FCC CFR47 PART 15 SUBPART C
INDUSTRY CANADA RSS-210 ISSUE 8

CERTIFICATION TEST REPORT

FOR

BROADCOM 802.11a/b/g/n WLAN + BLUETOOTH PCI-E MINI CARD

MODEL NUMBER: BCM943228HMB

FCC ID: QDS-BRCM1058
IC: 4324A-BRCM1058

REPORT NUMBER: 11U13795-1, Revision A

ISSUE DATE: JUNE 27, 2011

Prepared for
BROADCOM CORPORATION
190 MATHILDA PLACE
SUNNYVALE, CA 94086, U.S.A.

Prepared by
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NVLAP LAB CODE 200065-0

Revision History

Rev.	Issue Date	Revisions	Revised By
--	06/23/11	Initial Issue	M. Heckrotte
A	06/27/11	Corrected Maximum Output table on report	A. Zaffar

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TABLE OF CONTENTS

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: BROADCOM CORPORATION
190 MATHILDA PLACE
SUNNYVALE, CA 94086, U.S.A.

EUT DESCRIPTION: Broadcom 802.11a/b/g/n WLAN + Bluetooth PCI-E Mini Card

MODEL: BCM943228HMB

SERIAL NUMBER: 1403514 (P305)

DATE TESTED: MAY 25 – JUNE 9, 2011

APPLICABLE STANDARDS	
STANDARD	**TEST RESULTS**
CFR 47 Part 15 Subpart C	Pass
INDUSTRY CANADA RSS-210 Issue 8 Annex 8	Pass
INDUSTRY CANADA RSS-GEN Issue 3	Pass

Compliance Certification Services (UL 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 UL 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 UL CCS and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL 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 UL CCS By:

MICHAEL HECKROTTE
DIRECTOR OF ENGINEERING
UL CCS

Tested By:

TOM CHEN
EMC ENGINEER
UL CCS

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2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.4:2003, FCC CFR 47 Part 2, FCC CFR 47 Part 15, RSS-GEN Issue 3, and RSS-210 Issue 8.

3. FACILITIES AND ACCREDITATION

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

UL 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%.

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5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

The EUT is an 802.11a/b/g/n WLAN + Bluetooth PCI-E Mini card manufactured by Broadcom.

The radio module is manufactured by Broadcom.

5.2. MAXIMUM OUTPUT POWER

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

2400 to 2483.5 Authorized Band

Frequency Range (MHz)	Mode	Output Power (dBm)	Output Power (mW)
2412- 2462	802.11b	21.22	132.43
2412- 2462	802.11g	27.60	575.44
2412- 2462	802.11n HT20	28.89	774.46
2422- 2452	802.11n HT40	24.76	299.23

5725 to 5825 Authorized Band

Frequency Range (MHz)	Mode	Output Power (dBm)	Output Power (mW)
5745-5825	802.11a	25.91	389.94
5745-5825	802.11n HT20	28.11	647.14
5755-5795	802.11n HT40	28.52	711.21

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5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes an 802.11abgn WLAN antenna, with a maximum gain as table below;

Frequency Range (MHz)	Mode	Output Power (dBm)	Output Power (mW)
5745-5825	802.11a	25.91	389.94
5745-5825	802.11n HT20	28.11	647.14
5755-5795	802.11n HT40	28.52	711.21

	Antenna Gain		Antenna Gain		Antenna Gain	Antenna Gain
GHz	Ant 1 dBi	Ant 2 dBi	Ant 1 Numeric	Ant 2 Numeric	Combined Numeric	Combined dBi
2.4	3.90	3.90	2.45	2.45	4.91	**6.91**
5.8	4.20	4.20	2.63	2.63	5.26	**7.21**

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5.4. SOFTWARE AND FIRMWARE

The EUT driver software installed during testing was Broadcom, rev. 5.100.82.54.
The test utility software used during testing was BCM Internal, rev. 5.100.RC82.54.

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:

For 2.4GHz Band:
All final tests in the 802.11b Legacy mode were made at 1 Mb/s.
All final tests in the 802.11g Legacy mode were made at 6 Mb/s.
All final tests in the 802.11n 20MHz & 40MHz CDD mode were made at MCS0.

For 5.8GHz Band:
All final tests in the 802.11a Mode (Legacy) were made at 6 Mb/s.
All final tests in the 802.11n 20MHz & 40MHz CDD mode were made at MCS0.

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, which was determined to be HT20 mode, mid channel.

All legacy modes were measured with the highest gain for each type of antenna.

All MIMO modes were measured with the highest combination of gains for each type of antenna. Note that this combination of antennas will not be implemented in the end product. This combination was selected for testing purposes only, to accommodate the highest gain of each antenna type in one single test configuration. The combined gain of this test configuration is higher than any combined gain that will be implemented in the end product.

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5.6. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

PERIPHERAL SUPPORT EQUIPMENT LIST				
Description	**Manufacturer**	**Model**	**Serial Number**	**FCC ID**
Laptop	Lenovo	4446-38U	R8-CAD03	DoC
AC Adapter	Lenovo	ADP-65YB	11S42T4458Z1F4K96B09D	DoC
Adapter Board	Broadcom	BRCM05	N/A	N/A

I/O CABLES

I/O CABLE LIST						
Cable No.	**Port**	**# of Identical Ports**	**Connector Type**	**Cable Type**	**Cable Length**	**Remarks**
1	AC	1	US 115V	Shielded	1.5m	NA
2	DC	1	DC	Un-shielded	1.5m	Ferrite at laptop's end

TEST SETUP

The EUT was attached to a jig board which was installed in the PCMCI slot of a host laptop computer during the tests. Test software exercised the radio card.

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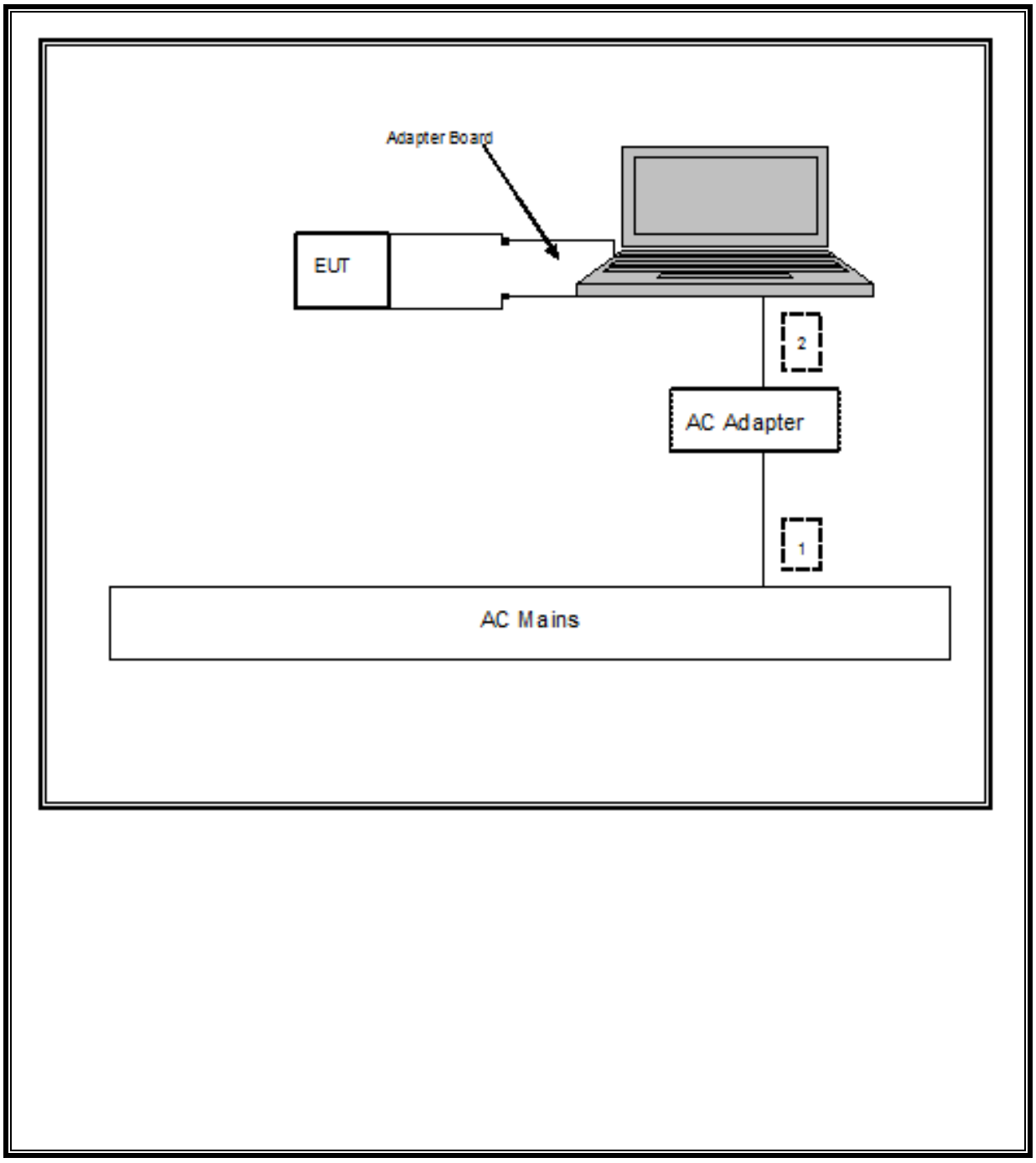
SETUP DIAGRAM FOR TESTS



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6. TEST AND MEASUREMENT EQUIPMENT

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

TEST EQUIPMENT LIST				
Description	**Manufacturer**	**Model**	**Asset**	**Cal Due**
Spectrum Analyzer, 44 GHz	Agilent / HP	E4446A	C00996	10/29/11
Antenna, Bilog, 2 GHz	Sunol Sciences	JB1	C01171	07/14/11
Antenna, Horn, 18 GHz	EMCO	3115	C00872	07/29/11
Antenna, Horn, 26.5 GHz	ARA	MWH-1826/B	C00980	07/29/11
Preamplifier, 1300 MHz	Agilent / HP	8447D	C00778	01/26/12
Preamplifier, 26.5 GHz	Agilent / HP	8449B	C00749	08/04/11
Peak Power Meter	Agilent / HP	E9327A	C00964	12/04/11
Peak Power Sensor	Agilent / HP	E4416A	C00963	12/04/11
EMI Receiver, 6.5 GHz	Agilent / HP	8546A	1963	08/19/11
Reject Filter, 2.4-2.5 GHz	Micro-Tronics	BRM50702	N02685	CNR
Reject Filter, 5.725-5.825 GHz	Micro-Tronics	BRC13192	N02676	CNR
LISN, 30 MHz	FCC	LISN-50/250-25-2	N02625	05/06/12
EMI Test Receiver, 30 MHz	R & S	ESHS 20	N02396	05/06/12

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7. ANTENNA PORT TEST RESULTS

7.1. 802.11b MODE IN THE 2.4 GHz BAND

7.1.1. 6 dB BANDWIDTH

LIMITS

FCC §15.247 (a) (2)

IC RSS-210 A8.2 (a)

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

TEST PROCEDURE

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

RESULTS

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low	2412	8.08	0.5
Middle	2437	8.08	0.5
High	2462	8.17	0.5

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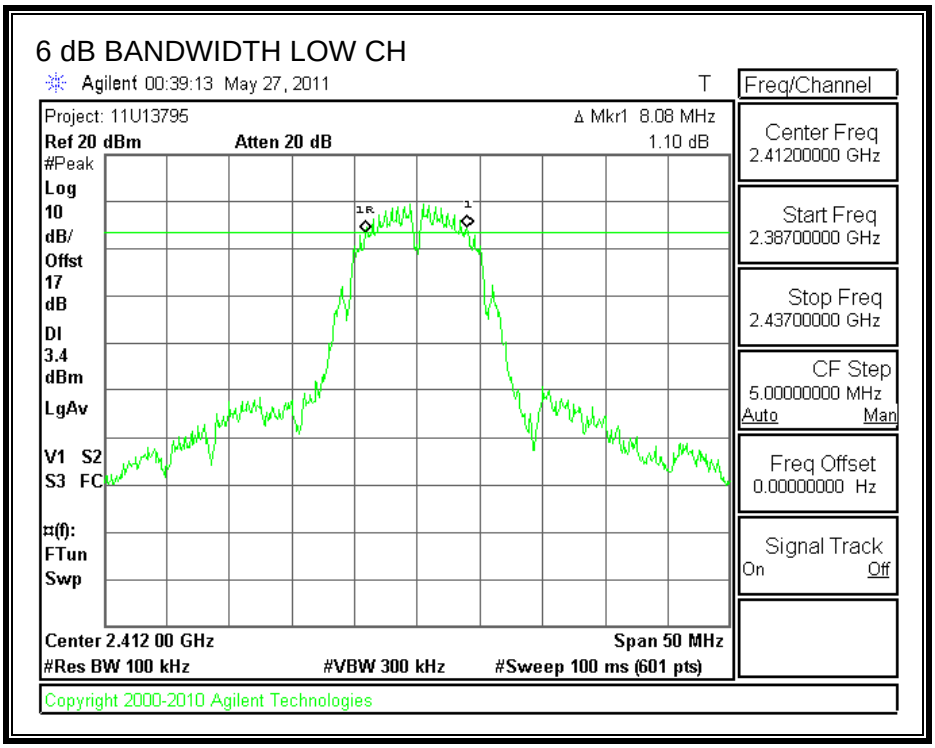
6 dB BANDWIDTH



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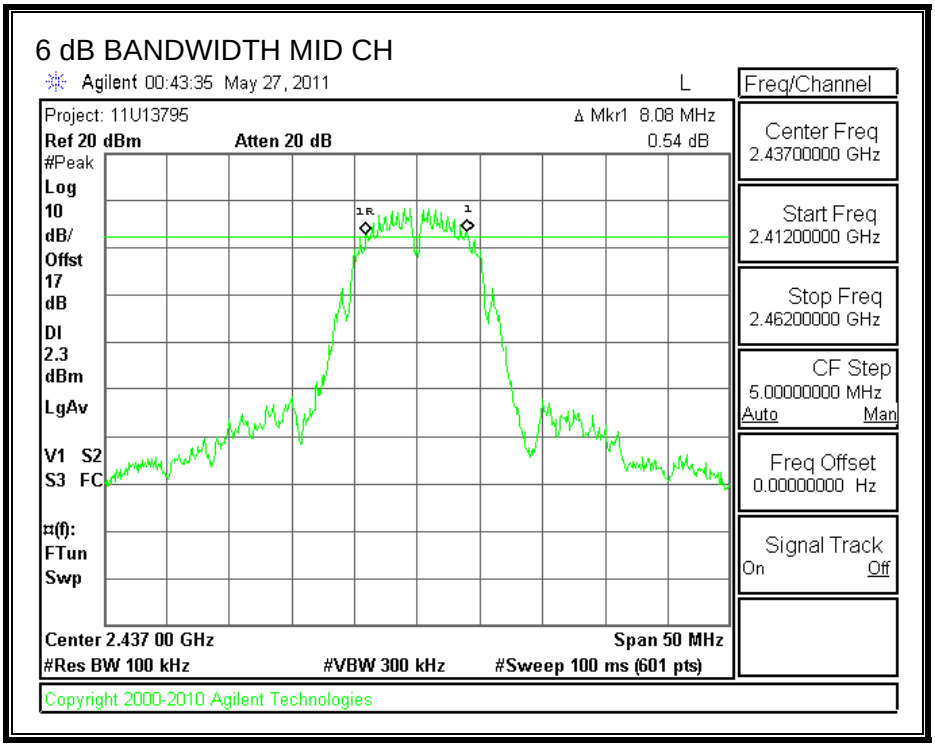

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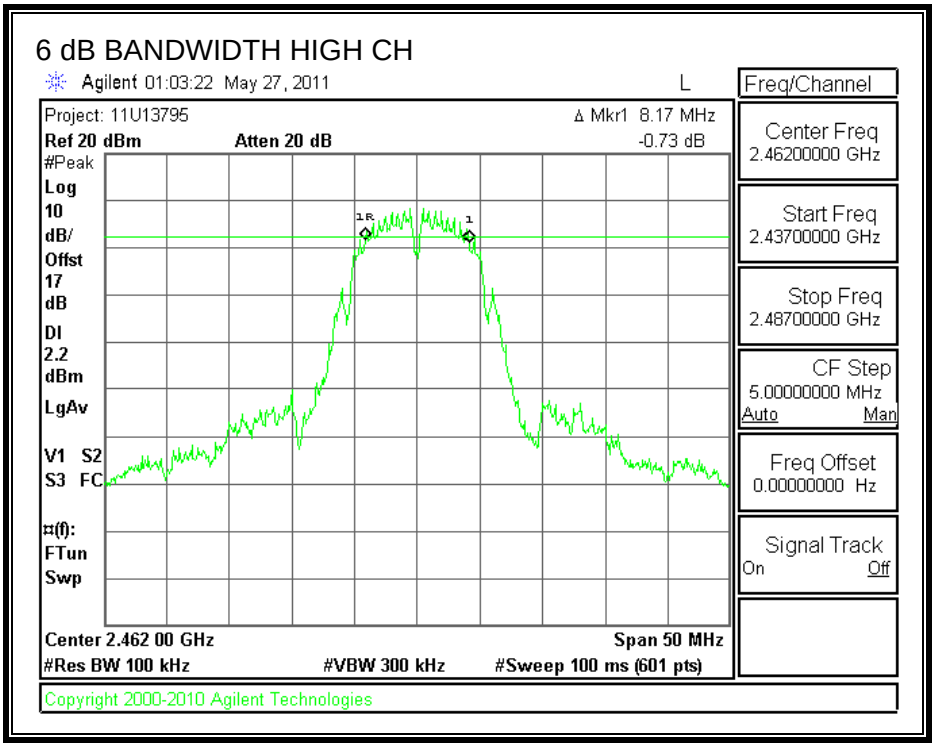

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7.1.2. 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

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

RESULTS

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2412	10.0955
Middle	2437	10.1069
High	2462	10.1211

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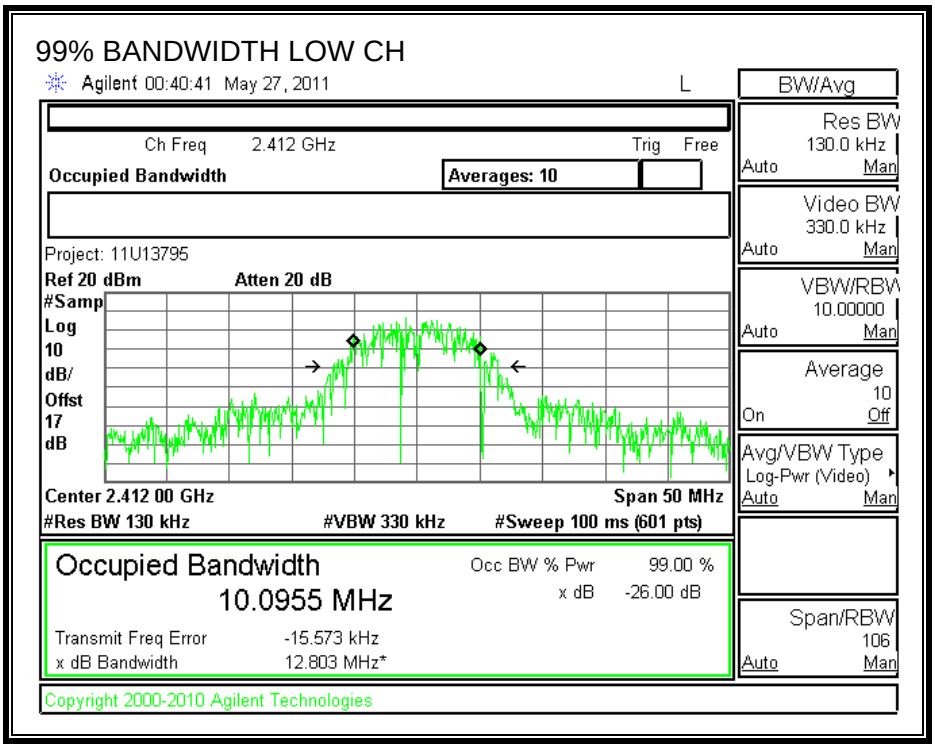
99% BANDWIDTH



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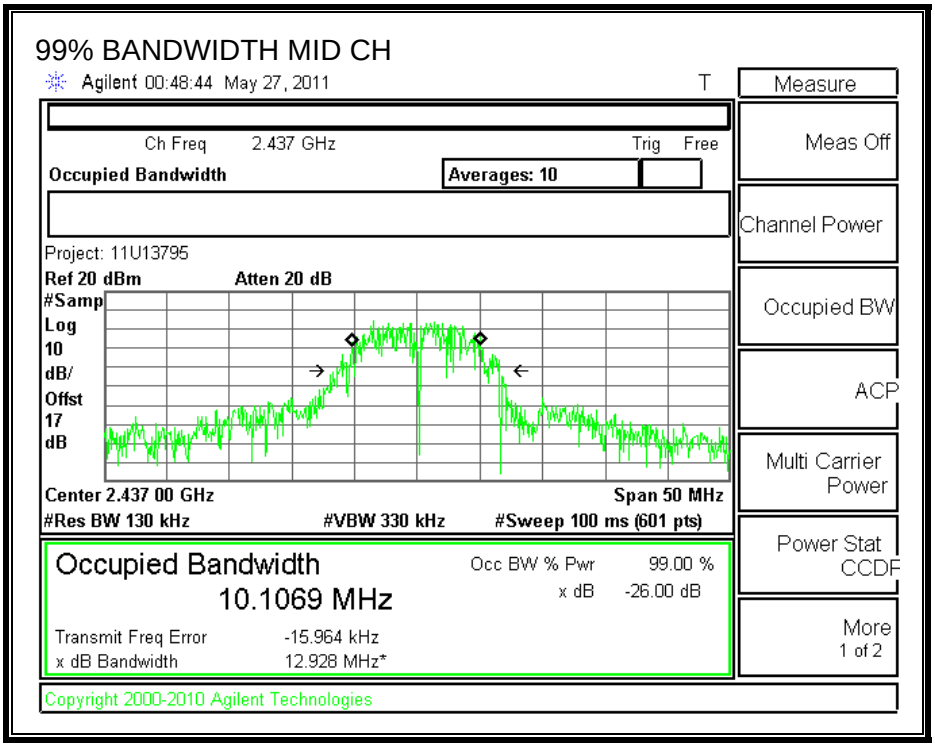

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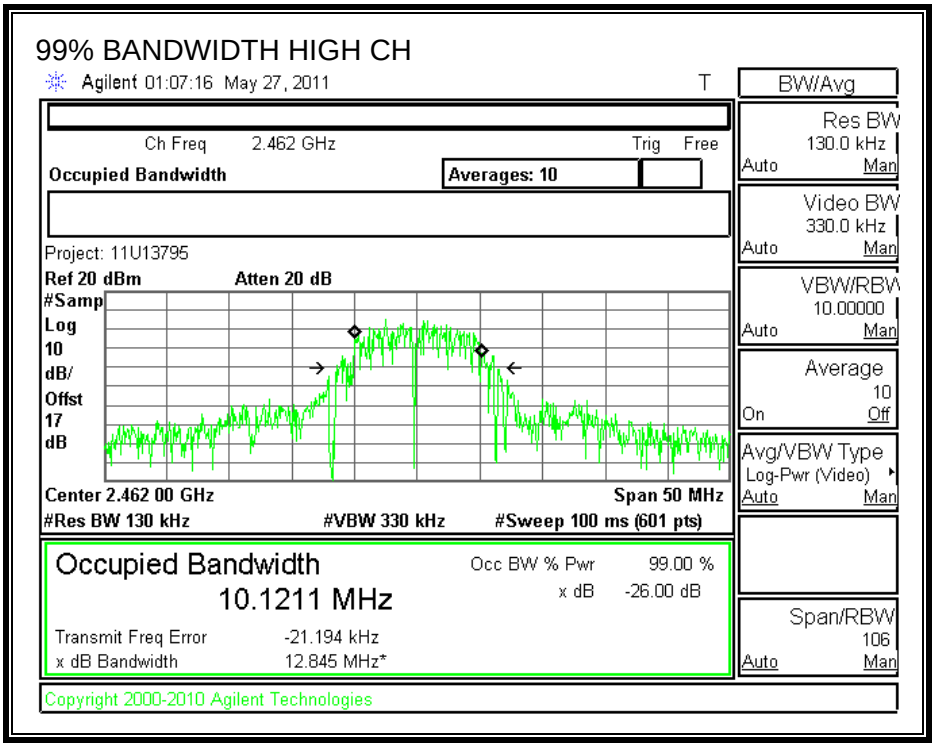

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7.1.3. OUTPUT POWER

LIMITS

FCC §15.247 (b)

IC RSS-210 A8.4

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

TEST PROCEDURE

Peak power is measured using the Channel bandwidth Alternative peak output power procedure specified in "TCB Training for Devices covered under Scopes A1 - A4" by Joe Dichoso, May 2003.

RESULTS

Channel	Frequency (MHz)	Peak Power Reading (dBm)	Attenuator and Cable Offset (dB)	Output Power (dBm)	Limit (dBm)	Margin (dB)
Low	2412	10.22	11	21.22	30	-8.78
Middle	2437	9.14	11	20.14	30	-9.86
High	2462	9.03	11	20.03	30	-9.97

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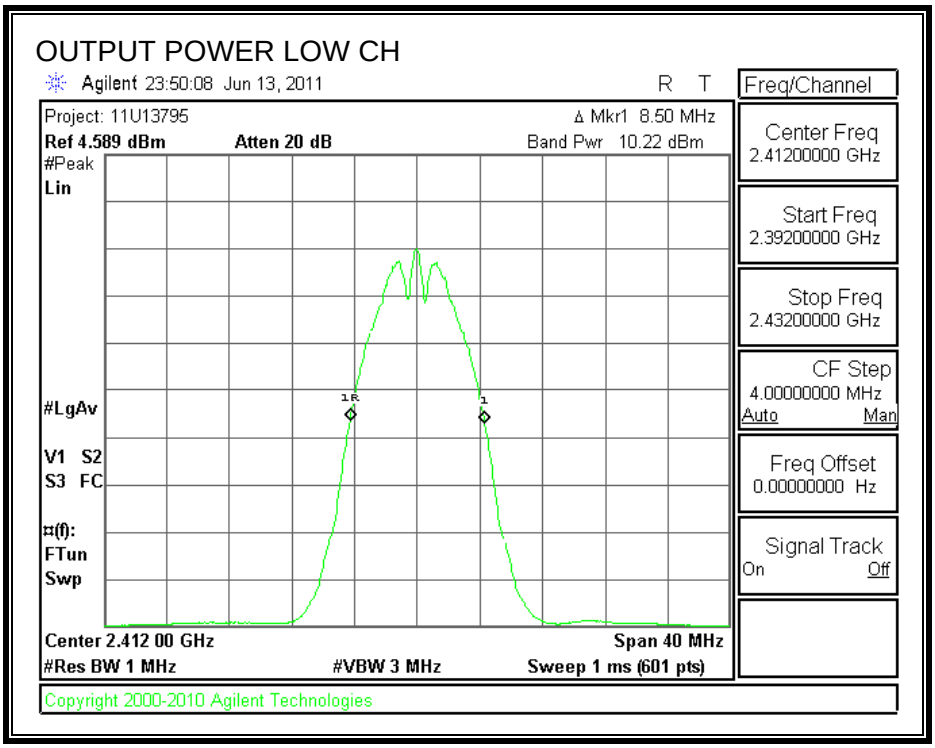
OUTPUT POWER



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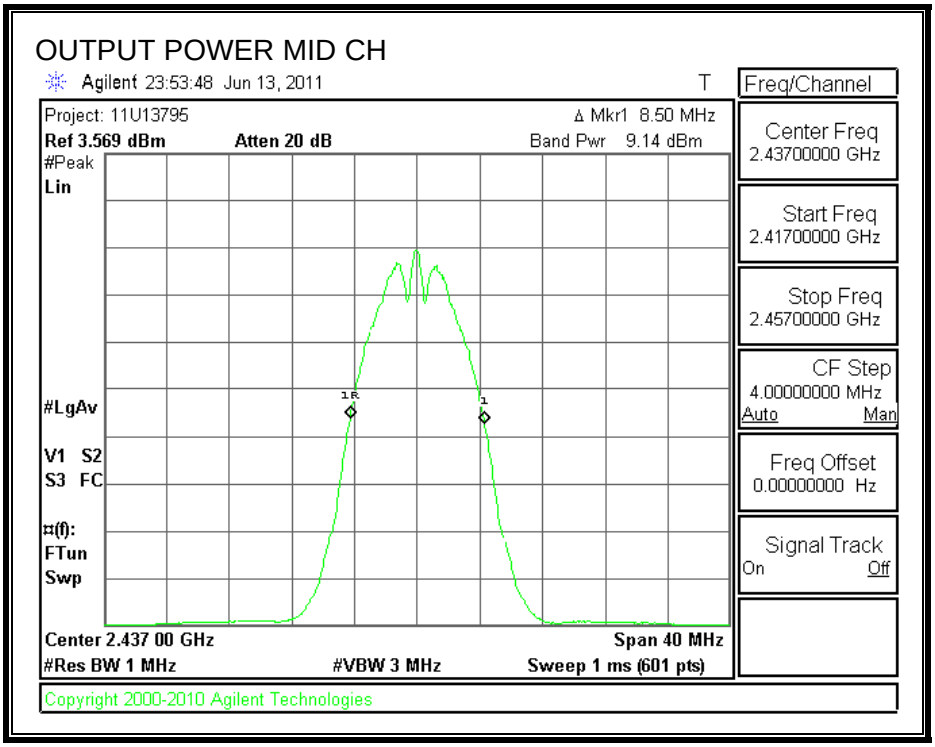

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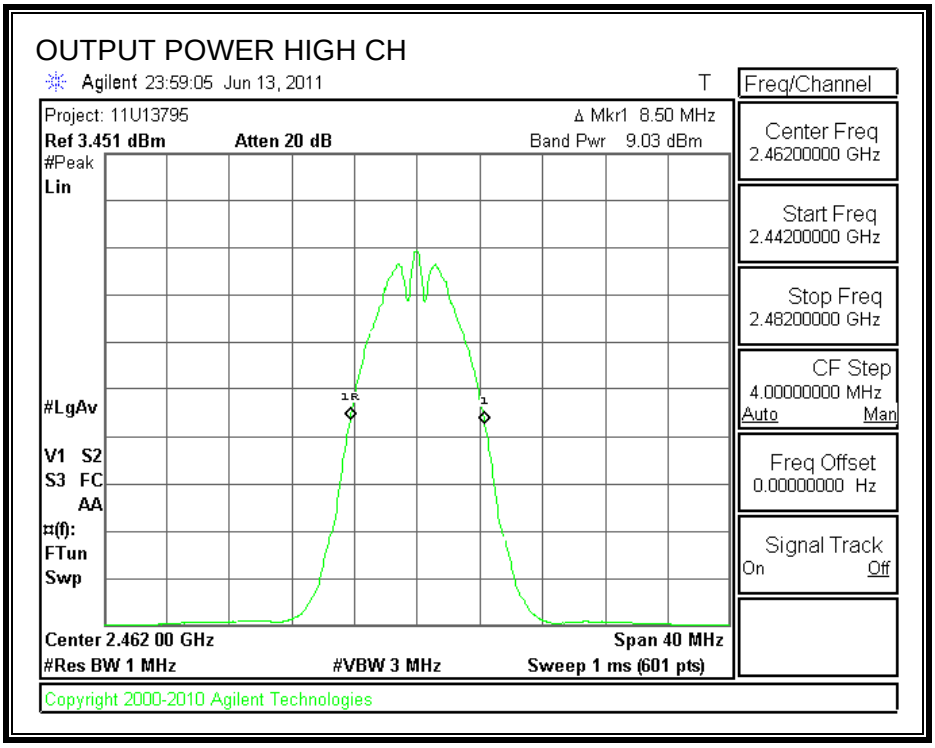

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7.1.4. POWER SPECTRAL DENSITY

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

Peak output power was measured, therefore the power spectral density was measured using PSD Option 1 in accordance with FCC document “Measurement of Digital Transmission Systems Operating under Section 15.247”, March 23, 2005.

RESULTS

Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Margin (dB)
Low	2412	-1.71	8	-9.71
Middle	2437	-2.97	8	-10.97
High	2462	-3.28	8	-11.28

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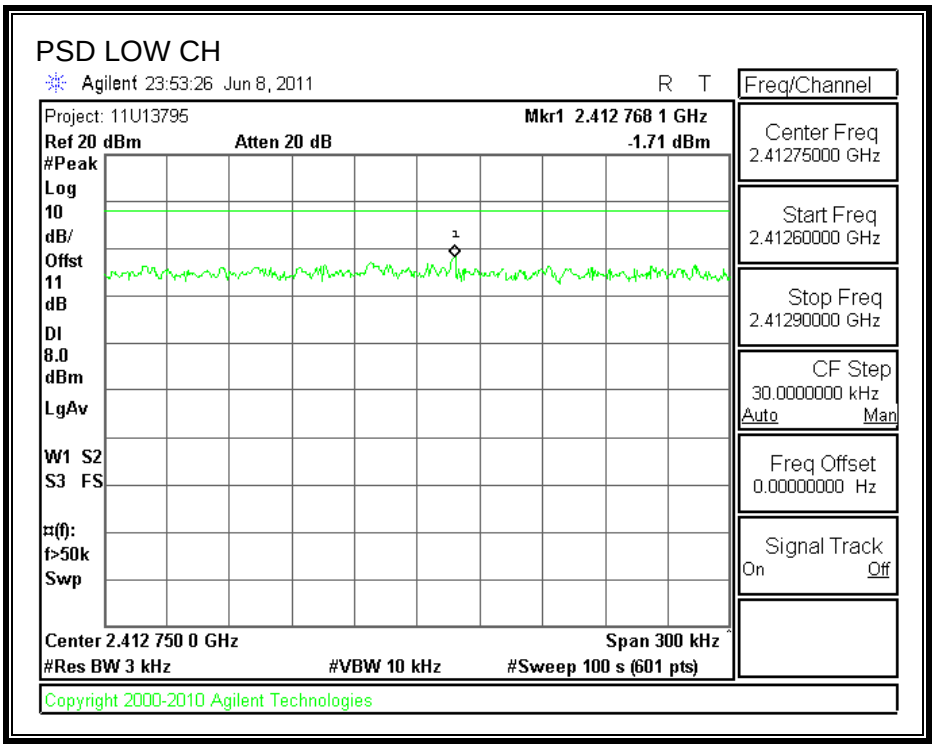
POWER SPECTRAL DENSITY



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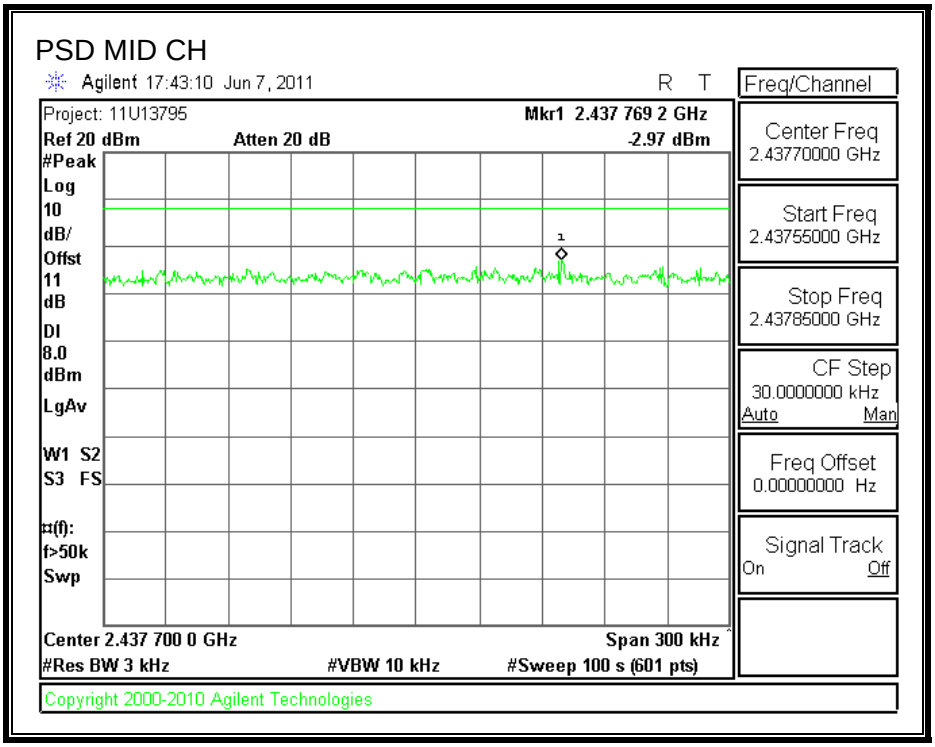

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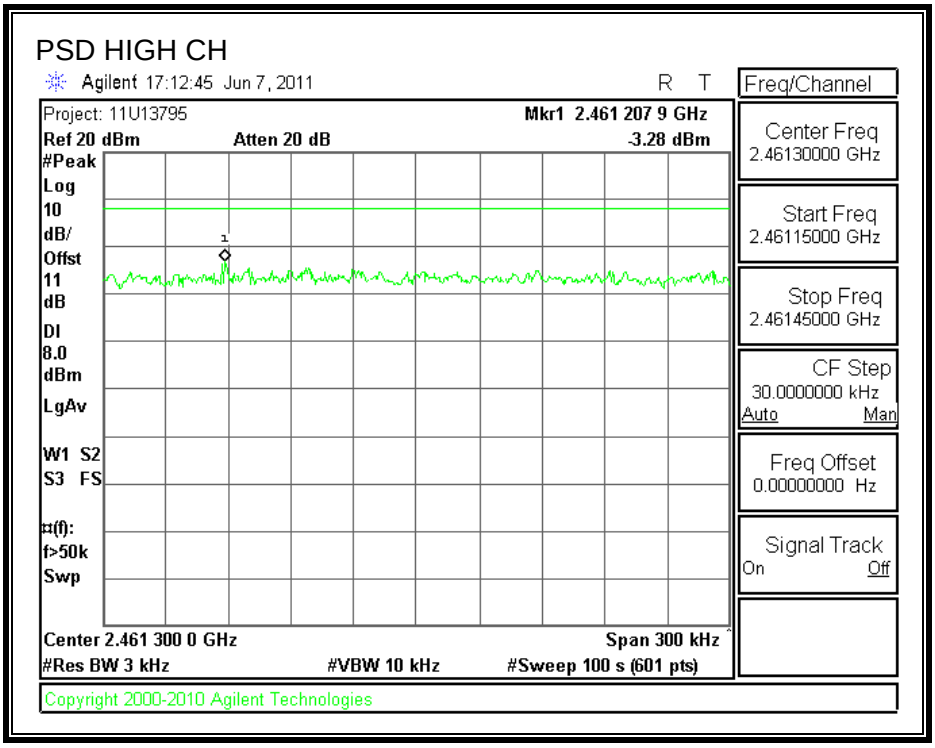

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7.1.5. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.247 (d)

IC RSS-210 A8.5

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

TEST PROCEDURE

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

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

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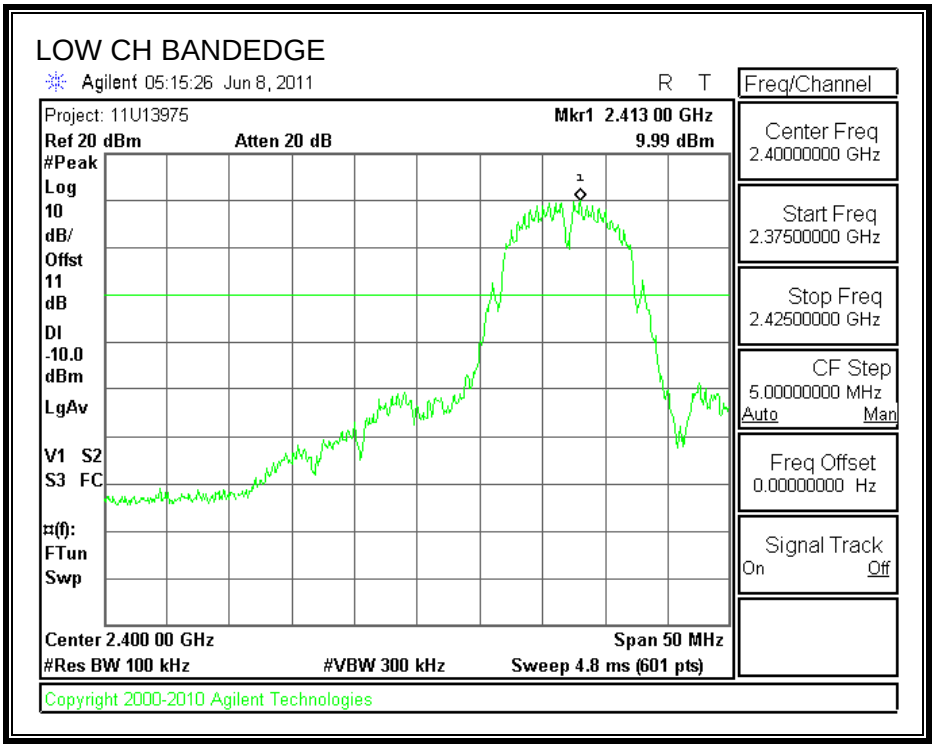
RESULTS

SPURIOUS EMISSIONS, LOW CHANNEL



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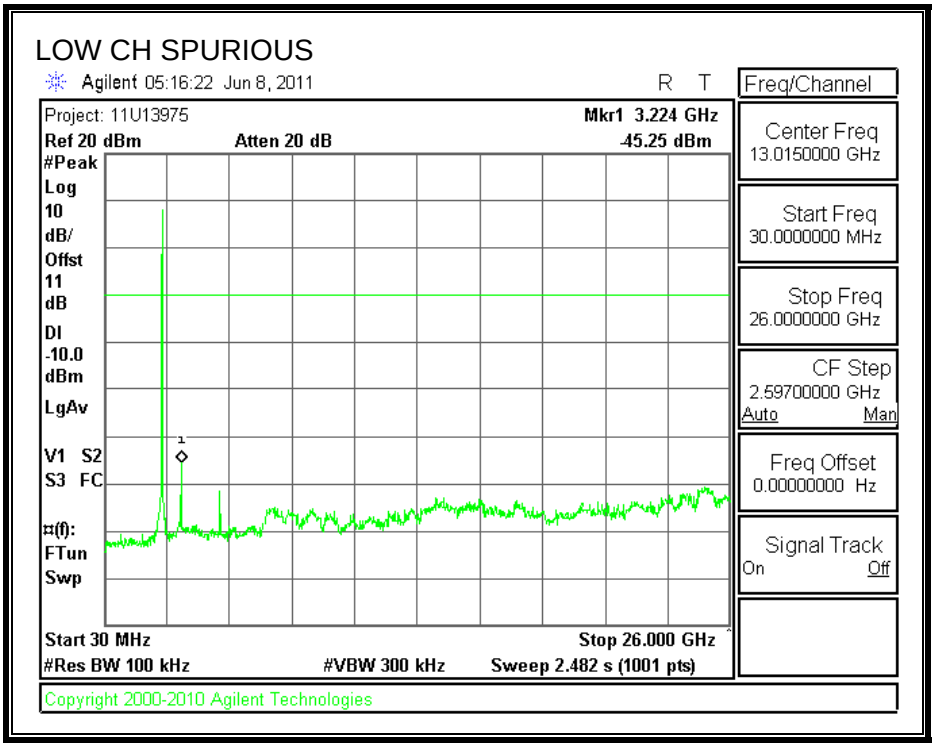

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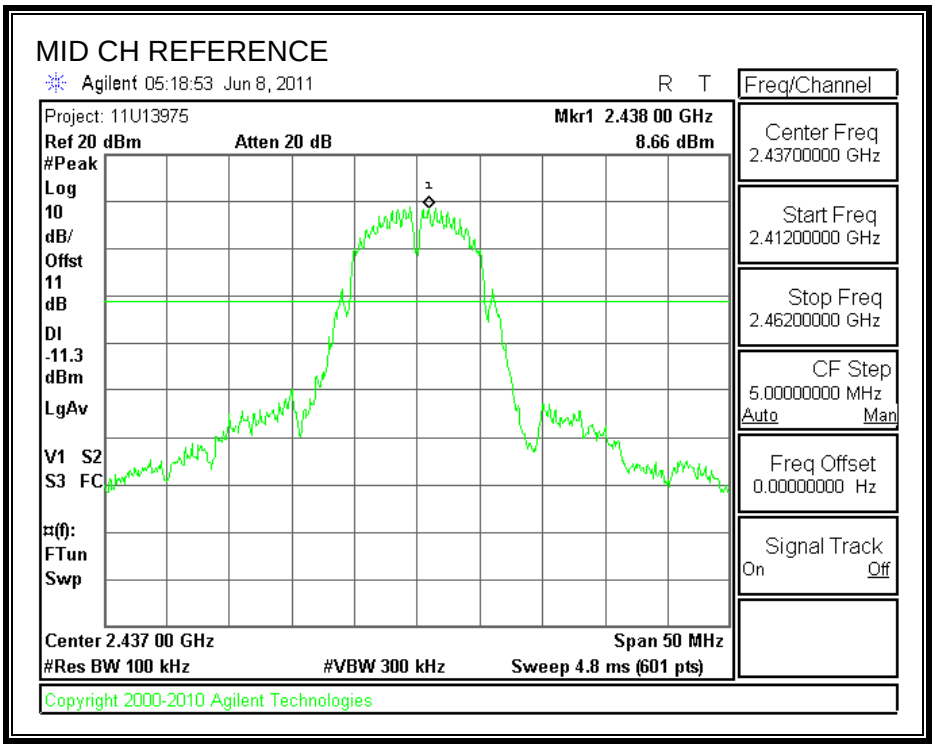
SPURIOUS EMISSIONS, MID CHANNEL



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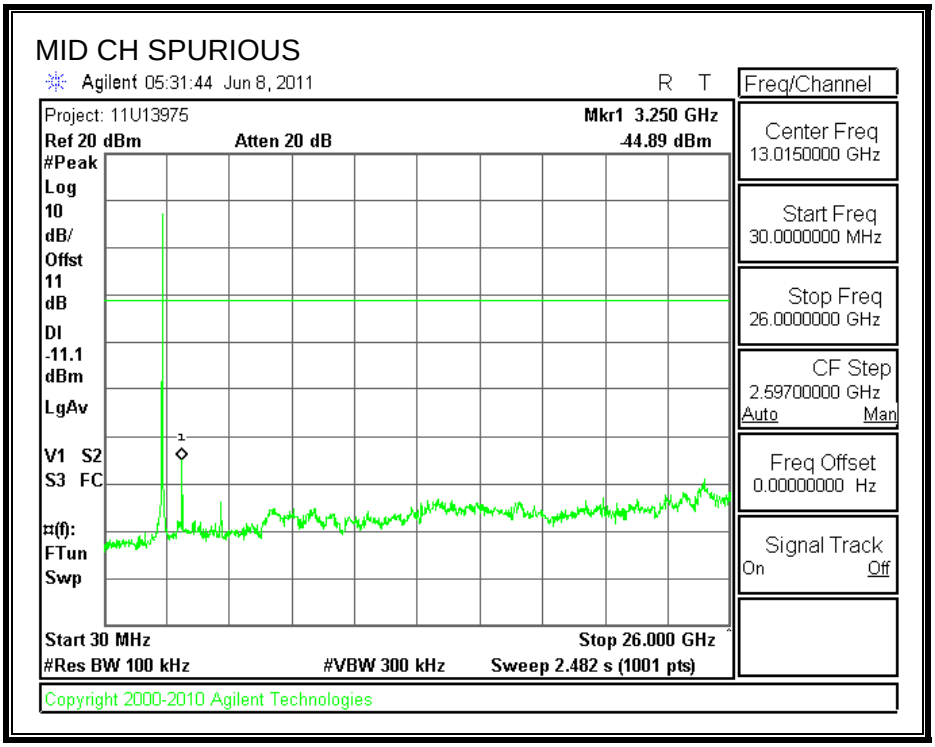

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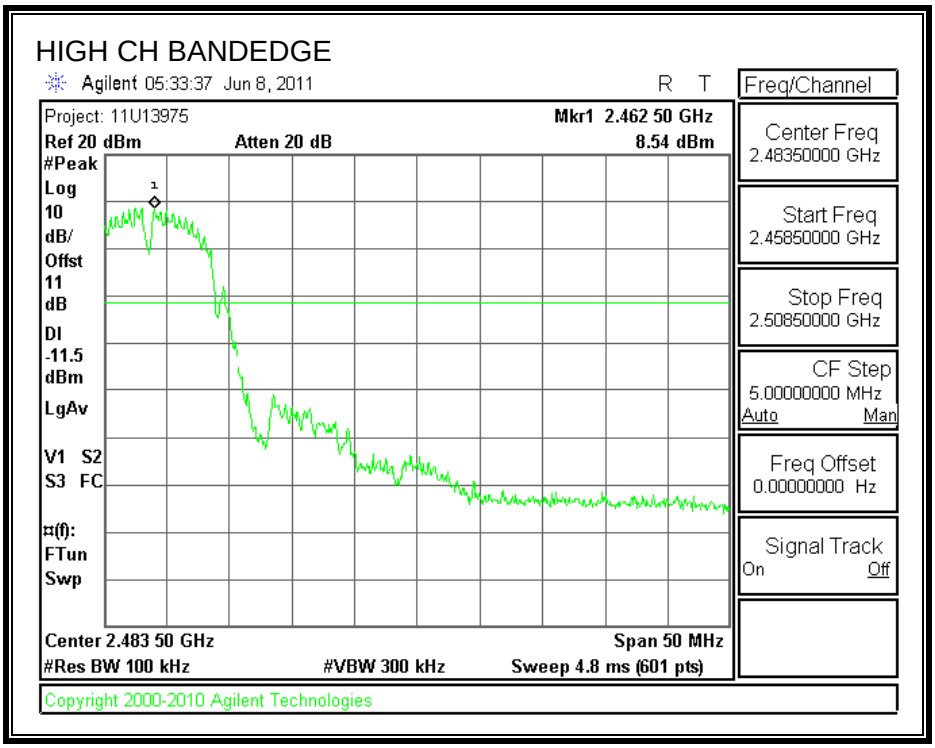
SPURIOUS EMISSIONS, HIGH CHANNEL



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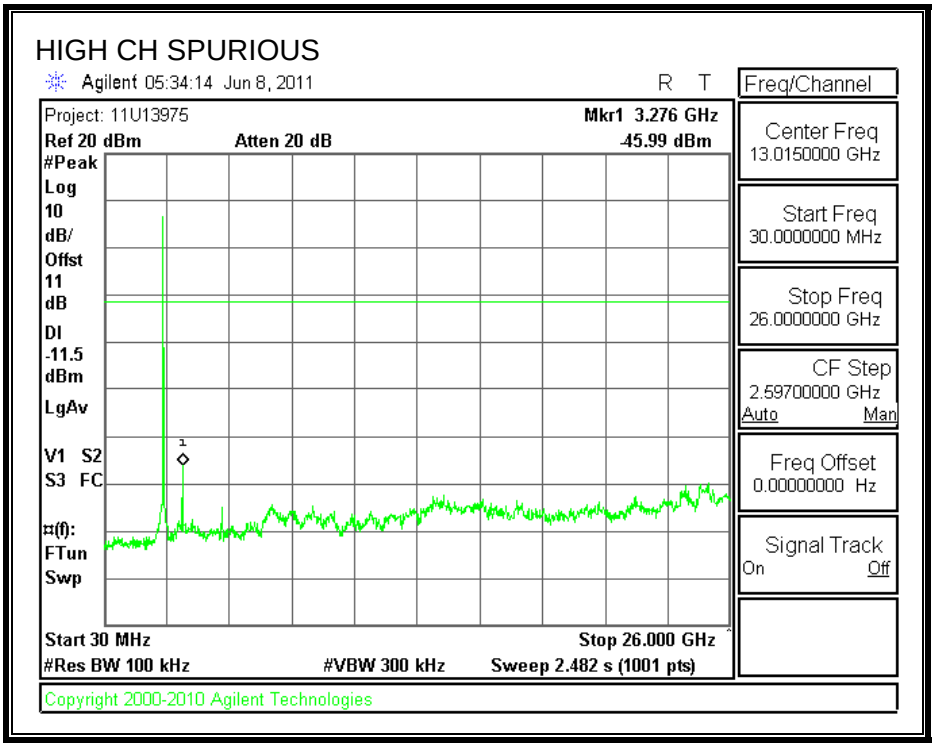

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7.2. 802.11g MODE IN THE 2.4 GHz BAND

7.2.1. 6 dB BANDWIDTH

LIMITS

FCC §15.247 (a) (2)

IC RSS-210 A8.2 (a)

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

TEST PROCEDURE

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

RESULTS

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low	2412	15.17	0.5
Middle	2437	15.17	0.5
High	2462	15.17	0.5

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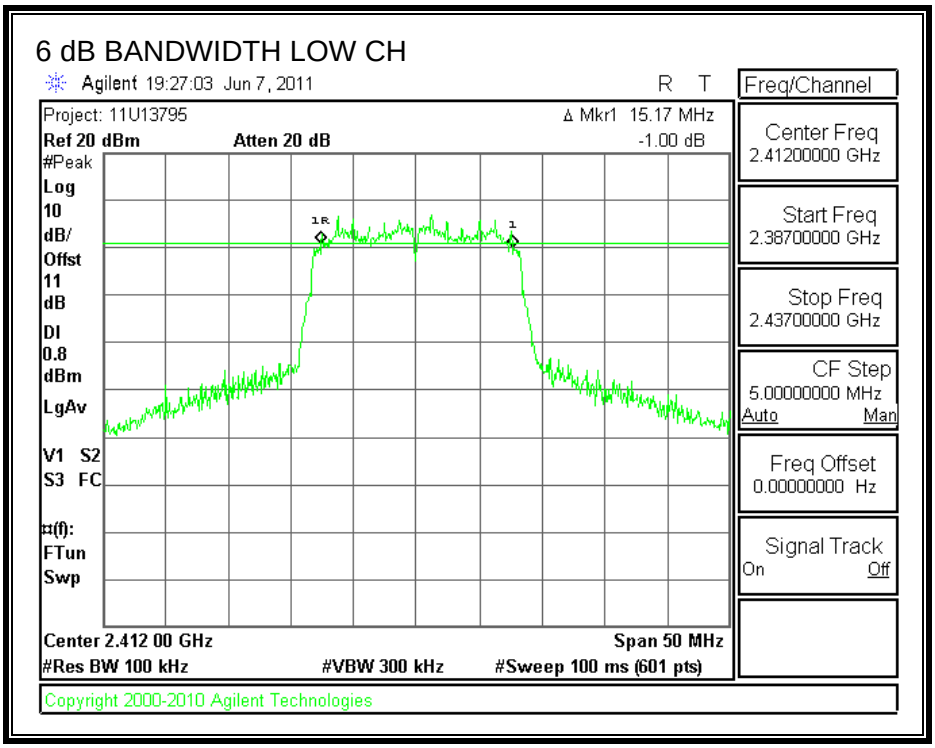
6 dB BANDWIDTH



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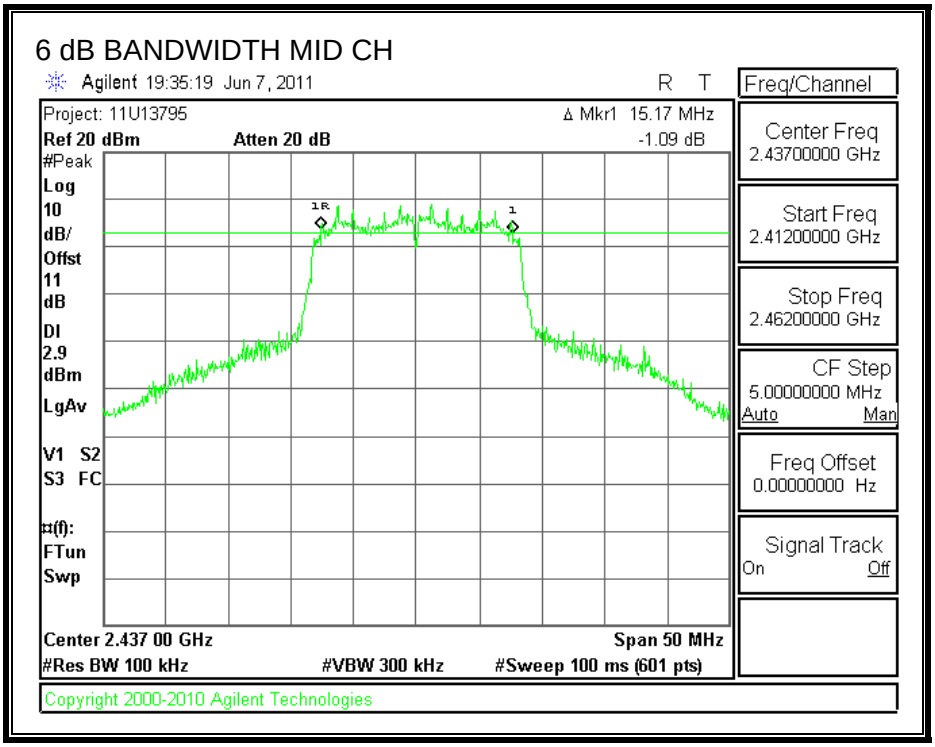

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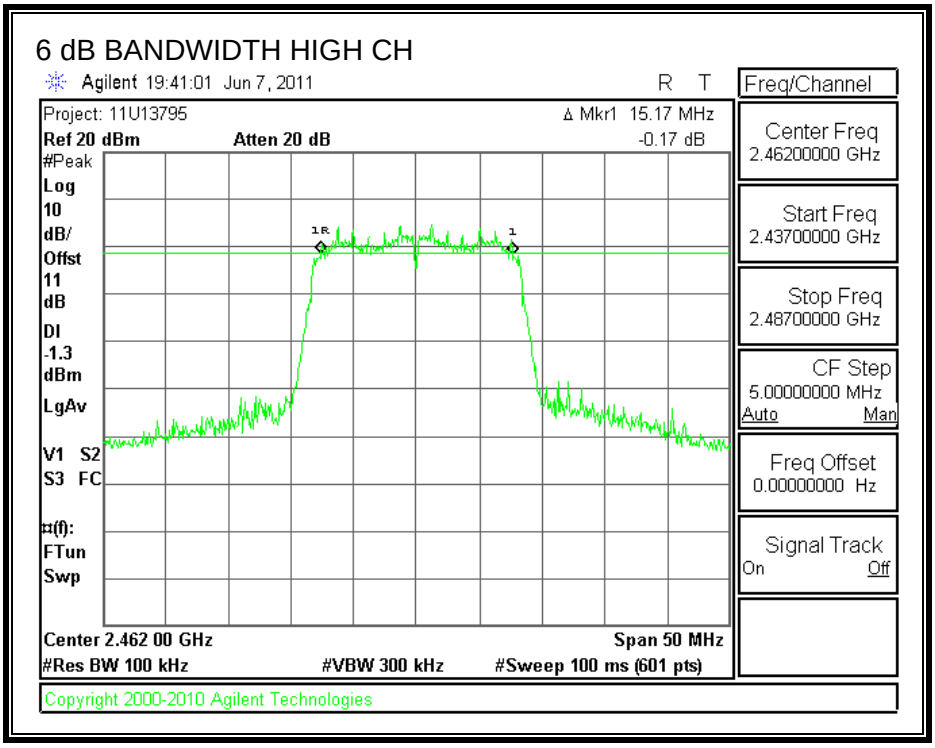

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7.2.2. 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

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

RESULTS

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2412	16.2851
Middle	2437	16.3561
High	2462	16.3147

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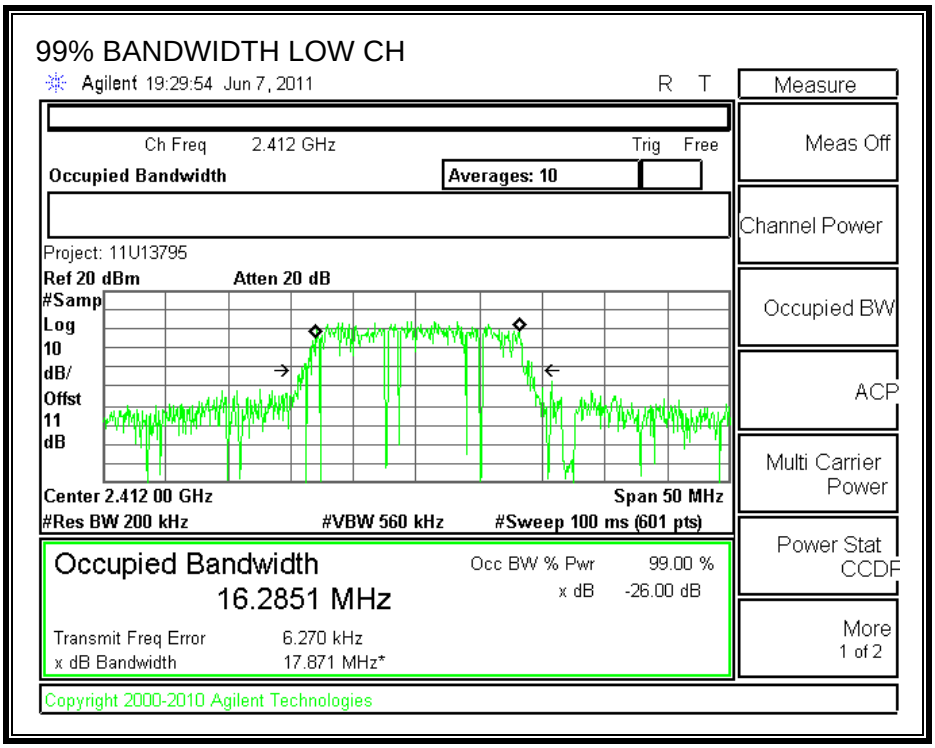
99% BANDWIDTH



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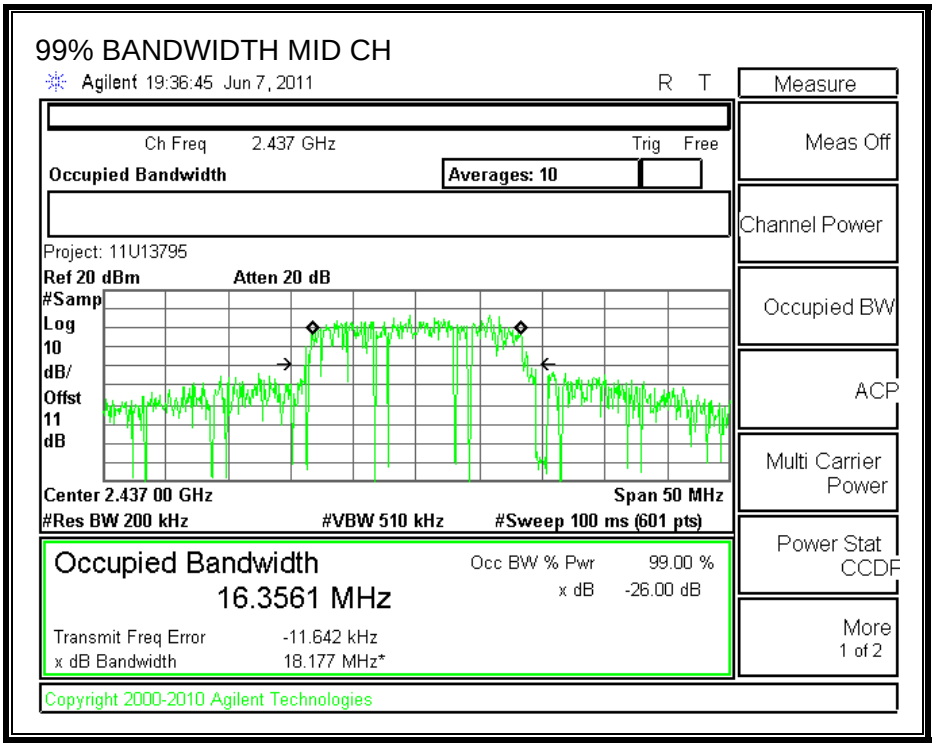

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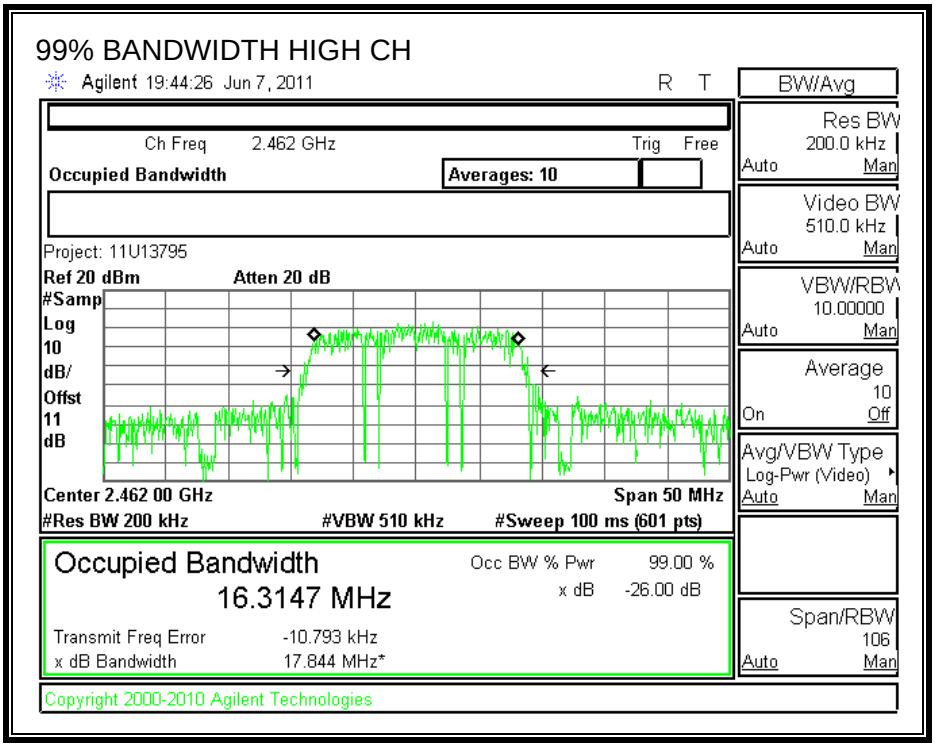

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7.2.3. OUTPUT POWER

LIMITS

FCC §15.247 (b)

IC RSS-210 A8.4

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

TEST PROCEDURE

Peak power is measured using the Channel bandwidth Alternative peak output power procedure specified in "TCB Training for Devices covered under Scopes A1 - A4" by Joe Dichoso, May 2003.

RESULTS

Channel	Frequency (MHz)	Peak Power Reading (dBm)	Attenuator and Cable Offset (dB)	Output Power (dBm)	Limit (dBm)	Margin (dB)
Low	2412	12.97	11	23.97	30	-6.03
Middle	2437	16.60	11	27.60	30	-2.40
High	2462	12.71	11	23.71	30	-6.29

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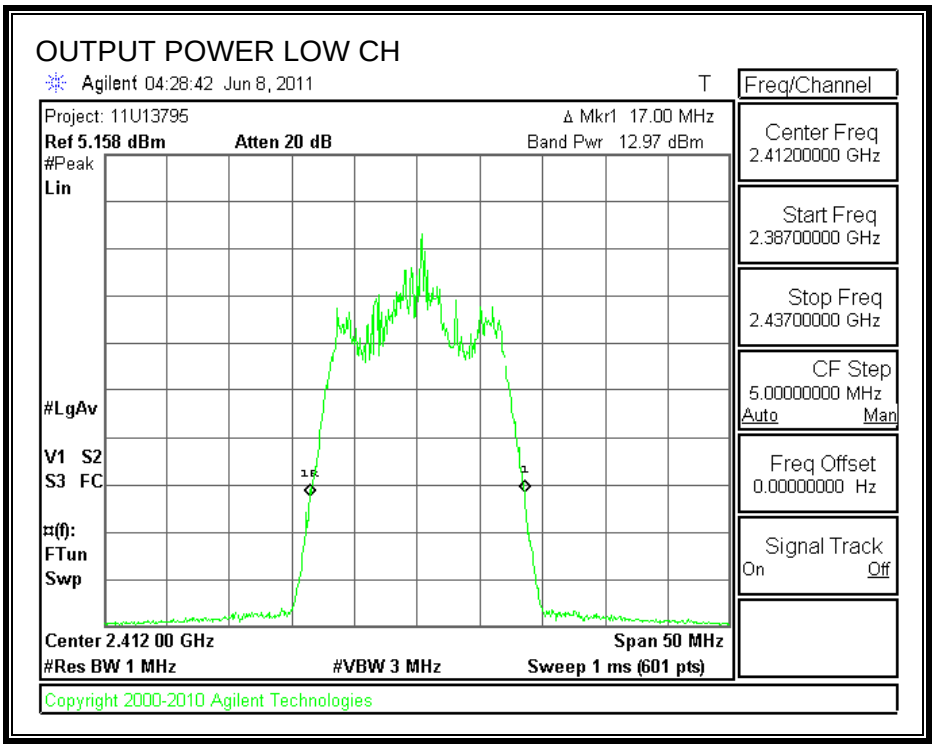
OUTPUT POWER



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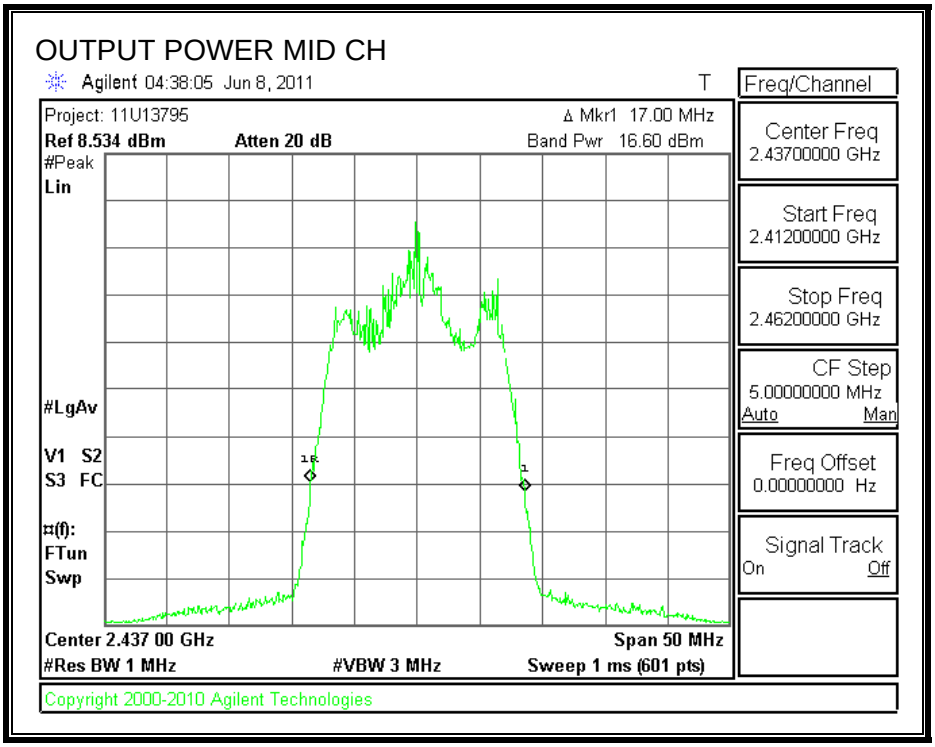

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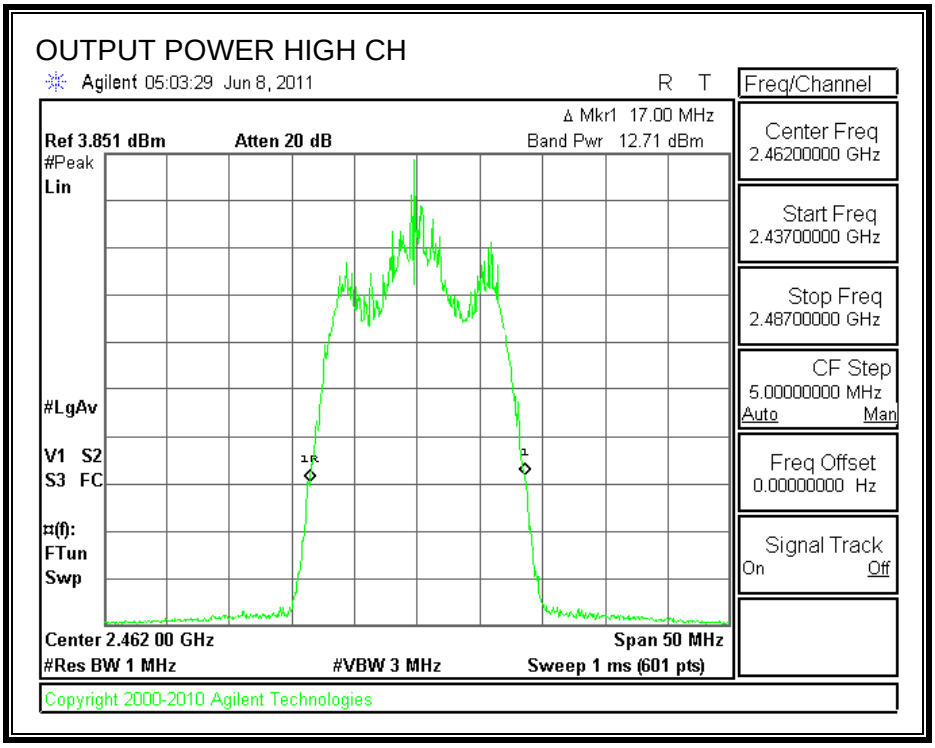

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7.2.4. POWER SPECTRAL DENSITY

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

Peak output power was measured, therefore the power spectral density was measured using PSD Option 1 in accordance with FCC document “Measurement of Digital Transmission Systems Operating under Section 15.247”, March 23, 2005.

RESULTS

Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Margin (dB)
Low	2412	-6.85	8	-14.85
Middle	2437	-5.04	8	-13.04
High	2462	-8.05	8	-16.05

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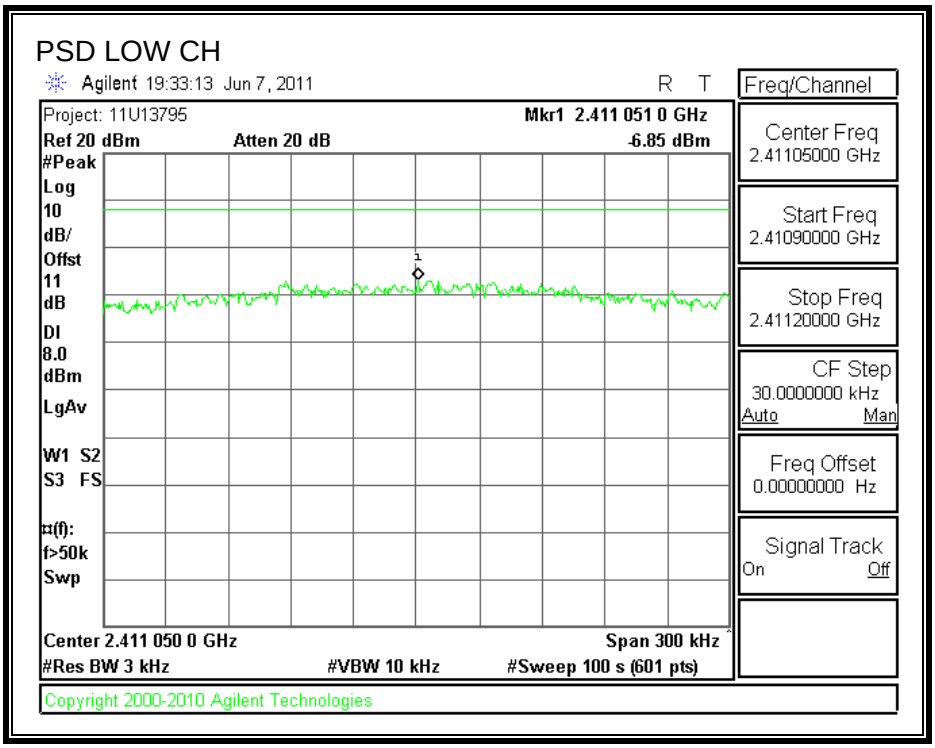
POWER SPECTRAL DENSITY



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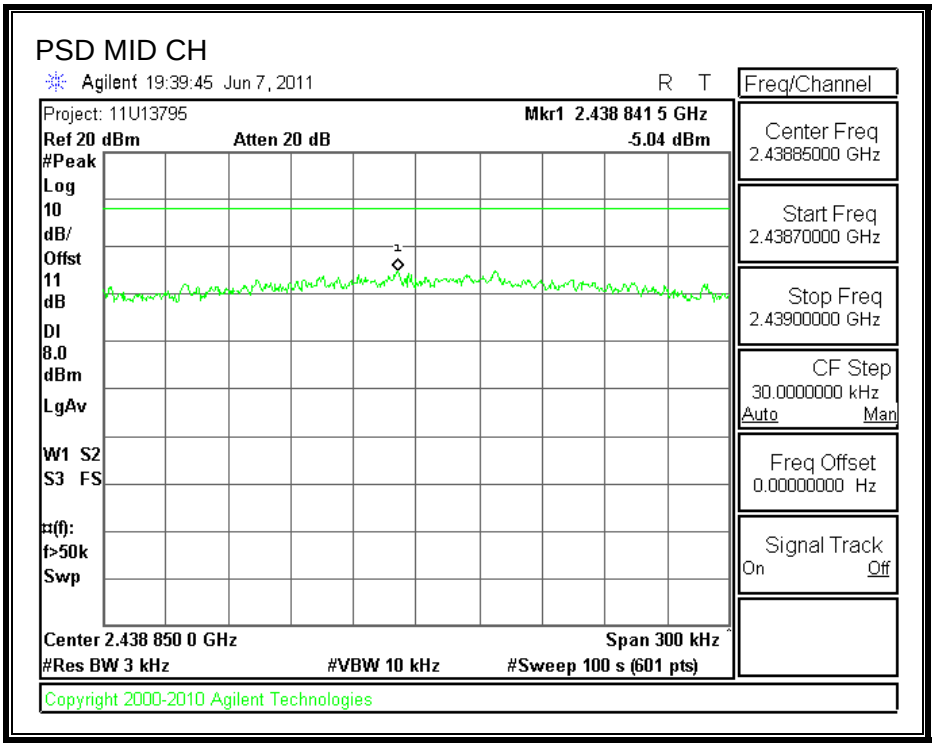
PSD MID CH



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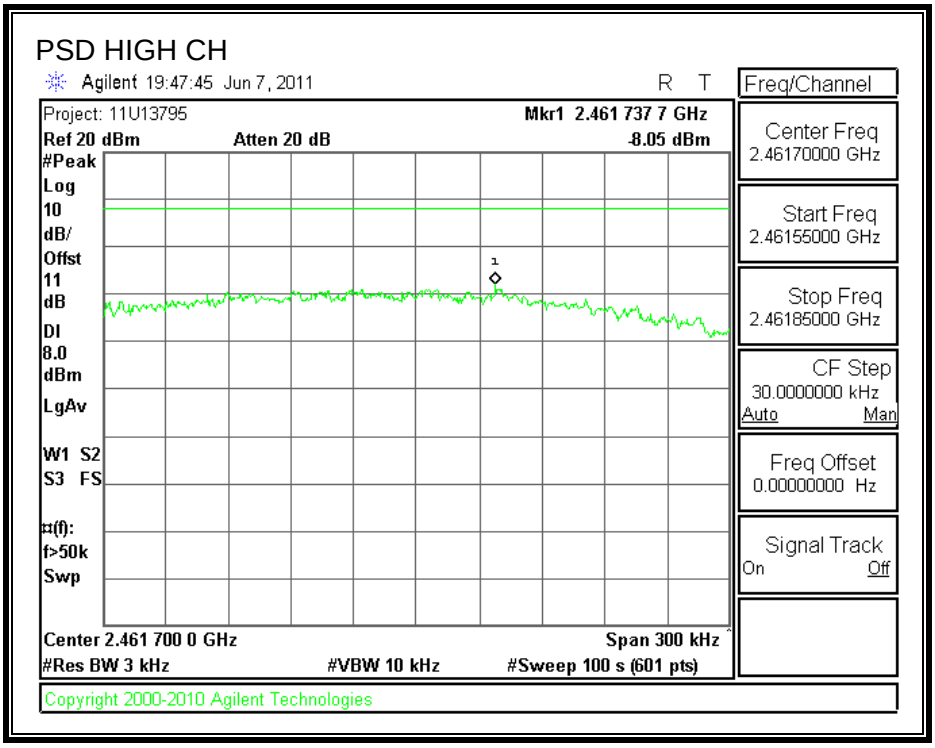

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7.2.5. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.247 (d)

IC RSS-210 A8.5

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

TEST PROCEDURE

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

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

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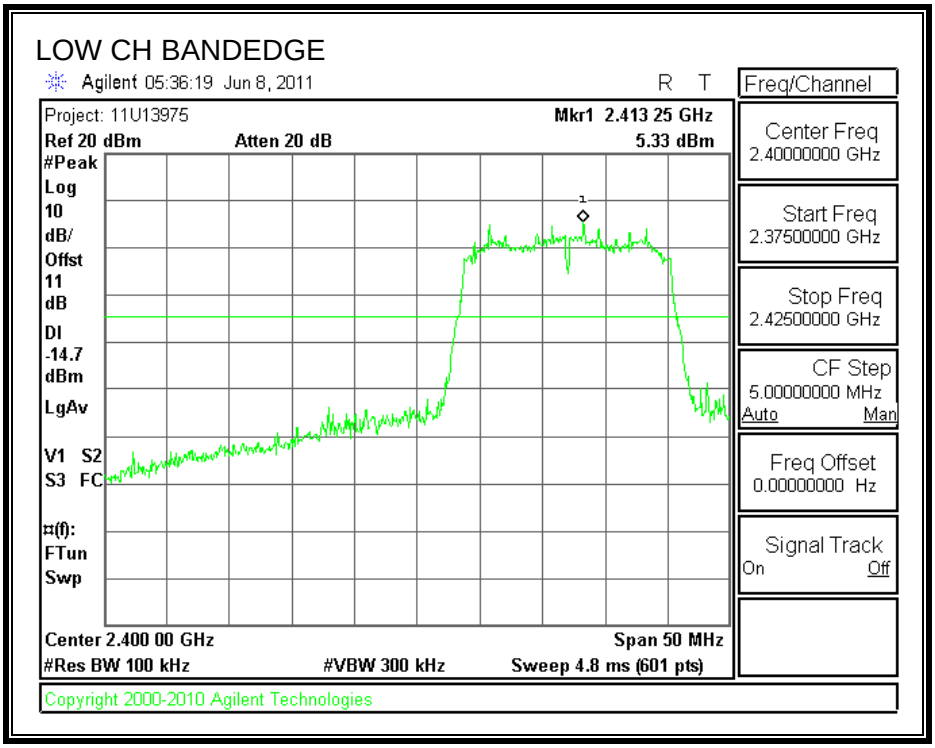
RESULTS

SPURIOUS EMISSIONS, LOW CHANNEL



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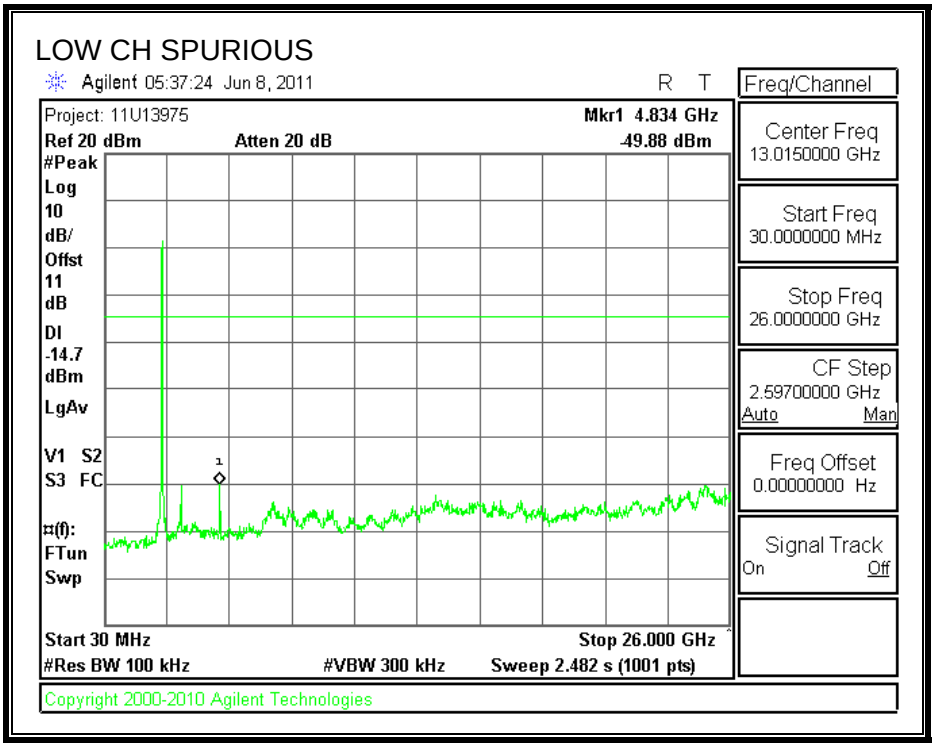

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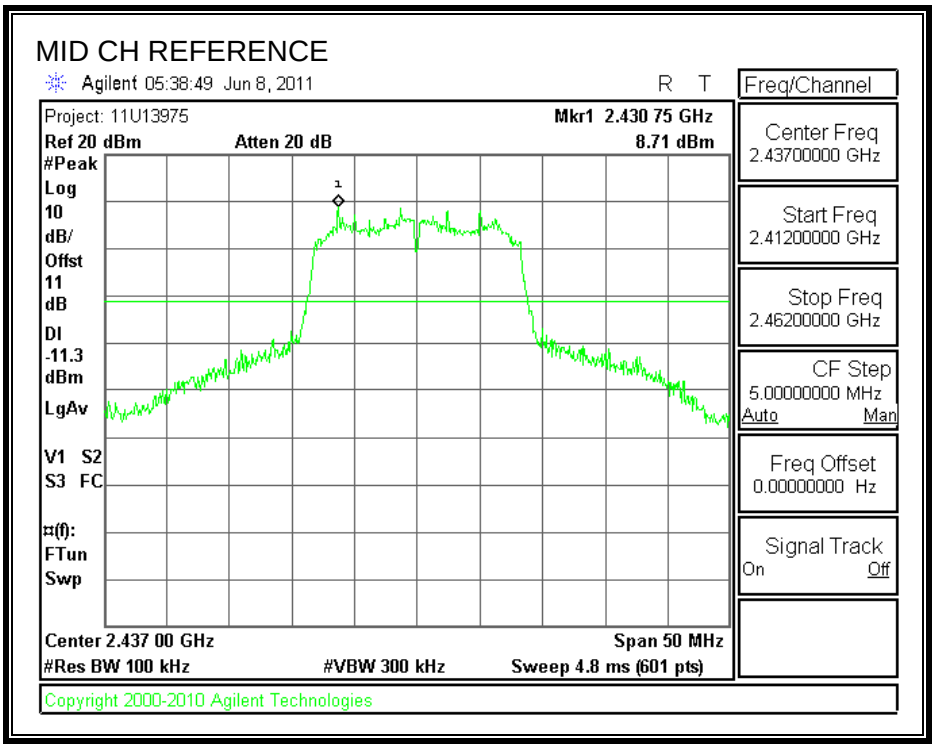
SPURIOUS EMISSIONS, MID CHANNEL



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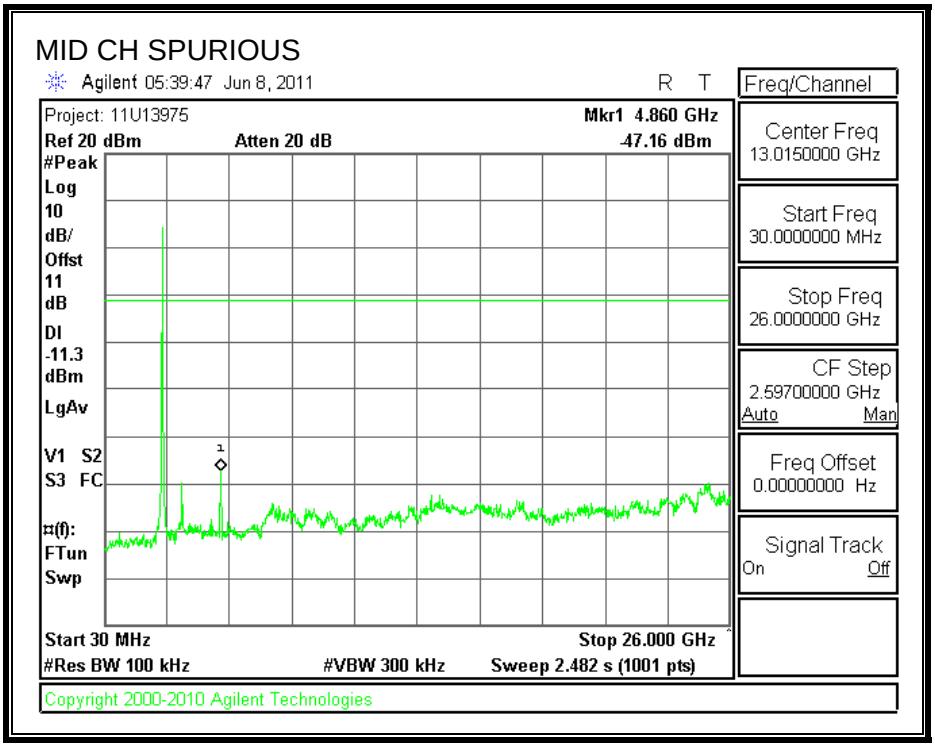

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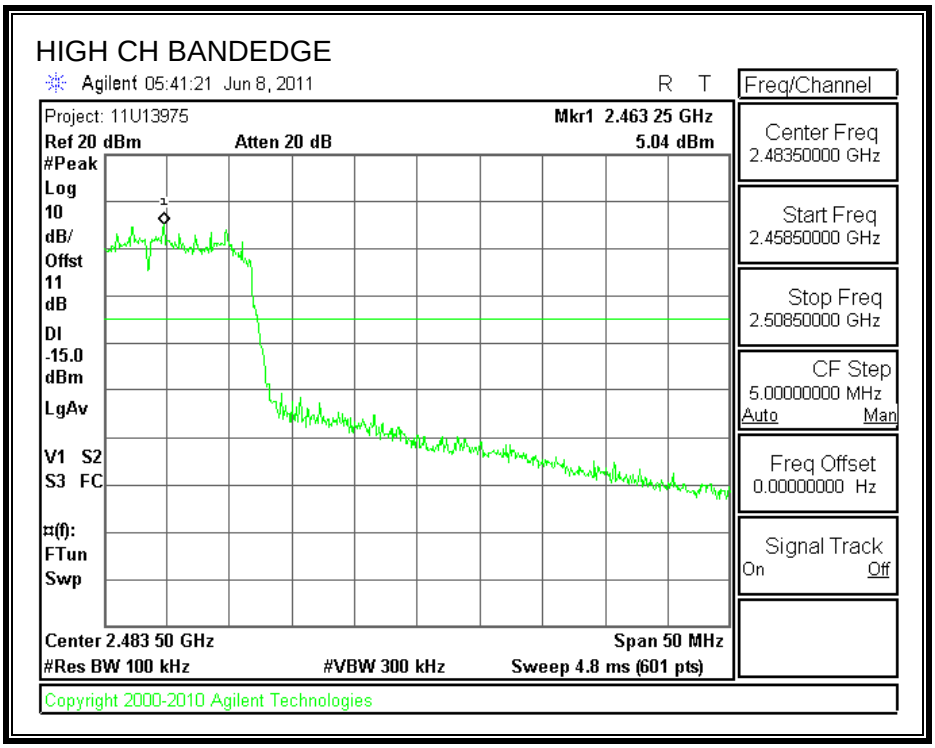
SPURIOUS EMISSIONS, HIGH CHANNEL



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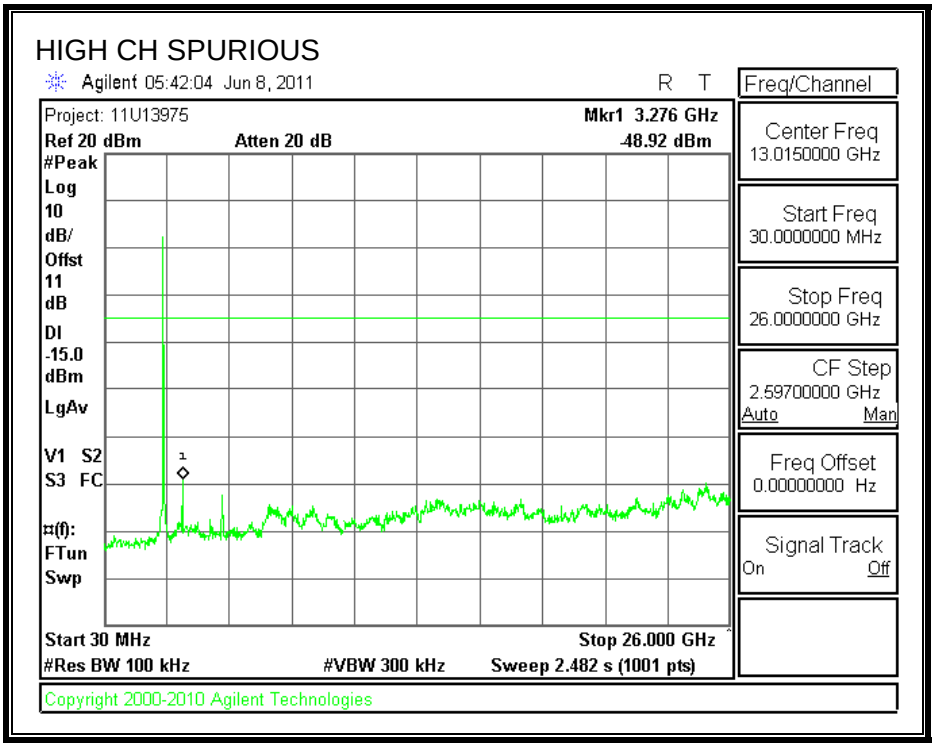

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7.3. 802.11n HT20 MODE IN THE 2.4 GHz BAND

7.3.1. 6 dB BANDWIDTH

LIMITS

FCC §15.247 (a) (2)

IC RSS-210 A8.2 (a)

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

TEST PROCEDURE

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

RESULTS

Channel	Frequency (MHz)	Chain 1 6 dB BW (MHz)	Chain 2 6 dB BW (MHz)	Minimum Limit (MHz)
Low	2412	14.75	16.58	0.5
Middle	2437	16.00	16.17	0.5
High	2462	15.17	16.67	0.5

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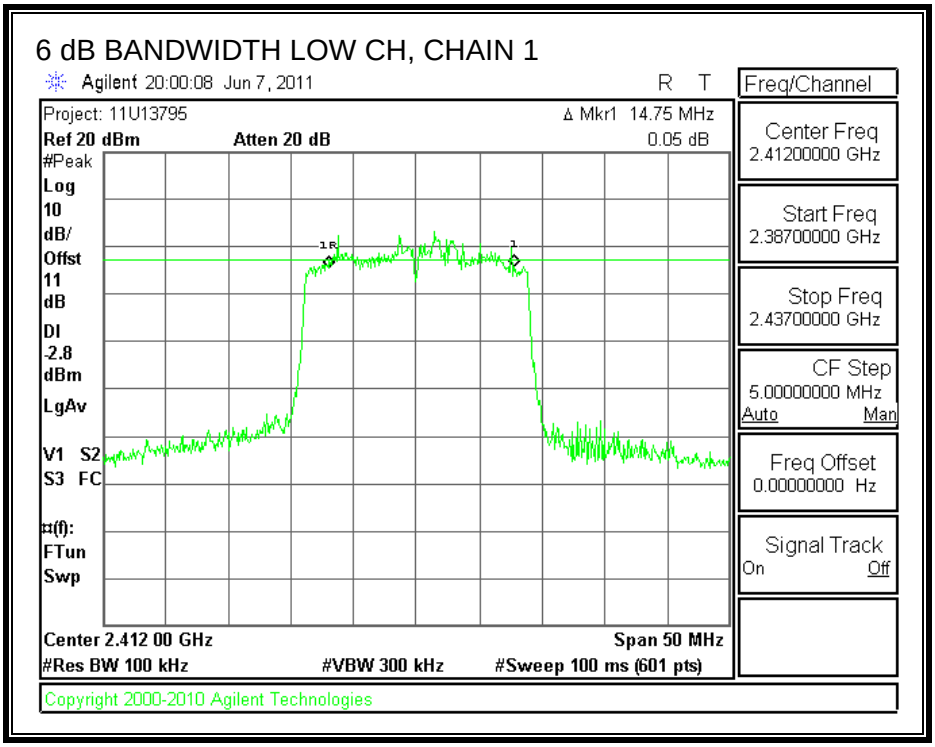
6 dB BANDWIDTH, CHAIN 1



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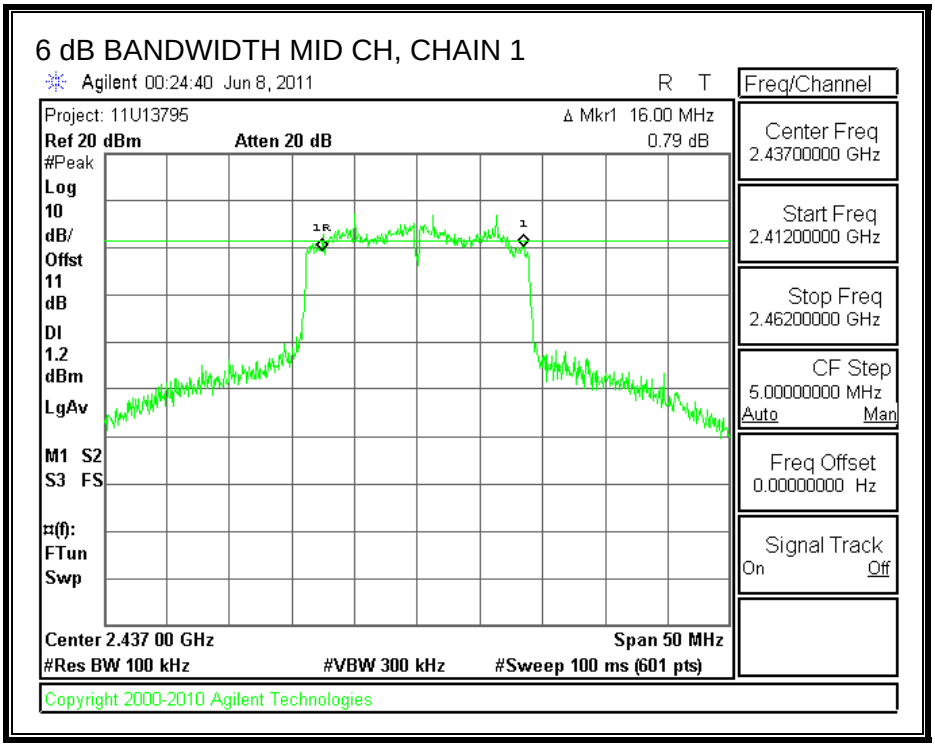

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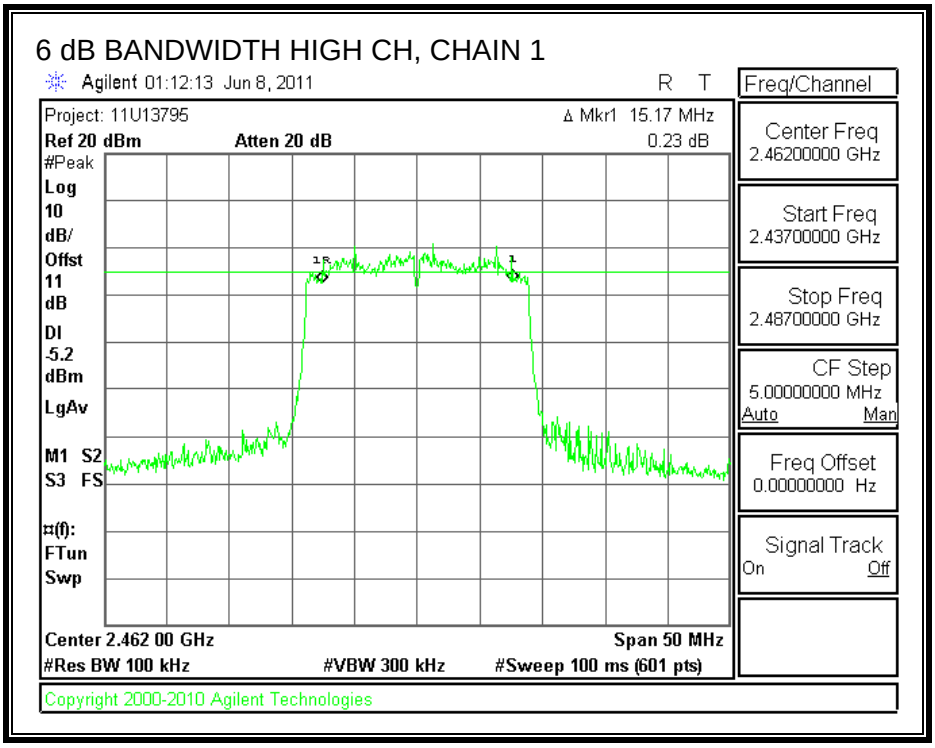

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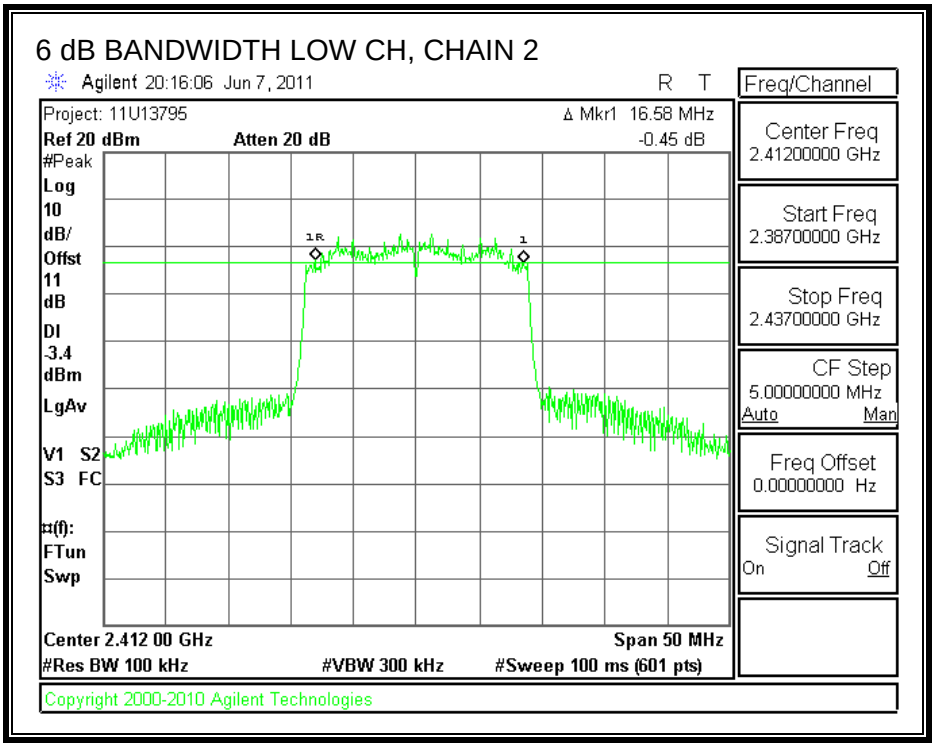
6 dB BANDWIDTH, CHAIN 2



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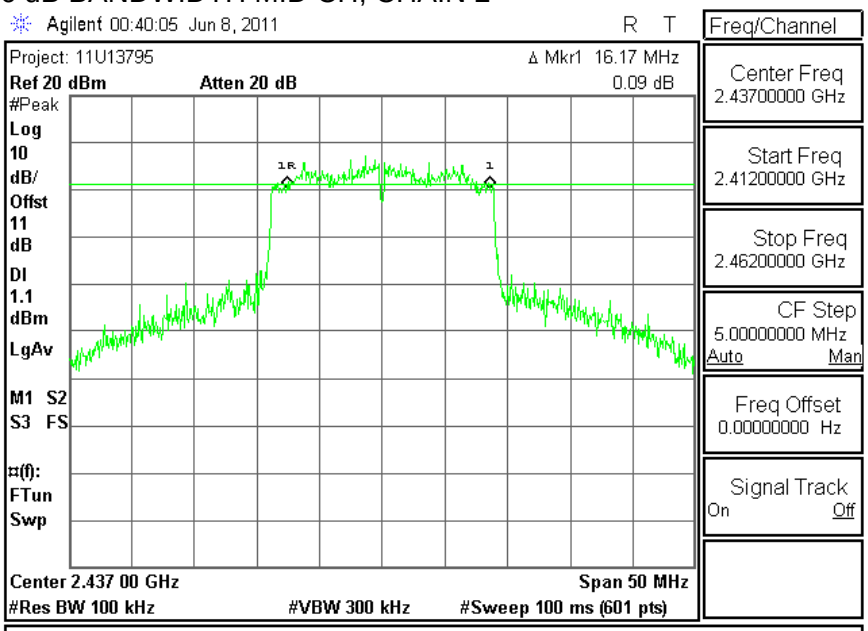
6 dB BANDWIDTH MID CH, CHAIN 2



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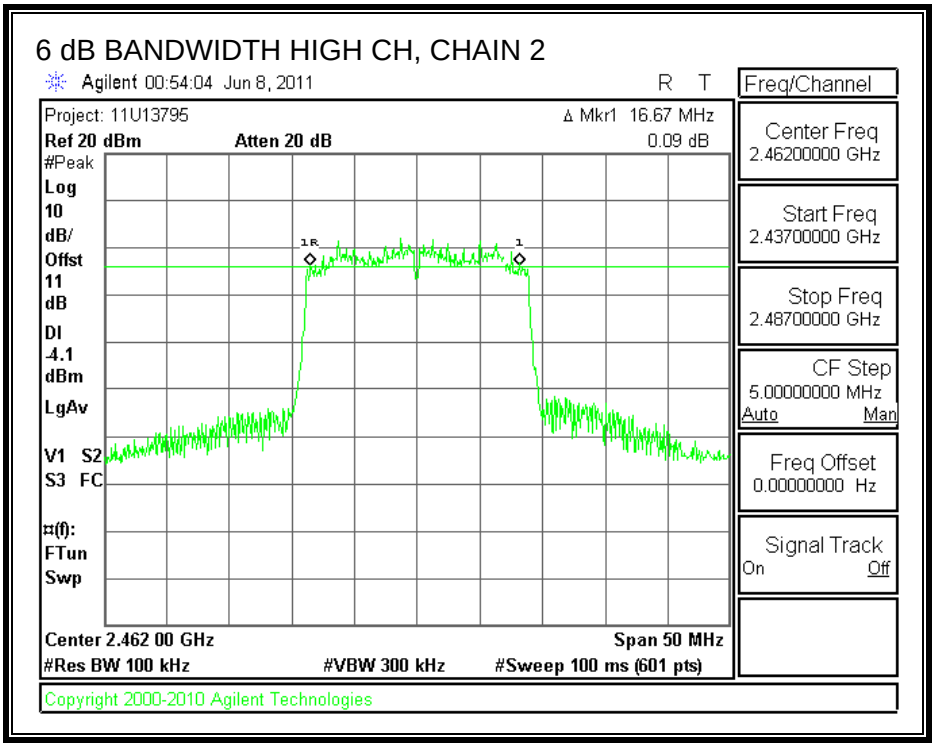
6 dB BANDWIDTH HIGH CH, CHAIN 2



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7.3.2. 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

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

RESULTS

Channel	Frequency (MHz)	Chain 1 99% Bandwidth (MHz)	Chain 2 99% Bandwidth (MHz)
Low	2412	17.4282	17.4521
Middle	2437	17.4062	17.5011
High	2462	17.4723	17.2552

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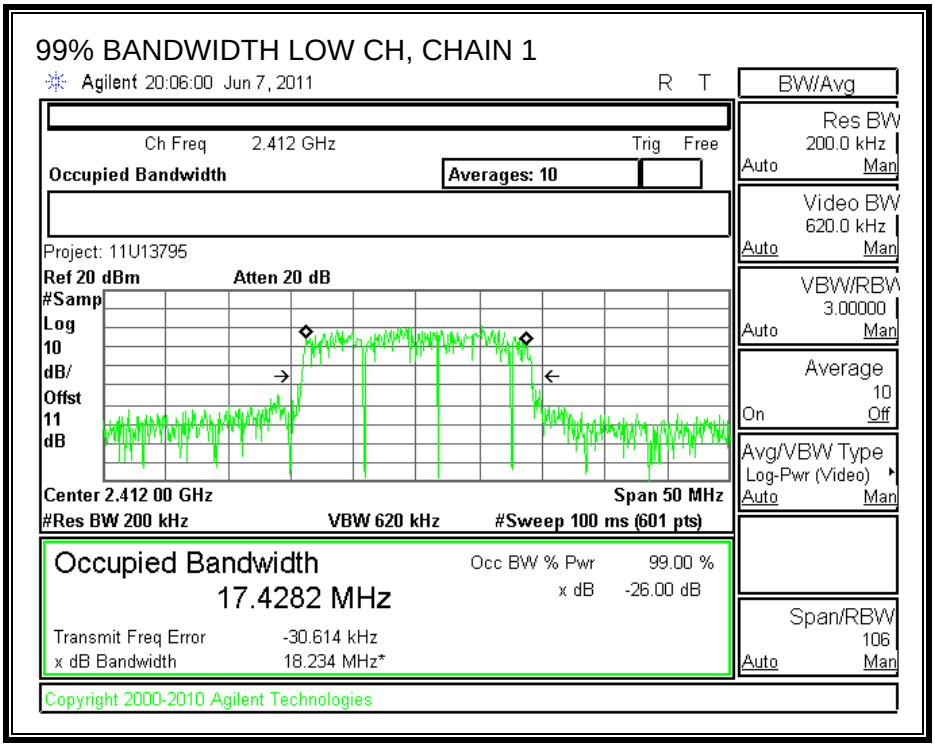
99% BANDWIDTH, CHAIN 1



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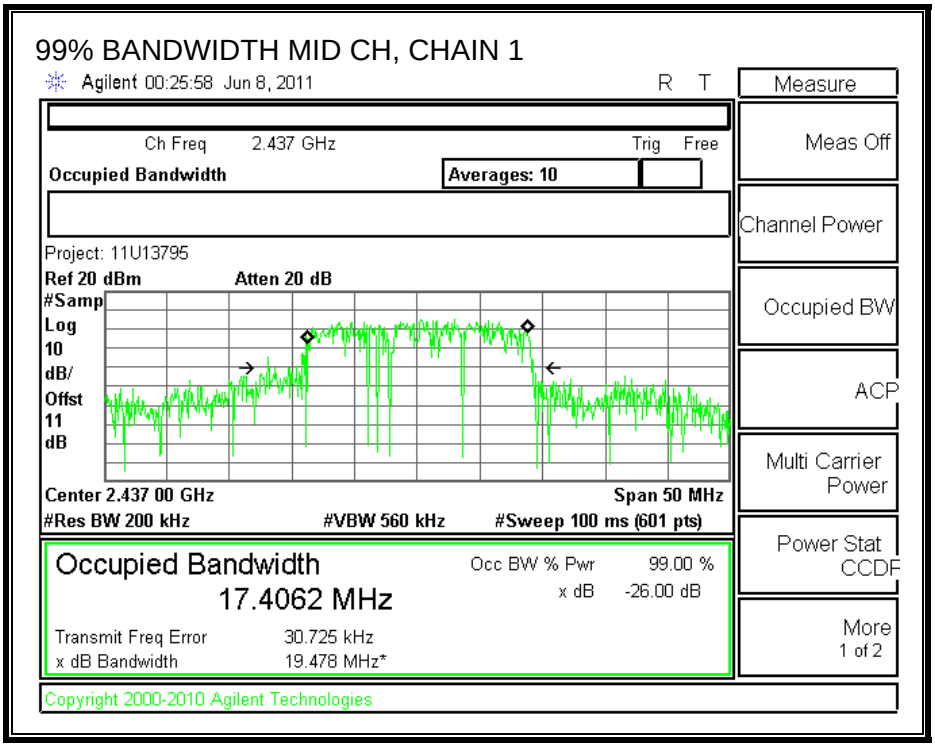

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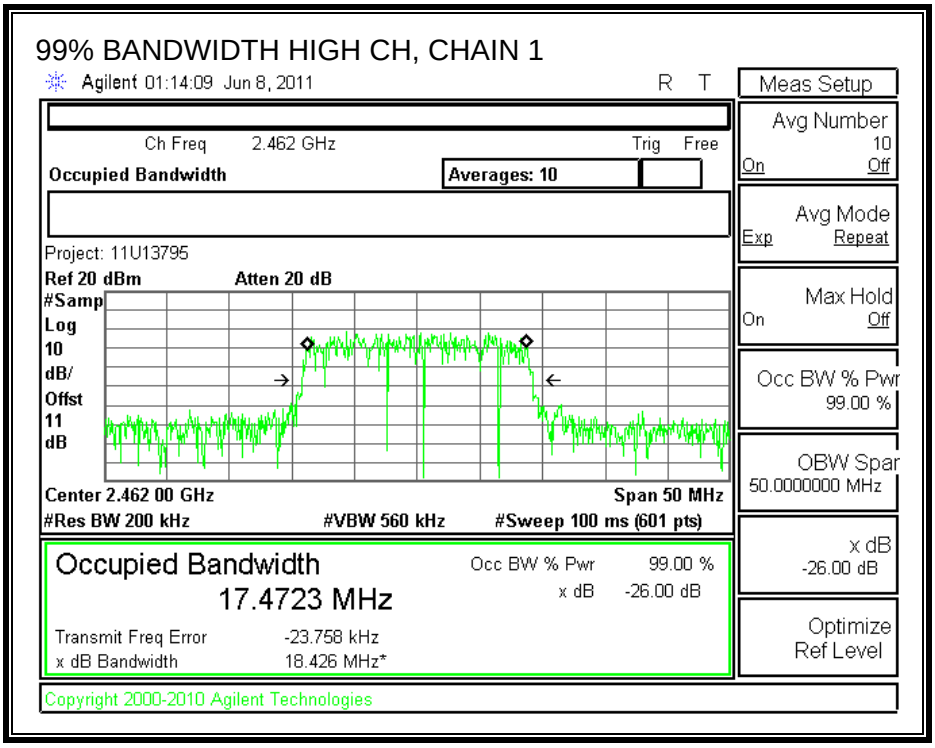

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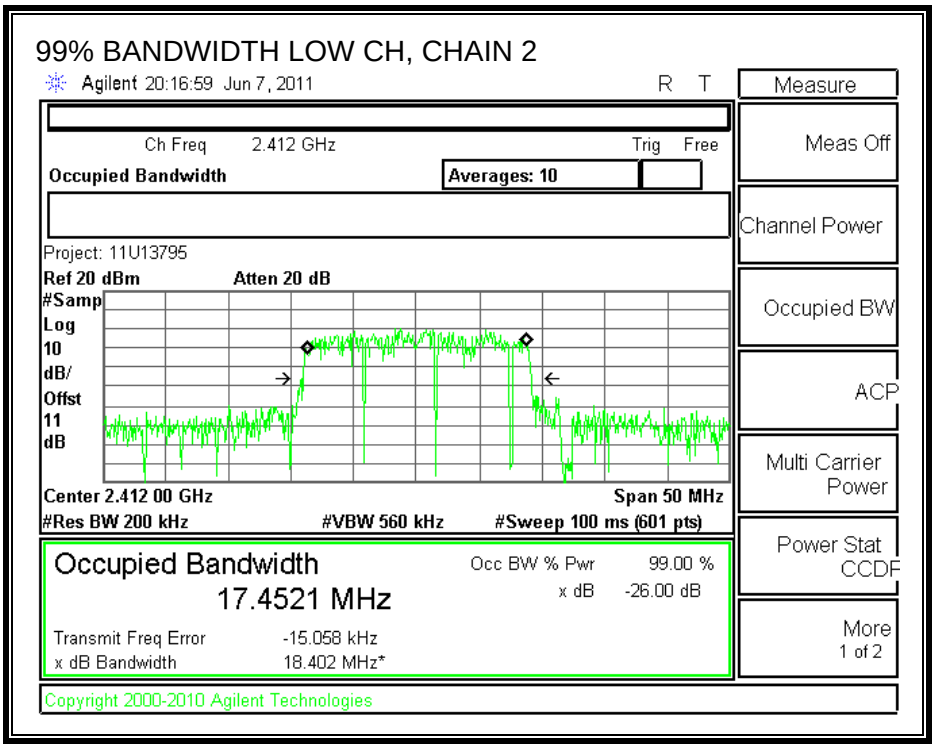
99% BANDWIDTH, CHAIN 2



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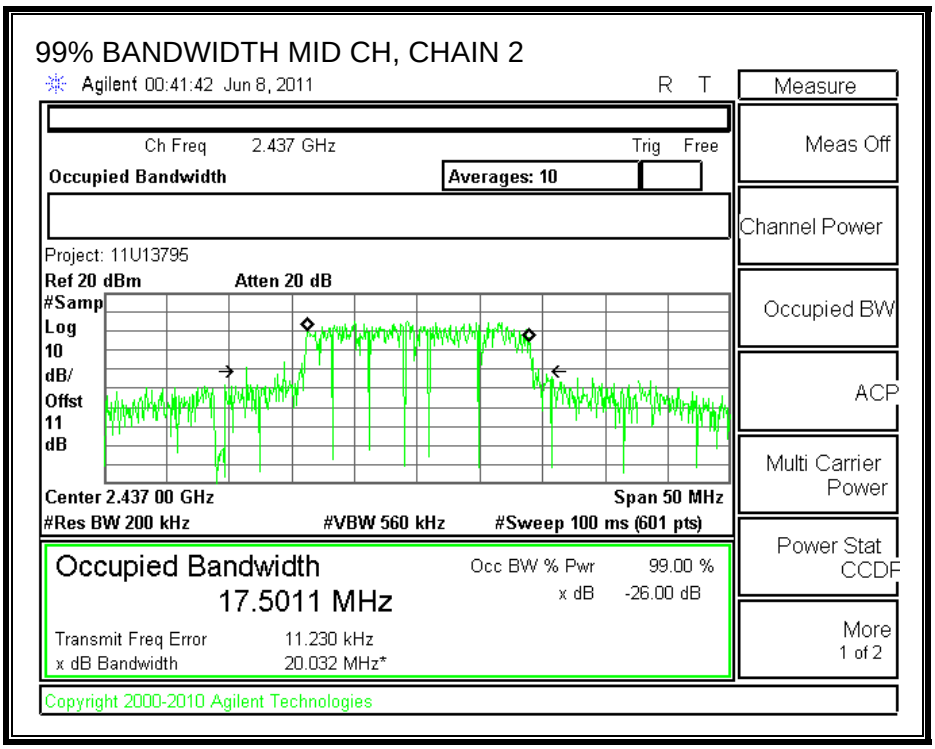
99% BANDWIDTH MID CH, CHAIN 2



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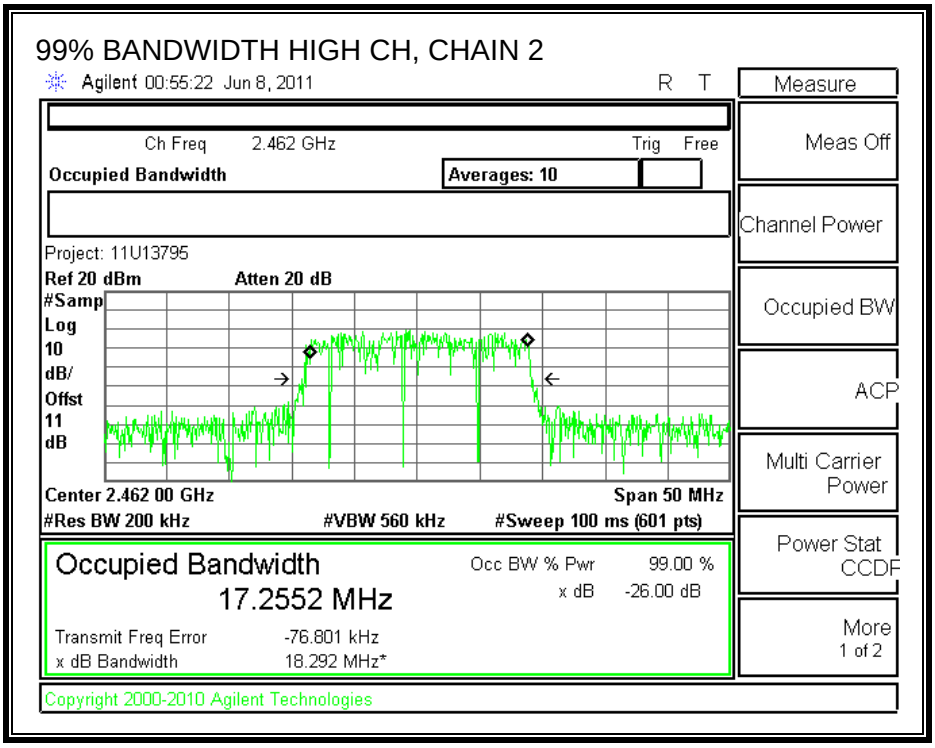

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7.3.3. OUTPUT POWER

LIMITS

FCC §15.247 (b)

IC RSS-210 A8.4

The composite antenna gain is equal to 6.91 dBi, therefore the limit is 29.09 dBm.

TEST PROCEDURE

Peak power is measured using the Channel bandwidth Alternative peak output power procedure specified in "TCB Training for Devices covered under Scopes A1 - A4" by Joe Dichoso, May 2003.

RESULTS

Channel	Frequency (MHz)	Chain 1 PK Power (dBm)	Chain 2 PK Power (dBm)	Attenuator + Cable Offset (dB)	Total Power (dBm)	Limit (dBm)	Margin (dB)
Low	2412	10.76	10.83	11.00	24.81	29.09	-4.28
Mid	2437	14.52	15.22	11.00	28.89	29.09	-0.20
High	2462	9.48	10.70	11.00	24.14	29.09	-4.95

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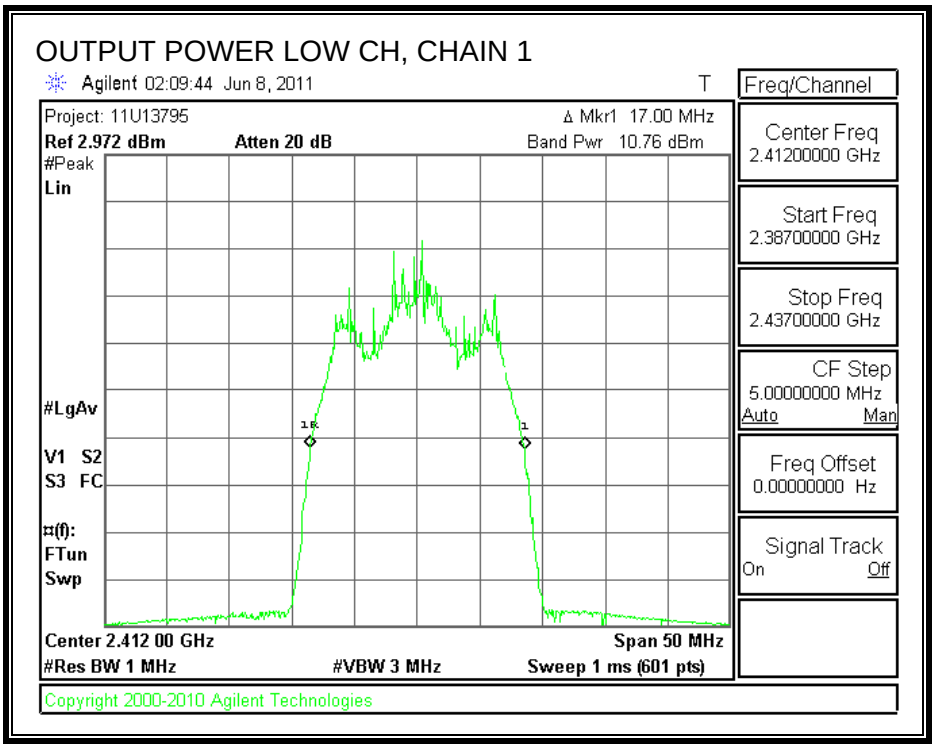
CHAIN 1 OUTPUT POWER



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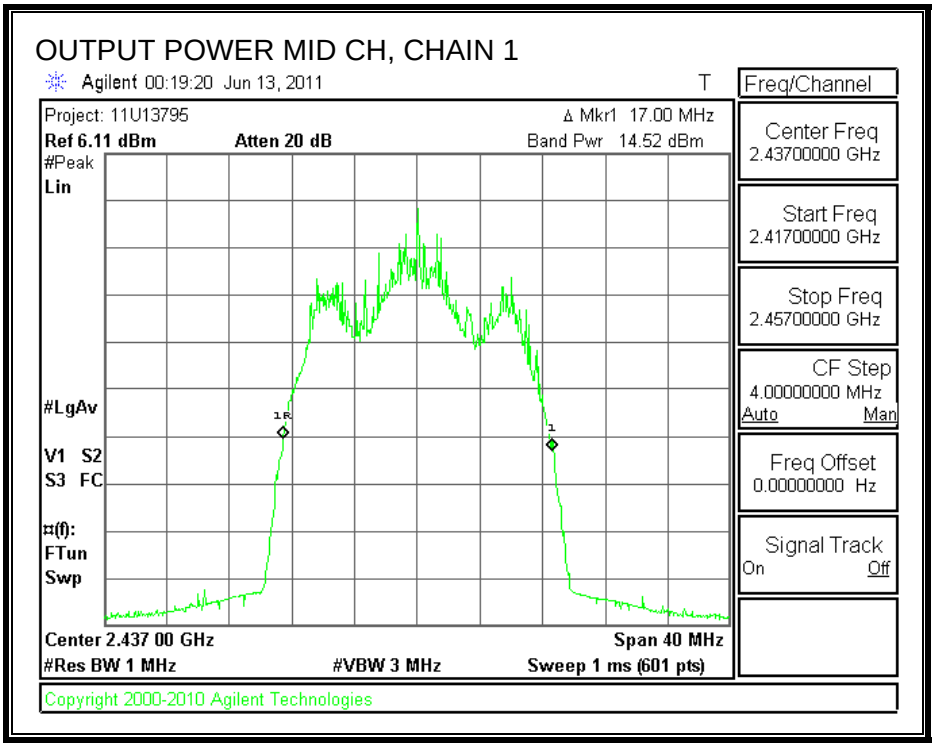

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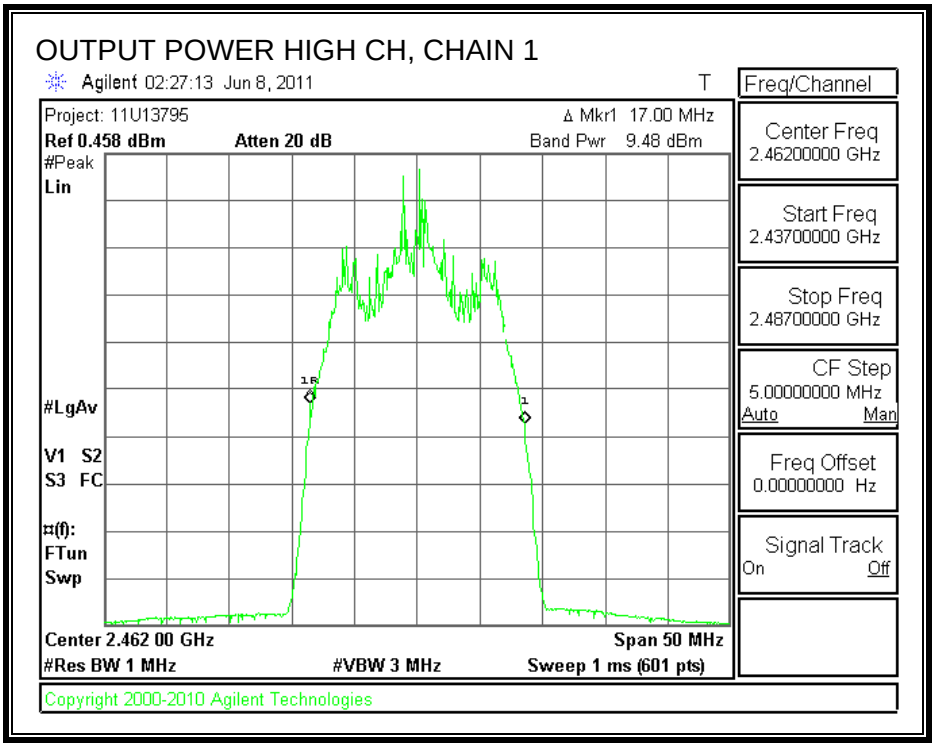

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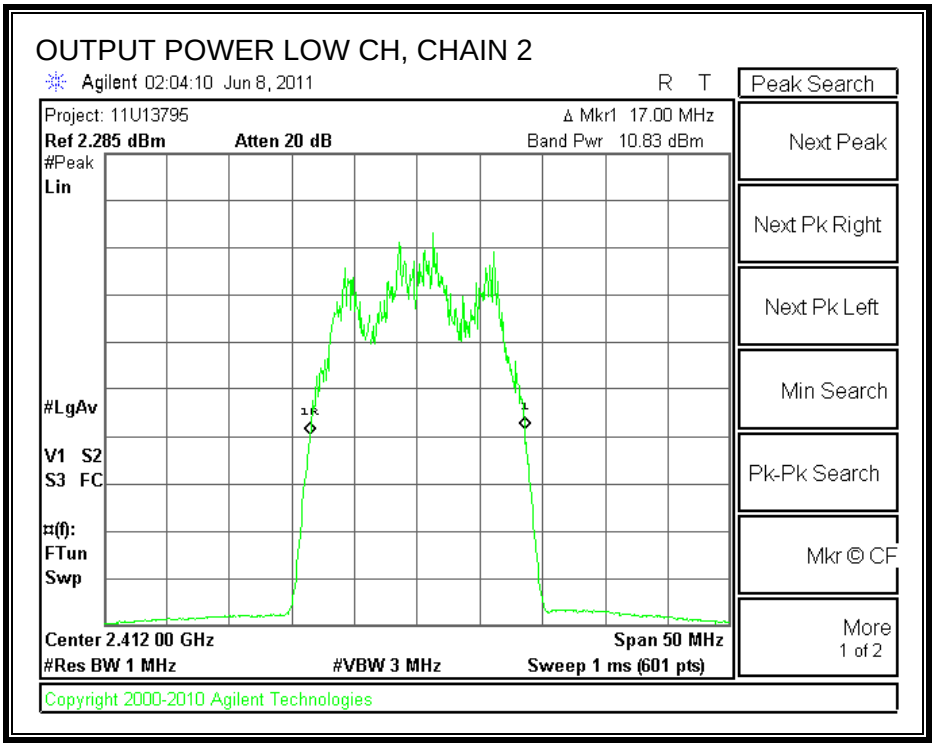
CHAIN 2 OUTPUT POWER



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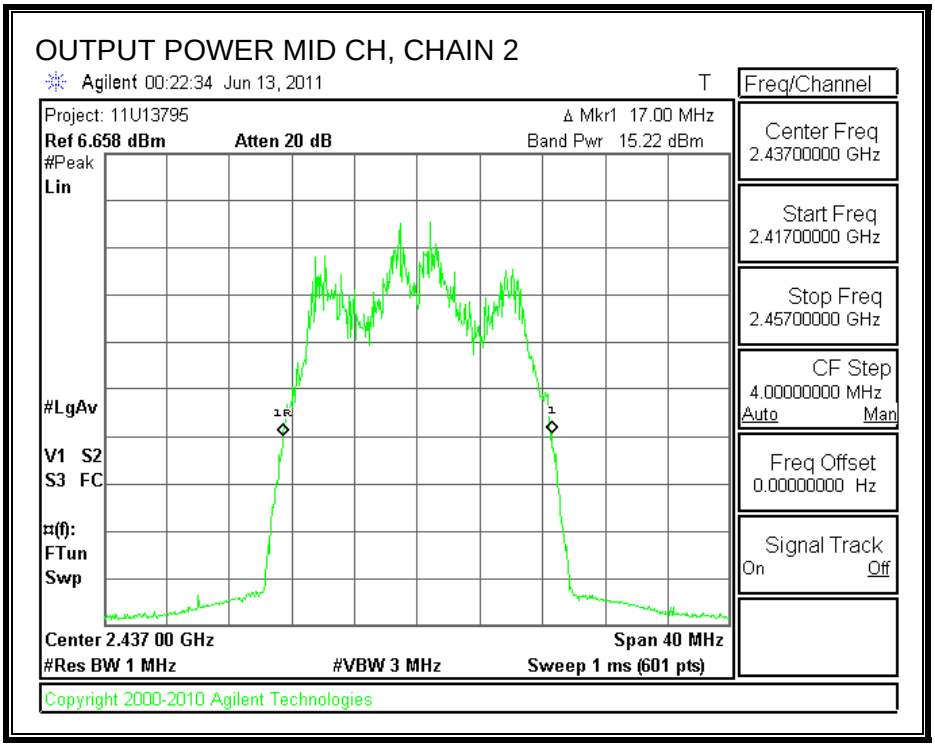

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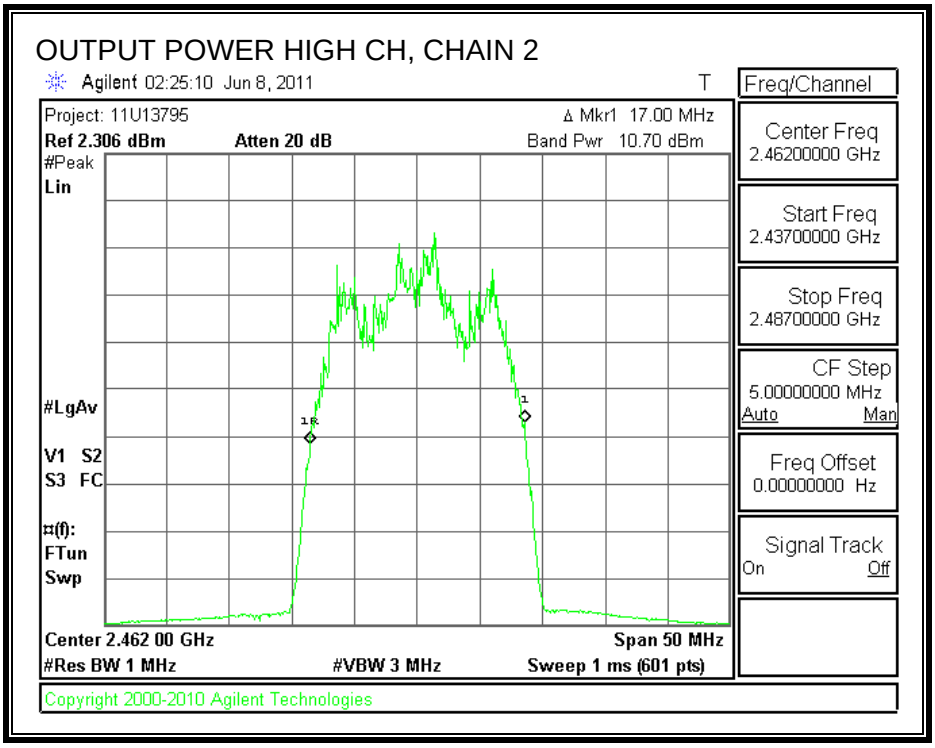

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7.3.4. AVERAGE POWER

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a power meter.

RESULTS

The cable assembly insertion loss of 11 dB (including 10 dB pad and 1 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

Channel	Frequency (MHz)	Chain 1 Power (dBm)	Chain 2 Power (dBm)	Total Power (dBm)
Middle	2437	17.20	17.64	20.44

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7.3.5. POWER SPECTRAL DENSITY

LIMITS

FCC §15.247 (e)

IC RSS-210 A8.2 (b)

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

TEST PROCEDURE

Peak output power was measured, therefore the power spectral density was measured using PSD Option 1 in accordance with FCC document "Measurement of Digital Transmission Systems Operating under Section 15.247", March 23, 2005.

RESULTS

Channel	Frequency (MHz)	Chain 1 PSD (dBm)	Chain 2 PSD (dBm)	Total PSD (dBm)	Limit (dBm)	Margin (dB)
Low	2412	-9.08	-10.77	-6.83	8	-14.83
Middle	2437	-5.11	-3.92	-1.46	8	-9.46
High	2462	-9.08	-11.91	-7.26	8	-15.26

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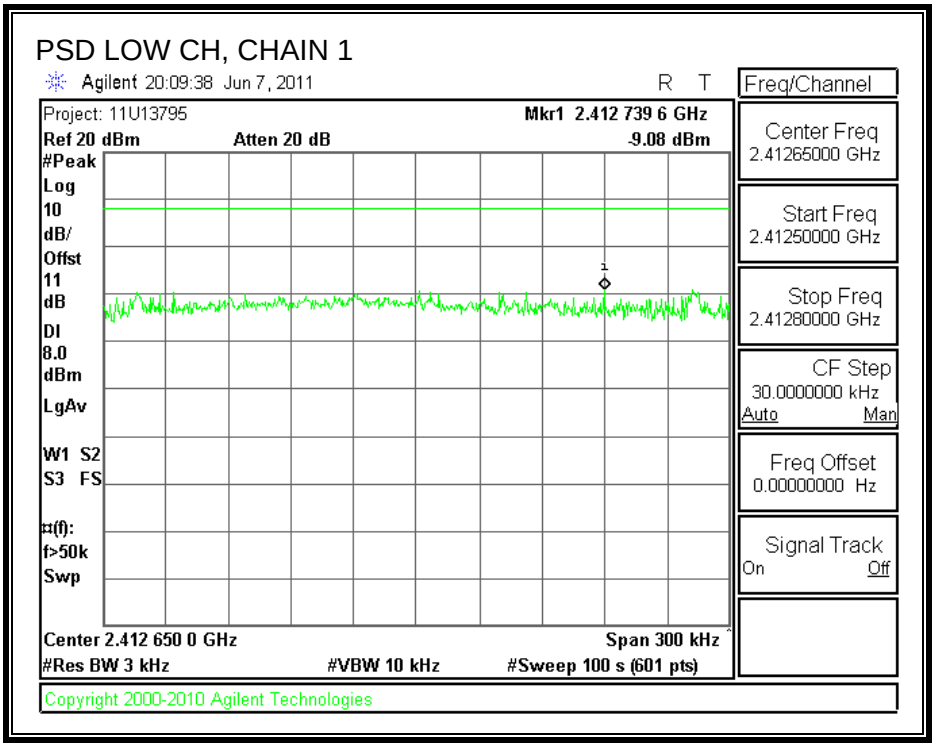
POWER SPECTRAL DENSITY, CHAIN 1



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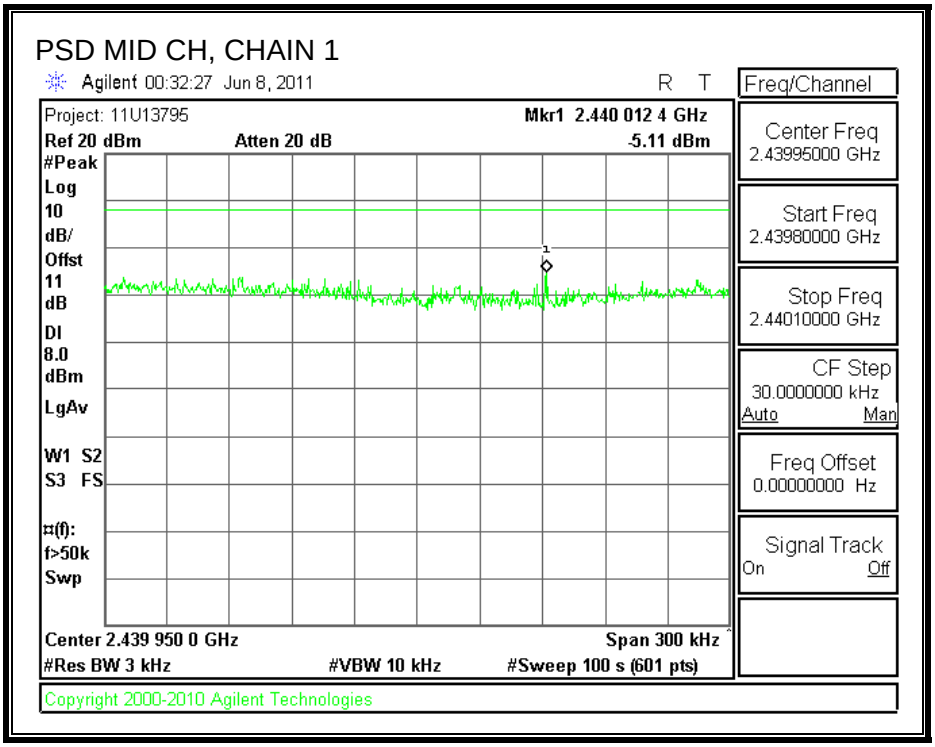
PSD MID CH, CHAIN 1



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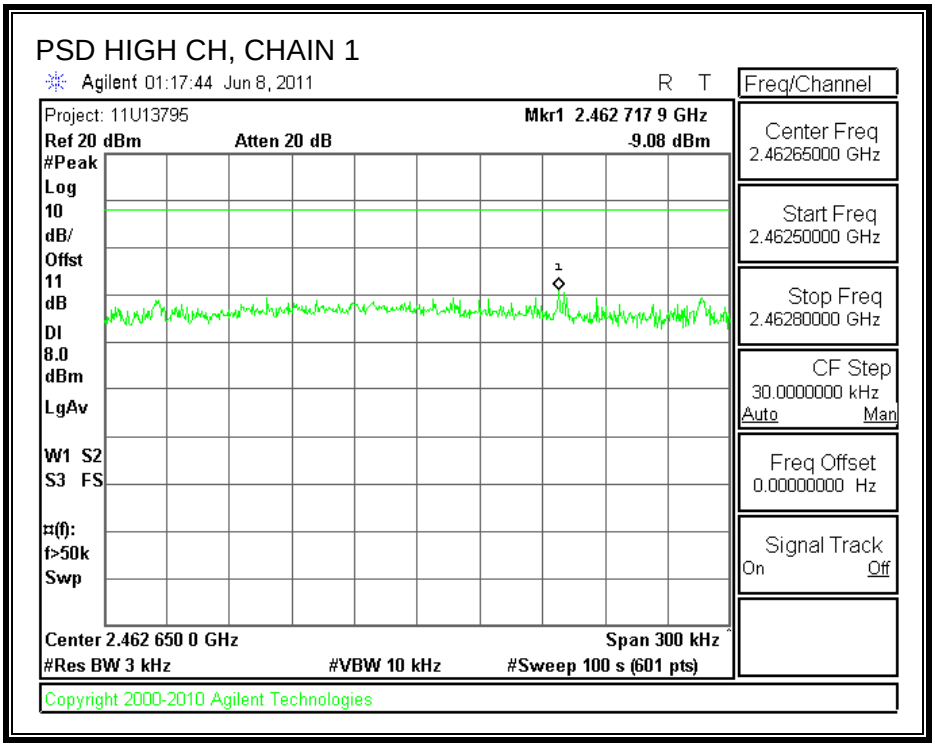
PSD HIGH CH, CHAIN 1



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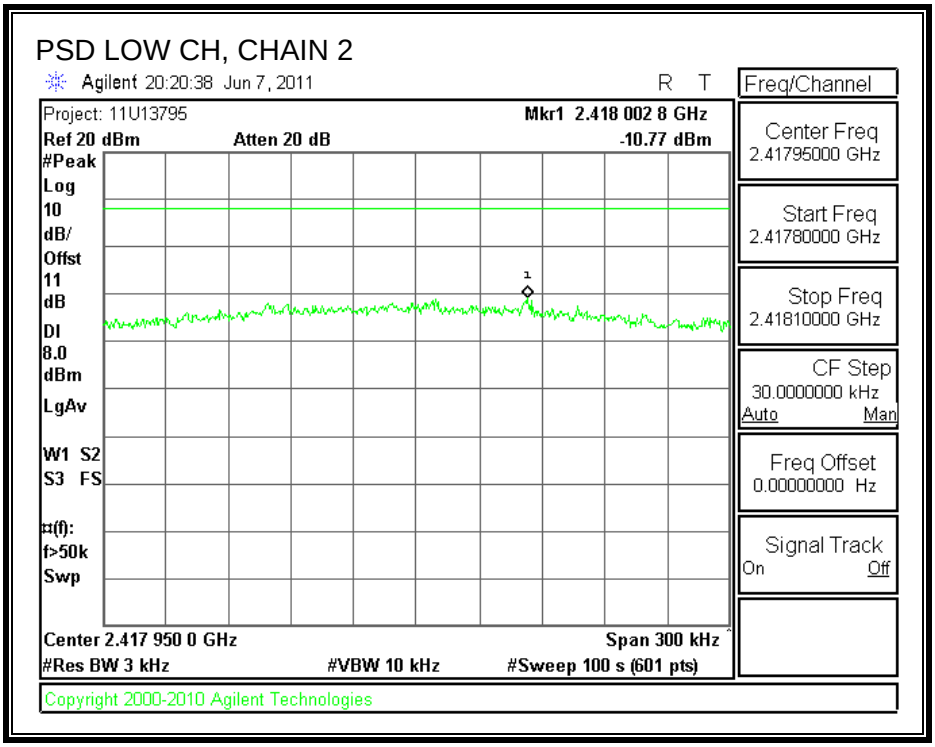
POWER SPECTRAL DENSITY, CHAIN 2



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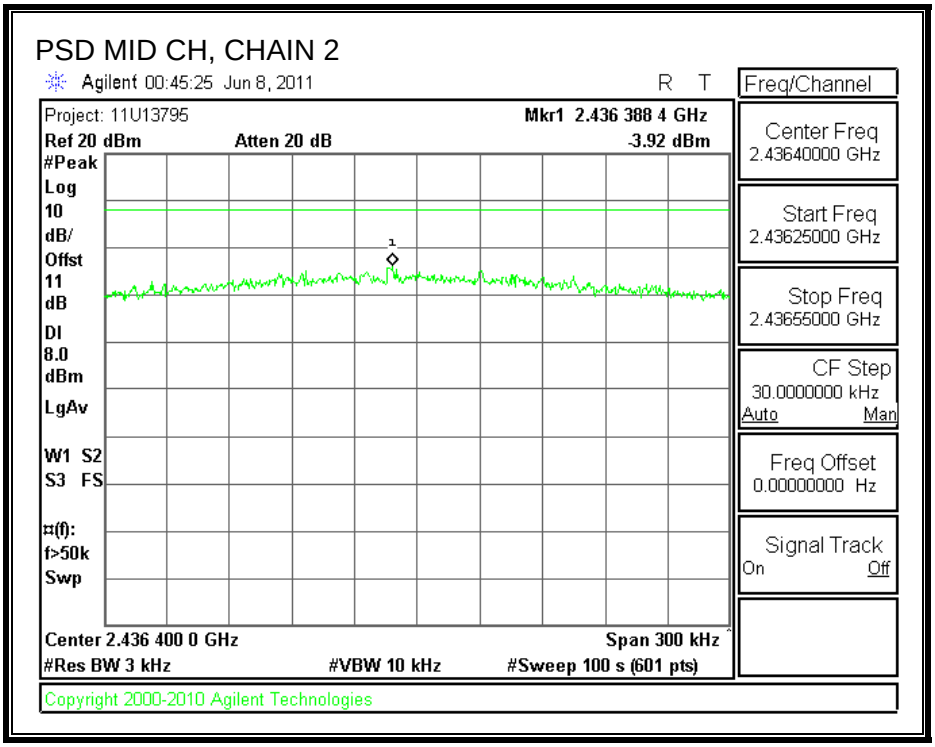
PSD MID CH, CHAIN 2



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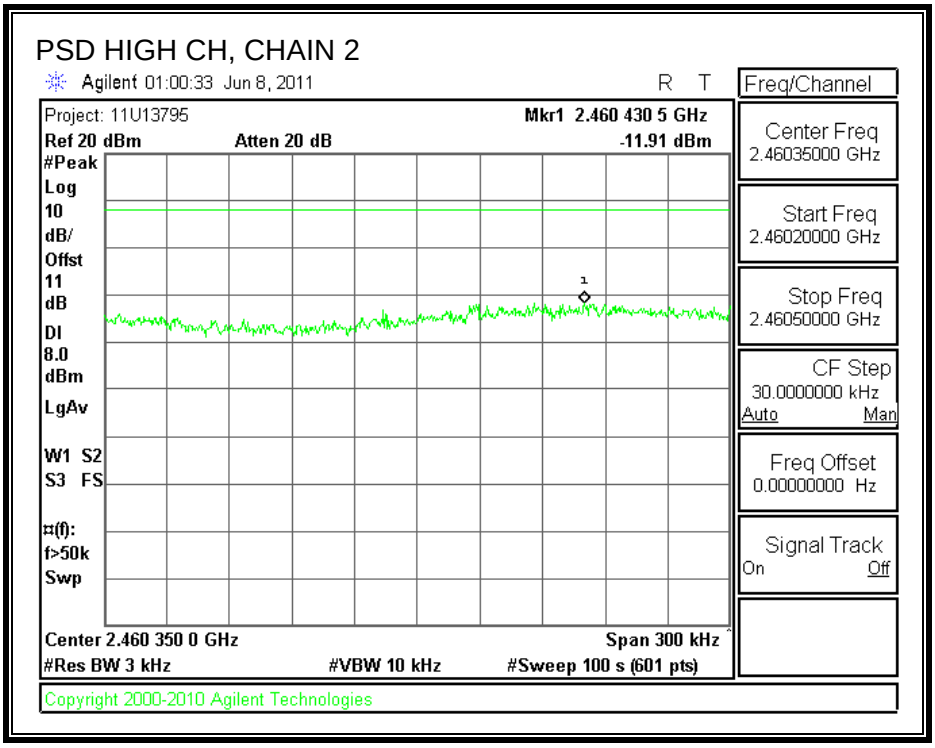

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7.3.6. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.247 (d)

IC RSS-210 A8.5

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

TEST PROCEDURE

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

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

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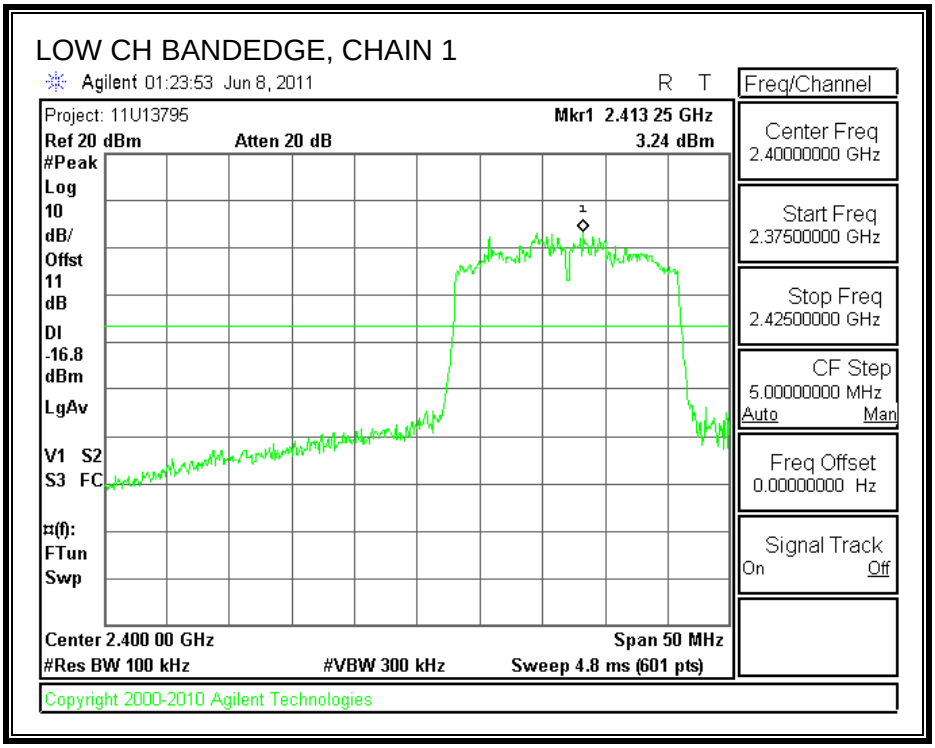
RESULTS

CHAIN 1 SPURIOUS EMISSIONS



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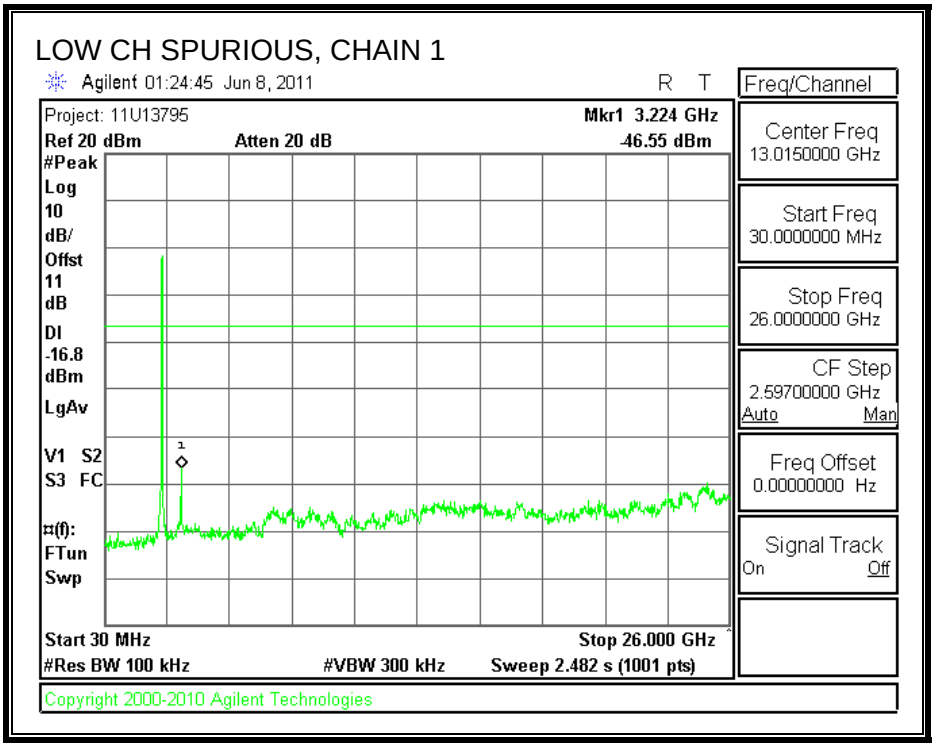

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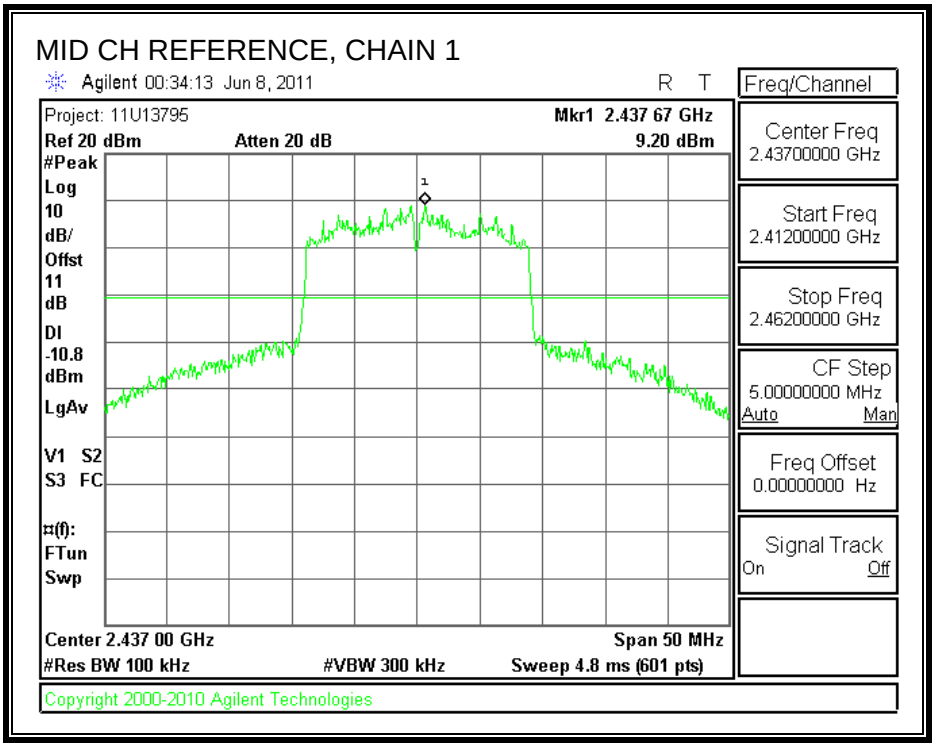
MID CH REFERENCE, CHAIN 1



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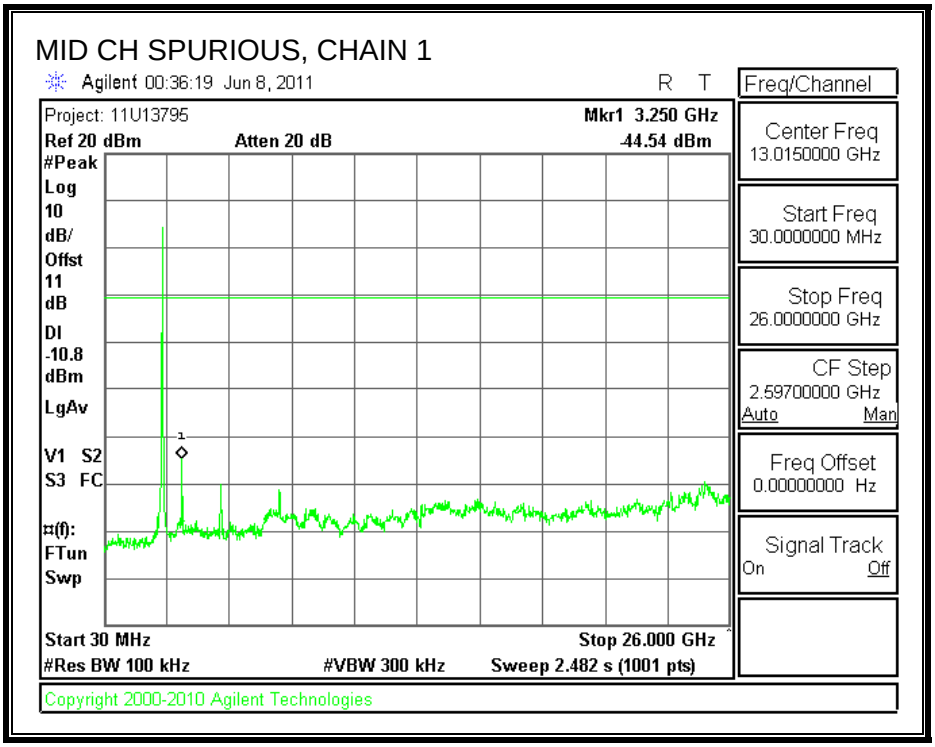

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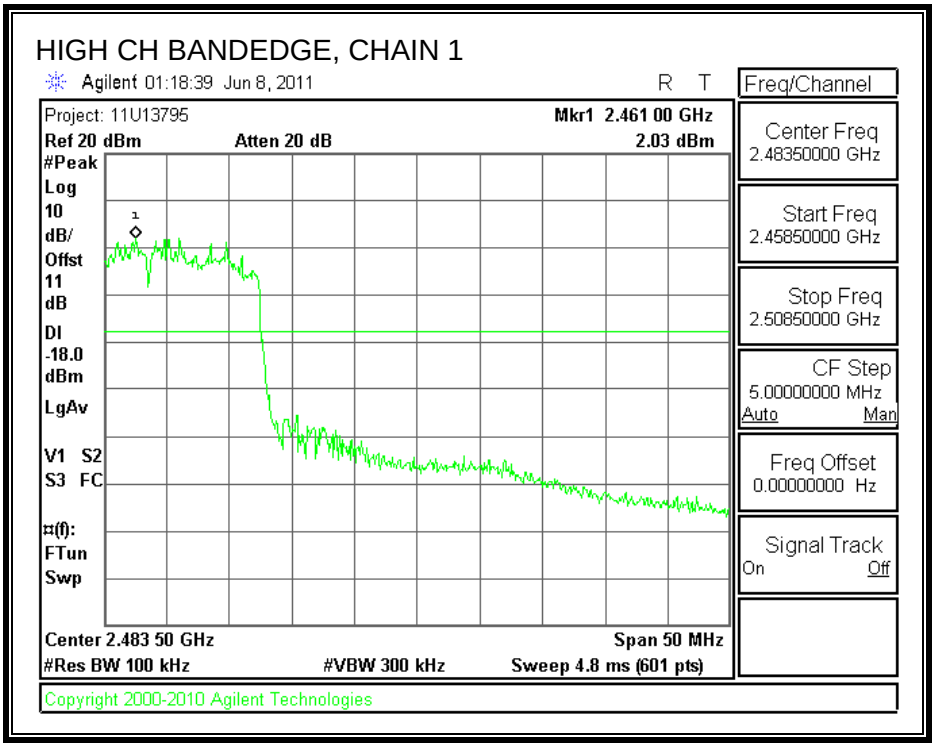
HIGH CH BANDEDGE, CHAIN 1



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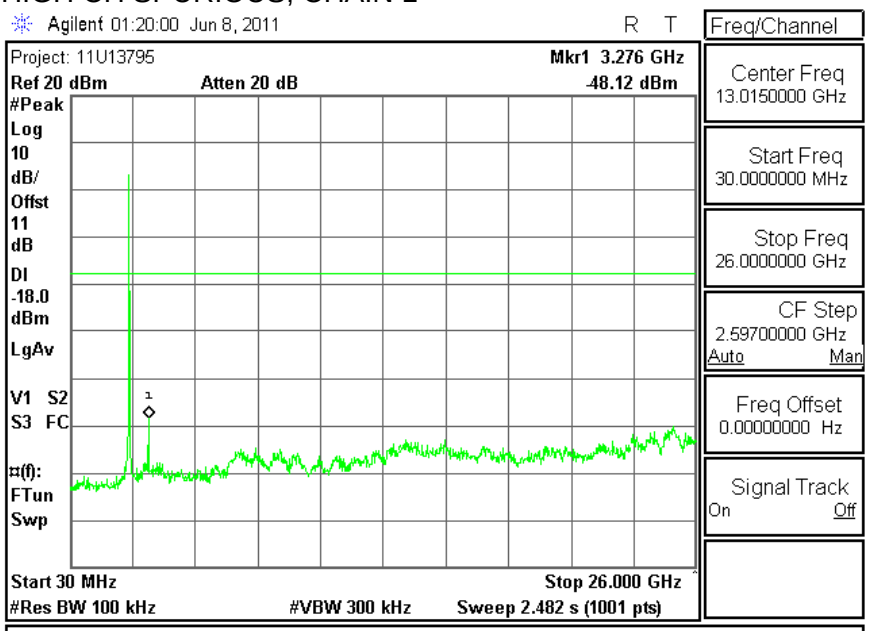
HIGH CH SPURIOUS, CHAIN 1



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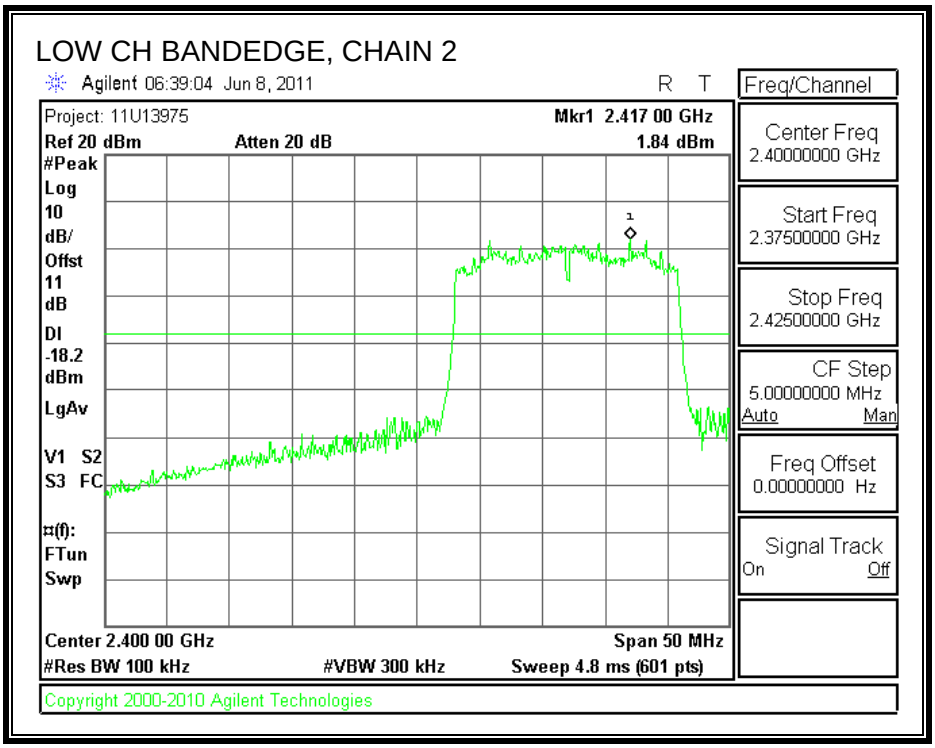
CHAIN 2 SPURIOUS EMISSIONS



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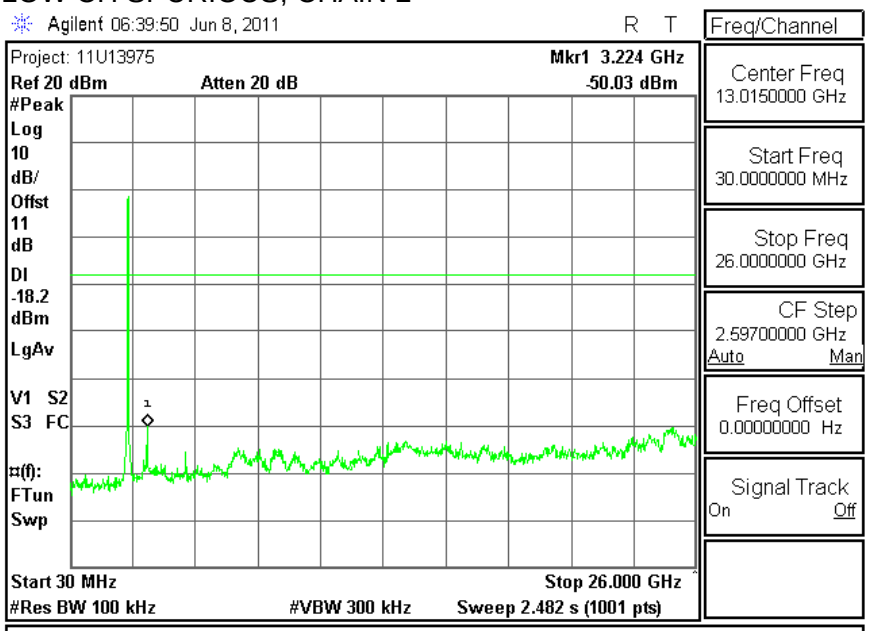
LOW CH SPURIOUS, CHAIN 2



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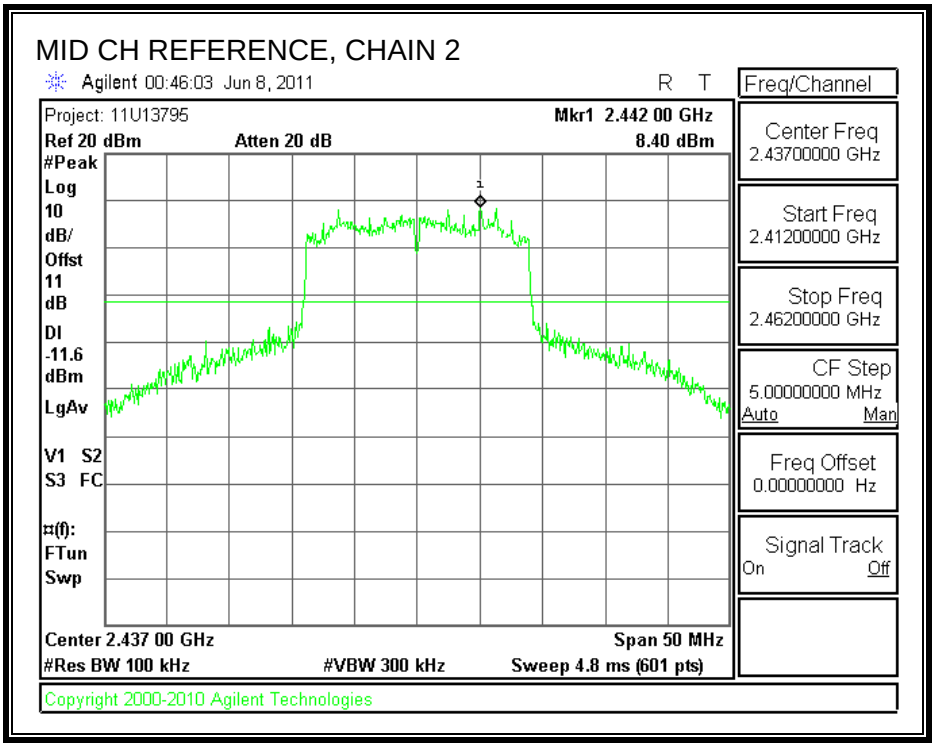
MID CH REFERENCE, CHAIN 2



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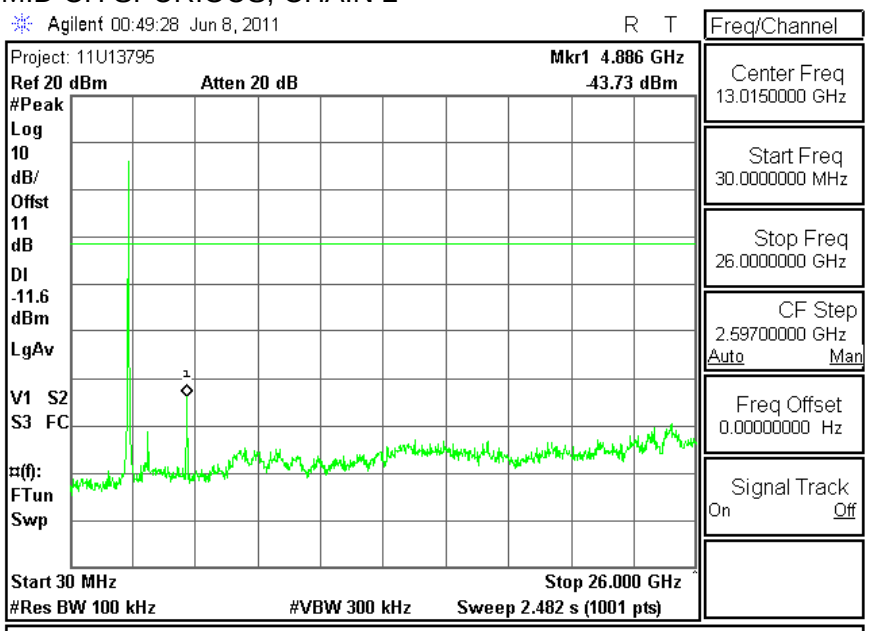
MID CH SPURIOUS, CHAIN 2



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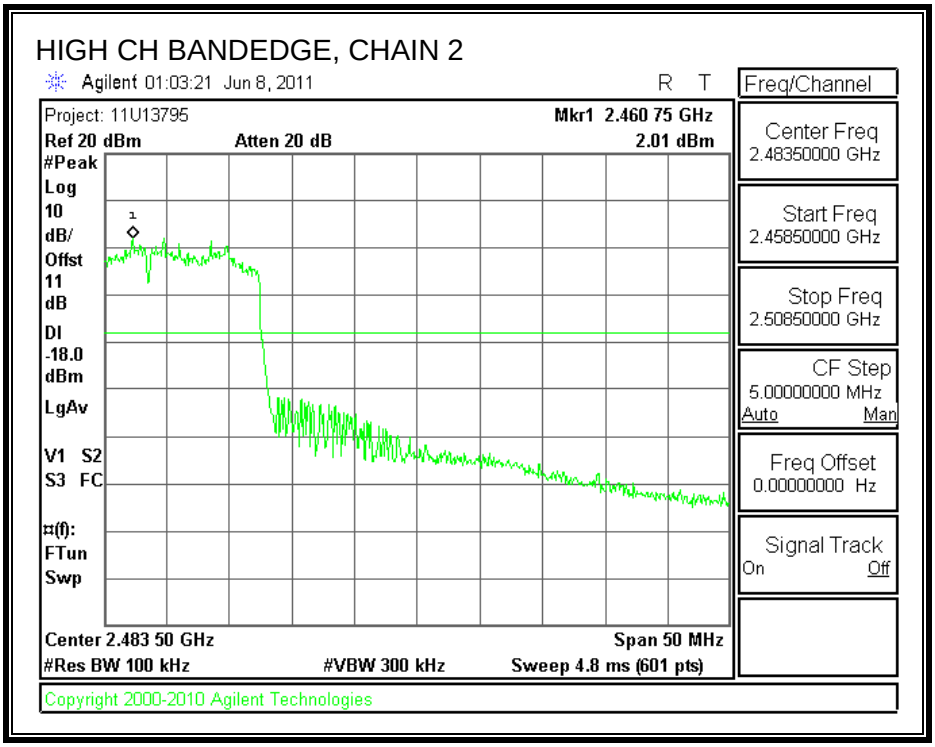
HIGH CH BANDEDGE, CHAIN 2



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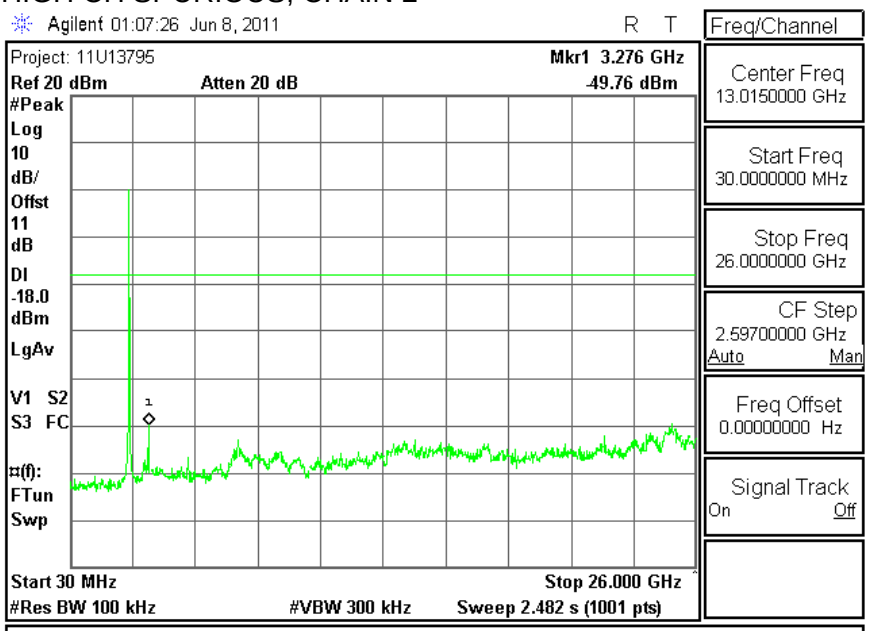
HIGH CH SPURIOUS, CHAIN 2



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7.4. 802.11n HT40 MODE IN THE 2.4 GHz BAND

7.4.1. 6 dB BANDWIDTH

LIMITS

FCC §15.247 (a) (2)

IC RSS-210 A8.2 (a)

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

TEST PROCEDURE

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

RESULTS

Channel	Frequency (MHz)	Chain 1 6 dB BW (MHz)	Chain 2 6 dB BW (MHz)	Minimum Limit (MHz)
Low	2422	36.05	36.52	0.5
Middle	2437	36.40	36.40	0.5
High	2452	35.93	36.40	0.5

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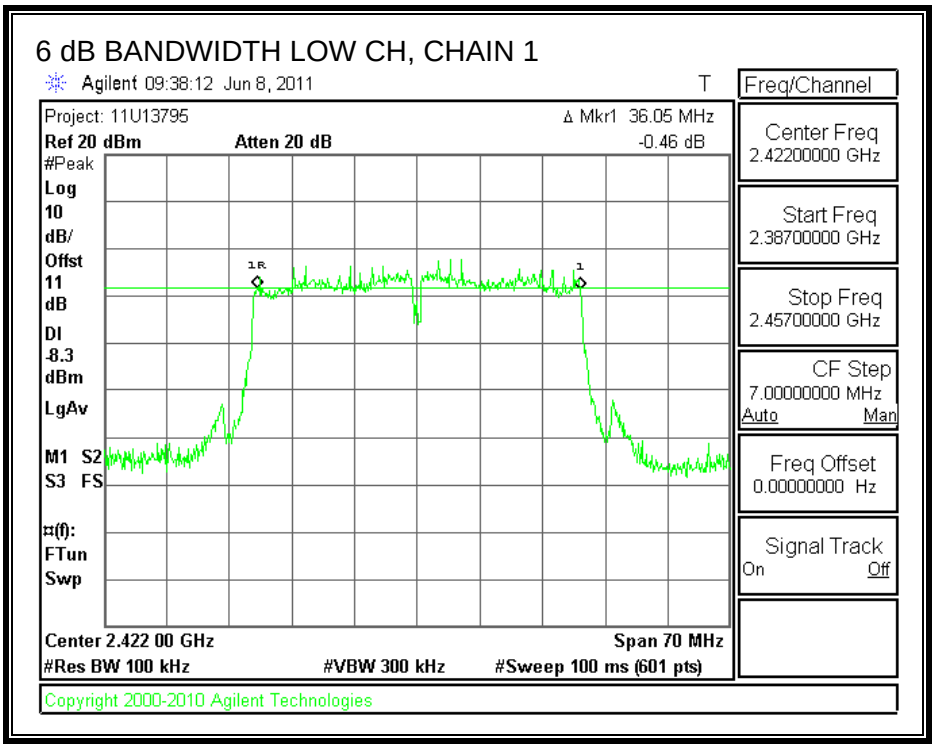
6 dB BANDWIDTH, CHAIN 1



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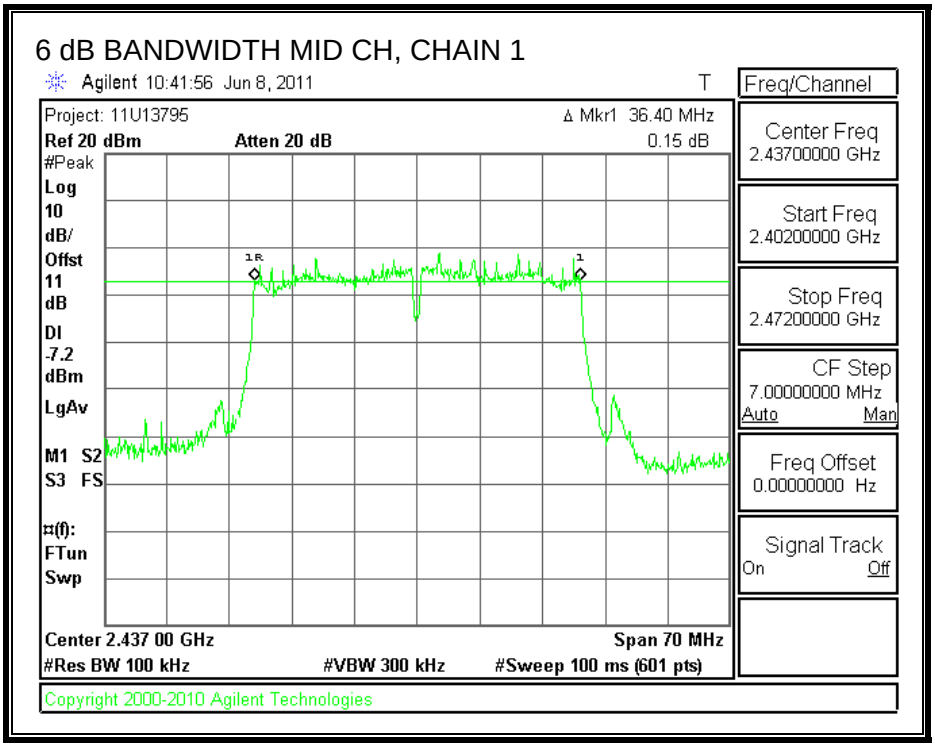

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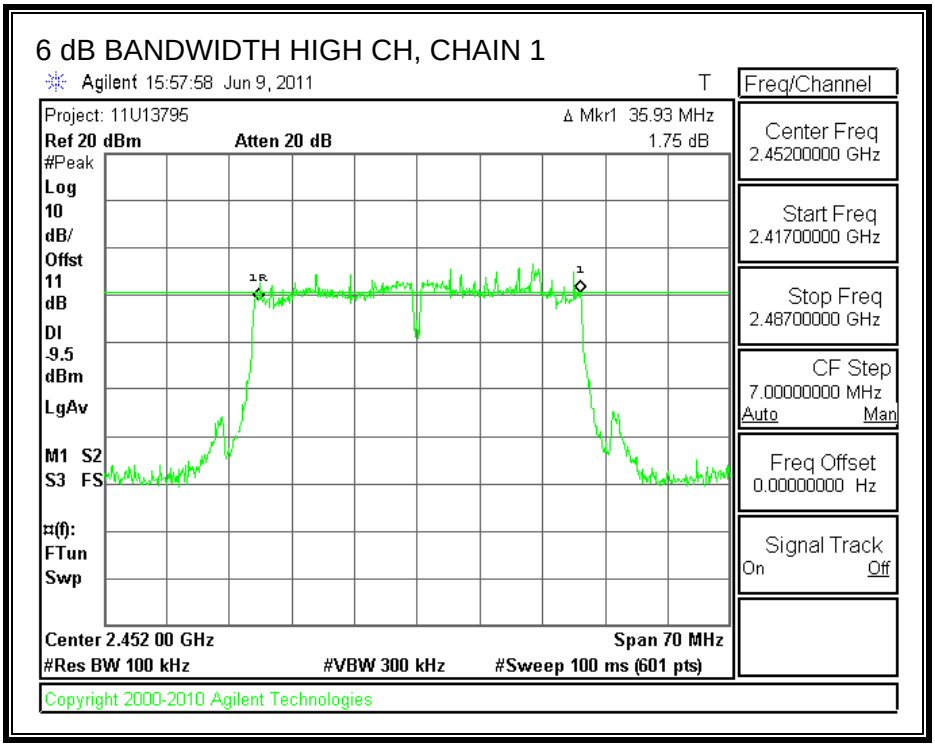

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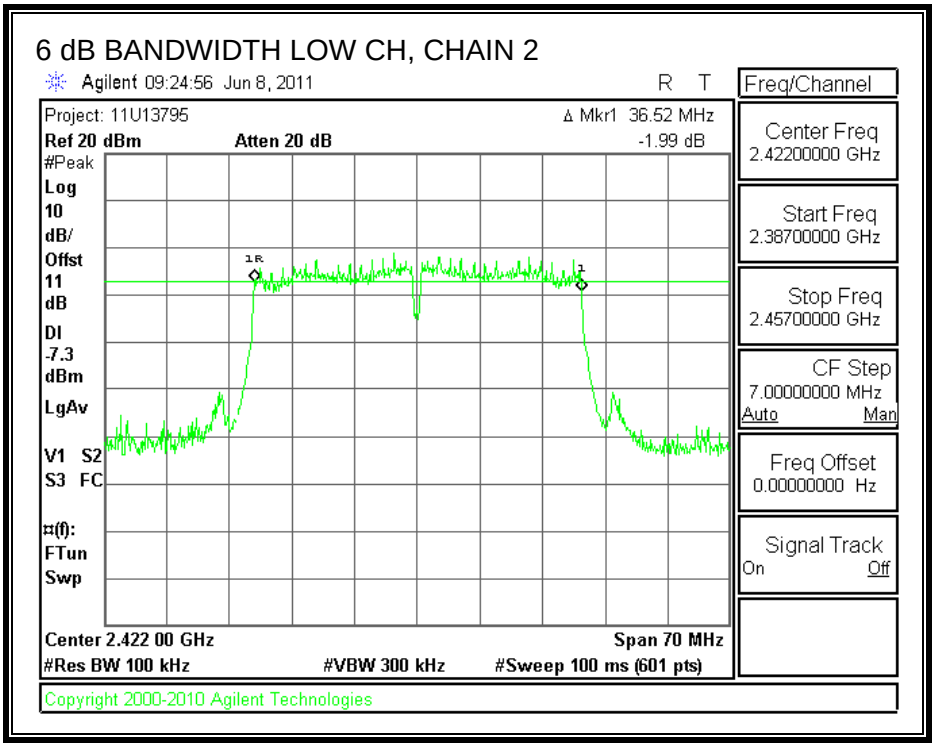
6 dB BANDWIDTH, CHAIN 2



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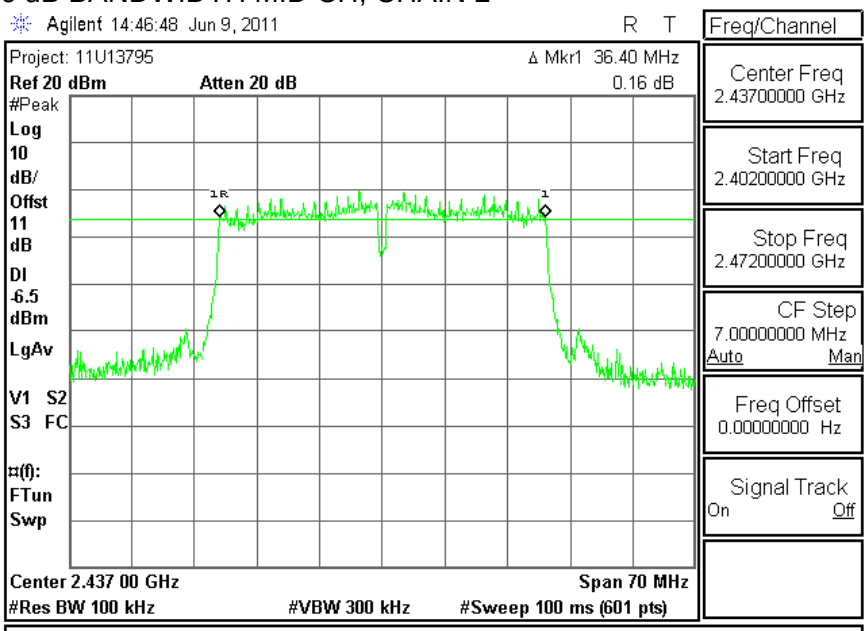
6 dB BANDWIDTH MID CH, CHAIN 2



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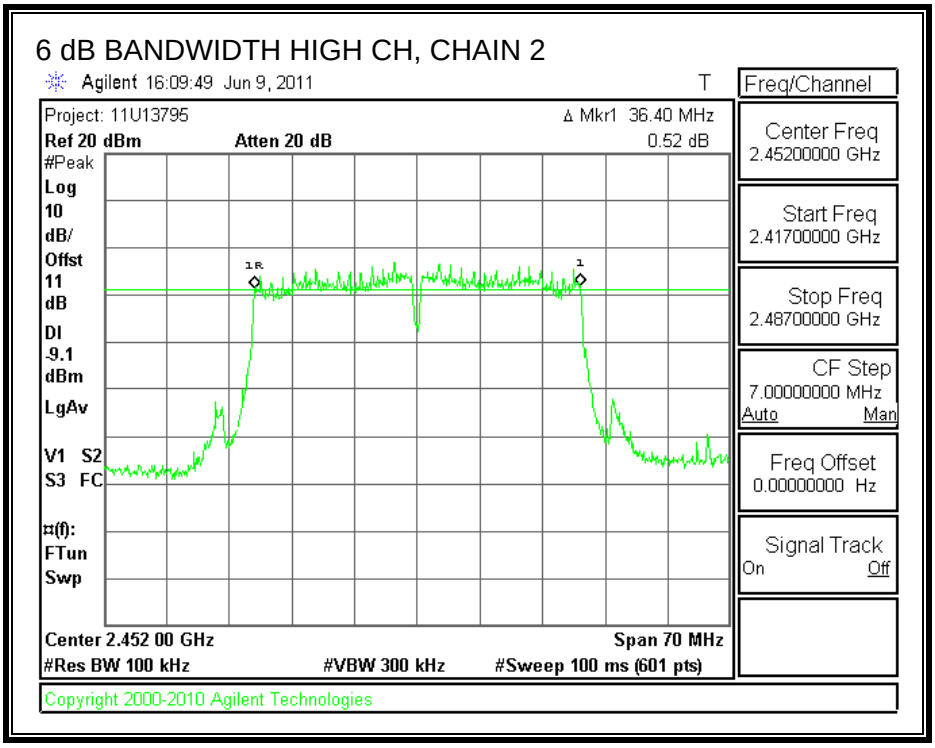

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7.4.2. 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

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

RESULTS

Channel	Frequency (MHz)	Chain 1 99% Bandwidth (MHz)	Chain 2 99% Bandwidth (MHz)
Low	2422	36.1697	36.2094
Middle	2437	36.1944	36.1327
High	2452	36.1418	36.0291

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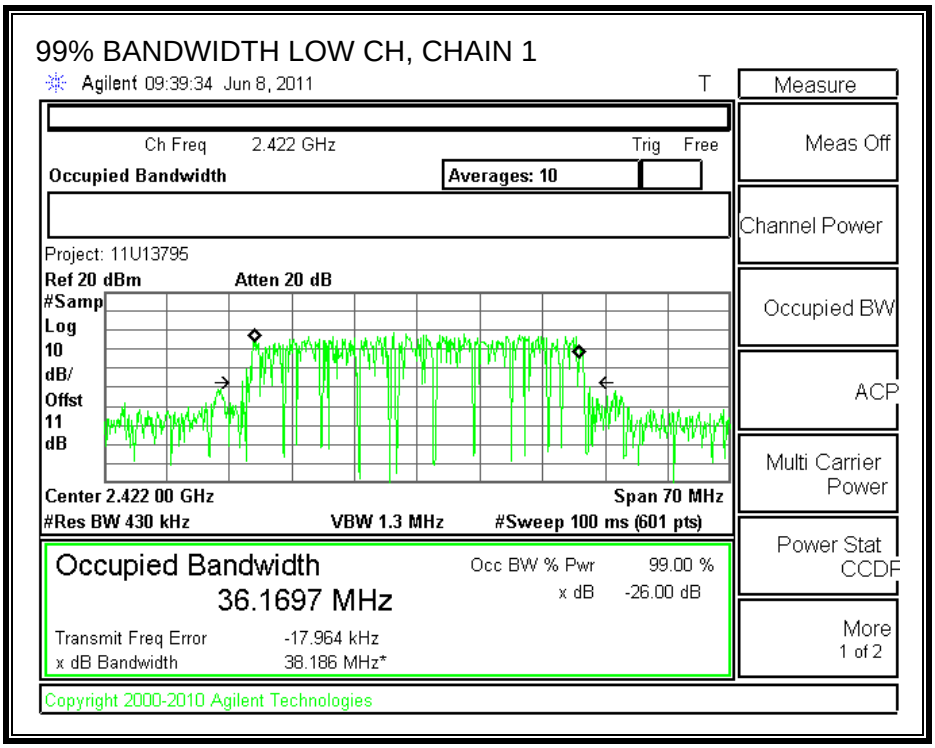
99% BANDWIDTH, CHAIN 1



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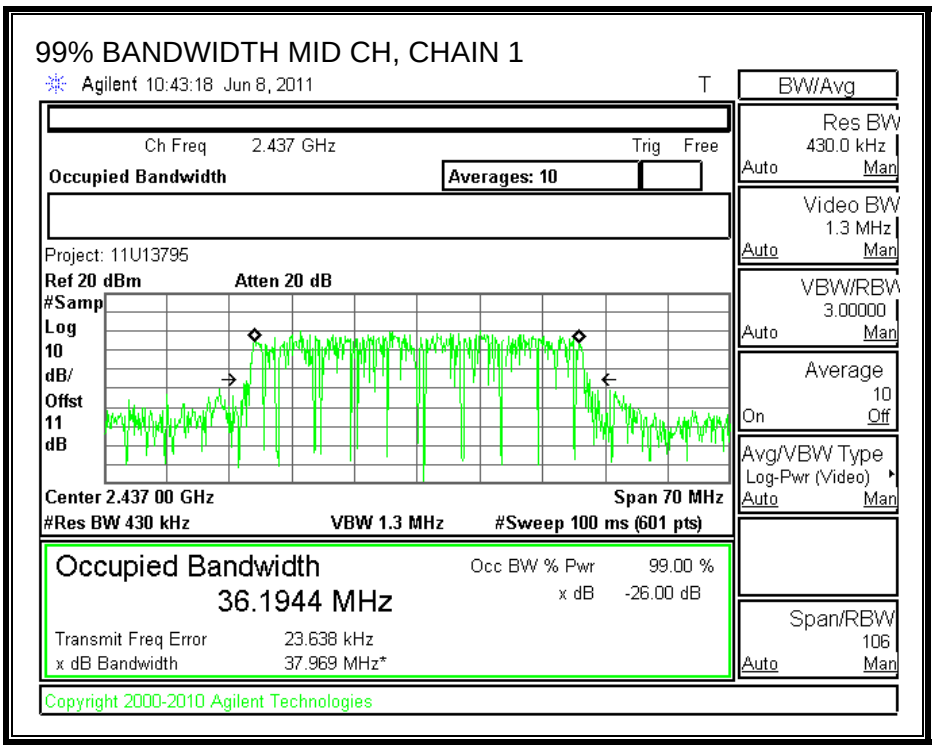
99% BANDWIDTH MID CH, CHAIN 1



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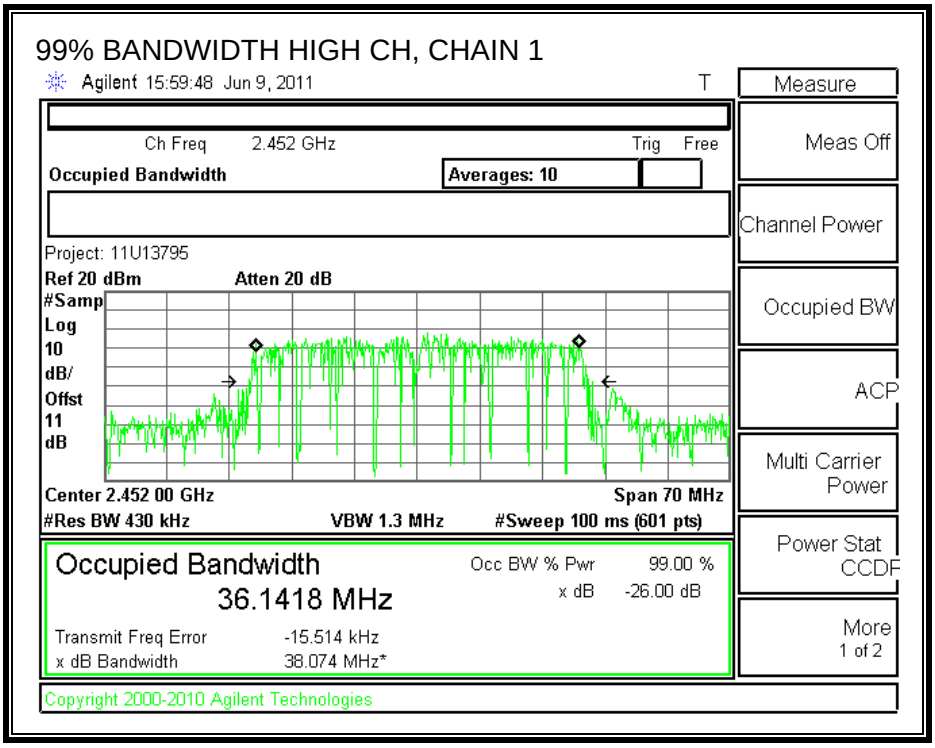

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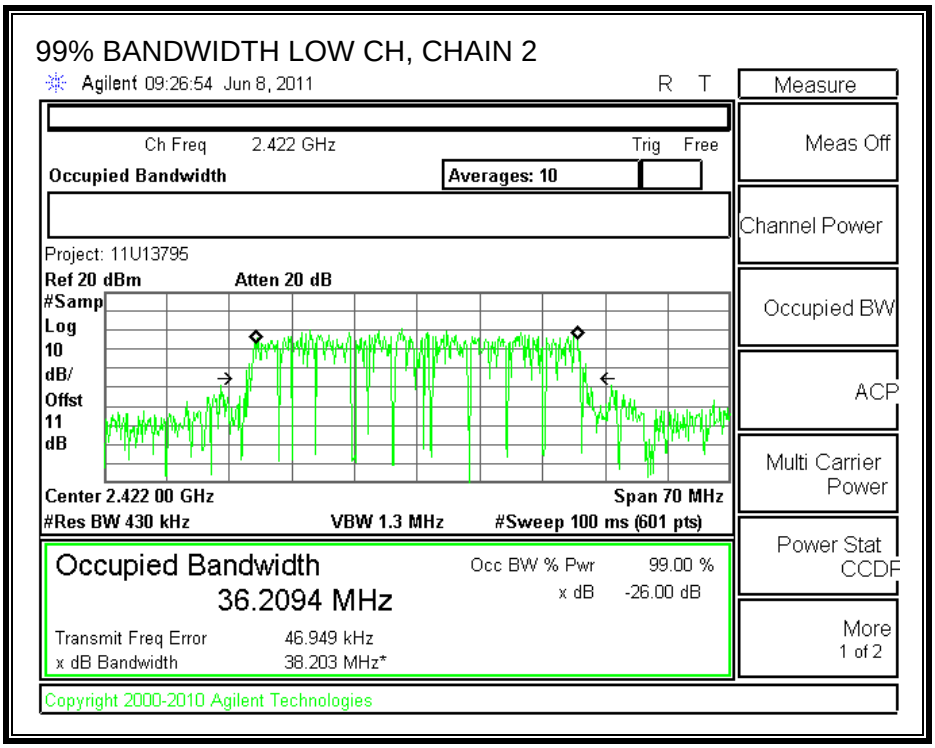
99% BANDWIDTH, CHAIN 2



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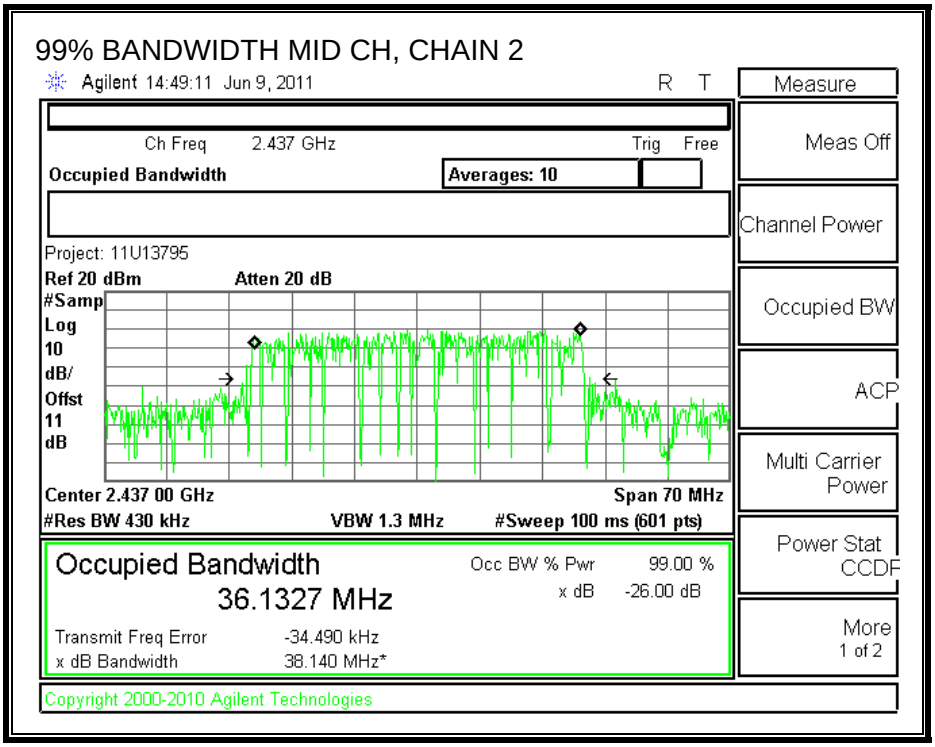

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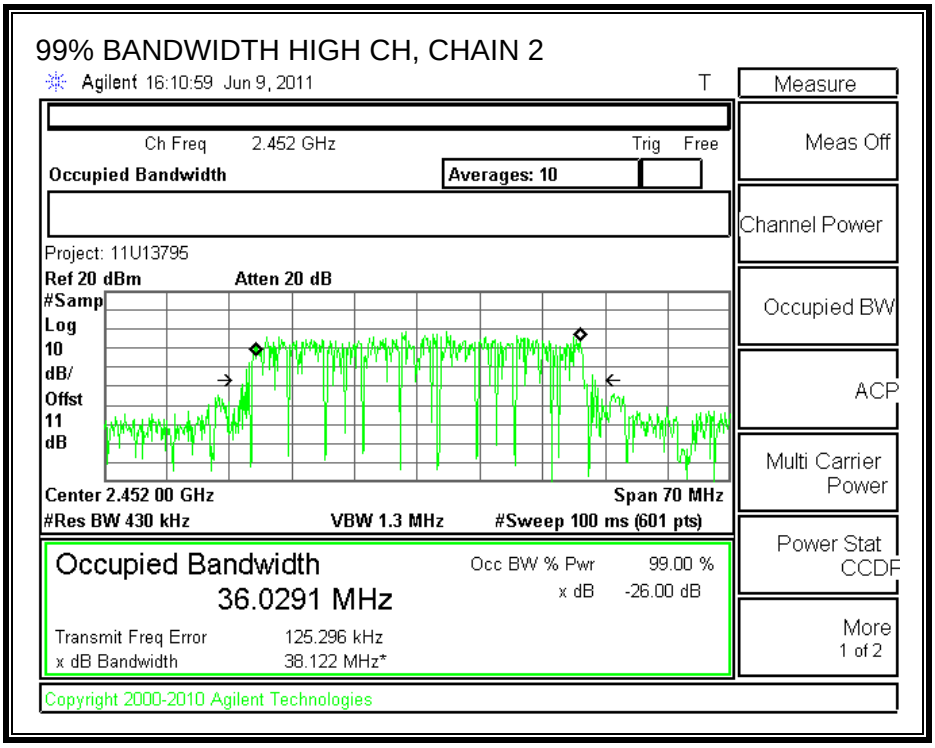

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7.4.3. OUTPUT POWER

LIMITS

FCC §15.247 (b)

IC RSS-210 A8.4

The highest combination of antenna gains is equal 6.91 dBi, therefore the limit is 29.09 dBm.

TEST PROCEDURE

Peak power is measured using the Channel bandwidth Alternative peak output power procedure specified in "TCB Training for Devices covered under Scopes A1 - A4" by Joe Dichoso, May 2003.

RESULTS

Channel	Frequency (MHz)	Chain 1 PK Power (dBm)	Chain 2 PK Power (dBm)	Attenuator + Cable Offset (dB)	Total Power (dBm)	Limit (dBm)	Margin (dB)
Low	2422	9.09	10.68	11.00	23.97	29.09	-5.12
Mid	2437	10.23	11.22	11.00	24.76	29.09	-4.33
High	2452	7.50	8.11	11.00	21.83	29.09	-7.26

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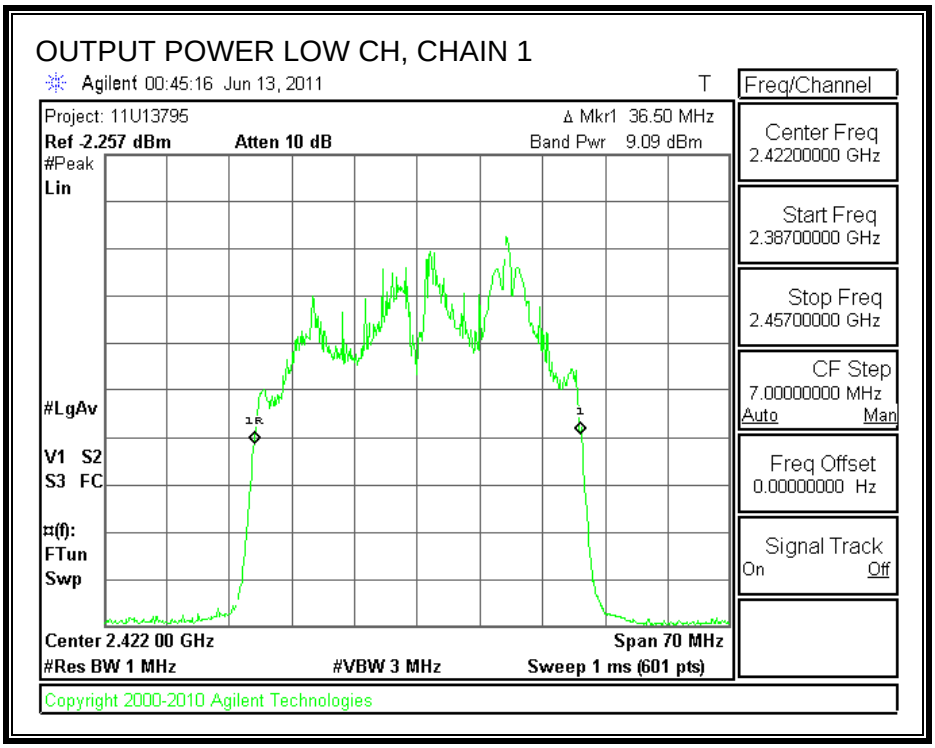
CHAIN 1 OUTPUT POWER



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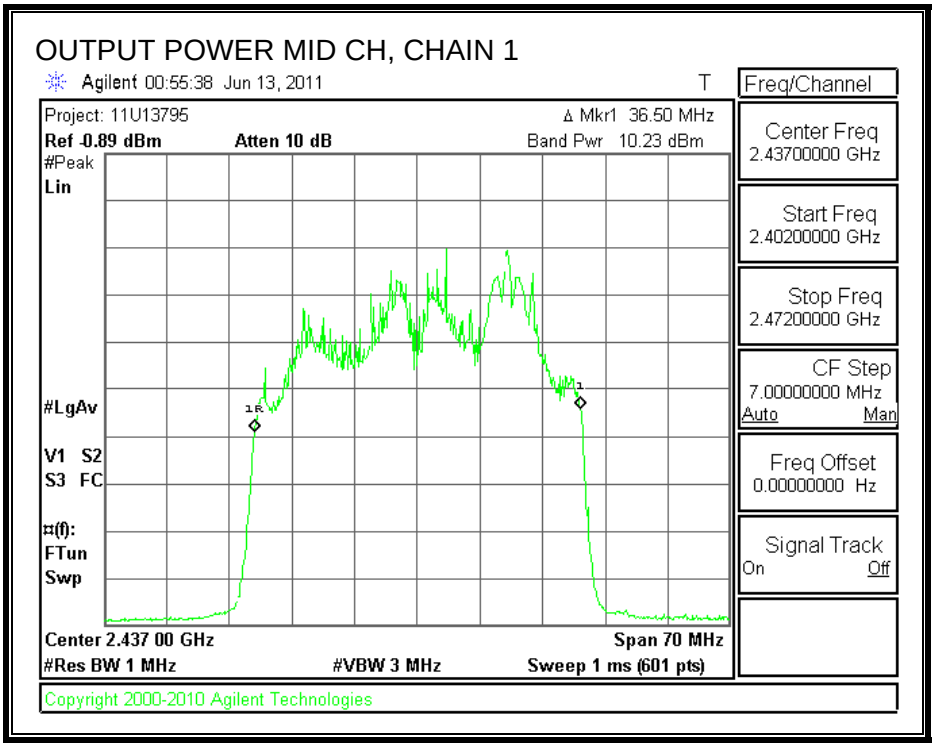

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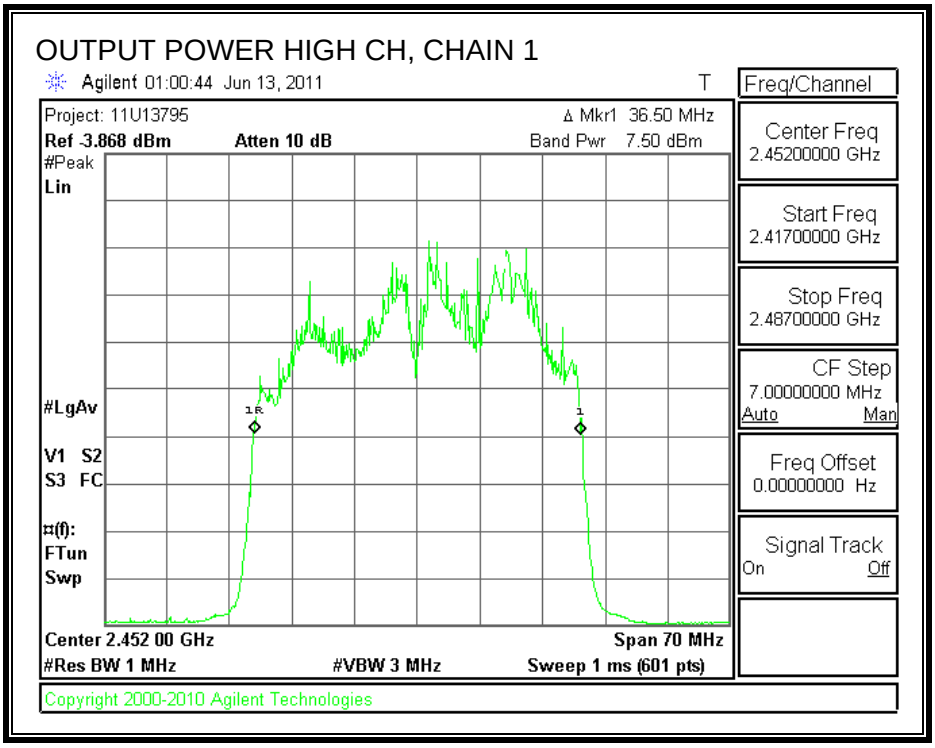

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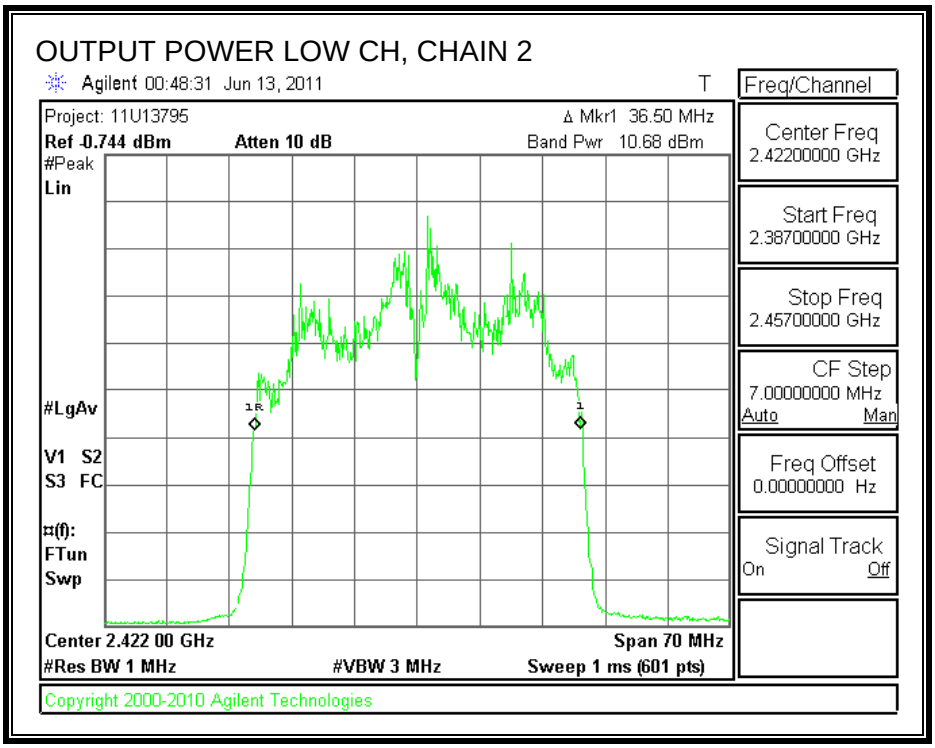
CHAIN 2 OUTPUT POWER



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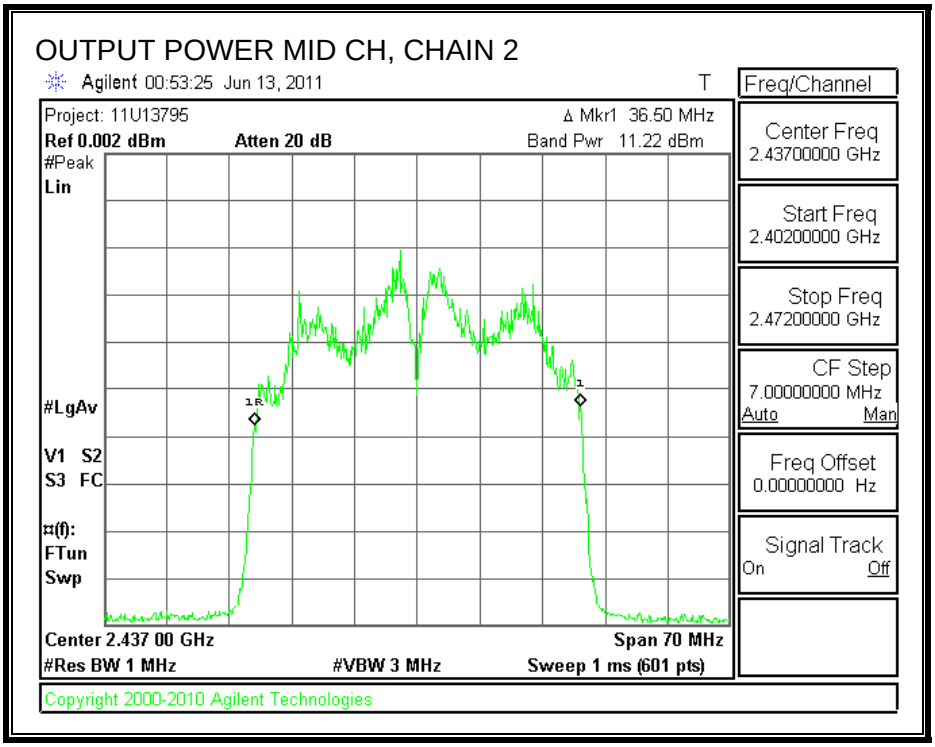

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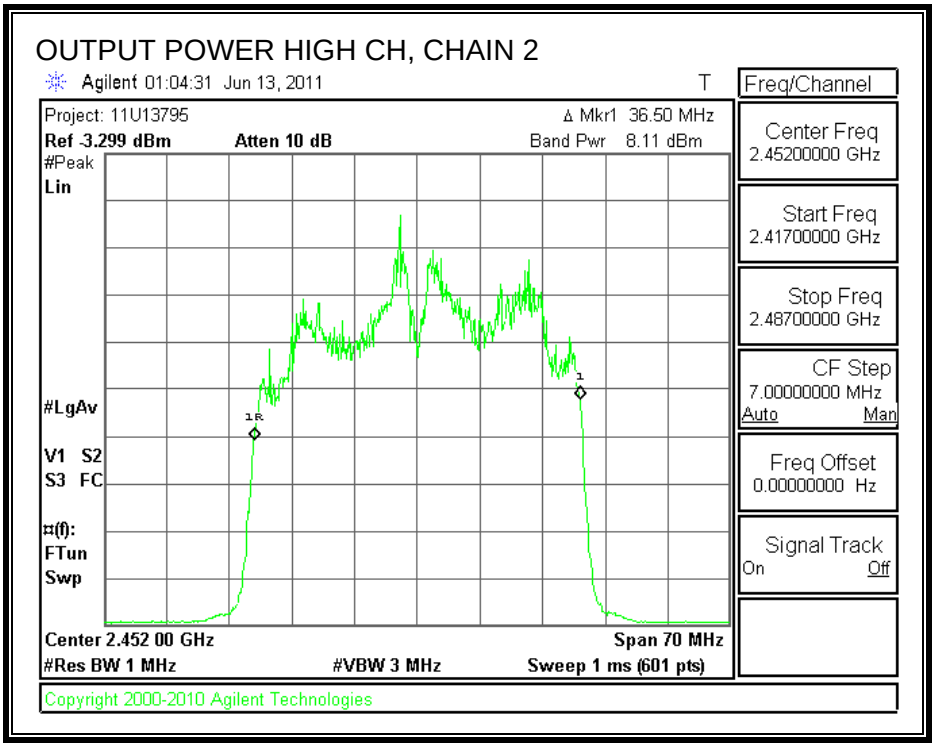

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7.4.4. POWER SPECTRAL DENSITY

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

Peak output power was measured, therefore the power spectral density was measured using PSD Option 1 in accordance with FCC document "Measurement of Digital Transmission Systems Operating under Section 15.247", March 23, 2005.

RESULTS

Channel	Frequency (MHz)	Chain 1 PSD (dBm)	Chain 2 PSD (dBm)	Total PSD (dBm)	Limit (dBm)	Margin (dB)
Low	2422	-10.03	-14.46	-8.69	8	-16.69
Middle	2437	-10.06	-13.52	-8.44	8	-16.44
High	2452	-15.12	-16.40	-12.70	8	-20.70

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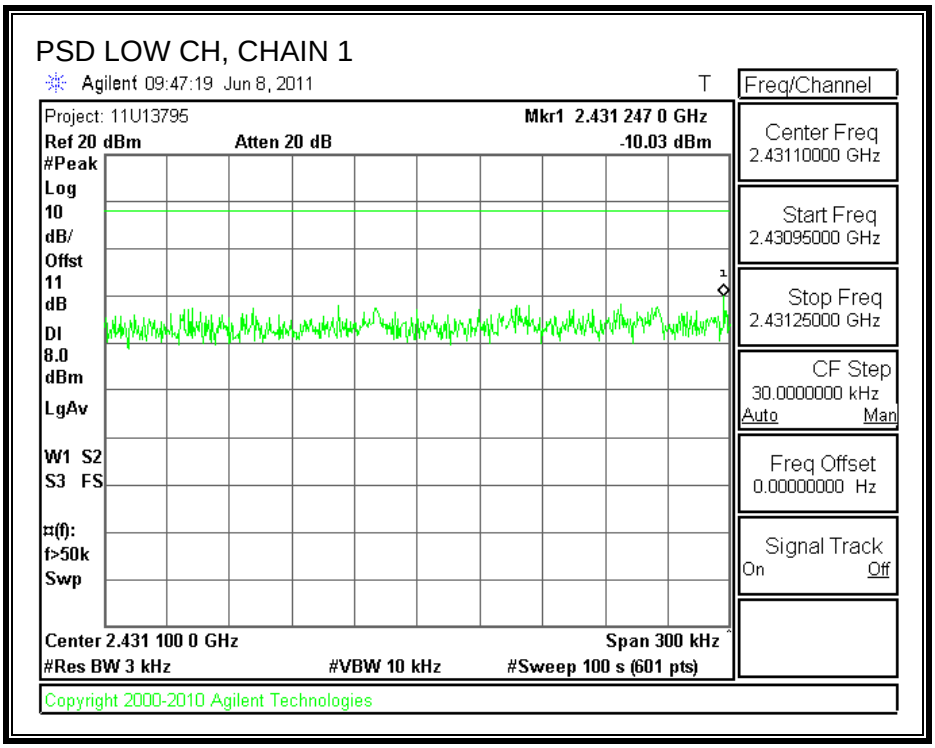
POWER SPECTRAL DENSITY, CHAIN 1



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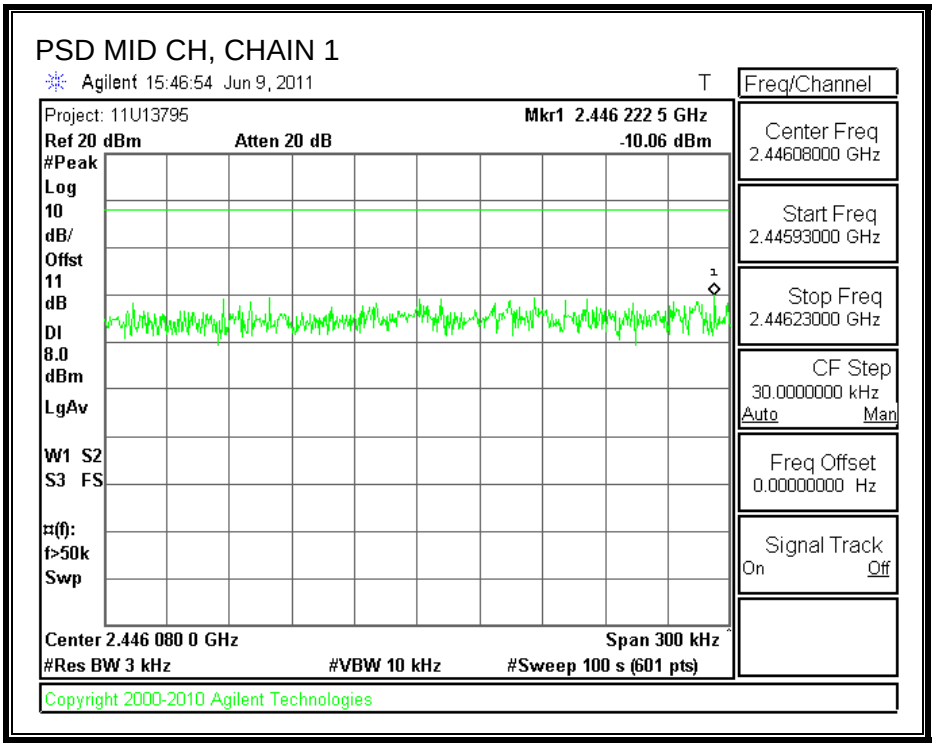
PSD MID CH, CHAIN 1



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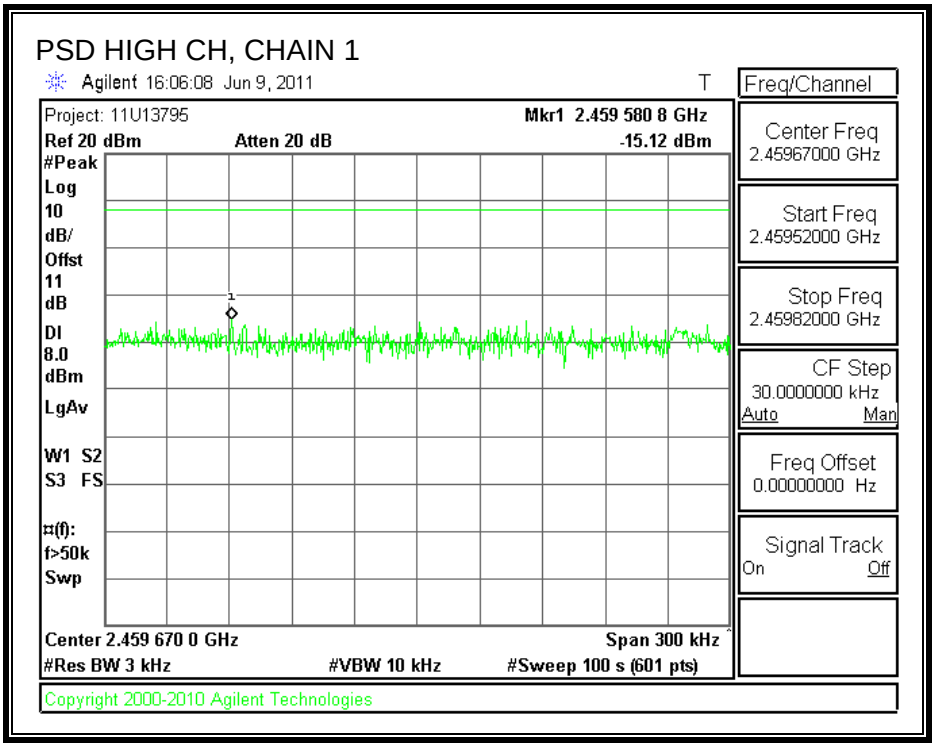
PSD HIGH CH, CHAIN 1



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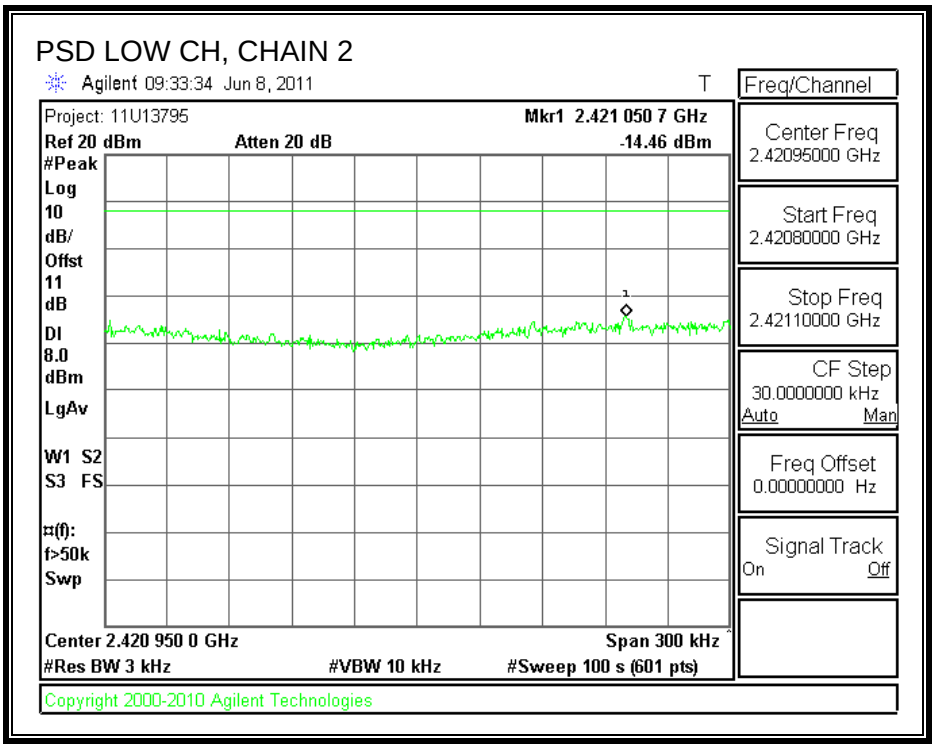
POWER SPECTRAL DENSITY, CHAIN 2



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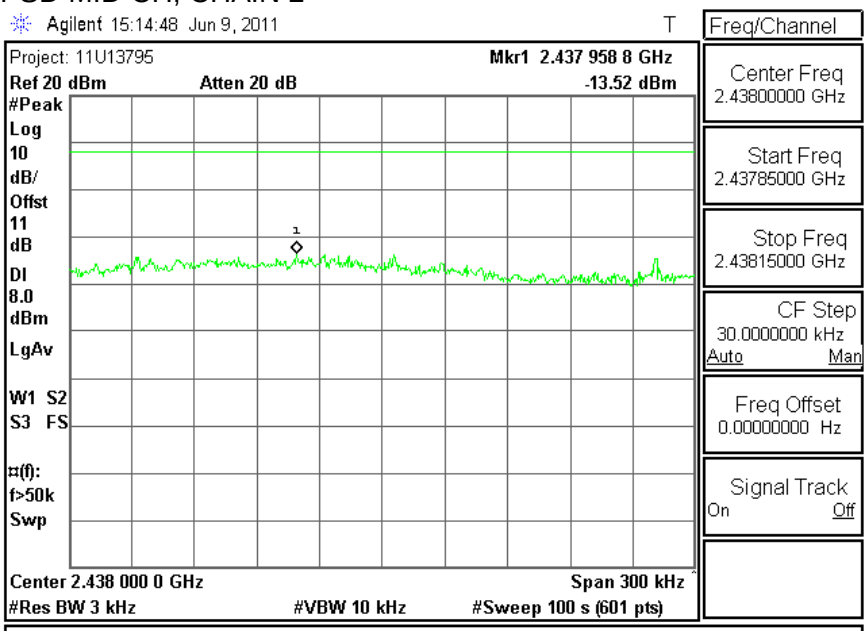
PSD MID CH, CHAIN 2



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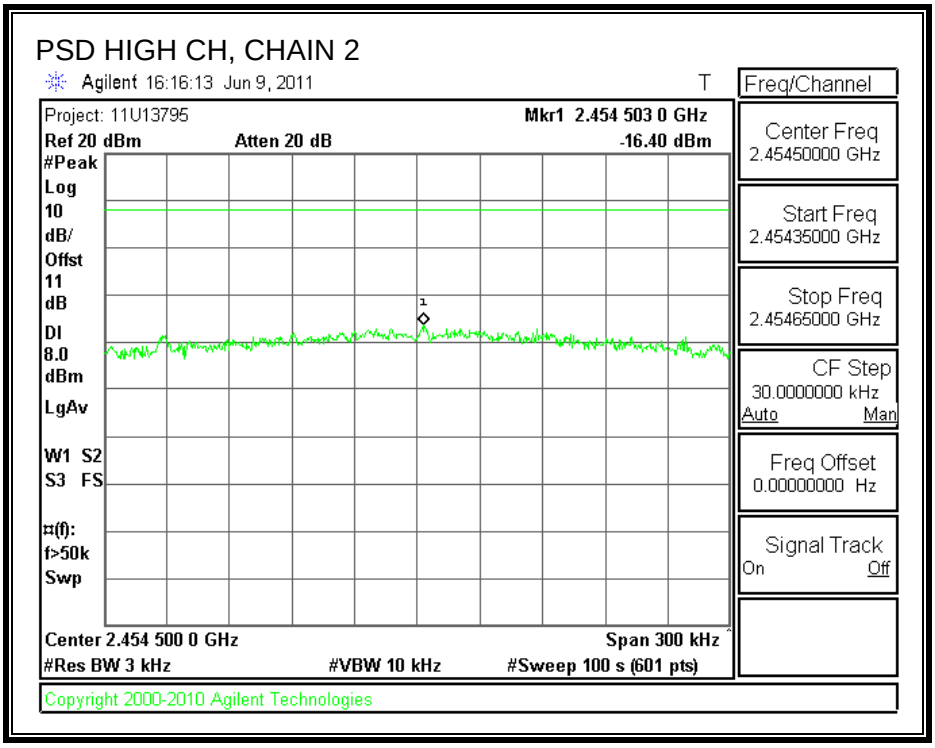
PSD HIGH CH, CHAIN 2



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7.4.5. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.247 (d)

IC RSS-210 A8.5

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

TEST PROCEDURE

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

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

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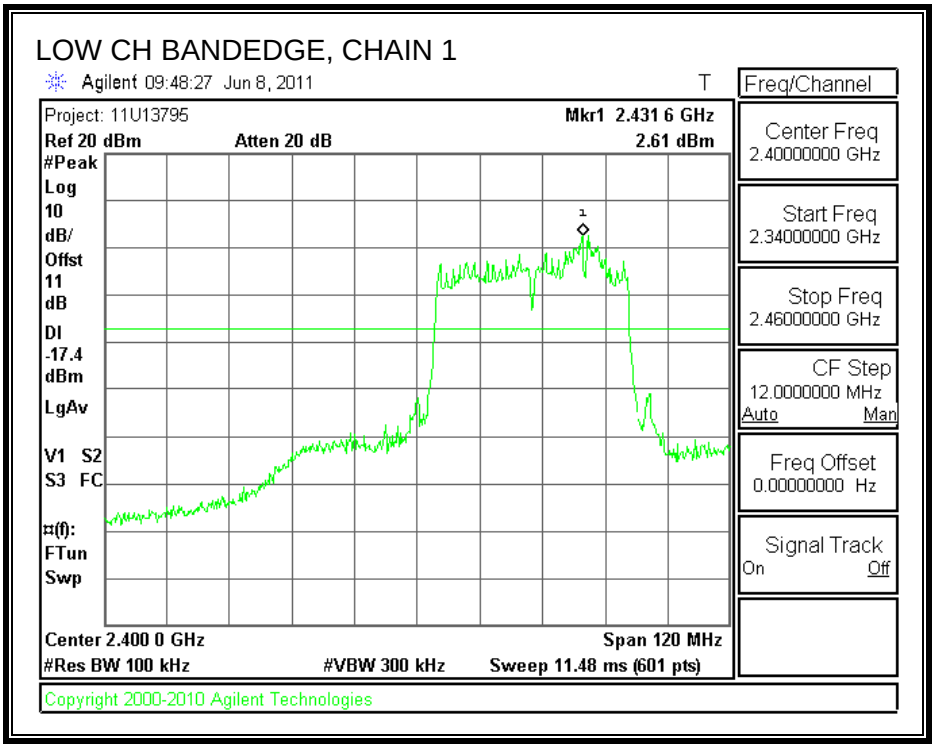
RESULTS

CHAIN 1 SPURIOUS EMISSIONS



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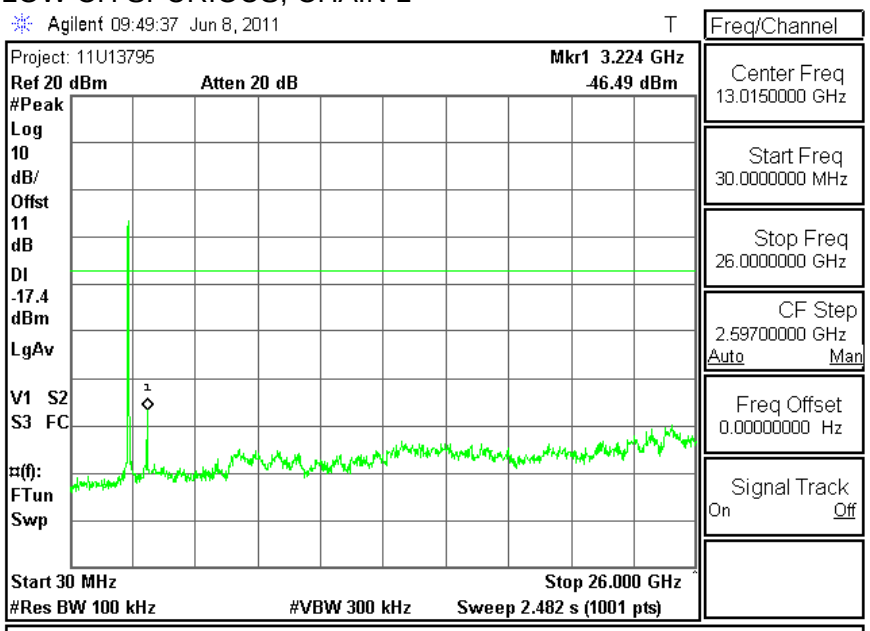
LOW CH SPURIOUS, CHAIN 1



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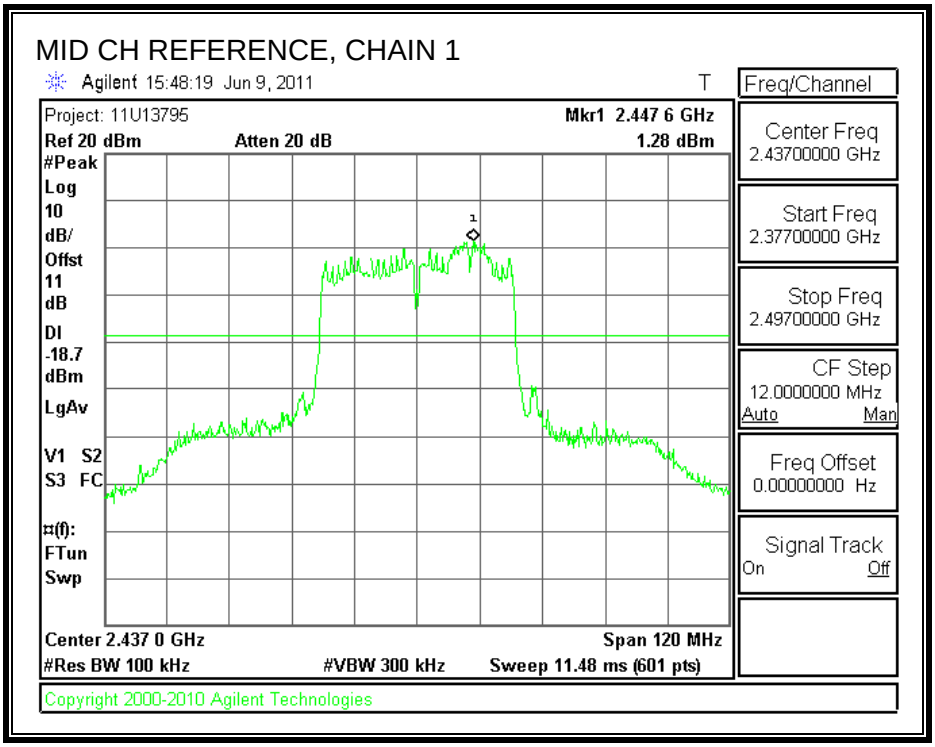

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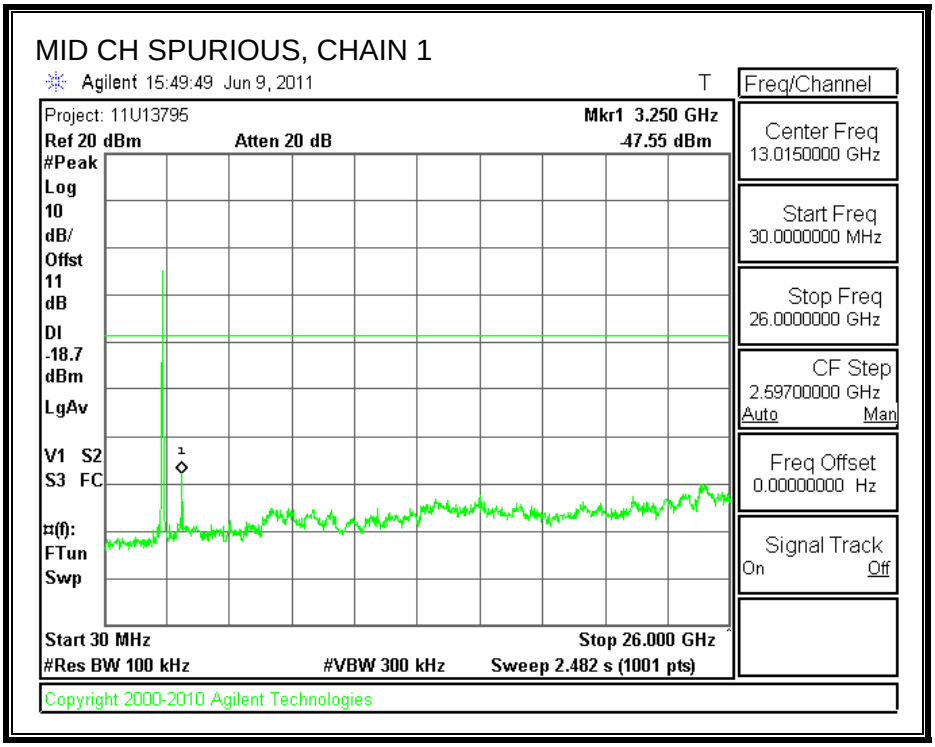

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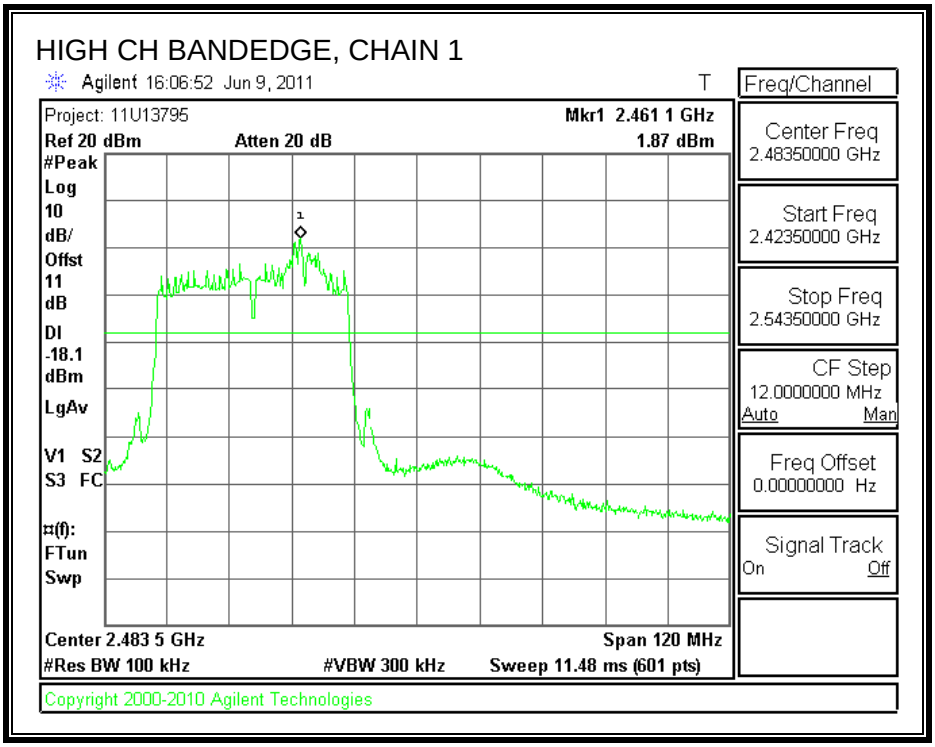
HIGH CH BANDEDGE, CHAIN 1



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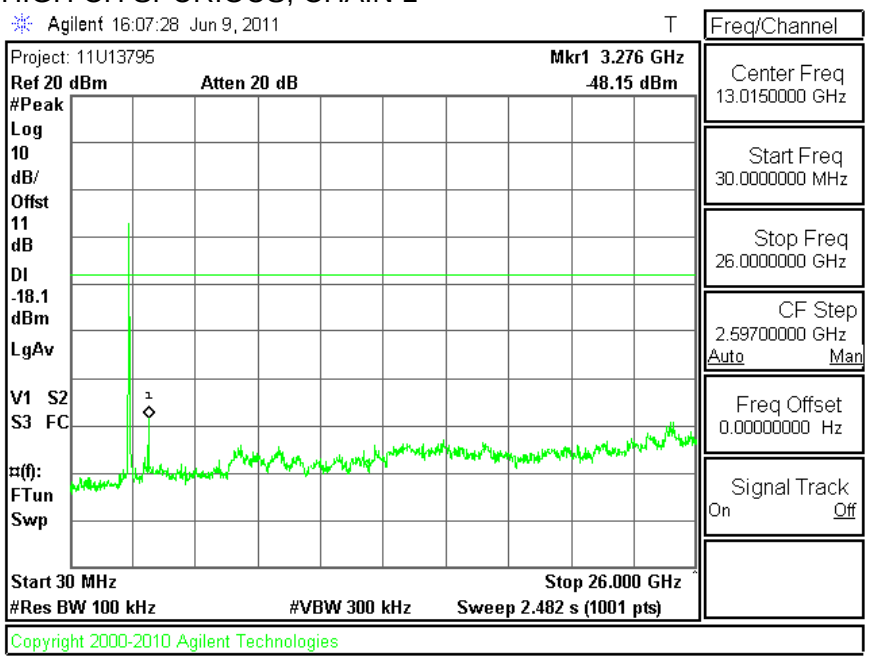
HIGH CH SPURIOUS, CHAIN 1



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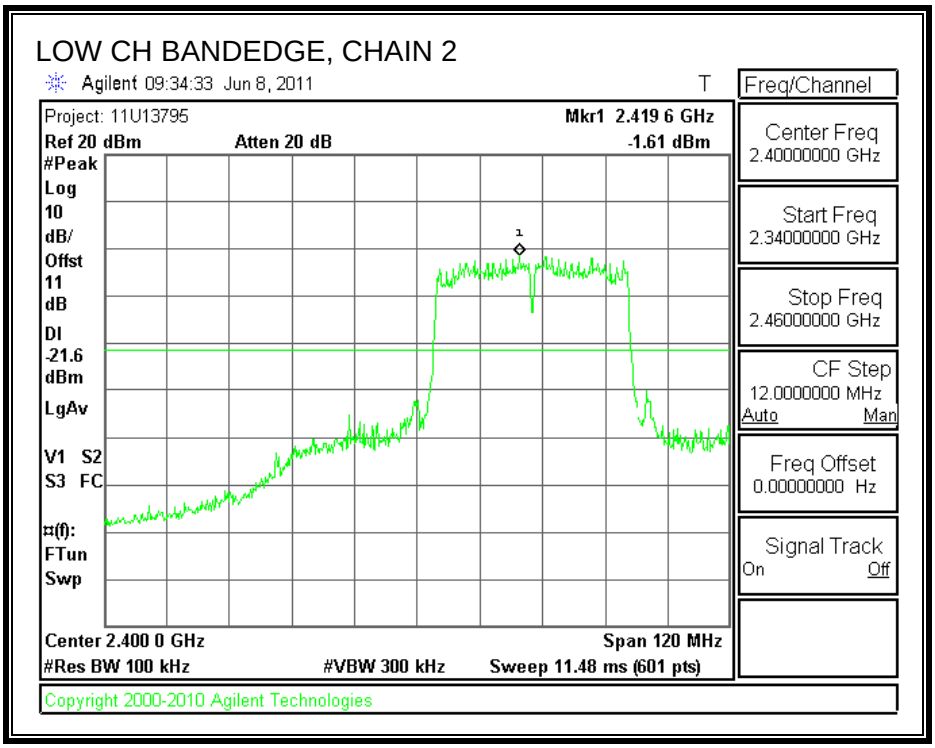
CHAIN 2 SPURIOUS EMISSIONS



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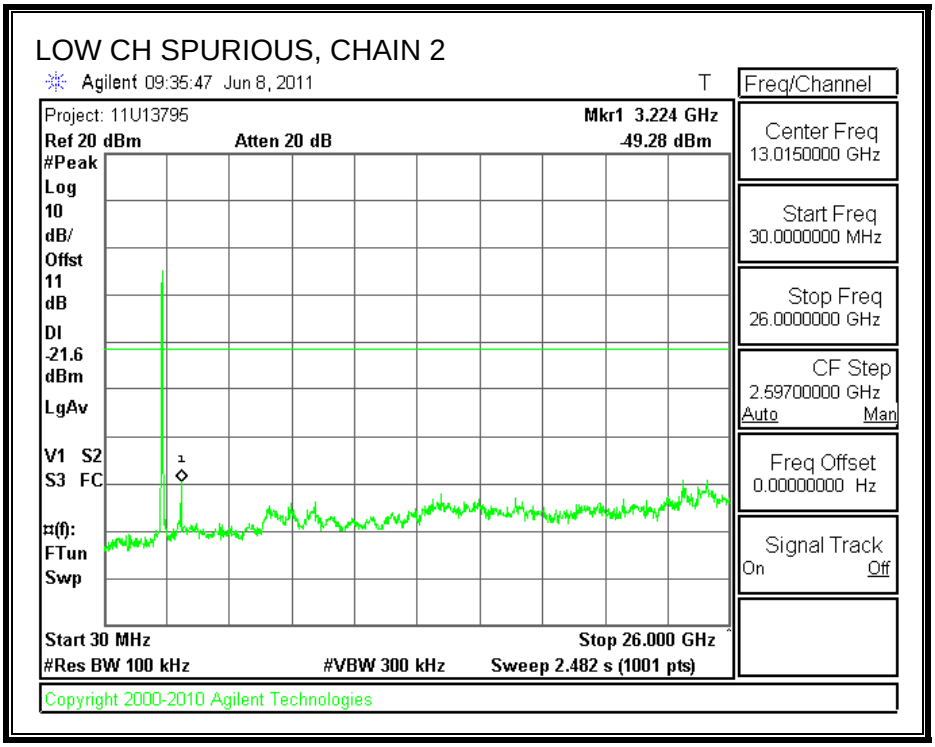

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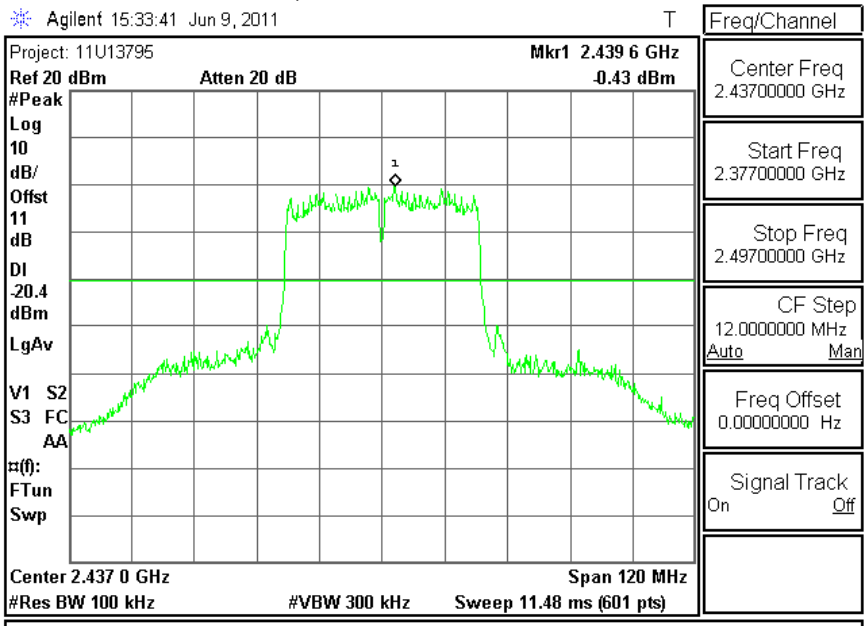
MID CH REFERENCE, CHAIN 2



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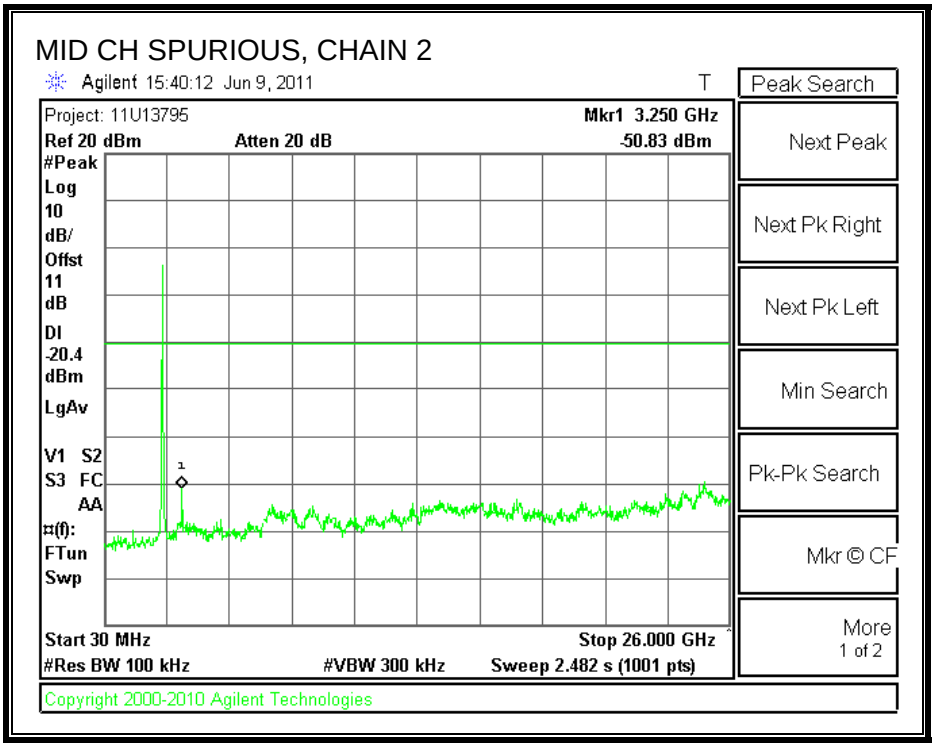

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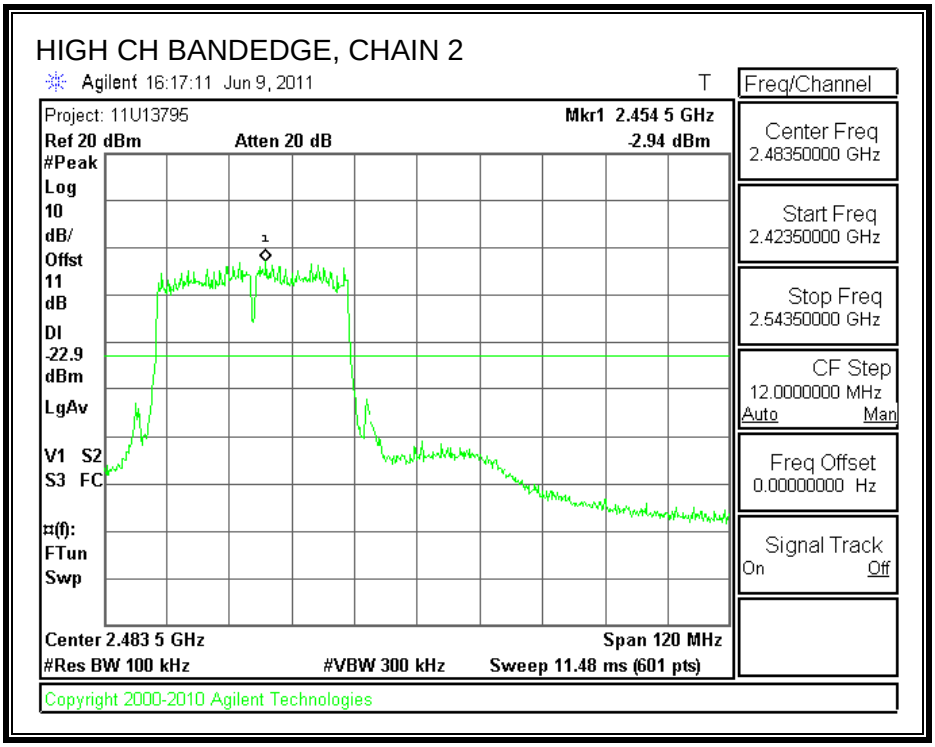
HIGH CH BANDEDGE, CHAIN 2



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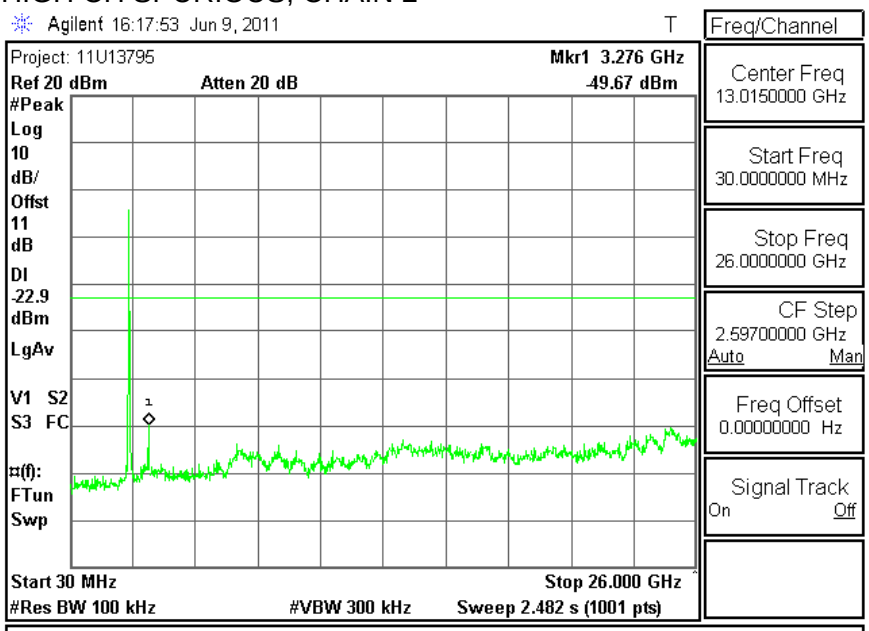
HIGH CH SPURIOUS, CHAIN 2



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7.5. 802.11a MODE IN THE 5.8 GHz BAND

7.5.1. 6 dB BANDWIDTH

LIMITS

FCC §15.247 (a) (2)

IC RSS-210 A8.2 (a)

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

TEST PROCEDURE

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

RESULTS

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low	5745	15.92	0.5
Middle	5785	16.17	0.5
High	5825	15.58	0.5

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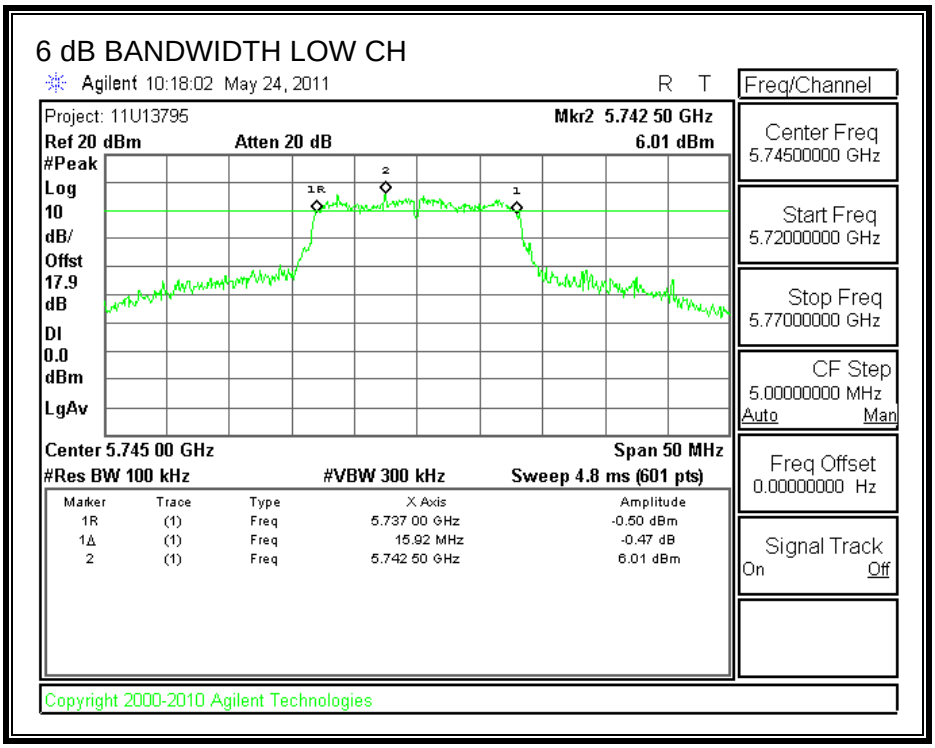
6 dB BANDWIDTH



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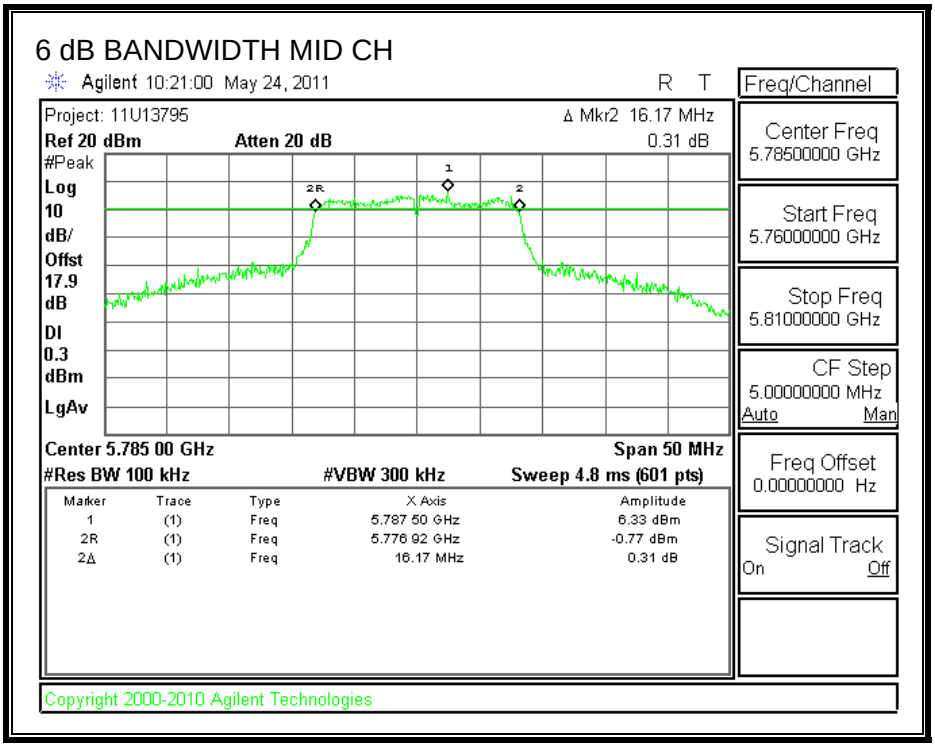

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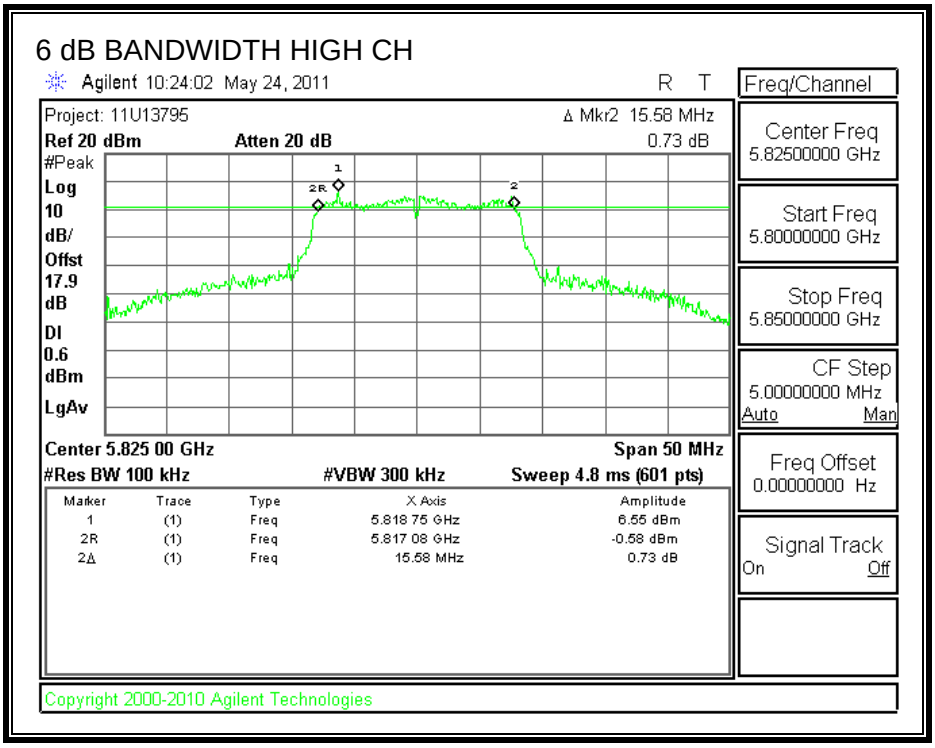

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7.5.2. 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

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

RESULTS

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	5745	16.3453
Middle	5785	16.3222
High	5825	16.2919

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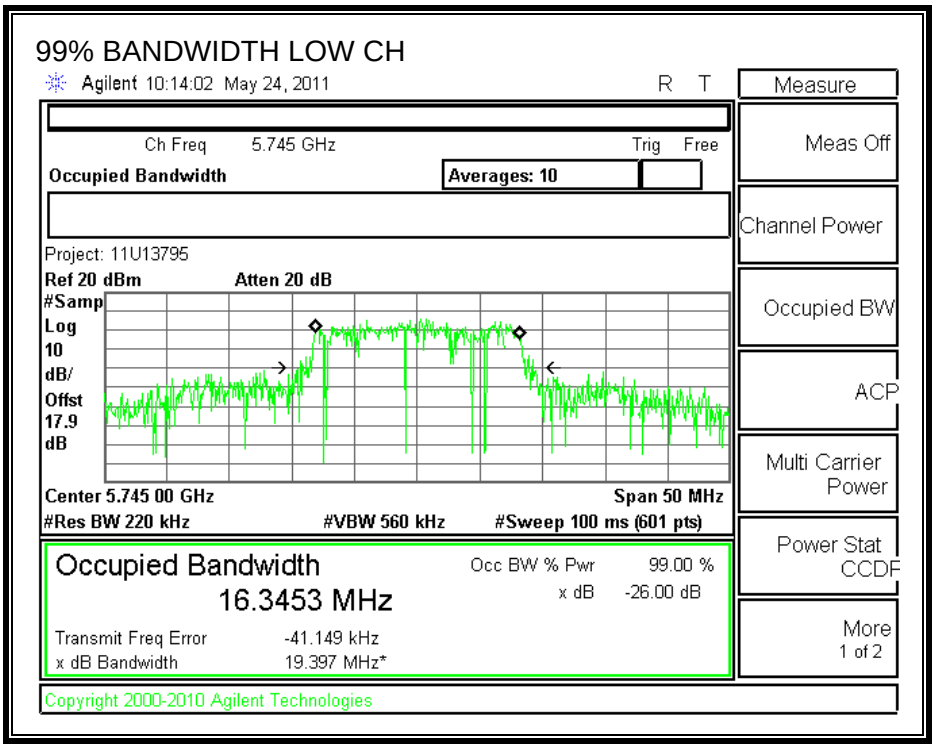
99% BANDWIDTH



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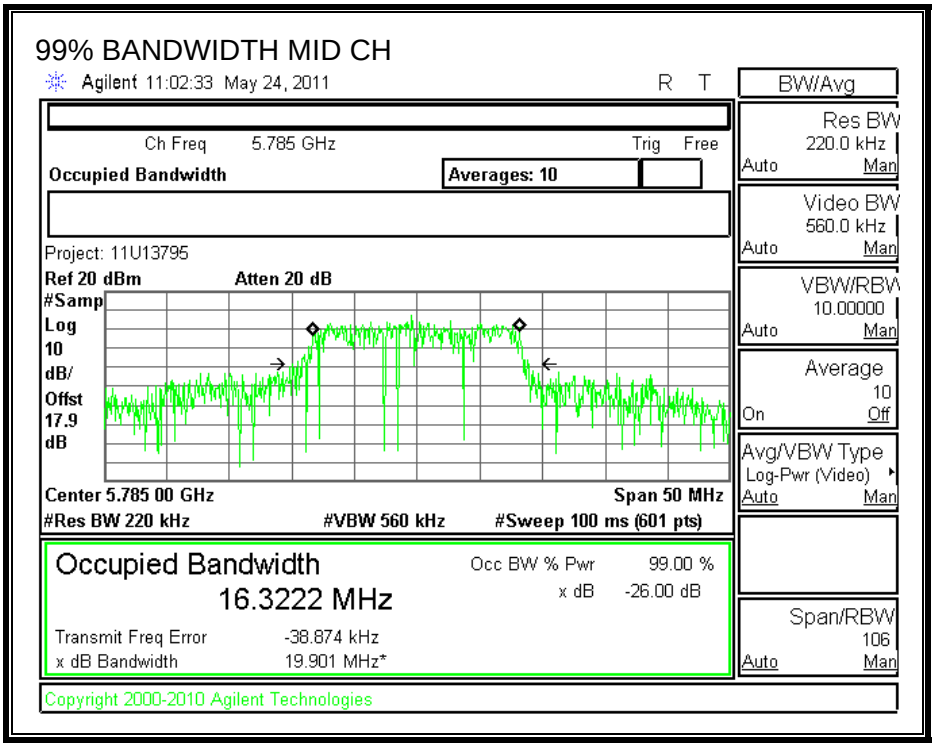

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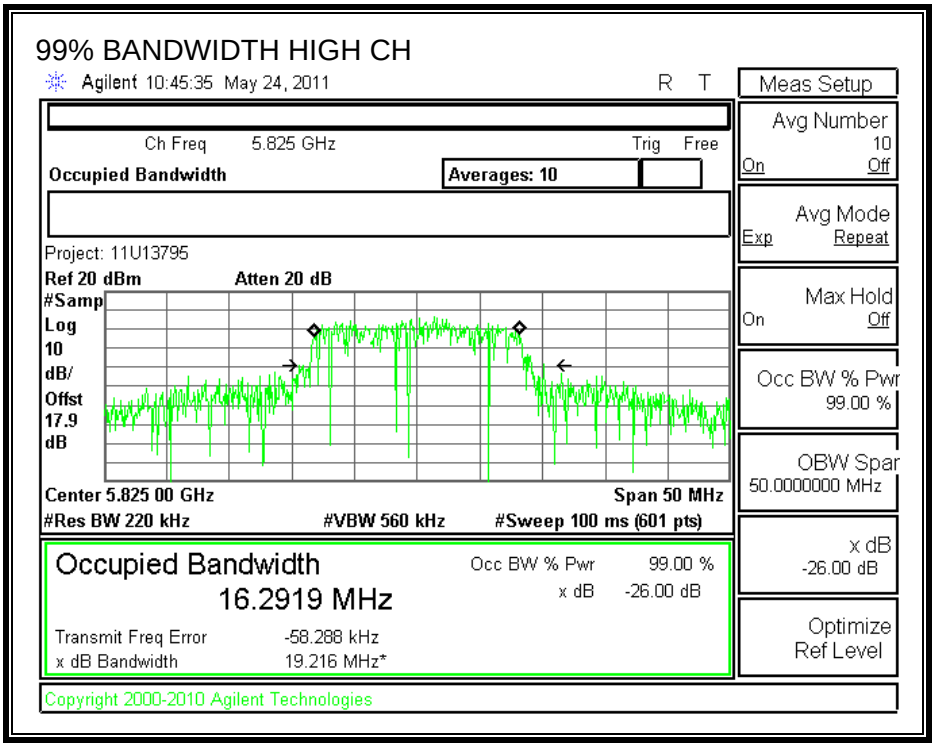

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7.5.3. OUTPUT POWER

LIMITS

FCC §15.247 (b)

IC RSS-210 A8.4

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

TEST PROCEDURE

Peak power is measured using the Channel bandwidth Alternative peak output power procedure specified in "TCB Training for Devices covered under Scopes A1 - A4" by Joe Dichoso, May 2003.

RESULTS

Channel	Frequency (MHz)	Peak Power Reading (dBm)	Attenuator and Cable Offset (dB)	Output Power (dBm)	Limit (dBm)	Margin (dB)
Low	5745	14.51	11.4	25.91	30	-4.09
Middle	5785	14.09	11.4	25.49	30	-4.51
High	5825	14.36	11.4	25.76	30	-4.24

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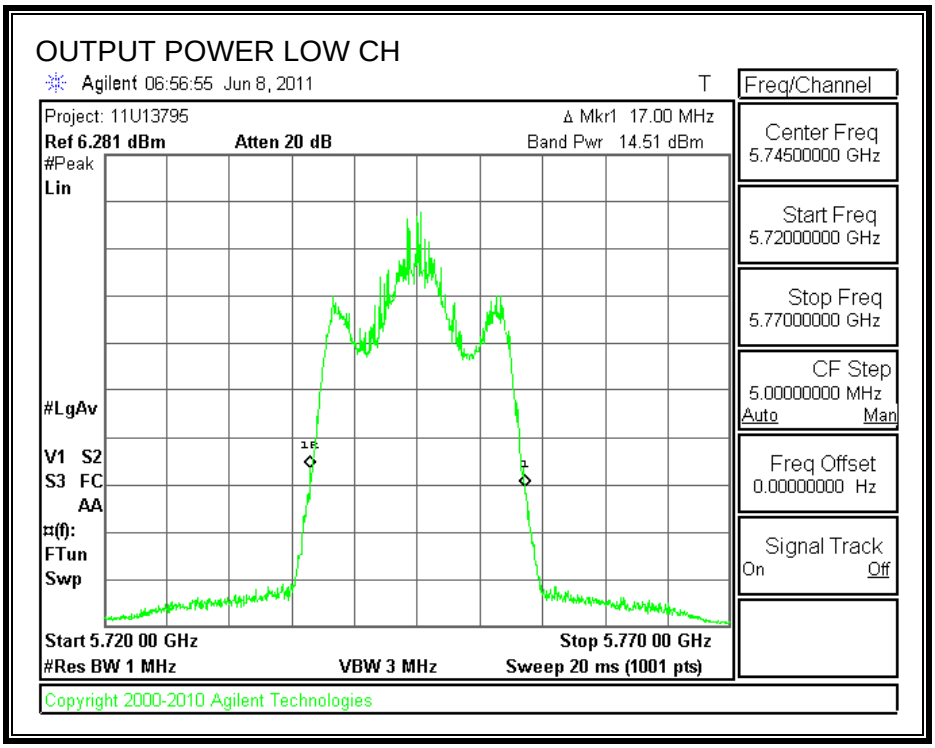
OUTPUT POWER



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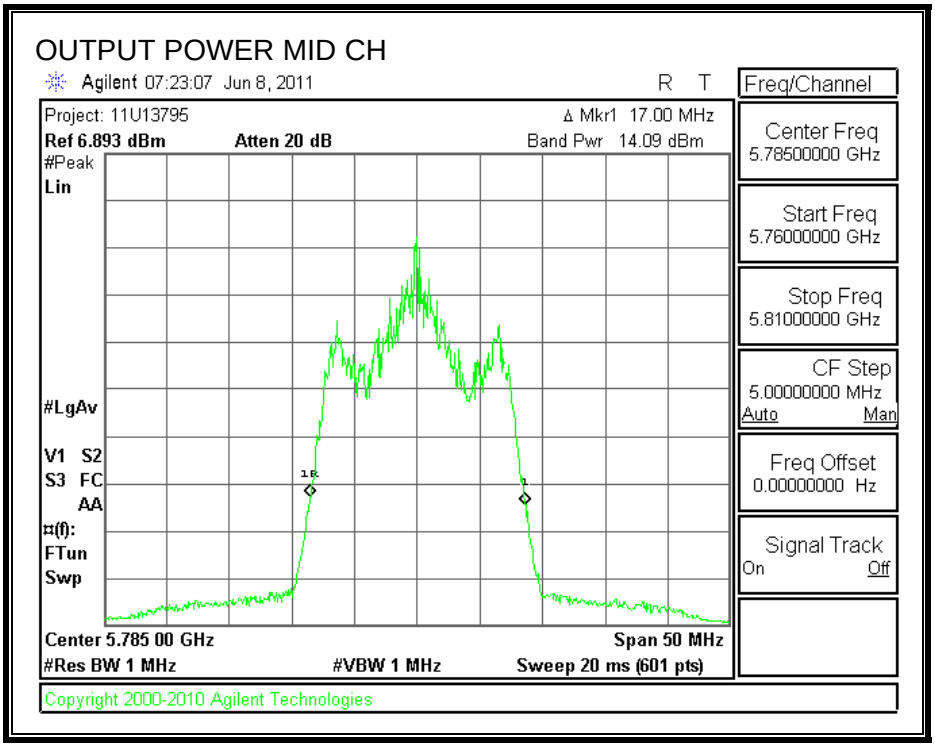

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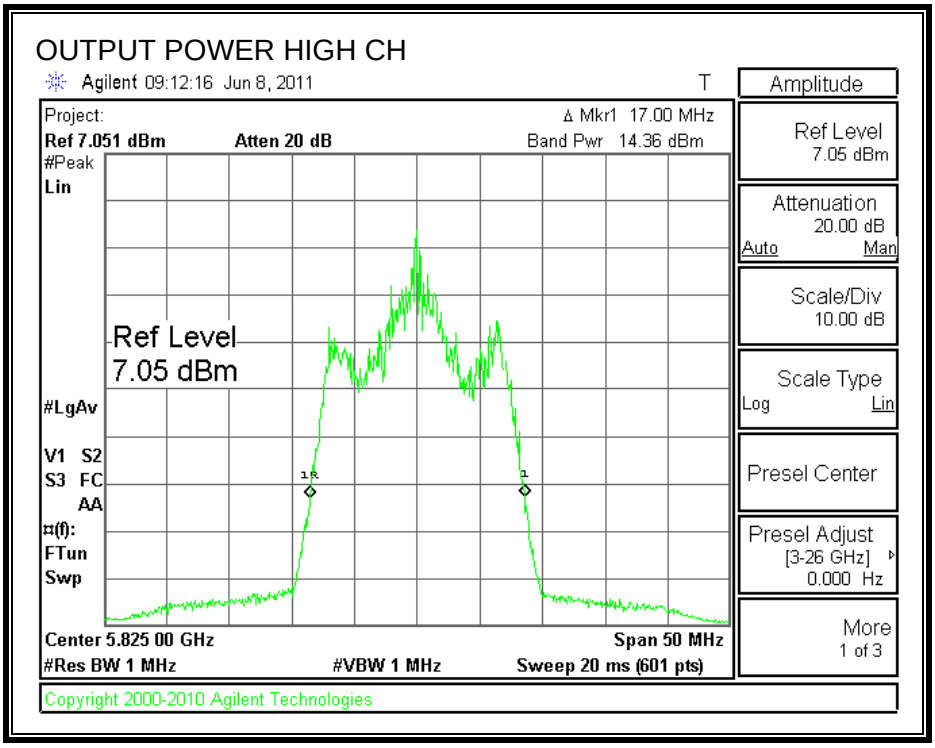

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7.5.4. POWER SPECTRAL DENSITY

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

Peak output power was measured, therefore the power spectral density was measured using PSD Option 1 in accordance with FCC document “Measurement of Digital Transmission Systems Operating under Section 15.247”, March 23, 2005.

RESULTS

Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Margin (dB)
Low	5745	-6.37	8	-14.37
Middle	5785	-5.60	8	-13.60
High	5825	-5.80	8	-13.80

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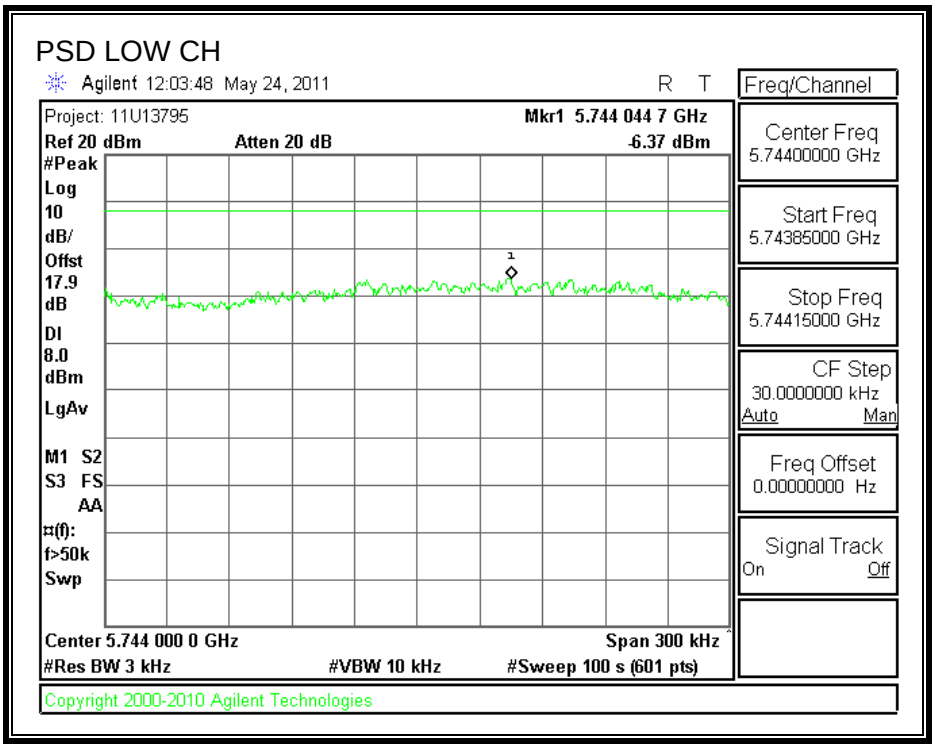
POWER SPECTRAL DENSITY



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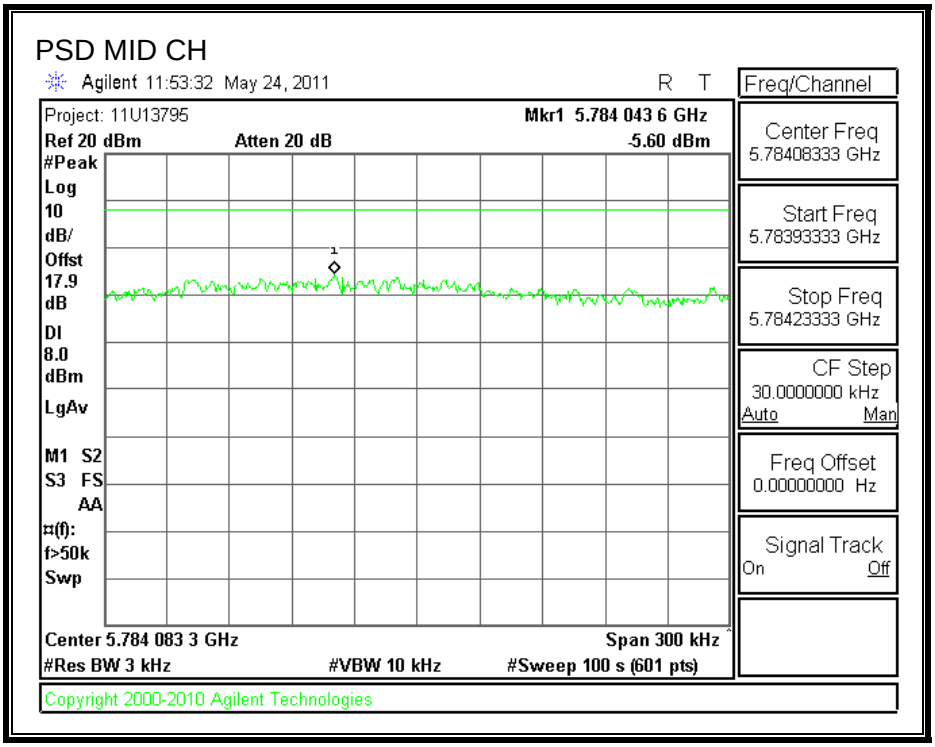

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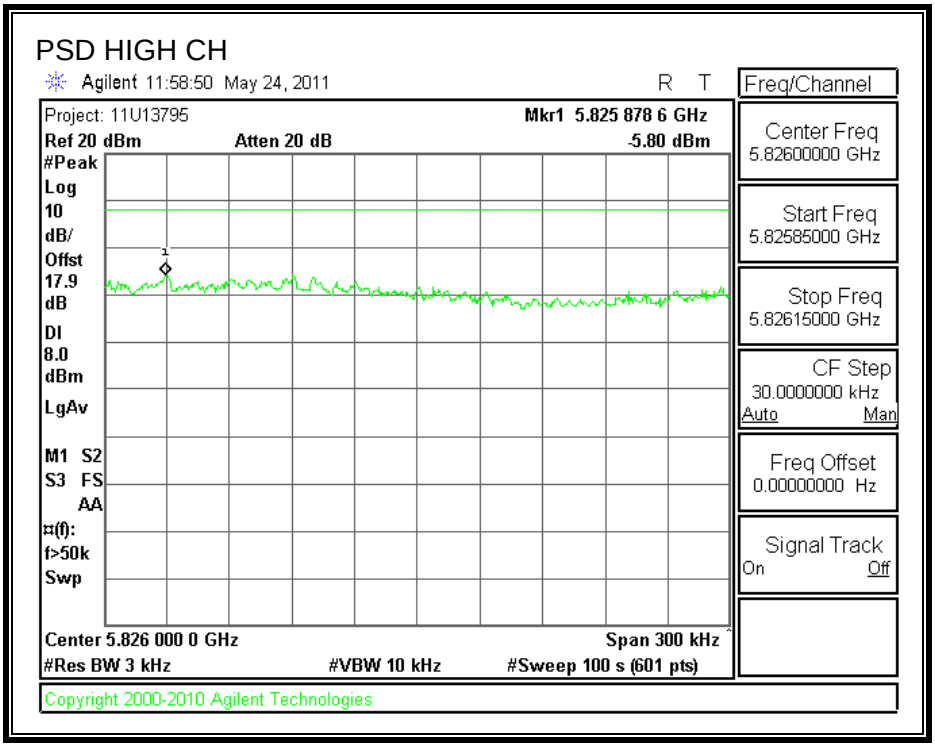

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7.5.5. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.247 (d)

IC RSS-210 A8.5

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

TEST PROCEDURE

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

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

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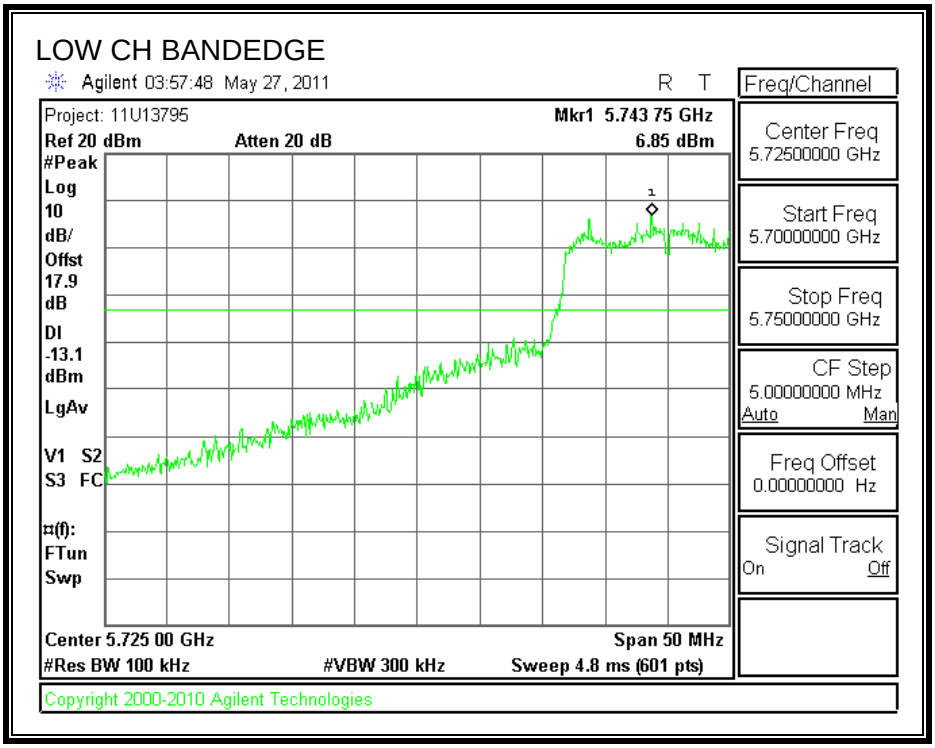
RESULTS

SPURIOUS EMISSIONS, LOW CHANNEL



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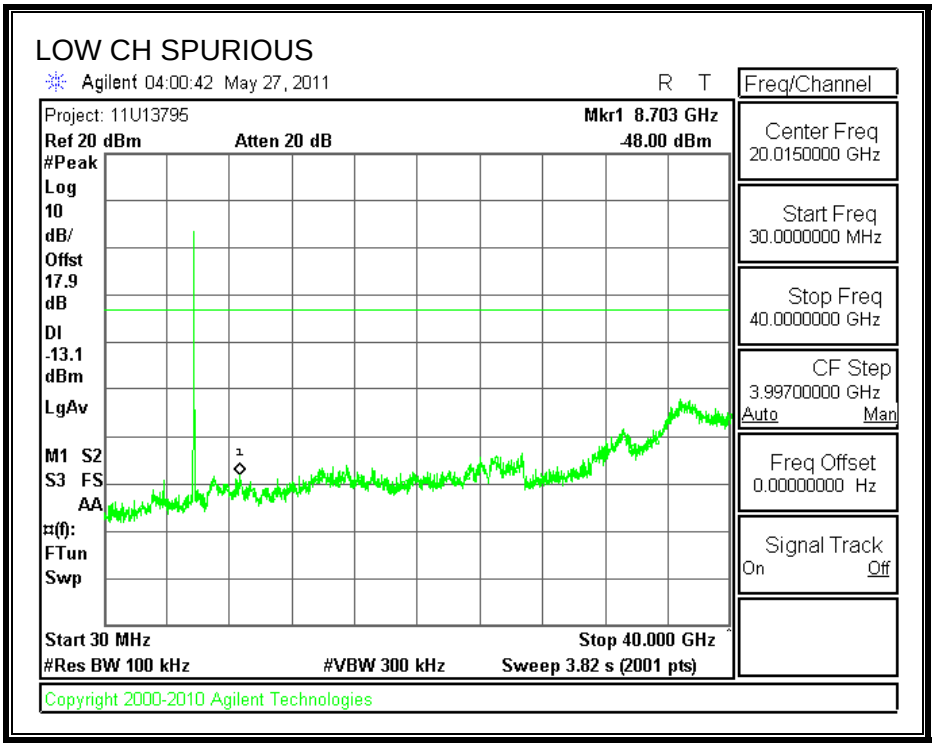

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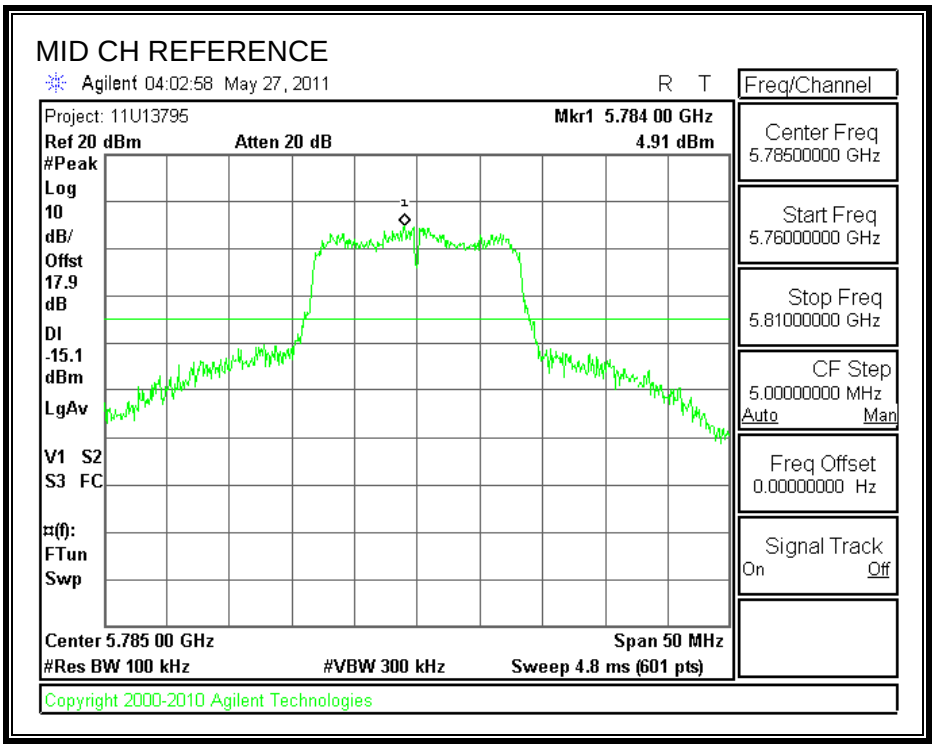
SPURIOUS EMISSIONS, MID CHANNEL



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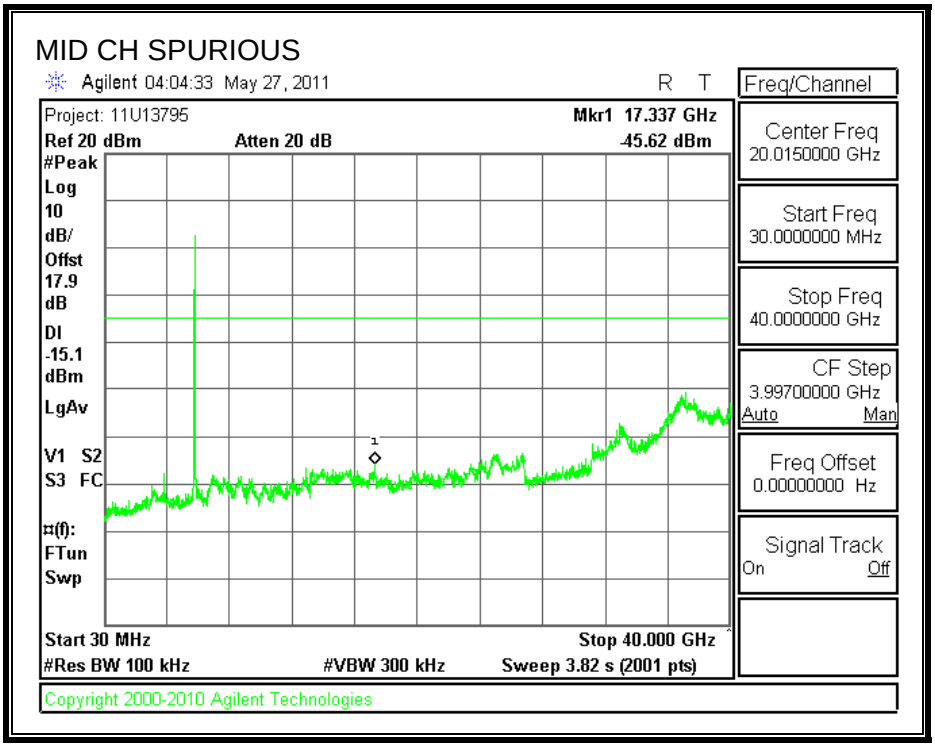

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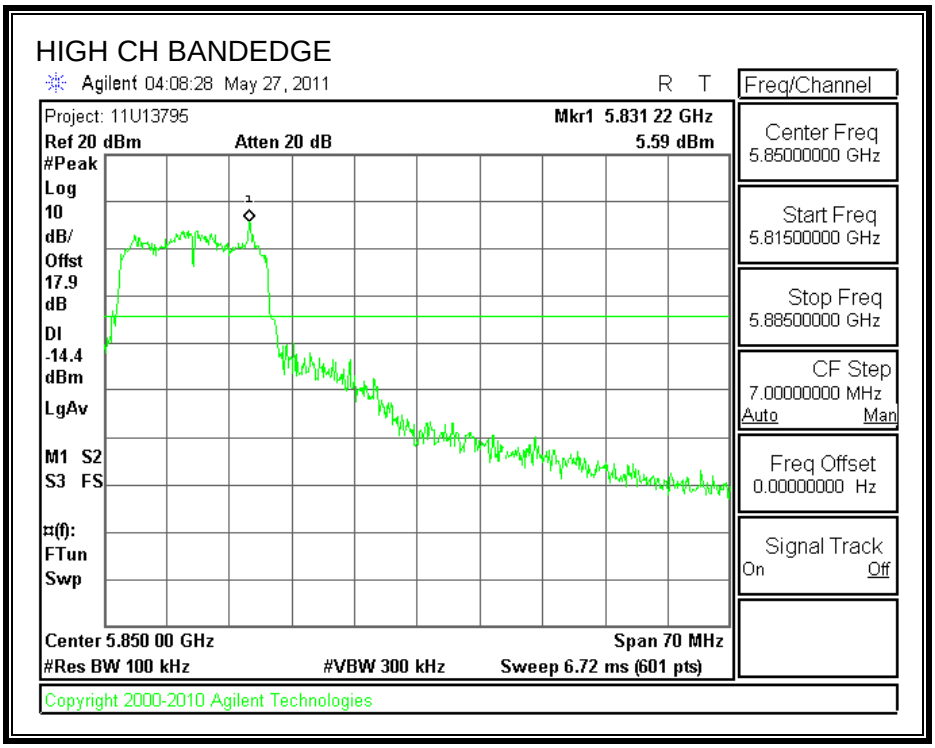
SPURIOUS EMISSIONS, HIGH CHANNEL



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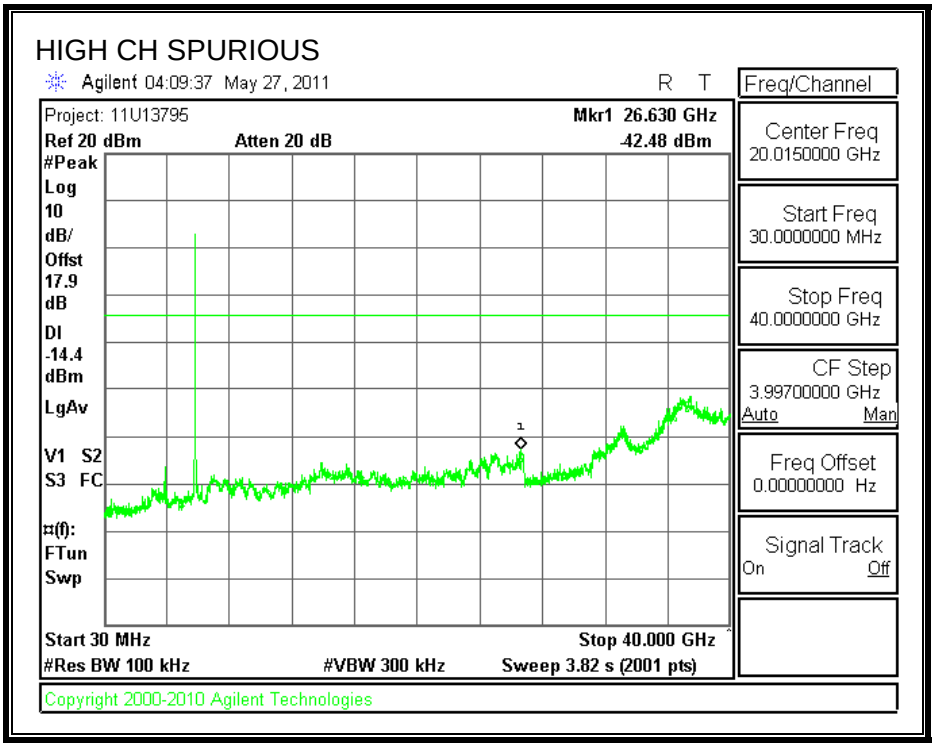

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7.6. 802.11n HT20 MODE IN THE 5.8 GHz BAND

7.6.1. 6 dB BANDWIDTH

LIMITS

FCC §15.247 (a) (2)

IC RSS-210 A8.2 (a)

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

TEST PROCEDURE

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

RESULTS

Channel	Frequency (MHz)	Chain 1 6 dB BW (MHz)	Chain 2 6 dB BW (MHz)	Minimum Limit (MHz)
Low	5745	17.58	17.58	0.5
Middle	5785	17.75	17.50	0.5
High	5825	17.75	17.58	0.5

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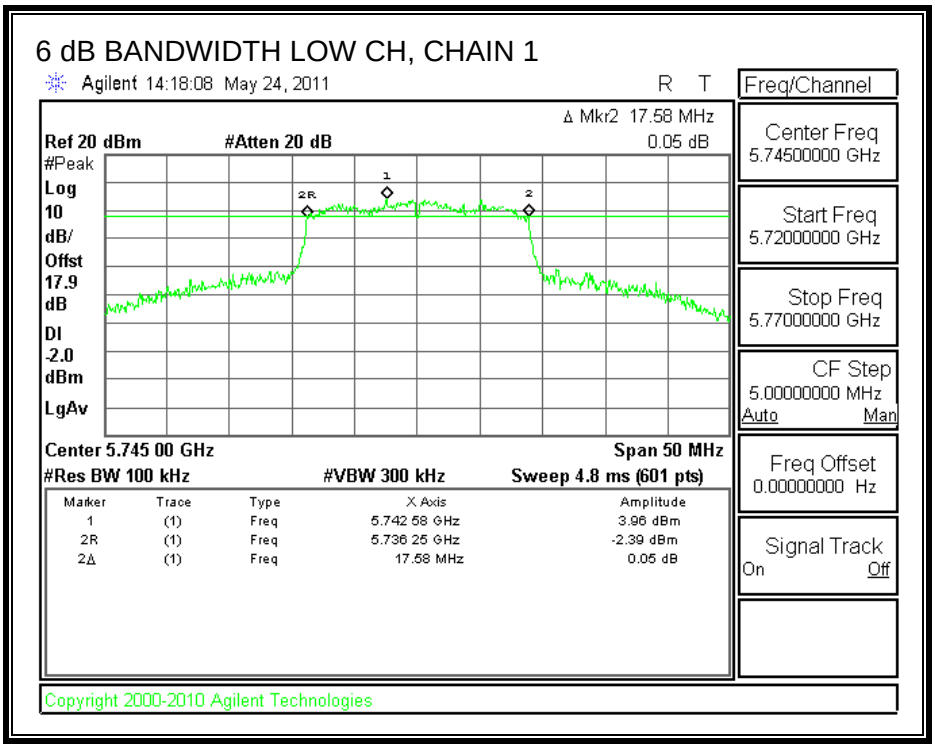
6 dB BANDWIDTH, CHAIN 1



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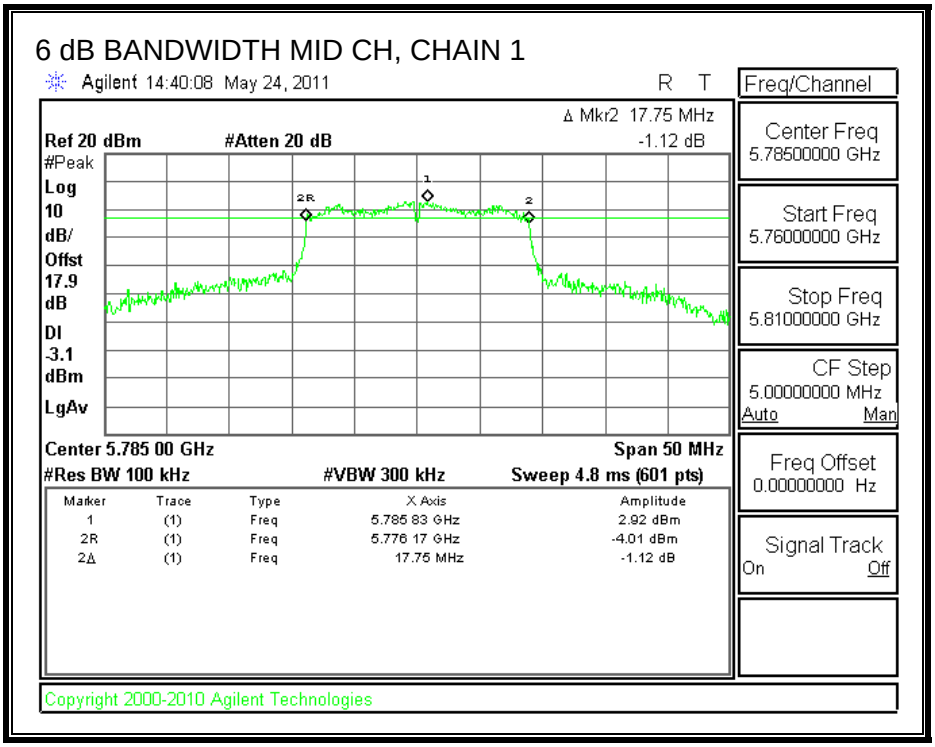

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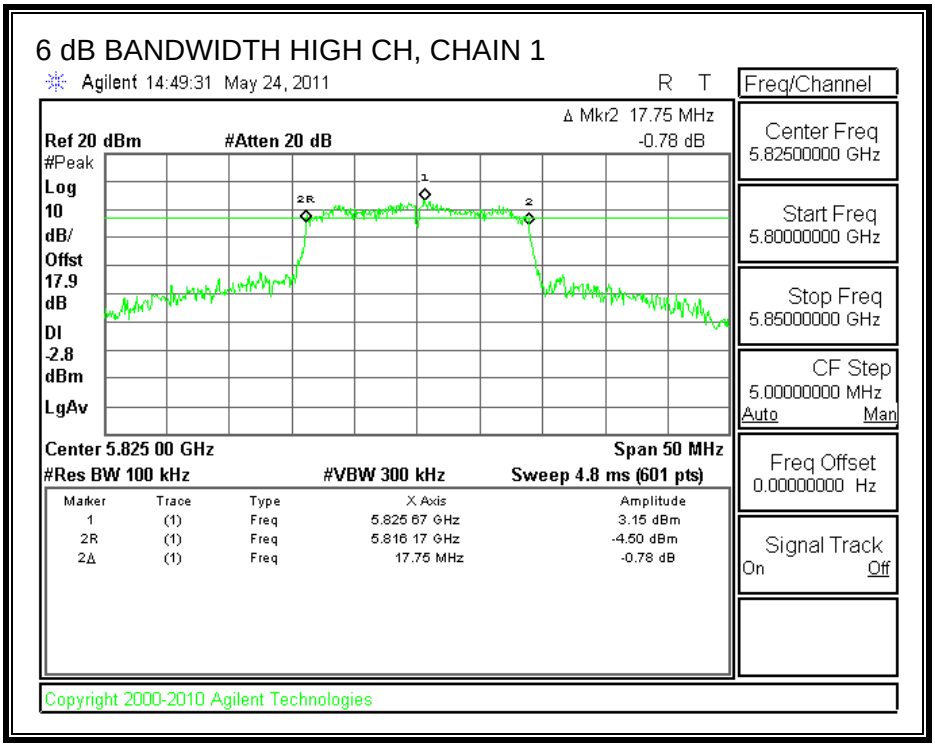

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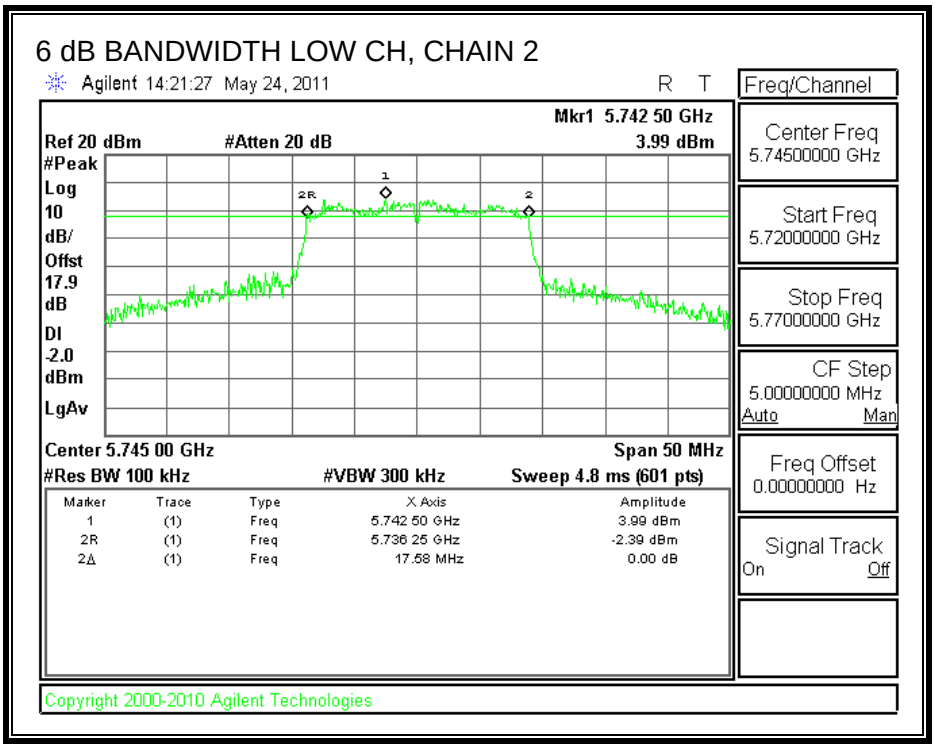
6 dB BANDWIDTH, CHAIN 2



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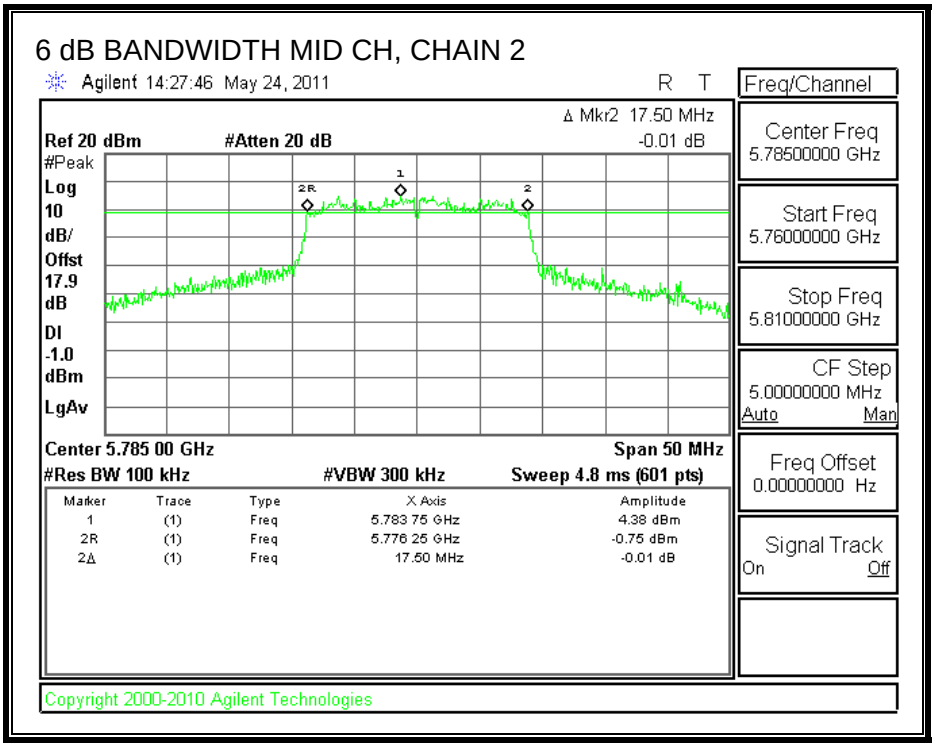

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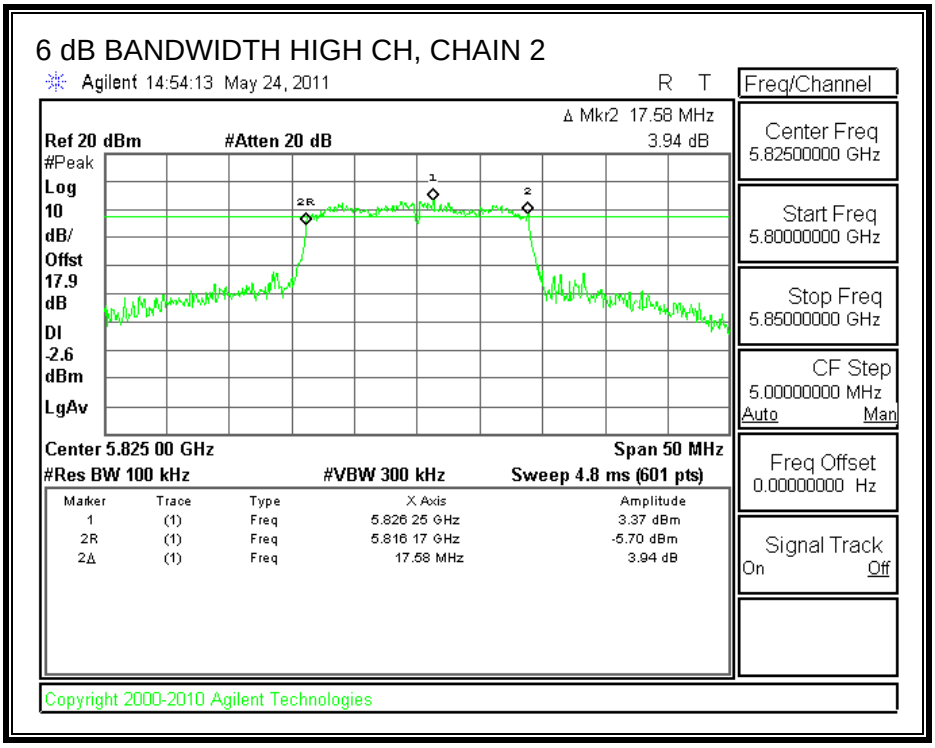

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7.6.2. 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

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

RESULTS

Channel	Frequency (MHz)	Chain 1 99% Bandwidth (MHz)	Chain 2 99% Bandwidth (MHz)
Low	5745	17.2075	17.4868
Middle	5785	17.4808	17.4308
High	5825	17.0241	17.5560

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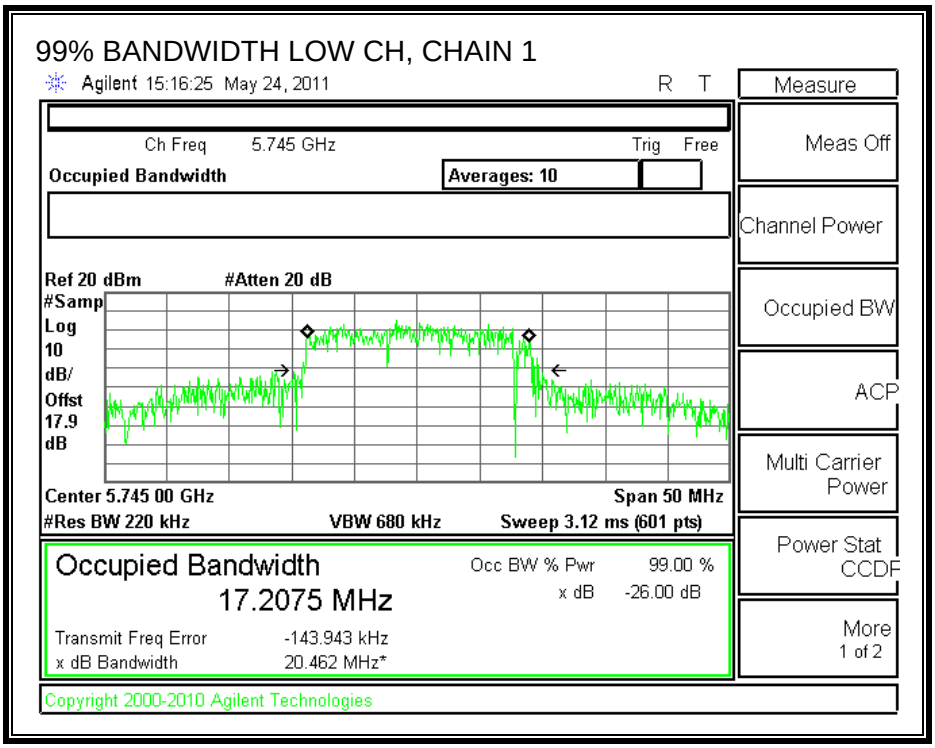
99% BANDWIDTH, CHAIN 1



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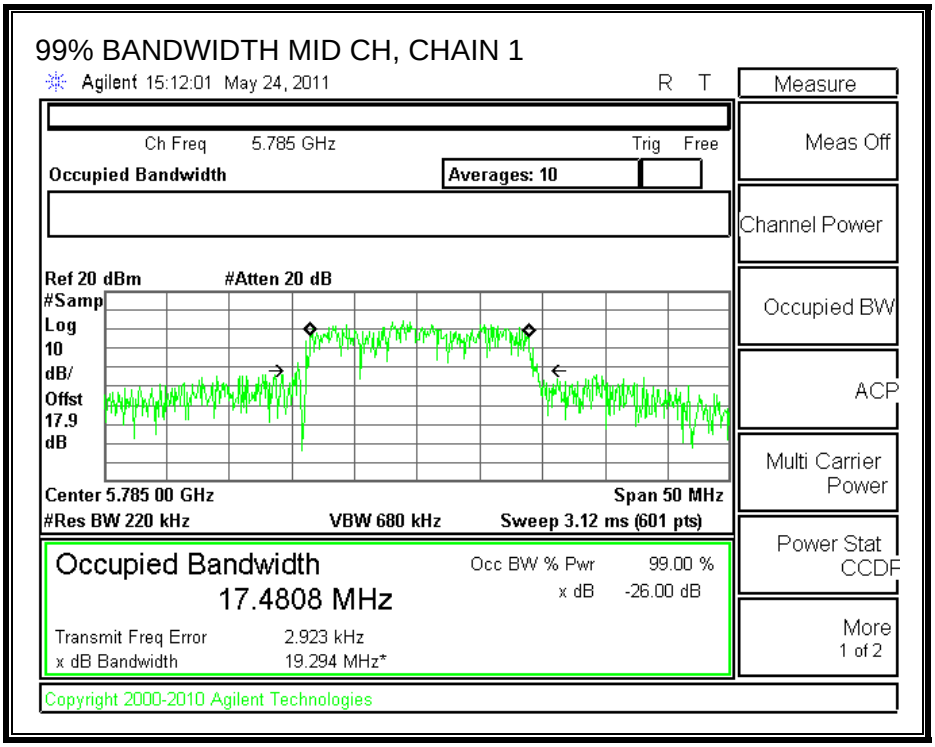

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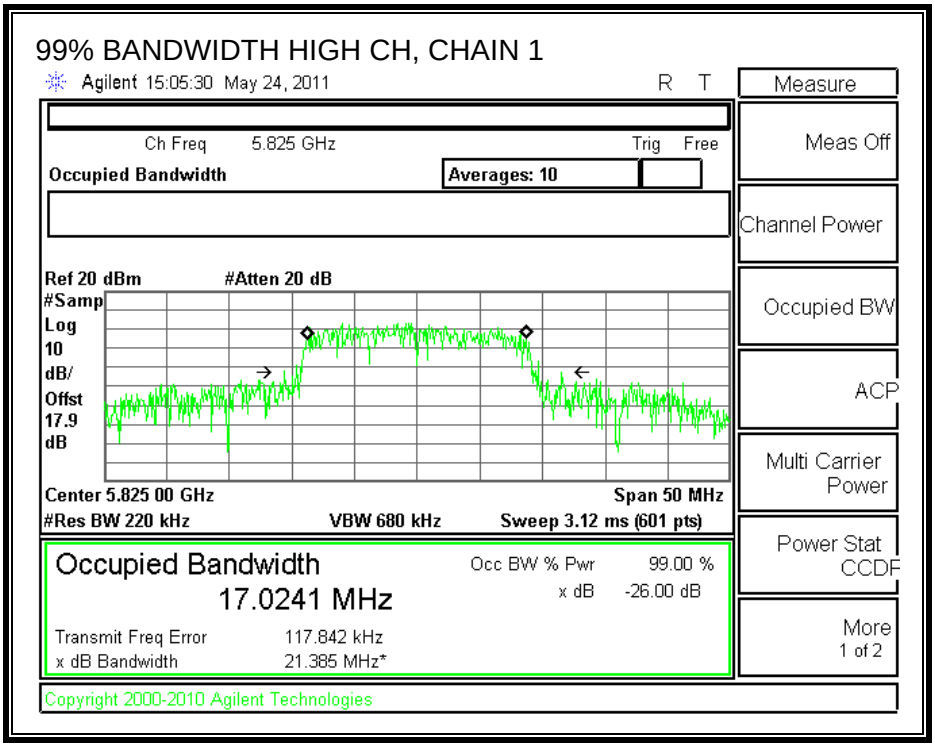

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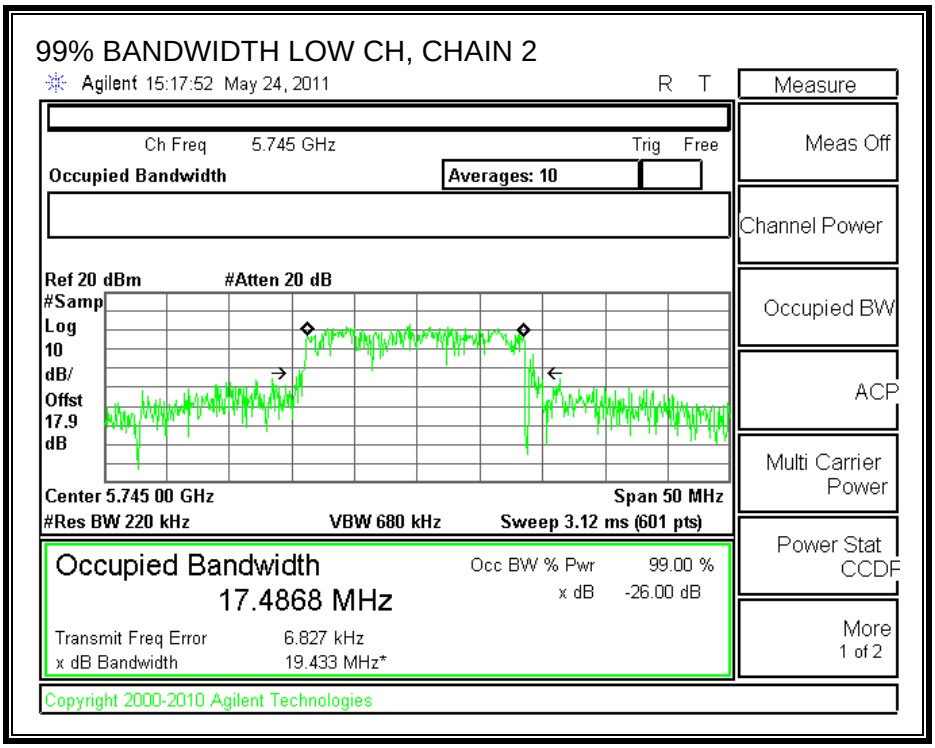
99% BANDWIDTH, CHAIN 2



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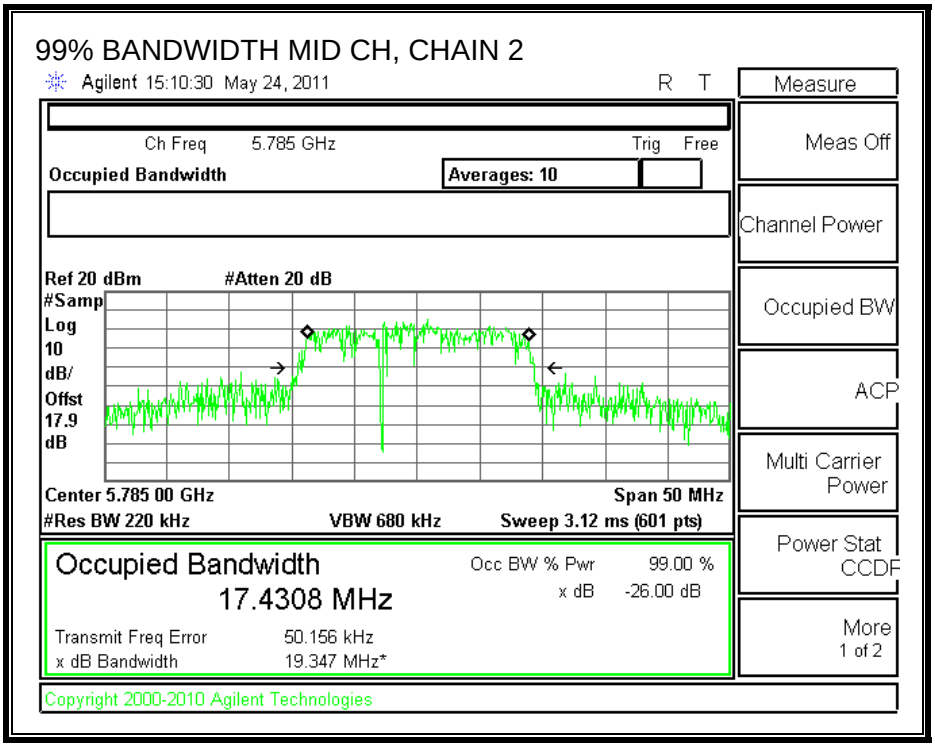

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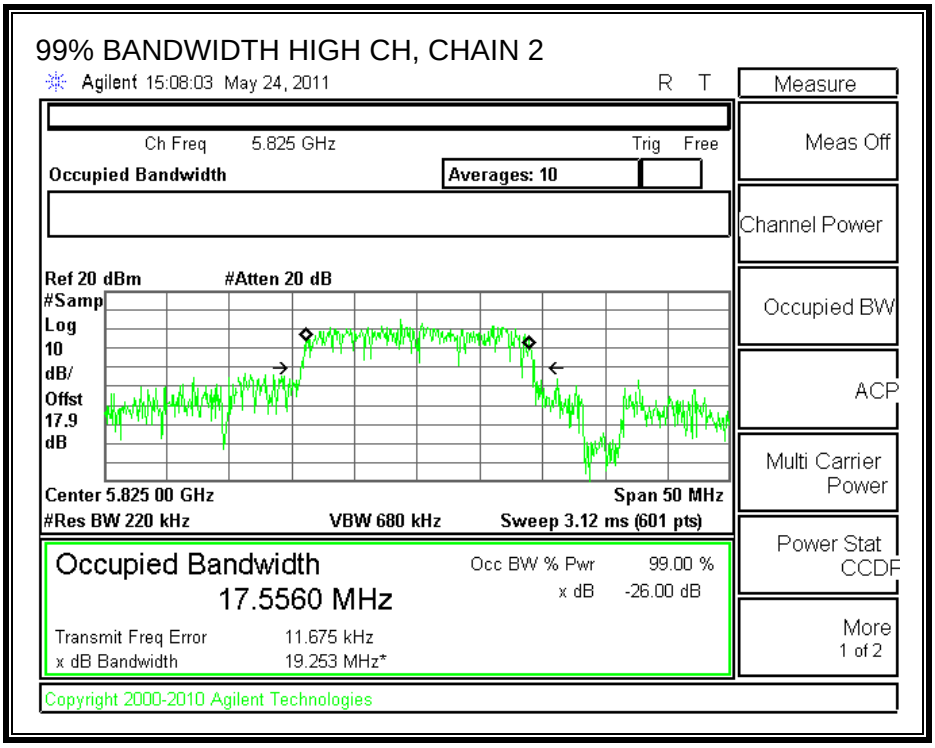

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7.6.3. OUTPUT POWER

LIMITS

FCC §15.247 (b)

IC RSS-210 A8.4

The highest combination of antenna gains is equal 7.21 dBi, therefore the limit is 28.79 dBm.

TEST PROCEDURE

Peak power is measured using the Channel bandwidth Alternative peak output power procedure specified in "TCB Training for Devices covered under Scopes A1 - A4" by Joe Dichoso, May 2003.

RESULTS

Channel	Frequency (MHz)	Chain 1 PK Power (dBm)	Chain 2 PK Power (dBm)	Attenuator + Cable Offset (dB)	Total Power (dBm)	Limit (dBm)	Margin (dB)
Low	5745	13.38	13.99	11.40	28.11	28.79	-0.68
Mid	5785	12.23	12.75	11.40	26.91	28.79	-1.88
High	5825	13.61	13.74	11.40	28.09	28.79	-0.70

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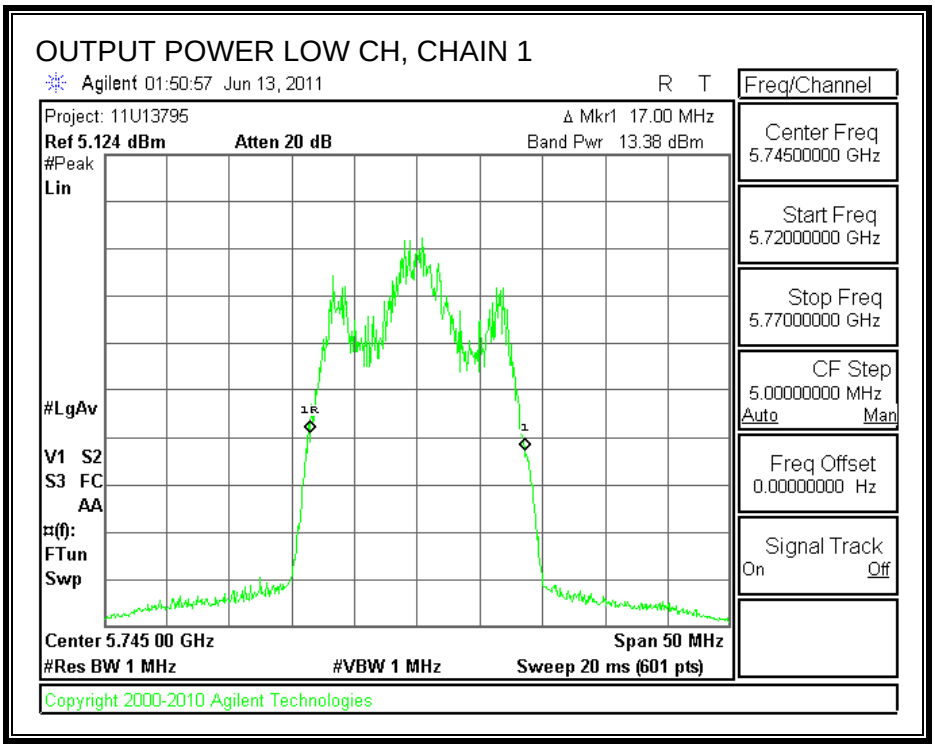
CHAIN 1 OUTPUT POWER



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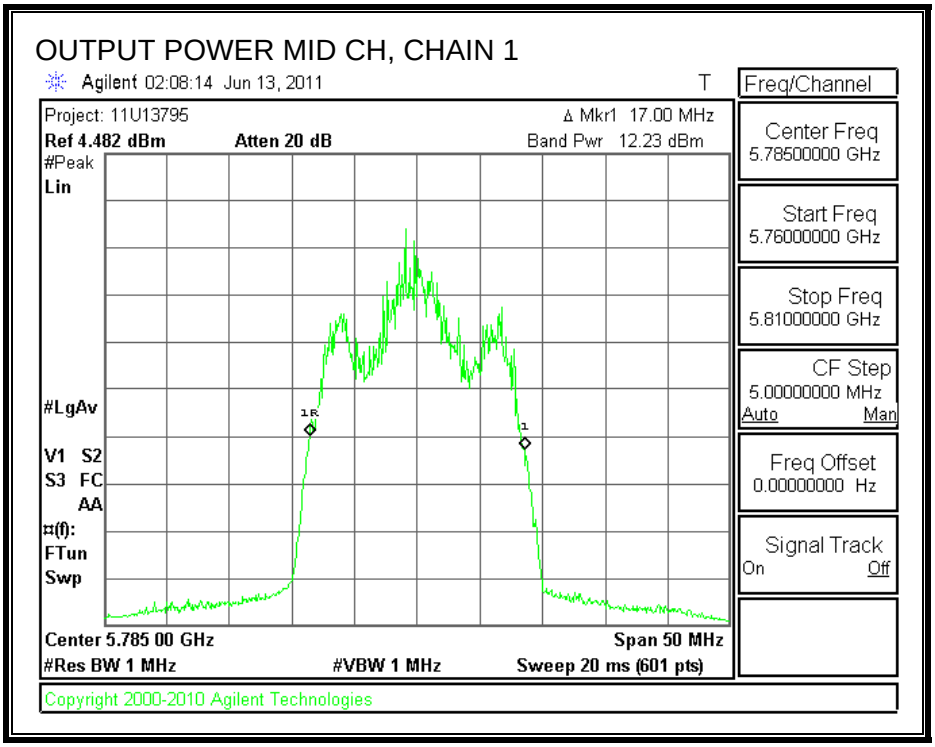

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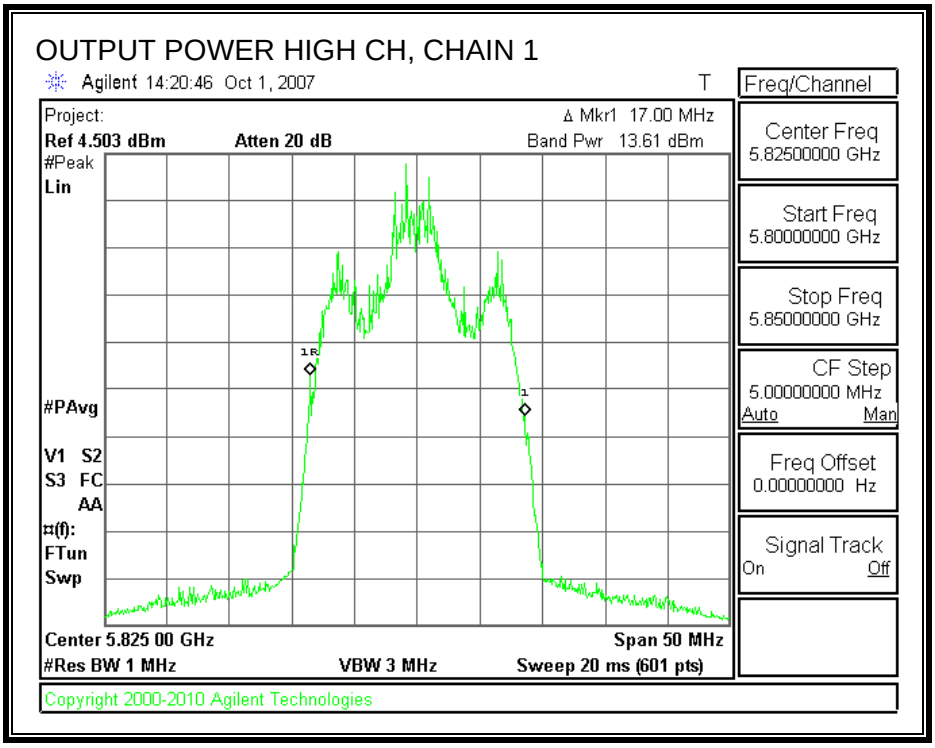

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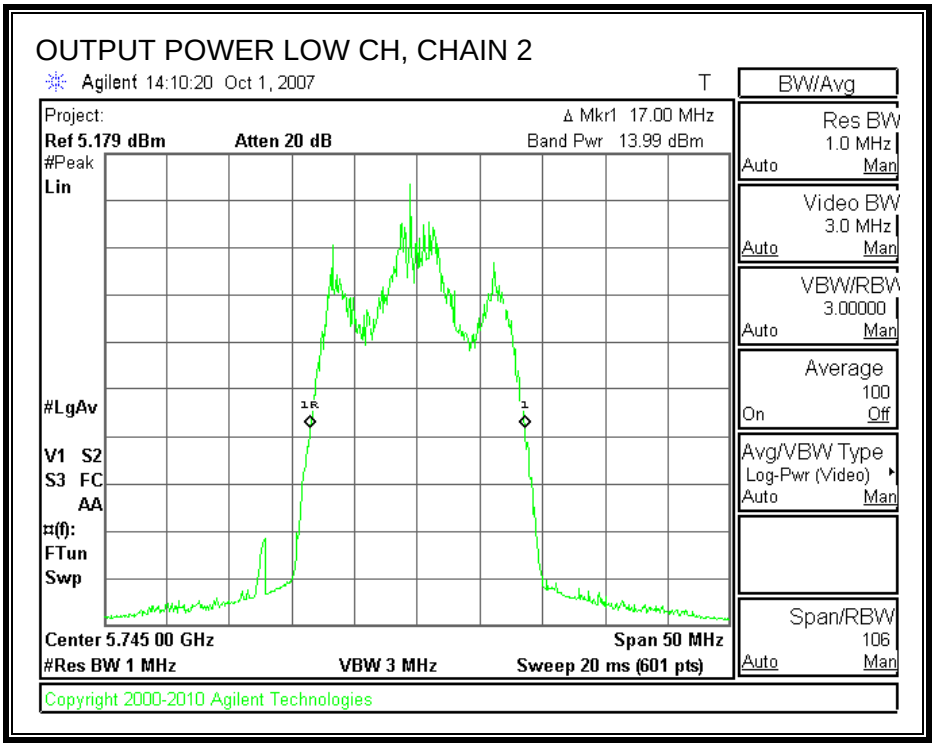
CHAIN 2 OUTPUT POWER



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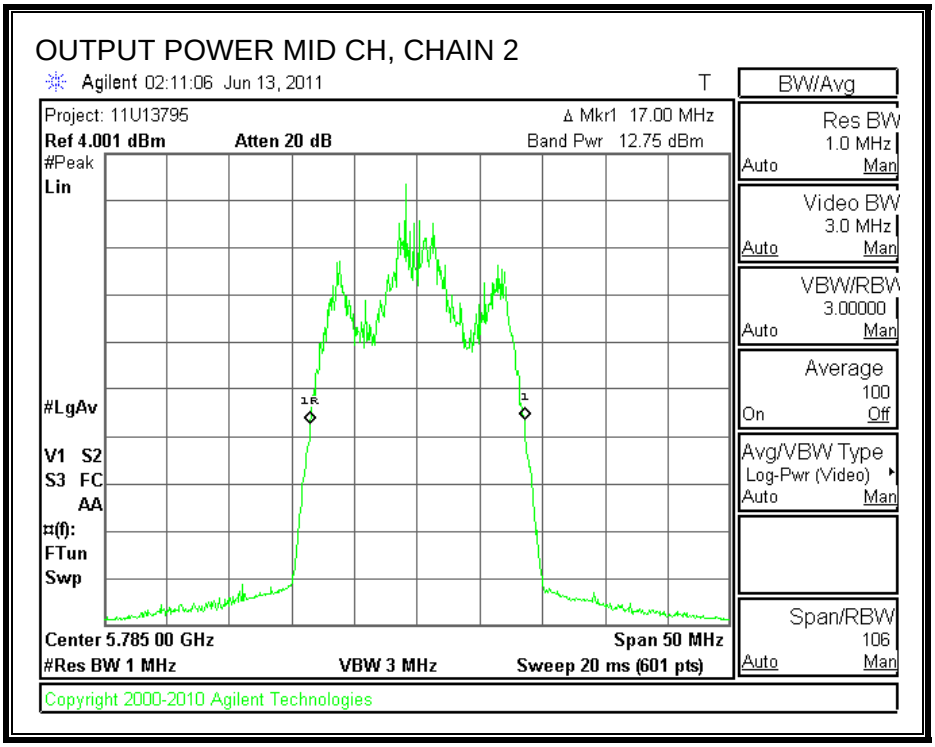

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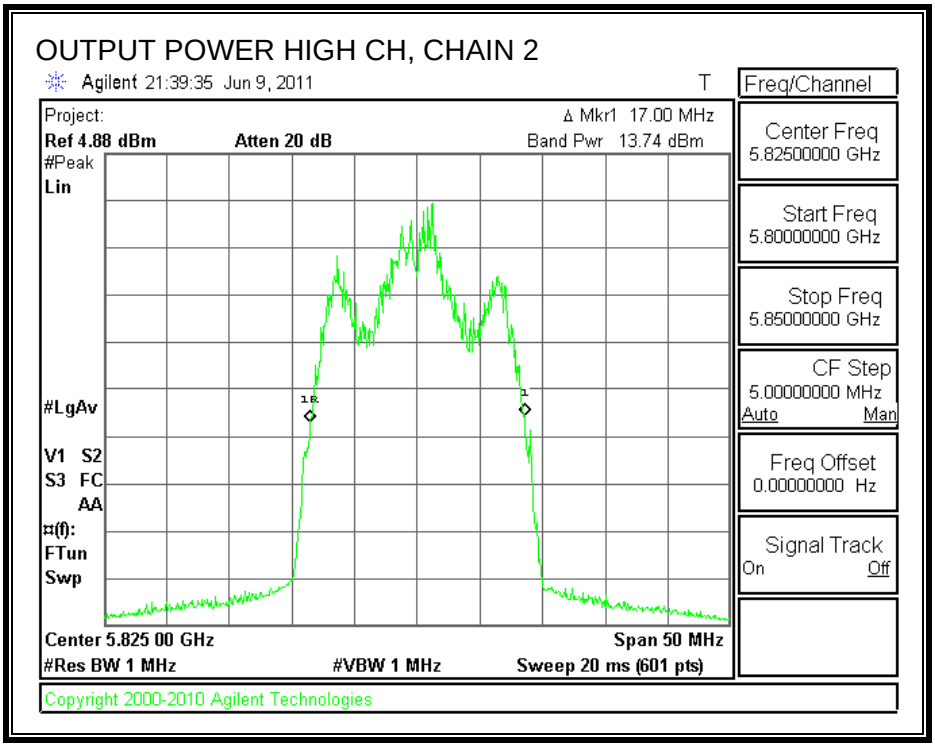

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7.6.4. POWER SPECTRAL DENSITY

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

Peak output power was measured, therefore the power spectral density was measured using PSD Option 1 in accordance with FCC document "Measurement of Digital Transmission Systems Operating under Section 15.247", March 23, 2005.

RESULTS:

Channel	Frequency (MHz)	Chain 1 PSD (dBm)	Chain 2 PSD (dBm)	Total PSD (dBm)	Limit (dBm)	Margin (dB)
Low	5745	-5.71	-7.06	-3.32	8	-11.32
Middle	5785	-7.23	-7.17	-4.19	8	-12.19
High	5825	-7.53	-7.67	-4.59	8	-12.59

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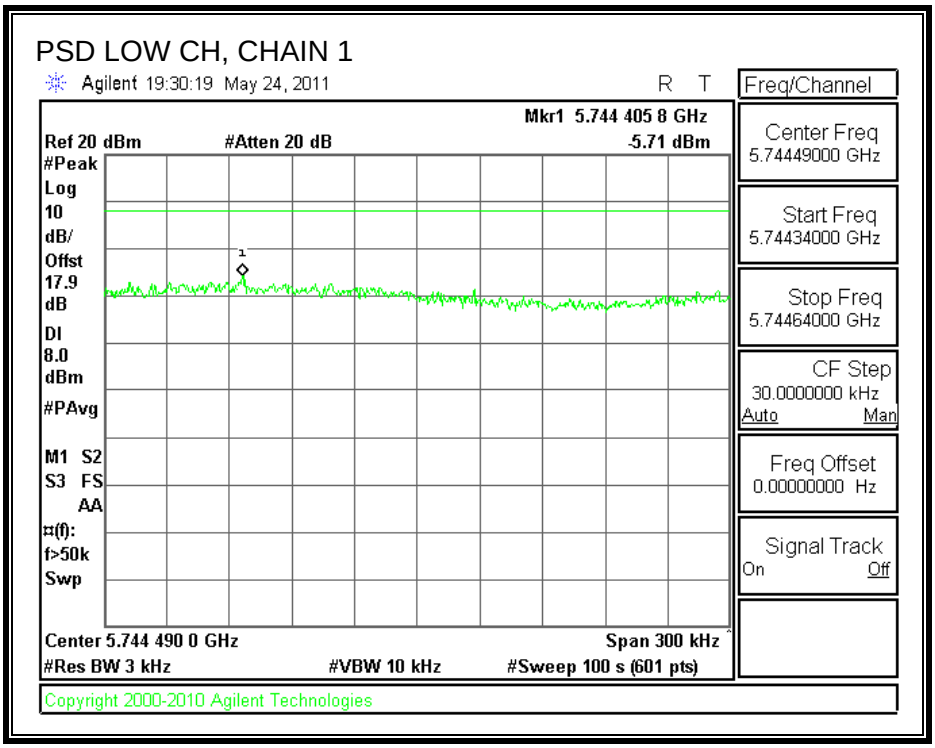
POWER SPECTRAL DENSITY, CHAIN 1



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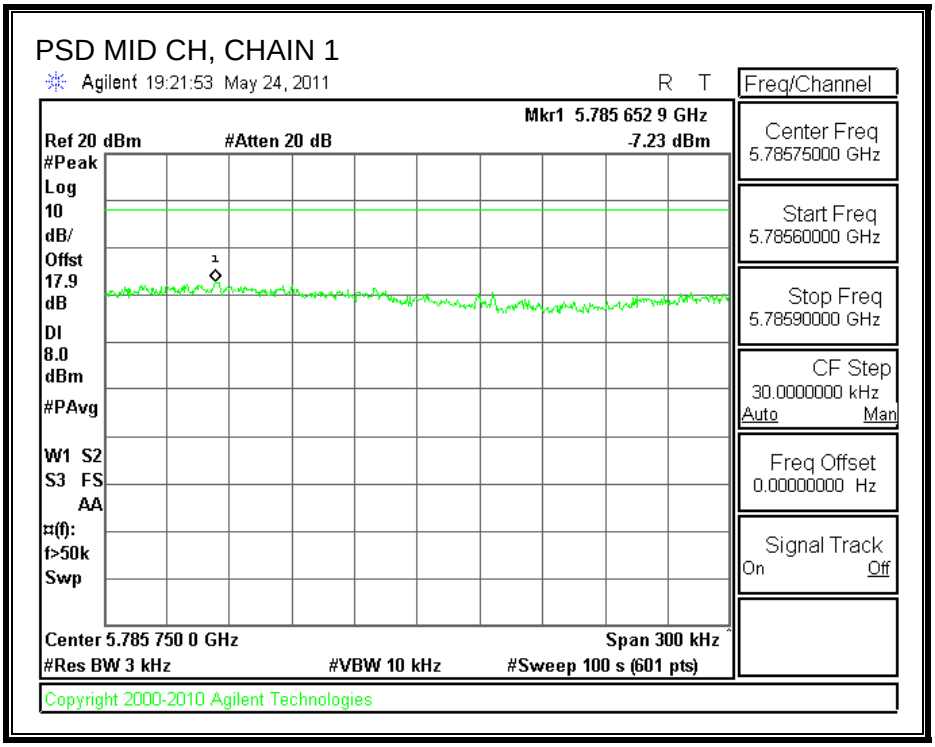
PSD MID CH, CHAIN 1



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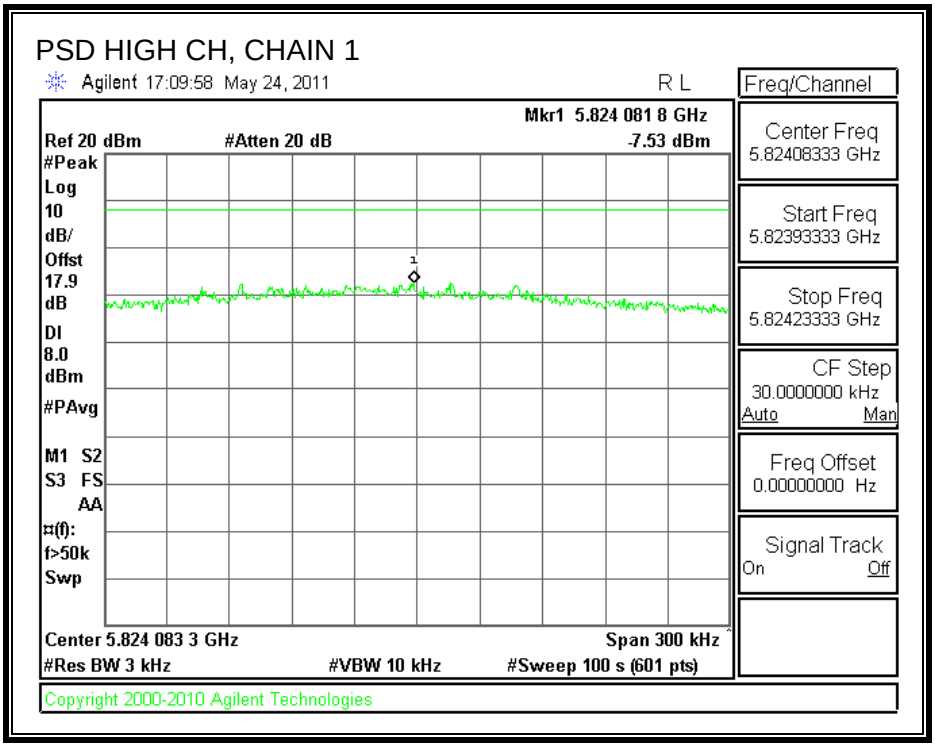
PSD HIGH CH, CHAIN 1



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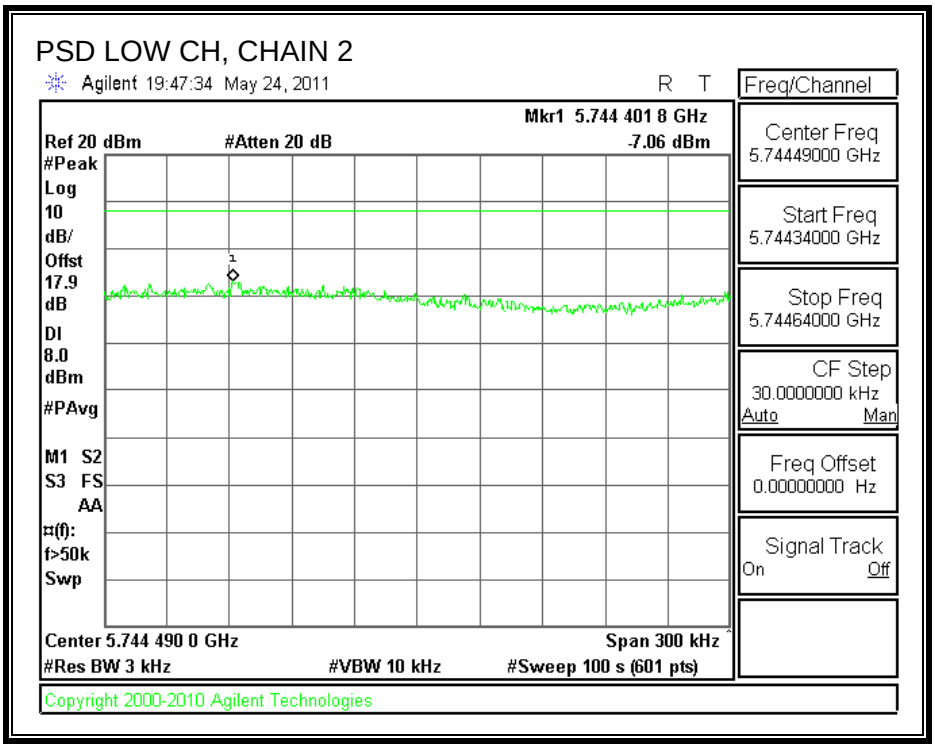
POWER SPECTRAL DENSITY, CHAIN 2



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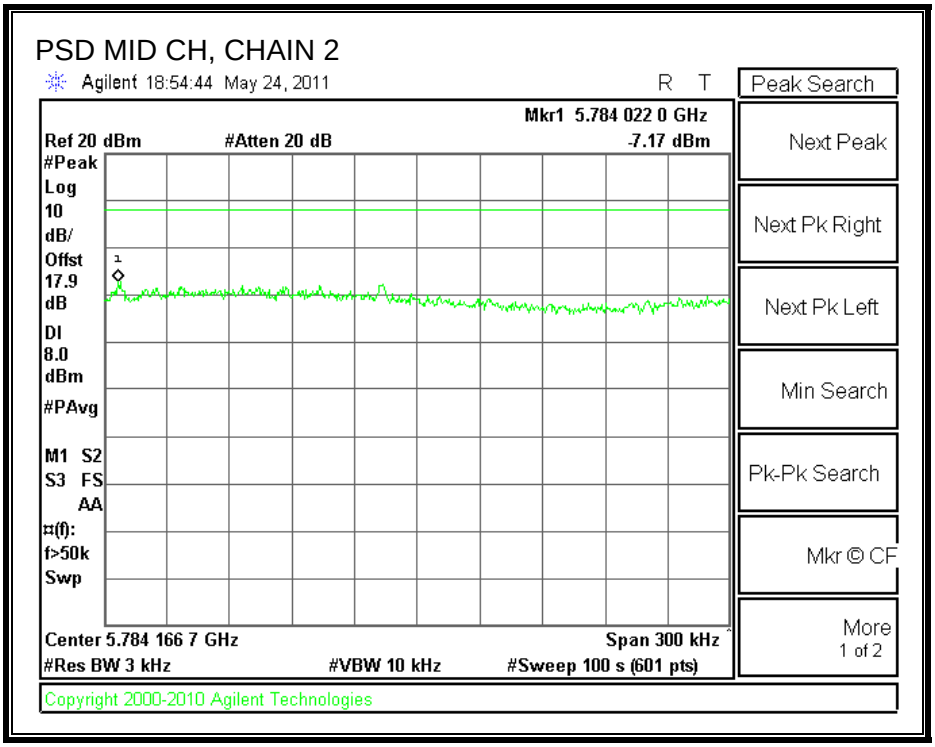
PSD MID CH, CHAIN 2



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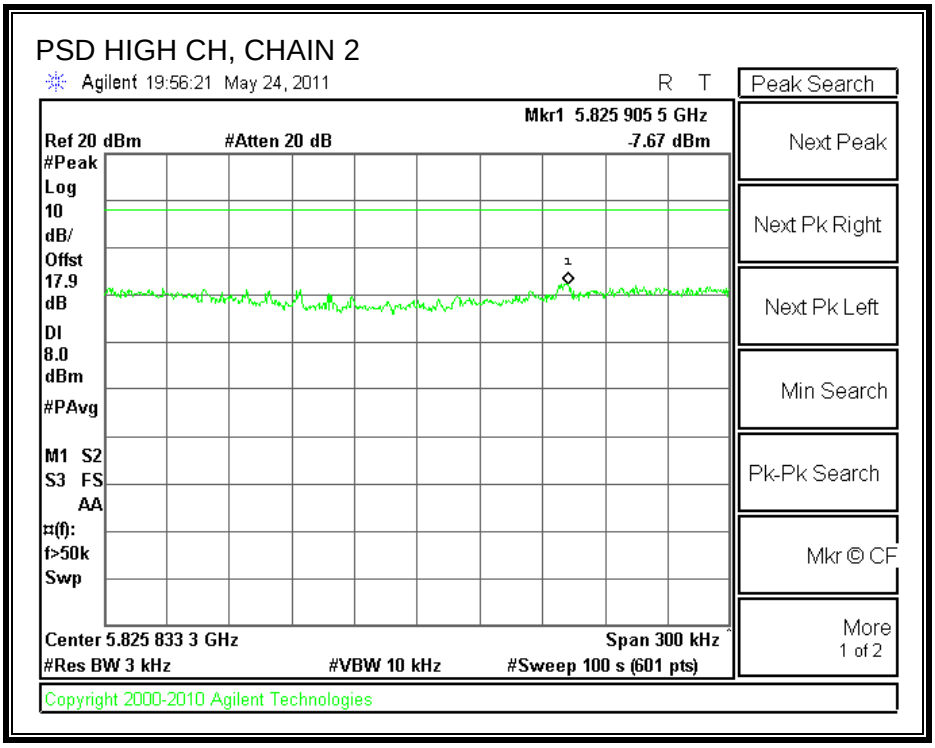

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7.6.5. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.247 (d)

IC RSS-210 A8.5

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

TEST PROCEDURE

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

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

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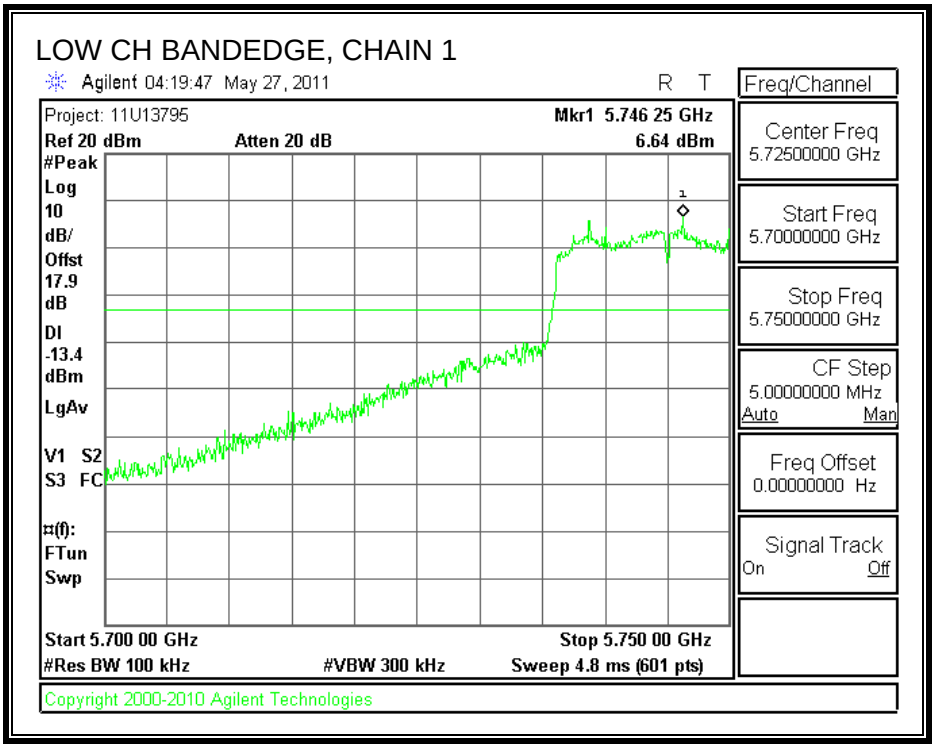
RESULTS

CHAIN 1 SPURIOUS EMISSIONS



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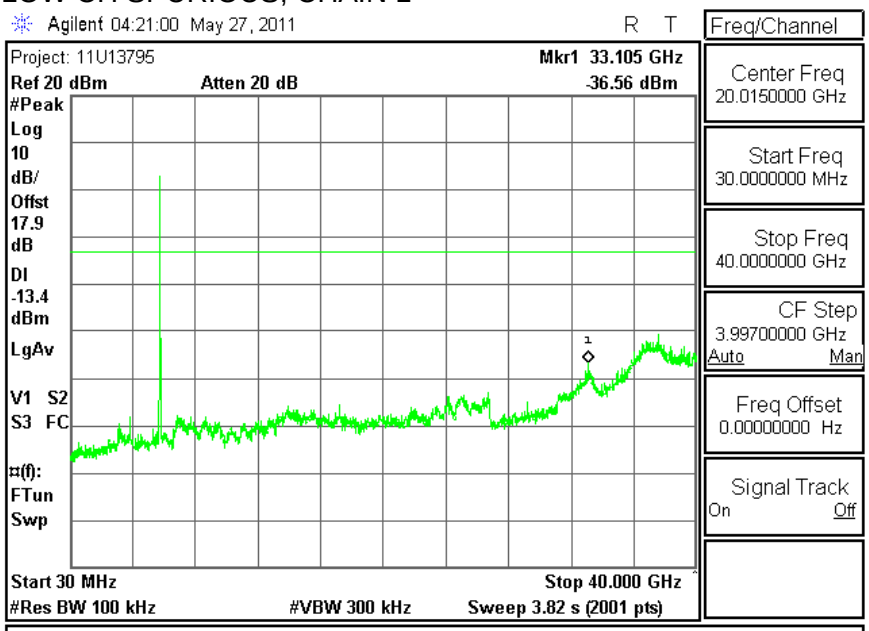
LOW CH SPURIOUS, CHAIN 1



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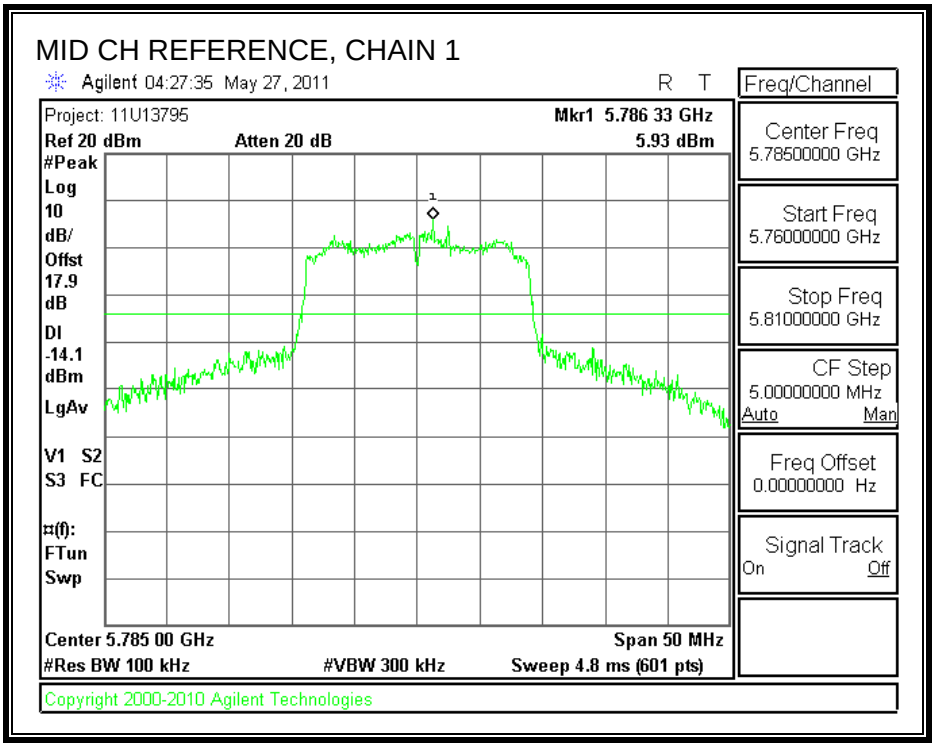
MID CH REFERENCE, CHAIN 1



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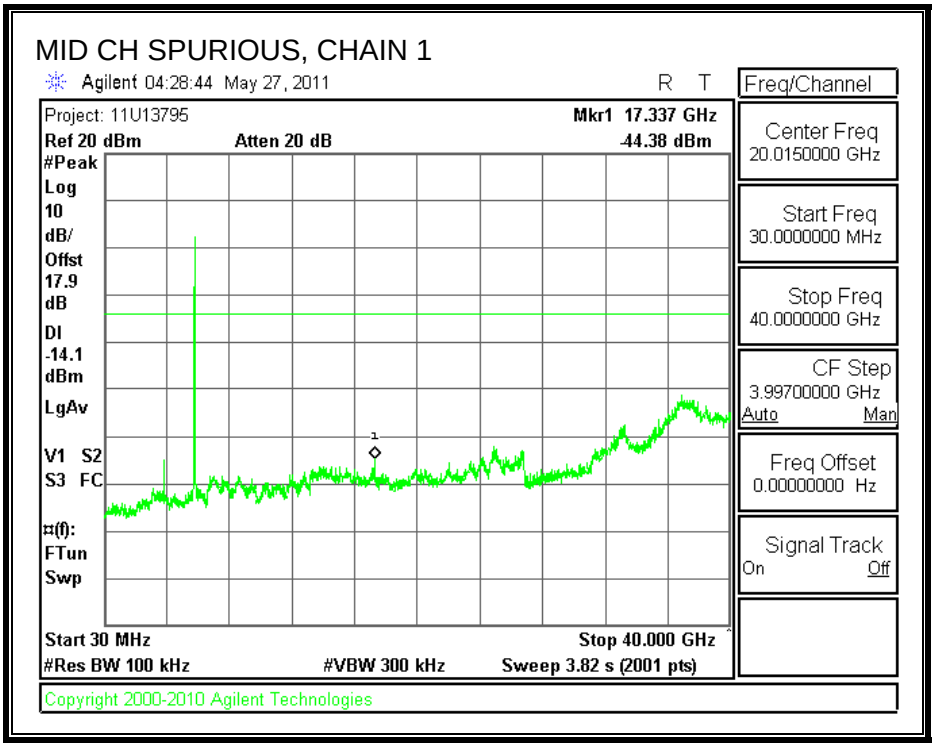

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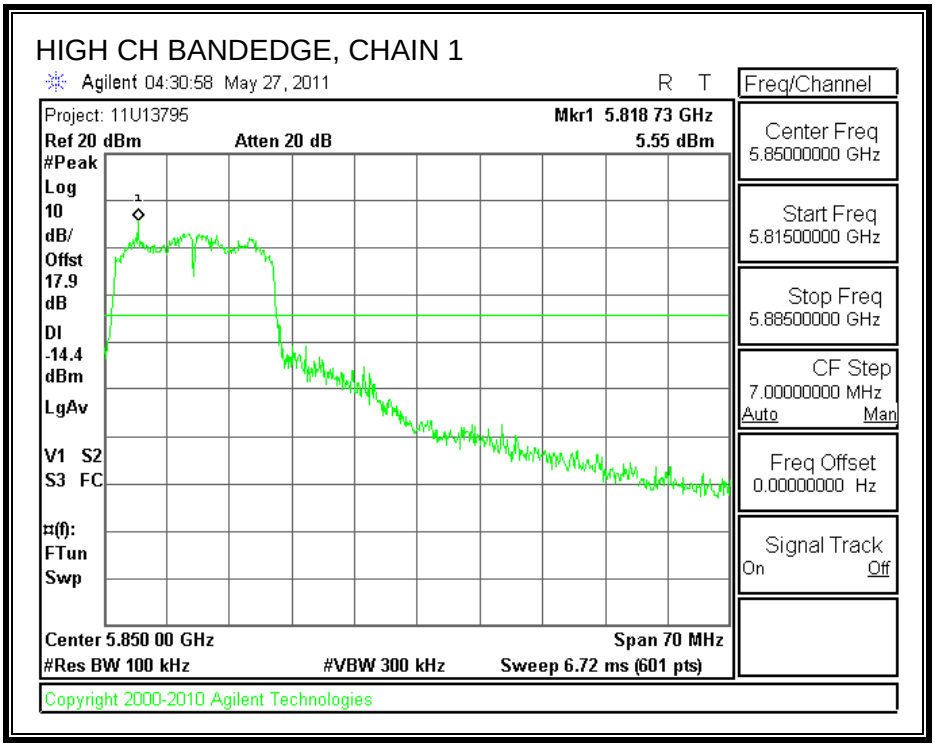
HIGH CH BANDEDGE, CHAIN 1



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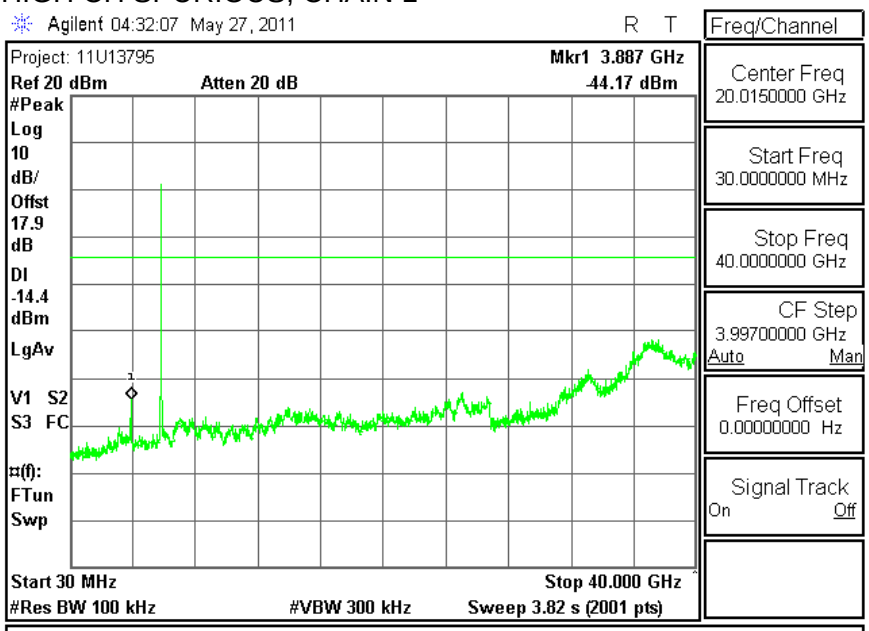
HIGH CH SPURIOUS, CHAIN 1



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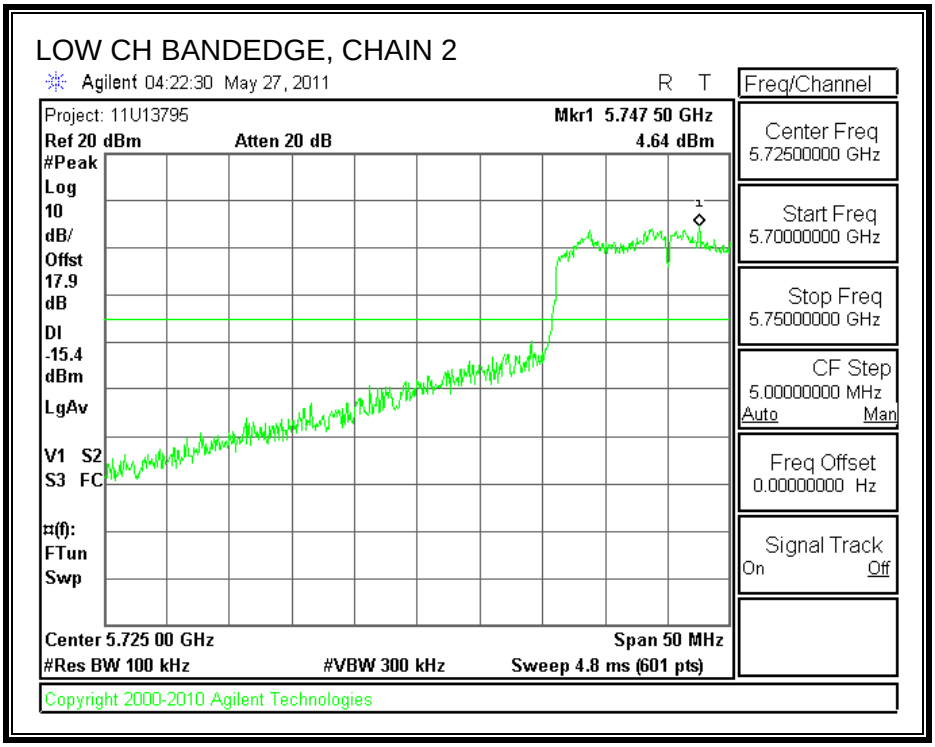
CHAIN 2 SPURIOUS EMISSIONS



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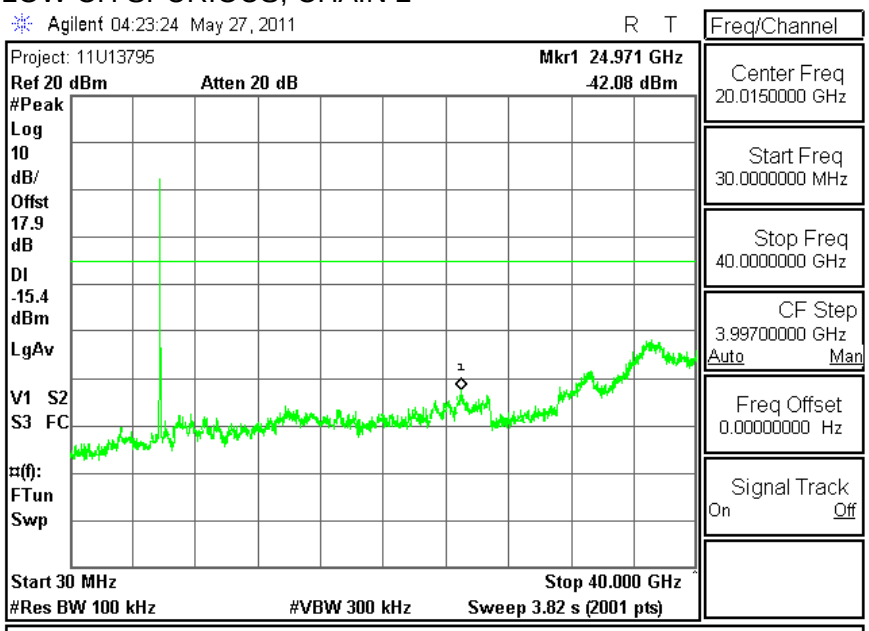
LOW CH SPURIOUS, CHAIN 2



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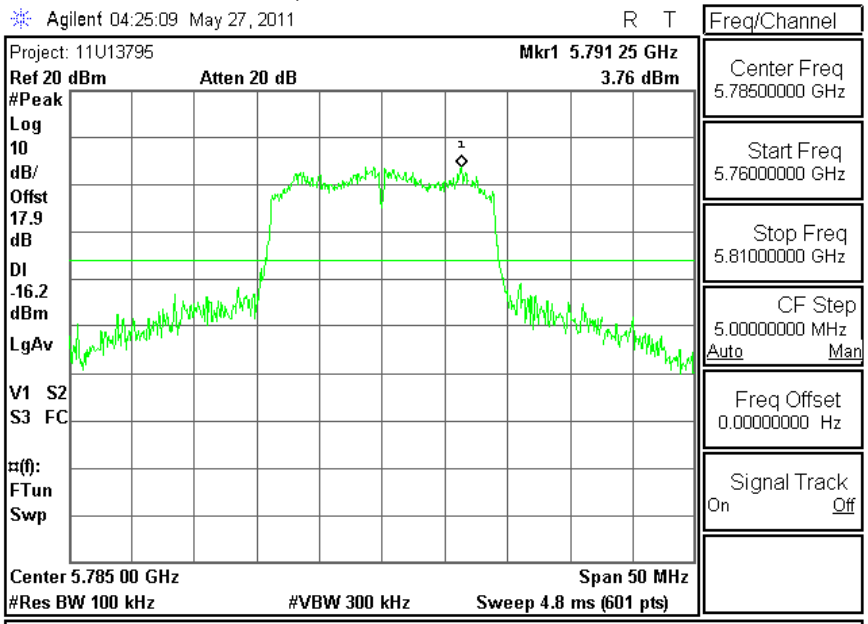
MID CH REFERENCE, CHAIN 2



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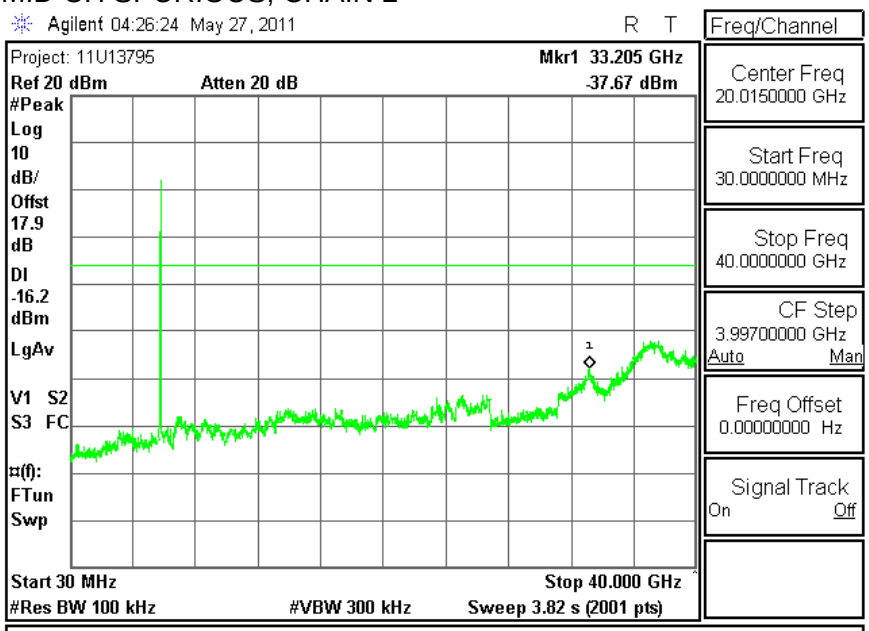
MID CH SPURIOUS, CHAIN 2



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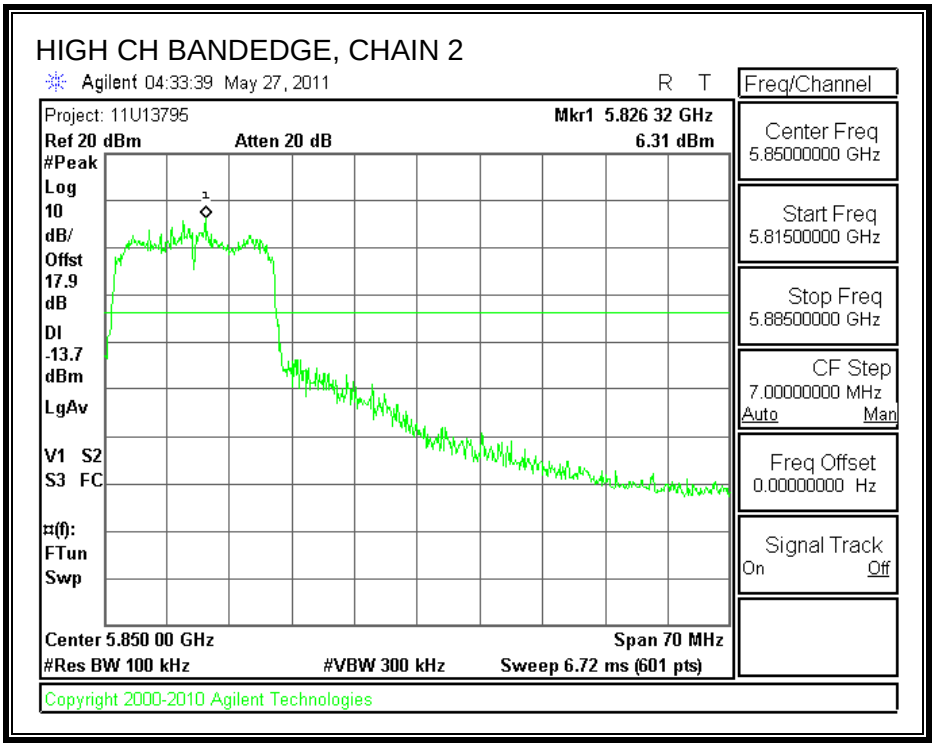
HIGH CH BANDEDGE, CHAIN 2



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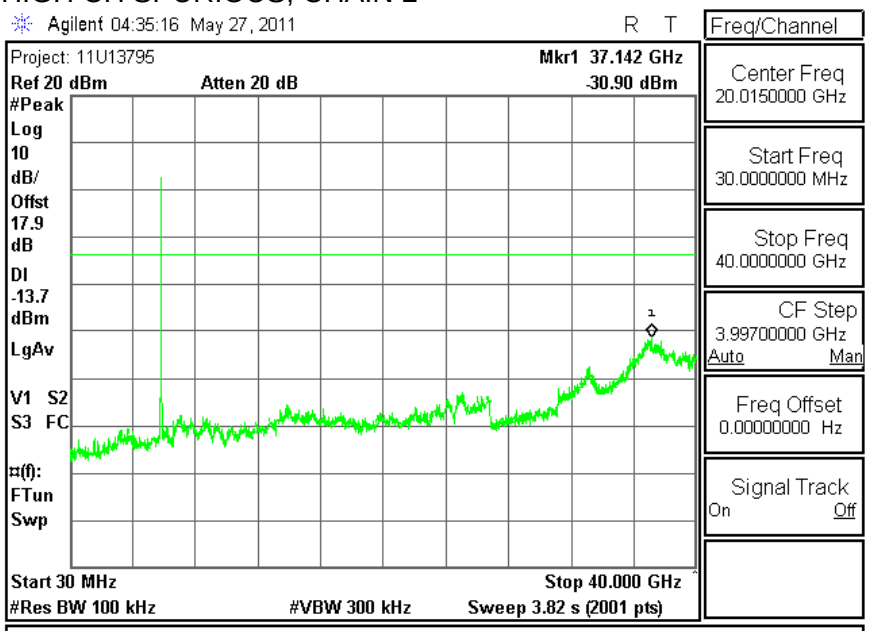
HIGH CH SPURIOUS, CHAIN 2



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7.7. 802.11n HT40 MODE IN THE 5.8 GHz BAND

7.7.1. 6 dB BANDWIDTH

LIMITS

FCC §15.247 (a) (2)

IC RSS-210 A8.2 (a)

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

TEST PROCEDURE

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

RESULTS

Channel	Frequency (MHz)	Chain 1 6 dB BW (MHz)	Chain 2 6 dB BW (MHz)	Minimum Limit (MHz)
Low	5755	36.4	36.4	0.5
High	5795	36.53	36.27	0.5

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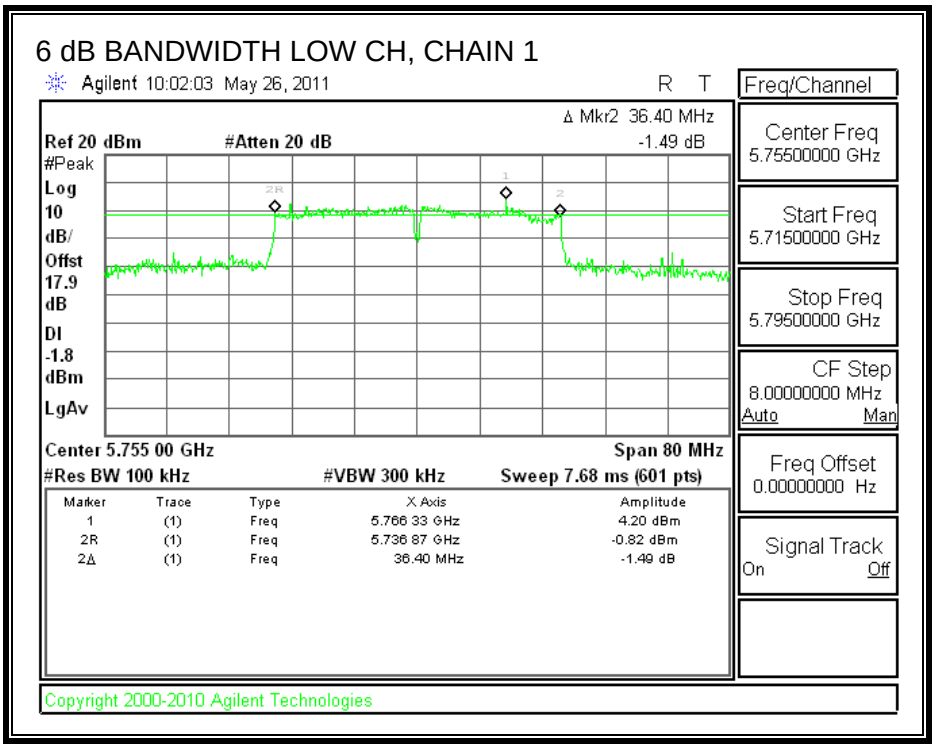
6 dB BANDWIDTH, CHAIN 1



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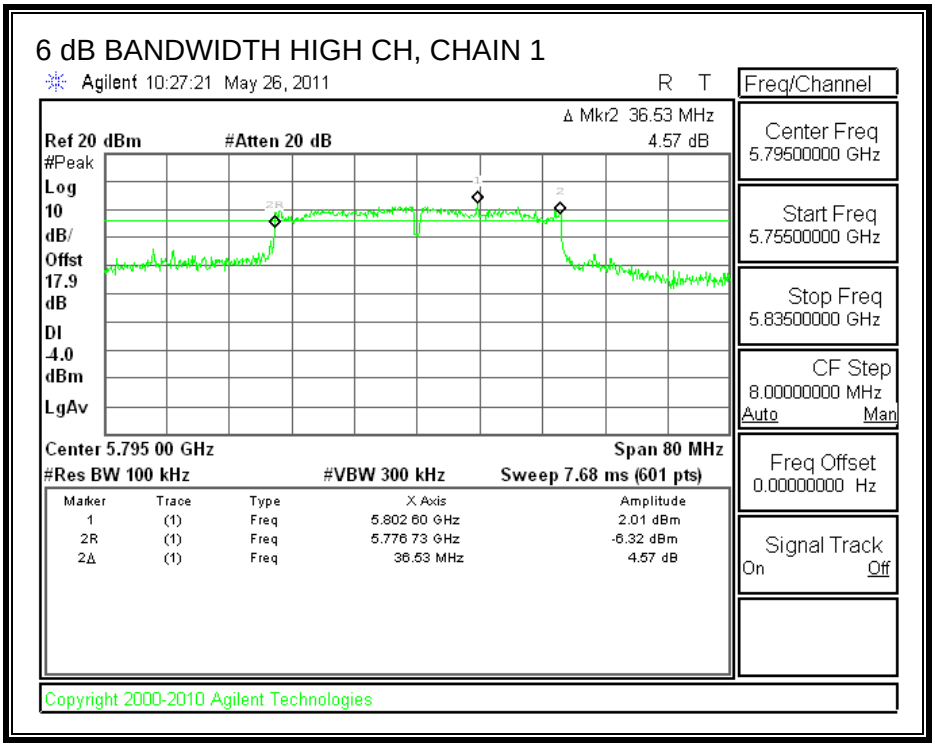

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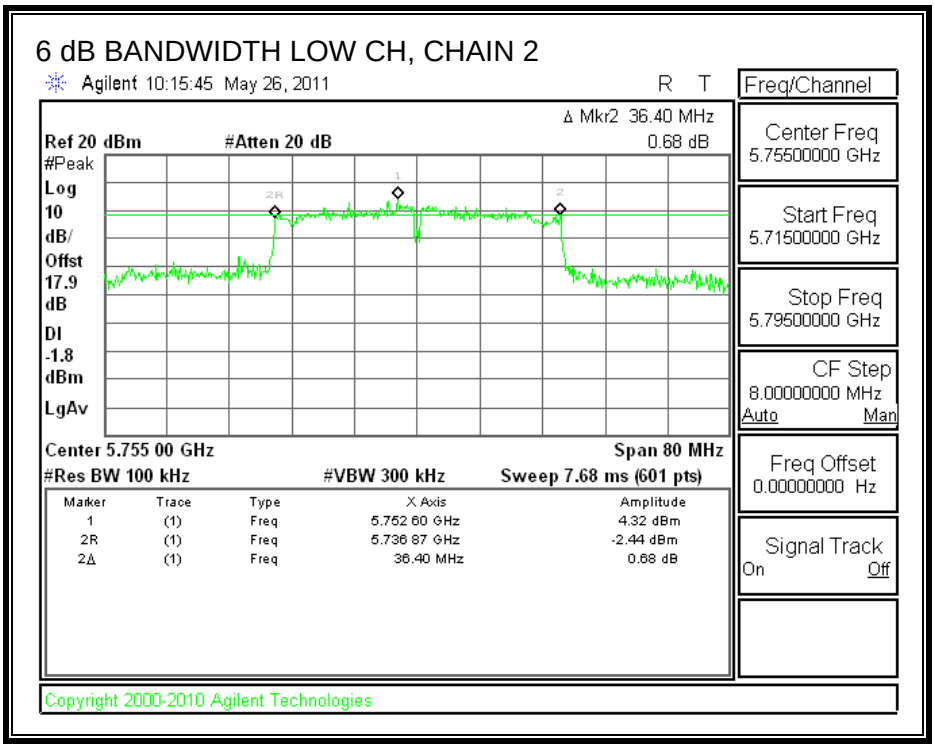
6 dB BANDWIDTH, CHAIN 2



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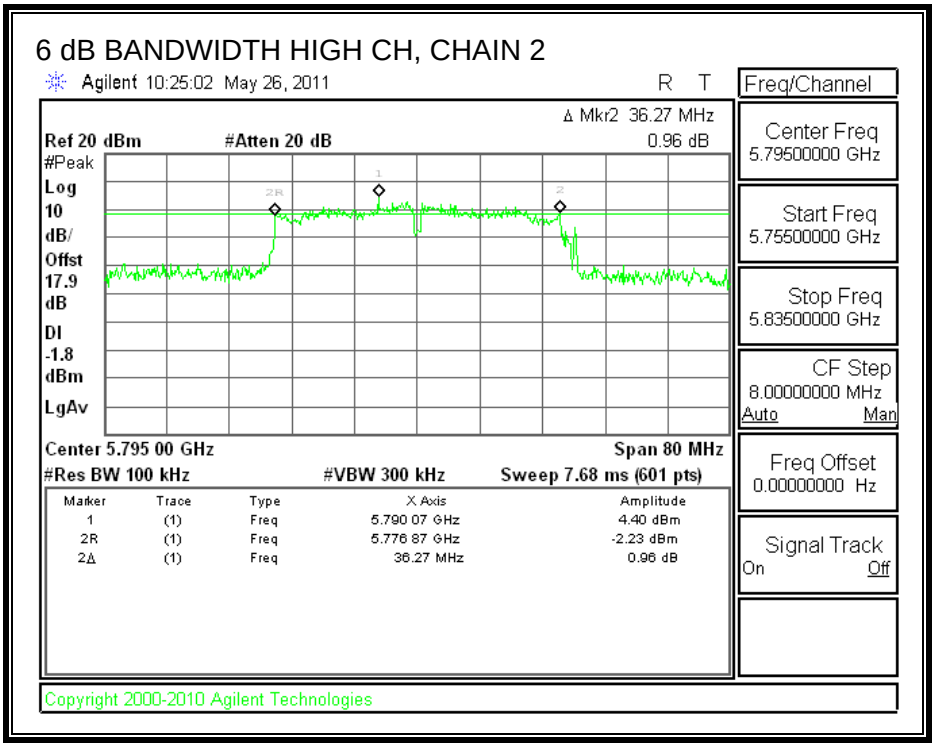

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7.7.2. 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

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

RESULTS

Channel	Frequency (MHz)	Chain 1 99% Bandwidth (MHz)	Chain 2 99% Bandwidth (MHz)
Low	5755	39.4725	36.2744
High	5795	39.7948	36.4881

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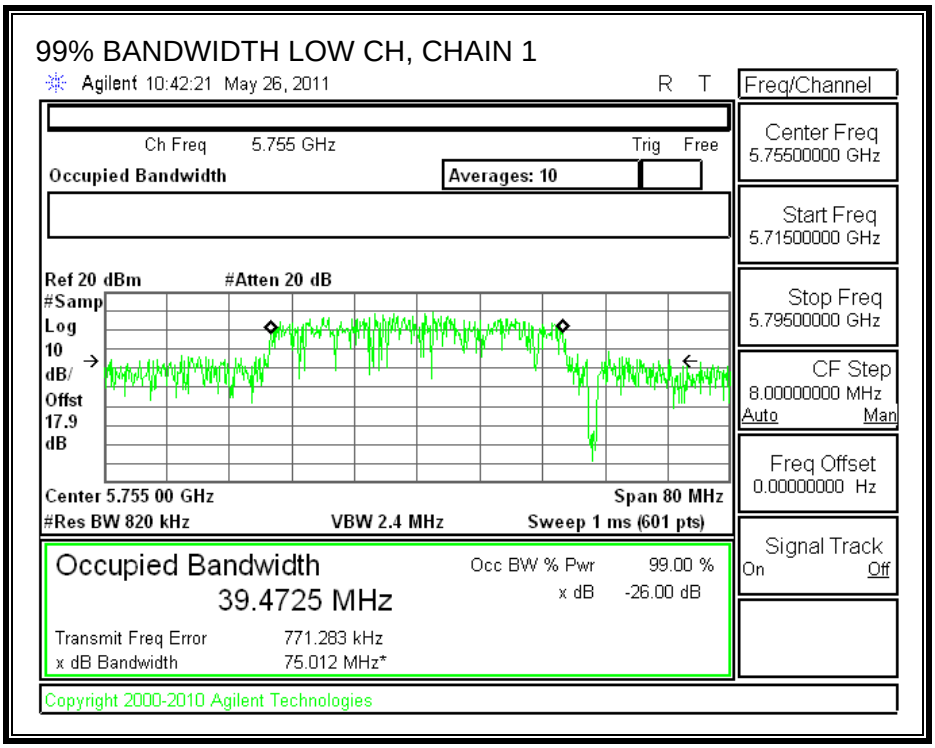
99% BANDWIDTH, CHAIN 1



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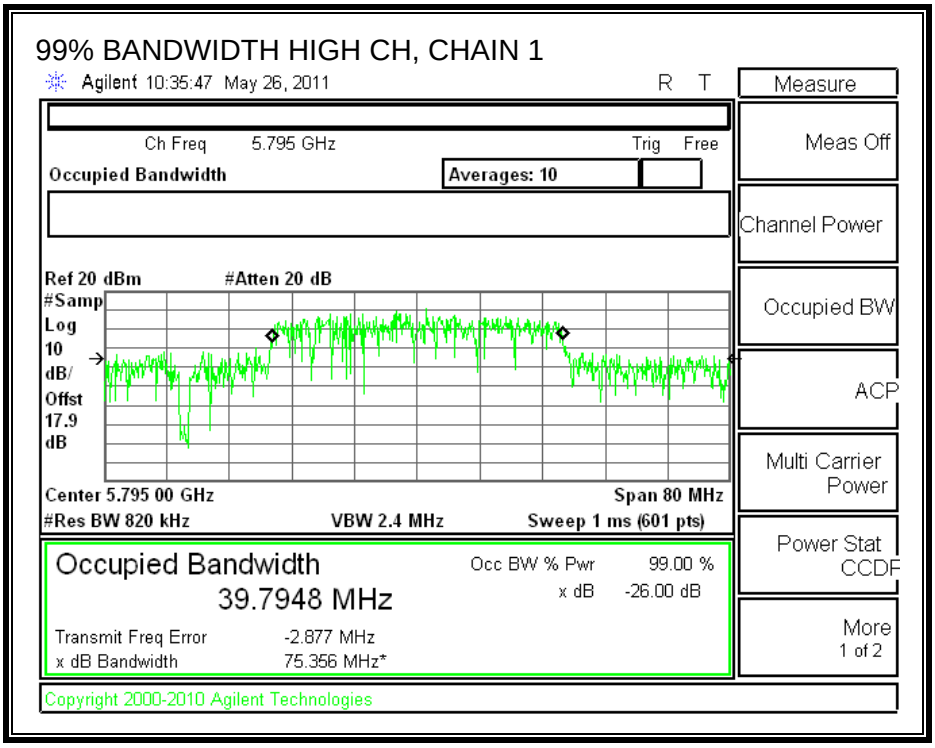

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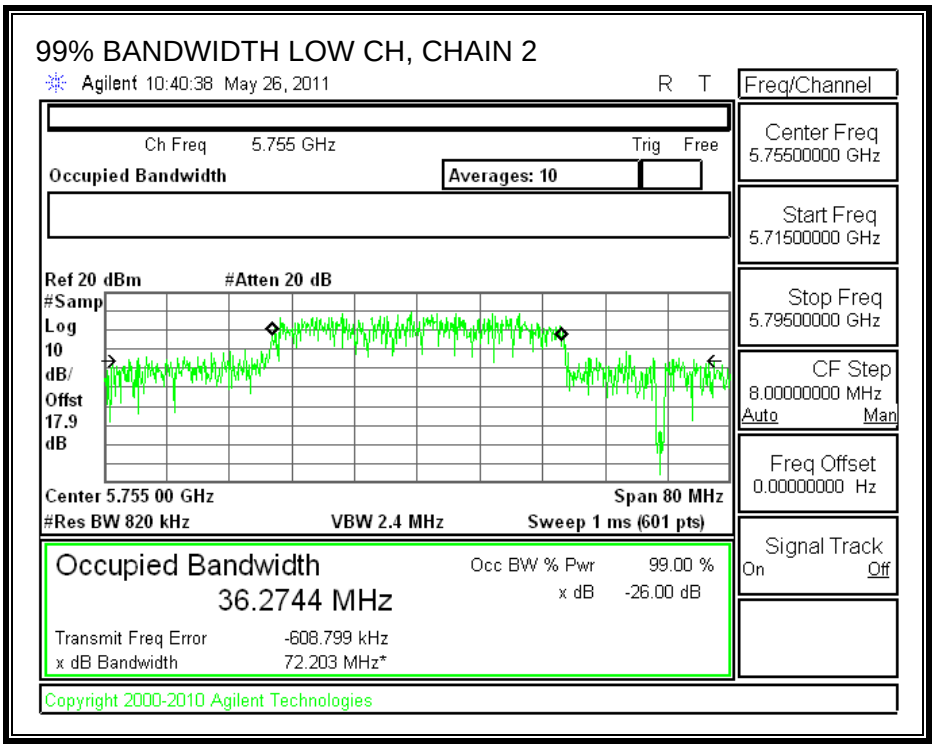
99% BANDWIDTH, CHAIN 2



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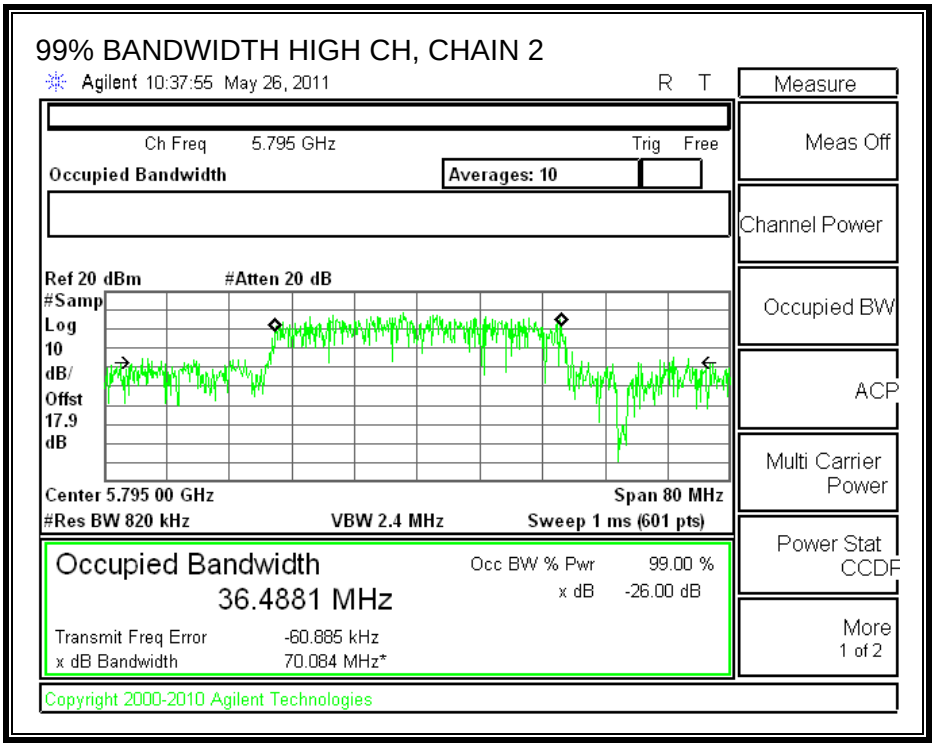

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7.7.3. OUTPUT POWER

LIMITS

FCC §15.247 (b)

IC RSS-210 A8.4

The highest combination of antenna gains is equal 7.21 dBi, therefore the limit is 28.79 dBm.

TEST PROCEDURE

Peak power is measured using the Channel bandwidth Alternative peak output power procedure specified in "TCB Training for Devices covered under Scopes A1 - A4" by Joe Dichoso, May 2003.

RESULTS

Channel	Frequency (MHz)	Chain 1 PK Power (dBm)	Chain 2 PK Power (dBm)	Attenuator + Cable Offset (dB)	Total Power (dBm)	Limit (dBm)	Margin (dB)
Low	5755	13.11	14.04	11.40	28.01	28.79	-0.78
High	5795	13.28	14.81	11.40	28.52	28.79	-0.27

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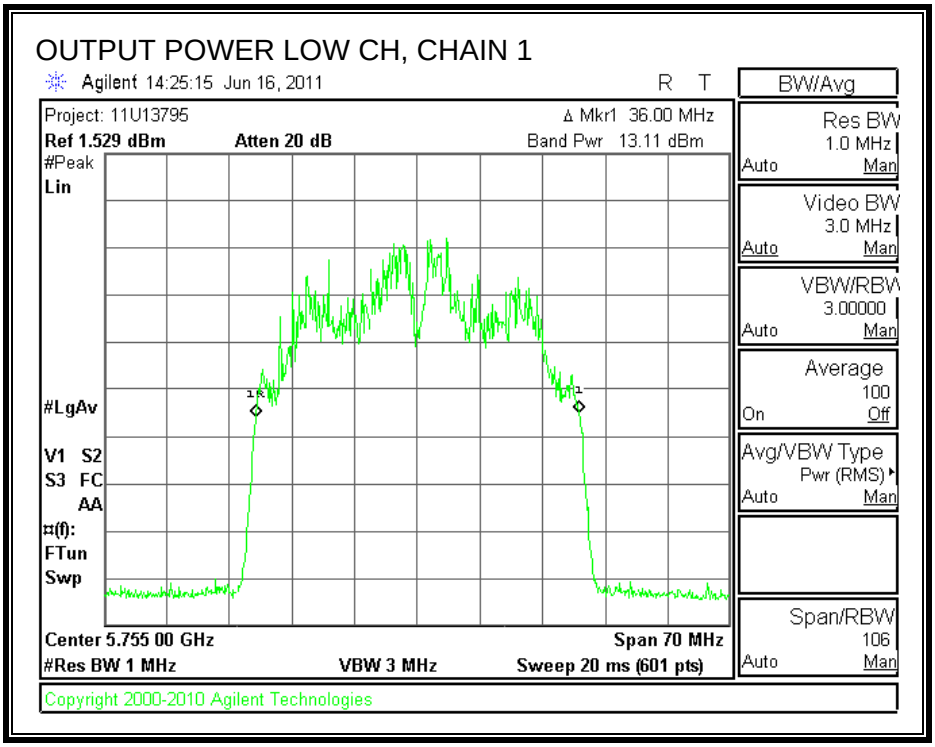
CHAIN 1 OUTPUT POWER



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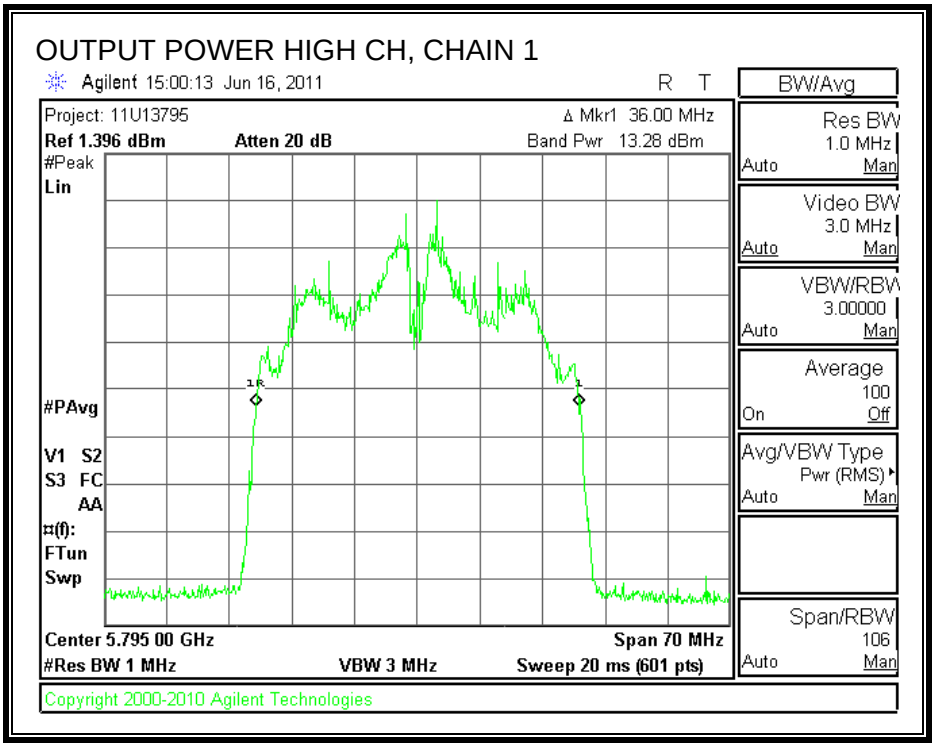

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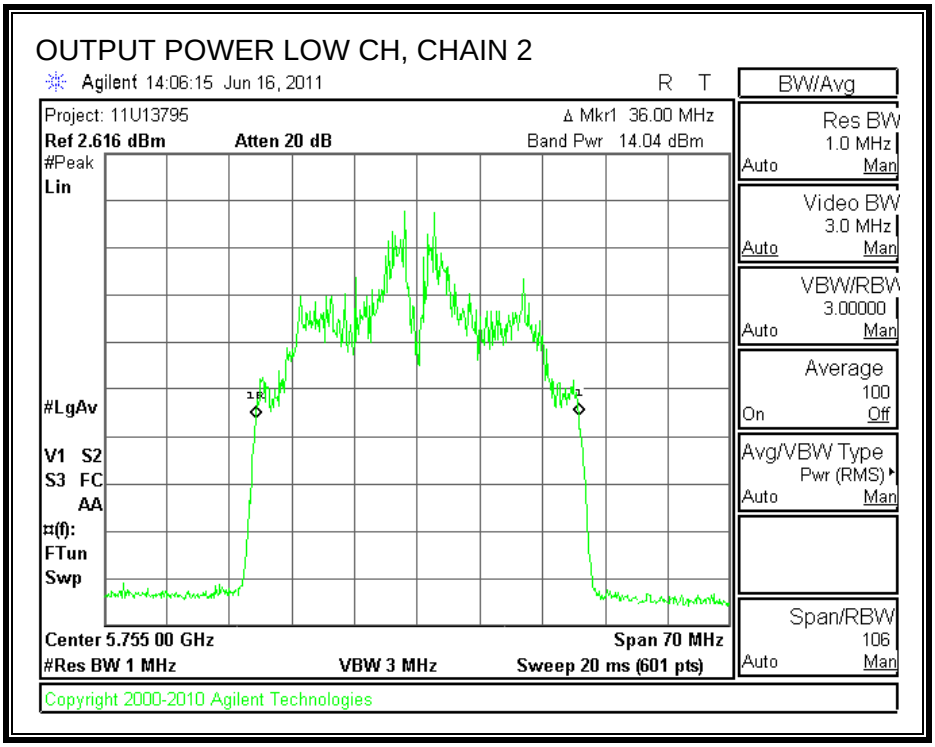
CHAIN 2 OUTPUT POWER



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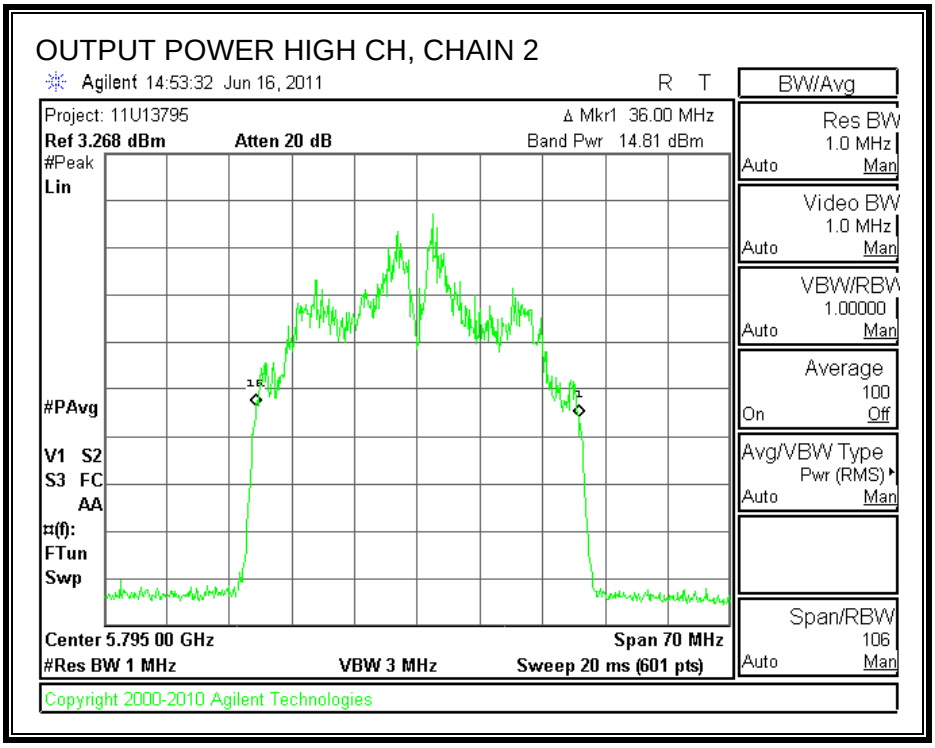

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7.7.4. AVERAGE POWER

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a power meter.

RESULTS

The cable assembly insertion loss of 17.9 dB (including 10 dB pad and 7.9 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

Channel	Frequency (MHz)	Chain 1 Power (dBm)	Chain 2 Power (dBm)	Total Power (dBm)
High	5795	16.00	16.63	19.34

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7.7.5. POWER SPECTRAL DENSITY

LIMITS

FCC §15.247 (e)

IC RSS-210 A8.2 (b)

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

TEST PROCEDURE

Peak output power was measured, therefore the power spectral density was measured using PSD Option 1 in accordance with FCC document "Measurement of Digital Transmission Systems Operating under Section 15.247", March 23, 2005.

RESULTS:

Channel	Frequency (MHz)	Chain 1 PSD (dBm)	Chain 2 PSD (dBm)	Total PSD (dBm)	Limit (dBm)	Margin (dB)
Low	5755	-2.81	-1.05	1.17	8	-6.83
High	5795	-3.32	-1.56	0.66	8	-7.34

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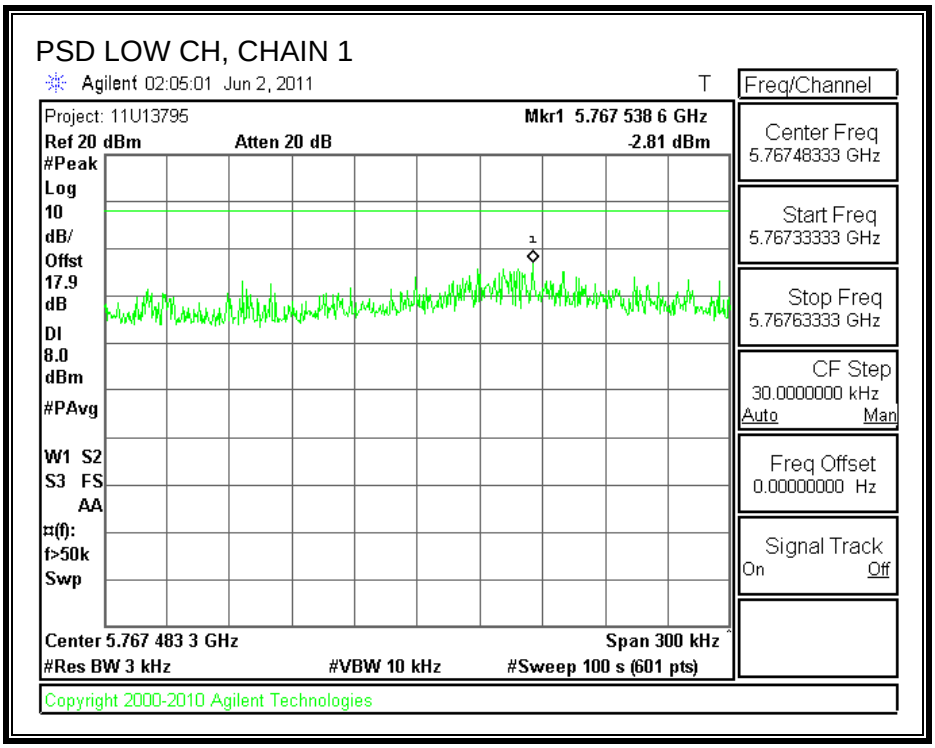
POWER SPECTRAL DENSITY, CHAIN 1



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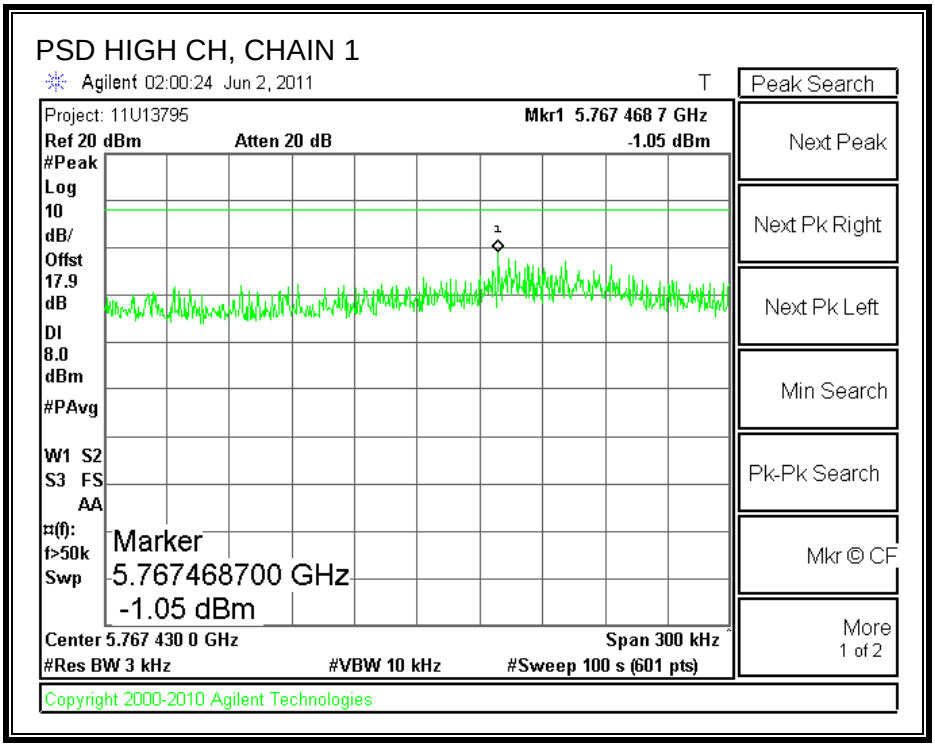

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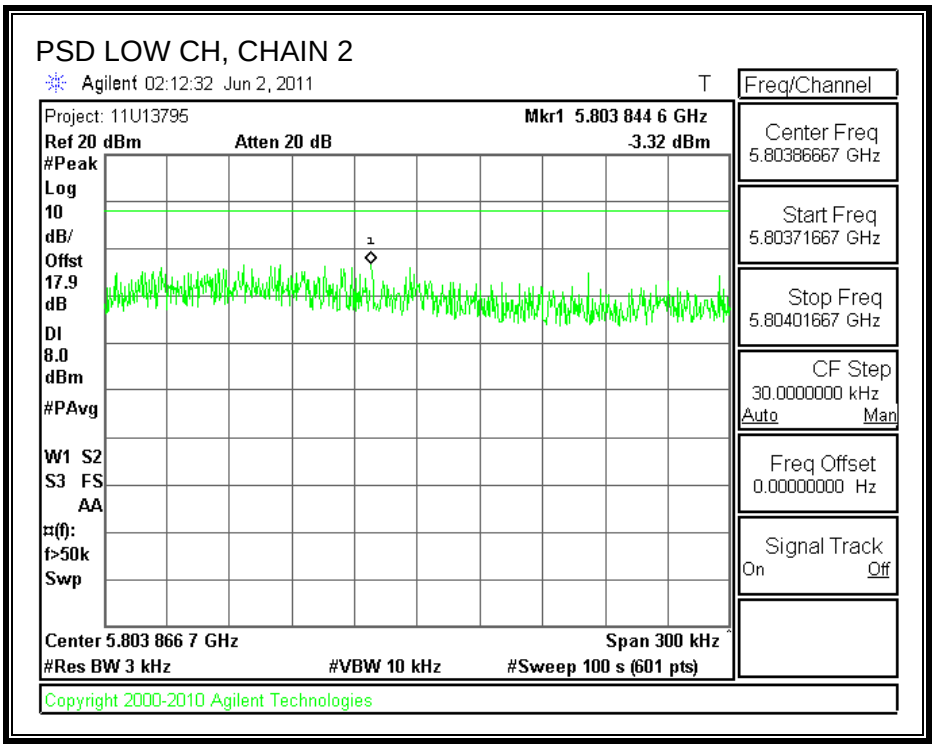
POWER SPECTRAL DENSITY, CHAIN 2



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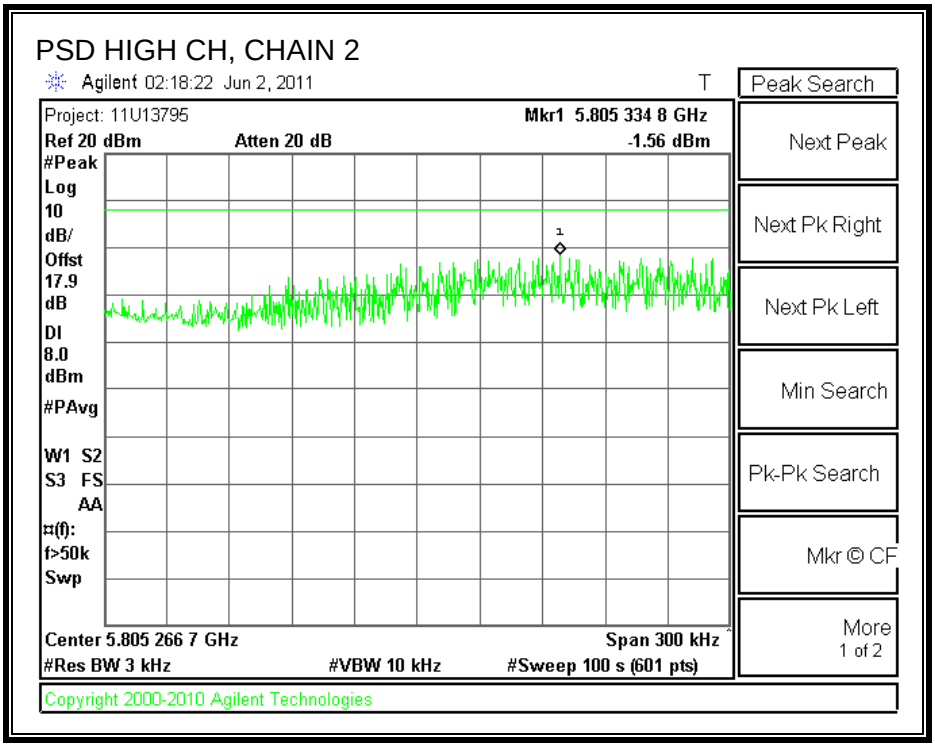

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7.7.6. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.247 (d)

IC RSS-210 A8.5

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

TEST PROCEDURE

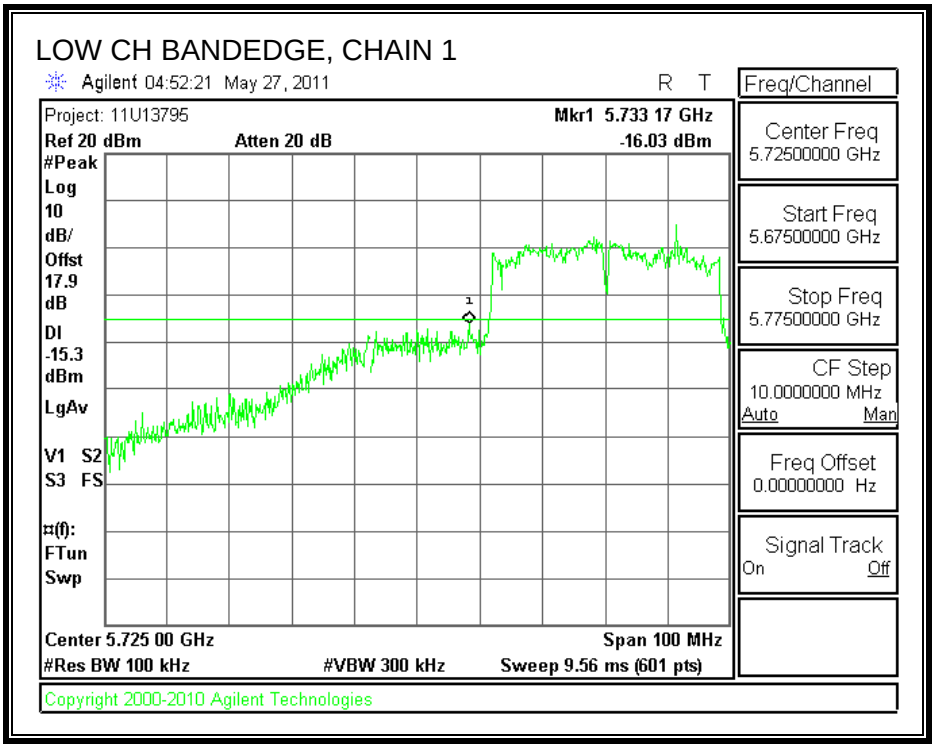
The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

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

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

RESULTS

CHAIN 1 SPURIOUS EMISSIONS



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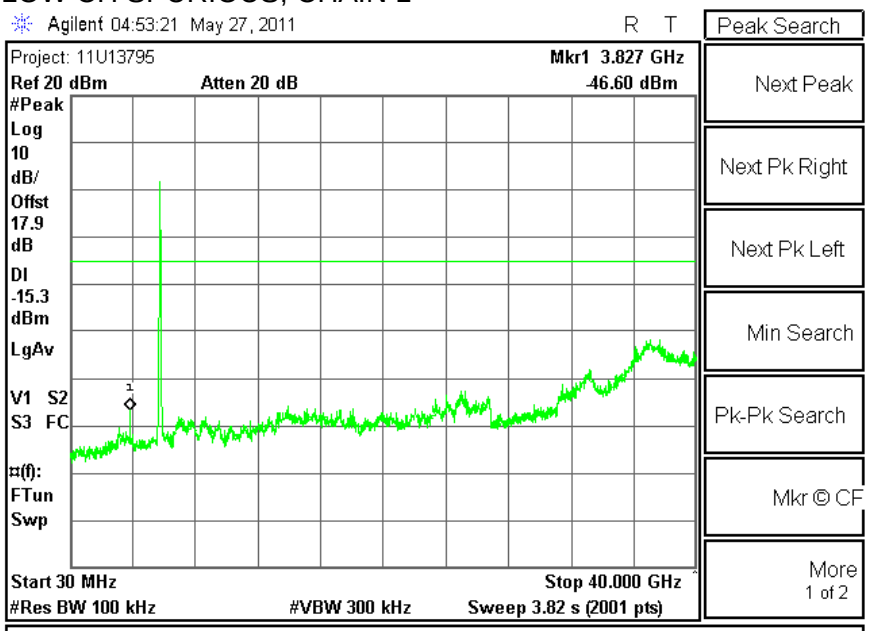
LOW CH SPURIOUS, CHAIN 1



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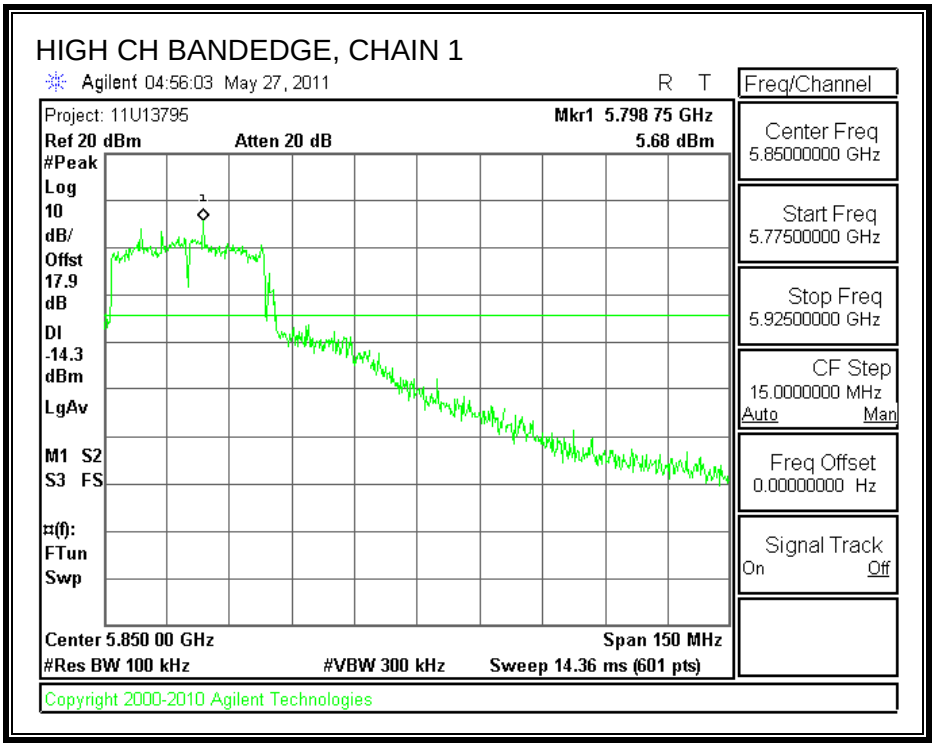
HIGH CH BANDEDGE, CHAIN 1



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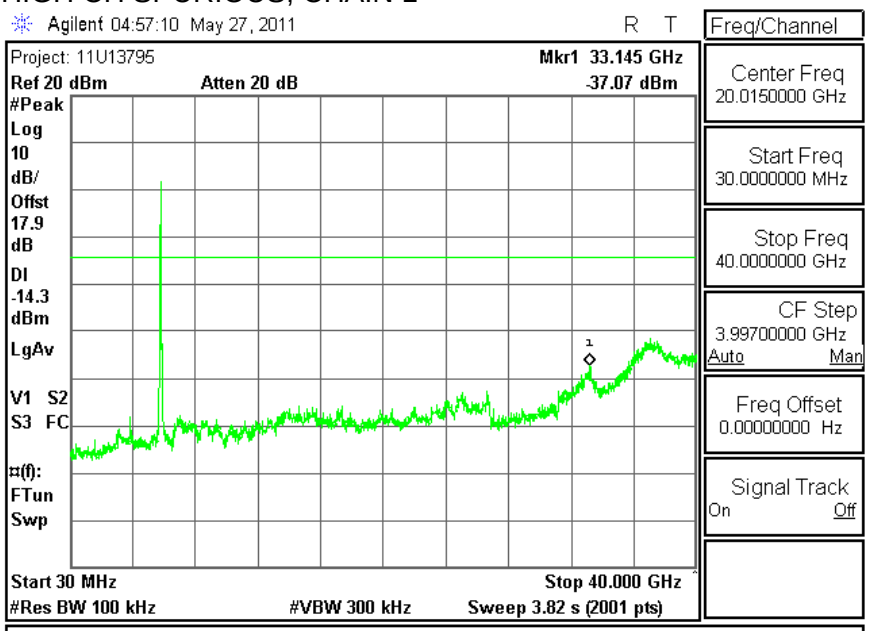
HIGH CH SPURIOUS, CHAIN 1



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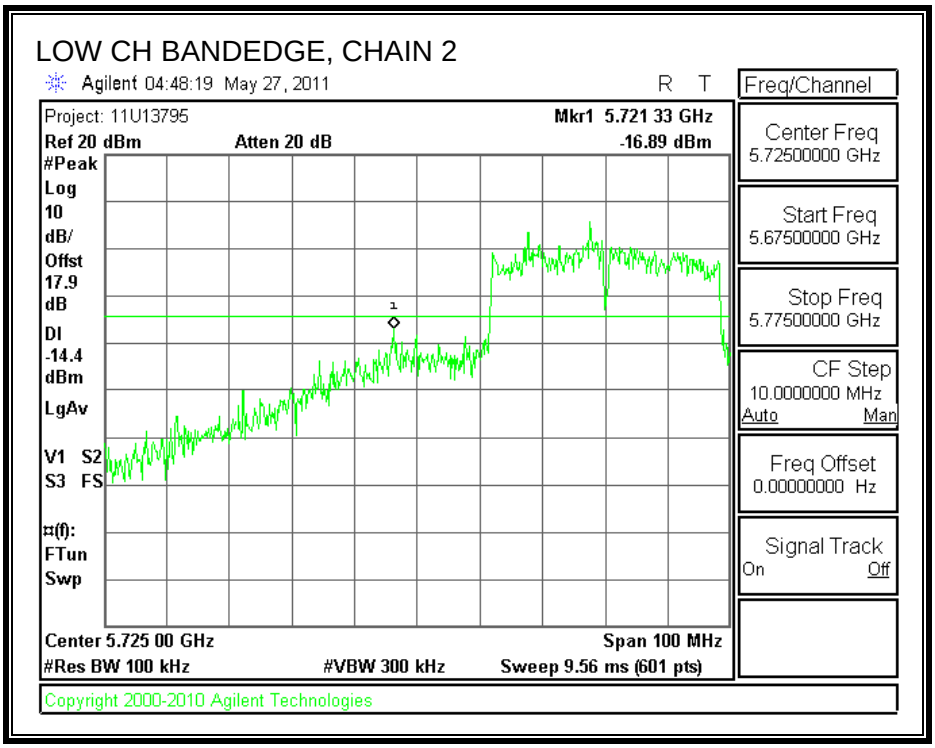
CHAIN 2 SPURIOUS EMISSIONS



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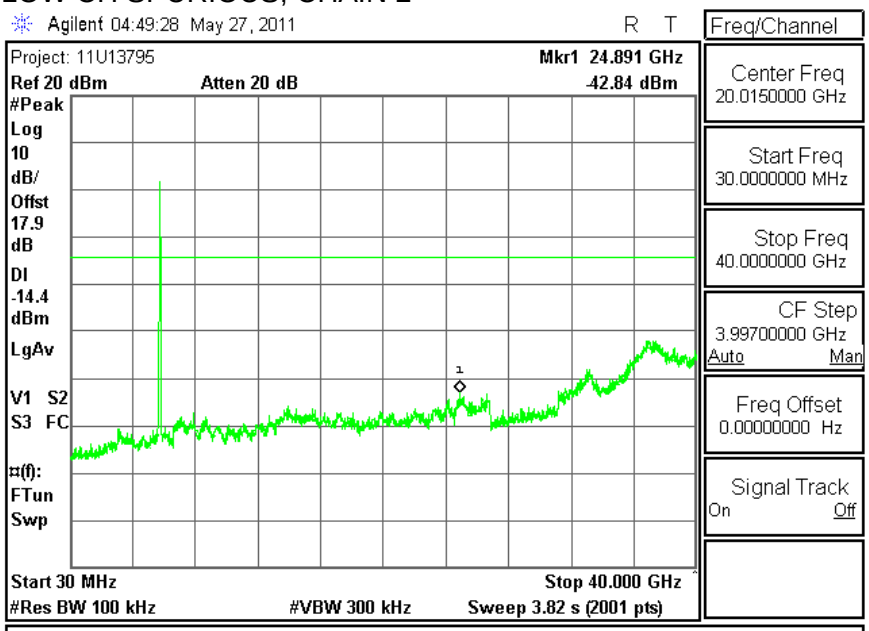
LOW CH SPURIOUS, CHAIN 2



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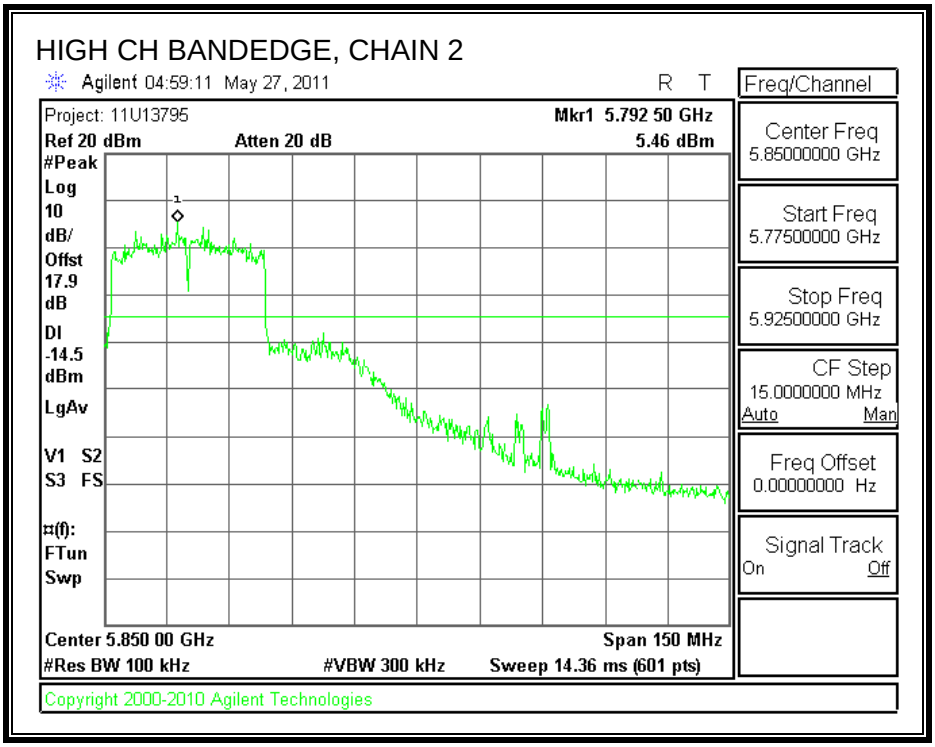
HIGH CH BANDEDGE, CHAIN 2



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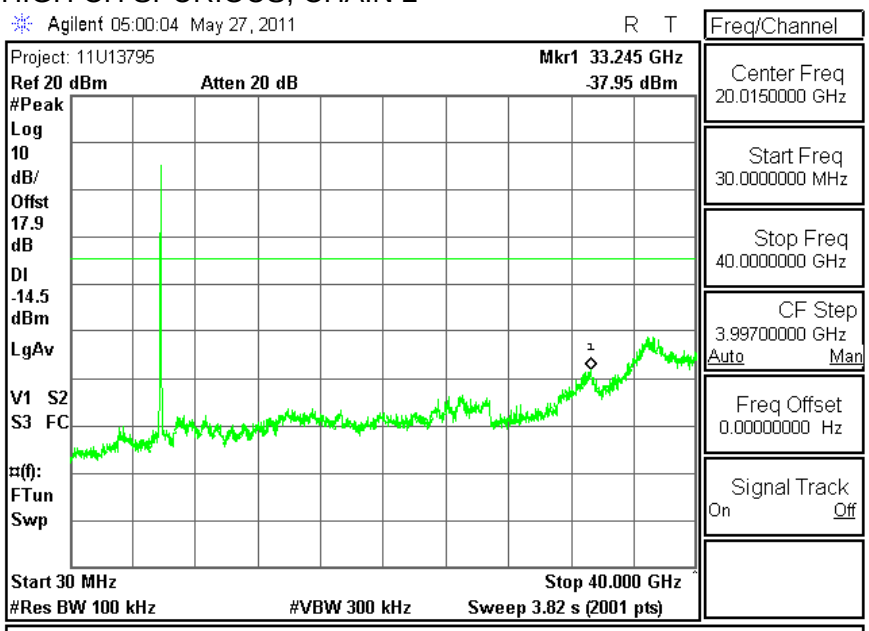
HIGH CH SPURIOUS, CHAIN 2



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8. RADIATED TEST RESULTS

8.1. LIMITS AND PROCEDURE

LIMITS

FCC §15.205 and §15.209

IC RSS-210 Clause 2.6 (Transmitter)

IC RSS-GEN Clause 6 (Receiver)

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

TEST PROCEDURE

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

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

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

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 appplicable band.

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

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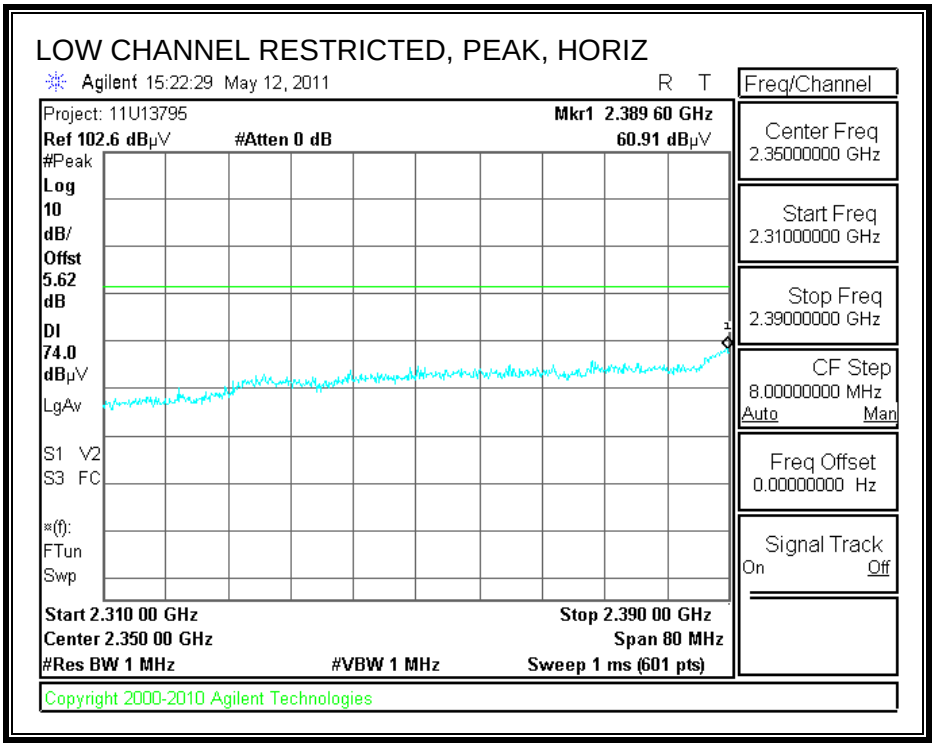
8.2. TRANSMITTER ABOVE 1 GHz

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

RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



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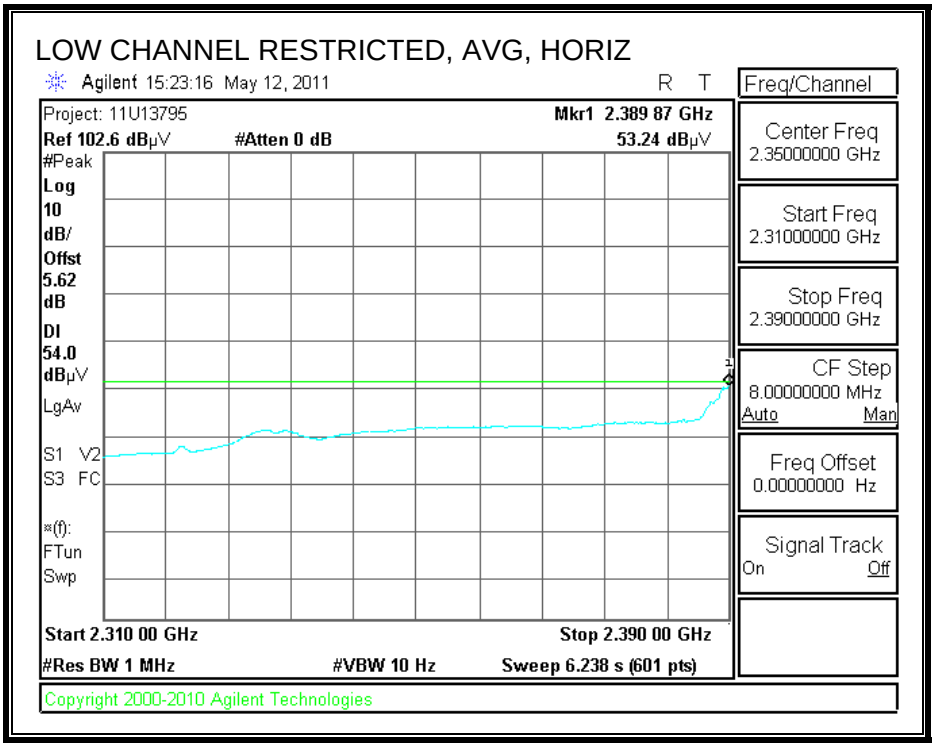
LOW CHANNEL RESTRICTED, AVG, HORIZ



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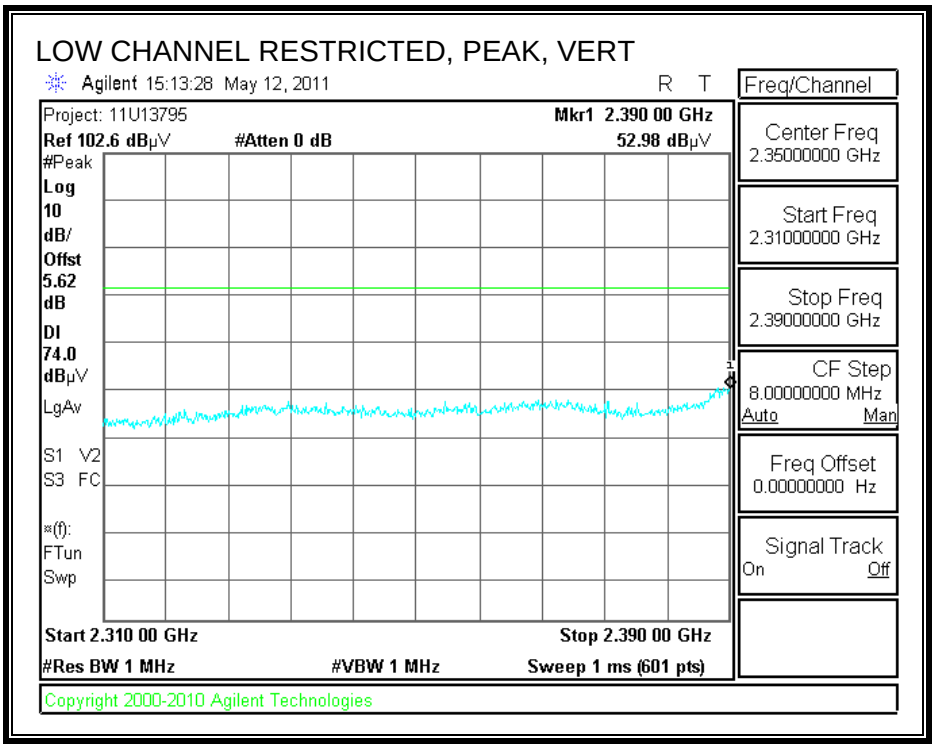
RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)



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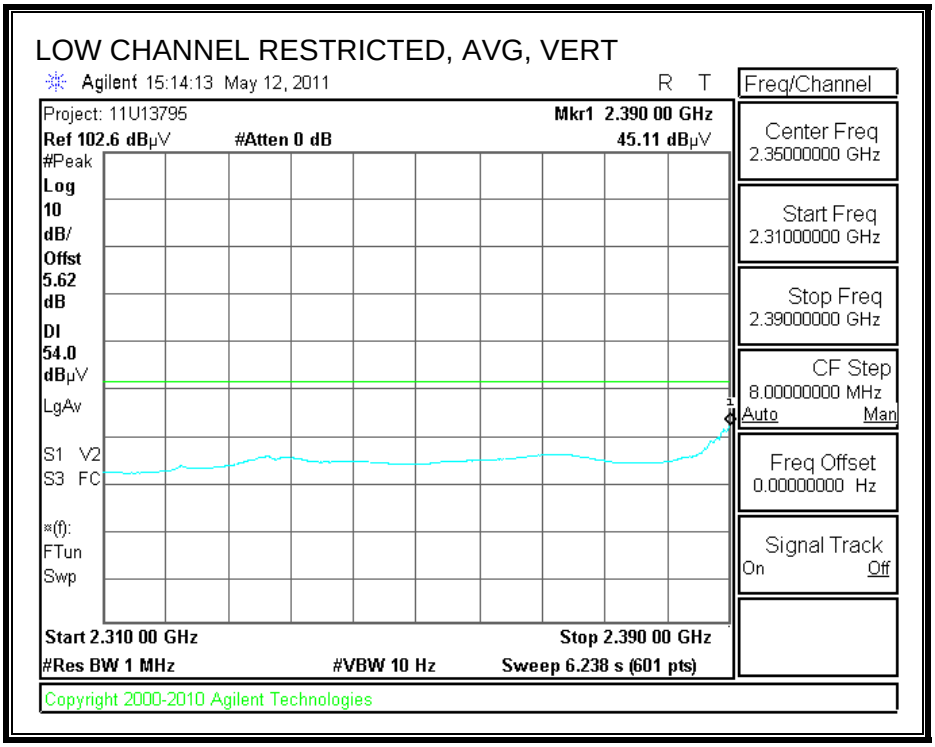
LOW CHANNEL RESTRICTED, AVG, VERT



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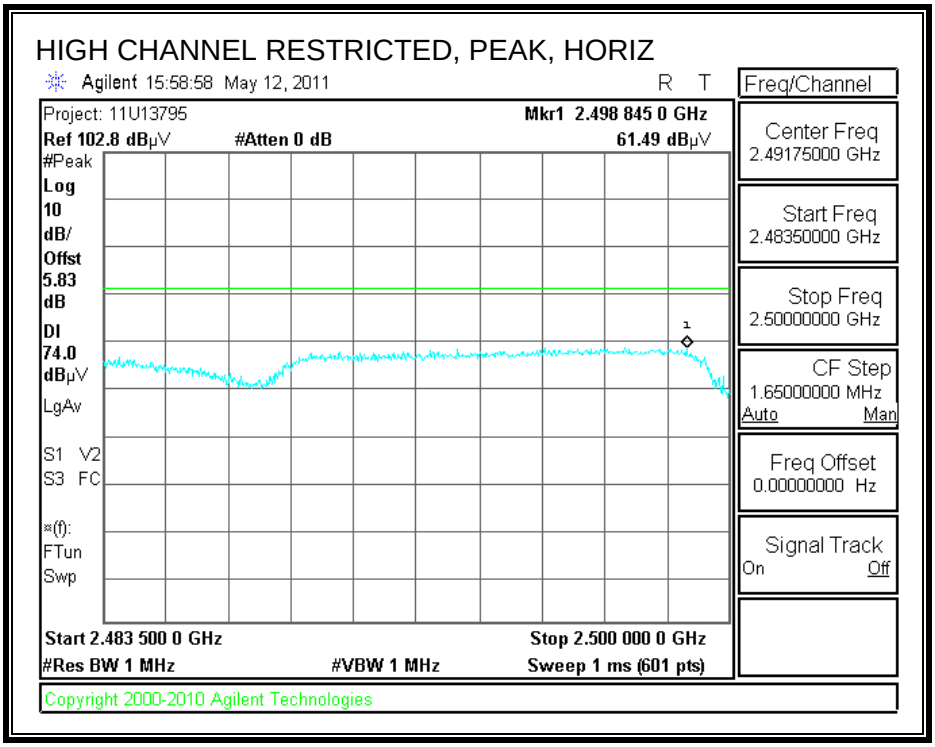
RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)



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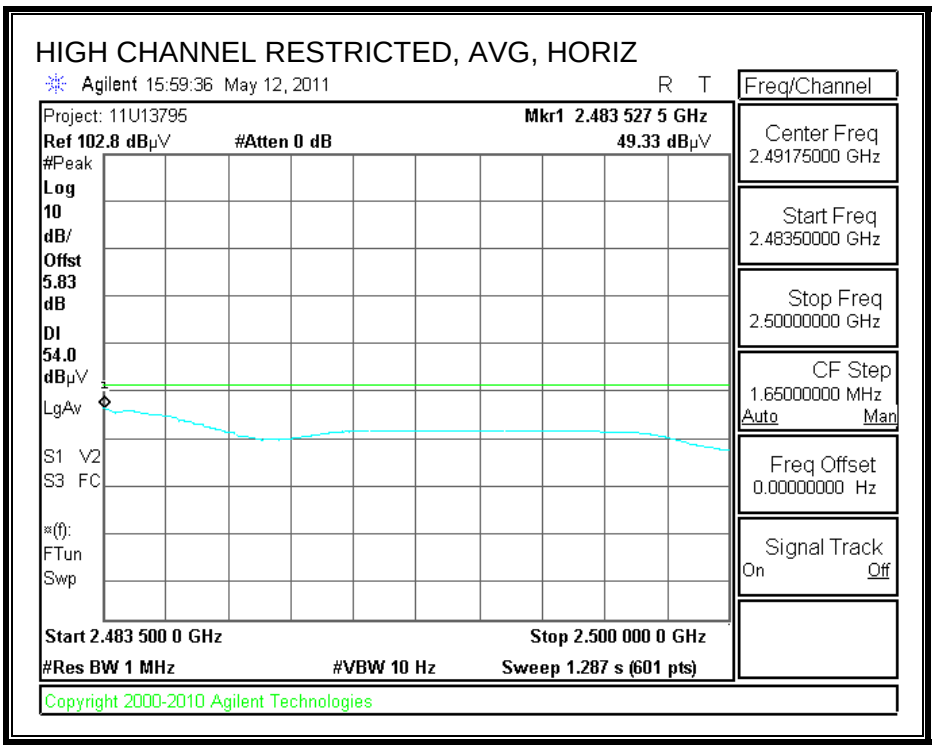
HIGH CHANNEL RESTRICTED, AVG, HORIZ



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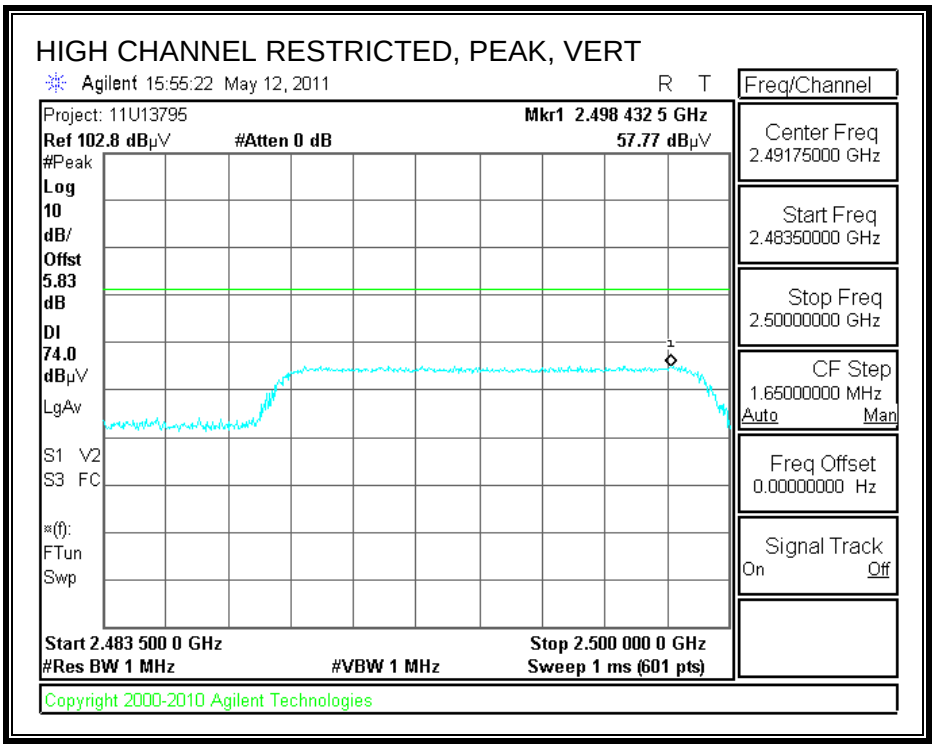
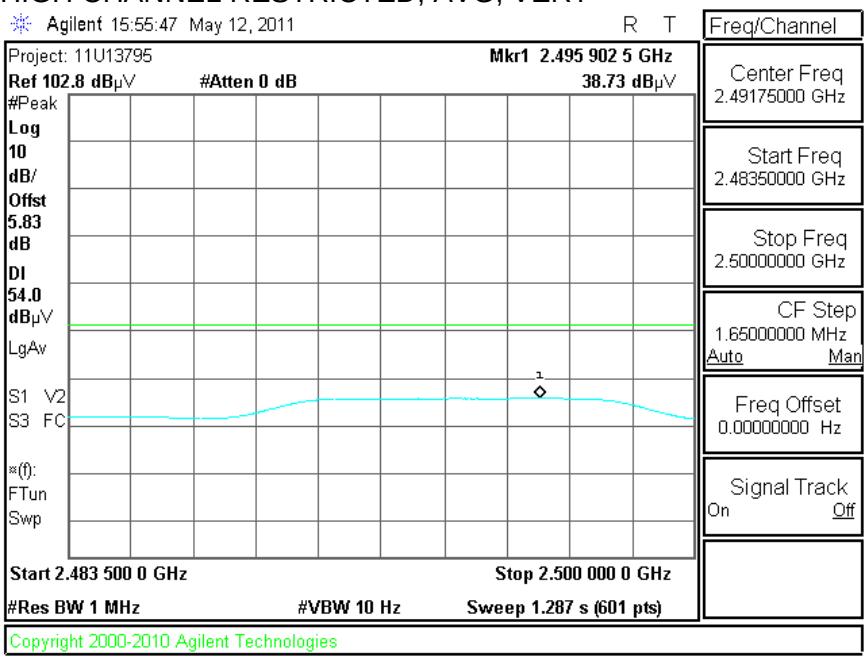
RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)



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

HIGH CHANNEL RESTRICTED, AVG, VERT



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HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement
Compliance Certification Services, Fremont 5m Chamber

Test Engr: Tom Chen
Date: 05/27/11
Project #: 11U13795
Company: Broadcom
Test Target: FCC Class B
Mode Oper: b mode, TX , EUT: P305

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	Notes
2412 MHz b mode													
4.824	3.0	48.4	32.7	5.8	-34.8	0.0	0.0	52.0	74.0	-22.0	H	P	
4.824	3.0	45.8	32.7	5.8	-34.8	0.0	0.0	49.4	54.0	-4.6	H	A	
4.824	3.0	49.2	32.7	5.8	-34.8	0.0	0.0	52.9	74.0	-21.1	V	P	
4.824	3.0	46.8	32.7	5.8	-34.8	0.0	0.0	50.4	54.0	-3.6	V	A	
2437 MHz b mode													
4.874	3.0	48.8	32.7	5.8	-34.8	0.0	0.0	52.5	74.0	-21.5	H	P	
4.874	3.0	46.3	32.7	5.8	-34.8	0.0	0.0	50.1	54.0	-3.9	H	A	
7.311	3.0	40.0	35.5	7.3	-34.1	0.0	0.0	48.6	74.0	-25.4	H	P	
7.311	3.0	33.1	35.5	7.3	-34.1	0.0	0.0	41.8	54.0	-12.2	H	A	
2437 MHz b mode													
4.874	3.0	51.7	32.7	5.8	-34.8	0.0	0.0	55.4	74.0	-18.6	V	P	
4.874	3.0	49.4	32.7	5.8	-34.8	0.0	0.0	53.1	54.0	-0.9	V	A	
7.311	3.0	39.0	35.5	7.3	-34.1	0.0	0.0	47.6	74.0	-26.4	V	P	
7.311	3.0	30.8	35.5	7.3	-34.1	0.0	0.0	39.5	54.0	-14.6	V	A	
2462 MHz b mode													
4.924	3.0	42.3	32.7	5.9	-34.8	0.0	0.0	46.1	74.0	-27.9	V	P	
4.924	3.0	38.5	32.7	5.9	-34.8	0.0	0.0	42.3	54.0	-11.7	V	A	
7.386	3.0	38.9	35.6	7.3	-34.1	0.0	0.0	47.7	74.0	-26.3	V	P	
7.386	3.0	31.4	35.6	7.3	-34.1	0.0	0.0	40.2	54.0	-13.8	V	A	
2462 MHz b mode													
4.924	3.0	47.8	32.7	5.9	-34.8	0.0	0.0	51.6	74.0	-22.4	H	P	
4.924	3.0	45.1	32.7	5.9	-34.8	0.0	0.0	48.9	54.0	-5.1	H	A	
7.386	3.0	38.6	35.6	7.3	-34.1	0.0	0.0	47.4	74.0	-26.6	H	P	
7.386	3.0	30.4	35.6	7.3	-34.1	0.0	0.0	39.1	54.0	-14.9	H	A	

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

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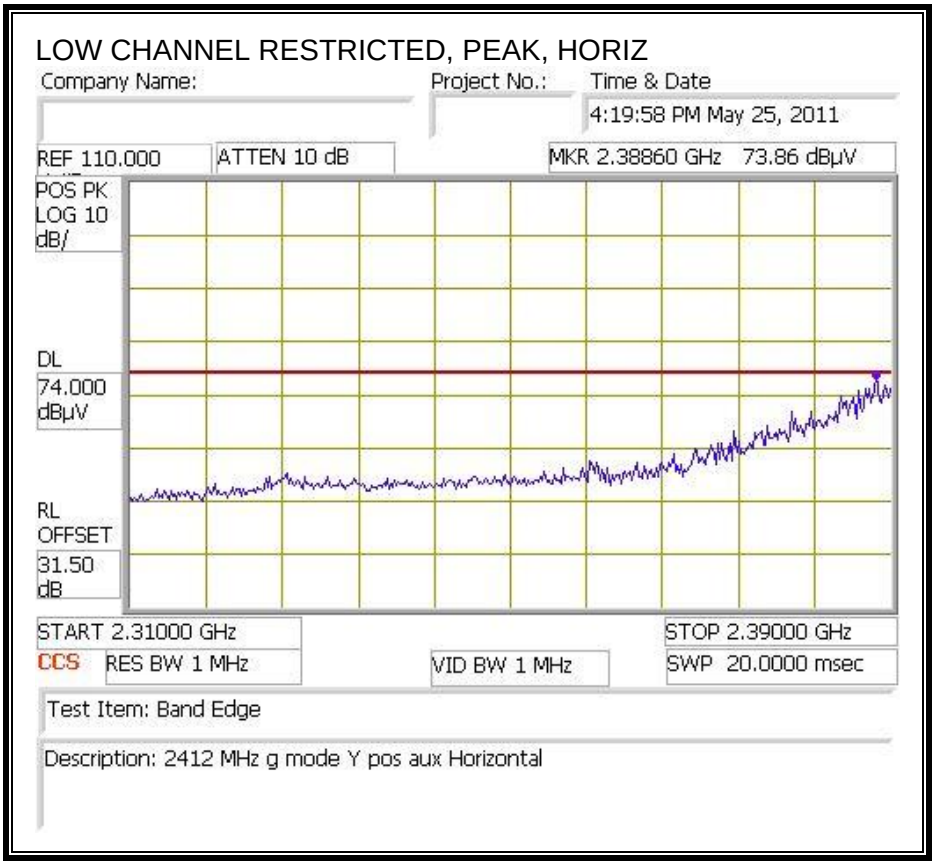
8.2.2. TRANSMITTER ABOVE 1 GHz FOR 802.11g MODE IN THE 2.4 GHz BAND

RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



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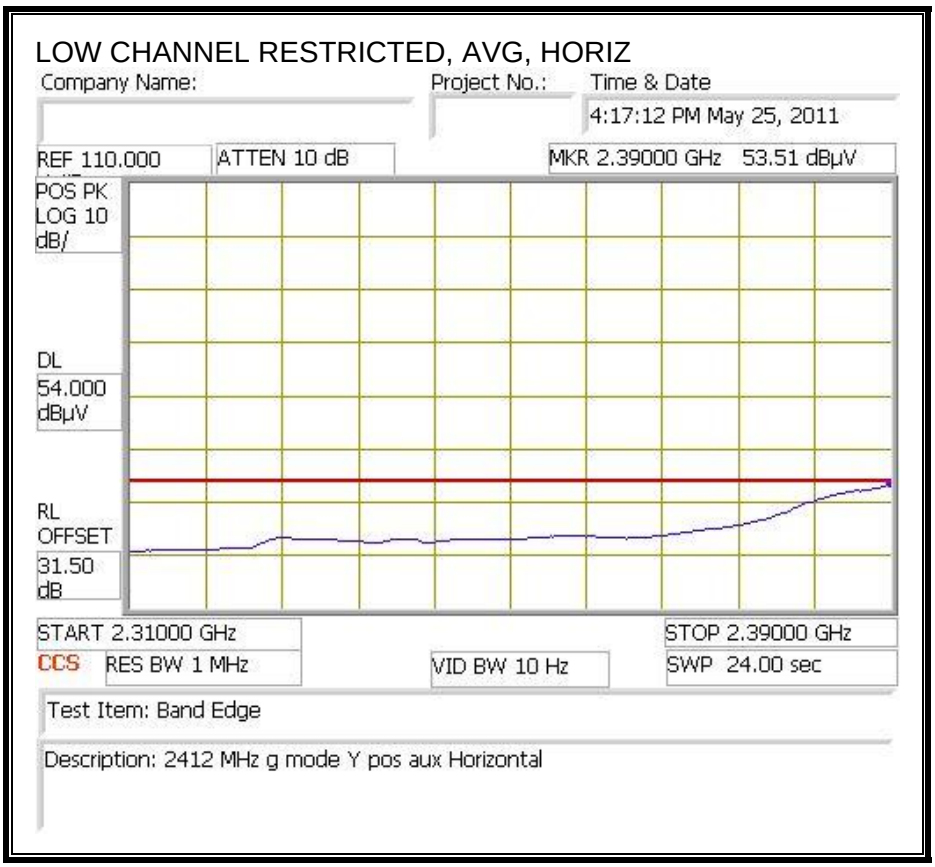

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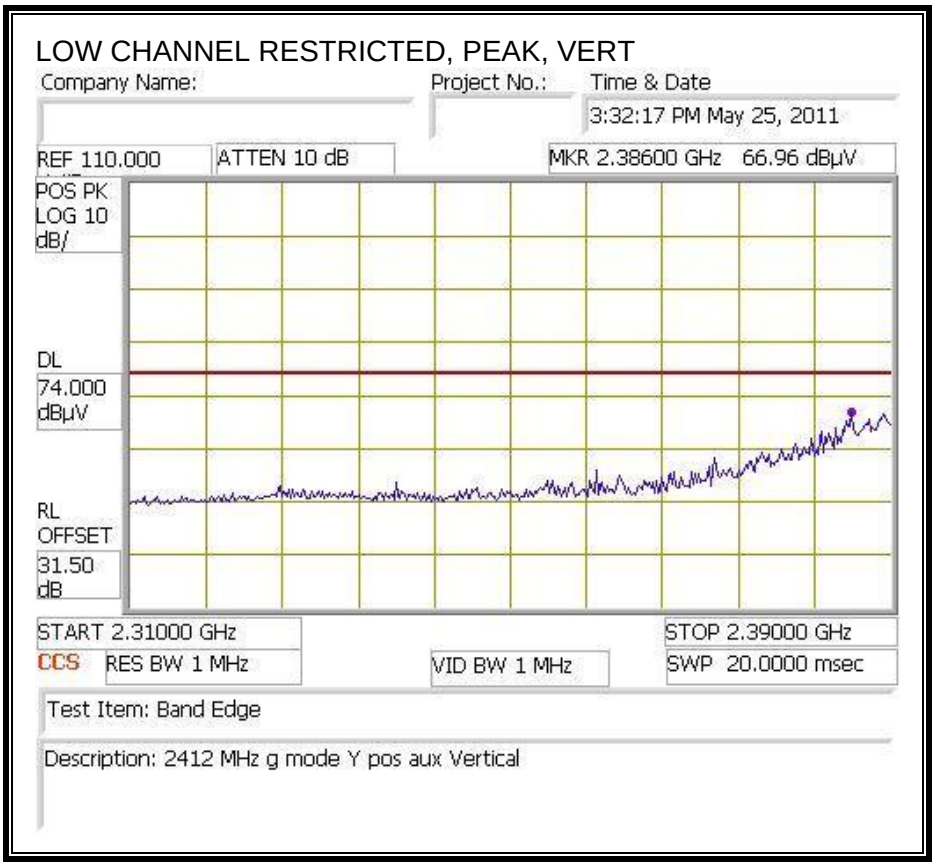
RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)



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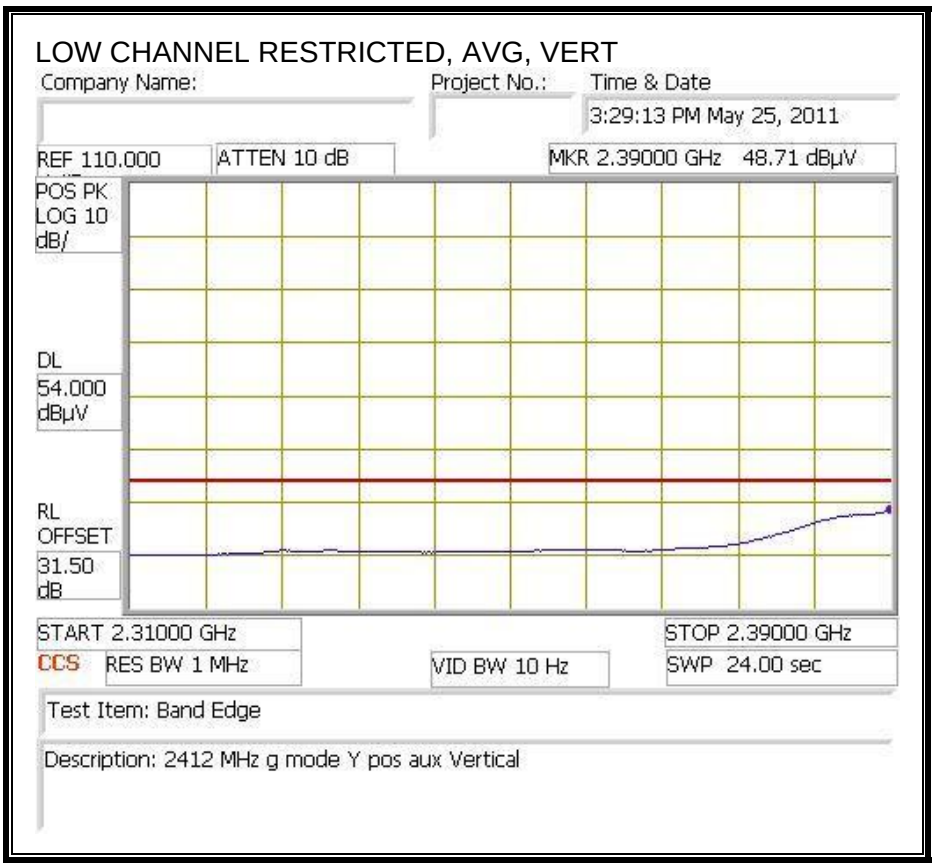
LOW CHANNEL RESTRICTED, AVG, VERT



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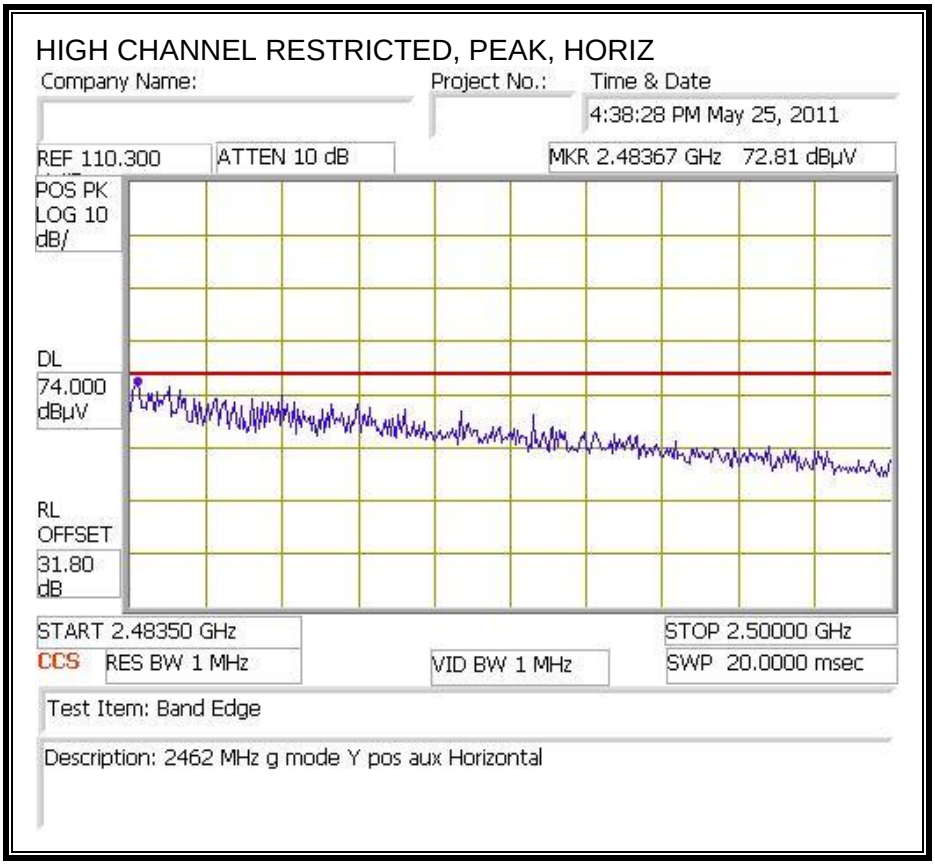
RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)



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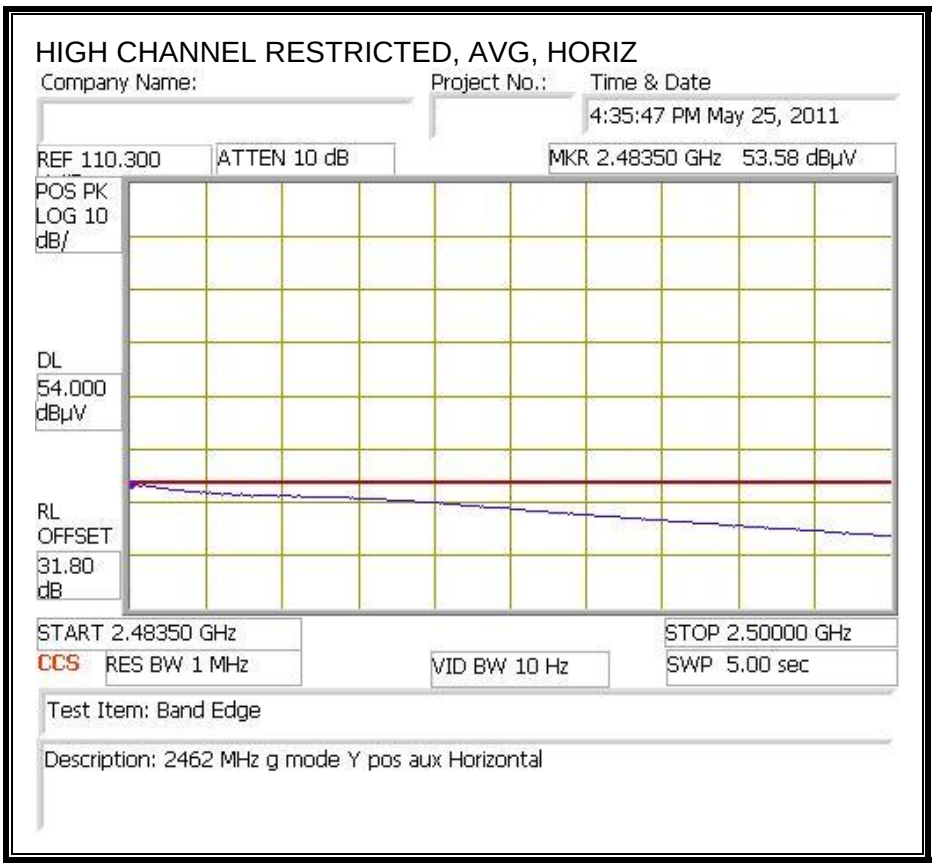

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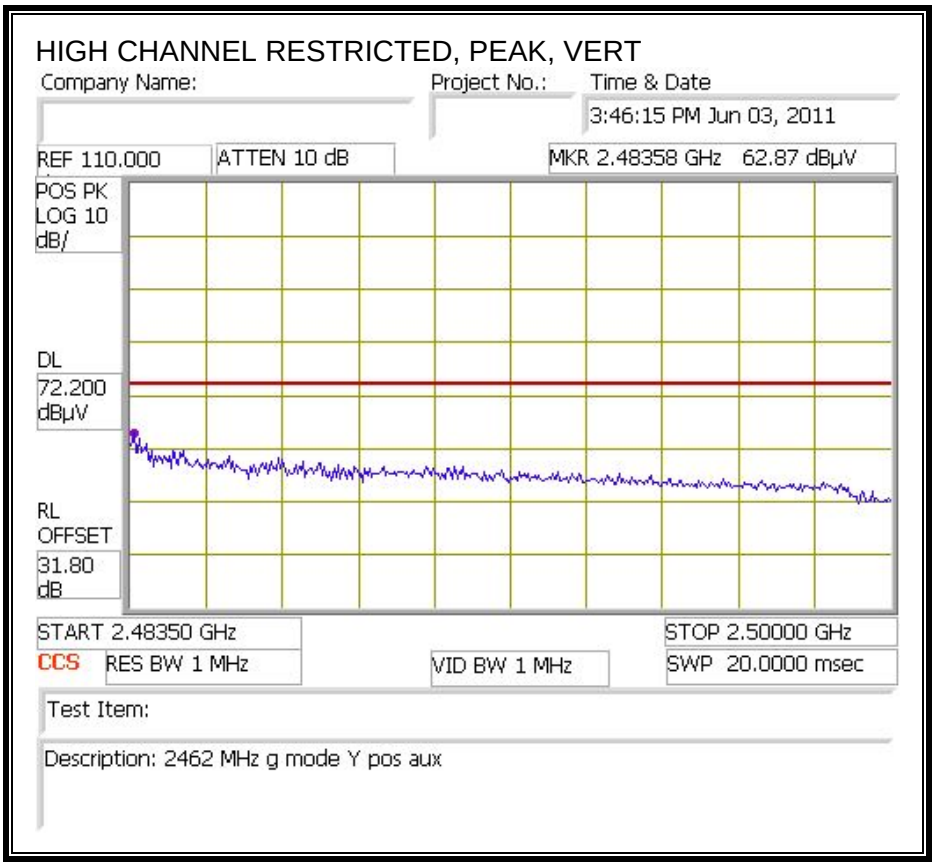
RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)



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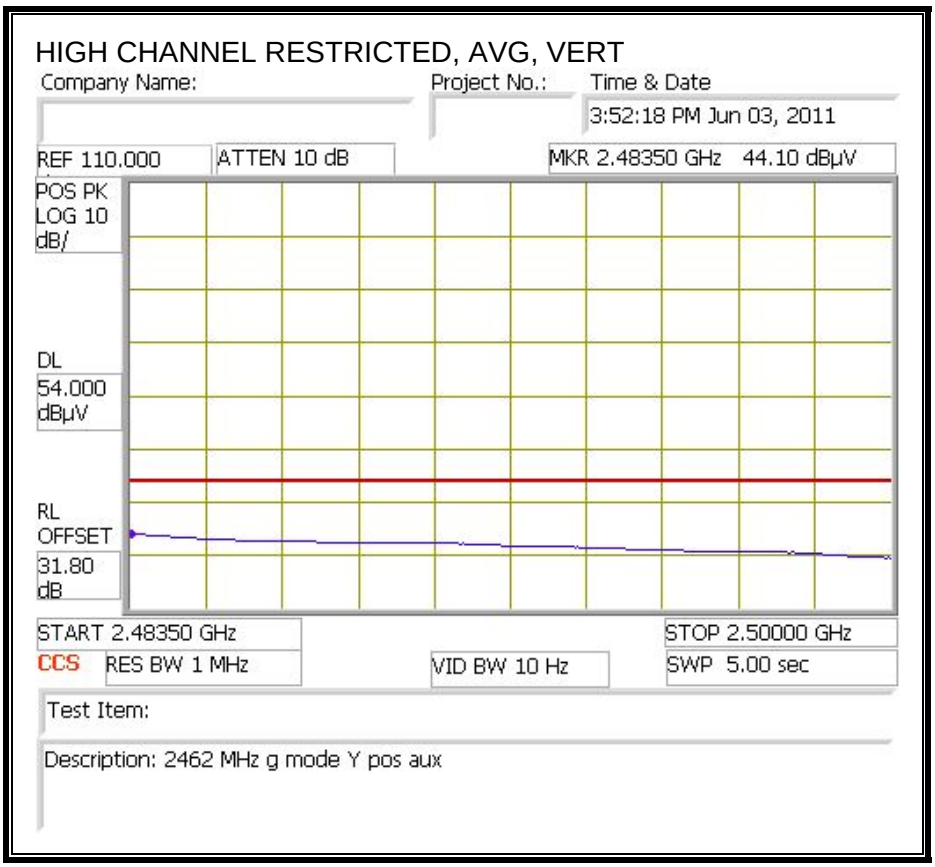

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HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement
Compliance Certification Services, Fremont 5m Chamber

Test Engr: Tom Chen
Date: 05/11/11
Project #: 11U13795
Company: Broadcom
Test Target: FCC Class B
Mode Oper: g mode, TX , EUT: P305

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	Notes
2412MHz g mode													
4.824	3.0	52.1	32.7	5.8	-34.8	0.0	0.0	55.8	74.0	-18.2	V	P	
4.824	3.0	37.8	32.7	5.8	-34.8	0.0	0.0	41.4	54.0	-12.6	V	A	
4.824	3.0	47.4	32.7	5.8	-34.8	0.0	0.0	51.0	74.0	-23.0	H	P	
4.824	3.0	33.0	32.7	5.8	-34.8	0.0	0.0	36.7	54.0	-17.3	H	A	
2437MHz g mode, AUX													
4.874	3.0	49.4	32.7	5.8	-34.8	0.0	0.0	53.2	74.0	-20.8	H	P	
4.874	3.0	37.0	32.7	5.8	-34.8	0.0	0.0	40.7	54.0	-13.3	H	A	
7.311	3.0	55.2	35.5	7.3	-34.1	0.0	0.0	63.8	74.0	-10.2	H	P	
7.311	3.0	41.4	35.5	7.3	-34.1	0.0	0.0	50.0	54.0	-4.0	H	A	
2437MHz g mode, AUX													
7.311	3.0	49.3	35.5	7.3	-34.1	0.0	0.0	58.0	74.0	-16.0	V	P	
7.311	3.0	36.1	35.5	7.3	-34.1	0.0	0.0	44.7	54.0	-9.3	V	A	
4.874	3.0	53.6	32.7	5.8	-34.8	0.0	0.0	57.3	74.0	-16.7	V	P	
4.874	3.0	40.1	32.7	5.8	-34.8	0.0	0.0	43.8	54.0	-10.2	V	A	
2462MHz g mode, AUX													
4.924	3.0	50.0	32.7	5.9	-34.8	0.0	0.0	53.8	74.0	-20.2	V	P	
4.924	3.0	35.4	32.7	5.9	-34.8	0.0	0.0	39.2	54.0	-14.8	V	A	
7.386	3.0	36.3	35.6	7.3	-34.1	0.0	0.0	45.1	74.0	-28.9	V	P	
7.386	3.0	24.0	35.6	7.3	-34.1	0.0	0.0	32.8	54.0	-21.2	V	A	
2462MHz g mode, AUX													
4.924	3.0	47.7	32.7	5.9	-34.8	0.0	0.0	51.5	74.0	-22.5	H	P	
4.924	3.0	33.5	32.7	5.9	-34.8	0.0	0.0	37.3	54.0	-16.7	H	A	
7.386	3.0	48.1	35.6	7.3	-34.1	0.0	0.0	56.9	74.0	-17.1	H	P	
7.386	3.0	31.9	35.6	7.3	-34.1	0.0	0.0	40.7	54.0	-13.3	H	A	

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

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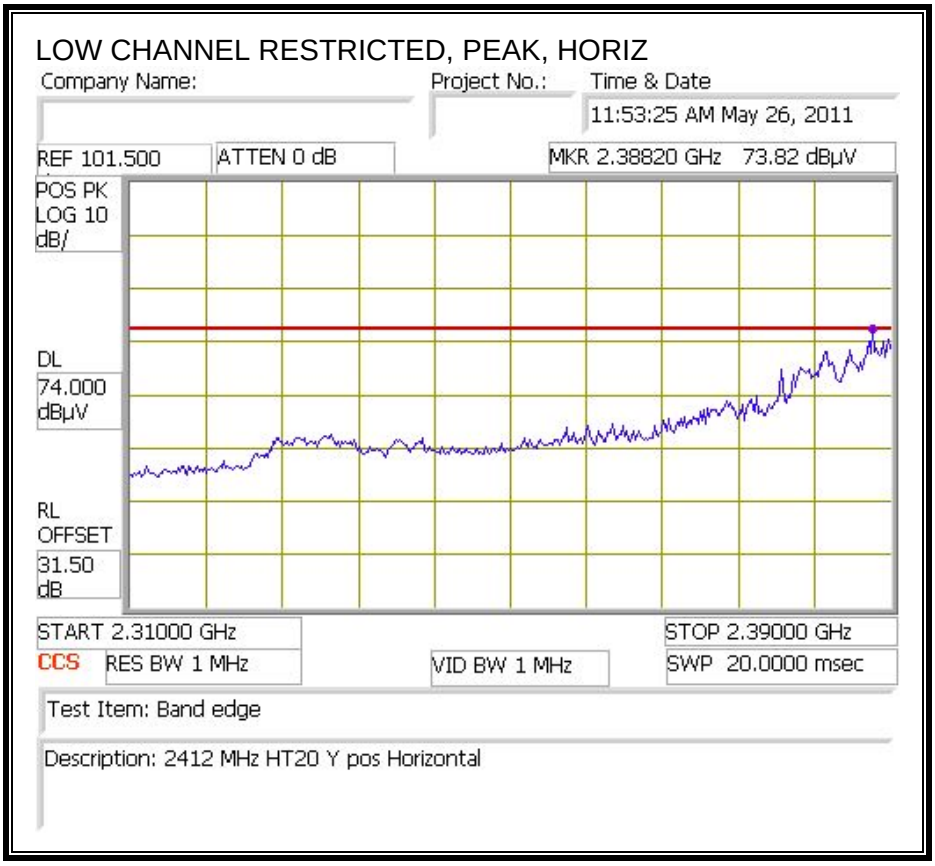
8.2.3. TRANSMITTER ABOVE 1 GHz FOR 802.11n HT20 MODE IN THE 2.4 GHz BAND

RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



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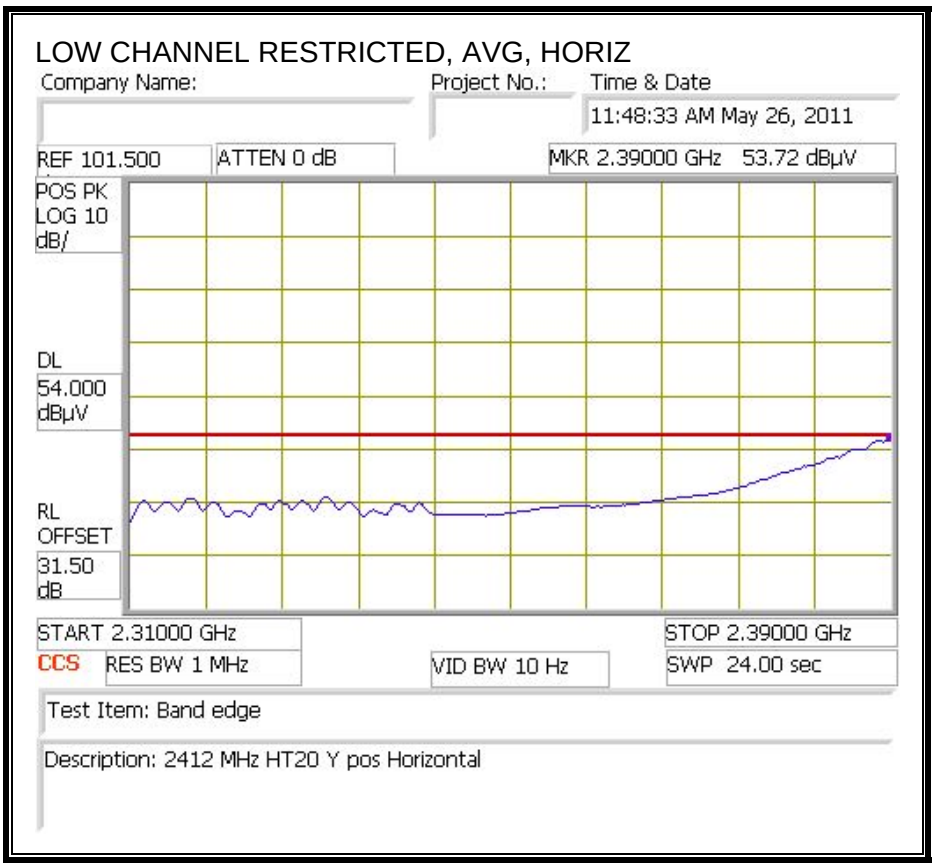

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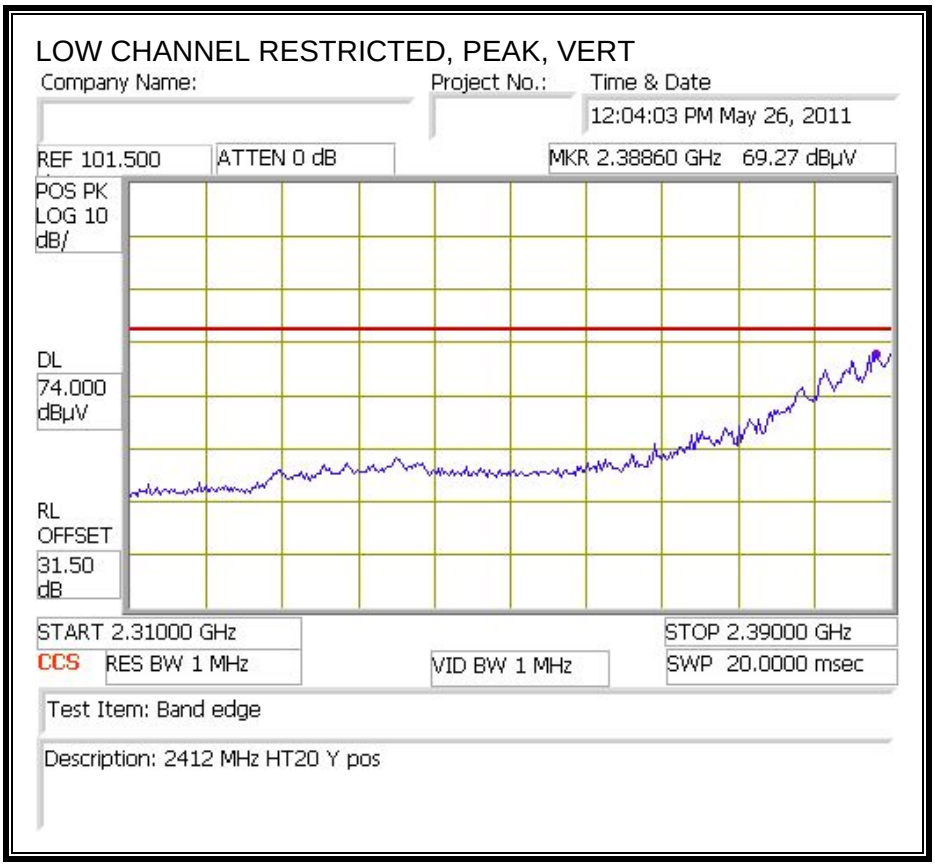
RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)



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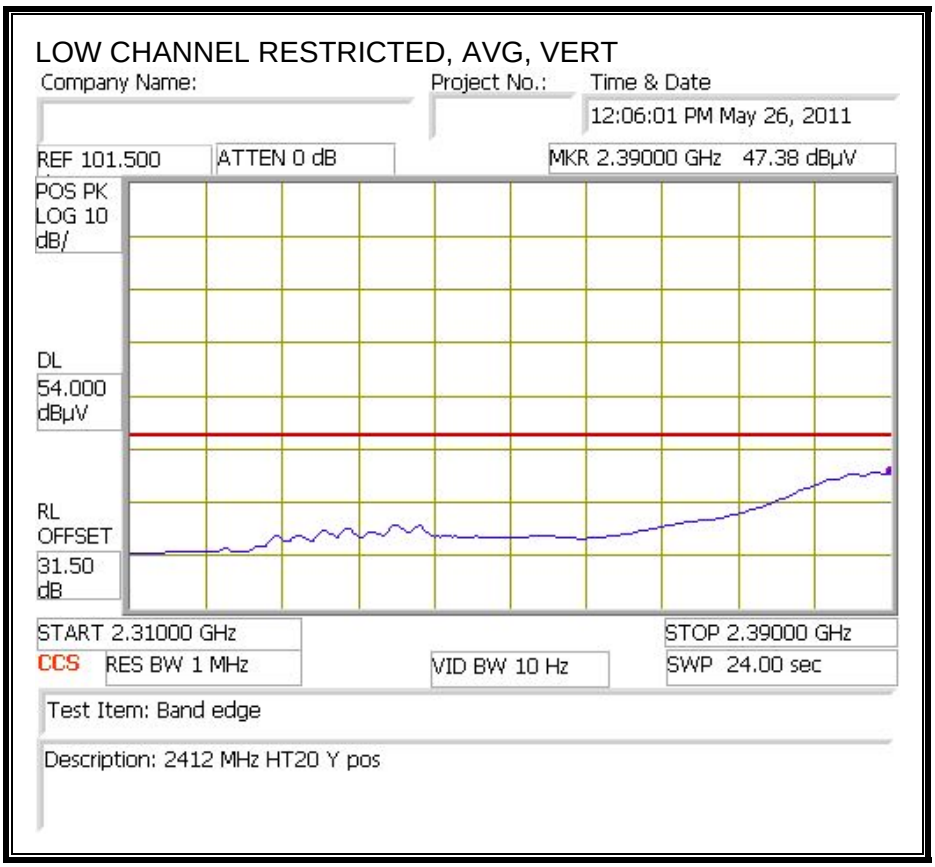

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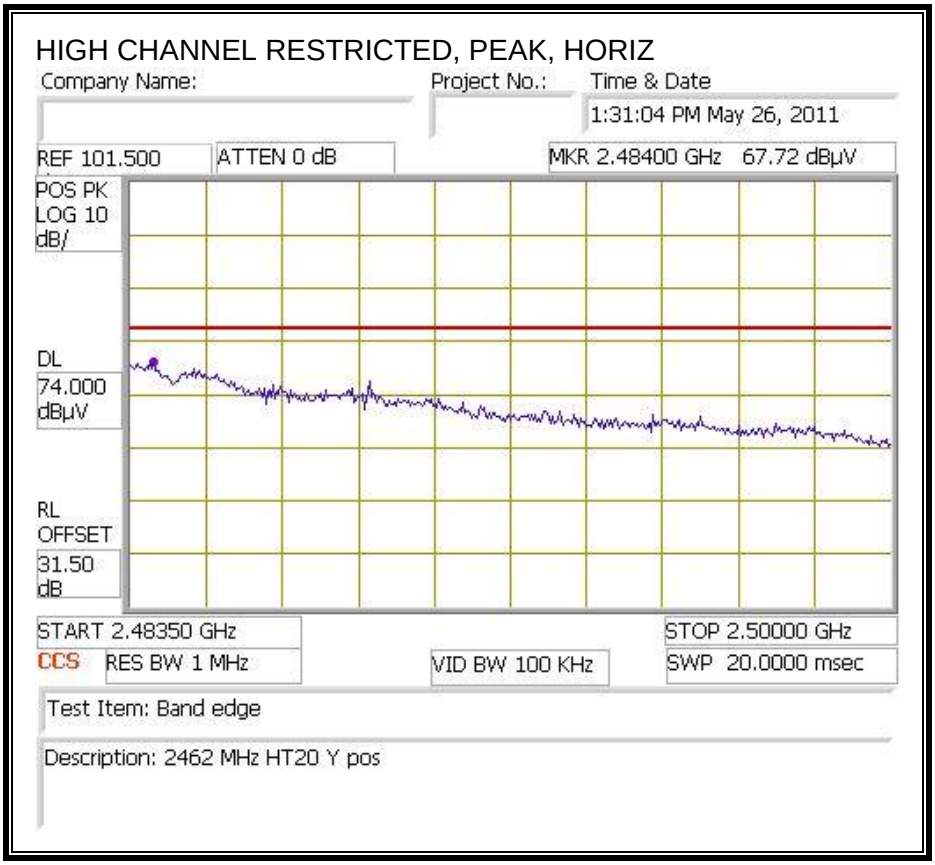
RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)



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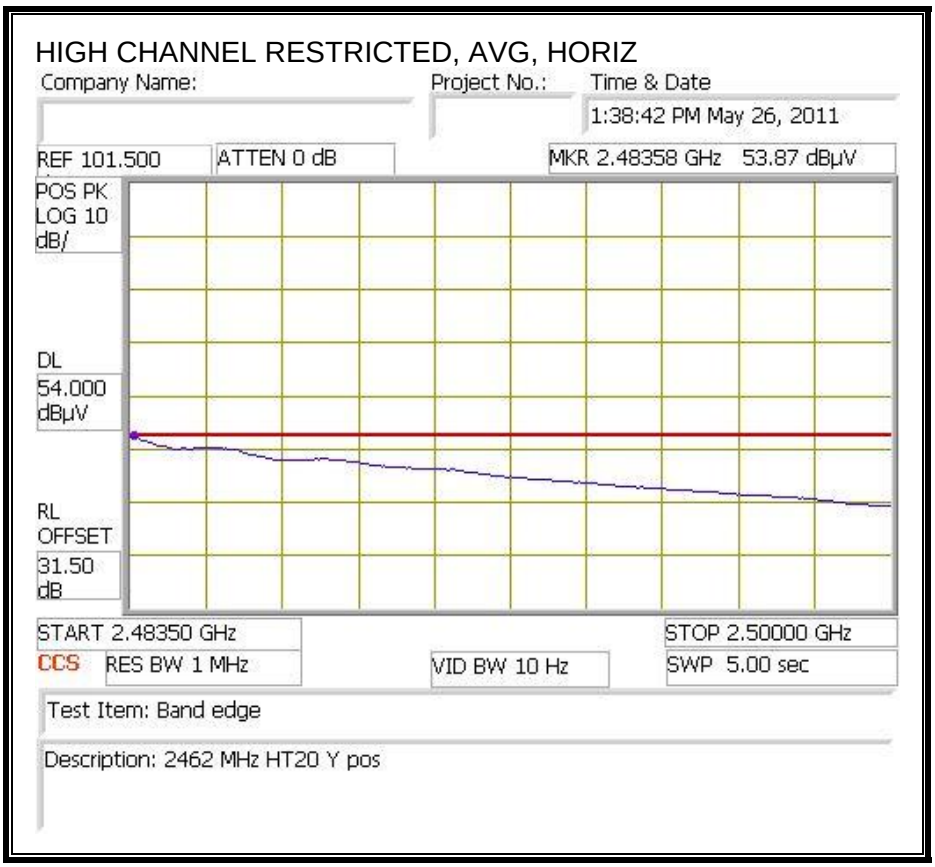

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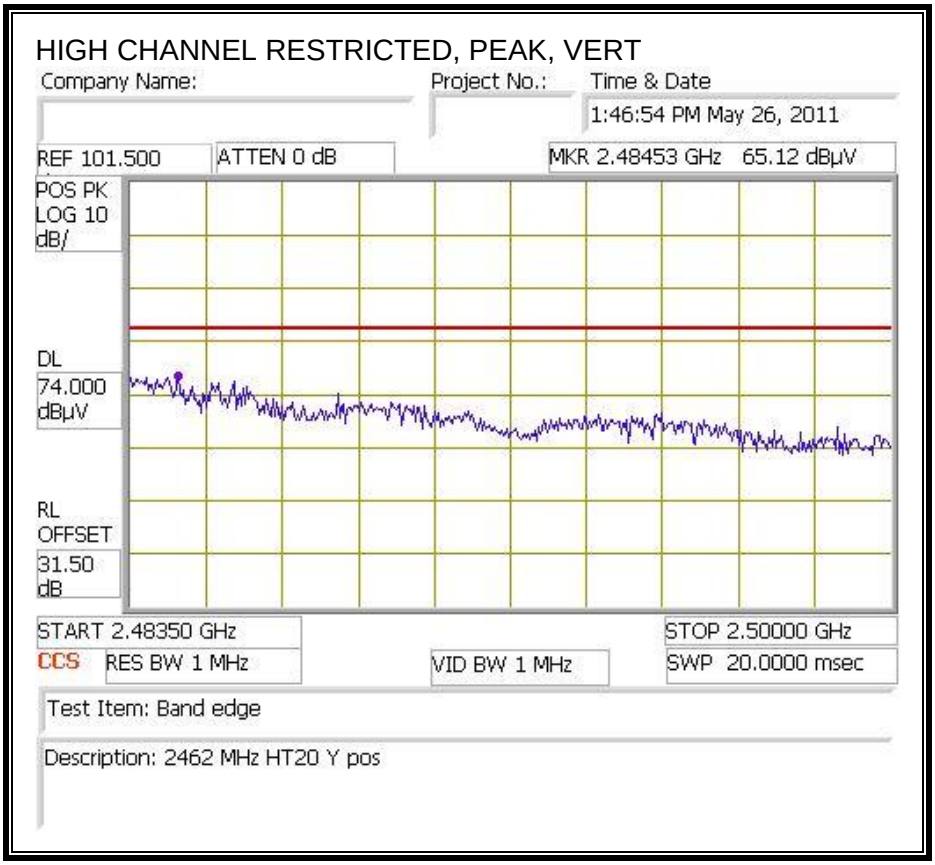
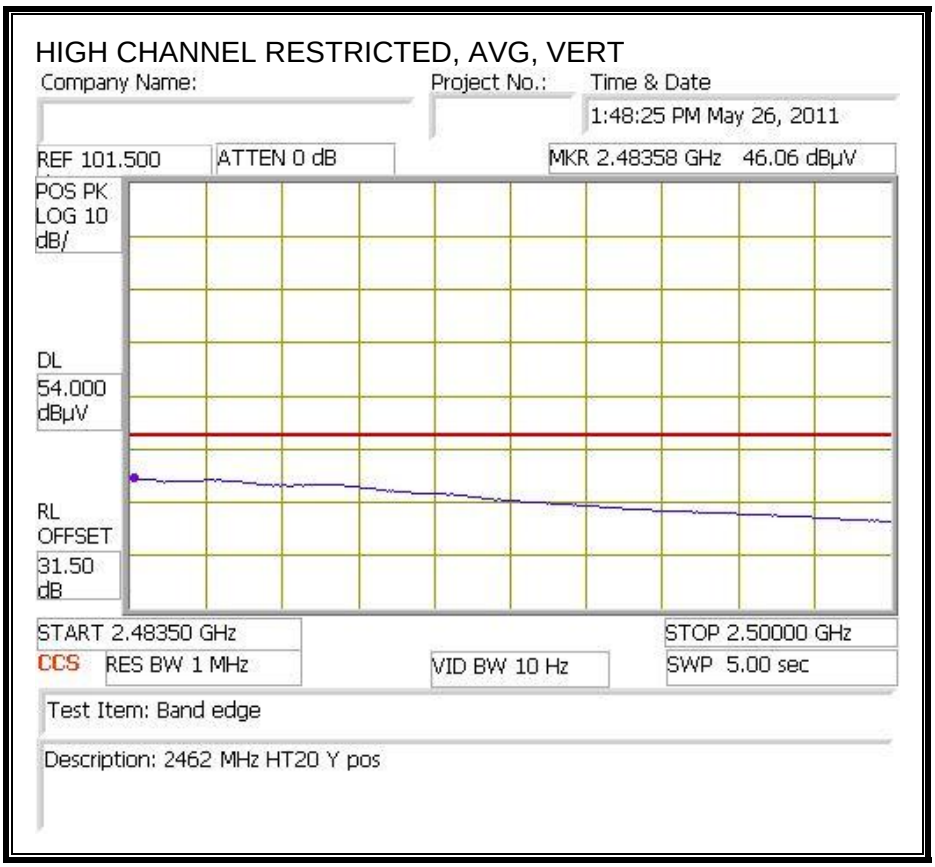
RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)



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



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HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement
Compliance Certification Services, Fremont 5m Chamber

Test Engr: Tom Chen
Date: 05/09/11
Project #: 11U13795
Company: Broadcom
Test Target:
Mode Oper: HT20 mode, TX , EUT: P305

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	Notes
2412 MHz HT20 mode													
4.824	3.0	53.5	32.7	5.8	-34.8	0.0	0.0	57.1	74.0	-16.9	V	P	
4.824	3.0	36.7	32.7	5.8	-34.8	0.0	0.0	40.3	54.0	-13.7	V	A	
2412 MHz HT20 mode													
4.824	3.0	51.8	32.7	5.8	-34.8	0.0	0.0	55.5	74.0	-18.5	H	P	
4.824	3.0	37.4	32.7	5.8	-34.8	0.0	0.0	41.1	54.0	-12.9	H	A	
2437 MHz HT20 mode													
4.874	3.0	59.7	32.7	5.8	-34.8	0.0	0.0	63.4	74.0	-10.6	H	P	
4.874	3.0	46.3	32.7	5.8	-34.8	0.0	0.0	50.1	54.0	-3.9	H	A	
7.311	3.0	53.0	35.5	7.3	-34.1	0.0	0.0	61.7	74.0	-12.3	H	P	
7.311	3.0	40.1	35.5	7.3	-34.1	0.0	0.0	48.7	54.0	-5.3	H	A	
2437 MHz HT20 mode													
4.874	3.0	57.2	32.7	5.8	-34.8	0.0	0.0	61.0	74.0	-13.0	V	P	
4.874	3.0	44.7	32.7	5.8	-34.8	0.0	0.0	48.4	54.0	-5.6	V	A	
7.311	3.0	52.8	35.5	7.3	-34.1	0.0	0.0	61.4	74.0	-12.6	V	P	
7.311	3.0	39.7	35.5	7.3	-34.1	0.0	0.0	48.3	54.0	-5.7	V	A	
2462 MHz HT20 mode													
4.924	3.0	53.6	32.7	5.9	-34.8	0.0	0.0	57.4	74.0	-16.6	H	P	
4.924	3.0	37.1	32.7	5.9	-34.8	0.0	0.0	40.9	54.0	-13.1	H	A	
7.386	3.0	42.8	35.6	7.3	-34.1	0.0	0.0	51.6	74.0	-22.4	H	P	
7.386	3.0	28.2	35.6	7.3	-34.1	0.0	0.0	37.0	54.0	-17.0	H	A	
2462 MHz HT20 mode													
4.924	3.0	50.3	32.7	5.9	-34.8	0.0	0.0	54.1	74.0	-19.9	V	P	
4.924	3.0	35.6	32.7	5.9	-34.8	0.0	0.0	39.4	54.0	-14.6	V	A	
7.386	3.0	42.0	35.6	7.3	-34.1	0.0	0.0	50.8	74.0	-23.2	V	P	
7.386	3.0	27.8	35.6	7.3	-34.1	0.0	0.0	36.6	54.0	-17.4	V	A	

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

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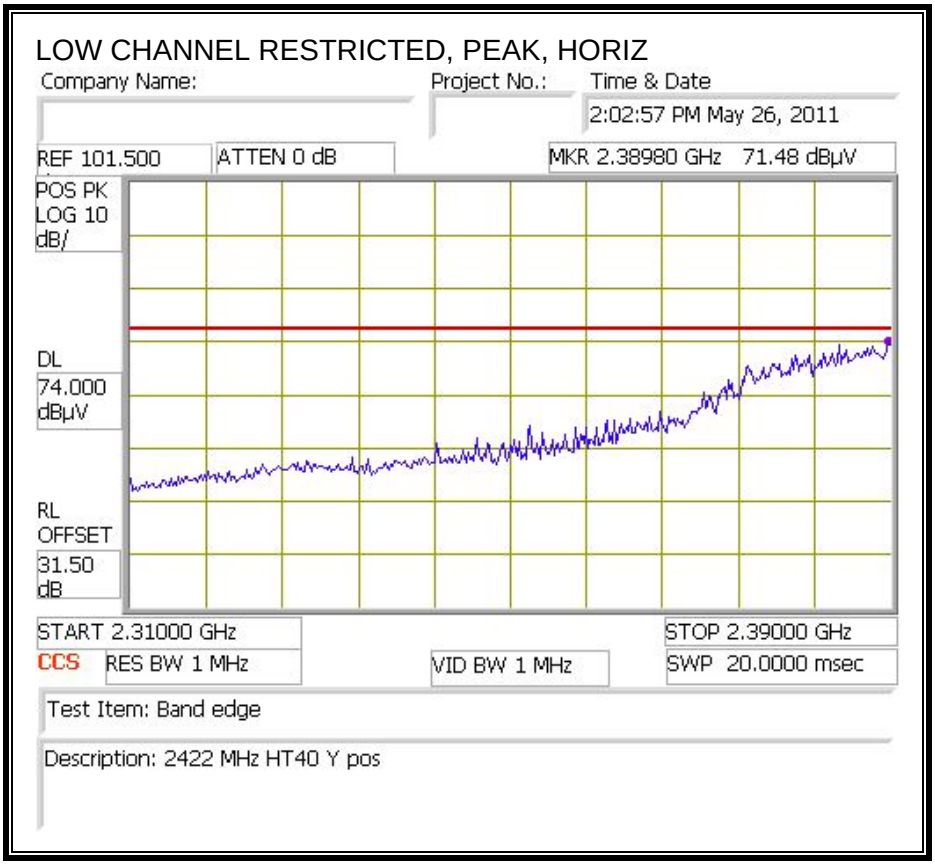
8.2.4. TRANSMITTER ABOVE 1 GHz FOR 802.11n HT40 MODE IN THE 2.4 GHz BAND

RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



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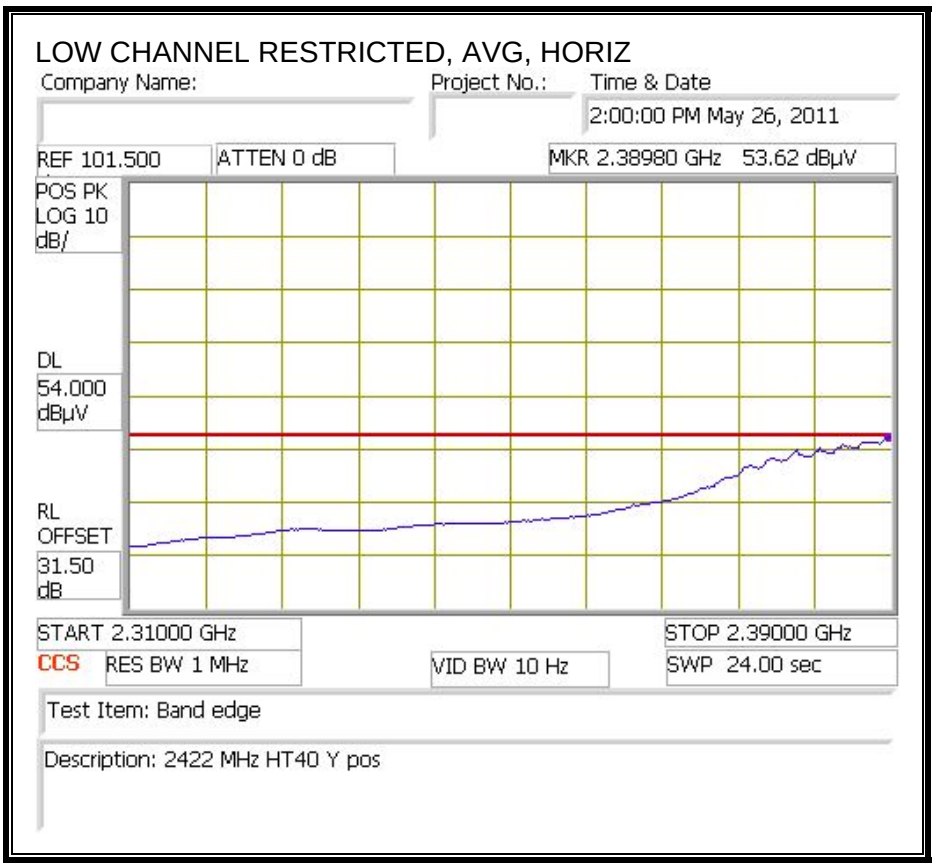

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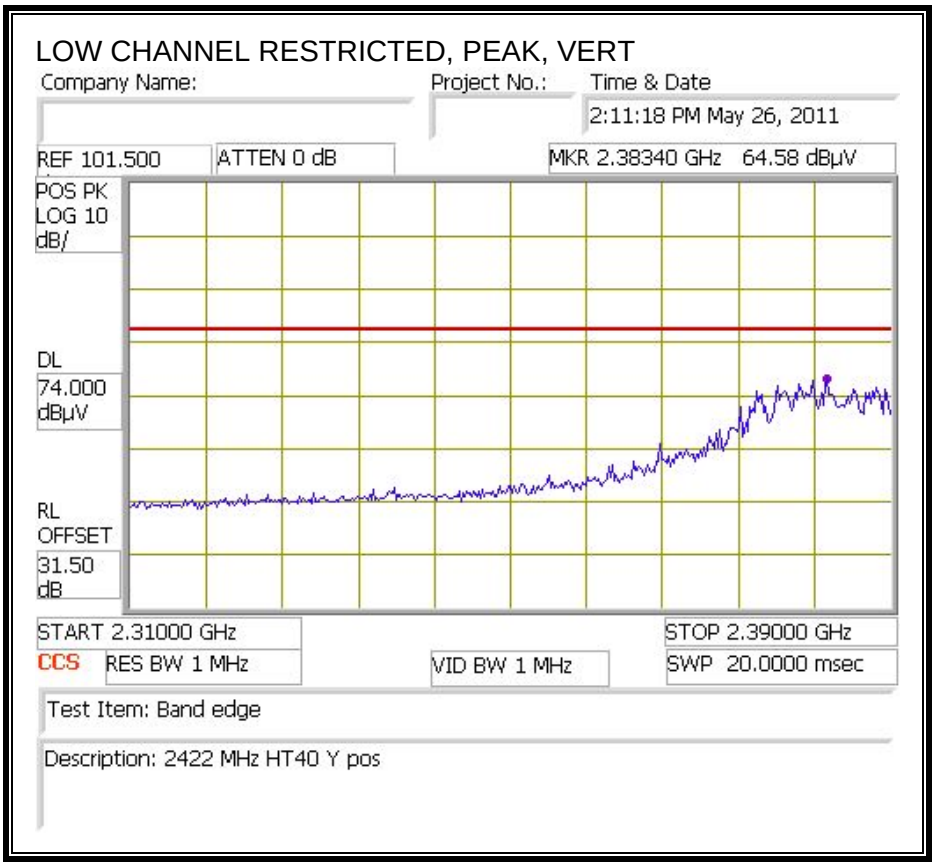
RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)



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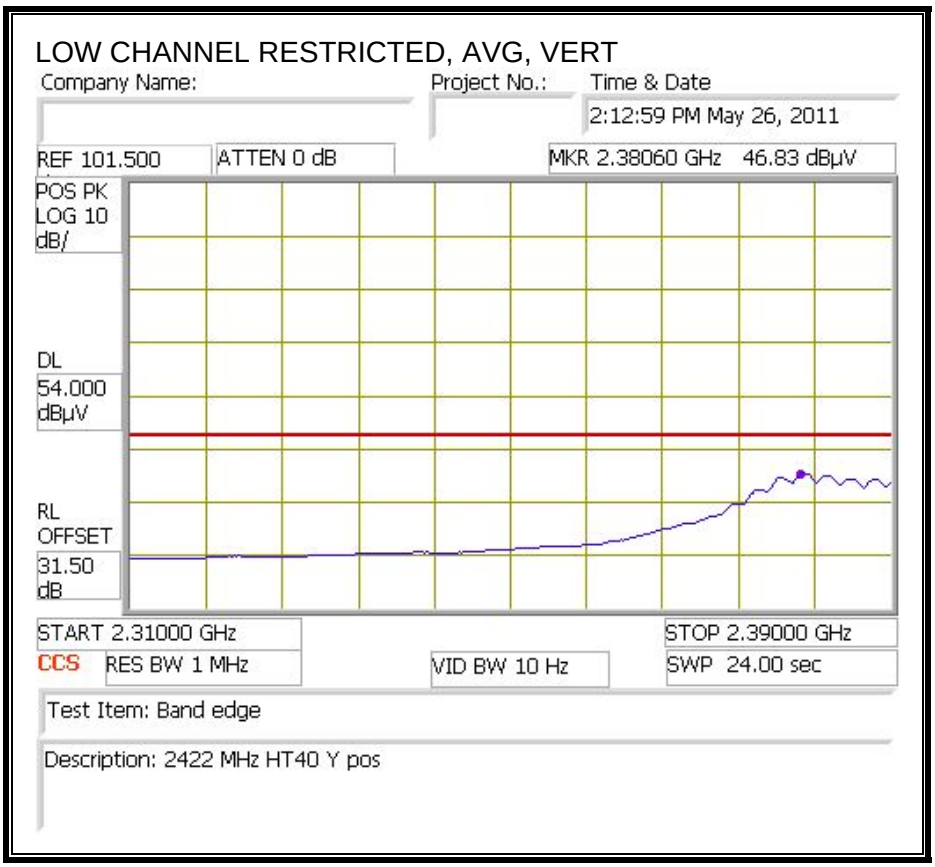

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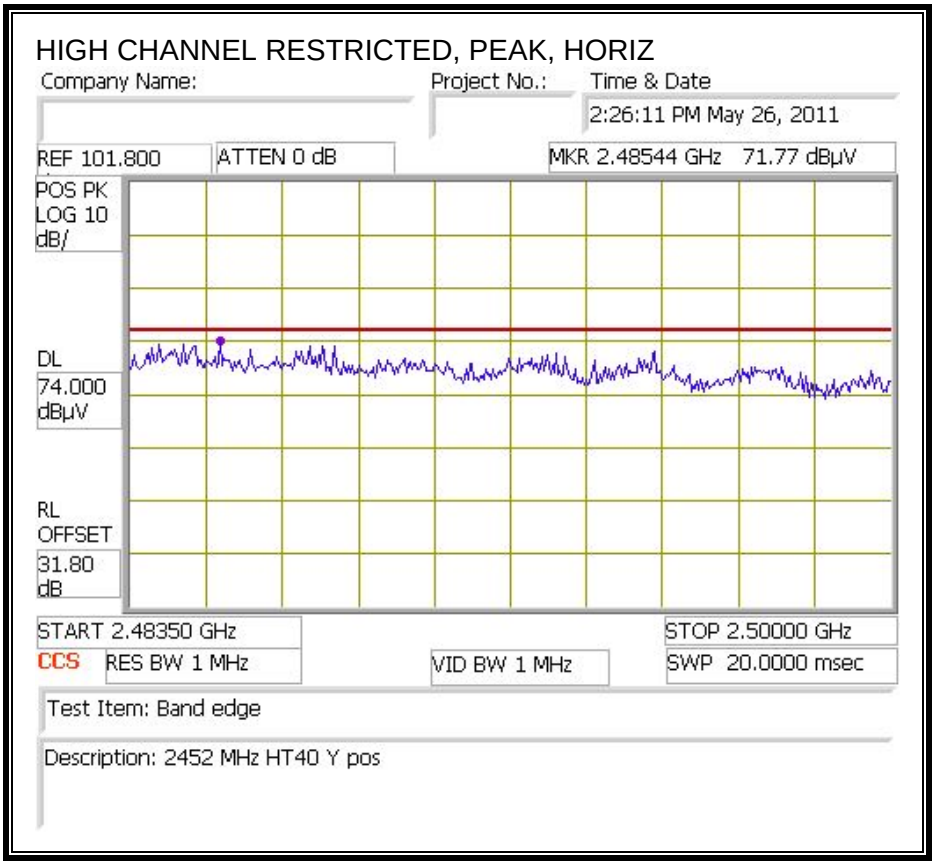
RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)



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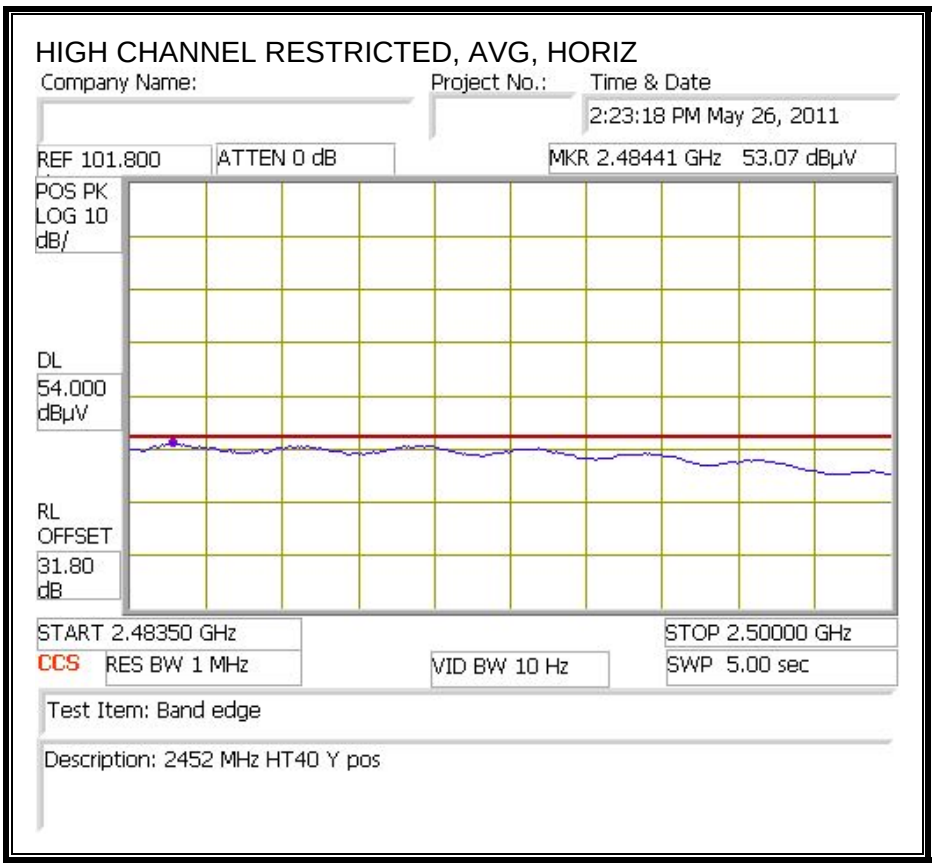

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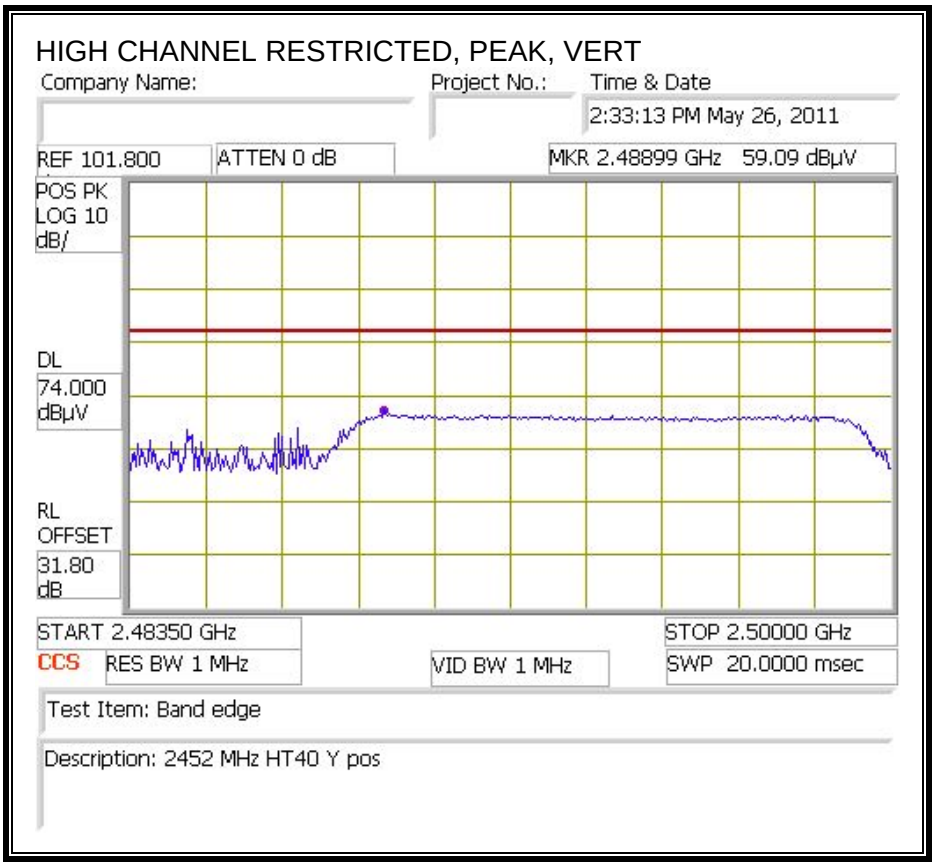
RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)



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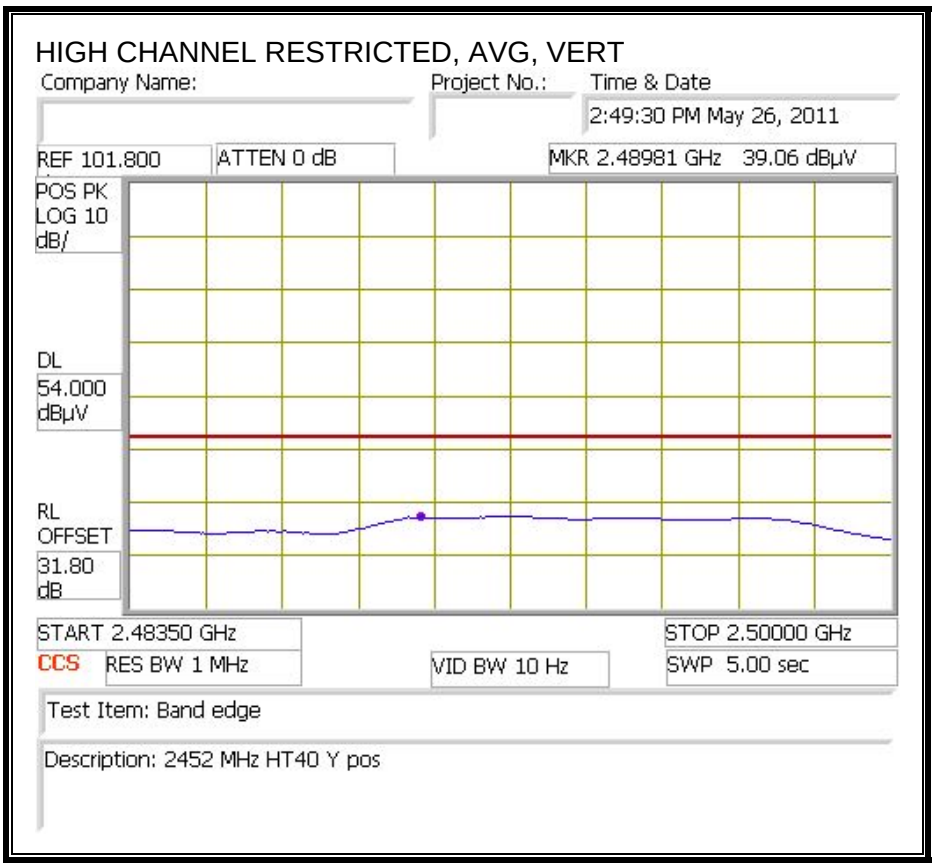

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HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement
Compliance Certification Services, Fremont 5m Chamber

Test Engr: Tom Chen
Date: 06/03/11
Project #: 11U13795
Company: Broadcom
Test Target: FCC Class B
Mode Oper: HT40, TX , EUT: P305

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	Notes
2422 MHz HT40													
4.844	3.0	46.8	32.8	5.8	-34.8	0.0	0.0	50.6	74.0	-23.4	V	P	
4.844	3.0	32.3	32.8	5.8	-34.8	0.0	0.0	36.1	54.0	-17.9	V	A	
7.266	3.0	36.7	35.1	7.2	-34.1	0.0	0.0	45.0	74.0	-29.0	V	P	
7.266	3.0	23.5	35.1	7.2	-34.1	0.0	0.0	31.7	54.0	-22.3	V	A	
2422 MHz HT40													
4.844	3.0	41.4	32.8	5.8	-34.8	0.0	0.0	45.2	74.0	-28.8	H	P	
4.844	3.0	28.5	32.8	5.8	-34.8	0.0	0.0	32.2	54.0	-21.8	H	A	
7.266	3.0	37.0	35.1	7.2	-34.1	0.0	0.0	45.2	74.0	-28.8	H	P	
7.266	3.0	23.6	35.1	7.2	-34.1	0.0	0.0	31.8	54.0	-22.2	H	A	
2437 MHz HT40													
4.874	3.0	39.4	32.8	5.8	-34.8	0.0	0.0	43.2	74.0	-30.8	H	P	
4.874	3.0	26.1	32.8	5.8	-34.8	0.0	0.0	29.9	54.0	-24.1	H	A	
4.874	3.0	43.8	32.8	5.8	-34.8	0.0	0.0	47.6	74.0	-26.4	V	P	
4.874	3.0	30.9	32.8	5.8	-34.8	0.0	0.0	34.7	54.0	-19.3	V	A	
2452 MHz HT40													
4.904	3.0	36.0	32.8	5.9	-34.8	0.0	0.0	39.9	74.0	-34.1	H	P	
4.904	3.0	24.0	32.8	5.9	-34.8	0.0	0.0	27.9	54.0	-26.1	H	A	
4.904	3.0	42.1	32.8	5.9	-34.8	0.0	0.0	46.0	74.0	-28.0	V	P	
4.904	3.0	29.3	32.8	5.9	-34.8	0.0	0.0	33.2	54.0	-20.8	V	A	

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

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

HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement
Compliance Certification Services, Fremont 5m Chamber

Test Engr: Tom Chen
Date: 05/09/11
Project #: 11U13795
Company: Broadcom
Test Target: FCC Class B
Mode Oper: TX mode, 11a main

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	Notes
5785 MHz 11a main													
11.570	3.0	46.6	38.1	9.5	-32.5	0.0	0.7	62.4	74.0	-11.6	V	P	
11.570	3.0	33.3	38.1	9.5	-32.5	0.0	0.7	49.1	54.0	-4.9	V	A	
11.570	3.0	43.7	38.1	9.5	-32.5	0.0	0.7	59.5	74.0	-14.5	H	P	
11.570	3.0	30.1	38.1	9.5	-32.5	0.0	0.7	45.9	54.0	-8.1	H	A	
5745MHz 11a main													
11.490	3.0	47.1	38.0	9.5	-32.5	0.0	0.0	62.1	74.0	-11.9	V	P	
11.490	3.0	33.8	38.0	9.5	-32.5	0.0	0.0	48.8	54.0	-5.2	V	A	
11.490	3.0	43.1	38.0	9.5	-32.5	0.0	0.0	58.1	74.0	-15.9	H	P	
11.490	3.0	30.1	38.0	9.5	-32.5	0.0	0.0	45.1	54.0	-8.9	H	A	
5825MHz 11a main													
11.650	3.0	41.4	38.2	9.6	-32.5	0.0	0.0	56.6	74.0	-17.4	H	P	
11.650	3.0	28.6	38.2	9.6	-32.5	0.0	0.0	43.9	54.0	-10.1	H	A	
11.650	3.0	42.1	38.2	9.6	-32.5	0.0	0.0	57.4	74.0	-16.6	V	P	
11.650	3.0	29.0	38.2	9.6	-32.5	0.0	0.0	44.2	54.0	-9.8	V	A	

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

COMPLIANCE CERTIFICATION SERVICES (UL CCS) FORM NO: CCSUP4701D
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888
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8.2.6. TRANSMITTER ABOVE 1 GHz FOR 802.11n HT20 MODE IN THE 5.8 GHz BAND

HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement
Compliance Certification Services, Fremont 5m Chamber

Test Engr: Tom Chen
Date: 05/09/11
Project #: 11U13795
Company: Broadcom
Test Target: FCC Class B
Mode Oper: TX mode, UNII band 5.8GHz 11n

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	Notes
5745MHz HT20													
11.490	3.0	42.4	38.0	9.5	-32.5	0.0	0.7	58.1	74.0	-15.9	H	P	
11.490	3.0	28.7	38.0	9.5	-32.5	0.0	0.7	44.4	54.0	-9.6	H	A	
11.490	3.0	44.8	38.0	9.5	-32.5	0.0	0.7	60.5	74.0	-13.5	V	P	
11.490	3.0	33.4	38.0	9.5	-32.5	0.0	0.7	49.1	54.0	-4.9	V	A	
5785MHz HT20													
11.570	3.0	42.8	38.1	9.5	-32.5	0.0	0.7	58.6	74.0	-15.4	V	P	
11.570	3.0	29.2	38.1	9.5	-32.5	0.0	0.7	45.0	54.0	-9.0	V	A	
11.570	3.0	41.0	38.1	9.5	-32.5	0.0	0.7	56.8	74.0	-17.2	H	P	
11.570	3.0	28.5	38.1	9.5	-32.5	0.0	0.7	44.3	54.0	-9.7	H	A	
5825MHz HT20													
11.650	3.0	37.9	38.2	9.6	-32.5	0.0	0.7	53.9	74.0	-20.1	H	P	
11.650	3.0	26.4	38.2	9.6	-32.5	0.0	0.7	42.3	54.0	-11.7	H	A	
11.650	3.0	38.7	38.2	9.6	-32.5	0.0	0.7	54.6	74.0	-19.4	V	P	
11.650	3.0	25.7	38.2	9.6	-32.5	0.0	0.7	41.6	54.0	-12.4	V	A	

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

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

HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement
Compliance Certification Services, Fremont 5m Chamber

Test Engr: Tom Chen
Date: 05/10/11
Project #: 11U13795
Company: Broadcom
Test Target: FCC Class B
Mode Oper: TX mode, UNII band 5.8GHz 11n HT40

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	Notes
5755MHz HT40													
11.510	3.0	40.9	38.1	9.5	-32.5	0.0	0.7	56.7	74.0	-17.3	V	P	
11.510	3.0	27.9	38.1	9.5	-32.5	0.0	0.7	43.6	54.0	-10.4	V	A	
11.510	3.0	40.5	38.1	9.5	-32.5	0.0	0.7	56.2	74.0	-17.8	H	P	
11.510	3.0	28.4	38.1	9.5	-32.5	0.0	0.7	44.1	54.0	-9.9	H	A	
5795MHz HT40													
11.590	3.0	40.8	38.1	9.5	-32.5	0.0	0.7	56.6	74.0	-17.4	H	P	
11.590	3.0	28.5	38.1	9.5	-32.5	0.0	0.7	44.4	54.0	-9.6	H	A	
11.590	3.0	46.1	38.1	9.5	-32.5	0.0	0.7	61.9	74.0	-12.1	V	P	
11.590	3.0	32.5	38.1	9.5	-32.5	0.0	0.7	48.3	54.0	-5.7	V	A	

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

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8.2.8. RECEIVER ABOVE 1 GHz

8.2.9. RECEIVER ABOVE 1 GHz FOR 20 MHz

High Frequency Measurement
Compliance Certification Services, Fremont 5m Chamber

Company: Broadcom
Project #: 11U13795
Date: 5/27/2011
Test Engineer: Tom Chen
Configuration: EUT with support Laptop PC
Mode: RX mode, HT20

Test Equipment:

Horn 1-18GHz	Pre-amplifer 1-26GHz	Pre-amplifer 26-40GHz	Horn > 18GHz	Limit
T60; S/N: 2238 @3m	T34 HP 8449B			RX RSS 210

Hi Frequency Cables

3' cable 22807700	12' cable 22807600	20' cable 22807500	HPF	Reject Filter
3' cable 22807700	12' cable 22807600	20' cable 22807500		

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

f GHz	Dist (m)	Read Pk dBuV	Read Avg. dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes (V/H)
1.390	3.0	50.1	31.0	25.8	2.8	-37.7	0.0	0.0	41.0	21.9	74	54	-33.0	-32.1	H
1.495	3.0	49.5	27.3	26.1	2.9	-37.6	0.0	0.0	41.0	18.7	74	54	-33.0	-35.3	H
2.500	3.0	59.4	27.9	28.3	3.9	-36.3	0.0	0.0	55.4	23.9	74	54	-18.6	-30.1	H
1.195	3.0	55.3	33.6	25.1	2.6	-38.0	0.0	0.0	45.0	23.3	74	54	-29.0	-30.7	V
1.300	3.0	52.0	31.1	25.5	2.7	-37.8	0.0	0.0	42.3	21.5	74	54	-31.7	-32.5	V
2.500	3.0	57.3	29.0	28.3	3.9	-36.3	0.0	0.0	53.3	25.0	74	54	-20.7	-29.0	V

Rev. 07.22.09

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

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8.2.10. RECEIVER ABOVE 1 GHz FOR 40 MHz BANDWIDTH

High Frequency Measurement
Compliance Certification Services, Fremont 5m Chamber

Company: Broadcom
Project #: 11U13795
Date: 5/27/2011
Test Engineer: Tom Chen
Configuration: EUT with support Laptop PC
Mode: RX mode, HT40

Test Equipment:

Horn 1-18GHz	Pre-amplifer 1-26GHz	Pre-amplifer 26-40GHz	Horn > 18GHz	Limit
T60; S/N: 2238 @3m	T34 HP 8449B			RX RSS 210

Hi Frequency Cables

3' cable 22807700	12' cable 22807600	20' cable 22807500	HPF	Reject Filter
3' cable 22807700	12' cable 22807600	20' cable 22807500		

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

f GHz	Dist (m)	Read Pk dBuV	Read Avg. dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes (V/H)
1.195	3.0	49.7	29.0	25.1	2.6	-38.0	0.0	0.0	39.4	18.7	74	54	-34.6	-35.3	H
2.440	3.0	51.2	31.3	28.2	3.9	-36.3	0.0	0.0	46.9	27.0	74	54	-27.1	-27.0	H
2.500	3.0	62.1	27.9	28.3	3.9	-36.3	0.0	0.0	58.1	23.9	74	54	-15.9	-30.1	H
1.330	3.0	51.7	33.6	25.6	2.7	-37.8	0.0	0.0	42.2	24.1	74	54	-31.8	-29.9	V
1.885	3.0	49.5	29.4	27.4	3.3	-37.0	0.0	0.0	43.2	23.2	74	54	-30.8	-30.8	V
2.485	3.0	60.0	29.0	28.3	3.9	-36.3	0.0	0.0	55.9	24.9	74	54	-18.1	-29.1	V

Rev. 07.22.09

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

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8.2.11. WORST-CASE BELOW 1 GHz

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

HORIZONTAL AND VERTICAL DATA

30-1000 MHz HORIZONTAL

Test Frequency	Meter Reading	Detector	Cable [dB]	T15 PreAmp [dB]	Bilog T185 [dB]	dB[uVolts/meter]	CFR 47 Part 15 Class B 3m	Margin	Height [cm]	Polarity
64.9317	52.94	QP	0.9	-28.2	8.1	33.74	40	-6.26	138	Horz
98.1283	52.19	QP	1	-28.1	9	34.09	43.5	-9.41	168	Horz
143.1853	42.2	QP	1.2	-27.9	13	28.5	43.5	-15	201	Horz
182.5837	48.76	PK	1.3	-27.5	11	33.56	43.5	-9.94	99	Horz
240.2398	53.66	PK	1.5	-28.1	11.9	38.96	46	-7.04	99	Horz
299.6669	52.54	PK	1.8	-28.5	13.6	39.44	46	-6.56	99	Horz
499.8001	50.1	PK	2.2	-27.3	16.8	41.8	46	-4.2	151	Horz
597.6016	47.35	PK	2.5	-28.2	18.4	40.05	46	-5.95	99	Horz
699.4004	46.93	PK	2.7	-28.3	18.9	40.23	46	-5.77	99	Horz

30-1000 MHz VERTICAL

Test Frequency	Meter Reading	Detector	Cable [dB]	T15 PreAmp [dB]	Bilog T185 [dB]	dB[uVolts/meter]	CFR 47 Part 15 Class B 3m	Margin	Height [cm]	Polarity
35.6922	45.37	PK	0.7	-28.2	17	34.87	40	-5.13	100	Vert
57.6962	53.89	PK	0.8	-28.1	7.9	34.49	40	-5.51	100	Vert
99.8351	53.74	PK	1	-28.1	9.3	35.94	43.5	-7.56	100	Vert
144.013	46.48	PK	1.2	-27.7	13	32.98	43.5	-10.52	100	Vert
230.3797	50.74	PK	1.5	-27.9	11.9	36.24	46	-9.76	251	Vert
498.7342	49.46	PK	2.2	-28.1	15	38.56	46	-7.44	151	Vert
597.6016	47.13	PK	2.5	-27.7	18.4	40.33	46	-5.67	101	Vert
697.002	45.18	PK	2.7	-27.3	18.9	39.48	46	-6.52	101	Vert
899.0007	43.24	PK	3.2	-27.7	22.1	40.84	46	-5.16	101	Vert

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9. AC POWER LINE CONDUCTED EMISSIONS

LIMITS

FCC §15.207 (a)

RSS-Gen 7.2.2

Frequency of Emission (MHz)	Conducted Limit (dBuV)	
	Quasi-peak	Average
0.15-0.5	66 to 56 *	56 to 46 *
0.5-5	56	46
5-30	60	50

* Decreases with the logarithm of the frequency.

TEST PROCEDURE

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

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

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

RESULTS

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6 WORST EMISSIONS

Line-L1 .15 - 30MHz									
Test Frequency	Meter Reading	Detector	LISN [dB]	Conducted Emission Cable [dB]	dB[uVolts]	Class B QP Limit	Margin	Class B Avg Limit	Margin
0.195	46.84	PK	0	0	46.84	63.8	-16.96	53.8	-6.96
0.195	34.56	Av	0	0	34.56	63.8	-29.24	53.8	-19.24
0.5865	34.25	PK	0	0	34.25	56	-21.75	46	-11.75
0.5865	29.01	Av	0	0	29.01	56	-26.99	46	-16.99
4.749	32.05	PK	0	0	32.05	56	-23.95	46	-13.95
4.749	22.87	Av	0	0	22.87	56	-33.13	46	-23.13

Line-L2 .15 - 30MHz									
Test Frequency	Meter Reading	Detector	LISN [dB]	Conducted Emission Cable [dB]	dB[uVolts]	Class B QP Limit	Margin	Class B Avg Limit	Margin
0.195	48.51	PK	0	0	48.51	63.8	-15.29	53.8	-5.29
0.195	35.39	Av	0	0	35.39	63.8	-28.41	53.8	-18.41
0.5235	35.05	PK	0	0	35.05	56	-20.95	46	-10.95
0.5235	24.28	Av	0	0	24.28	56	-31.72	46	-21.72
4.749	35.15	PK	0	0	35.15	56	-20.85	46	-10.85
4.749	19.59	Av	0	0	19.59	56	-36.41	46	-26.41

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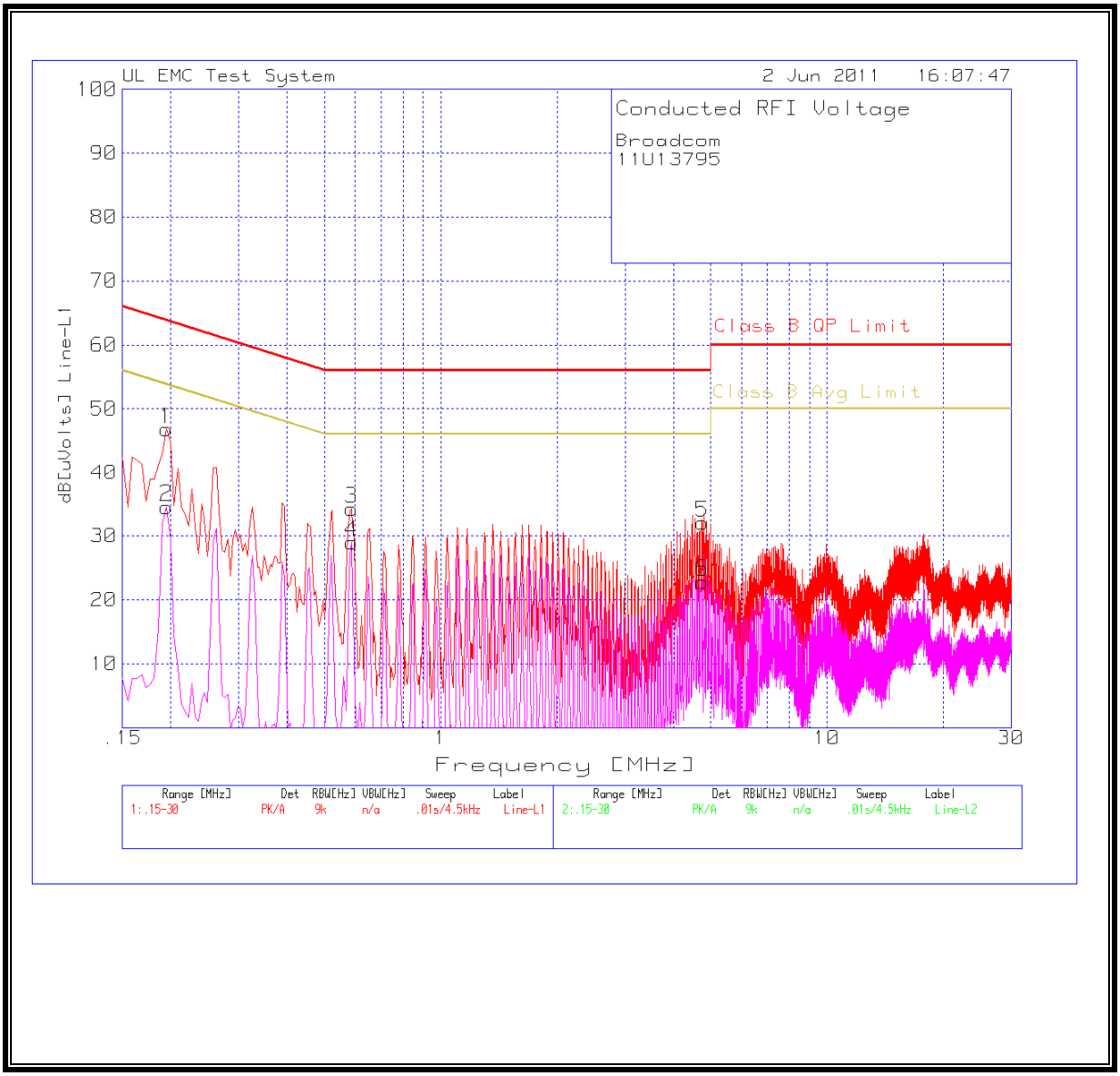
LINE 1 RESULTS



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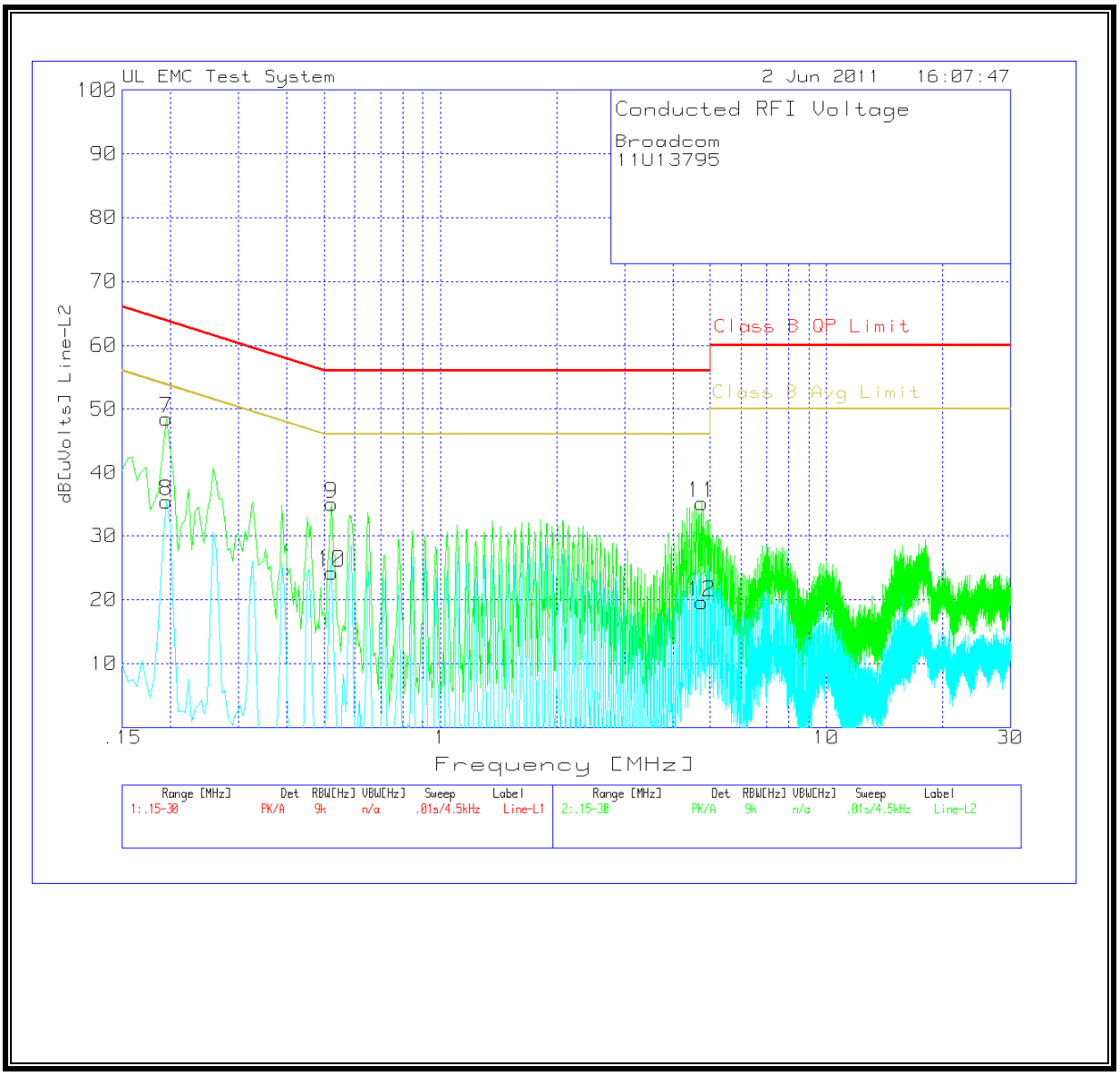
LINE 2 RESULTS



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10. MAXIMUM PERMISSIBLE EXPOSURE

FCC RULES

§1.1310 The criteria listed in Table 1 shall be used to evaluate the environmental impact of human exposure to radio-frequency (RF) radiation as specified in §1.1307(b), except in the case of portable devices which shall be evaluated according to the provisions of §2.1093 of this chapter.

TABLE 1—LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm^2)	Averaging time (minutes)
(A) Limits for Occupational/Controlled Exposures				
0.3–3.0	614	1.63	*(100)	6
3.0–30	1842/f	4.89/f	*($900/f^2$)	6
30–300	61.4	0.163	1.0	6
300–1500	.....	.....	f/300	6
1500–100,000	.....	.....	5	6
(B) Limits for General Population/Uncontrolled Exposure				
0.3–1.34	614	1.63	*(100)	30
1.34–30	824/f	2.19/f	*($180/f^2$)	30

TABLE 1—LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)—Continued

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm^2)	Averaging time (minutes)
30–300	27.5	0.073	0.2	30
300–1500	.....	.....	f/1500	30
1500–100,000	.....	.....	1.0	30

f = frequency in MHz
* = Plane-wave equivalent power density

NOTE 1 TO TABLE 1: Occupational/controlled limits apply in situations in which persons are exposed as a consequence of their employment provided those persons are fully aware of the potential for exposure and can exercise control over their exposure. Limits for occupational/controlled exposure also apply in situations when an individual is transient through a location where occupational/controlled limits apply provided he or she is made aware of the potential for exposure.

NOTE 2 TO TABLE 1: General population/uncontrolled exposures apply in situations in which the general public may be exposed, or in which persons that are exposed as a consequence of their employment may not be fully aware of the potential for exposure or can not exercise control over their exposure.

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IC RULES

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

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

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

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

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

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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

For multiple colocated transmitters operating simultaneously in frequency bands where the limit is identical, the total power density is calculated using the total EIRP obtained by summing the Power * Gain product (in linear units) of each transmitter.

Total EIRP = (P1 * G1) + (P2 * G2) + ... + (Pn * Pn)

where

Px = Power of transmitter x
Gx = Numeric gain of antenna x

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

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RESULTS

Band	Separation Distance (m)	Output Power (dBm)	Antenna Gain (dBi)	EIRP (dBm)	IC Power Density (W/m^2)	FCC Power Density (mW/cm^2)
2.4 GHz						
Chain 1		17.20	3.90	21.10		
Chain 2		17.64	3.90	21.54		
Total	0.20			24.34	0.54	0.054
5.8 GHz						
Chain 1		16.00	4.20	20.20		
Chain 2		16.63	4.20	20.83		
Total	0.20			23.54	0.45	0.045

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