FCC CFR47 PART 15 SUBPART E
CLASS II PERMISSIVE CHANGE
TEST REPORT

FOR

MC85 MINI CARD 11b/g/a/n RADIO CARD

MODEL NUMBER: MC85

FCC ID: UAY-MMC85M

REPORT NUMBER: 06U10699-1

ISSUE DATE: APRIL 25, 2007

Prepared for
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Revision History

Rev.	Issue Date	Revisions	Revised By
--	4/25/07	Initial Issue	M. Heckrotte

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: MARVELL SEMICONDUCTOR, INC.
5488 MARVELL LANE
SANTA CLARA, CA, 95054, USA

EUT DESCRIPTION: MC85 MINI CARD 802.11b/g/a/n RADIO CARD

MODEL: MC85

SERIAL NUMBER: 01779

DATE TESTED: NOVEMBER 2, 2006 – APRIL 5, 2007

APPLICABLE STANDARDS	
STANDARD	**TEST RESULTS**
FCC PART 15 SUBPART E	NO NON-COMPLIANCE NOTED

Compliance Certification Services, Inc. tested the above equipment in accordance with the requirements set forth in the above standards. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

Note: The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. This document may not be altered or revised in any way unless done so by Compliance Certification Services and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by Compliance Certification Services will constitute fraud and shall nullify the document. No part of this report may be used to claim product certification, approval, or endorsement by NVLAP, NIST, or any government agency.

Approved & Released For CCS By:

MICHAEL HECKROTTE
ENGINEERING MANAGER
COMPLIANCE CERTIFICATION SERVICES

Tested By:

THANH NGUYEN
EMC ENGINEER
COMPLIANCE CERTIFICATION SERVICES

2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.4-2003, FCC CFR 47 Part 2, FCC CFR 47 Part 15 and and FCC 06-96 APPENDIX "COMPLIANCE MEASUREMENT PROCEDURES FOR UNLICENSED-NATIONAL INFORMATION INFRASTRUCTURE DEVCIES OPERATING IN THE 5250-5350 MHz AND 5470-5725 MHz BANDS INCORPORATING DYNAMIC FREQUENCY SELECTION".

3. FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 561F Monterey Road, Morgan Hill, California, USA. The sites are constructed in conformance with the requirements of ANSI C63.4, ANSI C63.7 and CISPR Publication 22. All receiving equipment conforms to CISPR Publication 16-1, "Radio Interference Measuring Apparatus and Measurement Methods."

CCS is accredited by NVLAP, Laboratory Code 200065-0. The full scope of accreditation can be viewed at http://www.ccsemc.com.

4. CALIBRATION AND UNCERTAINTY

4.1. MEASURING INSTRUMENT CALIBRATION

The measuring equipment utilized to perform the tests documented in this report has been calibrated in accordance with the manufacturer's recommendations, and is traceable to recognized national standards.

4.2. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus:

PARAMETER	UNCERTAINTY
Radiated Emission, 30 to 200 MHz	+/- 3.3 dB
Radiated Emission, 200 to 1000 MHz	+4.5 / -2.9 dB
Radiated Emission, 1000 to 2000 MHz	+4.5 / -2.9 dB
Power Line Conducted Emission	+/- 2.9 dB

Uncertainty figures are valid to a confidence level of 95%.

5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

The EUT is an 802.11a/b/g/n transceiver.

The radio module is manufactured by Marvell Semiconductor

5.2. DESCRIPTION OF CLASS II PERMISSIVE CHANGE

The purpose of this Permissive Change is adding the 5470-5725 MHz band from the previous project.

5.3. MAXIMUM OUTPUT POWER

The transmitter has a maximum peak conducted output power as follows:

5470 to 5725 MHz Authorized Band

Frequency Band (MHz)	Mode	Output Power (dBm)	Output Power (mW)
5500 - 5700	802.11a	14.60	28.84
5500 - 5700	802.11n HT20	16.09	40.64
5510 - 5670	802.11a 40MHz	15.36	34.36
5510 - 5670	802.11n HT40	16.19	41.59

5.4. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes two antennas for diversity:
1) Foxconn Model 820-2032 with a maximum gain of 6 dBi @ 5.5GHz band.
2) Mega Chip Model QRANTDPLWPS008, Dipole, with a maximum gain of 5.30 dBi @ 5.5 GHz.

5.5. SOFTWARE AND FIRMWARE

The firmware installed in the EUT during testing was PCI rev. 1.0.0.0.2, MFG 2.1.0.36

The EUT driver software installed in the Laptop during testing was Marvell Semiconductor, Inc. Labtools rev. 1.0.3.p3.

The board revision of the EUT tested is 1.8.

The test utility software used during testing was PCI.exe.

5.6. WORST-CASE CONFIGURATION AND MODE

The 2x3 configuration was used for all testing in this report.

In our opinion the worst- case data rates are determined to be as follows for each mode based on investigation by measuring the average power, peak power and PPSD across all data rates, bandwidths, and modulations.

In our opinion the worst-case data rates for the 2GHz bands are: 11 Mbps for 802.11b; 54Mbps for 802.11g; MCS11 for 802.11n HT20; MCS15 for 802.11n HT40. These are based on baseline testing with this chipset.

In our opinion the worst-case data rates for the 5GHz bands are: 9 Mbps for 802.11a 20MHz and 802.11a 40MHz; MCS0 for 802.11n HT20 and 802.11n HT40. These are based on baseline testing with this chipset.

All emissions tests were made with the worst-case data rates.

5.7. MODIFICATIONS

There were no modifications made to the revision EUT during the testing.

5.8. DESCRIPTION OF TEST SETUP

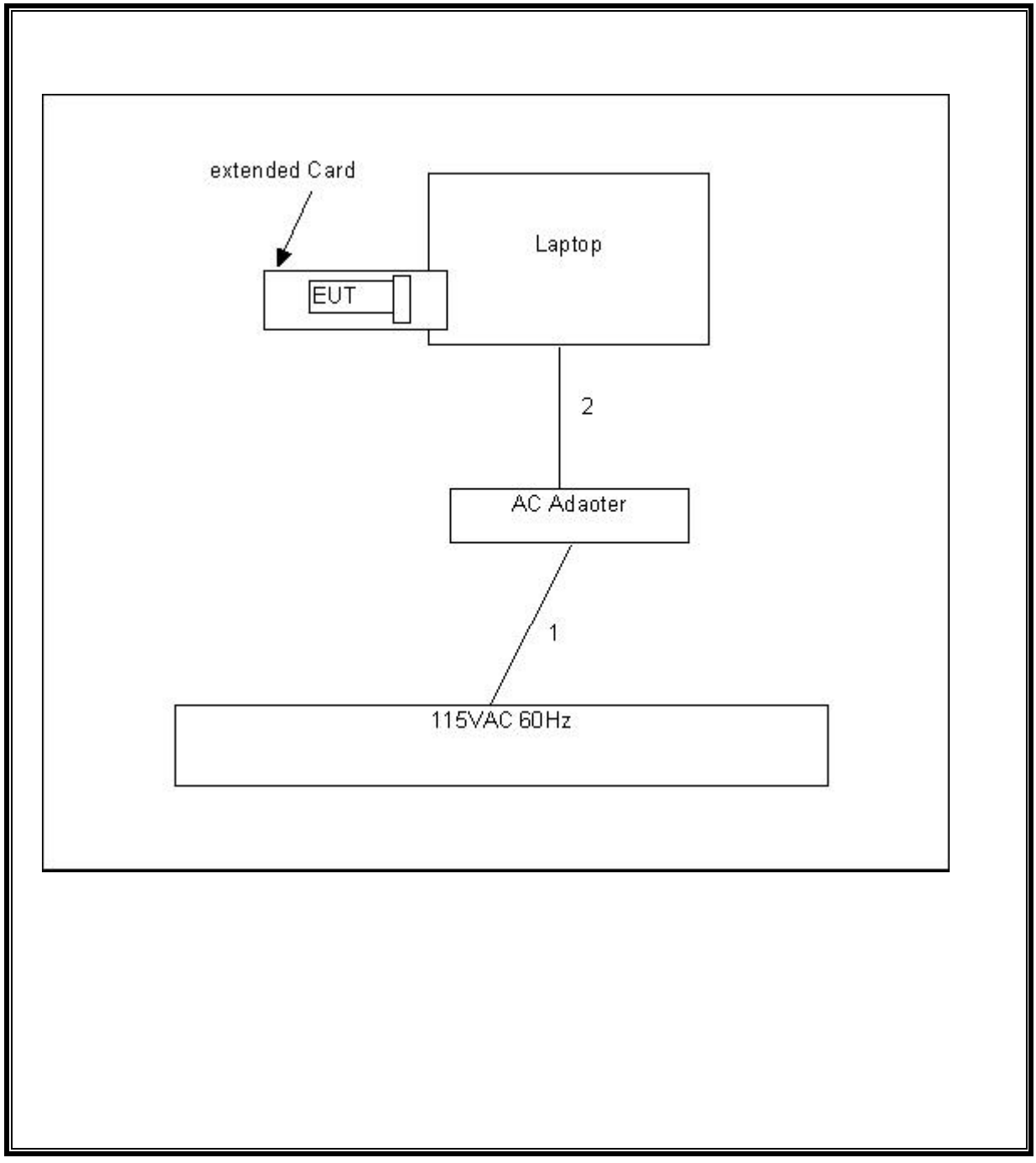
SUPPORT EQUIPMENT

PERIPHERAL SUPPORT EQUIPMENT LIST				
Description	**Manufacturer**	**Model**	**Serial Number**	**FCC ID**
Laptop	IBM	ThinkPad T60	L3-M5371	DoC
Extend PCB	Marvell	N/A	02V20806	N/A

TEST SETUP

The EUT is installed in a host laptop computer via an extension board during the tests. Test software exercised the radio card.

SETUP DIAGRAM FOR TESTS



6. TEST AND MEASUREMENT EQUIPMENT

The following test and measurement equipment was utilized for the tests documented in this report, excluding DFS tests; all tests utilizing this equipment were completed on or before November 20, 2006:

TEST EQUIPMENT LIST				
Description	**Manufacturer**	**Model**	**Serial Number**	**Cal Due**
EMI Receiver, 9 kHz ~ 2.9 GHz	Agilent / HP	8542E	3942A00286	2/4/2007
RF Filter Section	Agilent / HP	85420E	3705A00256	2/4/07
Antenna, Bilog 30 MHz ~ 2 Ghz	Sunol Sciences	JB1	A121003	8/30/07
Power Meter	Agilent / HP	438A	3513U04320	1/12/07
Antenna, Horn 1 ~ 18 GHz	ETS	3117	29310	4/22/07
Power Sensor 10MHz - 18GHz	Agilent / HP	8481A	3318A95392	1/11/07
7.6 GHz Highpass Filter	Micro-Tronics	HPM13195	1	CNR
Preamplifier, 1 ~ 26.5 GHz	Agilent / HP	8449B	3008A00561	10/3/07

The following test and measurement equipment was utilized for the DFS tests documented in this report:

TEST EQUIPMENT LIST				
Description	**Manufacturer**	**Model**	**Serial Number**	**Cal Due**
Spectrum Analyzer 3 Hz ~ 44 GHz	Agilent / HP	E4446A	US42070220	7/26/2007
Vector Signal Generator 250kHz-20GHz	Agilent / HP	E8267C	US43320336	11/2/2007
High Speed Digital I/O Card	National Instruments	PCI-6534	HA1612845	1/16/2008

7. LIMITS AND RESULTS

7.1. CHANNEL TESTS FOR THE 5470 TO 5725 MHz BAND

7.1.1. EMISSION BANDWIDTH

LIMIT

§15.403 (i) Emission bandwidth. For purposes of this subpart the emission bandwidth shall be determined by measuring the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, that are 26 dB down relative to the maximum level of the modulated carrier. Determination of the emissions bandwidth is based on the use of measurement instrumentation employing a peak detector function with an instrument resolutions bandwidth approximately equal to 1.0 percent of the emission bandwidth of the device under measurement.

TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The RBW is set to 1% to 3% of the 26 dB bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled.

RESULTS

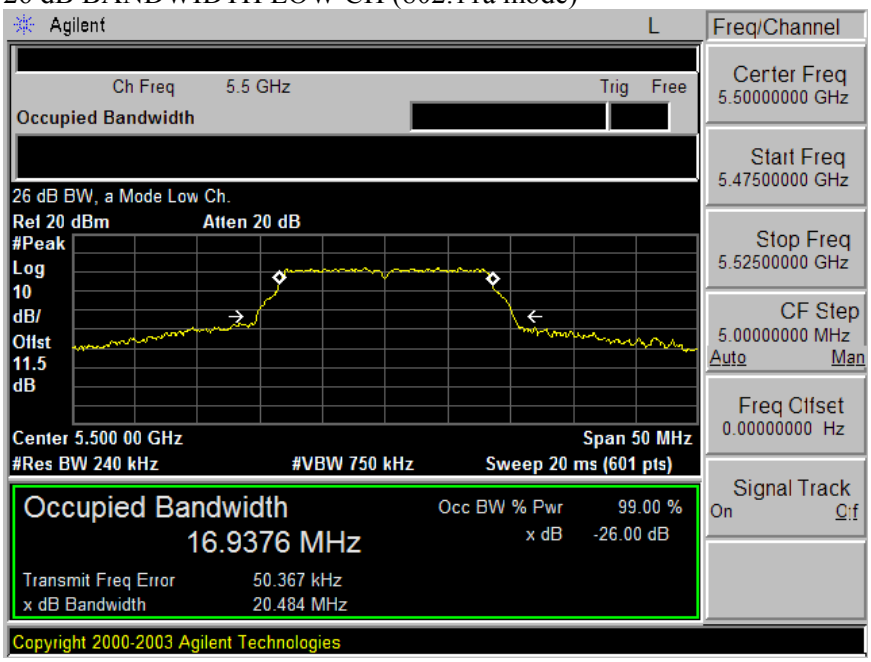
No non-compliance noted:

Mode Channel	Frequency (MHz)	26 dB BW Chain 0 (MHz)	26 dB BW Chain 1 (MHz)	Worst Case 10 Log B (dB)
802.11a Mode				
Low	5500	20.484	20.391	13.11
Middle	5600	20.434	20.346	13.10
High	5700	20.475	20.230	13.11
802.11n HT20 Mode				
Low	5500	20.629	20.462	13.14
Mid	5600	20.516	20.504	13.12
High	5700	20.553	20.65	13.15
802.11a 40 Mode				
Low	5510	41.382	41.354	16.17
Mid	5590	41.945	41.476	16.23
High	5670	41.599	41.526	16.19
802.11n HT40 Mode				
Low	5510	40.142	40.386	16.06
Mid	5590	42.784	40.629	16.31
High	5670	40.653	40.632	16.09

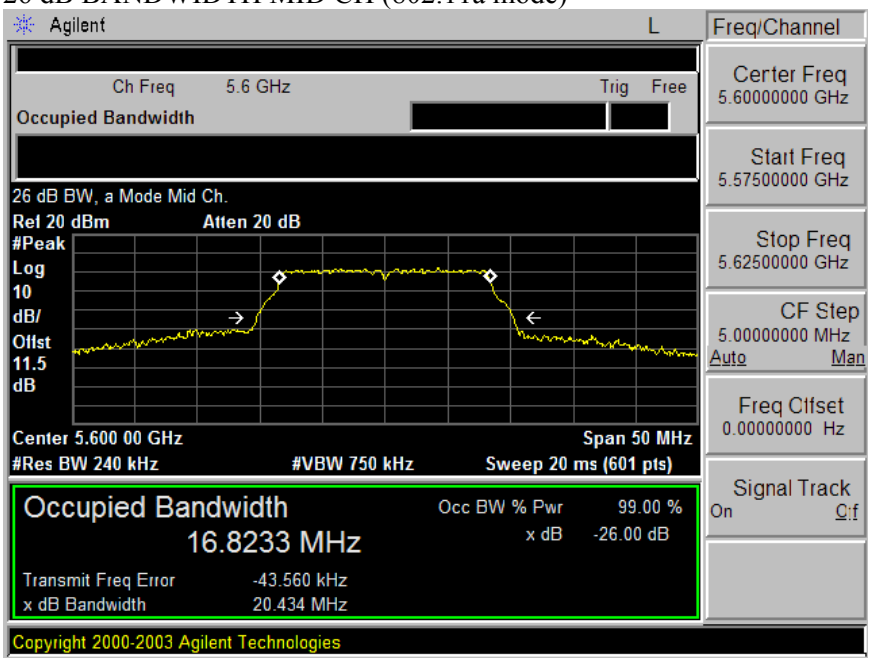
26 dB EMISSION BANDWIDTH (802.11a MODE)

Channel A

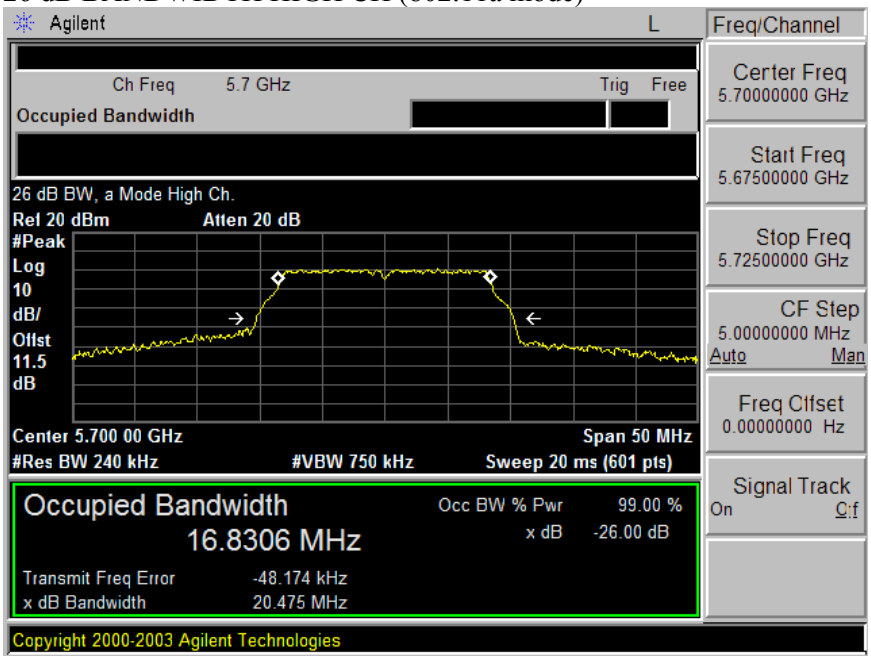
26 dB BANDWIDTH LOW CH (802.11a mode)



26 dB BANDWIDTH MID CH (802.11a mode)



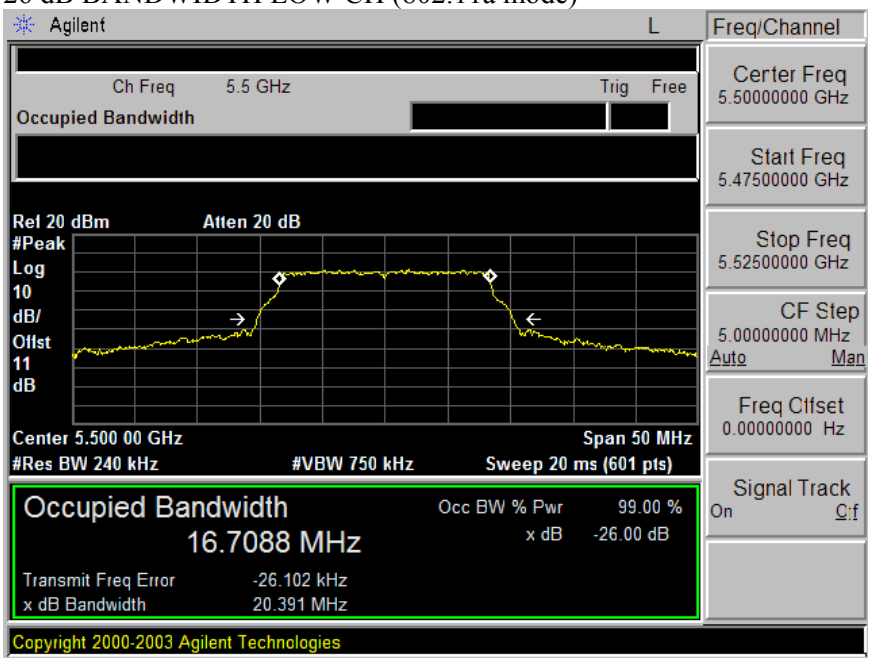
26 dB BANDWIDTH HIGH CH (802.11a mode)



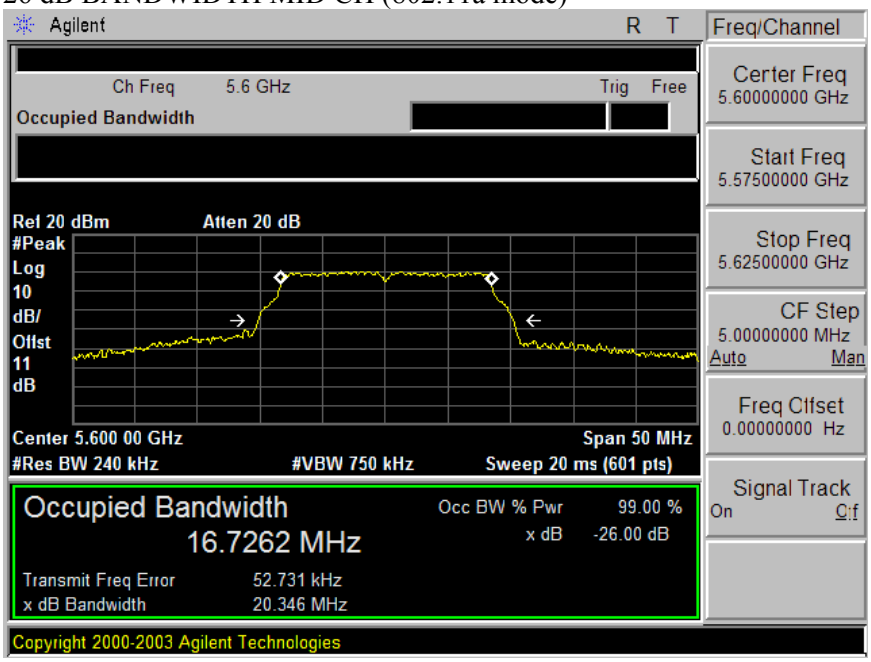
26 dB EMISSION BANDWIDTH (802.11a MODE)

Channel B

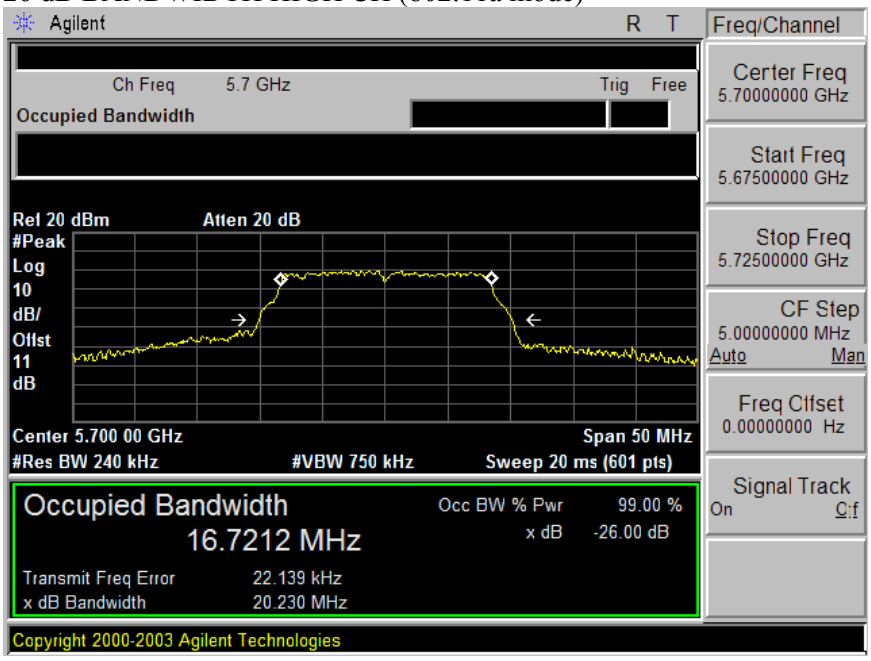
26 dB BANDWIDTH LOW CH (802.11a mode)



26 dB BANDWIDTH MID CH (802.11a mode)



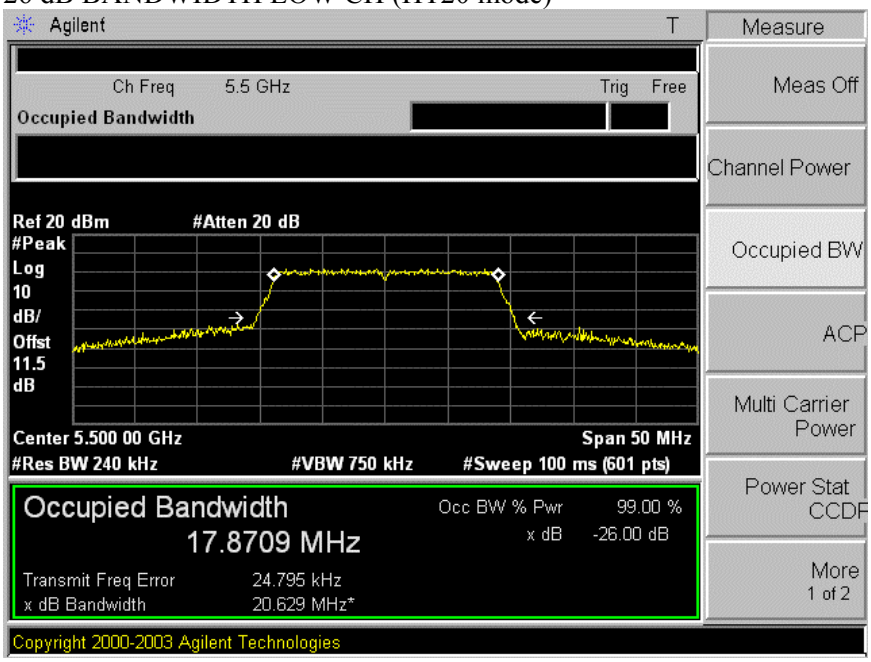
26 dB BANDWIDTH HIGH CH (802.11a mode)



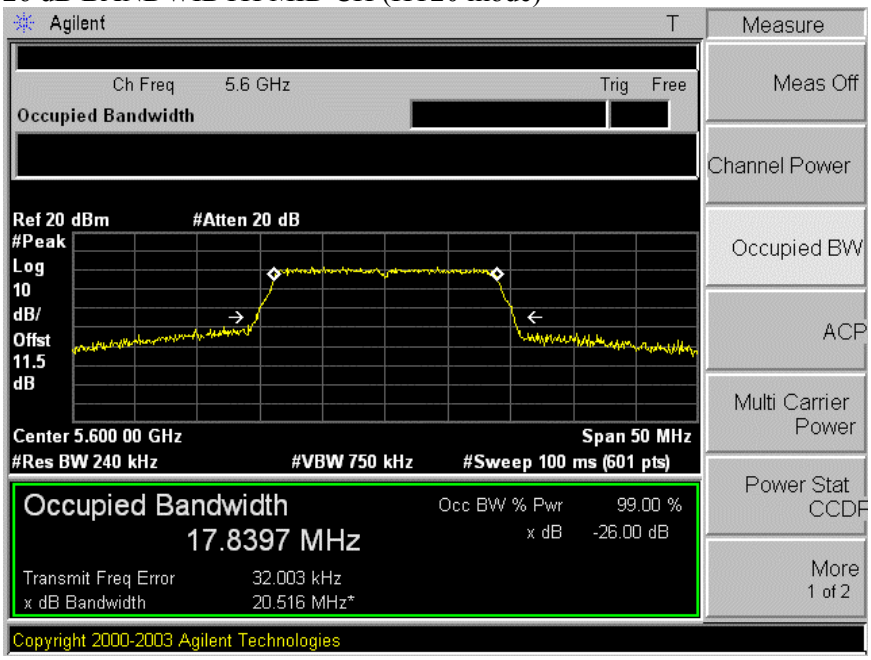
26 dB EMISSION BANDWIDTH (HT20 MODE)

Channel A

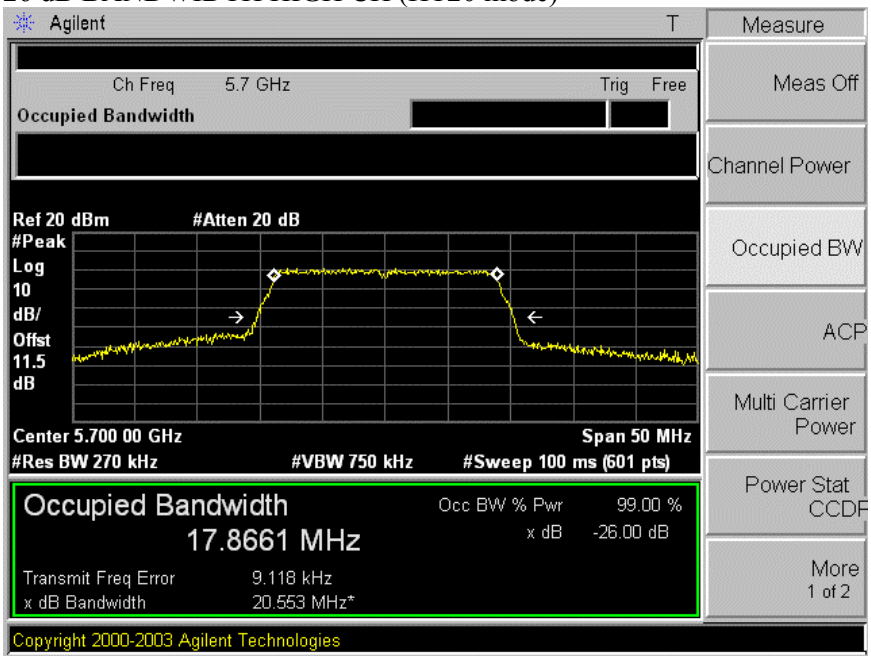
26 dB BANDWIDTH LOW CH (HT20 mode)



26 dB BANDWIDTH MID CH (HT20 mode)



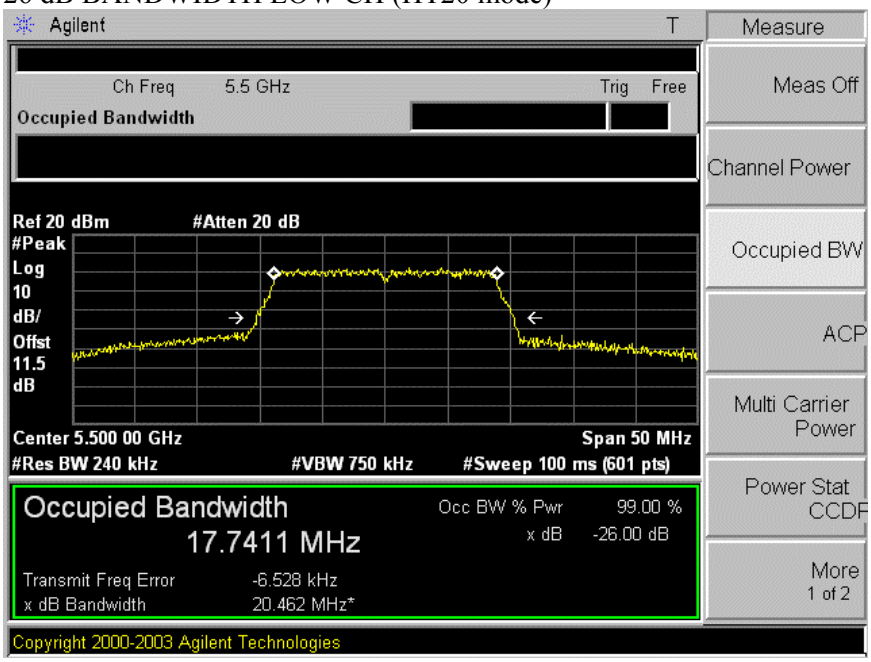
26 dB BANDWIDTH HIGH CH (HT20 mode)



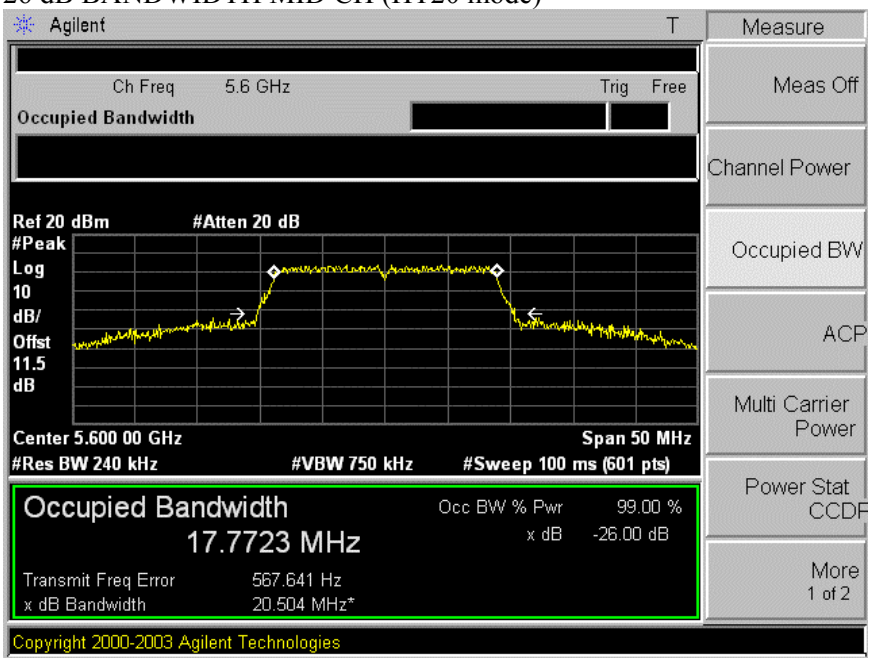
26 dB EMISSION BANDWIDTH (HT20 MODE)

Channel B

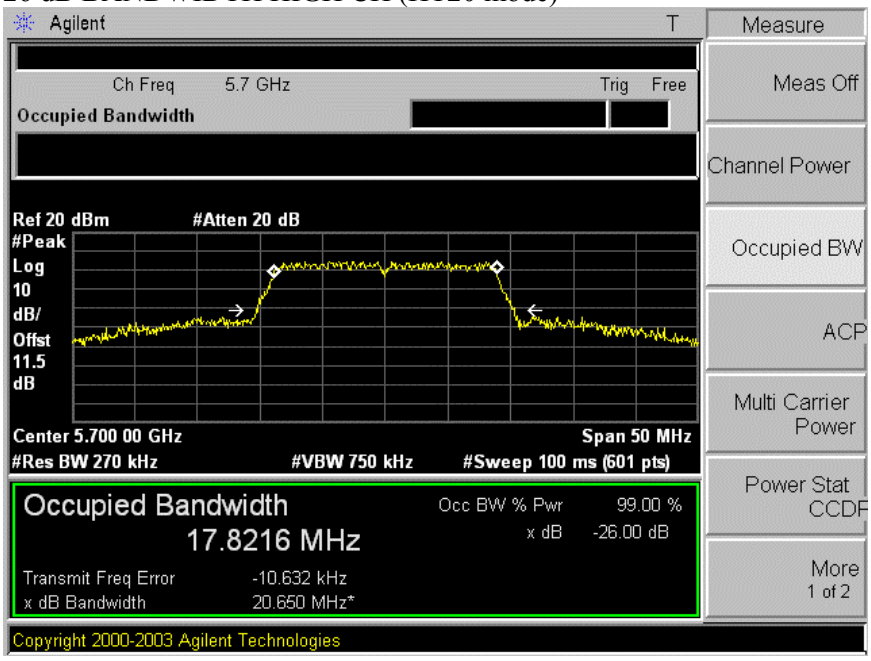
26 dB BANDWIDTH LOW CH (HT20 mode)



26 dB BANDWIDTH MID CH (HT20 mode)



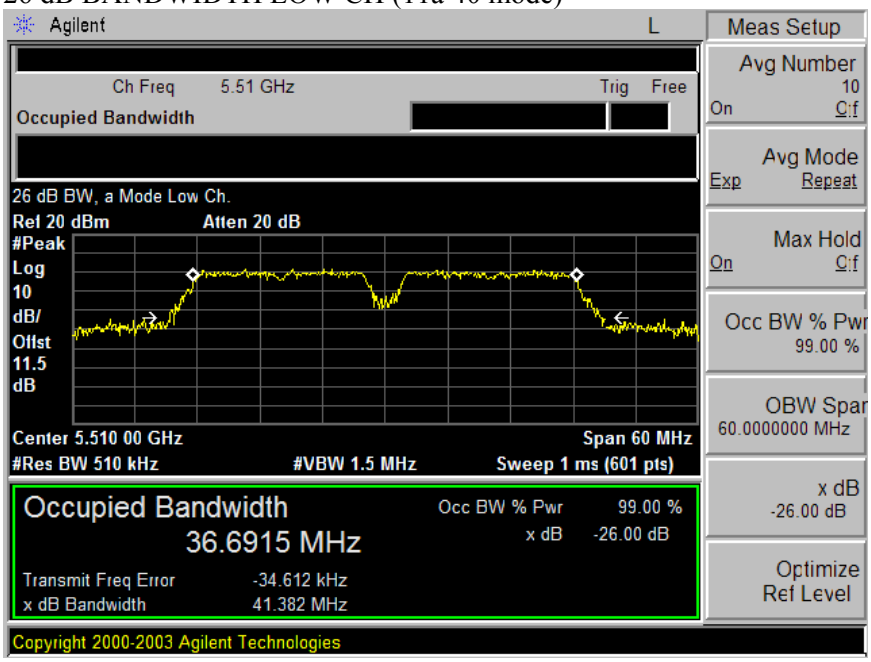
26 dB BANDWIDTH HIGH CH (HT20 mode)



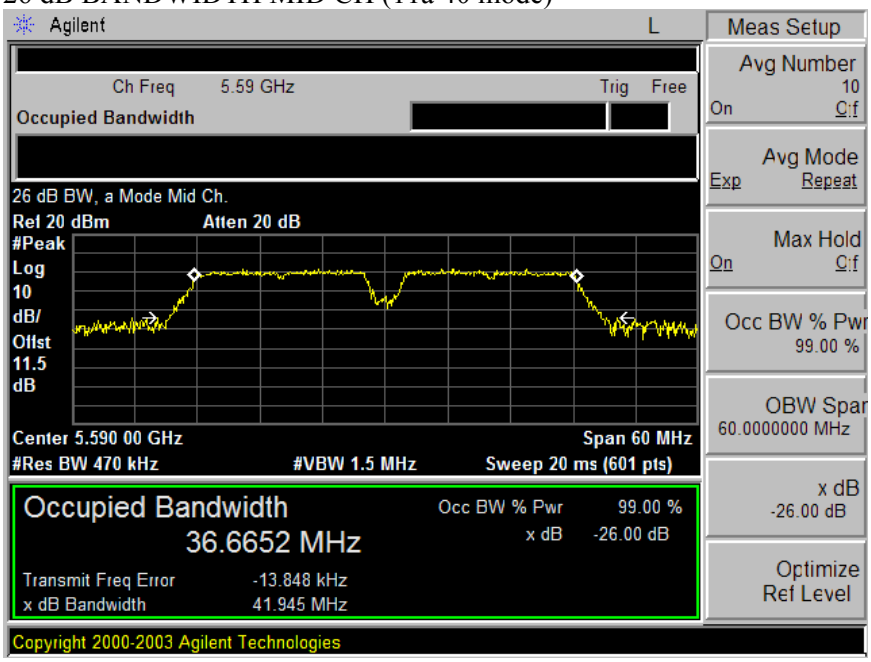
26 dB EMISSION BANDWIDTH (11a 40 MODE)

Channel A

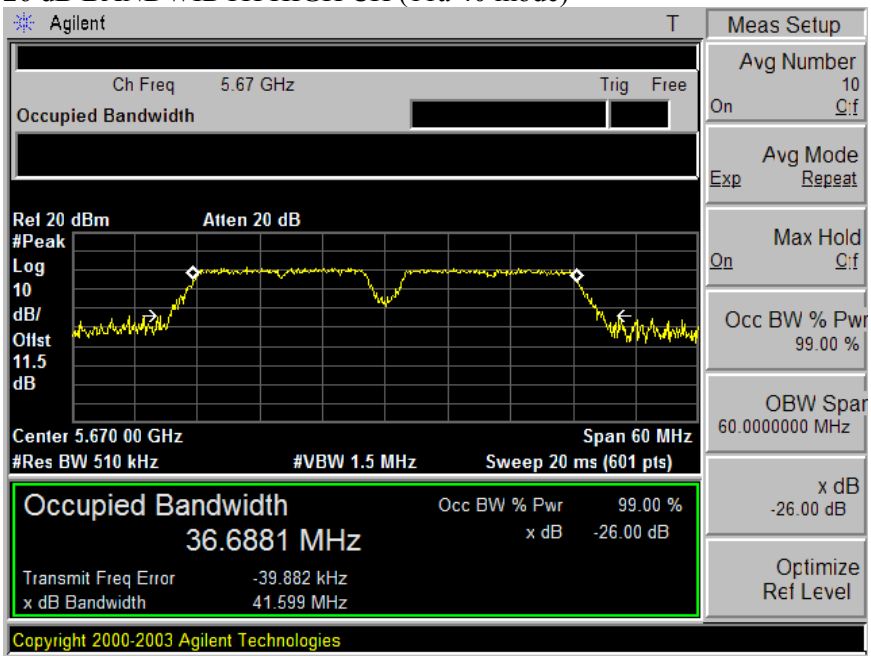
26 dB BANDWIDTH LOW CH (11a 40 mode)



26 dB BANDWIDTH MID CH (11a 40 mode)



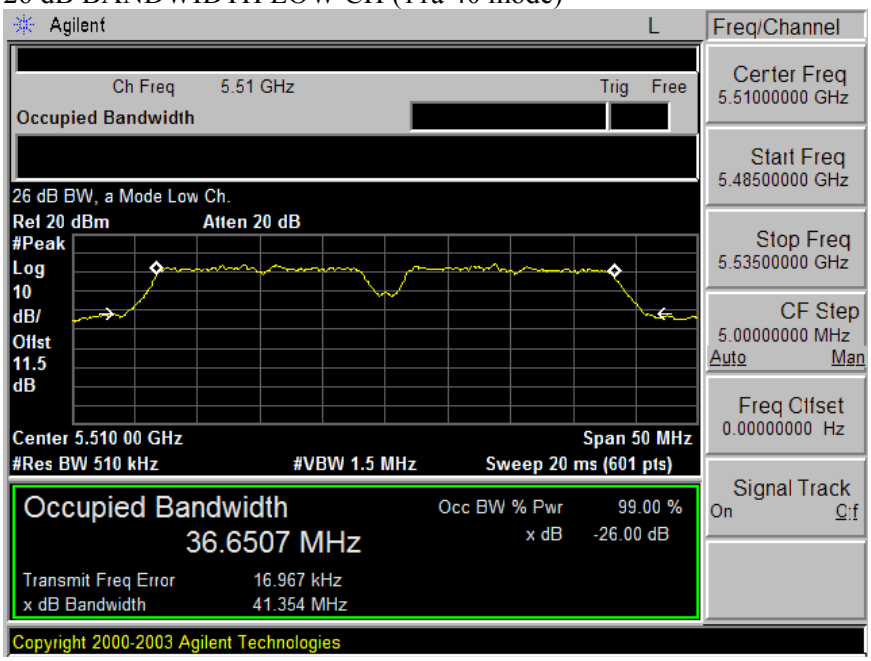
26 dB BANDWIDTH HIGH CH (11a 40 mode)



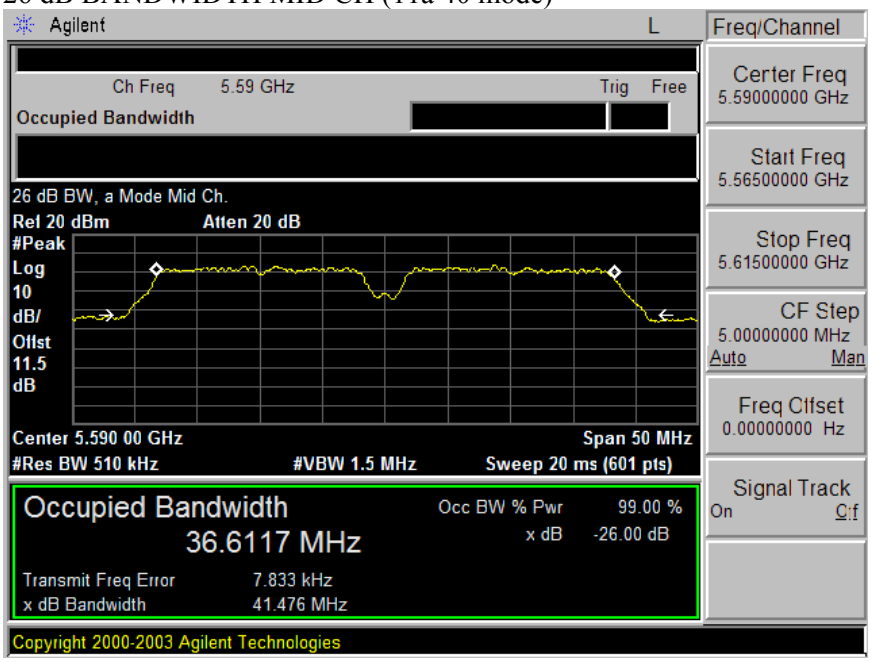
26 dB EMISSION BANDWIDTH (11a 40 MODE)

Channel B

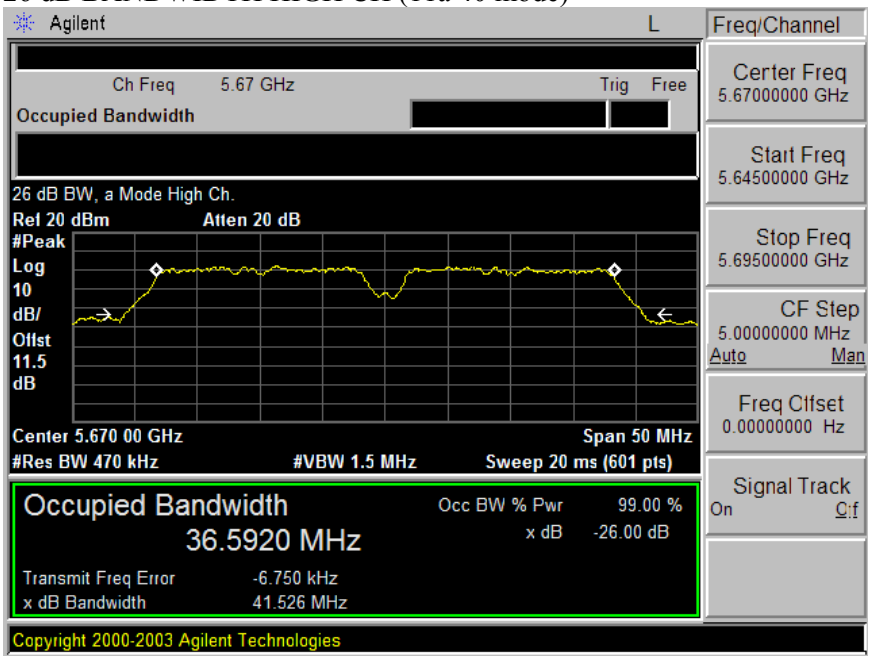
26 dB BANDWIDTH LOW CH (11a 40 mode)



26 dB BANDWIDTH MID CH (11a 40 mode)



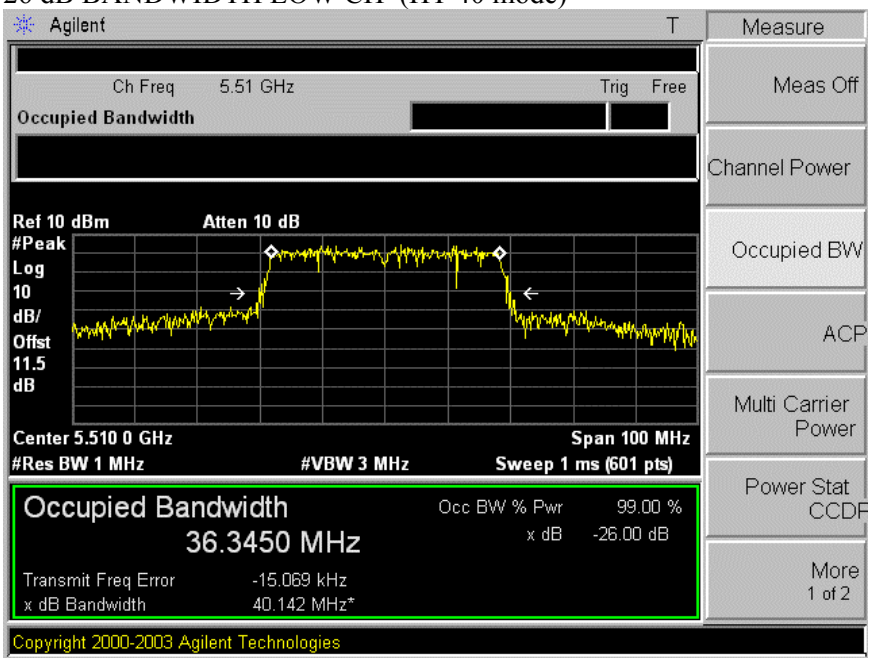
26 dB BANDWIDTH HIGH CH (11a 40 mode)



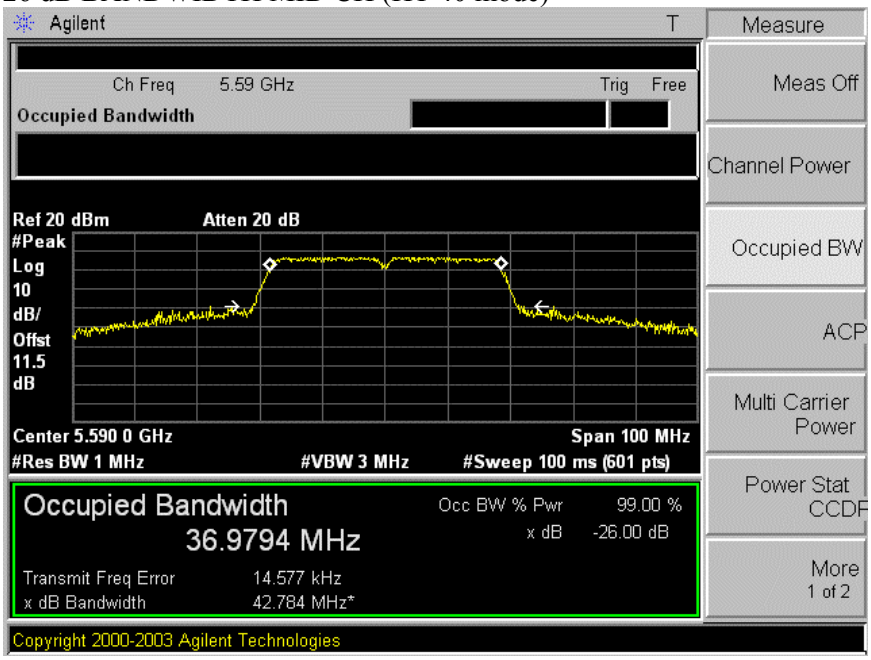
26 dB EMISSION BANDWIDTH (HT40 MODE)

Channel A

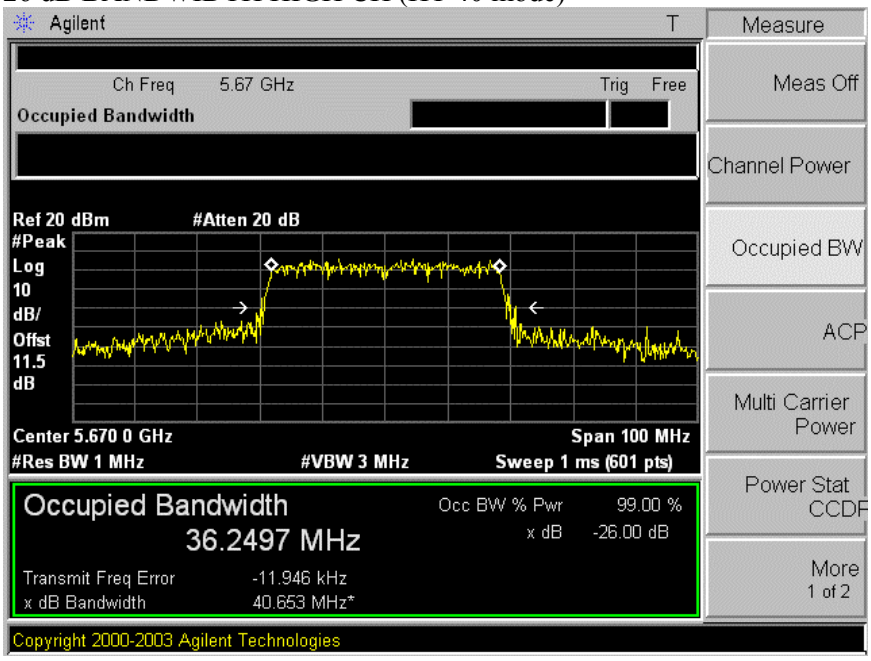
26 dB BANDWIDTH LOW CH (HT 40 mode)



26 dB BANDWIDTH MID CH (HT 40 mode)



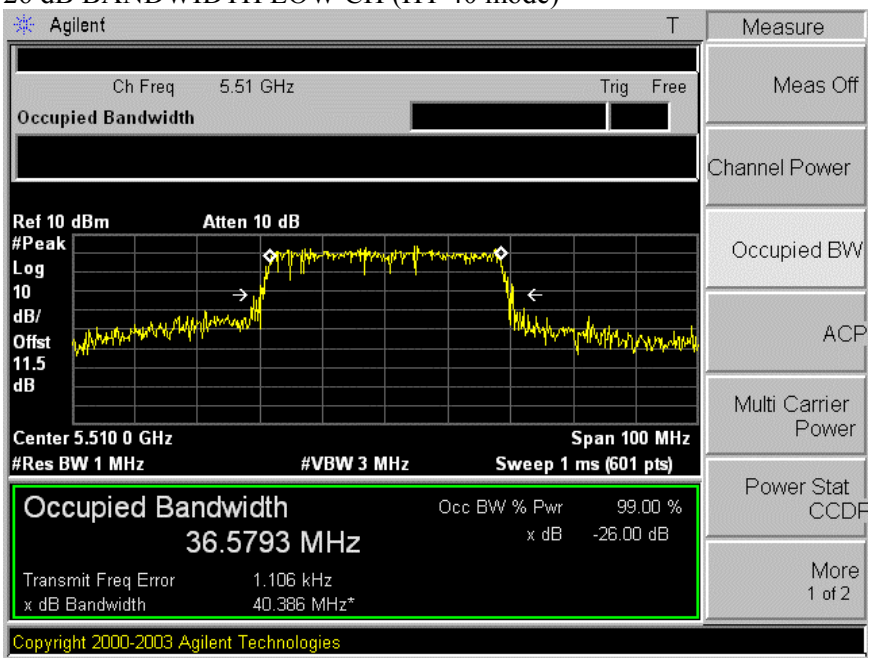
26 dB BANDWIDTH HIGH CH (HT 40 mode)



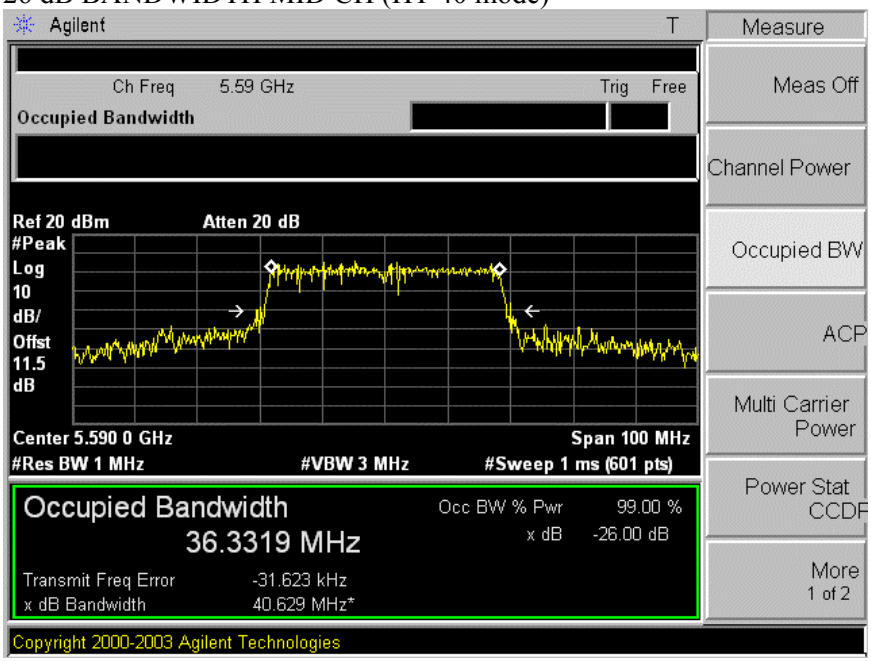
26 dB EMISSION BANDWIDTH (HT 40 MODE)

Channel B

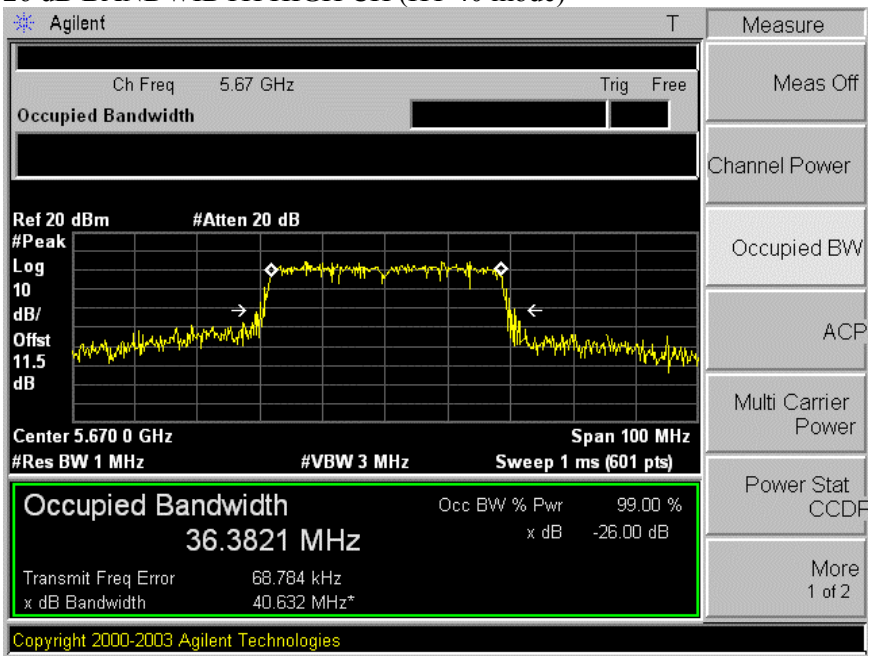
26 dB BANDWIDTH LOW CH (HT 40 mode)



26 dB BANDWIDTH MID CH (HT 40 mode)



26 dB BANDWIDTH HIGH CH (HT 40 mode)



7.1.2. MAXIMUM POWER

LIMIT

§15.407 (a) (2) For the 5.47–5.725 GHz band, the peak transmit power over the frequency band of operation shall not exceed the lesser of 250 mW or 11 dBm + 10 log 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 peak transmit 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.

TEST PROCEDURE

The test is performed in accordance with FCC Public Notice: APPENDIX A Guidelines for Assessing Unlicensed National Information Infrastructure (U-NII) Devices – Part 15, Subpart E, August 2002.

The transmitter output operates continuously therefore Method # 1 is used.

Each chain is measured separately and the total power is calculated using:

Total Power = 10 log (10^ (Chain 0 Power / 10) + 10^ (Chain 2 Power / 10))

LIMITS AND RESULTS

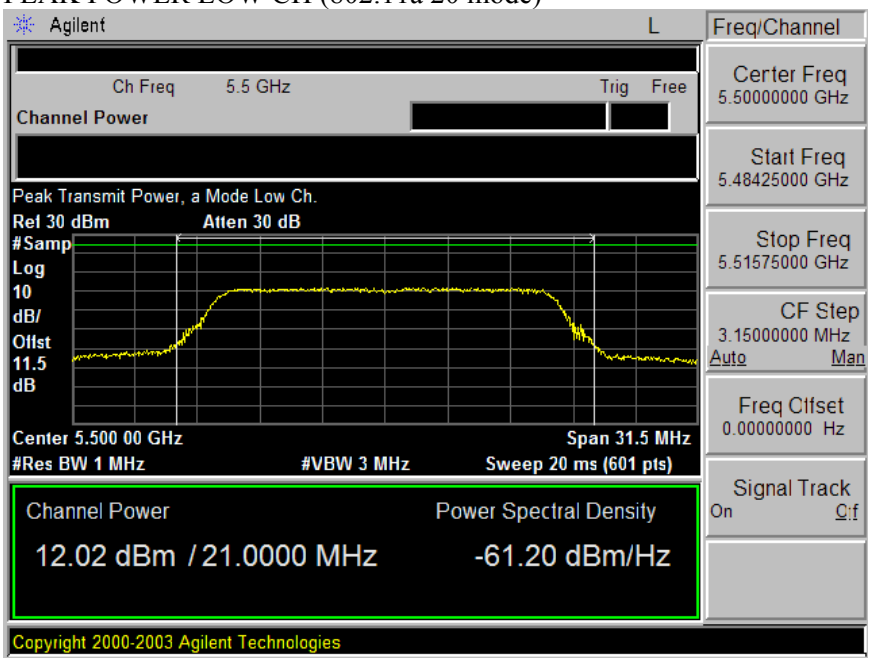
No non-compliance noted:

Mode Chan	Freq (MHz)	10LogB (dBm)	11+10LogB Limit (dBm)	Limit (dBm)	Chain 0 Power (dBm)	Chain 2 Power (dBm)	Total Power (dBm)	Margin (dB)
802.11a Mode								
Low	5500	13.11	24.11	20.99	12.02	11.04	14.57	-6.42
Mid	5600	13.10	24.10	20.99	11.94	11.20	14.60	-6.39
High	5700	13.11	24.11	20.99	11.03	10.32	13.70	-7.29
802.11n HT20 Mode								
Low	5500	13.14	24.14	24.00	12.95	12.17	15.59	-8.41
Mid	5600	13.12	24.12	24.00	11.91	14.00	16.09	-7.91
High	5700	13.15	24.15	24.00	11.11	14.19	15.93	-8.07
802.11a 40 Mode								
Low	5510	16.17	27.17	24.00	12.38	12.31	15.36	-8.64
Mid	5590	16.23	27.23	24.00	11.79	11.97	14.89	-9.11
High	5670	16.19	27.19	24.00	12.06	11.57	14.83	-9.17
802.11n HT40 Mode								
Low	5510	16.06	27.06	24.00	12.09	10.91	14.55	-9.45
Mid	5590	16.31	27.31	24.00	13.55	12.77	16.19	-7.81
High	5670	16.09	27.09	24.00	12.06	11.96	15.02	-8.98

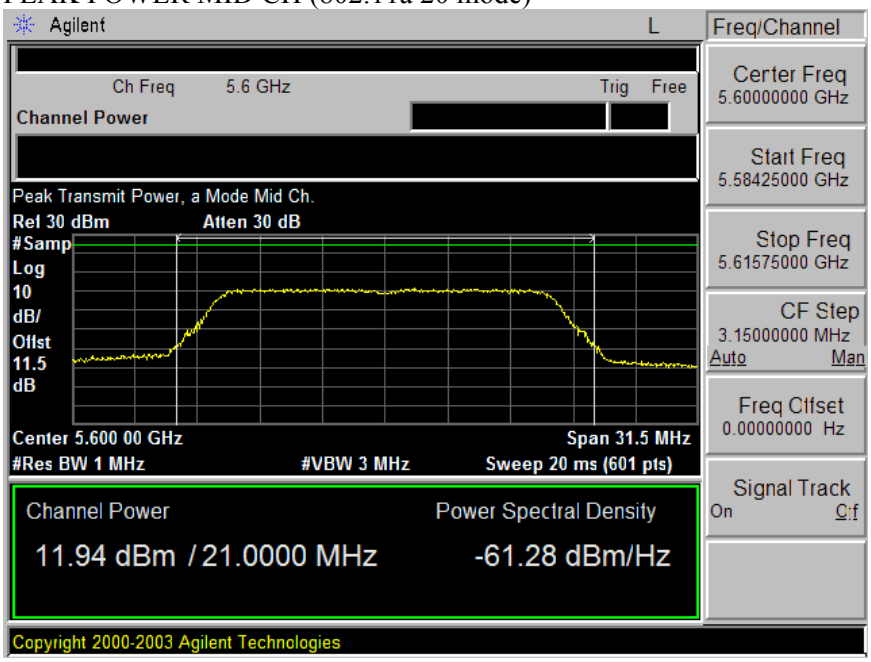
PEAK POWER (802.11a 20 MODE)

Channel A

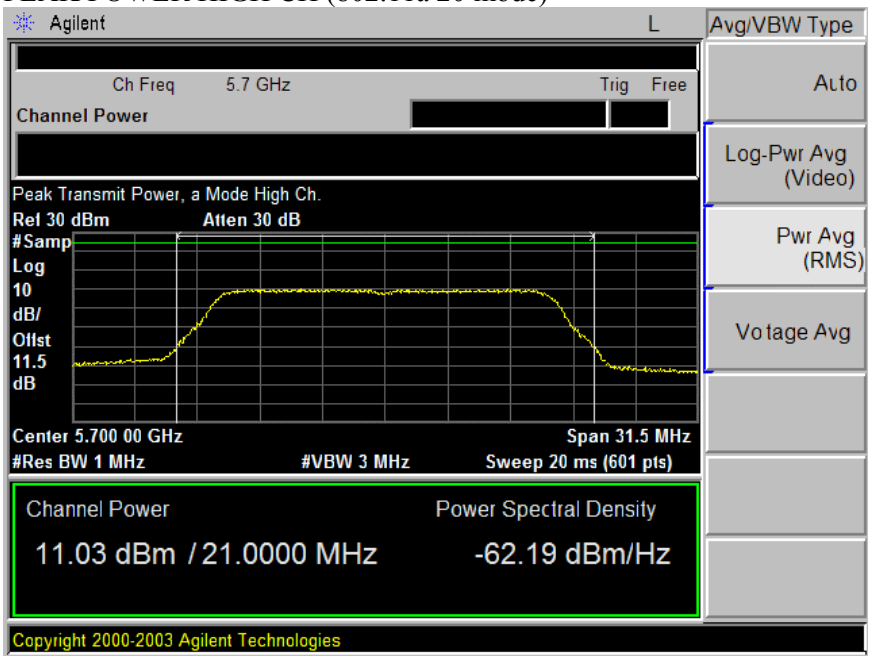
PEAK POWER LOW CH (802.11a 20 mode)



PEAK POWER MID CH (802.11a 20 mode)



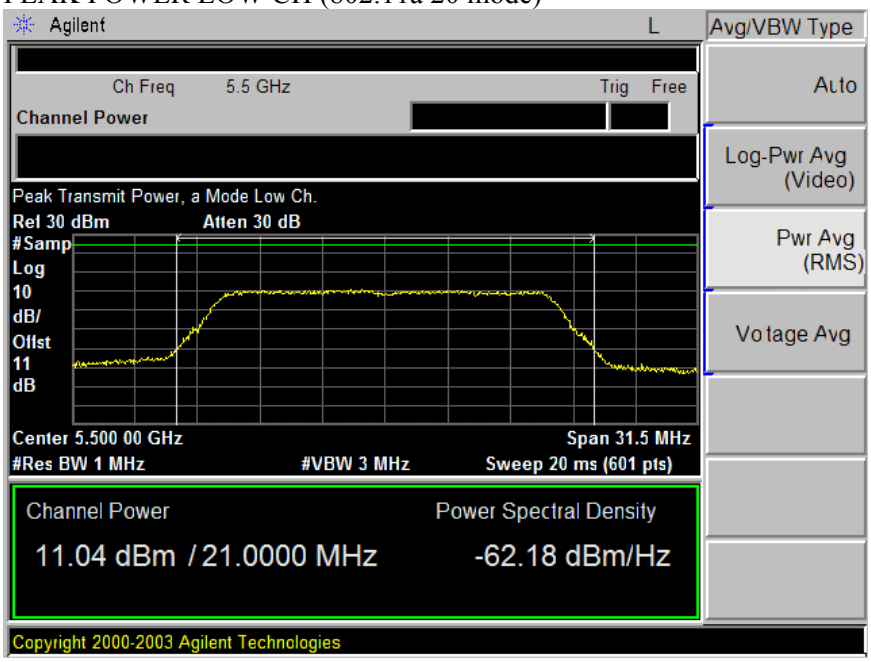
PEAK POWER HIGH CH (802.11a 20 mode)



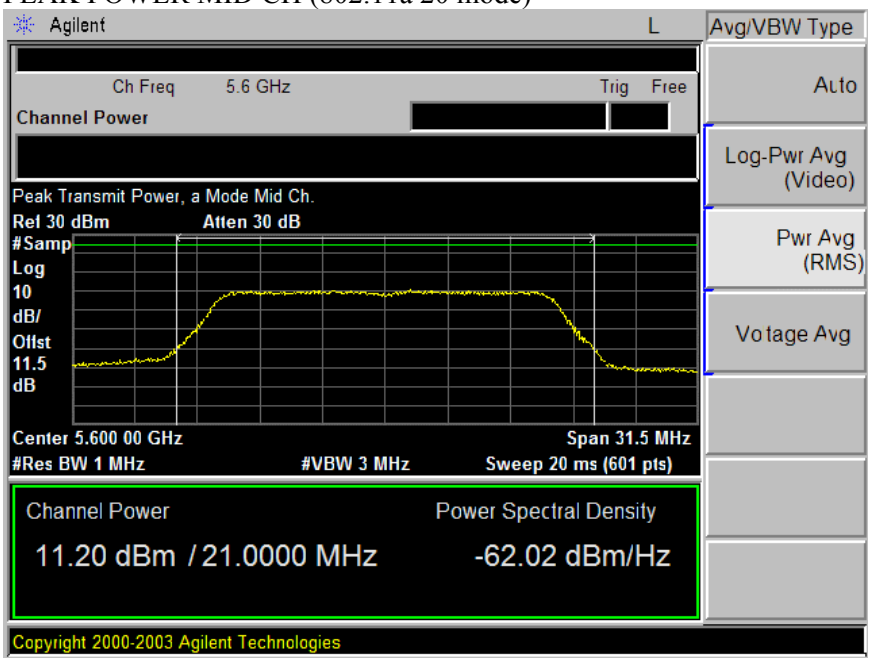
PEAK POWER (802.11a 20 MODE)

Channel B

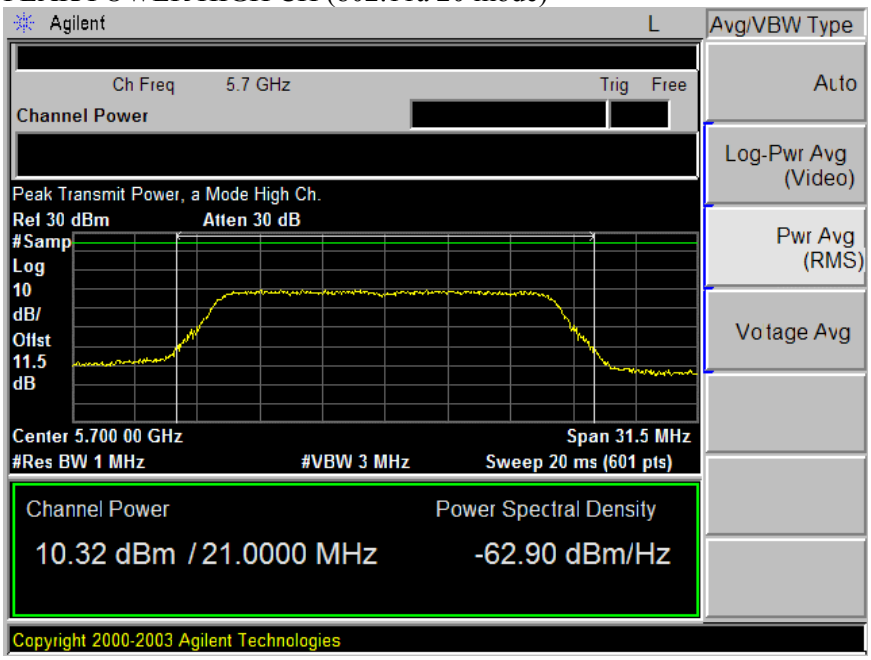
PEAK POWER LOW CH (802.11a 20 mode)



PEAK POWER MID CH (802.11a 20 mode)



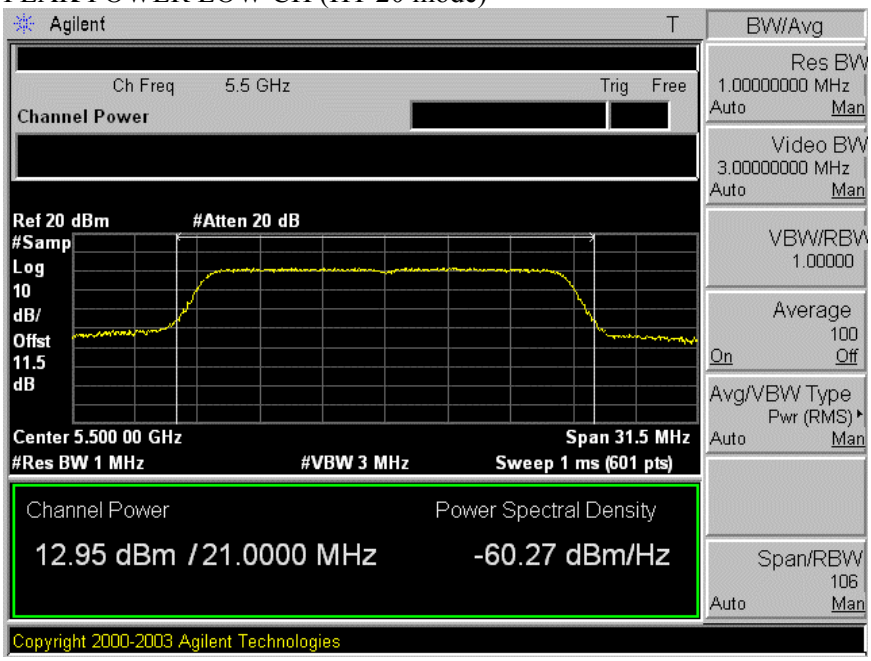
PEAK POWER HIGH CH (802.11a 20 mode)



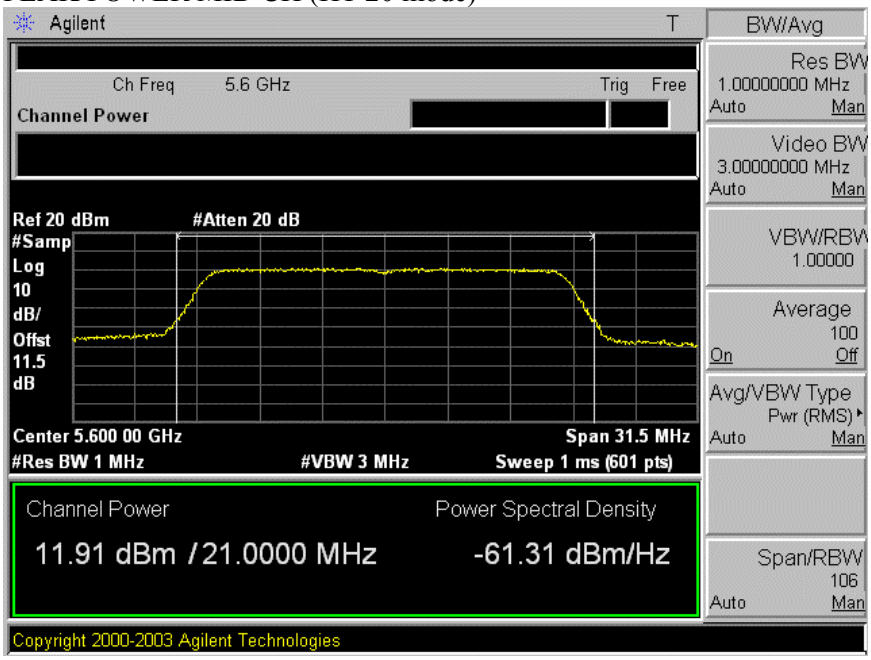
PEAK POWER (HT 20 MODE)

Channel A:

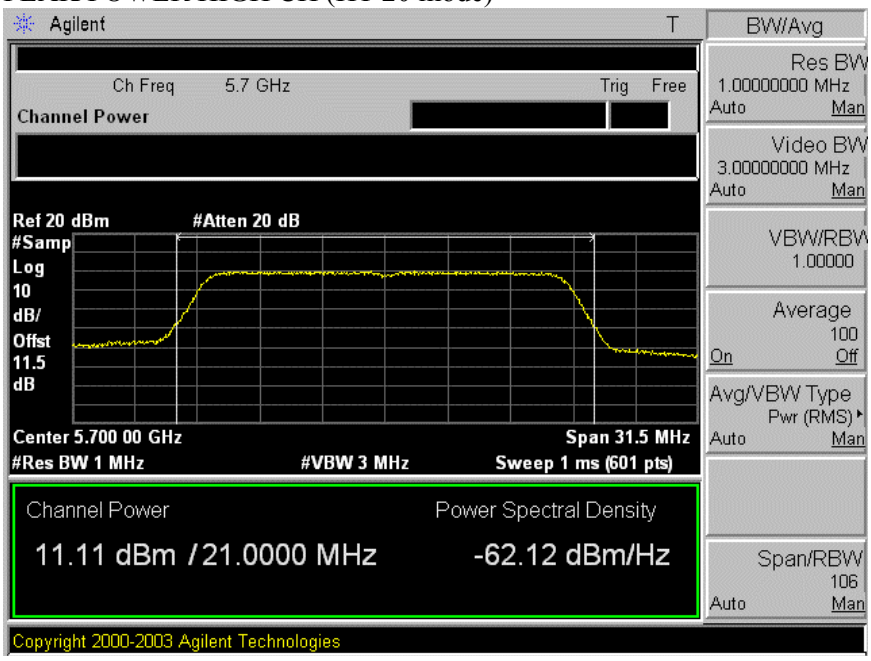
PEAK POWER LOW CH (HT 20 mode)



PEAK POWER MID CH (HT 20 mode)



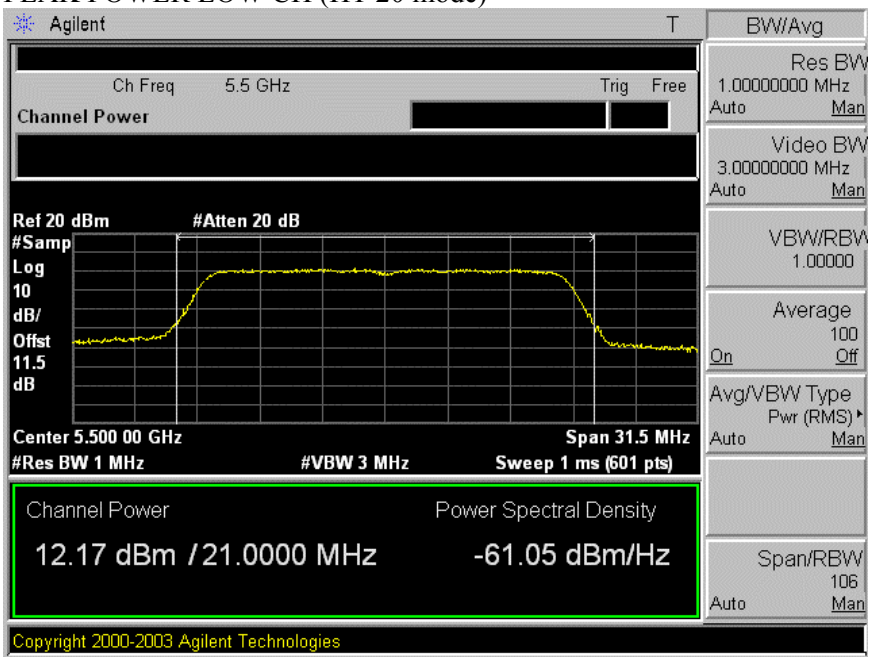
PEAK POWER HIGH CH (HT 20 mode)



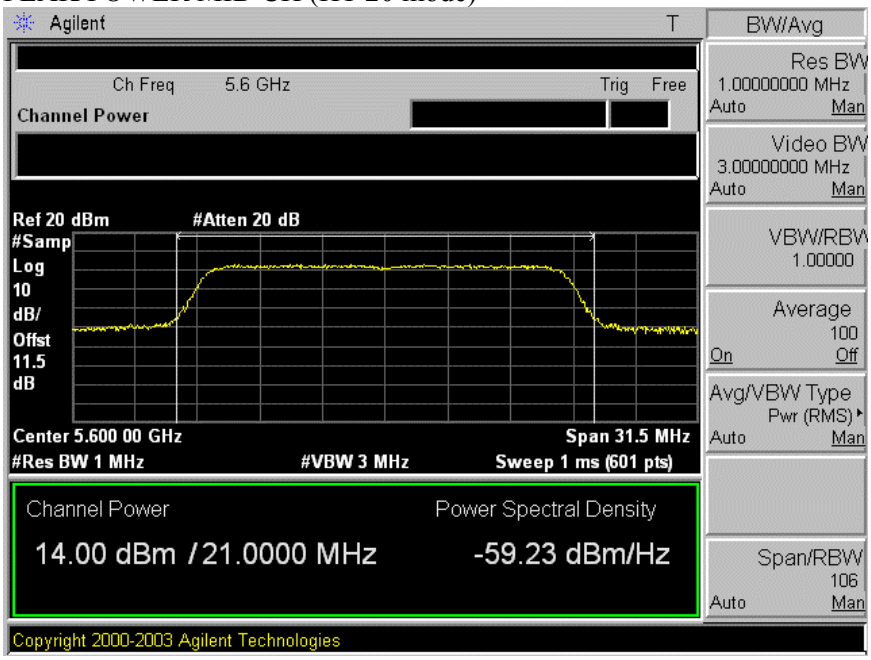
PEAK POWER (HT 20 MODE)

Channel B:

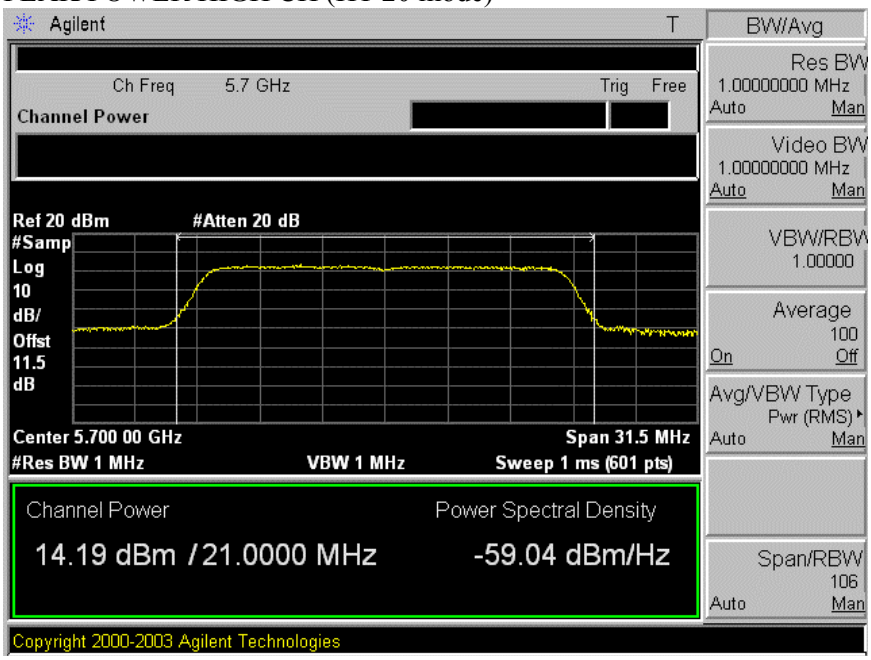
PEAK POWER LOW CH (HT 20 mode)



PEAK POWER MID CH (HT 20 mode)



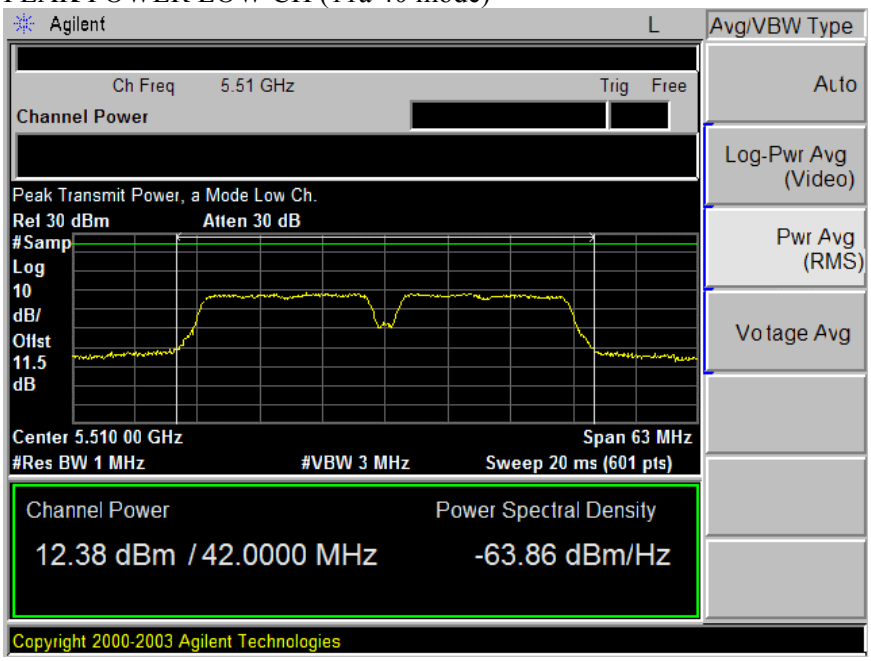
PEAK POWER HIGH CH (HT 20 mode)



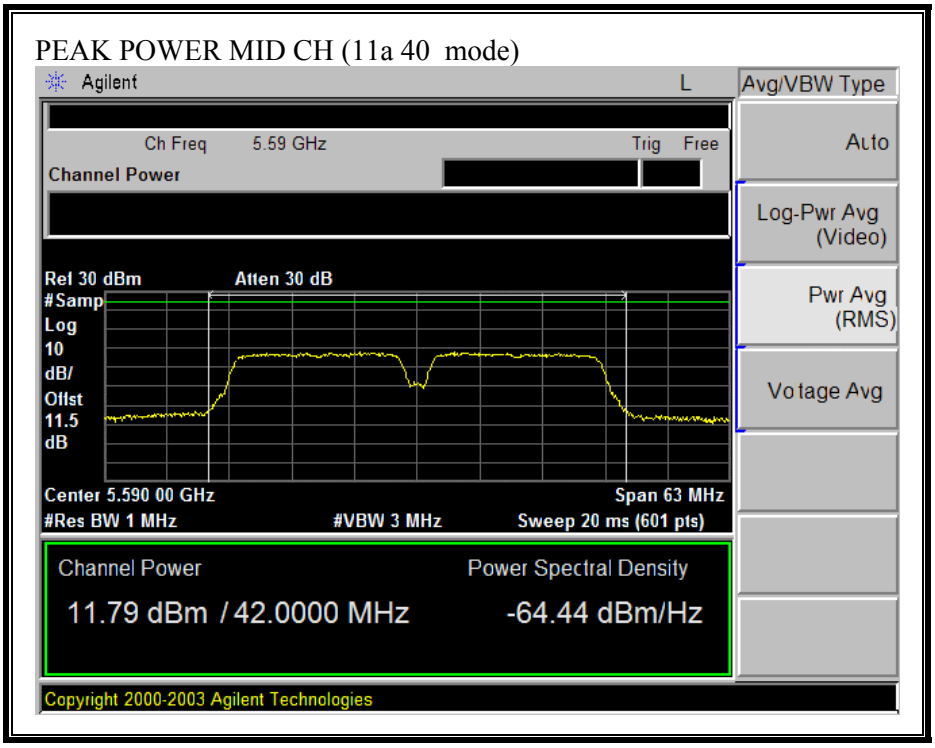
PEAK POWER (802.11a 40 MODE)

Channel A:

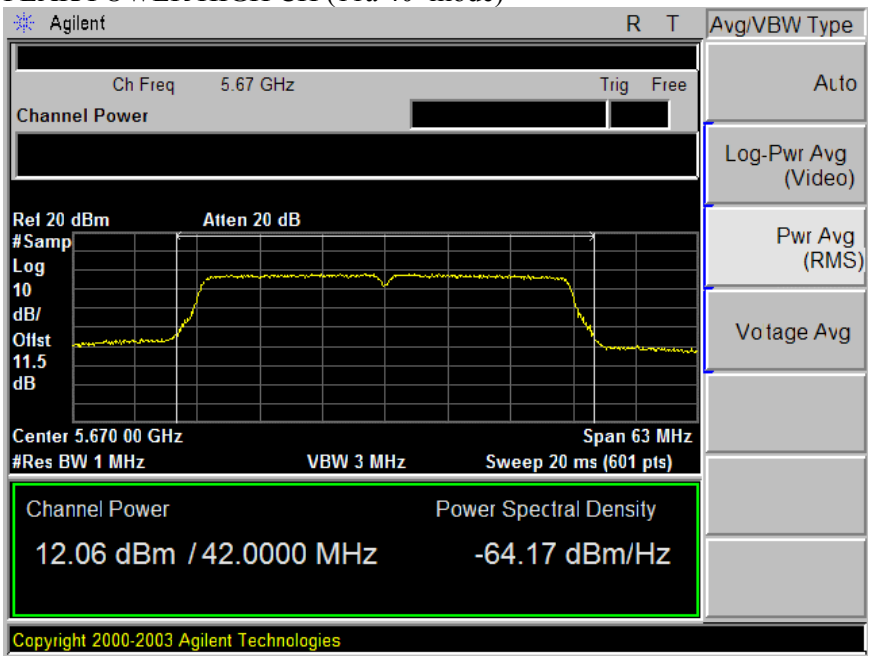
PEAK POWER LOW CH (11a 40 mode)



PEAK POWER MID CH (11a 40 mode)



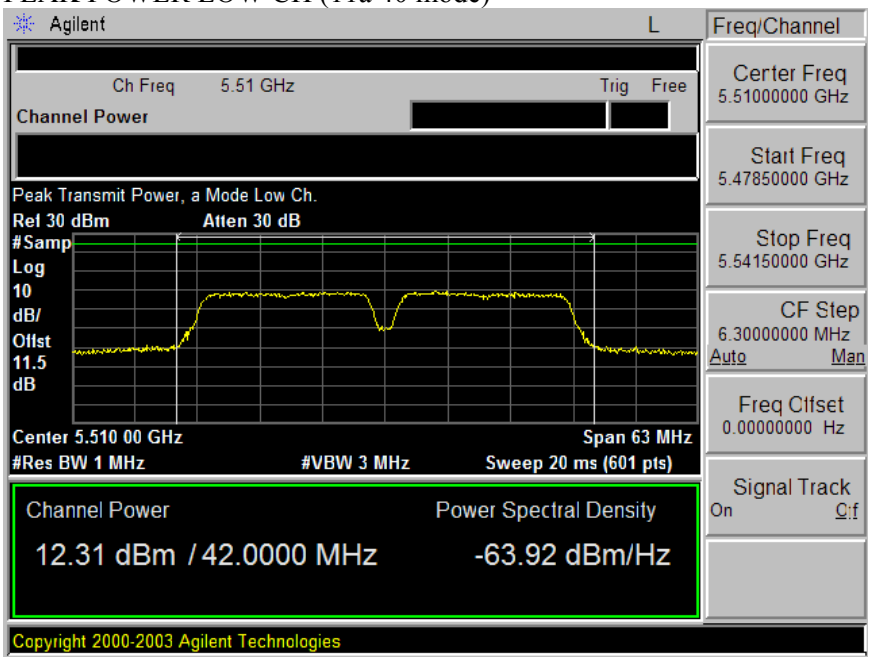
PEAK POWER HIGH CH (11a 40 mode)



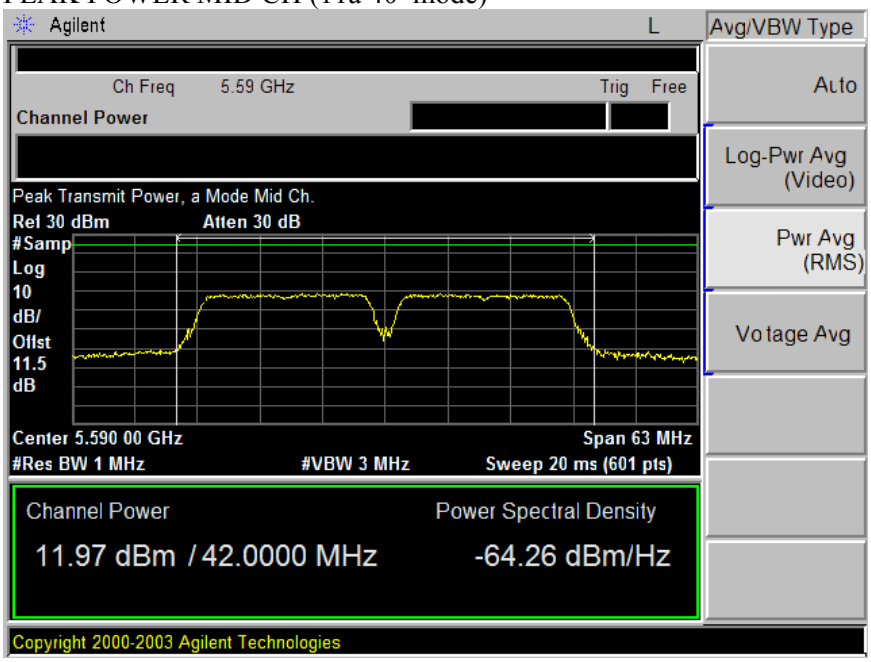
PEAK POWER (802.11a 40 MODE)

Channel B:

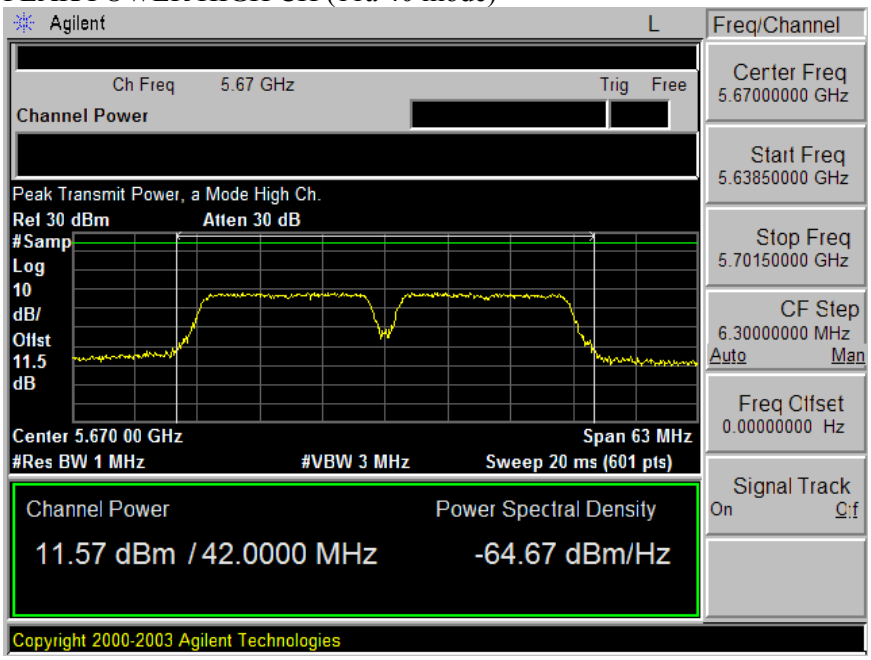
PEAK POWER LOW CH (11a 40 mode)



PEAK POWER MID CH (11a 40 mode)



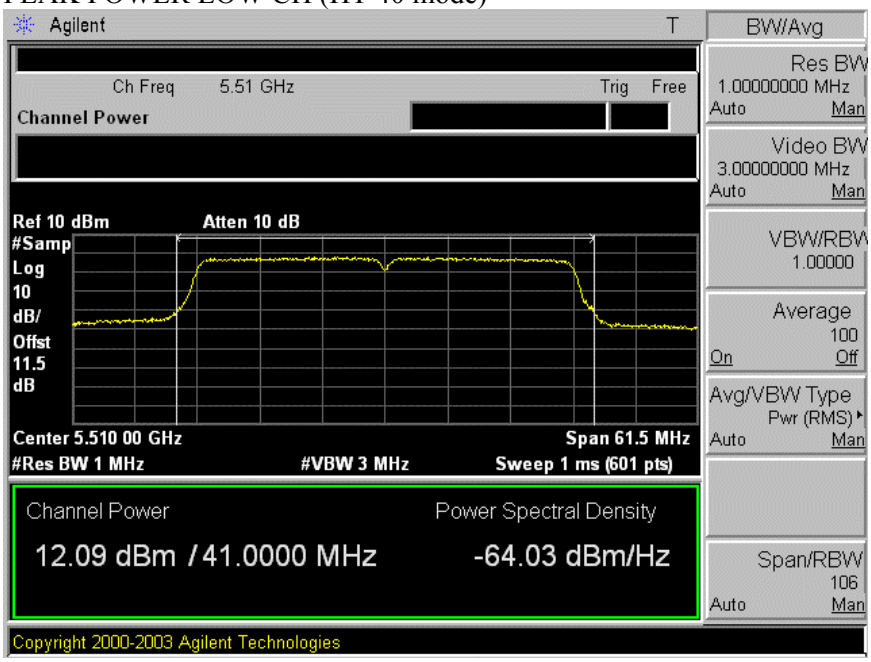
PEAK POWER HIGH CH (11a 40 mode)



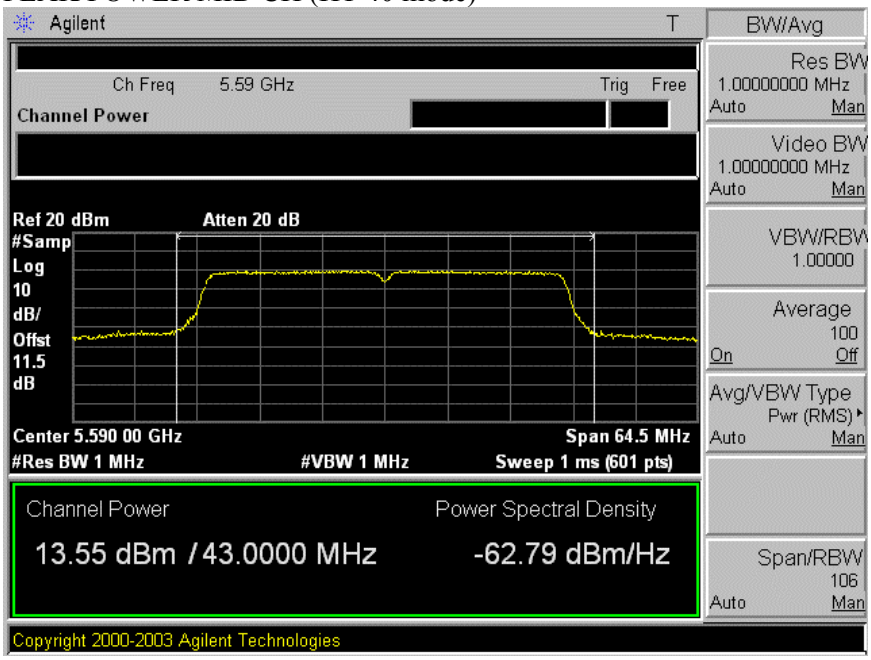
PEAK POWER (HT 40 MODE):

Channel A

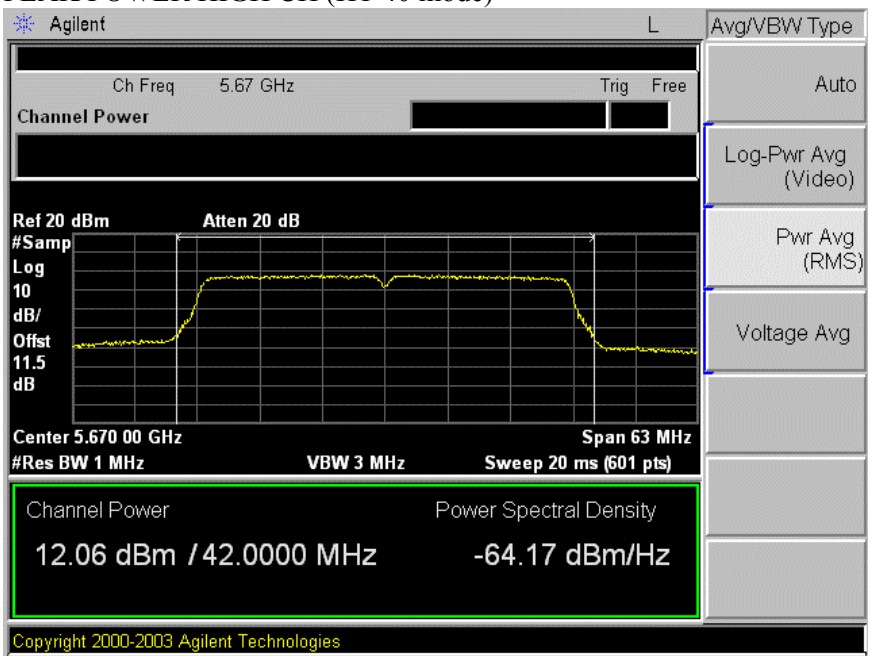
PEAK POWER LOW CH (HT 40 mode)



PEAK POWER MID CH (HT 40 mode)



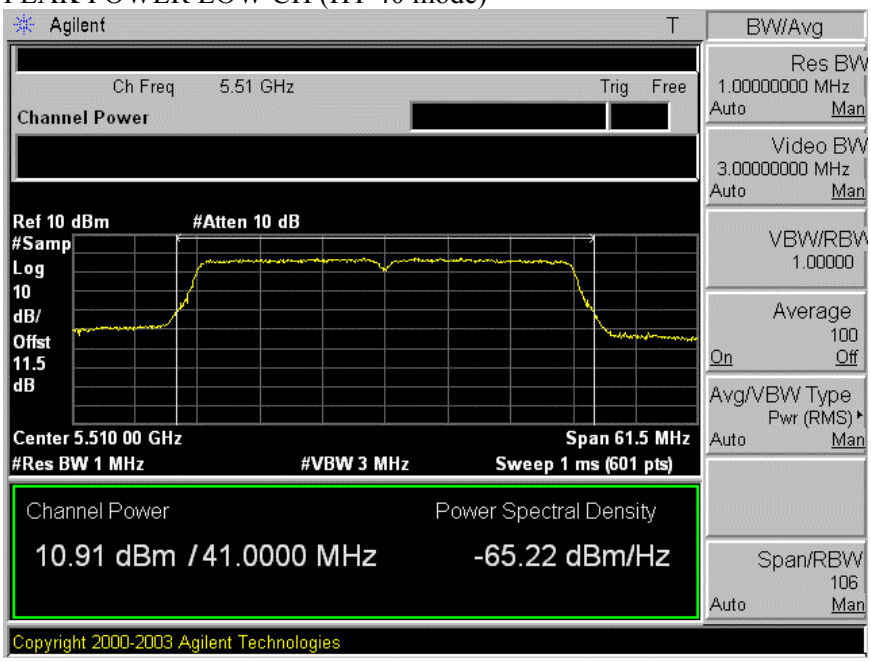
PEAK POWER HIGH CH (HT 40 mode)



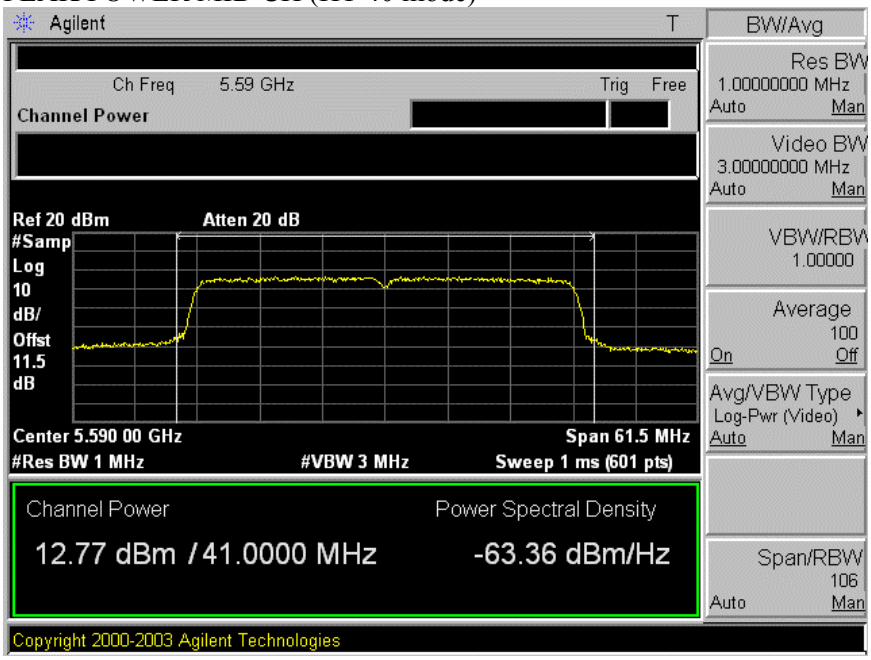
PEAK POWER (HT 40 MODE):

Channel B

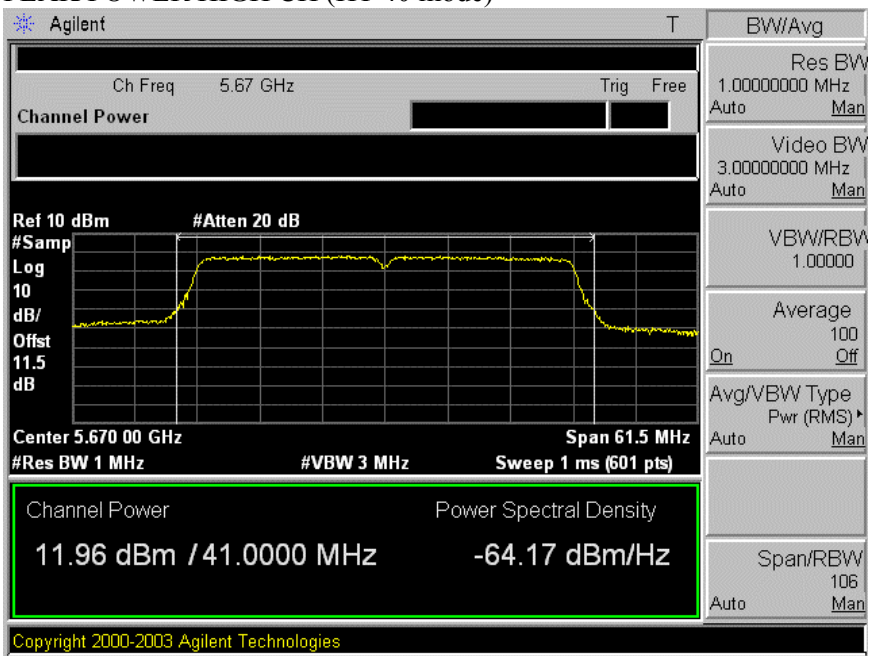
PEAK POWER LOW CH (HT 40 mode)



PEAK POWER MID CH (HT 40 mode)



PEAK POWER HIGH CH (HT 40 mode)



7.1.3. MAXIMUM PERMISSIBLE EXPOSURE

LIMITS

§1.1310 The criteria listed in Table 1 shall be used to evaluate the environmental impact of human exposure to radio-frequency (RF) radiation as specified in §1.1307(b), except in the case of portable devices which shall be evaluated according to the provisions of §2.1093 of this chapter.

TABLE 1—LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm^2)	Averaging time (minutes)
(A) Limits for Occupational/Controlled Exposures				
0.3–3.0	614	1.63	*(100)	6
3.0–30	1842/f	4.89/f	*(900/f^2)	6
30–300	61.4	0.163	1.0	6
300–1500	.....	.....	f/300	6
1500–100,000	.....	.....	5	6
(B) Limits for General Population/Uncontrolled Exposure				
0.3–1.34	614	1.63	*(100)	30
1.34–30	824/f	2.19/f	*(180/f^2)	30

TABLE 1—LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)—Continued

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm^2)	Averaging time (minutes)
30–300	27.5	0.073	0.2	30
300–1500	.....	.....	f/1500	30
1500–100,000	.....	.....	1.0	30

f = frequency in MHz
* = Plane-wave equivalent power density

NOTE 1 TO TABLE 1: Occupational/controlled limits apply in situations in which persons are exposed as a consequence of their employment provided those persons are fully aware of the potential for exposure and can exercise control over their exposure. Limits for occupational/controlled exposure also apply in situations when an individual is transient through a location where occupational/controlled limits apply provided he or she is made aware of the potential for exposure.

NOTE 2 TO TABLE 1: General population/uncontrolled exposures apply in situations in which the general public may be exposed, or in which persons that are exposed as a consequence of their employment may not be fully aware of the potential for exposure or can not exercise control over their exposure.

CALCULATIONS

Given

$E = \sqrt{(30 * P * G)} / d$

and

$S = E ^ 2 / 3770$

where

E = Field Strength in Volts/meter
P = Power in Watts
G = Numeric antenna gain
d = Distance in meters
S = Power Density in milliwatts/square centimeter

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

$d = \sqrt{((30 * P * G) / (3770 * S))}$

Changing to units of Power to mW and Distance to cm, using:

P (mW) = P (W) / 1000 and
d (cm) =100 * d (m)

yields

$d = 100 * \sqrt{((30 * (P / 1000) * G) / (3770 * S))}$
$d = 0.282 * \sqrt{(P * G / S)}$

where

d = distance in cm
P = Power in mW
G = Numeric antenna gain
S = Power Density in mW/cm^2

Substituting the logarithmic form of power and gain using:

P (mW) = 10 ^ (P (dBm) / 10) and
G (numeric) = 10 ^ (G (dBi) / 10)

yields

$d = 0.282 * 10 ^ ((P + G) / 20) / \sqrt{S}$

where

d = MPE distance in cm
P = Power in dBm
G = Antenna Gain in dBi
S = Power Density Limit in mW/cm^2

Rearranging terms to calculate the power density at a specific distance yields

$S = 0.0795 * 10 ^ ((P + G) / 10) / (d^2)$

LIMITS

From §1.1310 Table 1 (B), the maximum value of S = 1.0 mW/cm^2

RESULTS

No non-compliance noted: (MPE distance equals 20 cm)

Mode	MPE Distance (cm)	Output Power (dBm)	Antenna Gain (dBi)	Power Density (mW/cm^2)
802.11a 20	20.0	14.60	6.00	0.02
802.11a 40	20.0	16.09	6.00	0.03
802.HT 20	20.0	15.36	6.00	0.03
802.HT 40	20.0	16.19	6.00	0.03

NOTE: For mobile or fixed location transmitters, the minimum separation distance is 20 cm, even if calculations indicate that the MPE distance would be less.

7.1.4. AVERAGE POWER

AVERAGE POWER LIMIT

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a power meter.

Each chain is measured separately and the total power is calculated using:

Total Power = 10 log (10^ (Chain 0 Power / 10) + 10^ (Chain 2 Power / 10))

RESULTS

No non-compliance noted:

The cable assembly insertion loss of 11.5 dB (including 10 dB pad and 1.5 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

Mode Channel	Frequency (MHz)	Average Power Chain 0 (dBm)	Average Power Chain 2 (dBm)	Average Power Total (dBm)
802.11a Mode				
Low	5500	12.10	11.45	14.8
Middle	5600	11.76	11.57	14.7
High	5700	11.40	10.72	14.1
802.11n HT20 Mode				
Low	5500	12.19	11.63	14.9
Middle	5600	11.58	13.36	15.6
High	5700	10.33	13.46	15.2
802.11n 11a 40MHz Mode				
Low	5510	12.15	11.39	14.8
Middle	5590	12.66	11.58	15.2
High	5670	12.70	12.40	15.6
802.11n HT40 Mode				
Low	5510	11.43	10.50	14.0
Middle	5590	11.76	11.57	14.7
High	5670	11.40	10.72	14.1

7.1.5. PEAK POWER SPECTRAL DENSITY

LIMIT

§15.407 (a) (2) For the 5.47–5.725 GHz band, 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, both the peak transmit 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.

TEST PROCEDURE

The test is performed in accordance with FCC Public Notice: APPENDIX A Guidelines for Assessing Unlicensed National Information Infrastructure (U-NII) Devices – Part 15, Subpart E, August 2002. PPSD method #2 was used.

Each chain is measured separately and the total PPSD is calculated using:

Total PPSD = 10 log (10^ (Chain 0 PPSD / 10) + 10^ (Chain 2 PPSD / 10))

RESULTS

No non-compliance noted:

Antenna Gain (dBi)	6
10 Log (# Tx Chains)	3.01
Effective Legacy Gain	9.01

Mode Channel	Frequency (MHz)	PPSD Chain A (dBm)	PPSD Chain B (dBm)	PPSD Total (dBm)	Limit (dBm)	Margin (dB)
802.11a Mode						
Low	5500	1.74	1.04	4.41	7.99	-3.58
Middle	5600	1.53	0.39	4.01	7.99	-3.98
High	5700	0.10	-1.20	2.51	7.99	-5.48
802.11n HT20 Mode						
Low	5500	0.76	0.99	3.89	11.00	-7.11
Middle	5600	-0.20	2.78	4.55	11.00	-6.45
High	5700	-0.10	3.00	4.73	11.00	-6.27
802.11a 40 Mode						
Low	5510	-0.74	-1.73	1.80	11.00	-9.20
Middle	5590	-1.47	-1.69	1.43	11.00	-9.57
High	5670	-1.88	-2.93	0.64	11.00	-10.36
802.11n HT40 Mode						
Low	5510	-2.63	-2.98	0.21	11.00	-10.79
Middle	5590	-0.74	-1.57	1.87	11.00	-9.13
High	5670	-1.04	-1.90	1.56	11.00	-9.44

RESULTS WITH COMBINER

No non-compliance noted:

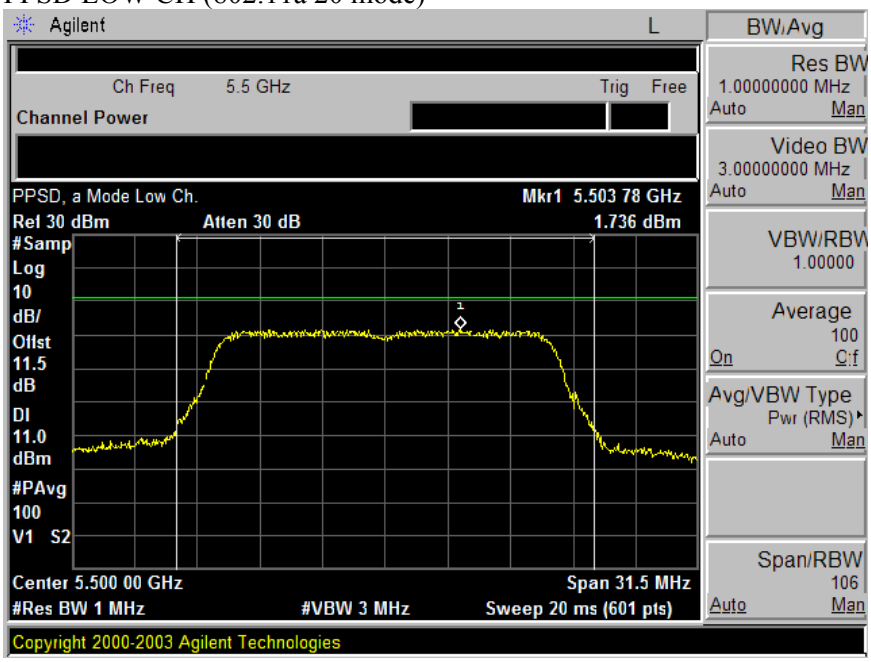
Antenna Gain (dBi)	6
10 Log (# Tx Chains)	3.01
Effective Legacy Gain	9.01

Mode Channel	Frequency (MHz)	PPSD With Combiner (dBm)	Limit (dBm)	Margin (dB)
802.11a Mode				
Low	5500	7.26	11.00	-3.74
Middle	5600	7.52	11.00	-3.49
High	5700	7.22	11.00	-3.78
802.11n HT20 Mode				
Low	5500	6.52	11.00	-4.49
Middle	5600	8.85	11.00	-2.15
High	5700	7.77	11.00	-3.23
802.11a 40 Mode				
Low	5510	3.46	11.00	-7.54
Middle	5590	5.50	11.00	-5.50
High	5670	5.59	11.00	-5.41
802.11n HT40 Mode				
Low	5510	3.70	11.00	-7.30
Middle	5590	5.02	11.00	-5.99
High	5670	3.99	11.00	-7.01

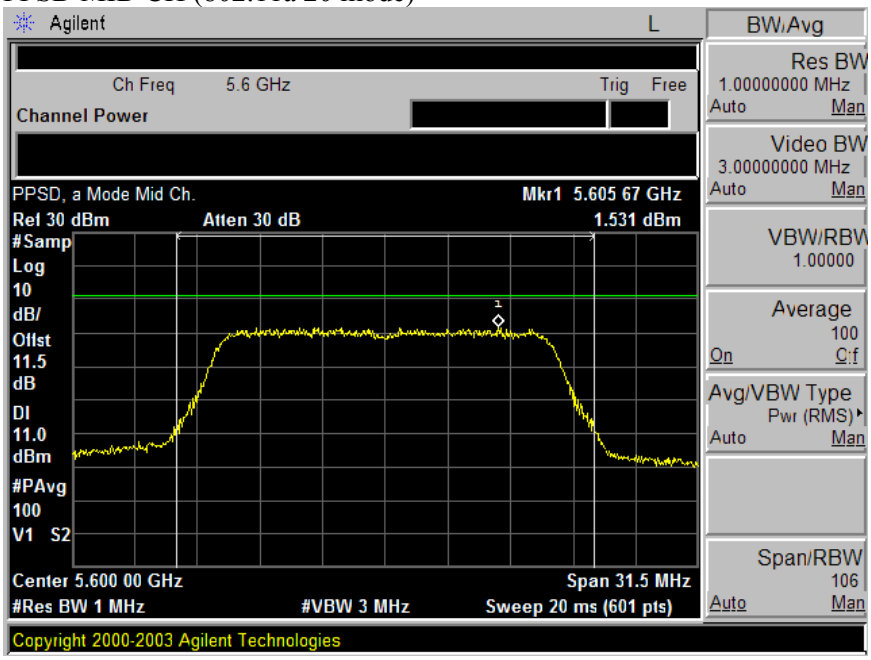
PEAK POWER SPECTRAL DENSITY (802.11a 20 MODE)

Chain A:

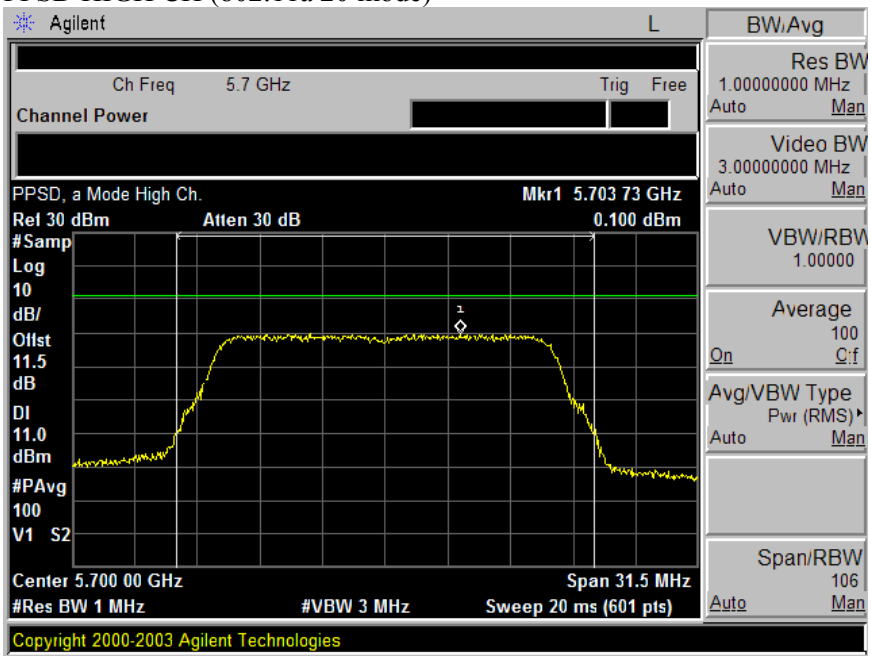
PPSD LOW CH (802.11a 20 mode)



PPSD MID CH (802.11a 20 mode)



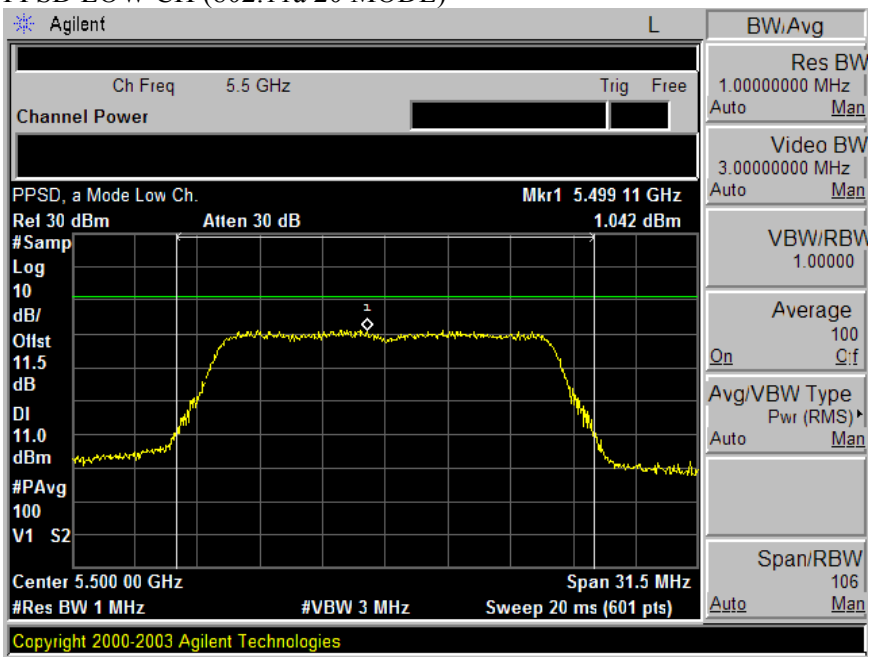
PPSD HIGH CH (802.11a 20 mode)



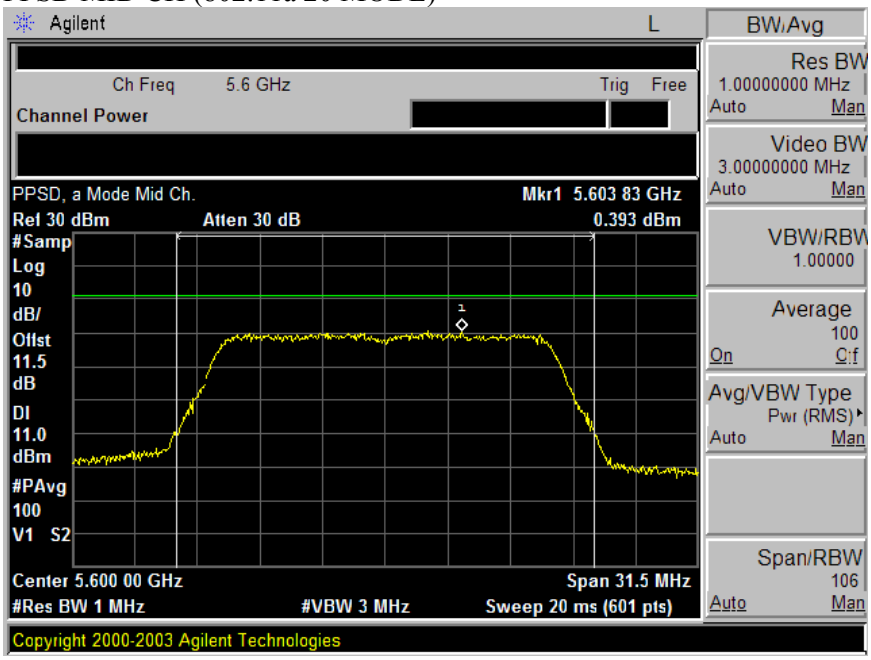
PEAK POWER SPECTRAL DENSITY (802.11a 20 MODE)

Chain B:

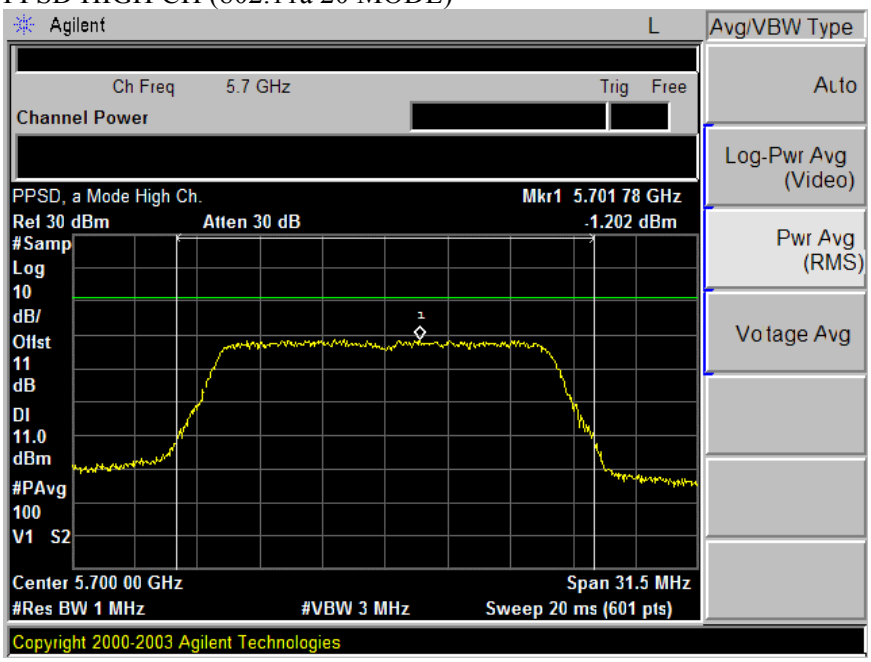
PPSD LOW CH (802.11a 20 MODE)



PPSD MID CH (802.11a 20 MODE)



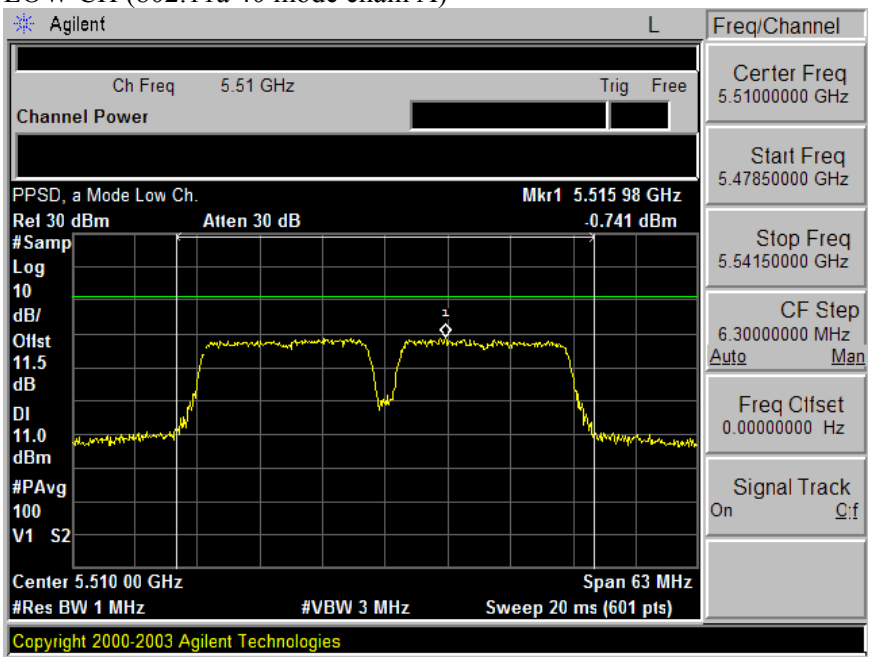
PPSD HIGH CH (802.11a 20 MODE)



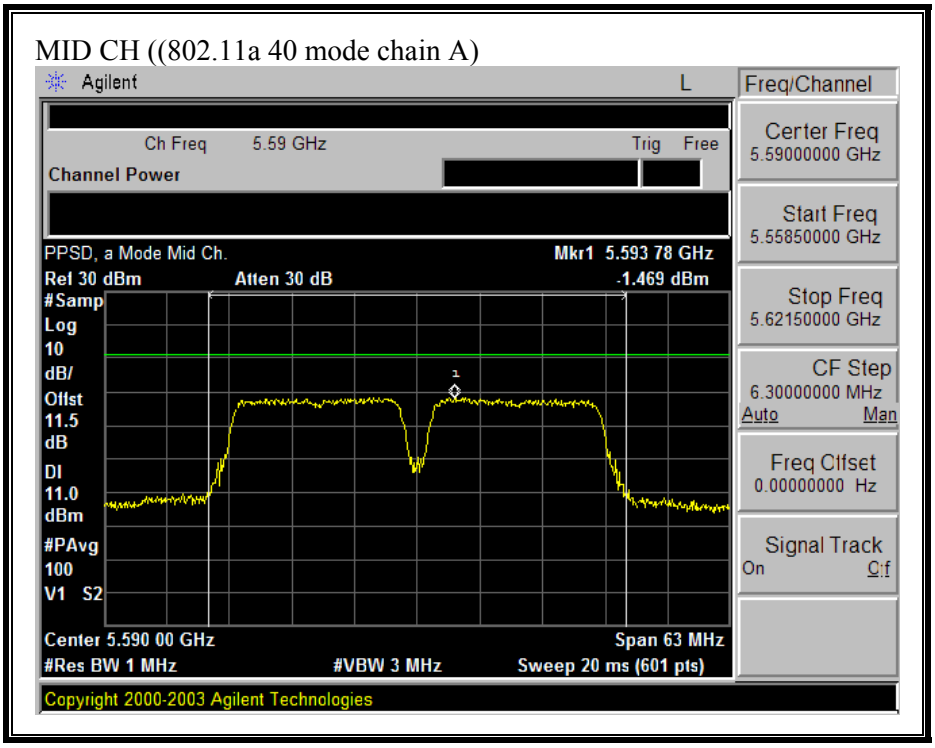
PEAK POWER SPECTRAL DENSITY (802.11a 40 MODE)

Chain A:

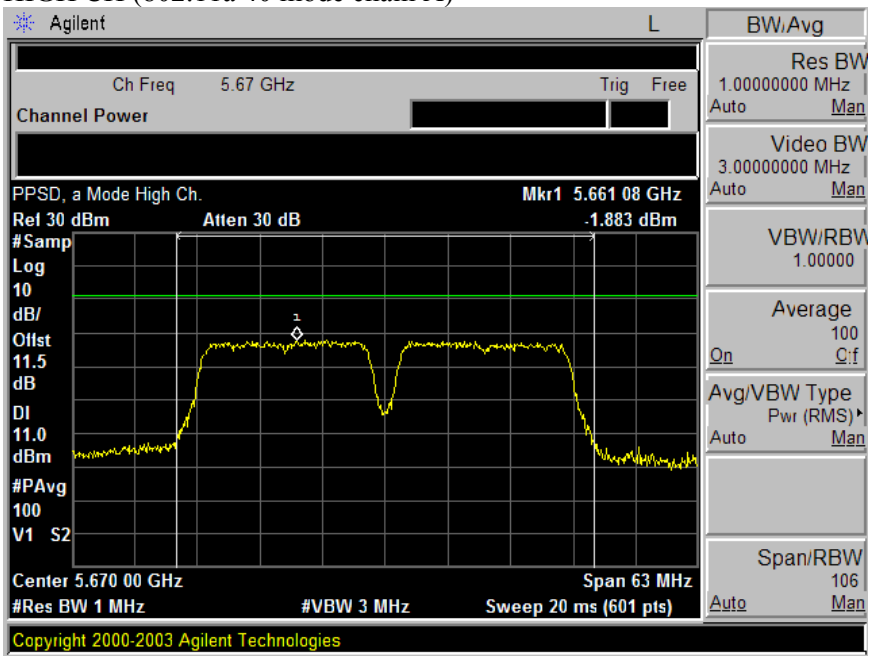
LOW CH (802.11a 40 mode chain A)



MID CH ((802.11a 40 mode chain A)



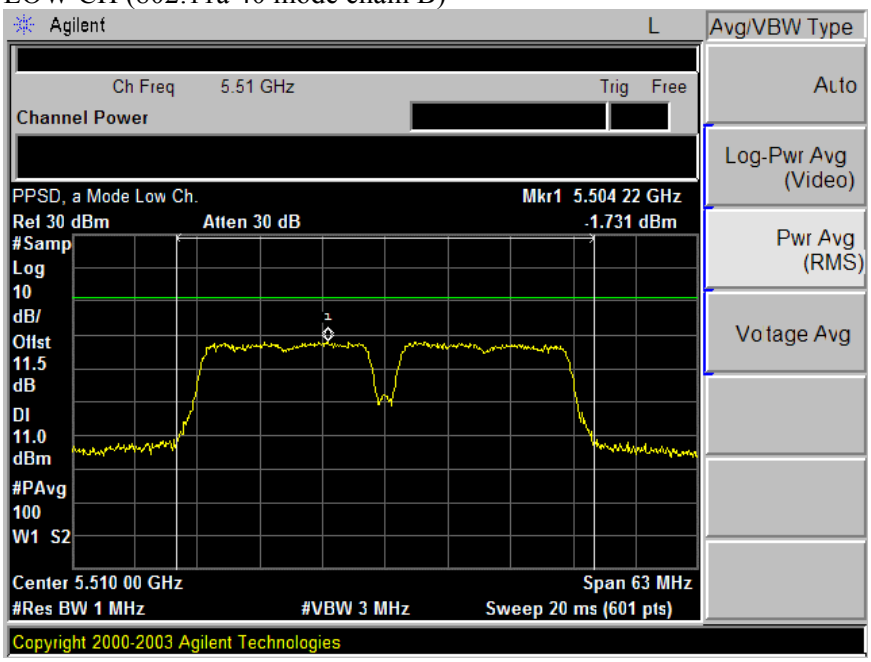
HIGH CH (802.11a 40 mode chain A)



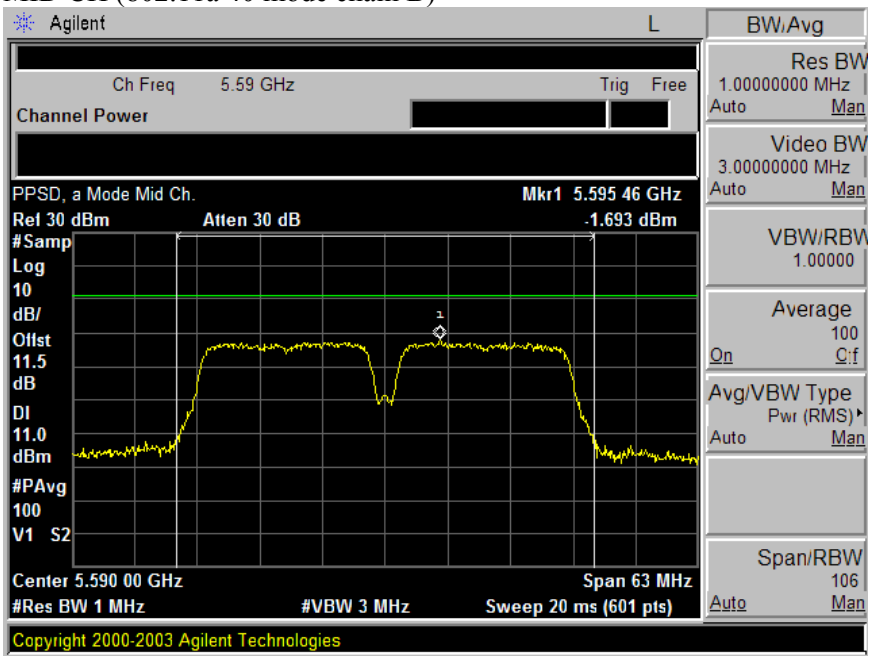
PEAK POWER SPECTRAL DENSITY (802.11a 40 MODE)

Chain B:

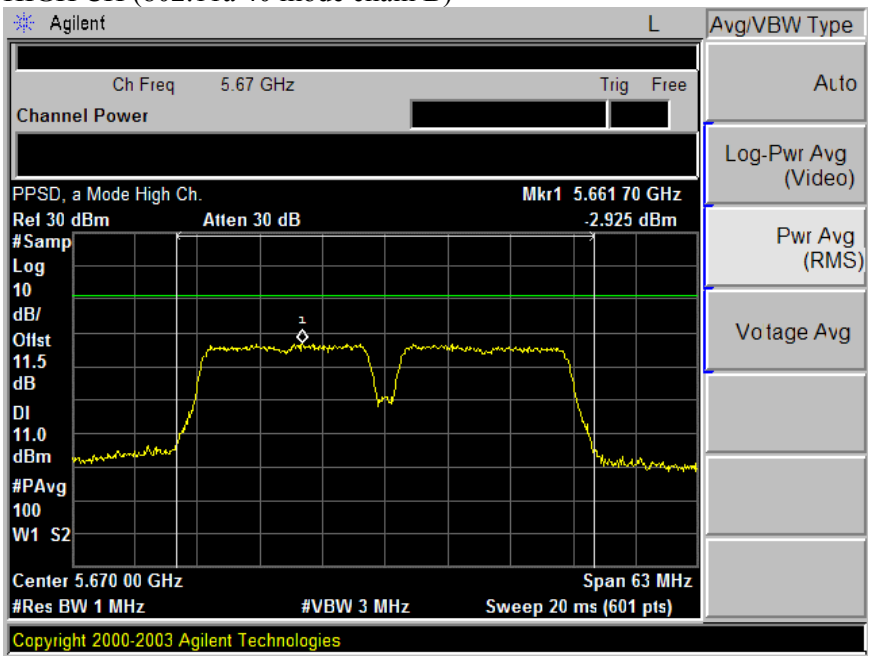
LOW CH (802.11a 40 mode chain B)



MID CH (802.11a 40 mode chain B)

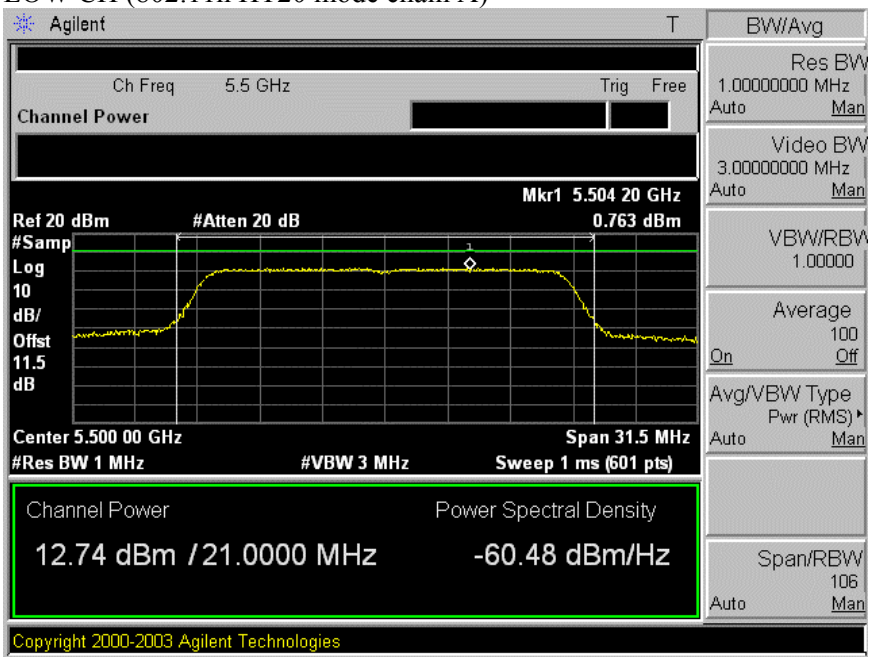


HIGH CH (802.11a 40 mode chain B)

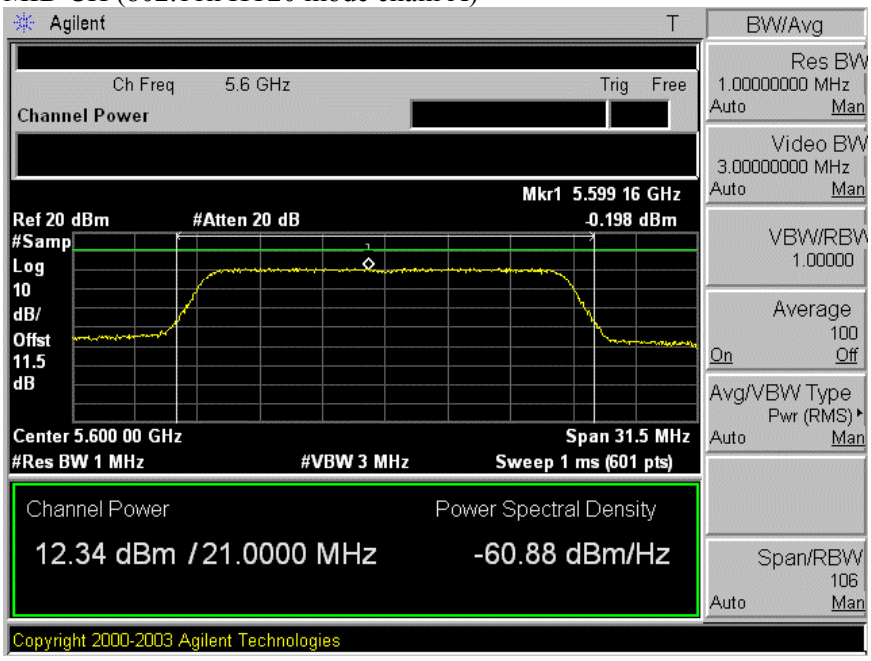


PEAK POWER SPECTRAL DENSITY (802.11n HT20 MODE CHAIN A)

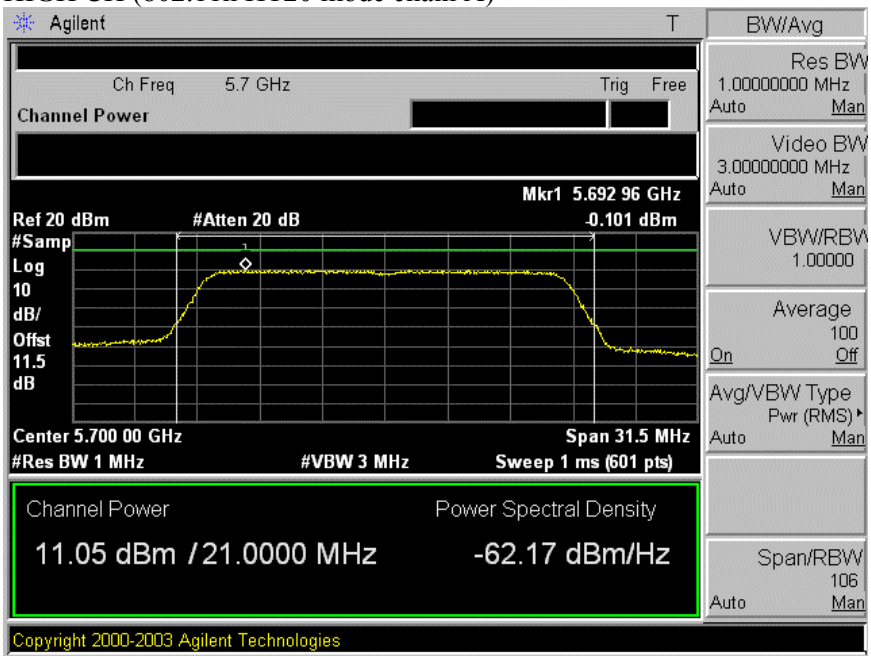
LOW CH (802.11n HT20 mode chain A)



MID CH (802.11n HT20 mode chain A)

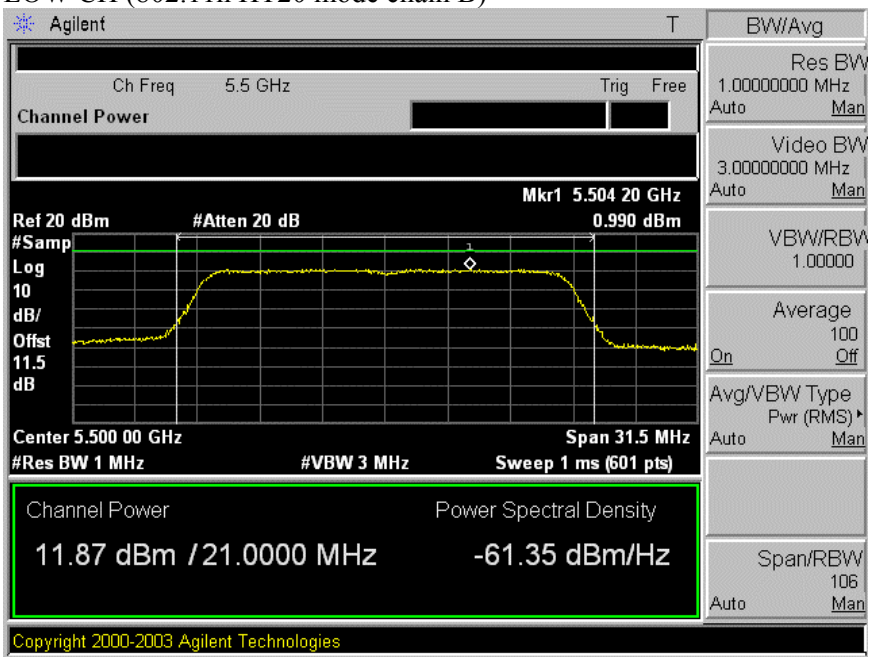


HIGH CH (802.11n HT20 mode chain A)

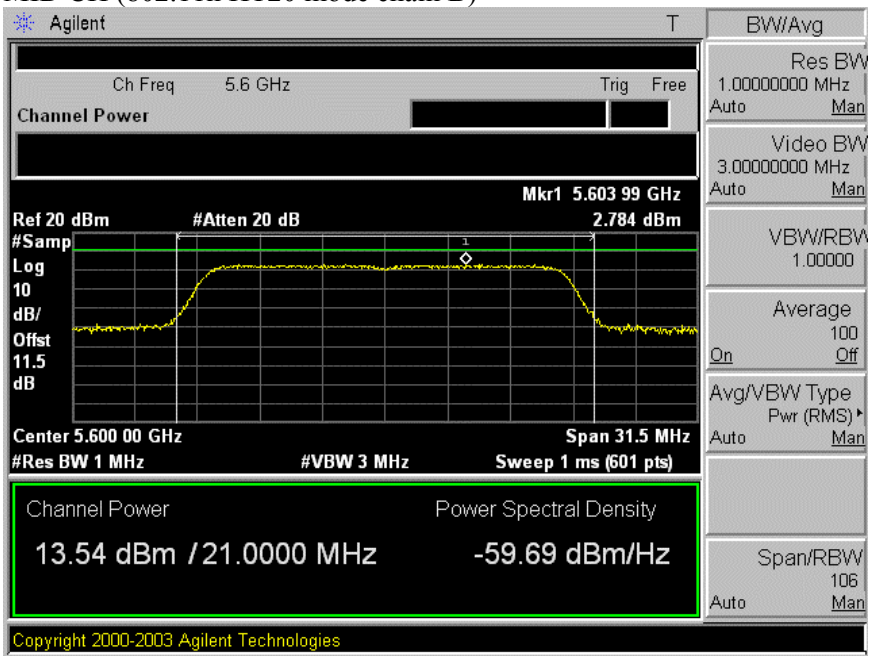


PEAK POWER SPECTRAL DENSITY (802.11 HT20 MODE CHAIN B)

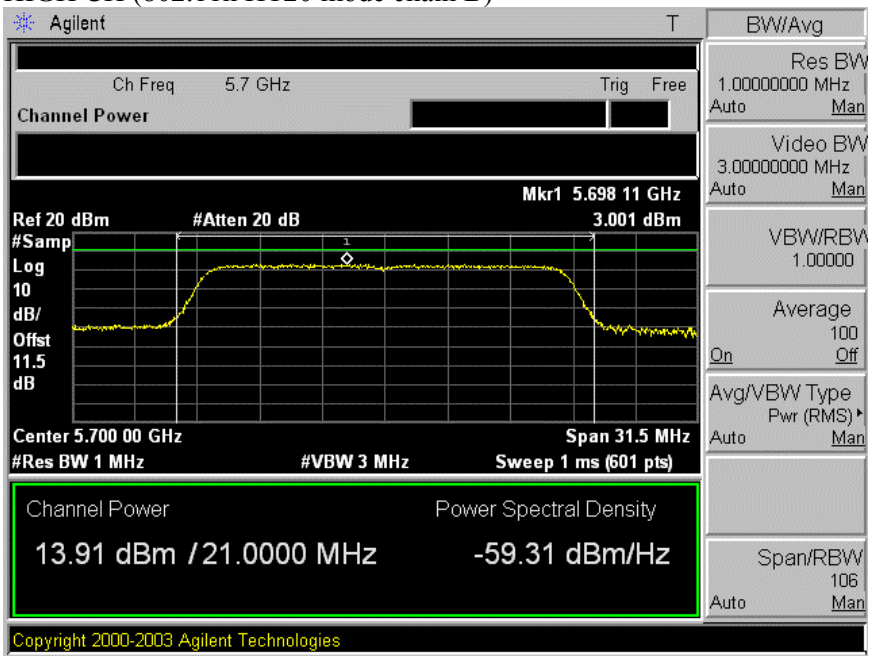
LOW CH (802.11n HT20 mode chain B)



MID CH (802.11n HT20 mode chain B)

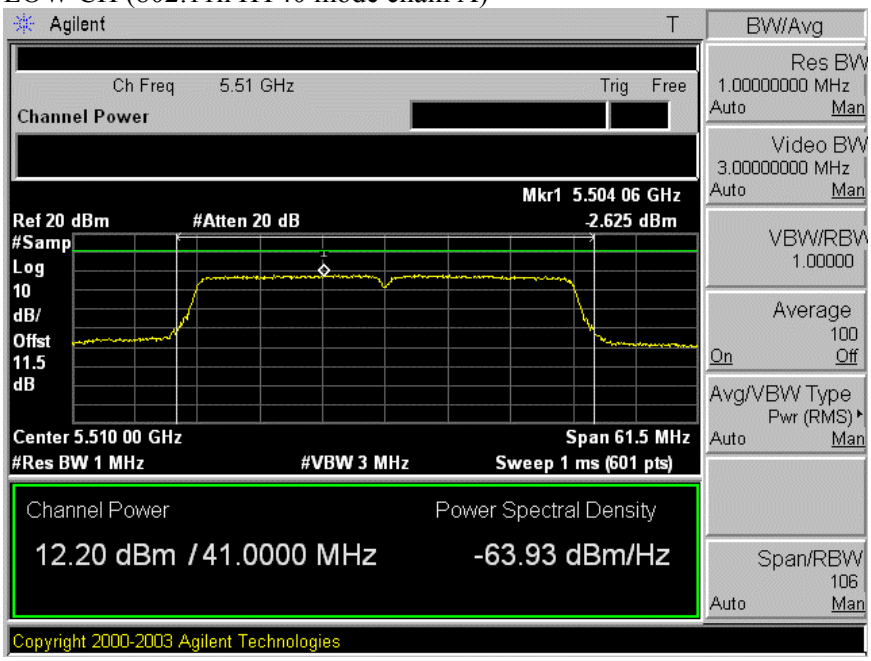


HIGH CH (802.11n HT20 mode chain B)

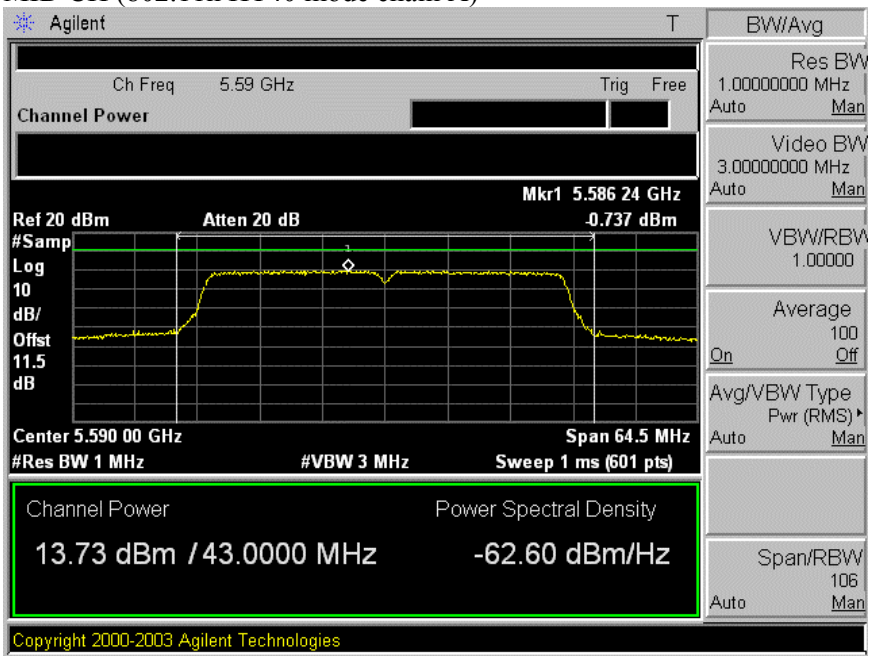


PEAK POWER SPECTRAL DENSITY (802.11 HT40 MODE CHAIN A)

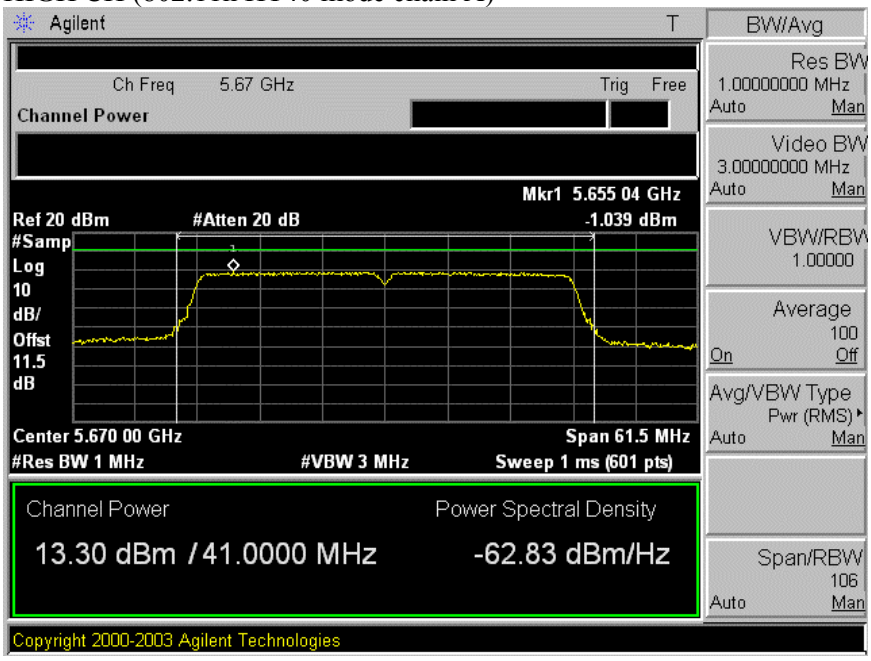
LOW CH (802.11n HT40 mode chain A)



MID CH (802.11n HT40 mode chain A)

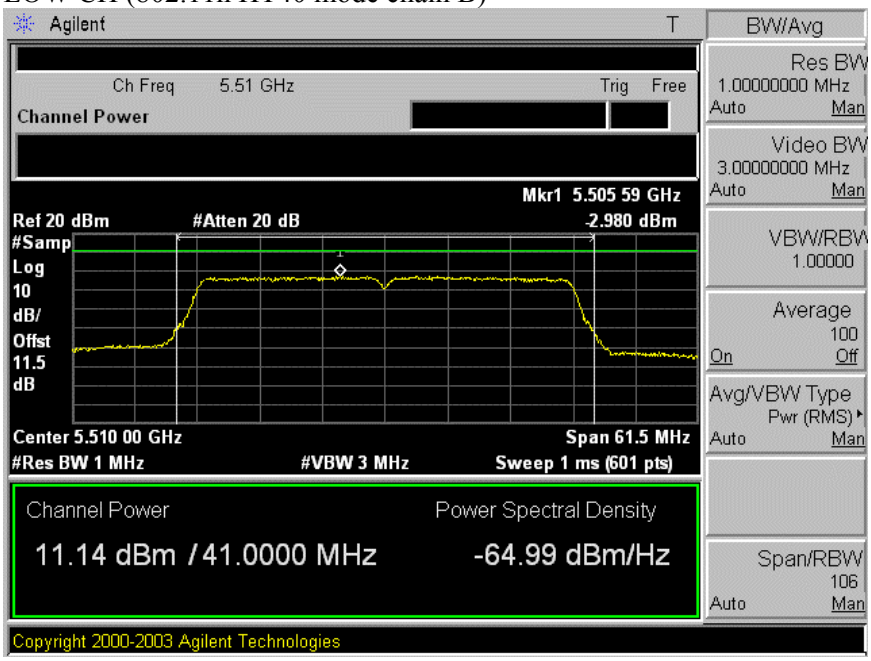


HIGH CH (802.11n HT40 mode chain A)

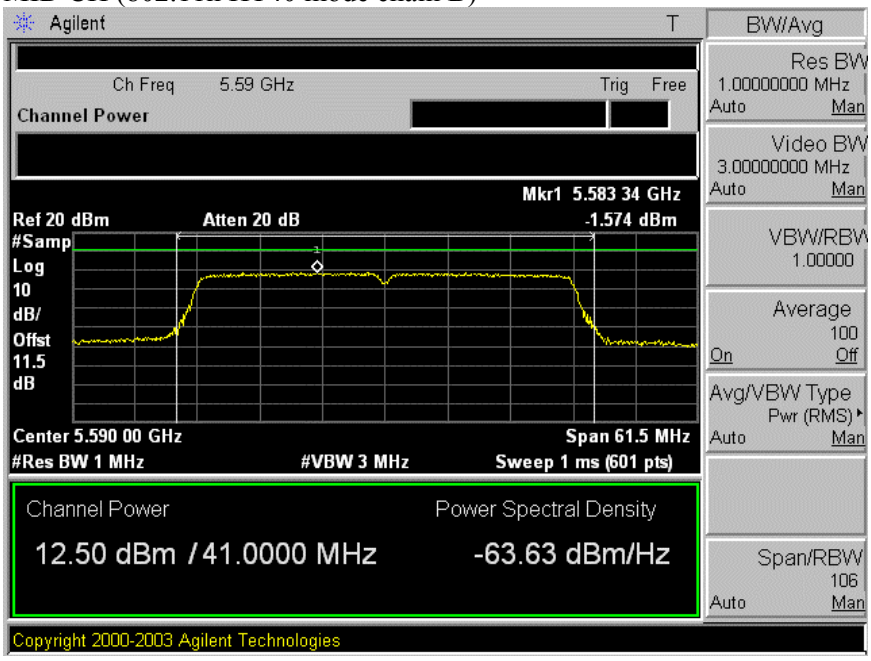


PEAK POWER SPECTRAL DENSITY (802.11 HT40 MODE CHAIN B)

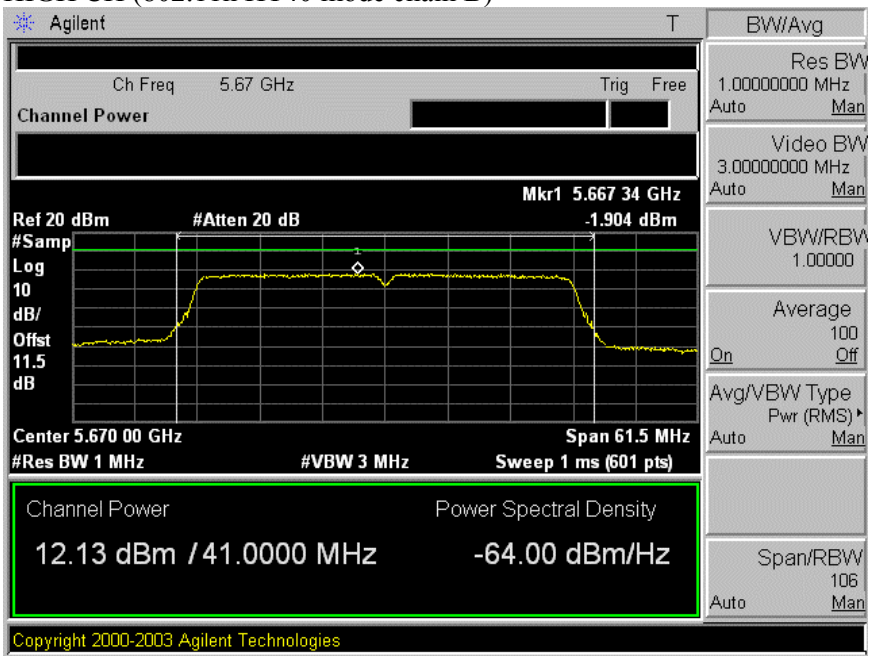
LOW CH (802.11n HT40 mode chain B)



MID CH (802.11n HT40 mode chain B)

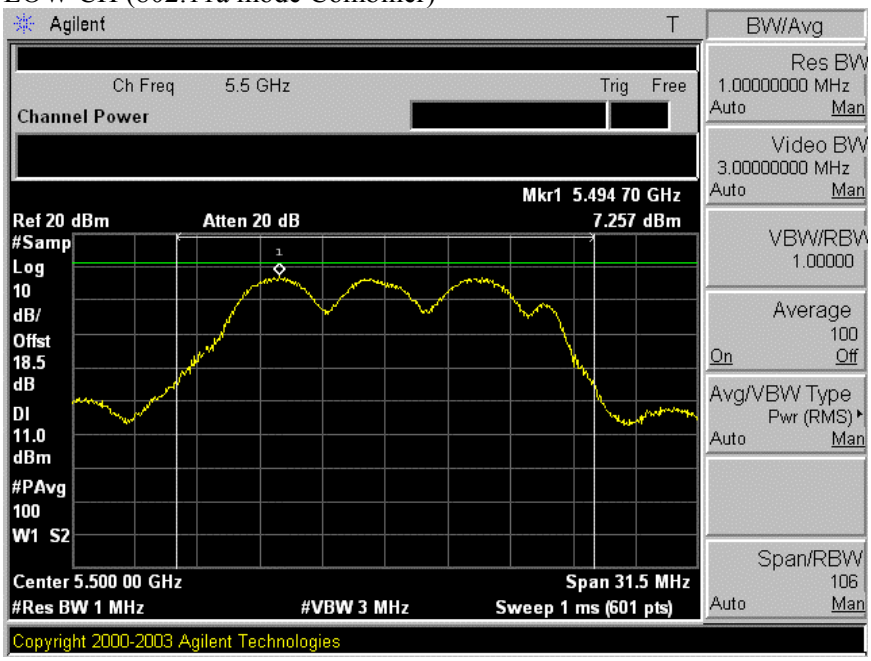


HIGH CH (802.11n HT40 mode chain B)

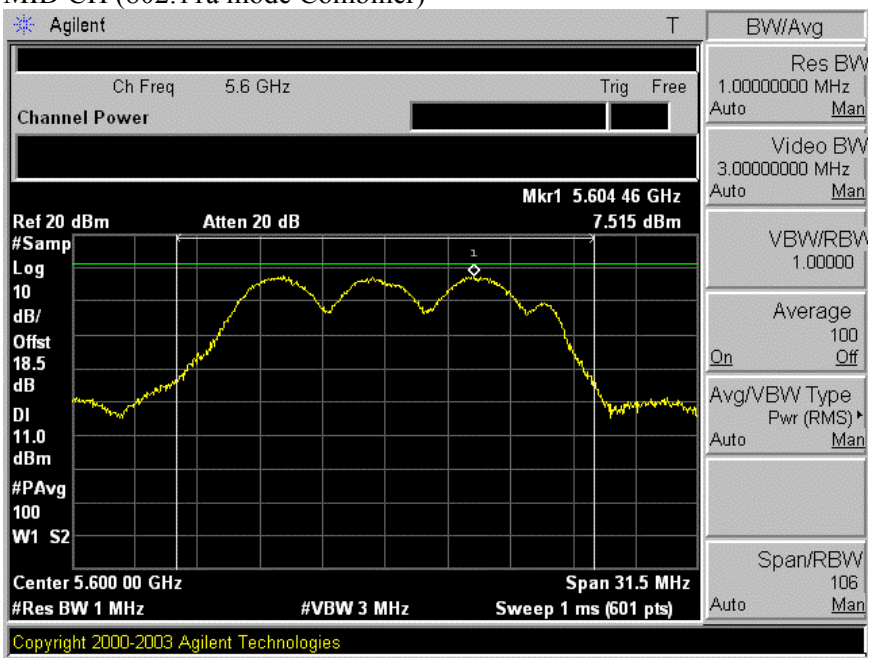


PEAK POWER SPECTRAL DENSITY (802.11a MODE COMBINER)

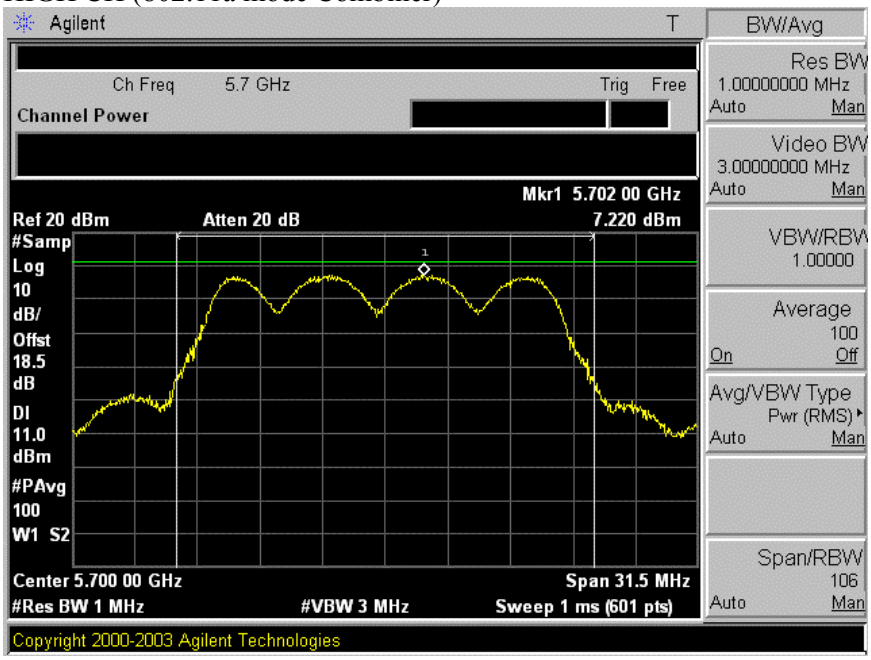
LOW CH (802.11a mode Combiner)



MID CH (802.11a mode Combiner)

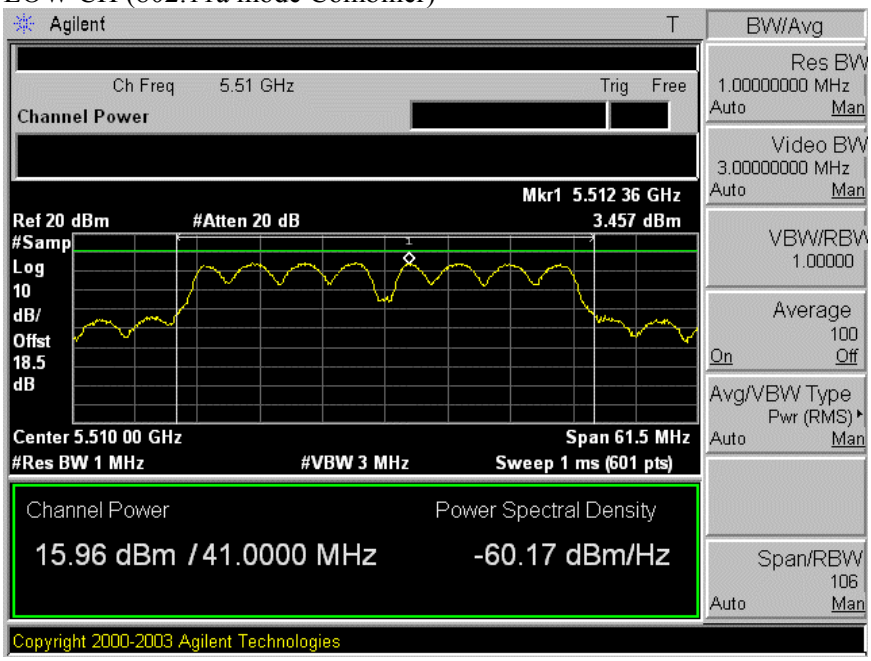


HIGH CH (802.11a mode Combiner)

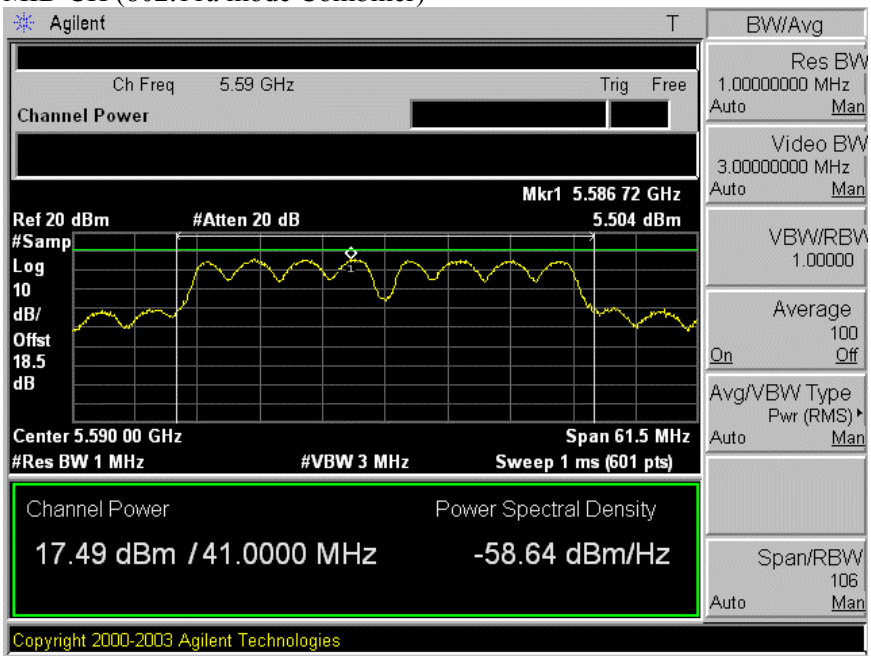


PEAK POWER SPECTRAL DENSITY (802.11a 40 MODE COMBINER)

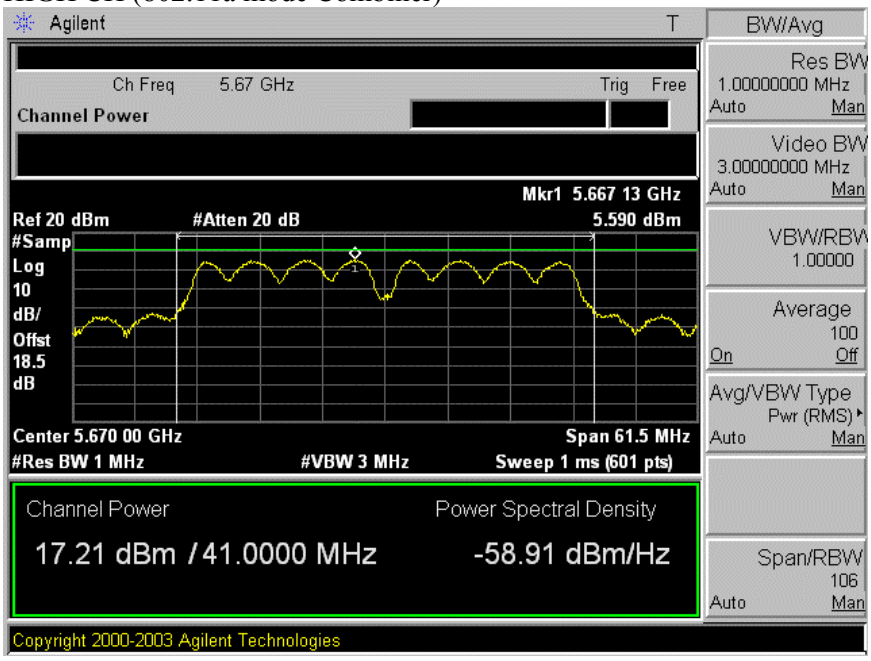
LOW CH (802.11a mode Combiner)



MID CH (802.11a mode Combiner)

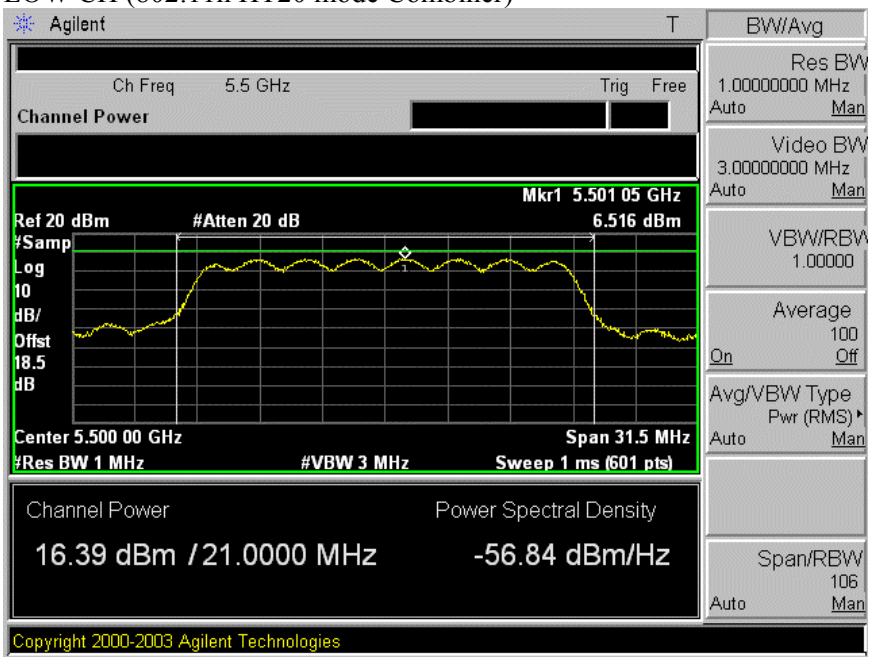


HIGH CH (802.11a mode Combiner)

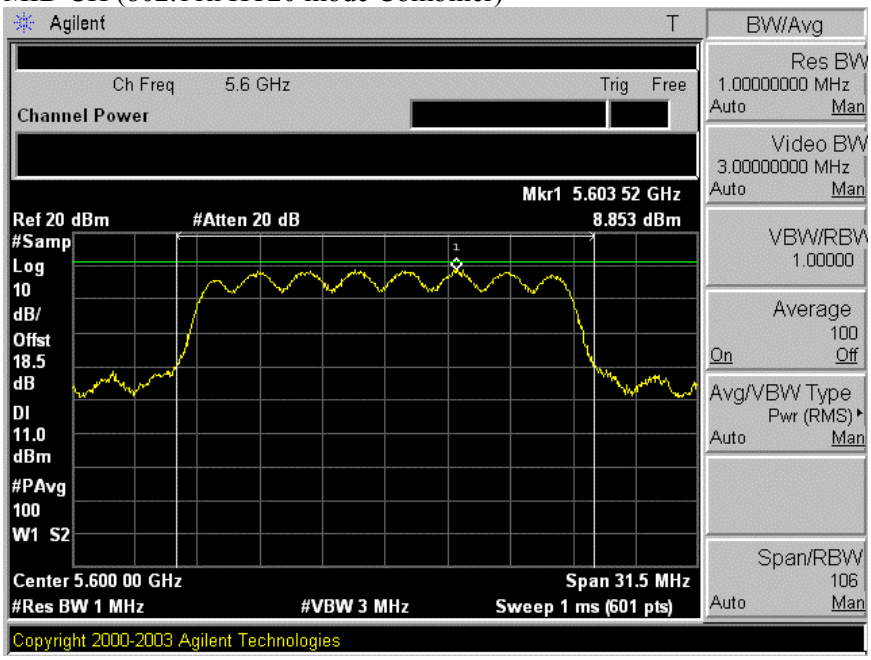


PEAK POWER SPECTRAL DENSITY (802.11n HT20 MODE COMBINER)

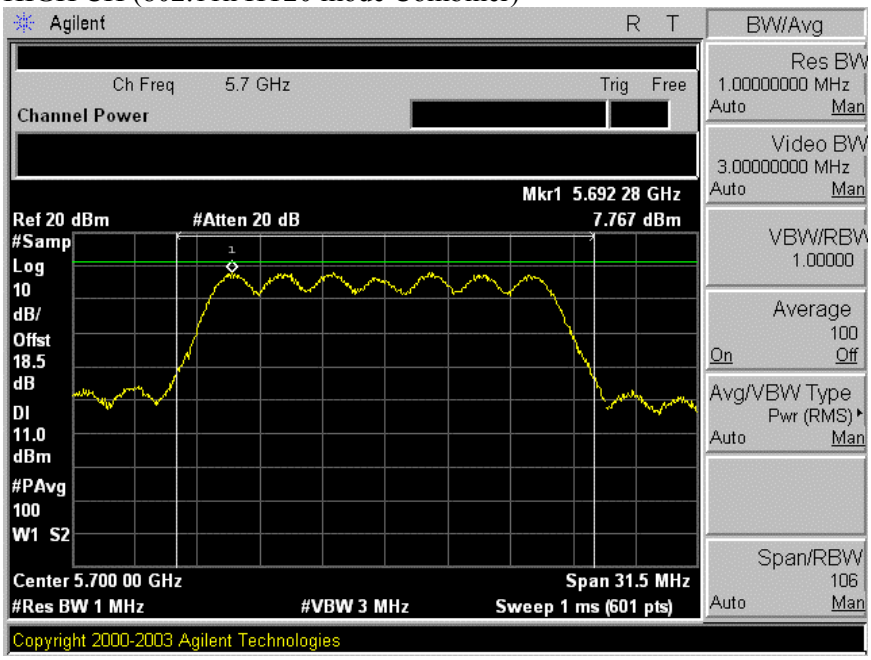
LOW CH (802.11n HT20 mode Combiner)



MID CH (802.11n HT20 mode Combiner)

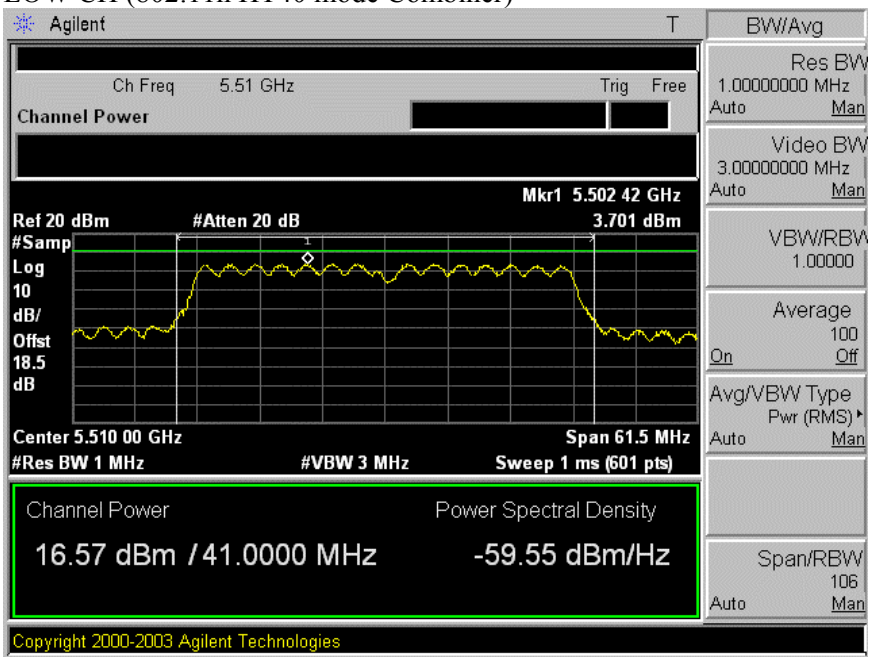


HIGH CH (802.11n HT20 mode Combiner)

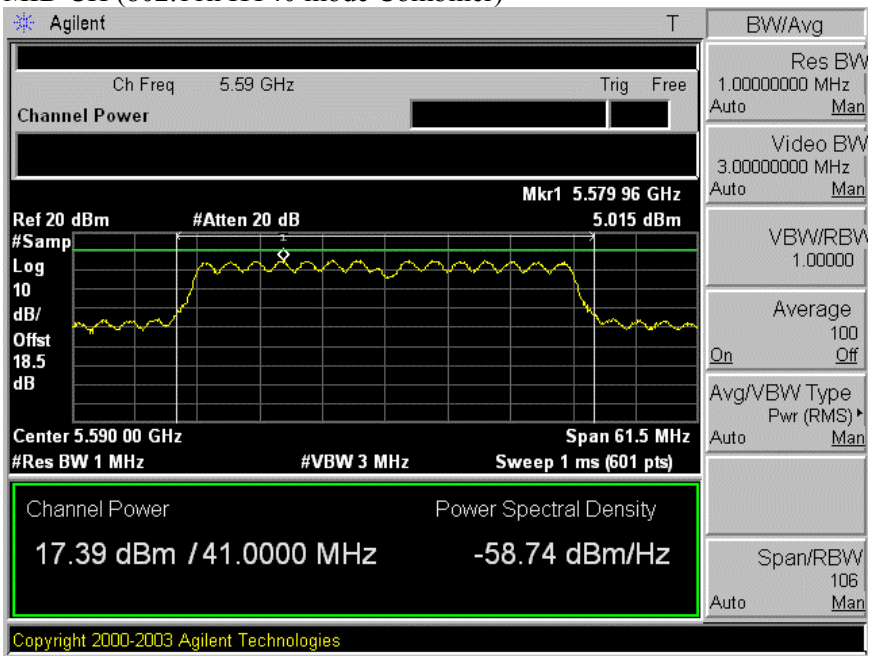


PEAK POWER SPECTRAL DENSITY (802.11 HT40 MODE COMBINER)

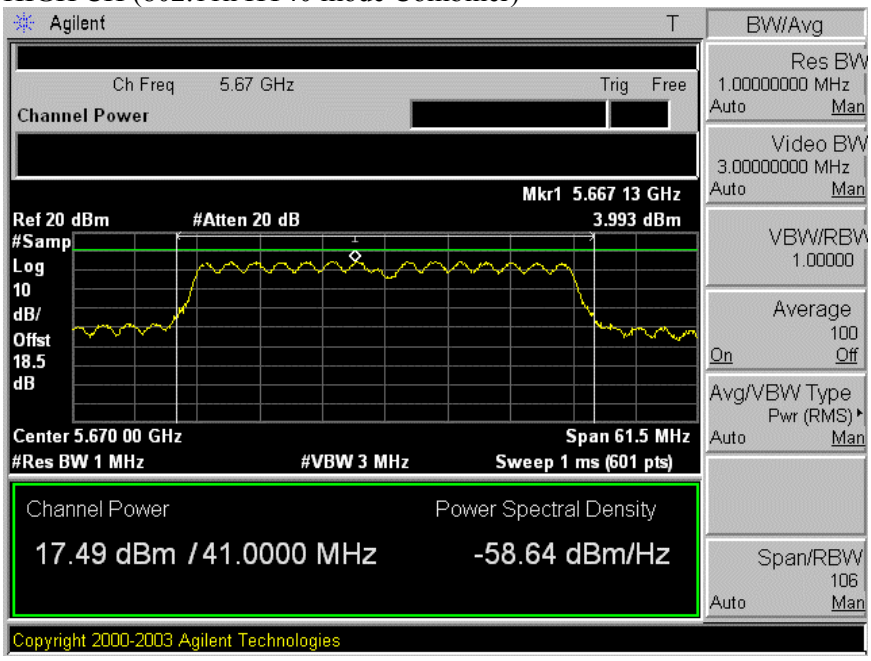
LOW CH (802.11n HT40 mode Combiner)



MID CH (802.11n HT40 mode Combiner)



HIGH CH (802.11n HT40 mode Combiner)



7.1.6. PEAK EXCURSION

LIMIT

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

TEST PROCEDURE

The test is performed in accordance with FCC Public Notice: APPENDIX A Guidelines for Assessing Unlicensed National Information Infrastructure (U-NII) Devices – Part 15, Subpart E, August 2002.

Since Method # 1 was used for peak power measurements, Method # 1 settings are used for the second PPSD trace.

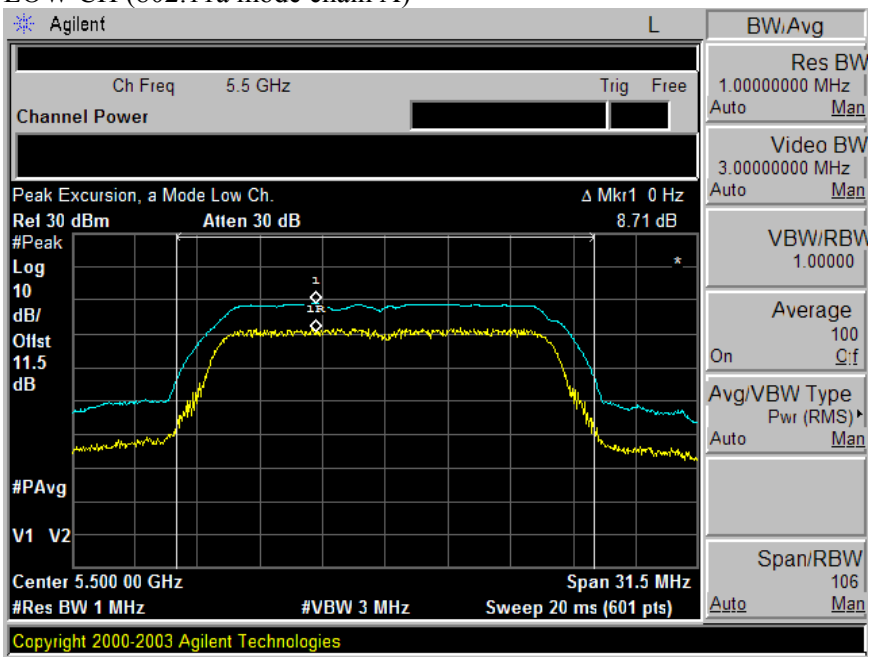
RESULTS

No non-compliance noted:

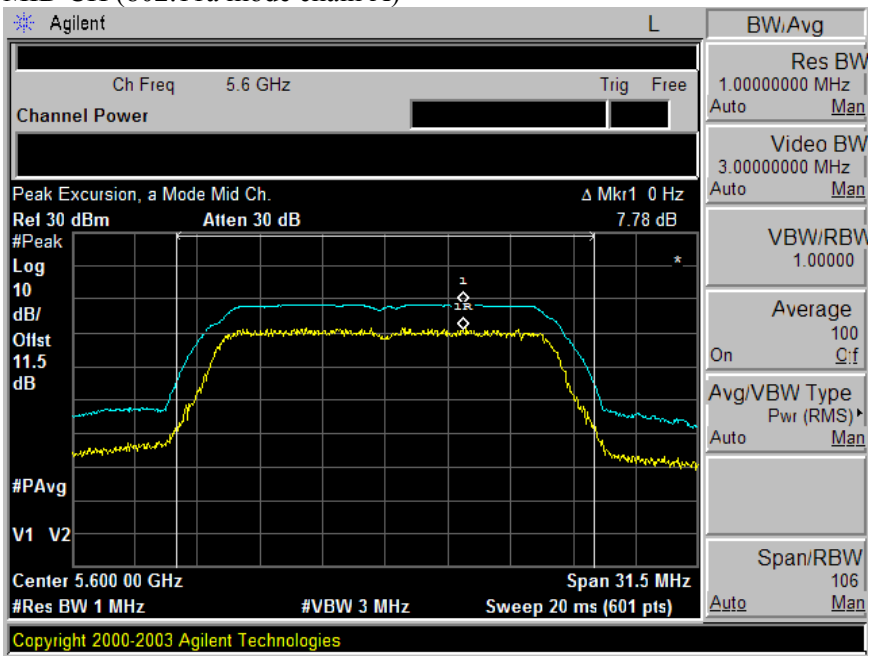
Mode Channel	Frequency (MHz)	Peak Excursion Chain A (dBm)	Peak Excursion Chain B (dBm)	Limit (dBm)	Worst Case Margin (dB)
802.11a Mode					
Low	5500	8.710	10.930	13	-2.070
Middle	5600	7.780	10.970	13	-2.030
High	5700	9.070	11.080	13	-1.920
802.11n HT20 Mode					
Low	5500	7.095	7.050	13	-5.905
Middle	5600	6.261	6.901	13	-6.099
High	5700	7.046	7.046	13	-5.954
802.11a 40 Mode					
Low	5510	7.580	8.040	13	-4.960
Middle	5600	8.440	8.070	13	-4.560
High	5690	8.570	8.100	13	-4.430
802.11n HT40 Mode					
Low	5510	7.769	7.252	13	-5.231
Middle	5600	7.272	7.152	13	-5.728
High	5690	7.704	8.673	13	-4.327

PEAK EXCURSION (802.11a MODE CHAIN A)

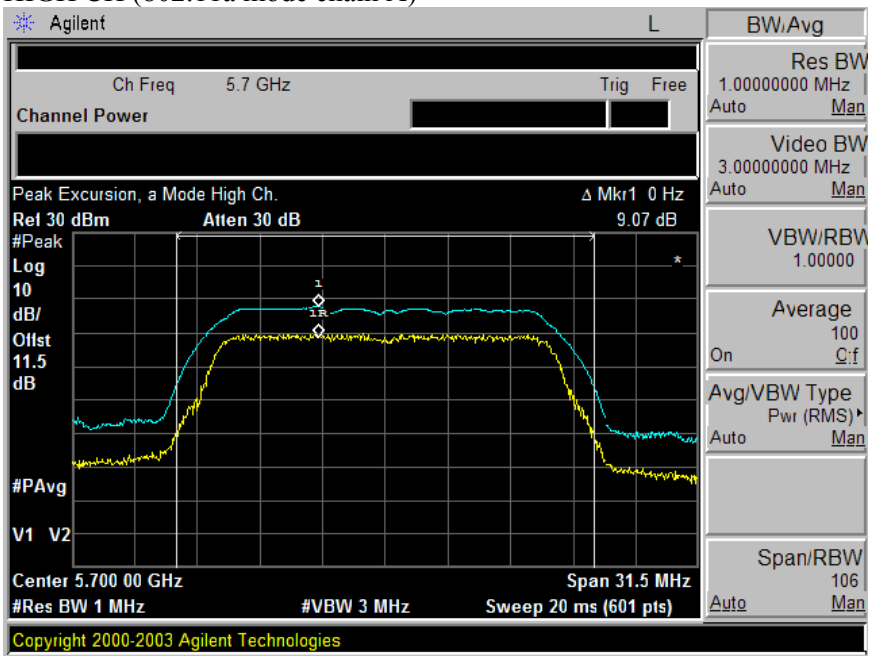
LOW CH (802.11a mode chain A)



MID CH (802.11a mode chain A)

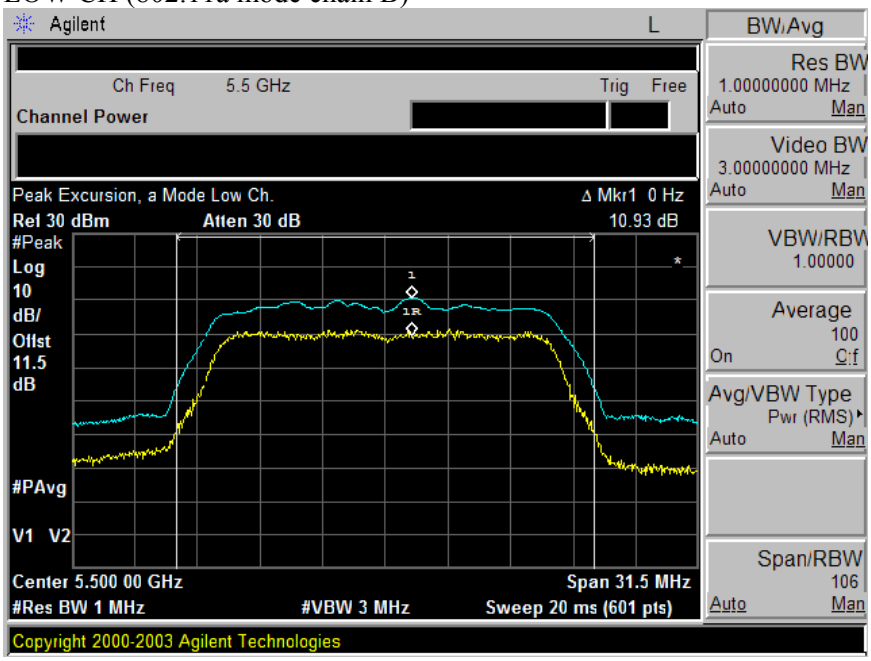


HIGH CH (802.11a mode chain A)

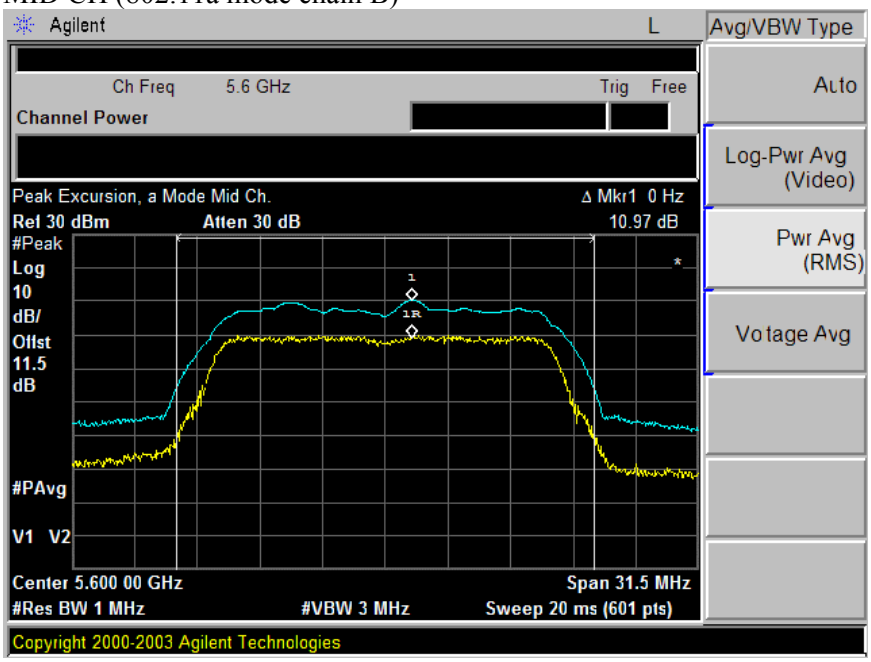


PEAK EXCURSION (802.11a MODE CHAIN B)

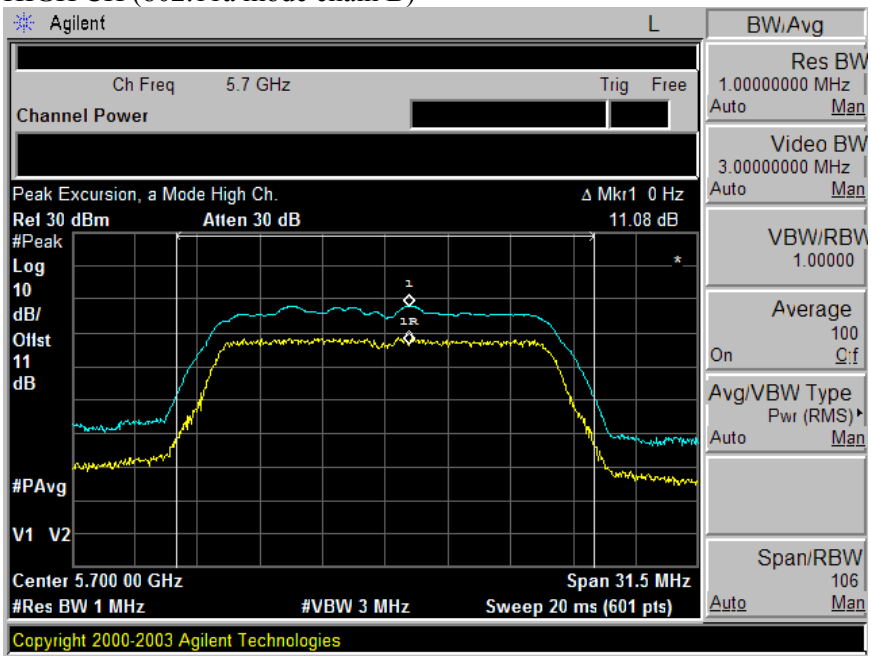
LOW CH (802.11a mode chain B)



MID CH (802.11a mode chain B)

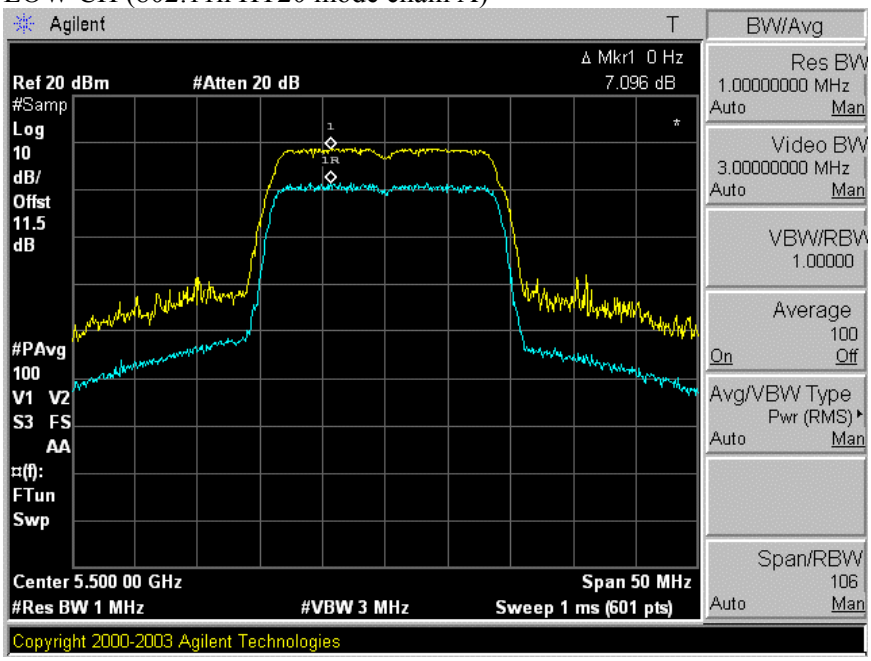


HIGH CH (802.11a mode chain B)

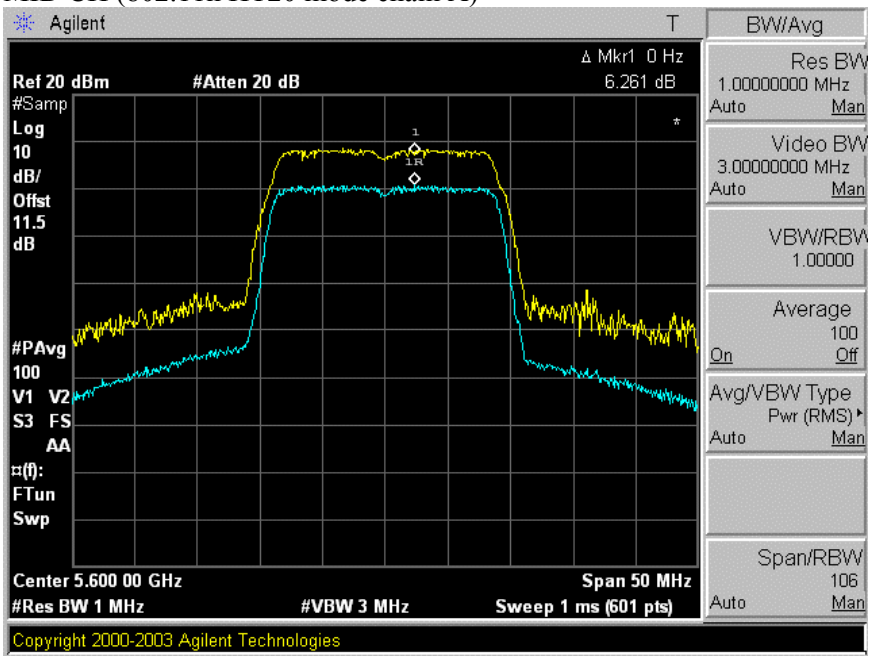


PEAK EXCURSION (802.11n HT20 MODE CHAIN A)

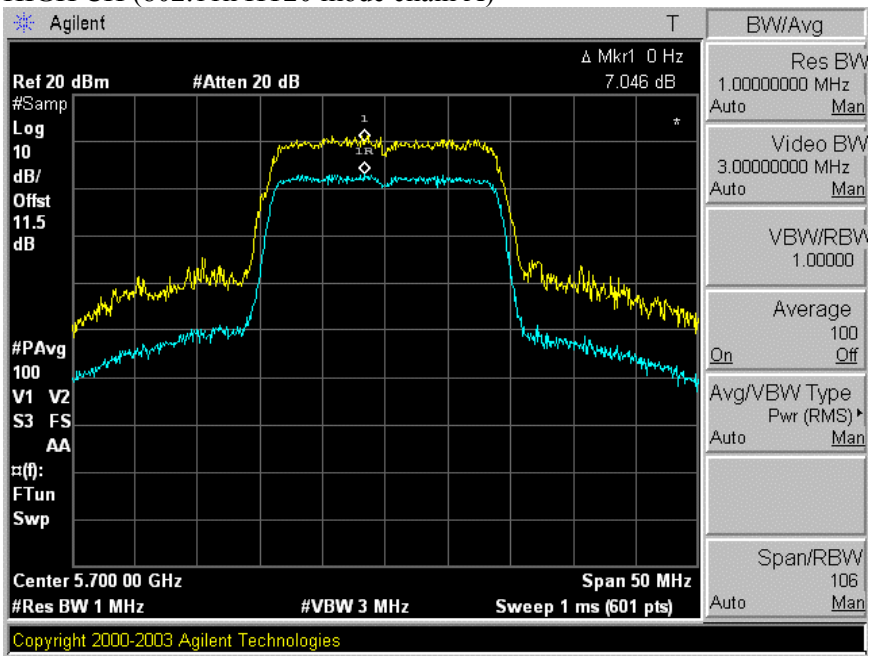
LOW CH (802.11n HT20 mode chain A)



MID CH (802.11n HT20 mode chain A)

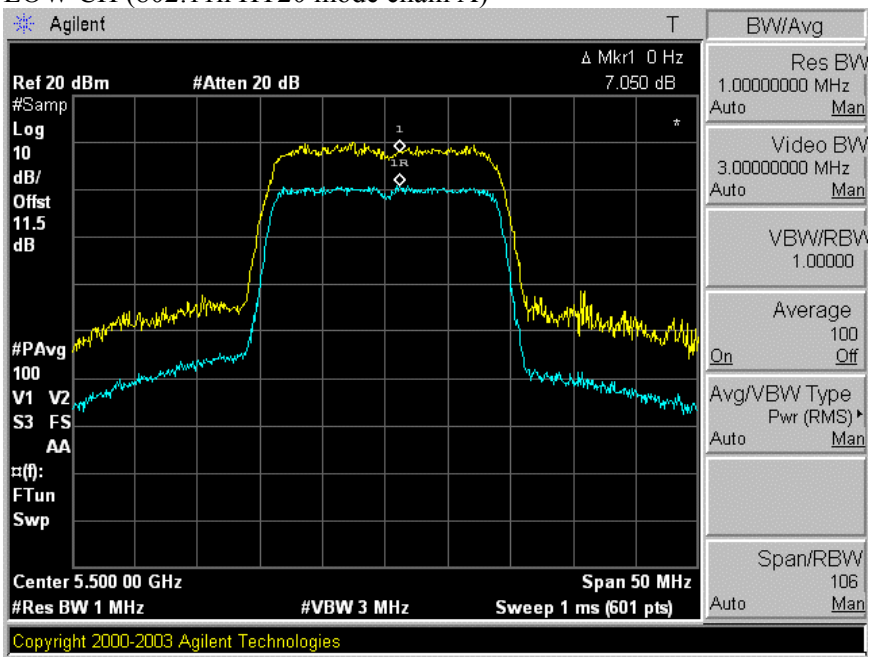


HIGH CH (802.11n HT20 mode chain A)

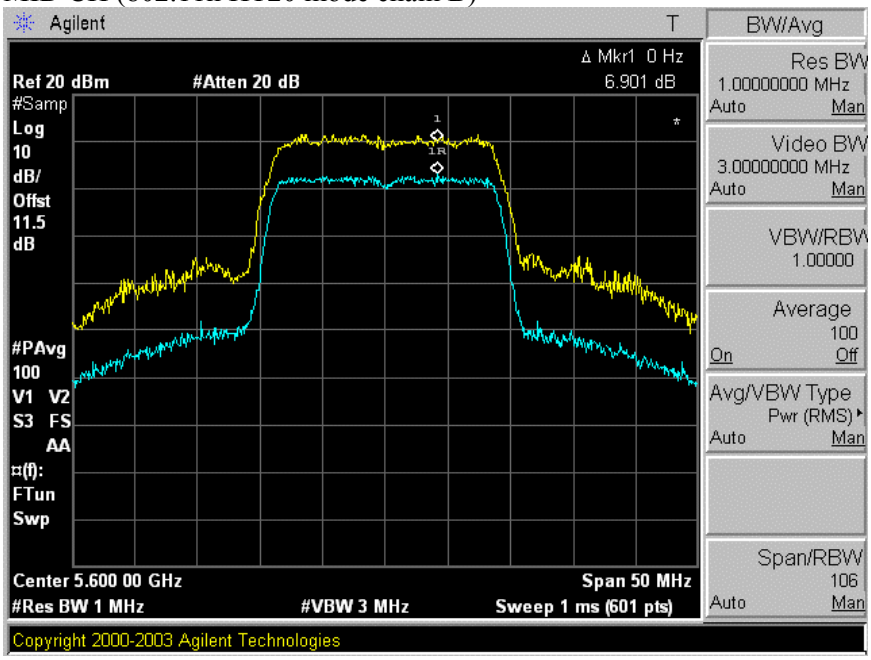


PEAK EXCURSION (802.11 HT20 MODE CHAIN B)

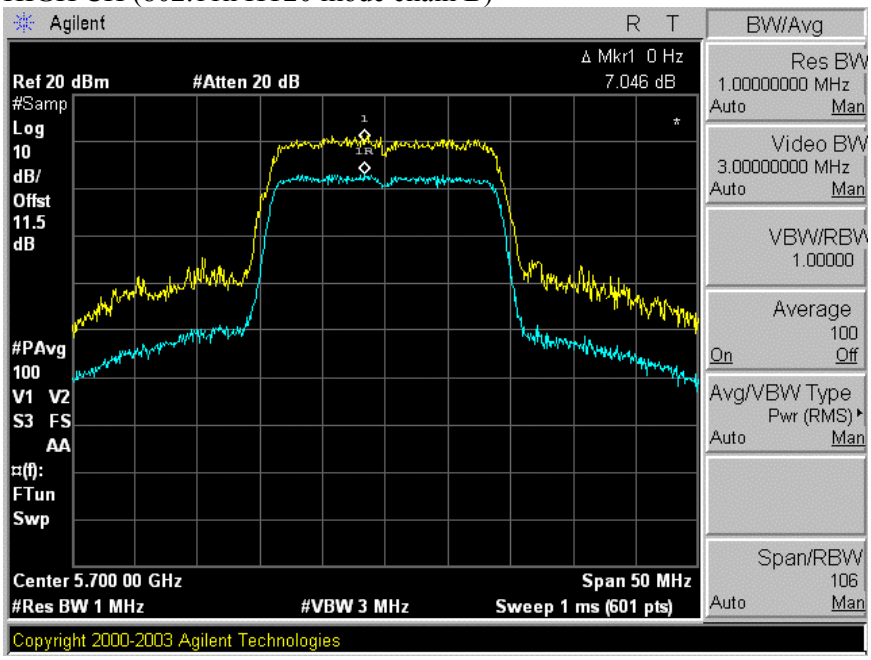
LOW CH (802.11n HT20 mode chain A)



MID CH (802.11n HT20 mode chain B)

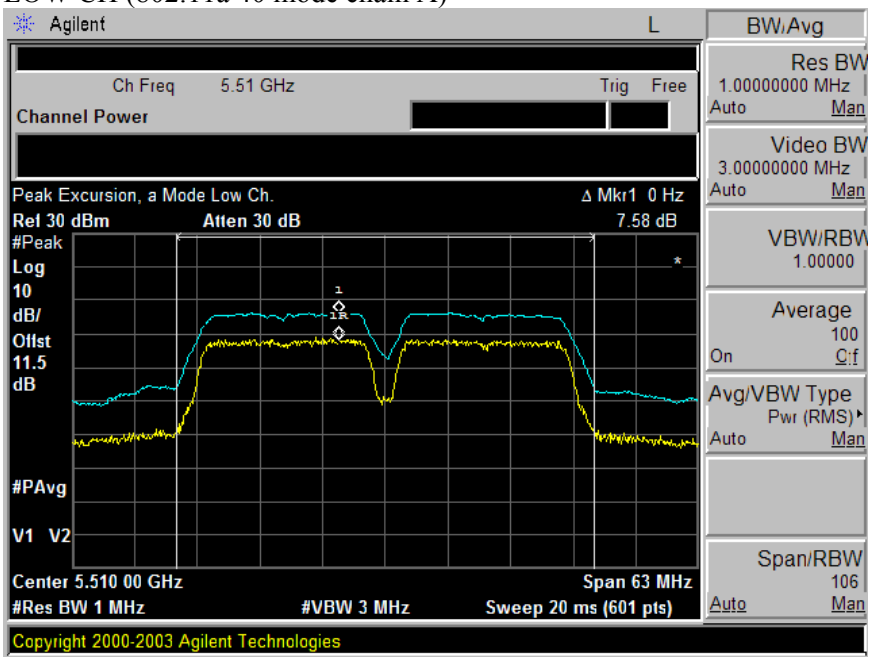


HIGH CH (802.11n HT20 mode chain B)

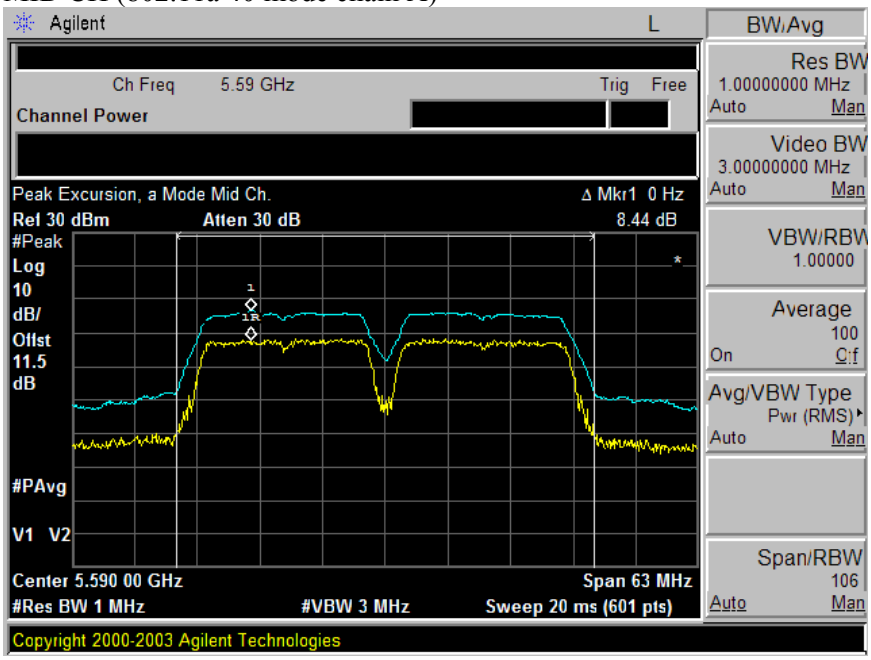


PEAK EXCURSION (802.11a 40 MODE CHAIN A)

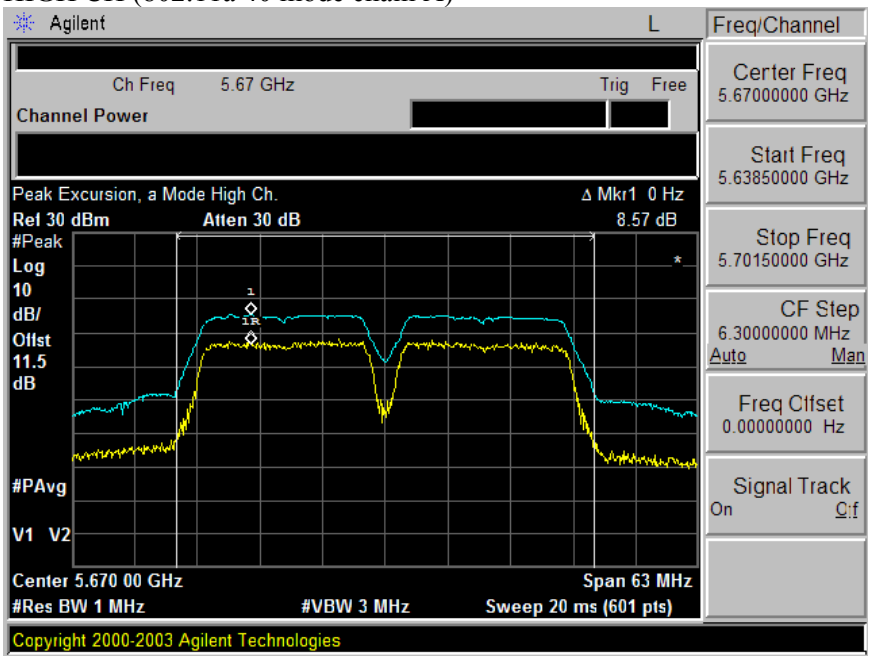
LOW CH (802.11a 40 mode chain A)



MID CH (802.11a 40 mode chain A)

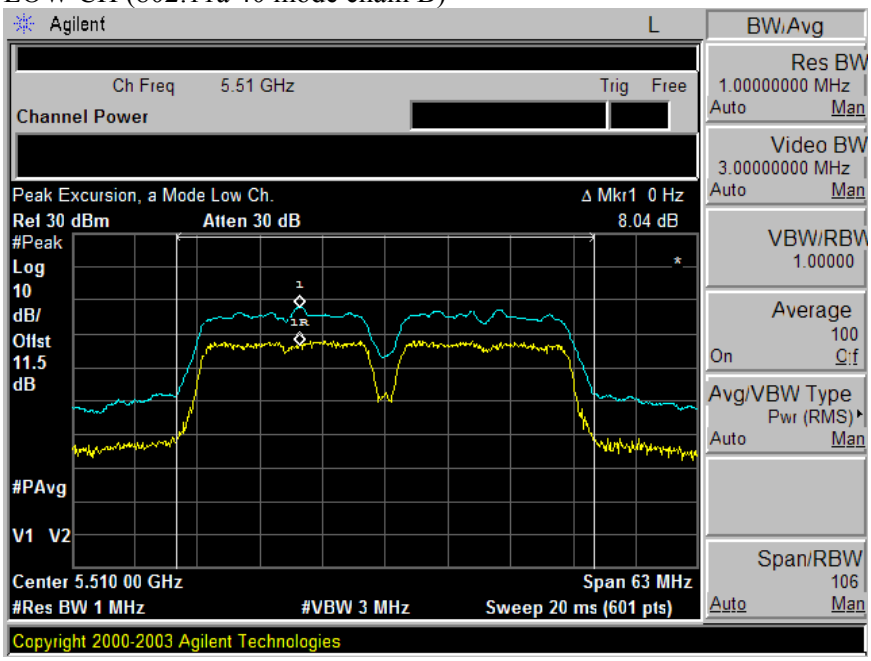


HIGH CH (802.11a 40 mode chain A)

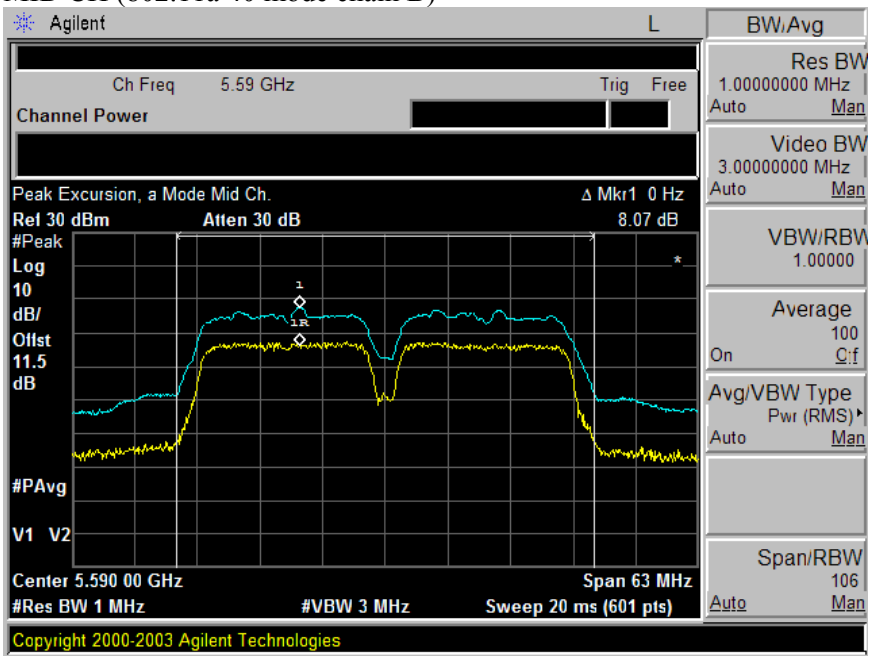


PEAK EXCURSION (802.11 a 40 MODE CHAIN B)

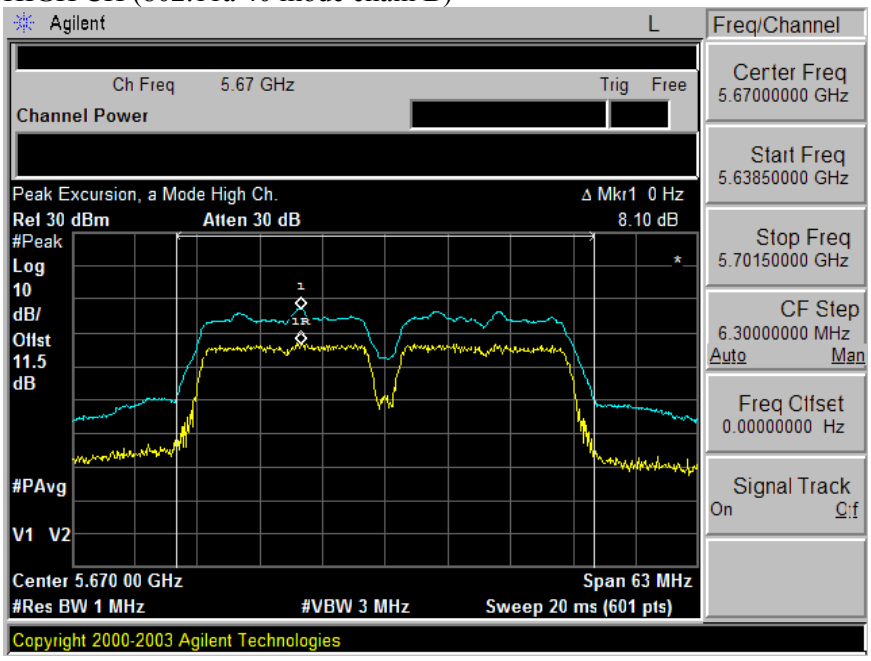
LOW CH (802.11a 40 mode chain B)



MID CH (802.11a 40 mode chain B)

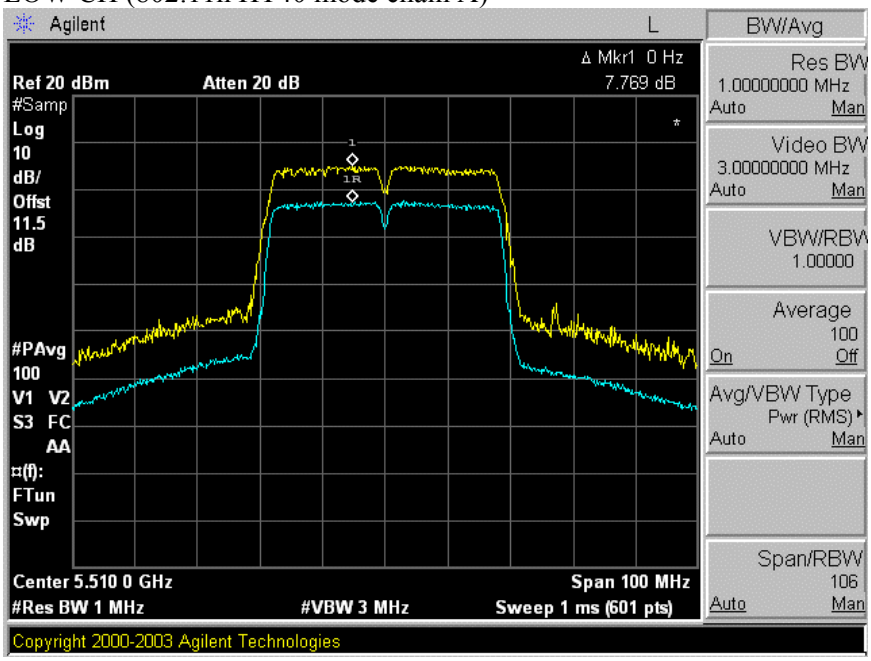


HIGH CH (802.11a 40 mode chain B)

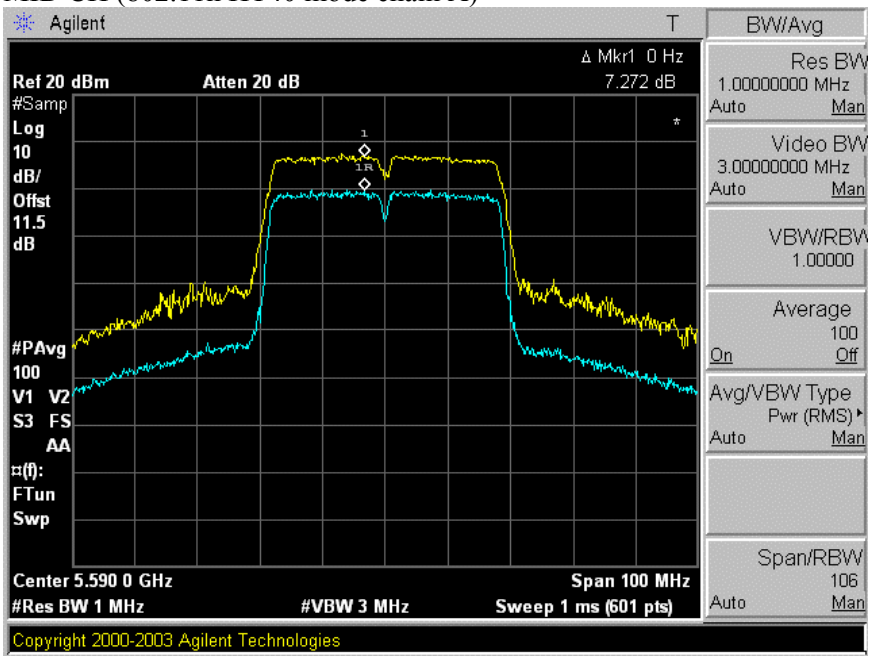


PEAK EXCURSION (802.11 HT40 MODE CHAIN A)

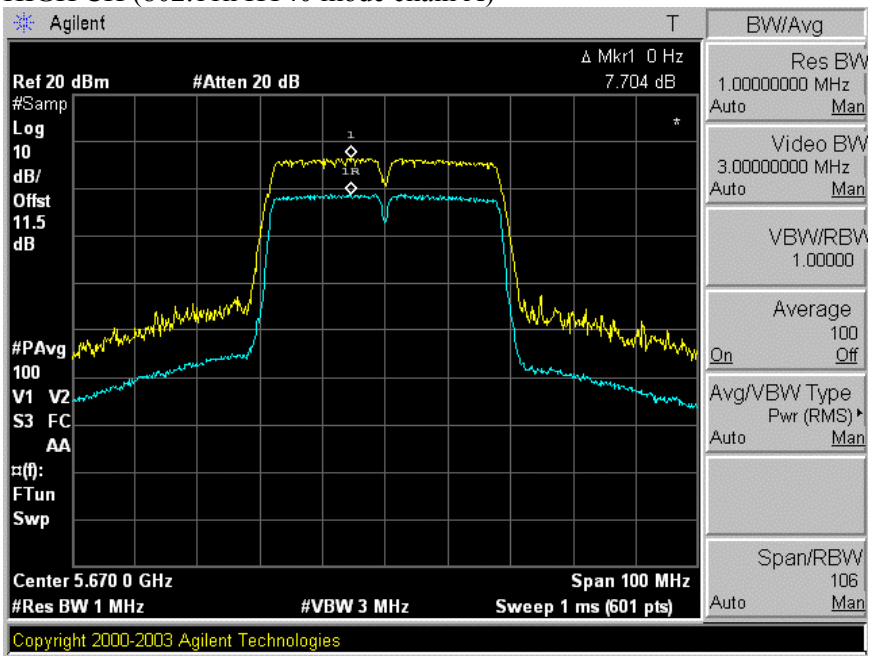
LOW CH (802.11n HT40 mode chain A)



MID CH (802.11n HT40 mode chain A)

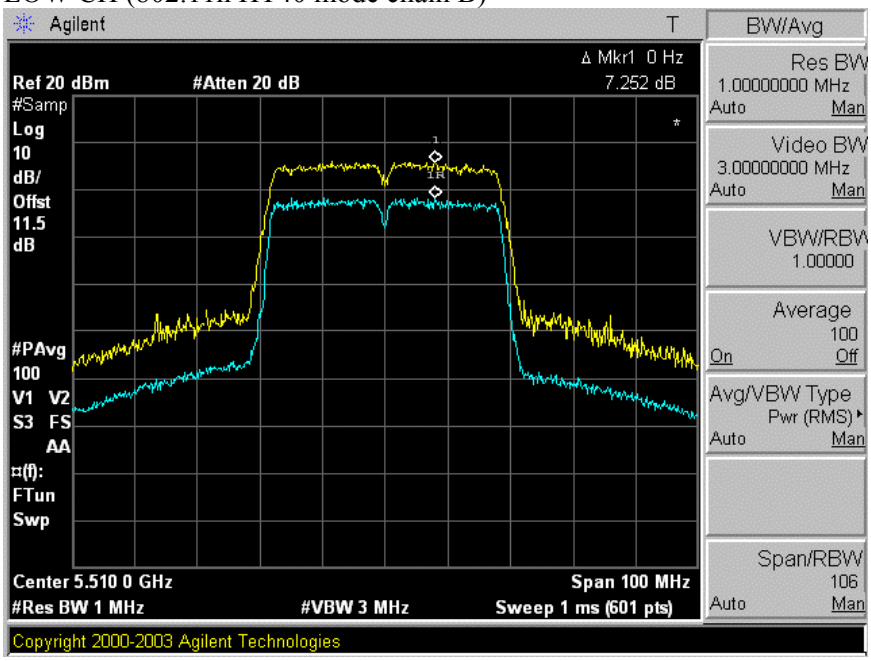


HIGH CH (802.11n HT40 mode chain A)

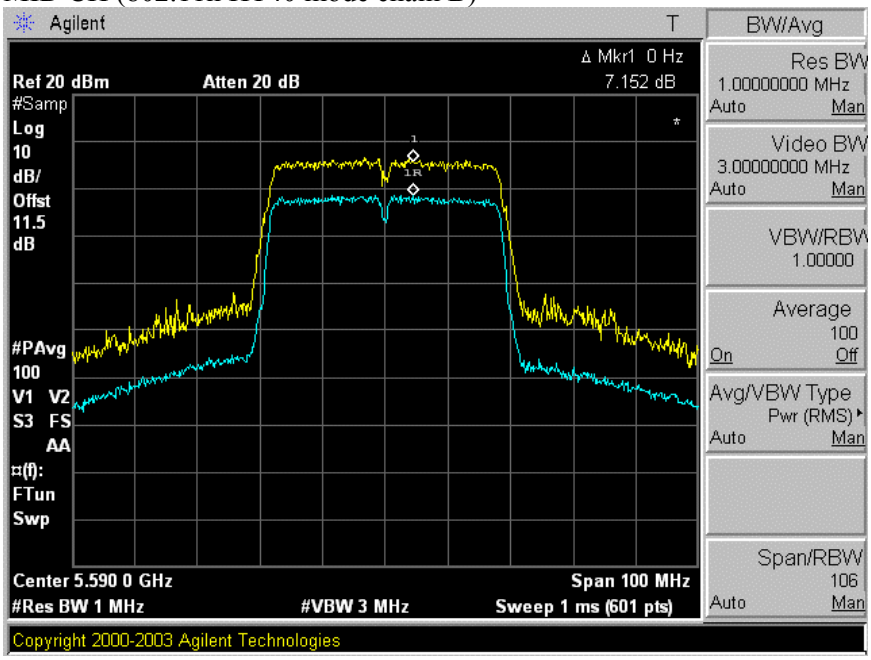


PEAK EXCURSION (802.11 HT40 MODE CHAIN B)

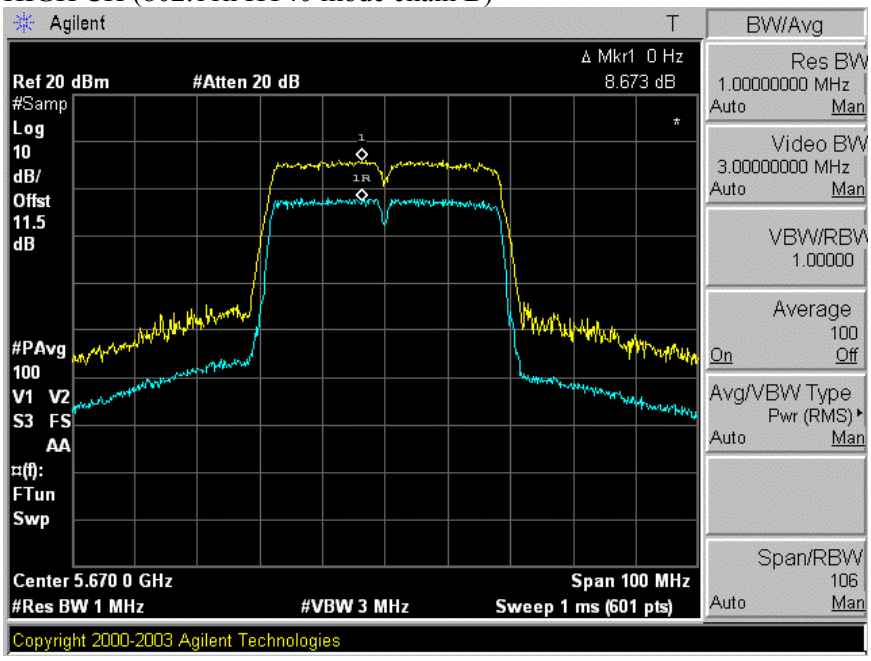
LOW CH (802.11n HT40 mode chain B)



MID CH (802.11n HT40 mode chain B)



HIGH CH (802.11n HT40 mode chain B)



7.1.7. CONDUCTED SPURIOUS EMISSIONS

LIMITS

§15.407 (b) (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.

TEST PROCEDURE

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

The transmitter output is connected to the spectrum analyzer. The resolution bandwidth is set to 1 MHz. The video bandwidth is set to 1 MHz. Peak detection measurements are compared to the average EIRP limit, adjusted for the maximum antenna gain. If necessary, additional average detection measurements are made.

Measurements are made over the 30 MHz to 40 GHz range with the transmitter set to the lowest, middle, and highest channels.

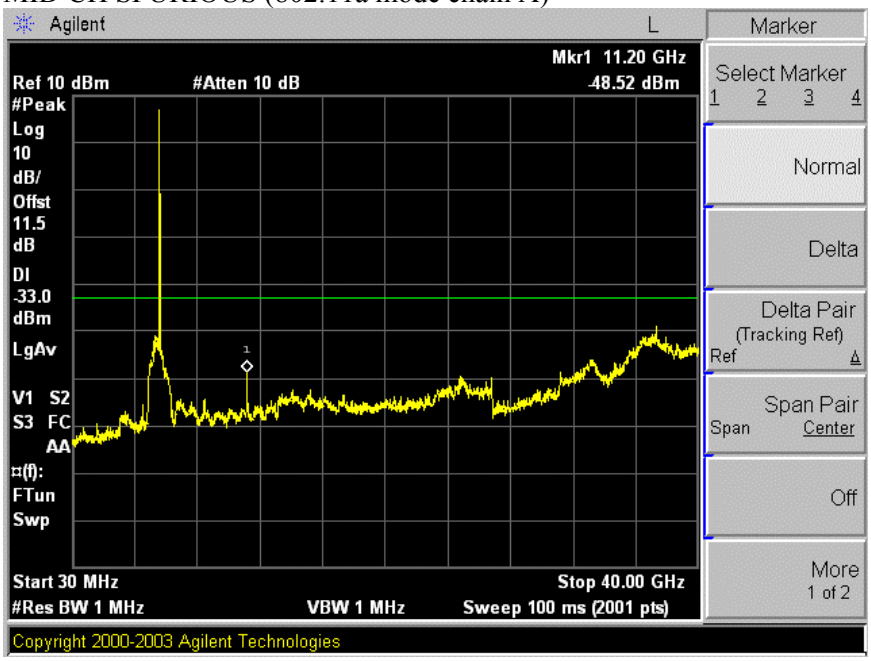
RESULTS

No non-compliance noted:

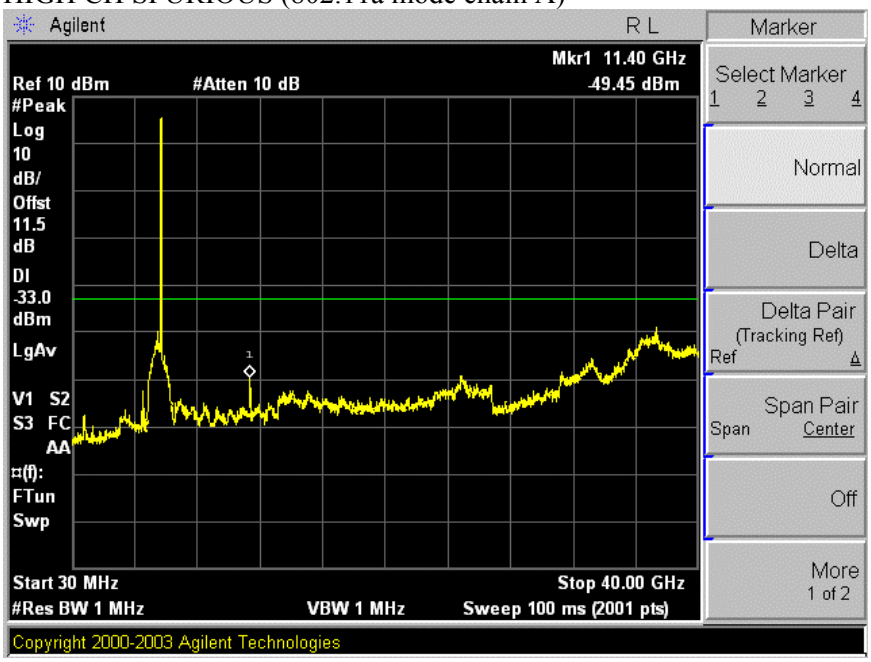
SPURIOUS EMISSIONS (802.11a MODE CHAIN A)

LOW CH SPURIOUS (802.11a mode chain A)

MID CH SPURIOUS (802.11a mode chain A)



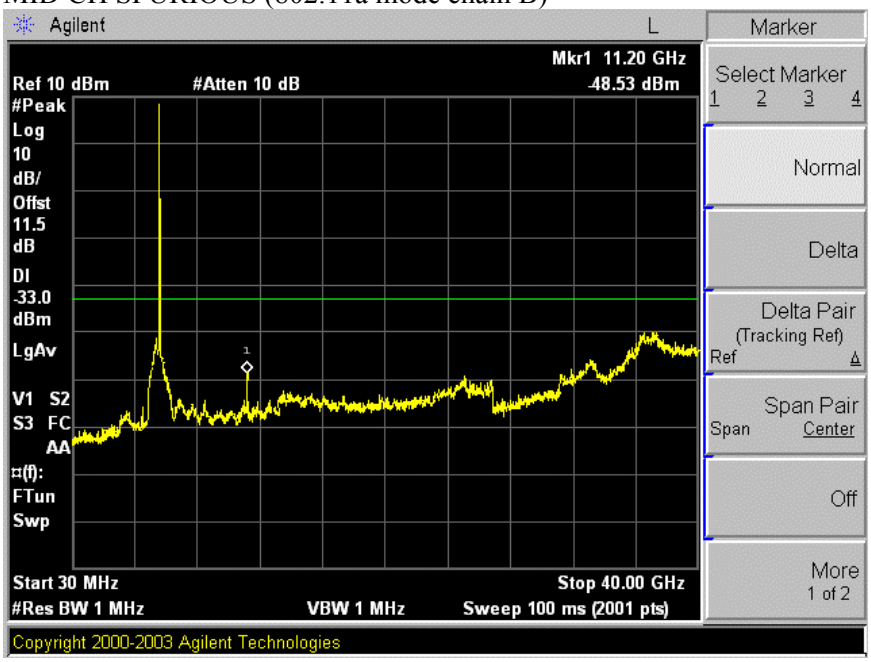
HIGH CH SPURIOUS (802.11a mode chain A)



SPURIOUS EMISSIONS (802.11a MODE CHAIN B)

LOW CH SPURIOUS (802.11a mode chain B

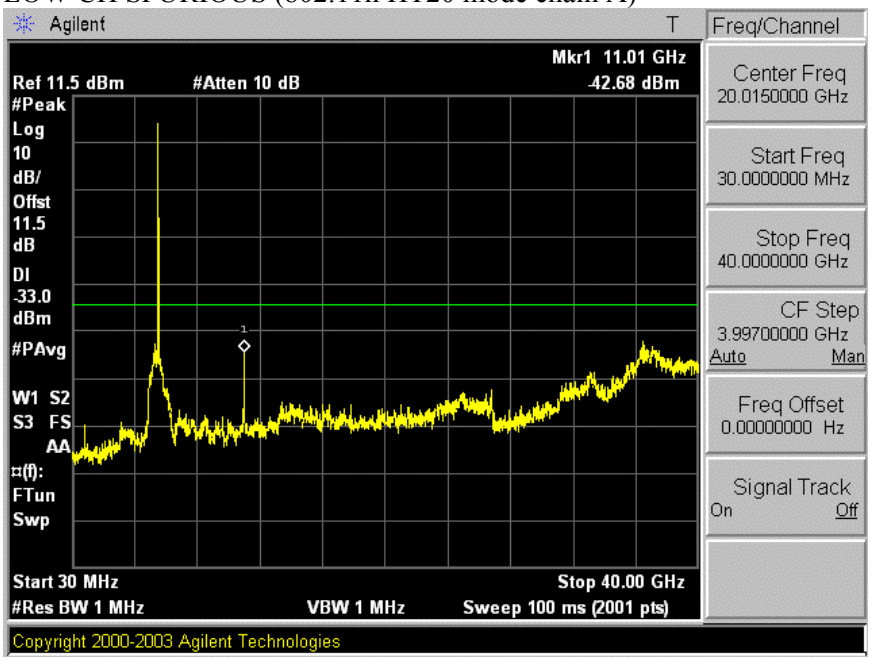
MID CH SPURIOUS (802.11a mode chain B)



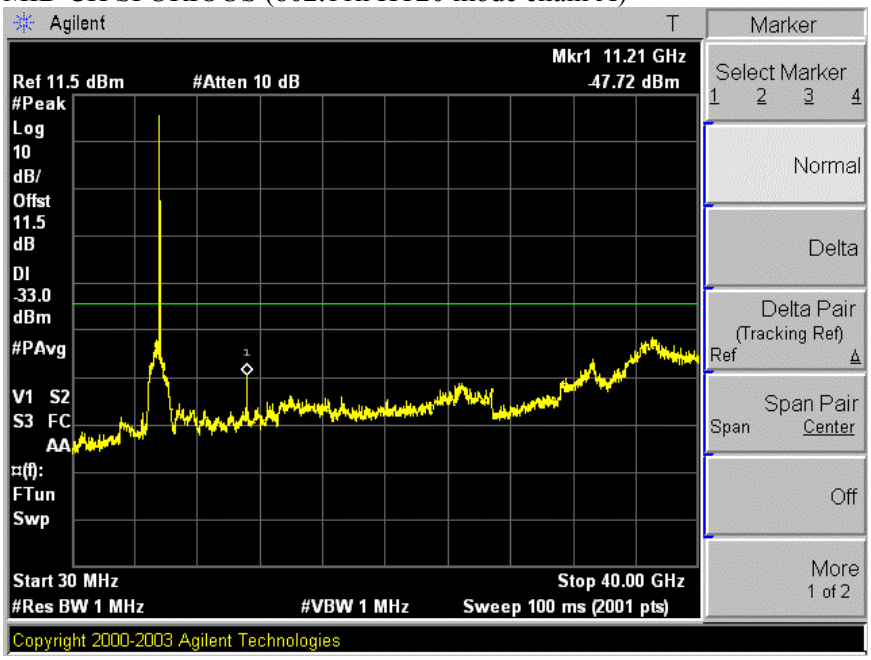
HIGH CH SPURIOUS (802.11a mode chain B)

SPURIOUS EMISSIONS (802.11n HT20 MODE CHAIN A)

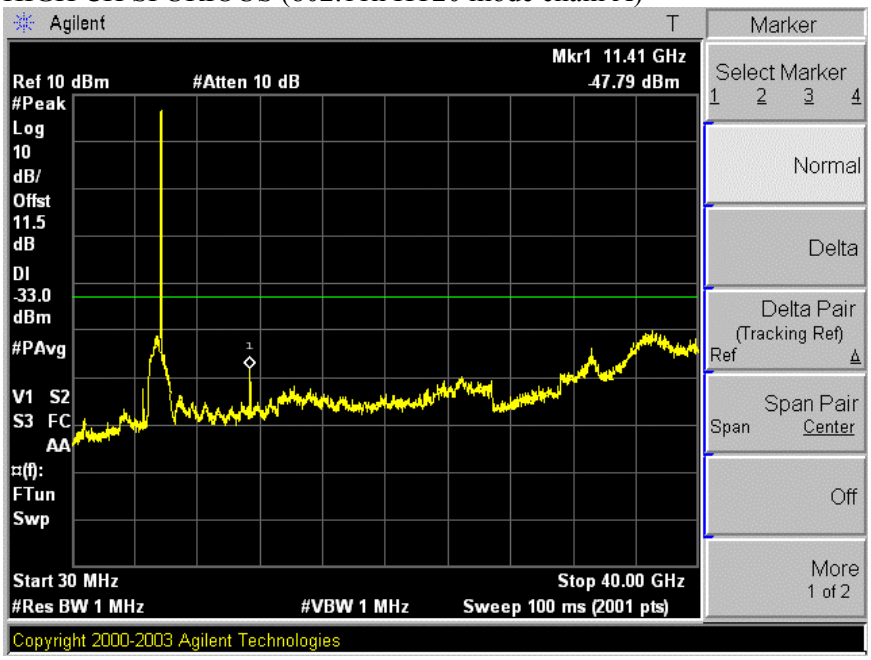
LOW CH SPURIOUS (802.11n HT20 mode chain A)



MID CH SPURIOUS (802.11n HT20 mode chain A)



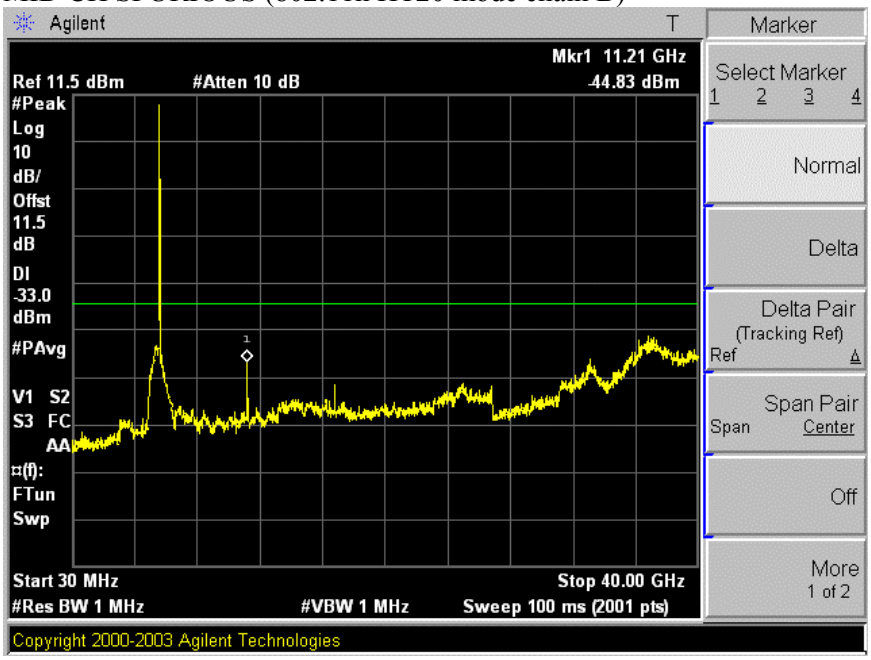
HIGH CH SPURIOUS (802.11n HT20 mode chain A)



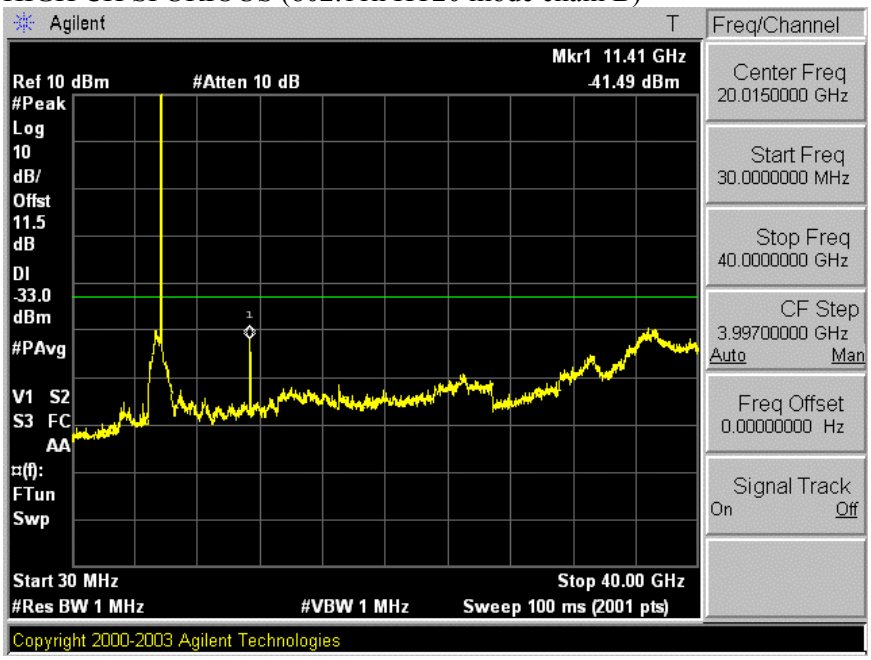
SPURIOUS EMISSIONS (802.11 HT20 MODE CHAIN B)

LOW CH SPURIOUS (802.11n HT20 mode chain B)

MID CH SPURIOUS (802.11n HT20 mode chain B)

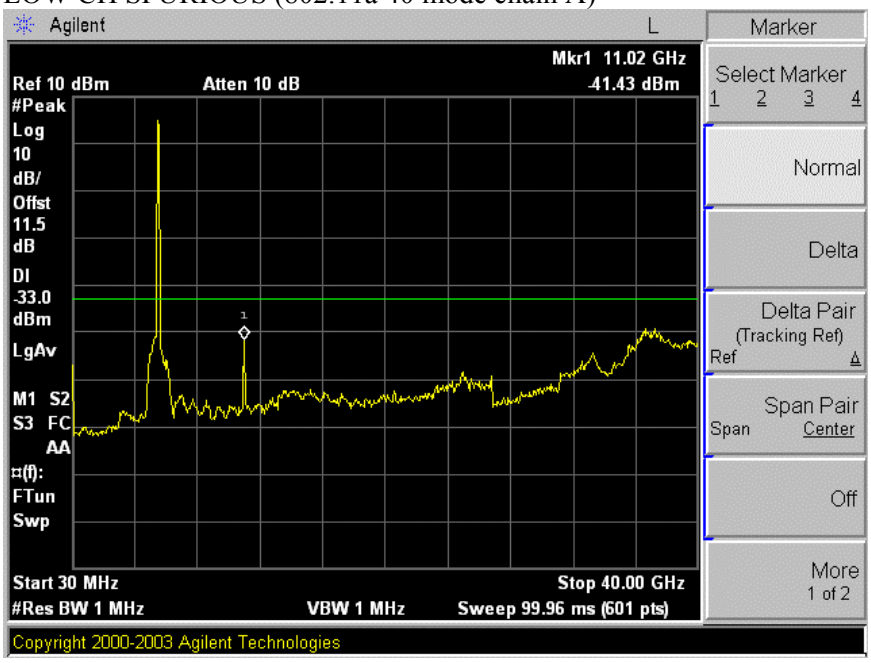


HIGH CH SPURIOUS (802.11n HT20 mode chain B)

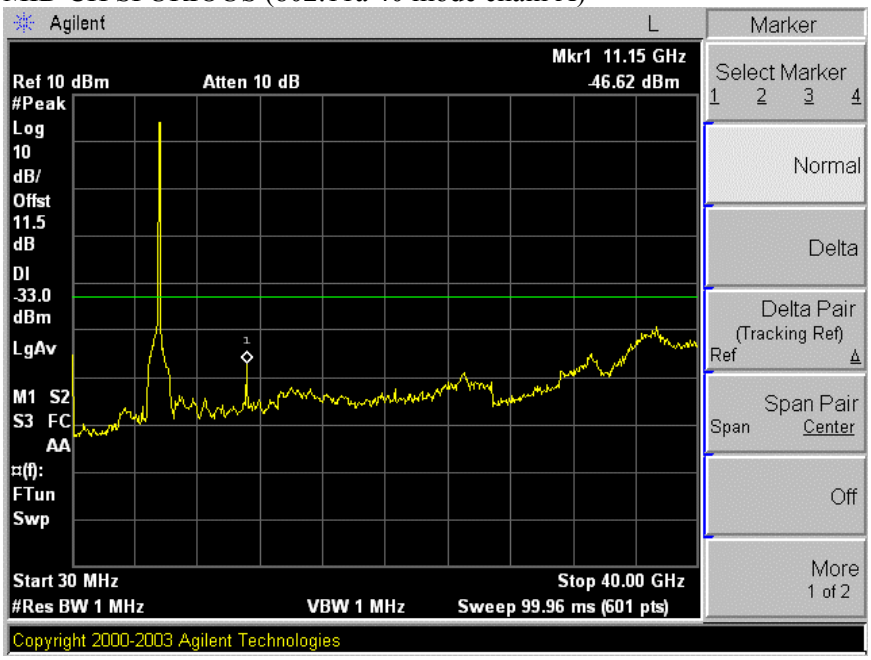


SPURIOUS EMISSIONS (802.11 a 40 MODE CHAIN A)

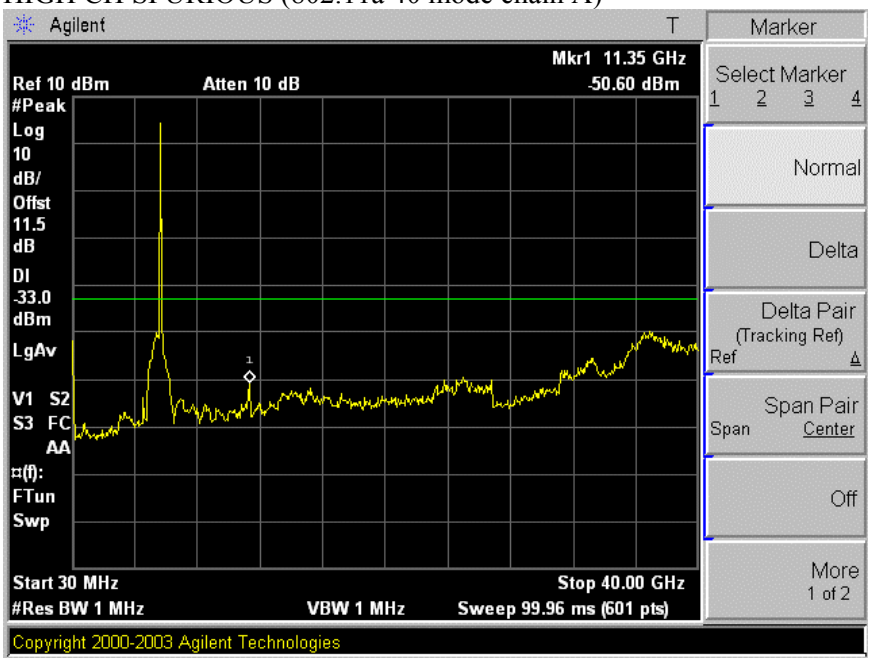
LOW CH SPURIOUS (802.11a 40 mode chain A)



MID CH SPURIOUS (802.11a 40 mode chain A)



HIGH CH SPURIOUS (802.11a 40 mode chain A)



SPURIOUS EMISSIONS (802.11 a 40 MODE CHAIN B)

LOW CH SPURIOUS (802.11a 40 mode chain B)