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

CERTIFICATION TEST REPORT

FOR

DC544D_3 PCIe DAUGHTER CARD FOR 2.4 / 5 GHz AP APPLICATIONS_NON DFS

MODEL NUMBER: 65-VN780-P3

FCC ID: J9C-DC544D3
IC: 2723A-DC544D3

REPORT NUMBER: 09U12687-6

ISSUE DATE: JULY 22, 2009

Prepared for
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Revision History

Rev.	Issue Date	Revisions	Revised By
--	7/22/2009	Initial Issue	F. Ibrahim

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: QUALCOMM INC.
3165 KIFER RD
SANTA CLARA, CA 95051
USA

EUT DESCRIPTION: DC544D_3 PCIe DAUGHTER CARD FOR 2.4 / 5 GHz AP APPLICATIONS_NON DFS

MODEL: 65-VN780-P3

SERIAL NUMBER: 7916 for Antenna Port, 7929 for Radiated Emission

DATE TESTED: JUNE 24 – JULY 17, 2009

APPLICABLE STANDARDS	
STANDARD	**TEST RESULTS**
CFR 47 Part 15 Subpart C	Pass
INDUSTRY CANADA RSS-210 Issue 7 Annex 8	Pass
INDUSTRY CANADA RSS-GEN Issue 2	Pass

Compliance Certification Services, Inc. (CCS) tested the above equipment in accordance with the requirements set forth in the above standards. All indications of Pass/Fail in this report are opinions expressed by CCS based on interpretations and/or observations of test results. Measurement Uncertainties were not taken into account and are published for informational purposes only. 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 CCS and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by CCS will constitute fraud and shall nullify the document. This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, any agency of the Federal Government, or any agency of any government.

Approved & Released For CCS By:

FRANK IBRAHIM
EMC SUPERVISOR
COMPLIANCE CERTIFICATION SERVICES

Tested By:

VIEN TRAN
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. SAMPLE CALCULATION

Where relevant, the following sample calculation is provided:

Field Strength (dBuV/m) = Measured Voltage (dBuV) + Antenna Factor (dB/m) + Cable Loss (dB) – Preamp Gain (dB)
36.5 dBuV + 18.7 dB/m + 0.6 dB – 26.9 dB = 28.9 dBuV/m

4.3. MEASUREMENT UNCERTAINTY

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

PARAMETER	UNCERTAINTY
Conducted Disturbance, 0.15 to 30 MHz	3.52 dB
Radiated Disturbance, 30 to 1000 MHz	4.94 dB

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

5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

The EUT is an 802.11a/b/g/n WLAN transceiver module in a PCI form factor, for 2.4 / 5 GHz AP Applications that do not include DFS bands. It is equipped with four identical transmitter / receiver chains.

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)
2.4 GHz BAND			
2412 - 2462	802.11b	24.37	273.53
2412 - 2462	802.11g	26.20	416.87
2412 - 2462	802.11n HT20	26.15	412.10
2422 - 2452	802.11n HT40	26.05	402.72
5.8 GHz BAND			
5745 - 5825	802.11a	25.15	327.34
5745 - 5825	802.11n HT20	25.24	334.20
5755 - 5795	802.11n HT40	25.05	319.89

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes a dual band omni monopole (4 identical) antenna, each with a maximum gain of 2 dBi in the 2.4 GHz band and 3 dBi in the 5.8 GHz band.

For the 802.11a/b/g legacy modes the effective legacy antenna gain is:

Antenna Gain (dBi)	10 Log (# Tx Chains) (dB)	Effective Legacy Gain (dBi)
2	6.02	8.02
3	6.02	9.02

5.4. SOFTWARE AND FIRMWARE

The EUT driver software installed during testing was Qualcomm, rev. 0.0.500.5.

The test utility software used during emissions testing was PTT Gui, rev. 5.1.

5.5. WORST-CASE CONFIGURATION AND MODE

The EUT was tested as an external module installed in a test jig board connected to a host Laptop PC.

Worst-Case data rates were utilized from preliminary testing of the Chipset, worst-case data rates used during the testing are as follows:

802.11b Mode (20 MHz BW operation): 1 Mbps, CCK.
802.11g Mode (20 MHz BW operation): 6 Mbps, OFDM.
802.11n MIMO HT20 Mode: MCS31, 260 Mbps, 4 Spatial Streams.
802.11n MIMO HT40 Mode: MCS31, 540 Mbps, 4 Spatial Streams.

Worst-case mode and channel used for 30-1000 MHz radiated and power line conducted emissions was the mode and channel with the highest output power, that was determined to be 11g mode, mid channel.

For bandwidth measurement preliminary testing showed that there is no significant difference among different chains, so the measurements were performed using Chain 0.

For conducted spurious measurement preliminary testing showed that combiner is worst-case compared to individual chains; therefore final measurements were performed using combiner for all channels and modes.

For PSD measurement preliminary testing showed that combiner is worst-case compared to individual chains; therefore final measurements were performed using combiner for all channels and modes.

For Radiated Band Edge measurements preliminary testing showed that the worst case was vertical polarization, so final measurements were performed with vertical polarization.

5.6. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

PERIPHERAL SUPPORT EQUIPMENT LIST				
Description	**Manufacturer**	**Model**	**Serial Number**	**FCC ID**
Laptop	IBM	T43 ThinkPad	L3-XDLXW06/02	DoC
AC Adapter	IBM	08K8204	11S08K8204Z1Z9	DoC
DC Power Supply	Tektronic	PS2521G	N/A	N/A
DC Power Supply	HP	336108	KR24104150	N/A
Extender PCI	ALLION	V1 EC-PEM V1.0	A073	N/A

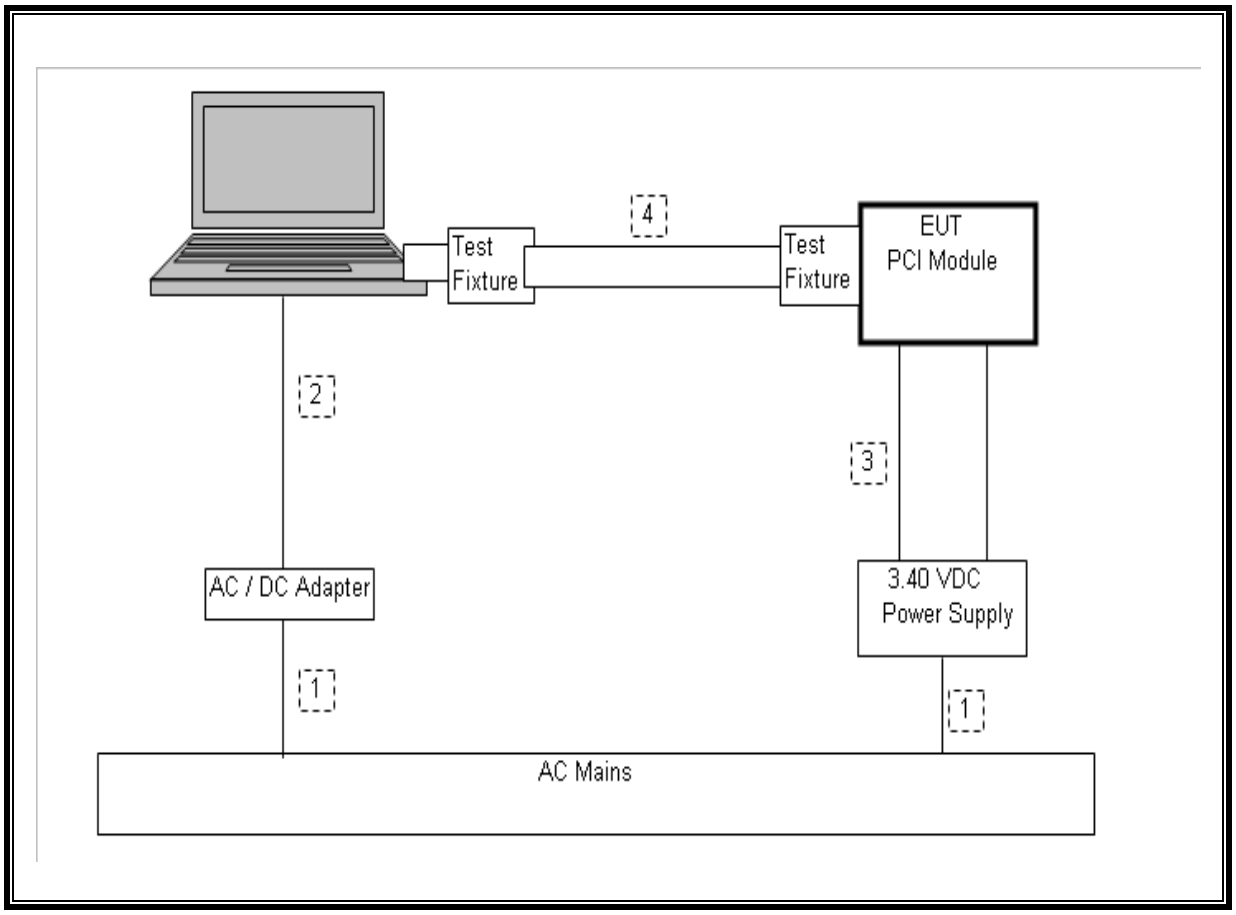
I/O CABLES

I/O CABLE LIST						
Cable No.	**Port**	**# of Identical Ports**	**Connecto Type**	**Cable Type**	**Cable Length**	**Remarks**
1	AC	2	US115	Un-shielded	1.5 m	For laptop
2	DC	1	DC	Un-shielded	1.5 m	For laptop
3	DC	1	Cable	Un-shielded	1.0 m	For EUT
4	Ribbon	1	Ribbon	Un-shielded	.4 m	Test Fixture

TEST SETUP

The EUT is connected to a host laptop computer via a test fixture 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**
Spectrum Analyzer, 44 GHz	Agilent / HP	E4446A	C01069	01/05/09	01/05/10
Antenna, Bilog, 2 GHz	Sunol Sciences	JB1	C01011	01/14/09	01/14/10
Antenna, Horn, 18 GHz	EMCO	3115	C00945	04/22/09	04/22/10
Antenna, Horn, 26.5 GHz	ARA	MWH-1826/B	C00589	09/29/08	11/28/09
Antenna, Horn, 40 GHz	ARA	MWH-2640B	C00981	05/21/09	05/21/10
Preamplifier, 40 GHz	Miteq	NSP4000-SP2	C00990	10/11/08	10/11/09
Preamplifier, 1300 MHz	Agilent / HP	8447D	C00885	03/31/09	03/31/10
Preamplifier, 1-26GHz	Agilent / HP	8449B	C01052	08/05/08	08/05/09
Peak Power Meter	Boonton	4541	C01186	01/19/09	01/19/10
Peak Power Sensor	Boonton	4541	C01189	01/15/09	01/15/10
LISN, 30 MHz	FCC	LISN-50/250-25-2	N02625	10/29/08	10/29/09
EMI Test Receiver, 30 MHz	R & S	ESHS 20	N02396	02/06/08	08/06/09

7. ANTENNA PORT TEST RESULTS

7.1. 2.4 GHz BAND CHANNEL TESTS FOR 802.11b MODE

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.

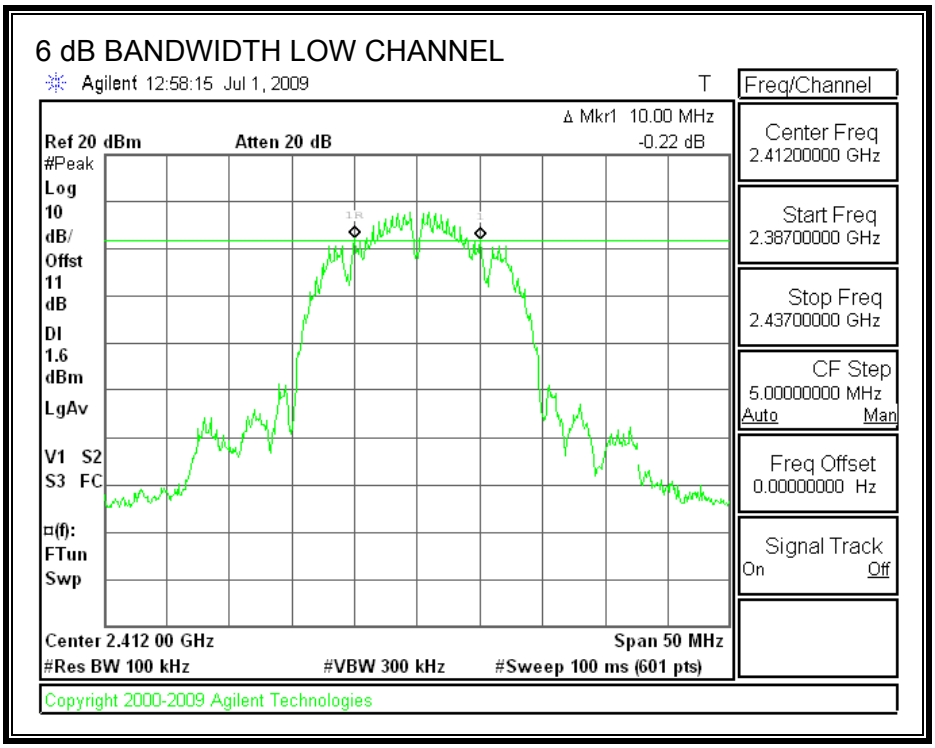
TEST PROCEDURE

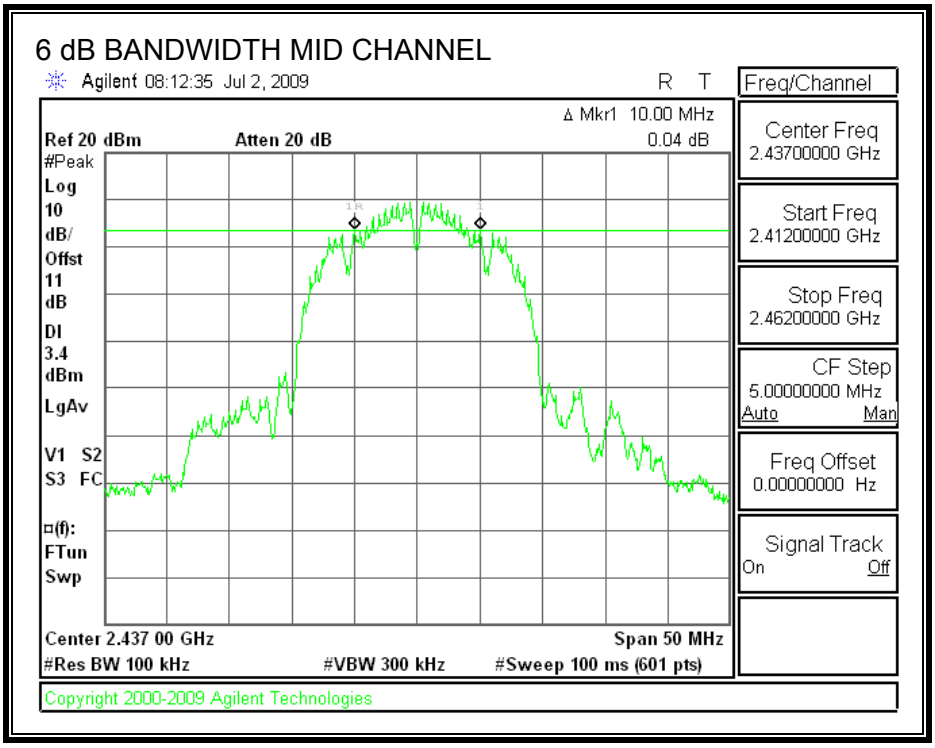
The transmitter output is connected to a spectrum analyzer. The RBW is set to 100 kHz and the VBW is set to 300 kHz. The sweep time is coupled.

RESULTS

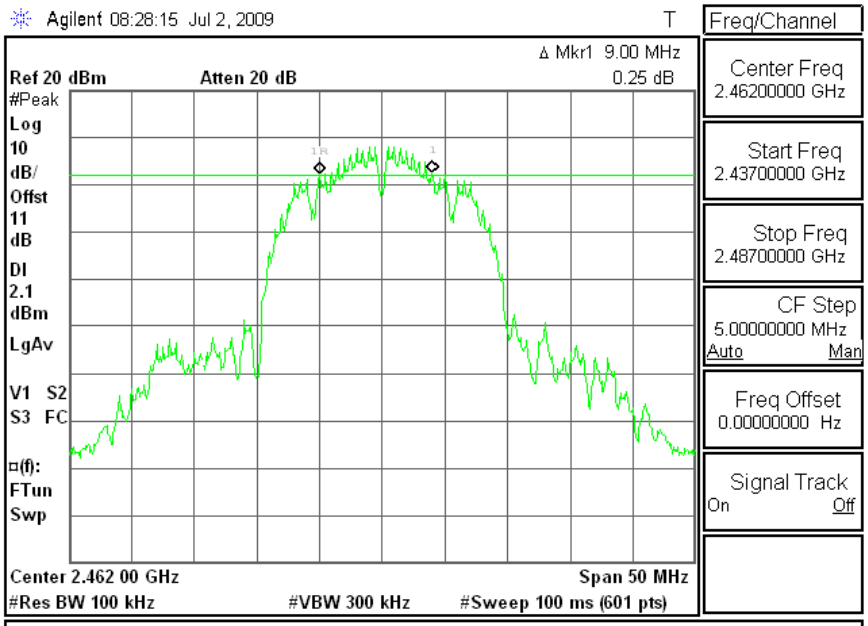
Channel	Frequency (MHz)	6 dB BW (MHz)	Minimum Limit (MHz)
Low	2412	10.00	0.5
Middle	2437	10.00	0.5
High	2462	9.00	0.5

6 dB BANDWIDTH





6 dB BANDWIDTH HIGH CHANNEL



7.1.2. 99% & 26 dB BANDWIDTH

LIMITS

None; for reporting purposes only.

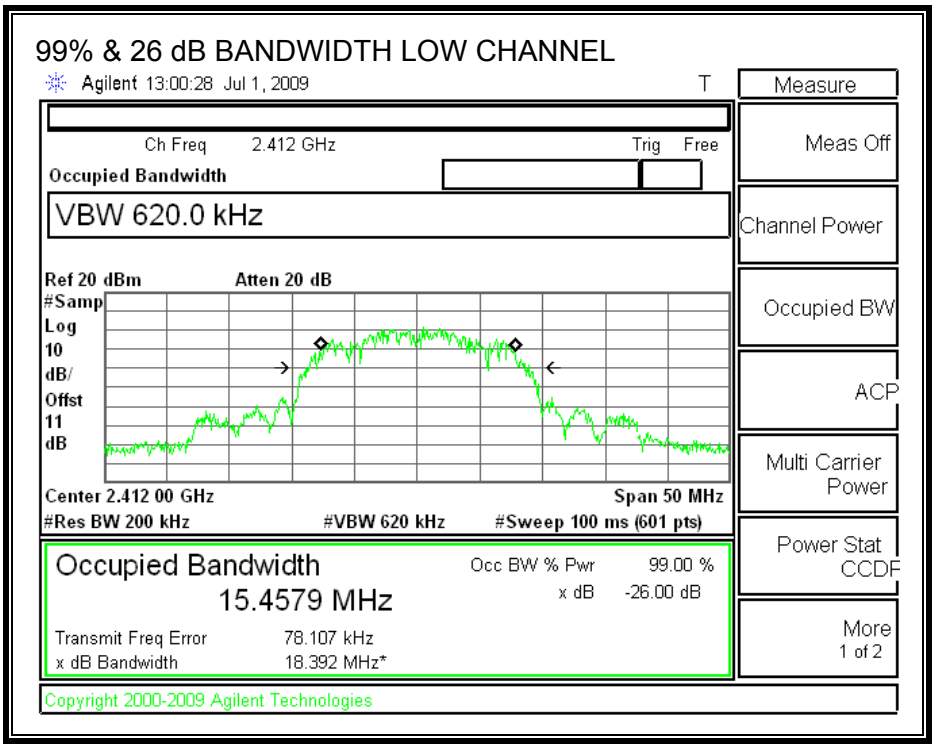
TEST PROCEDURE

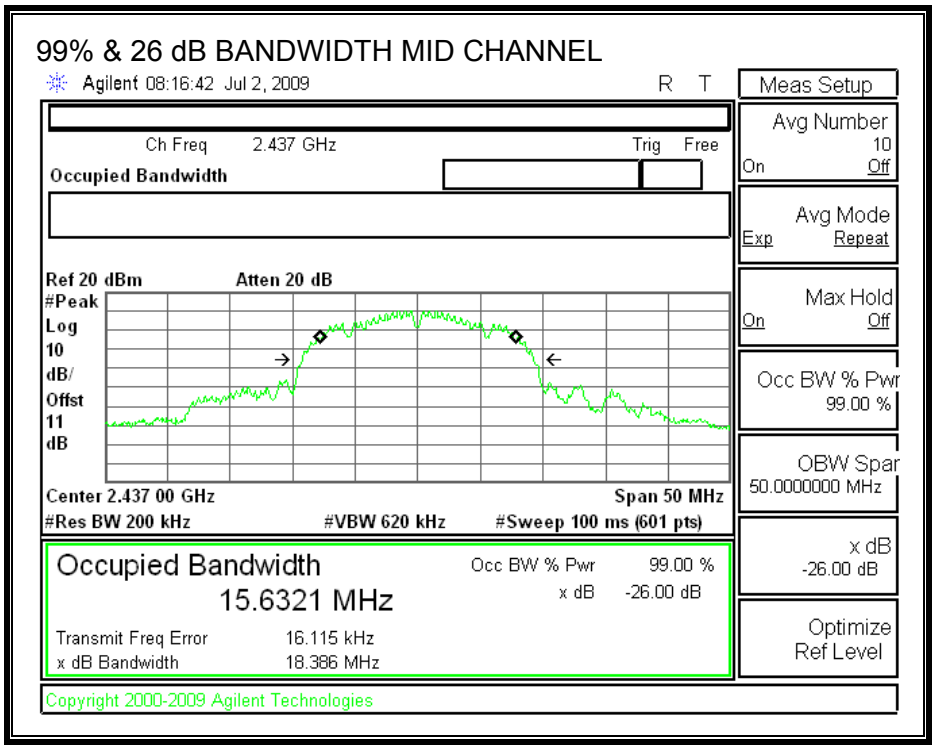
The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal bandwidth measurement function is utilized.

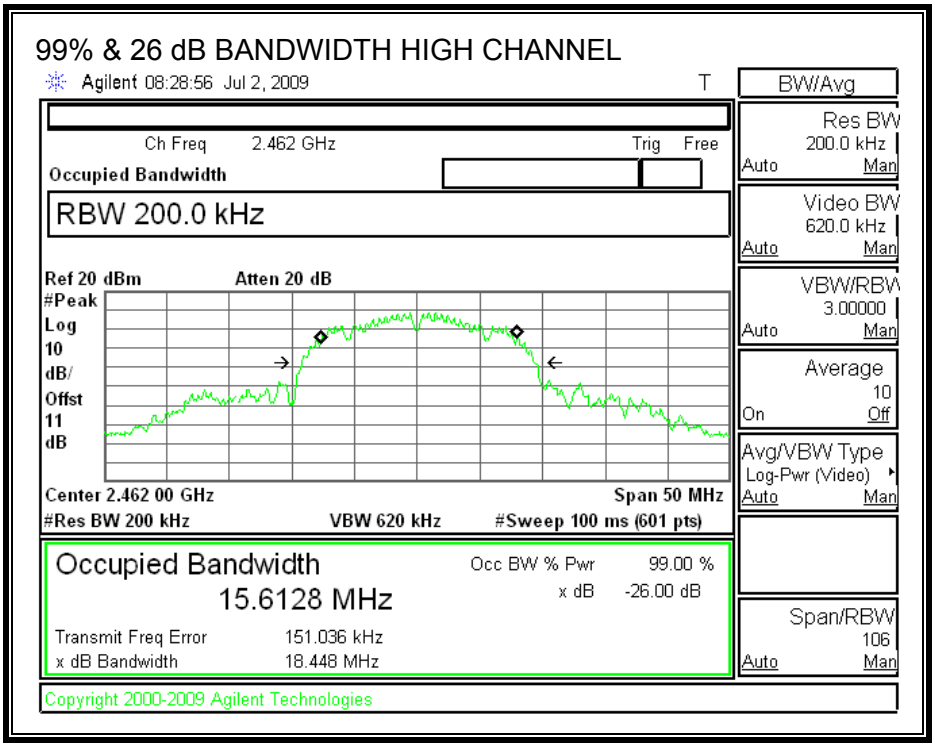
RESULTS

Channel	Frequency (MHz)	99% OBW (MHz)	26 dB BW (MHz)
Low	2412	15.46	18.39
Middle	2437	15.63	18.39
High	2462	15.61	18.45

99% & 26 dB BANDWIDTH







7.1.3. OUTPUT POWER

LIMITS

FCC §15.247 (b)

IC RSS-210 A8.4

TEST PROCEDURE

Output power was measured based on the use of RMS averaging over a time interval in accordance with FCC document "Measurement of Digital Transmission Systems Operating under Section 15.247", March 23, 2005.

RESULTS

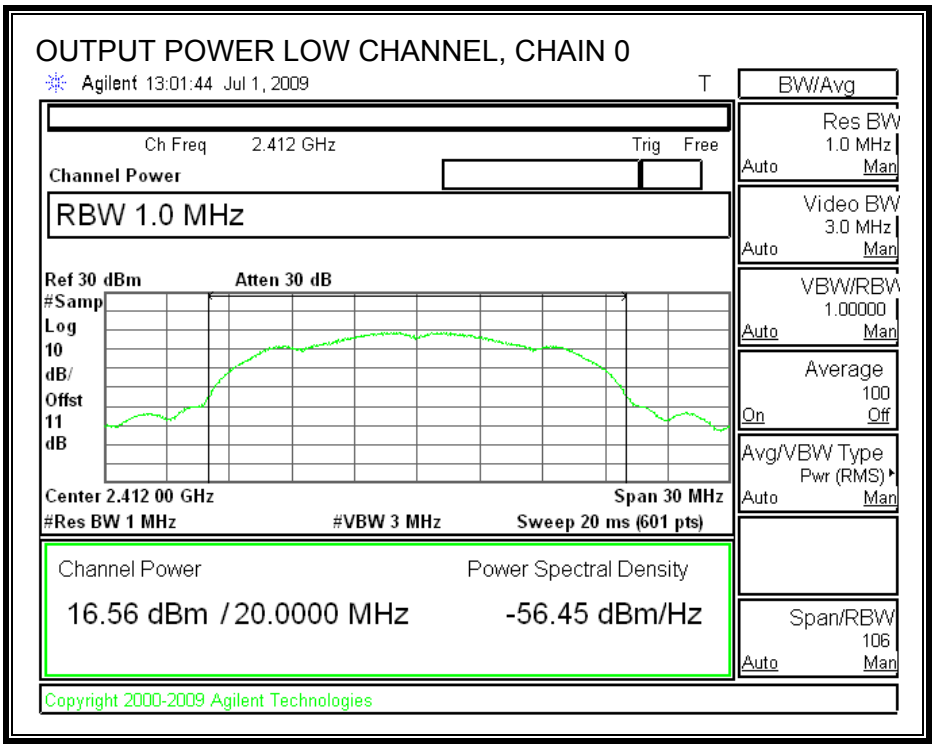
Effective Legacy Mode Composite Gain of 4 Identical Antennas:

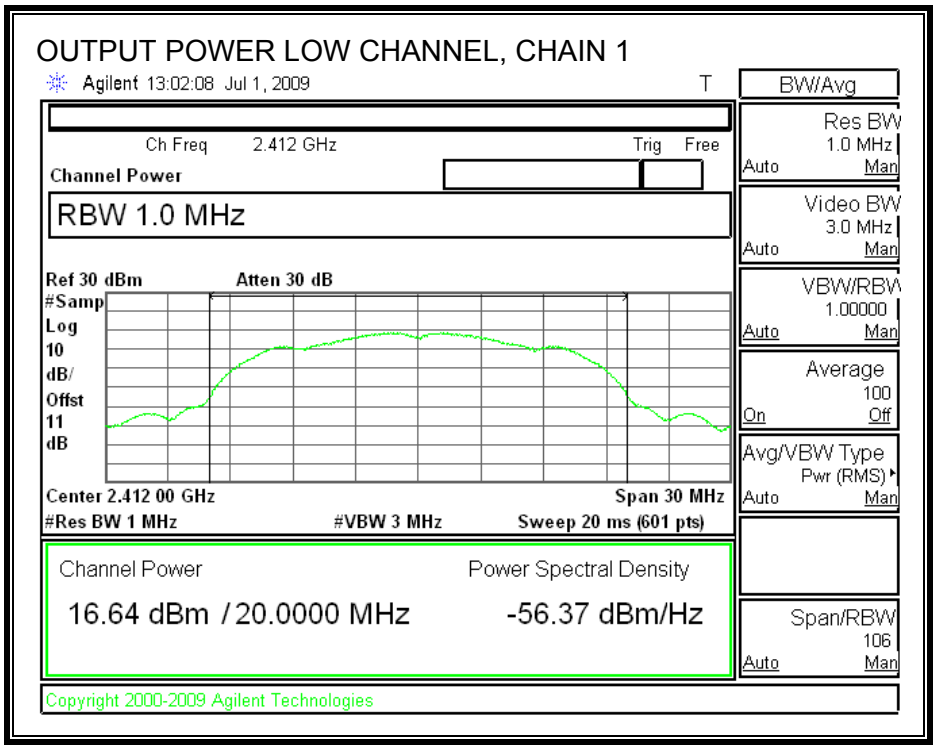
Antenna Gain (dBi)	10 Log (# Tx Chains) (dB)	Effective Legacy Gain (dBi)
2	6.02	8.02

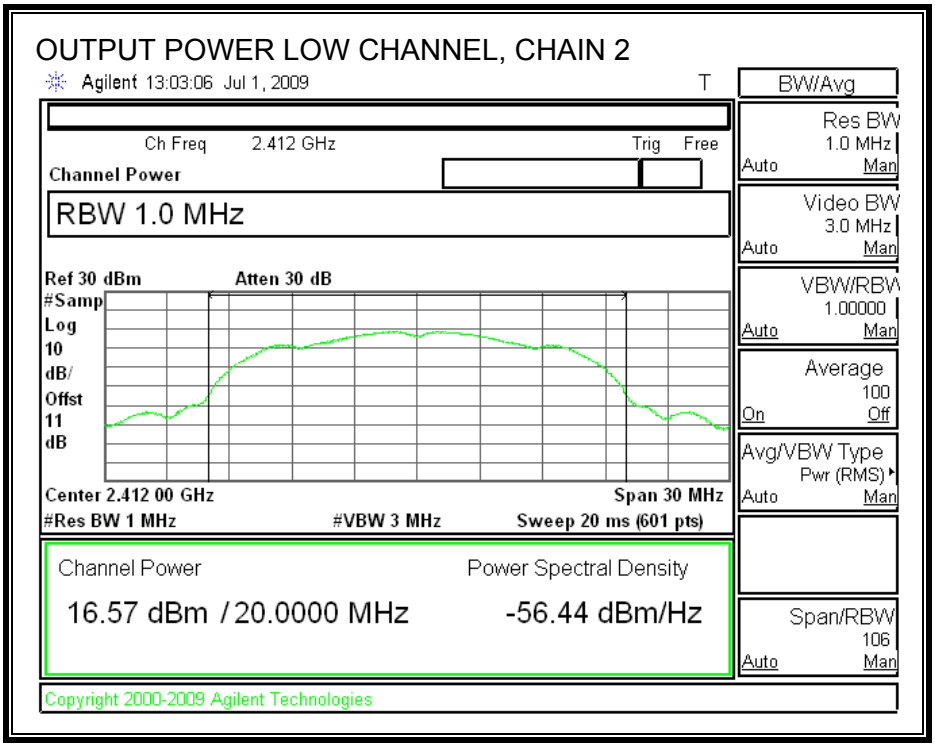
The composite antenna gain is 8.02 dBi, therefore the limit is 27.98 dBm.

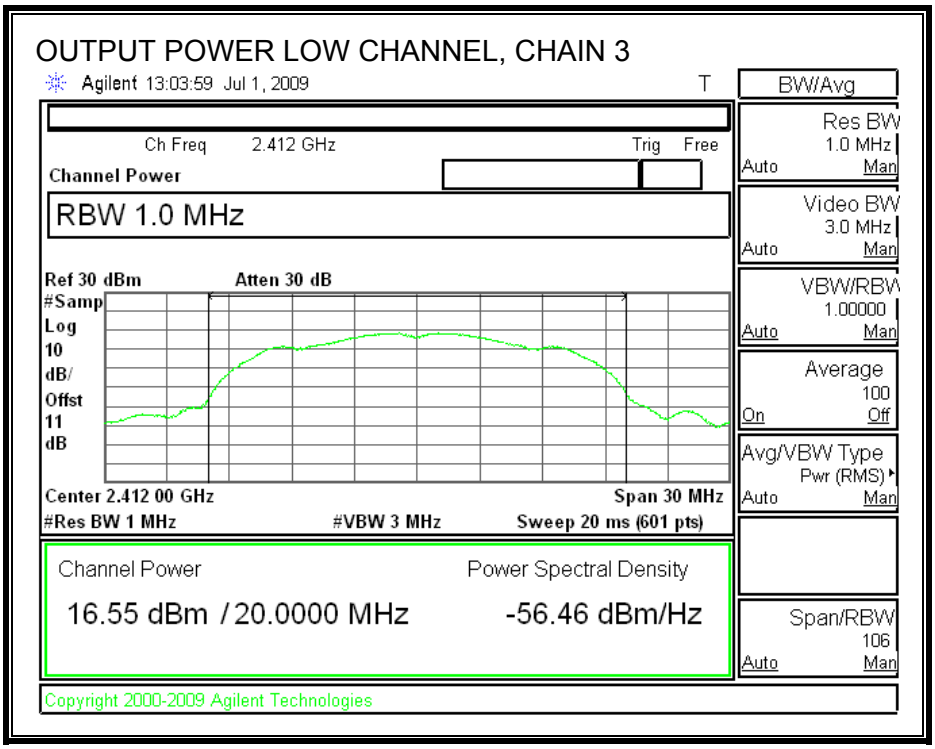
Channel	Frequency (MHz)	Chain 0 Power (dBm)	Chain 1 Power (dBm)	Chain 2 Power (dBm)	Chain 3 Power (dBm)	Total Power (dBm)	Limit (dBm)	Margin (dB)
Low	**2412**	16.56	16.64	16.57	16.55	**22.60**	**27.98**	**-5.38**
Mid	**2437**	18.35	18.38	18.35	18.30	**24.37**	**27.98**	**-3.61**
High	**2462**	16.70	16.80	16.79	16.65	**22.76**	**27.98**	**-5.22**

OUTPUT POWER, LOW CHANNEL

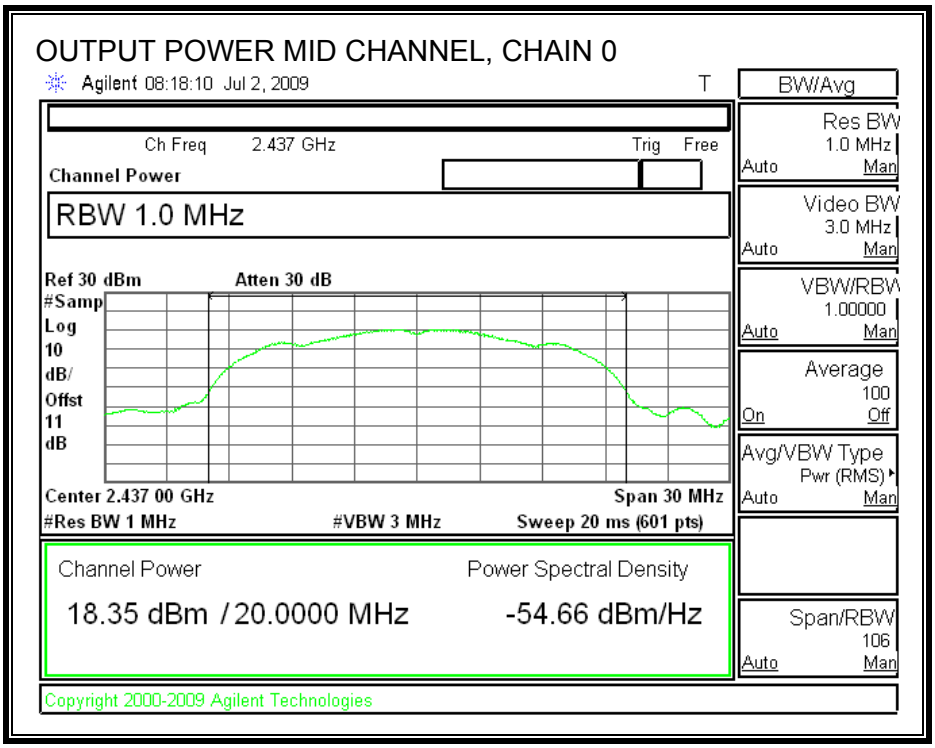


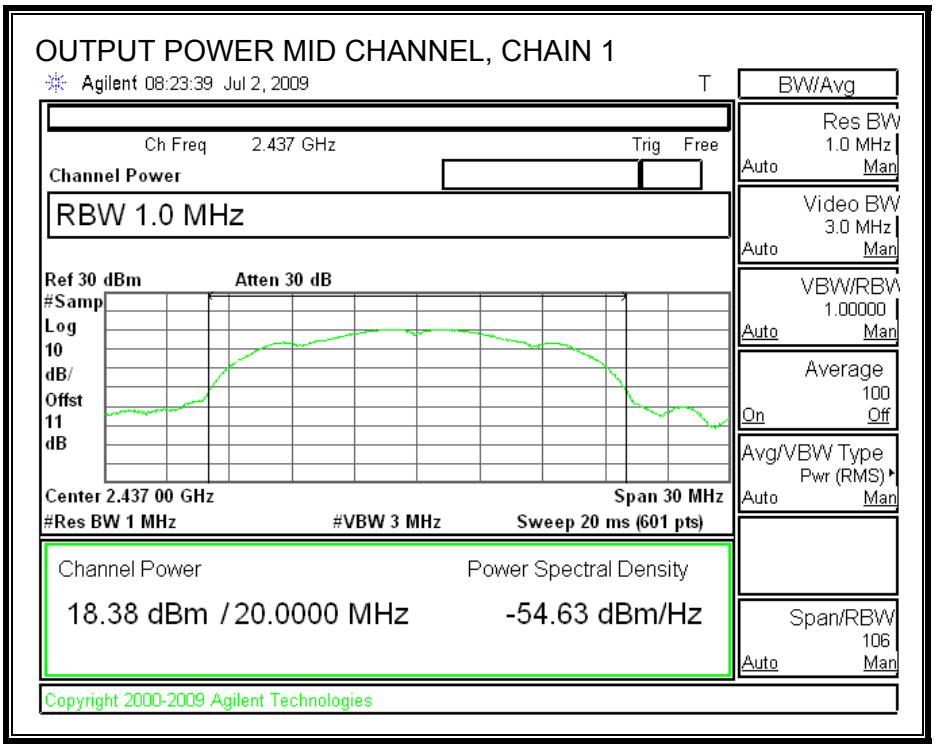


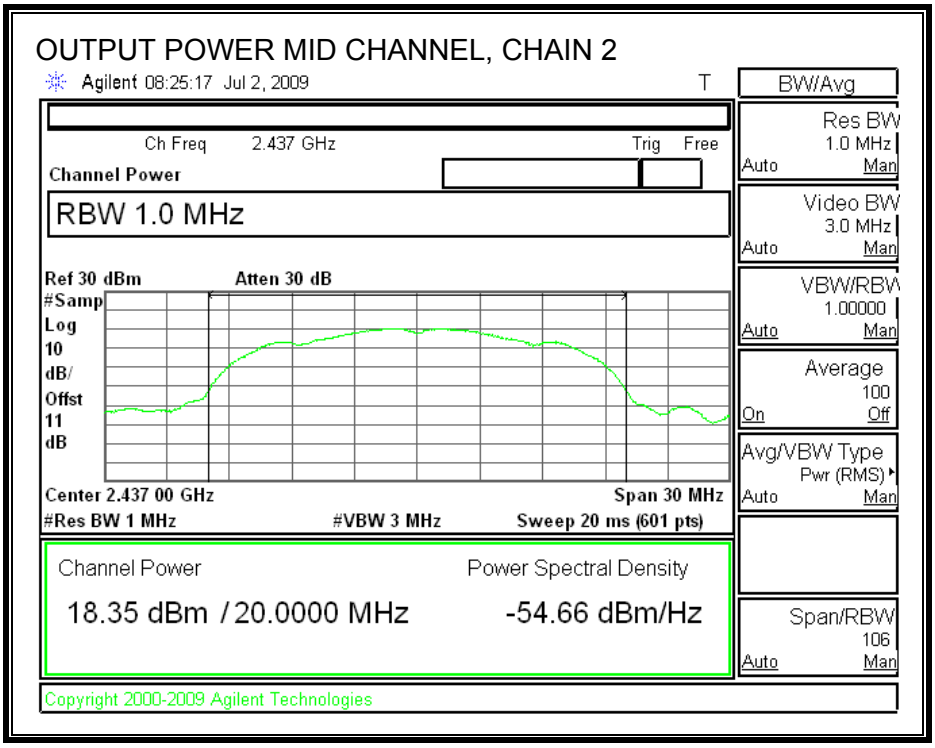


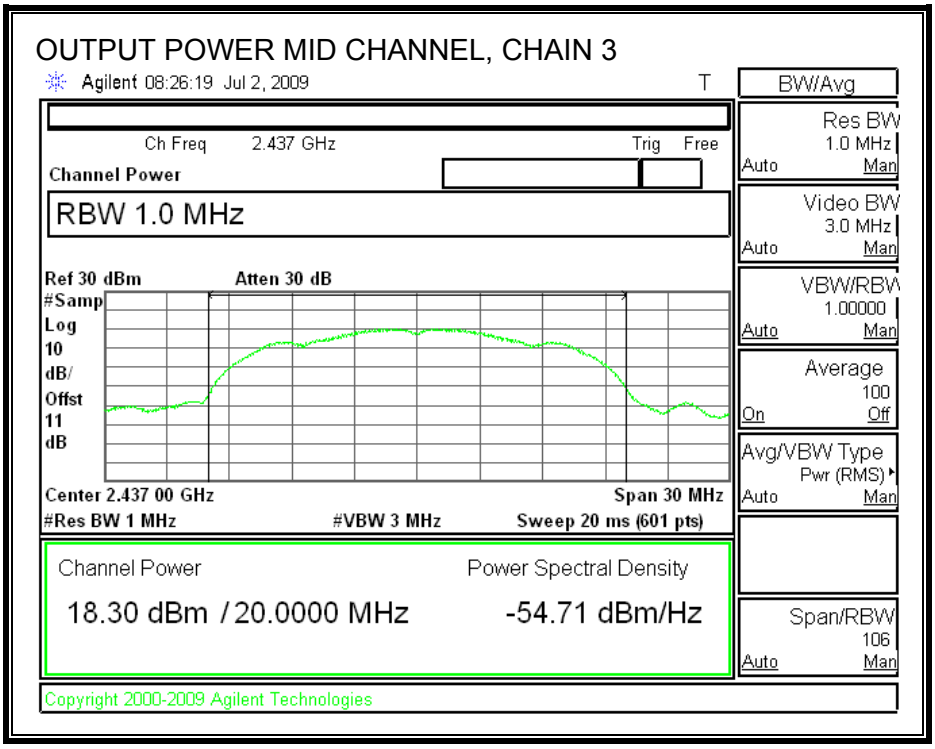


OUTPUT POWER, MID CHANNEL

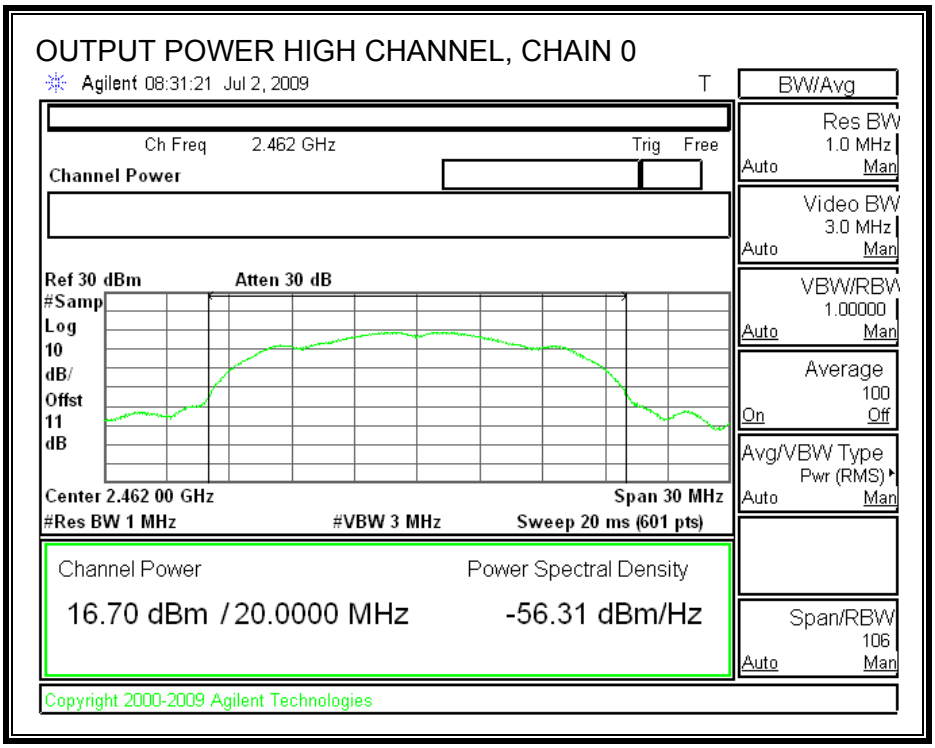


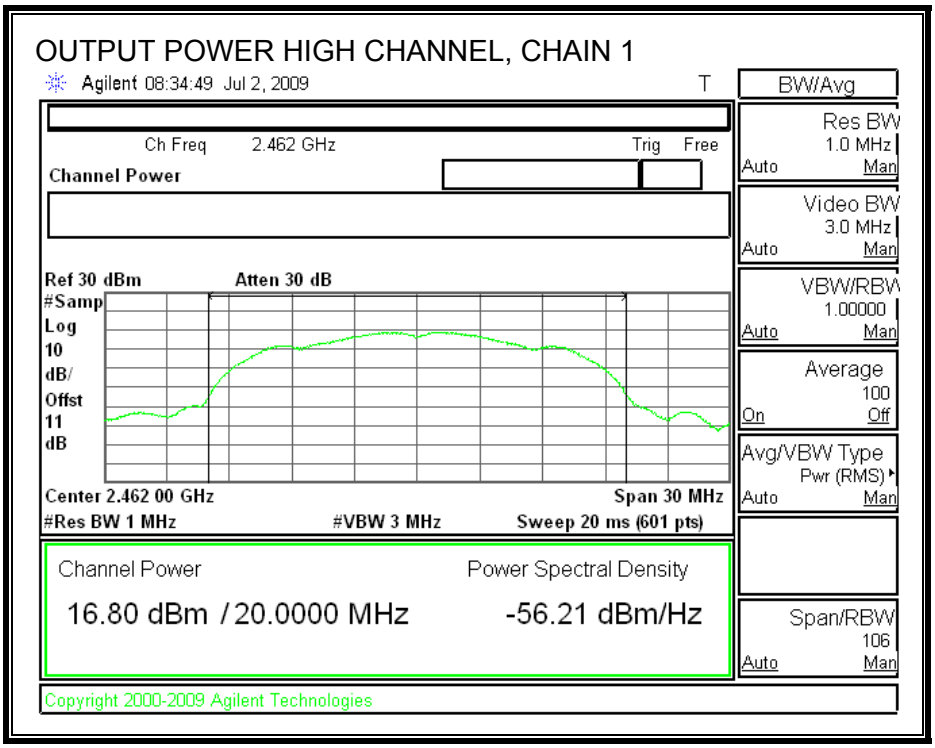


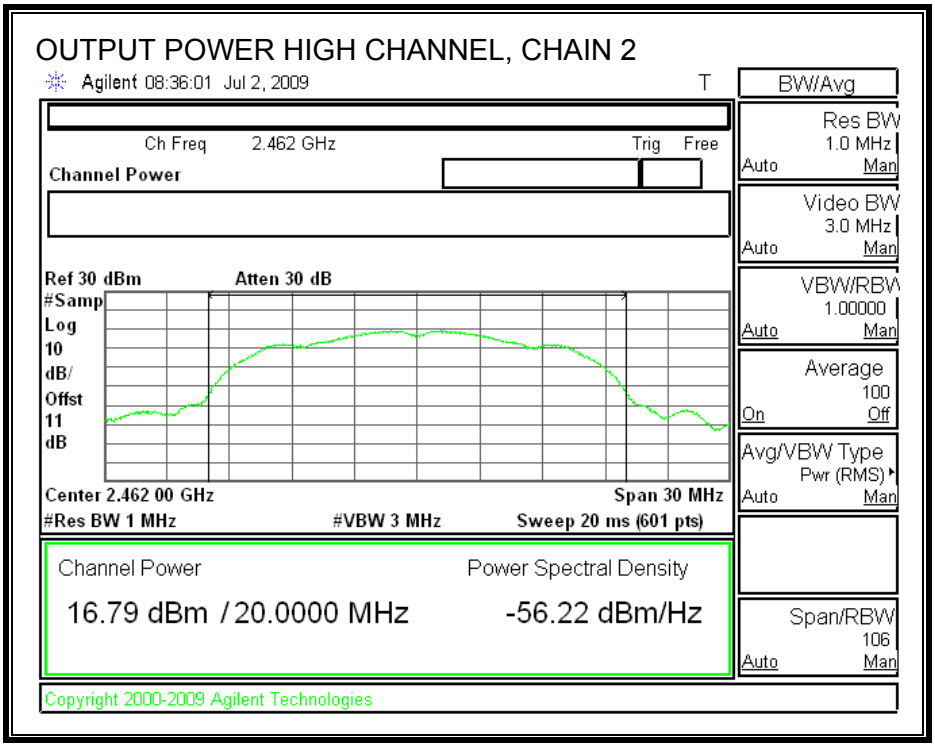


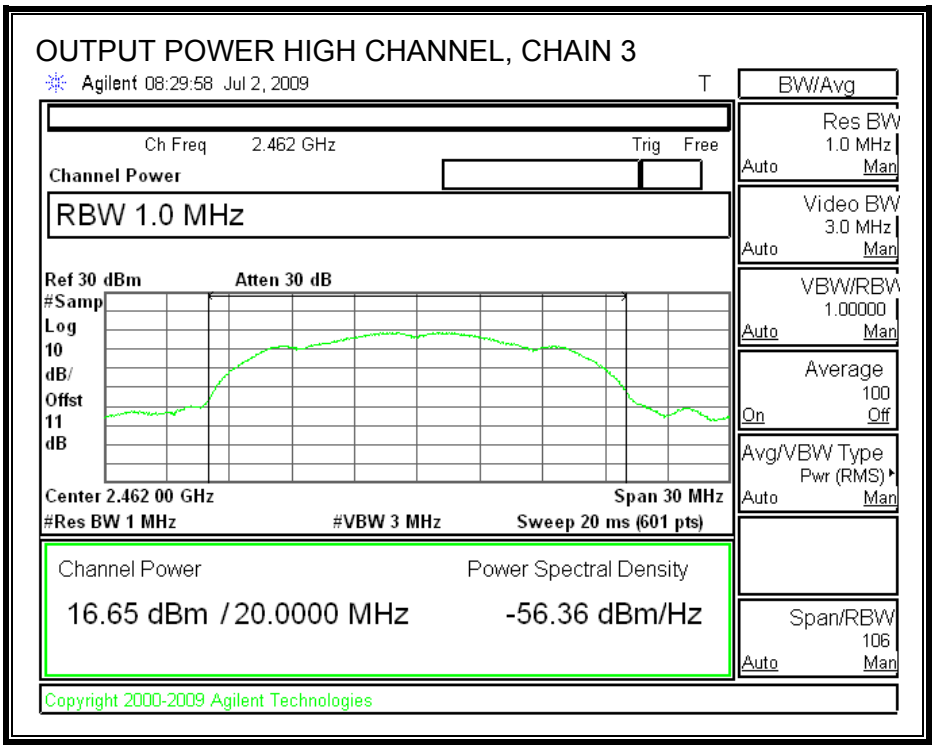


OUTPUT POWER, HIGH CHANNEL









7.1.4. AVERAGE POWER

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a power meter.

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.

RESULTS

Channel	Frequency (MHz)	Chain 0 Power (dBm)	Chain 1 Power (dBm)	Chain 2 Power (dBm)	Chain 3 Power (dBm)
Low	**2412**	16.54	16.67	16.65	16.50
Middle	**2437**	18.23	18.36	18.29	18.04
High	**2462**	16.69	16.88	16.68	16.77

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

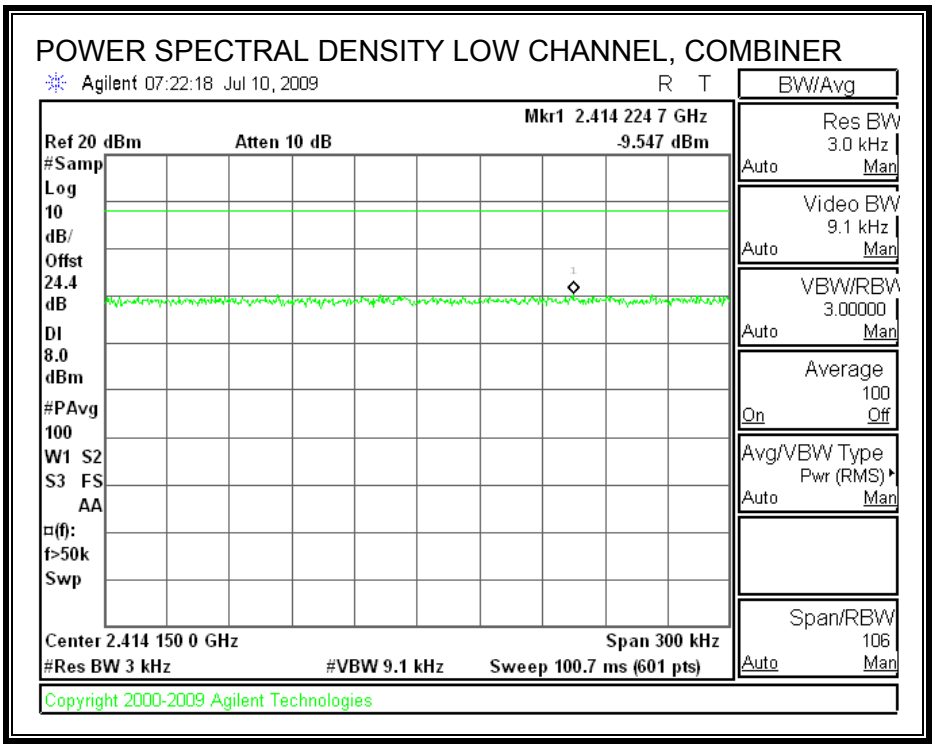
Output power was measured based on the use of RMS averaging over a time interval, therefore the power spectral density was measured using PSD Option 2 in accordance with FCC document "Measurement of Digital Transmission Systems Operating under Section 15.247", March 23, 2005.

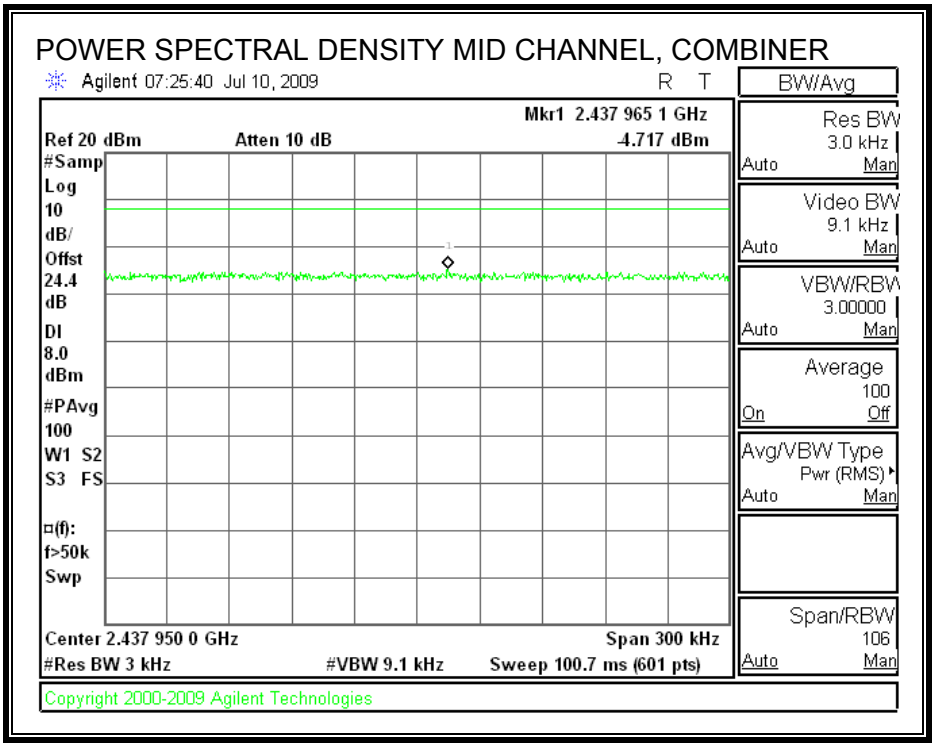
Preliminary tests on individual chains, and on all chains with a combiner, were performed. The worst-case configuration was with a combiner, therefore final test were performed with all chains feeding a combiner.

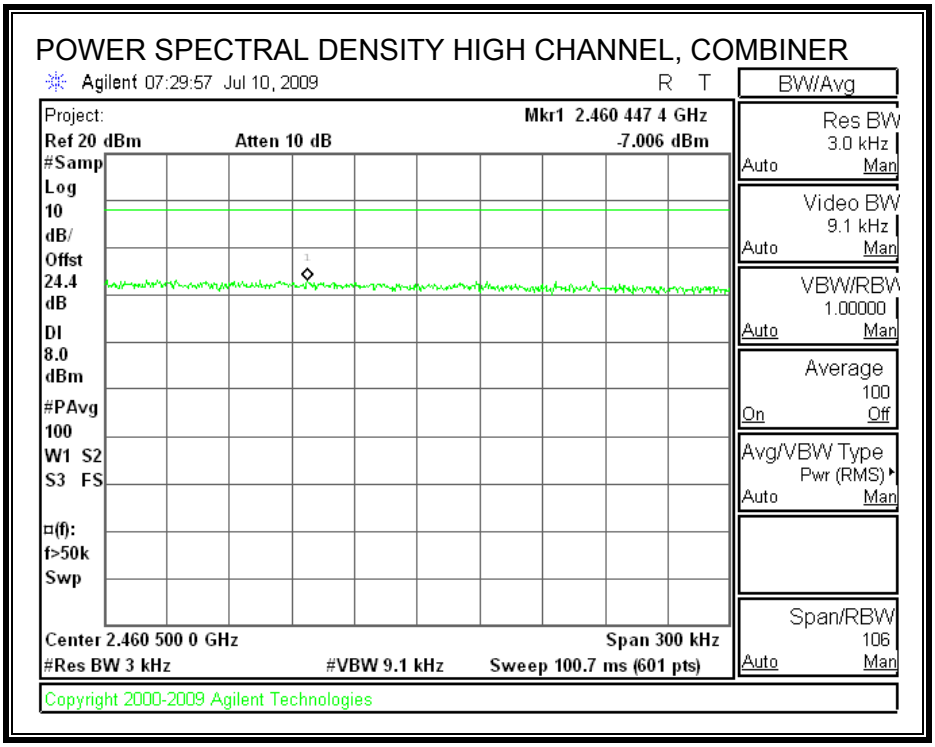
RESULTS

Channel	Frequency (MHz)	PSD with Combiner (dBm)	Limit (dBm)	Margin (dB)
Low	**2412**	-9.55	**8**	**-17.55**
Middle	**2437**	-4.72	**8**	**-12.72**
High	**2462**	-7.01	**8**	**-15.01**

POWER SPECTRAL DENSITY







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 RMS averaging over a time interval, therefore the required attenuation is 30 dBc.

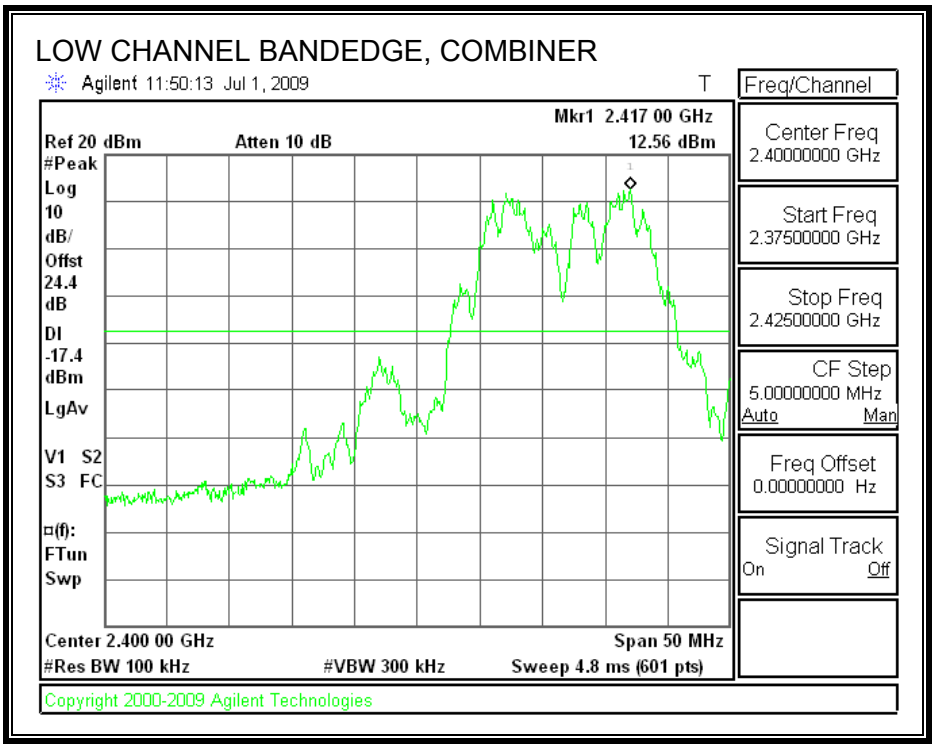
TEST PROCEDURE

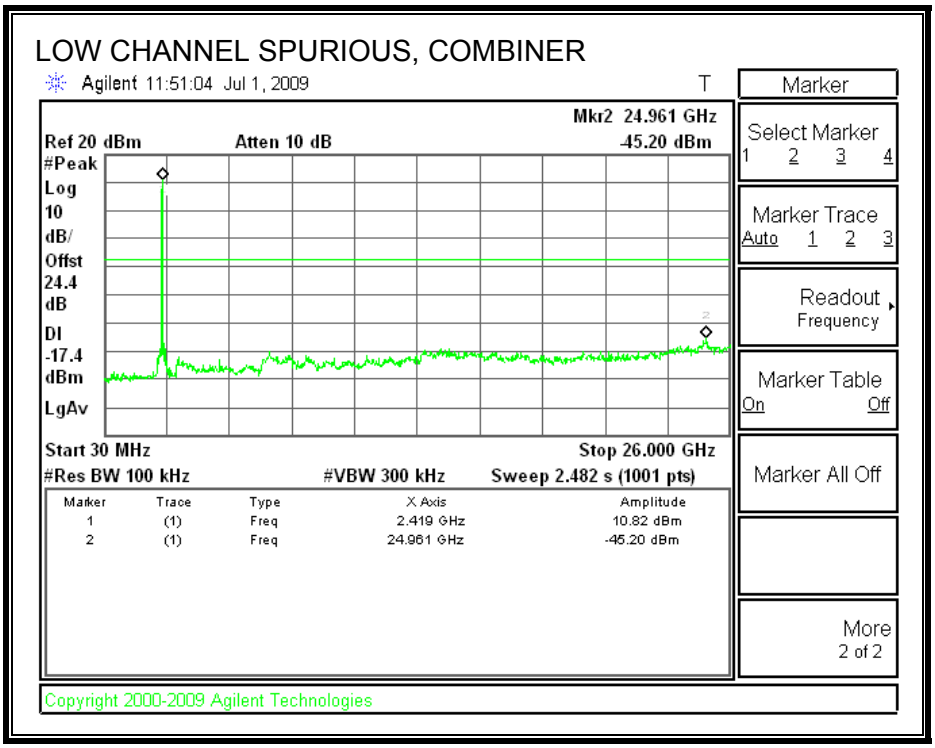
The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

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

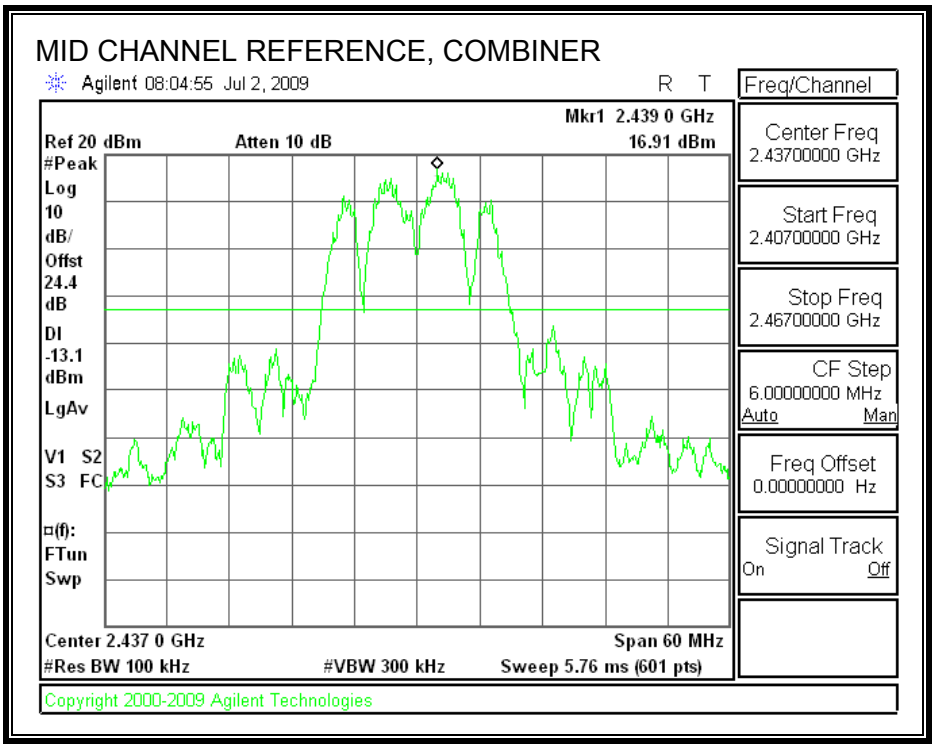
Preliminary tests on individual chains, and on all chains with a combiner, were performed. The worst-case configuration was with a combiner, therefore final test were performed with all chains feeding a combiner.

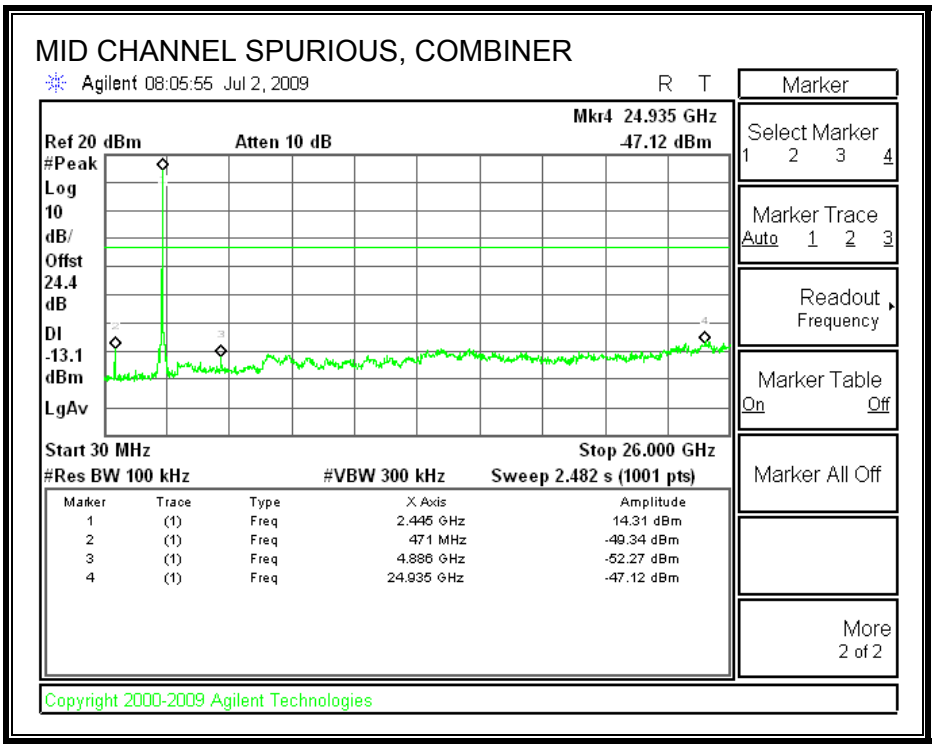
LOW CHANNEL SPURIOUS EMISSIONS



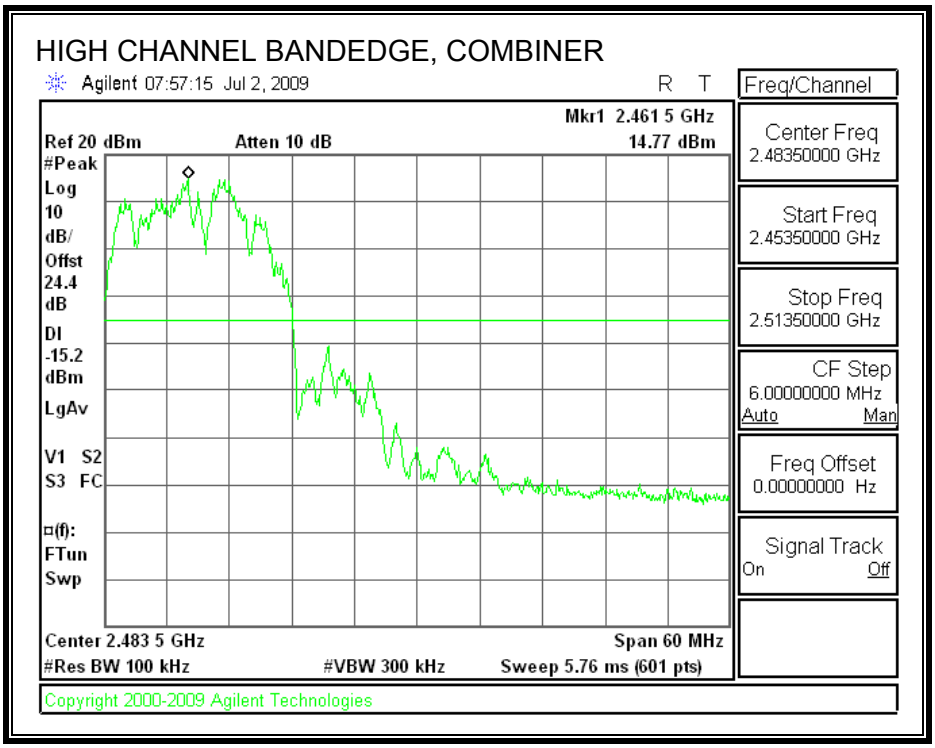


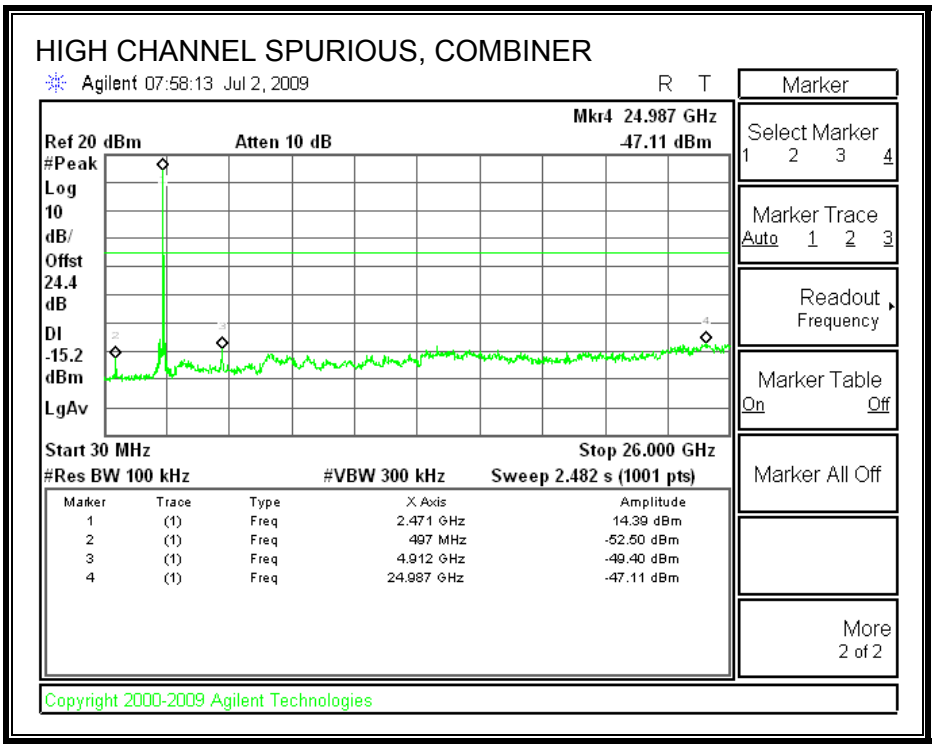
MID CHANNEL SPURIOUS EMISSIONS





HIGH CHANNEL SPURIOUS EMISSIONS





7.2. 2.4 GHz BAND CHANNEL TESTS FOR 802.11g MODE

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.

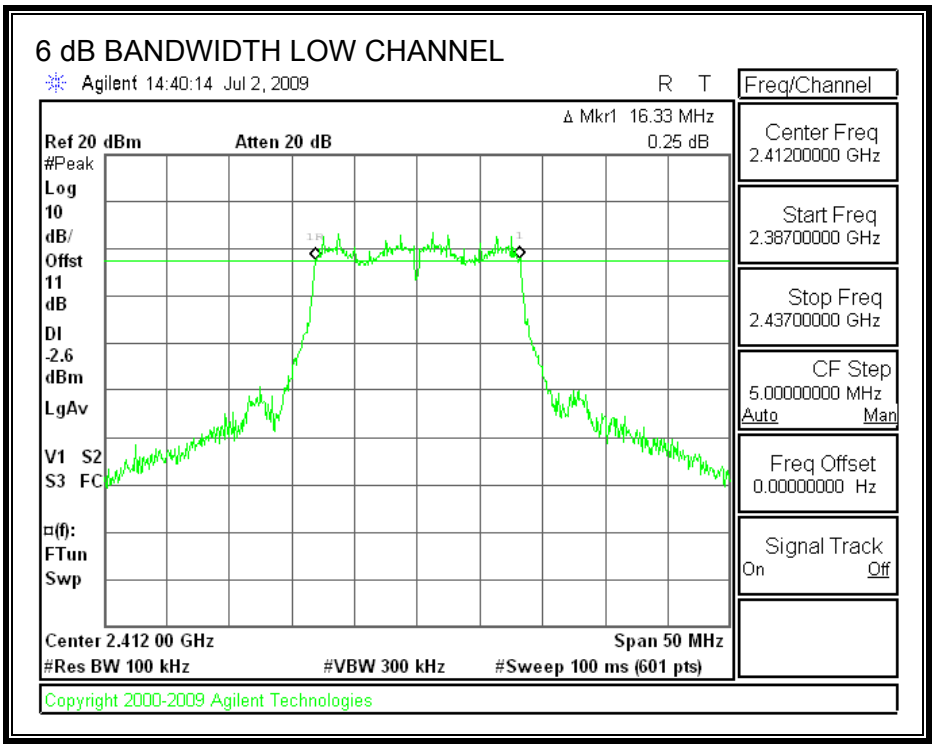
TEST PROCEDURE

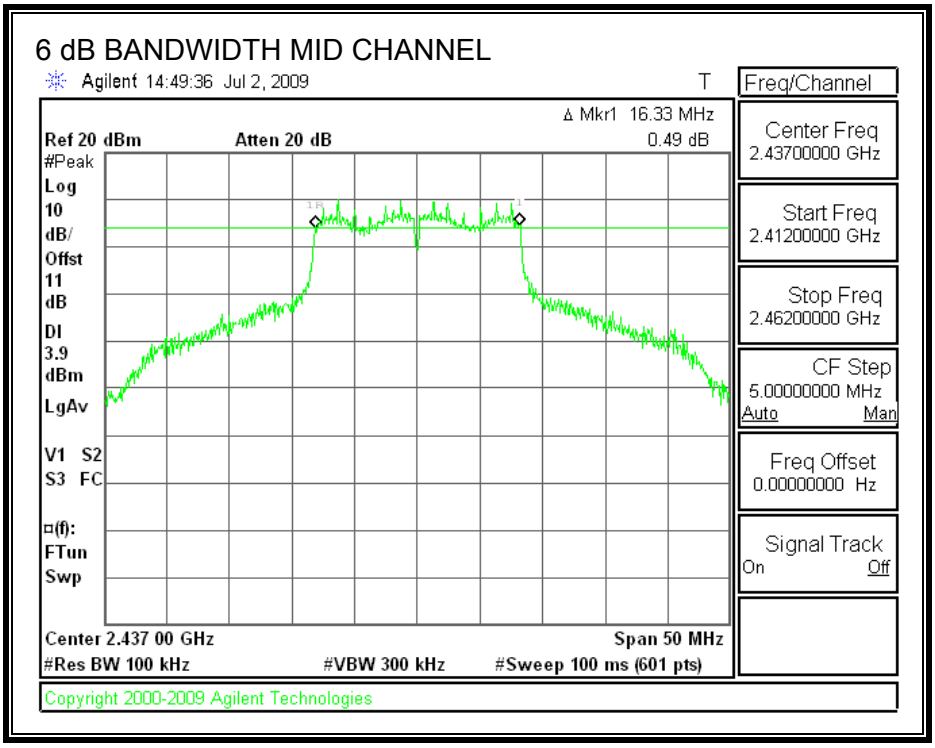
The transmitter output is connected to a spectrum analyzer. The RBW is set to 100 kHz and the VBW is set to 300 kHz. The sweep time is coupled.

RESULTS

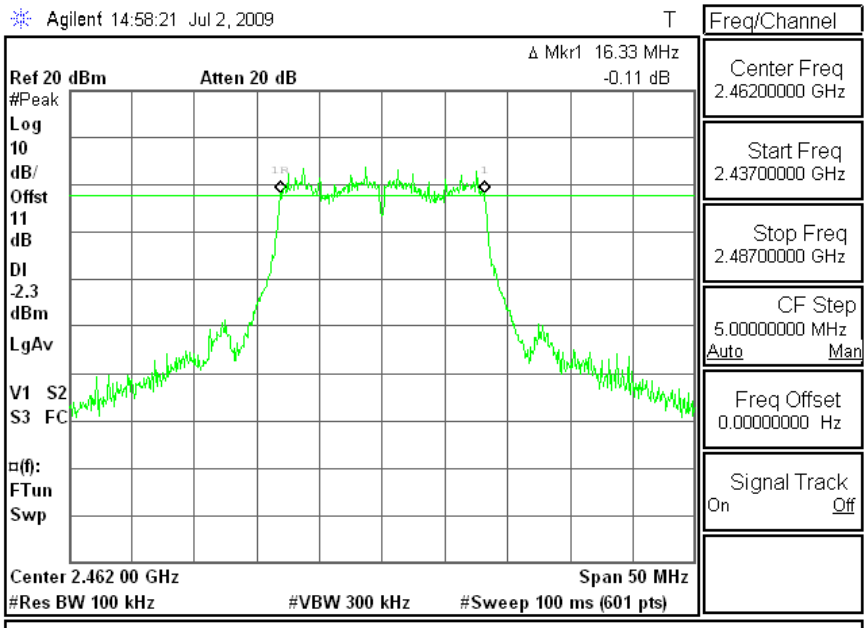
Channel	Frequency (MHz)	6 dB BW (MHz)	Minimum Limit (MHz)
Low	2412	16.33	0.5
Middle	2437	16.33	0.5
High	2462	16.33	0.5

6 dB BANDWIDTH





6 dB BANDWIDTH HIGH CHANNEL



7.2.2. 99% & 26 dB BANDWIDTH

LIMITS

None; for reporting purposes only.

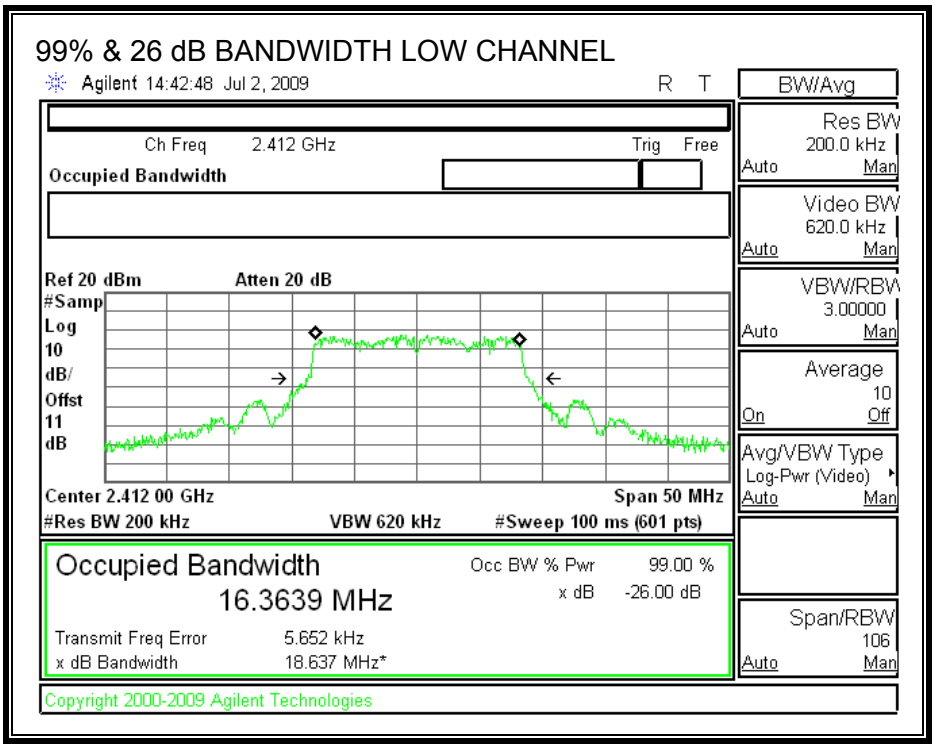
TEST PROCEDURE

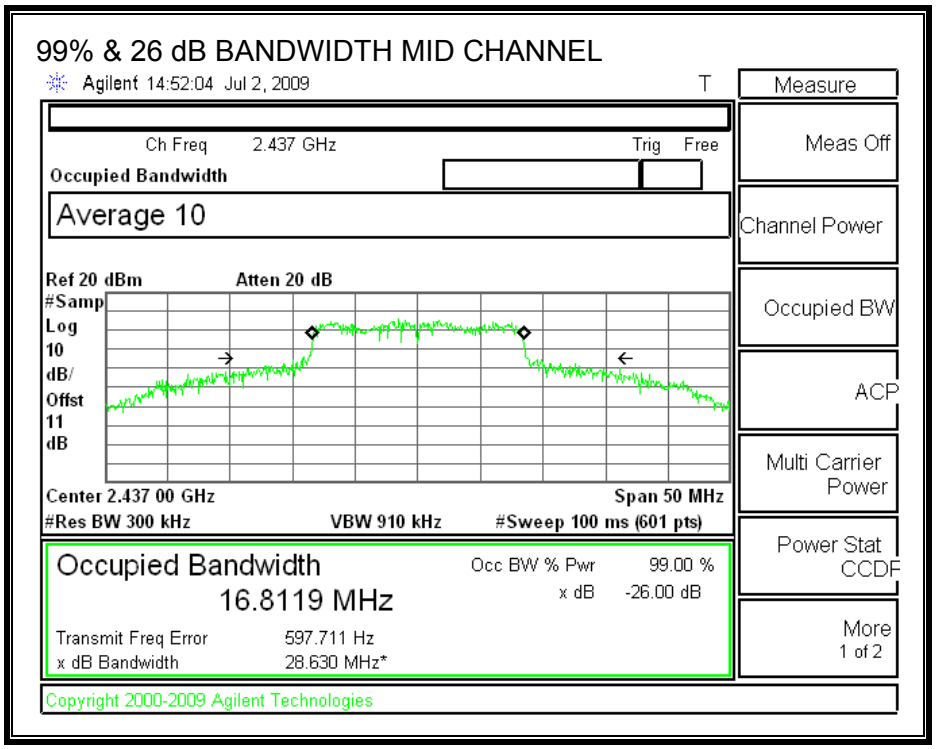
The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal bandwidth measurement function is utilized.

RESULTS

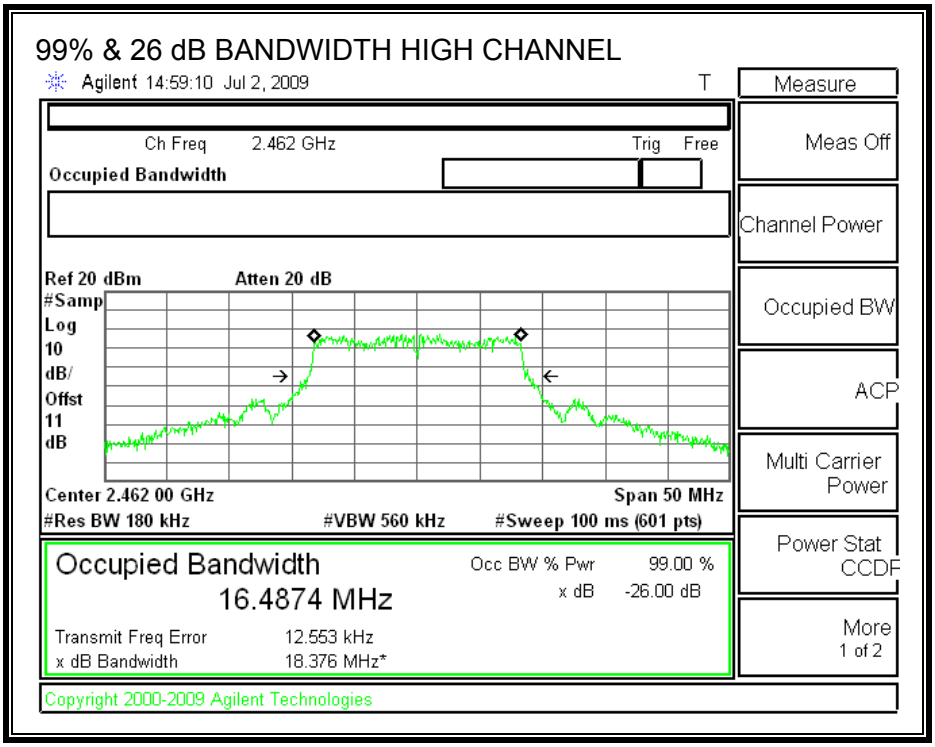
Channel	Frequency (MHz)	99% OBW (MHz)	26 dB BW (MHz)
Low	2412	16.36	18.64
Middle	2437	16.81	28.63
High	2462	16.49	18.38

99% & 26 dB BANDWIDTH





99% & 26 dB BANDWIDTH HIGH CHANNEL



7.2.3. OUTPUT POWER

LIMITS

FCC §15.247 (b)

IC RSS-210 A8.4

TEST PROCEDURE

Output power was measured based on the use of RMS averaging over a time interval in accordance with FCC document "Measurement of Digital Transmission Systems Operating under Section 15.247", March 23, 2005.

RESULTS

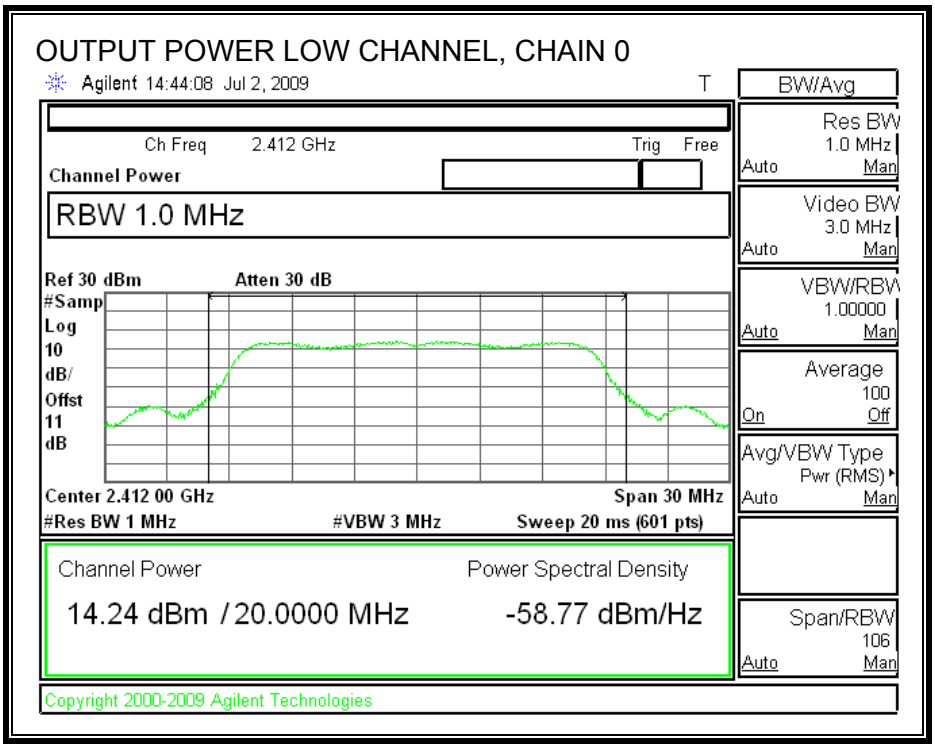
Effective Legacy Mode Composite Gain of 4 Identical Antennas:

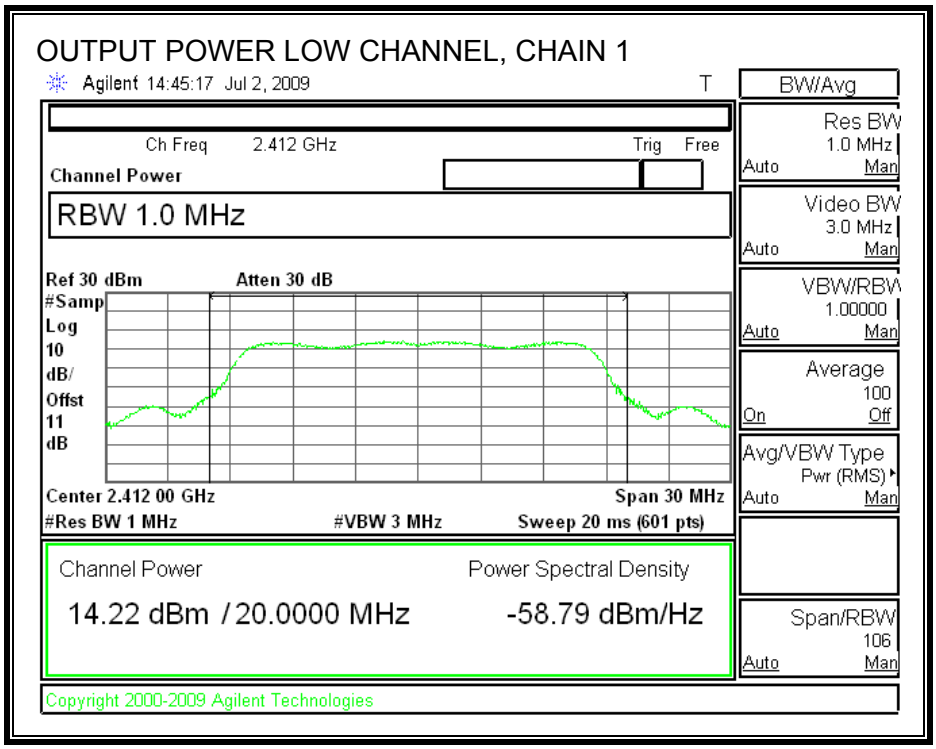
Antenna Gain (dBi)	10 Log (# Tx Chains) (dB)	Effective Legacy Gain (dBi)
2	6.02	8.02

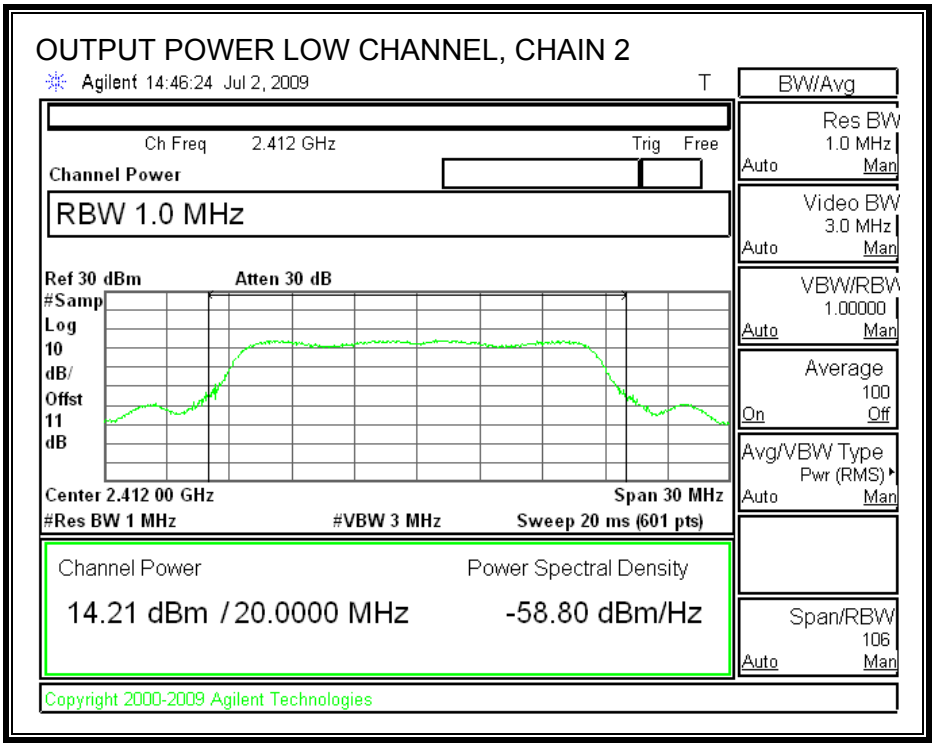
The composite antenna gain is 8.02 dBi, therefore the limit is 27.98 dBm.

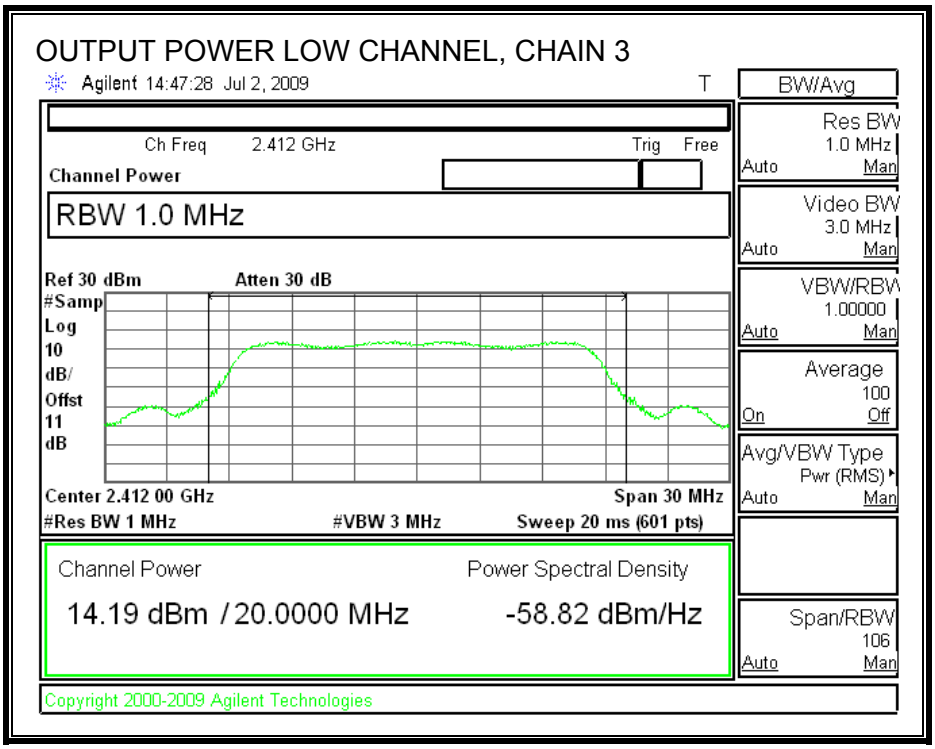
Channel	Frequency (MHz)	Chain 0 Power (dBm)	Chain 1 Power (dBm)	Chain 2 Power (dBm)	Chain 3 Power (dBm)	Total Power (dBm)	Limit (dBm)	Margin (dB)
Low	**2412**	14.24	14.22	14.21	14.19	**20.24**	**27.98**	**-7.74**
Mid	**2437**	20.21	20.24	20.11	20.17	**26.20**	**27.98**	**-1.78**
High	**2462**	14.13	13.99	14.14	14.08	**20.11**	**27.98**	**-7.87**

OUTPUT POWER, LOW CHANNEL

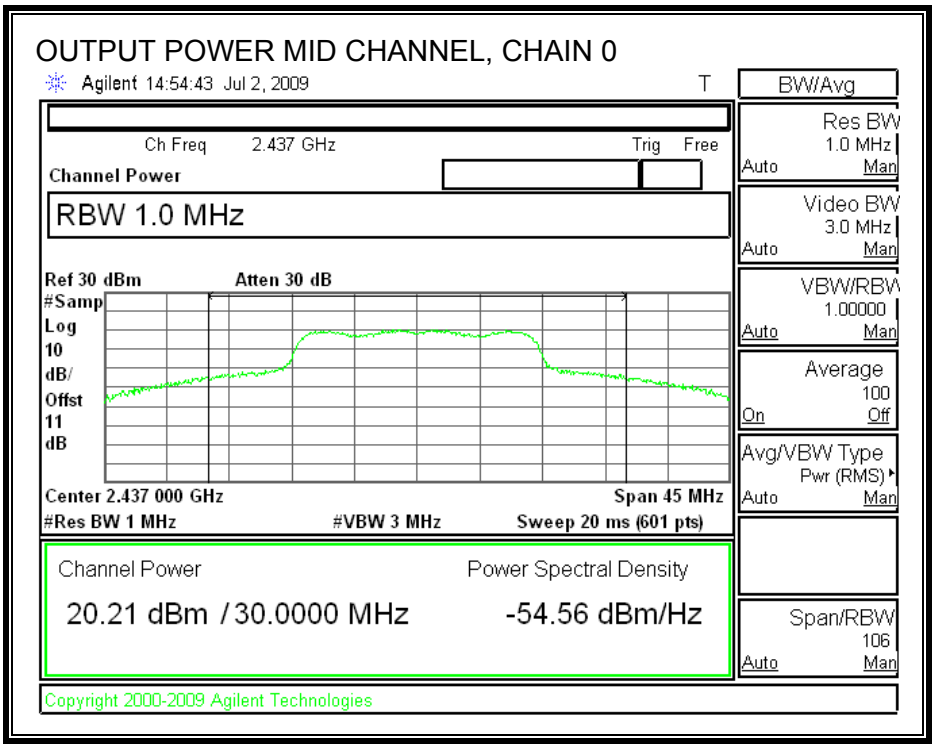


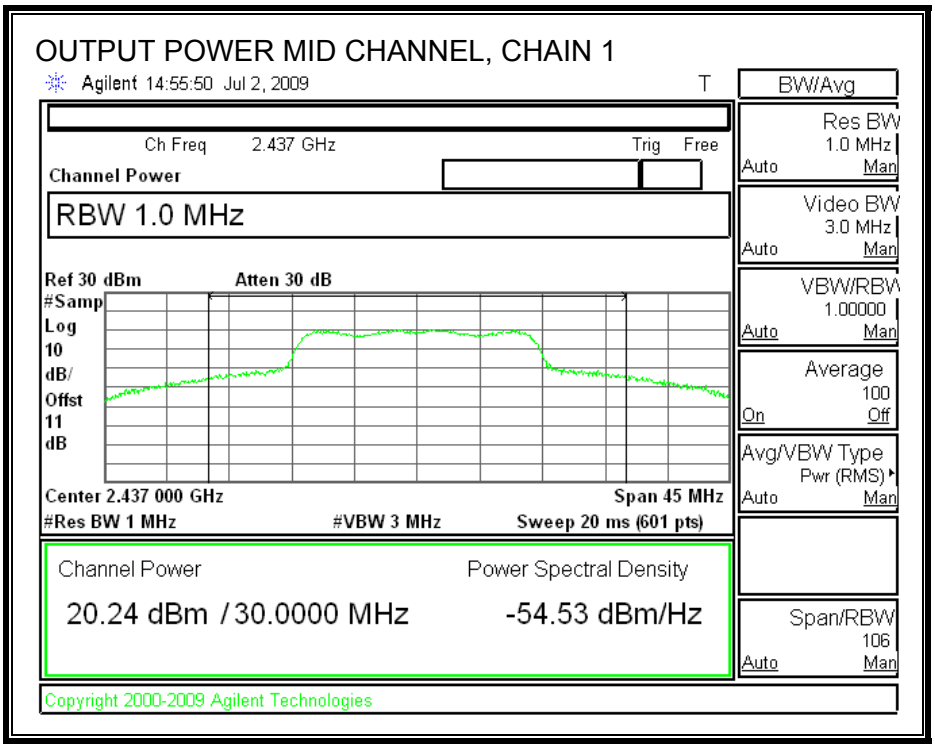


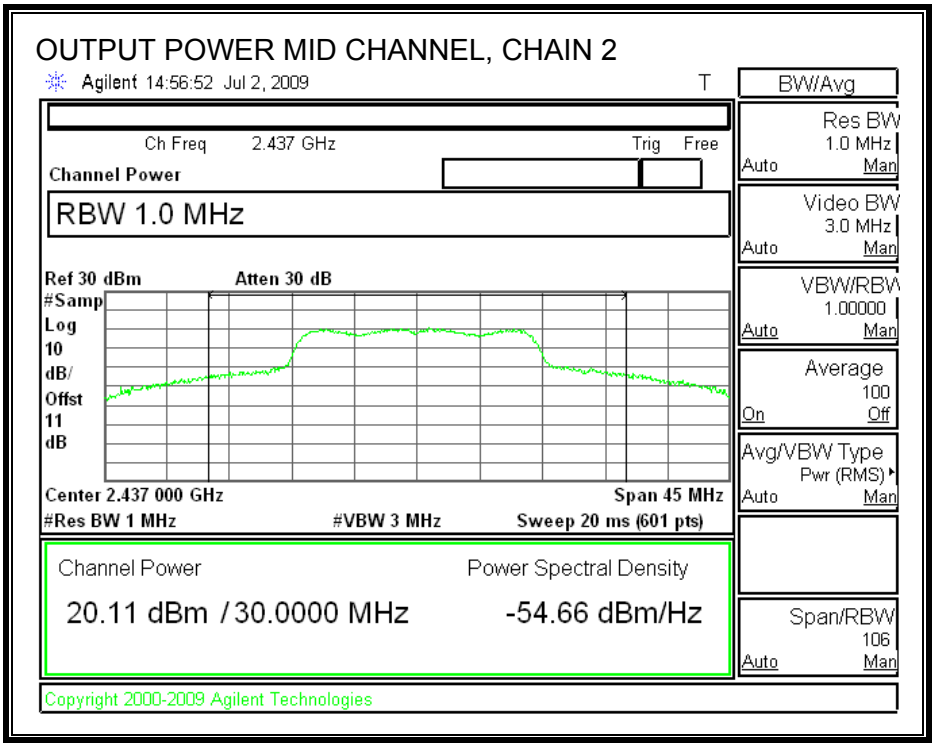


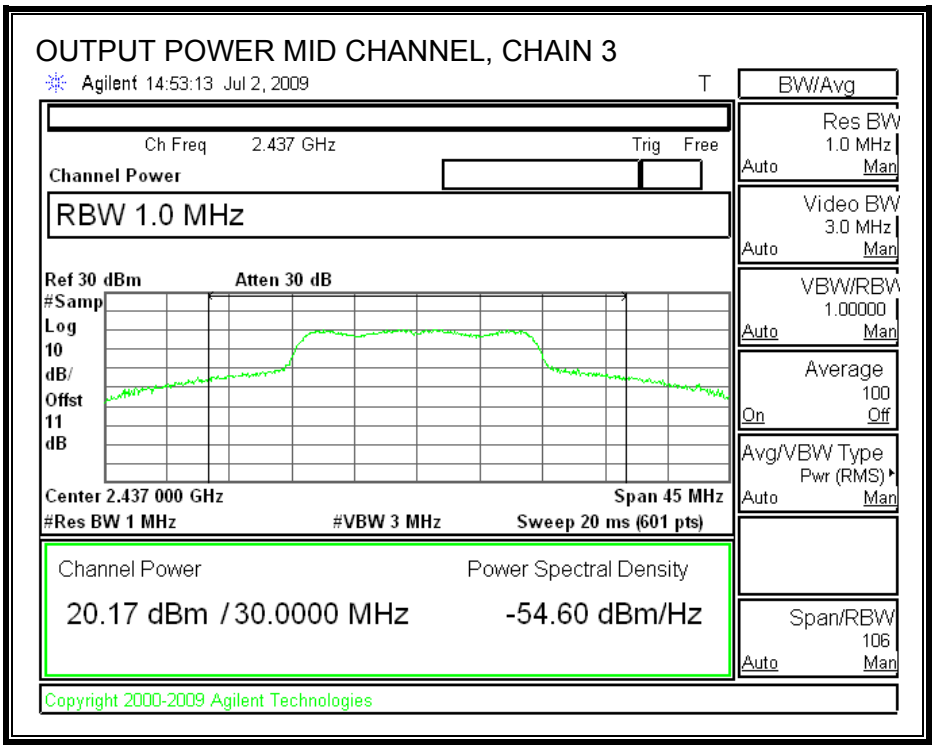


OUTPUT POWER, MID CHANNEL

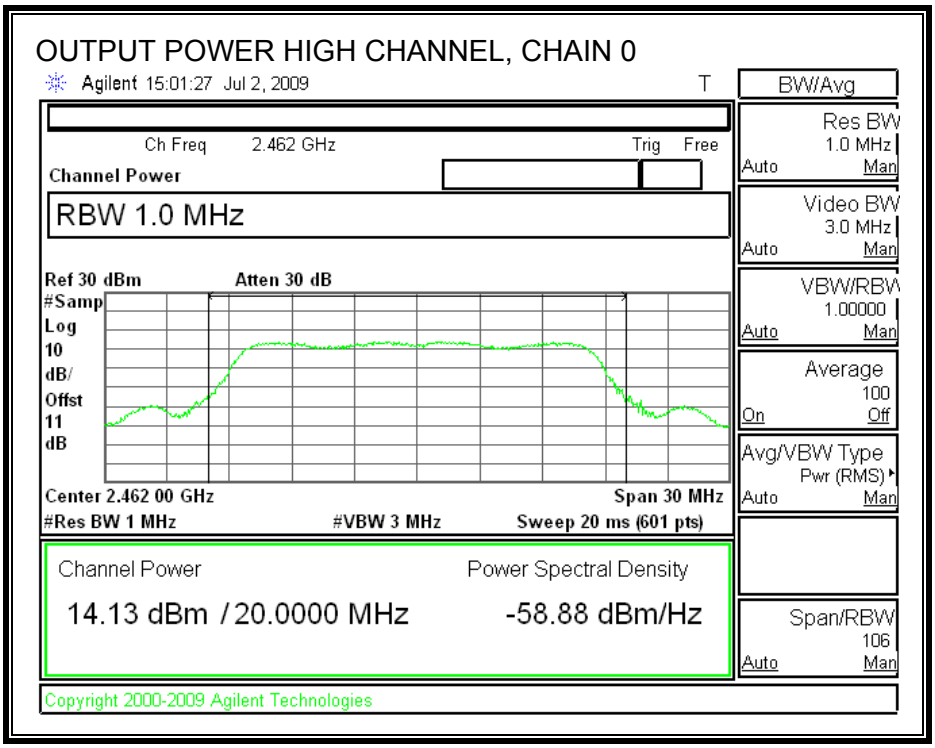


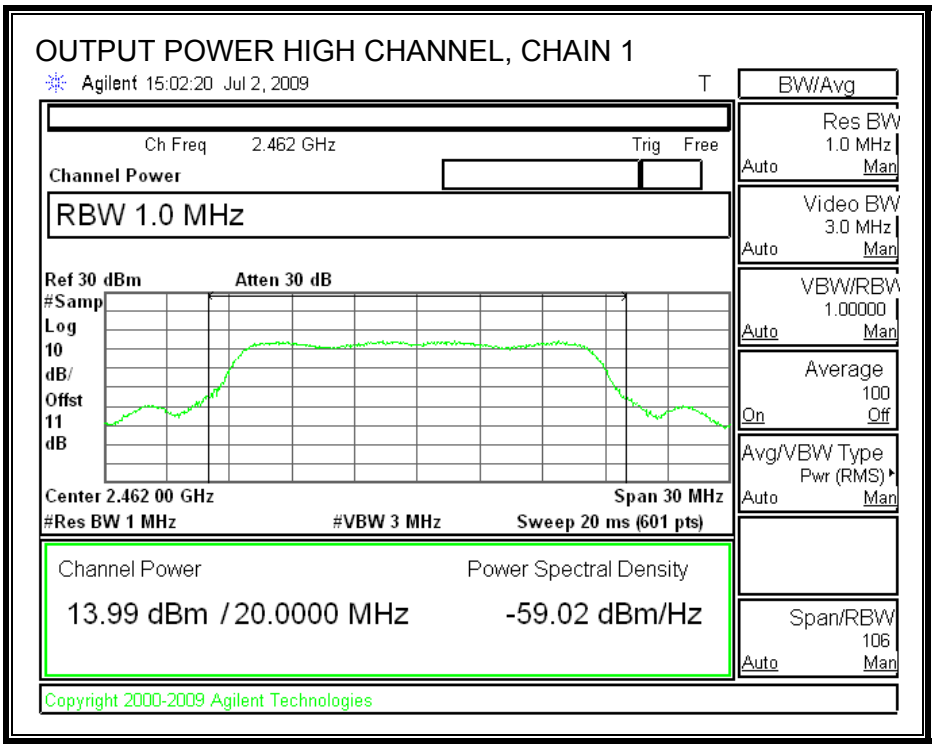


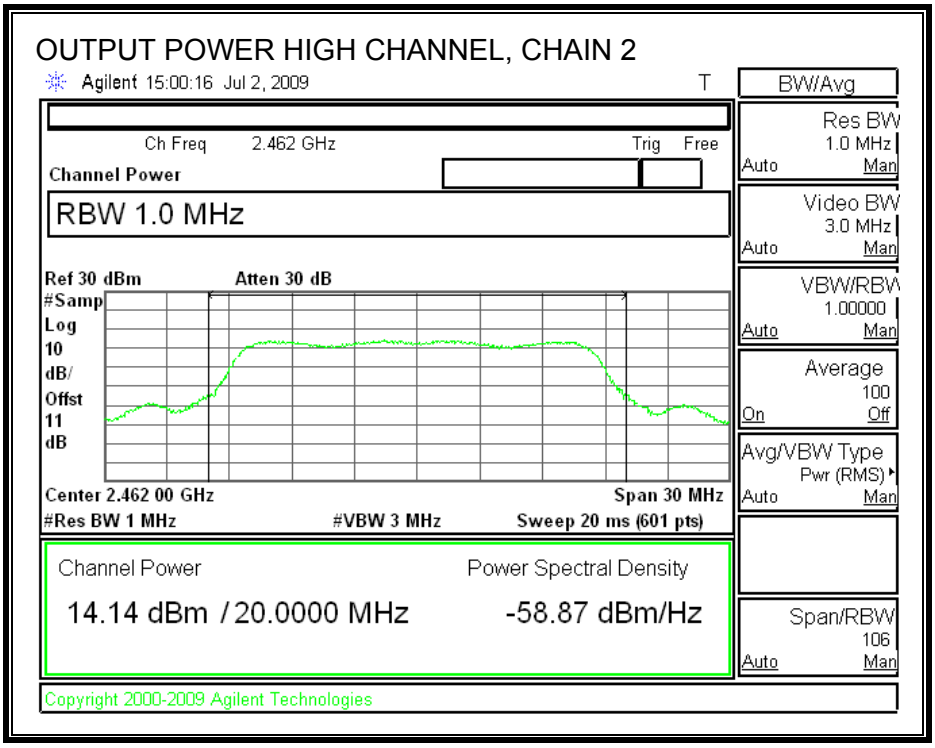


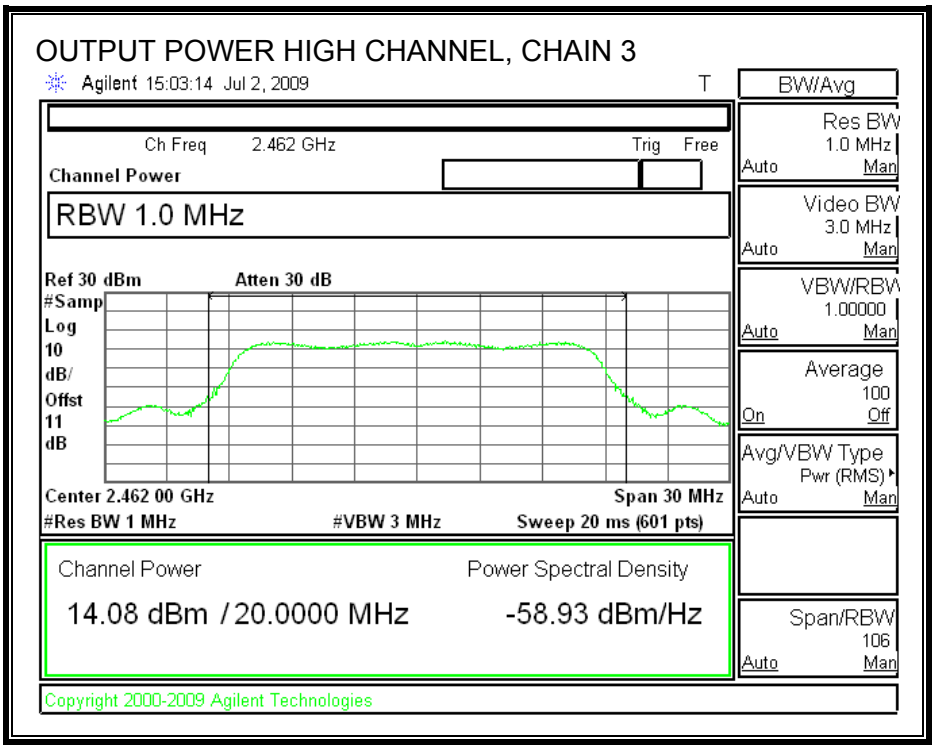


OUTPUT POWER, HIGH CHANNEL









7.2.4. AVERAGE POWER

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a power meter.

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.

RESULTS

Channel	Frequency (MHz)	Chain 0 Power (dBm)	Chain 1 Power (dBm)	Chain 2 Power (dBm)	Chain 3 Power (dBm)
Low	**2412.00**	14.12	14.04	14.11	14.14
Middle	**2437.00**	20.15	20.21	20.12	20.14
High	**2462.00**	13.95	14.10	14.02	14.11

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

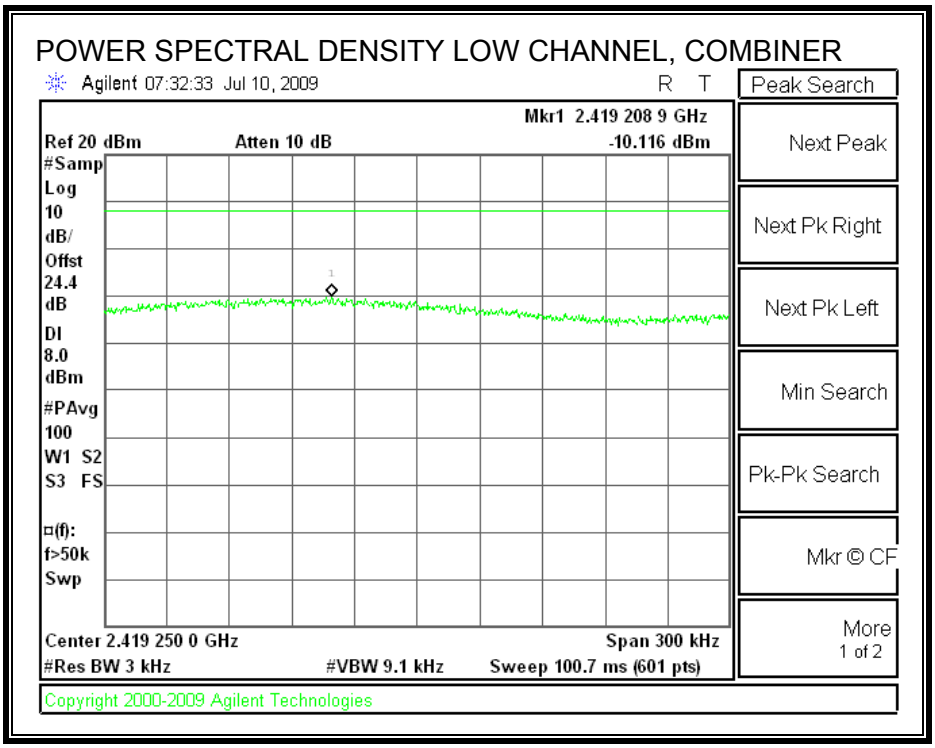
Output power was measured based on the use of RMS averaging over a time interval, therefore the power spectral density was measured using PSD Option 2 in accordance with FCC document "Measurement of Digital Transmission Systems Operating under Section 15.247", March 23, 2005.

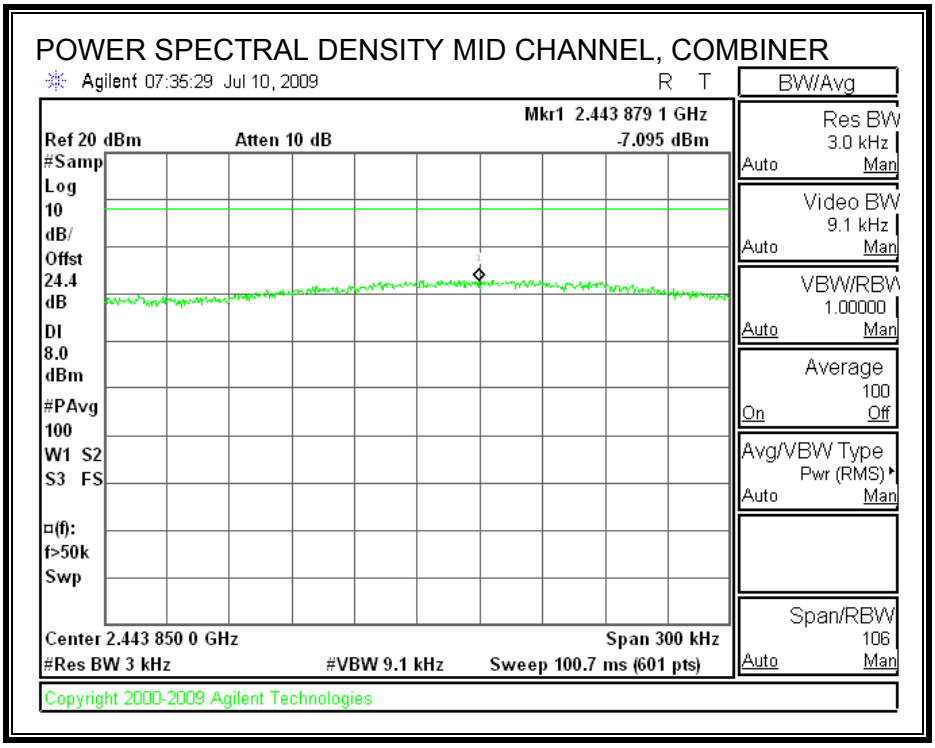
Preliminary tests on individual chains, and on all chains with a combiner, were performed. The worst-case configuration was with a combiner, therefore final test were performed with all chains feeding a combiner.

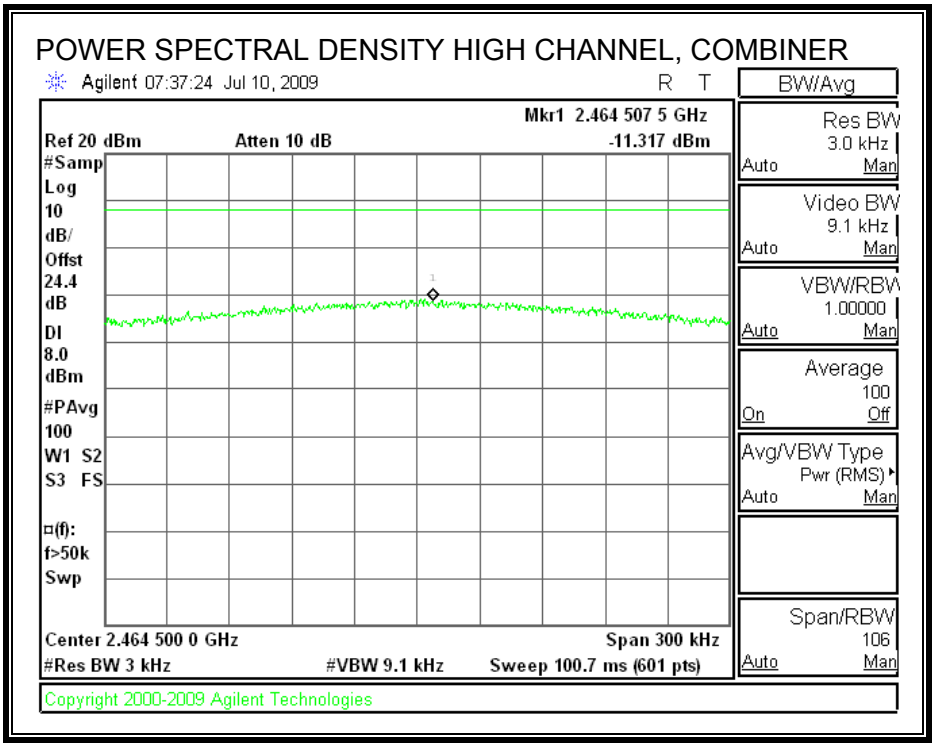
RESULTS

Channel	Frequency (MHz)	PSD with Combiner (dBm)	Limit (dBm)	Margin (dB)
Low	**2412**	-10.12	**8**	**-18.12**
Middle	**2437**	-7.10	**8**	**-15.10**
High	**2462**	-11.32	**8**	**-19.32**

POWER SPECTRAL DENSITY







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 RMS averaging over a time interval, therefore the required attenuation is 30 dBc.

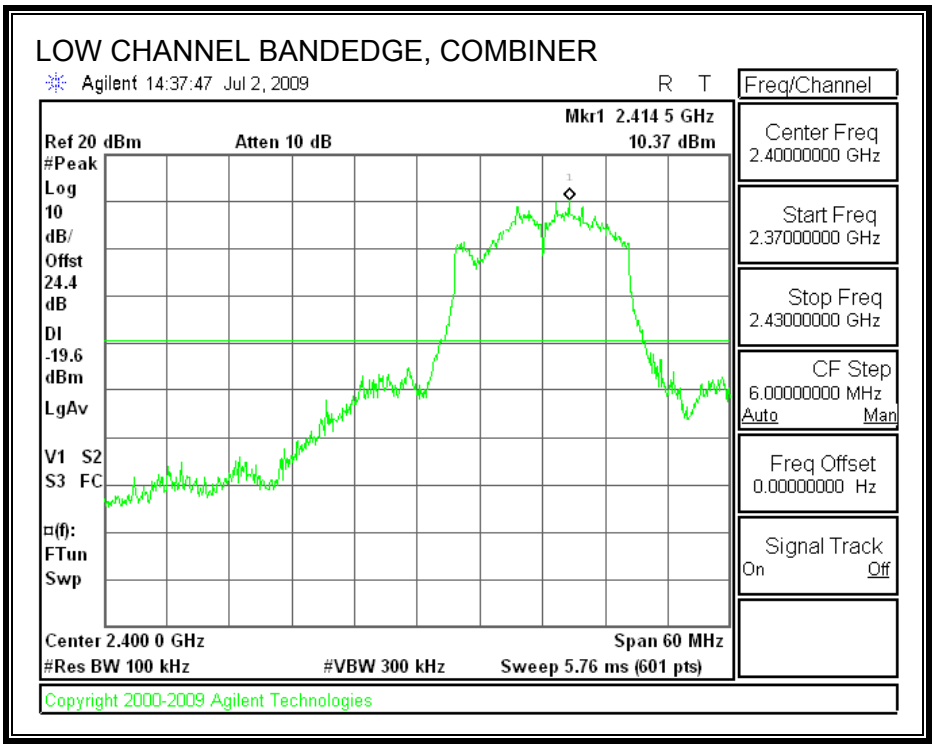
TEST PROCEDURE

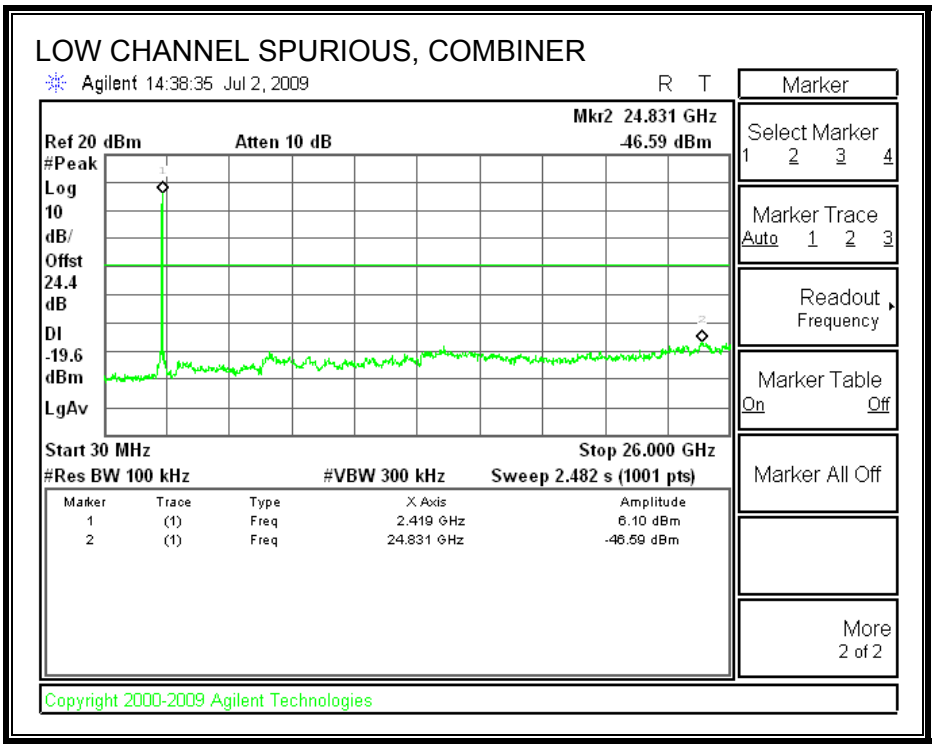
The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

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

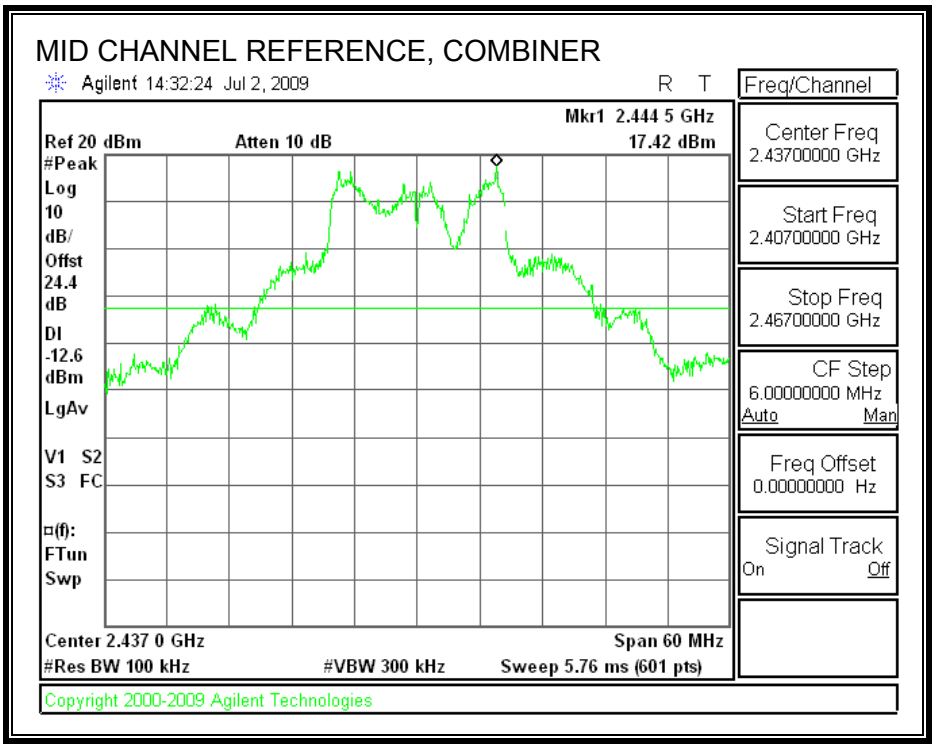
Preliminary tests on individual chains, and on all chains with a combiner, were performed. The worst-case configuration was with a combiner, therefore final test were performed with all chains feeding a combiner.

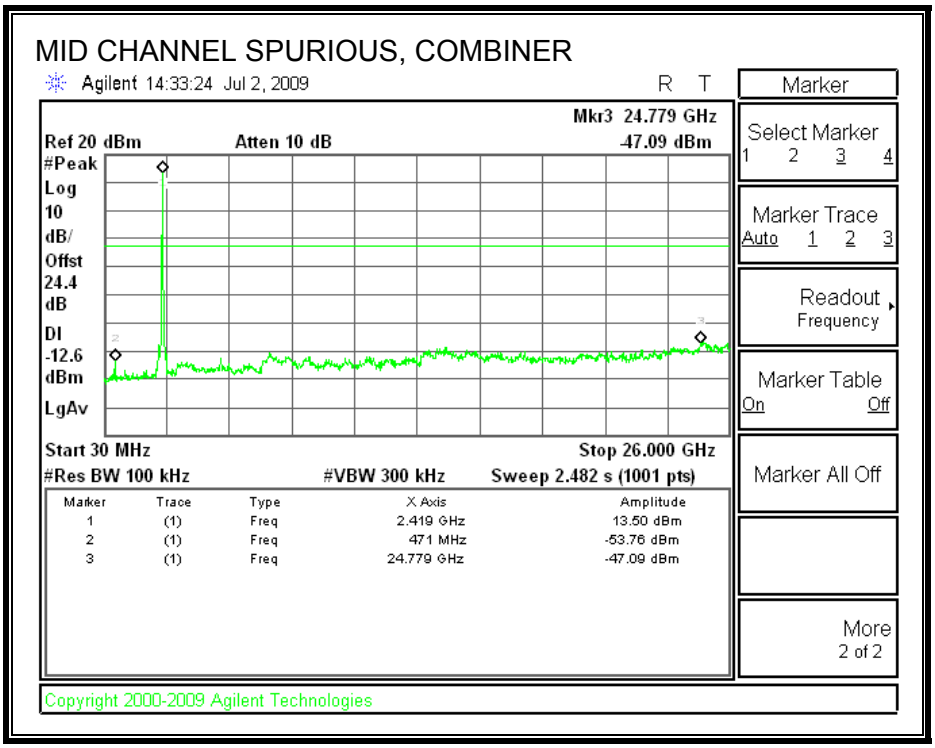
LOW CHANNEL SPURIOUS EMISSIONS



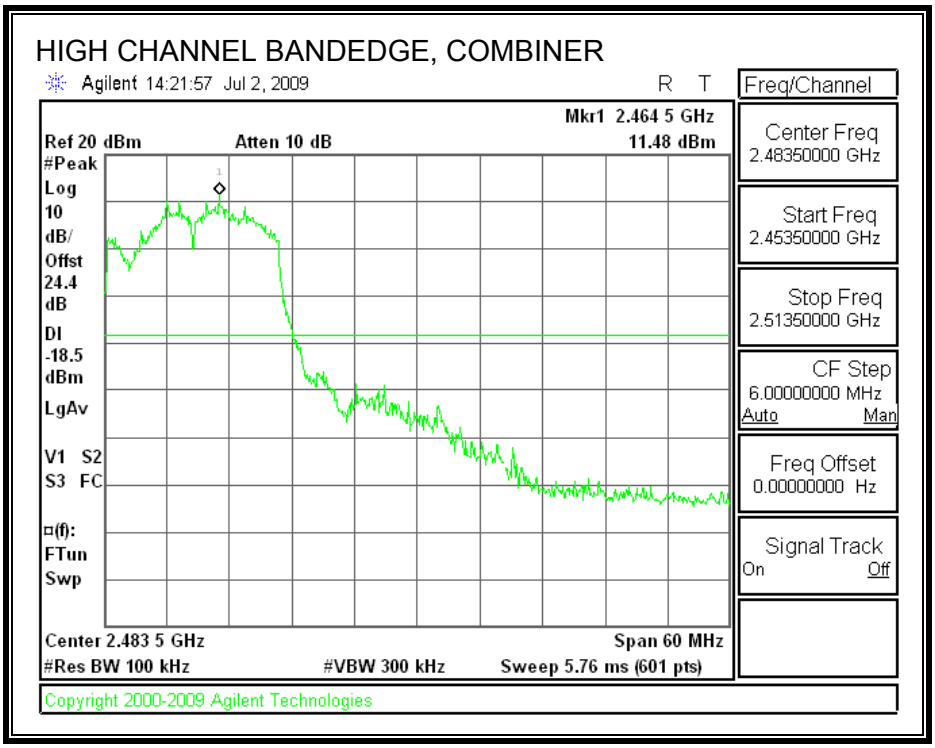


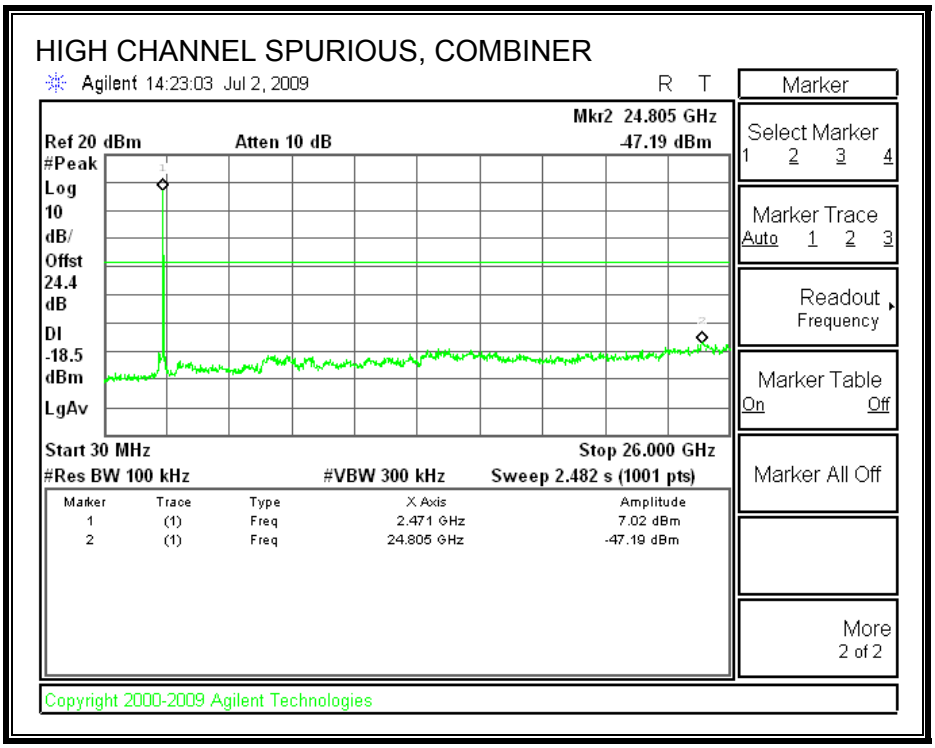
MID CHANNEL SPURIOUS EMISSIONS





HIGH CHANNEL SPURIOUS EMISSIONS





7.3. 2.4 GHz BAND CHANNEL TESTS FOR 802.11n HT20 MODE

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.

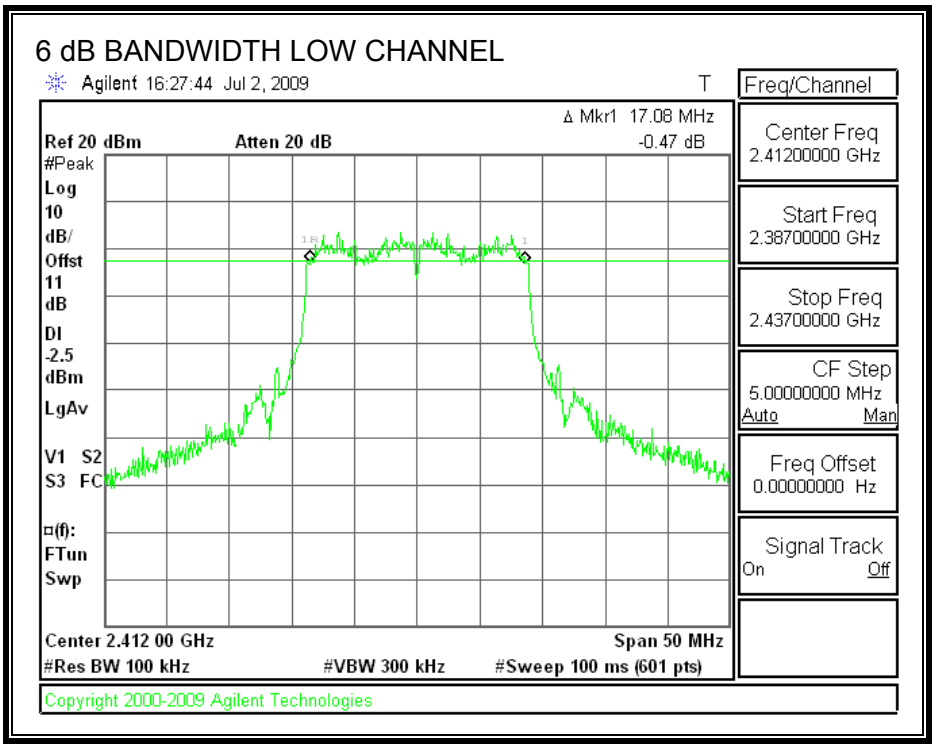
TEST PROCEDURE

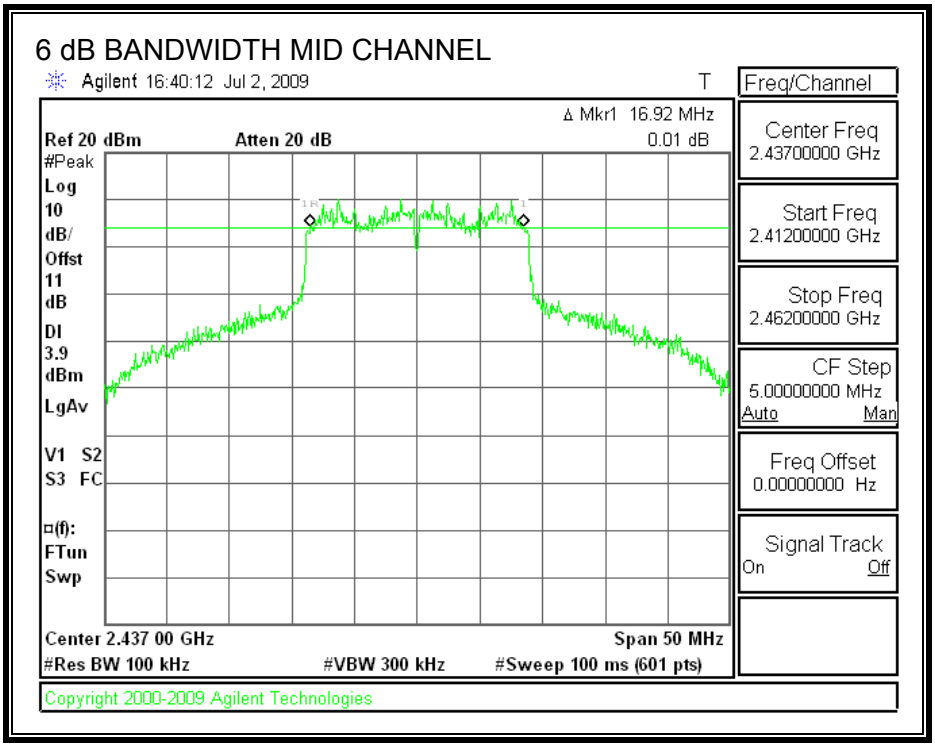
The transmitter output is connected to a spectrum analyzer. The RBW is set to 100 kHz and the VBW is set to 300 kHz. The sweep time is coupled.

RESULTS

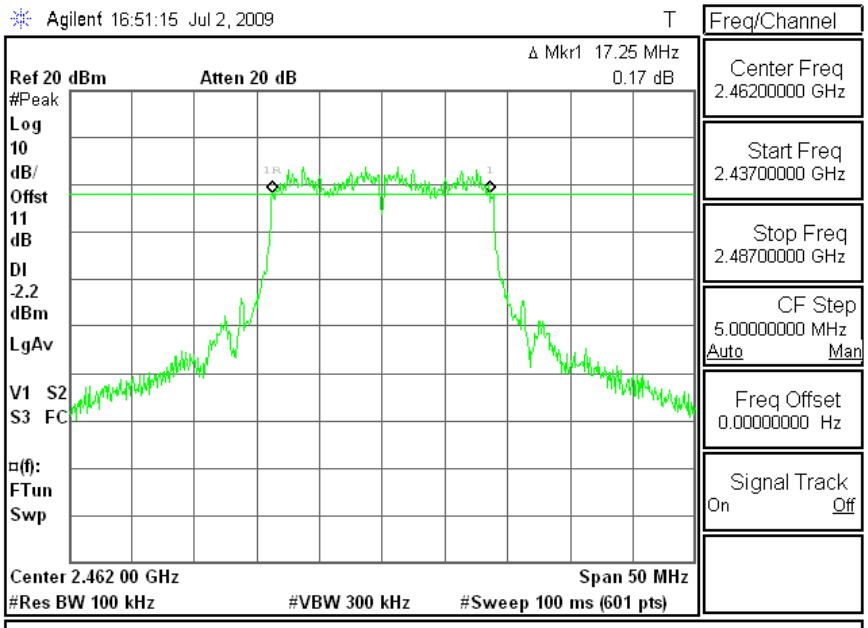
Channel	Frequency (MHz)	6 dB BW (MHz)	Minimum Limit (MHz)
Low	2412	17.08	0.5
Middle	2437	16.92	0.5
High	2462	17.25	0.5

6 dB BANDWIDTH





6 dB BANDWIDTH HIGH CHANNEL



7.3.2. 99% & 26 dB BANDWIDTH

LIMITS

None; for reporting purposes only.

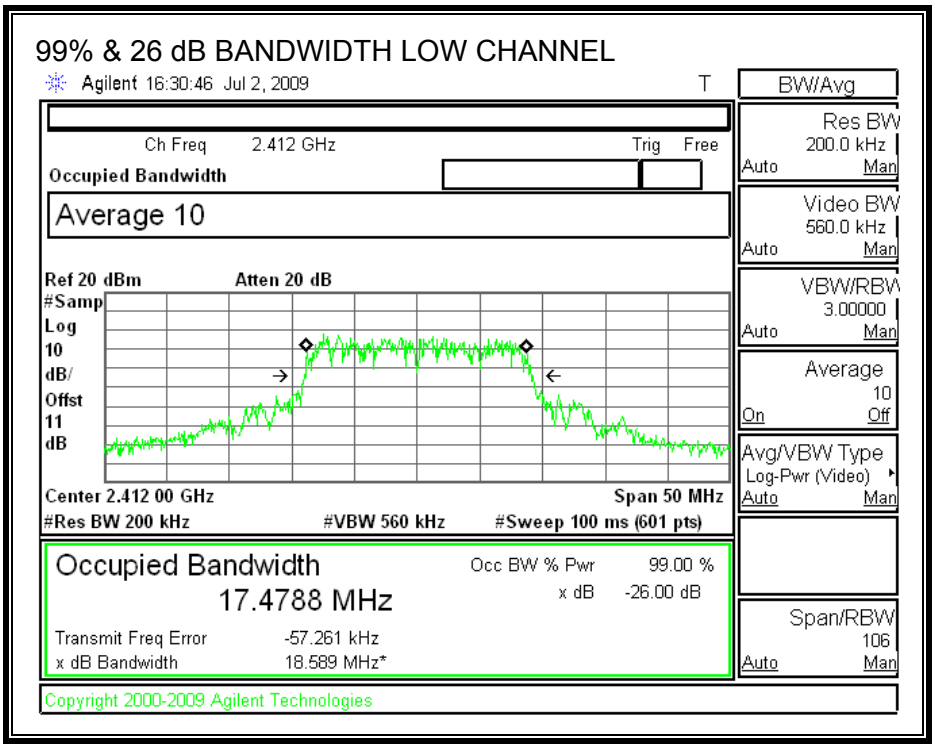
TEST PROCEDURE

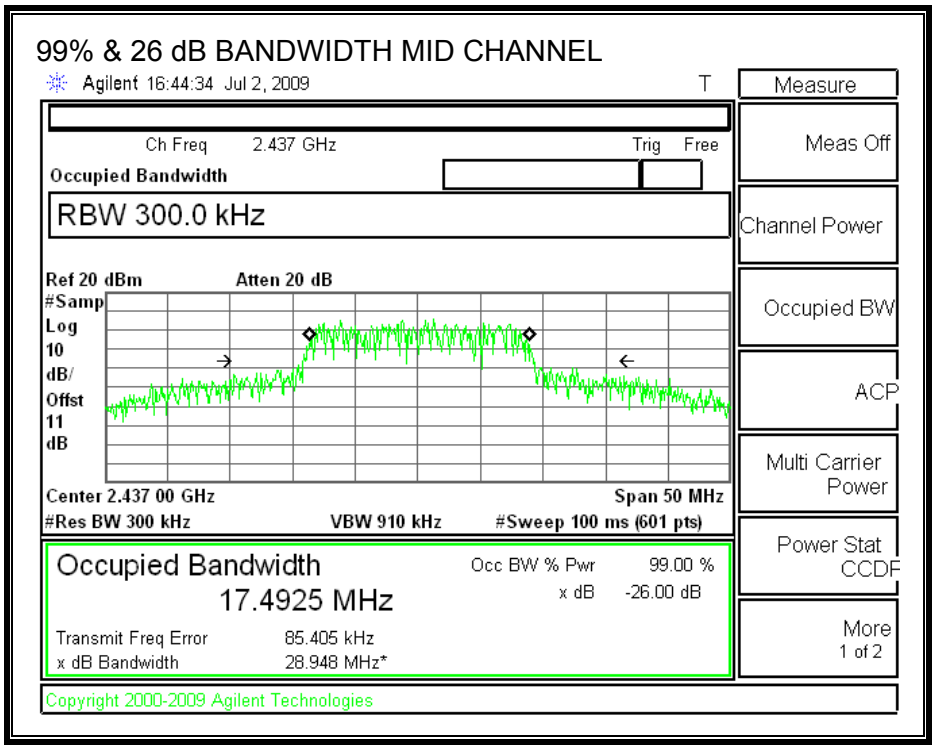
The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal bandwidth measurement function is utilized.

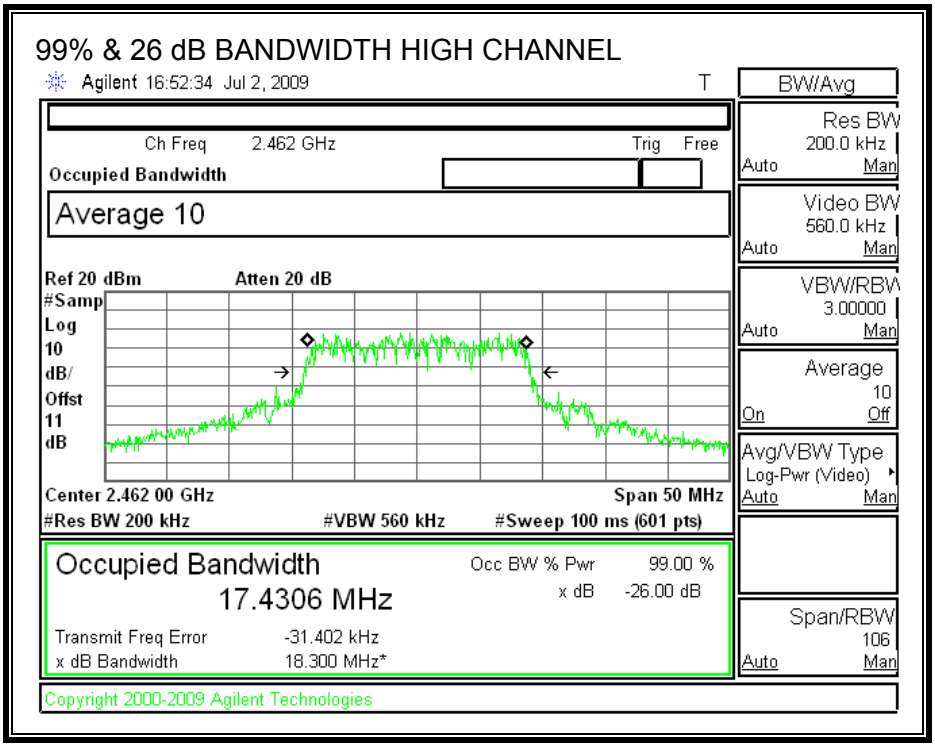
RESULTS

Channel	Frequency (MHz)	99% OBW (MHz)	26 dB BW (MHz)
Low	2412	17.48	18.59
Middle	2437	17.49	28.95
High	2462	17.43	18.30

99% & 26 dB BANDWIDTH







7.3.3. OUTPUT POWER

LIMITS

FCC §15.247 (b)

IC RSS-210 A8.4

TEST PROCEDURE

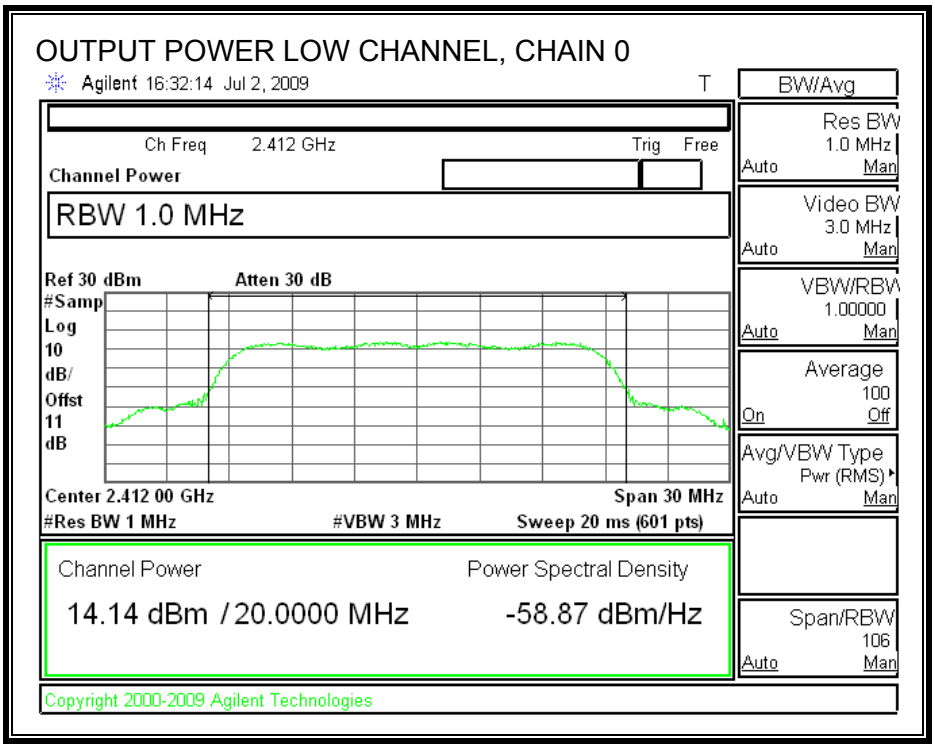
Output power was measured based on the use of RMS averaging over a time interval in accordance with FCC document "Measurement of Digital Transmission Systems Operating under Section 15.247", March 23, 2005.

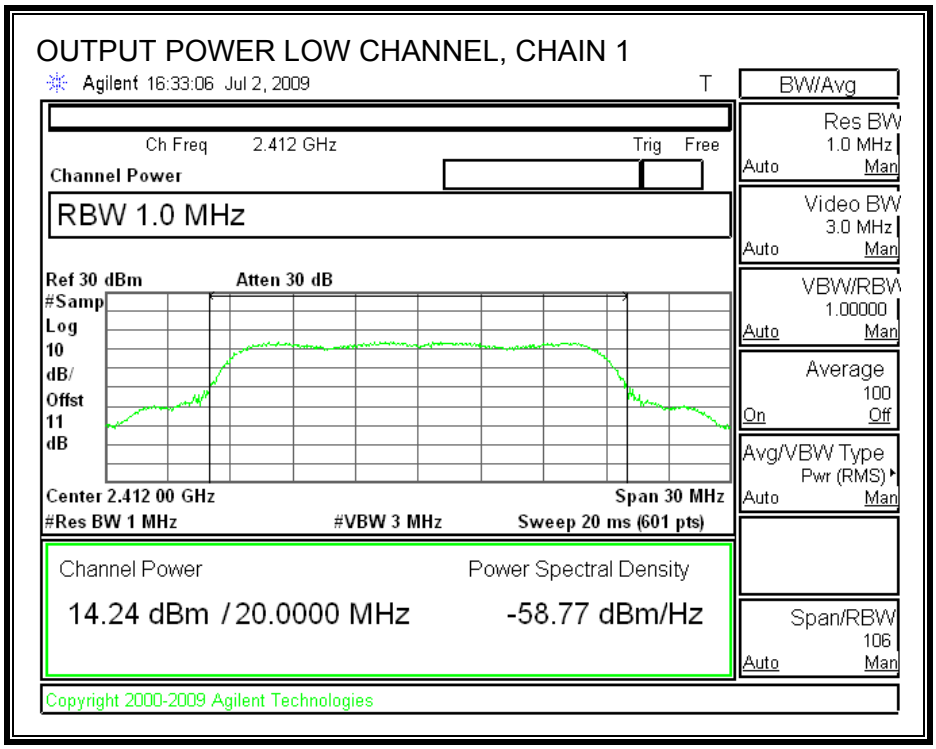
RESULTS

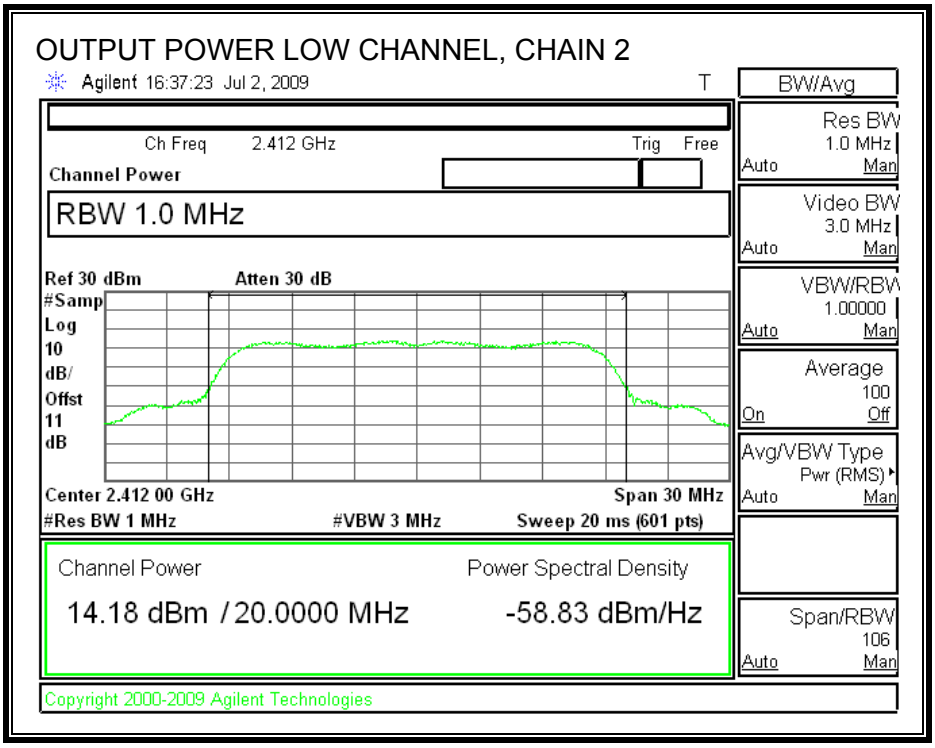
The antenna gain is less than 6 dBi, therefore the limit is 30 dBm.

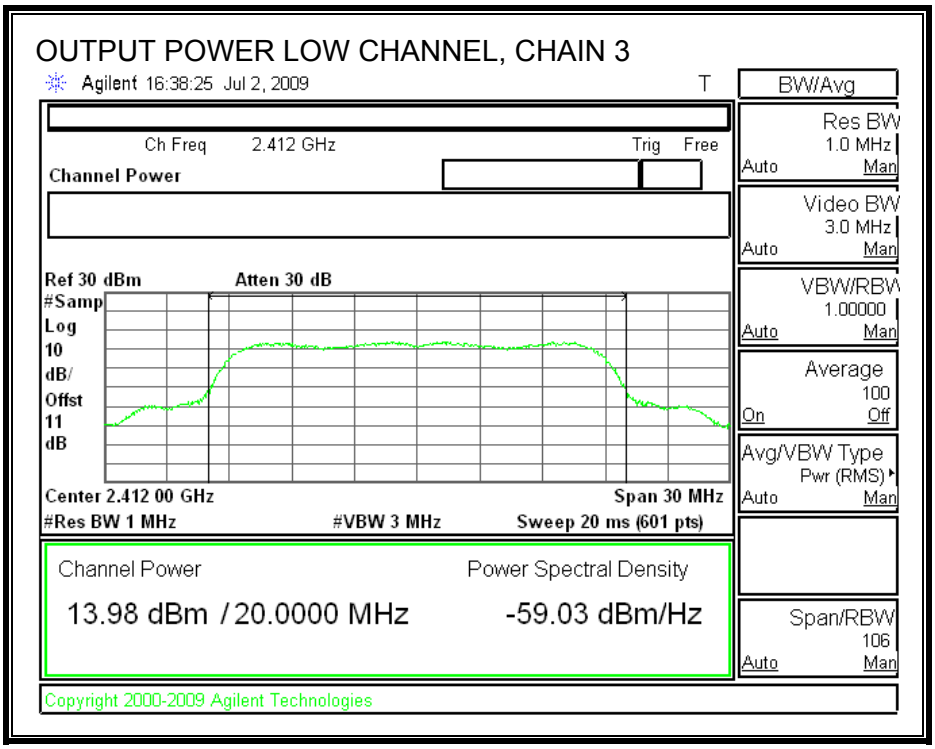
Channel	Frequency (MHz)	Chain 0 Power (dBm)	Chain 1 Power (dBm)	Chain 2 Power (dBm)	Chain 3 Power (dBm)	Total Power (dBm)	Limit (dBm)	Margin (dB)
Low	**2412**	14.14	14.24	14.18	13.98	**20.16**	**30**	**-9.84**
Mid	**2437**	20.16	20.25	19.99	20.10	**26.15**	**30**	**-3.85**
High	**2462**	14.22	14.20	14.22	14.17	**20.22**	**30**	**-9.78**

OUTPUT POWER, LOW CHANNEL

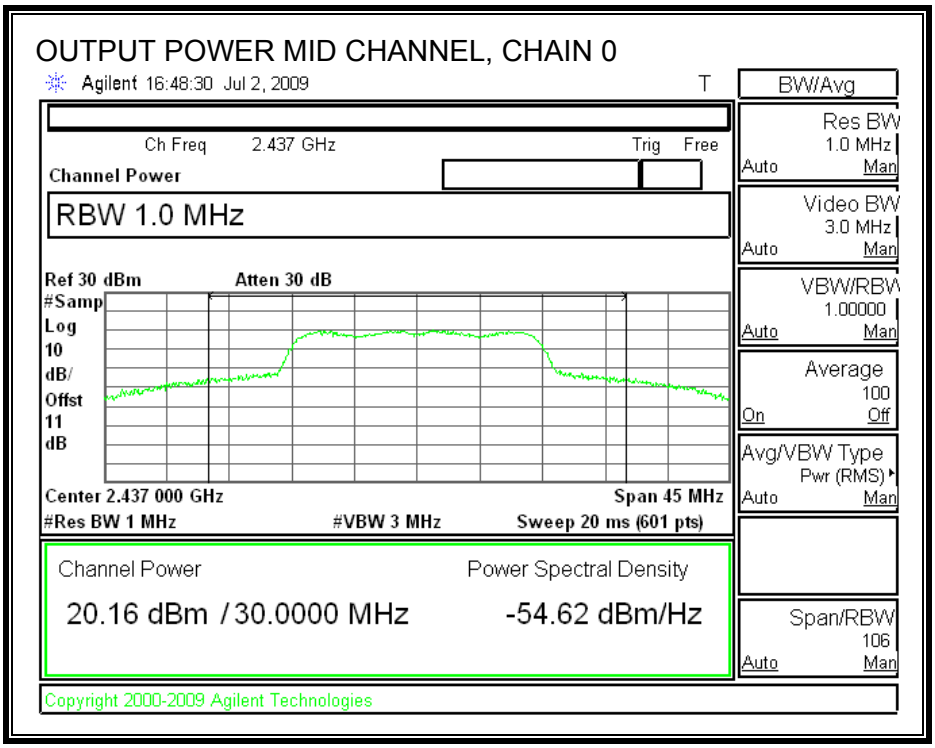


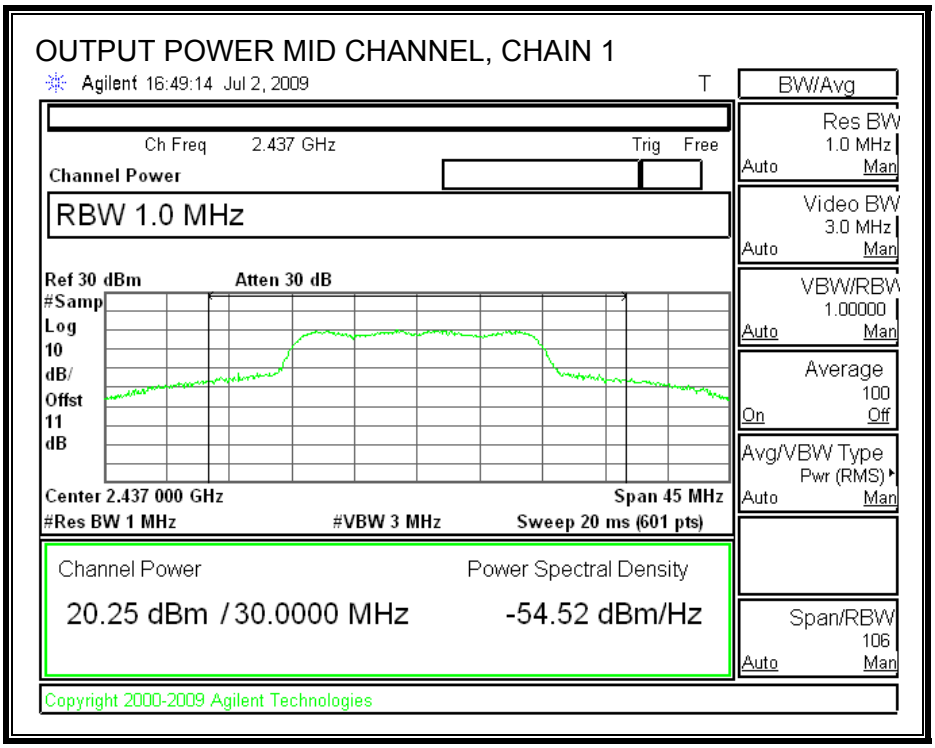


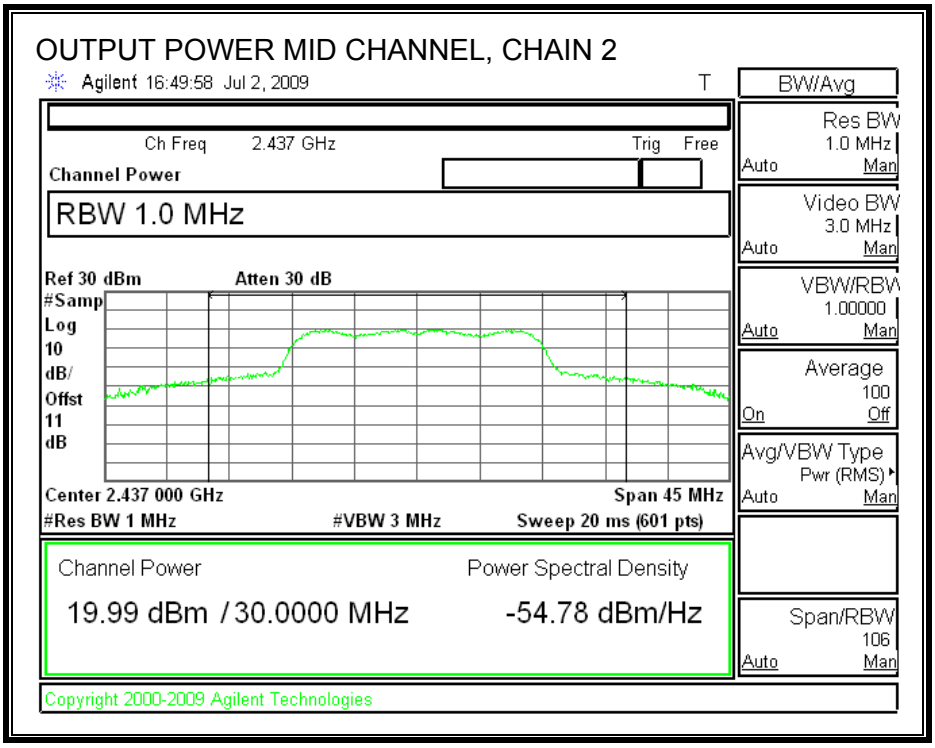


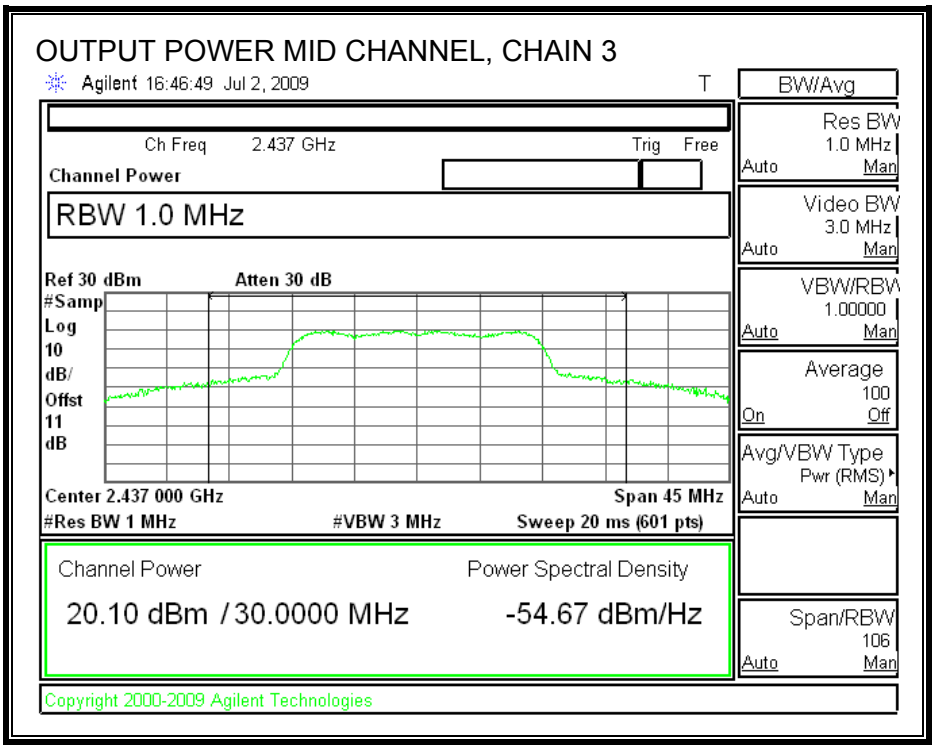


OUTPUT POWER, MID CHANNEL

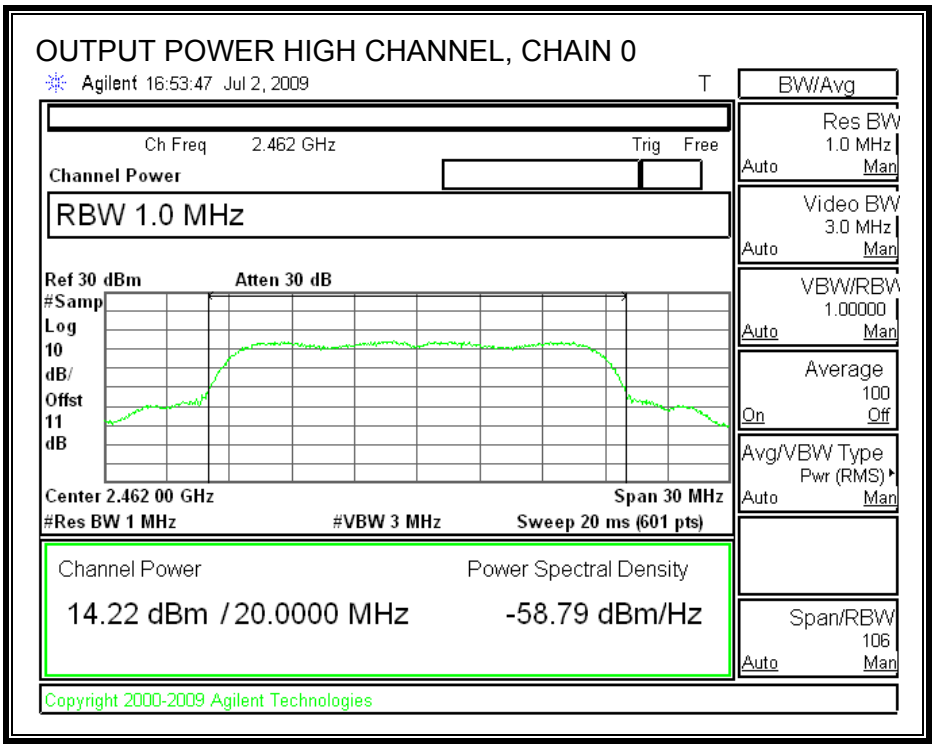


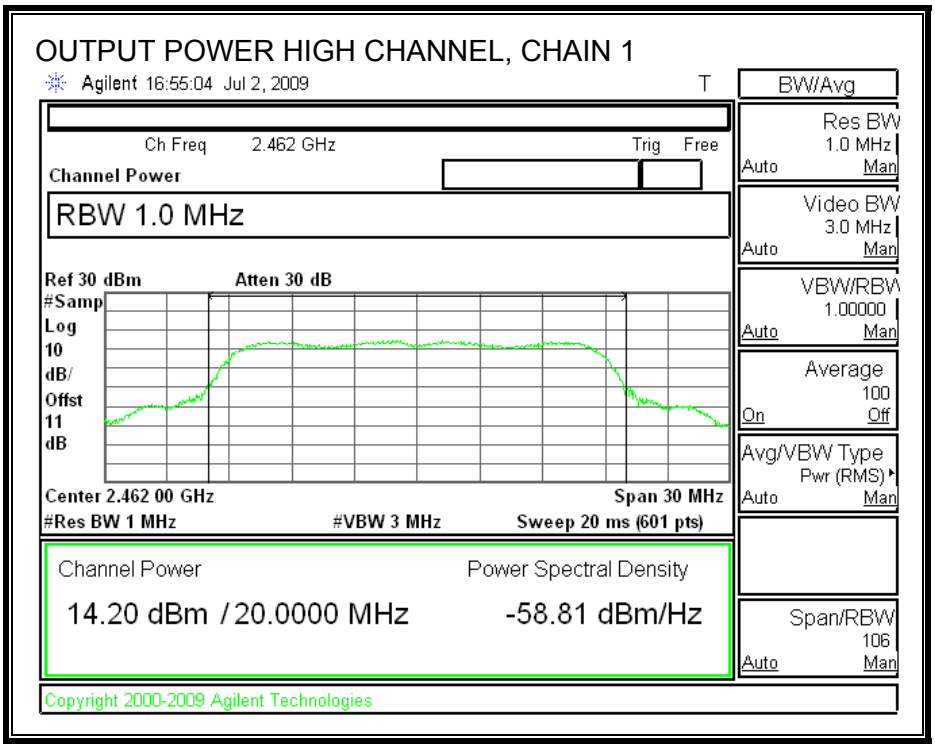


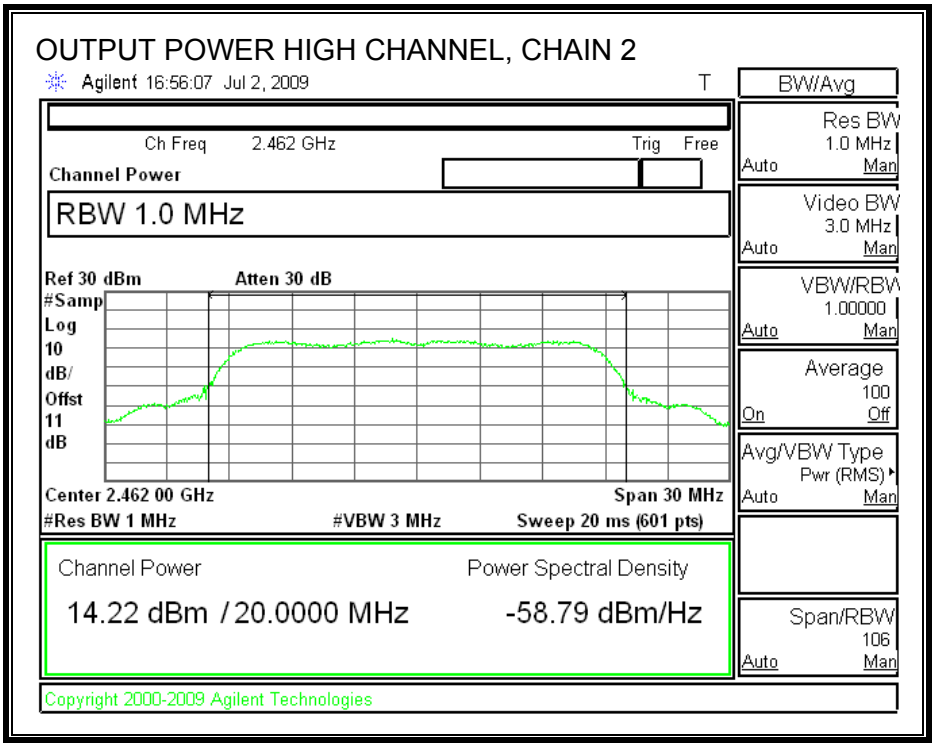


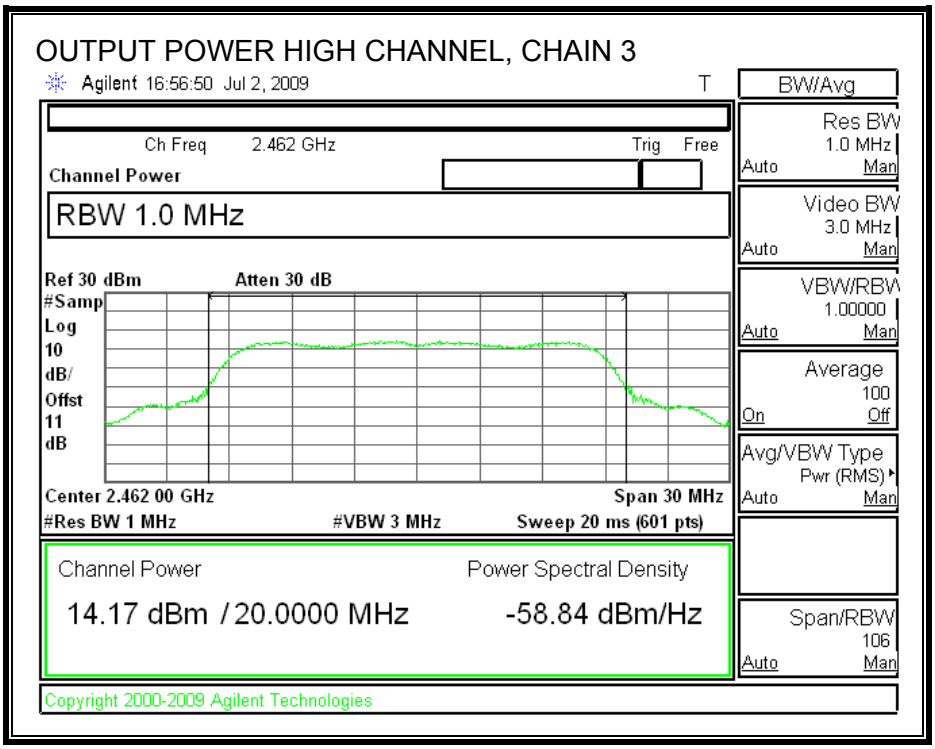


OUTPUT POWER, HIGH CHANNEL









7.3.4. AVERAGE POWER

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a power meter.

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.

RESULTS

Channel	Frequency (MHz)	Chain 0 Power (dBm)	Chain 1 Power (dBm)	Chain 2 Power (dBm)	Chain 3 Power (dBm)
Low	**2412.00**	14.16	14.11	14.05	14.14
Middle	**2437.00**	20.18	20.16	20.11	20.09
High	**2462.00**	14.17	14.14	14.08	14.18

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

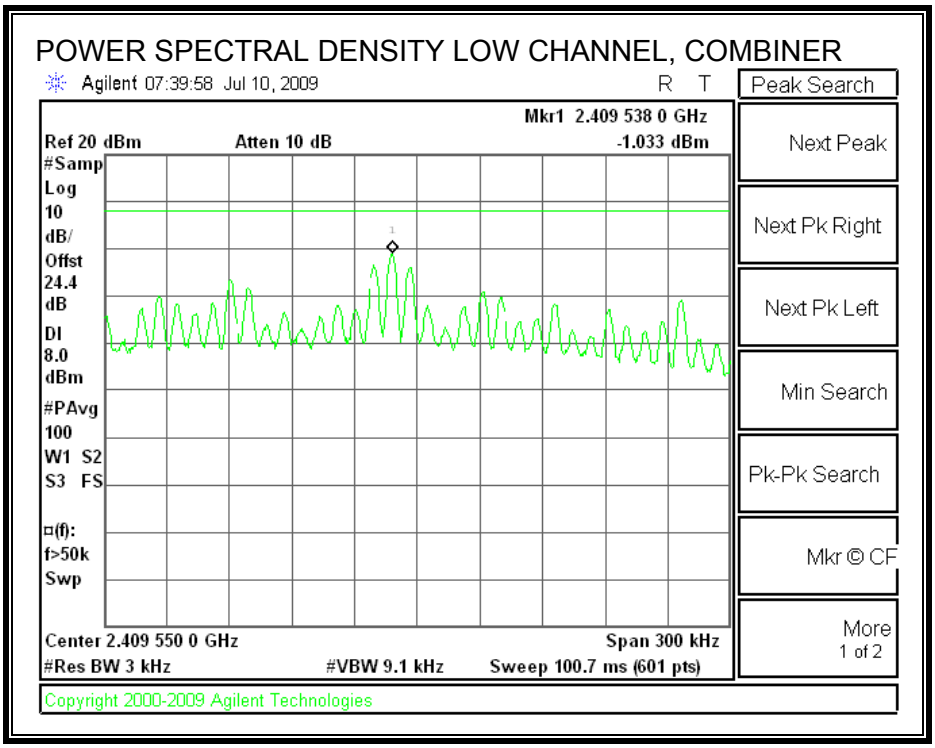
Output power was measured based on the use of RMS averaging over a time interval, therefore the power spectral density was measured using PSD Option 2 in accordance with FCC document "Measurement of Digital Transmission Systems Operating under Section 15.247", March 23, 2005.

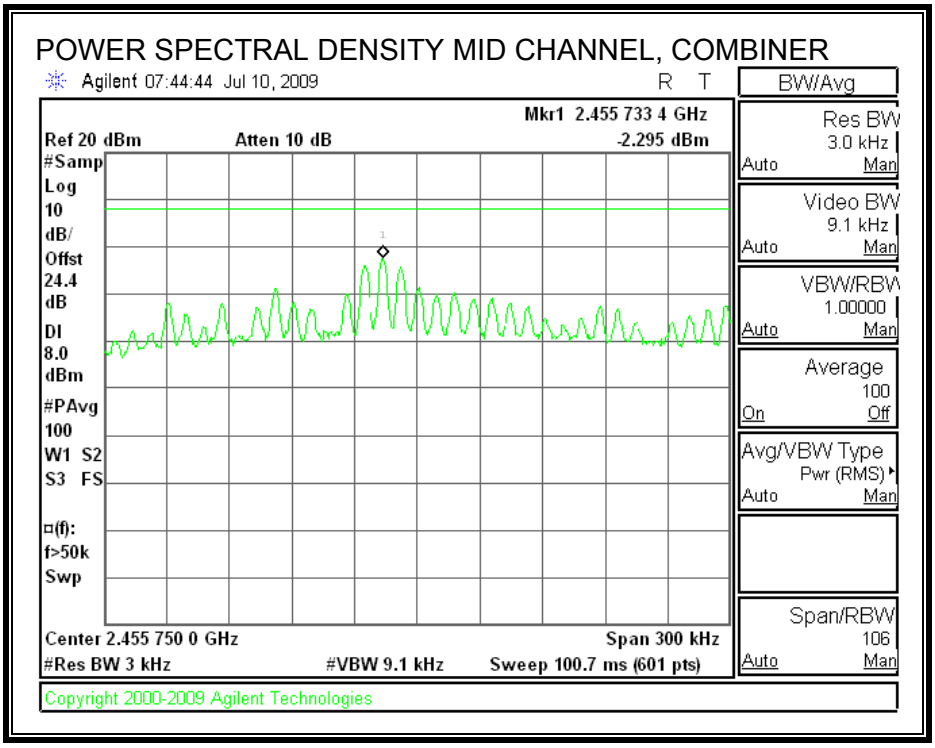
Preliminary tests on individual chains, and on all chains with a combiner, were performed. The worst-case configuration was with a combiner, therefore final test were performed with all chains feeding a combiner.

RESULTS

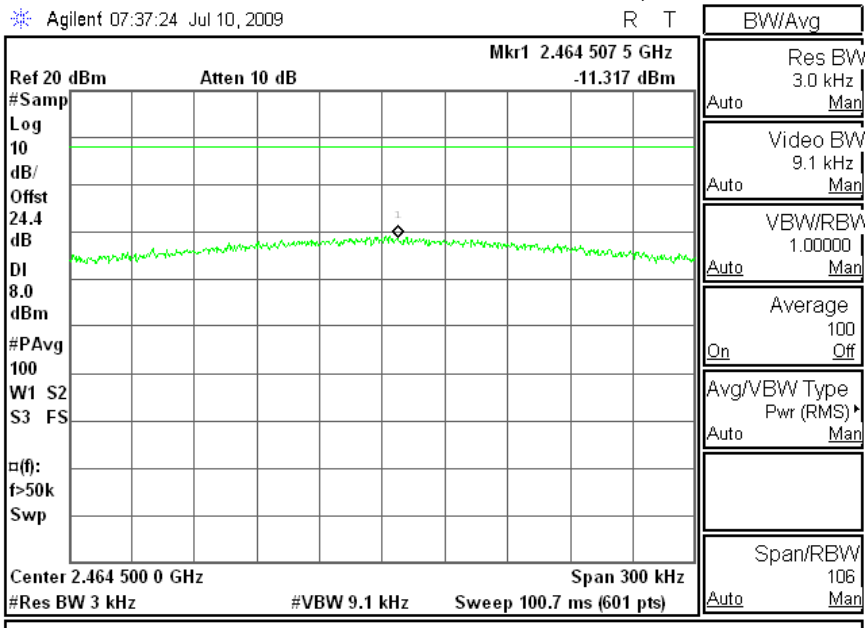
Channel	Frequency (MHz)	PSD with Combiner (dBm)	Limit (dBm)	Margin (dB)
Low	**2412**	-1.03	**8**	**-9.03**
Middle	**2437**	-2.30	**8**	**-10.30**
High	**2462**	-11.32	**8**	**-19.32**

POWER SPECTRAL DENSITY





POWER SPECTRAL DENSITY HIGH CHANNEL, 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 RMS averaging over a time interval, therefore the required attenuation is 30 dBc.

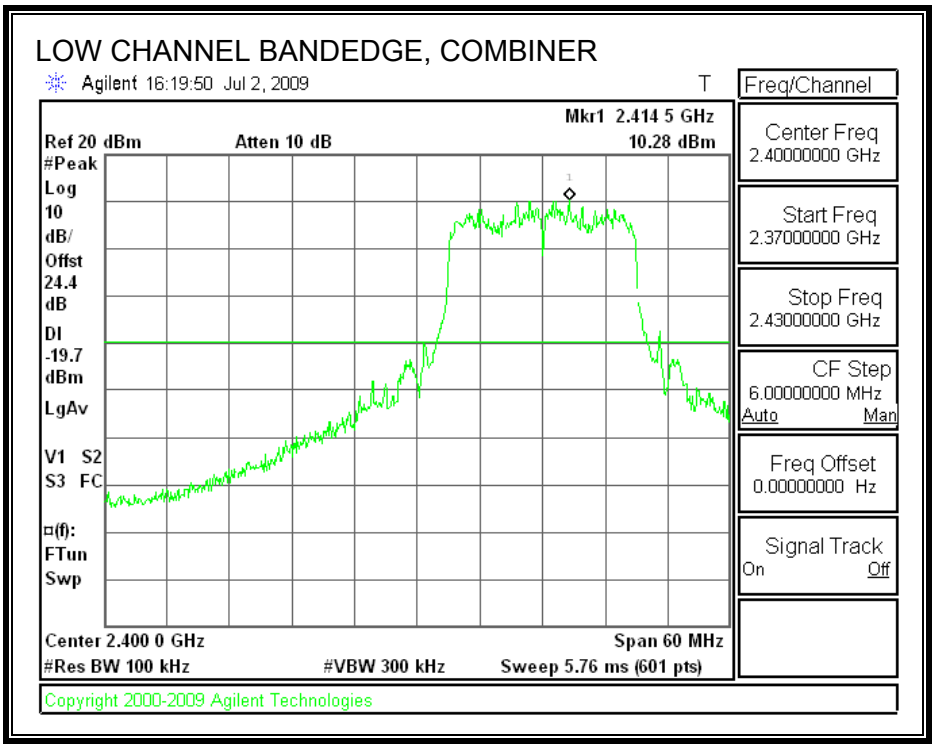
TEST PROCEDURE

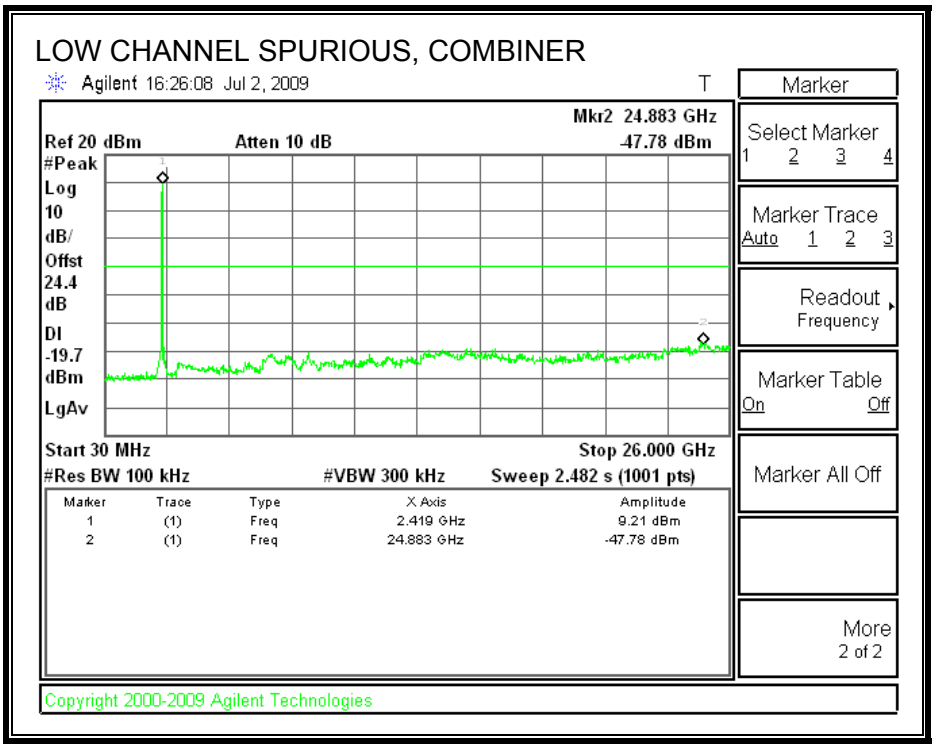
The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

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

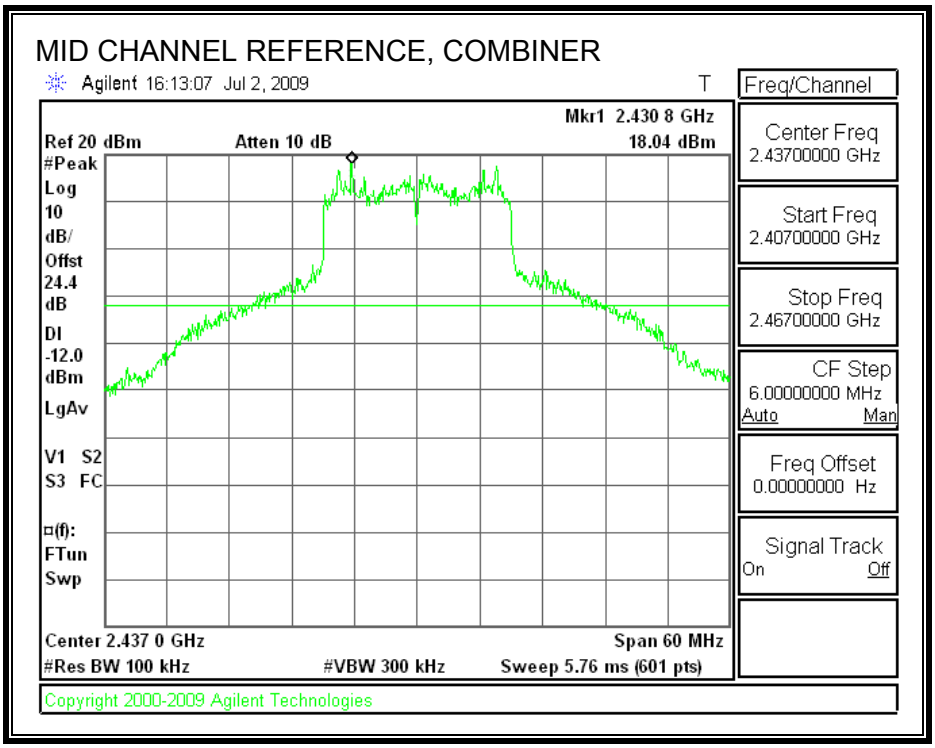
Preliminary tests on individual chains, and on all chains with a combiner, were performed. The worst-case configuration was with a combiner, therefore final test were performed with all chains feeding a combiner.

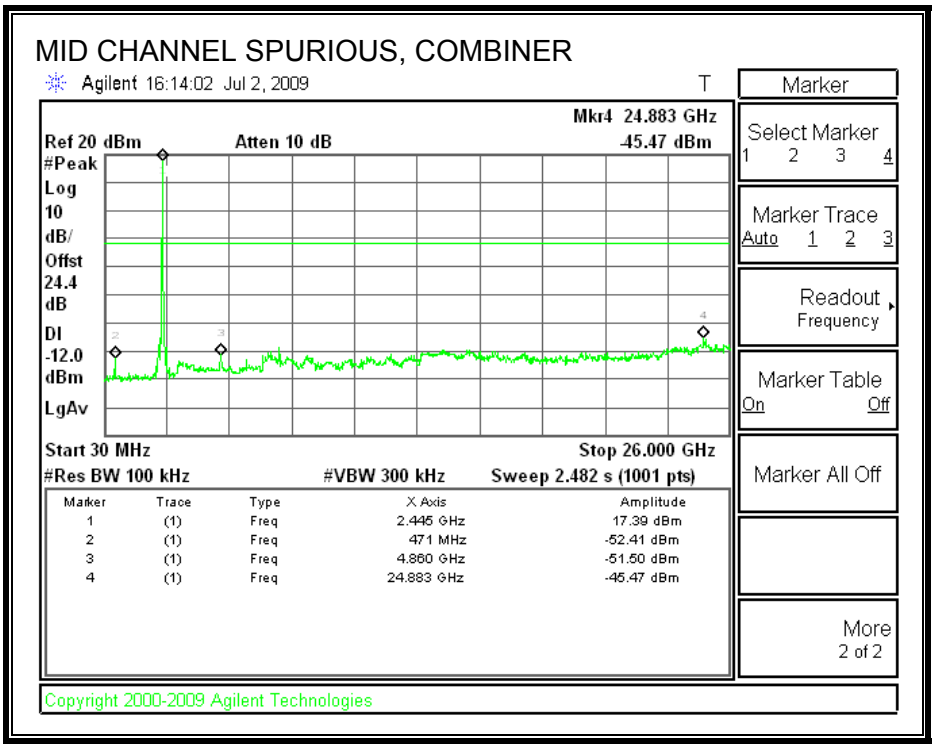
LOW CHANNEL SPURIOUS EMISSIONS



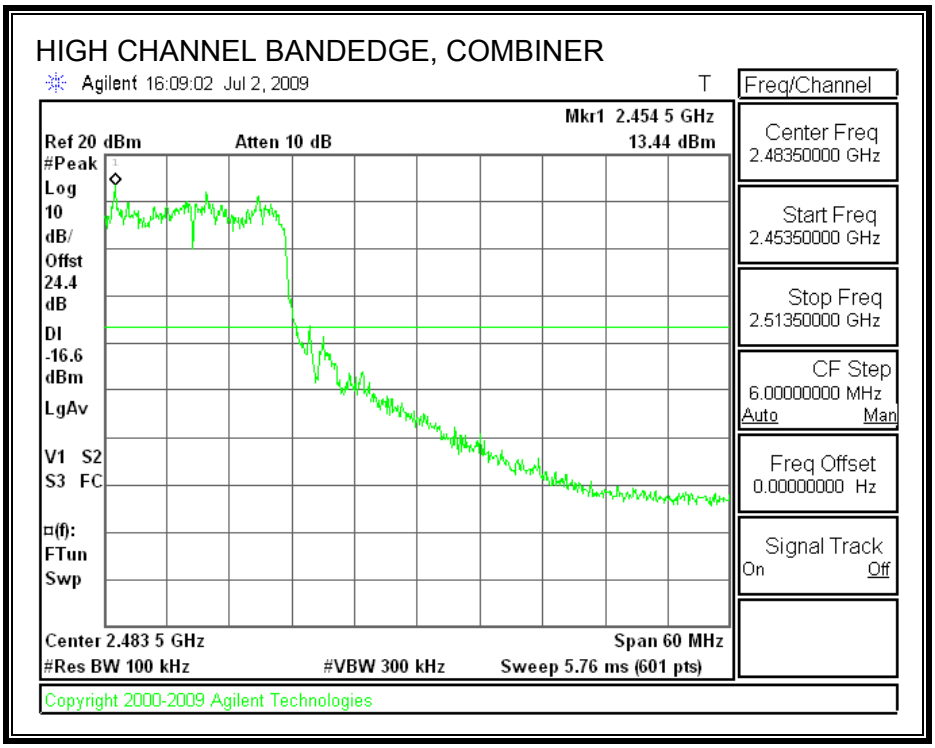


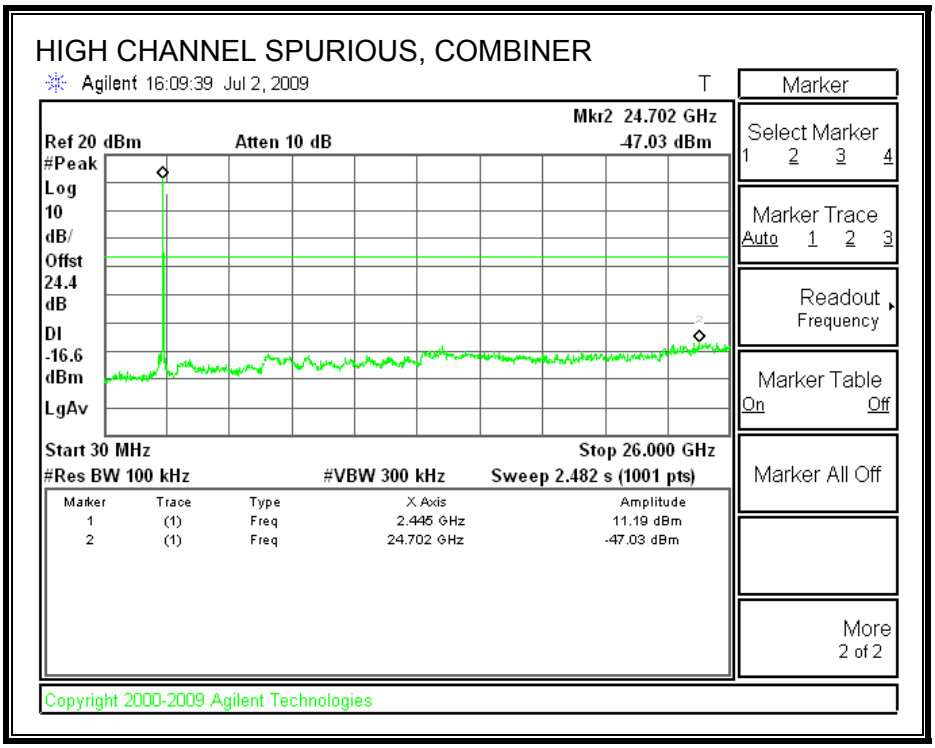
MID CHANNEL SPURIOUS EMISSIONS





HIGH CHANNEL SPURIOUS EMISSIONS





7.4. 2.4 GHz BAND CHANNEL TESTS FOR 802.11n HT40 MODE

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.

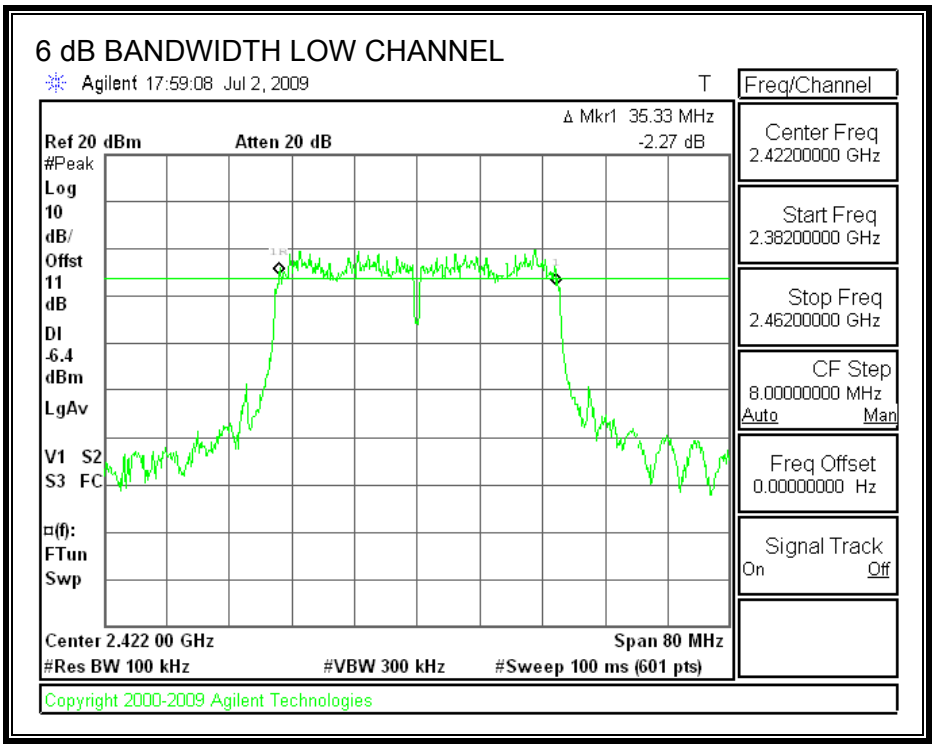
TEST PROCEDURE

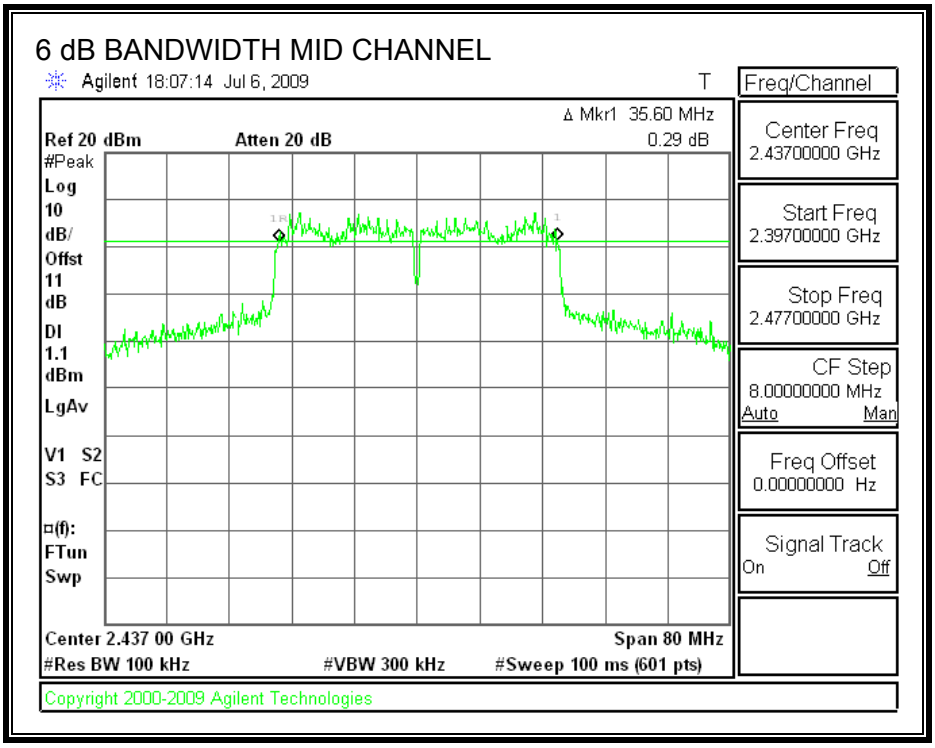
The transmitter output is connected to a spectrum analyzer. The RBW is set to 100 kHz and the VBW is set to 300 kHz. The sweep time is coupled.

RESULTS

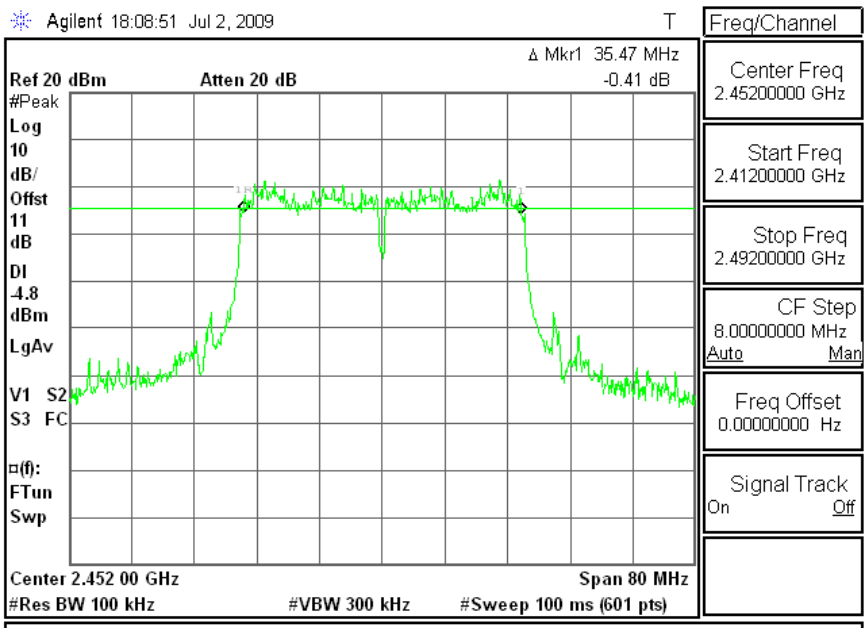
Channel	Frequency (MHz)	6 dB BW (MHz)	Minimum Limit (MHz)
Low	2422	35.33	0.5
Mid	2437	35.60	0.5
High	2452	35.47	0.5

6 dB BANDWIDTH





6 dB BANDWIDTH HIGH CHANNEL



7.4.2. 99% & 26 dB BANDWIDTH

LIMITS

None; for reporting purposes only.

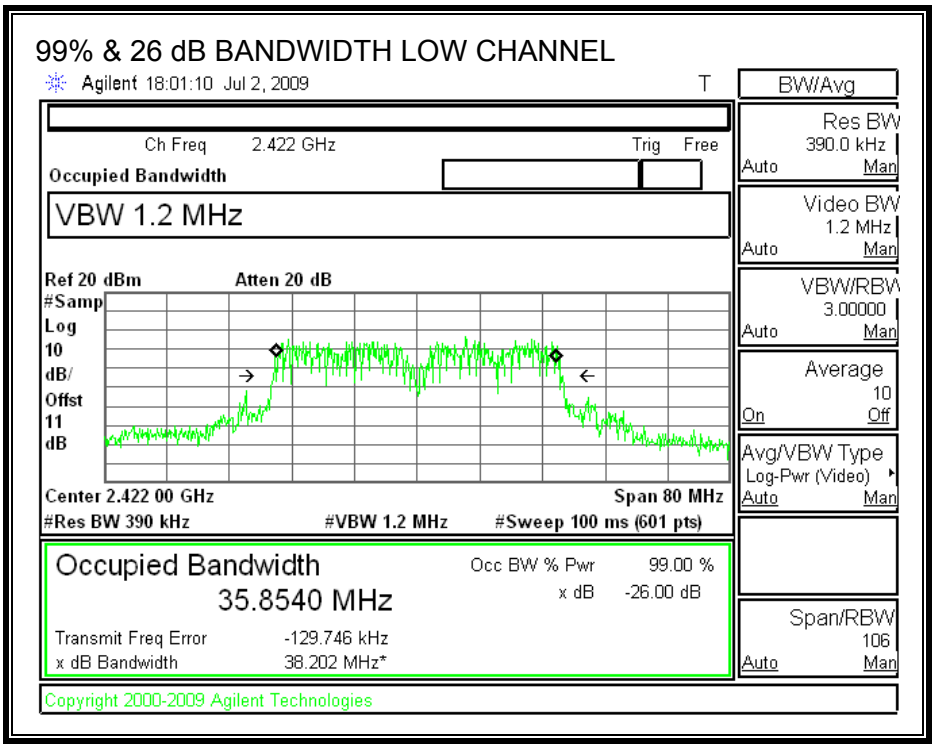
TEST PROCEDURE

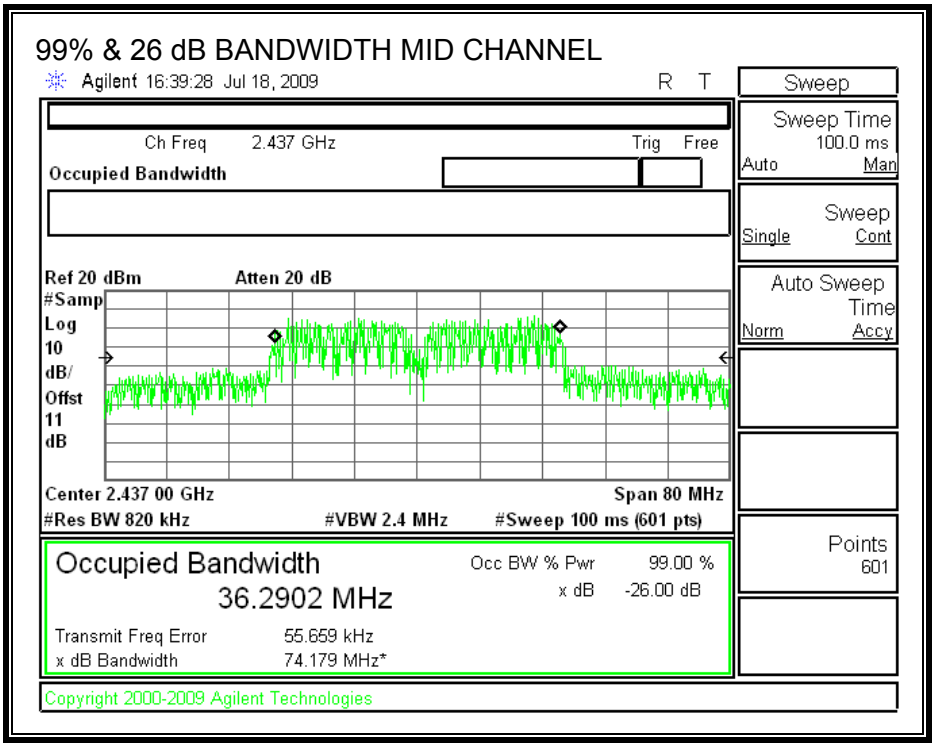
The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal bandwidth measurement function is utilized.

RESULTS

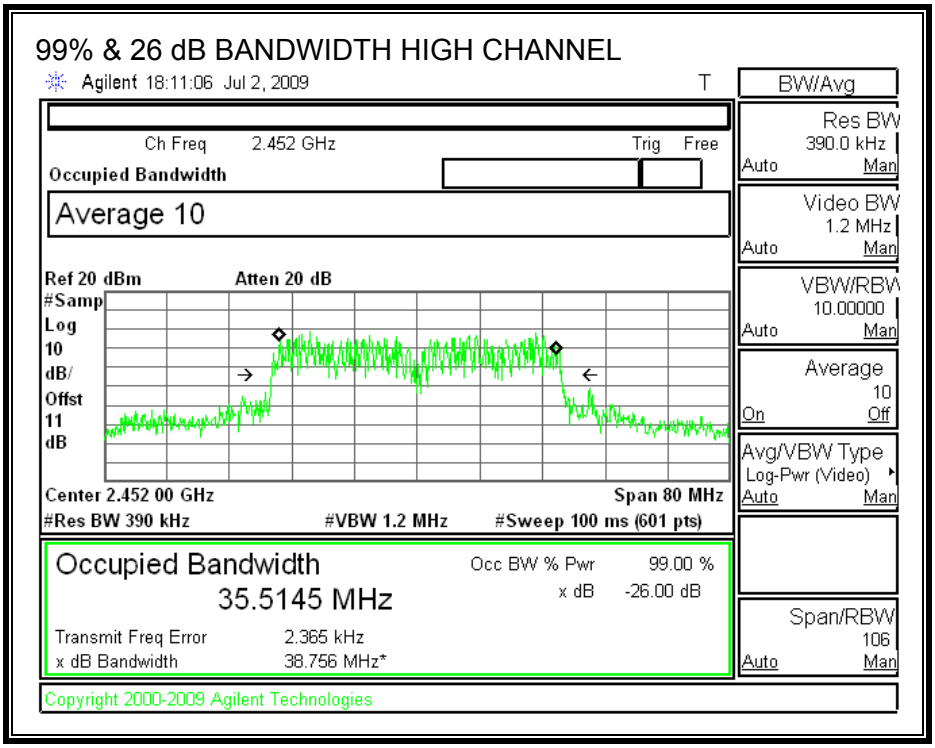
Channel	Frequency (MHz)	99% OBW (MHz)	26 dB BW (MHz)
Low	2422	35.85	38.20
Mid	2437	36.29	74.18
High	2452	35.51	38.76

99% & 26 dB BANDWIDTH





99% & 26 dB BANDWIDTH HIGH CHANNEL



7.4.3. OUTPUT POWER

LIMITS

FCC §15.247 (b)

IC RSS-210 A8.4

TEST PROCEDURE

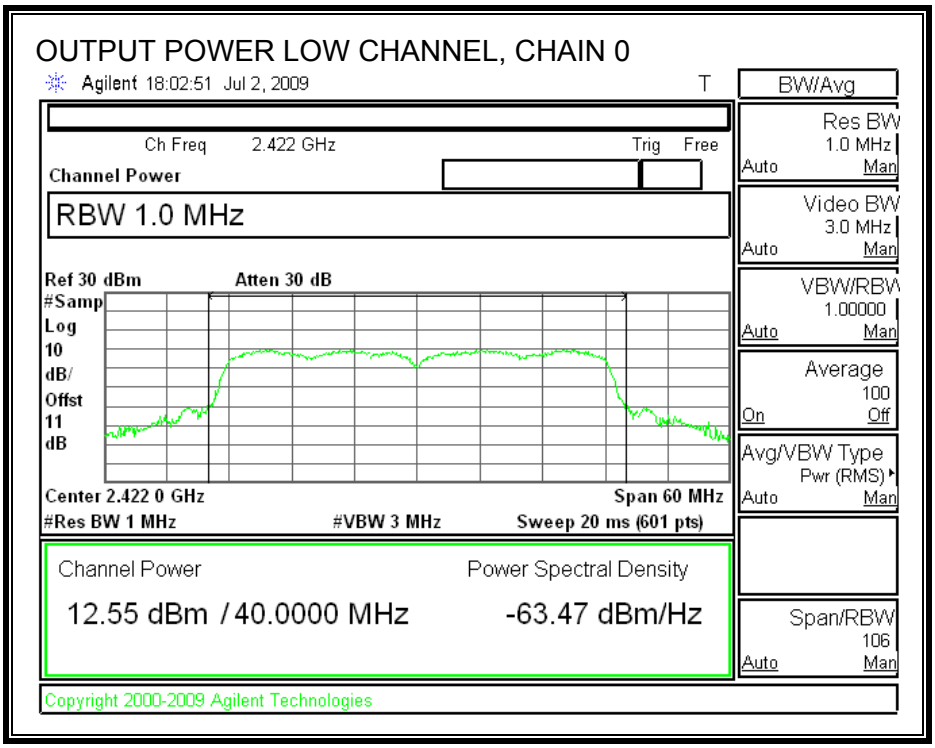
Output power was measured based on the use of RMS averaging over a time interval in accordance with FCC document "Measurement of Digital Transmission Systems Operating under Section 15.247", March 23, 2005.

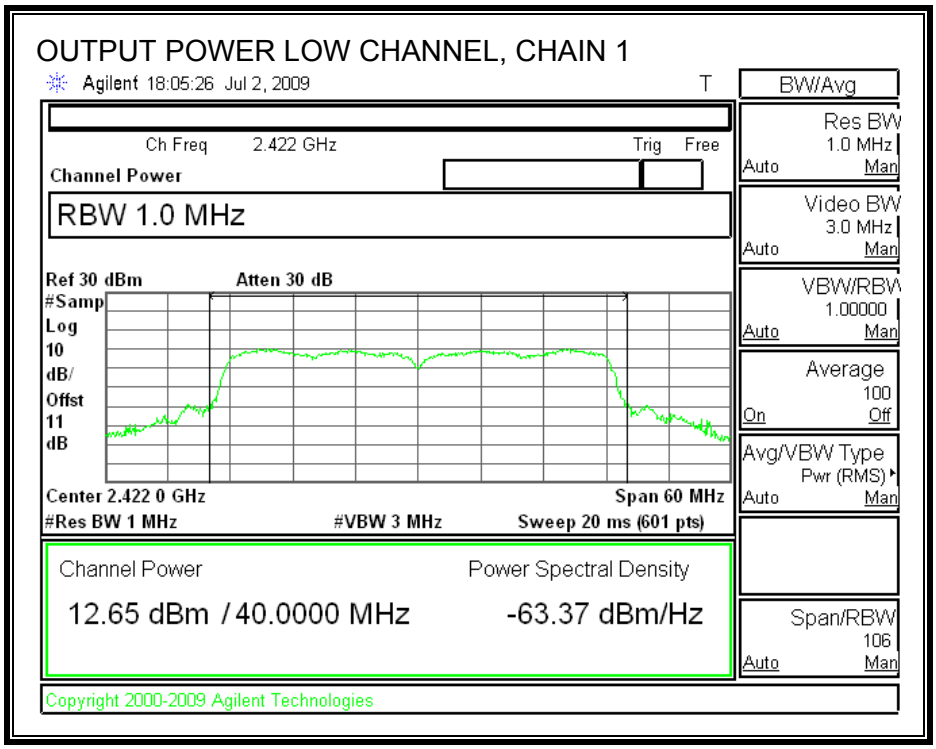
RESULTS

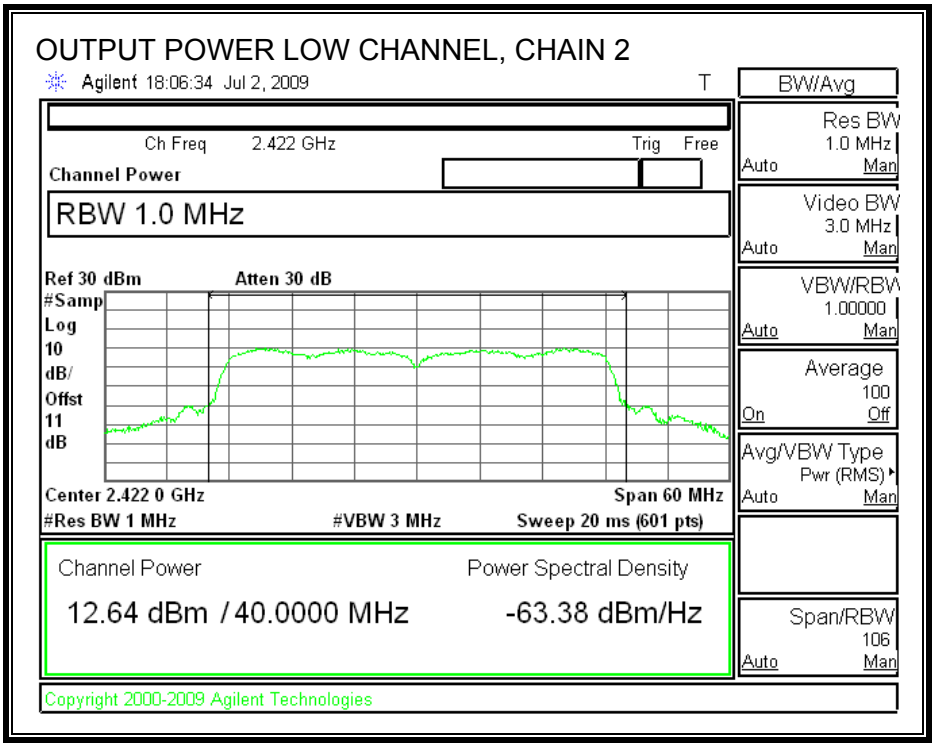
The antenna gain is less than 6 dBi, therefore the limit is 30 dBm.

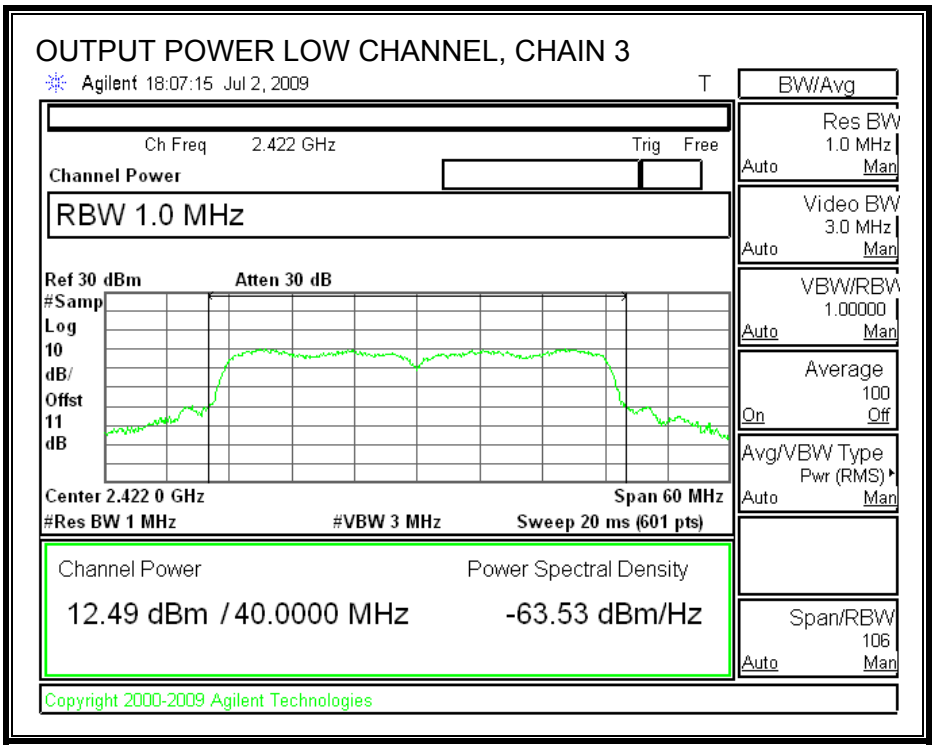
Channel	Frequency (MHz)	Chain 0 Power (dBm)	Chain 1 Power (dBm)	Chain 2 Power (dBm)	Chain 3 Power (dBm)	Total Power (dBm)	Limit (dBm)	Margin (dB)
Low	**2422**	12.55	12.65	12.64	12.49	**18.60**	**30**	**-11.40**
Mid	**2437**	20.08	20.01	19.99	20.02	**26.05**	**30**	**-3.95**
High	**2452**	13.54	13.57	13.56	13.61	**19.59**	**30**	**-10.41**

OUTPUT POWER, LOW CHANNEL

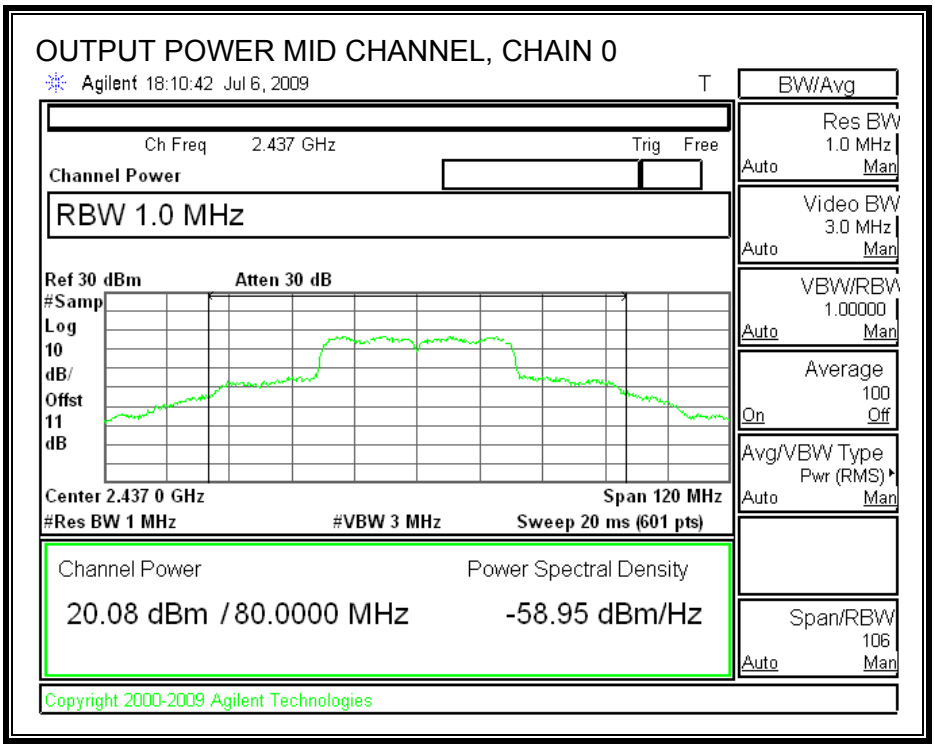


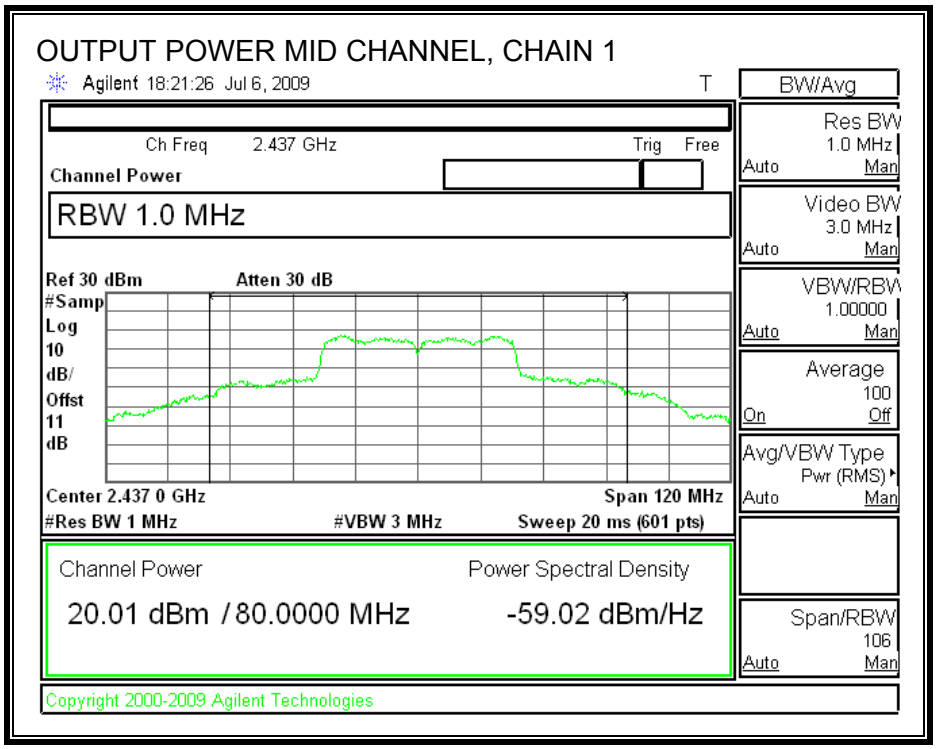


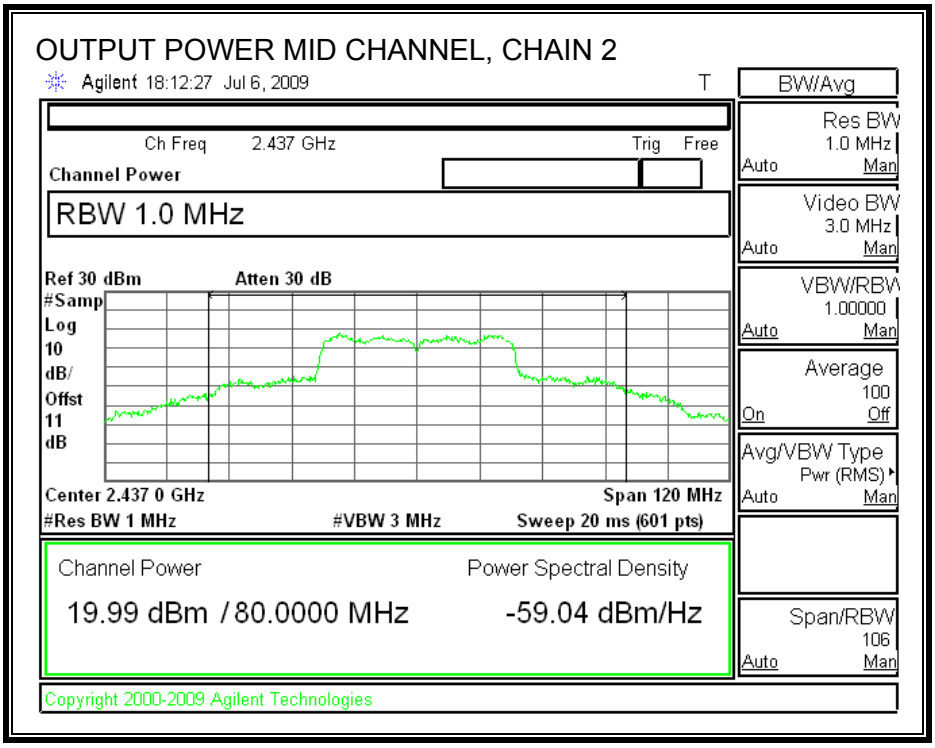


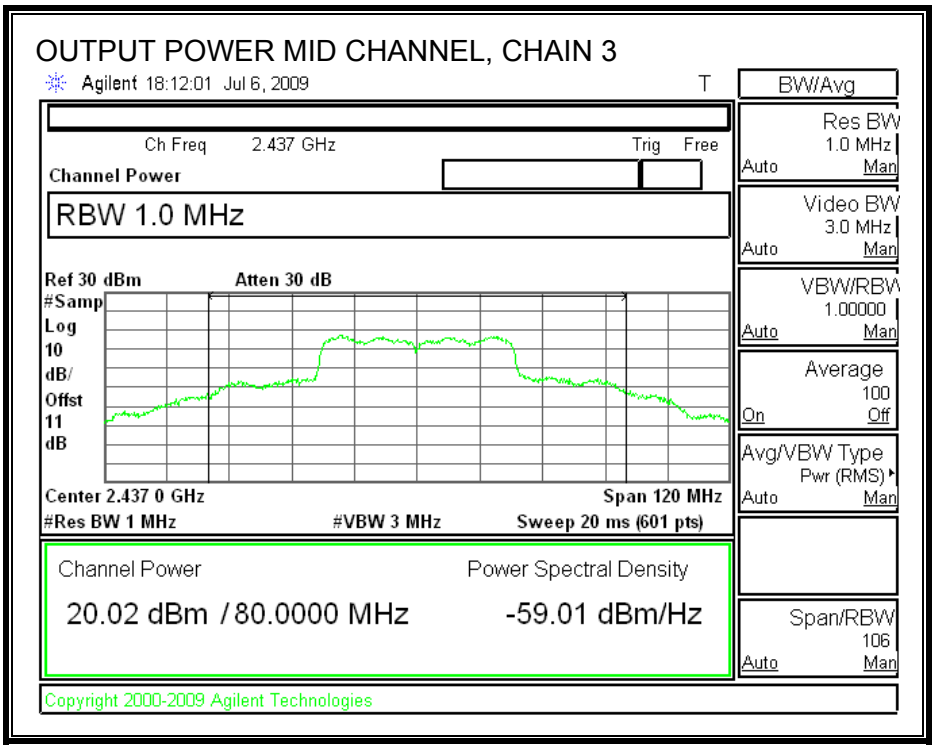


OUTPUT POWER, MID CHANNEL

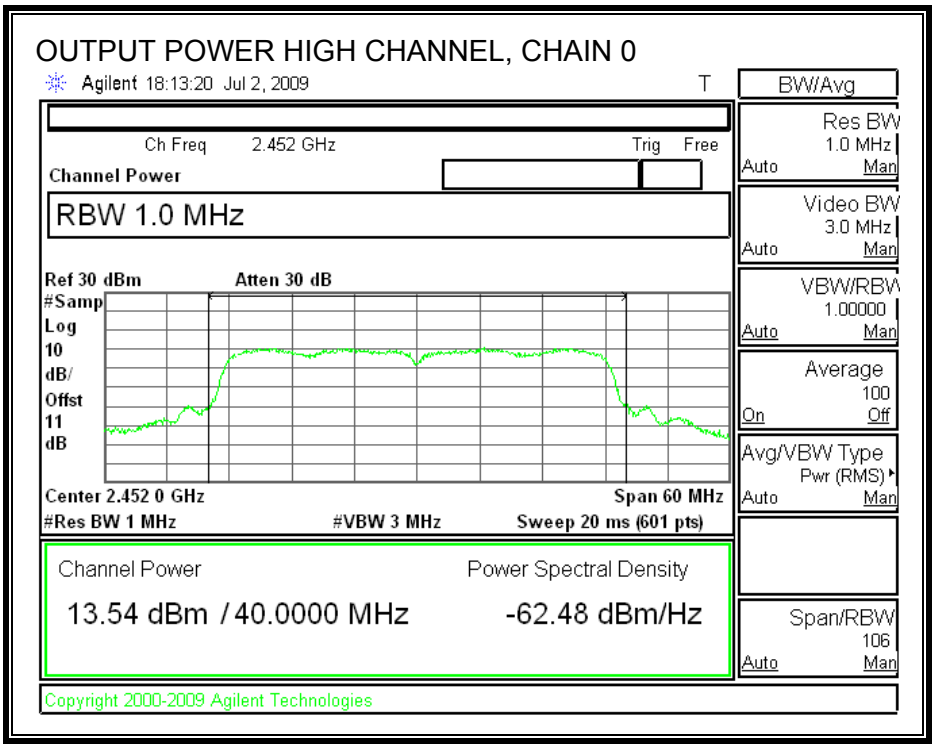


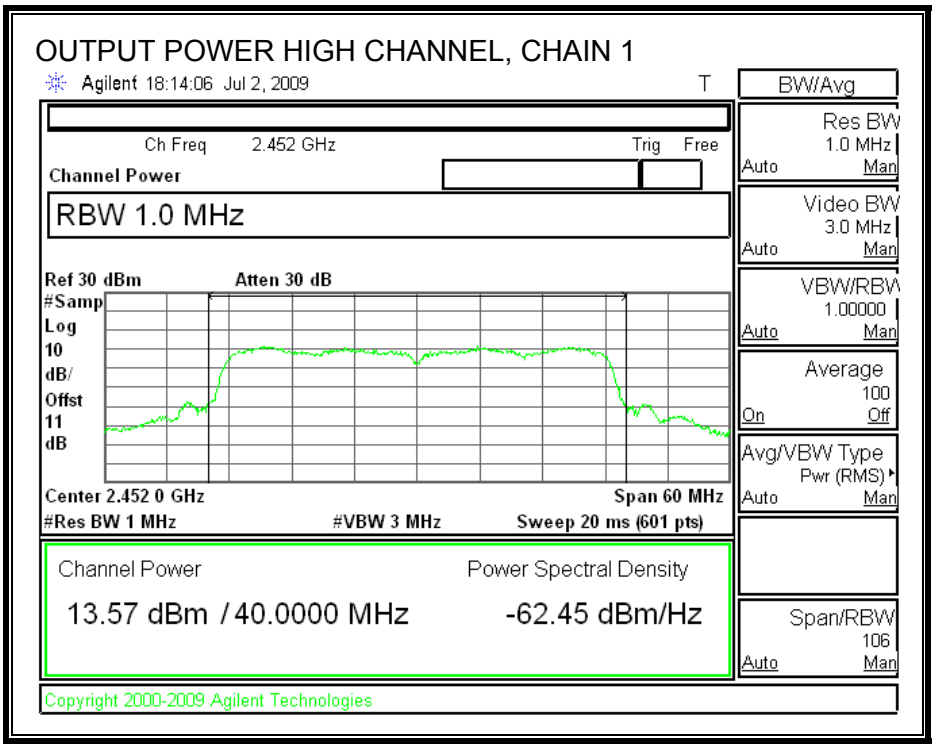


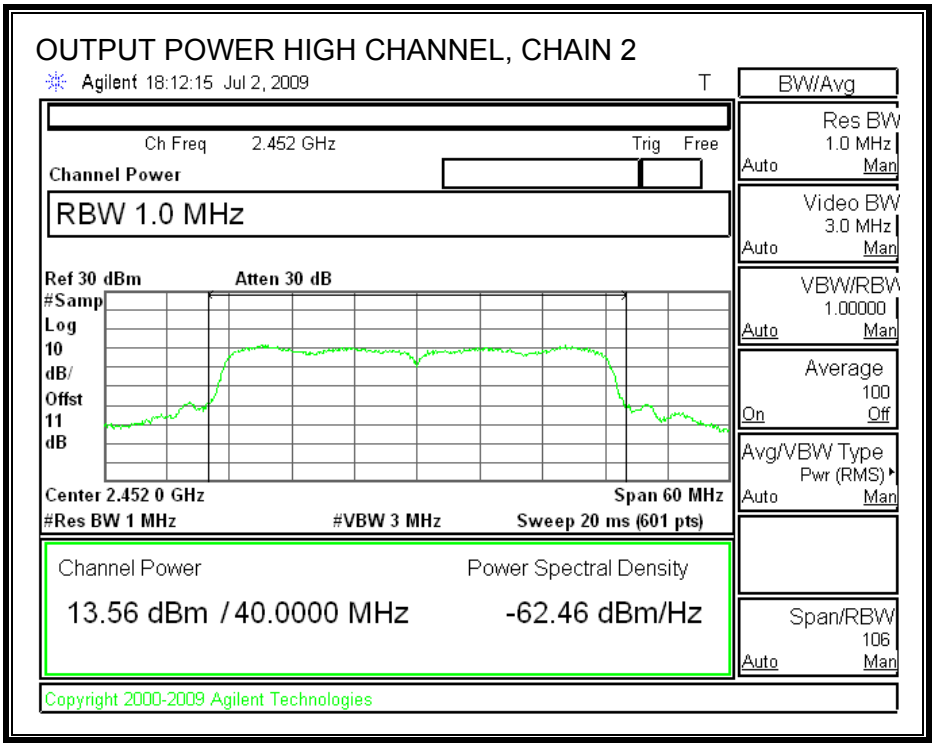


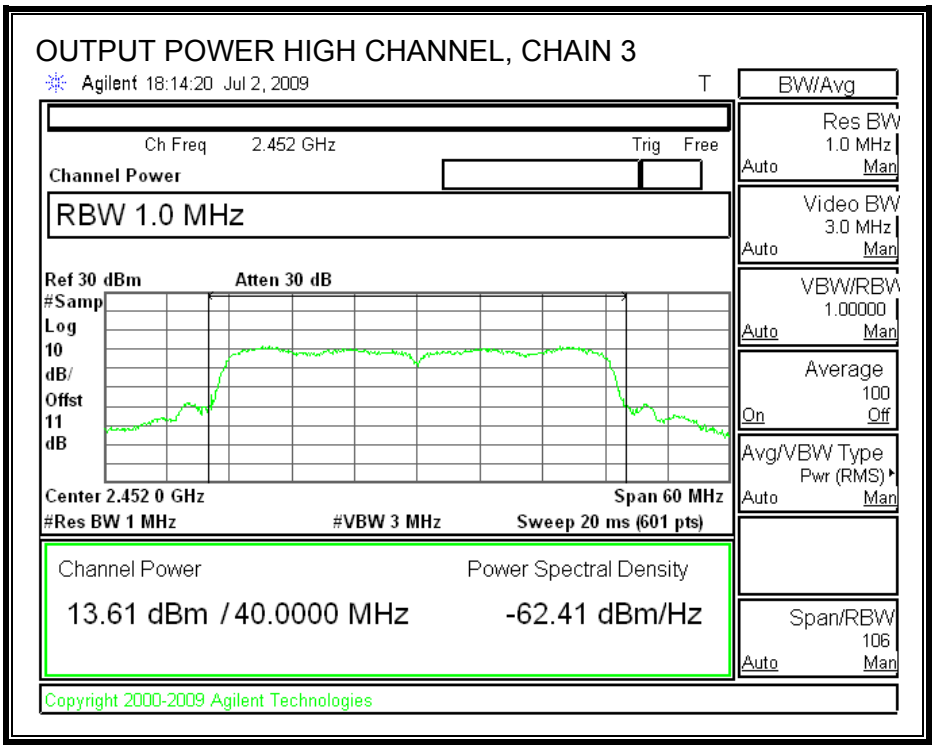


OUTPUT POWER, HIGH CHANNEL









7.4.4. AVERAGE POWER

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a power meter.

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.

RESULTS

Channel	Frequency (MHz)	Chain 0 Power (dBm)	Chain 1 Power (dBm)	Chain 2 Power (dBm)	Chain 3 Power (dBm)
Low	**2422.00**	12.64	12.53	12.50	12.65
Mid	**2437.00**	20.19	20.20	20.19	20.23
High	**2452.00**	13.65	13.54	13.52	13.53

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

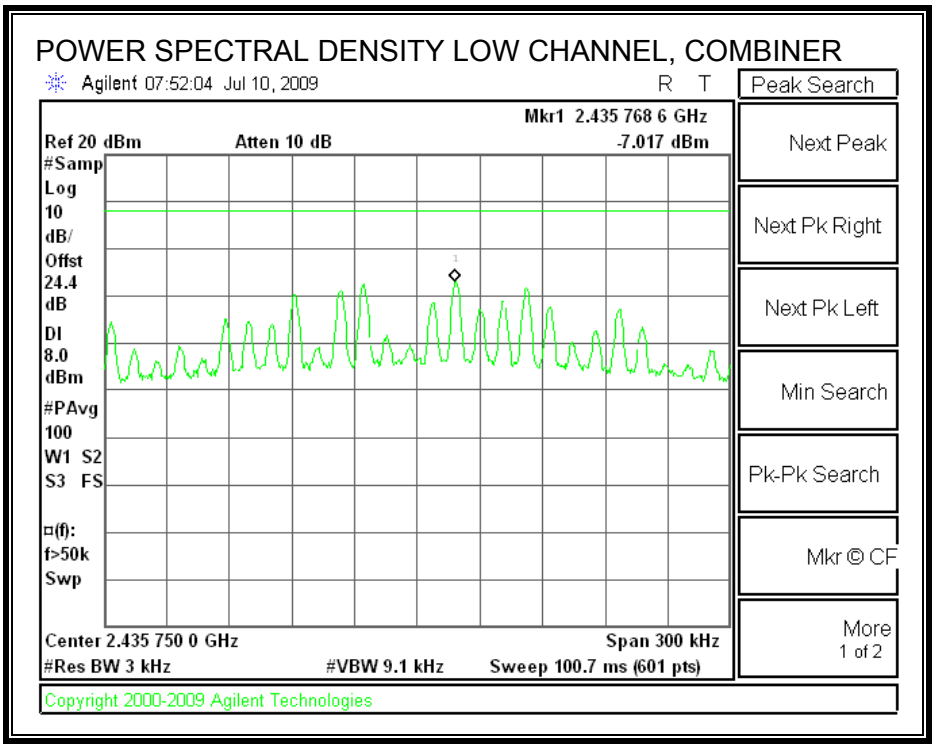
Output power was measured based on the use of RMS averaging over a time interval, therefore the power spectral density was measured using PSD Option 2 in accordance with FCC document "Measurement of Digital Transmission Systems Operating under Section 15.247", March 23, 2005.

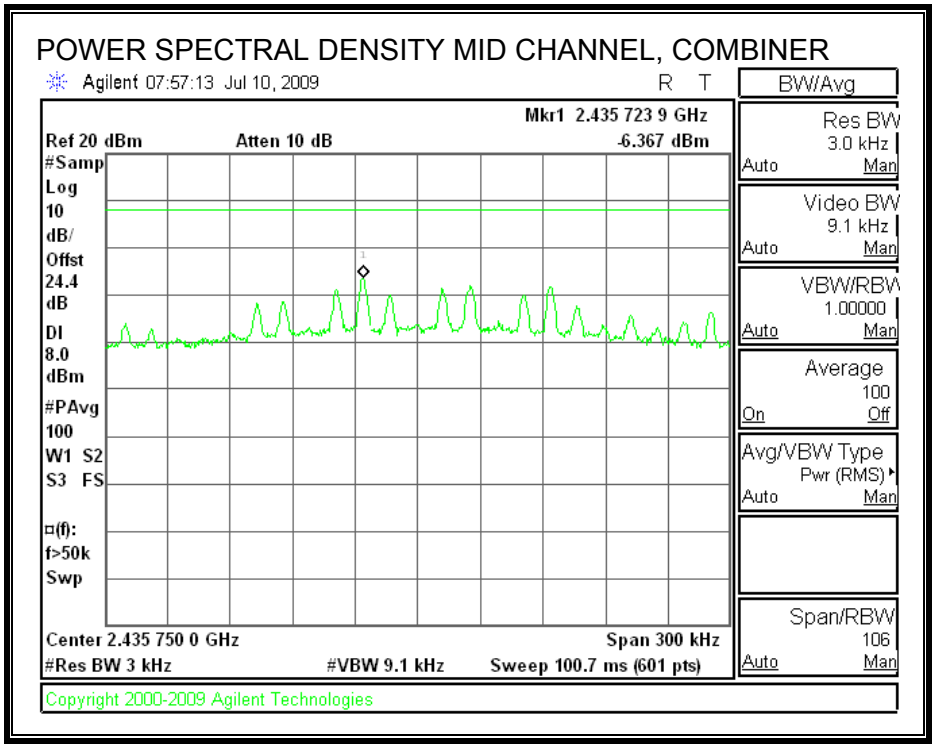
Preliminary tests on individual chains, and on all chains with a combiner, were performed. The worst-case configuration was with a combiner, therefore final test were performed with all chains feeding a combiner.

RESULTS

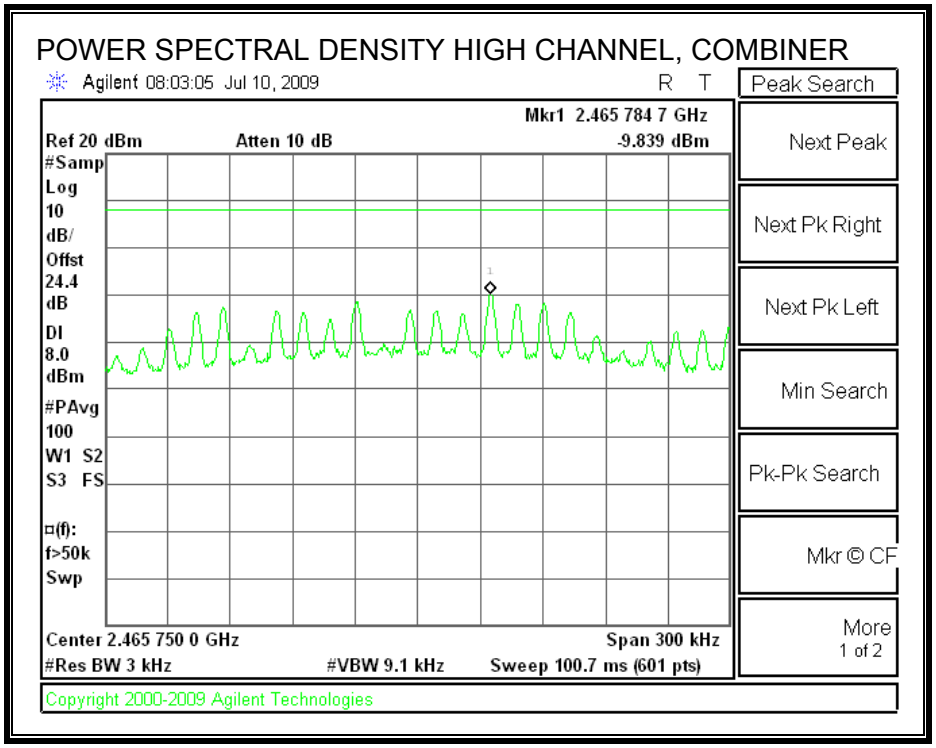
Channel	Frequency (MHz)	PSD with Combiner (dBm)	Limit (dBm)	Margin (dB)
Low	**2422**	-7.02	**8**	**-15.02**
Mid	**2437**	-6.37	**8**	**-14.37**
High	**2452**	-9.84	**8**	**-17.84**

POWER SPECTRAL DENSITY





POWER SPECTRAL DENSITY HIGH CHANNEL, 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 RMS averaging over a time interval, therefore the required attenuation is 30 dBc.

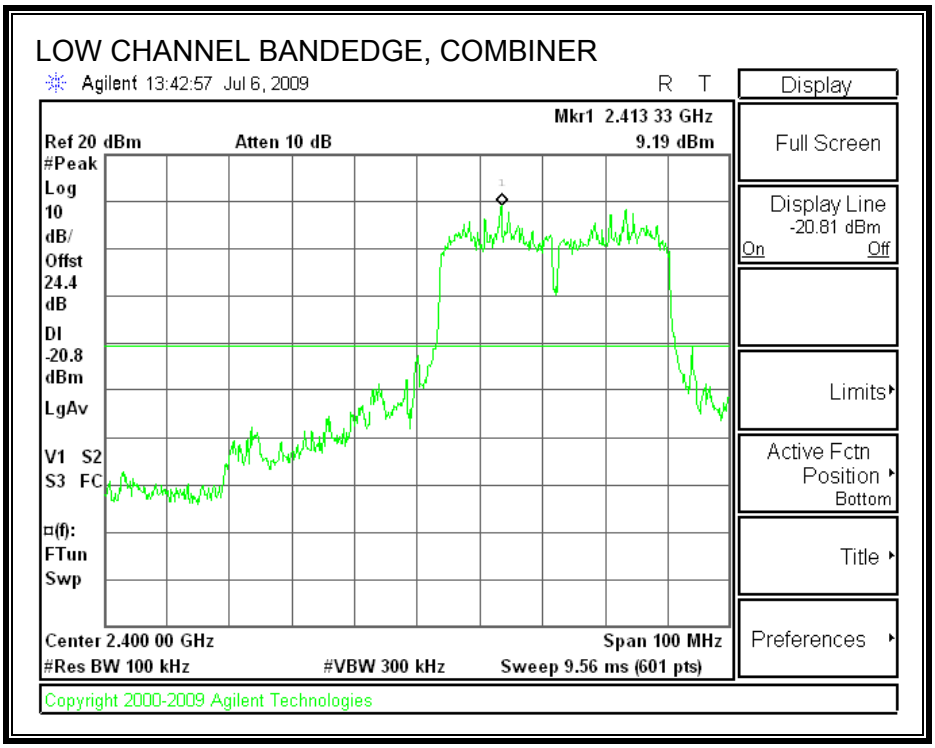
TEST PROCEDURE

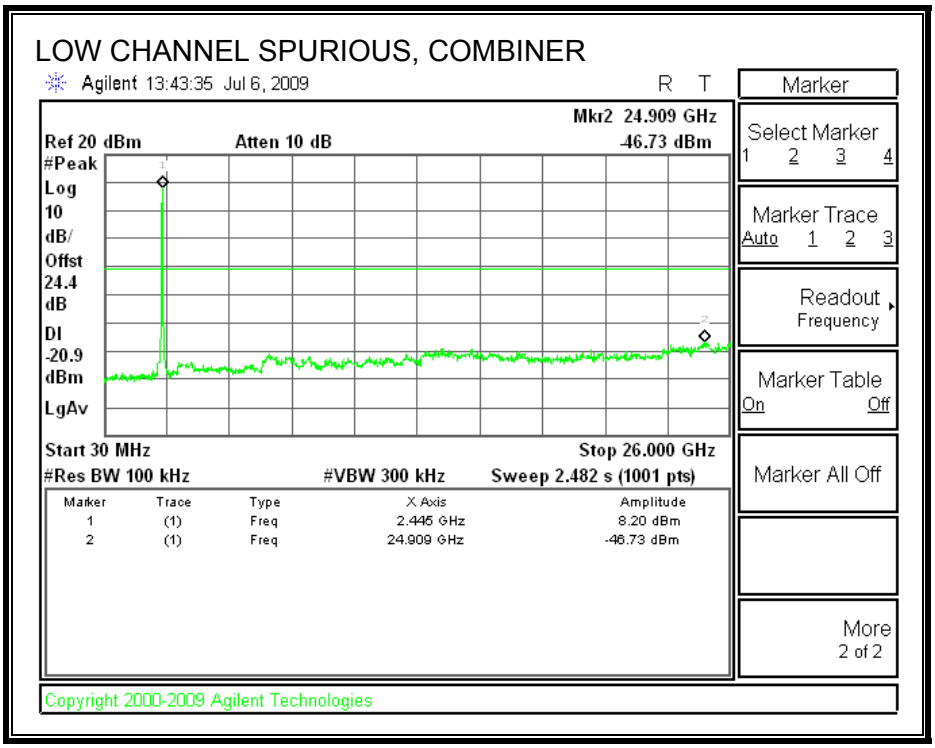
The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

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

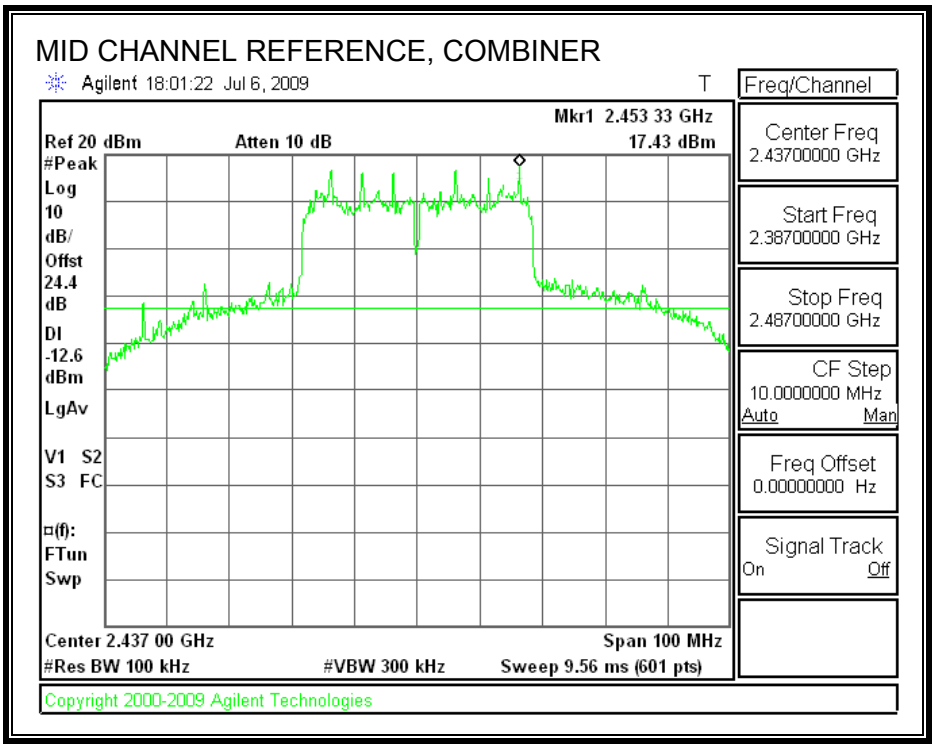
Preliminary tests on individual chains, and on all chains with a combiner, were performed. The worst-case configuration was with a combiner, therefore final test were performed with all chains feeding a combiner.

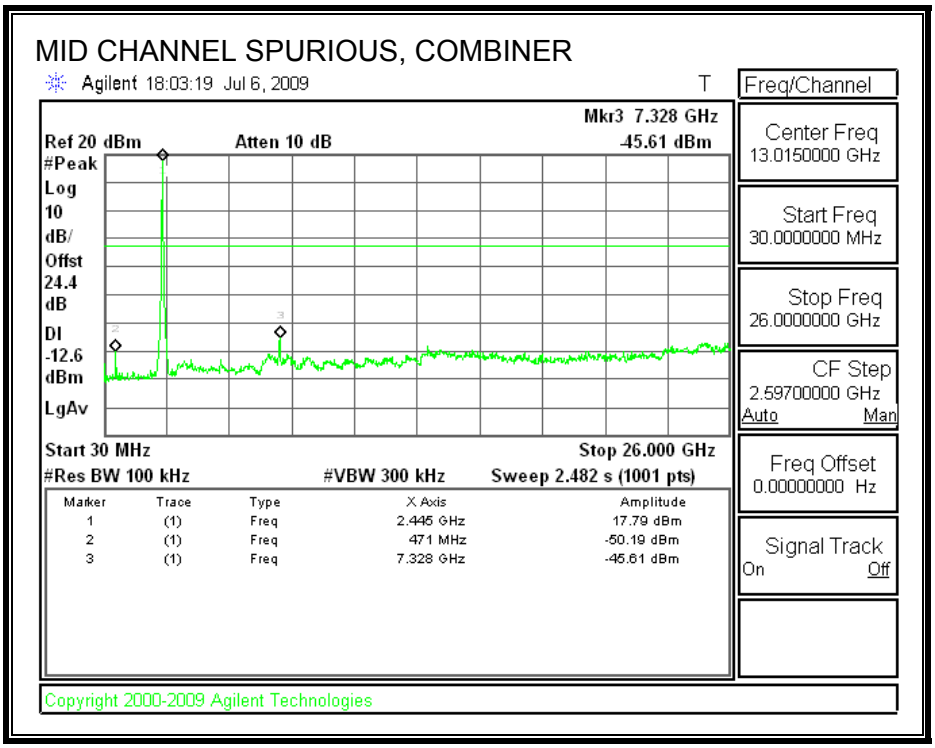
LOW CHANNEL SPURIOUS EMISSIONS



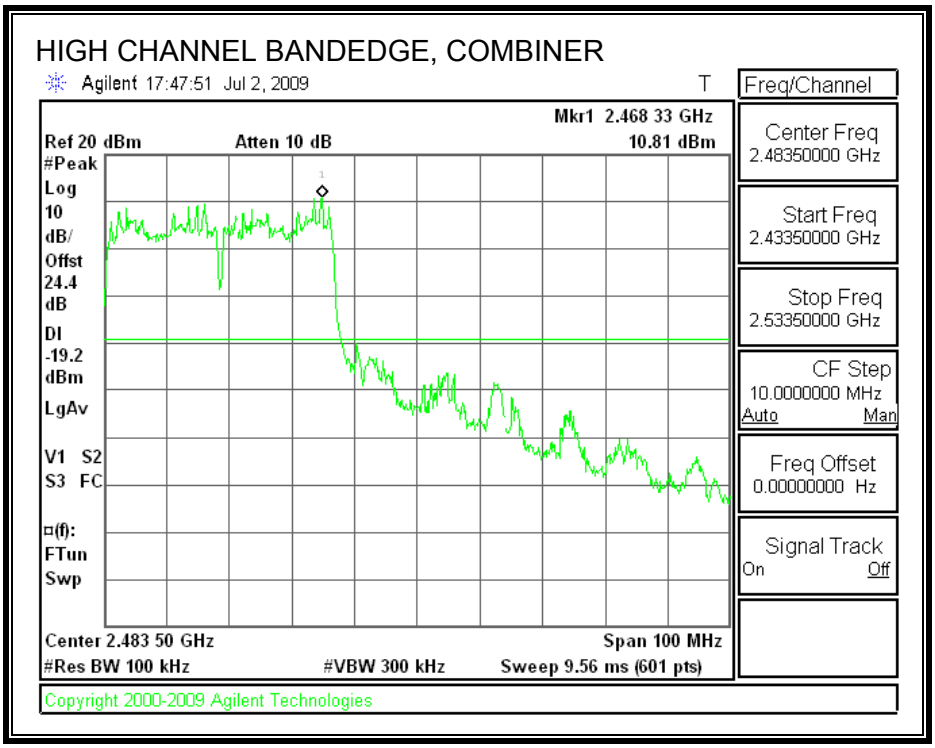


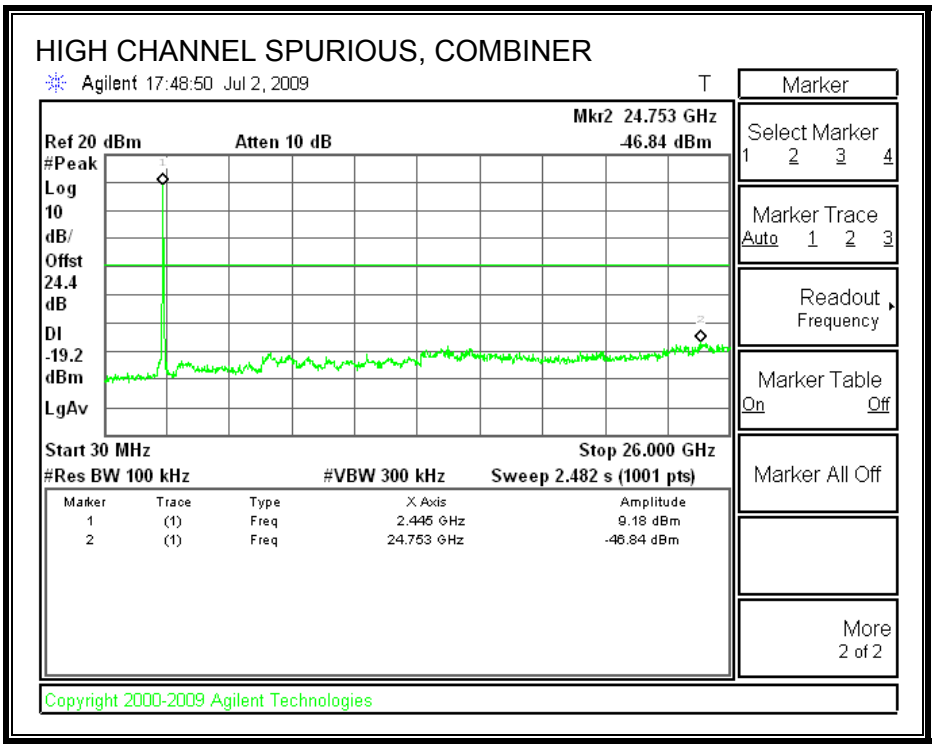
MID CHANNEL SPURIOUS EMISSIONS





HIGH CHANNEL SPURIOUS EMISSIONS





7.5. 5.8 GHz BAND CHANNEL TESTS FOR 802.11a MODE

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.

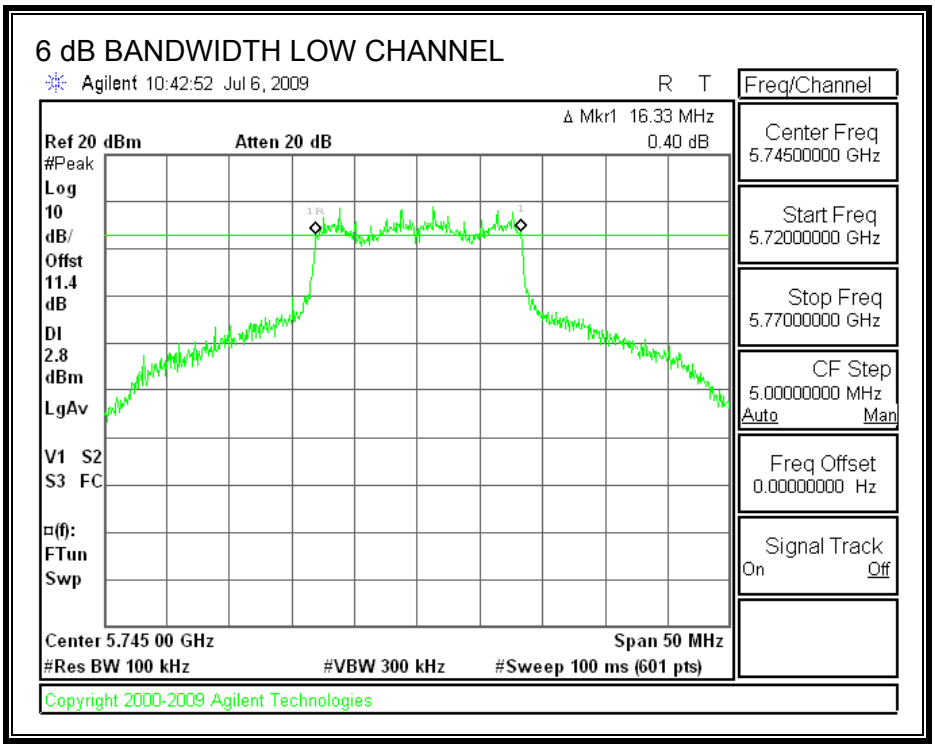
TEST PROCEDURE

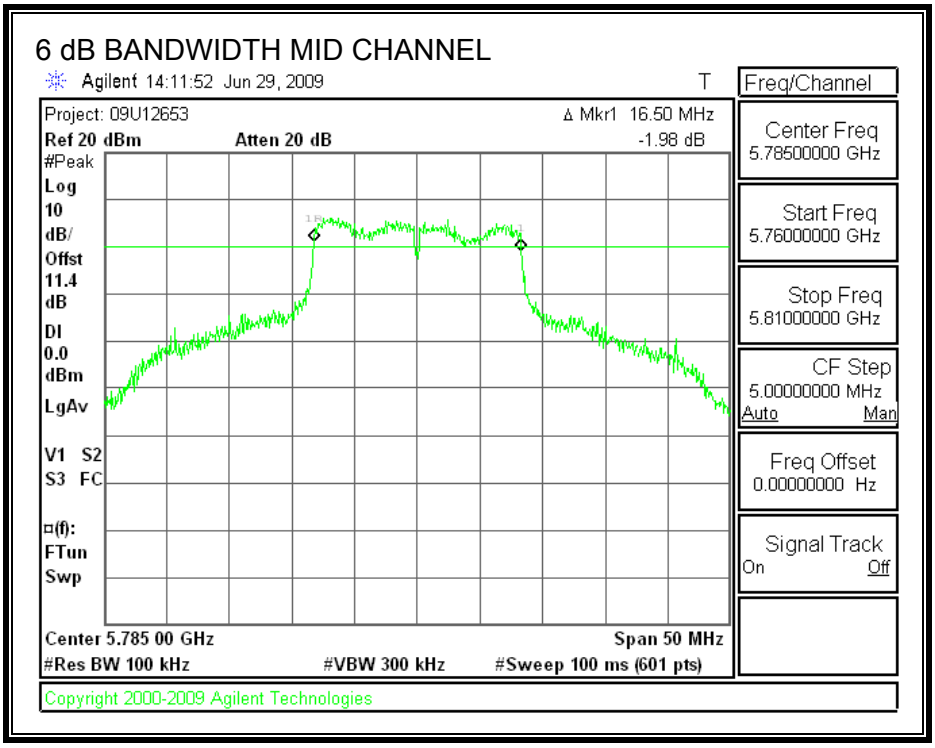
The transmitter output is connected to a spectrum analyzer. The RBW is set to 100 kHz and the VBW is set to 300 kHz. The sweep time is coupled.

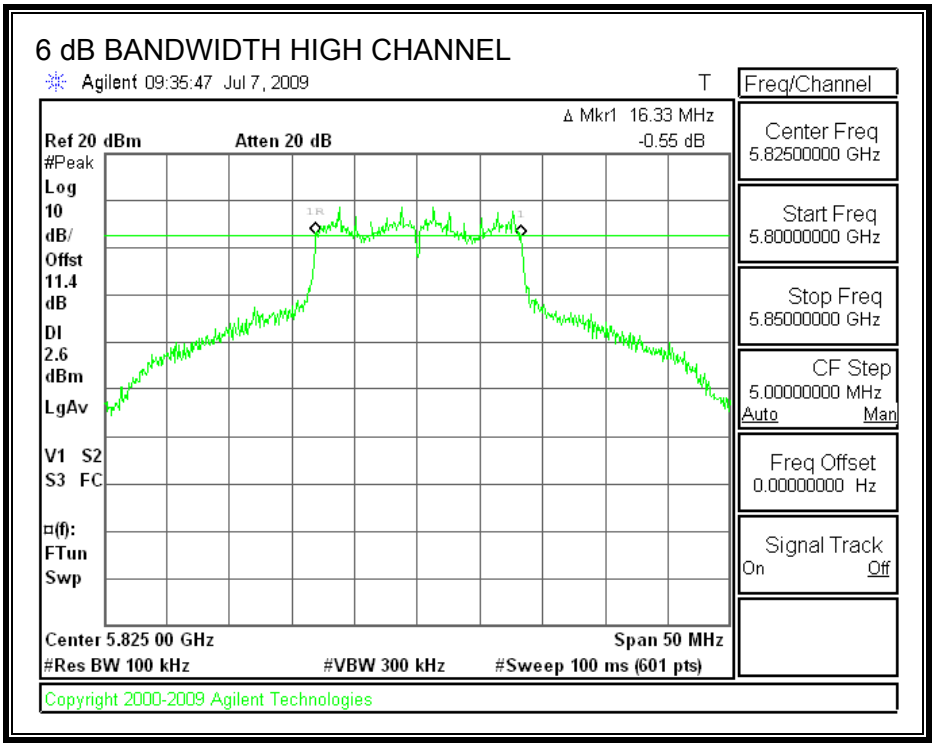
RESULTS

Channel	Frequency (MHz)	6 dB BW (MHz)	Minimum Limit (MHz)
Low	5745	16.33	0.5
Middle	5785	16.50	0.5
High	5825	16.33	0.5

6 dB BANDWIDTH







7.5.2. 99% & 26 dB BANDWIDTH

LIMITS

None; for reporting purposes only.

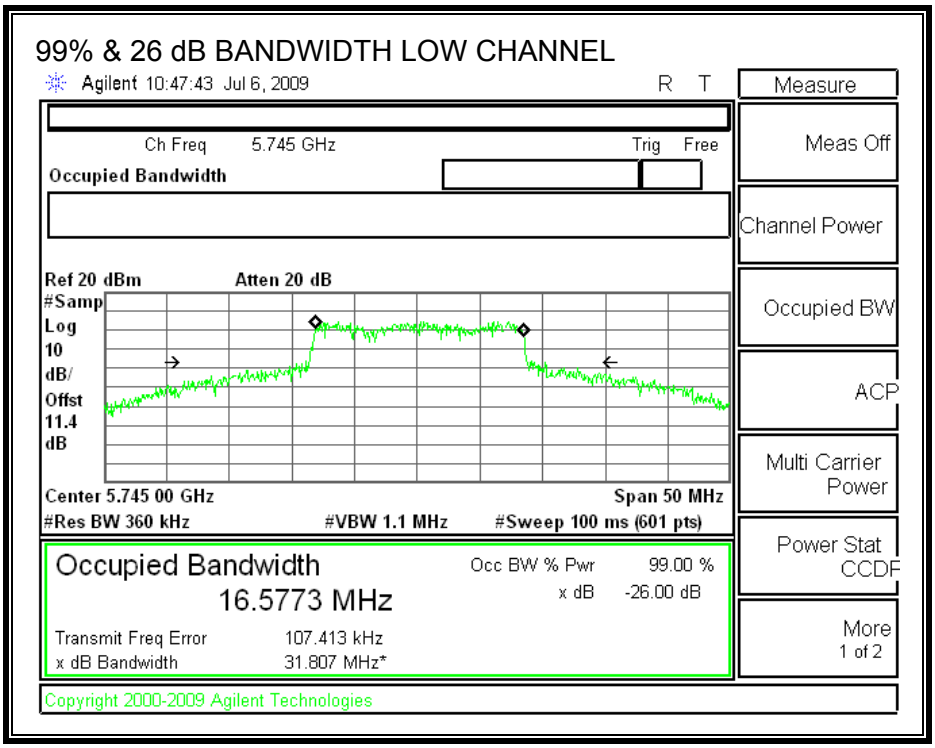
TEST PROCEDURE

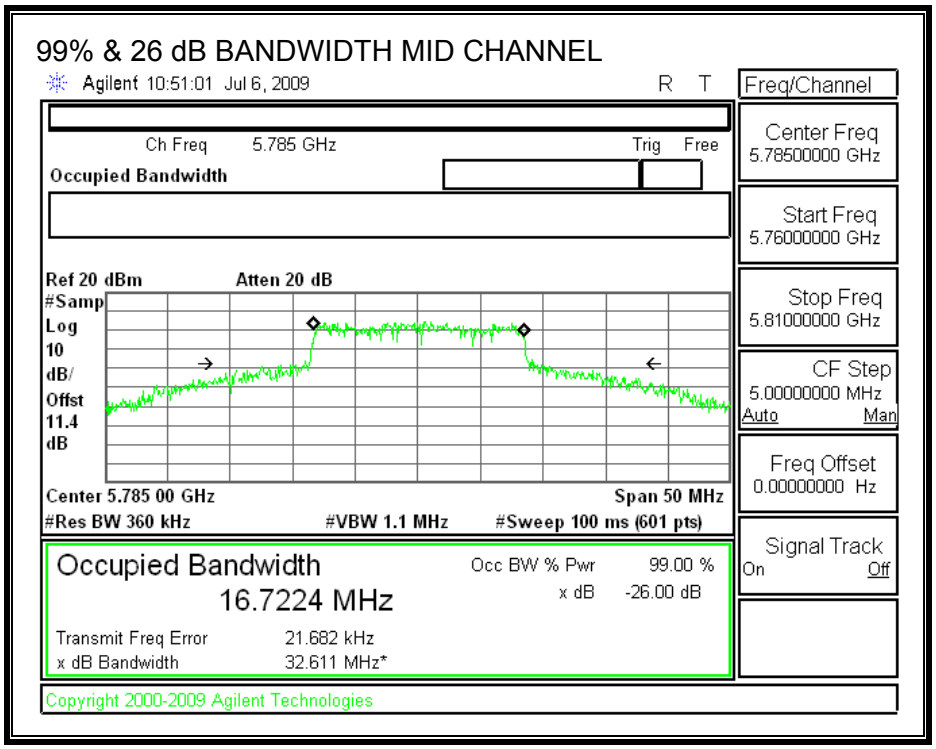
The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal bandwidth measurement function is utilized.

RESULTS

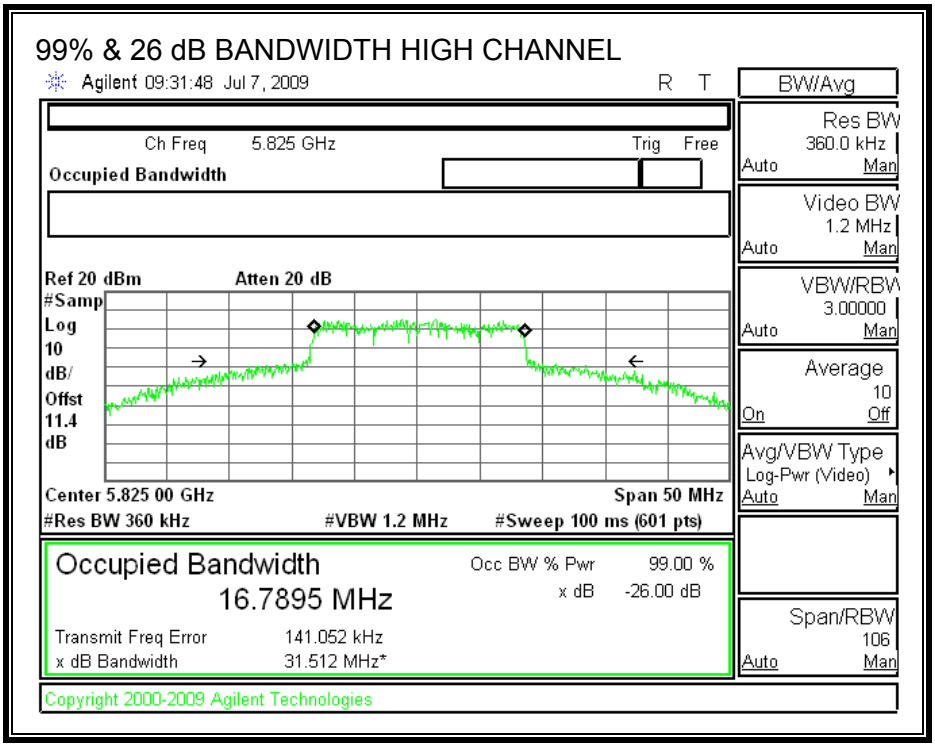
Channel	Frequency (MHz)	99% OBW (MHz)	26 dB BW (MHz)
Low	5745	16.58	31.81
Middle	5785	16.72	32.61
High	5825	16.79	31.51

99% & 26 dB BANDWIDTH





99% & 26 dB BANDWIDTH HIGH CHANNEL



7.5.3. OUTPUT POWER

LIMITS

FCC §15.247 (b)

IC RSS-210 A8.4

TEST PROCEDURE

Output power was measured based on the use of RMS averaging over a time interval in accordance with FCC document “Measurement of Digital Transmission Systems Operating under Section 15.247”, March 23, 2005.

RESULTS

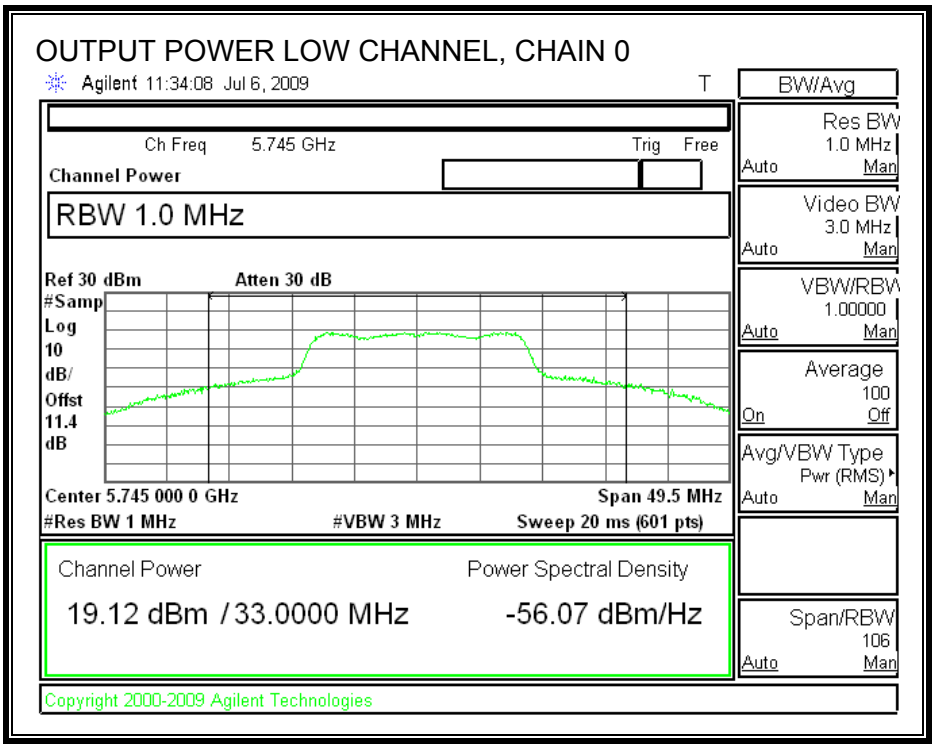
Effective Legacy Mode Composite Gain of 4 Identical Antennas:

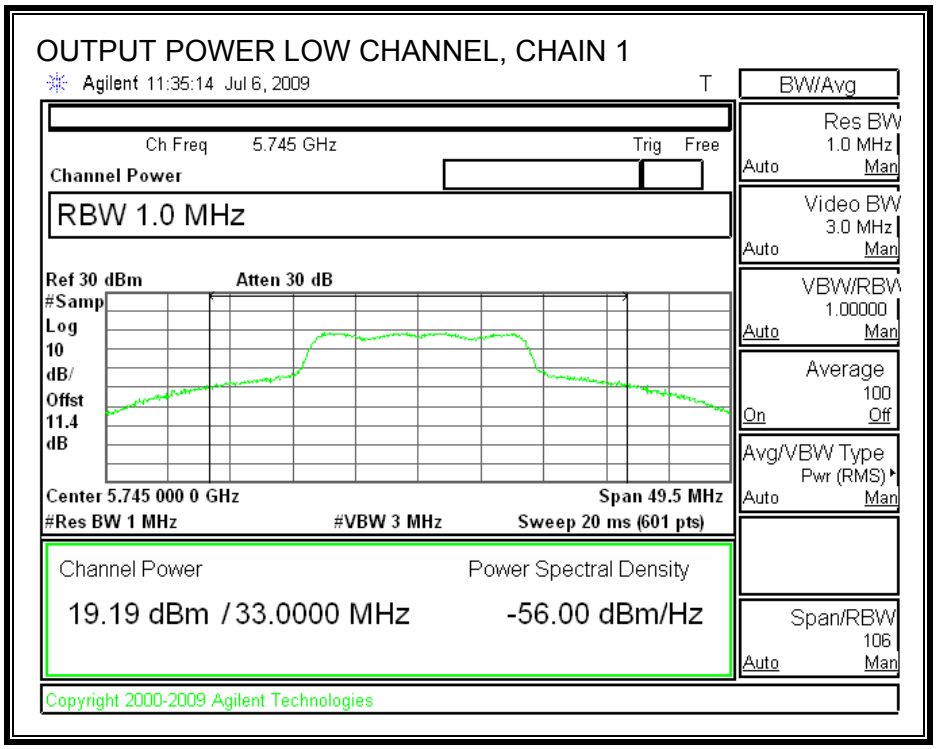
Antenna Gain (dBi)	10 Log (# Tx Chains) (dB)	Effective Legacy Gain (dBi)
3	6.02	9.02

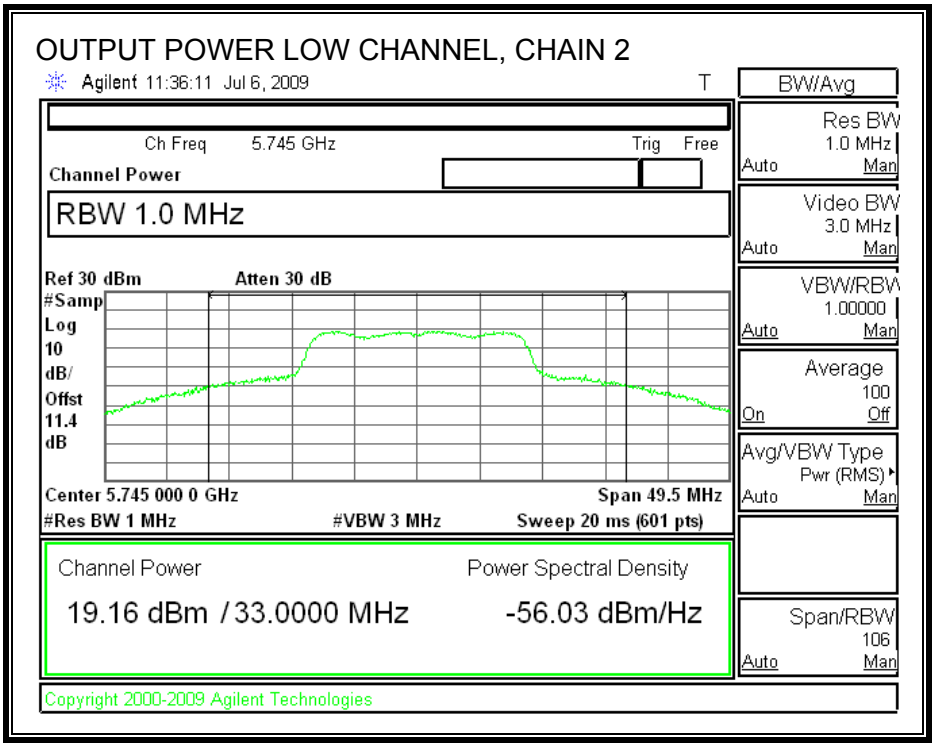
The composite antenna gain is 9.02 dBi, therefore the limit is 26.98 dBm.

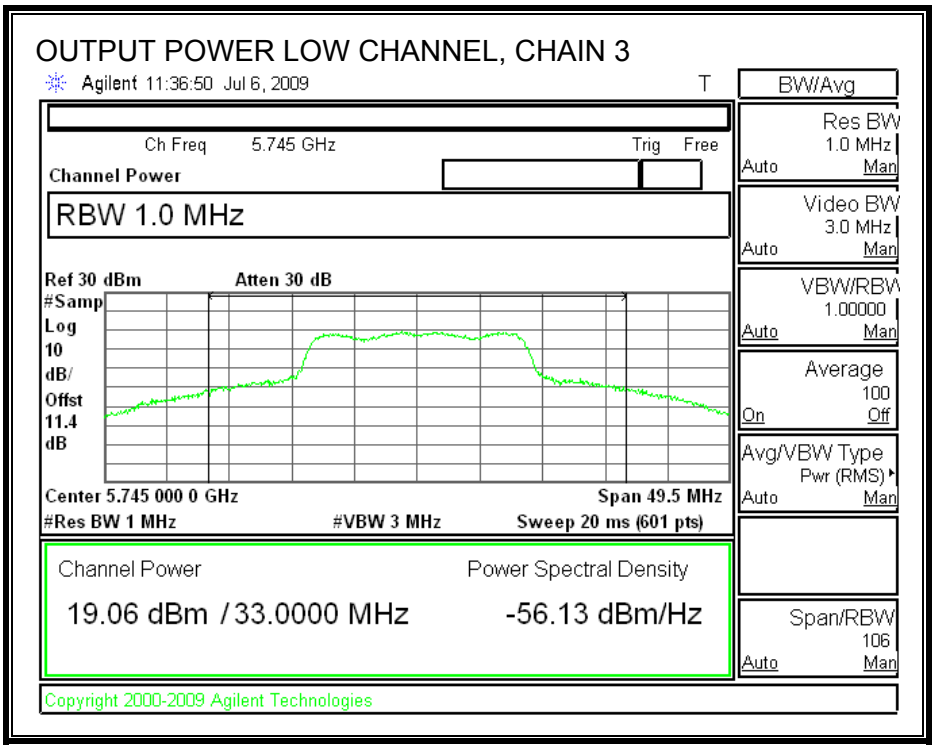
Channel	Frequency (MHz)	Chain 0 Power (dBm)	Chain 1 Power (dBm)	Chain 2 Power (dBm)	Chain 3 Power (dBm)	Total Power (dBm)	Limit (dBm)	Margin (dB)
Low	**5745**	19.12	19.19	19.16	19.06	**25.15**	**26.98**	**-1.83**
Mid	**5785**	19.19	19.22	19.11	18.94	**25.14**	**26.98**	**-1.84**
High	**5825**	19.14	19.08	19.11	19.07	**25.12**	**26.98**	**-1.86**

OUTPUT POWER, LOW CHANNEL

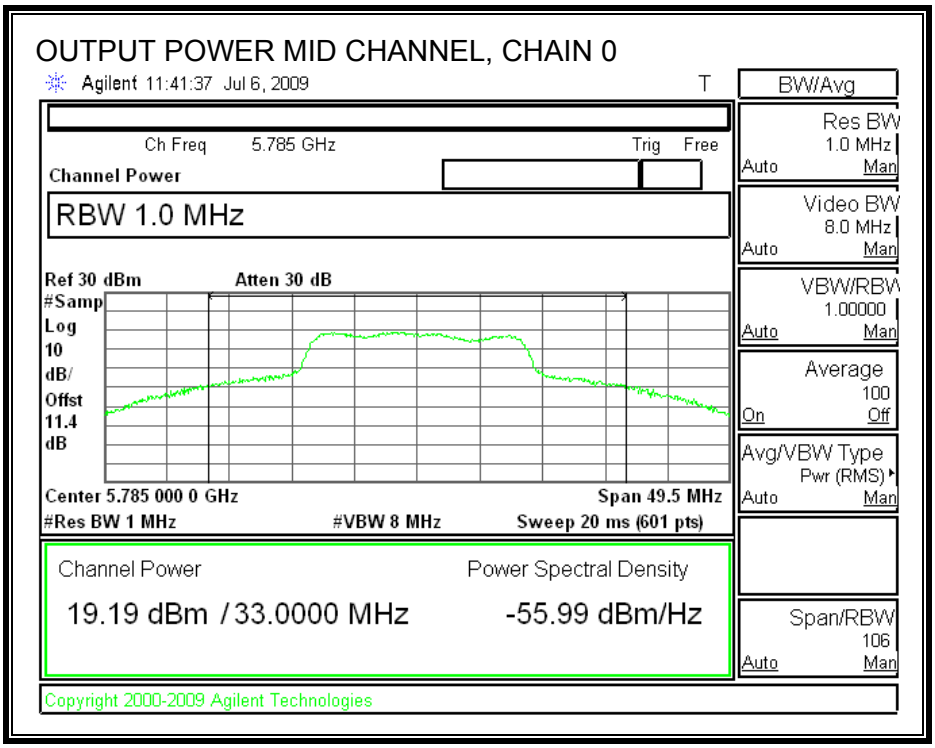


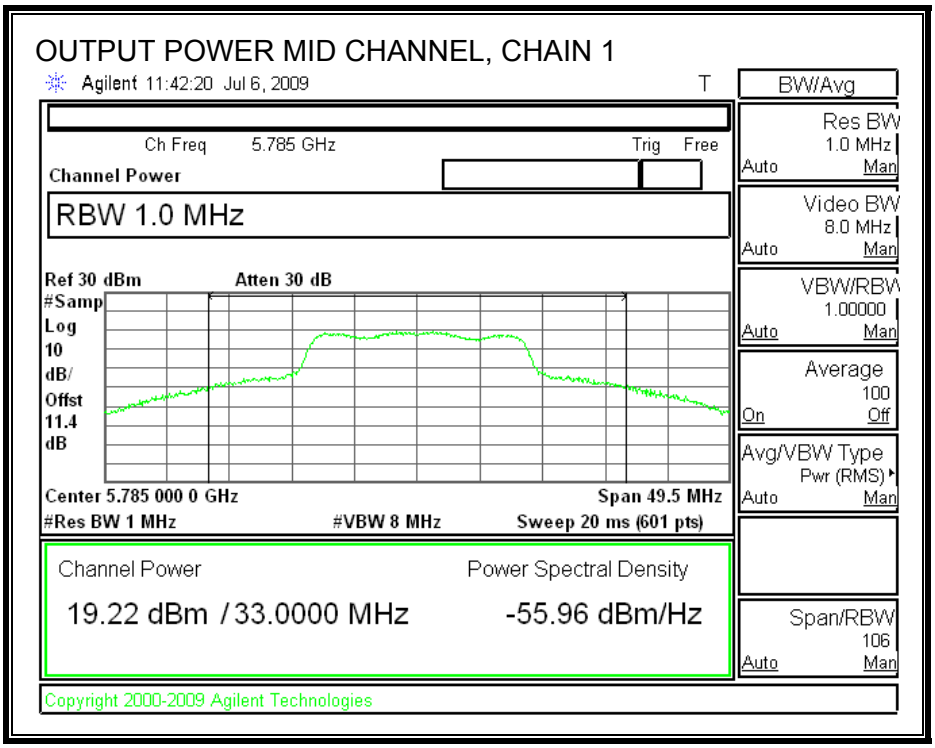


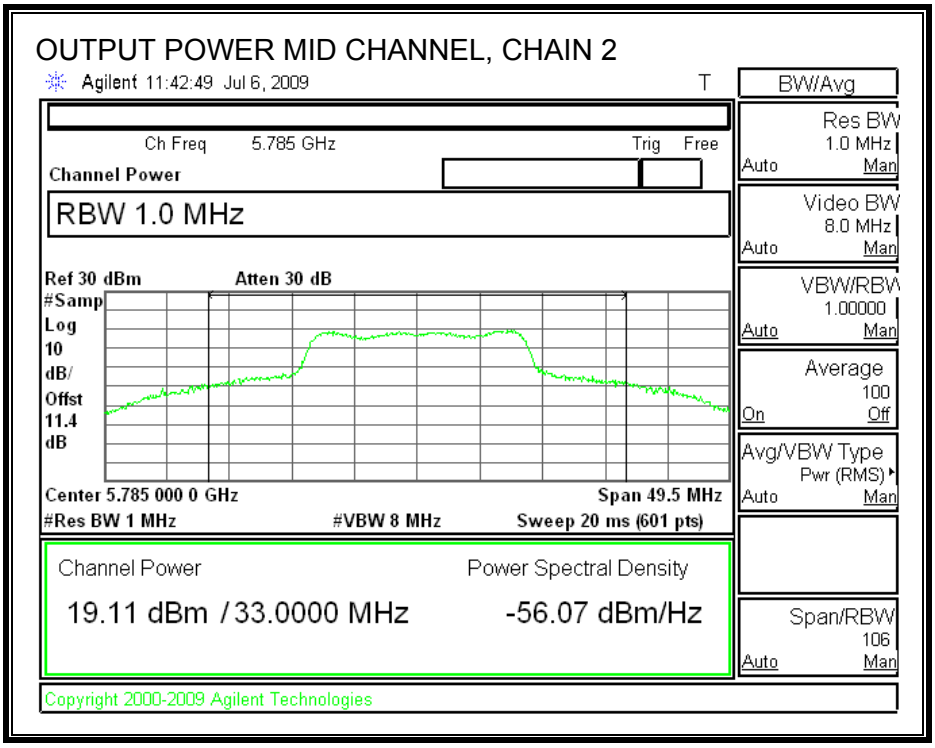


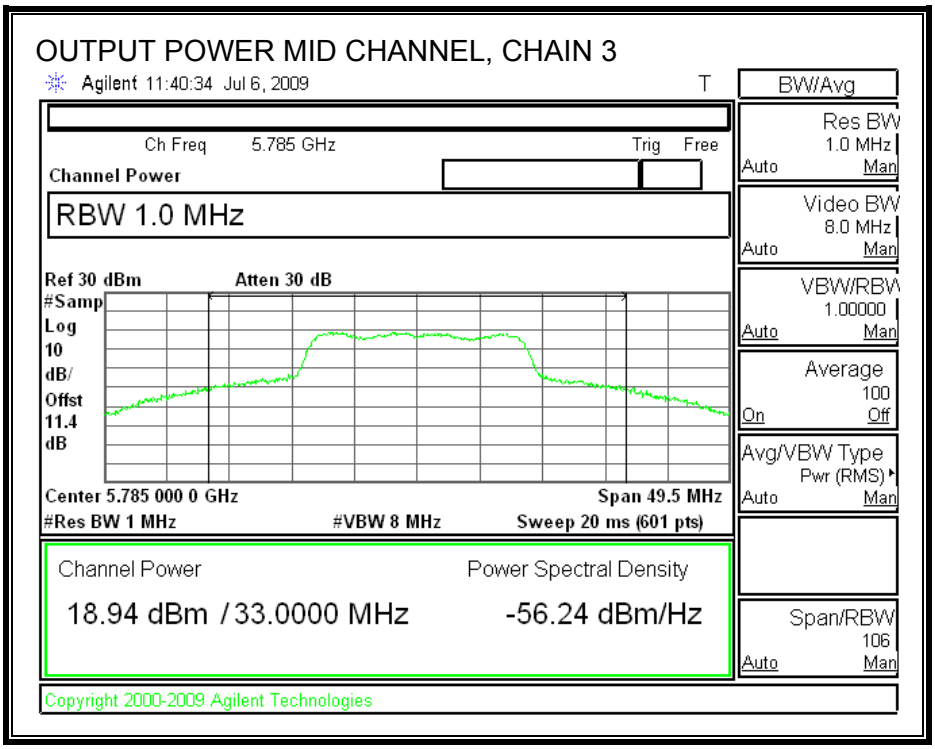


OUTPUT POWER, MID CHANNEL

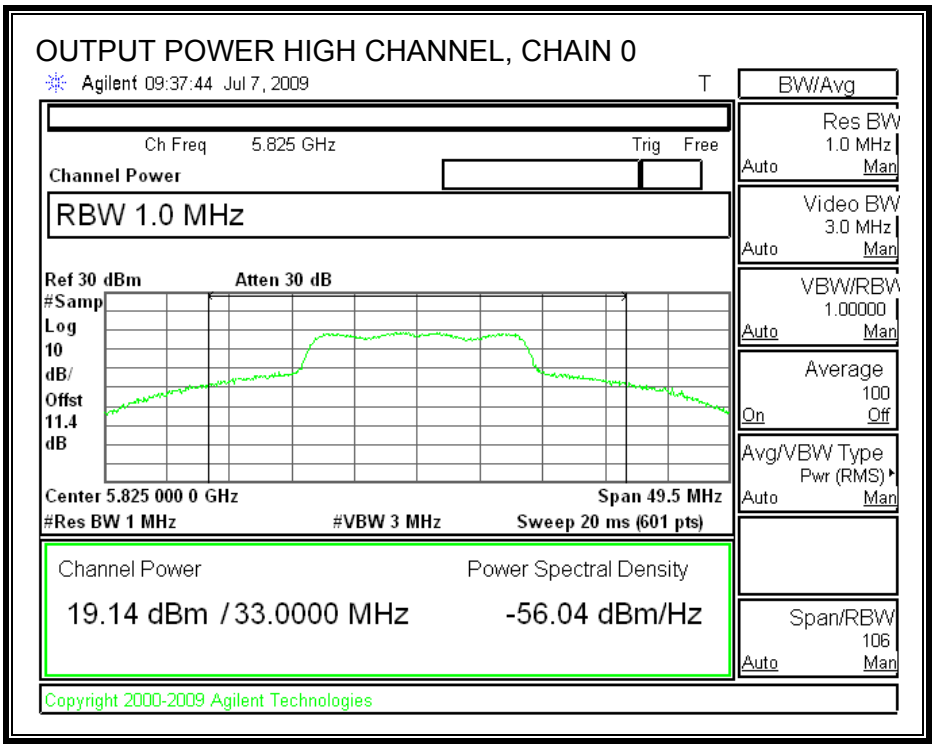


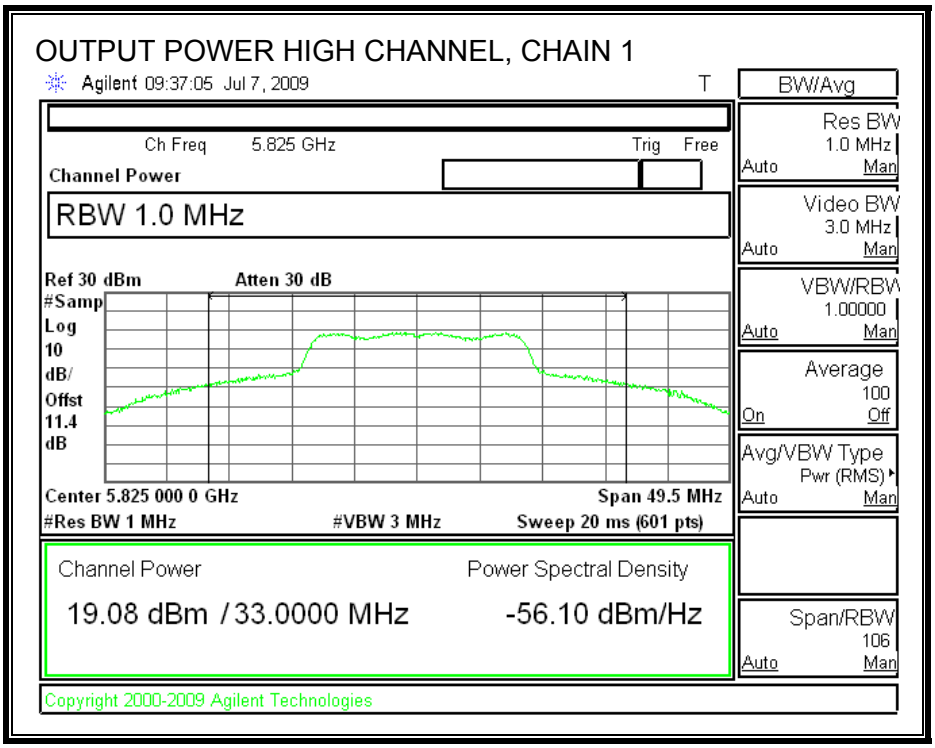


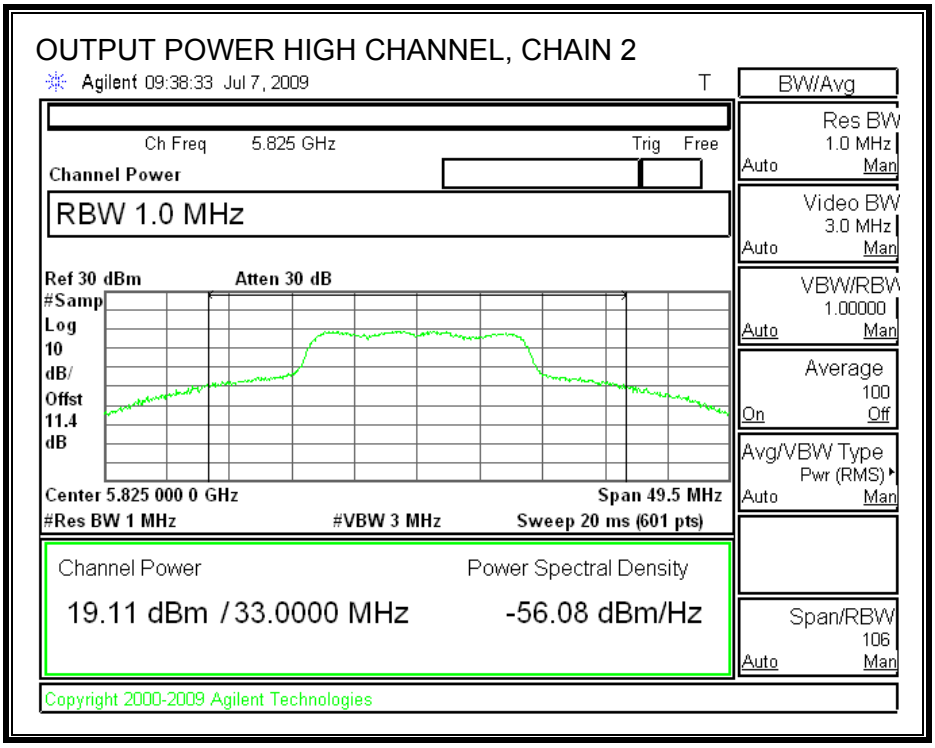


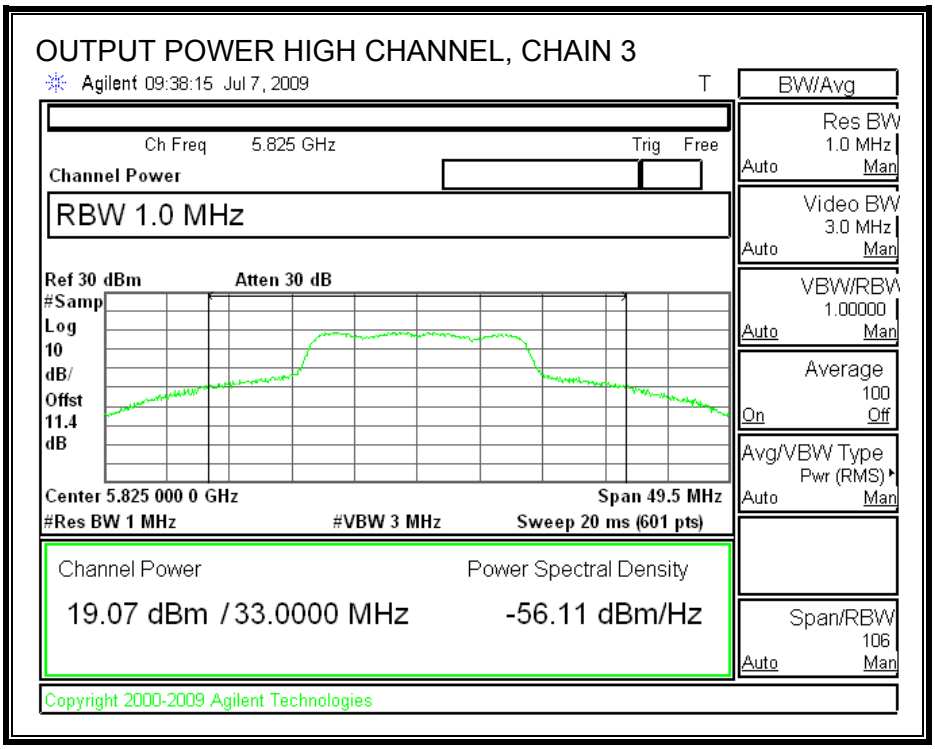


OUTPUT POWER, HIGH CHANNEL









7.5.4. AVERAGE POWER

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a power meter.

The cable assembly insertion loss of 11.4 dB (including 10 dB pad and 1.4 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

RESULTS

Channel	Frequency (MHz)	Chain 0 Power (dBm)	Chain 1 Power (dBm)	Chain 2 Power (dBm)	Chain 3 Power (dBm)
Low	**5745**	19.17	18.99	19.22	19.11
Middle	**5785**	19.18	19.04	19.13	19.17
High	**5825**	19.21	18.90	19.22	19.13

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

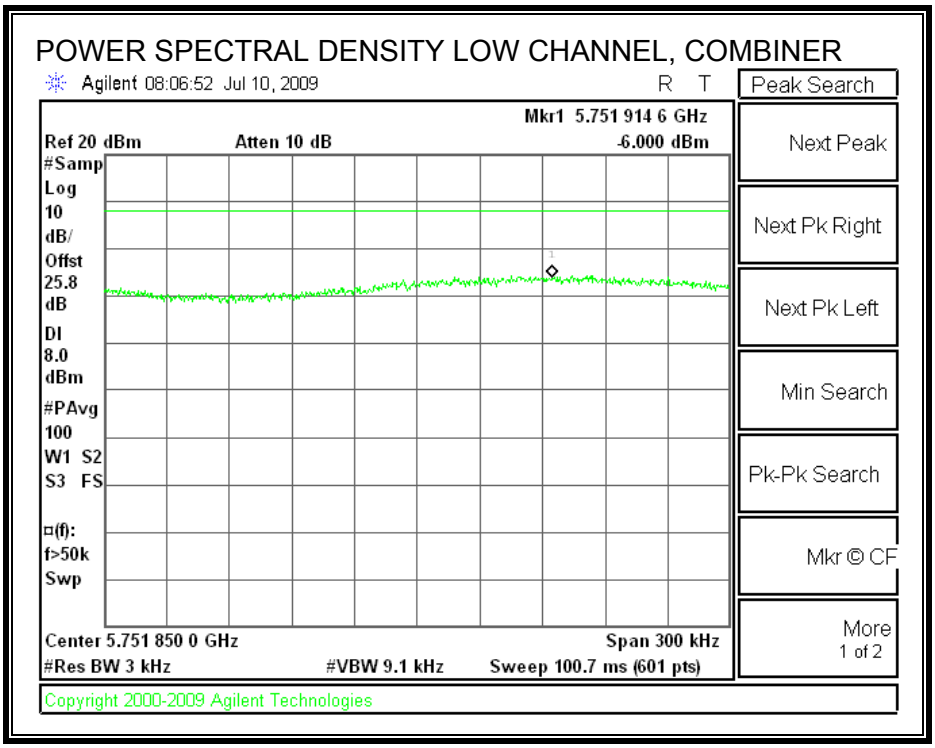
Output power was measured based on the use of RMS averaging over a time interval, therefore the power spectral density was measured using PSD Option 2 in accordance with FCC document "Measurement of Digital Transmission Systems Operating under Section 15.247", March 23, 2005.

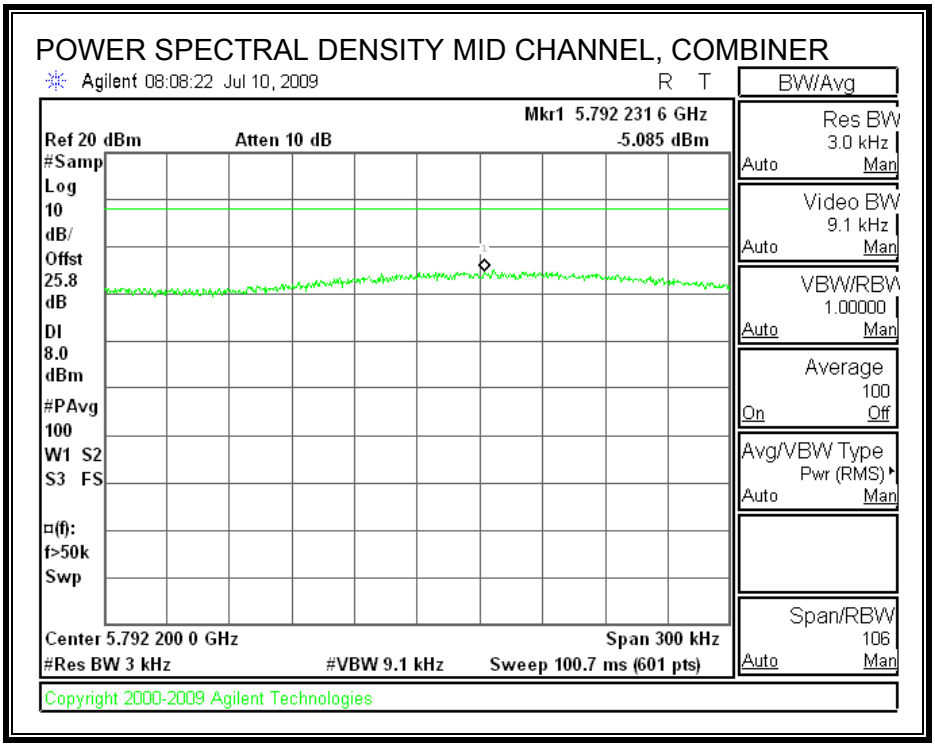
Preliminary tests on individual chains, and on all chains with a combiner, were performed. The worst-case configuration was with a combiner, therefore final test were performed with all chains feeding a combiner.

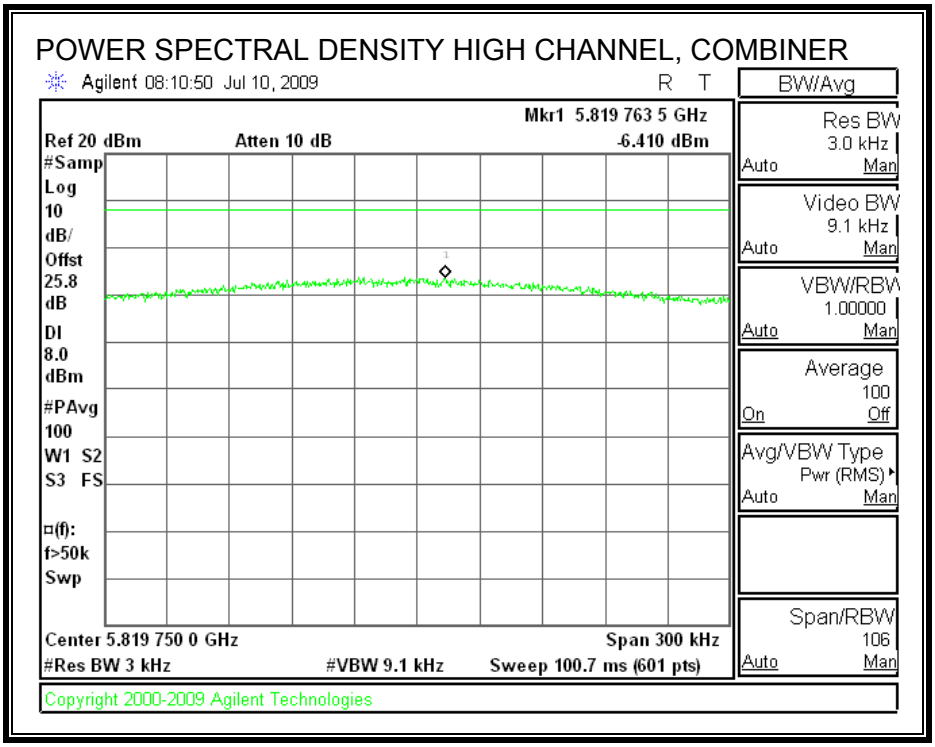
RESULTS

Channel	Frequency (MHz)	PSD with Combiner (dBm)	Limit (dBm)	Margin (dB)
Low	**5745**	-6.00	**8**	**-14.00**
Middle	**5785**	-5.09	**8**	**-13.09**
High	**5825**	-6.41	**8**	**-14.41**

POWER SPECTRAL DENSITY







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 RMS averaging over a time interval, therefore the required attenuation is 30 dBc.

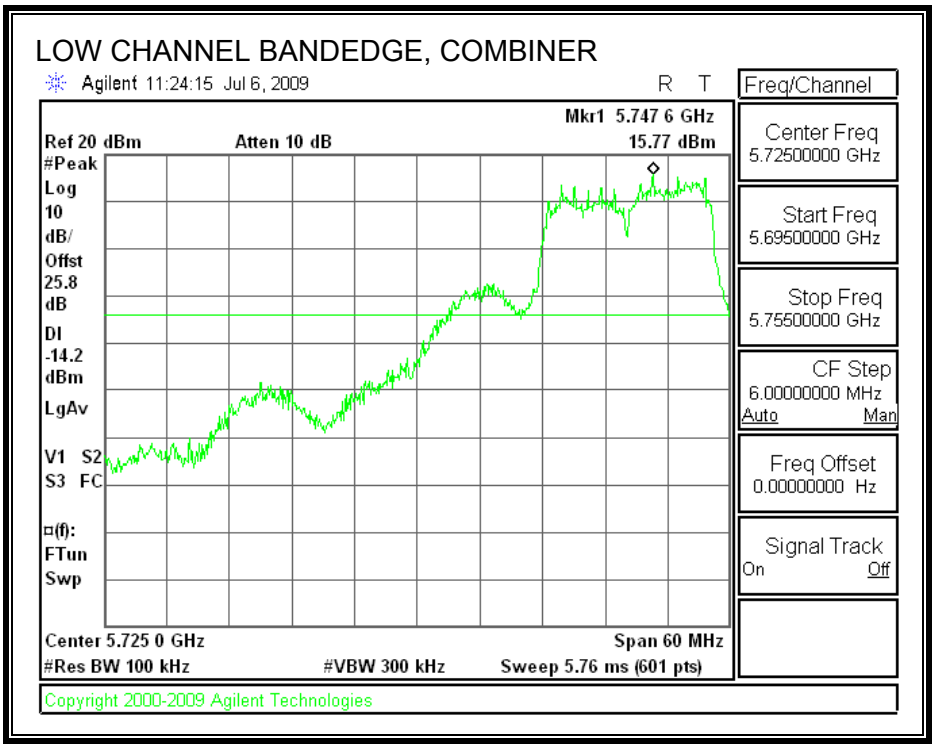
TEST PROCEDURE

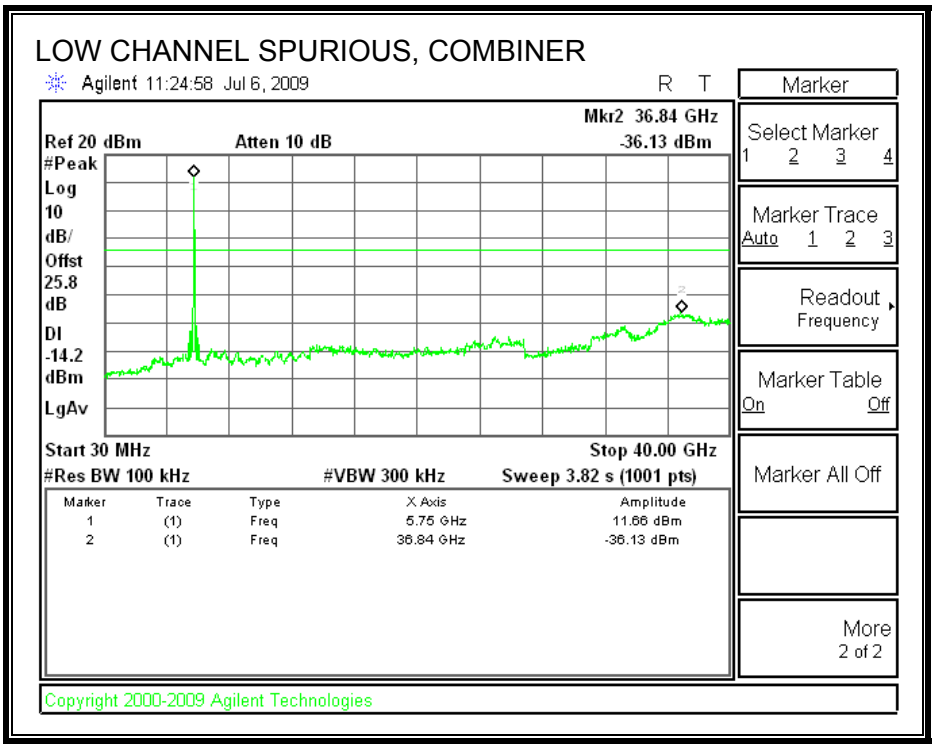
The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

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

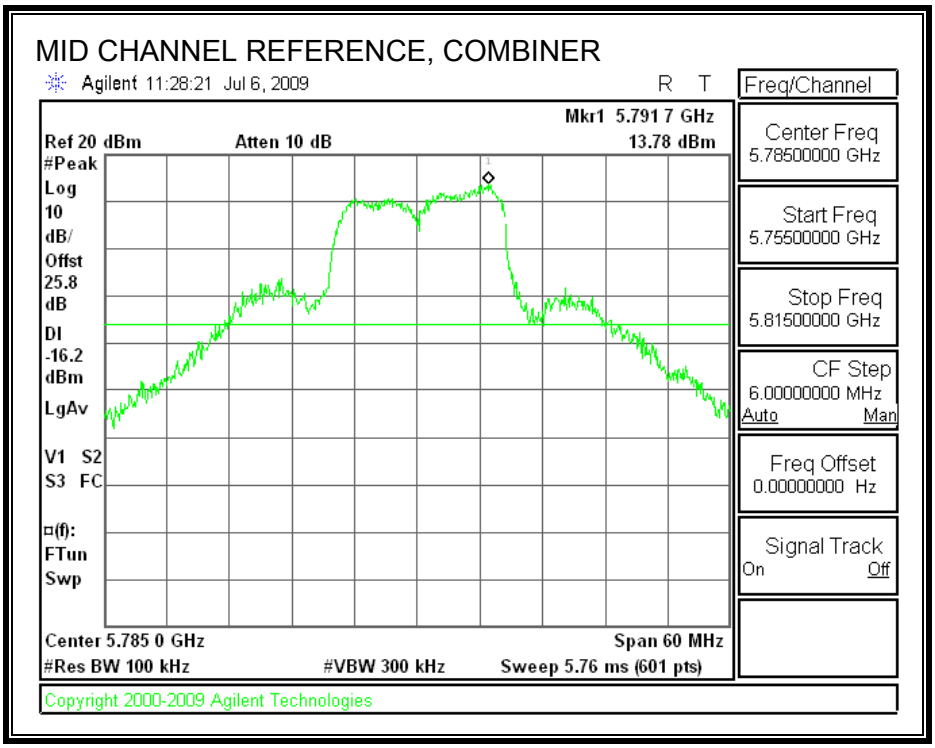
Preliminary tests on individual chains, and on all chains with a combiner, were performed. The worst-case configuration was with a combiner, therefore final test were performed with all chains feeding a combiner.

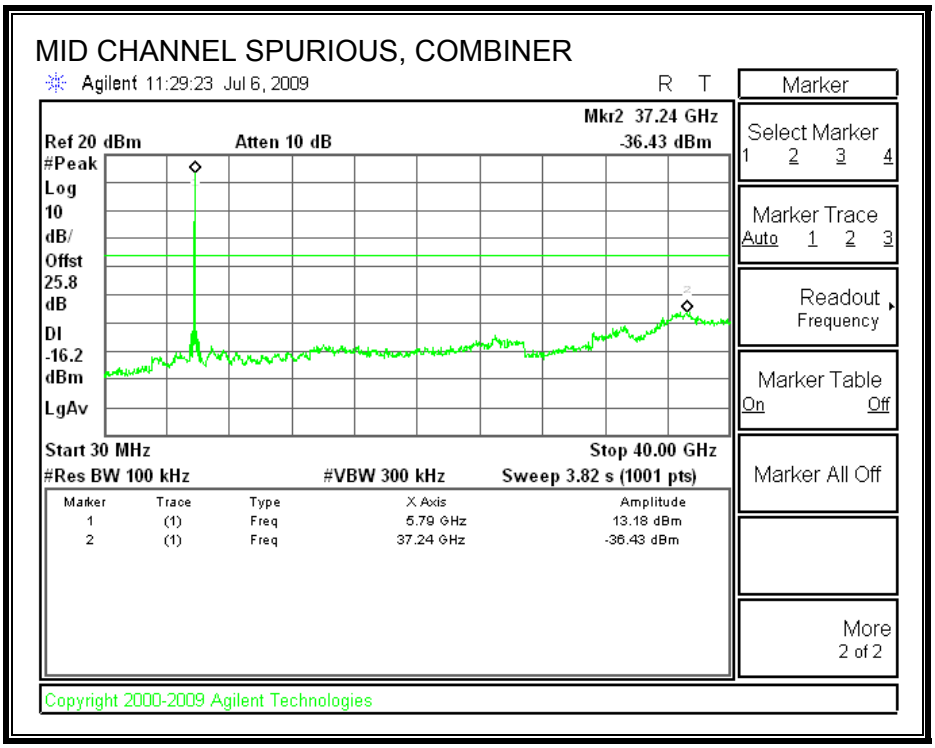
LOW CHANNEL SPURIOUS EMISSIONS



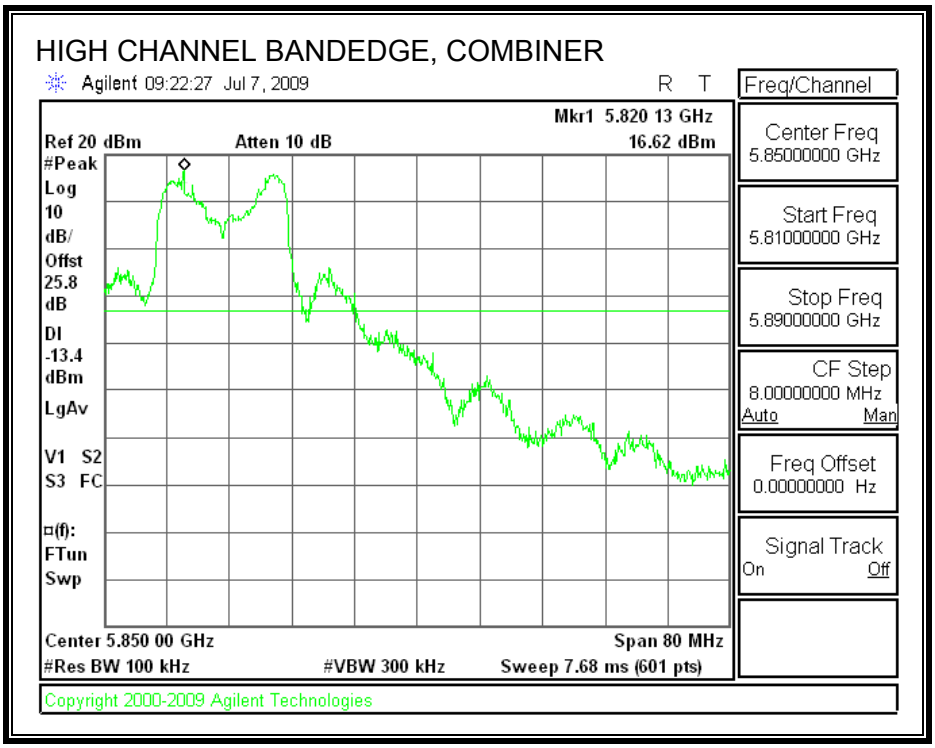


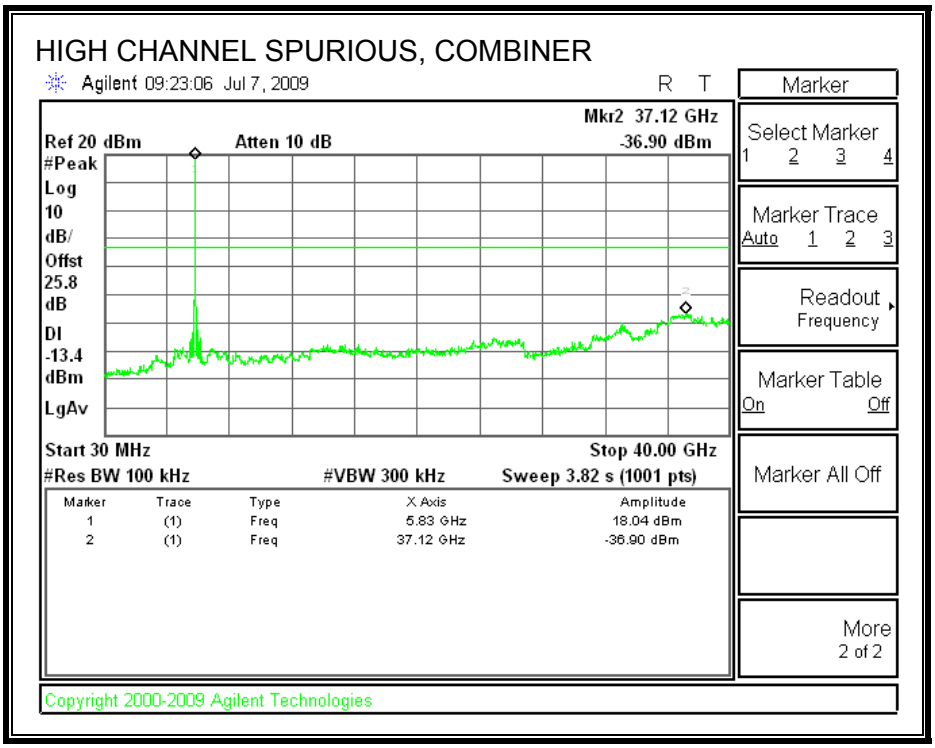
MID CHANNEL SPURIOUS EMISSIONS





HIGH CHANNEL SPURIOUS EMISSIONS





7.6. 5.8 GHz BAND CHANNEL TESTS FOR 802.11n HT20 MODE

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.

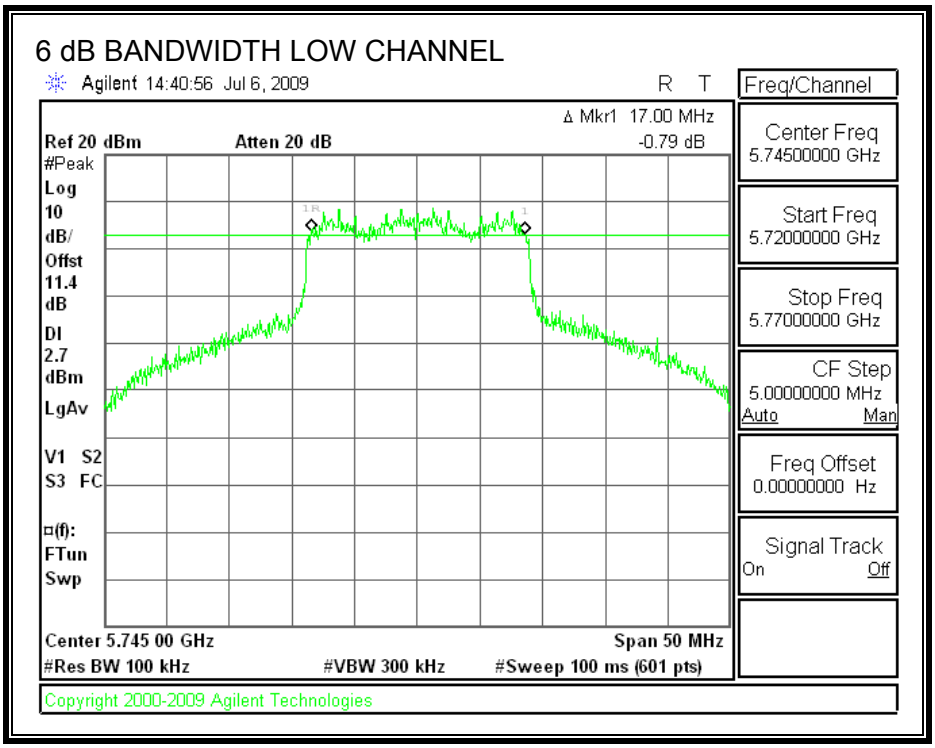
TEST PROCEDURE

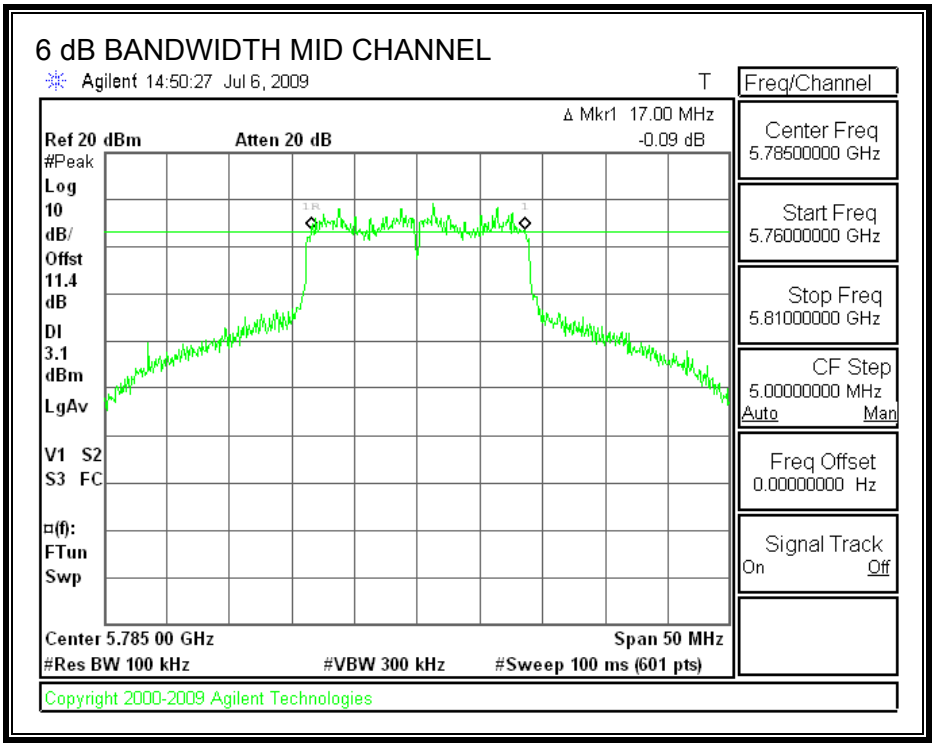
The transmitter output is connected to a spectrum analyzer. The RBW is set to 100 kHz and the VBW is set to 300 kHz. The sweep time is coupled.

RESULTS

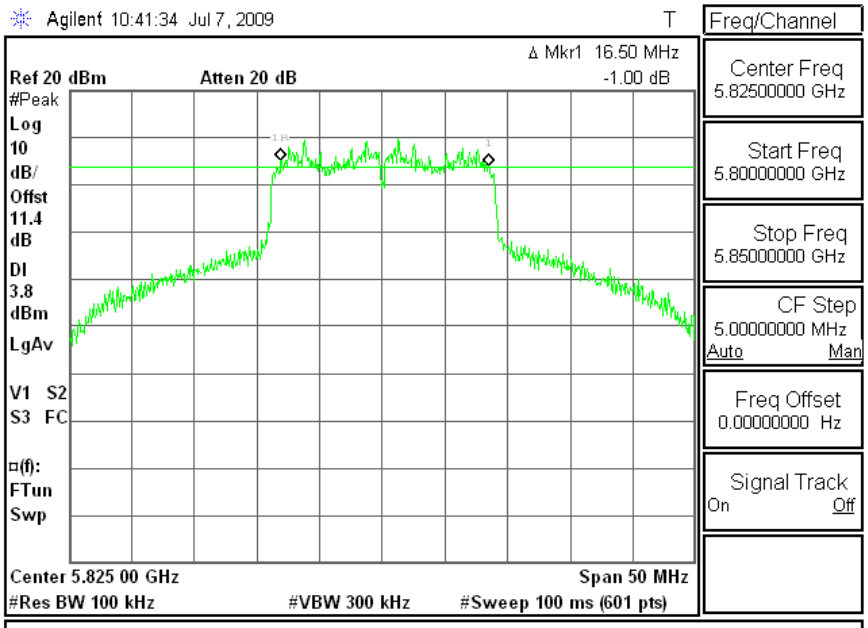
Channel	Frequency (MHz)	6 dB BW (MHz)	Minimum Limit (MHz)
Low	5745	17.00	0.5
Middle	5785	17.00	0.5
High	5825	16.50	0.5

6 dB BANDWIDTH





6 dB BANDWIDTH HIGH CHANNEL



7.6.2. 99% & 26 dB BANDWIDTH

LIMITS

None; for reporting purposes only.

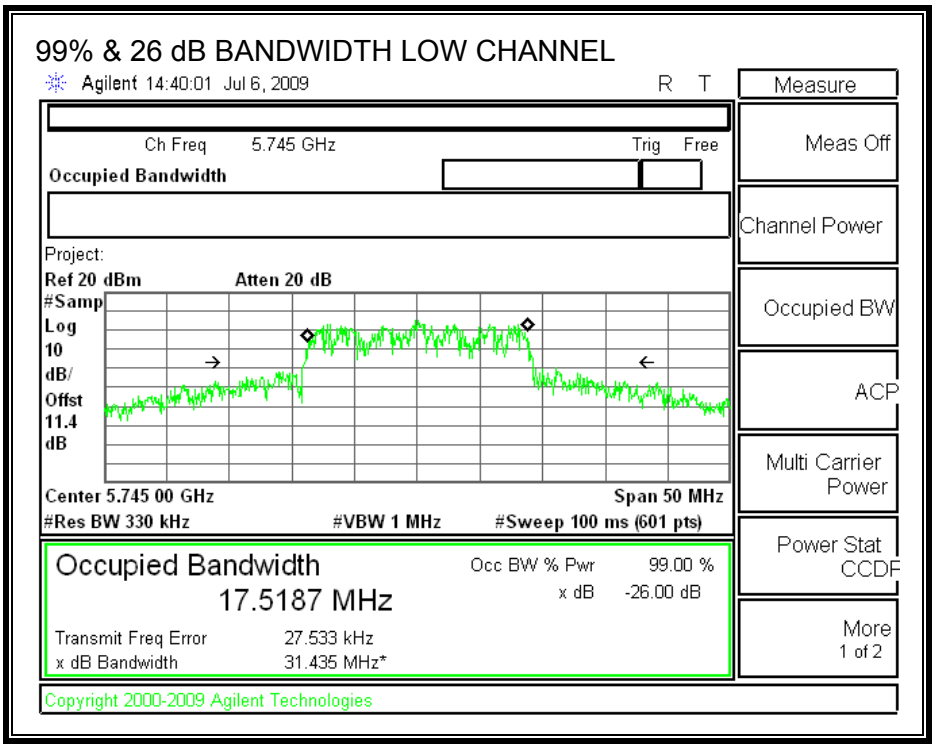
TEST PROCEDURE

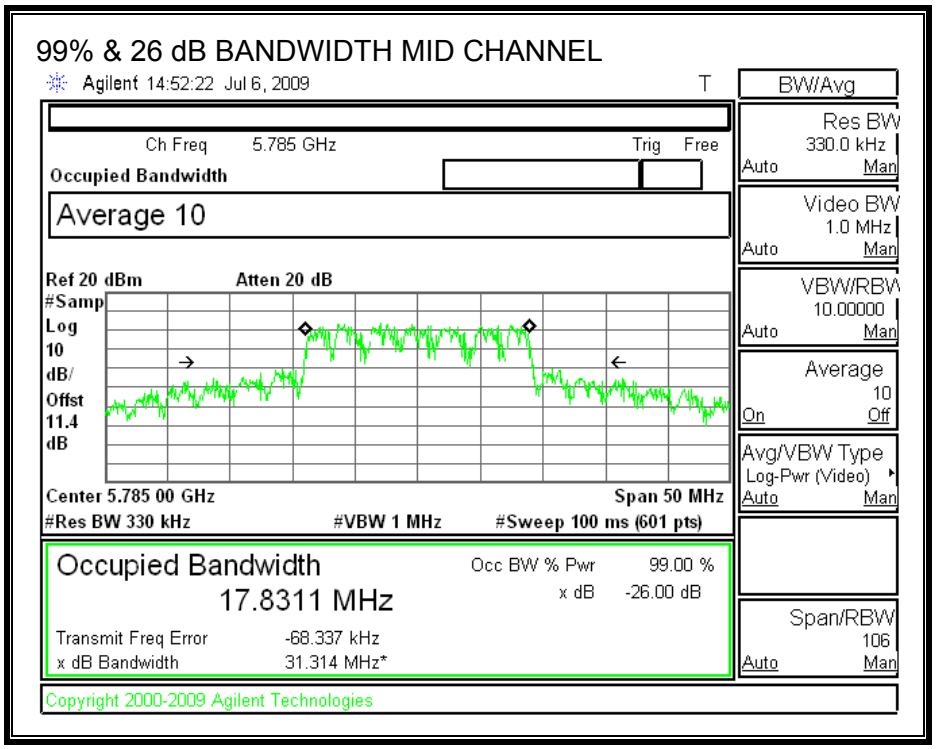
The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal bandwidth measurement function is utilized.

RESULTS

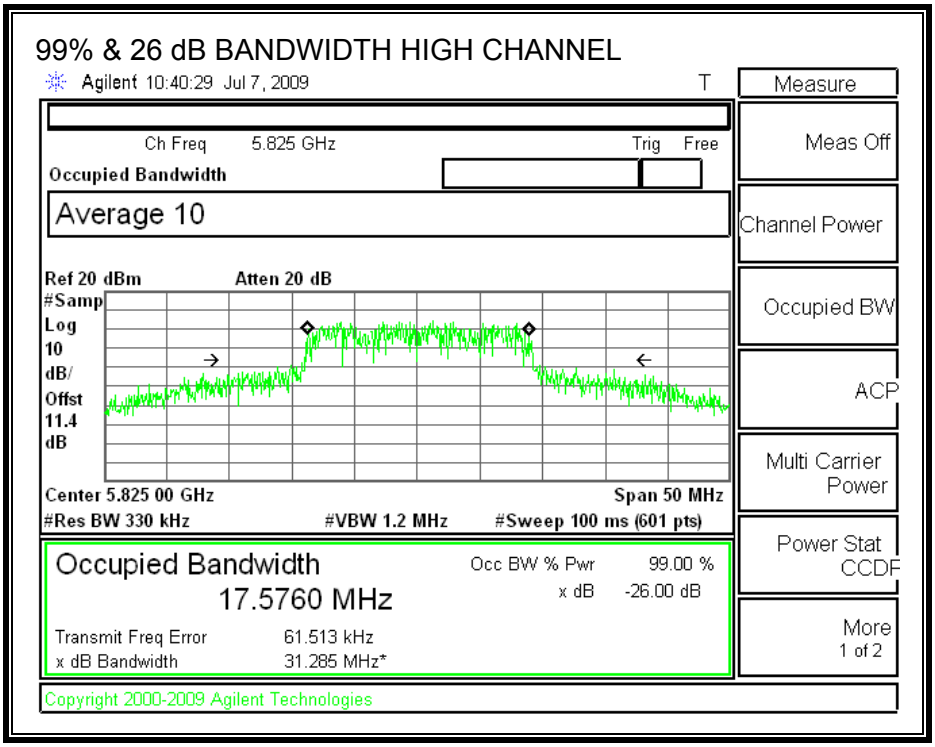
Channel	Frequency (MHz)	99% OBW (MHz)	26 dB BW (MHz)
Low	5745	17.52	31.44
Middle	5785	17.83	31.31
High	5825	17.58	31.29

99% & 26 dB BANDWIDTH





99% & 26 dB BANDWIDTH HIGH CHANNEL



7.6.3. OUTPUT POWER

LIMITS

FCC §15.247 (b)

IC RSS-210 A8.4

TEST PROCEDURE

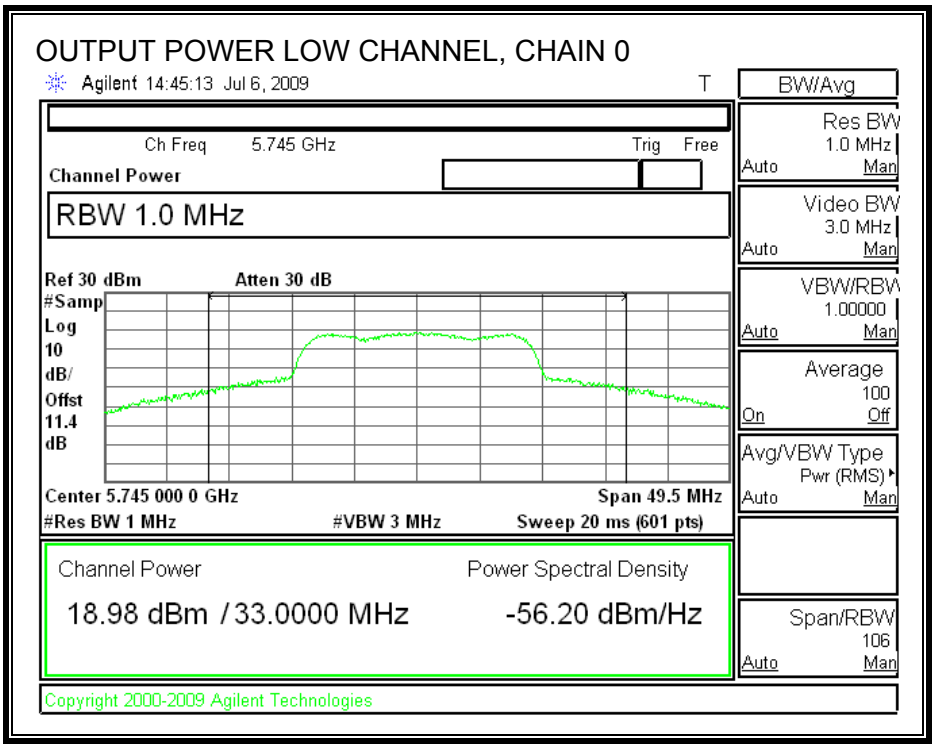
Output power was measured based on the use of RMS averaging over a time interval in accordance with FCC document “Measurement of Digital Transmission Systems Operating under Section 15.247”, March 23, 2005.

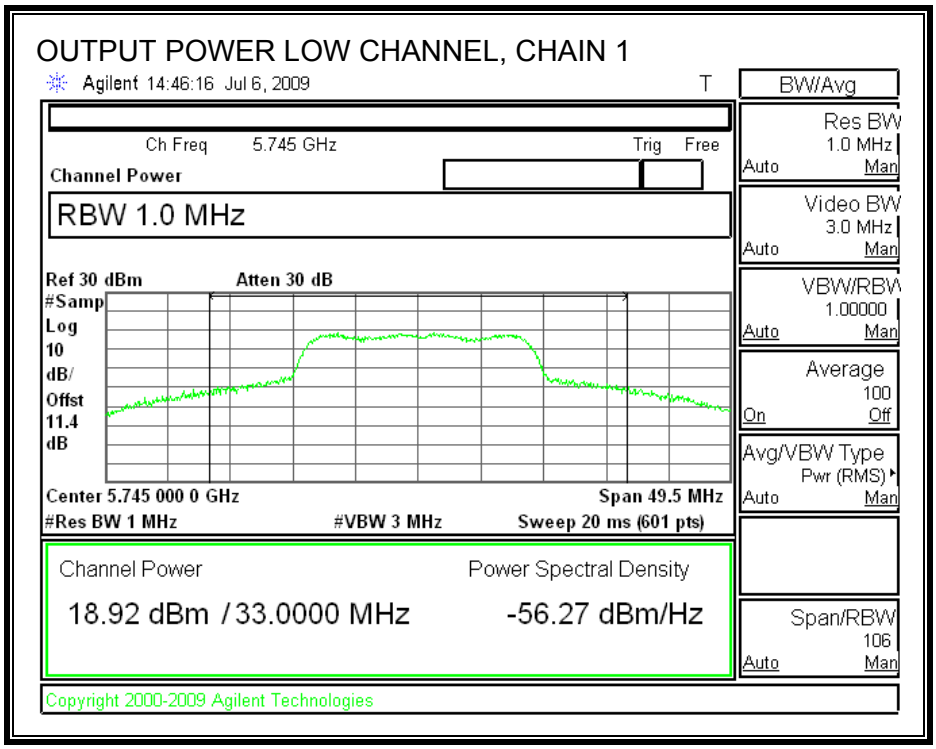
RESULTS

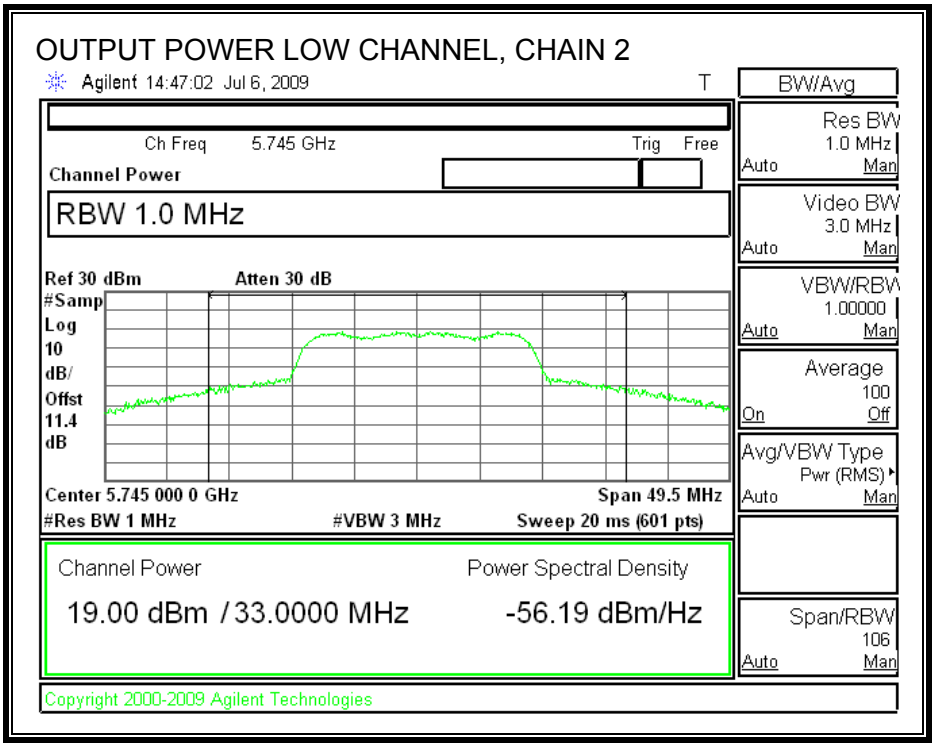
The maximum antenna gain is less than 6 dBi, therefore the limit is 30 dBm.

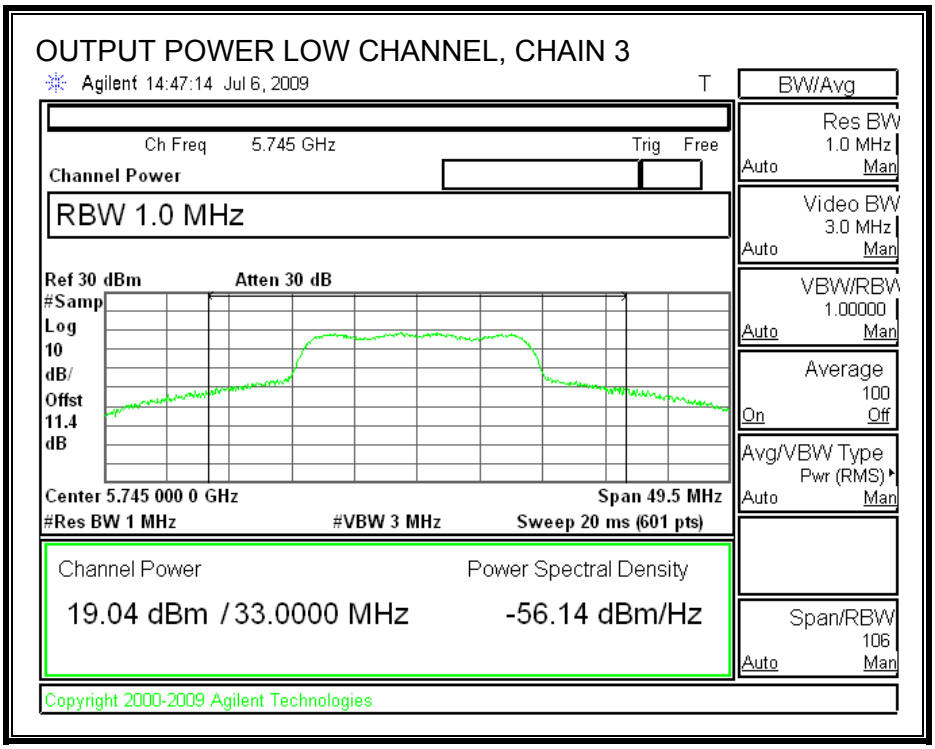
Channel	Frequency (MHz)	Chain 0 Power (dBm)	Chain 1 Power (dBm)	Chain 2 Power (dBm)	Chain 3 Power (dBm)	Total Power (dBm)	Limit (dBm)	Margin (dB)
Low	**5745**	18.98	18.92	19.00	19.04	**25.01**	**30**	**-4.99**
Mid	**5785**	18.98	19.13	18.96	18.99	**25.04**	**30**	**-4.96**
High	**5825**	19.23	19.19	19.28	19.16	**25.24**	**30**	**-4.76**

OUTPUT POWER, LOW CHANNEL

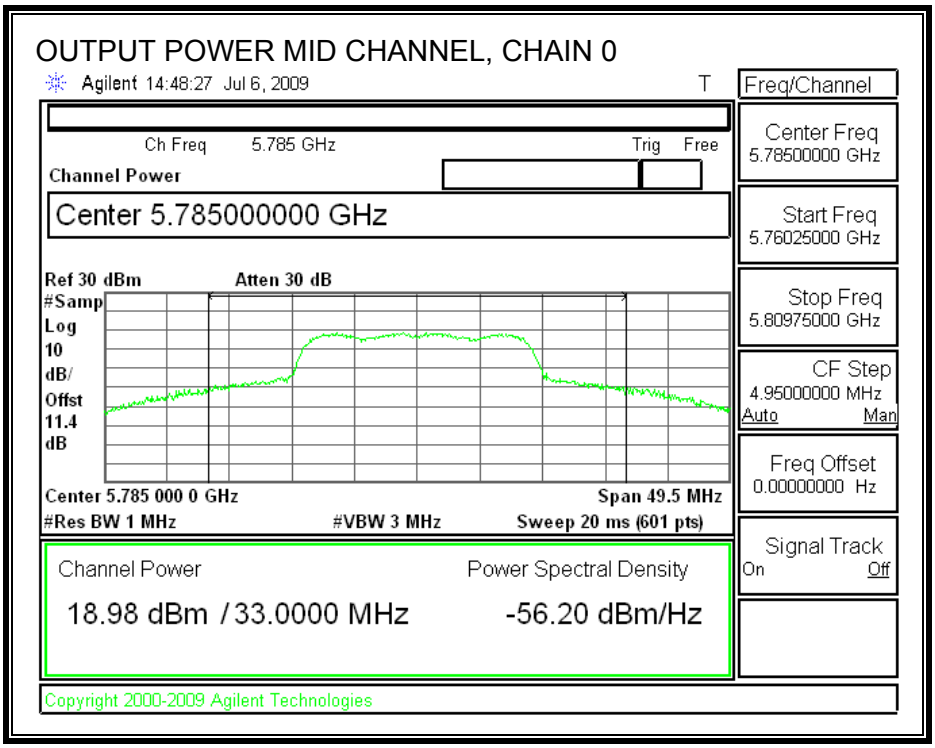


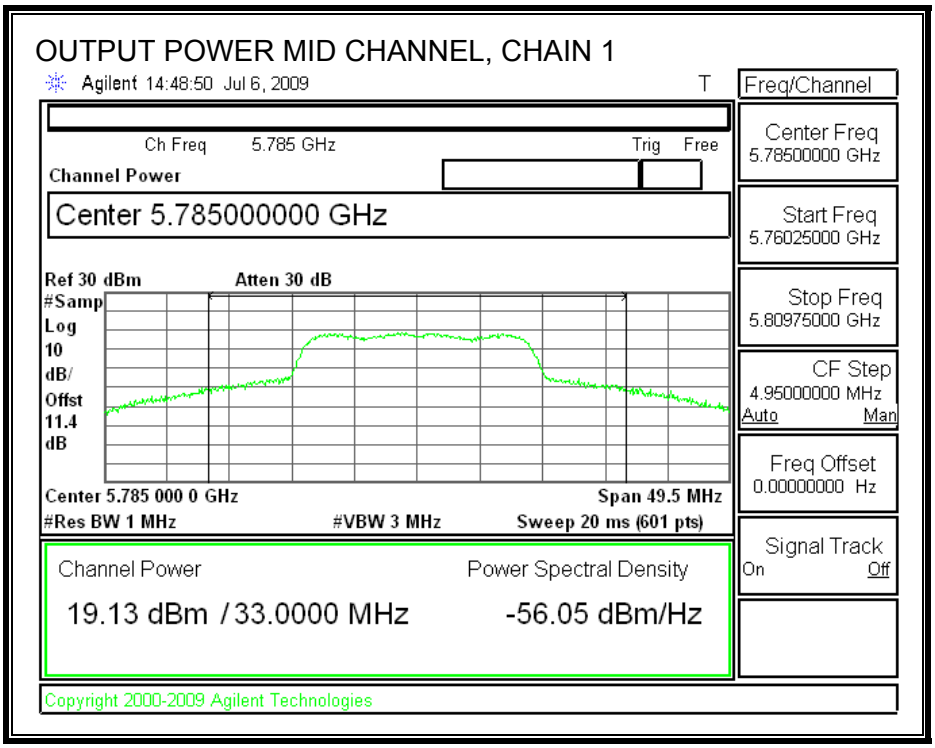


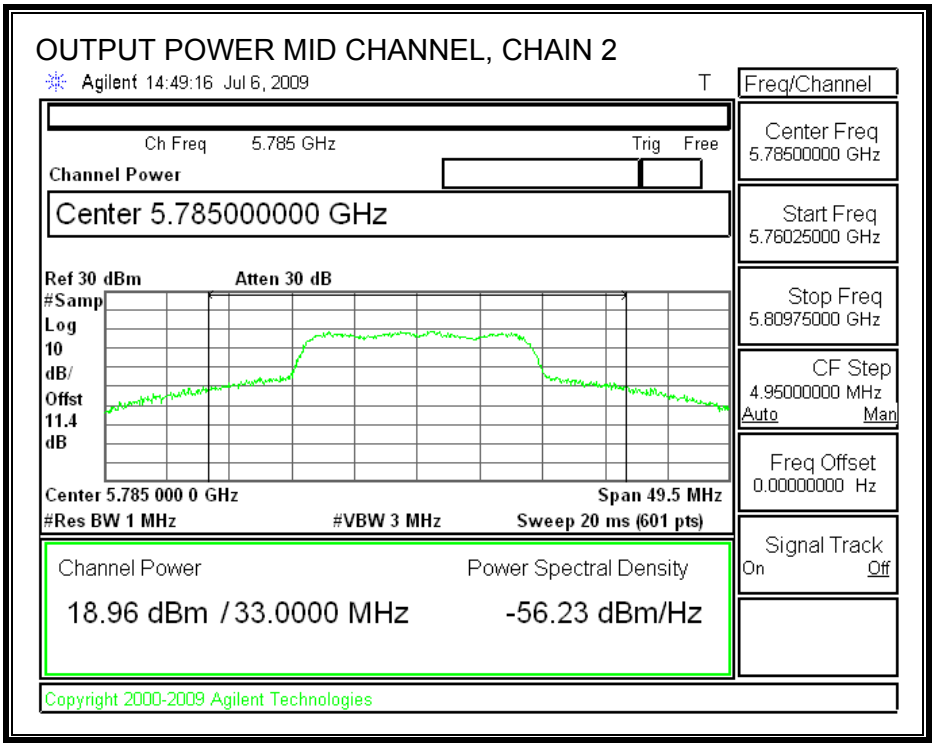


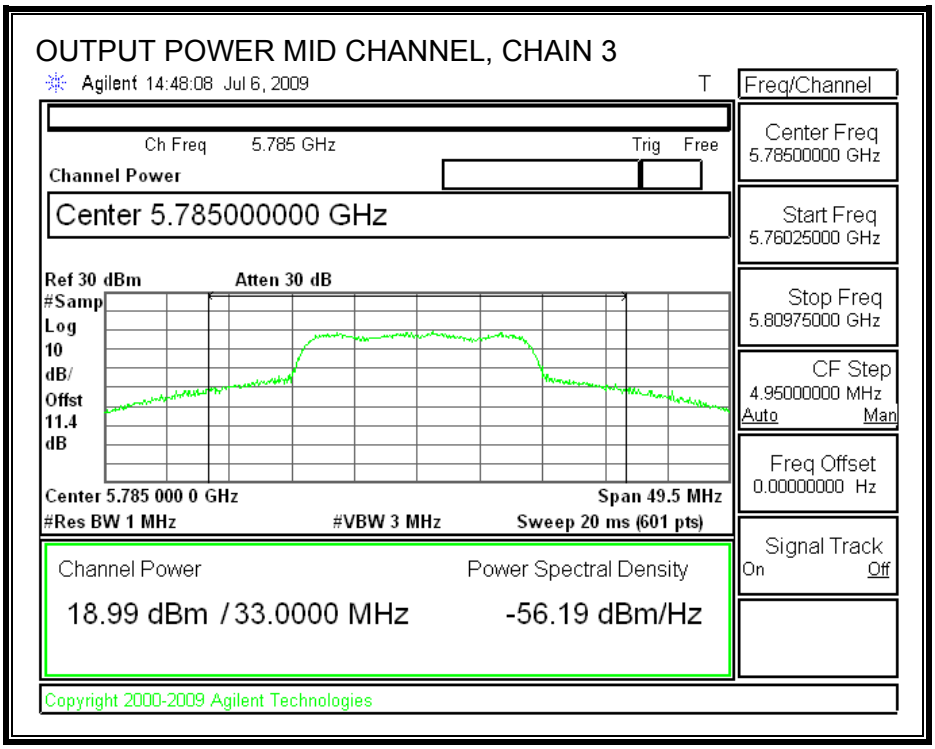


OUTPUT POWER, MID CHANNEL

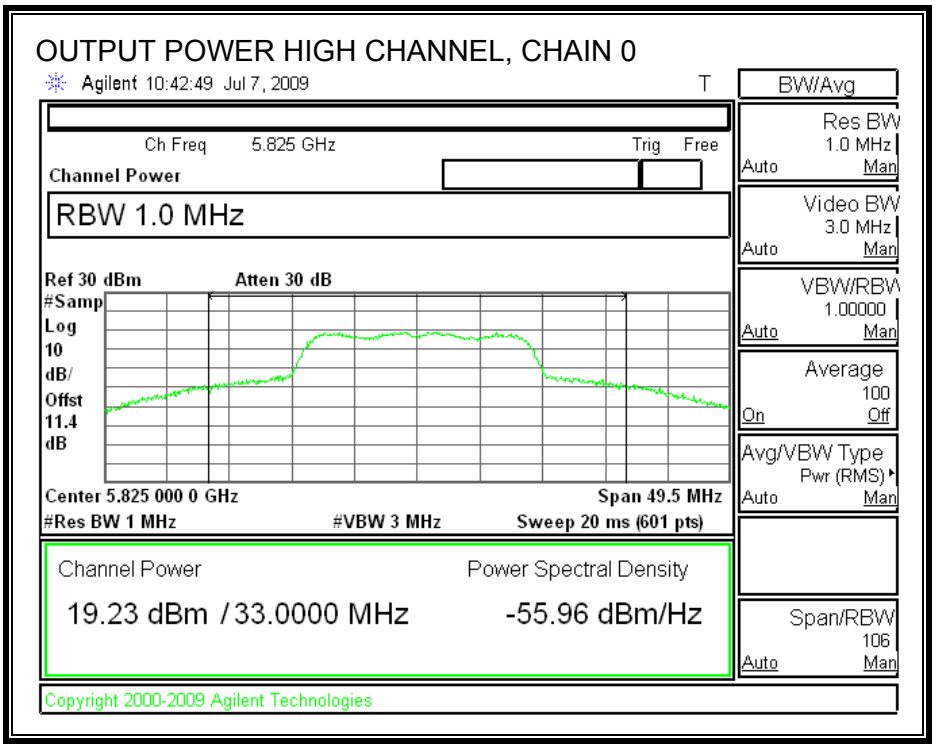


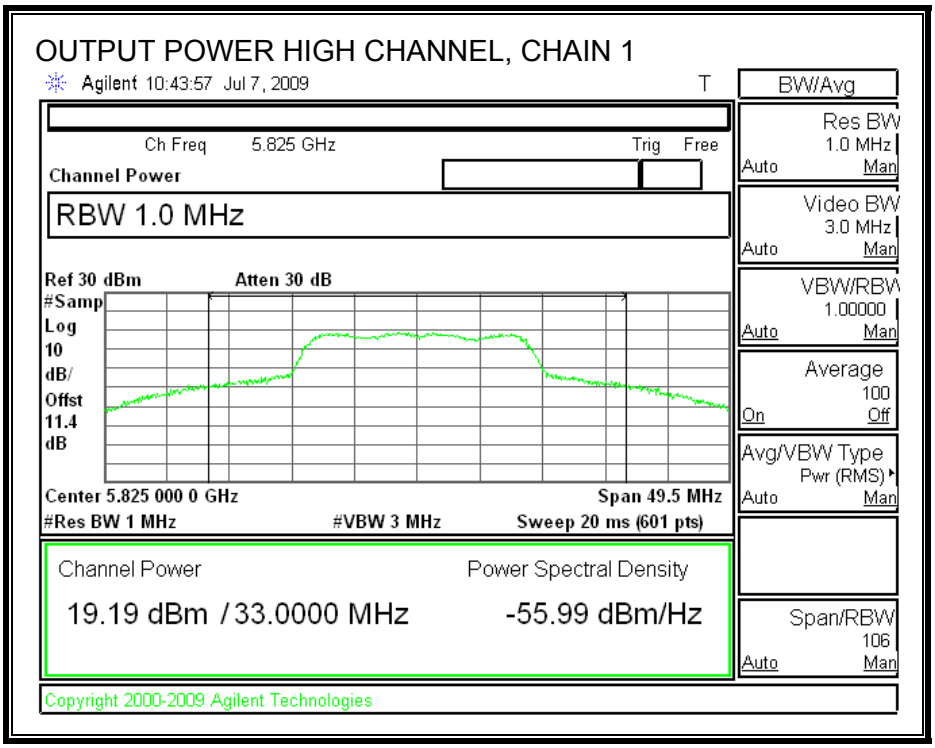


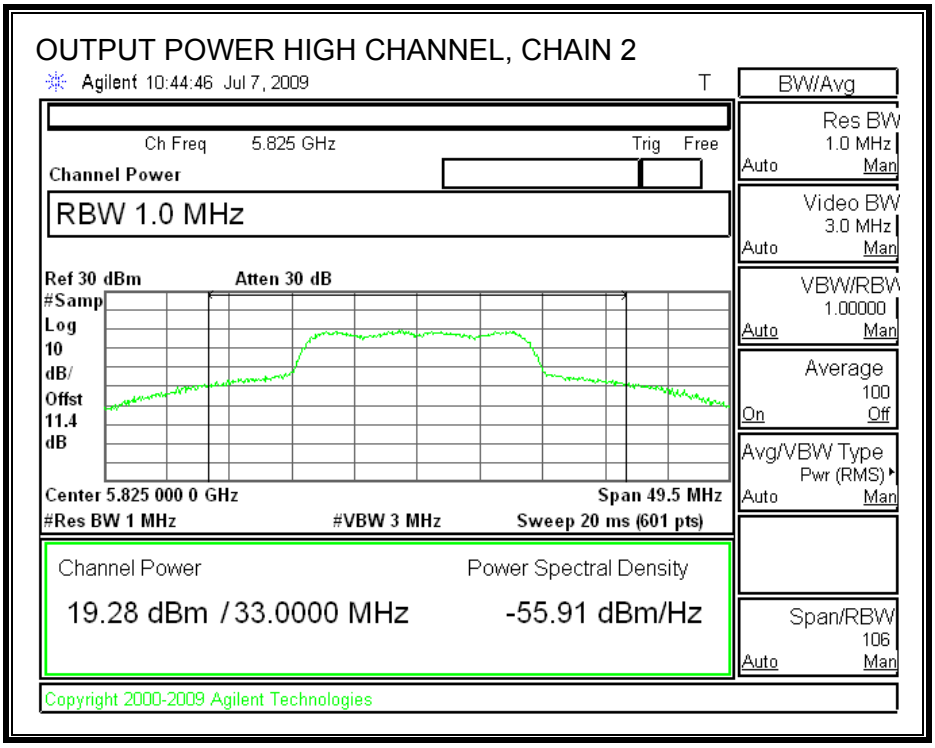


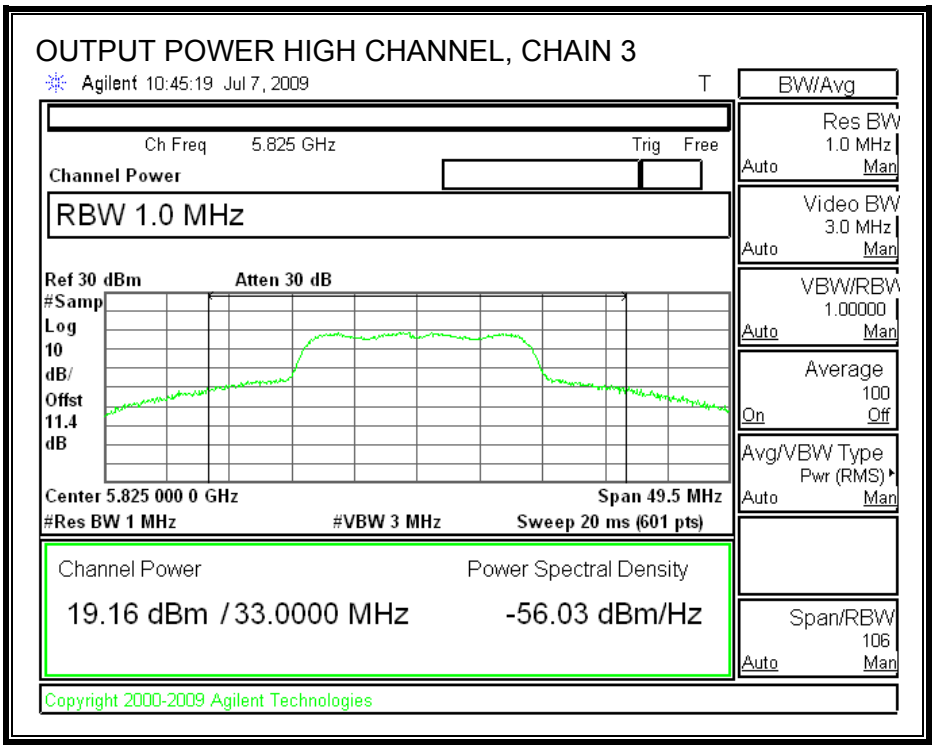


OUTPUT POWER, HIGH CHANNEL









7.6.4. AVERAGE POWER

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a power meter.

The cable assembly insertion loss of 11.4 dB (including 10 dB pad and 1.4 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

RESULTS

Channel	Frequency (MHz)	Chain 0 Power (dBm)	Chain 1 Power (dBm)	Chain 2 Power (dBm)	Chain 3 Power (dBm)
Low	**5745**	18.93	18.98	19.04	19.13
Middle	**5785**	19.13	18.95	19.09	19.19
High	**5825**	19.23	19.2	19.27	19.17

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

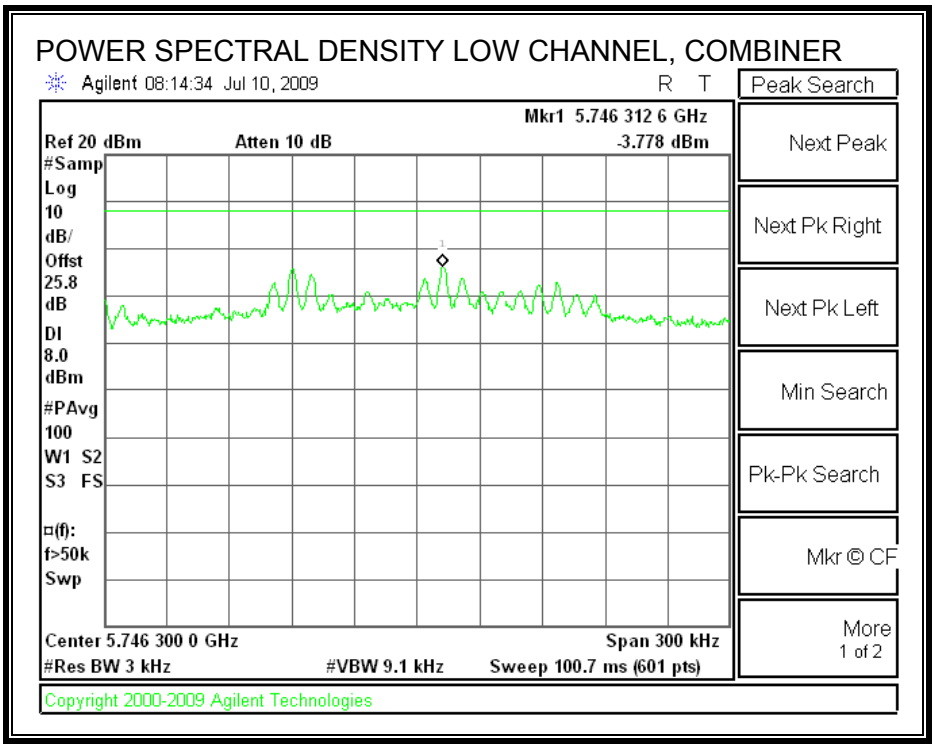
Output power was measured based on the use of RMS averaging over a time interval, therefore the power spectral density was measured using PSD Option 2 in accordance with FCC document "Measurement of Digital Transmission Systems Operating under Section 15.247", March 23, 2005.

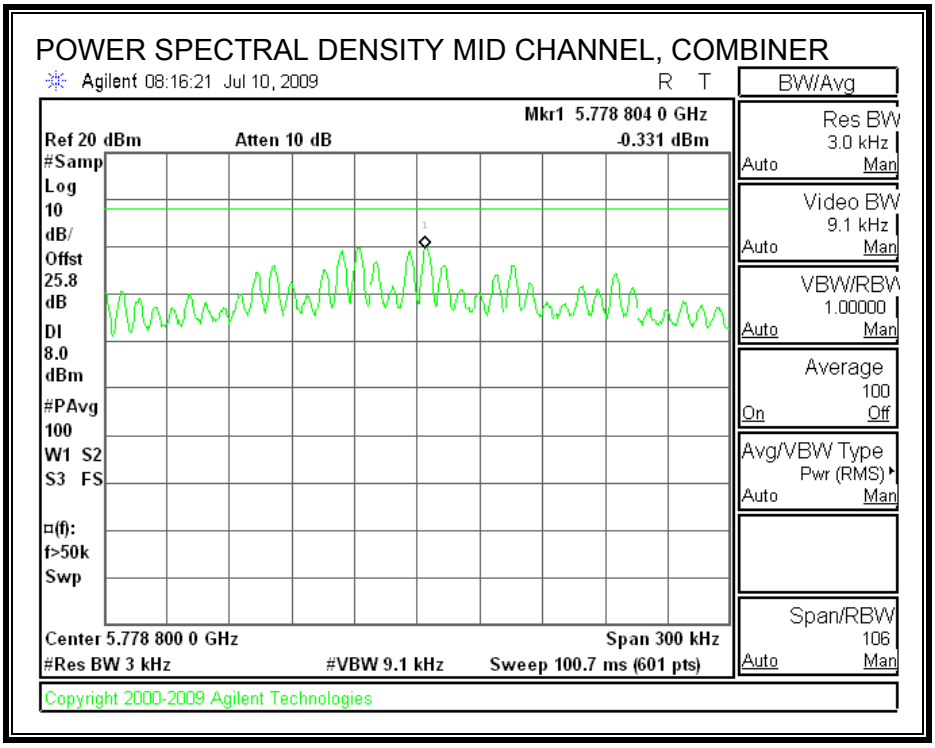
Preliminary tests on individual chains, and on all chains with a combiner, were performed. The worst-case configuration was with a combiner, therefore final test were performed with all chains feeding a combiner.

RESULTS

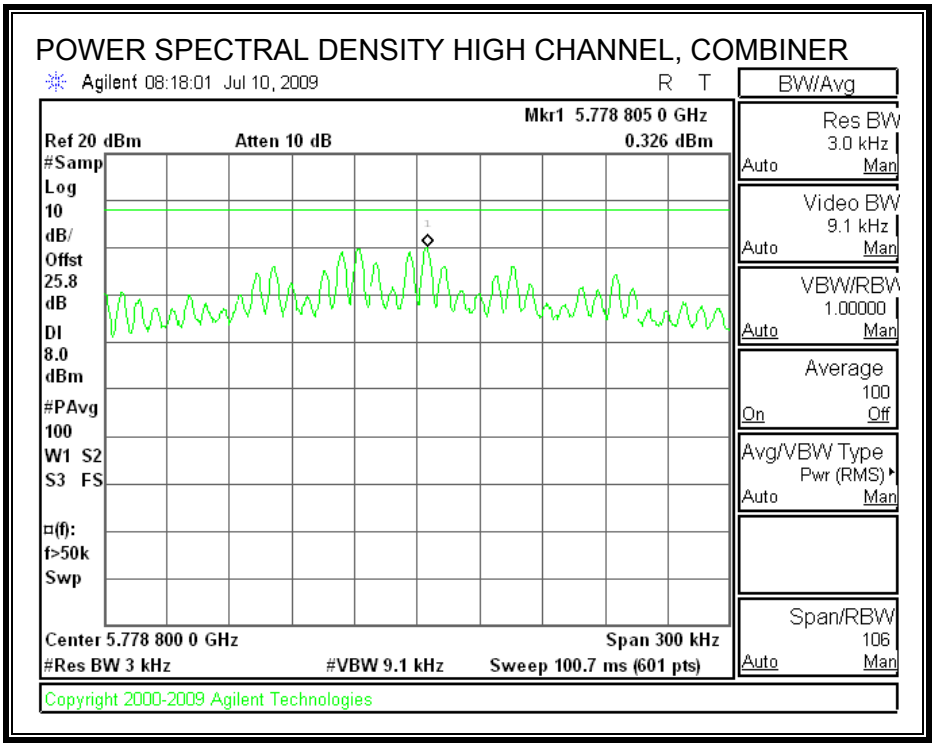
Channel	Frequency (MHz)	PSD with Combiner (dBm)	Limit (dBm)	Margin (dB)
Low	**5745**	-3.778	**8**	**-11.78**
Middle	**5785**	-0.331	**8**	**-8.33**
High	**5825**	0.326	**8**	**-7.67**

POWER SPECTRAL DENSITY





POWER SPECTRAL DENSITY HIGH CHANNEL, COMBINER



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 RMS averaging over a time interval, therefore the required attenuation is 30 dBc.

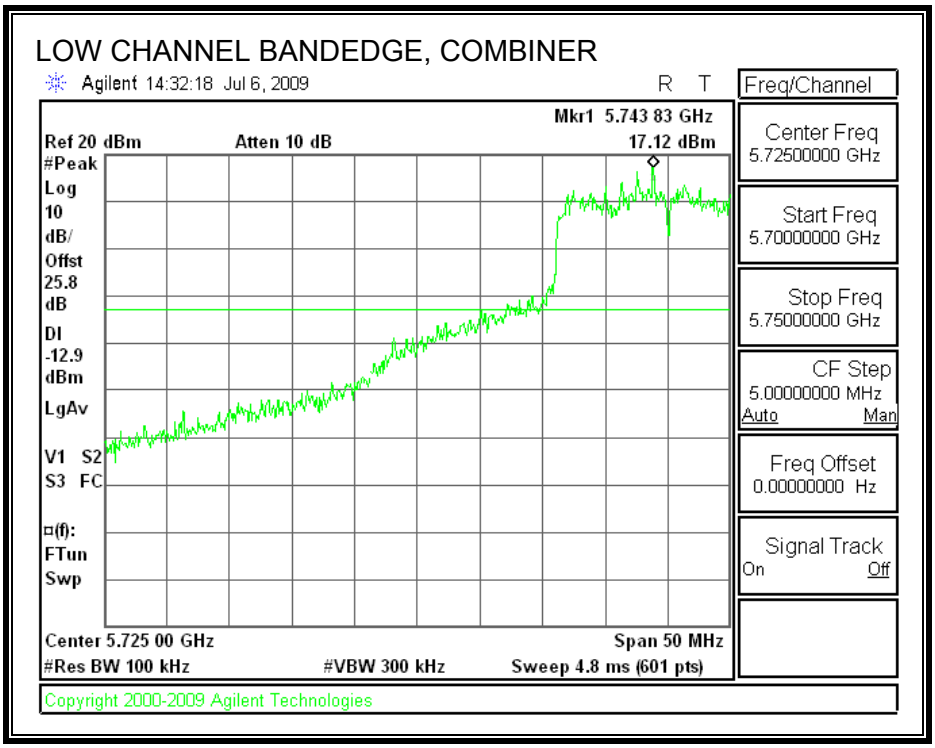
TEST PROCEDURE

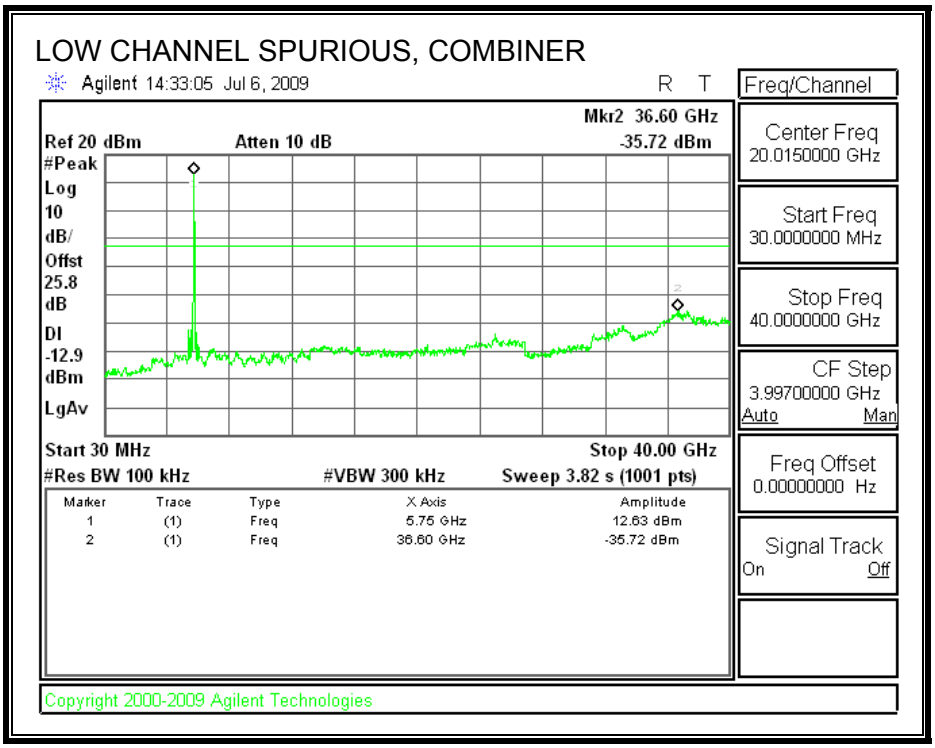
The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

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

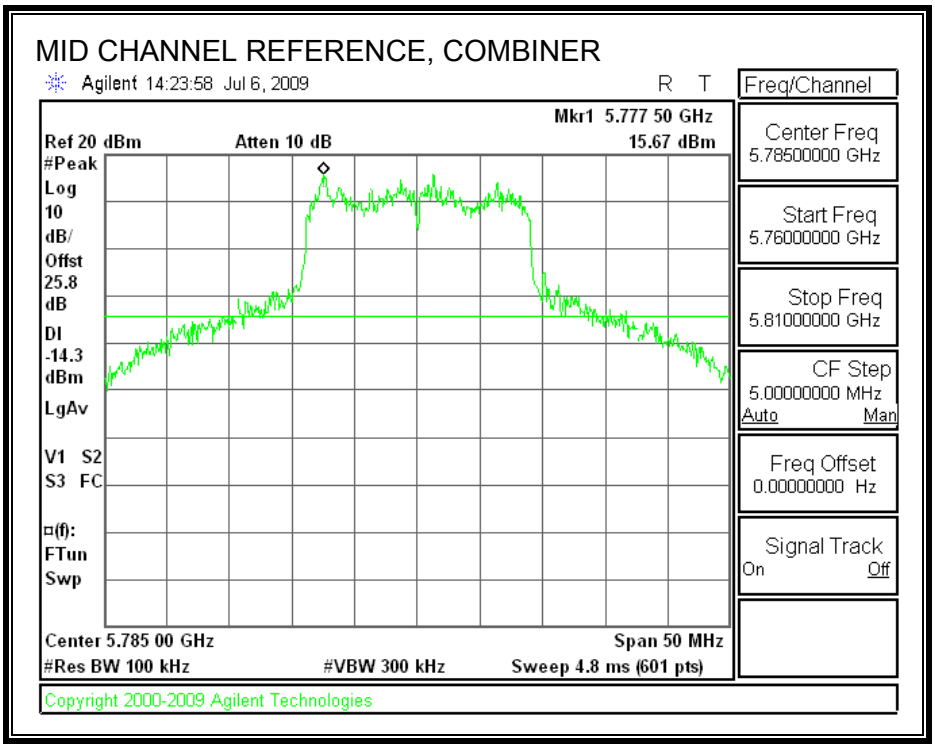
Preliminary tests on individual chains, and on all chains with a combiner, were performed. The worst-case configuration was with a combiner, therefore final test were performed with all chains feeding a combiner.

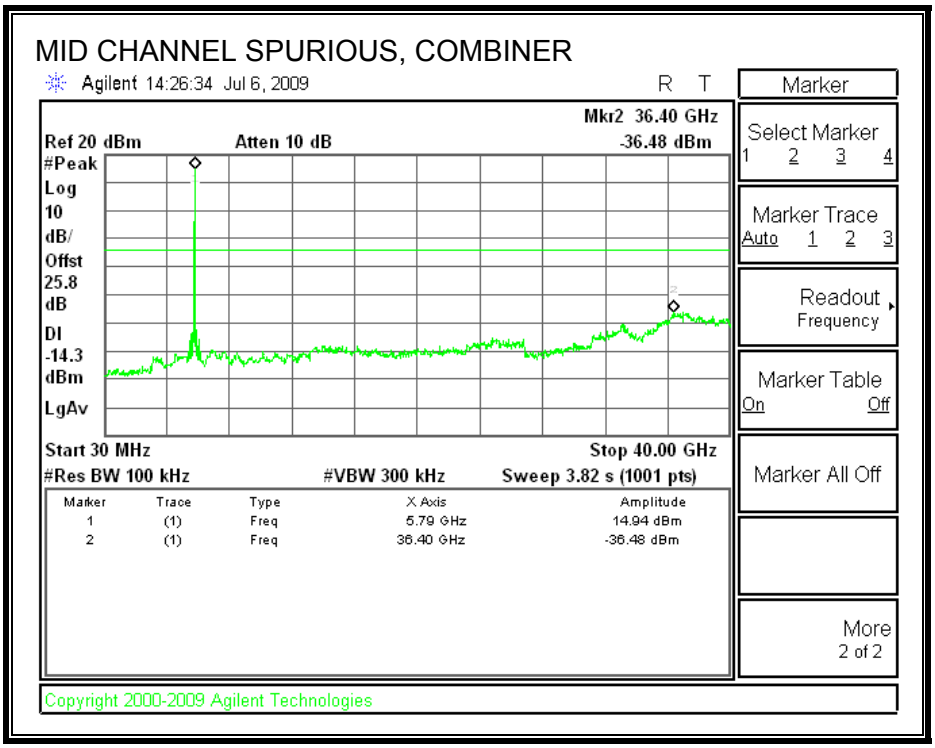
LOW CHANNEL SPURIOUS EMISSIONS



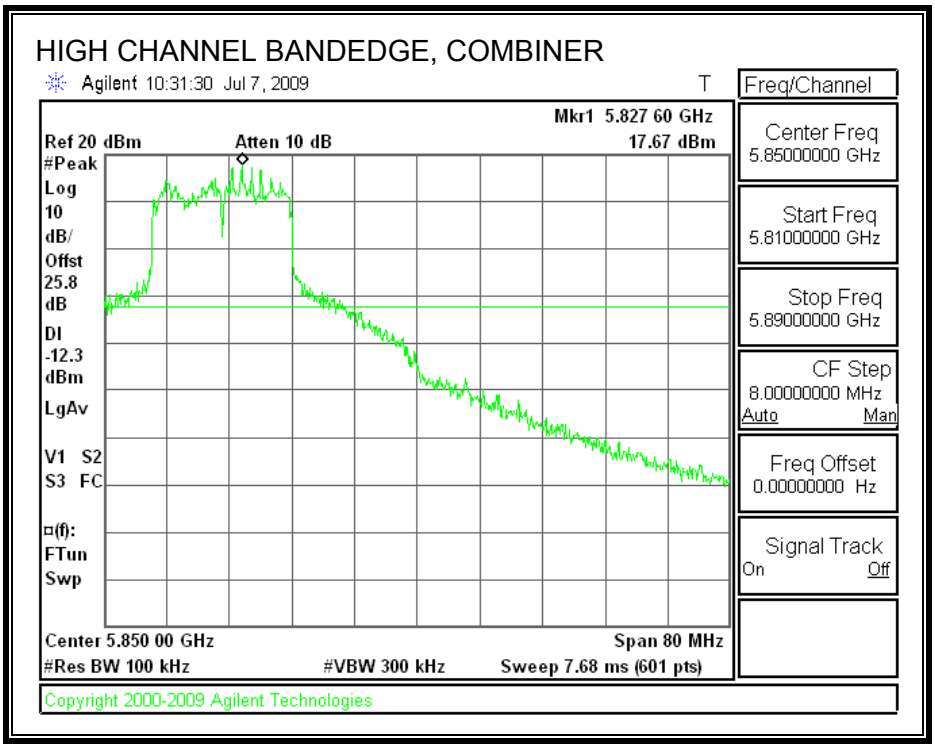


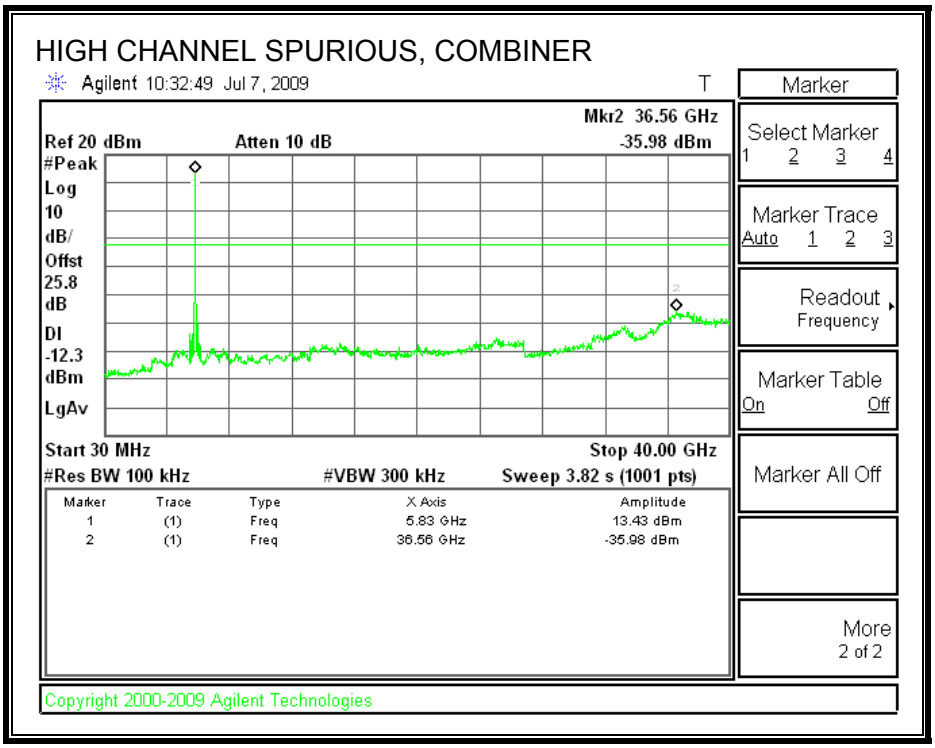
MID CHANNEL SPURIOUS EMISSIONS





HIGH CHANNEL SPURIOUS EMISSIONS





7.7. 5.8 GHz BAND CHANNEL TESTS FOR 802.11n HT40 MODE

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.

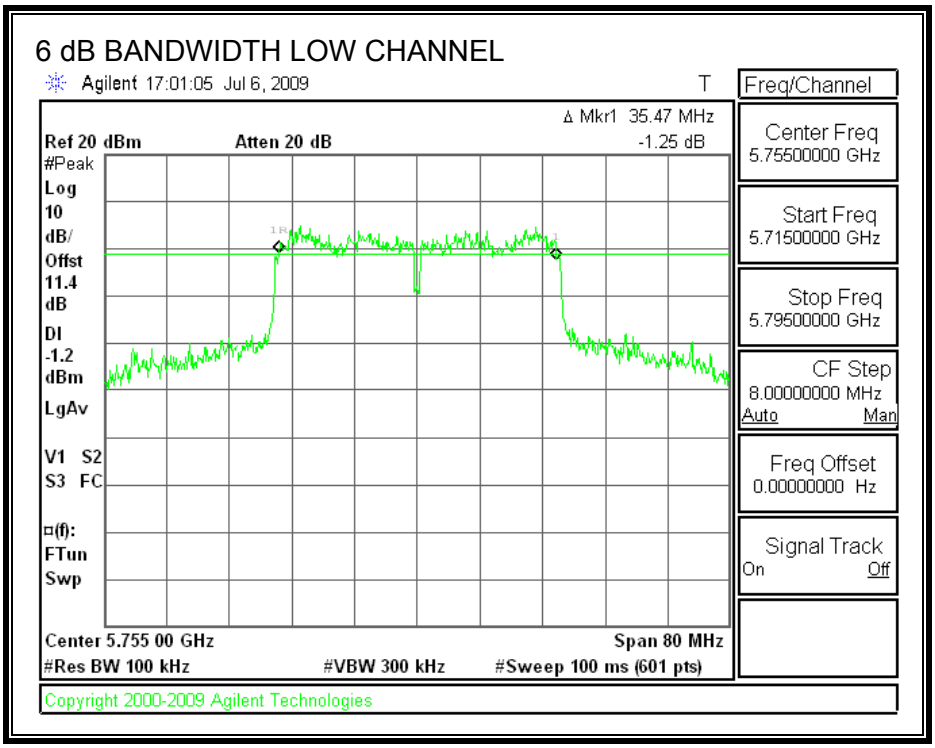
TEST PROCEDURE

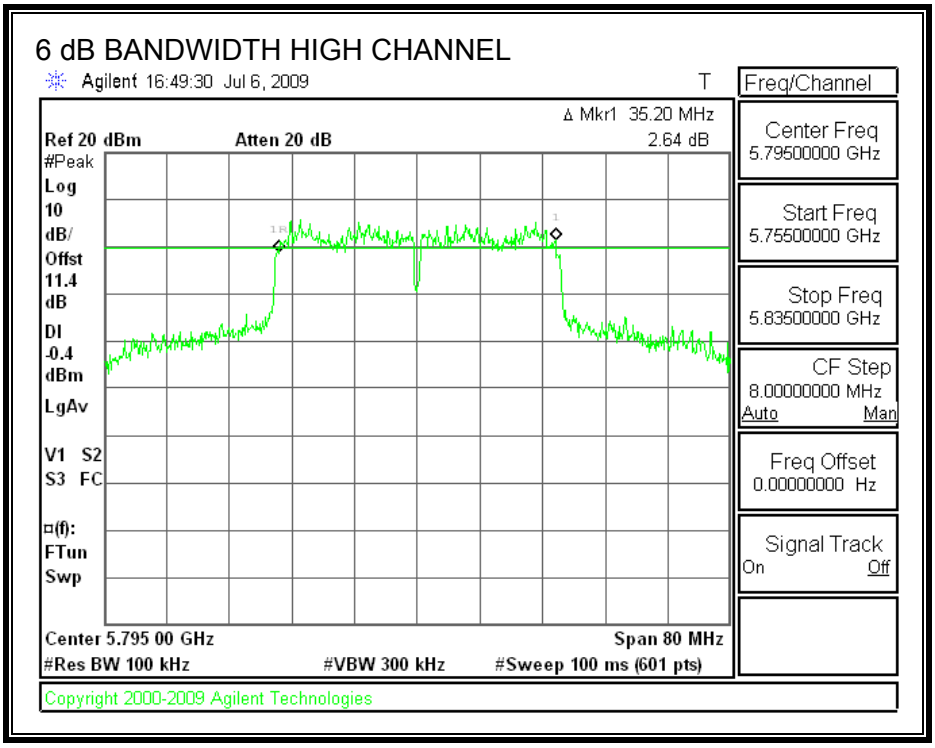
The transmitter output is connected to a spectrum analyzer. The RBW is set to 100 kHz and the VBW is set to 300 kHz. The sweep time is coupled.

RESULTS

Channel	Frequency (MHz)	6 dB BW (MHz)	Minimum Limit (MHz)
Low	5755	35.47	0.5
High	5795	35.20	0.5

6 dB BANDWIDTH





7.7.2. 99% & 26 dB BANDWIDTH

LIMITS

None; for reporting purposes only.

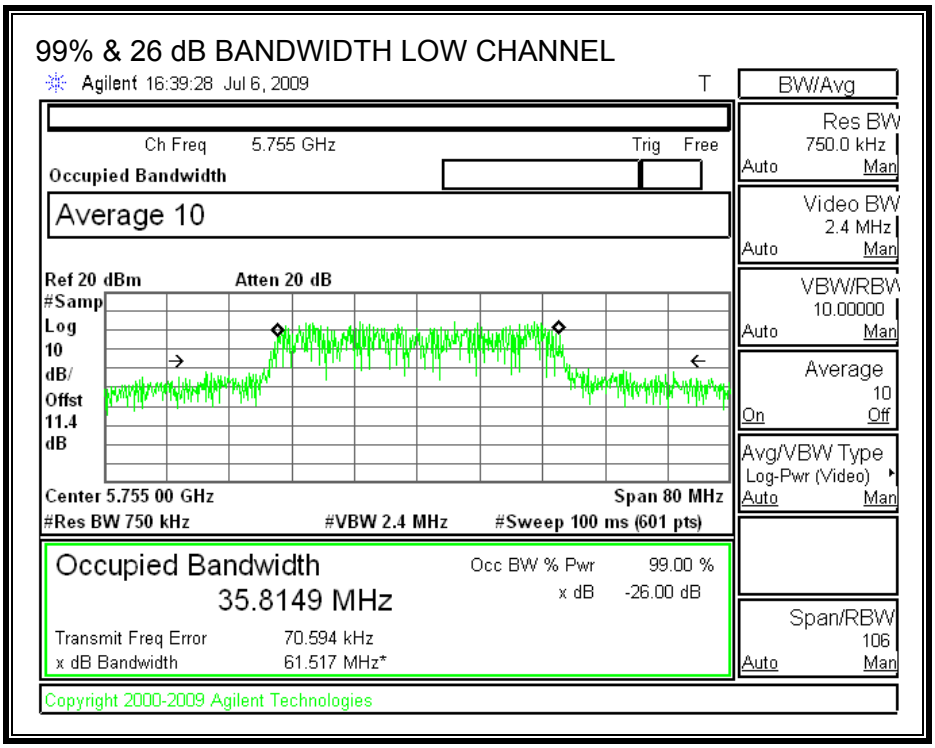
TEST PROCEDURE

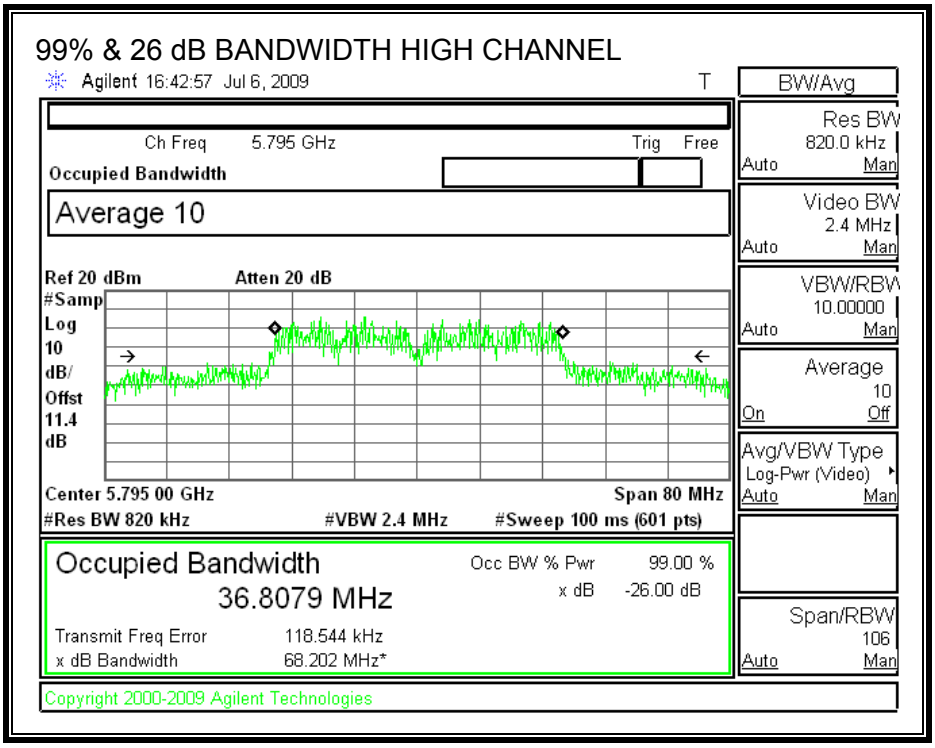
The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal bandwidth measurement function is utilized.

RESULTS

Channel	Frequency (MHz)	99% OBW (MHz)	26 dB BW (MHz)
Low	5755	35.8149	61.517
High	5795	36.8079	68.202

99% & 26 dB BANDWIDTH





7.7.3. OUTPUT POWER

LIMITS

FCC §15.247 (b)

IC RSS-210 A8.4

TEST PROCEDURE

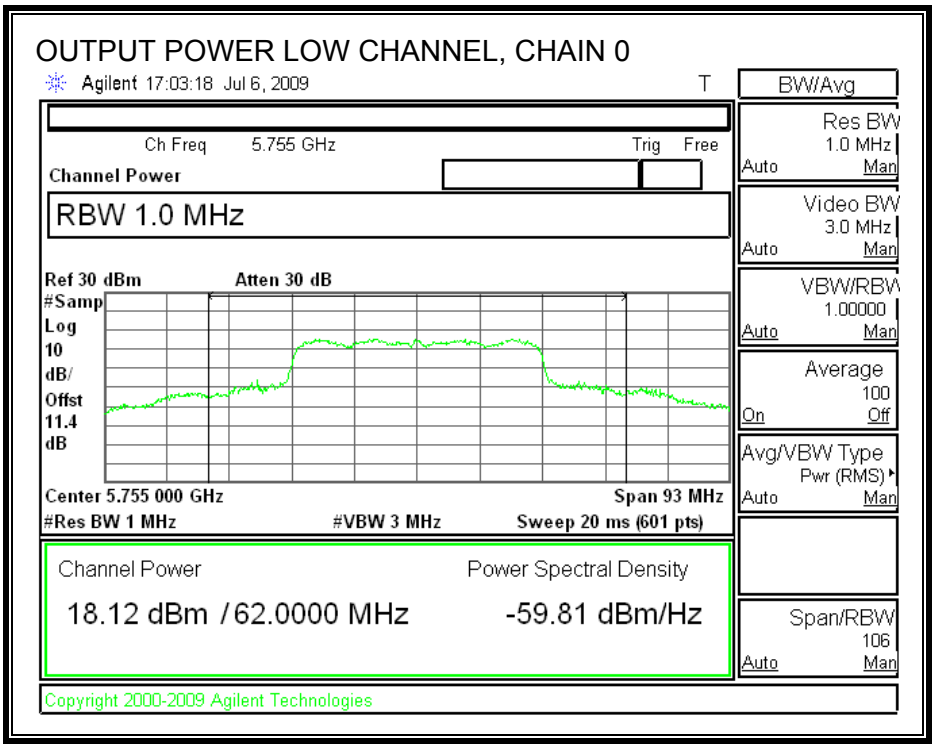
Output power was measured based on the use of RMS averaging over a time interval in accordance with FCC document “Measurement of Digital Transmission Systems Operating under Section 15.247”, March 23, 2005.

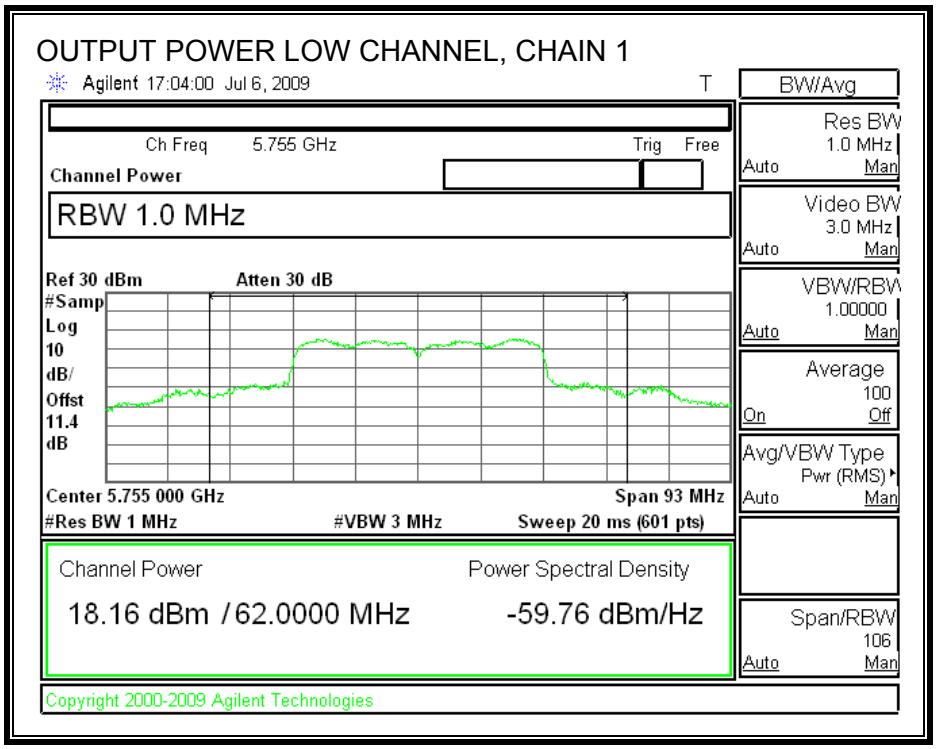
RESULTS

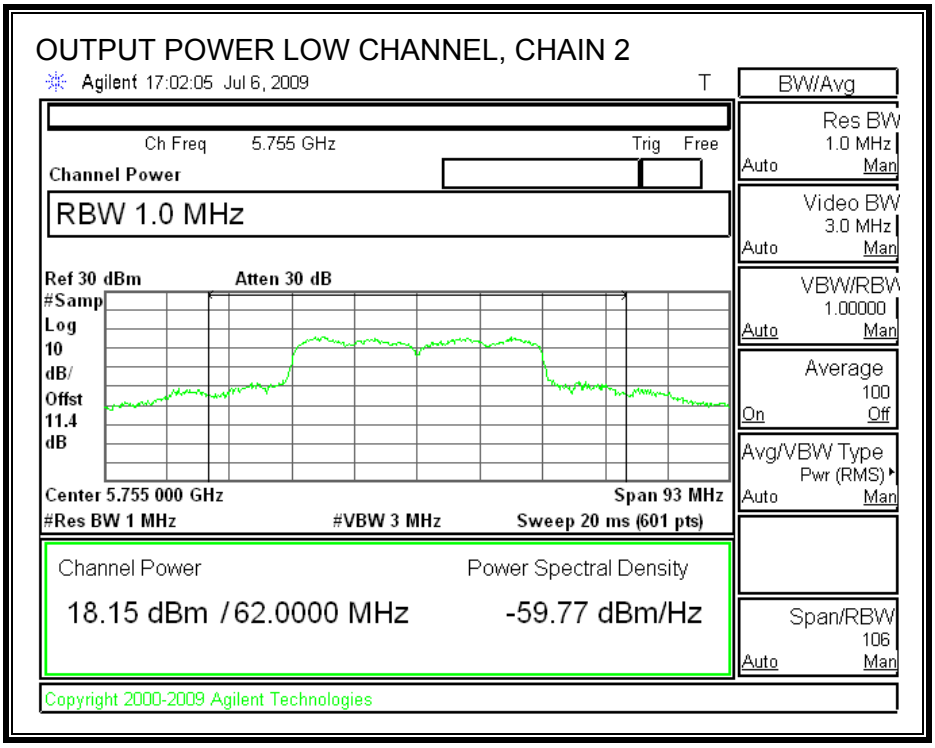
The maximum antenna gain is less than 6 dBi, therefore the limit is 30 dBm.

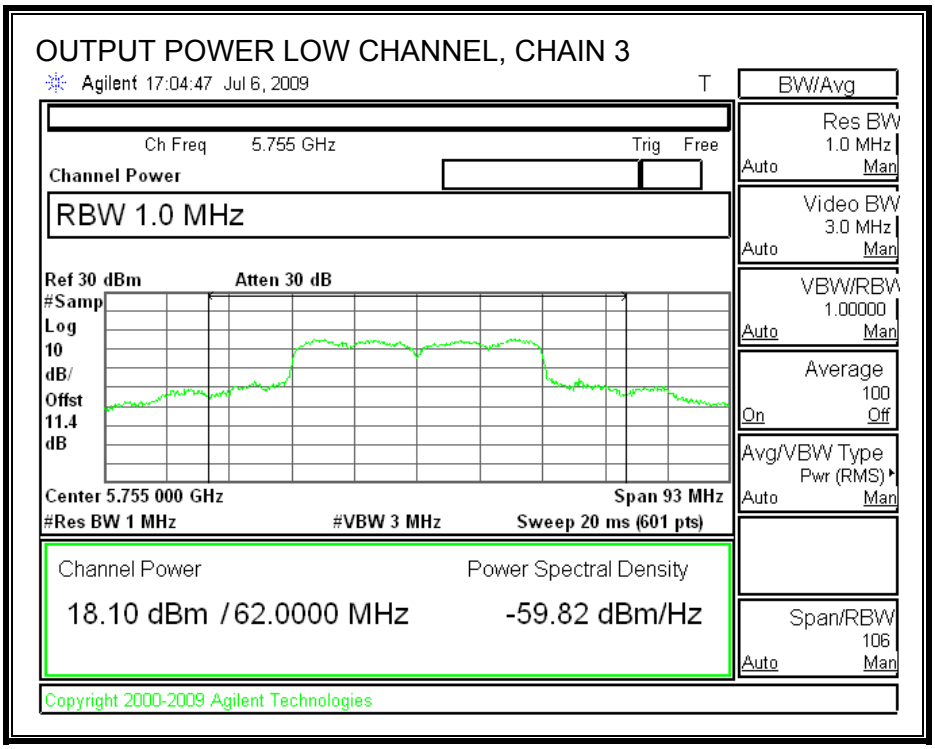
Channel	Frequency (MHz)	Chain 0 Power (dBm)	Chain 1 Power (dBm)	Chain 2 Power (dBm)	Chain 3 Power (dBm)	Total Power (dBm)	Limit (dBm)	Margin (dB)
Low	**5755**	18.12	18.16	18.15	18.10	**24.15**	**30.00**	**-5.85**
High	**5795**	19.12	18.94	19.04	18.97	**25.04**	**30.00**	**-4.96**

OUTPUT POWER, LOW CHANNEL

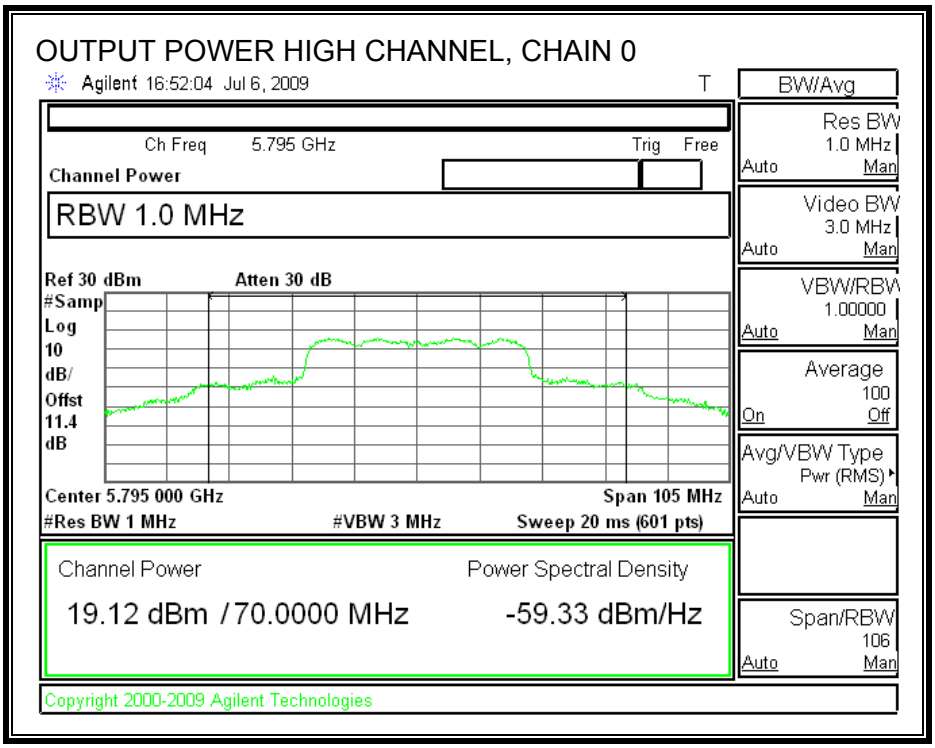


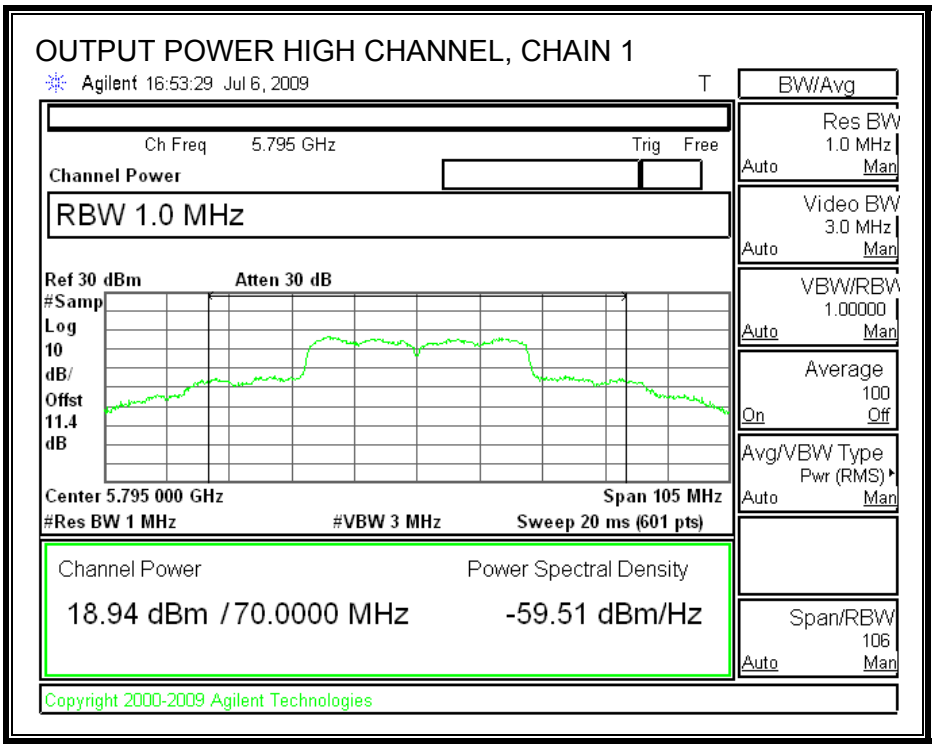


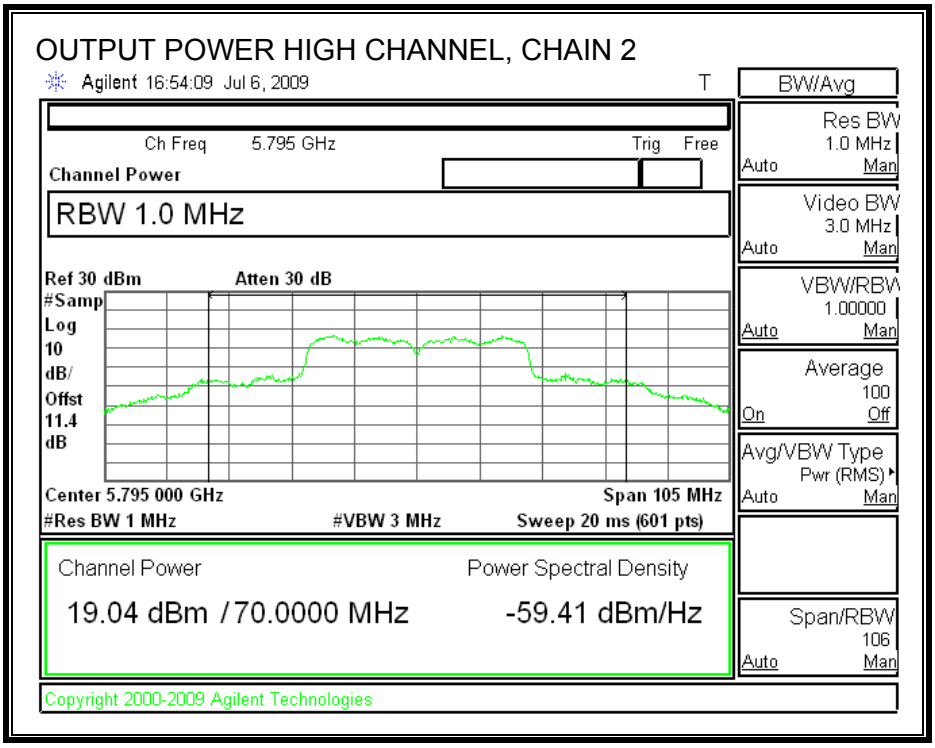


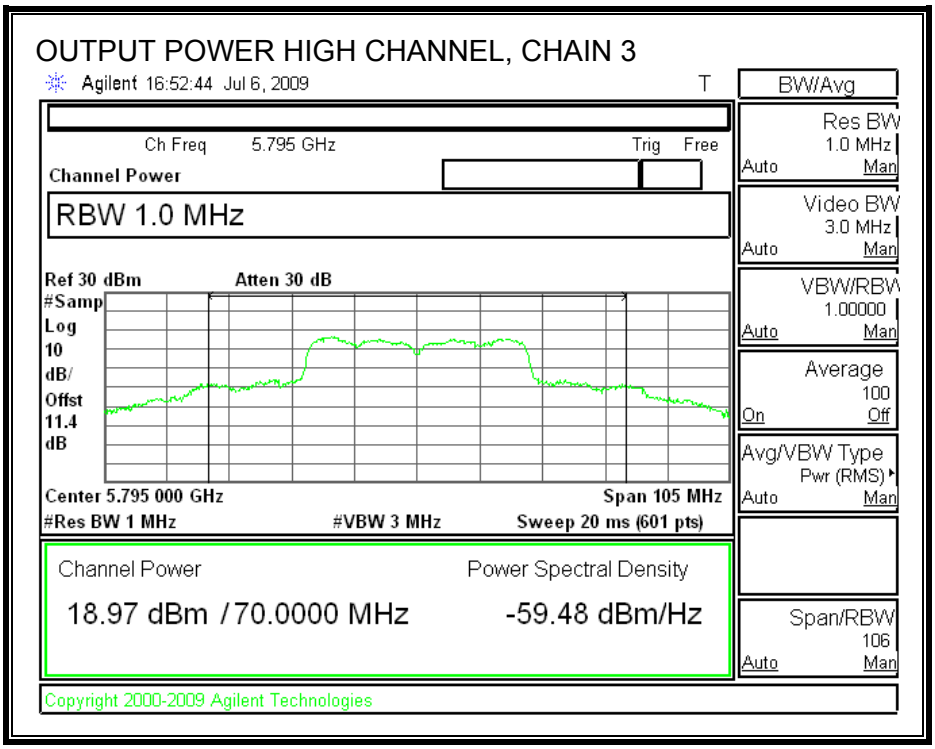


OUTPUT POWER, HIGH CHANNEL









7.7.4. AVERAGE POWER

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a power meter.

The cable assembly insertion loss of 11.4 dB (including 10 dB pad and 1.4 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

RESULTS

Channel	Frequency (MHz)	Chain 0 Power (dBm)	Chain 1 Power (dBm)	Chain 2 Power (dBm)	Chain 3 Power (dBm)
Low	**5755**	18.13	18.29	18.15	17.92
High	**5795**	18.91	18.96	19.02	19.06

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

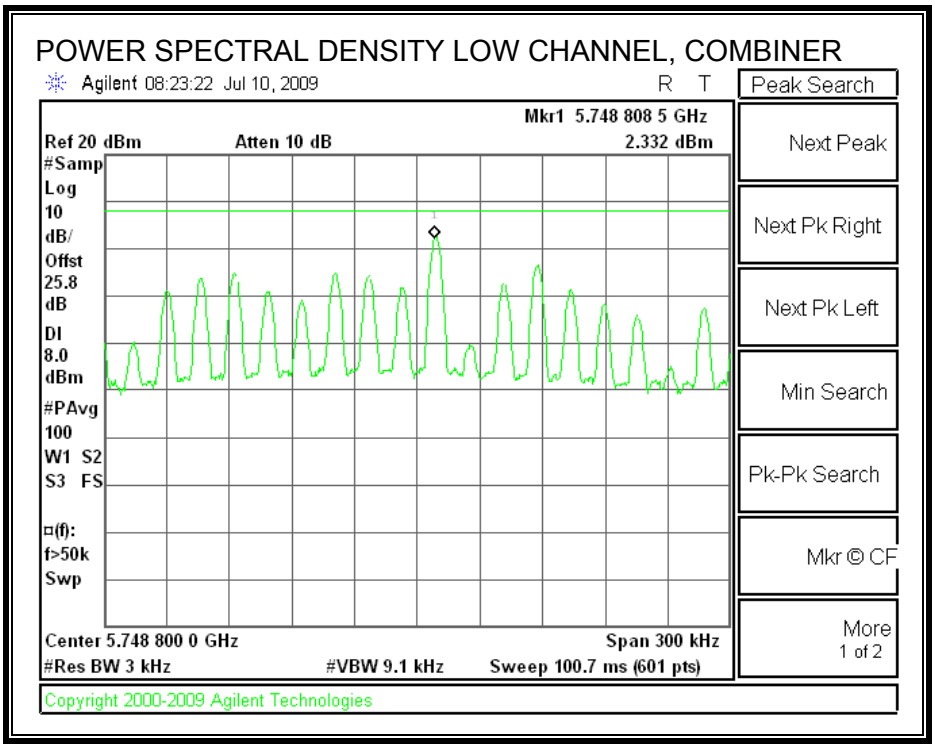
Output power was measured based on the use of RMS averaging over a time interval, therefore the power spectral density was measured using PSD Option 2 in accordance with FCC document “Measurement of Digital Transmission Systems Operating under Section 15.247”, March 23, 2005.

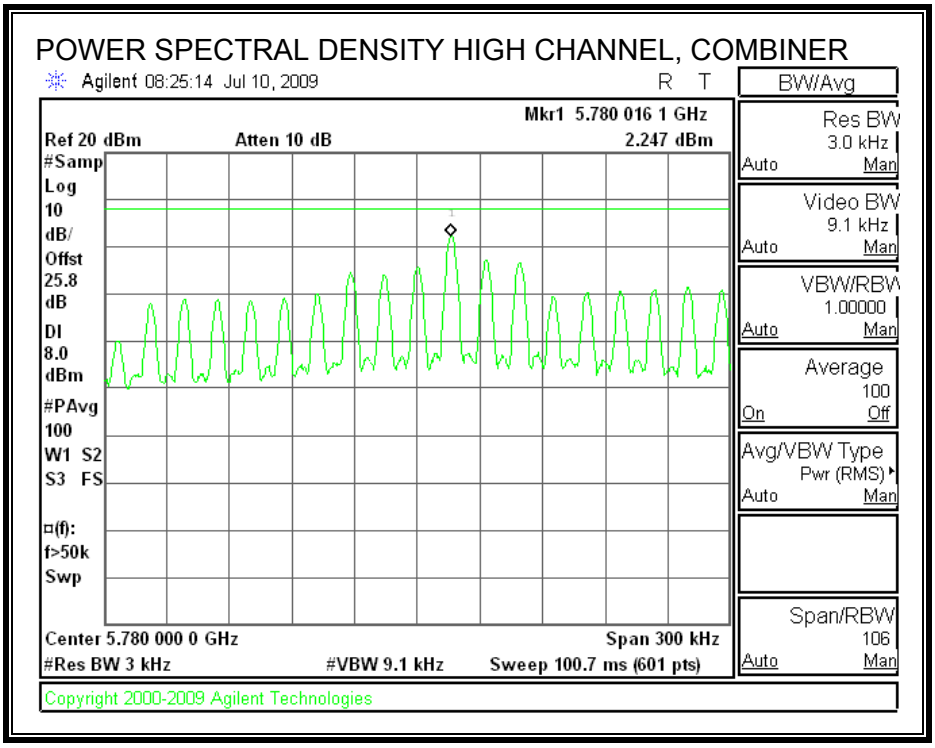
Preliminary tests on individual chains, and on all chains with a combiner, were performed. The worst-case configuration was with a combiner, therefore final test were performed with all chains feeding a combiner.

RESULTS

Channel	Frequency (MHz)	PSD with Combiner (dBm)	Limit (dBm)	Margin (dB)
Low	**5755**	2.332	**8**	**-5.67**
High	**5795**	2.25	**8**	**-5.75**

POWER SPECTRAL DENSITY





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 RMS averaging over a time interval, therefore the required attenuation is 30 dBc.

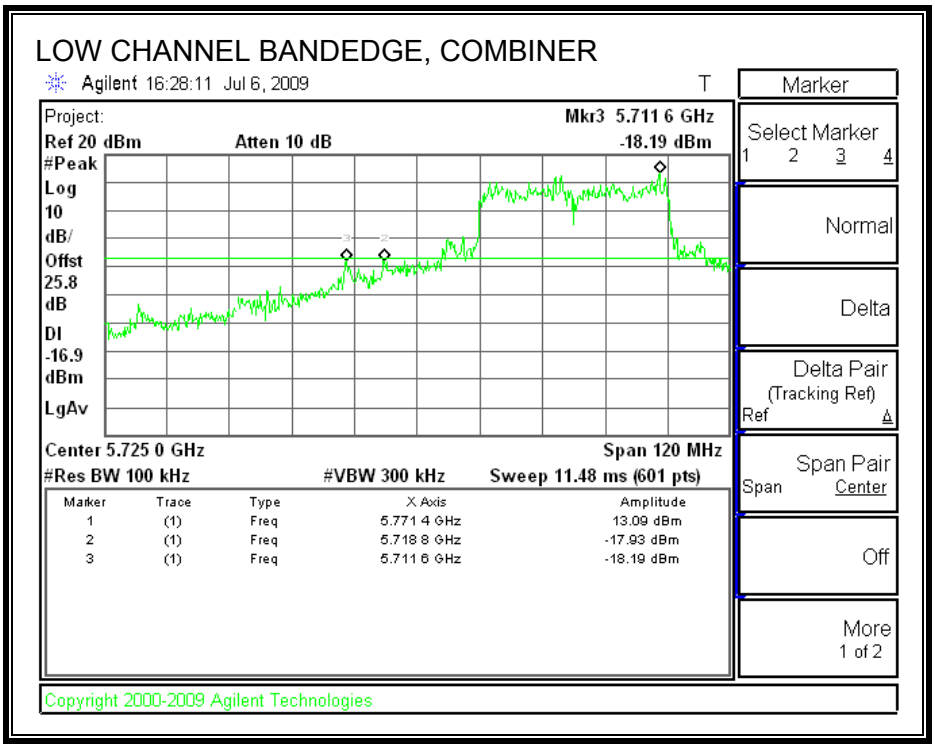
TEST PROCEDURE

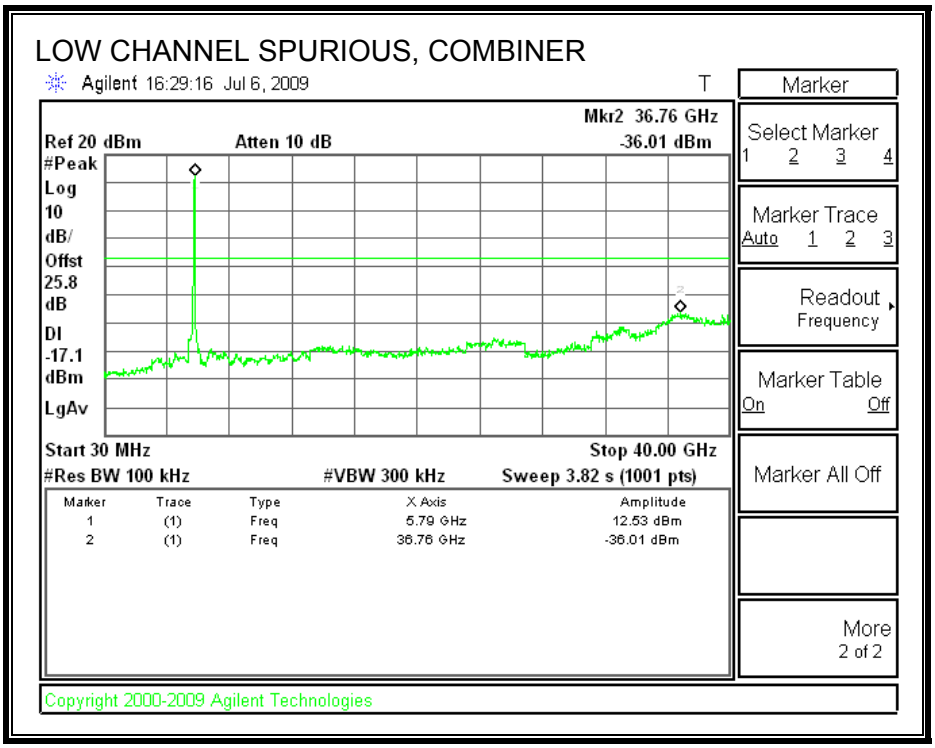
The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

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

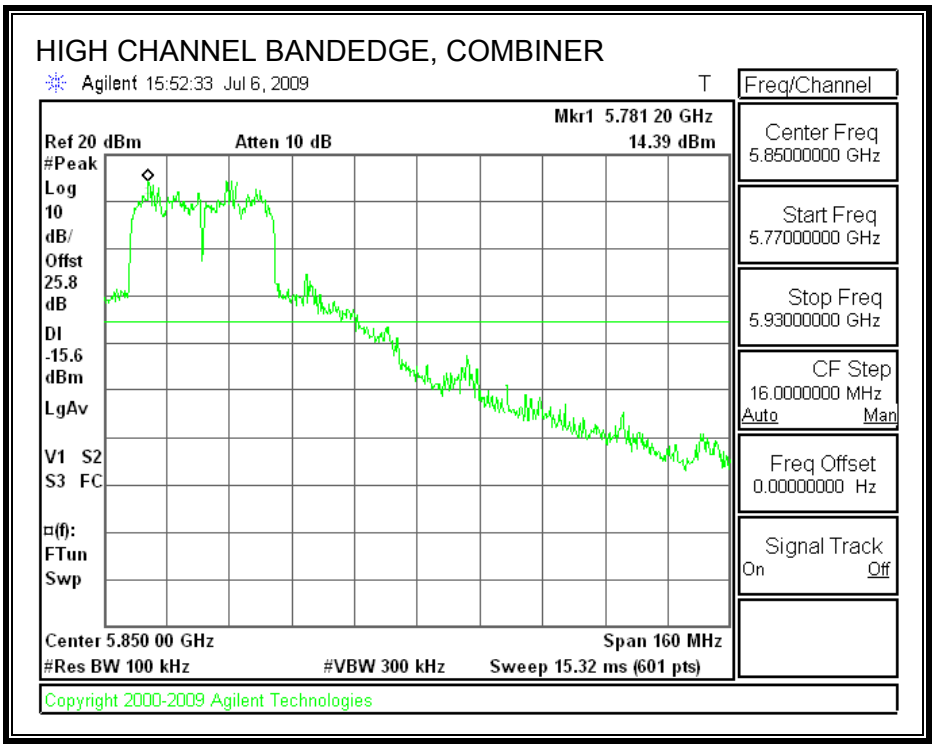
Preliminary tests on individual chains, and on all chains with a combiner, were performed. The worst-case configuration was with a combiner, therefore final test were performed with all chains feeding a combiner.

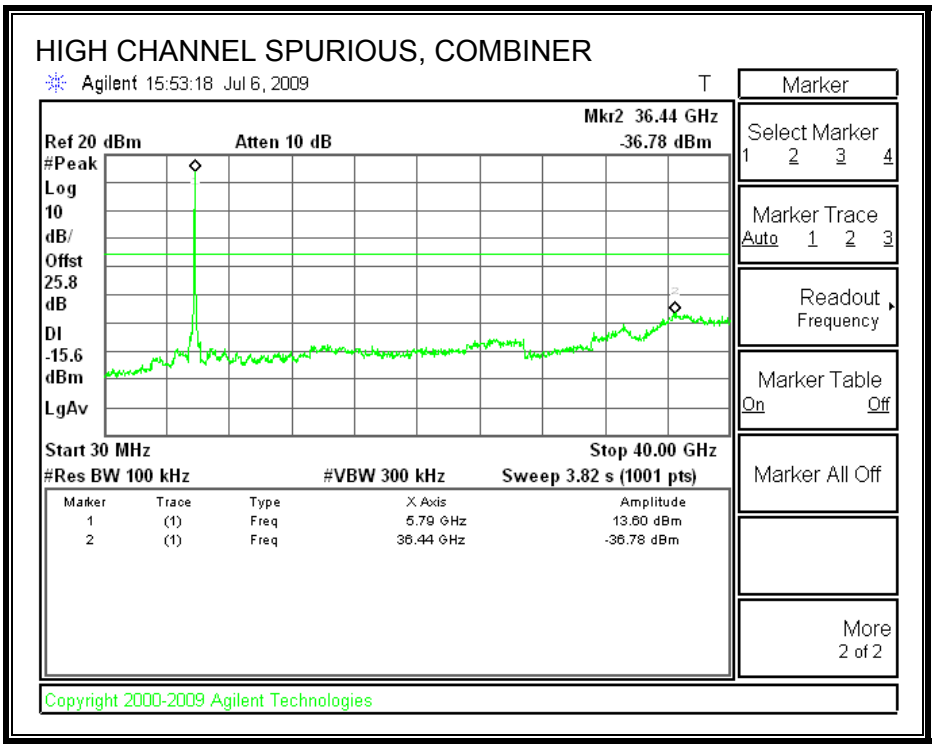
LOW CHANNEL SPURIOUS EMISSIONS





HIGH CHANNEL SPURIOUS EMISSIONS





7.8. RECEIVER CONDUCTED SPURIOUS EMISSIONS

LIMITS

IC RSS-GEN 7.2.3.1

Antenna Conducted Measurement: Receiver spurious emissions at any discrete frequency shall not exceed 2 nanowatts (-57 dBm) in the band 30-1000 MHz, or 5 nanowatts (-53 dBm) above 1 GHz.

TEST PROCEDURE

IC RSS-GEN 4.10, Conducted Method

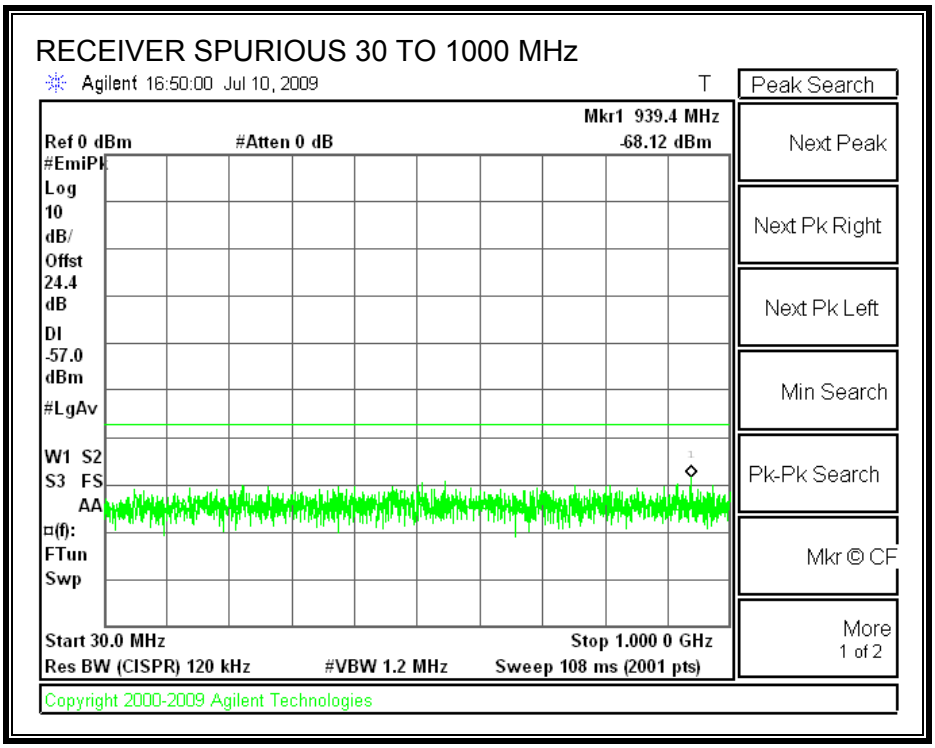
The receiver antenna port is connected to a spectrum analyzer.

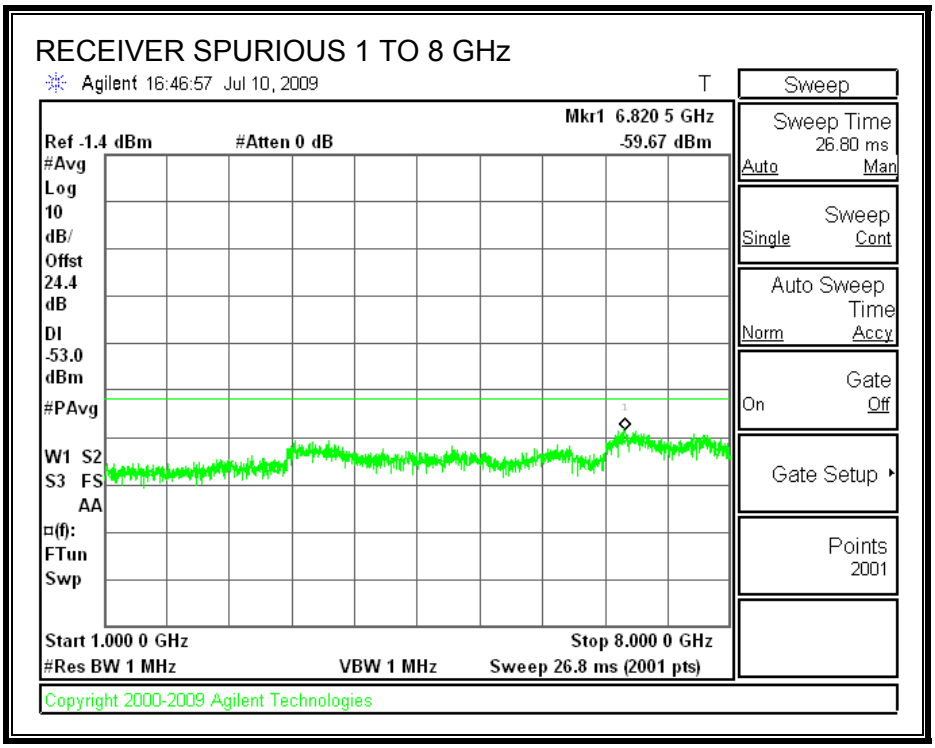
The spectrum from 30 MHz to 8 GHz is investigated with the receiver set to the middle channel of the 2.4 GHz band.

The spectrum from 30 MHz to 18 GHz is investigated with the receiver set to the middle channel of each 5 GHz band.

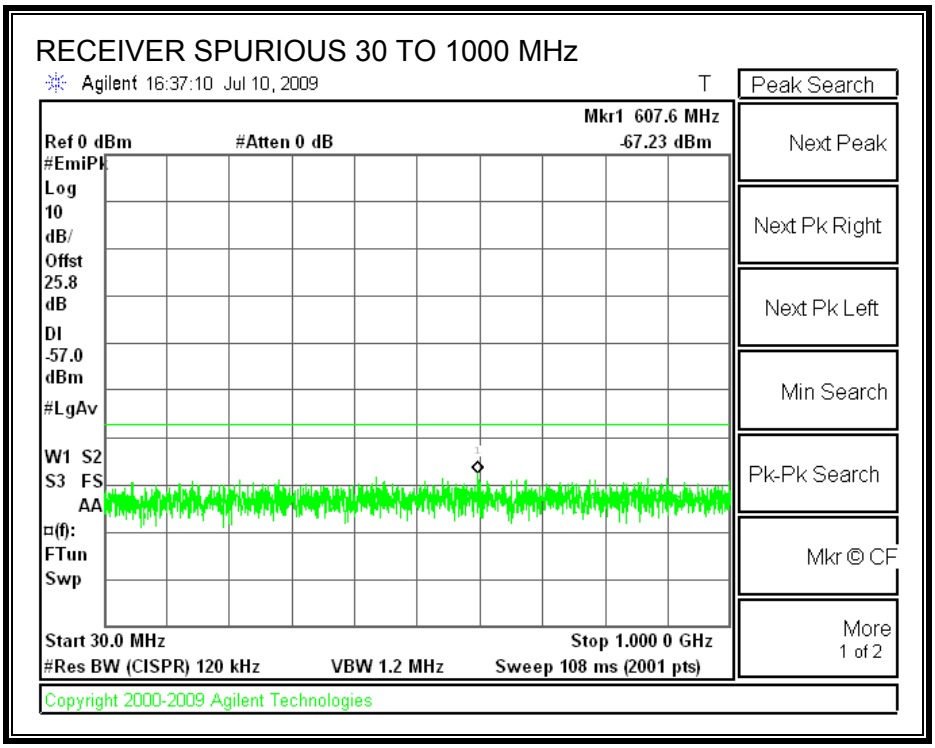
Preliminary tests on individual chains, and on all chains with a combiner, were performed. The worst-case configuration was with a combiner, therefore final test were performed with all chains feeding a combiner.

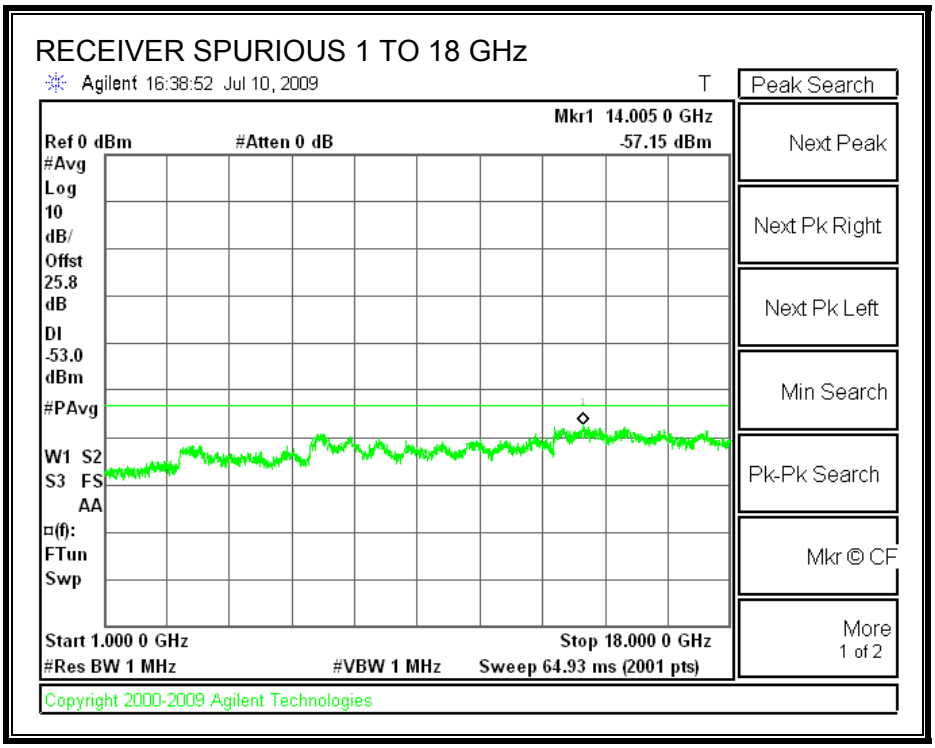
RECEIVER SPURIOUS EMISSIONS IN THE 2.4 GHz BAND





RECEIVER SPURIOUS EMISSIONS IN THE 5.8 GHz BAND





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.

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

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

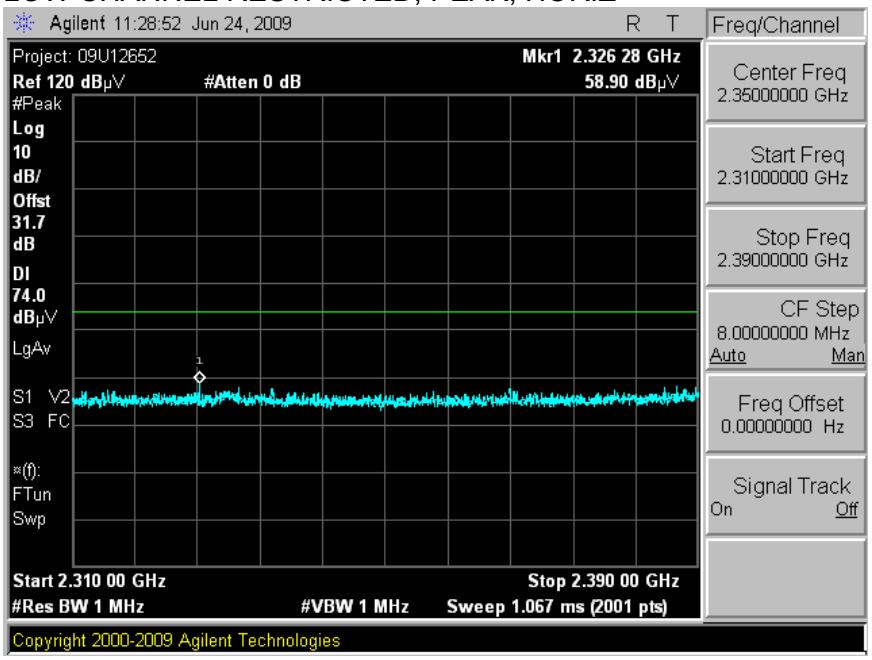
The frequency range of interest is monitored at a fixed antenna height and EUT azimuth. The EUT is rotated through 360 degrees to maximize emissions received. The antenna is scanned from 1 to 4 meters above the ground plane to further maximize the emission. Measurements are made with the antenna polarized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

8.2. TRANSMITTER ABOVE 1 GHz

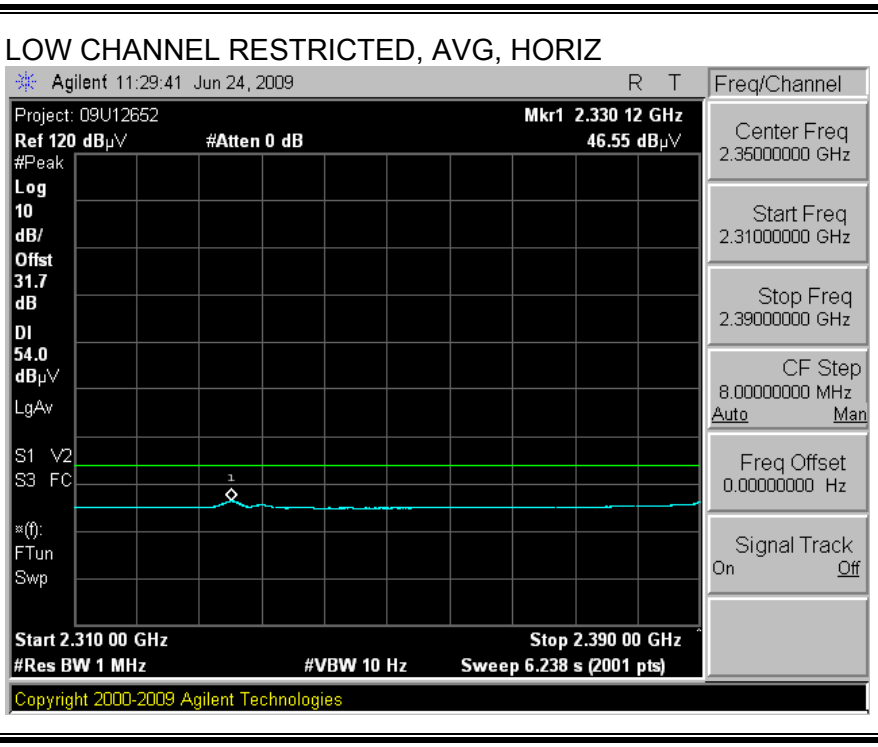
8.2.1. 802.11b MODE IN THE 2.4 GHz BAND

RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)

LOW CHANNEL RESTRICTED, PEAK, HORIZ

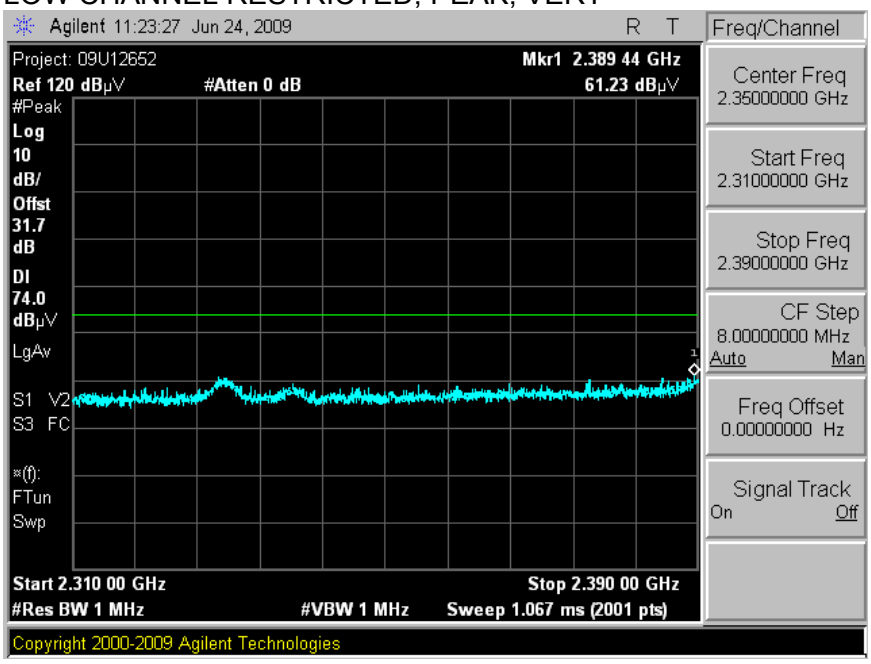


LOW CHANNEL RESTRICTED, AVG, HORIZ

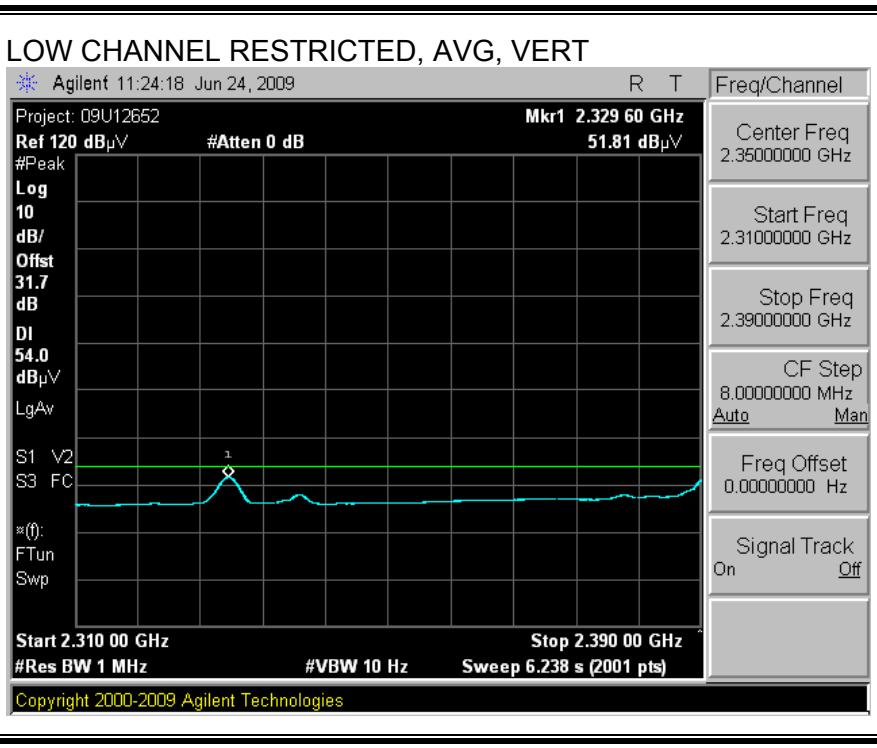


RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)

LOW CHANNEL RESTRICTED, PEAK, VERT

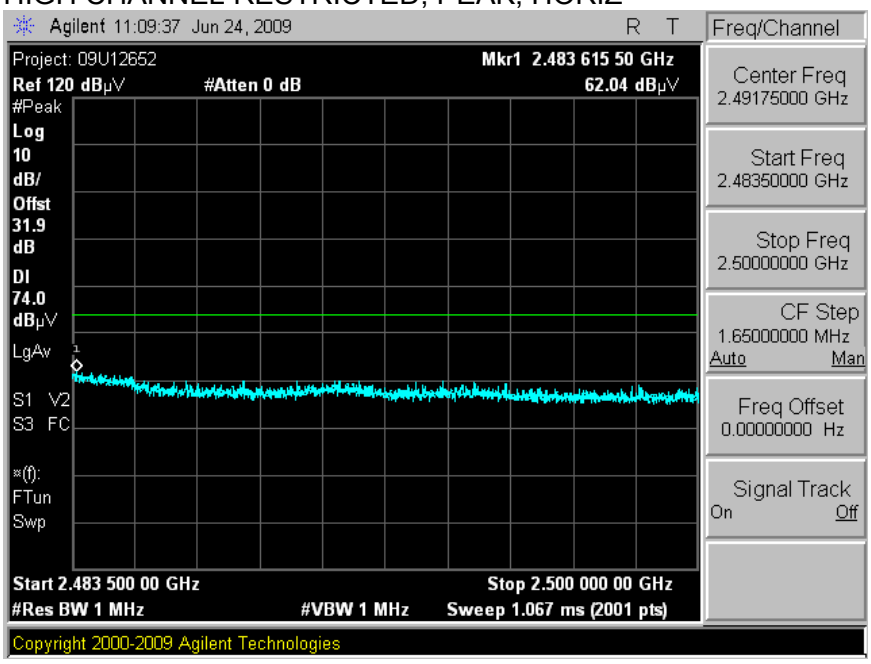


LOW CHANNEL RESTRICTED, AVG, VERT

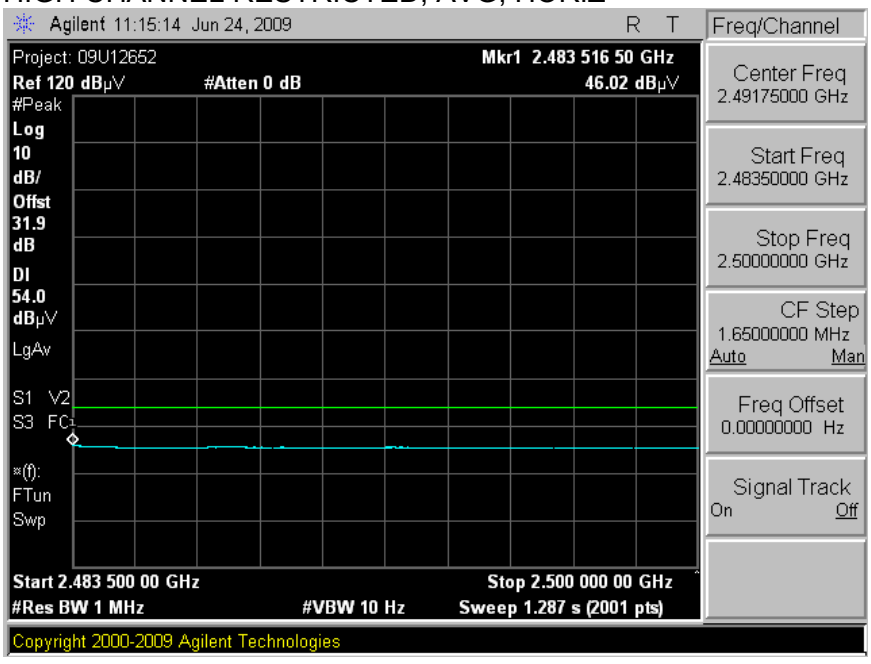


RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)

HIGH CHANNEL RESTRICTED, PEAK, HORIZ

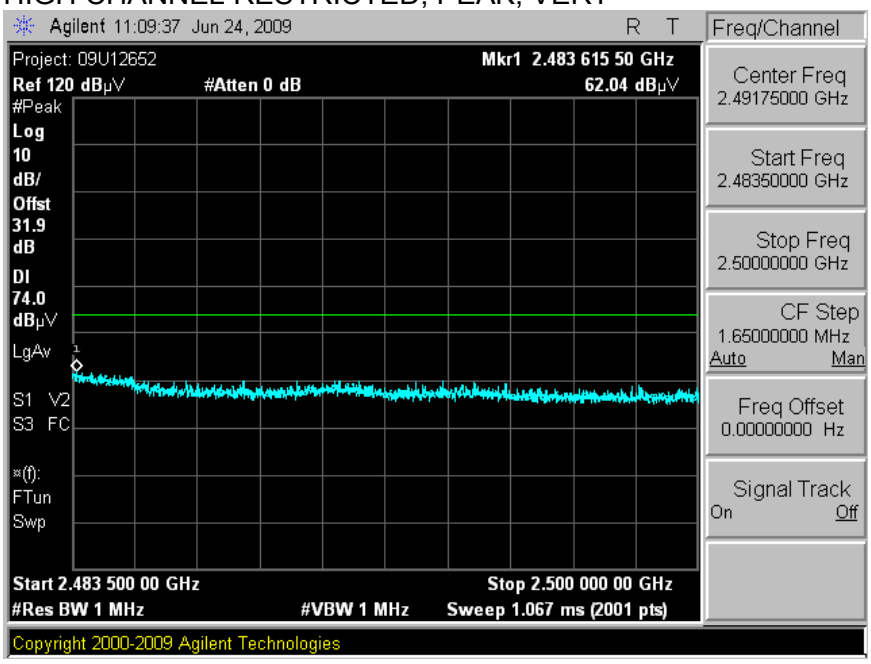


HIGH CHANNEL RESTRICTED, AVG, HORIZ

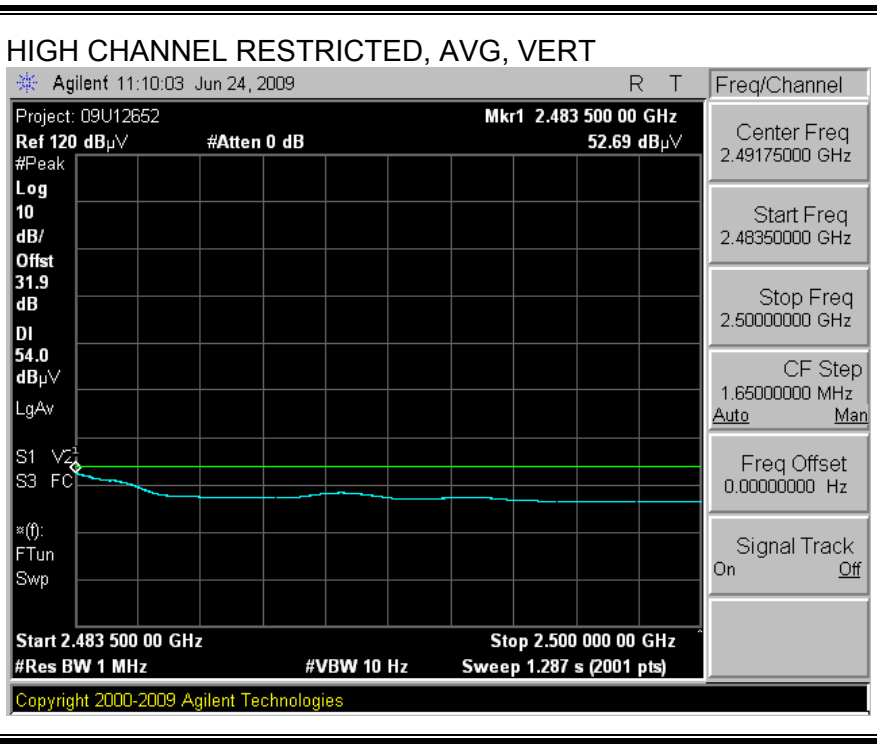


RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)

HIGH CHANNEL RESTRICTED, PEAK, VERT



HIGH CHANNEL RESTRICTED, AVG, VERT



HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement
Compliance Certification Services, Fremont 5m Chamber

Test Engr: Thanh Nguyen
Date: 06/30/09
Company: Qualcomm Inc.
EUT Description: 802.11 abgn 4X4 Module
EUT M/N: 65-VN780-P2
Test Target: FCC Class B
Mode Oper: Transmit b mode

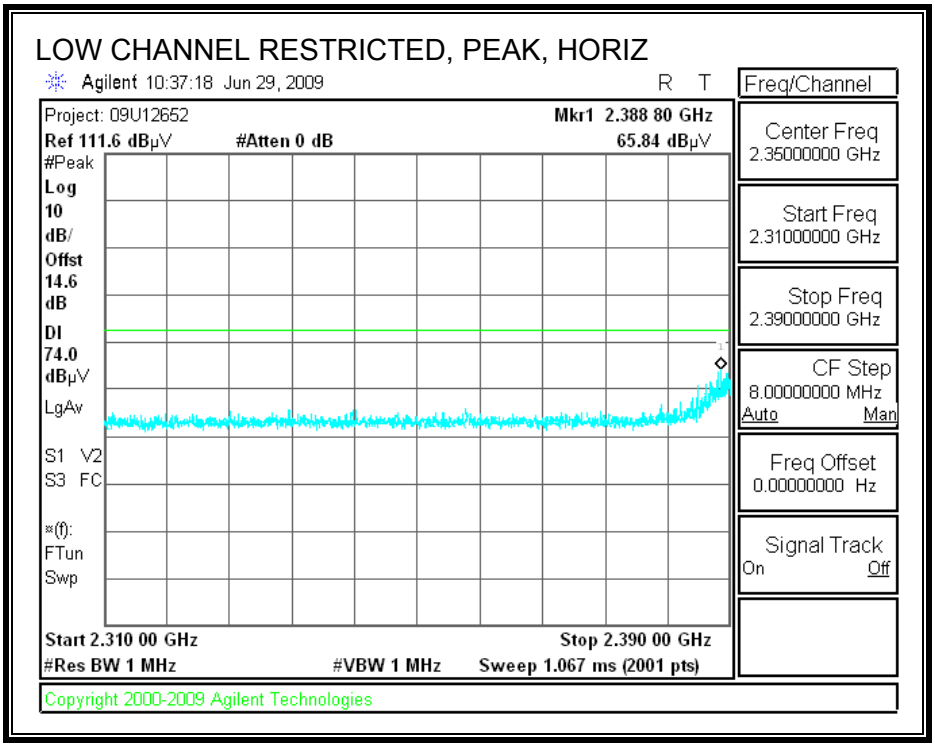
f	Measurement Frequency	Amp	Preamp Gain		Average Field Strength Limit
Dist	Distance to Antenna	D Corr	Distance Correct to 3 meters		Peak Field Strength Limit
Read	Analyzer Reading	Avg	Average Field Strength @ 3 m		Margin vs. Average Limit
AF	Antenna Factor	Peak	Calculated Peak Field Strength		Margin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

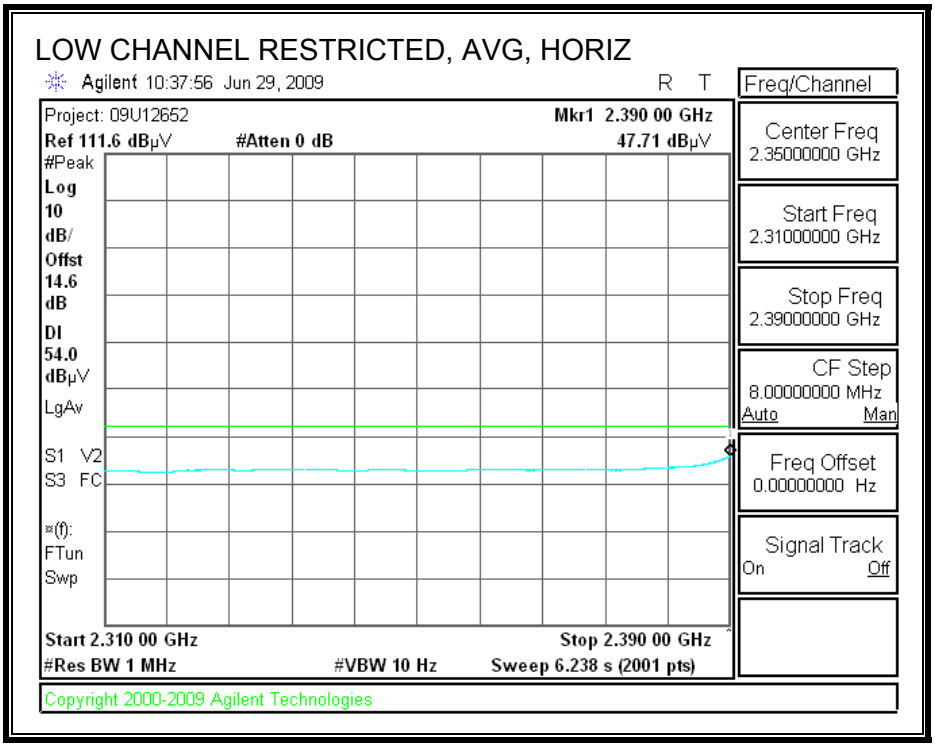
f GHz	Dist (m)	Read dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Corr. dBuV/m	Limit dBuV/m	Margin dB	Ant. Pol. V/H	Det. P/A/QP	Ant.High cm	Table Angle Degree	Notes
Low 2412MHz, set 16.5dbm															
4.824	3.0	44.8	33.0	5.8	-36.5	0.0	0.0	47.1	74.0	-26.9	V	P	129.4	241.0	
4.824	3.0	41.4	33.0	5.8	-36.5	0.0	0.0	43.8	54.0	-10.2	V	A	129.4	241.0	
4.824	3.0	40.2	33.0	5.8	-36.5	0.0	0.0	42.6	74.0	-31.4	H	P	116.2	197.3	Noise floor
4.824	3.0	31.4	33.0	5.8	-36.5	0.0	0.0	33.8	54.0	-20.2	H	A	116.2	197.3	Noise floor
Mid ch 2437MHz, set 20dbm															
4.874	3.0	46.0	33.1	5.8	-36.5	0.0	0.0	48.5	74.0	-25.5	V	P	116.1	272.7	
4.874	3.0	42.9	33.1	5.8	-36.5	0.0	0.0	45.3	54.0	-8.7	V	A	116.1	272.7	
7.311	3.0	45.0	35.3	7.3	-36.2	0.0	0.0	51.3	74.0	-22.7	V	P	157.9	305.2	
7.311	3.0	39.5	35.3	7.3	-36.2	0.0	0.0	45.9	54.0	-8.1	V	A	157.9	305.2	
12.185	3.0	36.8	39.0	9.8	-35.4	0.0	0.0	50.2	74.0	-23.8	V	P	103.8	360.0	Noise floor
12.185	3.0	23.6	39.0	9.8	-35.4	0.0	0.0	37.0	54.0	-17.0	V	A	103.8	360.0	Noise floor
4.874	3.0	40.3	33.1	5.8	-36.5	0.0	0.0	42.8	74.0	-31.2	H	P	103.9	221.2	
4.874	3.0	32.7	33.1	5.8	-36.5	0.0	0.0	35.1	54.0	-18.9	H	A	103.9	221.2	
7.311	3.0	37.5	35.3	7.3	-36.2	0.0	0.0	43.9	74.0	-30.1	H	P	142.0	211.3	
7.311	3.0	27.6	35.3	7.3	-36.2	0.0	0.0	33.9	54.0	-20.1	H	A	142.0	211.3	
12.185	3.0	35.7	39.0	9.8	-35.4	0.0	0.0	49.1	74.0	-24.9	H	P	116.2	356.5	Noise floor
12.185	3.0	23.5	39.0	9.8	-35.4	0.0	0.0	36.9	54.0	-17.1	H	A	116.2	356.5	Noise floor
High Ch 2462MHz set 16.5dbm															
4.924	3.0	45.3	33.1	5.9	-36.5	0.0	0.0	47.9	74.0	-26.1	V	P	198.1	245.8	
4.924	3.0	41.4	33.1	5.9	-36.5	0.0	0.0	43.9	54.0	-10.1	V	A	198.1	245.8	
7.386	3.0	39.8	35.4	7.3	-36.2	0.0	0.6	46.9	74.0	-27.1	V	P	156.2	170.9	
7.386	3.0	31.1	35.4	7.3	-36.2	0.0	0.6	38.2	54.0	-15.8	V	A	156.2	170.9	
4.924	3.0	40.6	33.1	5.9	-36.5	0.0	0.0	43.2	74.0	-30.8	H	P	102.3	150.9	
4.924	3.0	33.1	33.1	5.9	-36.5	0.0	0.0	35.7	54.0	-18.3	H	A	102.3	150.9	
7.386	3.0	36.8	35.4	7.3	-36.2	0.0	0.6	43.9	74.0	-30.1	H	P	173.5	156.4	Noise floor
7.386	3.0	24.9	35.4	7.3	-36.2	0.0	0.6	32.0	54.0	-22.0	H	A	173.5	156.4	Noise floor

Rev. 4.1.2.7
Note: No other emissions were detected above the system noise floor.

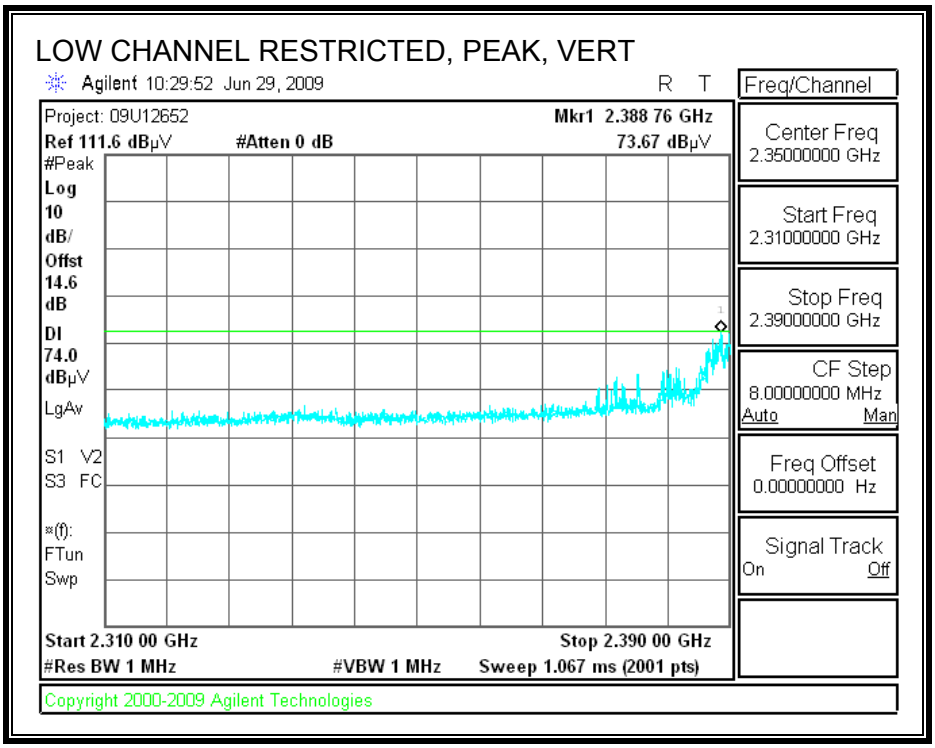
8.2.2. 802.11g MODE IN THE 2.4 GHz BAND

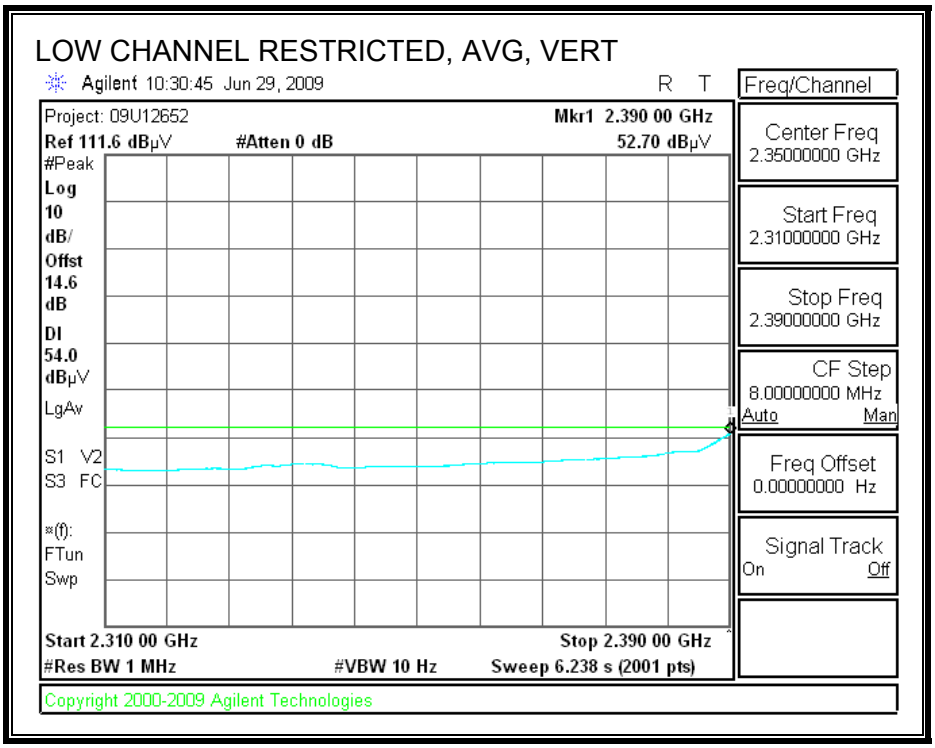
RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)





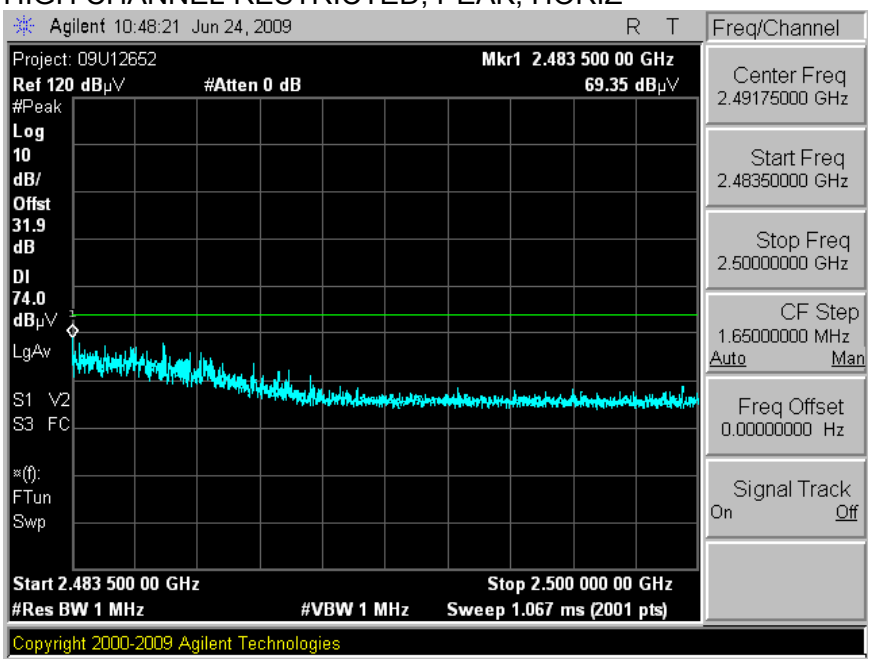
RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)



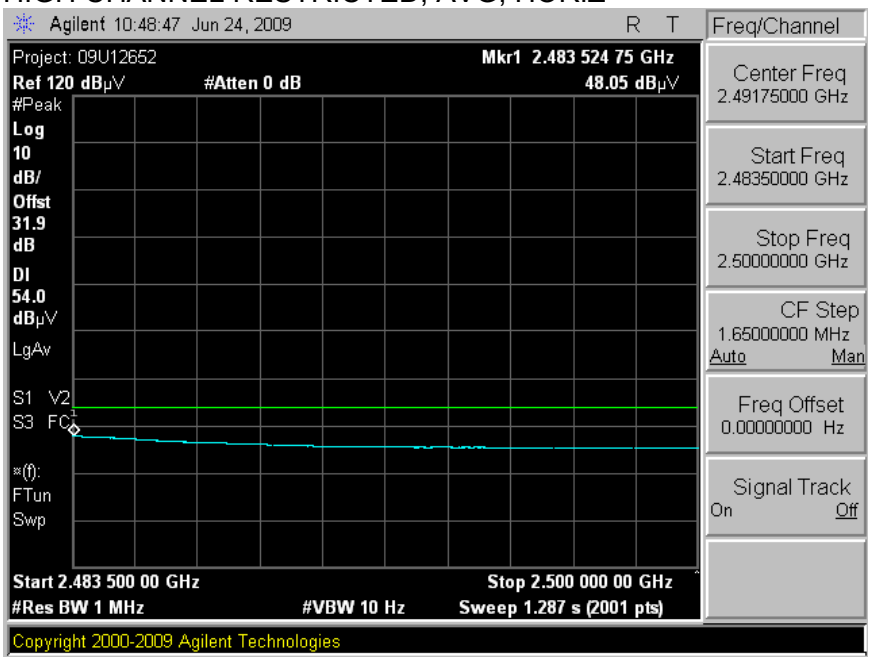


RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)

HIGH CHANNEL RESTRICTED, PEAK, HORIZ

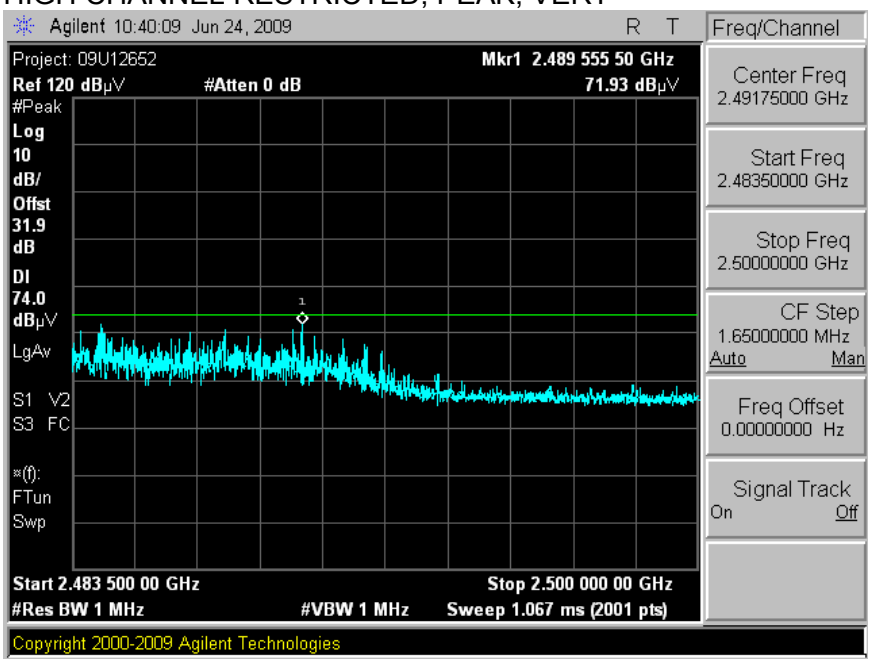


HIGH CHANNEL RESTRICTED, AVG, HORIZ

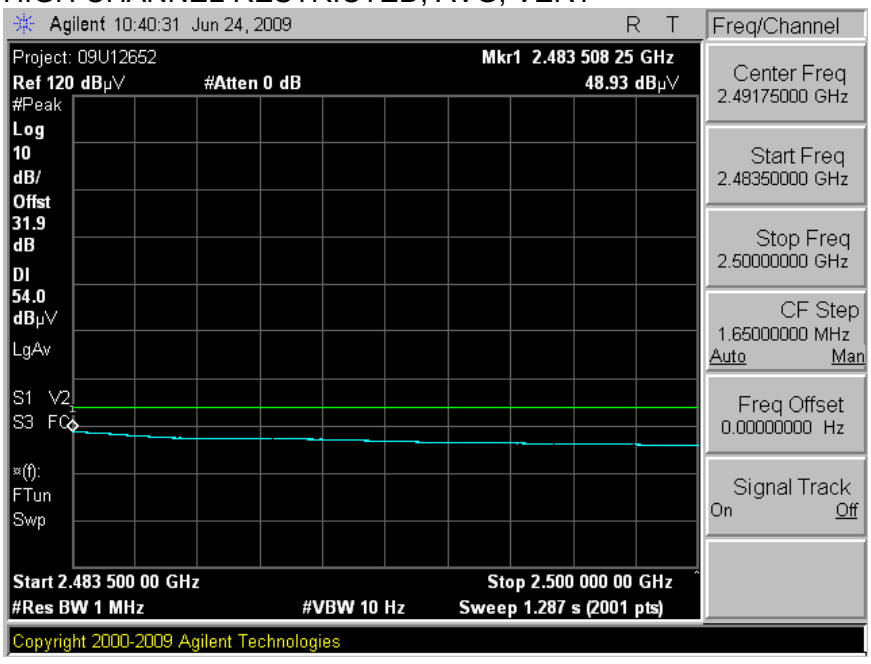


RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)

HIGH CHANNEL RESTRICTED, PEAK, VERT



HIGH CHANNEL RESTRICTED, AVG, VERT



HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement
Compliance Certification Services, Fremont 5m Chamber

Test Engr: Thanh Nguyen
Date: 06/29/09
Project #: 09U12652
Company: Qualcomm Inc.
EUT Description: 802.11 abgn 4X4 Module
EUT M/N: 65-VN780-P2
Test Target: FCC Class B
Mode Oper: Transmit g mode

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

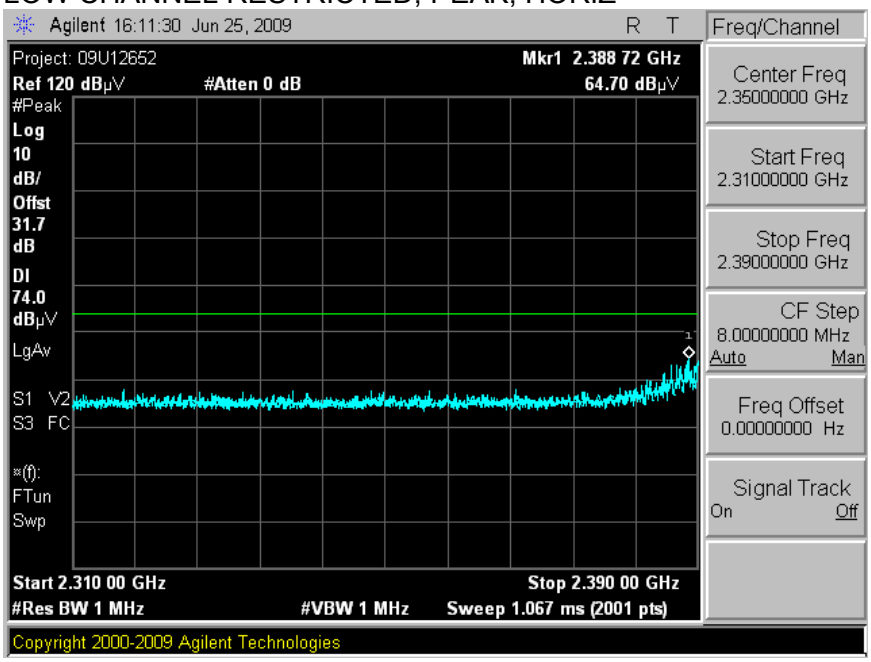
f GHz	Dist (m)	Read dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Corr. dBuV/m	Limit dBuV/m	Margin dB	Ant. Pol. V/H	Det. P/A/QP	Ant.High cm	Table Angle Degree	Notes
g low_set 14dbm															
4.824	3.0	41.2	33.0	5.8	-36.5	0.0	0.0	43.6	74.0	-30.4	V	P	113.1	225.9	
4.824	3.0	35.0	33.0	5.8	-36.5	0.0	0.0	37.4	54.0	-16.6	V	A	113.1	225.9	
4.824	3.0	39.4	33.0	5.8	-36.5	0.0	0.0	41.7	74.0	-32.3	H	P	100.0	187.4	
4.824	3.0	30.2	33.0	5.8	-36.5	0.0	0.0	32.5	54.0	-21.5	H	A	100.0	187.4	
g mid set 20dbm															
4.874	3.0	50.2	33.1	5.8	-36.5	0.0	0.0	52.7	74.0	-21.3	V	P	139.4	228.7	
4.874	3.0	34.5	33.1	5.8	-36.5	0.0	0.0	37.0	54.0	-17.0	V	A	139.4	228.7	
7.311	3.0	48.5	35.3	7.3	-36.2	0.0	0.0	56.4	74.0	-17.6	V	P	157.0	294.1	
7.311	3.0	34.6	35.3	7.3	-36.2	0.0	0.0	40.9	54.0	-13.1	V	A	157.0	294.1	
4.874	3.0	46.2	33.1	5.8	-36.5	0.0	0.0	48.8	74.0	-25.2	H	P	139.4	228.7	
4.874	3.0	30.2	33.1	5.8	-36.5	0.0	0.0	42.8	54.0	-11.2	H	A	139.4	228.7	
7.311	3.0	45.6	35.3	7.3	-36.2	0.0	0.0	56.4	74.0	-21.4	H	P	157.0	294.1	
7.311	3.0	40.0	35.3	7.3	-36.2	0.0	0.0	47.0	54.0	-7.0	H	A	157.0	294.1	
g High_set 14dbm															
4.924	3.0	42.6	33.1	5.9	-36.5	0.0	0.0	45.2	74.0	-28.8	V	P	111.5	225.7	
4.924	3.0	36.3	33.1	5.9	-36.5	0.0	0.0	38.8	54.0	-15.2	V	A	111.5	225.7	
7.386	3.0	38.5	35.4	7.3	-36.2	0.0	0.6	45.6	74.0	-28.4	V	P	157.6	180.0	
7.386	3.0	26.0	35.4	7.3	-36.2	0.0	0.6	33.1	54.0	-20.9	V	A	157.6	180.0	
4.924	3.0	37.3	33.1	5.9	-36.5	0.0	0.0	39.9	74.0	-34.1	H	P	111.5	225.7	
4.924	3.0	33.4	33.1	5.9	-36.5	0.0	0.0	36.0	54.0	-18.0	H	A	111.5	225.7	
7.386	3.0	36.5	35.4	7.3	-36.2	0.0	0.6	43.6	74.0	-30.4	H	P	157.6	180.0	
7.386	3.0	32.3	35.4	7.3	-36.2	0.0	0.6	39.4	54.0	-14.6	H	A	157.6	180.0	

Rev. 4.1.2.7
Note: No other emissions were detected above the system noise floor.

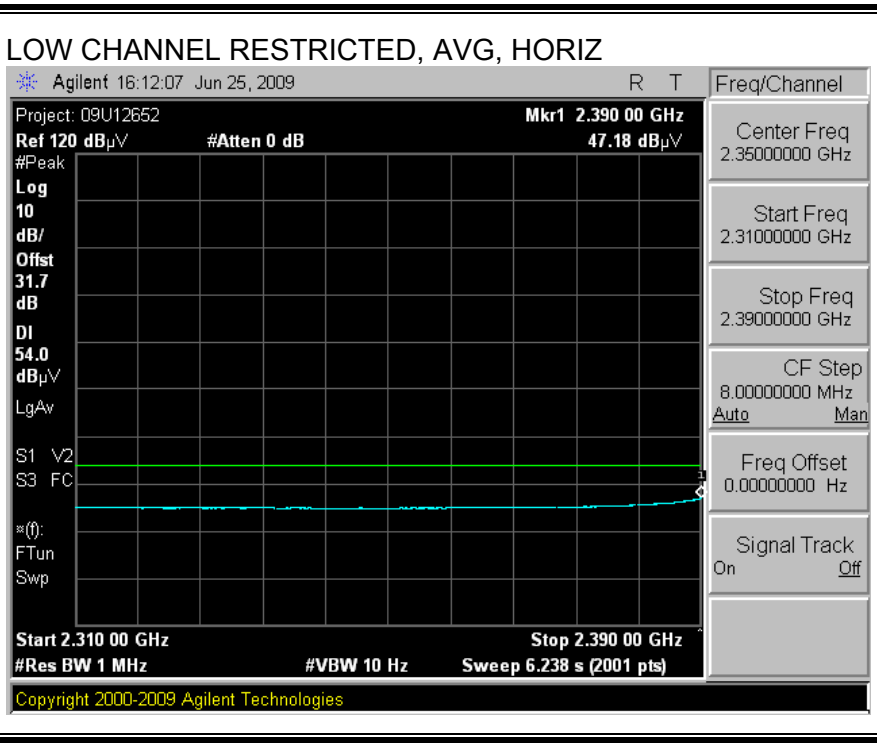
8.2.3. 802.11n HT20 MODE IN THE 2.4 GHz BAND

RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)

LOW CHANNEL RESTRICTED, PEAK, HORIZ

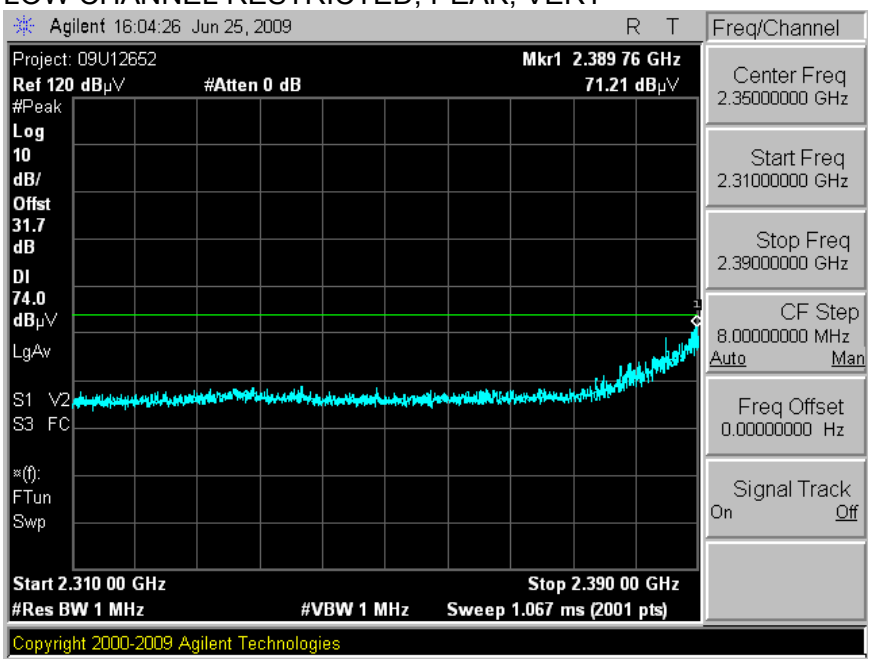


LOW CHANNEL RESTRICTED, AVG, HORIZ

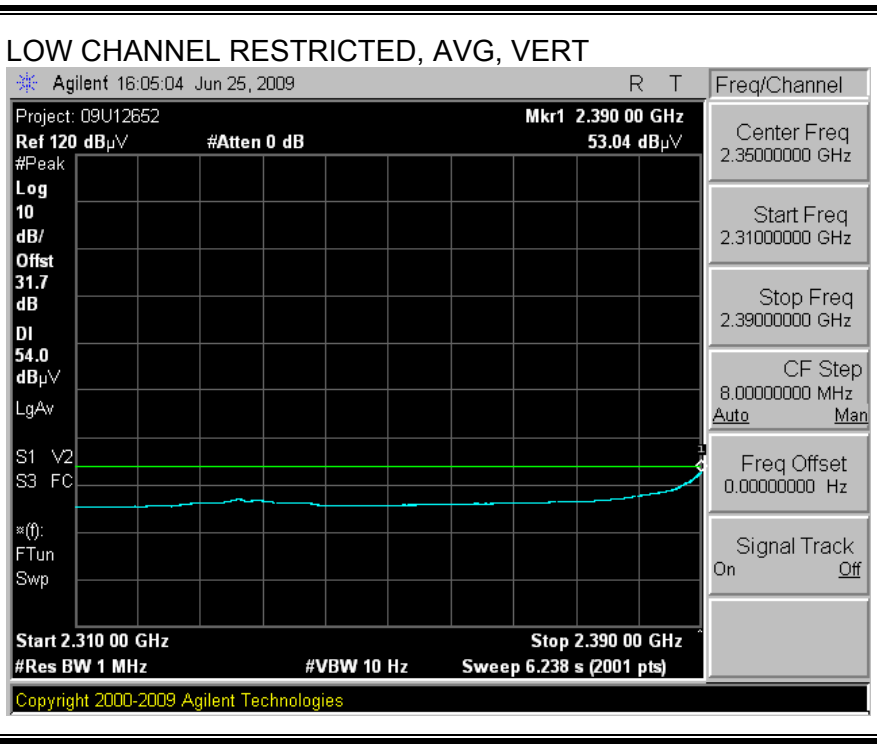


RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)

LOW CHANNEL RESTRICTED, PEAK, VERT

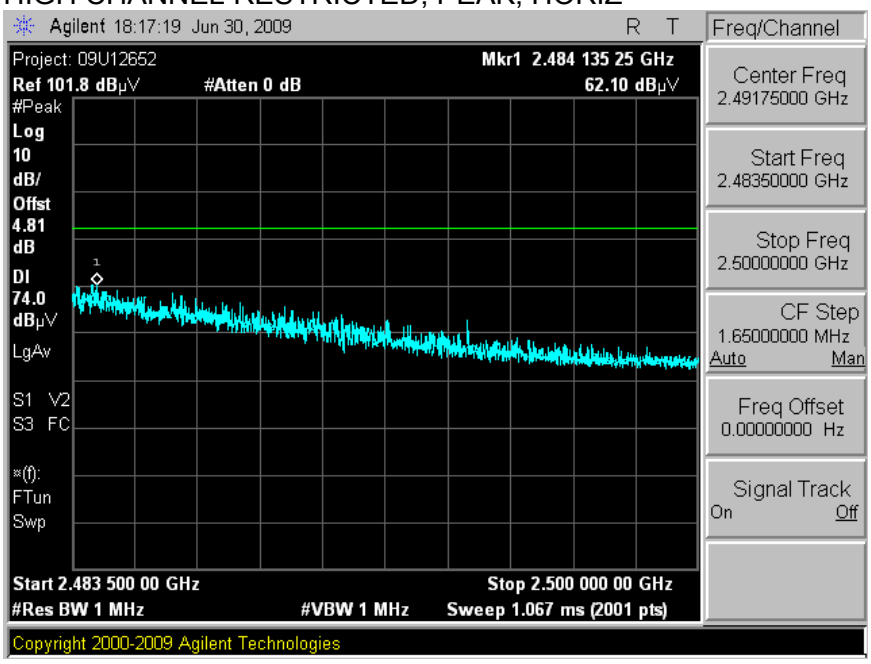


LOW CHANNEL RESTRICTED, AVG, VERT

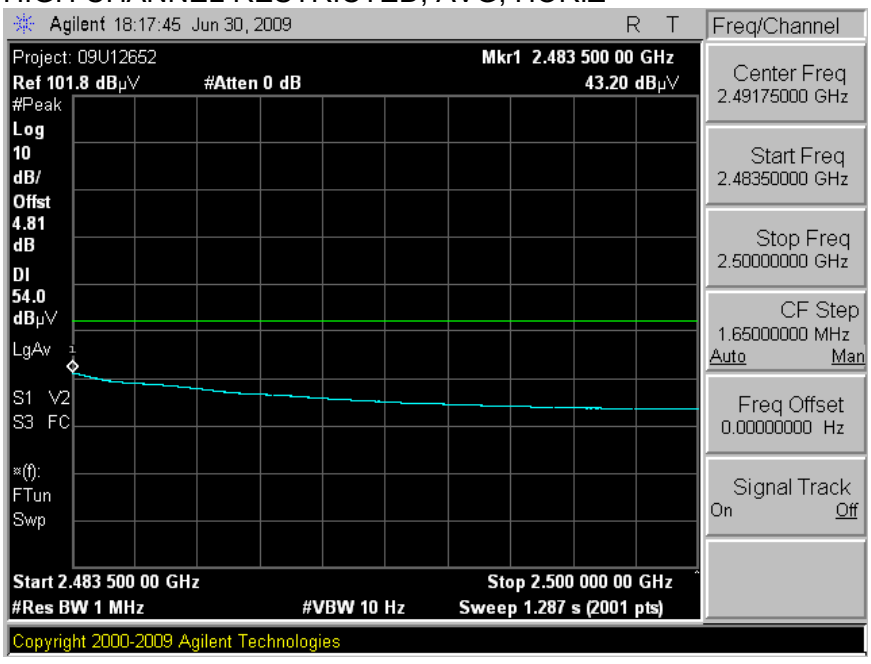


RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)

HIGH CHANNEL RESTRICTED, PEAK, HORIZ

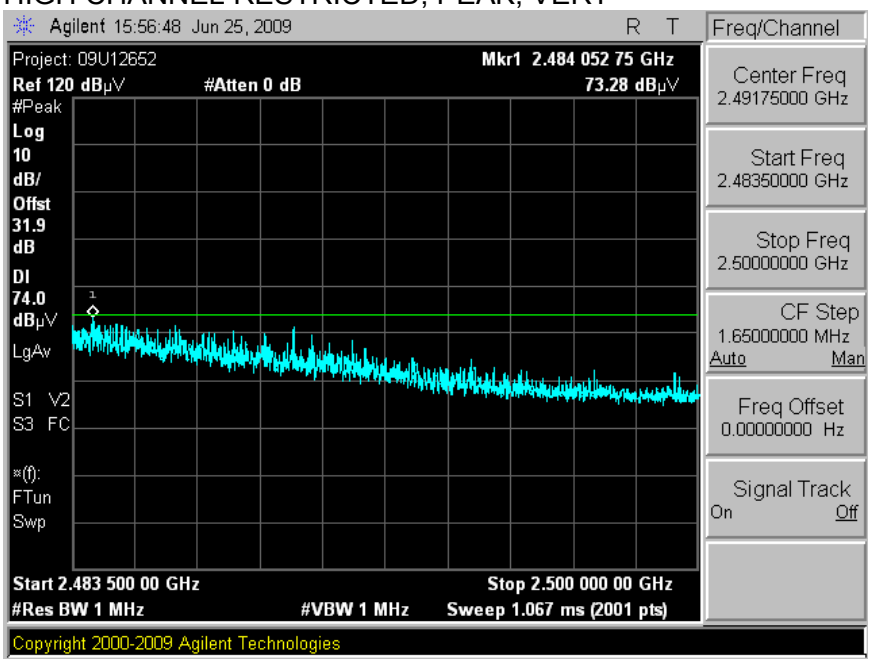


HIGH CHANNEL RESTRICTED, AVG, HORIZ

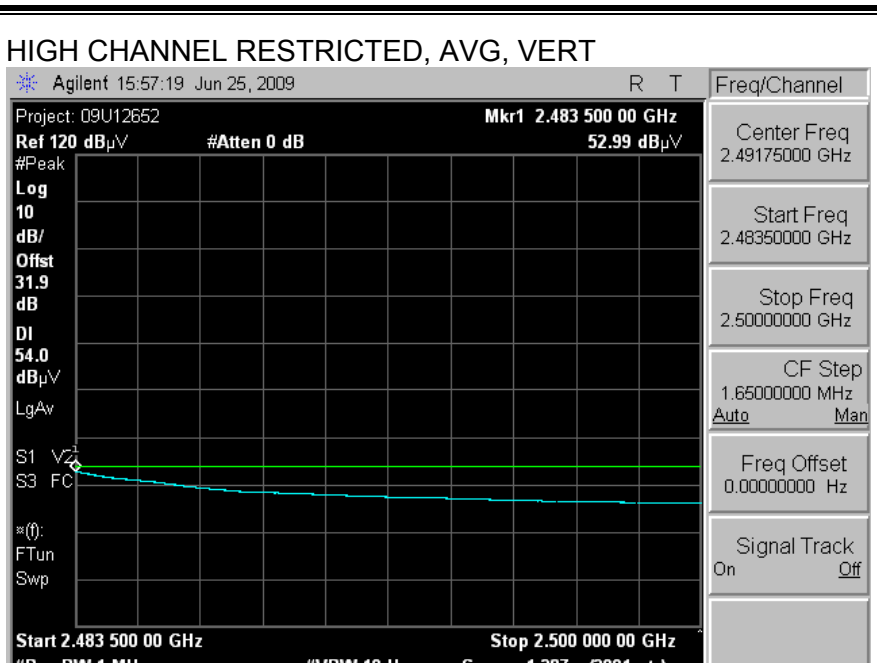


RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)

HIGH CHANNEL RESTRICTED, PEAK, VERT



HIGH CHANNEL RESTRICTED, AVG, VERT



HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement
Compliance Certification Services, Fremont 5m Chamber

Test Engr: Thanh Nguyen
Date: 06/30/09
Company: Qualcomm Inc.
EUT Description: 802.11 abgn 4X4 Module
EUT M/N: 65-VN780-P2
Test Target: FCC Class B
Mode Oper: Transmit HT20 mode

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

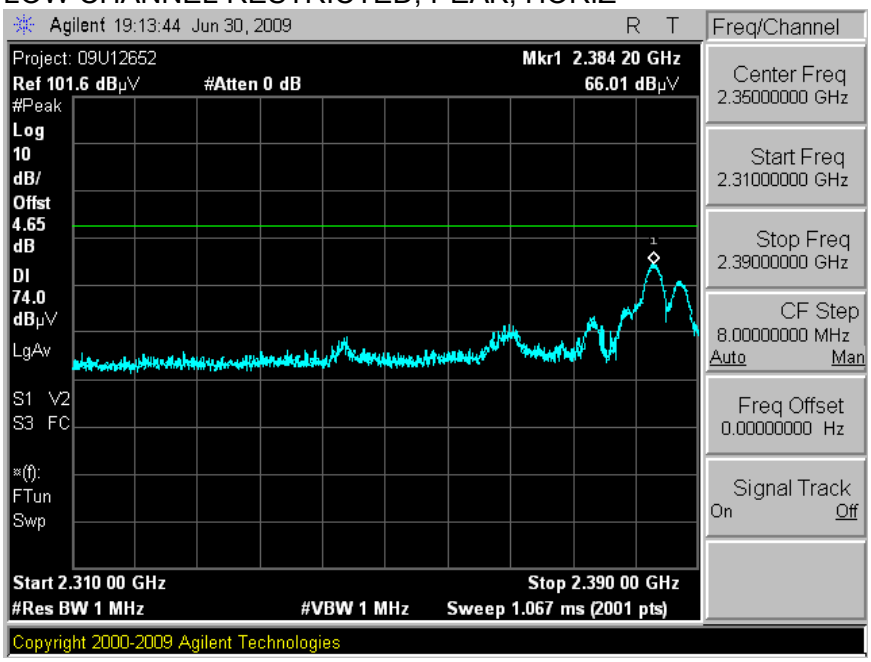
f GHz	Dist (m)	Read dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Corr. dBuV/m	Limit dBuV/m	Margin dB	Ant. Pol. V/H	Det. P/A/QP	Ant.High cm	Table Angle Degree	Notes
Low_set 14dbm															
4.824	3.0	41.3	33.0	5.8	-36.5	0.0	0.0	43.7	74.0	-30.3	V	P	100.0	225.9	
4.824	3.0	34.2	33.0	5.8	-36.5	0.0	0.0	36.5	54.0	-17.5	V	A	100.0	225.9	
4.824	3.0	38.8	33.0	5.8	-36.5	0.0	0.0	41.1	74.0	-32.9	H	P	114.9	197.8	
4.824	3.0	29.5	33.0	5.8	-36.5	0.0	0.0	31.8	54.0	-22.2	H	A	114.9	197.8	
Mid_set 20dbm															
4.874	3.0	52.8	33.1	5.8	-36.5	0.0	0.0	55.3	74.0	-18.7	V	P	108.3	187.0	
4.874	3.0	35.7	33.1	5.8	-36.5	0.0	0.0	38.2	54.0	-15.8	V	A	108.3	187.0	
7.311	3.0	50.3	35.3	7.3	-36.2	0.0	0.6	57.3	74.0	-16.7	V	P	162.7	212.0	
7.311	3.0	30.2	35.3	7.3	-36.2	0.0	0.6	37.1	54.0	-16.9	V	A	162.7	212.0	
12.185	3.0	35.6	39.0	9.8	-35.4	0.0	0.7	49.7	74.0	-24.3	V	P	162.7	212.0	
12.185	3.0	23.6	39.0	9.8	-35.4	0.0	0.7	37.6	54.0	-16.4	V	A	162.7	212.0	
4.874	3.0	43.7	33.1	5.8	-36.5	0.0	0.0	46.2	74.0	-27.8	H	P	100.0	198.4	
4.874	3.0	29.4	33.1	5.8	-36.5	0.0	0.0	31.9	54.0	-22.1	H	A	100.0	198.4	
7.311	3.0	39.3	35.3	7.3	-36.2	0.0	0.6	46.3	74.0	-27.7	H	P	136.4	245.8	
7.311	3.0	25.1	35.3	7.3	-36.2	0.0	0.6	32.1	54.0	-21.9	H	A	136.4	245.8	
High_set 14dbm															
4.924	3.0	43.5	33.1	5.9	-36.5	0.0	0.0	46.1	74.0	-27.9	V	P	125.1	224.9	
4.924	3.0	35.6	33.1	5.9	-36.5	0.0	0.0	38.1	54.0	-15.9	V	A	125.1	224.9	
7.386	3.0	37.4	35.4	7.3	-36.2	0.0	0.6	44.5	74.0	-29.5	V	P	165.5	286.8	
7.386	3.0	25.8	35.4	7.3	-36.2	0.0	0.6	32.9	54.0	-21.1	V	A	165.5	286.8	
4.924	3.0	39.1	33.1	5.9	-36.5	0.0	0.0	41.6	74.0	-32.4	H	P	100.0	198.8	
4.924	3.0	29.9	33.1	5.9	-36.5	0.0	0.0	32.4	54.0	-21.6	H	A	100.0	198.8	
7.386	3.0	36.8	35.4	7.3	-36.2	0.0	0.6	43.9	74.0	-30.1	H	P	100.0	198.8	
7.386	3.0	24.7	35.4	7.3	-36.2	0.0	0.6	31.8	54.0	-22.2	H	A	100.0	198.8	

Rev. 4.1.2.7
Note: No other emissions were detected above the system noise floor.

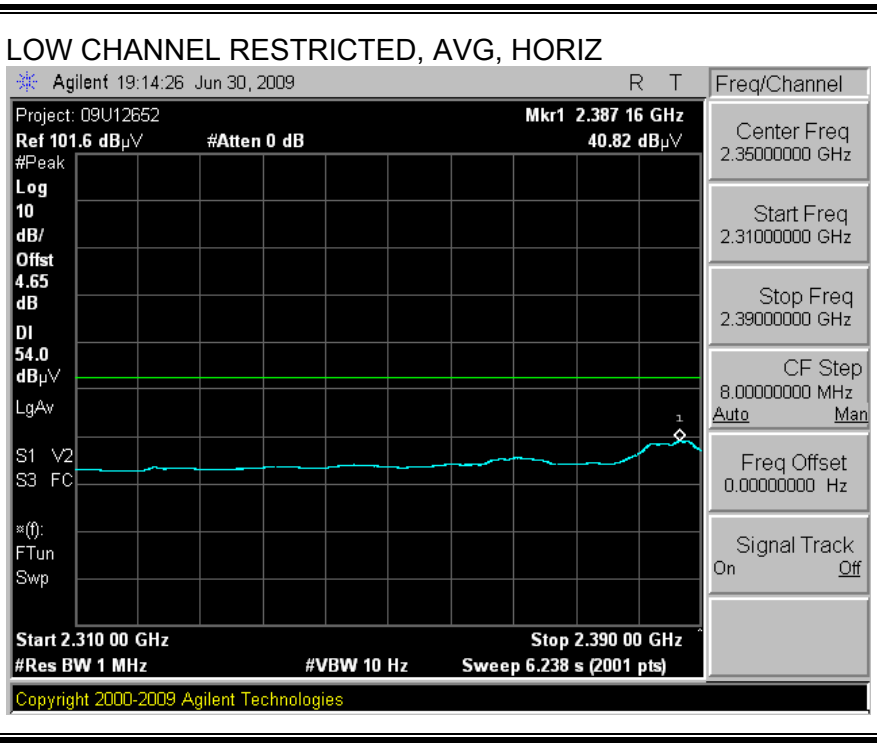
8.2.4. 802.11n HT40 MODE IN THE 2.4 GHz BAND

RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)

LOW CHANNEL RESTRICTED, PEAK, HORIZ

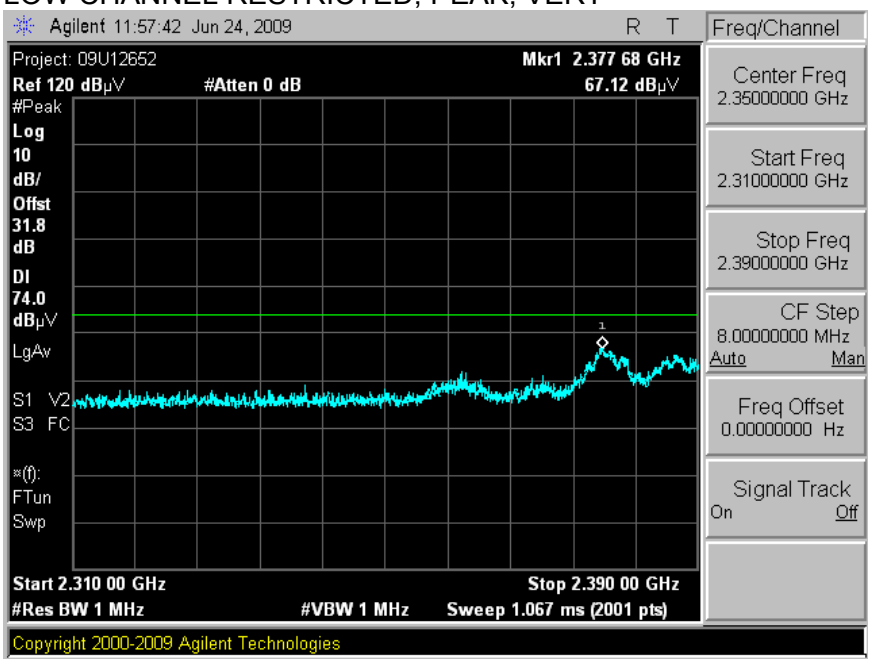


LOW CHANNEL RESTRICTED, AVG, HORIZ

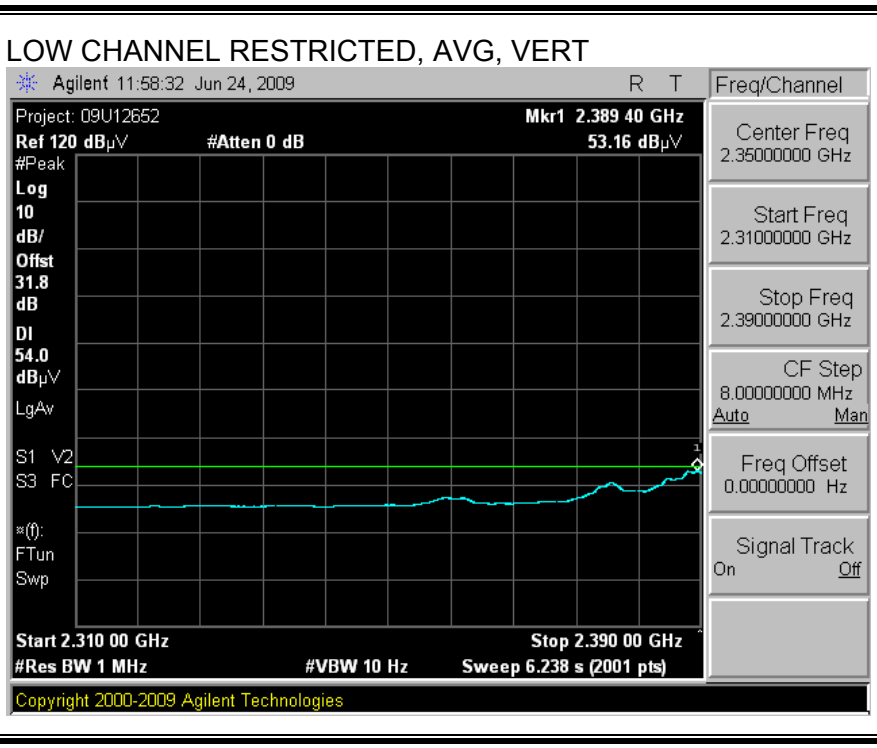


RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)

LOW CHANNEL RESTRICTED, PEAK, VERT

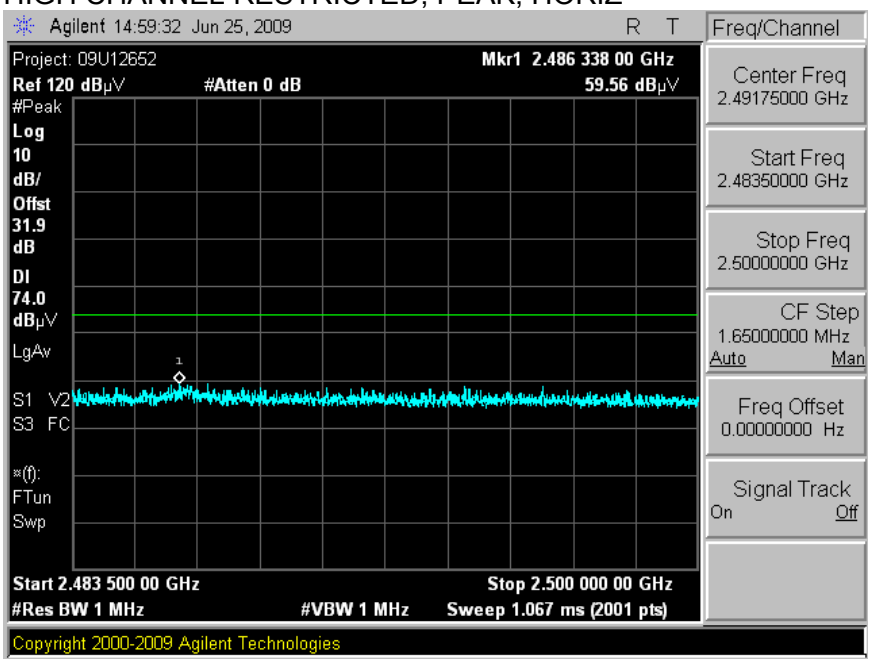


LOW CHANNEL RESTRICTED, AVG, VERT

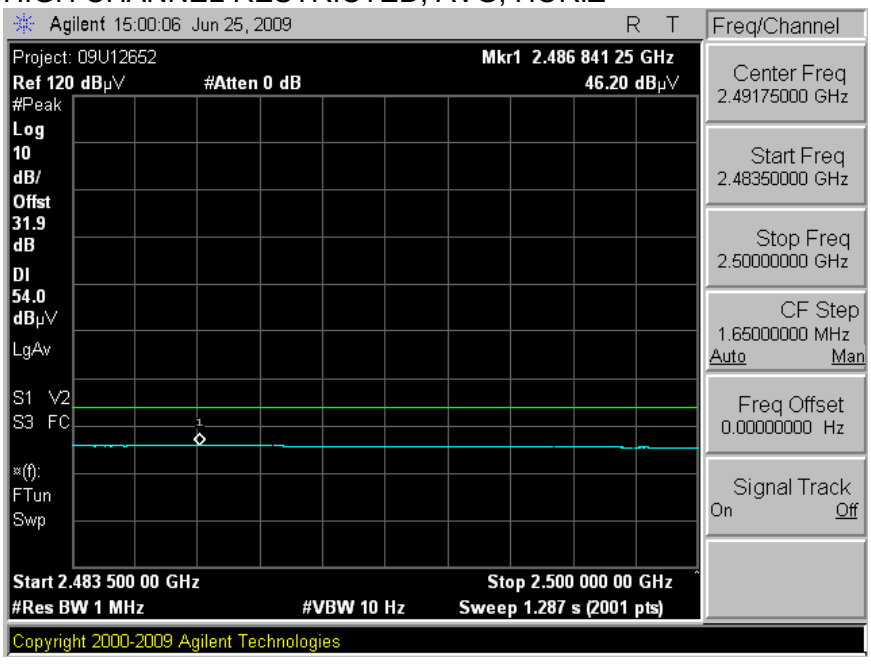


RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)

HIGH CHANNEL RESTRICTED, PEAK, HORIZ

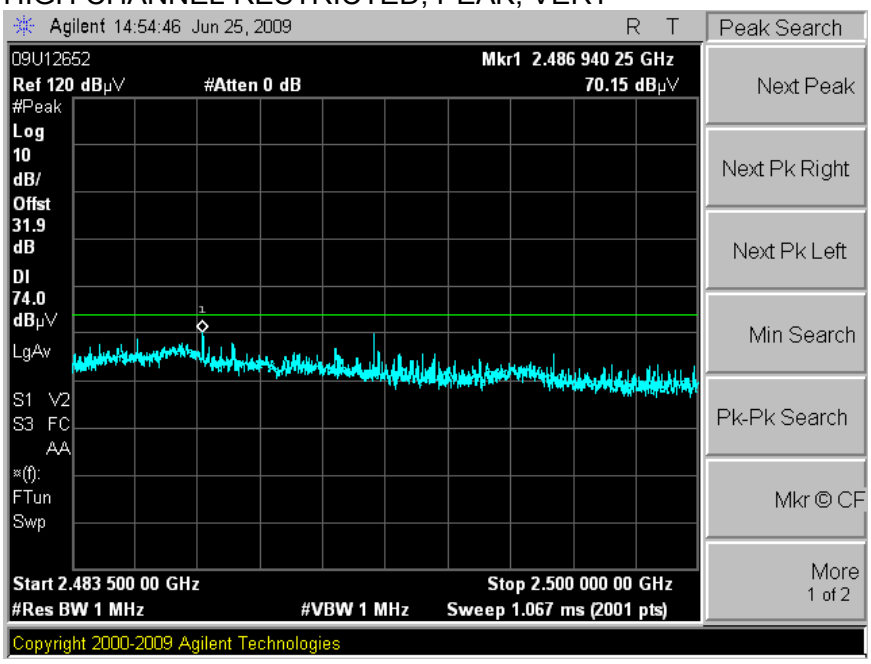


HIGH CHANNEL RESTRICTED, AVG, HORIZ

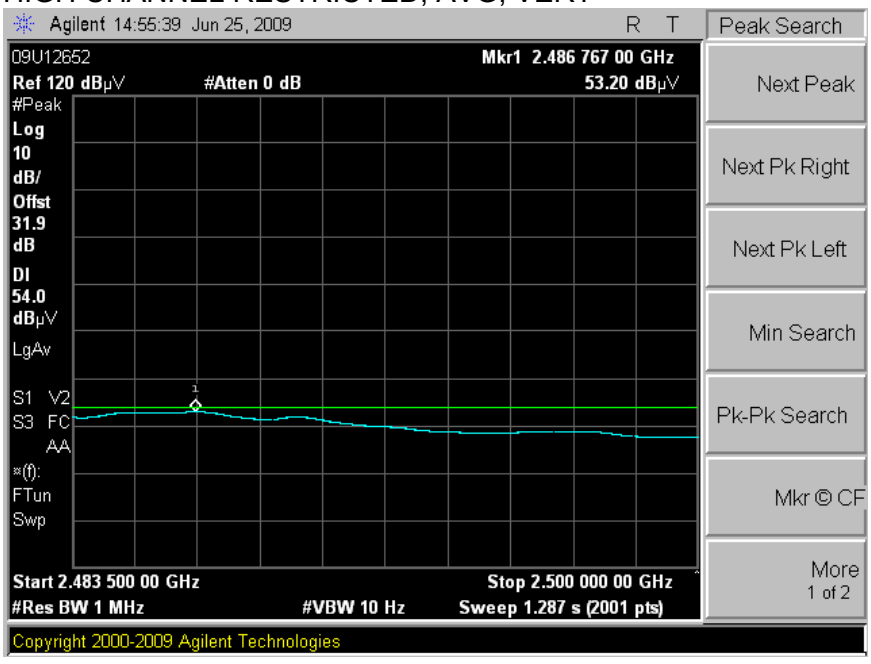


RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)

HIGH CHANNEL RESTRICTED, PEAK, VERT



HIGH CHANNEL RESTRICTED, AVG, VERT



HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement
Compliance Certification Services, Fremont 5m Chamber

Test Engr: Thanh Nguyen
Date: 06/30/09
Company: Qualcomm Inc.
EUT Description: 802.11 abgn 4X4 Module
EUT M/N: 65-VN780-P2
Test Target: FCC Class B
Mode Oper: Transmit HT40 mode

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

f GHz	Dist (m)	Read dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Corr. dBuV/m	Limit dBuV/m	Margin dB	Ant. Pol. V/H	Det. P/A/QP	Ant.High cm	Table Angle Degree	Notes
Low ch set 12.5dbm															
4.844	3.0	38.9	33.1	5.8	-36.5	0.0	10.0	51.3	74.0	-22.7	V	P	188.2	209.4	Noise floor
4.844	3.0	25.9	33.1	5.8	-36.5	0.0	10.0	38.3	54.0	-15.7	V	A	188.2	209.4	
High ch set 13.5dbm															
4.904	3.0	39.4	33.1	5.9	-36.5	0.0	10.0	51.9	74.0	-22.1	V	P	186.0	269.7	Noise floor
4.904	3.0	26.3	33.1	5.9	-36.5	0.0	10.0	38.8	54.0	-15.2	V	A	186.0	269.7	

Rev. 4.1.2.7
Note: No other emissions were detected above the system noise floor.

8.2.5. 802.11a MODE IN THE 5.8 GHz BAND

HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement
Compliance Certification Services, Fremont 5m Chamber

Test Engr: Thanh Nguyen
Date: 06/30/09
Company: Qualcomm Inc.
EUT Description: 802.11 abgn 4X4 Module
EUT M/N: 65-VN780-P2
Test Target: FCC DTS
Mode Oper: Transmit 11a Mode

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

f GHz	Dist (m)	Read dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Corr. dBuV/m	Limit dBuV/m	Margin dB	Ant. Pol. V/H	Det. P/A/QP	Ant.High cm	Table Angle Degree	Notes
Low ch 5745MHz, set 19dbm															
11.490	3.0	43.3	38.4	9.5	-35.9	0.0	0.7	56.0	74.0	-18.0	V	P	100.1	302.3	
11.490	3.0	40.0	38.4	9.5	-35.9	0.0	0.7	52.8	54.0	-1.2	V	A	100.1	302.3	
11.490	3.0	38.6	38.4	9.5	-35.9	0.0	0.7	51.4	74.0	-22.6	H	P	100.1	26.6	
11.490	3.0	30.9	38.4	9.5	-35.9	0.0	0.7	43.7	54.0	-10.3	H	A	100.1	26.6	
Mid ch 5785MHz set 19dbm															
11.570	3.0	43.1	38.5	9.5	-35.8	0.0	0.7	56.0	74.0	-18.0	V	P	149.9	303.4	
11.570	3.0	39.8	38.5	9.5	-35.8	0.0	0.7	52.7	54.0	-1.3	V	A	149.9	303.4	
11.570	3.0	39.5	38.5	9.5	-35.8	0.0	0.7	52.4	74.0	-21.6	H	P	100.0	27.0	
11.570	3.0	32.1	38.5	9.5	-35.8	0.0	0.7	45.0	54.0	-9.0	H	A	100.0	27.0	
High ch 5825MHz set 19dbm															
11.650	3.0	43.9	38.6	9.6	-35.7	0.0	0.7	57.0	74.0	-17.0	V	P	120.4	133.7	
11.650	3.0	40.3	38.6	9.6	-35.7	0.0	0.7	53.5	54.0	-0.5	V	A	120.4	133.7	
11.650	3.0	38.1	38.6	9.6	-35.7	0.0	0.7	51.2	74.0	-22.8	H	P	102.4	18.9	
11.650	3.0	30.5	38.6	9.6	-35.7	0.0	0.7	43.6	54.0	-10.4	H	A	102.4	18.9	

Rev. 4.1.2.7
Note: No other emissions were detected above the system noise floor.

8.2.6. 802.11n HT20 MODE IN THE 5.8 GHz BAND

HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement
Compliance Certification Services, Fremont 5m Chamber

Test Engr: Thanh Nguyen
Date: 06/30/09
Project #: 09U12652
Company: Qualcomm Inc.
EUT Description: 802.11 abgn 4X4 Module
EUT M/N: 65-VN780-P2
Test Target: FCC DTS
Mode Oper: Transmit

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

f GHz	Dist (m)	Read dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Corr. dBuV/m	Limit dBuV/m	Margin dB	Ant. Pol. V/H	Det. P/A/QP	Ant.High cm	Table Angle Degree	Notes
HT20 Low Ch set 19dbm															
11.490	3.0	44.0	38.4	9.5	-35.9	0.0	0.0	56.0	74.0	-18.0	V	P	131.7	159.5	
11.490	3.0	40.8	38.4	9.5	-35.9	0.0	0.0	52.9	54.0	-1.1	V	A	131.7	159.5	
11.490	3.0	41.9	38.4	9.5	-35.9	0.0	0.0	53.9	74.0	-20.1	H	P	131.9	100.7	
11.490	3.0	30.5	38.4	9.5	-35.9	0.0	0.0	42.6	54.0	-11.4	H	A	131.9	100.7	
HT20 Mid Ch set 19dbm															
11.570	3.0	43.7	38.5	9.5	-35.8	0.0	0.0	56.0	74.0	-18.0	V	P	131.5	159.8	
11.570	3.0	40.7	38.5	9.5	-35.8	0.0	0.0	52.9	54.0	-1.1	V	A	131.5	159.8	
11.570	3.0	36.8	38.5	9.5	-35.8	0.0	0.0	49.0	74.0	-25.0	H	P	101.0	92.4	
11.570	3.0	28.2	38.5	9.5	-35.8	0.0	0.0	40.5	54.0	-13.5	H	A	101.0	92.4	
HT20 High Ch set 19dbm															
11.650	3.0	45.4	38.6	9.6	-35.7	0.0	0.0	57.8	74.0	-16.2	V	P	122.8	120.5	
11.650	3.0	41.6	38.6	9.6	-35.7	0.0	0.0	54.0	54.0	0.0	V	A	122.8	120.5	
11.650	3.0	38.9	38.6	9.6	-35.7	0.0	0.0	51.3	74.0	-22.7	H	P	148.7	86.6	
11.650	3.0	32.1	38.6	9.6	-35.7	0.0	0.0	44.5	54.0	-9.5	H	A	148.7	86.6	

Rev. 4.1.2.7
Note: No other emissions were detected above the system noise floor.

8.2.7. 802.11n HT40 MODE IN THE 5.8 GHz BAND

HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement
Compliance Certification Services, Fremont 5m Chamber

Test Engr: Thanh Nguyen
Date: 06/30/09
Company: Qualcomm Inc.
EUT Description: 802.11 abgn 4X4 Module
EUT M/N: 65-VN780-P2
Test Target: FCC DTS
Mode Oper: Transmit HT40 Mode

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

f GHz	Dist (m)	Read dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Corr. dBuV/m	Limit dBuV/m	Margin dB	Ant. Pol. V/H	Det. P/A/QP	Ant.High cm	Table Angle Degree	Notes
Low Ch 5755MHz Set 19dbm															
11.510	3.0	41.4	38.4	9.5	-35.9	0.0	0.0	53.5	74.0	-20.5	V	P	129.3	281.3	
11.510	3.0	25.4	38.4	9.5	-35.9	0.0	0.0	37.4	54.0	-16.6	V	A	129.3	281.3	
11.510	3.0	36.7	38.4	9.5	-35.9	0.0	0.0	48.8	74.0	-25.2	H	P	187.2	309.1	
11.510	3.0	24.2	38.4	9.5	-35.9	0.0	0.0	36.3	54.0	-17.7	H	A	187.2	309.1	
High Ch 5795MHz Set 19dbm															
11.585	3.0	36.5	38.6	9.6	-35.7	0.0	0.0	49.0	74.0	-25.0	V	P	127.9	270.8	
11.585	3.0	24.0	38.6	9.6	-35.7	0.0	0.0	36.4	54.0	-17.6	V	A	127.9	270.8	
11.585	3.0	36.8	38.6	9.6	-35.7	0.0	0.0	49.2	74.0	-24.8	H	P	187.2	309.1	
11.585	3.0	24.2	38.6	9.6	-35.7	0.0	0.0	36.6	54.0	-17.4	H	A	187.2	309.1	

Rev. 4.1.2.7
Note: No other emissions were detected above the system noise floor.

8.3. WORST-CASE BELOW 1 GHz

2.4 GHz BAND

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

HORIZONTAL & VERTICAL

30-1000MHz Frequency Measurement
Compliance Certification Services, Fremont 5m Chamber

Test Engr: Thanh Nguyen
Date: 06/25/09
Company: QualComm Inc.
EUT Description: PCI 802.11n module
EUT M/N: 65-VN780-P1
Test Target: FCC Class B
Mode Oper: Transmit Worst Case 2.4GHz band

f	Measurement Frequency	Amp	Preamp Gain	Margin	Margin vs. Limit
Dist	Distance to Antenna	D Corr	Distance Correct to 3 meters		
Read	Analyzer Reading	Filter	Filter Insert Loss		
AF	Antenna Factor	Corr.	Calculated Field Strength		
CL	Cable Loss	Limit	Field Strength Limit		

f MHz	Dist (m)	Read dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Filter dB	Corr. dBuV/m	Limit dBuV/m	Margin dB	Ant. Pol. V/H	Det. P/A/QP	Notes
61.681	3.0	53.1	7.9	0.7	28.4	0.0	0.0	33.3	40.0	-6.7	V	EP	Full Scan
138.124	3.0	45.6	13.3	1.1	28.3	0.0	0.0	31.7	43.5	-11.8	V	EP	
364.934	3.0	41.3	14.4	1.7	28.1	0.0	0.0	29.2	46.0	-16.8	V	EP	
514.340	3.0	39.0	17.0	2.1	27.8	0.0	0.0	30.3	46.0	-15.7	V	EP	
745.109	3.0	38.3	20.2	2.5	27.3	0.0	0.0	33.8	46.0	-12.2	V	EP	
799.952	3.0	44.2	21.0	2.6	27.4	0.0	0.0	40.3	46.0	-5.7	V	EP	
80.042	3.0	50.6	7.3	0.8	28.3	0.0	0.0	30.4	40.0	-9.6	H	EP	
233.048	3.0	50.7	11.9	1.3	28.2	0.0	0.0	35.7	46.0	-10.3	H	EP	
299.171	3.0	52.5	13.4	1.5	28.1	0.0	0.0	39.3	46.0	-6.7	H	EP	
718.348	3.0	42.7	19.8	2.5	27.2	0.0	0.0	37.8	46.0	-8.2	H	EP	
738.029	3.0	44.1	20.1	2.5	27.3	0.0	0.0	39.4	46.0	-6.6	H	EP	
895.956	3.0	44.1	21.8	2.8	27.8	0.0	0.0	41.0	46.0	-5.1	H	EP	

Rev. 1.27.09
Note: No other emissions were detected above the system noise floor.

5.8 GHz BAND

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

HORIZONTAL & VERTICAL

30-1000MHz Frequency Measurement
Compliance Certification Services, Fremont 5m Chamber

Test Engr: Thanh Nguyen
Date: 06/25/09
Company: QualComm Inc.
EUT Description: PCI 802.11n module
EUT M/N: 65-VN780-P1
Test Target: FCC Class B
Mode Oper: Tx 5 GHz Band_Worst Case

f	Measurement Frequency	Amp	Preamp Gain	Margin	Margin vs. Limit
Dist	Distance to Antenna	D Corr	Distance Correct to 3 meters		
Read	Analyzer Reading	Filter	Filter Insert Loss		
AF	Antenna Factor	Corr.	Calculated Field Strength		
CL	Cable Loss	Limit	Field Strength Limit		

f MHz	Dist (m)	Read dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Filter dB	Corr. dBuV/m	Limit dBuV/m	Margin dB	Ant. Pol. V/H	Det. P/A/QP	Notes
90.002	3.0	52.1	7.6	0.8	28.3	0.0	0.0	32.2	43.5	-11.3	H	EP	Full Scan
234.608	3.0	51.0	11.9	1.3	28.2	0.0	0.0	36.0	46.0	-10.0	H	EP	
299.171	3.0	51.5	13.4	1.5	28.1	0.0	0.0	38.2	46.0	-7.8	H	EP	
429.136	3.0	45.8	15.4	1.9	28.0	0.0	0.0	35.1	46.0	-10.9	H	EP	
639.985	3.0	44.1	18.9	2.3	27.4	0.0	0.0	37.9	46.0	-8.1	H	EP	
799.952	3.0	46.2	21.0	2.6	27.4	0.0	0.0	42.3	46.0	-3.7	H	EP	
61.441	3.0	53.4	7.9	0.7	28.4	0.0	0.0	33.7	40.0	-6.3	V	EP	
142.925	3.0	45.9	13.1	1.1	28.3	0.0	0.0	31.8	43.5	-11.7	V	EP	
498.379	3.0	39.0	16.7	2.0	27.8	0.0	0.0	29.9	46.0	-16.1	V	EP	
599.303	3.0	41.0	18.4	2.2	27.5	0.0	0.0	34.1	46.0	-11.9	V	EP	
799.952	3.0	43.7	21.0	2.6	27.4	0.0	0.0	39.9	46.0	-6.1	V	EP	

Rev. 1.27.09
Note: No other emissions were detected above the system noise floor.

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

6 WORST EMISSIONS

Transmit 2.4GHz

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	51.00	--	38.34	0.00	62.78	52.78	-11.78	-14.44	L1
0.33	41.16	--	29.23	0.00	59.35	49.35	-18.19	-20.12	L1
21.26	42.22	--	35.52	0.00	60.00	50.00	-17.78	-14.48	L1
0.22	50.33	--	36.39	0.00	62.78	52.78	-12.45	-16.39	L2
0.33	39.00	--	27.59	0.00	59.35	49.35	-20.35	-21.76	L2
21.71	38.01	--	31.87	0.00	60.00	50.00	-21.99	-18.13	L2
6 Worst Data									

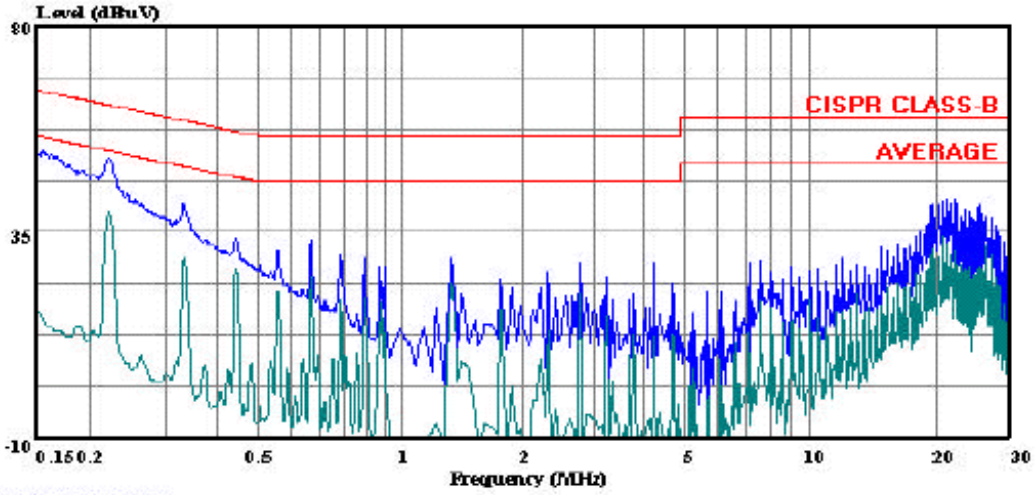
Transmit 5.8GHz

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	49.94	--	36.55	0.00	62.74	52.74	-12.80	-16.19	L1
0.33	39.76	--	28.62	0.00	59.35	49.35	-19.59	-20.73	L1
21.15	41.63	--	37.25	0.00	60.00	50.00	-18.37	-12.75	L1
0.22	49.89	--	36.03	0.00	62.82	52.82	-12.93	-16.79	L2
0.33	39.80	--	27.12	0.00	59.35	49.35	-19.55	-22.23	L2
21.71	38.81	--	32.20	0.00	60.00	50.00	-21.19	-17.80	L2
6 Worst Data									

LINE 1 RESULTS: Transmit 2.4GHz

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

Data#: 7 File#: 09U12652 LC.EMI Date: 06-26-2009 Time: 14:06:43



(Line Conduction)

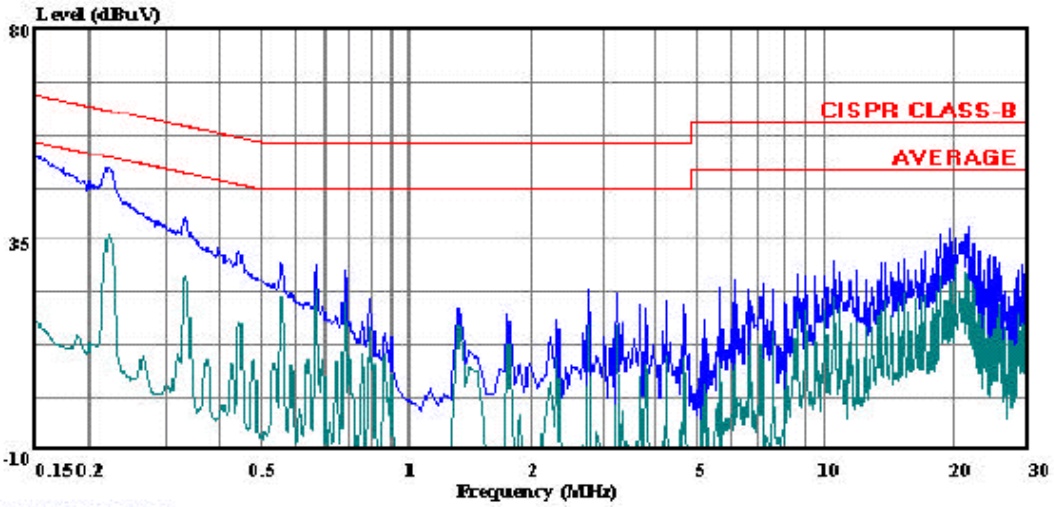
Trace: 5 Ref Trace:

Condition: CISPR CLASS-B
Test Operator: : Thanh Nguyen
Project #: : 09U12652
Company: : Qualcomm
EUT Description:: 802.11n 4x4 WLAN Module
: 5000 Series PCIe, 2.4 and 5GHz AP router
Mode: : Tx 2.4 GHz Band
Target: : FCC Class B
Voltage: : 115VAC, 60Hz
: L1: Peak (Blue) , Average (Green)

LINE 2 RESULTS

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

Data#: 14 File#: 09U12652_LC.EMI Date: 06-26-2009 Time: 14:16:45



(Line Conduction)

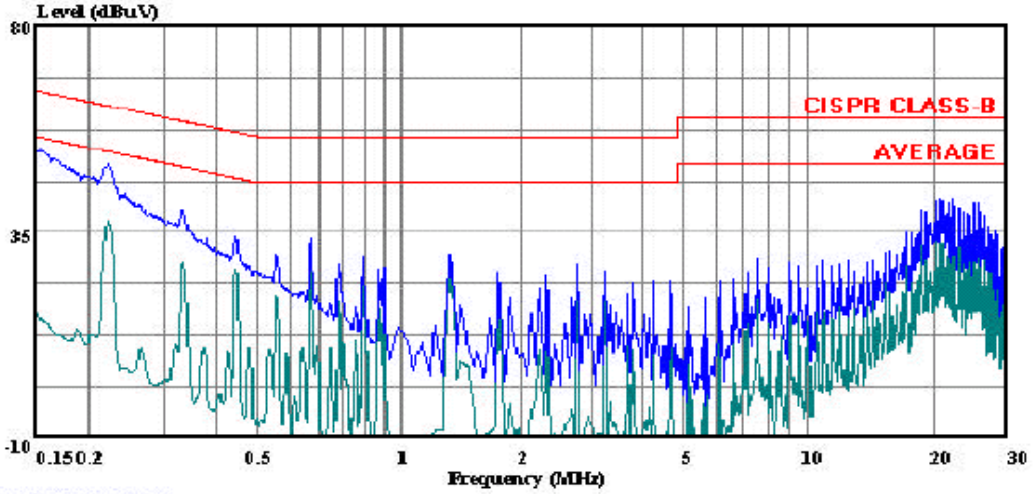
Trace: 12 Ref Trace:

Condition: CISPR CLASS-B
Test Operator: : Thanh Nguyen
Project #: : 09U12652
Company: : Qualcomm
EUT Description: : 802.11n 4x4 WLAN Module
: 5000 Series PCIe, 2.4 and 5GHz AP router
Mode: : Tx 2.4 GHz Band
Target: : FCC Class B
Voltage: : 115VAC, 60Hz
: L2: Peak (Blue) , Average (Green)

LINE 1 RESULTS: Transmit 5.8GHz

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

Data#: 32 File#: 09U12652_LC.EMI Date: 06-26-2009 Time: 14:57:07

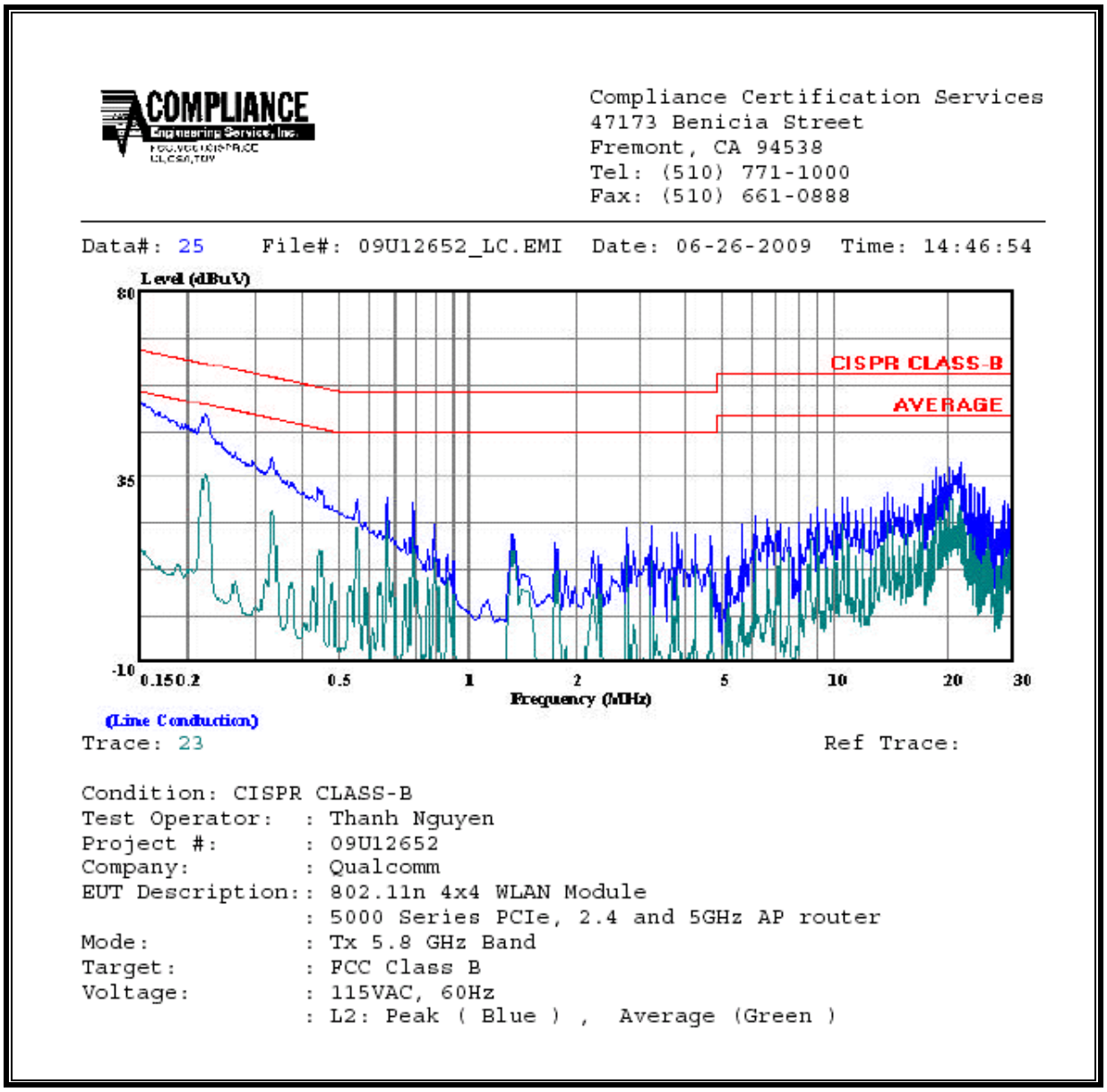


(Line Conduction)

Trace: 30 Ref Trace:

Condition: CISPR CLASS-B
Test Operator: : Thanh Nguyen
Project #: : 09U12652
Company: : Qualcomm
EUT Description: : 802.11n 4x4 WLAN Module
: 5000 Series PCIe, 2.4 and 5GHz AP router
Mode: : Tx 5.8 GHz Band
Target: : FCC Class B
Voltage: : 115VAC, 60Hz
: L1: Peak (Blue) , Average (Green)

LINE 2 RESULTS



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.

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).

EQUATIONS

Power density is given by:

S = EIRP / (4 * Pi * D^2)

where

S = Power density in W/m^2
EIRP = Equivalent Isotropic Radiated Power in W
D = Separation distance in m

Power density in units of W/m^2 is converted to units of mWc/m^2 by dividing by 10.

Distance is given by:

D = SQRT (EIRP / (4 * Pi * S))

where

D = Separation distance in m
EIRP = Equivalent Isotropic Radiated Power in W
S = Power density in W/m^2

In the table(s) below, Power and Gain are entered in units of dBm and dBi respectively and conversions to linear forms are used for the calculations.

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 equals 20 cm)

Band	Mode	Separation Distance (m)	Output Power (dBm)	Antenna Gain (dBi)	IC Power Density (W/m^2)	FCC Power Density (mW/cm^2)
2.4 GHz	Legacy	0.20	26.20	8.02	5.26	0.526
2.4 GHz	MIMO	0.20	26.15	2	1.30	0.130
5.8 GHz	Legacy	0.20	25.15	9.02	5.20	0.520
5.8 GHz	MIMO	0.20	25.24	3	1.33	0.133