FCC CFR47 PART 15 SUBPART C
INDUSTRY CANADA RSS-210 ISSUE 7
CERTIFICATION TEST REPORT

FOR

802.11n 2X2 PCIE MINICARD TRANSCEIVER

MODEL NUMBER: AR5BHB92

FCC ID: PPD-AR5BHB92

IC: 4104A-AR5BHB92

REPORT NUMBER: 08U11571-1

ISSUE DATE: MARCH 13, 2008

Prepared for

ATHEROS COMMUNICATIONS, INC.
5480 GREAT AMERICA PARKWAY
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Prepared by

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NVLAP LAB CODE 200065-0

Revision History

Rev.	Issue Date	Revisions	Revised By
--	03/13/08	Initial Issue	T. Chan

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TABLE OF CONTENTS

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME:	ATHEROS COMMUNICATION, INC
	5480 GREAT AMERICA PARKWAY
	SANTA CLARA, CA 95054 USA
EUT DESCRIPTION:	802.11n 2X2 PCIE MINICARD TRANSCEIVER
MODEL:	AR5BHB92
SERIAL NUMBER:	HB92-031-S0830 AND HB92-031-S805
DATE TESTED:	FEBRUARY 25-29, 2008

APPLICABLE STANDARDS	
STANDARD	**TEST RESULTS**
CFR 47 Part 15 Subpart C and Subpart E	No Non-Compliance Noted
RSS-210 Issue 7 Annex 8 and RSS-GEN Issue 2	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:

CHIN PANG
EMC ENGINEER
COMPLIANCE CERTIFICATION SERVICES

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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, FCC CFR 47 Part 15, 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
Power Line Conducted Emission	+/- 2.3 dB
Radiated Emission	+/- 3.4 dB

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

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5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

The EUT is an 802.11n 2x2 PCIe minicard transceiver, model AR5BHB92. Two front-end module parts were evaluated; vendors are SiGe (FEM1) and Hitachi (FEM2).

The radio module is manufactured by Atheros Communications, Inc.

5.2. MAXIMUM OUTPUT POWER

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

Frequency Range (MHz)	Mode	Chain 0 Power (dBm)	Chain 1 Power (dBm)	Total Power (dBm)	Total Power (mW)
2412 - 2462	802.11b	22.58	22.12	25.37	344.06
2412 - 2462	802.11g	26.44	26.69	29.58	907.21
2412 - 2462	802.11n HT20	26.50	26.55	29.54	898.54
2422 - 2452	802.11n HT40	21.58	22.21	24.92	310.22
5745 - 5825	802.11a	25.82	26.12	28.98	791.20
5745 - 5825	802.11n HT20	26.32	26.07	29.21	833.12
5755 - 5795	802.11n HT40	26.76	26.91	29.85	965.15

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The 2x2 configuration utilizes a set of PIFA antennas with maximum gain of 3.62 dBi from 2400 – 2483.5 MHz, 4.63 dBi from 5150 – 5350 MHz, 5.56 dBi from 5250 – 5350 MHz, 5.34 dBi from 5470 – 5725 MHz, and 4.76 dBi from 5725 - 5850 MHz.

5.4. SOFTWARE AND FIRMWARE

The test utility and driver software used during testing was Art ANWI 1.4 and Devlib Revision 0.6 Build #18 Art_11n.

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5.5. WORST-CASE CONFIGURATION AND MODE

The 2x2 configuration was used for all testing in this report.

Both FEM1 and FEM2 boards were evaluated on conducted and radiated emissions tests to find the worst case.

The worst-case data rates are determined to be as follows for each mode, based on the investigations by measuring the avarage power, peak power and PPSD across all the data rates, bandwidths, modulations and spatial stream modes.

Thus all emissions tests were made with following data rates:

- 802.11b mode, 20 MHz Channel Bandwidth, 1 Mb/s, CCK Modulation, Spatial Stream 1.
- 802.11g mode, 20 MHz Channel Bandwidth, 9 Mb/s, OFDM Modulation, Spatial Stream 1.
- 802.11n HT20 mode, 20 MHz Channel Bandwidth, MCS0, 6.5 Mb/s, OFDM Modulation, Spatial Stream 1.
- 802.11n HT40 mode, 40 MHz Channel Bandwidth, MCS0, 13.5 Mb/s, OFDM Modulation, Spatial Stream 1.

Baseline testing demonstrated that the Power Spectral Density as measured through a combiner with both chains operating simultaneously is worst case.

For RF conducted emissions, all tests were performed on FEM2 board excepted conducted spurious to use FEM1 board.

For RF radiated emissions, all tests were performed on FEM1 boards.

For radiated emissions bandedge, both FEM1 and FEM2 boards were performed at both vertical and horizontal polarizations.

For radiated emissions TX below 1 GHz, RX spurious, and AC line conduction were performed at FEM1 board.

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5.6. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

PERIPHERAL SUPPORT EQUIPMENT LIST				
Description	**Manufacturer**	**Model**	**Serial Number**	**FCC ID**
Laptop	IBM	ThinkPad T43	I3-BR298	DoC
AC Adapter	IBM	08k8202	11S08k8202Z1Z6LR36000	DoC

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	2m	No
2	DC	1	DC	Un-shielded	2m	No

TEST SETUP

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

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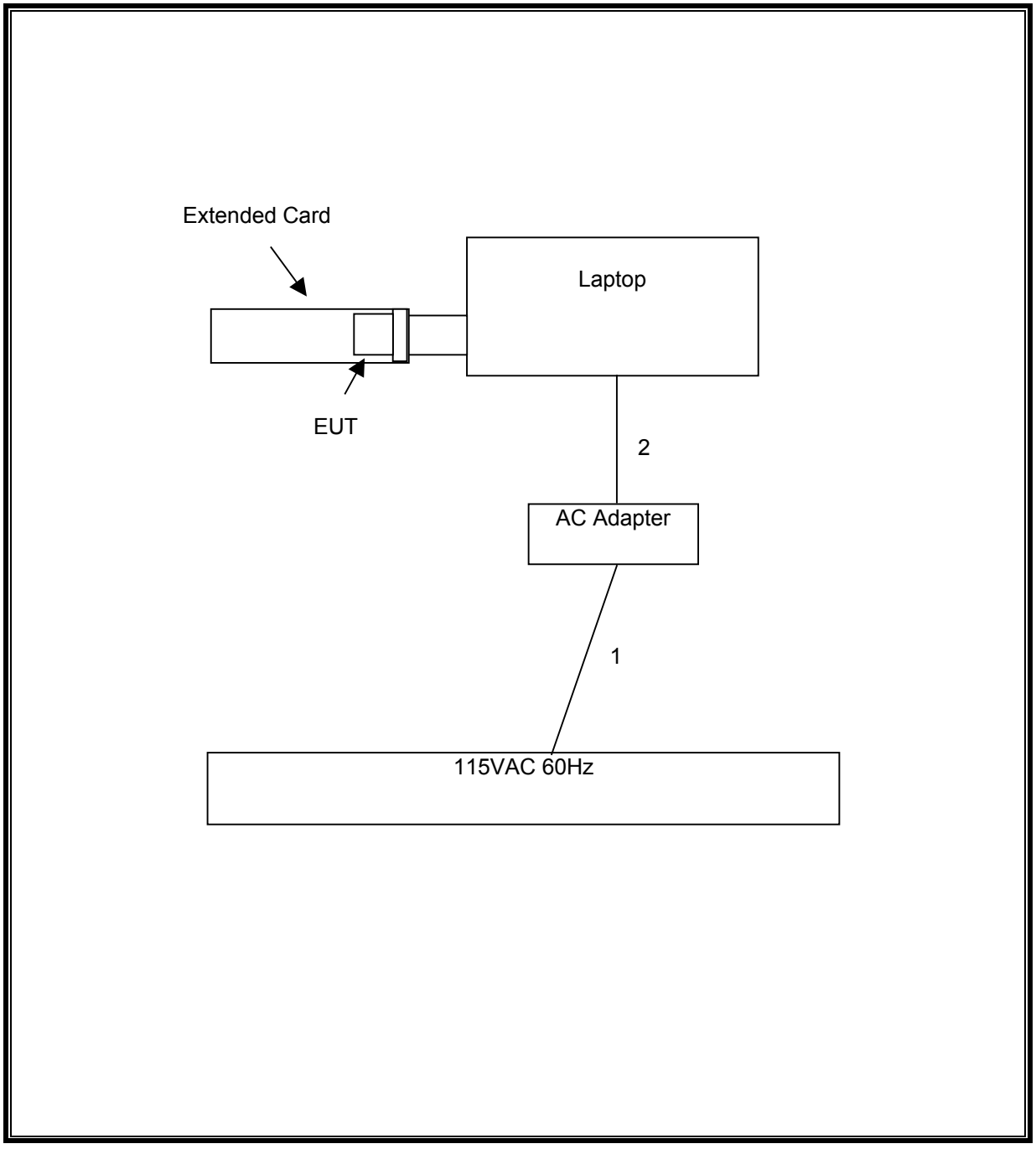
SETUP DIAGRAM FOR TESTS



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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**
Spectrum Analyzer, 44 GHz	Agilent / HP	E4446A	C01012	12/3/2007	3/3/2009
Peak Power Meter	Agilent / HP	E4416A	C00963	12/4/2007	12/4/2009
Peak / Average Power Sensor	Agilent	E9327A	C00964	12/7/2007	12/7/2009
Antenna, Bilog, 2 GHz	Sunol Sciences	JB1	C01011	9/28/2007	9/28/2008
Antenna, Horn, 18 GHz	EMCO	3115	C00945	4/15/2007	4/15/2008
Preamplifier, 26.5 GHz	Agilent / HP	8449B	C01063	9/27/2007	9/27/2008
Antenna, Horn, 26.5 GHz	ARA	MWH-1826/B	C00589	9/29/2007	9/29/2008
Preamplifier, 40 GHz	Miteq	NSP4000-SP2	C00990	10/11/2007	10/11/2008
EMI Receiver, 2.9 GHz	Agilent / HP	8542E	C00957	2/6/2007	6/12/2008
RF Filter Section, 2.9 GHz	Agilent / HP	85420E	C00958	2/6/2007	6/12/2008
EMI Test Receiver, 30 MHz	R & S	ESHS 20	N02396	2/6/2008	8/6/2009
LISN, 30 MHz	FCC	LISN-50/250-25-2	N02625	10/25/2007	10/25/2008
2.4-2.5GHz Reject Filter	Micro Tronics	BRM50702	N02685	CNR	CNR
High Pass Filter 7.6GHz	Micro Tronics	HPM13195	N02681	CNR	CNR
Reject Filter, 5.15-5.35 GHz	Micro-Tronics	BRC13190	N02679	CNR	CNR
Reject Filter, 5.47-5.725 GHz	Micro-Tronics	BRC13191	N02678	CNR	CNR
Reject Filter, 5.725-5.85 GHz	Micro-Tronics	BRC13192	N02676	CNR	CNR

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7. ANTENNA PORT TEST RESULTS

7.1. 802.11b DUAL CHAIN LEGACY MODE IN THE 2.4 GHz BAND

7.1.1. 6 dB BANDWIDTH

LIMITS

FCC §15.247 (a) (2)

IC RSS-210 A8.2 (a)

The minimum 6 dB bandwidth shall be at least 500 kHz.

TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The RBW is set to 100 kHz and the VBW is set to 300 kHz. The sweep time is coupled.

RESULTS

Channel	Frequency (MHz)	Chain 1 (MHz)	Minimum Limit (MHz)
Middle	2437	11.269	0.5

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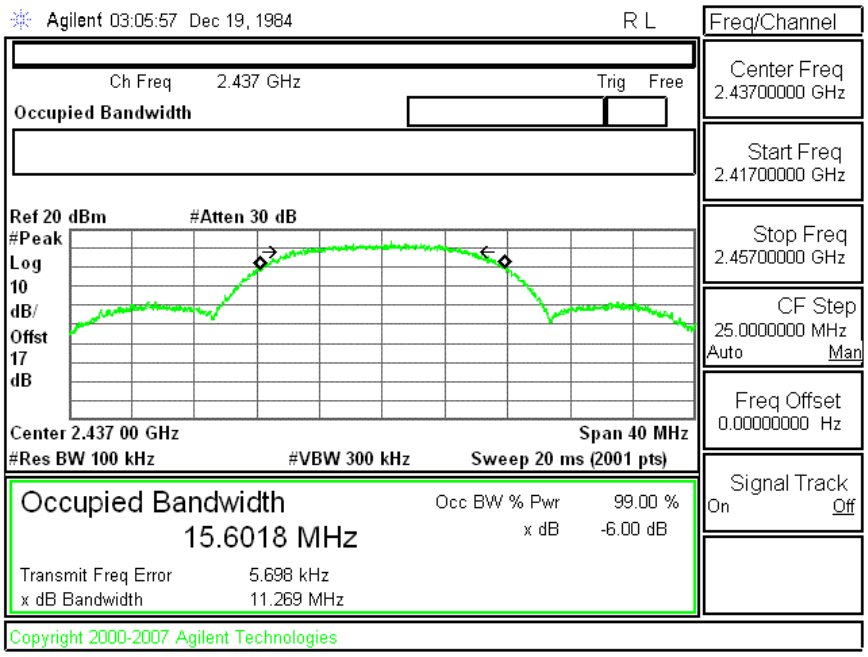
6 dB BANDWIDTH MID CH, CHAIN 1



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7.1.2. 99% BANDWIDTH

LIMITS

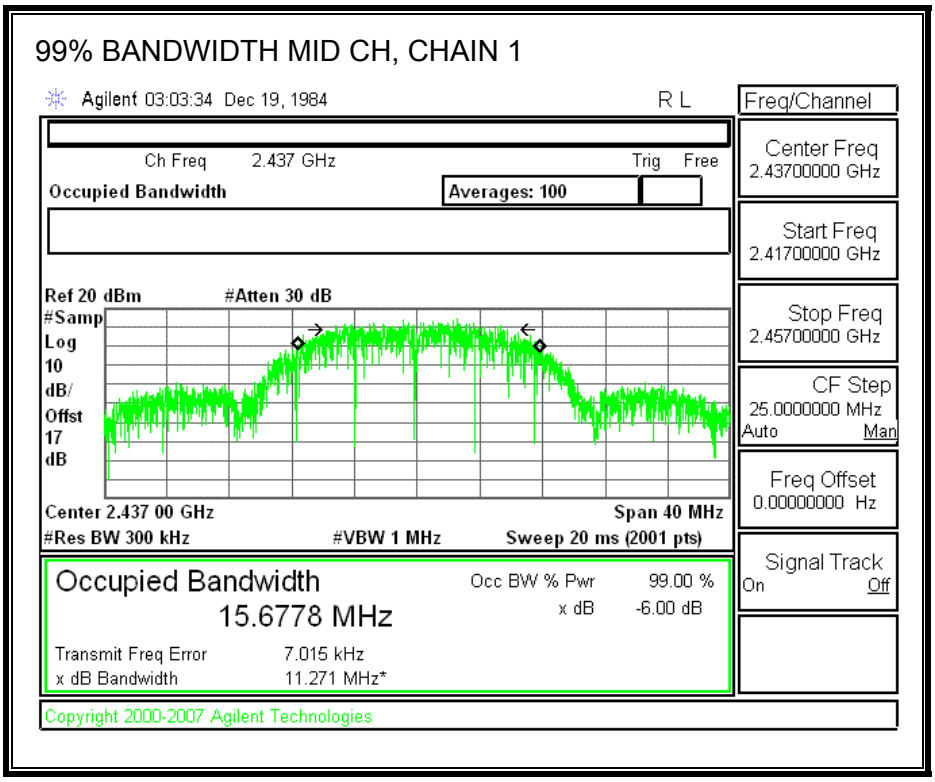
None; for reporting purposes only.

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 function is utilized.

RESULTS

Channel	Frequency (MHz)	Chain 1 (MHz)
Middle	2437	15.6778



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7.1.3. OUTPUT POWER

LIMITS

FCC §15.247 (b)

IC RSS-210 A8.4

Directional gain = gain of antenna element + 10 log (# of TX antenna elements)

Effective Legacy Gain (dBi)
6.33

The maximum antenna gain is 6.33 dBi for P-To-M; therefore the limit is 29.67 dBm.

TEST PROCEDURE

Peak power is measured using the spectrum analyzer's internal channel power integration function. Power is integrated over a bandwidth greater than or equal to the 99% bandwidth.

RESULTS

Channel	Frequency (MHz)	Limit (dBm)	Chain 0 Power (dBm)	Chain 1 Power (dBm)	Total Power (dBm)	Margin (dB)
Low	2412	29.67	22.58	22.12	25.37	-4.30
Mid	2437	29.67	21.68	21.98	24.84	-4.83
High	2462	29.67	22.23	21.98	25.12	-4.55

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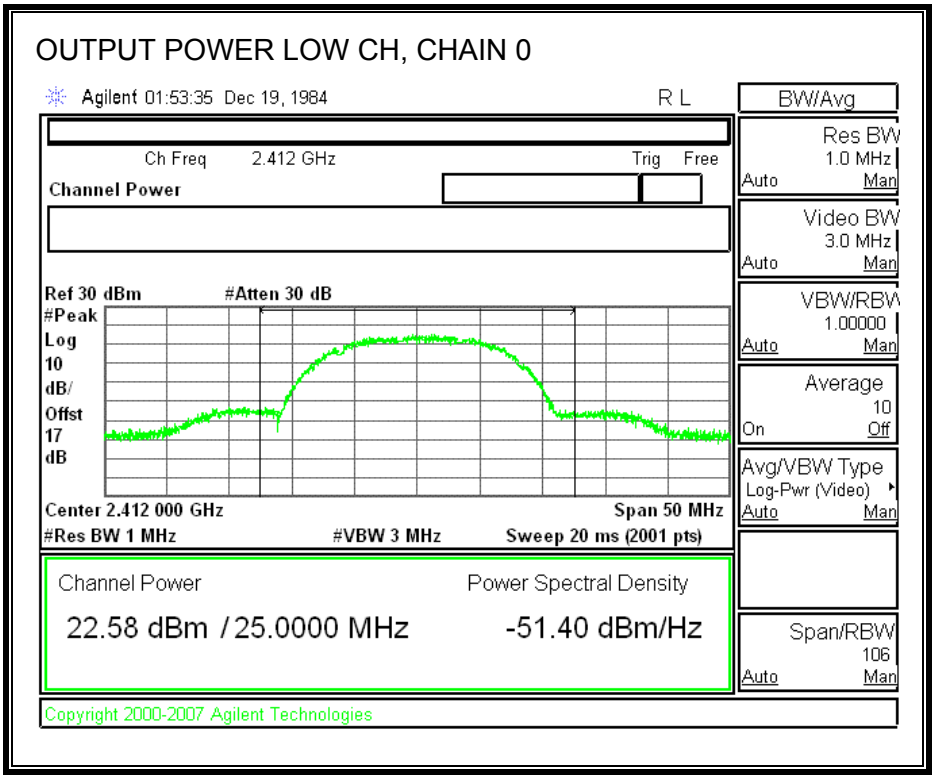
CHAIN 0 OUTPUT POWER



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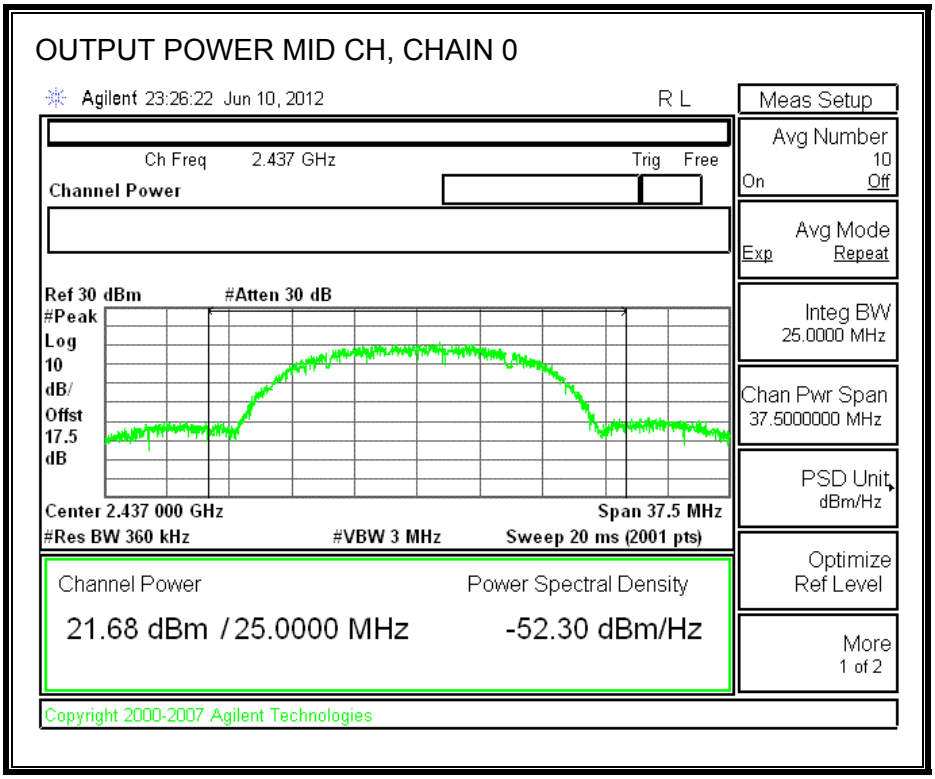

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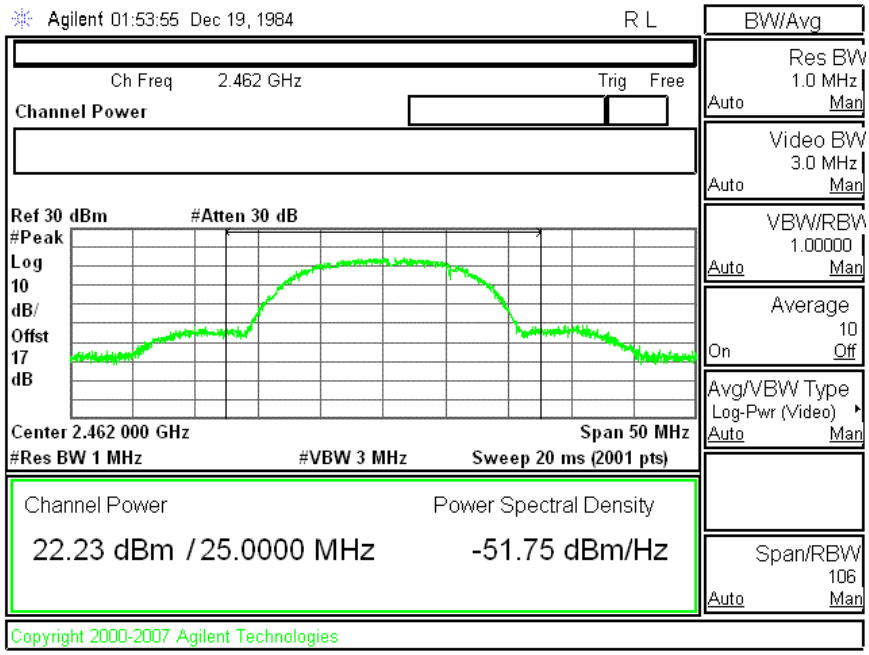
OUTPUT POWER HIGH CH, CHAIN 0



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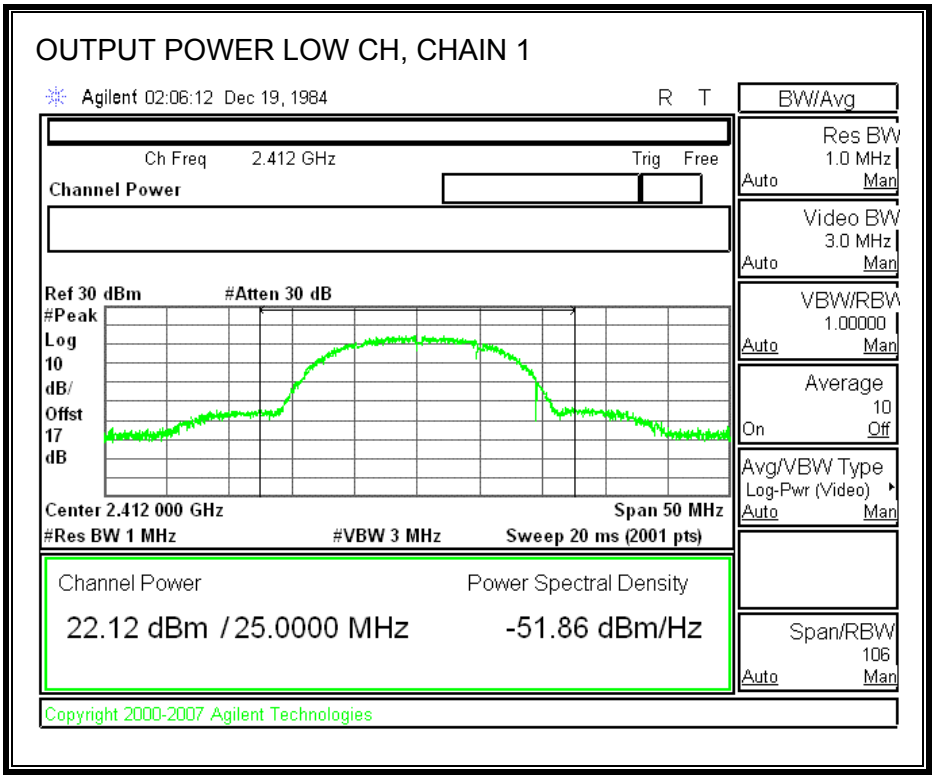
CHAIN 1 OUTPUT POWER



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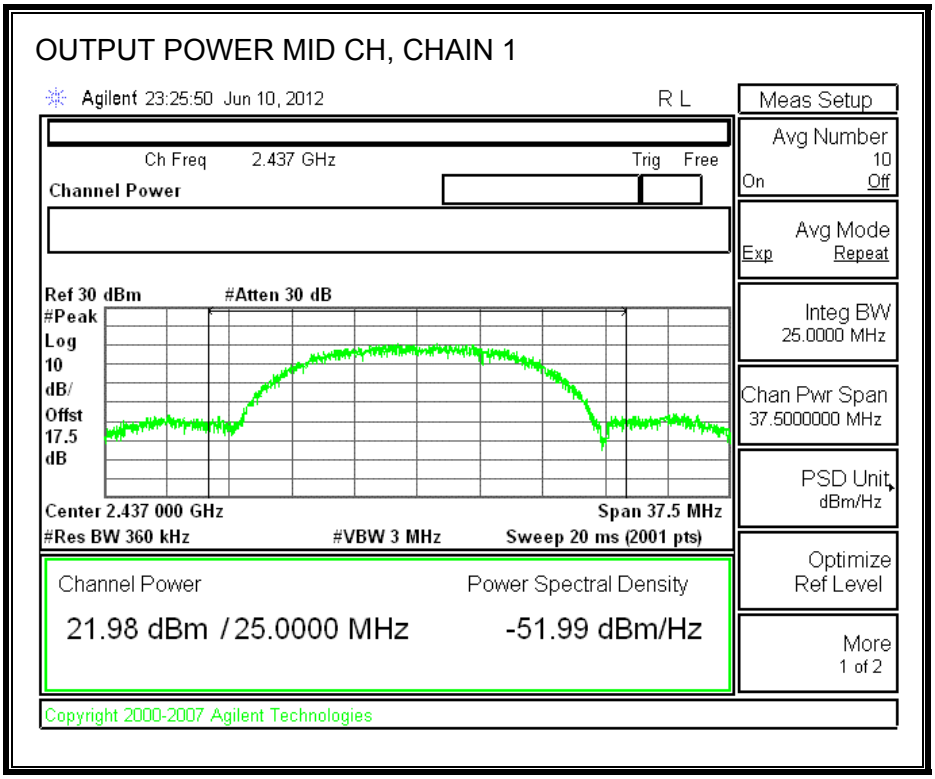

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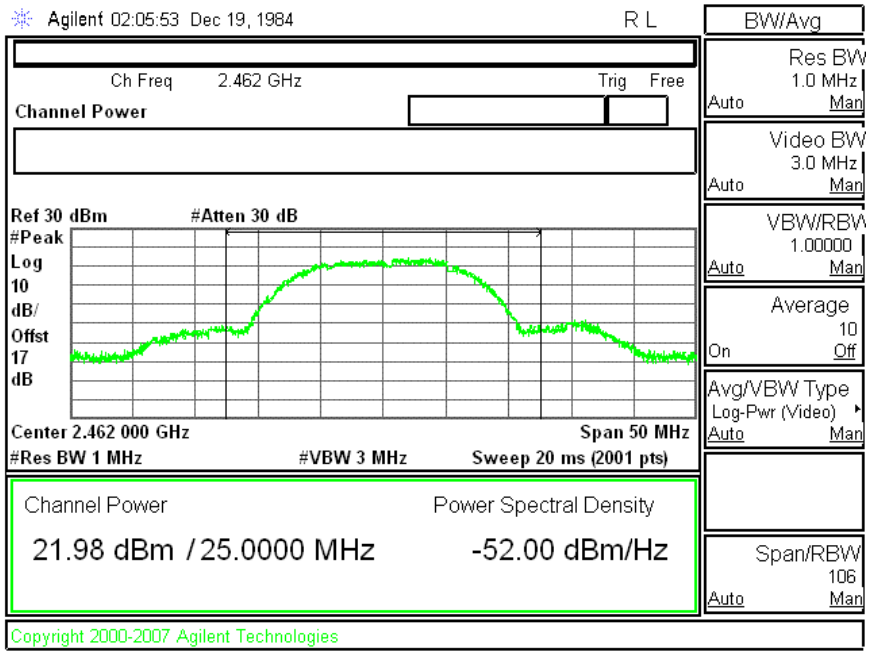
OUTPUT POWER HIGH CH, CHAIN 1



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7.1.4. 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 17 dB (including 16 dB pad and 1 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

Channel	Frequency (MHz)	Chain 0 Power (dBm)	Chain 1 Power (dBm)	Total Power (dBm)
Low	2412	17.73	17.62	20.69
Middle	2437	16.81	17.05	19.94
High	2462	17.91	17.88	20.91

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7.1.5. POWER SPECTRAL DENSITY

LIMITS

FCC §15.247 (e)

IC RSS-210 A8.2 (b)

The power spectral density conducted from the transmitter to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

TEST PROCEDURE

Output power was measured based on the use of a peak measurement, therefore the power spectral density was measured using PSD Option 1 in accordance with FCC document "Measurement of Digital Transmission Systems Operating under Section 15.247", March 23, 2005.

RESULTS

Channel	Frequency (MHz)	PSD with Combiner (dBm)	Limit (dBm)	Margin (dB)
Low	2412	1.89	8	-6.11
Middle	2437	4.06	8	-3.94
High	2462	-0.20	8	-8.20

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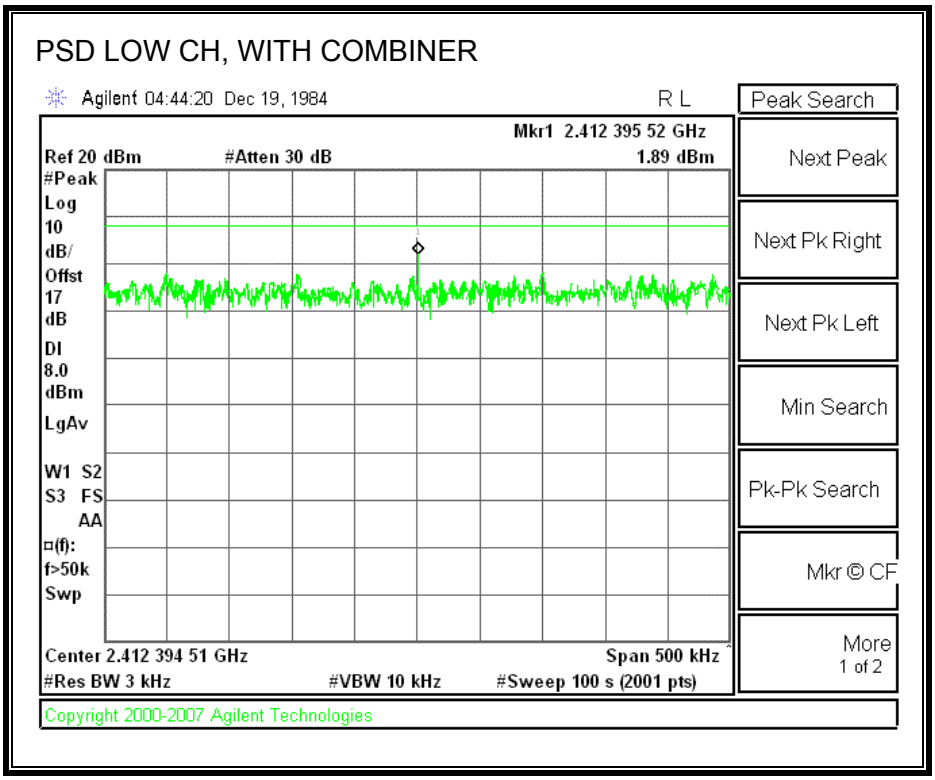
POWER SPECTRAL DENSITY, WITH COMBINER



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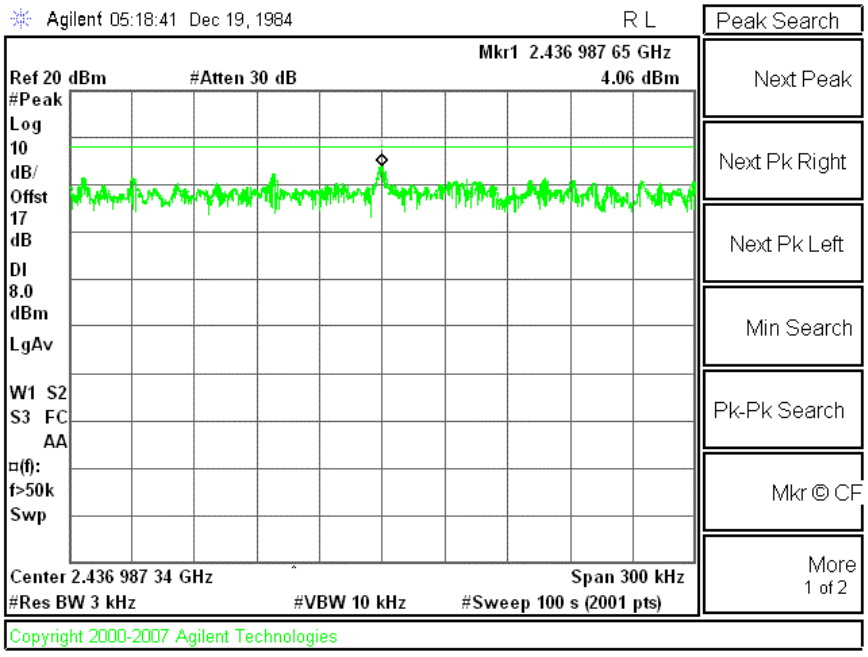
PSD MID CH, WITH COMBINER



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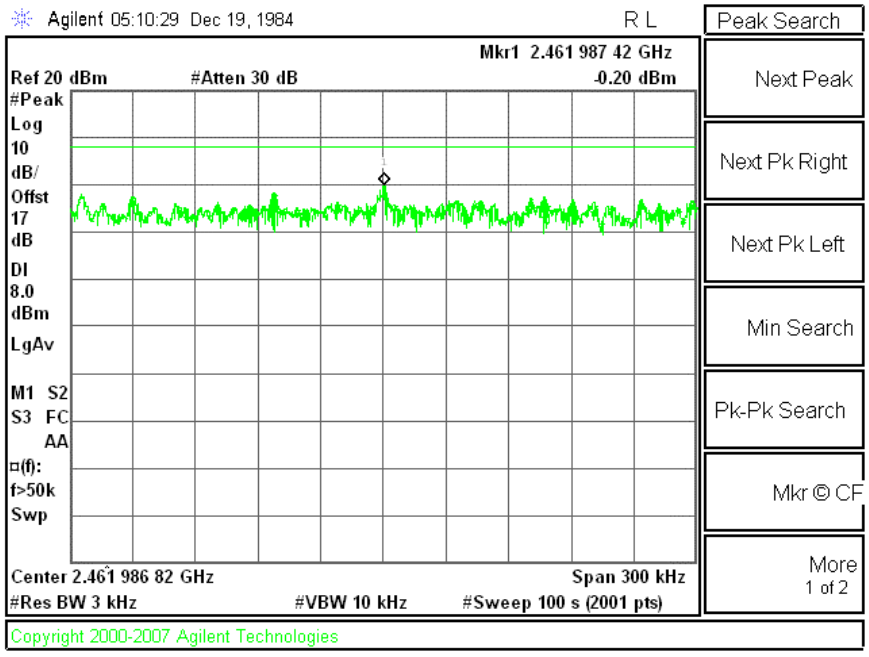
PSD HIGH CH, WITH COMBINER



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7.1.6. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.247 (d)

IC RSS-210 A8.5

Output power was measured based on the use of a peak measurement, therefore the required attenuation is 20 dB.

TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

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

RESULTS

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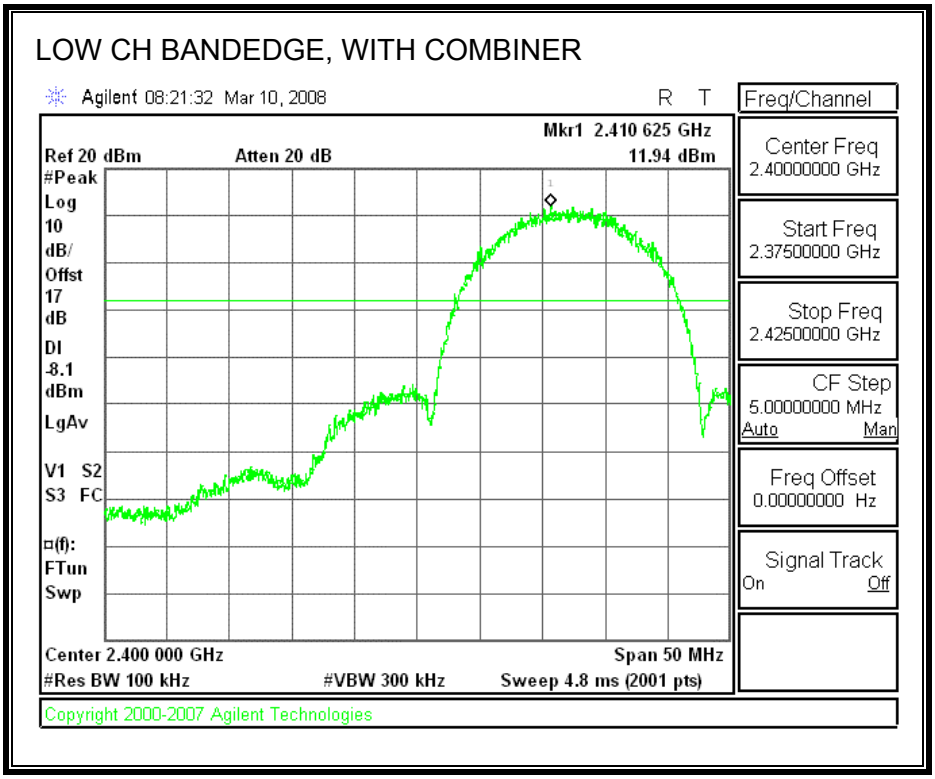
SPURIOUS EMISSIONS WITH COMBINER



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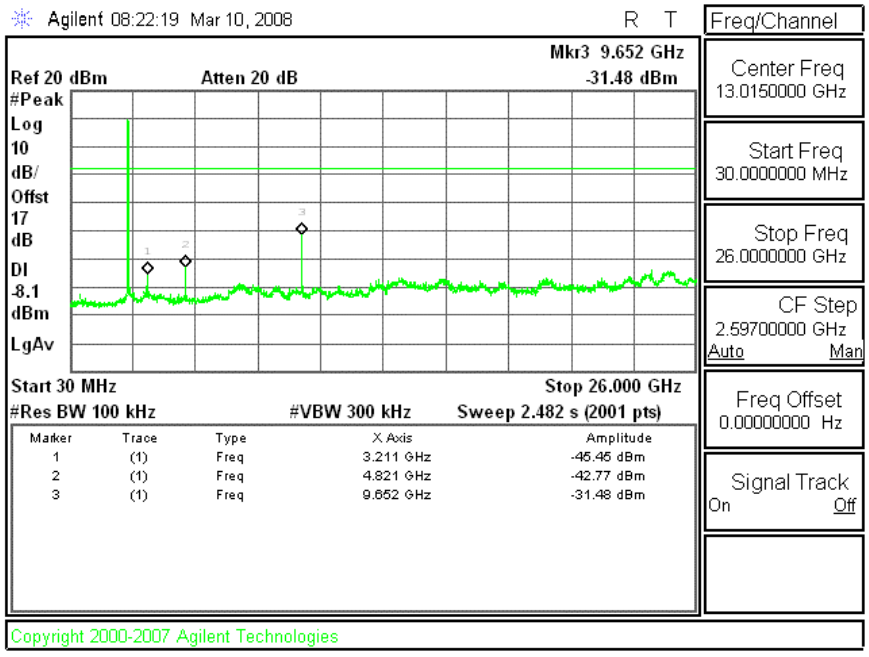
LOW CH SPURIOUS, WITH COMBINER



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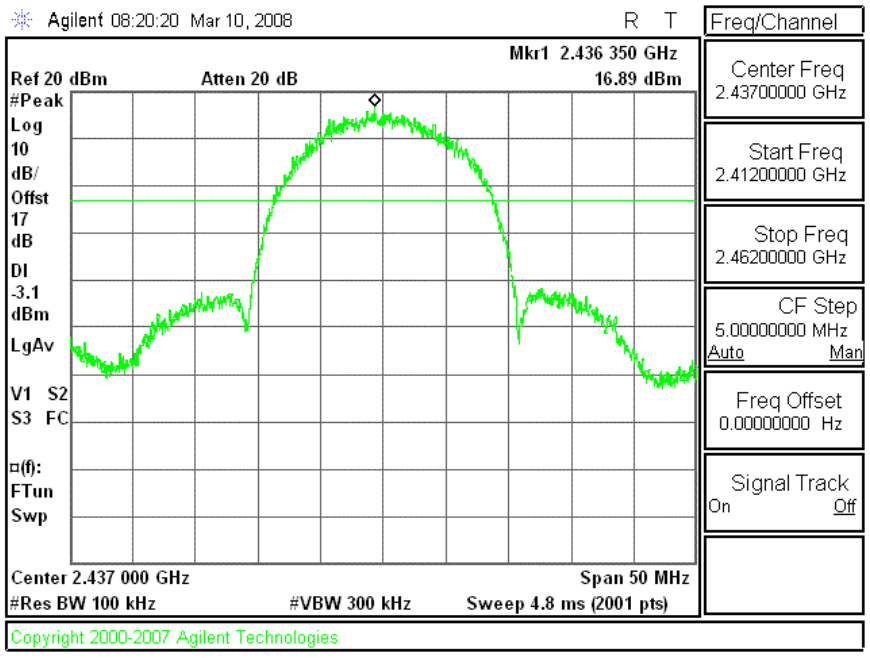
MID CH REFERENCE, WITH COMBINER



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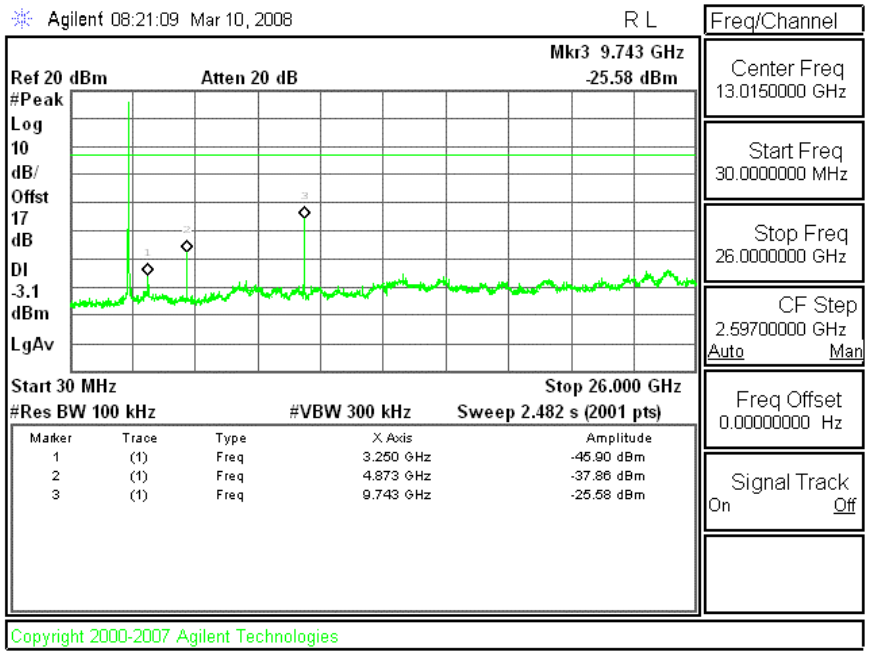
MID CH SPURIOUS, WITH COMBINER



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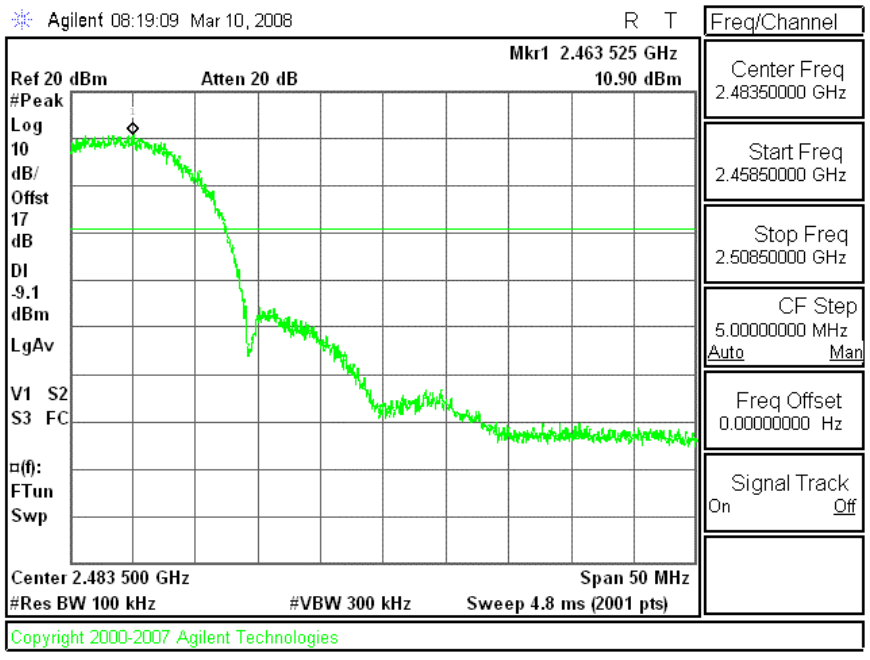
HIGH CH BANDEDGE, WITH COMBINER



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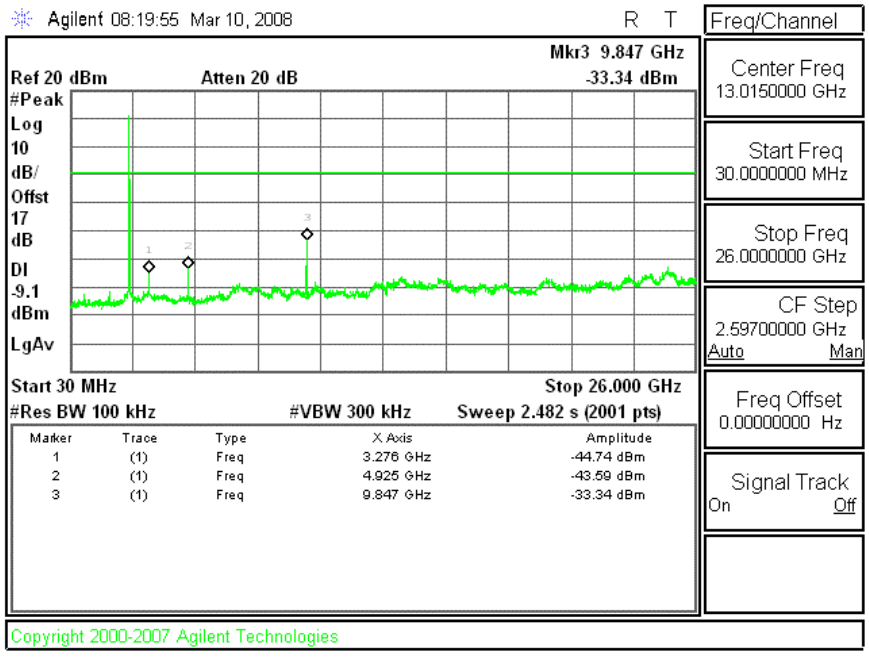
HIGH CH SPURIOUS, WITH COMBINER



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7.2. 802.11g DUAL CHAIN LEGACY MODE IN THE 2.4 GHz BAND

7.2.1. 6 dB BANDWIDTH

LIMITS

FCC §15.247 (a) (2)

IC RSS-210 A8.2 (a)

The minimum 6 dB bandwidth shall be at least 500 kHz.

TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The RBW is set to 100 kHz and the VBW is set to 300 kHz. The sweep time is coupled.

RESULTS

Channel	Frequency (MHz)	Chain 1 (MHz)	Minimum Limit (MHz)
Middle	2437	16.362	0.5

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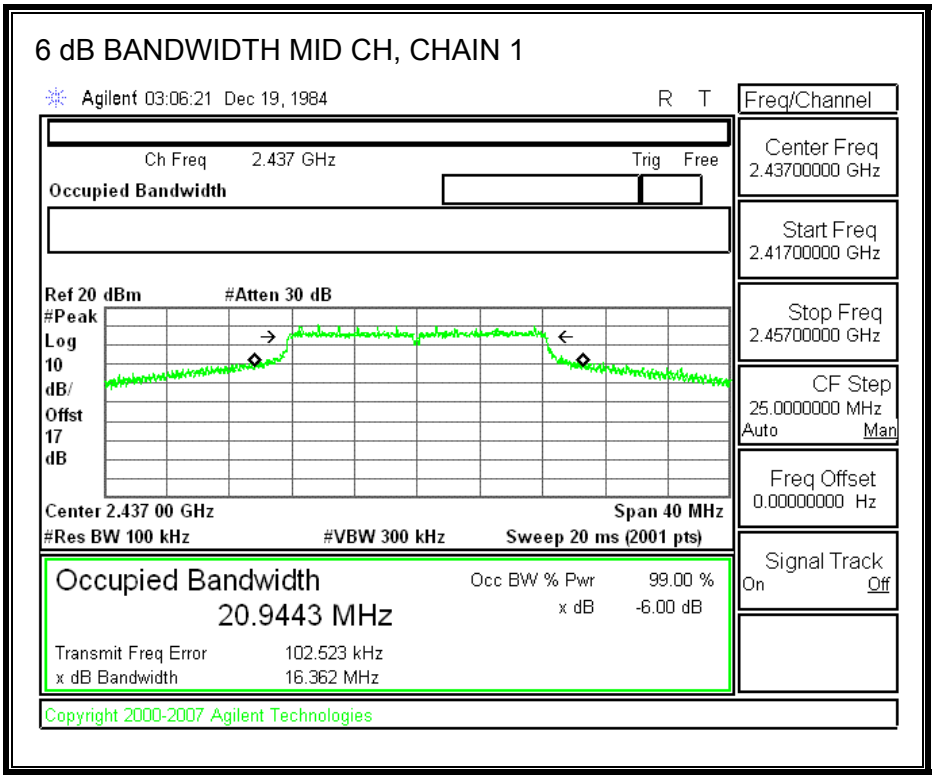

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7.2.2. 99% BANDWIDTH

LIMITS

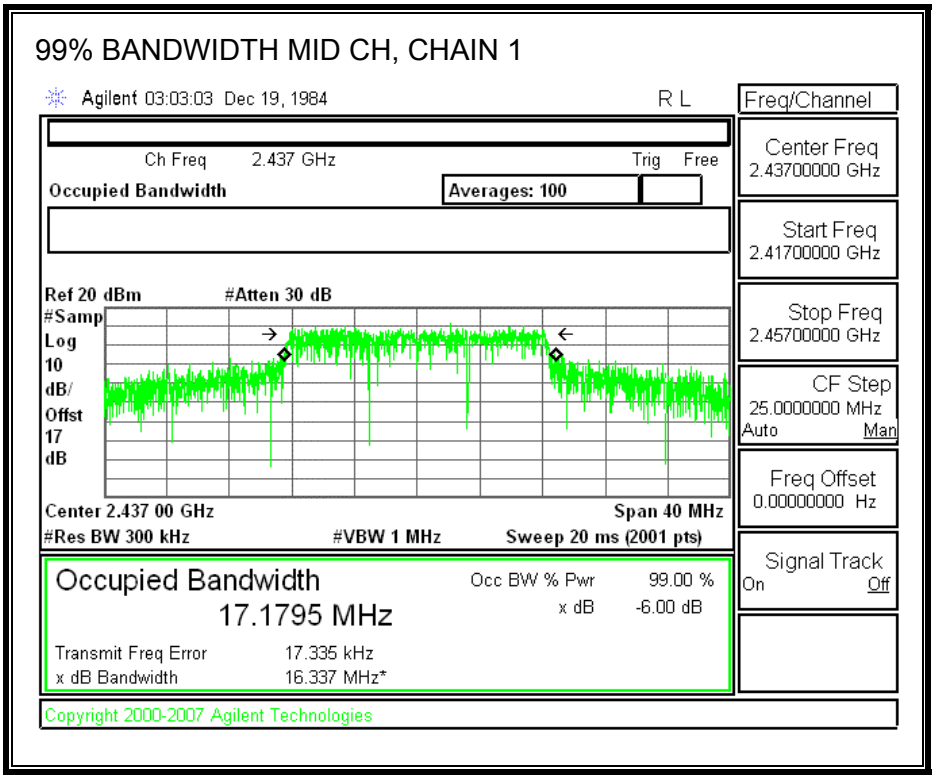
None; for reporting purposes only.

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 function is utilized.

RESULTS

Channel	Frequency (MHz)	Chain 1 (MHz)
Middle	2437	17.1795



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7.2.3. OUTPUT POWER

LIMITS

FCC §15.247 (b)

IC RSS-210 A8.4

Directional gain = gain of antenna element + 10 log (# of TX antenna elements)

Effective Legacy Gain (dBi)
6.33

The maximum antenna gain is 6.33 dBi for P-To-M; therefore the limit is 29.67 dBm.

TEST PROCEDURE

Peak power is measured using the spectrum analyzer's internal channel power integration function. Power is integrated over a bandwidth greater than or equal to the 99% bandwidth.

RESULTS

Channel	Frequency (MHz)	Limit (dBm)	Chain 0 Power (dBm)	Chain 1 Power (dBm)	Total Power (dBm)	Margin (dB)
Low	2412	29.67	21.83	20.43	24.20	-5.47
Mid	2437	29.67	26.44	26.69	29.58	-0.09
High	2462	29.67	21.01	21.11	24.07	-5.60

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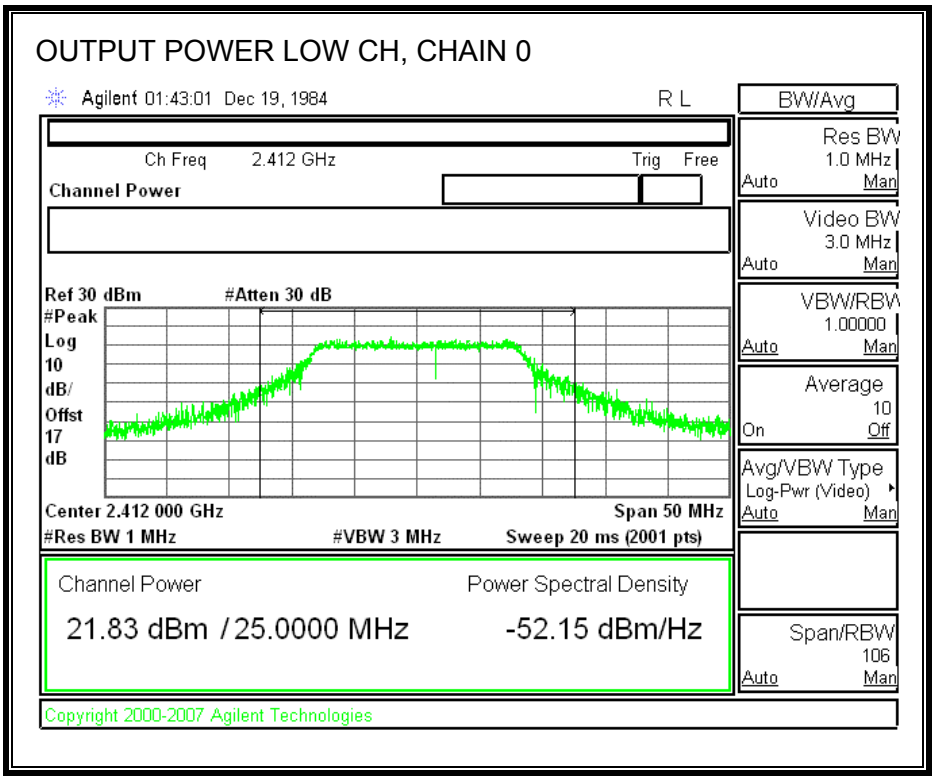
CHAIN 0 OUTPUT POWER



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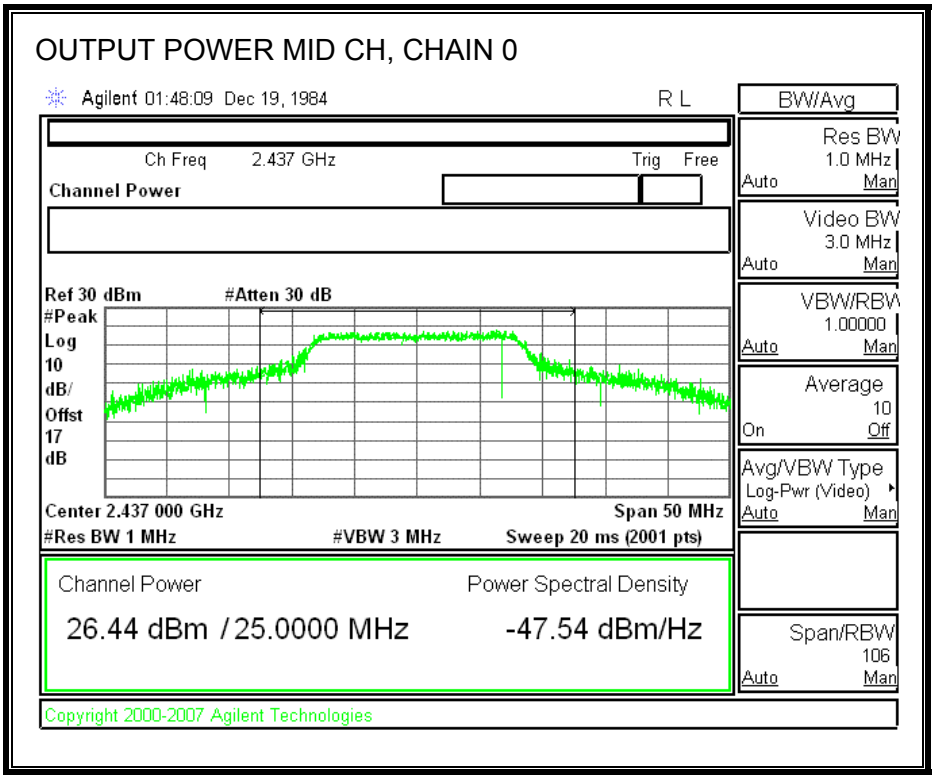

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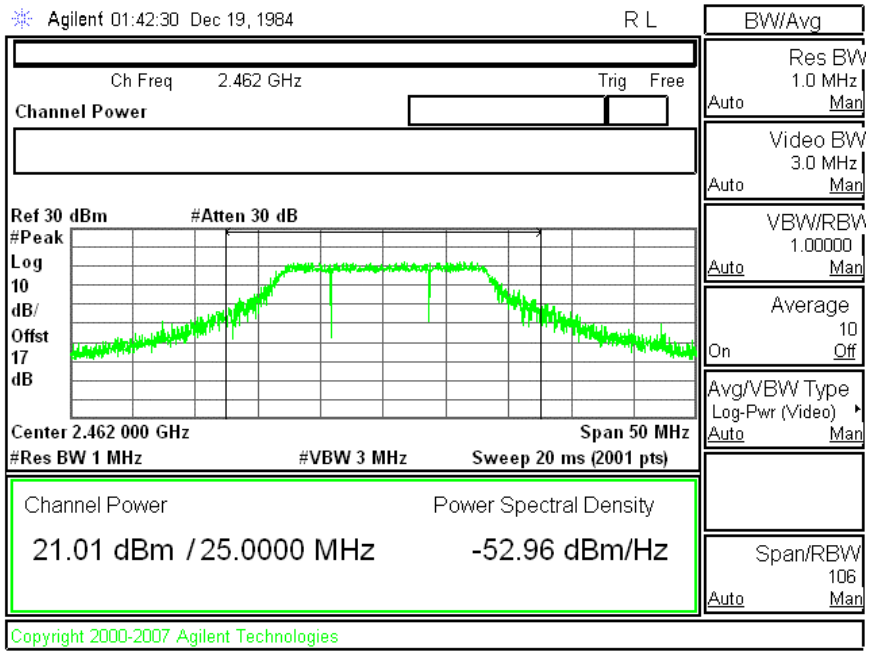
OUTPUT POWER HIGH CH, CHAIN 0



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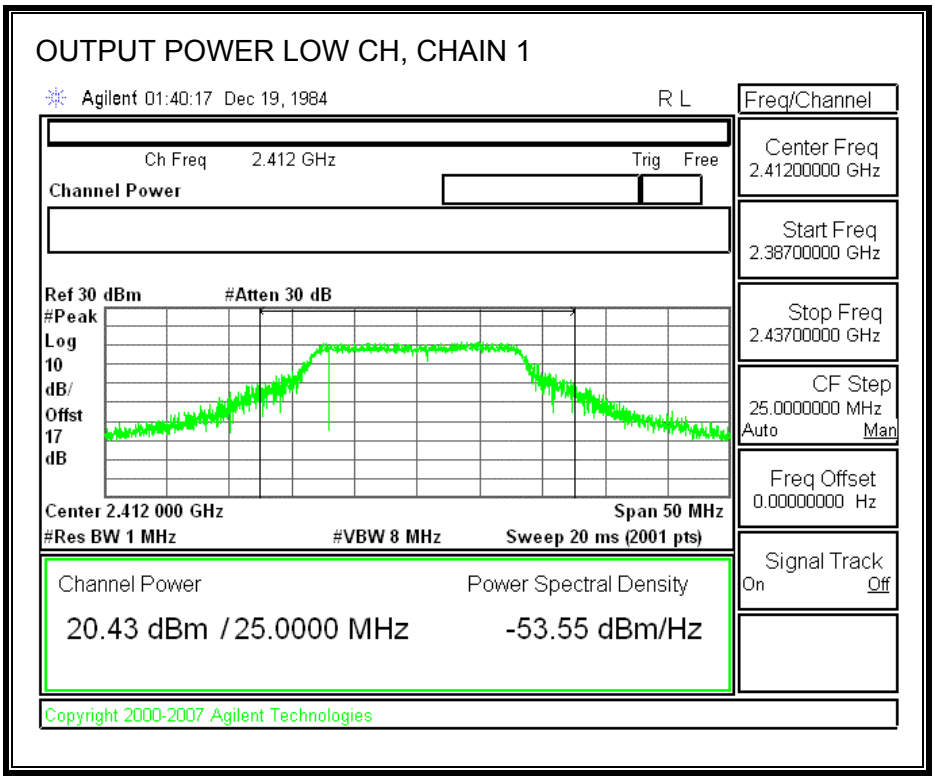
CHAIN 1 OUTPUT POWER



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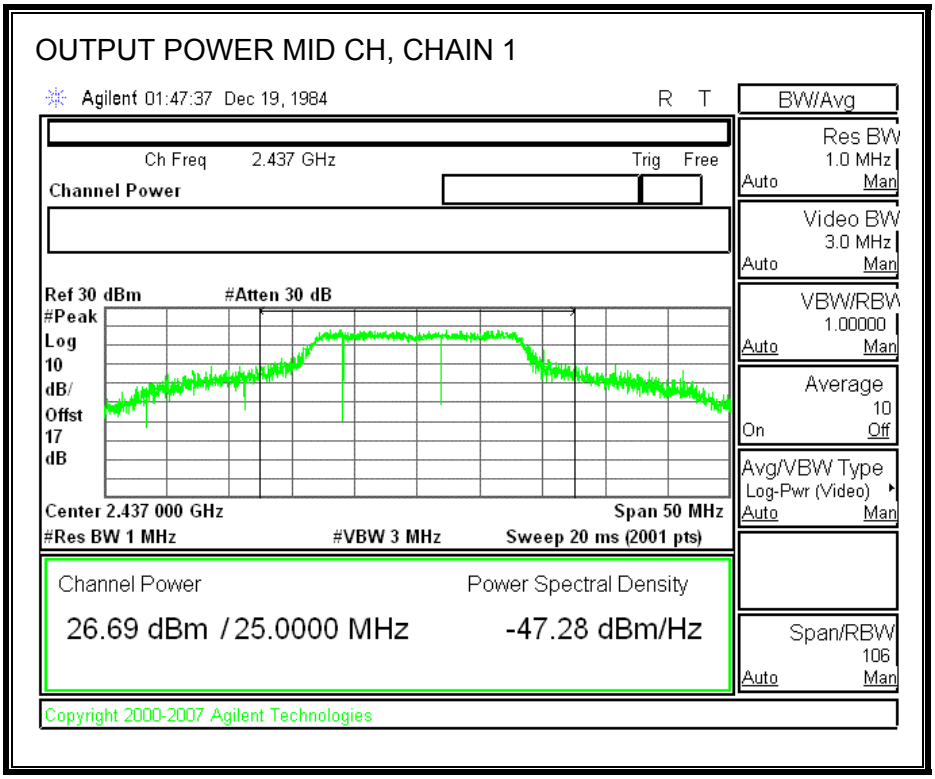
OUTPUT POWER MID CH, CHAIN 1



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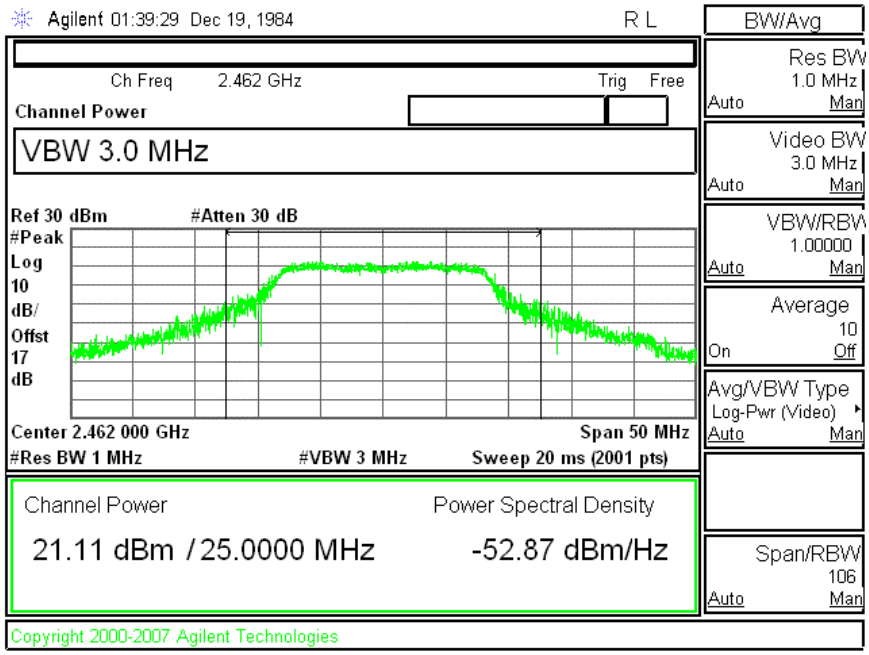
OUTPUT POWER HIGH CH, CHAIN 1



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7.2.4. 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 17 dB (including 16 dB pad and 1 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

Channel	Frequency (MHz)	Chain 0 Power (dBm)	Chain 1 Power (dBm)	Total Power (dBm)
Low	2412	16.27	15.23	18.79
Middle	2437	21.29	21.35	24.33
High	2462	15.83	15.91	18.88

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7.2.5. POWER SPECTRAL DENSITY

LIMITS

FCC §15.247 (e)

IC RSS-210 A8.2 (b)

The power spectral density conducted from the transmitter to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

TEST PROCEDURE

Output power was measured based on the use of a peak measurement, therefore the power spectral density was measured using PSD Option 1 in accordance with FCC document "Measurement of Digital Transmission Systems Operating under Section 15.247", March 23, 2005.

RESULTS

Channel	Frequency (MHz)	PSD with Combiner (dBm)	Limit (dBm)	Margin (dB)
Low	2412	-0.70	8	-8.70
Middle	2437	3.98	8	-4.02
High	2462	-1.79	8	-9.79

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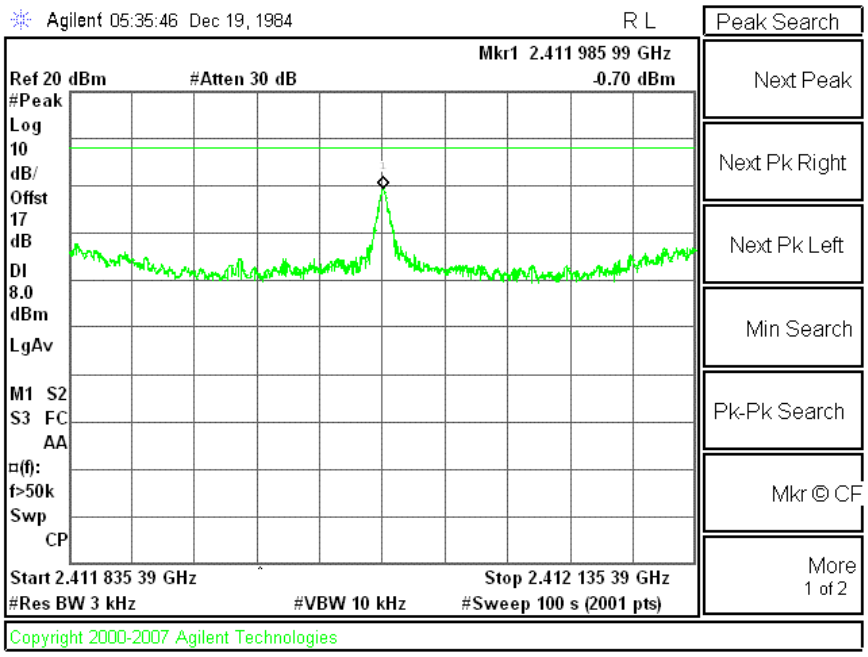
POWER SPECTRAL DENSITY, WITH COMBINER

PSD LOW CH, WITH COMBINER



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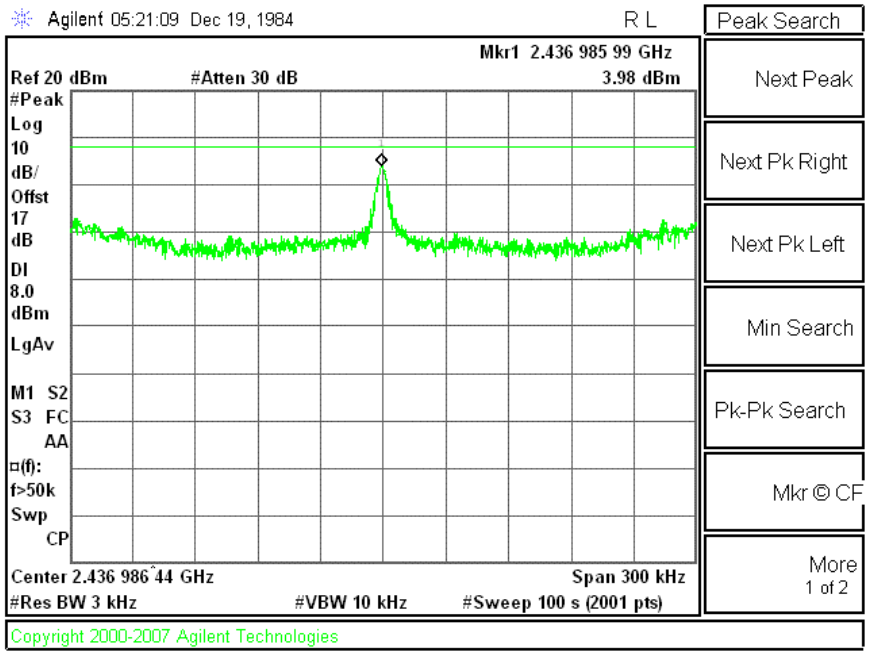
PSD MID CH, WITH COMBINER



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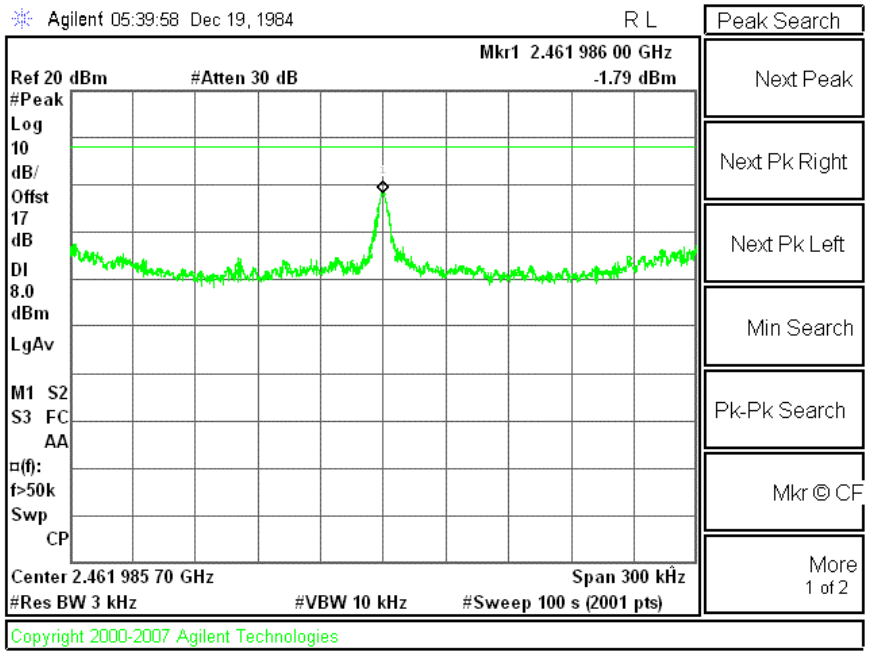
PSD HIGH CH, WITH COMBINER



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7.2.6. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.247 (d)

IC RSS-210 A8.5

Output power was measured based on the use of a peak measurement, therefore the required attenuation is 20 dB.

TEST PROCEDURE

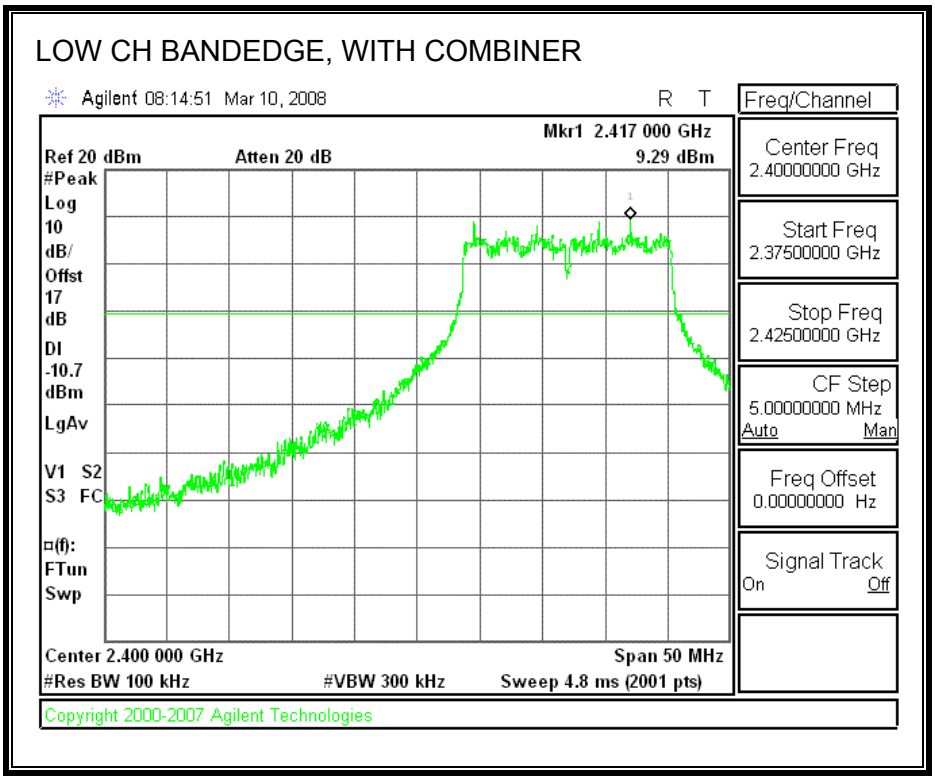
The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

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

RESULTS

This report shall not be reproduced except in full, without the written approval of CCS.

SPURIOUS EMISSIONS WITH COMBINER



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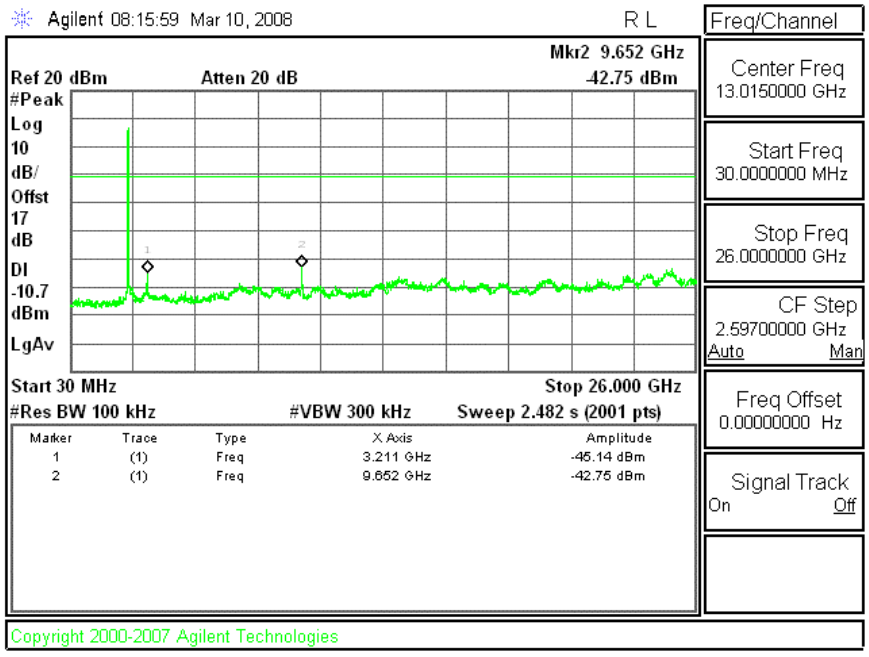
LOW CH SPURIOUS, WITH COMBINER



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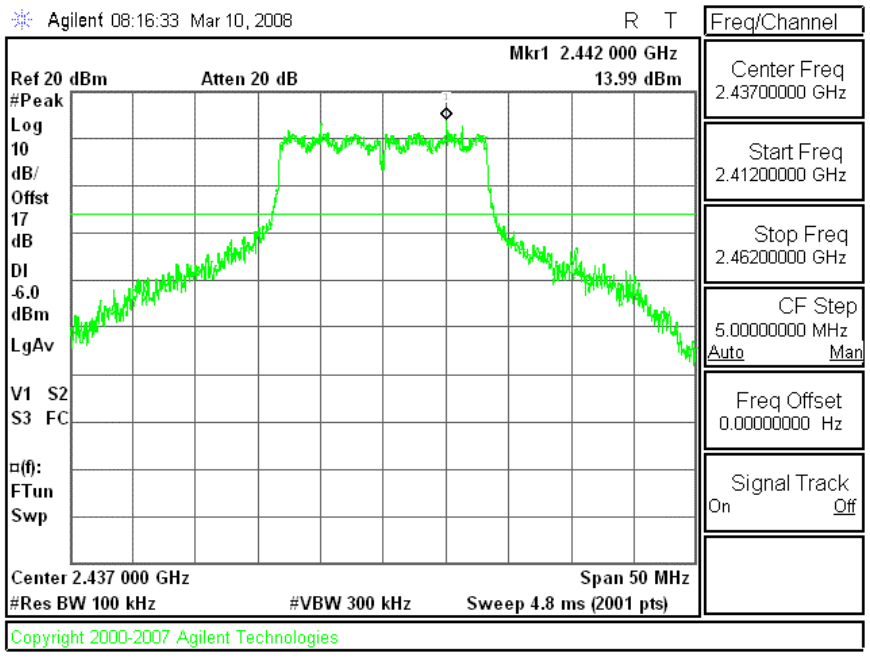
MID CH REFERENCE, WITH COMBINER



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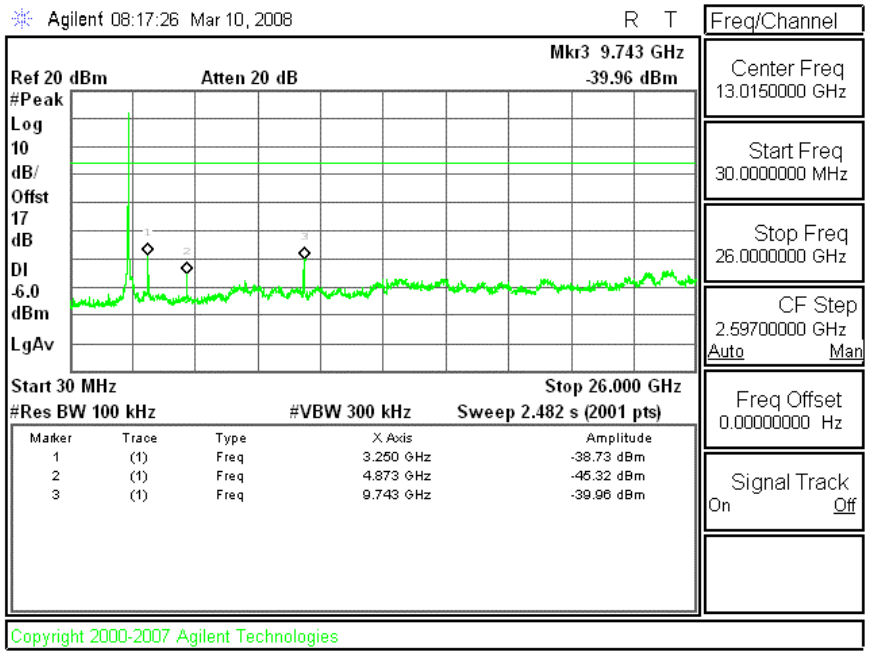
MID CH SPURIOUS, WITH COMBINER



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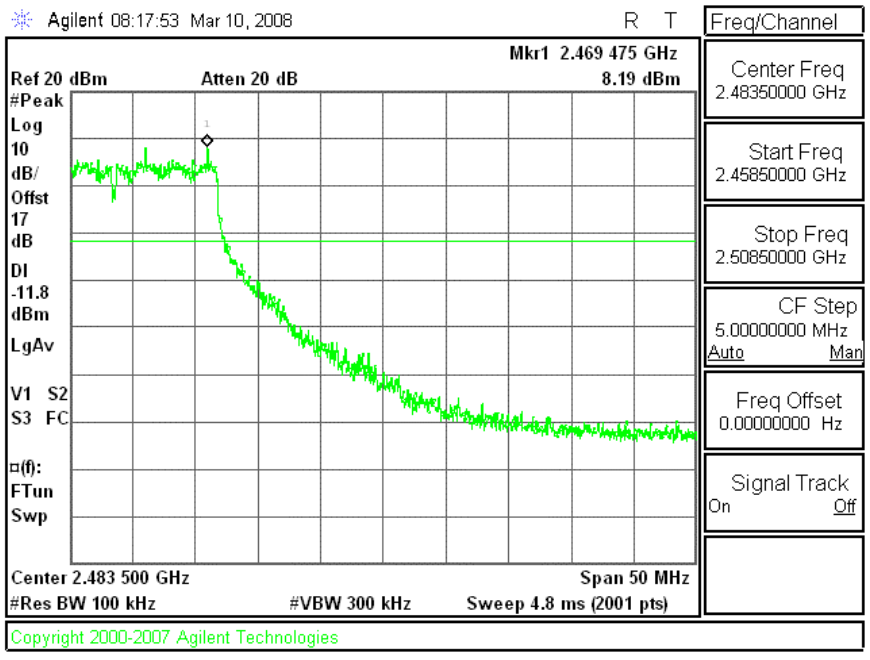
HIGH CH BANDEDGE, WITH COMBINER



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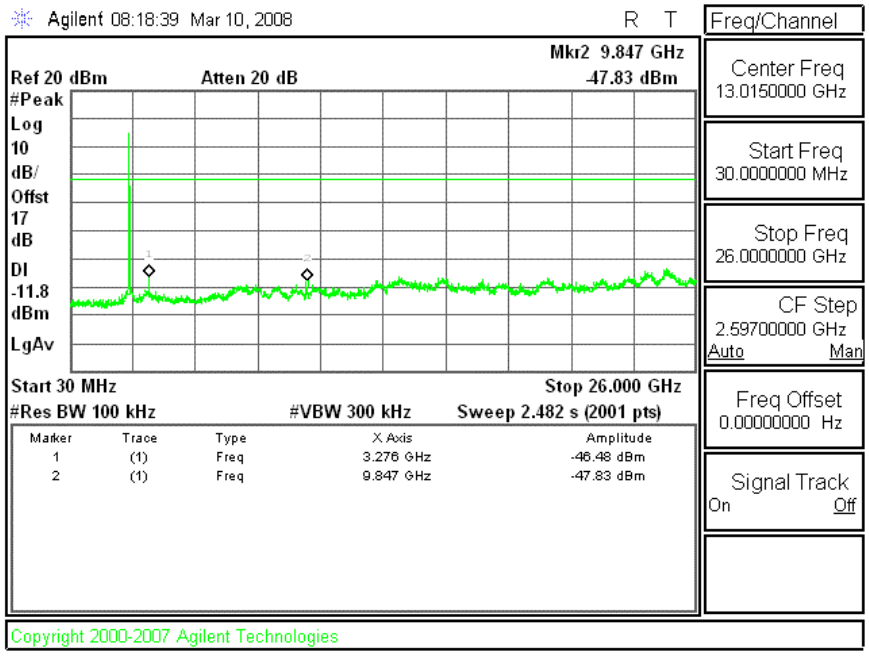
HIGH CH SPURIOUS, WITH COMBINER



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7.3. 802.11n HT20 MODE IN THE 2.4 GHz BAND

7.3.1. 6 dB BANDWIDTH

LIMITS

FCC §15.247 (a) (2)

IC RSS-210 A8.2 (a)

The minimum 6 dB bandwidth shall be at least 500 kHz.

TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The RBW is set to 100 kHz and the VBW is set to 300 kHz. The sweep time is coupled.

RESULTS

Channel	Frequency (MHz)	Chain 1 (MHz)	Minimum Limit (MHz)
Middle	2437	17.592	0.5

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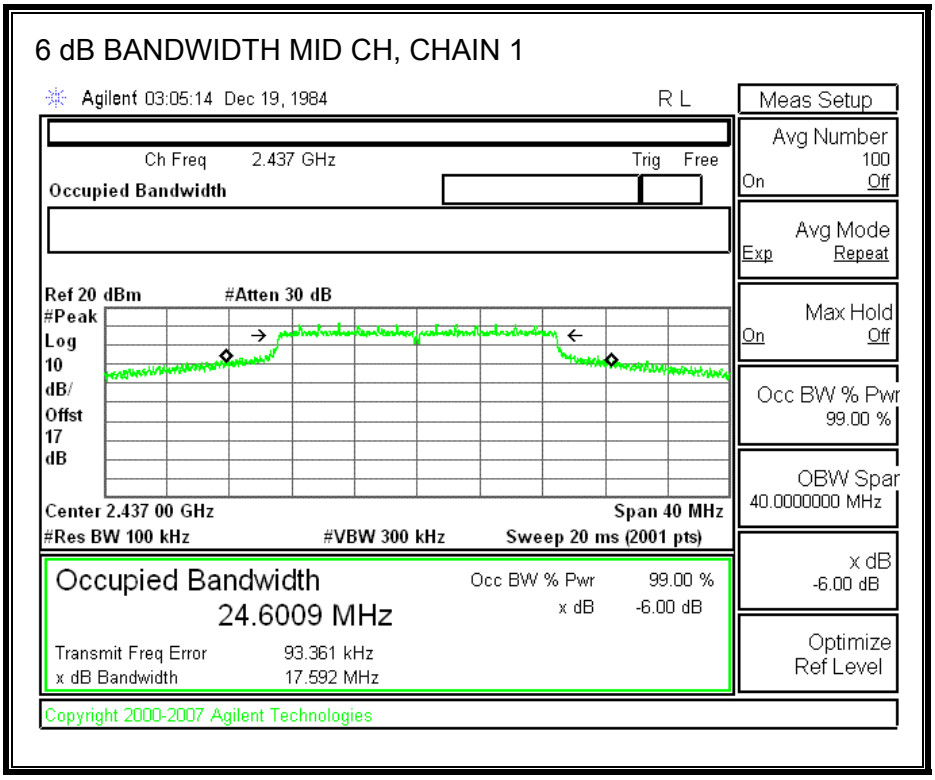

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7.3.2. 99% BANDWIDTH

LIMITS

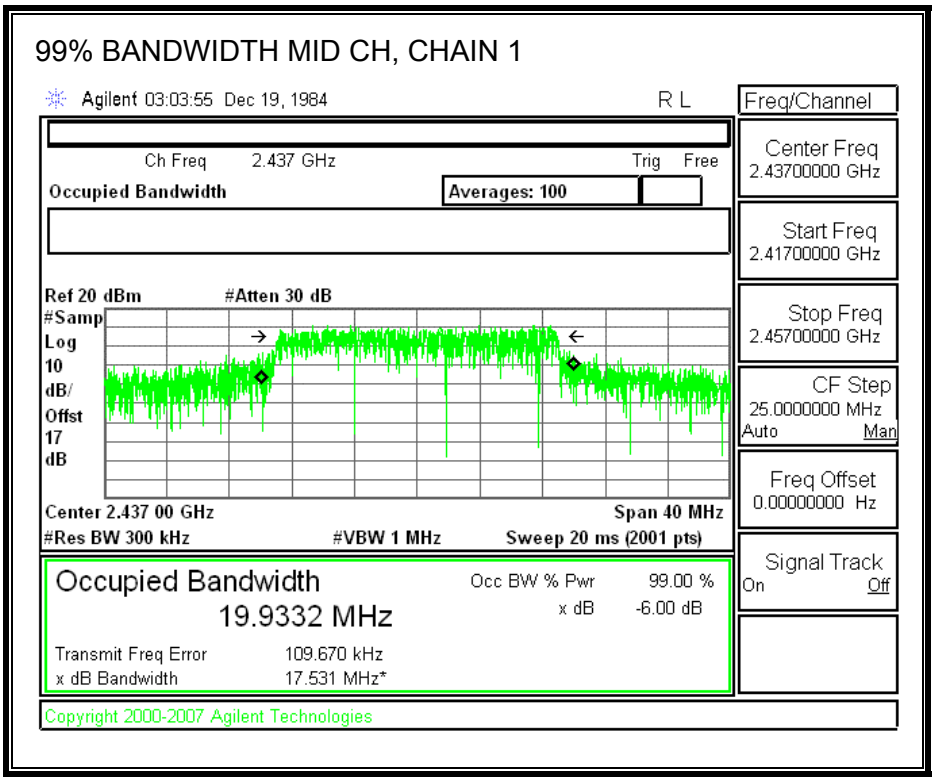
None; for reporting purposes only.

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 function is utilized.

RESULTS

Channel	Frequency (MHz)	Chain 1 (MHz)
Middle	2437	19.9332



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7.3.3. OUTPUT POWER

LIMITS

FCC §15.247 (b)

IC RSS-210 A8.4

The maximum antenna gain is less than or equal to 6 dBi, therefore the limit is 30 dBm.

TEST PROCEDURE

Peak power is measured using the spectrum analyzer's internal channel power integration function. Power is integrated over a bandwidth greater than or equal to the 99% bandwidth.

RESULTS

Channel	Frequency (MHz)	Limit (dBm)	Chain 0 Power (dBm)	Chain 1 Power (dBm)	Total Power (dBm)	Margin (dB)
Low	2412	30.00	20.64	19.79	23.25	-6.75
Mid	2437	30.00	26.50	26.55	29.54	-0.46
High	2462	30.00	18.43	18.72	21.59	-8.41

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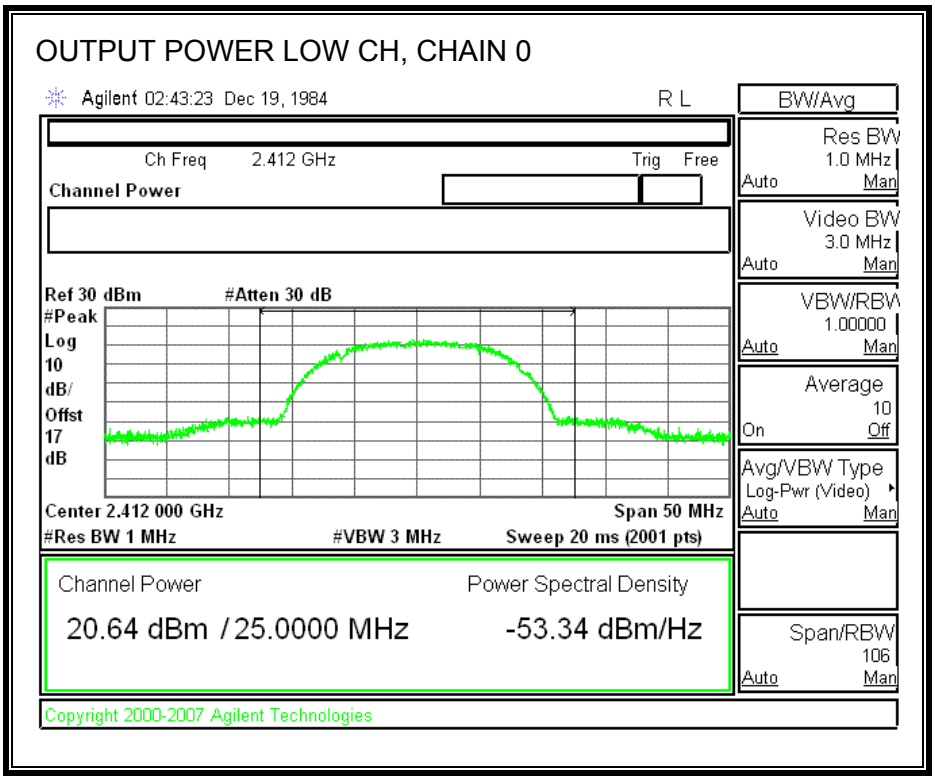
CHAIN 0 OUTPUT POWER



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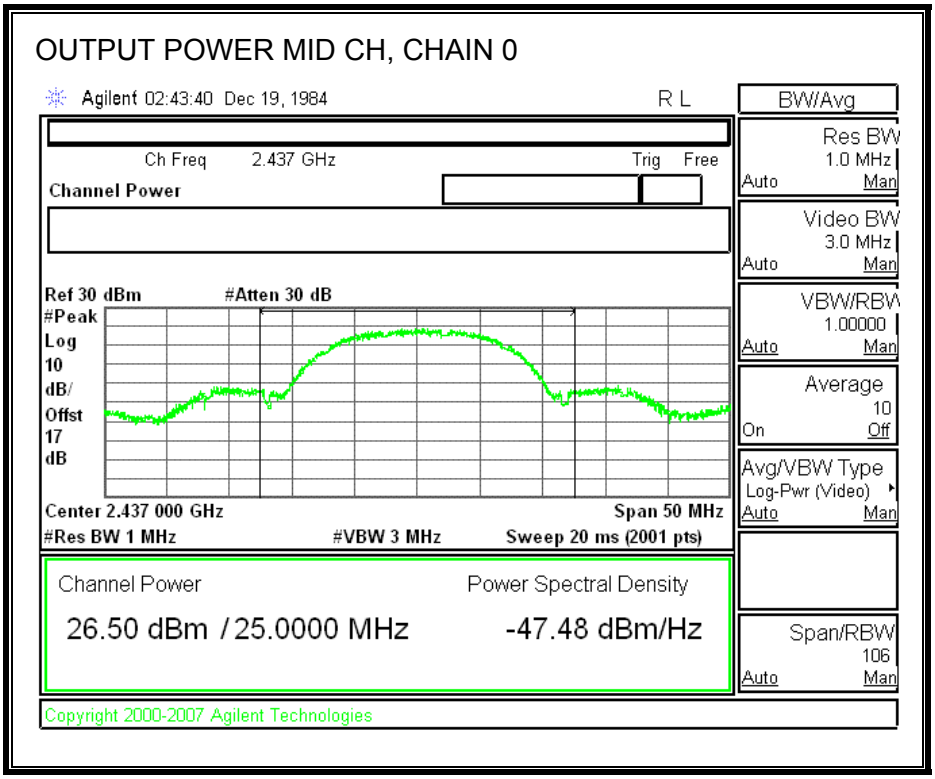

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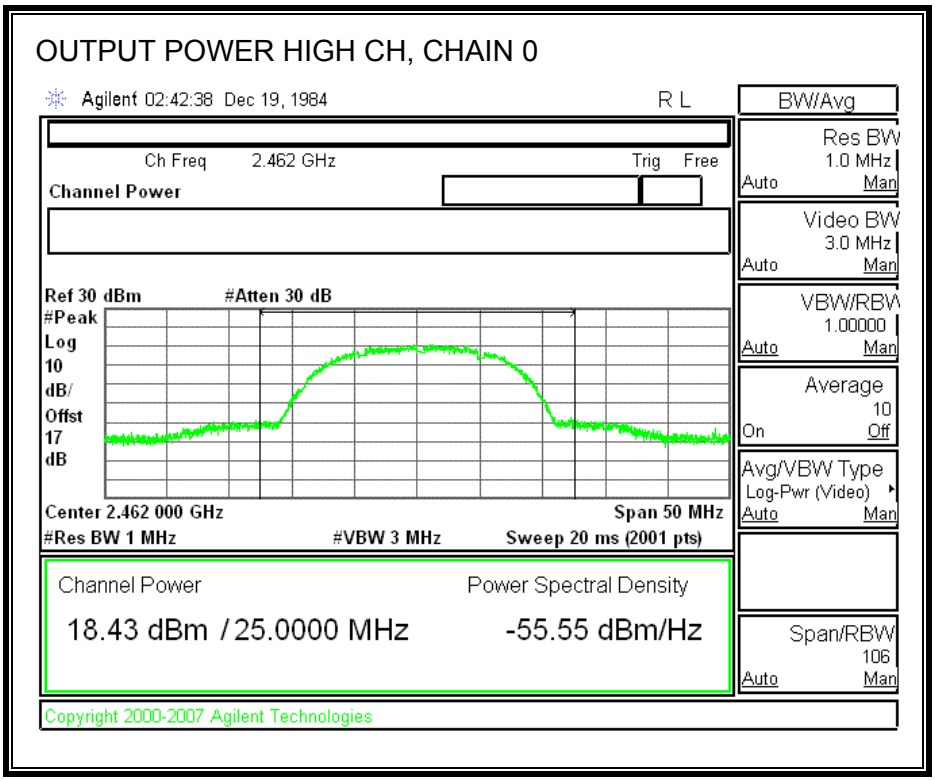

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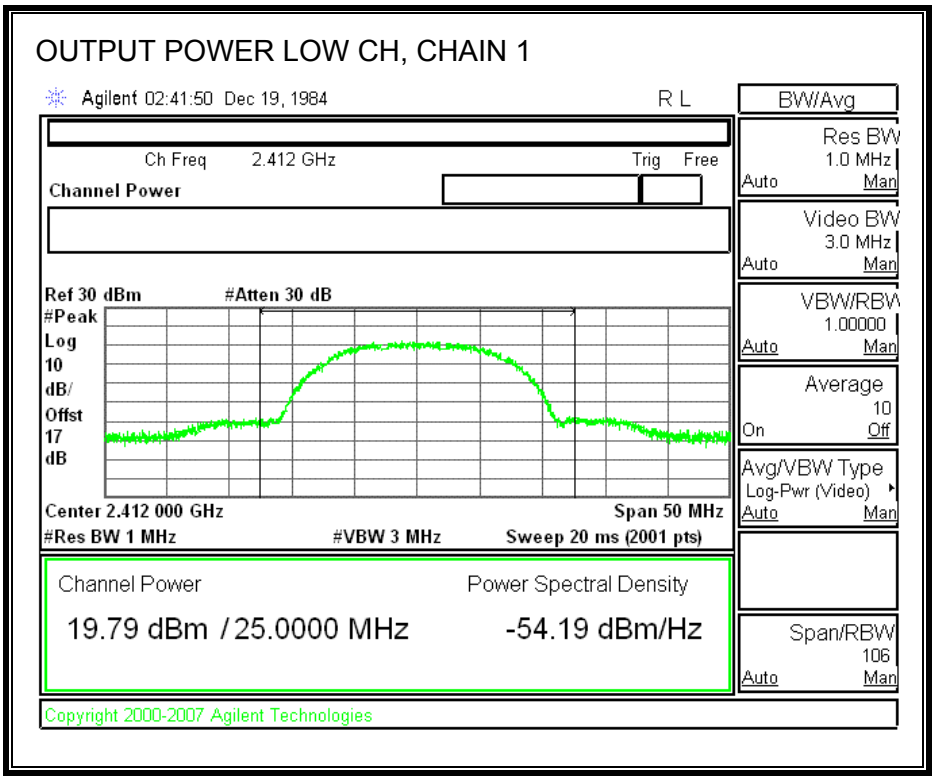
CHAIN 1 OUTPUT POWER



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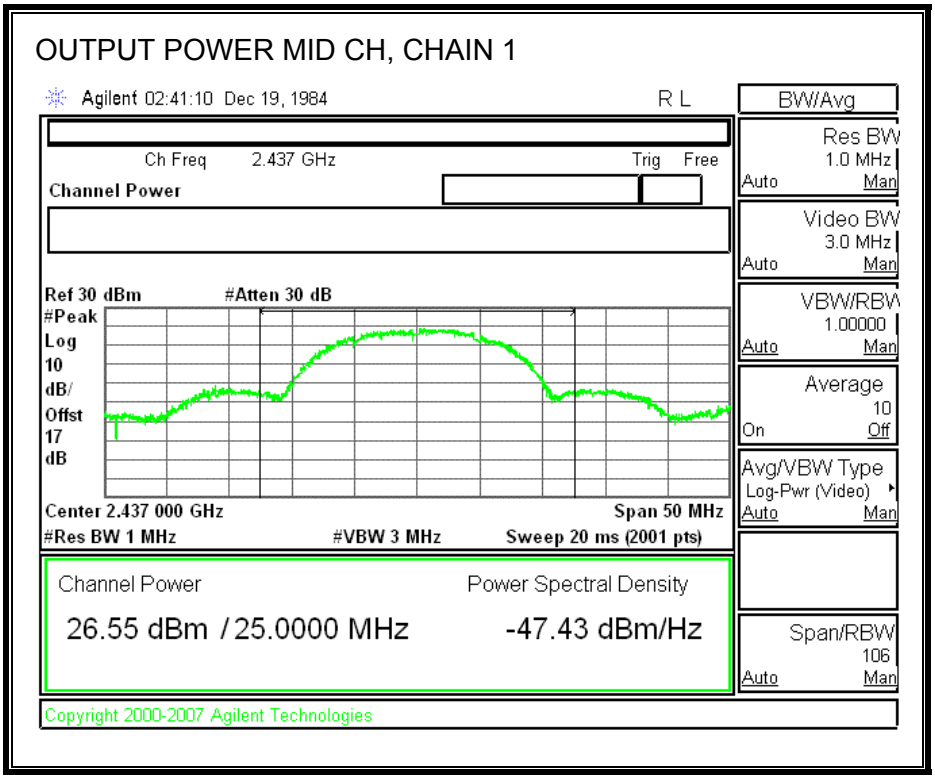

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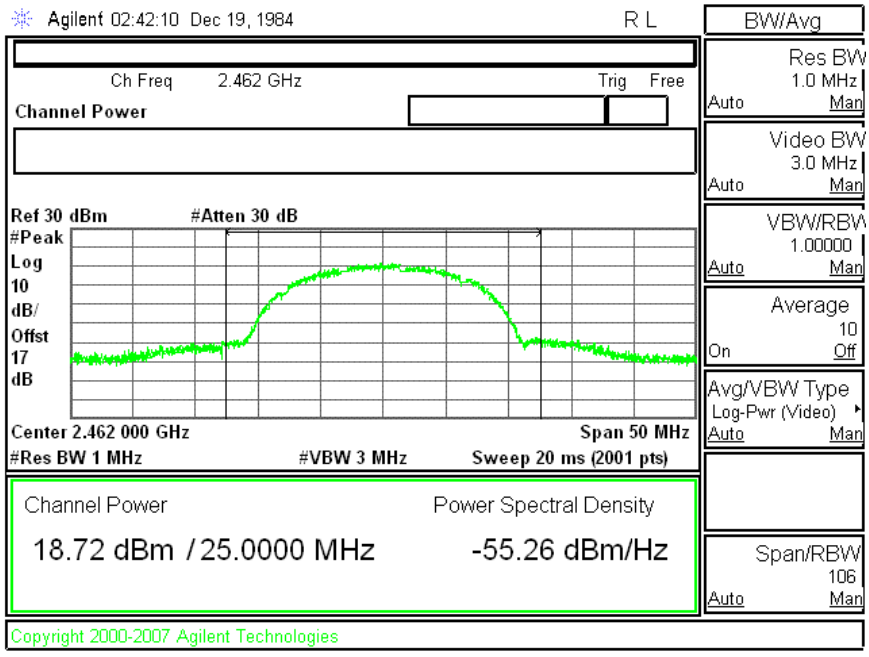
OUTPUT POWER HIGH CH, CHAIN 1



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7.3.4. 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 17 dB (including 16 dB pad and 1 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

Channel	Frequency (MHz)	Chain 0 Power (dBm)	Chain 1 Power (dBm)	Total Power (dBm)
Low	2412	15.99	15.47	18.75
Middle	2437	21.96	22.01	25.00
High	2462	14.09	14.11	17.11

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7.3.5. POWER SPECTRAL DENSITY

LIMITS

FCC §15.247 (e)

IC RSS-210 A8.2 (b)

The power spectral density conducted from the transmitter to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

TEST PROCEDURE

Output power was measured based on the use of a peak measurement, therefore the power spectral density was measured using PSD Option 1 in accordance with FCC document "Measurement of Digital Transmission Systems Operating under Section 15.247", March 23, 2005.

RESULTS

Channel	Frequency (MHz)	PSD with Combiner (dBm)	Limit (dBm)	Margin (dB)
Low	2412	-0.16	8	-8.16
Middle	2437	6.39	8	-1.61
High	2462	-0.59	8	-8.59

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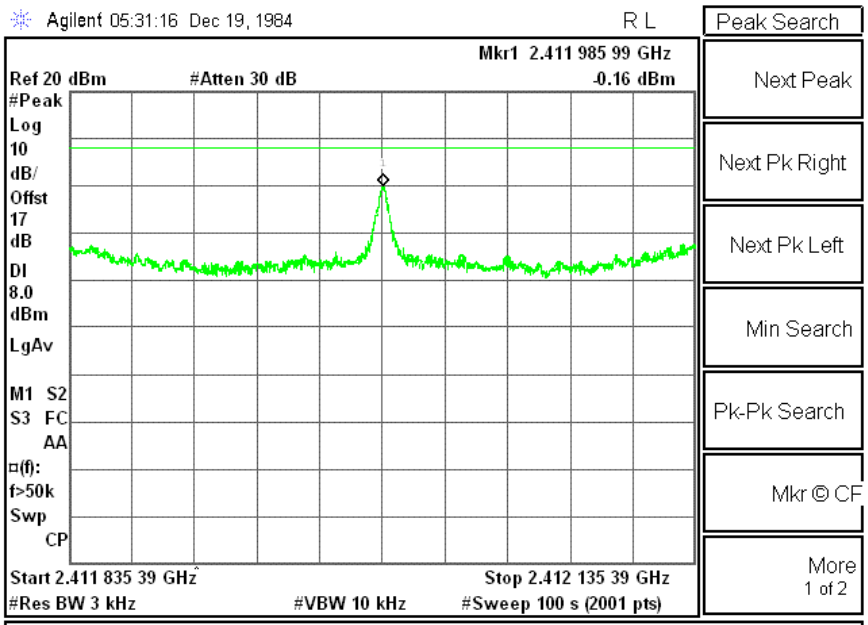
POWER SPECTRAL DENSITY, WITH COMBINER

PSD LOW CH, WITH COMBINER



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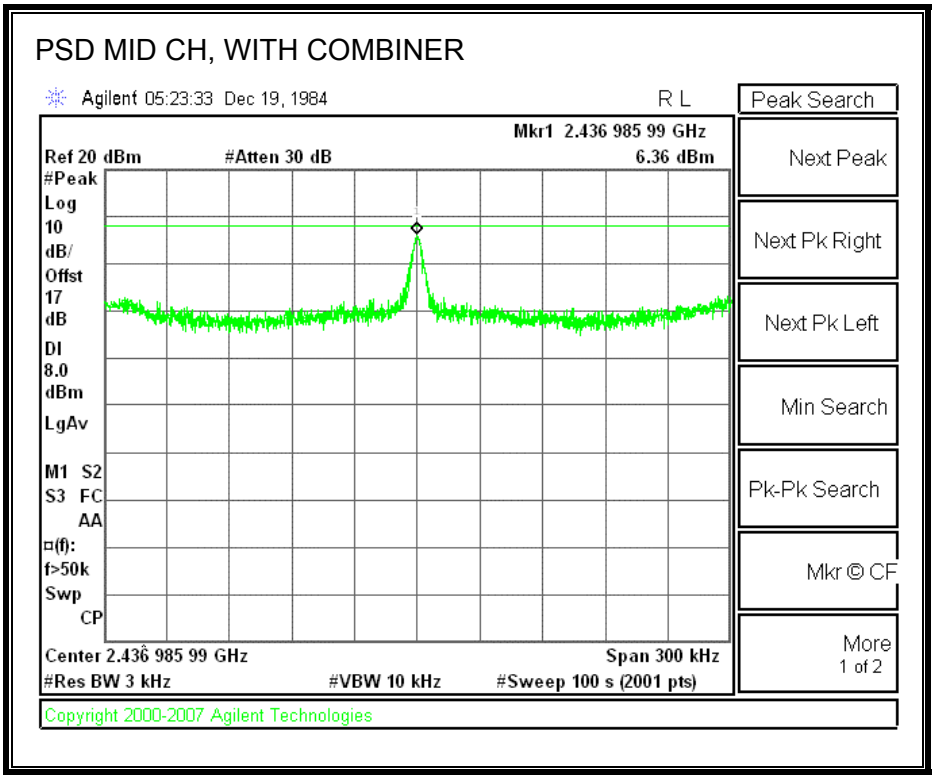
PSD MID CH, WITH COMBINER



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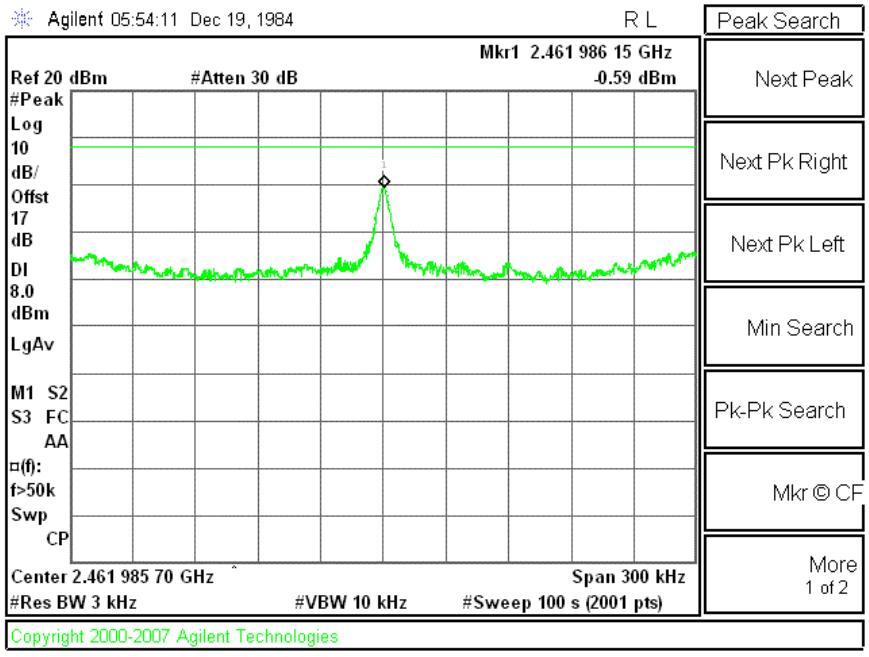
PSD HIGH CH, WITH COMBINER



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7.3.6. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.247 (d)

IC RSS-210 A8.5

Output power was measured based on the use of a peak measurement, therefore the required attenuation is 20 dB.

TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

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

RESULTS

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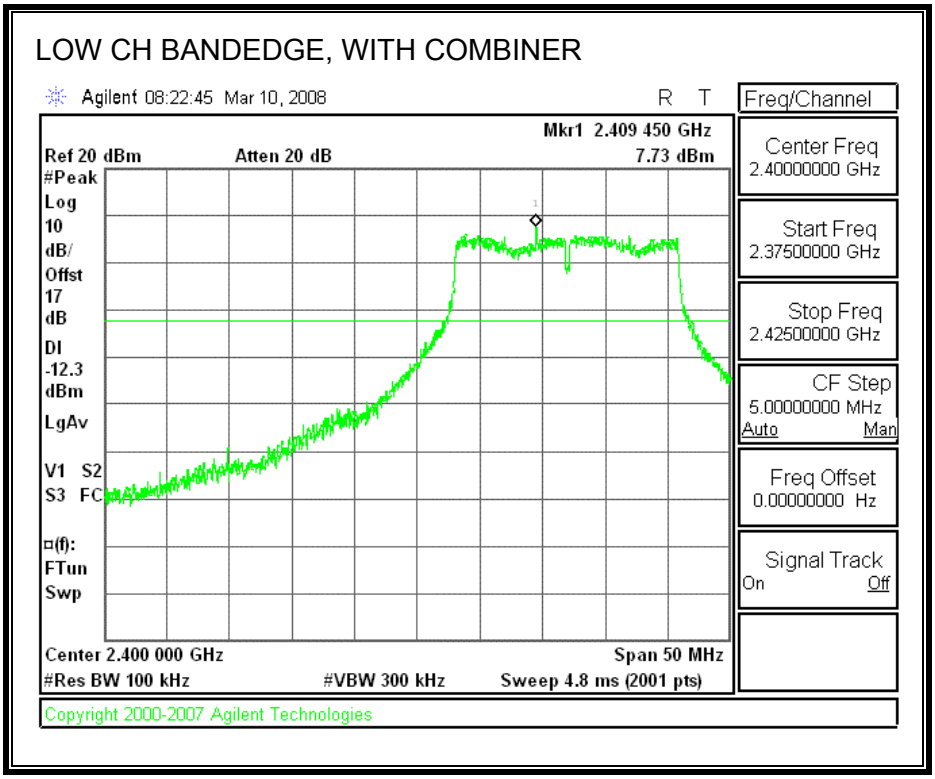
SPURIOUS EMISSIONS WITH COMBINER



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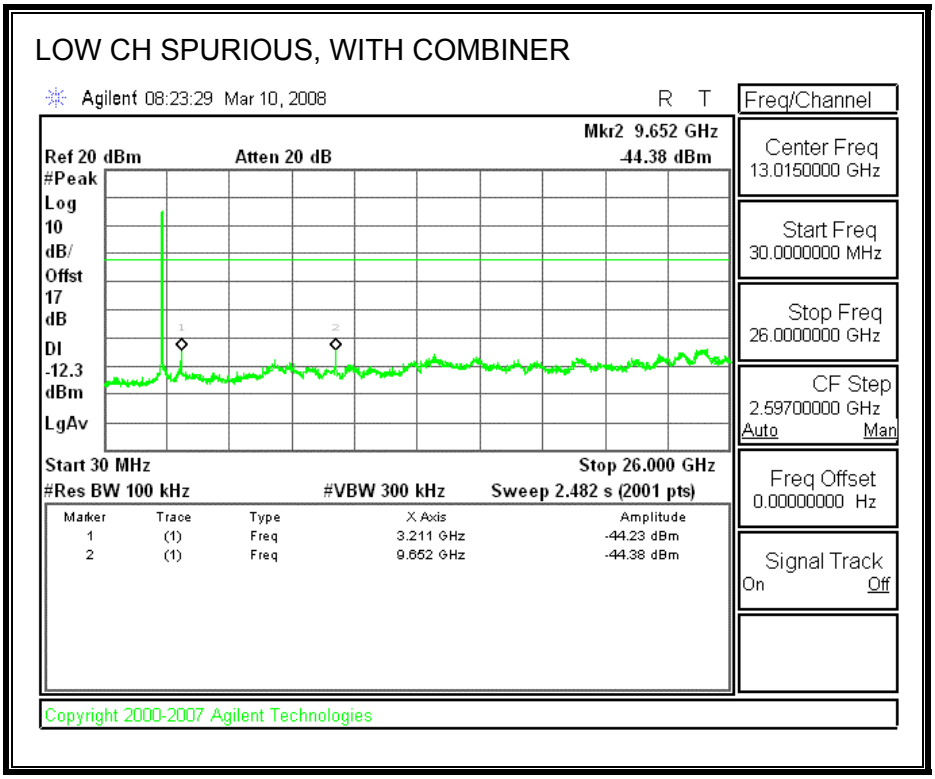
LOW CH SPURIOUS, WITH COMBINER



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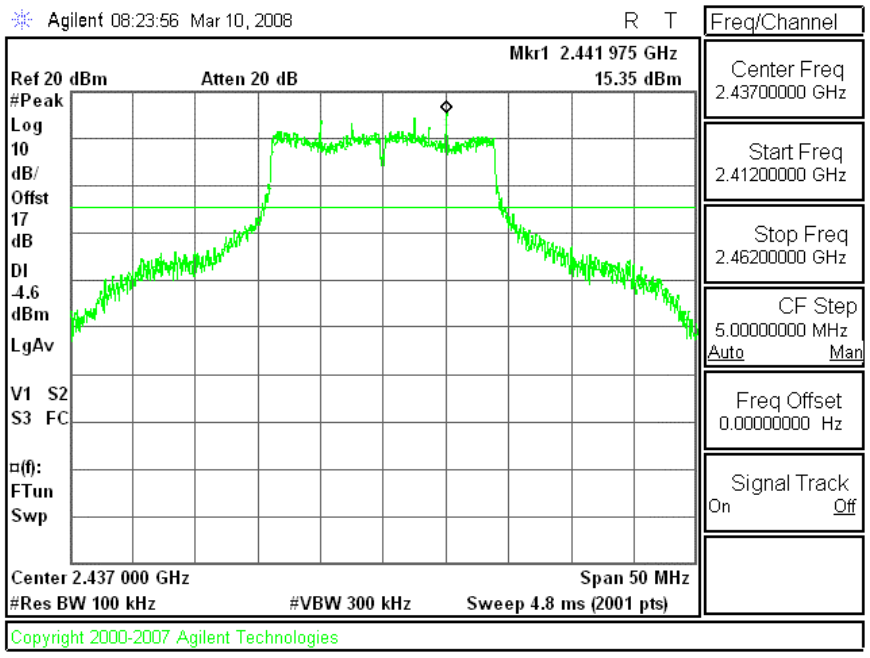
MID CH REFERENCE, WITH COMBINER



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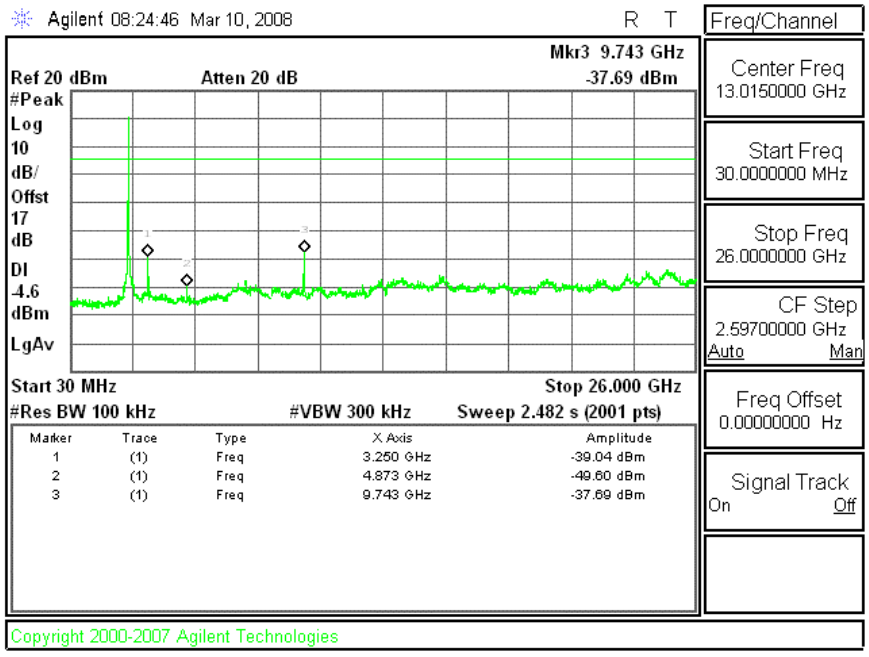
MID CH SPURIOUS, WITH COMBINER



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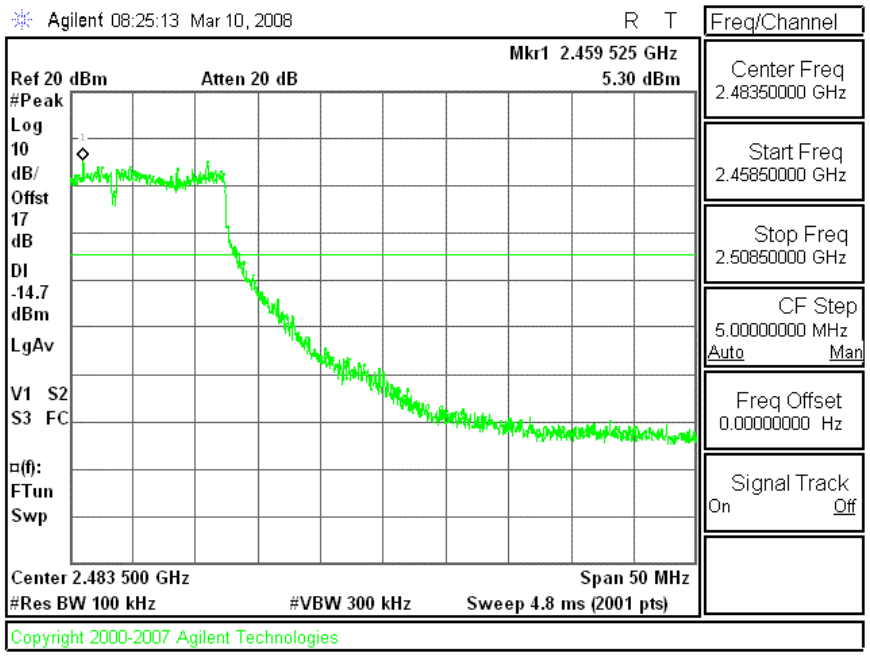
HIGH CH BANDEDGE, WITH COMBINER



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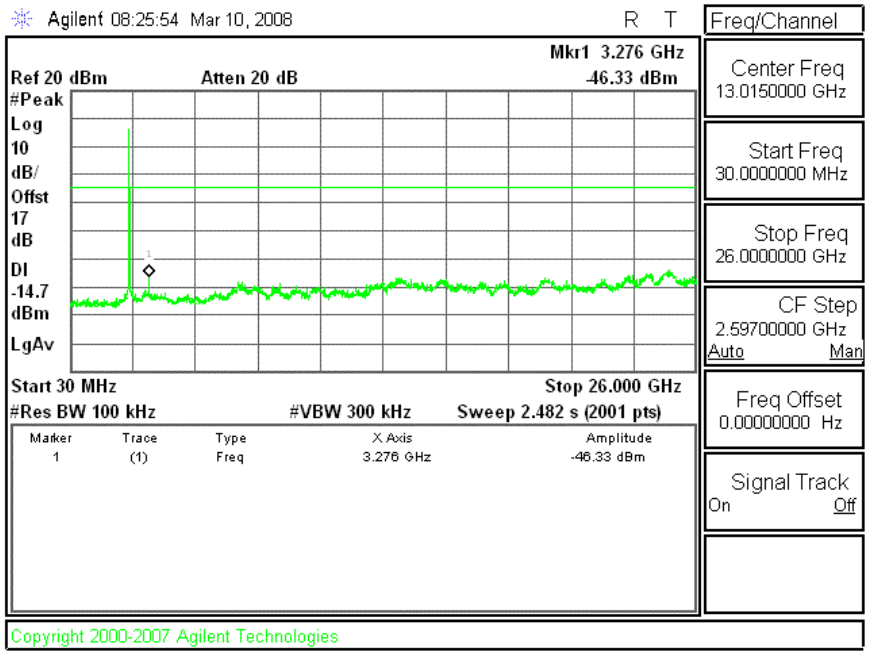
HIGH CH SPURIOUS, WITH COMBINER



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7.4. 802.11n HT40 MODE IN THE 2.4 GHz BAND

7.4.1. 6 dB BANDWIDTH

LIMITS

FCC §15.247 (a) (2)

IC RSS-210 A8.2 (a)

The minimum 6 dB bandwidth shall be at least 500 kHz.

TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The RBW is set to 100 kHz and the VBW is set to 300 kHz. The sweep time is coupled.

RESULTS

Channel	Frequency (MHz)	Chain 1 (MHz)	Minimum Limit (MHz)
Middle	2437	36.342	0.5

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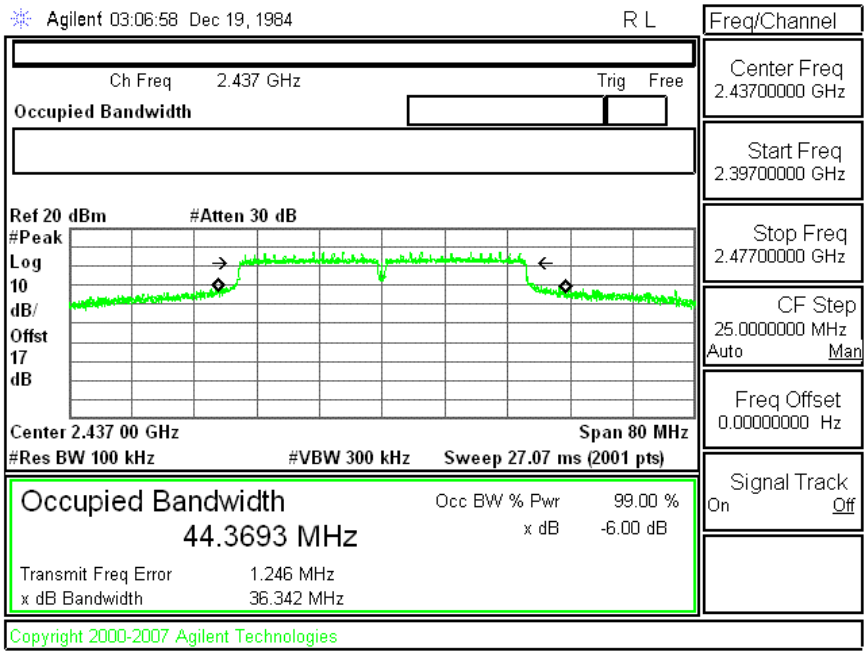
6 dB BANDWIDTH MID CH, CHAIN 1



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7.4.2. 99% BANDWIDTH

LIMITS

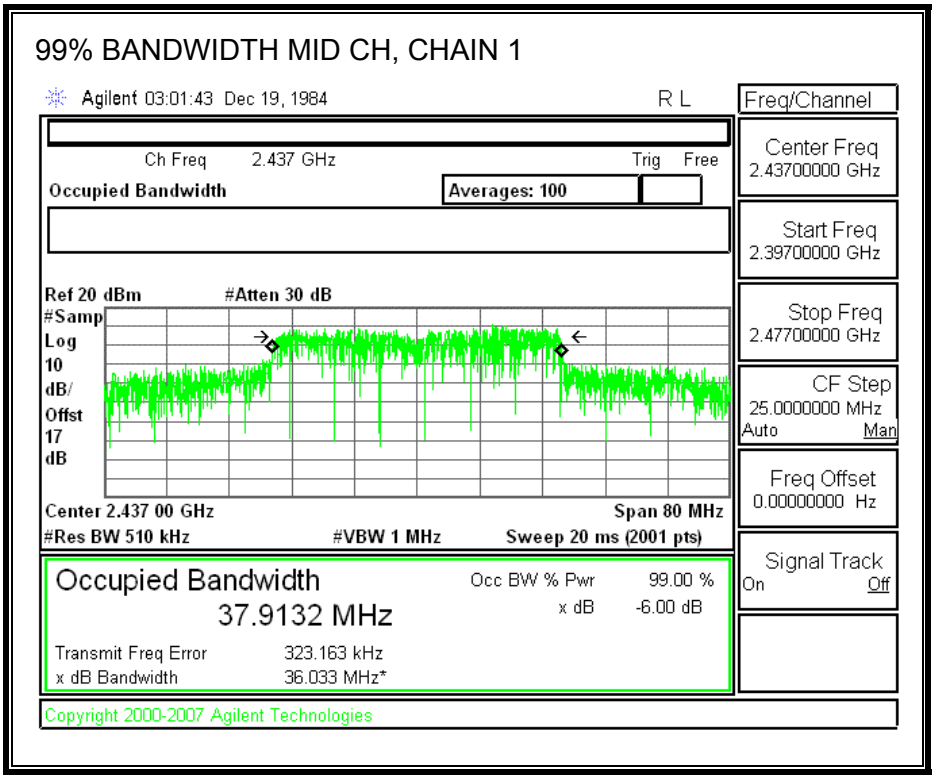
None; for reporting purposes only.

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 function is utilized.

RESULTS

Channel	Frequency (MHz)	Chain 1 (MHz)
Middle	2437	37.9132



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7.4.3. OUTPUT POWER

LIMITS

FCC §15.247 (b)

IC RSS-210 A8.4

The maximum antenna gain is less than or equal to 6 dBi, therefore the limit is 30 dBm.

TEST PROCEDURE

Peak power is measured using the spectrum analyzer's internal channel power integration function. Power is integrated over a bandwidth greater than or equal to the 99% bandwidth.

RESULTS

Channel	Frequency (MHz)	Limit (dBm)	Chain 0 Power (dBm)	Chain 1 Power (dBm)	Total Power (dBm)	Margin (dB)
Low	2422	30.00	17.87	17.69	20.79	-9.21
Mid	2437	30.00	21.58	22.21	24.92	-5.08
High	2452	30.00	17.82	17.93	20.89	-9.11

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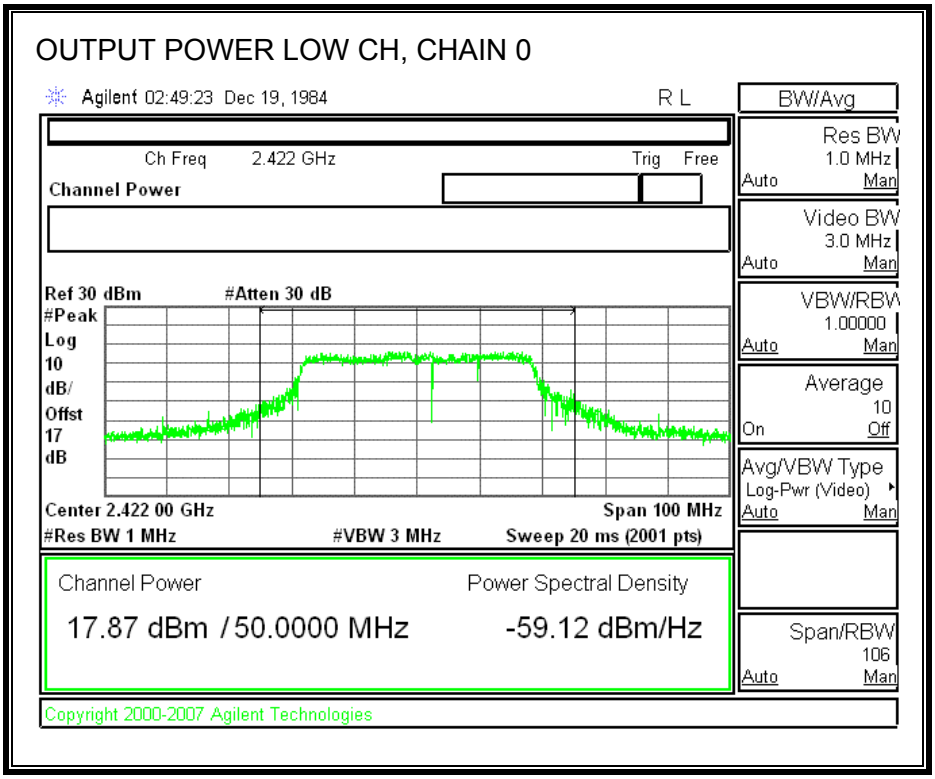
CHAIN 0 OUTPUT POWER



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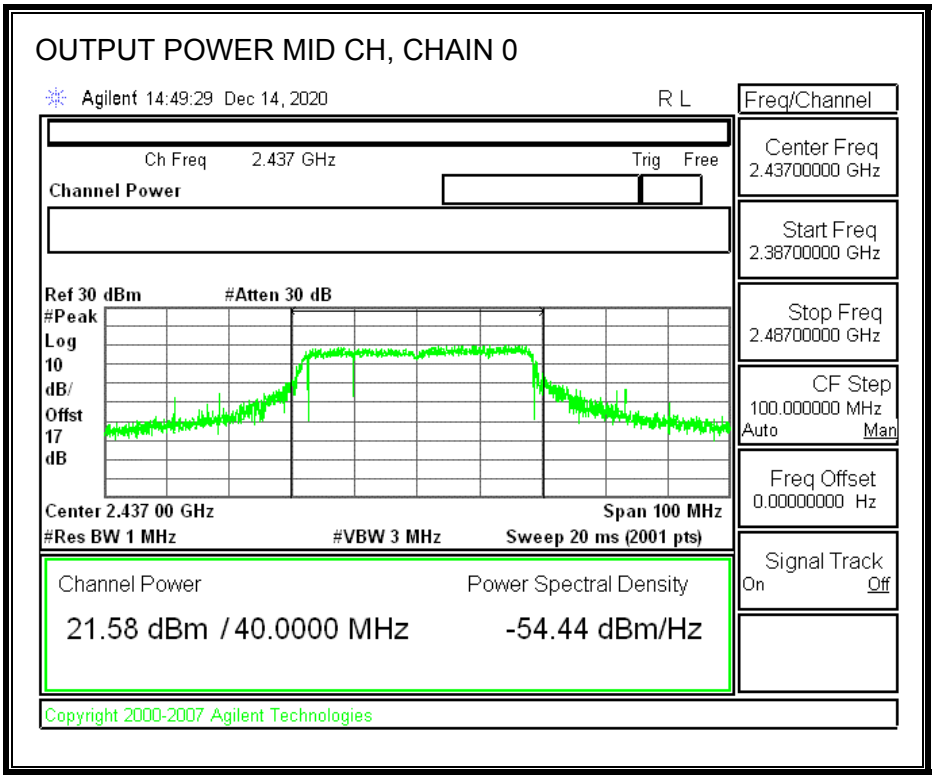

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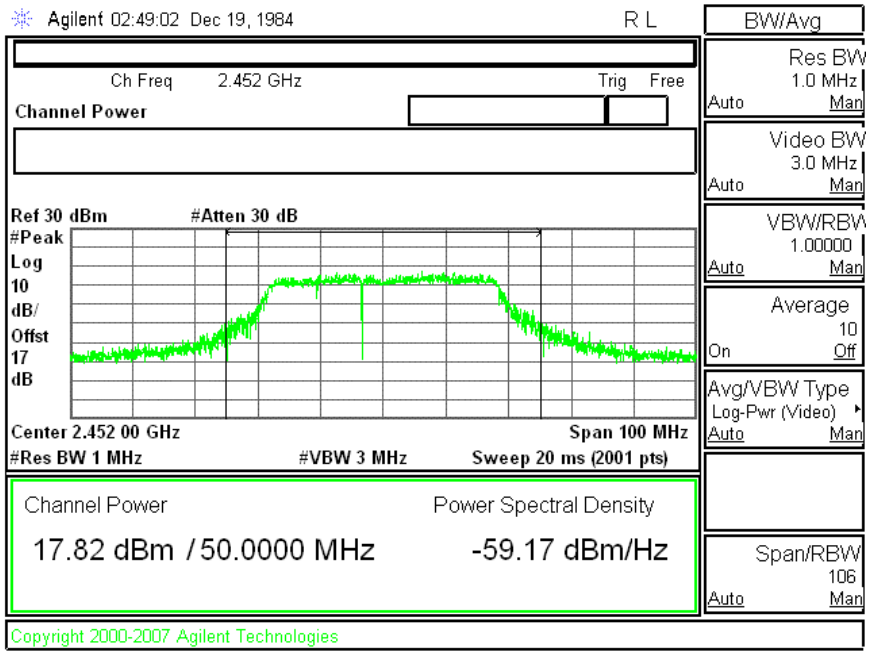
OUTPUT POWER HIGH CH, CHAIN 0



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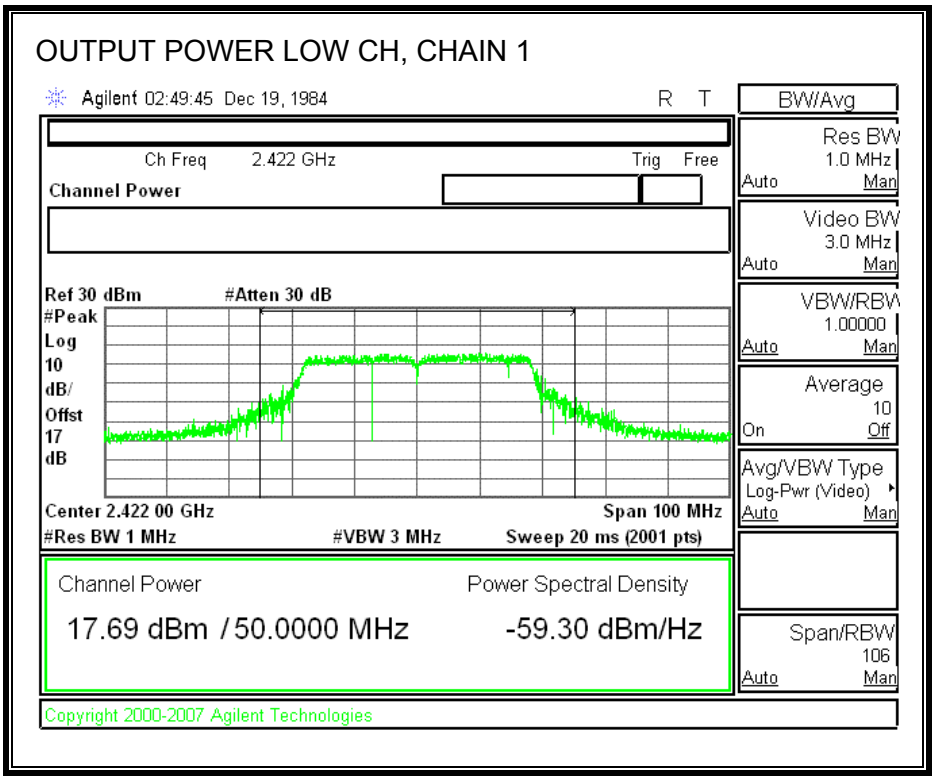
CHAIN 1 OUTPUT POWER



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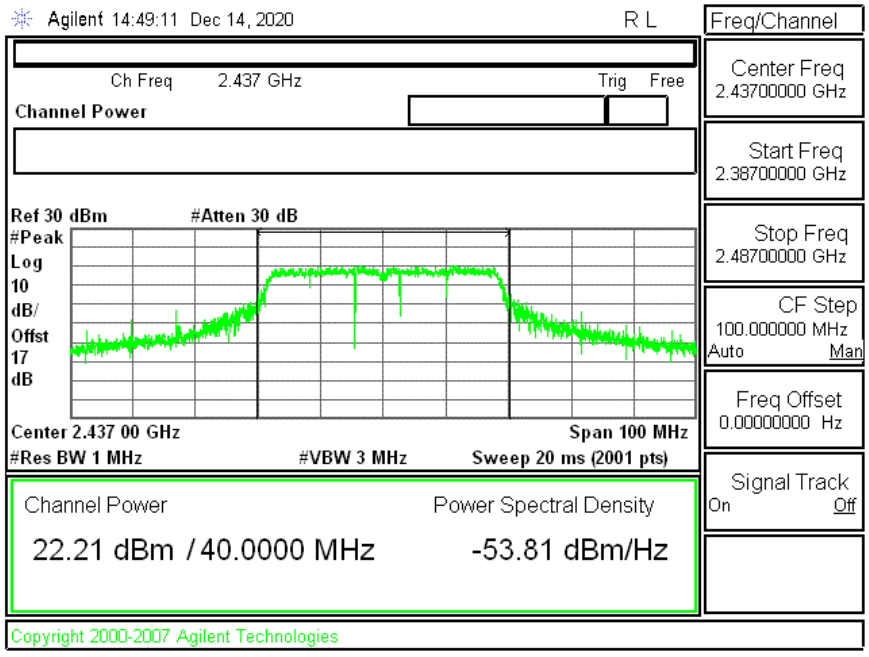
OUTPUT POWER MID CH, CHAIN 1



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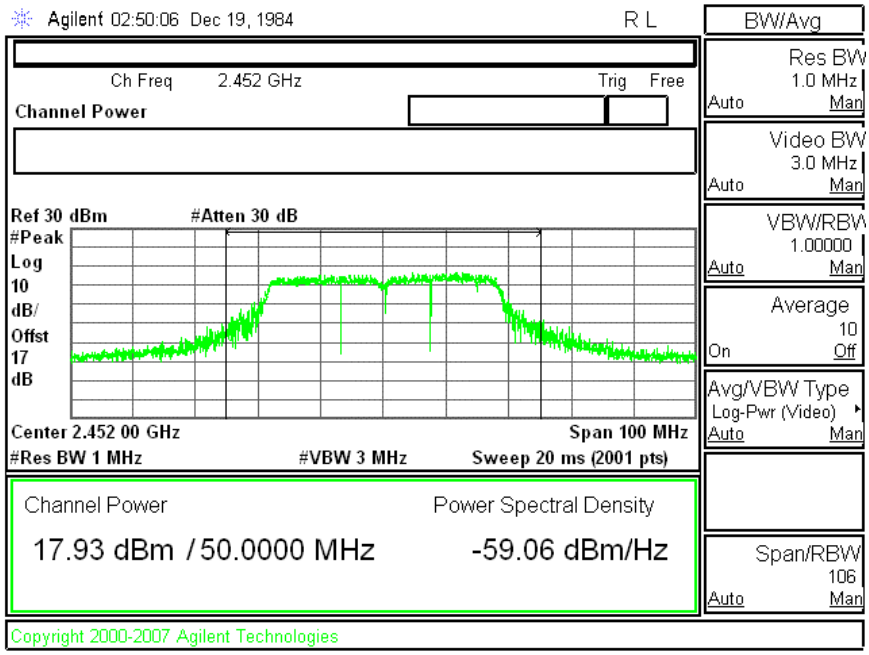
OUTPUT POWER HIGH CH, CHAIN 1



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7.4.4. 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 17 dB (including 16 dB pad and 1 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

Channel	Frequency (MHz)	Chain 0 Power (dBm)	Chain 1 Power (dBm)	Total Power (dBm)
Low	2422	12.49	12.23	15.37
Middle	2437	16.15	16.91	19.56
High	2452	12.76	12.80	15.79

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7.4.5. POWER SPECTRAL DENSITY

LIMITS

FCC §15.247 (e)

IC RSS-210 A8.2 (b)

The power spectral density conducted from the transmitter to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

TEST PROCEDURE

Output power was measured based on the use of a peak measurement, therefore the power spectral density was measured using PSD Option 1 in accordance with FCC document "Measurement of Digital Transmission Systems Operating under Section 15.247", March 23, 2005.

RESULTS

Channel	Frequency (MHz)	PSD with Combiner (dBm)	Limit (dBm)	Margin (dB)
Low	2422	-3.51	8	-11.51
Middle	2437	3.55	8	-4.45
High	2452	-2.40	8	-10.40

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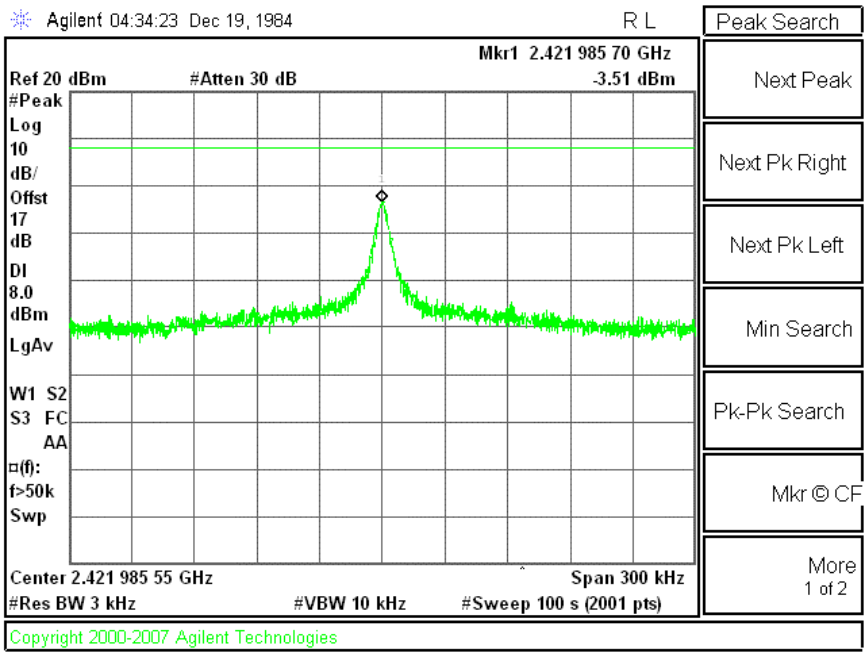
POWER SPECTRAL DENSITY, WITH COMBINER

PSD LOW CH, WITH COMBINER



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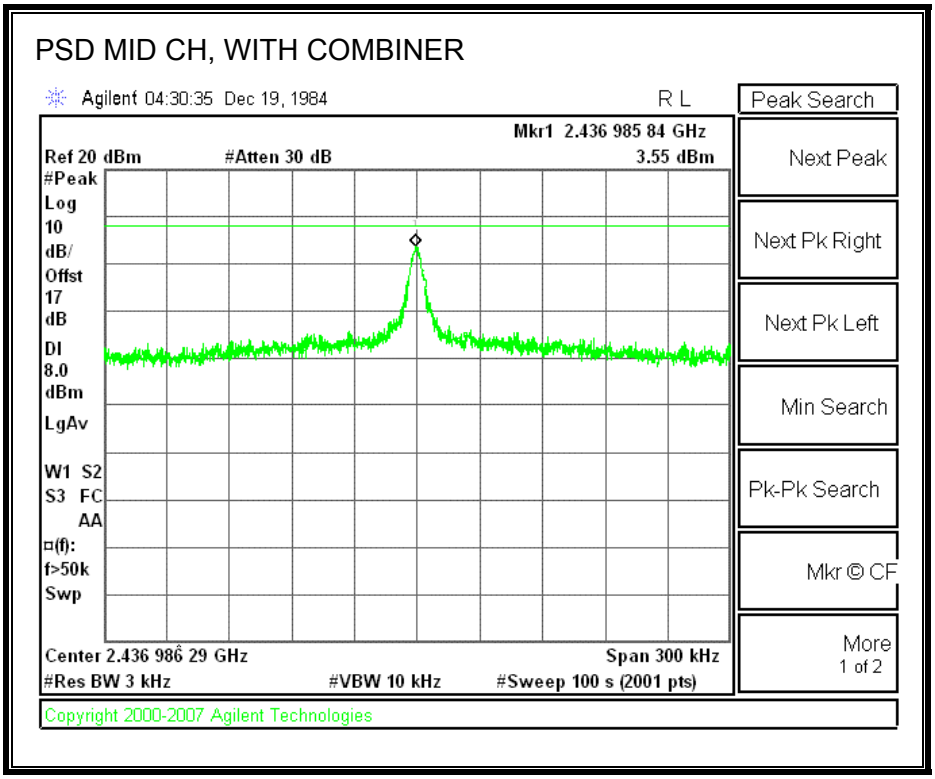
PSD MID CH, WITH COMBINER



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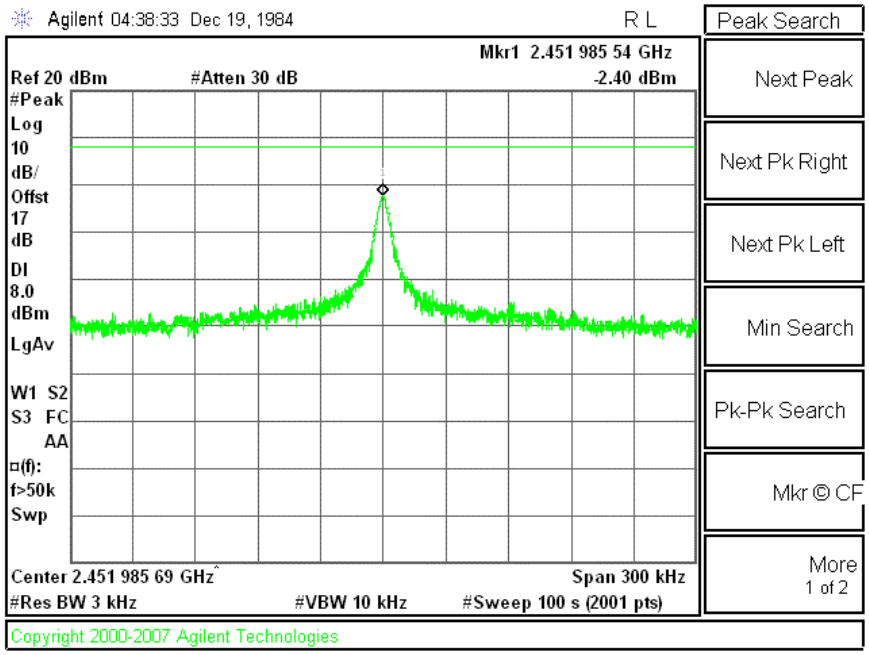
PSD HIGH CH, WITH COMBINER



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7.4.6. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.247 (d)

IC RSS-210 A8.5

Output power was measured based on the use of a peak measurement, therefore the required attenuation is 20 dB.

TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

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

RESULTS

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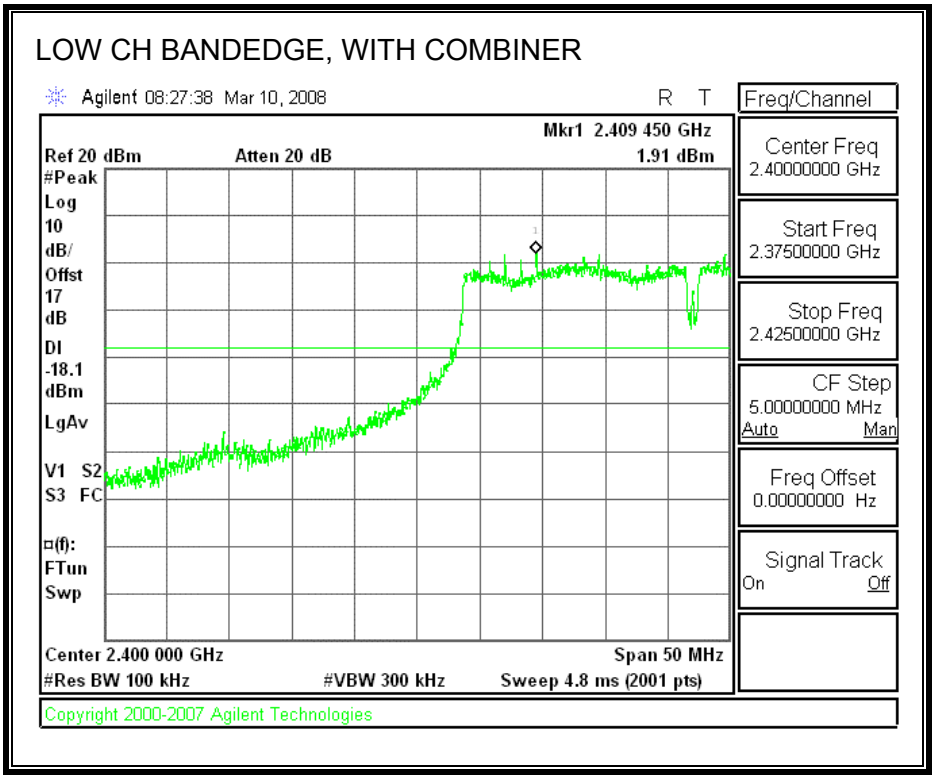
SPURIOUS EMISSIONS WITH COMBINER



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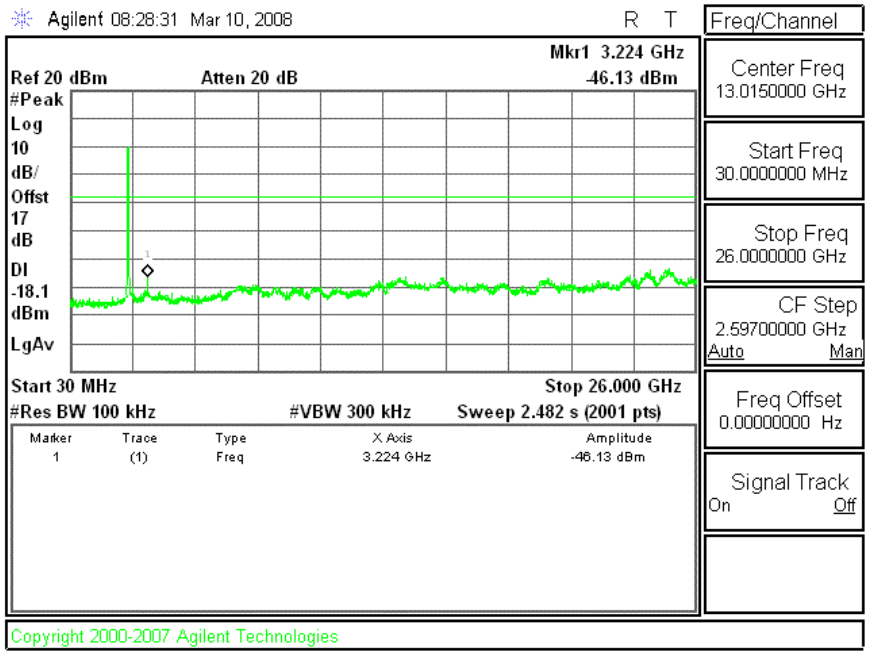
LOW CH SPURIOUS, WITH COMBINER



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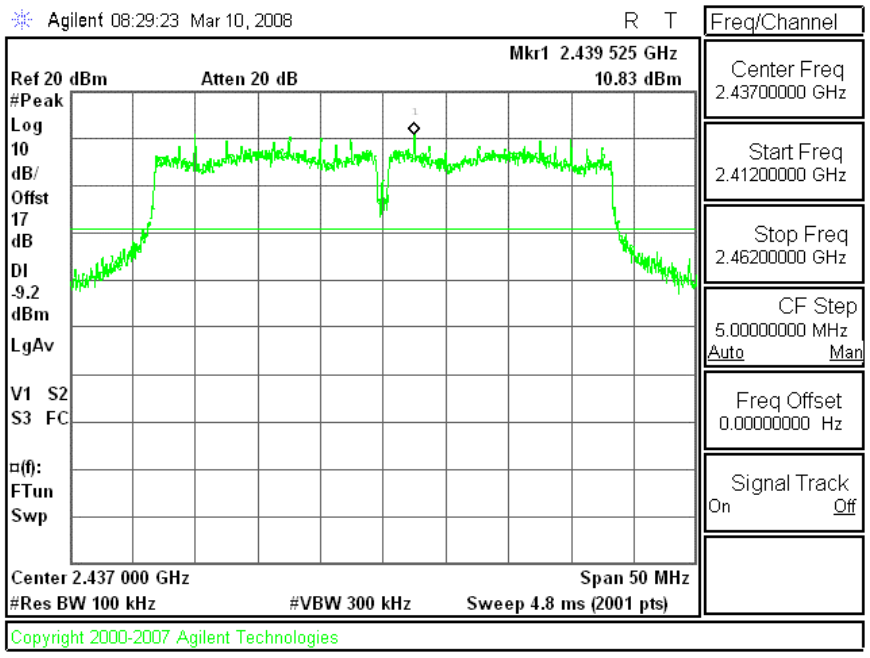
MID CH REFERENCE, WITH COMBINER



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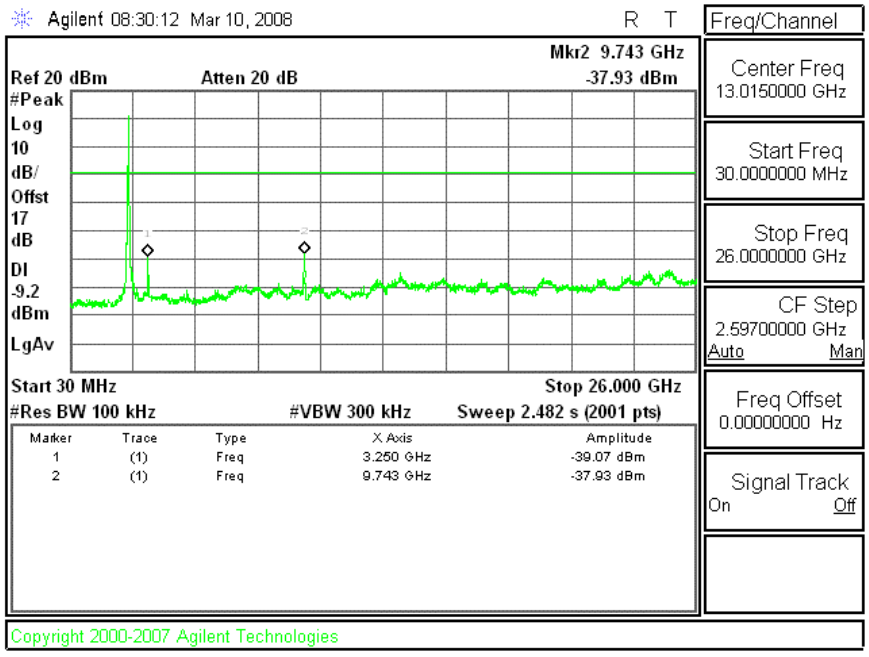
MID CH SPURIOUS, WITH COMBINER



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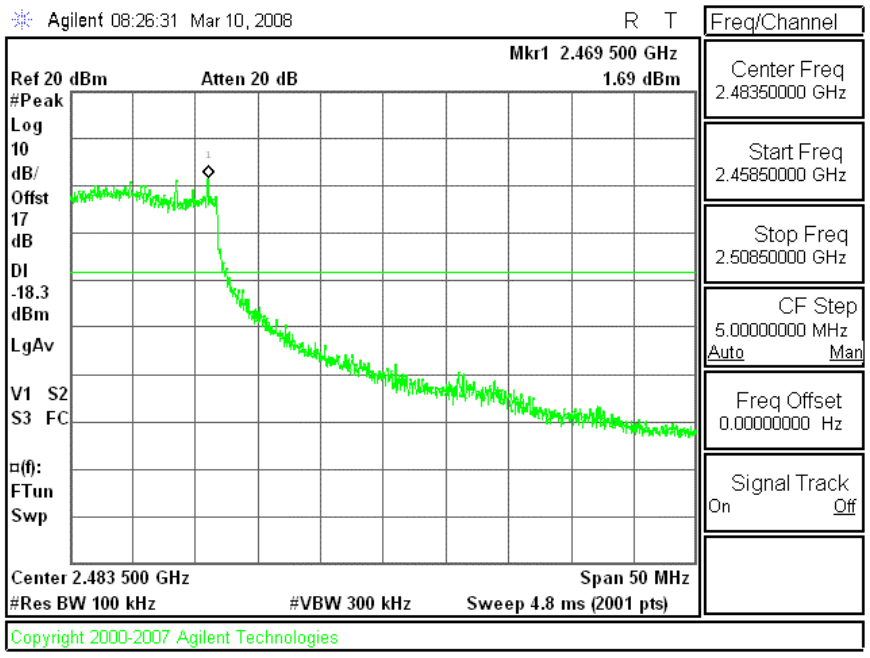
HIGH CH BANDEDGE, WITH COMBINER



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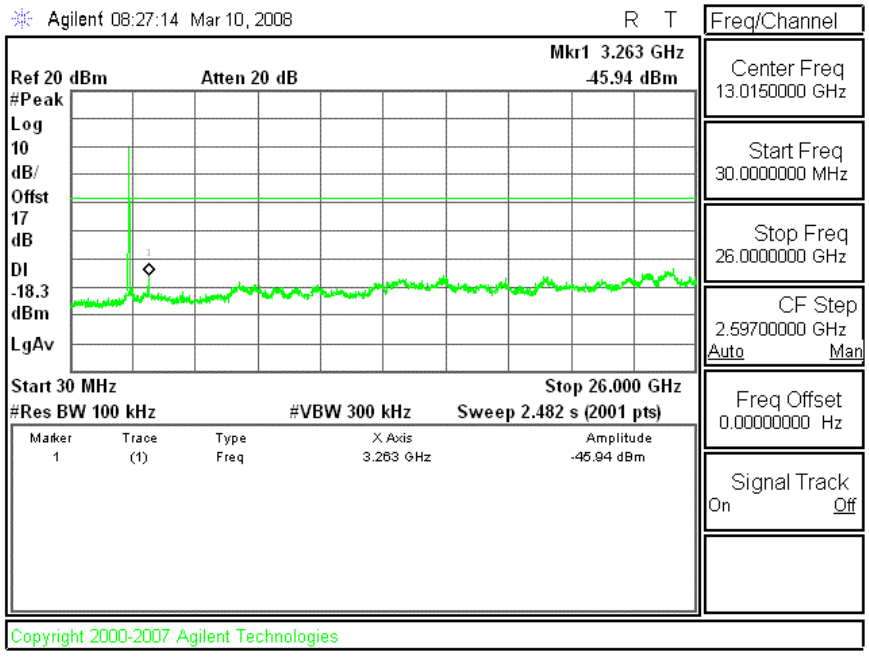
HIGH CH SPURIOUS, WITH COMBINER



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7.5. 802.11a MODE IN THE 5.8 GHz BAND

7.5.1. 6 dB BANDWIDTH

LIMITS

FCC §15.247 (a) (2)

IC RSS-210 A8.2 (a)

The minimum 6 dB bandwidth shall be at least 500 kHz.

TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The RBW is set to 100 kHz and the VBW is set to 300 kHz. The sweep time is coupled.

RESULTS

Channel	Frequency (MHz)	Chain 1 (MHz)	Minimum Limit (MHz)
Middle	5785	16.426	0.5

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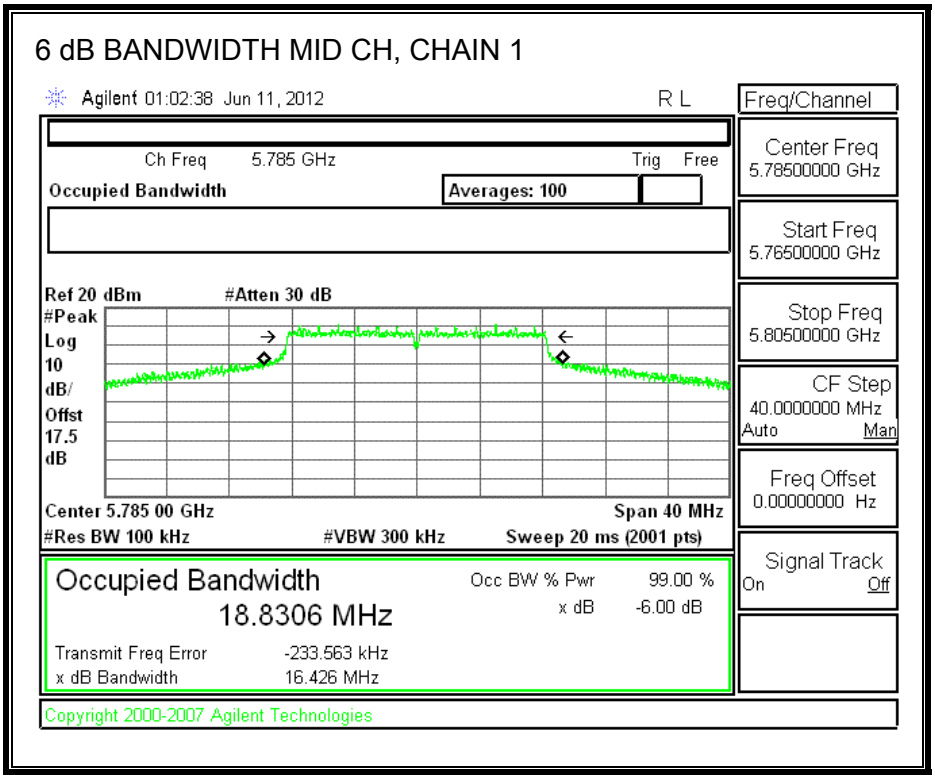

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7.5.2. 99% BANDWIDTH

LIMITS

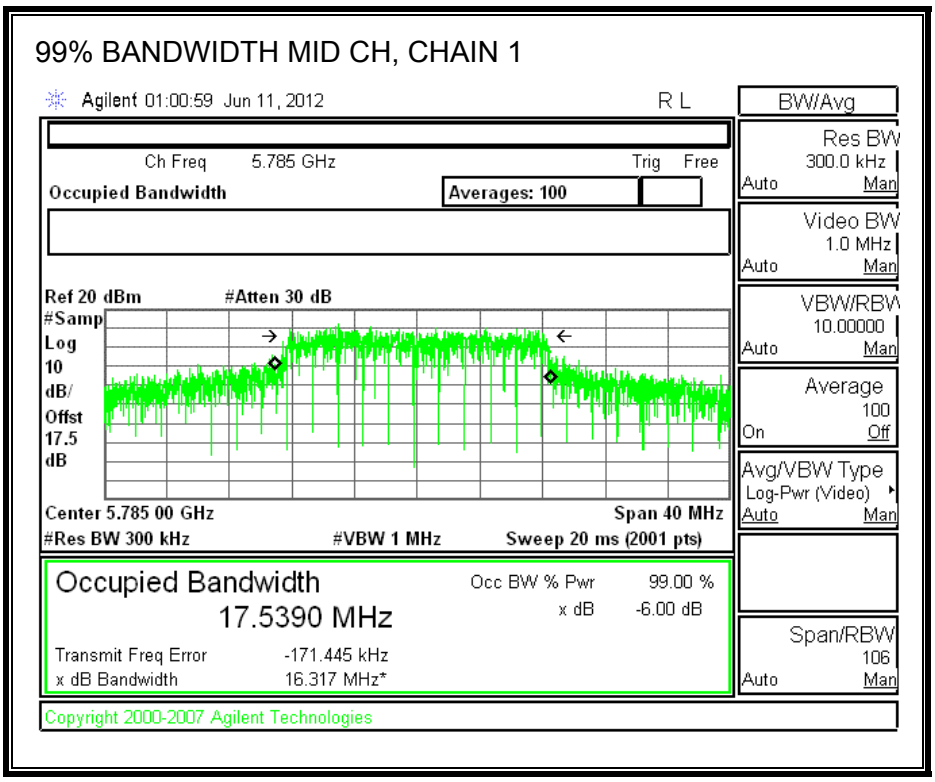
None; for reporting purposes only.

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 function is utilized.

RESULTS

Channel	Frequency (MHz)	Chain 1 (MHz)
Middle	5785	17.539



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7.5.3. OUTPUT POWER

LIMITS

FCC §15.247 (b)

IC RSS-210 A8.4

Effective Legacy Gain (dBi)
6.76

The maximum antenna gain is 6.76 dBi for P-To-M; therefore the limit is 29.24 dBm.

TEST PROCEDURE

Peak power is measured using the spectrum analyzer's internal channel power integration function. Power is integrated over a bandwidth greater than or equal to the 99% bandwidth.

RESULTS

Channel	Frequency (MHz)	Limit (dBm)	Chain 0 Power (dBm)	Chain 1 Power (dBm)	Total Power (dBm)	Margin (dB)
Low	5745	29.24	25.78	25.92	28.86	-0.38
Mid	5785	29.24	25.81	25.93	28.88	-0.36
High	5825	29.24	25.82	26.12	28.98	-0.26

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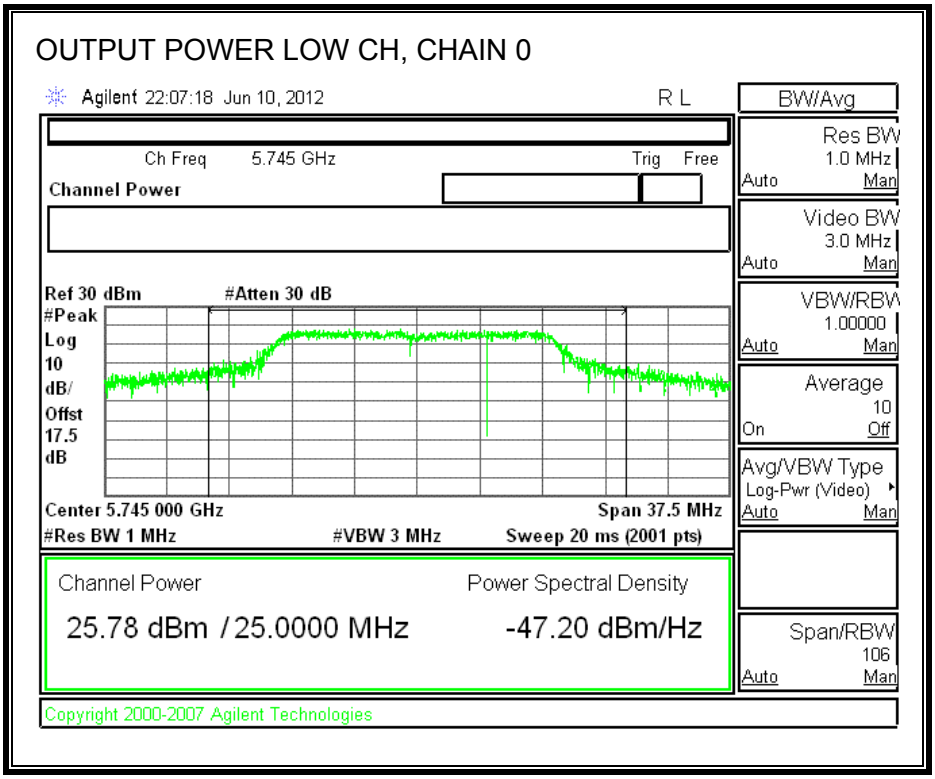
CHAIN 0 OUTPUT POWER



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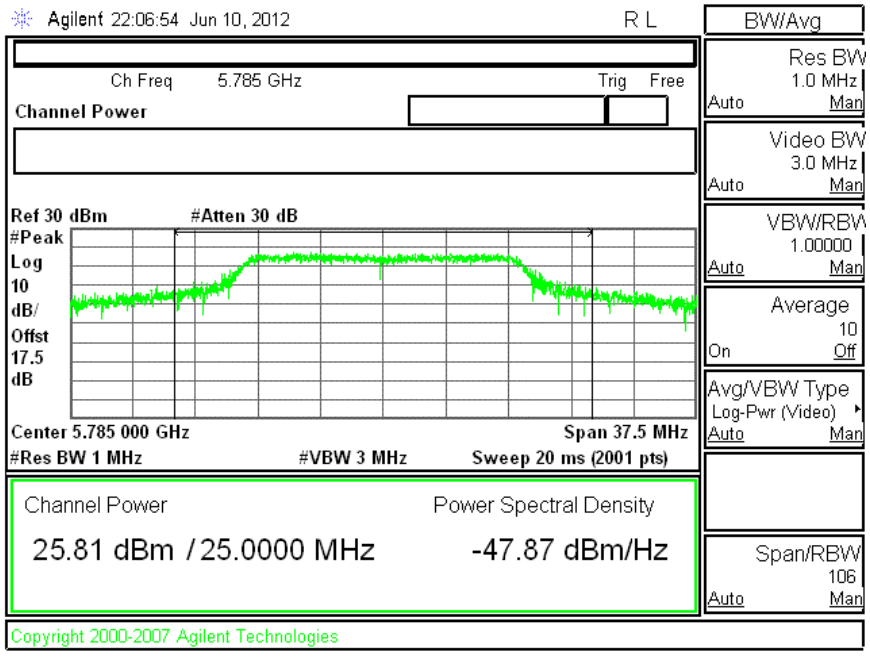
OUTPUT POWER MID CH, CHAIN 0



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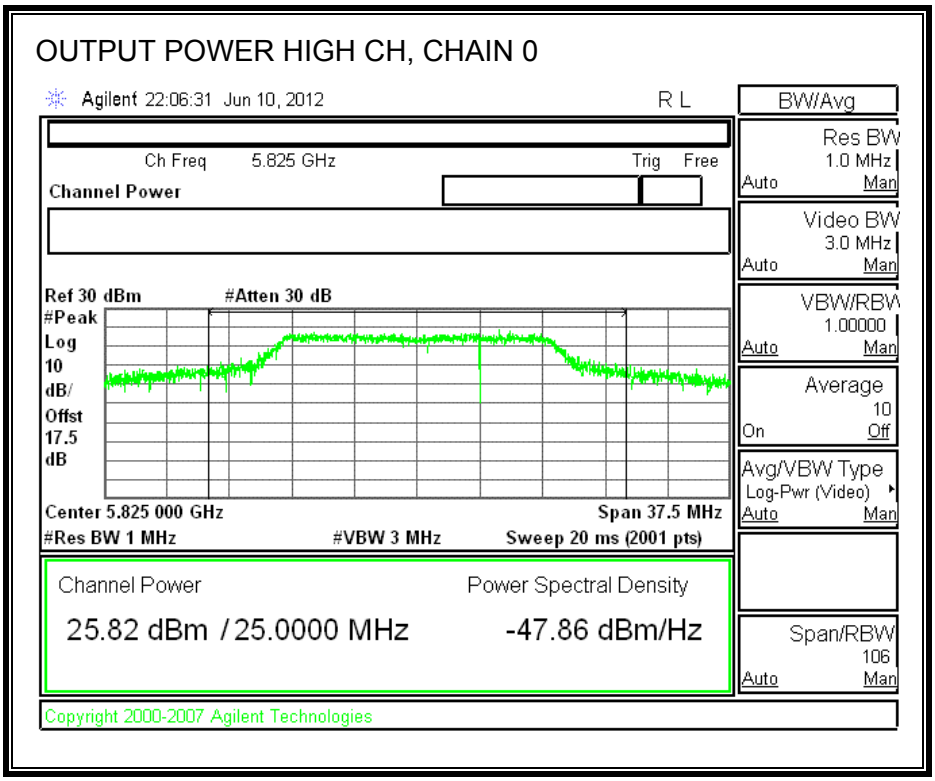

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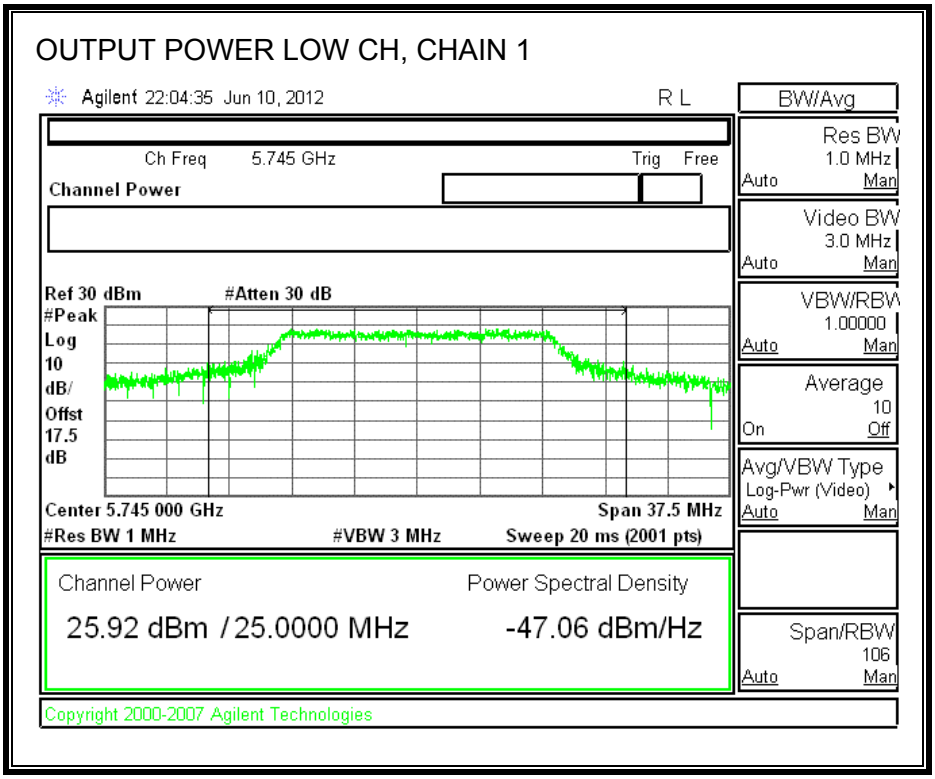
CHAIN 1 OUTPUT POWER



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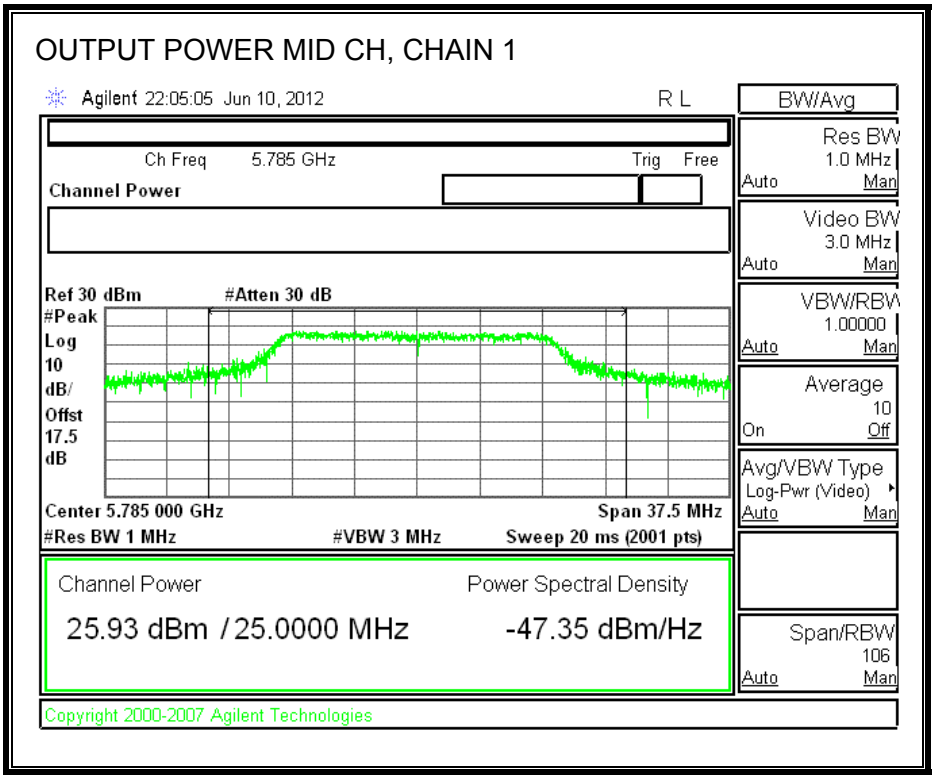

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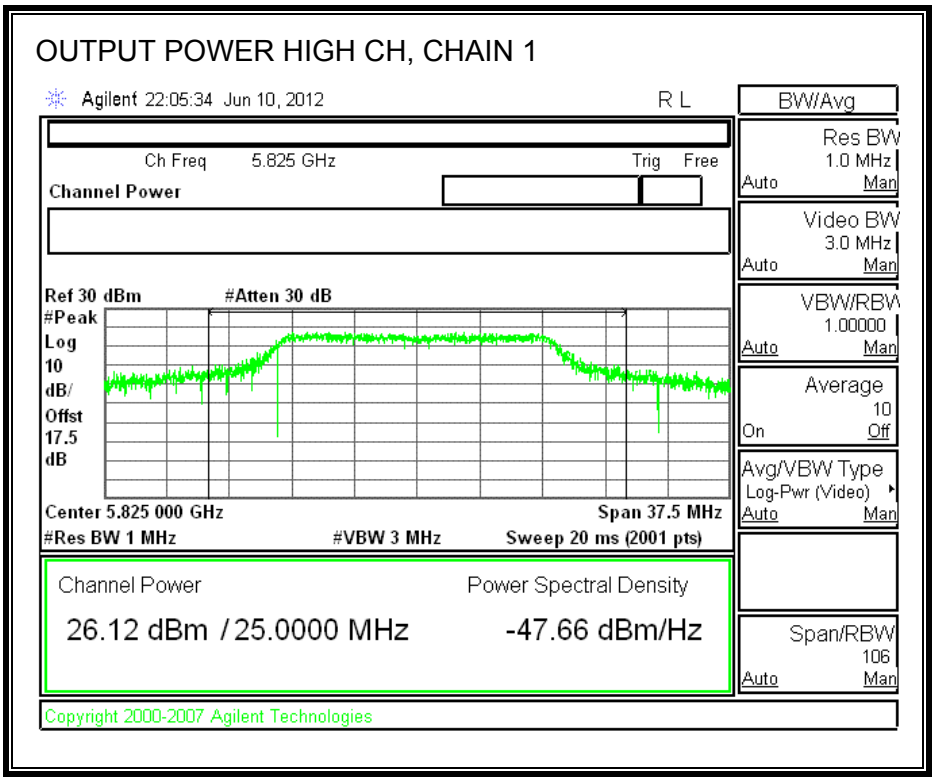

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7.5.4. AVERAGE POWER

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a power meter.

RESULTS

The cable assembly insertion loss of 17.5 dB (including 16 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 0 Power (dBm)	Chain 1 Power (dBm)	Total Power (dBm)
Low	5745	19.58	19.71	22.66
Middle	5785	19.20	19.57	22.40
High	5825	19.03	19.21	22.13

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7.5.5. POWER SPECTRAL DENSITY

LIMITS

FCC §15.247 (e)

IC RSS-210 A8.2 (b)

The power spectral density conducted from the transmitter to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

TEST PROCEDURE

Output power was measured based on the use of a peak measurement, therefore the power spectral density was measured using PSD Option 1 in accordance with FCC document "Measurement of Digital Transmission Systems Operating under Section 15.247", March 23, 2005.

RESULTS:

Channel	Frequency (MHz)	PSD with Combiner (dBm)	Limit (dBm)	Margin (dB)
Low	5745	2.05	8	-5.95
Middle	5785	3.80	8	-4.20
High	5825	0.64	8	-7.36

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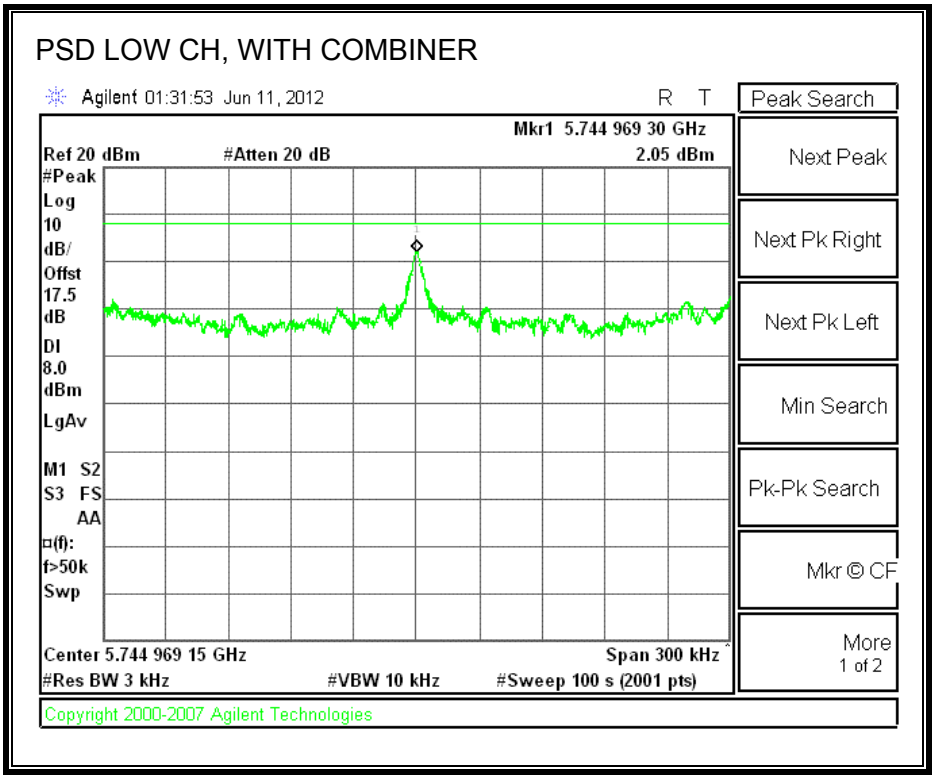
POWER SPECTRAL DENSITY, WITH COMBINER



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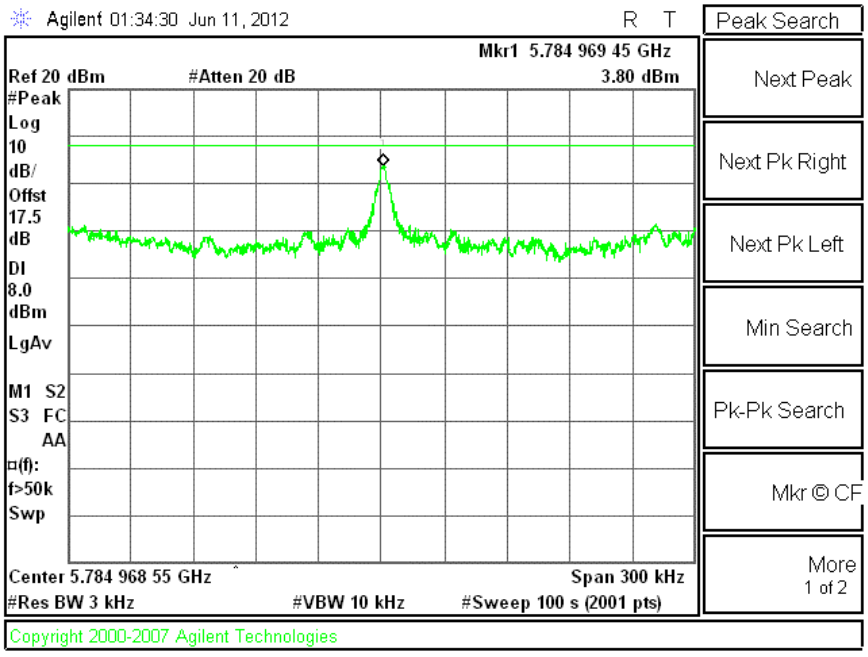
PSD MID CH, WITH COMBINER



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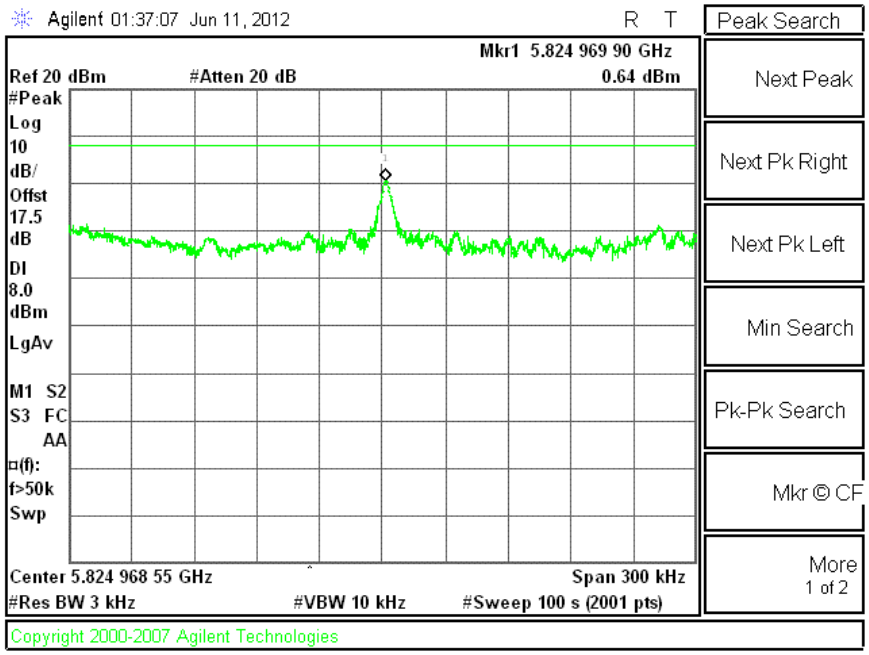
PSD HIGH CH, WITH COMBINER



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7.5.6. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.247 (d)

IC RSS-210 A8.5

Output power was measured based on the use of a peak measurement, therefore the required attenuation is 20 dB.

TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

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

RESULTS

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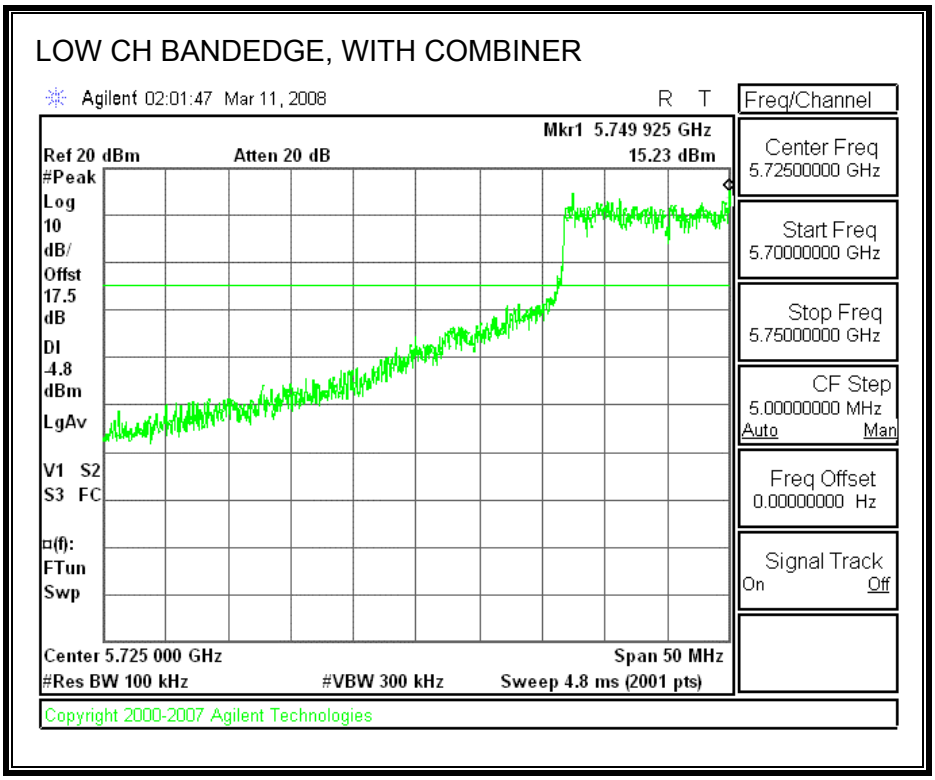
SPURIOUS EMISSIONS WITH COMBINER



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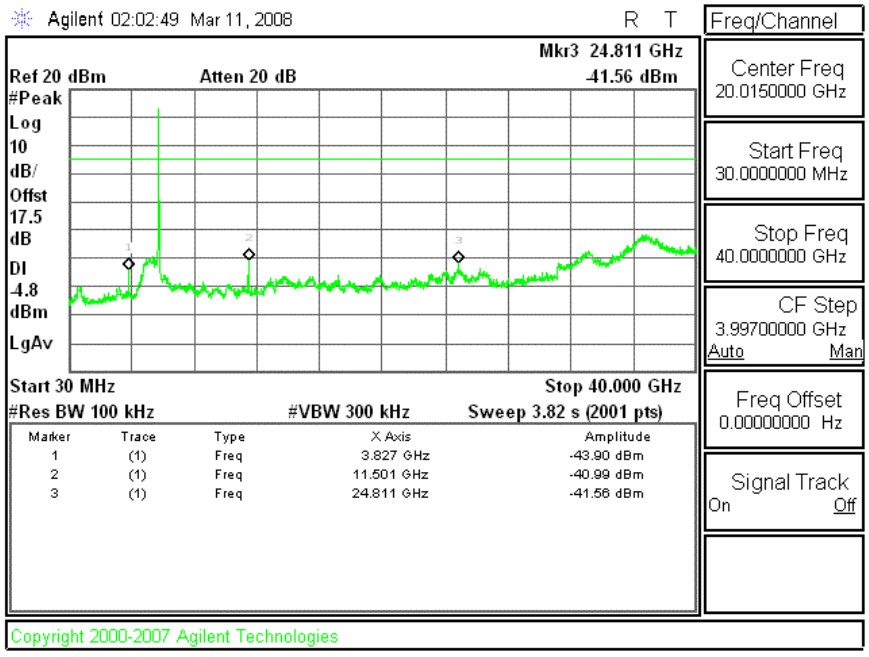
LOW CH SPURIOUS, WITH COMBINER



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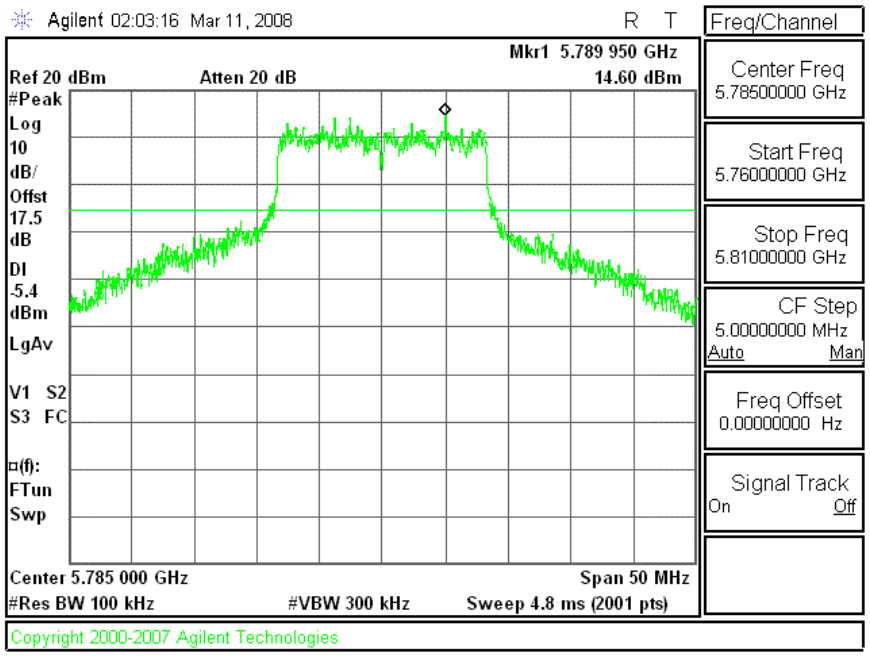
MID CH REFERENCE, WITH COMBINER



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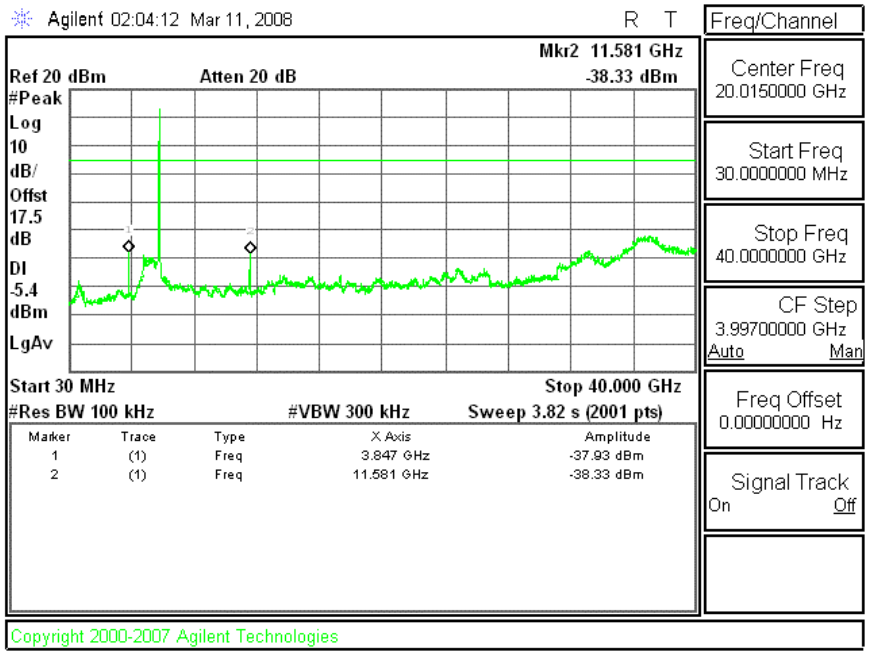
MID CH SPURIOUS, WITH COMBINER



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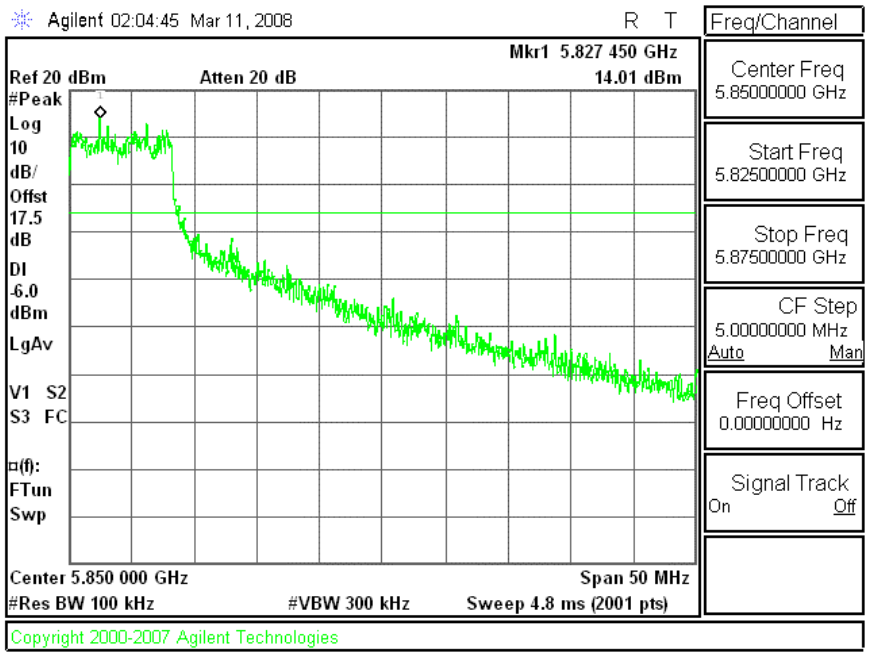
HIGH CH BANDEDGE, WITH COMBINER



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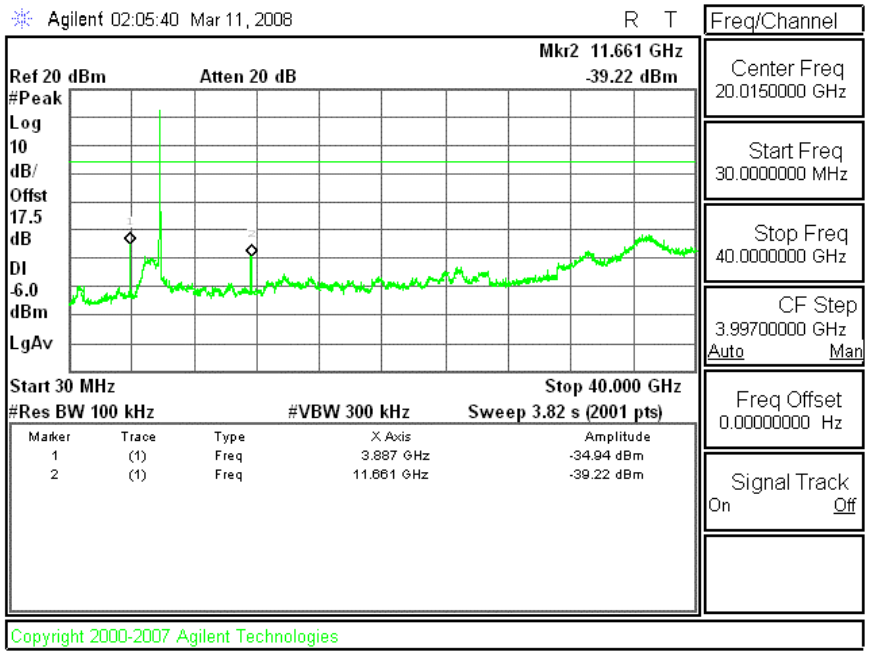
HIGH CH SPURIOUS, WITH COMBINER



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7.6. 802.11n HT20 MODE IN THE 5.8 GHz BAND

7.6.1. 6 dB BANDWIDTH

LIMITS

FCC §15.247 (a) (2)

IC RSS-210 A8.2 (a)

The minimum 6 dB bandwidth shall be at least 500 kHz.

TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The RBW is set to 100 kHz and the VBW is set to 300 kHz. The sweep time is coupled.

RESULTS

Channel	Frequency (MHz)	Chain 1 (MHz)	Minimum Limit (MHz)
Middle	5785	17.571	0.5

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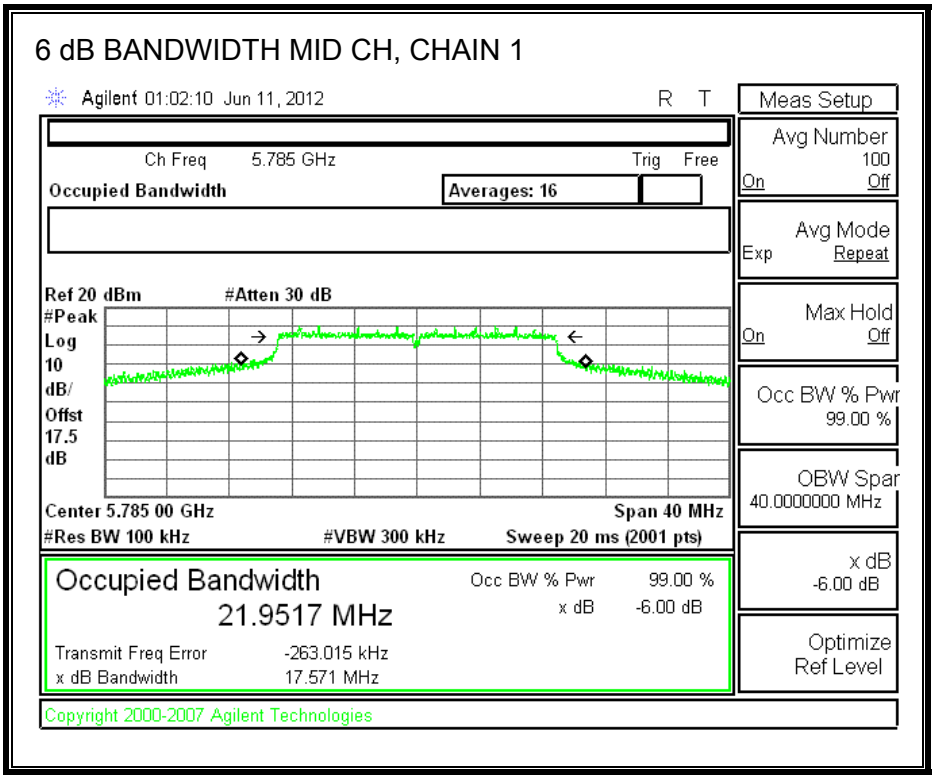

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7.6.2. 99% BANDWIDTH

LIMITS

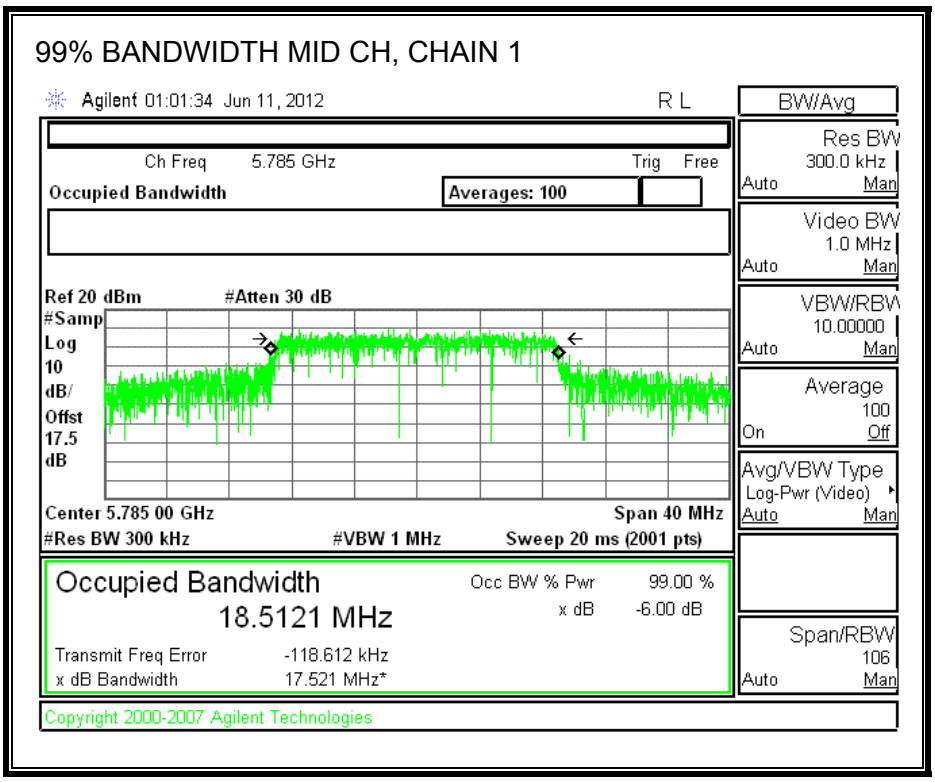
None; for reporting purposes only.

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 function is utilized.

RESULTS

Channel	Frequency (MHz)	Chain 1 (MHz)
Middle	5785	18.5121



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7.6.3. OUTPUT POWER

LIMITS

FCC §15.247 (b)

IC RSS-210 A8.4

The maximum antenna gain is less than or equal to 6 dBi, therefore the limit is 30 dBm.

TEST PROCEDURE

Peak power is measured using the spectrum analyzer's internal channel power integration function. Power is integrated over a bandwidth greater than or equal to the 99% bandwidth.

RESULTS

Channel	Frequency (MHz)	Limit (dBm)	Chain 0 Power (dBm)	Chain 1 Power (dBm)	Total Power (dBm)	Margin (dB)
Low	5745	30.00	26.32	26.07	29.21	-0.79
Mid	5785	30.00	25.86	26.15	29.02	-0.98
High	5825	30.00	25.88	26.17	29.04	-0.96

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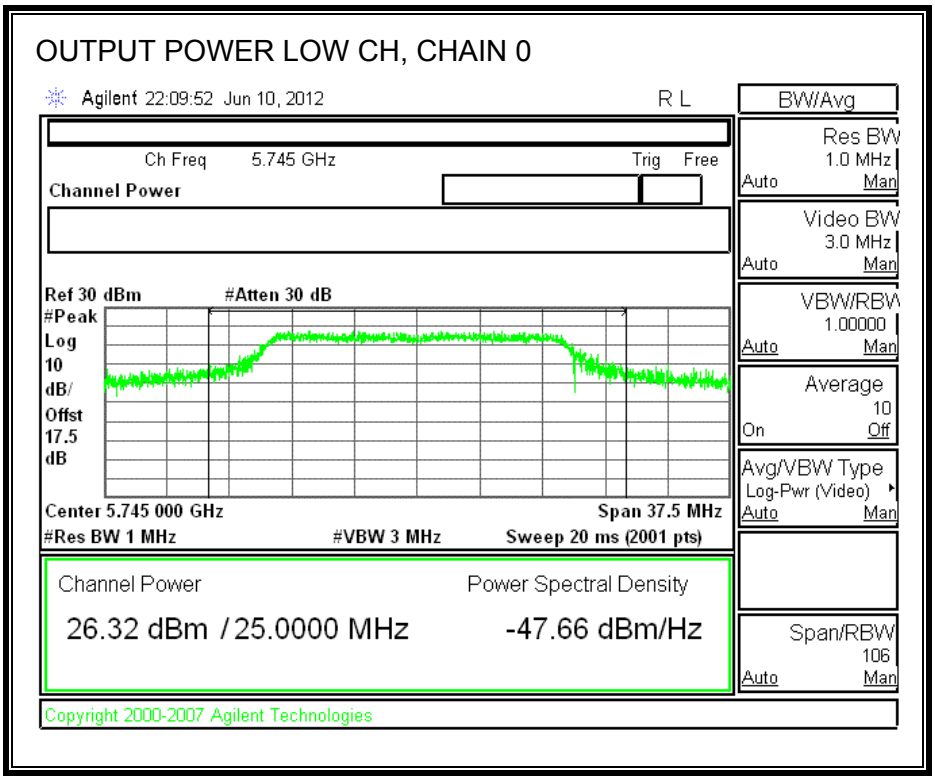
CHAIN 0 OUTPUT POWER



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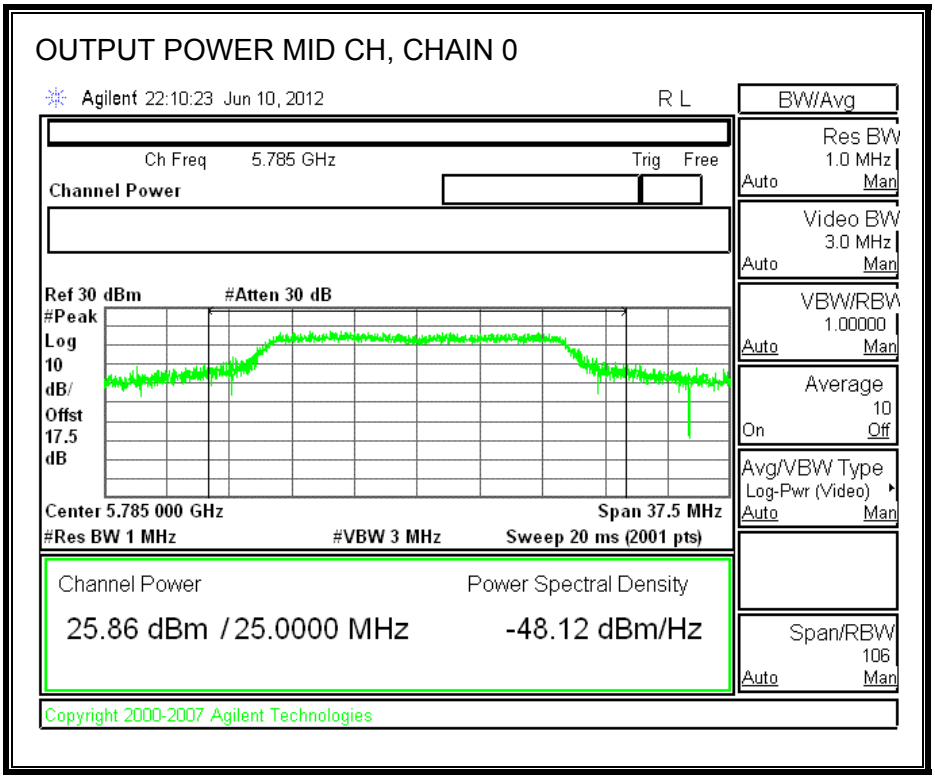
OUTPUT POWER MID CH, CHAIN 0



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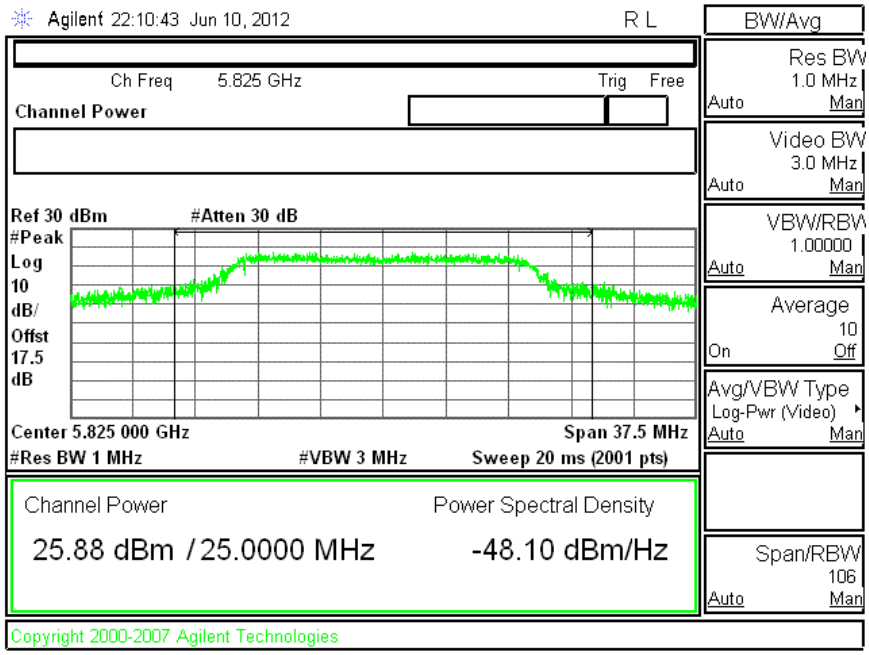
OUTPUT POWER HIGH CH, CHAIN 0



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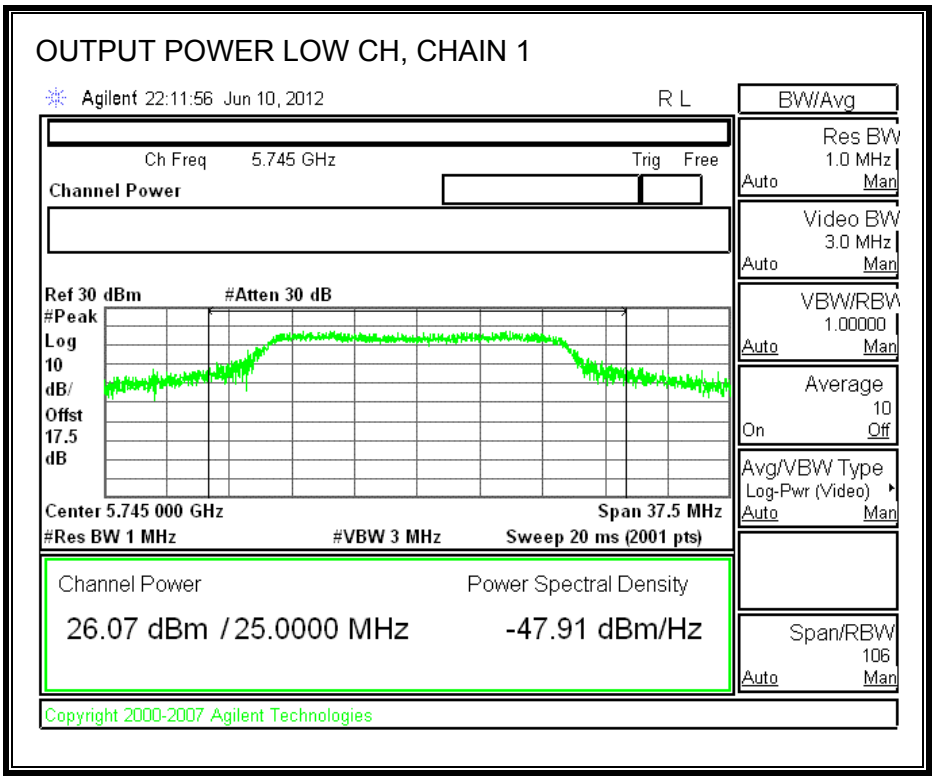
CHAIN 1 OUTPUT POWER



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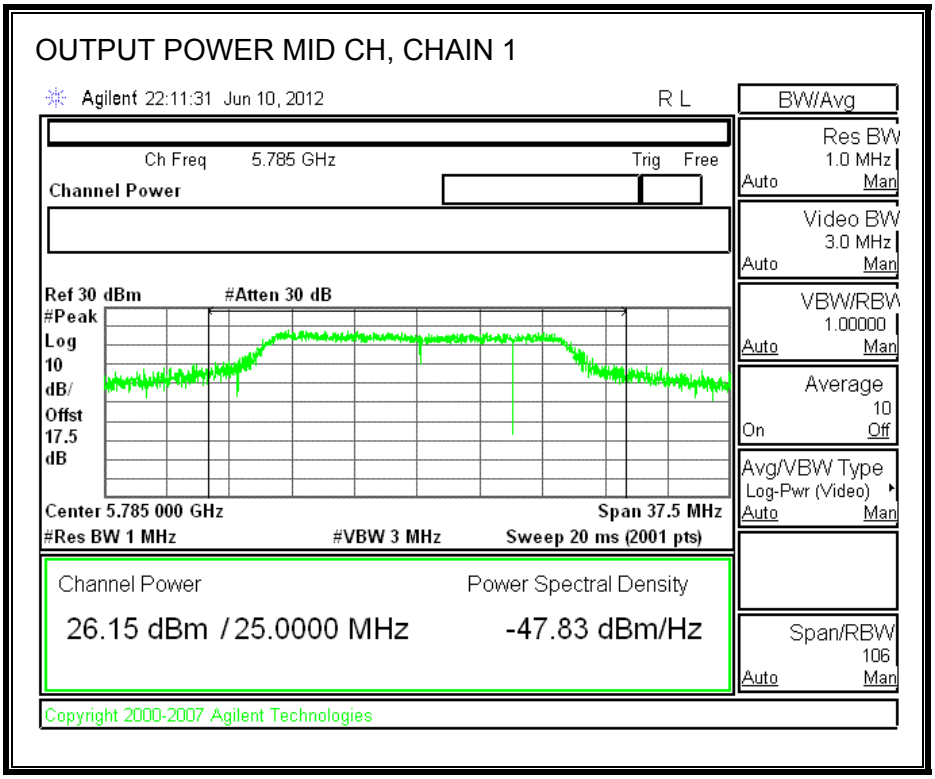
OUTPUT POWER MID CH, CHAIN 1



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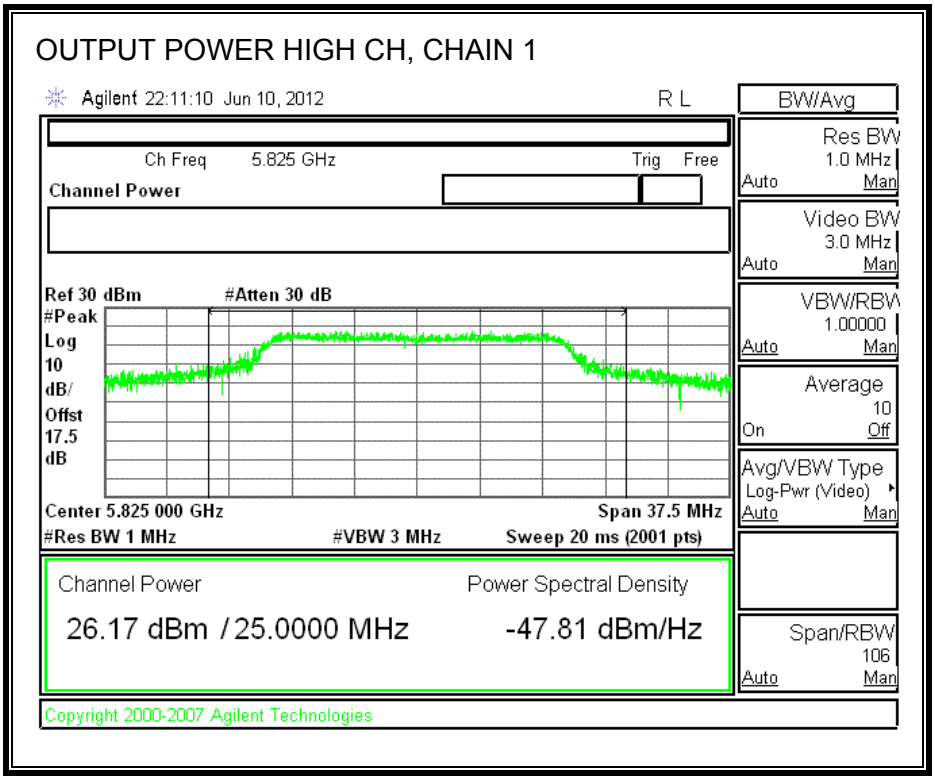
OUTPUT POWER HIGH CH, CHAIN 1



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7.6.4. 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 17.5 dB (including 16 dB pad and 1.5 dB cable) entered as an offset in the power meter to allow for direct reading of power.

Channel	Frequency (MHz)	Chain 0 Power (dBm)	Chain 1 Power (dBm)	Total Power (dBm)
Low	5745	19.73	19.72	22.74
Middle	5785	19.35	19.54	22.46
High	5825	18.99	19.39	22.20

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7.6.5. POWER SPECTRAL DENSITY

LIMITS

FCC §15.247 (e)

IC RSS-210 A8.2 (b)

The power spectral density conducted from the transmitter to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

TEST PROCEDURE

Output power was measured based on the use of a peak measurement, therefore the power spectral density was measured using PSD Option 1 in accordance with FCC document "Measurement of Digital Transmission Systems Operating under Section 15.247", March 23, 2005.

RESULTS:

Channel	Frequency (MHz)	PSD with Combiner (dBm)	Limit (dBm)	Margin (dB)
Low	5745	2.93	8	-5.07
Middle	5785	4.89	8	-3.11
High	5825	2.40	8	-5.60

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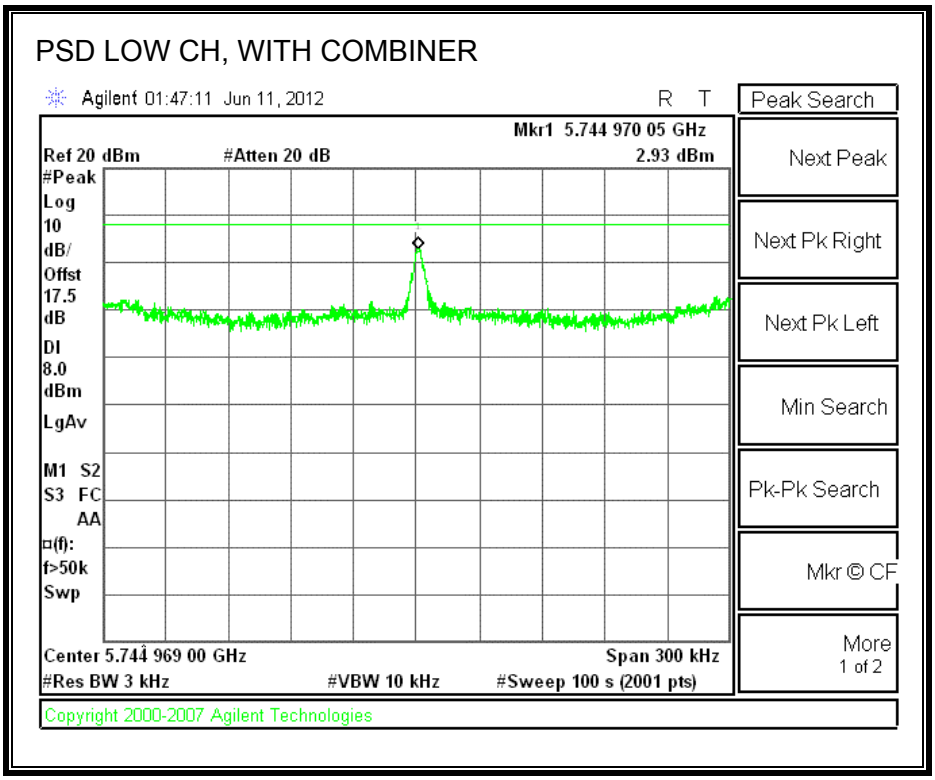
POWER SPECTRAL DENSITY, WITH COMBINER



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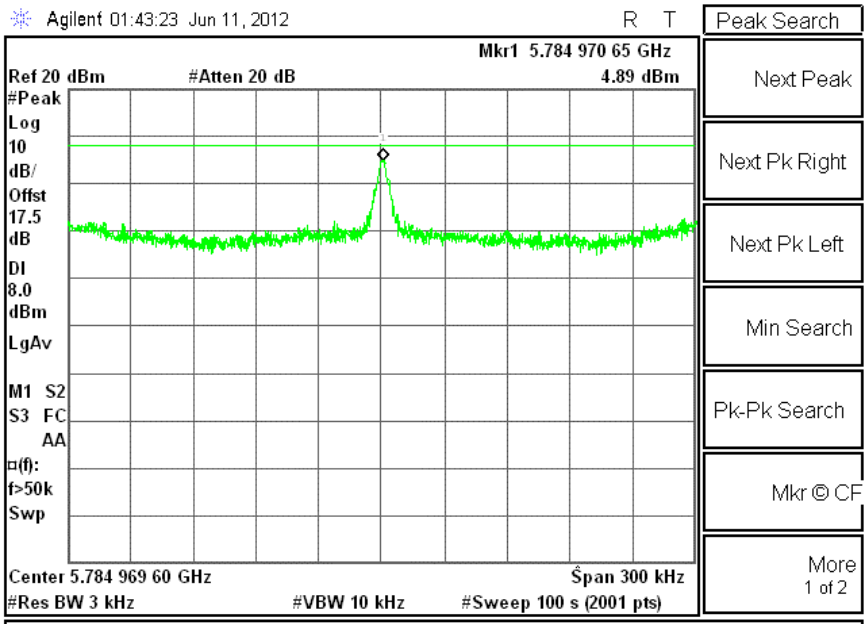
PSD MID CH, WITH COMBINER



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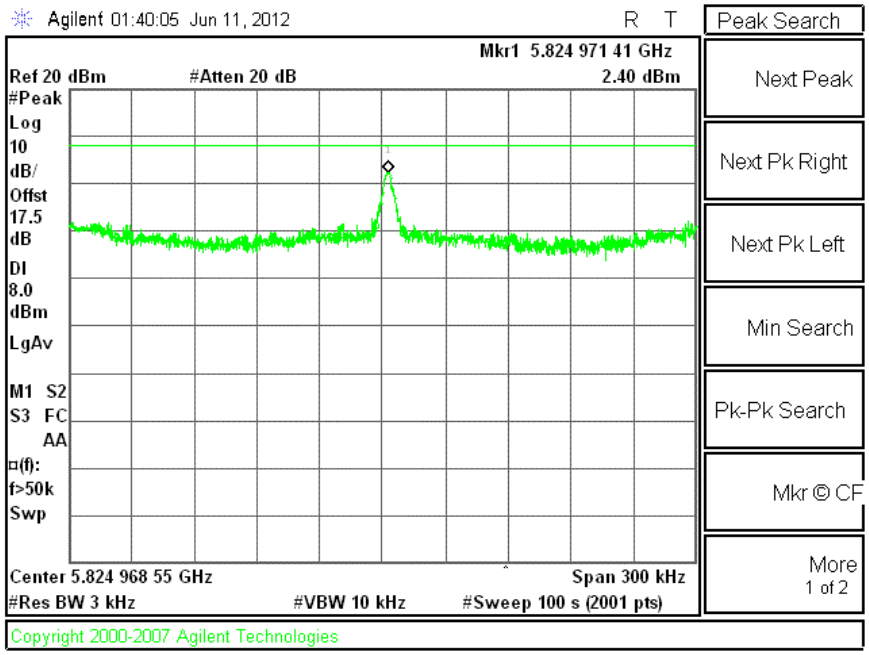
PSD HIGH CH, WITH COMBINER



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7.6.6. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.247 (d)

IC RSS-210 A8.5

Output power was measured based on the use of a peak measurement, therefore the required attenuation is 20 dB.

TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

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

RESULTS

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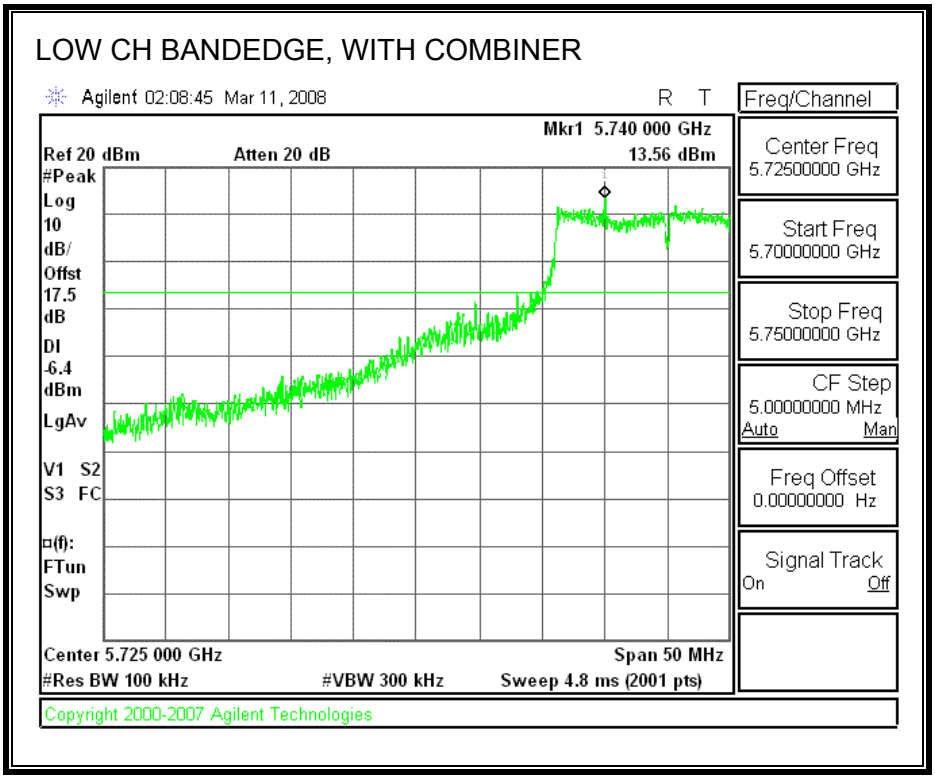
SPURIOUS EMISSIONS WITH COMBINER



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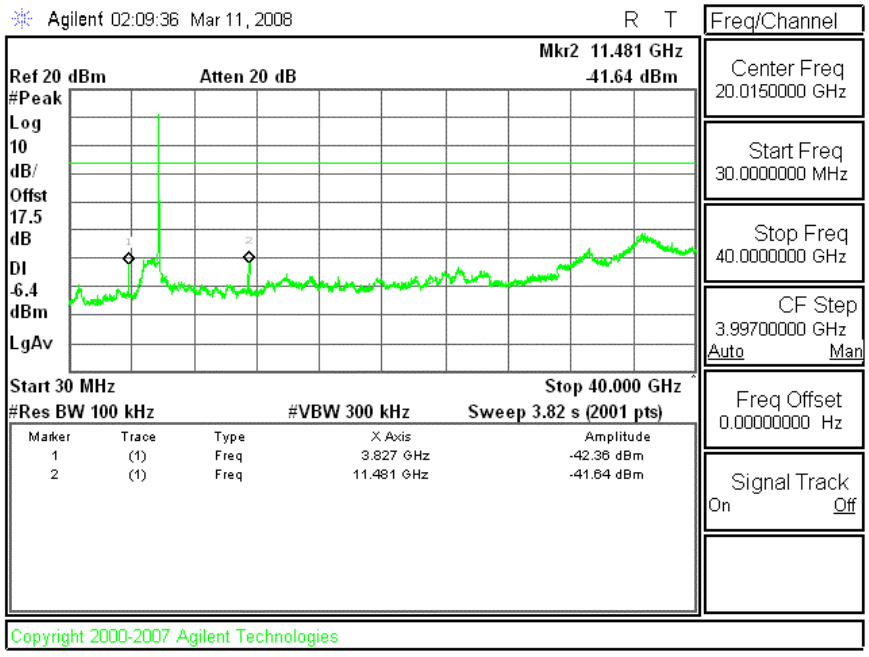
LOW CH SPURIOUS, WITH COMBINER



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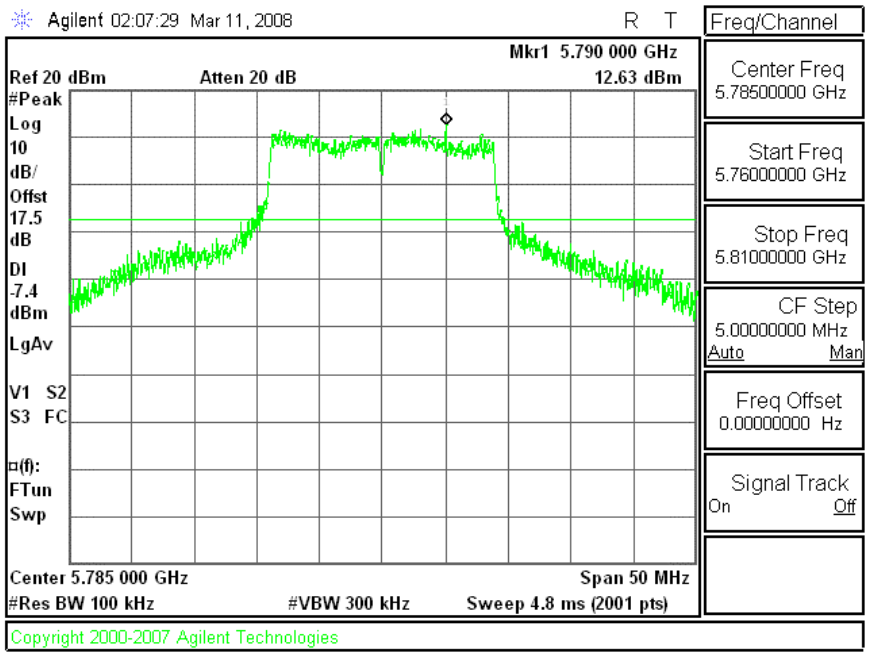
MID CH REFERENCE, WITH COMBINER



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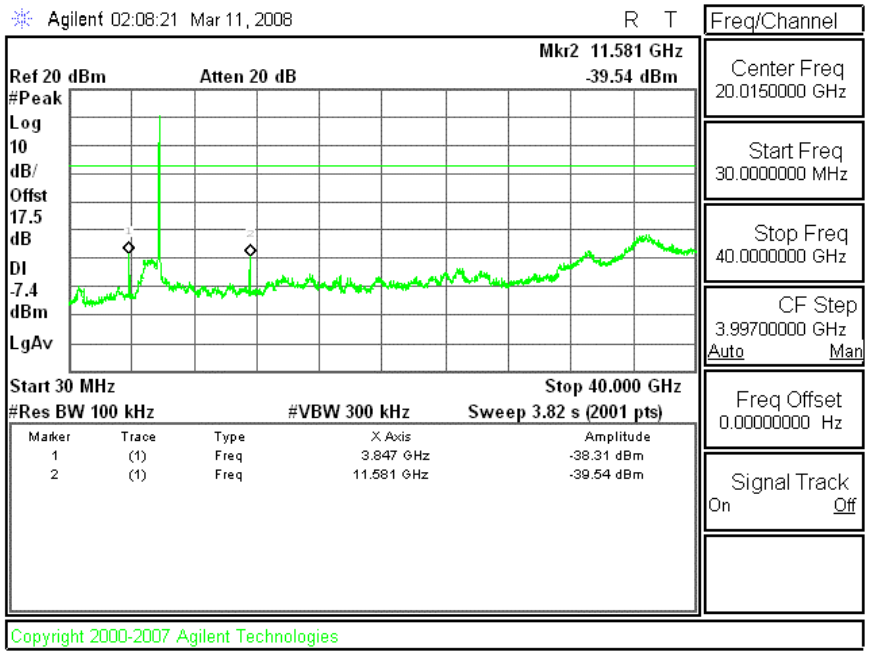
MID CH SPURIOUS, WITH COMBINER



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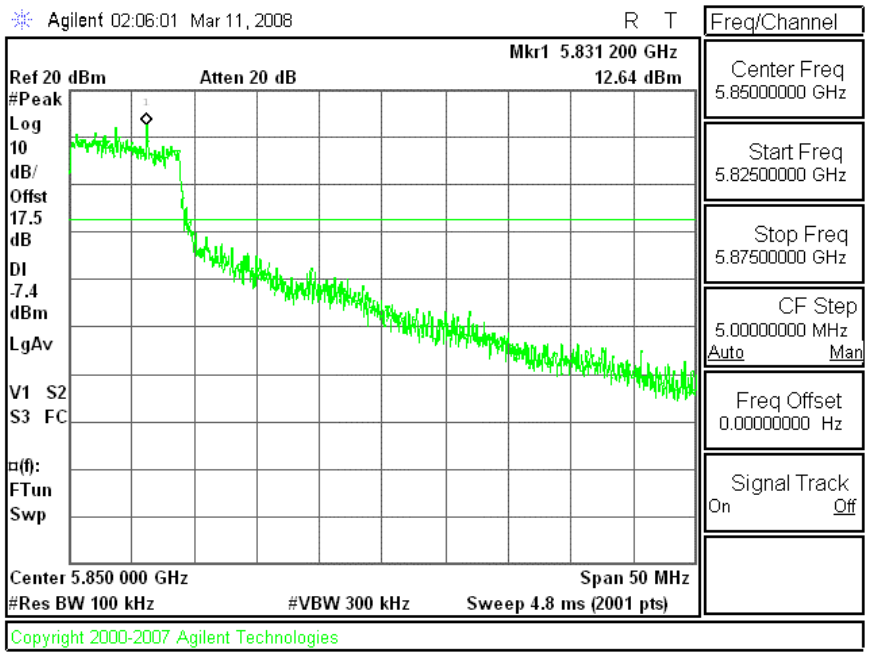
HIGH CH BANDEDGE, WITH COMBINER



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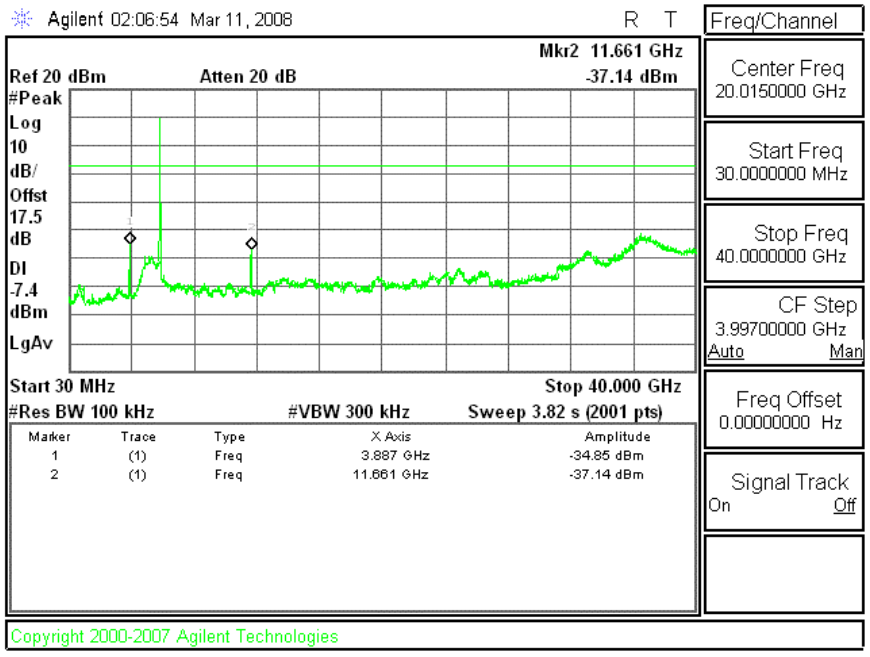
HIGH CH SPURIOUS, WITH COMBINER



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7.7. 802.11n HT40 MODE IN THE 5.8 GHz BAND

7.7.1. 6 dB BANDWIDTH

LIMITS

FCC §15.247 (a) (2)

IC RSS-210 A8.2 (a)

The minimum 6 dB bandwidth shall be at least 500 kHz.

TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The RBW is set to 100 kHz and the VBW is set to 300 kHz. The sweep time is coupled.

RESULTS

Channel	Frequency (MHz)	Chain 1 (MHz)	Minimum Limit (MHz)
Middle	5795	36.33	0.5

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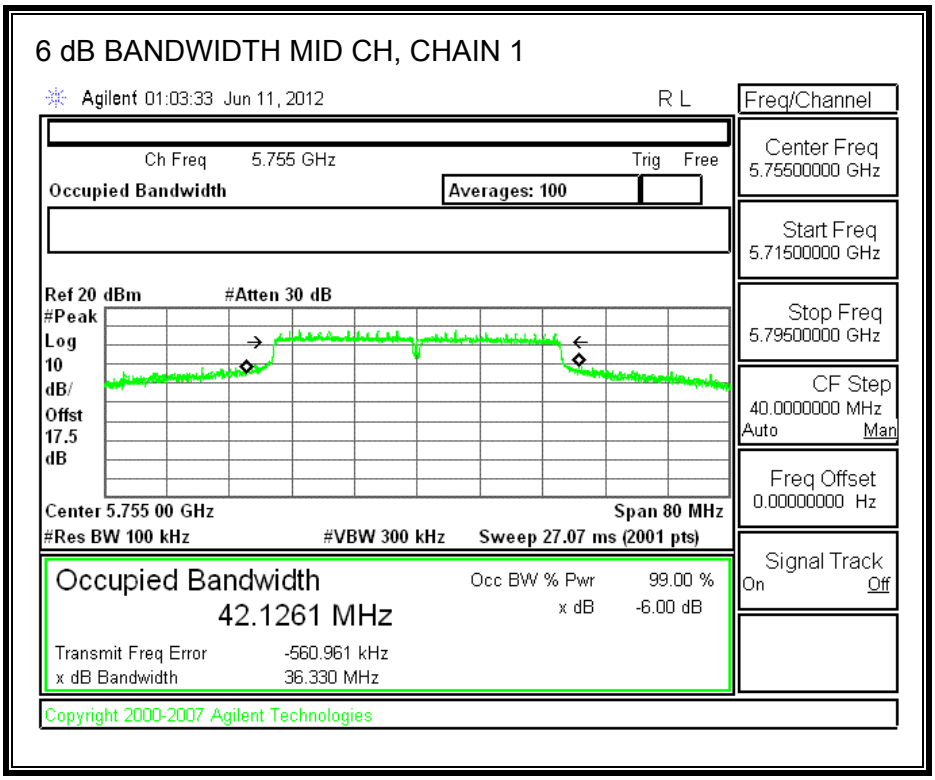

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7.7.2. 99% BANDWIDTH

LIMITS

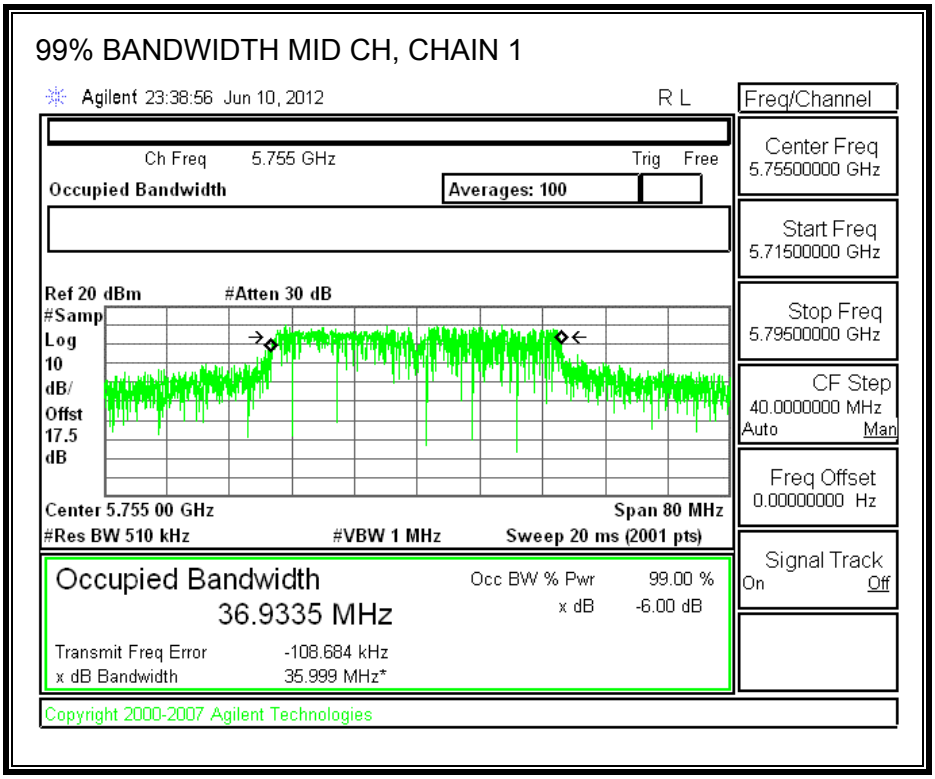
None; for reporting purposes only.

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 function is utilized.

RESULTS

Channel	Frequency (MHz)	Chain 1 99% Bandwidth (MHz)
Middle	5795	36.9335



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7.7.3. OUTPUT POWER

LIMITS

FCC §15.247 (b)

IC RSS-210 A8.4

The maximum antenna gain is less than or equal to 6 dBi, therefore the limit is 30 dBm.

TEST PROCEDURE

Peak power is measured using the spectrum analyzer's internal channel power integration function. Power is integrated over a bandwidth greater than or equal to the 99% bandwidth.

RESULTS

Channel	Frequency (MHz)	Limit (dBm)	Chain 0 Power (dBm)	Chain 1 Power (dBm)	Total Power (dBm)	Margin (dB)
Low	5755	30.00	26.76	26.91	29.85	-0.15
High	5795	30.00	26.15	26.76	29.48	-0.52

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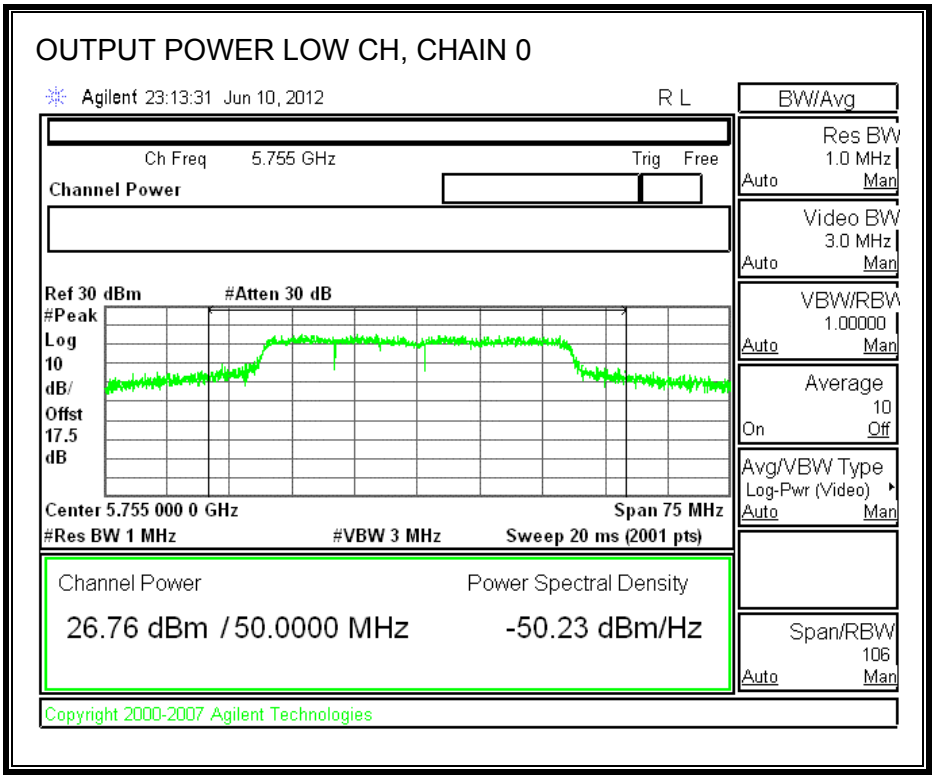
CHAIN 0 OUTPUT POWER



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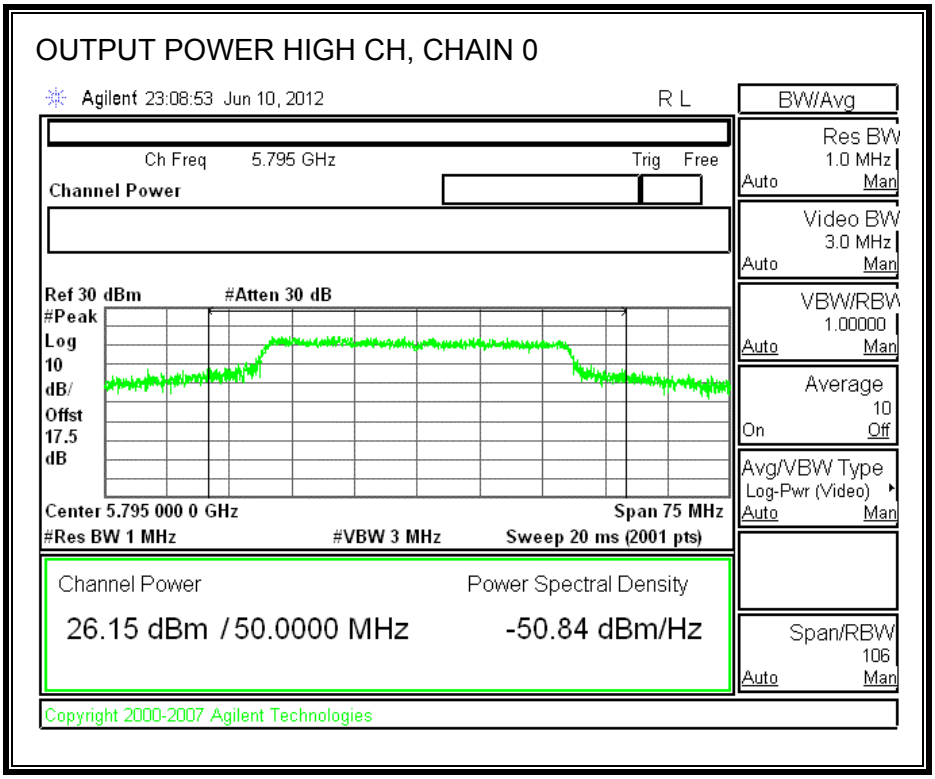
OUTPUT POWER HIGH CH, CHAIN 0



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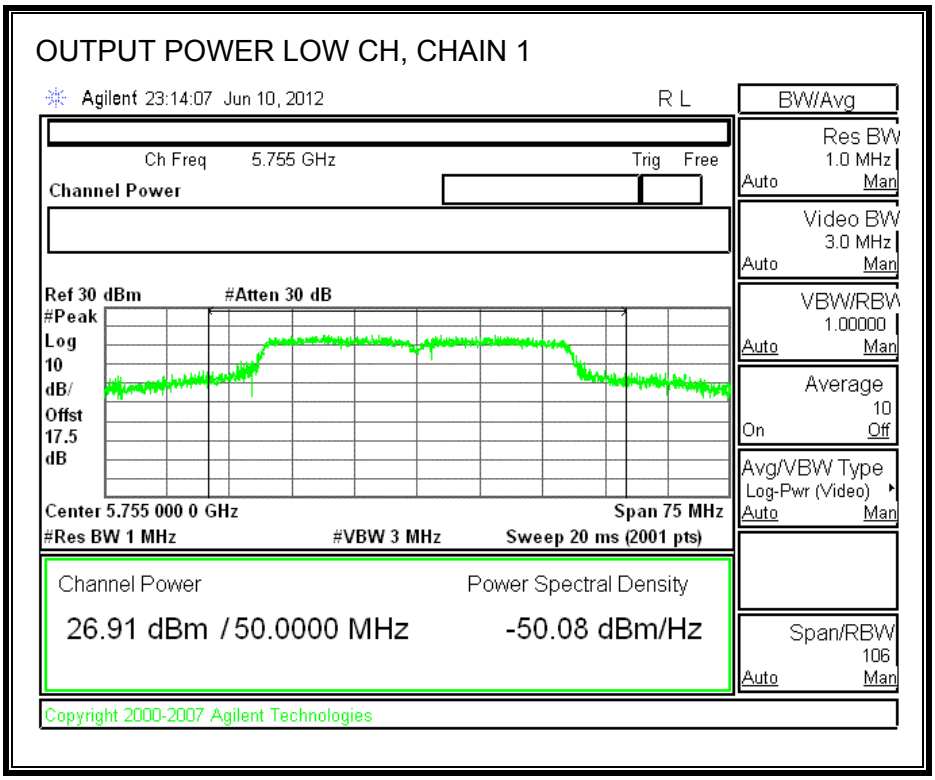
CHAIN 1 OUTPUT POWER



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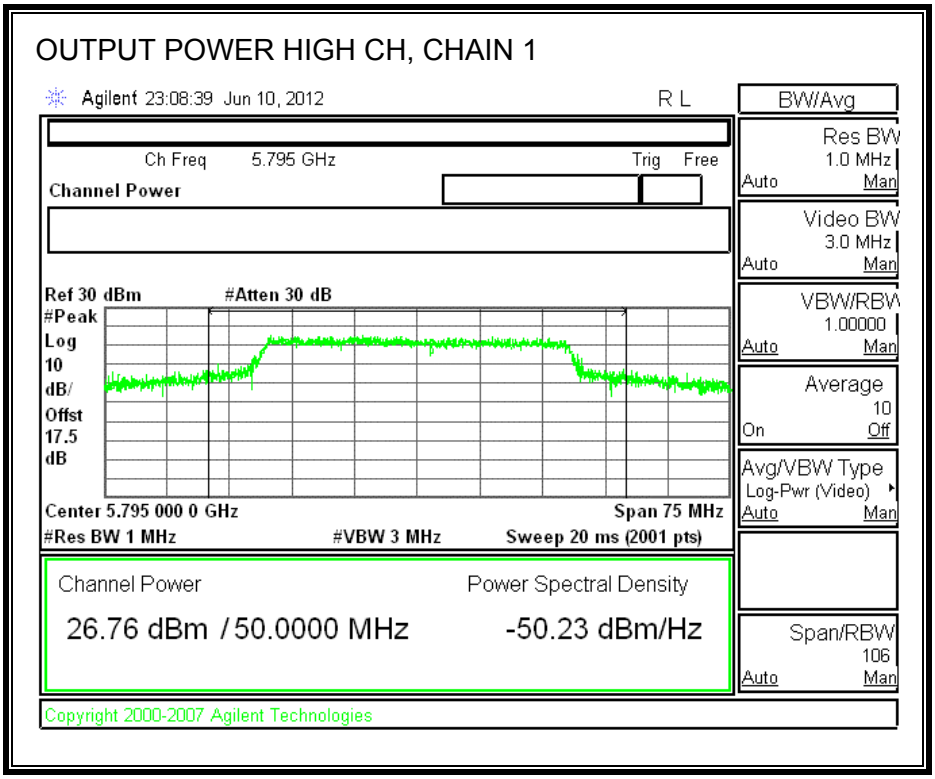
OUTPUT POWER HIGH CH, CHAIN 1



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7.7.4. 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 17.5 dB (including 16 dB pad and 1.5 dB cable) entered as an offset in the power meter to allow for direct reading of power.

Channel	Frequency (MHz)	Chain 0 Power (dBm)	Chain 1 Power (dBm)	Total Power (dBm)
Low	5755	19.93	20.11	23.03
High	5795	19.48	20.03	22.77

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7.7.5. POWER SPECTRAL DENSITY

LIMITS

FCC §15.247 (e)

IC RSS-210 A8.2 (b)

The power spectral density conducted from the transmitter to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

TEST PROCEDURE

Output power was measured based on the use of a peak measurement, therefore the power spectral density was measured using PSD Option 1 in accordance with FCC document "Measurement of Digital Transmission Systems Operating under Section 15.247", March 23, 2005.

RESULTS:

Channel	Frequency (MHz)	PSD with Combiner (dBm)	Limit (dBm)	Margin (dB)
Low	5755	5.82	8	-2.18
High	5795	7.21	8	-0.79

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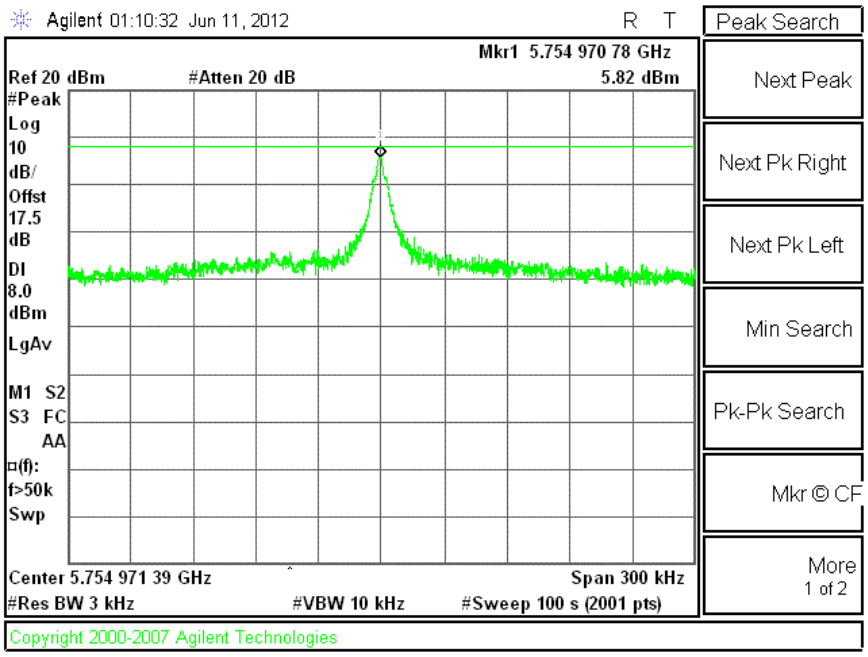
POWER SPECTRAL DENSITY, WITH COMBINER

PSD LOW CH, WITH COMBINER



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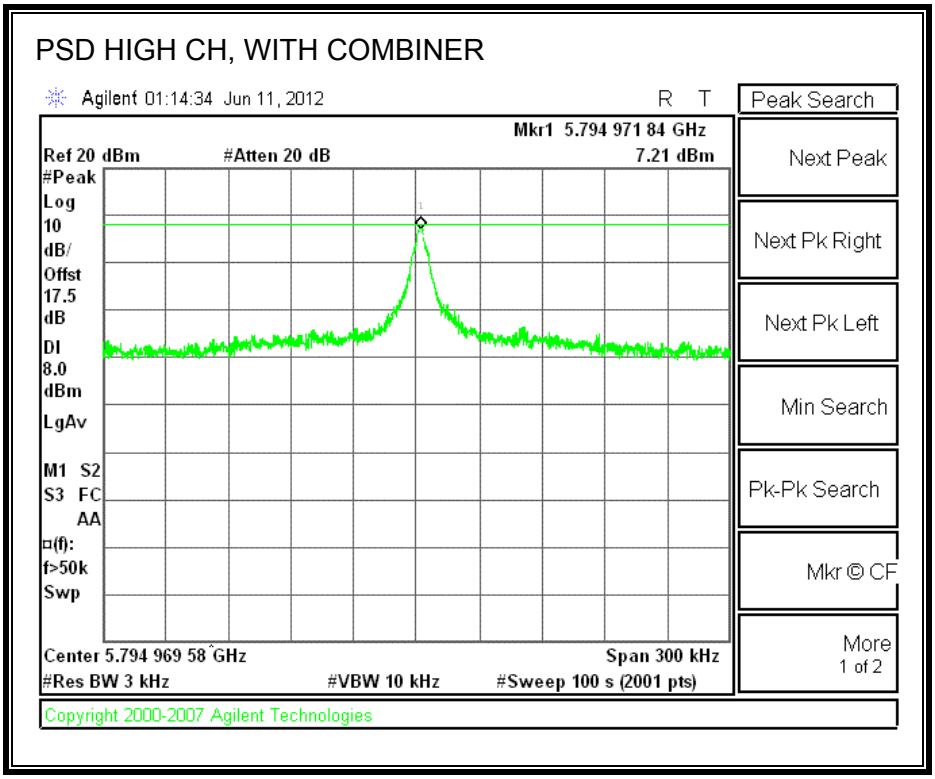
PSD HIGH CH, WITH COMBINER



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7.7.6. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.247 (d)

IC RSS-210 A8.5

Output power was measured based on the use of a peak measurement, therefore the required attenuation is 20 dB.

TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

The spectrum from 30 MHz to 40 GHz is investigated with the transmitter set to the lowest and highest channels.

RESULTS

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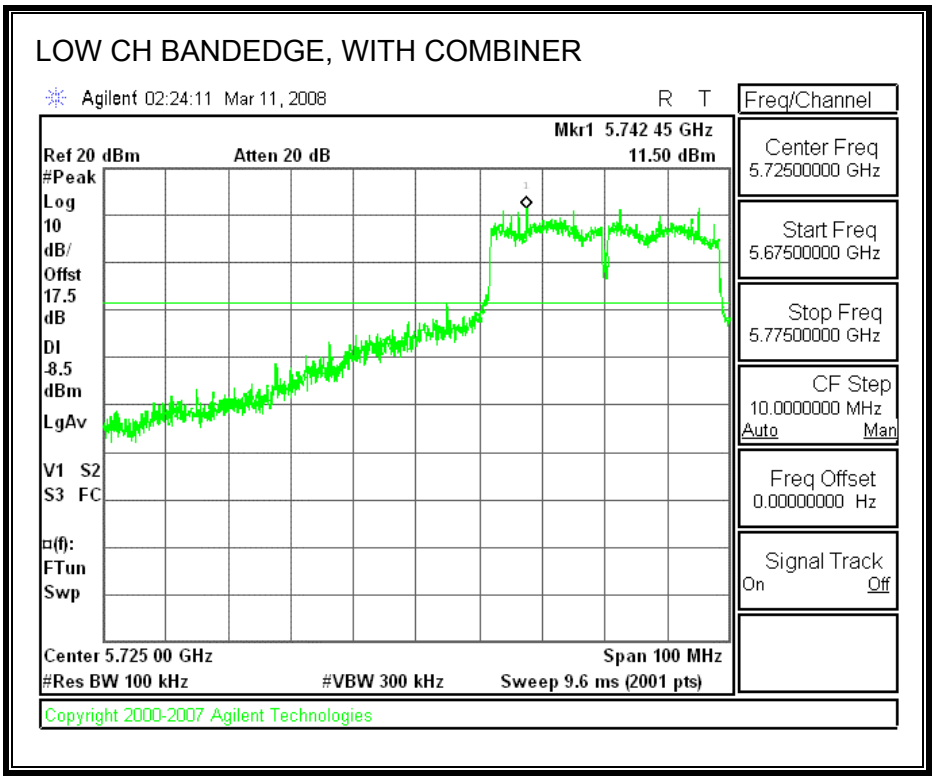
SPURIOUS EMISSIONS WITH COMBINER



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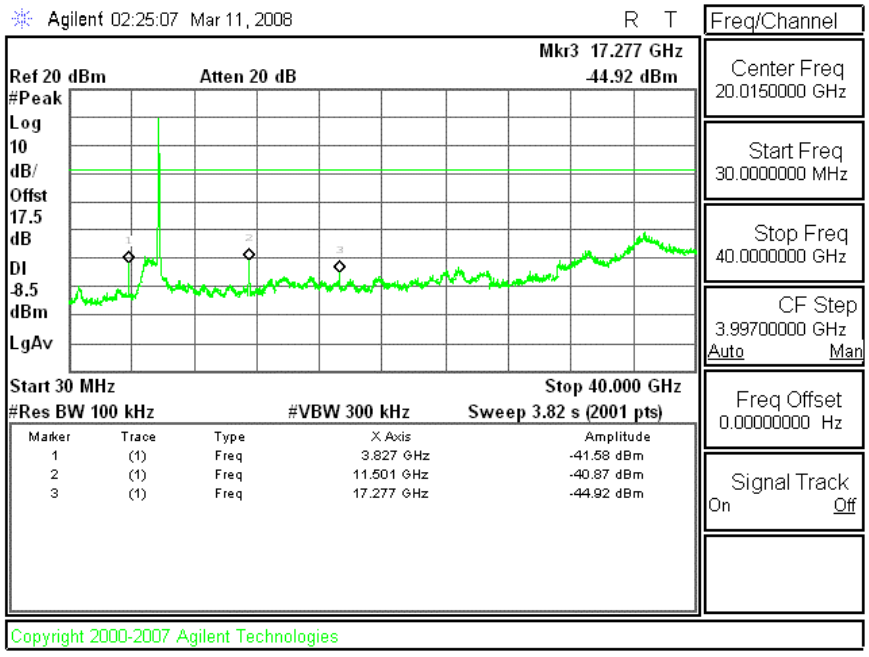
LOW CH SPURIOUS, WITH COMBINER



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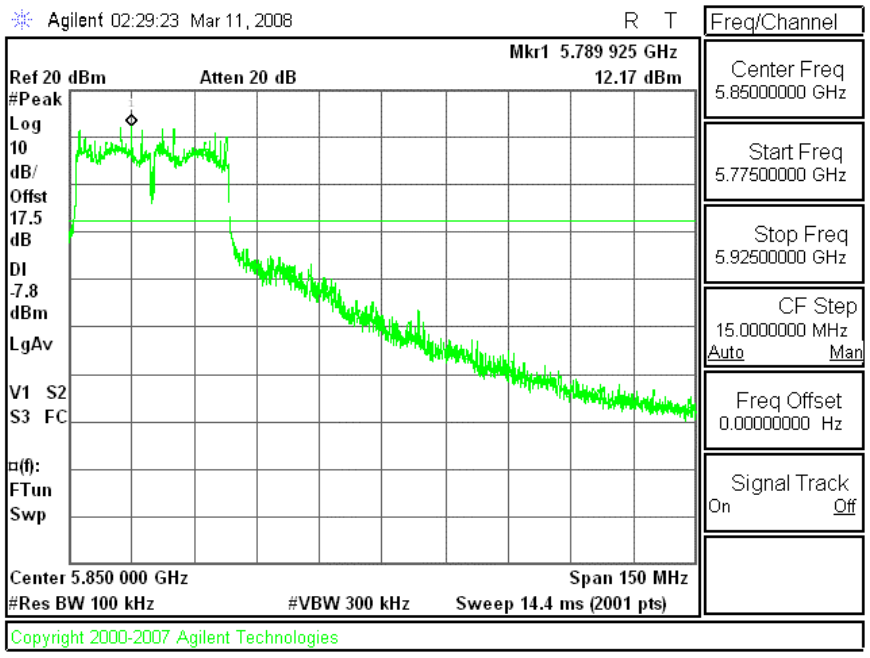
HIGH CH BANDEDGE, WITH COMBINER



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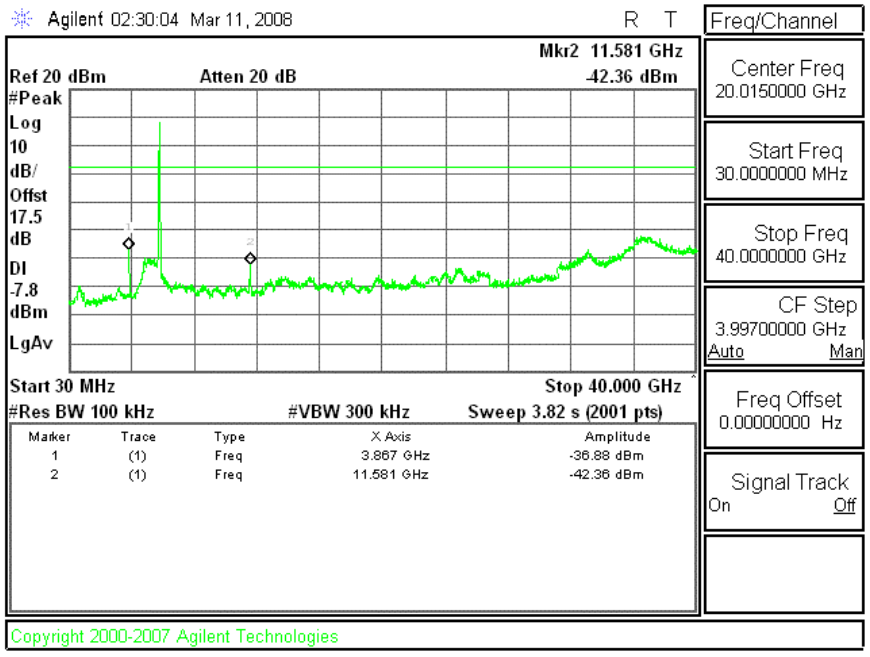
HIGH CH SPURIOUS, WITH COMBINER



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8. RADIATED TEST RESULTS

8.1. LIMITS AND PROCEDURE

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.

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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.

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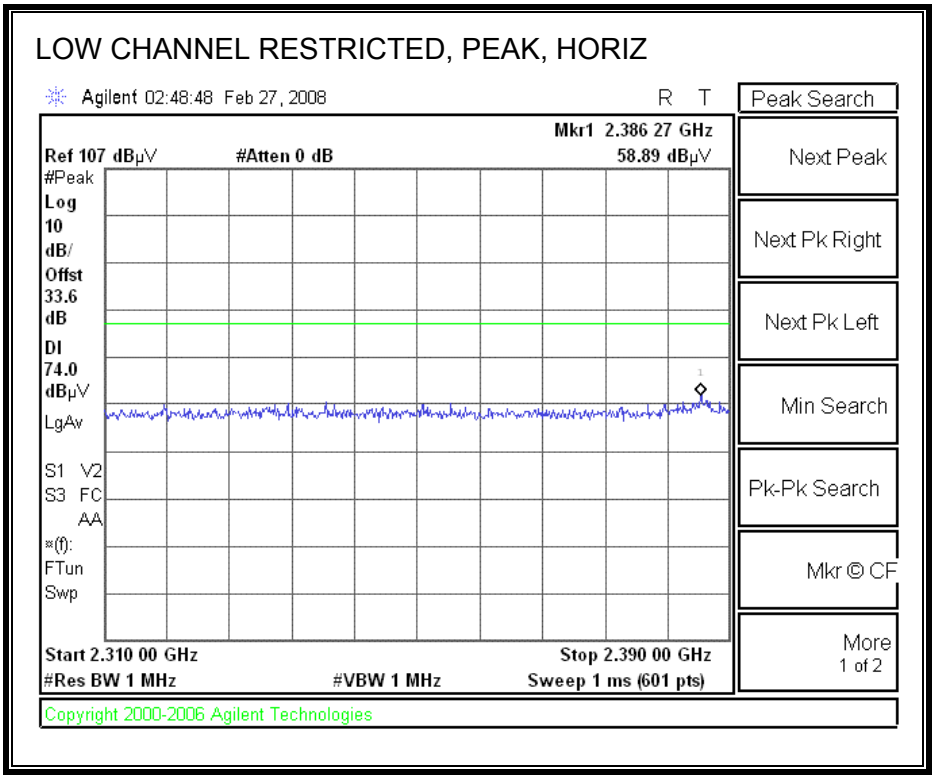
8.2. TRANSMITTER ABOVE 1 GHz

8.2.1. TRANSMITTER ABOVE 1 GHz FOR 802.11b MODE IN THE 2.4 GHz BAND

RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



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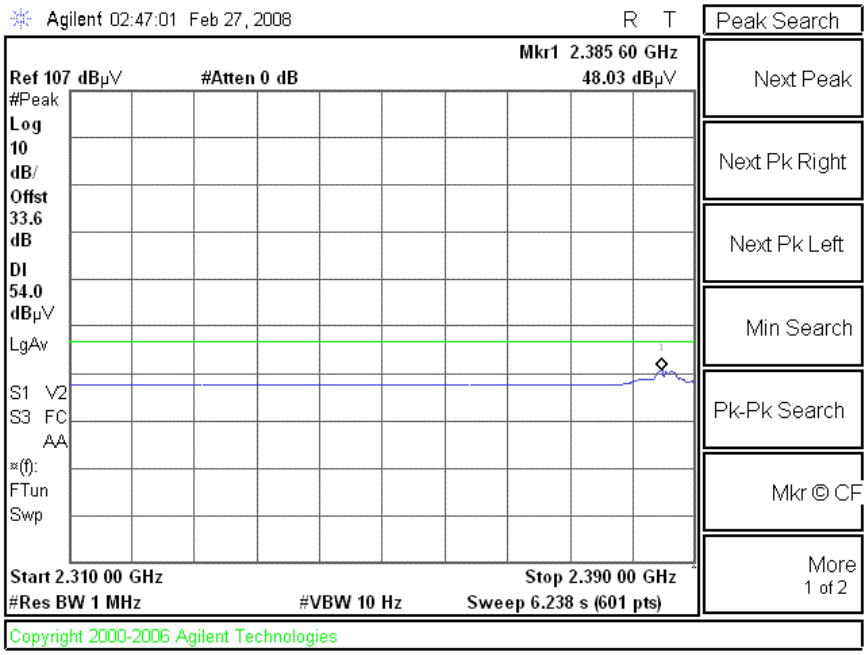
LOW CHANNEL RESTRICTED, AVG, HORIZ



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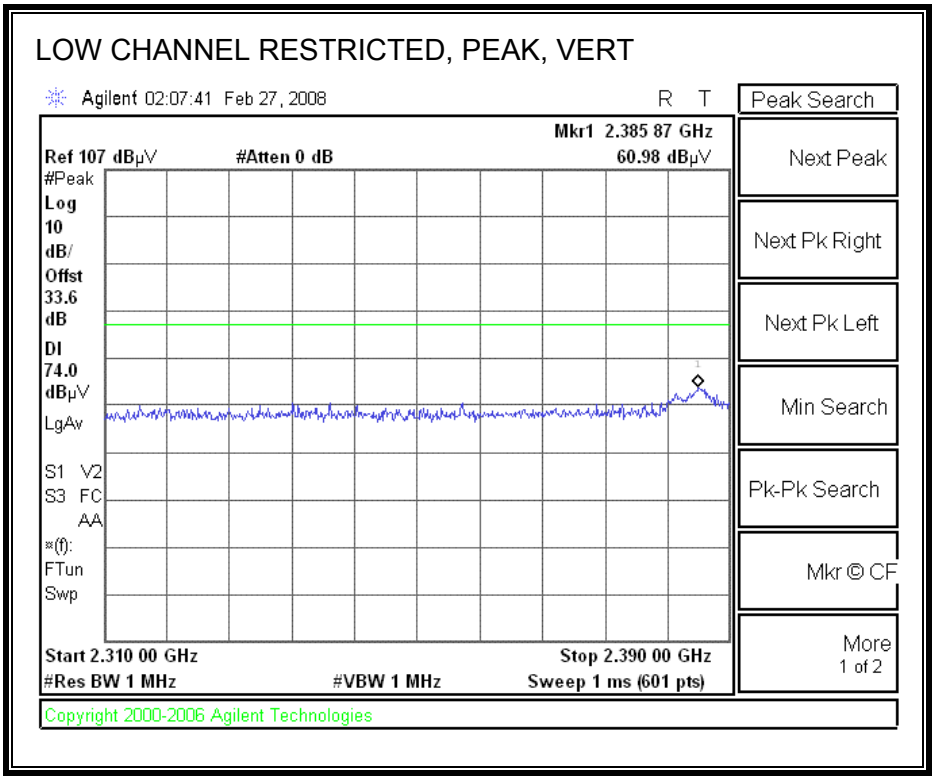
RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)



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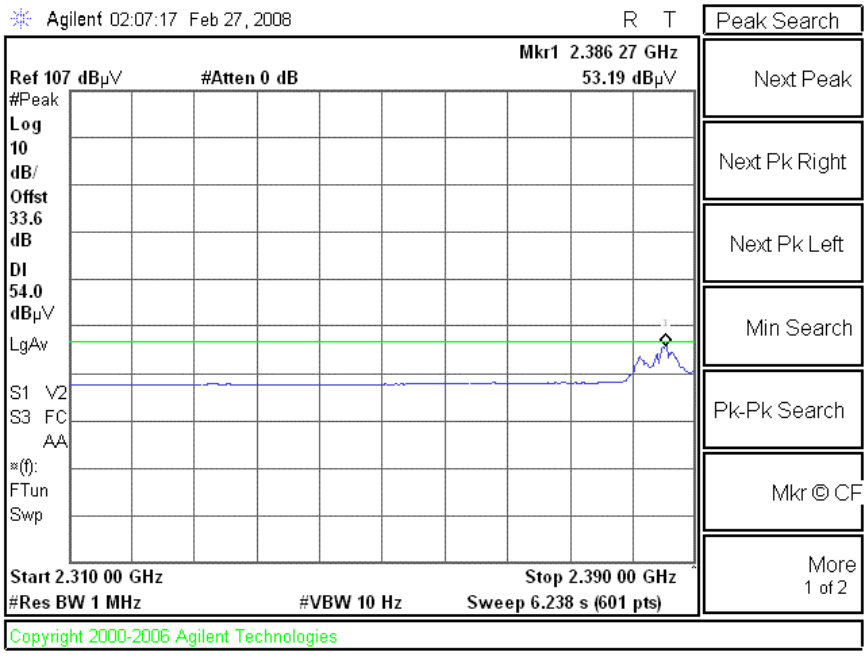
LOW CHANNEL RESTRICTED, AVG, VERT



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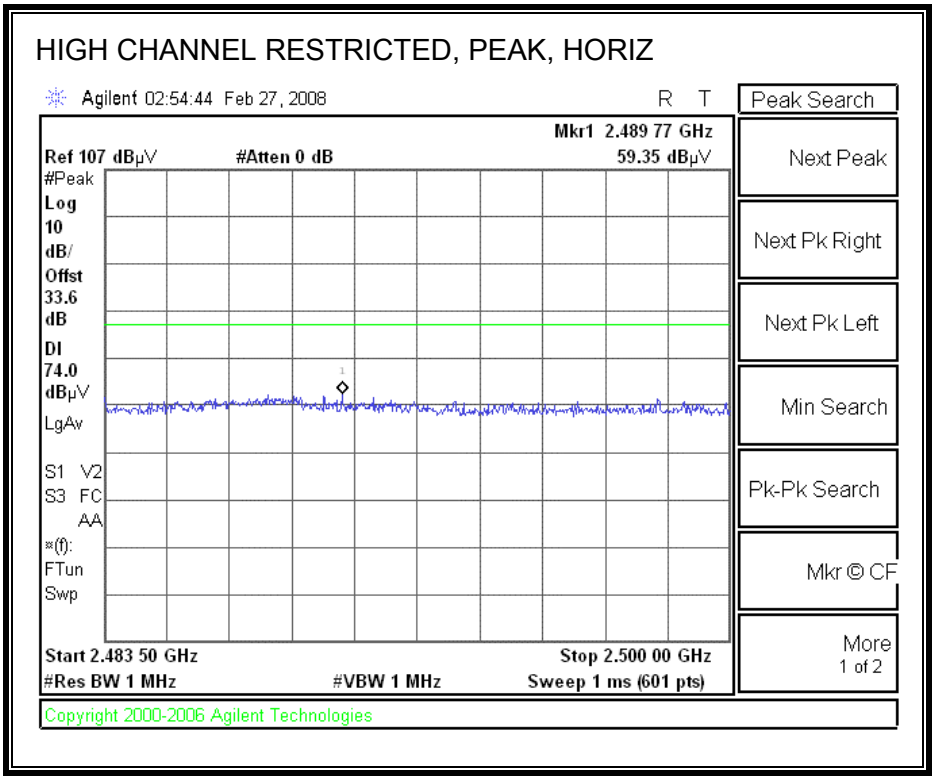
RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)



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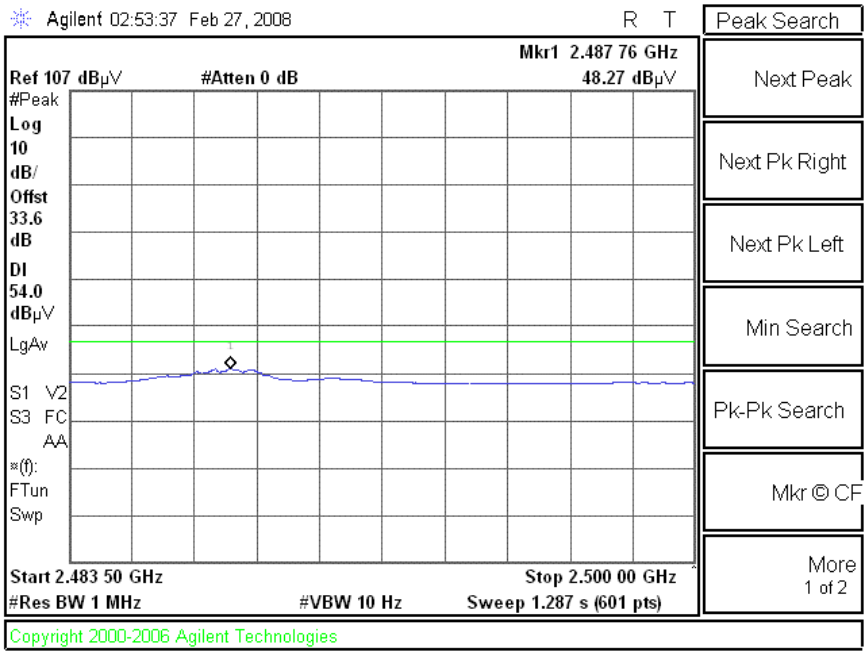
HIGH CHANNEL RESTRICTED, AVG, HORIZ



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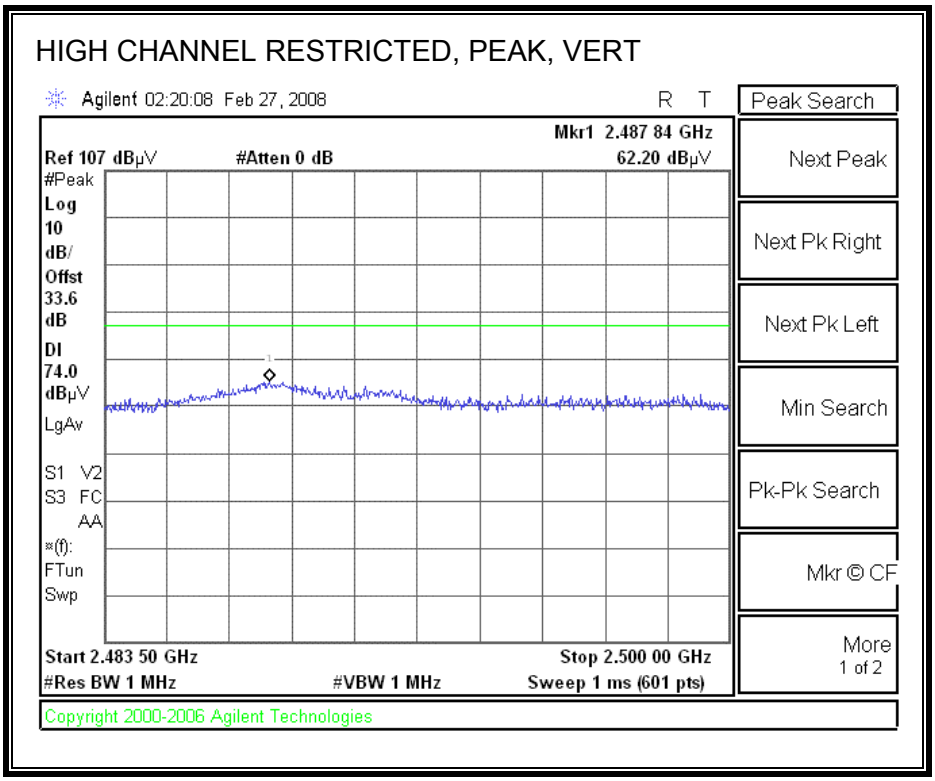
RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)



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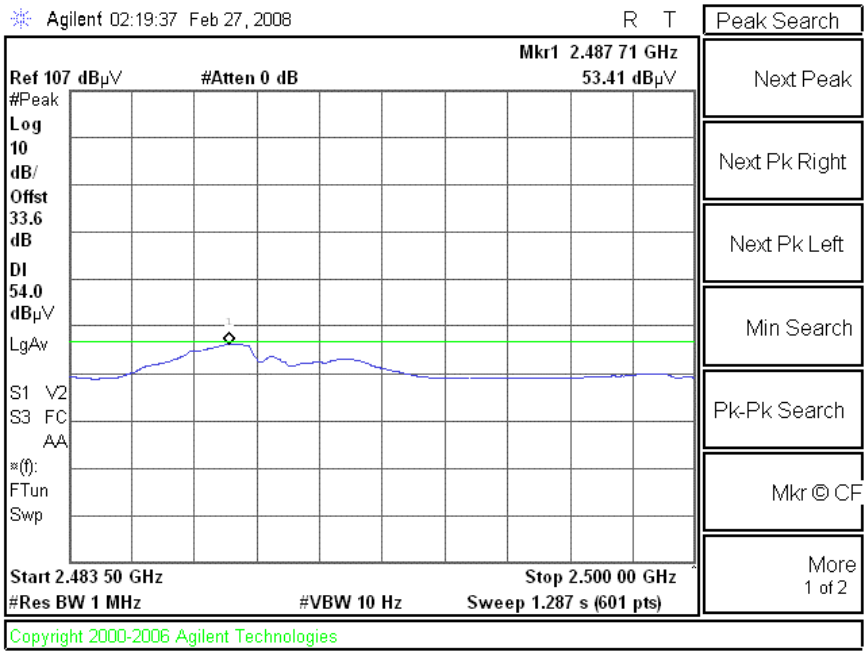
HIGH CHANNEL RESTRICTED, AVG, VERT



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HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement
Compliance Certification Services, Fremont 5m Chamber

Company: Atheros
Project #: 08U11571
Date: 2/26/2008
Test Engineer: Chin Pang
Configuration: EUT/Antenna/Laptop
Mode: b mode, TX
S/N: HB92-031-S-S0805
FEM #1

Test Equipment:

Horn 1-18GHz	Pre-amplifer 1-26GHz	Pre-amplifer 26-40GHz	Horn > 18GHz	Limit
T73; S/N: 6717 @3m	T34 HP 8449B			FCC 15.209

Hi Frequency Cables

2 foot cable	3 foot cable	12 foot cable	HPF	Reject Filter
		A-5m Chamber		R_001

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)
Low Ch (2412MHz)															
3.216	3.0	42.0	30.2	30.5	5.5	-35.7	0.0	0.0	42.3	30.5	74	54	-31.7	-23.5	V
4.824	3.0	49.0	47.0	33.3	6.9	-34.8	0.0	0.0	54.4	52.4	74	54	-19.6	-1.6	V
7.326	3.0	45.0	36.0	35.0	8.4	-34.1	0.0	0.0	54.3	45.3	74	54	-19.7	-8.7	V
Mid Ch (2437MHz)															
3.249	3.0	42.0	30.2	30.6	5.5	-35.7	0.0	0.0	42.5	30.7	74	54	-31.5	-23.3	V
4.874	3.0	49.5	48.0	33.4	6.9	-34.8	0.0	0.0	55.0	53.5	74	54	-19.0	-0.5	V
4.874	3.0	50.9	47.6	33.4	6.9	-34.8	0.0	0.0	56.3	53.1	74	54	-17.7	-0.9	V
7.311	3.0	43.0	33.2	35.0	8.4	-34.1	0.0	0.0	52.3	42.5	74	54	-21.7	-11.5	V
High Ch (2462MHz)															
3.283	3.0	41.6	29.5	30.7	5.6	-35.6	0.0	0.0	42.2	30.1	74	54	-31.8	-23.9	V
4.924	3.0	49.2	47.5	33.4	7.0	-34.8	0.0	0.0	54.8	53.1	74	54	-19.2	-0.9	V
7.386	3.0	43.5	33.5	35.0	8.4	-34.1	0.0	0.0	52.9	42.9	74	54	-21.1	-11.1	V

Rev. 4.12.7
Note: No other emissions were detected above the system noise floor.

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		

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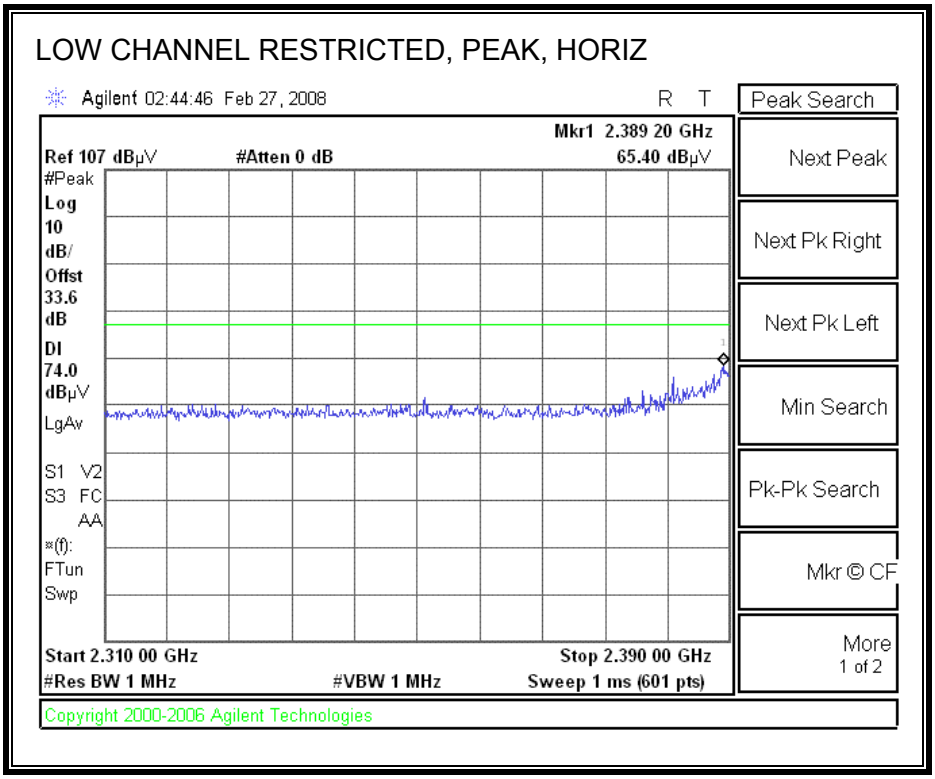
8.2.2. TRANSMITTER ABOVE 1 GHz FOR 802.11g MODE IN THE 2.4 GHz BAND

RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



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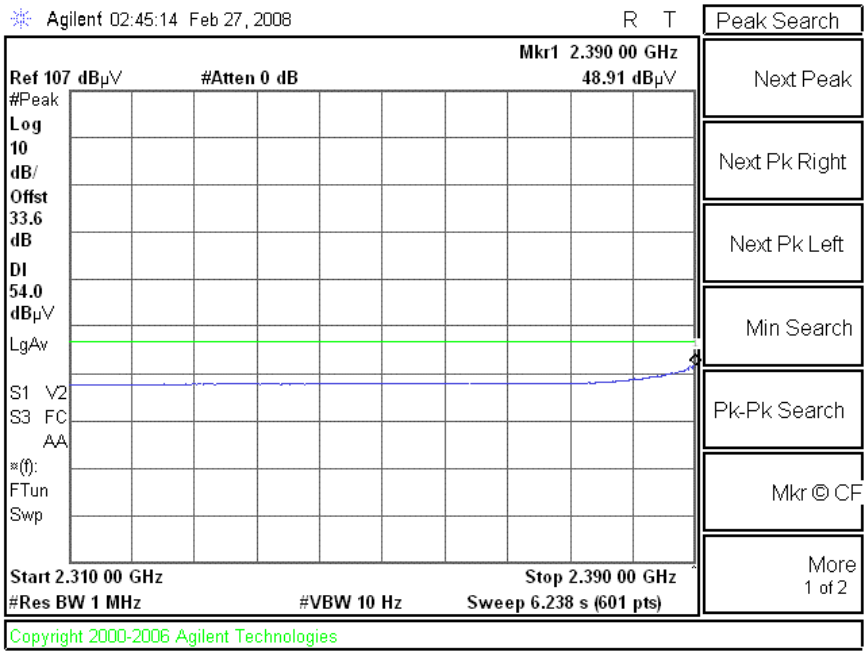
LOW CHANNEL RESTRICTED, AVG, HORIZ



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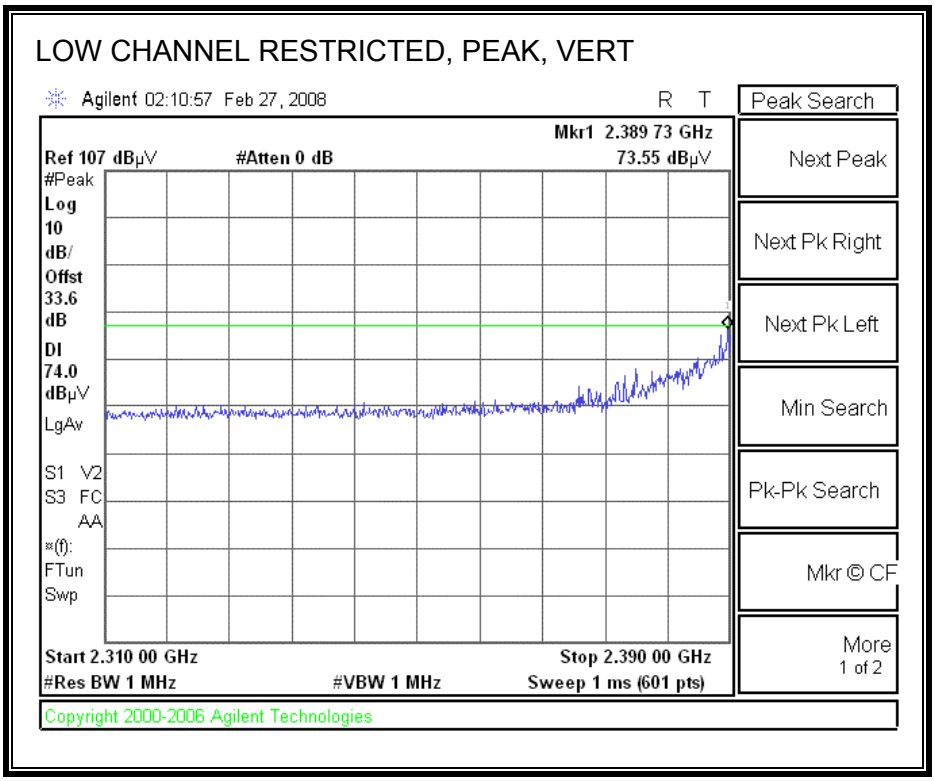
RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)



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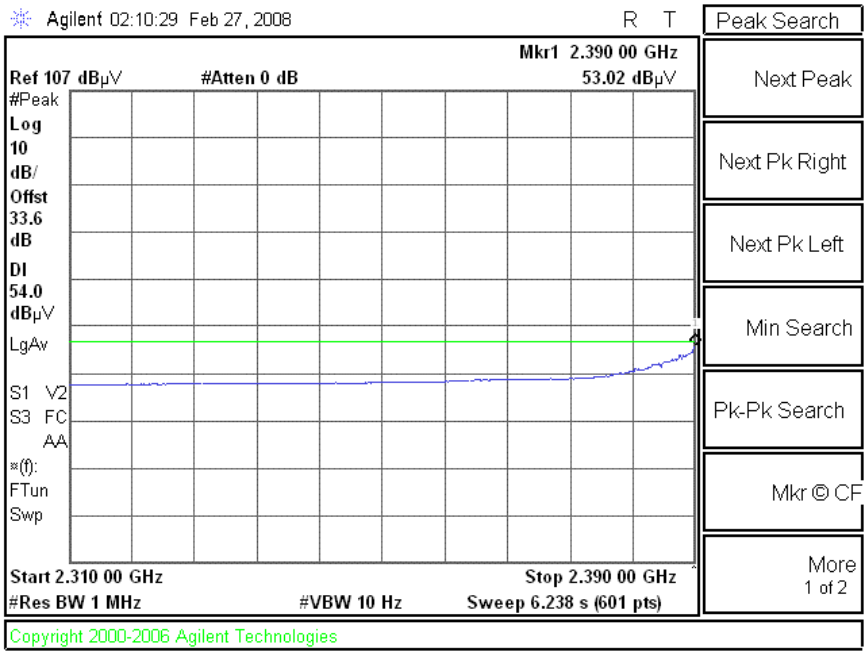
LOW CHANNEL RESTRICTED, AVG, VERT



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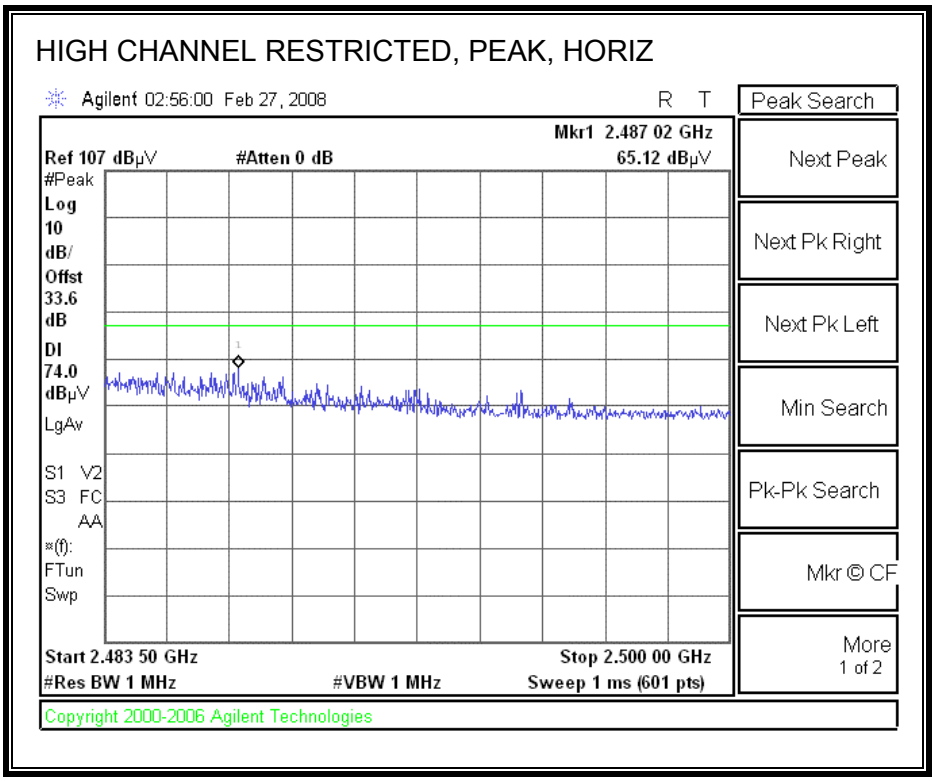
RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)



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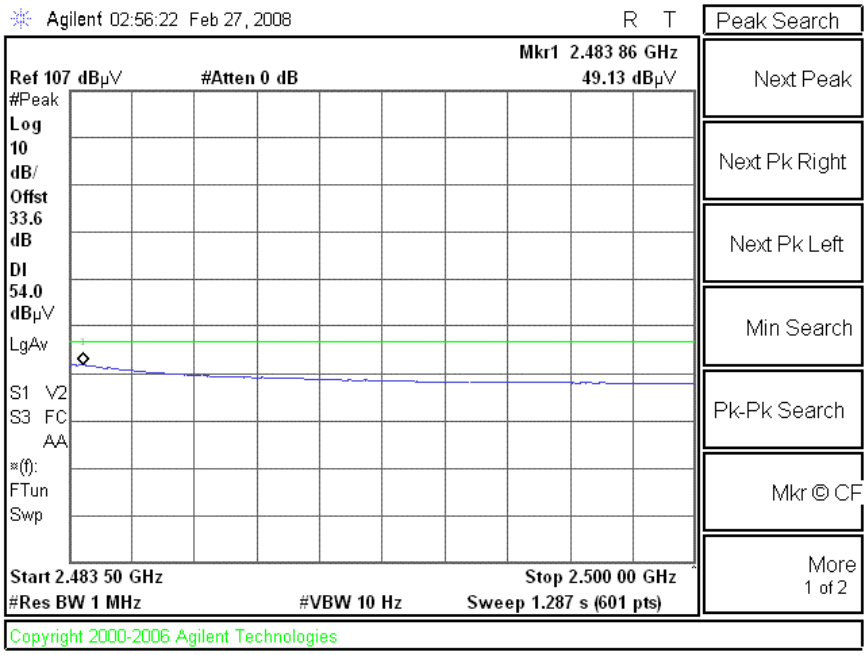
HIGH CHANNEL RESTRICTED, AVG, HORIZ



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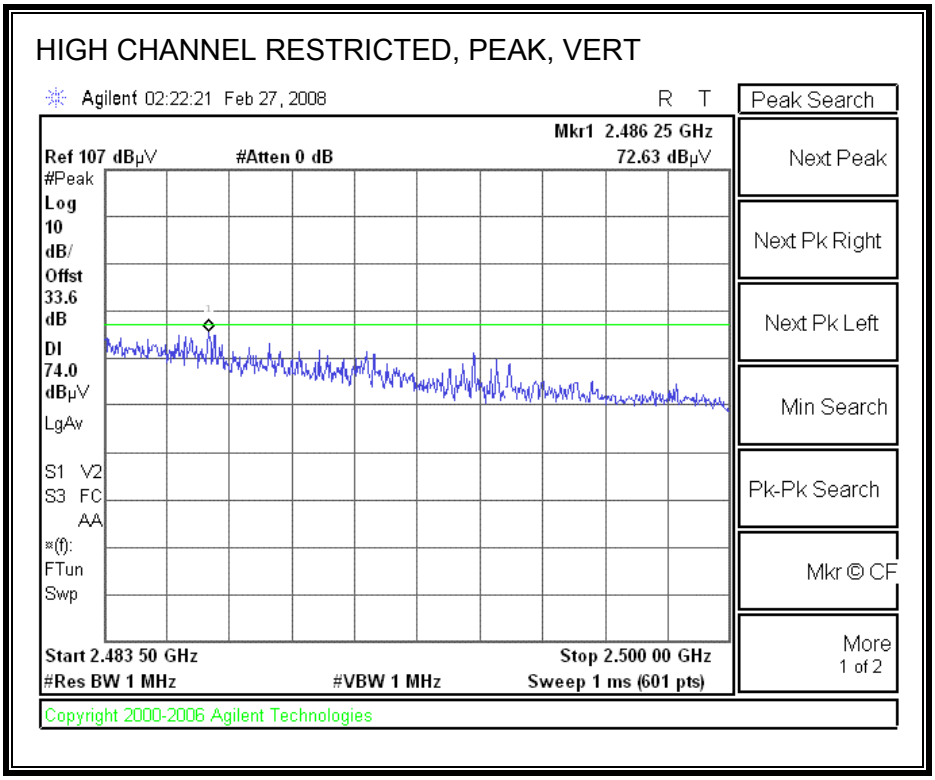
RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)



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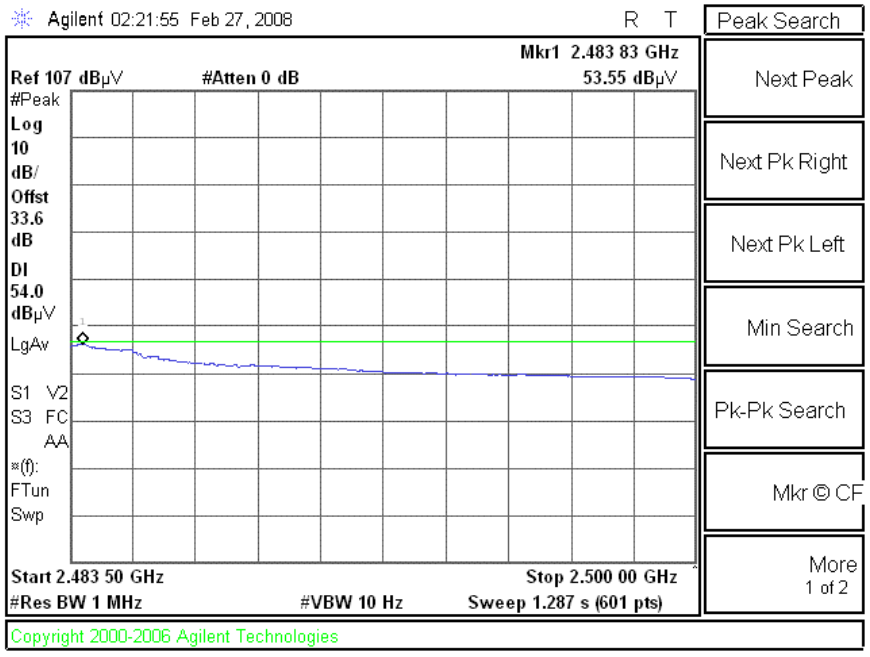
HIGH CHANNEL RESTRICTED, AVG, VERT



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HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement
Compliance Certification Services, Fremont 5m Chamber

Company: Atheros
Project #: 08U11571
Date: 2/27/2008
Test Engineer: Chin Pang
Configuration: EUT/Antenna/Laptop
Mode: g Mode, TX
S/N: HB92-031-S-S0805
FEM #1

Test Equipment:

Horn 1-18GHz	Pre-amplifer 1-26GHz	Pre-amplifer 26-40GHz	Horn > 18GHz	Limit
T73; S/N: 6717 @3m	T34 HP 8449B			FCC 15.209

Hi Frequency Cables

2 foot cable	3 foot cable	12 foot cable	HPF	Reject Filter
		A-5m Chamber		R_001

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)
Low Ch (2412MHz)															
3.216	3.0	44.0	36.0	30.5	5.5	-35.7	0.0	0.0	44.3	36.3	74	54	-29.7	-17.7	V
4.824	3.0	46.7	34.0	33.3	6.9	-34.8	0.0	0.0	52.1	39.4	74	54	-21.9	-14.6	V
7.326	3.0	45.0	30.0	35.0	8.4	-34.1	0.0	0.0	54.3	39.3	74	54	-19.7	-14.7	V
3.216	3.0	44.7	37.5	30.5	5.5	-35.7	0.0	0.0	45.0	37.8	74	54	-29.0	-16.2	H
4.824	3.0	43.9	32.0	33.3	6.9	-34.8	0.0	0.0	49.3	37.4	74	54	-24.7	-16.6	H
7.326	3.0	42.3	29.6	35.0	8.4	-34.1	0.0	0.0	51.6	38.9	74	54	-22.4	-15.1	H
Mid Ch (2437MHz)															
3.249	3.0	43.0	32.6	30.6	5.5	-35.7	0.0	0.0	43.5	33.1	74	54	-30.5	-20.9	V
4.874	3.0	47.1	34.4	33.4	6.9	-34.8	0.0	0.0	52.6	39.9	74	54	-21.4	-14.1	V
7.311	3.0	45.6	31.6	35.0	8.4	-34.1	0.0	0.0	54.9	40.9	74	54	-19.1	-13.1	V
3.249	3.0	43.7	33.2	30.6	5.5	-35.7	0.0	0.0	44.2	33.7	74	54	-29.8	-20.3	H
4.874	3.0	44.6	32.1	33.4	6.9	-34.8	0.0	0.0	50.1	37.6	74	54	-23.9	-16.4	H
7.311	3.0	42.0	30.0	35.0	8.4	-34.1	0.0	0.0	51.3	39.3	74	54	-22.7	-14.7	H
High Ch (2462MHz)															
3.283	3.0	43.0	32.0	30.7	5.6	-35.6	0.0	0.0	43.6	32.6	74	54	-30.4	-21.4	V
4.924	3.0	46.5	34.4	33.4	7.0	-34.8	0.0	0.0	52.1	40.0	74	54	-21.9	-14.0	V
7.386	3.0	46.0	32.0	35.0	8.4	-34.1	0.0	0.0	55.4	41.4	74	54	-18.6	-12.6	V
3.283	3.0	43.4	32.3	30.7	5.6	-35.6	0.0	0.0	44.0	32.9	74	54	-30.0	-21.1	H
4.924	3.0	44.7	32.2	33.4	7.0	-34.8	0.0	0.0	50.3	37.8	74	54	-23.7	-16.2	H
7.386	3.0	43.8	31.2	35.0	8.4	-34.1	0.0	0.0	53.2	40.6	74	54	-20.8	-13.4	H

Rev. 4.12.7
Note: No other emissions were detected above the system noise floor.

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		

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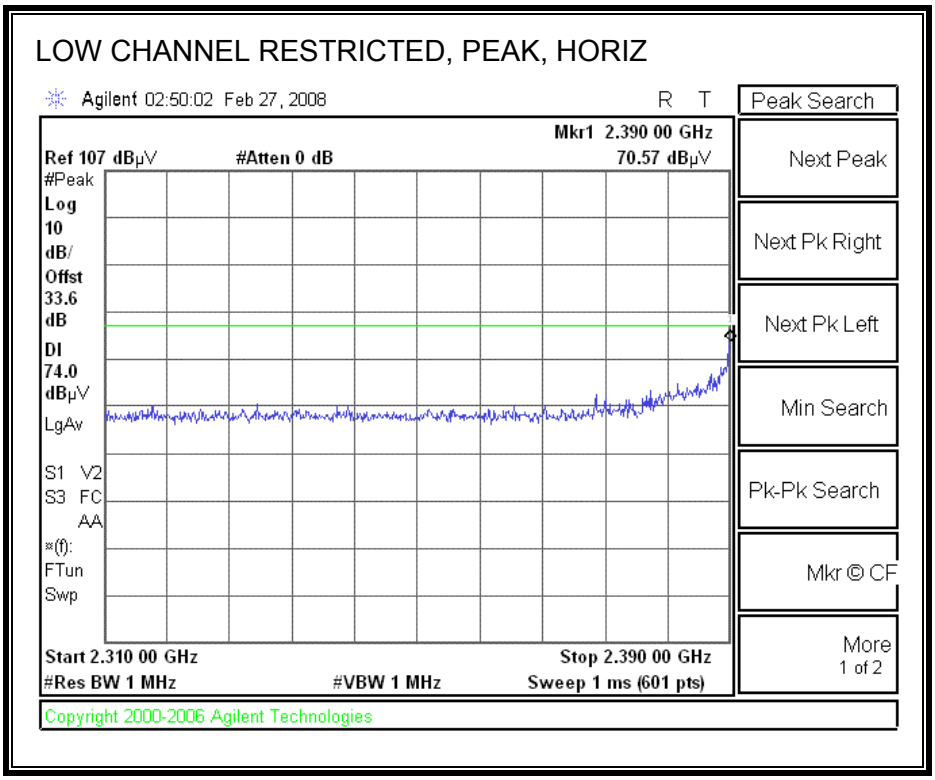
8.2.3. TRANSMITTER ABOVE 1 GHz FOR 802.11n HT20 MODE IN THE 2.4 GHz BAND

RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



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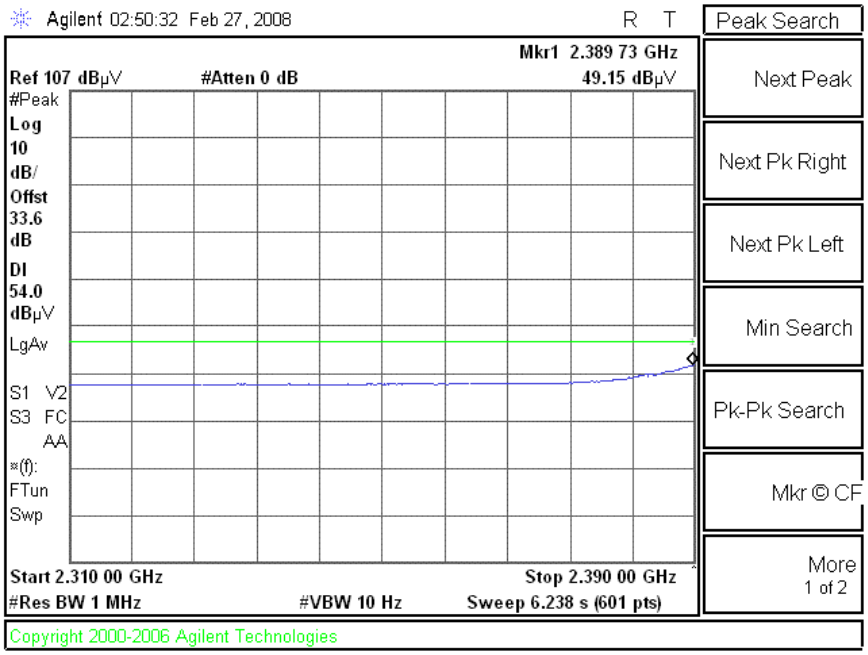
LOW CHANNEL RESTRICTED, AVG, HORIZ



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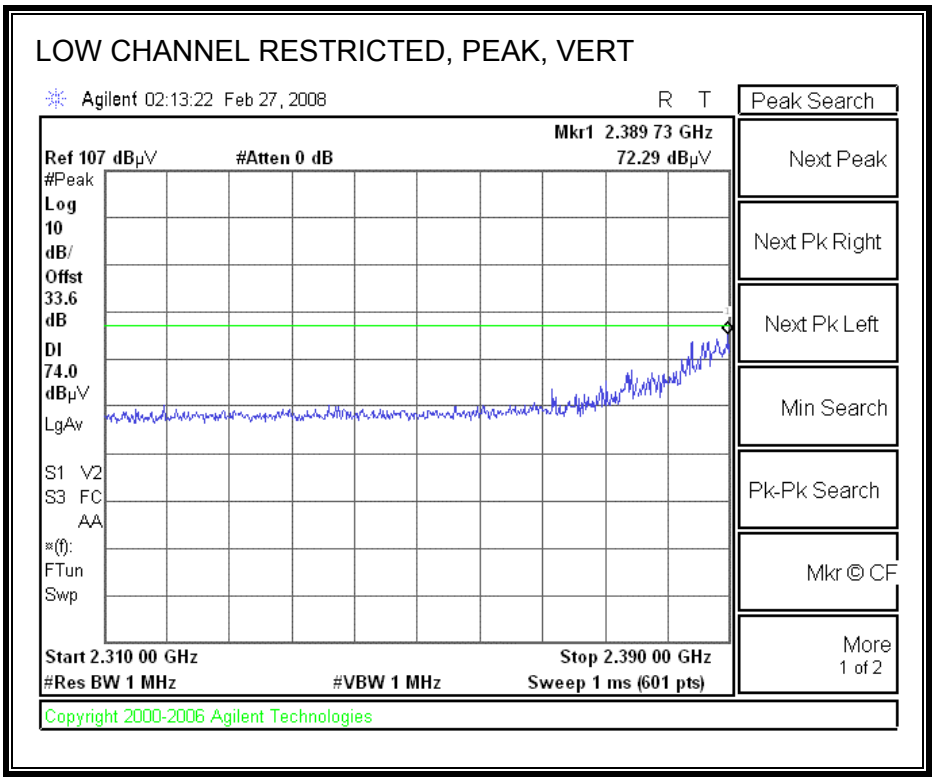
RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)



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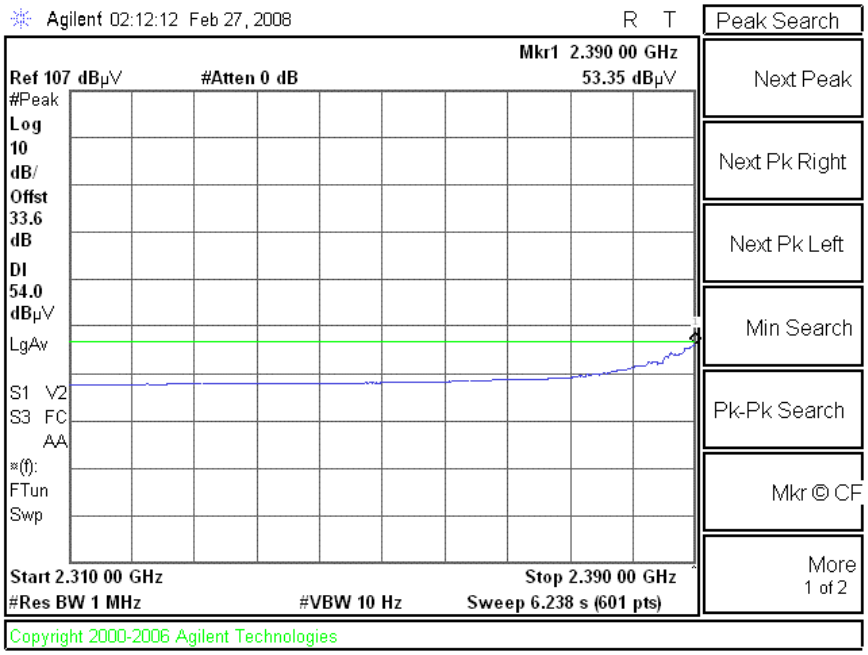
LOW CHANNEL RESTRICTED, AVG, VERT



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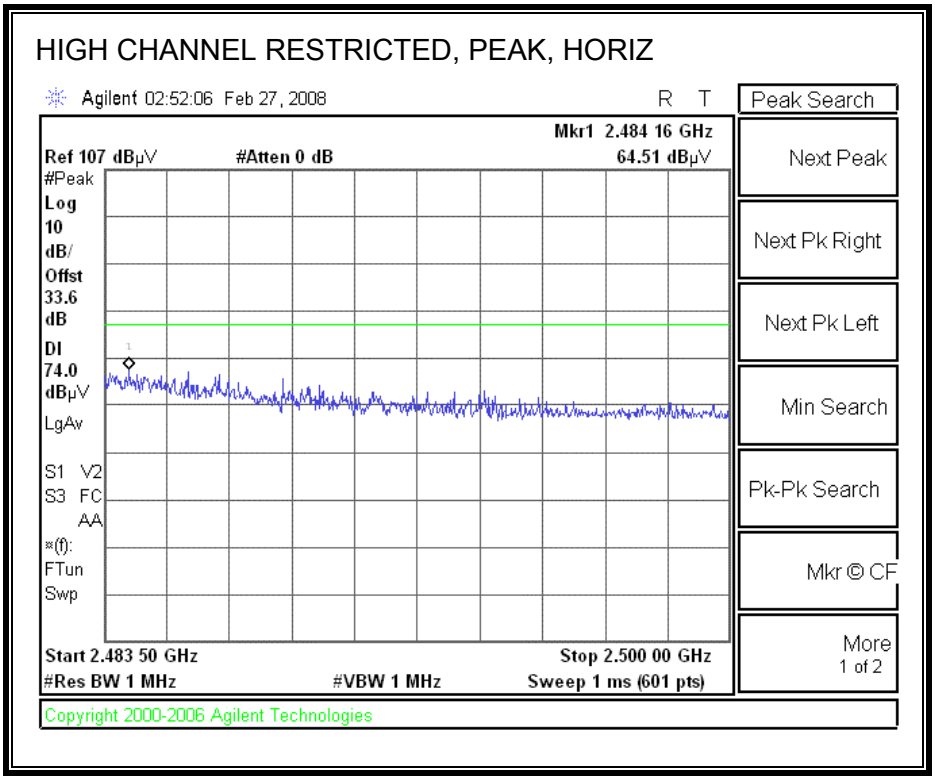
RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)



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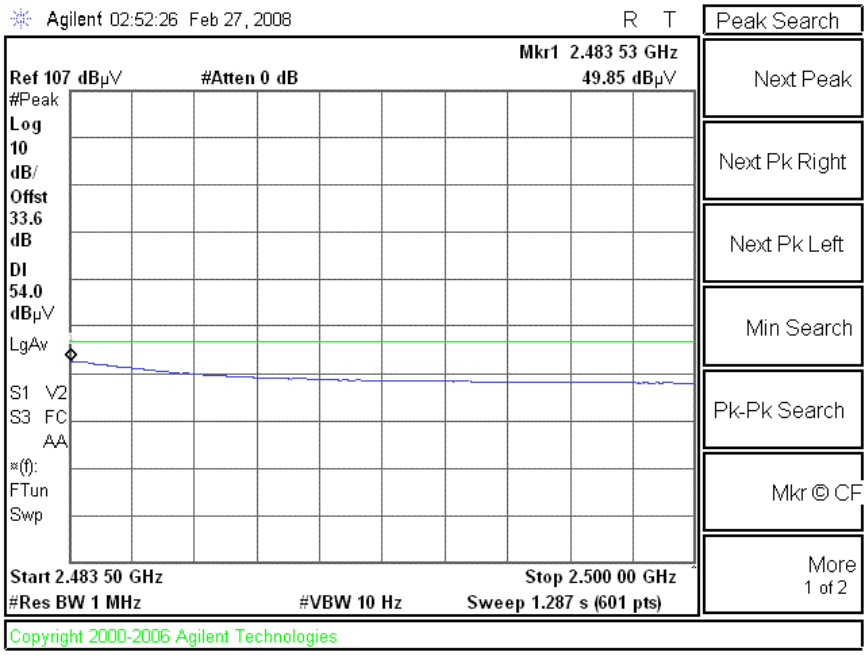
HIGH CHANNEL RESTRICTED, AVG, HORIZ



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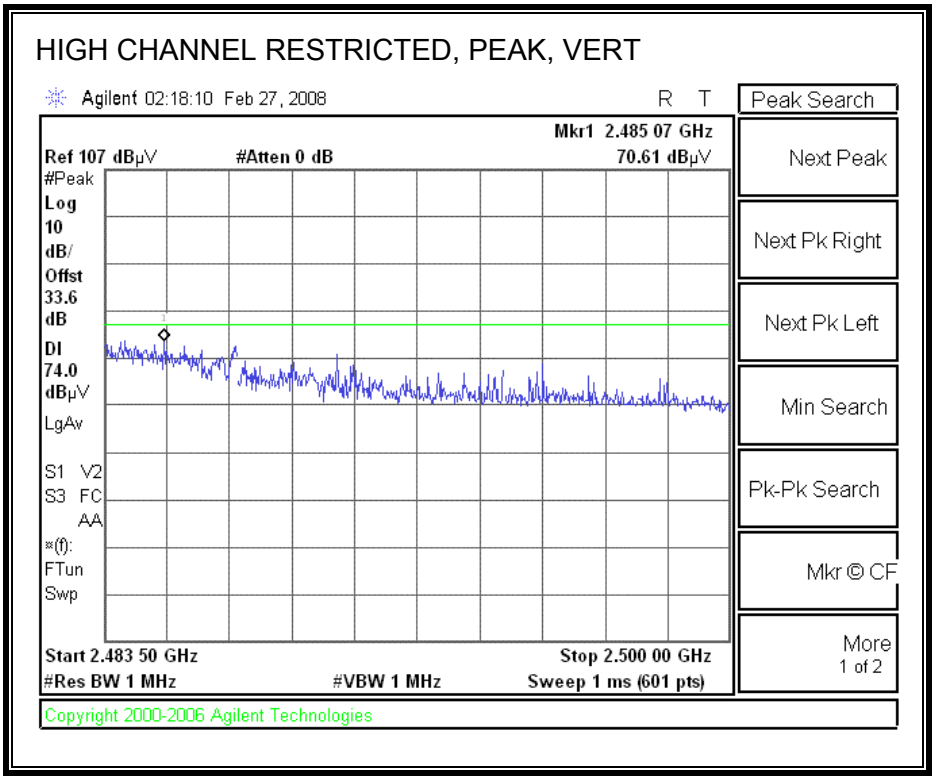
RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)



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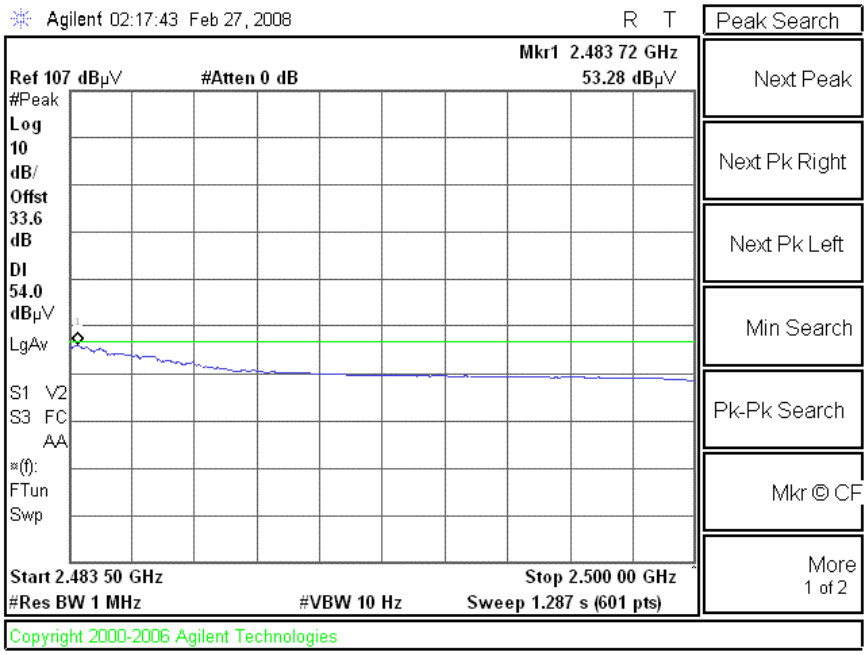
HIGH CHANNEL RESTRICTED, AVG, VERT



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HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement
Compliance Certification Services, Fremont 5m Chamber

Company: Atheros
Project #: 08U11571
Date: 2/27/2008
Test Engineer: Chin Pang
Configuration: EUT/Antenna/Laptop
Mode: HT20, TX
S/N: HB92-031-S-S0805
FEM #1

Test Equipment:

Horn 1-18GHz	Pre-amplifer 1-26GHz	Pre-amplifer 26-40GHz	Horn > 18GHz	Limit
T73; S/N: 6717 @3m	T34 HP 8449B			FCC 15.209

Hi Frequency Cables

2 foot cable	3 foot cable	12 foot cable	HPF	Reject Filter
		A-5m Chamber		R_001

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)
Low Ch (2412MHz)															
3.216	3.0	43.5	31.6	30.5	5.5	-35.7	0.0	0.0	43.8	31.9	74	54	-30.2	-22.1	V
4.824	3.0	45.0	32.0	33.3	6.9	-34.8	0.0	0.0	50.4	37.4	74	54	-23.6	-16.6	V
7.326	3.0	43.0	30.0	35.0	8.4	-34.1	0.0	0.0	52.3	39.3	74	54	-21.7	-14.7	V
3.216	3.0	45.6	39.4	30.5	5.5	-35.7	0.0	0.0	45.9	39.7	74	54	-28.1	-14.3	H
4.824	3.0	43.7	30.7	33.3	6.9	-34.8	0.0	0.0	49.1	36.1	74	54	-24.9	-17.9	H
7.326	3.0	42.0	29.3	35.0	8.4	-34.1	0.0	0.0	51.3	38.6	74	54	-22.7	-15.4	H
Mid Ch (2437MHz)															
3.249	3.0	42.8	34.0	30.6	5.5	-35.7	0.0	0.0	43.3	34.5	74	54	-30.7	-19.5	V
4.874	3.0	47.2	33.0	33.4	6.9	-34.8	0.0	0.0	52.7	38.5	74	54	-21.3	-15.5	V
7.311	3.0	44.0	31.6	35.0	8.4	-34.1	0.0	0.0	53.3	40.9	74	54	-20.7	-13.1	V
3.249	3.0	43.0	35.7	30.6	5.5	-35.7	0.0	0.0	43.5	36.2	74	54	-30.5	-17.8	H
4.874	3.0	45.0	32.6	33.4	6.9	-34.8	0.0	0.0	50.5	38.1	74	54	-23.5	-15.9	H
7.311	3.0	43.5	31.3	35.0	8.4	-34.1	0.0	0.0	52.8	40.6	74	54	-21.2	-13.4	H
High Ch (2462MHz)															
3.283	3.0	42.0	31.6	30.7	5.6	-35.6	0.0	0.0	42.6	32.2	74	54	-31.4	-21.8	V
4.924	3.0	46.3	33.5	33.4	7.0	-34.8	0.0	0.0	51.9	39.1	74	54	-22.1	-14.9	V
7.386	3.0	45.0	31.4	35.0	8.4	-34.1	0.0	0.0	54.4	40.8	74	54	-19.6	-13.2	V
3.283	3.0	42.5	32.0	30.7	5.6	-35.6	0.0	0.0	43.1	32.6	74	54	-30.9	-21.4	H
4.924	3.0	44.2	32.3	33.4	7.0	-34.8	0.0	0.0	49.8	37.9	74	54	-24.2	-16.1	H
7.386	3.0	43.8	31.7	35.0	8.4	-34.1	0.0	0.0	53.2	41.1	74	54	-20.8	-12.9	H

Rev. 4.12.7
Note: No other emissions were detected above the system noise floor.

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		

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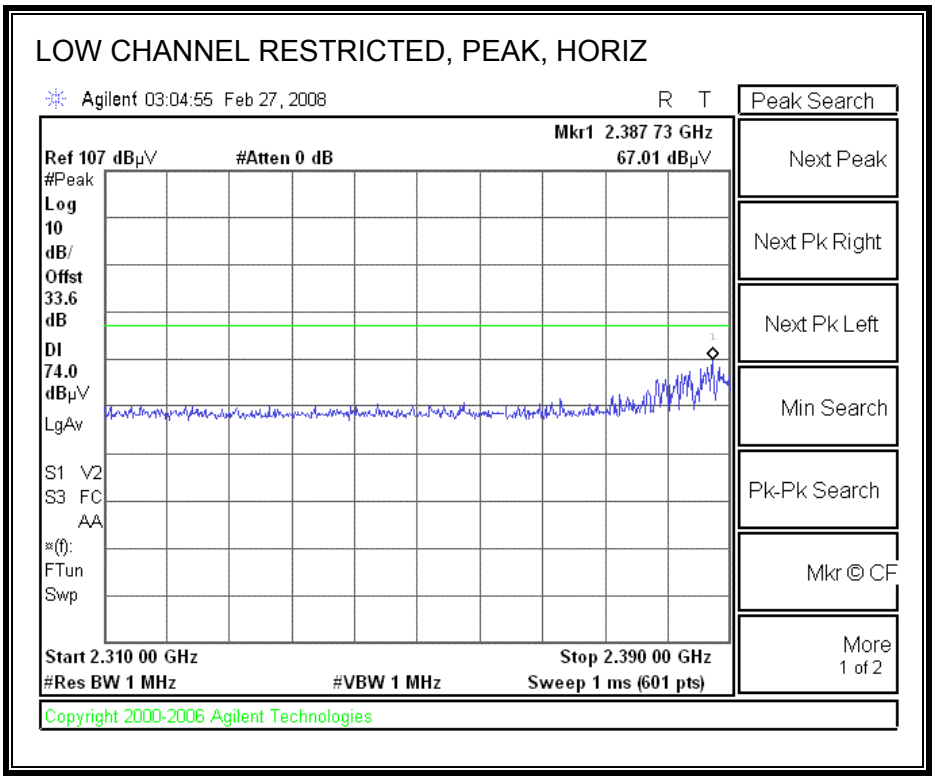
8.2.4. TRANSMITTER ABOVE 1 GHz FOR 802.11n HT40 MODE IN THE 2.4 GHz BAND

RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



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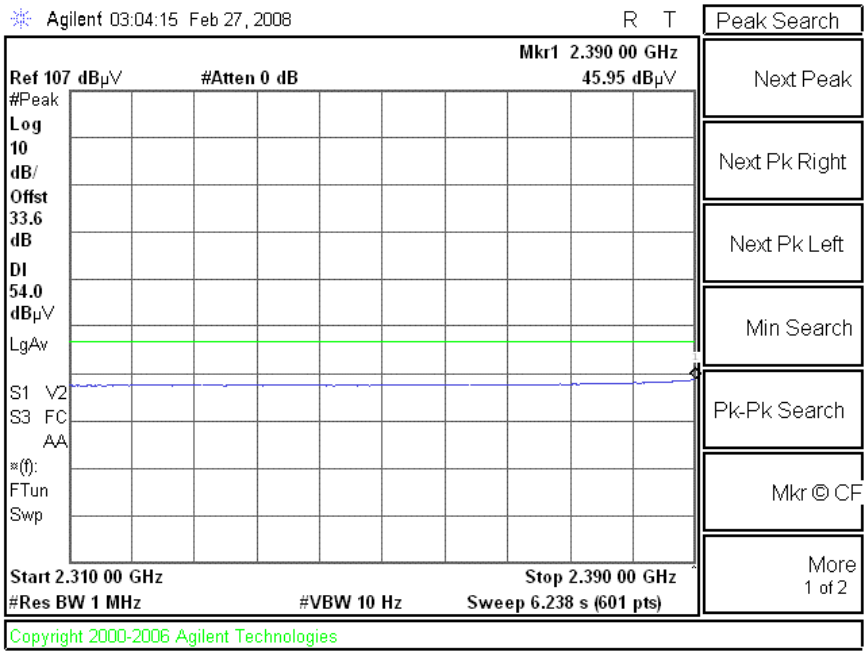
LOW CHANNEL RESTRICTED, AVG, HORIZ



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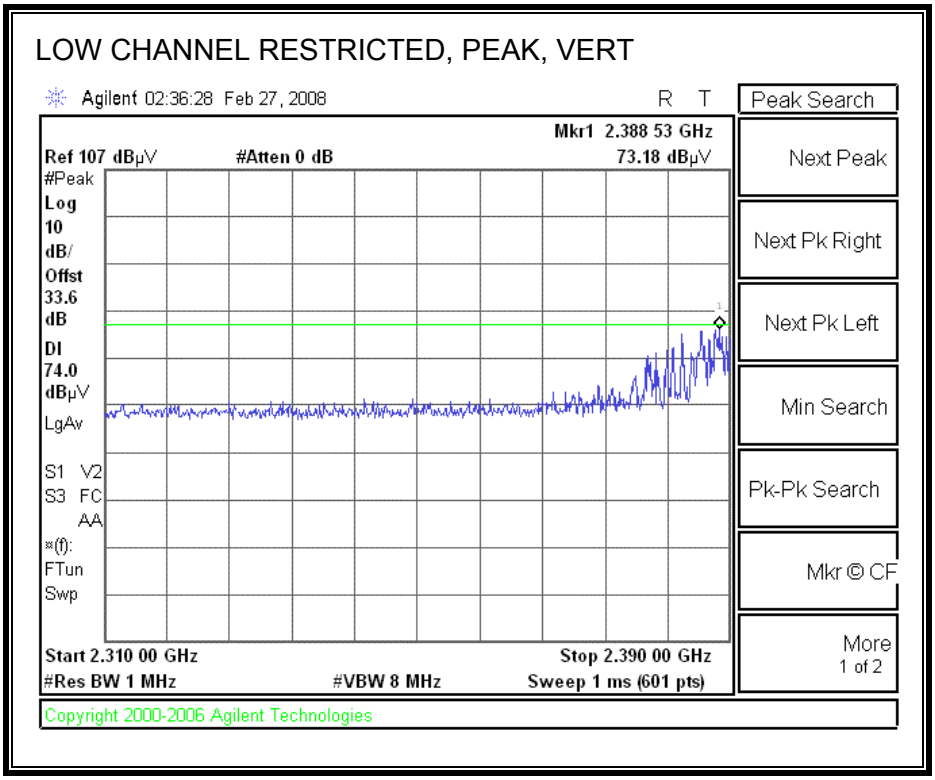
RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)



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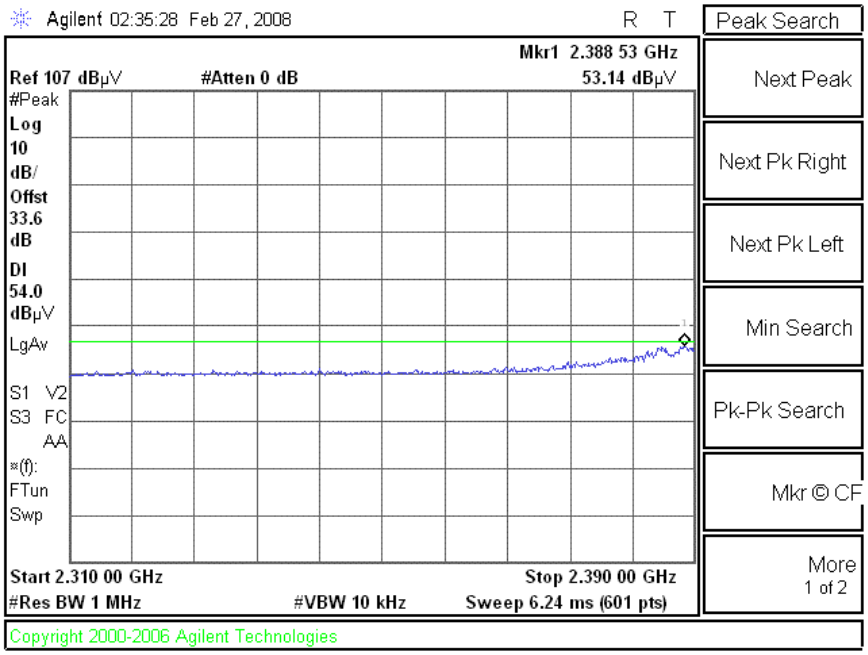
LOW CHANNEL RESTRICTED, AVG, VERT



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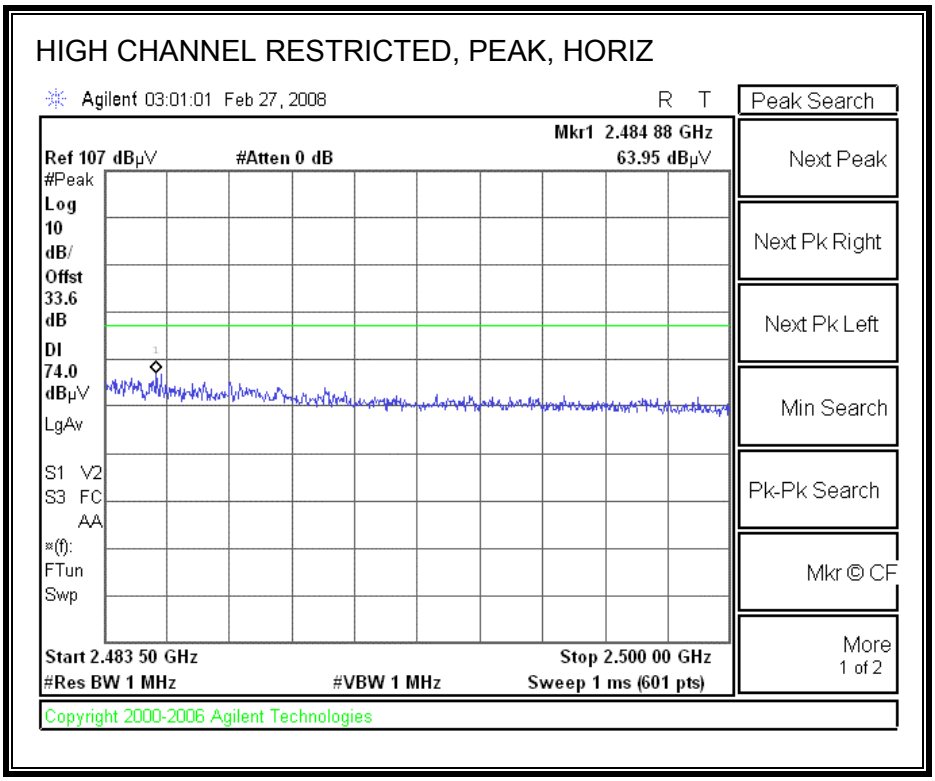
RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)



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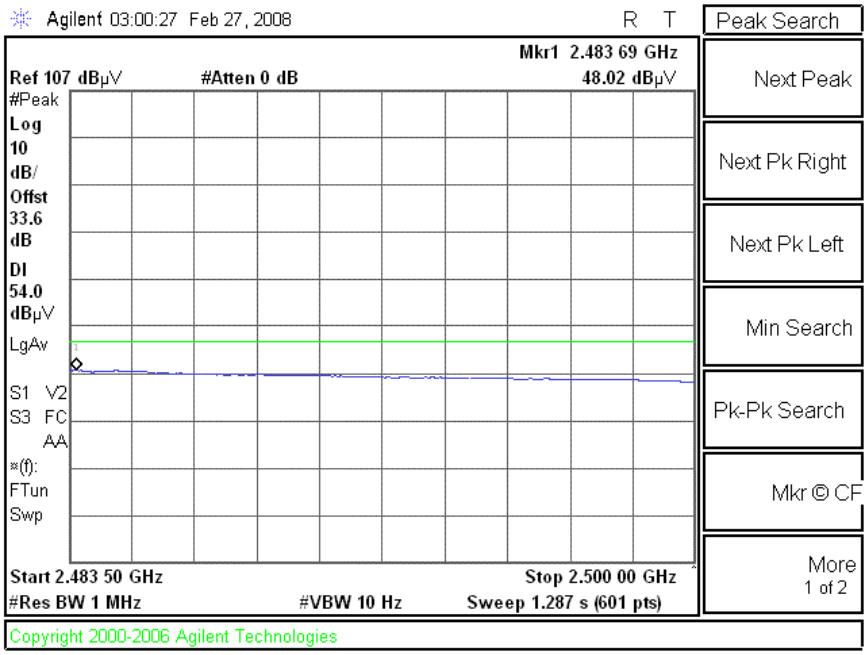
HIGH CHANNEL RESTRICTED, AVG, HORIZ



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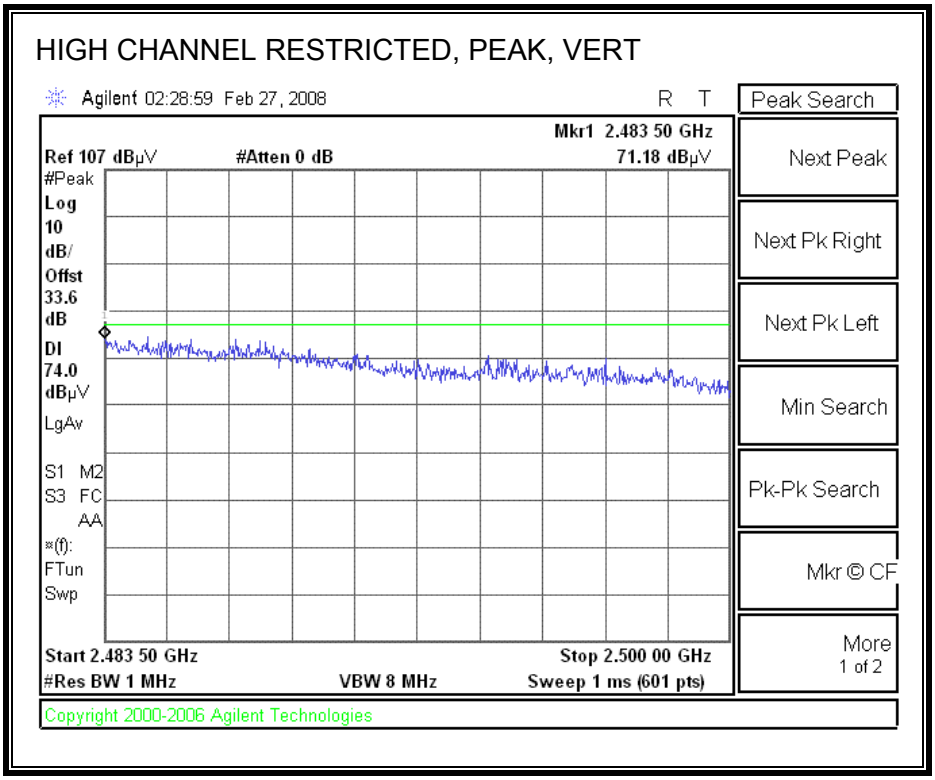
RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)



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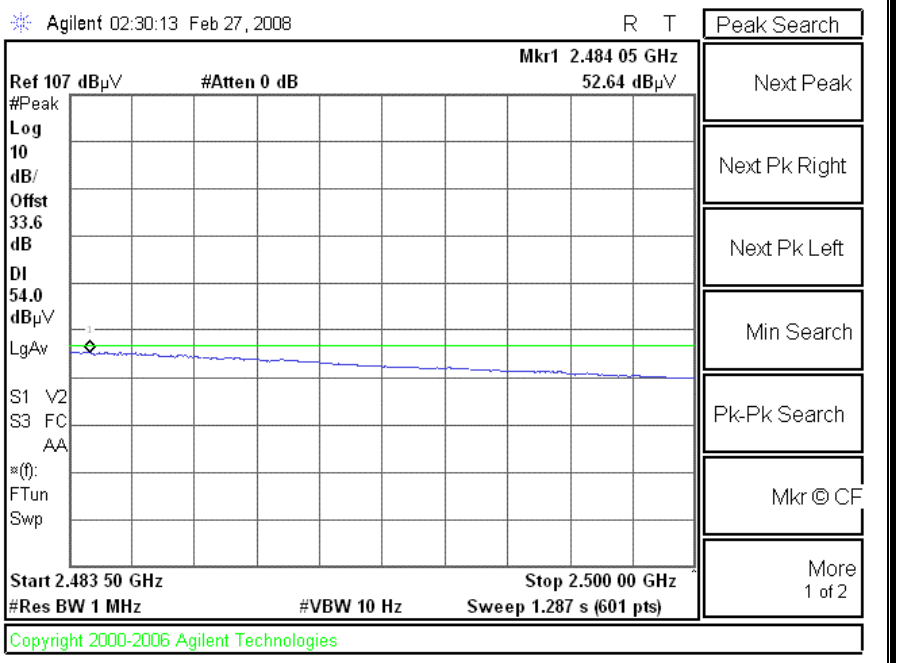
HIGH CHANNEL RESTRICTED, AVG, VERT



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HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement
Compliance Certification Services, Fremont 5m Chamber

Company: Atheros
Project #: 08U11571
Date: 2/27/2008
Test Engineer: Chin Pang
Configuration: EUT/Antenna/Laptop
Mode: HT40, TX
S/N: HB92-031-S-S0805
FEM #1

Test Equipment:

Horn 1-18GHz	Pre-amplifer 1-26GHz	Pre-amplifer 26-40GHz	Horn > 18GHz	Limit
T73; S/N: 6717 @3m	T34 HP 8449B			FCC 15.209

Hi Frequency Cables

2 foot cable	3 foot cable	12 foot cable	HPF	Reject Filter
		A-5m Chamber		R_001

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)
Low Ch (2422MHz)															
3.229	3.0	43.5	31.6	30.6	5.5	-35.7	0.0	0.0	43.9	32.0	74	54	-30.1	-22.0	V
4.844	3.0	45.0	31.8	33.3	6.9	-34.8	0.0	0.0	50.4	37.2	74	54	-23.6	-16.8	V
7.266	3.0	43.0	29.1	35.0	8.4	-34.1	0.0	0.0	52.2	38.3	74	54	-21.8	-15.7	V
3.229	3.0	44.0	32.0	30.6	5.5	-35.7	0.0	0.0	44.4	32.4	74	54	-29.6	-21.6	H
4.844	3.0	43.6	30.6	33.3	6.9	-34.8	0.0	0.0	49.0	36.0	74	54	-25.0	-18.0	H
7.266	3.0	42.3	29.0	35.0	8.4	-34.1	0.0	0.0	51.5	38.2	74	54	-22.5	-15.8	H
Mid Ch (2437MHz)															
3.249	3.0	42.5	32.0	30.6	5.5	-35.7	0.0	0.0	43.0	32.5	74	54	-31.0	-21.5	V
4.874	3.0	46.8	33.0	33.4	6.9	-34.8	0.0	0.0	52.3	38.5	74	54	-21.7	-15.5	V
7.311	3.0	43.0	30.4	35.0	8.4	-34.1	0.0	0.0	52.3	39.7	74	54	-21.7	-14.3	V
3.249	3.0	43.6	33.7	30.6	5.5	-35.7	0.0	0.0	44.1	34.2	74	54	-29.9	-19.8	H
4.874	3.0	44.7	31.8	33.4	6.9	-34.8	0.0	0.0	50.2	37.3	74	54	-23.8	-16.7	H
7.311	3.0	42.6	30.5	35.0	8.4	-34.1	0.0	0.0	51.9	39.8	74	54	-22.1	-14.2	H
High Ch (2452MHz)															
3.269	3.0	42.5	31.0	30.7	5.6	-35.6	0.0	0.0	43.1	31.6	74	54	-30.9	-22.4	V
4.904	3.0	47.0	33.4	33.4	7.0	-34.8	0.0	0.0	52.5	38.9	74	54	-21.5	-15.1	V
7.356	3.0	44.3	32.3	35.0	8.4	-34.1	0.0	0.0	53.7	41.7	74	54	-20.3	-12.3	V
3.269	3.0	43.6	33.0	30.7	5.6	-35.6	0.0	0.0	44.2	33.6	74	54	-29.8	-20.4	H
4.904	3.0	45.5	31.5	33.4	7.0	-34.8	0.0	0.0	51.0	37.0	74	54	-23.0	-17.0	H
7.356	3.0	43.2	30.8	35.0	8.4	-34.1	0.0	0.0	52.6	40.2	74	54	-21.4	-13.8	H

Rev. 4.12.7
Note: No other emissions were detected above the system noise floor.

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8.2.5. TRANSMITTER ABOVE 1 GHz FOR 802.11a MODE IN THE 5.8 GHz BAND

HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement
Compliance Certification Services, Fremont 5m Chamber

Company: Atheros Communications
Project #: 08U11571
Date: 2/28/2008
Test Engineer: Chin Pang
Configuration: EUT/Antenna/Laptop
Mode: Tx a mode

Test Equipment:

Horn 1-18GHz	Pre-amplifer 1-26GHz	Pre-amplifer 26-40GHz	Horn > 18GHz	Limit
T73; S/N: 6717 @3m	T34 HP 8449B	T88 Miteq 26-40GHz	T39-T88 ARA 18-40GHz & Mixer > 40GHz	FCC 15.205

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)
5745MHz															
11.490	1.0	55.7	43.5	37.5	11.6	-32.5	-9.5	0.7	63.4	51.2	74	54	-10.6	-2.8	V
11.490	1.0	48.6	38.0	37.5	11.6	-32.5	-9.5	0.7	56.3	45.7	74	54	-17.7	-8.3	H
5785MHz															
11.570	1.0	56.0	44.2	37.5	11.7	-32.5	-9.5	0.7	63.8	52.0	74	54	-10.2	-2.0	V
11.570	1.0	50.0	38.6	37.5	11.7	-32.5	-9.5	0.7	57.8	46.4	74	54	-16.2	-7.6	H
5825MHz															
11.650	1.0	54.0	42.0	37.5	11.8	-32.5	-9.5	0.7	61.9	49.9	74	54	-12.1	-4.1	V
11.650	1.0	47.4	35.0	37.5	11.8	-32.5	-9.5	0.7	55.3	42.9	74	54	-18.7	-11.1	H

Rev. 4.12.7
Note: No other emissions were detected above the system noise floor.

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		

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8.2.6. TRANSMITTER ABOVE 1 GHz FOR 802.11n HT20 MODE IN THE 5.8 GHz BAND

HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement
Compliance Certification Services, Fremont 5m Chamber

Company: Atheros Communications
Project #: 08U11571
Date: 2/28/2008
Test Engineer: Chin Pang
Configuration: EUT/Antenna/Laptop
Mode: Tx HT20 mode

Test Equipment:

Horn 1-18GHz	Pre-amplifer 1-26GHz	Pre-amplifer 26-40GHz	Horn > 18GHz	Limit
T73; S/N: 6717 @3m	T34 HP 8449B	T88 Miteq 26-40GHz	T39-T88 ARA 18-40GHz & Mixer > 40GHz	FCC 15.205

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)
5745MHz															
11.490	1.0	55.4	43.0	37.5	11.6	-32.5	-9.5	0.7	63.1	50.7	74	54	-10.9	-3.3	V
11.490	1.0	51.2	37.6	37.5	11.6	-32.5	-9.5	0.7	58.9	45.3	74	54	-15.1	-8.7	H
5785MHz															
11.570	1.0	56.0	43.5	37.5	11.7	-32.5	-9.5	0.7	63.8	51.3	74	54	-10.2	-2.7	V
11.570	1.0	53.2	38.2	37.5	11.7	-32.5	-9.5	0.7	61.0	46.0	74	54	-13.0	-8.0	H
5825MHz															
11.650	1.0	54.8	41.0	37.5	11.8	-32.5	-9.5	0.7	62.7	48.9	74	54	-11.3	-5.1	V
11.650	1.0	51.6	36.0	37.5	11.8	-32.5	-9.5	0.7	59.5	43.9	74	54	-14.5	-10.1	H

Rev. 4.12.7
Note: No other emissions were detected above the system noise floor.

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		

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8.2.7. TRANSMITTER ABOVE 1 GHz FOR 802.11n HT40 MODE IN THE 5.8 GHz BAND

HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement
Compliance Certification Services, Fremont 5m Chamber

Company: Atheros Communications
Project #: 08U11571
Date: 2/28/2008
Test Engineer: Chin Pang
Configuration: EUT/Antenna/Laptop.
Mode: Tx HT40 mode

Test Equipment:

Horn 1-18GHz	Pre-amplifer 1-26GHz	Pre-amplifer 26-40GHz	Horn > 18GHz	Limit
T73; S/N: 6717 @3m	T34 HP 8449B	T88 Miteq 26-40GHz	T39-T88 ARA 18-40GHz & Mixer > 40GHz	FCC 15.205

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)
Low channel (5755MHz)															
11.510	1.0	52.6	42.5	37.5	11.6	-32.5	-9.5	0.7	60.3	50.2	74	54	-13.7	-3.8	V
11.510	1.0	46.5	33.5	37.5	11.6	-32.5	-9.5	0.7	54.2	41.2	74	54	-19.8	-12.8	H
High Channel (5795MHz)															
11.590	1.0	51.5	42.0	37.5	11.7	-32.5	-9.5	0.7	59.4	49.9	74	54	-14.6	-4.1	V
11.590	1.0	47.0	35.0	37.5	11.7	-32.5	-9.5	0.7	54.9	42.9	74	54	-19.1	-11.1	H

Rev. 4.12.7
Note: No other emissions were detected above the system noise floor.

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		

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8.3. RECEIVER ABOVE 1 GHz

High Frequency Measurement
Compliance Certification Services, Fremont 5m Chamber

Company: Atheros Communications
Project #: 08U11571
Date: 2/29/2008
Test Engineer: Chin Pang
Configuration: EUT/Antenna/Laptop
Mode: 2.4GHz RX (Worst Case)

Test Equipment:

Horn 1-18GHz	Pre-amplifer 1-26GHz	Pre-amplifer 26-40GHz	Horn > 18GHz	Limit
T73; S/N: 6717 @3m	T34 HP 8449B			FCC 15.209

Hi Frequency Cables

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

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)
Mid Ch															
1.062	3.0	54.0	34.2	25.9	3.1	-38.2	0.0	0.0	44.8	25.0	74	54	-29.2	-29.0	V
2.492	3.0	58.5	36.0	29.5	4.9	-36.3	0.0	0.0	56.7	34.2	74	54	-17.3	-19.8	V
1.062	3.0	53.4	33.5	25.9	3.1	-38.2	0.0	0.0	44.2	24.3	74	54	-29.8	-29.7	H
2.500	3.0	57.8	34.1	29.5	4.9	-36.3	0.0	0.0	56.0	32.3	74	54	-18.0	-21.7	H

Rev. 4.12.7
Note: No other emissions were detected above the system noise floor.

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		

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8.4. WORST-CASE BELOW 1 GHz

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

HORIZONTAL DATA

```
Condition: FCC CLASS-B HORIZONTAL
Test Operator: Chin Pang
Project #     : 08U11571
Company       : Atheros Communications
Config        : EUT/laptop/antenna
Mode          : 2.4GHz Band, Tx (Worst Case)
Target        : FCC Class B
```

	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dBuV/m	dBuV/m	dB	
1	181.320	55.83	-18.52	37.32	43.50	-6.18	Peak
2	357.860	48.00	-14.43	33.57	46.00	-12.43	Peak
3	454.860	48.33	-12.28	36.05	46.00	-9.95	Peak
4	551.860	44.50	-10.68	33.82	46.00	-12.18	Peak
5	700.270	43.83	-8.56	35.27	46.00	-10.73	Peak
6	799.210	43.33	-7.05	36.28	46.00	-9.72	Peak

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

VERTICAL DATA

Condition: FCC CLASS-B VERTICAL
Test Operator: Chin Pang
Project # : 08U11571
Company : Atheros Communications
Config : EUT/laptop/antenna
Mode : 2.4GHz Band, Tx (Worst Case)
Target : FCC Class B

	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dBuV/m	dBuV/m	dB	
1	175.500	51.67	-18.49	33.18	43.50	-10.32	Peak
2	258.920	49.67	-17.48	32.19	46.00	-13.81	Peak
3	356.890	50.33	-14.31	36.02	46.00	-9.98	Peak
4	452.920	49.83	-12.32	37.51	46.00	-8.49	Peak
5	486.870	48.00	-11.59	36.41	46.00	-9.59	Peak
6	698.330	40.33	-8.54	31.79	46.00	-14.21	Peak

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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

ANSI C63.4

RESULTS

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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
0.22	51.17	--	38.33	0.00	63.01	53.01	-11.84	-14.68	L1
0.32	40.84	--	29.74	0.00	59.63	49.63	-18.79	-19.89	L1
21.71	38.27	--	32.32	0.00	60.00	50.00	-21.73	-17.68	L1
0.22	52.03	--	38.67	0.00	63.01	53.01	-10.98	-14.34	L2
0.32	40.62	--	29.60	0.00	59.63	49.63	-19.01	-20.03	L2
21.26	34.70	--	27.01	0.00	60.00	50.00	-25.30	-22.99	L2
6 Worst Data									

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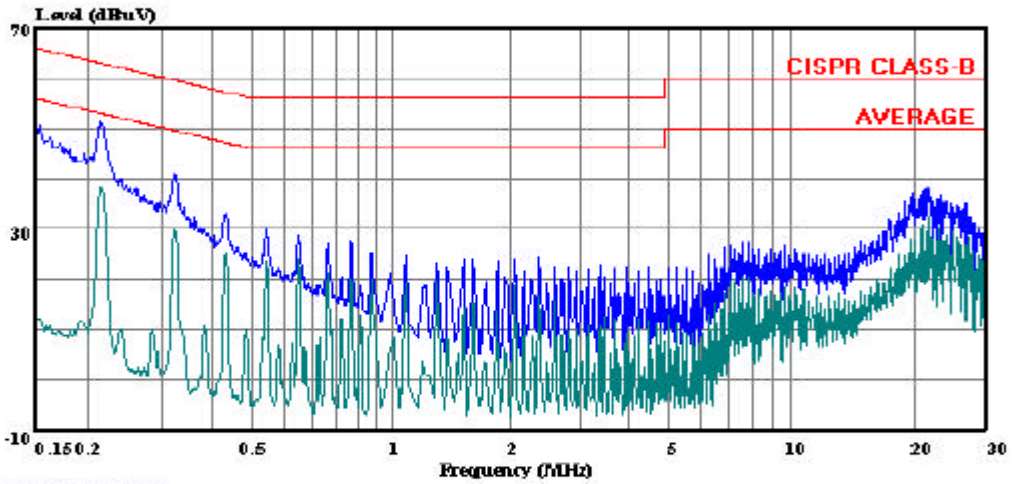
LINE 1 RESULTS

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

Data#: 70 File#: 08U11571 LC.EMI Date: 02-29-2008 Time: 18:21:49



(Line Conduction)

Trace: 68 Ref Trace:

Condition: CISPR CLASS-B
Test Operator:: Mengistu Mekuria
Project #: : 08U11571
Company: : Atheros Communications
Configuration:: EUT With Support Laptop
Mode: : Tx (Worst Case)
Target: : FCC Class B
Voltage: : 115 VAC / 60Hz
: Line 1: Peak (Blue); Average (Green)

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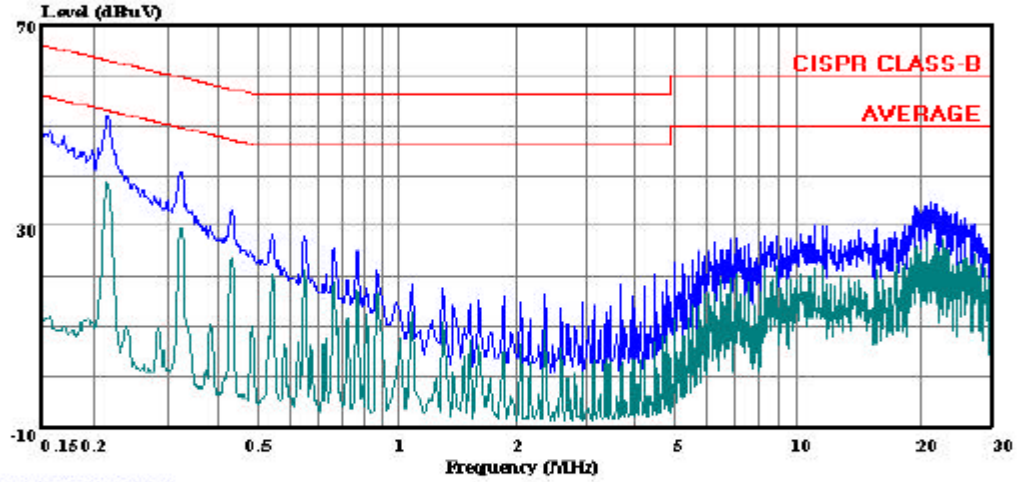
LINE 2 RESULTS

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

Data#: 63 File#: 08U11571 LC.EMI Date: 02-29-2008 Time: 18:12:53



(Line Conduction)

Trace: 61 Ref Trace:

Condition: CISPR CLASS-B
Test Operator:: Mengistu Mekuria
Project #: : 08U11571
Company: : Atheros Communications
Configuration:: EUT With Support Laptop
Mode: : Tx (Worst Case)
Target: : FCC Class B
Voltage: : 115 VAC / 60Hz
: Line 2: Peak (Blue); Average (Green)

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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.

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IC RULES

IC Safety Code 6, Section 2.2.1 (a) A person other than an RF and microwave exposed worker shall not be exposed to electromagnetic radiation in a frequency band listed in Column 1 of Table 5, if the field strength exceeds the value given in Column 2 or 3 of Table 5, when averaged spatially and over time, or if the power density exceeds the value given in Column 4 of Table 5, when averaged spatially and over time.

Table 5
Exposure Limits for Persons Not Classed As RF and Microwave Exposed Workers (Including the General Public)

1 Frequency (MHz)	2 Electric Field Strength; rms (V/m)	3 Magnetic Field Strength; rms (A/m)	4 Power Density (W/m^2)	5 Averaging Time (min)
0.003–1	280	2.19		6
1–10	$280/f$	$2.19/f$		6
10–30	28	$2.19/f$		6
30–300	28	0.073	2*	6
300–1 500	$1.585f^{0.5}$	$0.0042f^{0.5}$	$f/150$	6
1 500–15 000	61.4	0.163	10	6
15 000–150 000	61.4	0.163	10	$616\,000/f^{1.2}$
150 000–300 000	$0.158f^{0.5}$	$4.21 \times 10^{-4}f^{0.5}$	$6.67 \times 10^{-5}f$	$616\,000/f^{1.2}$

* Power density limit is applicable at frequencies greater than 100 MHz.

Notes: 1. Frequency, f, is in MHz.
2. A power density of 10 W/m^2 is equivalent to 1 mW/cm^2.
3. A magnetic field strength of 1 A/m corresponds to 1.257 microtesla (μT) or 12.57 milligauss (mG).

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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.

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LIMITS

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

From IC Safety Code 6, Section 2.2 Table 5 Column 4, S = 10 W/m^2

RESULTS

(MPE distance is greater than 20 cm)

Mode	Band	FCC Limit (mW/cm^2)	IC Limit (W/m^2)	Output (dBm)	Antenna (dBi)	MPE Distance (cm)
WLAN	2.4 GHz	1.0	10.0	29.58	6.33	17.61
WLAN	5 GHz	1.0	10.0	29.86	6.76	19.11

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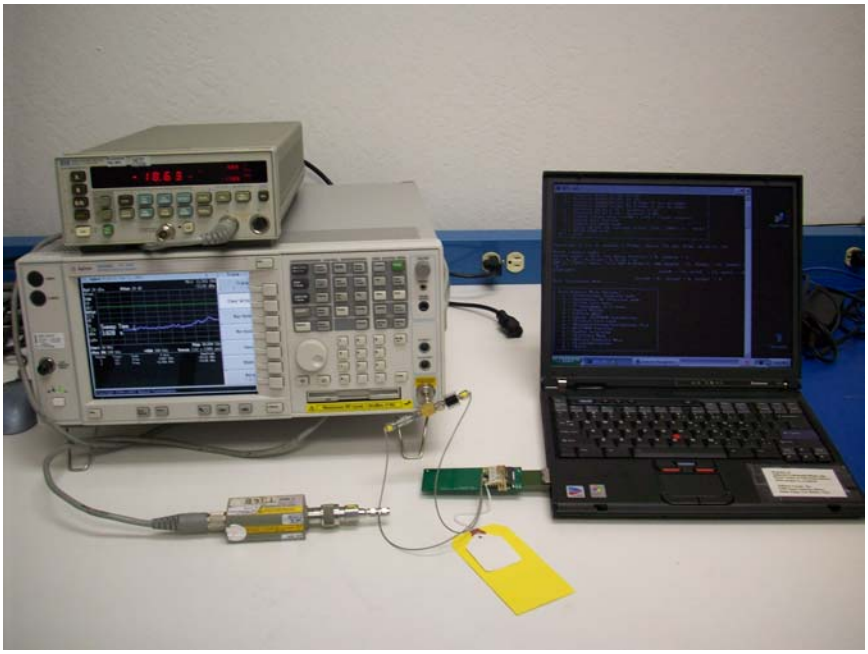
11. SETUP PHOTOS

ANTENNA PORT CONDUCTED RF MEASUREMENT SETUP

ANTENNA PORT CONDUCTED PHOTO



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RADIATED RF MEASUREMENT SETUP

RADIATED FRONT PHOTO

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RADIATED BACK PHOTO

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POWERLINE CONDUCTED EMISSIONS MEASUREMENT SETUP

LINE CONDUCTED FRONT PHOTO

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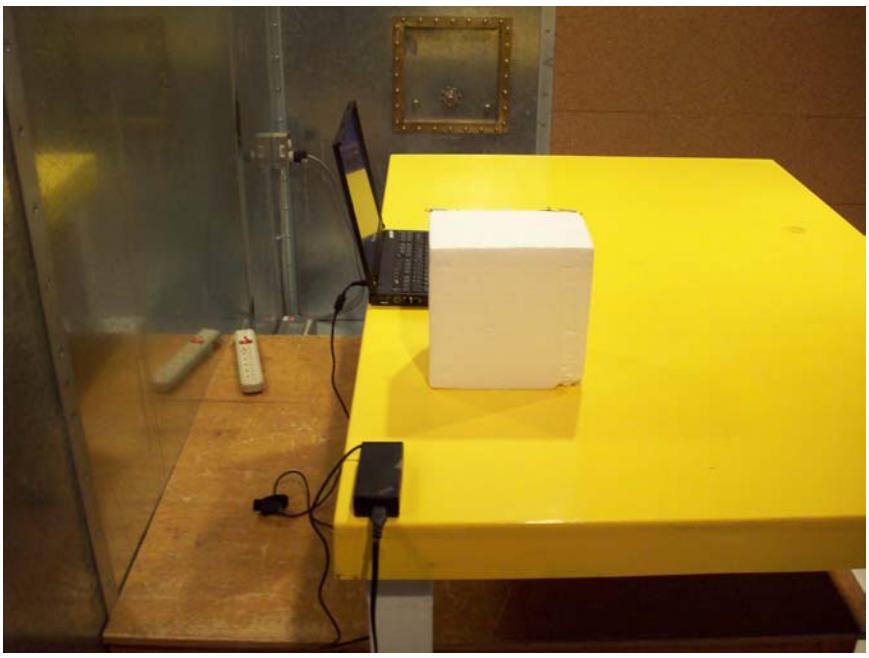
LINE CONDUCTED BACK PHOTO



END OF REPORT

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