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

CERTIFICATION TEST REPORT

FOR

802.11a/g/n WLAN + Bluetooth PCI-E Custom Combination Card

MODEL NUMBER: BCM94331PCIEBT3B

FCC ID: QDS-BRCM1066
IC: 4324A-BRCM1066

REPORT NUMBER: 12U14373-2, Revision A

ISSUE DATE: JUNE 29, 2012

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
--	06/27/12	Initial Issue	F. Ibrahim
A	06/29/12	Updated Section 5.5	A. Zaffar

TABLE OF CONTENTS

1. ATTESTATION OF TEST RESULTS

COMPANY NAME:	BROADCOM CORPORATION 190 MATHILDA PLACE SUNNYVALE, CA 94086, U.S.A.
EUT DESCRIPTION:	802.11a/b/g/n WLAN + Bluetooth PCI-E Custom Combination Card
MODEL:	BCM94331PCIEBT3B
SERIAL NUMBER:	C962154016AF2GQBL & C962154015FF2GQBL (P101)
DATE TESTED:	MAY 12 – JUNE 26, 2012

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:

FRANK IBRAHIM
EMC SUPERVISOR
UL CCS

Tested By:

VIEN TRAN
EMC ENGINEER
UL CCS

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%.

5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

The EUT is an 802.11a/g/n WLAN + Bluetooth PCI-E Custom Combination Card

The radio module is manufactured by Broadcom.

5.2. MAXIMUM OUTPUT POWER

The transmitter has a maximum conducted output power as follows:

2400 - 2483.5 MHz Authorized Frequency Band							Note
Frequency Range (MHz)	Mode	Power, Chain 1 (dBm)	Power, Chain 2 (dBm)	Power, Chain 3 (dBm)	Total power (dBm)	Total power (mW)	
2412 - 2462	802.11b Legacy 1TX	Covered by the worst case 802.11b CDD 3TX Mode					
2412 - 2462	802.11b CDD 2TX	Covered by the worst case 802.11b CDD 3TX Mode					
2412 - 2462	802.11b CDD 3TX	21.67	21.21	21.81	26.34	430.73	Peak Detector
2412 - 2462	802.11g Legacy 1TX	27.13	N/A	N/A	27.13	516.42	Peak Detector
2412 - 2462	802.11n HT20 1TX	Covered by the worst case 802.11g Legacy Mode testing					
2412 - 2462	802.11g CDD 2TX	Covered by the worst case 802.11n HT20 CDD 2TX Mode					
2412 - 2462	802.11g CDD 3TX	Covered by the worst case 802.11n HT20 CDD 3TX Mode					
2412 - 2462	802.11n HT20 CDD 3TX	19.132	19.169	19.262	23.959	248.841	Avg Detector
5725 - 5850 MHz Authorized Frequency Band							
Frequency Range (MHz)	Mode	Power, Chain 1 (dBm)	Power, Chain 2 (dBm)	Power, Chain 3 (dBm)	Total power (dBm)	Total power (mW)	
5745 - 5825	802.11a Legacy 1TX	19.34	N/A	N/A	19.34	85.90	Avg Detector
5745 - 5825	802.11n HT20 1TX	Covered by the worst case 802.11g Legacy Mode testing					
5745 - 5825	802.11a CDD 2TX	Covered by the worst case 802.11n HT20 CDD 2TX					
5745 - 5825	802.11a CDD 3TX	Covered by the worst case 802.11n HT20 CDD 3TX					
5745 - 5825	802.11n CDD 3TX	19.760	18.937	19.046	24.034	253.191	Avg Detector
5755 - 5795	802.11n HT40 1TX	16.719	N/A	N/A	16.719	46.979	Avg Detector
5755 - 5795	802.11n HT40 CDD 3TX	19.053	19.067	19.254	23.897	245.293	Avg Detector

Note: Option 5.2.2.1 Measurement Procedure AVG1 from KDB D01 558074 was used to measure the Average Output Power, except where noted above, PK2 Option 5.2.1.2 was used.

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

FCC/IC/NCC FMA - BCM94331PCIEBT3B FCC ID: QDS-BRCM1066 IC ID: 4324A-BRCM1066								
No.	Antenna Manufacturer	Antenna Type	Model	Peak gain (2.4GHz band)	Peak gain (5.2GHz band)	Peak gain (5.3GHz band)	Peak gain (5.6GHz band)	Peak gain (5.8GHz band)
1	Amphenol/Tyco	802.11abgn WLAN Antenna	631-1744 WiFi1	1.66	4.16	4	2.92	1.91
1	Amphenol/Tyco	802.11abgn WLAN/BT Antenna	631-2082 WiFi2	1.11	2.51	3.81	4.71	4.18
1	Amphenol/Tyco	802.11abgn WLAN Antenna	631-1771 WiFi3	6.77	5.65	5.61	5.35	4.39

5.4. SOFTWARE AND FIRMWARE

The EUT driver software installed during testing was Broadcom, rev. 5.106.98.77.
The test utility software used during testing was BCM Internal, rev. 5.106.RC98.77.

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. The EUT was oriented in a flat orientation, similar to the orientation it would have in real installations; see setup photos for details.

Worst-Case data rates, as provided by the client, were as follows:

For 2.4 GHz Band:
802.11b: 1 Mb/s.
802.11g: 6 Mb/s.
802.11n 20MHz: MCS0.

For 5.8 GHz Band:
802.11a: 6 Mb/s.
802.11n 20MHz: MCS0.
802.11n 40MHz: 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.

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

For HT40 SISO mode in the 5.8 GHz band, only low channel was tested, high channel is covered by testing to HT40 CDD MCS0 3TX.

For the modes where CH2 and CH10 were tested for output power, all other test items at CH1 and CH11 were performed with the higher power level between CH1 and CH2, and between CH10 and CH11 as worst-case scenario.

For all modes with single chain SISO, chain 3 (J2) was used for both 2.4GHz and 5GHz band as worst case.

5.6. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List				
Description	**Manufacturer**	**Model**	**Serial Number**	**FCC ID**
Laptop	Lenovo	G560	CPU4495771	DoC
Laptop	Lenovo	G560	CPU4466228	DoC
AC/DC Adapter	Lenovo	PA-1650-56LC	11S36001646ZZ400008KCM8	DoC
AC/DC Adapter	Lenovo	PA-1650-56LC	11S36001646ZZ400011AAV4	DoC
Adapter Board	Catalyst	MINI2EXP	BRCM 02	N/A
Adapter Board	Catalyst	MINI2EXP	BRCM 01	N/A
Adapter Board	Broadcom	BCM94331PCIBT4HAD	93	N/A
Adapter Board	Broadcom	BCM94331PCIBT4HAD	101	N/A

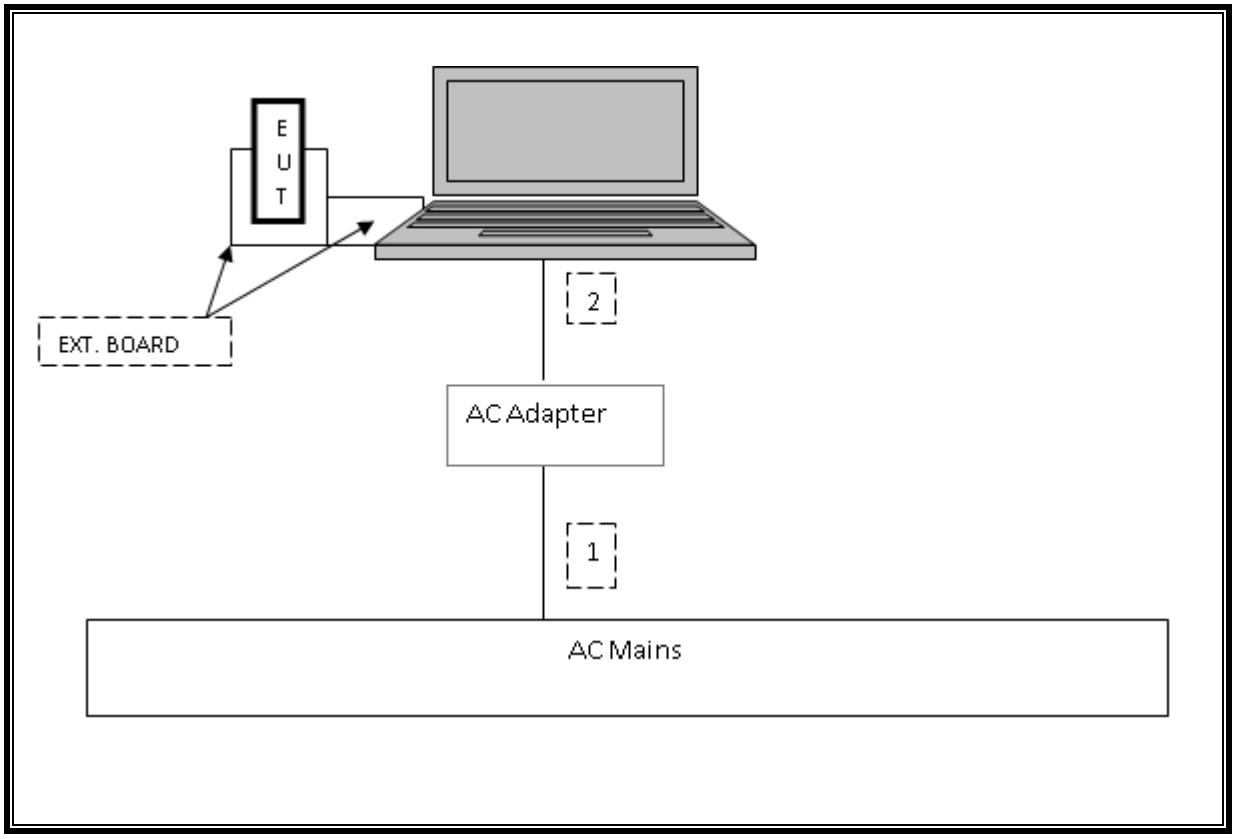
I/O CABLES

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

SETUP DIAGRAM FOR TESTS



6. TEST AND MEASUREMENT EQUIPMENT

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

Test Equipment List					
Description	**Manufacturer**	**Model**	**Asset**	**Cal Date**	**Cal Due**
Spectrum Analyzer, 44 GHz	Agilent / HP	E4446A	C01069	12/15/11	12/15/12
Spectrum Analyzer, 44 GHz	Agilent / HP	E4446A	C01012	09/02/11	09/02/12
EMI Test Receiver, 9 kHz-7 GHz	R & S	ESCI 7	1000741	07/06/11	07/06/12
EMI Test Receiver, 30 MHz	R & S	ESHS 20	N02396	08/19/11	08/19/13
Peak Power Meter	Agilent / HP	E4416A	C00963	12/13/11	12/13/12
Peak / Average Power Sensor	Agilent / HP	E9327A	C00964	12/13/11	12/13/12
Antenna, Horn, 18 GHz	EMCO	3115	C00872	09/20/11	09/20/12
Antenna, Horn, 26.5 GHz	ARA	MWH-1826/B	C00589	07/28/11	07/28/12
Antenna, Horn, 40 GHz	ARA	MWH-2640/B	C00981	06/14/11	06/14/12
Antenna, Bilog, 30MHz-1 GHz	Sunol Sciences	JB1		02/07/12	02/07/13
Preamplifier, 1300 MHz	Agilent / HP	8447D	C00885	11/11/11	11/11/12
Preamplifier, 26.5 GHz	Agilent / HP	8449B	C01063	07/12/11	07/12/12
Preamplifier, 40 GHz	Miteq	NSP4000-SP2	C00990	08/02/11	08/02/12
LISN, 30 MHz	FCC	50/250-25-2	C00626	12/13/11	12/13/12
Reject Filter, 2.4-2.5 GHz	Micro-Tronics	BRC13192	N02683	CNR	CNR
Reject Filter, 5.725-5.825 GHz	Micro-Tronics	BRC13192	N02676	CNR	CNR

7. ANTENNA PORT TEST RESULTS

7.1. 802.11g 1TX LEGACY MODE IN THE 2.4 GHz BAND

7.1.1. 6 dB BANDWIDTH

LIMITS

FCC §15.247 (a) (2)

IC RSS-210 A8.2 (a)

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

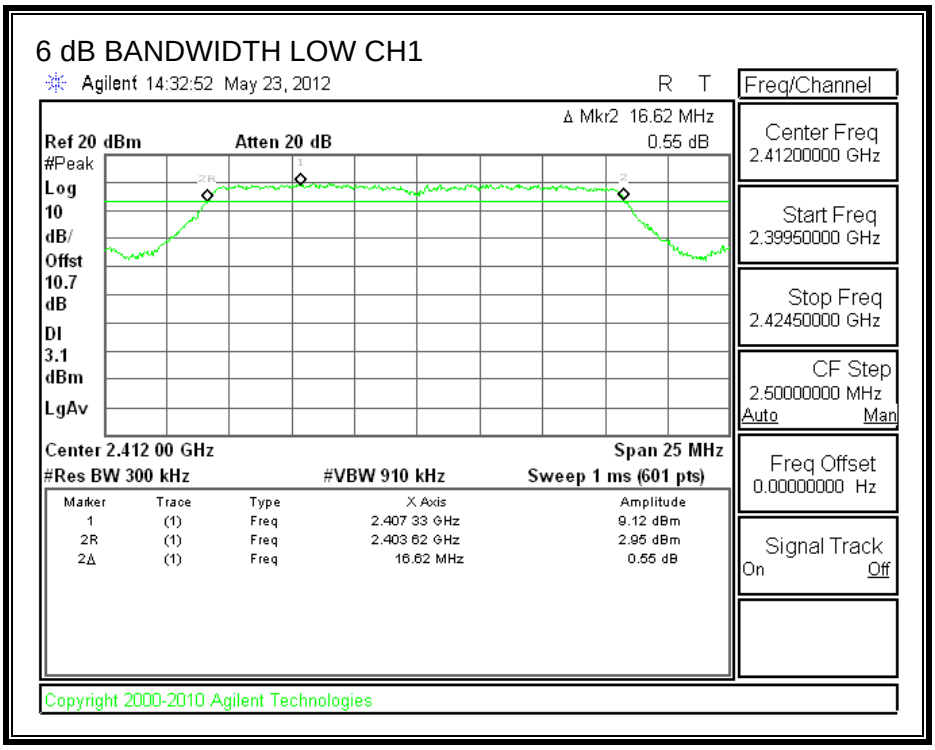
TEST PROCEDURE

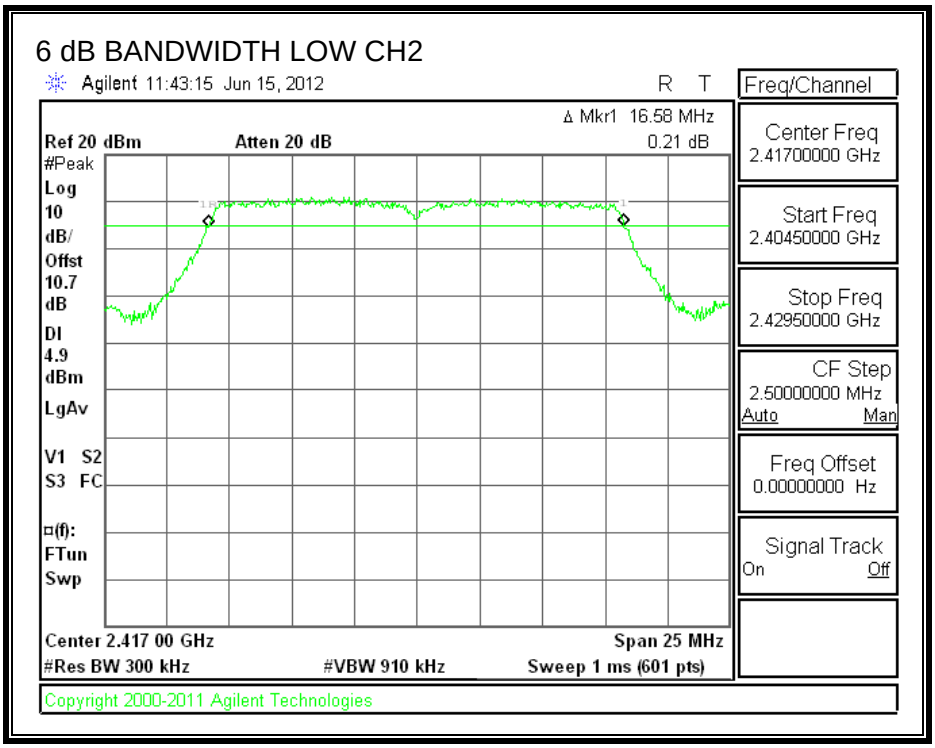
KDB 558074 D01 V01 “Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under 15.247”, dated 01/18/2012.

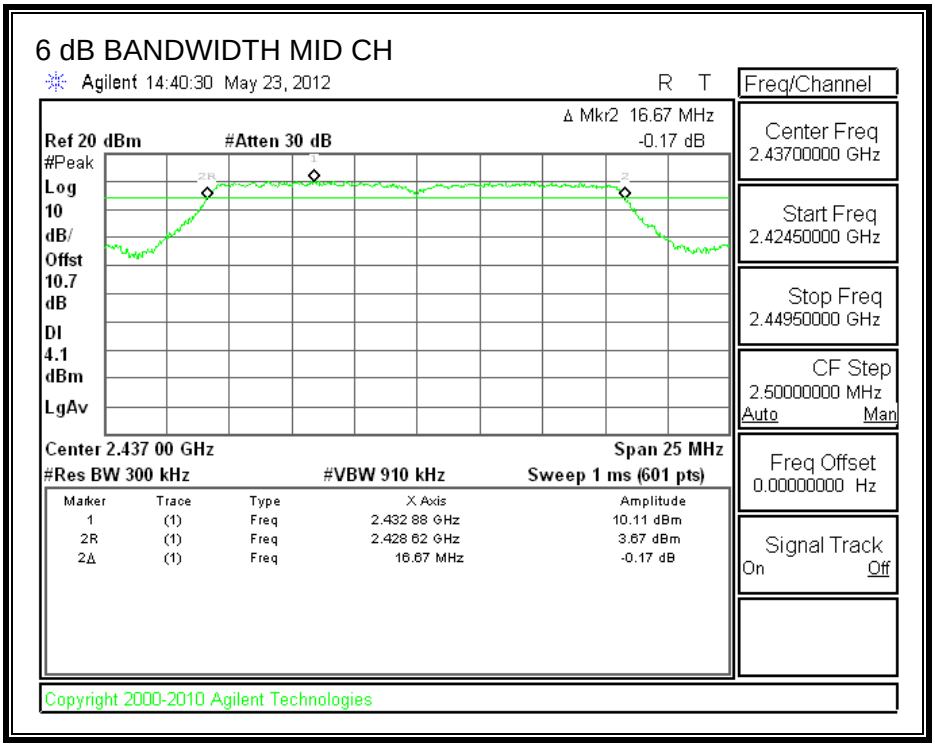
RESULTS

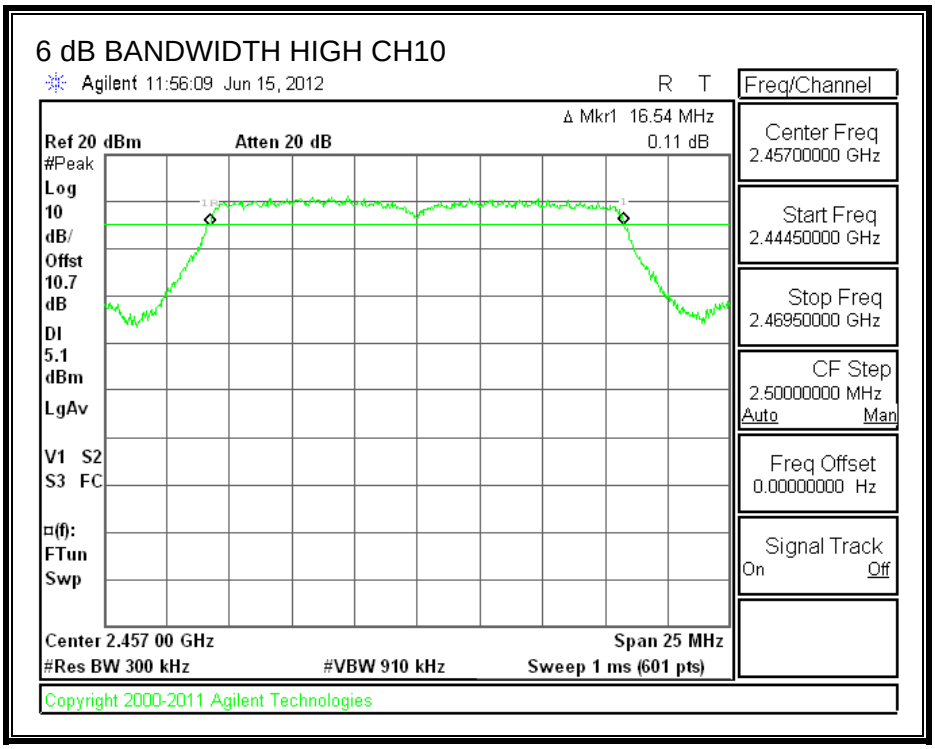
Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low	2412	16.62	0.5
Low	2417	16.58	0.5
Middle	2437	16.67	0.5
High	2457	16.54	0.5
High	2462	16.67	0.5

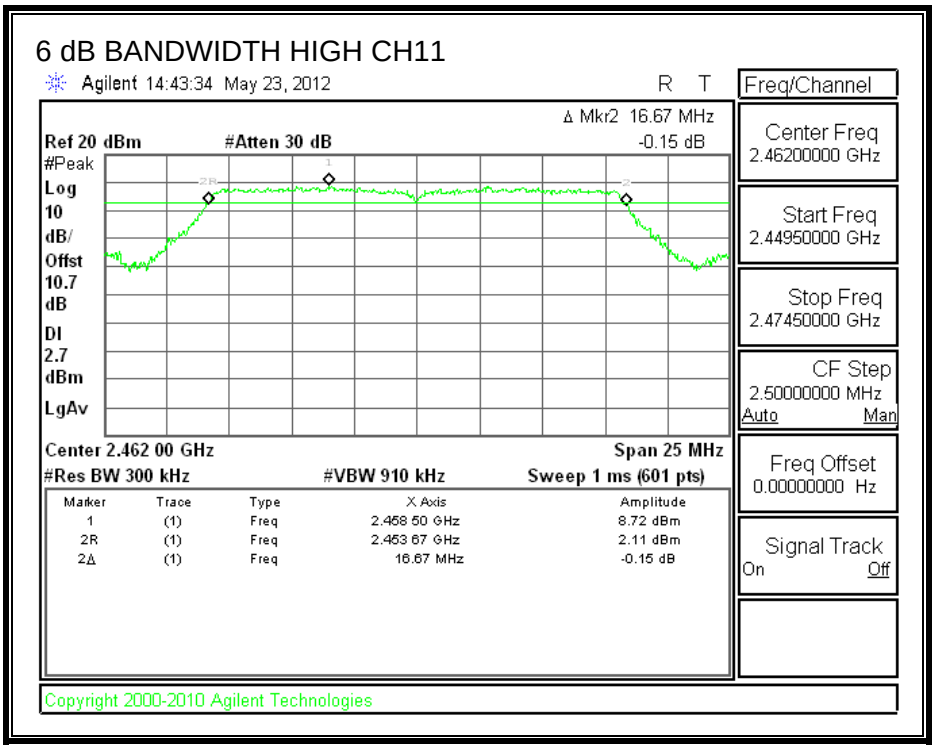
6 dB BANDWIDTH











7.1.2. 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

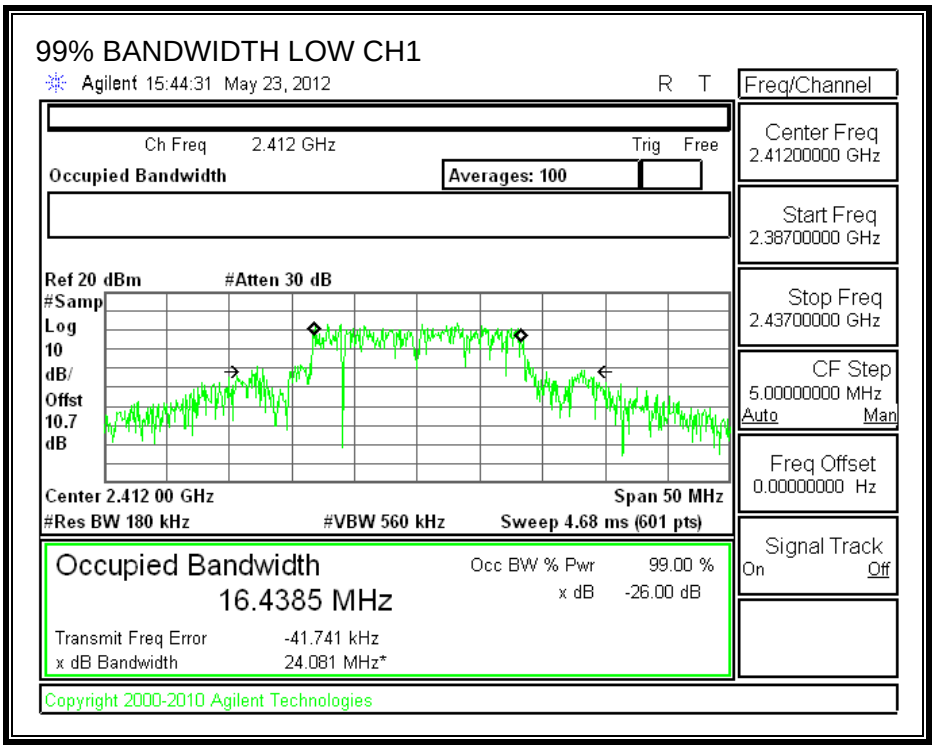
TEST PROCEDURE

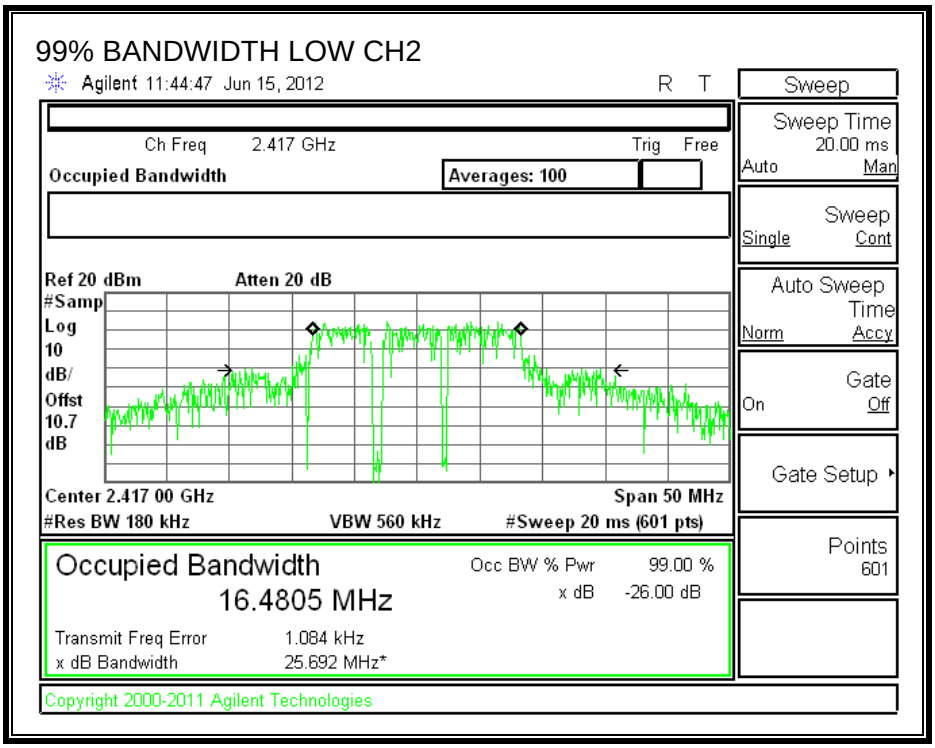
The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the 99 % bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal 99% bandwidth function is utilized.

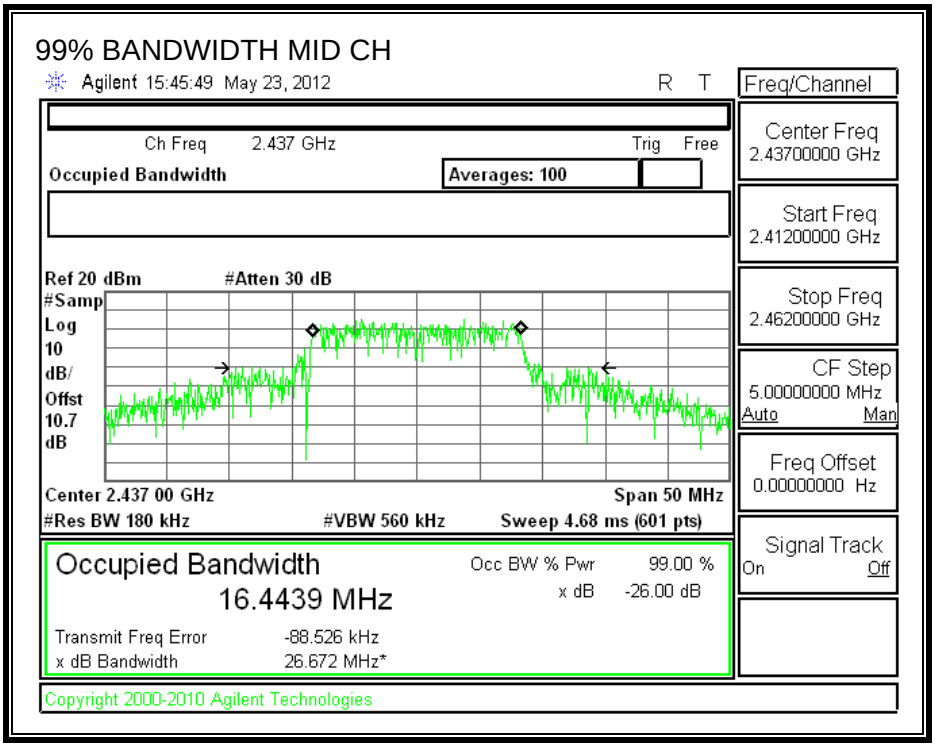
RESULTS

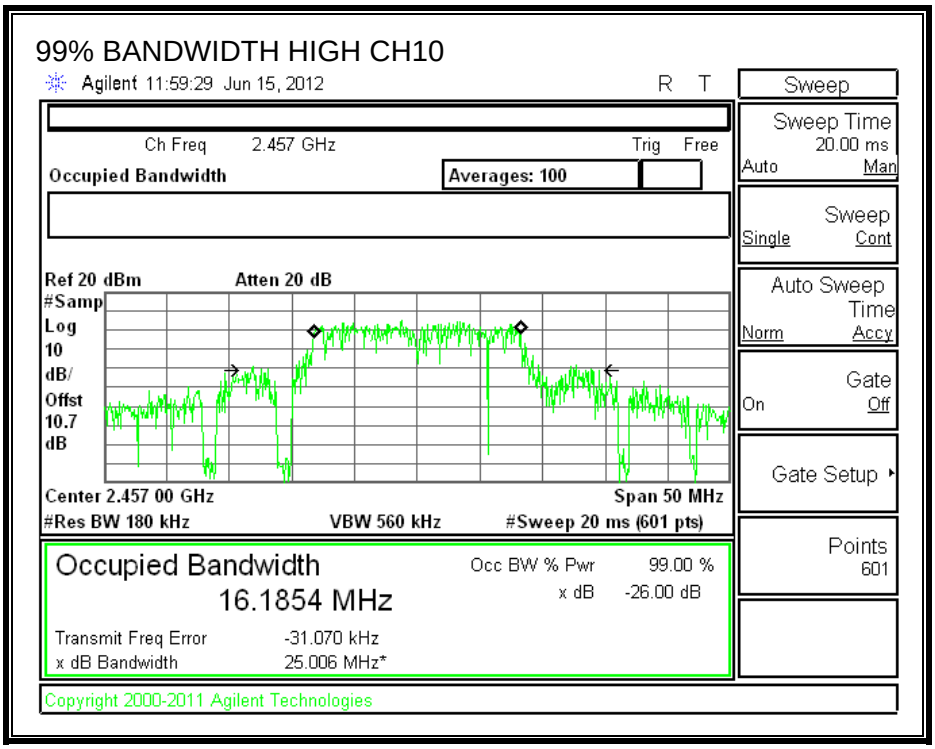
Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2412	16.4385
Low	2417	16.4850
Middle	2437	16.4439
High	2457	16.1854
High	2462	16.3772

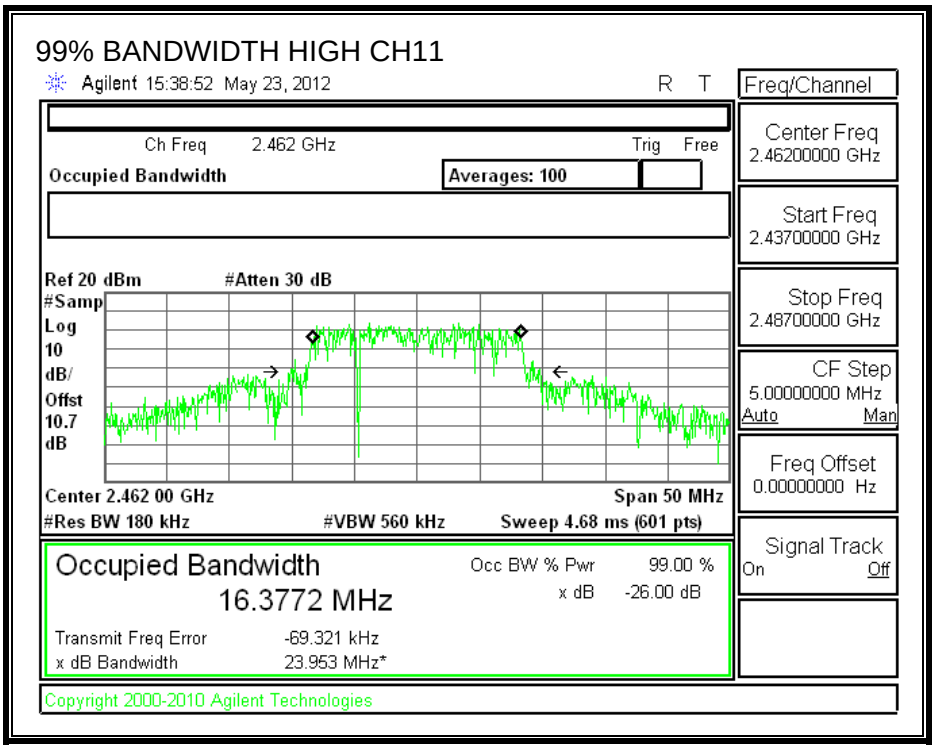
99% BANDWIDTH











7.1.3. OUTPUT POWER

LIMITS

FCC §15.247 (b)

IC RSS-210 A8.4

The maximum antenna gain is equal to 6.77 dBi, therefore the limit is 29.23 dBm.

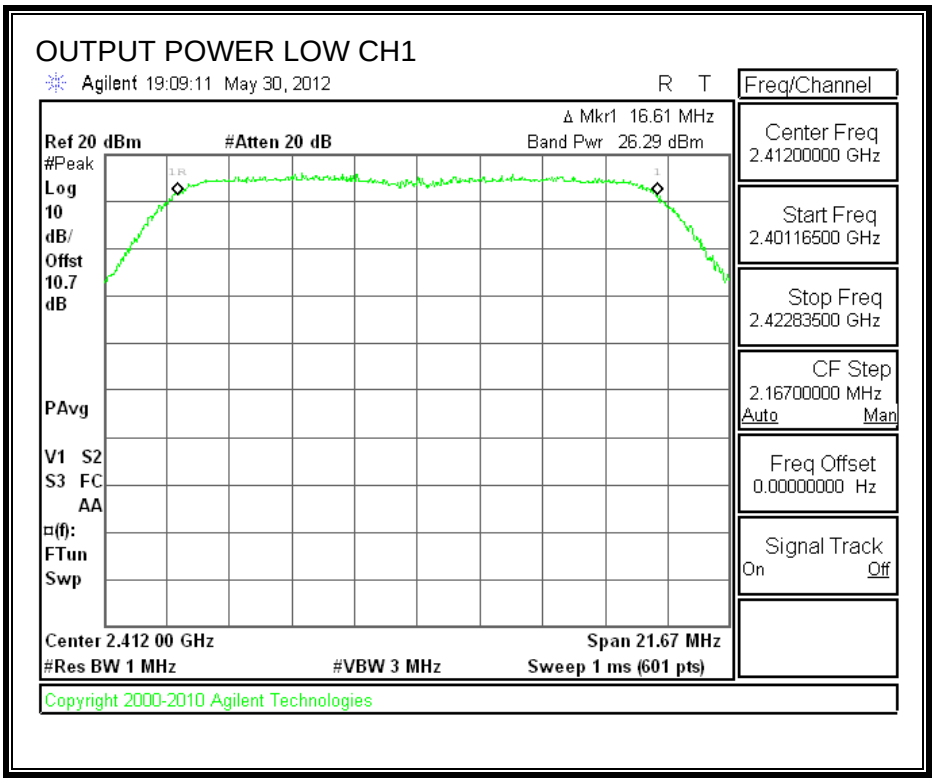
TEST PROCEDURE

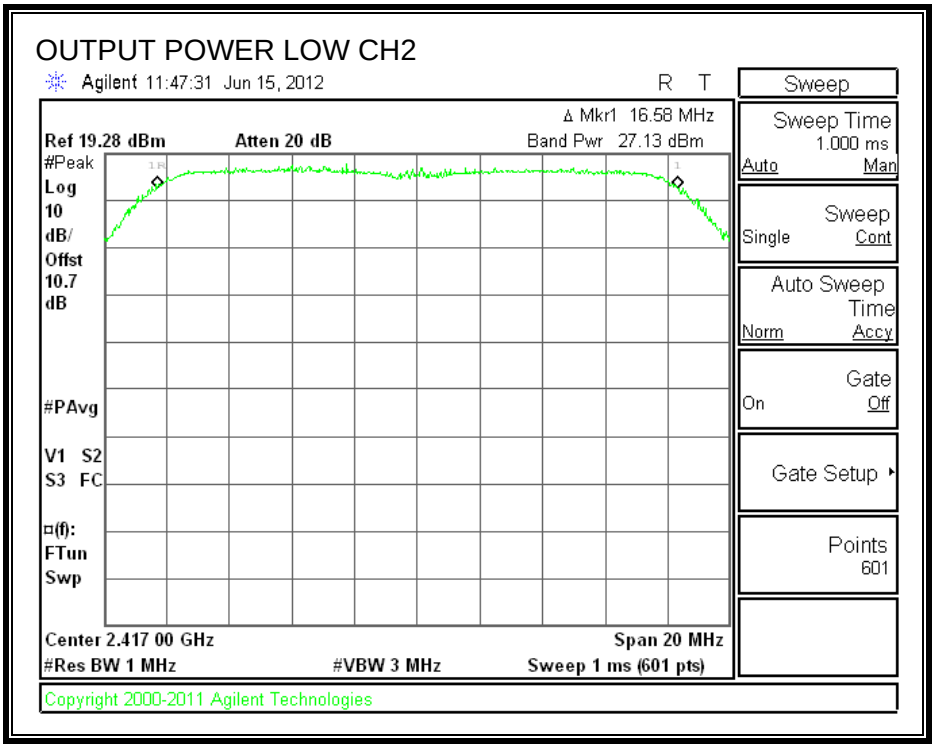
KDB 558074 D01 V01 "Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under 15.247", dated 01/18/2012.

RESULTS

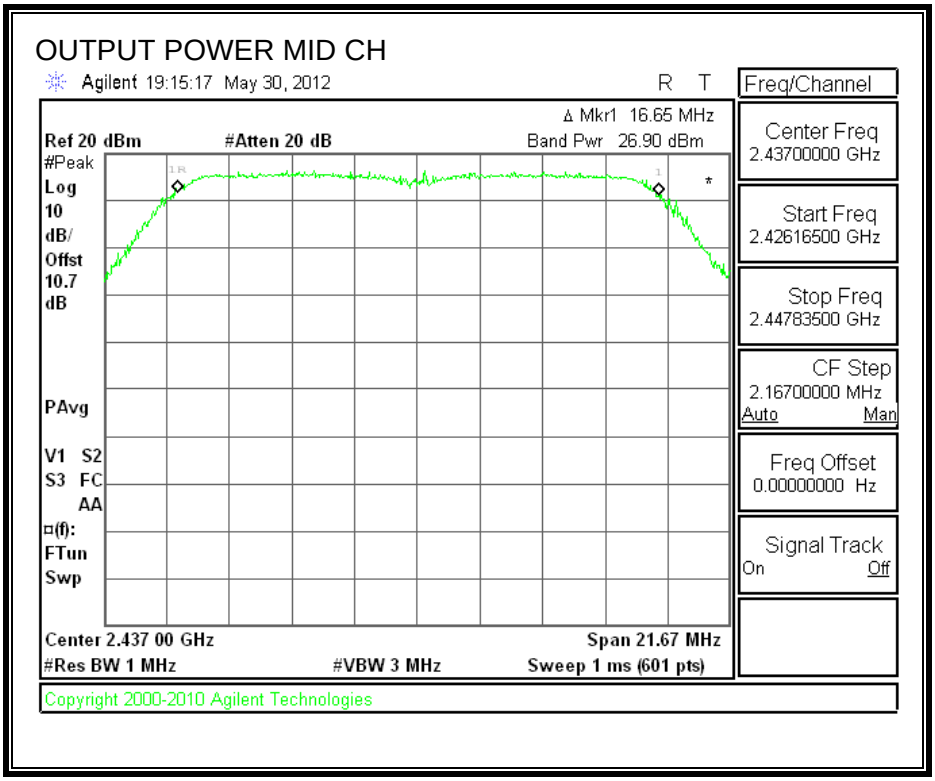
Channel	Frequency (MHz)	Peak Power Reading (dBm)	Limit (dBm)	Margin (dB)
Low	2412	26.29	29.23	-2.94
Low	2417	27.13	29.23	-2.10
Middle	2437	26.90	29.23	-2.33
High	2457	26.91	29.23	-2.32
High	2462	25.57	29.23	-3.66

OUTPUT POWER

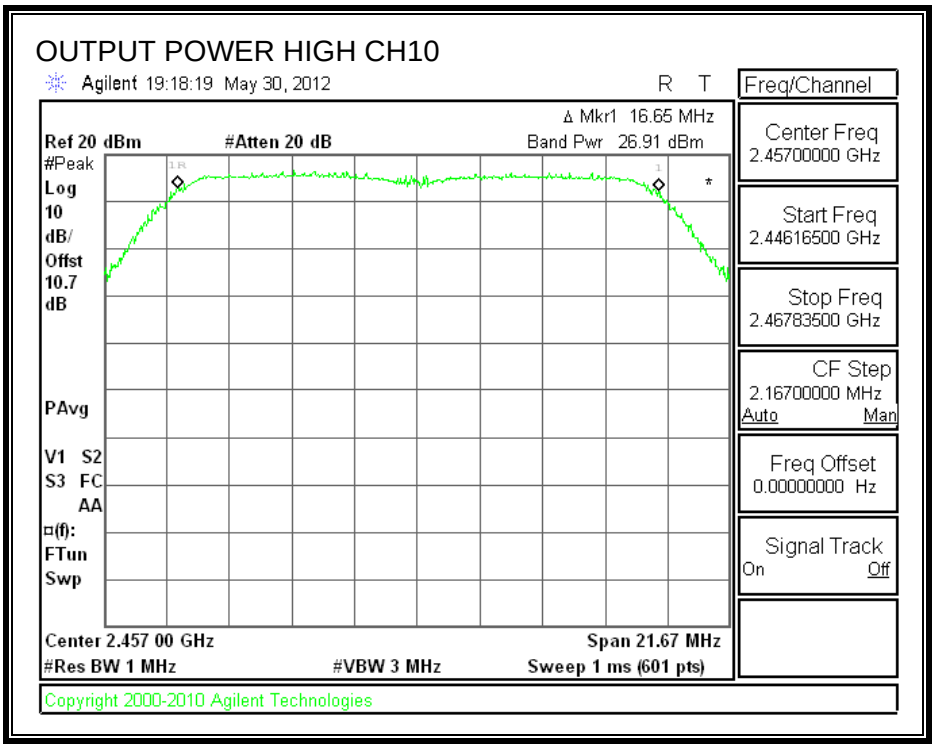




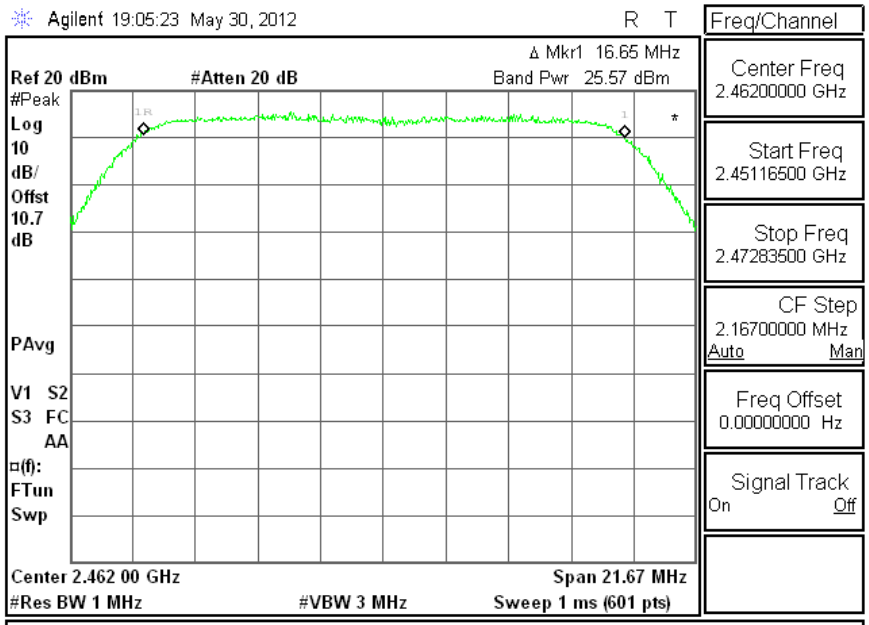
OUTPUT POWER MID CH



OUTPUT POWER HIGH CH10



OUTPUT POWER HIGH CH11



7.1.4. AVERAGE POWER

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a power meter.

RESULTS

The cable assembly insertion loss of 10.7 dB (including 10 dB pad and 0.7 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

Channel	Frequency (MHz)	Power (dBm)
Low	2412	18.20
Low	2417	19.10
Middle	2437	19.00
High	2457	19.10
High	2462	17.50

7.1.5. POWER SPECTRAL DENSITY

LIMITS

FCC §15.247 (e)

IC RSS-210 A8.2 (b)

TEST PROCEDURE

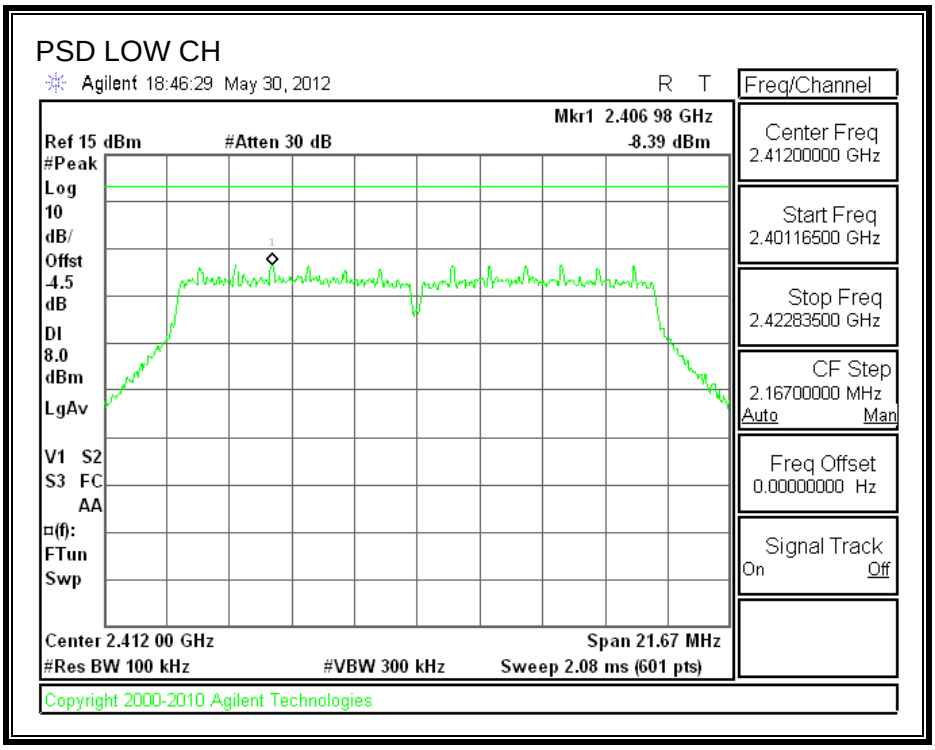
KDB 558074 D01 V01 "Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under 15.247", dated 01/18/2012.

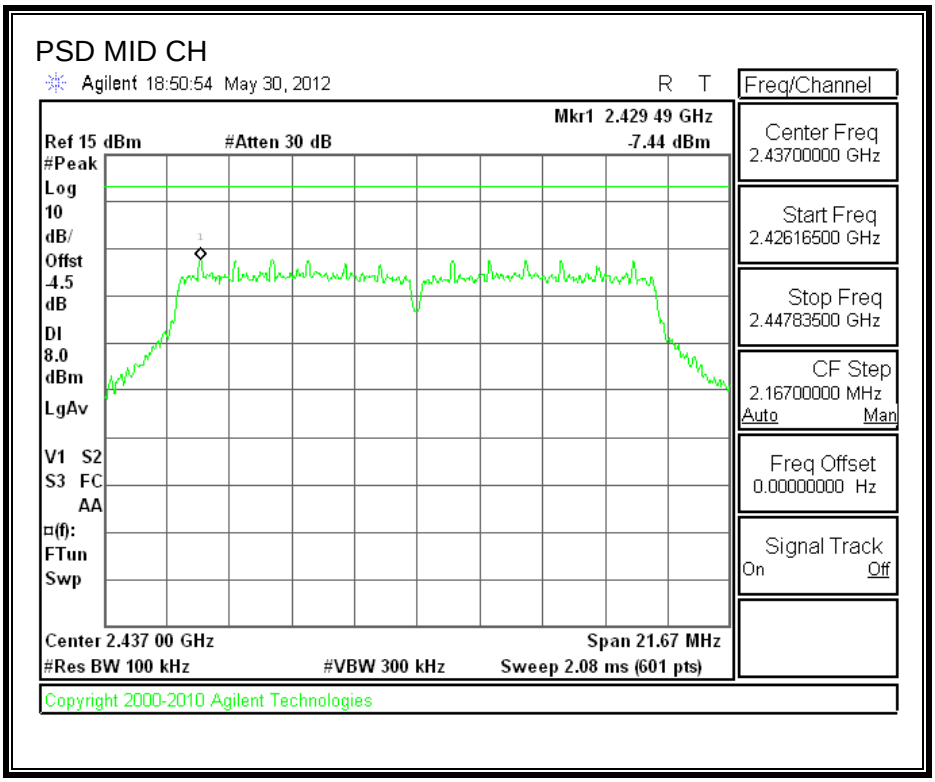
RESULTS

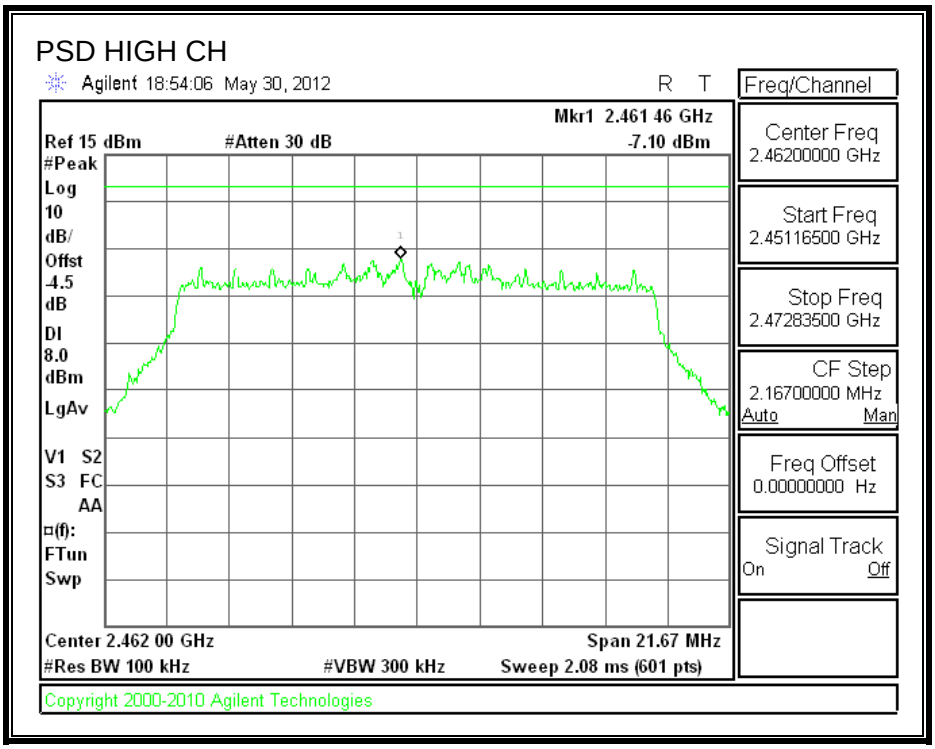
Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Margin (dB)
Low	2412	-8.39	8	-16.39
Middle	2437	-7.44	8	-15.44
High	2462	-7.10	8	-15.10

Note: The spectrum analyzer offset = attenuator loss + cable loss + 10 log(3/100 kHz) = -4.53 dB

POWER SPECTRAL DENSITY







7.1.6. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.247 (d)

IC RSS-210 A8.5

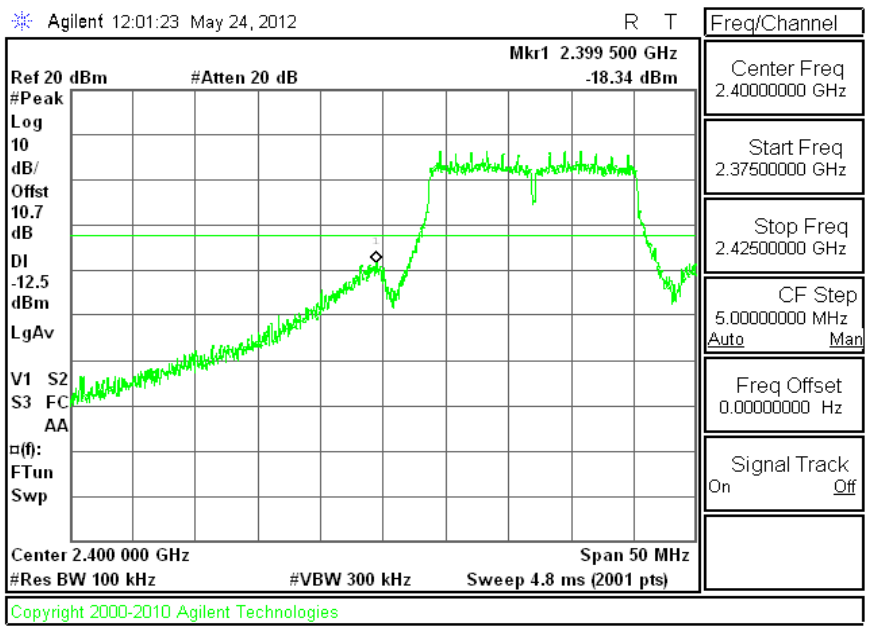
Output power was measured based on the use of a peak measurement, therefore the required attenuation is 20 dB.

TEST PROCEDURE

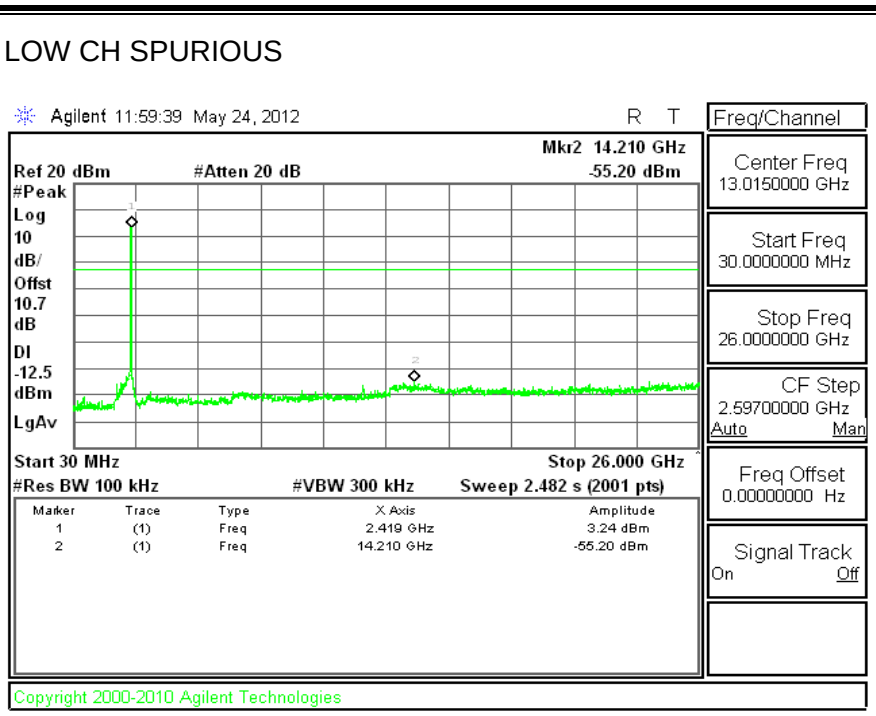
KDB 558074 D01 V01 “Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under 15.247”, dated 01/18/2012.

SPURIOUS EMISSIONS, LOW CHANNEL

LOW CH BANDEDGE

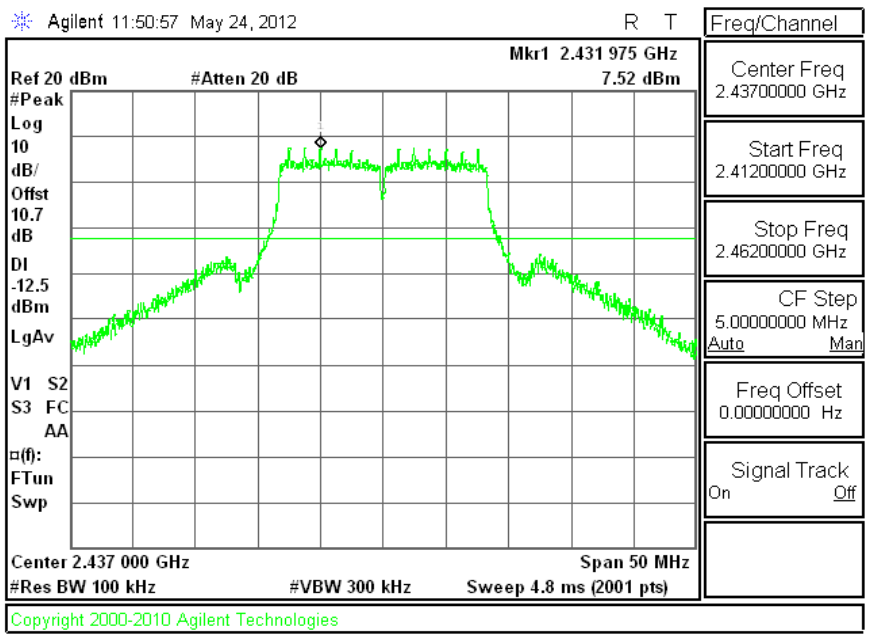


LOW CH SPURIOUS

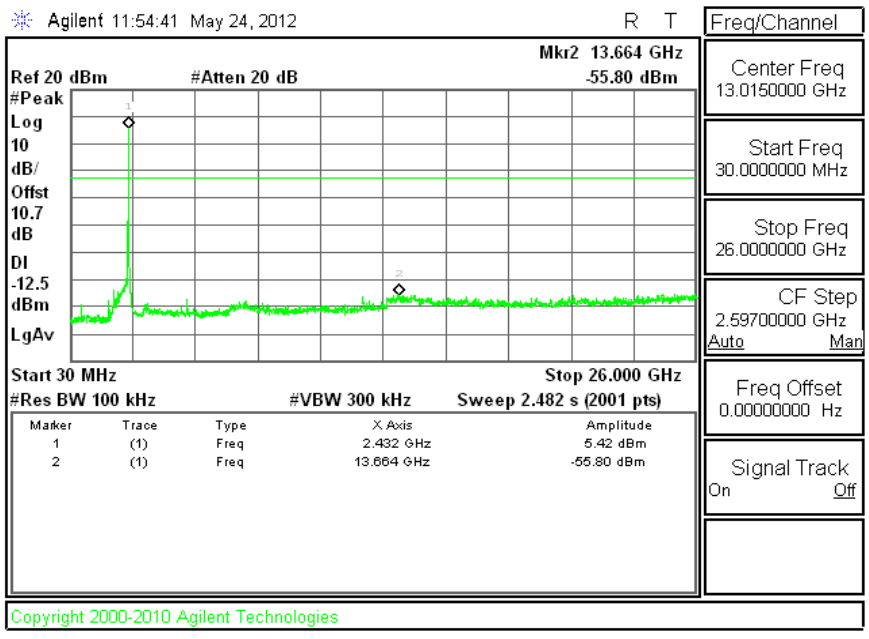


SPURIOUS EMISSIONS, MID CHANNEL

MID CH REFERENCE

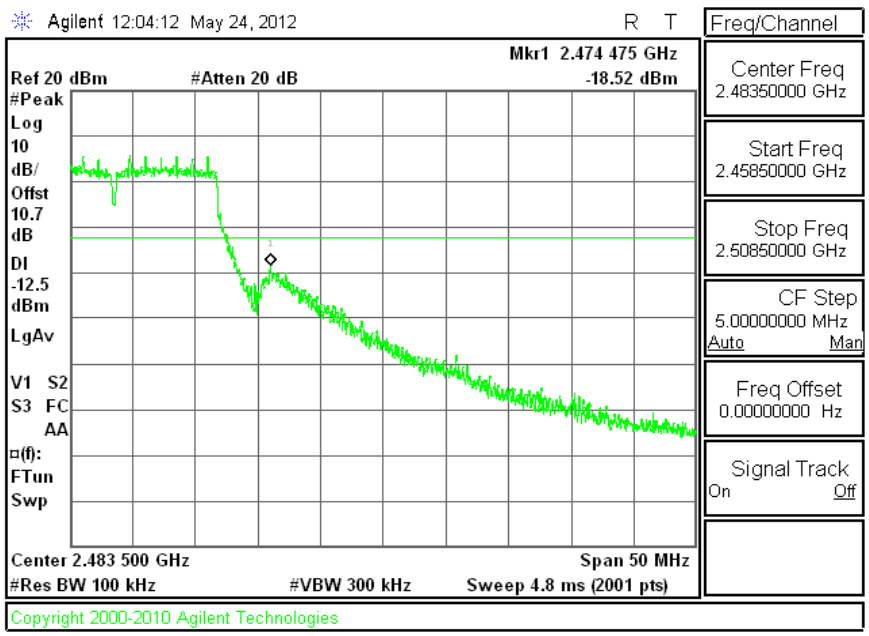


MID CH SPURIOUS

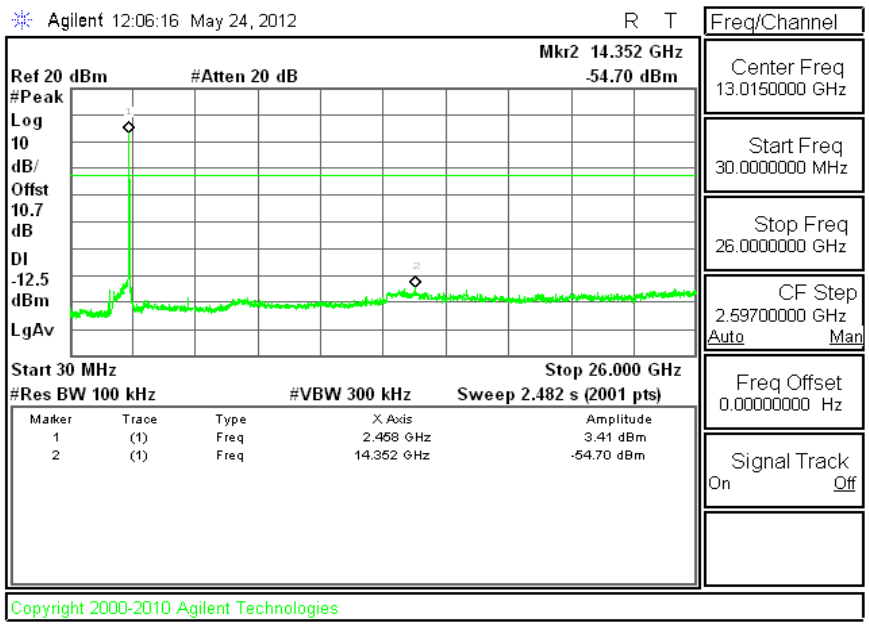


SPURIOUS EMISSIONS, HIGH CHANNEL

HIGH CH BANDEDGE



HIGH CH SPURIOUS



7.2. 802.11b CDD 3TX 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.

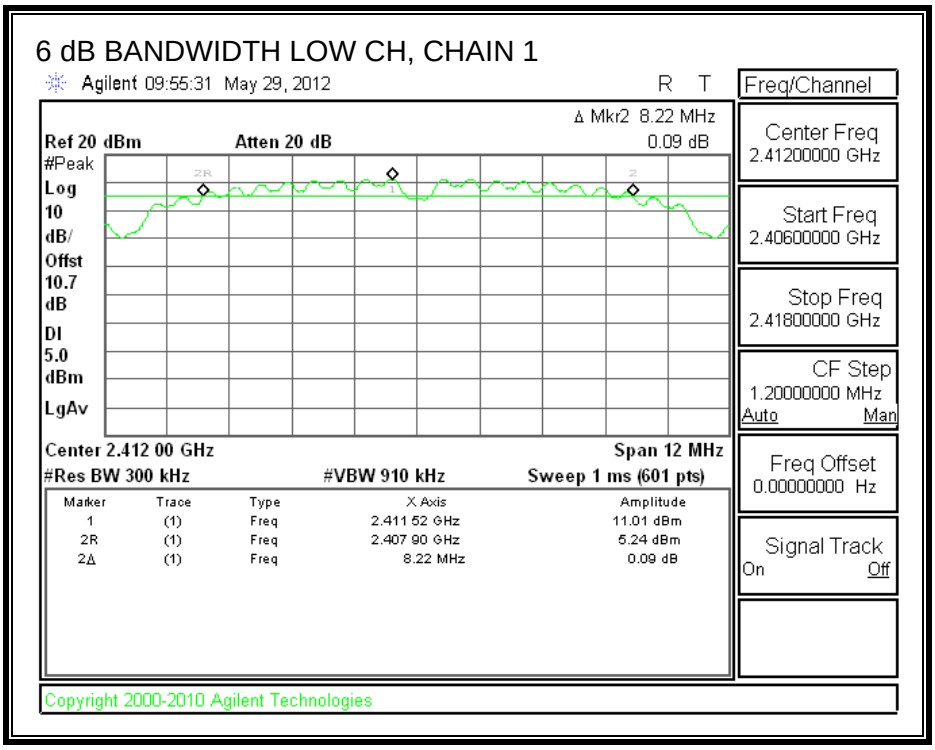
TEST PROCEDURE

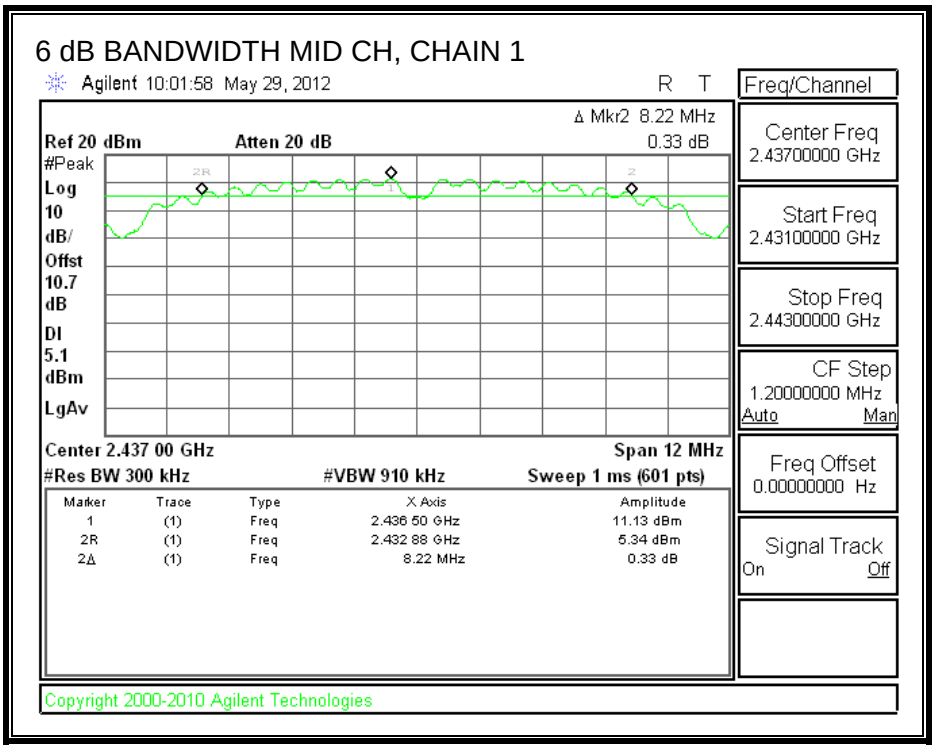
KDB 558074 D01 V01 "Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under 15.247", dated 01/18/2012.

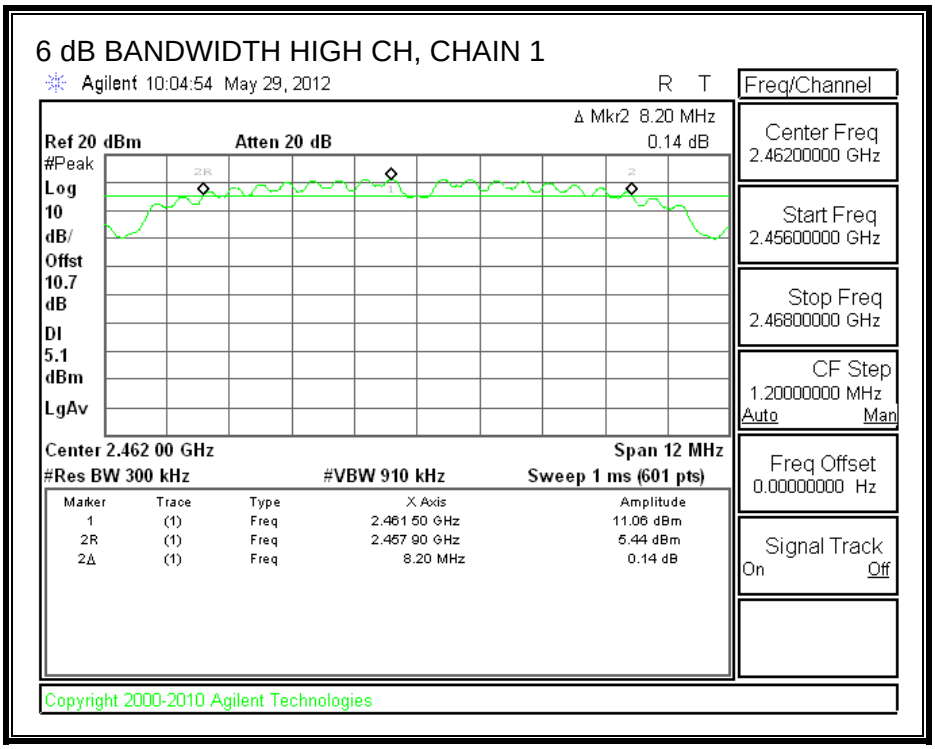
RESULTS

Channel	Frequency (MHz)	Chain 1 6 dB BW (MHz)	Chain 2 6 dB BW (MHz)	Chain 3 6 dB BW (MHz)	Minimum Limit (MHz)
Low	2412	8.22	8.21	8.22	0.5
Middle	2437	8.22	8.22	8.21	0.5
High	2462	8.20	8.20	8.21	0.5

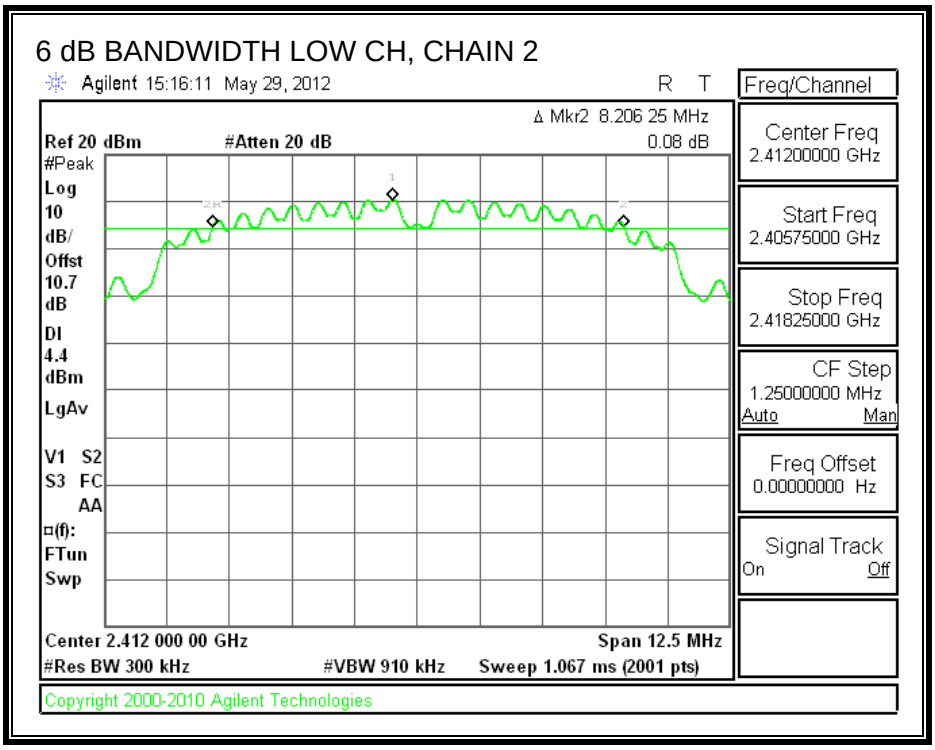
6 dB BANDWIDTH, CHAIN 1

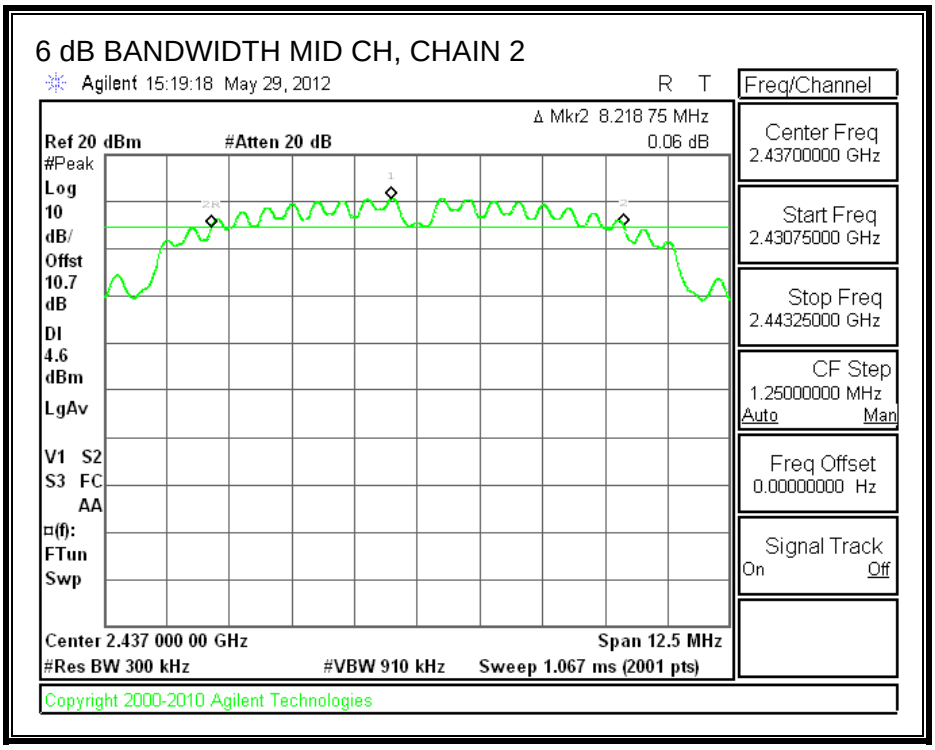




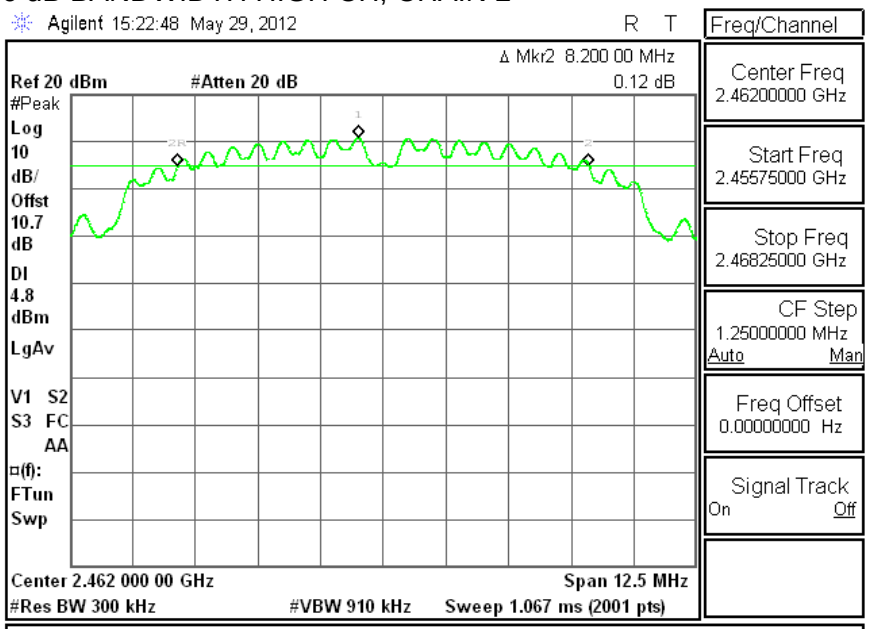


6 dB BANDWIDTH, CHAIN 2

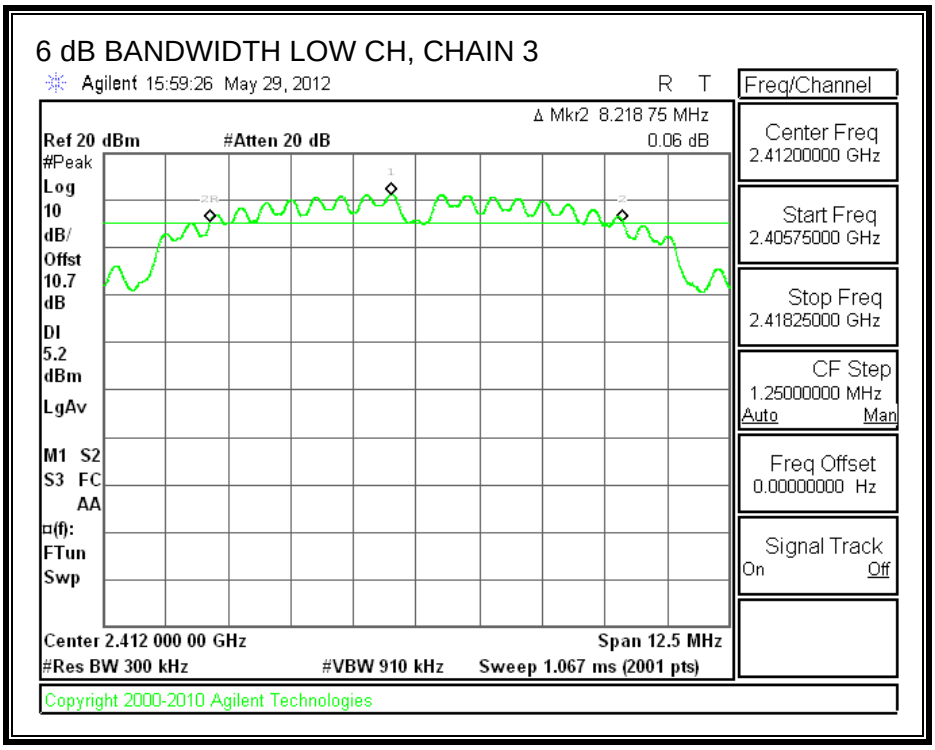


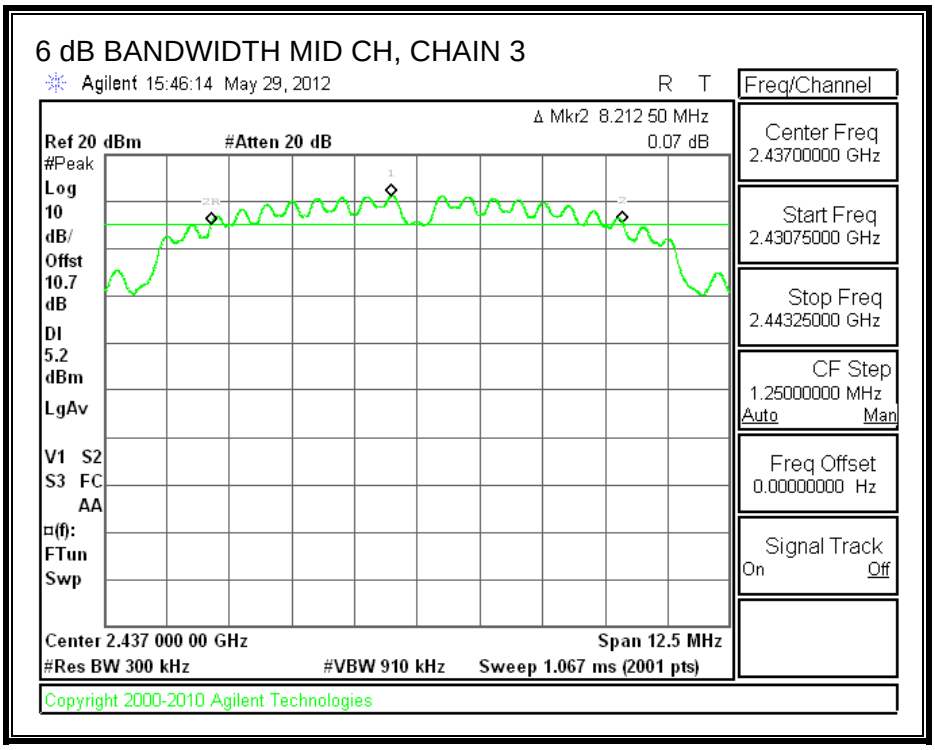


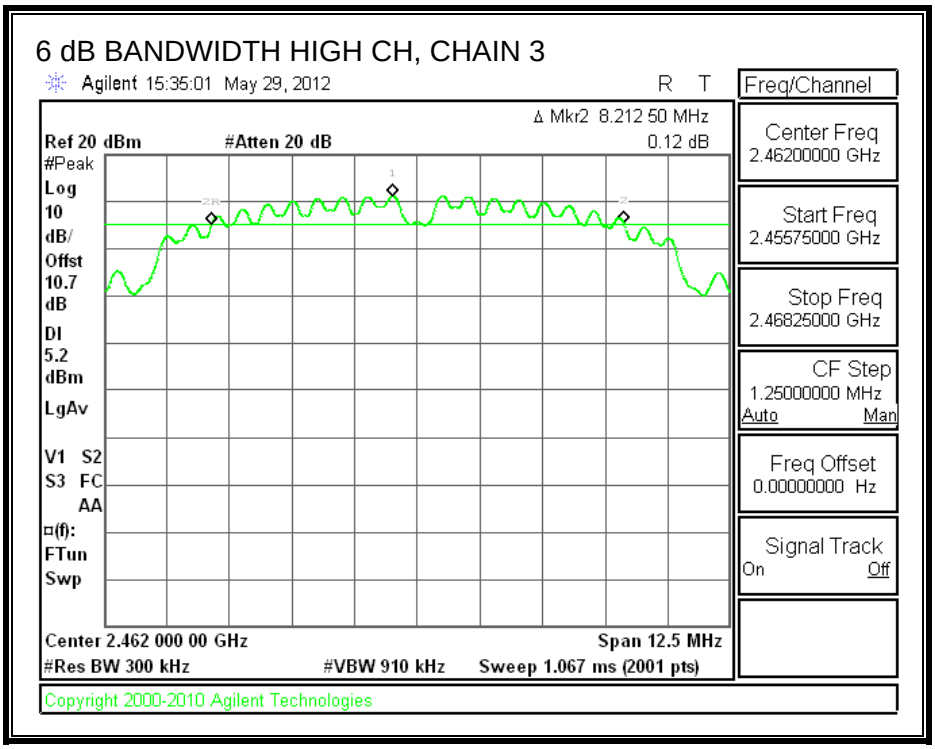
6 dB BANDWIDTH HIGH CH, CHAIN 2



6 dB BANDWIDTH, CHAIN 3







7.2.2. 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

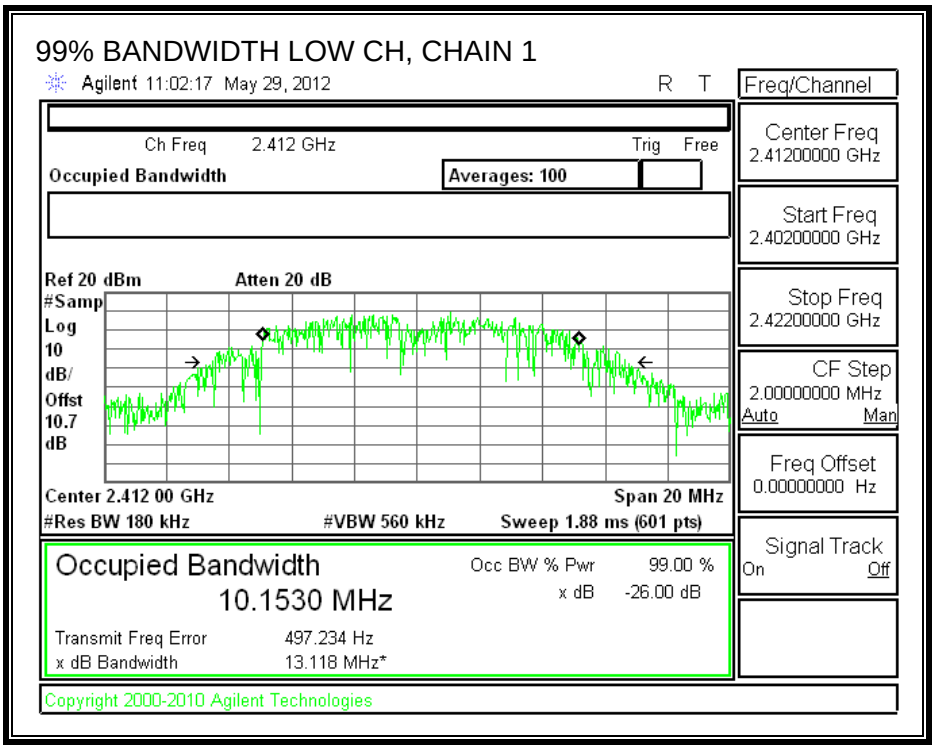
TEST PROCEDURE

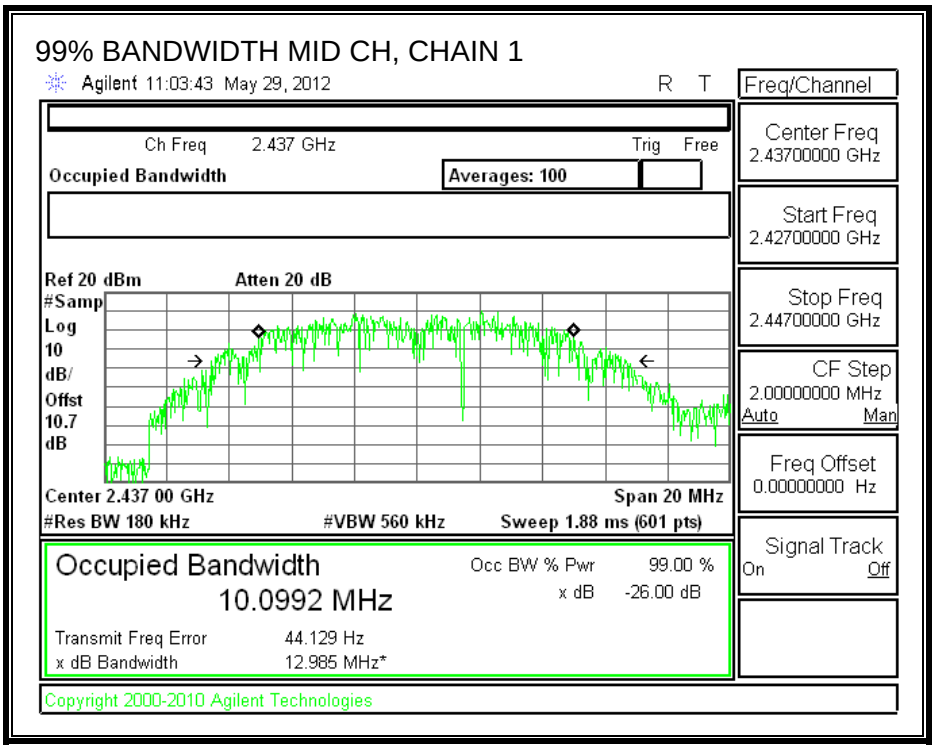
The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the 99 % bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal 99% bandwidth function is utilized.

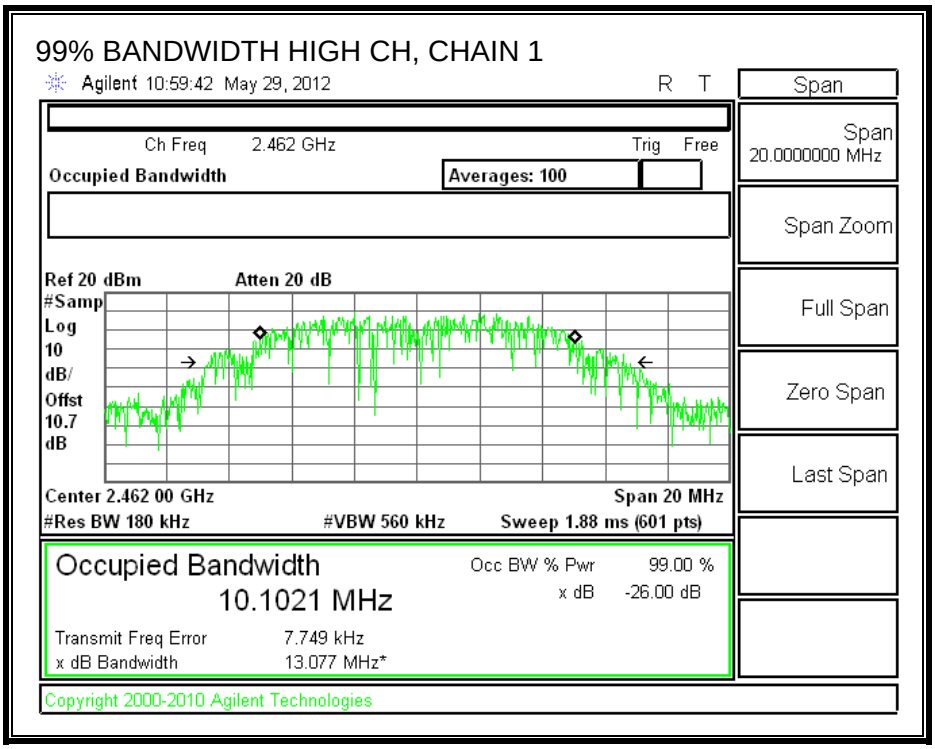
RESULTS

Channel	Frequency (MHz)	Chain 1 99% Bandwidth (MHz)	Chain 2 99% Bandwidth (MHz)	Chain 3 99% Bandwidth (MHz)
Low	2412	10.1530	10.0381	10.2677
Middle	2437	10.0992	10.0854	10.2258
High	2462	10.1021	10.1067	10.1248

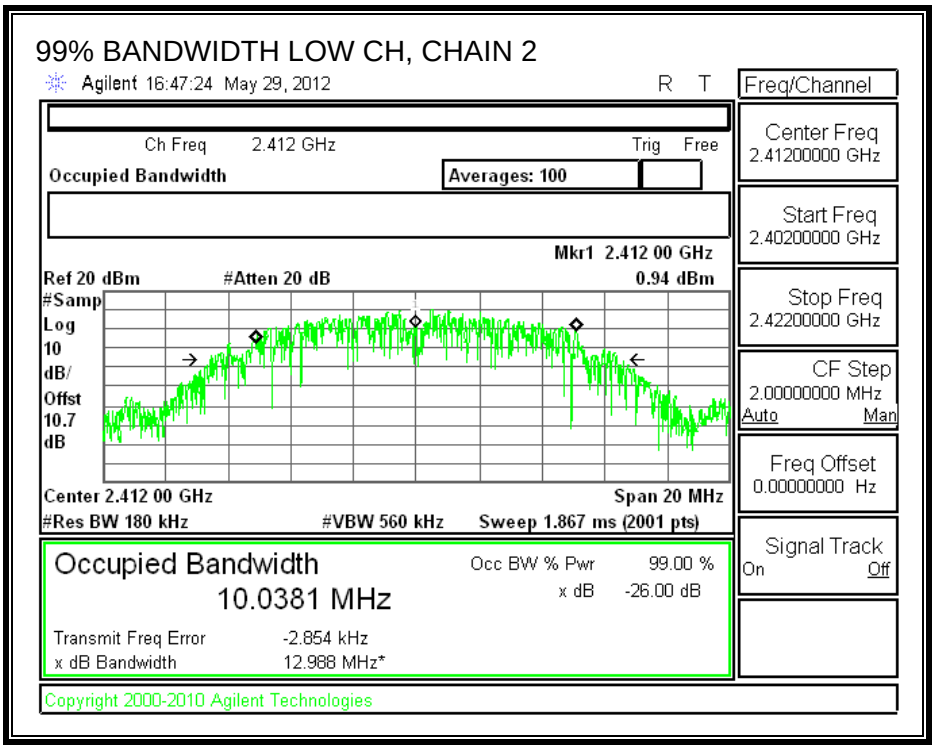
99% BANDWIDTH, CHAIN 1

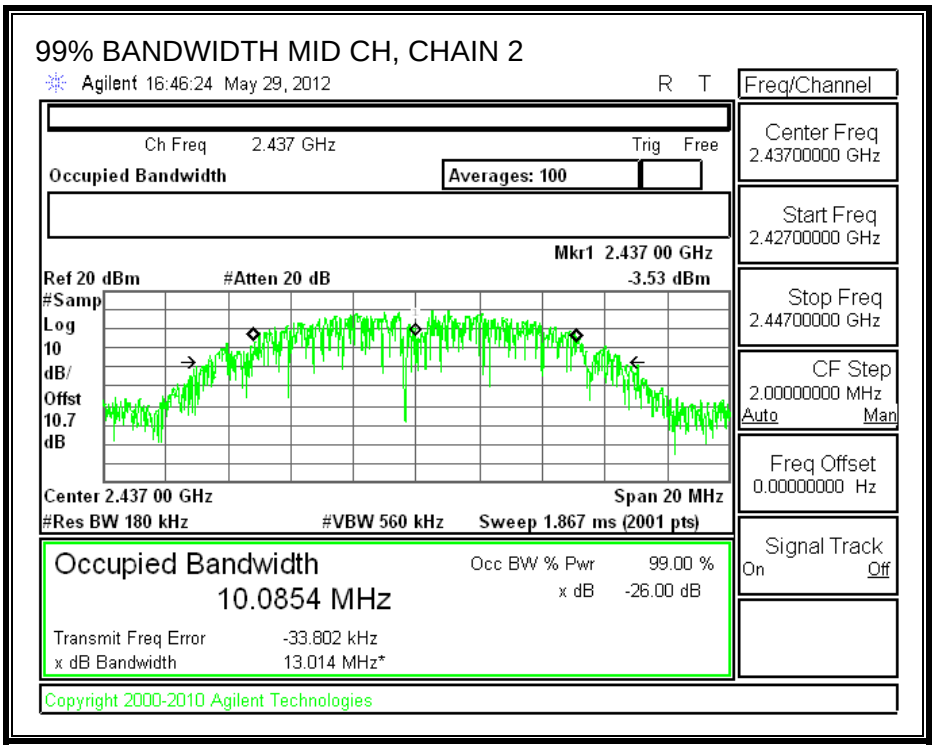


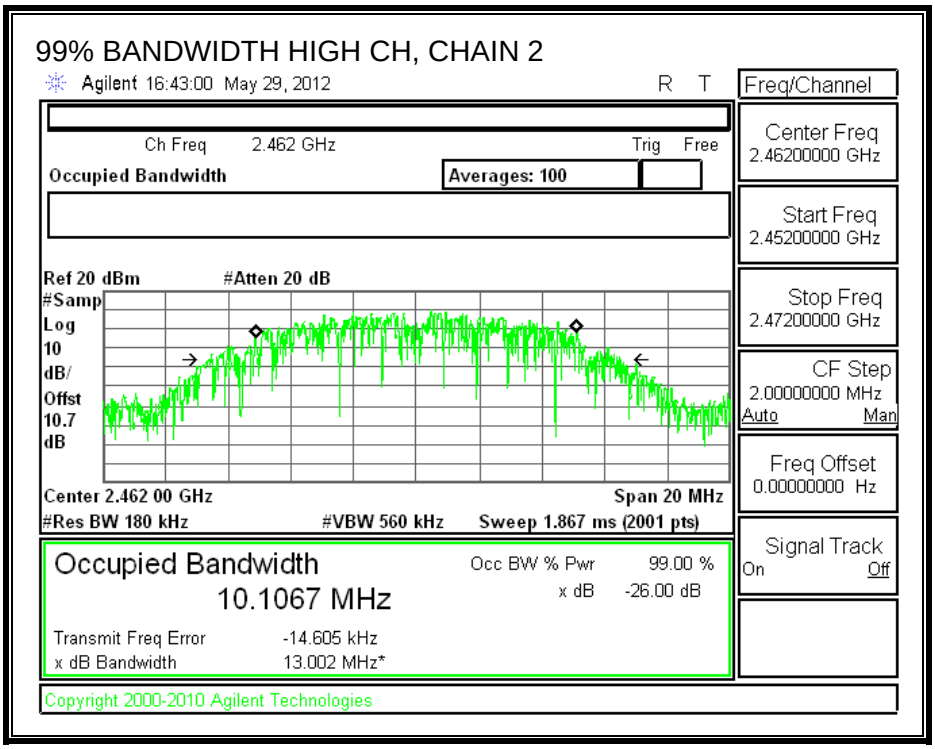




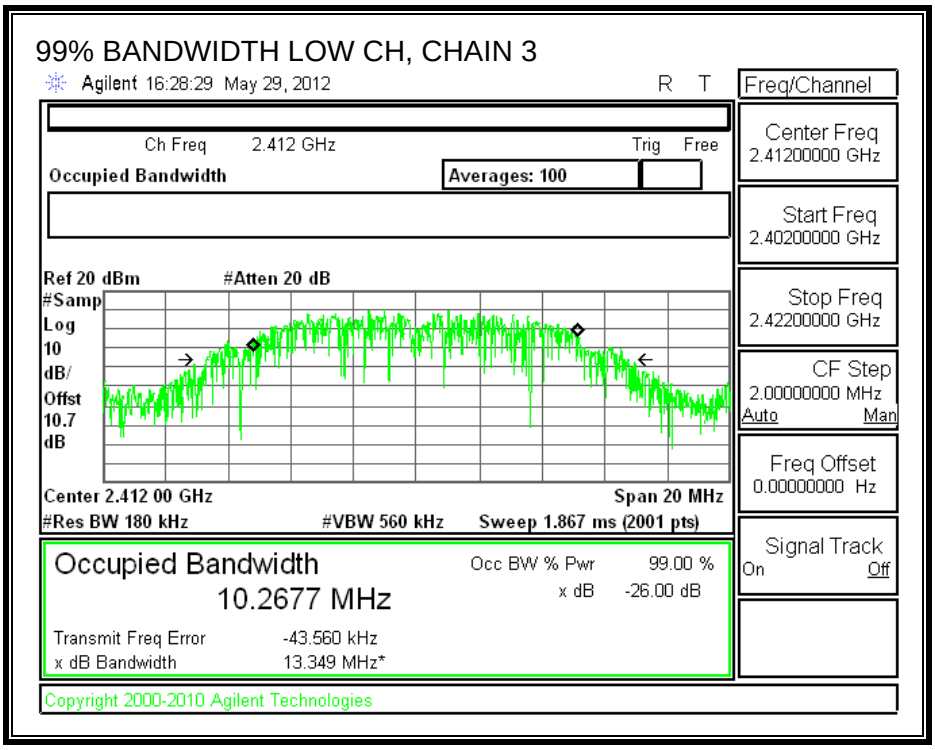
99% BANDWIDTH, CHAIN 2

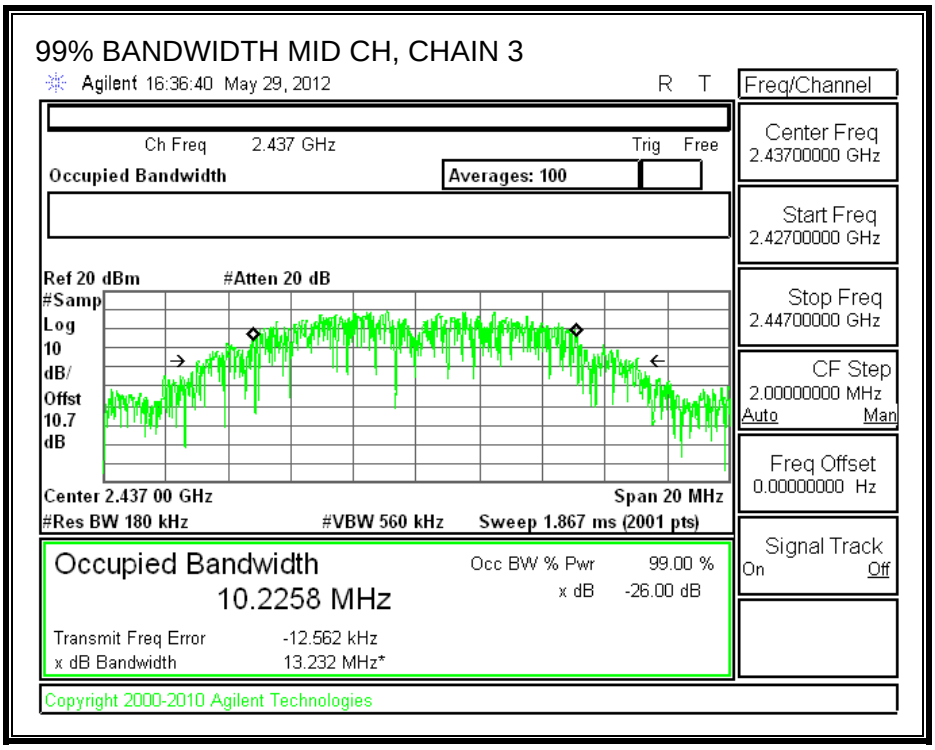


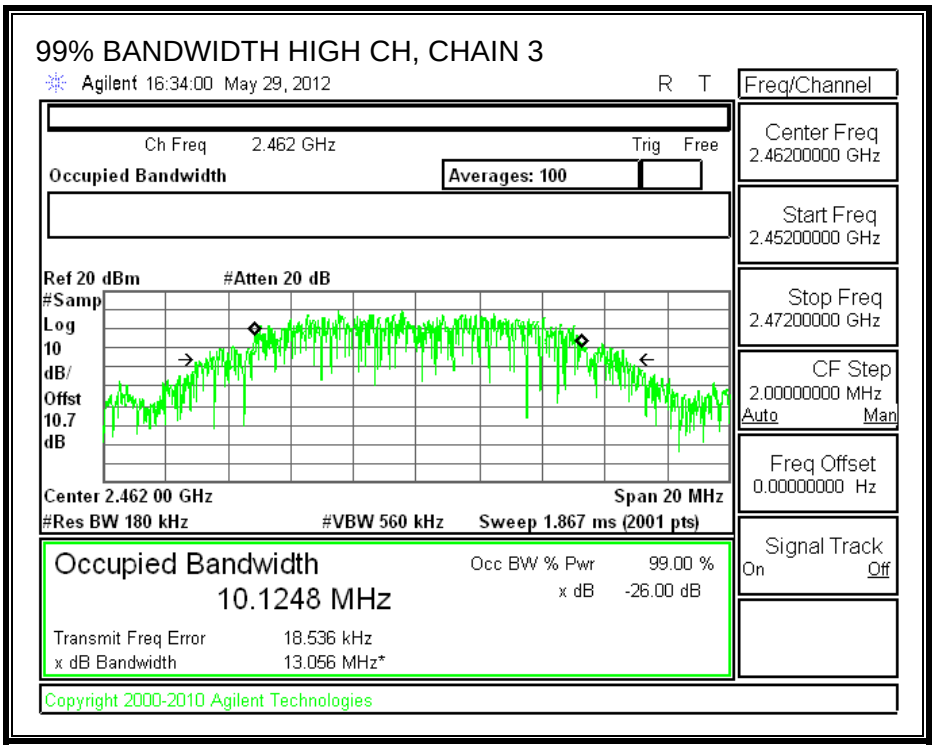




99% BANDWIDTH, CHAIN 3







7.2.3. OUTPUT POWER

LIMITS

FCC §15.247 (b)

IC RSS-210 A8.4

DIRECTIONAL ANTENNA GAIN

The TX chains are correlated and the antenna gain is unequal among the chains. The directional gain is:

Chain 0 Antenna Gain (dBi)	Chain 1 Antenna Gain (dBi)	Chain 2 Antenna Gain (dBi)	Correlated Chains Directional Gain (dBi)
1.66	1.11	6.77	8.35

The maximum effective composite gain is 8.35 dBi for other than fixed, point-to-point operations, therefore the limit is 27.65 dBm.

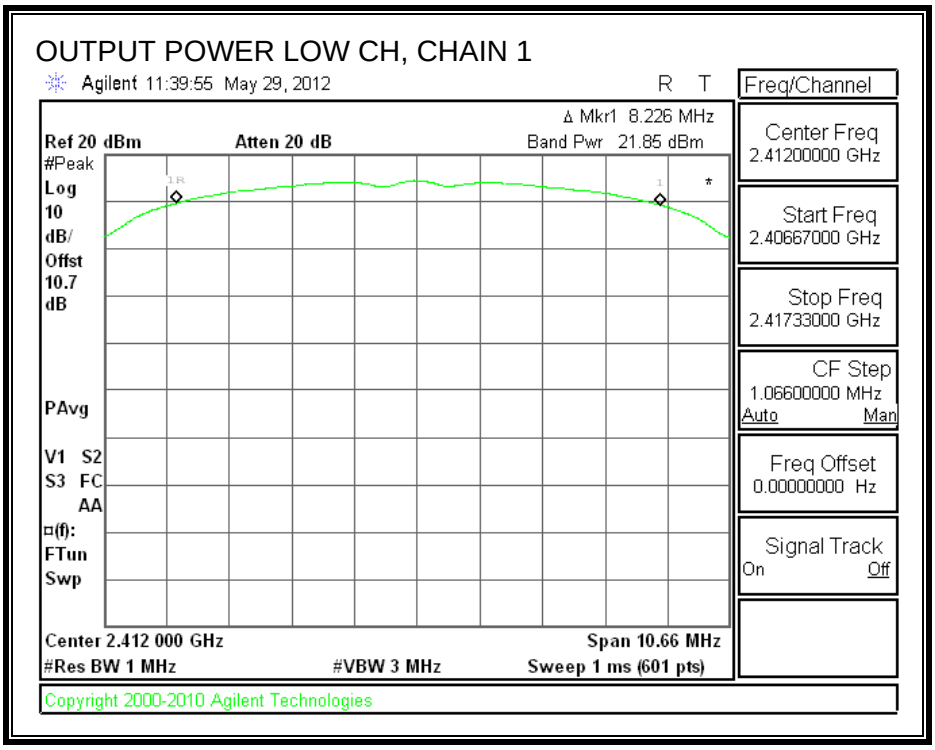
TEST PROCEDURE

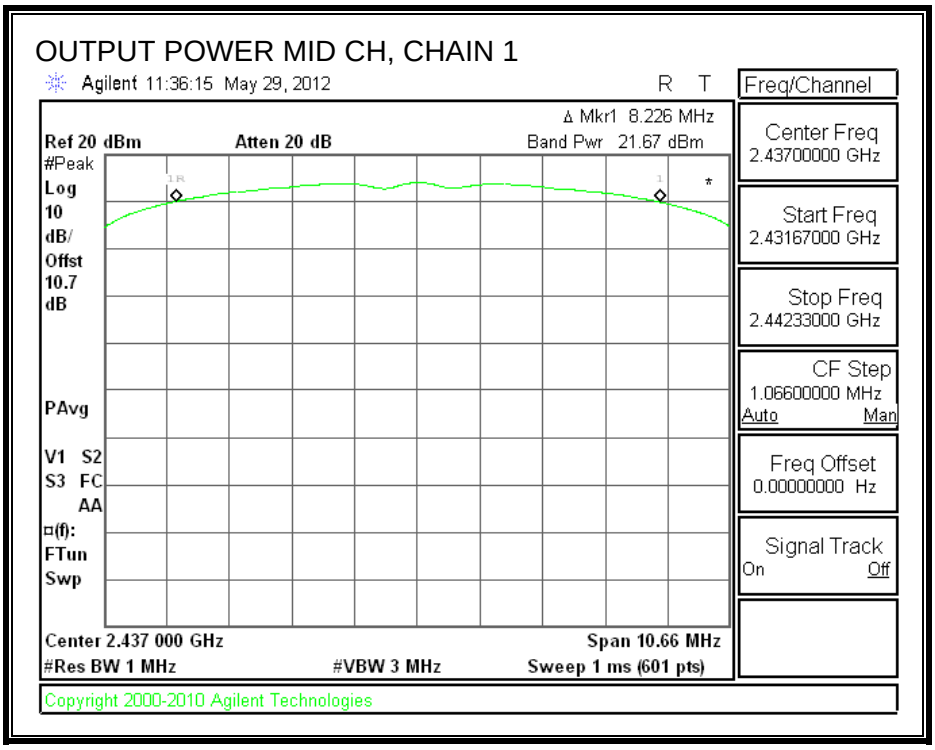
KDB 558074 D01 V01 “Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under 15.247”, dated 01/18/2012.

RESULTS

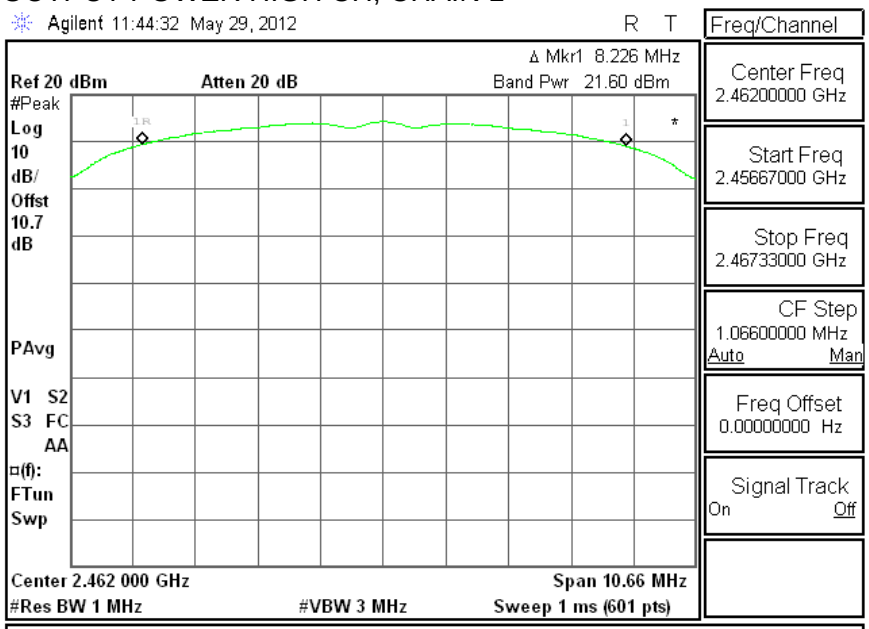
Channel	Frequency (MHz)	Chain 1 PK Power (dBm)	Chain 2 PK Power (dBm)	Chain 3 PK Power (dBm)	Total Power (dBm)	Limit (dBm)	Margin (dB)
Low	**2412**	**21.85**	**21.02**	**21.74**	**26.32**	**27.65**	**-1.33**
Mid	**2437**	**21.67**	**21.21**	**21.81**	**26.34**	**27.65**	**-1.31**
High	**2462**	**21.60**	**21.36**	**21.67**	**26.32**	**27.65**	**-1.33**

CHAIN 1 OUTPUT POWER

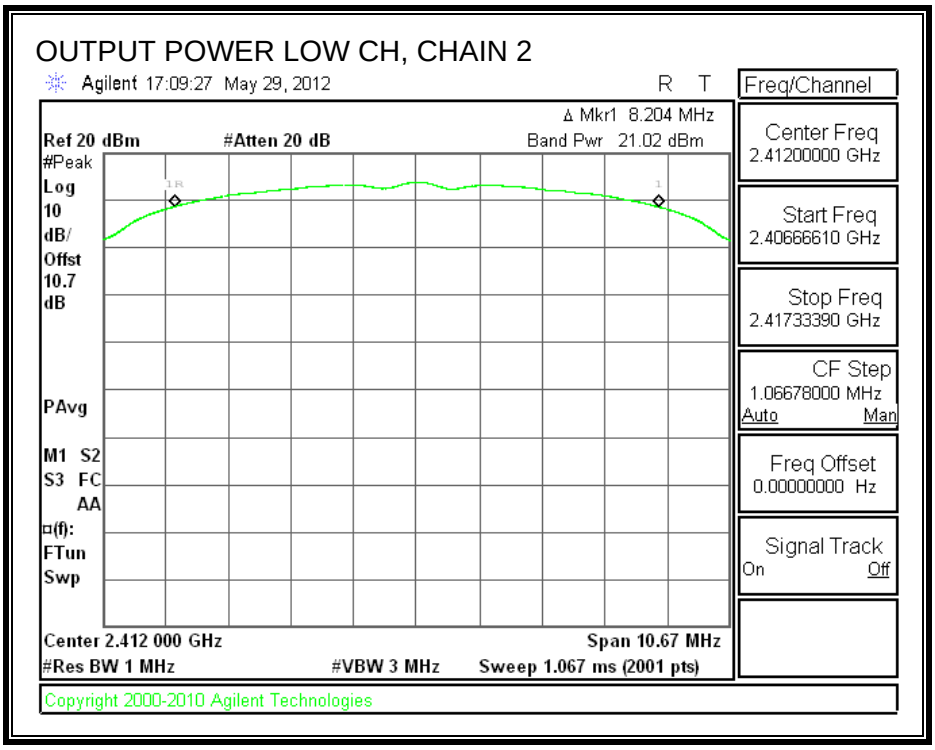


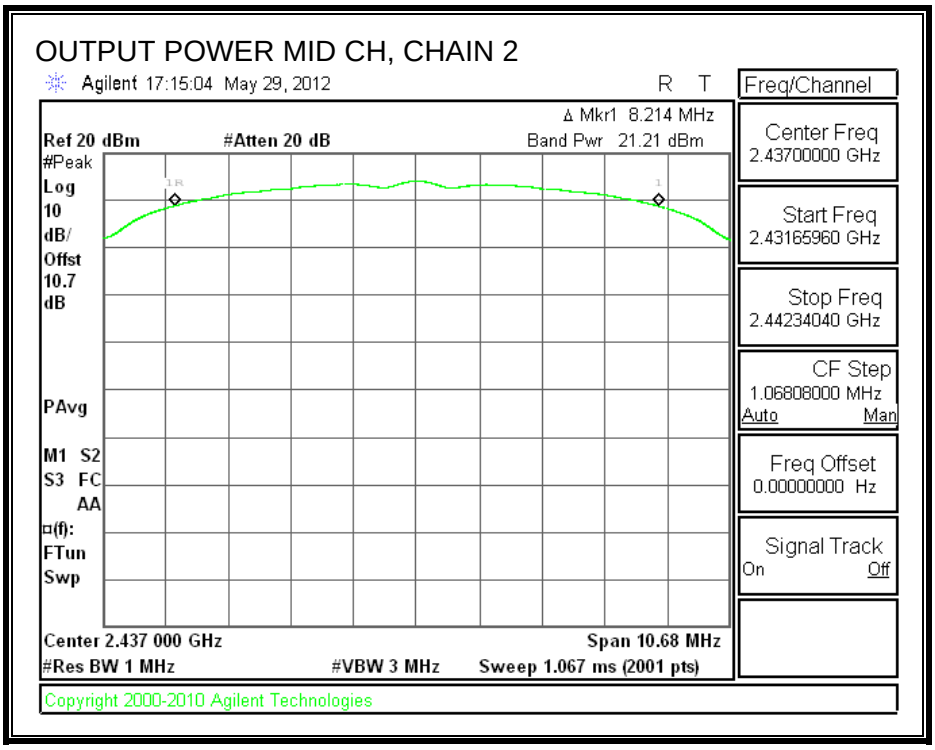


OUTPUT POWER HIGH CH, CHAIN 1

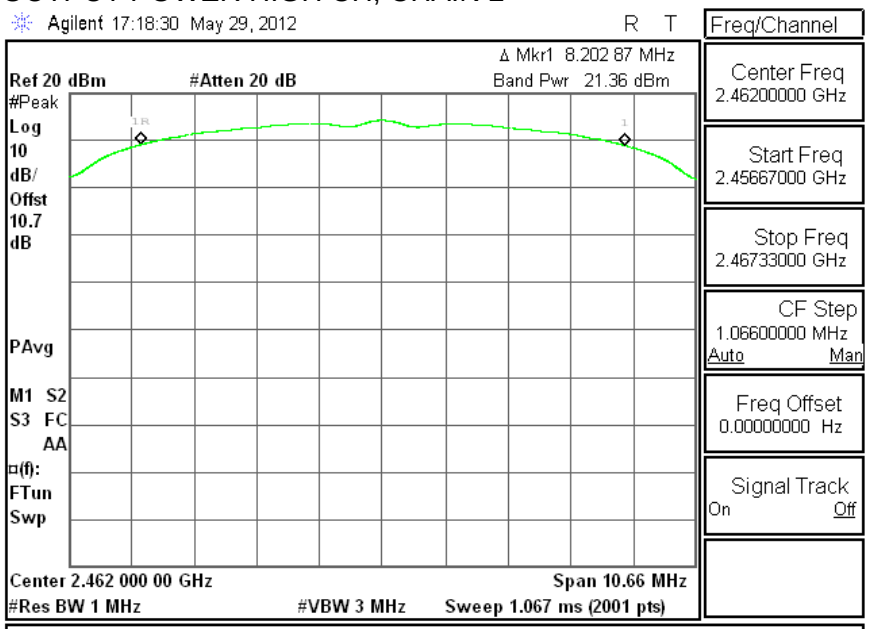


CHAIN 2 OUTPUT POWER

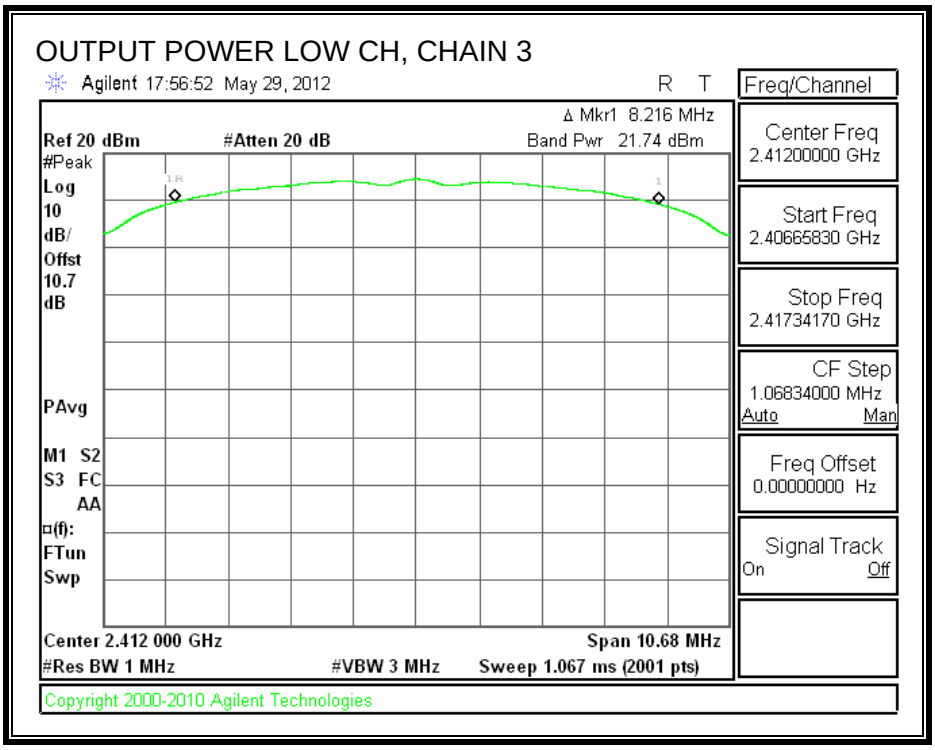


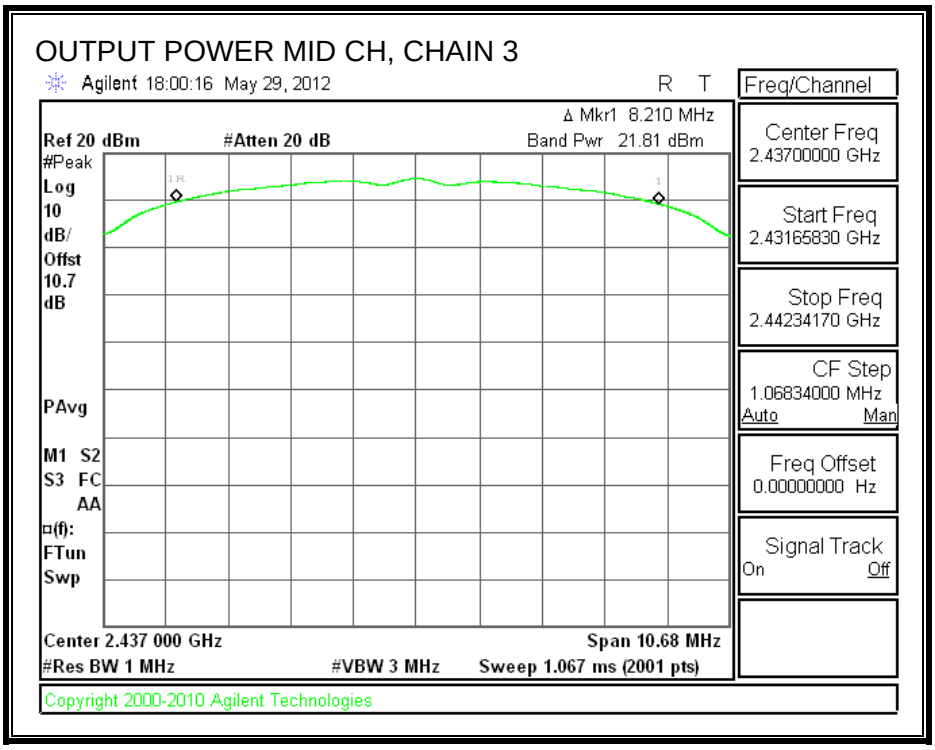


OUTPUT POWER HIGH CH, CHAIN 2

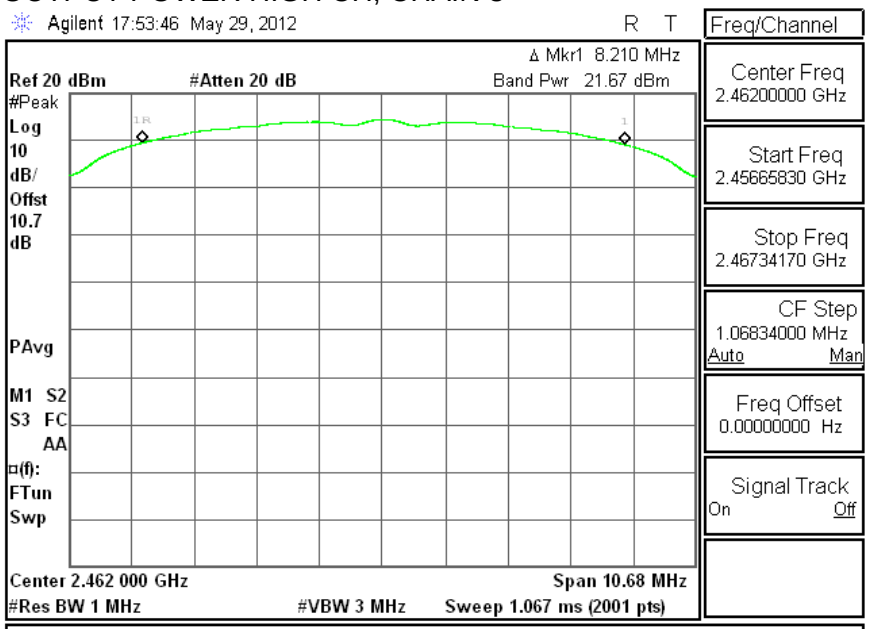


CHAIN 3 OUTPUT POWER





OUTPUT POWER HIGH CH, CHAIN 3



7.2.4. AVERAGE POWER

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a power meter.

RESULTS

The cable assembly insertion loss of 10.7 dB (including 10 dB pad and 0.7 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)	Chain 3 Power (dBm)	Total Power (dBm)
Low	2412	19.10	18.35	19.15	23.65
Middle	2437	19.05	18.50	19.10	23.66
High	2462	19.00	18.46	19.08	23.63

7.2.5. POWER SPECTRAL DENSITY

LIMITS

FCC §15.247 (e)

IC RSS-210 A8.2 (b)

TEST PROCEDURE

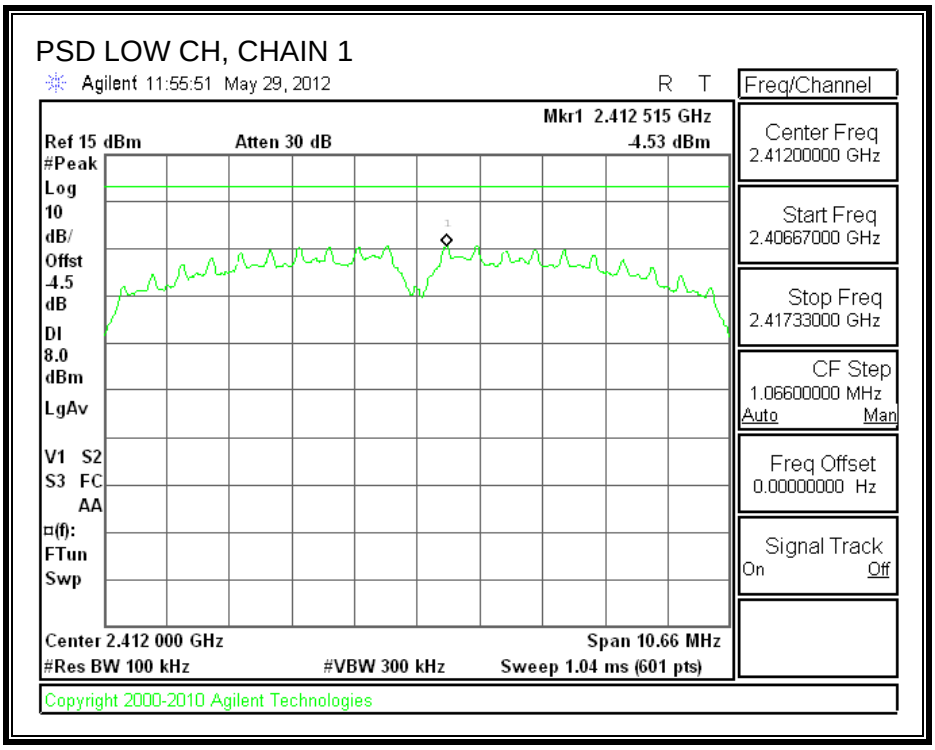
KDB 558074 D01 V01 "Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under 15.247", dated 01/18/2012.

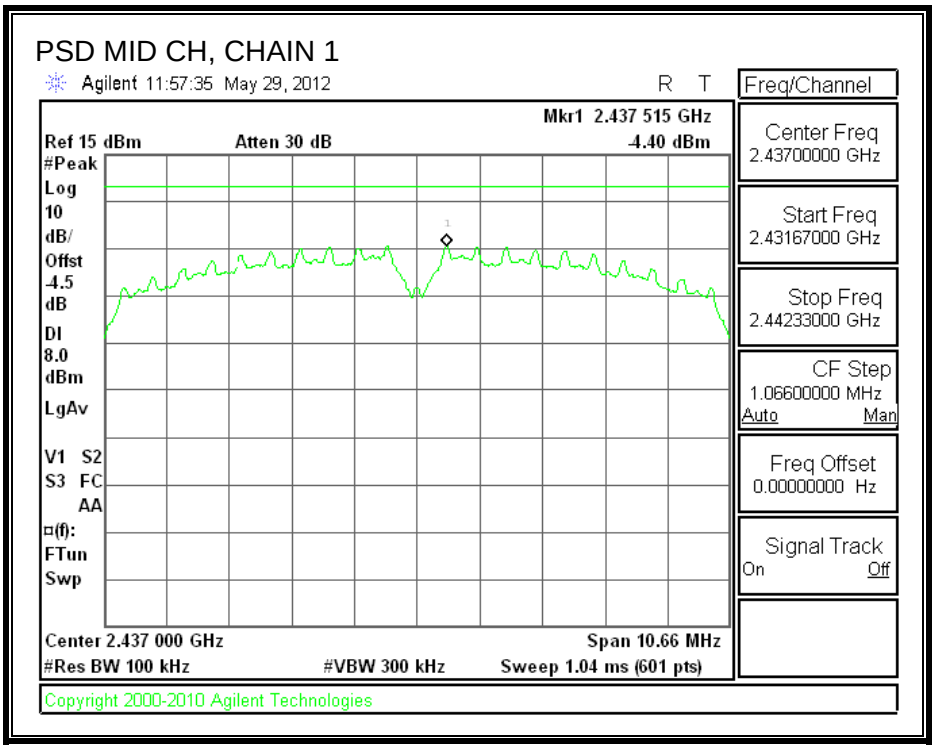
RESULTS

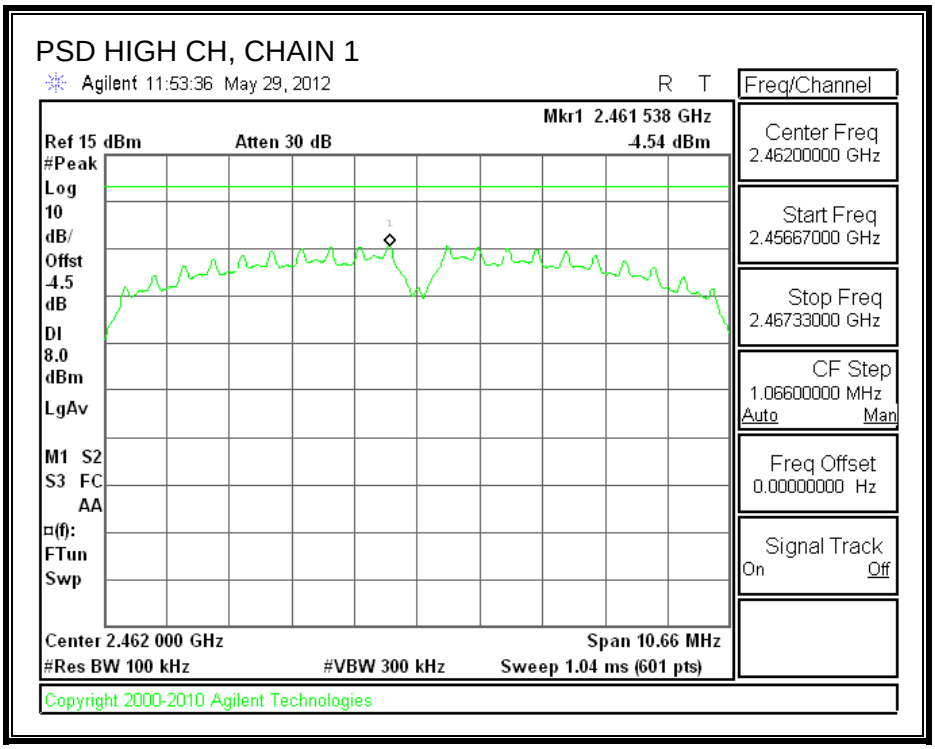
Channel	Frequency (MHz)	Chain 1 PSD (dBm)	Chain 2 PSD (dBm)	Chain 3 PSD (dBm)	Total PSD (dBm)	Limit (dBm)	Margin (dB)
Low	2412	-4.53	-4.74	-4.26	0.27	8	-7.73
Middle	2437	-4.40	-4.66	-4.21	0.35	8	-7.65
High	2462	-4.54	-4.77	-3.99	0.35	8	-7.65

Note: The spectrum analyzer offset = attenuator loss + cable loss + 10 log(3/100 kHz) = -4.53 dB

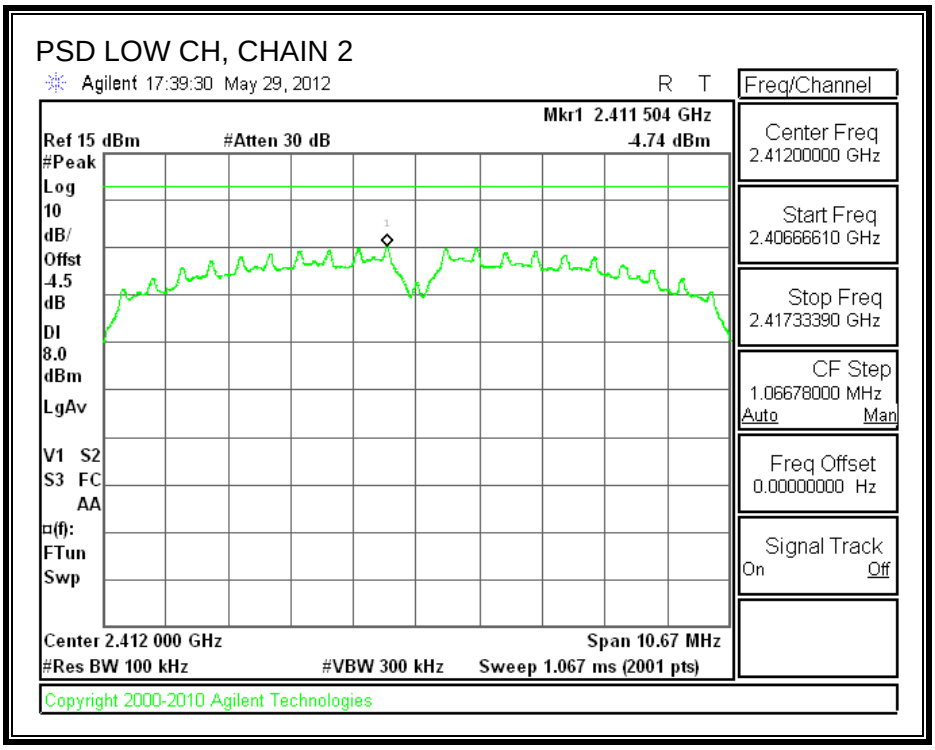
POWER SPECTRAL DENSITY, CHAIN 1

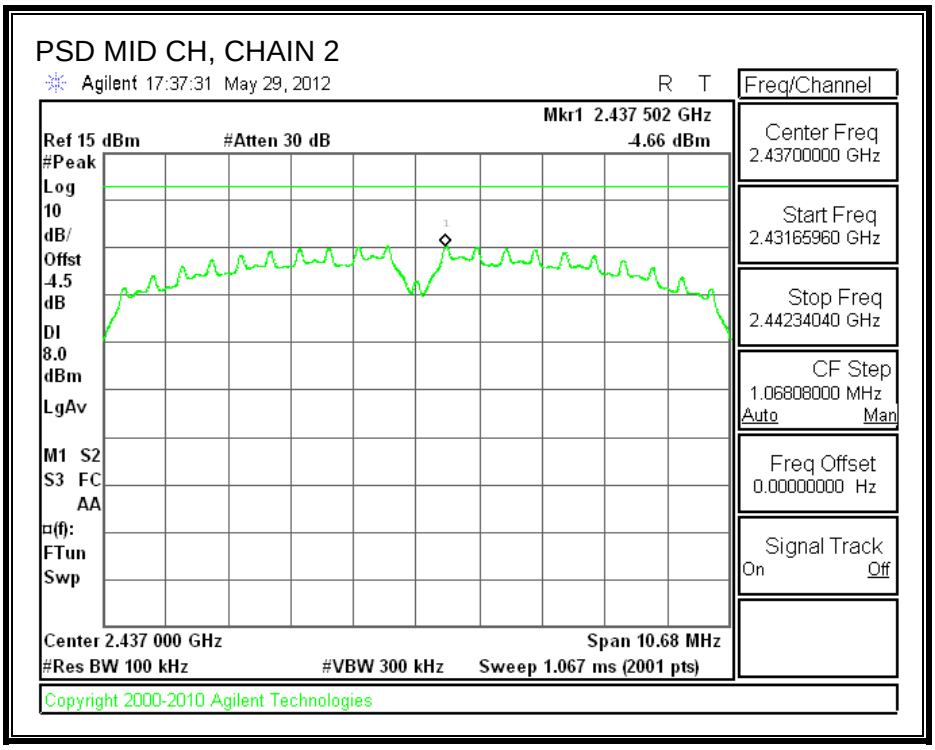


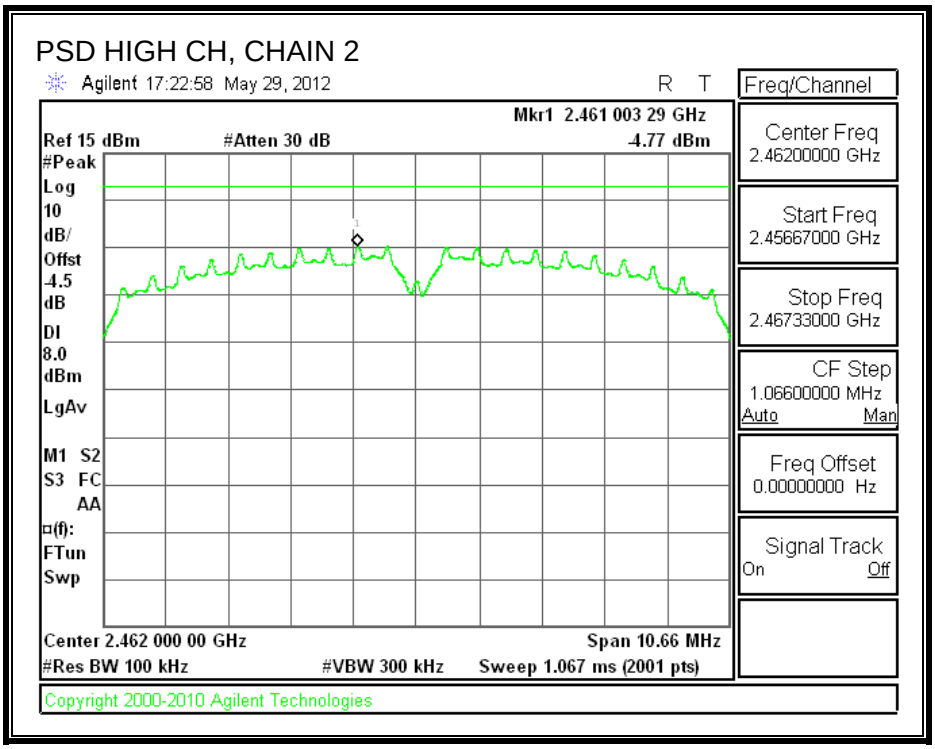




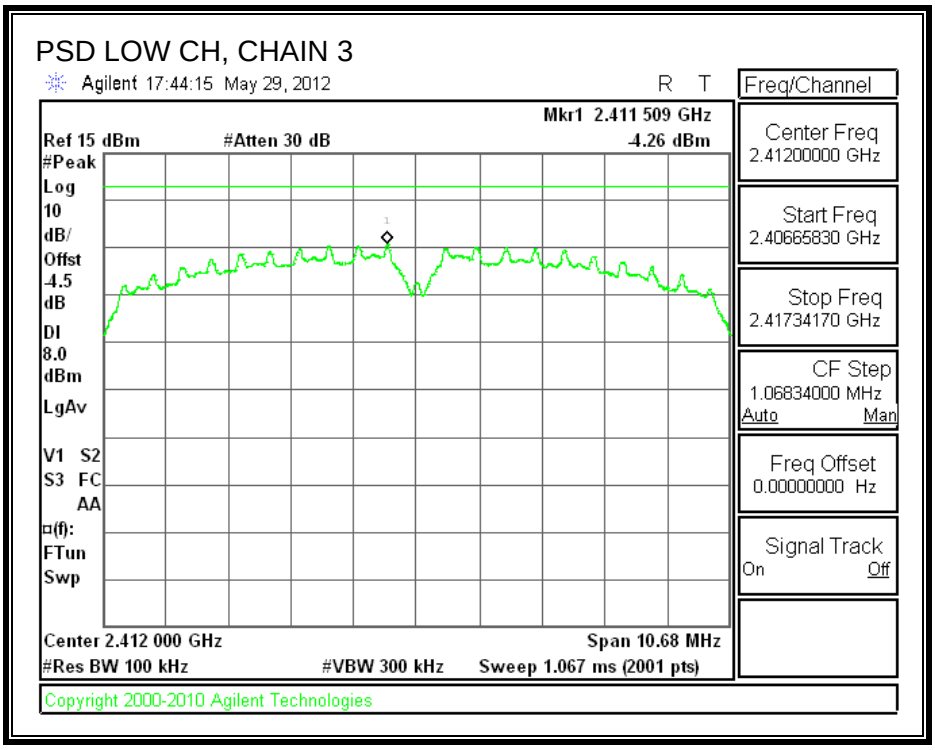
POWER SPECTRAL DENSITY, CHAIN 2

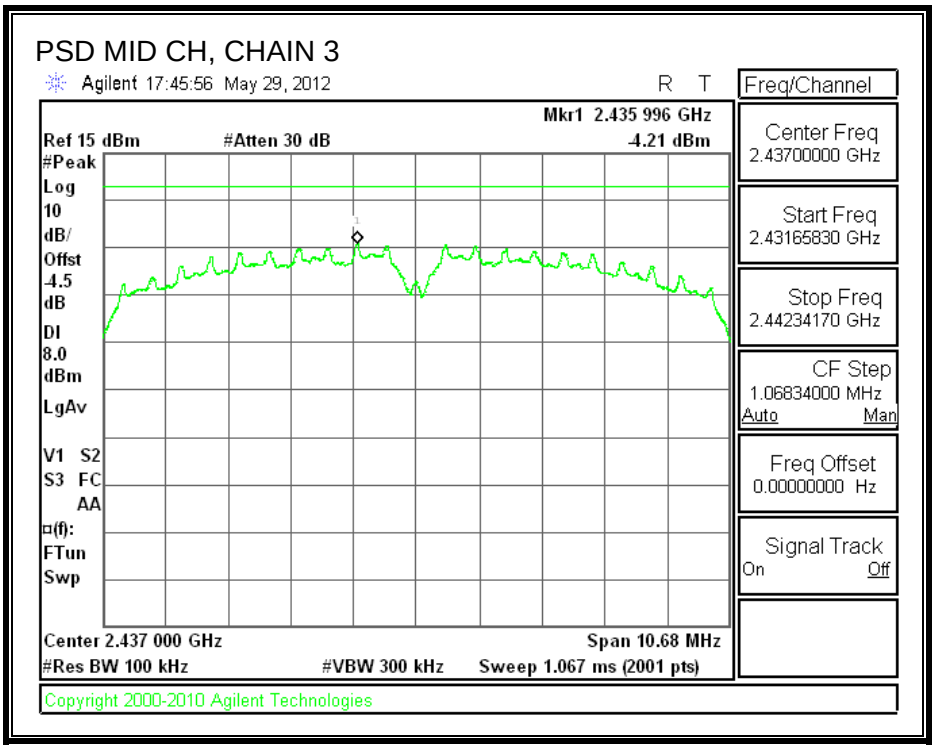




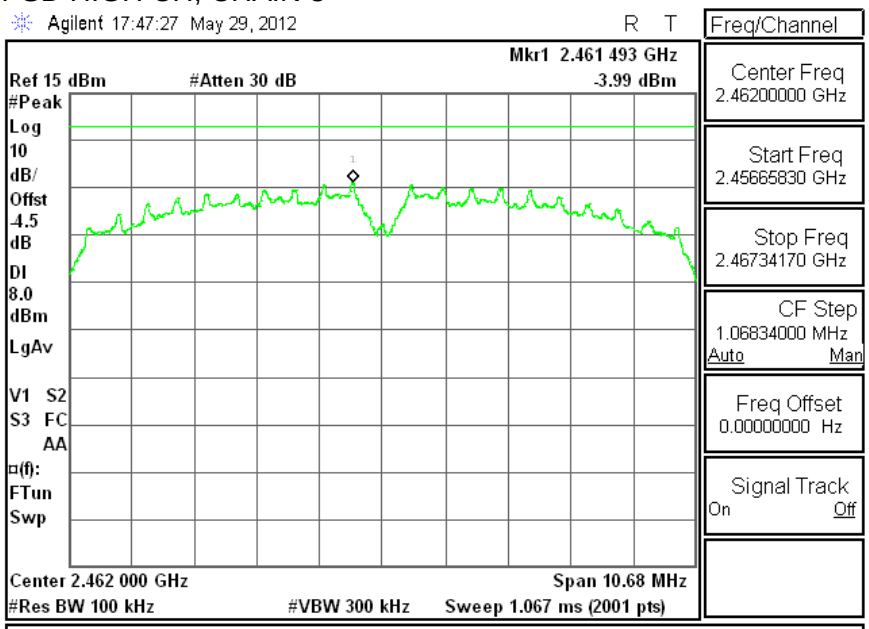


POWER SPECTRAL DENSITY, CHAIN 3





PSD HIGH CH, CHAIN 3



7.2.6. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.247 (d)

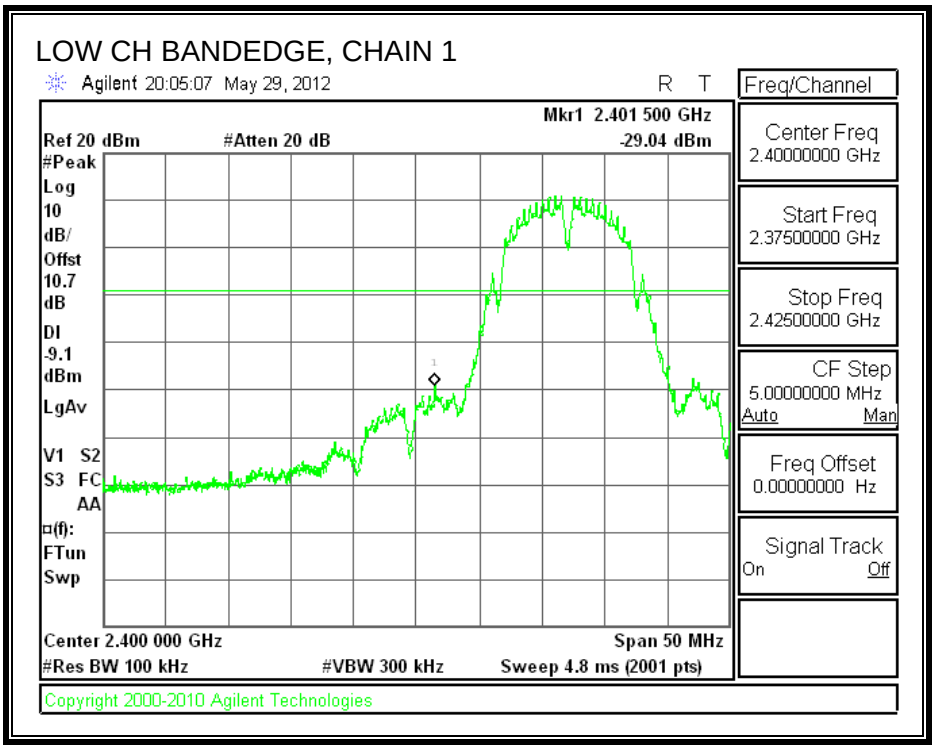
IC RSS-210 A8.5

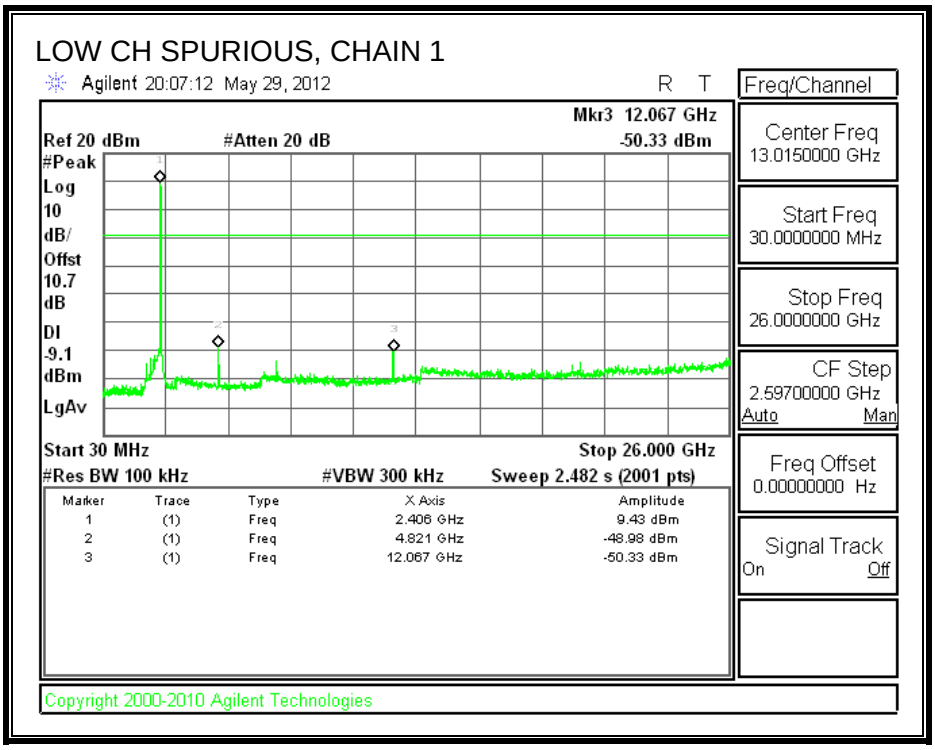
Output power was measured based on the use of a peak measurement, therefore the required attenuation is 20 dB.

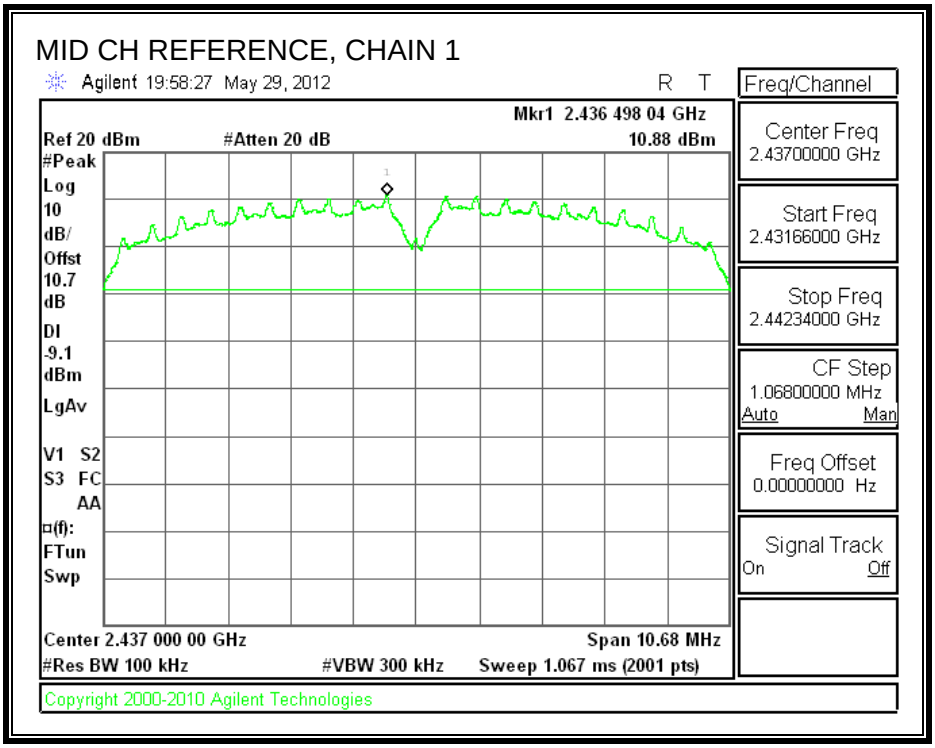
TEST PROCEDURE

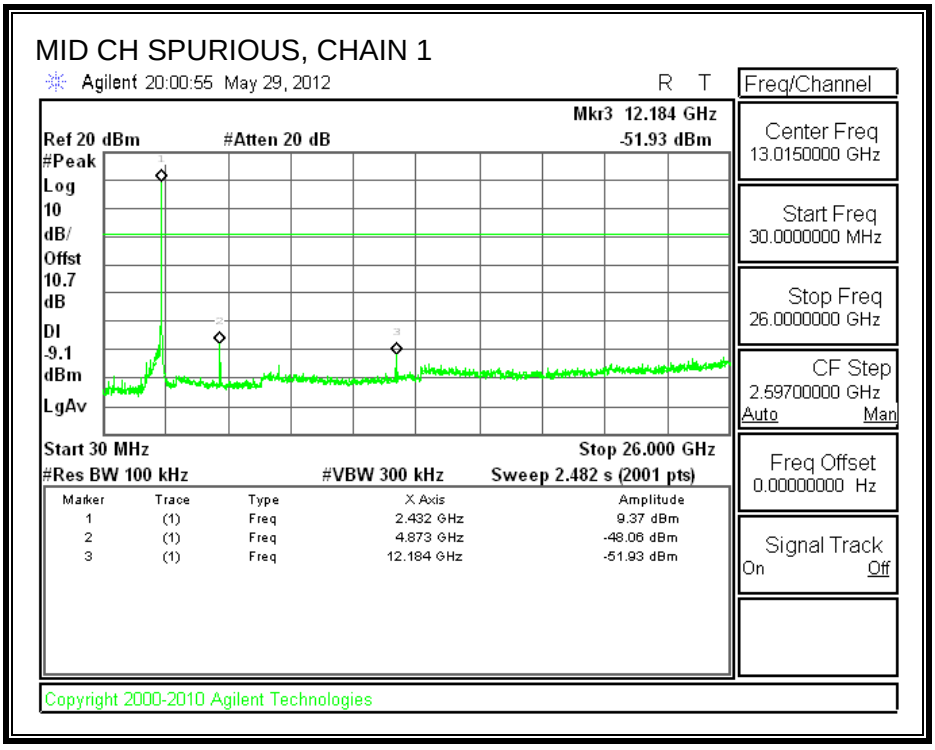
KDB 558074 D01 V01 “Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under 15.247”, dated 01/18/2012.

CHAIN 1 SPURIOUS EMISSIONS

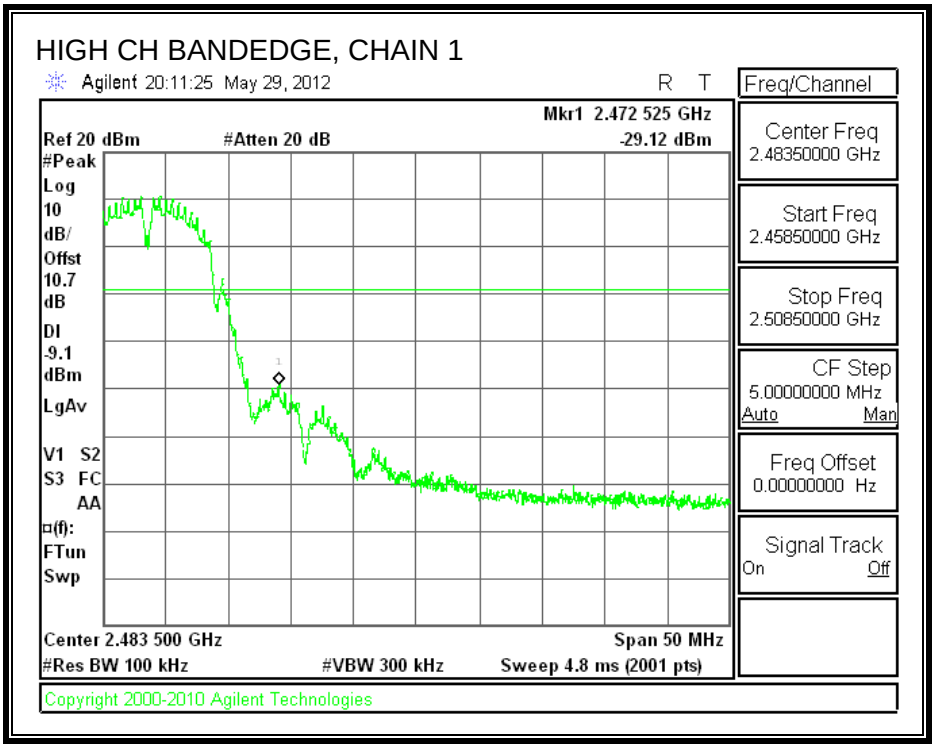




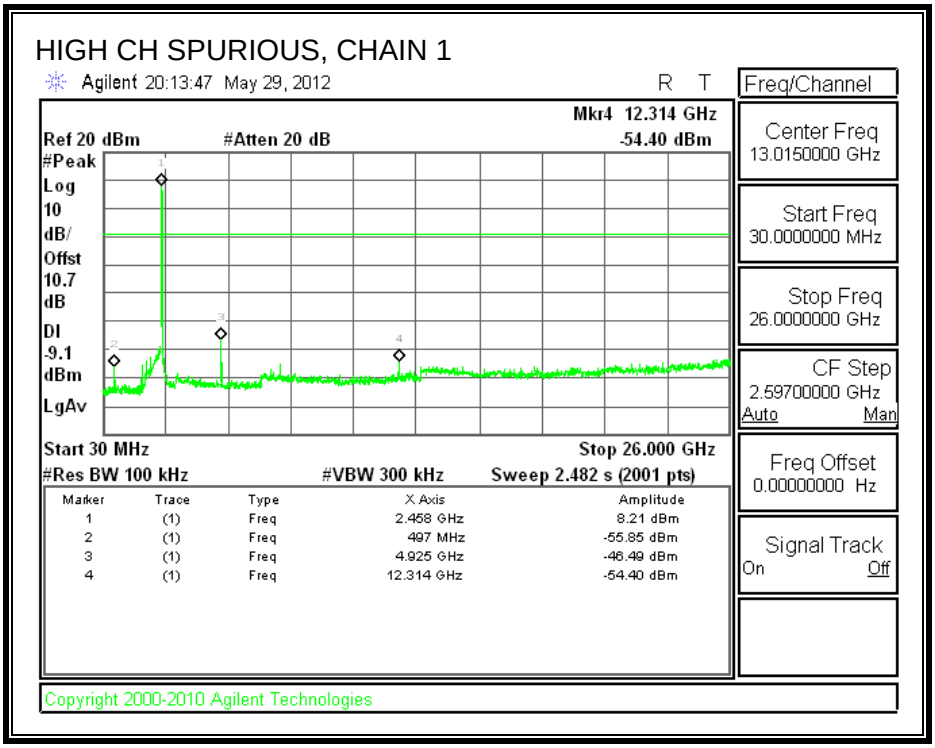




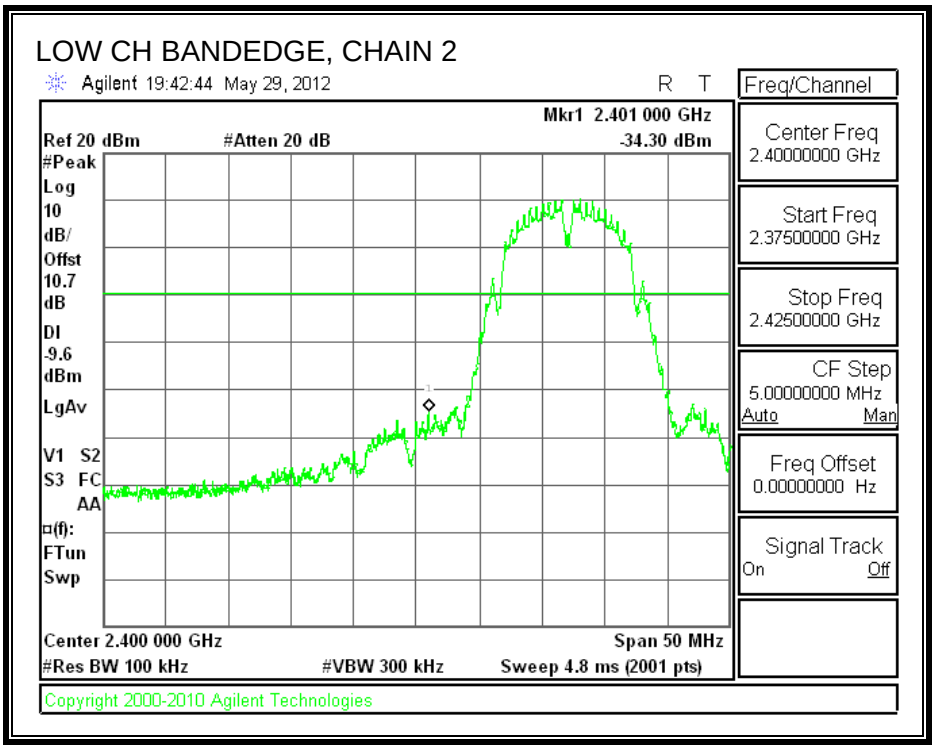
HIGH CH BANDEDGE, CHAIN 1

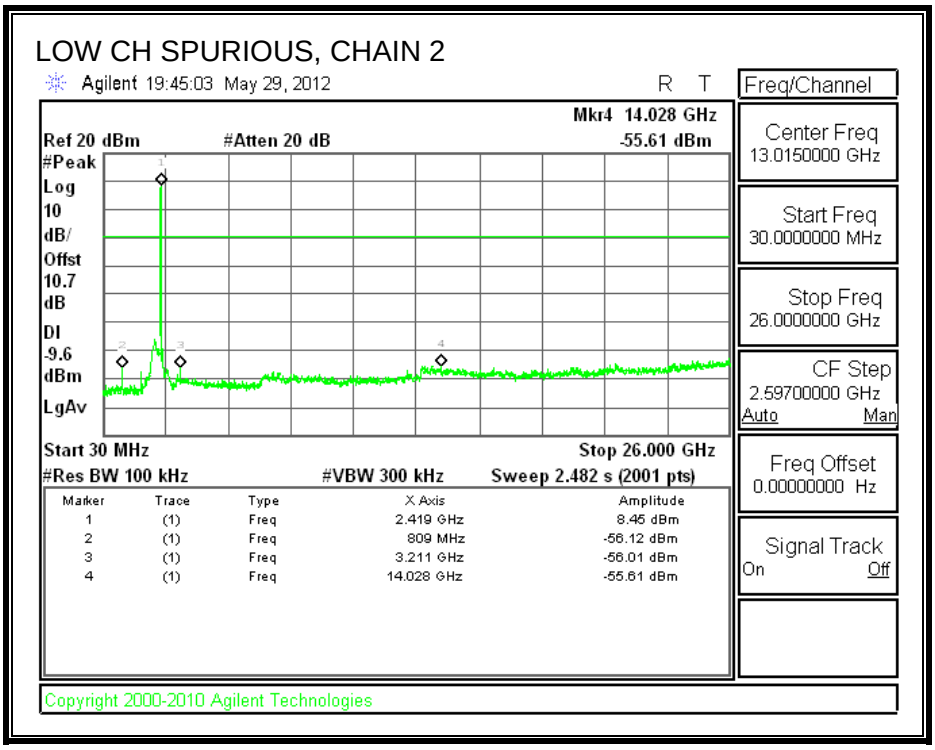


HIGH CH SPURIOUS, CHAIN 1

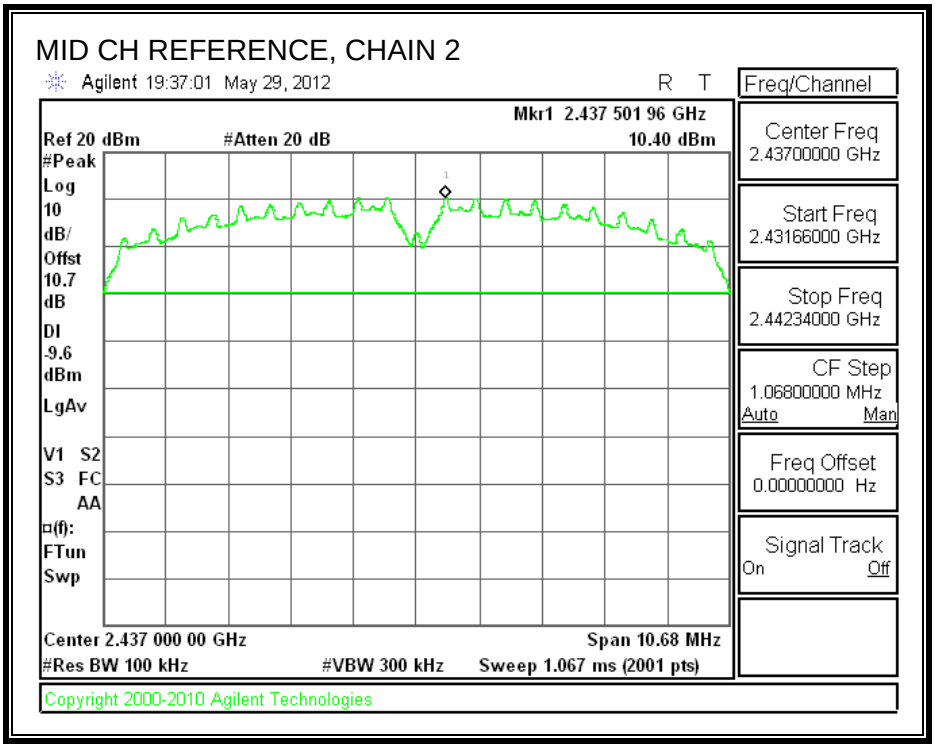


CHAIN 2 SPURIOUS EMISSIONS

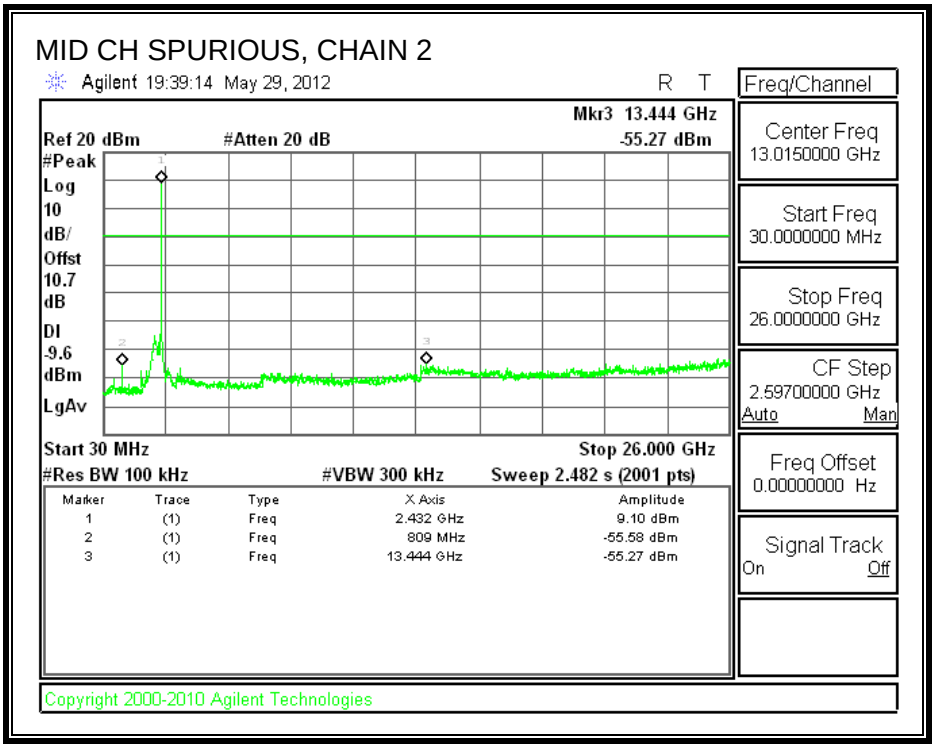




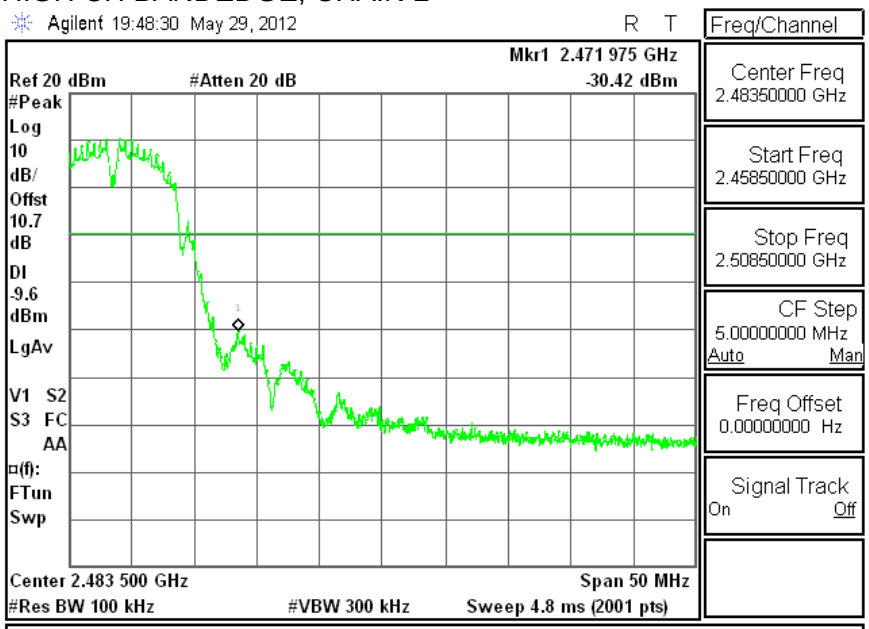
MID CH REFERENCE, CHAIN 2



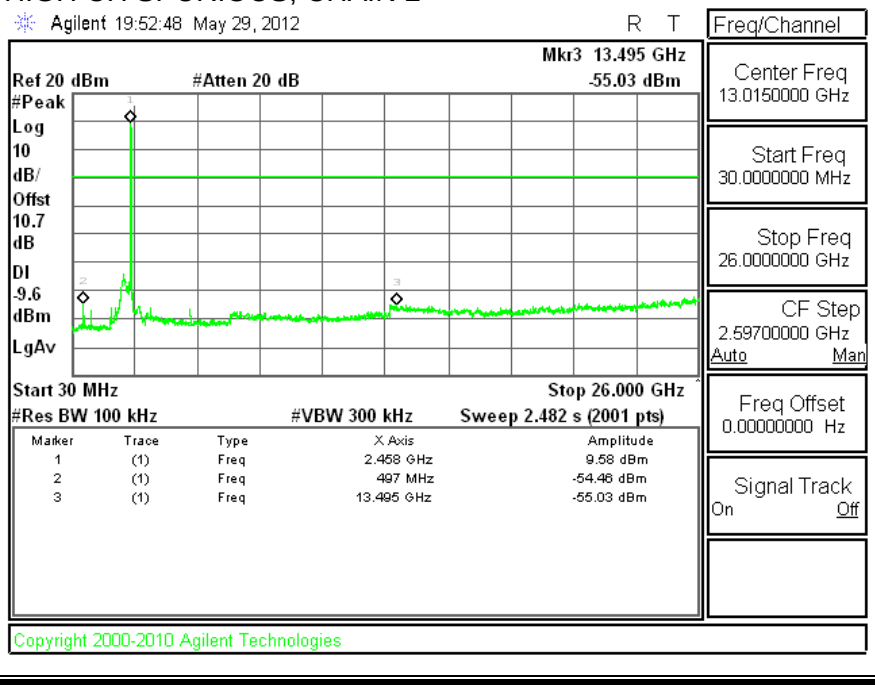
MID CH SPURIOUS, CHAIN 2



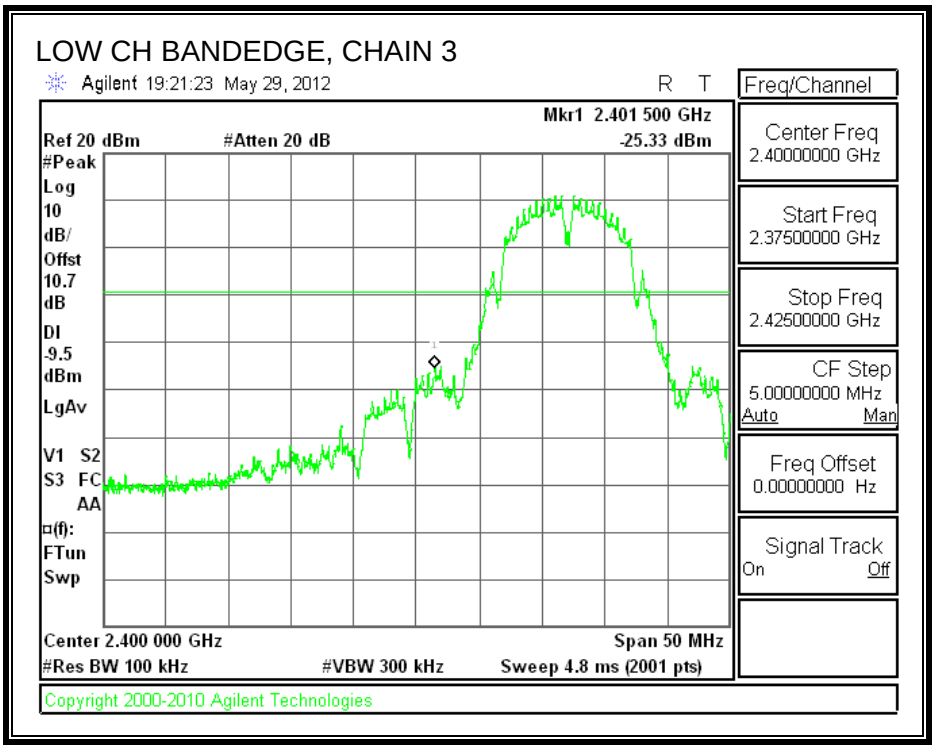
HIGH CH BANDEDGE, CHAIN 2

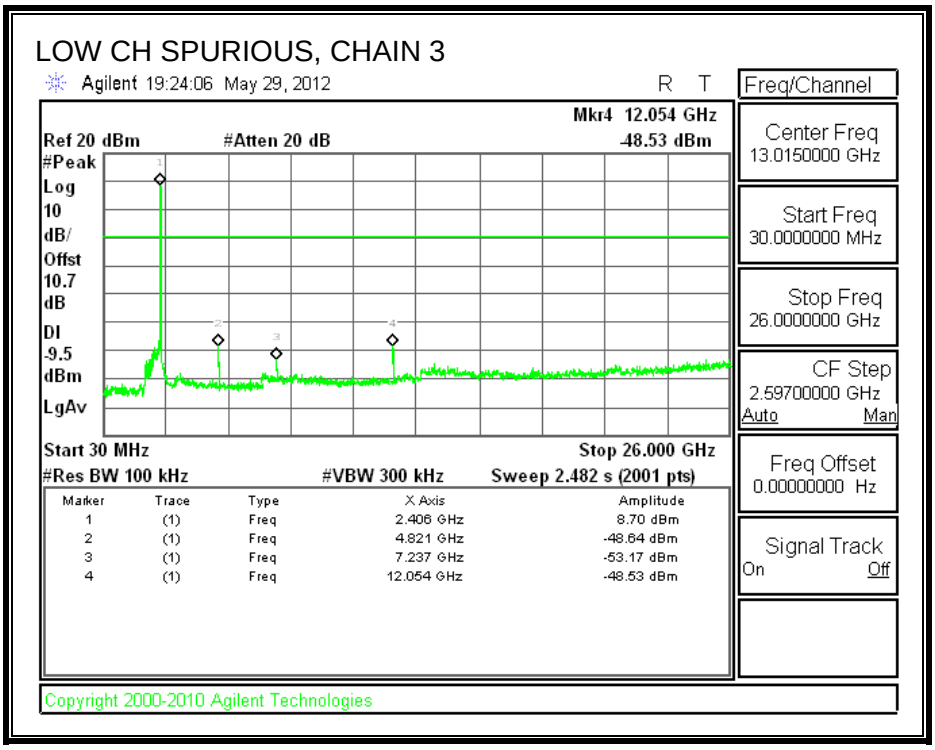


HIGH CH SPURIOUS, CHAIN 2

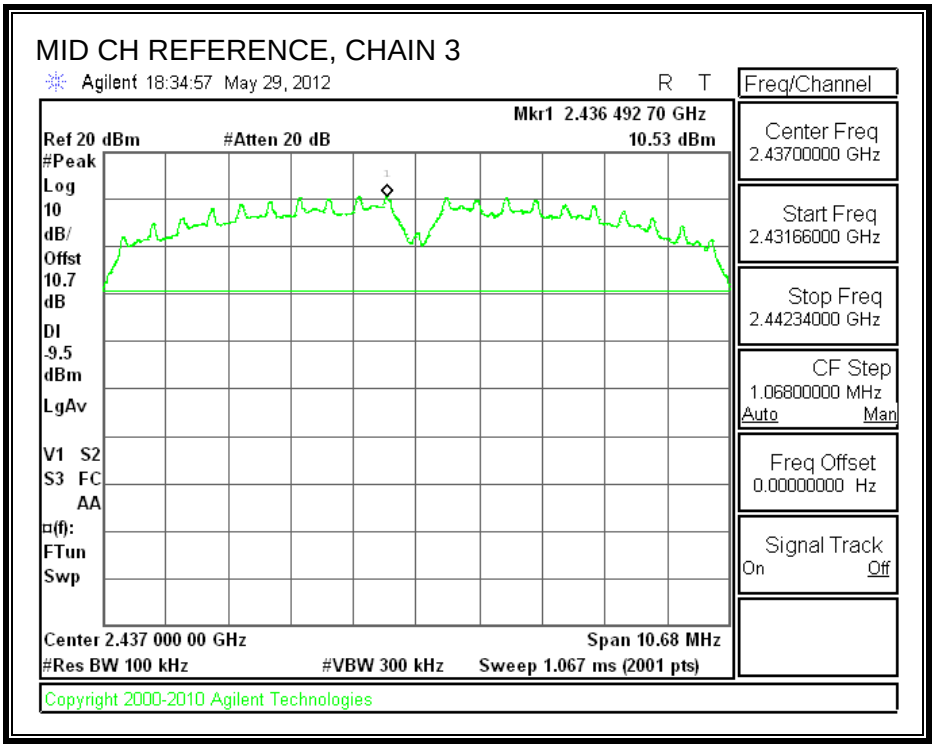


CHAIN 3 SPURIOUS EMISSIONS

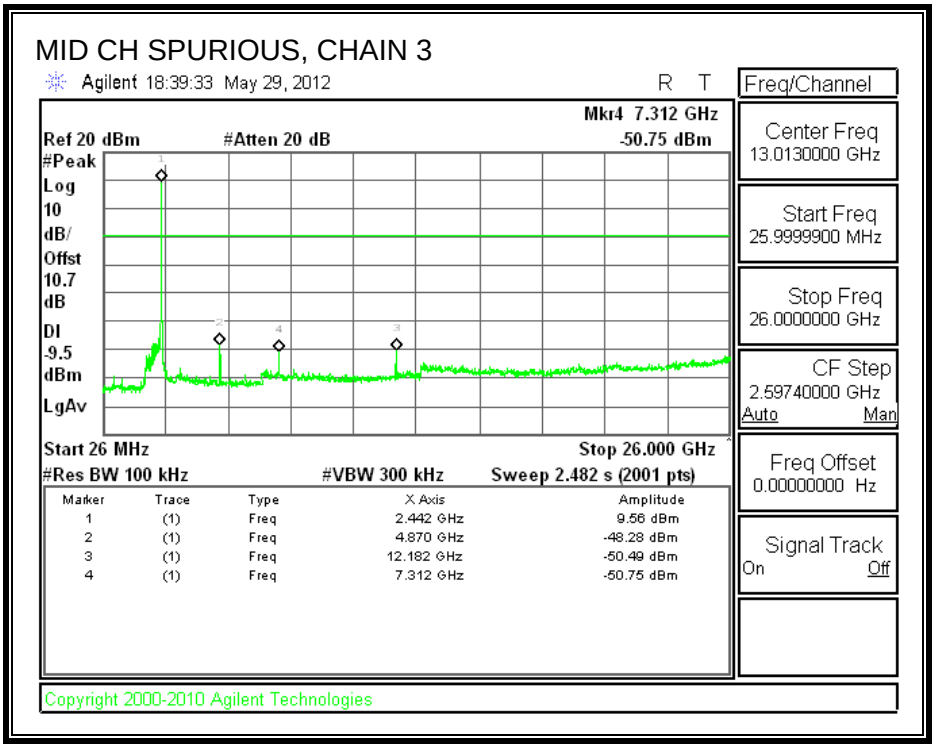




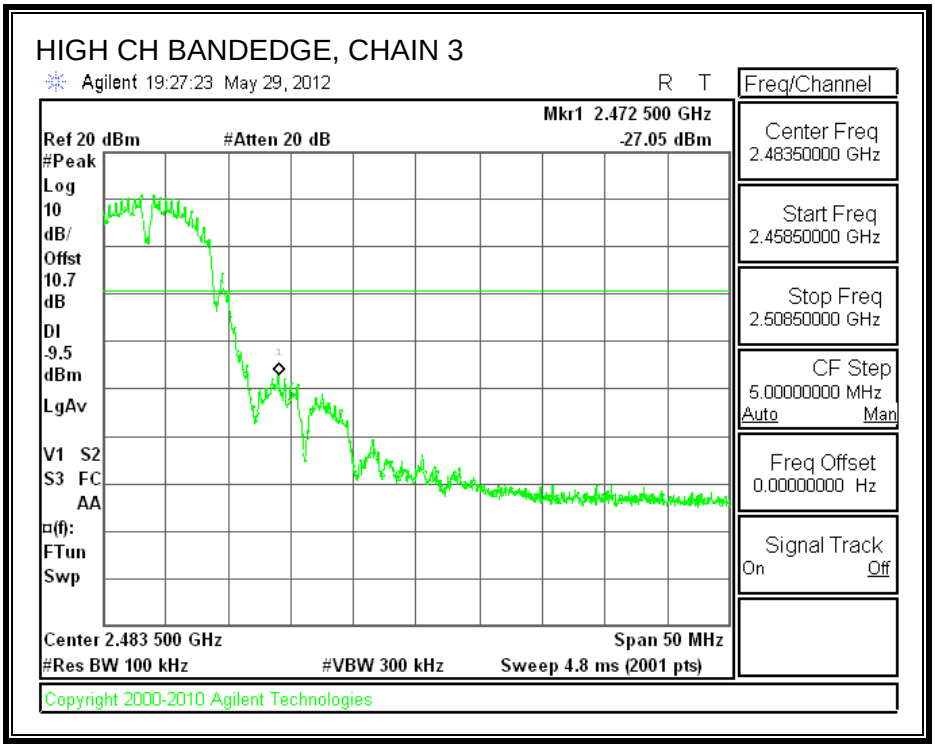
MID CH REFERENCE, CHAIN 3



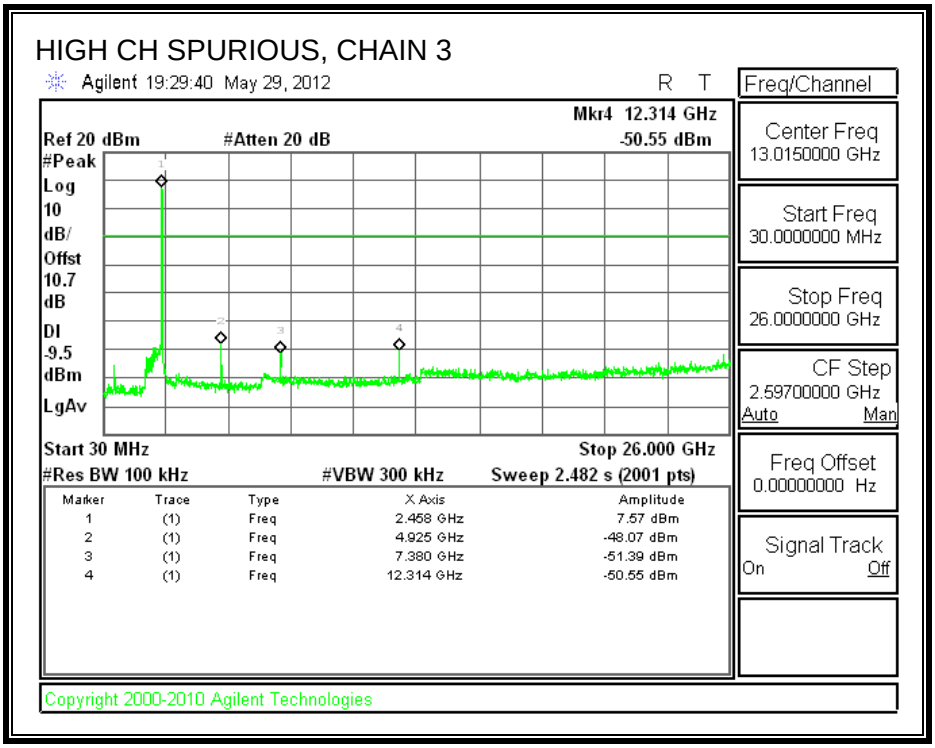
MID CH SPURIOUS, CHAIN 3



HIGH CH BANDEDGE, CHAIN 3



HIGH CH SPURIOUS, CHAIN 3



7.3. 802.11n HT20 CDD 3TX 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.

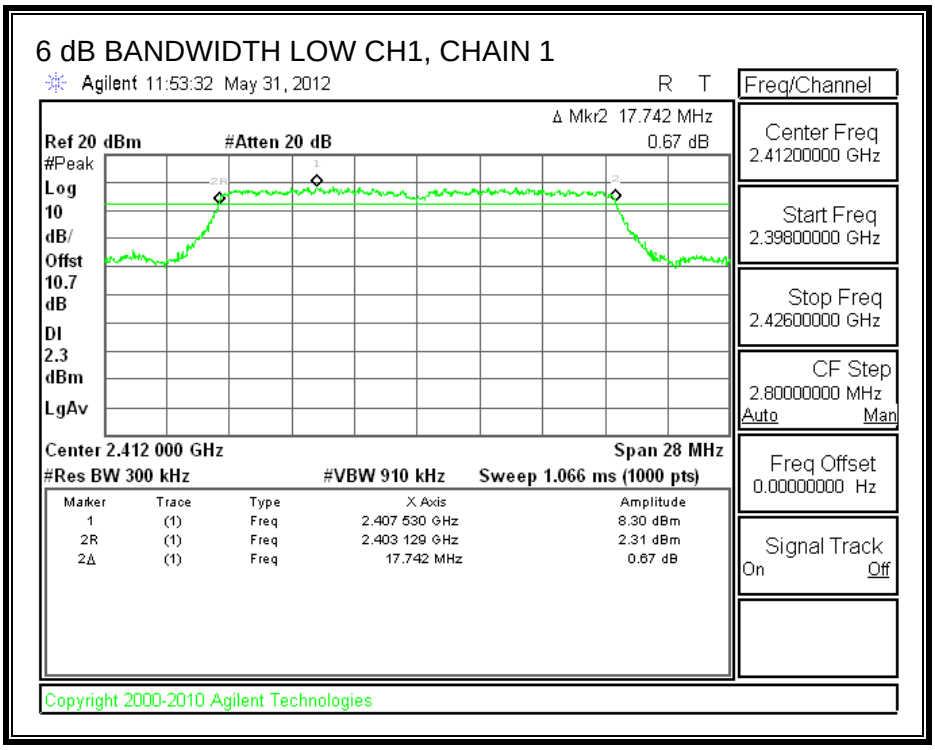
TEST PROCEDURE

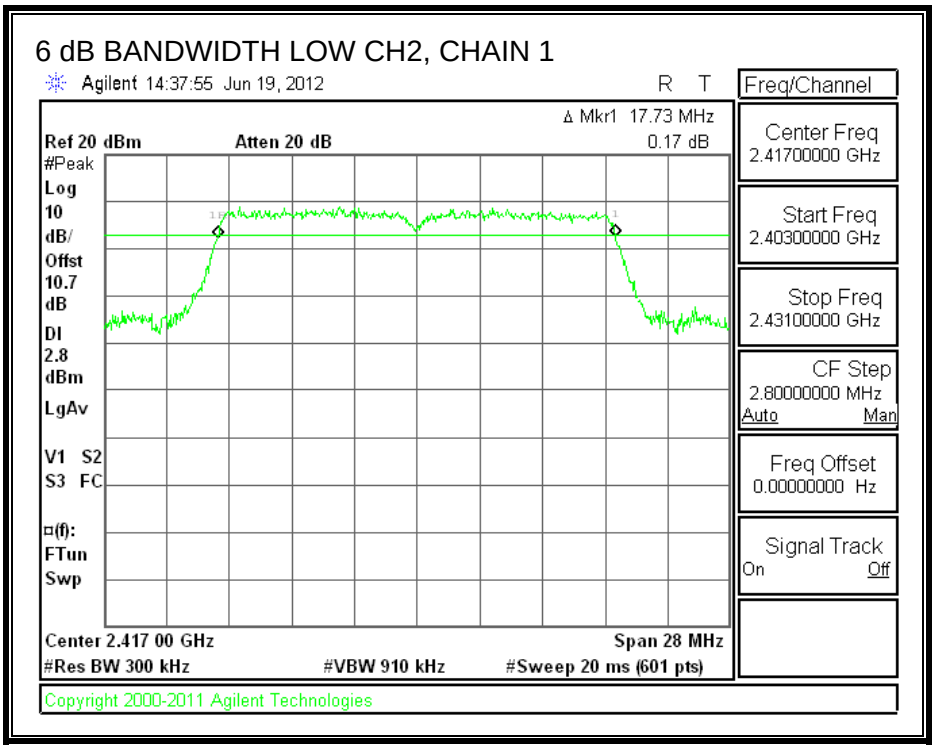
KDB 558074 D01 V01 "Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under 15.247", dated 01/18/2012.

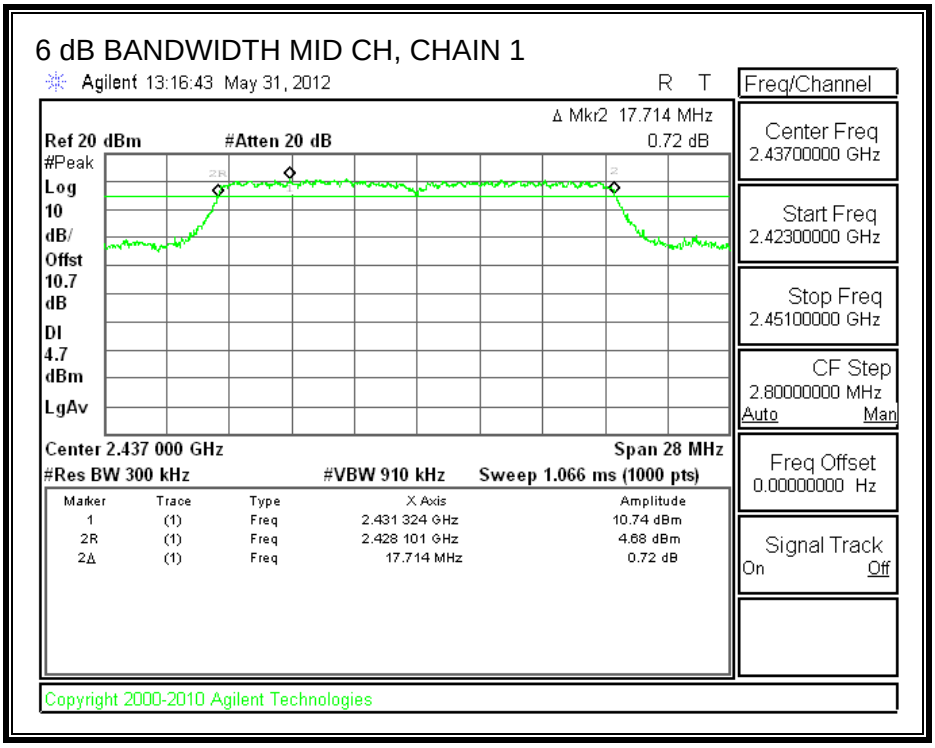
RESULTS

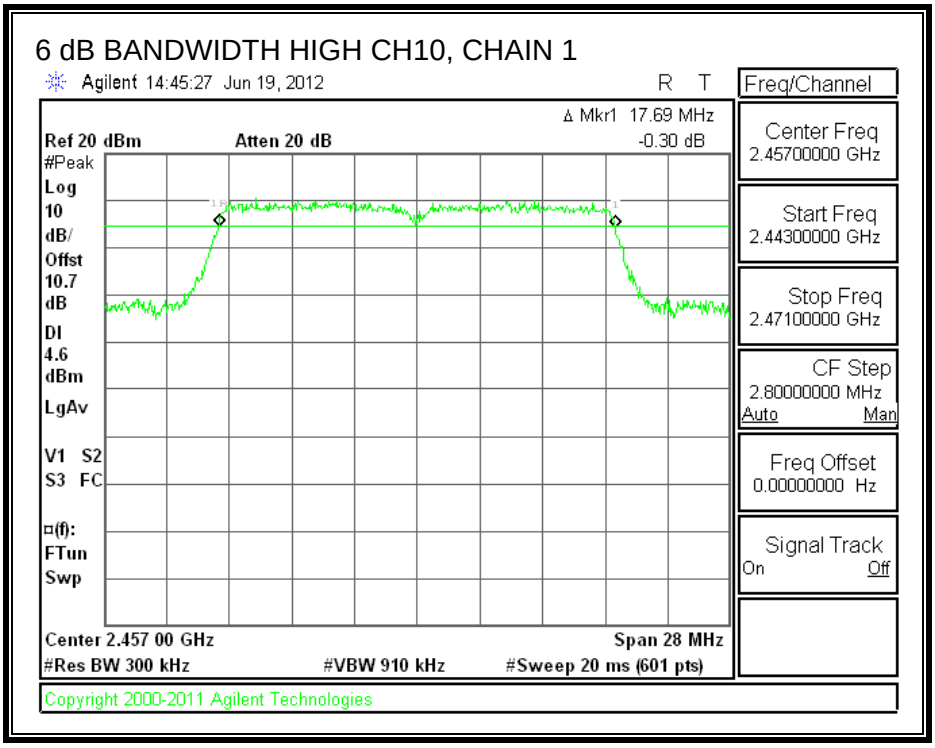
Channel	Frequency (MHz)	Chain 1 6 dB BW (MHz)	Chain 2 6 dB BW (MHz)	Chain 3 6 dB BW (MHz)	Minimum Limit (MHz)
Low	2412	17.42	17.68	17.70	0.5
Low	2417	17.73	17.73	17.69	0.5
Middle	2437	17.71	17.71	17.72	0.5
High	2457	17.69	17.73	17.73	0.5
High	2462	17.66	17.60	17.57	0.5

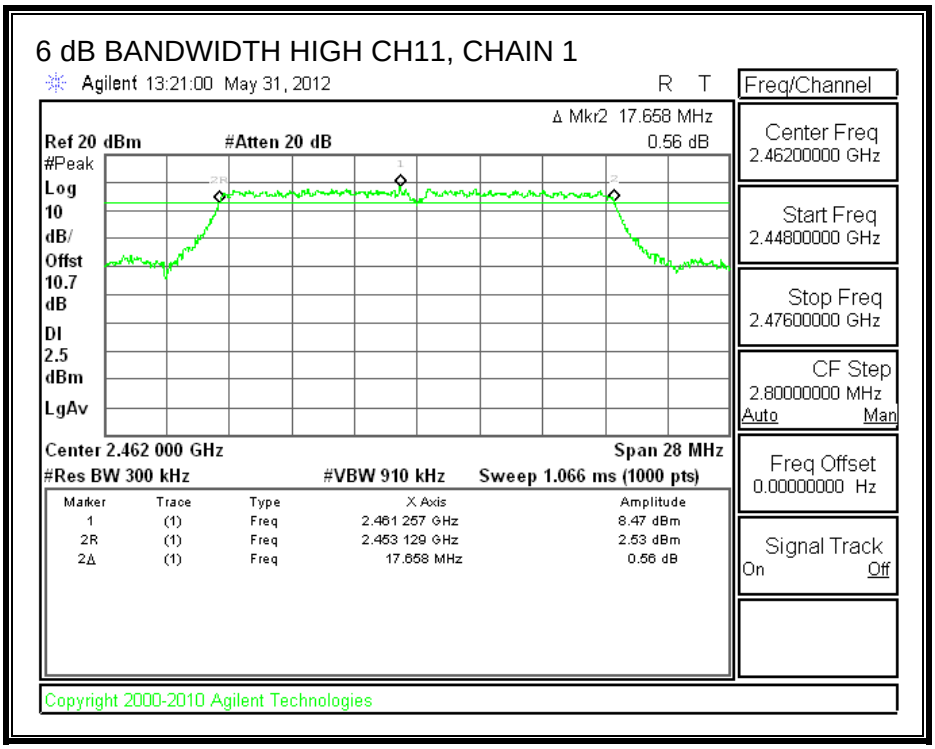
6 dB BANDWIDTH, CHAIN 1



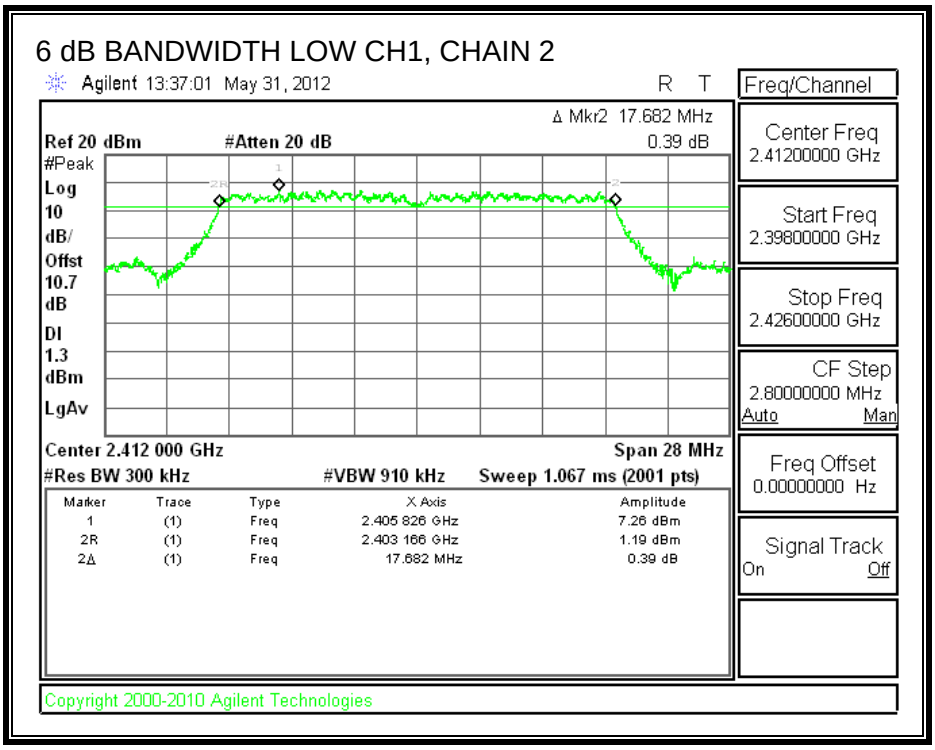


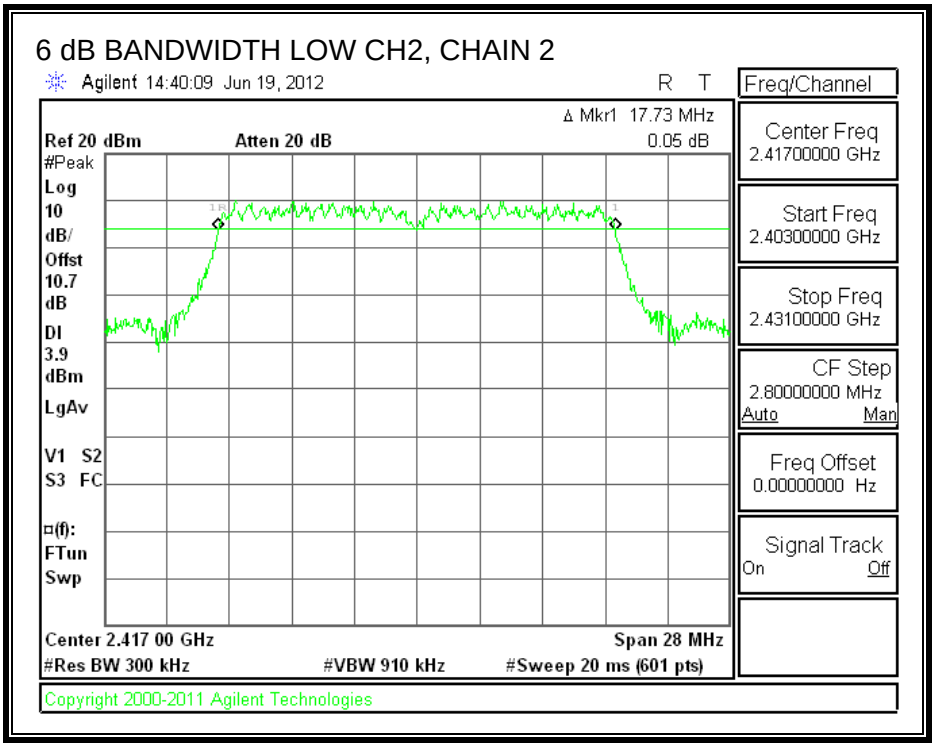


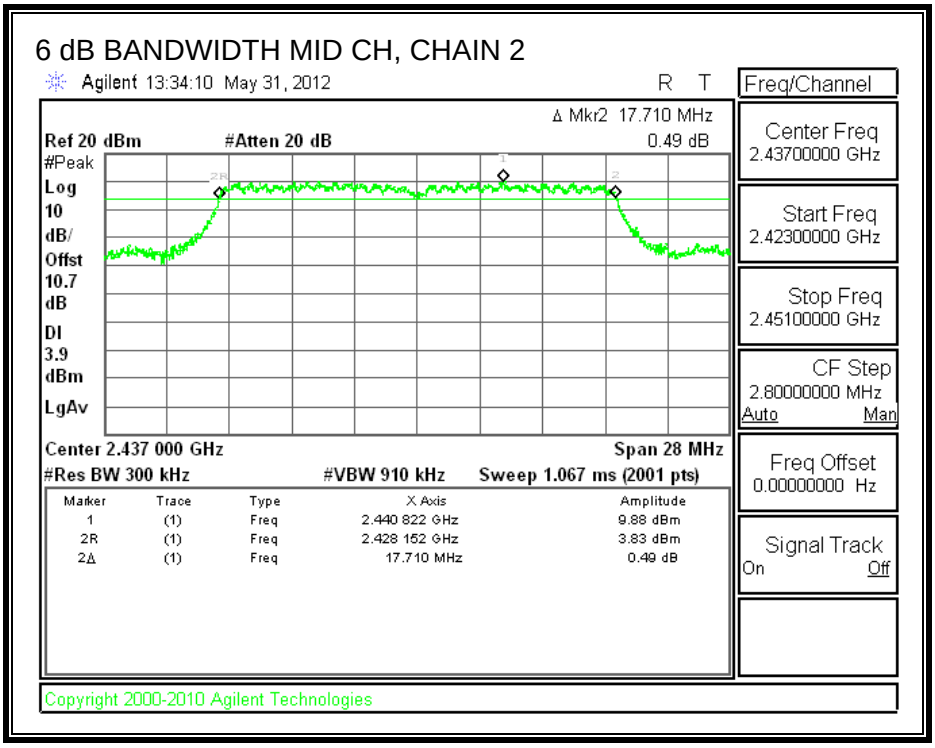


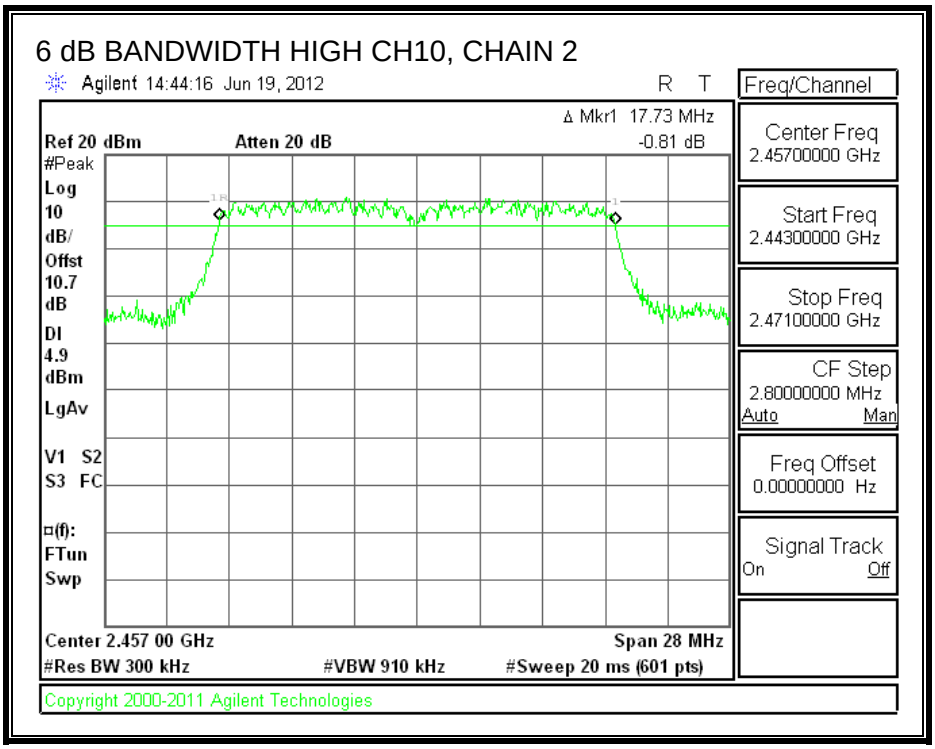


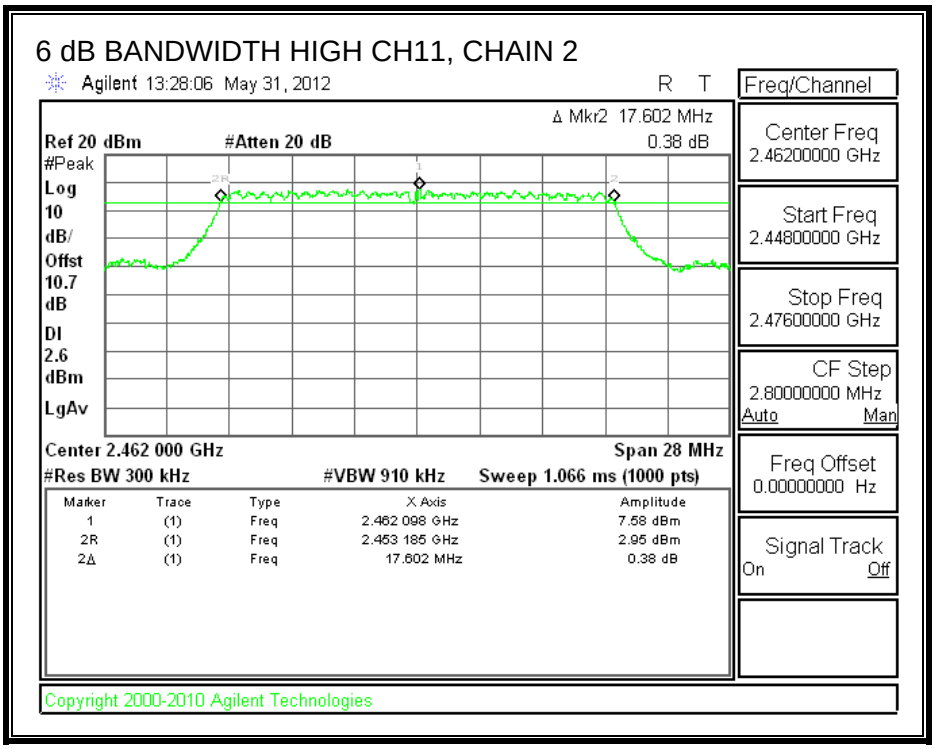
6 dB BANDWIDTH, CHAIN 2



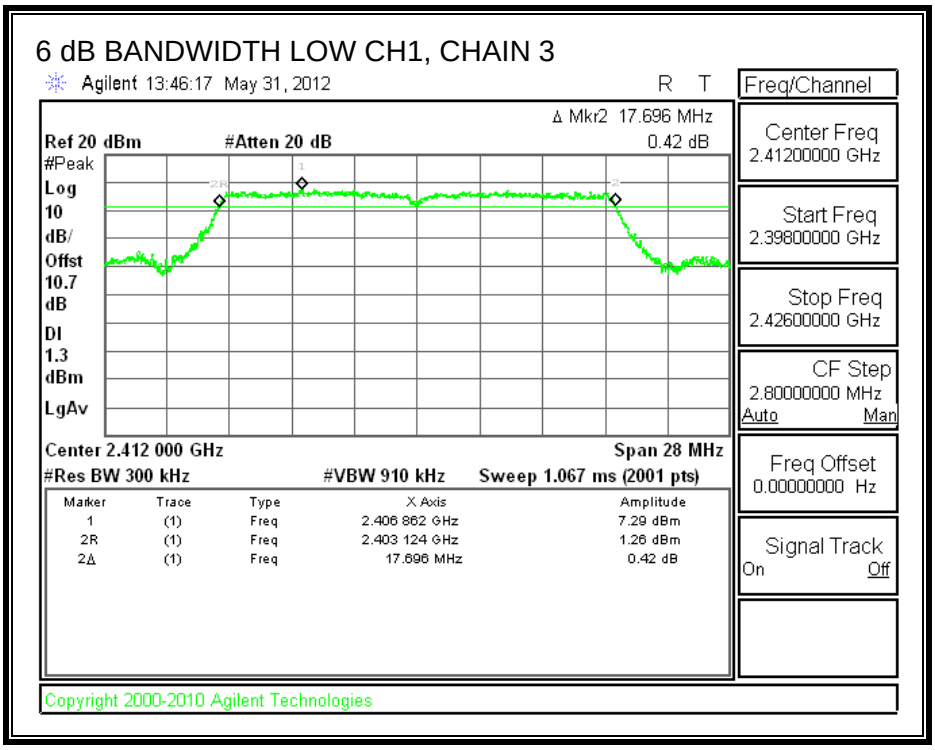


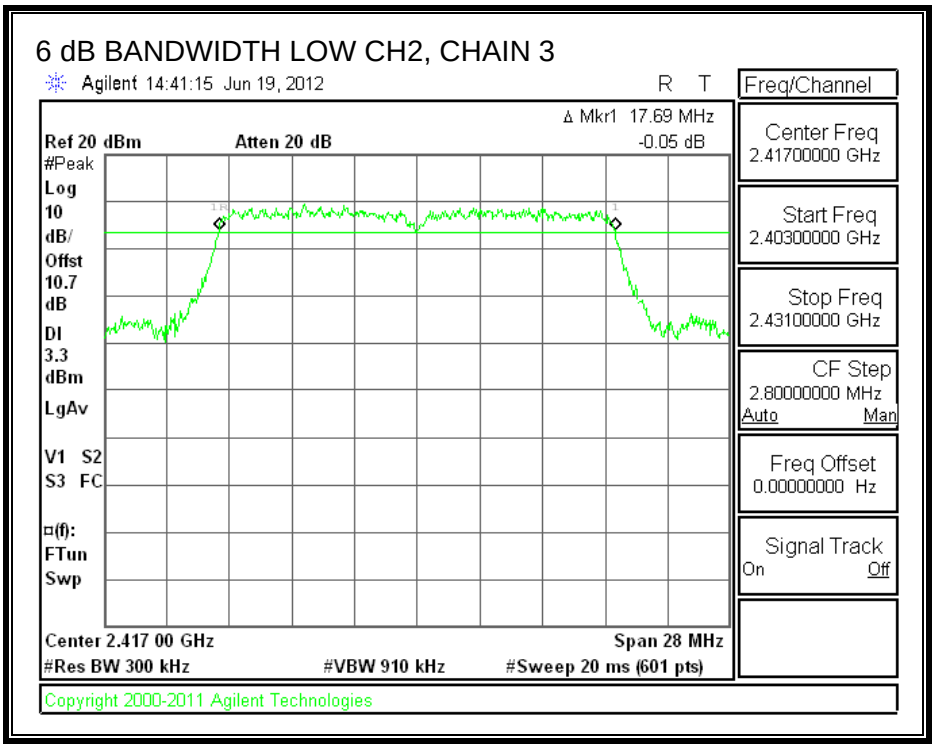


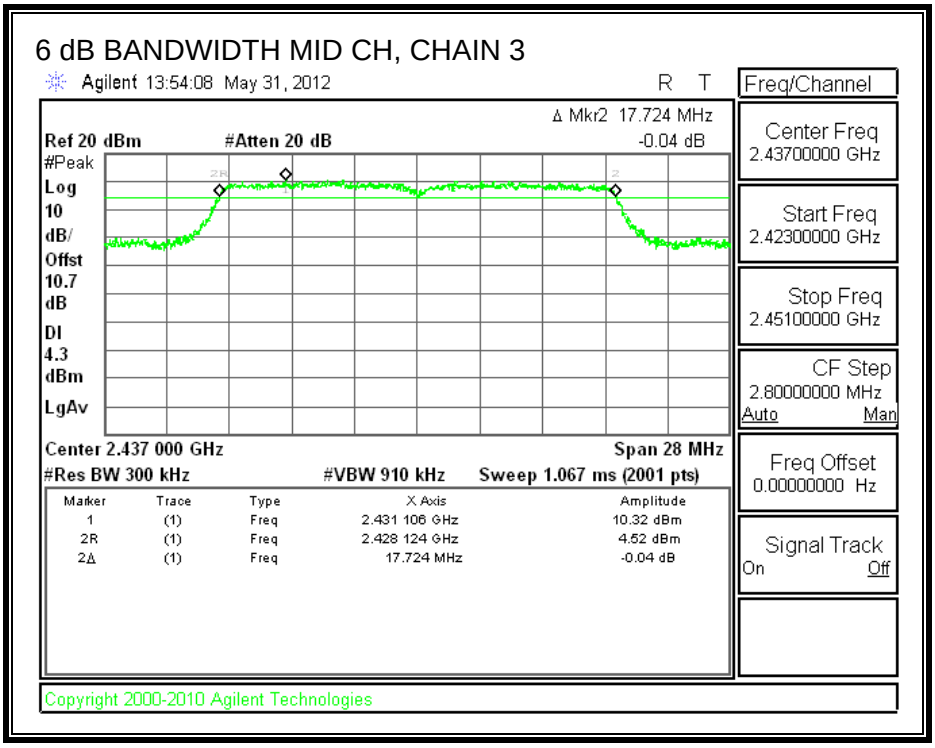


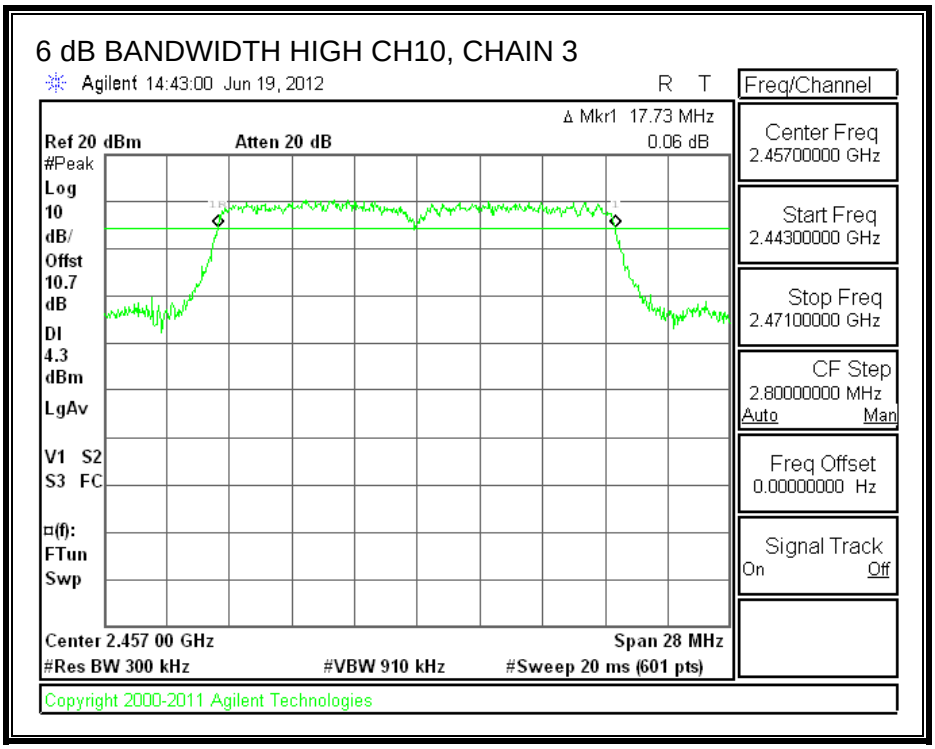


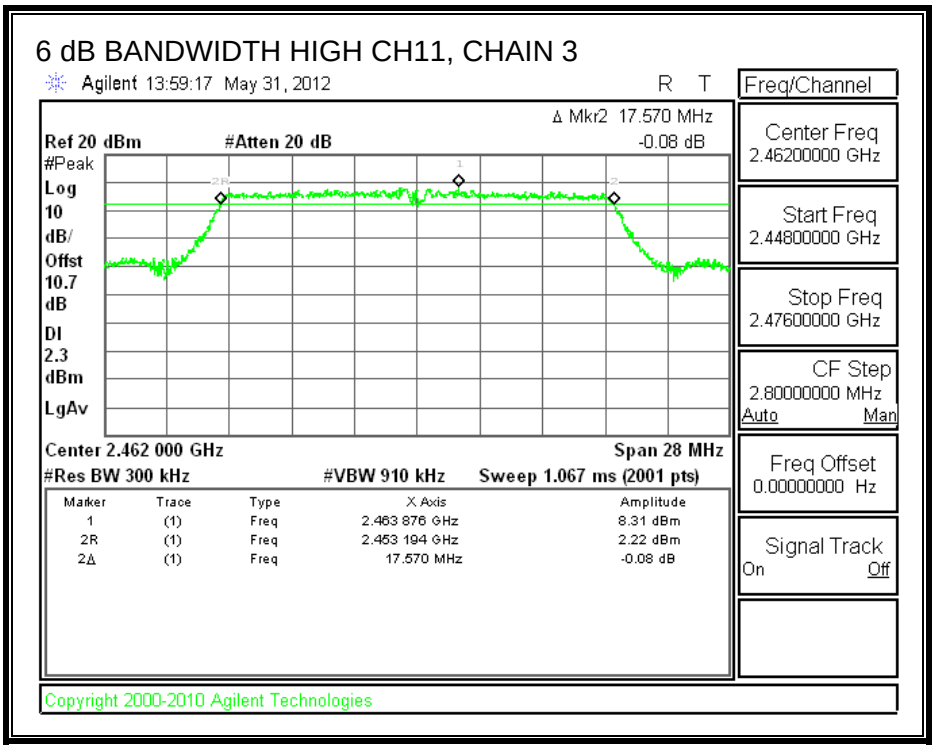
6 dB BANDWIDTH, CHAIN 3











7.3.2. 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

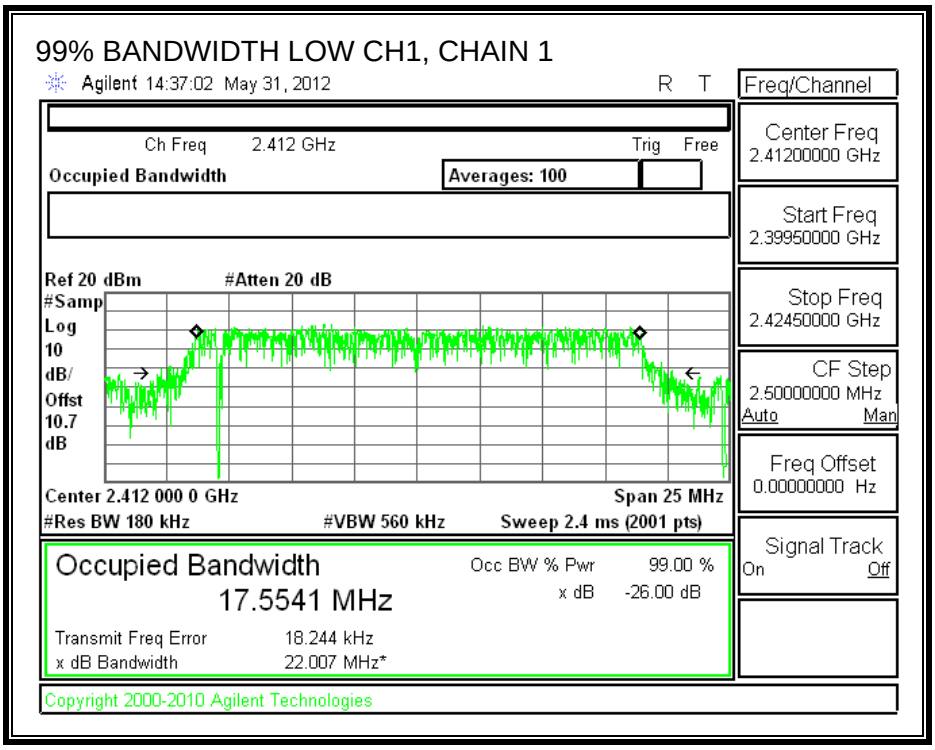
TEST PROCEDURE

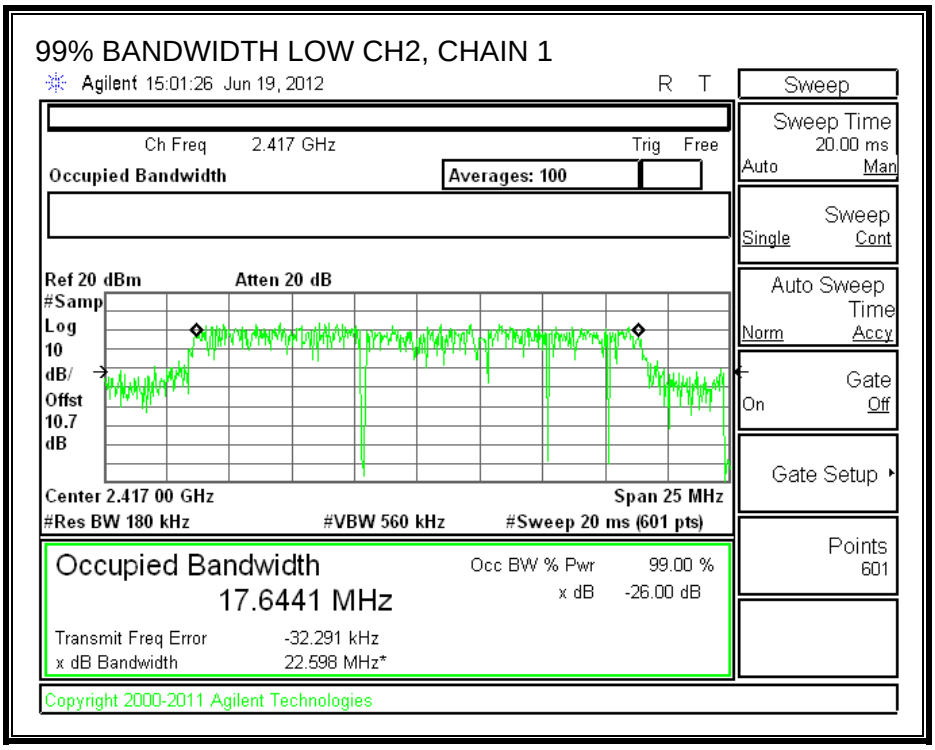
The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the 99 % bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal 99% bandwidth function is utilized.

RESULTS

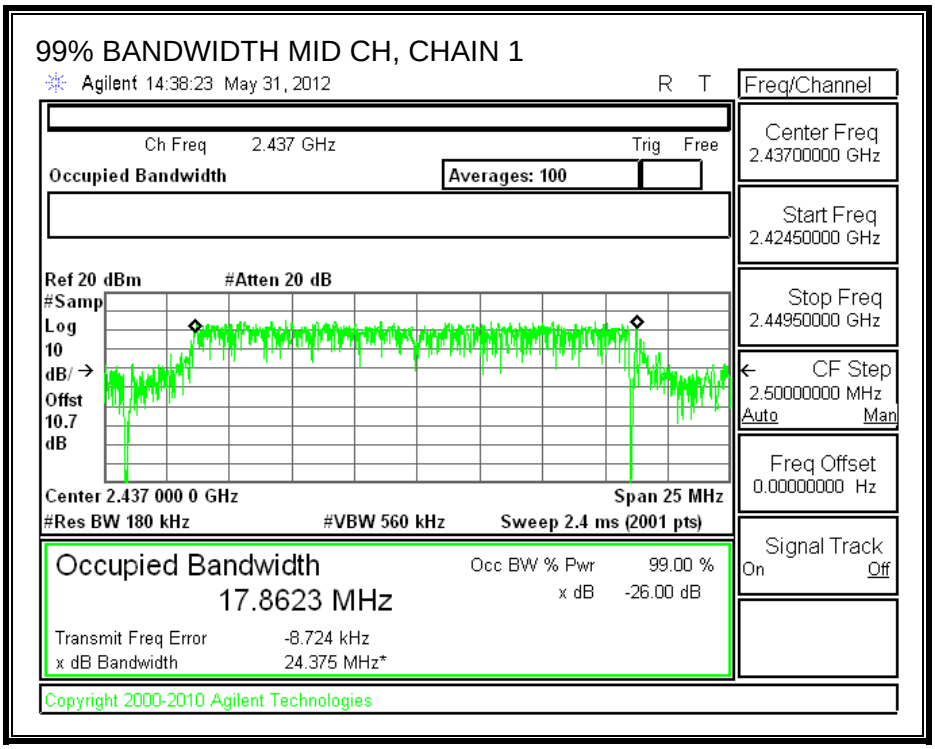
	(MHz)	99% Bandwidth (MHz)	99% Bandwidth (MHz)	99% Bandwidth (MHz)
Low	2412	17.5541	17.5955	17.5137
Low	2417	17.6441	17.6356	17.6442
Middle	2437	17.8623	17.5900	17.6473
High	2457	17.6618	17.6661	17.6581
High	2462	17.4181	17.5298	17.5152

99% BANDWIDTH, CHAIN 1

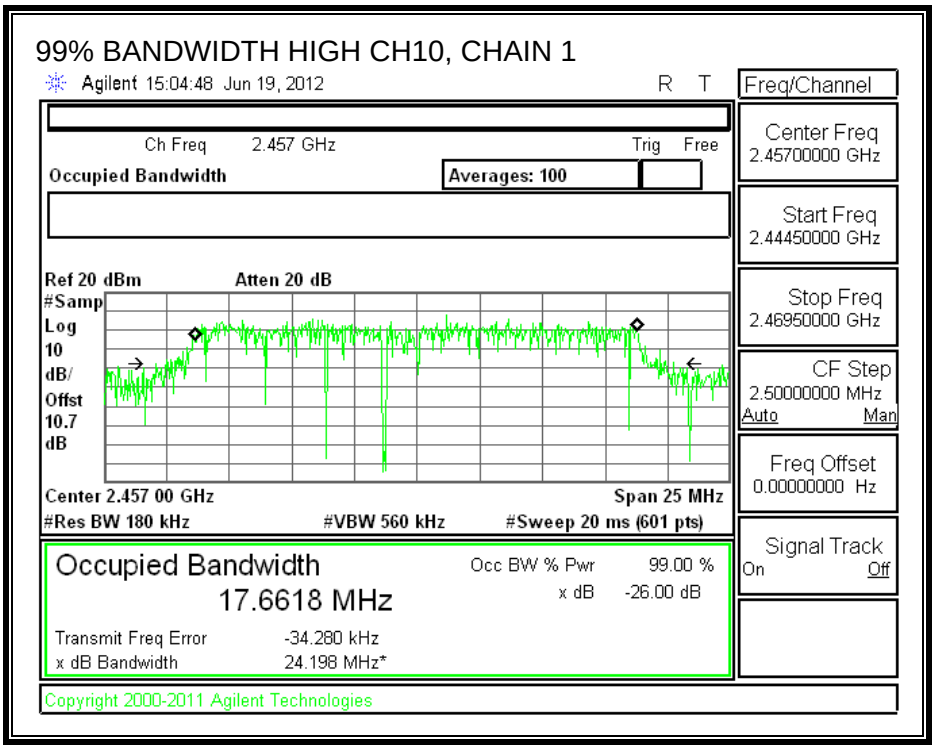


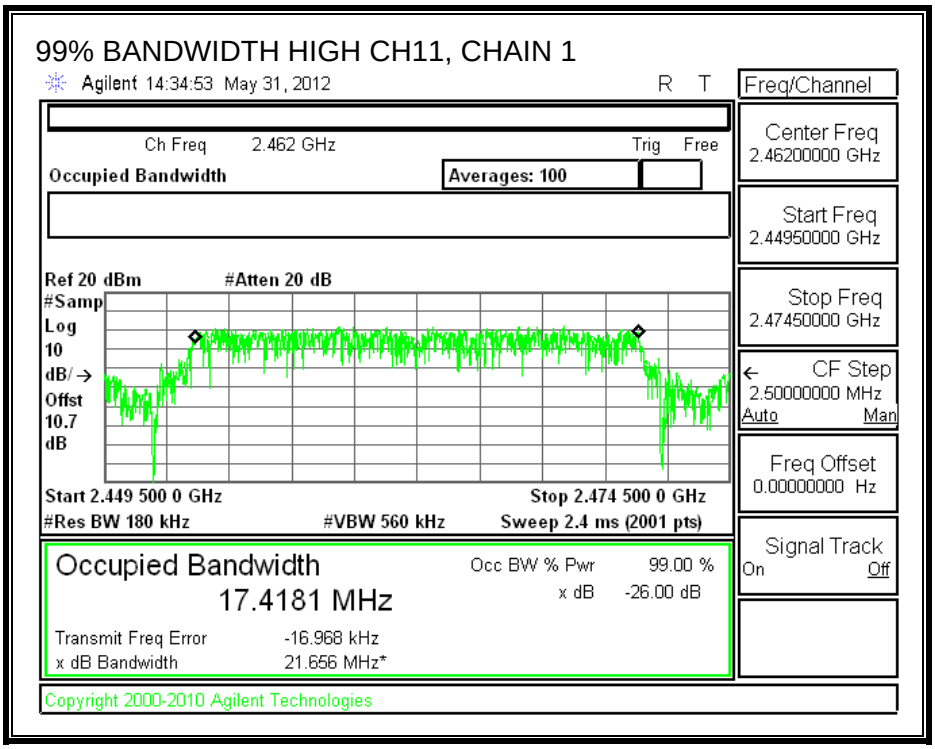


99% BANDWIDTH MID CH, CHAIN 1

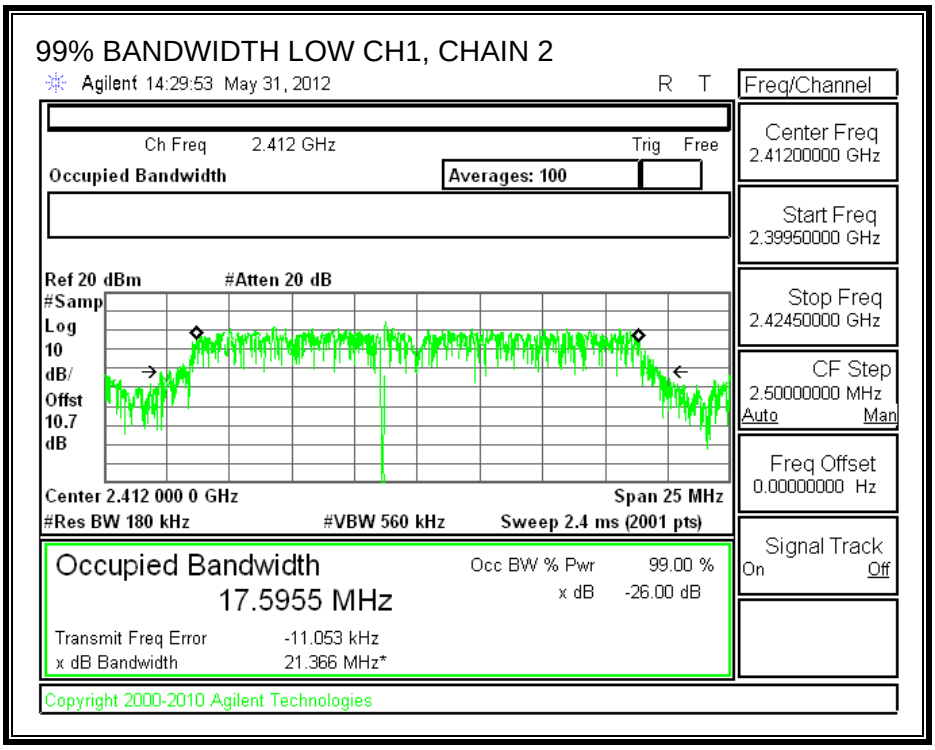


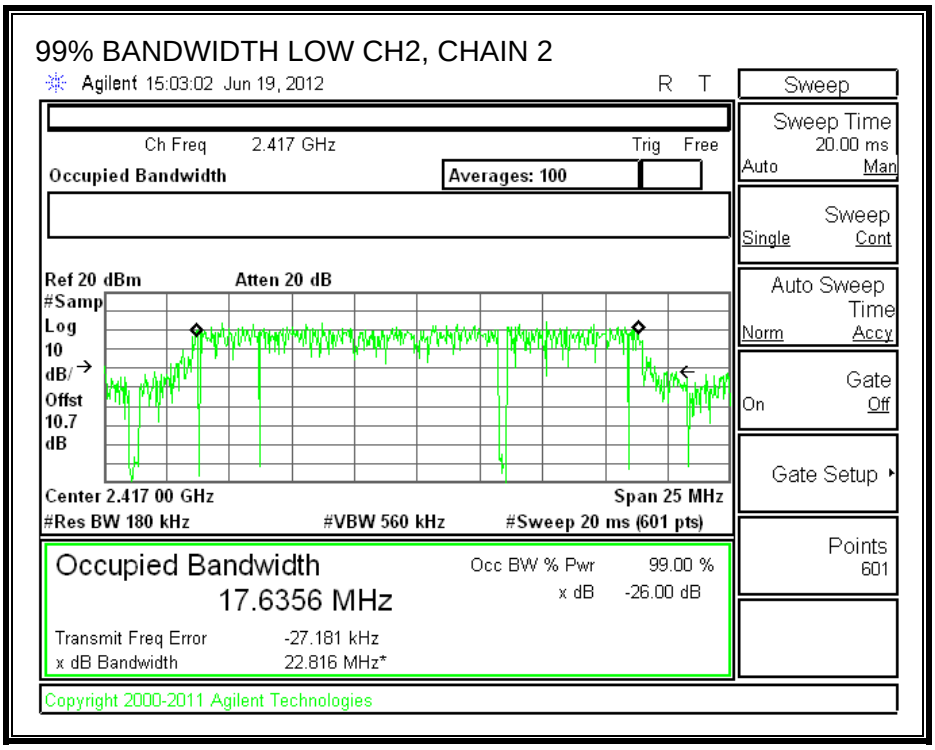
99% BANDWIDTH HIGH CH10, CHAIN 1



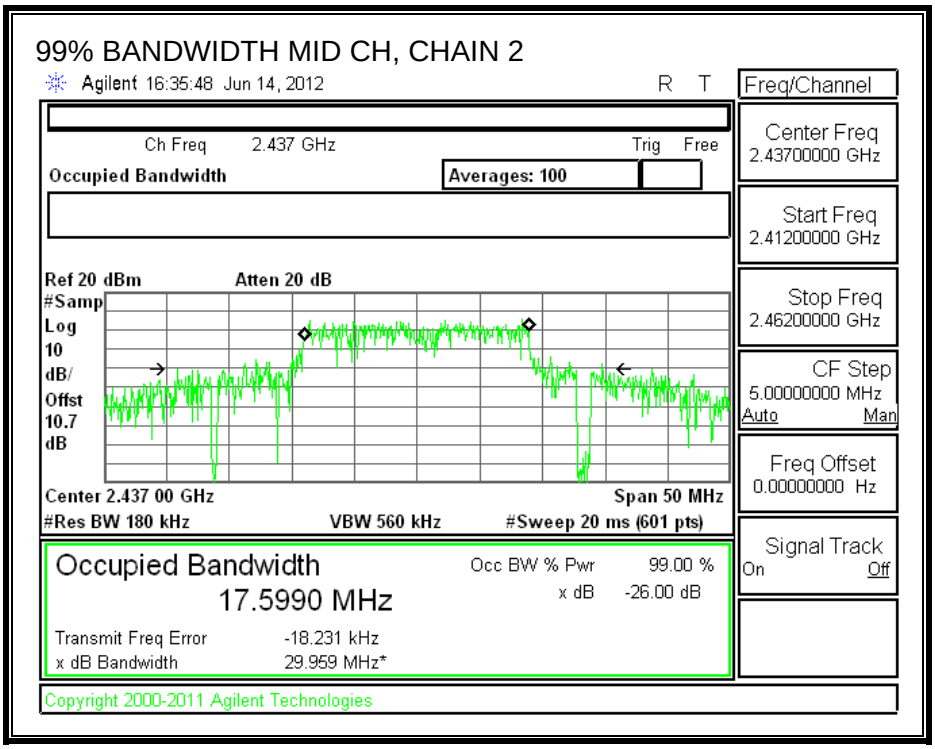


99% BANDWIDTH, CHAIN 2

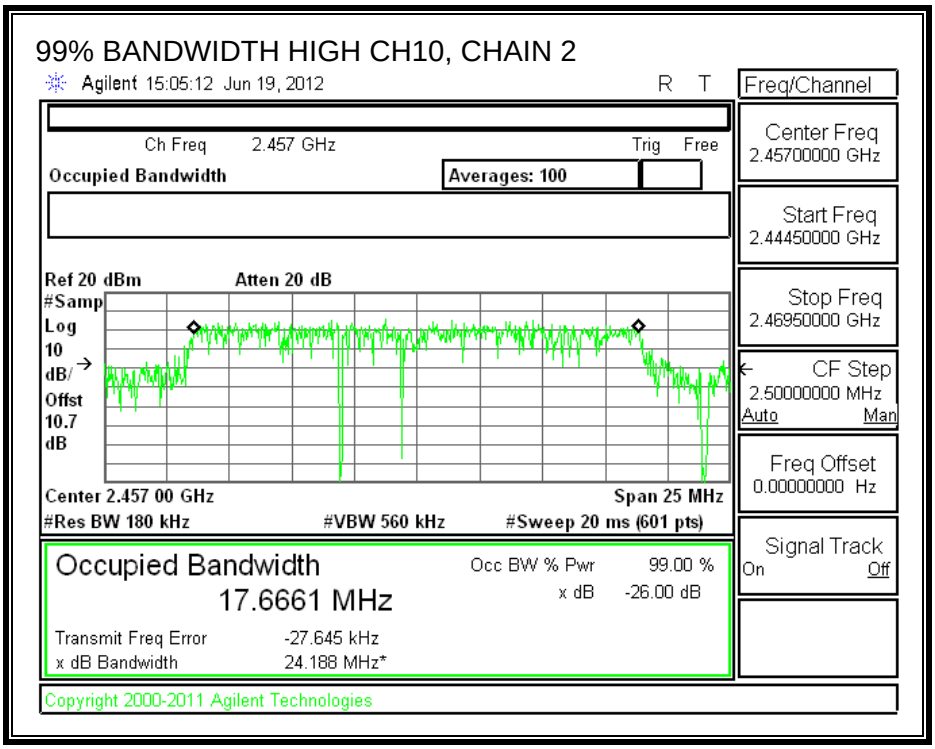


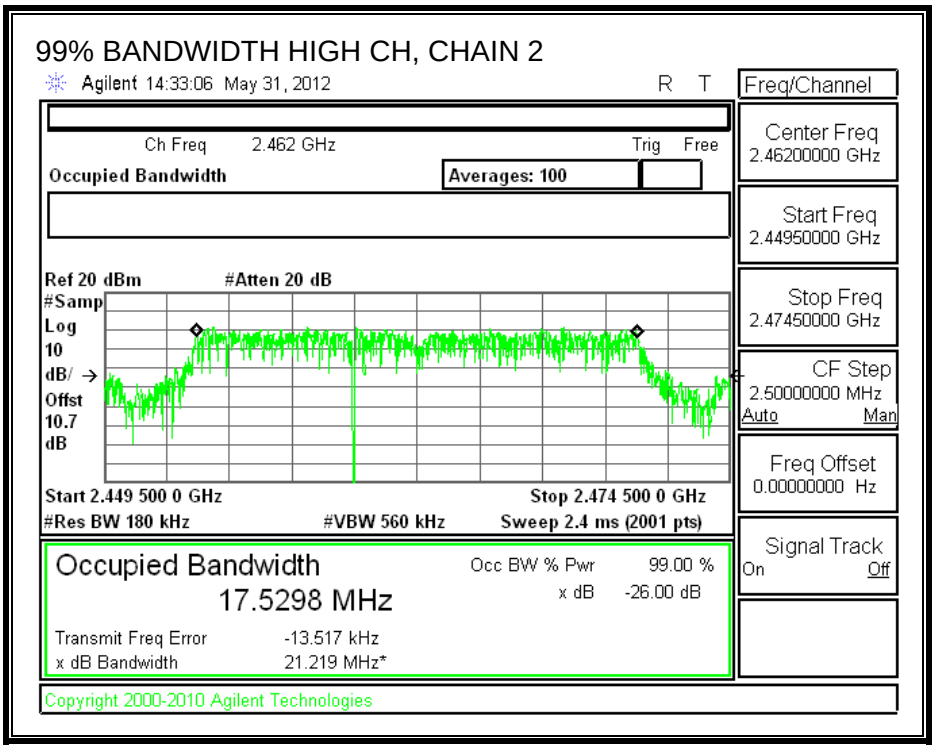


99% BANDWIDTH MID CH, CHAIN 2

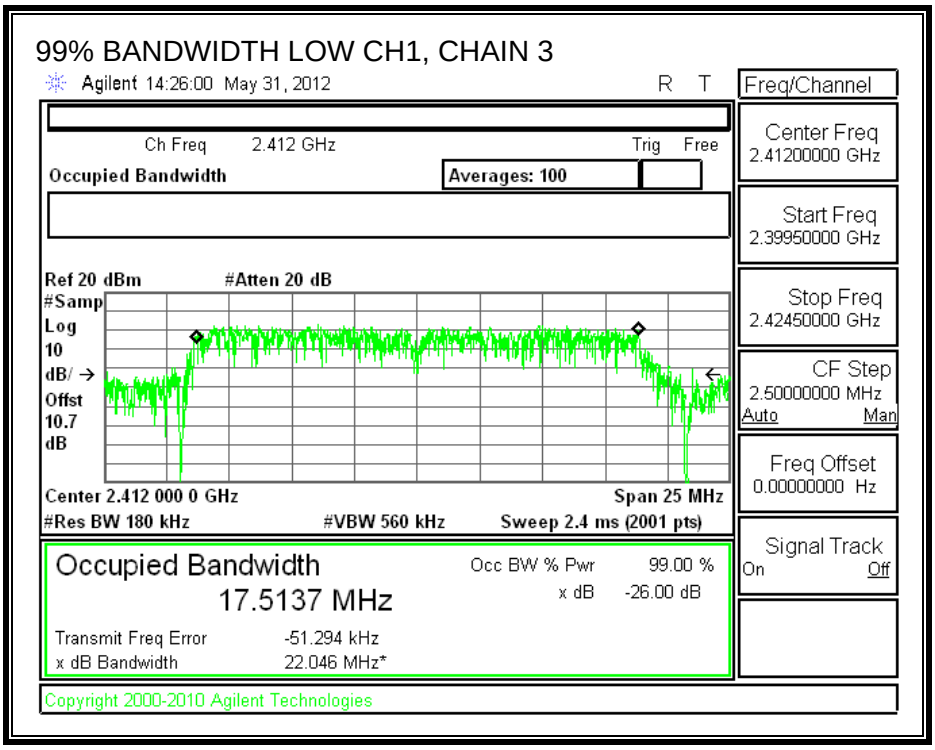


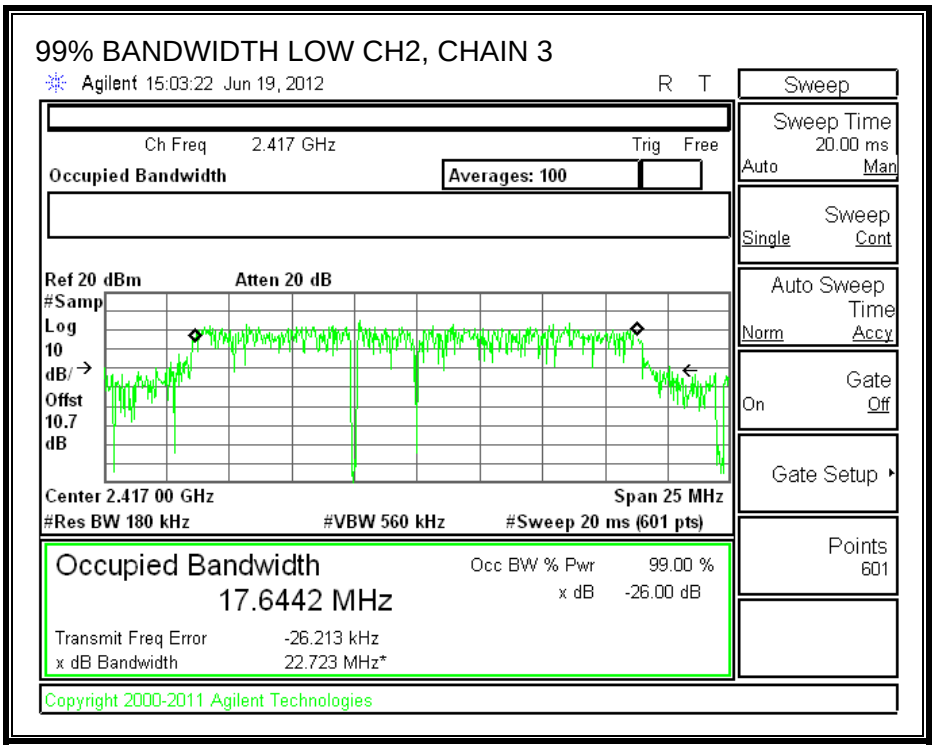
99% BANDWIDTH HIGH CH10, CHAIN 2



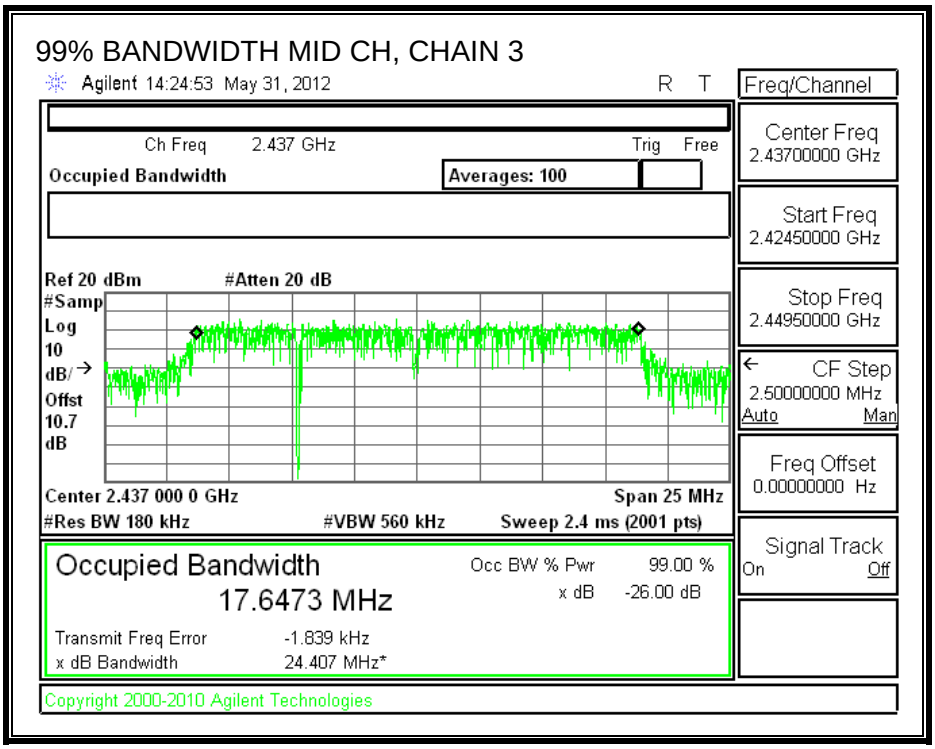


99% BANDWIDTH, CHAIN 3

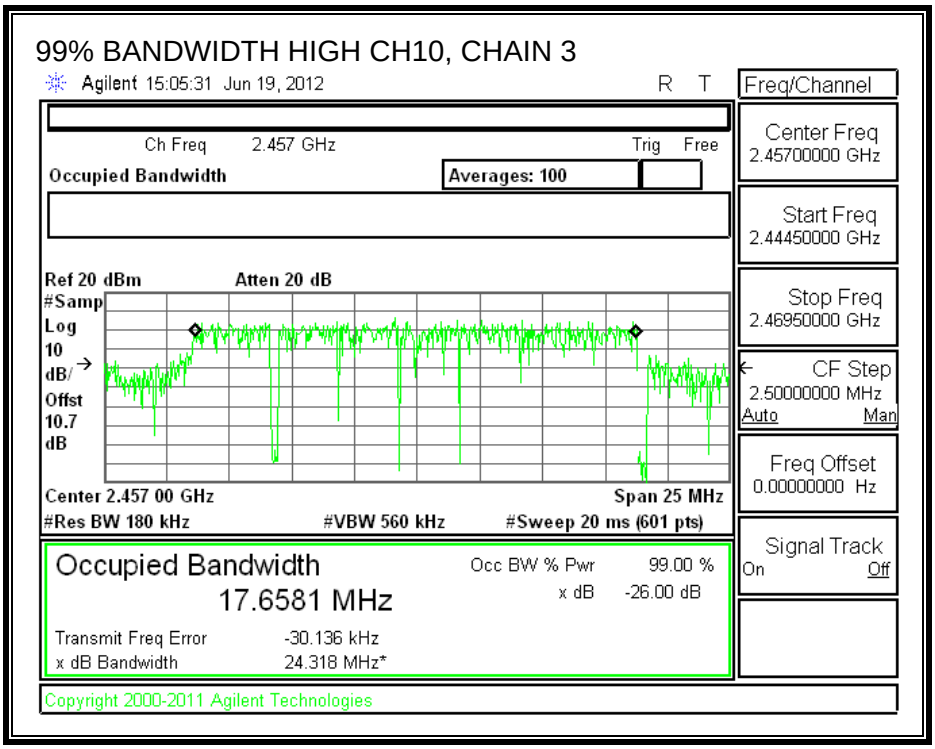


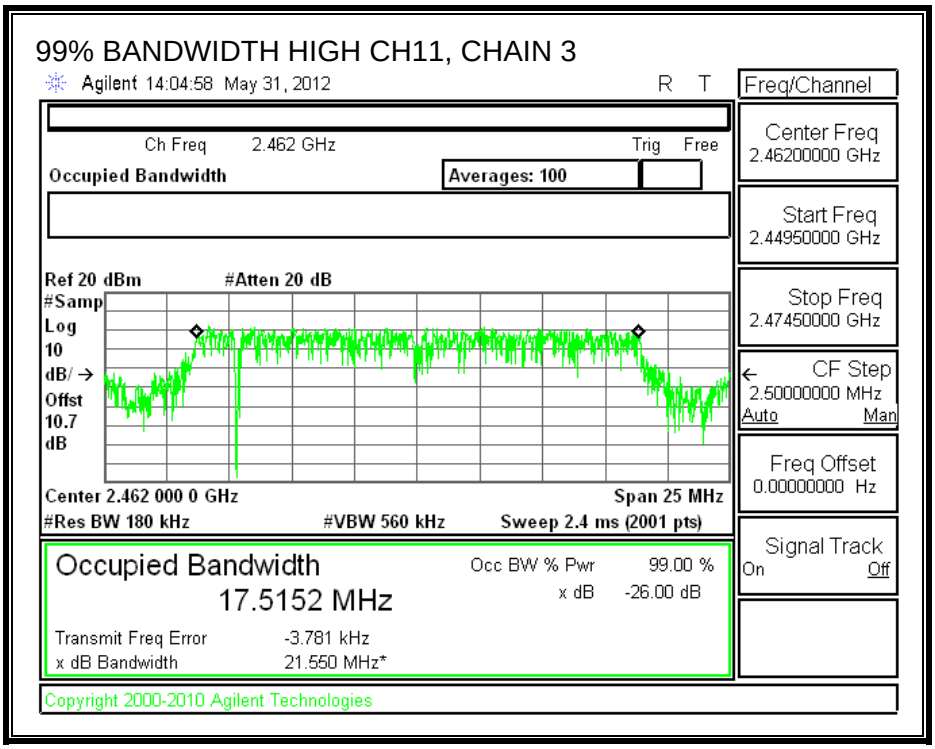


99% BANDWIDTH MID CH, CHAIN 3



99% BANDWIDTH HIGH CH10, CHAIN 3





7.3.3. OUTPUT POWER

LIMITS

FCC §15.247 (b)

IC RSS-210 A8.4

The TX chains are correlated and the antenna gain is unequal among the chains. The directional gain is:

Chain 1 Antenna Gain (dBi)	Chain 2 Antenna Gain (dBi)	Chain 3 Antenna Gain (dBi)	Correlated Chains Directional Gain (dBi)
1.66	1.11	6.77	8.35

The maximum effective composite gain is 8.35 dBi for other than fixed, point-to-point operations, therefore the limit is 27.65 dBm.

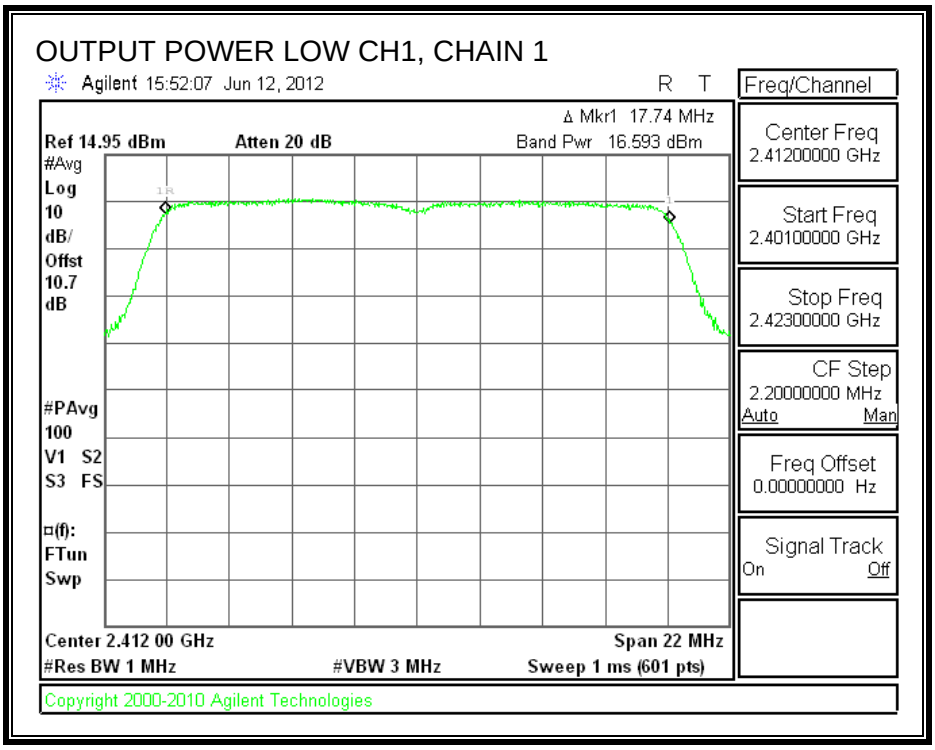
TEST PROCEDURE

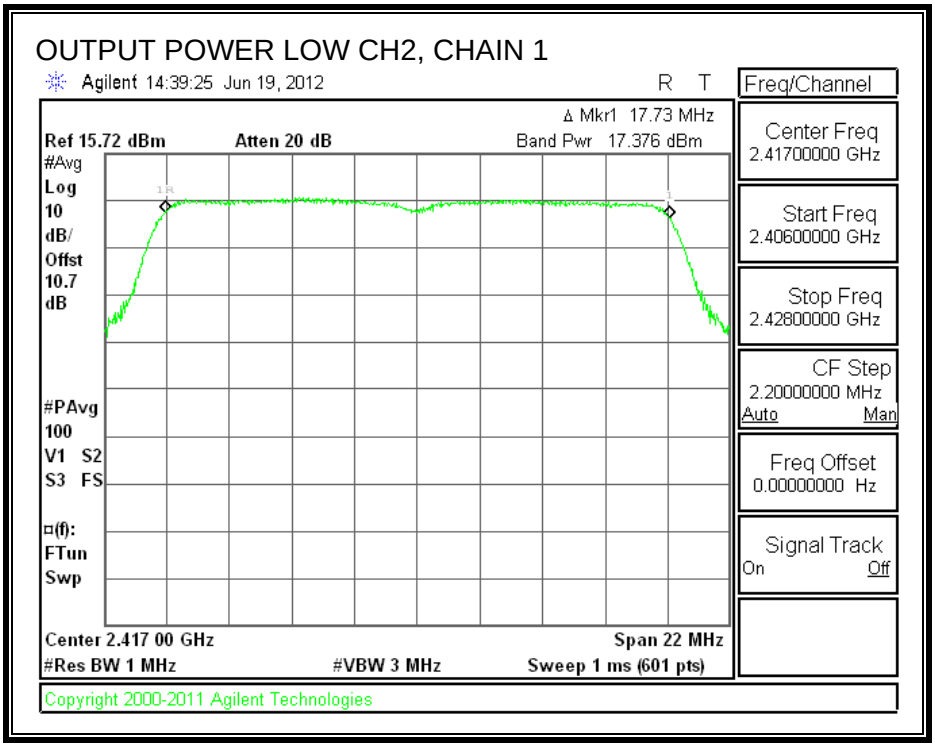
KDB 558074 D01 V01 "Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under 15.247", dated 01/18/2012.

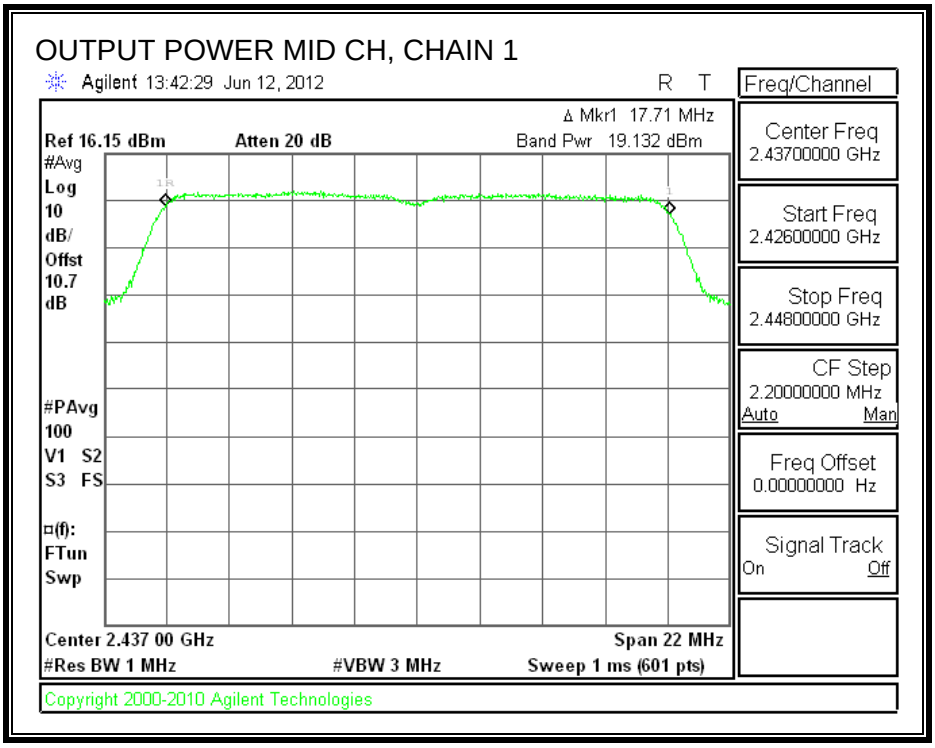
RESULTS

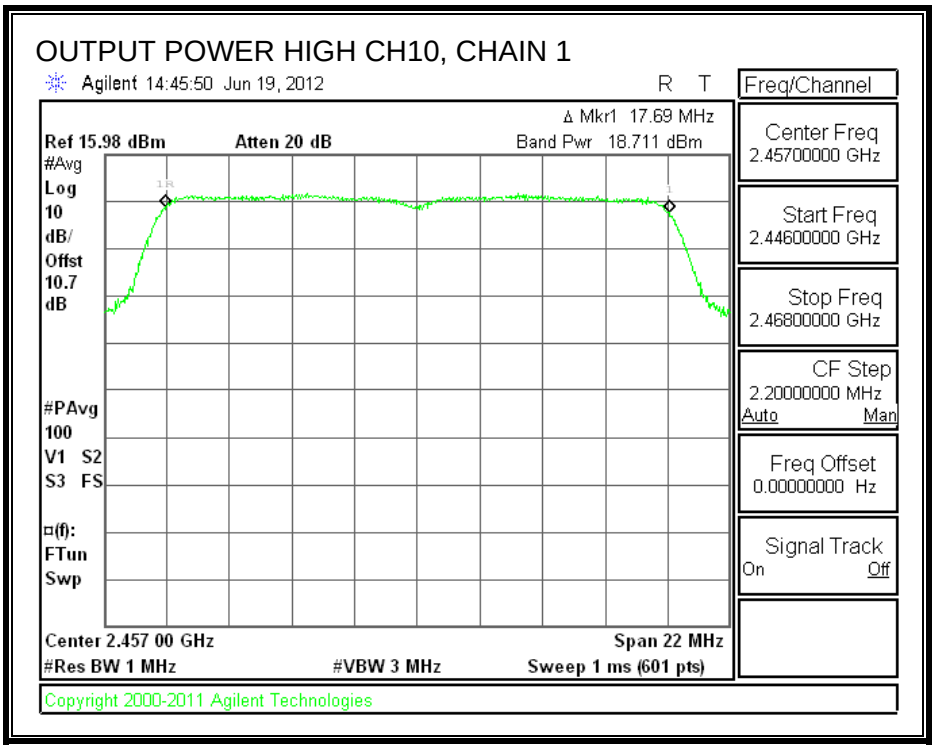
Frequency (MHz)	Chain 1 RMS Power (dBm)	Chain 2 RMS Power (dBm)	Chain 3 RMS Power (dBm)	Total RMS Power (dBm)	Limit (dBm)	Margin (dB)
2412	16.593	16.505	16.583	21.332	27.65	-6.318
2417	17.376	17.575	17.406	22.224	27.65	-5.426
2437	19.132	19.169	19.262	23.959	27.65	-3.691
2457	18.711	18.492	18.750	23.424	27.65	-4.226
2462	16.278	16.344	16.057	20.999	26.95	-5.951

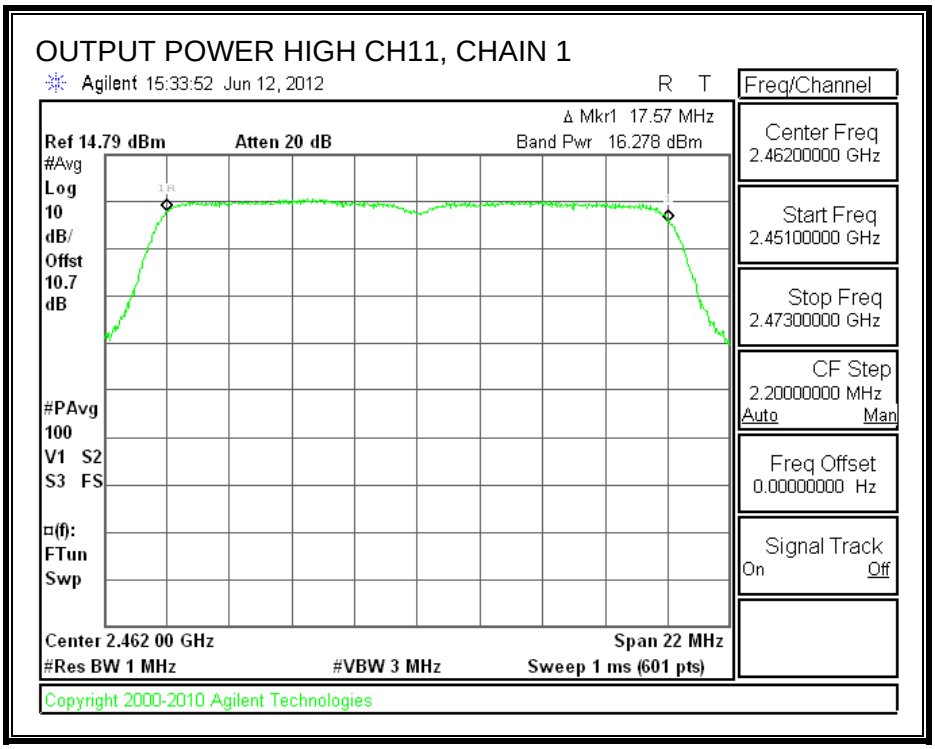
CHAIN 1 OUTPUT POWER



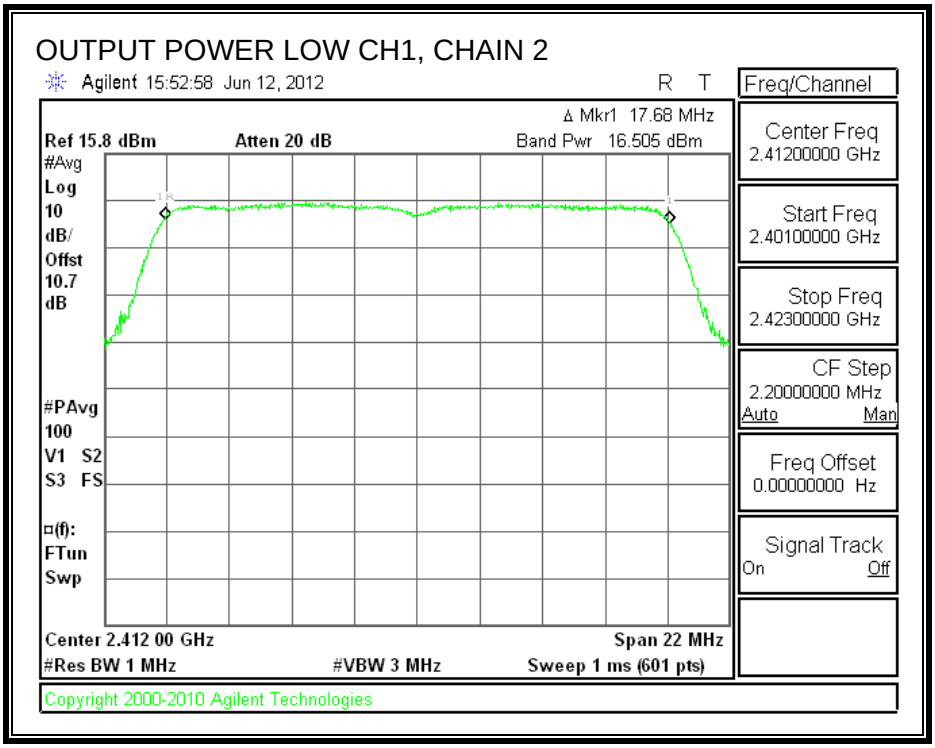


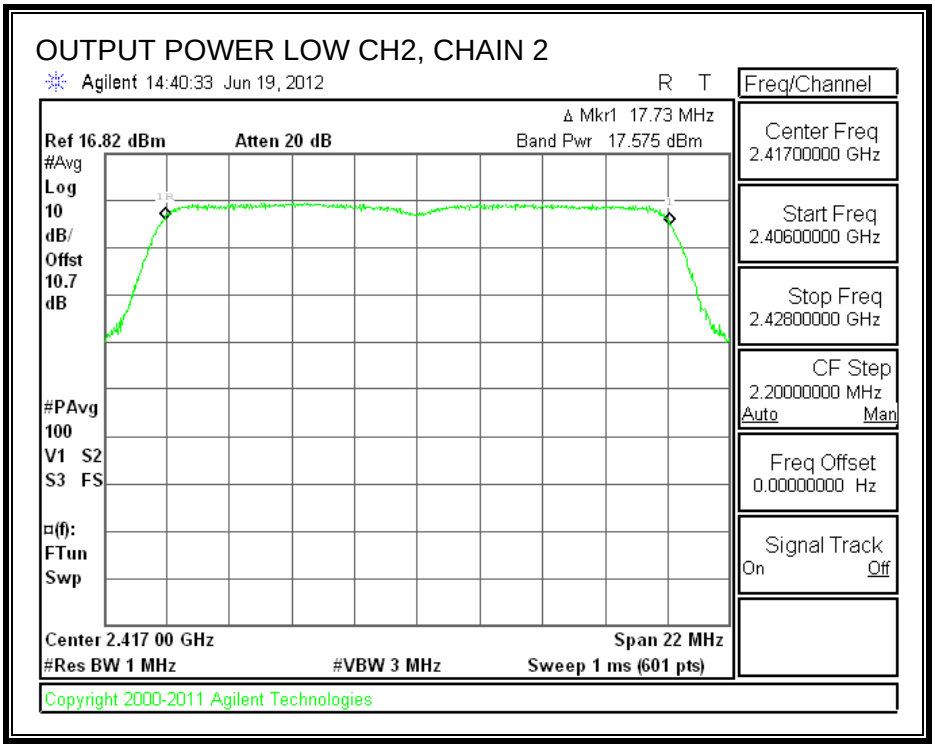


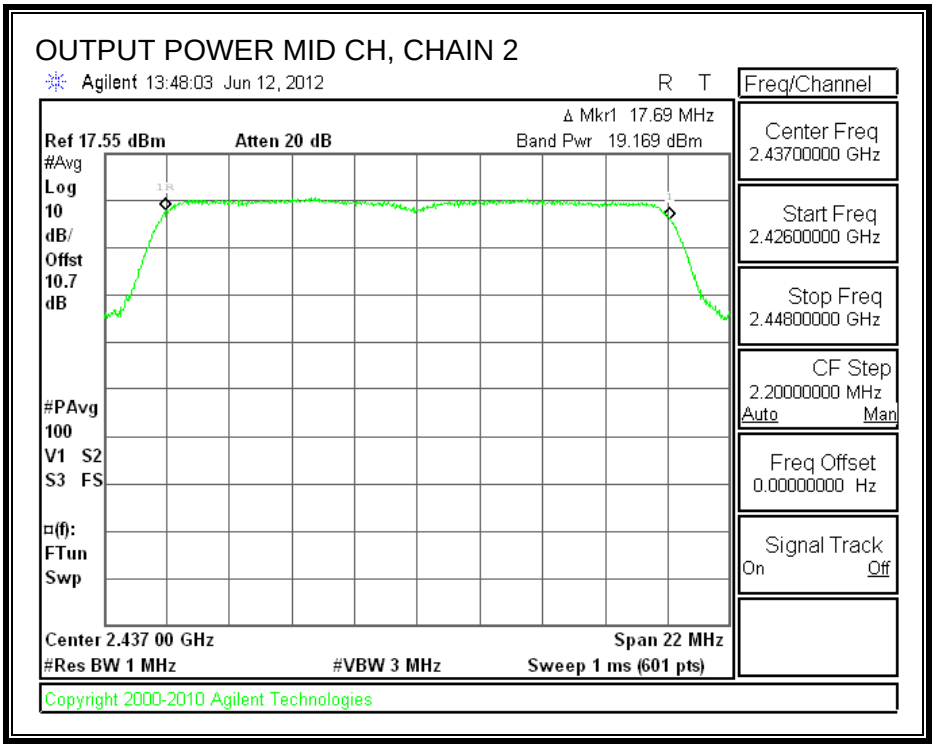




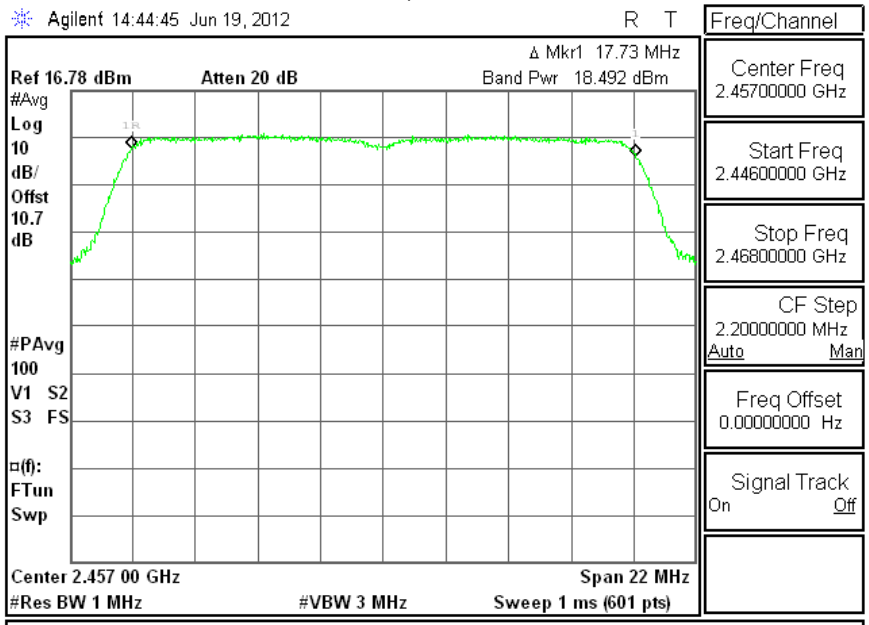
CHAIN 2 OUTPUT POWER



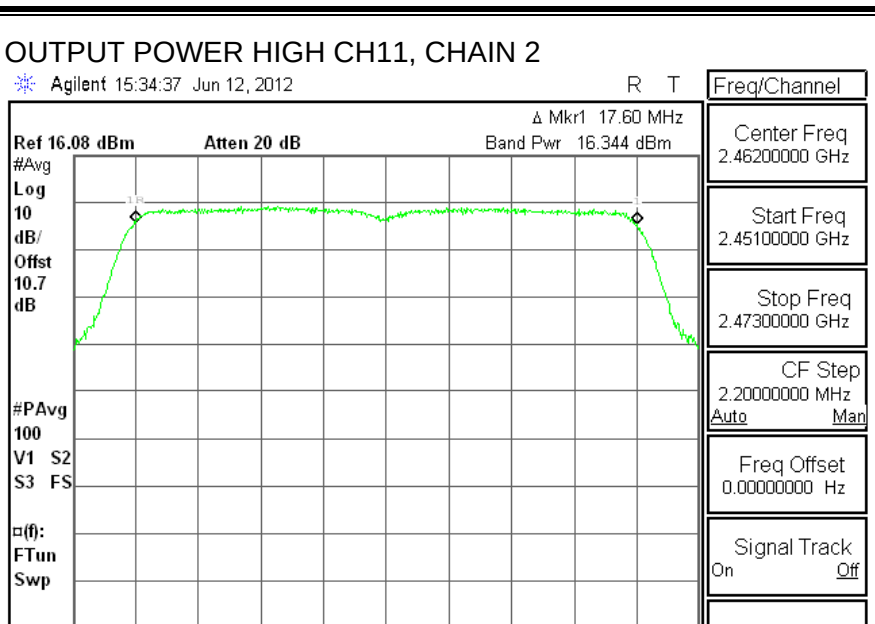




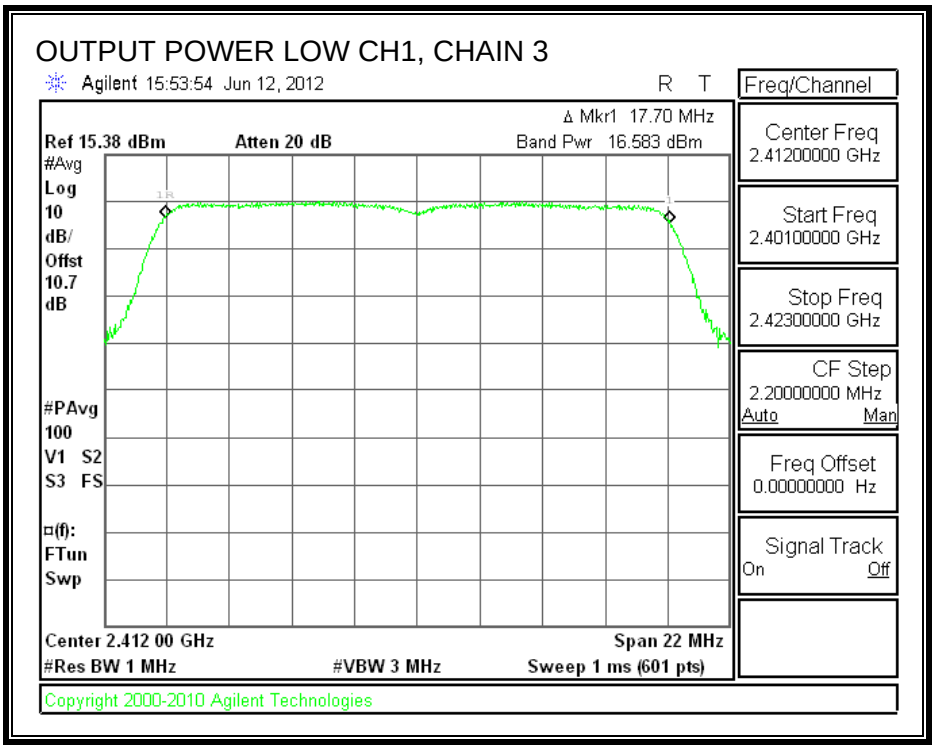
OUTPUT POWER HIGH CH10, CHAIN 2

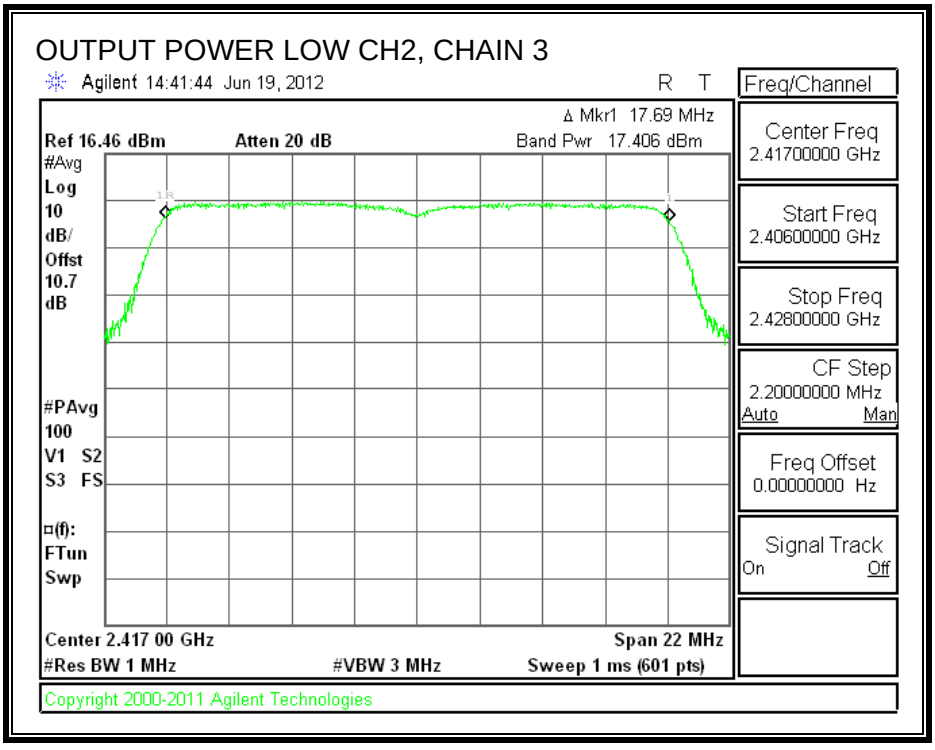


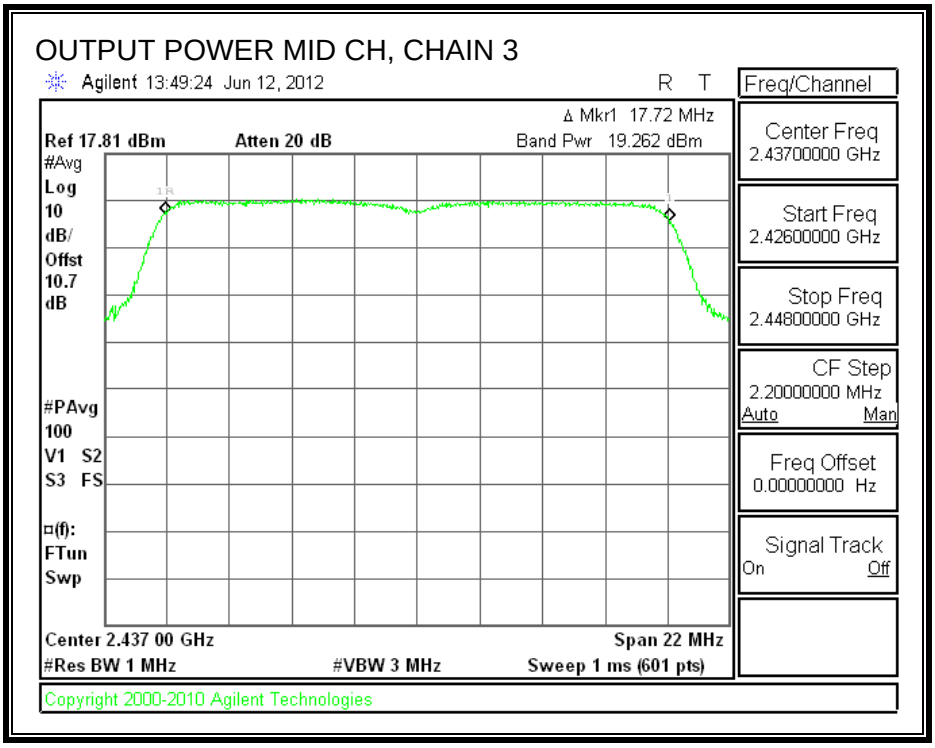
OUTPUT POWER HIGH CH11, CHAIN 2

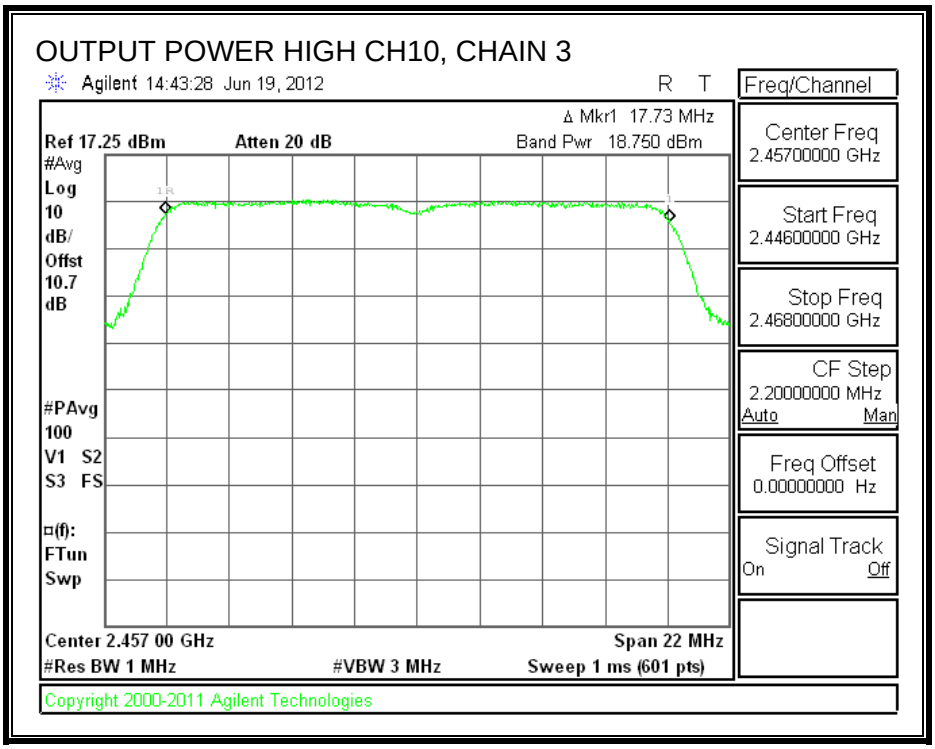


CHAIN 3 OUTPUT POWER

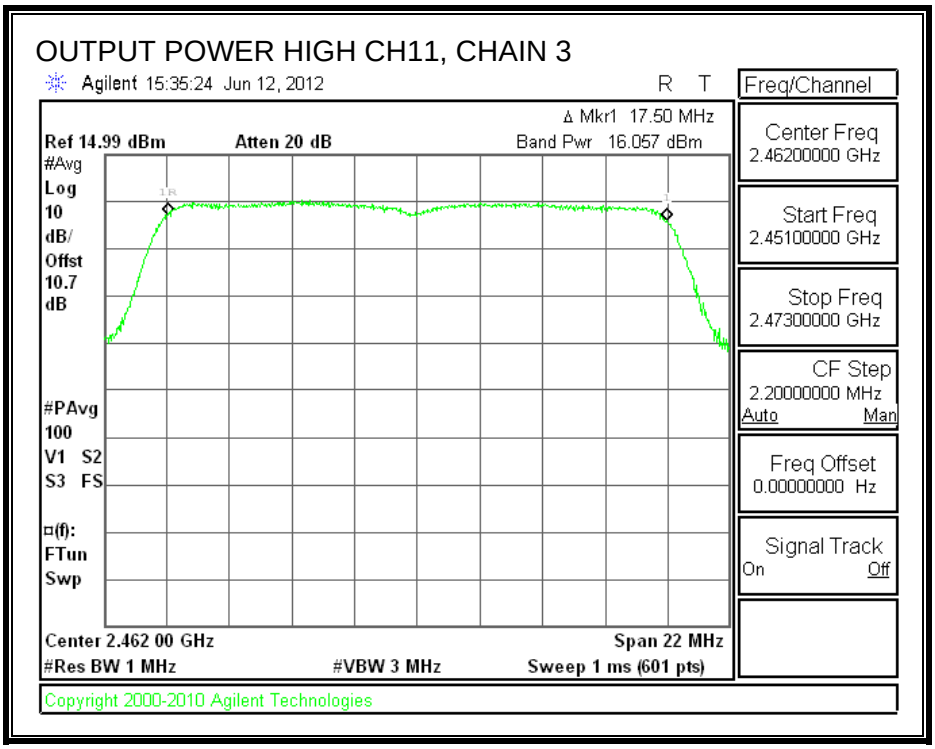








OUTPUT POWER HIGH CH11, CHAIN 3



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 10.7 dB (including 10 dB pad and 0.70 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)	Chain 3 Power (dBm)	Total Power (dBm)
Low	**2412**	16.50	16.65	16.67	**21.38**
Low	**2417**	19.10	19.20	19.10	**23.90**
Middle	**2437**	19.10	19.20	19.10	**23.90**
High	**2457**	18.60	18.65	18.60	**23.39**
High	**2462**	16.20	16.30	16.10	**20.97**

7.3.5. POWER SPECTRAL DENSITY

LIMITS

FCC §15.247 (e)

IC RSS-210 A8.2 (b)

TEST PROCEDURE

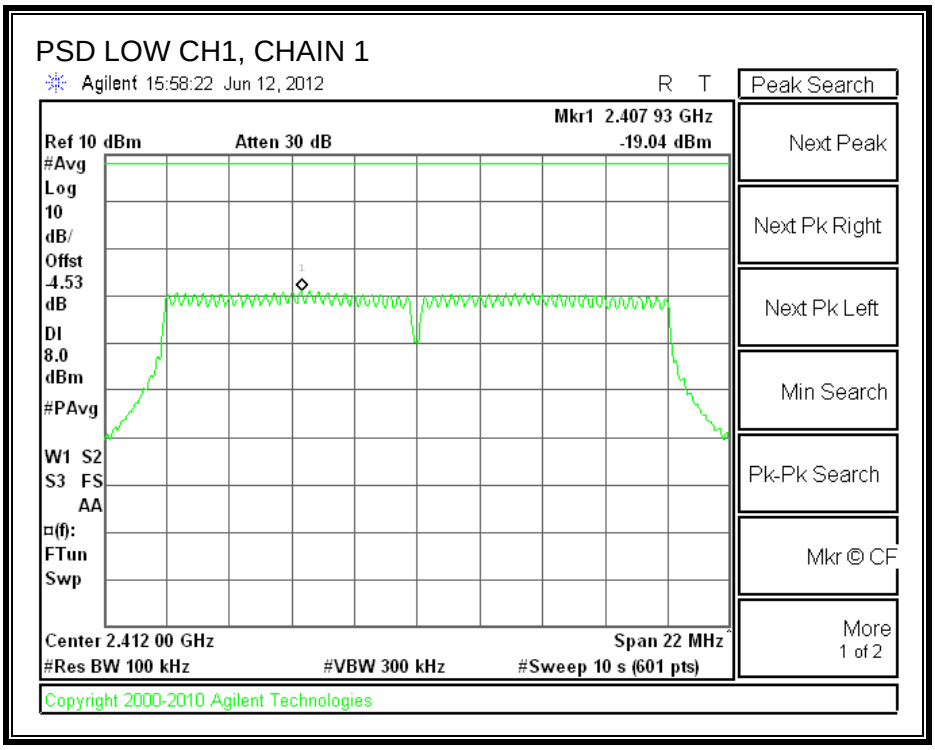
KDB 558074 D01 V01 "Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under 15.247", dated 01/18/2012.

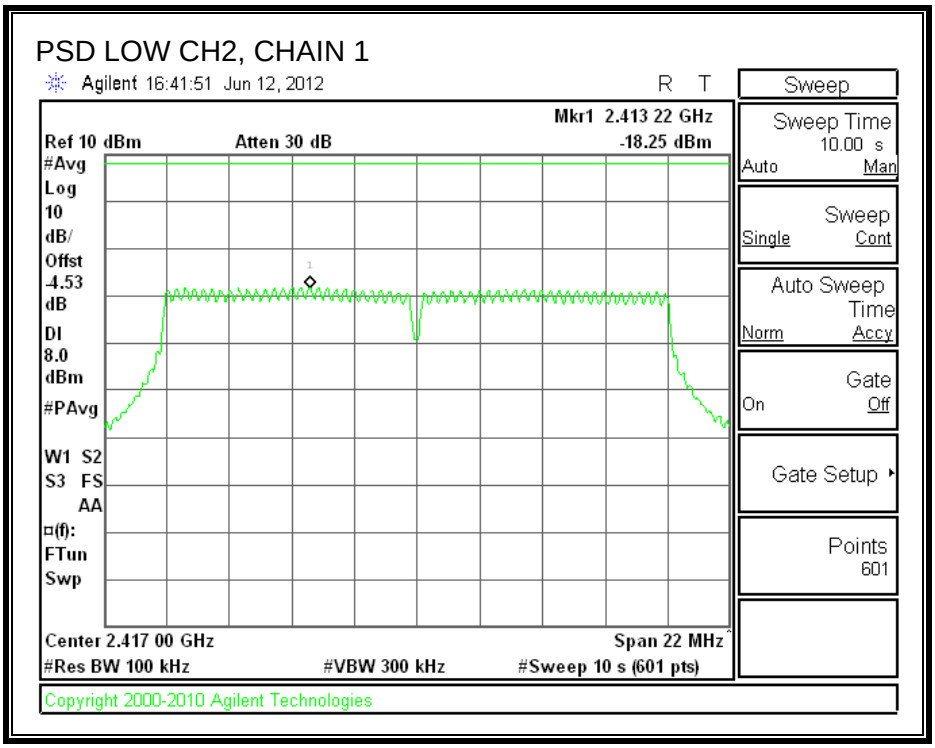
RESULTS

Channel	Frequency (MHz)	Chain 1 PSD (dBm)	Chain 2 PSD (dBm)	Chain 3 PSD (dBm)	Total PSD (dBm)	Limit (dBm)	Margin (dB)
Low	2412	-19.40	-19.20	-18.90	-14.39	8	-22.39
Low	2412	-18.25	-18.48	-18.42	-13.61	8	-21.61
Middle	2437	-16.29	-15.56	-15.65	-11.05	8	-19.05
High	2462	-17.06	-17.42	-17.13	-12.43	8	-20.43
High	2462	-19.27	-19.48	-19.49	-14.64	8	-22.64

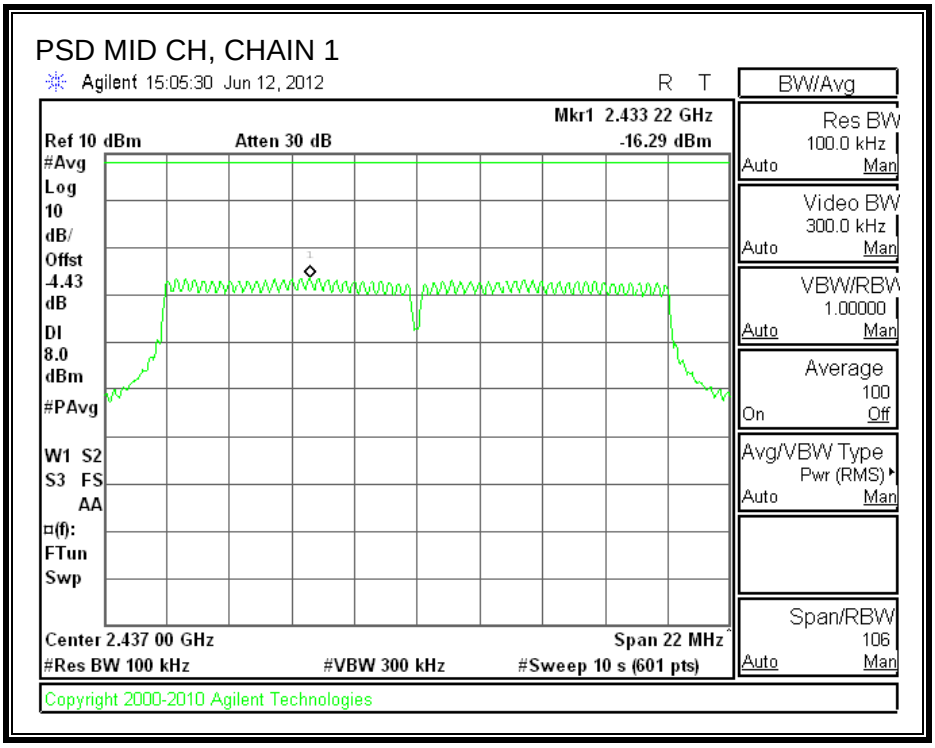
Note: The spectrum analyzer offset = attenuator loss + cable loss + 10 log (3/100 kHz) = -4.53 dB

POWER SPECTRAL DENSITY, CHAIN 1

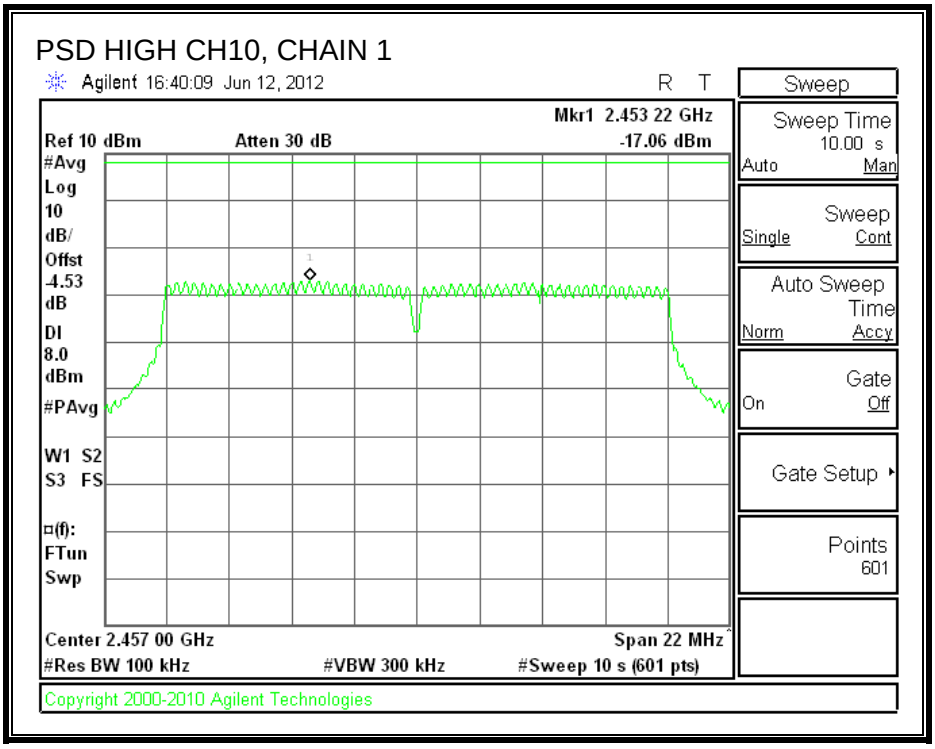


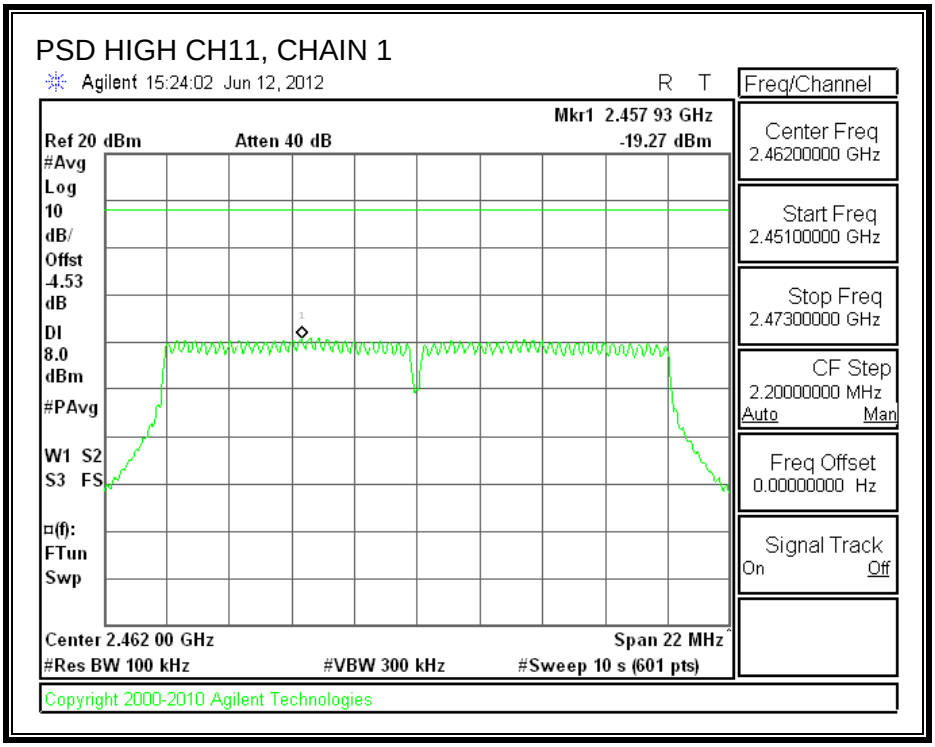


PSD MID CH, CHAIN 1

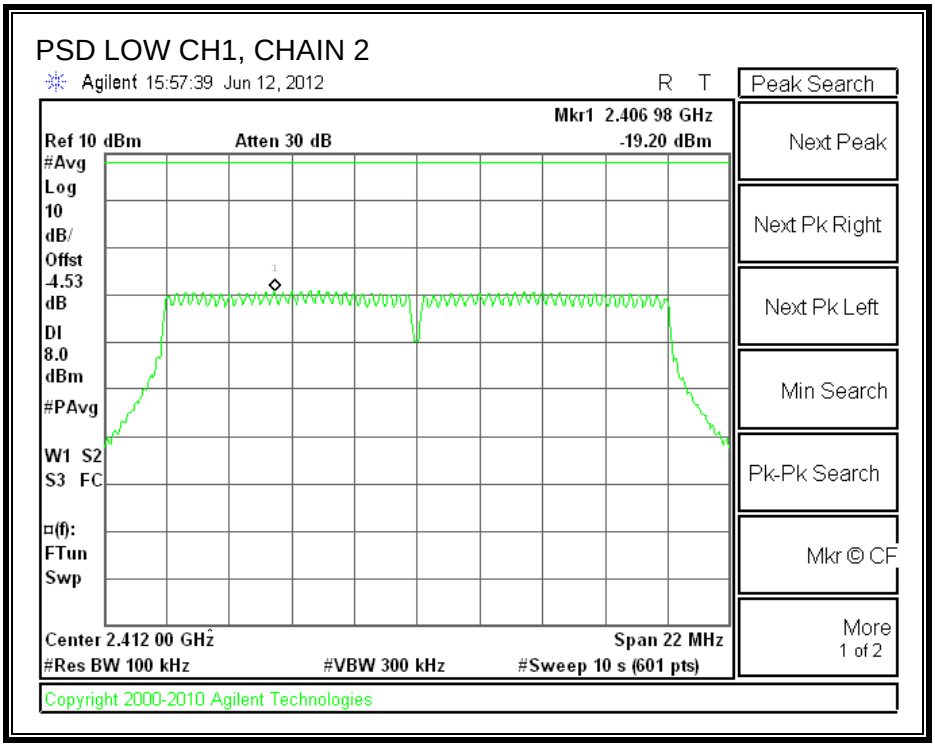


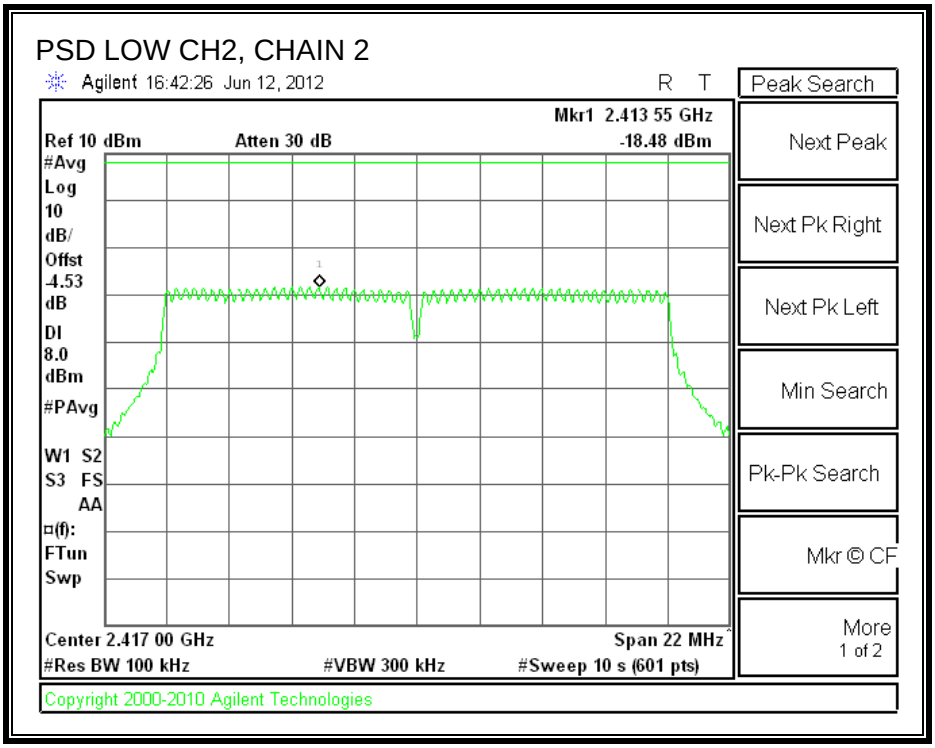
PSD HIGH CH10, CHAIN 1



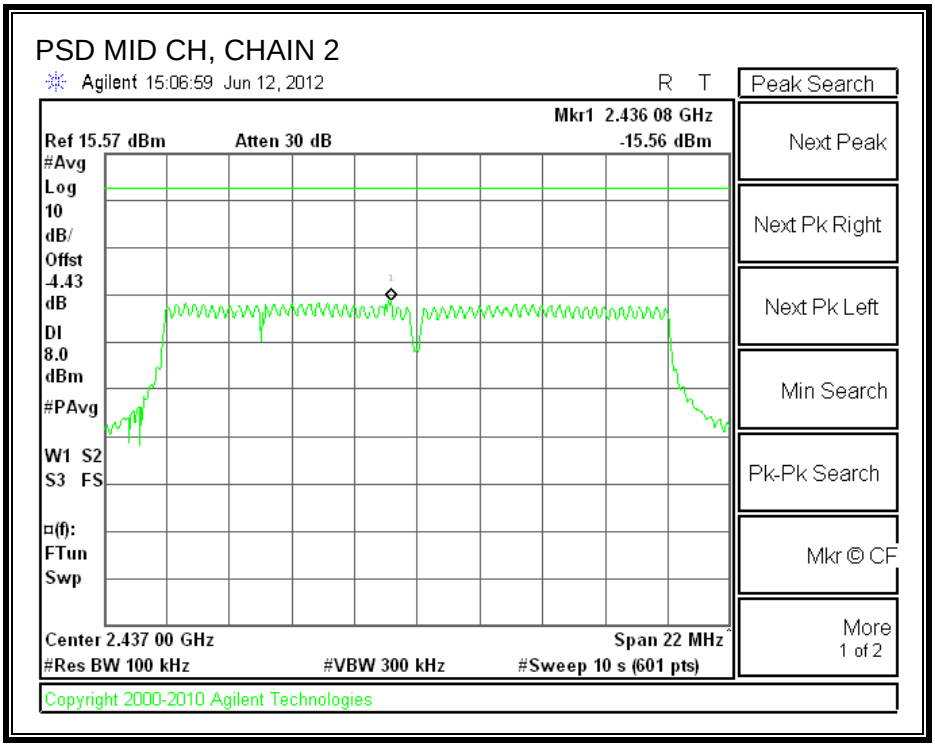


POWER SPECTRAL DENSITY, CHAIN 2

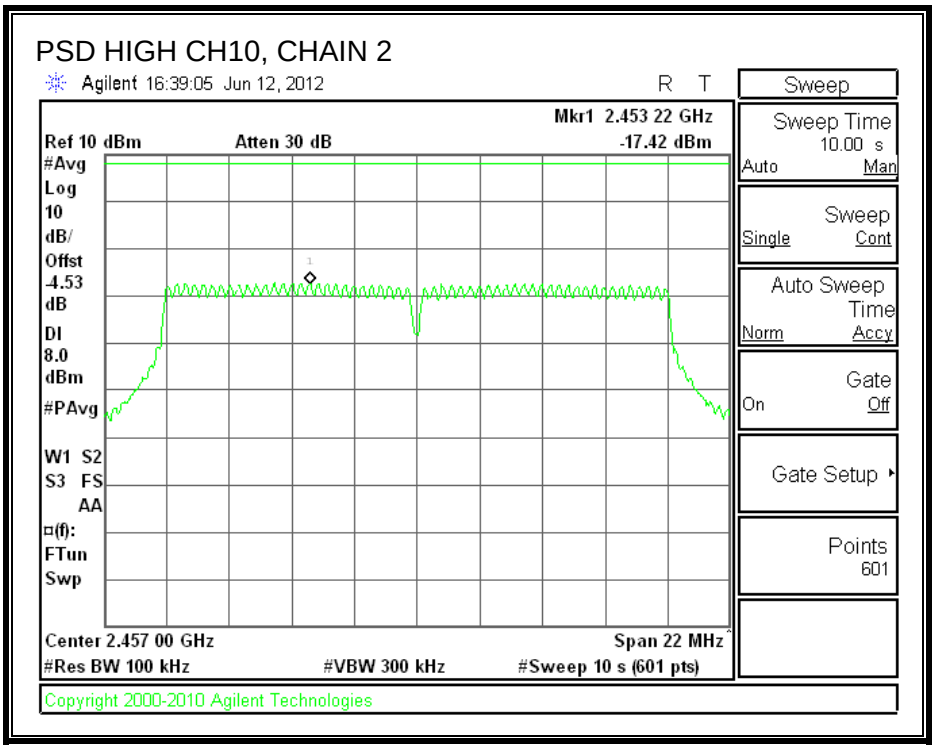


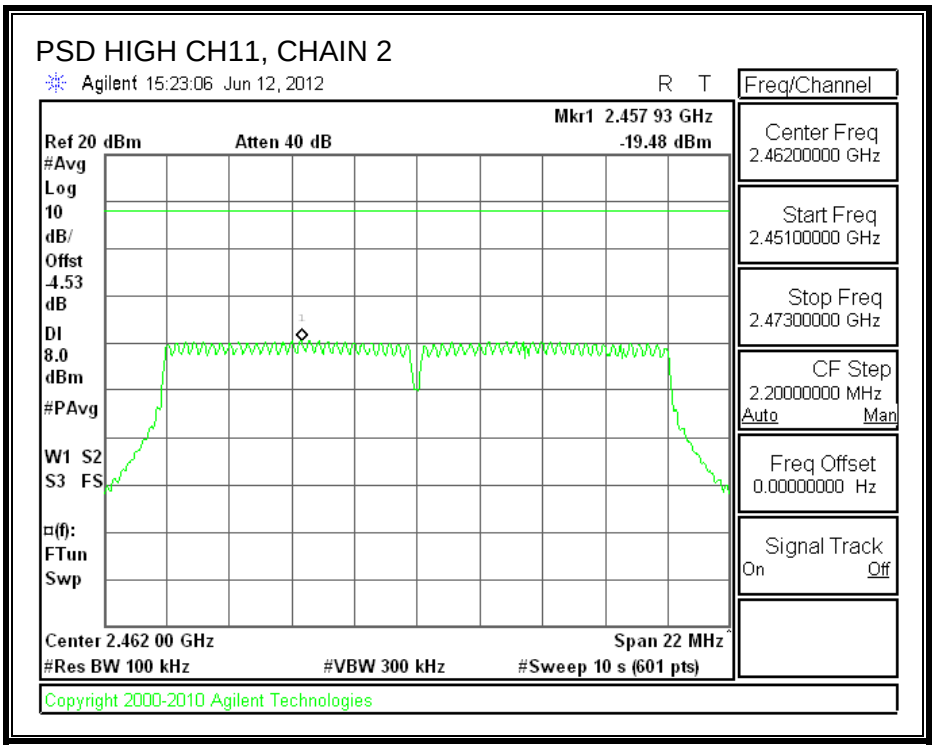


PSD MID CH, CHAIN 2

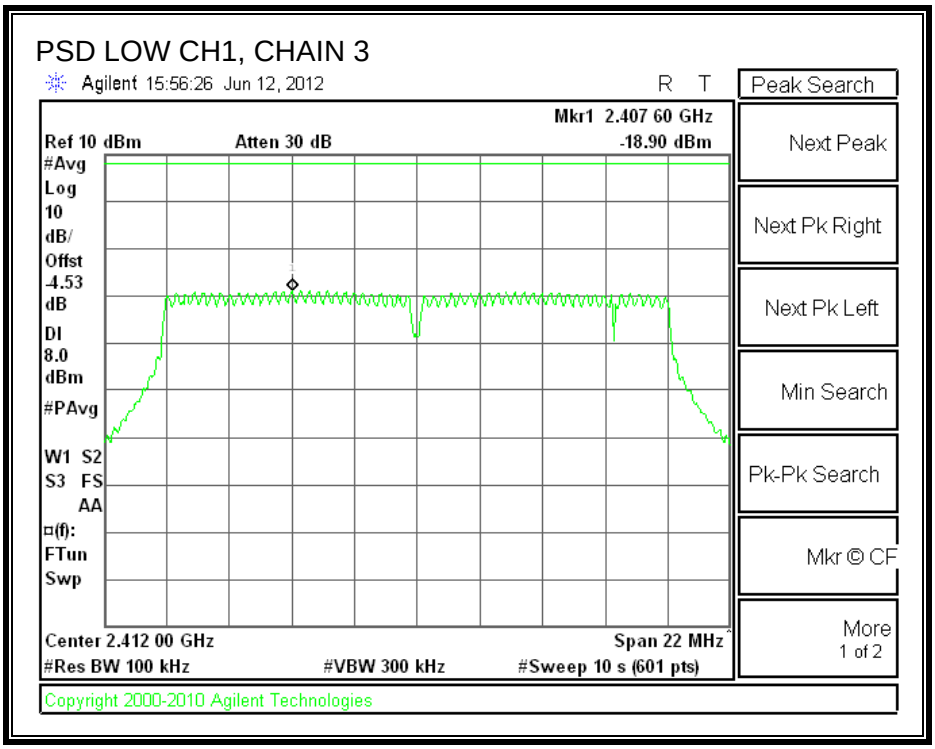


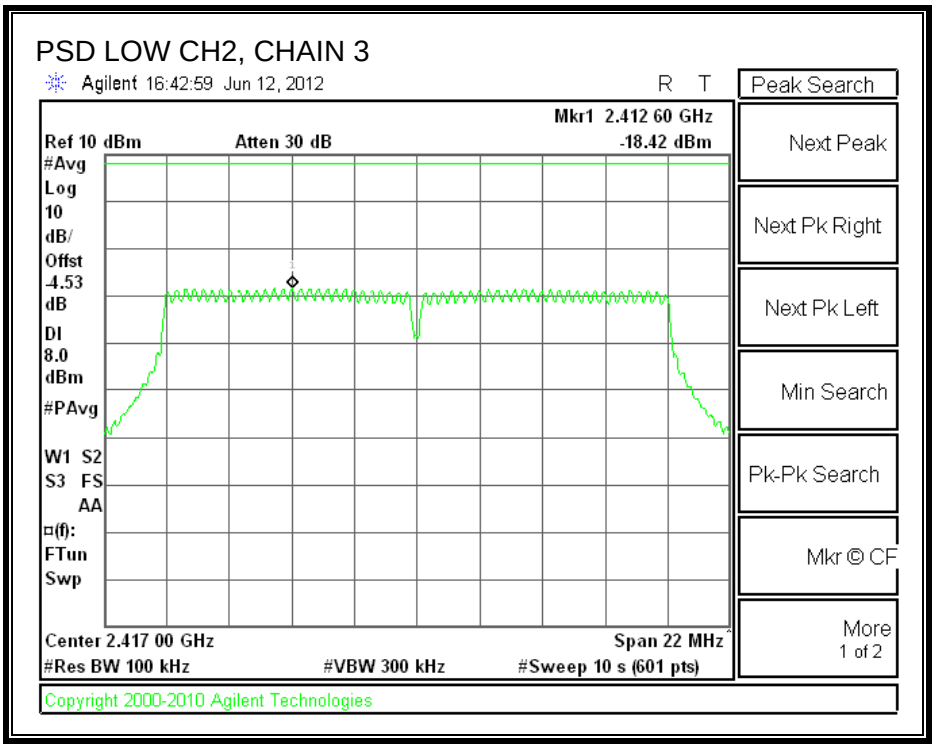
PSD HIGH CH10, CHAIN 2



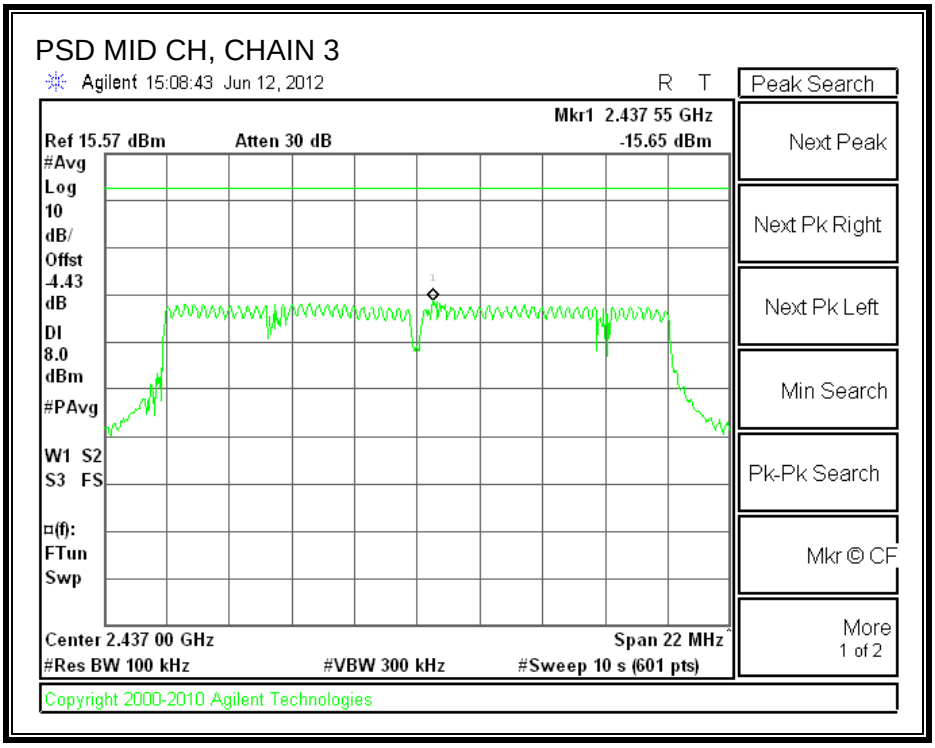


POWER SPECTRAL DENSITY, CHAIN 3

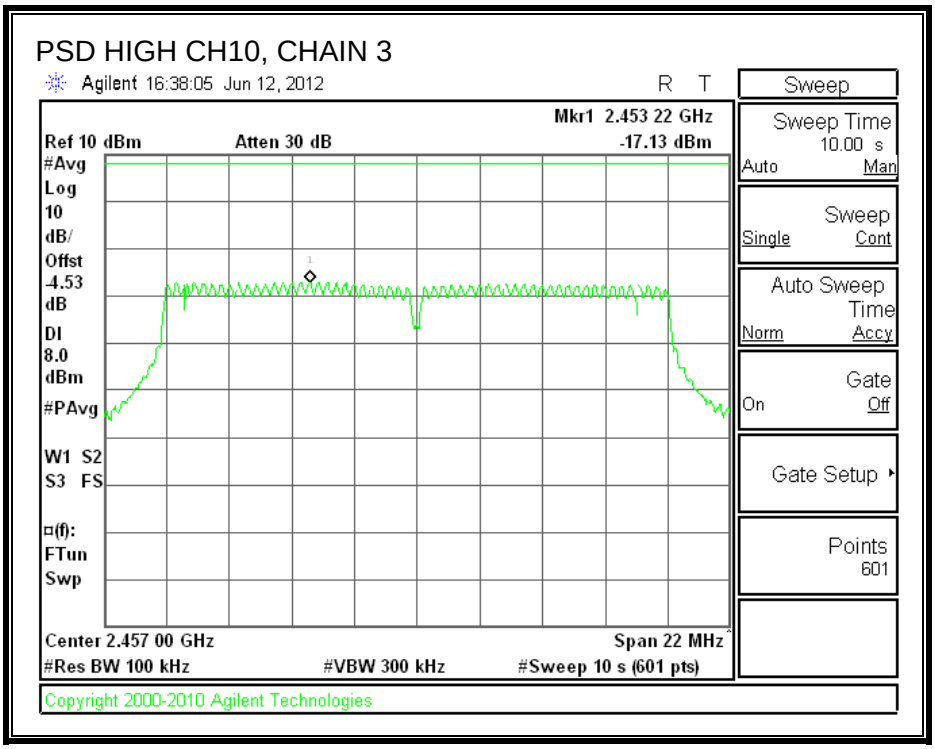


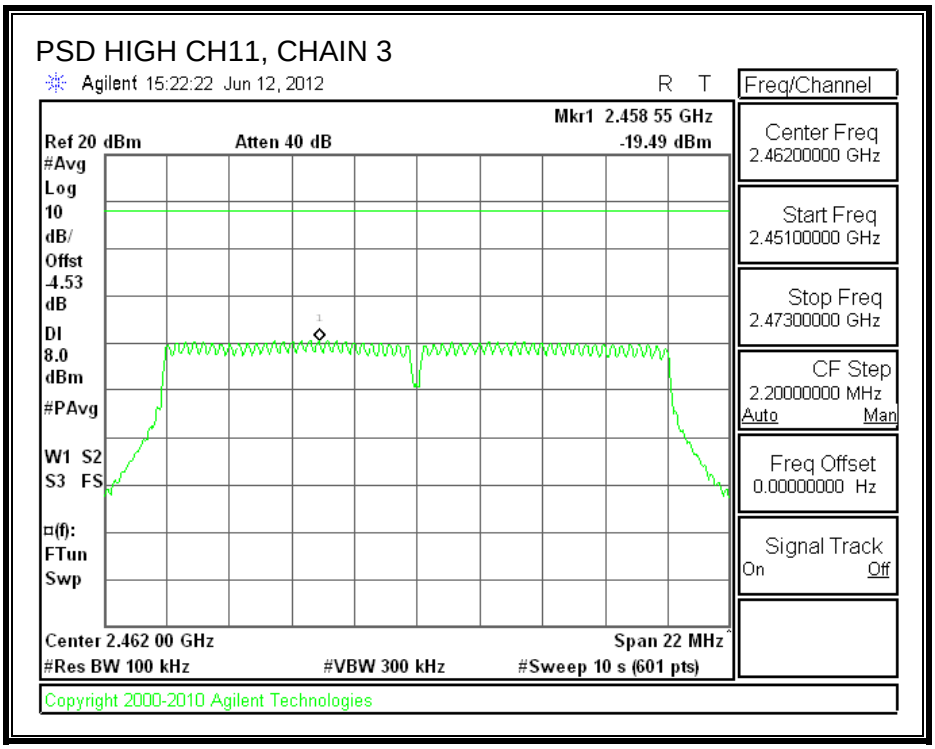


PSD MID CH, CHAIN 3



PSD HIGH CH10, CHAIN 3





7.3.6. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.247 (d)

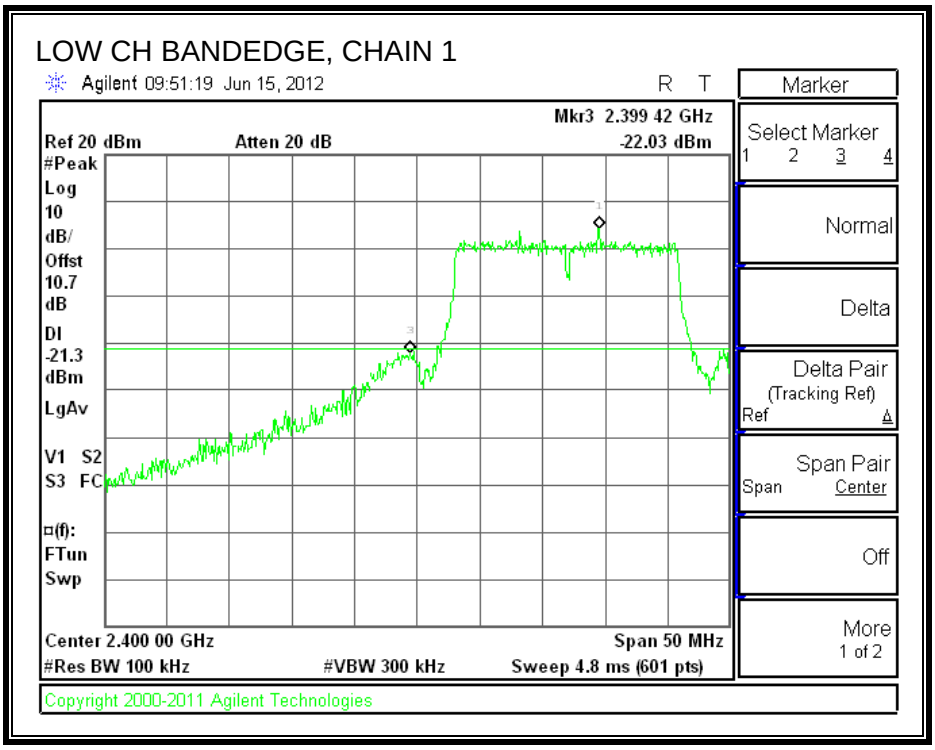
IC RSS-210 A8.5

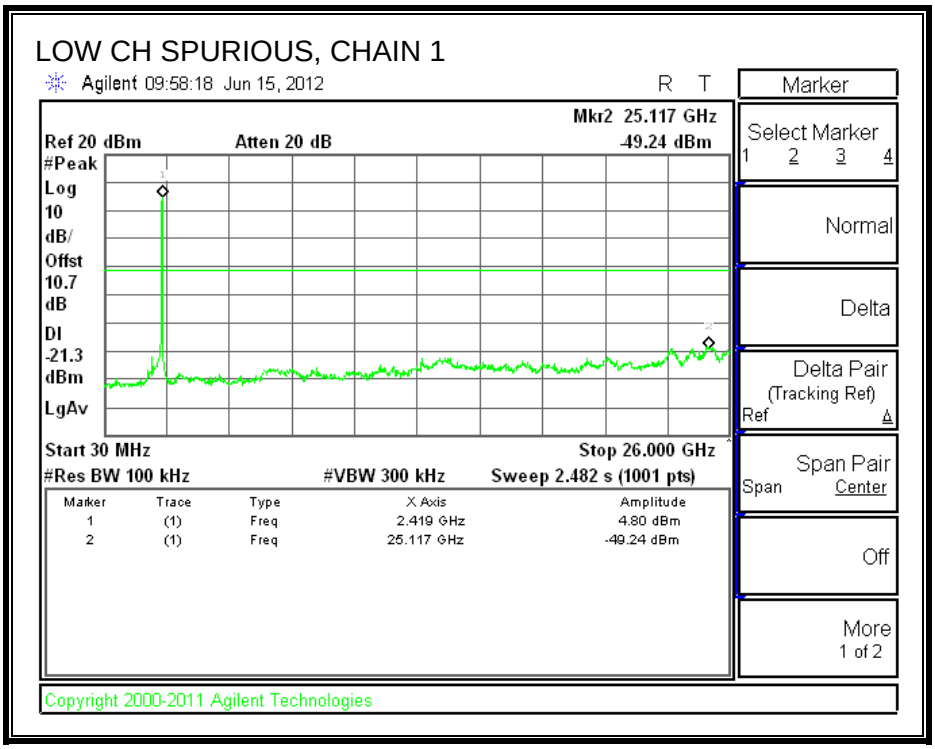
Output power was measured based on the use of RMS averaging over a time interval, therefore the required attenuation is 30 dB.

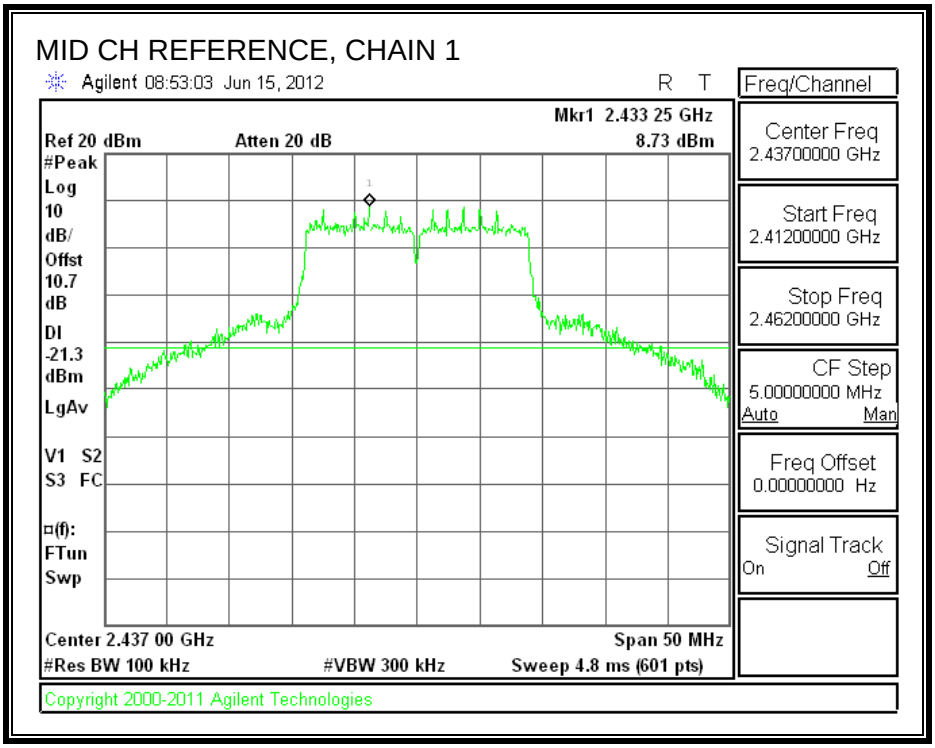
TEST PROCEDURE

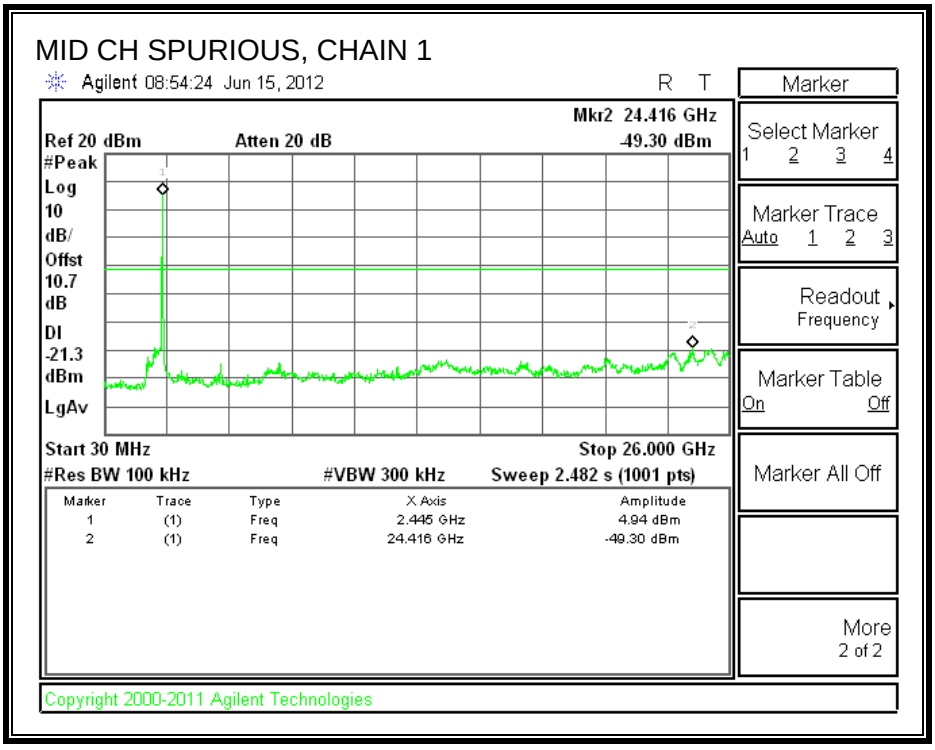
KDB 558074 D01 V01 “Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under 15.247”, dated 01/18/2012.

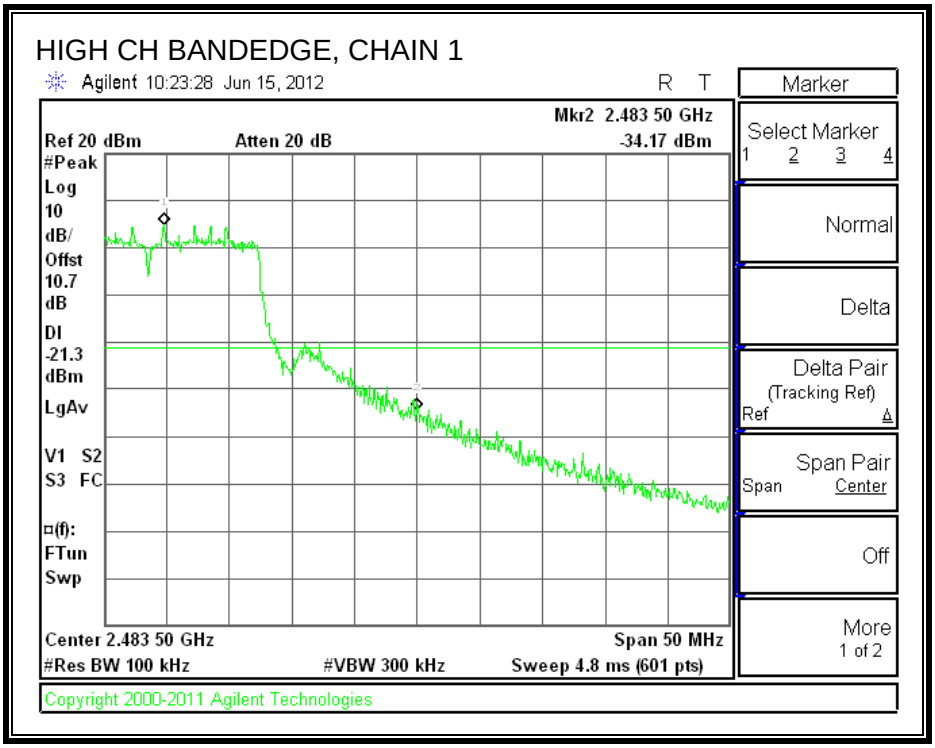
CHAIN 1 SPURIOUS EMISSIONS

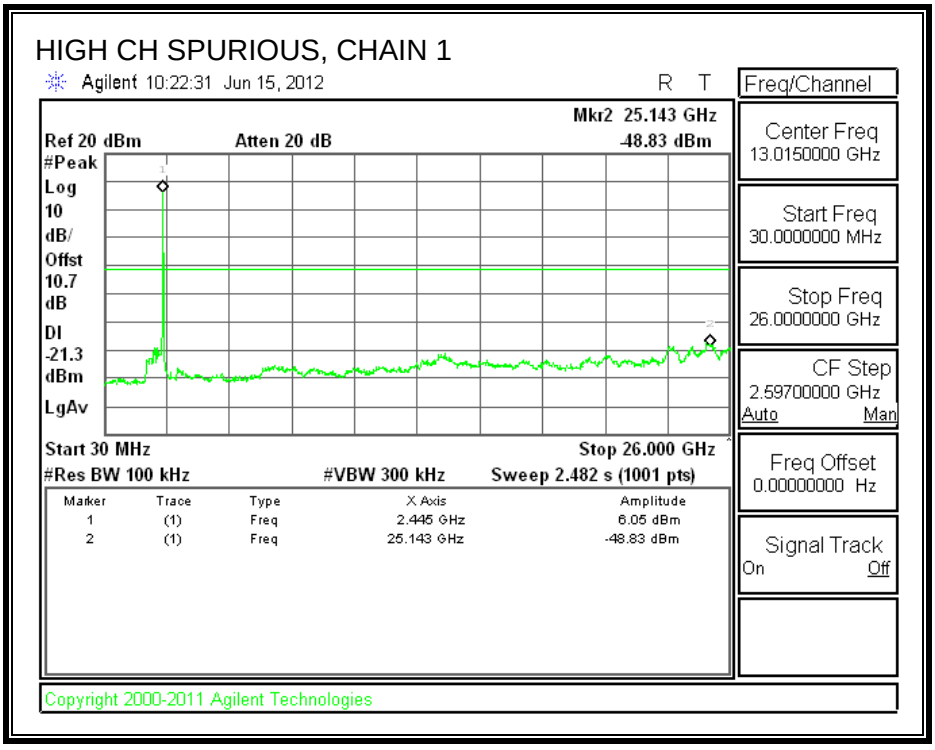




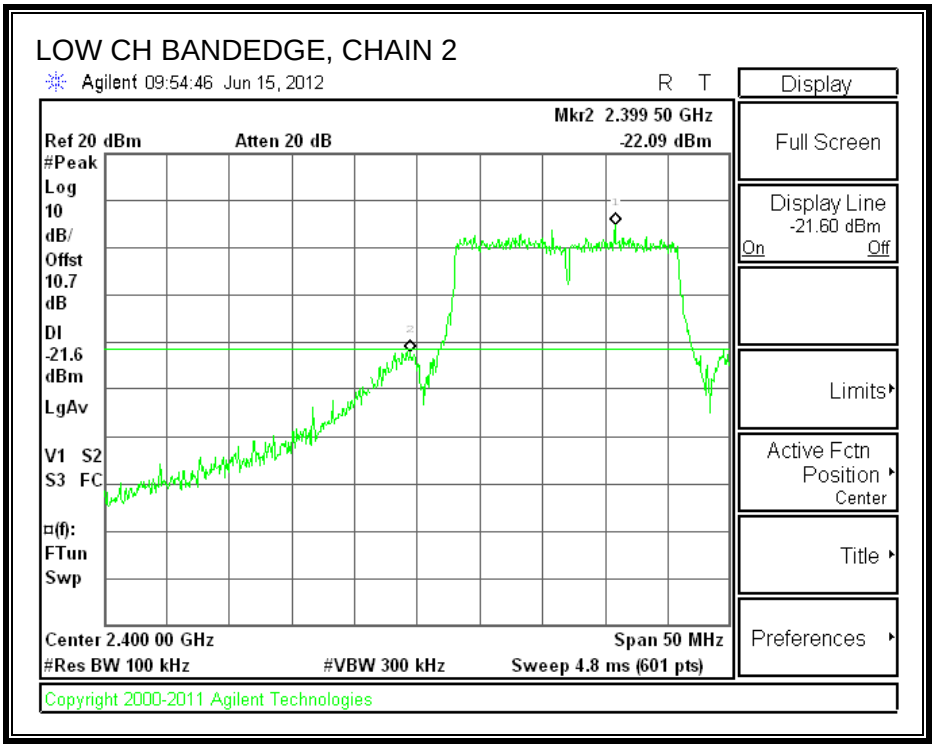


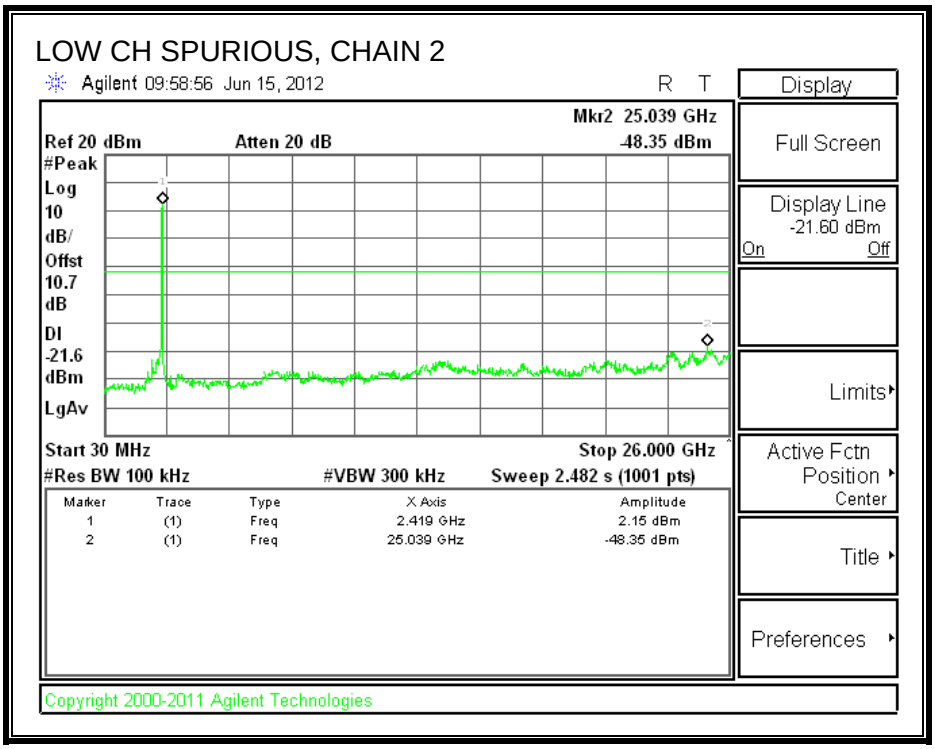




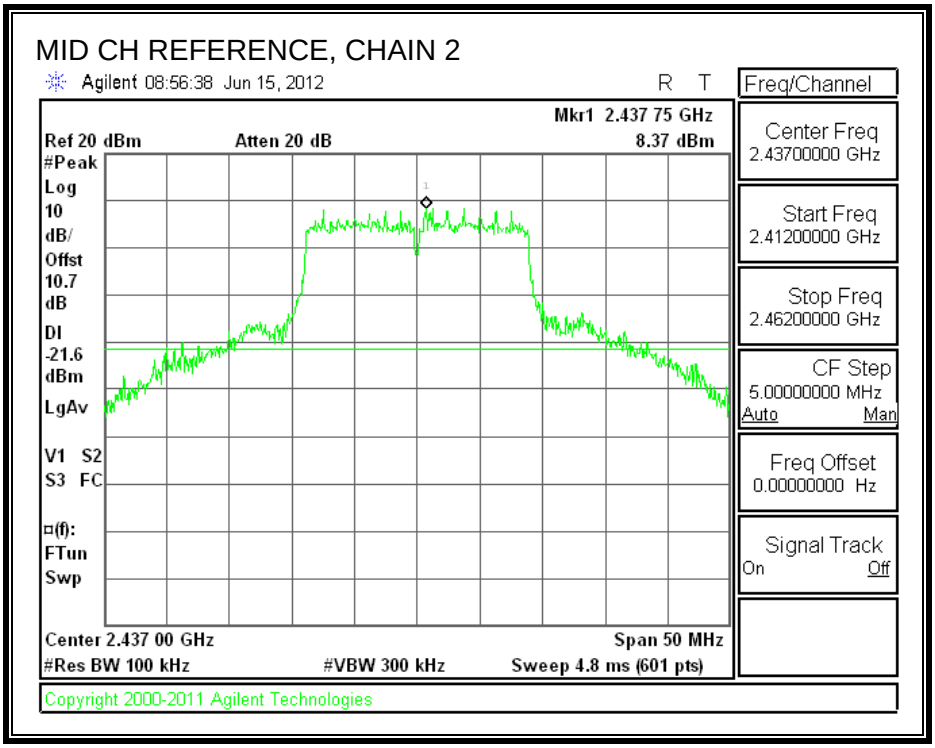


CHAIN 2 SPURIOUS EMISSIONS

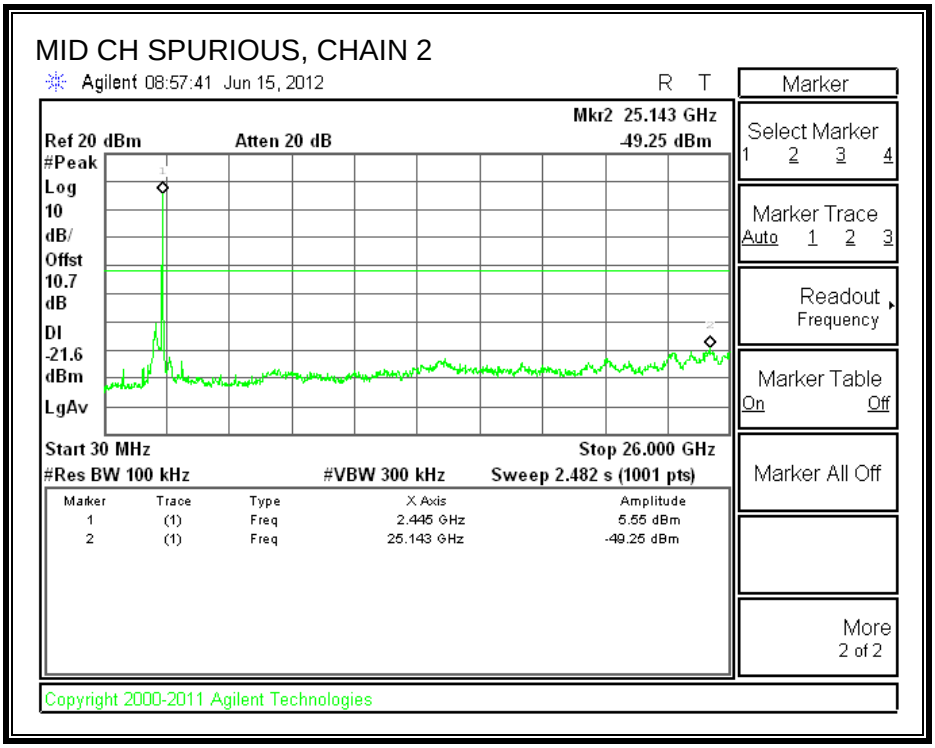




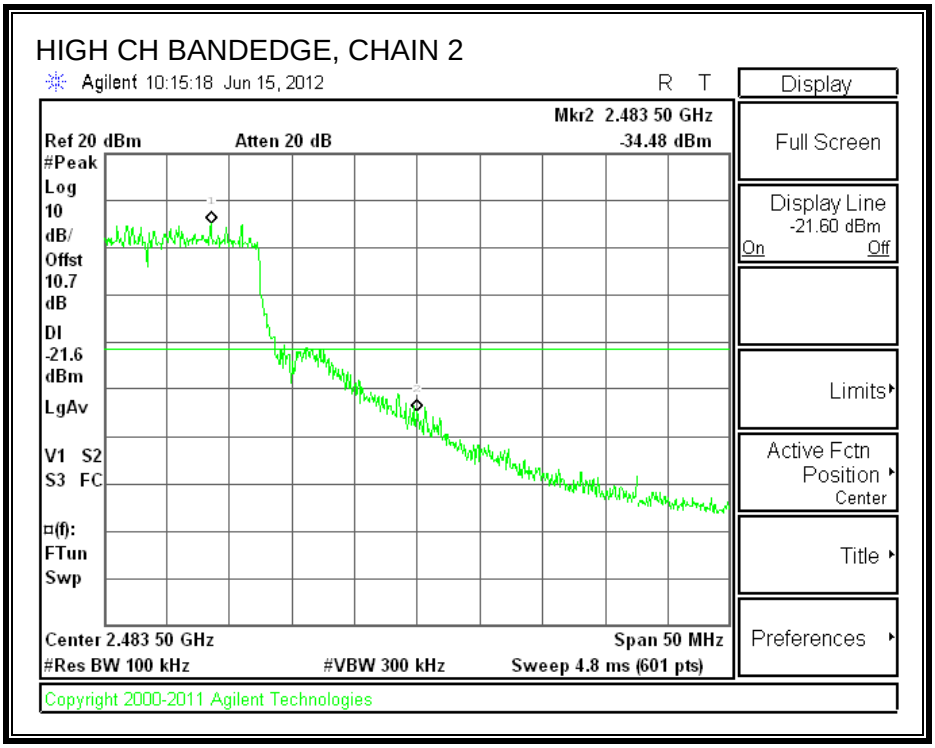
MID CH REFERENCE, CHAIN 2



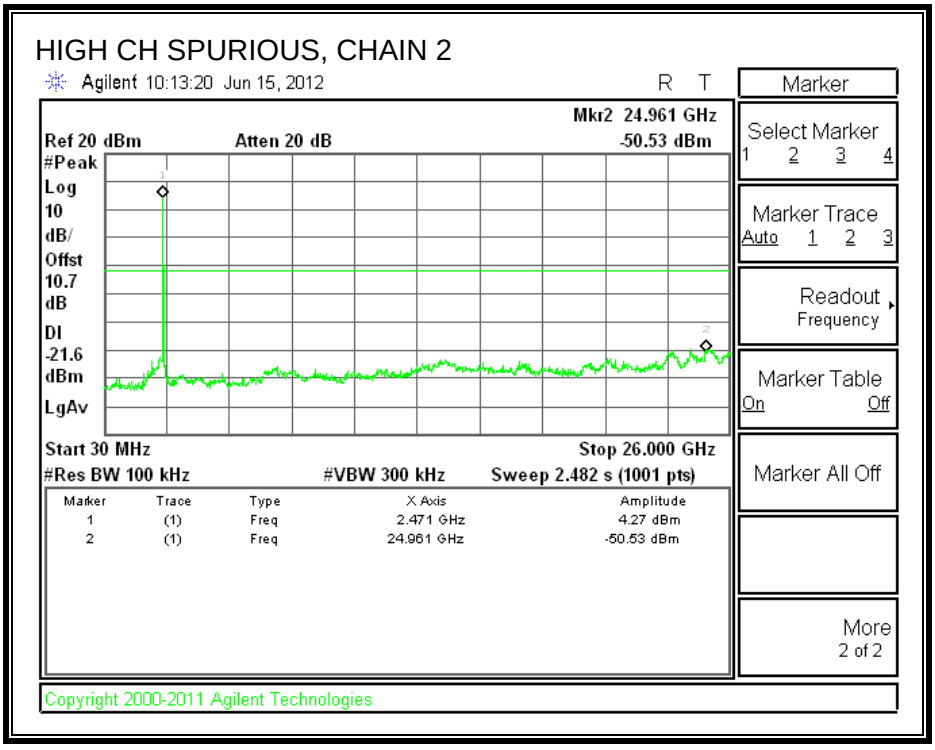
MID CH SPURIOUS, CHAIN 2



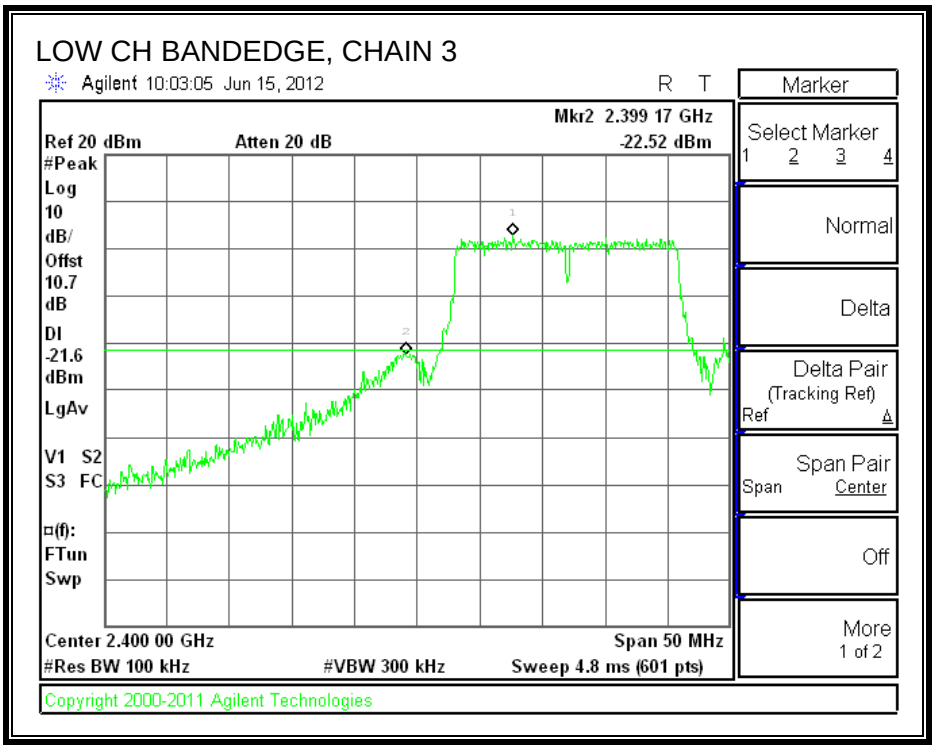
HIGH CH BANDEDGE, CHAIN 2

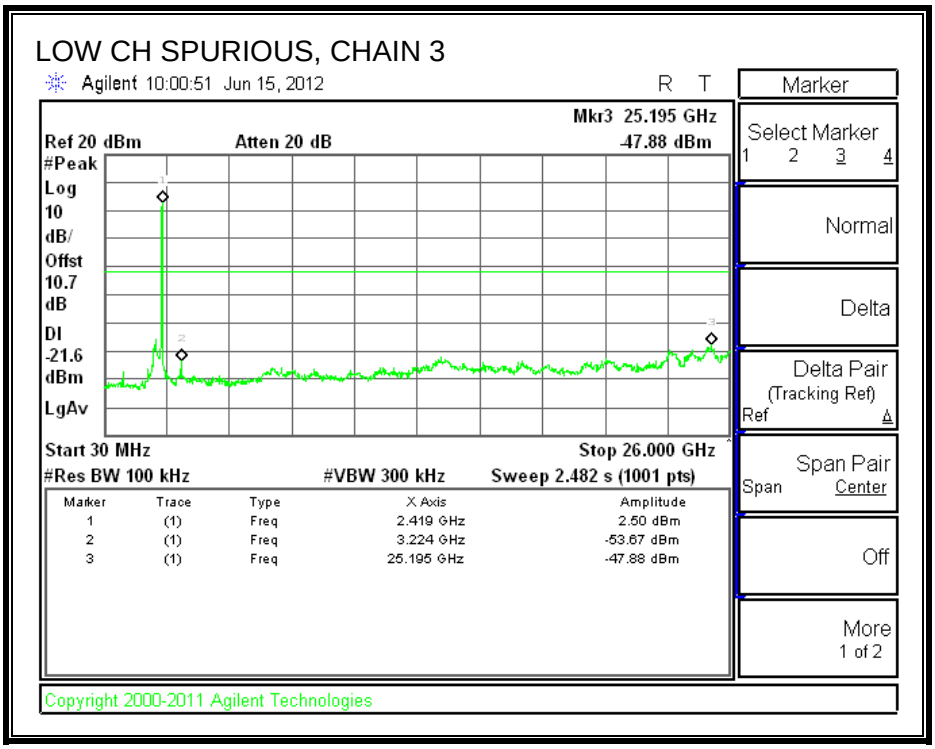


HIGH CH SPURIOUS, CHAIN 2

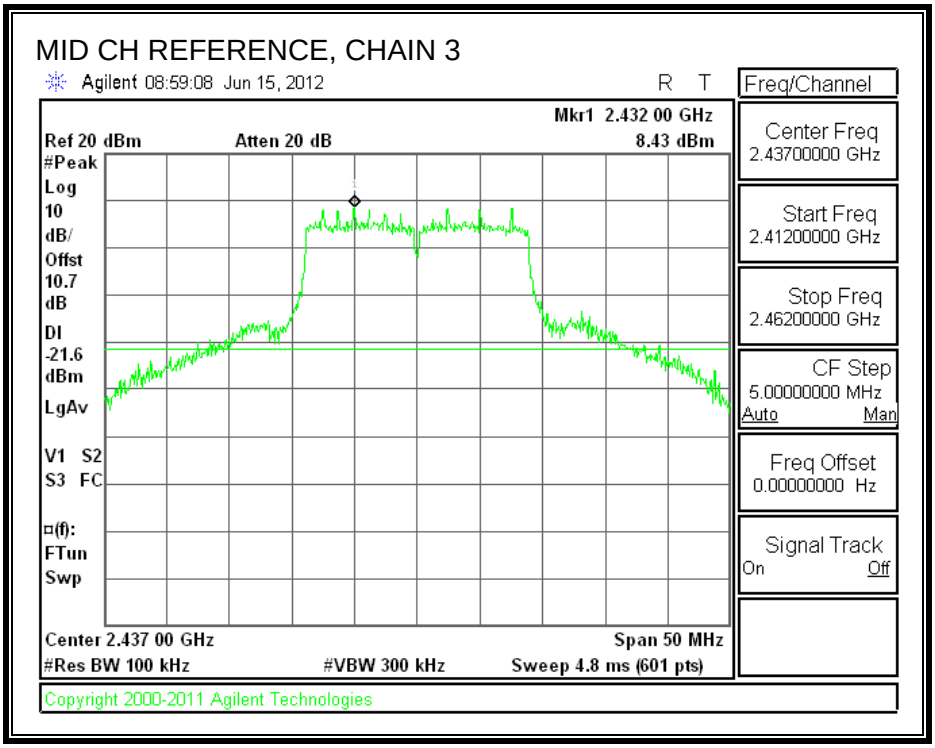


CHAIN 3 SPURIOUS EMISSIONS

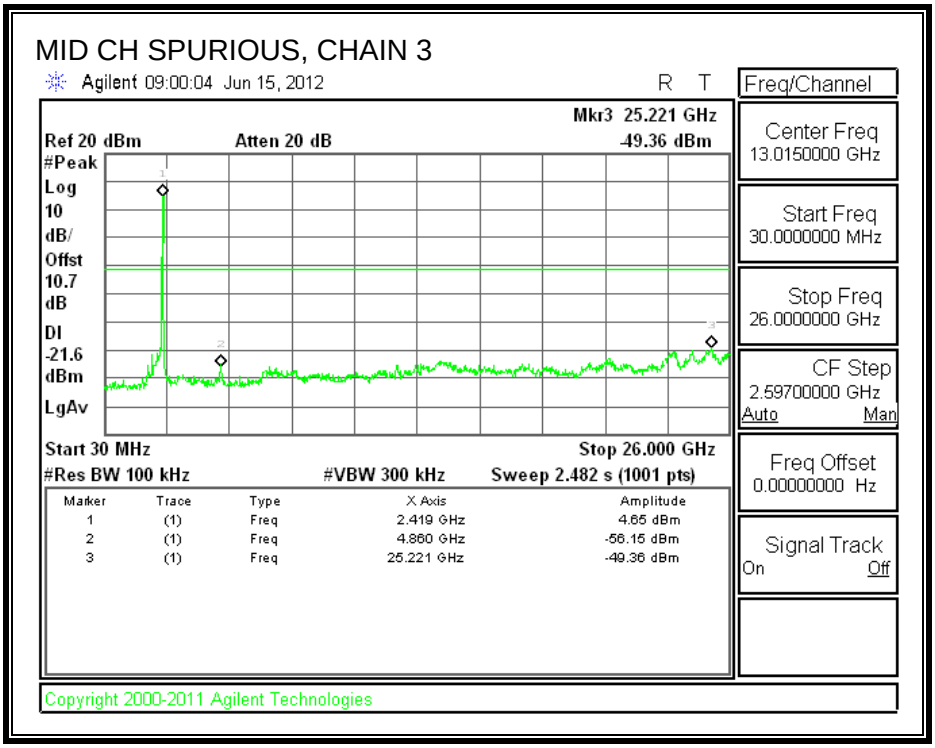




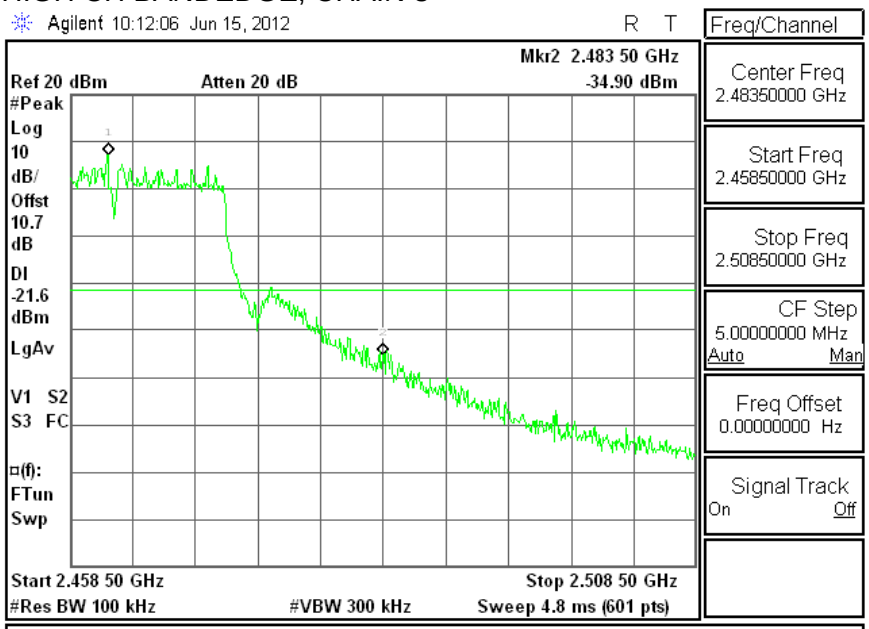
MID CH REFERENCE, CHAIN 3



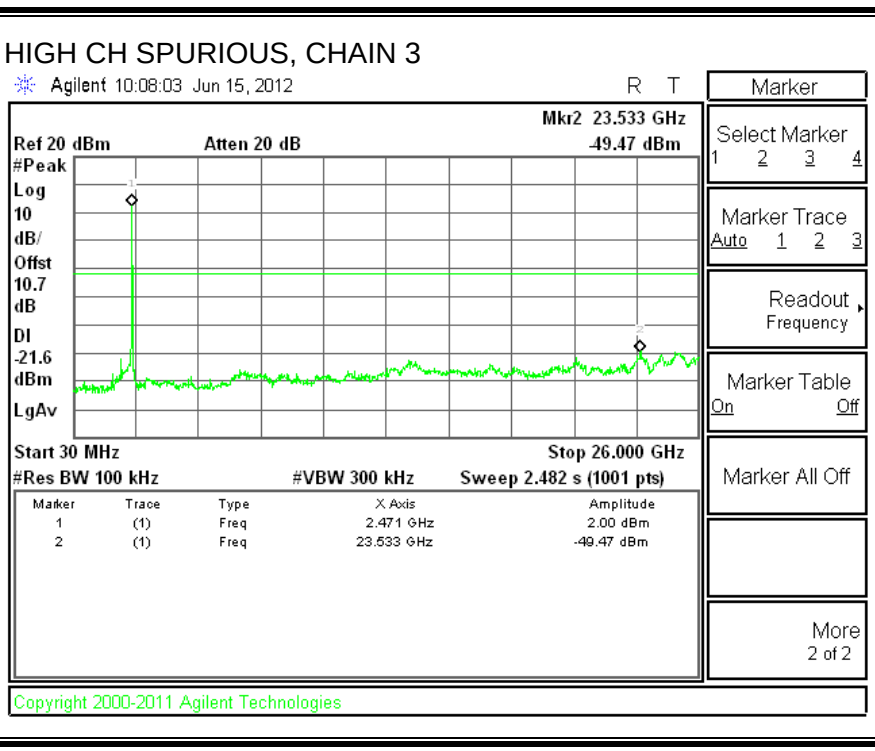
MID CH SPURIOUS, CHAIN 3



HIGH CH BANDEDGE, CHAIN 3



HIGH CH SPURIOUS, CHAIN 3



7.4. 802.11a LEGACY MODE IN THE 5.8 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.

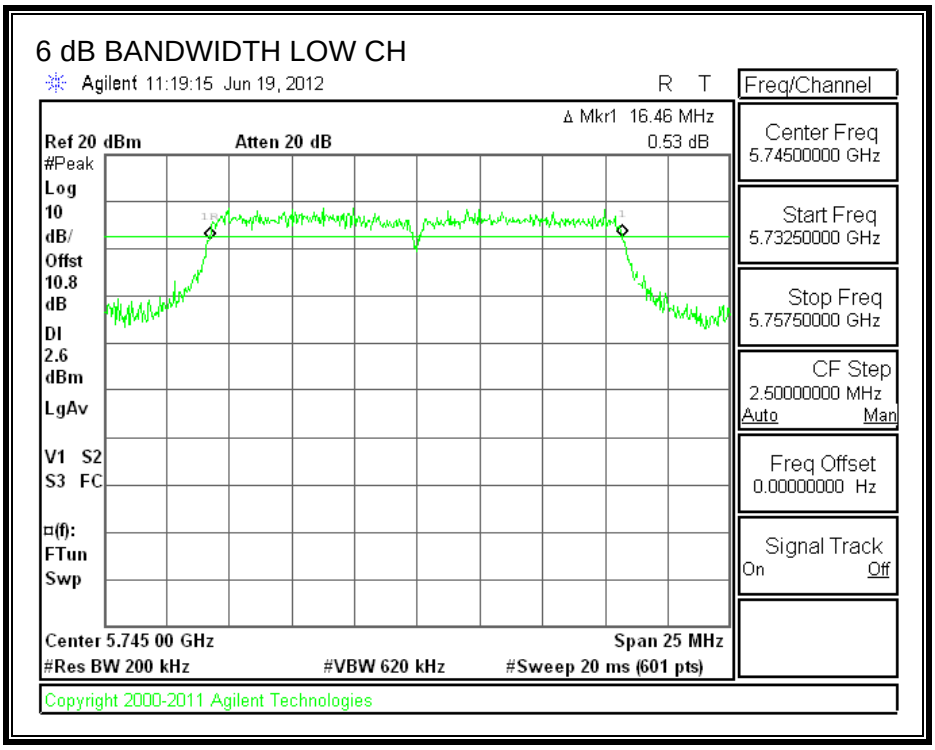
TEST PROCEDURE

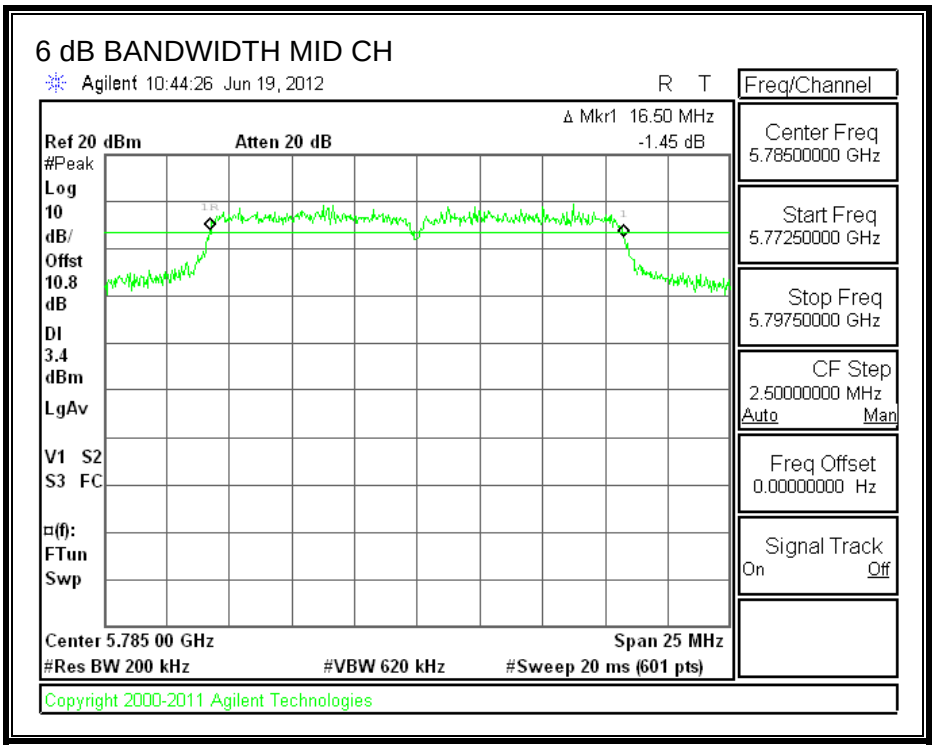
KDB 558074 D01 V01 “Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under 15.247”, dated 01/18/2012.

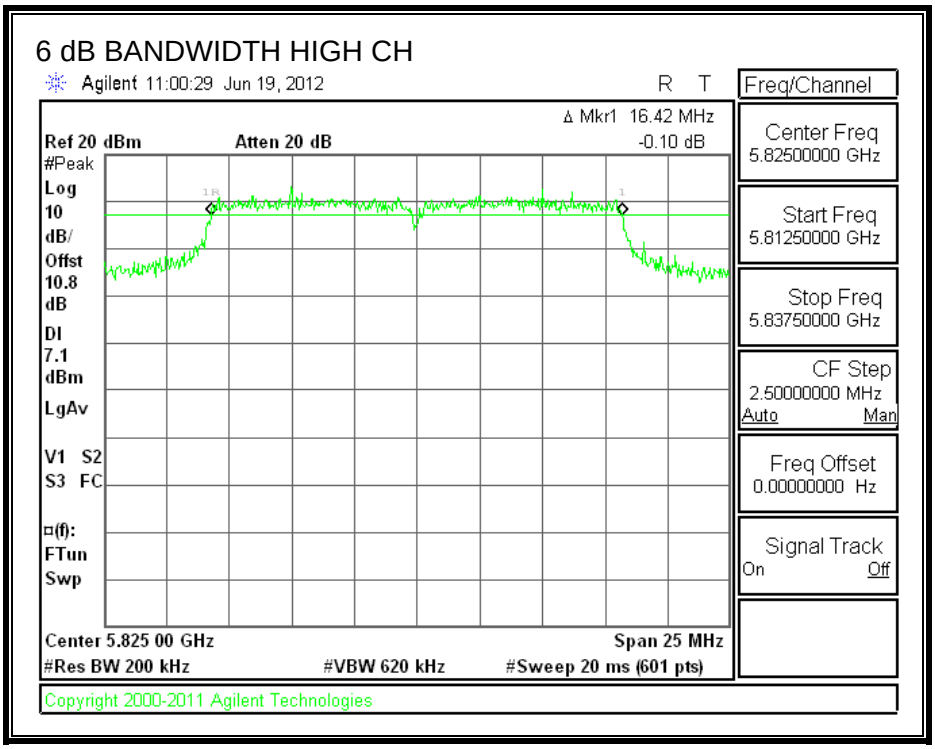
RESULTS

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low	5745	16.46	0.5
Middle	5785	16.50	0.5
High	5825	16.42	0.5

6 dB BANDWIDTH







7.4.2. 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

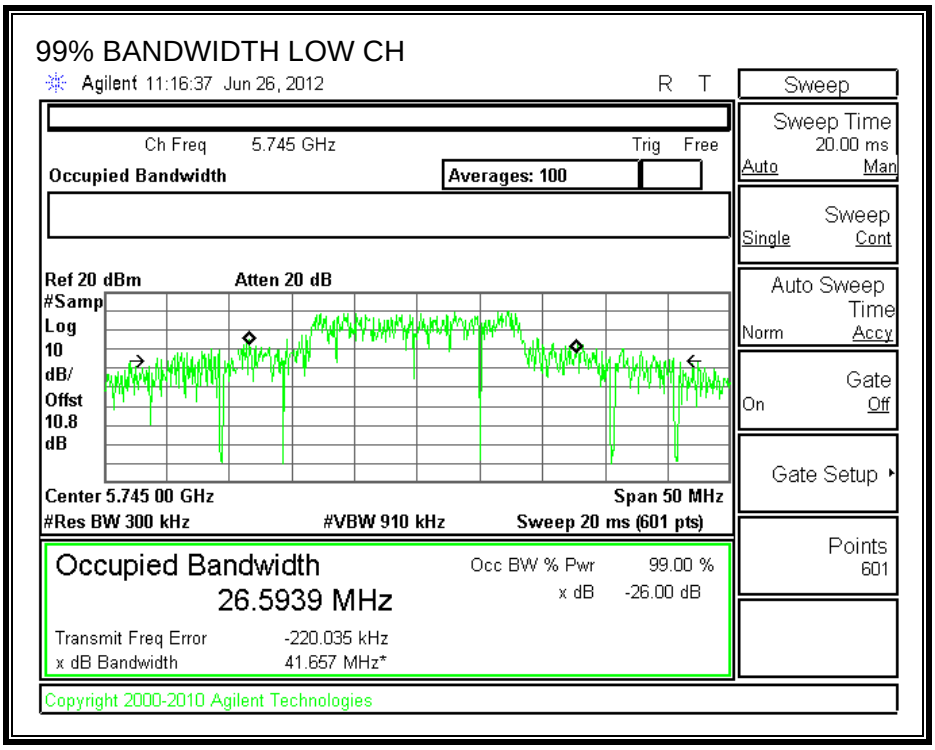
TEST PROCEDURE

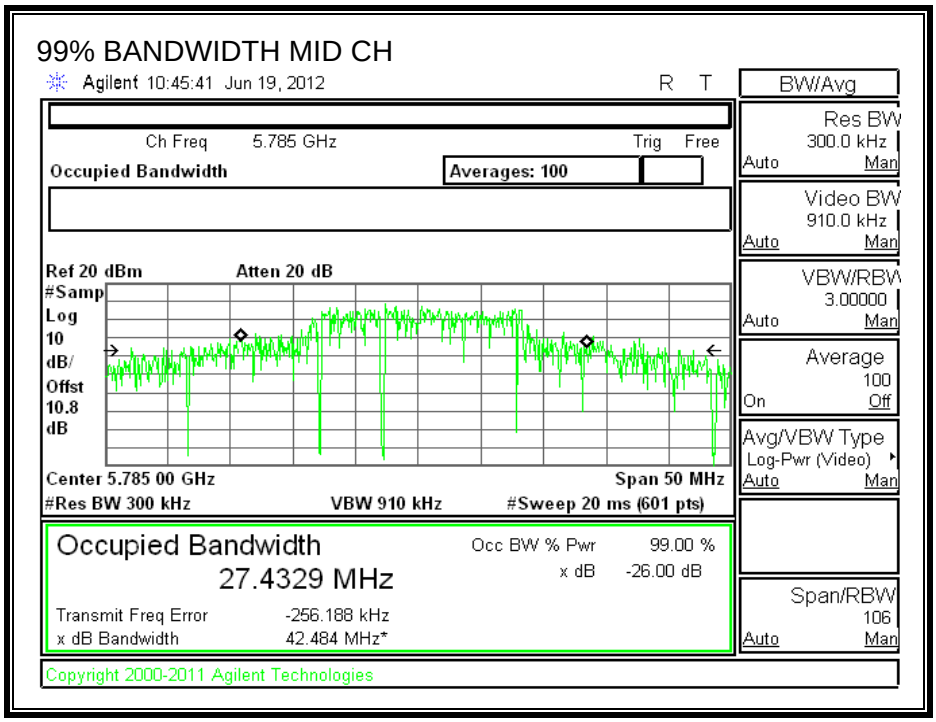
The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the 99 % bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal 99% bandwidth function is utilized.

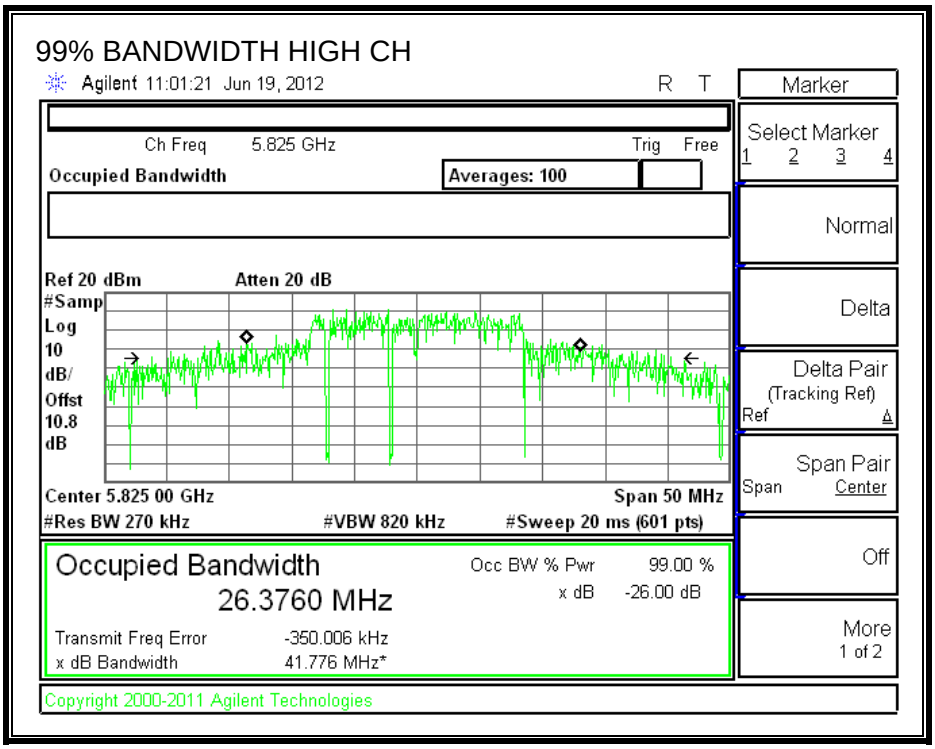
RESULTS

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	5745	26.5939
Middle	5785	27.4329
High	5825	26.3760

99% BANDWIDTH







7.4.3. OUTPUT POWER

LIMITS

FCC §15.247 (b)

IC RSS-210 A8.4

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

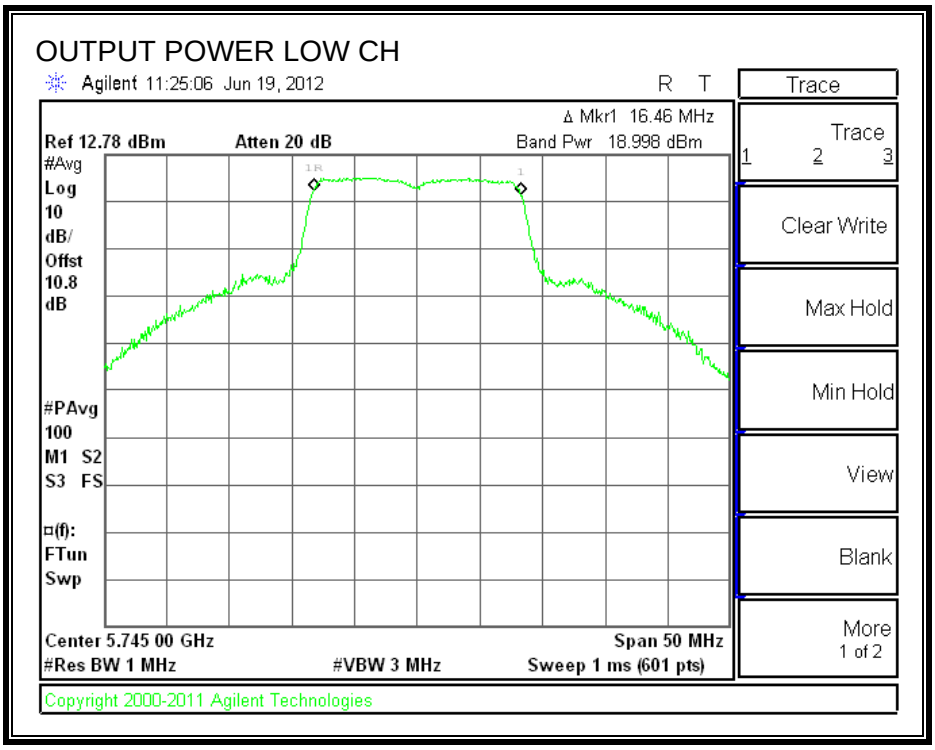
TEST PROCEDURE

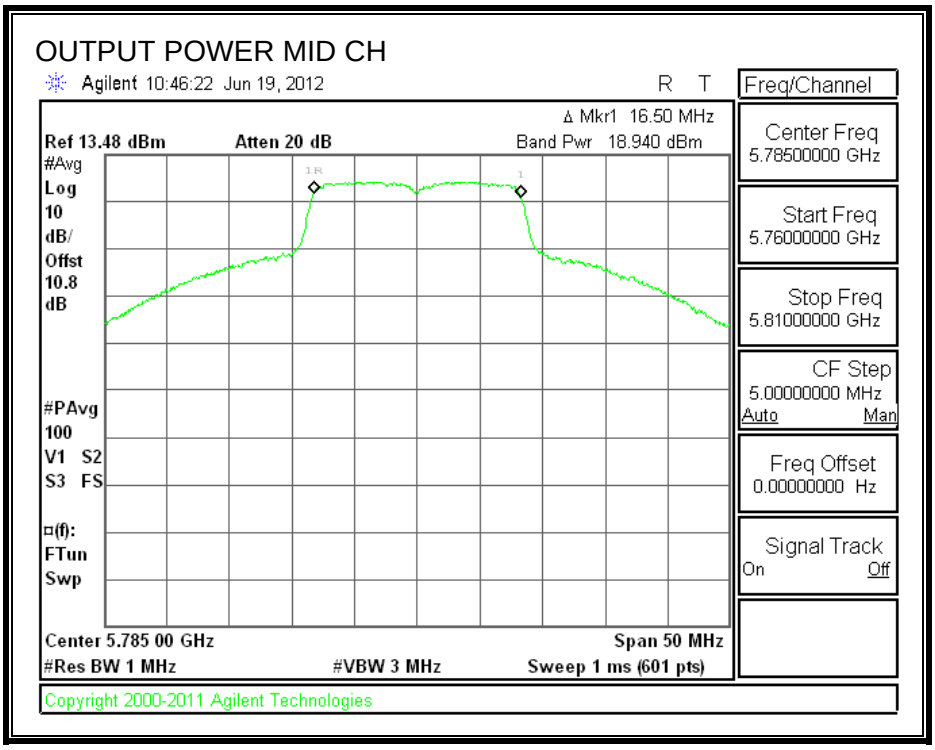
KDB 558074 D01 V01 “Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under 15.247”, dated 01/18/2012.

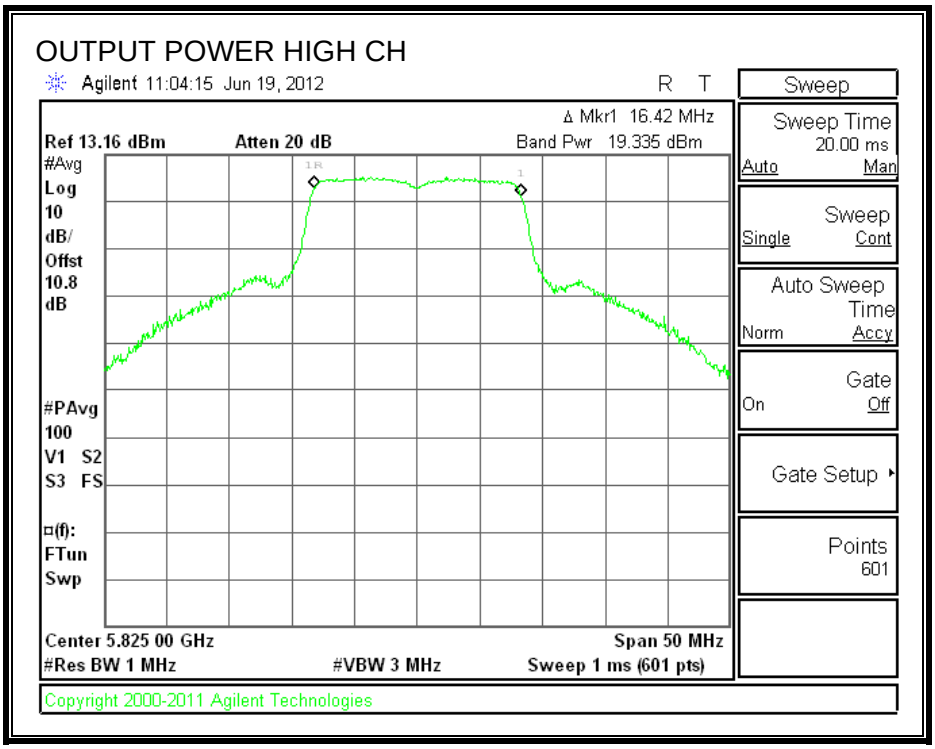
RESULTS

Channel	Frequency (MHz)	RMS Power Reading (dBm)	Limit (dBm)	Margin (dB)
Low	5745	19.00	30.00	-11.00
Middle	5785	18.94	30.00	-11.06
High	5825	19.34	30.00	-10.66

OTPUT POWER







7.4.4. AVERAGE POWER

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a power meter.

RESULTS

The cable assembly insertion loss of 10.8 dB (including 10 dB pad and 0.80 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

Channel	Frequency (MHz)	Power (dBm)
Low	5745	19.10
Middle	5785	19.17
High	5825	19.10

7.4.5. POWER SPECTRAL DENSITY

LIMITS

FCC §15.247 (e)

IC RSS-210 A8.2 (b)

TEST PROCEDURE

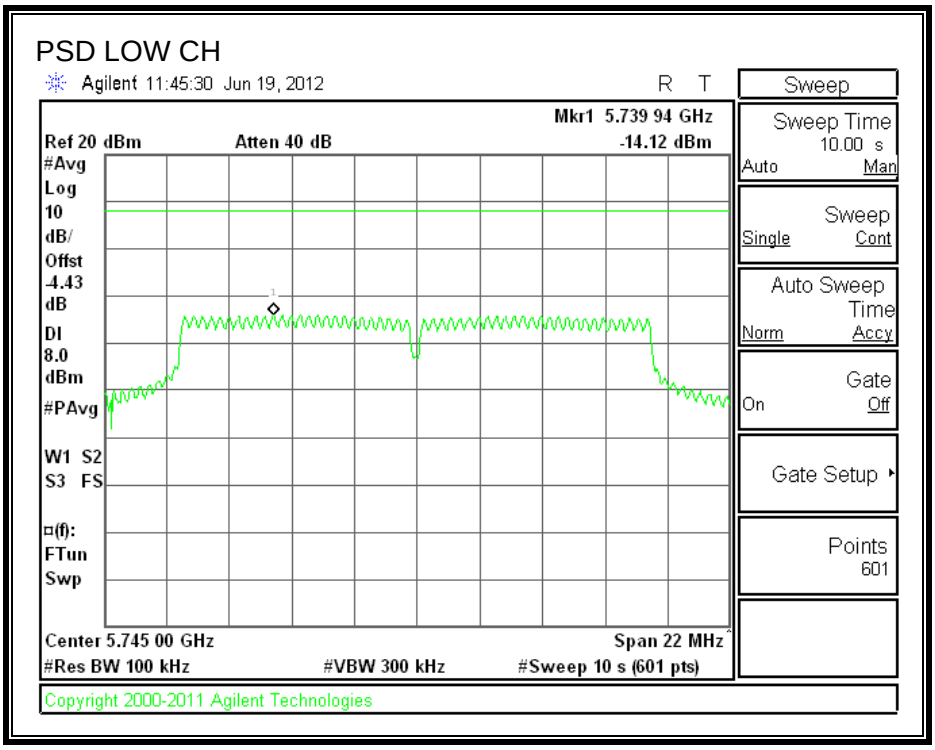
KDB 558074 D01 V01 "Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under 15.247", dated 01/18/2012.

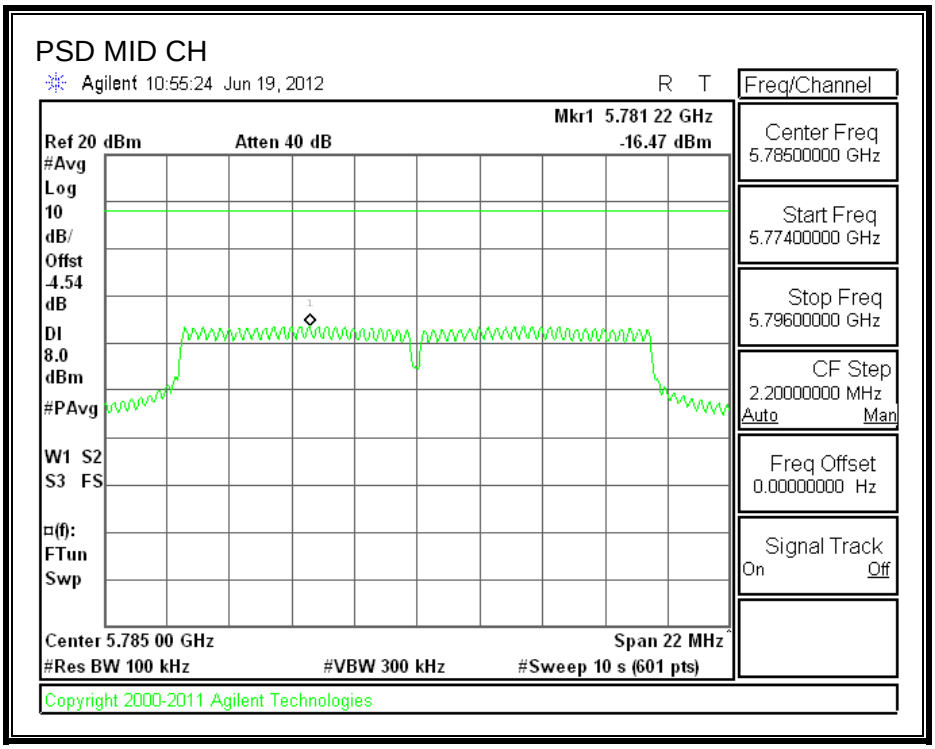
RESULTS

Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Margin (dB)
Low	5745	-14.12	8	-22.12
Middle	5785	-16.47	8	-24.47
High	5825	-17.08	8	-25.08

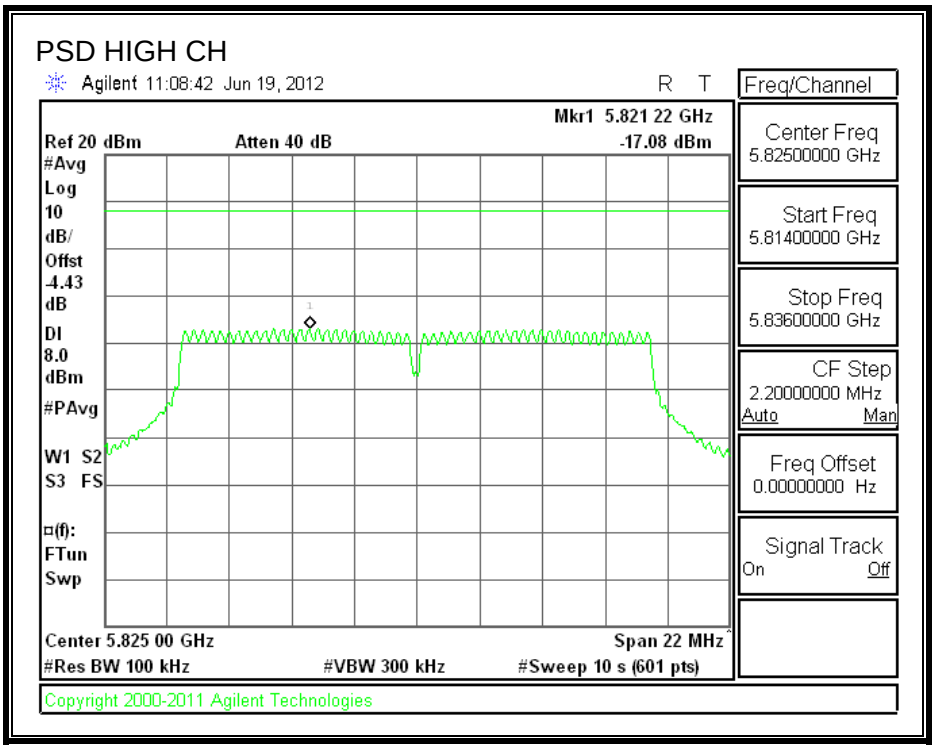
Note: The spectrum analyzer offset = attenuator loss + cable loss + 10 log (3/100 kHz) = -4.43 dB

POWER SPECTRAL DENSITY





PSD HIGH CH



7.4.6. CONDUCTED SPURIOUS EMISSIONS

Covered by testing to 11n HT20 CDD 3TX

7.5. 802.11n HT20 CDD 3TX 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.

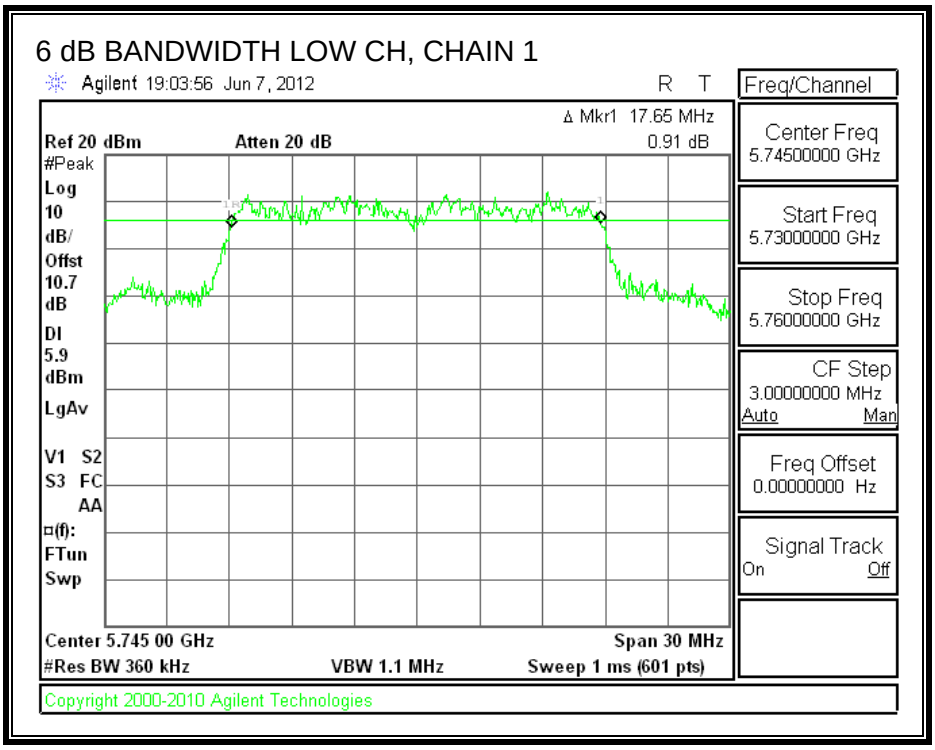
TEST PROCEDURE

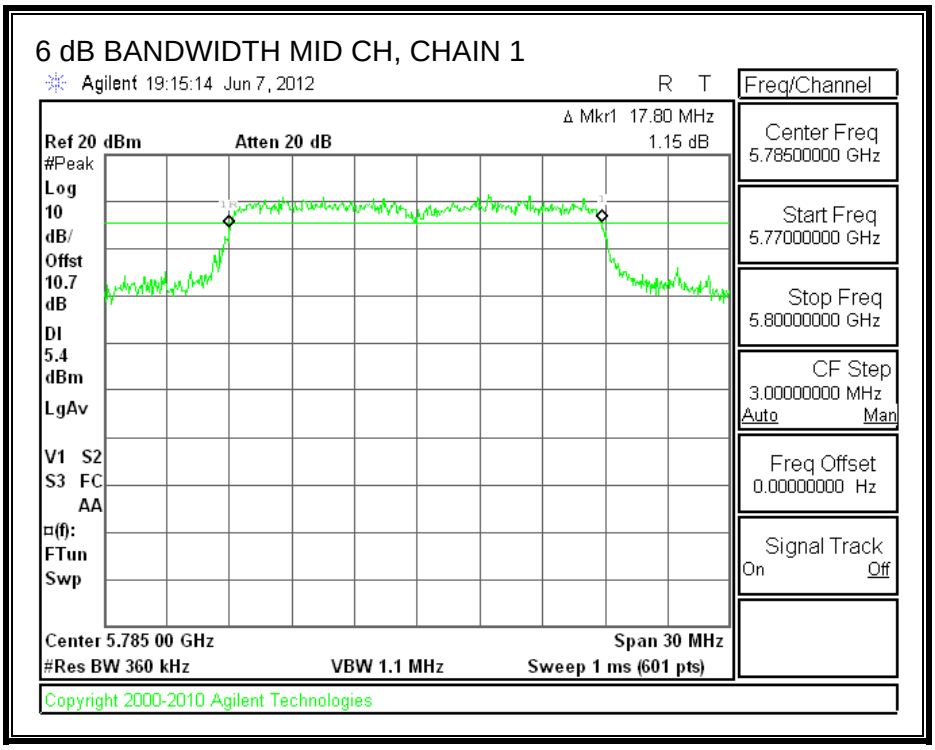
KDB 558074 D01 V01 "Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under 15.247", dated 01/18/2012.

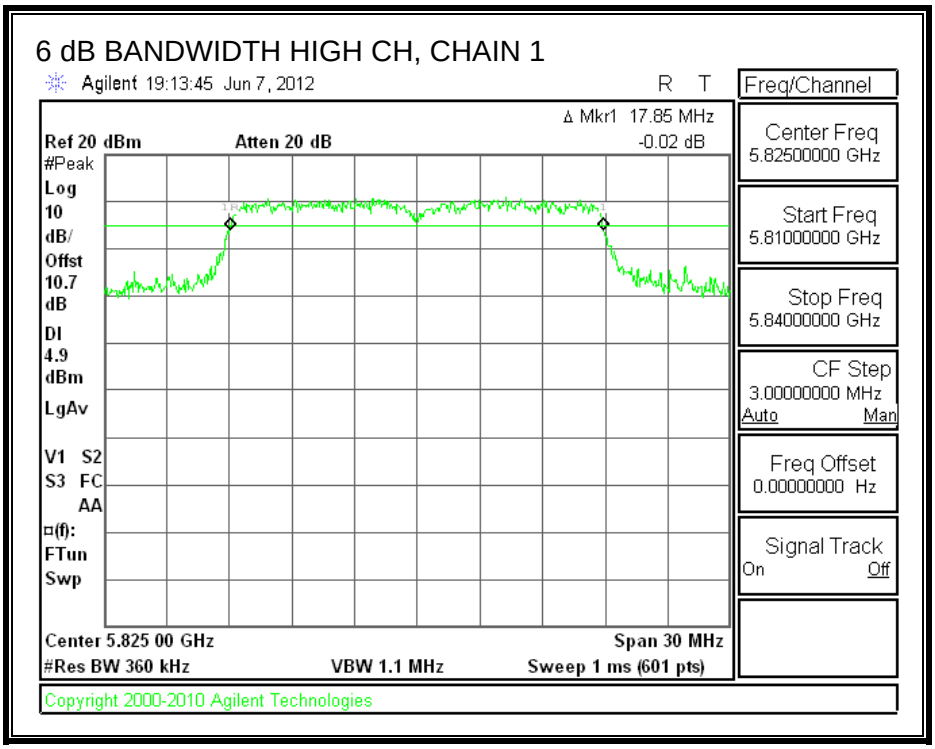
RESULTS

Channel	Frequency (MHz)	Chain 1 6 dB BW (MHz)	Chain 2 6 dB BW (MHz)	Chain 3 6 dB BW (MHz)	Minimum Limit (MHz)
Low	5745	17.65	17.80	17.75	0.5
Middle	5785	17.80	17.80	17.80	0.5
High	5825	17.85	17.75	17.75	0.5

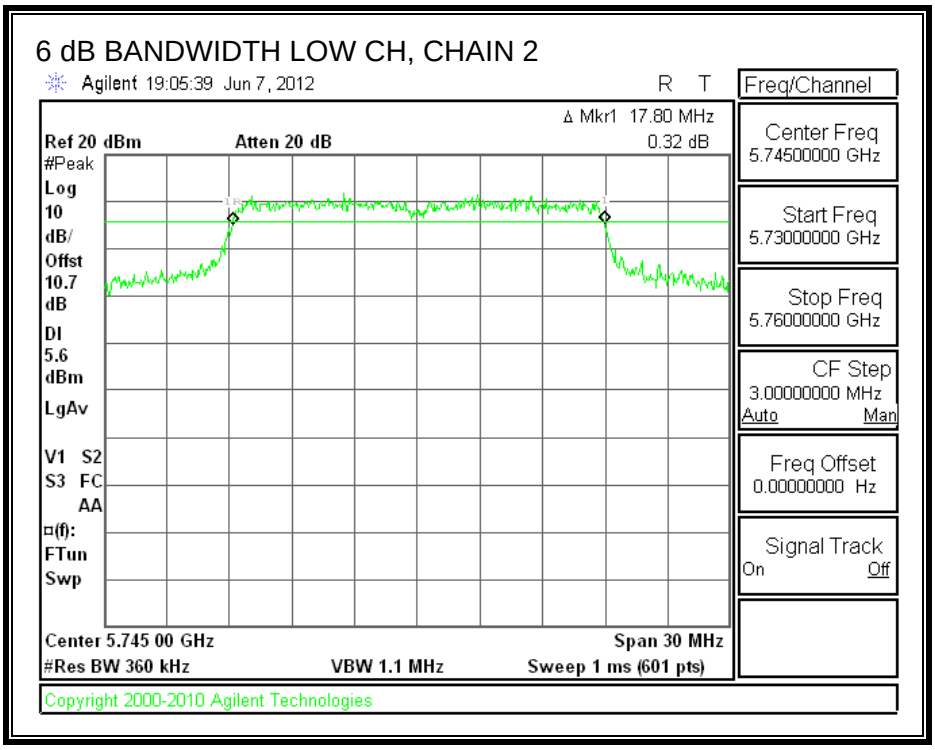
6 dB BANDWIDTH, CHAIN 1

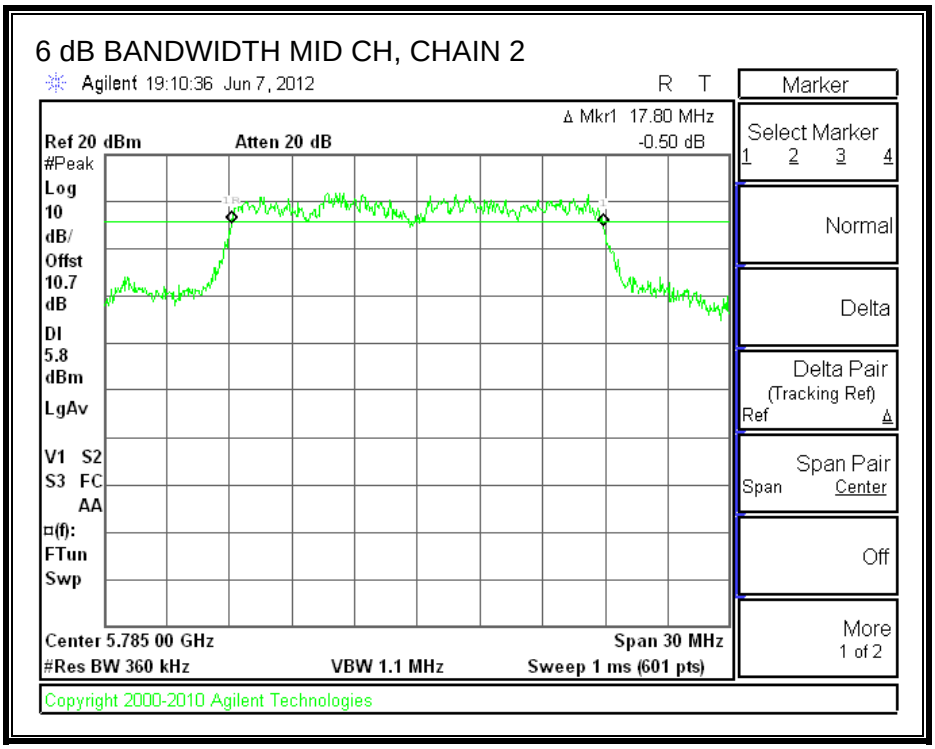


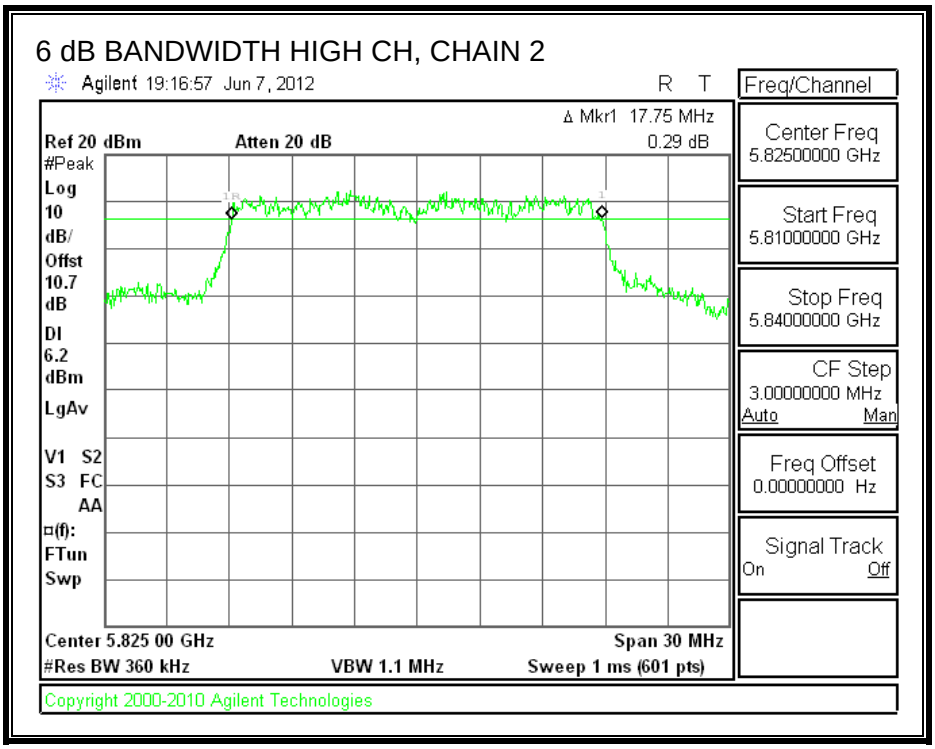




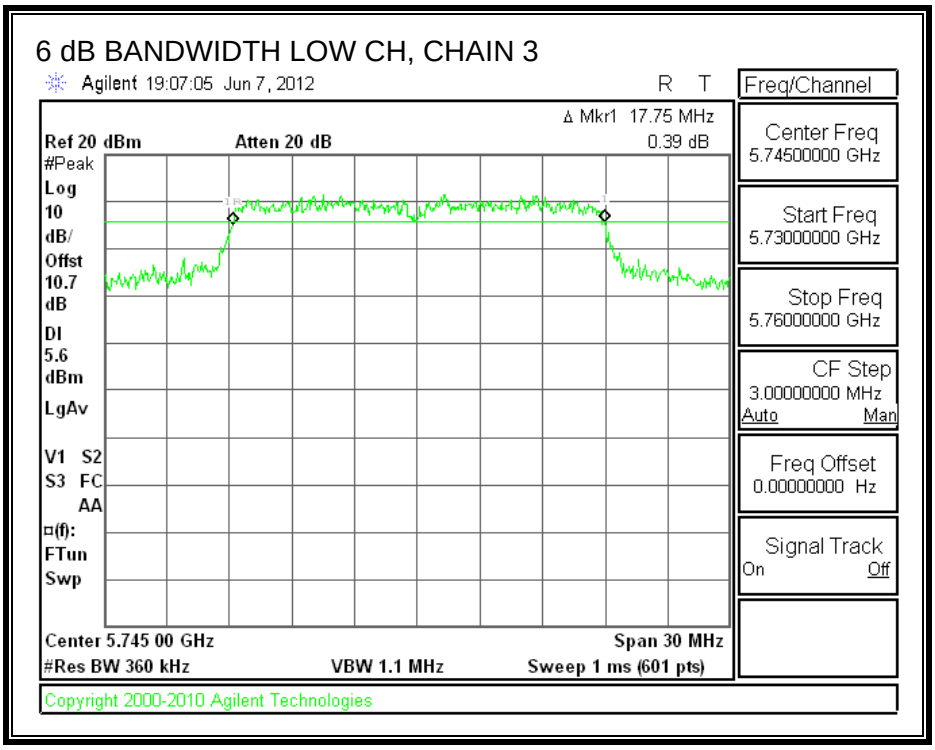
6 dB BANDWIDTH, CHAIN 2

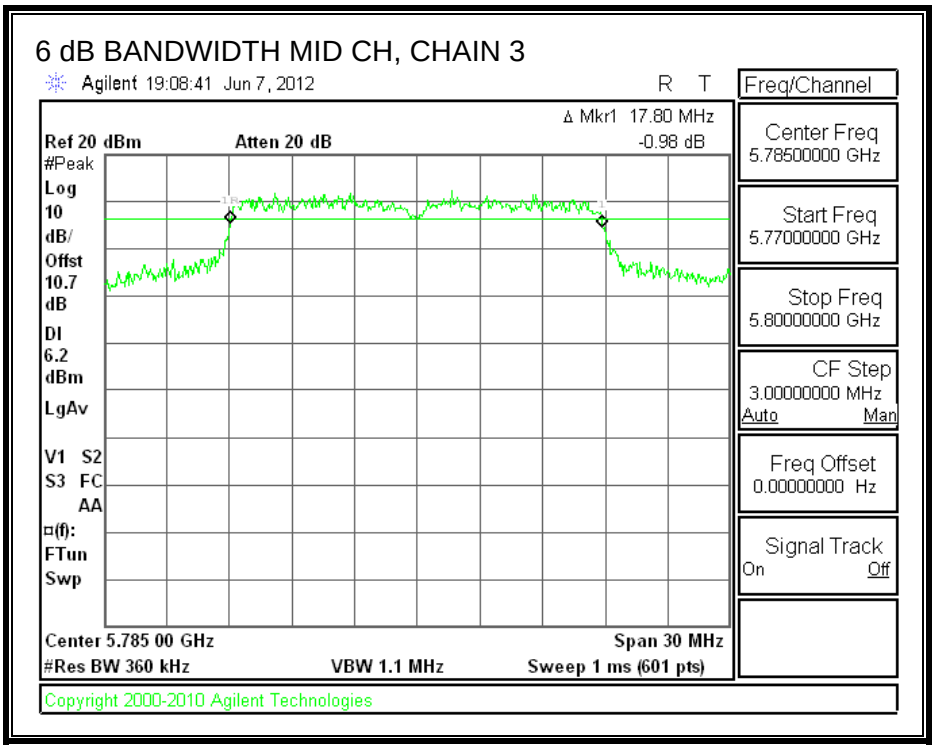


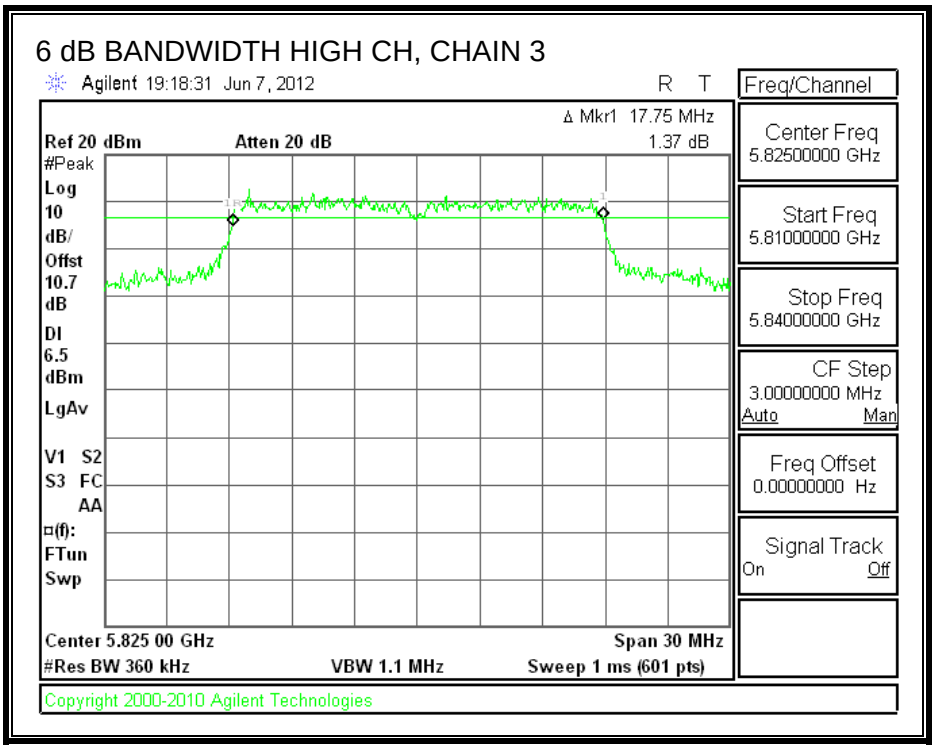




6 dB BANDWIDTH, CHAIN 3







7.5.2. 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

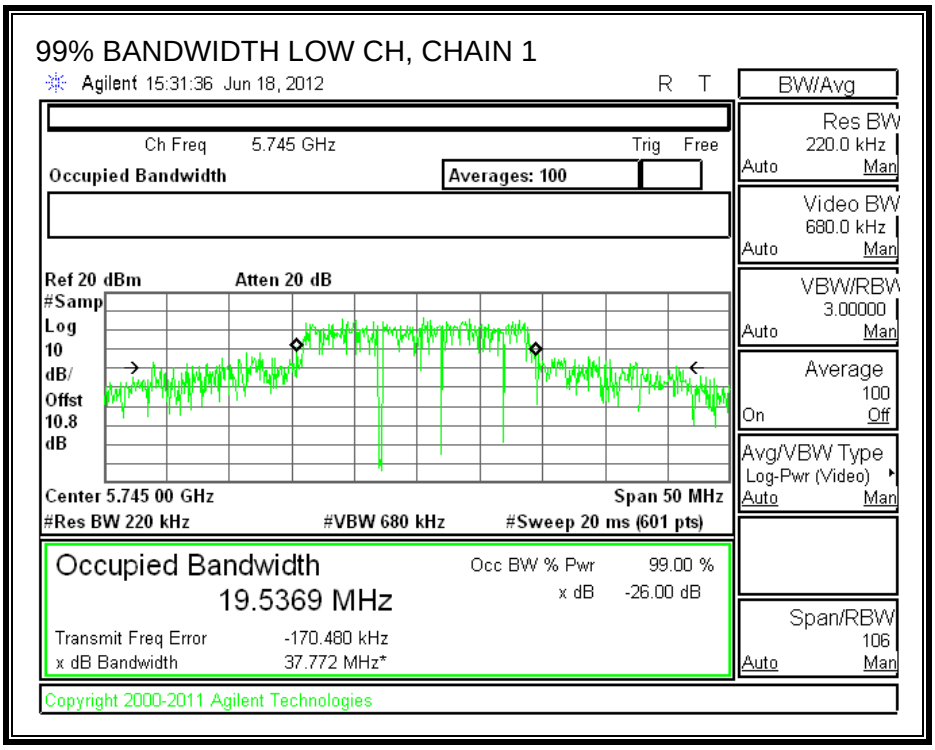
TEST PROCEDURE

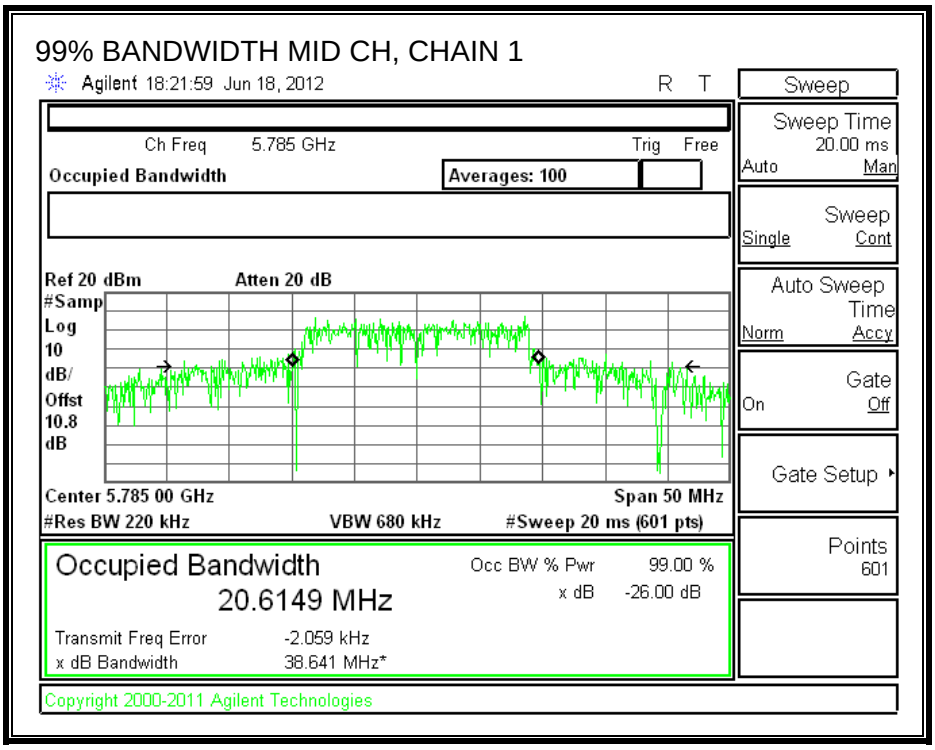
The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the 99 % bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal 99% bandwidth function is utilized.

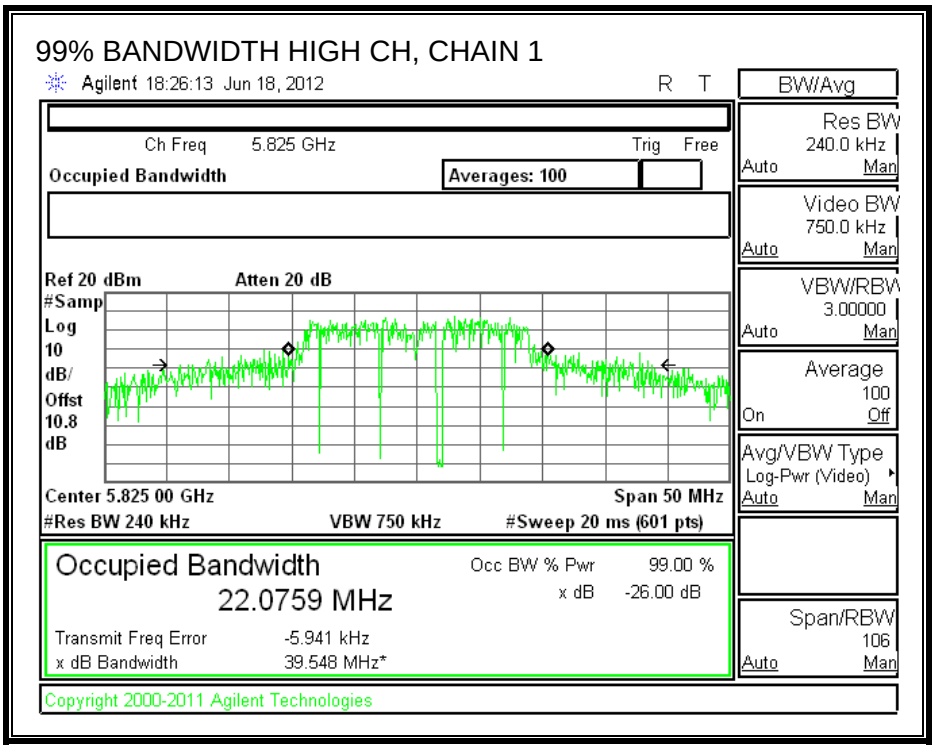
RESULTS

Channel	Frequency (MHz)	Chain 1 99% Bandwidth (MHz)	Chain 2 99% Bandwidth (MHz)	Chain 3 99% Bandwidth (MHz)
Low	5745	19.5369	21.3080	21.5673
Middle	5785	20.6149	18.0281	20.5800
High	5825	22.0579	23.4166	22.1894

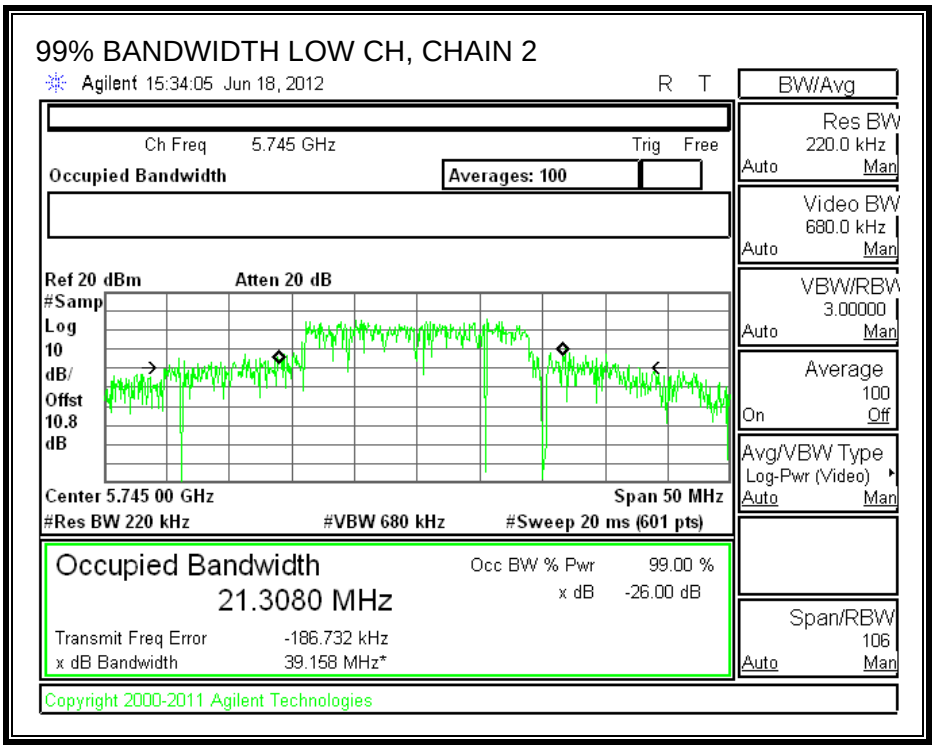
99% BANDWIDTH, CHAIN 1

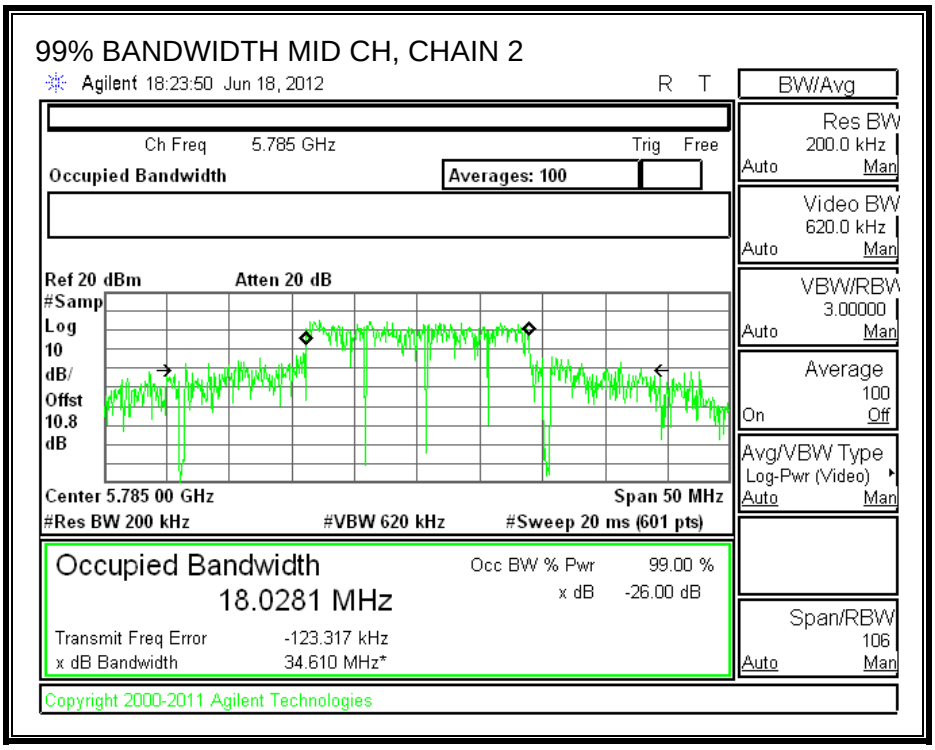


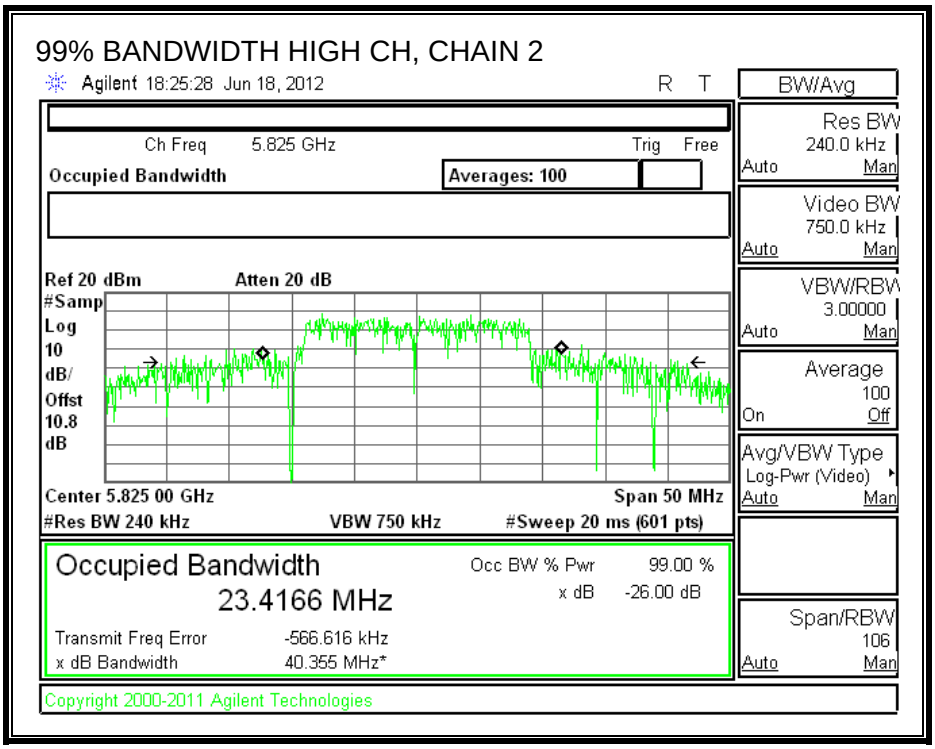




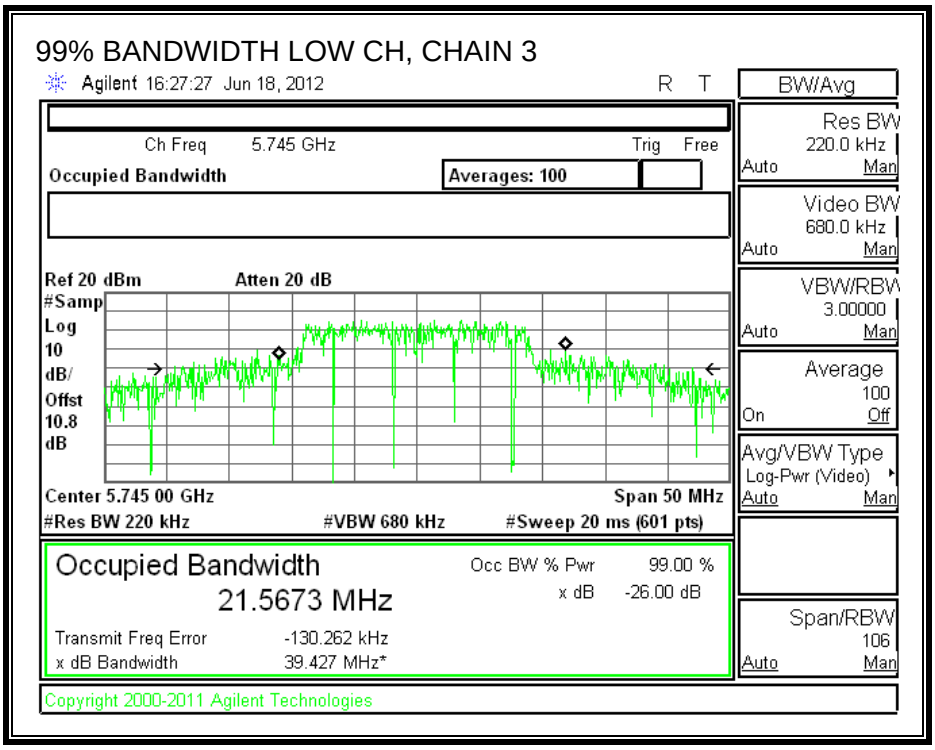
99% BANDWIDTH, CHAIN 2

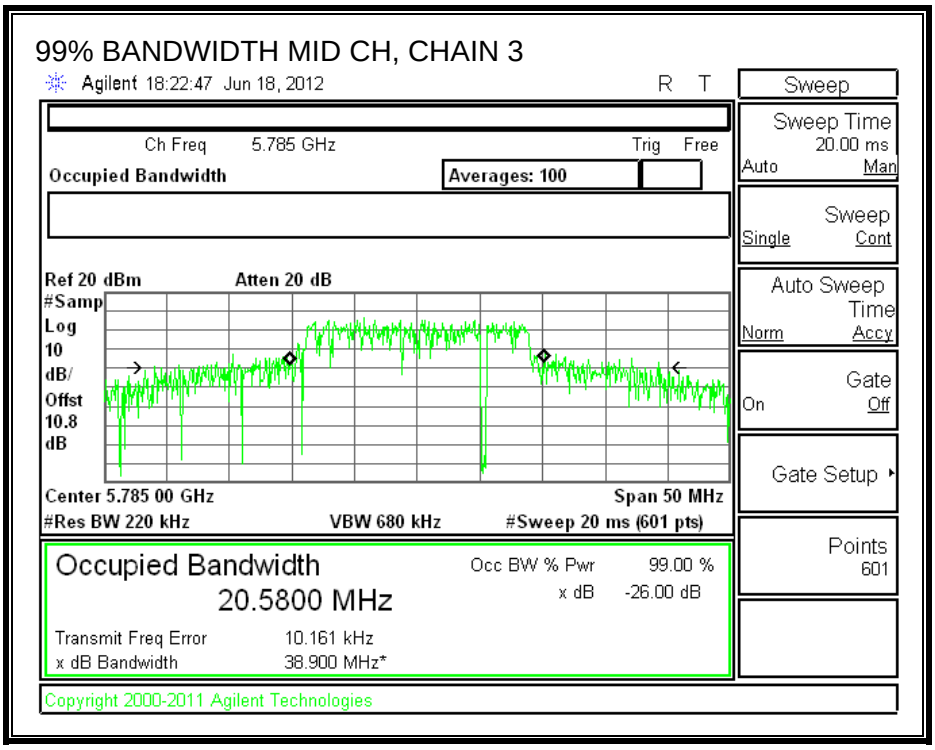


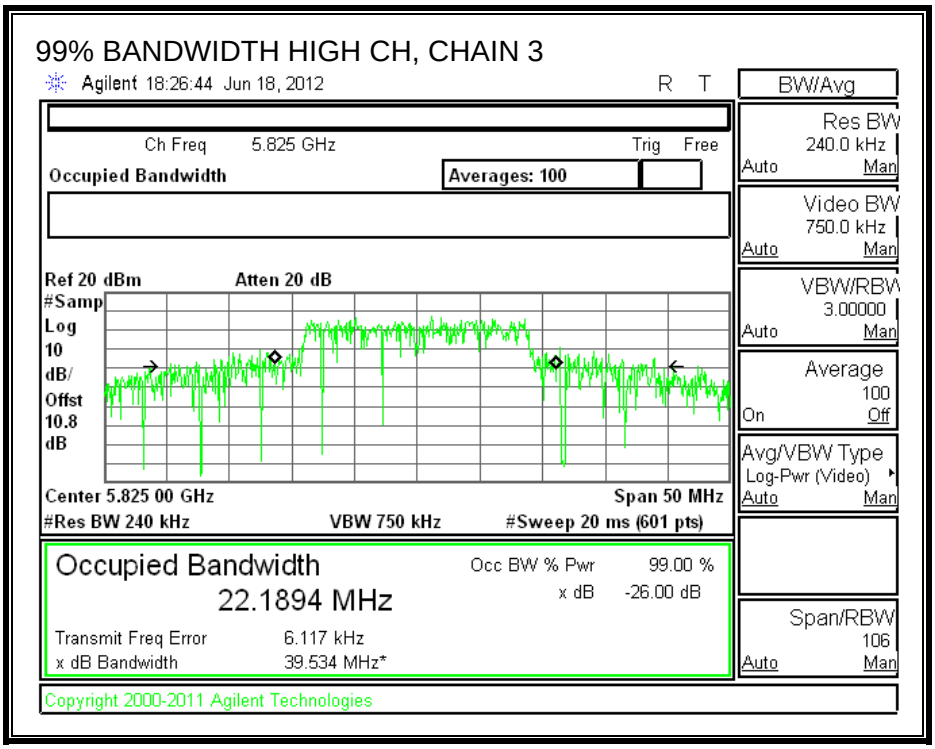




99% BANDWIDTH, CHAIN 3







7.5.3. OUTPUT POWER

LIMITS

FCC §15.247 (b)

IC RSS-210 A8.4

The TX chains are correlated and the antenna gain is unequal among the chains. The directional gain is:

Chain 1 Antenna Gain (dBi)	Chain 2 Antenna Gain (dBi)	Chain 3 Antenna Gain (dBi)	Correlated Chains Directional Gain (dBi)
1.91	4.18	4.39	8.33

The maximum effective composite gain is 8.33 dBi for other than fixed, point-to-point operations, therefore the limit is 27.67 dBm.

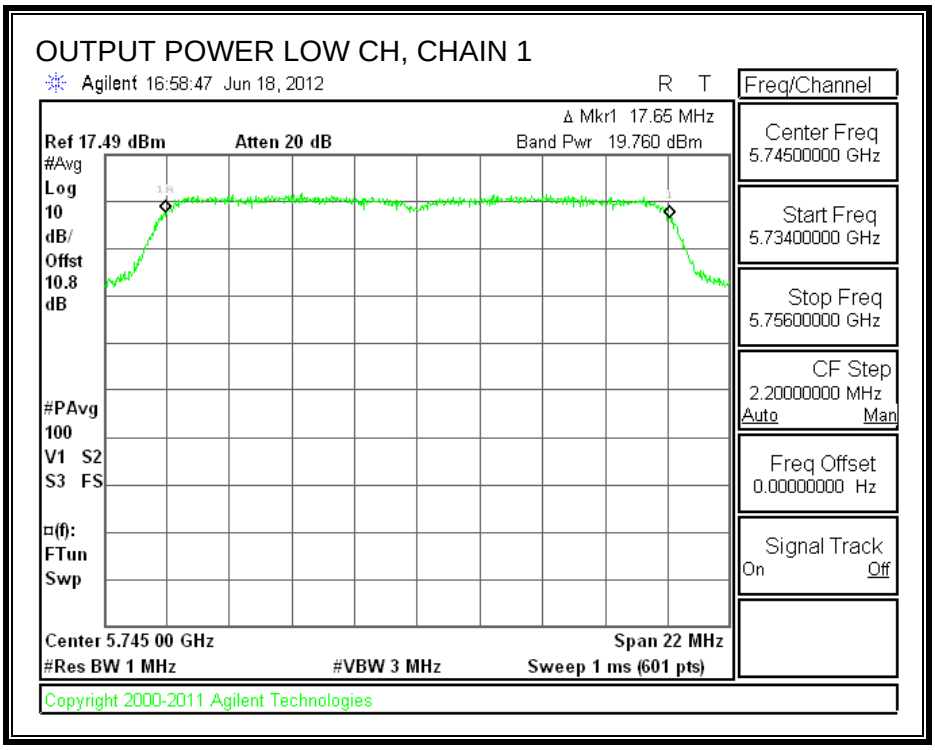
TEST PROCEDURE

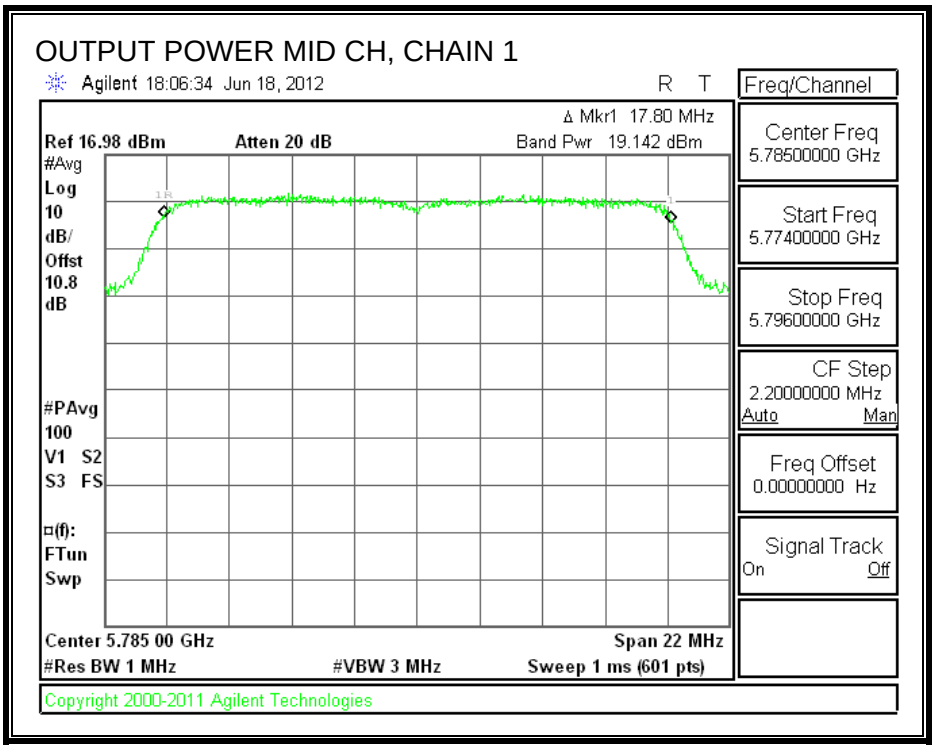
KDB 558074 D01 V01 "Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under 15.247", dated 01/18/2012.

RESULTS

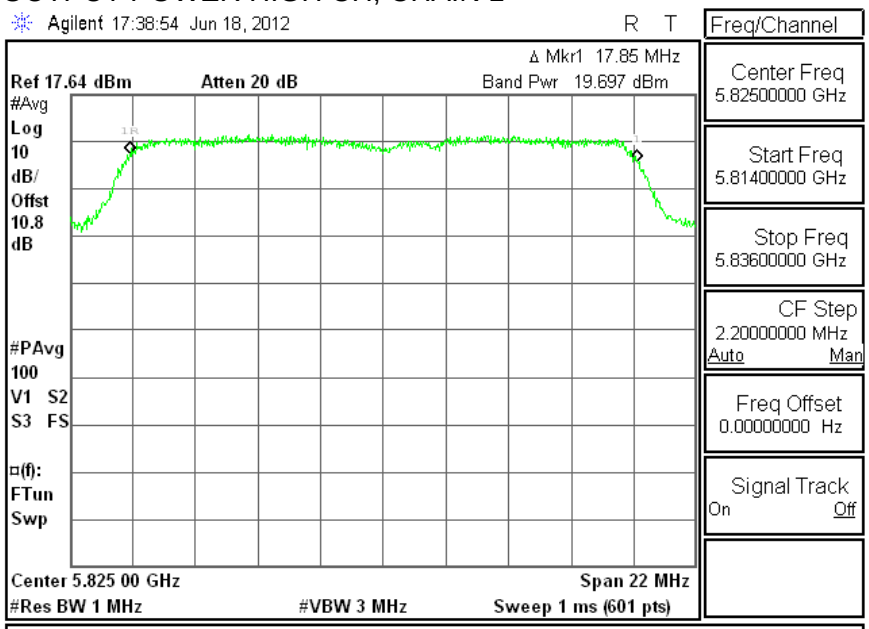
Channel	Frequency (MHz)	Chain 1 RMS Power (dBm)	Chain 2 RMS Power (dBm)	Chain 3 RMS Power (dBm)	Total RMS Power (dBm)	Limit (dBm)	Margin (dB)
Low	**5745**	**19.760**	**18.937**	**19.046**	**24.034**	**27.67**	**-3.636**
Mid	**5785**	**19.142**	**18.956**	**18.888**	**23.768**	**27.67**	**-3.902**
High	**5825**	**19.697**	**18.818**	**19.018**	**23.965**	**27.67**	**-3.705**

CHAIN 1 OUTPUT POWER

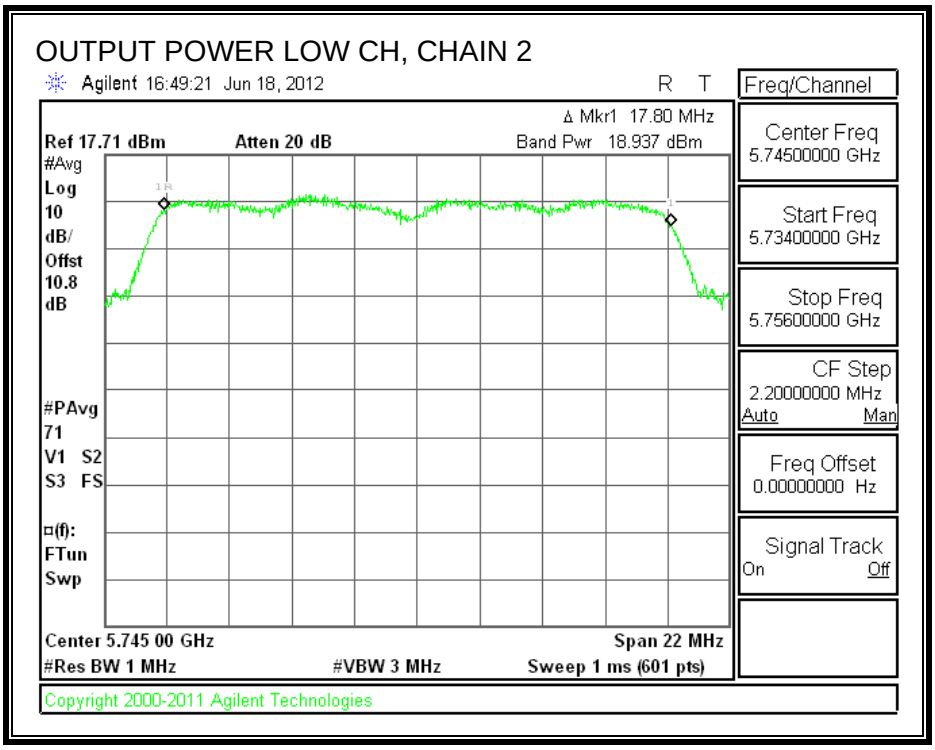


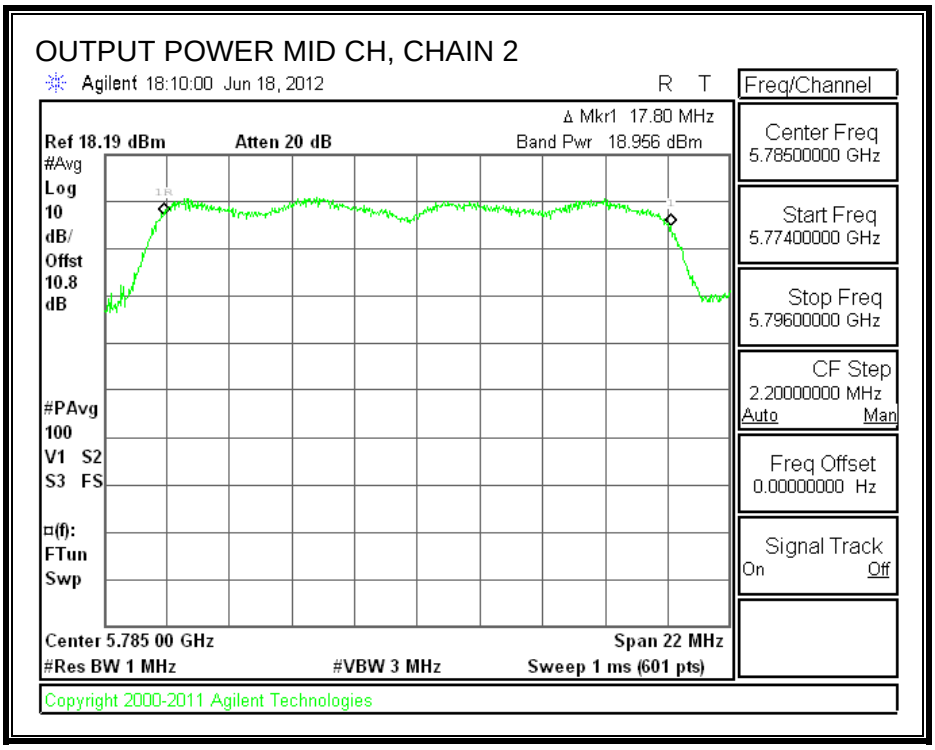


OUTPUT POWER HIGH CH, CHAIN 1

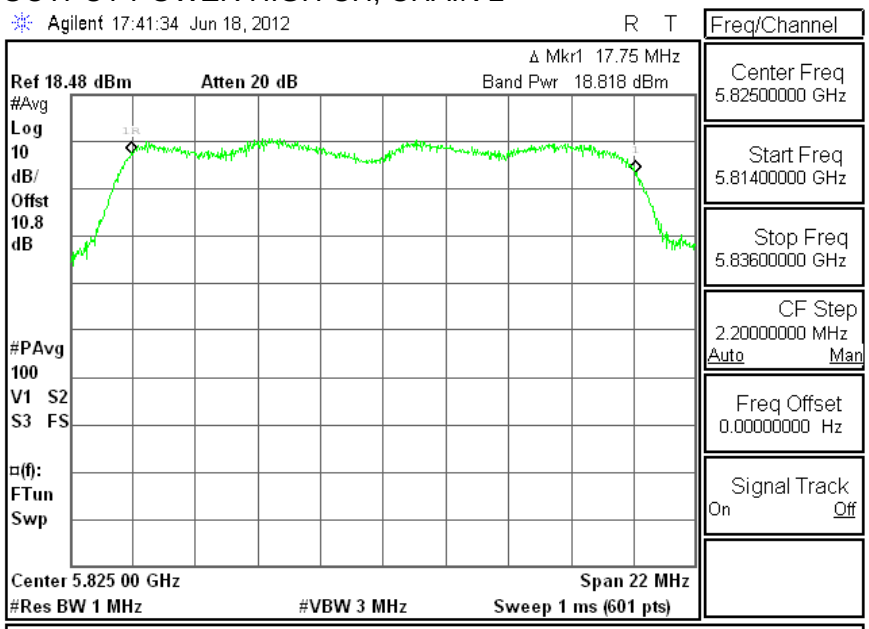


CHAIN 2 OUTPUT POWER

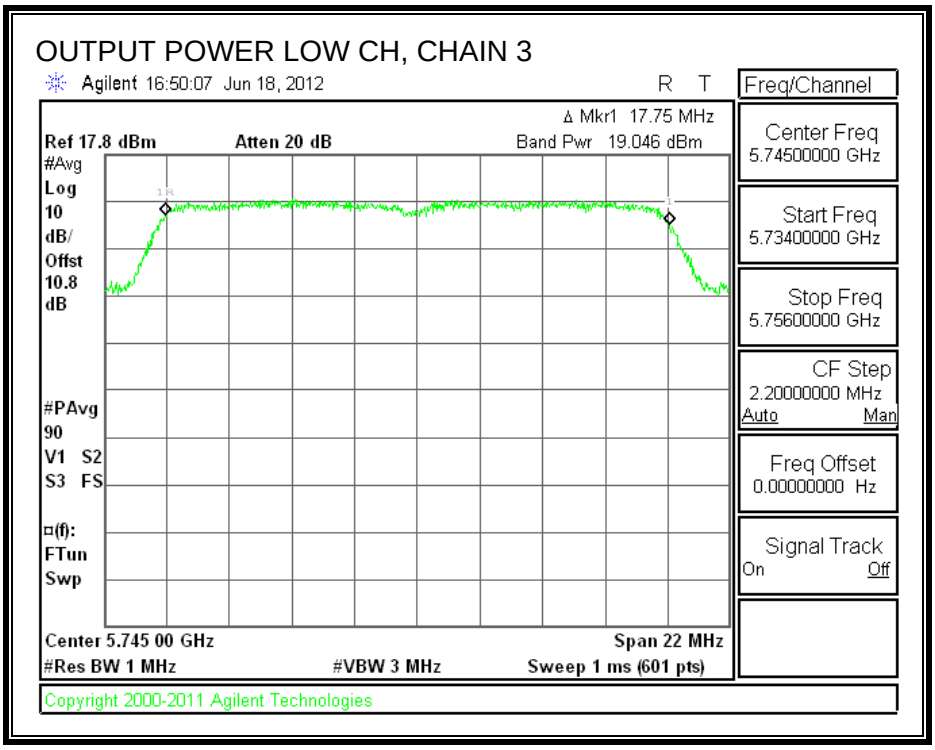


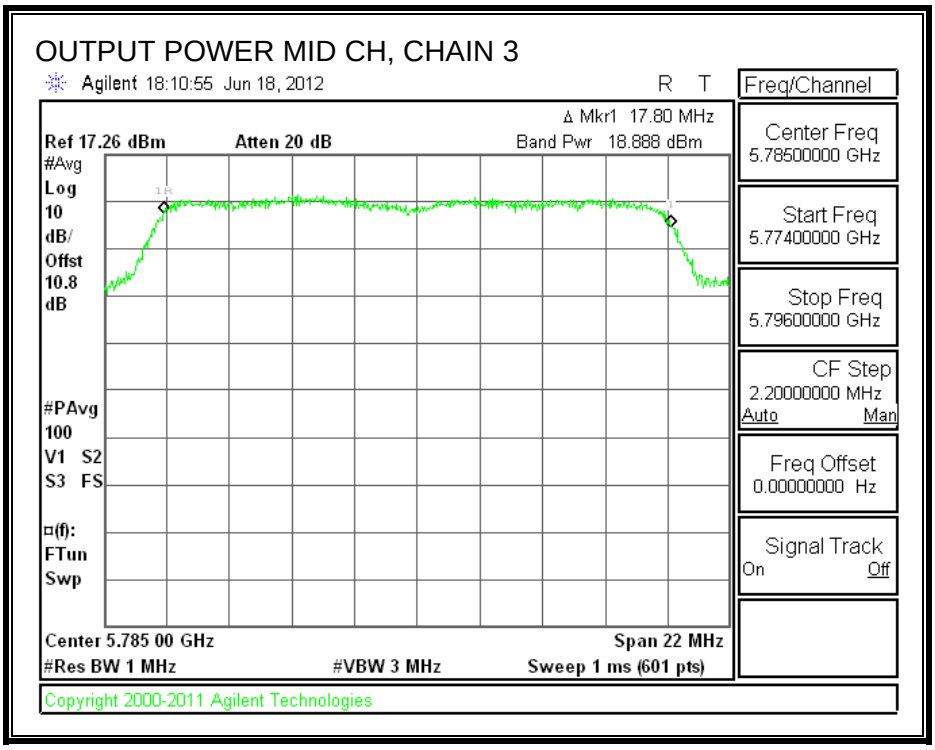


OUTPUT POWER HIGH CH, CHAIN 2

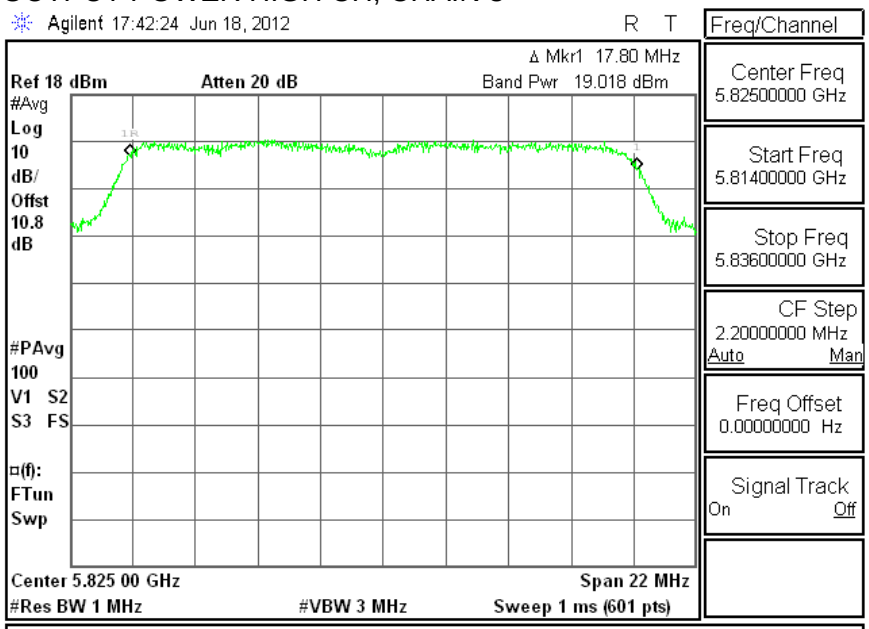


CHAIN 3 OUTPUT POWER





OUTPUT POWER HIGH CH, CHAIN 3



7.5.4. AVERAGE POWER

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a power meter.

RESULTS

The cable assembly insertion loss of 10.8 dB (including 10 dB pad and 0.80 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)	Chain 3 Power (dBm)	Total Power (dBm)
Low	**5745**	19.50	18.65	18.65	**23.72**
Middle	**5785**	19.50	18.70	18.70	**23.75**
High	**5825**	19.50	18.70	18.70	**23.75**

7.5.5. POWER SPECTRAL DENSITY

LIMITS

FCC §15.247 (e)

IC RSS-210 A8.2 (b)

TEST PROCEDURE

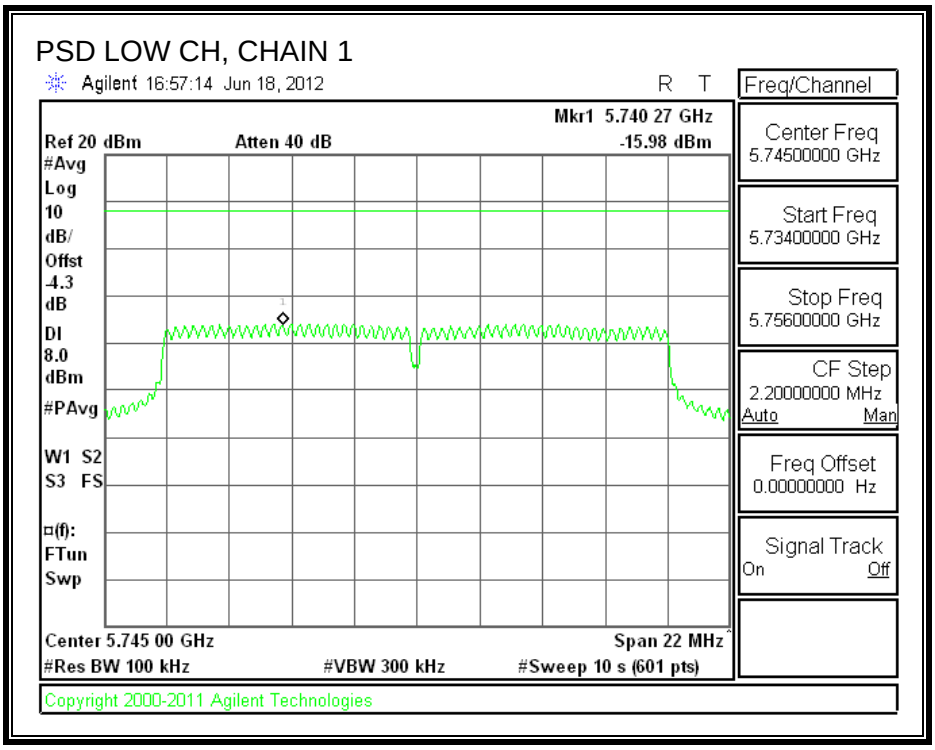
KDB 558074 D01 V01 "Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under 15.247", dated 01/18/2012.

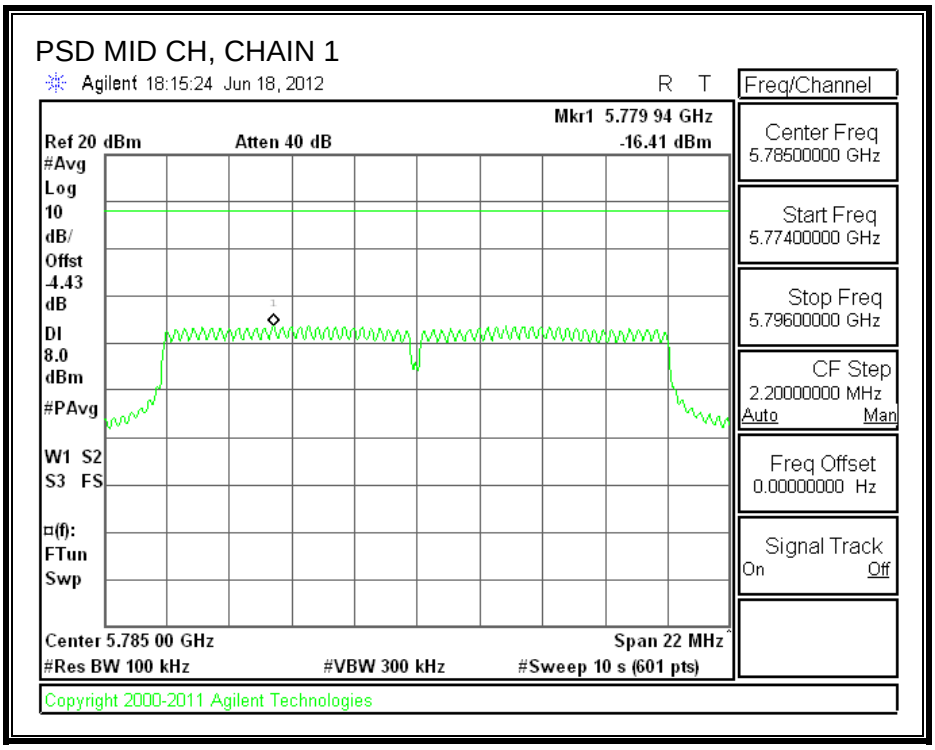
RESULTS:

Channel	Frequency (MHz)	Chain 1 PSD (dBm)	Chain 2 PSD (dBm)	Chain 3 PSD (dBm)	Total PSD (dBm)	Limit (dBm)	Margin (dB)
Low	5745	-15.98	-15.45	-16.36	-11.14	8	-19.14
Middle	5785	-16.41	-15.74	-16.77	-11.51	8	-19.51
High	5825	-16.92	-15.55	-16.23	-11.43	8	-19.43

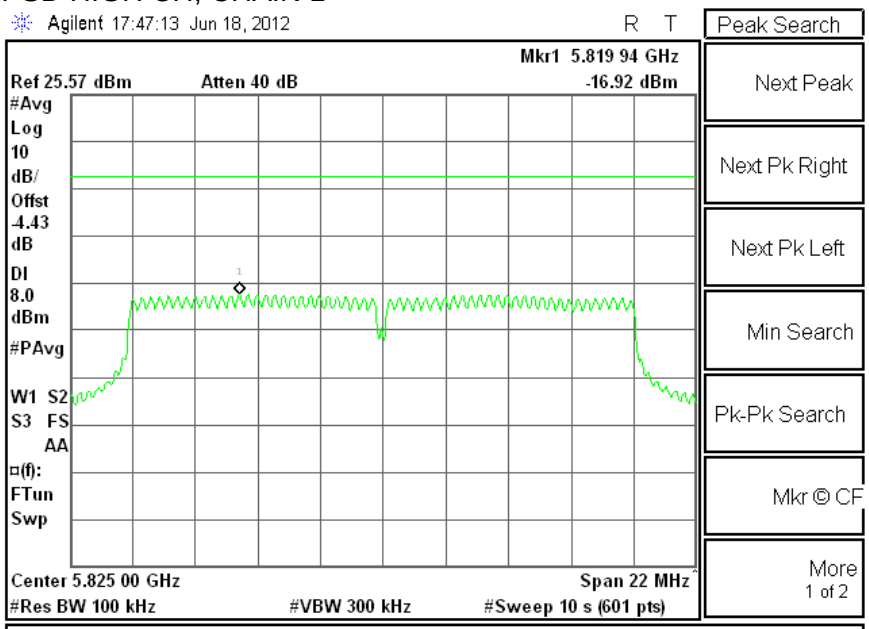
Note: The spectrum analyzer offset = attenuator loss + cable loss + 10 log (3/100 kHz) = -4.43 dB

POWER SPECTRAL DENSITY, CHAIN 1

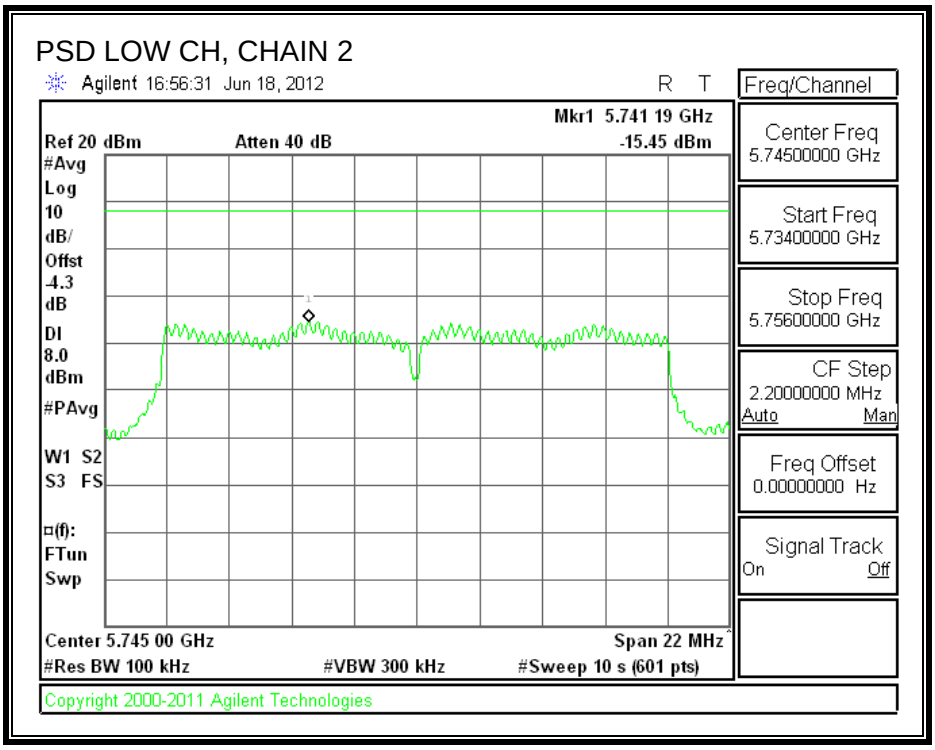


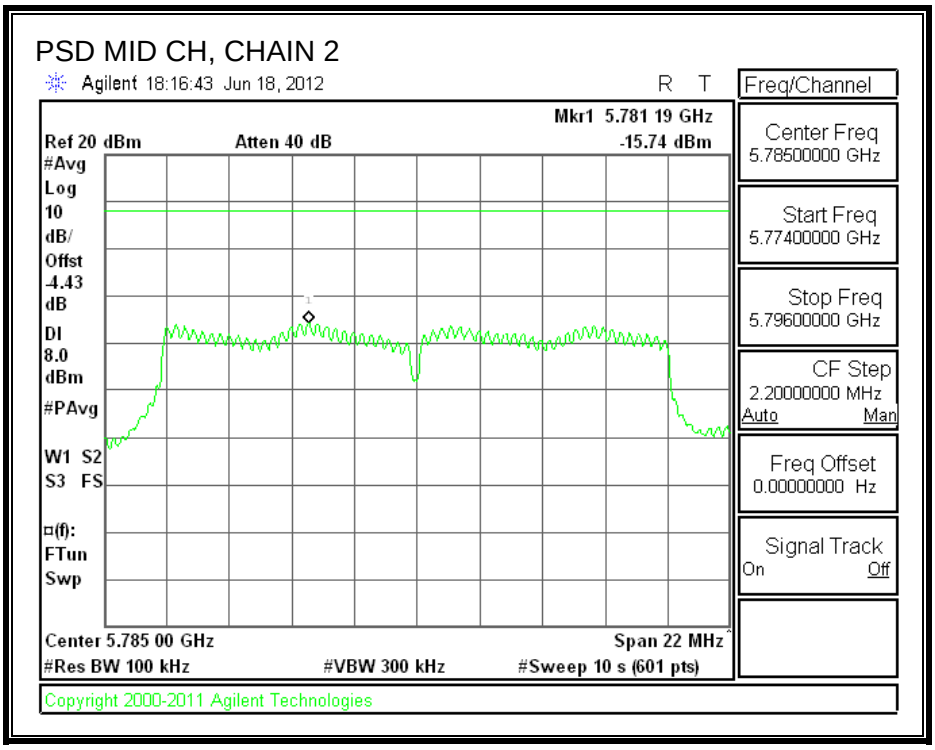


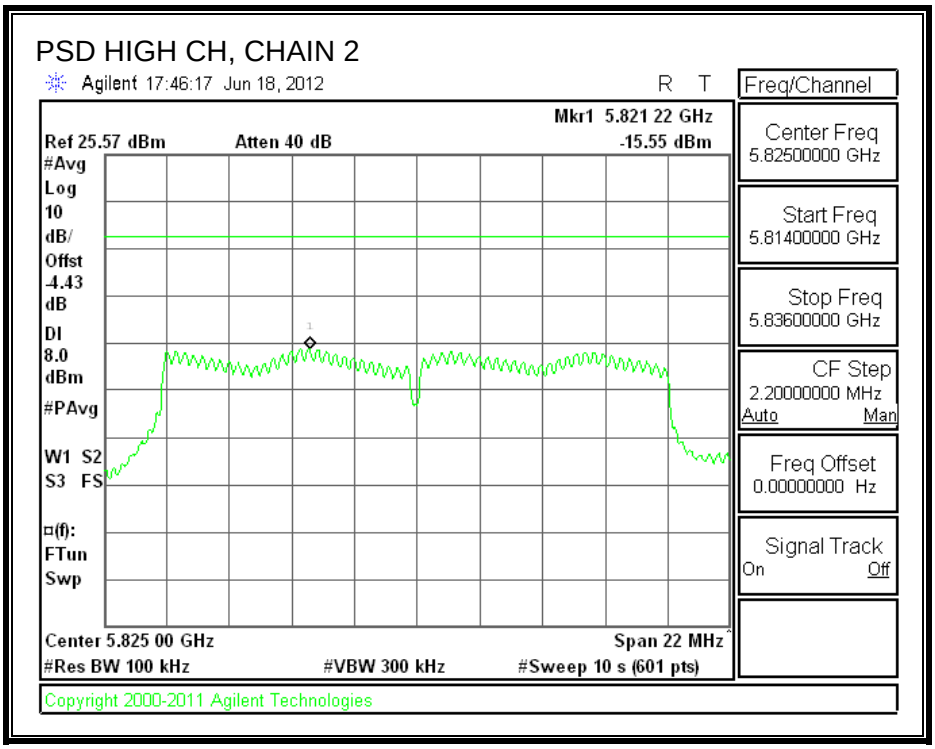
PSD HIGH CH, CHAIN 1



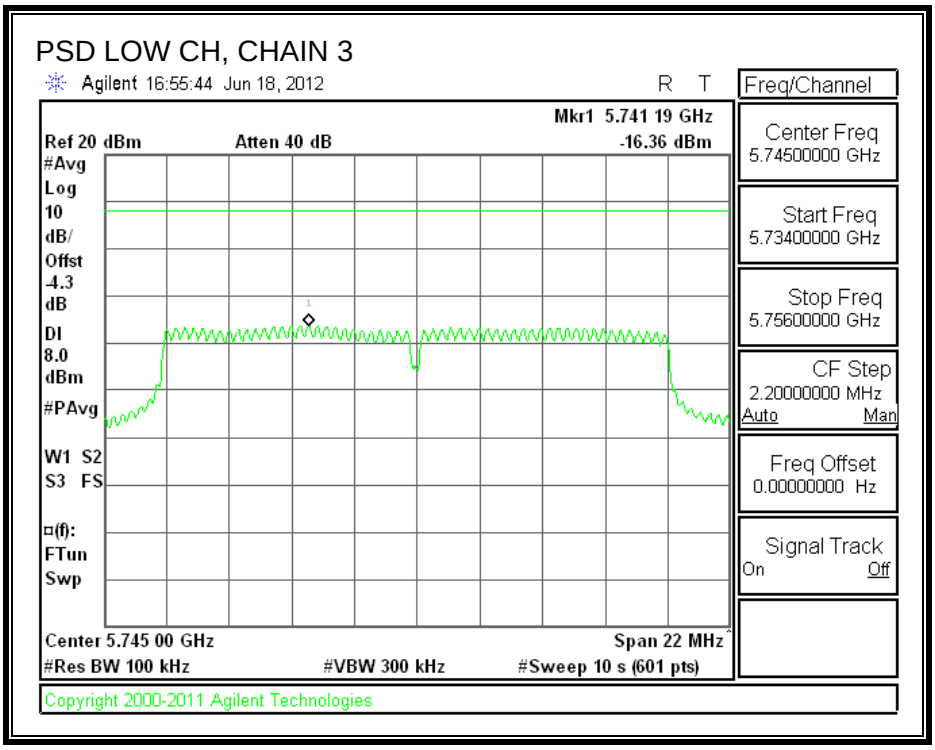
POWER SPECTRAL DENSITY, CHAIN 2

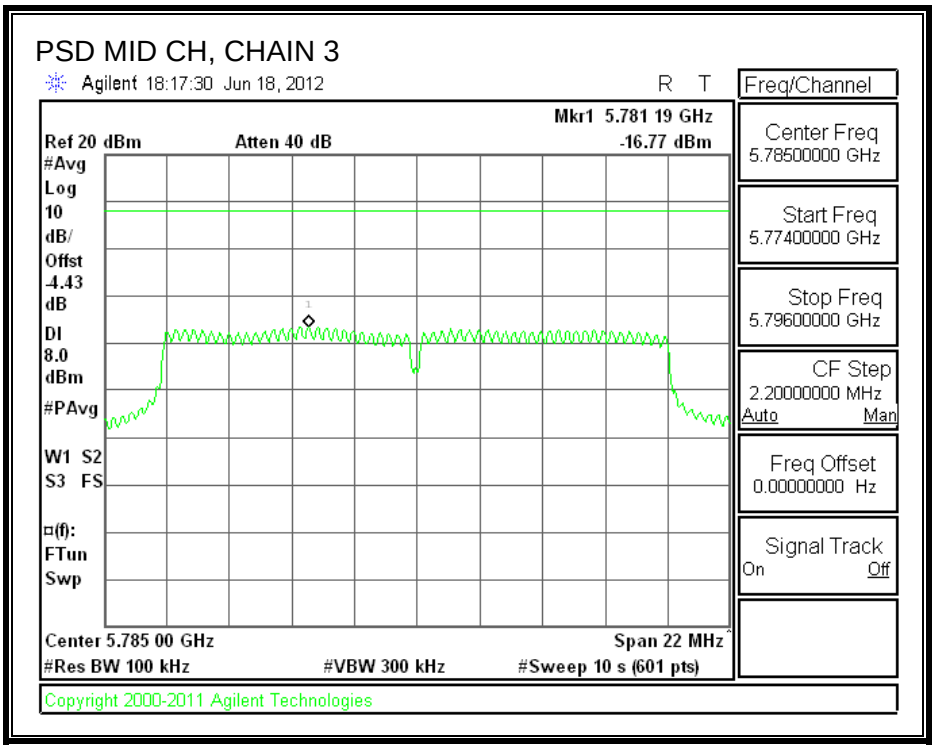


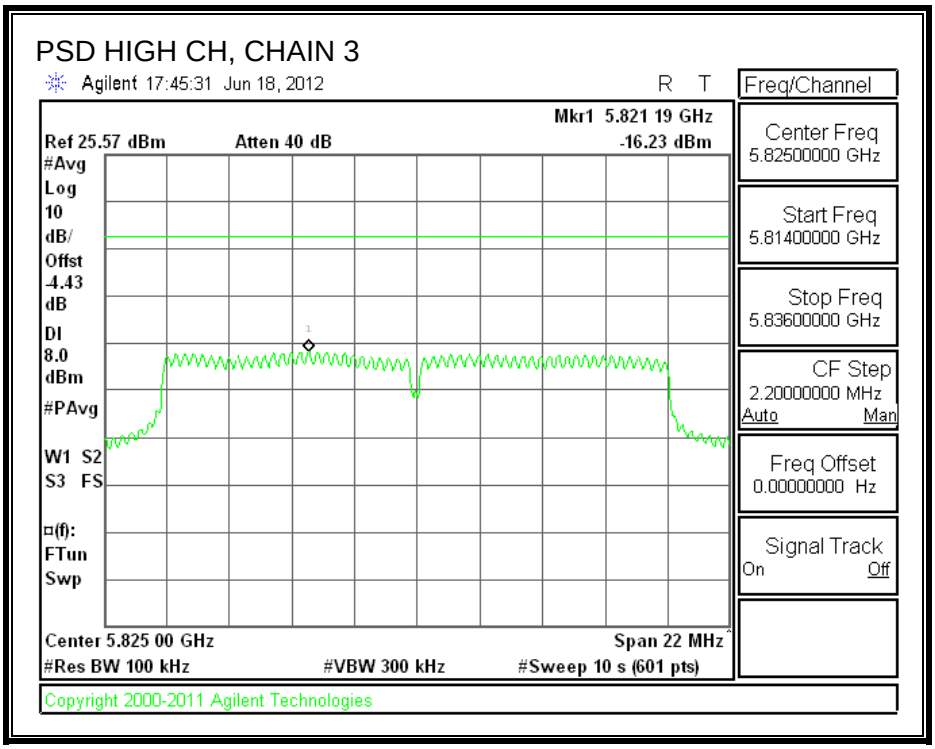




POWER SPECTRAL DENSITY, CHAIN 3







7.5.6. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.247 (d)

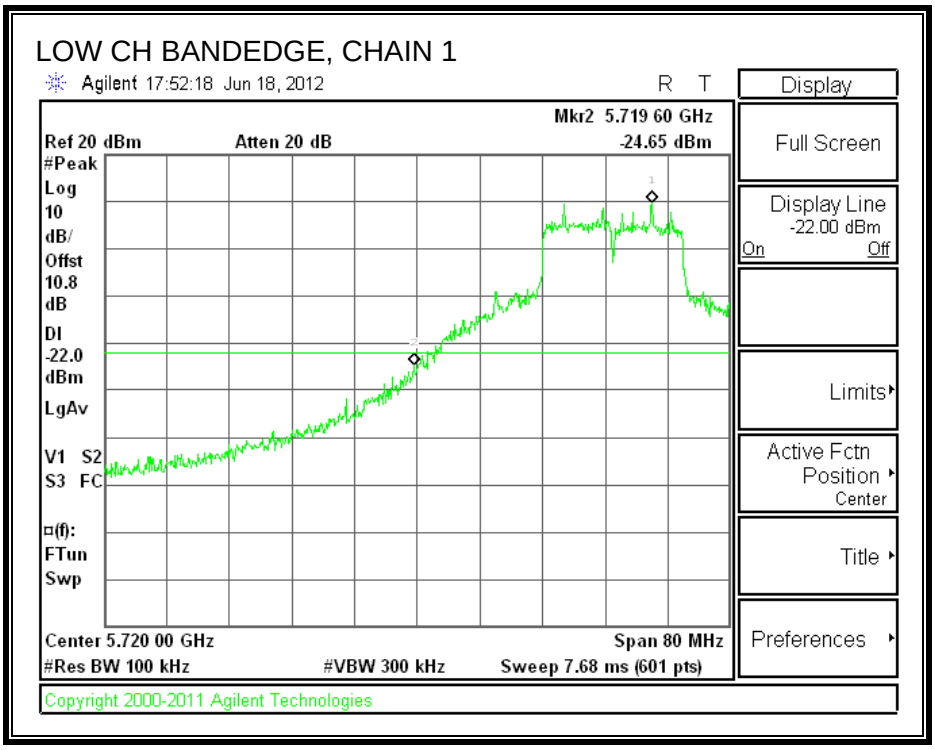
IC RSS-210 A8.5

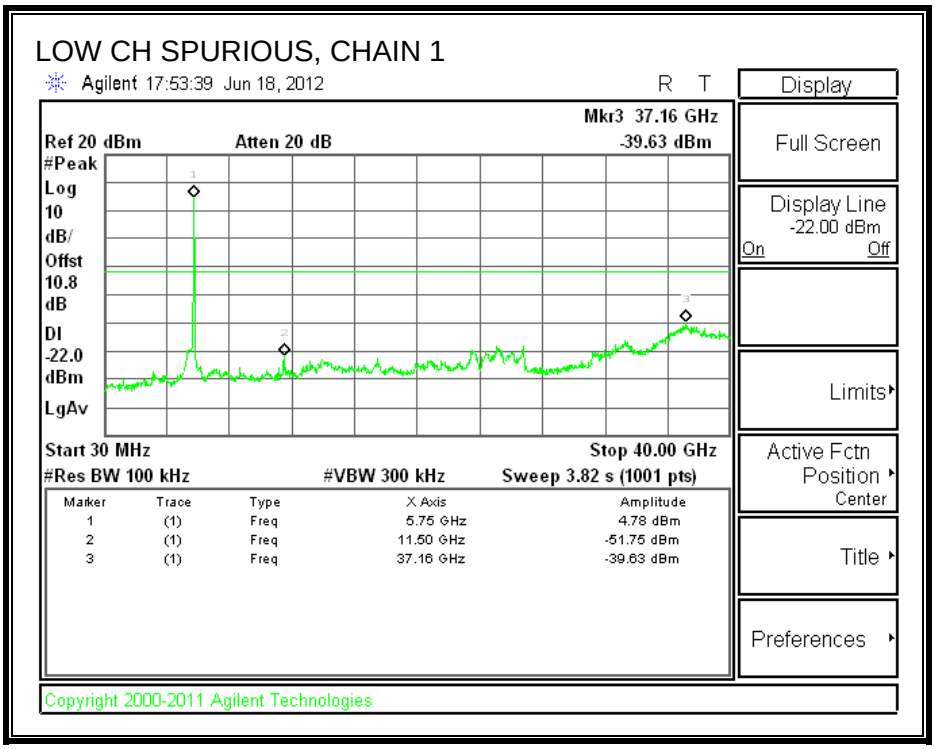
Output power was measured based on the use of RMS averaging over a time interval, therefore the required attenuation is 30 dB.

TEST PROCEDURE

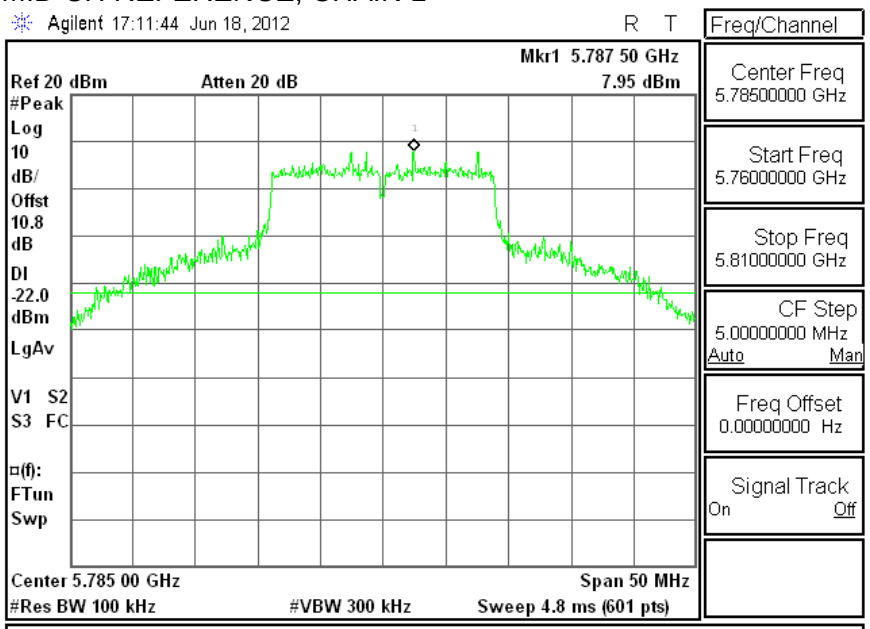
KDB 558074 D01 V01 “Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under 15.247”, dated 01/18/2012.

CHAIN 1 SPURIOUS EMISSIONS

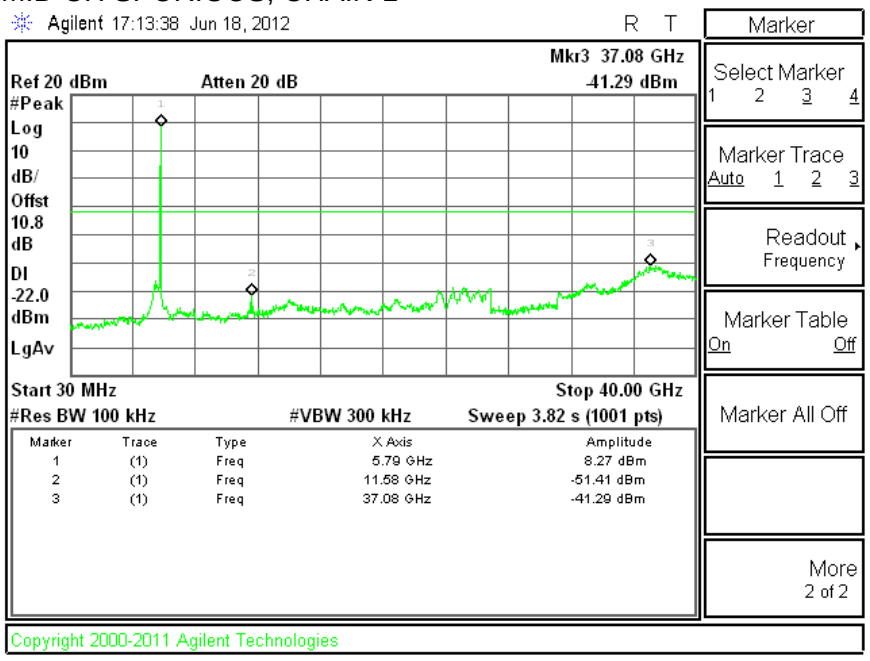


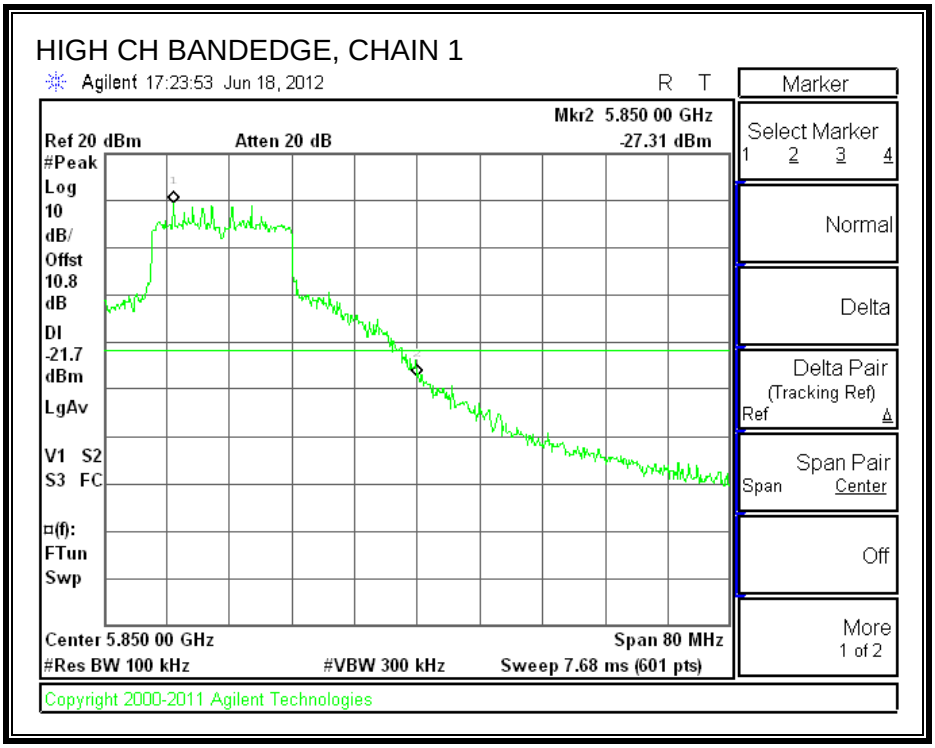


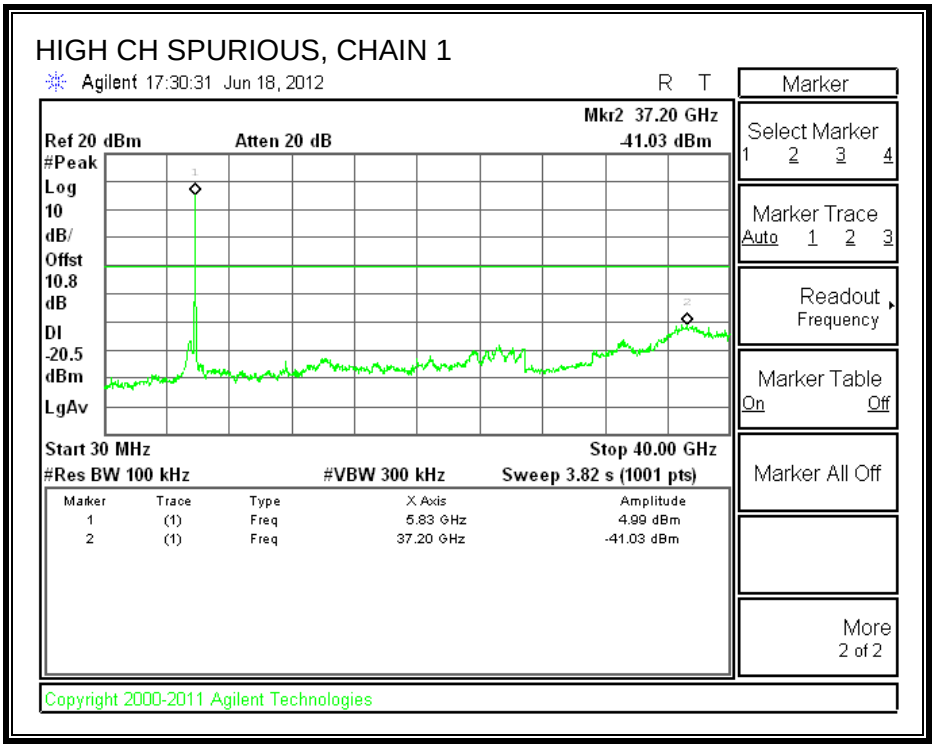
MID CH REFERENCE, CHAIN 1



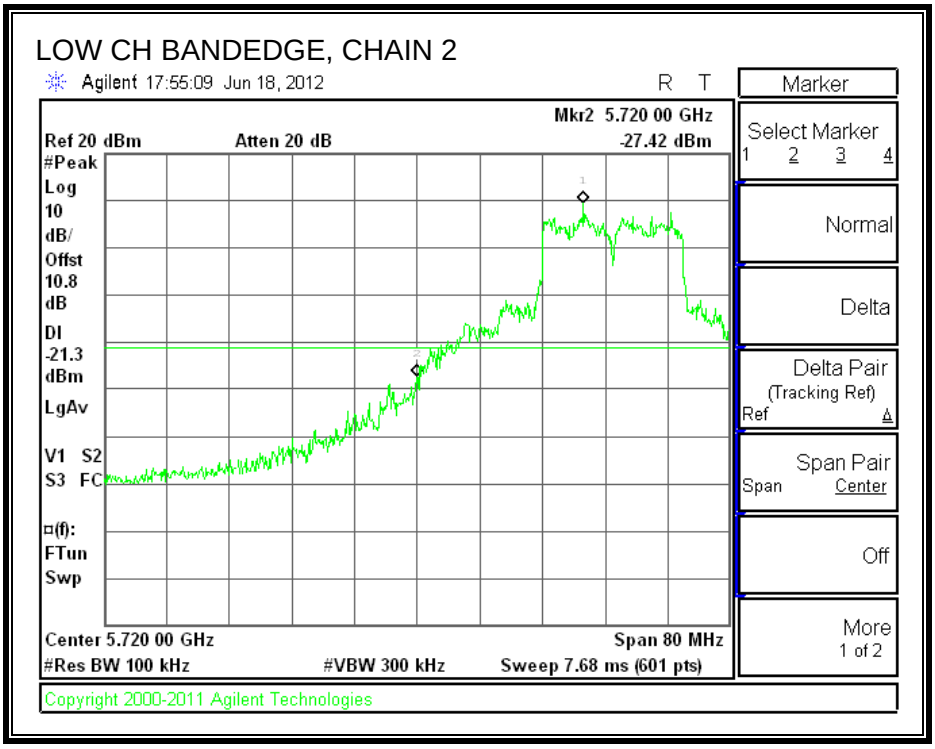
MID CH SPURIOUS, CHAIN 1

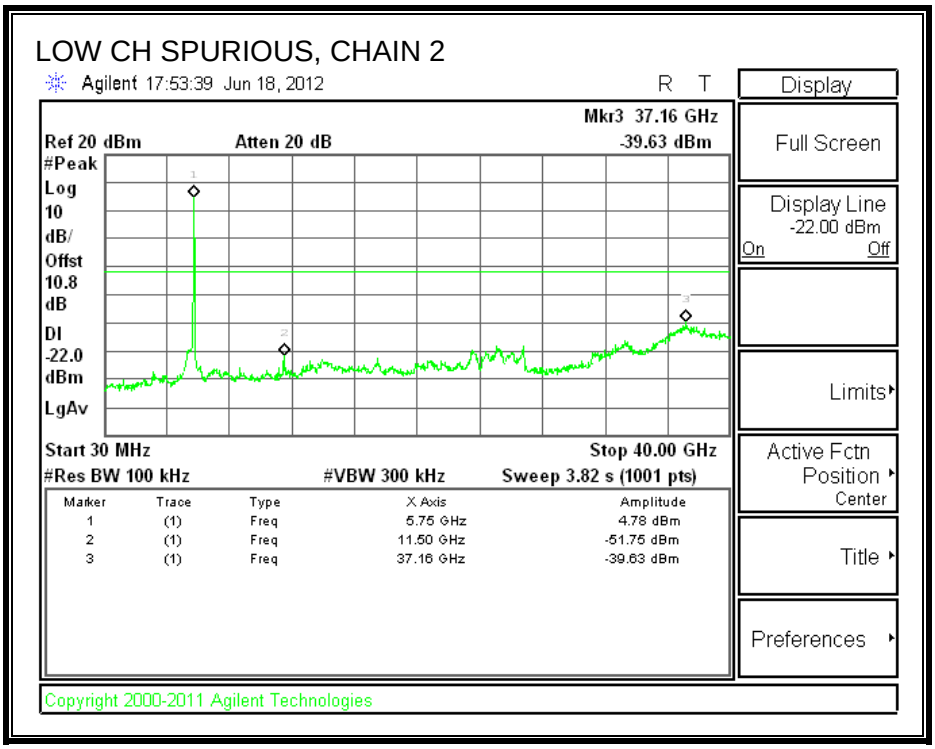




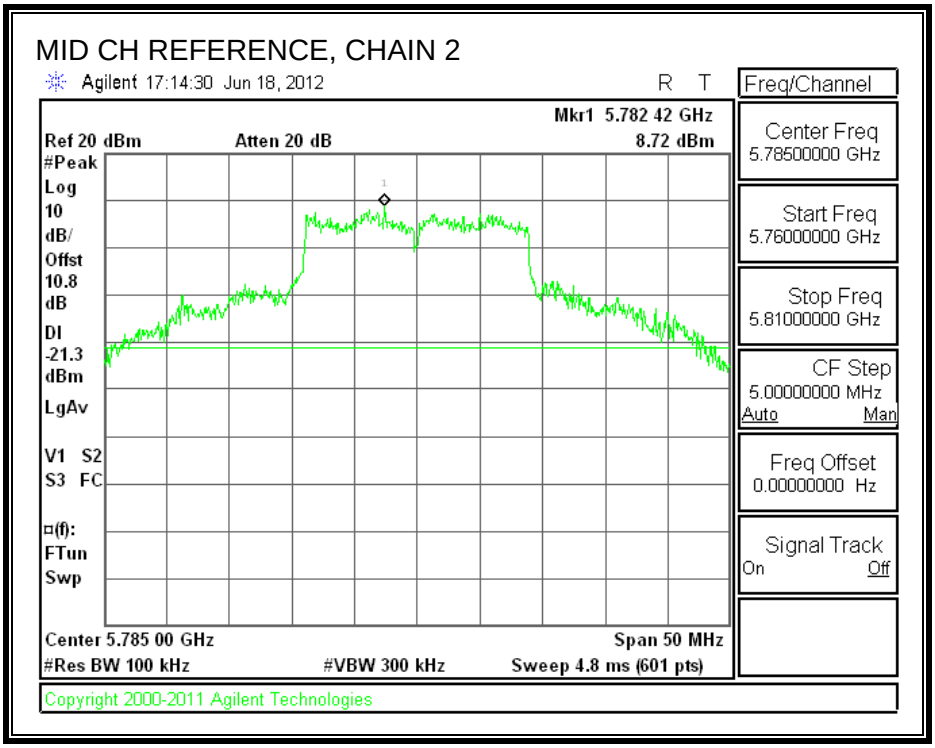


CHAIN 2 SPURIOUS EMISSIONS

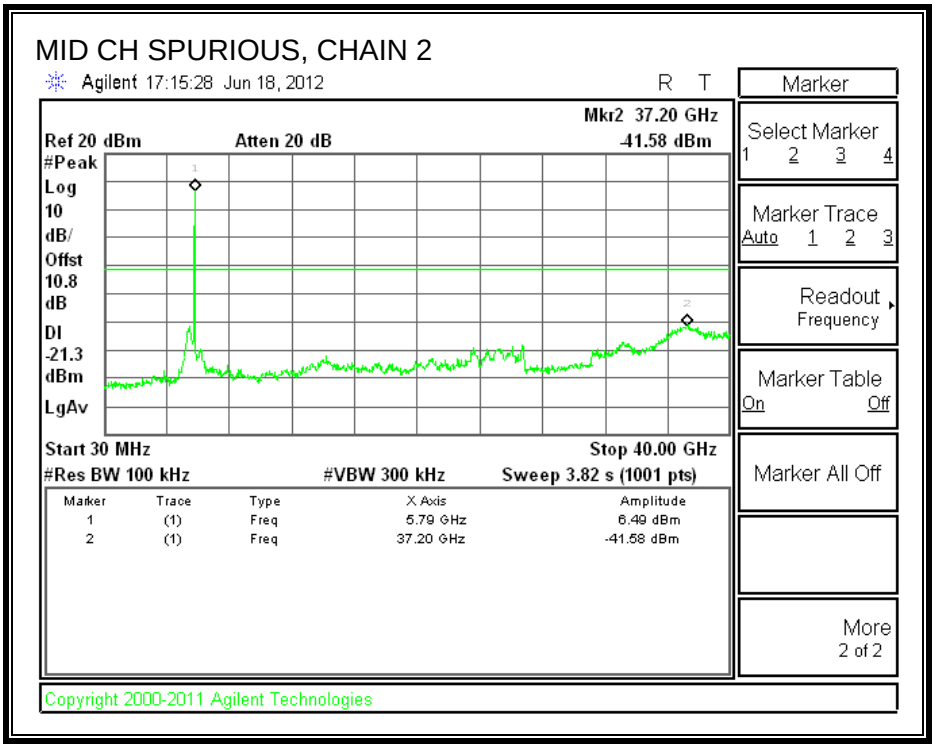




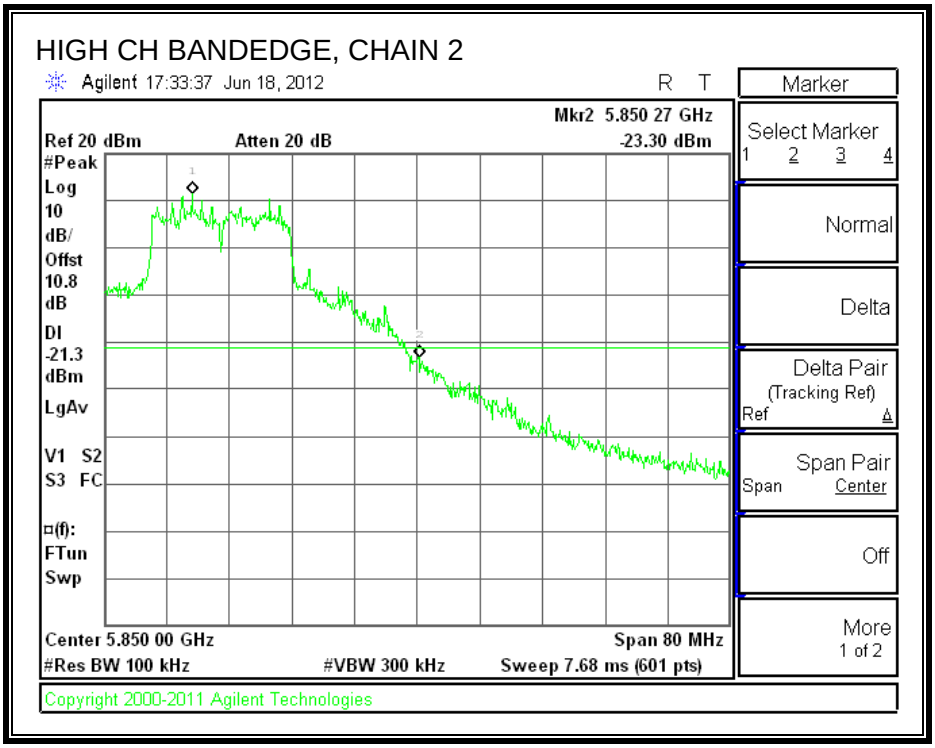
MID CH REFERENCE, CHAIN 2



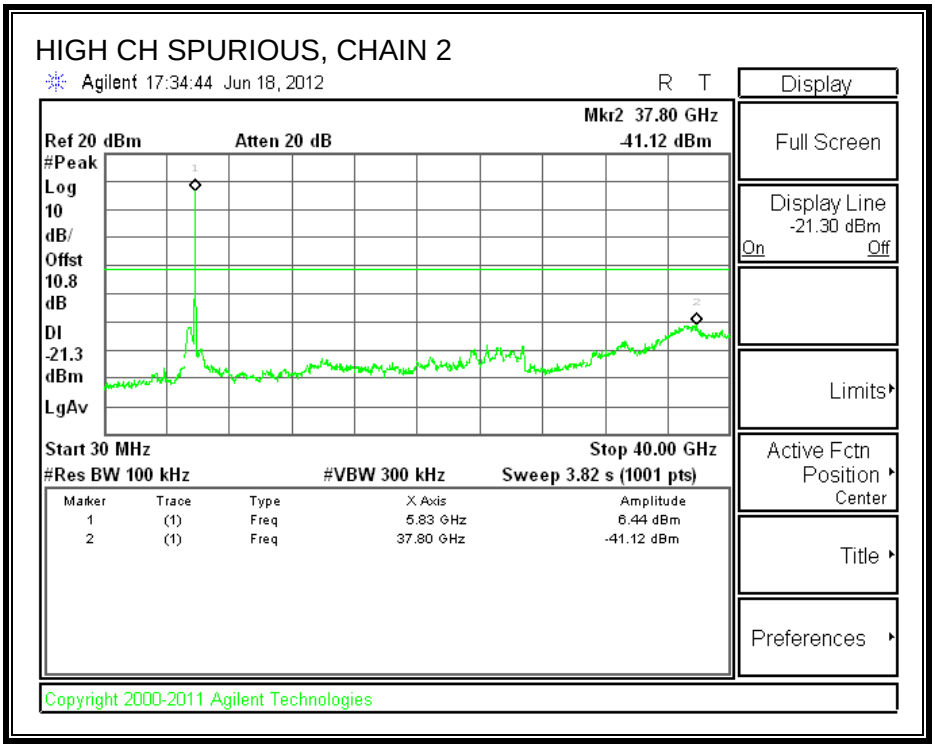
MID CH SPURIOUS, CHAIN 2



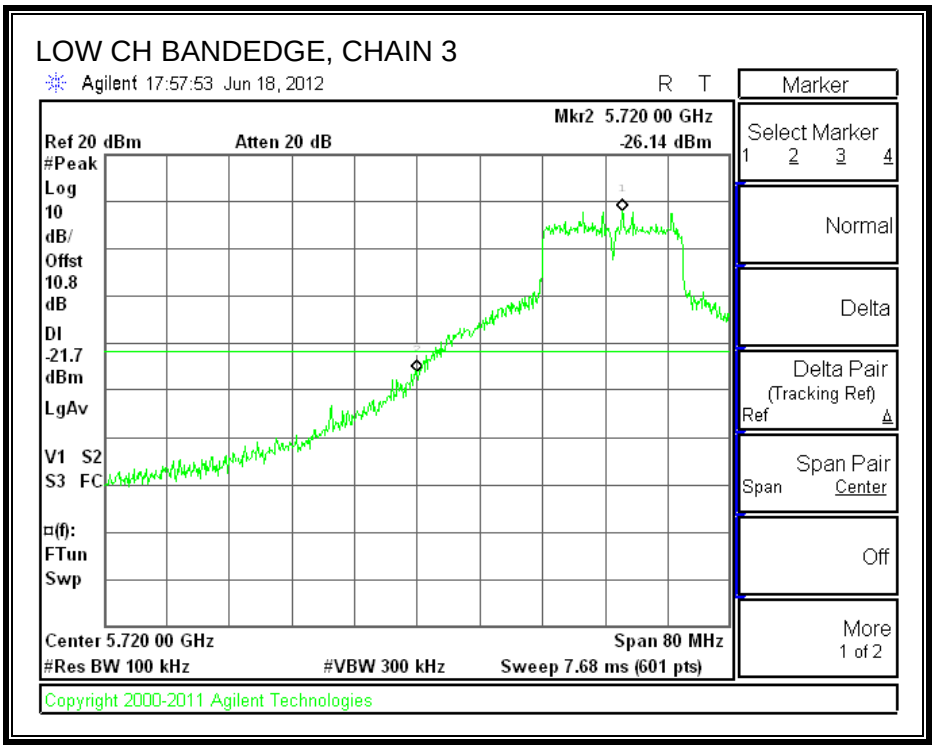
HIGH CH BANDEDGE, CHAIN 2

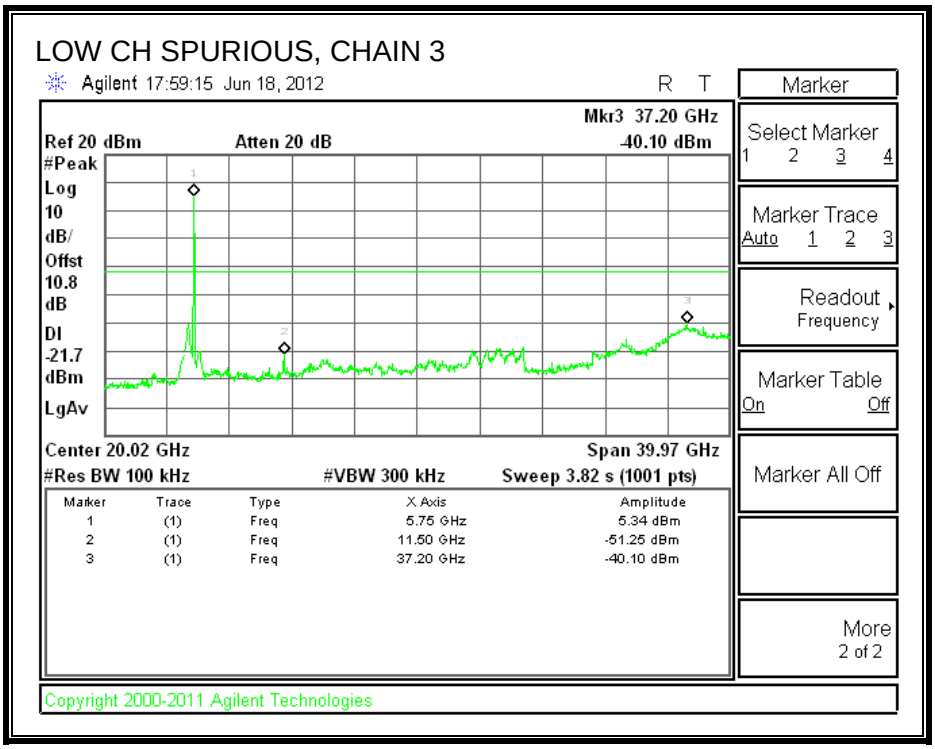


HIGH CH SPURIOUS, CHAIN 2

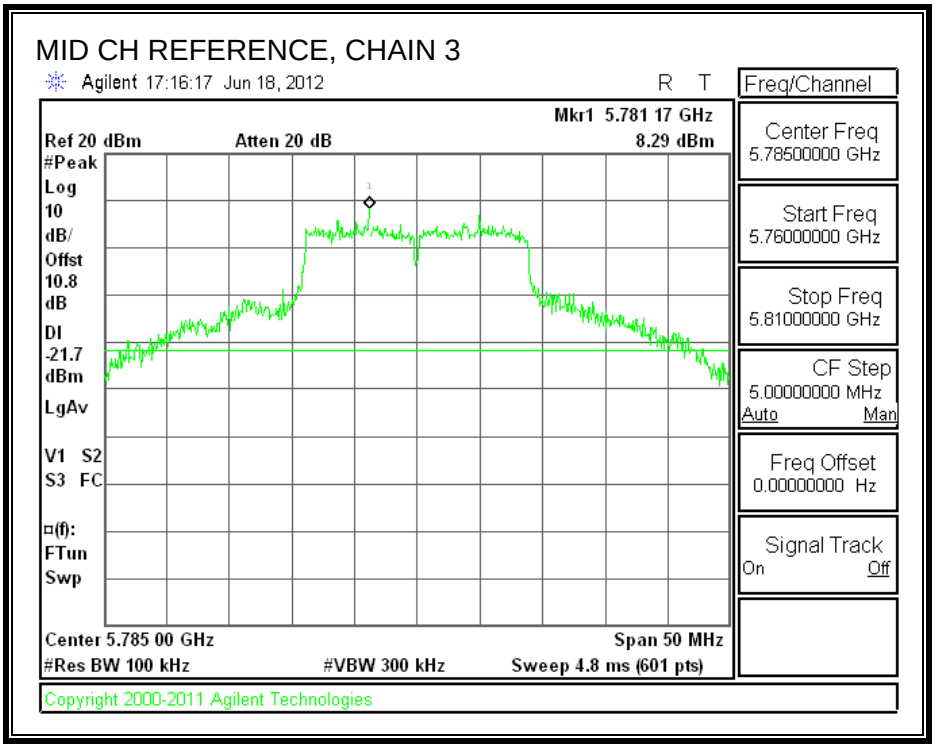


CHAIN 3 SPURIOUS EMISSIONS

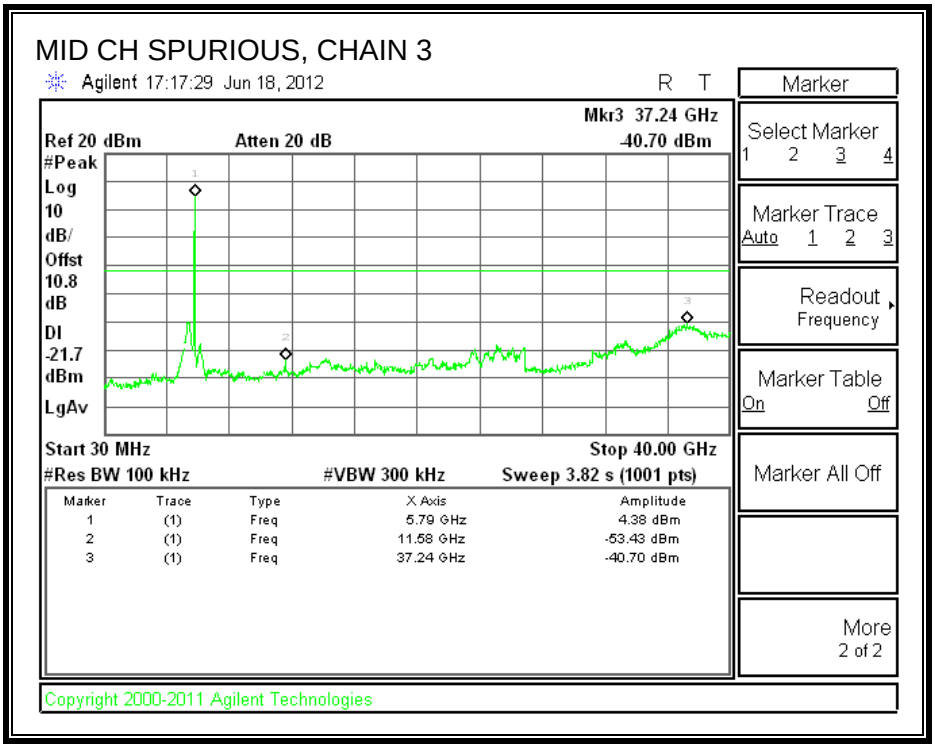




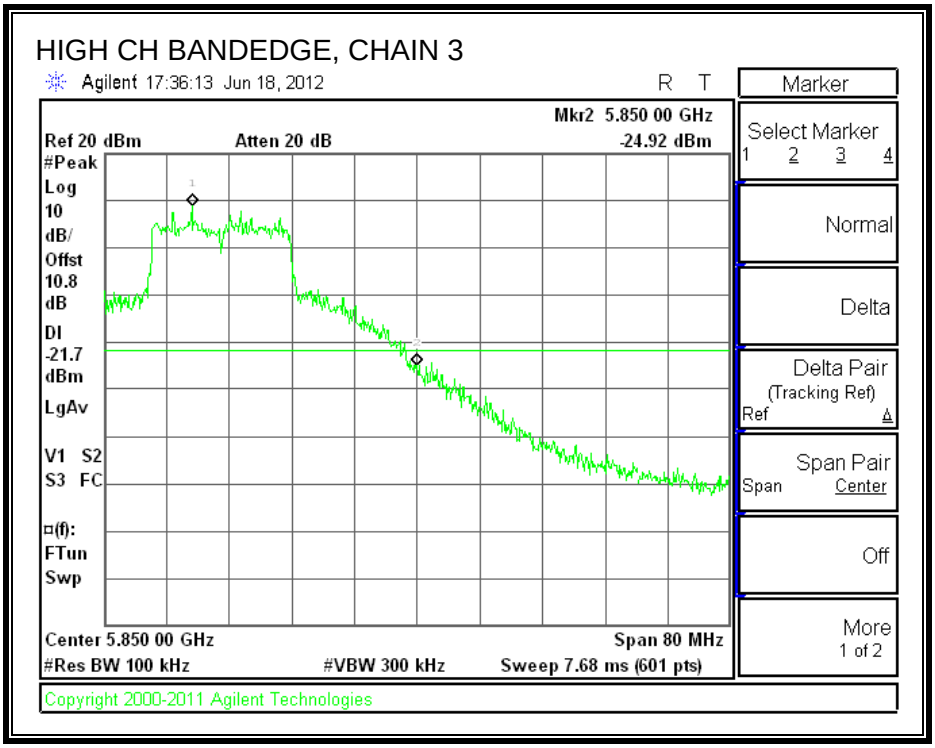
MID CH REFERENCE, CHAIN 3



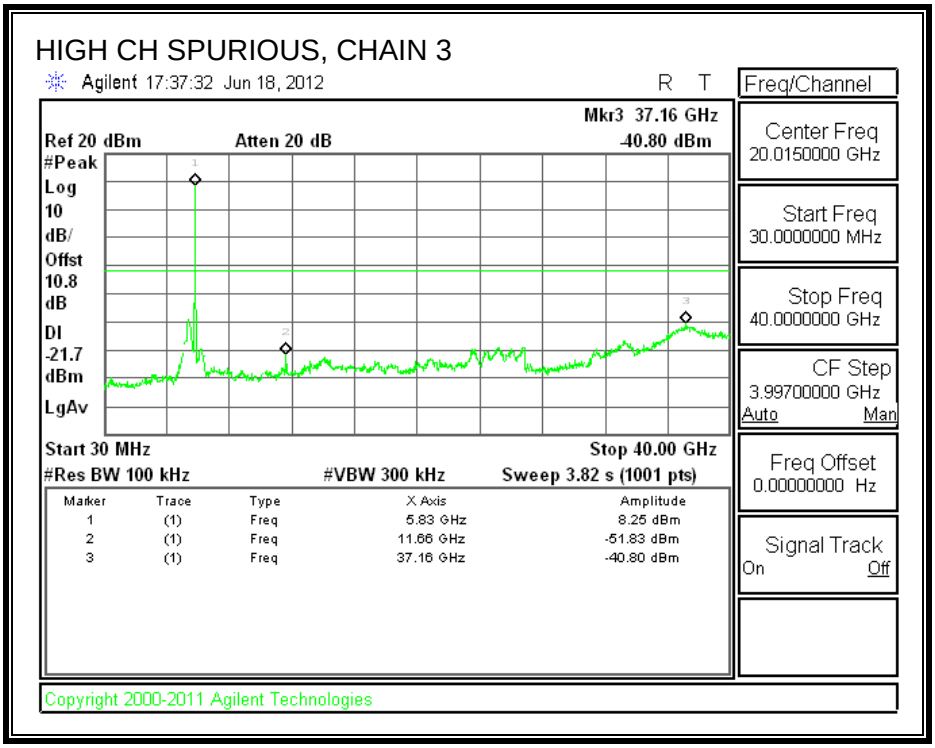
MID CH SPURIOUS, CHAIN 3



HIGH CH BANDEDGE, CHAIN 3



HIGH CH SPURIOUS, CHAIN 3



7.6. 802.11n HT40 SISO MODE IN THE 5.8 GHz BAND

Note: High channel is covered by testing to HT40 CDD MCS0 3TX

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.

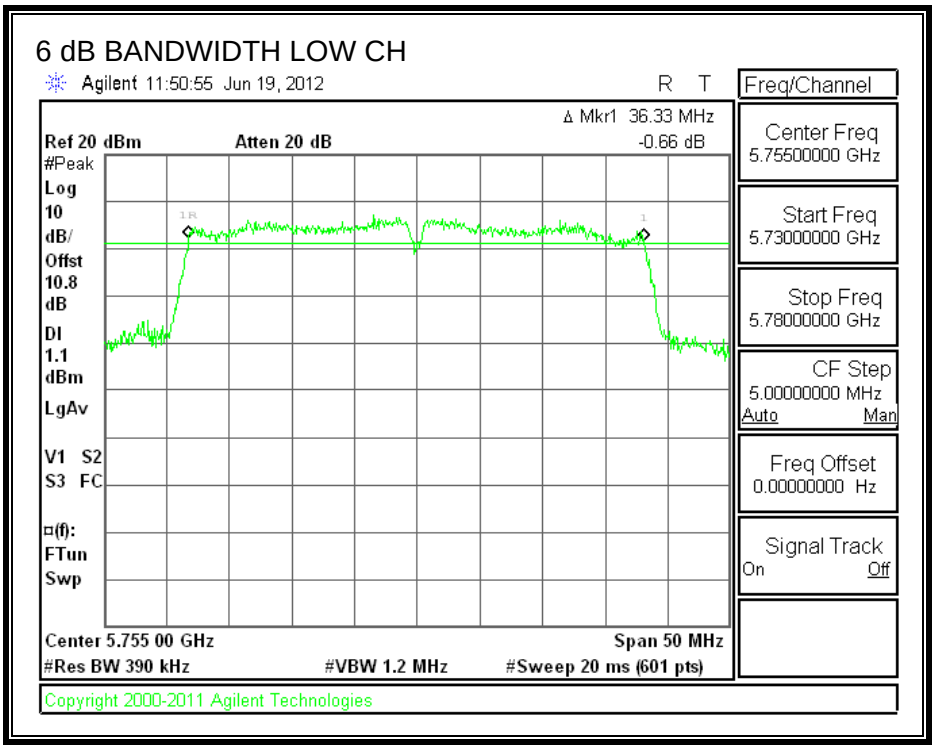
TEST PROCEDURE

KDB 558074 D01 V01 "Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under 15.247", dated 01/18/2012.

RESULTS

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low	5755	36.33	0.5

6 dB BANDWIDTH



7.6.2. 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

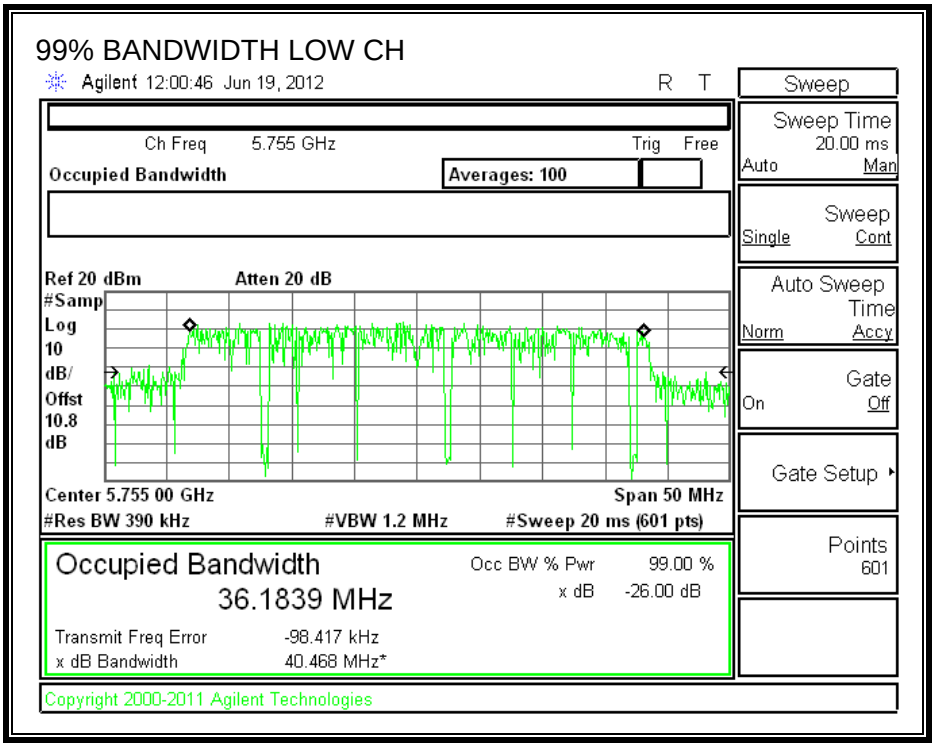
TEST PROCEDURE

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)	99% Bandwidth (MHz)
Low	5755	36.1839

99% BANDWIDTH



7.6.3. OUTPUT POWER

LIMITS

FCC §15.247 (b)

IC RSS-210 A8.4

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

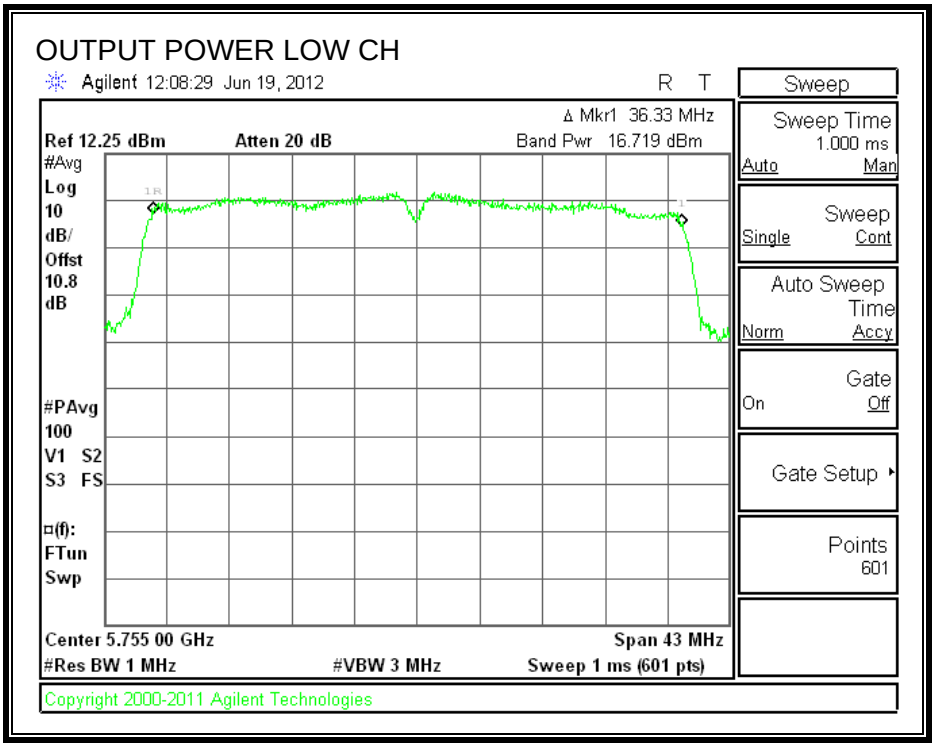
TEST PROCEDURE

KDB 558074 D01 V01 “Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under 15.247”, dated 01/18/2012.

RESULTS

Channel	Frequency (MHz)	RMS Power Reading (dBm)	Limit (dBm)	Margin (dB)
Low	5755	16.719	30	-13.28

OUTPUT POWER



7.6.4. AVERAGE POWER

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a power meter.

RESULTS

The cable assembly insertion loss of 10.8 dB (including 10 dB pad and 0.80 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

Channel	Frequency (MHz)	Power (dBm)
Low	5755	16.56

7.6.5. POWER SPECTRAL DENSITY

LIMITS

FCC §15.247 (e)

IC RSS-210 A8.2 (b)

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

TEST PROCEDURE

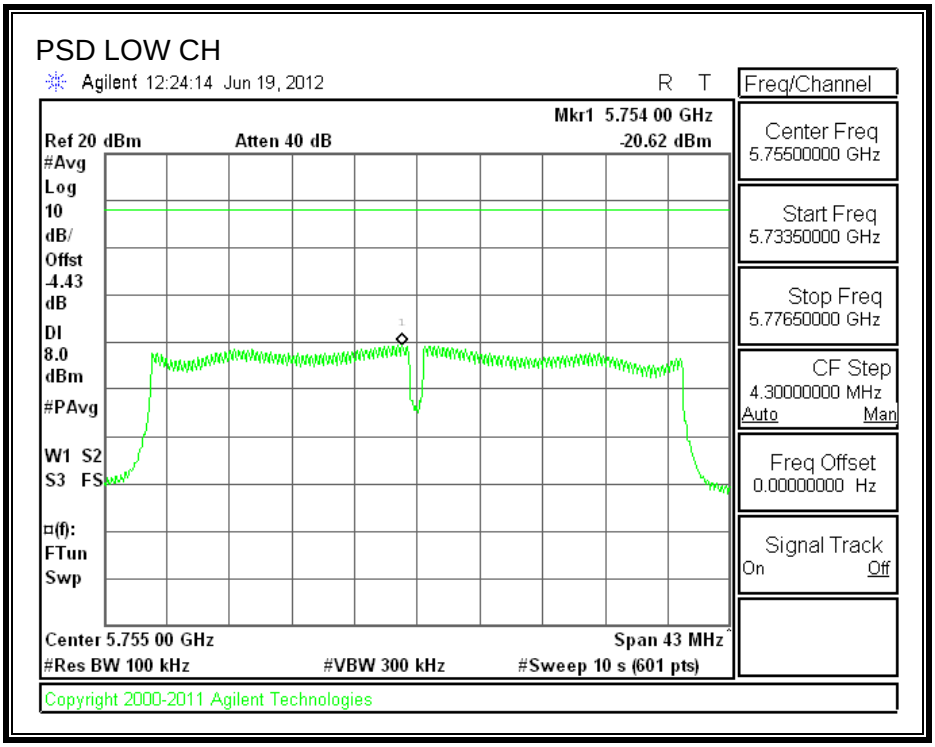
KDB 558074 D01 V01 "Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under 15.247", dated 01/18/2012.

RESULTS

Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Margin (dB)
Low	5755	-20.61	8	-28.61

Note: The spectrum analyzer offset = attenuator loss + cable loss + 10 log (3/100 kHz) = -4.43 dB.

POWER SPECTRAL DENSITY



7.6.6. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.247 (d)

IC RSS-210 A8.5

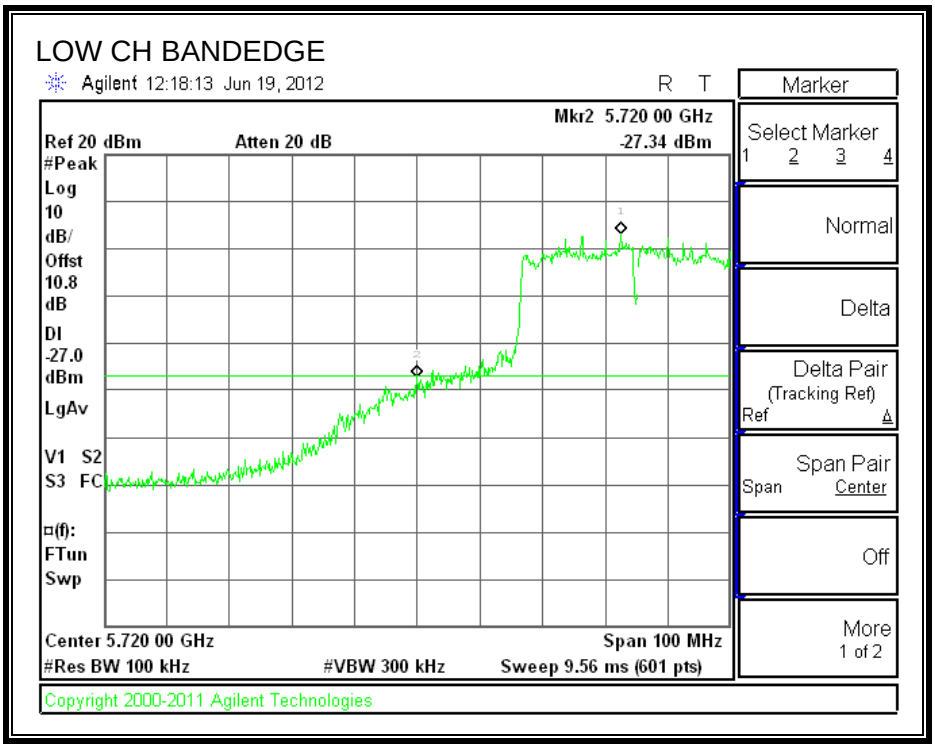
Output power was measured based on the use of RMS averaging over a time interval, therefore the required attenuation is 30 dB.

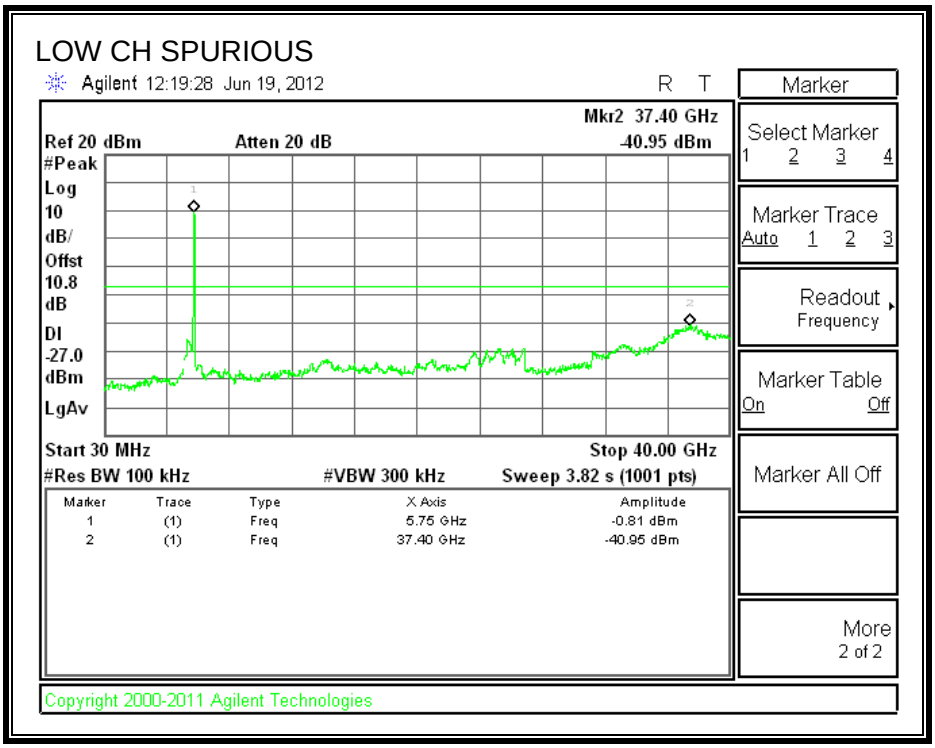
TEST PROCEDURE

KDB 558074 D01 V01 “Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under 15.247”, dated 01/18/2012.

RESULTS

SPURIOUS EMISSIONS, LOW CHANNEL





7.7. 802.11n HT40 CDD 3TX 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.

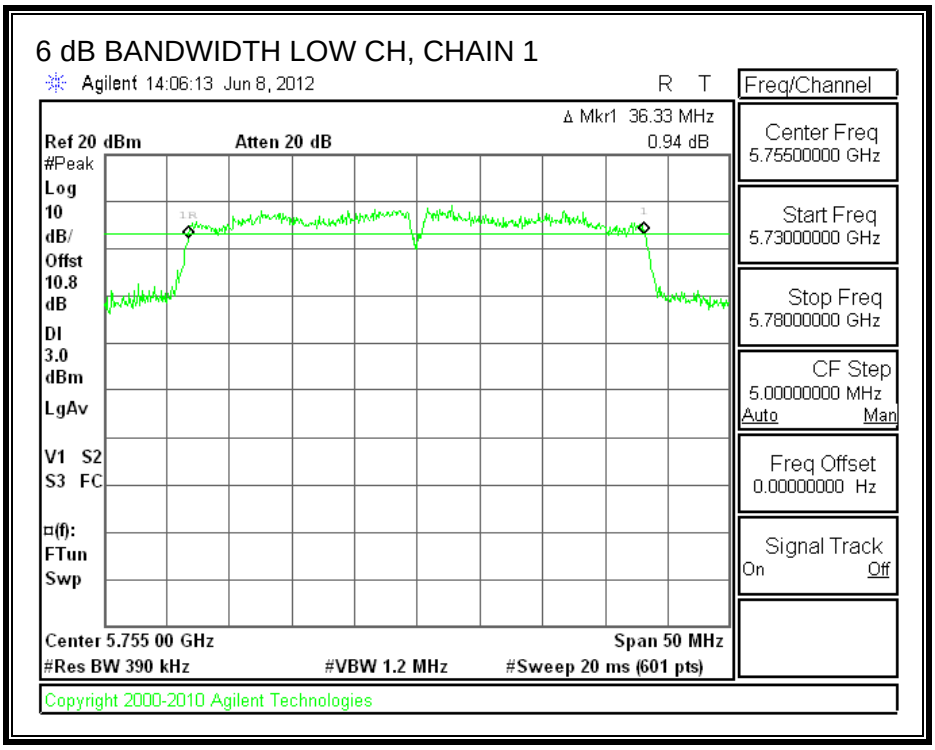
TEST PROCEDURE

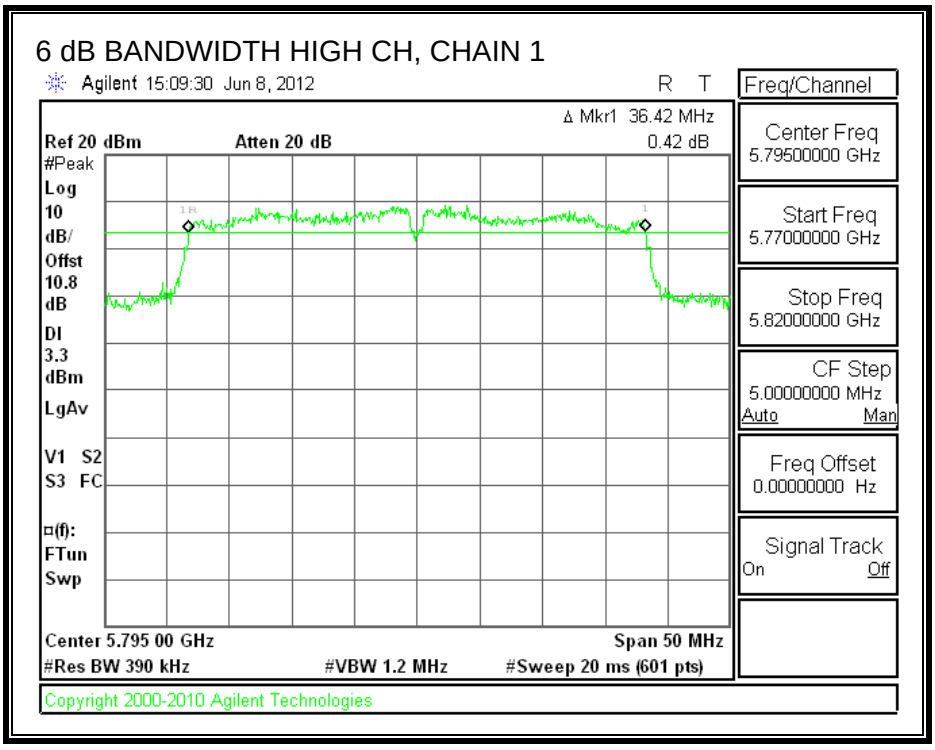
KDB 558074 D01 V01 "Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under 15.247", dated 01/18/2012.

RESULTS

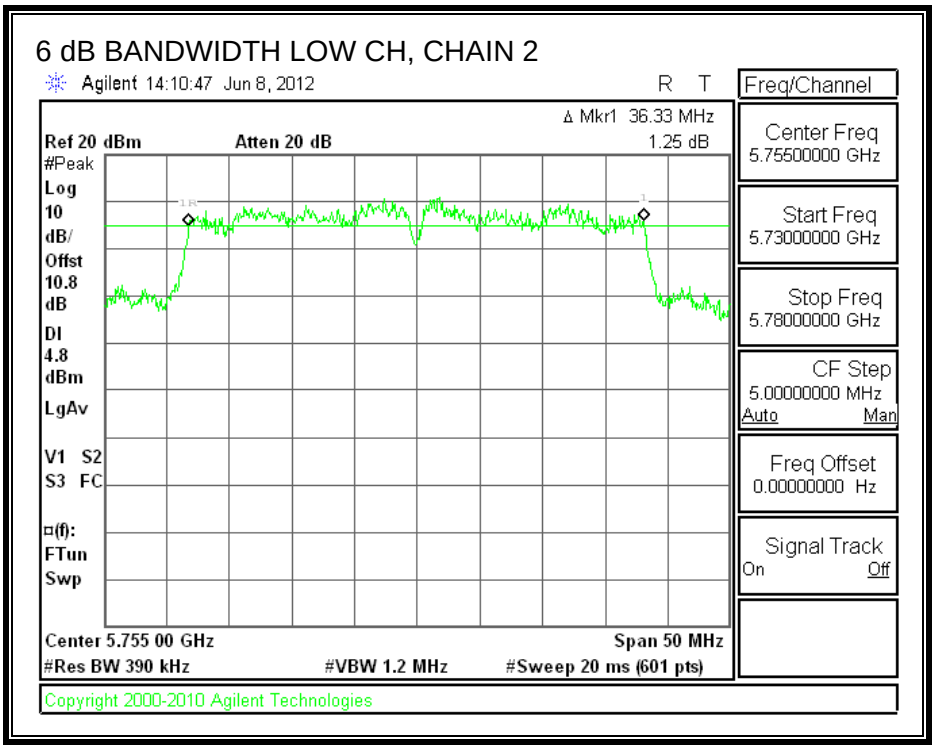
Channel	Frequency (MHz)	Chain 1 6 dB BW (MHz)	Chain 2 6 dB BW (MHz)	Chain 3 6 dB BW (MHz)	Minimum Limit (MHz)
Low	5755	36.33	36.33	36.33	0.5
High	5795	36.42	35.92	36.25	0.5

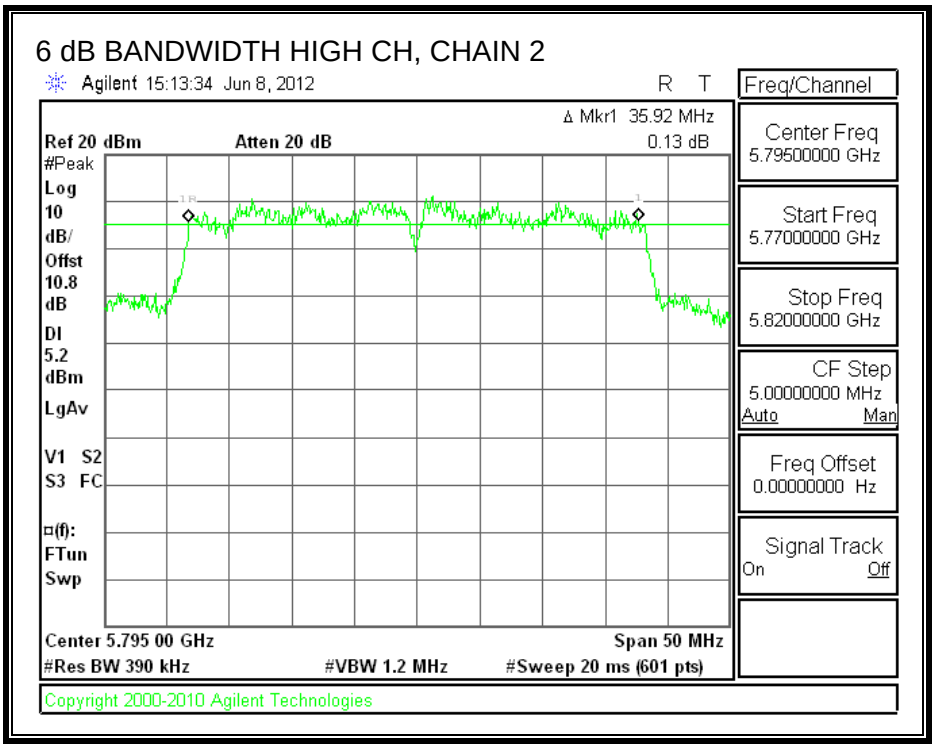
6 dB BANDWIDTH, CHAIN 1



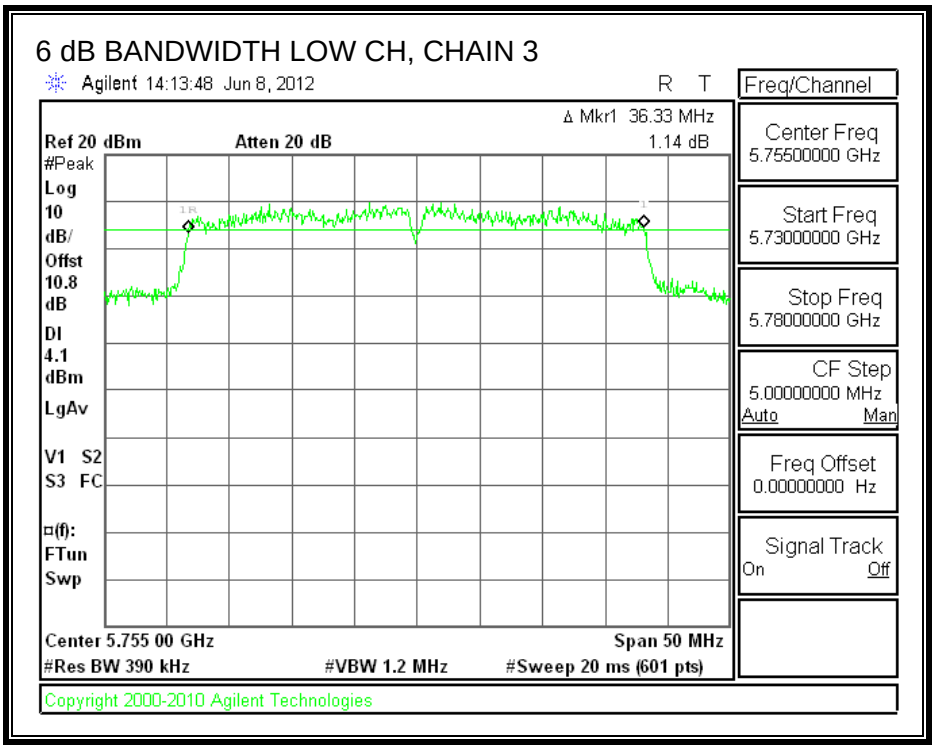


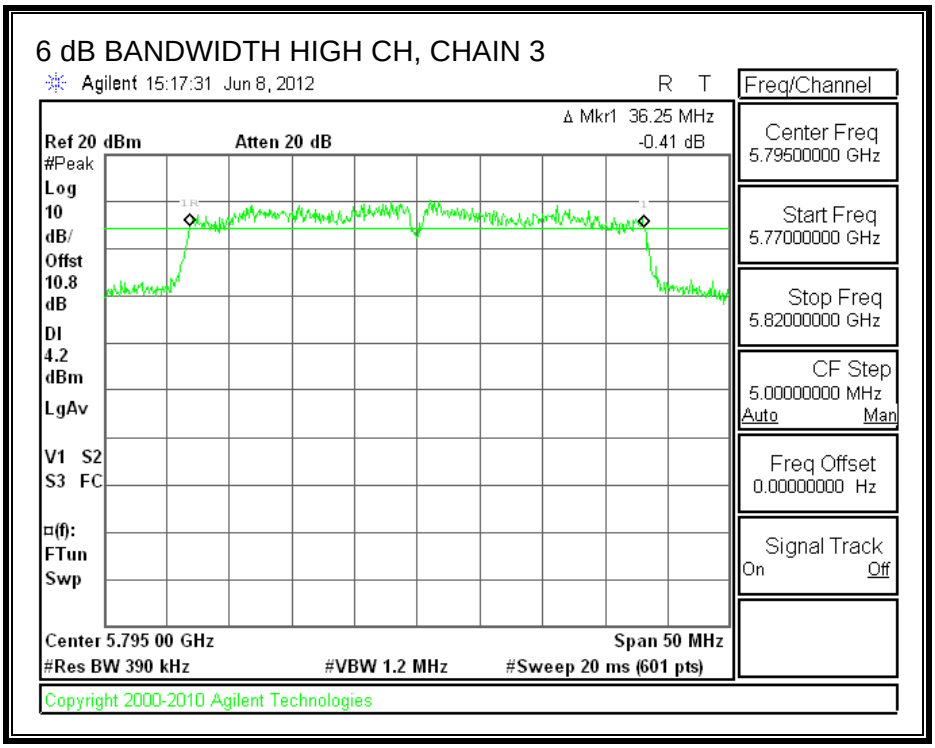
6 dB BANDWIDTH, CHAIN 2





6 dB BANDWIDTH, CHAIN 3





7.7.2. 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

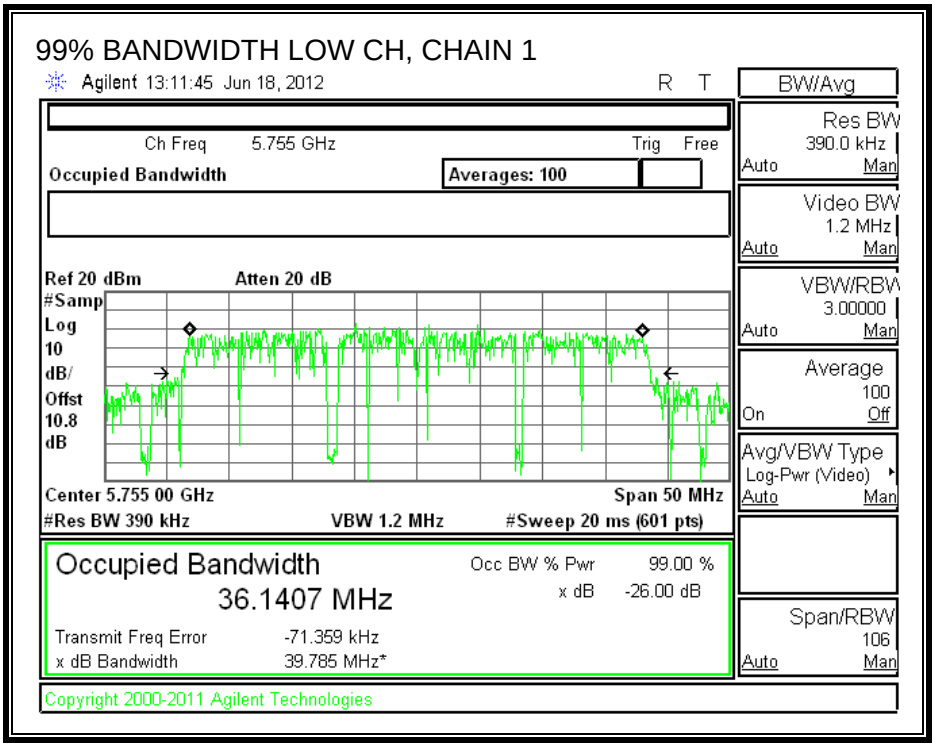
TEST PROCEDURE

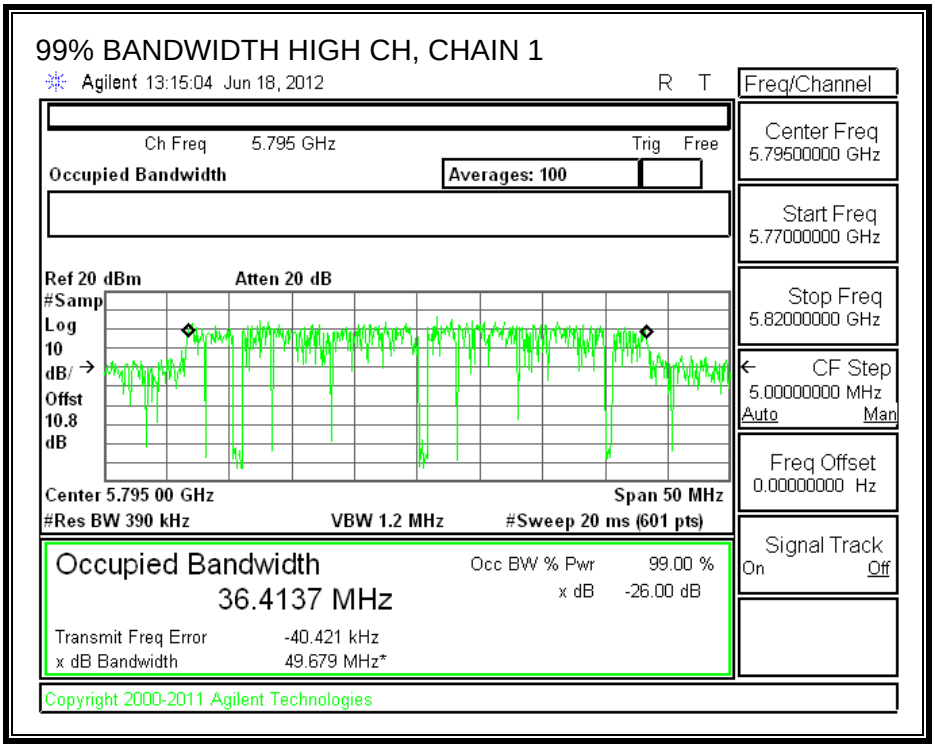
The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the 99 % bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal 99% bandwidth function is utilized.

RESULTS

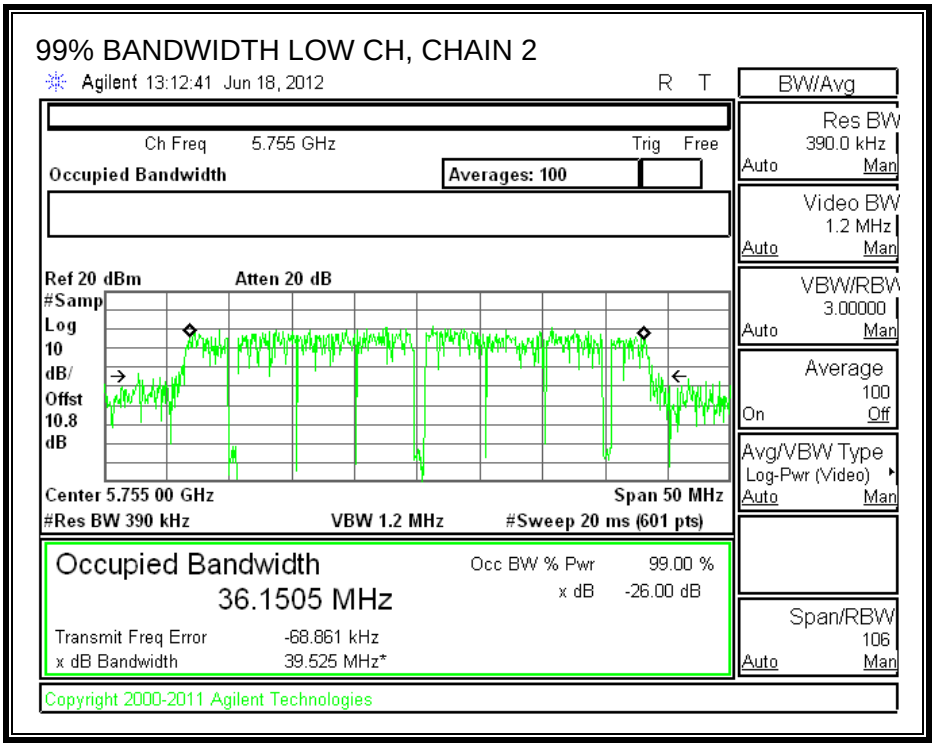
Channel	Frequency (MHz)	Chain 1 99% Bandwidth (MHz)	Chain 2 99% Bandwidth (MHz)	Chain 3 99% Bandwidth (MHz)
Low	5755	36.1407	36.1505	36.1750
High	5795	36.4137	36.4344	36.4085

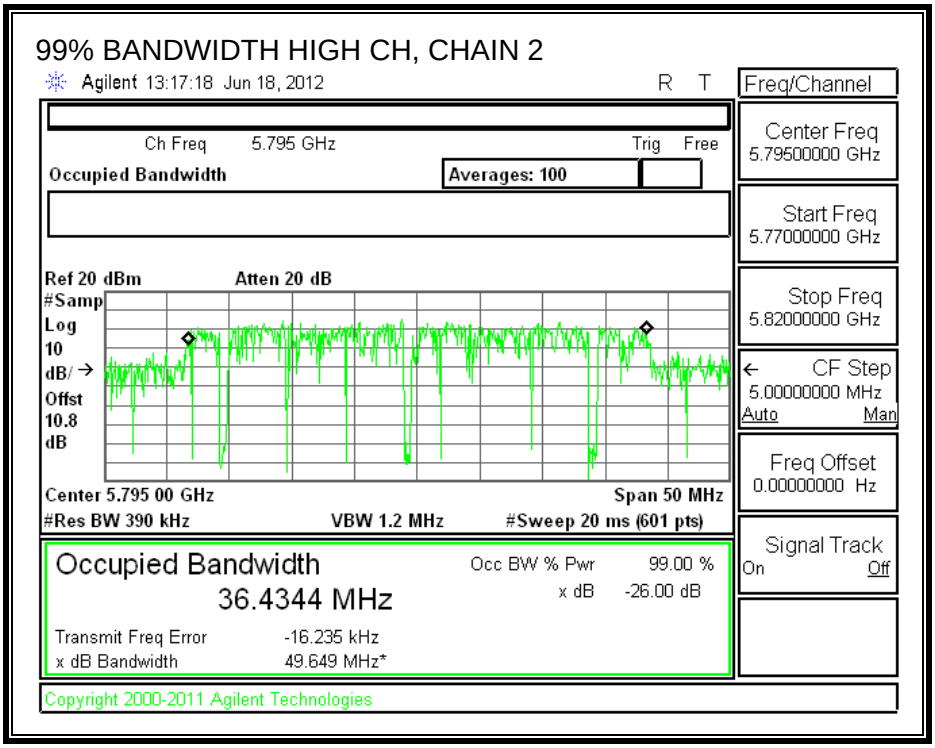
99% BANDWIDTH, CHAIN 1



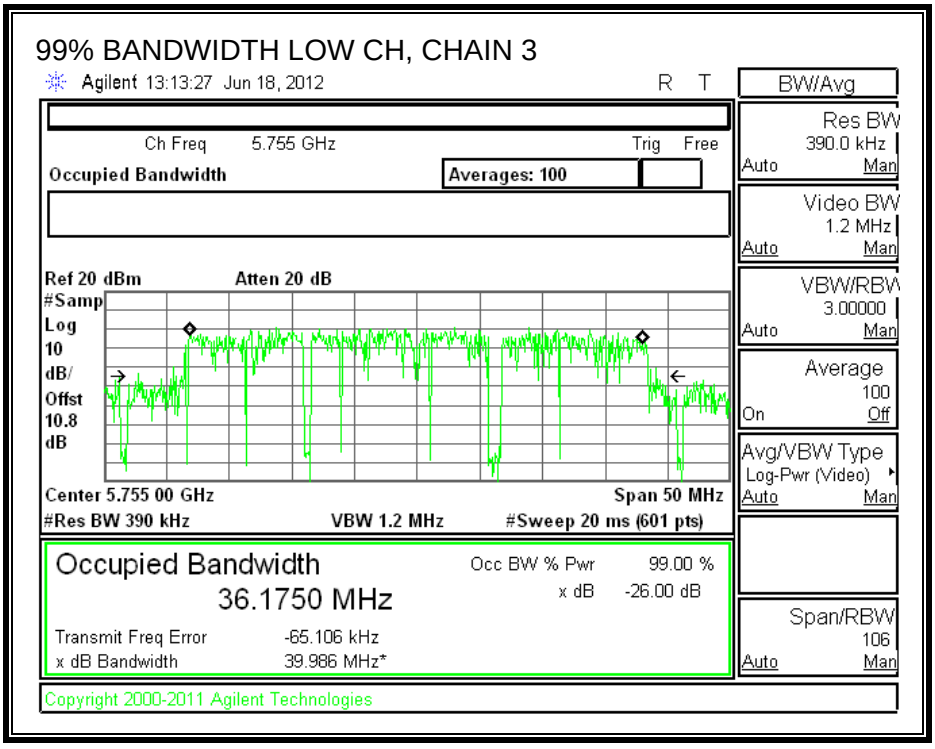


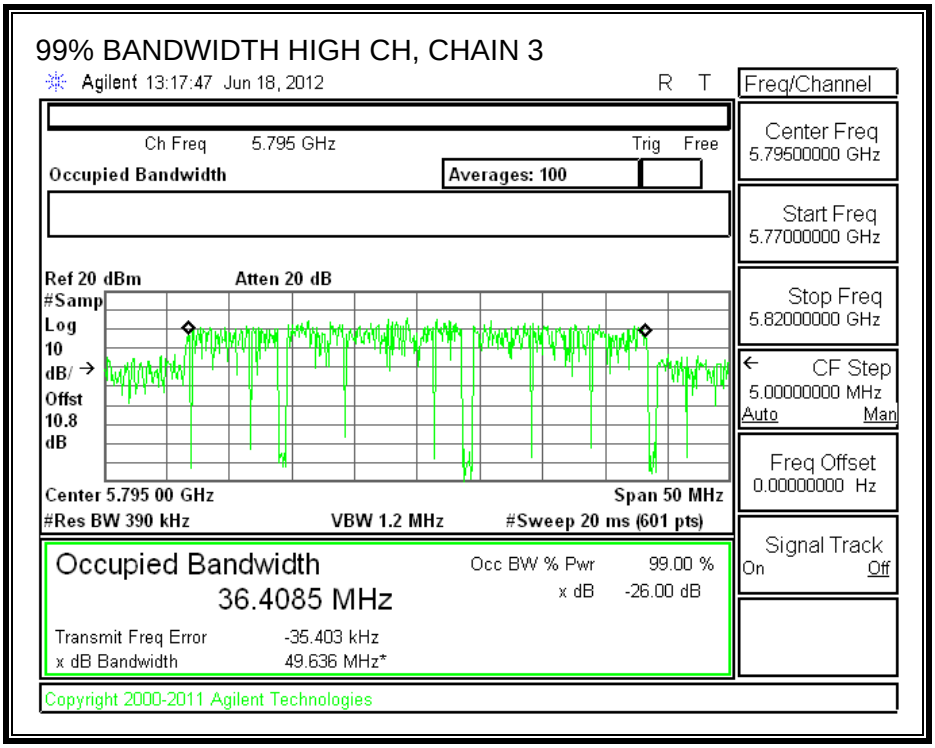
99% BANDWIDTH, CHAIN 2





99% BANDWIDTH, CHAIN 3





7.7.3. OUTPUT POWER

LIMITS

FCC §15.247 (b)

IC RSS-210 A8.4

The TX chains are correlated and the antenna gain is unequal among the chains. The directional gain is:

Chain 1 Antenna Gain (dBi)	Chain 2 Antenna Gain (dBi)	Chain 3 Antenna Gain (dBi)	Correlated Chains Directional Gain (dBi)
1.91	4.18	4.39	8.33

The maximum effective composite gain is 8.33 dBi for other than fixed, point-to-point operations, therefore the limit is 27.67 dBm.

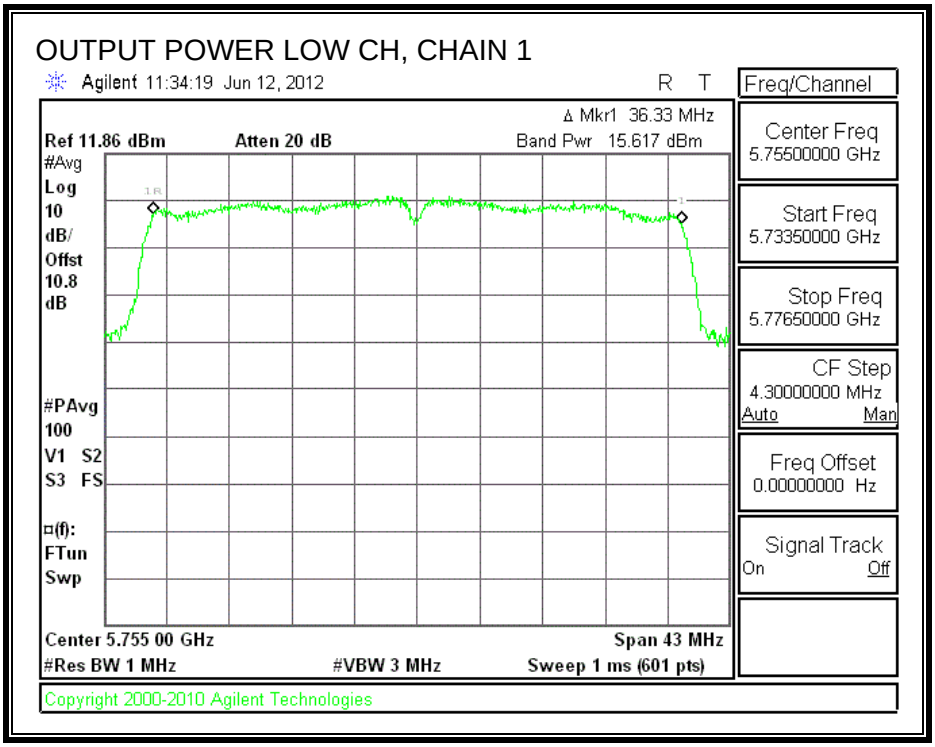
TEST PROCEDURE

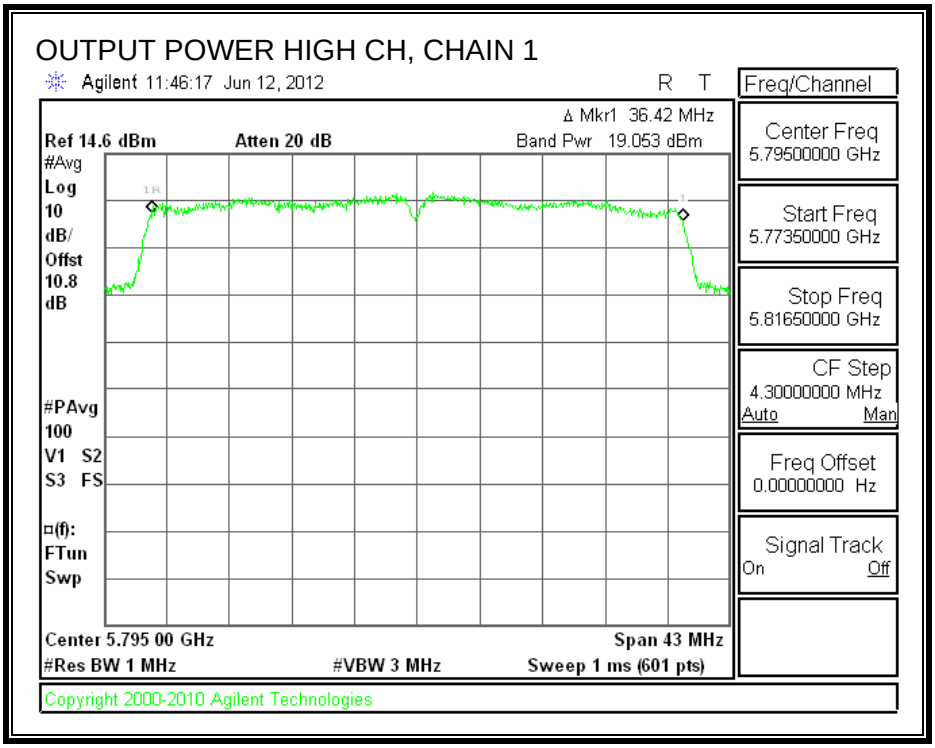
KDB 558074 D01 V01 “Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under 15.247”, dated 01/18/2012.

RESULTS

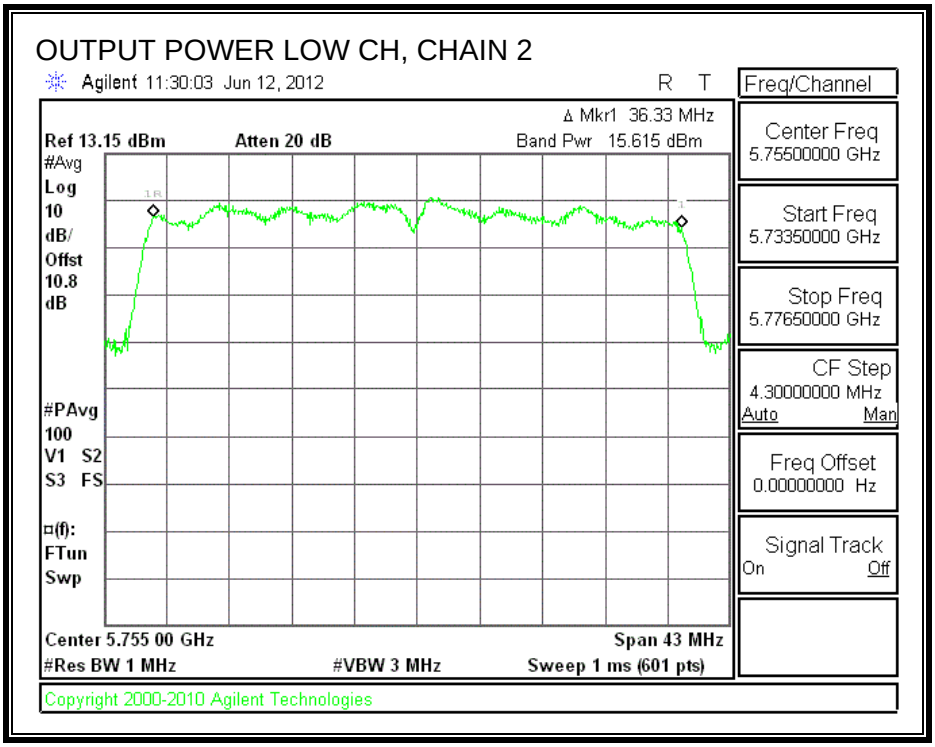
Channel	Frequency (MHz)	Chain 1 RMS Power (dBm)	Chain 2 RMS Power (dBm)	Chain 3 RMS Power (dBm)	Total RMS Power (dBm)	Limit (dBm)	Margin (dB)
Low	**5755**	**15.617**	**15.615**	**15.729**	**20.425**	**27.67**	**-7.245**
High	**5795**	**19.053**	**19.067**	**19.254**	**23.897**	**27.67**	**-3.773**

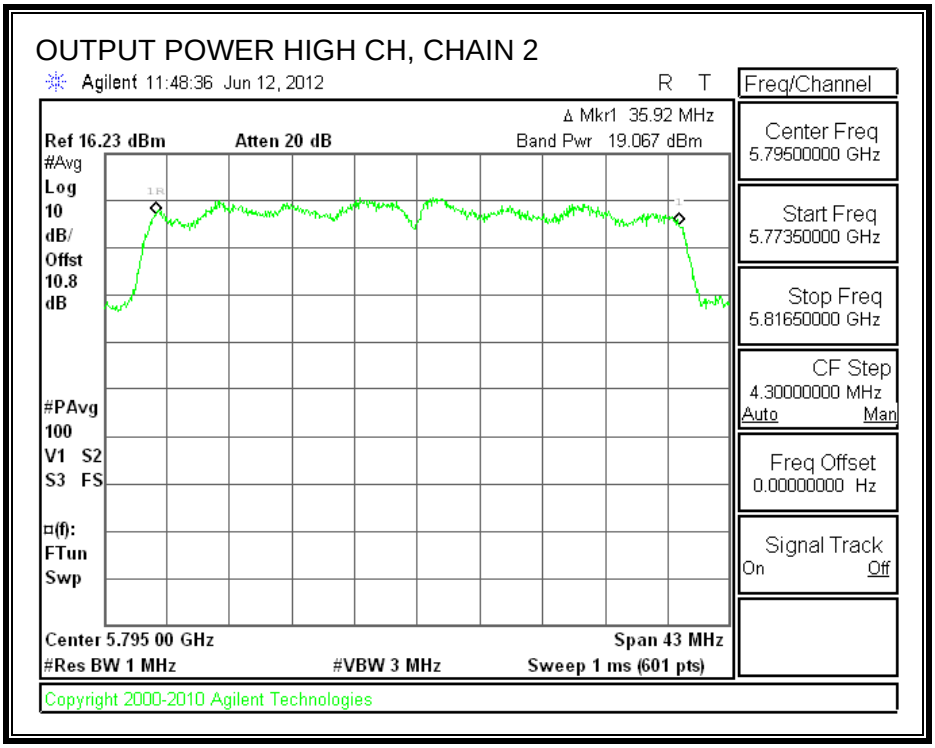
CHAIN 1 OUTPUT POWER



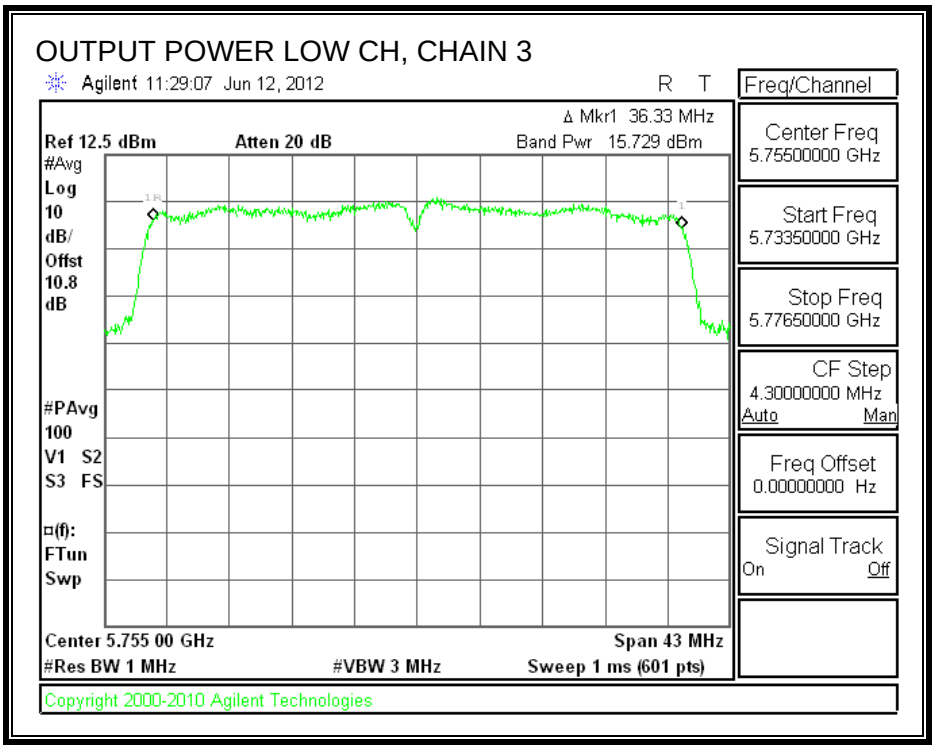


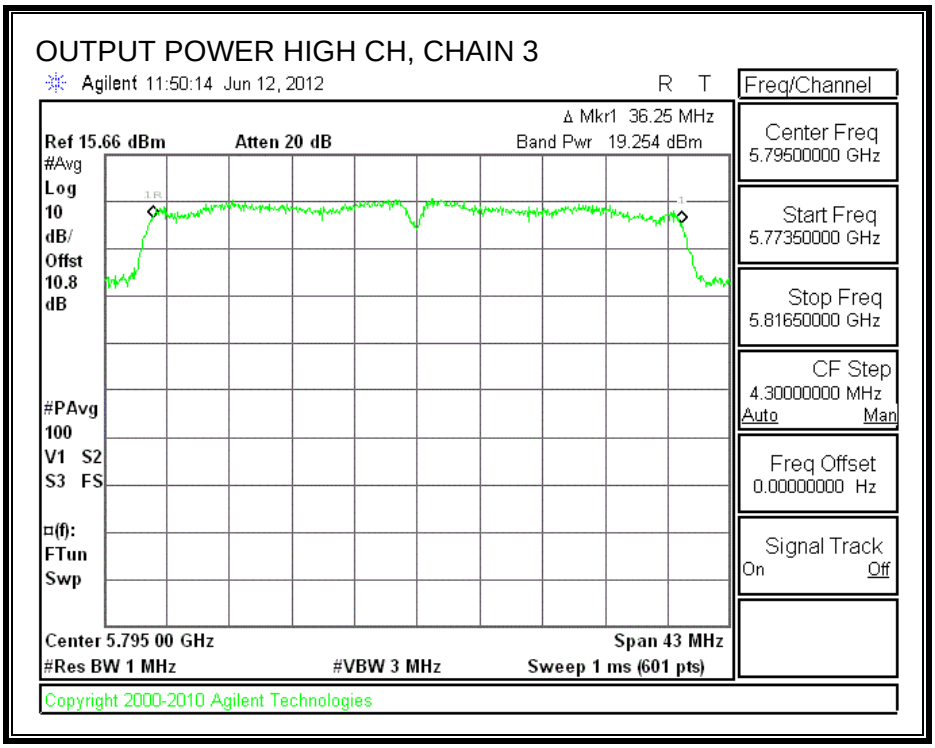
CHAIN 2 OUTPUT POWER





CHAIN 3 OUTPUT POWER





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 10.8 dB (including 10 dB pad and 0.80 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)	Chain 3 Power (dBm)	Total Power (dBm)
Low	**5755**	15.50	15.50	15.50	**20.27**
High	**5795**	19.00	19.00	19.00	**23.77**

7.7.5. POWER SPECTRAL DENSITY

LIMITS

FCC §15.247 (e)

IC RSS-210 A8.2 (b)

TEST PROCEDURE

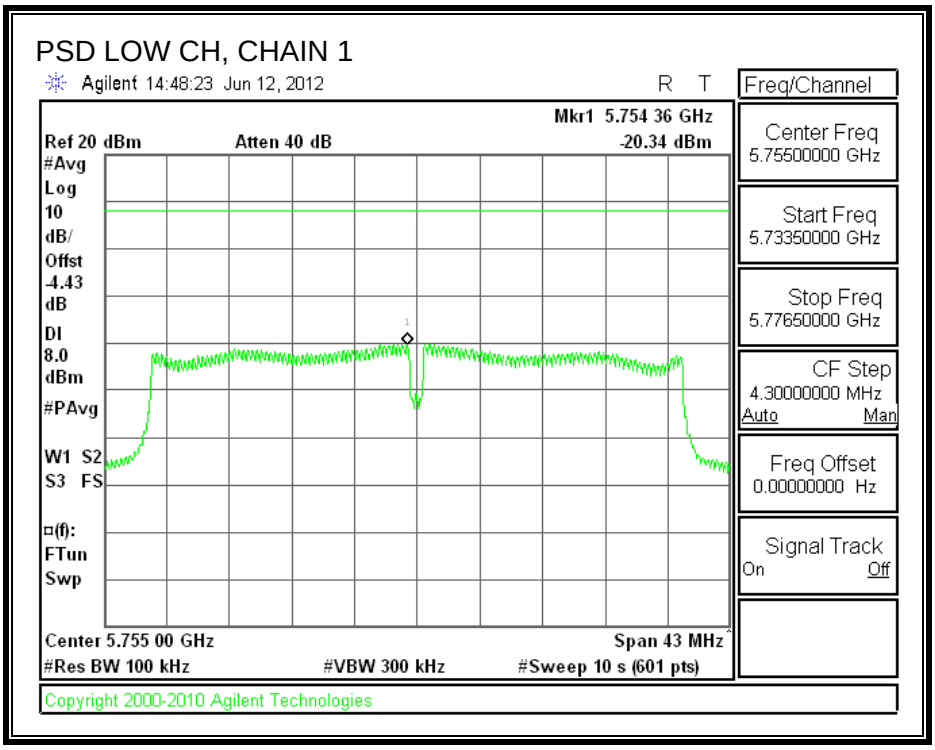
KDB 558074 D01 V01 "Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under 15.247", dated 01/18/2012.

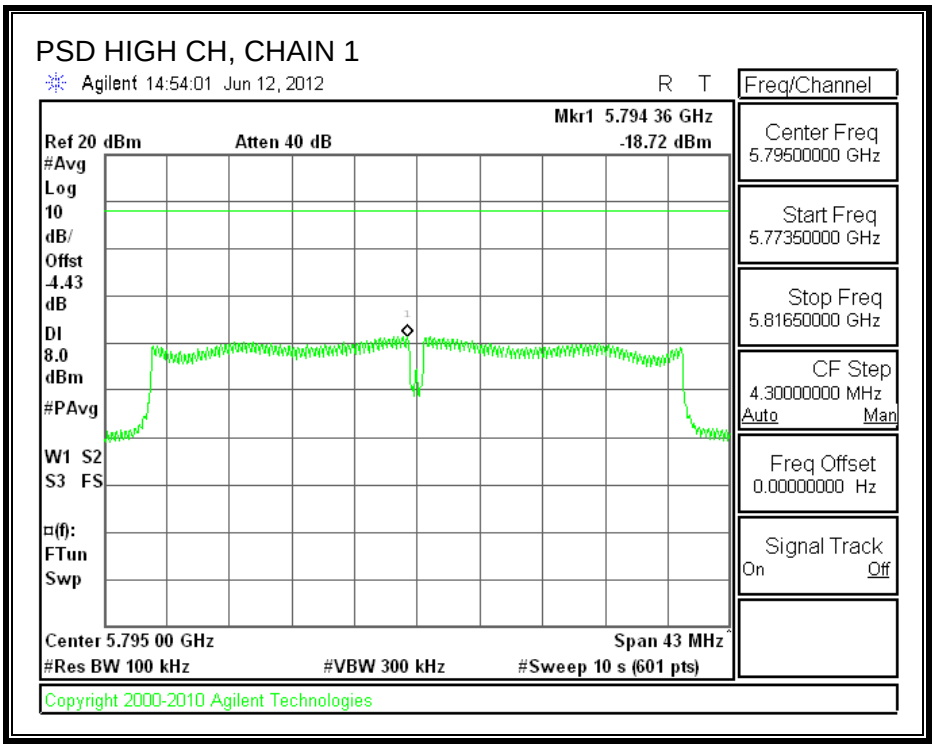
RESULTS:

Channel	Frequency (MHz)	Chain 1 PSD (dBm)	Chain 2 PSD (dBm)	Chain 3 PSD (dBm)	Total PSD (dBm)	Limit (dBm)	Margin (dB)
Low	5755	-20.34	-17.69	-19.72	-14.33	8	-22.33
High	5795	-18.72	-17.71	-18.35	-13.47	8	-21.47

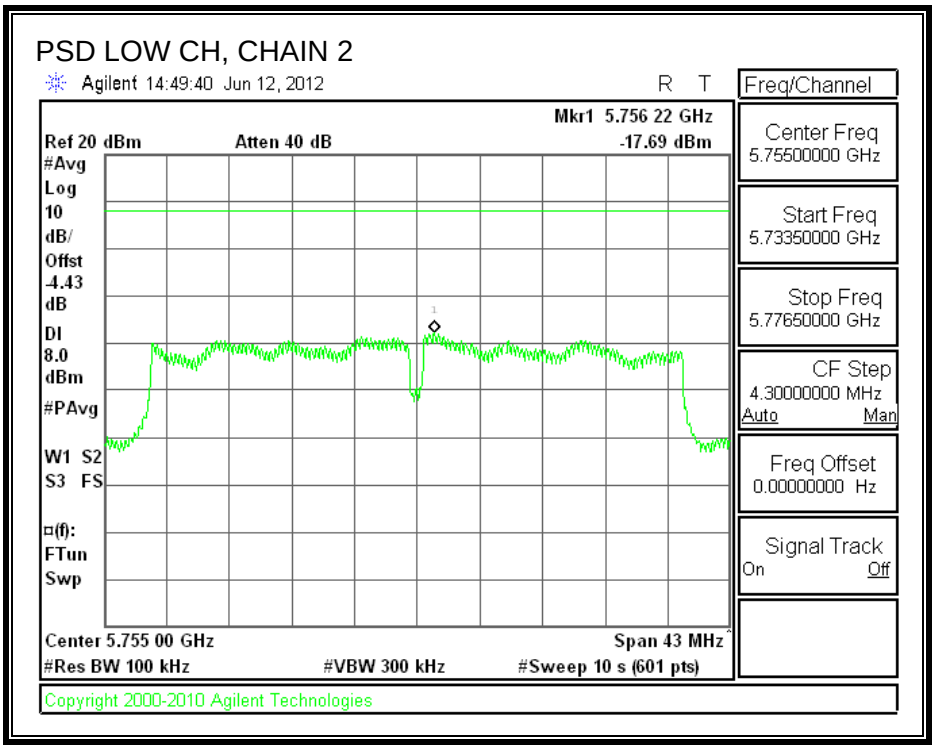
Note: The spectrum analyzer offset = attenuator loss + cable loss + 10 log (3/100 kHz) = -4.43 dB.

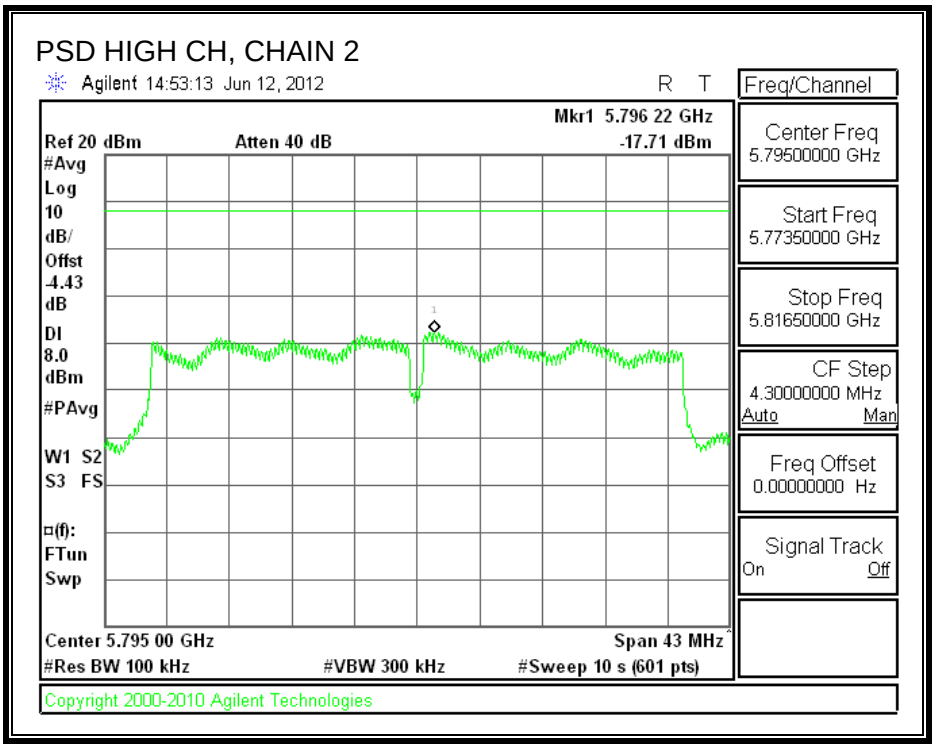
POWER SPECTRAL DENSITY, CHAIN 1



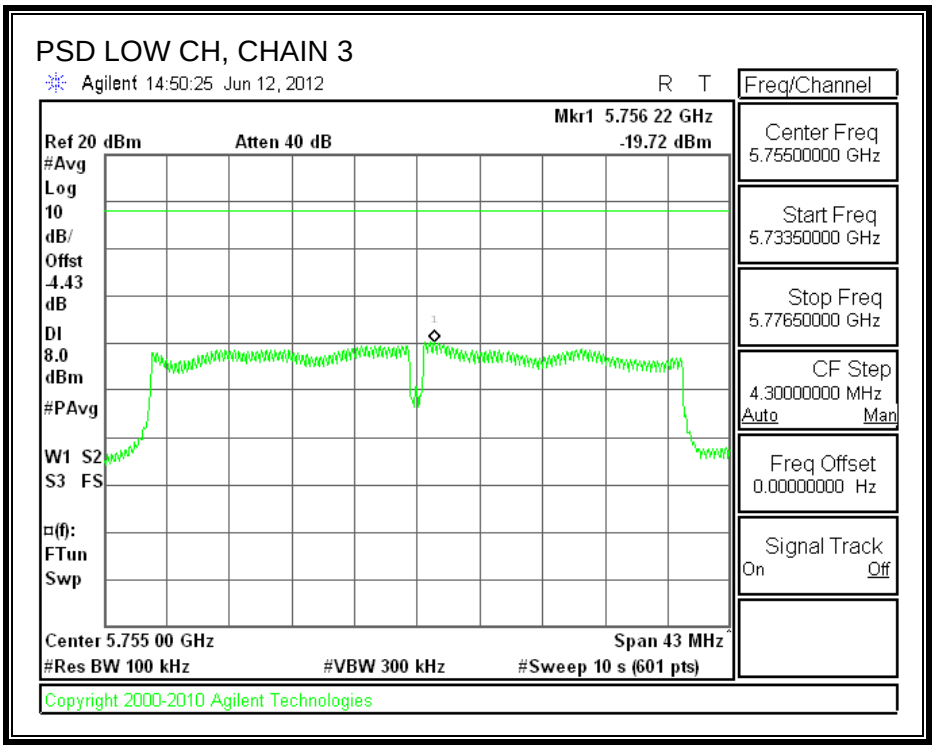


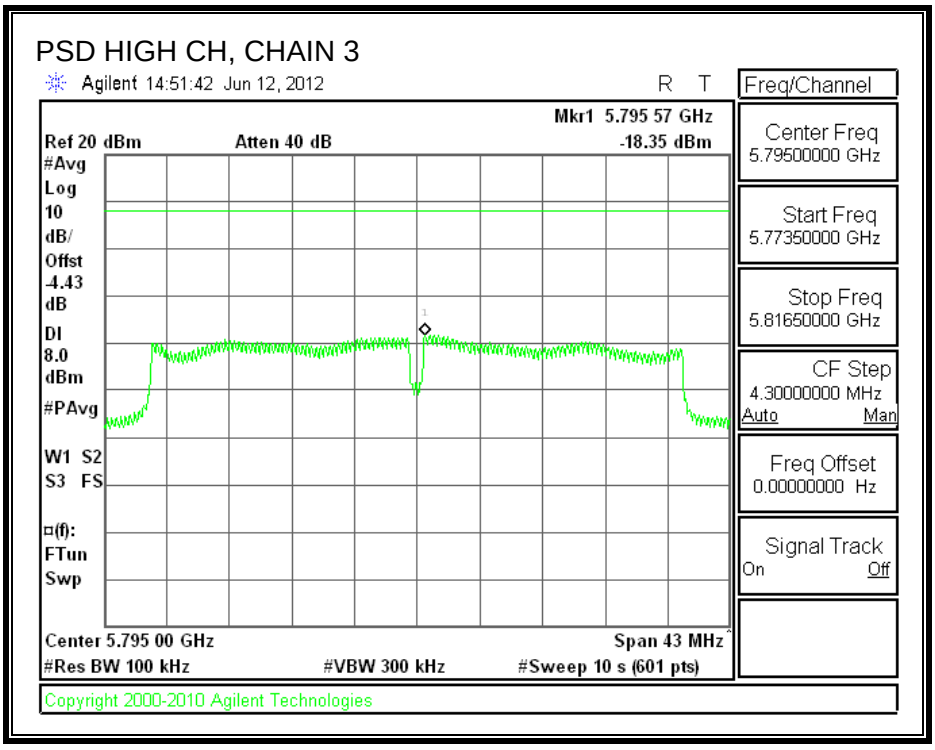
POWER SPECTRAL DENSITY, CHAIN 2





POWER SPECTRAL DENSITY, CHAIN 3





7.7.6. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.247 (d)

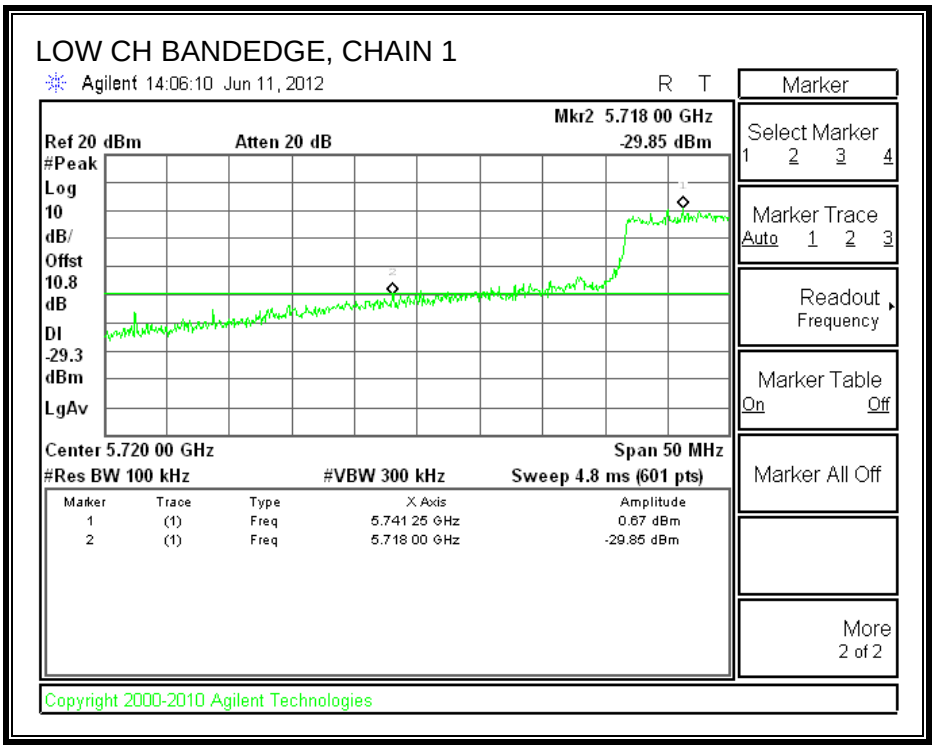
IC RSS-210 A8.5

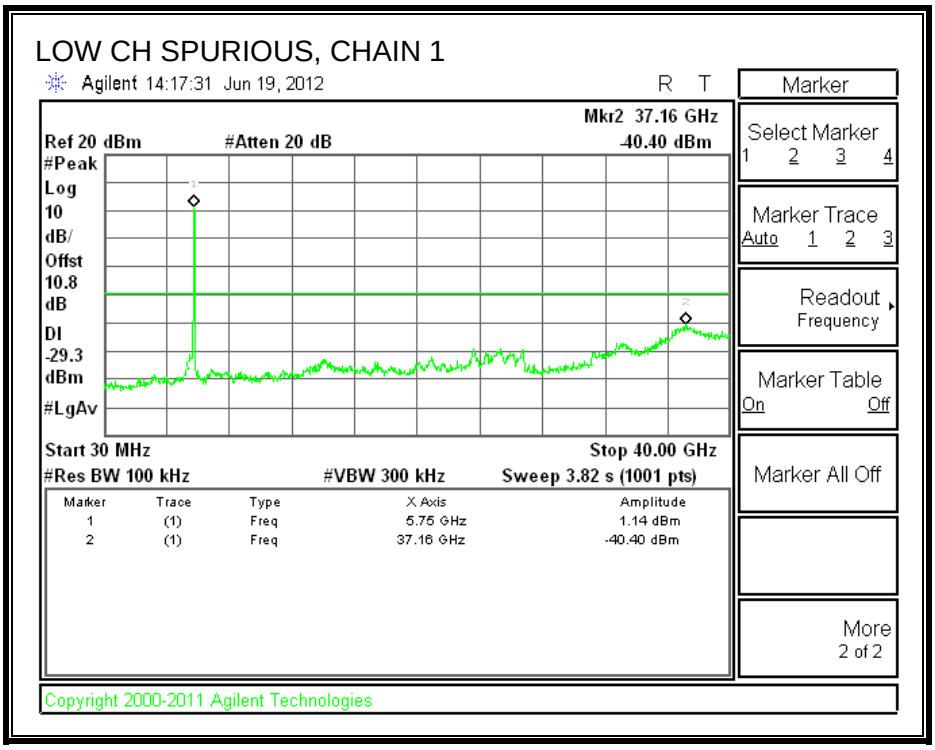
Output power was measured based on the use of RMS averaging over a time interval, therefore the required attenuation is 30 dB.

TEST PROCEDURE

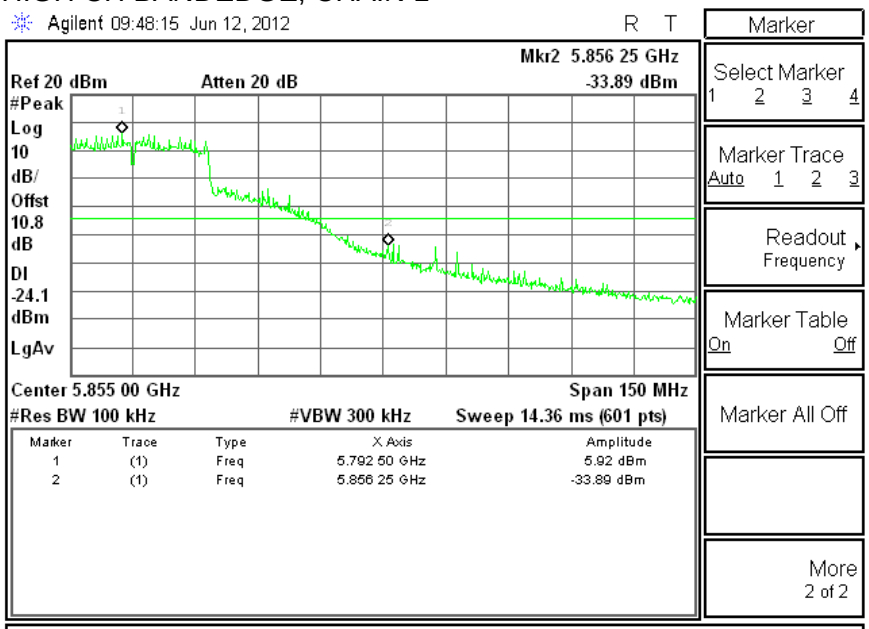
KDB 558074 D01 V01 “Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under 15.247”, dated 01/18/2012.

CHAIN 1 SPURIOUS EMISSIONS

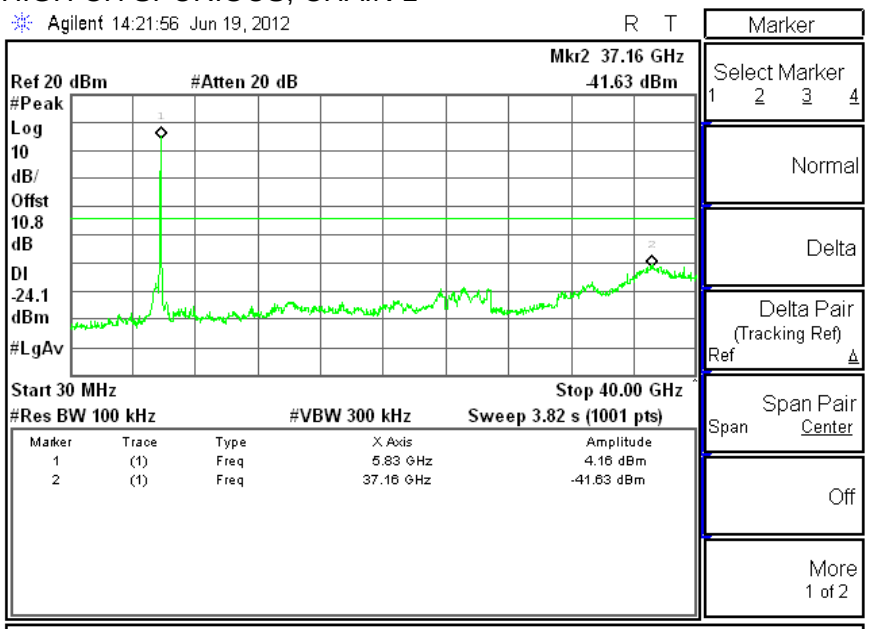




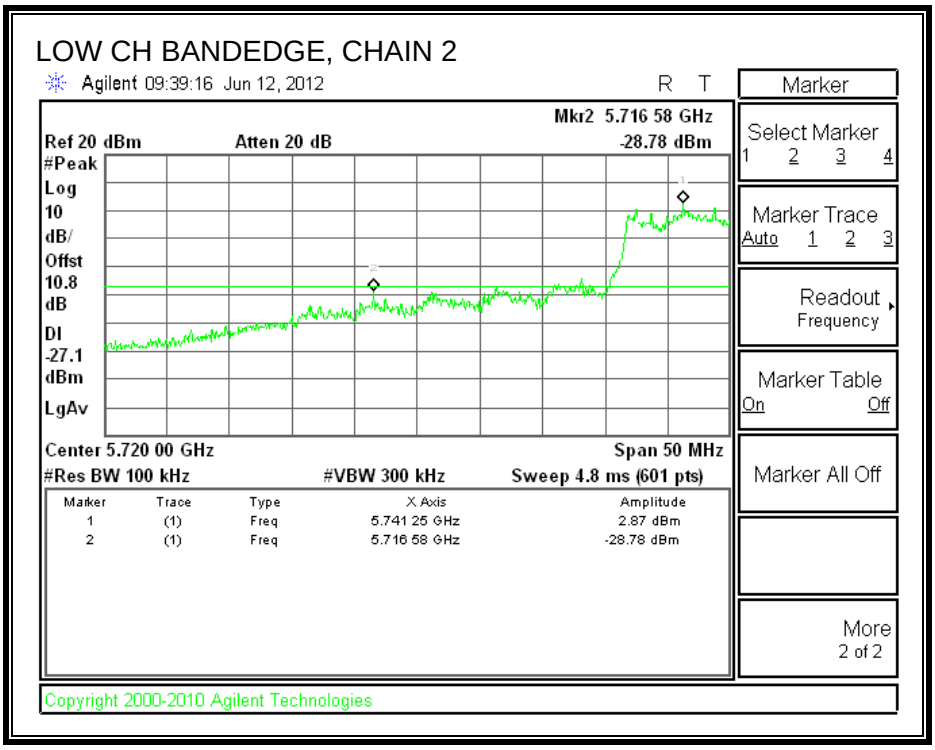
HIGH CH BANDEDGE, CHAIN 1

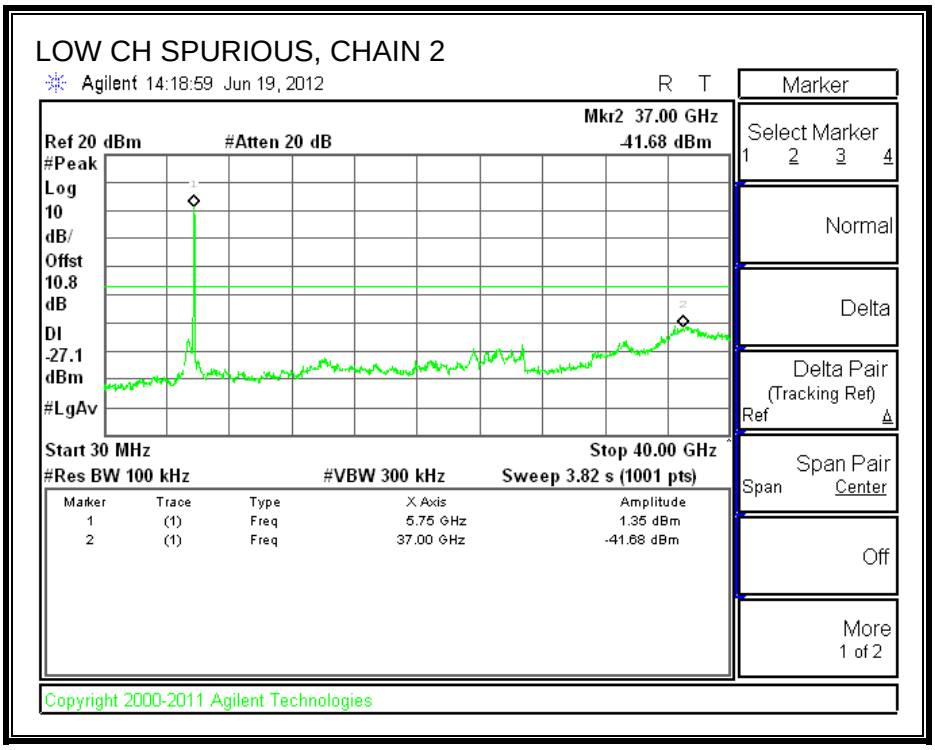


HIGH CH SPURIOUS, CHAIN 1

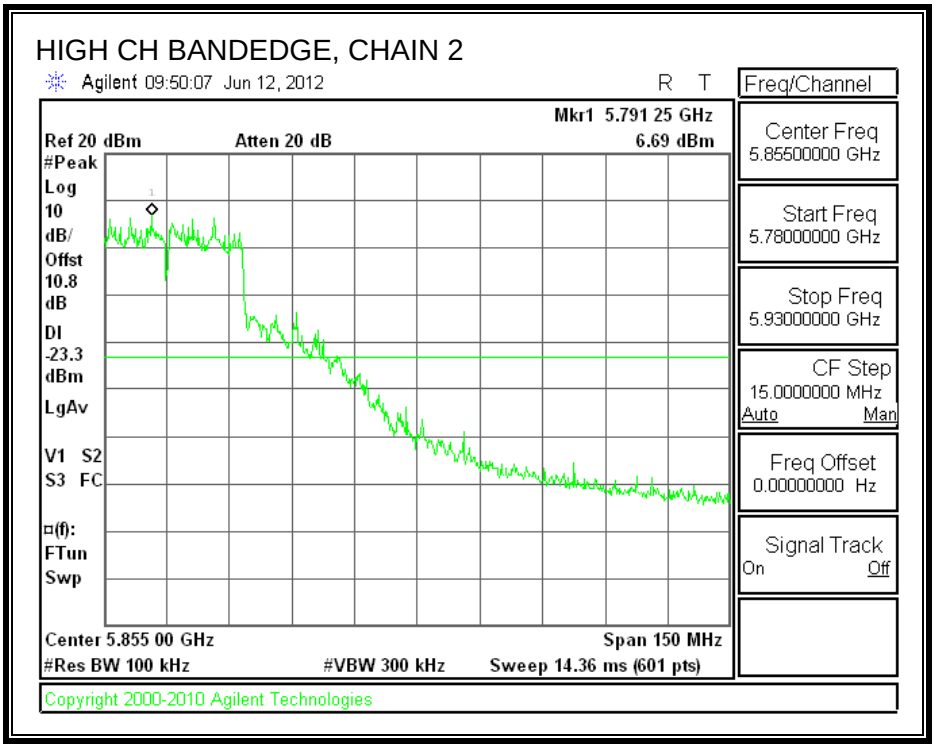


CHAIN 2 SPURIOUS EMISSIONS

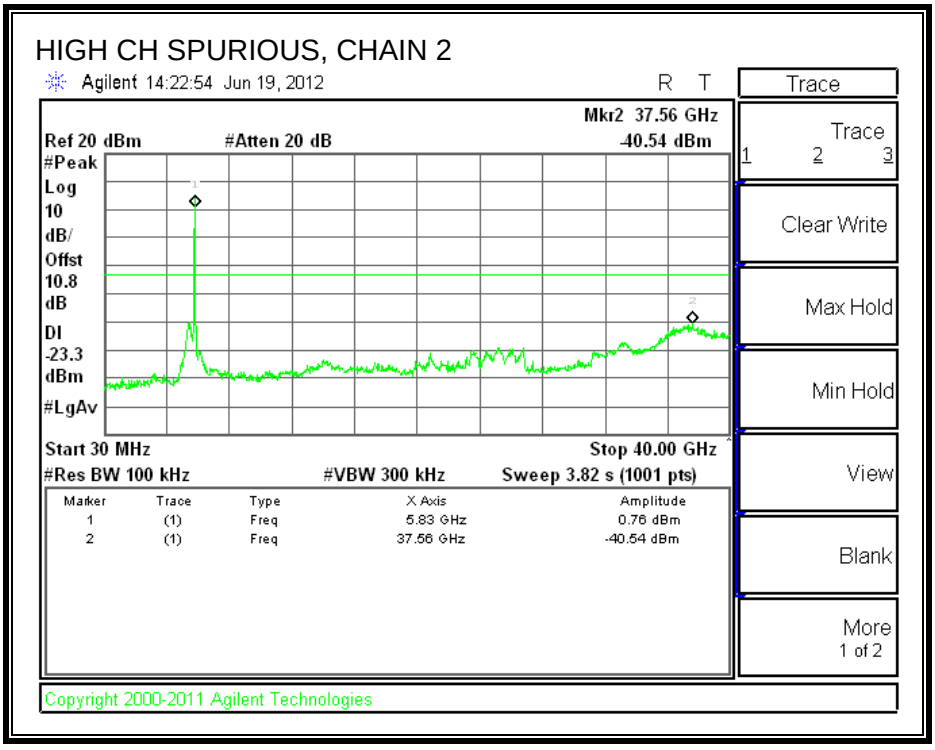




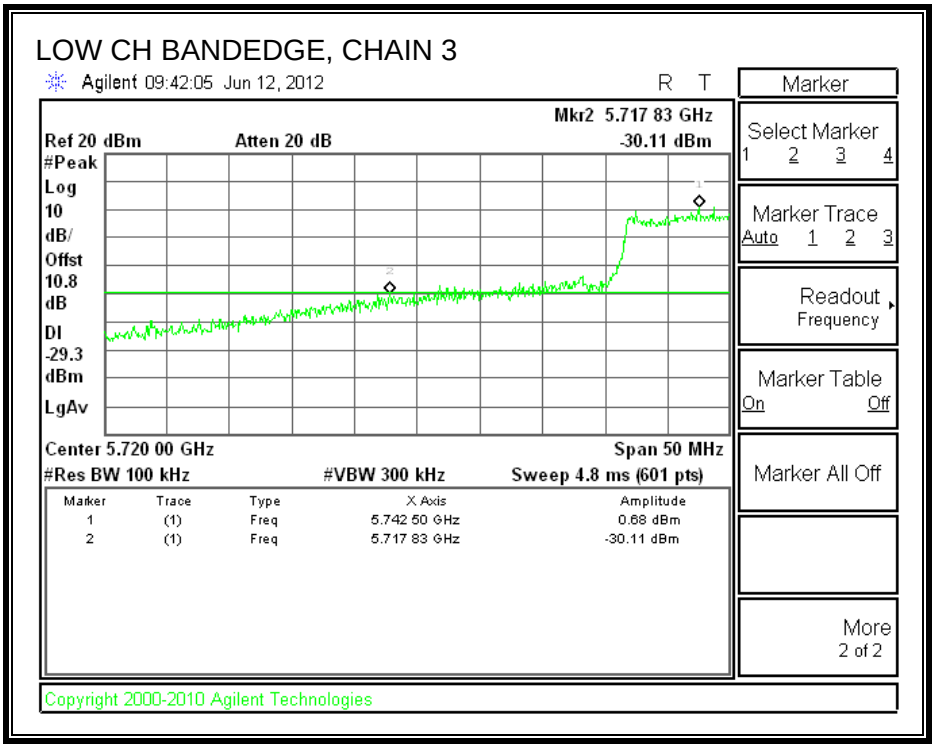
HIGH CH BANDEDGE, CHAIN 2

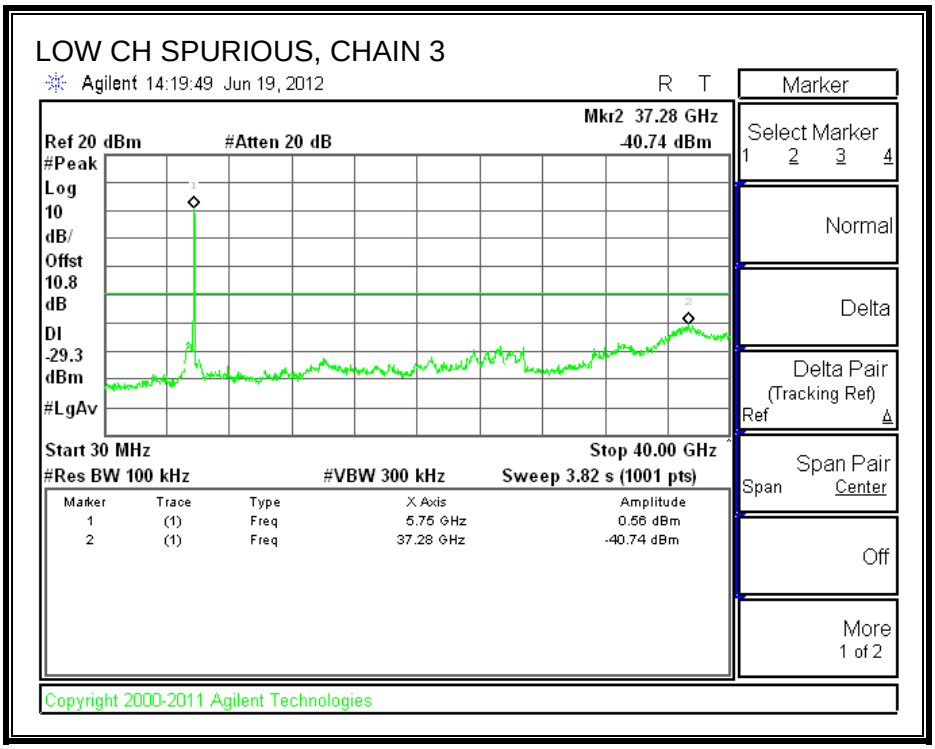


HIGH CH SPURIOUS, CHAIN 2

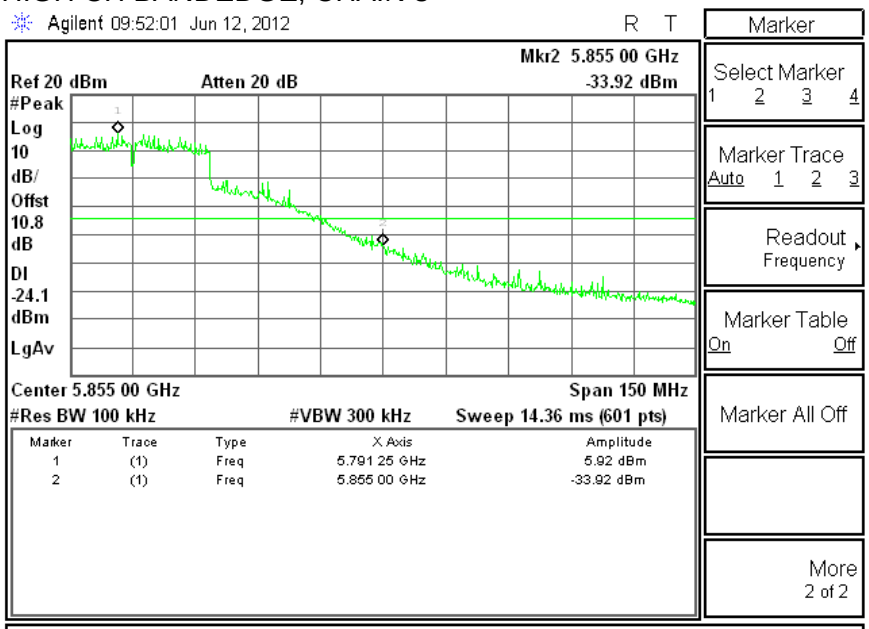


CHAIN 3 SPURIOUS EMISSIONS

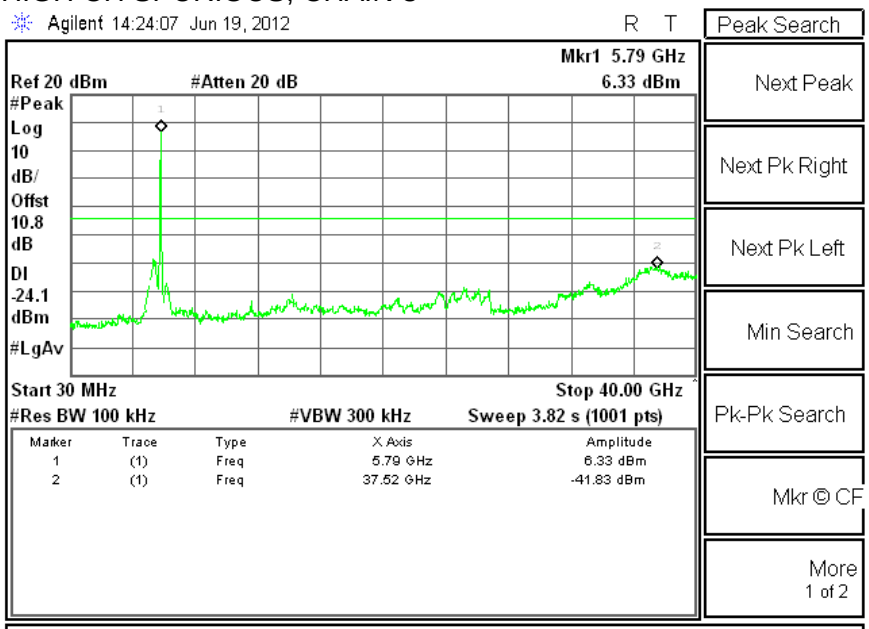




HIGH CH BANDEDGE, CHAIN 3



HIGH CH SPURIOUS, CHAIN 3



8. RADIATED TEST RESULTS

8.1. LIMITS AND PROCEDURE

LIMITS

FCC §15.205 and §15.209

IC RSS-210 Clause 2.6 (Transmitter)

IC RSS-GEN Clause 6 (Receiver)

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

TEST PROCEDURE

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

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

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

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

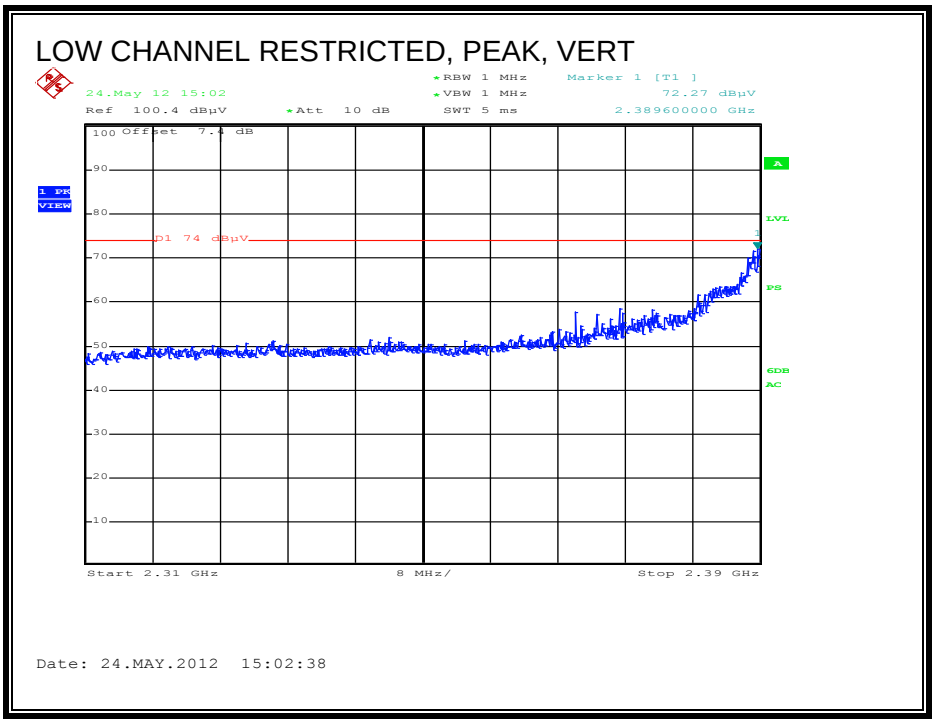
The spectrum from 30 MHz to 40 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in each applicable band.

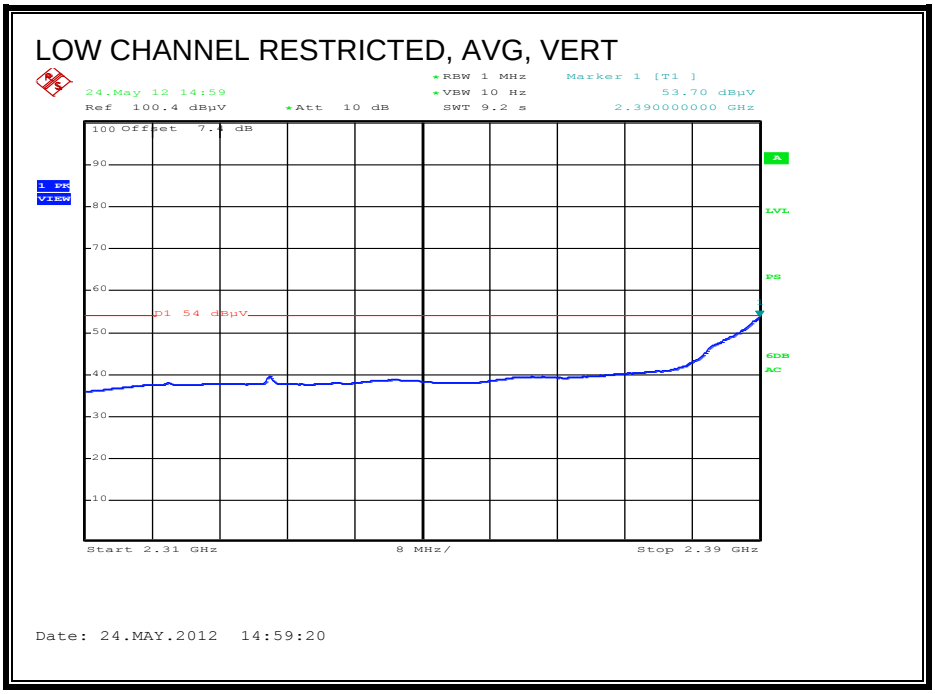
The frequency range of interest is monitored at a fixed antenna height and EUT azimuth. The EUT is rotated through 360 degrees to maximize emissions received. The antenna is scanned from 1 to 4 meters above the ground plane to further maximize the emission. Measurements are made with the antenna polarized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

8.2. TRANSMITTER ABOVE 1 GHz

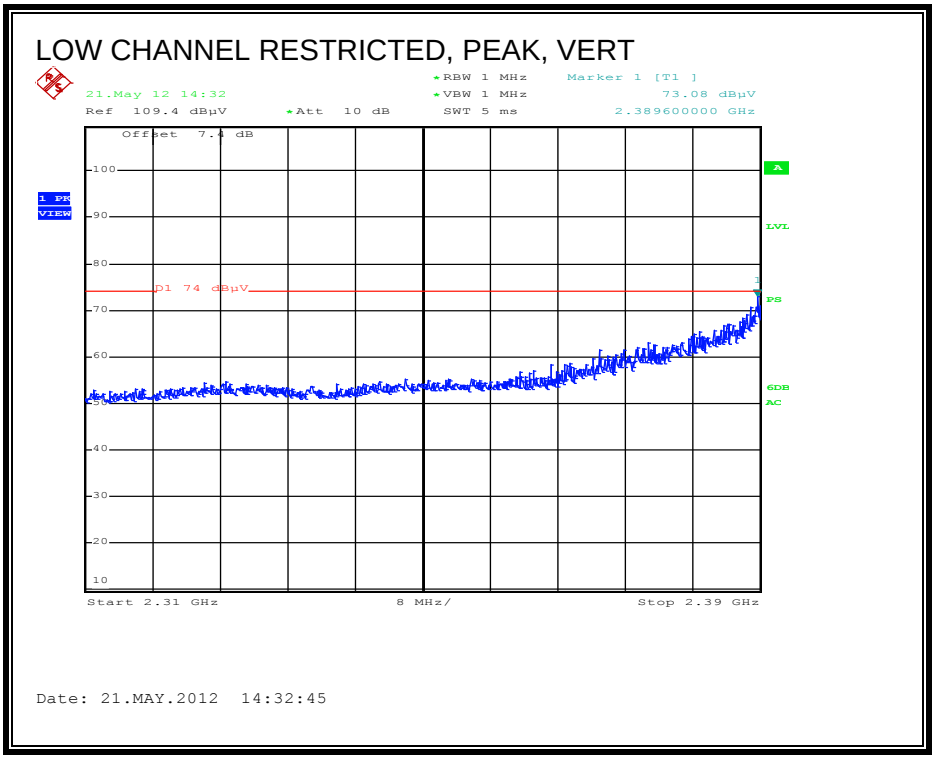
8.2.1. TX ABOVE 1 GHz, 802.11g 1TX MODE IN THE 2.4 GHz BAND

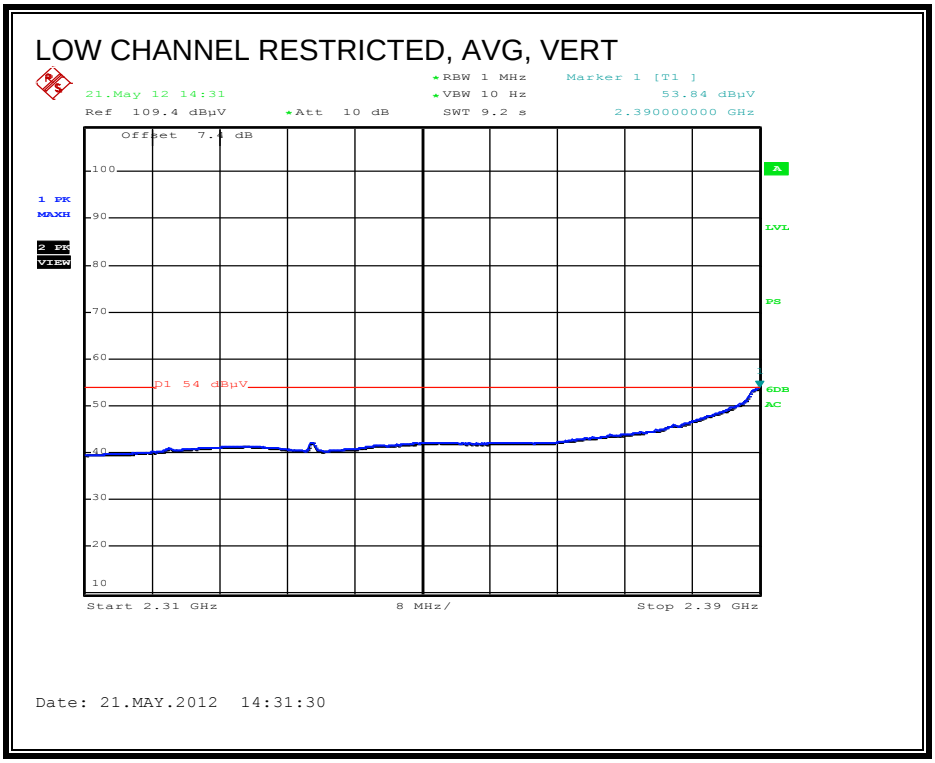
RESTRICTED BANDEDGE (LOW CHANNEL, 2412 MHz, VERT



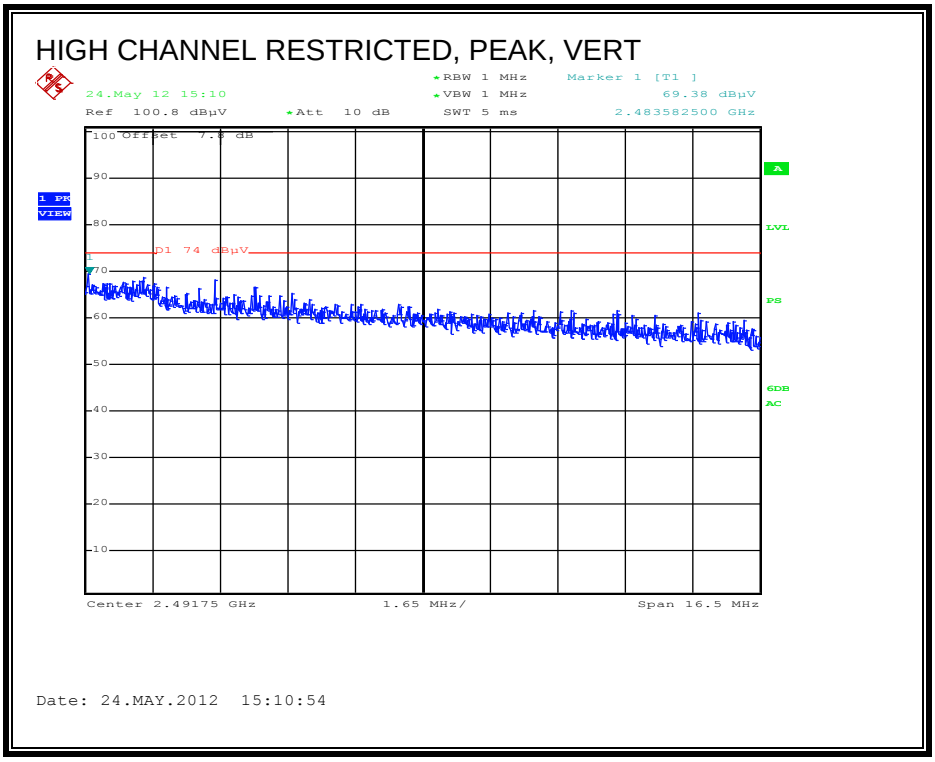


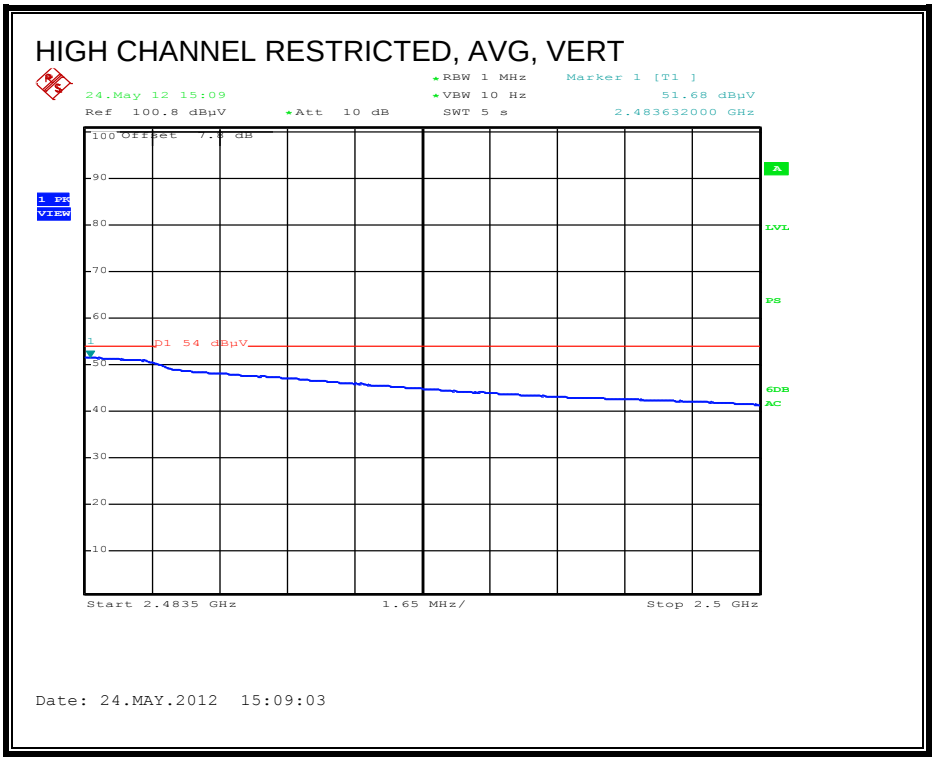
RESTRICTED BANDEDGE (LOW CHANNEL, 2417 MHz, VERTICAL)



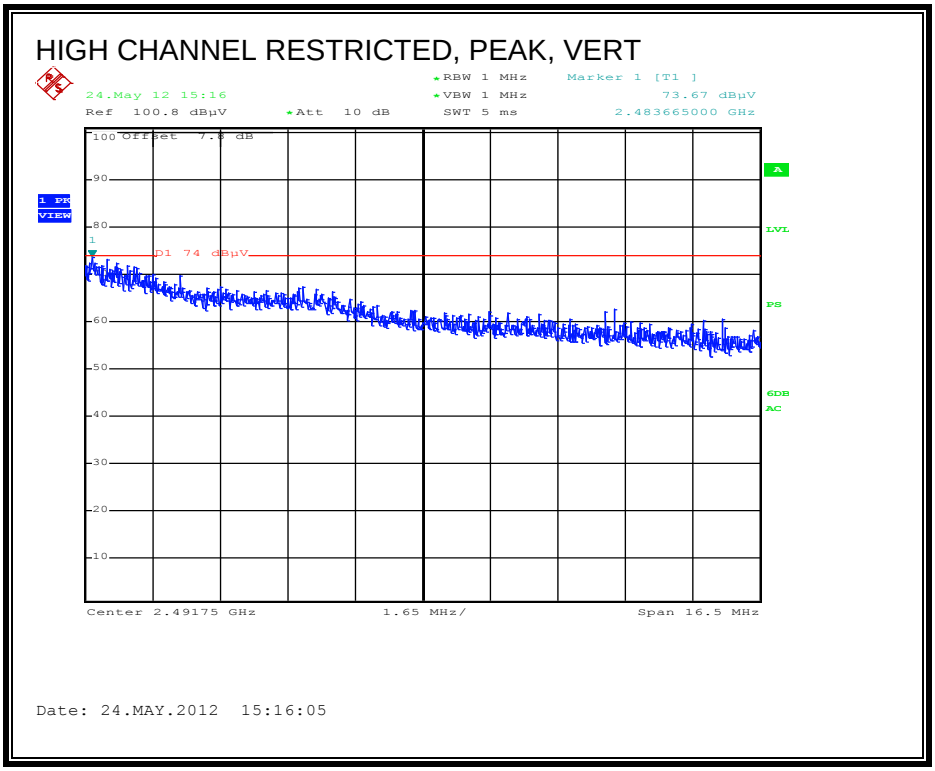


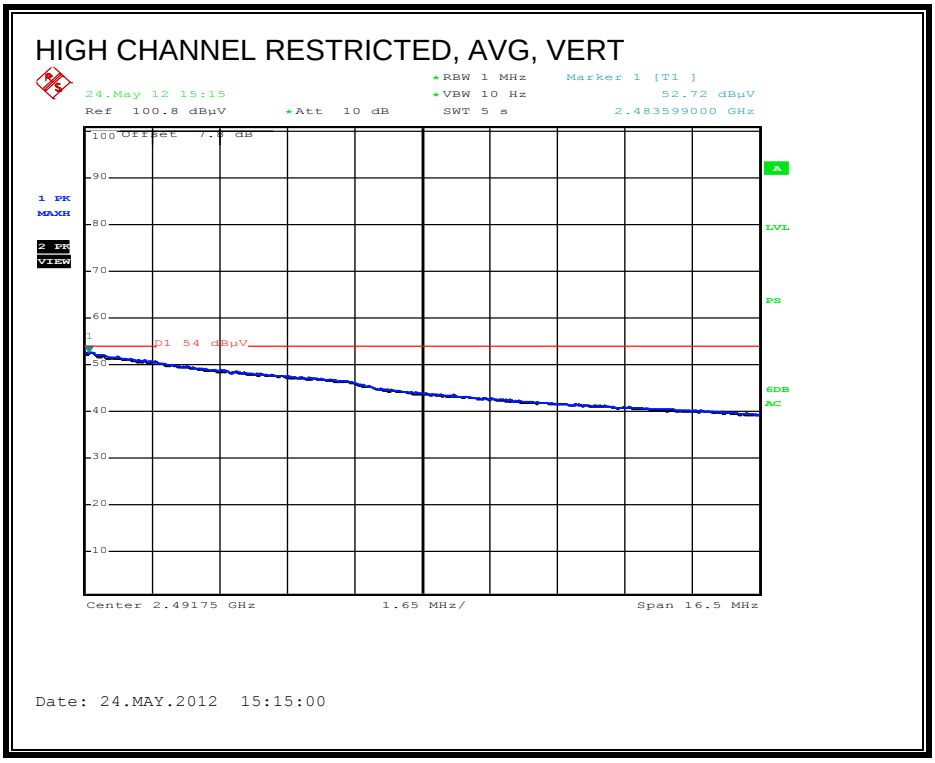
RESTRICTED BANDEDGE (HIGH CHANNEL, 2457 MHz, VERTICAL)





RESTRICTED BANDEDGE (HIGH CHANNEL, 2462MHz, VERTICAL)



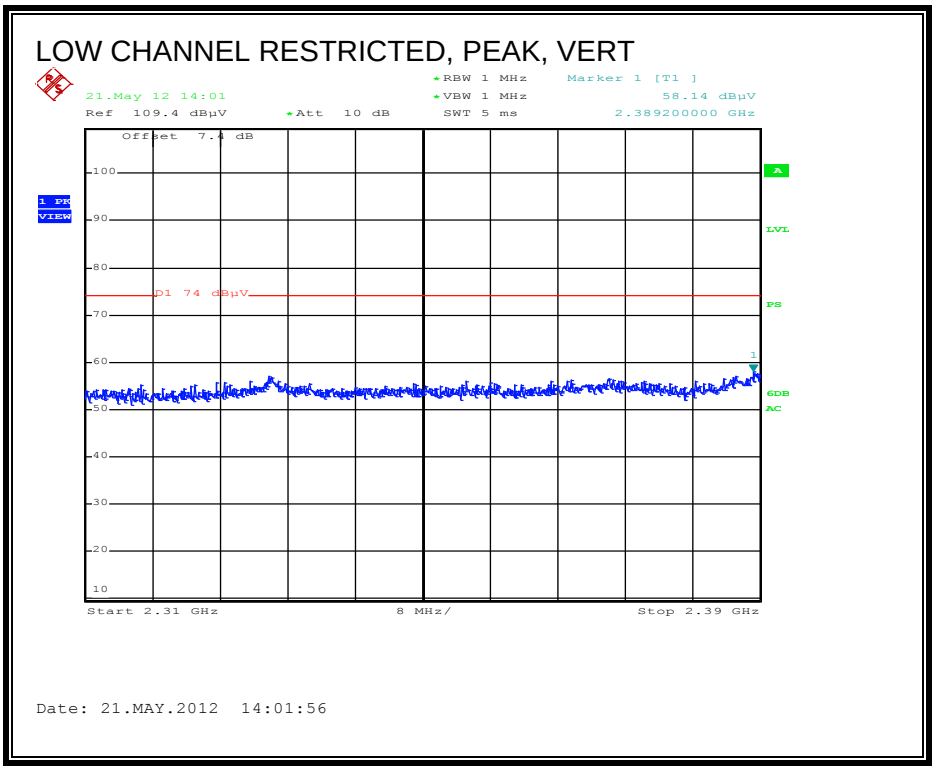


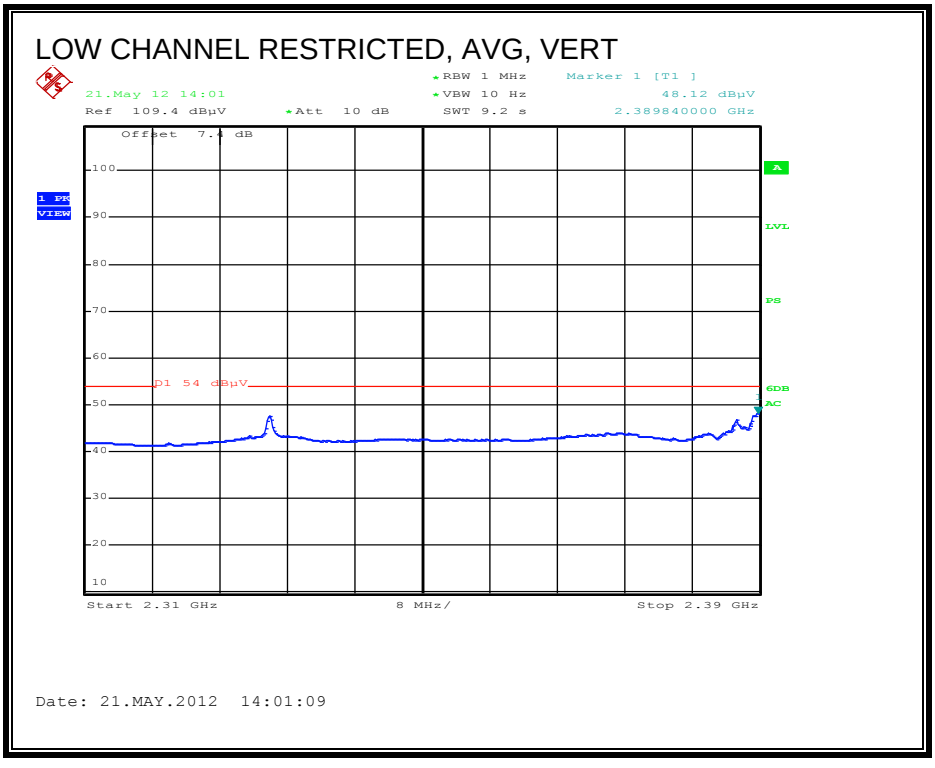
HARMONICS AND SPURIOUS EMISSIONS

Covered by testing to 11n HT20 CCD MCS0 3TX at highest output power 19dBm

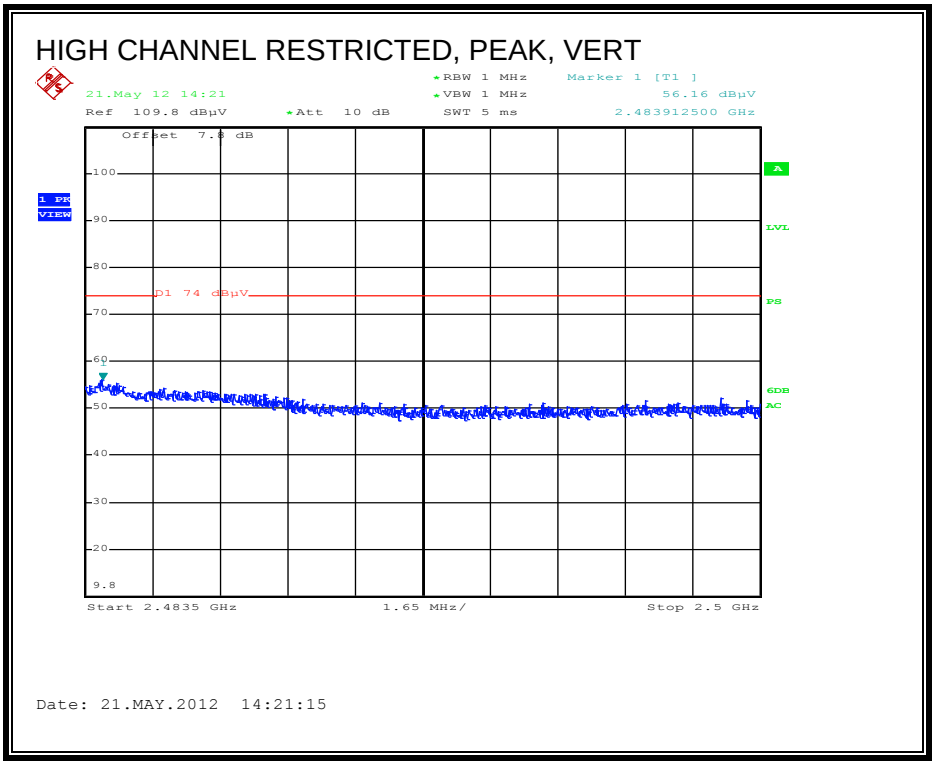
8.2.2. TX ABOVE 1 GHz, 802.11b CDD 3TX MODE IN THE 2.4 GHz BAND

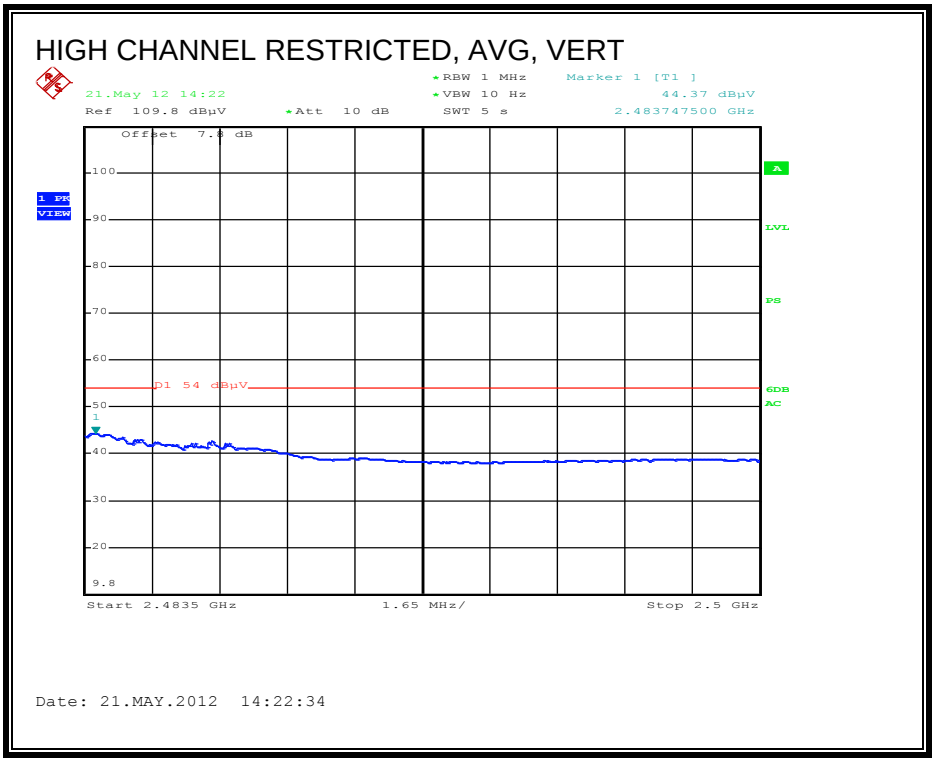
RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)





RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)





HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement
Compliance Certification Services, Fremont 5m Chamber

Test Engr: Vien Tran
Date: 05/22/12
Project #: 12U14373
Company: Broadcom
Test Target: FCC 15.247
Mode Oper: TX 11b 3x3 CDD Mode

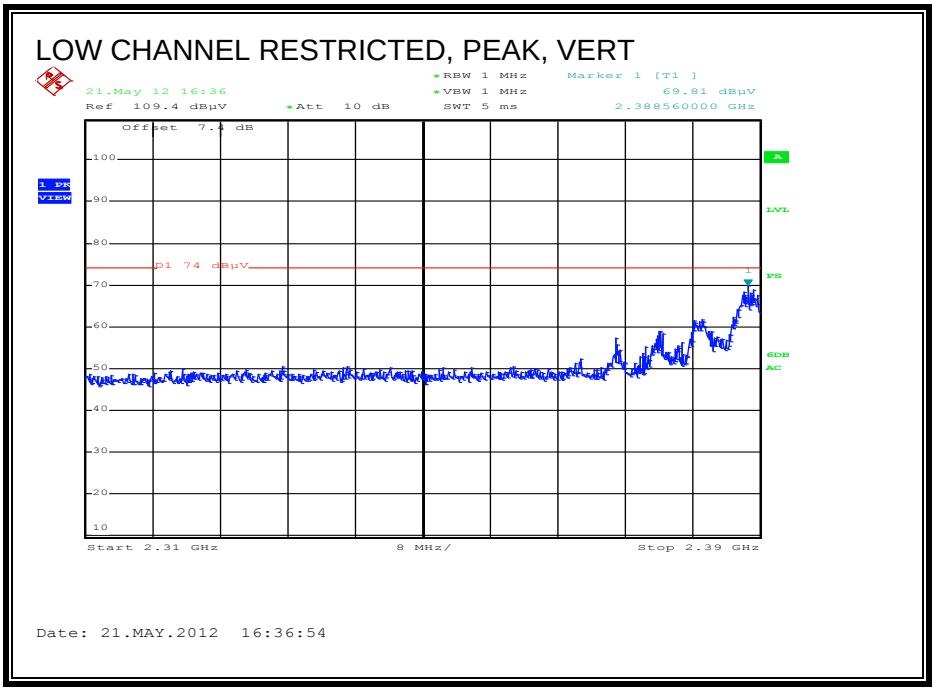
f	Measurement Frequency	Amp	Preamp Gain		Average Field Strength Limit
Dist	Distance to Antenna	D Corr	Distance Correct to 3 meters		Peak Field Strength Limit
Read	Analyzer Reading	Avg	Average Field Strength @ 3 m		Margin vs. Average Limit
AF	Antenna Factor	Peak	Calculated Peak Field Strength		Margin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

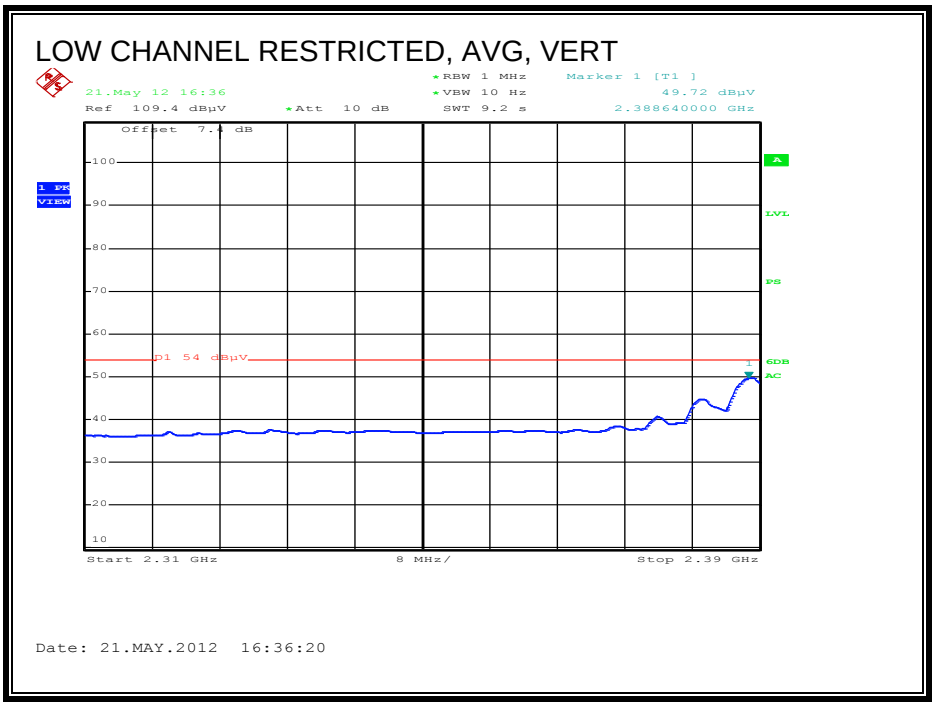
f GHz	Dist (m)	Read dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Corr. dBuV/m	Limit dBuV/m	Margin dB	Ant. Pol. V/H	Det. P/A/QP	Ant.High cm	Table Angle Degree	Notes
LOW CHANNEL, 2412MHz															
4.824	3.0	49.6	33.1	6.8	-34.1	0.0	0.0	55.4	74.0	-18.6	V	P	111.0	317.0	
4.824	3.0	47.3	33.1	6.8	-34.1	0.0	0.0	53.1	54.0	-0.9	V	A	111.0	317.0	
12.060	3.0	37.6	39.4	11.9	-32.5	0.0	0.0	56.4	74.0	-17.6	V	P	100.0	138.0	
12.060	3.0	30.2	39.4	11.9	-32.5	0.0	0.0	49.0	54.0	-5.0	V	A	100.0	138.0	
4.824	3.0	49.3	33.1	6.8	-34.1	0.0	0.0	55.1	74.0	-18.9	H	P	138.0	219.0	
4.824	3.0	46.9	33.1	6.8	-34.1	0.0	0.0	52.8	54.0	-1.2	H	A	138.0	219.0	
12.060	3.0	36.9	39.4	11.9	-32.5	0.0	0.0	55.7	74.0	-18.3	H	P	98.0	325.0	
12.060	3.0	29.9	39.4	11.9	-32.5	0.0	0.0	48.7	54.0	-5.3	H	A	98.0	325.0	
MID CHANNEL, 2437MHz															
4.874	3.0	48.3	33.2	6.8	-34.0	0.0	0.0	54.2	74.0	-19.8	V	P	126.0	344.0	
4.874	3.0	45.5	33.2	6.8	-34.0	0.0	0.0	51.4	54.0	-2.6	V	A	126.0	344.0	
7.311	3.0	37.2	36.3	9.1	-33.1	0.0	0.0	49.5	74.0	-24.5	V	P	114.0	2.0	
7.311	3.0	28.1	36.3	9.1	-33.1	0.0	0.0	40.4	54.0	-13.6	V	A	114.0	2.0	
12.185	3.0	38.6	39.4	12.0	-32.5	0.0	0.0	57.5	74.0	-16.5	V	P	100.0	137.0	
12.185	3.0	31.2	39.4	12.0	-32.5	0.0	0.0	50.1	54.0	-3.9	V	A	100.0	137.0	
4.874	3.0	47.8	33.2	6.8	-34.0	0.0	0.0	53.8	74.0	-20.2	H	P	177.0	329.0	
4.874	3.0	45.1	33.2	6.8	-34.0	0.0	0.0	51.0	54.0	-3.0	H	A	177.0	329.0	
7.311	3.0	36.9	36.3	9.1	-33.1	0.0	0.0	49.2	74.0	-24.8	H	P	129.0	299.0	
7.311	3.0	25.8	36.3	9.1	-33.1	0.0	0.0	38.1	54.0	-15.9	H	A	129.0	299.0	
12.185	3.0	38.4	39.4	12.0	-32.5	0.0	0.0	57.3	74.0	-16.7	H	P	114.0	198.0	
12.185	3.0	31.9	39.4	12.0	-32.5	0.0	0.0	50.8	54.0	-3.2	H	A	114.0	198.0	
HIGH CHANNEL, 2462MHz															
4.924	3.0	46.5	33.2	6.8	-34.0	0.0	0.0	52.5	74.0	-21.5	H	P	162.0	326.0	
4.924	3.0	43.6	33.2	6.8	-34.0	0.0	0.0	49.6	54.0	-4.4	H	A	162.0	326.0	
7.386	3.0	37.3	36.4	9.1	-33.1	0.0	0.0	49.7	74.0	-24.3	H	P	130.0	319.0	
7.386	3.0	29.1	36.4	9.1	-33.1	0.0	0.0	41.5	54.0	-12.5	H	A	130.0	319.0	
12.310	3.0	40.0	39.4	12.0	-32.5	0.0	0.0	59.0	74.0	-15.0	H	P	111.0	292.0	
12.310	3.0	33.7	39.4	12.0	-32.5	0.0	0.0	52.7	54.0	-1.3	H	A	111.0	292.0	
4.924	3.0	43.1	33.2	6.8	-34.0	0.0	0.0	49.1	74.0	-24.9	V	P	110.0	260.0	
4.924	3.0	39.9	33.2	6.8	-34.0	0.0	0.0	45.9	54.0	-8.1	V	A	110.0	260.0	
7.386	3.0	38.7	36.4	9.1	-33.1	0.0	0.0	51.1	74.0	-22.9	V	P	100.0	5.0	
7.386	3.0	31.2	36.4	9.1	-33.1	0.0	0.0	43.6	54.0	-10.4	V	A	100.0	5.0	
12.310	3.0	38.5	39.4	12.0	-32.5	0.0	0.0	57.5	74.0	-16.5	V	P	100.0	304.0	
12.310	3.0	32.0	39.4	12.0	-32.5	0.0	0.0	51.0	54.0	-3.0	V	A	100.0	304.0	

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

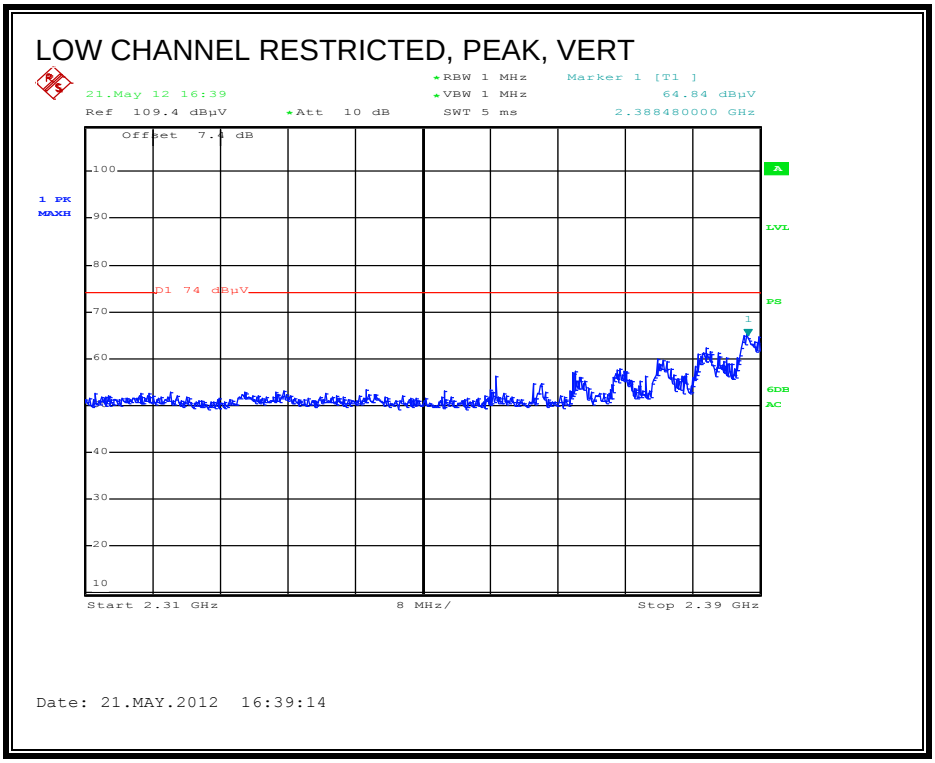
8.2.3. TX ABOVE 1 GHz, 802.11n HT20 CDD MCS0 3TX IN THE 2.4 GHz BAND

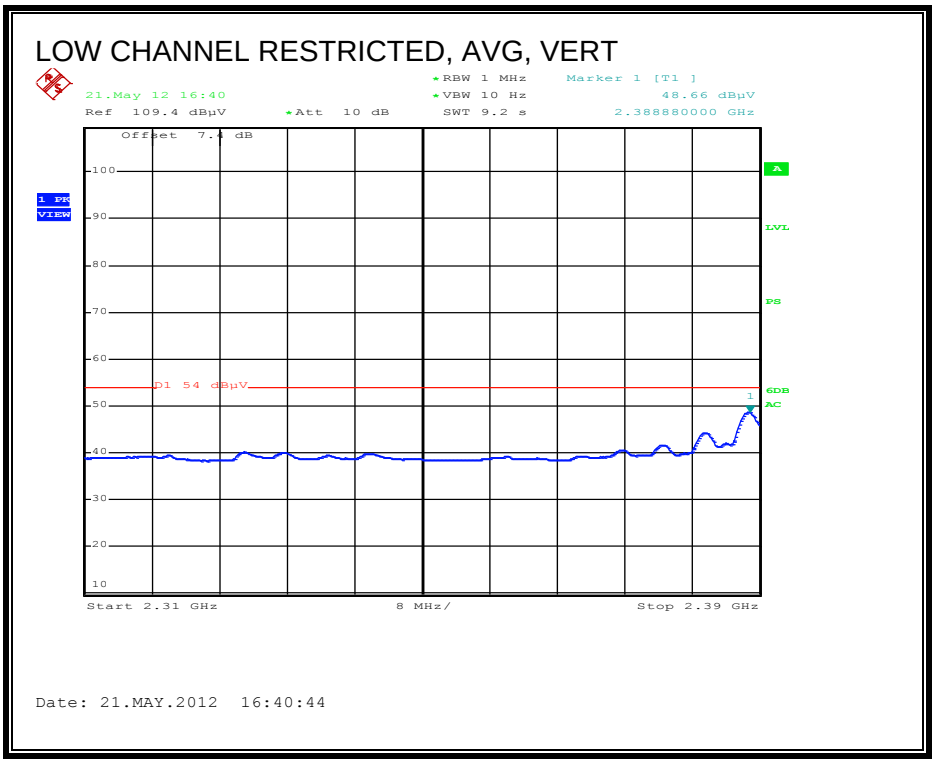
RESTRICTED BANDEDGE (LOW CHANNEL, 2412 MHz, VERTICAL)



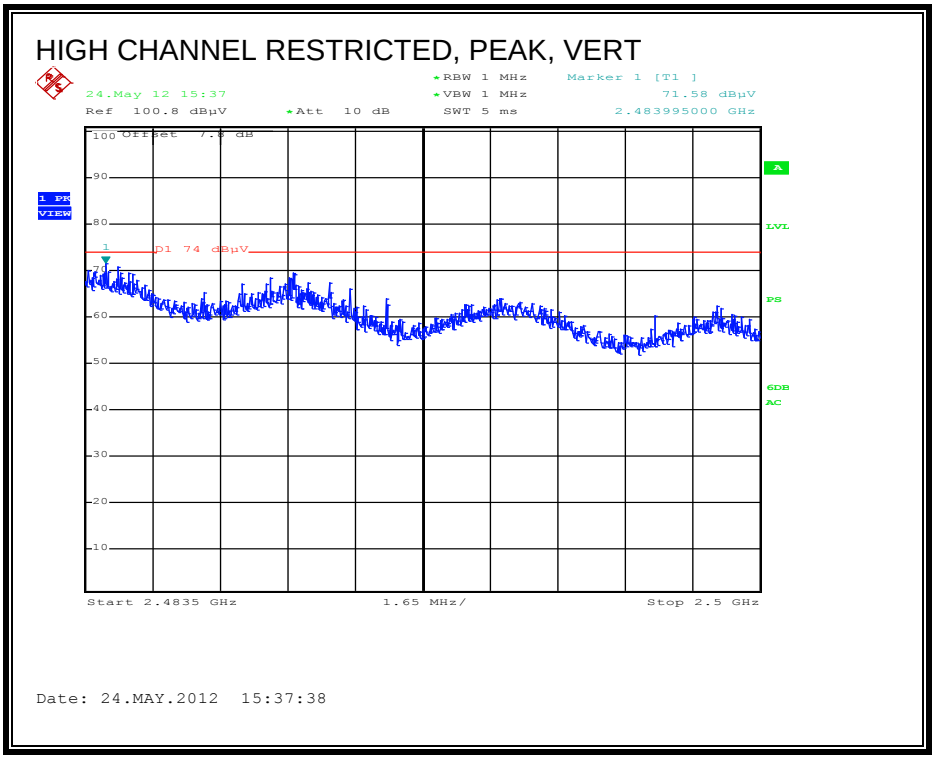


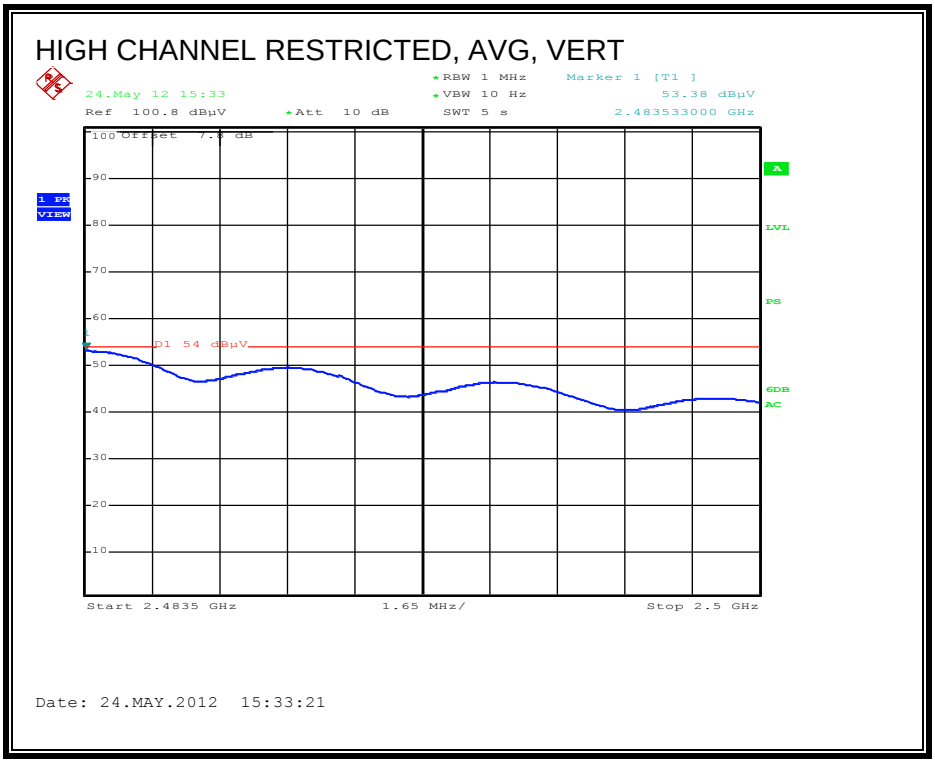
RESTRICTED BANDEDGE (LOW CHANNEL, 2417 MHz, VERTICAL)



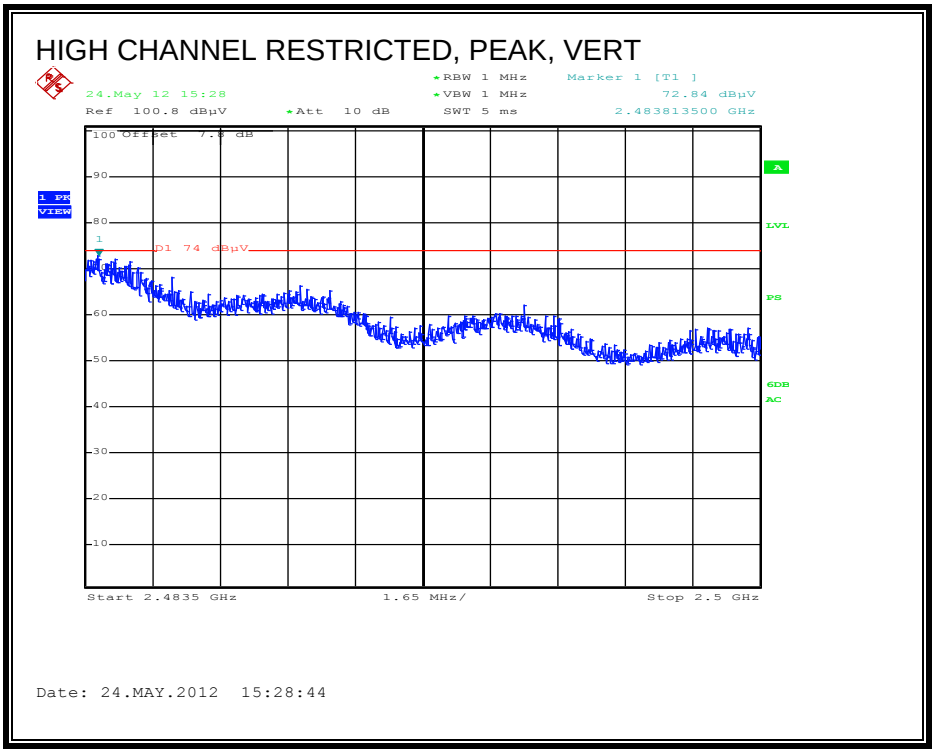


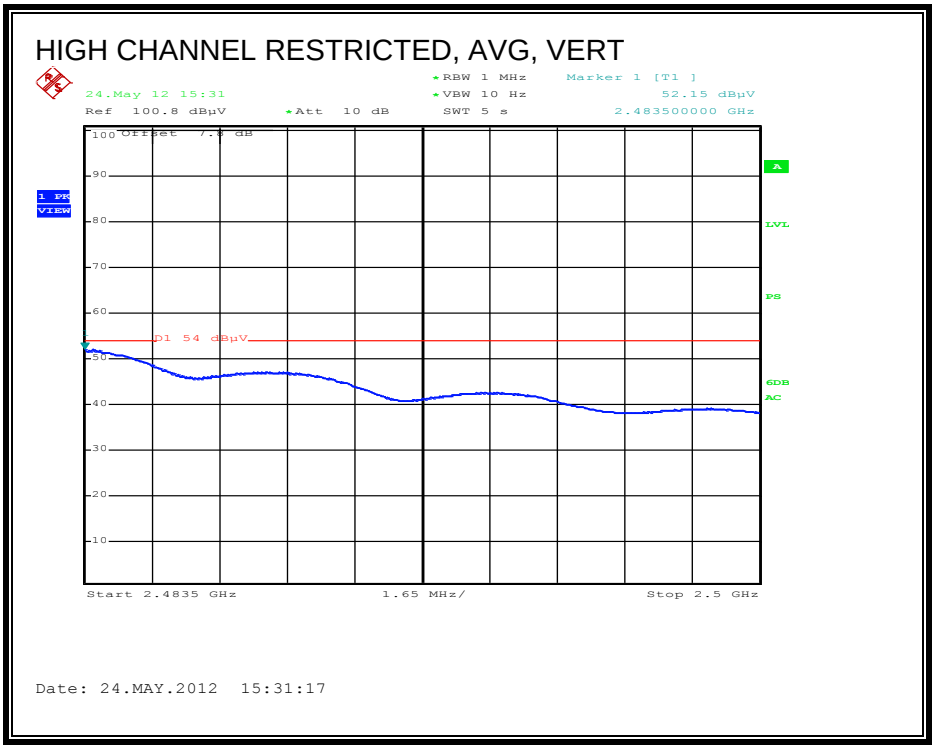
RESTRICTED BANDEDGE (HIGH CHANNEL, 2457 MHz, VERTICAL)





RESTRICTED BANDEDGE (HIGH CHANNEL, 2462 MHz, VERTICAL)





HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement
Compliance Certification Services, Fremont 5m Chamber

Test Engr: Vien Tran
Date: 05/22/12
Project #: 12U14373
Company: Broadcom
Test Target: FCC 15.247
Mode Oper: TX HT20 3x3 MCS0 CDD Mode

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

f GHz	Dist (m)	Read dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Corr. dBuV/m	Limit dBuV/m	Margin dB	Ant. Pol. V/H	Det. P/A/QP	Ant.High cm	Table Angle Degree	Notes
LOW CHANNEL, 2412MHz															
4.824	3.0	53.8	33.1	6.8	-34.1	0.0	0.0	59.7	74.0	-14.3	V	P	132.0	159.0	
4.824	3.0	37.7	33.1	6.8	-34.1	0.0	0.0	43.5	54.0	-10.5	V	A	132.0	159.0	
12.060	3.0	41.2	39.4	11.9	-32.5	0.0	0.0	60.0	74.0	-14.0	V	P	118.0	151.0	
12.060	3.0	25.6	39.4	11.9	-32.5	0.0	0.0	44.4	54.0	-9.6	V	A	118.0	151.0	
4.824	3.0	51.8	33.1	6.8	-34.1	0.0	0.0	57.7	74.0	-16.3	H	P	143.0	219.0	
4.824	3.0	37.0	33.1	6.8	-34.1	0.0	0.0	42.9	54.0	-11.1	H	A	143.0	219.0	
12.060	3.0	46.1	39.4	11.9	-32.5	0.0	0.0	64.9	74.0	-9.1	H	P	122.0	242.0	
12.060	3.0	29.3	39.4	11.9	-32.5	0.0	0.0	48.1	54.0	-5.9	H	A	122.0	242.0	
MID CHANNEL, 2437MHz															
4.874	3.0	52.9	33.2	6.8	-34.0	0.0	0.0	58.8	74.0	-15.2	V	P	158.0	345.0	
4.874	3.0	37.4	33.2	6.8	-34.0	0.0	0.0	43.3	54.0	-10.7	V	A	158.0	345.0	
7.311	3.0	39.5	36.3	9.1	-33.1	0.0	0.0	51.8	74.0	-22.2	V	P	101.0	201.0	
7.311	3.0	25.6	36.3	9.1	-33.1	0.0	0.0	37.8	54.0	-16.2	V	A	101.0	201.0	
12.185	3.0	44.8	39.4	12.0	-32.5	0.0	0.0	63.7	74.0	-10.3	V	P	112.0	301.0	
12.185	3.0	28.8	39.4	12.0	-32.5	0.0	0.0	47.7	54.0	-6.3	V	A	112.0	301.0	
4.874	3.0	48.1	33.2	6.8	-34.0	0.0	0.0	54.1	74.0	-19.9	H	P	139.0	179.0	
4.874	3.0	33.6	33.2	6.8	-34.0	0.0	0.0	39.5	54.0	-14.5	H	A	139.0	179.0	
7.311	3.0	36.7	36.3	9.1	-33.1	0.0	0.0	49.0	74.0	-25.0	H	P	138.0	305.0	
7.311	3.0	25.0	36.3	9.1	-33.1	0.0	0.0	37.3	54.0	-16.7	H	A	138.0	305.0	
12.185	3.0	45.3	39.4	12.0	-32.5	0.0	0.0	64.1	74.0	-9.9	H	P	103.0	300.0	
12.185	3.0	30.4	39.4	12.0	-32.5	0.0	0.0	49.3	54.0	-4.7	H	A	103.0	300.0	
HIGH CHANNEL, 2462MHz															
4.924	3.0	48.0	33.2	6.8	-34.0	0.0	0.0	54.0	74.0	-20.0	V	P	151.0	161.0	
4.924	3.0	33.3	33.2	6.8	-34.0	0.0	0.0	39.3	54.0	-14.7	V	A	151.0	161.0	
7.386	3.0	40.4	36.4	9.1	-33.1	0.0	0.0	52.8	74.0	-21.2	V	P	139.0	327.0	
7.386	3.0	27.0	36.4	9.1	-33.1	0.0	0.0	39.5	54.0	-14.5	V	A	139.0	327.0	
12.310	3.0	45.3	39.4	12.0	-32.5	0.0	0.0	64.3	74.0	-9.7	V	P	115.0	298.0	
12.310	3.0	28.0	39.4	12.0	-32.5	0.0	0.0	47.0	54.0	-7.0	V	A	115.0	298.0	
4.924	3.0	45.1	33.2	6.8	-34.0	0.0	0.0	51.1	74.0	-22.9	H	P	143.0	312.0	
4.924	3.0	31.6	33.2	6.8	-34.0	0.0	0.0	37.6	54.0	-16.4	H	A	143.0	312.0	
7.386	3.0	39.0	36.4	9.1	-33.1	0.0	0.0	51.4	74.0	-22.6	H	P	145.0	260.0	
7.386	3.0	26.2	36.4	9.1	-33.1	0.0	0.0	38.6	54.0	-15.4	H	A	145.0	260.0	
12.310	3.0	45.8	39.4	12.0	-32.5	0.0	0.0	64.8	74.0	-9.2	H	P	100.0	296.0	
12.310	3.0	29.0	39.4	12.0	-32.5	0.0	0.0	47.9	54.0	-6.1	H	A	100.0	296.0	

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

Note: tested with highest output powers at 19 dBm.

8.2.4. TX ABOVE 1 GHz, 802.11a LEGACY IN THE 5.8 GHz BAND

HARMONICS AND SPURIOUS EMISSIONS

Covered by testing 11n HT20, CDD MCS0, 3TX at highest output power 19dBm

8.2.5. TX ABOVE 1 GHz, 802.11n HT20 CDD MCS0, 3TX IN THE 5.8 GHz BAND

HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement
Compliance Certification Services, Fremont 5m Chamber

Test Engr: Vien Tran
Date: 05/22/12
Project #: 12U14373
Company: Broadcom
Test Target: FCC 15.247
Mode Oper: TX HT20 3x3 MCS0 CDD Mode In 5.8GHz Band

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

Average Field Strength Limit
Peak Field Strength Limit
Margin vs. Average Limit
Margin vs. Peak Limit

f GHz	Dist (m)	Read dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Corr. dBuV/m	Limit dBuV/m	Margin dB	Ant. Pol. V/H	Det. P/A/QP	Ant.High cm	Table Angle Degree	Notes
LOW CHANNEL, 5745MHz															
11.490	3.0	39.7	38.9	11.2	-33.1	0.0	0.0	56.7	74.0	-17.3	V	P	104.0	295.0	
11.490	3.0	28.5	38.9	11.2	-33.1	0.0	0.0	45.5	54.0	-8.5	V	A	104.0	295.0	
11.490	3.0	40.9	38.9	11.2	-33.1	0.0	0.0	57.9	74.0	-16.1	H	P	110.0	278.0	
11.490	3.0	29.3	38.9	11.2	-33.1	0.0	0.0	46.3	54.0	-7.7	H	A	110.0	278.0	
MID CHANNEL, 5785MHz															
11.570	3.0	41.7	38.9	11.3	-33.0	0.0	0.0	59.0	74.0	-15.0	V	P	99.0	289.0	
11.570	3.0	29.7	38.9	11.3	-33.0	0.0	0.0	47.0	54.0	-7.0	V	A	99.0	289.0	
11.570	3.0	44.0	38.9	11.3	-33.0	0.0	0.0	61.3	74.0	-12.7	H	P	112.0	272.0	
11.570	3.0	32.1	38.9	11.3	-33.0	0.0	0.0	49.4	54.0	-4.6	H	A	112.0	272.0	
HIGH CHANNEL, 5825MHz															
11.650	3.0	42.2	39.0	11.4	-32.9	0.0	0.0	59.7	74.0	-14.3	V	P	106.0	344.0	
11.650	3.0	30.0	39.0	11.4	-32.9	0.0	0.0	47.6	54.0	-6.4	V	A	106.0	344.0	
11.650	3.0	38.6	39.0	11.4	-32.9	0.0	0.0	56.1	74.0	-17.9	H	P	102.0	246.0	
11.650	3.0	26.4	39.0	11.4	-32.9	0.0	0.0	43.9	54.0	-10.1	H	A	102.0	246.0	

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

Note: tested with highest output powers at 19 dBm.

8.2.6. TX ABOVE 1 GHz, 802.11n HT40 SISO IN THE 5.8 GHz BAND

HARMONICS AND SPURIOUS EMISSIONS

Covered by testing 11n HT40, CDD MCS0, 3TX at highest output power 19dBm

8.2.7. TX ABOVE 1 GHz, 802.11n HT40 CDD MCS0 3TX IN THE 5.8 GHz BAND

HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement
Compliance Certification Services, Fremont 5m Chamber

Test Engr: Vien Tran
Date: 05/22/12
Project #: 12U14373
Company: Broadcom
Test Target: FCC 15.247
Mode Oper: TX HT40 3x3 MCS0 CDD Mode In 5.8GHz Band

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

f GHz	Dist (m)	Read dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Corr. dBuV/m	Limit dBuV/m	Margin dB	Ant. Pol. V/H	Det. P/A/QP	Ant.High cm	Table Angle Degree	Notes
LOW CHANNEL, 5755MHz															
11.510	3.0	37.1	38.9	11.2	-33.0	0.0	0.0	54.1	74.0	-19.9	V	P	107.0	289.0	
11.510	3.0	26.2	38.9	11.2	-33.0	0.0	0.0	43.3	54.0	-10.7	V	A	107.0	289.0	
11.510	3.0	39.8	38.9	11.2	-33.0	0.0	0.0	56.9	74.0	-17.1	H	P	116.0	249.0	
11.510	3.0	27.1	38.9	11.2	-33.0	0.0	0.0	44.2	54.0	-9.8	H	A	116.0	249.0	
HIGH CHANNEL, 5795MHz															
11.590	3.0	40.2	39.0	11.3	-33.0	0.0	0.0	57.6	74.0	-16.4	V	P	112.0	294.0	
11.590	3.0	26.1	39.0	11.3	-33.0	0.0	0.0	43.4	54.0	-10.6	V	A	112.0	294.0	
11.590	3.0	40.2	39.0	11.3	-33.0	0.0	0.0	57.6	74.0	-16.4	H	P	123.0	272.0	
11.590	3.0	27.5	39.0	11.3	-33.0	0.0	0.0	44.9	54.0	-9.1	H	A	123.0	272.0	

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

Note: tested with highest output powers at 19 dBm.

8.3. WORST-CASE BELOW 1 GHz

HORIZONTAL AND VERTICAL DATA

Project No: 12U14373
Client Name: Broadcom
Model/Device: BCM94331PCIEBT3B
Test Volt/Freq: 120VAC / 60Hz
Test By: John Nguyen

Test Freq.	Meter Reading	Detector	25MHz-1GHz ChmbrA Amplified. TX (dB)	T243 Sunol Bilog.TXT (dB)	dBuV/m	CFR 47 Part 15 Class B 2m	Margin	Height (cm)	Polarity
152.3161	39.36	PK	-26.6	12.1	24.86	43.5	-18.64	200	Horz
213.02	47.25	PK	-26.1	10.6	31.75	46	-14.25	100	Horz
300.755	39.8	PK	-25.8	13.3	27.3	46	-18.7	100	Horz
497.06	44	PK	-24.8	17.5	36.7	46	-9.3	100	Horz
530.929	40.29	QP	-24.9	18.8	33.59	46	-12.41	100	Horz
896.034	45.04	QP	-23.3	22.1	43.84	46	-2.16	115	Horz

Test Freq.	Meter Reading	Detector	25MHz-1GHz ChmbrA Amplified. TX (dB)	T243 Sunol Bilog.TXT (dB)	dBuV/m	CFR 47 Part 15 Class B 2m	Margin	Height (cm)	Polarity
152.51	52.82	PK	-26.6	12	38.22	43.5	-5.28	200	Vert
223.6511	53.47	PK	-26	10.6	38.07	46	-7.93	200	Vert
300.755	38	PK	-25.8	13.3	25.5	46	-20.5	100	Vert
433.0036	47.21	PK	-25.1	16.6	38.71	46	-7.29	100	Vert
497.06	44	PK	-24.8	17.5	36.7	46	-9.3	100	Vert
899.7822	41.92	PK	-23.4	22.2	40.72	46	-5.28	200	Vert

PK - Peak detector
QP - Quasi-Peak detector
LnAv - Linear Average detector
LgAv - Log Average detector
Av - Average detector
CAV - CISPR Average detector
RMS - RMS detection
CRMS - CISPR RMS detection
Text File: X28B_UL-EMC_2nd_Test.TXT
File: X28B_UL-EMC_2nd_Test.DAT

9. AC POWER LINE CONDUCTED EMISSIONS

LIMITS

FCC §15.207 (a)

RSS-Gen 7.2.2

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

* Decreases with the logarithm of the frequency.

TEST PROCEDURE

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

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

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

RESULTS

6 WORST EMISSIONS

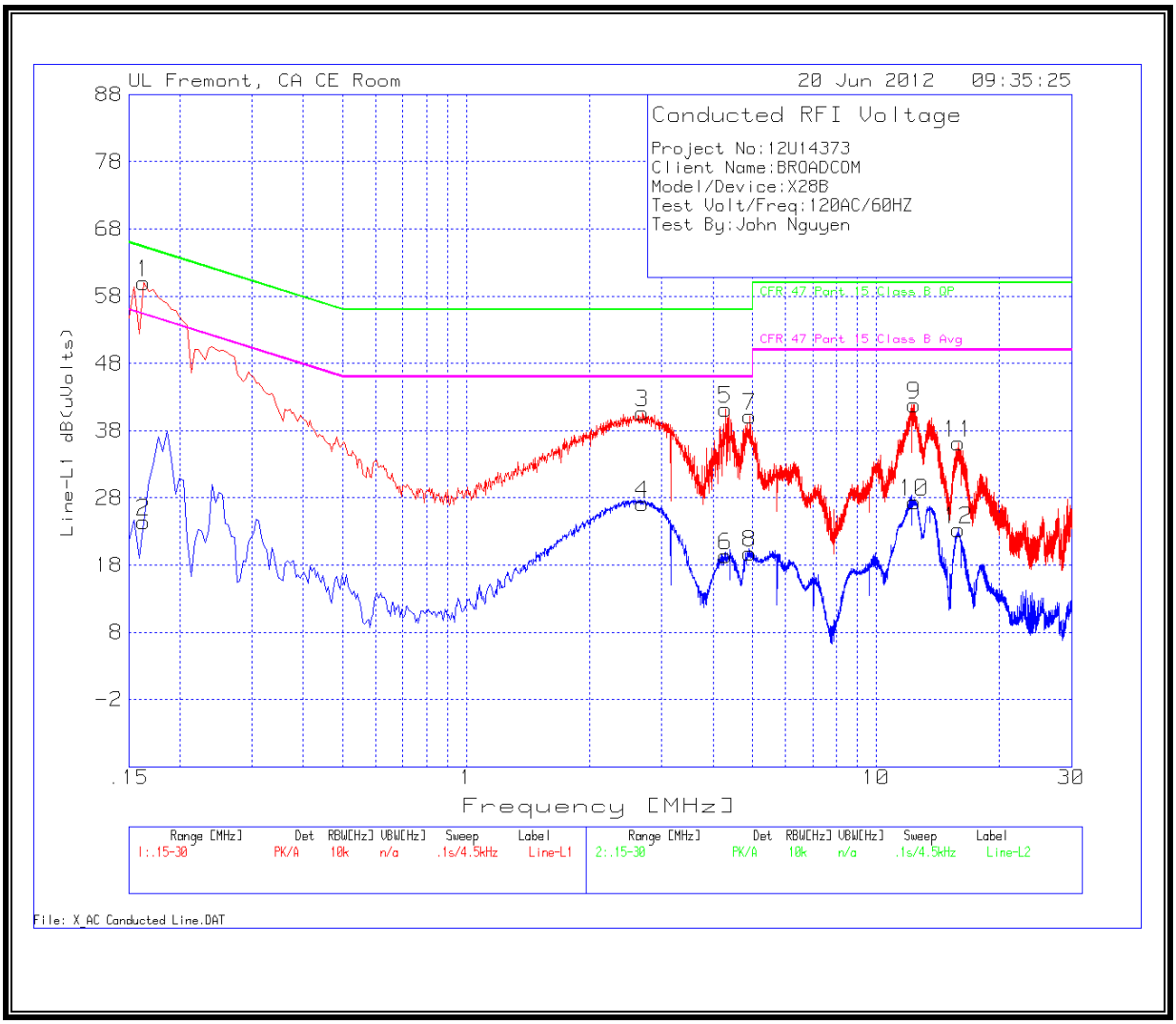
LINE CONDUCTED DATA

Project No:12U14373
Client Name:BROADCOM
Model/Device: BCM94331PCIEBT3B
Test Volt/Freq:120AC/60Hz
Test By:John Nguyen

Test Freq. MHz	Meter Reading dB(µV)	Detector Type	LISN Factor dB	Path Loss dB	Corrected Reading dB(µV)	Class B QP Limit dB(µV)	QP Margin dB	Class B Av Limit dB(µV)	Av Margin dB
Line-L1 .15 - 30MHz									
0.1635	59.96	PK	0.1	0	60.06	65.3	-5.24	-	-
0.1635	24.35	Av	0.1	0	24.45	-	-	55.3	-30.85
2.6925	40.50	PK	0.1	0.1	40.70	56	-15.3	-	-
2.6925	26.96	Av	0.1	0.1	27.16	-	-	46	-18.84
4.299	41.04	PK	0.1	0.1	41.24	56	-14.76	-	-
4.299	19.20	Av	0.1	0.1	19.40	-	-	46	-26.6
4.9155	39.99	PK	0.1	0.1	40.19	56	-15.81	-	-
4.9155	19.65	Av	0.1	0.1	19.85	-	-	46	-26.15
12.3675	41.44	PK	0.2	0.2	41.84	60	-18.16	-	-
12.3675	27.03	Av	0.2	0.2	27.43	-	-	50	-22.57
15.8595	35.78	PK	0.2	0.2	36.18	60	-23.82	-	-
15.8595	22.91	Av	0.2	0.2	23.31	-	-	50	-26.69
Line-L2 .15 - 30MHz									
0.177	54.67	PK	0.1	0	54.77	64.6	-9.83	-	-
0.177	30.00	Av	0.1	0	30.10	-	-	54.6	-24.5
0.42	38.92	PK	0.1	0	39.02	57.4	-18.38	-	-
0.42	24.35	Av	0.1	0	24.45	-	-	47.4	-22.95
2.2065	38.30	PK	0.1	0.1	38.50	56	-17.5	-	-
2.2065	25.99	Av	0.1	0.1	26.19	-	-	46	-19.81
4.155	37.19	PK	0.1	0.1	37.39	56	-18.61	-	-
4.155	18.03	Av	0.1	0.1	18.23	-	-	46	-27.77
12.6645	37.85	PK	0.2	0.2	38.25	60	-21.75	-	-
12.6645	24.77	Av	0.2	0.2	25.17	-	-	50	-24.83
15.657	32.00	PK	0.2	0.2	32.40	60	-27.6	-	-
15.657	15.76	Av	0.2	0.2	16.16	-	-	50	-33.84

PK - Peak detector
QP - Quasi-Peak detector
Av - Average detector

LINE 1 RESULTS



LINE 2 RESULTS