



FCC CFR47 PART 15 SUBPART E

**TEST REPORT
FOR**

**RoHS WLAN PCIe minicard a/b/g/n Adapter for 2.4/5GHz Client
Applications**

MODEL NUMBER: 65-VE239-P2

FCC ID: J9C-65VE239P2

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: QUALCOMM INCORPORATED
900 ARASTRADERO ROAD
PALO ALTO, CA 94304, USA

EUT DESCRIPTION: ROHS WLAN PCIE MINICARD A/B/G/N ADAPTER FOR 2.4/5GHZ
CLIENT APPLICATIONS

MODEL: 65-VE239-P2

SERIAL NUMBER: 4956, 4961, 4965

DATE TESTED: JUNE 18 TO JULY 07, 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:

Tested By:



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EMC ENGINEER
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2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.4-2003, FCC CFR 47 Part 2 and FCC CFR 47 Part 15.

3. FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 47173 Benicia Street, Fremont, California, USA.

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

RoHS WLAN PCIe minicard a/b/g/n Adapter for 2.4/5GHz Client Applications.

The radio module is manufactured by QUALCOMM, Inc.

5.2. MAXIMUM OUTPUT POWER

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

Frequency Range (MHz)	Mode	Output Power (dBm)	Output Power (mW)
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5150 to 5250 MHz Authorized Band

5180 - 5240	802.11a	14.49	28.12
5180 - 5240	802.11n HT20	13.78	23.88

5250 to 5350 MHz Authorized Band

5260 - 5320	802.11a	20.44	110.66
5260 - 5320	802.11n HT20	21.31	135.21

5500 to 5700 MHz Authorized Band

5500 - 5700	802.11a	19.76	94.62
5500 - 5700	802.11n HT20	21.41	138.36

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes 3 identical omni antennas in a 2x3 MIMO configuration, with maximum gain at 2dBi for 2.4GHz and 3dBi for 5GHz.

5.4. SOFTWARE AND FIRMWARE

The EUT driver software installed in the host support equipment during testing was WFB400 802.11n rev. 0.0.93.451.

The test utility software used during testing was PTT.0.0.93.451 revised 4 June 2007.

5.5. WORST-CASE CONFIGURATION AND MODE

The worst-case channel is determined as the channel with the highest output power. The highest measured output power was at mid channel for 5.2GHz Band and high channel for 5.5GHz Band.

The worst-case data rate emissions tests were made in the 802.11, legacy mode, at 6Mbps, HT20, at MCS07, 65Mbps.

5.6. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

PERIPHERAL SUPPORT EQUIPMENT LIST				
Description	Manufacturer	Model	Serial Number	FCC ID
Laptop	IBM	T60 Type 2007-64U	L3-5G47Y 06/12	Doc
AC/DC Adapter	Lenovo	92P1105	11s92P1105Z1ZBW96 AP1AM	Doc
DC Power Supply	Agilent	E3620A	X28343	Doc

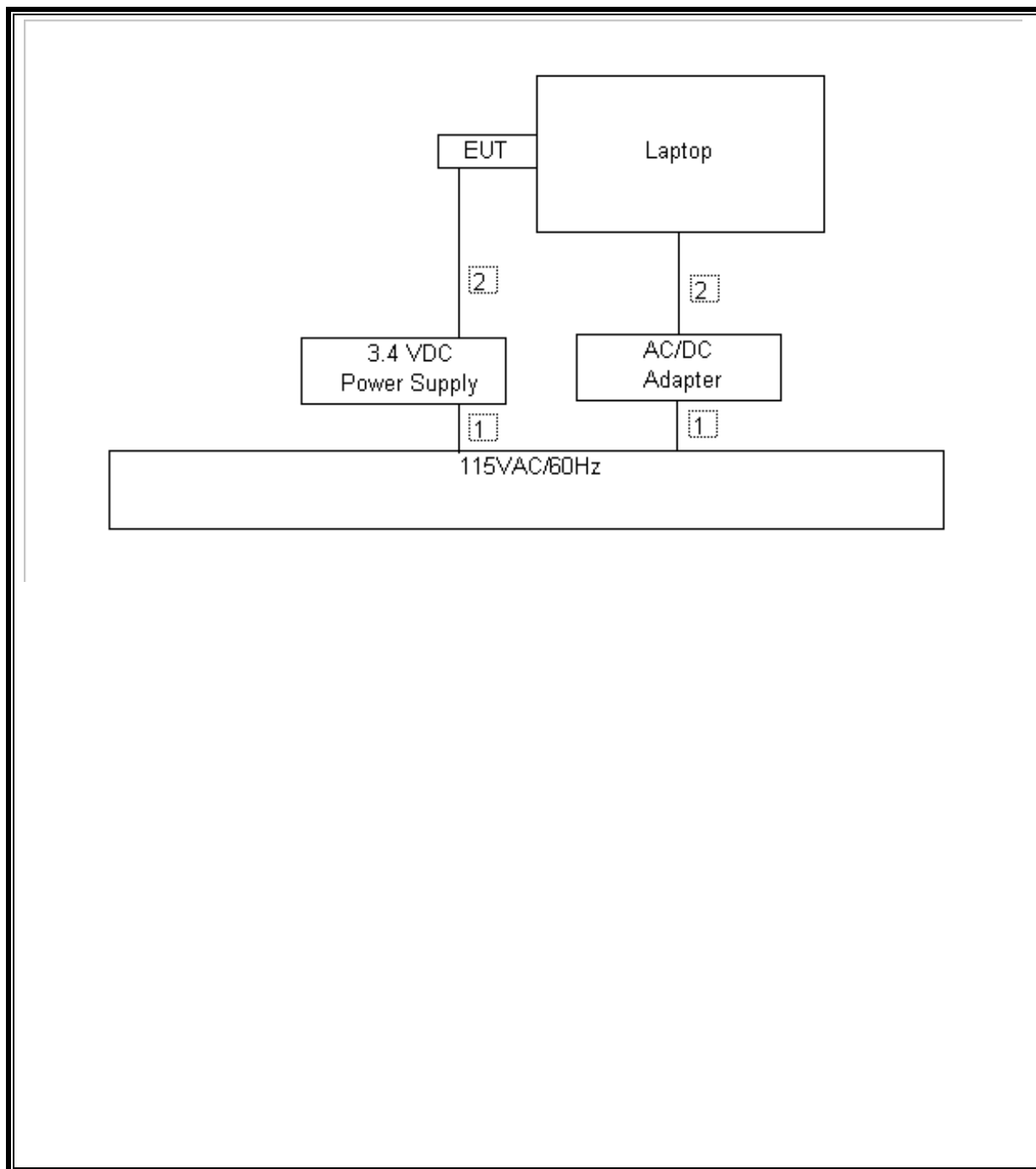
I/O CABLES

I/O CABLE LIST						
Cable No.	Port	# of Identical Ports	Connector Type	Cable Type	Cable Length	Remarks
1	AC	2	US 115V	Un-shielded	2m	N/A
2	DC	2	US 115V	Un-shielded	1m	N/A

TEST SETUP

The EUT is installed in a host laptop computer via a mini card adapter and 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:

TEST EQUIPMENT LIST				
Description	Manufacturer	Model	Serial Number	Cal Due
Peak Power Meter	Agilent / HP	E4416A	GB41291160	12/2/2007
Peak / Average Power Sensor	Agilent	E9327A	US40440755	12/2/2007
Spectrum Analyzer 3 Hz ~ 44 GHz	Agilent / HP	E4446A	MY43360112	5/3/2008
SA Display Section 2	Agilent / HP	85662A	2816A16696	4/7/2008
SA RF Section, 1.5 GHz	Agilent / HP	85680B	2814A04227	1/7/2008
Quasi-Peak Adaptor	Agilent / HP	85650A	3145A01654	1/21/2008
Antenna, Bilog 30 MHz ~ 2 Ghz	Sunol Sciences	JB1	A0022704	9/3/2007
Preamp 30-1000MHz	Sonoma	310N	185623	1/20/2008
Antenna, Horn 1 ~ 18 GHz	EMCO	3115	6717	4/22/2008
Preamplifier, 1 ~ 26.5 GHz	Agilent / HP	8449B	3008A00561	10/3/2007
EMI Test Receiver	R & S	ESHS 20	827129/006	6/3/2008
LISN, 10 kHz ~ 30 MHz	FCC	LISN-50/250-25-2	2023	8/30/2007
LISN, 10 kHz ~ 30 MHz	Solar	8012-50-R-24-BNC	8379443	8/30/2007

7. LIMITS AND RESULTS

7.1. CHANNEL TESTS FOR THE 5150 TO 5350 MHz BAND

7.1.1. 99% BANDWIDTH AND 26 dB BANDWIDTH

LIMIT

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the 99 % bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal 99% bandwidth and 26 dB bandwidth functions are utilized.

RESULTS

No non-compliance noted:

Mode Channel	Frequency (MHz)	99% BW Chain 0 (MHz)	99% BW Chain 1 (MHz)	26 dB BW Chain 0 (MHz)	26 dB BW Chain 1 (MHz)	Worst Case 10 Log B (dB)
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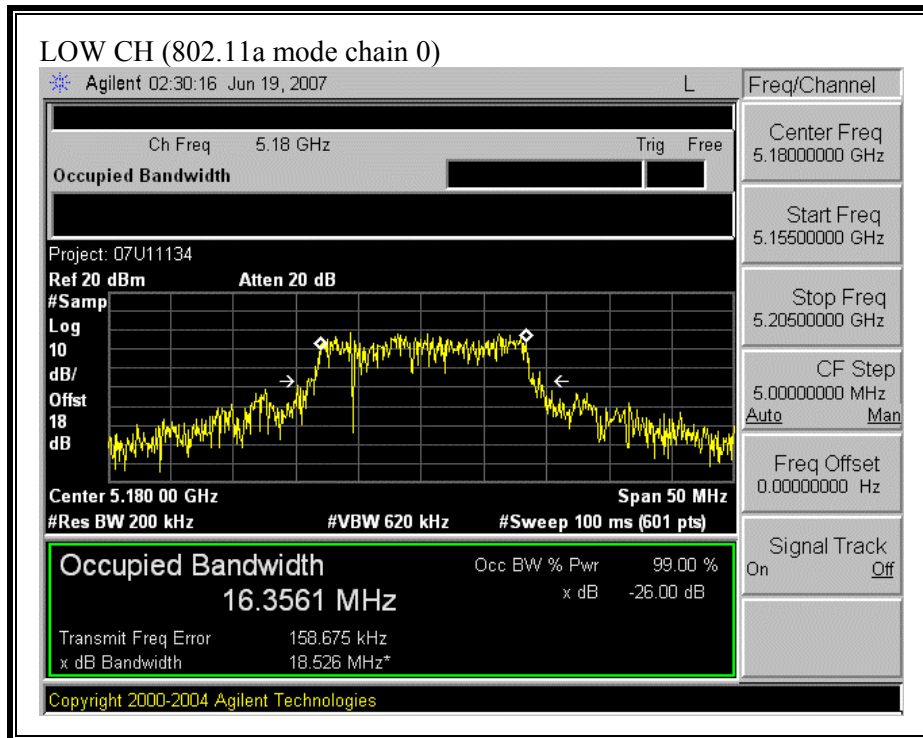
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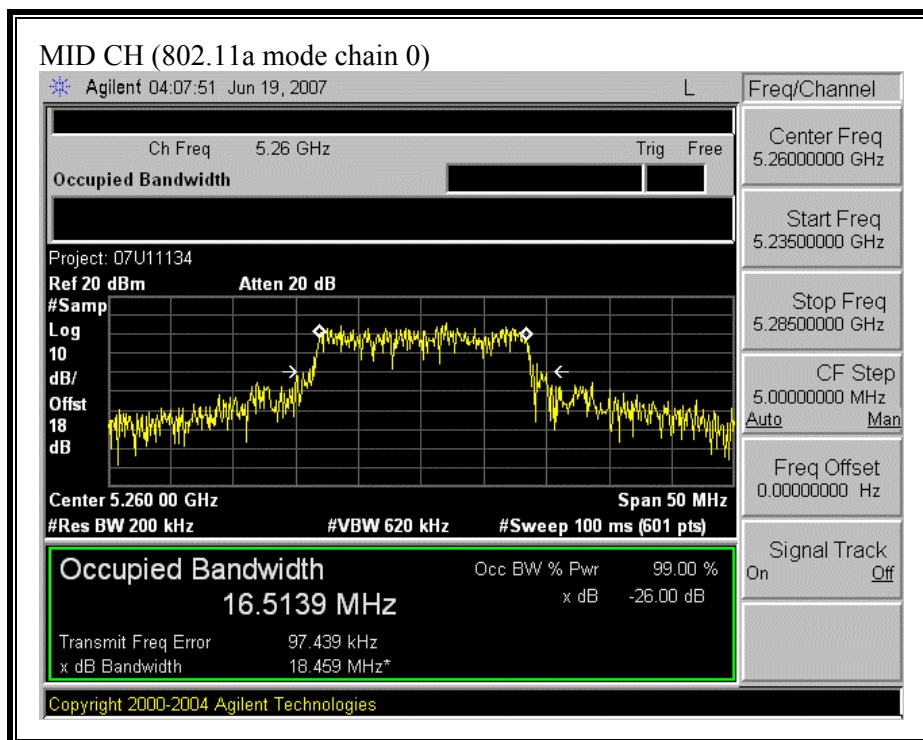
Low	5180	16.356	16.302	18.526	18.589	12.69
Mid	5260	16.514	16.501	18.459	18.543	12.68
High	5320	16.442	16.465	18.728	18.343	12.72

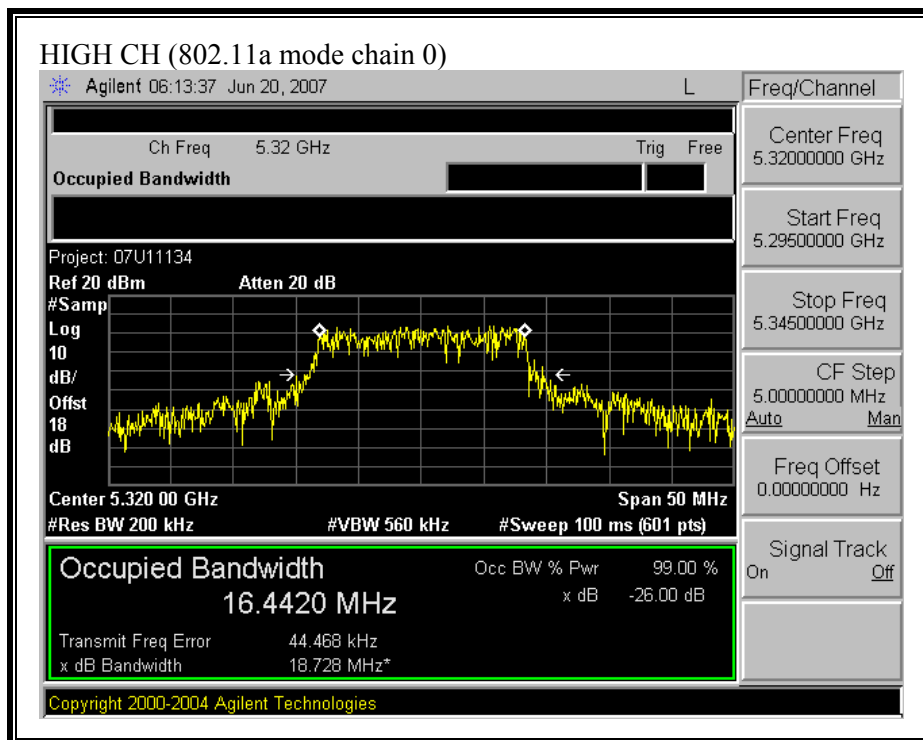
802.11n HT20 Mode

Low	5180	17.49	17.351	19.126	19.360	12.87
Mid	5260	17.482	17.301	18.777	18.368	12.74
High	5320	17.45	17.391	18.907	19.221	12.84

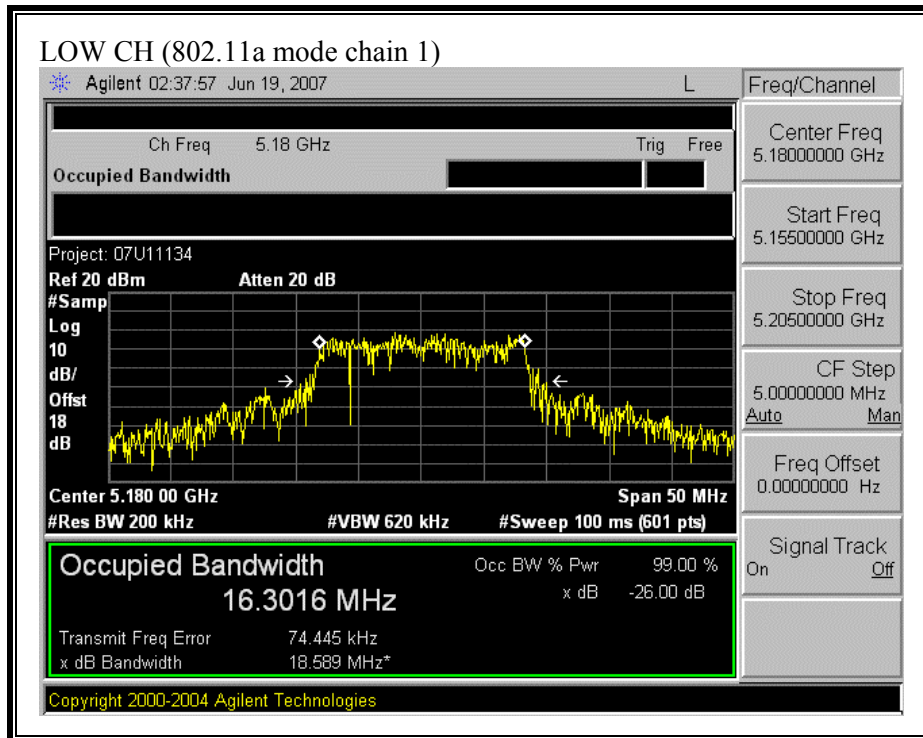
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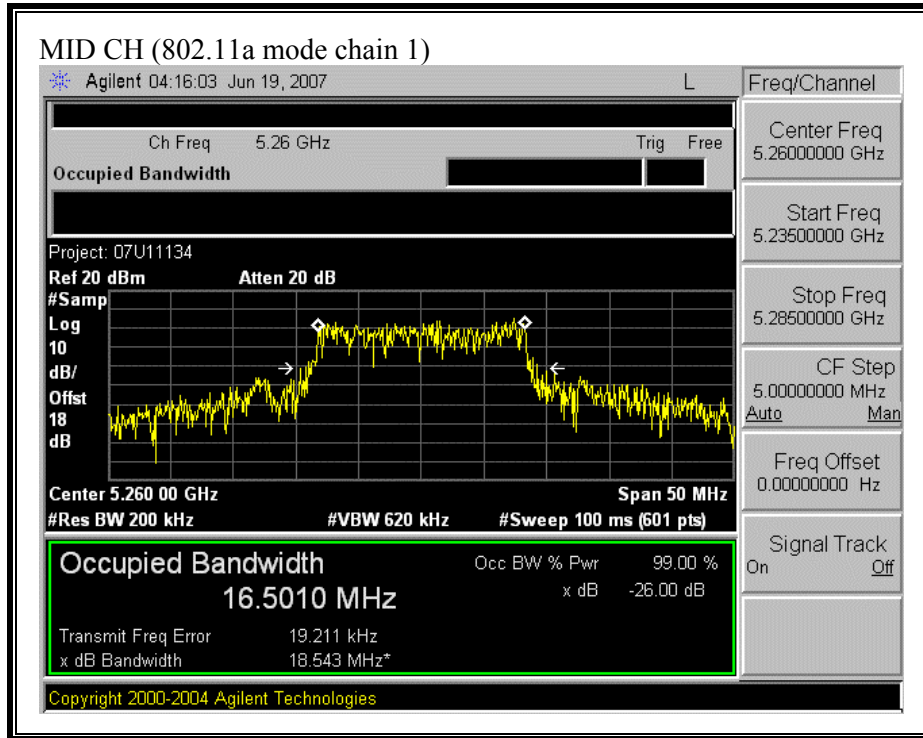


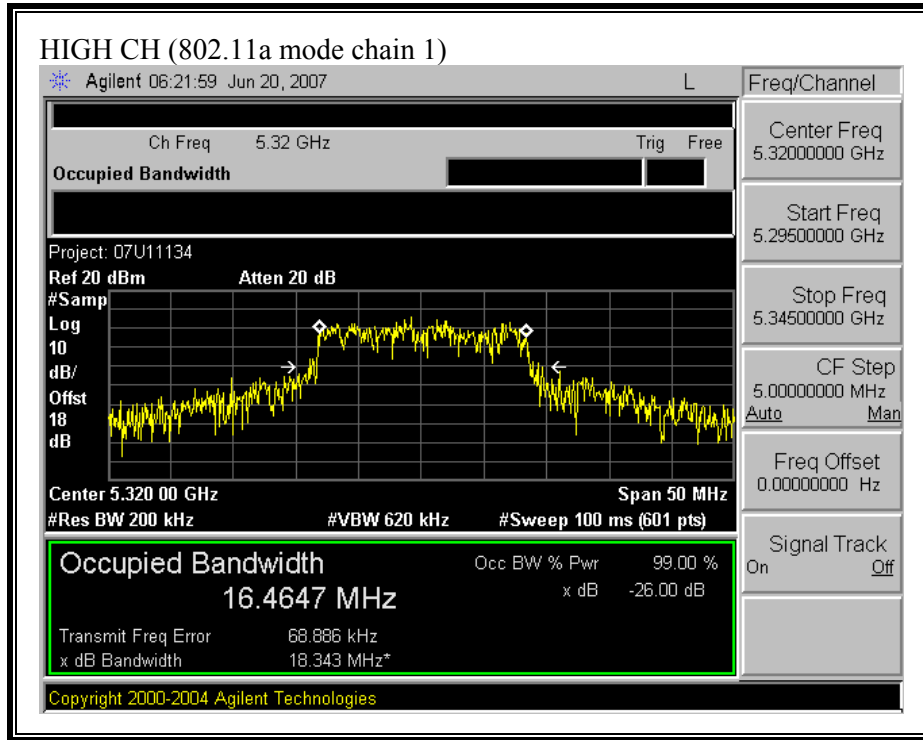




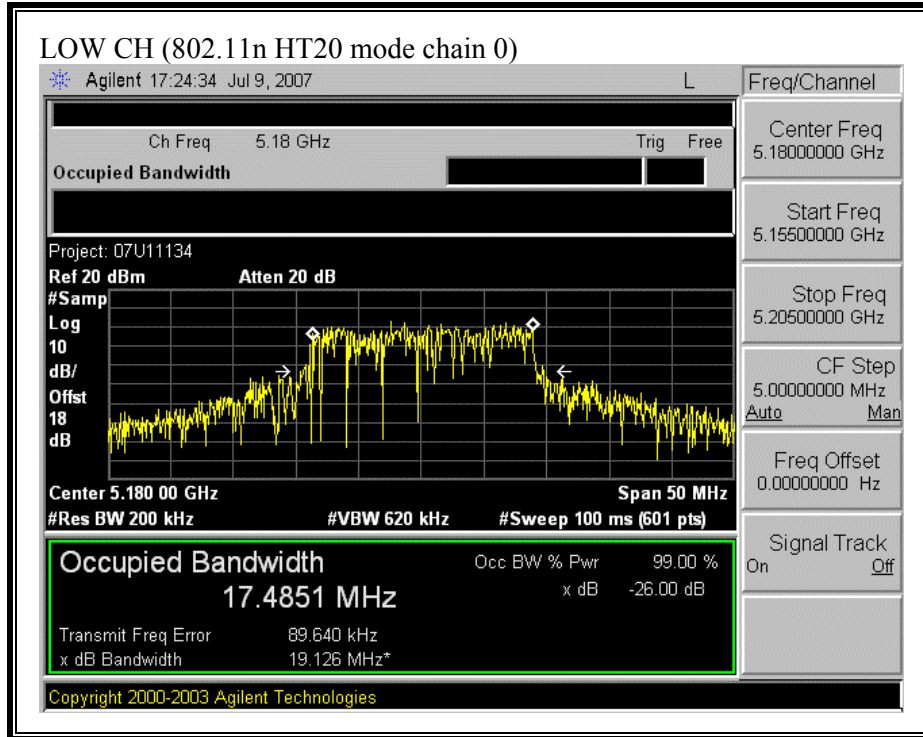
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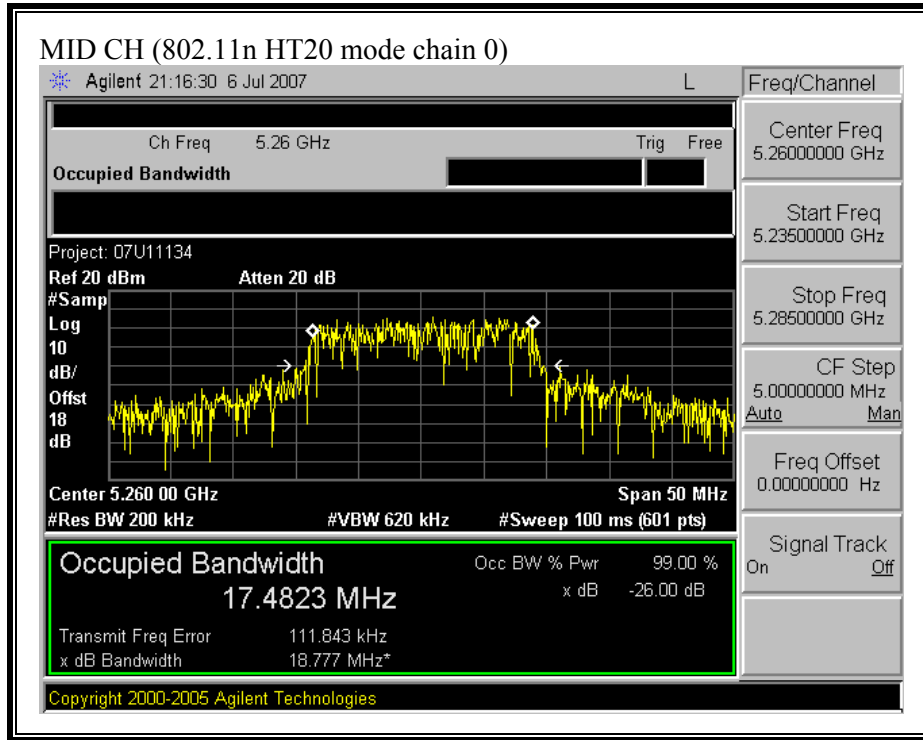


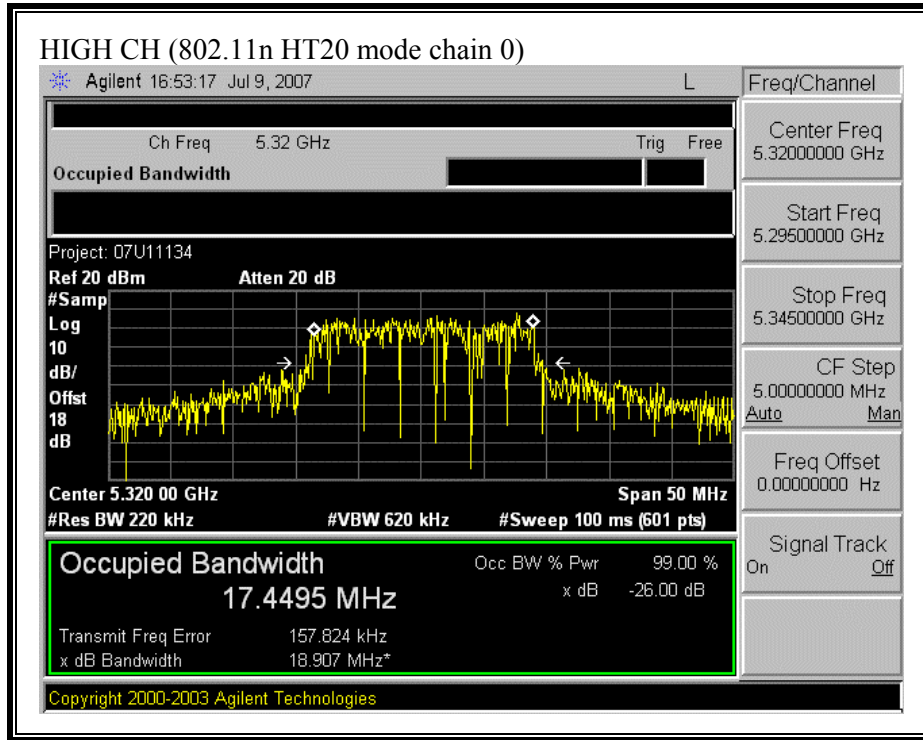




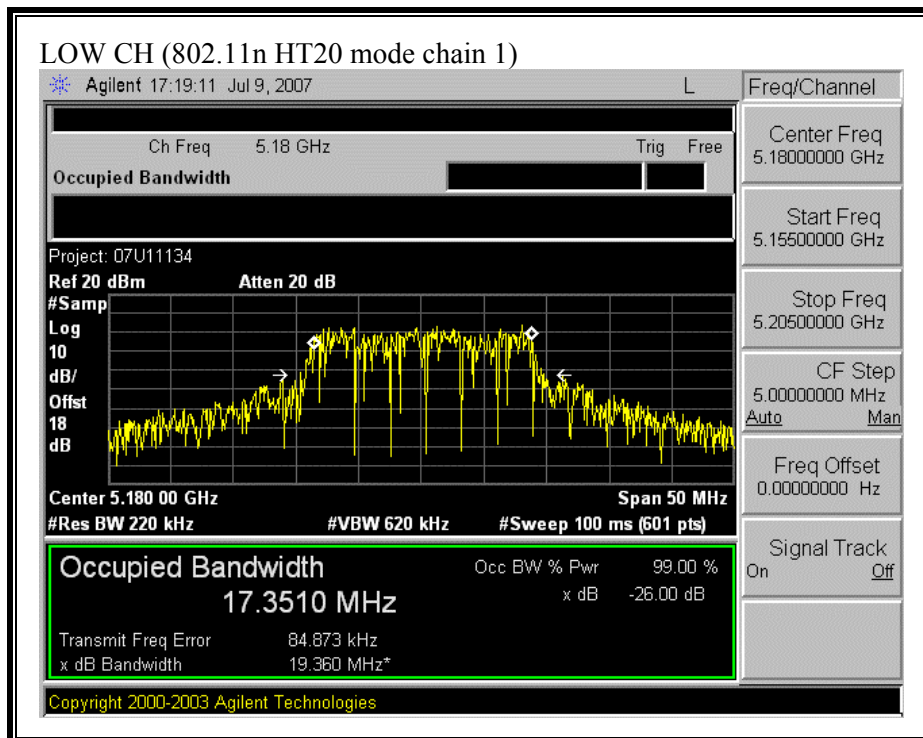
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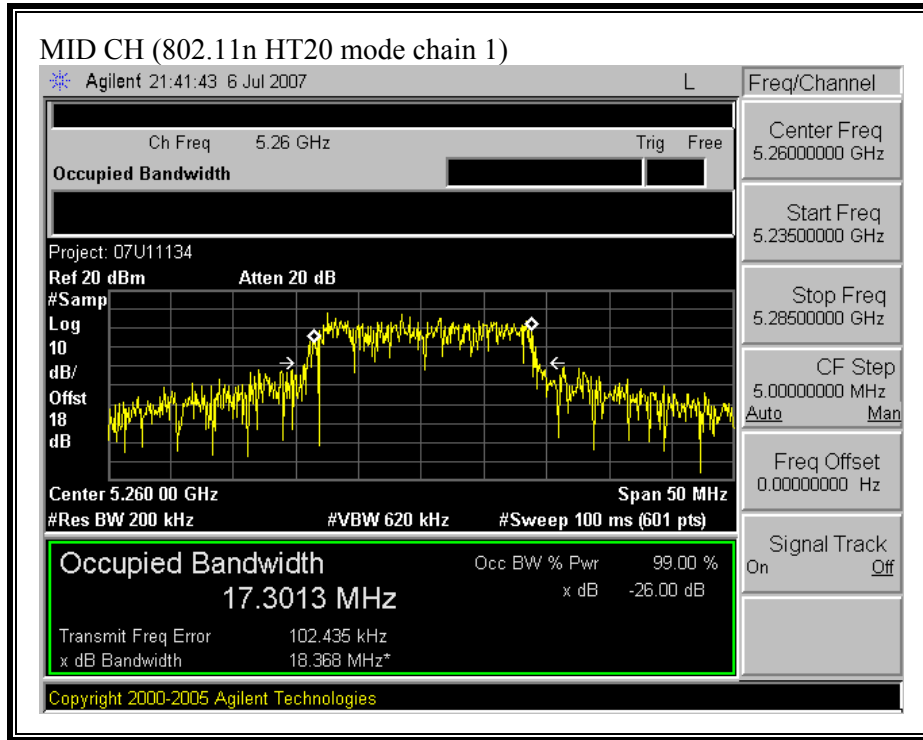


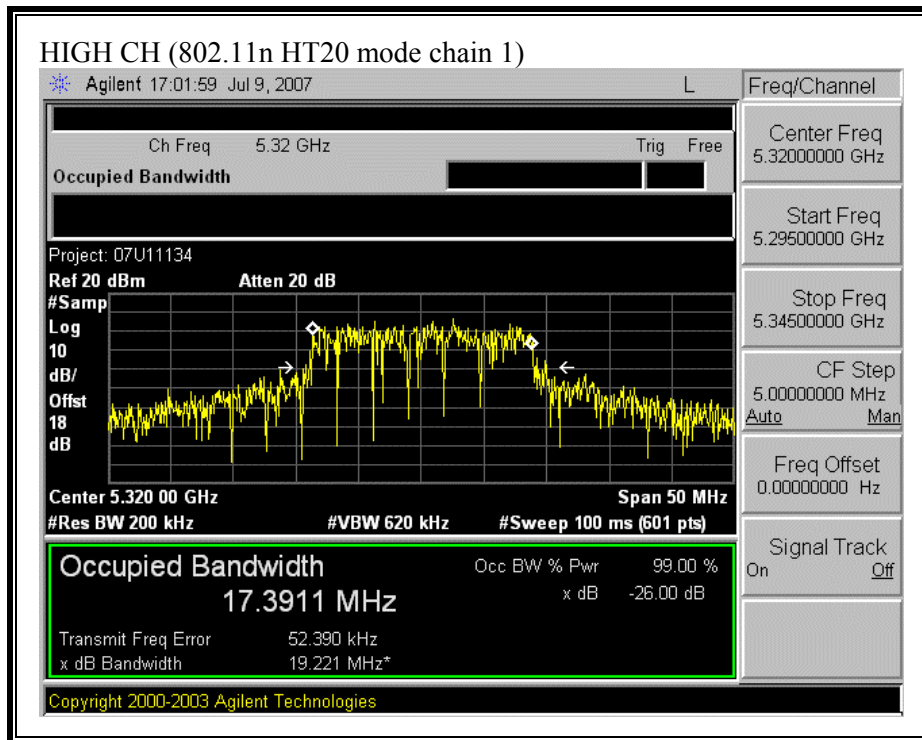




(802.11 HT20 MODE CHAIN 1)







7.1.2. MAXIMUM POWER

LIMIT

§15.407 (a) (1) For the band 5.15-5.25 GHz, the peak transmit power over the frequency band of operation shall not exceed the lesser of 50 mW or $4 \text{ dBm} + 10 \log B$, 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.

§15.407 (a) (1) For the band 5.25-5.35 GHz, the peak transmit power over the frequency band of operation shall not exceed the lesser of 250 mW or $11 \text{ dBm} + 10 \log B$, 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 = $10 \log (10^{(\text{Chain 0 Power} / 10)} + 10^{(\text{Chain 2 Power} / 10)})$

LIMITS AND RESULTS

No non-compliance noted:

5150 to 5250 Band

Fixed Limit (dBm)	17
Antenna Gain (dBi)	3
10 Log (# Tx Chains)	3.01
Effective Legacy Gain	6.01

5250 to 5350 Band

Fixed Limit (dBm)	24
Antenna Gain (dBi)	3
10 Log (# Tx Chains)	3.01
Effective Legacy Gain	6.01

Mode Chan	Freq (MHz)	10LogB (dBm)	4+10LogB / 11+10LogB Limit (dBm)	Limit (dBm)	Chain 0 Power (dBm)	Chain 1 Power (dBm)	Total Power (dBm)	Margin (dB)
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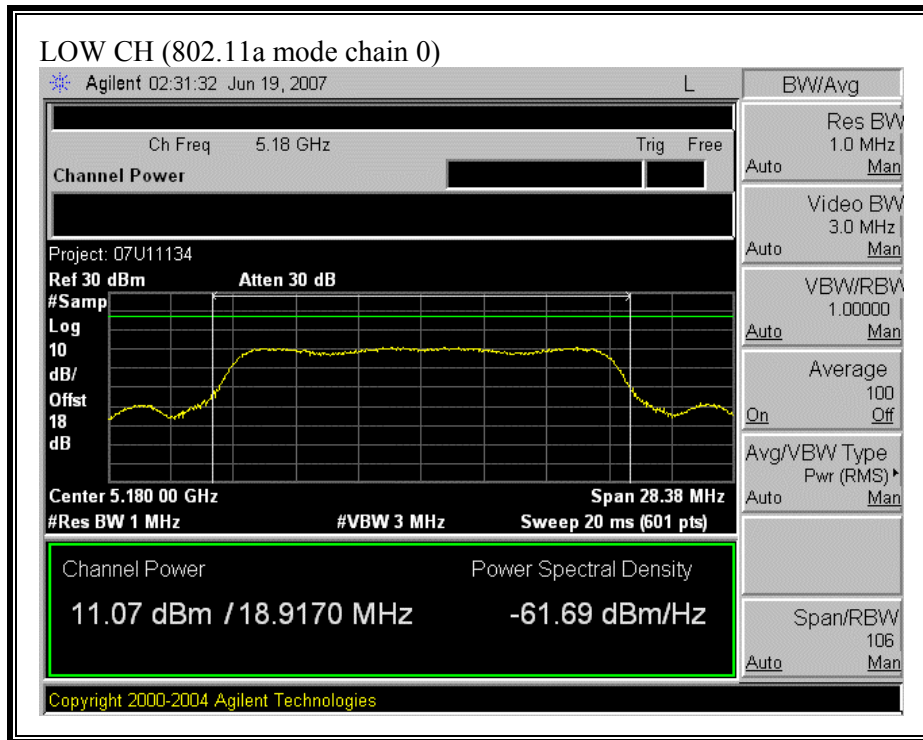
802.11a Mode

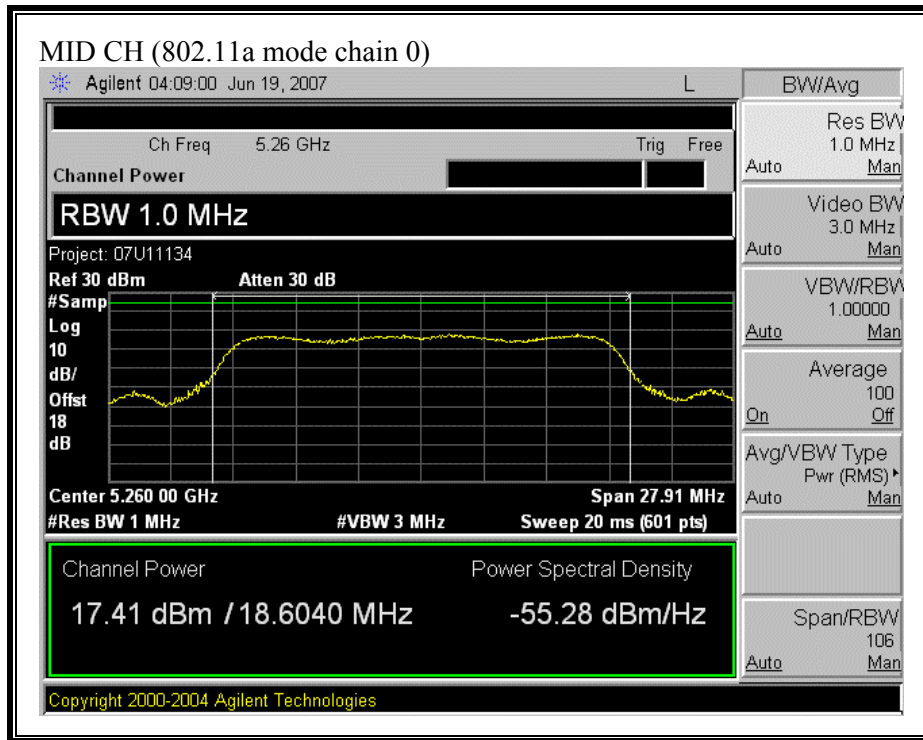
Low	5180	12.69	16.69	16.68	11.07	11.86	14.49	-2.19
Mid	5260	12.68	23.68	23.67	17.41	17.44	20.44	-3.23
High	5320	12.72	23.72	23.71	17.31	16.93	20.13	-3.58

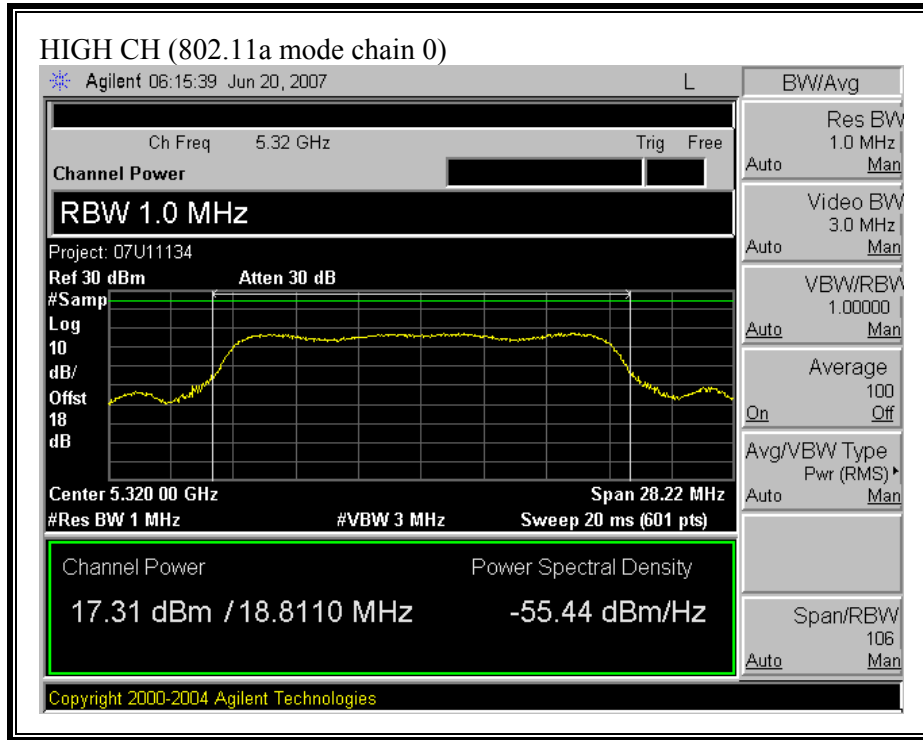
802.11n HT20 Mode

Low	5180	12.87	16.87	16.87	10.76	10.78	13.78	-3.09
Mid	5260	12.74	23.74	23.74	18.27	18.32	21.31	-2.43
High	5320	12.84	23.84	23.84	18.31	17.63	20.99	-2.85

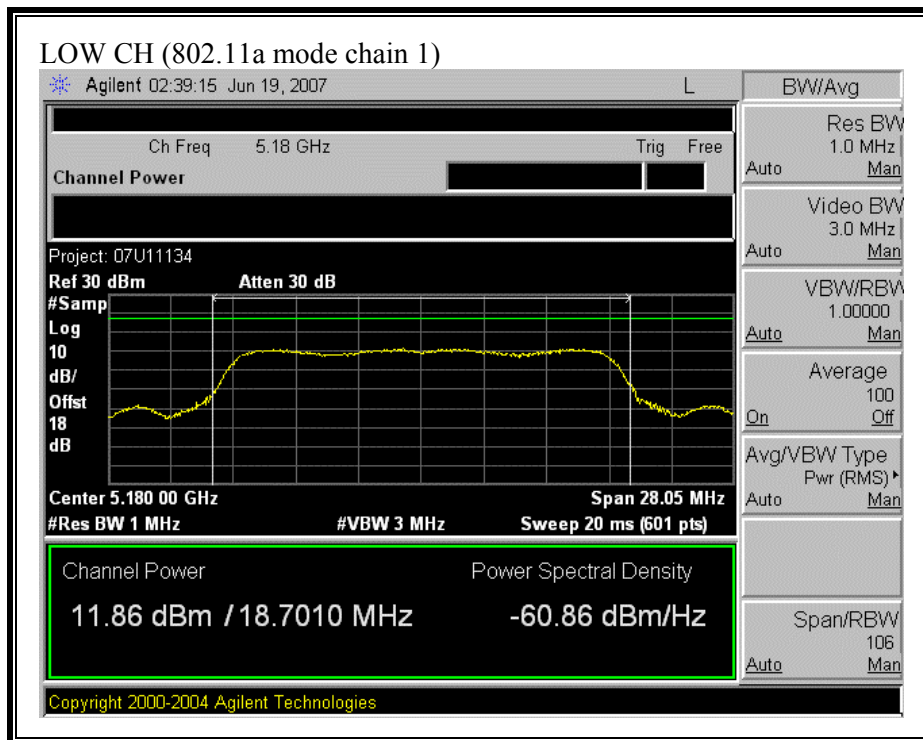
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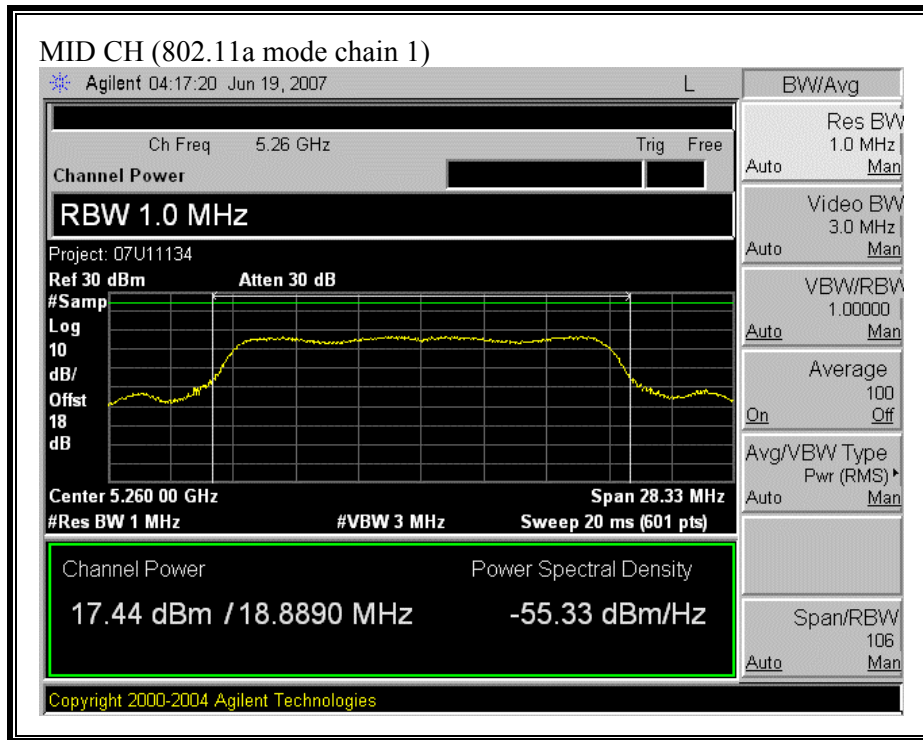


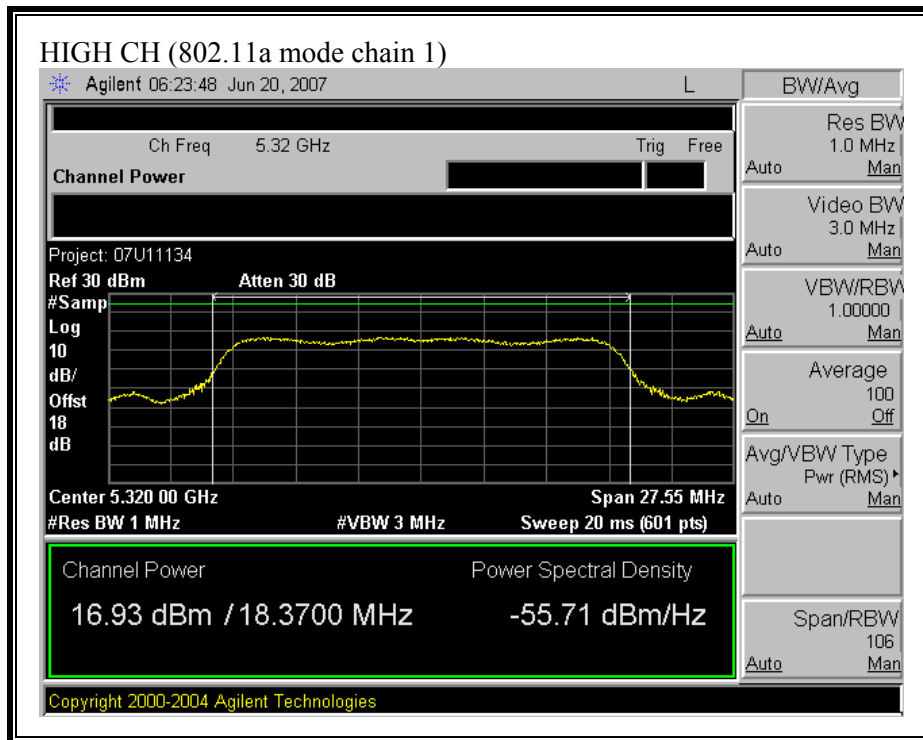




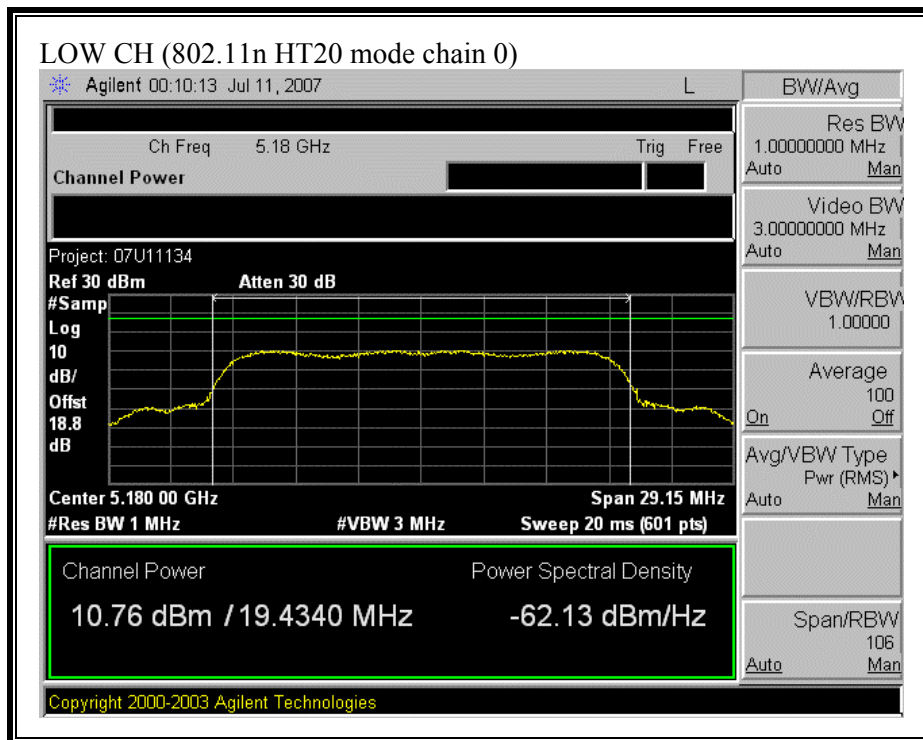
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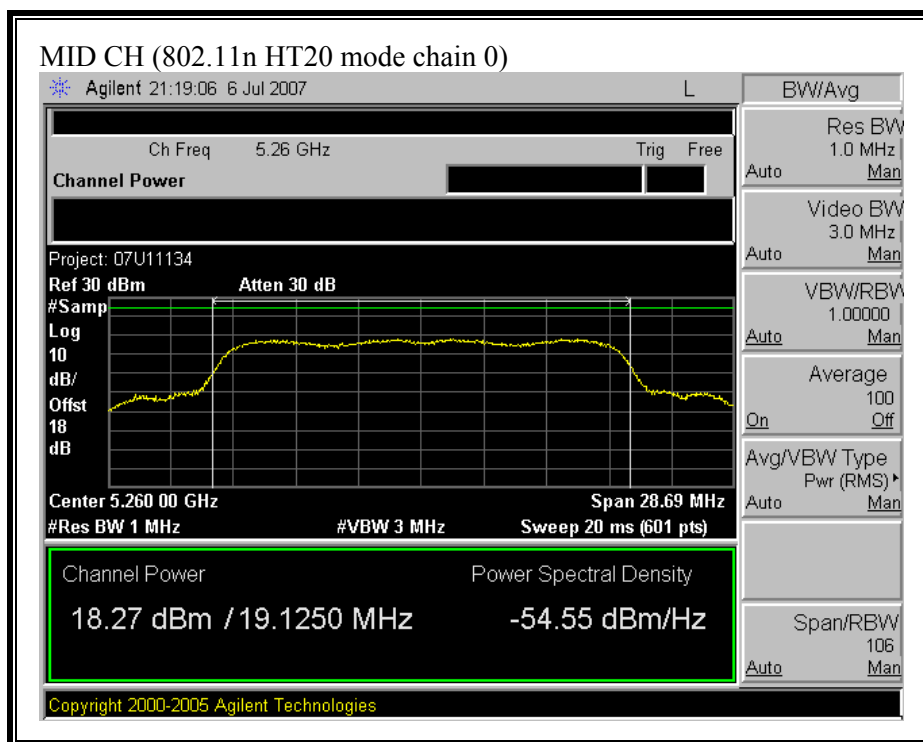


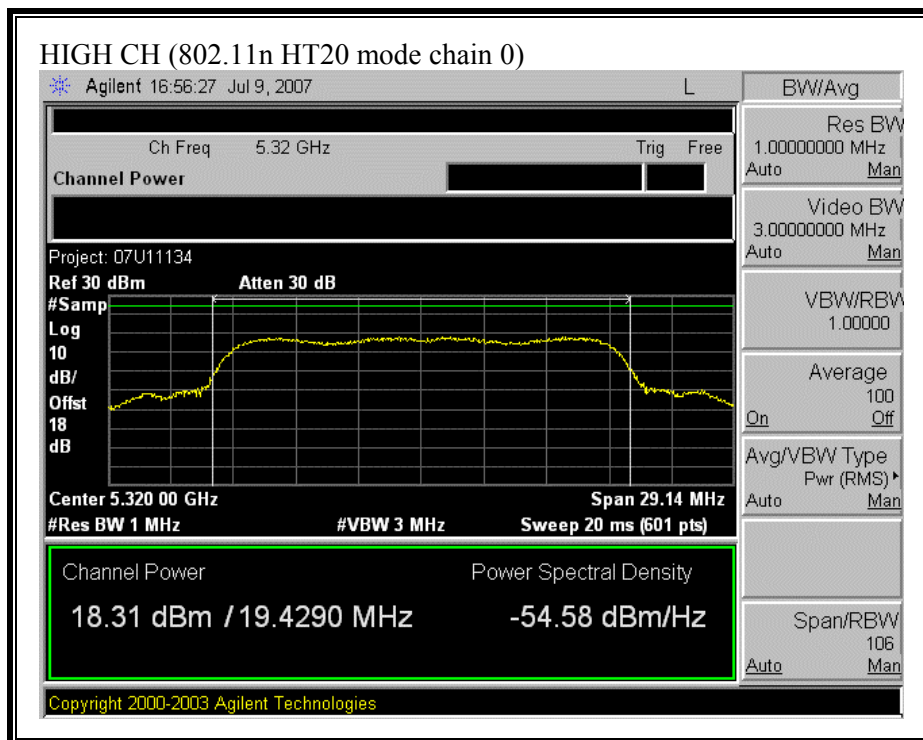




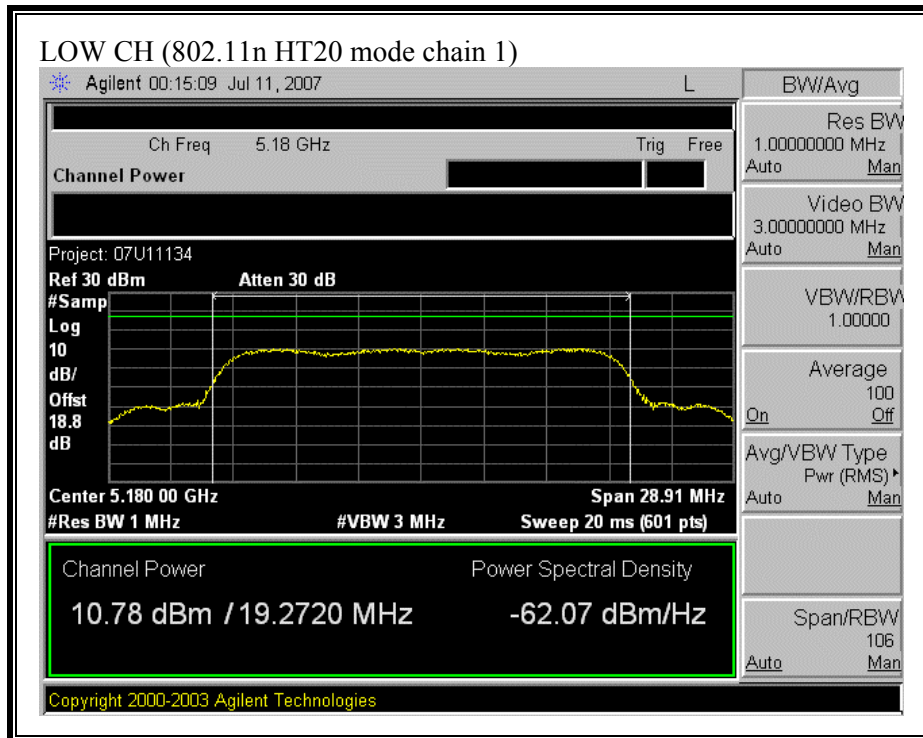
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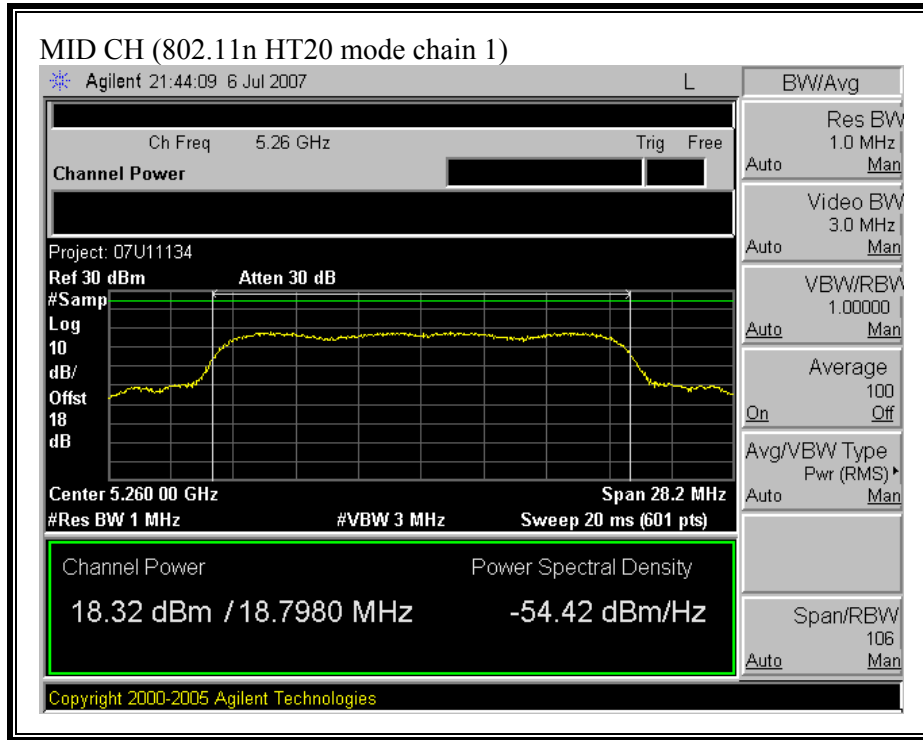


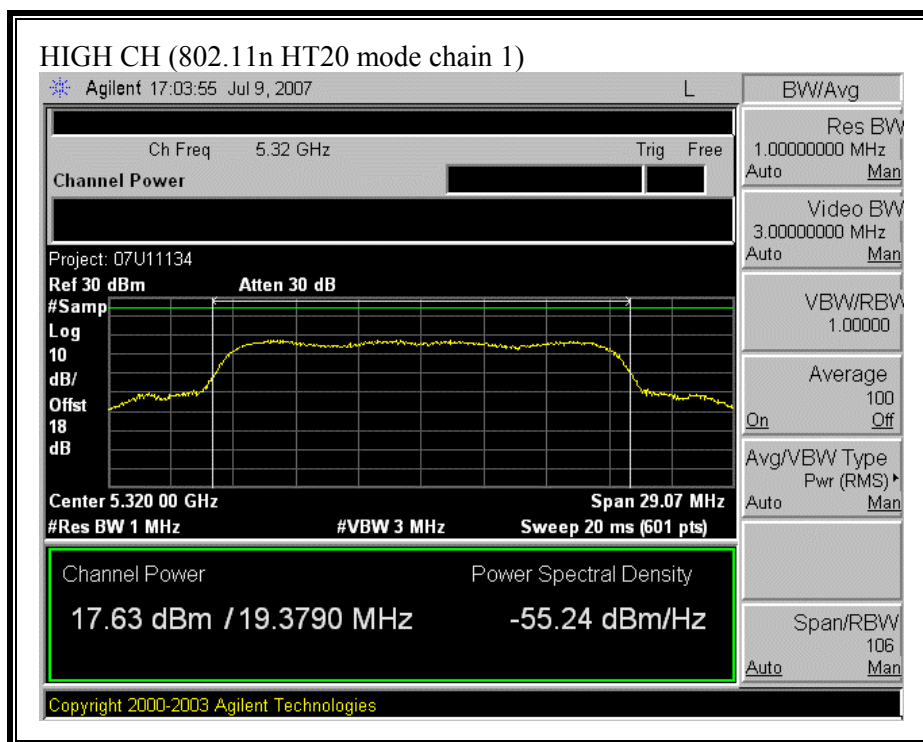




(802.11 HT20 MODE CHAIN 1)







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:

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

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

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/cm²

Substituting the logarithmic form of power and gain using:

$$P \text{ (mW)} = 10^{(P \text{ (dBm)} / 10)} \text{ and}$$

$$G \text{ (numeric)} = 10^{(G \text{ (dBi)} / 10)}$$

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/cm²

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 $S = 1.0 \text{ mW/cm}^2$ in the 5.2 / 5.3 GHz band

RESULTS

No non-compliance noted

Mode	MPE Distance (cm)	Output Power (dBm)	Antenna Gain (dBi)	Power Density (mW/cm^2)
802.11a 5.2GHz Band	20.0	21.31	3.00	0.05

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. PEAK POWER SPECTRAL DENSITY

LIMIT

§15.407 (a) (1) For the band 5.15-5.25 GHz, the peak power spectral density shall not exceed 4 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.

§15.407 (a) (1) For the band 5.25-5.35 GHz, 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 = $10 \log (10^{\text{Chain 0 PPSD} / 10} + 10^{\text{Chain 2 PPSD} / 10})$

RESULTS

No non-compliance noted:

Based on the previous preliminary scan of single channel vs. combiner, combined PPSD has the worse condition over all

RESULTS WITH COMBINER

No non-compliance noted:

5150 to 5250 Band

Antenna Gain (dBi)	3
10 Log (# Tx Chains)	3.01
Effective Legacy Gain	6.01

5250 to 5350 Band

Antenna Gain (dBi)	3
10 Log (# Tx Chains)	3.01
Effective Legacy Gain	6.01

Mode Channel	Frequency (MHz)	PPSD With Combiner (dBm)	Limit (dBm)	Margin (dB)
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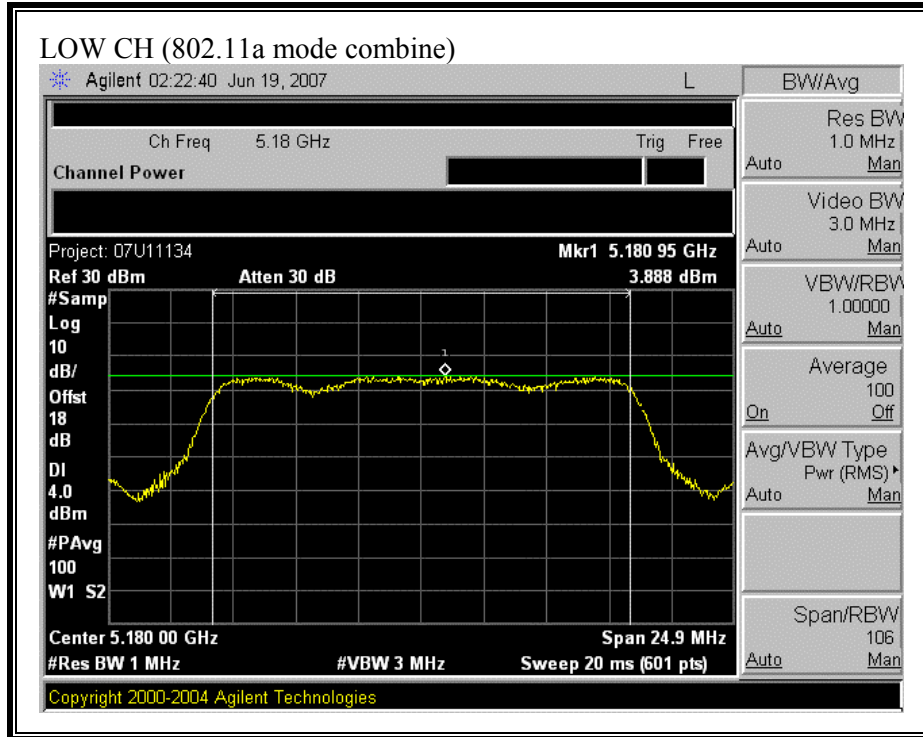
802.11a Mode

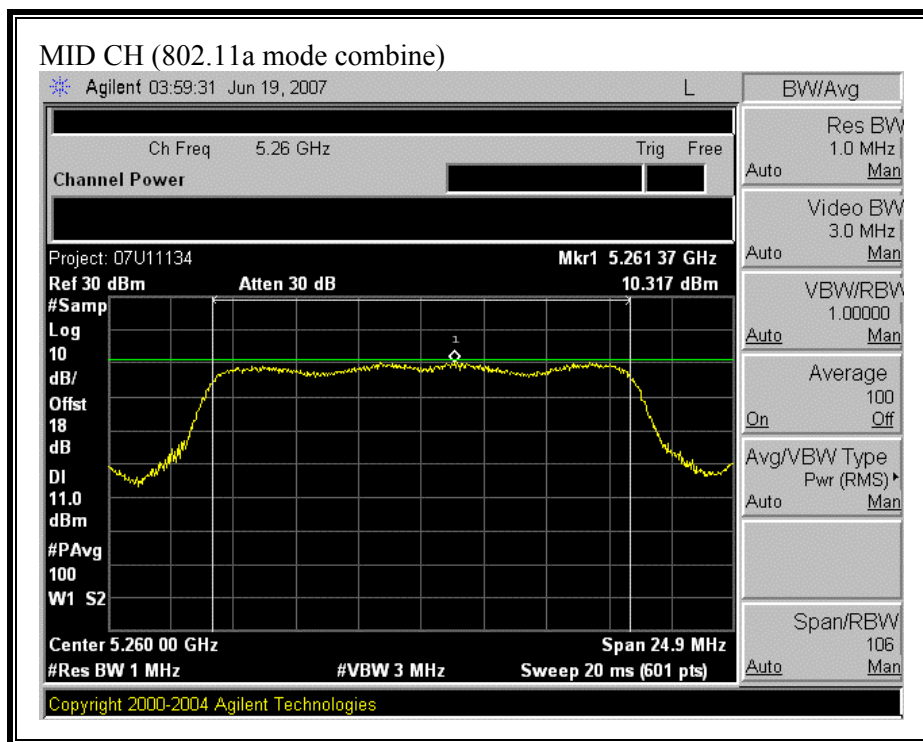
Low	5180	3.89	4.00	-0.11
Mid	5260	10.32	11.00	-0.68
High	5320	10.13	11.00	-0.87

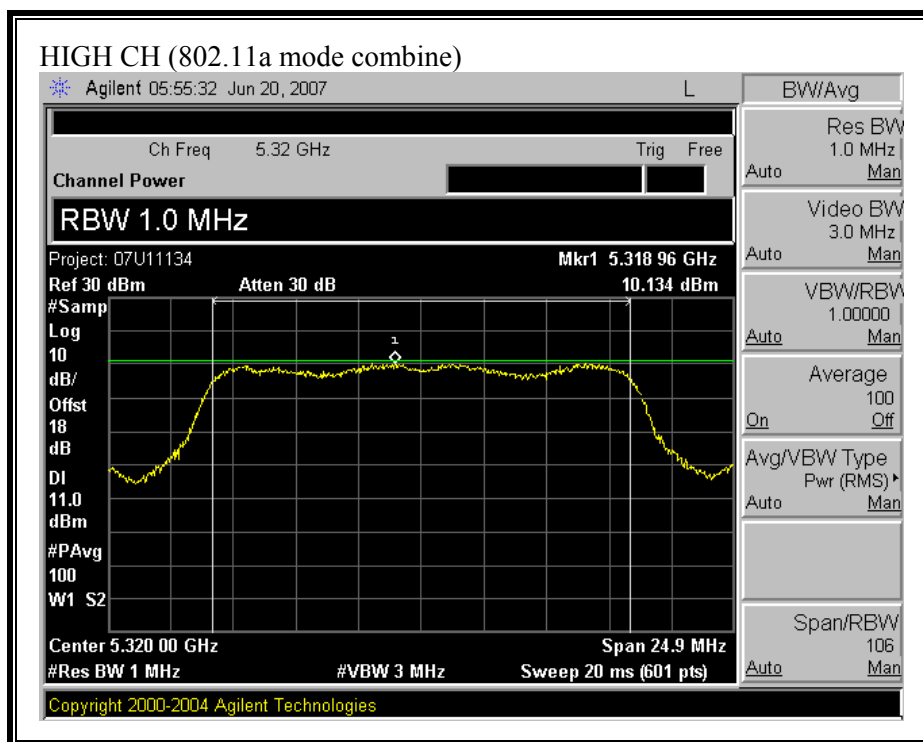
802.11n HT20 Mode

Low	5180	2.71	4.00	-1.30
Mid	5260	10.63	11.00	-0.37
High	5320	10.21	11.00	-0.79

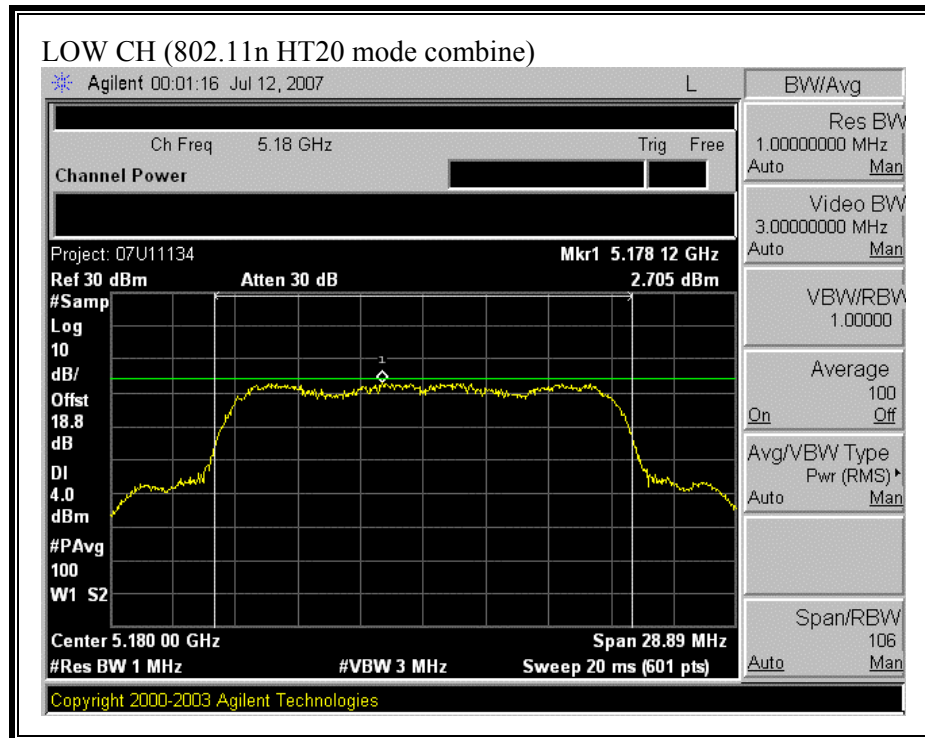
(802.11a MODE COMBINE)

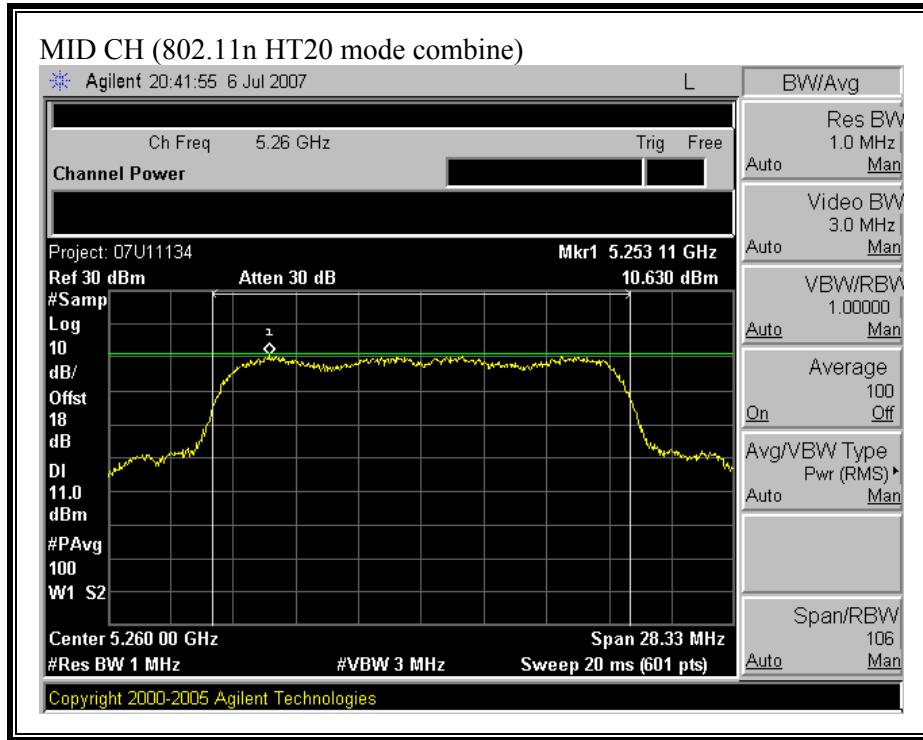


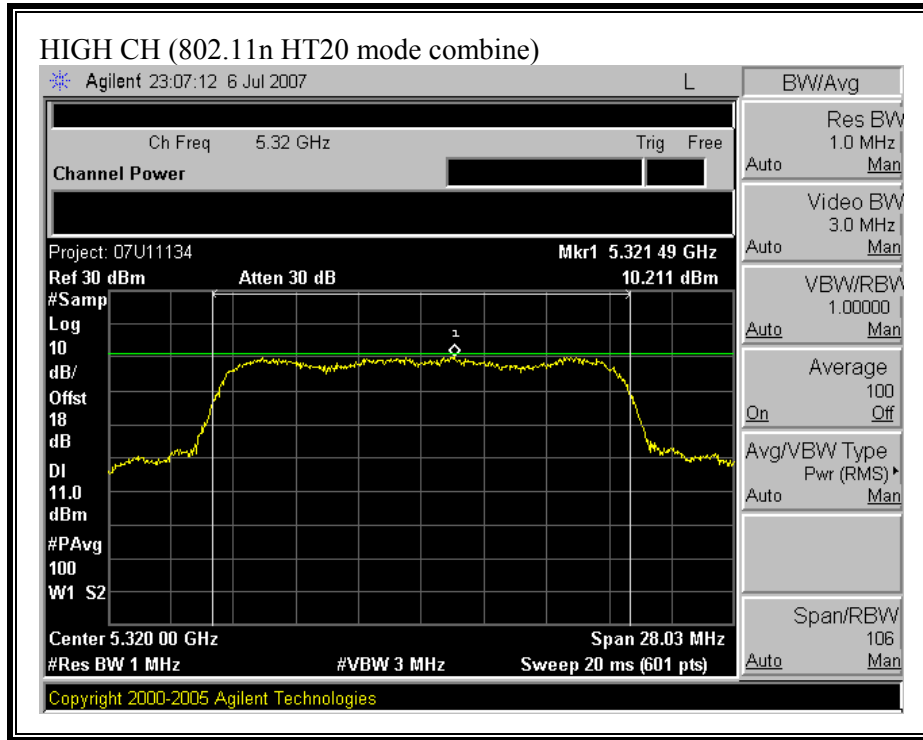




(802.11n HT20 MODE COMBINE)







7.1.5. 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 = $10 \log (10^{\text{(Chain 0 Power / 10)}} + 10^{\text{(Chain 1 Power / 10)}})$

RESULTS

No non-compliance noted:

The cable assembly insertion loss of 18 dB (including 10 dB pad and 8 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 1 (dBm)	Average Power Total (dBm)
---------------------	------------------------	------------------------------------	------------------------------------	----------------------------------

802.11a Mode

Low	5180	11.3	11.3	14.3
Mid	5260	17.7	17.2	20.4
High	5320	17.4	17.0	20.2

802.11n HT20 Mode

Low	5180	10.8	10.8	13.8
Mid	5260	18.0	17.8	20.9
High	5320	17.9	17.3	20.6

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 0 (dBm)	Peak Excursion Chain 1 (dBm)	Limit (dBm)	Worst Case Margin (dB)
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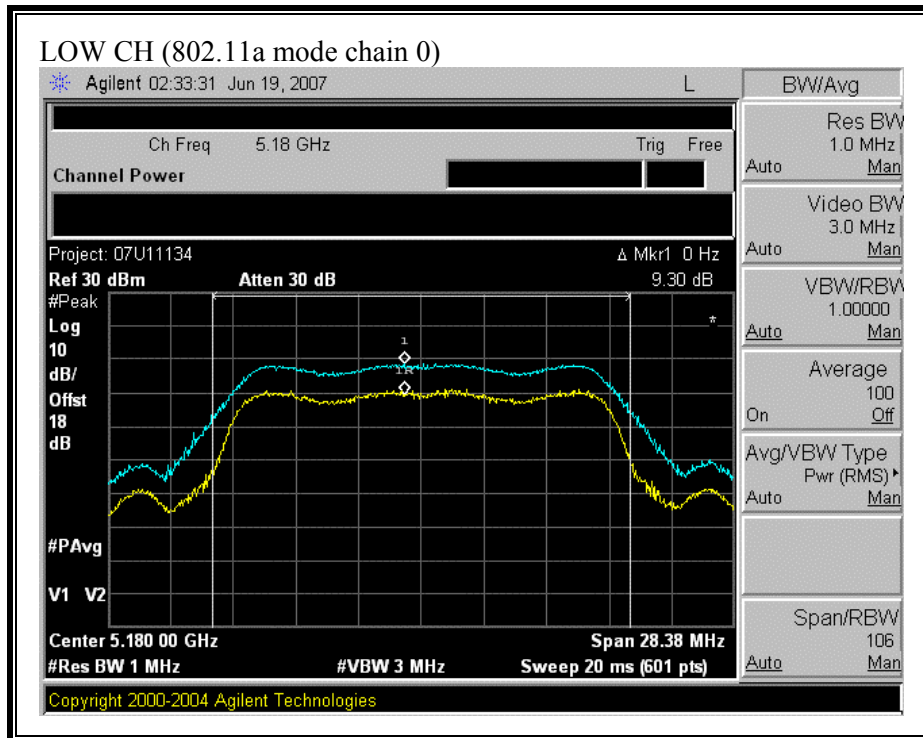
802.11a Mode

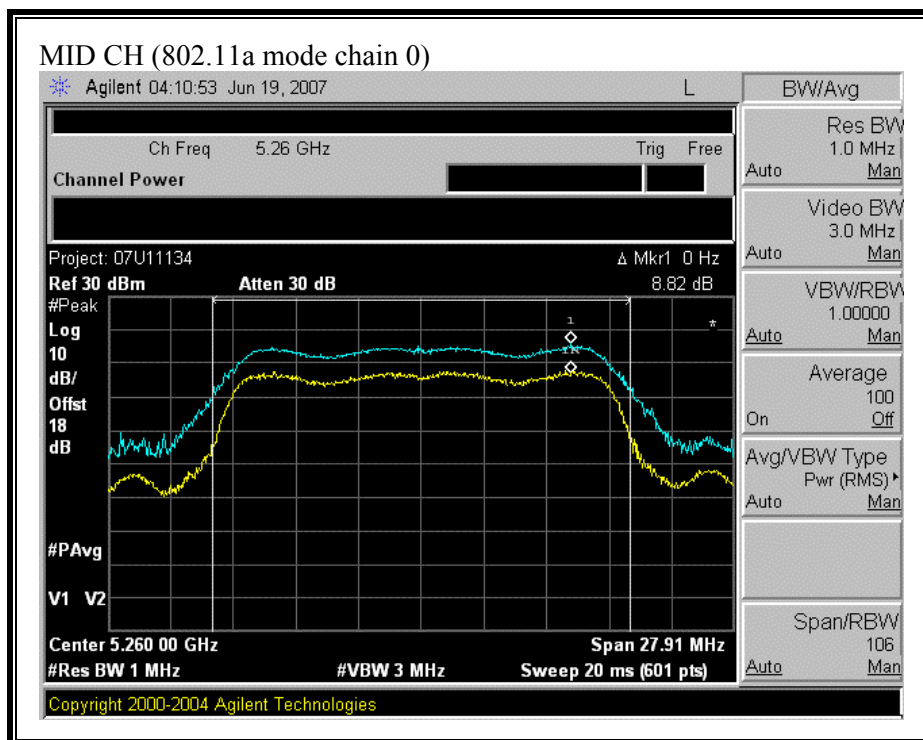
Low	5180	9.30	10.40	13	-2.60
Mid	5260	8.82	9.78	13	-3.22
High	5320	9.35	10.61	13	-2.39

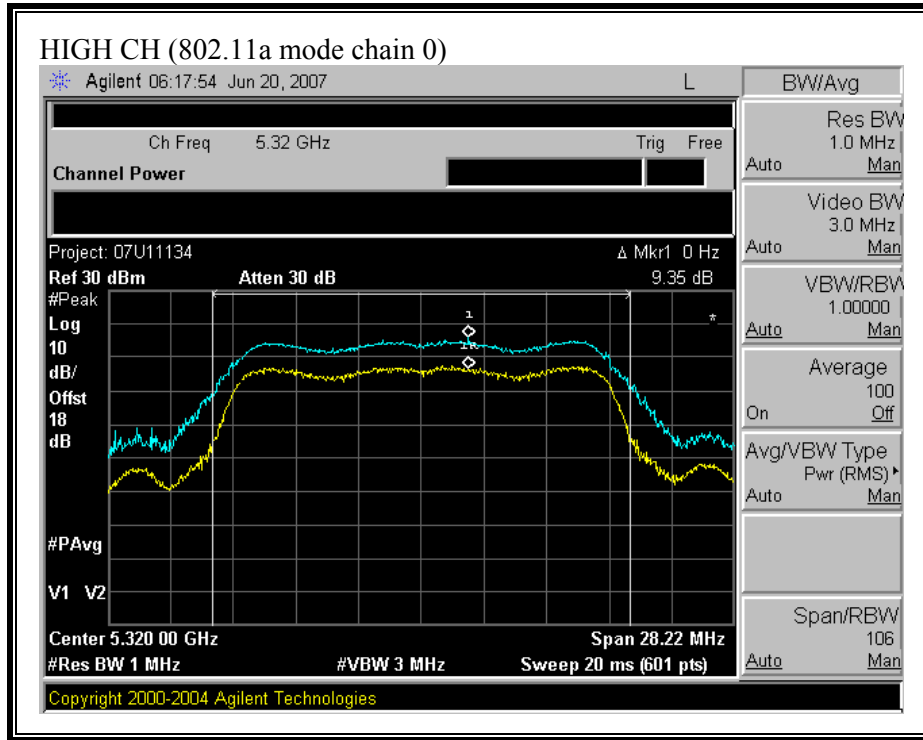
802.11n HT20 Mode

Low	5180	10.80	10.01	13	-2.20
Mid	5260	10.12	10.08	13	-2.88
High	5320	9.43	10.44	13	-2.56

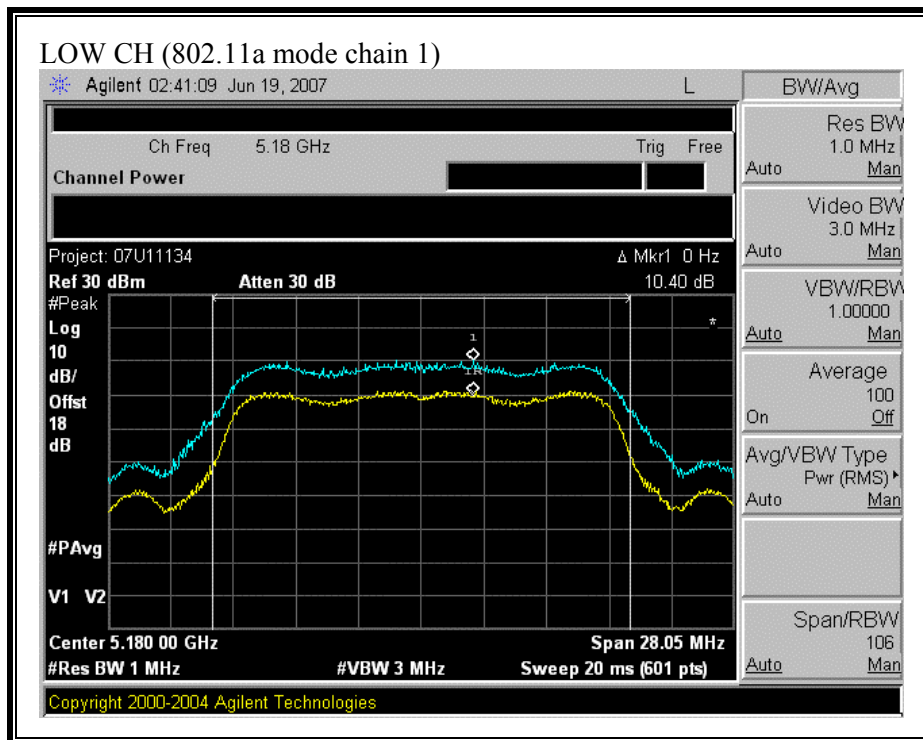
(802.11a MODE CHAIN 0)

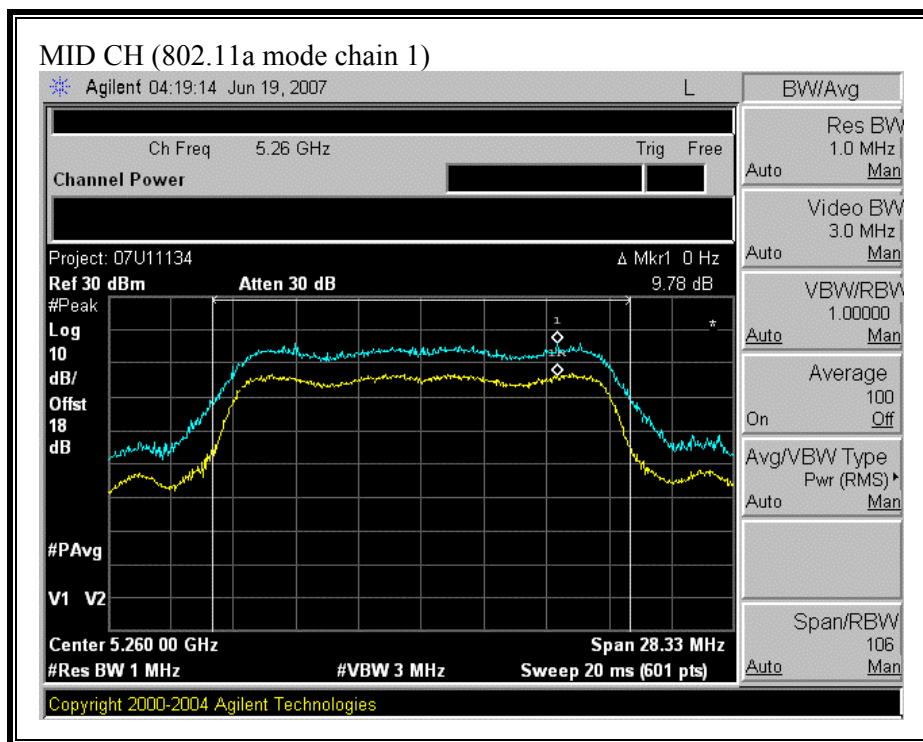


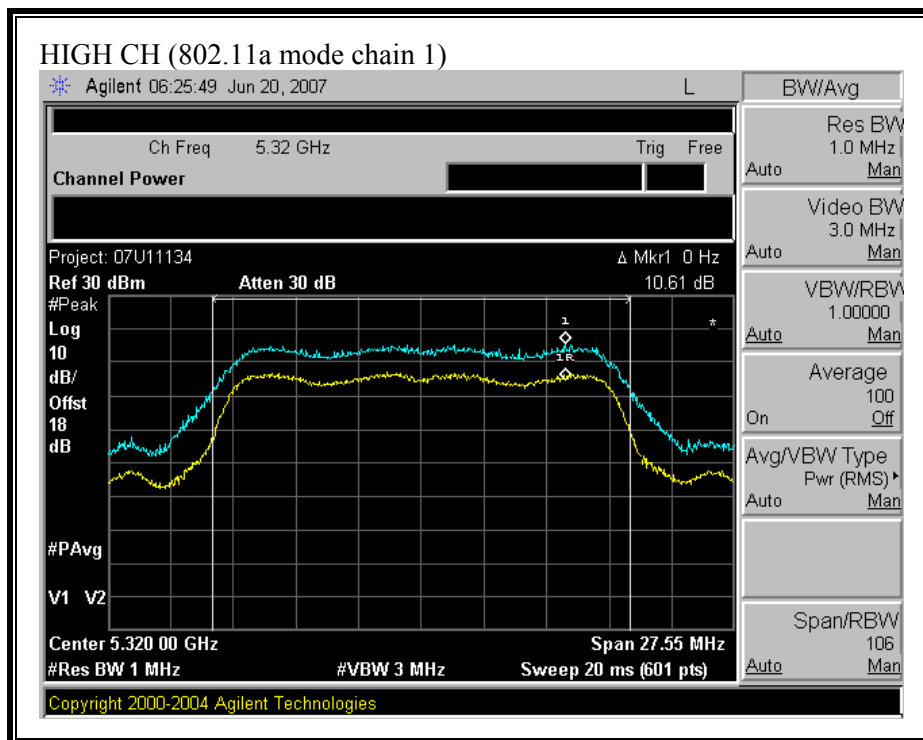




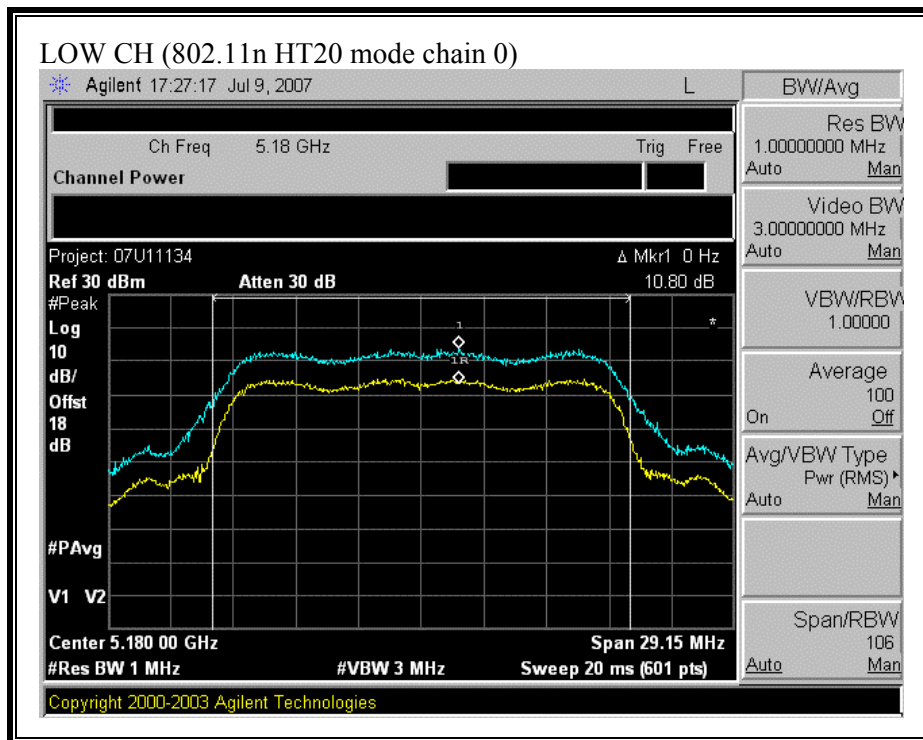
(802.11a MODE CHAIN 1)

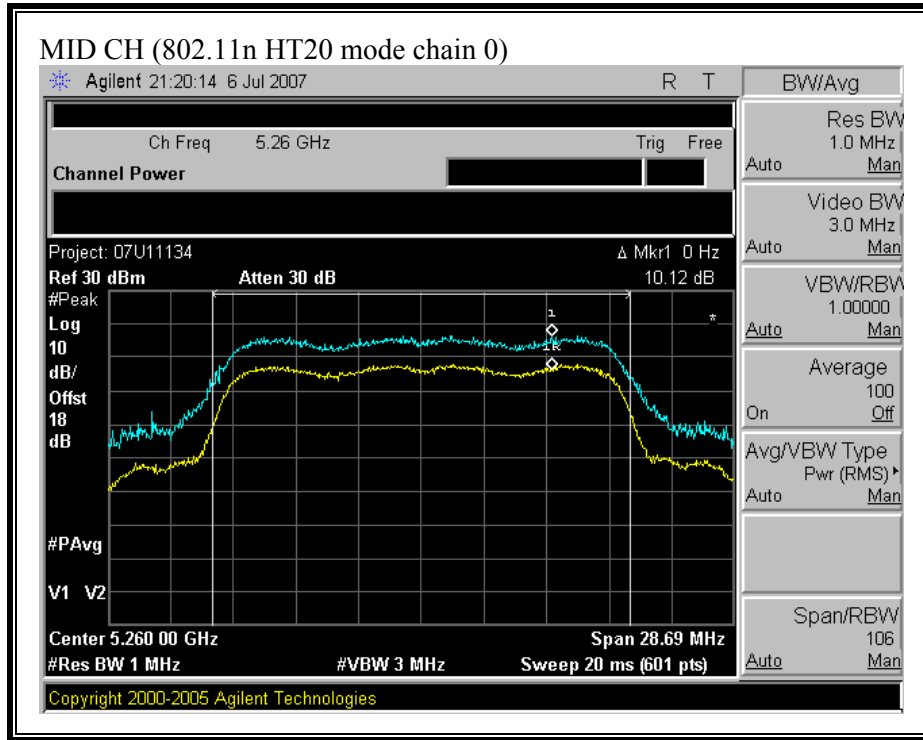


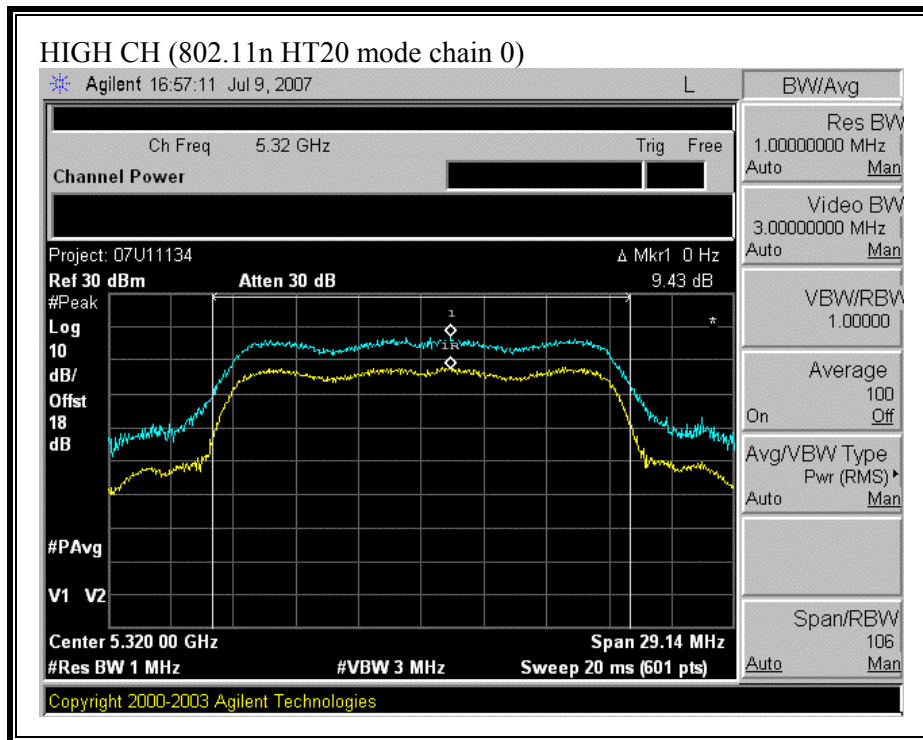




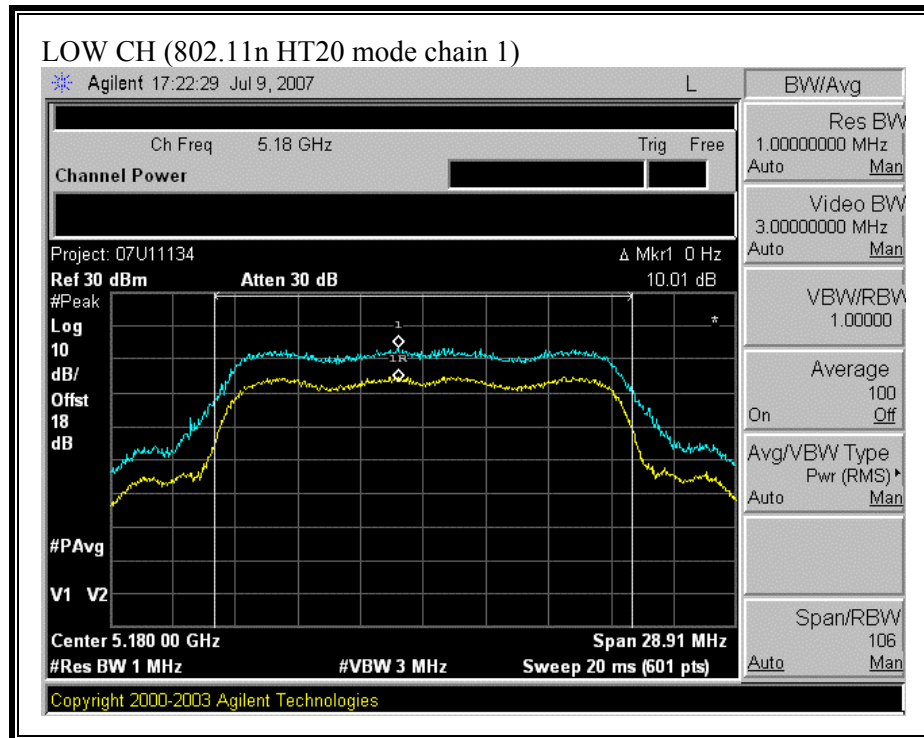
(802.11n HT20 MODE CHAIN 0)

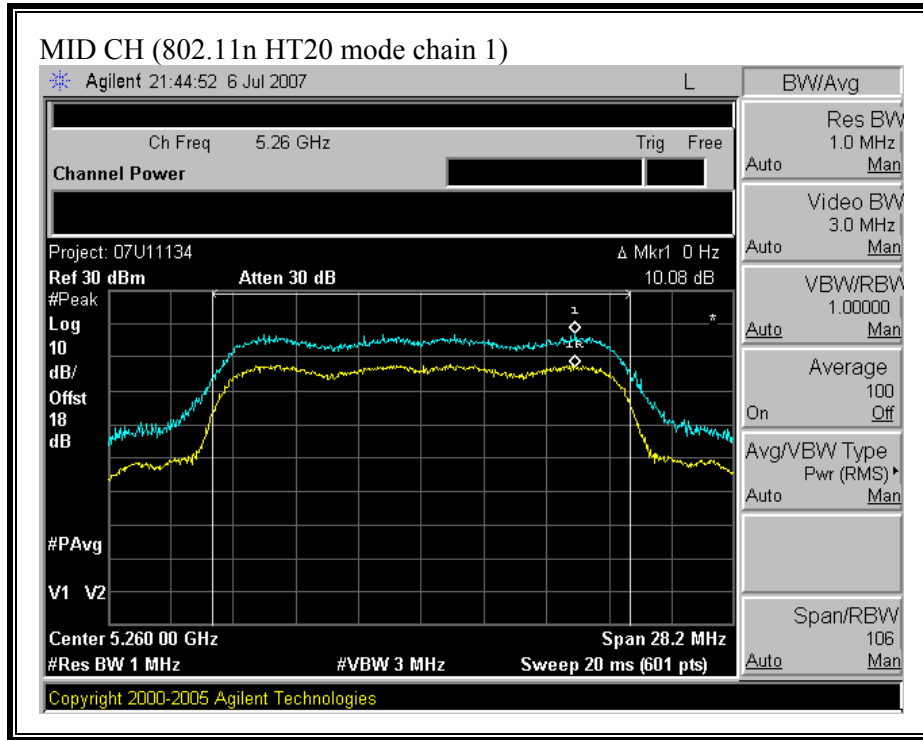


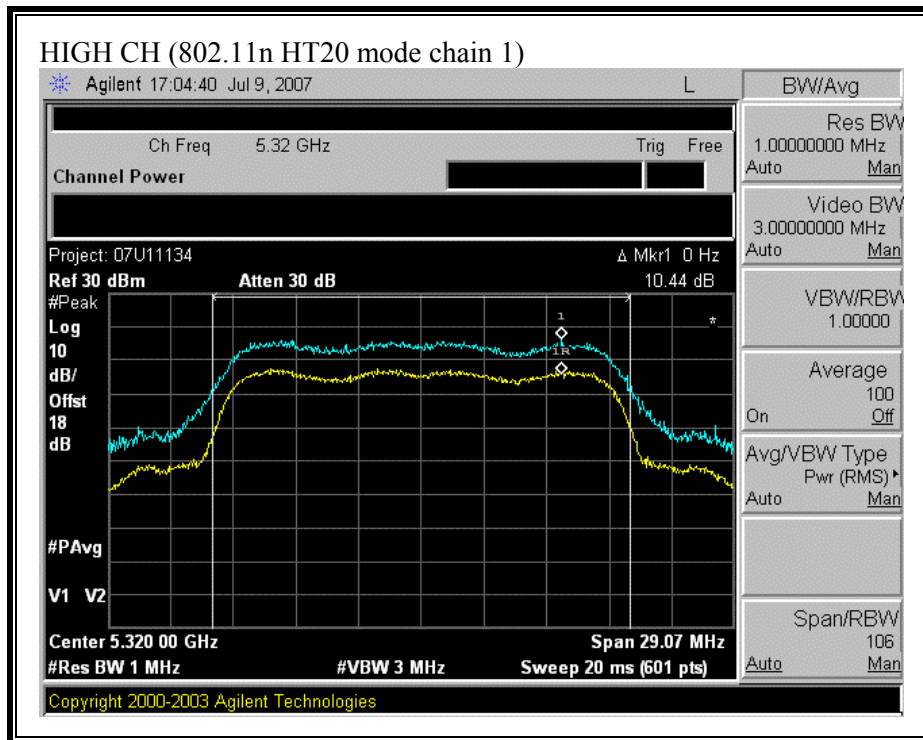




(802.11 HT20 MODE CHAIN 1)







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.

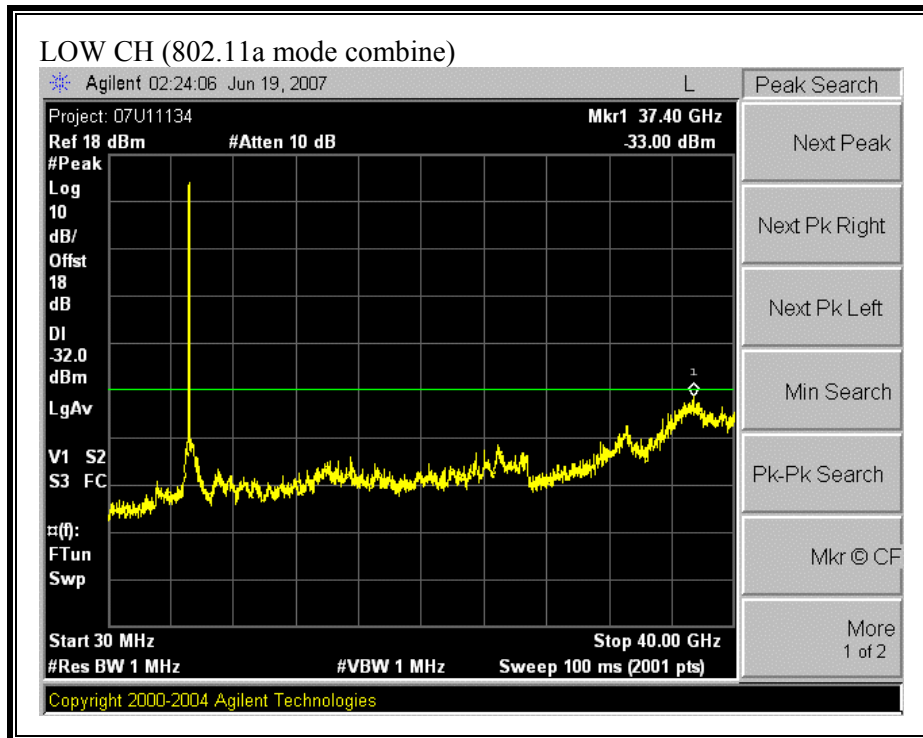
The transmitter output is connected to the spectrum analyzer. The resolution bandwidth is set to 1 MHz. The video bandwidth is set to 1 MHz. Peak detection measurements are compared to the average EIRP limit, adjusted for the maximum antenna gain. If necessary, additional average detection measurements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

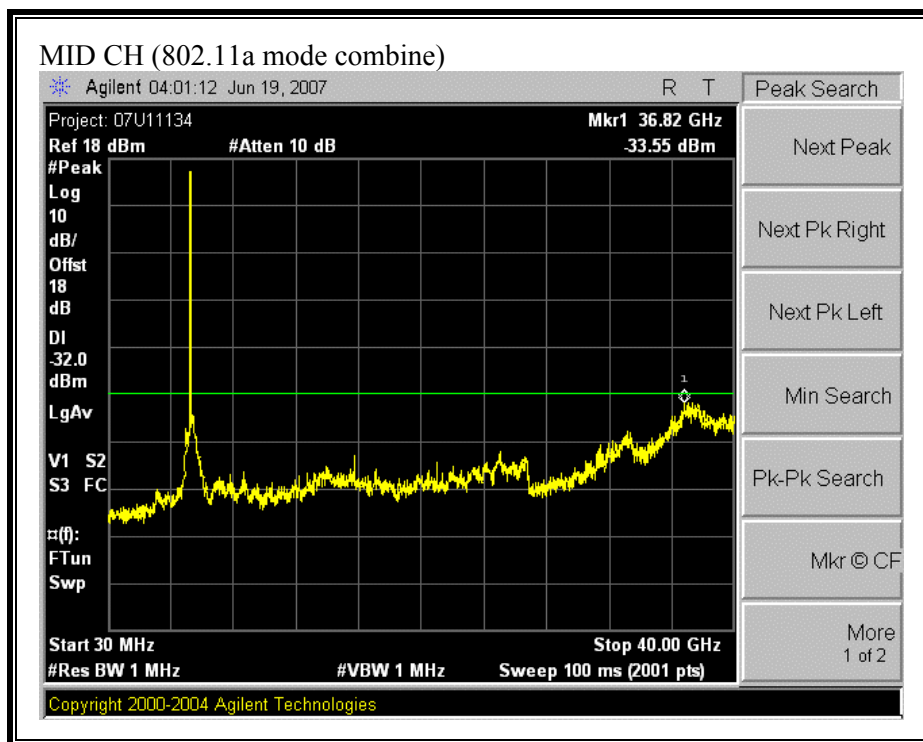
Measurements are made over the 30 MHz to 40 GHz range with the transmitter set to the lowest, middle, and highest channels.

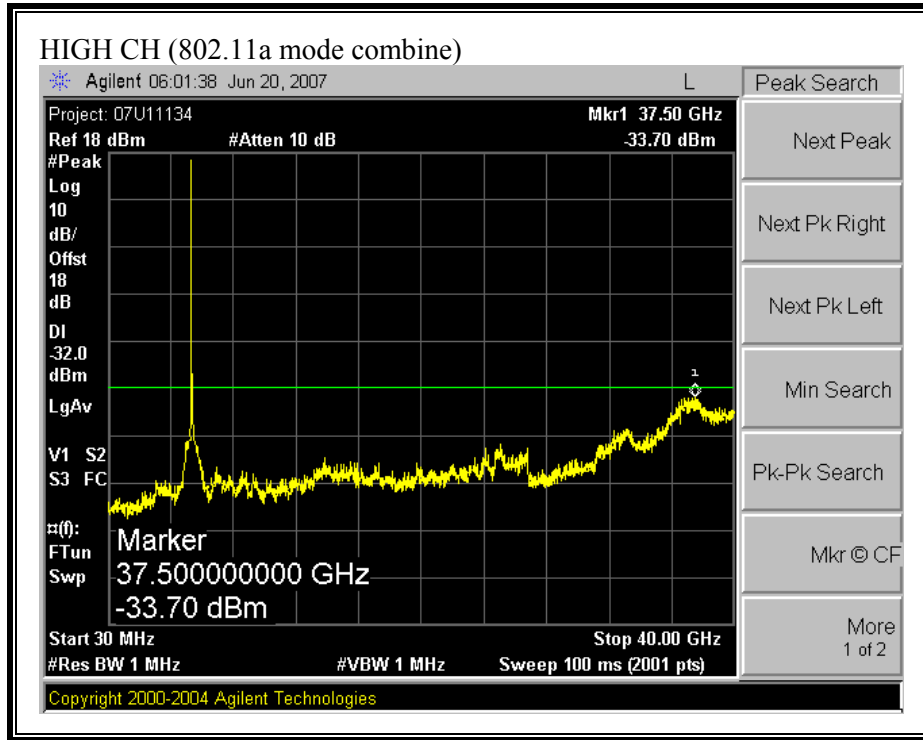
RESULTS

No non-compliance noted:

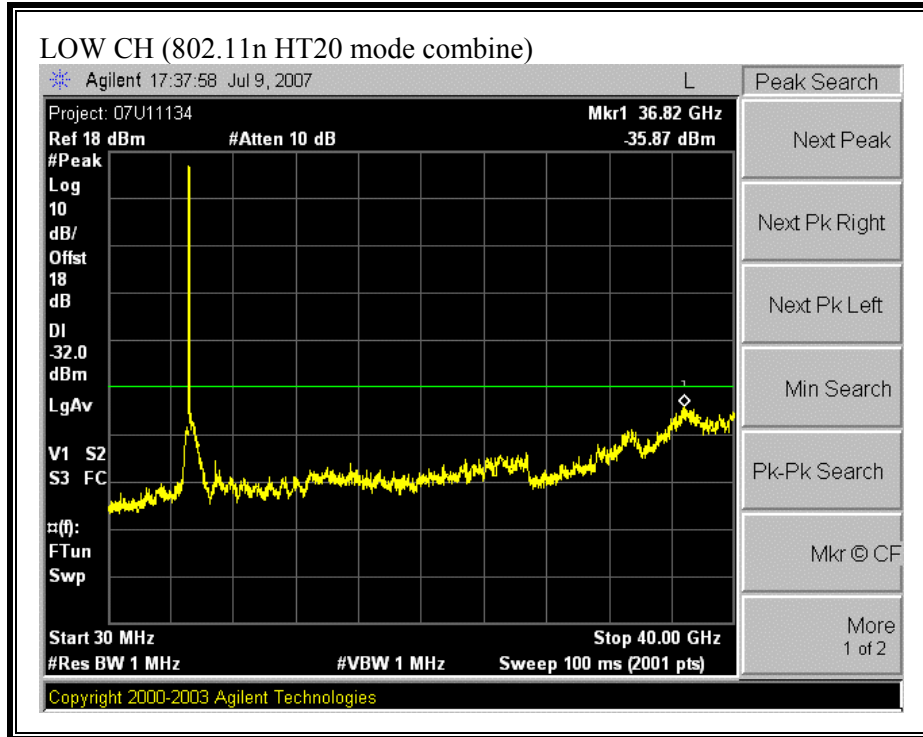
(802.11a MODE COMBINE)

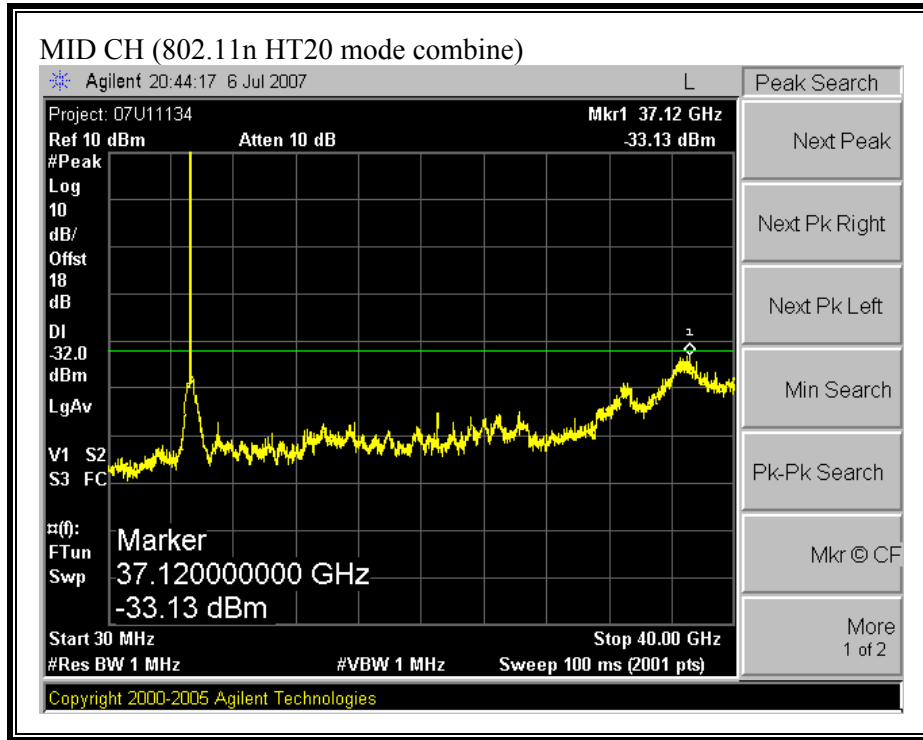


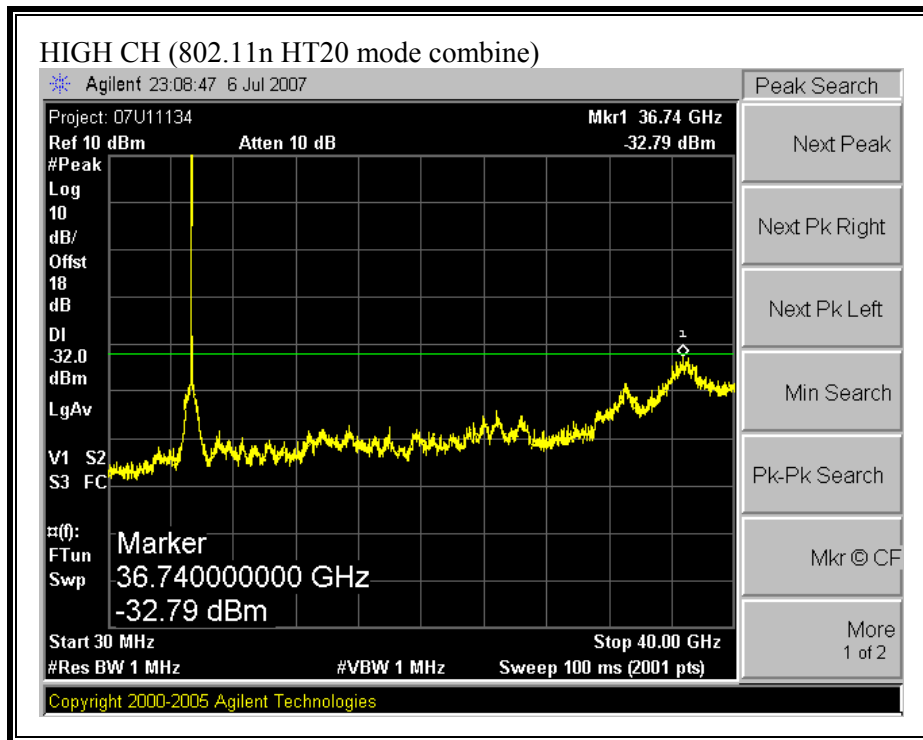




(802.11n HT20 MODE COMBINE)







7.2. CHANNEL TESTS FOR THE 5470 TO 5725 MHz BAND

7.2.1. 99% BANDWIDTH AND 26 dB BANDWIDTH

LIMIT

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the 99 % bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal 99% bandwidth and 26 dB bandwidth functions are utilized.

RESULTS

No non-compliance noted:

Mode Channel	Frequency (MHz)	99% BW Chain 0 (MHz)	99% BW Chain 1 (MHz)	26 dB BW Chain 0 (MHz)	26 dB BW Chain 1 (MHz)	Worst Case 10 Log B (dB)
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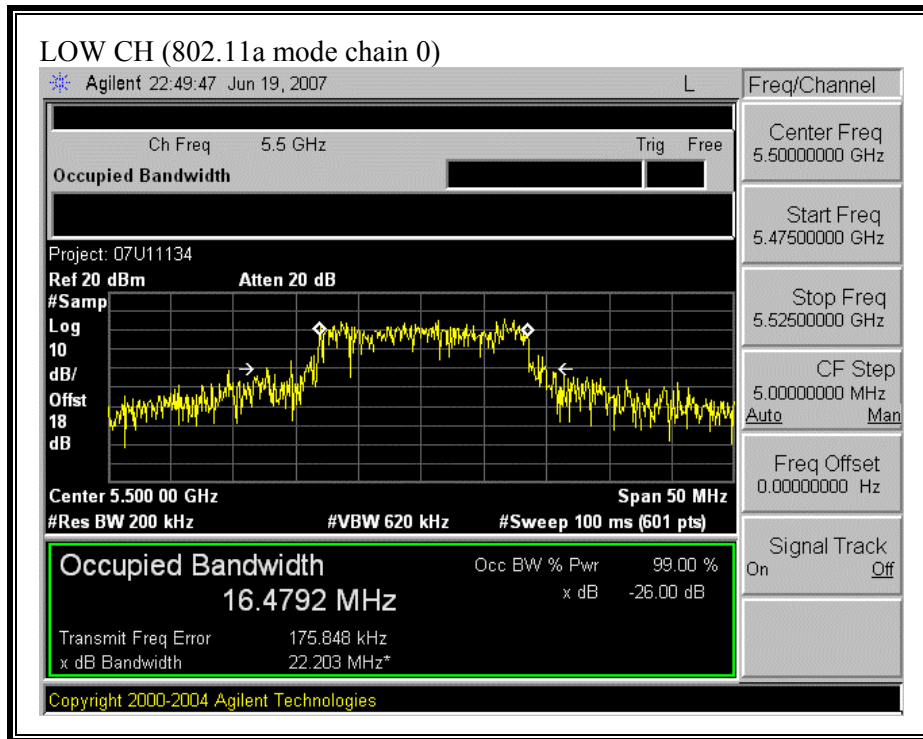
802.11a Mode

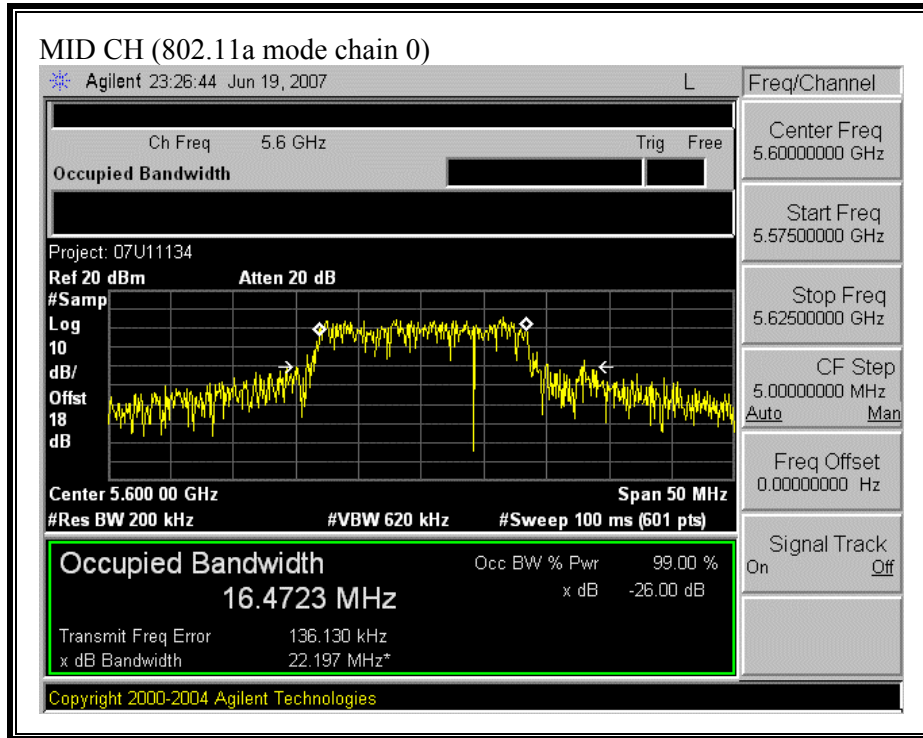
Low	5500	16.479	16.517	22.203	19.129	13.46
Mid	5600	16.472	16.425	22.197	19.379	13.46
High	5700	16.443	16.357	22.064	18.811	13.44

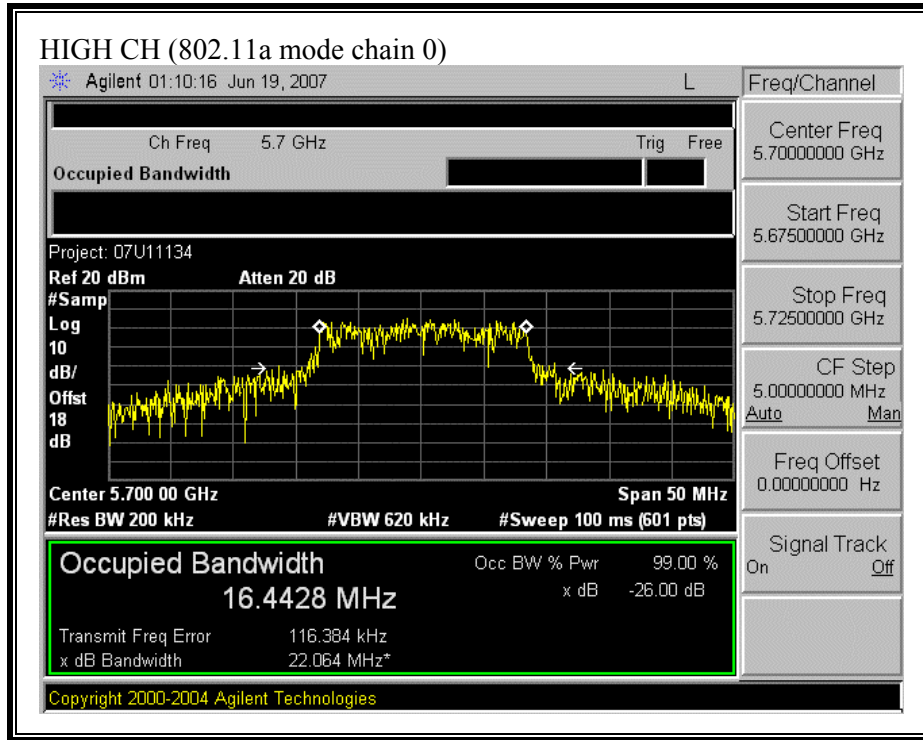
802.11n HT20 Mode

Low	5500	17.576	17.441	18.4	20.438	13.10
Mid	5600	17.601	17.586	20.846	20.25	13.19
High	5700	17.738	17.425	20.626	22.702	13.56

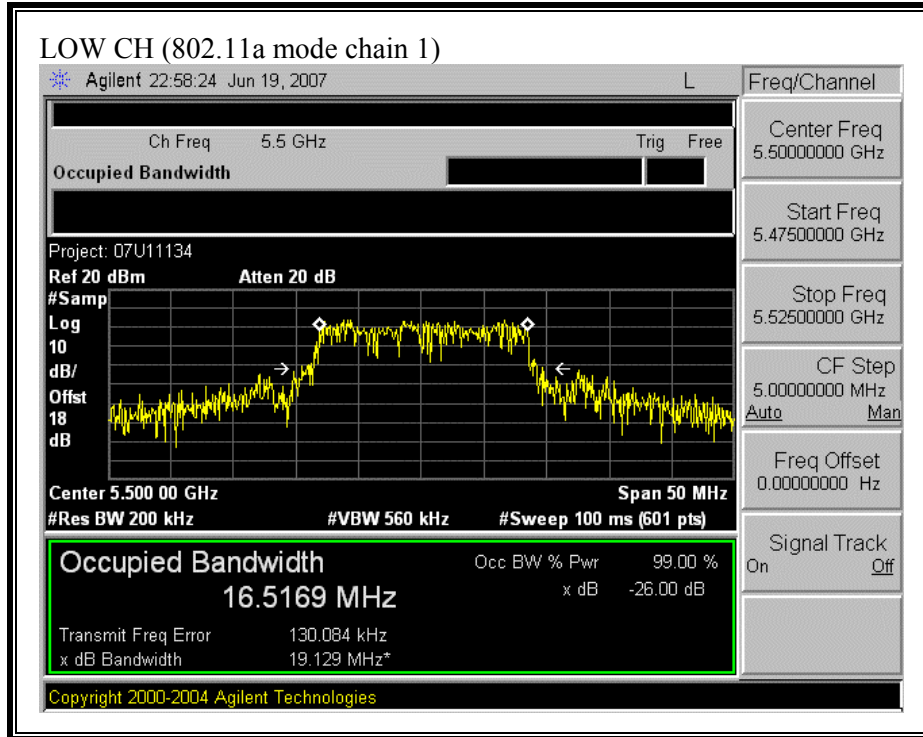
(802.11a MODE CHAIN 0)

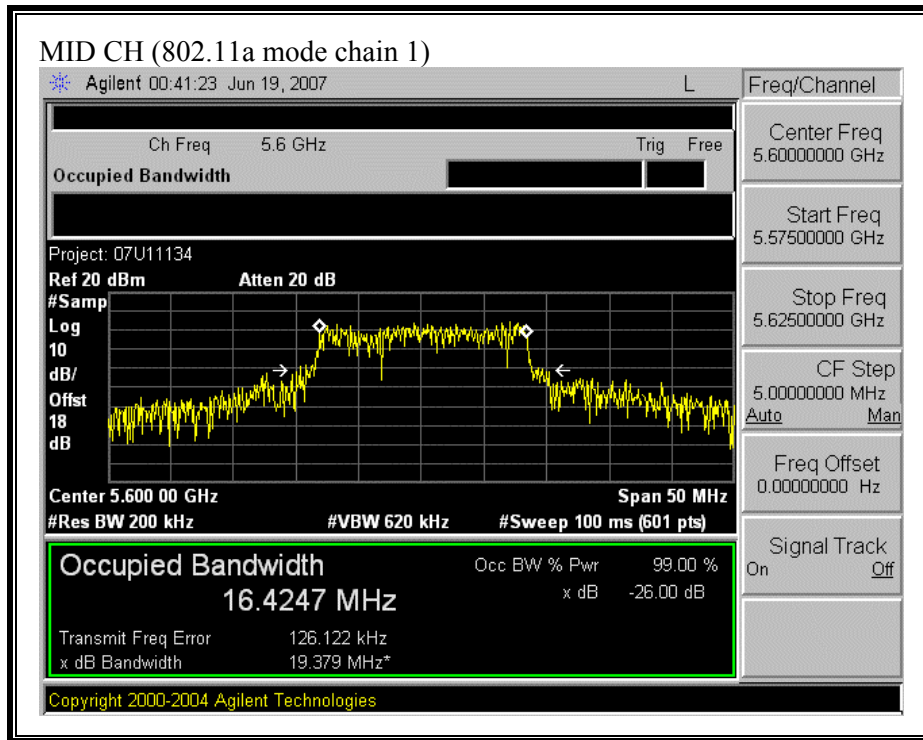


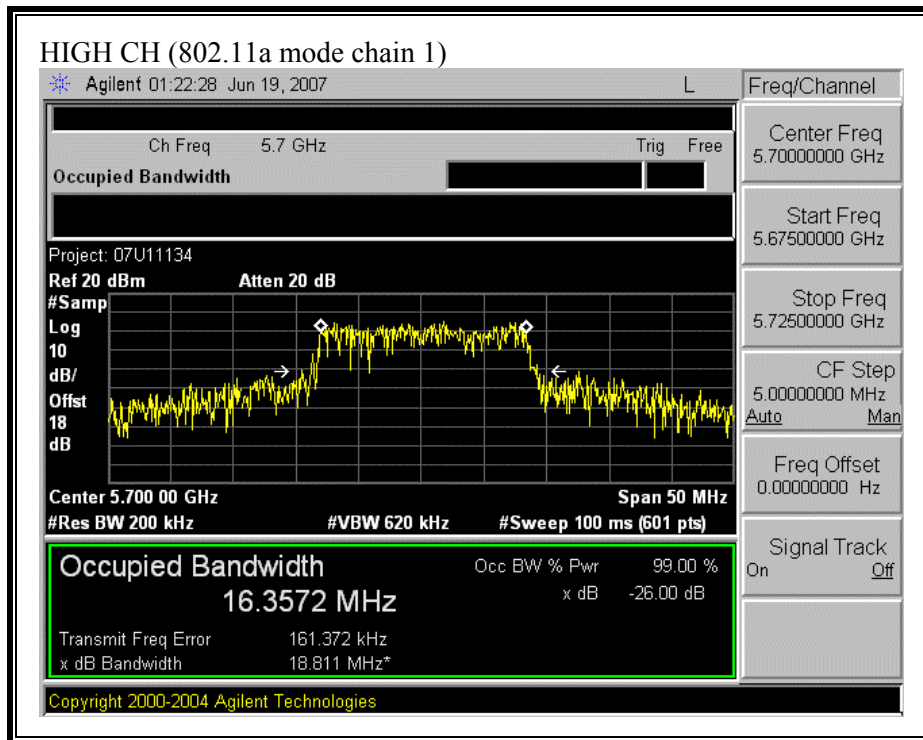




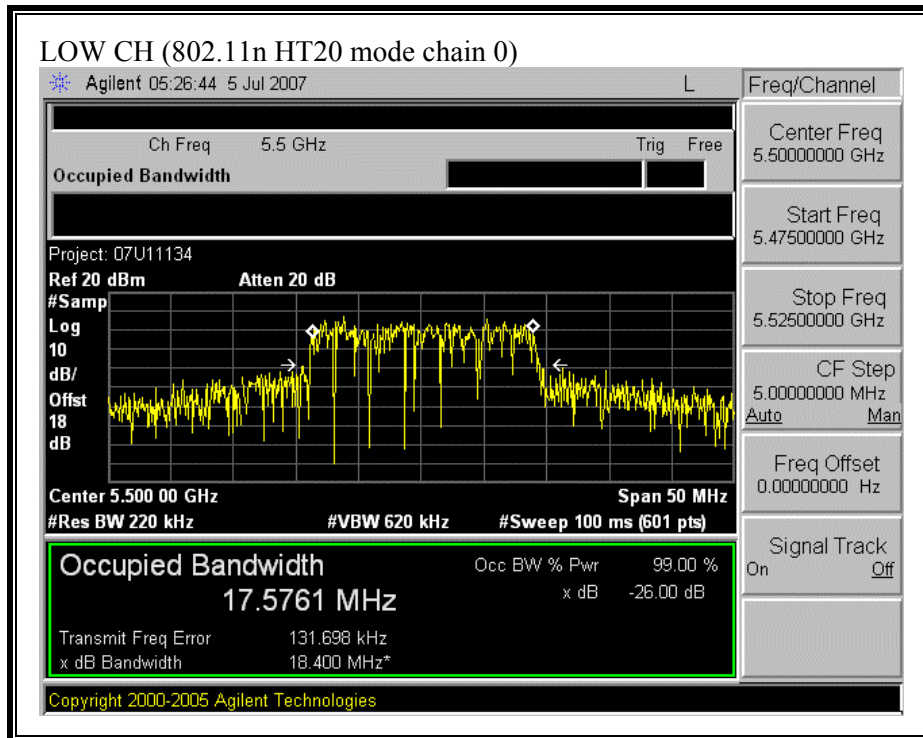
(802.11a MODE CHAIN 1)

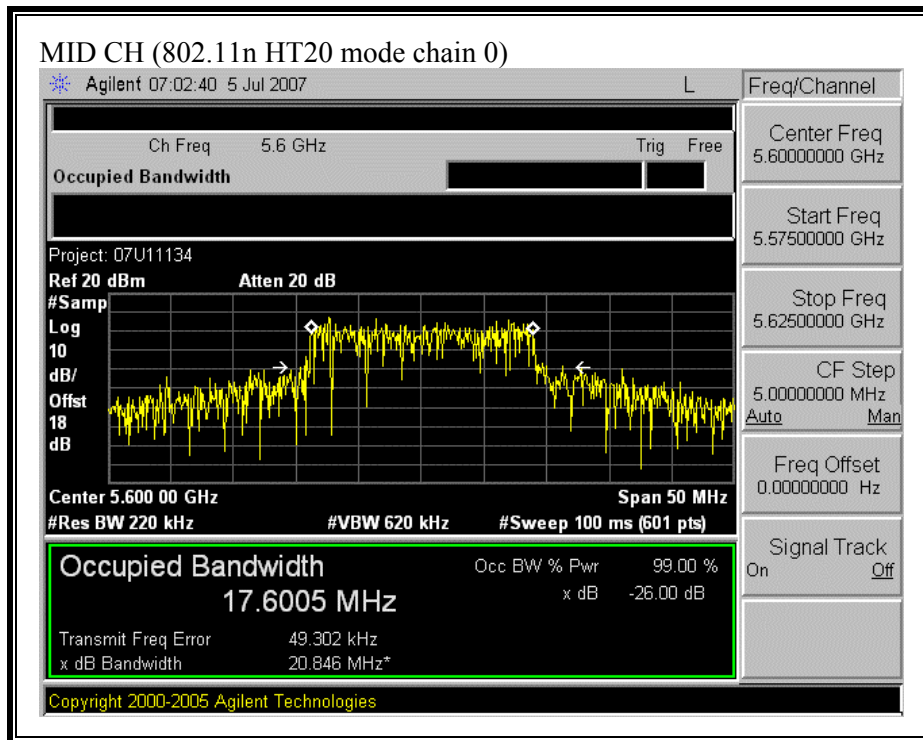


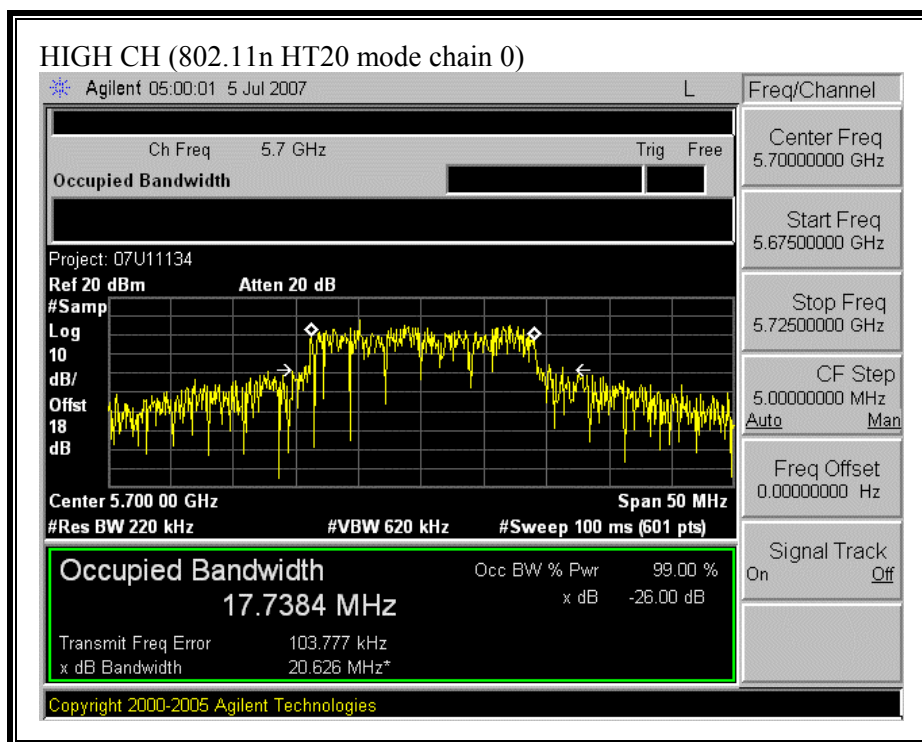




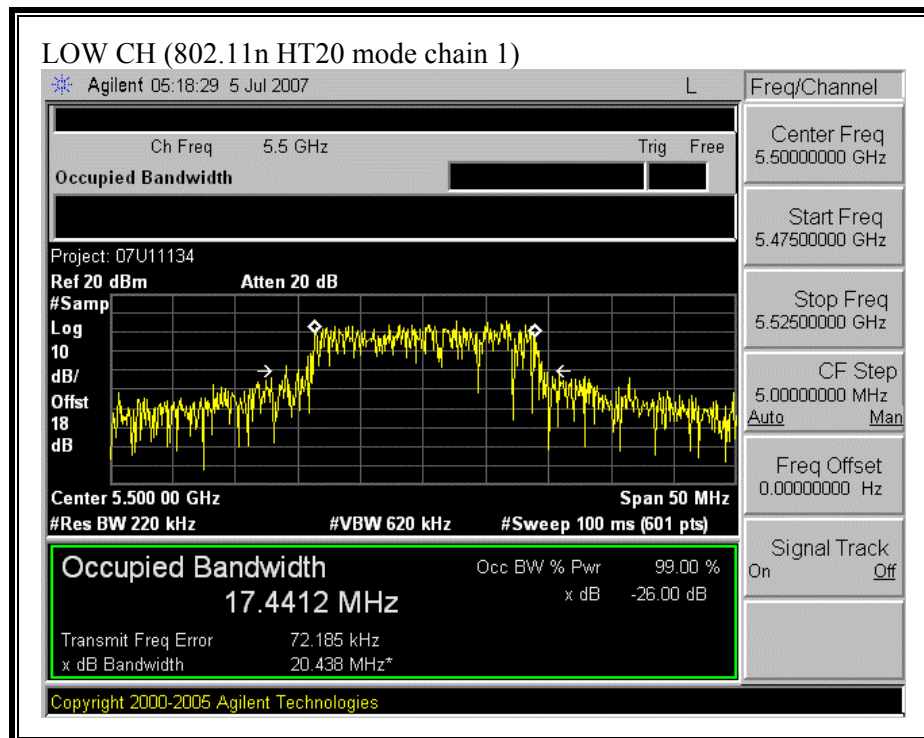
(802.11n HT20 MODE CHAIN 0)

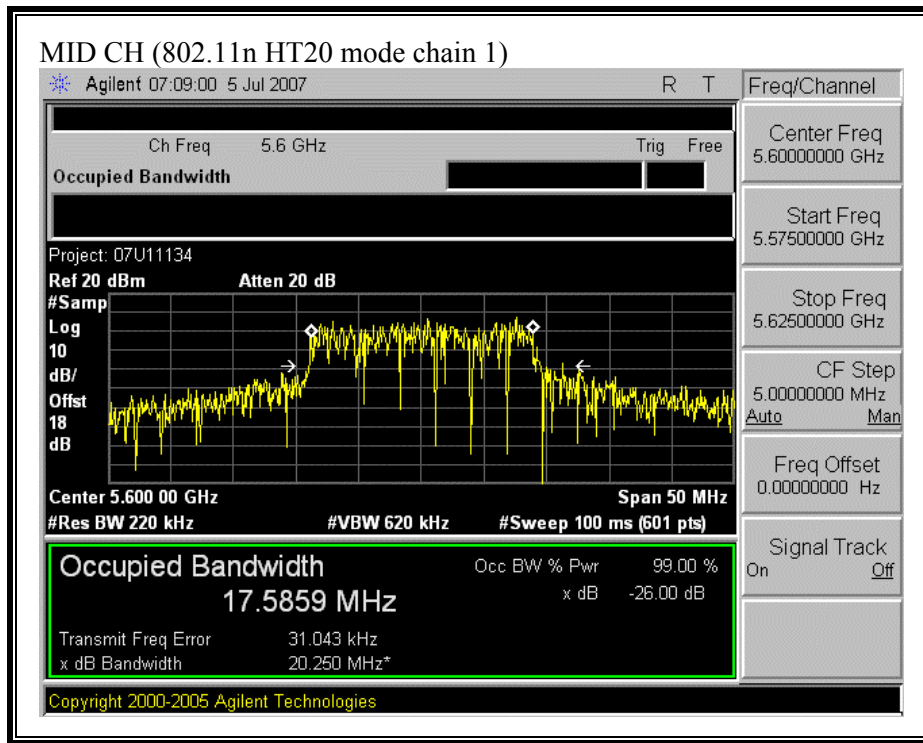


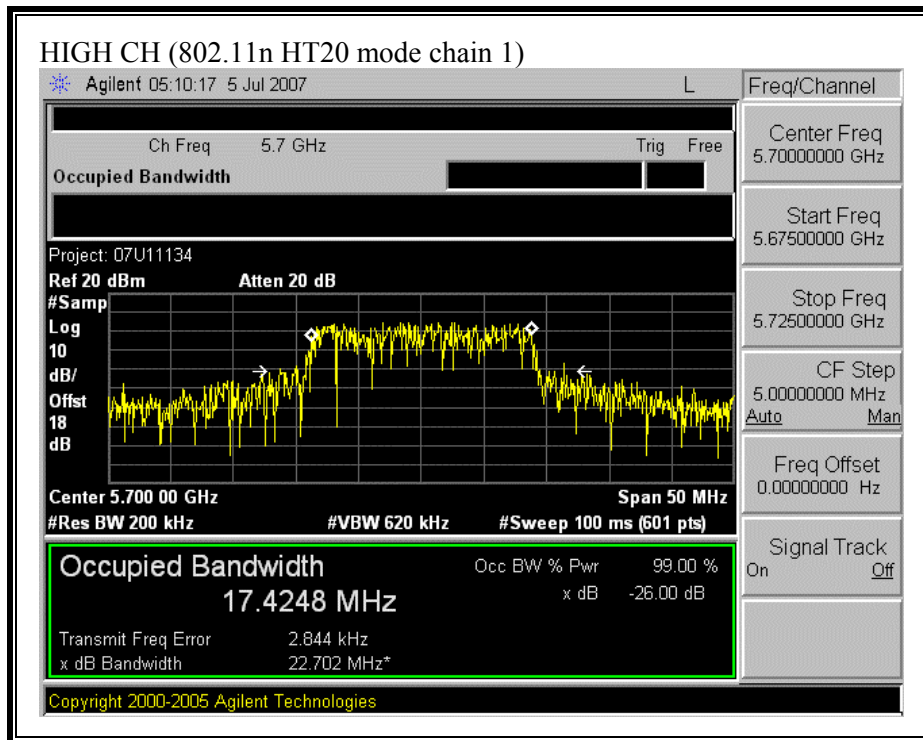




(802.11 HT20 MODE CHAIN 1)







7.2.2. 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 = $10 \log (10^{(\text{Chain 0 Power} / 10)} + 10^{(\text{Chain 1 Power} / 10)})$

LIMITS AND RESULTS

No non-compliance noted:

Fixed Limit (dBm)	24
Antenna Gain (dBi)	3
10 Log (# Tx Chains)	3.01
Effective Legacy Gain	6.01

Mode Chan	Freq (MHz)	10LogB (dBm)	11+10LogB Limit (dBm)	Limit (dBm)	Chain 0 Power (dBm)	Chain 1 Power (dBm)	Total Power (dBm)	Margin (dB)
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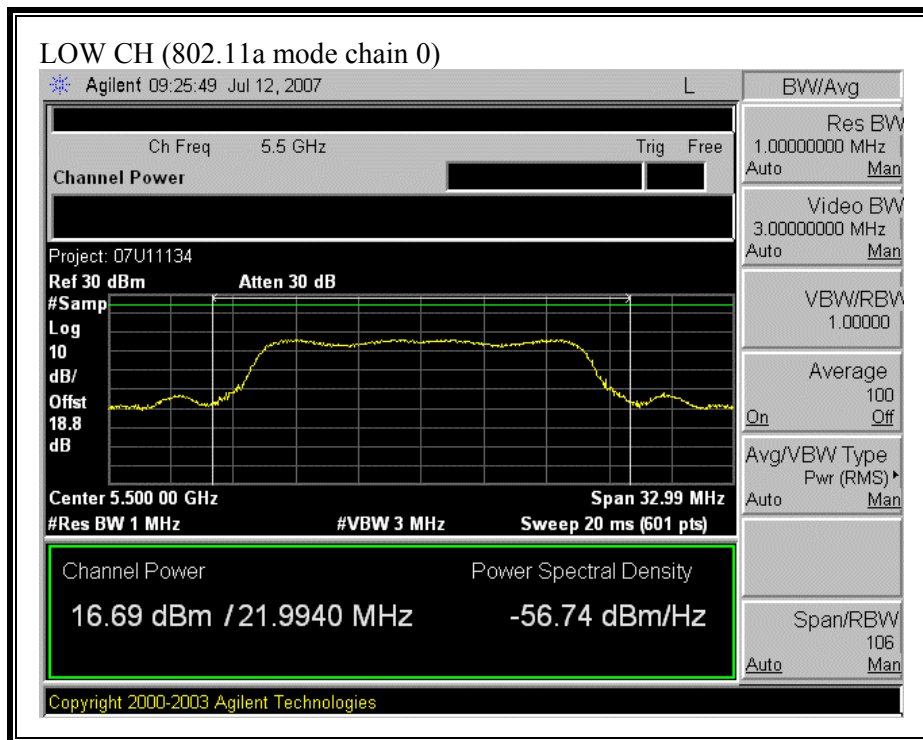
802.11a Mode

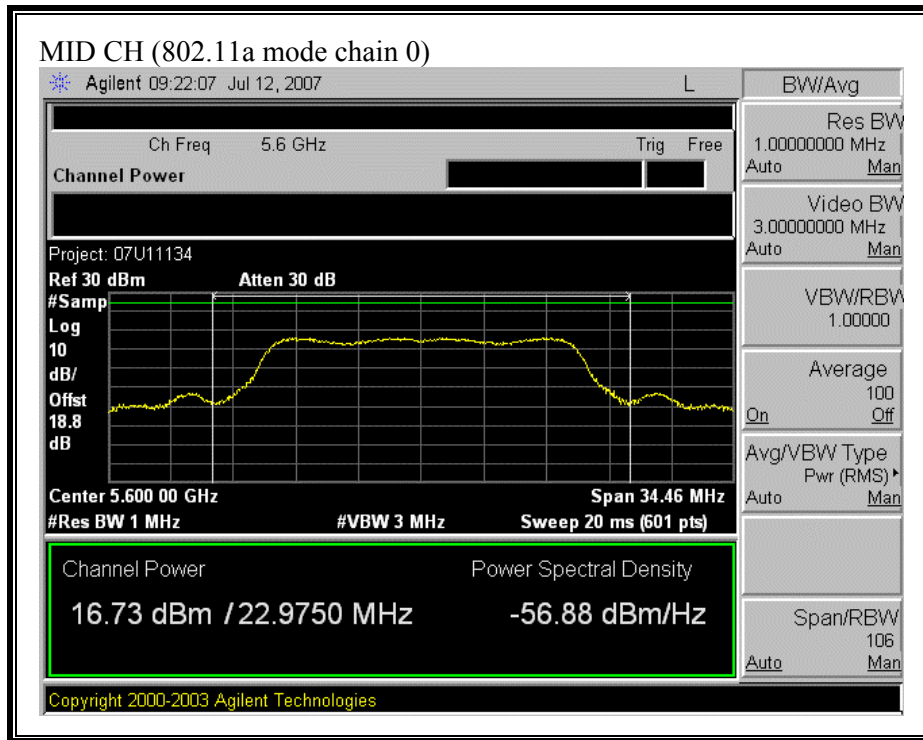
Low	5500	13.46	24.46	23.99	16.69	15.97	19.36	-4.63
Mid	5600	13.46	24.46	23.99	16.73	16.77	19.76	-4.23
High	5700	13.44	24.44	23.99	16.89	16.27	19.60	-4.39

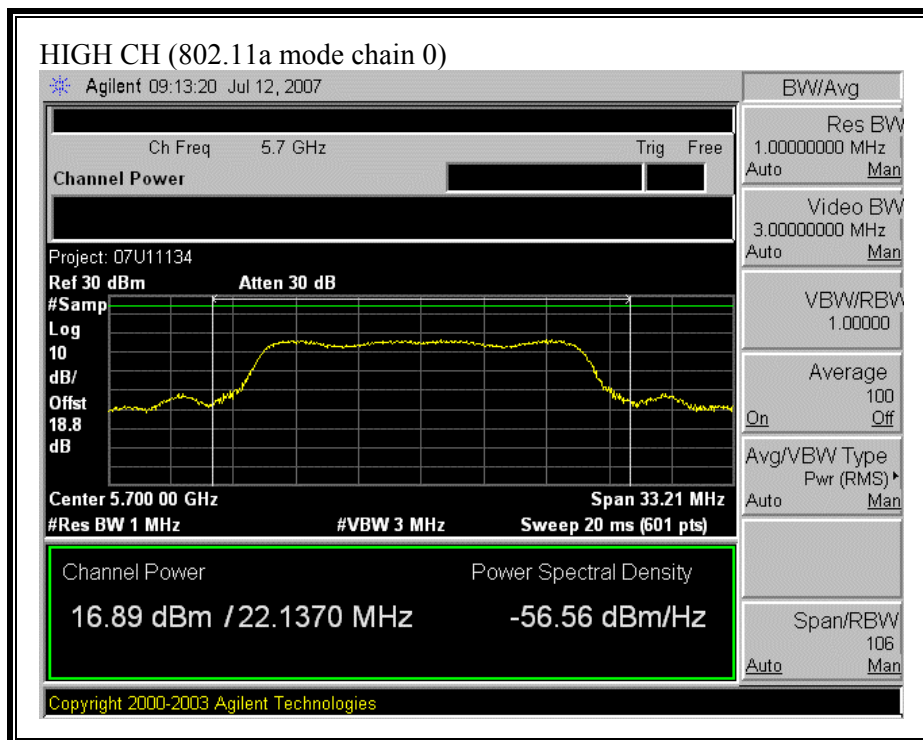
802.11n HT20 Mode

Low	5500	13.1	24.10	24.00	17.62	17.35	20.50	-3.50
Mid	5600	13.19	24.19	24.00	17.93	17.03	20.51	-3.49
High	5700	13.56	24.56	24.00	18.57	18.22	21.41	-2.59

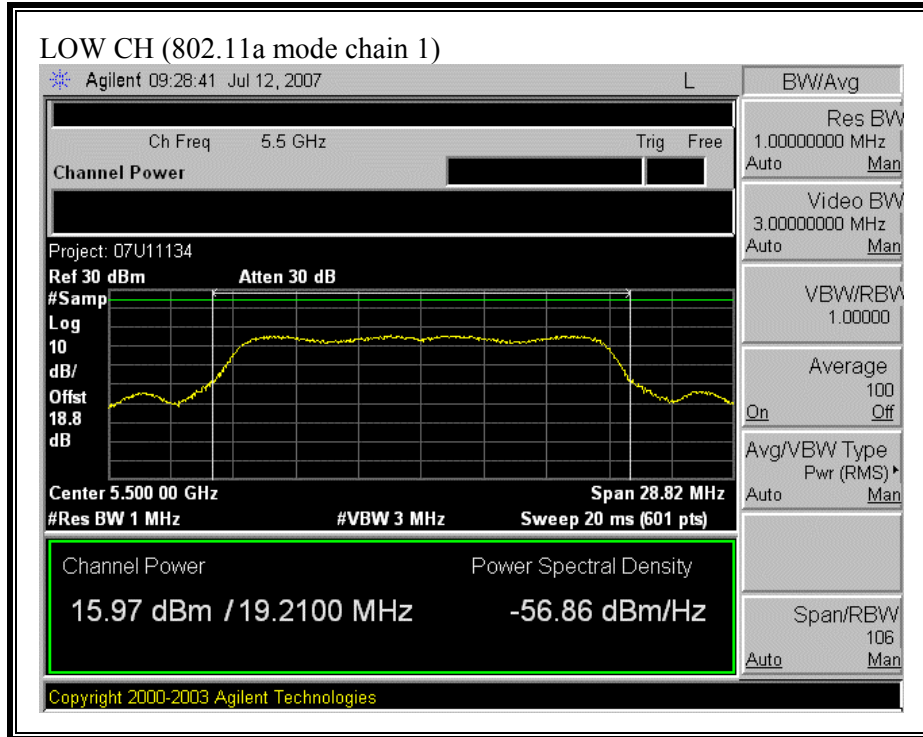
(802.11a MODE CHAIN 0)

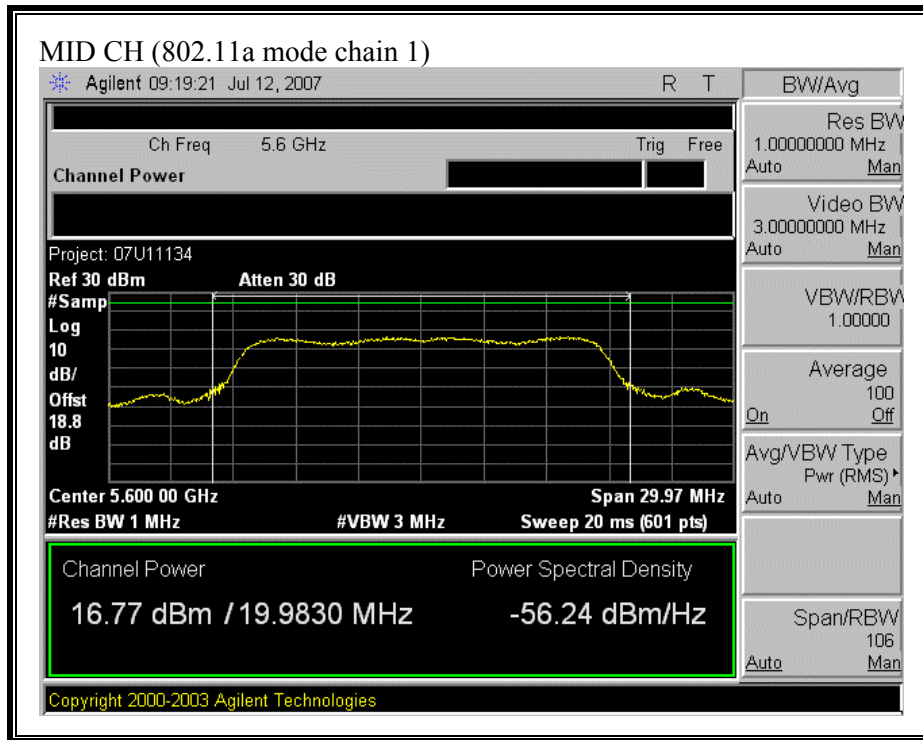


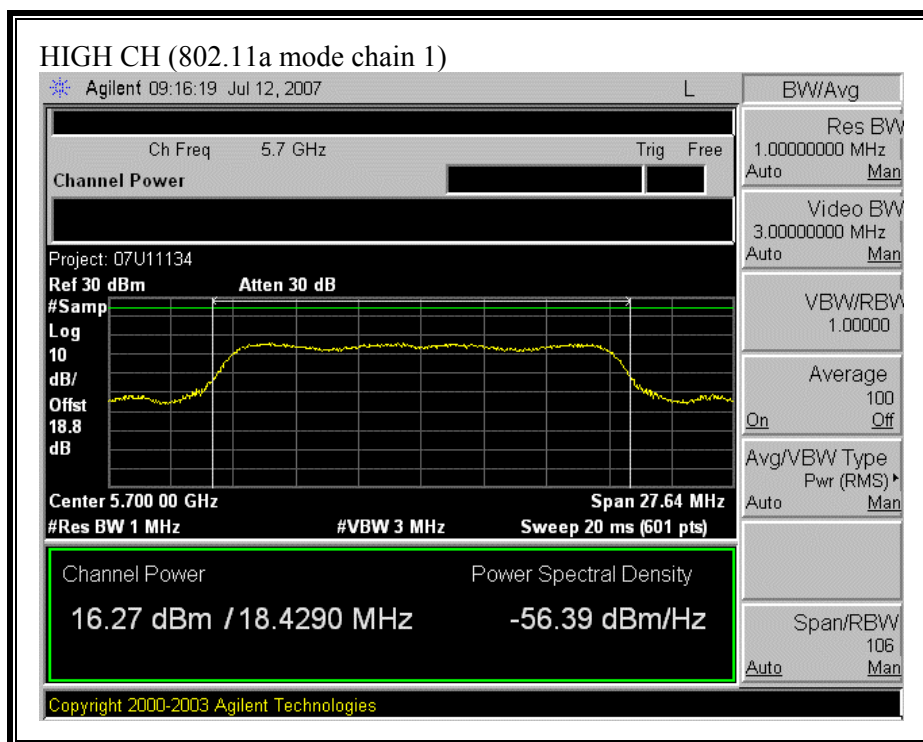




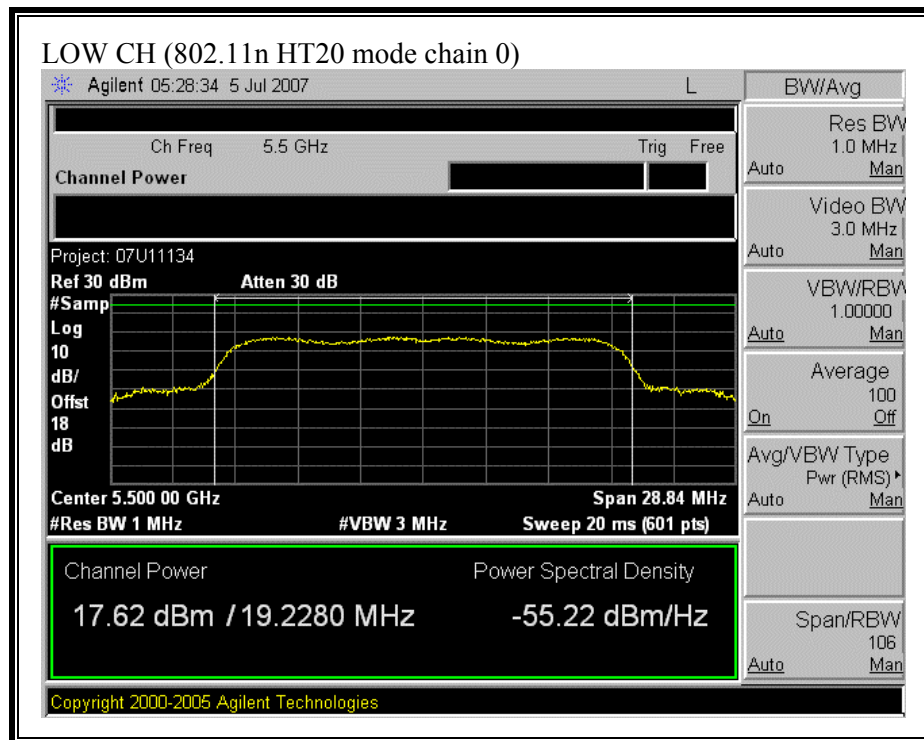
(802.11a MODE CHAIN 1)

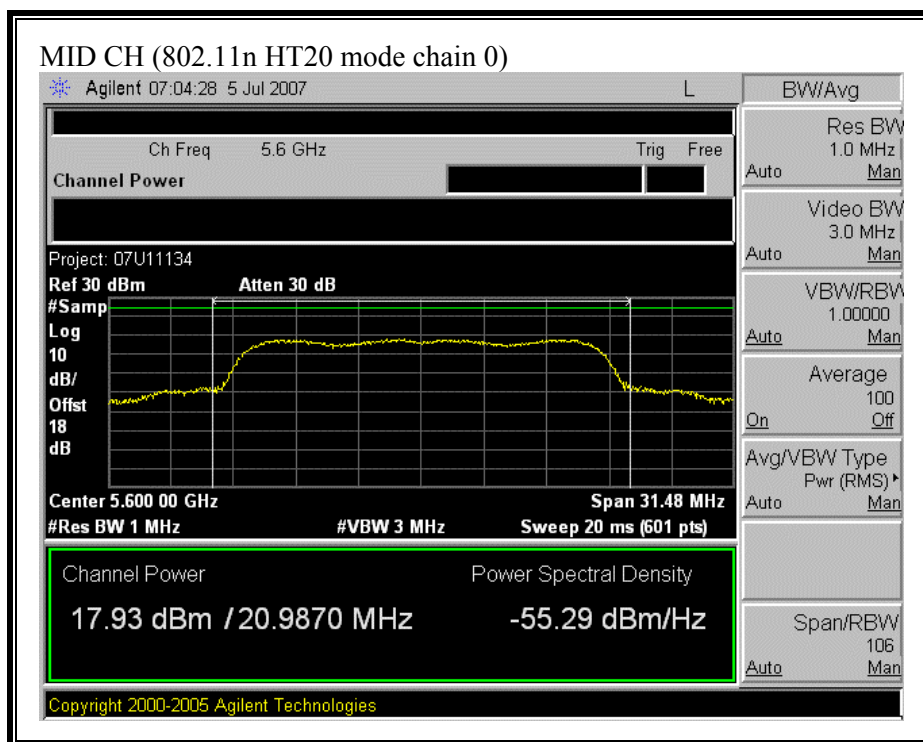


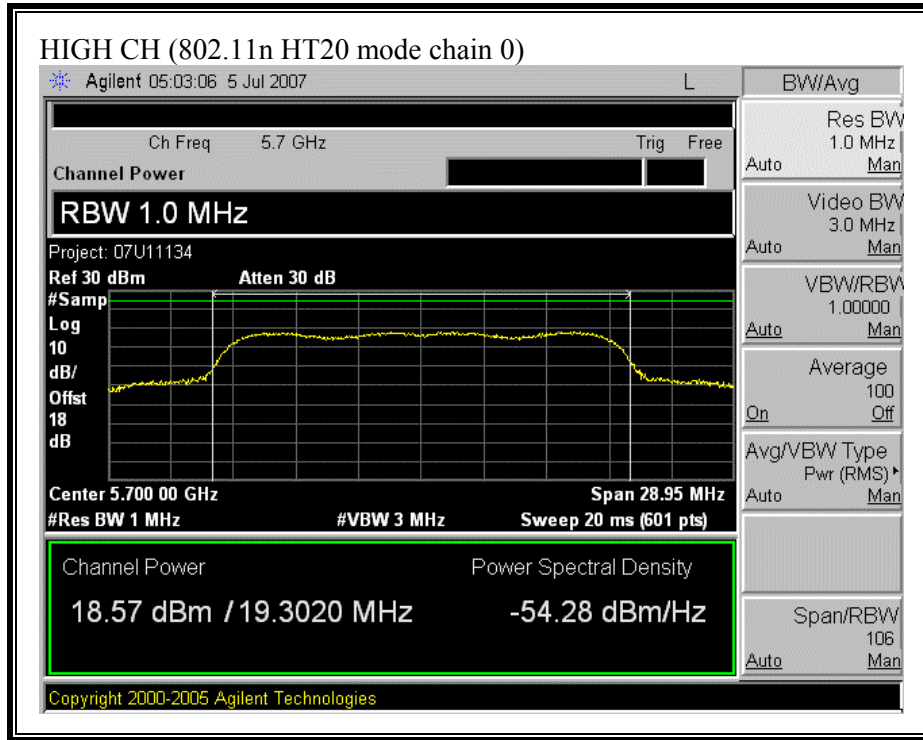




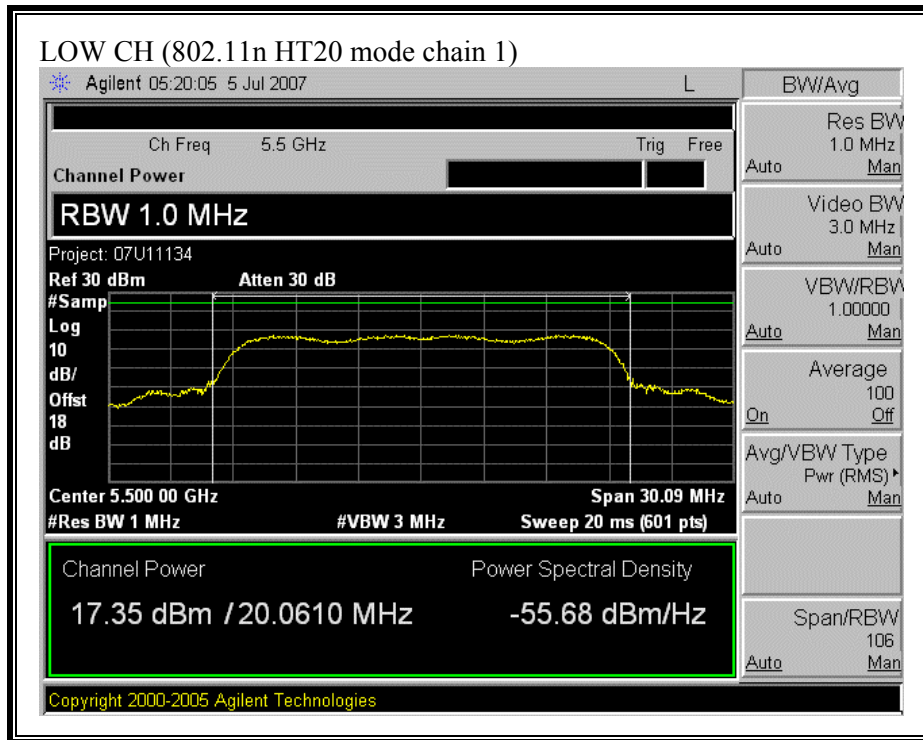
(802.11n HT20 MODE CHAIN 0)

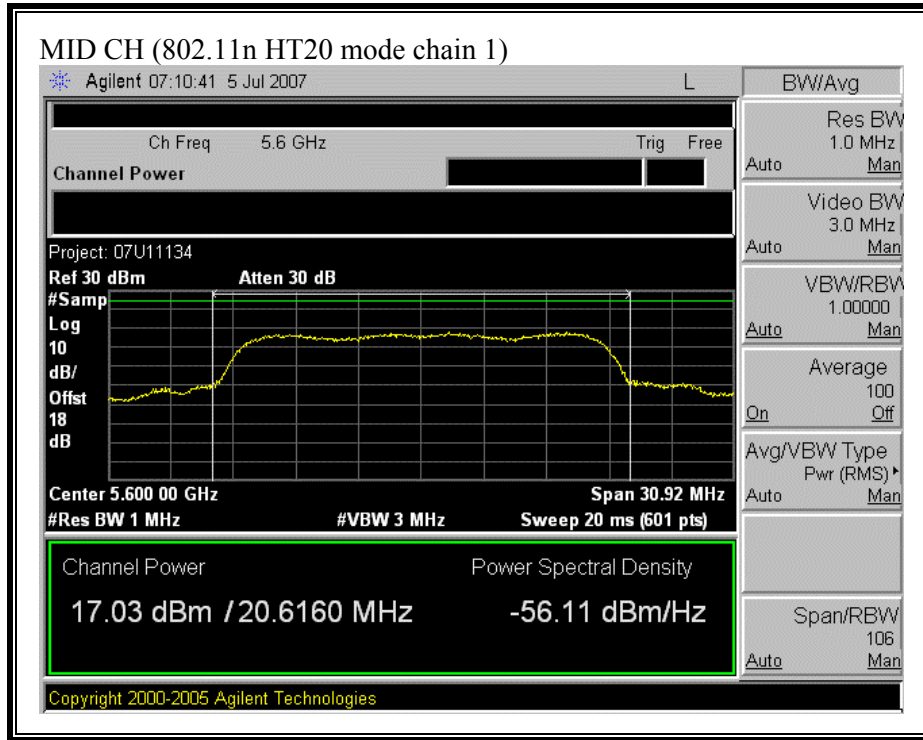


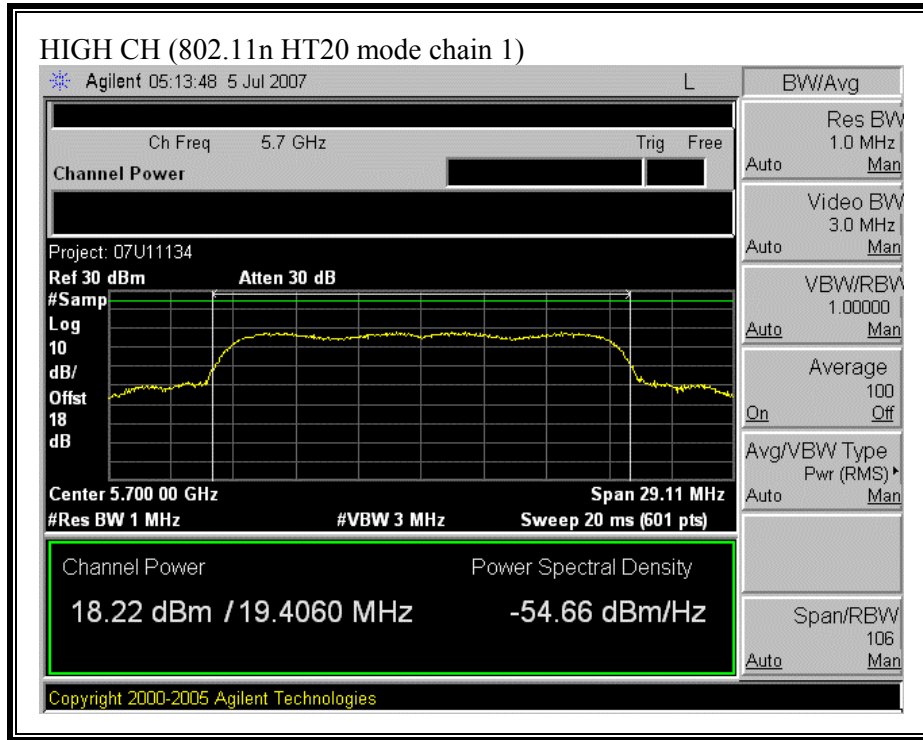




(802.11 HT20 MODE CHAIN 1)







7.2.1. 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:

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

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

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/cm²

Substituting the logarithmic form of power and gain using:

$$P \text{ (mW)} = 10^{(P \text{ (dBm)} / 10)} \text{ and}$$

$$G \text{ (numeric)} = 10^{(G \text{ (dBi)} / 10)}$$

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/cm²

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 $S = 1.0 \text{ mW/cm}^2$ in the 5.2 / 5.3 GHz band

RESULTS

No non-compliance noted

Mode	MPE Distance (cm)	Output Power (dBm)	Antenna Gain (dBi)	Power Density (mW/cm²)
802.11a 5.5GHz Band	20.0	20.51	3.00	0.04

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.

7.2.2. 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:

$$\text{Total PPSD} = 10 \log (10^{\text{Chain 0 PPSD} / 10} + 10^{\text{Chain 2 PPSD} / 10})$$

RESULTS

No non-compliance noted:

Based on the previous preliminary scan of single channel vs. combiner, combined PPSD has the worse condition over all

RESULTS WITH COMBINER

No non-compliance noted:

Antenna Gain (dBi)	3
10 Log (# Tx Chains)	3.01
Effective Legacy Gain	6.01

Mode Channel	Frequency (MHz)	PPSD With Combiner (dBm)	Limit (dBm)	Margin (dB)
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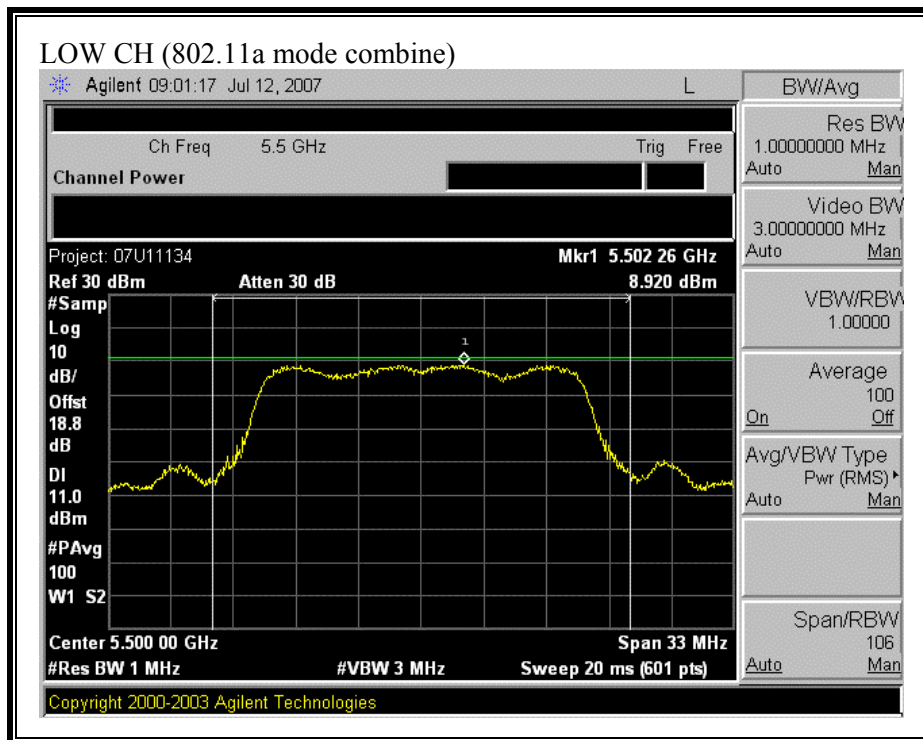
802.11a Mode

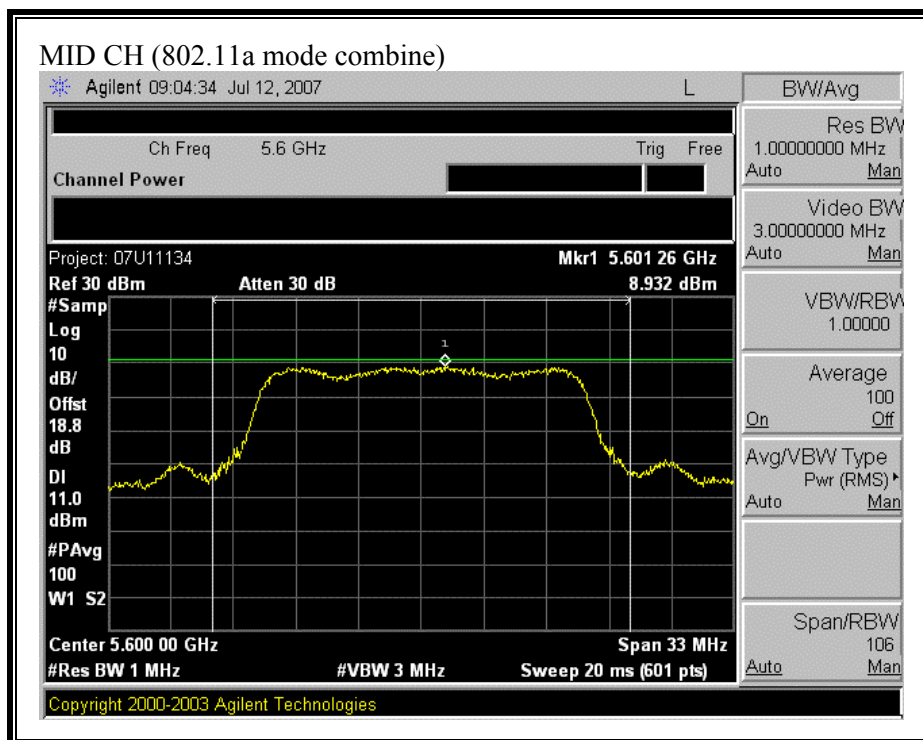
Low	5500	8.92	10.99	-2.07
Mid	5600	8.93	10.99	-2.06
High	5700	8.98	10.99	-2.01

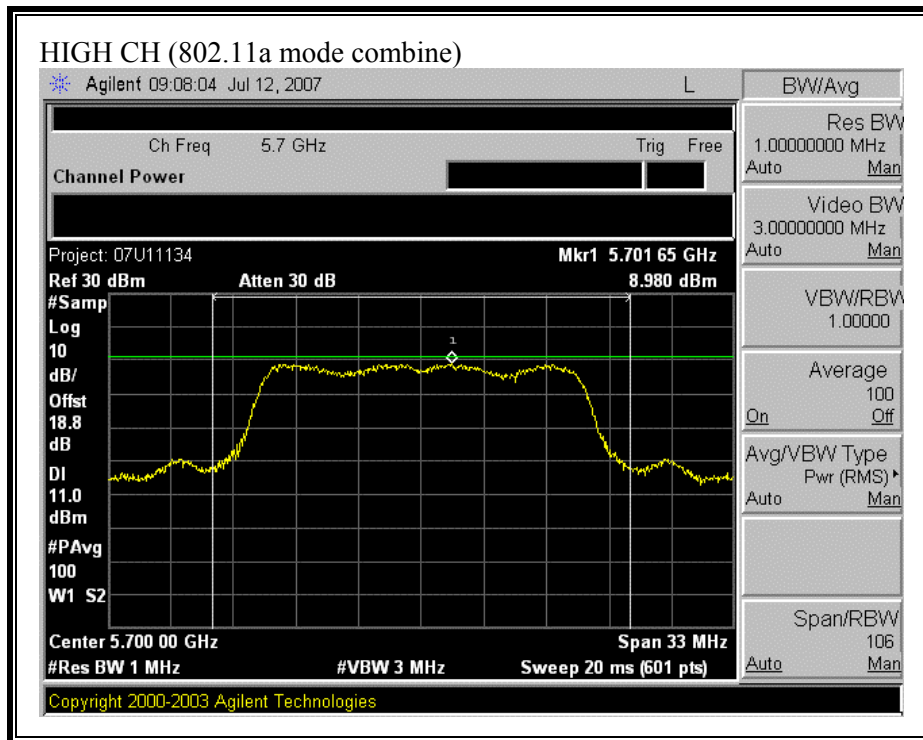
802.11n HT20 Mode

Low	5500	10.27	11.00	-0.73
Mid	5600	10.99	11.00	-0.02
High	5700	10.87	11.00	-0.13

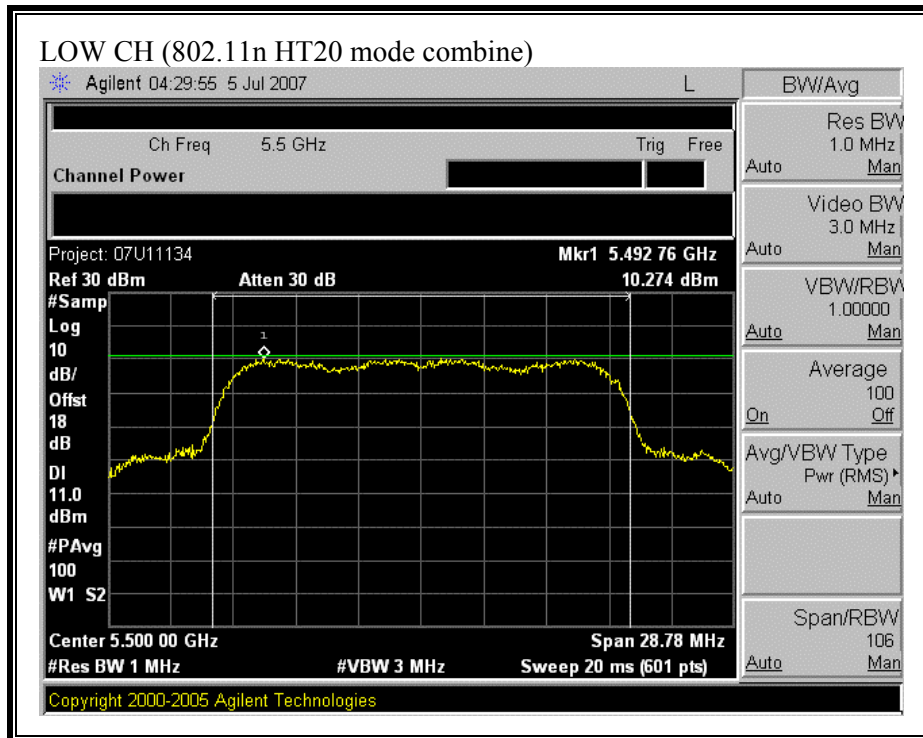
(802.11a MODE COMBINE)

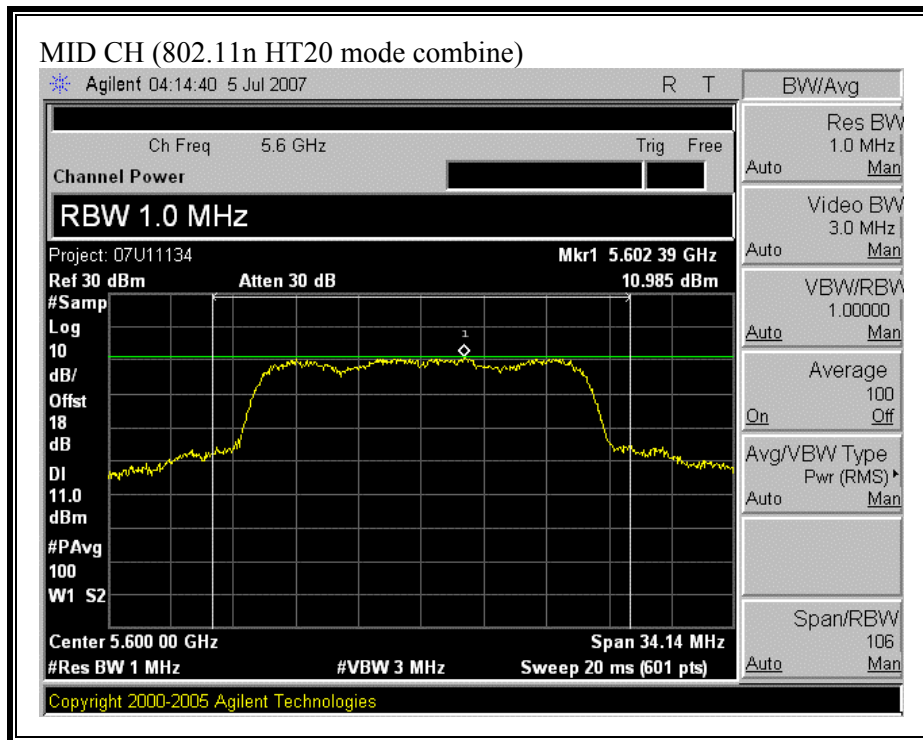


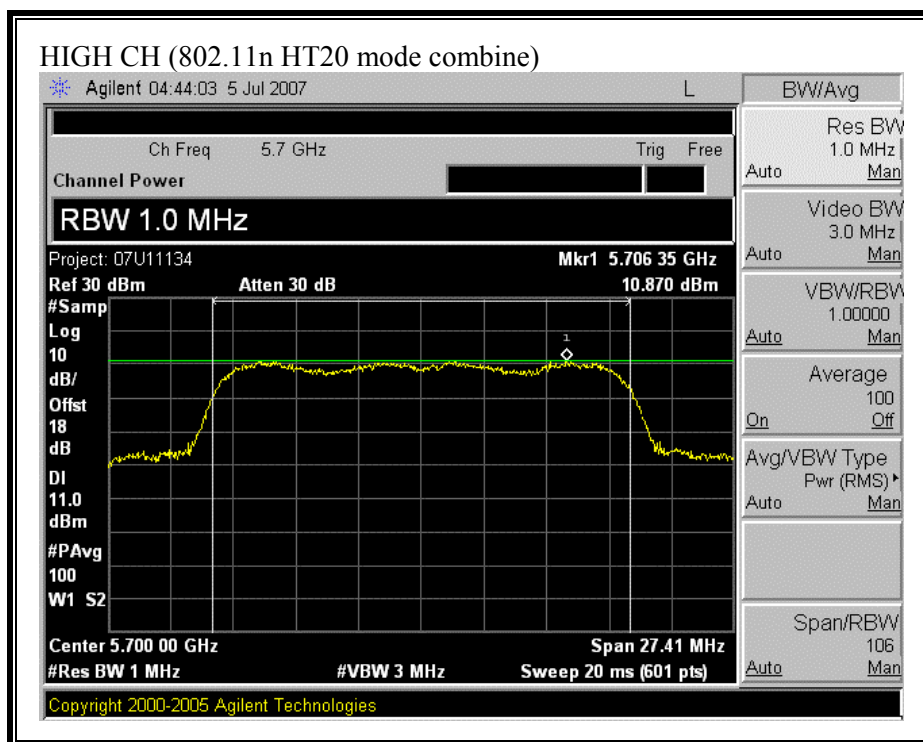




(802.11n HT20 MODE COMBINE)







7.2.3. 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 = $10 \log (10^{\text{Chain 0 Power} / 10} + 10^{\text{Chain 2 Power} / 10})$

RESULTS

No non-compliance noted:

The cable assembly insertion loss of 18 dB (including 10 dB pad and 8 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	16.2	15.4	18.8
Mid	5600	16.0	16.1	19.1
High	5700	16.2	15.5	18.9

802.11n HT20 Mode

Low	5500	18.2	17.8	21.0
Mid	5600	17.9	17.5	20.7
High	5700	17.9	17.7	20.8

7.2.4. 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 0 (dBm)	Peak Excursion Chain 1 (dBm)	Limit (dBm)	Worst Case Margin (dB)
---------------------	------------------------	-------------------------------------	-------------------------------------	--------------------	-------------------------------

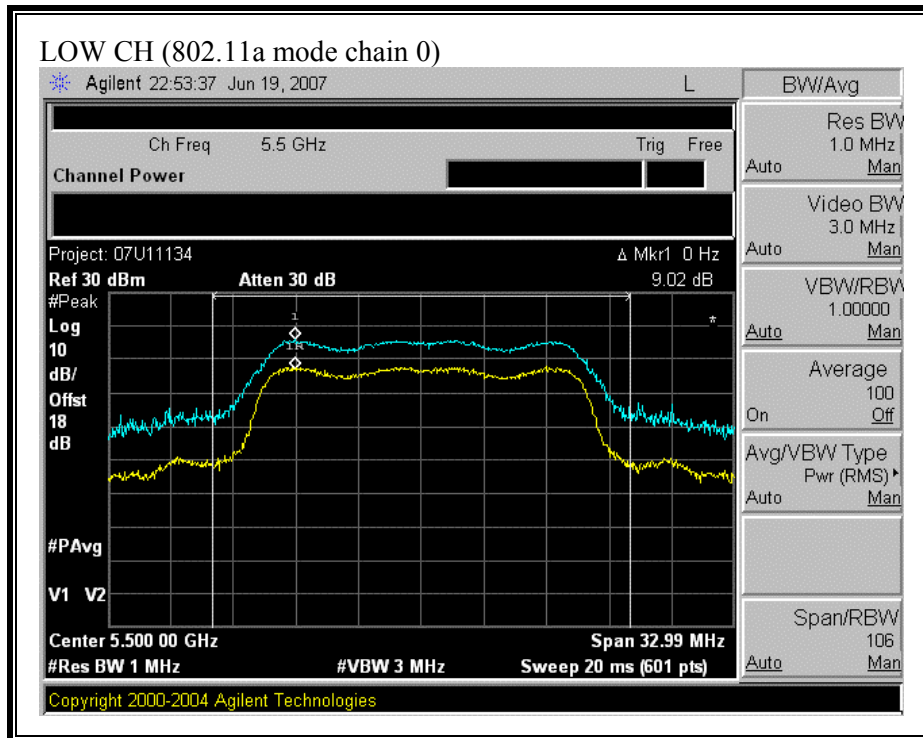
802.11a Mode

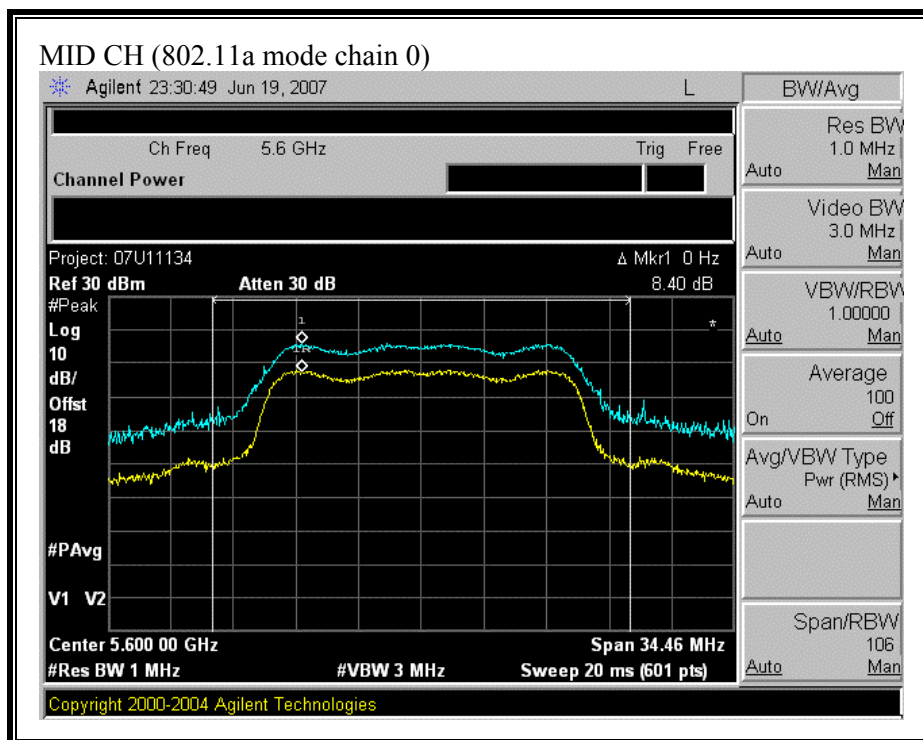
Low	5500	9.02	11.07	13	-1.93
Mid	5600	8.40	10.27	13	-2.73
High	5700	7.73	10.00	13	-3.00

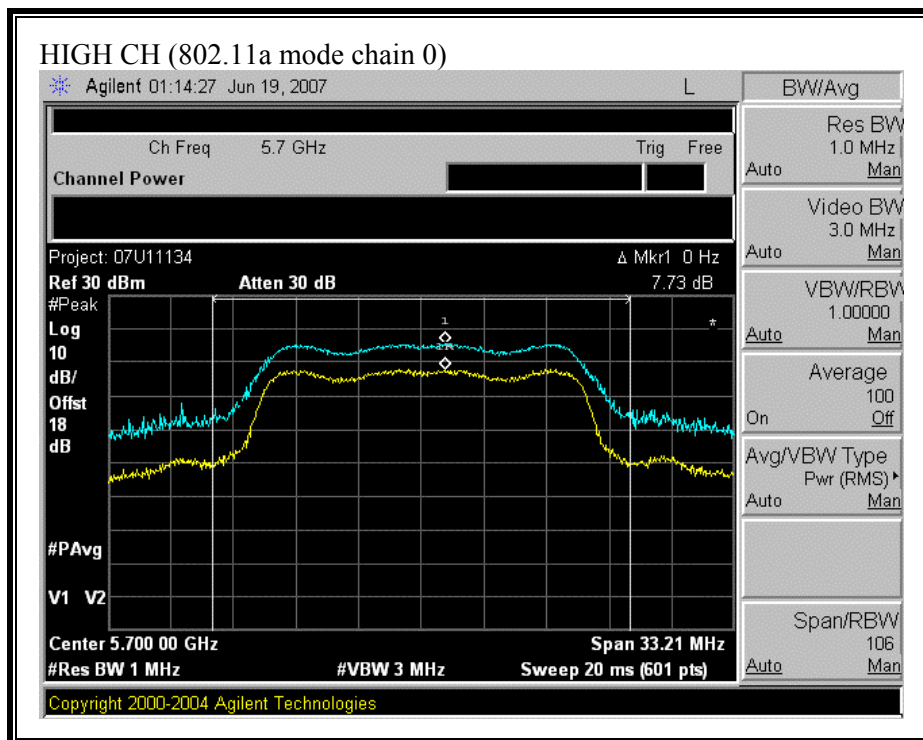
802.11n HT20 Mode

Low	5500	8.89	10.52	13	-2.48
Mid	5600	9.10	9.80	13	-3.20
High	5700	9.45	10.11	13	-2.89

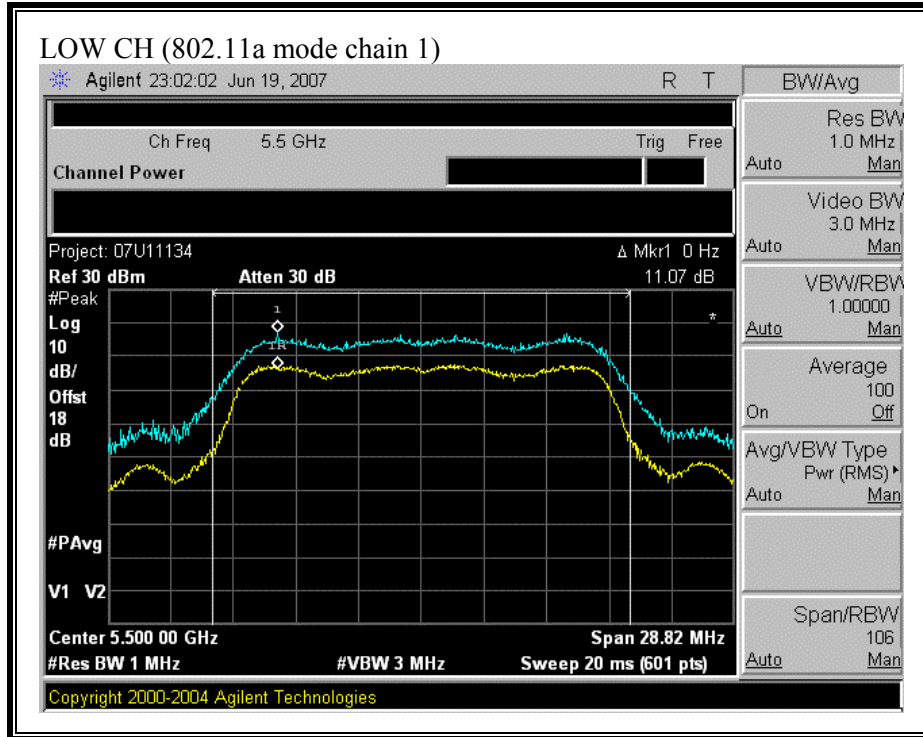
(802.11a MODE CHAIN 0)

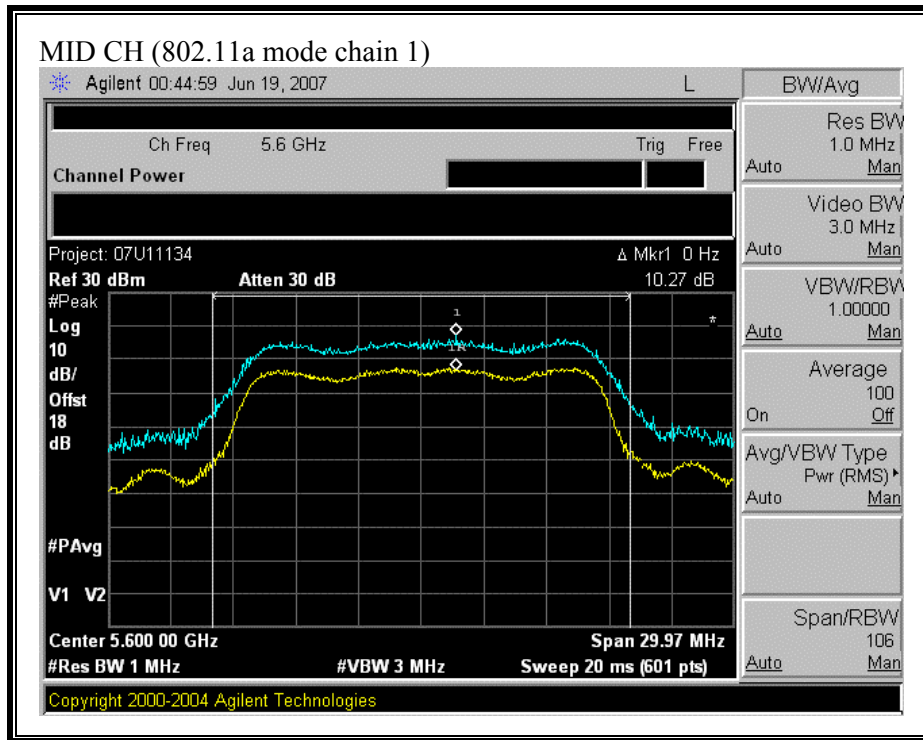


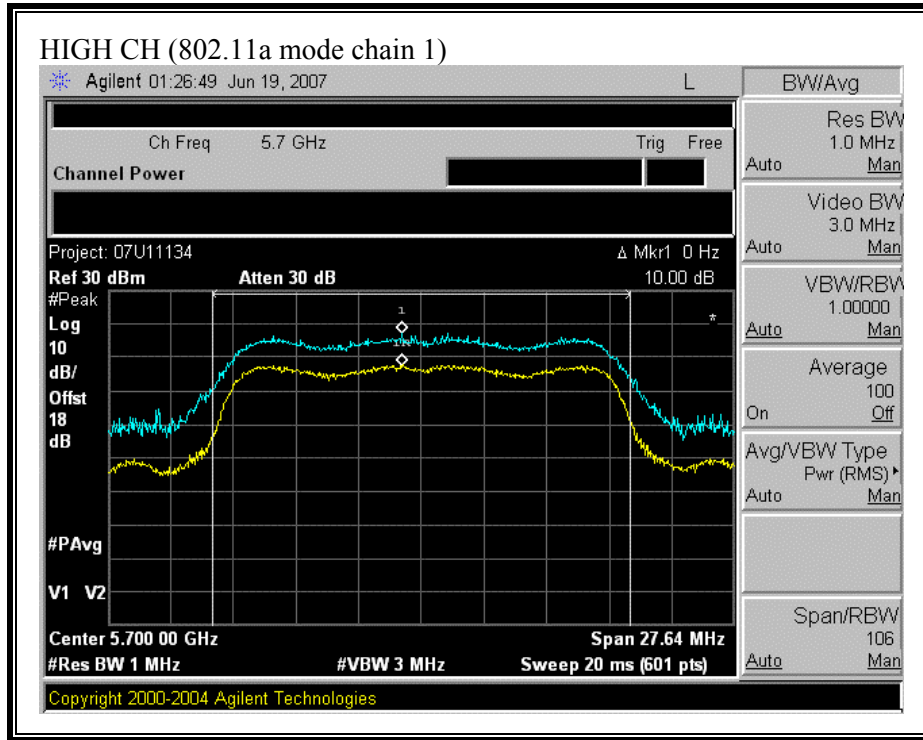




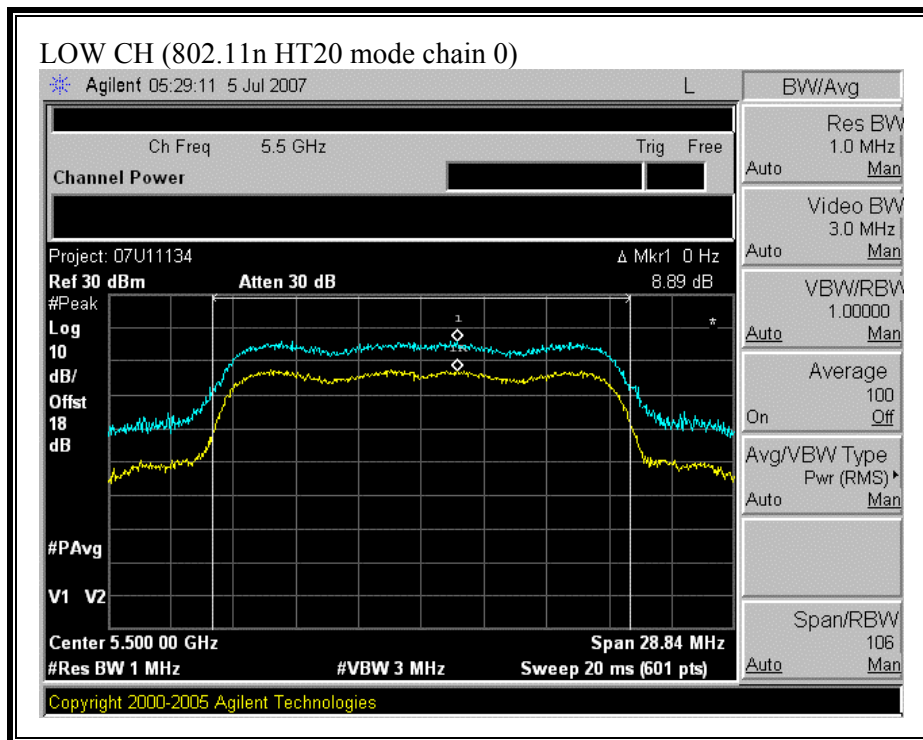
(802.11a MODE CHAIN 1)

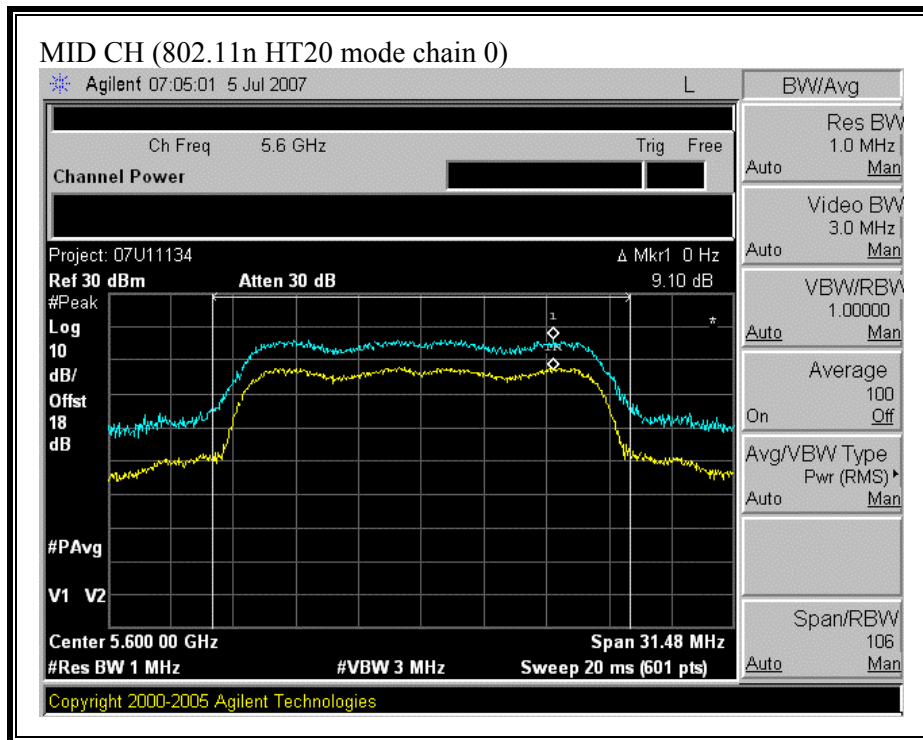


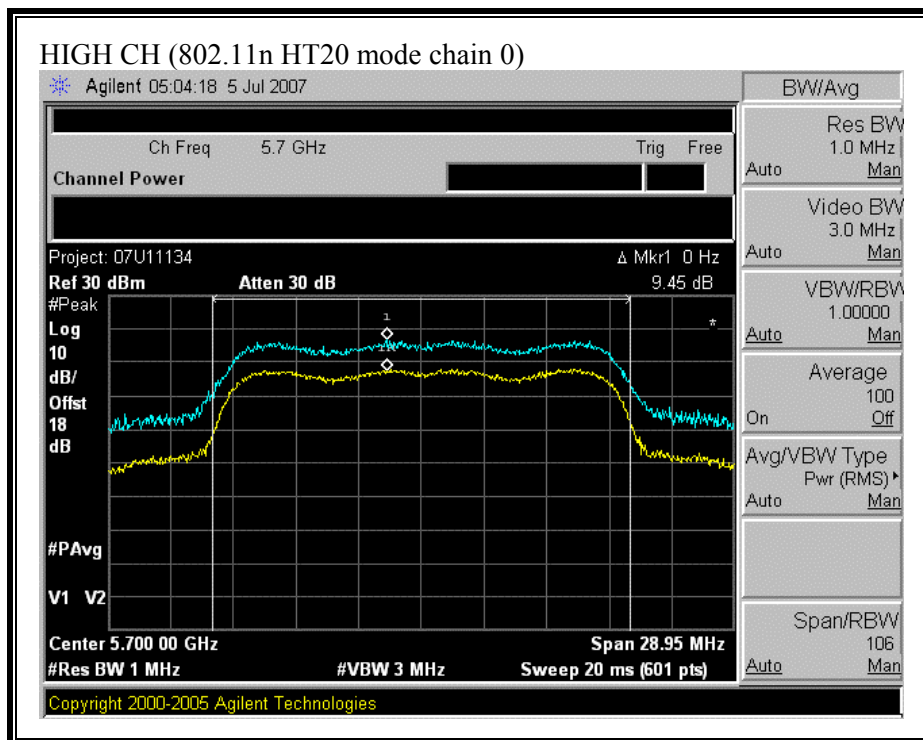




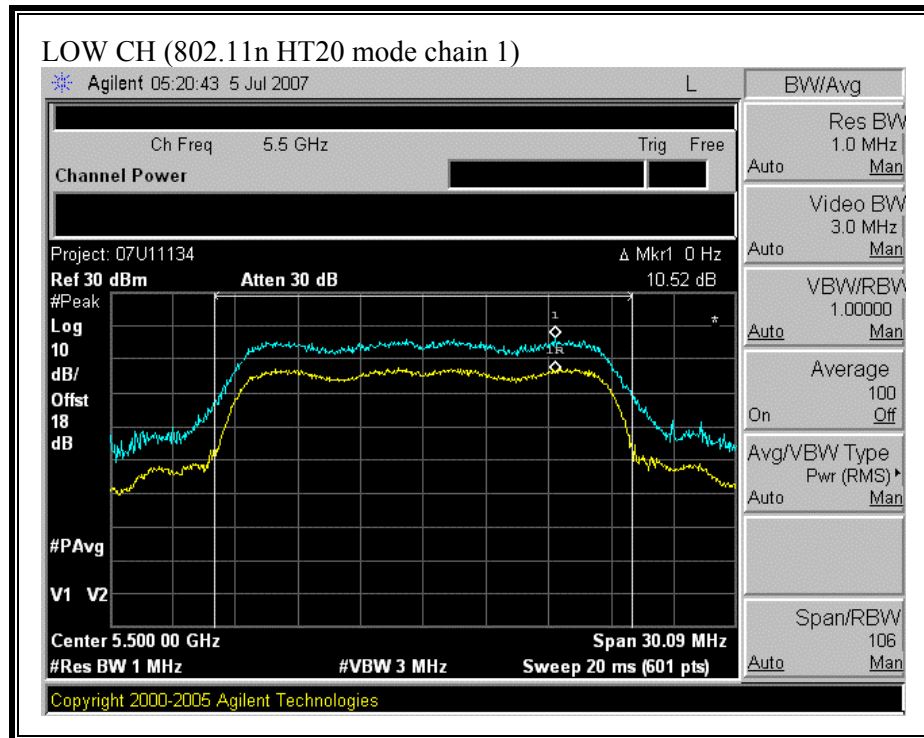
(802.11n HT20 MODE CHAIN 0)

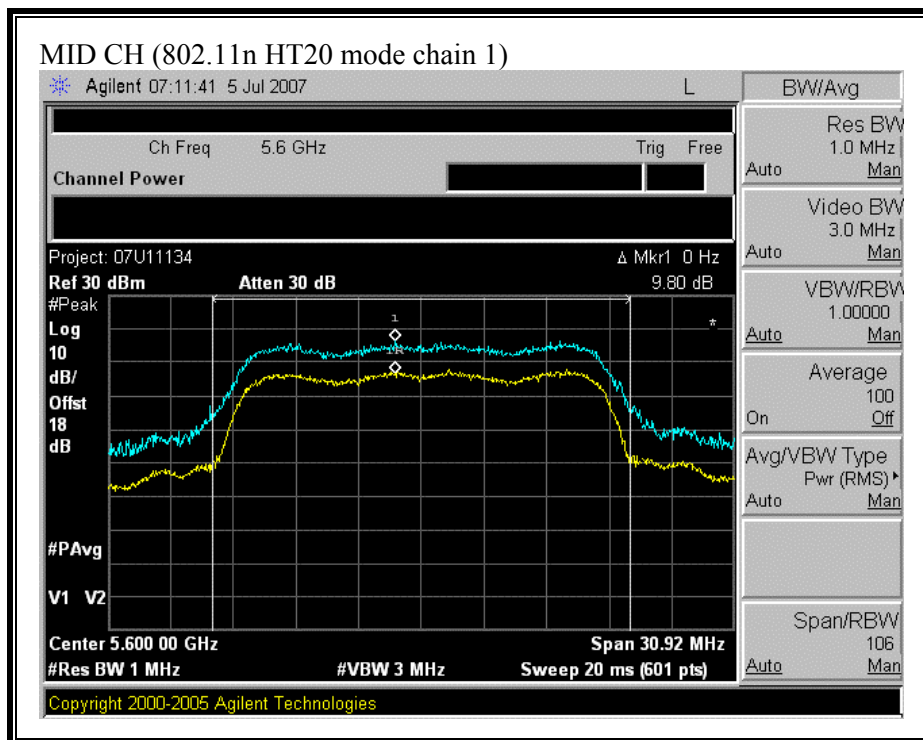


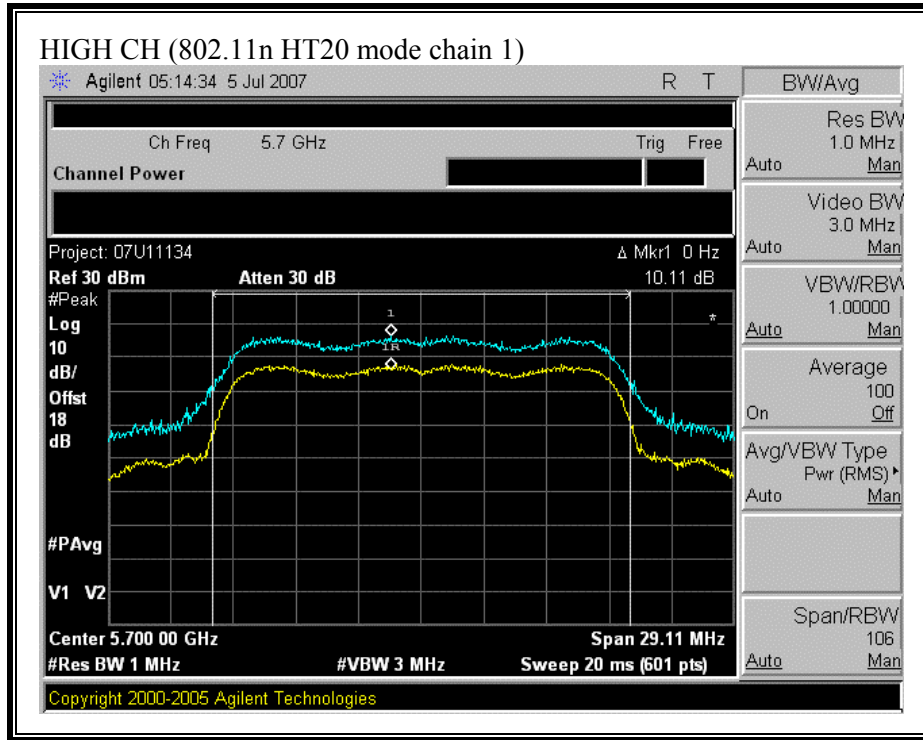




(802.11 HT20 MODE CHAIN 1)







7.2.5. 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.

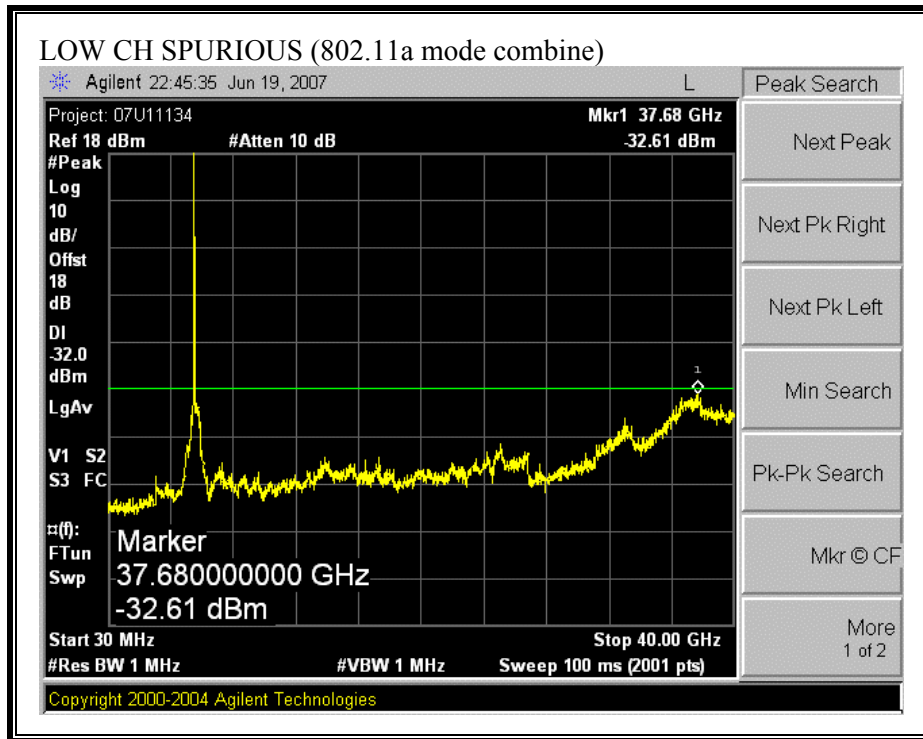
The transmitter output is connected to the spectrum analyzer. The resolution bandwidth is set to 1 MHz. The video bandwidth is set to 1 MHz. Peak detection measurements are compared to the average EIRP limit, adjusted for the maximum antenna gain. If necessary, additional average detection measurements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

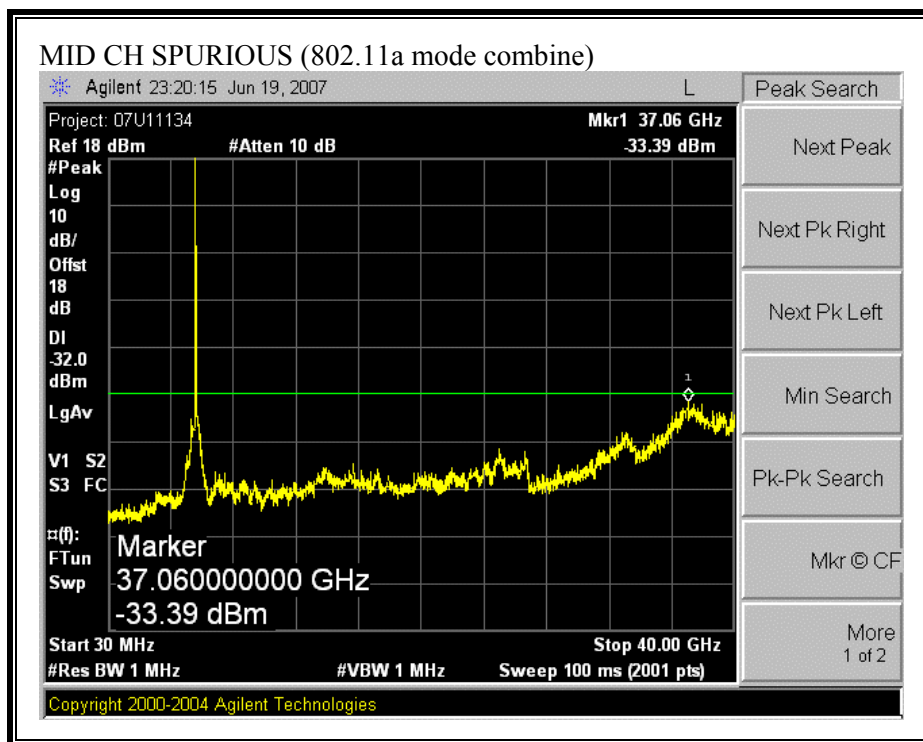
Measurements are made over the 30 MHz to 40 GHz range with the transmitter set to the lowest, middle, and highest channels.

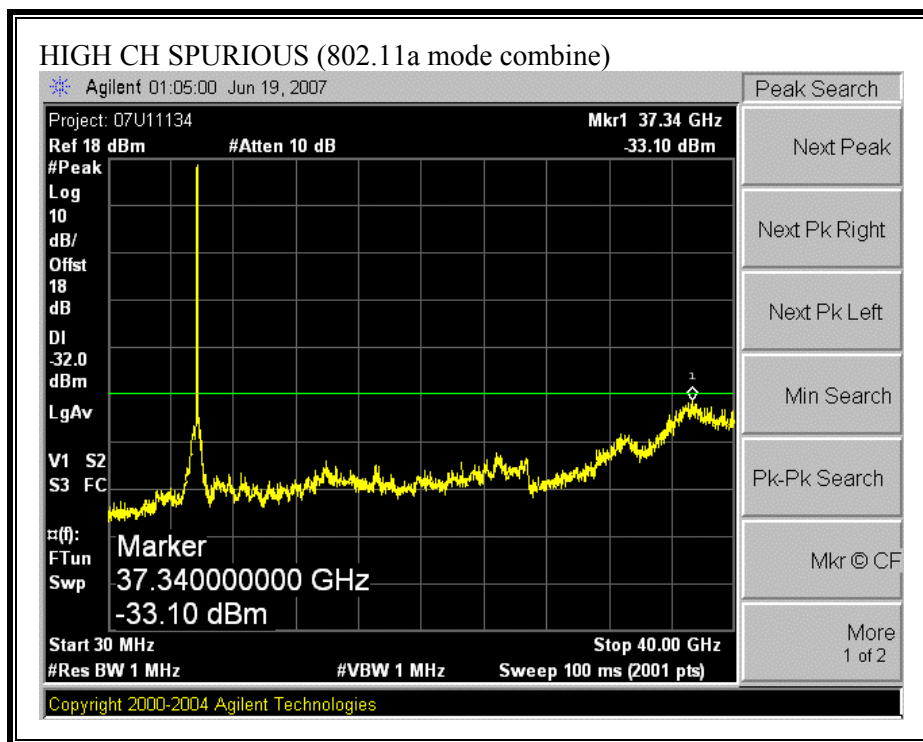
RESULTS

No non-compliance noted:

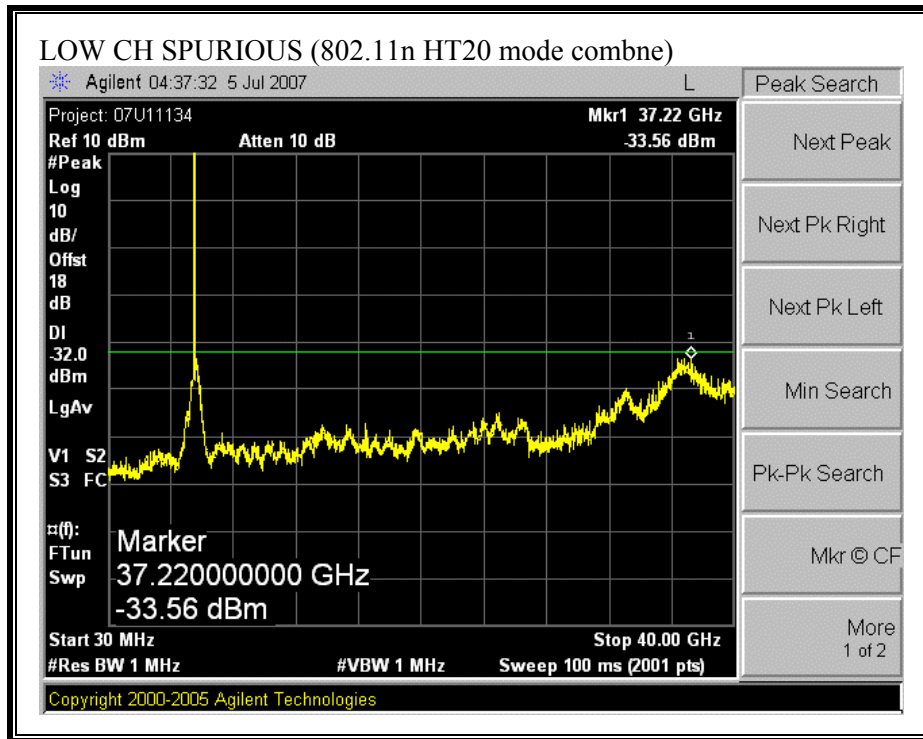
SPURIOUS EMISSIONS (802.11a MODE COMBINE)

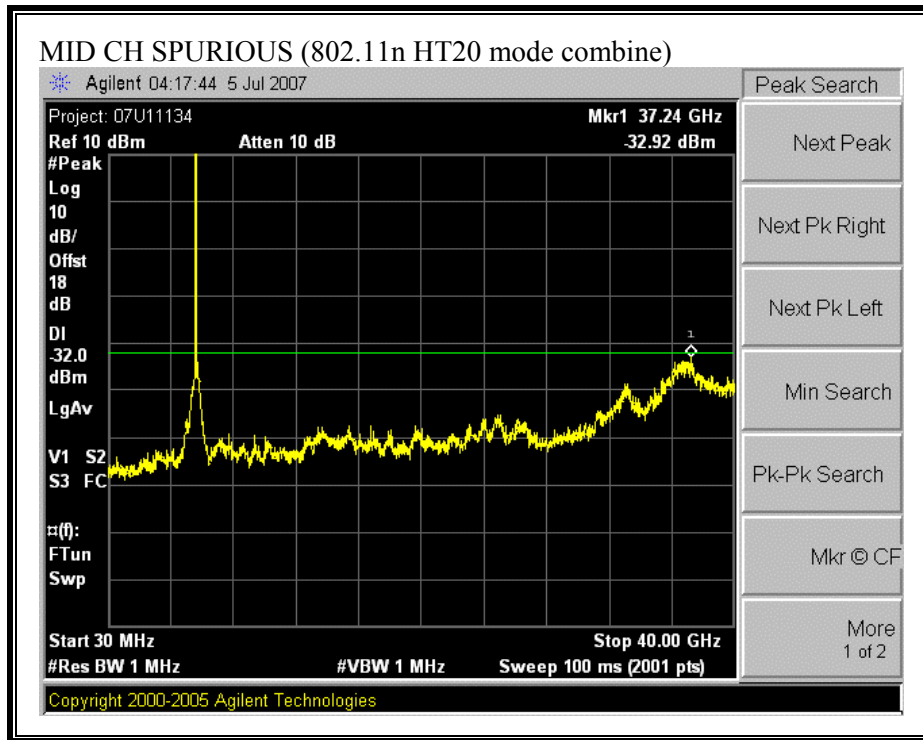


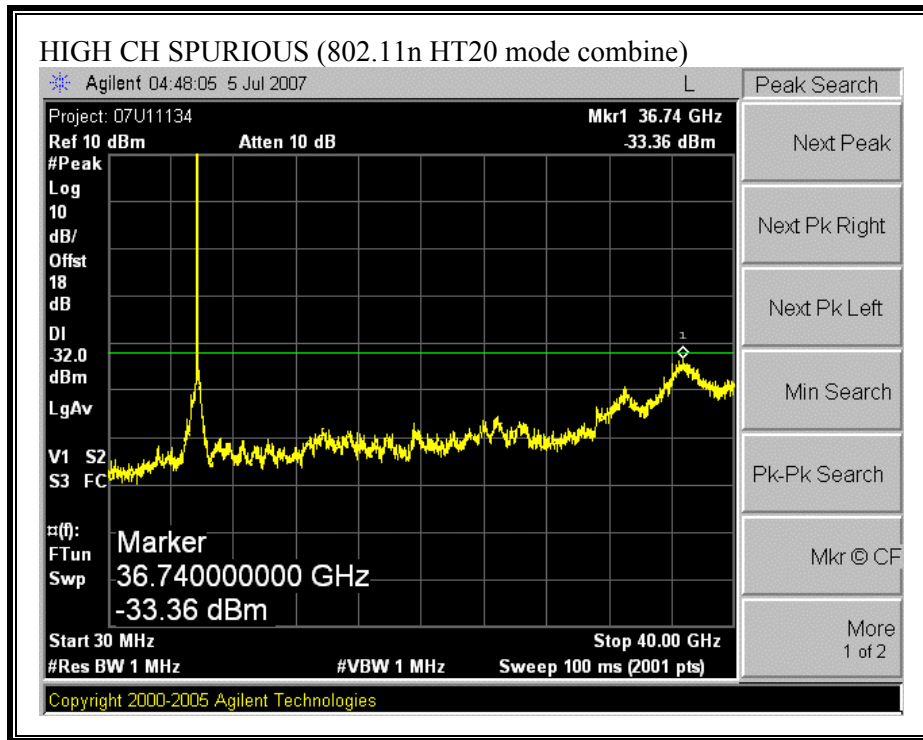




SPURIOUS EMISSIONS (802.11n HT20 MODE COMBINE)







7.3. RADIATED EMISSIONS

7.3.1. TRANSMITTER RADIATED SPURIOUS EMISSIONS

LIMITS

§15.205 (a) Except as shown in paragraph (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
¹ 0.495 - 0.505	16.69475 - 16.69525	608 - 614	5.35 - 5.46
2.1735 - 2.1905	16.80425 - 16.80475	960 - 1240	7.25 - 7.75
4.125 - 4.128	25.5 - 25.67	1300 - 1427	8.025 - 8.5
4.17725 - 4.17775	37.5 - 38.25	1435 - 1626.5	9.0 - 9.2
4.20725 - 4.20775	73 - 74.6	1645.5 - 1646.5	9.3 - 9.5
6.215 - 6.218	74.8 - 75.2	1660 - 1710	10.6 - 12.7
6.26775 - 6.26825	108 - 121.94	1718.8 - 1722.2	13.25 - 13.4
6.31175 - 6.31225	123 - 138	2200 - 2300	14.47 - 14.5
8.291 - 8.294	149.9 - 150.05	2310 - 2390	15.35 - 16.2
8.362 - 8.366	156.52475 - 156.52525	2483.5 - 2500	17.7 - 21.4
8.37625 - 8.38675	156.7 - 156.9	2655 - 2900	22.01 - 23.12
8.41425 - 8.41475	162.0125 - 167.17	3260 - 3267	23.6 - 24.0
12.29 - 12.293	167.72 - 173.2	3332 - 3339	31.2 - 31.8
12.51975 - 12.52025	240 - 285	3345.8 - 3358	36.43 - 36.5
12.57675 - 12.57725	322 - 335.4	3600 - 4400	(²)
13.36 - 13.41			

¹ Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz.

² Above 38.6

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

§15.209 (a) Except as provided elsewhere in this Subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
30 - 88	100 **	3
88 - 216	150 **	3
216 - 960	200 **	3
Above 960	500	3

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

§15.209 (b) In the emission table above, the tighter limit applies at the band edges.

TEST PROCEDURE

The EUT is placed on a non-conducting table 80 cm above the ground plane. The antenna to EUT distance is 3 meters. The EUT is configured in accordance with ANSI C63.4. The EUT is set to transmit in a continuous mode.

For measurements below 1 GHz the resolution bandwidth is set to 100 kHz for peak detection measurements or 120 kHz for quasi-peak detection measurements. Peak detection is used unless otherwise noted as quasi-peak.

For measurements above 1 GHz the resolution bandwidth is set to 1 MHz, then the video bandwidth is set to 1 MHz for peak measurements and 10 Hz for average measurements.

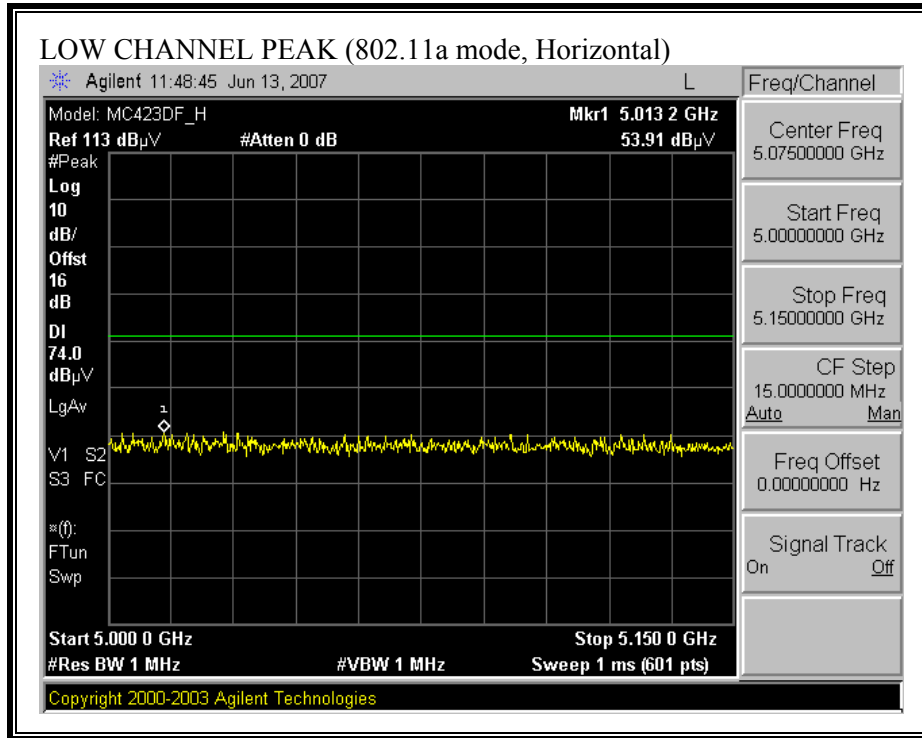
The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in the 2.4 GHz band.

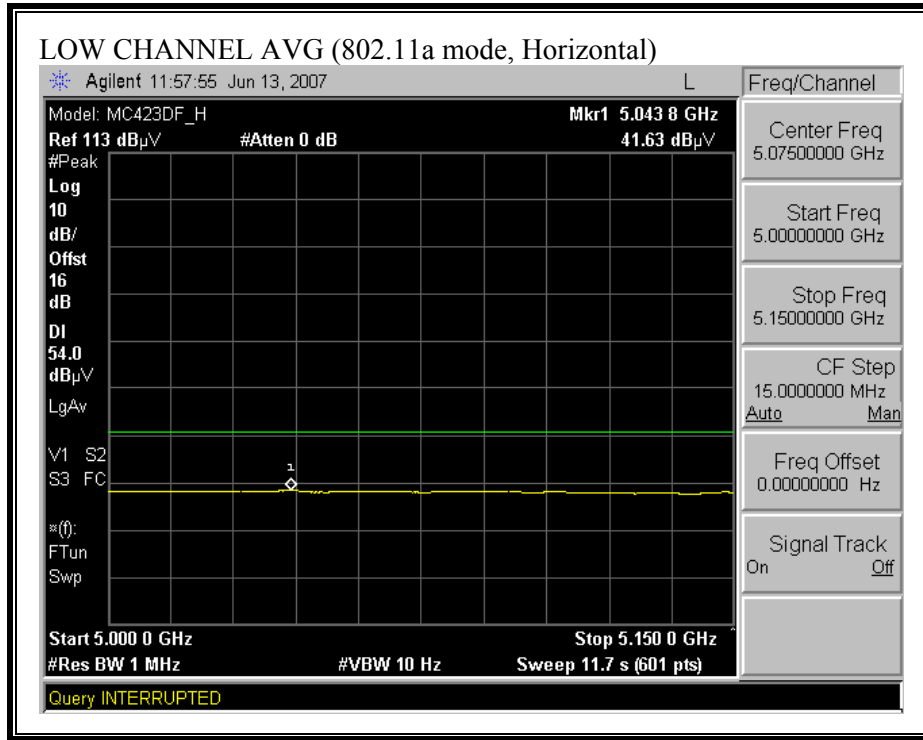
The spectrum from 30 MHz to 40 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in each 5 GHz band.

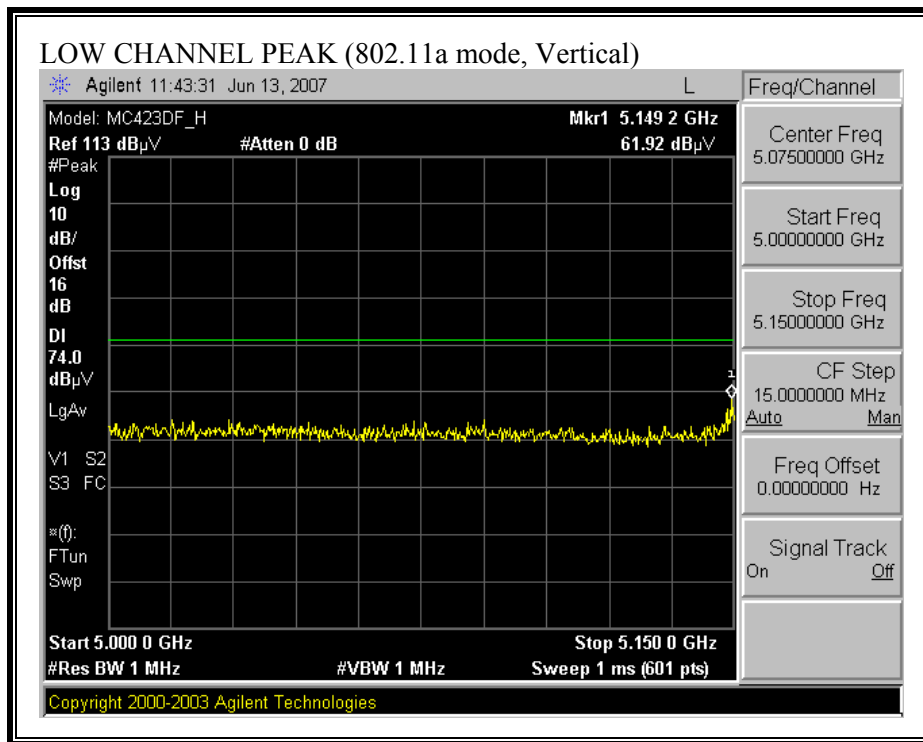
The frequency range of interest is monitored at a fixed antenna height and EUT azimuth. The EUT is rotated through 360 degrees to maximize emissions received. The antenna is scanned from 1 to 4 meters above the ground plane to further maximize the emission. Measurements are made with the antenna polarized in both the vertical and the horizontal positions.

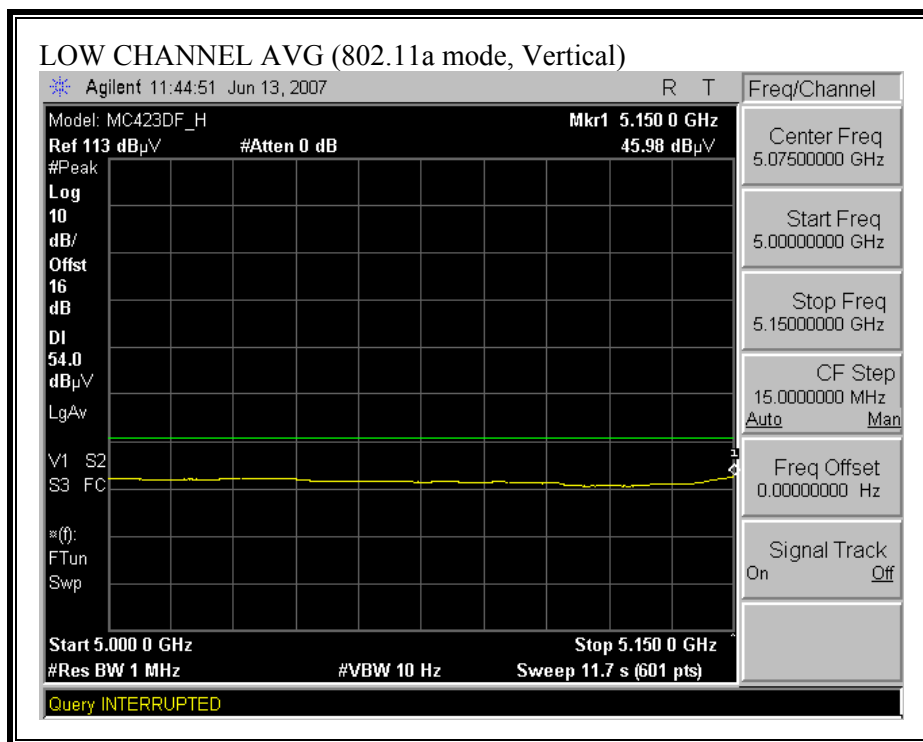
7.3.2. TRANSMITTER ABOVE 1 GHz FOR 5150 TO 5350 MHz BAND

RESTRICTED BANDEDGE (802.11a MODE, LOW CHANNEL)

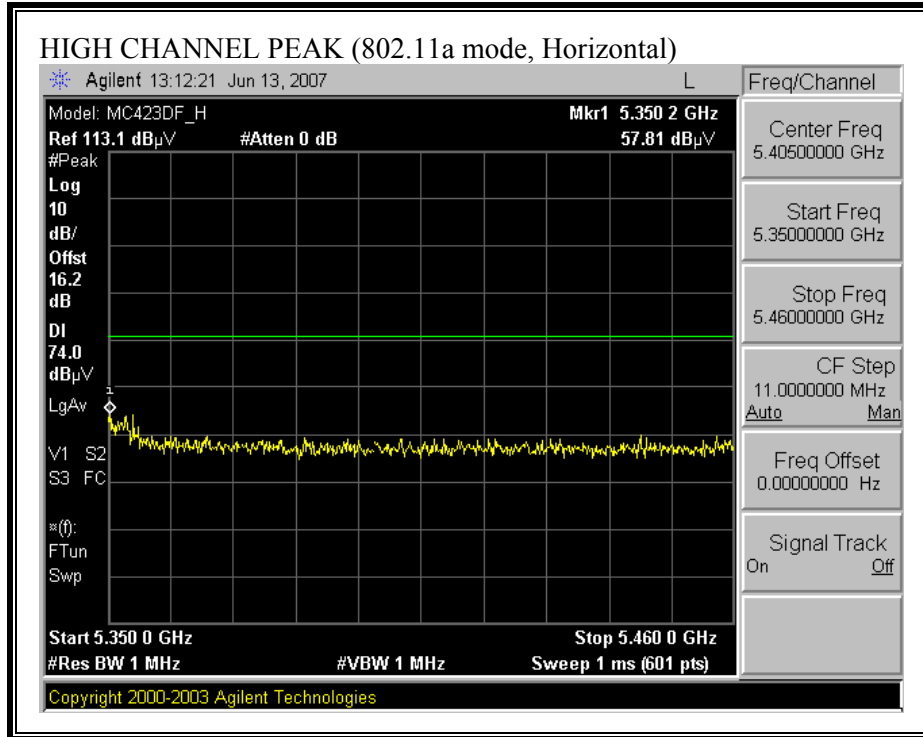


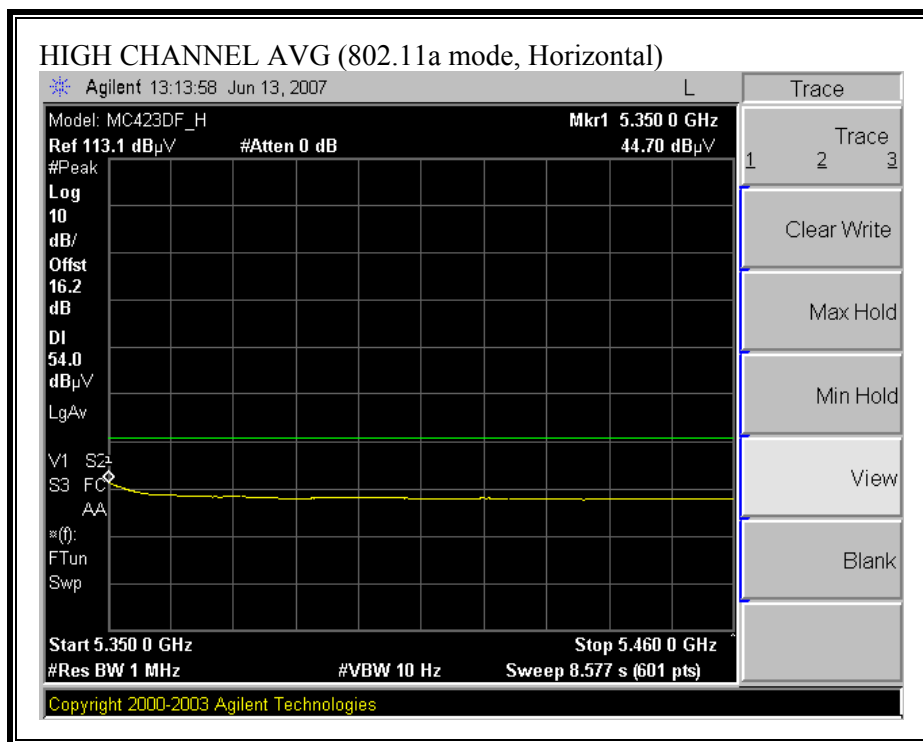


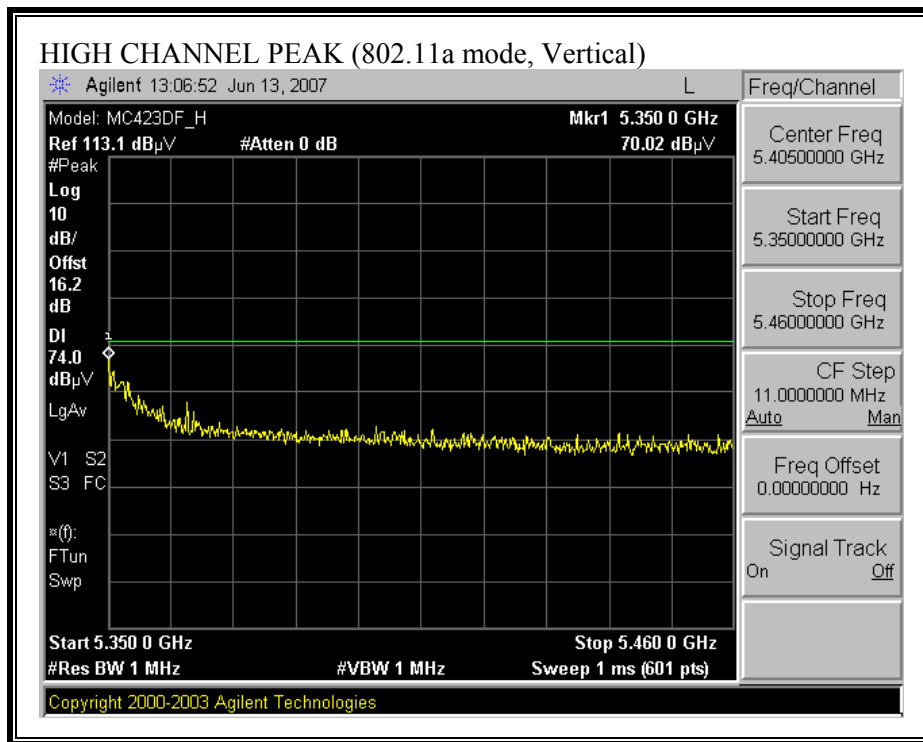


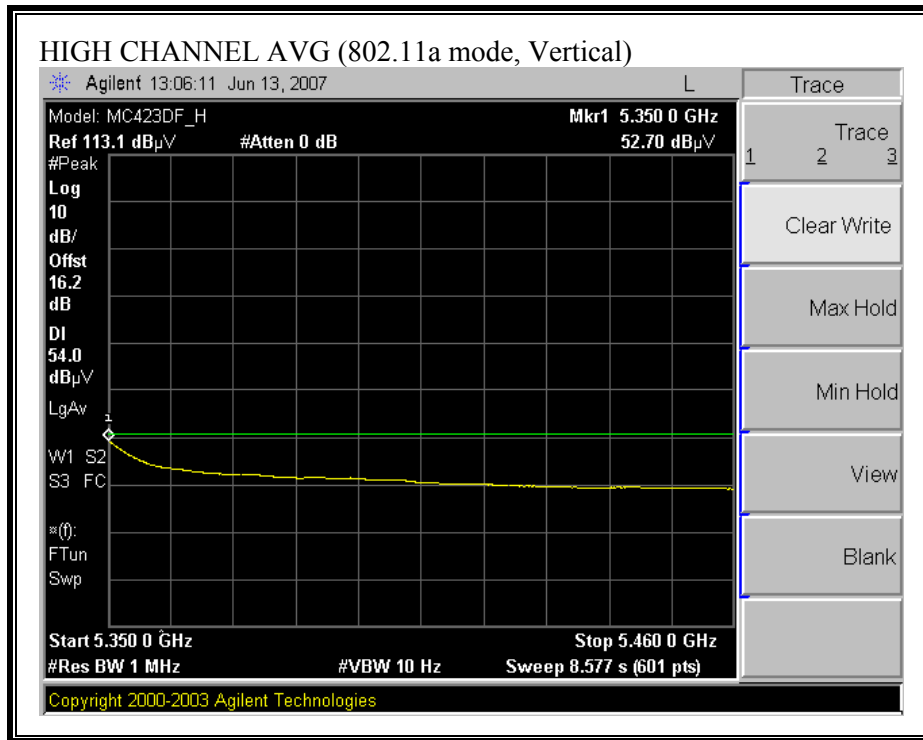


RESTRICTED BANDEDGE (802.11a MODE, HIGH CHANNEL)









HARMONICS AND SPURIOUS EMISSIONS (802.11a MODE)

High Frequency Measurement
 Compliance Certification Services, Morgan Hill Open Field Site

Company: Qualcomm
 Project #: 07U11134
 Date: 6/15/2007 and 7/16/2007
 Test Engineer: William Zhuang
 Configuration: EUT with Laptop
 Mode: Transmit, a Legacy Mode, Low Band

Test Equipment:

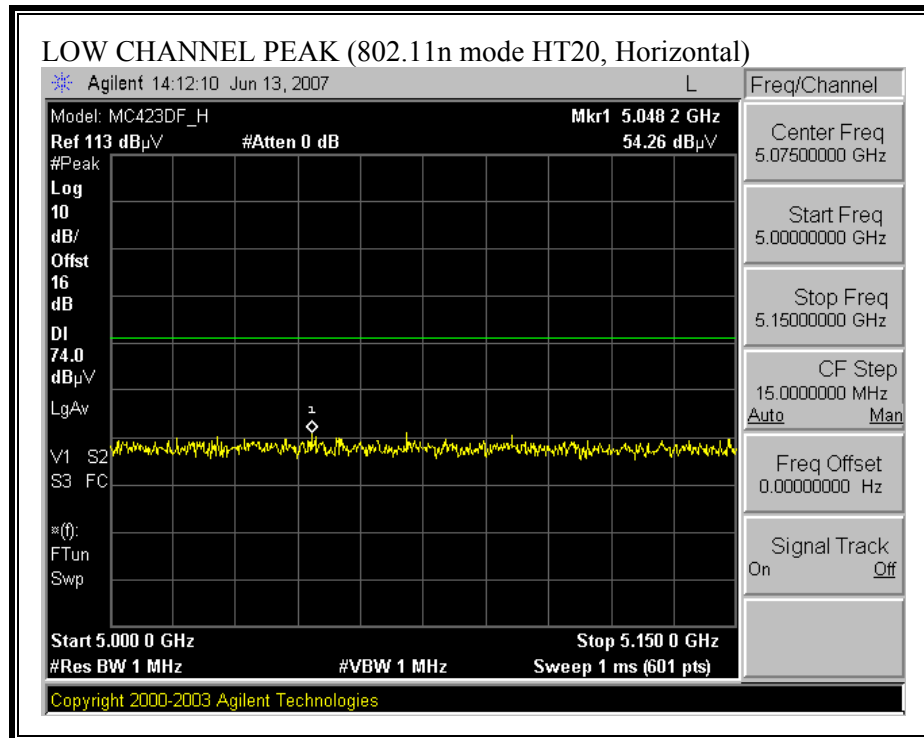
Horn 1-18GHz	Pre-amplifier 1-26GHz	Pre-amplifier 26-40GHz	Horn > 18GHz	Limit
T73; S/N: 6717 @3m	T145 Agilent 3008A005			FCC 15.209

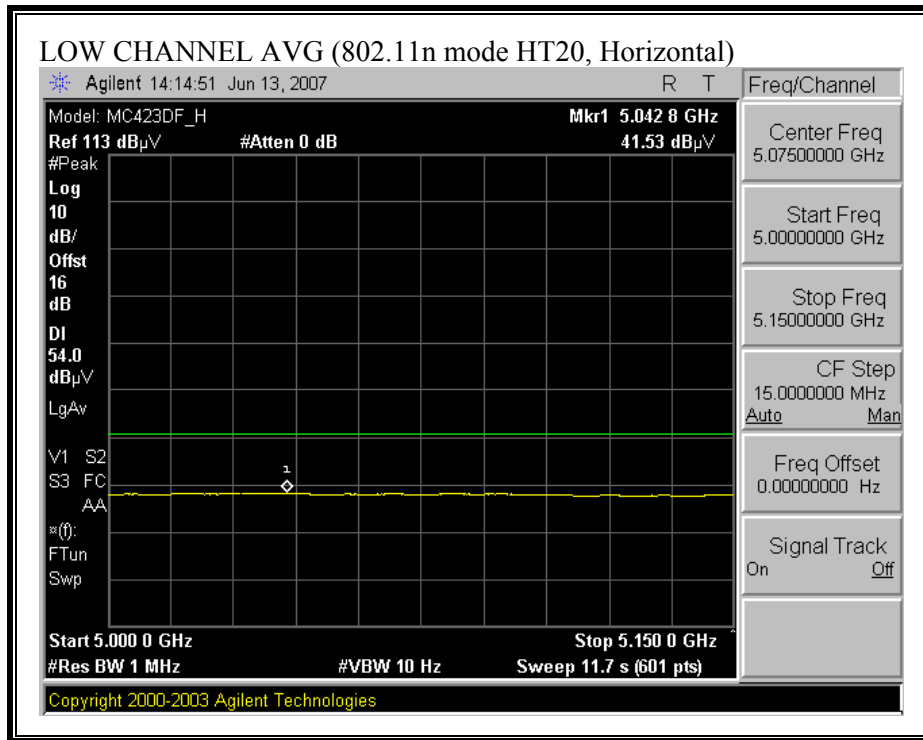
Hi Frequency Cables

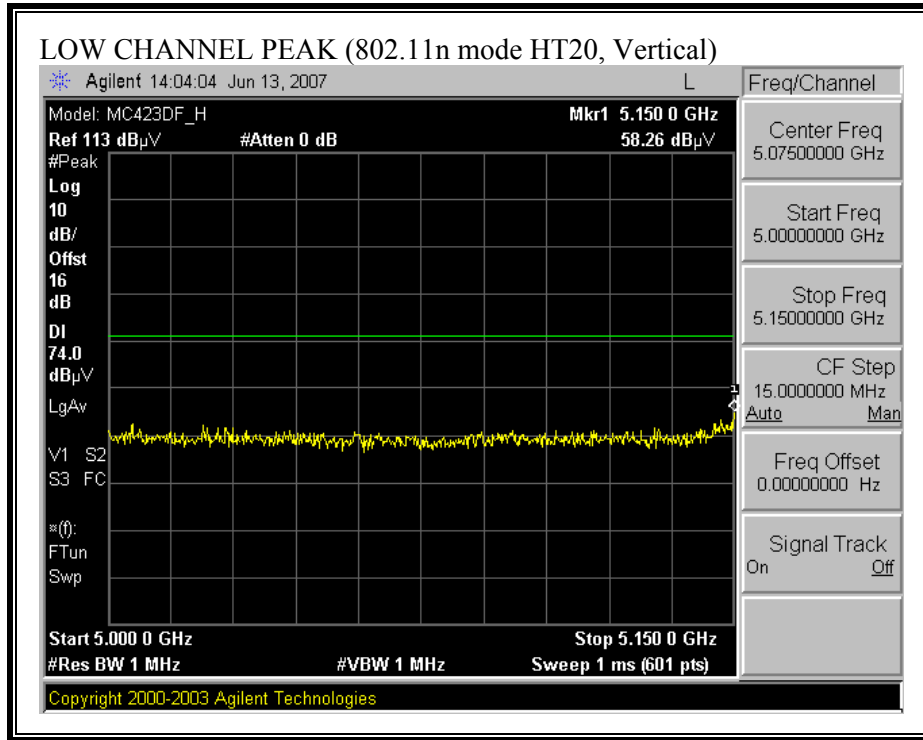
2 foot cable	3 foot cable	12 foot cable	HPF	Reject Filter	Peak Measurements RBW=VBW=1MHz Average Measurements RBW=1MHz ; VBW=10Hz
		Gordon 203134001	HPF_7.6GHz		

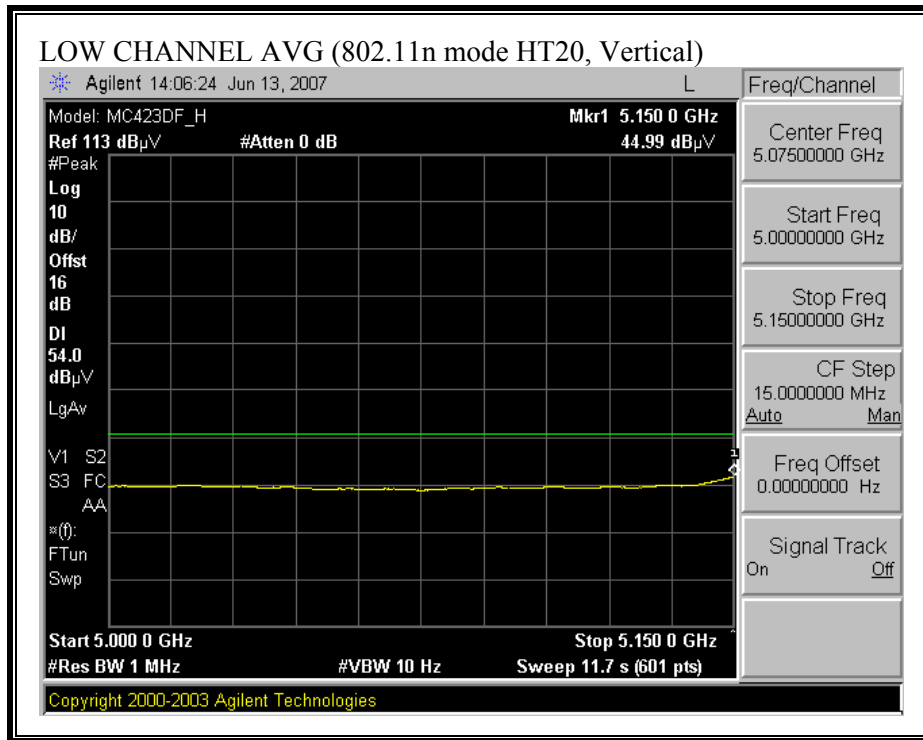
f GHz	Dist (m)	Read Pk dBuV	Read Avg. dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fitr dB	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes (V/H)
Low Ch. 5180MHz															
10.360	3.0	36.1	23.8	37.0	10.4	-34.6	0.0	0.8	49.7	37.4	74	54	-24.3	-16.6	V
15.540	3.0	36.6	23.4	38.1	12.7	-32.3	0.0	0.7	55.8	42.6	74	54	-18.2	-11.4	V
10.360	3.0	36.6	23.7	37.0	10.4	-34.6	0.0	0.8	50.2	37.3	74	54	-23.8	-16.7	H
15.540	3.0	36.5	23.3	38.1	12.7	-32.3	0.0	0.7	55.7	42.5	74	54	-18.3	-11.5	H
Mid Ch. 5260MHz															
10.520	3.0	46.6	34.2	37.1	10.6	-34.4	0.0	0.8	60.6	48.3	74	54	-13.4	-5.7	V
15.780	3.0	45.7	29.3	37.5	12.8	-32.2	0.0	0.7	64.4	48.0	74	54	-9.6	-6.0	V
10.520	3.0	46.0	33.9	37.1	10.6	-34.4	0.0	0.8	60.0	48.0	74	54	-14.0	-6.0	H
15.780	3.0	37.1	24.0	37.5	12.8	-32.2	0.0	0.7	55.8	42.7	74	54	-18.2	-11.3	H
High Ch. 5320MHz															
10.640	3.0	44.3	32.1	37.1	10.7	-34.2	0.0	0.8	58.7	46.4	74	54	-15.3	-7.6	V
15.960	3.0	46.8	28.4	37.1	12.8	-32.2	0.0	0.7	65.2	46.8	74	54	-8.8	-7.2	V
10.640	3.0	42.1	31.0	37.1	10.7	-34.2	0.0	0.8	56.5	45.3	74	54	-17.5	-8.7	H
15.960	3.0	40.4	27.8	37.1	12.8	-32.2	0.0	0.7	58.8	46.2	74	54	-15.2	-7.8	H

RESTRICTED BANDEDGE (802.11n MODE HT20, LOW CHANNEL)

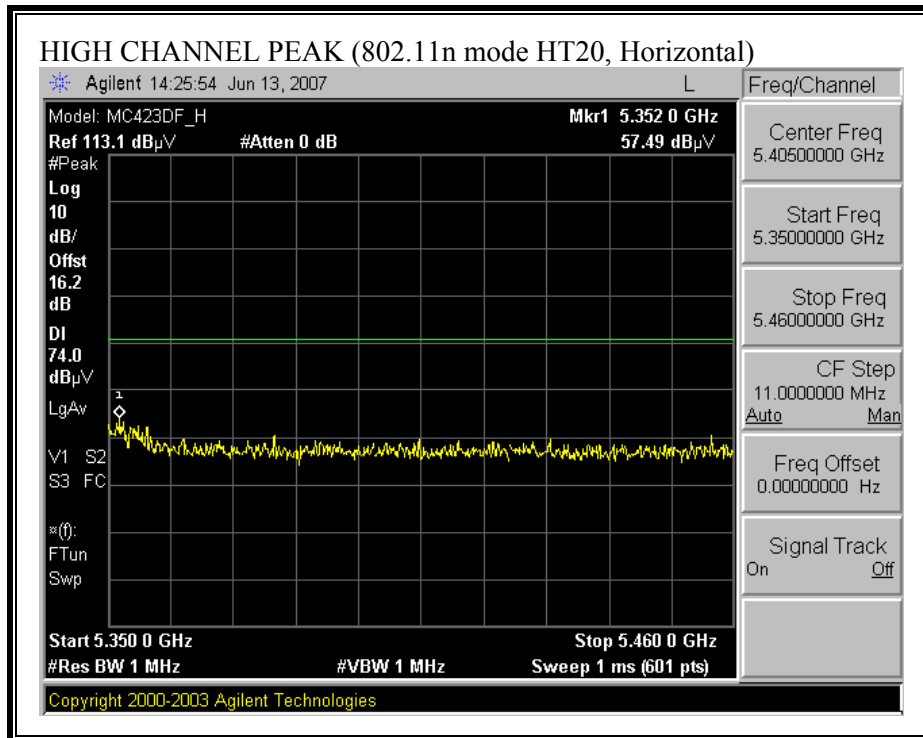


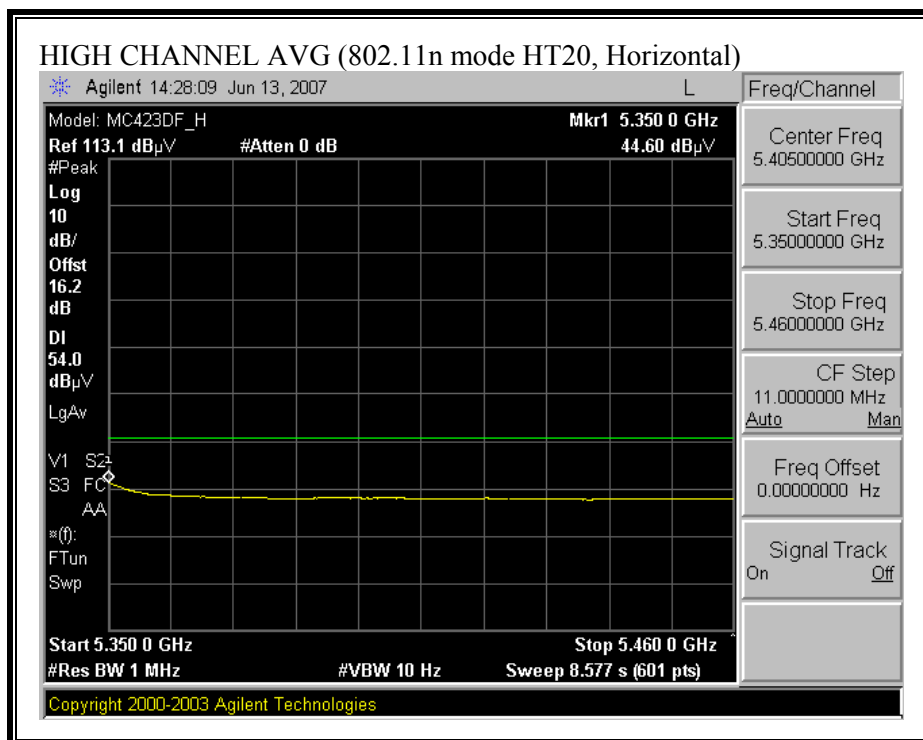


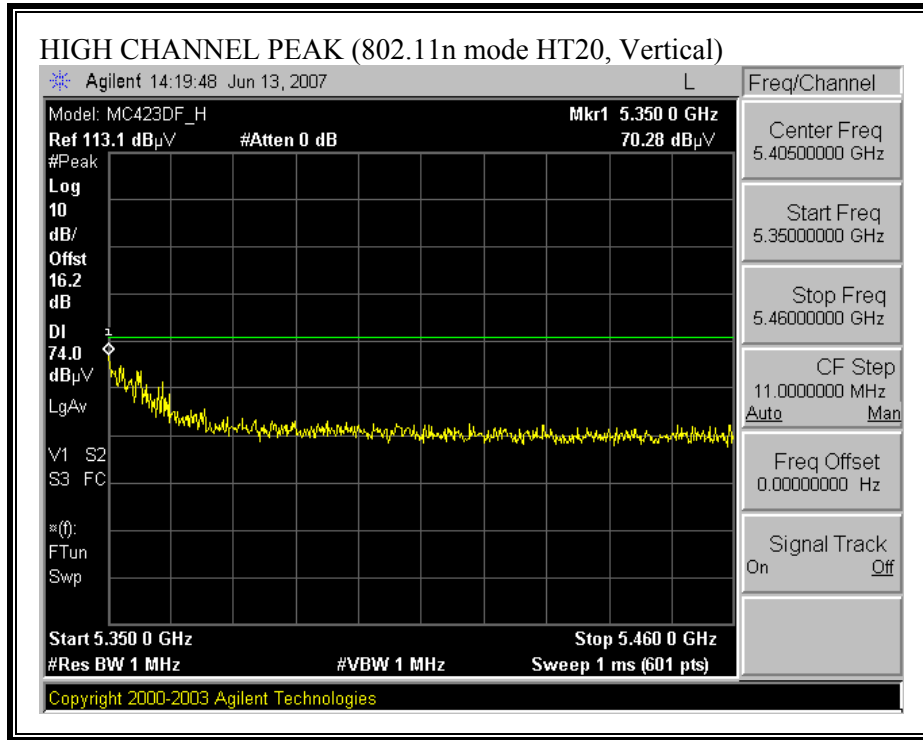


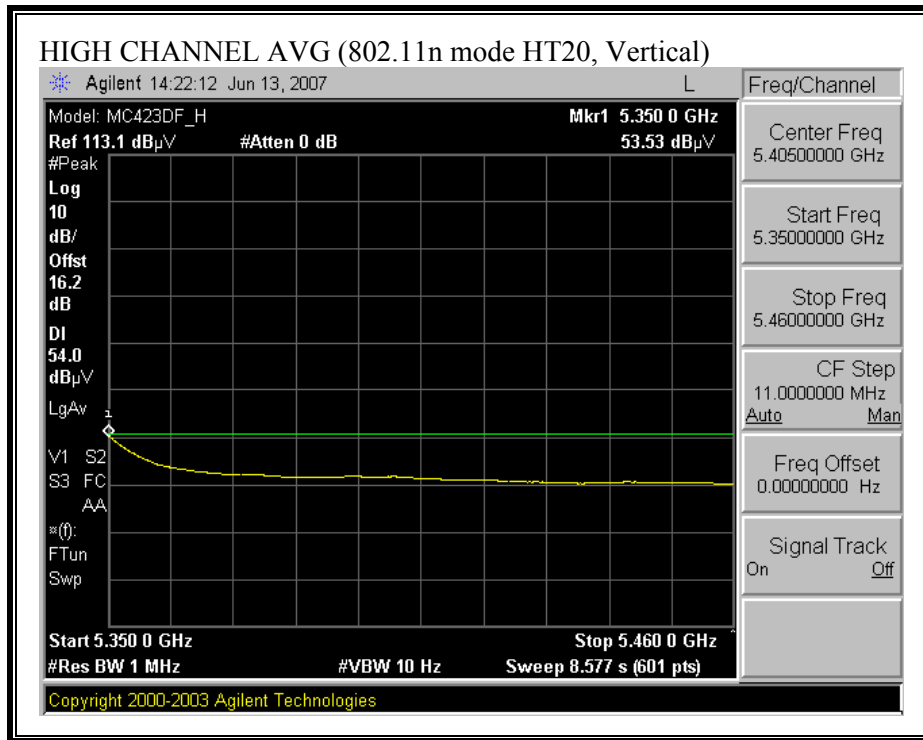


RESTRICTED BANDEDGE (802.11n MODE HT20, HIGH CHANNEL)









HARMONICS AND SPURIOUS EMISSIONS (802.11n MODE HT20)

High Frequency Measurement
 Compliance Certification Services, Morgan Hill Open Field Site

Company: Qualcomm
 Project #: 07U11134
 Date: 6/20/2007 and 7/16/2007
 Test Engineer: William Zhuang
 Configuration: EUT with Laptop
 Mode: Transmit, a HT20 Mode, Low Band

Test Equipment:

Horn 1-18GHz	Pre-amplifier 1-26GHz	Pre-amplifier 26-40GHz	Horn > 18GHz	Limit
T60; S/N: 2238 @3m	T145 Agilent 3008A005			FCC 15.209

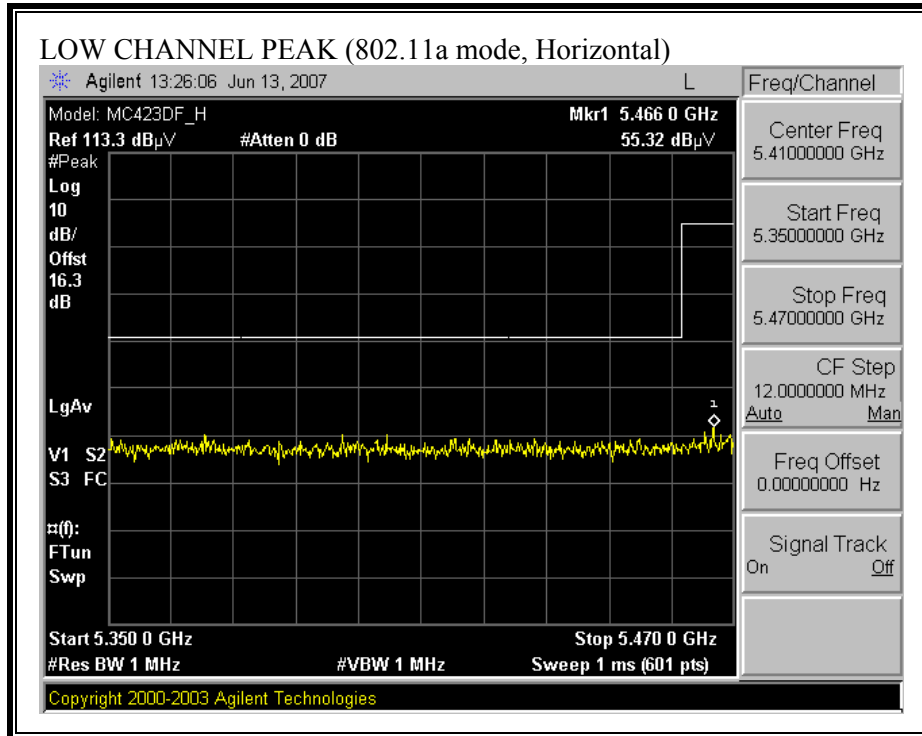
Hi Frequency Cables

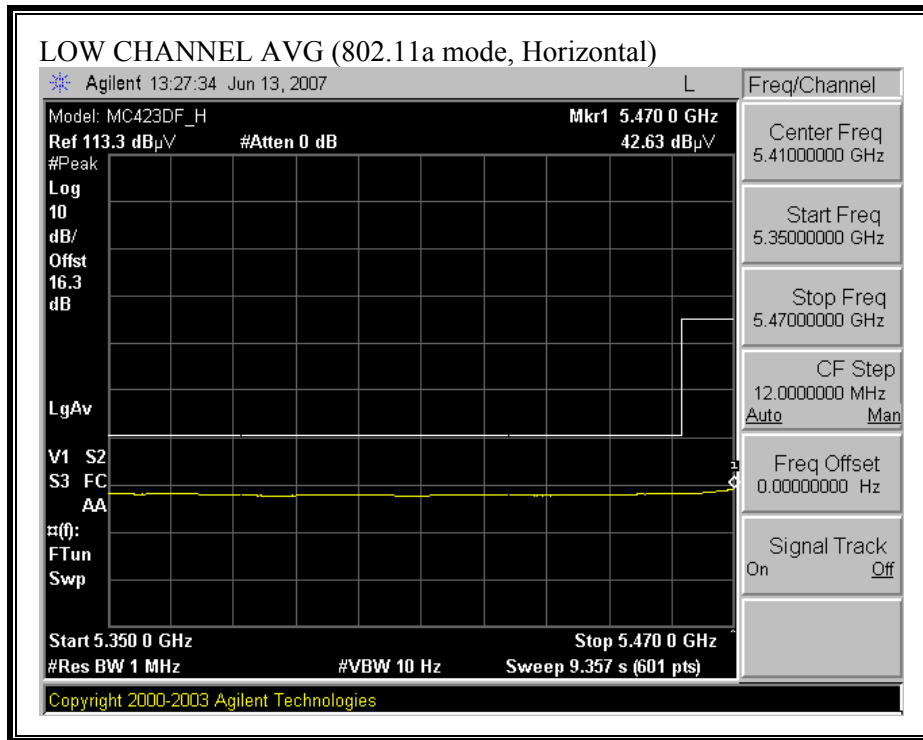
2 foot cable	3 foot cable	12 foot cable	HPF	Reject Filter	Peak Measurements RBW=VBW=1MHz Average Measurements RBW=1MHz ; VBW=10Hz
		Gordon 203134001	HPF_7.6GHz		

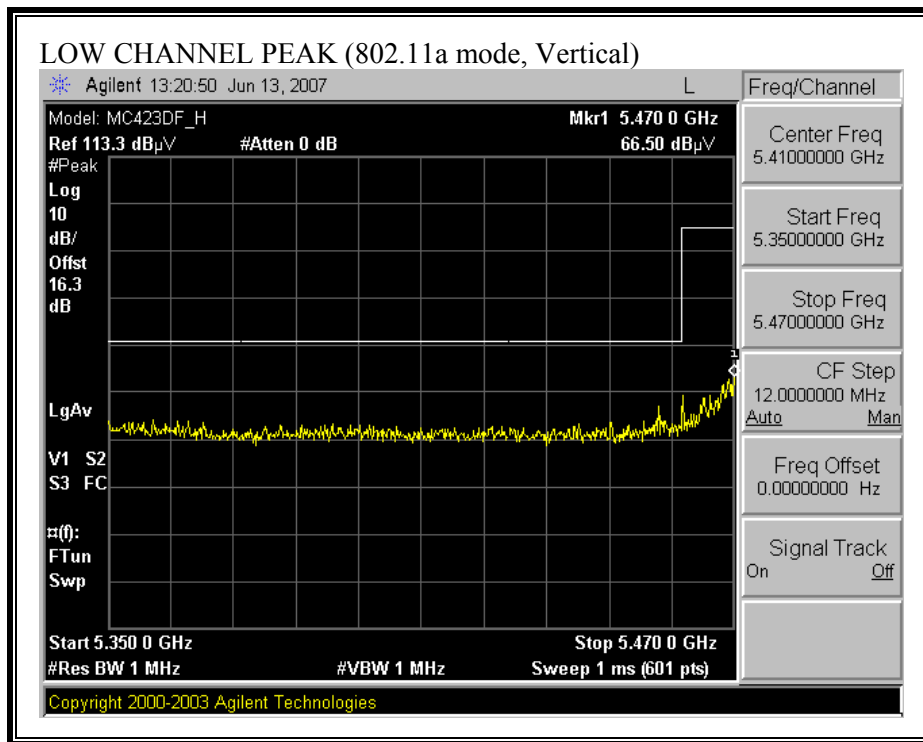
f GHz	Dist (m)	Read Pk dBuV	Read Avg. dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fitr dB	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes (V/H)
Low Ch. 5180MHz															
10.360	3.0	37.9	26.2	37.4	10.4	-34.6	0.0	0.8	51.9	40.1	74	54	-22.1	-13.9	V
15.540	3.0	43.0	26.7	38.0	12.7	-32.3	0.0	0.7	62.1	45.8	74	54	-11.9	-8.2	V
10.360	3.0	36.3	23.9	37.4	10.4	-34.6	0.0	0.8	50.3	37.9	74	54	-23.7	-16.1	H
15.540	3.0	40.6	27.3	38.0	12.7	-32.3	0.0	0.7	59.7	46.4	74	54	-14.3	-7.6	H
Mid Ch. 5260MHz															
10.520	3.0	41.1	28.2	37.4	10.6	-34.4	0.0	0.8	55.4	42.5	74	54	-18.6	-11.5	V
15.780	3.0	47.1	32.6	37.9	12.8	-32.2	0.0	0.7	66.2	51.8	74	54	-7.8	-2.2	V
10.520	3.0	39.7	26.8	37.4	10.6	-34.4	0.0	0.8	54.0	41.1	74	54	-20.0	-12.9	H
15.780	3.0	41.2	28.4	37.9	12.8	-32.2	0.0	0.7	60.3	47.5	74	54	-13.7	-6.5	H
High Ch. 5320MHz															
10.640	3.0	42.1	30.3	37.3	10.7	-34.2	0.0	0.8	56.7	44.9	74	54	-17.3	-9.1	V
15.960	3.0	46.2	33.0	37.8	12.8	-32.2	0.0	0.7	65.4	52.2	74	54	-8.6	-1.8	V
10.640	3.0	42.3	30.7	37.3	10.7	-34.2	0.0	0.8	56.9	45.3	74	54	-17.1	-8.7	H
15.960	3.0	38.2	25.1	37.8	12.8	-32.2	0.0	0.7	57.4	44.3	74	54	-16.6	-9.7	H

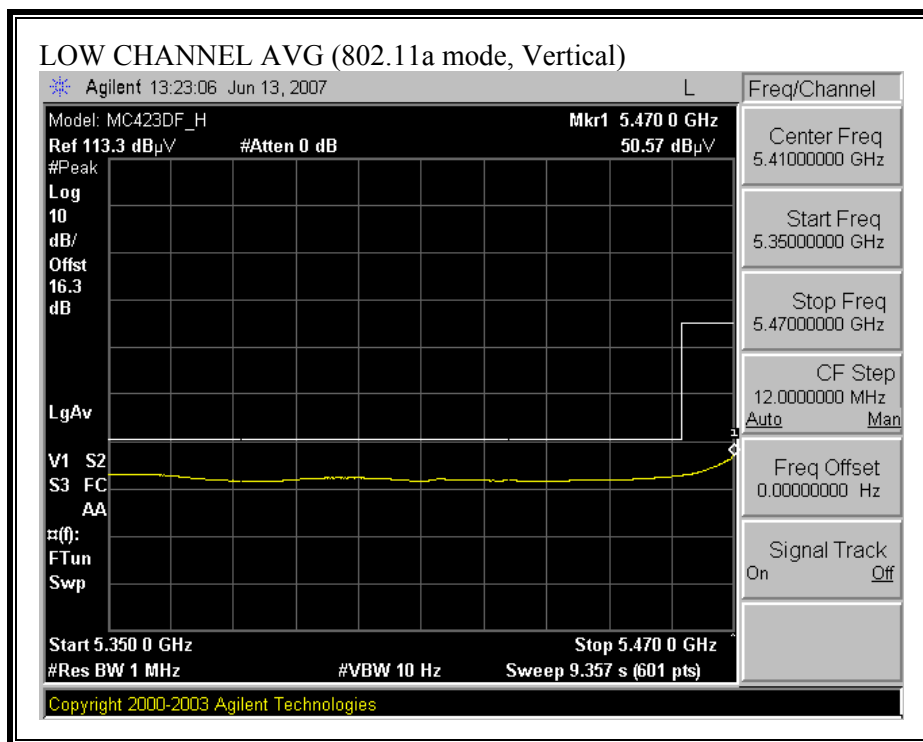
7.3.3. TRANSMITTER ABOVE 1 GHz FOR 5470 TO 5725 MHz BAND

RESTRICTED BANDEDGE (802.11a MODE, LOW CHANNEL)

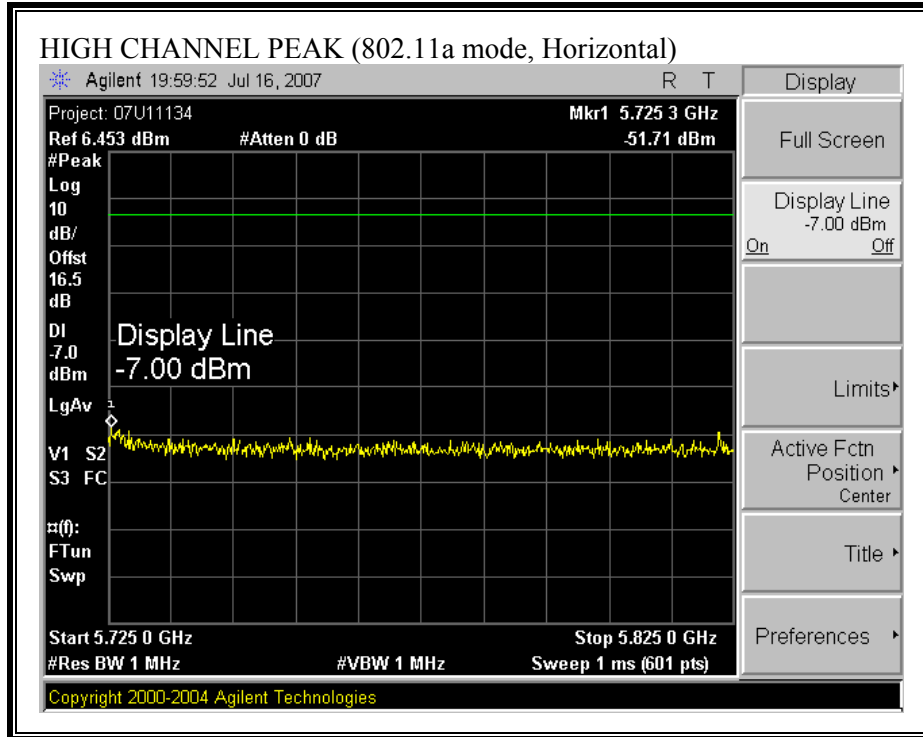


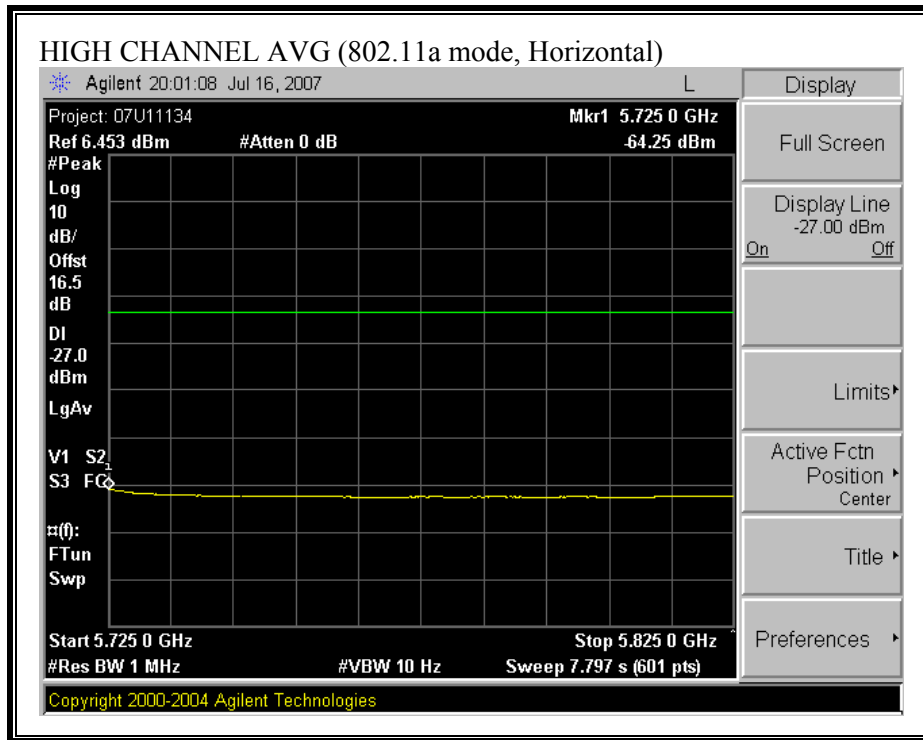


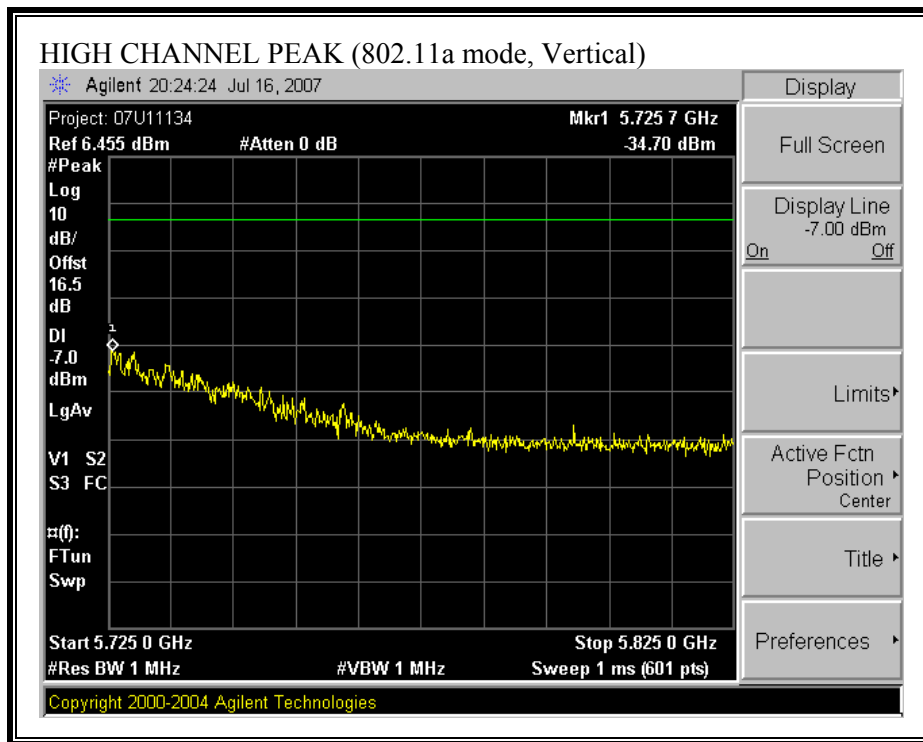


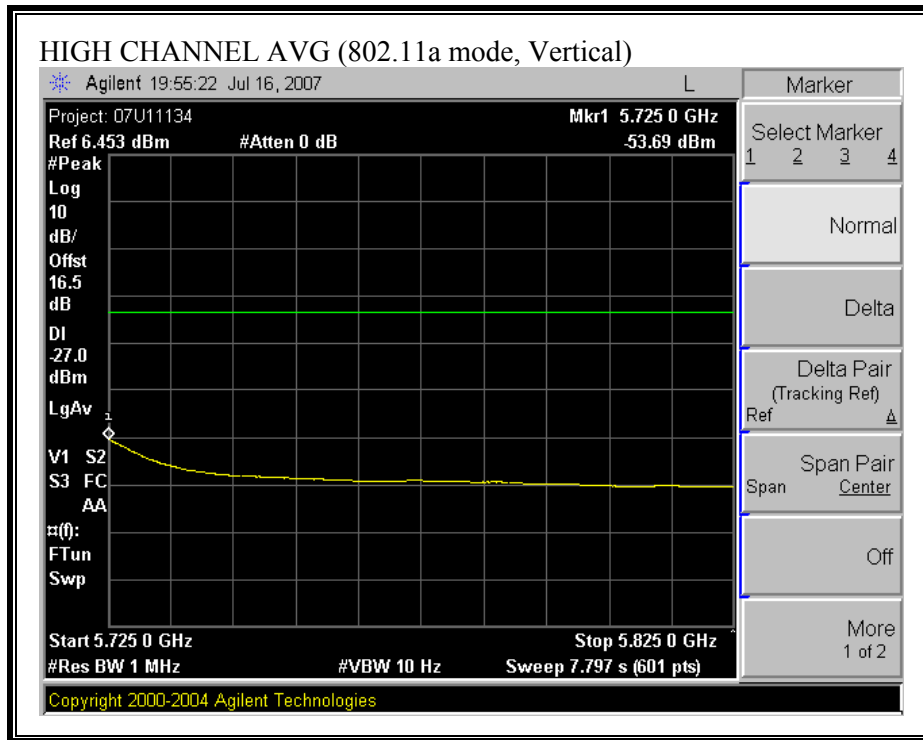


RESTRICTED BANDEDGE (802.11a MODE, HIGH CHANNEL)









HARMONICS AND SPURIOUS EMISSIONS (802.11a MODE)

High Frequency Measurement
 Compliance Certification Services, Morgan Hill Open Field Site

Company: Qualcomm
 Project #: 07U11134
 Date: 6/15/2007 and 7/16/2007
 Test Engineer: William Zhuang
 Configuration: EUT with Laptop
 Mode: Transmit, a Legacy Mode, High Band

Test Equipment:

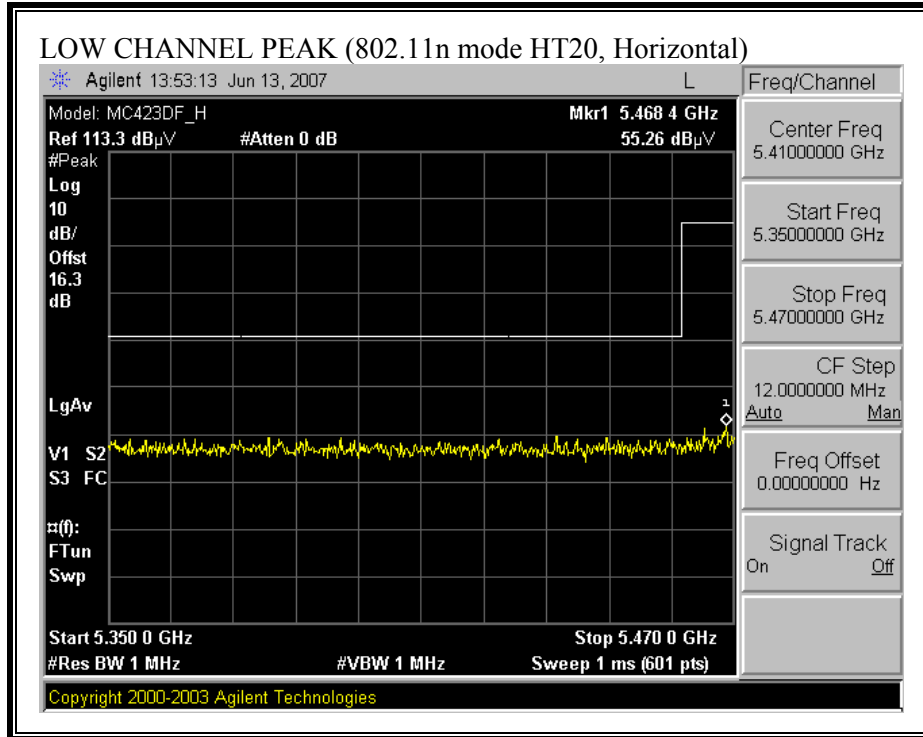
Horn 1-18GHz	Pre-amplifier 1-26GHz	Pre-amplifier 26-40GHz	Horn > 18GHz	Limit
T73; S/N: 6717 @3m	T145 Agilent 3008A005			FCC 15.209

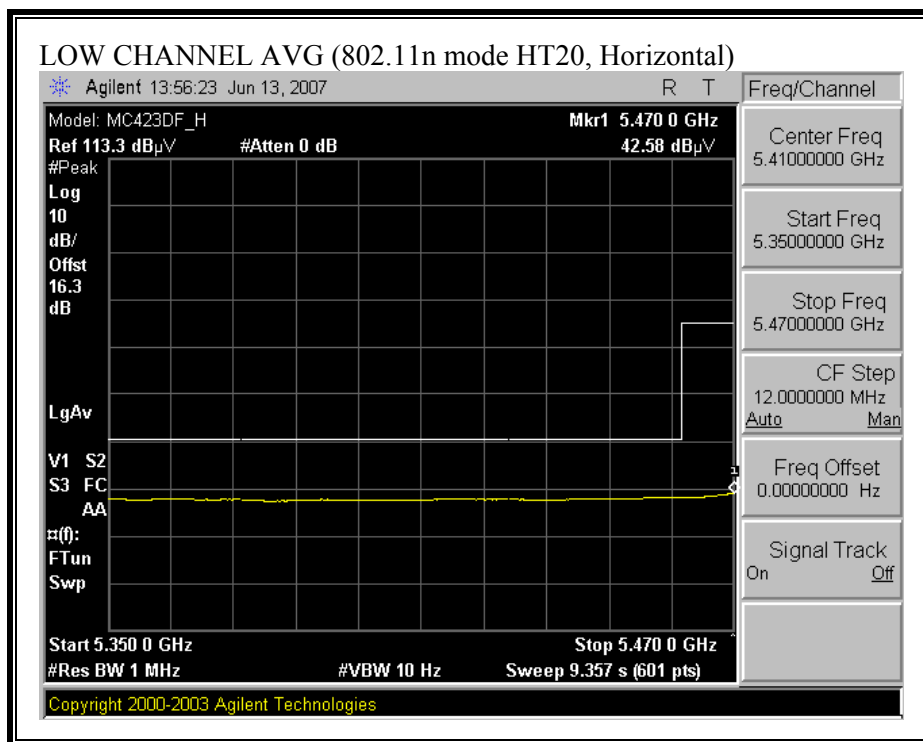
Hi Frequency Cables

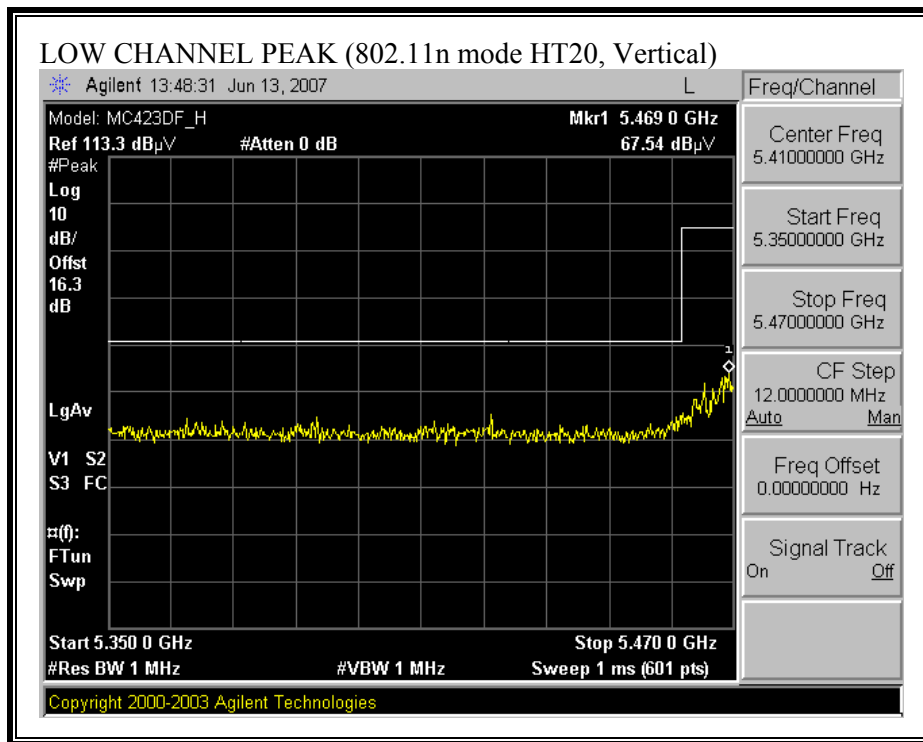
2 foot cable	3 foot cable	12 foot cable	HPF	Reject Filter	Peak Measurements RBW=VBW=1MHz Average Measurements RBW=1MHz ; VBW=10Hz
		Gordon 203134001	HPF_7.6GHz		

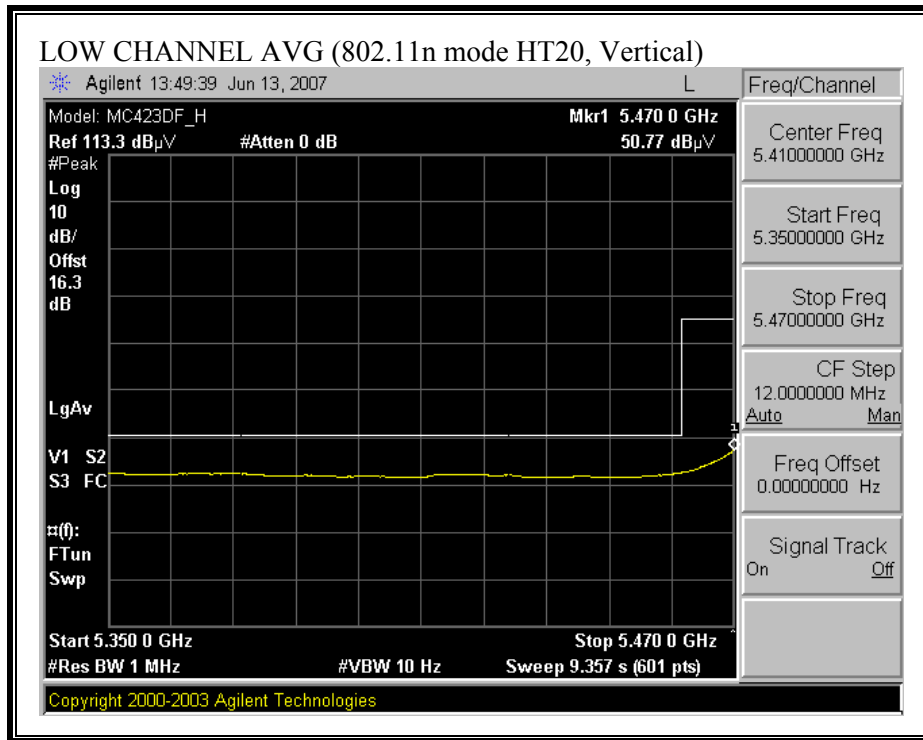
f GHz	Dist (m)	Read Pk dBuV	Read Avg. dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fitr dB	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes (V/H)
Low Ch. 5500MHz															
11.000	3.0	42.2	30.7	37.2	11.1	-33.8	0.0	0.7	57.6	46.0	74	54	-16.4	-8.0	V
16.500	3.0	53.8	41.5	38.9	13.0	-32.1	0.0	0.7	74.3	62.0	88	68	-13.7	-6.0	V, Non Restricted Band
11.000	3.0	40.2	28.2	37.2	11.1	-33.8	0.0	0.7	55.5	43.5	74	54	-18.5	-10.5	H
16.500	3.0	45.9	32.8	38.9	13.0	-32.1	0.0	0.7	66.4	53.3	88	68	-21.6	-14.7	H, Non Restricted Band
Mid Ch. 5600MHz															
11.200	3.0	39.8	28.6	37.3	11.3	-33.5	0.0	0.7	55.7	44.5	74	54	-18.3	-9.5	V
16.800	3.0	48.8	31.1	40.1	13.1	-32.0	0.0	0.7	70.6	53.0	88	68	-17.4	-15.0	V, Non Restricted Band
11.200	3.0	37.9	26.3	37.3	11.3	-33.5	0.0	0.7	53.8	42.2	74	54	-20.2	-11.8	H
16.800	3.0	44.9	29.1	40.1	13.1	-32.0	0.0	0.7	66.7	50.9	88	68	-21.3	-17.1	H, Non Restricted Band
High Ch. 5700MHz															
11.400	3.0	37.1	24.5	37.4	11.5	-33.2	0.0	0.7	53.5	40.9	74	54	-20.5	-13.1	V
17.100	3.0	45.3	30.9	41.2	13.2	-32.0	0.0	0.7	68.4	54.0	88	68	-19.6	-14.0	V, Non Restricted Band
11.400	3.0	35.6	23.2	37.4	11.5	-33.2	0.0	0.7	52.0	39.6	74	54	-22.0	-14.4	H
17.100	3.0	46.2	30.9	41.2	13.2	-32.0	0.0	0.7	69.3	54.0	88	68	-18.7	-14.0	H, Non Restricted Band

RESTRICTED BANDEDGE (802.11n MODE HT20, LOW CHANNEL)

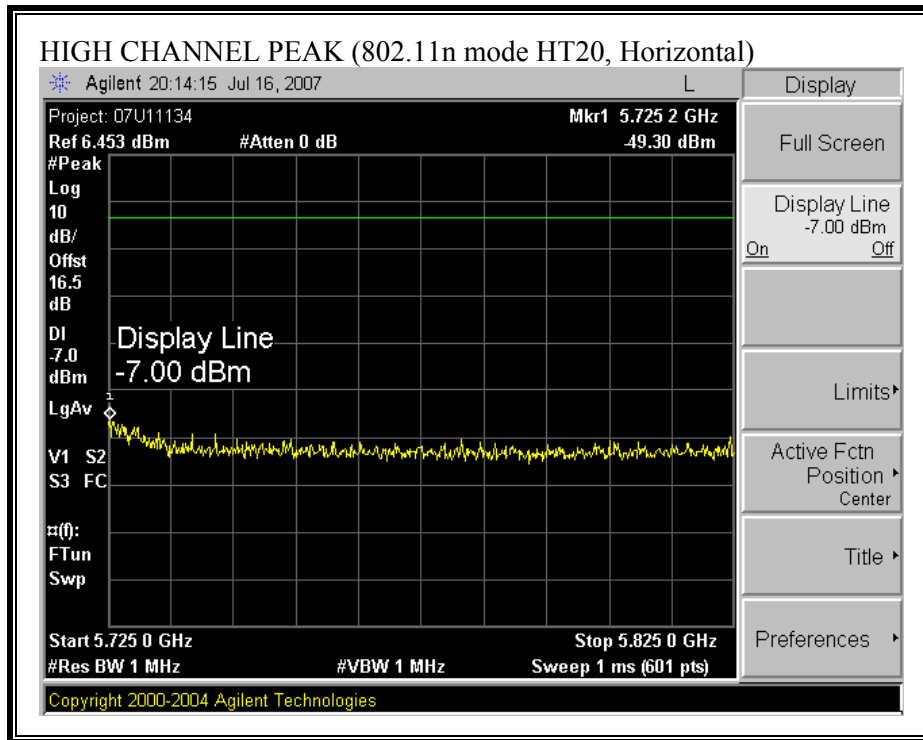


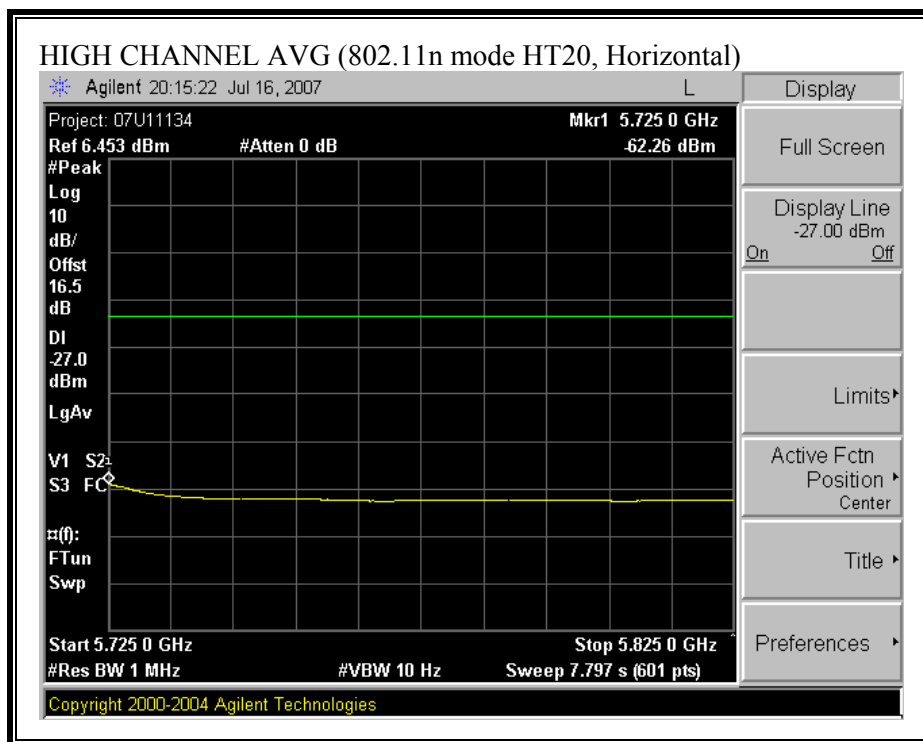


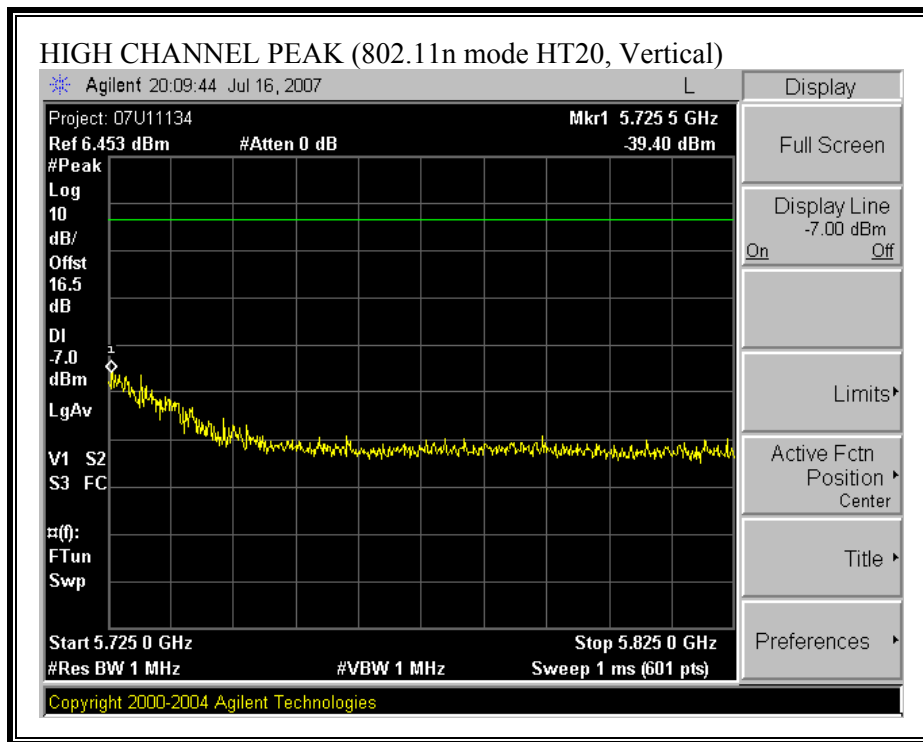


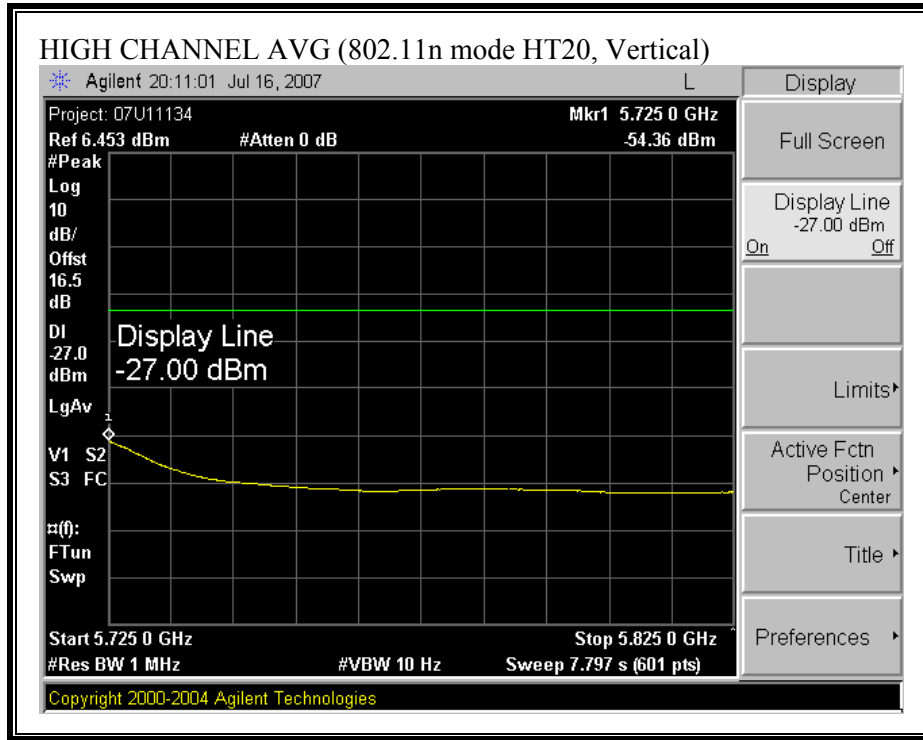


RESTRICTED BANDEDGE (802.11n MODE HT20, HIGH CHANNEL)









HARMONICS AND SPURIOUS EMISSIONS (802.11n MODE HT20)

High Frequency Measurement
 Compliance Certification Services, Morgan Hill Open Field Site

Company: Qualcomm
 Project #: 07U11134
 Date: 6/20/2007
 Test Engineer: William Zhuang
 Configuration: EUT with Laptop
 Mode: Transmit, a HT20 Mode, High Band

Test Equipment:

Horn 1-18GHz	Pre-amplifier 1-26GHz	Pre-amplifier 26-40GHz	Horn > 18GHz	Limit
T60; S/N: 2238 @3m	T145 Agilent 3008A005			FCC 15.209

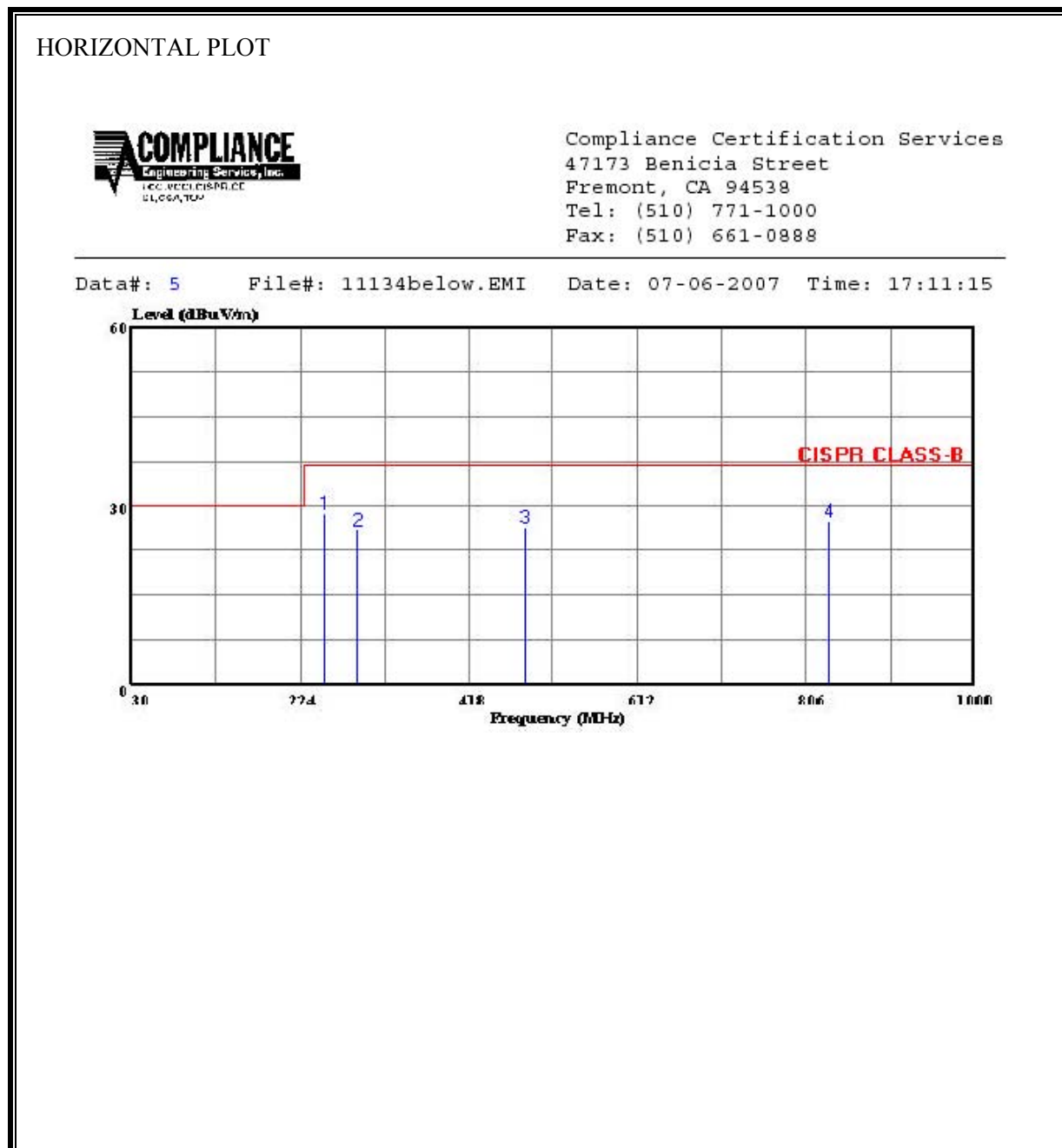
Hi Frequency Cables

2 foot cable	3 foot cable	12 foot cable	HPF	Reject Filter	Peak Measurements RBW=VBW=1MHz Average Measurements RBW=1MHz ; VBW=10Hz
		Gordon 203134001	HPF_7.6GHz		

f GHz	Dist (m)	Read Pk dBuV	Read Avg. dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Filtr dB	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes (V/H)
Low Ch. 5500MHz															
11.000	3.0	38.8	27.0	37.3	11.1	-33.8	0.0	0.7	54.2	42.4	74	54	-19.8	-11.6	V
16.500	3.0	50.4	37.2	39.3	13.0	-32.1	0.0	0.7	71.3	58.1	88	68	-16.7	-9.9	V, Non Restricted Band
11.000	3.0	42.0	29.5	37.3	11.1	-33.8	0.0	0.7	57.3	44.9	74	54	-16.7	-9.1	H
16.500	3.0	46.1	31.1	39.3	13.0	-32.1	0.0	0.7	67.1	52.0	88	68	-20.9	-16.0	H, Non Restricted Band
Mid Ch. 5600MHz															
11.200	3.0	38.0	27.3	37.3	11.3	-33.5	0.0	0.7	53.9	43.2	74	54	-20.1	-10.8	V
16.800	3.0	47.4	32.5	40.2	13.1	-32.0	0.0	0.7	69.4	54.5	88	68	-18.6	-13.5	V, Non Restricted Band
11.200	3.0	38.6	28.0	37.3	11.3	-33.5	0.0	0.7	54.5	43.9	74	54	-19.5	-10.1	H
16.800	3.0	46.9	31.3	40.2	13.1	-32.0	0.0	0.7	68.9	53.3	88	68	-19.1	-14.7	H, Non Restricted Band
High Ch. 5700MHz															
11.400	3.0	38.3	26.2	37.4	11.5	-33.2	0.0	0.7	54.6	42.5	74	54	-19.4	-11.5	V
17.100	3.0	47.1	32.1	41.2	13.2	-32.0	0.0	0.7	70.2	55.2	88	68	-17.8	-12.8	V, Non Restricted Band
11.400	3.0	40.7	30.0	37.4	11.5	-33.2	0.0	0.7	57.1	46.4	74	54	-16.9	-7.6	H
17.100	3.0	40.8	25.6	41.2	13.2	-32.0	0.0	0.7	63.9	48.7	88	68	-24.1	-19.3	H, Non Restricted Band

7.3.4. WORST-CASE RADIATED EMISSIONS BELOW 1 GHz

SPURIOUS EMISSIONS 30 TO 1000 MHz (2.4GHZ WORST-CASE CONFIGURATION, HORIZONTAL)



HORIZONTAL DATA

Condition: CISPR CLASS-B HORIZONTAL
Test Operator:: Thanh Nguyen
Project #: : 07U11134
Company: : QualCom
Configuration:: EUT w/ Extender card, Laptop
Mode : : Tx 22dBm, b, low channel
Target: : CISPR22 Class B

Page: 1

	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dBuV/m	dBuV/m	dB	
1	252.130	14.98	13.94	28.92	37.00	-8.08	Peak
2	288.990	10.46	15.42	25.88	37.00	-11.12	Peak
3	482.990	6.34	20.10	26.44	37.00	-10.56	Peak
4	832.190	2.23	25.31	27.54	37.00	-9.46	Peak

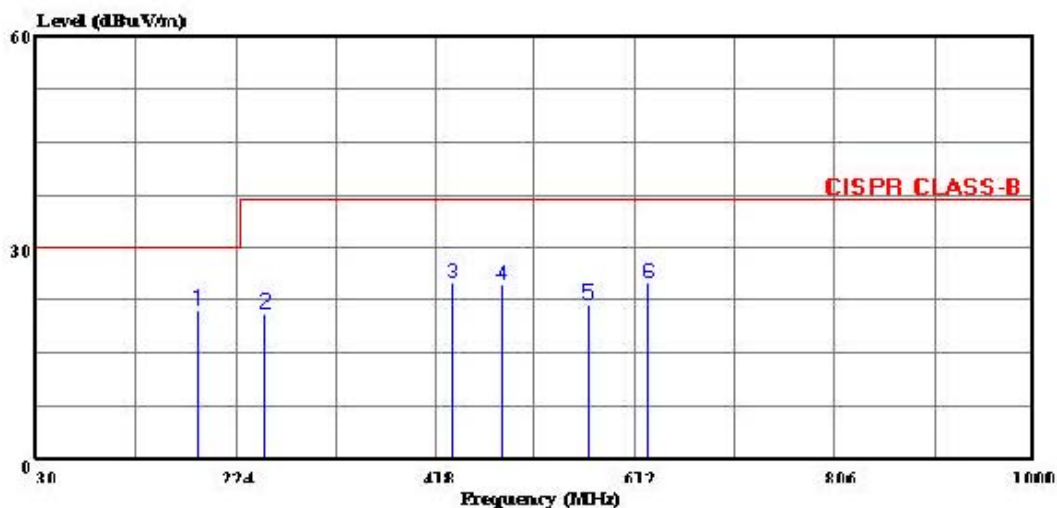
SPURIOUS EMISSIONS 30 TO 1000 MHz (2.4GHZ WORST-CASE CONFIGURATION, VERTICAL)

VERTICAL PLOT



Compliance Certification Services
47173 Benicia Street
Fremont, CA 94538
Tel: (510) 771-1000
Fax: (510) 661-0888

Data#: 7 File#: 11134below.EMI Date: 07-06-2007 Time: 17:19:30



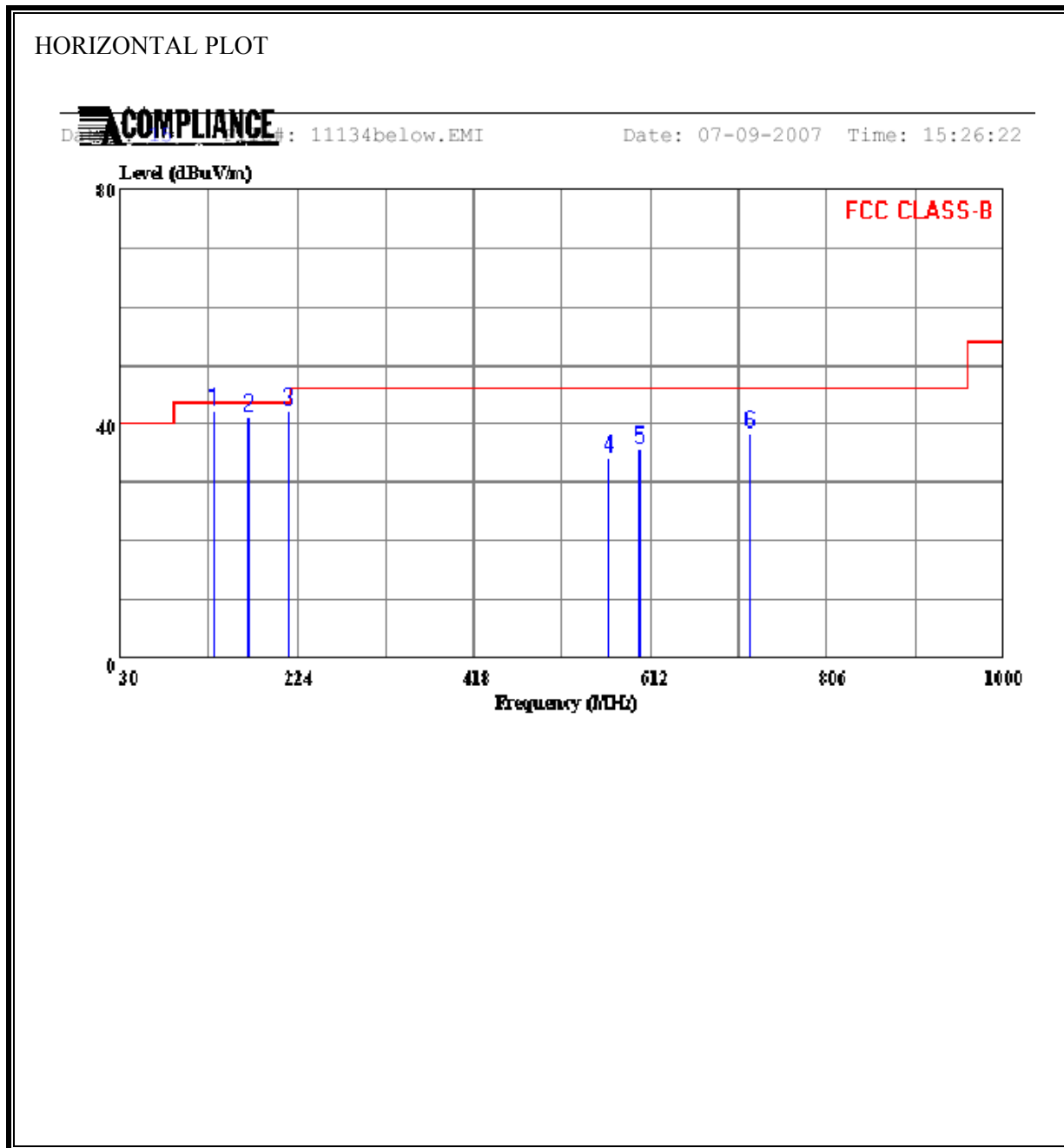
VERTICAL DATA

Condition: CISPR CLASS-B VERTICAL
Test Operator:: Thanh Nguyen
Project #: : 07U11134
Company: : QualCom
Configuration:: EUT w/ Extender card, Laptop
Mode : : Tx 22dBm, b, low channel
Target: : CISPR22 Class B

Page: 1

	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dBuV/m	dBuV/m	dB	
1	187.140	7.67	13.30	20.97	30.00	-9.03	Peak
2	252.130	6.52	13.94	20.46	37.00	-16.54	Peak
3	434.490	5.91	19.01	24.92	37.00	-12.08	Peak
4	482.990	4.53	20.10	24.63	37.00	-12.37	Peak
5	566.410	0.38	21.48	21.85	37.00	-15.15	Peak
6	625.580	2.53	22.36	24.89	37.00	-12.11	Peak

SPURIOUS EMISSIONS 30 TO 1000 MHz (5GHZ WORST-CASE CONFIGURATION, HORIZONTAL)



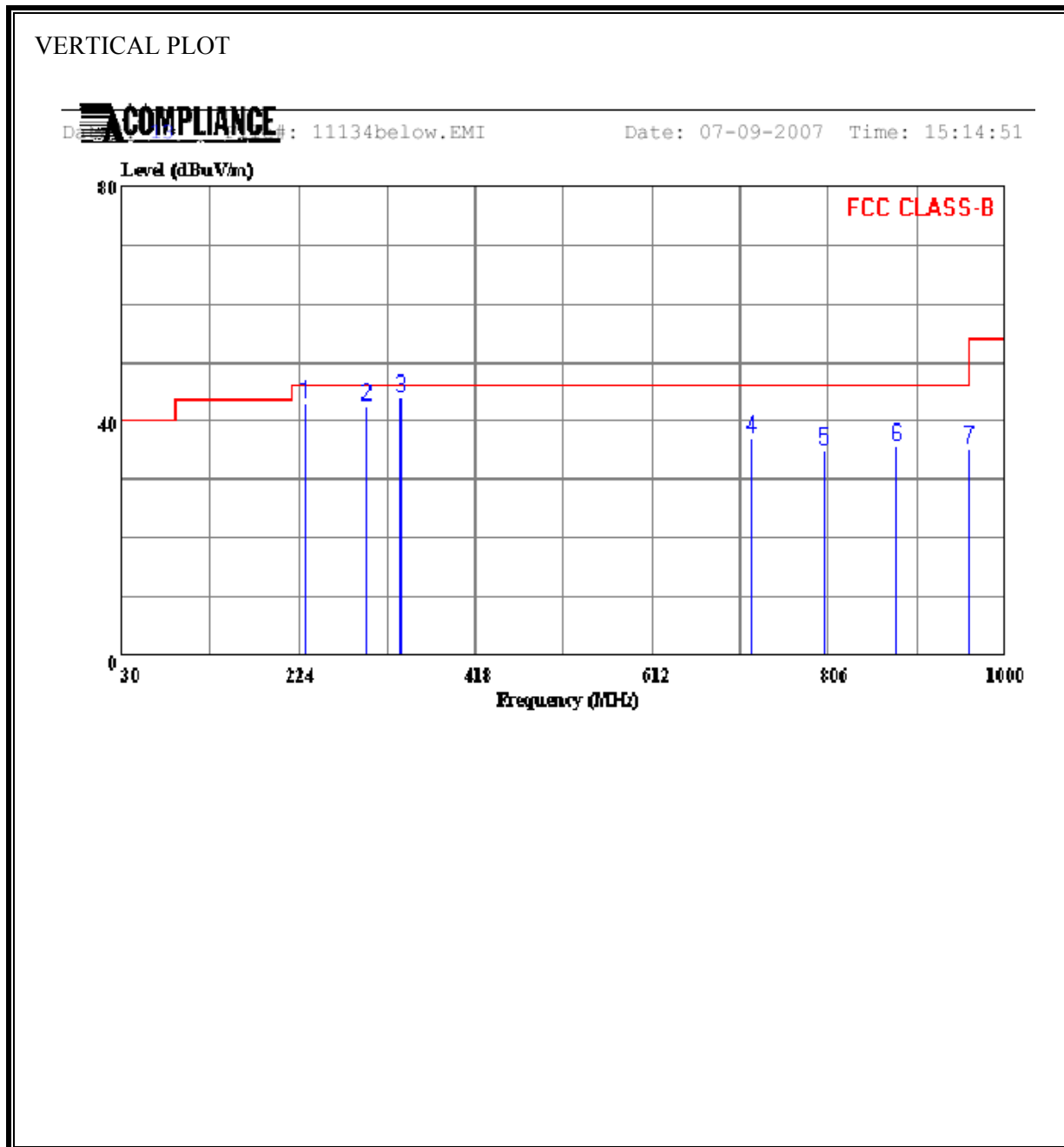
HORIZONTAL DATA

Condition: FCC CLASS-B HORIZONTAL
Test Operator:: William Zhuang
Project #: : 07U11134
Company: : QualCom
Configuration:: EUT off/ Extender card, Laptop
Mode : : Tx, 5 GHz worst case
Target: : CISPR22 Class B

Page: 1

	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dBuV/m	dBuV/m	dB	
1	131.850	58.90	-16.63	42.27	43.50	-1.23	Peak
2	170.650	59.20	-18.14	41.06	43.50	-2.44	Peak
3	213.330	61.20	-18.83	42.37	43.50	-1.13	Peak
4	566.410	44.60	-10.35	34.25	46.00	-11.75	Peak
5	600.360	45.40	-9.84	35.56	46.00	-10.44	Peak
6	720.640	46.60	-8.19	38.41	46.00	-7.59	Peak

SPURIOUS EMISSIONS 30 TO 1000 MHz (5GHZ WORST-CASE CONFIGURATION, VERTICAL)



VERTICAL DATA

Condition: FCC CLASS-B VERTICAL
Test Operator:: William Zhuang
Project #: : 07U11134
Company: : QualCom
Configuration:: EUT off/ Extender card, Laptop
Mode : : Tx, 5 GHz worst case
Target: : CISPR22 Class B

Page: 1

	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dBuV/m	dBuV/m	dB	
1	231.760	61.20	-18.35	42.85	46.00	-3.15	Peak
2	298.690	58.60	-15.90	42.70	46.00	-3.30	Peak
3	335.550	58.80	-14.92	43.88	46.00	-2.12	Peak
4	720.640	45.20	-8.19	37.01	46.00	-8.99	Peak
5	800.180	42.00	-6.88	35.12	46.00	-10.88	Peak
6	880.690	41.00	-5.17	35.83	46.00	-10.17	Peak
7	960.230	39.00	-3.73	35.27	54.00	-18.73	Peak

7.4. POWERLINE CONDUCTED EMISSIONS

LIMIT

§15.207 (a) Except as shown in paragraphs (b) and (c) of this section, for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table, as measured using a 50 μ H/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal.

The lower limit applies at the boundary between the frequency ranges.

Frequency of Emission (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.

TEST PROCEDURE

The EUT is placed on a non-conducting table 40 cm from the vertical ground plane and 80 cm above the horizontal ground plane. The EUT is configured in accordance with ANSI C63.4.

The resolution bandwidth is set to 9 kHz for both peak detection and quasi-peak detection measurements. Peak detection is used unless otherwise noted as quasi-peak.

Line conducted data is recorded for both NEUTRAL and HOT lines.

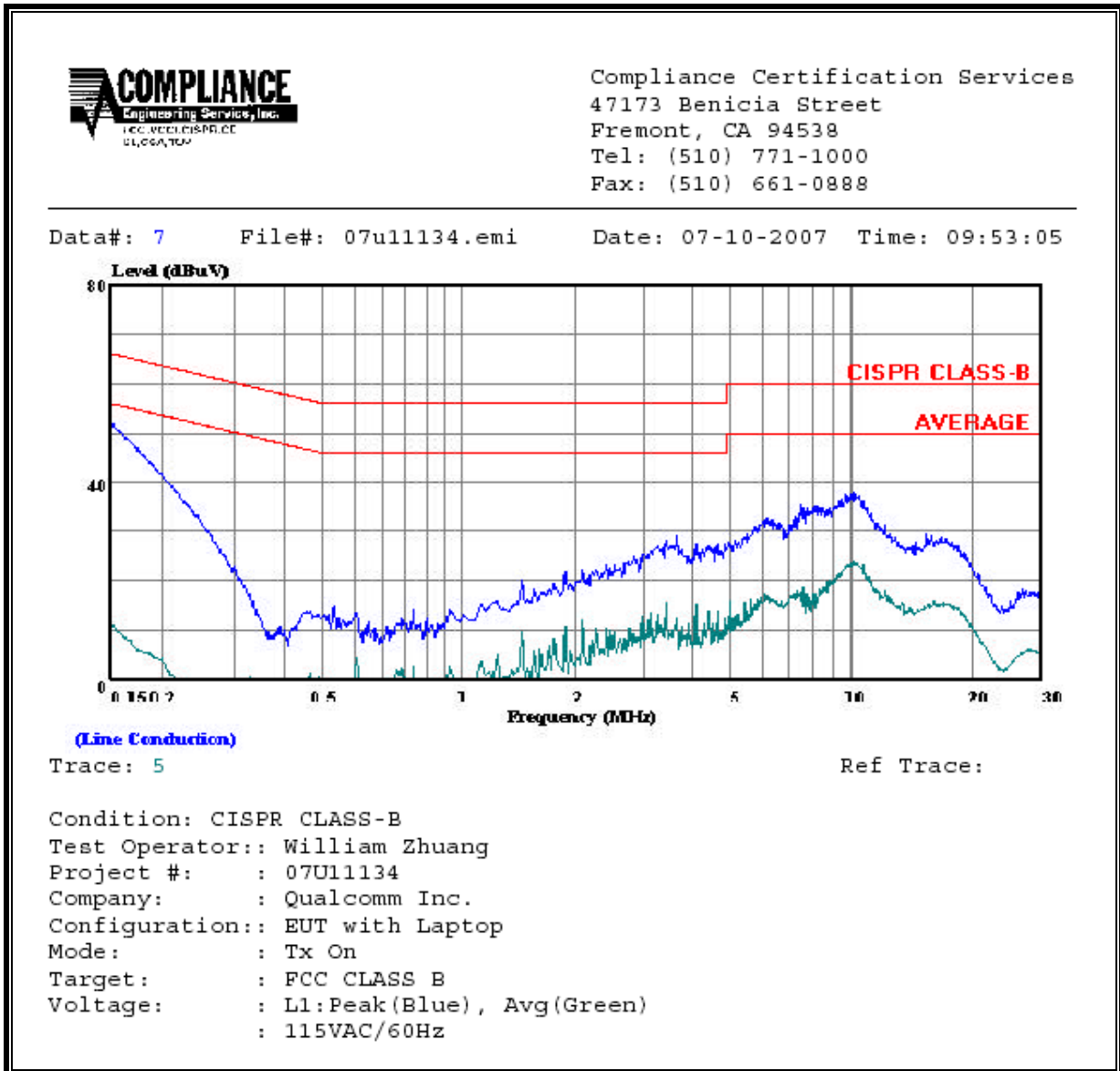
RESULTS

No non-compliance noted:

6 WORST EMISSIONS

CONDUCTED EMISSIONS DATA (115VAC 60Hz)										
Freq. (MHz)	Reading			Class (dB)	Limit QP	FCC B		Margin		Remark L1 / L2
	PK (dBuV)	QP (dBuV)	AV (dBuV)			AV	QP (dB)	AV (dB)		
0.15	52.08	--	11.40	0.00	65.94	55.94	-13.86	-44.54	L1	
7.57	35.54	--	18.53	0.00	60.00	50.00	-24.46	-31.47	L1	
10.18	38.10	--	23.81	0.00	60.00	50.00	-21.90	-26.19	L1	
0.15	63.12	--	17.54	0.00	65.89	55.89	-2.77	-38.35	L2	
0.16	61.96	--	17.61	0.00	65.62	55.62	-3.66	-38.01	L2	
9.91	37.32	--	23.76	0.00	60.00	50.00	-22.68	-26.24	L2	
6 Worst Data										

LINE 1 RESULTS

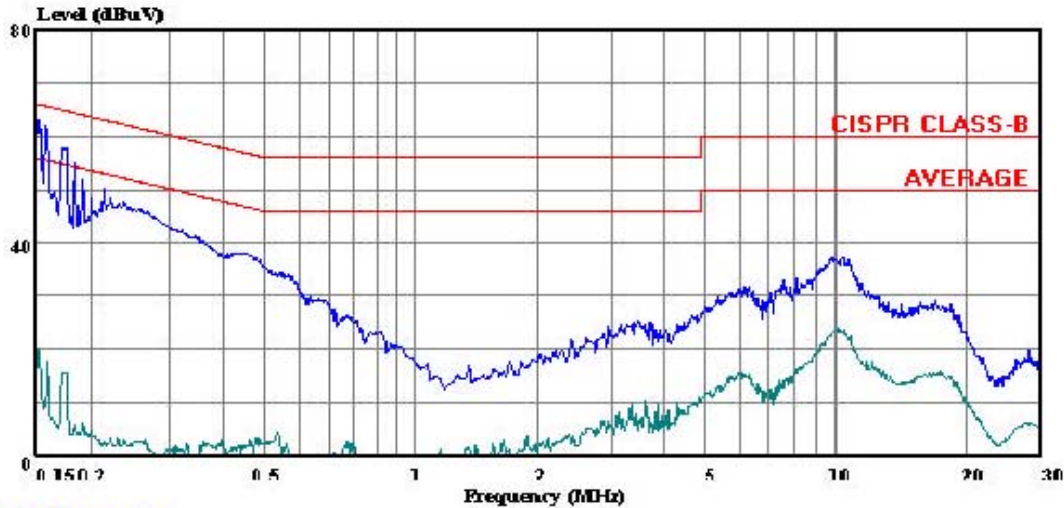


LINE 2 RESULTS



Compliance Certification Services
47173 Benicia Street
Fremont, CA 94538
Tel: (510) 771-1000
Fax: (510) 661-0888

Data#: 14 File#: 07u11134.emi Date: 07-10-2007 Time: 10:09:19



(Line Conduction)

Trace: 12

Ref Trace:

Condition: CISPR CLASS-B
Test Operator:: William Zhuang
Project #: : 07U11134
Company: : Qualcomm Inc.
Configuration:: EUT with Laptop
Mode: : Tx On
Target: : FCC CLASS B
Voltage: : L2:Peak(Blue), Avg(Green)
: 115VAC/60Hz

7.5. DYNAMIC FREQUENCY SELECTION

7.5.1. LIMITS

FCC

§15.407 (h) 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”.

Table 1: Applicability of DFS requirements prior to use of a channel

Requirement	Operational Mode		
	Master	Client (without radar detection)	Client (with radar detection)
<i>Non-Occupancy Period</i>	Yes	Not required	Yes
<i>DFS Detection Threshold</i>	Yes	Not required	Yes
<i>Channel Availability Check Time</i>	Yes	Not required	Not required
<i>Uniform Spreading</i>	Yes	Not required	Not required

Table 2: Applicability of DFS requirements during normal operation

Requirement	Operational Mode		
	Master	Client (without DFS)	Client (with DFS)
<i>DFS Detection Threshold</i>	Yes	Not required	Yes
<i>Channel Closing Transmission Time</i>	Yes	Yes	Yes
<i>Channel Move Time</i>	Yes	Yes	Yes

Table 3: Interference Threshold values, Master or Client incorporating In-Service Monitoring

Maximum Transmit Power	Value (see note)
≥ 200 milliwatt	-64 dBm
< 200 milliwatt	-62 dBm
Note 1: This is the level at the input of the receiver assuming a 0 dBi receive antenna Note 2: Throughout these test procedures an additional 1 dB has been added to the amplitude of the test transmission waveforms to account for variations in measurement equipment. This will ensure that the test signal is at or above the detection threshold level to trigger a DFS response.	

Table 4: DFS Response requirement values

Parameter	Value
<i>Non-occupancy period</i>	30 minutes
<i>Channel Availability Check Time</i>	60 seconds
<i>Channel Move Time</i>	10 seconds
<i>Channel Closing Transmission Time</i>	200 milliseconds + approx. 60 milliseconds over remaining 10 second period
The instant that the <i>Channel Move Time</i> and the <i>Channel Closing Transmission Time</i> begins is as follows: <ul style="list-style-type: none"> • For the Short pulse radar Test Signals this instant is the end of the <i>Burst</i>. • For the Frequency Hopping radar Test Signal, this instant is the end of the last radar burst generated. • For the Long Pulse radar Test Signal this instant is the end of the 12 second period defining the radar transmission. The Channel Closing Transmission Time is comprised of 200 milliseconds starting at the beginning of the Channel Move Time plus any additional intermittent control signals required to facilitate channel changes (an aggregate of approximately 60 milliseconds) during the remainder of the 10 second period. The aggregate duration of control signals will not count quiet periods in between transmissions.	

Table 5 – Short Pulse Radar Test Waveforms

Radar Type	Pulse Width (Microseconds)	PRI (Microseconds)	Pulses	Minimum Percentage of Successful Detection	Minimum Trials
1	1	1428	18	60%	30
2	1-5	150-230	23-29	60%	30
3	6-10	200-500	16-18	60%	30
4	11-20	200-500	12-16	60%	30
Aggregate (Radar Types 1-4)				80%	120

Table 6 – Long Pulse Radar Test Signal

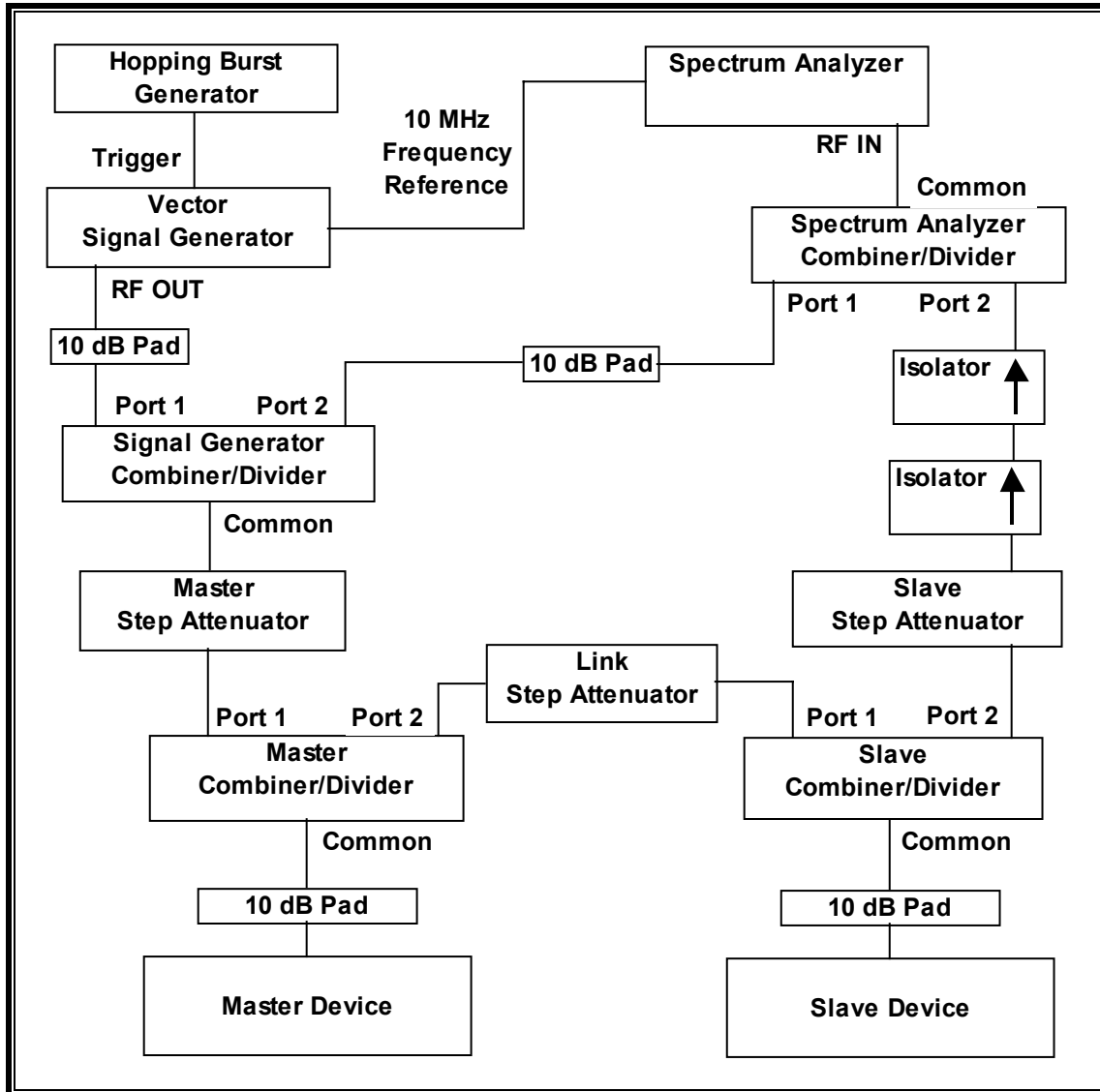
Radar Waveform	Bursts	Pulses per Burst	Pulse Width (µsec)	Chirp Width (MHz)	PRI (µsec)	Minimum Percentage of Successful Detection	Minimum Trials
5	8-20	1-3	50-100	5-20	1000-2000	80%	30

Table 7 – Frequency Hopping Radar Test Signal

Radar Waveform	Pulse Width (µsec)	PRI (µsec)	Burst Length (ms)	Pulses per Hop	Hopping Rate (kHz)	Minimum Percentage of Successful Detection	Minimum Trials
6	1	333	300	9	.333	70%	30

7.5.2. TEST AND MEASUREMENT SYSTEM

CONDUCTED METHOD SYSTEM BLOCK DIAGRAM



SYSTEM OVERVIEW

The short pulse and long pulse signal generating system utilizes the NTIA software. The Vector Signal Generator has been validated by the NTIA. The hopping signal generating system utilizes the CCS simulated hopping method and system, which has been validated by the DoD, FCC and NTIA. The software selects waveform parameters from within the bounds of the signal type on a random basis using uniform distribution.

The short pulse types 2, 3 and 4, and the long pulse type 5 parameters are randomized at run-time.

The hopping type 6 pulse parameters are fixed while the hopping sequence is based on the August 2005 NTIA Hopping Frequency List. The initial starting point randomized at run-time and each subsequent starting point is incremented by 475. Each frequency in the 100-length segment is compared to the boundaries of the EUT Detection Bandwidth and the software creates a hopping burst pattern in accordance with Section 7.4.1.3 Method #2 Simulated Frequency Hopping Radar Waveform Generating Subsystem of FCC 06-96 APPENDIX. The frequency of the signal generator is incremented in 1 MHz steps from F_L to F_H for each successive trial. This incremental sequence is repeated as required to generate a minimum of 30 total trials and to maintain a uniform frequency distribution over the entire Detection Bandwidth.

The signal monitoring equipment consists of a spectrum analyzer set to display 8001 bins on the horizontal axis. The time-domain resolution is 2 msec / bin with a 16 second sweep time, meeting the 10 second short pulse reporting criteria. The aggregate ON time is calculated by multiplying the number of bins above a threshold during a particular observation period by the dwell time per bin, with the analyzer set to peak detection and max hold.

Should multiple RF ports be utilized for the Master and/or Slave devices (for example, for diversity or MIMO implementations), additional combiner/dividers are inserted between the Master Combiner/Divider and the pad connected to the Master Device (and/or between the Slave Combiner/Divider and the pad connected to the Slave Device). Additional pads are utilized such that there is one pad at each RF port on each EUT.

SYSTEM CALIBRATION

A 50 ohm load is connected in place of the spectrum analyzer, and the spectrum analyzer is connected in place of the master device and the signal generator is set to CW mode. The amplitude of the signal generator is adjusted to yield a level of -64 dBm as measured on the spectrum analyzer.

Without changing any of the instrument settings, the spectrum analyzer is reconnected to the Common port of the Spectrum Analyzer Combiner/Divider. Measure the amplitude and calculate the difference from -64 dBm. Adjust the Reference Level Offset of the spectrum analyzer to this difference.

The spectrum analyzer displays the level of the signal generator as received at the antenna ports of the Master Device. The interference detection threshold may be varied from the calibrated value of -64 dBm and the spectrum analyzer will still indicate the level as received by the Master Device.

Set the signal generator to produce a radar waveform, trigger a burst manually and measure the level on the spectrum analyzer. Readjust the amplitude of the signal generator as required so that the peak level of the waveform is at a displayed level equal to the required or desired interference detection threshold. Separate signal generator amplitude settings are determined as required for each radar type.

ADJUSTMENT OF DISPLAYED TRAFFIC LEVEL

Establish a link between the Master and Slave, adjusting the Link Step Attenuator as needed to provide a suitable received level at the Master and Slave devices. Stream the video test file to generate WLAN traffic. Confirm that the WLAN traffic level, as displayed on the spectrum analyzer, is at lower amplitude than the radar detection threshold. For Master Device testing confirm that the displayed traffic does not include Slave Device traffic. For Slave Device testing confirm that the displayed traffic does not include Master Device traffic.

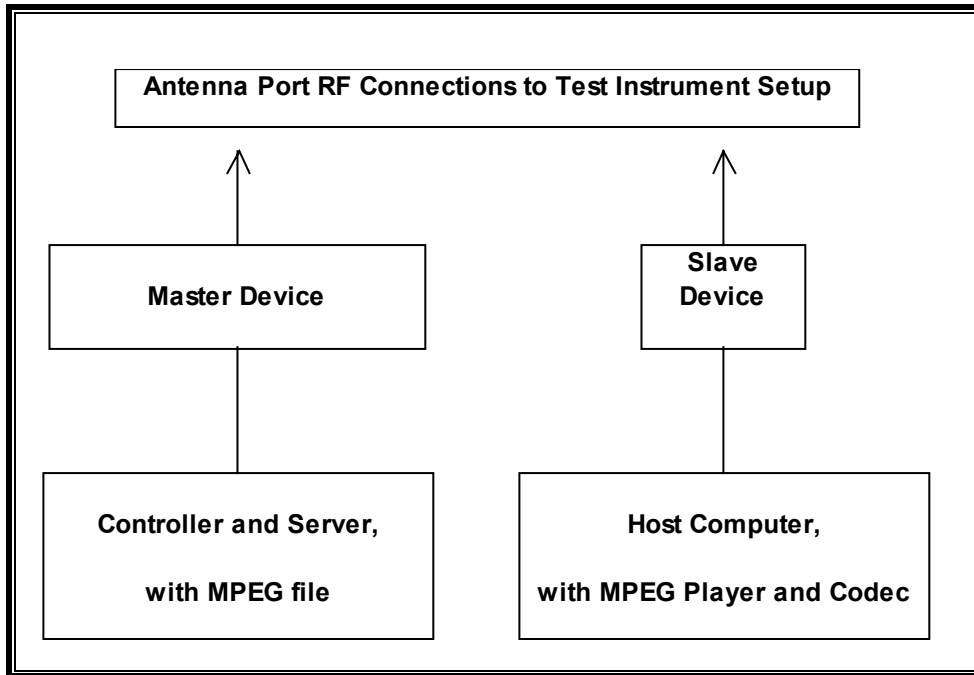
If a different setting of the Master Step Attenuator is required to meet the above conditions, perform a new System Calibration for the new Master Step Attenuator setting.

TEST AND MEASUREMENT EQUIPMENT

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	7/29/2007
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

CONDUCTED METHOD EUT TEST SETUP



SUPPORT EQUIPMENT

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

PERIPHERAL SUPPORT EQUIPMENT LIST				
Description	Manufacture	Model	Serial Number	FCC ID
AC Adapter	Lenovo	92P1105	11S92P1105Z1ZBW96AP1AM	DoC
Laptop	IBM	T60	L3-5G47Y	DoC
AC Adapter	Compaq	PPP012L	565BC0ALLOJ1BE	DoC
Laptop	Compaq	Presario 3000	CNU327025L	DoC

7.5.3. DESCRIPTION OF EUT

The EUT operates over the 5250-5350 MHz and 5470-5725 MHz ranges.

The EUT is a Slave Device without radar detection.

The highest power level within these bands is 26.45 dBm EIRP in the 5250-5350 MHz band and 25.6 dBm EIRP in the 5470-5725 MHz band.

The antenna assembly utilized with the EUT has a gain of 3.0 dBi. For legacy mode operation with simultaneous transmissions on two transmit chains, the effective Legacy Antenna Gain is 6.01 dBi

Two identical antennas are utilized to meet the transmit diversity and MIMO operational requirements.

The EUT uses two transmitter/receiver chains and one receive-only chain, each connected to a 50-ohm coaxial antenna port. All three antenna ports are connected to the test system via a power divider to perform conducted tests.

WLAN traffic is generated by streaming the video file TestFile.mp2 “6 ½ Magic Hours” from the Master to the Slave in full motion video mode using the media player with the V2.61 Codec package.

TPC is not required since the maximum EIRP is less than 500 mW (27 dBm).

The EUT utilizes the 802.11a/n architecture. One nominal channel bandwidth, 20 MHz, is implemented.

OVERVIEW OF MASTER DEVICE WITH RESPECT TO §15.407 (h) REQUIREMENTS

The Master Device is a Cisco Access Point, FCC ID: LDK102056. The DFS software installed in the Master Device is revision 6.00.1. The minimum antenna gain for the Master Device is 3.5 dBi.

The rated output power of the Master unit is > 23dBm (EIRP). Therefore the required interference threshold level is -64 dBm. After correction for antenna gain and procedural adjustments, the required conducted threshold at the antenna port is $-64 + 2 + 1 = -61$ dBm.

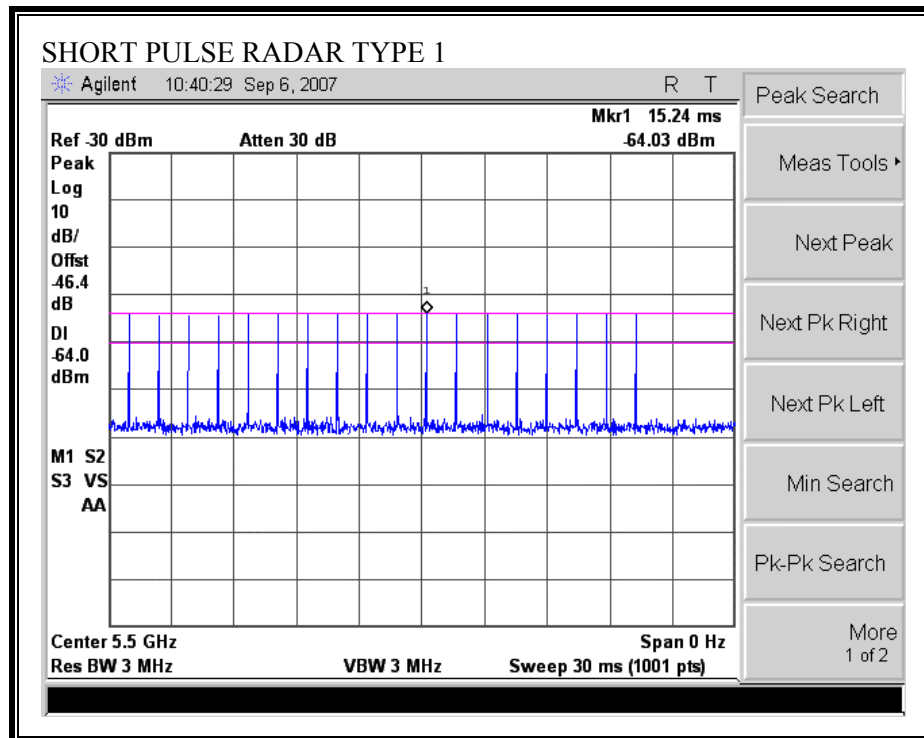
The calibrated conducted DFS Detection Threshold level is set to -64 dBm. The tested level is lower than the required level hence it provides margin to the limit.

7.5.4. TEST CHANNEL AND METHOD

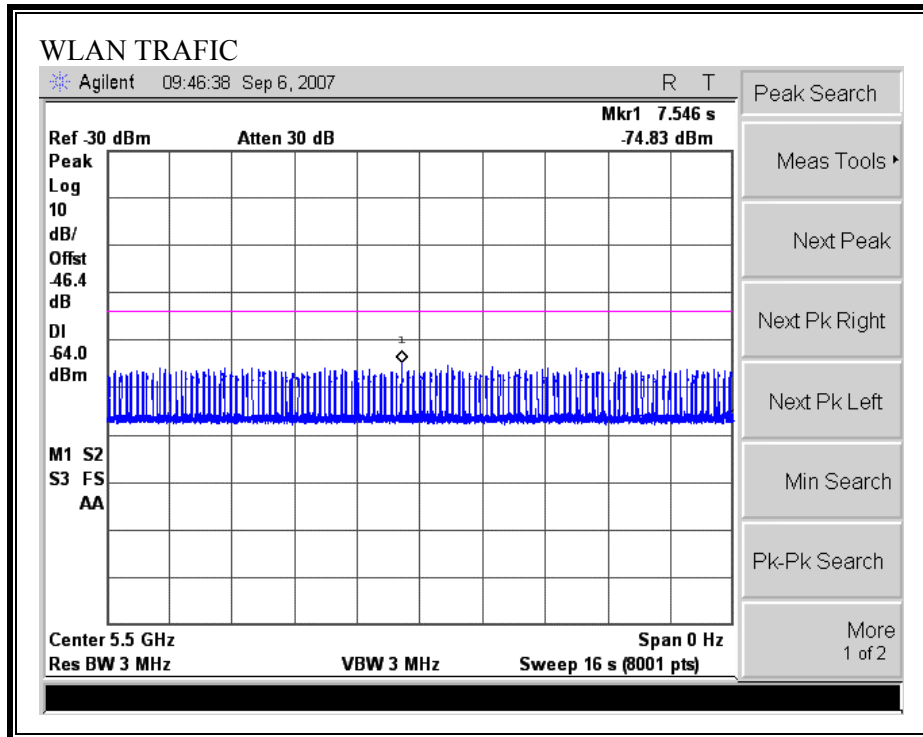
All tests were performed at a channel center frequency of 5500 MHz. Measurements were performed using conducted test methods.

7.5.5. PLOTS OF RADAR WAVEFORM, AND WLAN TRAFFIC

PLOTS OF RADAR WAVEFORMS



PLOT OF WLAN TRAFFIC FROM SLAVE



7.5.6. CHANNEL MOVE TIME AND CHANNEL CLOSING TRANSMISSION TIME

REPORTING NOTES

The reference marker is set at the end of last radar pulse.

The delta marker is set at the end of the last WLAN transmission following the radar pulse. This delta is the channel move time.

The aggregate channel closing transmission time is calculated as follows:

Aggregate Transmission Time =
(Number of analyzer bins showing transmission) * (dwell time per bin)

FCC

The observation period over which the aggregate time is calculated

Begins at (Reference Marker + 200 msec)

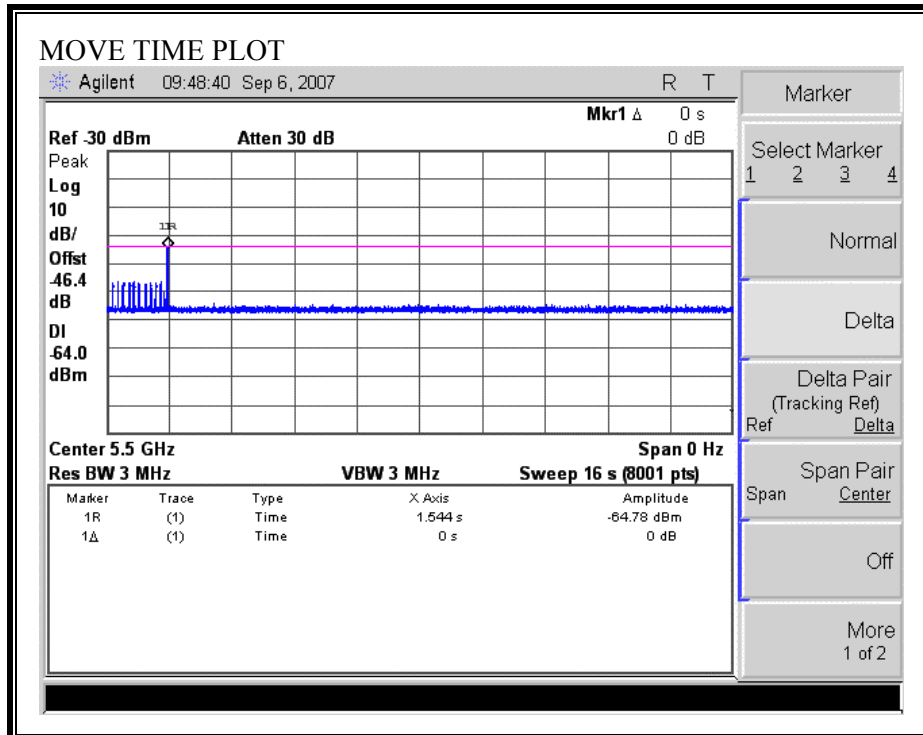
and

Ends no earlier than (Reference Marker + 10 sec).

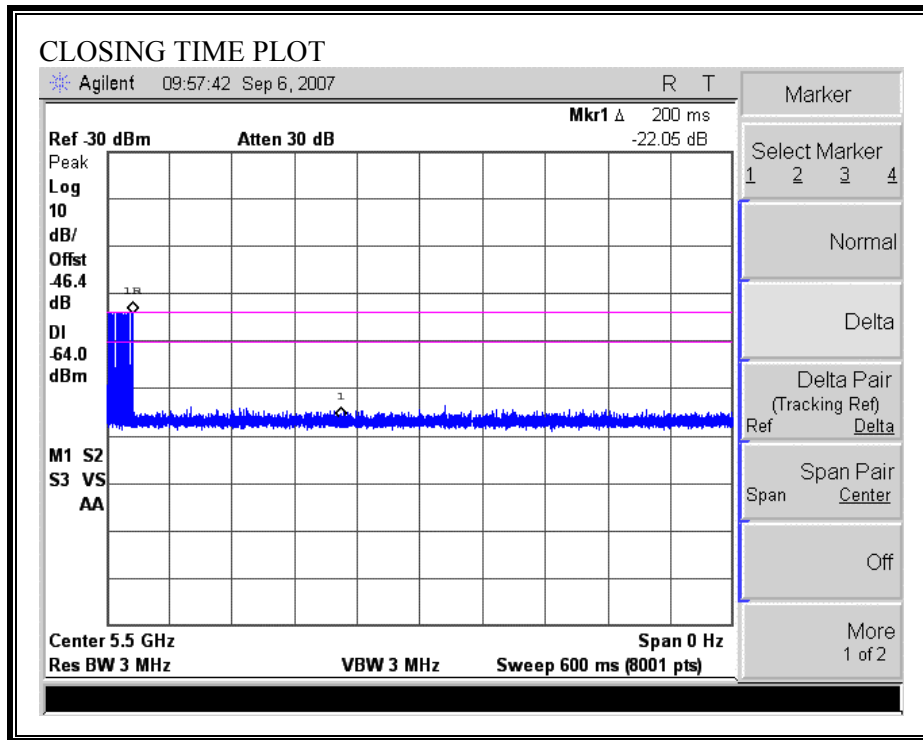
CHANNEL MOVE TIME RESULTS

No non-compliance noted:

Channel Move Time (s)	Limit (s)
0.000	10



CHANNEL CLOSING TIME RESULTS

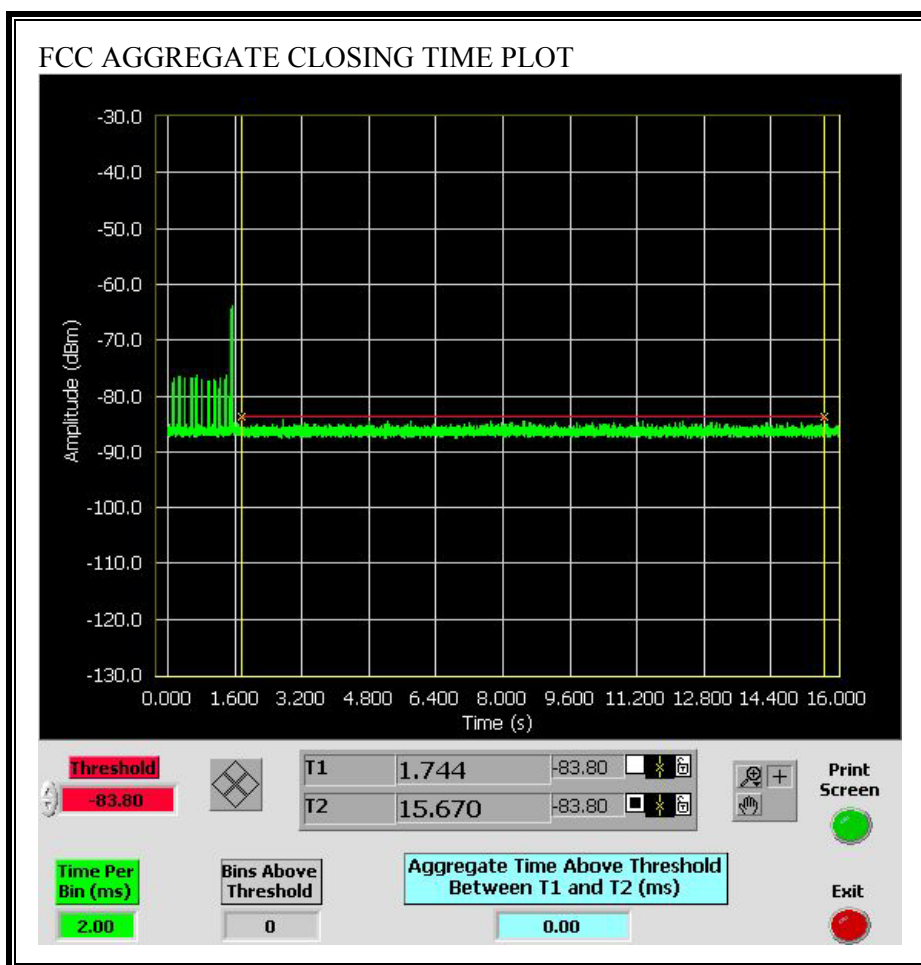


FCC AGGREGATE CHANNEL CLOSING TRANSMISSION TIME RESULTS

No non-compliance noted:

Aggregate Transmission Time (ms)	Limit (ms)	Margin (ms)
0.00	60	60.00

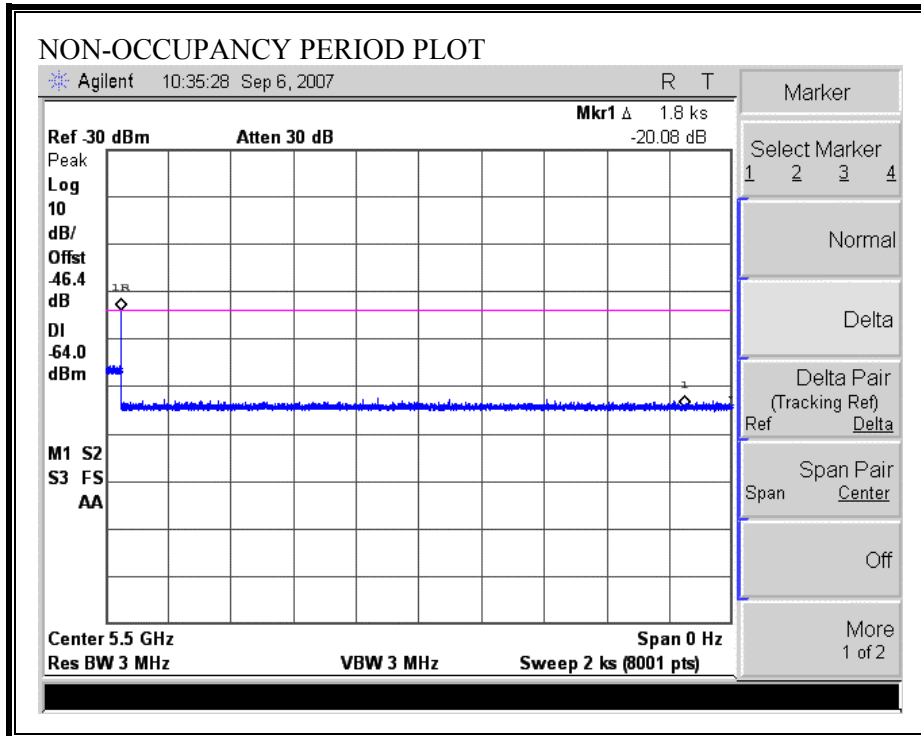
No transmissions are observed during the aggregate monitoring period.



7.5.7. NON-OCCUPANCY PERIOD

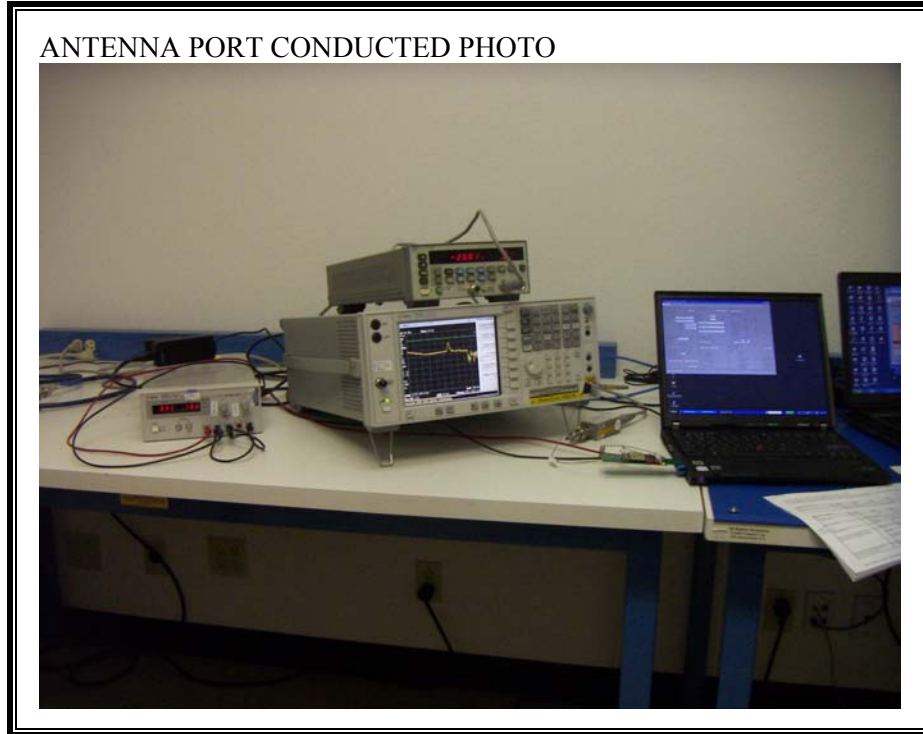
RESULTS

No non-compliance noted: No EUT transmissions were observed on the test channel during the 30 minute observation time.

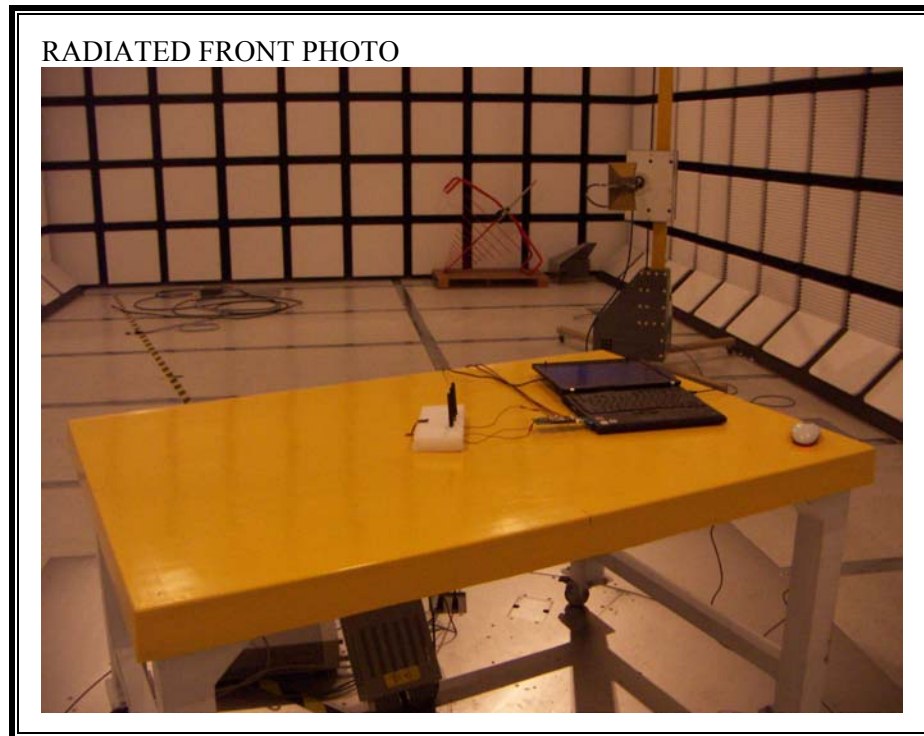


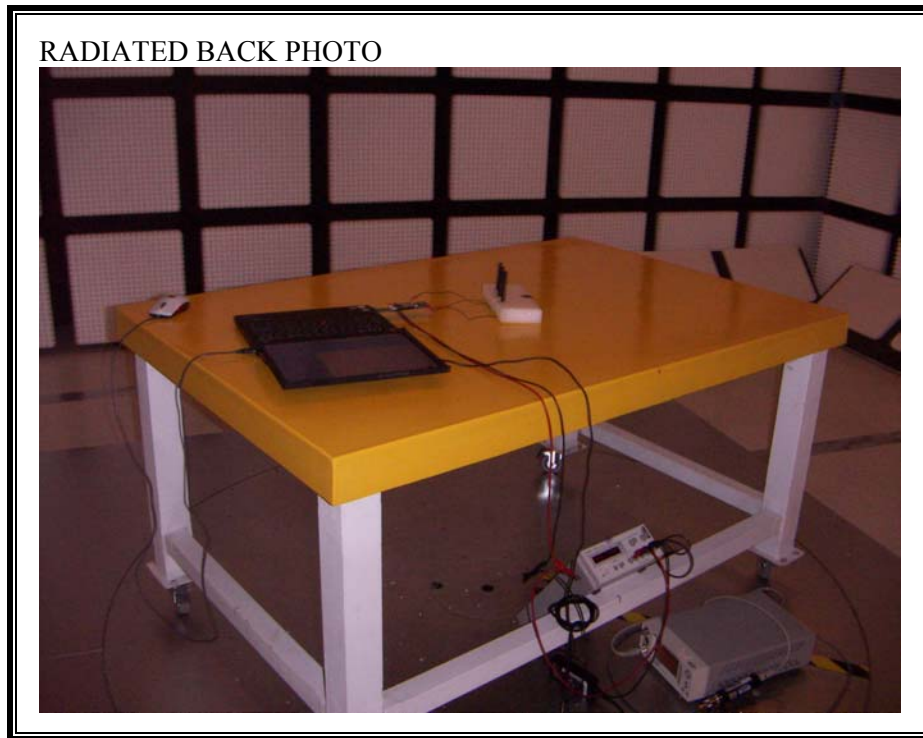
8. SETUP PHOTOS

ANTENNA PORT CONDUCTED RF MEASUREMENT SETUP

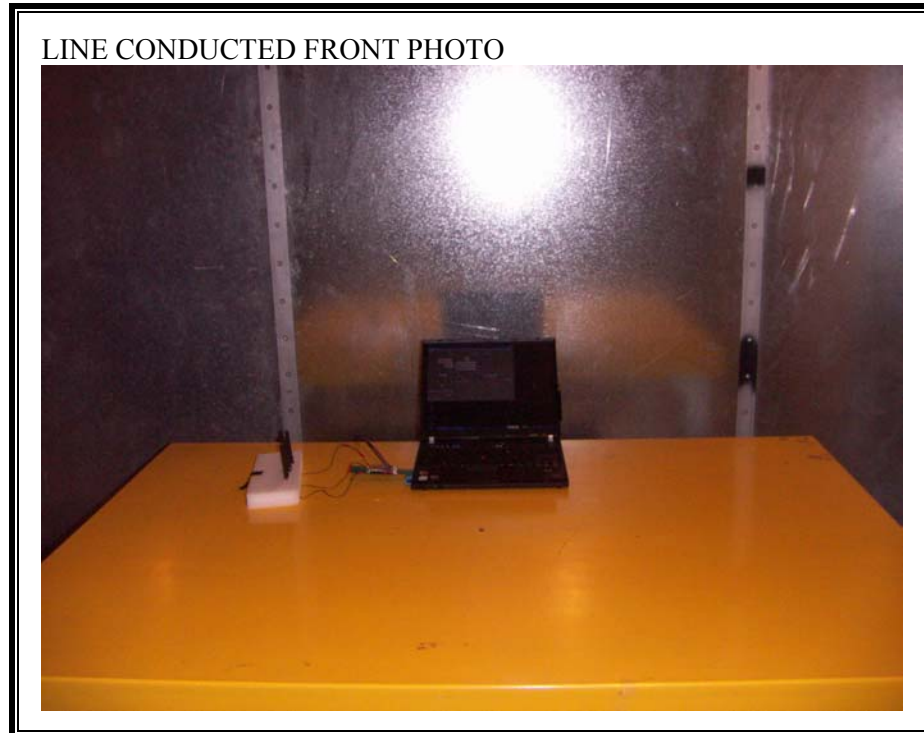


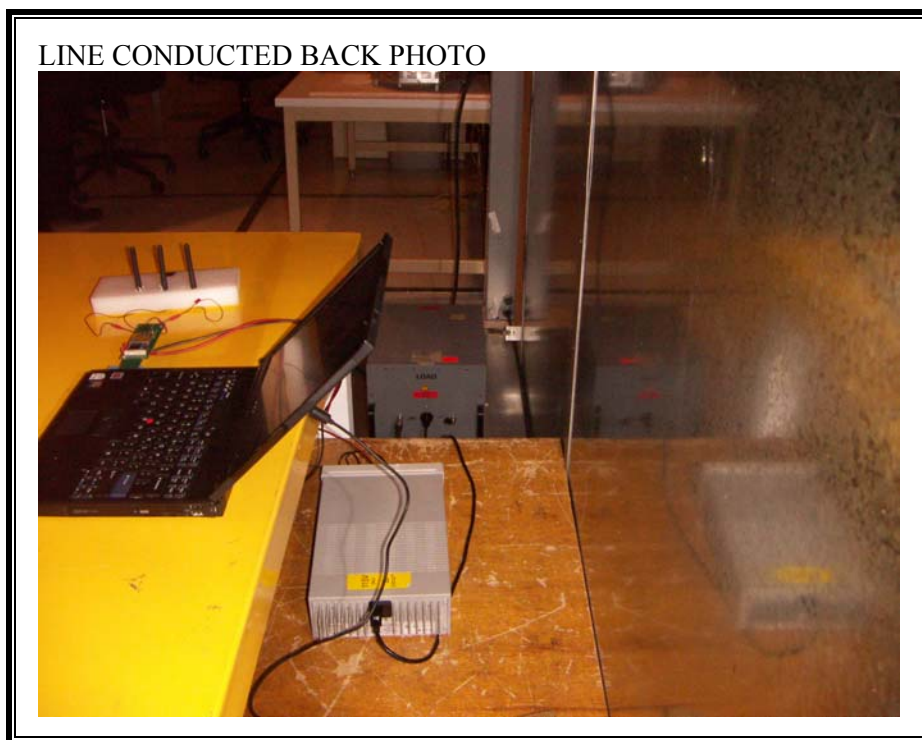
RADIATED RF MEASUREMENT SETUP



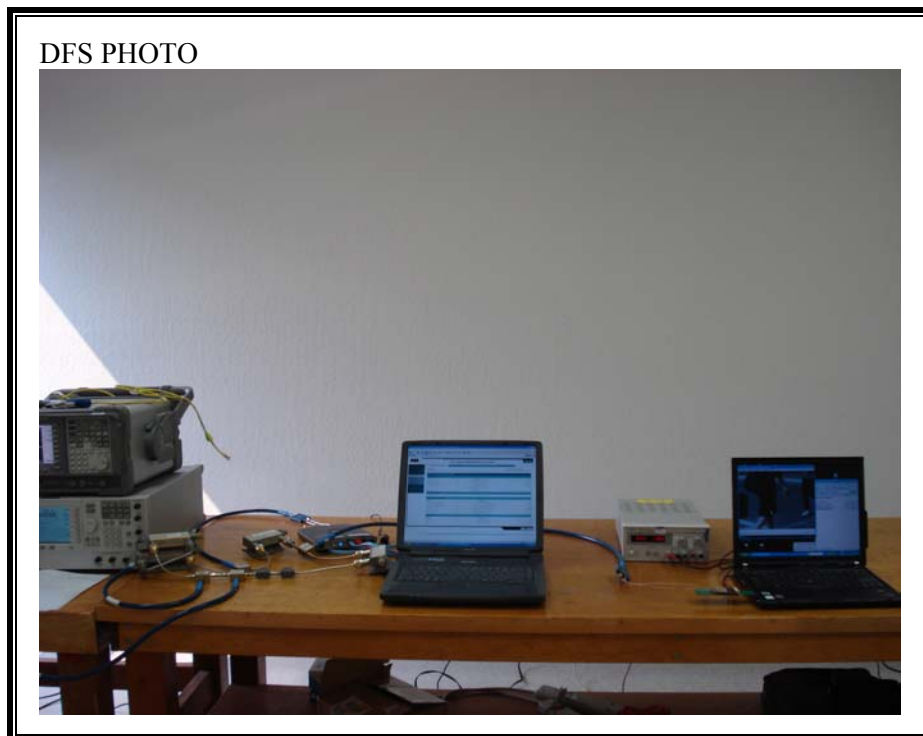


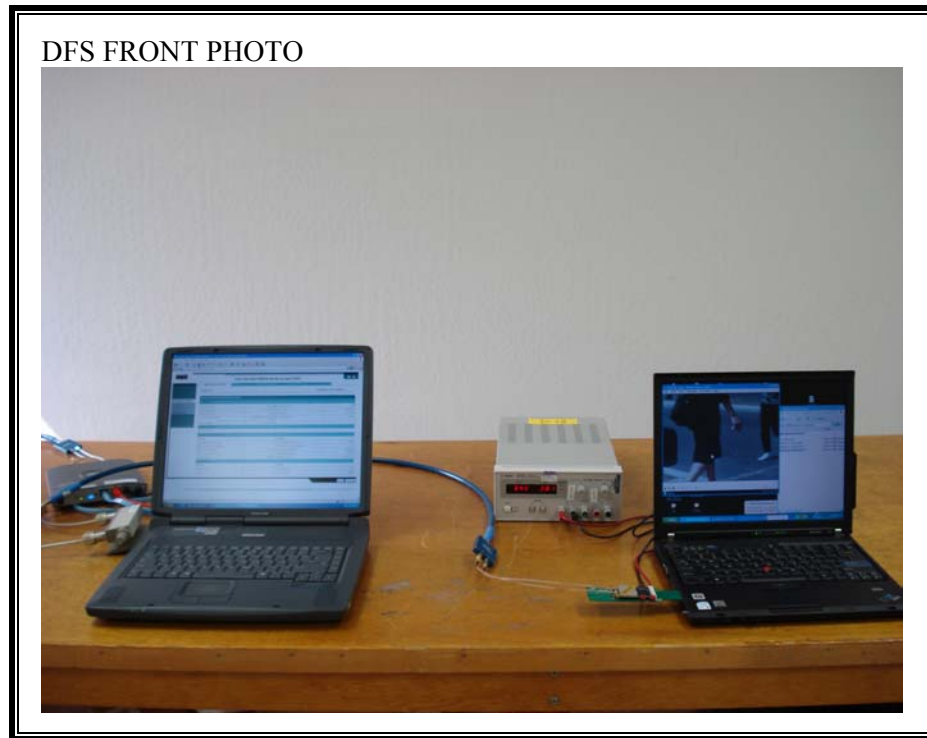
POWERLINE CONDUCTED EMISSIONS MEASUREMENT SETUP





DFS MEASUREMENT SETUP





END OF REPORT