FCC CFR47 PART 15 SUBPART E
CERTIFICATION TEST REPORT
FOR

WLAN a/b/g/n miniPCI Adapter

MODEL NUMBER: 65-VF320-P2

FCC ID: J9C-65VF320P2

REPORT NUMBER: 07U11488-2

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Prepared for

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Revision History

Rev.	Issue Date	Revisions	Revised By
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1. ATTESTATION OF TEST RESULTS

COMPANY NAME:	QUALCOMM INCORPORATED
	900 ARASTRADERO ROAD
	PALO ALTO, CA 94304, USA
EUT DESCRIPTION:	WLAN a/b/g/n miniPCI Adapter
MODEL:	65-VF320-P2
SERIAL NUMBER:	6043
DATE TESTED:	NOVEMBER 19 - DECEMBER 10, 2007

APPLICABLE STANDARDS	
STANDARD	**TEST RESULTS**
CFR 47 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:

THU CHAN
EMC SUPERVISOR
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, FCC MO&O 06-96, RSS-GEN Issue 2, and RSS-210 Issue 7.

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

The EUT is a RoHS/4000 Series PCI-E mini-card 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)
5180 - 5240	802.11a	13.69	23.39
5180 - 5240	802.11n HT20	12.88	19.41
5190 - 5230	802.11n HT40	15.55	35.89

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes three monopole antennas in MIMO Configuration, each with a maximum gain of 3 dBi for 5GHz bands.

5.4. SOFTWARE AND FIRMWARE

The EUT driver software installed during testing was Qualcomm PTT rev. 4.0.11.51

The test utility software used during testing was PTTGUI, Version 11-14-2007.

5.5. WORST-CASE CONFIGURATION AND MODE

The worst-case channel is determined as the channel with the highest output power.

The worst-case data rate emissions tests were made in the 802.11a CDD mode @ 6Mbps, HT20 MCS07 @ 65Mbps, and HT40 MCS15 @ 135Mbps.

5.6. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

PERIPHERAL SUPPORT EQUIPMENT LIST				
Description	**Manufacturer**	**Model**	**Serial Number**	**FCC ID**
Laptop	Dell	PP02X	CAP11290	DoC
AC adapter	Dell	LA65NS0-00	72N-5925	DoC
USB Mouse	Kensington	72123	25007290	DoC
Extender Card	CalAmp	STCBMP13	626	N/A

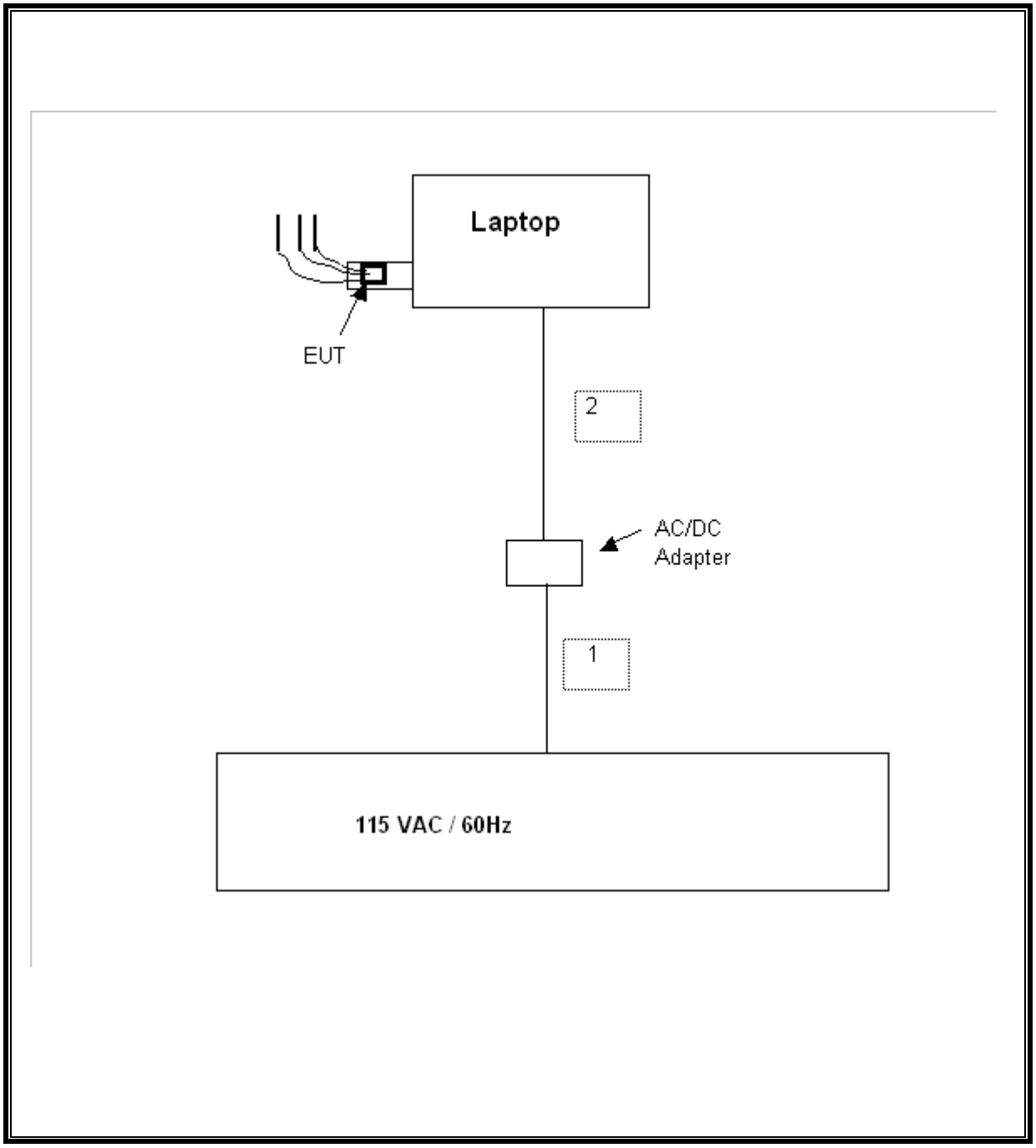
I/O CABLES

I/O CABLE LIST						
Cable No.	**Port**	**# of Identica Ports**	**Connector Type**	**Cable Type**	**Cable Length**	**Remarks**
1	AC	1	US 115V	Un-shielded	.8m	No
2	DC	1	DC Plug	Un-shielded	1.5m	No

TEST SETUP

The EUT is installed in extender card and a host laptop computer 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**	**Asset**	**Cal Date**	**Cal Due**
EMI Receiver, 9 kHz ~ 2.9 GHz	Agilent / HP	8542E	3942A00286	06/12/07	06/12/08
RF Filter Section	Agilent / HP	85420E	3705A00256	06/12/07	06/12/08
Antenna, Bilog 30 MHz ~ 2 Ghz	Sunol Sciences	JB1	A121003	06/12/07	08/13/08
Preamplifier, 1300 MHz	Agilent / HP	8447D	1937A02062	05/09/07	05/09/08
Spectrum Analyzer 3 Hz ~ 44 GHz	Agilent / HP	E4446A	US42510266	10/18/07	10/18/08
Antenna, Horn 1 ~ 18 GHz	EMCO	3115	6717	09/15/07	09/15/08
Preamplifier, 1 ~ 26.5 GHz	Agilent / HP	8449B	3008A00931	08/06/07	08/16/08
Power Sensor 10MHz - 18GHz	Agilent / HP	8481A	2237A31744	04/30/07	04/30/08
Peak Power Meter	Agilent / HP	E4416A	GB41291160	12/04/07	12/04/08
5.15-5.35 GHz Reject Filter	Micro-Tronics	BRC13190	1	CNR	CNR
5.725-5.825 GHz Reject Filter	Micro-Tronics	BRC13192	2	CNR	CNR
LISN, 10 kHz ~ 30 MHz	FCC	LISN-50/250-25-2	2023	09/15/07	09/15/08
LISN, 10 kHz ~ 30 MHz	Solar	8012-50-R-24-BNC	8379443	09/15/07	09/15/08
EMI Test Receiver	R & S	ESHS 20	827129/006	01/27/07	01/27/08

7. ANTENNA PORT TEST RESULTS

7.1. 802.11a DUAL CHAIN LEGACY MODE IN THE LOWER 5.2 GHz BAND

7.1.1. 26 dB and 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

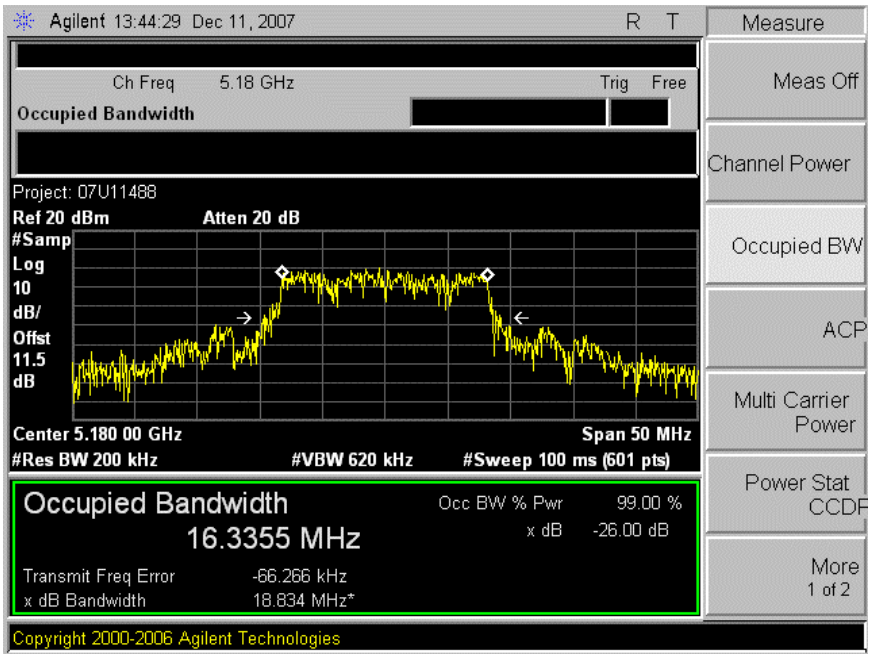
The transmitter outputs are connected to the spectrum analyzer via a combiner. The RBW is set to 1% to 3% of the measured bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal bandwidth function is utilized.

RESULTS

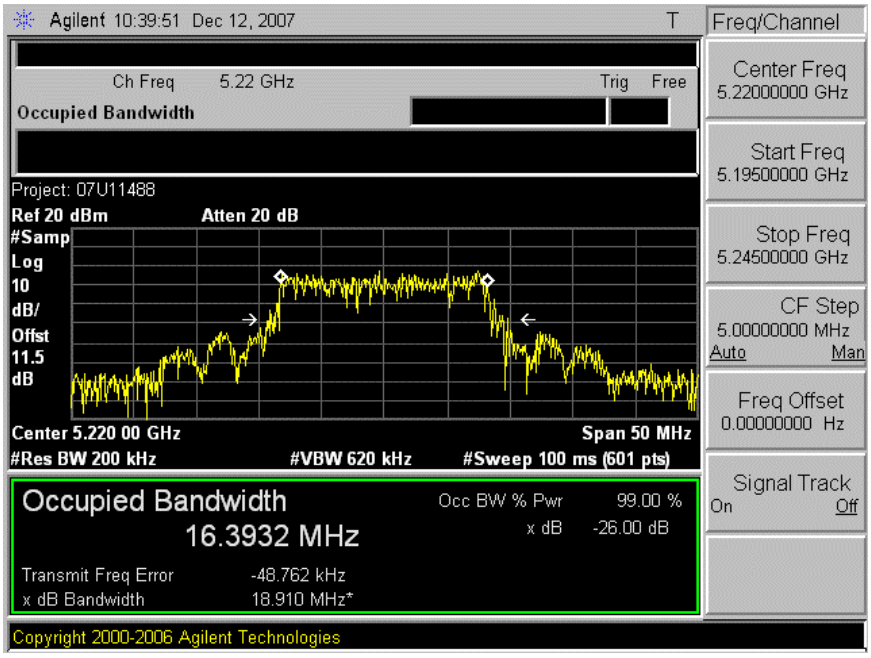
Channel	Frequency (MHz)	26 dB Bandwidth (MHz)	99% Bandwidth (MHz)
Low	5180	18.834	16.3355
Middle	5220	18.91	16.3932
High	5240	18.819	16.3853

26 dB and 99% BANDWIDTH

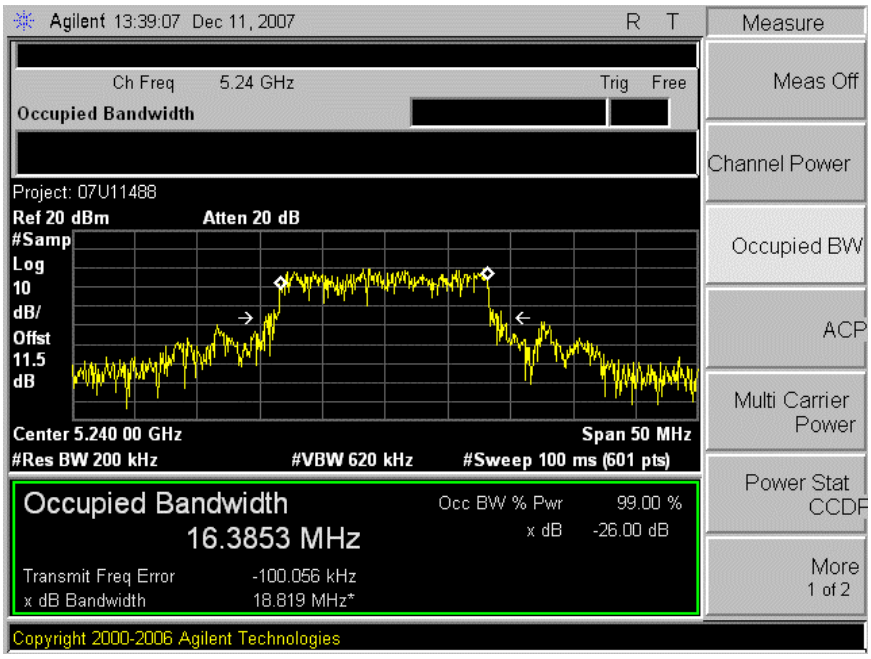
BANDWIDTH LOW CH



BANDWIDTH MID CH



BANDWIDTH HIGH CH



7.1.2. OUTPUT POWER

LIMITS

FCC §15.407 (a) (1)

IC RSS-210 A9.2 (1)

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

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

RESULTS

Limit

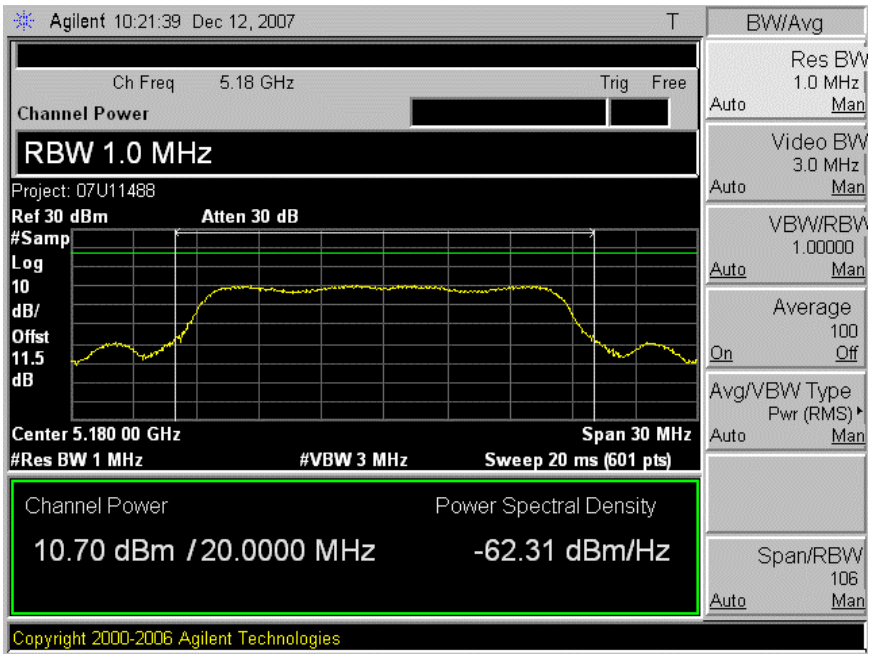
Channel	Frequency (MHz)	Fixed Limit (dBm)	B (MHz)	4 + 10 Log B Limit (dBm)	Antenna Gain (dBi)	Limit (dBm)
Low	5180	17	18.834	16.75	6.01	16.73
Mid	5220	17	18.91	16.77	6.01	16.75
High	5240	17	18.819	16.75	6.01	16.73

Individual Chain Results

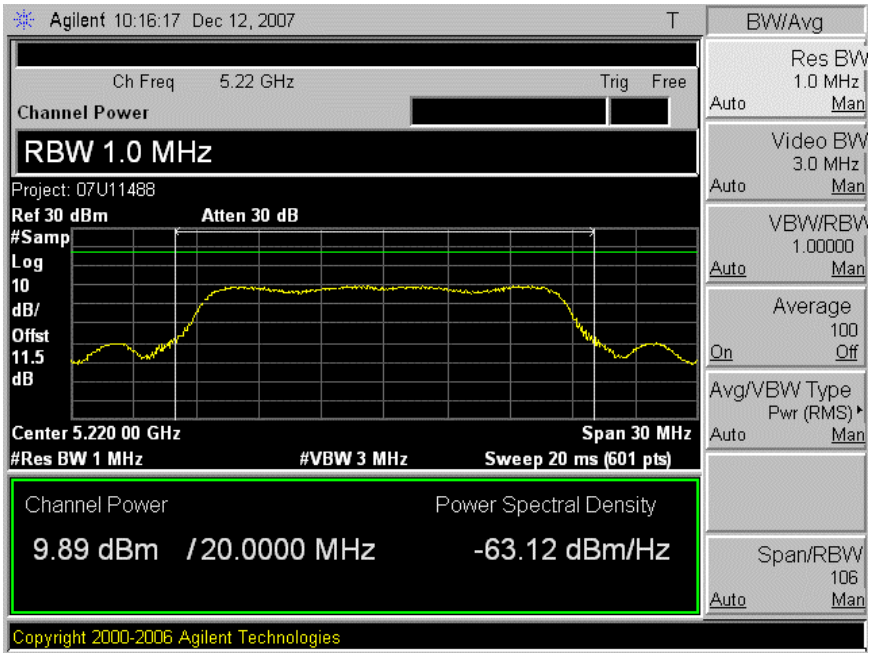
Channel	Frequency (MHz)	Chain 1 Power (dBm)	Chain 2 Power (dBm)	Total Power (dBm)	Limit (dBm)	Margin (dB)
Low	5180	10.70	10.66	13.69	16.73	-3.04
Mid	5220	9.89	9.74	12.83	16.75	-3.92
High	5240	10.32	10.03	13.19	16.73	-3.54

CHAIN 1 OUTPUT POWER

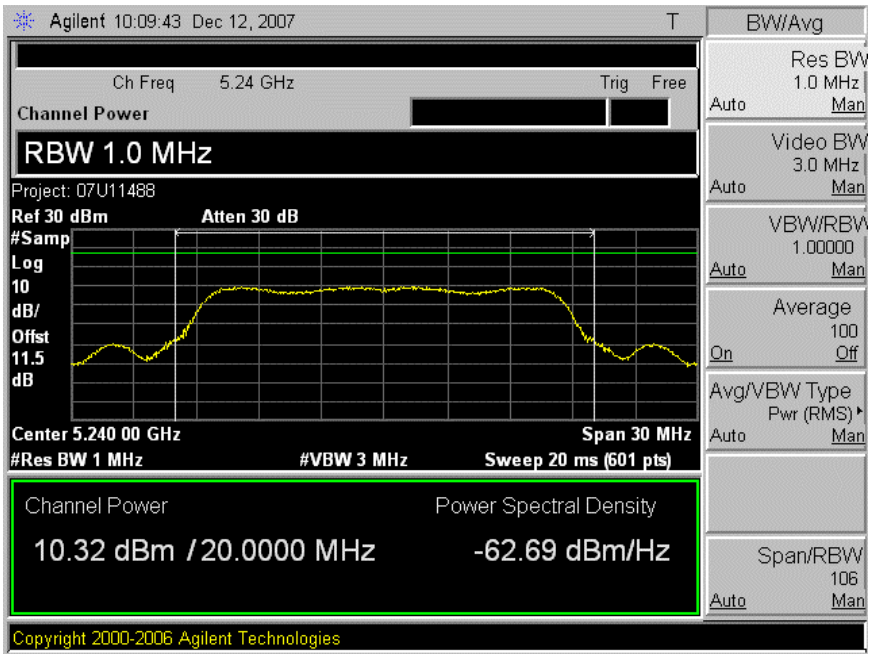
OUTPUT POWER LOW CH, CHAIN 1



OUTPUT POWER MID CH, CHAIN 1

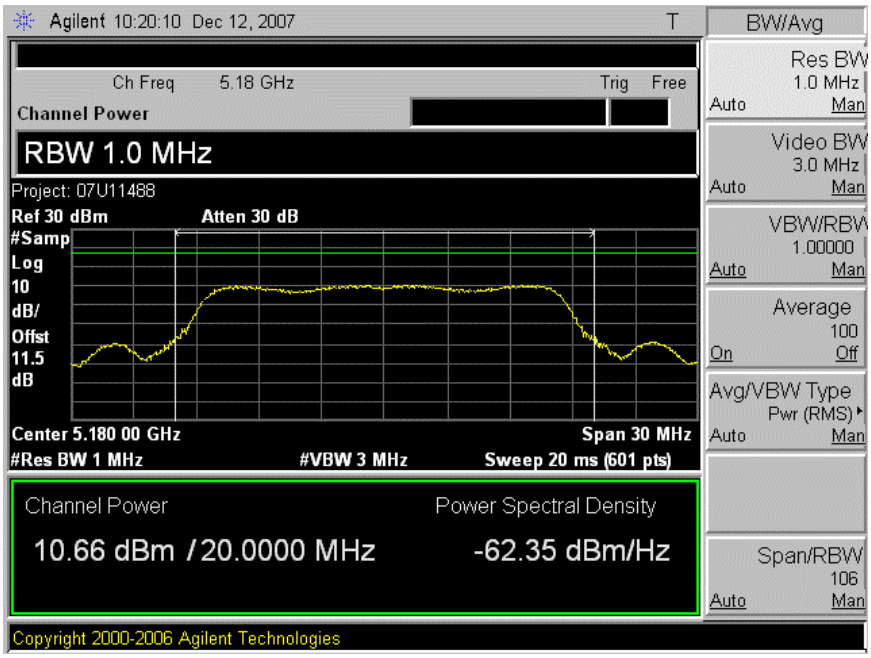


OUTPUT POWER HIGH CH, CHAIN 1

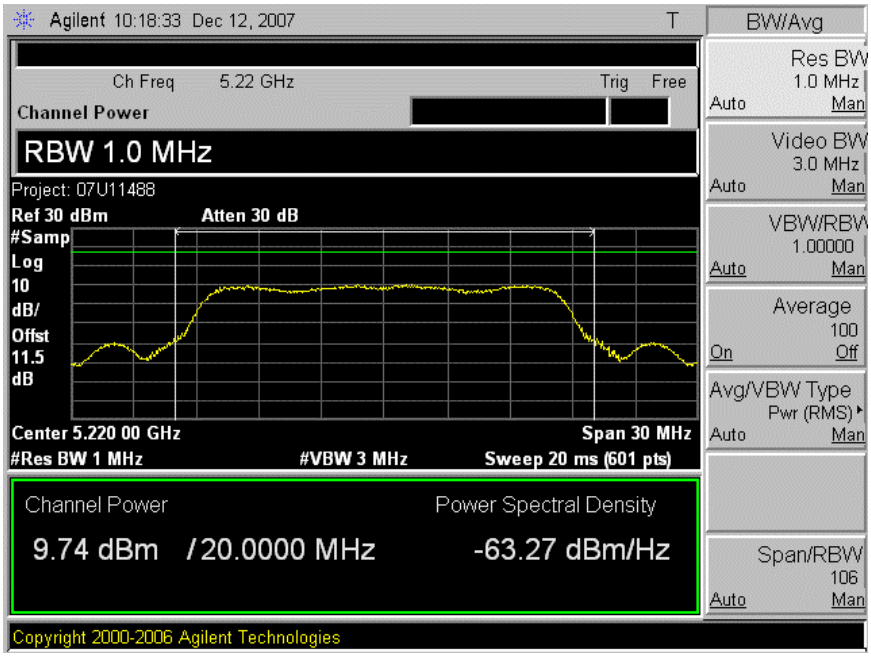


CHAIN 2 OUTPUT POWER

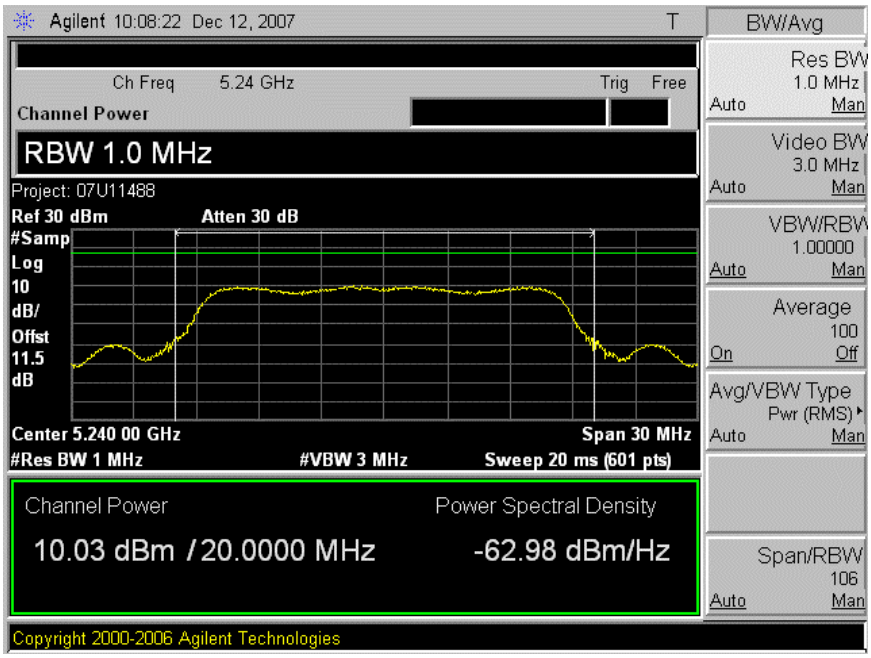
OUTPUT POWER LOW CH, CHAIN 2



OUTPUT POWER MID CH, CHAIN 2



OUTPUT POWER HIGH CH, CHAIN 2



7.1.3. AVERAGE POWER

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a power meter.

RESULTS

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.

Channel	Frequency (MHz)	Chain 1 Power (dBm)	Chain 2 Power (dBm)	Total Power (dBm)
Low	5180	10.53	10.61	13.58
Middle	5220	10.00	9.99	13.01
High	5240	9.89	9.80	12.86

7.1.4. PEAK POWER SPECTRAL DENSITY

LIMITS

FCC §15.407 (a) (1)

IC RSS-210 A9.2 (1)

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

For the 5.15-5.25 GHz band, 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.

The maximum antenna gain is 6.01 dBi, therefore the limit is 3.99 dBm.

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.

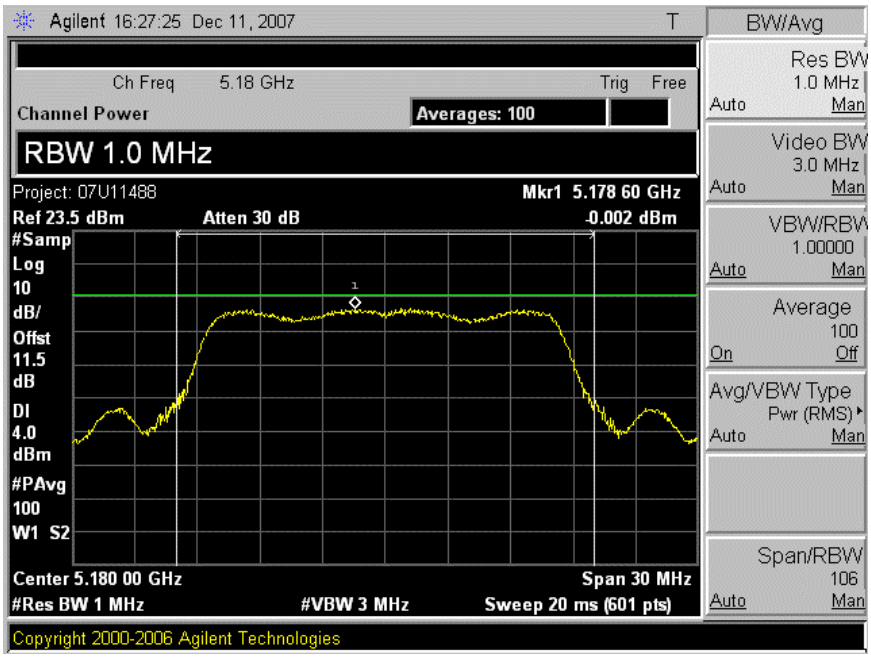
RESULTS

Channel	Frequency (MHz)	Chain 1 PPSD (dBm)	Chain 2 PPSD (dBm)	Total PPSD (dBm)	Limit (dBm)	Margin (dB)
Low	5180	-0.002	0.262	3.14	3.99	-0.85

Channel	Frequency (MHz)	PPSD With Combiner (dBm)	Limit (dBm)	Margin (dB)
Low	5180	3.72	3.99	-0.27
Middle	5220	2.98	3.99	-1.01
High	5240	3.05	3.99	-0.94

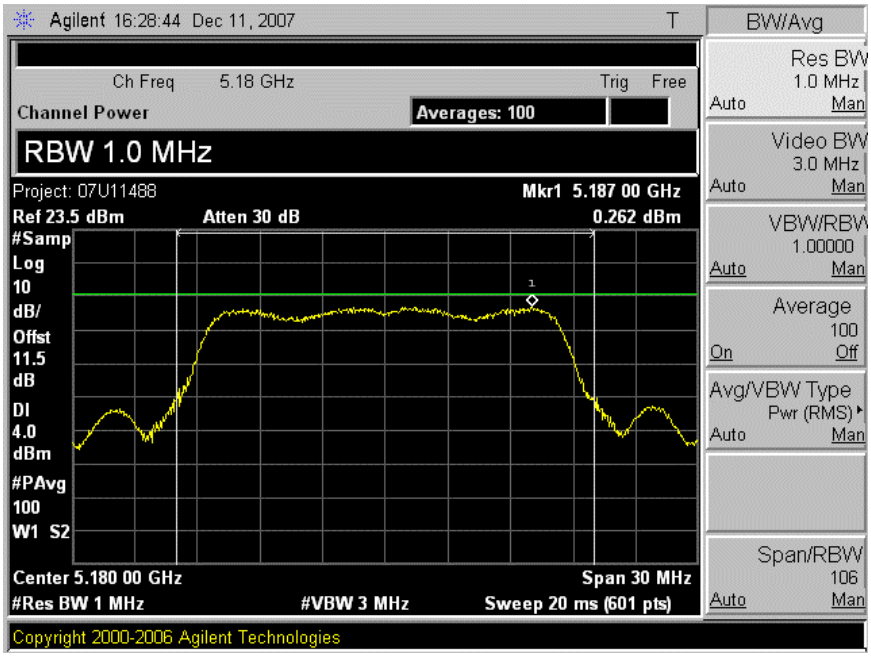
CHAIN 1 POWER SPECTRAL DENSITY

PSD LOW CH, CHAIN 1



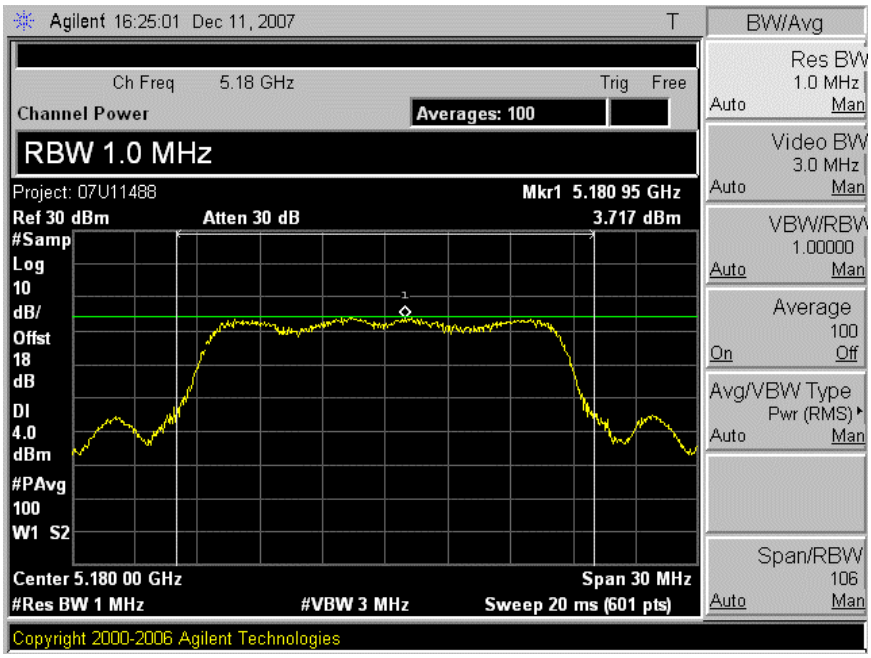
CHAIN 2 POWER SPECTRAL DENSITY

PSD LOW CH, CHAIN 2

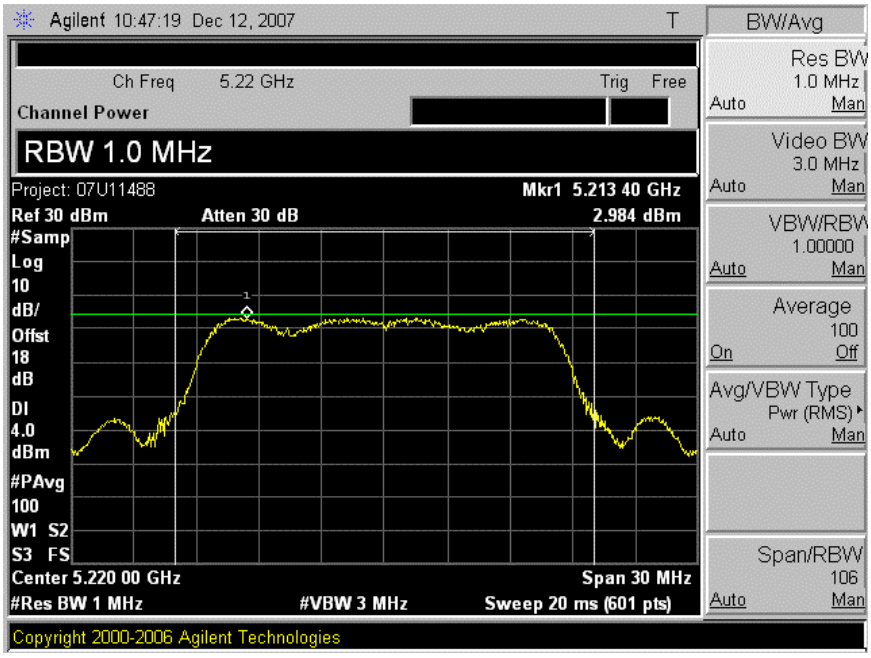


POWER SPECTRAL DENSITY WITH COMBINER

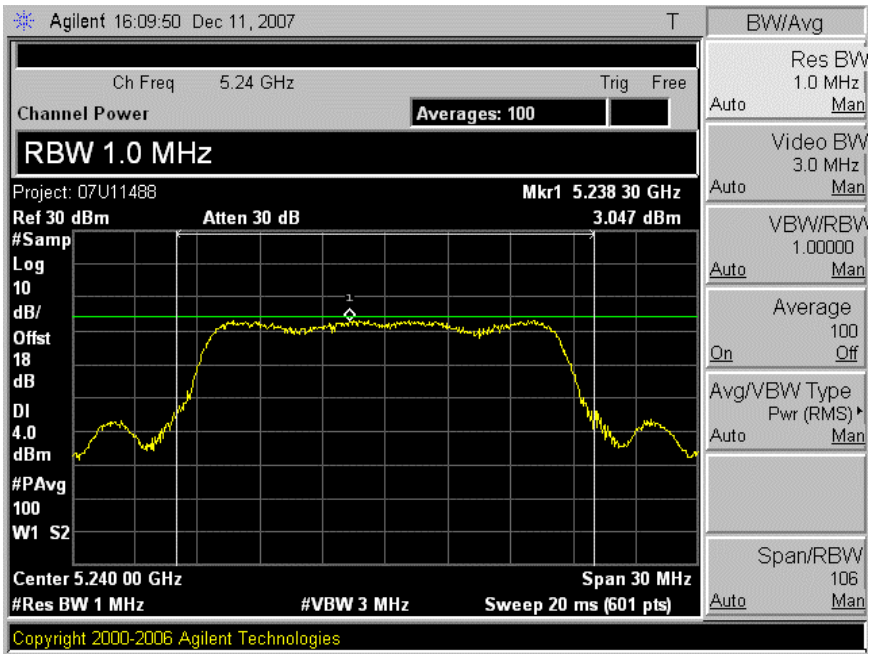
PSD LOW CH, WITH COMBINER



PSD MID CH, WITH COMBINER



PSD HIGH CH, WITH COMBINER



7.1.5. PEAK EXCURSION

LIMITS

FCC §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 transmitter outputs are connected to the spectrum analyzer via a combiner.

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.

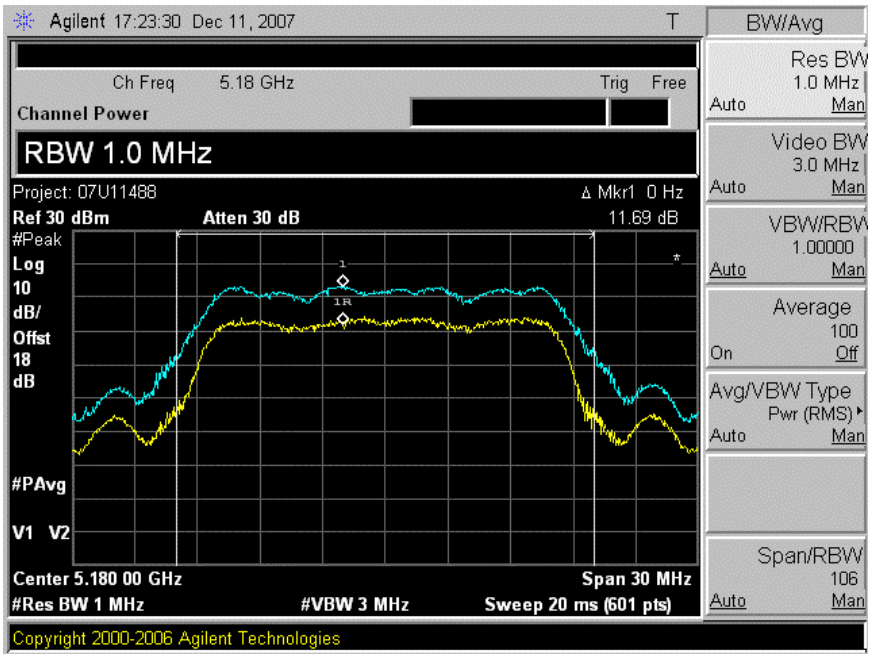
Since Method # 1 was used for peak power measurements, Method # 1 settings are used for the second PPSD trace.

RESULTS

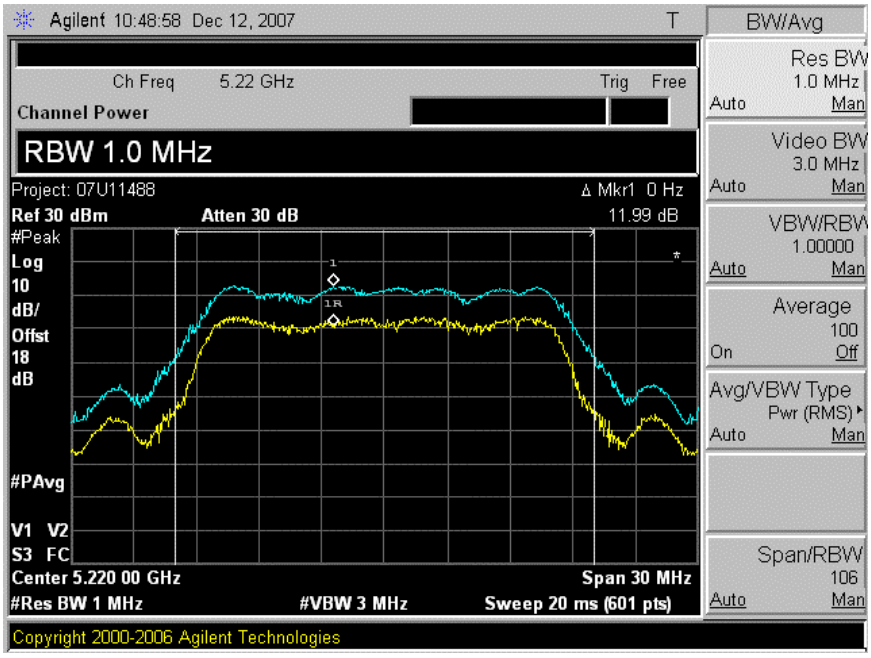
Channel	Frequency (MHz)	Peak Excursion (dB)	Limit (dB)	Margin (dB)
Low	5180	11.69	13	-1.31
Middle	5220	11.99	13	-1.01
High	5240	10.34	13	-2.66

PEAK EXCURSION

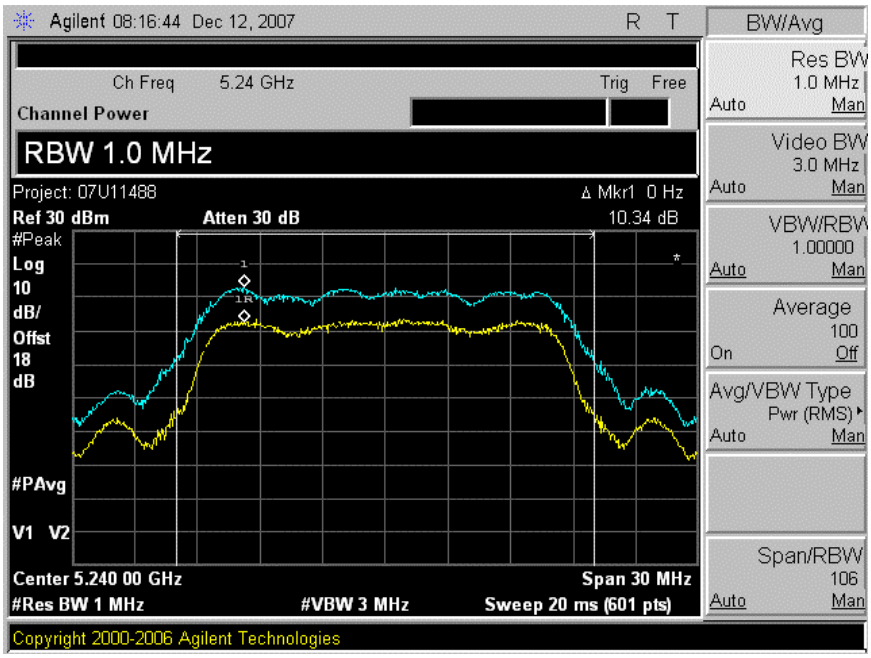
PEAK EXCURSION LOW CH



PEAK EXCURSION MID CH



PEAK EXCURSION HIGH CH



7.1.6. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.407 (b) (1)

IC RSS-210 A9.3 (1)

For transmitters operating in the 5.15-5.25 GHz band: all emissions outside of the 5.15-5.35 GHz band shall not exceed an EIRP of -27 dBm / MHz.

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.

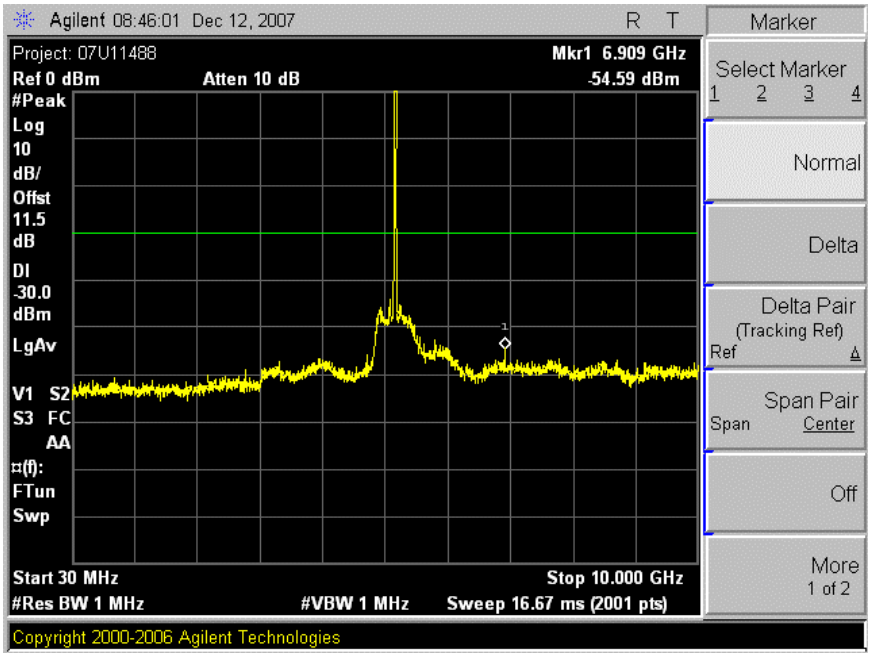
The transmitter output is connected to the spectrum analyzer. The resolution bandwidth is set to 1 MHz. The video bandwidth is set to 1 MHz. Peak detection measurements are compared to the average EIRP limit, adjusted for the maximum antenna gain. If necessary, additional average detection measurements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

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

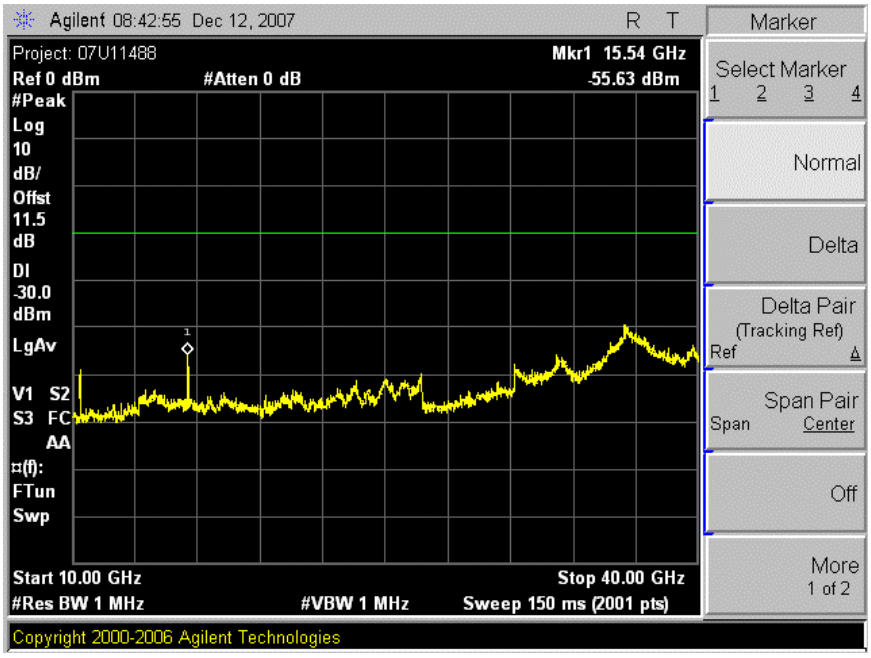
RESULTS

CHAIN 1 SPURIOUS EMISSIONS

LOW CHANNEL SPURIOUS, CHAIN 1

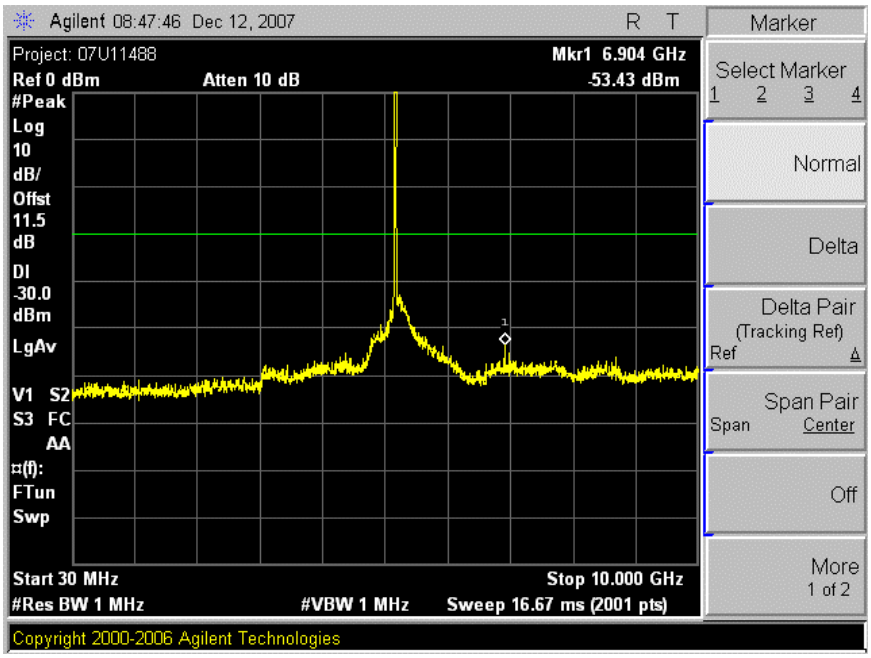


LOW CHANNEL SPURIOUS, CHAIN 1

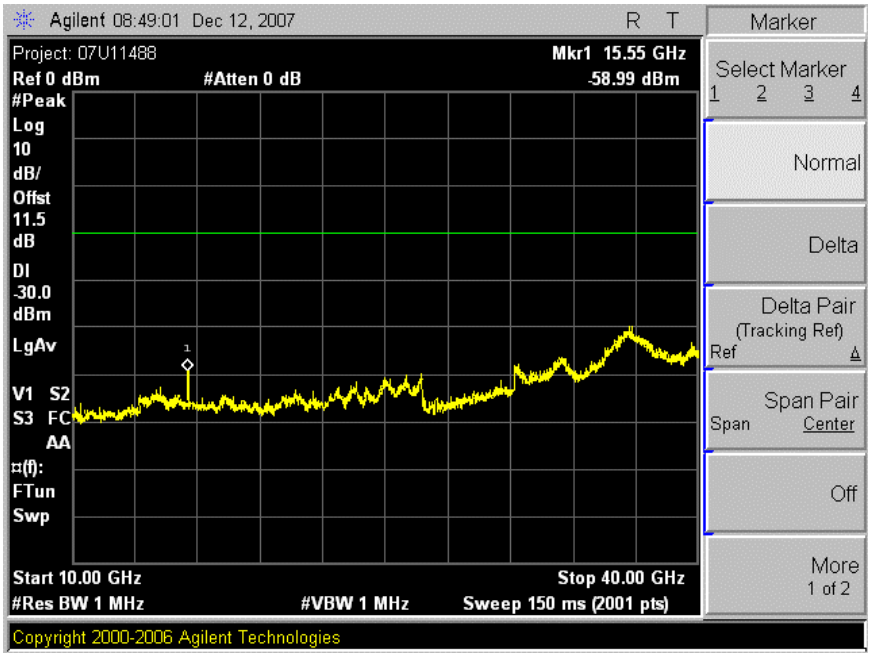


CHAIN 2 SPURIOUS EMISSIONS

LOW CHANNEL SPURIOUS, CHAIN 2

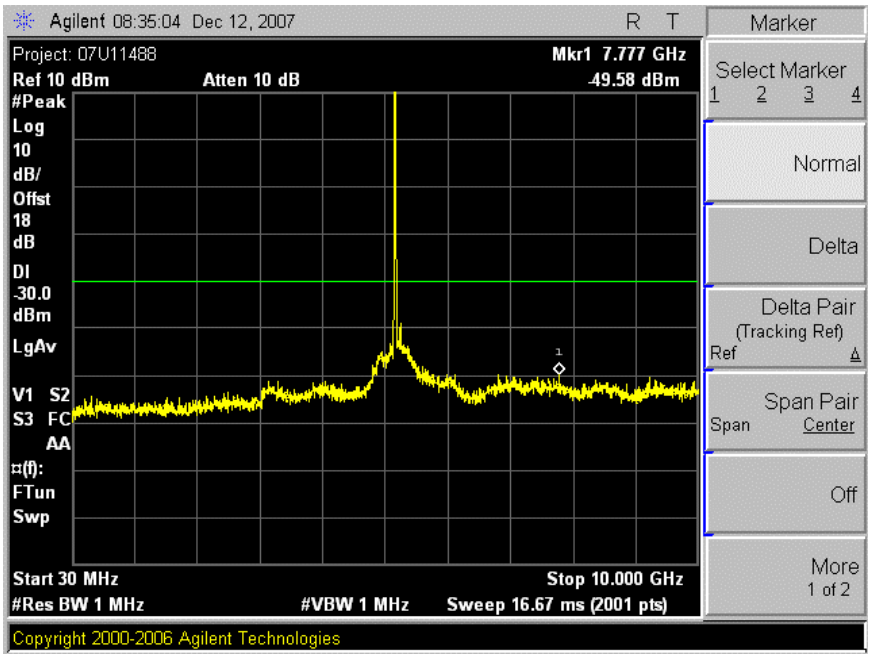


LOW CHANNEL SPURIOUS, CHAIN 2

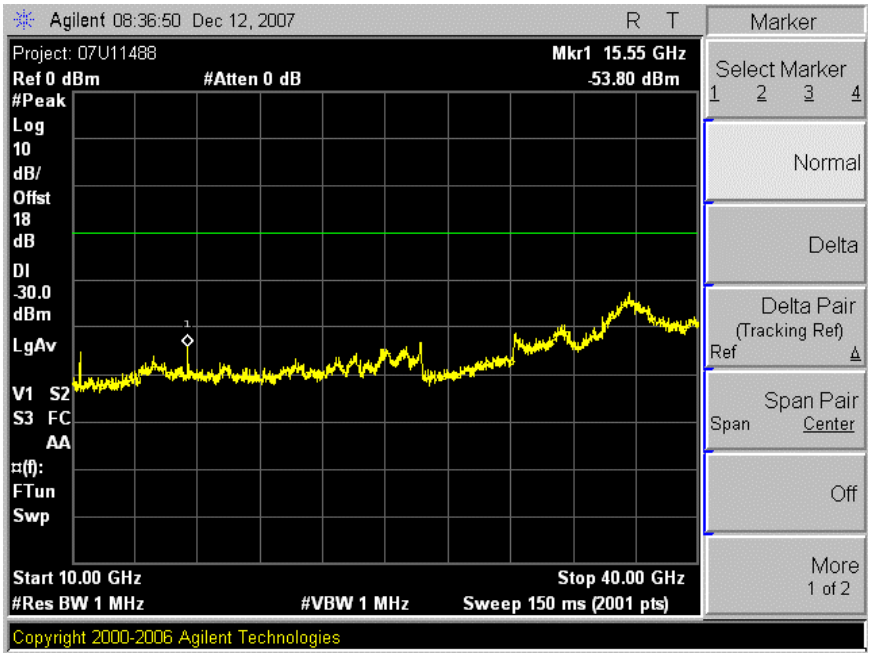


SPURIOUS EMISSIONS WITH COMBINER

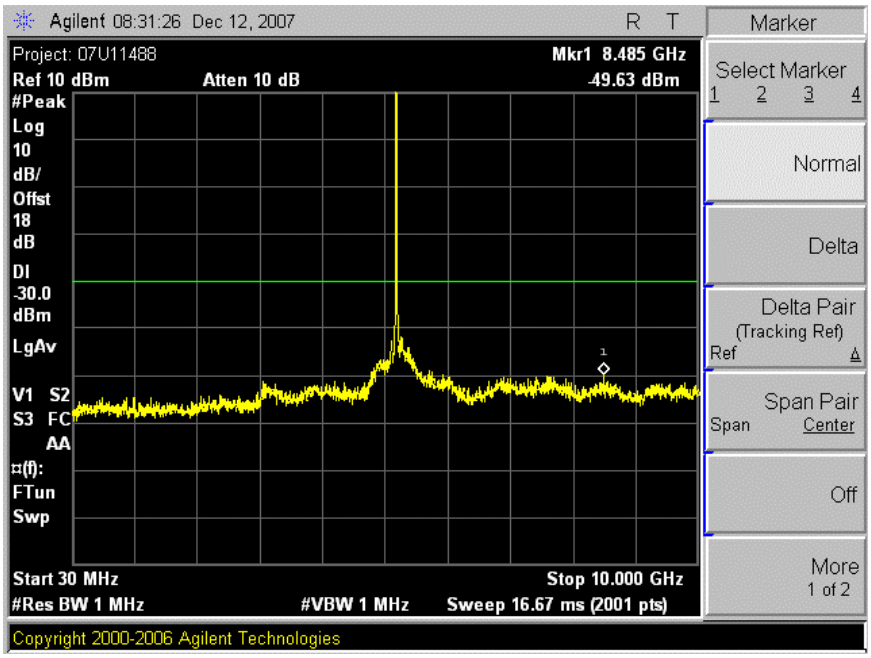
LOW CHANNEL SPURIOUS, WITH COMBINER



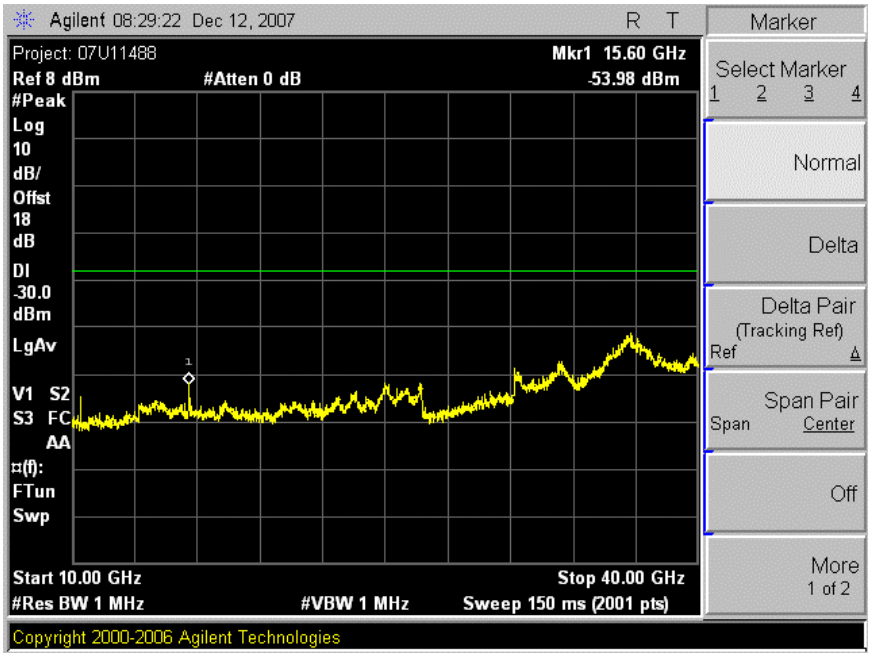
LOW CHANNEL SPURIOUS, WITH COMBINER



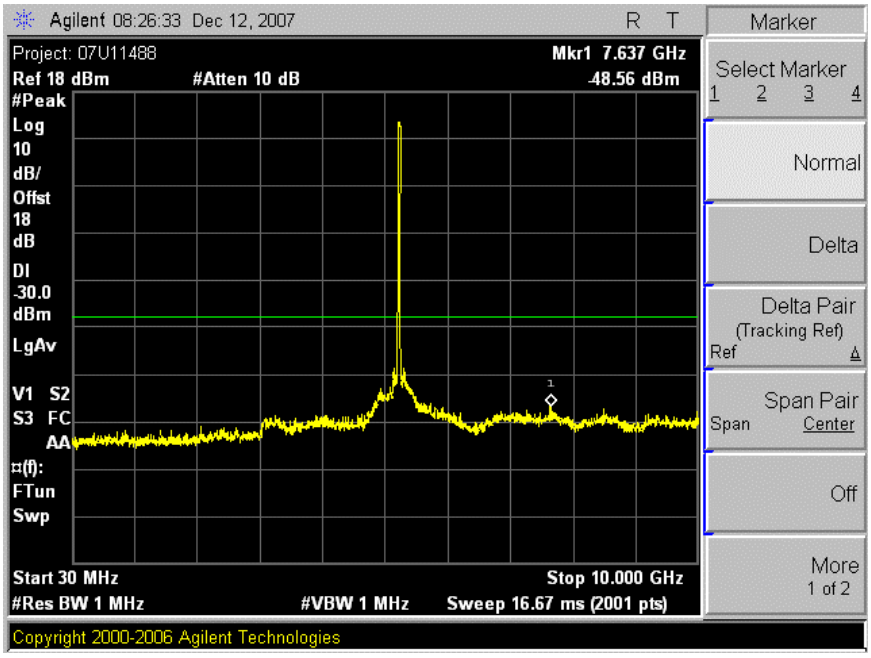
MID CHANNEL SPURIOUS, WITH COMBINER



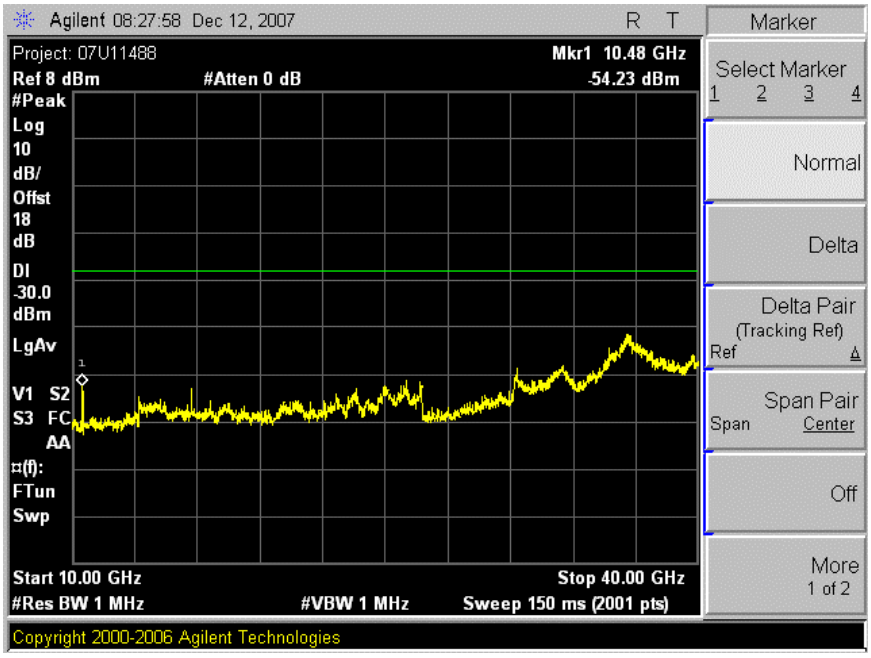
MID CHANNEL SPURIOUS, WITH COMBINER



HIGH CHANNEL SPURIOUS, WITH COMBINER



HIGH CHANNEL SPURIOUS, WITH COMBINER



7.2. 802.11n HT20 MODE IN THE LOWER 5.2 GHz BAND

7.2.1. 26 dB and 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

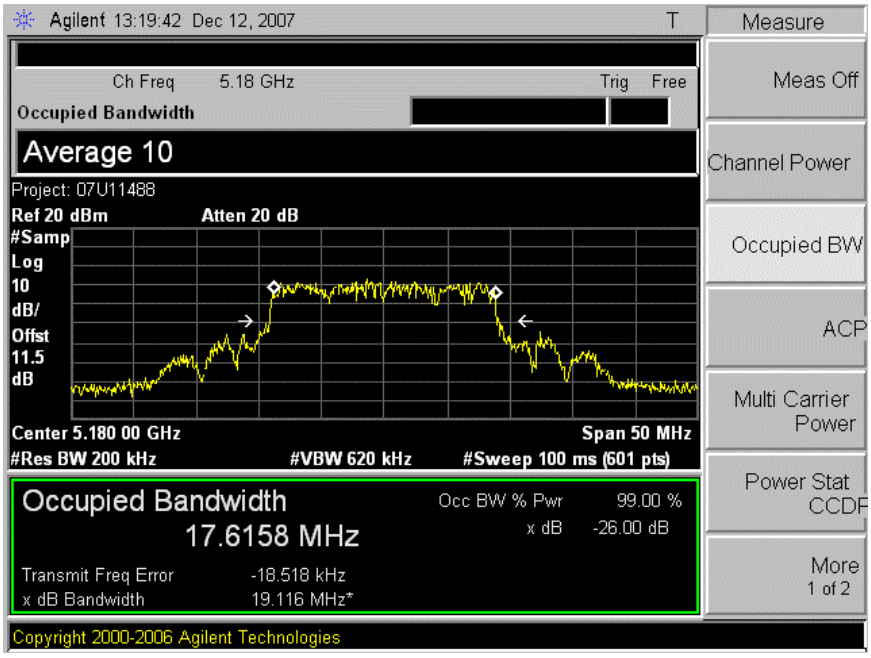
The transmitter outputs are connected to the spectrum analyzer via a combiner. The RBW is set to 1% to 3% of the measured bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal bandwidth function is utilized.

RESULTS

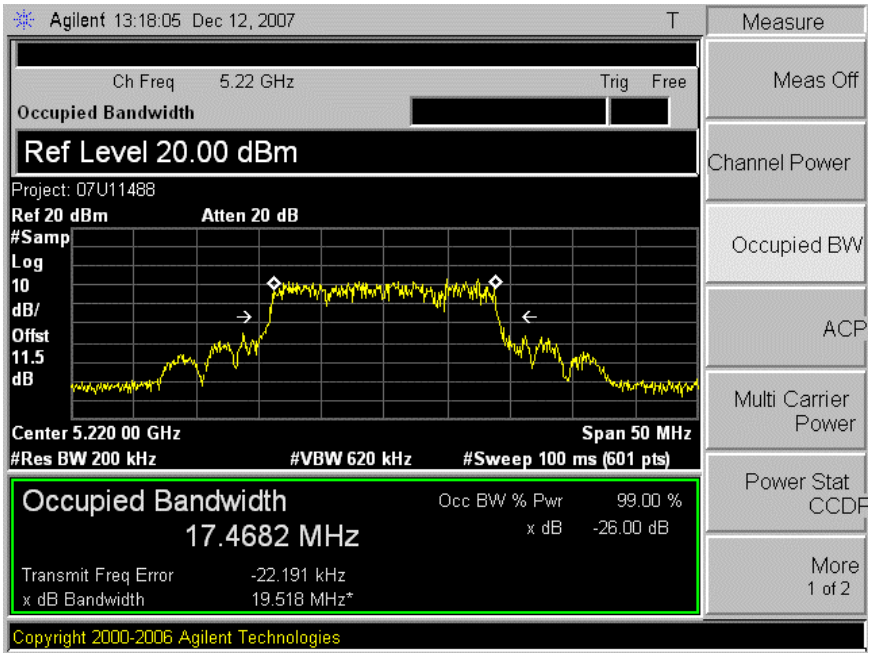
Channel	Frequency (MHz)	26 dB Bandwidth (MHz)	99% Bandwidth (MHz)
Low	5180	19.116	17.6158
Middle	5220	19.518	17.4682
High	5240	19.21	17.4437

26 dB and 99% BANDWIDTH

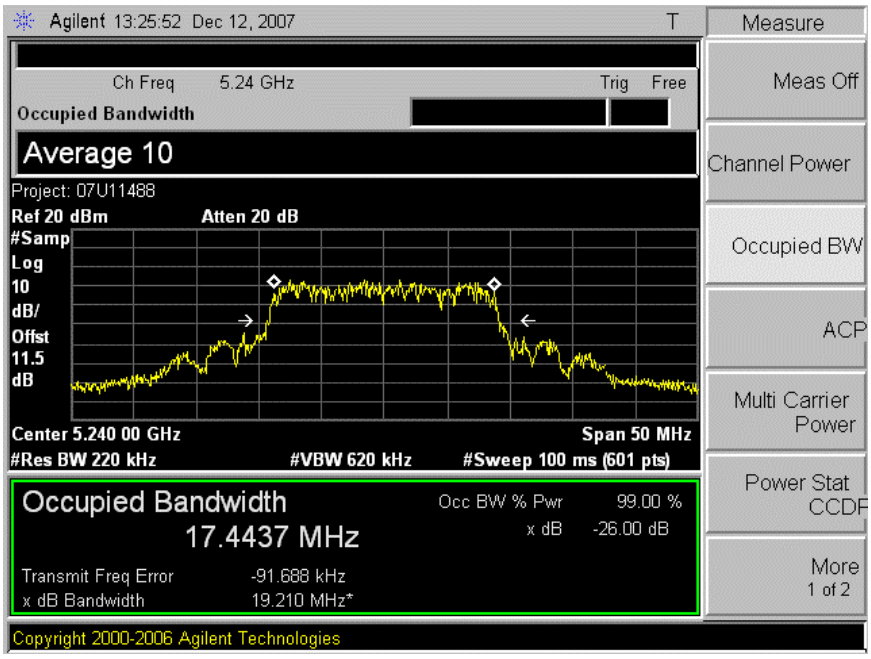
BANDWIDTH LOW CH



BANDWIDTH MID CH



BANDWIDTH HIGH CH



7.2.2. OUTPUT POWER

LIMITS

FCC §15.407 (a) (1)

IC RSS-210 A9.2 (1)

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

RESULTS

Limit

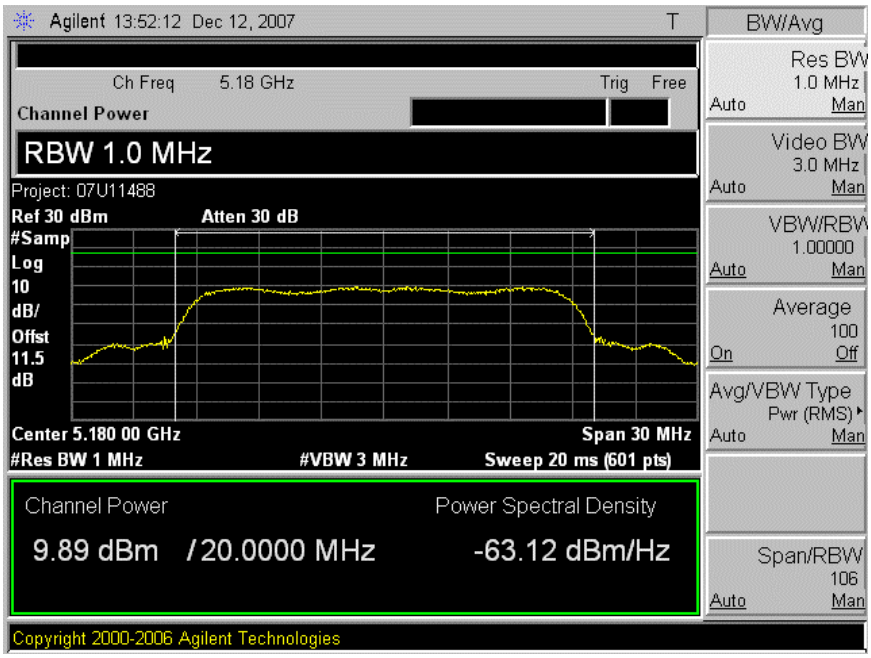
Channel	Frequency (MHz)	Fixed Limit (dBm)	B (MHz)	4 + 10 Log B Limit (dBm)	Antenna Gain (dBi)	Limit (dBm)
Low	5180	17	19.116	16.81	3.00	15.81
Mid	5220	17	19.518	16.90	3.00	16.89
High	5240	17	19.21	16.84	3.00	16.83

Individual Chain Results

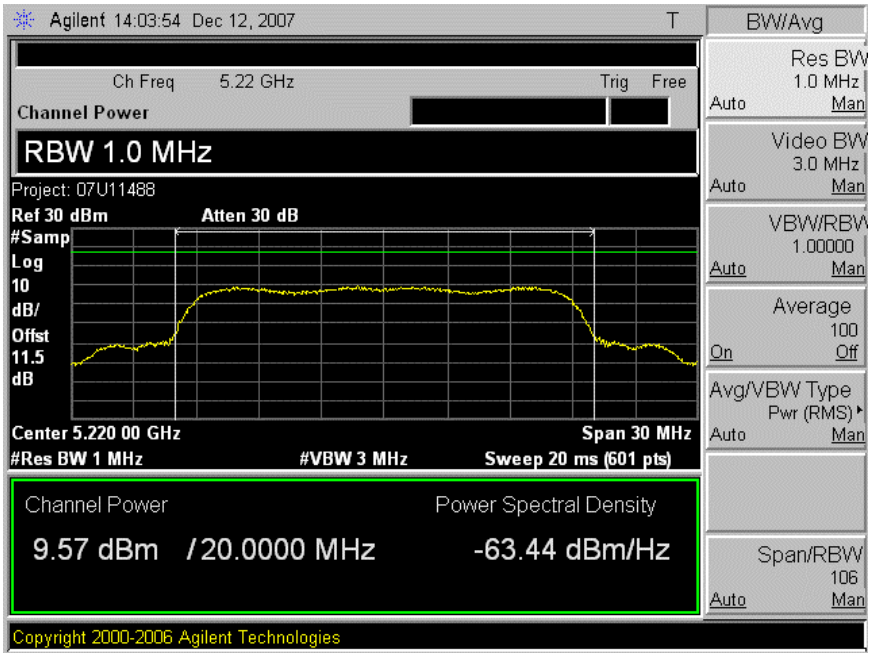
Channel	Frequency (MHz)	Chain 1 Power (dBm)	Chain 2 Power (dBm)	Total Power (dBm)	Limit (dBm)	Margin (dB)
Low	5180	9.89	9.84	12.88	15.81	-5.92
Mid	5220	9.57	9.71	12.65	16.89	-7.32
High	5240	9.61	9.70	12.67	16.83	-7.22

CHAIN 1 OUTPUT POWER

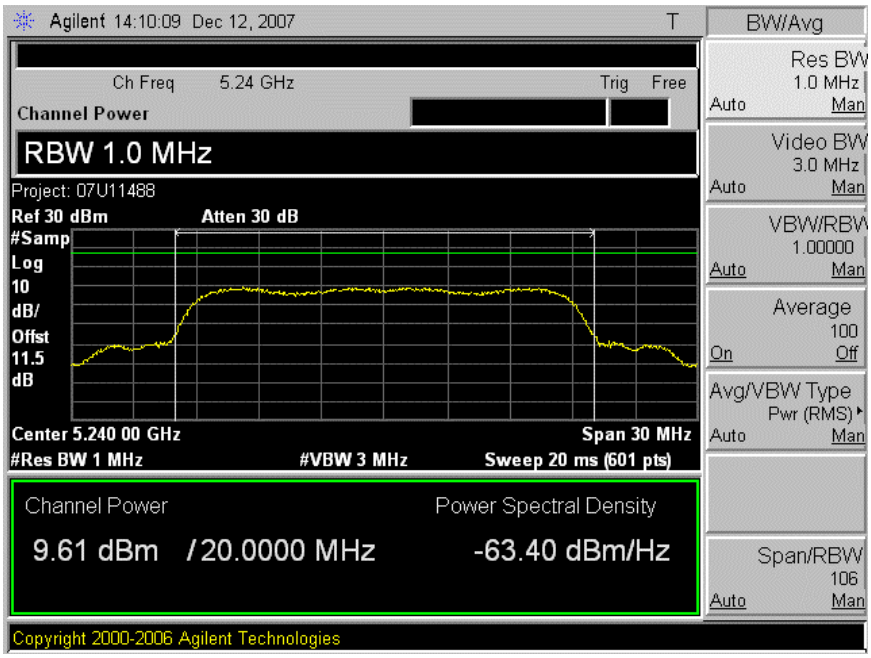
OUTPUT POWER LOW CH, CHAIN 1



OUTPUT POWER MID CH, CHAIN 1

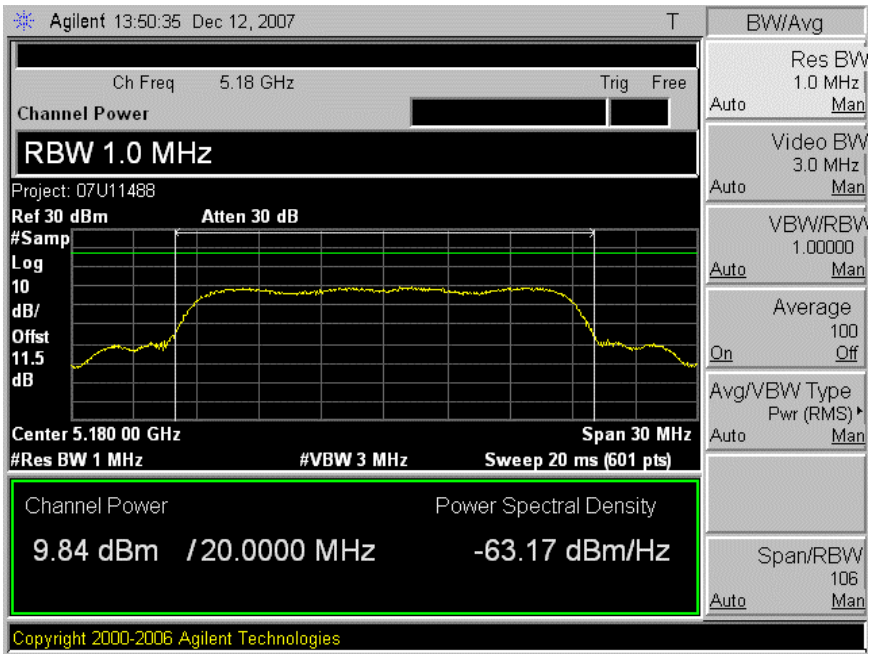


OUTPUT POWER HIGH CH, CHAIN 1

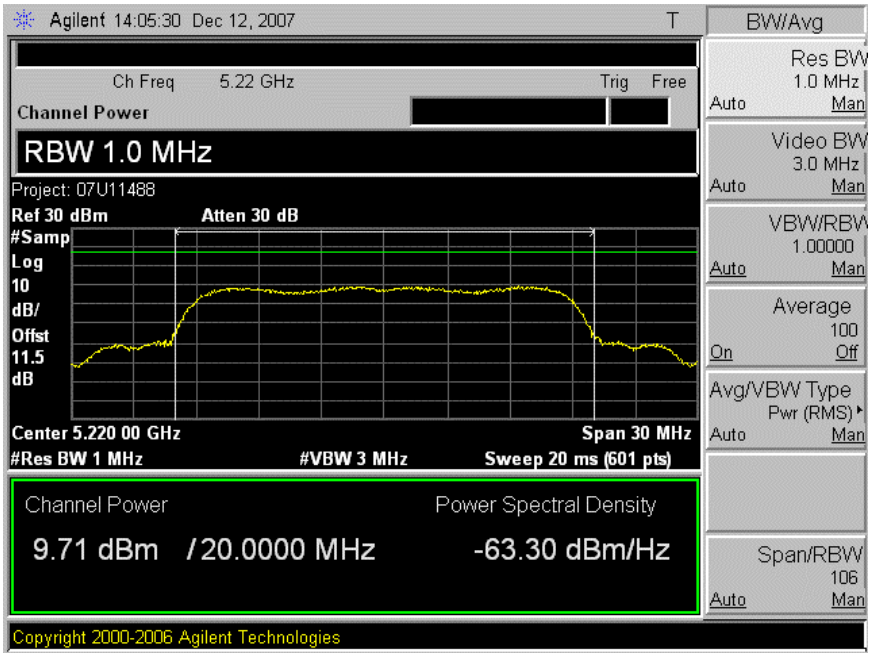


CHAIN 2 OUTPUT POWER

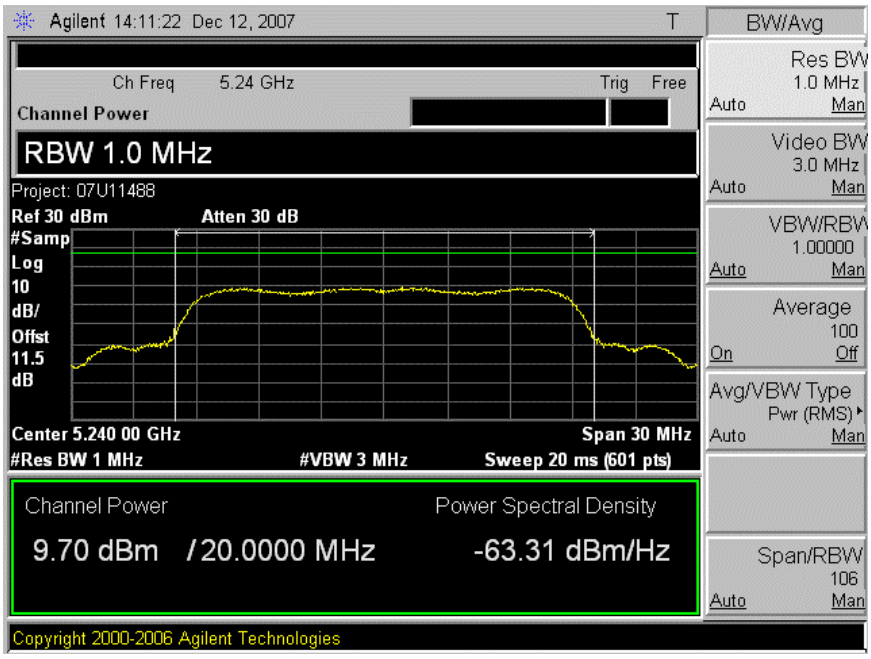
OUTPUT POWER LOW CH, CHAIN 2



OUTPUT POWER MID CH, CHAIN 2



OUTPUT POWER HIGH CH, CHAIN 2



7.2.3. AVERAGE POWER

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a power meter.

RESULTS

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.

Channel	Frequency (MHz)	Chain 1 Power (dBm)	Chain 2 Power (dBm)	Total Power (dBm)
Low	5180	10.02	10.15	13.10
Middle	5220	9.83	9.85	12.85
High	5240	9.80	9.70	12.76

7.2.4. PEAK POWER SPECTRAL DENSITY

LIMITS

FCC §15.407 (a) (1)

IC RSS-210 A9.2 (1)

For the 5.15-5.25 GHz band, 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.

The maximum antenna gain is 6.01 dBi, therefore the limit is 3.99 dBm.

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.

RESULTS

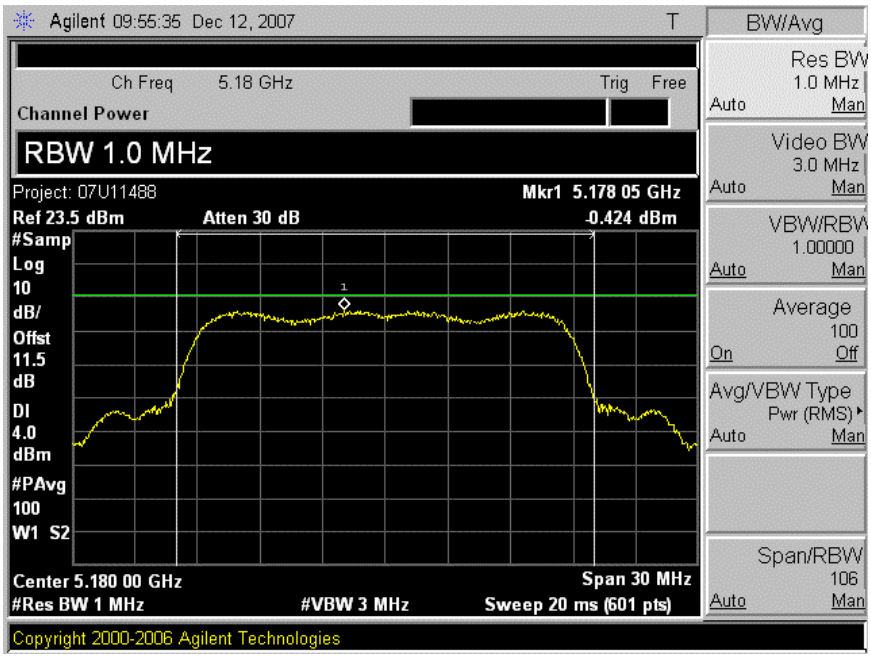
Middle and High channels were measured with the combiner only, since doing so results in the worst-case compared to measuring either chain alone.

Channel	Frequency (MHz)	Chain 1 PPSD (dBm)	Chain 2 PPSD (dBm)	Total PPSD (dBm)	Limit (dBm)	Margin (dB)
Low	5180	-0.424	-0.716	2.44	3.99	-1.55

Channel	Frequency (MHz)	PPSD With Combiner (dBm)	Limit (dBm)	Margin (dB)
Low	5180	3.61	3.99	-0.38
Middle	5220	3.13	3.99	-0.86
High	5240	3.81	3.99	-0.18

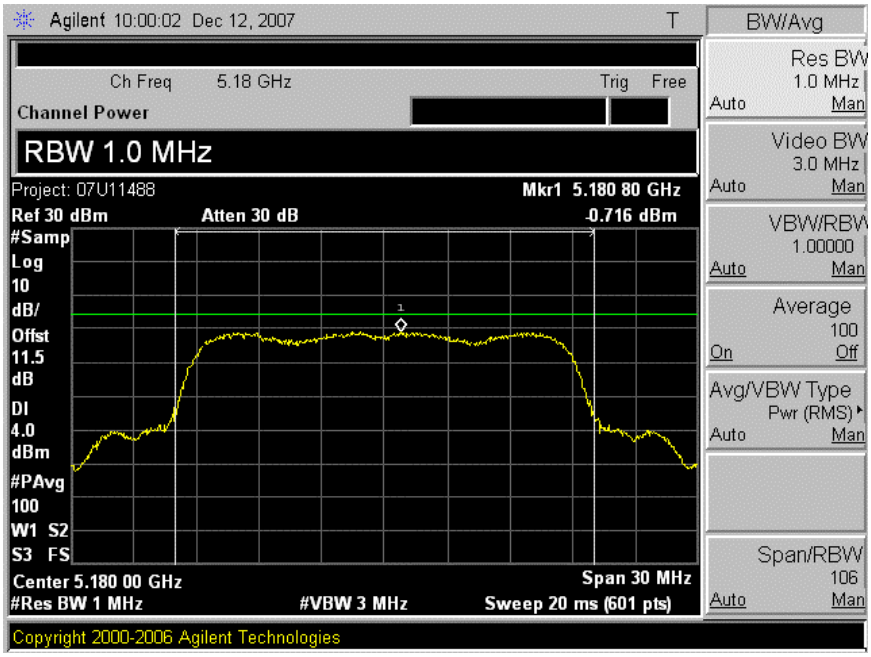
CHAIN 1 POWER SPECTRAL DENSITY

PSD LOW CH, CHAIN 1



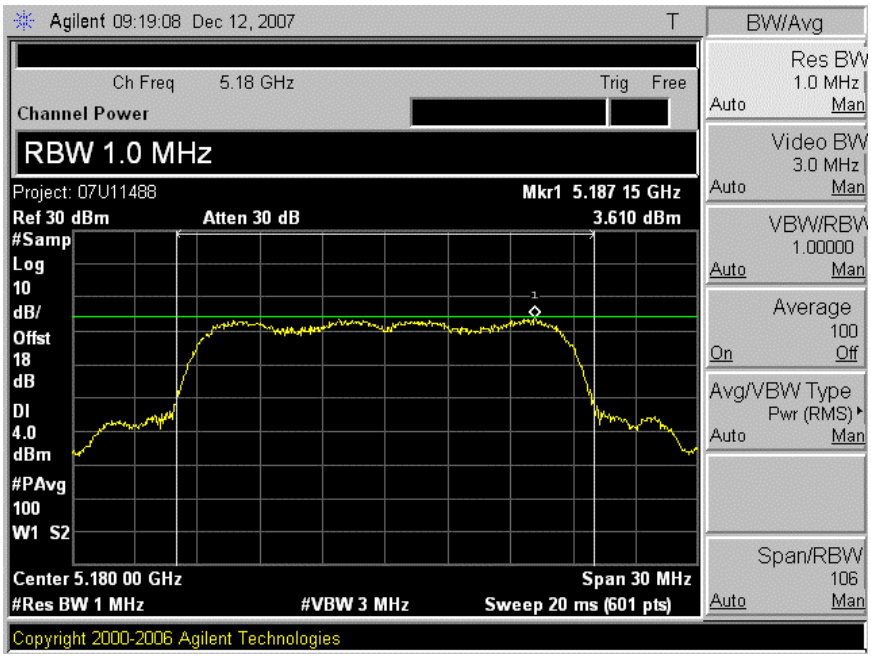
CHAIN 2 POWER SPECTRAL DENSITY

PSD LOW CH, CHAIN 2

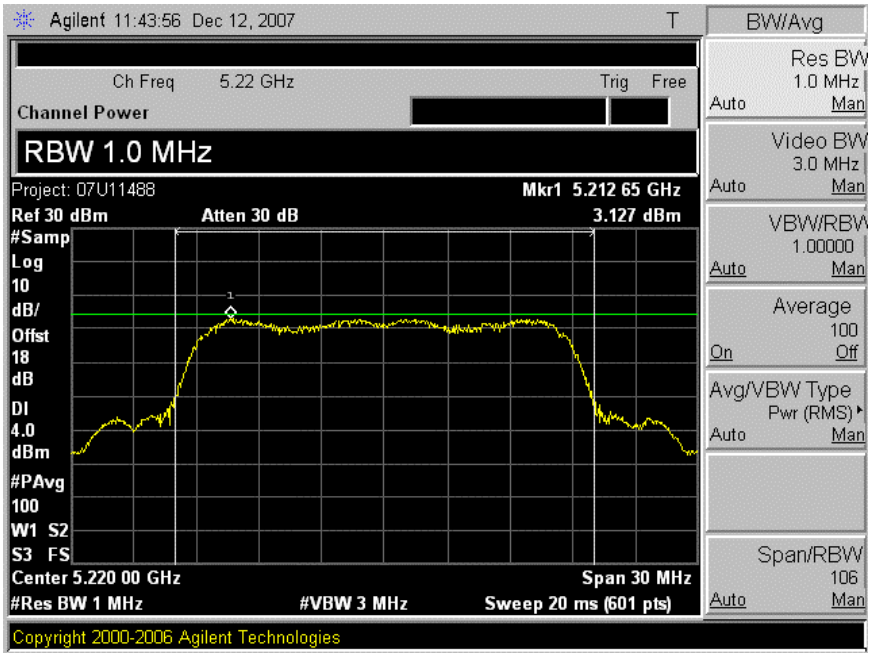


POWER SPECTRAL DENSITY WITH COMBINER

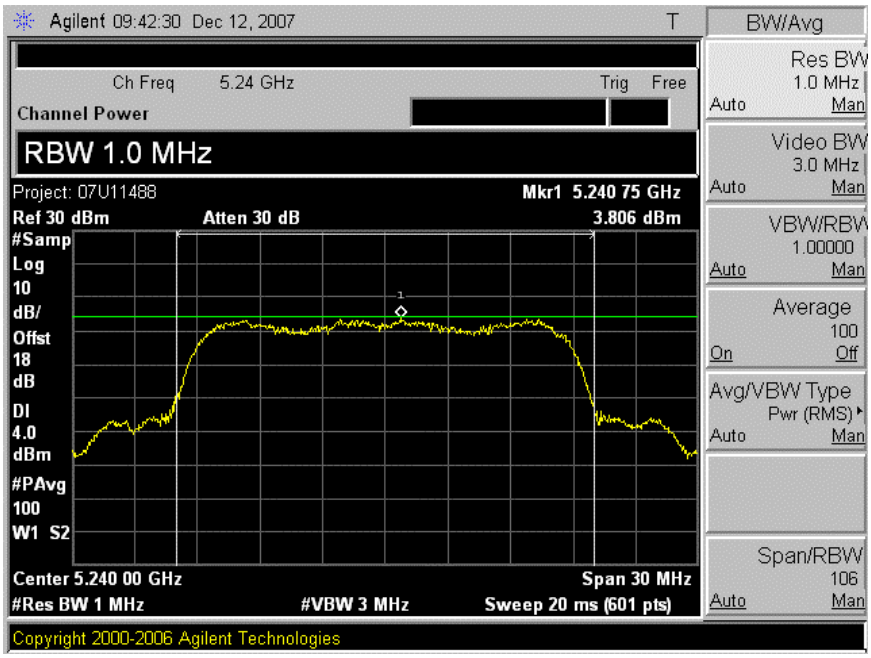
PSD LOW CH, WITH COMBINER



PSD MID CH, WITH COMBINER



PSD HIGH CH, WITH COMBINER



7.2.5. PEAK EXCURSION

LIMITS

FCC §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 transmitter outputs are connected to the spectrum analyzer via a combiner.

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.

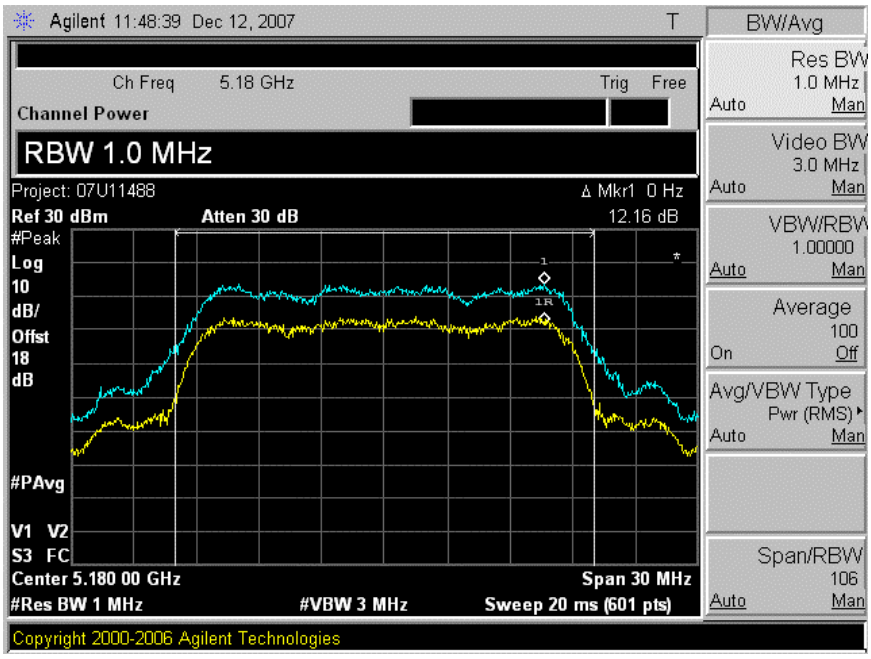
Since Method # 1 was used for peak power measurements, Method # 1 settings are used for the second PPSD trace.

RESULTS

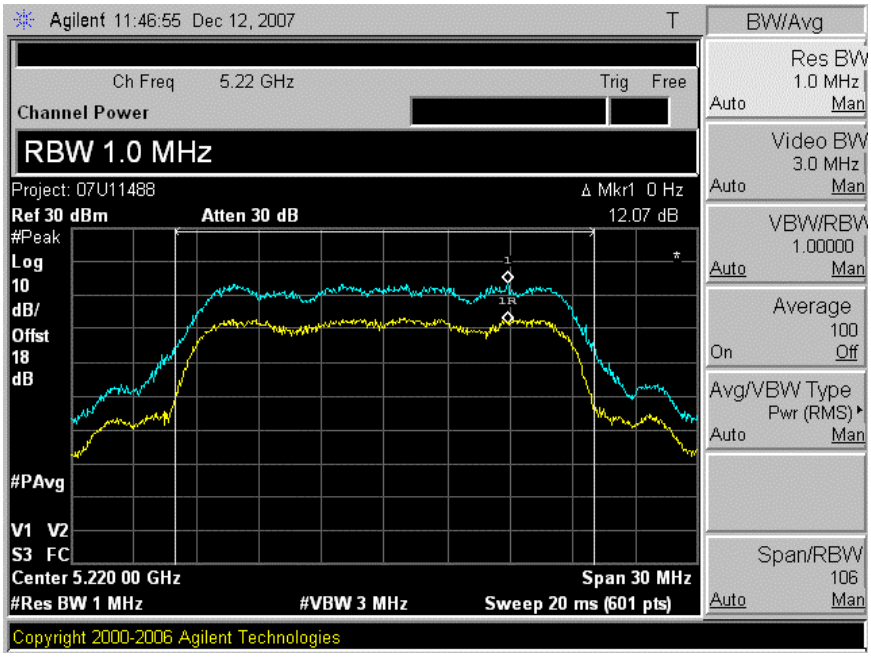
Channel	Frequency (MHz)	Peak Excursion (dB)	Limit (dB)	Margin (dB)
Low	5180	12.16	13	-0.84
Middle	5220	12.07	13	-0.93
High	5240	10.09	13	-2.91

PEAK EXCURSION

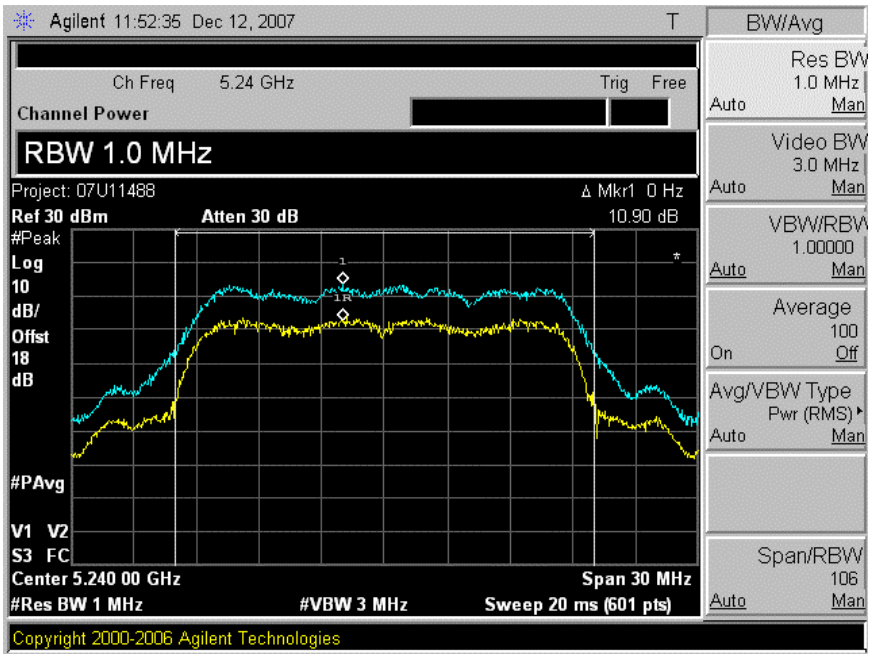
PEAK EXCURSION LOW CH



PEAK EXCURSION MID CH



PEAK EXCURSION HIGH CH



7.2.6. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.407 (b) (1)

IC RSS-210 A9.3 (1)

For transmitters operating in the 5.15-5.25 GHz band: all emissions outside of the 5.15-5.35 GHz band shall not exceed an EIRP of -27 dBm / MHz.

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.

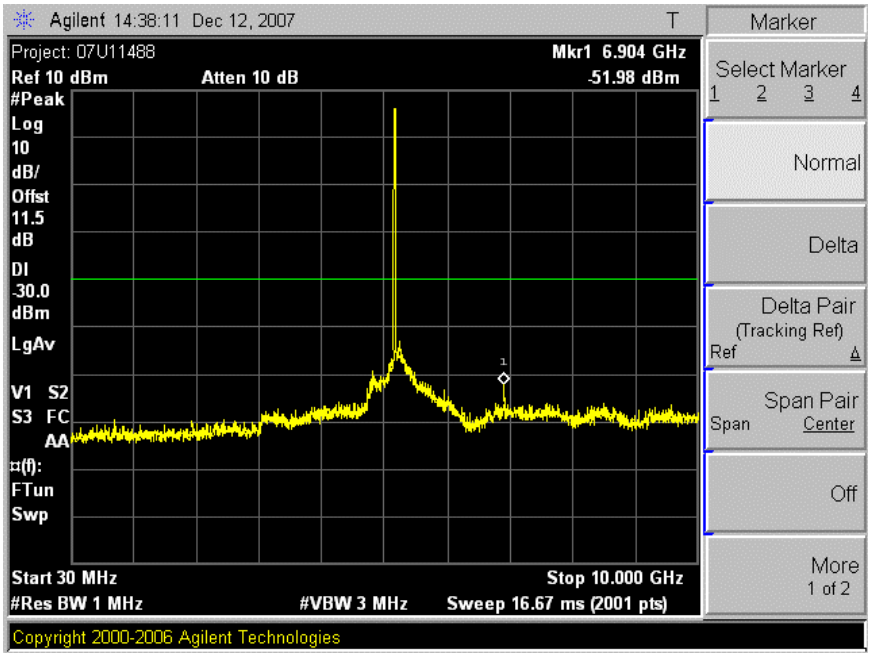
Measurements are made over the 30 MHz to 40 GHz range with the transmitter set to the lowest, middle, and highest channels.

RESULTS

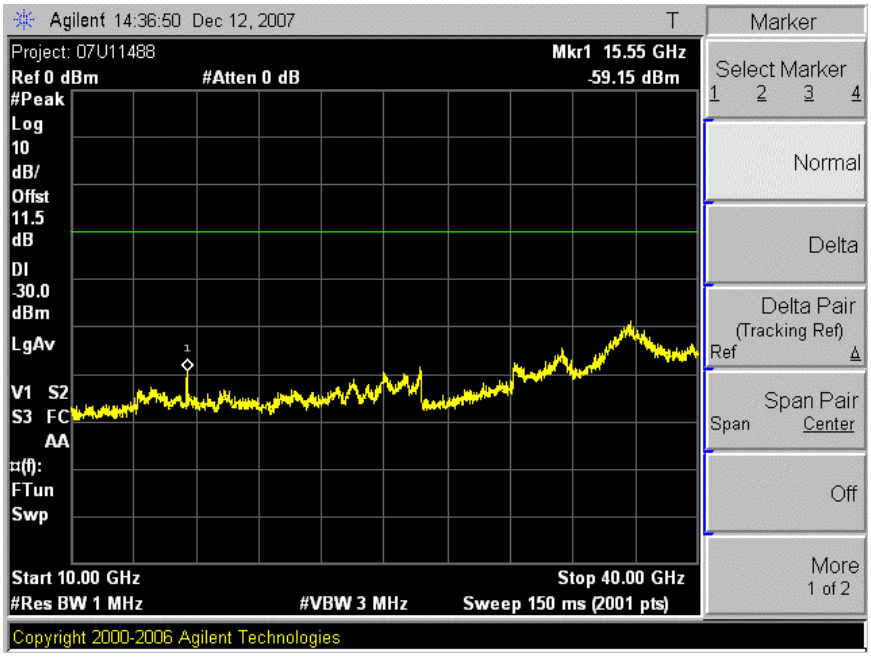
Middle and High channels were measured with the combiner only, since doing so results in the worst-case compared to measuring either chain alone.

CHAIN 1 SPURIOUS EMISSIONS

LOW CHANNEL SPURIOUS, CHAIN 1

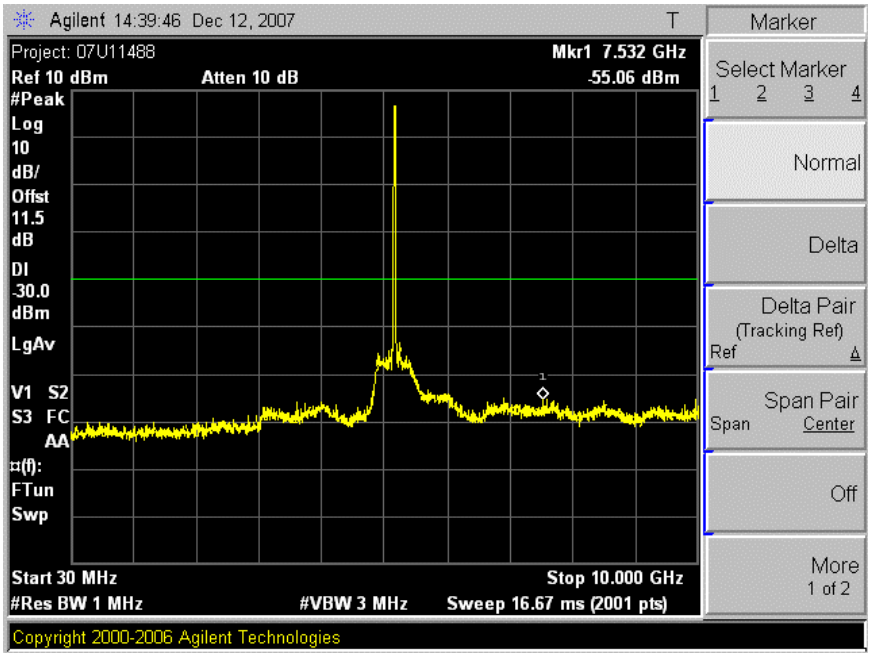


LOW CHANNEL SPURIOUS, CHAIN 1

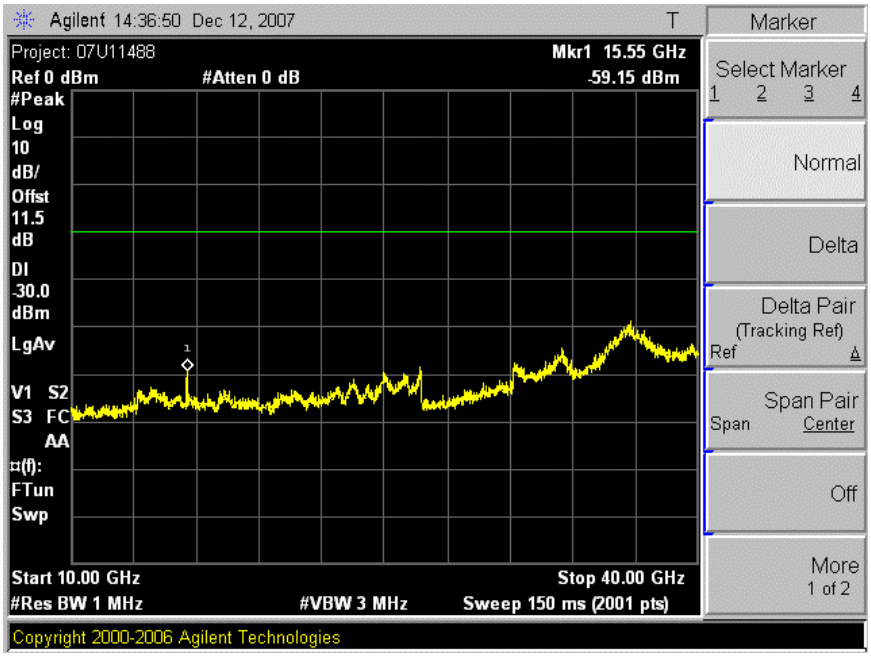


CHAIN 2 SPURIOUS EMISSIONS

LOW CHANNEL SPURIOUS, CHAIN 2

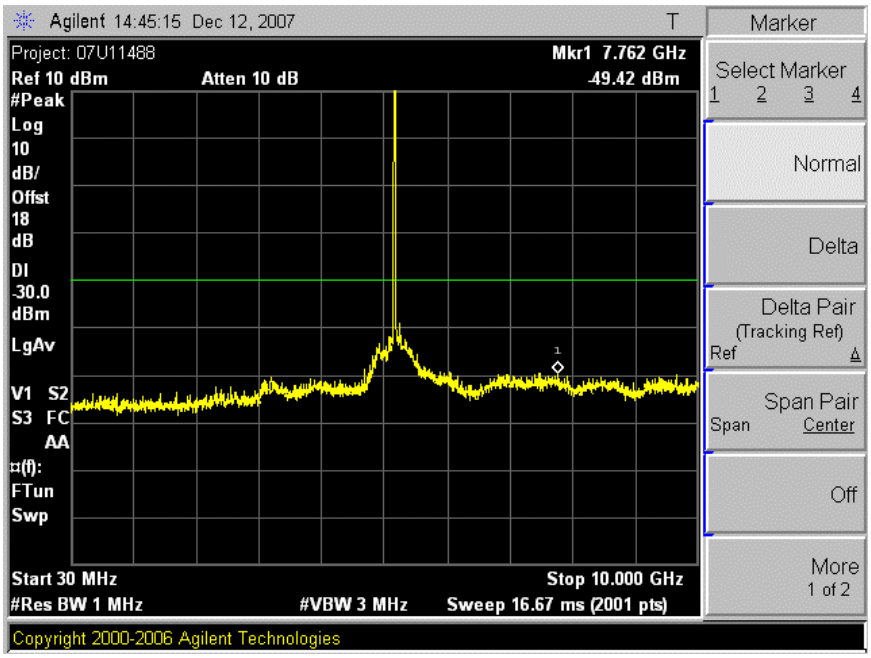


LOW CHANNEL SPURIOUS, CHAIN 1

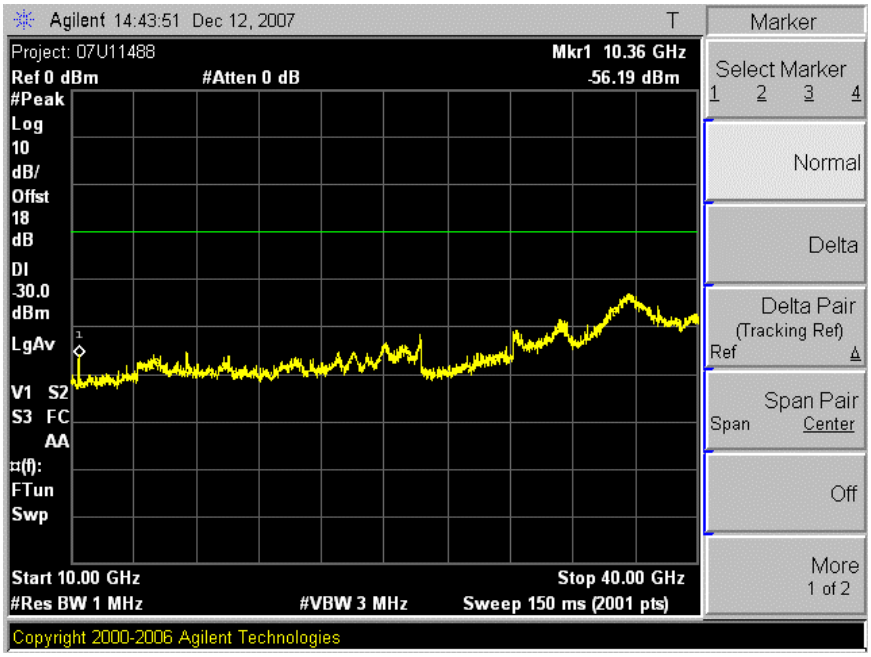


SPURIOUS EMISSIONS WITH COMBINER

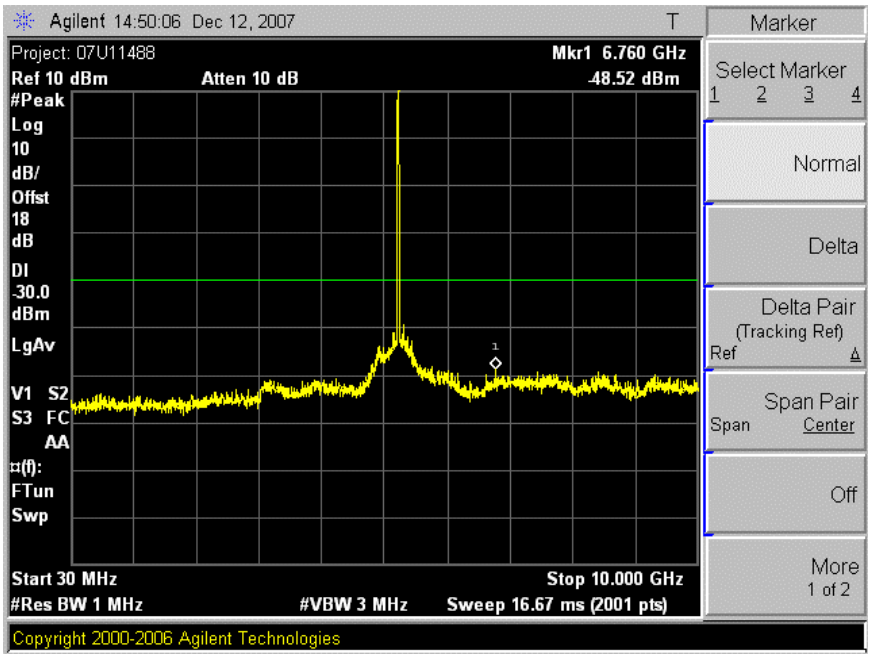
LOW CHANNEL SPURIOUS, WITH COMBINER



LOW CHANNEL SPURIOUS, WITH COMBINER



HIGH CHANNEL SPURIOUS, WITH COMBINER



HIGH CHANNEL SPURIOUS, WITH COMBINER

7.3. 802.11n HT40 MODE IN THE LOWER 5.2 GHz BAND

7.3.1. 26 dB and 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

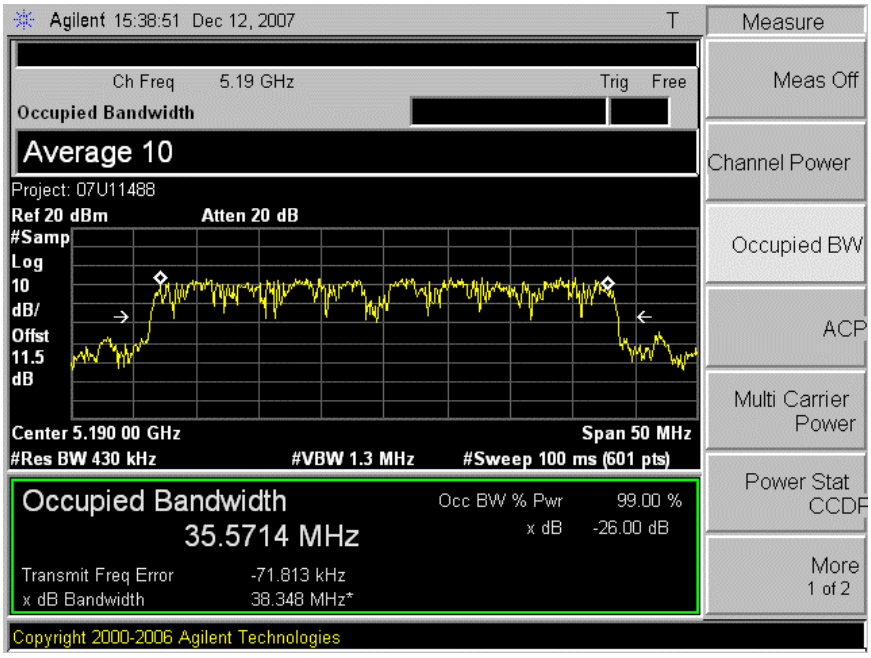
The transmitter outputs are connected to the spectrum analyzer via a combiner. The RBW is set to 1% to 3% of the measured bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal bandwidth function is utilized.

RESULTS

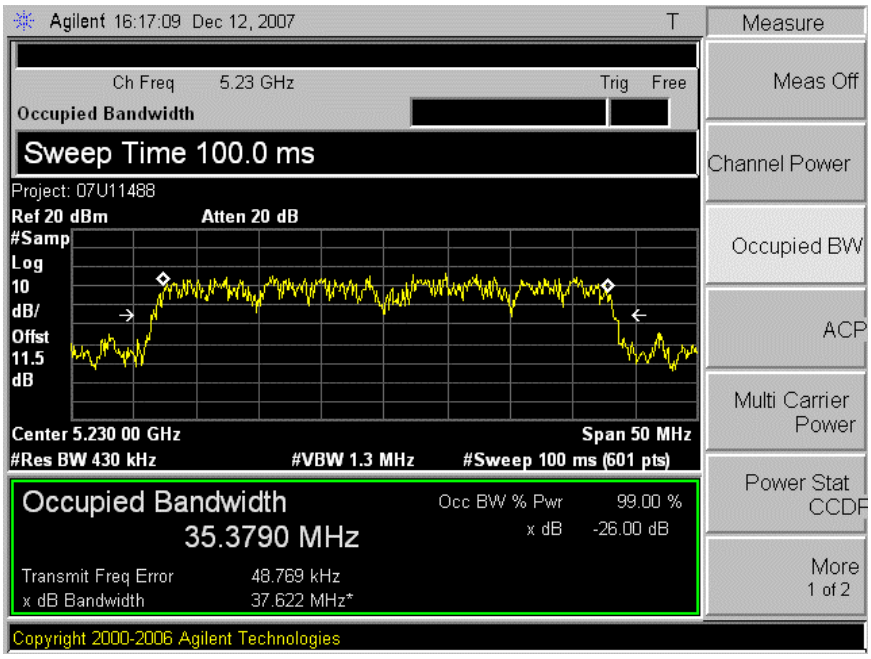
Channel	Frequency (MHz)	26 dB Bandwidth (MHz)	99% Bandwidth (MHz)
Low	5190	38.348	35.5714
High	5230	37.622	35.379

26 dB and 99% BANDWIDTH

BANDWIDTH LOW CH



BANDWIDTH HIGH CH



7.3.2. OUTPUT POWER

LIMITS

FCC §15.407 (a) (1)

IC RSS-210 A9.2 (1)

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

RESULTS

Limit

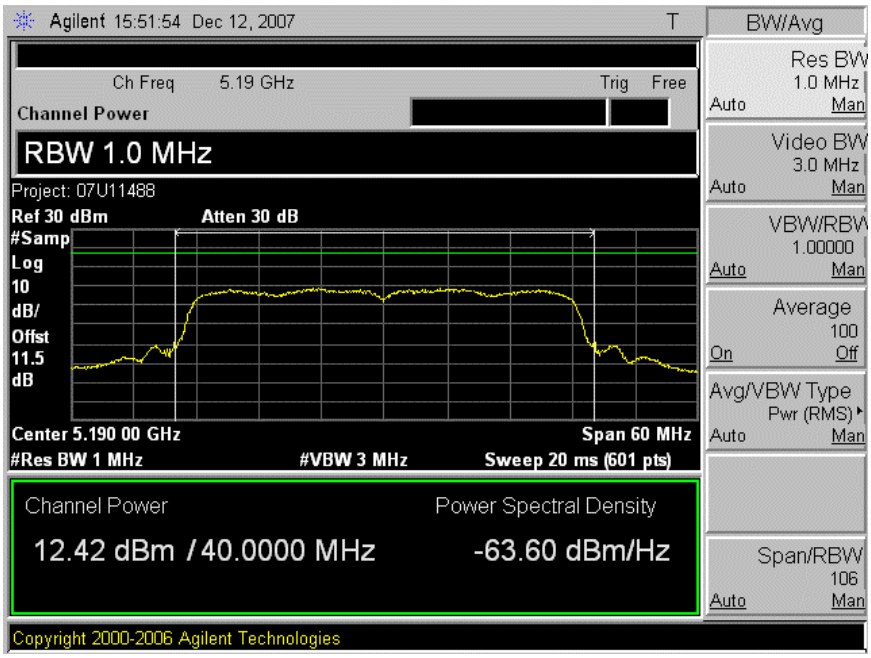
Channel	Frequency (MHz)	Fixed Limit (dBm)	B (MHz)	4 + 10 Log B Limit (dBm)	Antenna Gain (dBi)	Limit (dBm)
Low	5190	17	38.348	19.84	3.00	16.99
High	5230	17	37.622	19.75	3.00	16.99

Individual Chain Results

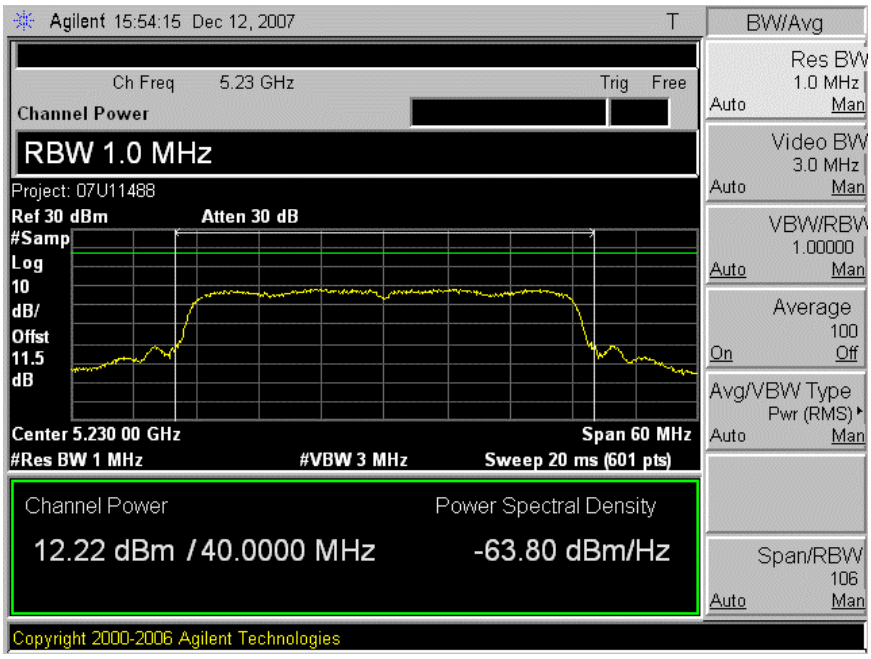
Channel	Frequency (MHz)	Chain 1 Power (dBm)	Chain 2 Power (dBm)	Total Power (dBm)	Limit (dBm)	Margin (dB)
Low	5190	12.42	12.65	15.55	16.99	-4.57
High	5230	12.22	12.42	15.33	16.99	-4.77

CHAIN 1 OUTPUT POWER

OUTPUT POWER LOW CH, CHAIN 1

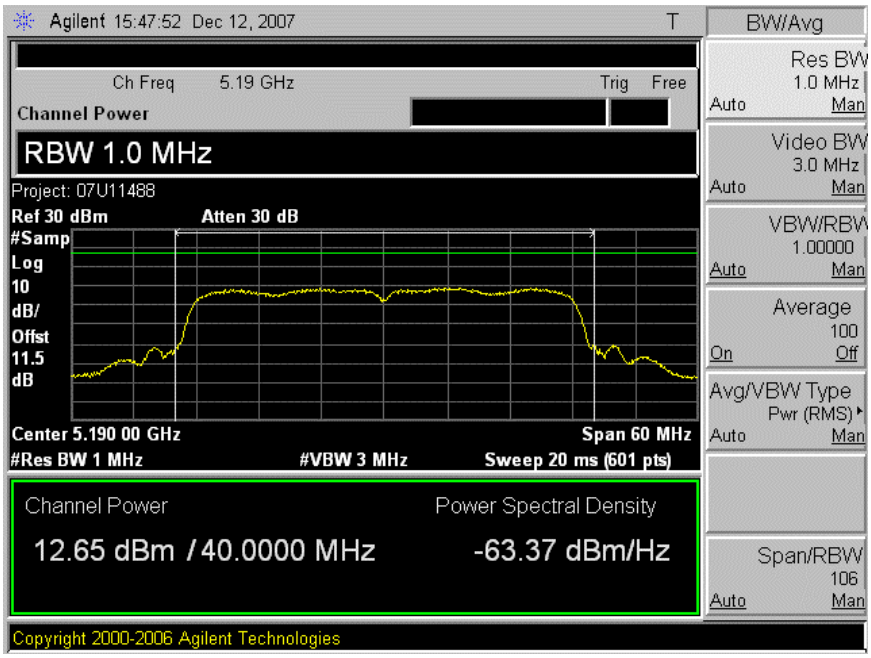


OUTPUT POWER HIGH CH, CHAIN 1

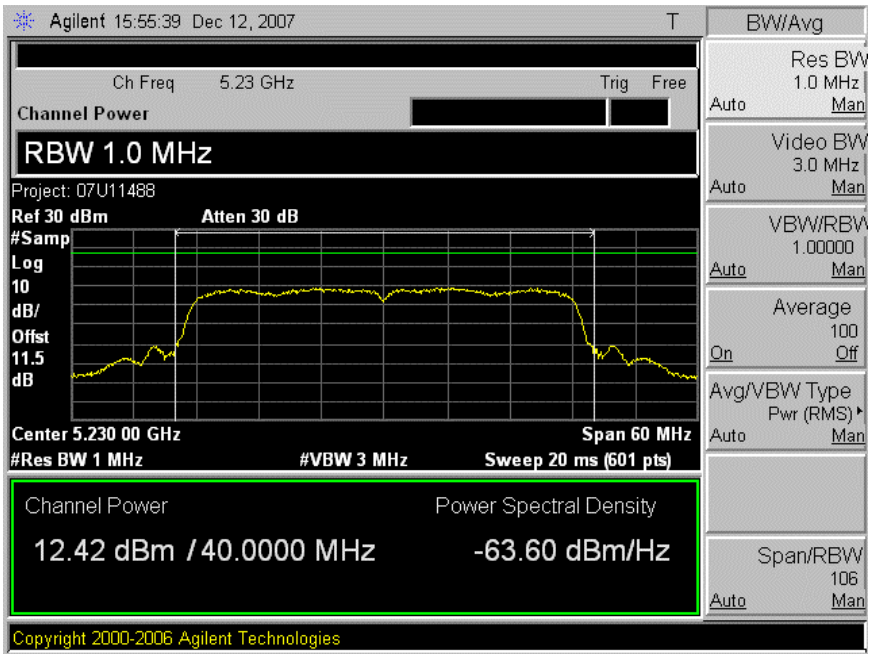


CHAIN 2 OUTPUT POWER

OUTPUT POWER LOW CH, CHAIN 2



OUTPUT POWER HIGH CH, CHAIN 2



7.3.3. AVERAGE POWER

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a power meter.

RESULTS

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.

Channel	Frequency (MHz)	Chain 1 Power (dBm)	Chain 2 Power (dBm)	Total Power (dBm)
Low	5190	11.94	12.01	14.99
High	5230	12.05	12.22	15.15

7.3.4. PEAK POWER SPECTRAL DENSITY

LIMITS

FCC §15.407 (a) (1)

IC RSS-210 A9.2 (1)

For the 5.15-5.25 GHz band, 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.

The maximum antenna gain is 6.01 dBi, therefore the limit is 3.99 dBm.

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.

RESULTS

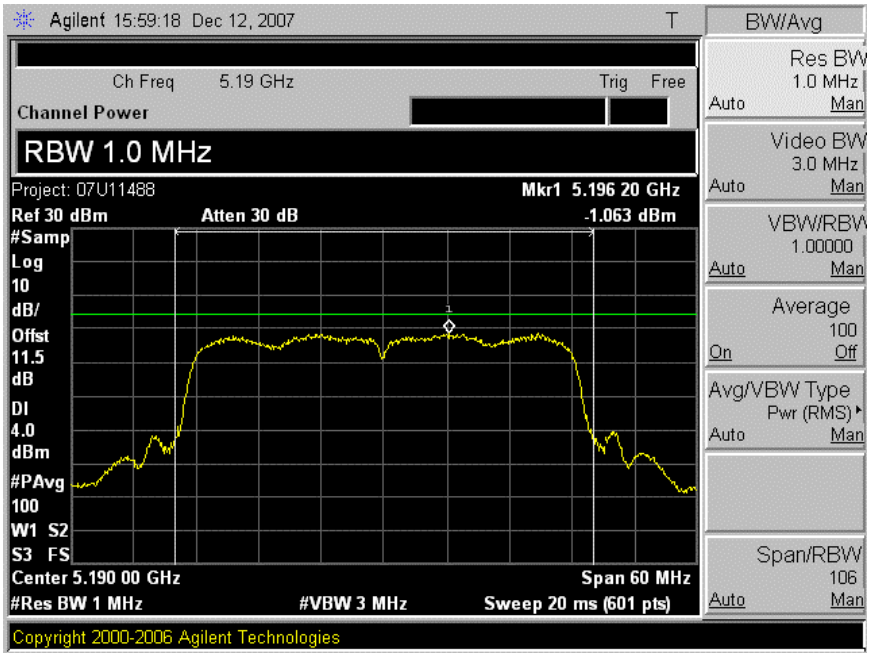
High channels were measured with the combiner only, since doing so results in the worst-case compared to measuring either chain alone.

Channel	Frequency (MHz)	Chain 1 PPSD (dBm)	Chain 2 PPSD (dBm)	Total PPSD (dBm)	Limit (dBm)	Margin (dB)
Low	5190	-1.063	-1.374	1.79	3.99	-2.20

Channel	Frequency (MHz)	PPSD With Combiner (dBm)	Limit (dBm)	Margin (dB)
Low	5190	2.44	3.99	-1.55
Middle	5230	2.49	3.99	-1.50

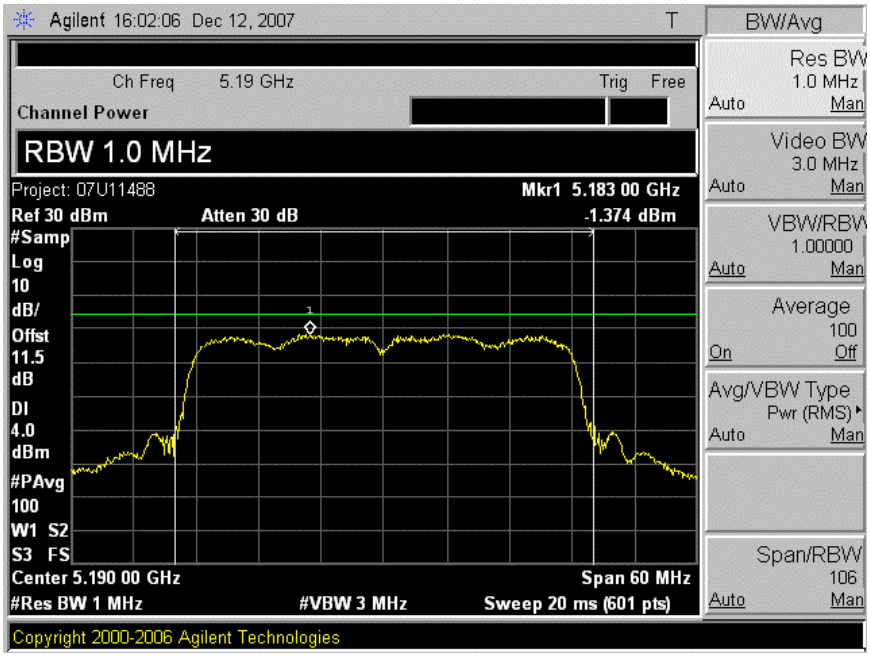
CHAIN 1 POWER SPECTRAL DENSITY

PSD LOW CH, CHAIN 1



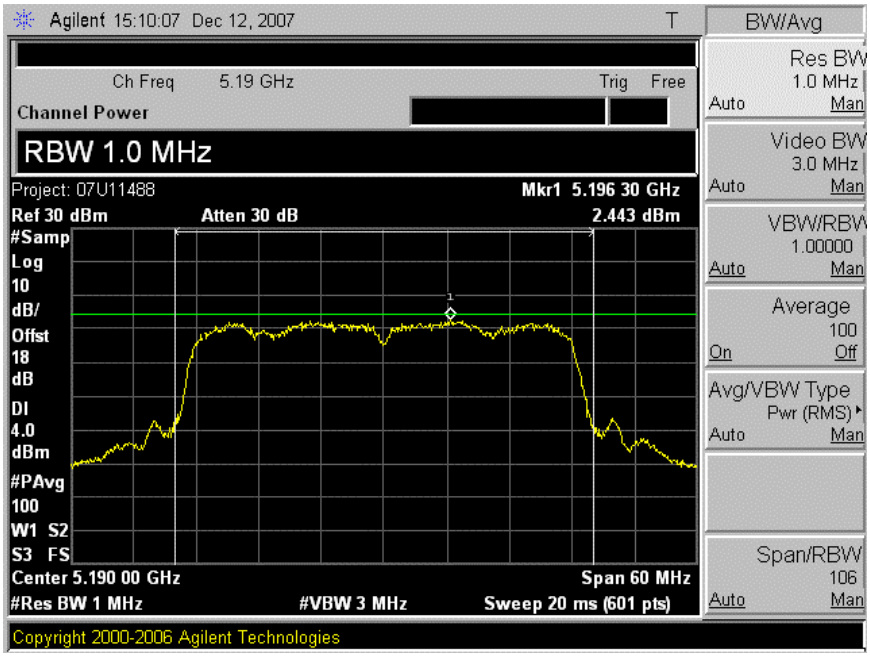
CHAIN 2 POWER SPECTRAL DENSITY

PSD LOW CH, CHAIN 2

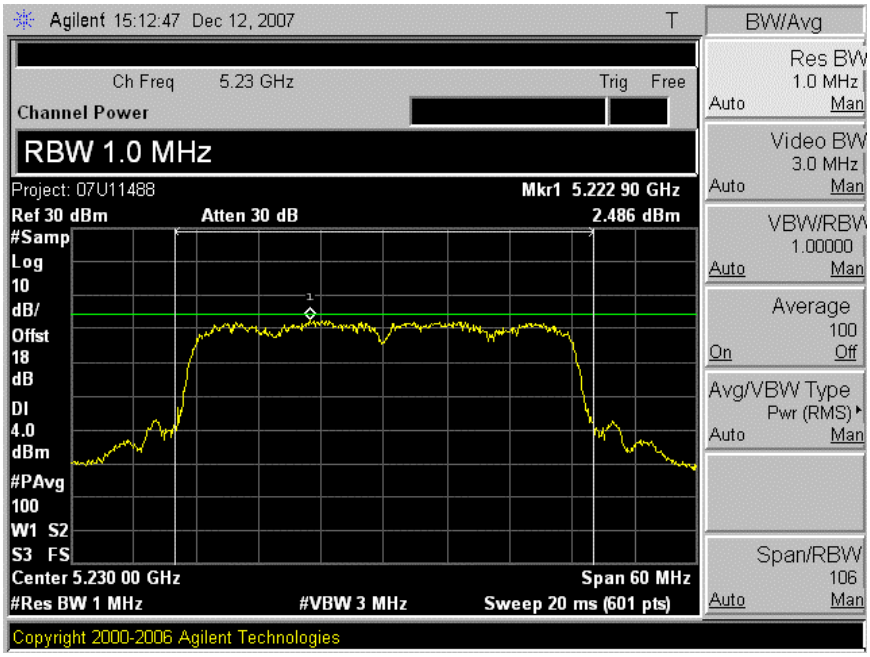


POWER SPECTRAL DENSITY WITH COMBINER

PSD LOW CH, WITH COMBINER



PSD HIGH CH, WITH COMBINER



7.3.5. PEAK EXCURSION

LIMITS

FCC §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 transmitter outputs are connected to the spectrum analyzer via a combiner.

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.

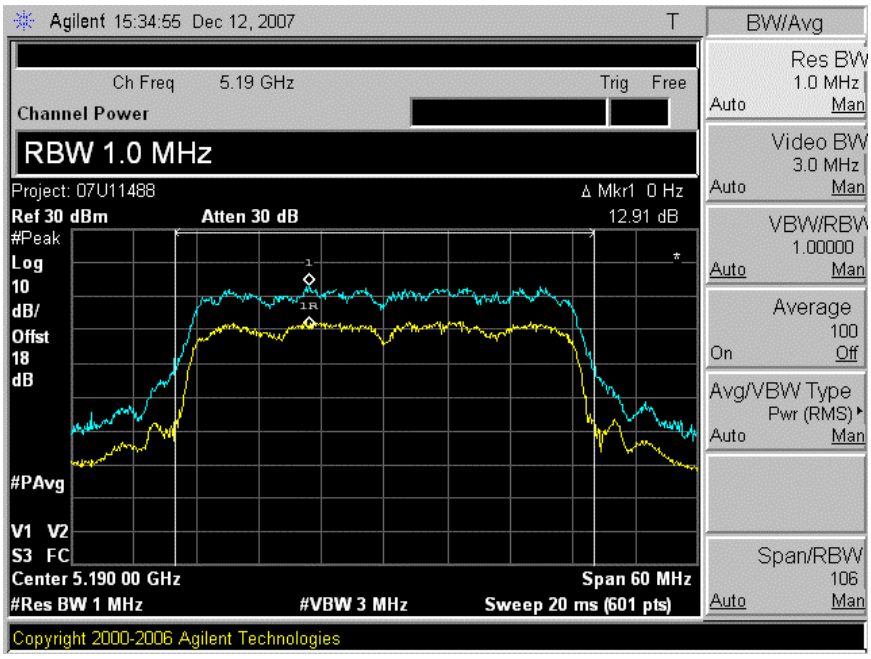
Since Method # 1 was used for peak power measurements, Method # 1 settings are used for the second PPSD trace.

RESULTS

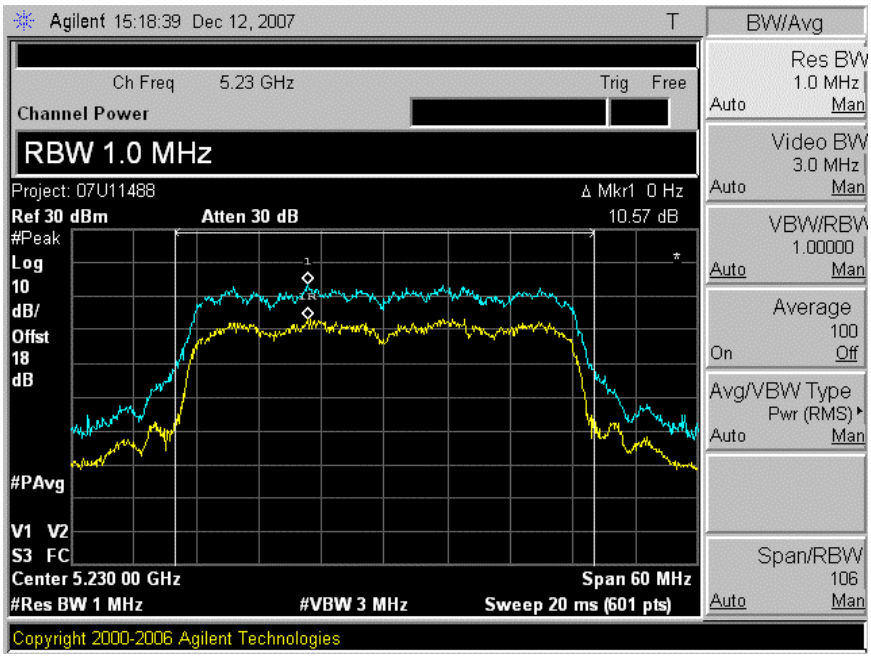
Channel	Frequency (MHz)	Peak Excursion (dB)	Limit (dB)	Margin (dB)
Low	5190	12.91	13	-0.09
High	5230	10.57	13	-2.43

PEAK EXCURSION

PEAK EXCURSION LOW CH



PEAK EXCURSION HIGH CH



7.3.6. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.407 (b) (1)

IC RSS-210 A9.3 (1)

For transmitters operating in the 5.15-5.25 GHz band: all emissions outside of the 5.15-5.35 GHz band shall not exceed an EIRP of -27 dBm / MHz.

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.

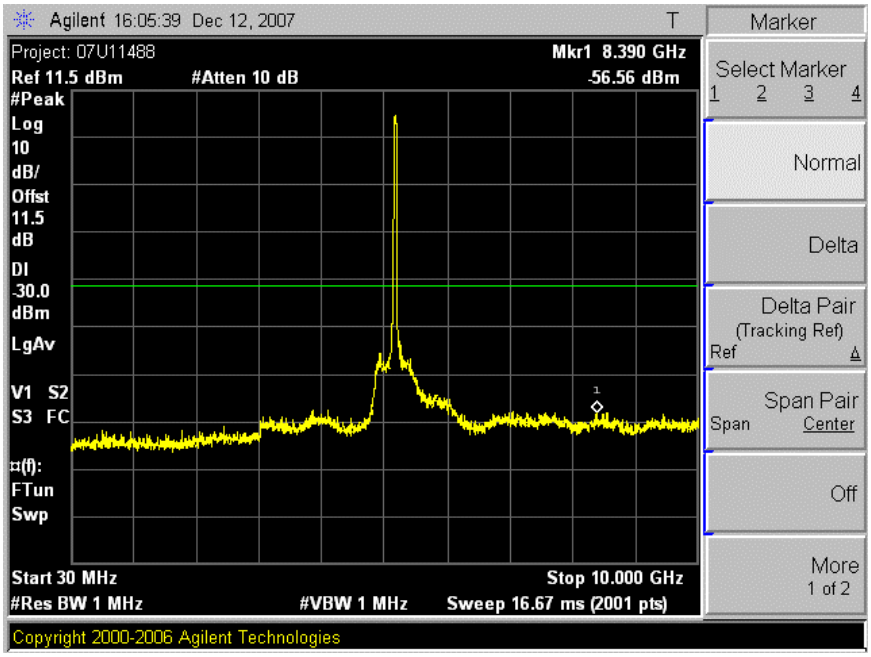
Measurements are made over the 30 MHz to 40 GHz range with the transmitter set to the lowest, middle, and highest channels.

RESULTS

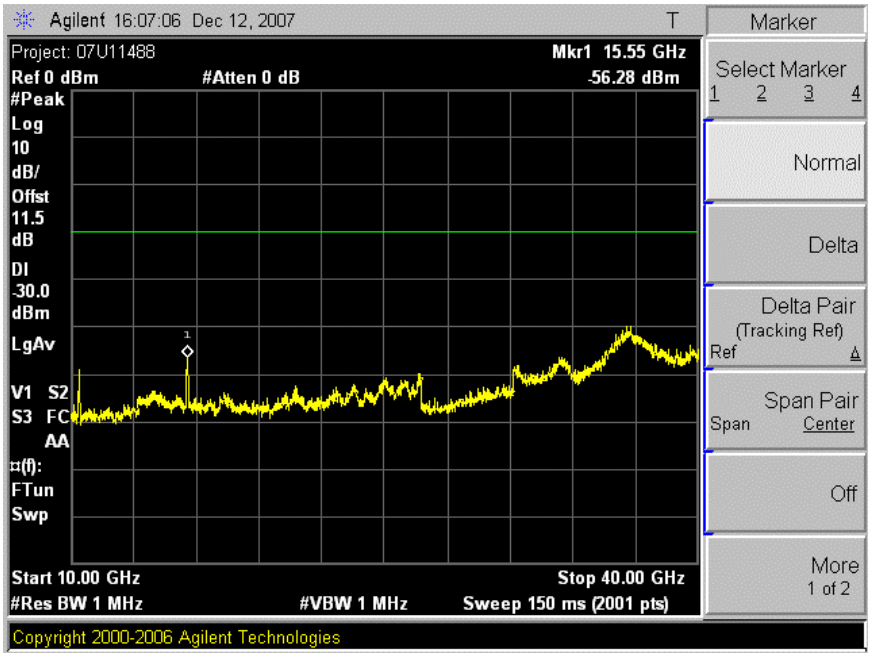
High channels were measured with the combiner only, since doing so results in the worst-case compared to measuring either chain alone.

CHAIN 1 SPURIOUS EMISSIONS

LOW CHANNEL SPURIOUS, CHAIN 1

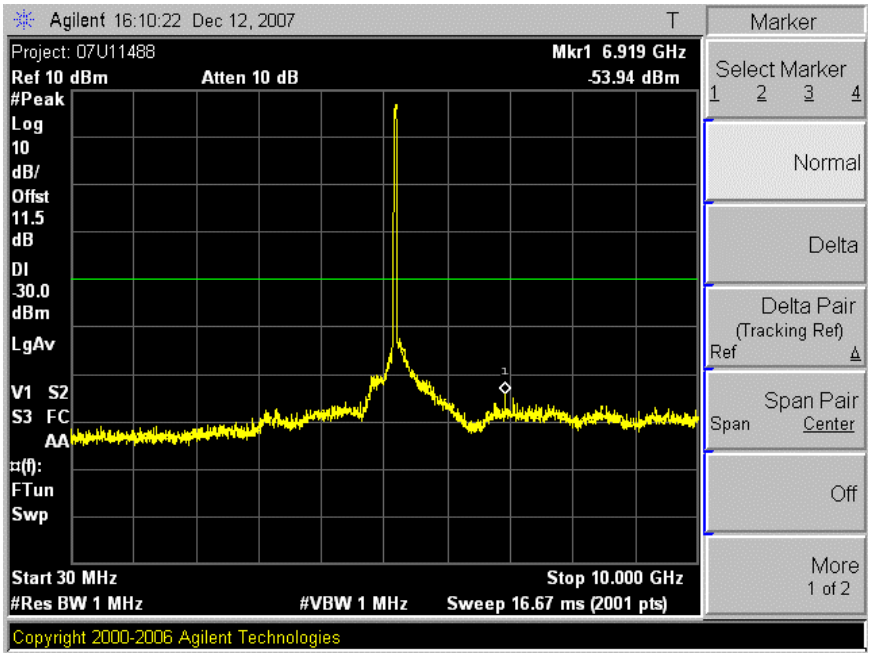


LOW CHANNEL SPURIOUS, CHAIN 1

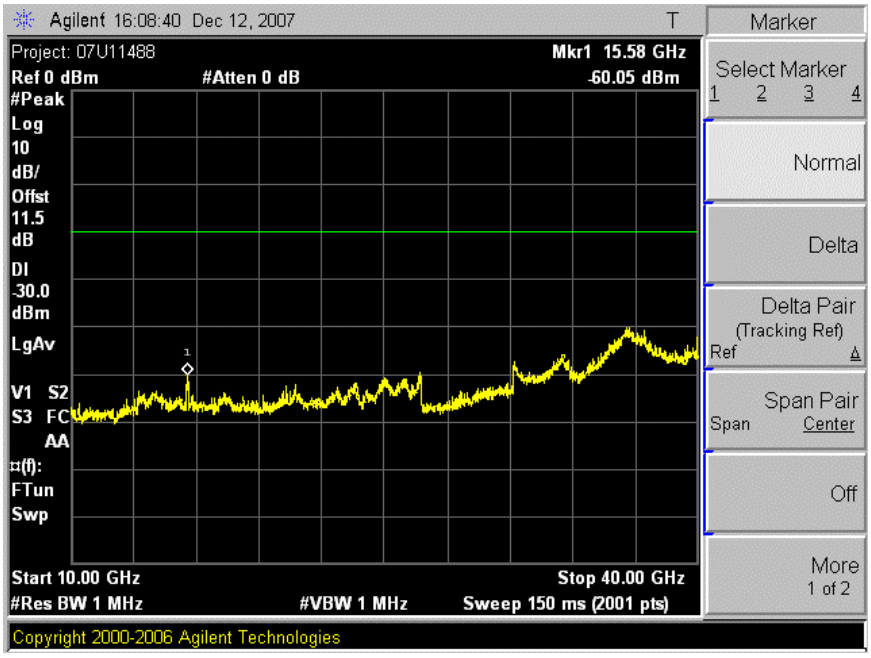


CHAIN 2 SPURIOUS EMISSIONS

LOW CHANNEL SPURIOUS, CHAIN 2

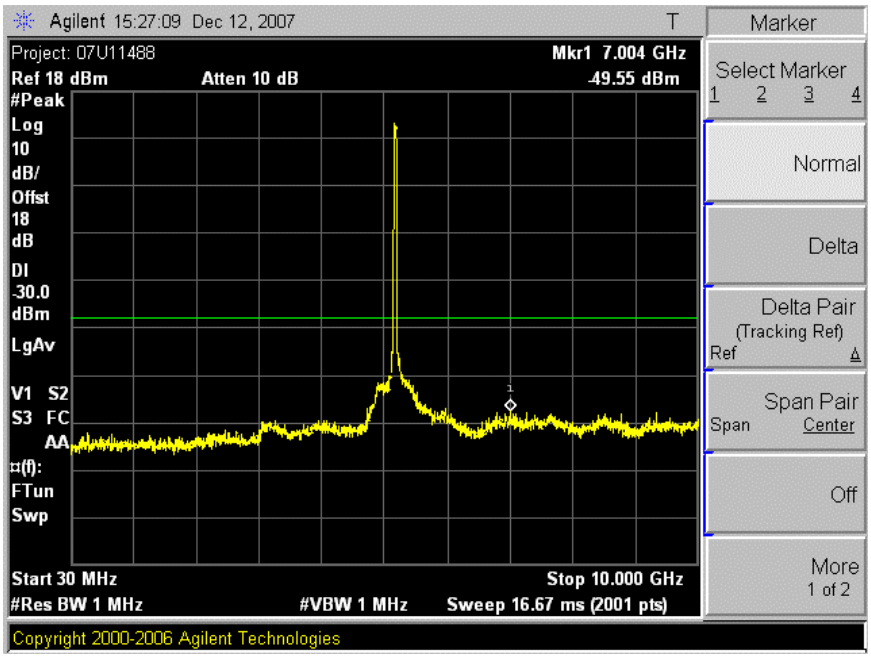


LOW CHANNEL SPURIOUS, CHAIN 1

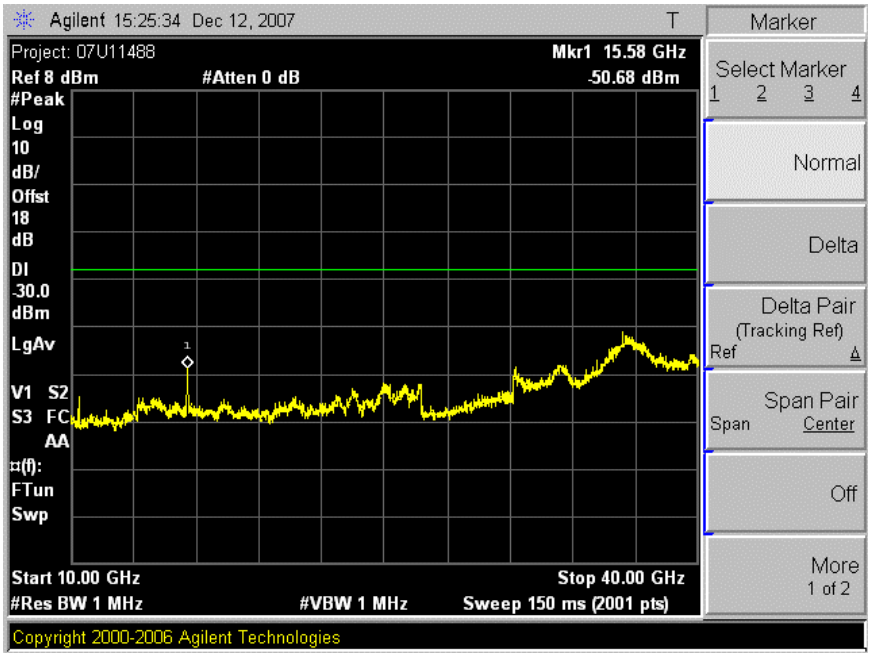


SPURIOUS EMISSIONS WITH COMBINER

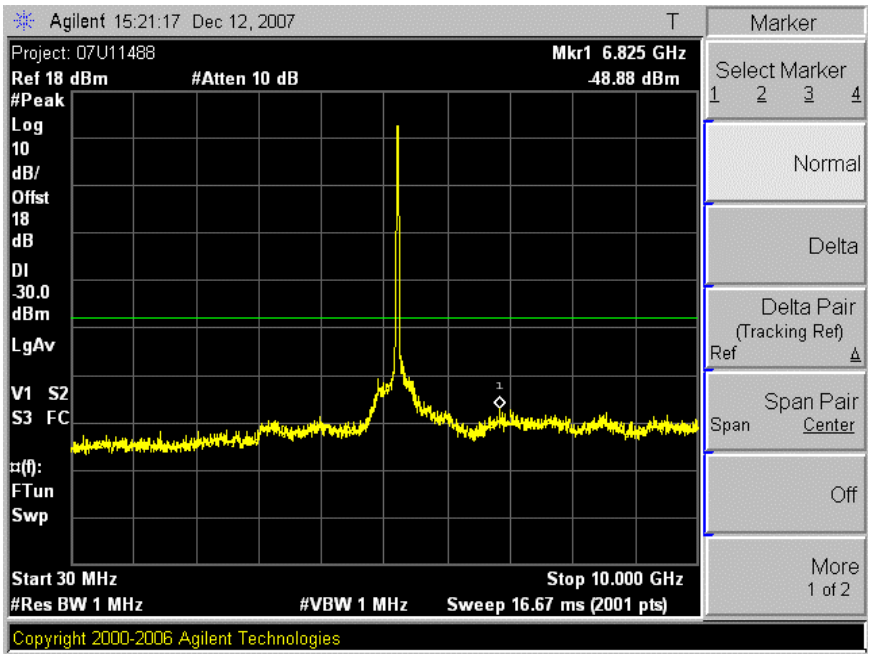
LOW CHANNEL SPURIOUS, WITH COMBINER



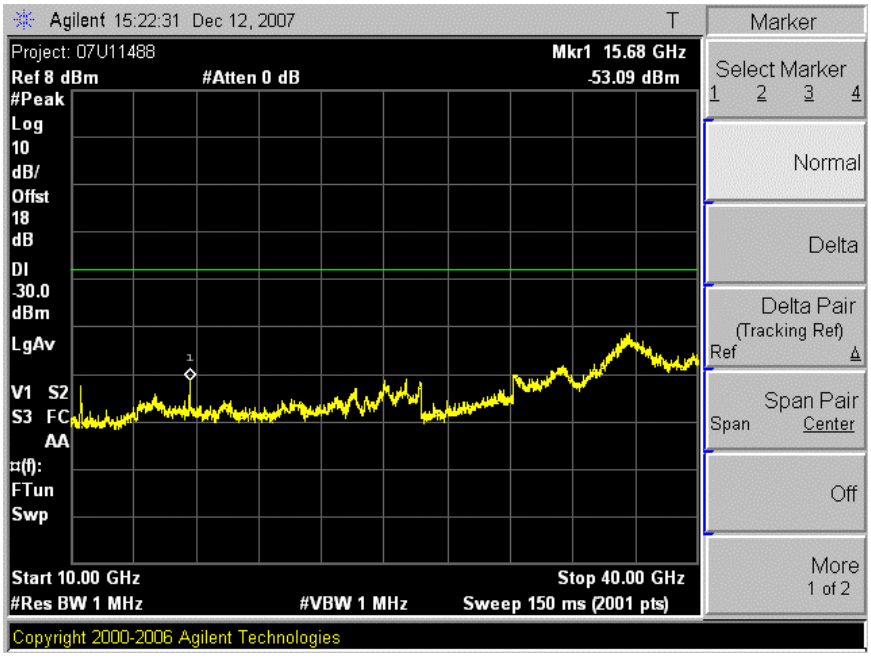
LOW CHANNEL SPURIOUS, WITH COMBINER



HIGH CHANNEL SPURIOUS, WITH COMBINER



HIGH CHANNEL SPURIOUS, WITH COMBINER



8. RADIATED TEST RESULTS

LIMITS

FCC §15.205 and §15.209

IC RSS-210 Clause 2.6 (Transmitter)

IC RSS-GEN Clause 6 (Receiver)

Frequency Range (MHz)	Field Strength Limit (uV/m) at 3 m	Field Strength Limit (dBuV/m) at 3 m
30 - 88	100	40
88 - 216	150	43.5
216 - 960	200	46
Above 960	500	54

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.

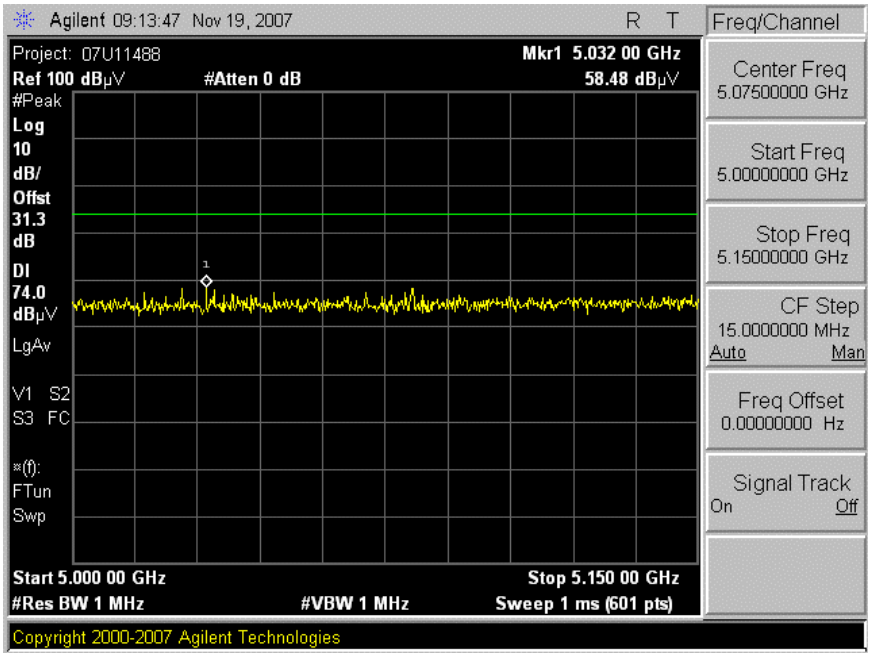
The frequency range of interest is monitored at a fixed antenna height and EUT azimuth. The EUT is rotated through 360 degrees to maximize emissions received. The antenna is scanned from 1 to 4 meters above the ground plane to further maximize the emission. Measurements are made with the antenna polarized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

8.1. TRANSMITTER ABOVE 1 GHz

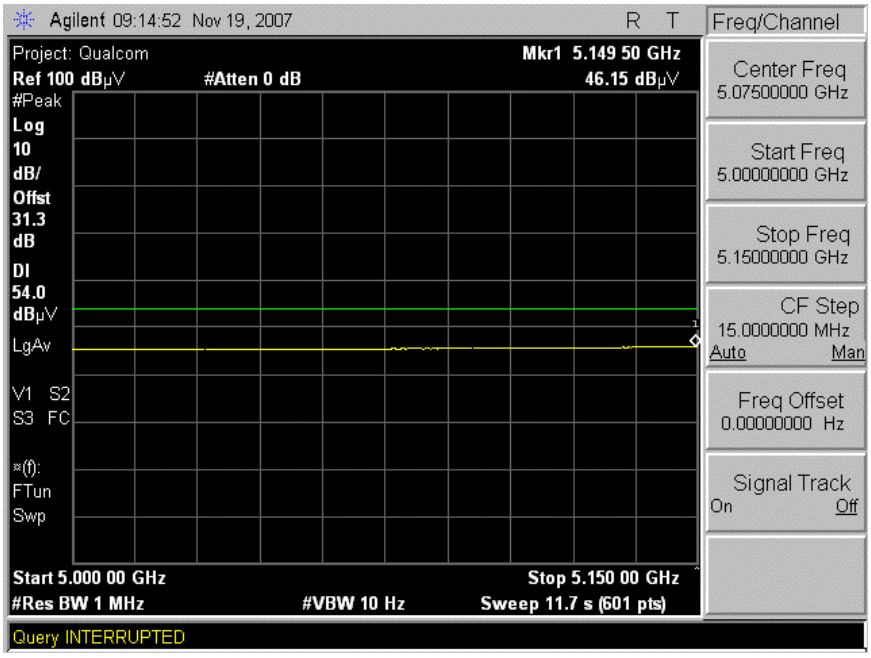
8.1.1. TRANSMITTER ABOVE 1 GHz FOR 802.11a DUAL CHAIN LEGACY MODE IN THE LOWER 5.2 GHz BAND

RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)

LOW CHANNEL RESTRICTED, PEAK, HORIZ

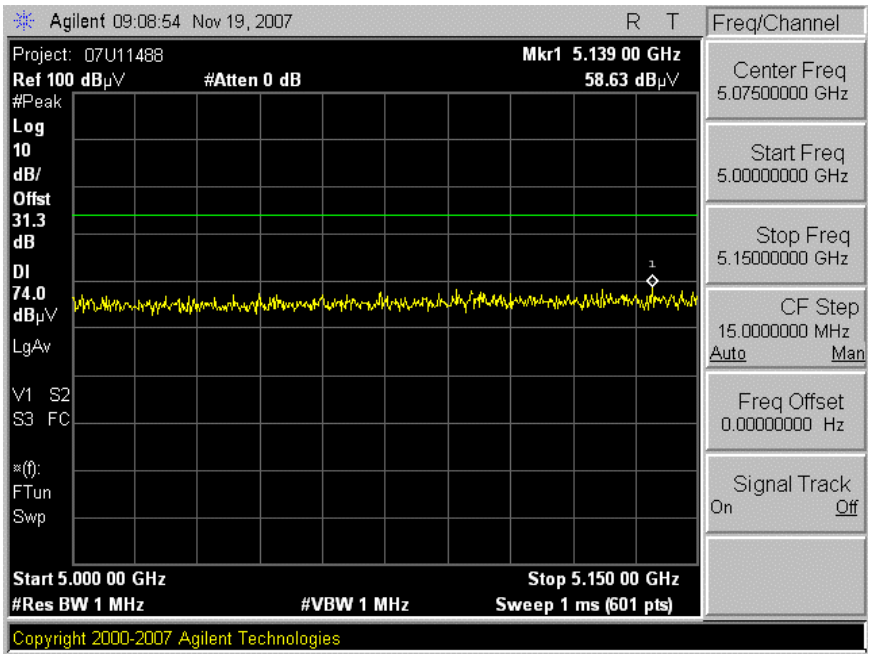


LOW CHANNEL RESTRICTED, AVG, HORIZ

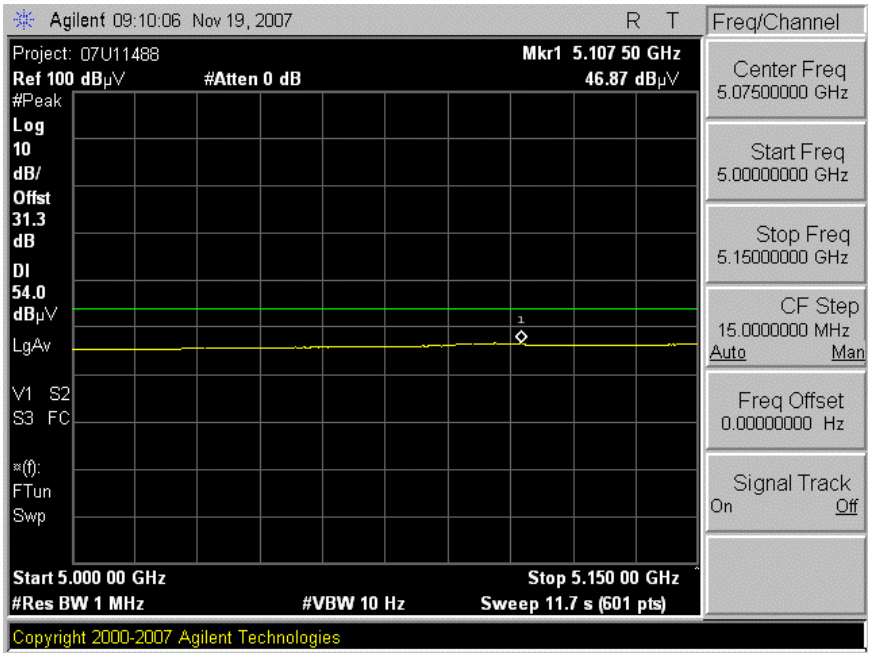


RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)

LOW CHANNEL RESTRICTED, PEAK, VERT



LOW CHANNEL RESTRICTED, AVG, VERT



AUTHORIZED BANDEDGE (HIGH CHANNEL, HORIZONTAL)

See upper 5.2GHz band report, no conduct spurious emissions were detected at range 5250MHz to 5350Mhz

HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement
Compliance Certification Services, Fremont 5m Chamber

Company: QualCom INC.
Project #: 07U11488
Date: 11/19/2007
Test Engineer: Thanh Nguyen
Configuration: EUT, Ext. Card, Laptop.
Mode: Transmit 5.2GHz Lower Band

Test Equipment:

Horn 1-18GHz	Pre-amplifer 1-26GHz	Pre-amplifer 26-40GHz	Horn > 18GHz	Limit
T73; S/N: 6717 @3m	T144 Miteq 3008A00931			FCC 15.209

Hi Frequency Cables

2 foot cable	3 foot cable	12 foot cable	HPF	Reject Filter
		A-5m Chamber		R_002

Peak Measurements
RBW=VBW=1MHz
Average Measurements
RBW=1MHz ; VBW=10Hz

f GHz	Dist (m)	Read Pk dBuV	Read Avg. dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes (V/H)
Harmonics emissions															
Low Ch 5180MHz															
10.360	3.0	37.7	24.5	37.0	10.4	-36.8	0.0	0.0	48.3	35.1	74	54	-25.7	-18.9	V
15.540	3.0	38.1	25.0	38.1	12.7	-34.8	0.0	0.0	54.0	40.9	74	54	-20.0	-13.1	Noise Floor
10.360	3.0	37.1	24.1	37.0	10.4	-36.8	0.0	0.0	47.7	34.7	74	54	-26.3	-19.3	H
15.540	3.0	37.9	24.5	38.1	12.7	-34.8	0.0	0.0	53.8	40.4	74	54	-20.2	-13.6	Noise Floor
Mid Ch 5220MHz															
10.405	3.0	36.9	23.5	37.0	10.5	-36.8	0.0	0.0	47.6	34.2	74	54	-26.4	-19.8	H
15.613	3.0	36.9	24.2	37.9	12.7	-34.8	0.0	0.0	52.7	40.0	74	54	-21.3	-14.0	Noise Floor
10.405	3.0	37.6	24.2	37.0	10.5	-36.8	0.0	0.0	48.3	34.9	74	54	-25.7	-19.1	V
15.613	3.0	37.1	24.4	37.9	12.7	-34.8	0.0	0.0	52.9	40.2	74	54	-21.1	-13.8	Noise Floor
High Ch 5240MHz															
10.480	3.0	37.2	24.1	37.0	10.6	-36.7	0.0	0.0	48.1	35.0	74	54	-25.9	-19.0	V
15.720	3.0	37.1	24.6	37.6	12.8	-34.7	0.0	0.0	52.8	40.3	74	54	-21.2	-13.7	Noise Floor
10.480	3.0	36.8	23.8	37.0	10.6	-36.7	0.0	0.0	47.7	34.7	74	54	-26.3	-19.3	H
15.720	3.0	37.5	24.7	37.6	12.8	-34.7	0.0	0.0	53.2	40.4	74	54	-20.8	-13.6	Noise Floor
Spurious Emissions															
1.005	3.0	54.3	36.8	23.8	3.0	-39.5	0.0	0.0	41.6	24.1	74	54	-32.4	-29.9	H
1.250	3.0	49.7	34.1	24.7	3.3	-39.1	0.0	0.0	38.6	23.0	74	54	-35.4	-31.0	H
1.010	3.0	56.1	38.8	23.8	3.0	-39.5	0.0	0.0	43.5	26.1	74	54	-30.5	-27.9	V
2.066	3.0	52.5	35.7	27.6	4.4	-38.0	0.0	0.0	46.4	29.7	74	54	-27.6	-24.3	V
No other emissions were detected above noise floor															

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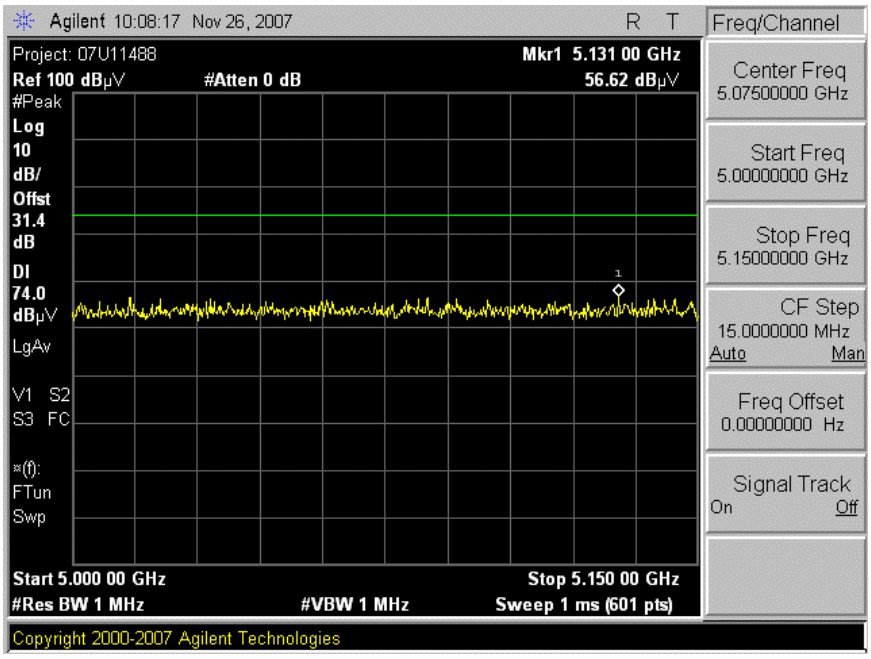
f	Measurement Frequency	Amp	Preamp Gain	Avg Lim	Average Field Strength Limit
Dist	Distance to Antenna	D Corr	Distance Correct to 3 meters	Pk Lim	Peak Field Strength Limit
Read	Analyzer Reading	Avg	Average Field Strength @ 3 m	Avg Mar	Margin vs. Average Limit
AF	Antenna Factor	Peak	Calculated Peak Field Strength	Pk Mar	Margin vs. Peak Limit
CL	Cable Loss	HPF	High Pass Filter		

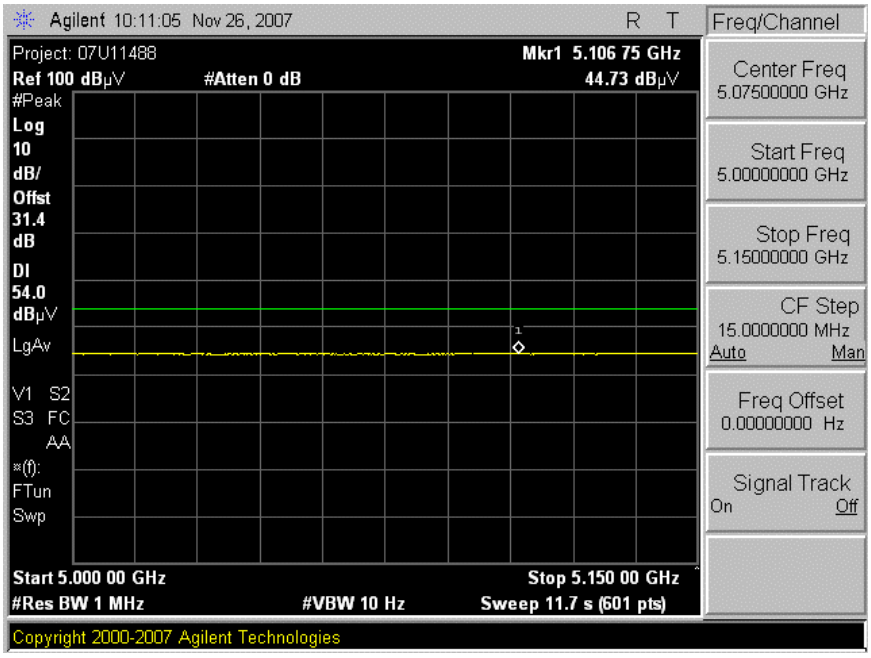
8.1.2. TRANSMITTER ABOVE 1 GHz FOR 802.11n HT20 MODE IN THE LOWER 5.2 GHz BAND

RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)

LOW CHANNEL RESTRICTED, PEAK, HORIZ

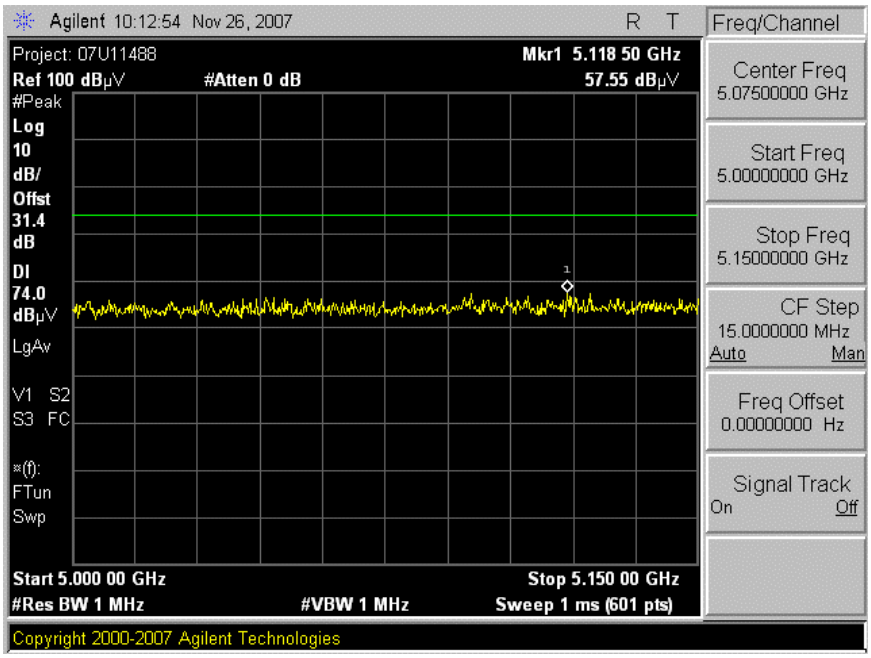


LOW CHANNEL RESTRICTED, AVG, HORIZ

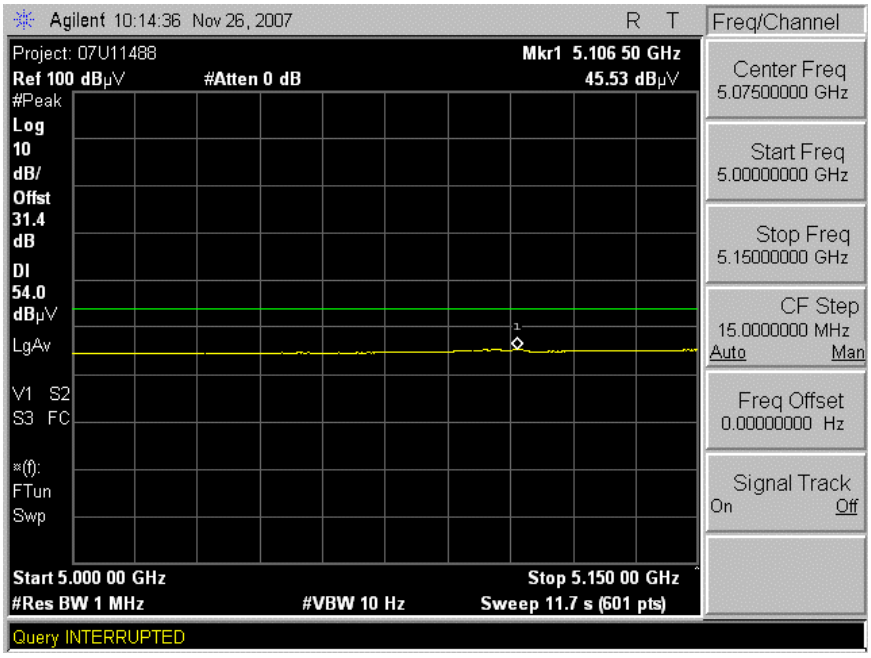


RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)

LOW CHANNEL RESTRICTED, PEAK, VERT



LOW CHANNEL RESTRICTED, AVG, VERT



AUTHORIZED BANDEDGE (HIGH CHANNEL, HORIZONTAL)

See upper 5.2GHz band report, no conduct spurious emissions were detected at range 5250MHz to 5350Mhz

HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement
Compliance Certification Services, Fremont 5m Chamber

Company: QualCom INC.
Project #: 07U11488
Date: 11/21/2007
Test Engineer: Thanh Nguyen
Configuration: EUT, Ext. card, Laptop
Mode: Transmit 5.2GHz HT20 mode

Test Equipment:

Horn 1-18GHz	Pre-amplifer 1-26GHz	Pre-amplifer 26-40GHz	Horn > 18GHz	Limit
T73; S/N: 6717 @3m	T144 Miteq 3008A00931			FCC 15.209

Hi Frequency Cables

2 foot cable	3 foot cable	12 foot cable	HPF	Reject Filter
		A-5m Chamber	HPF_7.6GHz	

Peak Measurements
RBW=VBW=1MHz
Average Measurements
RBW=1MHz ; VBW=10Hz

f GHz	Dist (m)	Read Pk dBuV	Read Avg. dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes (V/H)
Harmonics emissions															
Low Ch 5180MHz															
10.360	3.0	38.6	25.4	37.0	10.4	-36.8	0.0	0.8	50.0	36.8	74	54	-24.0	-17.2	V
15.540	3.0	38.7	25.3	38.1	12.7	-34.8	0.0	0.7	55.3	42.0	74	54	-18.7	-12.0	Noise Floor
10.360	3.0	37.2	24.3	37.0	10.4	-36.8	0.0	0.8	48.6	35.7	74	54	-25.4	-18.3	H
15.540	3.0	38.4	25.2	38.1	12.7	-34.8	0.0	0.7	55.0	41.9	74	54	-19.0	-12.1	Noise Floor
Mid Ch 5220MHz															
10.440	3.0	35.7	23.9	37.0	10.5	-36.7	0.0	0.8	47.3	35.5	74	54	-26.7	-18.5	H
15.660	3.0	37.1	23.4	37.8	12.7	-34.7	0.0	0.7	53.6	39.9	74	54	-20.4	-14.1	Noise Floor
10.440	3.0	37.6	24.7	37.0	10.5	-36.7	0.0	0.8	49.2	36.3	74	54	-24.8	-17.7	V
15.660	3.0	38.2	25.3	37.8	12.7	-34.7	0.0	0.7	54.7	41.8	74	54	-19.3	-12.2	Noise Floor
High Ch 5240MHz															
10.480	3.0	37.4	24.1	37.0	10.6	-36.7	0.0	0.8	49.1	35.8	74	54	-24.9	-18.2	V
15.720	3.0	41.0	28.5	37.6	12.8	-34.7	0.0	0.7	57.5	44.9	74	54	-16.5	-9.1	V
10.480	3.0	36.6	23.5	37.0	10.6	-36.7	0.0	0.8	48.3	35.1	74	54	-25.7	-18.9	H
15.720	3.0	38.3	25.2	37.6	12.8	-34.7	0.0	0.7	54.7	41.6	74	54	-19.3	-12.4	Noise Floor
No other emissions were detected above noise floor															

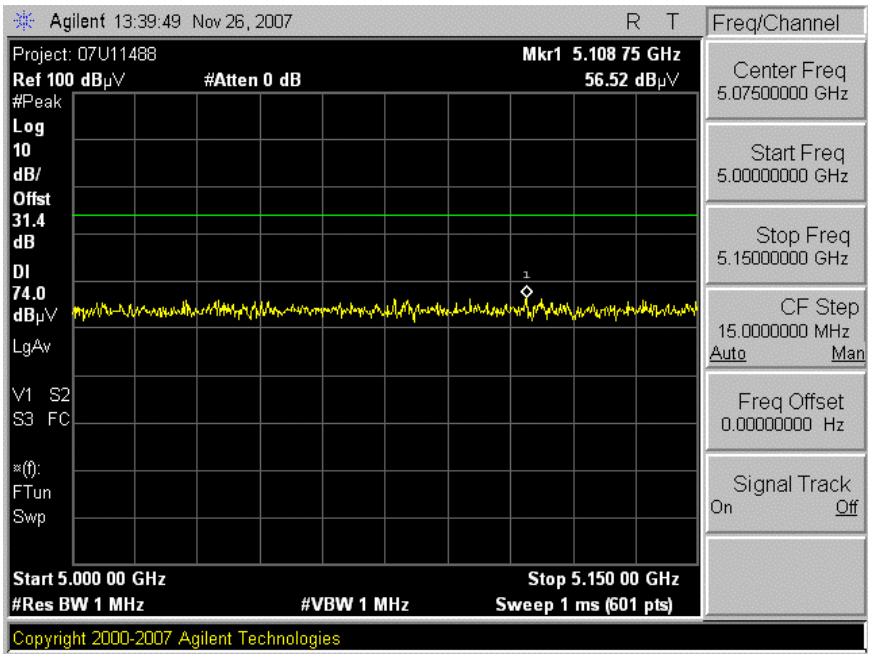
Rev. 4.12.7

f	Measurement Frequency	Amp	Preamp Gain	Avg Lim	Average Field Strength Limit
Dist	Distance to Antenna	D Corr	Distance Correct to 3 meters	Pk Lim	Peak Field Strength Limit
Read	Analyzer Reading	Avg	Average Field Strength @ 3 m	Avg Mar	Margin vs. Average Limit
AF	Antenna Factor	Peak	Calculated Peak Field Strength	Pk Mar	Margin vs. Peak Limit
CL	Cable Loss	HPF	High Pass Filter		

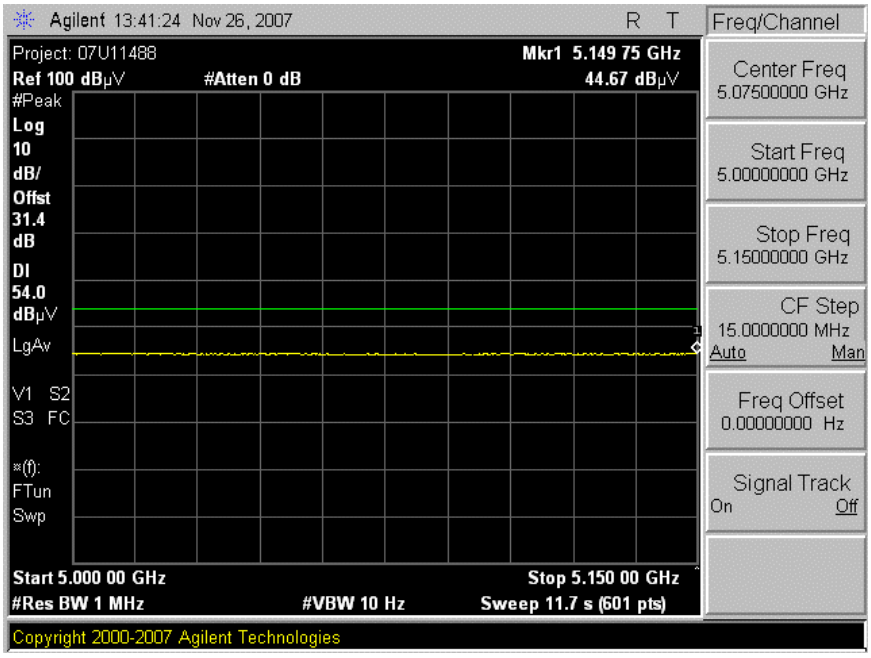
8.1.3. TRANSMITTER ABOVE 1 GHz FOR 802.11n HT40 MODE IN THE LOWER 5.2 GHz BAND

RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)

LOW CHANNEL RESTRICTED, PEAK, HORIZ

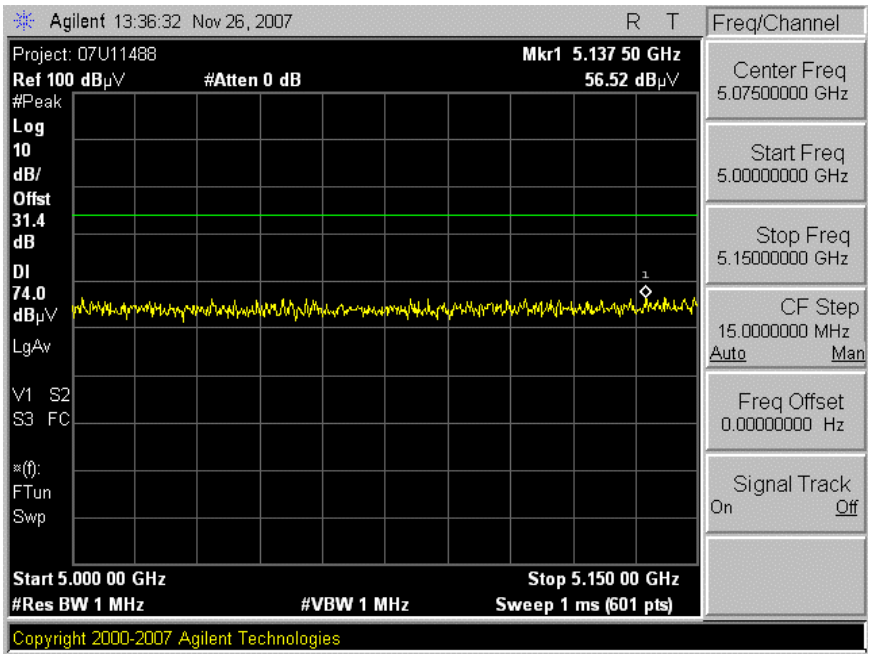


LOW CHANNEL RESTRICTED, AVG, HORIZ

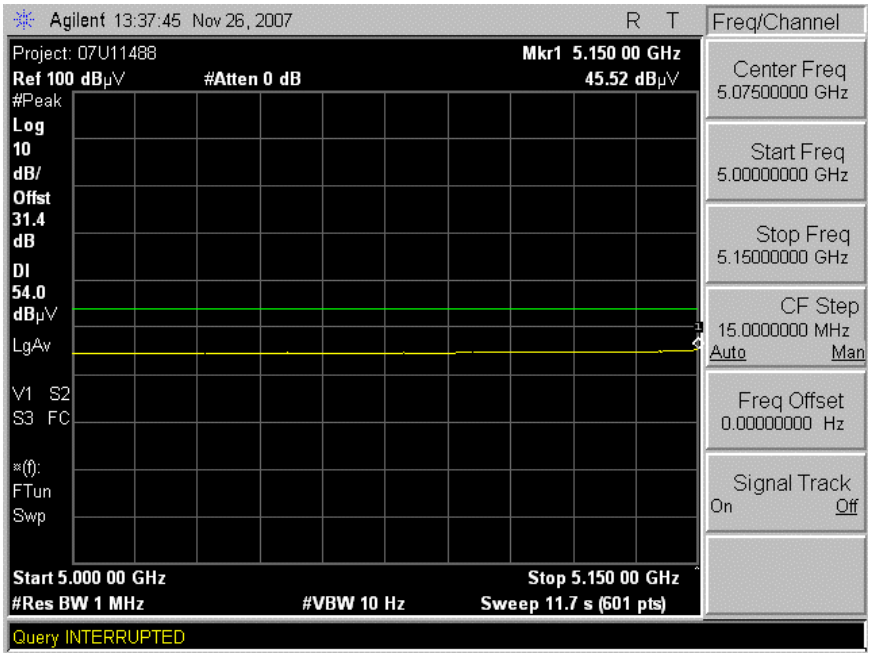


RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)

LOW CHANNEL RESTRICTED, PEAK, VERT



LOW CHANNEL RESTRICTED, AVG, VERT



AUTHORIZED BANDEDGE (HIGH CHANNEL, HORIZONTAL)

See upper 5.2GHz band report, no conduct spurious emissions were detected at range 5250MHz to 5350Mhz

HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement
Compliance Certification Services, Fremont 5m Chamber

Company: QualCom INC.
Project #: 07U11488
Date: 11/26/2007
Test Engineer: Thanh Nguyen
Configuration: EUT, Ext. Card, Laptop.
Mode: Transmit 5.2GHz_HT40

Test Equipment:

Horn 1-18GHz	Pre-amplifer 1-26GHz	Pre-amplifer 26-40GHz	Horn > 18GHz	Limit
T73; S/N: 6717 @3m	T144 Miteq 3008A00931			FCC 15.209

Hi Frequency Cables

2 foot cable	3 foot cable	12 foot cable	HPF	Reject Filter
		A-5m Chamber	HPF_7.6GHz	

Peak Measurements
RBW=VBW=1MHz
Average Measurements
RBW=1MHz ; VBW=10Hz

f GHz	Dist (m)	Read Pk dBuV	Read Avg. dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes (V/H)
Harmonics emissions															
Ch 5190MHz															
10.380	3.0	37.5	24.7	37.0	10.5	-36.8	0.0	0.8	48.9	36.1	74	54	-25.1	-17.9	V
15.570	3.0	38.2	24.9	38.0	12.7	-34.8	0.0	0.7	54.8	41.5	74	54	-19.2	-12.5	Noise Floor
10.380	3.0	36.9	24.2	37.0	10.5	-36.8	0.0	0.8	48.4	35.7	74	54	-25.6	-18.3	H
15.570	3.0	37.8	24.7	38.0	12.7	-34.8	0.0	0.7	54.4	41.3	74	54	-19.6	-12.7	Noise Floor
Ch 5230MHz															
10.460	3.0	37.4	24.4	37.0	10.5	-36.7	0.0	0.8	49.1	36.0	74	54	-24.9	-18.0	H
15.690	3.0	37.7	24.5	37.7	12.7	-34.7	0.0	0.7	54.1	41.0	74	54	-19.9	-13.0	Noise Floor
10.460	3.0	37.5	25.1	37.0	10.5	-36.7	0.0	0.8	49.1	36.7	74	54	-24.9	-17.3	V
15.690	3.0	37.9	24.7	37.7	12.7	-34.7	0.0	0.7	54.3	41.1	74	54	-19.7	-12.9	Noise Floor
No other emissions were detected above noise floor															

Rev. 4.12.7

f	Measurement Frequency	Amp	Preamp Gain	Avg Lim	Average Field Strength Limit
Dist	Distance to Antenna	D Corr	Distance Correct to 3 meters	Pk Lim	Peak Field Strength Limit
Read	Analyzer Reading	Avg	Average Field Strength @ 3 m	Avg Mar	Margin vs. Average Limit
AF	Antenna Factor	Peak	Calculated Peak Field Strength	Pk Mar	Margin vs. Peak Limit
CL	Cable Loss	HPF	High Pass Filter		

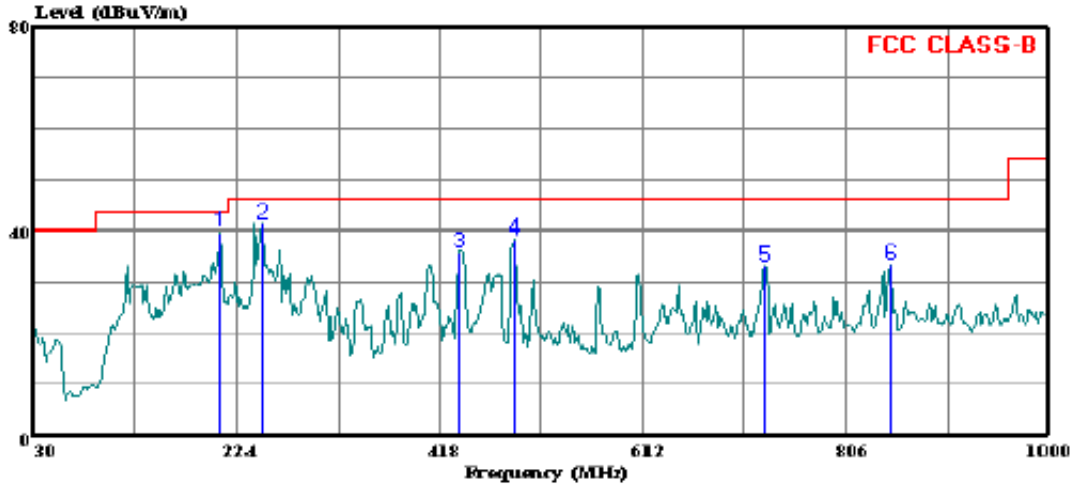
8.2. WORST-CASE BELOW 1 GHz

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

HORIZONTAL PLOT

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

Data#: 8 File#: EMI below 1GHz.EMI
Date: 11-20-2007 Time: 16:19:29



Trace: 7 Ref Trace:

Condition: FCC CLASS-B HORIZONTAL
Test Operator:: Thanh Nguyen
Project #: : 07U12XXX
Company: : QualComm Inc.
Model : MA423D_H
Configuration:: EUT/Extender Card/Laptop
Mode : : Transmit 5Ghz Worst Case
Target: : FCC Class B
: Module testing, close LID

HORIZONTAL DATA

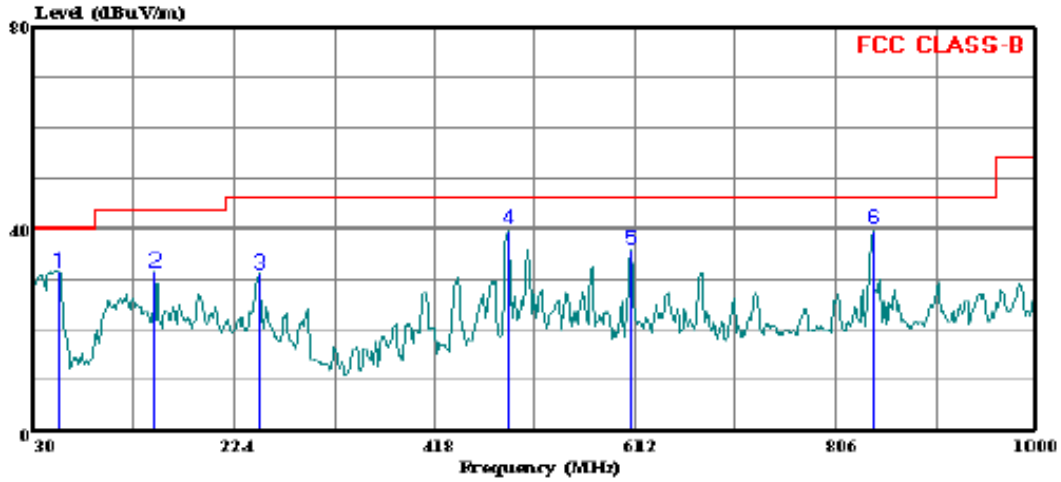
	Freq	Read Level	Level	Factor	Limit Line	Over Limit	Remark
	MHz	dBuV	dBuV/m	dB	dBuV/m	dB	
1	208.480	58.20	39.78	-18.42	43.50	-3.72	Peak
2	247.280	59.25	41.31	-17.94	46.00	-4.69	Peak
3	436.430	48.75	36.13	-12.62	46.00	-9.87	Peak
4	487.840	49.79	38.36	-11.43	46.00	-7.64	Peak
5	727.430	41.35	33.36	-8.00	46.00	-12.65	Peak
6	848.680	39.65	33.55	-6.10	46.00	-12.45	Peak

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

VERTICAL PLOT

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

Data#: 10 File#: EMI below 1GHz.EMI
Date: 11-20-2007 Time: 16:22:23



Trace: 9 Ref Trace:

Condition: FCC CLASS-B VERTICAL
Test Operator:: Thanh Nguyen
Project #: : 07U12XXX
Company: : QualComm Inc.
Model : MA423D_H
Configuration:: EUT/Extender Card/Laptop
Mode : : Transmit 5Ghz Worst Case
Target: : FCC Class B
: Module testing, close LID

VERTICAL DATA

	Freq	Read Level	Level	Factor	Limit Line	Over Limit	Remark
	MHz	dBuV	dBuV/m	dB	dBuV/m	dB	
1	55.220	54.19	31.35	-22.83	40.00	-8.65	Peak
2	148.340	48.91	31.68	-17.23	43.50	-11.82	Peak
3	247.280	48.98	31.04	-17.94	46.00	-14.96	Peak
4	487.840	51.13	39.70	-11.43	46.00	-6.30	Peak
5	609.090	45.82	36.07	-9.75	46.00	-9.93	Peak
6	841.890	45.93	39.84	-6.09	46.00	-6.16	Peak

9. AC POWER LINE CONDUCTED EMISSIONS

LIMITS

FCC §15.207 (a)

RSS-Gen 7.2.2

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 receiver is set to a resolution bandwidth of 9 kHz. Peak detection is used unless otherwise noted as quasi-peak or average.

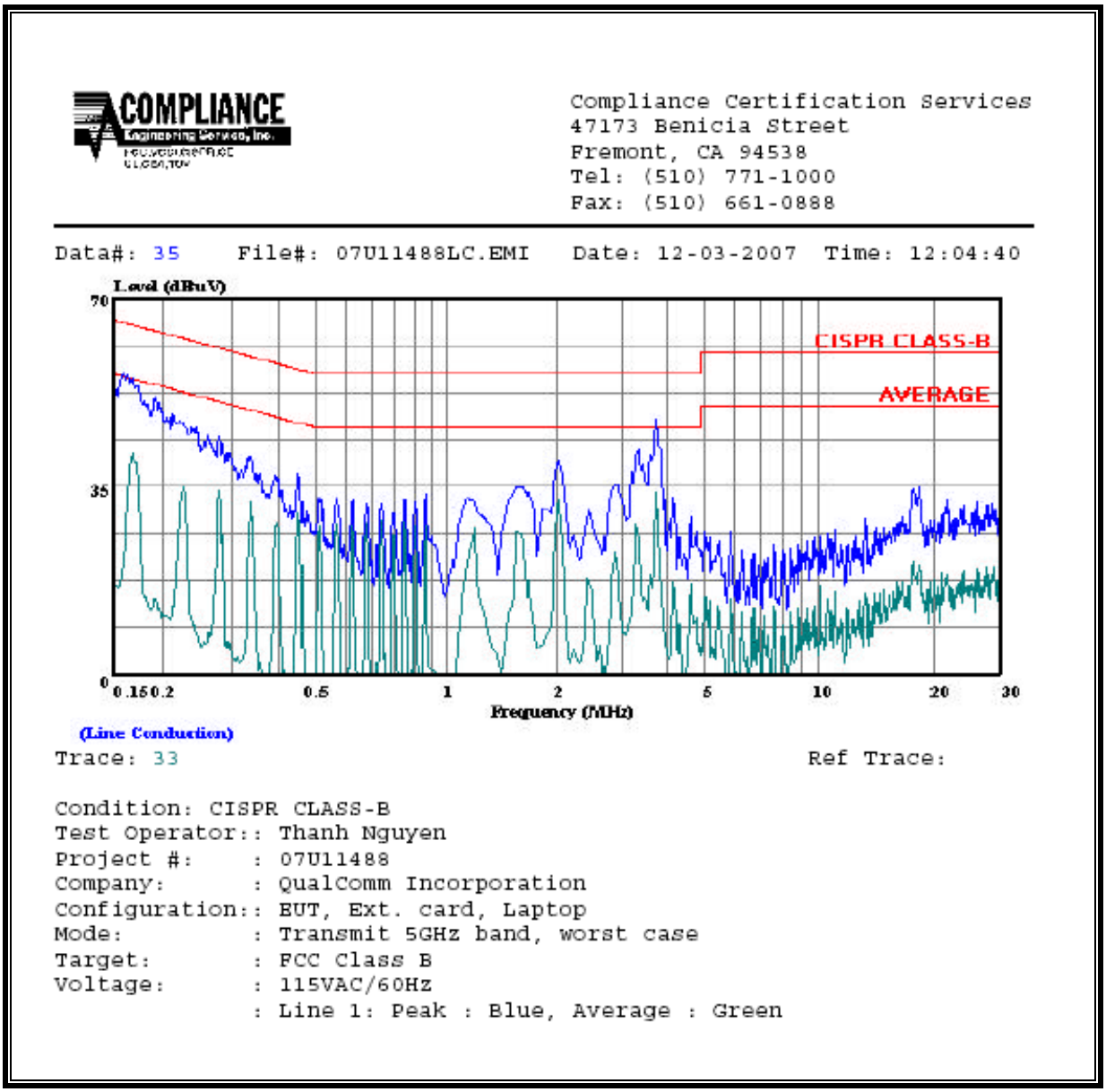
Line conducted data is recorded for both NEUTRAL and HOT lines.

RESULTS

6 WORST EMISSIONS

CONDUCTED EMISSIONS DATA (115VAC 60Hz)									
Freq.	Reading			Closs	Limit	EN_B	Margin		Remark
(MHz)	PK (dBuV)	QP (dBuV)	AV (dBuV)	(dB)	QP	AV	QP (dB)	AV (dB)	L1 / L2
0.16	55.92	--	41.08	0.00	65.52	55.52	-9.60	-14.44	L1
3.44	41.96	--	27.22	0.00	56.00	46.00	-14.04	-18.78	L1
3.82	47.72	--	34.06	0.00	56.00	46.00	-8.28	-11.94	L1
0.17	54.56	--	37.74	0.00	65.21	55.21	-10.65	-17.47	L2
3.38	41.60	--	28.66	0.00	56.00	46.00	-14.40	-17.34	L2
3.82	43.32	--	26.95	0.00	56.00	46.00	-12.68	-19.05	L2
6 Worst Data									

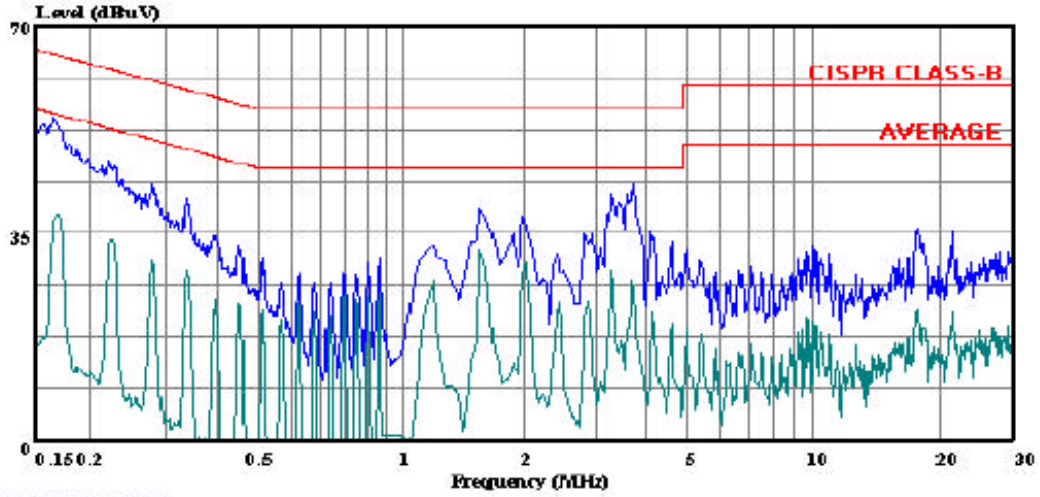
LINE 1 RESULTS



LINE 2 RESULTS

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

Data#: 42 File#: 07U11488LC.EMI Date: 12-03-2007 Time: 12:55:06



(Line Conduction)

Trace: 40 Ref Trace:

Condition: CISPR CLASS-B
Test Operator:: Thanh Nguyen
Project #: : 07U11488
Company: : QualComm Incorporation
Configuration:: EUT, Ext. card, Laptop
Mode: : Transmit 5GHz band, worst case
Target: : FCC Class B
Voltage: : 115VAC/60Hz
: Line 2: Peak : Blue, Average : Green

10. MAXIMUM PERMISSIBLE EXPOSURE

FCC RULES

§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, rearranging the terms to express the distance as a function of the remaining variables, changing to units of Power to mW and Distance to cm, and substituting the logarithmic form of power and gain 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

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

The power density in units of mW/cm^2 is converted to units of W/m^2 by multiplying by a factor of 10.

LIMITS

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

RESULTS

Mode	Frequency Range (MHz)	MPE Distance (cm)	Output Power (dBm)	Antenna Gain (dBi)	FCC Power Density (mW/cm^2)
802.11a	5180 - 5240	20.0	13.69	3.00	0.01
802.11n HT20	5180 - 5240	20.0	12.88	3.00	0.01
802.11n HT40	5190 - 5230	20.0	15.55	3.00	0.01

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.