FCC CFR47 PART 15 SUBPART C

CERTIFICATION TEST REPORT
FOR

WLAN a/b/g/n miniPCI Adapter

MODEL NUMBER: 65-VF320-P2

FCC ID: J9C-65VF320P2

REPORT NUMBER: 07U11488-1

ISSUE DATE: DECEMBER 18, 2007

Prepared for

QUALCOMM INCORPORATED
900 ARASTRADERO ROAD
PALO ALTO, CA 94304, U.S.A.

Prepared by

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NVLAP LAB CODE 200065-0

Revision History

Rev.	Issue Date	Revisions	Revised By
--	12/18/2007	Initial Issue	T. Chan

TABLE OF CONTENTS

1. ATTESTATION OF TEST RESULTS

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

APPLICABLE STANDARDS	
STANDARD	**TEST RESULTS**
CFR 47 Part 15 Subpart C	No Non-Compliance Noted

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

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

Approved & Released For CCS By:

THU CHAN
EMC SUPERVISOR
COMPLIANCE CERTIFICATION SERVICES

Tested By:

THANH NGUYEN
EMC ENGINEER
COMPLIANCE CERTIFICATION SERVICES

2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.4-2003, FCC CFR 47 Part 2, FCC CFR 47 Part 15, RSS-GEN Issue 2, and RSS-210 Issue 7.

3. FACILITIES AND ACCREDITATION

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

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

4. CALIBRATION AND UNCERTAINTY

4.1. MEASURING INSTRUMENT CALIBRATION

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

4.2. MEASUREMENT UNCERTAINTY

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

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

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

5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

The EUT is a 3x3 802.11 a/b/g/n RoHS/4000 Series PCI-E MiniPCI card for 2.4/5GHz Client applications, with all transmitters active at all times.

The radio module is manufactured by Qualcomm Inc.

5.2. MAXIMUM OUTPUT POWER

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

Frequency Range (MHz)	Mode	Output Power (dBm)	Output Power (mW)
2412 - 2462	802.11b	27.96	625.17
2412 - 2462	802.11g	28.45	699.84
2412 - 2462	802.11n HT20	28.96	787.05
2422 - 2452	802.11n HT40	28.49	706.32
5745 - 5825	802.11a	27.56	570.16
5745 - 5825	802.11n HT20	27.60	575.44
5755 - 5795	802.11n HT40	26.62	459.20

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes three monopole antennas in MIMO Configuration, each with a maximum gain of 2 dBi for 2.4GHz and 3 dBi for 5GHz bands.

5.4. SOFTWARE AND FIRMWARE

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

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

5.5. WORST-CASE CONFIGURATION AND MODE

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

The worst-case data rate emissions tests were made in the 802.11b, CDD mode @ 1Mbps 802.11g, CDD mode @ 6Mbps, HT20 @ MCS07, 65Mbps, and HT40 @ MCS15135Mbps.

5.6. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

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

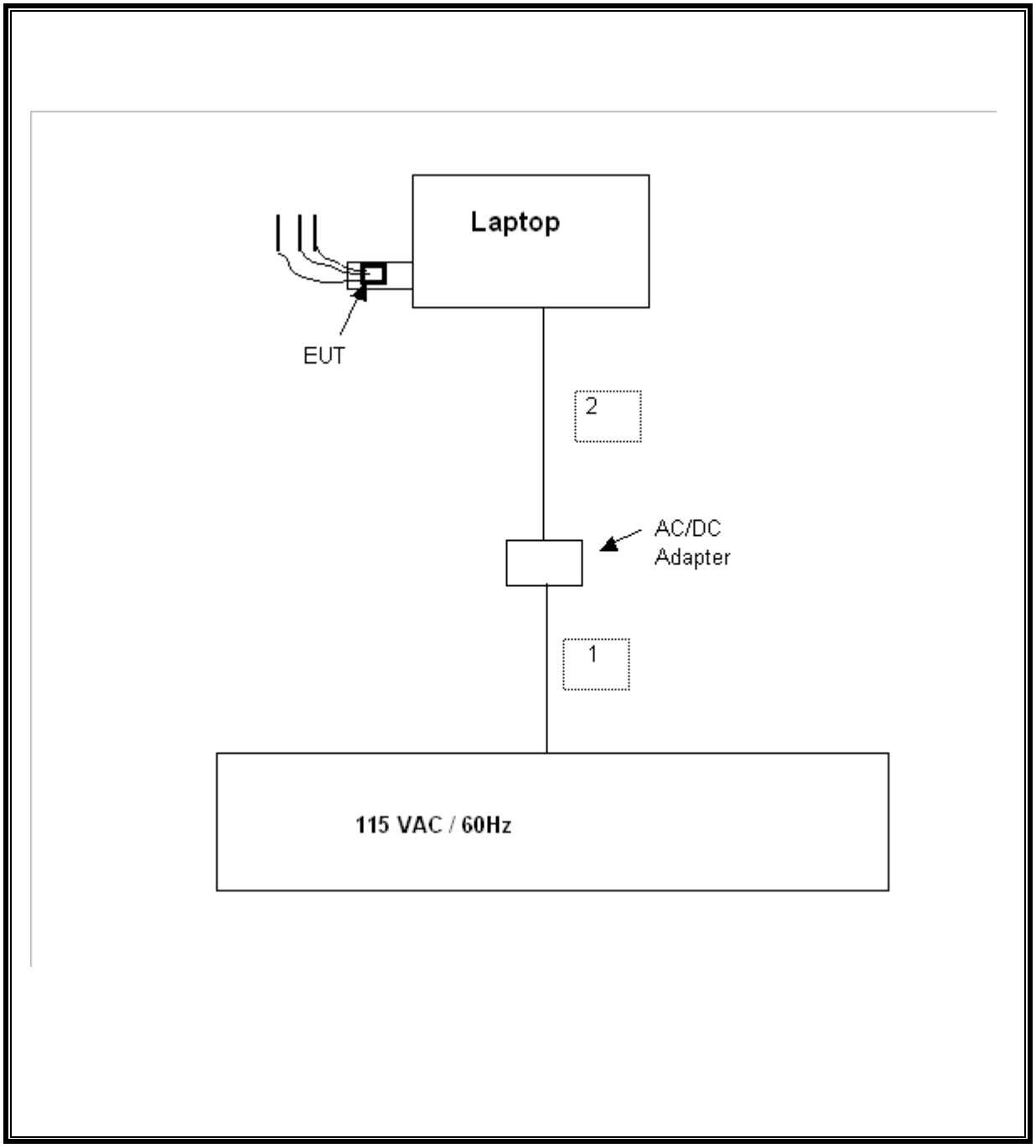
I/O CABLES

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

TEST SETUP

The EUT is installed in extender card and a host laptop computer during the tests. Test software exercised the radio card.

SETUP DIAGRAM FOR TESTS



6. TEST AND MEASUREMENT EQUIPMENT

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

TEST EQUIPMENT LIST					
Description	**Manufacturer**	**Model**	**Asset**	**Cal Date**	**Cal Due**
EMI Receiver, 9 kHz ~ 2.9 GHz	Agilent / HP	8542E	3942A00286	06/12/07	06/12/08
RF Filter Section	Agilent / HP	85420E	3705A00256	06/12/07	06/12/08
Antenna, Bilog 30 MHz ~ 2 Ghz	Sunol Sciences	JB1	A121003	06/12/07	08/13/08
Preamplifier, 1300 MHz	Agilent / HP	8447D	1937A02062	05/09/07	05/09/08
Spectrum Analyzer 3 Hz ~ 44 GHz	Agilent / HP	E4446A	US42510266	10/18/07	10/18/08
Antenna, Horn 1 ~ 18 GHz	EMCO	3115	6717	09/15/07	09/15/08
Preamplifier, 1 ~ 26.5 GHz	Agilent / HP	8449B	3008A00931	08/06/07	08/16/08
4.0 GHz Highpass Filter	Micro-Tronics	HPM13351	4	CNR	CNR
Power Sensor 10MHz - 18GHz	Agilent / HP	8481A	2237A31744	04/30/07	04/30/08
Peak Power Meter	Agilent / HP	E4416A	GB41291160	12/04/07	12/04/08
5.15-5.35 GHz Reject Filter	Micro-Tronics	BRC13190	1	CNR	CNR
2.4-2.5 GHz Reject Filter	Micro-Tronics	BRM50702	1	CNR	CNR
5.725-5.825 GHz Reject Filter	Micro-Tronics	BRC13192	2	CNR	CNR
LISN, 10 kHz ~ 30 MHz	FCC	LISN-50/250-25-2	2023	09/15/07	09/15/08
LISN, 10 kHz ~ 30 MHz	Solar	8012-50-R-24-BNC	8379443	09/15/07	09/15/08
EMI Test Receiver	R & S	ESHS 20	827129/006	01/27/07	01/27/08

7. ANTENNA PORT TEST RESULTS

7.1. 802.11b 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

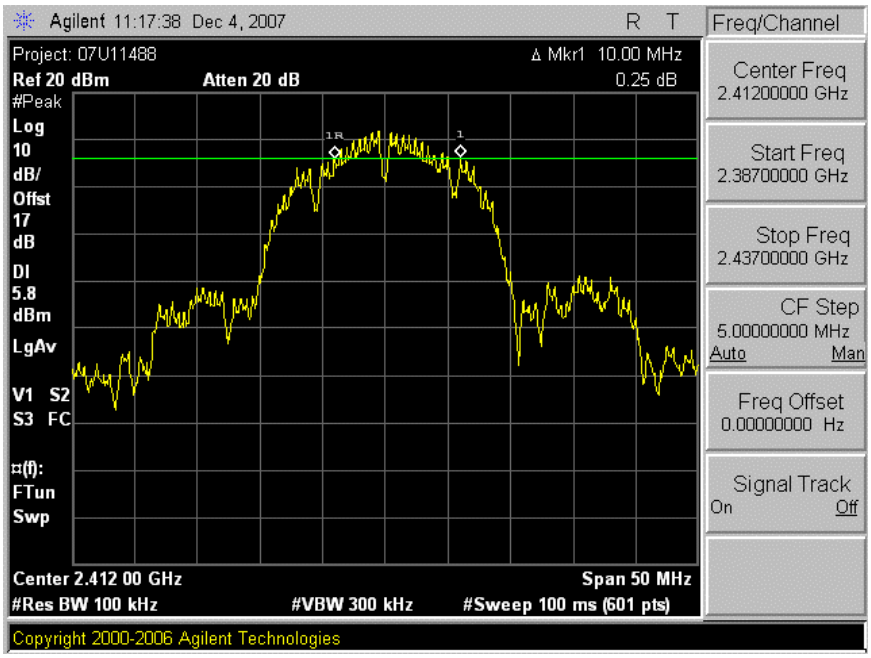
The transmitter output is connected to a spectrum analyzer. The RBW is set to 100 kHz and the VBW is set to 300 kHz. The sweep time is coupled.

RESULTS

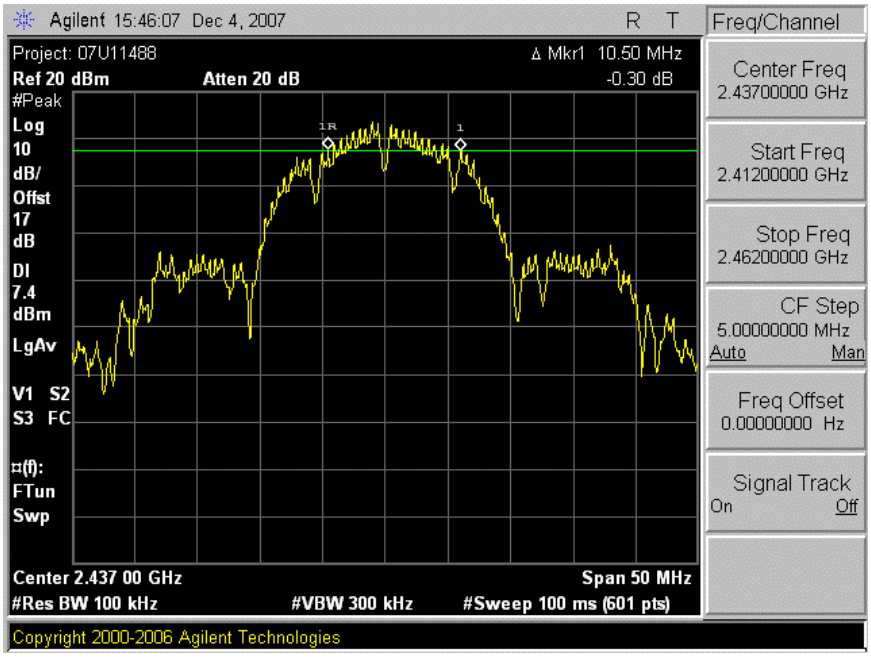
Channel	Frequency (MHz)	Chain 1 6 dB BW (MHz)	Chain 2 6 dB BW (MHz)	Minimum Limit (MHz)
Low	2412	10	9.5	0.5
Middle	2437	10.5	9.5	0.5
High	2462	9.08	9.08	0.5

6 dB BANDWIDTH, CHAIN 1

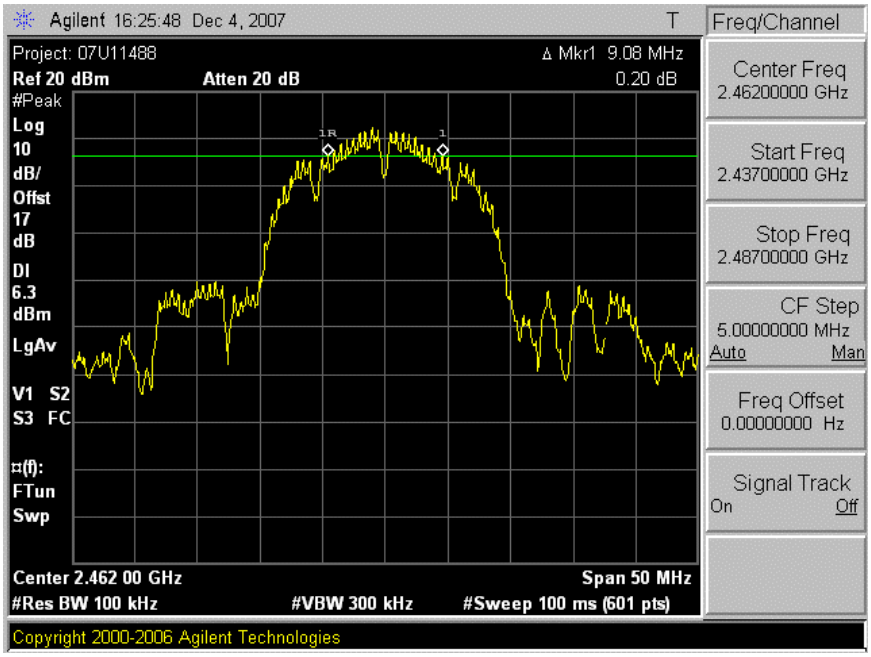
6 dB BANDWIDTH LOW CH, CHAIN 1



6 dB BANDWIDTH MID CH, CHAIN 1

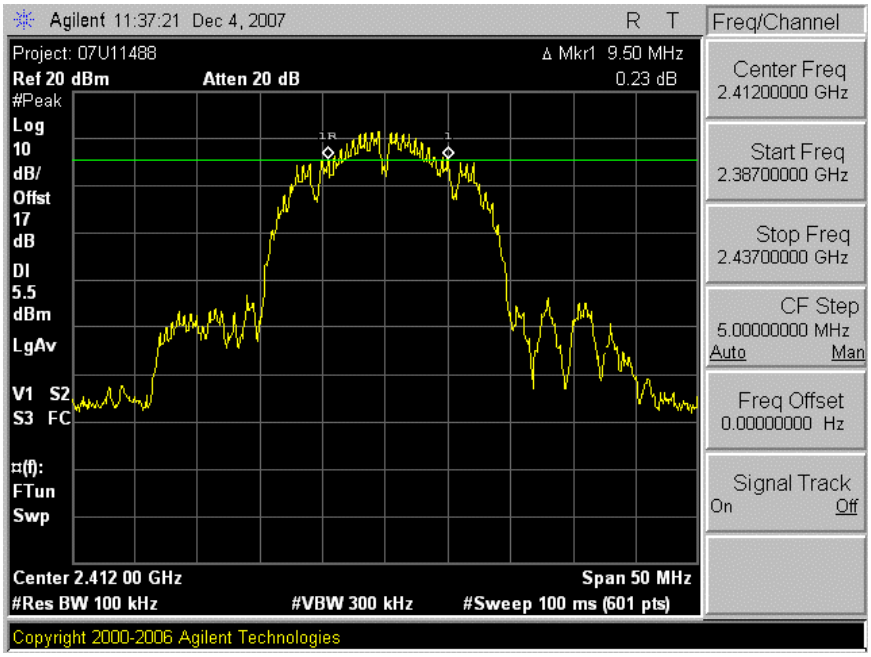


6 dB BANDWIDTH HIGH CH, CHAIN 1

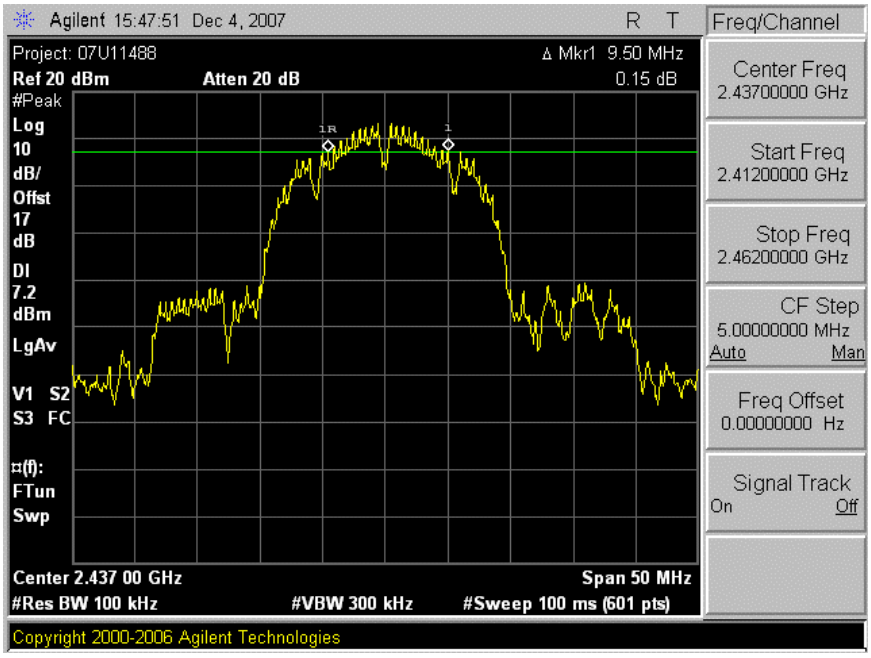


6 dB BANDWIDTH, CHAIN 2

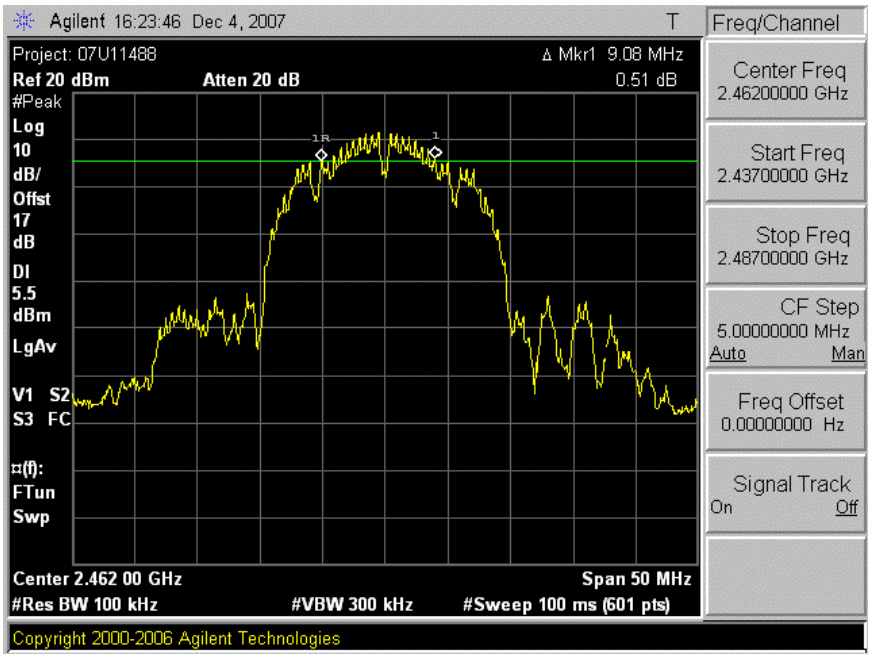
6 dB BANDWIDTH LOW CH, CHAIN 2



6 dB BANDWIDTH MID CH, CHAIN 2



6 dB BANDWIDTH HIGH CH, CHAIN 2



7.1.2. 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

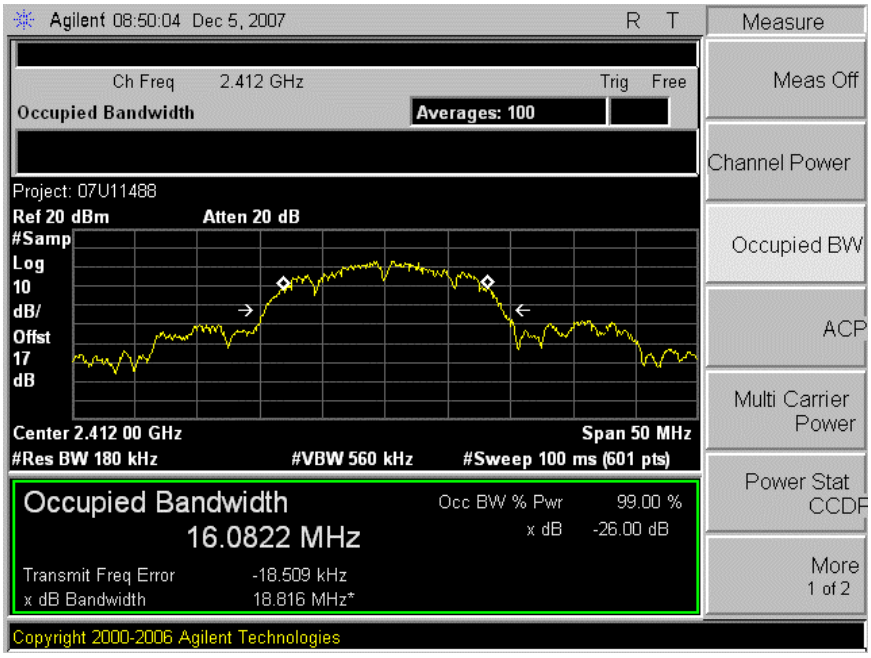
The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the 99 % bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal 99% bandwidth function is utilized.

RESULTS

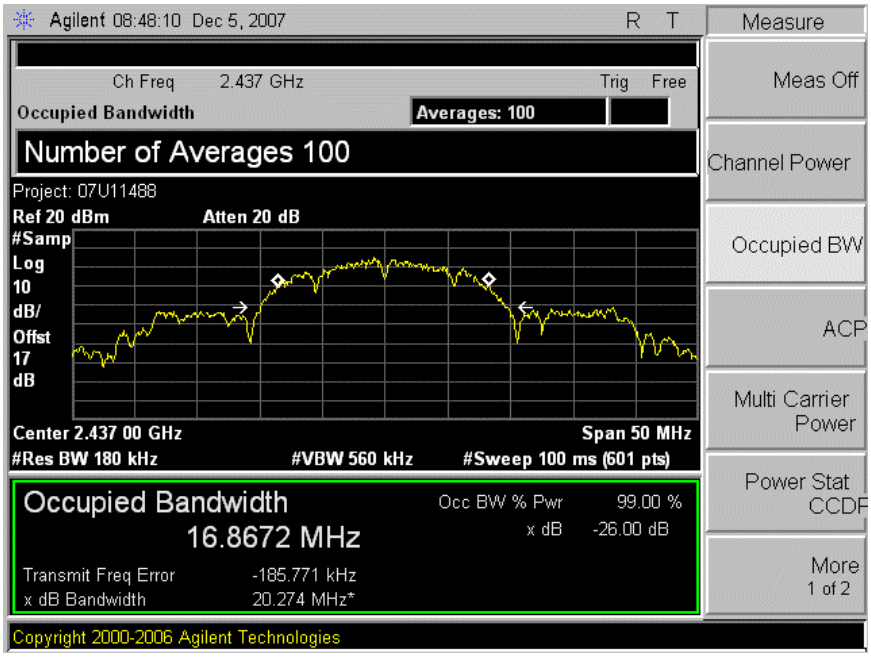
Channel	Frequency (MHz)	Chain 1 99% Bandwidth (MHz)	Chain 2 99% Bandwidth (MHz)
Low	2412	16.0822	15.8409
Middle	2437	16.8672	15.8898
High	2462	16.0700	15.8574

99% BANDWIDTH, CHAIN 1

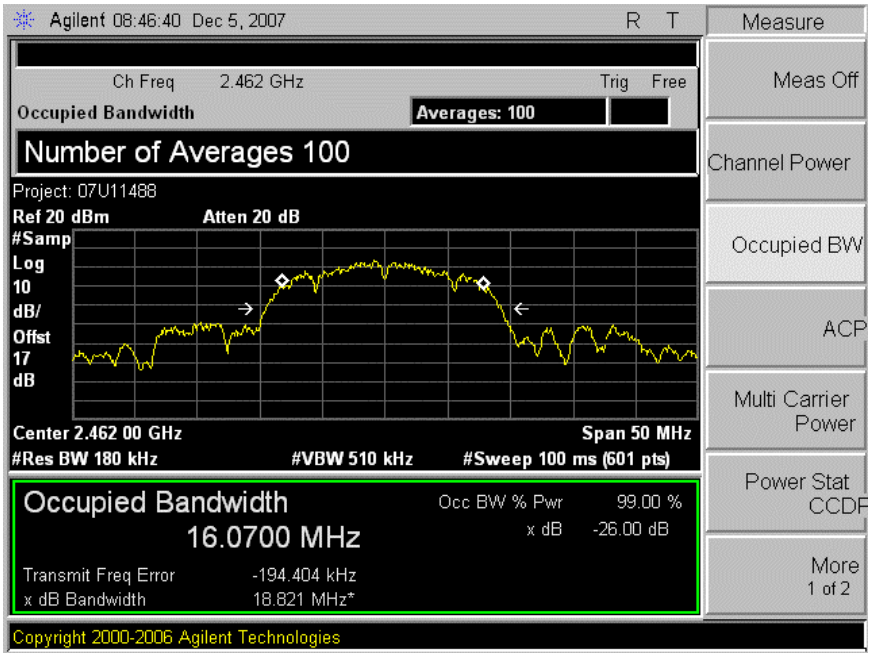
99% BANDWIDTH LOW CH, CHAIN 1



99% BANDWIDTH MID CH, CHAIN 1

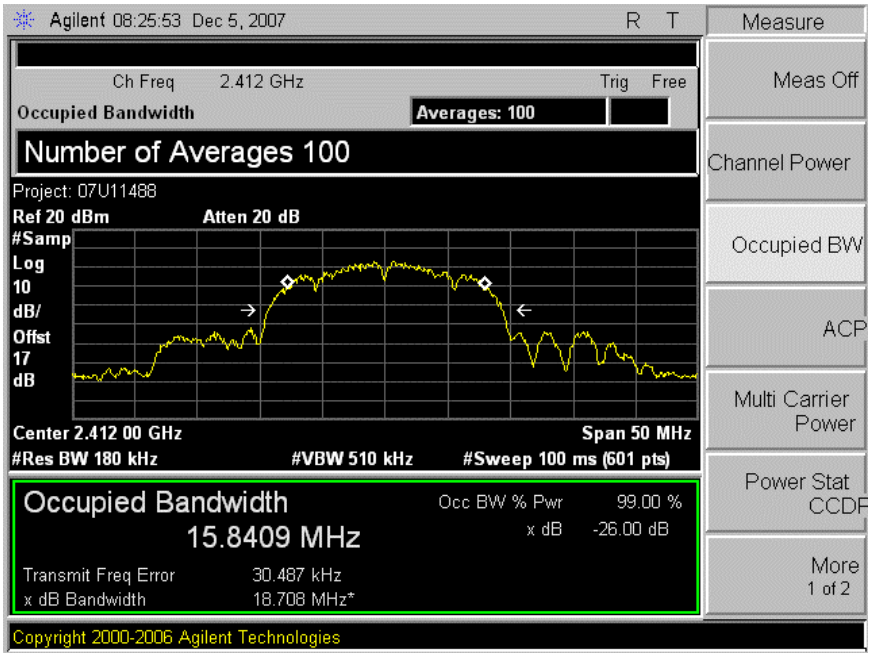


99% BANDWIDTH HIGH CH, CHAIN 1

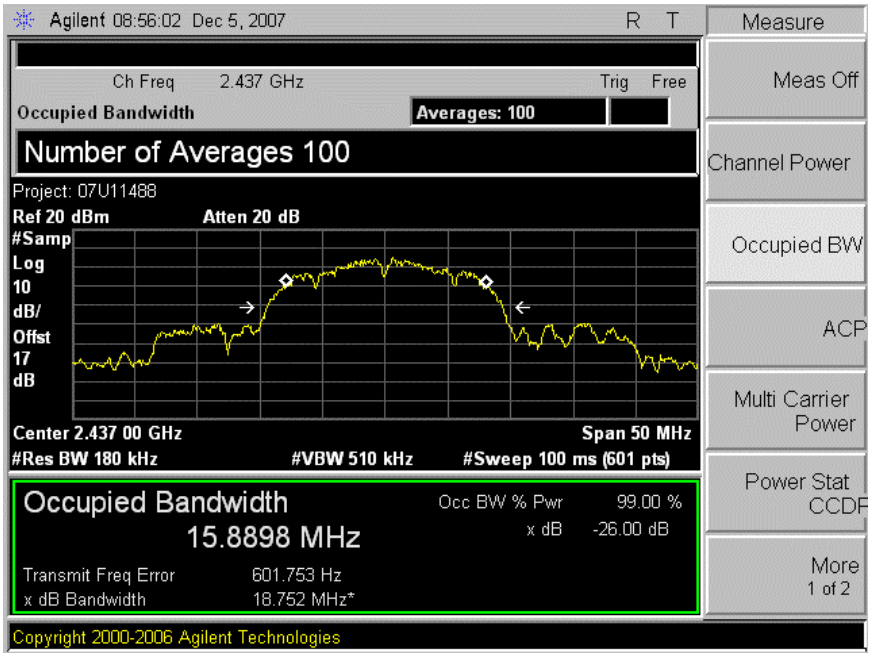


99% BANDWIDTH, CHAIN 2

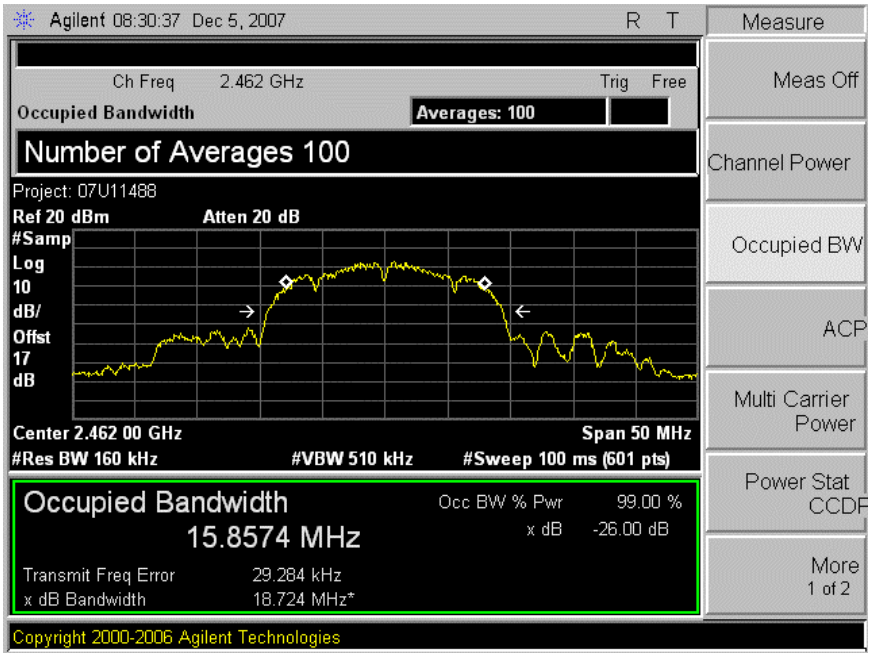
99% BANDWIDTH LOW CH, CHAIN 2



99% BANDWIDTH MID CH, CHAIN 2



99% BANDWIDTH HIGH CH, CHAIN 2



7.1.3. OUTPUT POWER

LIMITS

FCC §15.247 (b)

IC RSS-210 A8.4

Antenna Gain (dBi)	10 Log (# Tx Chains) (dB)	Effective Legacy Gain (dBi)
2	3.01	5.01

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

TEST PROCEDURE

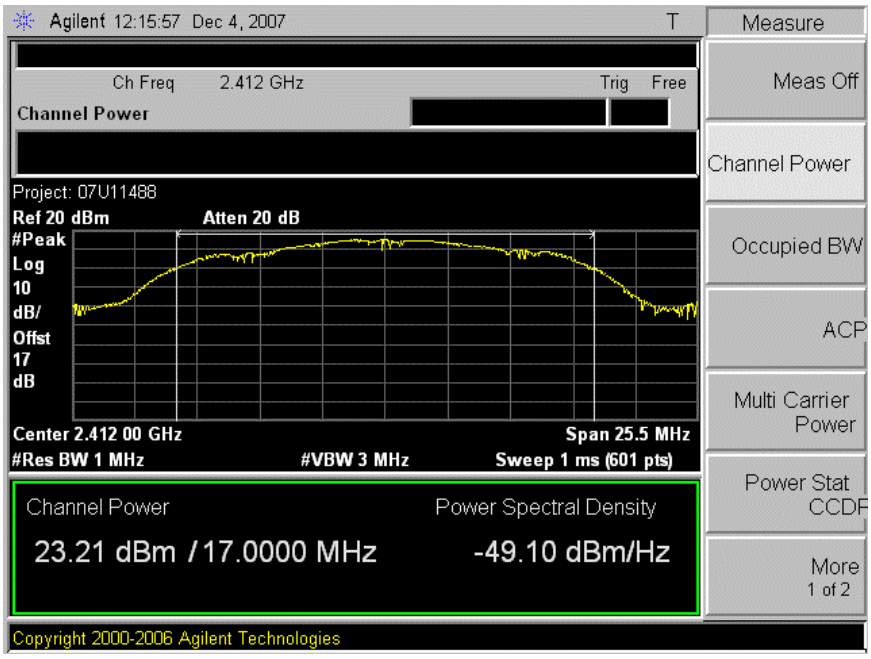
Peak power is measured using the spectrum analyzer's internal channel power integration function. Power is integrated over a bandwidth greater than or equal to the 99% bandwidth.

RESULTS

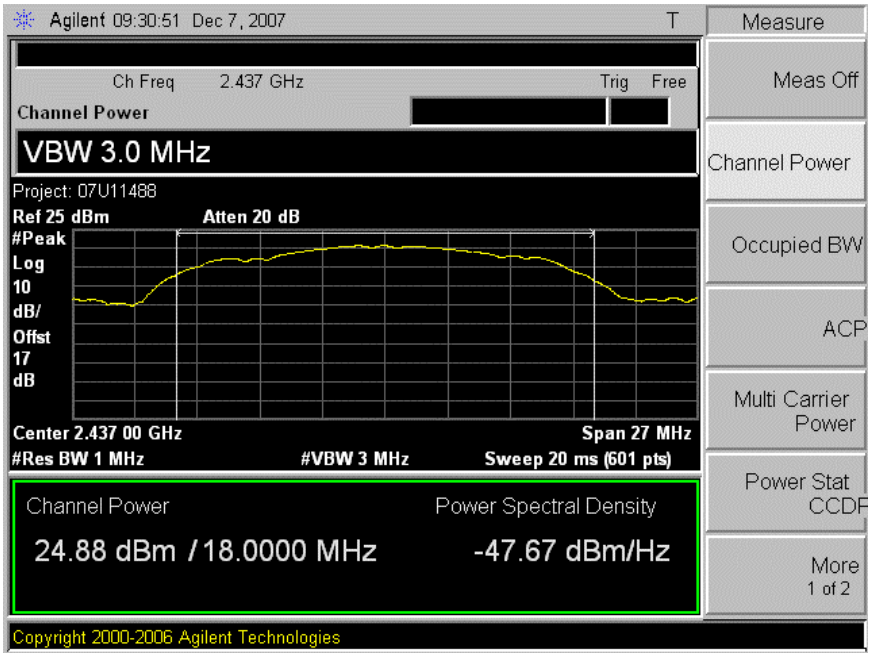
Channel	Frequency (MHz)	Limit (dBm)	Chain 1 Power (dBm)	Chain 2 Power (dBm)	Total Power (dBm)	Margin (dB)
Low	2412	30.00	23.21	22.82	26.03	-3.97
Mid	2437	30.00	24.88	25.02	27.96	-2.04
High	2462	30.00	23.60	23.37	26.50	-3.50

CHAIN 1 OUTPUT POWER

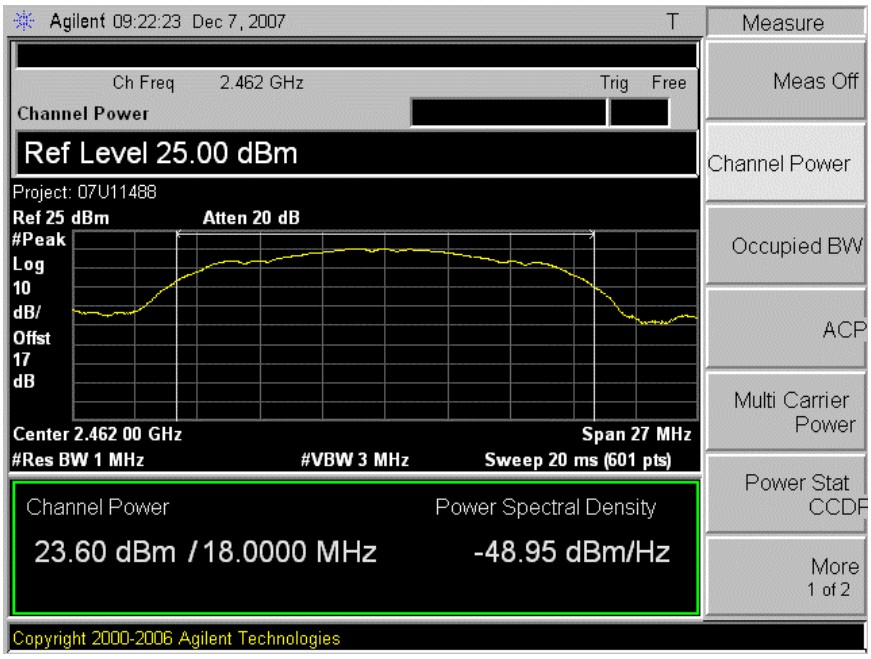
OUTPUT POWER LOW CH, CHAIN 1



OUTPUT POWER MID CH, CHAIN 1

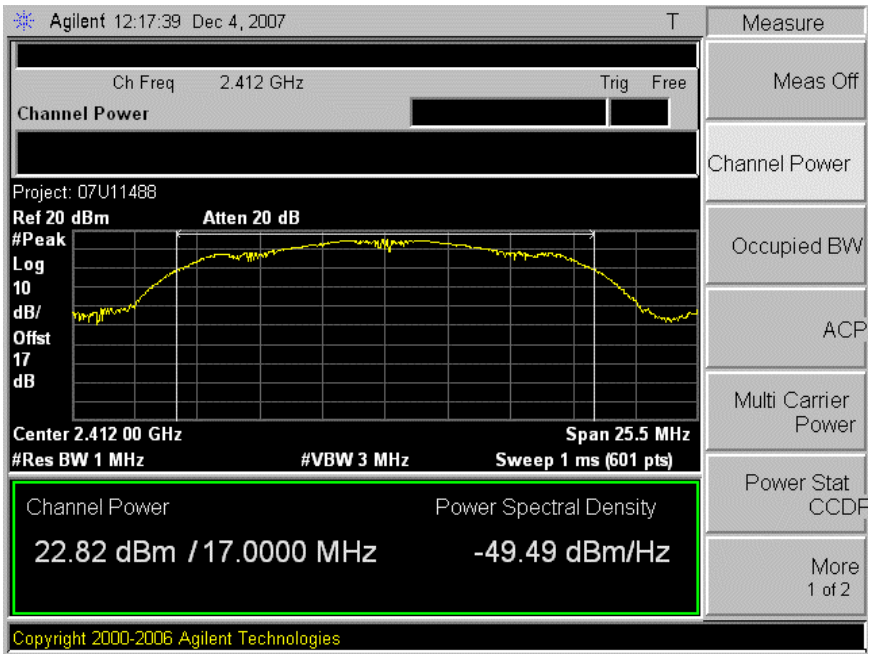


OUTPUT POWER HIGH CH, CHAIN 1

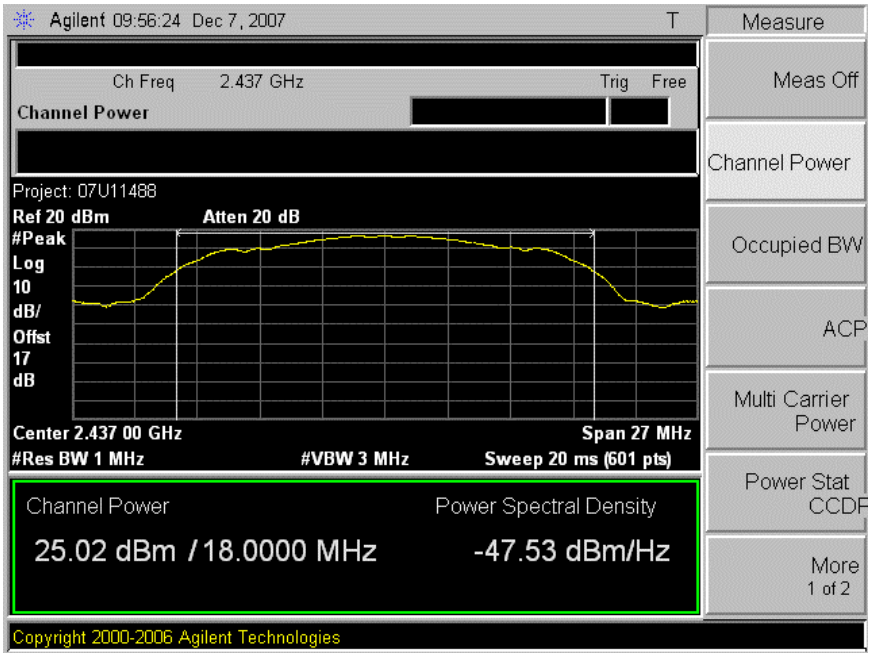


CHAIN 2 OUTPUT POWER

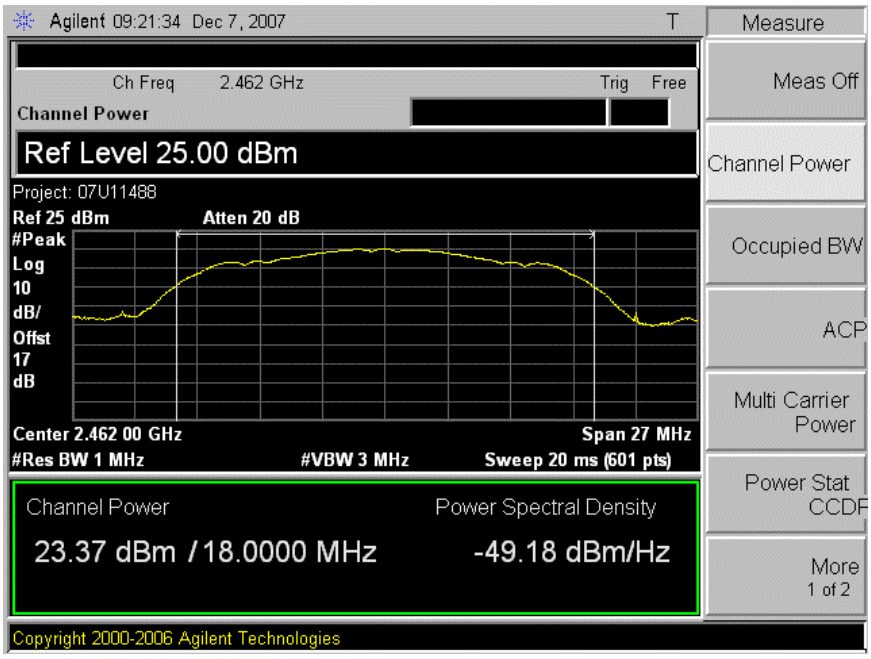
OUTPUT POWER LOW CH, CHAIN 2



OUTPUT POWER MID CH, CHAIN 2



OUTPUT POWER HIGH CH, CHAIN 2



7.1.4. 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 11 dB (including 10 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 1 Power (dBm)	Chain 2 Power (dBm)	Total Power (dBm)
Low	2412	20.05	19.72	22.90
Middle	2437	21.50	21.43	24.48
High	2462	20.10	19.70	22.91

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

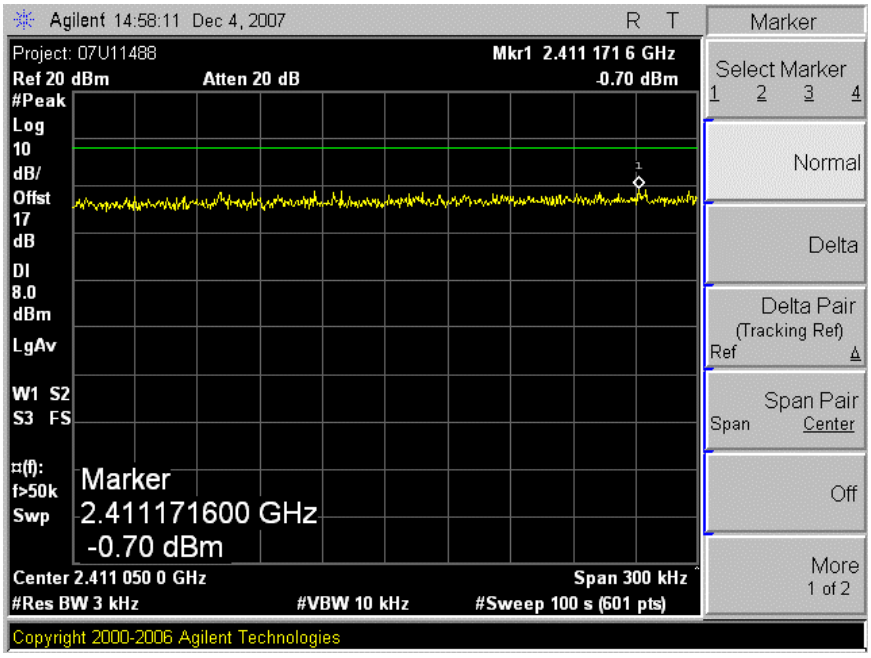
Middle and High channels were measured with the combiner only, since doing so results in the worst-case compared to measuring either chain alone.

Channel	Frequency (MHz)	Chain 1 PSD (dBm)	Chain 2 PSD (dBm)	Total PSD (dBm)	Limit (dBm)	Margin (dB)
Low	2412	-0.7	-1.41	1.97	8	-6.03
Middle	2437	see combiner results				
High	2462	see combiner results				

Channel	Frequency (MHz)	PSD with Combiner (dBm)	Limit (dBm)	Margin (dB)
Low	2412	3.88	8	-4.12
Middle	2437	5.76	8	-2.24
High	2462	2.95	8	-5.05

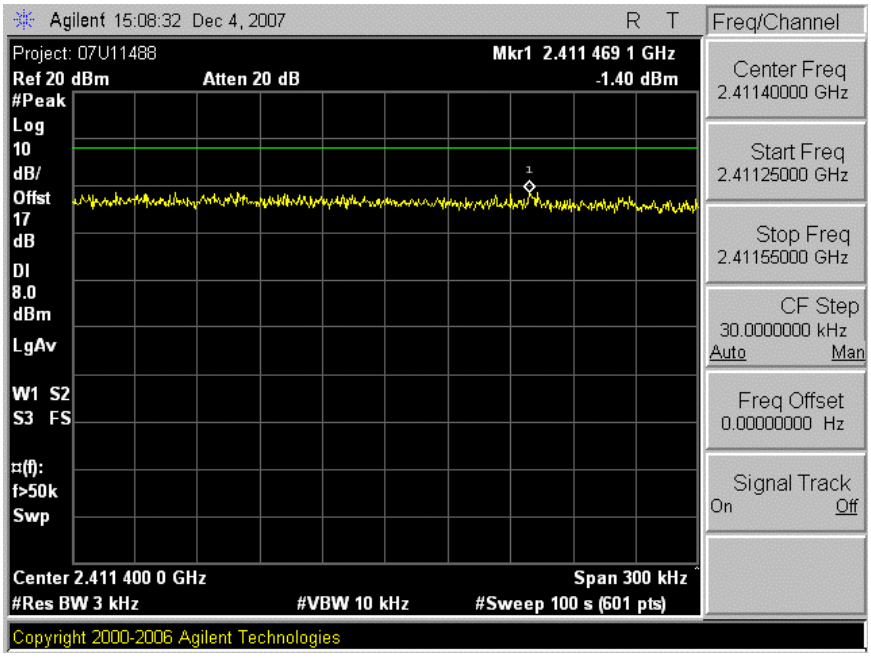
POWER SPECTRAL DENSITY, CHAIN 1

PSD LOW CH, CHAIN 1



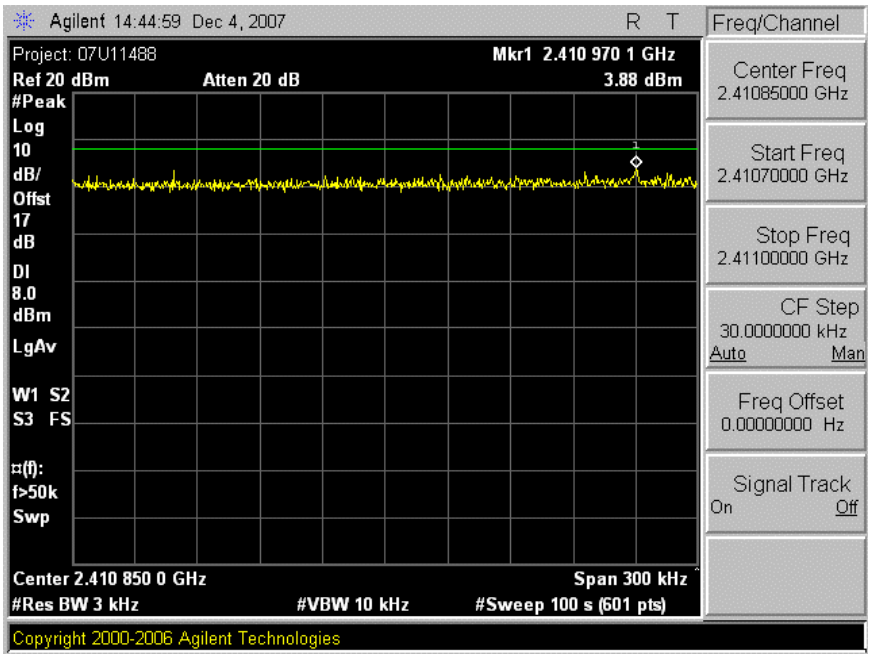
POWER SPECTRAL DENSITY, CHAIN 2

PSD LOW CH, CHAIN 2

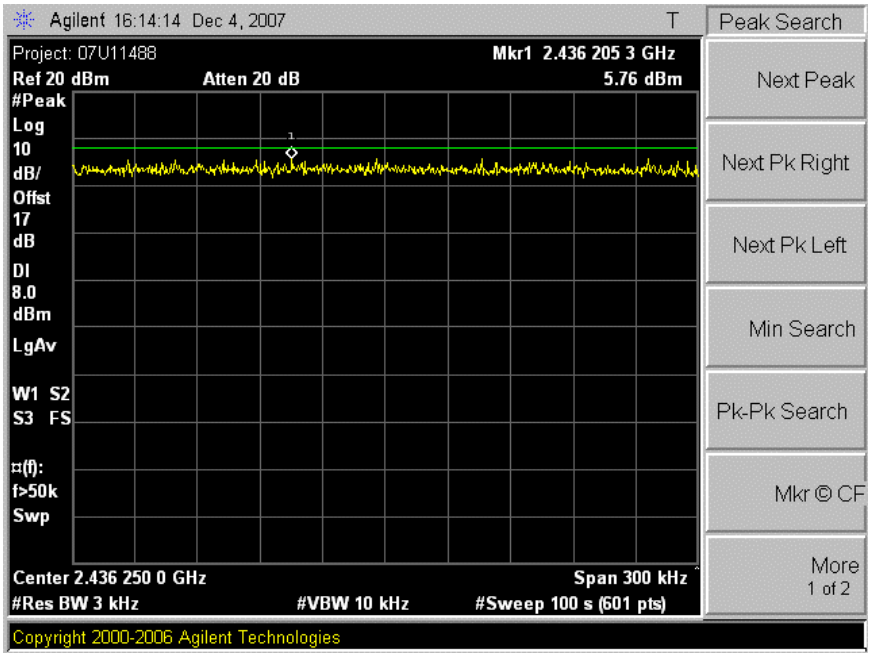


POWER SPECTRAL DENSITY, WITH COMBINER

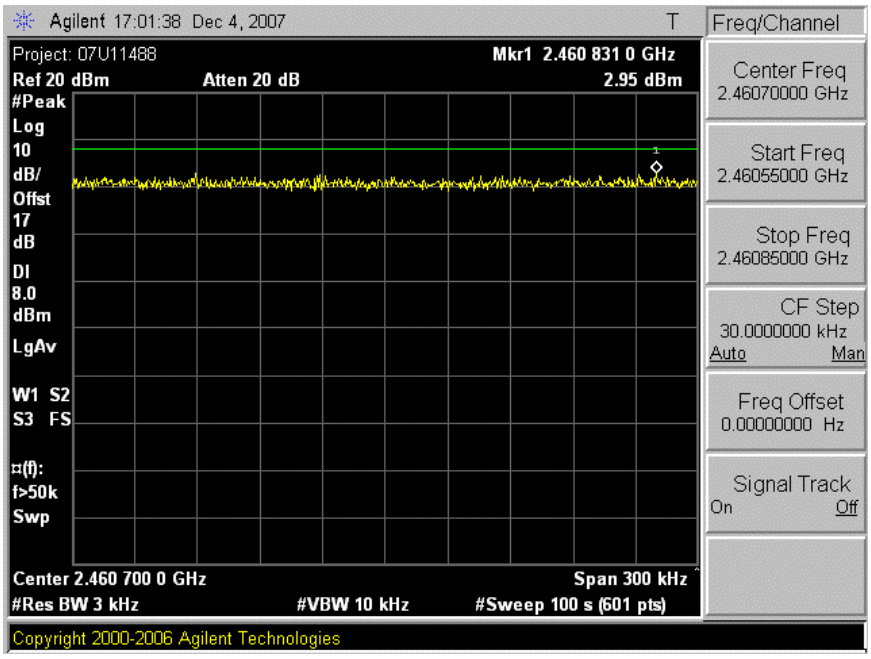
PSD LOW CH, WITH COMBINER



PSD MID CH, WITH COMBINER



PSD HIGH CH, WITH COMBINER



7.1.6. 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.

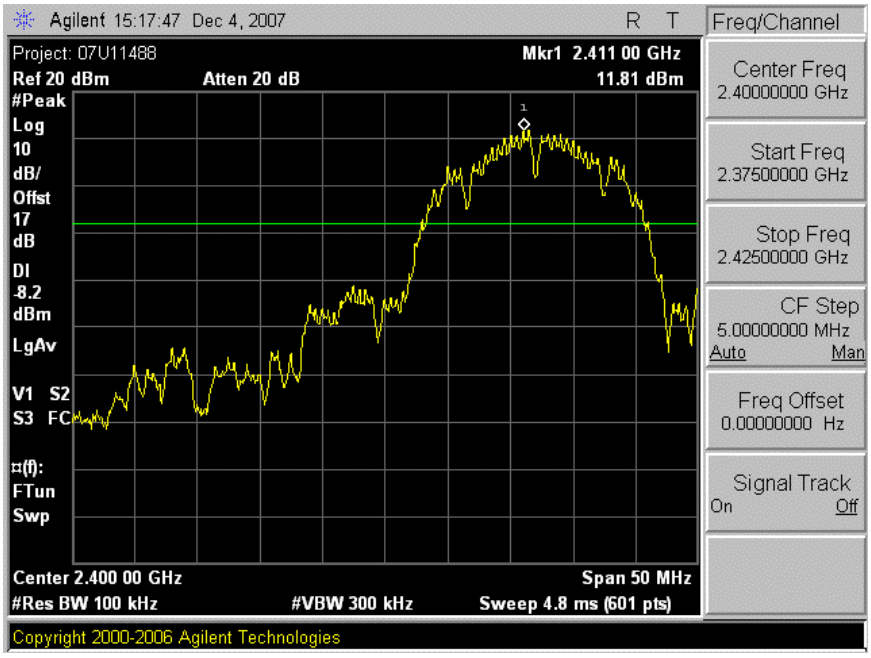
The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels.

RESULTS

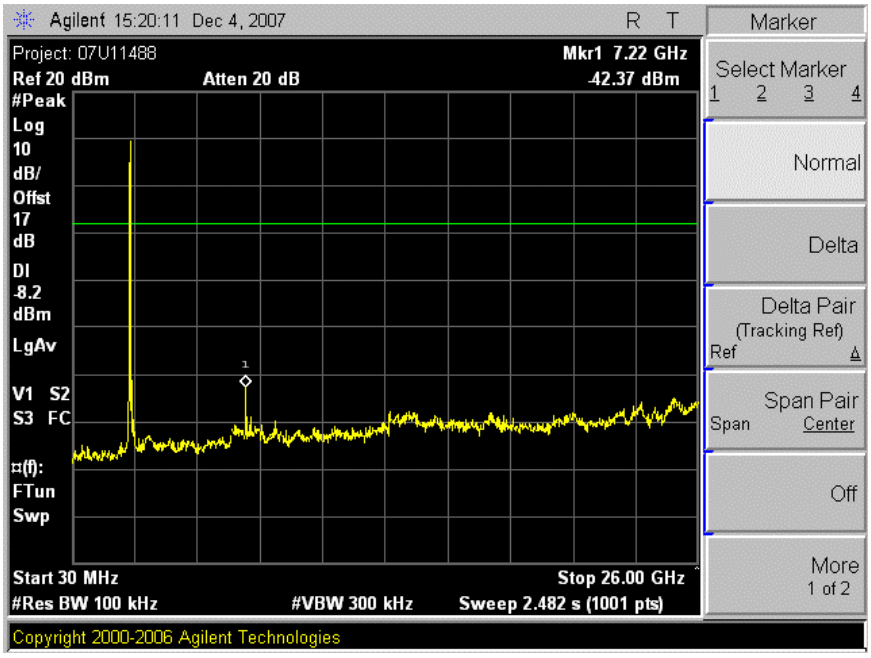
Middle and High channels were measured with the combiner only, since doing so results in the worst-case compared to measuring either chain alone.

CHAIN 1 SPURIOUS EMISSIONS

LOW CH BANDEDGE, CHAIN 1

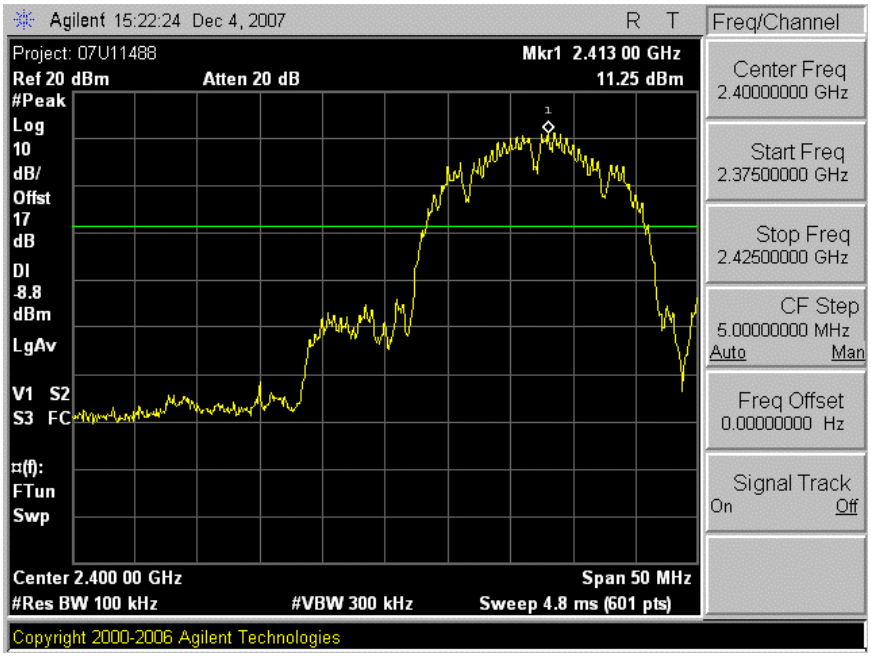


LOW CH SPURIOUS, CHAIN 1

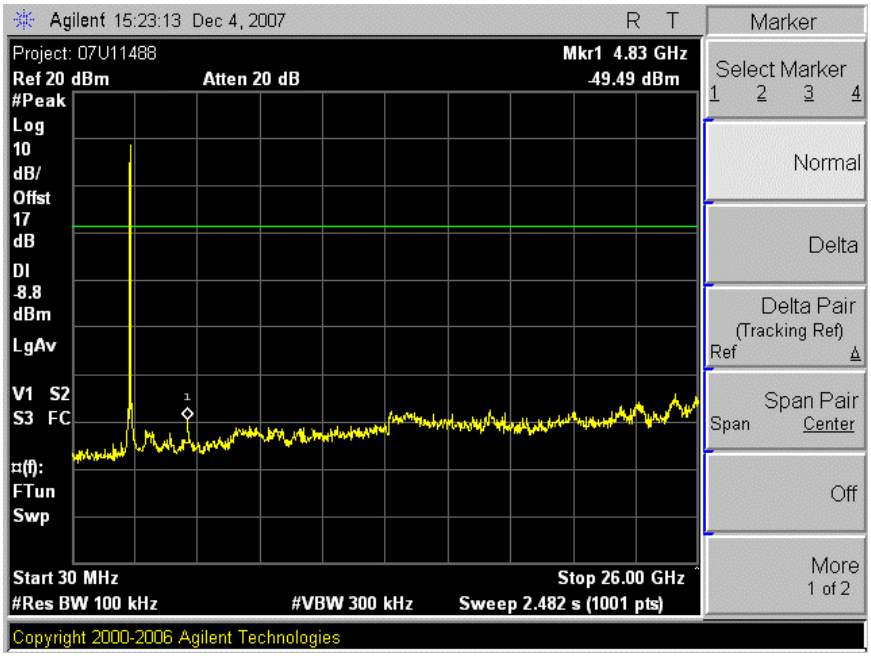


CHAIN 2 SPURIOUS EMISSIONS

LOW CH BANDEDGE, CHAIN 2



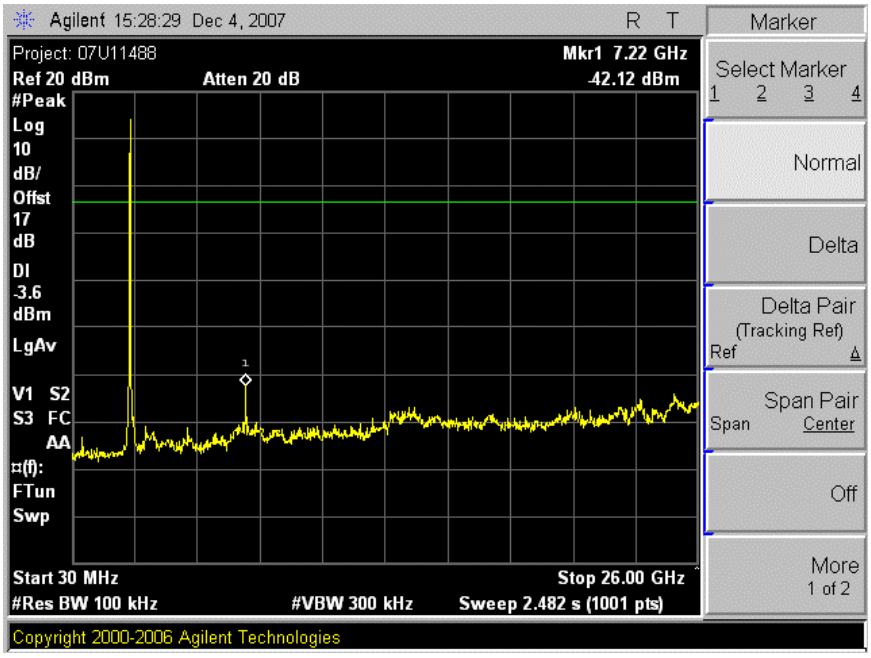
LOW CH SPURIOUS, CHAIN 2



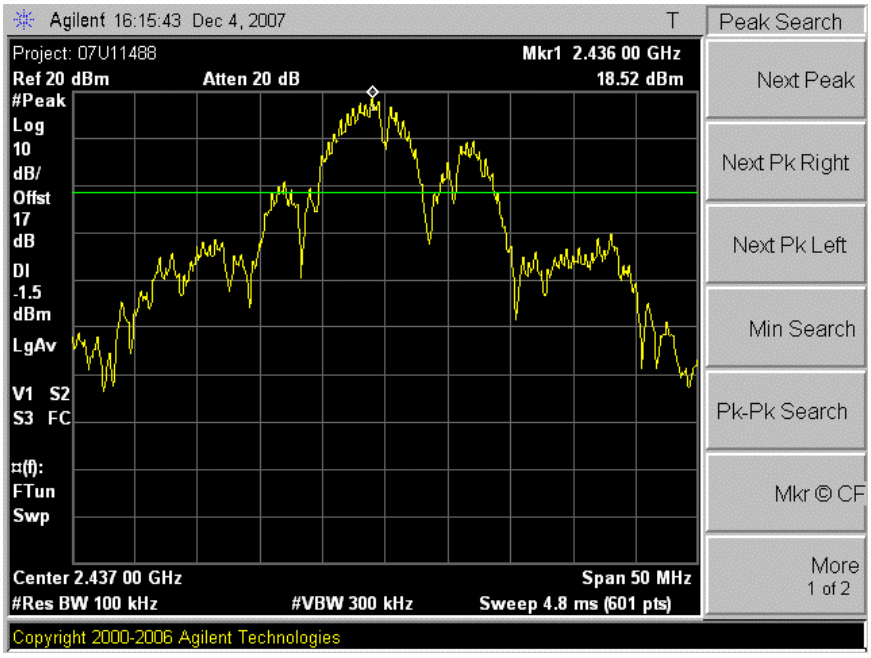
SPURIOUS EMISSIONS WITH COMBINER

LOW CH BANDEDGE, WITH COMBINER

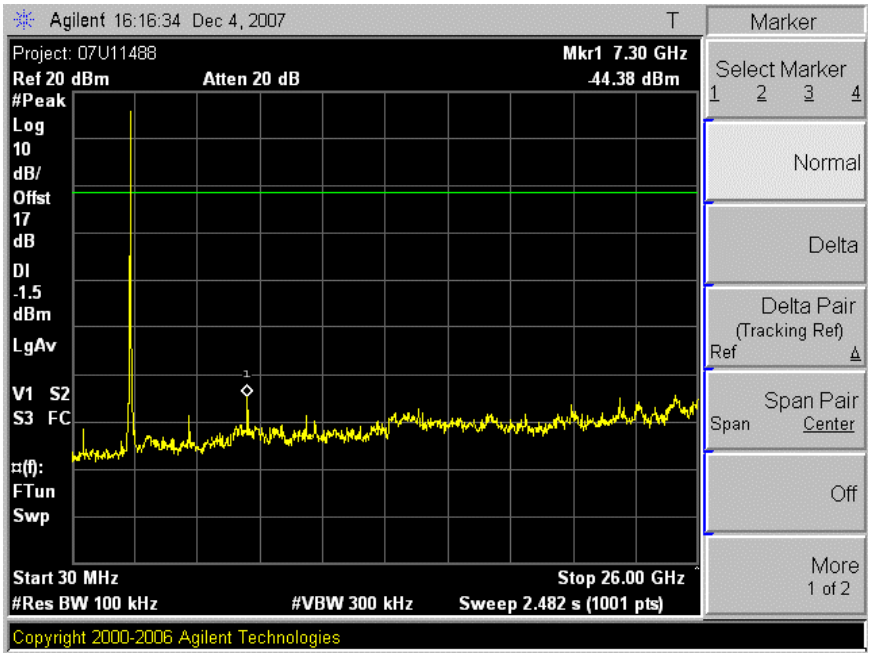
LOW CH SPURIOUS, WITH COMBINER



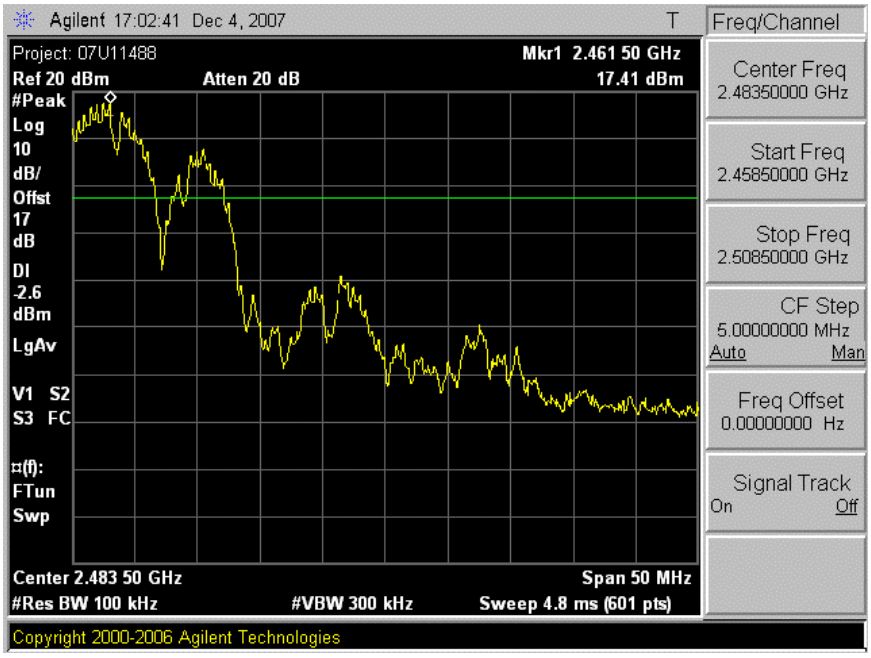
MID CH REFERENCE, WITH COMBINER



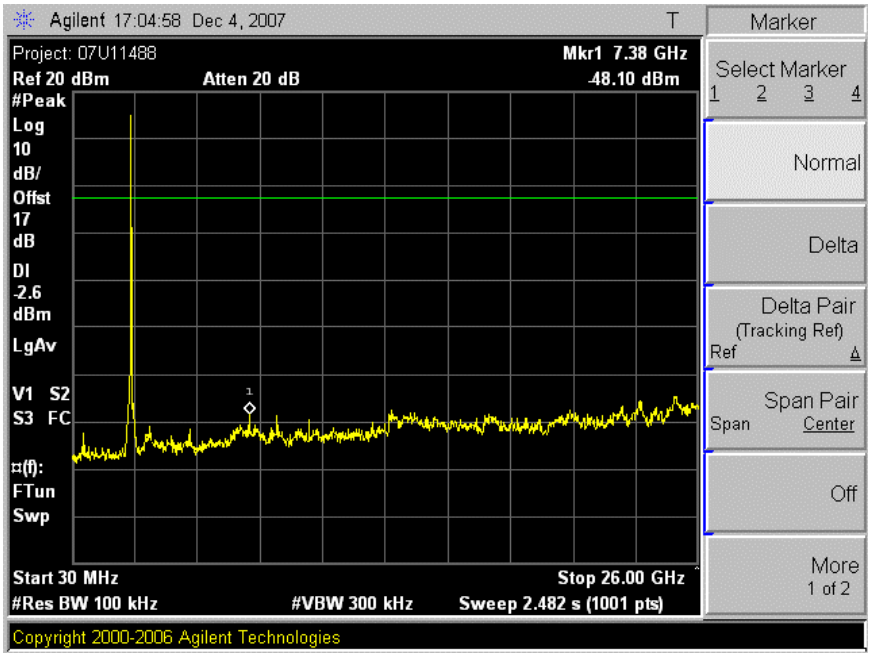
MID CH SPURIOUS, WITH COMBINER



HIGH CH BANDEDGE, WITH COMBINER



HIGH CH SPURIOUS, WITH COMBINER



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

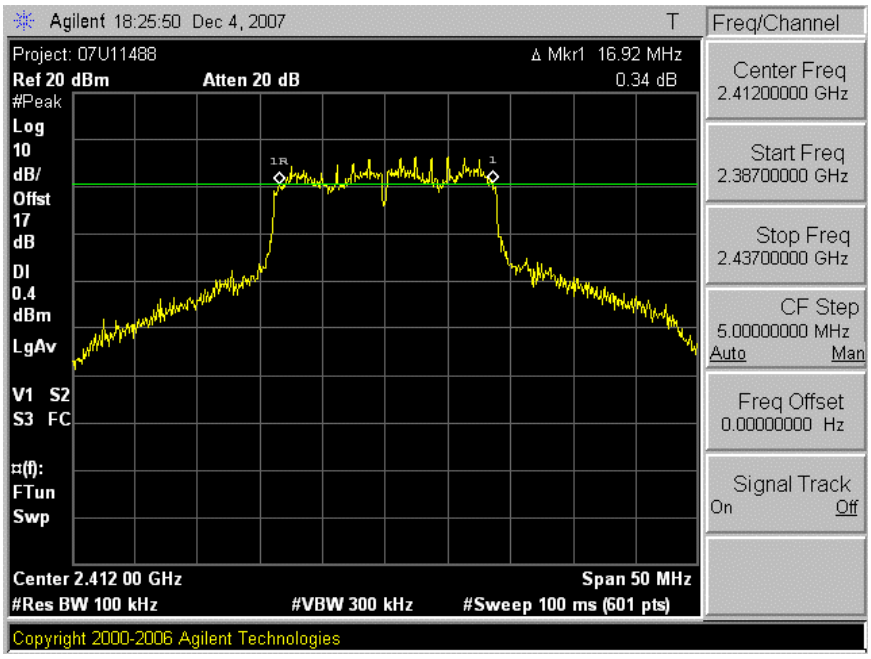
The transmitter output is connected to a spectrum analyzer. The RBW is set to 100 kHz and the VBW is set to 300 kHz. The sweep time is coupled.

RESULTS

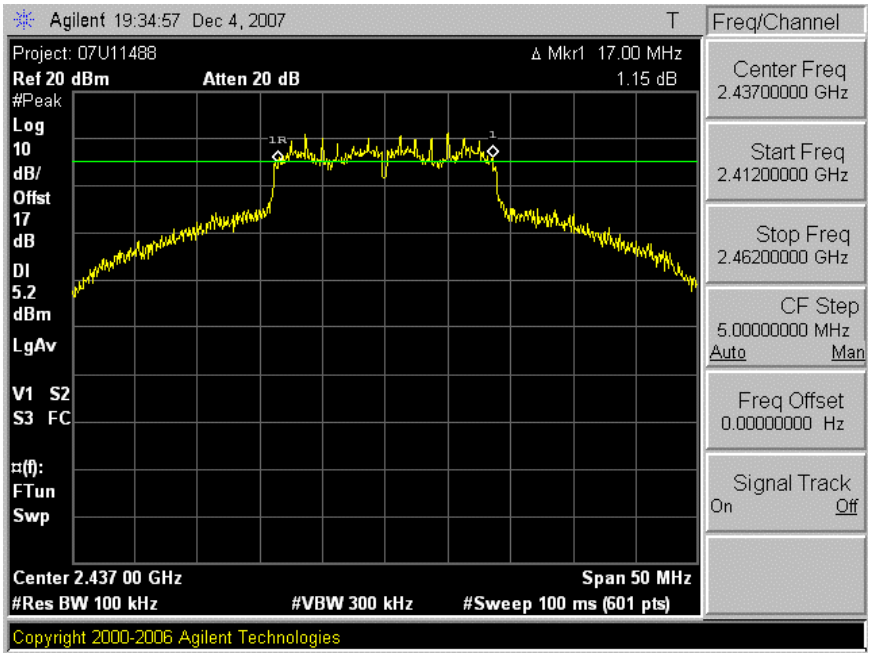
Channel	Frequency (MHz)	Chain 1 6 dB BW (MHz)	Chain 2 6 dB BW (MHz)	Minimum Limit (MHz)
Low	2412	16.92	16.92	0.5
Middle	2437	17.00	16.33	0.5
High	2462	16.33	16.42	0.5

6 dB BANDWIDTH, CHAIN 1

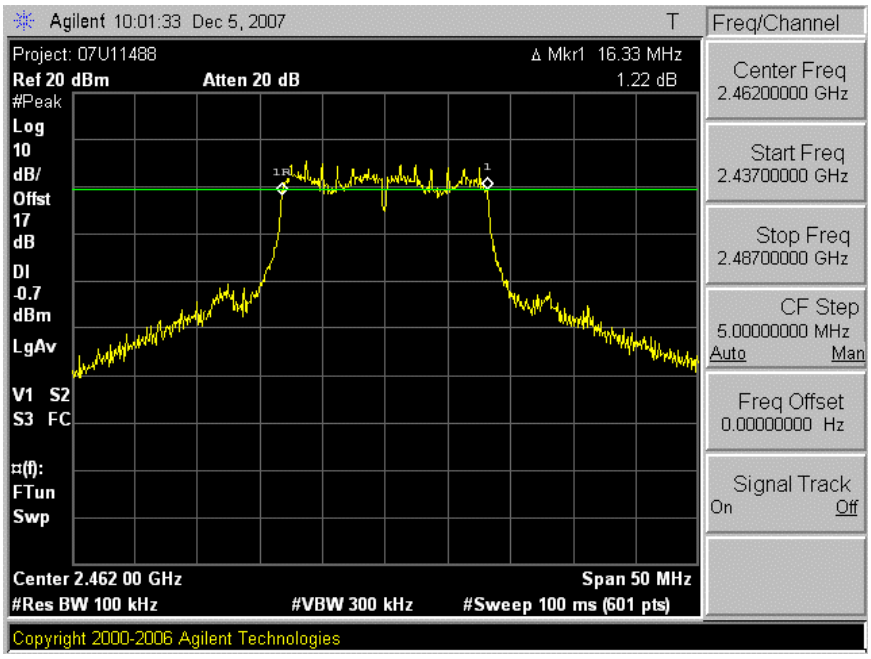
6 dB BANDWIDTH LOW CH, CHAIN 1



6 dB BANDWIDTH MID CH, CHAIN 1

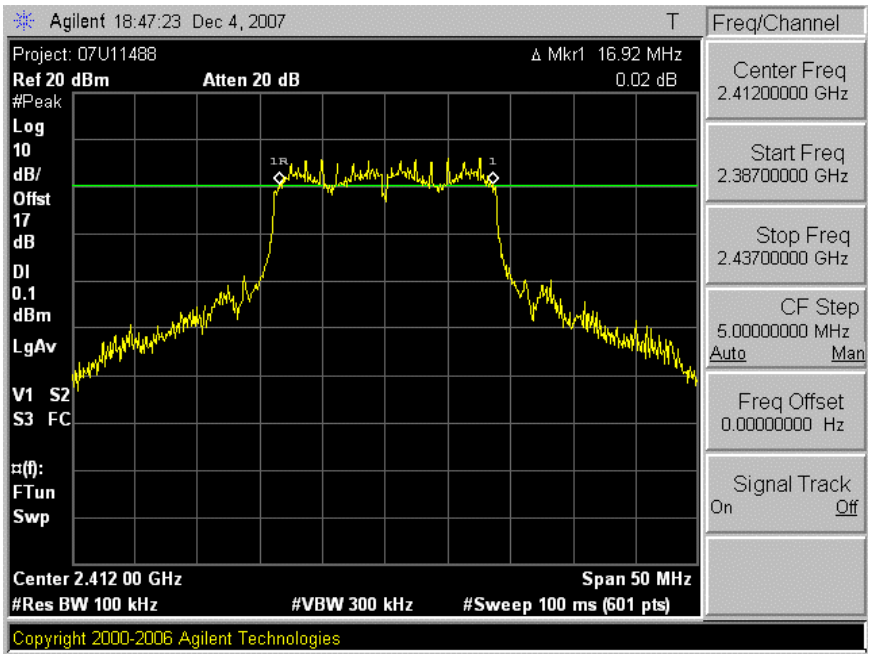


6 dB BANDWIDTH HIGH CH, CHAIN 1

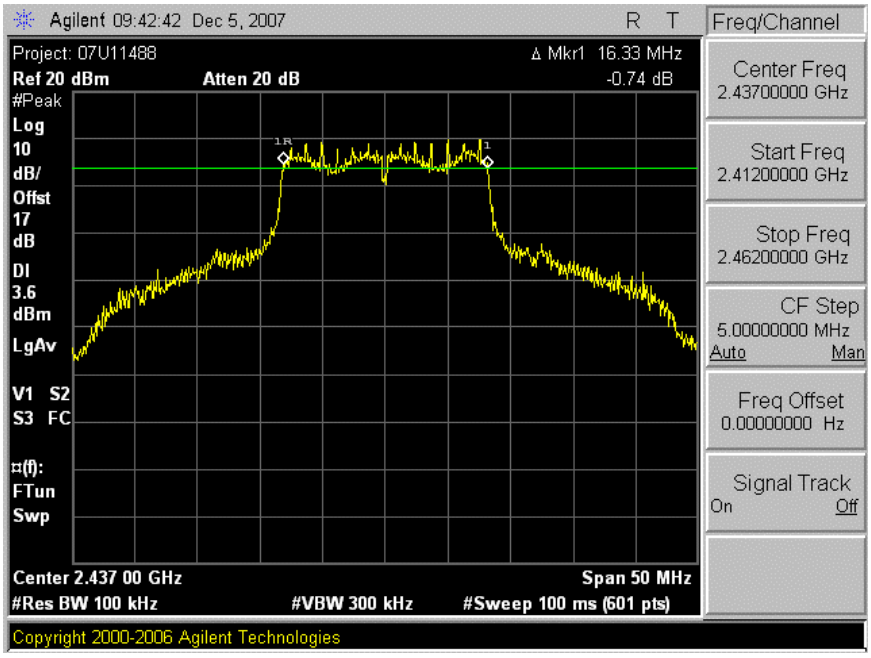


6 dB BANDWIDTH, CHAIN 2

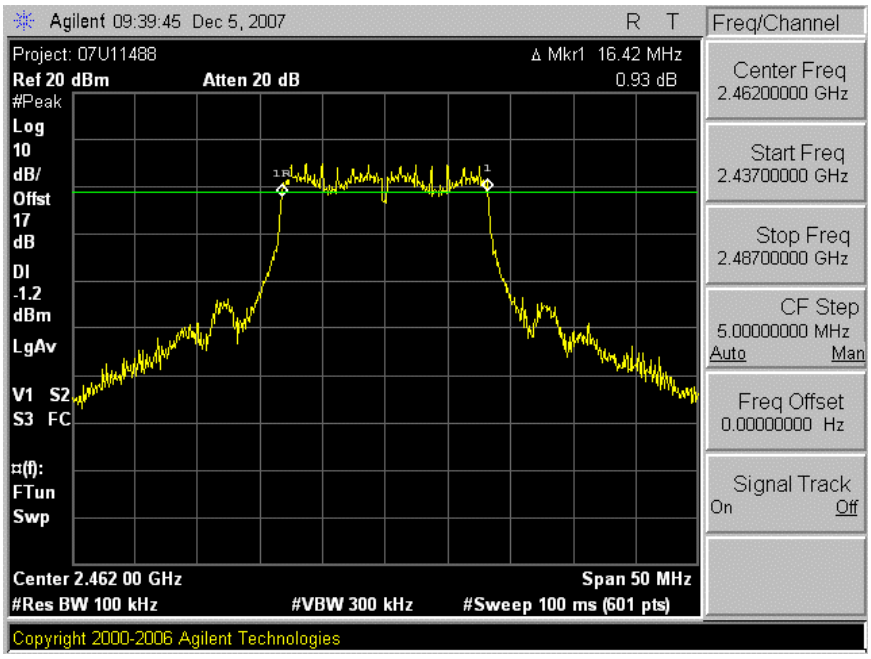
6 dB BANDWIDTH LOW CH, CHAIN 2



6 dB BANDWIDTH MID CH, CHAIN 2



6 dB BANDWIDTH HIGH CH, CHAIN 2



7.2.2. 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

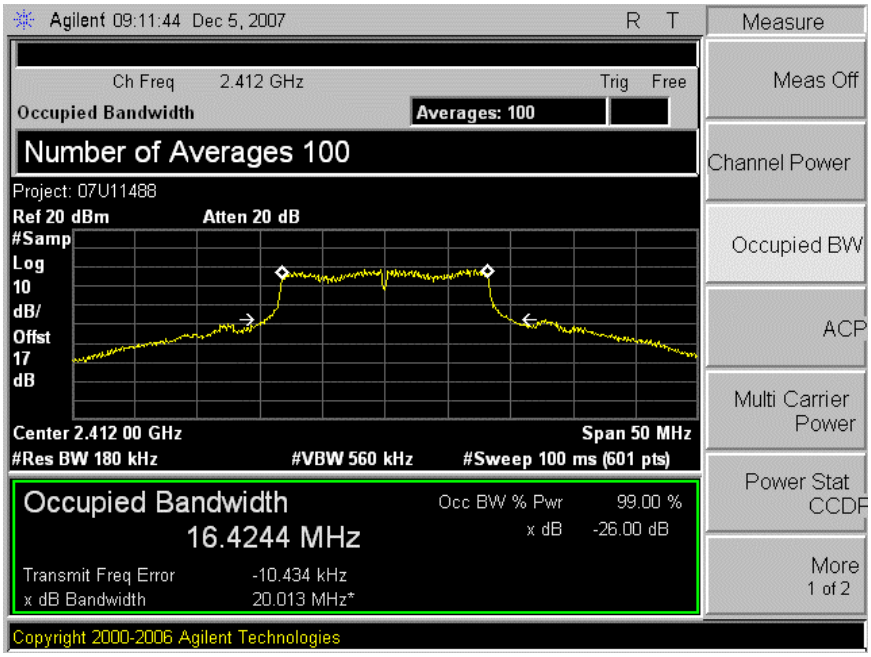
The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the 99 % bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal 99% bandwidth function is utilized.

RESULTS

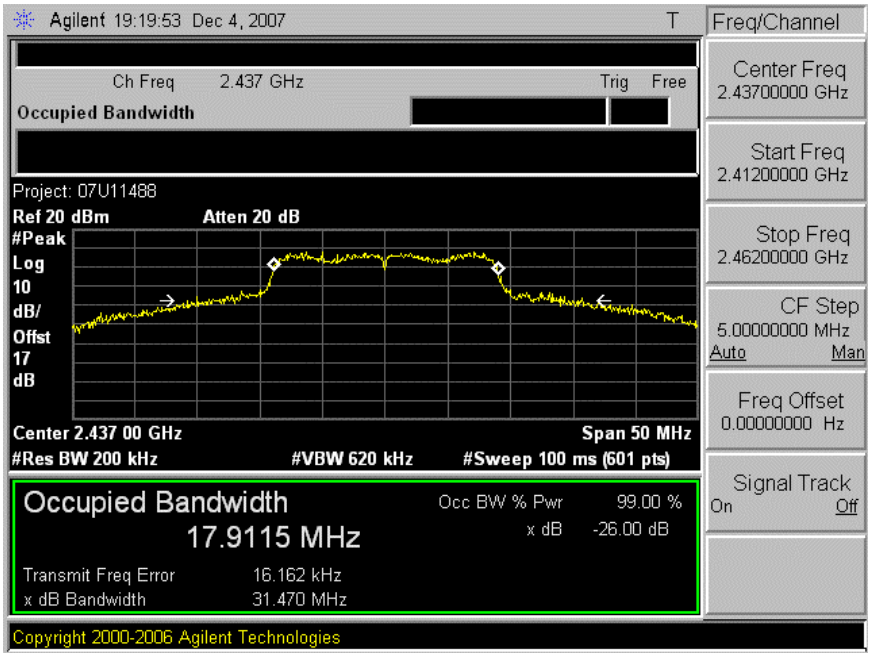
Channel	Frequency (MHz)	Chain 1 99% Bandwidth (MHz)	Chain 2 99% Bandwidth (MHz)
Low	2412	16.4244	16.4106
Middle	2437	17.9115	16.4581
High	2462	16.4293	16.4169

99% BANDWIDTH, CHAIN 1

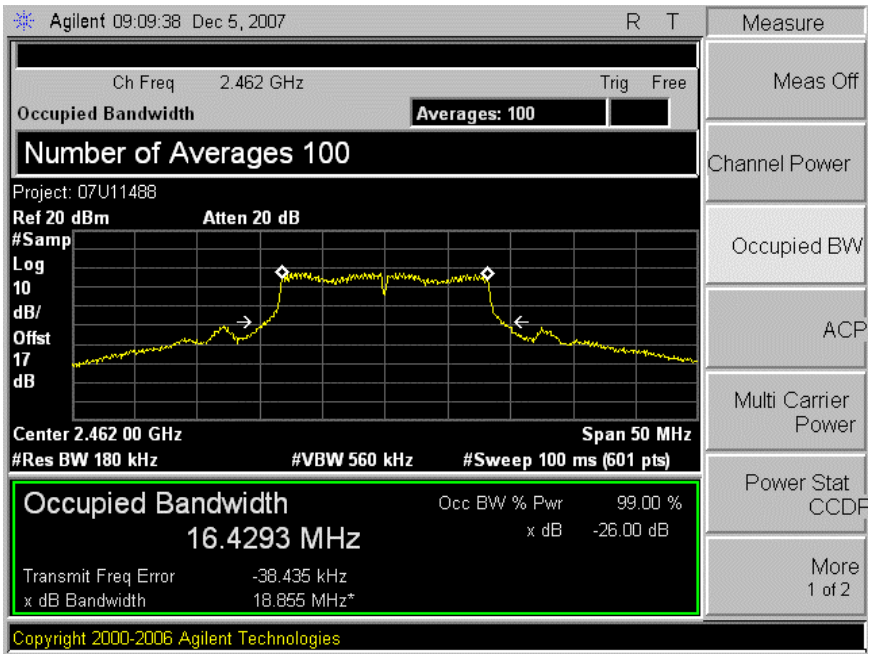
99% BANDWIDTH LOW CH, CHAIN 1



99% BANDWIDTH MID CH, CHAIN 1

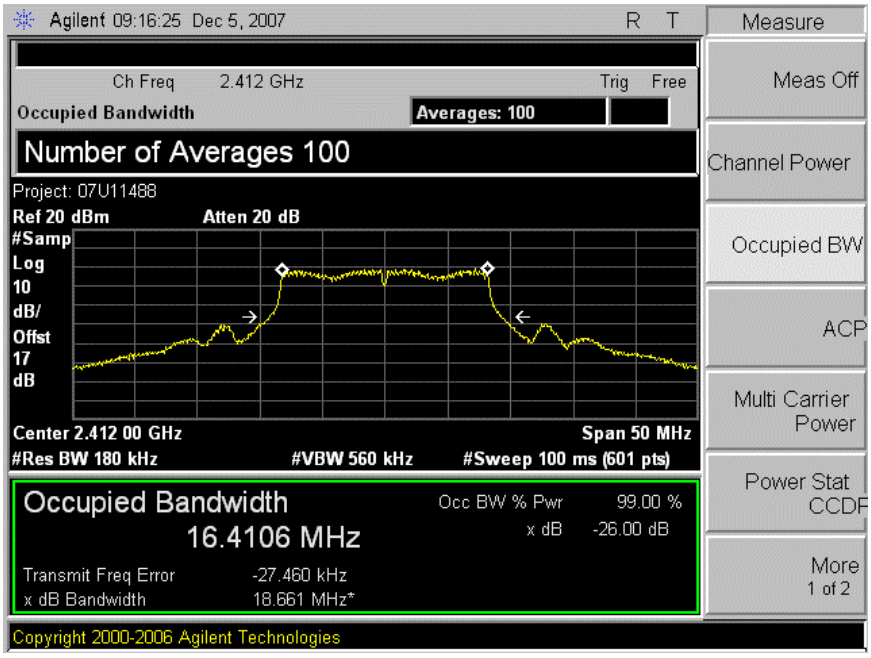


99% BANDWIDTH HIGH CH, CHAIN 1

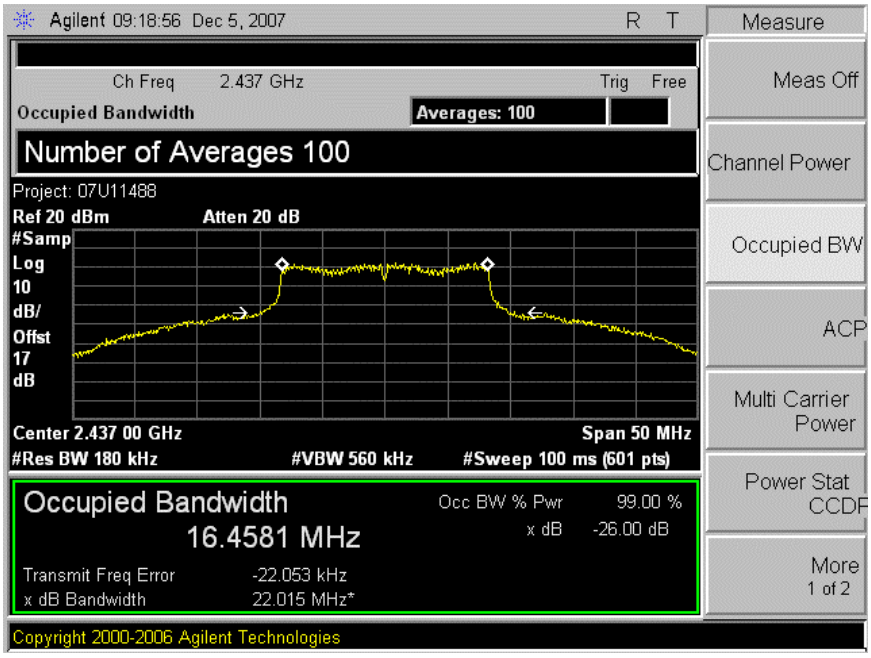


99% BANDWIDTH, CHAIN 2

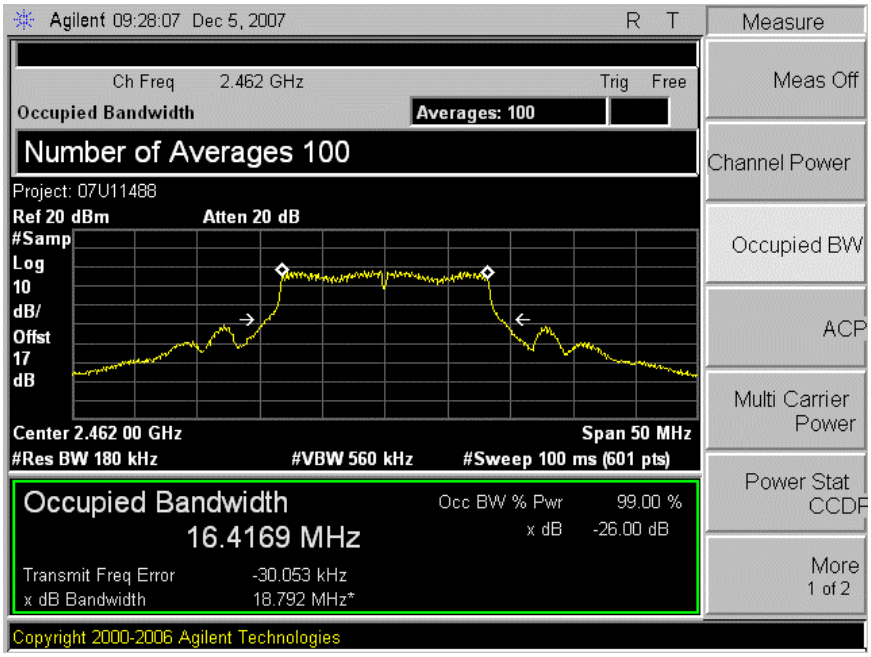
99% BANDWIDTH LOW CH, CHAIN 2



99% BANDWIDTH MID CH, CHAIN 2



99% BANDWIDTH HIGH CH, CHAIN 2



7.2.3. OUTPUT POWER

LIMITS

FCC §15.247 (b)

IC RSS-210 A8.4

Antenna Gain (dBi)	10 Log (# Tx Chains) (dB)	Effective Legacy Gain (dBi)
2	3.01	5.01

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

TEST PROCEDURE

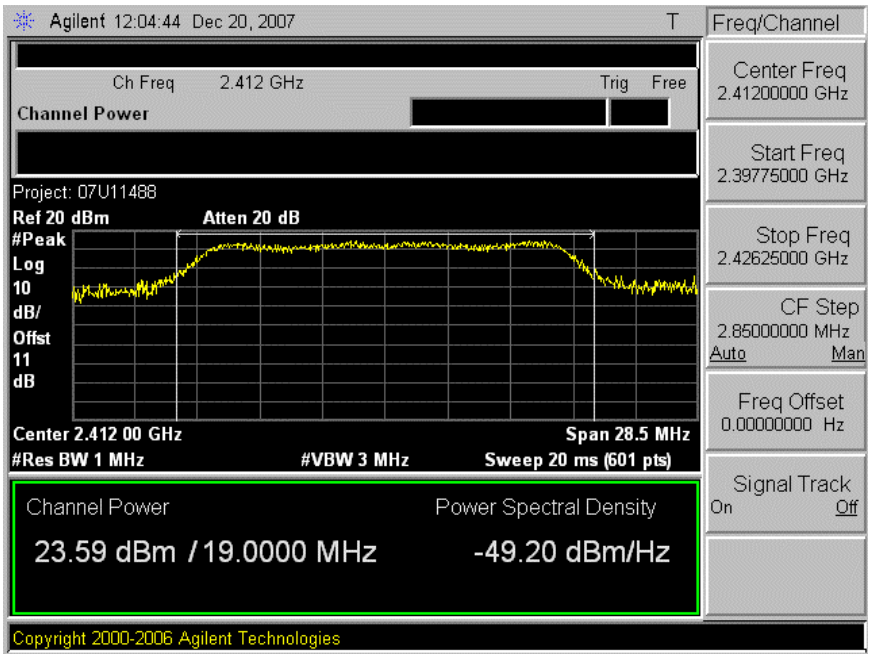
Peak power is measured using the spectrum analyzer's internal channel power integration function. Power is integrated over a bandwidth greater than or equal to the 99% bandwidth.

RESULTS

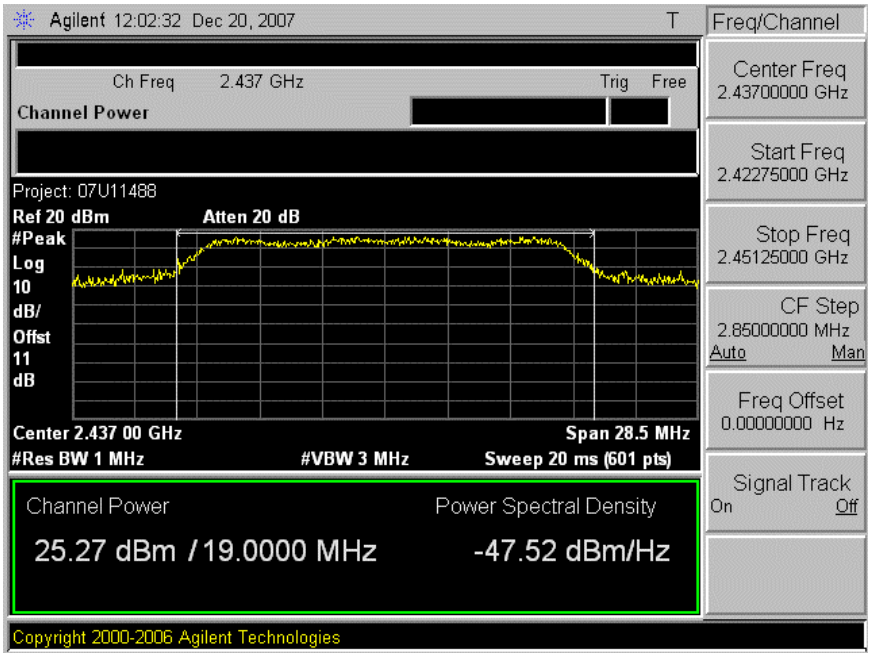
Channel	Frequency (MHz)	Limit (dBm)	Chain 1 Power (dBm)	Chain 2 Power (dBm)	Total Power (dBm)	Margin (dB)
Low	2412	30.00	23.95	23.44	26.71	-3.29
Mid	2437	30.00	25.27	25.61	28.45	-1.55
High	2462	30.00	22.38	22.38	25.39	-4.61

CHAIN 1 OUTPUT POWER

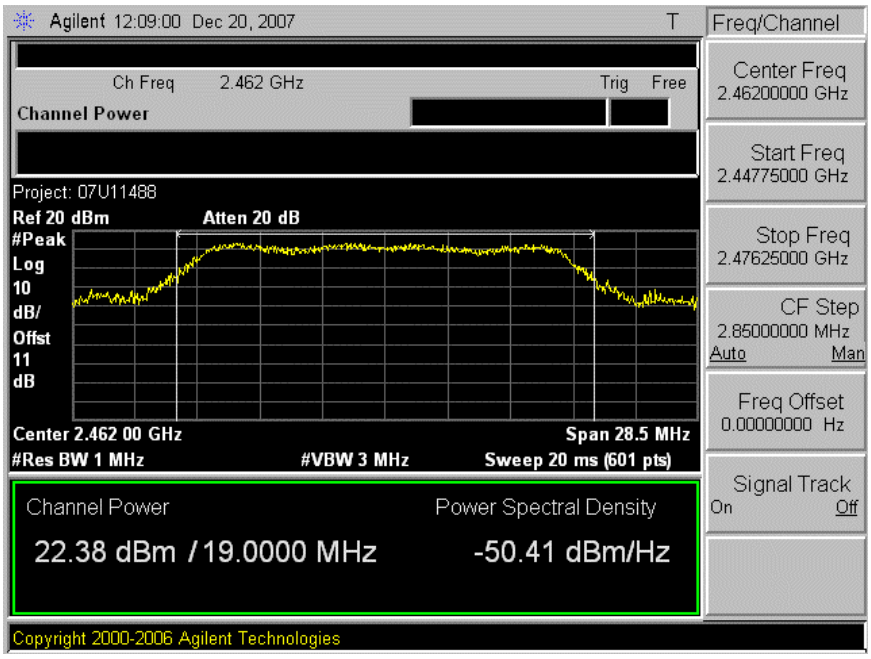
OUTPUT POWER LOW CH, CHAIN 1



OUTPUT POWER MID CH, CHAIN 1

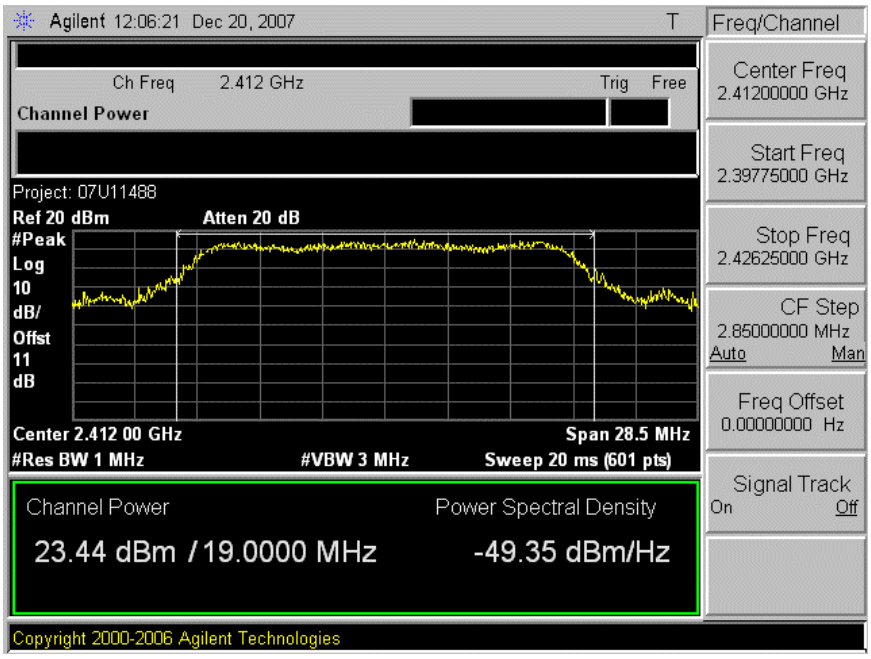


OUTPUT POWER HIGH CH, CHAIN 1

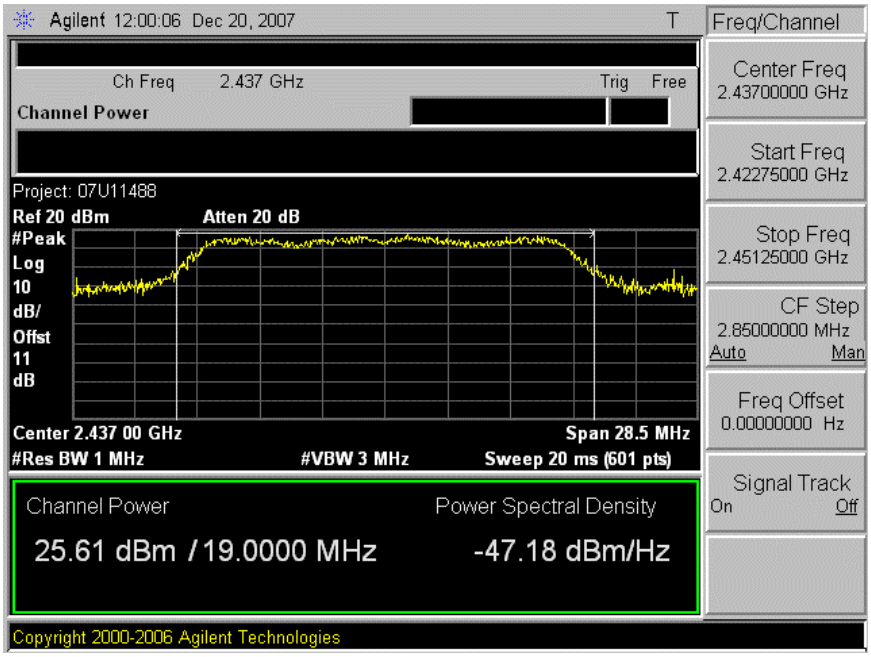


CHAIN 2 OUTPUT POWER

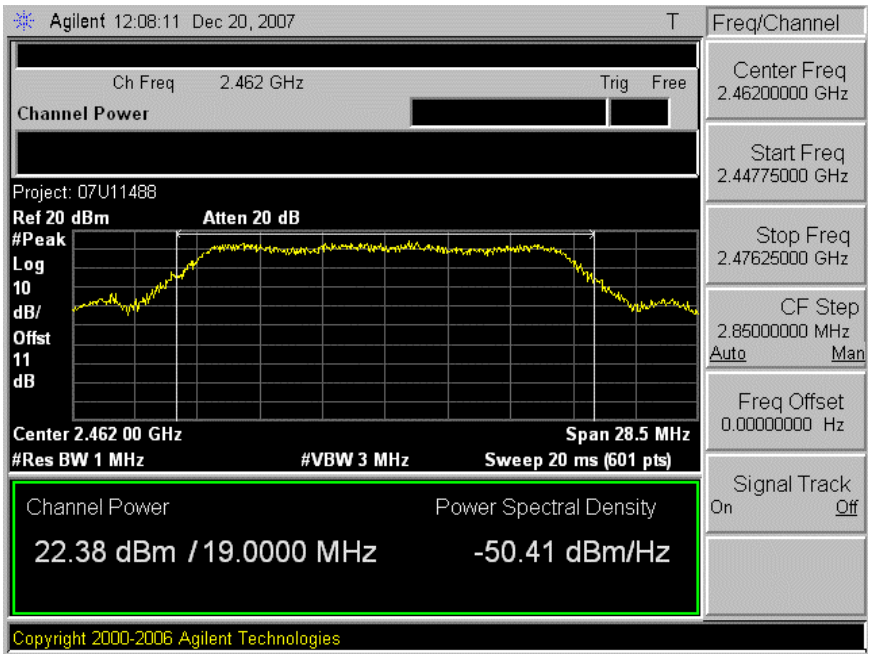
OUTPUT POWER LOW CH, CHAIN 2



OUTPUT POWER MID CH, CHAIN 2



OUTPUT POWER HIGH CH, CHAIN 2



7.2.4. 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 11 dB (including 10 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)	Power with Combiner (dBm)
Low	2412	19.90
Mid	2437	22.12
High	2462	18.68

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

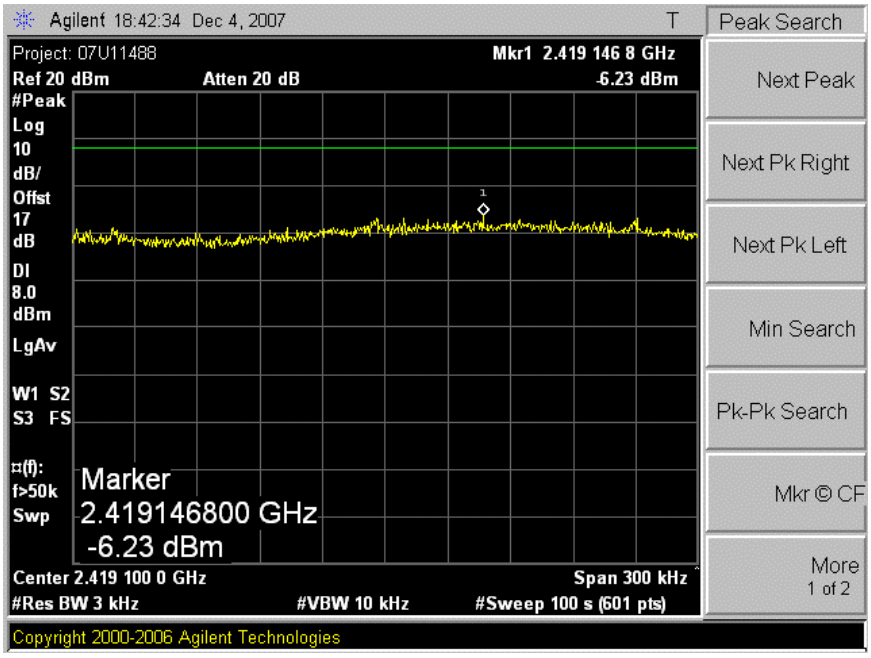
Middle and High channels were measured with the combiner only, since doing so results in the worst-case compared to measuring either chain alone.

Channel	Frequency (MHz)	Chain 1 PSD (dBm)	Chain 2 PSD (dBm)	Total PSD (dBm)	Limit (dBm)	Margin (dB)
Low	2412	-6.23	-8.69	-4.28	8	-12.28
Middle	2437	(see combine result)				
High	2462	(see combine result)				

Channel	Frequency (MHz)	PSD with Combiner (dBm)	Limit (dBm)	Margin (dB)
Low	2412	-0.70	8	-8.70
Middle	2437	1.49	8	-6.51
High	2462	-3.16	8	-11.16

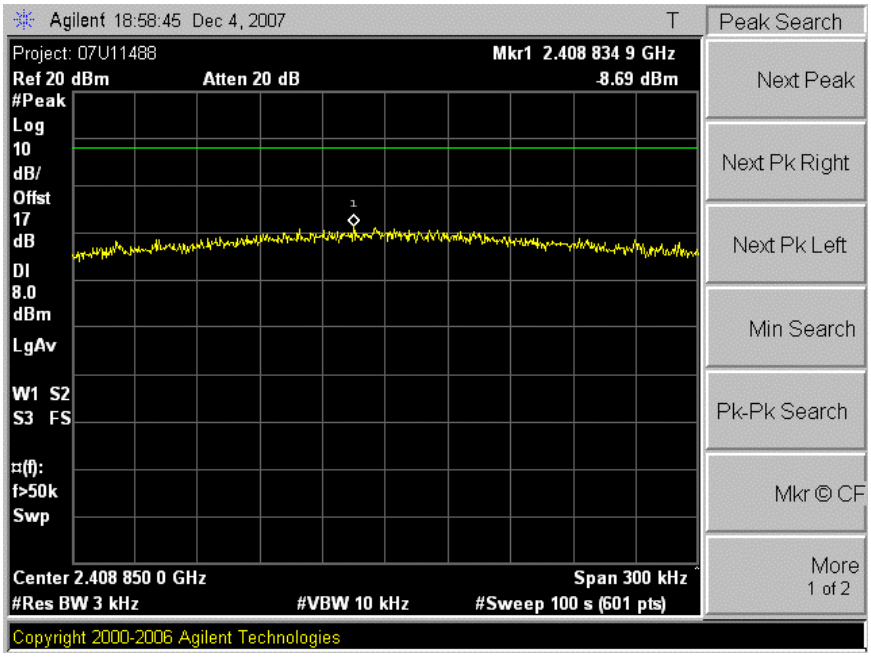
POWER SPECTRAL DENSITY, CHAIN 1

PSD LOW CH, CHAIN 1



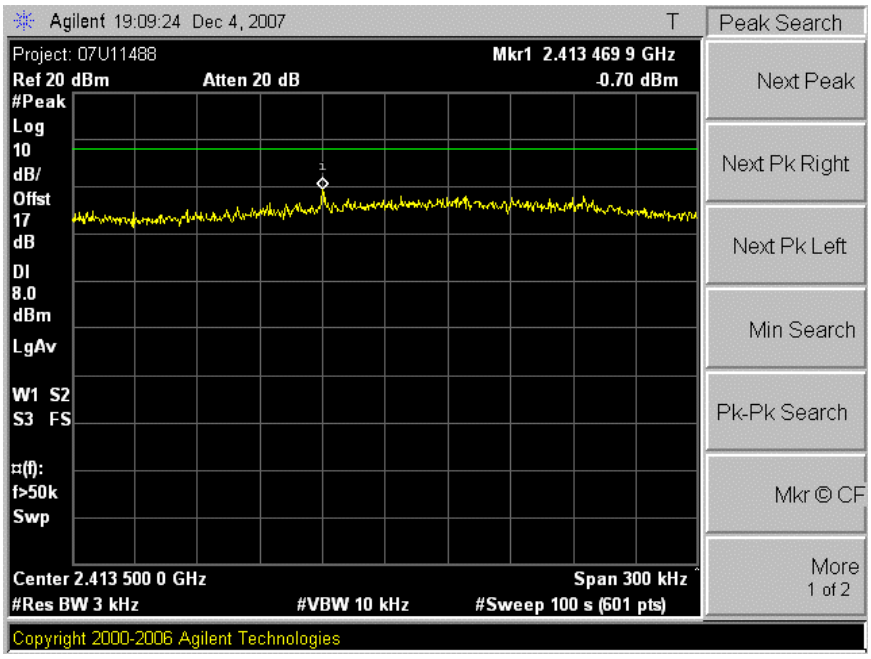
POWER SPECTRAL DENSITY, CHAIN 2

PSD LOW CH, CHAIN 2

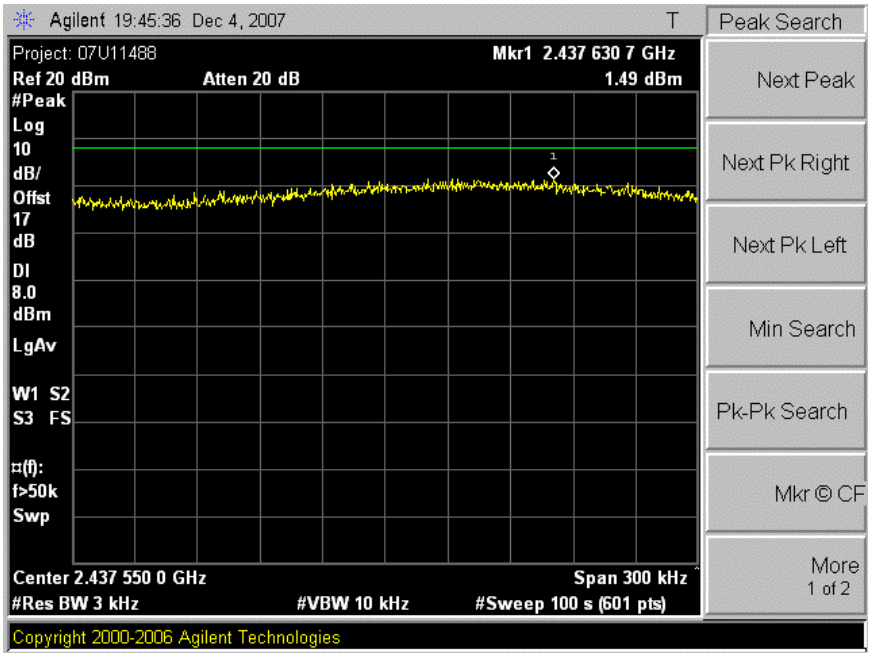


POWER SPECTRAL DENSITY, WITH COMBINER

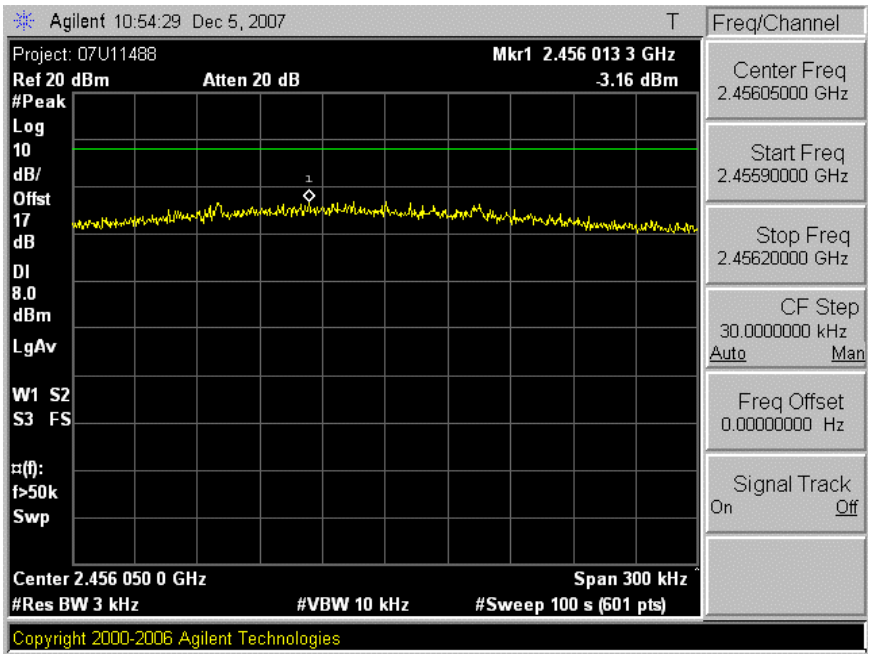
PSD LOW CH, WITH COMBINER



PSD MID CH, WITH COMBINER



PSD HIGH CH, WITH COMBINER



7.2.6. 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.

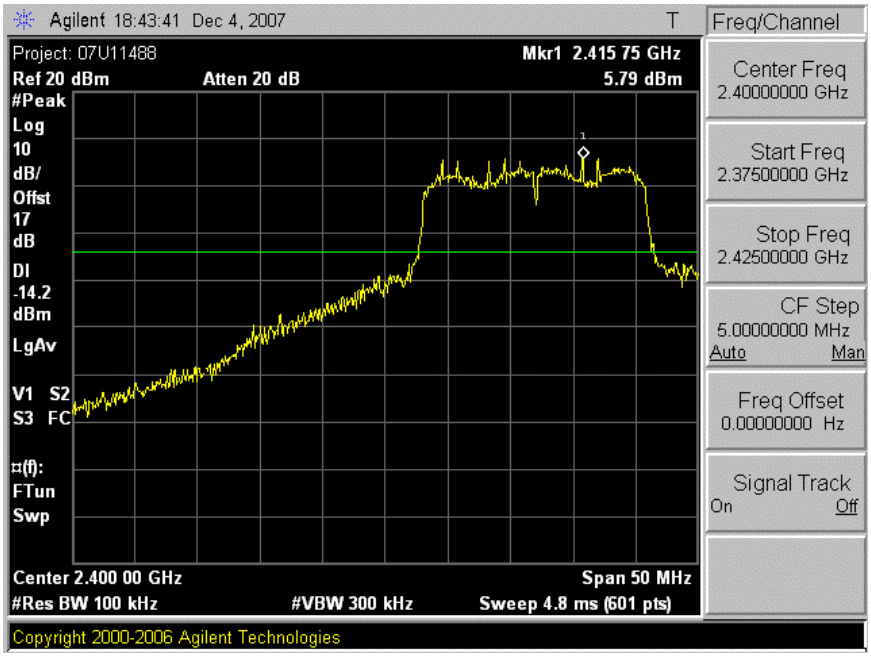
The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels.

RESULTS

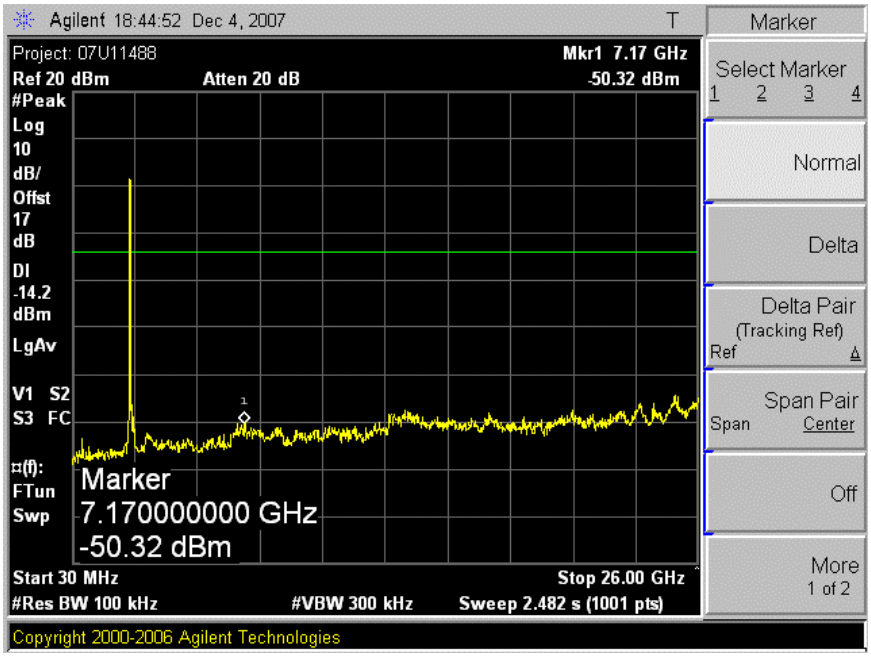
Middle and High channels were measured with the combiner only, since doing so results in the worst-case compared to measuring either chain alone.

CHAIN 1 SPURIOUS EMISSIONS

LOW CH BANDEDGE, CHAIN 1

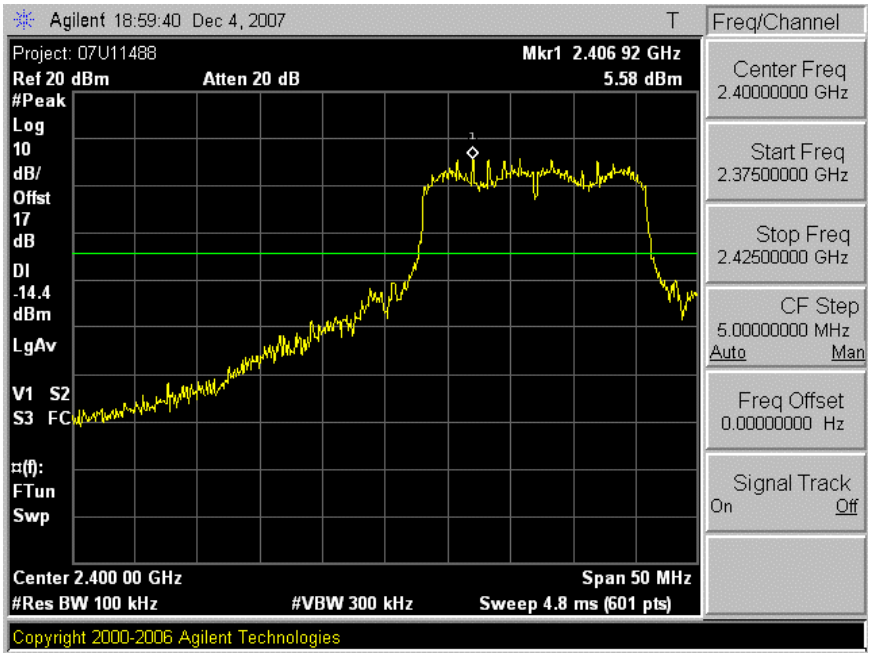


LOW CH SPURIOUS, CHAIN 1

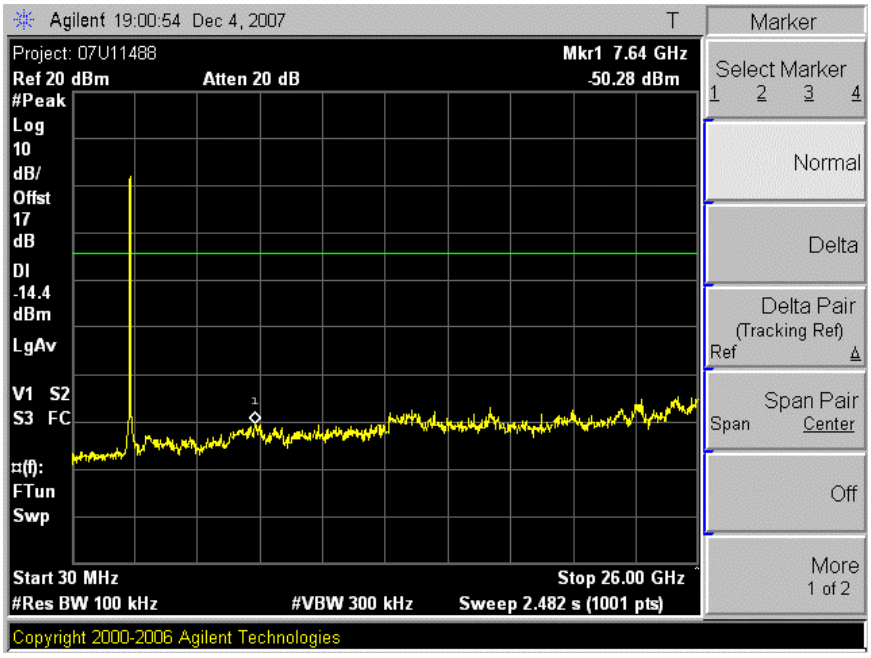


CHAIN 2 SPURIOUS EMISSIONS

LOW CH BANDEDGE, CHAIN 2



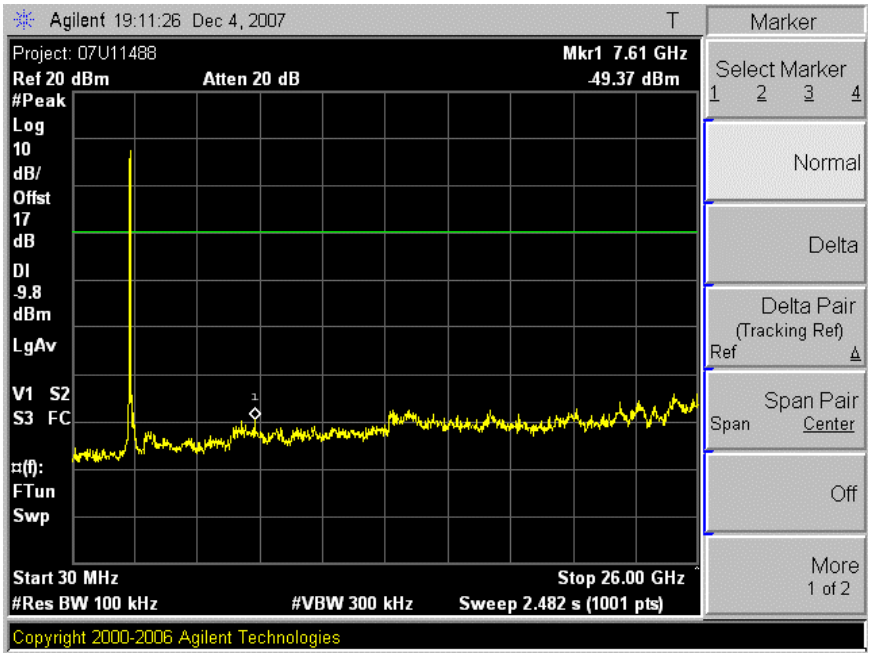
LOW CH SPURIOUS, CHAIN 2



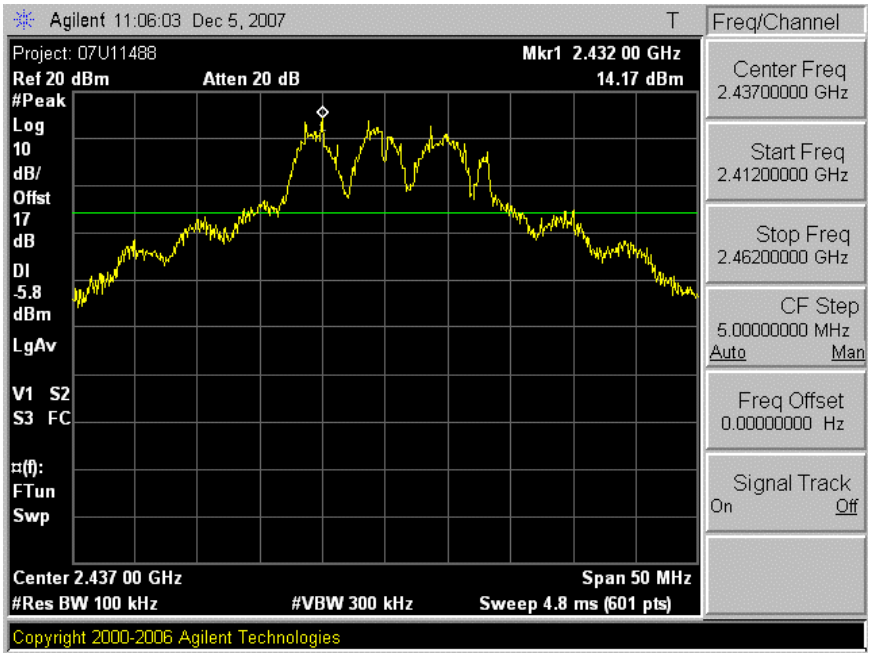
SPURIOUS EMISSIONS WITH COMBINER

LOW CH BANDEDGE, WITH COMBINER

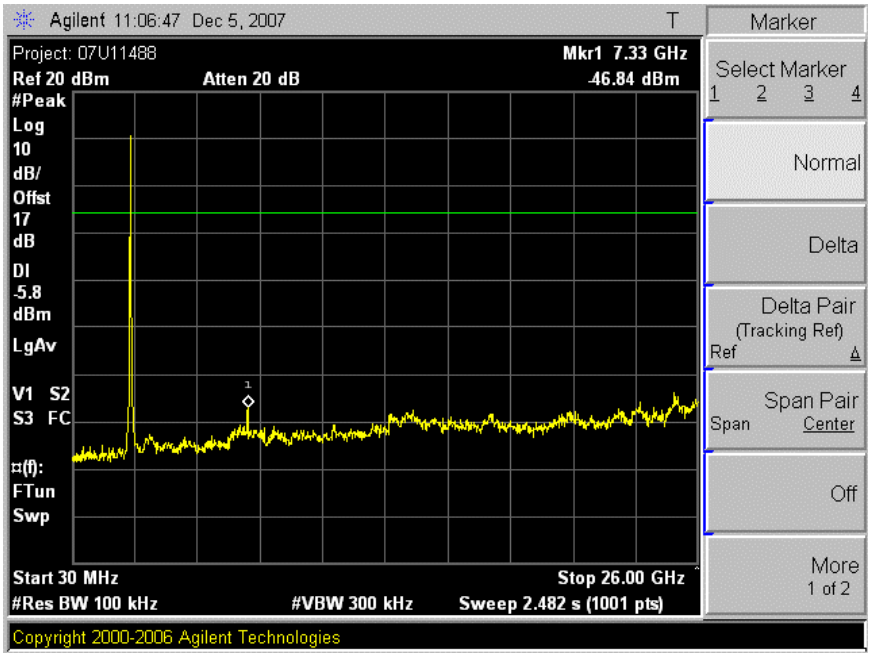
LOW CH SPURIOUS, WITH COMBINER



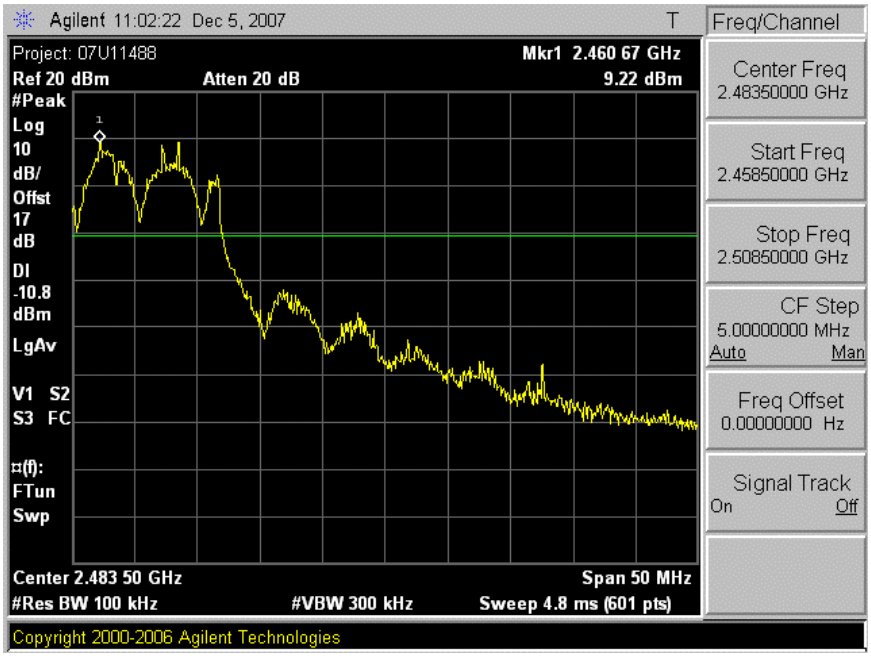
MID CH REFERENCE, WITH COMBINER



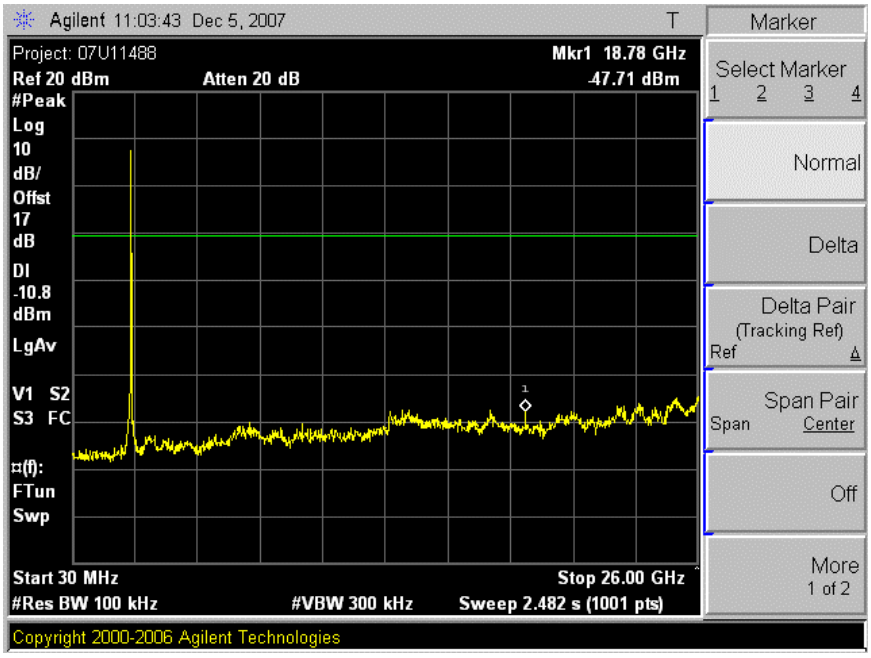
MID CH SPURIOUS, WITH COMBINER



HIGH CH BANDEDGE, WITH COMBINER



HIGH CH SPURIOUS, WITH COMBINER



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

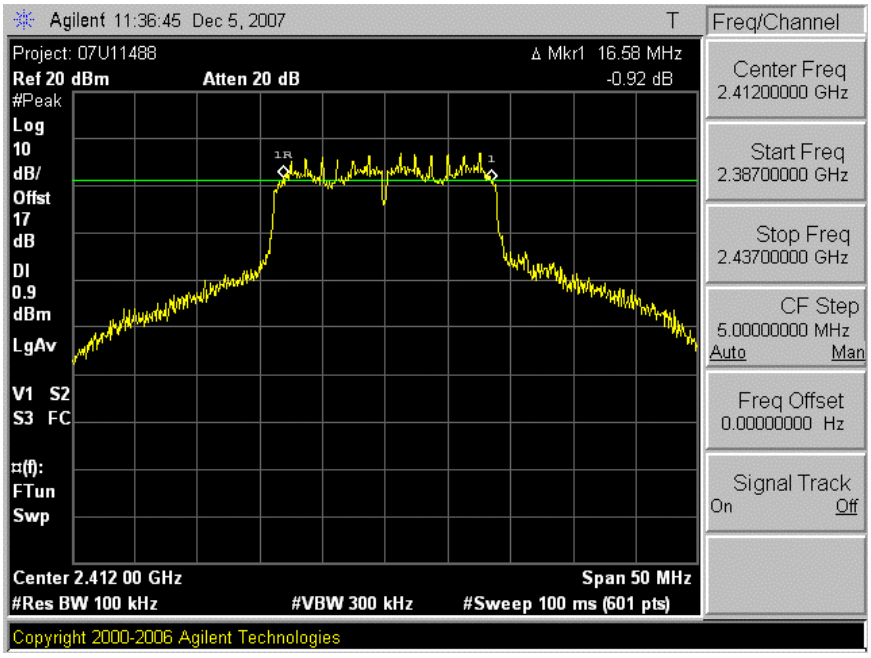
The transmitter output is connected to a spectrum analyzer. The RBW is set to 100 kHz and the VBW is set to 300 kHz. The sweep time is coupled.

RESULTS

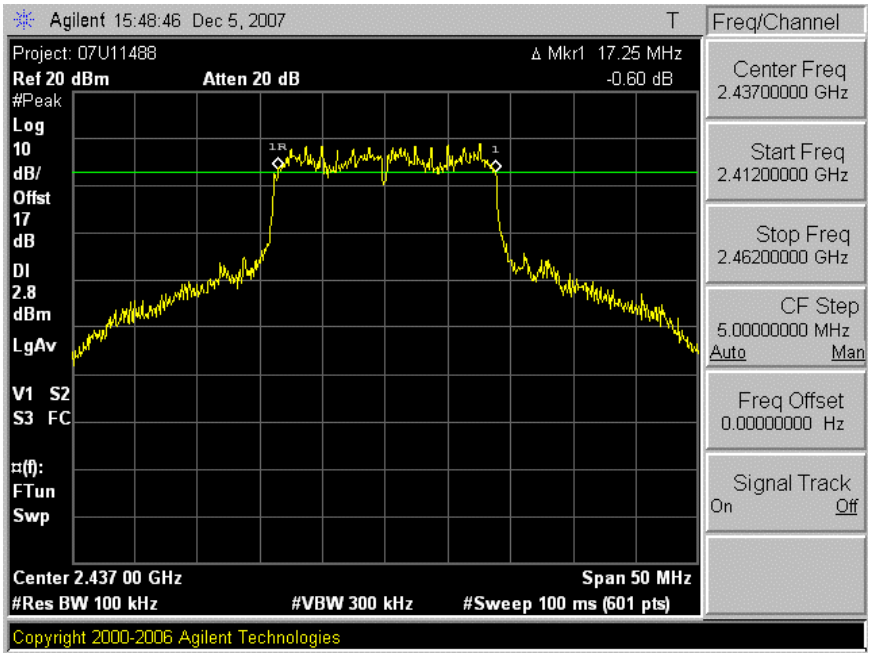
Channel	Frequency (MHz)	Chain 1 6 dB BW (MHz)	Chain 2 6 dB BW (MHz)	Minimum Limit (MHz)
Low	2412	16.58	17.08	0.5
Middle	2437	17.25	16.92	0.5
High	2462	16.92	17.33	0.5

6 dB BANDWIDTH, CHAIN 1

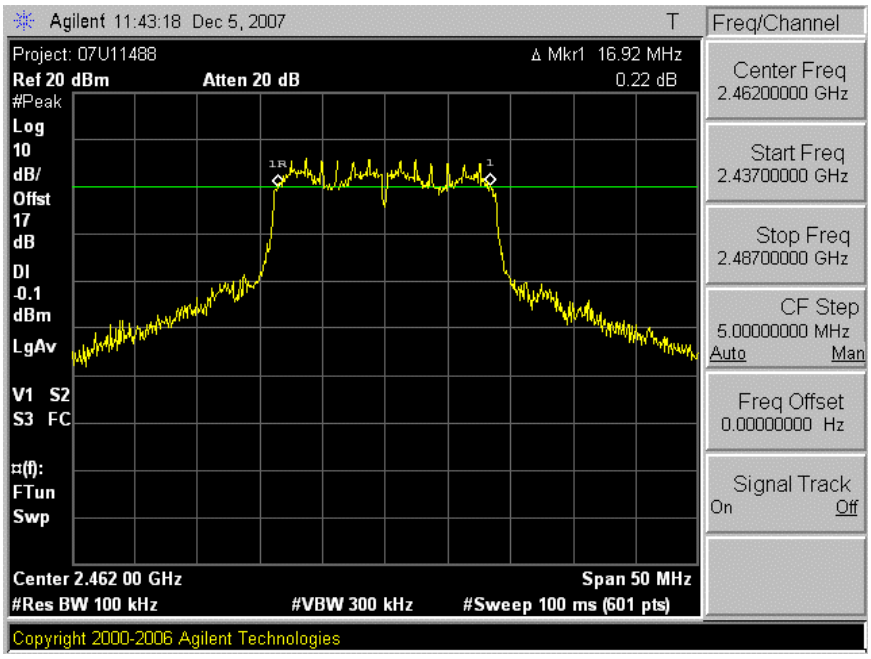
6 dB BANDWIDTH LOW CH, CHAIN 1



6 dB BANDWIDTH MID CH, CHAIN 1

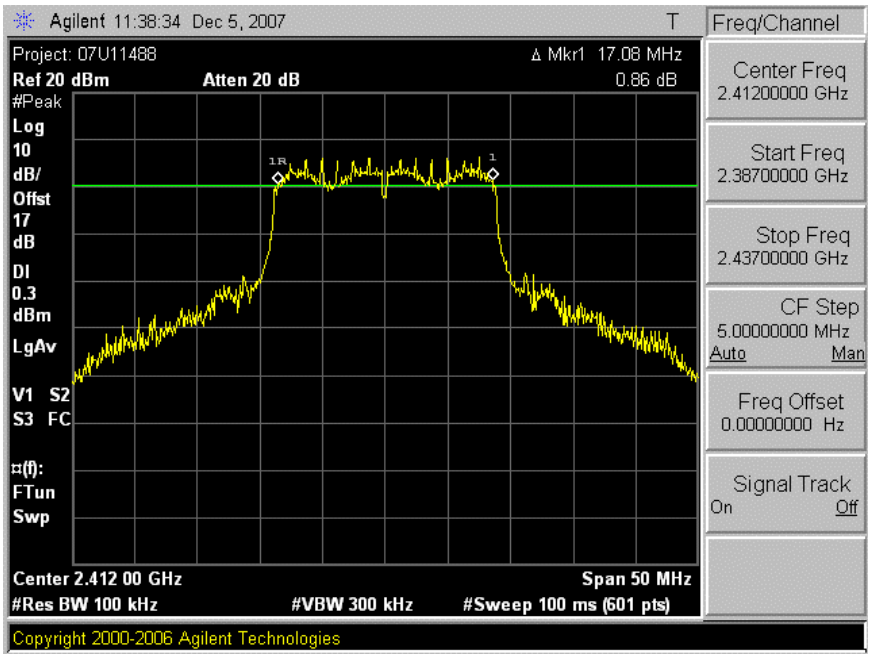


6 dB BANDWIDTH HIGH CH, CHAIN 1

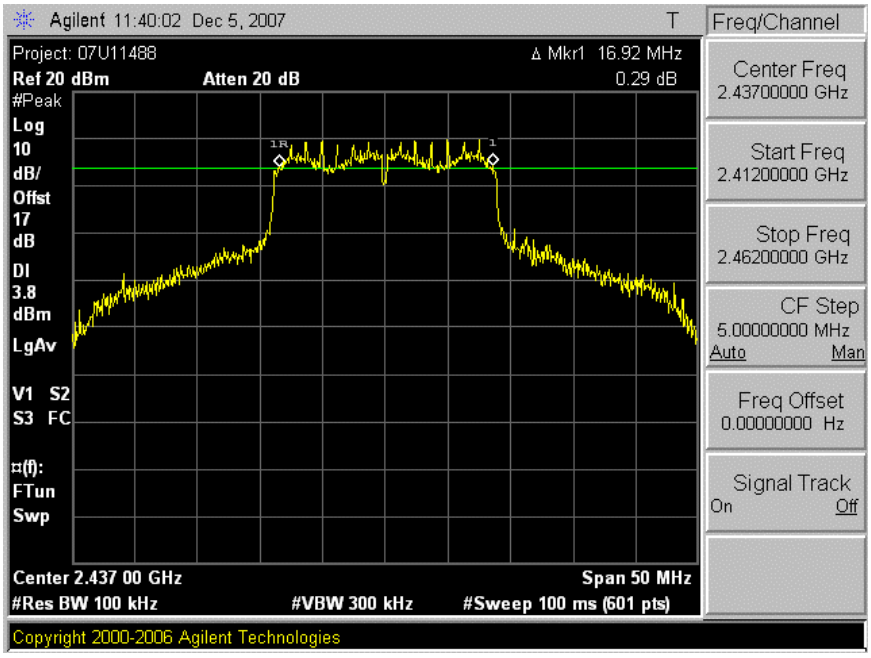


6 dB BANDWIDTH, CHAIN 2

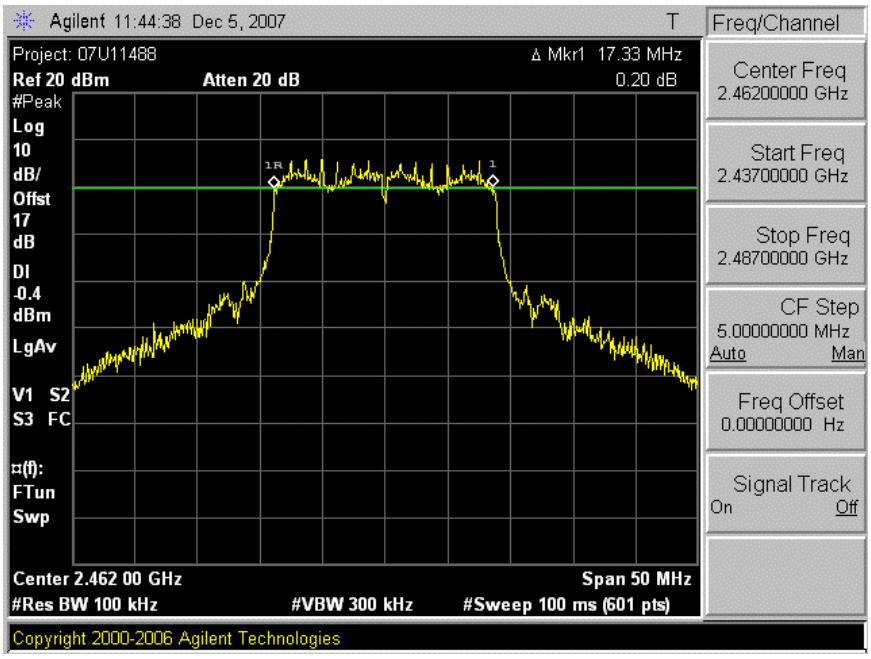
6 dB BANDWIDTH LOW CH, CHAIN 2



6 dB BANDWIDTH MID CH, CHAIN 2



6 dB BANDWIDTH HIGH CH, CHAIN 2



7.3.2. 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

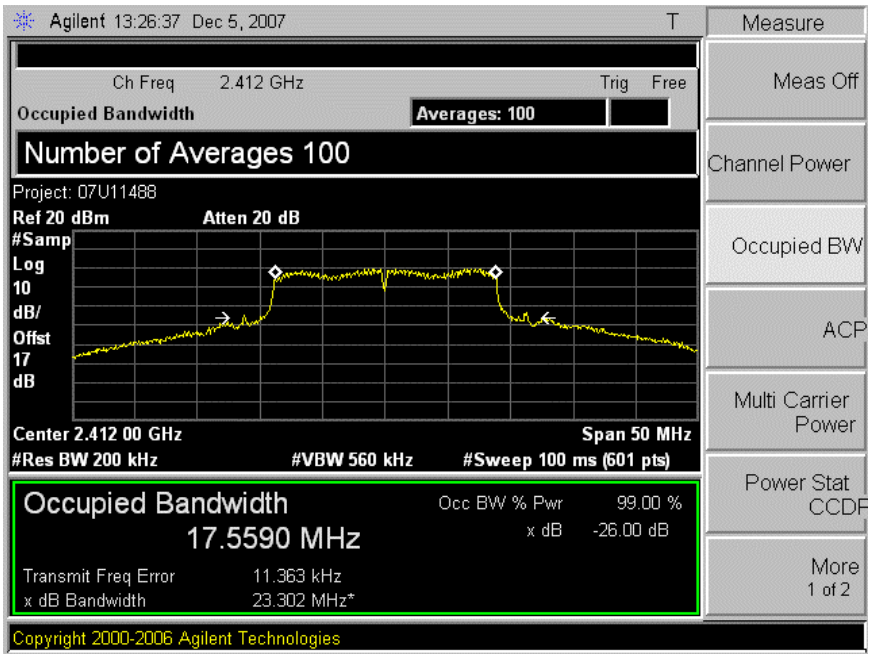
The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the 99 % bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal 99% bandwidth function is utilized.

RESULTS

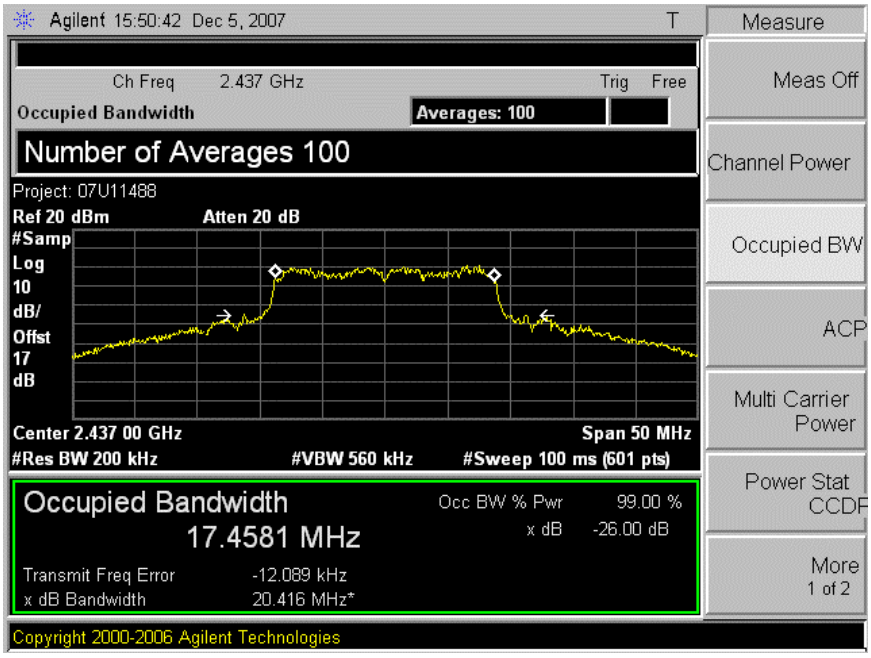
Channel	Frequency (MHz)	Chain 1 99% Bandwidth (MHz)	Chain 2 99% Bandwidth (MHz)
Low	2412	17.559	17.5607
Middle	2437	17.4581	17.6132
High	2462	17.5619	17.556

99% BANDWIDTH, CHAIN 1

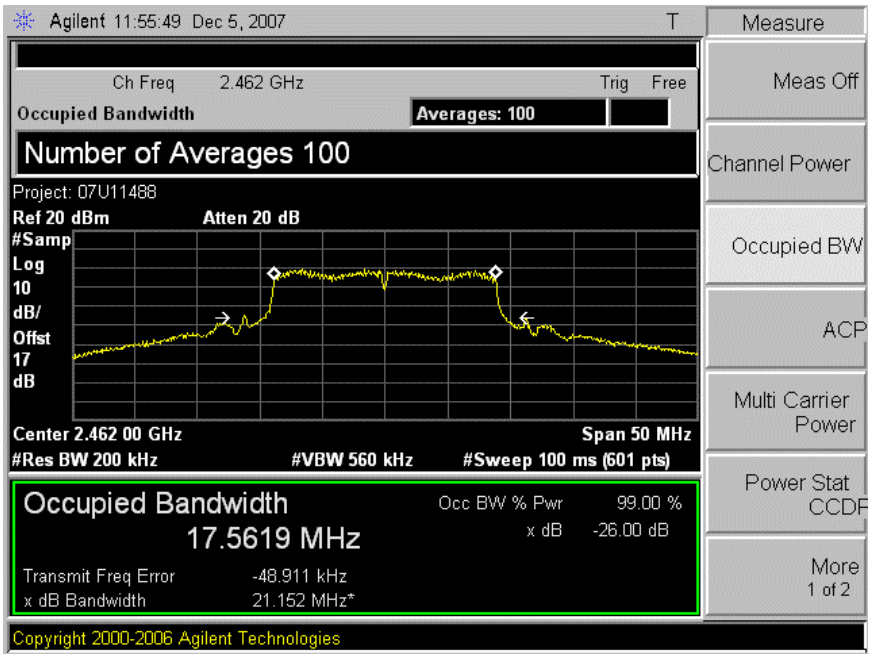
99% BANDWIDTH LOW CH, CHAIN 1



99% BANDWIDTH MID CH, CHAIN 1

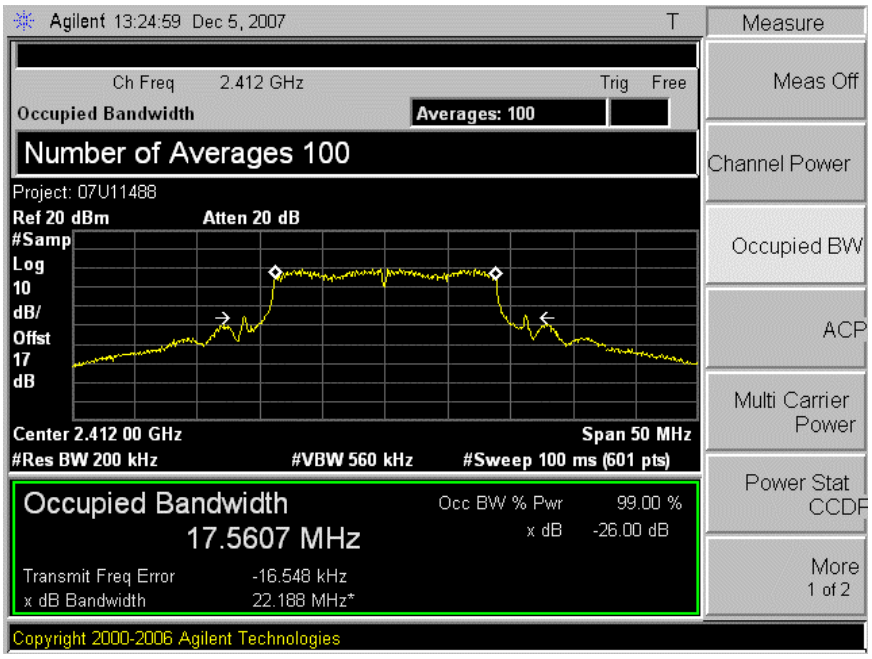


99% BANDWIDTH HIGH CH, CHAIN 1

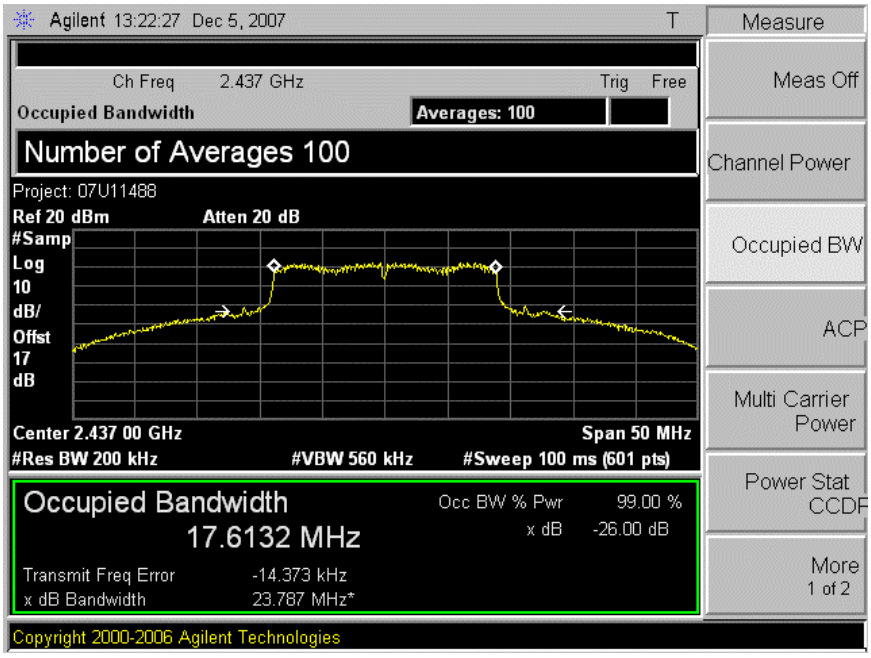


99% BANDWIDTH, CHAIN 2

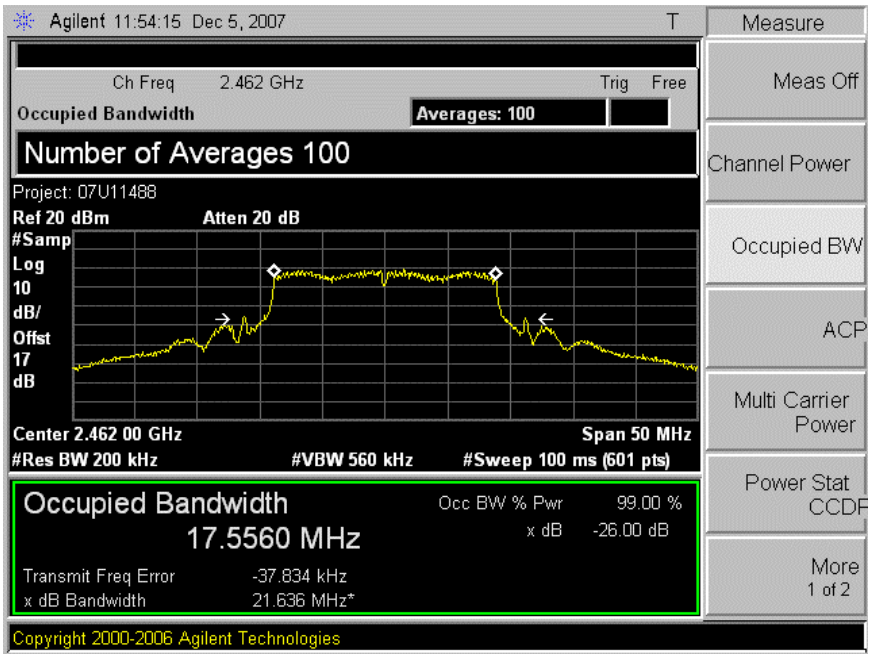
99% BANDWIDTH LOW CH, CHAIN 2



99% BANDWIDTH MID CH, CHAIN 2



99% BANDWIDTH HIGH CH, CHAIN 2



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

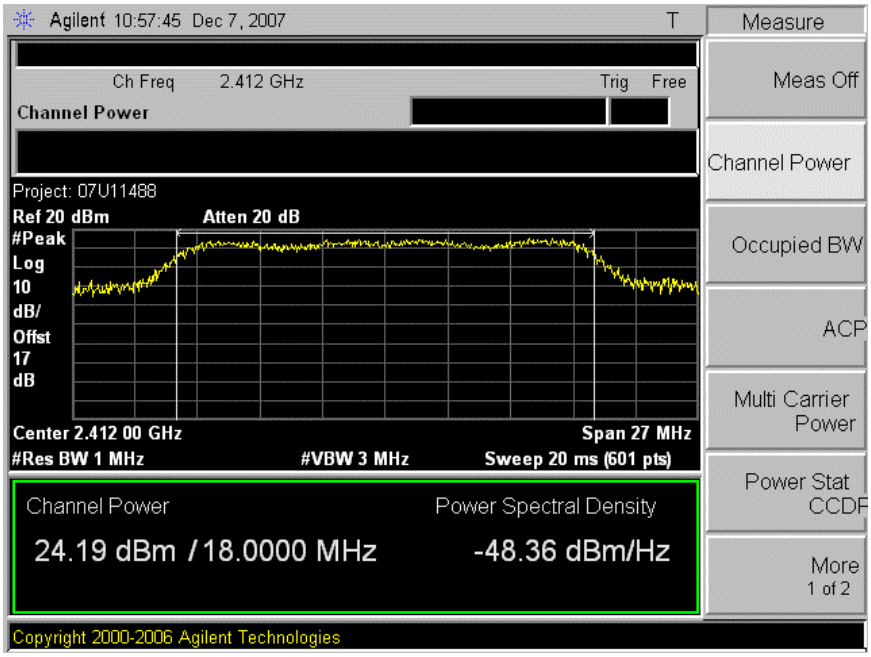
Peak power is measured using the spectrum analyzer's internal channel power integration function. Power is integrated over a bandwidth greater than or equal to the 99% bandwidth.

RESULTS

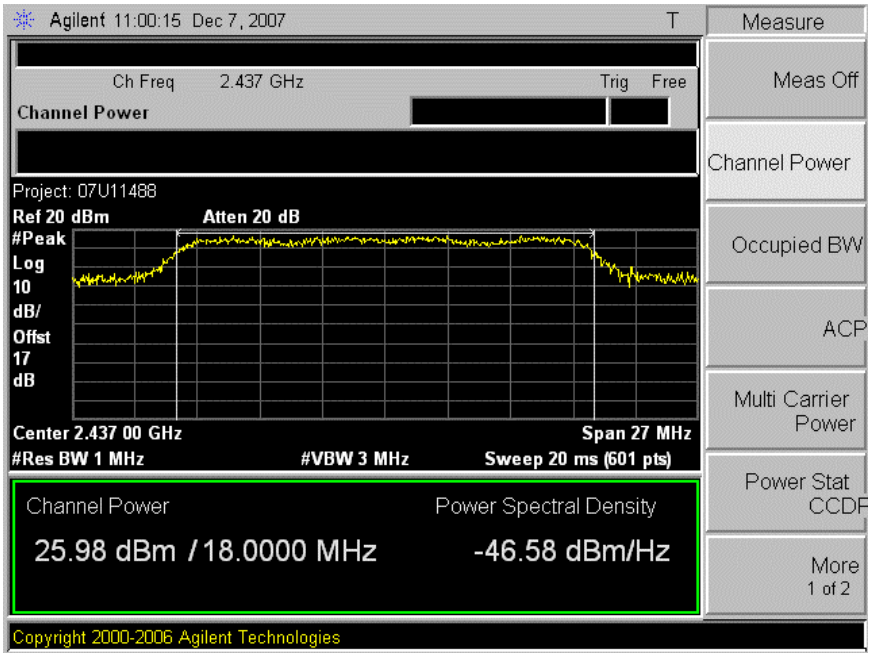
Channel	Frequency (MHz)	Limit (dBm)	Chain 1 Power (dBm)	Chain 2 Power (dBm)	Total Power (dBm)	Margin (dB)
Low	2412	30.00	24.19	23.84	27.03	-2.97
Mid	2437	30.00	25.98	25.91	28.96	-1.04
High	2462	30.00	23.50	23.37	26.45	-3.55

CHAIN 1 OUTPUT POWER

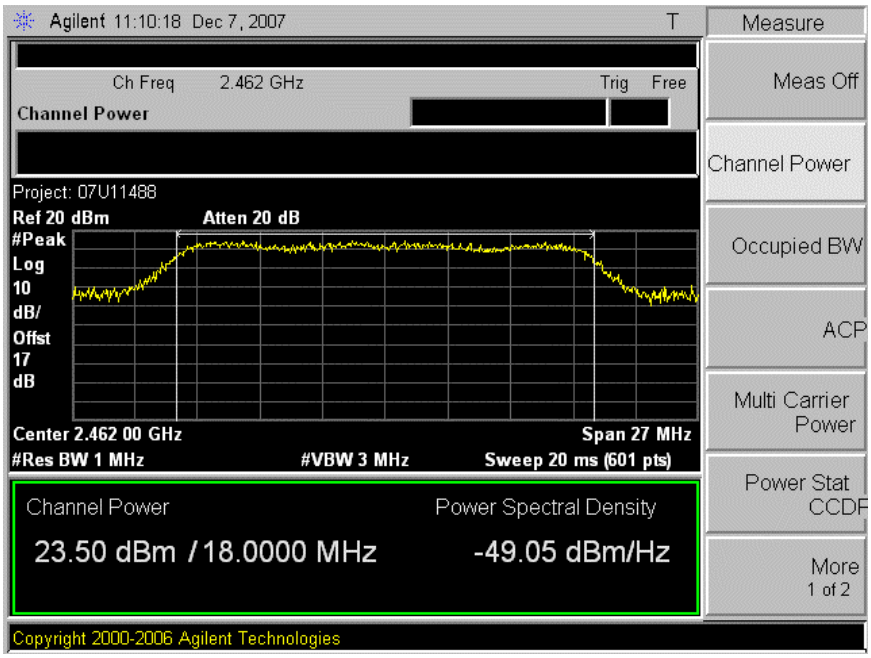
OUTPUT POWER LOW CH, CHAIN 1



OUTPUT POWER MID CH, CHAIN 1

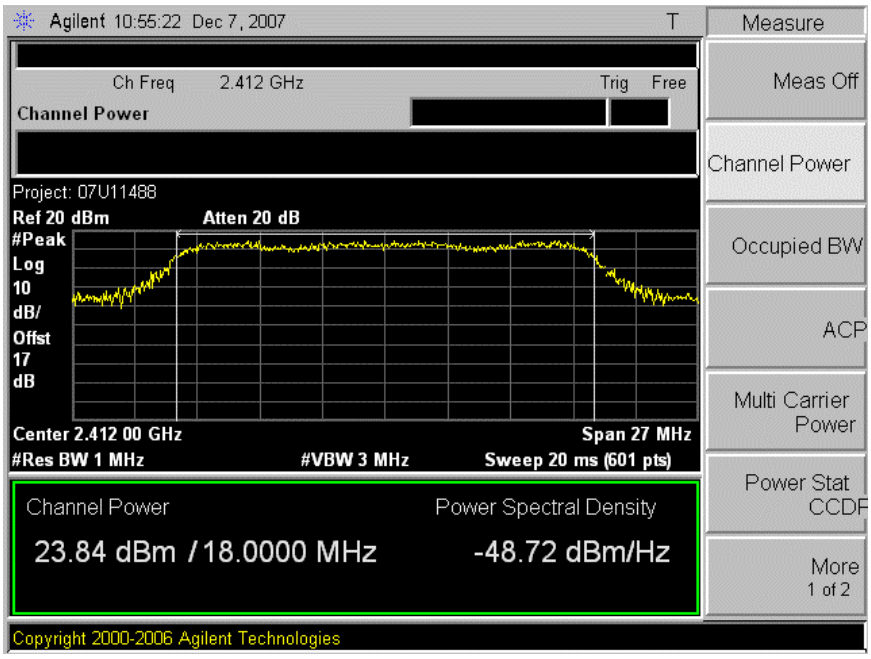


OUTPUT POWER HIGH CH, CHAIN 1

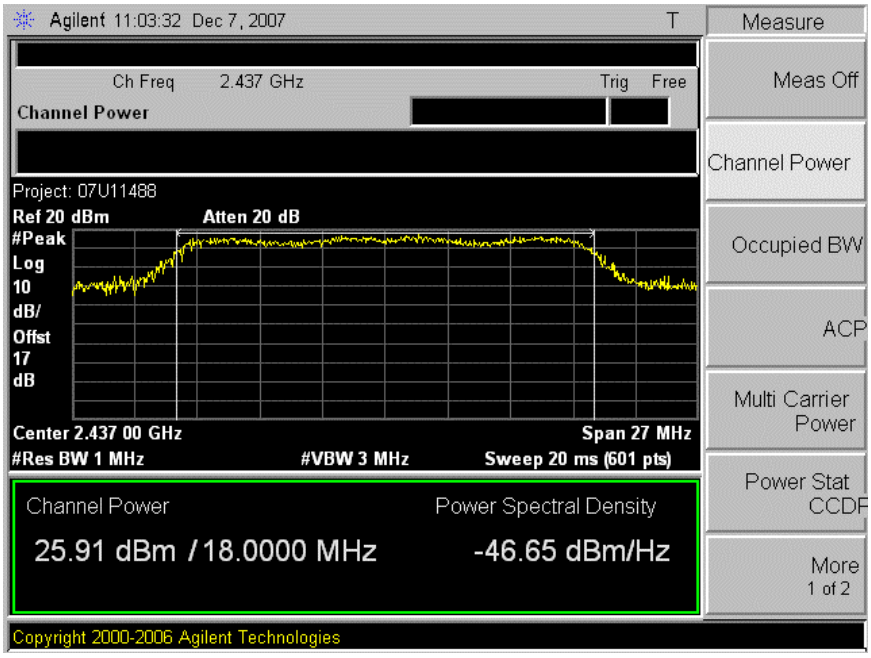


CHAIN 2 OUTPUT POWER

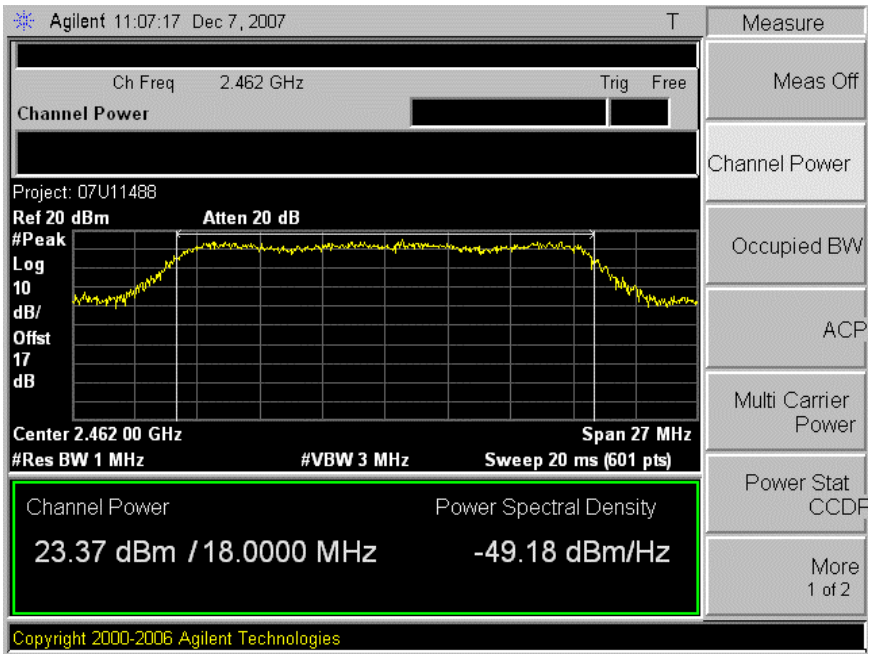
OUTPUT POWER LOW CH, CHAIN 2



OUTPUT POWER MID CH, CHAIN 2



OUTPUT POWER HIGH CH, CHAIN 2



7.3.4. 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 11 dB (including 10 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 1 Power (dBm)	Chain 2 Power (dBm)	Total Power (dBm)
Low	2412	17.13	17.11	20.13
Middle	2437	18.76	18.59	21.69
High	2462	16.46	16.35	19.42

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

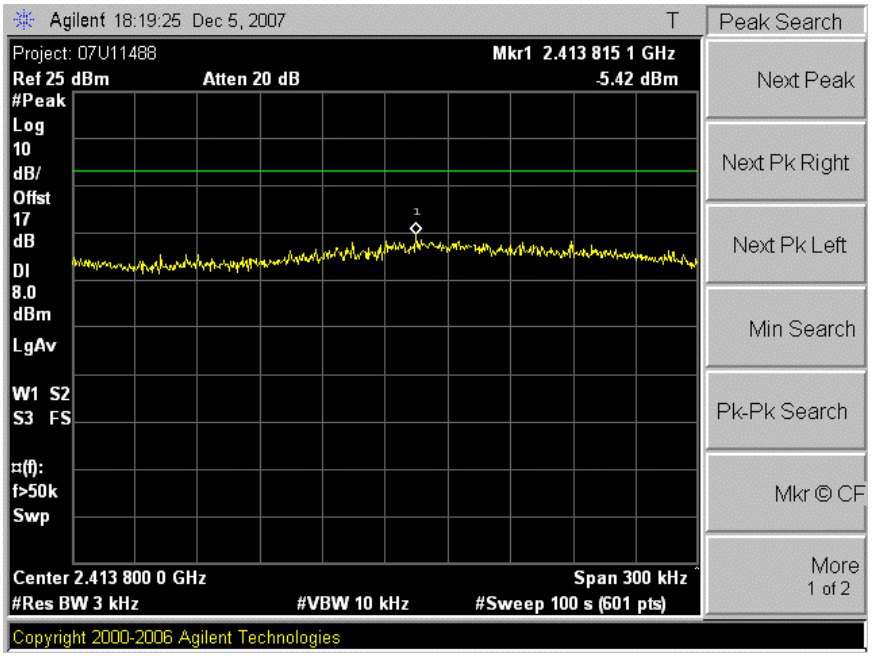
Middle and High channels were measured with the combiner only, since doing so results in the worst-case compared to measuring either chain alone.

Channel	Frequency (MHz)	Chain 1 PSD (dBm)	Chain 2 PSD (dBm)	Total PSD (dBm)	Limit (dBm)	Margin (dB)
Low	2412	-5.42	-6.87	-3.07	8	-11.07

Channel	Frequency (MHz)	PSD with Combiner (dBm)	Limit (dBm)	Margin (dB)
Low	2412	-2.13	8	-10.13
Middle	2437	0.65	8	-7.35
High	2462	-1.41	8	-9.41

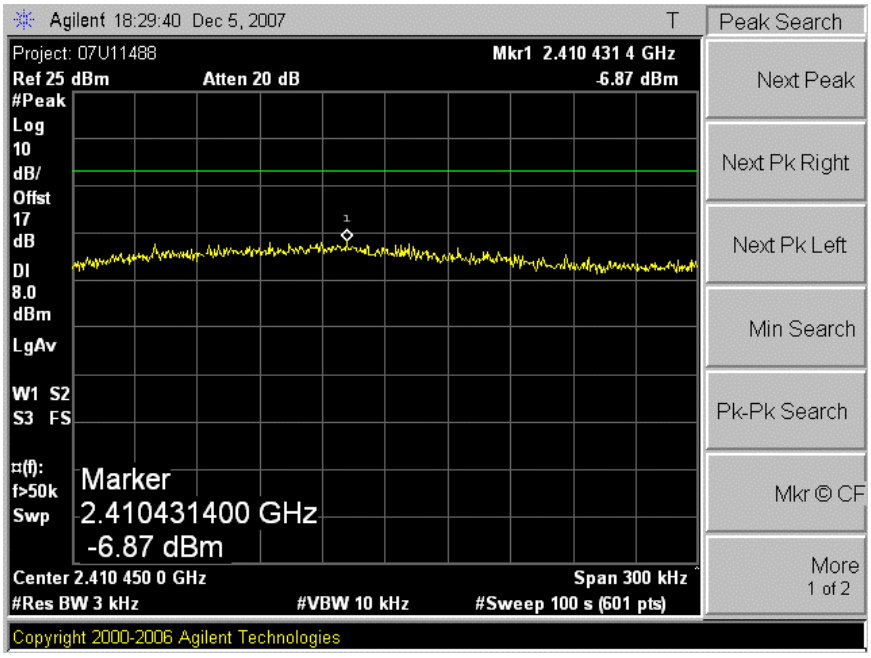
POWER SPECTRAL DENSITY, CHAIN 1

PSD LOW CH, CHAIN 1



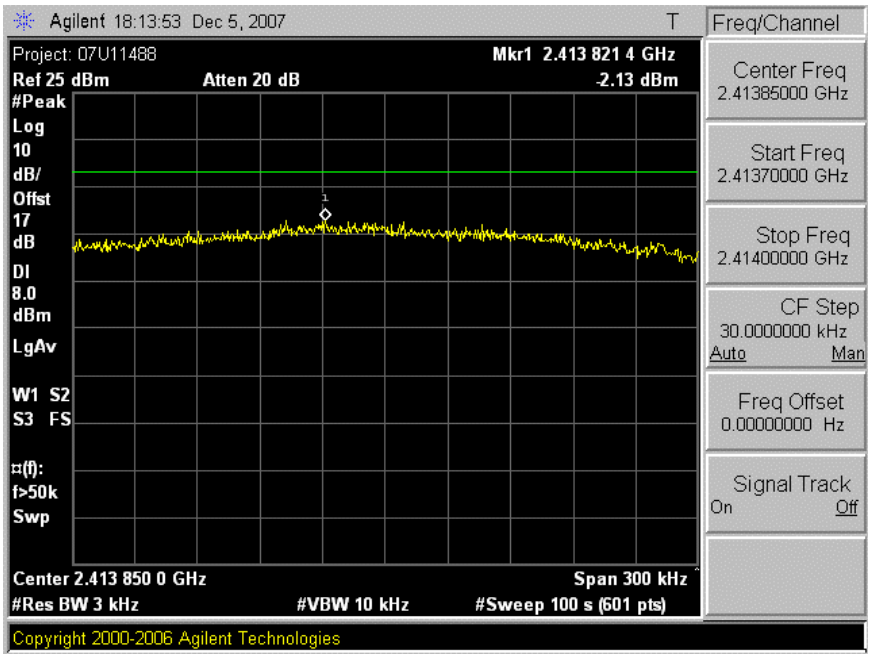
POWER SPECTRAL DENSITY, CHAIN 2

PSD LOW CH, CHAIN 2

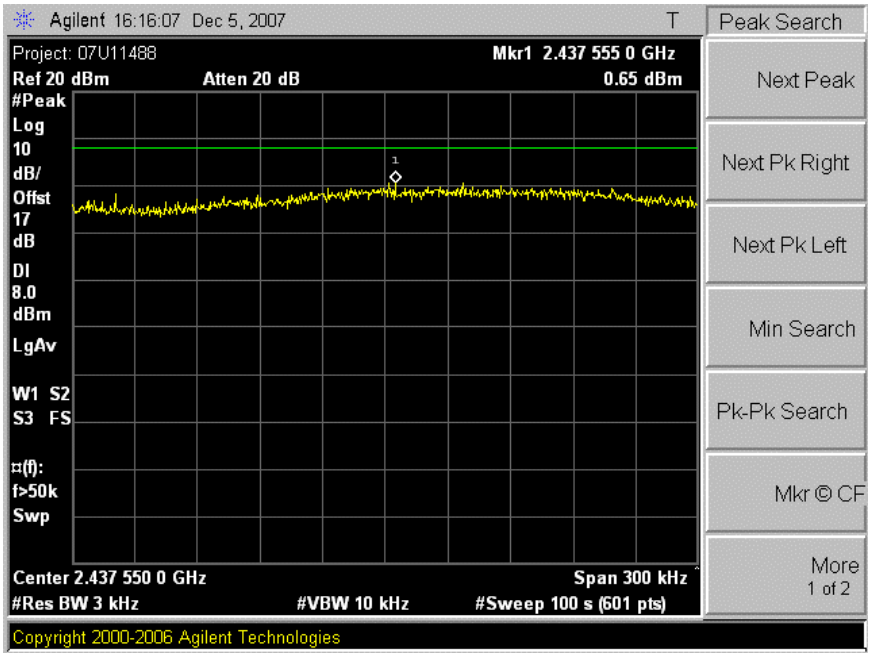


POWER SPECTRAL DENSITY, WITH COMBINER

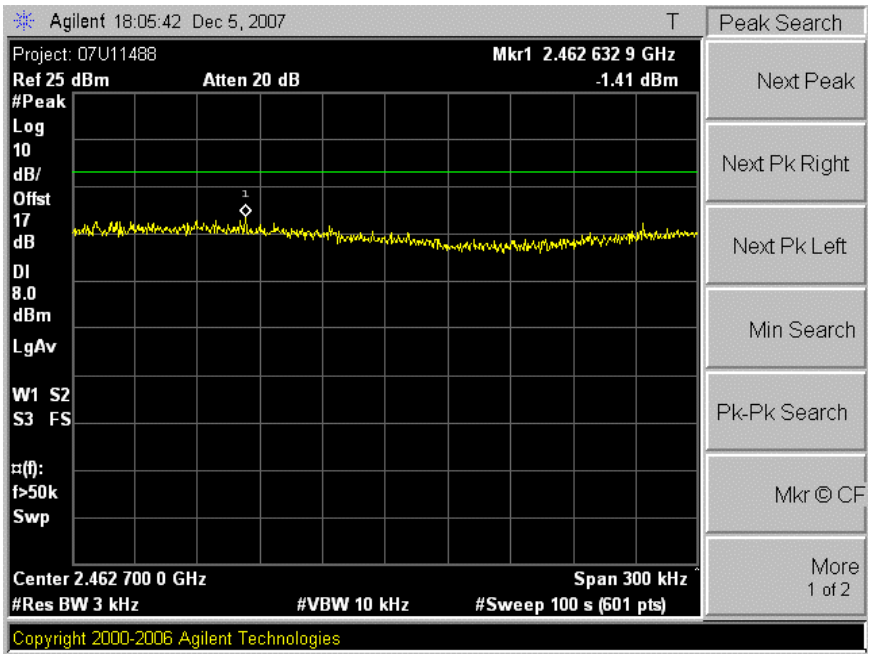
PSD LOW CH, WITH COMBINER



PSD MID CH, WITH COMBINER



PSD HIGH CH, WITH COMBINER



7.3.6. 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.

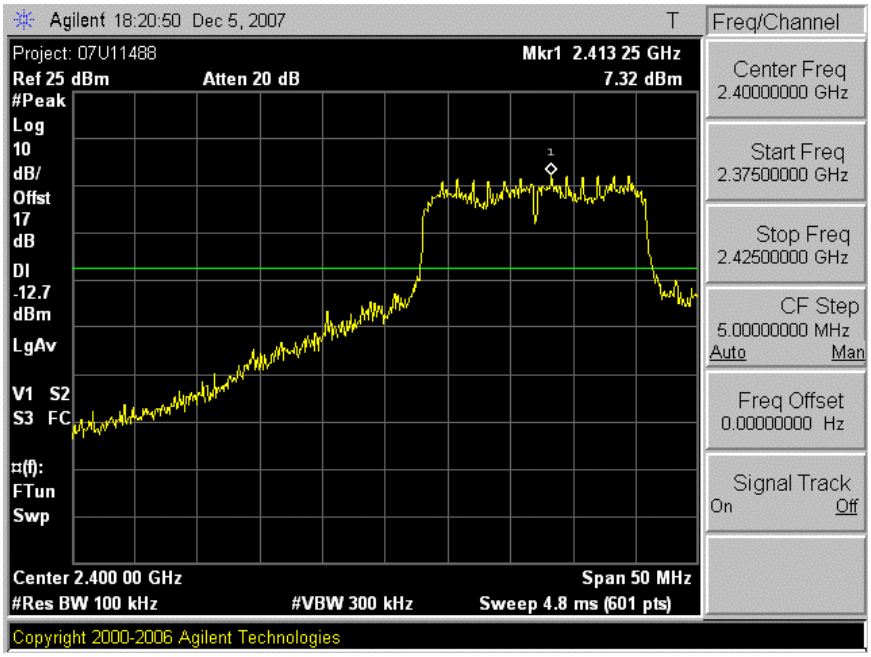
The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels.

RESULTS

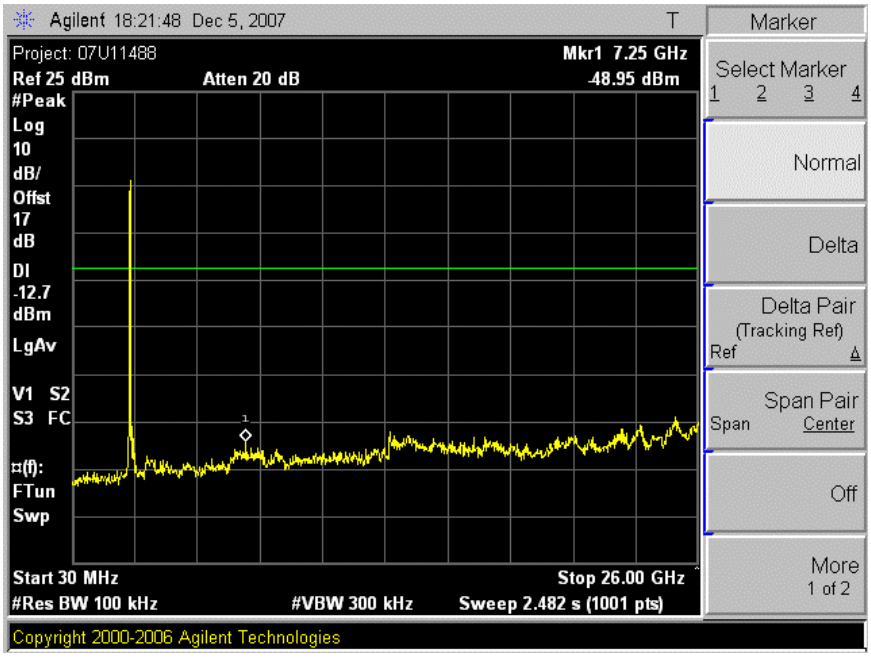
Middle and High channels were measured with the combiner only, since doing so results in the worst-case compared to measuring either chain alone.

CHAIN 1 SPURIOUS EMISSIONS

LOW CH BANDEDGE, CHAIN 1

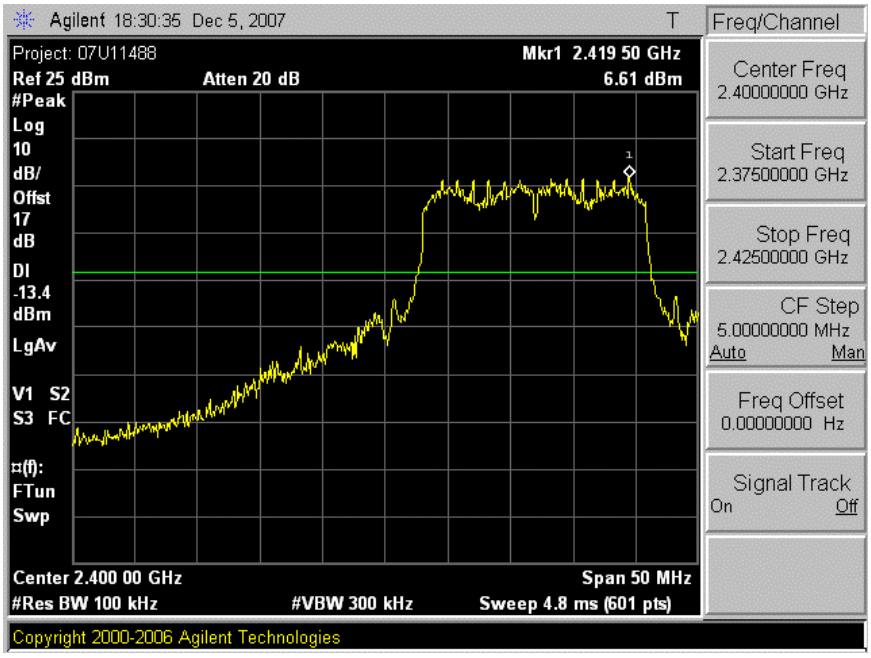


LOW CH SPURIOUS, CHAIN 1

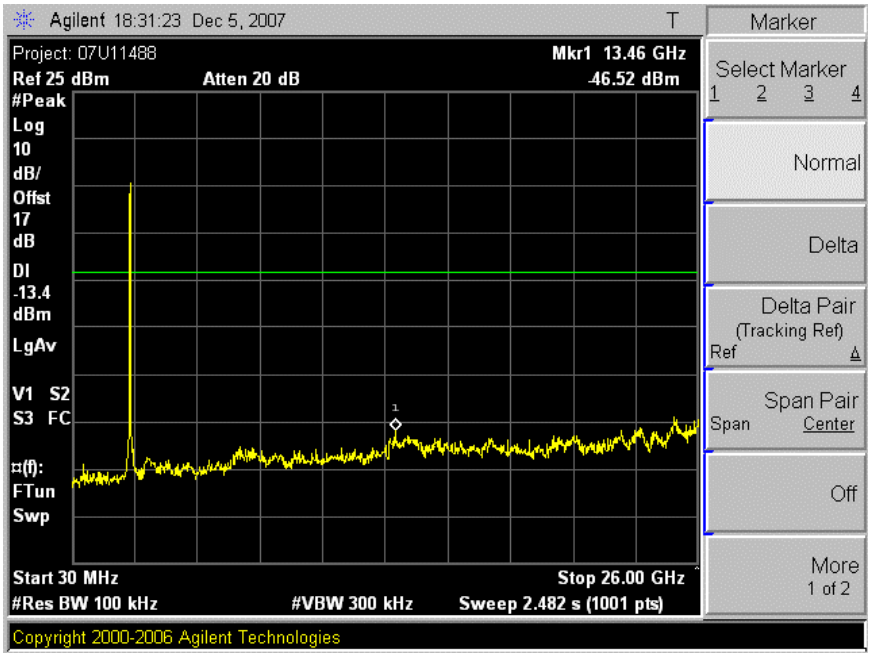


CHAIN 2 SPURIOUS EMISSIONS

LOW CH BANDEDGE, CHAIN 2



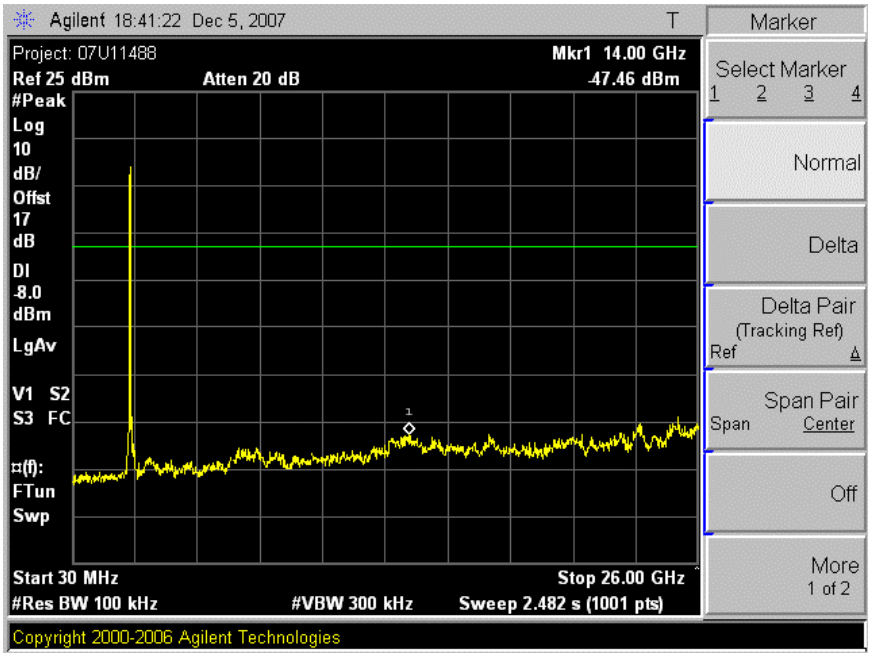
LOW CH SPURIOUS, CHAIN 2



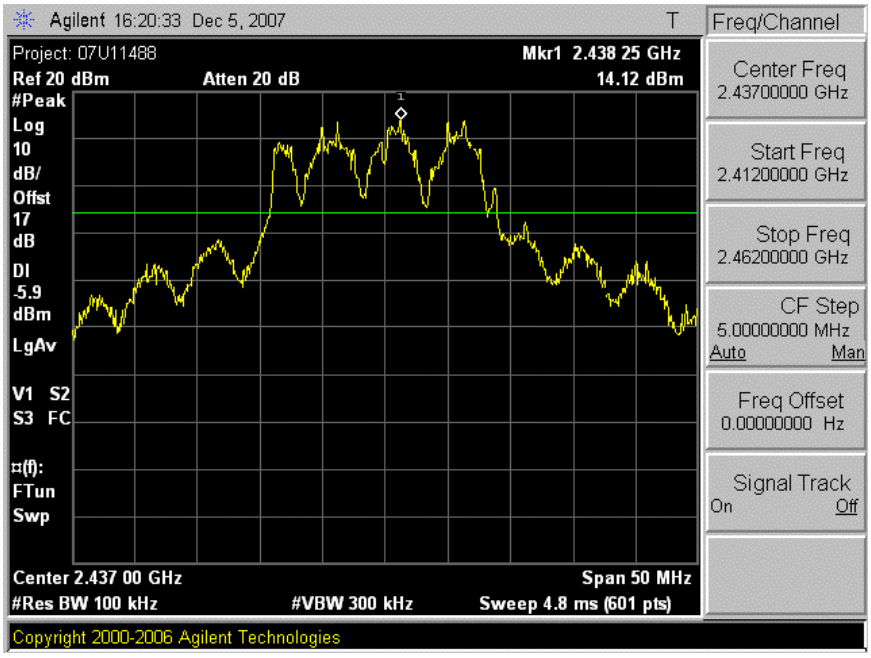
SPURIOUS EMISSIONS WITH COMBINER

LOW CH BANDEDGE, WITH COMBINER

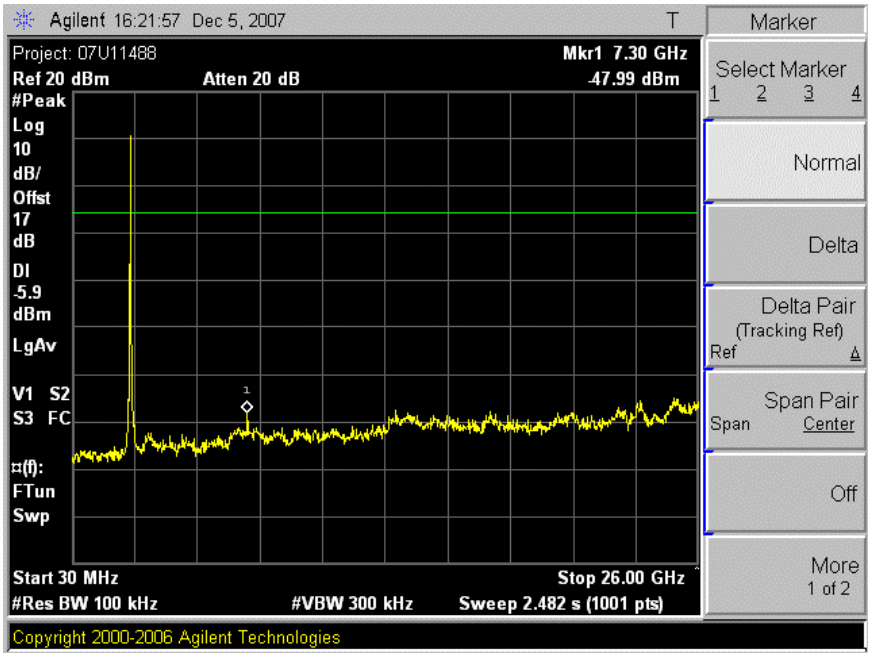
LOW CH SPURIOUS, WITH COMBINER



MID CH REFERENCE, WITH COMBINER

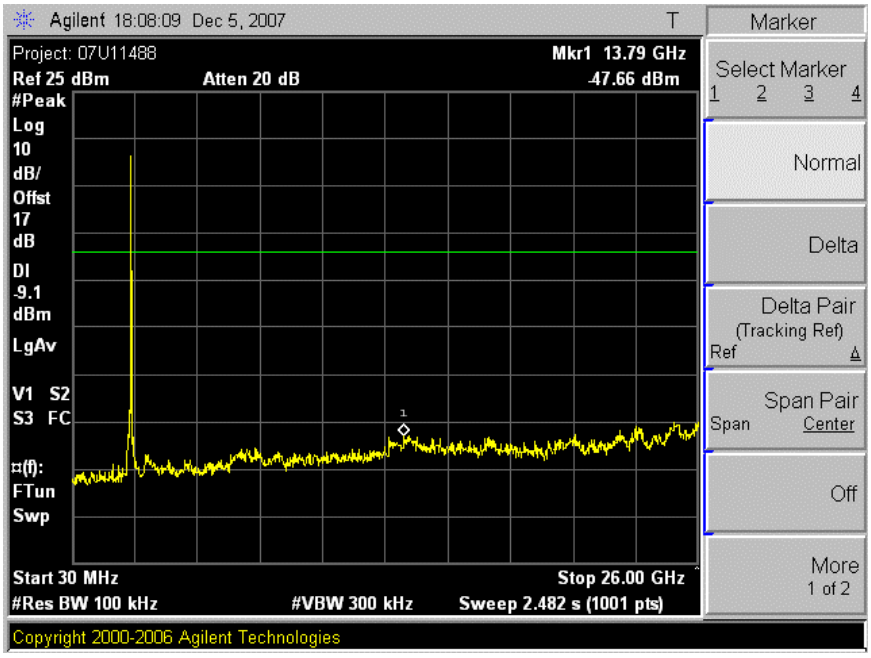


MID CH SPURIOUS, WITH COMBINER



HIGH CH BANDEDGE, WITH COMBINER

HIGH CH SPURIOUS, WITH COMBINER



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

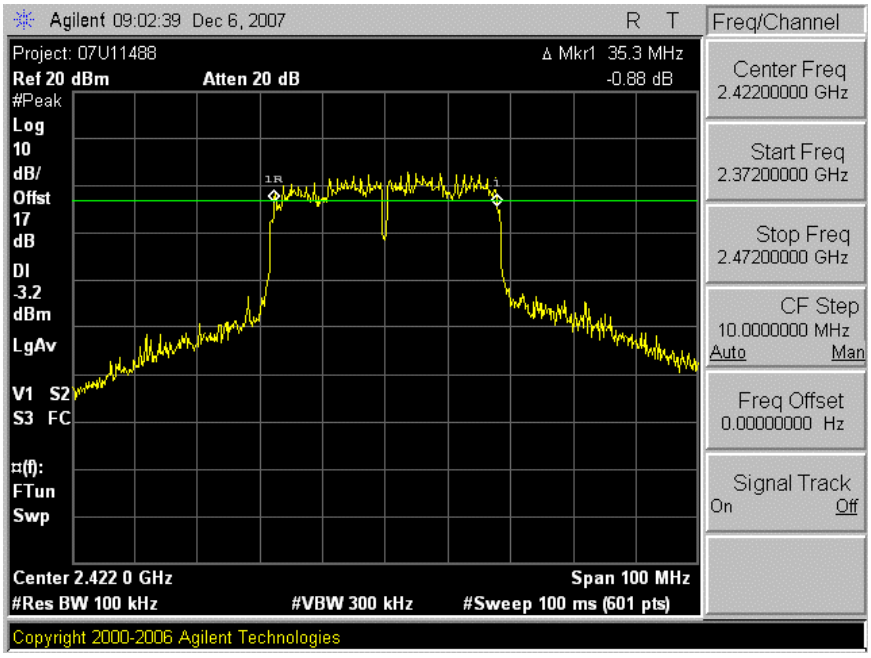
The transmitter output is connected to a spectrum analyzer. The RBW is set to 100 kHz and the VBW is set to 300 kHz. The sweep time is coupled.

RESULTS

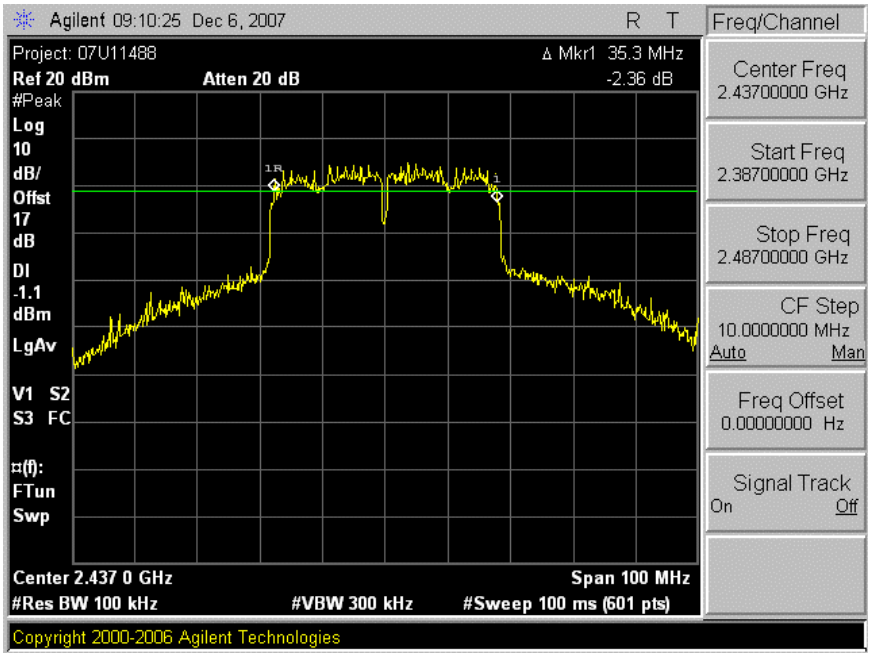
Channel	Frequency (MHz)	Chain 1 6 dB BW (MHz)	Chain 2 6 dB BW (MHz)	Minimum Limit (MHz)
Low	2422	35.3	35.3	0.5
Middle	2437	35.3	35.5	0.5
High	2452	35.3	35.3	0.5

6 dB BANDWIDTH, CHAIN 1

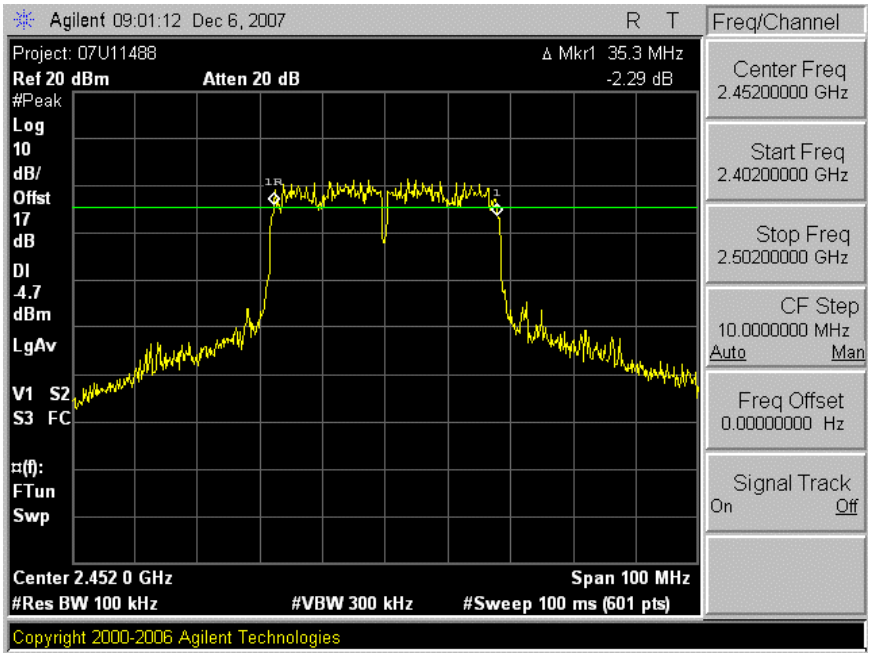
6 dB BANDWIDTH LOW CH, CHAIN 1



6 dB BANDWIDTH MID CH, CHAIN 1

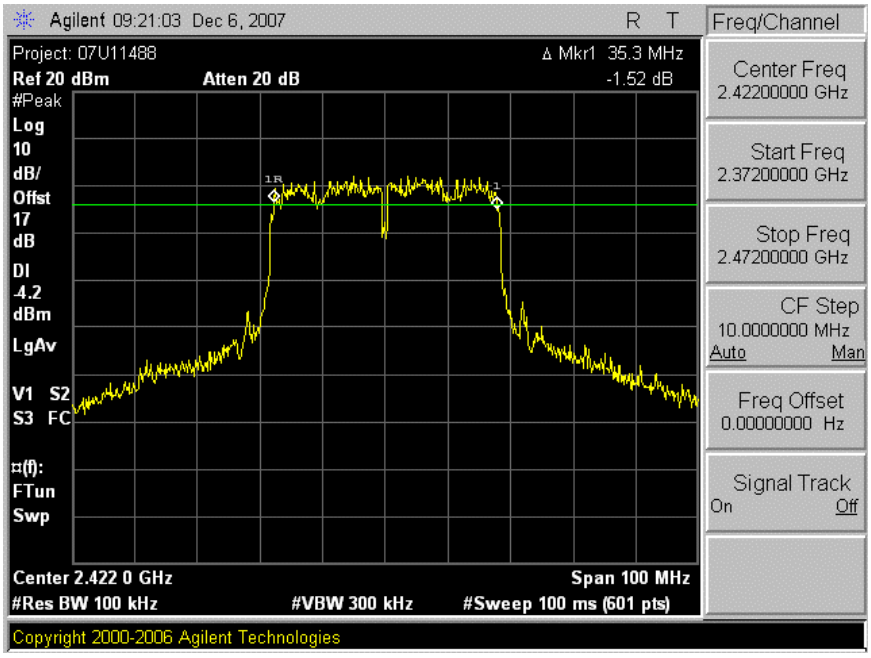


6 dB BANDWIDTH HIGH CH, CHAIN 1

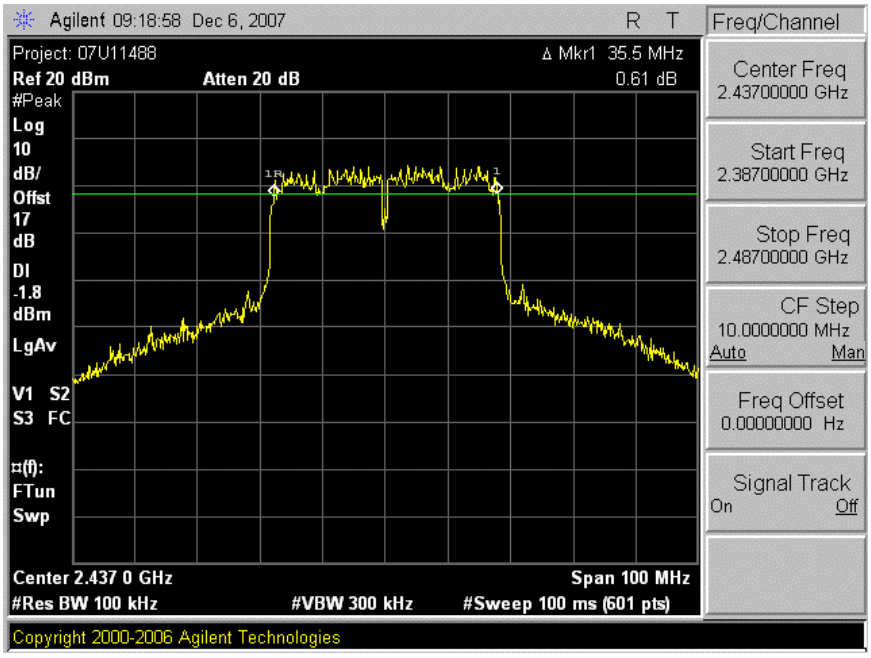


6 dB BANDWIDTH, CHAIN 2

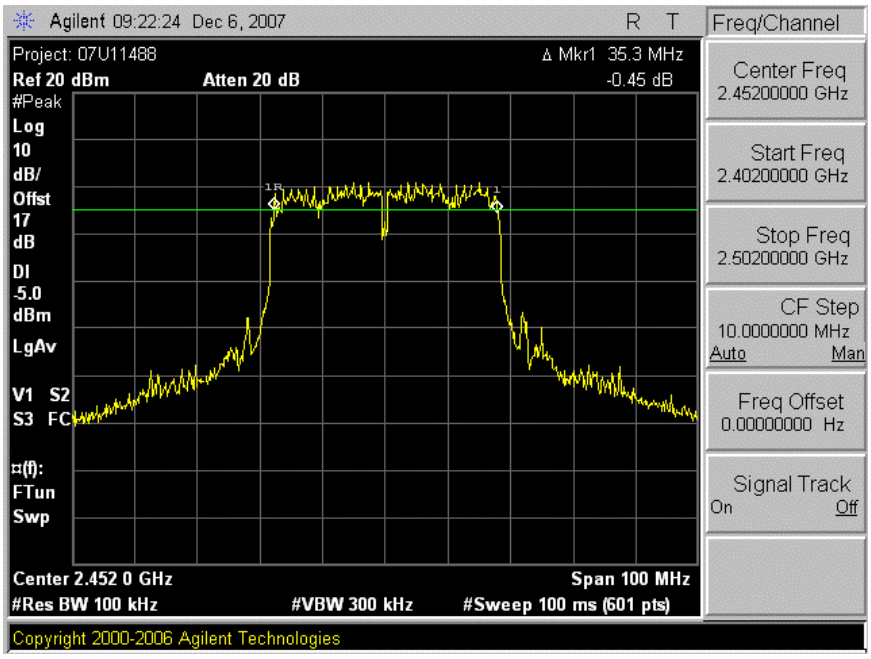
6 dB BANDWIDTH LOW CH, CHAIN 2



6 dB BANDWIDTH MID CH, CHAIN 2



6 dB BANDWIDTH HIGH CH, CHAIN 2



7.4.2. 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

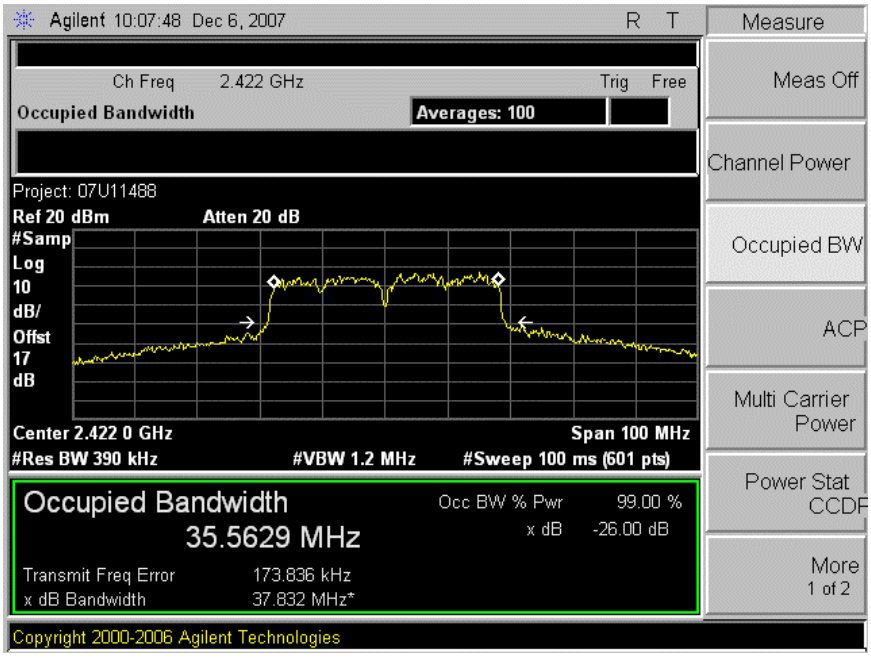
The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the 99 % bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal 99% bandwidth function is utilized.

RESULTS

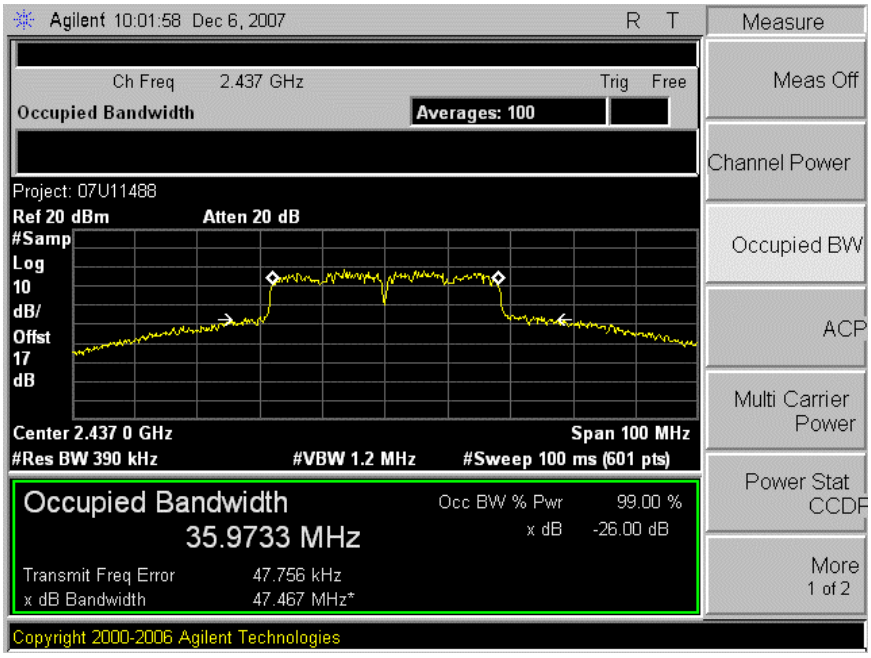
Channel	Frequency (MHz)	Chain 1 99% Bandwidth (MHz)	Chain 2 99% Bandwidth (MHz)
Low	2422	35.5629	35.5721
Middle	2437	35.9733	35.6379
High	2452	35.6365	35.7710

99% BANDWIDTH, CHAIN 1

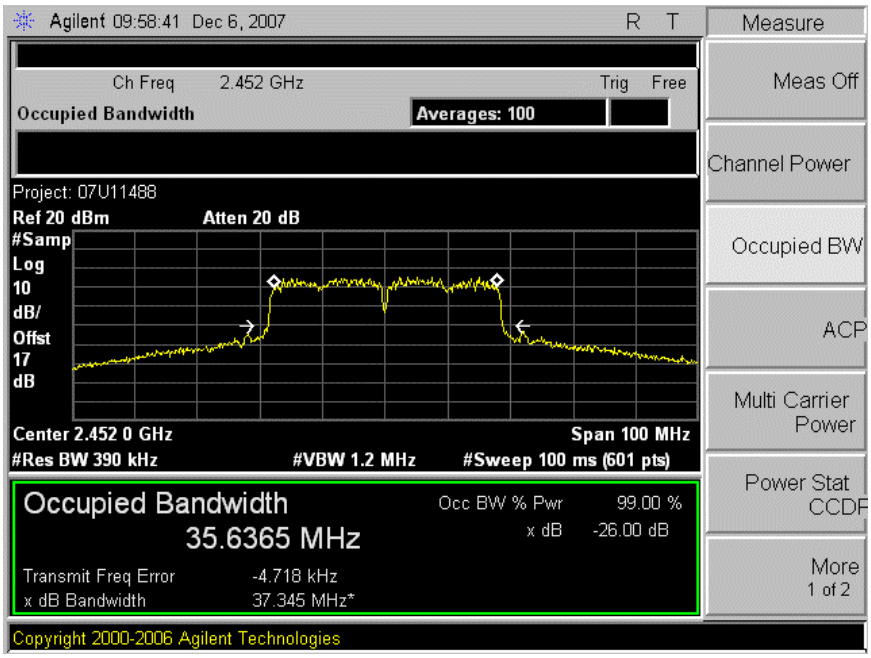
99% BANDWIDTH LOW CH, CHAIN 1



99% BANDWIDTH MID CH, CHAIN 1

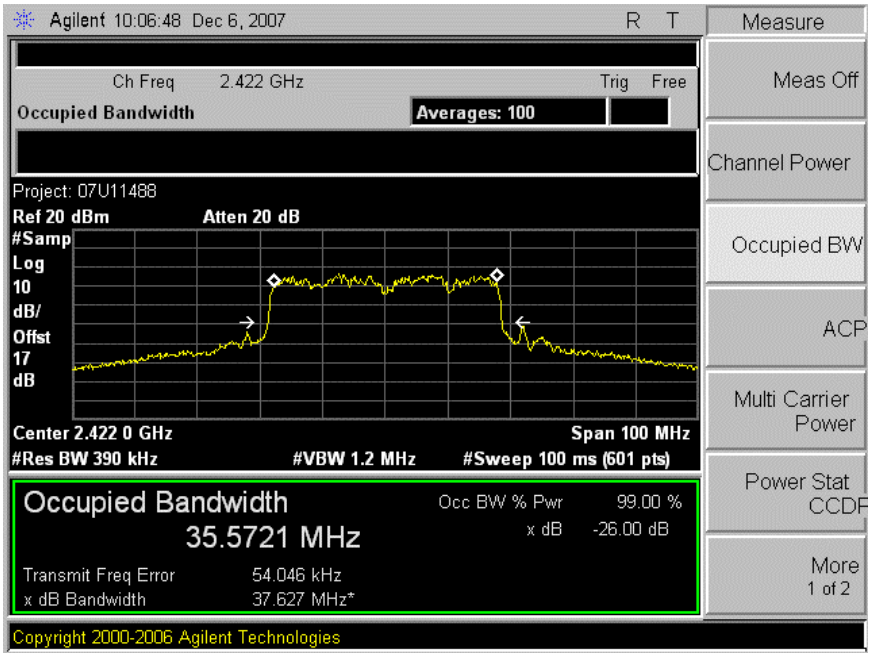


99% BANDWIDTH HIGH CH, CHAIN 1

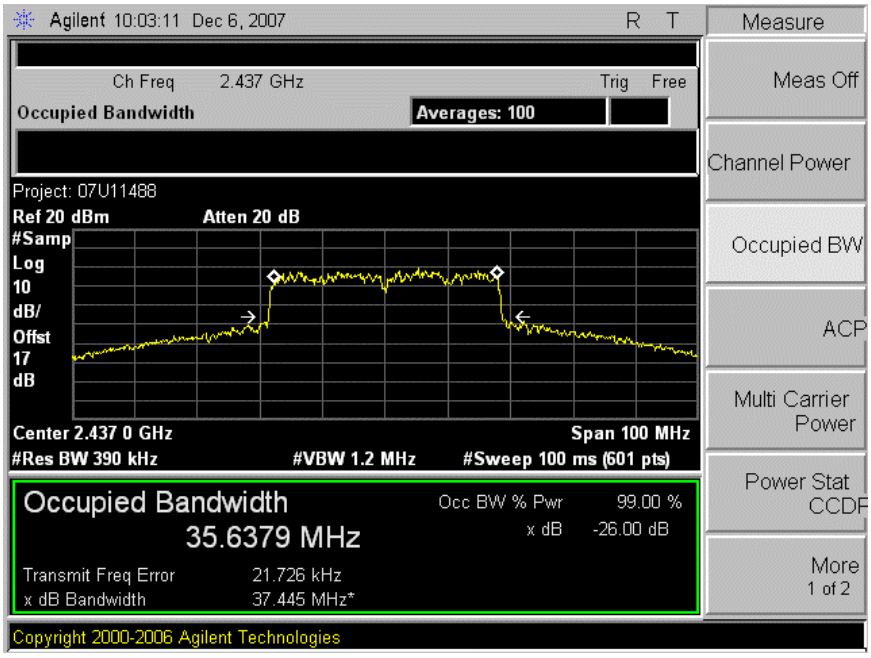


99% BANDWIDTH, CHAIN 2

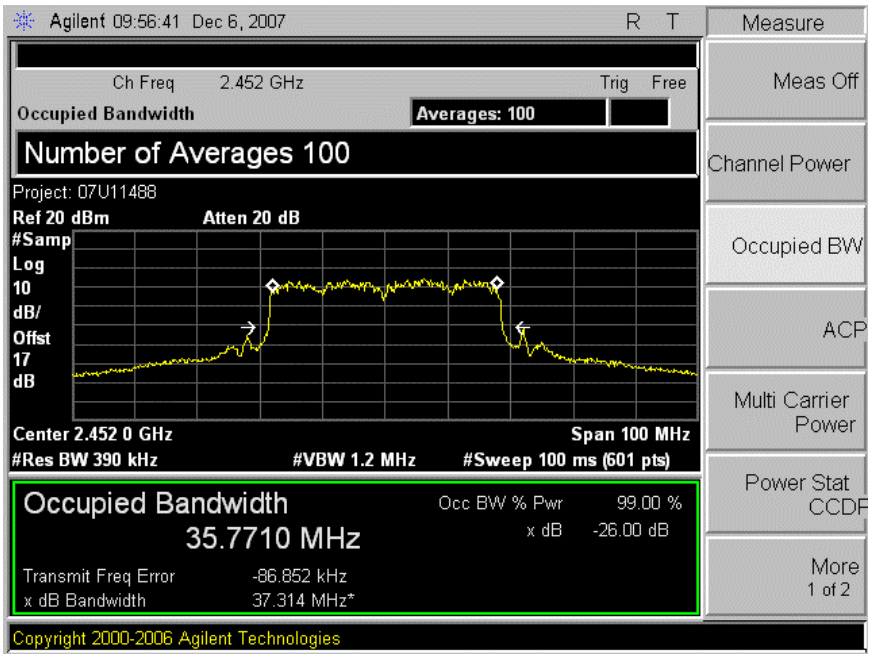
99% BANDWIDTH LOW CH, CHAIN 2



99% BANDWIDTH MID CH, CHAIN 2



99% BANDWIDTH HIGH CH, CHAIN 2



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.

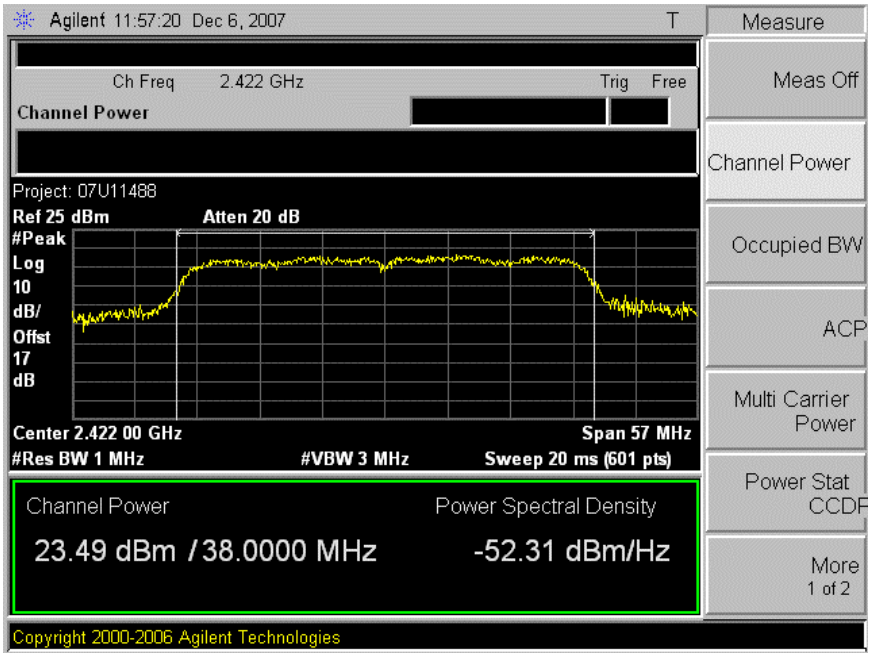
Maximum Conducted Output Power based on RMS averaging over a time interval is measured in accordance with FCC document "Measurement of Digital Transmission Systems Operating under Section 15.247", March 23, 2005. The transmitter operates continuously therefore Power Output Option 2, Method # 1 is used.

RESULTS

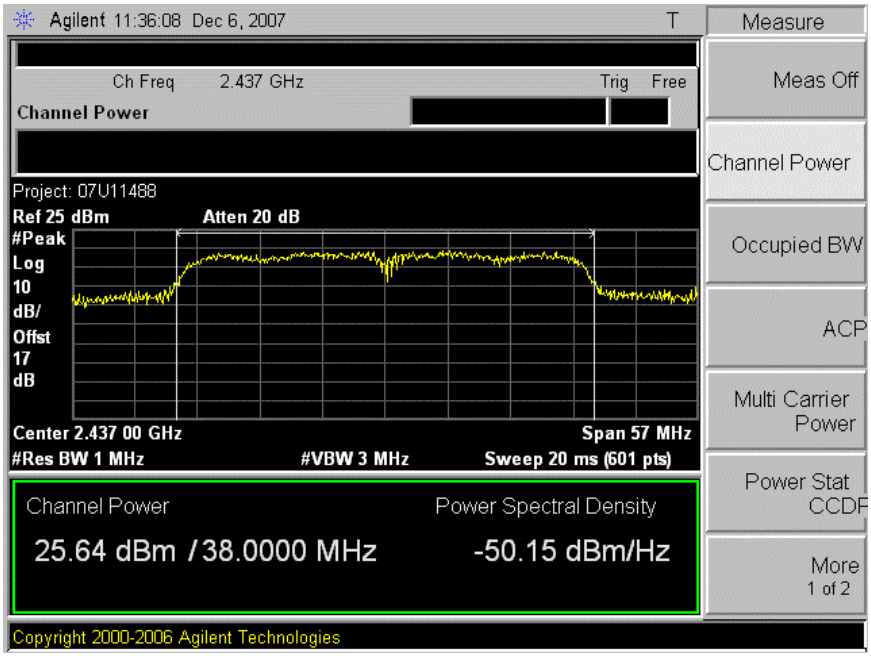
Channel	Frequency (MHz)	Limit (dBm)	Chain 1 Power (dBm)	Chain 2 Power (dBm)	Total Power (dBm)	Margin (dB)
Low	2422	30.00	23.49	23.32	26.42	-3.58
Mid	2437	30.00	25.64	25.32	28.49	-1.51
High	2452	30.00	22.25	22.09	25.18	-4.82

CHAIN 1 OUTPUT POWER

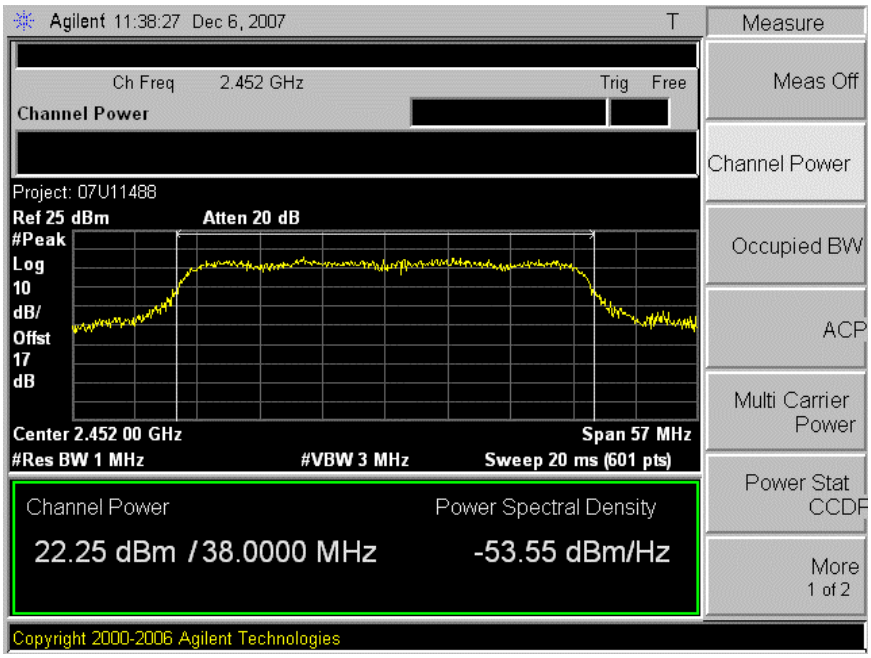
OUTPUT POWER LOW CH, CHAIN 1



OUTPUT POWER MID CH, CHAIN 1

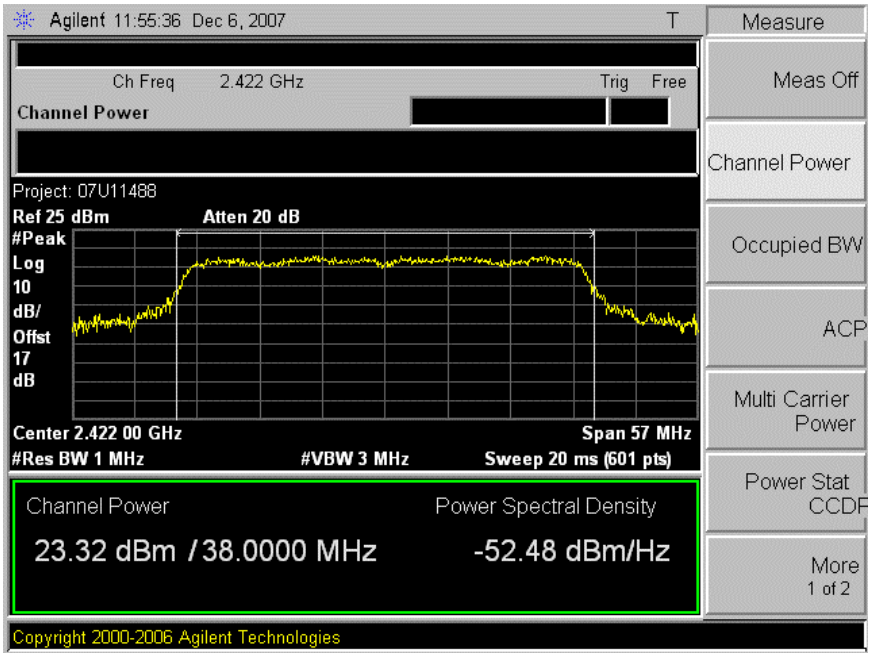


OUTPUT POWER HIGH CH, CHAIN 1

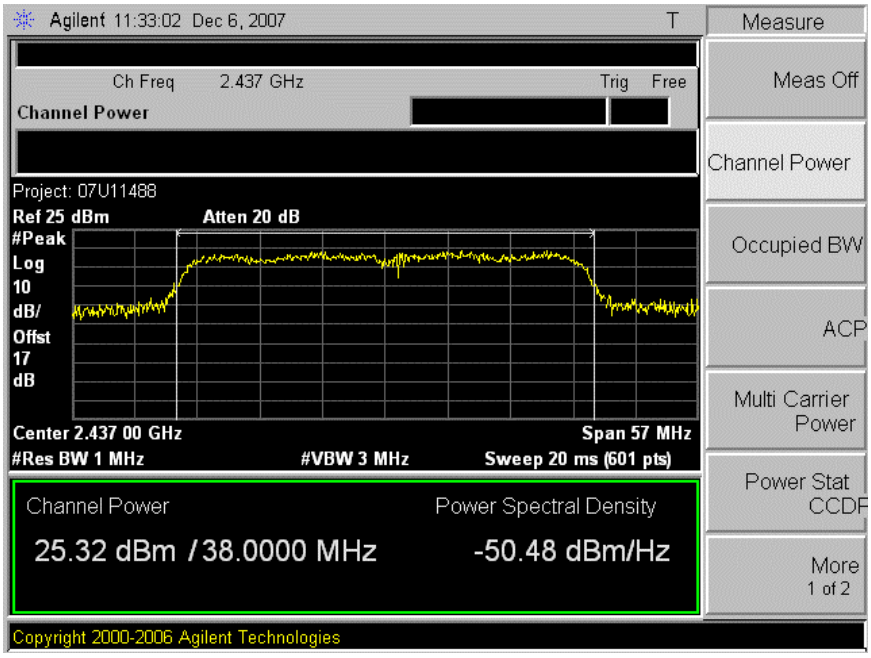


CHAIN 2 OUTPUT POWER

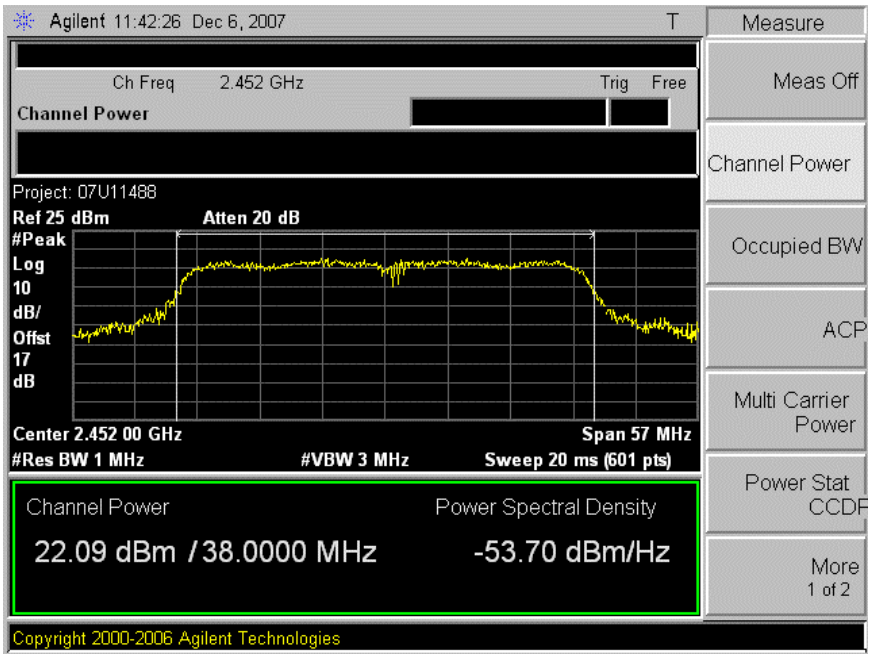
OUTPUT POWER LOW CH, CHAIN 2



OUTPUT POWER MID CH, CHAIN 2



OUTPUT POWER HIGH CH, CHAIN 2



7.4.4. 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 11 dB (including 10 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 1 Power (dBm)	Chain 2 Power (dBm)	Total Power (dBm)
Low	2422	16.96	16.72	19.85
Middle	2437	18.84	18.80	21.83
High	2452	15.70	15.82	18.77

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

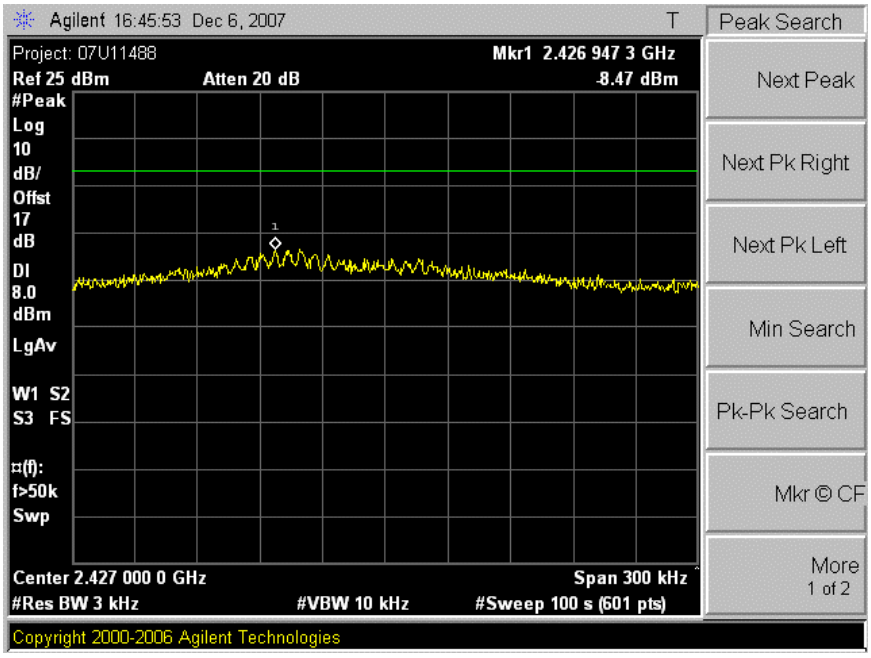
Middle and High channels were measured with the combiner only, since doing so results in the worst-case compared to measuring either chain alone.

Channel	Frequency (MHz)	Chain 1 PSD (dBm)	Chain 2 PSD (dBm)	Total PSD (dBm)	Limit (dBm)	Margin (dB)
Low	2422	-8.47	-9.02	-5.73	8	-13.73

Channel	Frequency (MHz)	PSD with Combiner (dBm)	Limit (dBm)	Margin (dB)
Low	2422	-3.80	8	-11.80
Middle	2437	-2.90	8	-10.90
High	2452	-4.76	8	-12.76

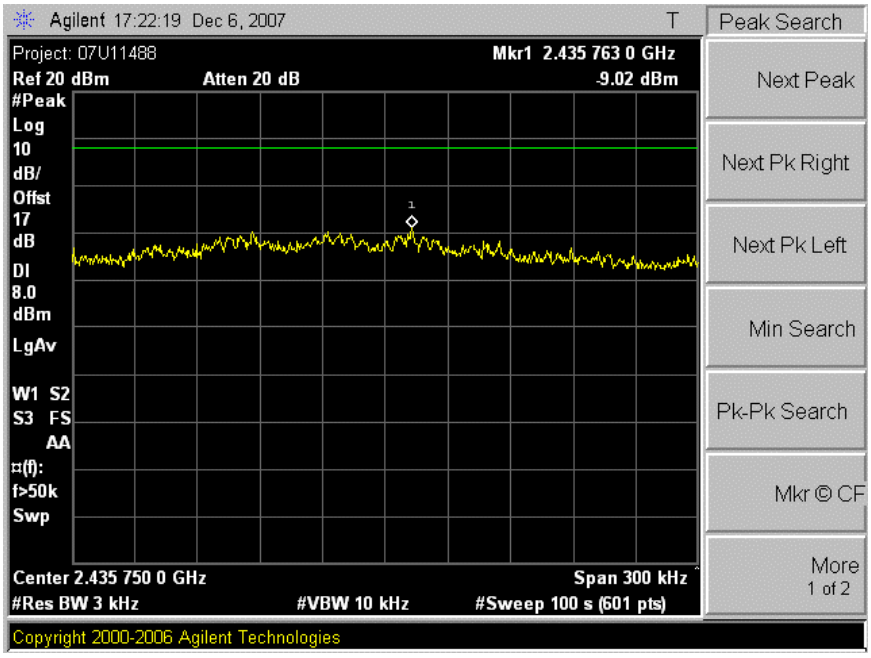
POWER SPECTRAL DENSITY, CHAIN 1

PSD LOW CH, CHAIN 1



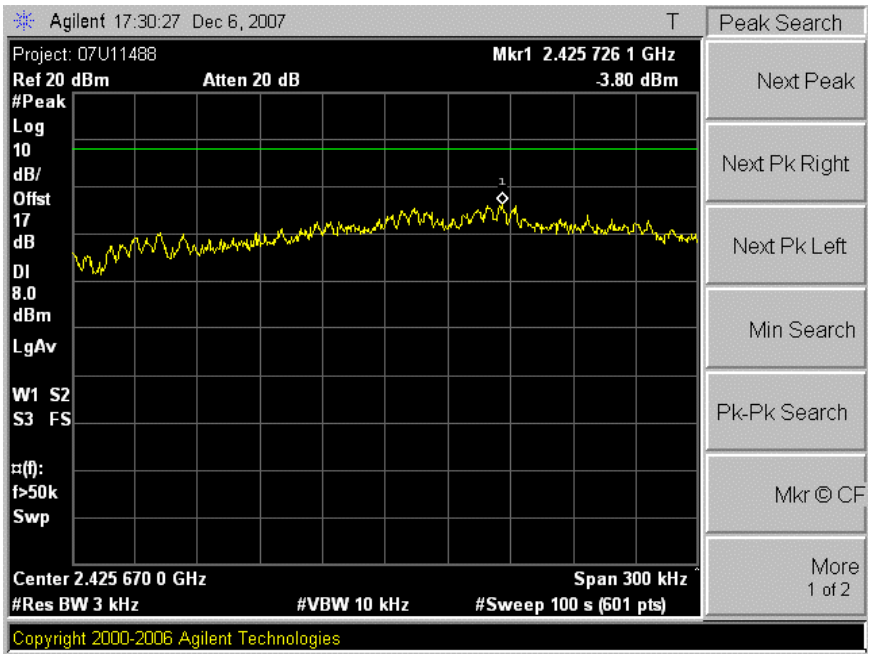
POWER SPECTRAL DENSITY, CHAIN 2

PSD LOW CH, CHAIN 2

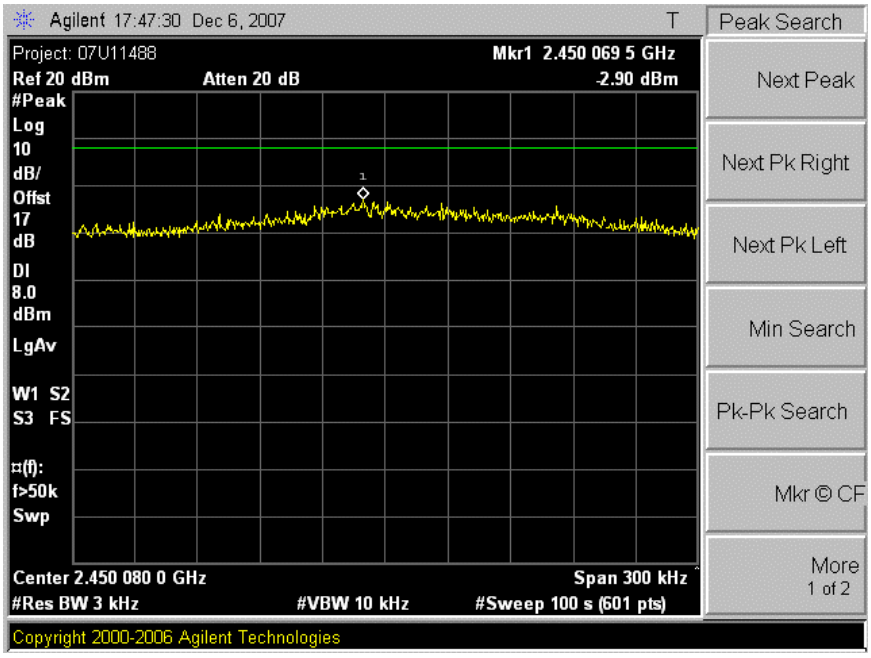


POWER SPECTRAL DENSITY, WITH COMBINER

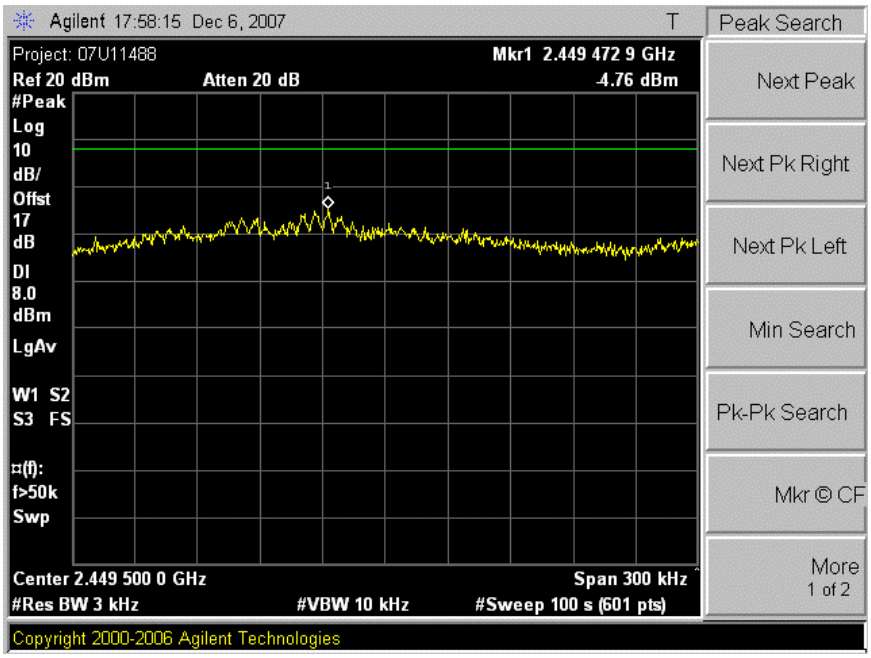
PSD LOW CH, WITH COMBINER



PSD MID CH, WITH COMBINER



PSD HIGH CH, WITH COMBINER



7.4.6. 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.

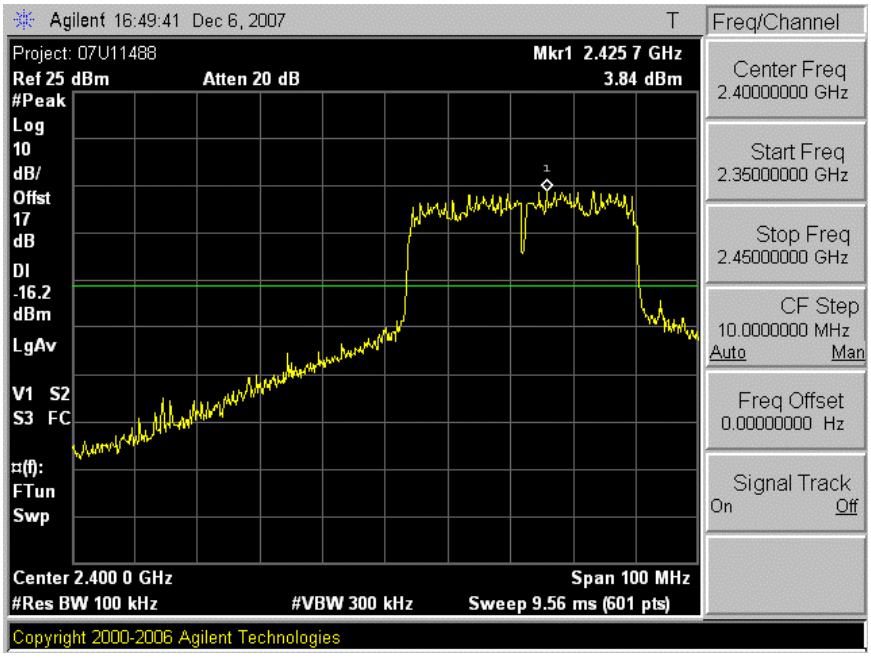
The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels.

RESULTS

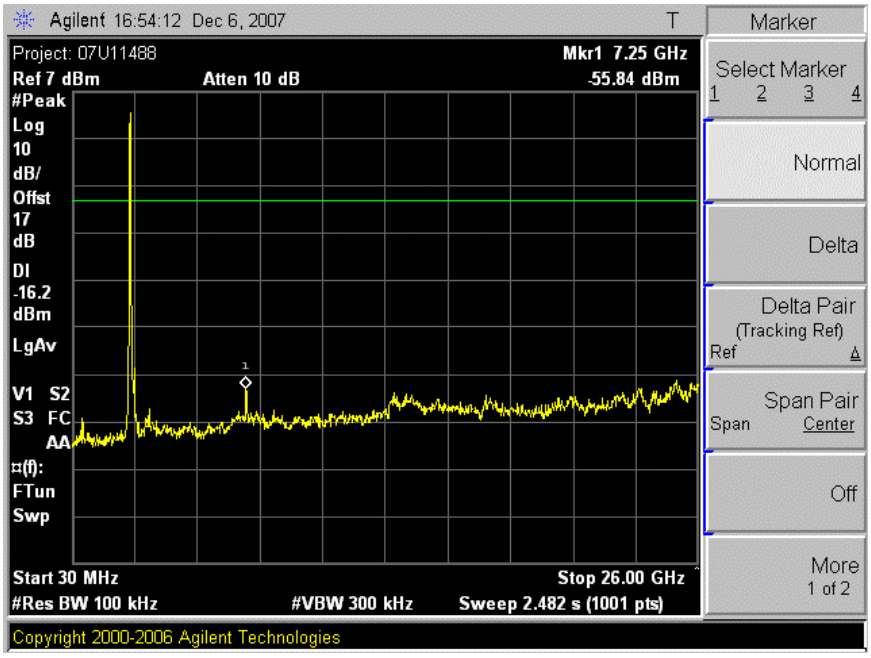
Middle and High channels were measured with the combiner only, since doing so results in the worst-case compared to measuring either chain alone.

CHAIN 1 SPURIOUS EMISSIONS

LOW CH BANDEDGE, CHAIN 1

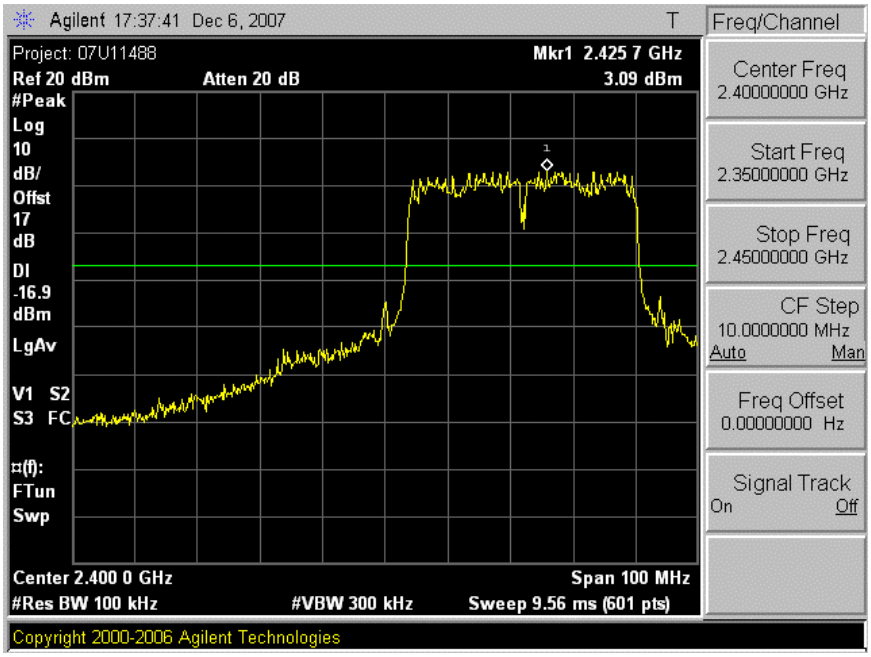


LOW CH SPURIOUS, CHAIN 1

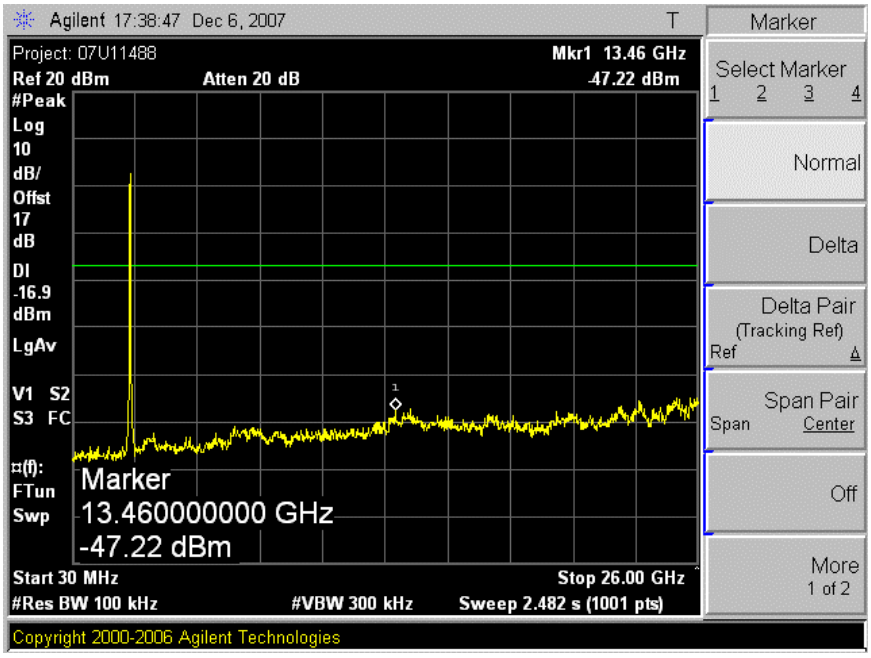


CHAIN 2 SPURIOUS EMISSIONS

LOW CH BANDEDGE, CHAIN 2

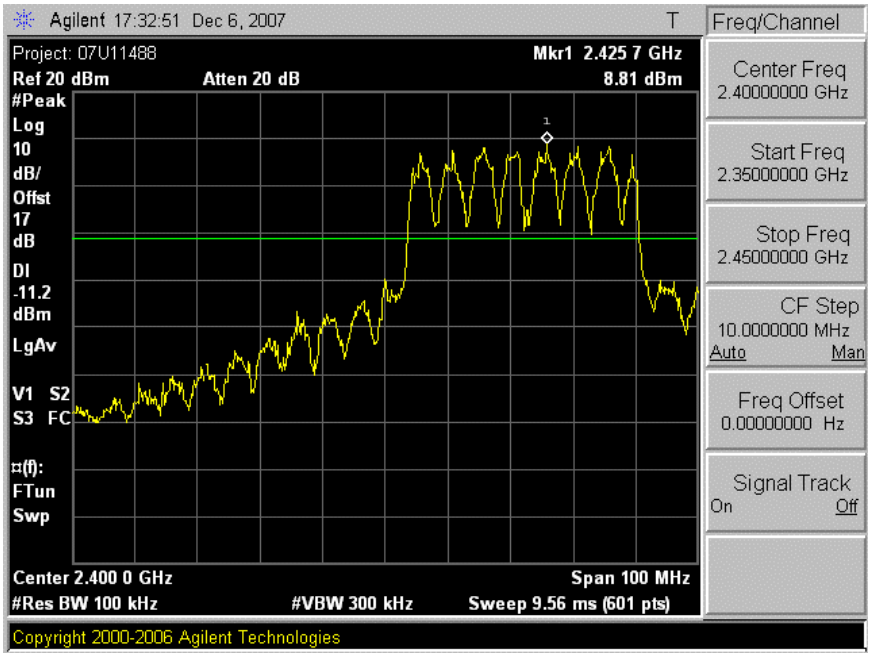


LOW CH SPURIOUS, CHAIN 2

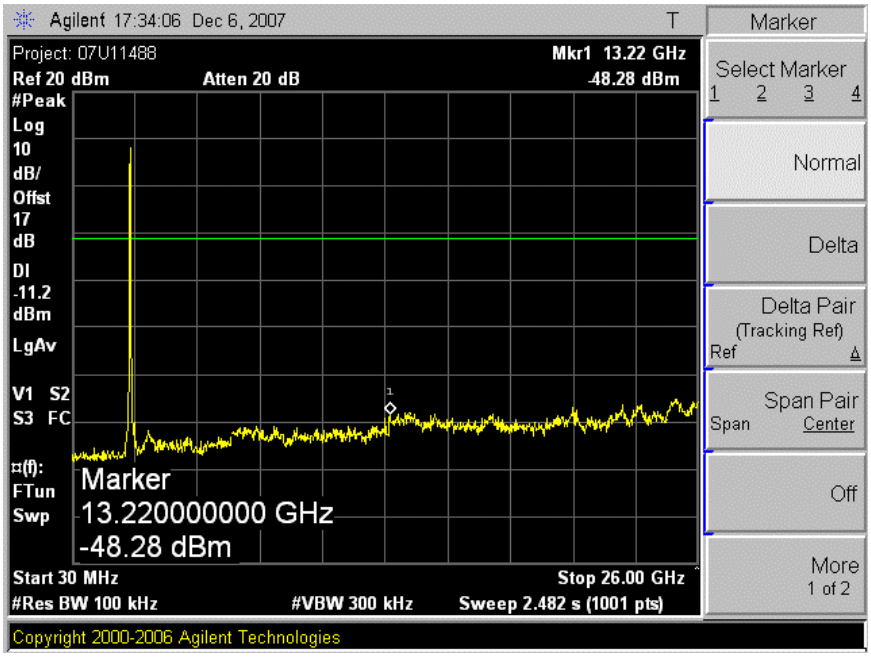


SPURIOUS EMISSIONS WITH COMBINER

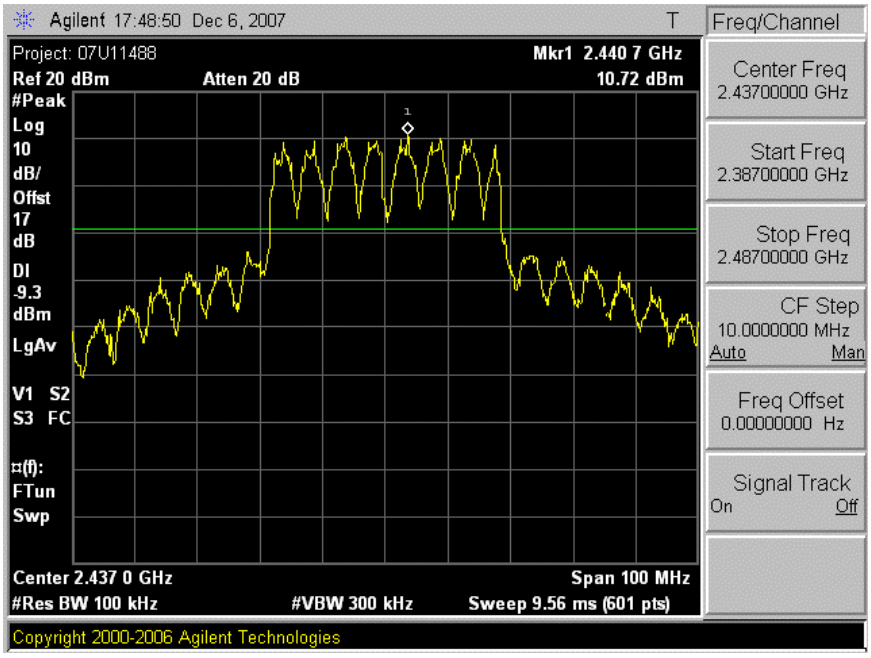
LOW CH BANDEDGE, WITH COMBINER



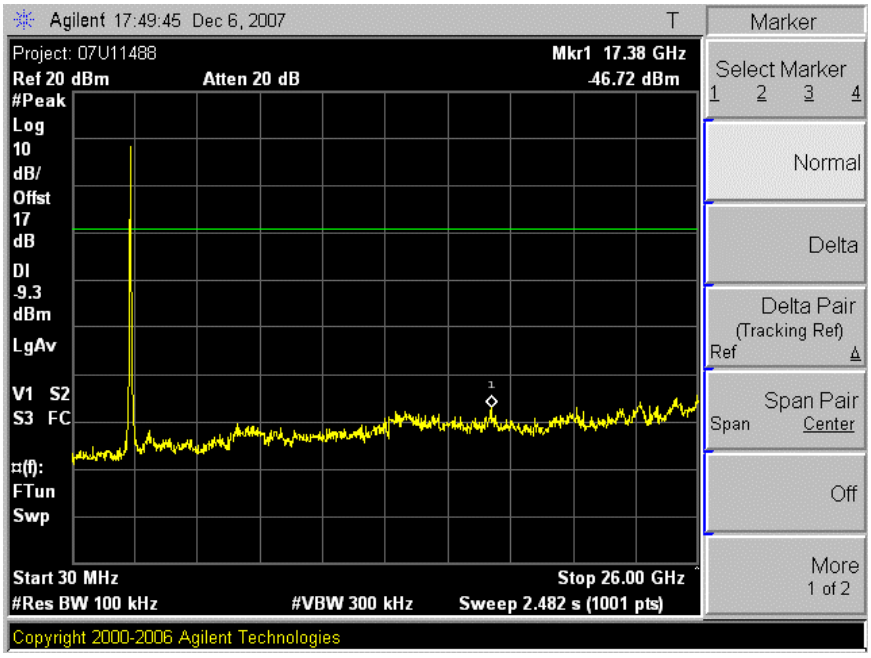
LOW CH SPURIOUS, WITH COMBINER



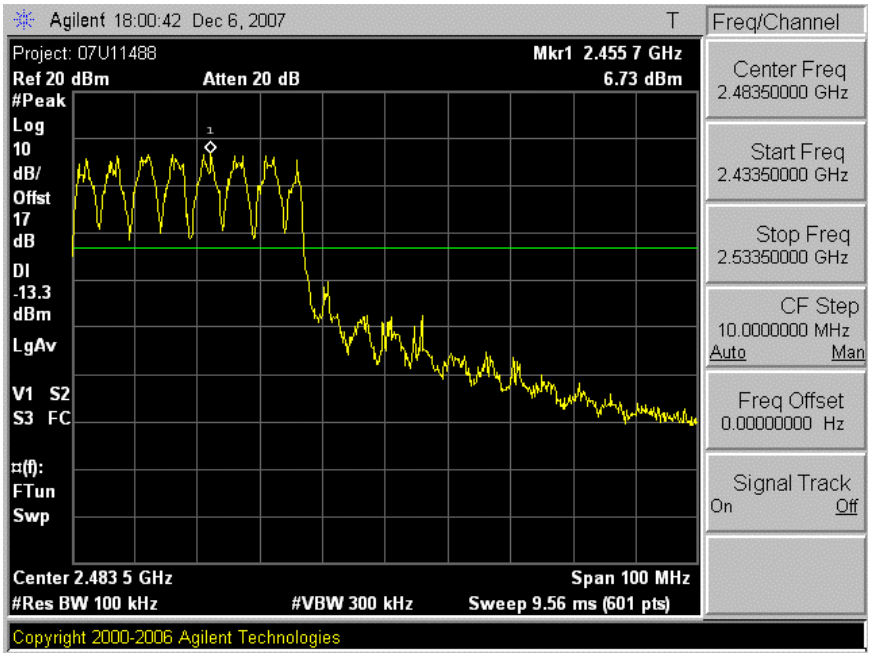
MID CH REFERENCE, WITH COMBINER



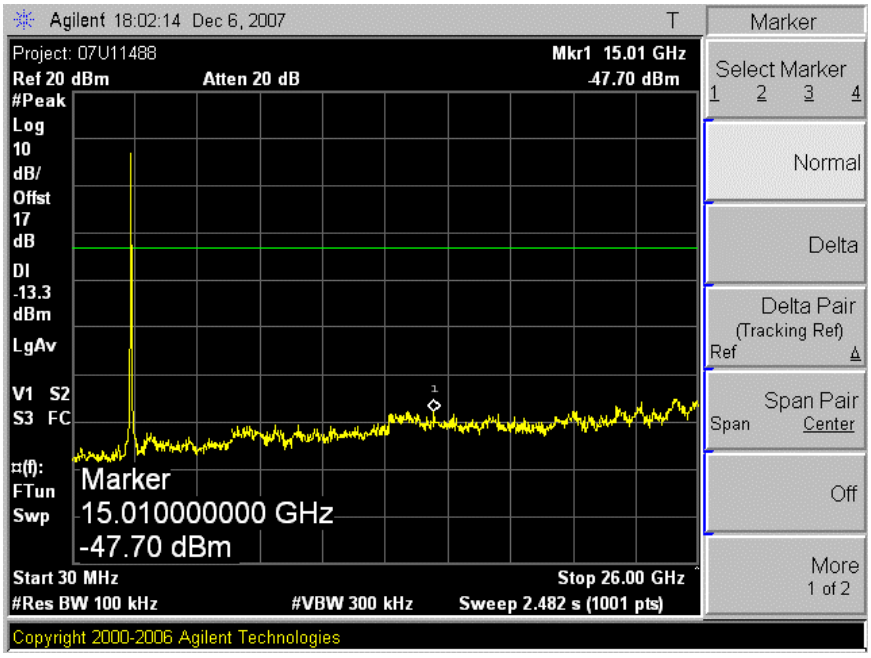
MID CH SPURIOUS, WITH COMBINER



HIGH CH BANDEDGE, WITH COMBINER



HIGH CH SPURIOUS, WITH COMBINER



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

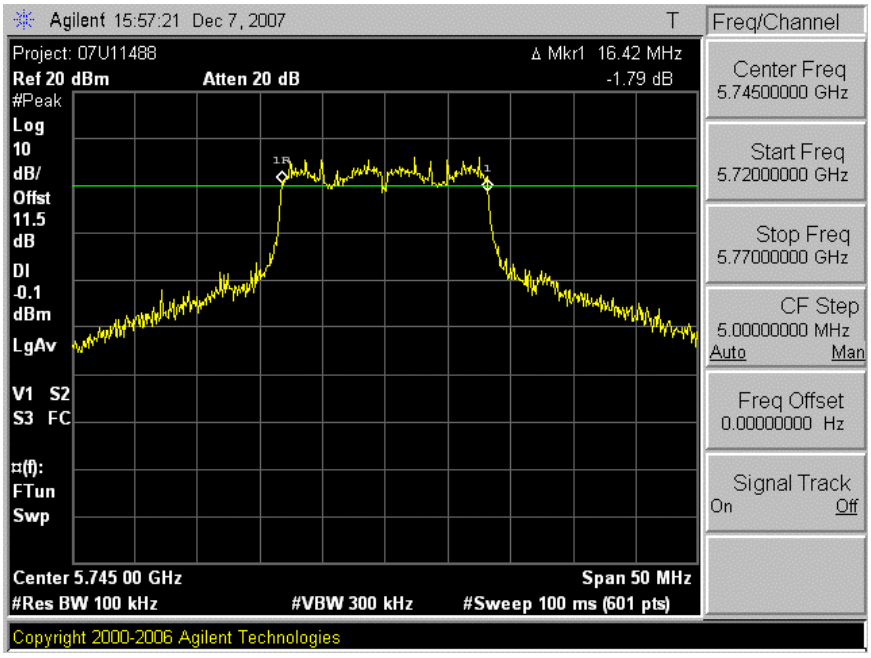
The transmitter output is connected to a spectrum analyzer. The RBW is set to 100 kHz and the VBW is set to 300 kHz. The sweep time is coupled.

RESULTS

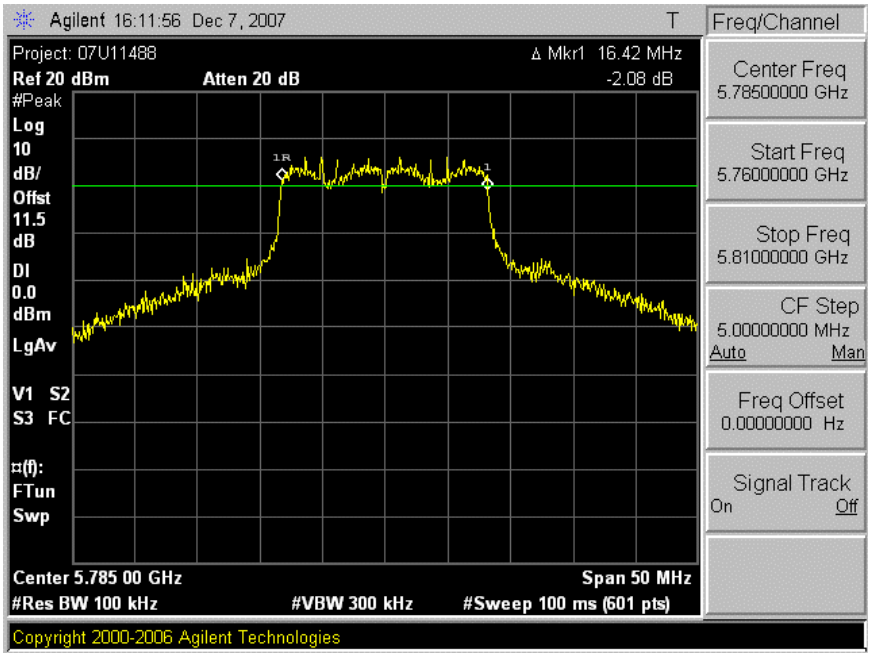
Channel	Frequency (MHz)	Chain 1 6 dB BW (MHz)	Chain 2 6 dB BW (MHz)	Minimum Limit (MHz)
Low	5745	16.42	16.33	0.5
Middle	5785	16.42	16.33	0.5
High	5825	16.33	16.33	0.5

6 dB BANDWIDTH, CHAIN 1

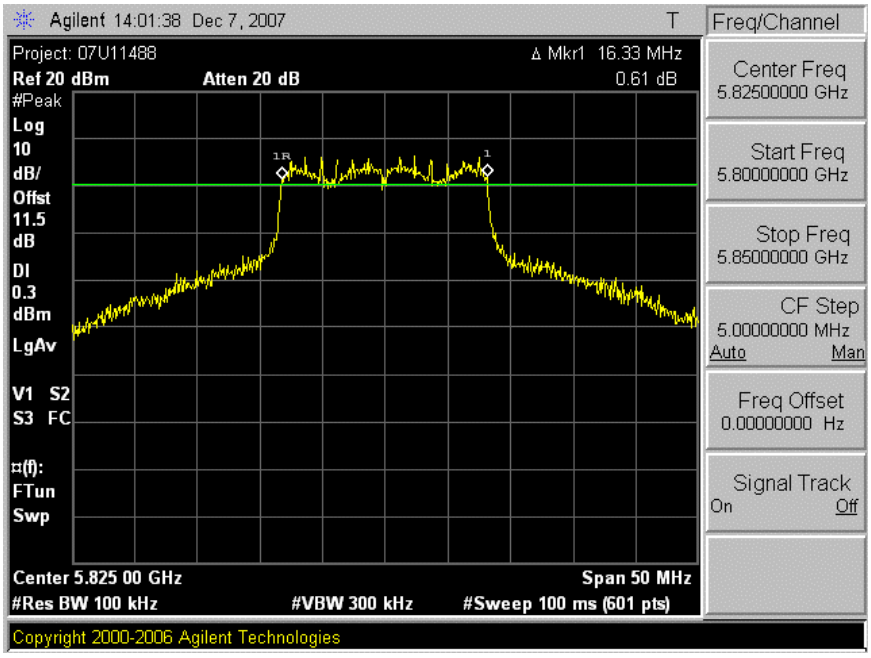
6 dB BANDWIDTH LOW CH, CHAIN 1



6 dB BANDWIDTH MID CH, CHAIN 1

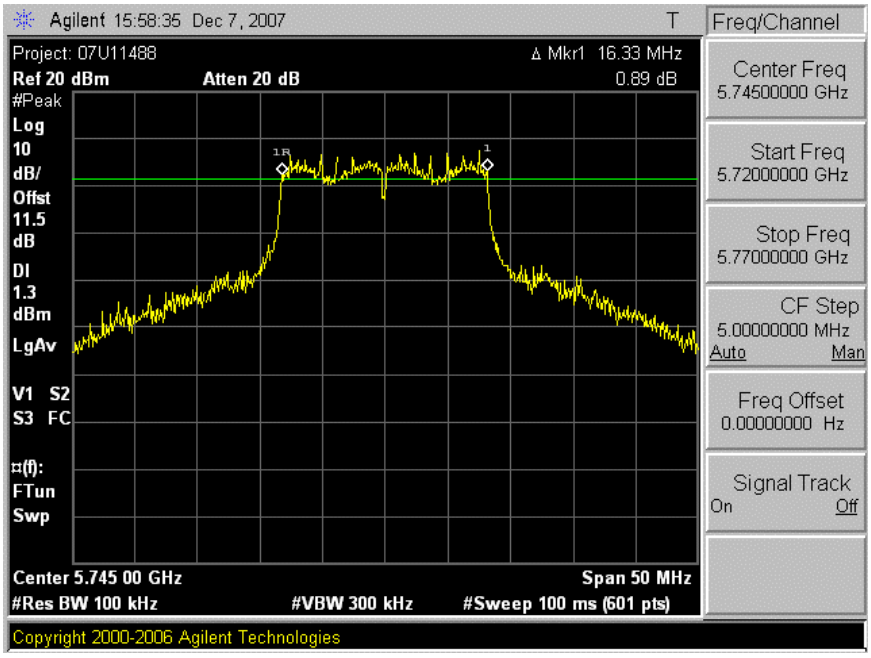


6 dB BANDWIDTH HIGH CH, CHAIN 1

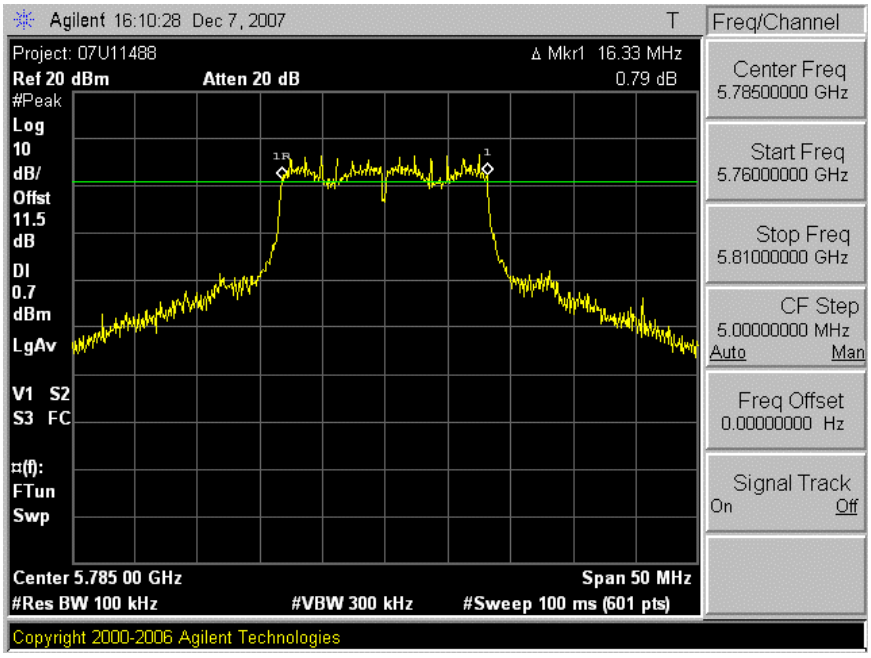


6 dB BANDWIDTH, CHAIN 2

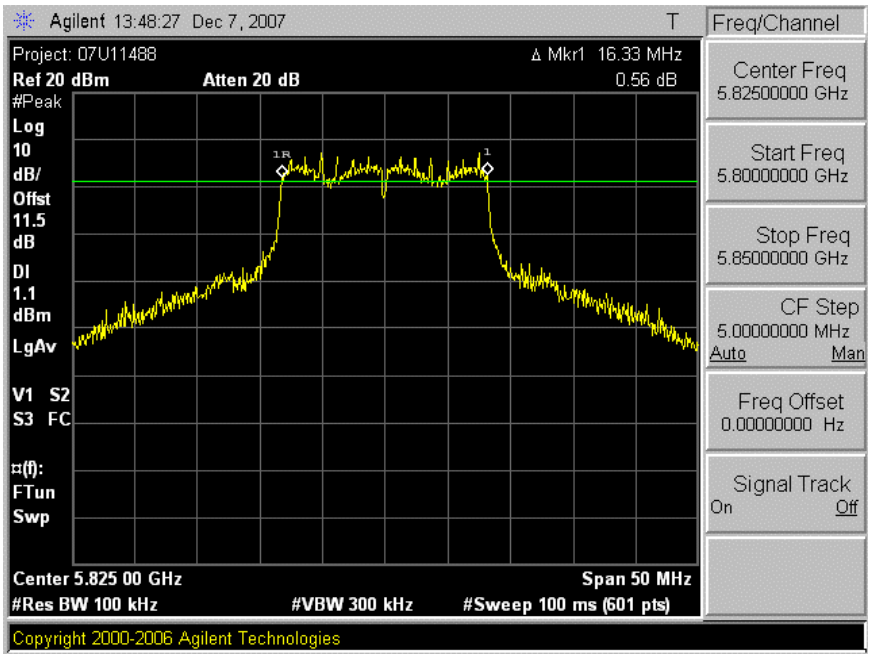
6 dB BANDWIDTH LOW CH, CHAIN 2



6 dB BANDWIDTH MID CH, CHAIN 2



6 dB BANDWIDTH HIGH CH, CHAIN 2



7.5.2. 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

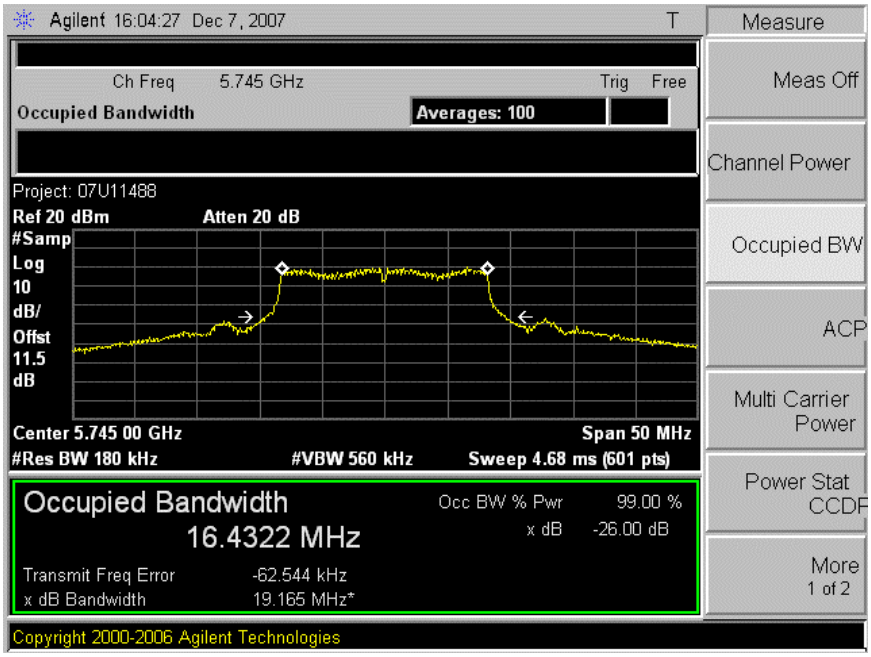
The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the 99 % bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal 99% bandwidth function is utilized.

RESULTS

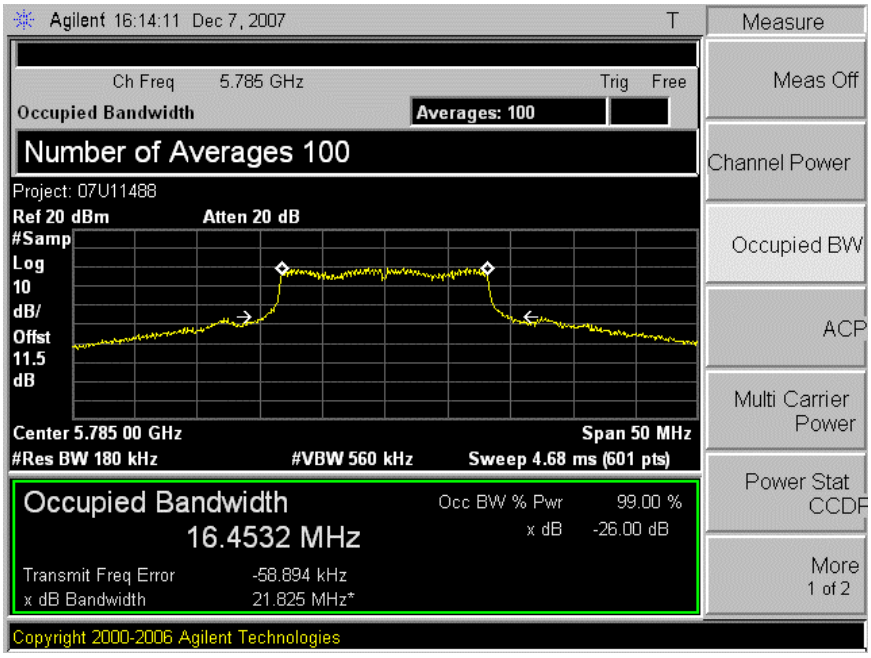
Channel	Frequency (MHz)	Chain 1 99% Bandwidth (MHz)	Chain 2 99% Bandwidth (MHz)
Low	5745	16.4322	16.4254
Middle	5785	16.4532	16.4186
High	5825	16.4834	16.4389

99% BANDWIDTH, CHAIN 1

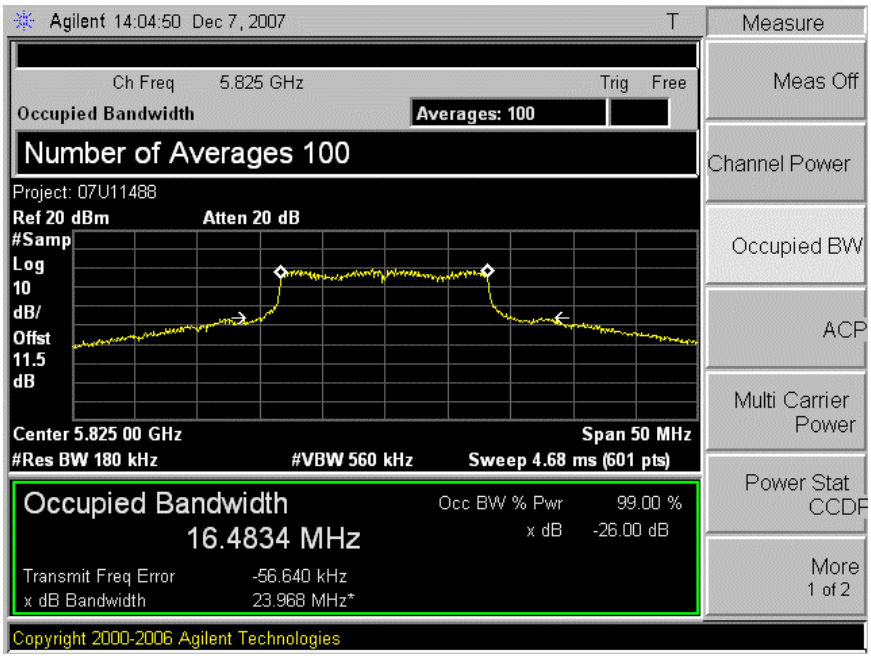
99% BANDWIDTH LOW CH, CHAIN 1



99% BANDWIDTH MID CH, CHAIN 1

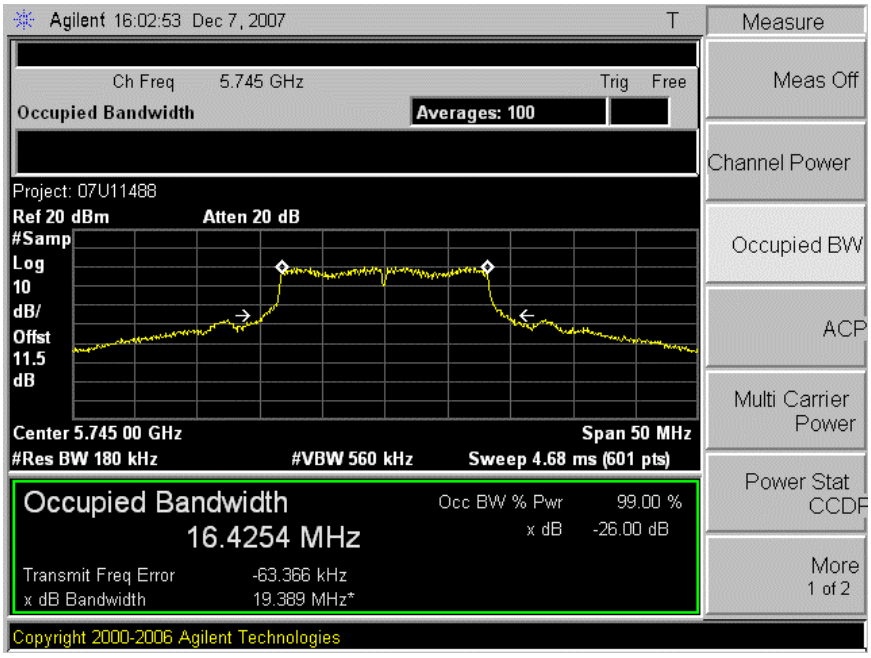


99% BANDWIDTH HIGH CH, CHAIN 1

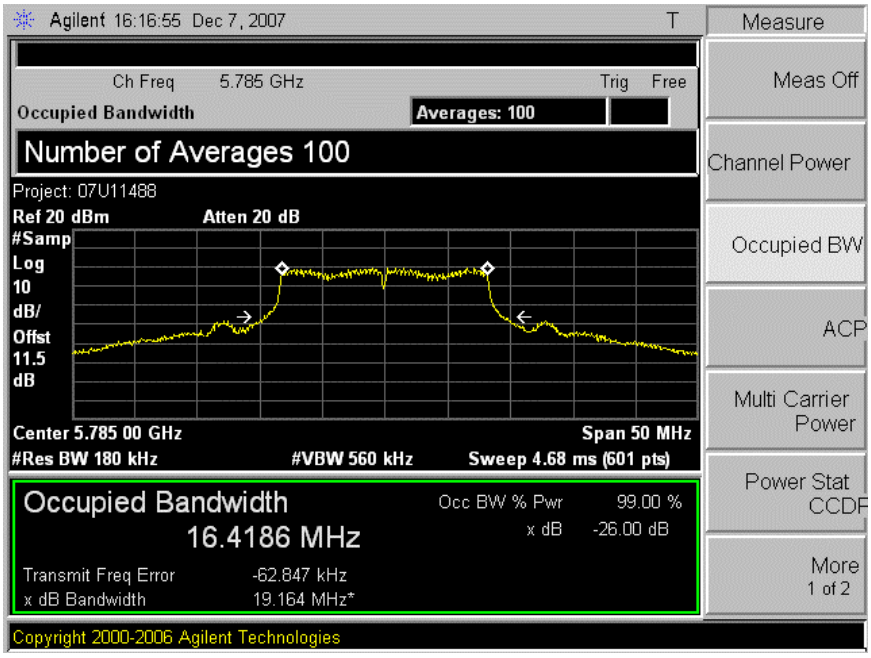


99% BANDWIDTH, CHAIN 2

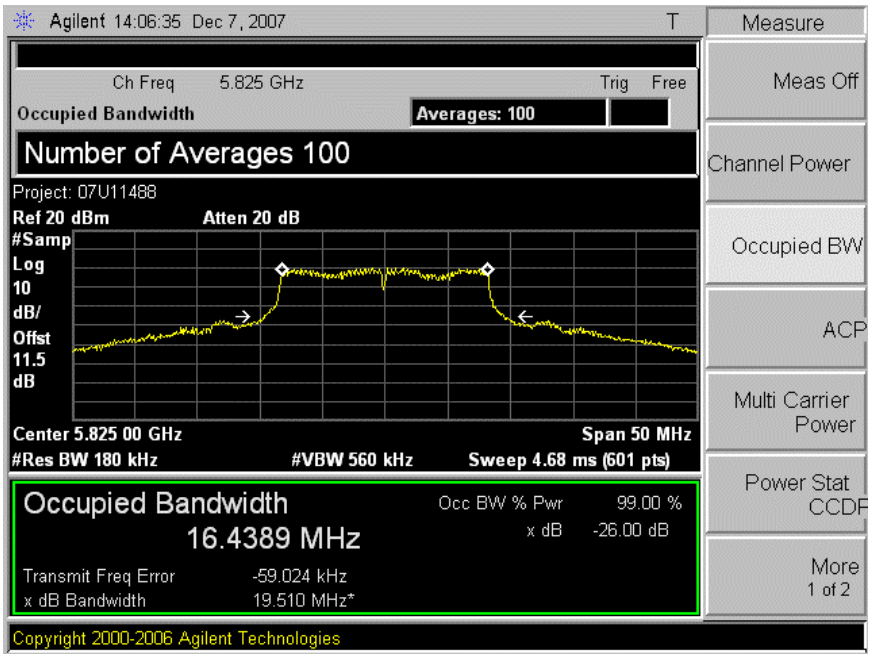
99% BANDWIDTH LOW CH, CHAIN 2



99% BANDWIDTH MID CH, CHAIN 2



99% BANDWIDTH HIGH CH, CHAIN 2



7.5.3. OUTPUT POWER

LIMITS

FCC §15.247 (b)

IC RSS-210 A8.4

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

The maximum antenna gain is 6.01 dBi, therefore the limit is 29.99 dBm.

TEST PROCEDURE

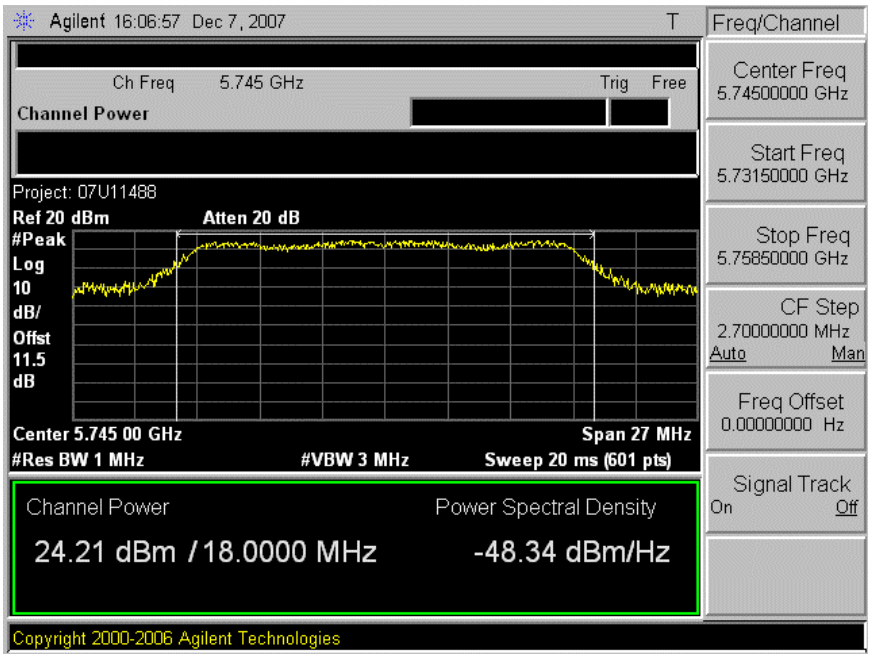
Peak power is measured using the spectrum analyzer's internal channel power integration function. Power is integrated over a bandwidth greater than or equal to the 99% bandwidth.

RESULTS

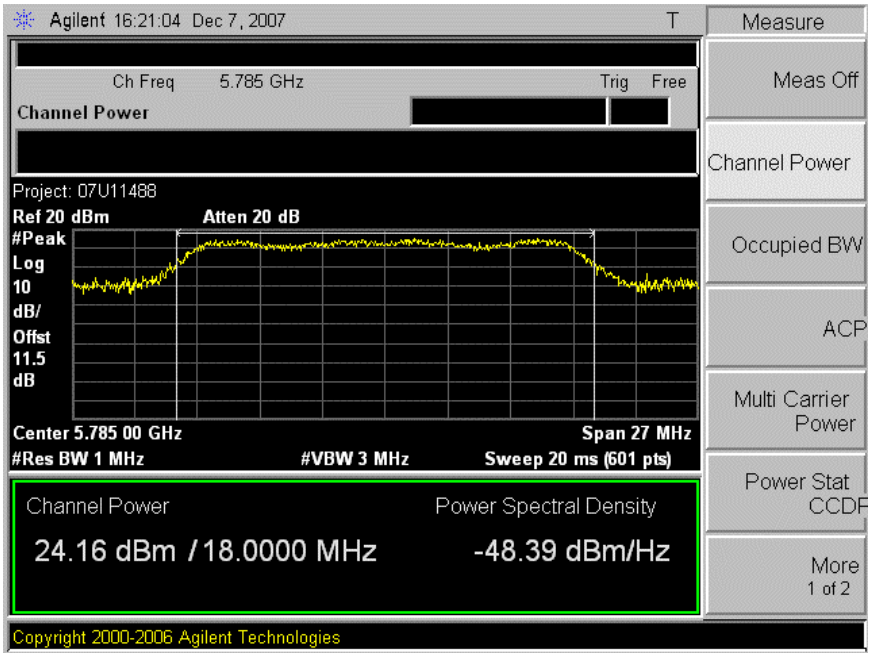
Channel	Frequency (MHz)	Limit (dBm)	Chain 1 Power (dBm)	Chain 2 Power (dBm)	Total Power (dBm)	Margin (dB)
Low	5745	29.99	24.21	24.86	27.56	-2.43
Mid	5785	29.99	24.16	24.19	27.19	-2.80
High	5825	29.99	24.05	24.94	27.53	-2.46

CHAIN 1 OUTPUT POWER

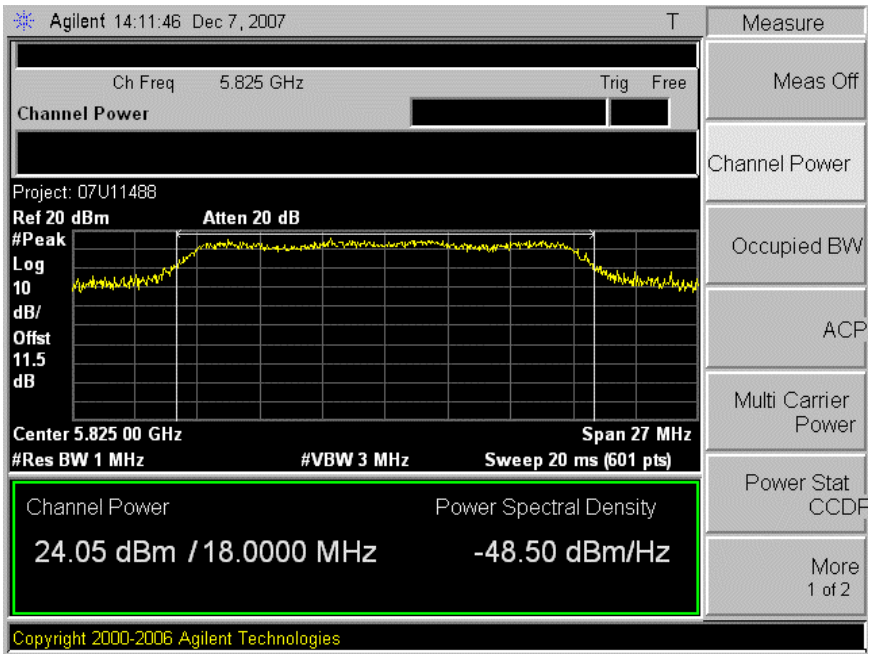
OUTPUT POWER LOW CH, CHAIN 1



OUTPUT POWER MID CH, CHAIN 1

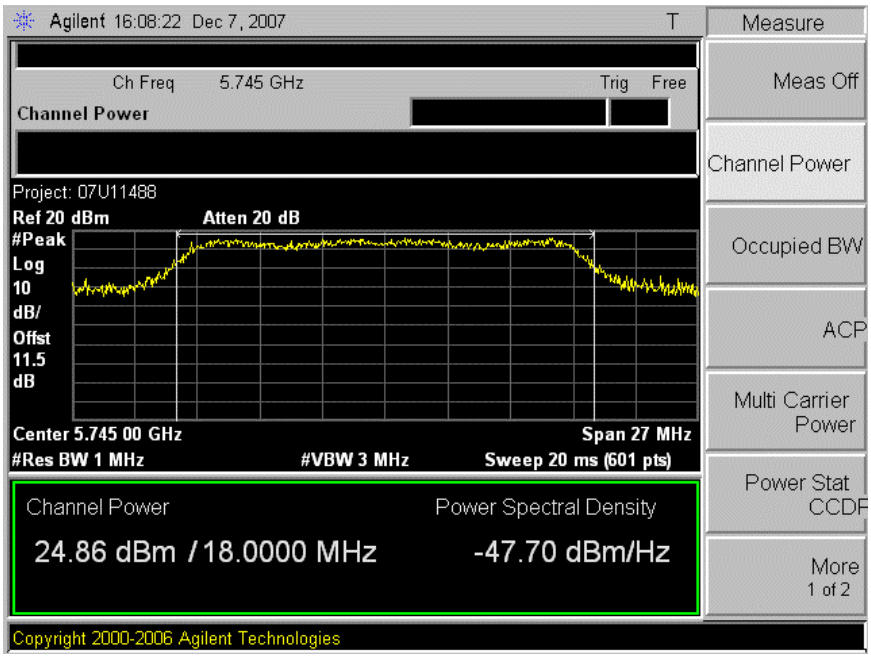


OUTPUT POWER HIGH CH, CHAIN 1

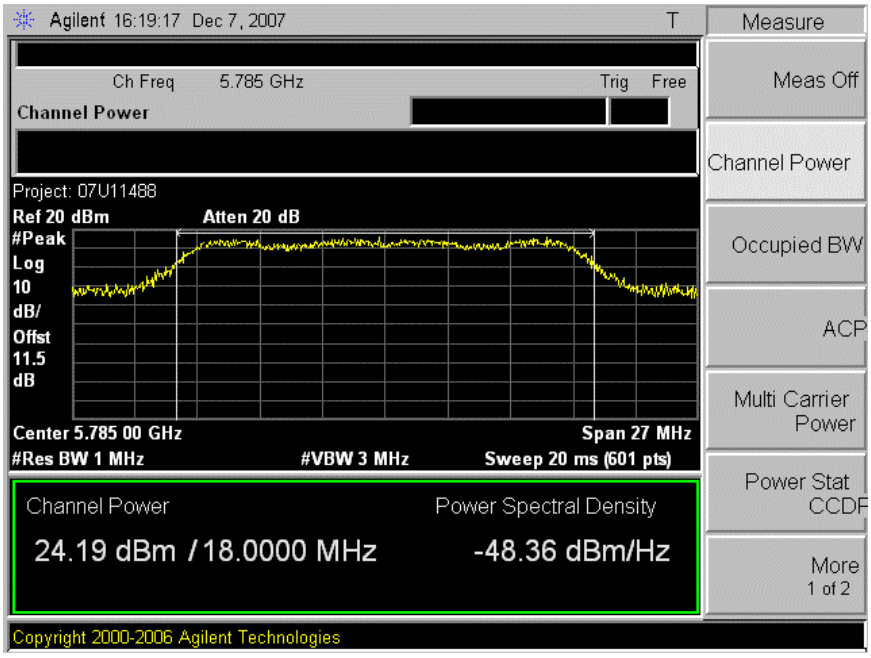


CHAIN 2 OUTPUT POWER

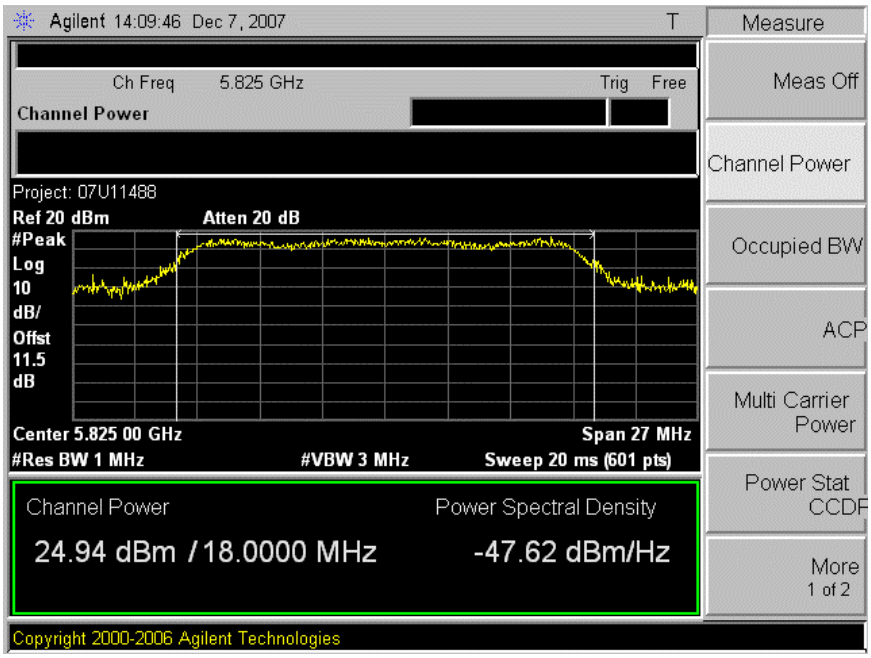
OUTPUT POWER LOW CH, CHAIN 2



OUTPUT POWER MID CH, CHAIN 2



OUTPUT POWER HIGH CH, CHAIN 2



7.5.4. 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 11.5 dB (including 10 dB pad and 1.5 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

Channel	Frequency (MHz)	Chain 1 Power (dBm)	Chain 2 Power (dBm)	Total Power (dBm)
Low	5745	17.08	17.60	20.36
Middle	5785	17.08	17.75	20.44
High	5825	17.03	17.80	20.44

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:

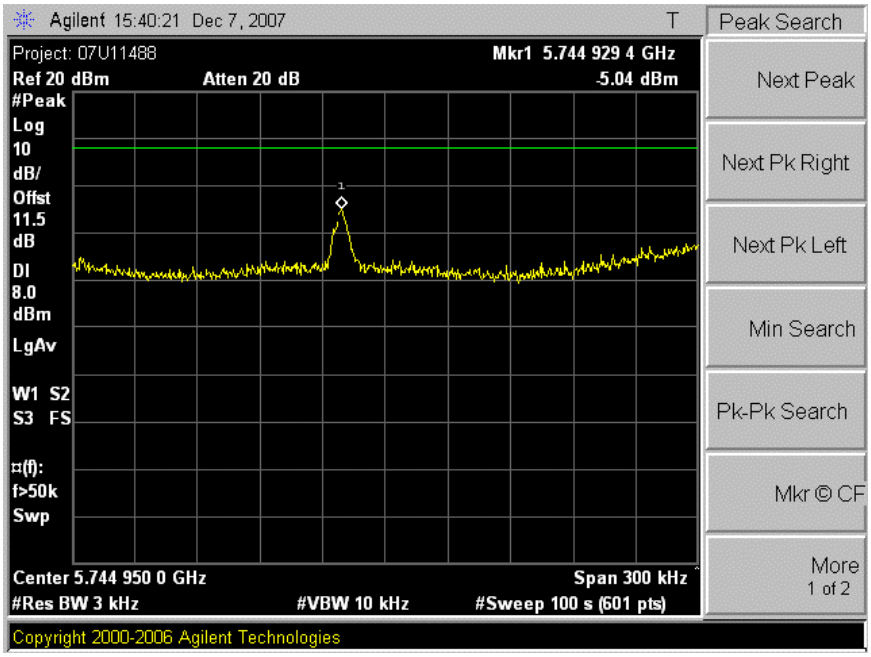
Middle and High channels were measured with the combiner only, since doing so results in the worst-case compared to measuring either chain alone.

Channel	Frequency (MHz)	Chain 1 PSD (dBm)	Chain 2 PSD (dBm)	Total PSD (dBm)	Limit (dBm)	Margin (dB)
Low	5745	-5.04	-5.31	-2.16	8	-10.16

Channel	Frequency (MHz)	PSD with Combiner (dBm)	Limit (dBm)	Margin (dB)
Low	5745	-0.32	8	-8.32
Middle	5785	-0.13	8	-8.13
High	5825	-0.01	8	-8.01

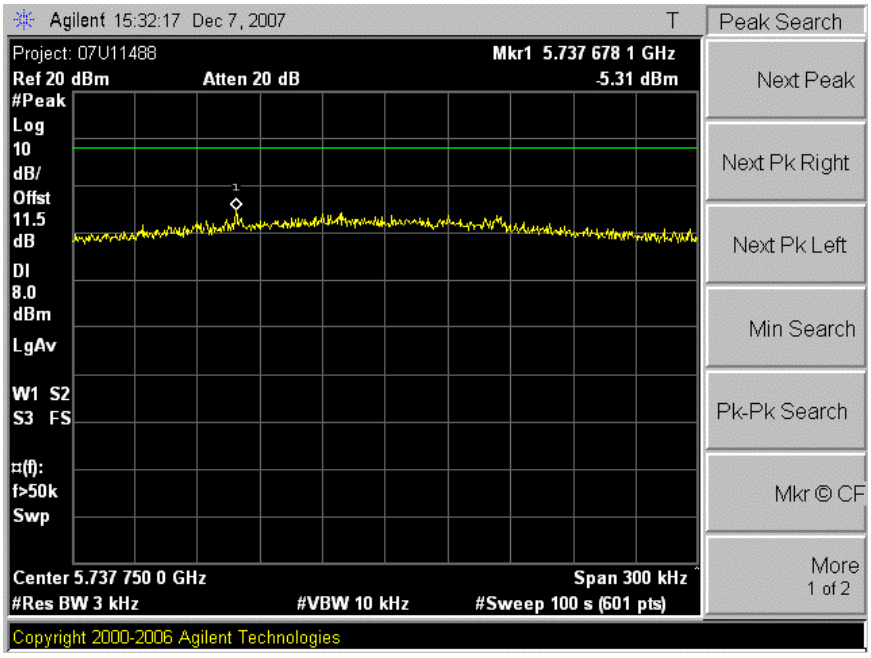
POWER SPECTRAL DENSITY, CHAIN 1

PSD LOW CH, CHAIN 1



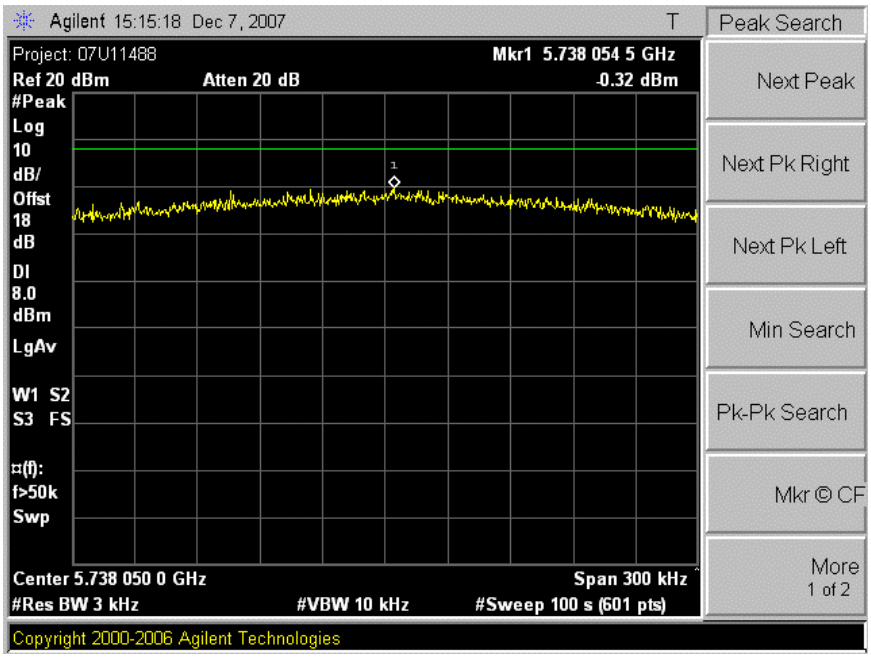
POWER SPECTRAL DENSITY, CHAIN 2

PSD LOW CH, CHAIN 2

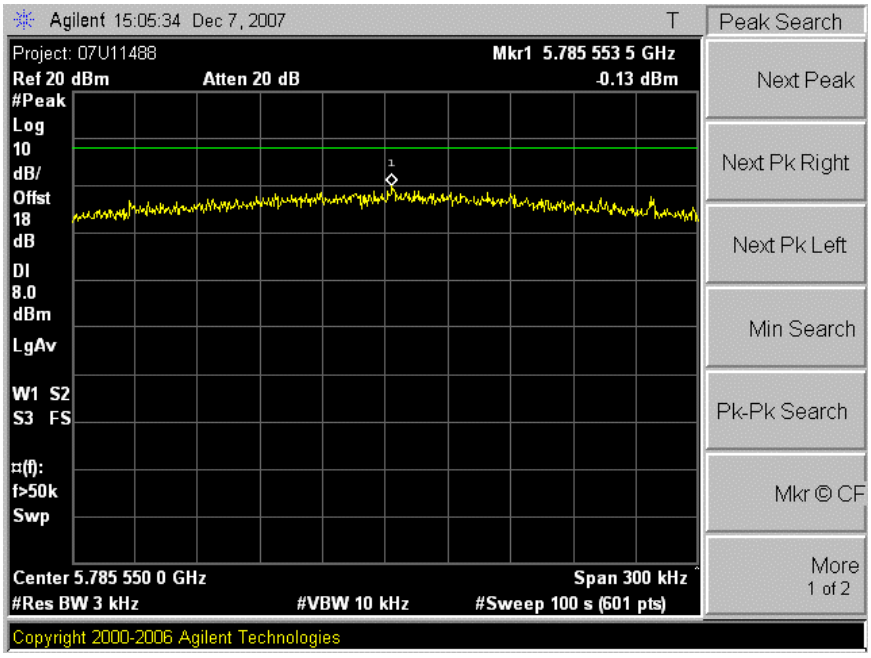


POWER SPECTRAL DENSITY, WITH COMBINER

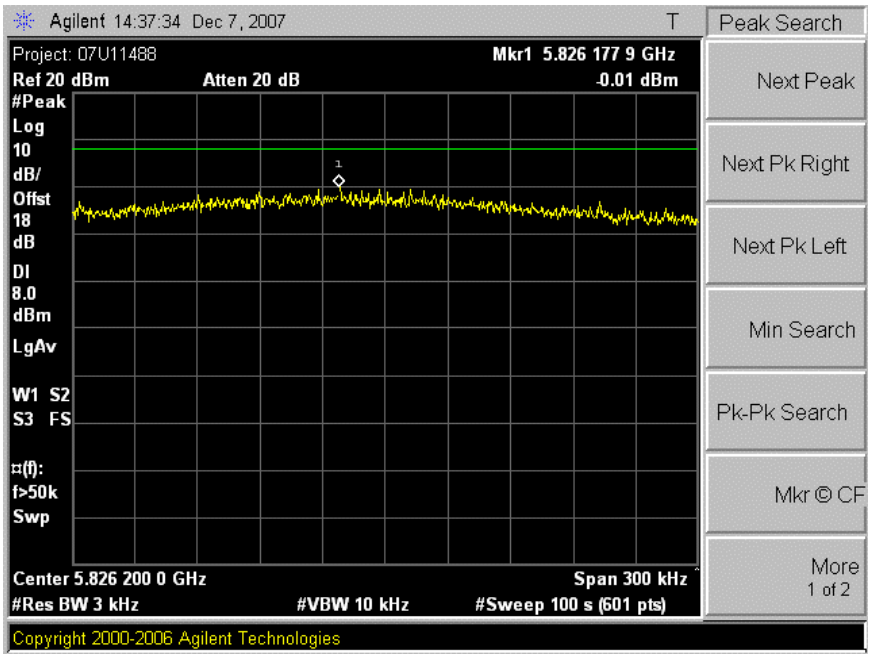
PSD LOW CH, WITH COMBINER



PSD MID CH, WITH COMBINER



PSD HIGH CH, WITH COMBINER



7.5.6. 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.

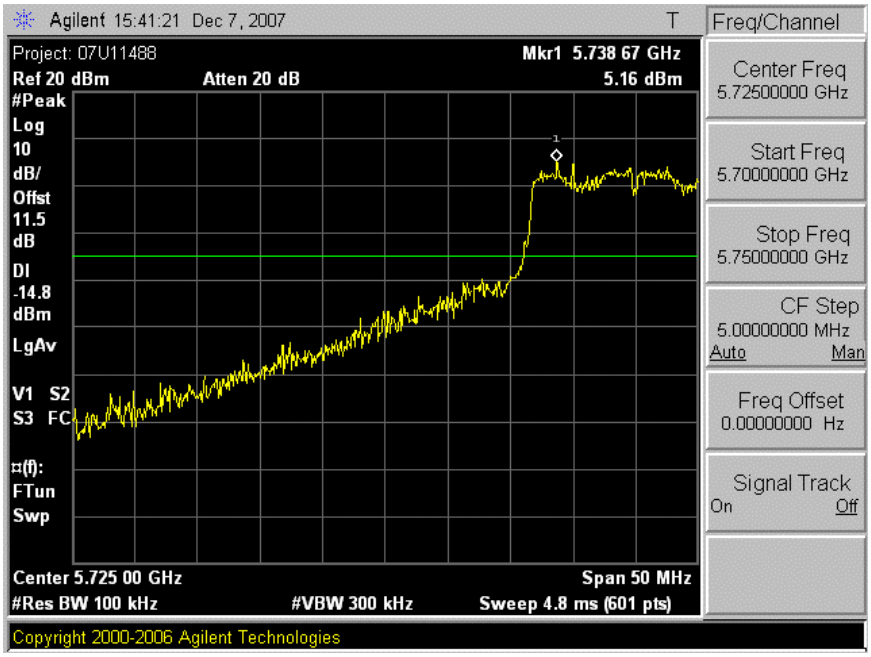
The spectrum from 30 MHz to 40 GHz is investigated with the transmitter set to the lowest, middle, and highest channels.

RESULTS

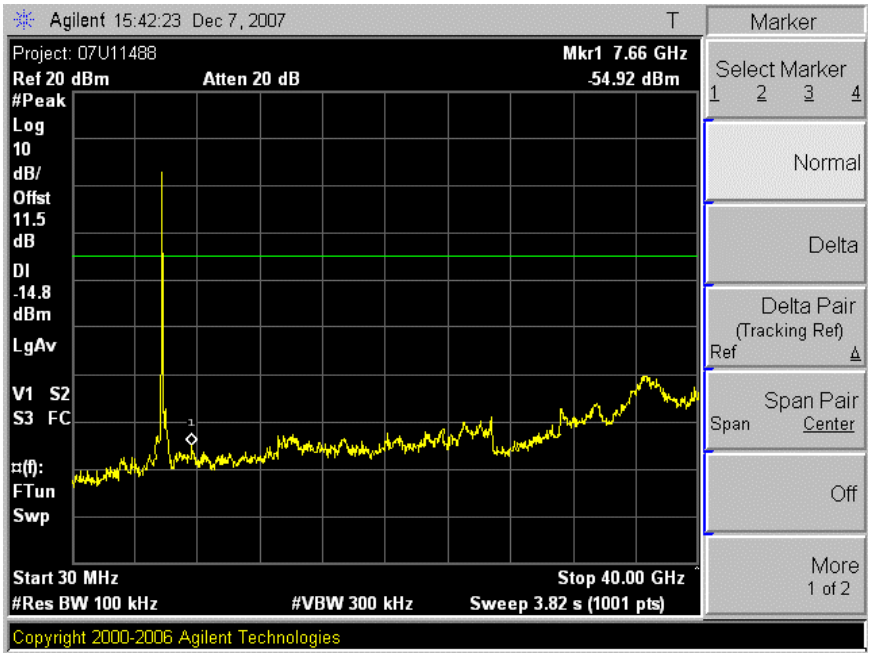
Middle and High channels were measured with the combiner only, since doing so results in the worst-case compared to measuring either chain alone.

CHAIN 1 SPURIOUS EMISSIONS

LOW CH BANDEDGE, CHAIN 1

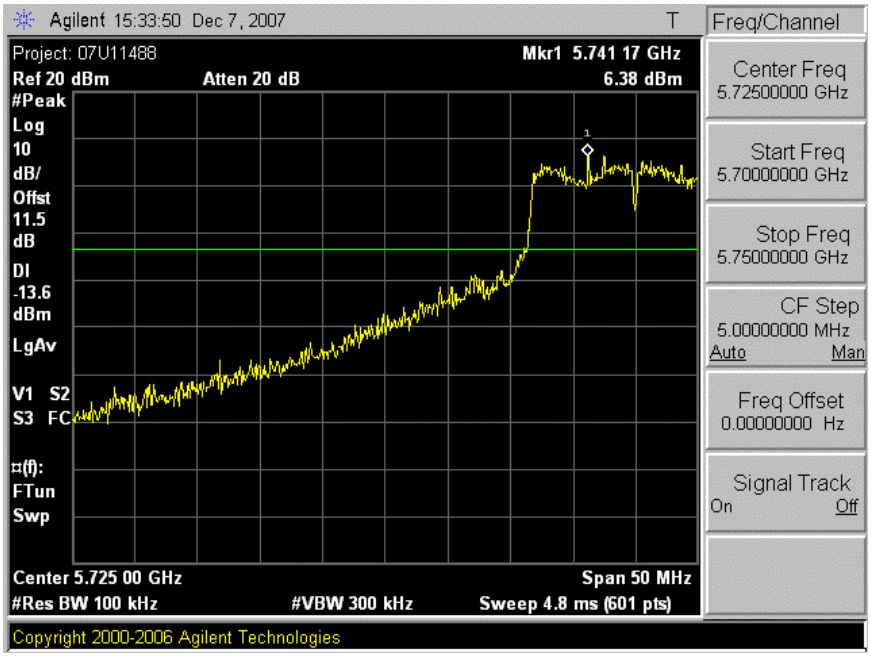


LOW CH SPURIOUS, CHAIN 1

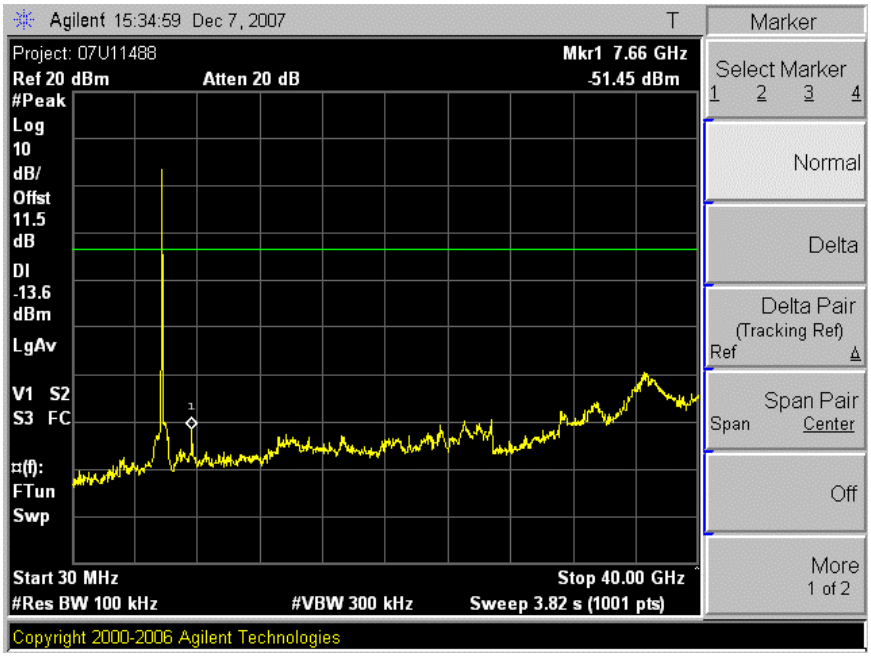


CHAIN 2 SPURIOUS EMISSIONS

LOW CH BANDEDGE, CHAIN 2



LOW CH SPURIOUS, CHAIN 2



SPURIOUS EMISSIONS WITH COMBINER

LOW CH BANDEDGE, WITH COMBINER