5.3G



Results of Conducted Emission

Digital EMC
Date : 2012-09-06

Model No.	: LG-E974	Reference No.	:
Type	:	Power Supply	: 120 V 60 Hz
Serial No.	: Identical prototype	Temp/Humi.	: 24 °C 50 % R.H.
Test Condition	: WLAN	Operator	: J.J.LEE
Memo	: 15.407 / BAND2		
LIMIT	: CISPR22_B_QP		
	: CISPR22_B_AV		



AC Line Conducted Emissions (Data List)

Test Mode: 802.11a_5.3G

Results of Conducted Emission

Digital EMC
 Date : 2012-08-06

Model No.	: LG-E974	Reference No.	:
Type	:	Power Supply	: 120 V 60 Hz
Serial No.	: Identical prototype	Temp/Humi.	: 24 °C 50 % R.H.
Test Condition	: WLAN	Operator	: J.J.LEE
Memo	: 15.407 / BAND2		

LIMIT : CISPR22_B QP
 CISPR22_B AV

NO	FREQ [MHz]	READING		C. FACTOR [dB]	RESULT		LIMIT		MARGIN		PHASE
		QP [dBuV]	AV [dBuV]		QP [dBuV]	AV [dBuV]	QP [dBuV]	AV [dBuV]	QP [dBuV]	AV [dBuV]	
1	0.18068	28.5	20.1	0.2	28.7	20.3	64.5	54.5	35.8	34.2	N
2	0.38448	40.5	30.5	0.3	40.8	30.8	58.2	48.2	17.4	17.4	N
3	0.96450	26.4	19.1	0.3	26.7	19.4	56.0	46.0	29.3	26.6	N
4	1.94600	27.4	18.7	0.3	27.7	19.0	56.0	46.0	28.3	27.0	N
5	3.55250	24.0	16.8	0.4	24.4	17.2	56.0	46.0	31.6	28.8	N
6	13.73950	20.9	13.8	0.9	21.8	14.7	60.0	50.0	38.2	35.3	N
7	29.74000	22.8	10.1	1.3	24.1	11.4	60.0	50.0	35.9	38.6	N
8	0.19925	31.2	21.1	0.2	31.4	21.3	63.6	53.6	32.2	32.3	L1
9	0.40028	41.5	30.7	0.3	41.8	31.0	57.8	47.8	16.0	16.8	L1
10	0.48548	38.8	29.5	0.2	39.0	29.7	56.2	46.2	17.2	16.5	L1
11	0.85233	35.2	24.1	0.3	35.5	24.4	56.0	46.0	20.5	21.6	L1
12	1.84450	30.5	17.9	0.3	30.8	18.2	56.0	46.0	25.2	27.8	L1
13	3.35350	28.7	17.7	0.4	29.1	18.1	56.0	46.0	26.9	27.9	L1
14	16.39550	26.0	16.9	1.0	27.0	17.9	60.0	50.0	33.0	32.1	L1
15	28.79600	22.4	9.4	1.3	23.7	10.7	60.0	50.0	36.3	39.3	L1

AC Line Conducted Emissions (Graph)

Test Mode: 802.11a_5.5G

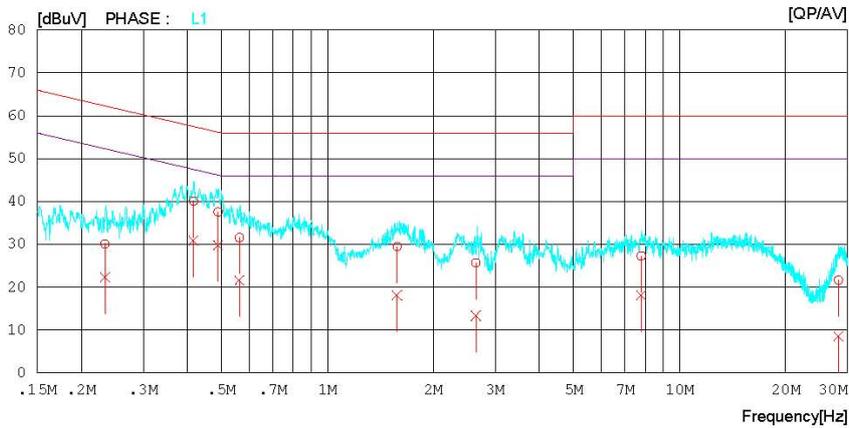
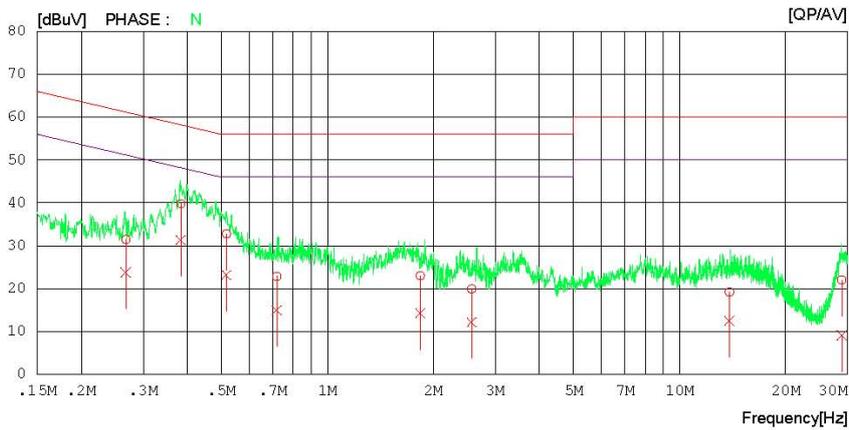


Results of Conducted Emission

Digital EMC
Date : 2012-09-06

Model No.	: LG-E974	Reference No.	:
Type	:	Power Supply	: 120 V 60 Hz
Serial No.	: Identical prototype	Temp/Humi.	: 24 °C 50 % R.H.
Test Condition	: WLAN	Operator	: J.J.LEE
Memo	: 15.407 / BAND3		

LIMIT : CISPR22_B QP
CISPR22_B AV



AC Line Conducted Emissions (Data List)

Test Mode: 802.11a_5.5G

Results of Conducted Emission

Digital EMC
 Date : 2012-09-06

Model No.	: LG-E974	Reference No.	:
Type	:	Power Supply	: 120 V 60 Hz
Serial No.	: Identical prototype	Temp/Humi.	: 24 °C 50 % R.H.
Test Condition	: WLAN	Operator	: J.J.LEE

Memo : 15.407 / BAND3

LIMIT : CISPR22_B QP
 CISPR22_B AV

NO	FREQ [MHz]	READING		C. FACTOR [dB]	RESULT		LIMIT		MARGIN		PHASE
		QP [dBuV]	AV [dBuV]		QP [dBuV]	AV [dBuV]	QP [dBuV]	AV [dBuV]			
1	0.26775	31.2	23.6	0.2	31.4	23.8	61.2	51.2	29.8	27.4	N
2	0.38340	39.5	31.0	0.3	39.8	31.3	58.2	48.2	18.4	16.9	N
3	0.51693	32.5	23.0	0.2	32.7	23.2	56.0	46.0	23.3	22.8	N
4	0.71878	22.6	14.8	0.2	22.8	15.0	56.0	46.0	33.2	31.0	N
5	1.83650	22.7	13.9	0.3	23.0	14.2	56.0	46.0	33.0	31.8	N
6	2.56950	19.6	11.9	0.3	19.9	12.2	56.0	46.0	36.1	33.8	N
7	13.86800	18.3	11.6	0.9	19.2	12.5	60.0	50.0	40.8	37.5	N
8	28.86900	20.7	7.8	1.3	22.0	9.1	60.0	50.0	38.0	40.9	N
9	0.23373	29.9	22.2	0.2	30.1	22.4	62.3	52.3	32.2	29.9	L1
10	0.41661	39.8	30.6	0.3	40.1	30.9	57.5	47.5	17.4	16.6	L1
11	0.48909	37.4	29.6	0.2	37.6	29.8	56.2	46.2	18.6	16.4	L1
12	0.56274	31.4	21.4	0.2	31.6	21.6	56.0	46.0	24.4	24.4	L1
13	1.57700	29.2	17.8	0.3	29.5	18.1	56.0	46.0	26.5	27.9	L1
14	2.64100	25.4	13.1	0.3	25.7	13.4	56.0	46.0	30.3	32.6	L1
15	7.78350	26.8	17.7	0.5	27.3	18.2	60.0	50.0	32.7	31.8	L1
16	28.26550	20.3	7.2	1.3	21.6	8.5	60.0	50.0	38.4	41.5	L1

3.2.8 Antenna Requirements

■ **Procedure:**

Describe how the EUT complies with the requirement that either its antenna is permanently attached, or that it employs a unique antenna connector, for every antenna proposed for use with the EUT.

■ **Conclusion: Comply**

The internal antenna is attached on the main PCB using the special spring tension. (Refer to Internal Photo file.)

■ **Minimum Standard:**

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions.

3.2.9 Occupied Bandwidth

■ **TEST Requirements**

When an occupied bandwidth value is not specified in the applicable RSS, the transmitted signal bandwidth to be reported is to be its 99% emission bandwidth, as calculated or measured

■ **TEST CONFIGURATION**

■ **TEST PROCEDURE :**

The resolution bandwidth shall be set to as close to 1% of the selected span as is possible without being below 1%. The video bandwidth shall be set to 3 times the resolution bandwidth. Video averaging is not permitted. Where practical, a sampling detector shall be used given that a peak or peak hold may produce a wider bandwidth than actual

■ **TEST RESULT : N/A**

Minimum Standard : N/A

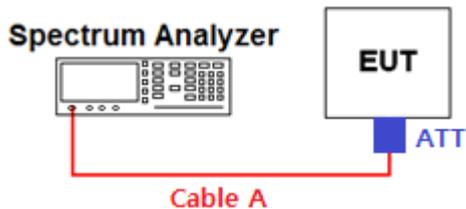
■ **RESULT PLOT : N/A**

4. LIST OF TEST EQUIPMENT

Type	Manufacturer	Model	Cal.Date (yy/mm/dd)	Next.Cal.Date (yy/mm/dd)	S/N
Spectrum Analyzer	Agilent	E4440A	11/10/11	12/10/11	US45303022
Spectrum Analyzer	Agilent	E4440A	11/09/30	12/09/30	MY45304199
Spectrum Analyzer	Rohde Schwarz	FSQ26	12/01/09	13/01/09	200445
Harmonic Mixer	OML	M28HWD	12/02/06	13/02/06	Ka100224-1
Digital Multimeter	H.P	34401A	12/03/05	13/03/05	3146A13475, US36122178
Spectrum Analyzer	Agilent	N9020A	12/01/09	13/01/09	MY49100833
Signal Generator	Rohde Schwarz	SMR20	12/03/05	13/03/05	101251
Vector Signal Generator	Rohde Schwarz	SMJ100A	12/01/09	13/01/09	100148
Thermo hygrometer	BODYCOM	BJ5478	12/01/13	13/01/13	090205-2
DC Power Supply	HP	6622A	12/03/05	13/03/05	3448A03760
High-Pass Filter	Wainwright	WHKX8.5	11/09/30	12/09/30	1
BILOG ANTENNA	SCHAFFNER	CBL6112D	10/12/21	12/12/21	2737
HORN ANT	ETS	3115	12/02/20	14/02/20	6419
HORN ANT	A.H.Systems	SAS-574	11/03/25	13/03/25	154
Attenuator (10dB)	WEINSCHTEL	23-10-34	11/09/30	12/09/30	BP4386
Amplifier (22dB)	H.P	8447E	12/01/09	13/01/09	2945A02865
Amplifier (30dB)	Agilent	8449B	12/03/05	13/03/05	3008A01590
EMI TEST RECEIVER	R&S	ESU	12/03/05	13/03/05	100014
EMI TEST RECEIVER	R&S	ESCI	12/03/06	13/03/06	100364
CVCF	NF Electronic	4420	12/03/06	13/03/06	304935/337980
ARTIFICIAL MAINS NETWORK	R&S	ESH2-Z5	11/09/30	12/09/30	828739/006
RFI/Field intensity Meter	KYORITSU	KNM-2402	12/07/02	13/07/02	4N-170-3
TEMP & HUMIDITY Chamber	SJ SCIENCE	TEMI850-10	12/03/06	13/03/06	S7400LE267 1226

APPENDIX I Conducted Test set up Diagram & Path loss Information

▪ Conducted Measurement



Path loss value information

Frequency (GHz)	Path Loss (dB)	Frequency (GHz)	Path Loss (dB)
5.180 ~ 5.240	11.34	5.500 ~ 5.700	11.55
5.260 ~ 5.320	11.48	-	-

Note. 1: The path loss from EUT to Spectrum analyzer was measured and used for test.
 Path loss (=S/A's offset value) = Cable A + ATT (Attenuator, Applied only when it was used externally)

APPENDIX II

Duty cycle plots

TEST PROCEDURE

Duty Cycle $[X = \text{On Time} / (\text{On} + \text{Off time})]$ is measured using Measurement Procedure of KDB789033

1. Set the center frequency of the spectrum analyzer to the center frequency of the transmission.
2. Set RBW \geq EBW if possible; otherwise, set RBW to the largest available value.
3. Set VBW \geq RBW.
4. Set detector = peak.
5. Note : The zero-span measurement method shall not be used unless both **RBW and VBW are $> 50/T$** , where T is defined in section B)1)a), and **the number of sweep points across duration T exceeds 100**. (For example, if VBW and/or RBW are limited to 3 MHz, then the zero-span method of measuring duty cycle shall not be used if $T \leq 16.7$ microseconds.)

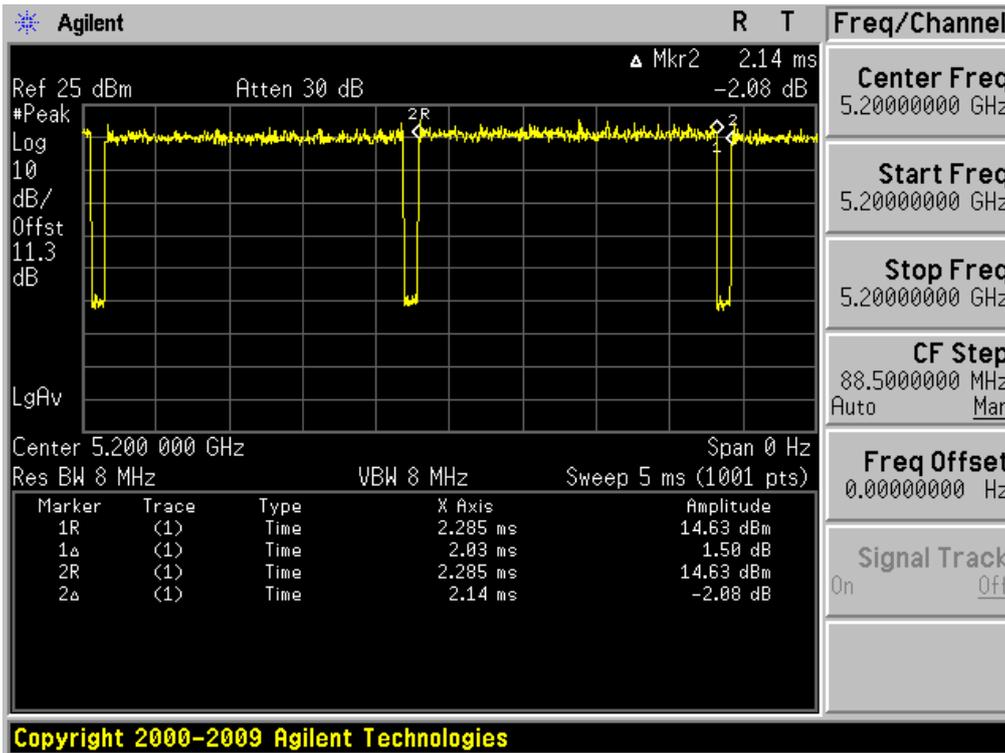
- Summary of Duty Cycle Calculation Table

Mode	Channel	Frequency [MHz]	Maximum Achievable Duty Cycle ($x = \text{On} / (\text{On} + \text{Off})$)		
			On Time [ms]	(On+Off) Time [ms]	x
802.11a	36	5180	2.030	2.140	0.94
	40	5200			
	48	5240			
	52	5260	2.030	2.140	0.94
	60	5300			
	64	5320			
	100	5500	2.030	2.140	0.94
	116	5580			
140	5700				
802.11n (20MHz)	36	5180	1.890	1.990	0.94
	40	5200			
	48	5240			
	52	5260	1.890	1.990	0.94
	60	5300			
	64	5320			
	100	5500	1.890	1.990	0.94
	116	5580			
140	5700				
802.11n (40MHz)	38	5190	0.930	0.984	0.94
	46	5230			
	54	5270	0.930	0.984	0.94
	62	5310			
	102	5510	0.930	0.984	0.94
	110	5550			
134	5670				

- Description for duty cycle plot data on next pages : **$1 \Delta = \text{On Time}$, $2\Delta = (\text{On} + \text{Off}) \text{ Time}$ So $\text{Off Time} = 2\Delta - 1 \Delta$**
- T : The minimum transmission duration over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation.
($T = \text{On time}$ of the above table since the EUT operates with above fixed Duty Cycle and it is the minimum On time)
For Duty Cycle with zero span method, both RBW/VBW $> 50/T$
(For example, this case **$\text{RBW/VBW (8 MHz)} > 50/0.00093 = 53.8 \text{ KHz}$**)
- The reason for the Duty Cycle Limitation : The test S/W provided by the applicant supports transmission with above maximum fixed duty cycle.
- The number of sweeps were increased by factor of $1/x$ until the trace stabilizes for Peak Measurement
- The number of average traces were increased by factor of $1/x$ for Method AD

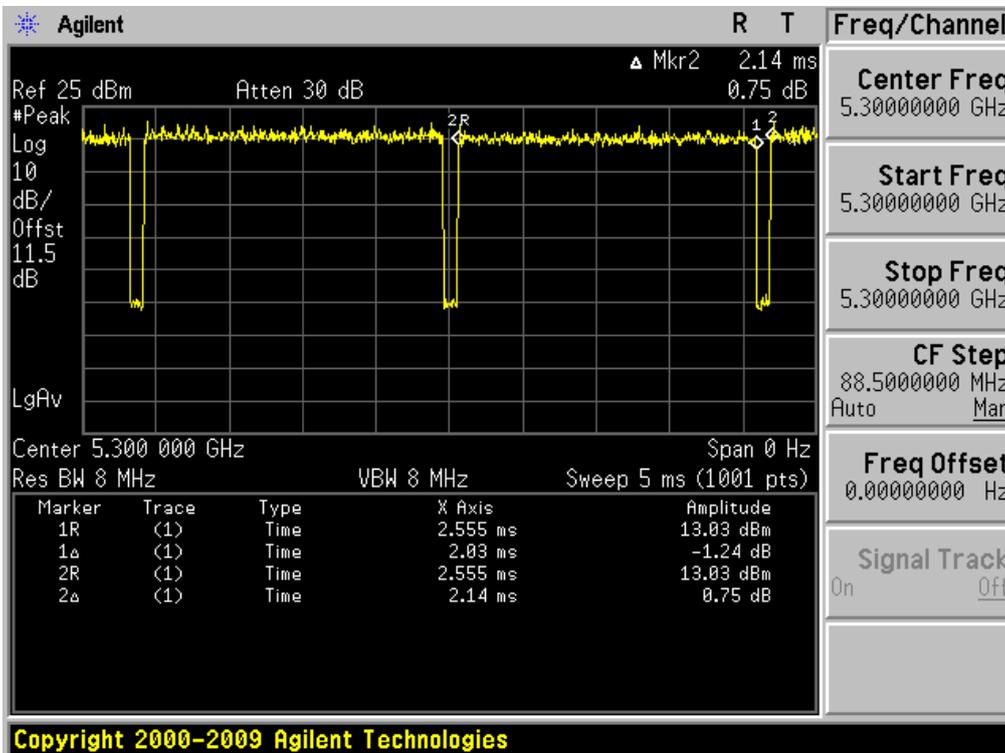
Duty Cycle

Test Mode: 802.11a & Ch.40



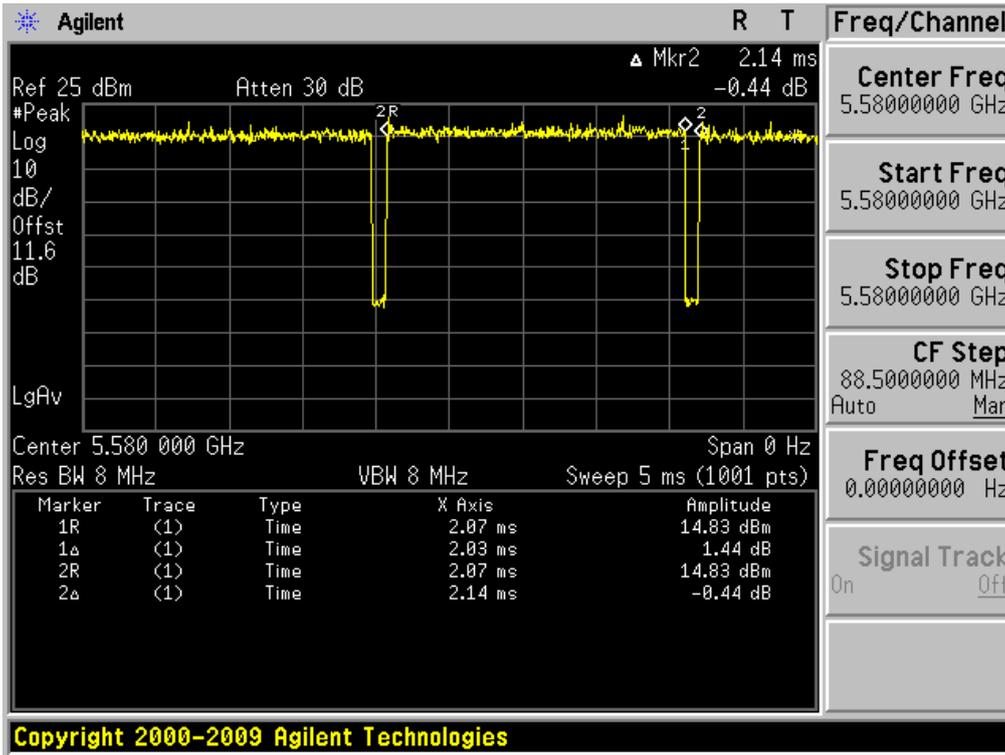
Duty Cycle

Test Mode: 802.11a & Ch.60



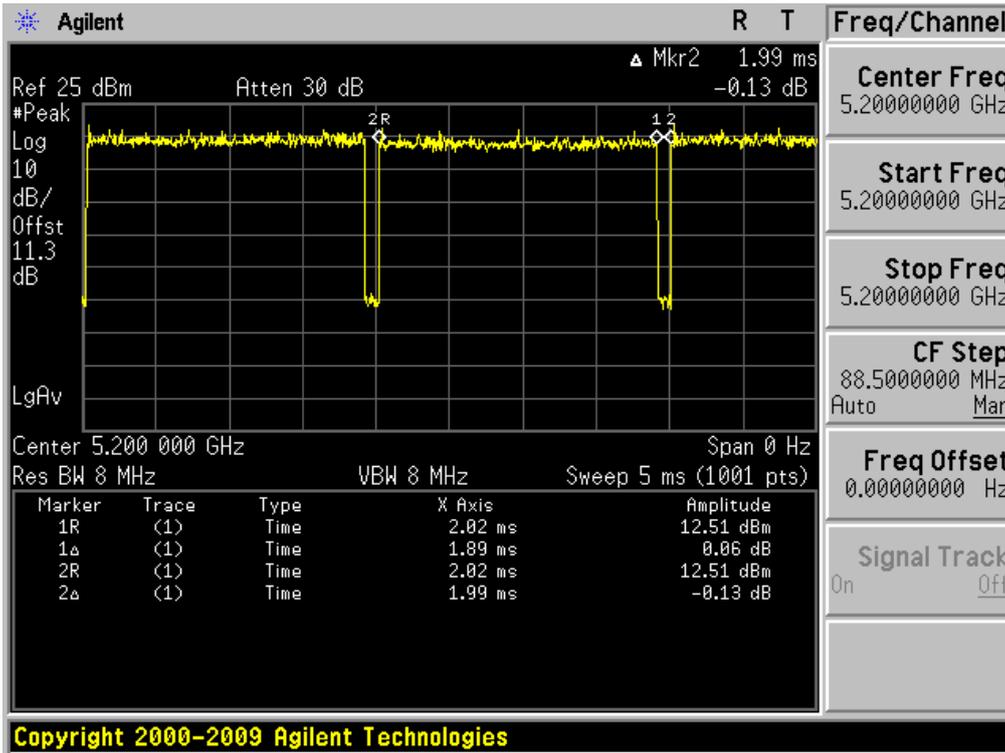
Duty Cycle

Test Mode: 802.11a & Ch.116



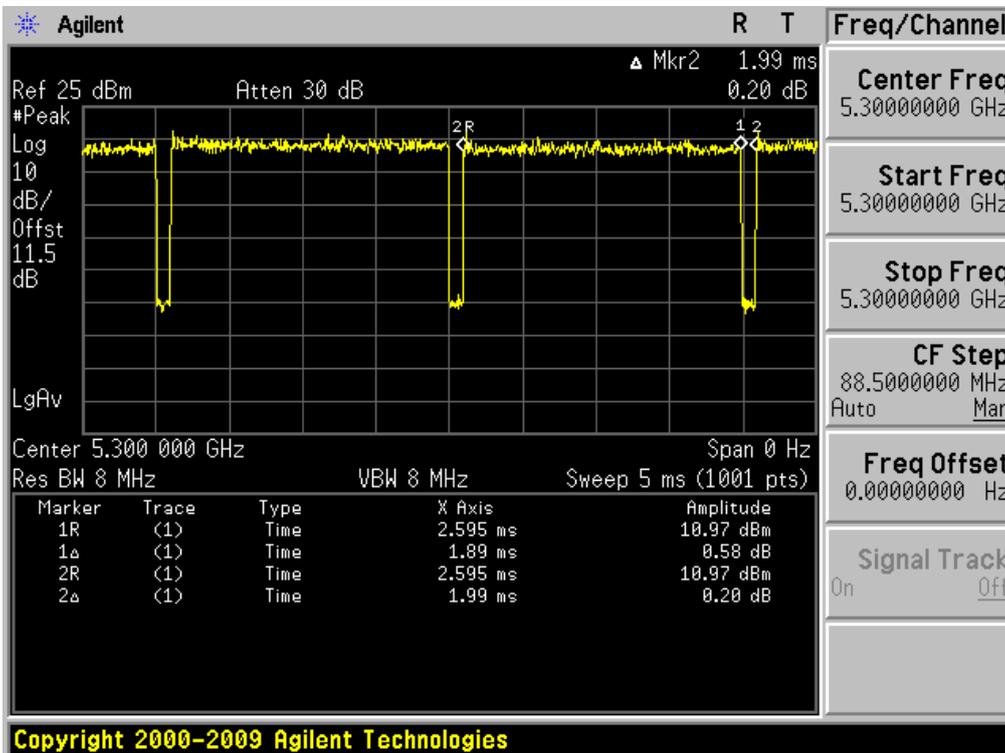
Duty Cycle

Test Mode: 802.11n(HT20) & Ch.40



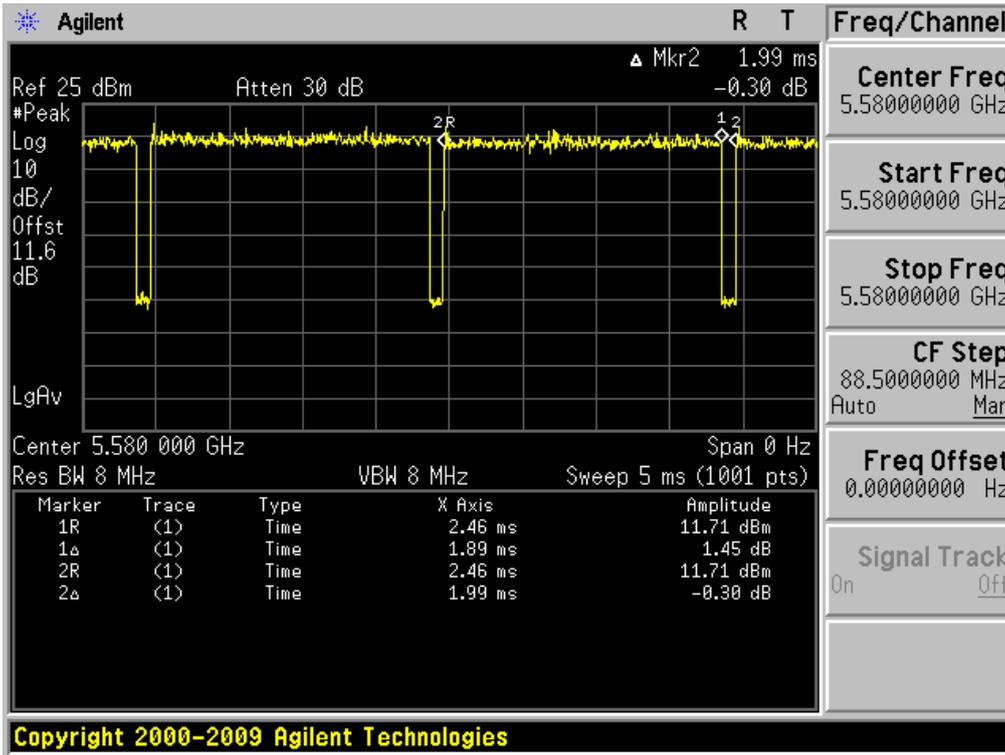
Duty Cycle

Test Mode: 802.11n(HT20) & Ch.60



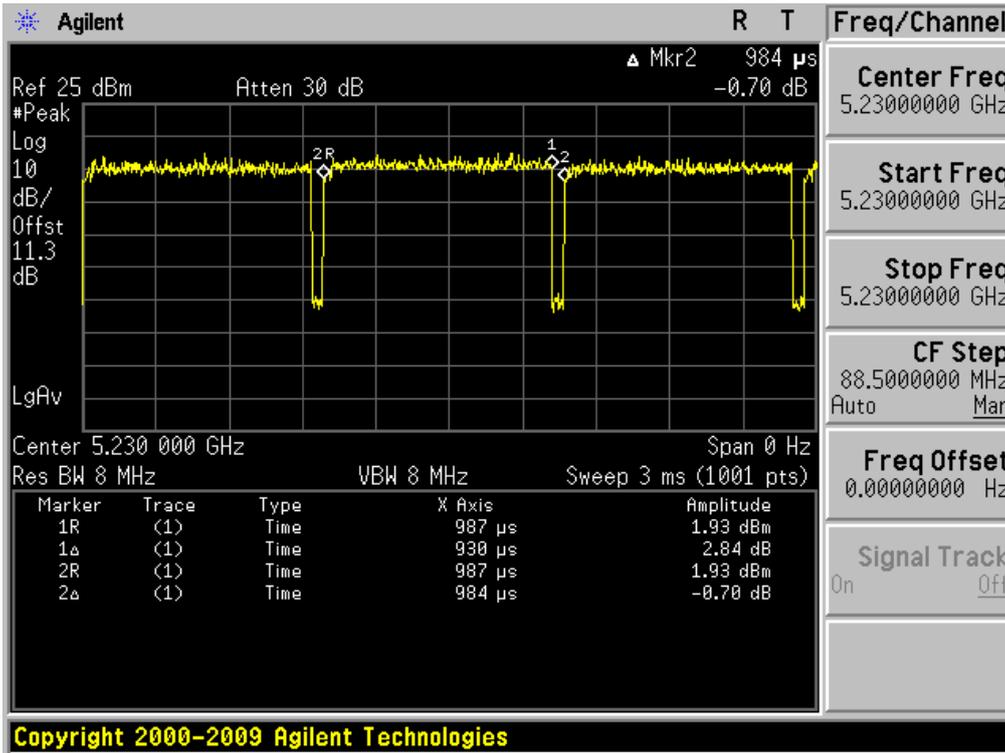
Duty Cycle

Test Mode: 802.11n(HT20) & Ch.116



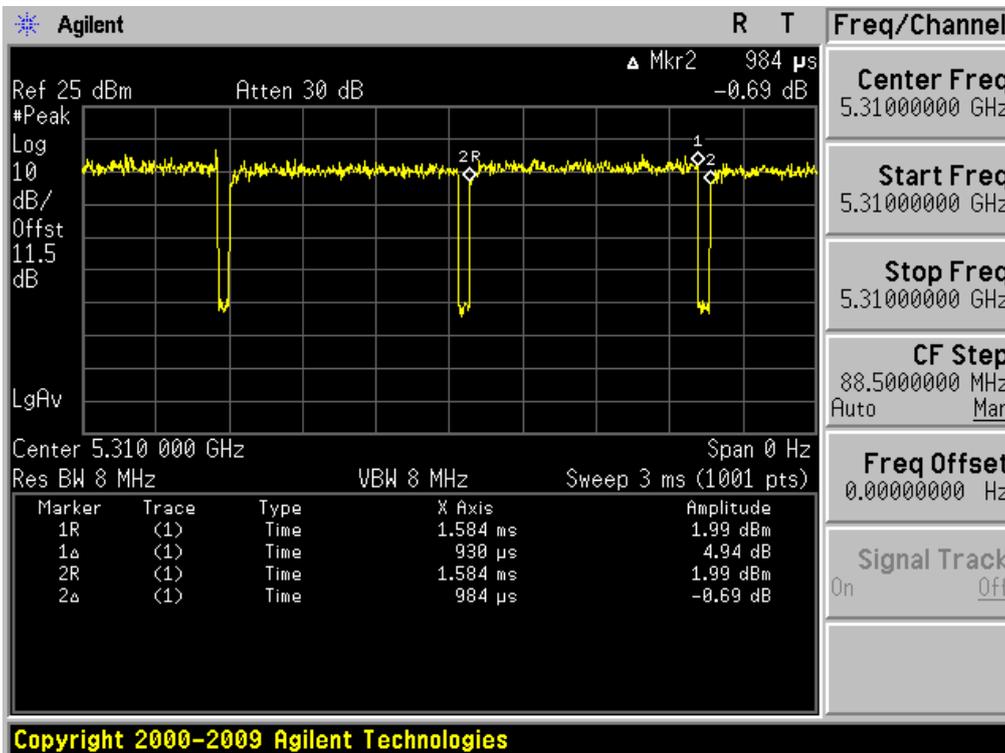
Duty Cycle

Test Mode: 802.11n(HT40) & Ch.46



Duty Cycle

Test Mode: 802.11n(HT40) & Ch.62



Duty Cycle

Test Mode: 802.11n(HT40) & Ch.110

