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

CERTIFICATION TEST REPORT

FOR

802.11n + BT MODULE

MODEL NUMBER: WCN3660

FCC ID: PPD-WCN3660
IC: 4104A-WCN3660

REPORT NUMBER: 12U14222-6

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Prepared for
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1700 TECHNOLOGY DRIVE
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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: QUALCOMM ATHEROS, INC.
1700 TECHNOLOGY DRIVE
SAN JOSE, CA, 95110, U.S.A.

EUT DESCRIPTION: 802.11n + BT MODULE

MODEL: WCN3660

SERIAL NUMBER: N10FXYDC9 and N10G84TRF

DATE TESTED: February 2, 2012 – June 06, 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:

DENNIS HUANG
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 Qualcomm Atheros 802.11n + Bluetooth Adapter supports 802.11a/b/g/n and Bluetooth v2.1 + EDR/ Bluetooth 3.0/ Bluetooth 4.0 LE operation.

The test platform contains the WCN3660 module and the Qualcomm APQ8060A host processor which serves as the WLAN and BT baseband.

The radio module is manufactured by Qualcomm Atheros.

5.2. MODIFICATIONS

The manufacturer declares the following modification in order to pass 2nd harmonic:

"We have identified a source of leakage for the 2nd harmonic as the 1.8V bias line from the WCN3660 chip. We implemented a notch filter on this line inside the module to filter the harmonic and achieve compliance. This filter will be used in the production version of the module. It was added at the output of chip inside the Y0253 module on Vdd 1p8 LDO net.

5.3. MAXIMUM OUTPUT POWER

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

2.4GHz WLAN			
Frequency Range (MHz)	Mode	Output Power (dBm)	Output Power (mW)
2412 - 2462	802.11b	21.74	149.28
2412 - 2462	802.11g	25.48	353.18
2412 - 2462	802.11n HT20	24.79	301.30
5.8GHz WLAN			
5725-5850	802.11a	24.88	307.61
5725-5850	802.11n HT20	24.83	304.09
5725-5850	802.11n HT40	24.68	293.76

5.4. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes **WCN3660 WLAN/BT** antenna with the following specification:

Band of operation (MHz)	2400-2483.5	5.15-5.35	5.47-5.725	5.725-5.850
Antenna Type	PIFA	PIFA	PIFA	PIFA
Antenna model	EBJ Aux	ED4 Main	ED4 Aux	ED4 Main
Antenna Gain (dBi)	3.62	5.6	5.3	4.8

5.5. SOFTWARE AND FIRMWARE

The test utility software used during testing was QRCT, Version 2.4.74.0.

5.6. WORST-CASE CONFIGURATION AND MODE

Radiated emission below 1 GHz and power line conducted emission were performed with the EUT set to transmit at the channel with highest output power as worst-case scenario.

The fundamental of the EUT was investigated in three orthogonal orientations X,Y,Z, it was determined that Y orientation was worst-case orientation; therefore, all final radiated testing was performed with the EUT in Y orientation.

The worst-case data rate for each mode is determined to be as follows, based on input from the manufacturer of the radio:

802.11b mode: 1 Mbps
802.11g mode: 6 Mbps
802.11a mode: 6 Mbps
802.11n HT20mode: MCS0
802.11n HT40mode: MCS0

All Radiated Emissions tests were tested with a new modified module (see Section 5.2 for Client's Description of changes).

All Antenna port tests were tested with the original RF module and verified with the new modified module to ensure its compliance performance.

5.7. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List				
Description	**Manufacturer**	**Model**	**Serial Number**	**FCC ID**
Laptop PC	Lenovo	2007-64U	L3-5C76D	DoC
Laptop 1	HP	EliteBook 8460P	CNU20326PD	Doc
Laptop 1 AC/DC Adapter	HP	PPP012D-S	608428-003	Doc
AC/DC Combo Adapter	Lenovo	40Y7649	670044390K	DoC
Host (MTP Test Platform)	Qualcomm	N10G1DJYG	7415BA7C	None
JTAG & Power Supply Adapter Board	Qualcomm	1DN14ASSY20-N6859	N10G1C4WW	None
Module Test Board	Qualcomm	1DN14ASSY20-Y0122	N10G3JMG8	None
DC power supply	Lambda	LA-300	783974	None
DC power supply	Xantrex	XHR 60-18	27519	None

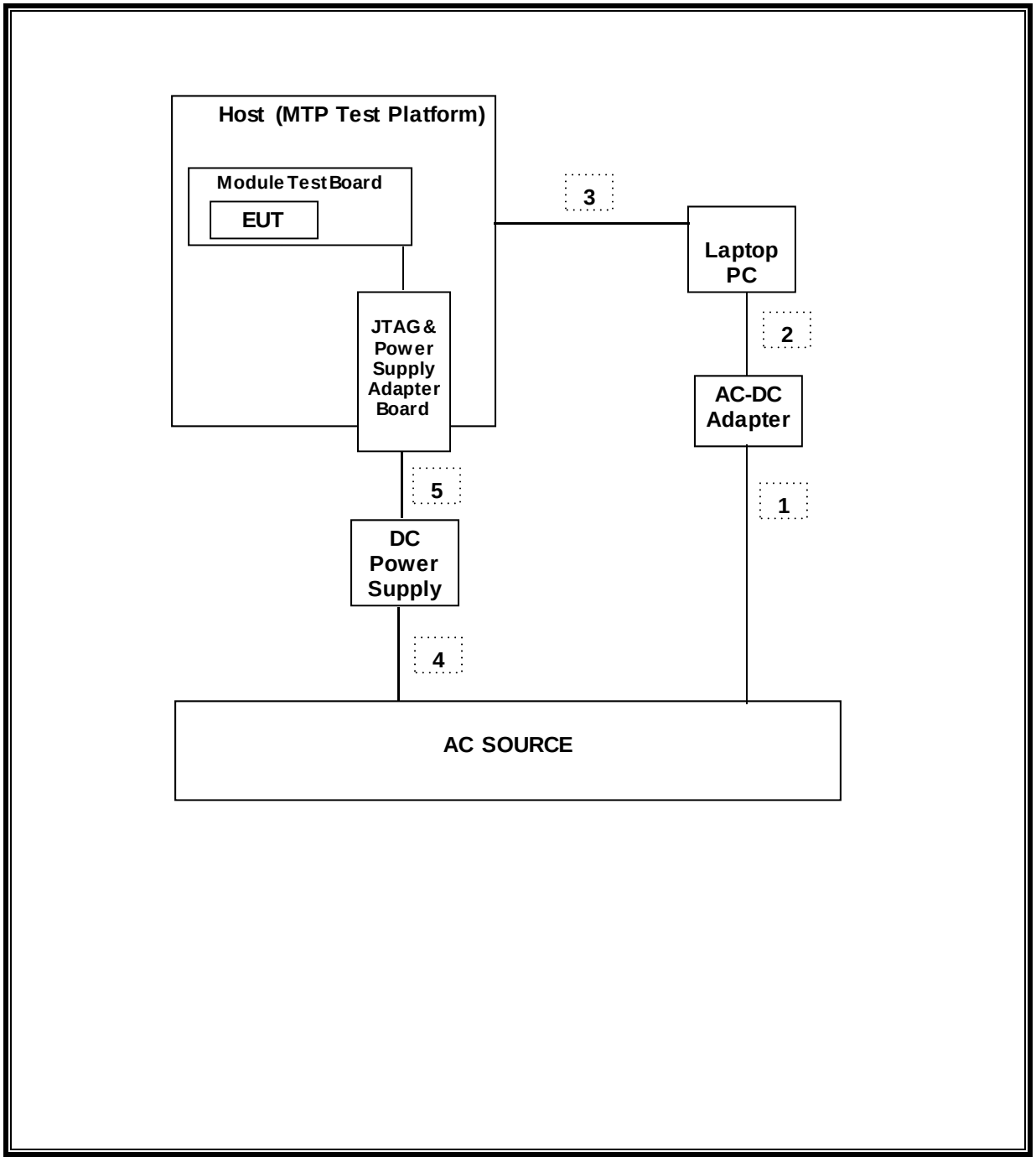
I/O CABLES

I/O Cable List						
Cable No	**Port**	**# of identical ports**	**Connector Type**	**Cable Type**	**Cable Length (m)**	**Remarks**
1	AC	1	US 115V	Shielded	1	N/A
2	DC	1	DC	Un-shielded	1.85	Ferrite at laptop's end
3	USB	1	USB	Un-shielded	1.8	N/A
4	AC	1	US 115V	Shielded	1.85	N/A
5	DC	1	DC	Un-shielded	1	N/A

TEST SETUP

The EUT is soldered on a test board that is mounted on the MTP Test Platform. The back cover of the MTP is removed so that the EUT is totally exposed, outside of the host platform. Test software exercised the EUT.

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 Due Date**
Preamplifier, 26.5 GHz	Agilent / HP	8449B	C01052	07/14/12
Antenna, Horn, 18 GHz	EMCO	3115	C00945	06/29/12
Preamplifier, 1300 MHz	Agilent / HP	8447D	C00580	11/11/12
Antenna, Bilog, 2 GHz	Sunol Sciences	JB1	C01016	07/12/12
Horn Antenna, 26.5 GHz	ARA	MWH-1826/B	C00589	07/28/12
Horn Antenna, 40 GHz	ARA	MWH-2640/B	C00981	06/14/12
Preamplifier, 40 GHz	Miteq	NSP4000-SP2	C00990	03/14/13
Spectrum Analyzer, 44 GHz	Agilent / HP	E4446A	C00986	03/22/13
Power Meter	Agilent / HP	437B	N02778	08/11/12
Power Sensor, 18 GHz	Agilent / HP	8481A	N02782	07/29/12
High pass Filter, 7.6 GHz	Micro-Tronics	HPM13195	N02682	CNR
Reject Notch Filter, 2.4 GHz	Micro-Tronics	-	-	CNR
EMI Test Receiver	R & S	ESHS 20	N02396	08/19/13
LISN	FCC	FCC-LISN-50/250	C00626	12/13/12

7. ANTENNA PORT TEST RESULTS

7.1. 802.11b MODE IN THE 2.4 GHz BAND

7.1.1. 6 dB BANDWIDTH

LIMITS

FCC §15.247 (a) (2)

IC RSS-210 A8.2 (a)

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

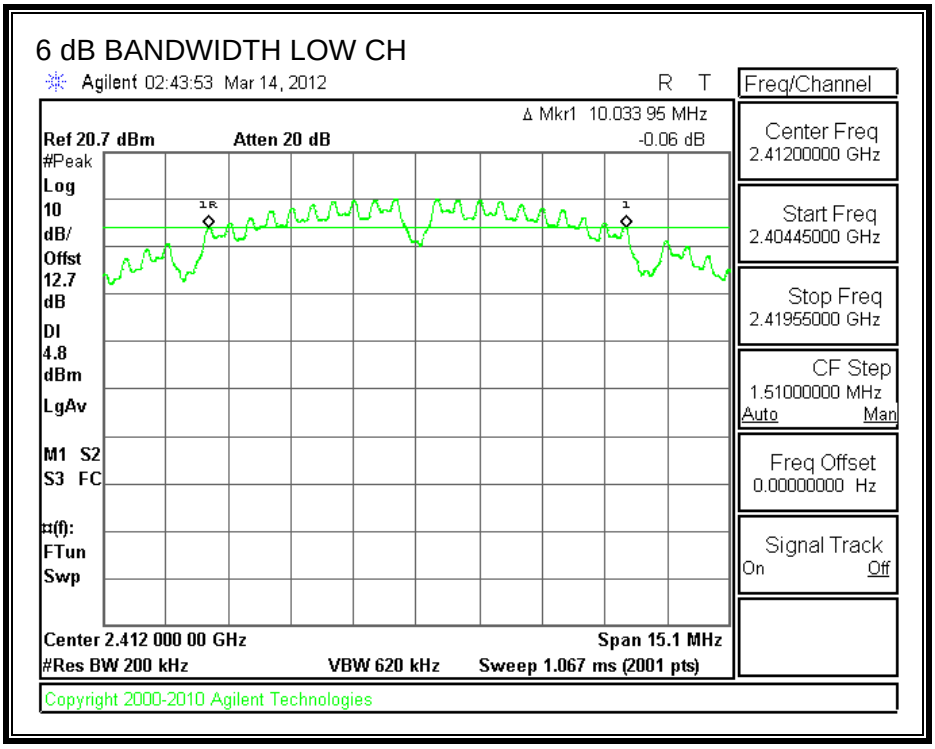
TEST PROCEDURE

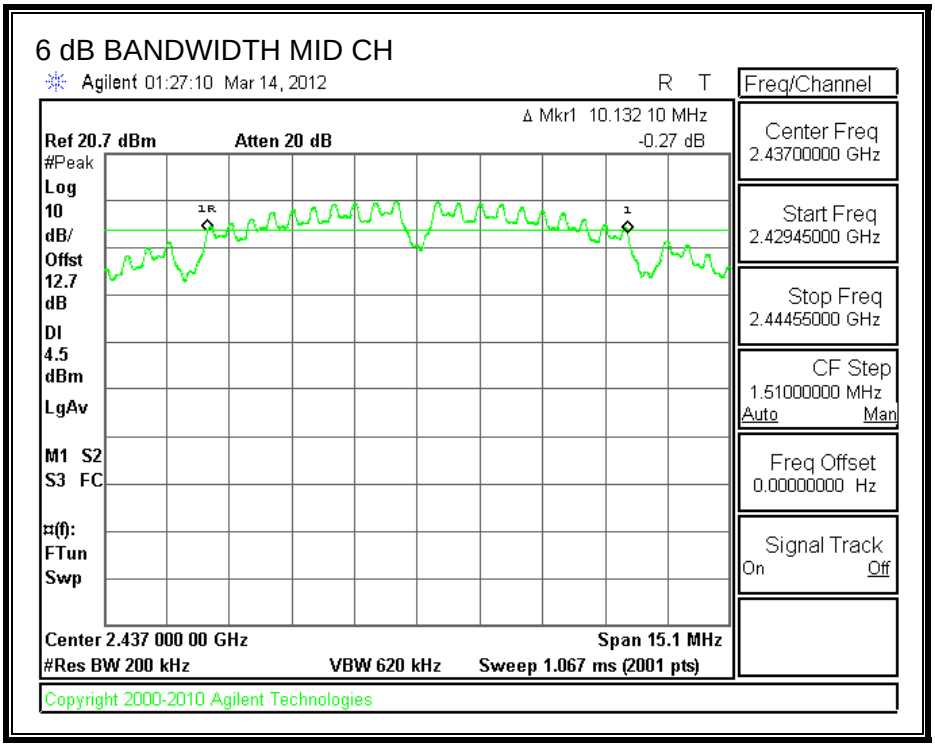
KDB 558074 D01 DTS Measurement Guidance V01 dated 01-18-12.

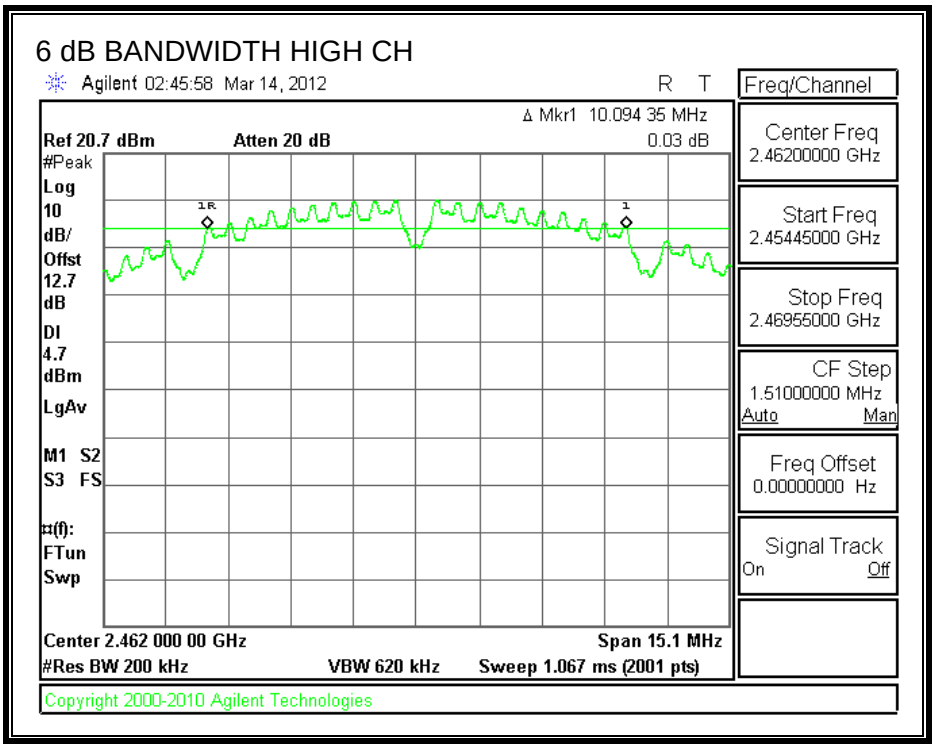
RESULTS

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low	2412	10.03395	0.5
Middle	2437	10.13210	0.5
High	2462	10.09435	0.5

6 dB BANDWIDTH







7.1.2. 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

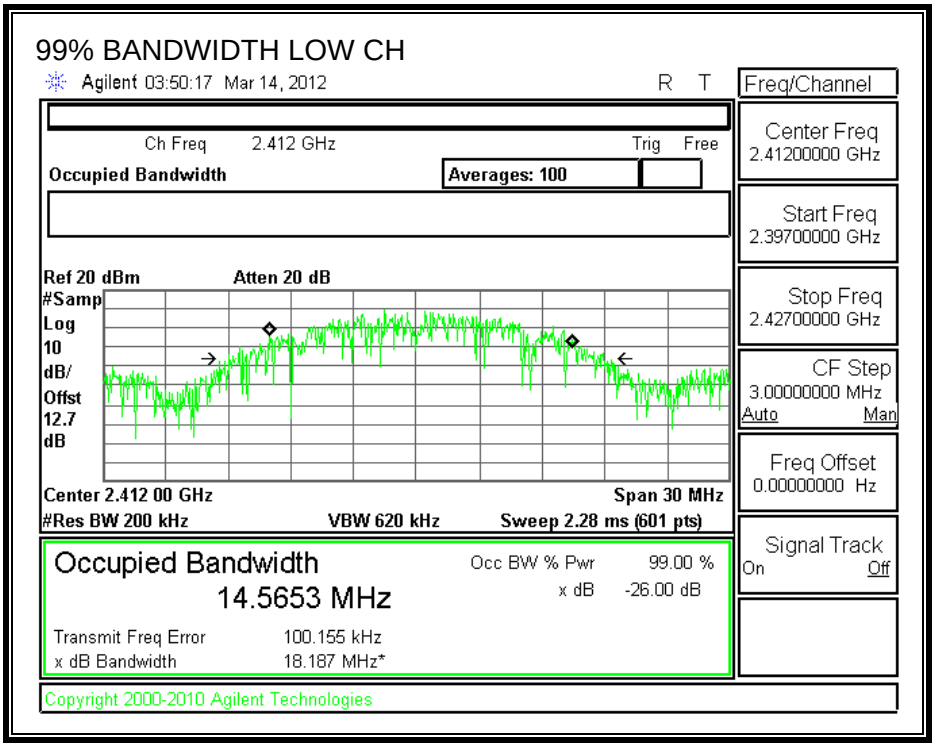
TEST PROCEDURE

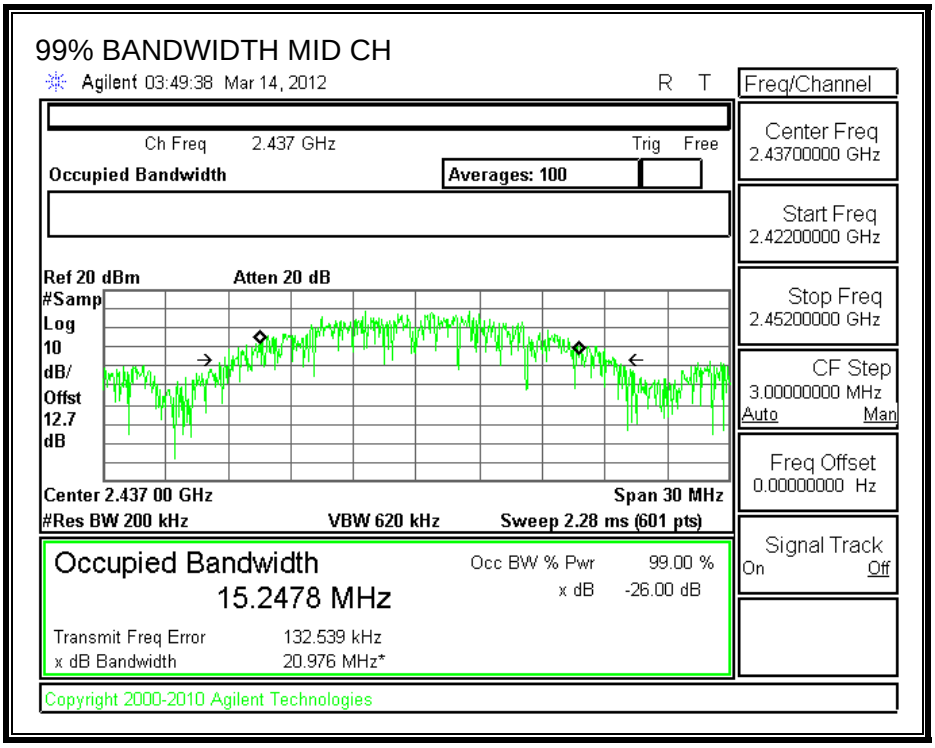
The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the 99 % bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal 99% bandwidth function is utilized.

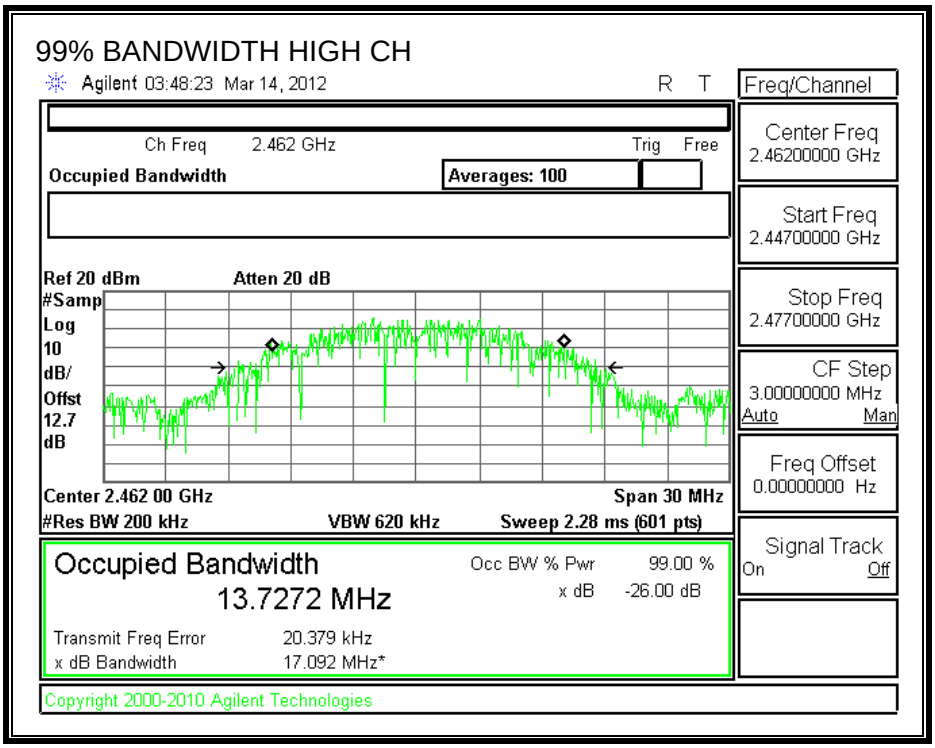
RESULTS

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2412	14.5653
Middle	2437	15.2478
High	2462	13.7272

99% BANDWIDTH







7.1.3. OUTPUT POWER

LIMITS

FCC §15.247 (b)

IC RSS-210 A8.4

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

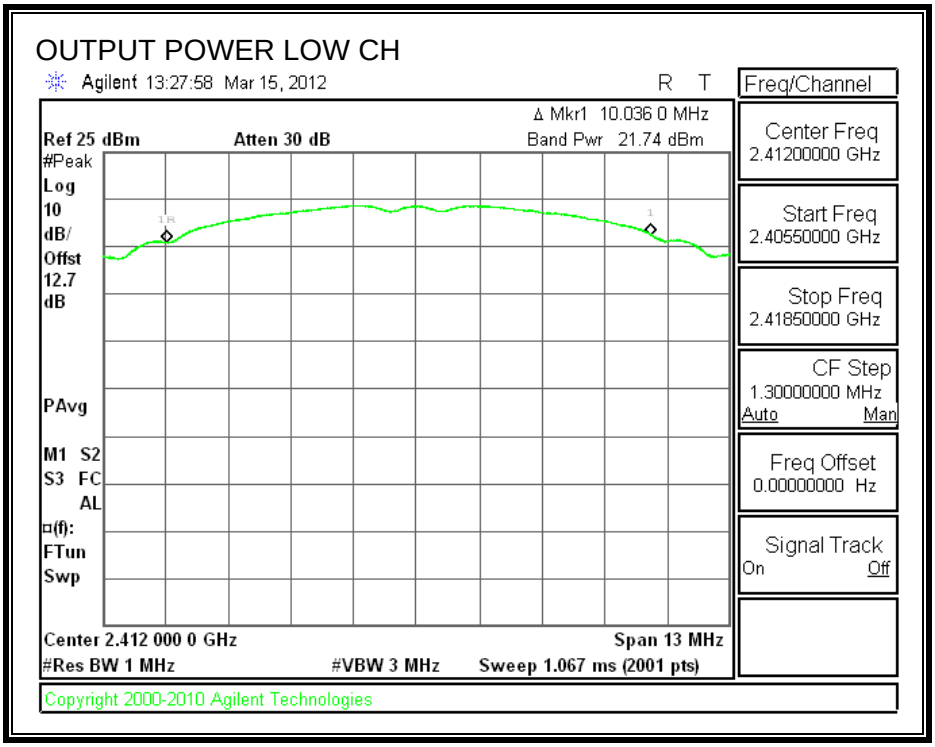
TEST PROCEDURE

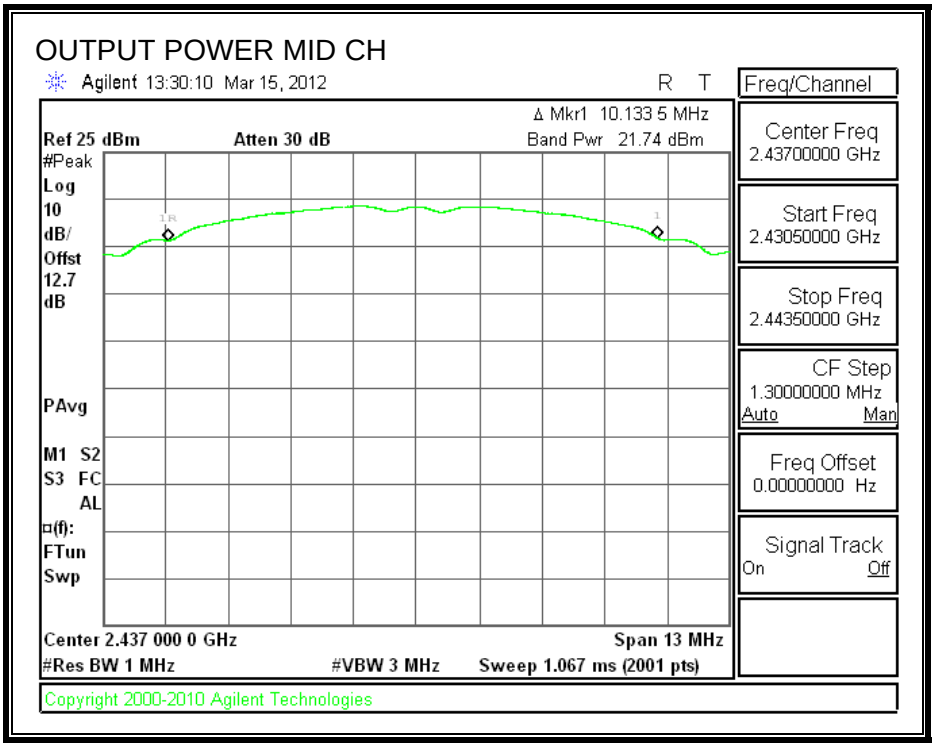
KDB 558074 D01 DTS Measurement Guidance V01 dated 01-18-12.

RESULTS

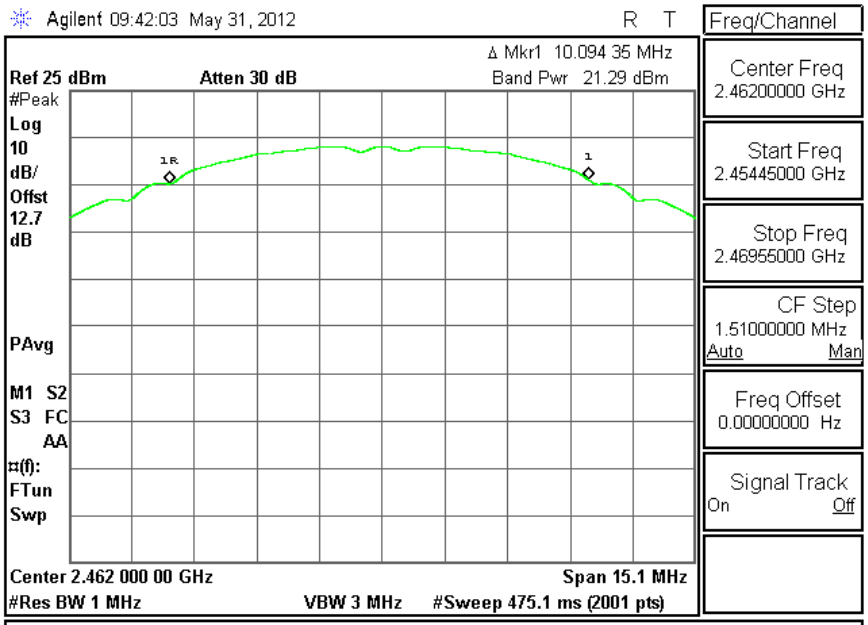
Channel	Frequency (MHz)	Peak Power Reading (dBm)	Limit (dBm)	Margin (dB)
Low	2412	21.74	30	-8.26
Middle	2437	21.74	30	-8.26
High	2462	21.29	30	-8.71

OUTPUT POWER





OUTPUT POWER HIGH CH



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 12.7 dB (including 12 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	19.00
Middle	2437	19.00
High	2462	19.00

7.1.5. POWER SPECTRAL DENSITY

LIMITS

FCC §15.247 (e)

IC RSS-210 A8.2 (b)

TEST PROCEDURE

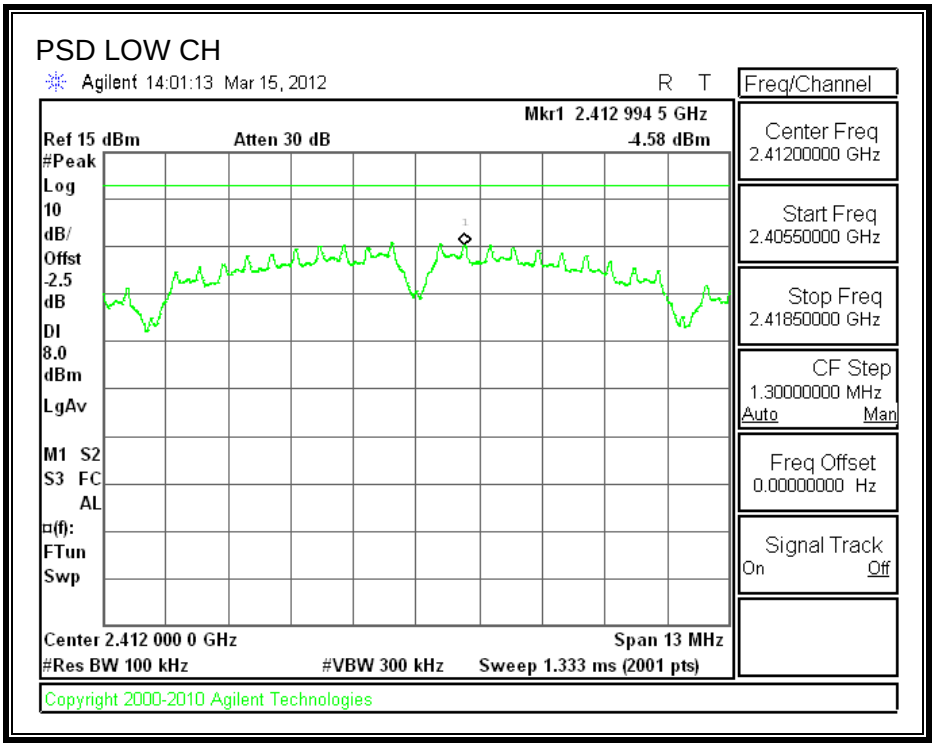
KDB 558074 D01 DTS Measurement Guidance V01 dated 01-18-12.

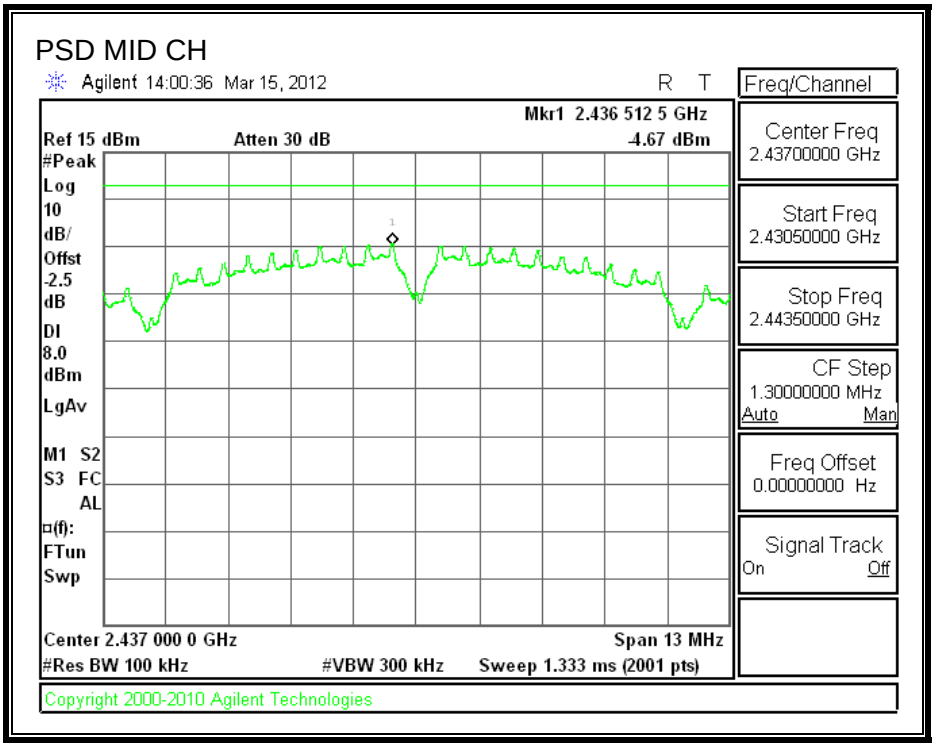
RESULTS

Note: analyzer offset = cable loss + attenuator + 10 log (3/100 kHz) = -2.5 dB

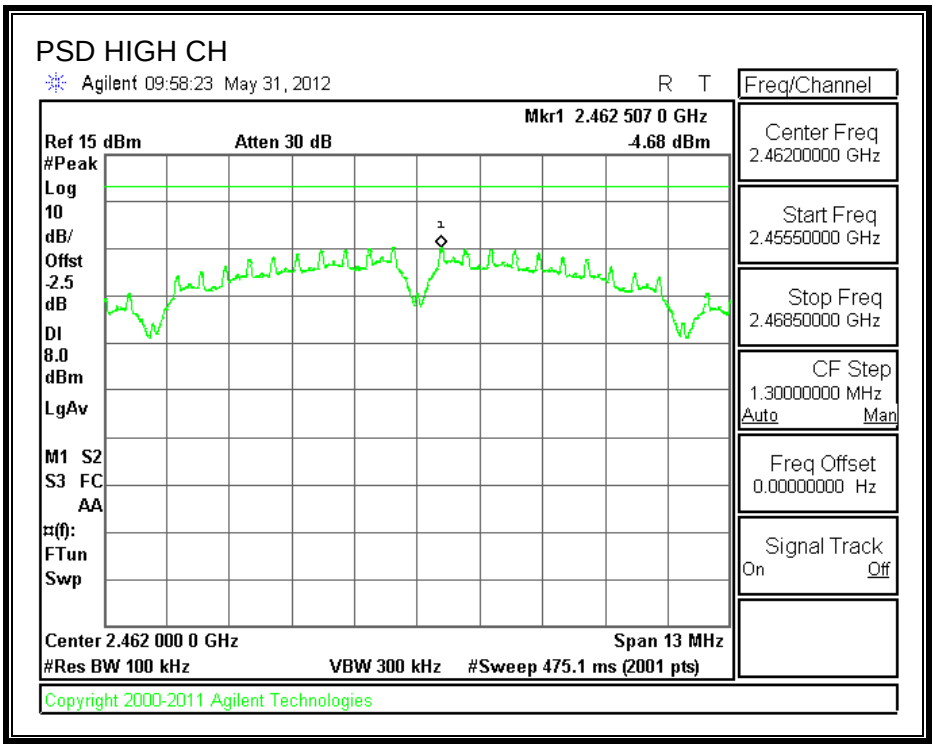
Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Margin (dB)
Low	2412	-4.58	8	-12.58
Middle	2437	-4.67	8	-12.67
High	2462	-4.68	8	-12.68

POWER SPECTRAL DENSITY





PSD HIGH CH



7.1.6. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.247 (d)

IC RSS-210 A8.5

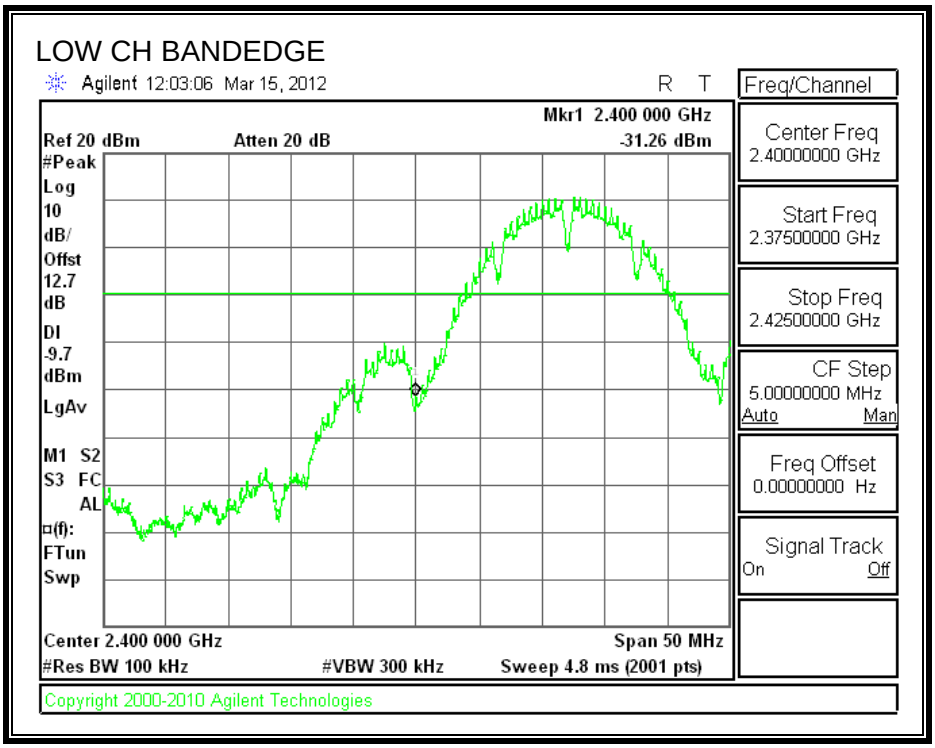
Output power was measured based on the use of a peak measurement, therefore the required attenuation is 20 dB.

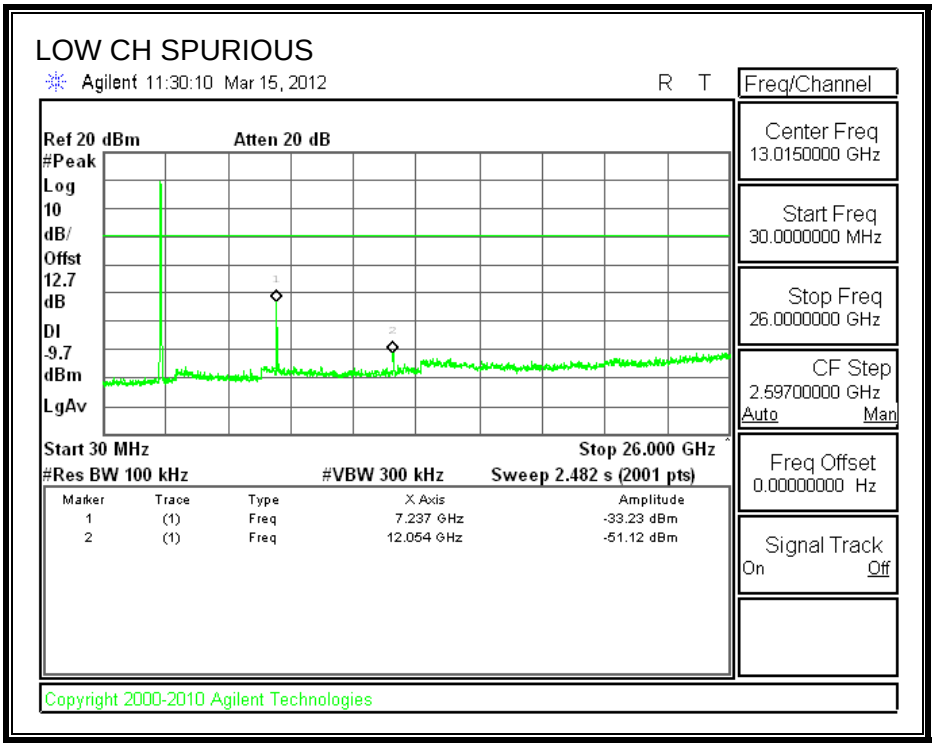
TEST PROCEDURE

KDB 558074 D01 DTS Measurement Guidance V01 dated 01-18-12.

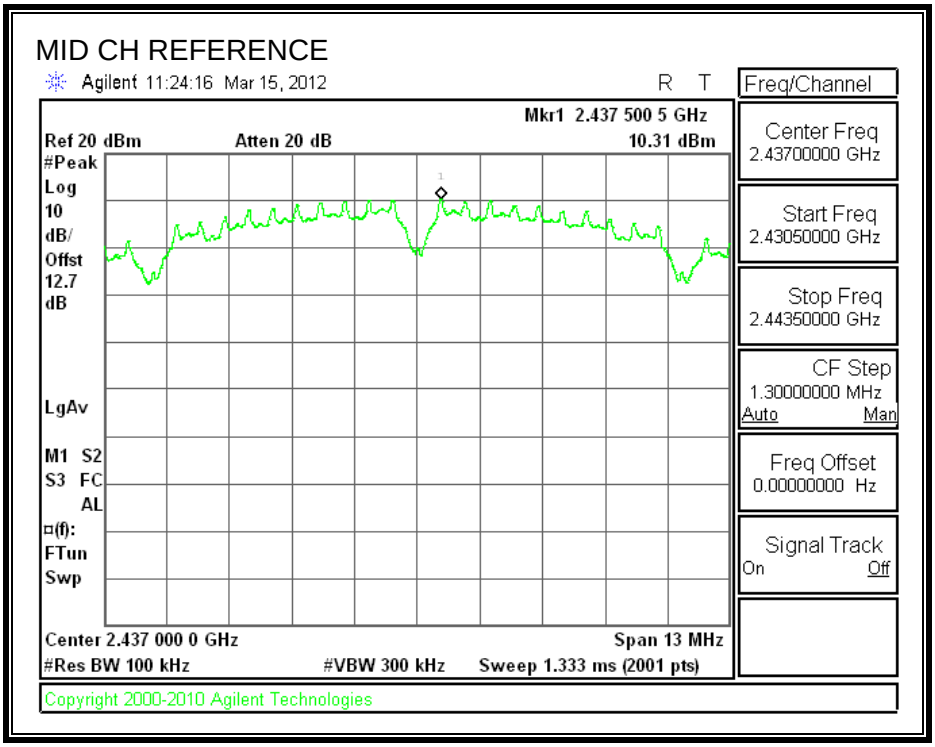
RESULTS

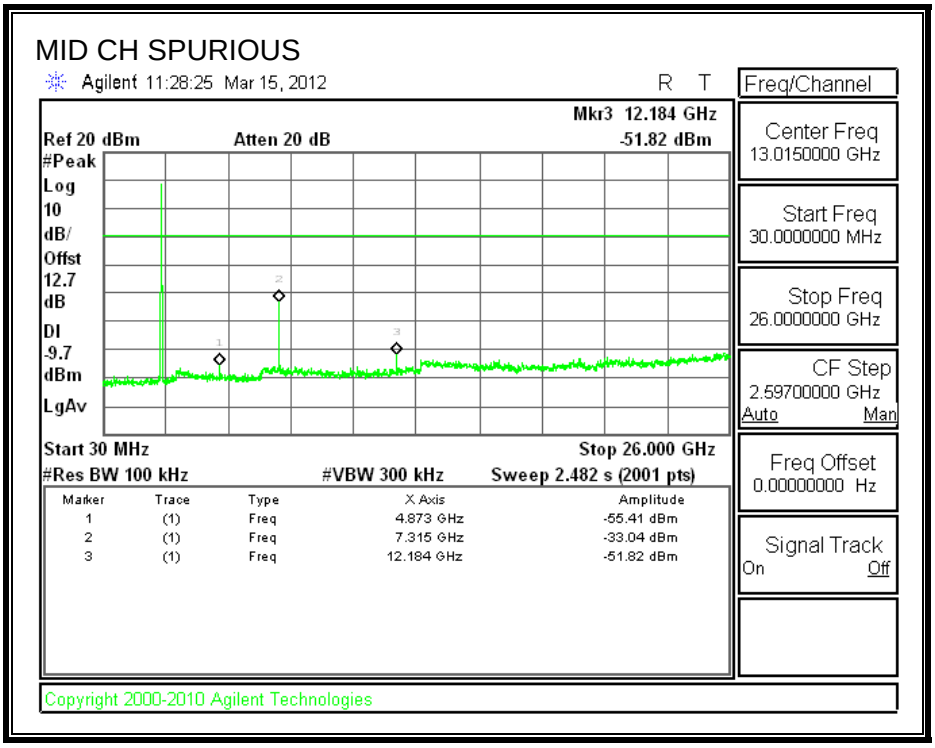
SPURIOUS EMISSIONS, LOW CHANNEL



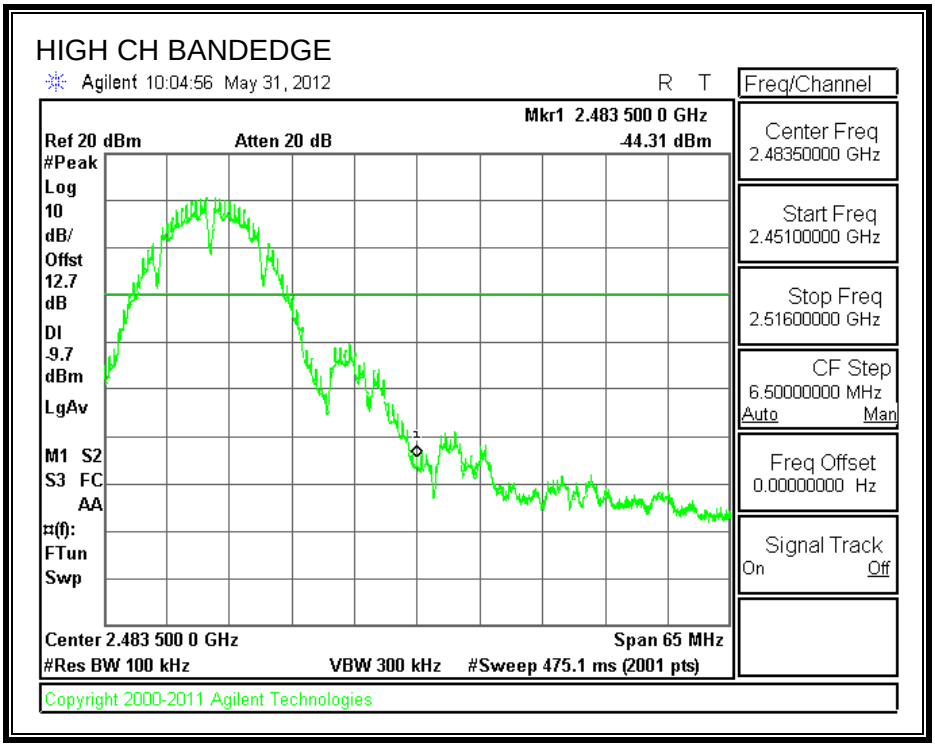


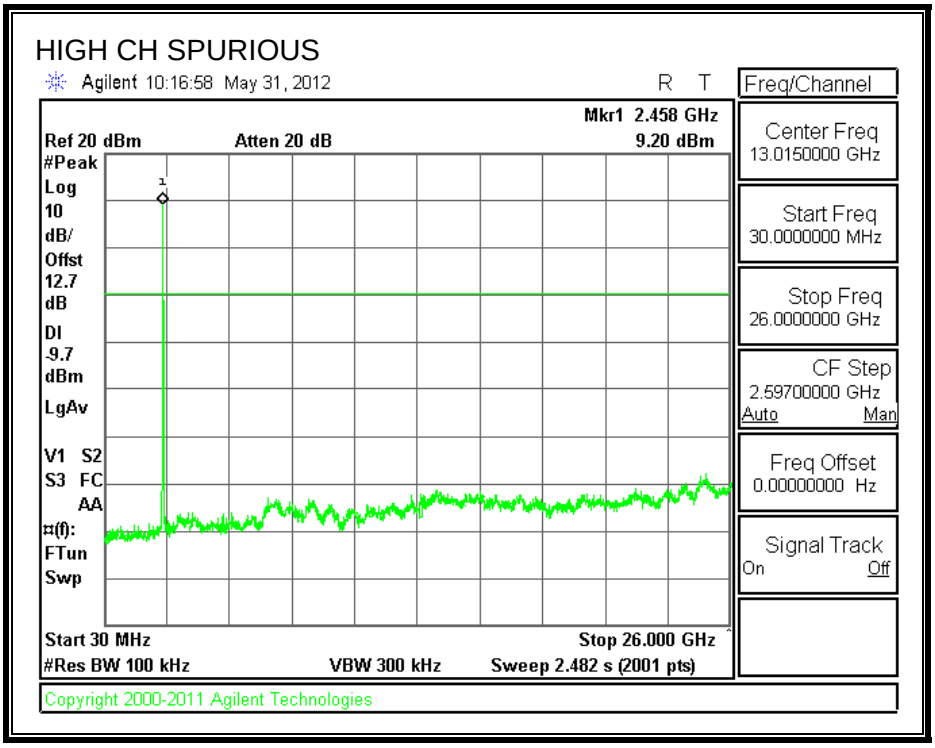
SPURIOUS EMISSIONS, MID CHANNEL





SPURIOUS EMISSIONS, HIGH CHANNEL





7.2. 802.11g MODE IN THE 2.4 GHz BAND

7.2.1. 6 dB BANDWIDTH

LIMITS

FCC §15.247 (a) (2)

IC RSS-210 A8.2 (a)

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

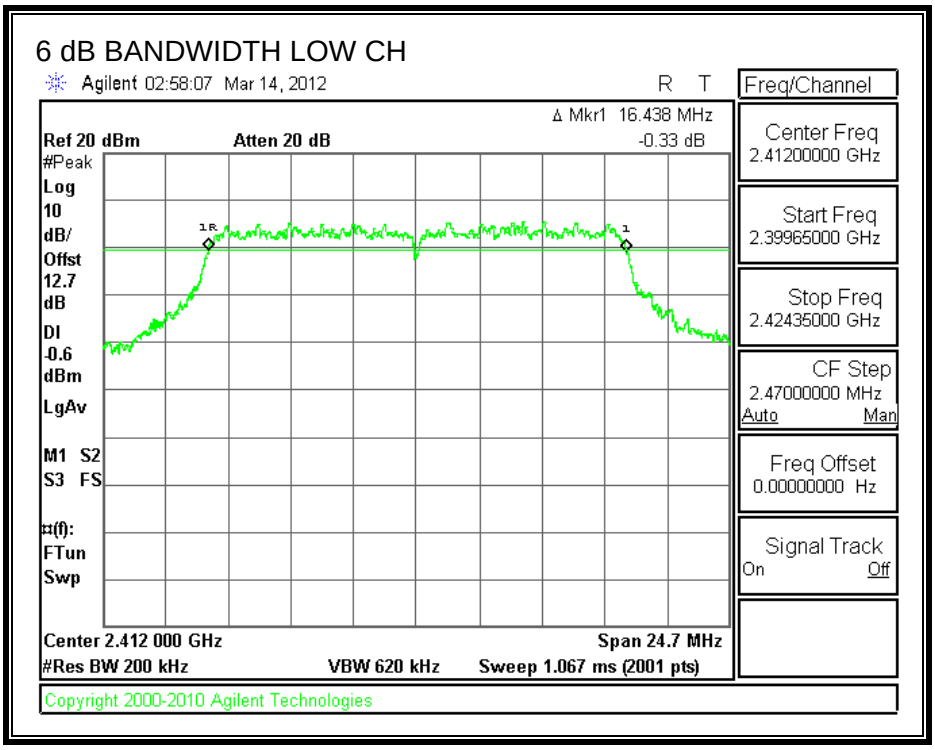
TEST PROCEDURE

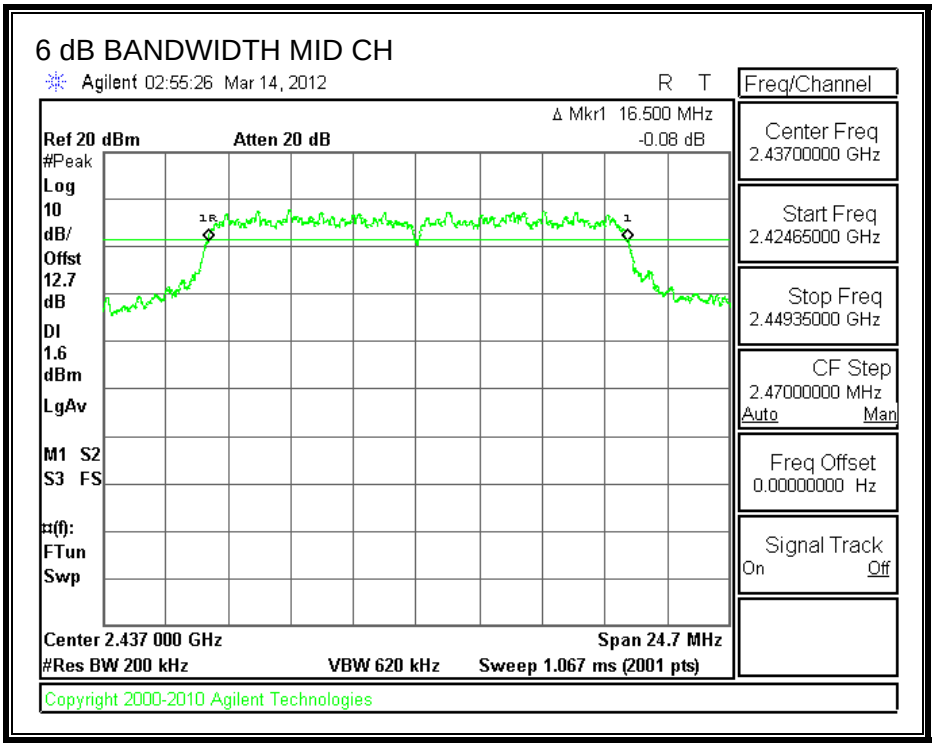
KDB 558074 D01 DTS Measurement Guidance V01 dated 01-18-12.

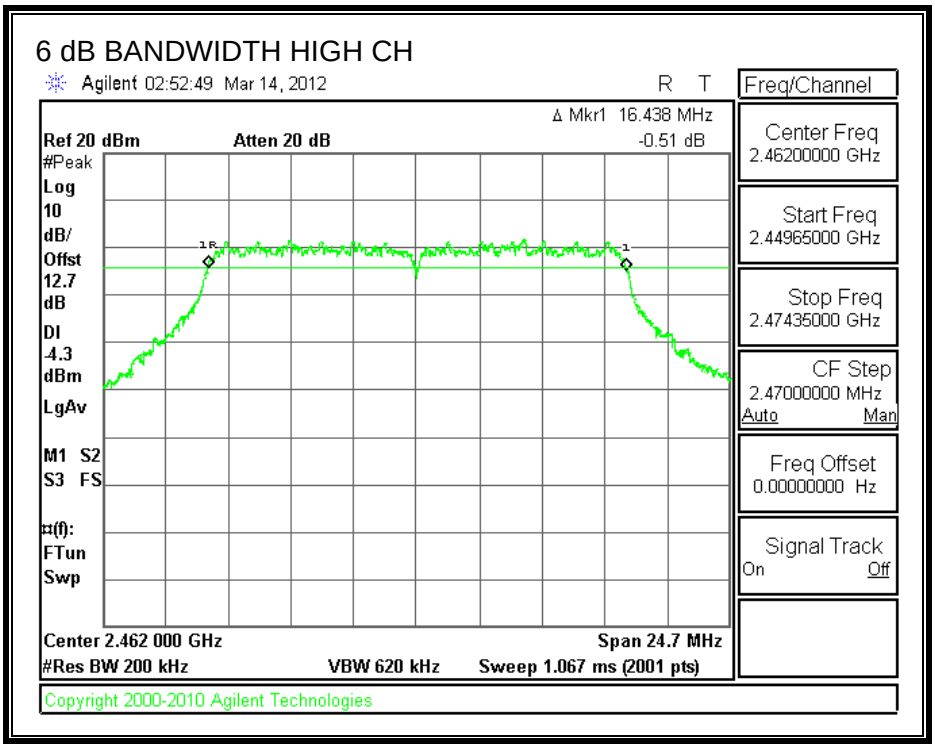
RESULTS

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low	2412	16.438	0.5
Middle	2437	16.500	0.5
High	2462	16.438	0.5

6 dB BANDWIDTH







7.2.2. 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

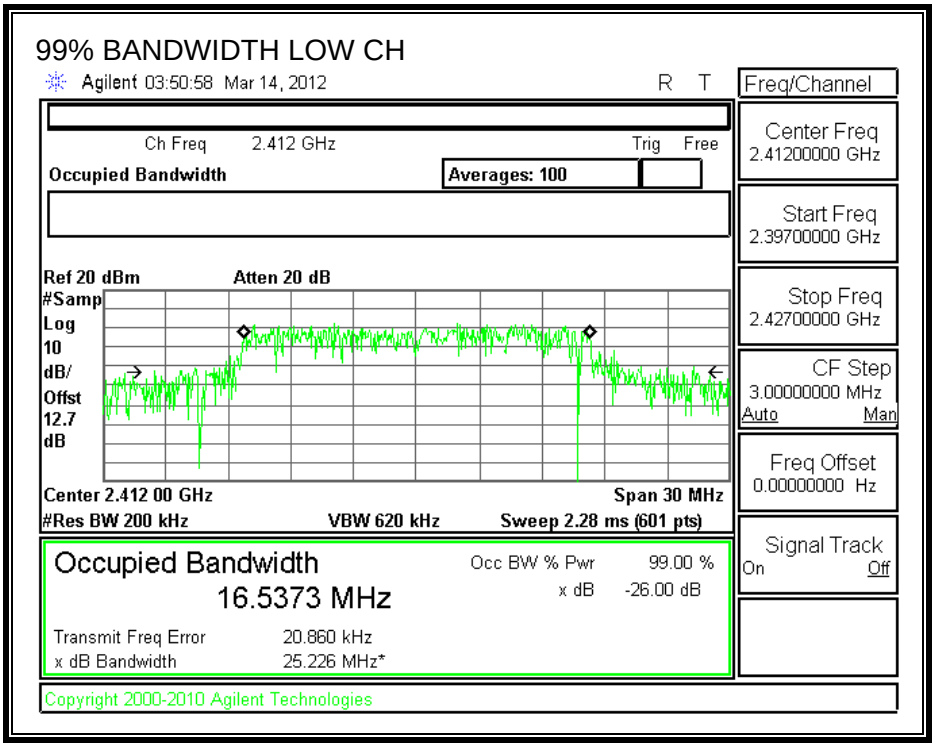
TEST PROCEDURE

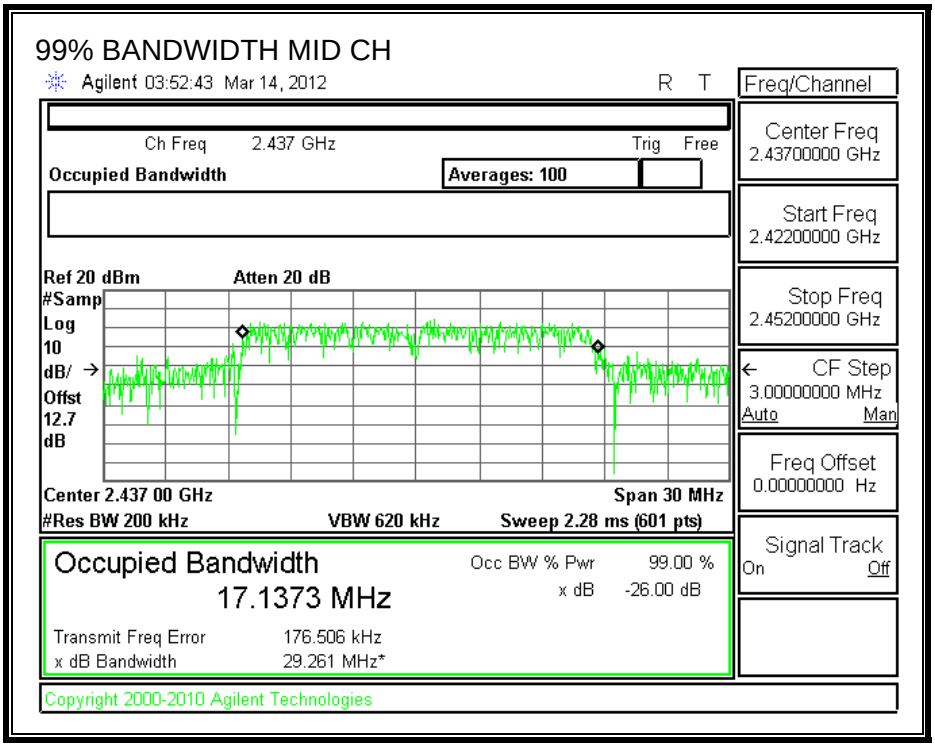
The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the 99 % bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal 99% bandwidth function is utilized.

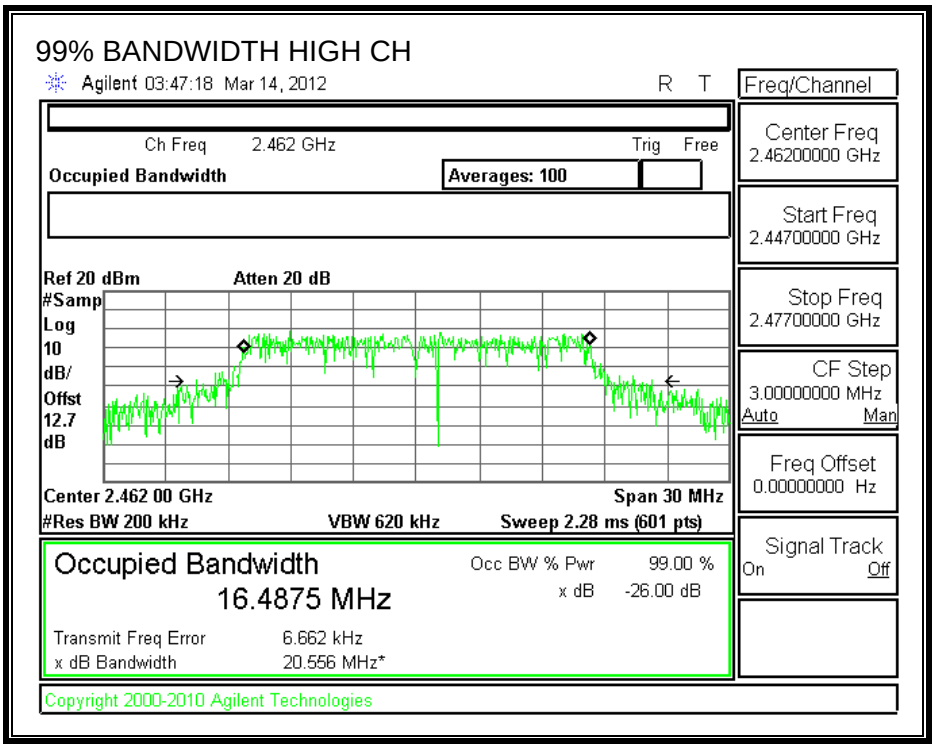
RESULTS

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2412	16.5373
Middle	2437	17.1373
High	2462	16.4875

99% BANDWIDTH







7.2.3. OUTPUT POWER

LIMITS

FCC §15.247 (b)

IC RSS-210 A8.4

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

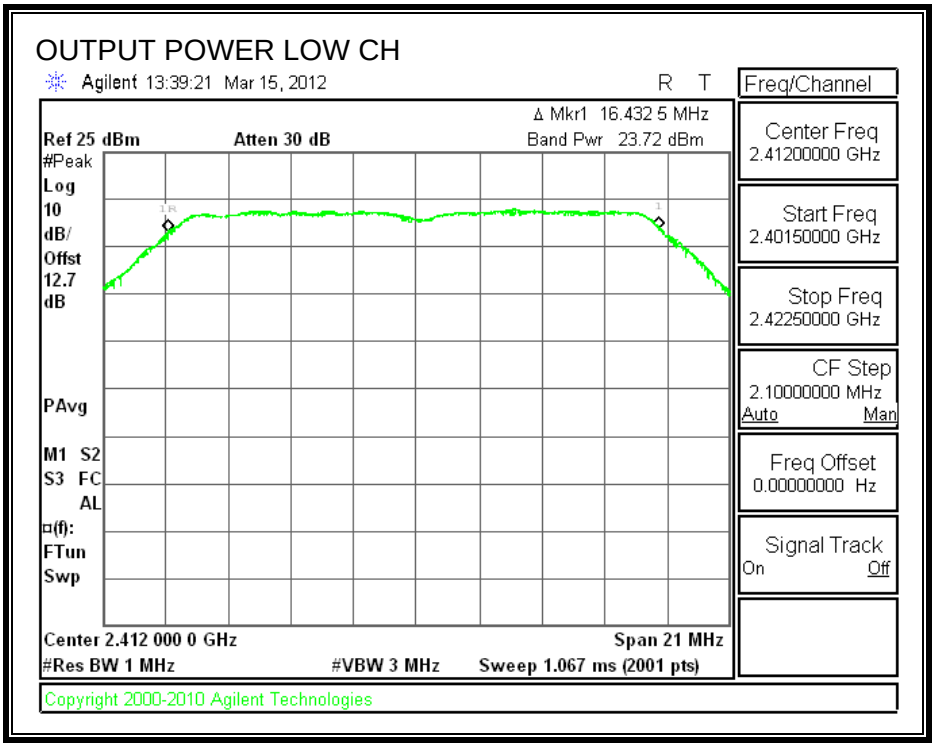
TEST PROCEDURE

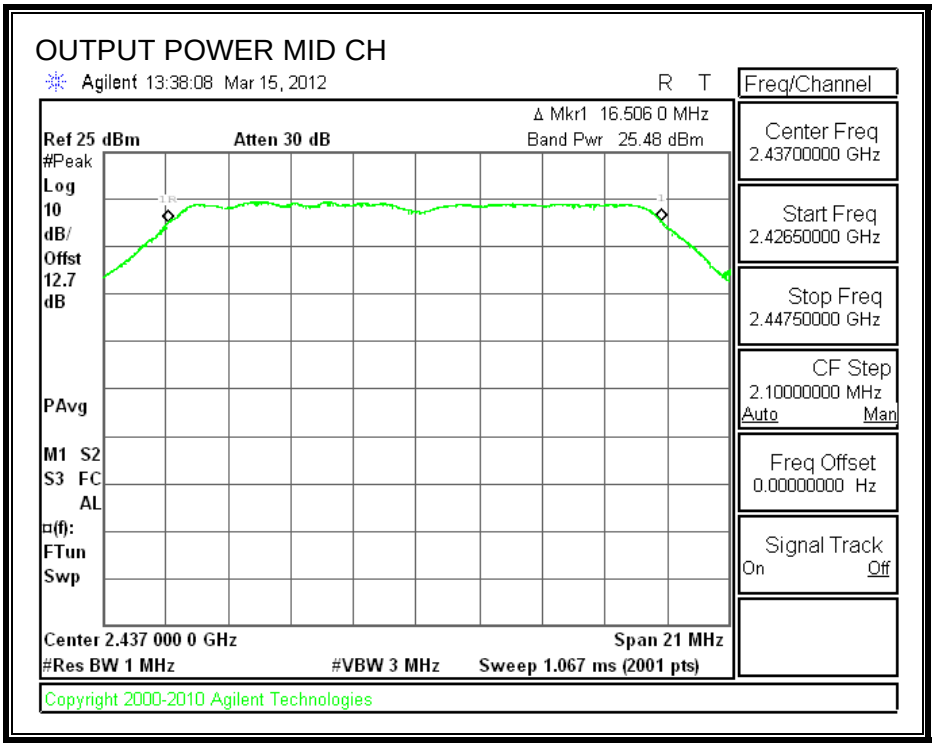
KDB 558074 D01 DTS Measurement Guidance V01 dated 01-18-12.

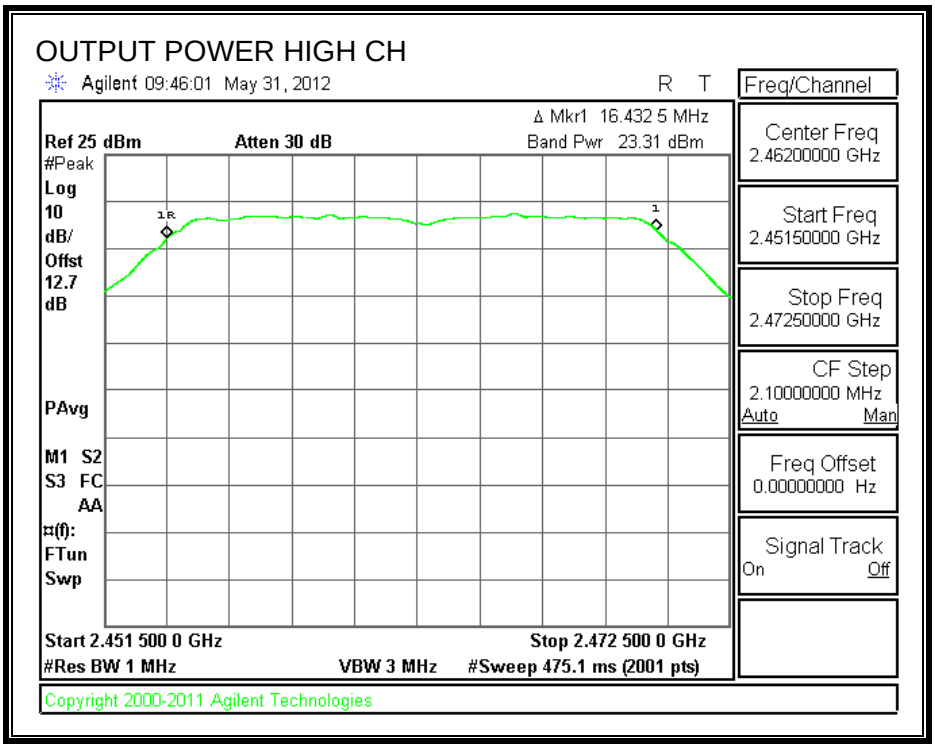
RESULTS

Channel	Frequency (MHz)	Peak Power Reading (dBm)	Limit (dBm)	Margin (dB)
Low	2412	23.72	30	-6.28
Middle	2437	25.48	30	-4.52
High	2462	23.31	30	-6.69

OUTPUT POWER







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 12.7 dB (including 12 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	15.40
Middle	2437	17.20
High	2462	15.30

7.2.5. POWER SPECTRAL DENSITY

LIMITS

FCC §15.247 (e)

IC RSS-210 A8.2 (b)

TEST PROCEDURE

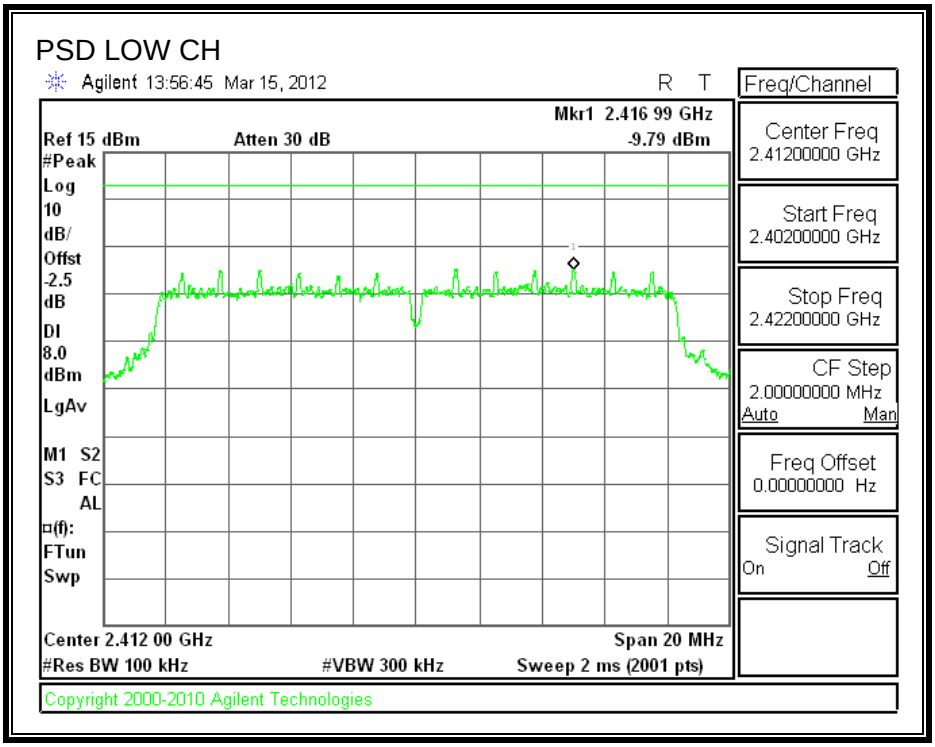
KDB 558074 D01 DTS Measurement Guidance V01 dated 01-18-12.

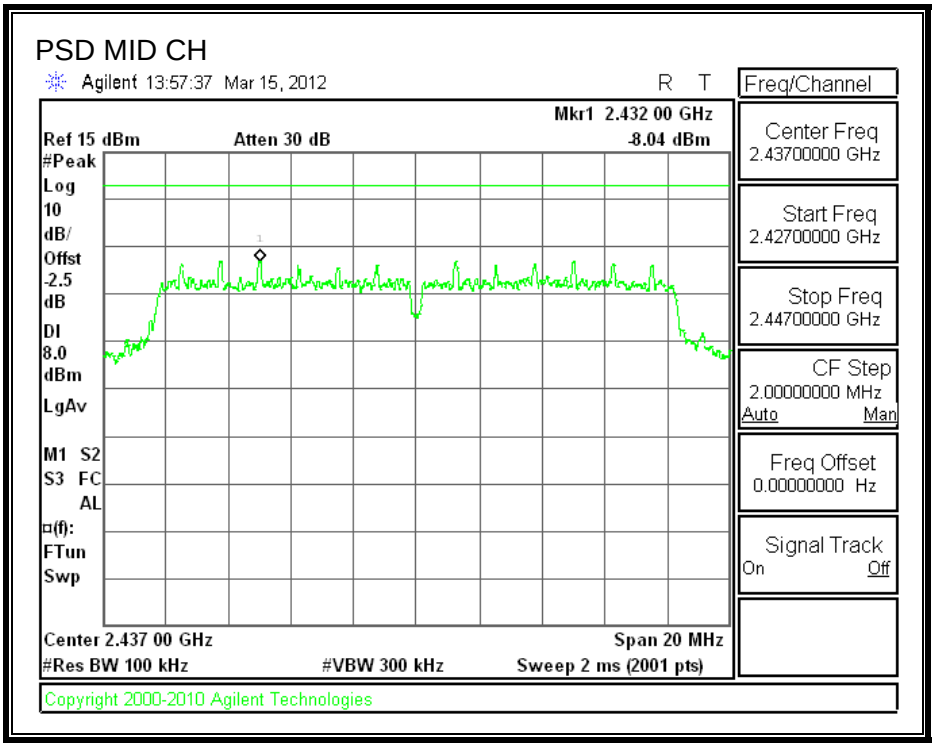
RESULTS

Note: analyzer offset = cable loss + attenuator + 10 log (3/100 kHz) = -2.5 dB

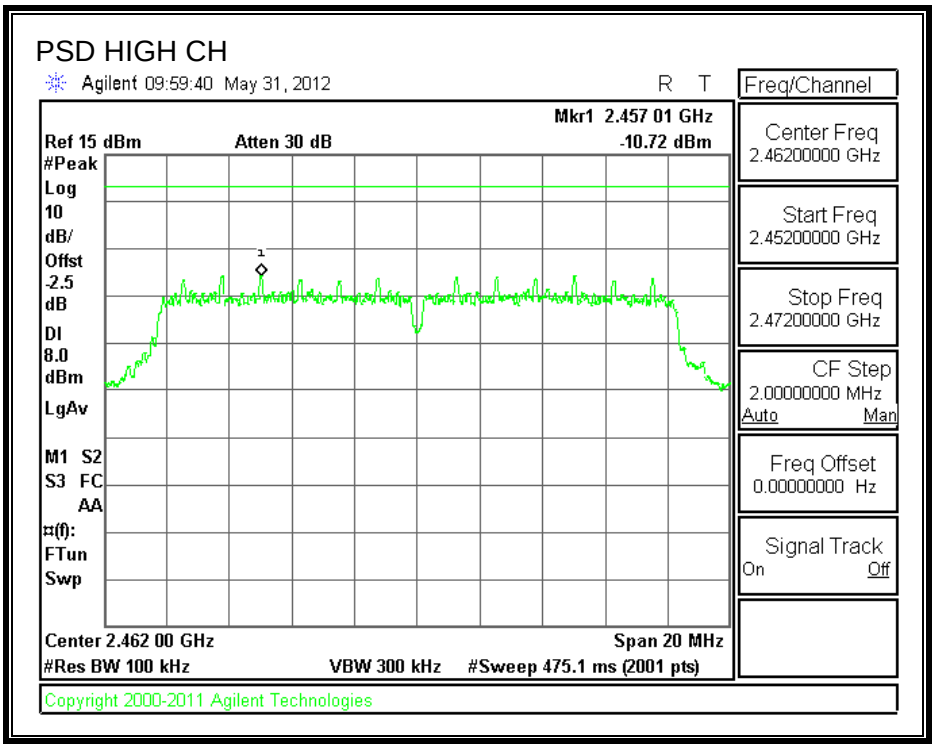
Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Margin (dB)
Low	2412	-9.79	8	-17.79
Middle	2437	-8.04	8	-16.04
High	2462	-10.72	8	-18.72

POWER SPECTRAL DENSITY





PSD HIGH CH



7.2.6. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.247 (d)

IC RSS-210 A8.5

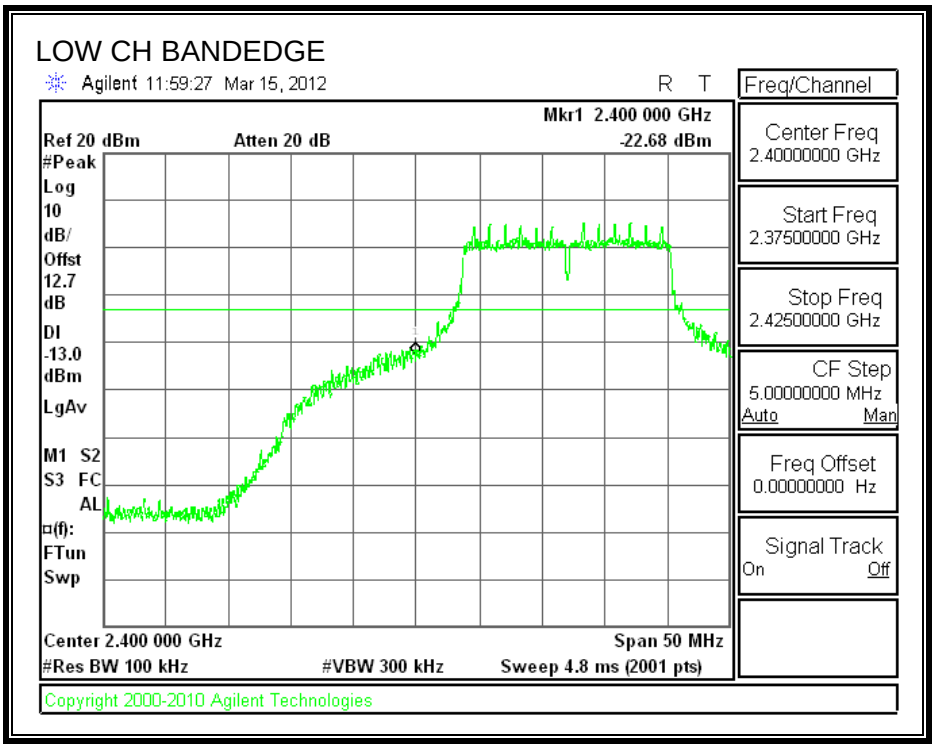
Output power was measured based on the use of a peak measurement, therefore the required attenuation is 20 dB.

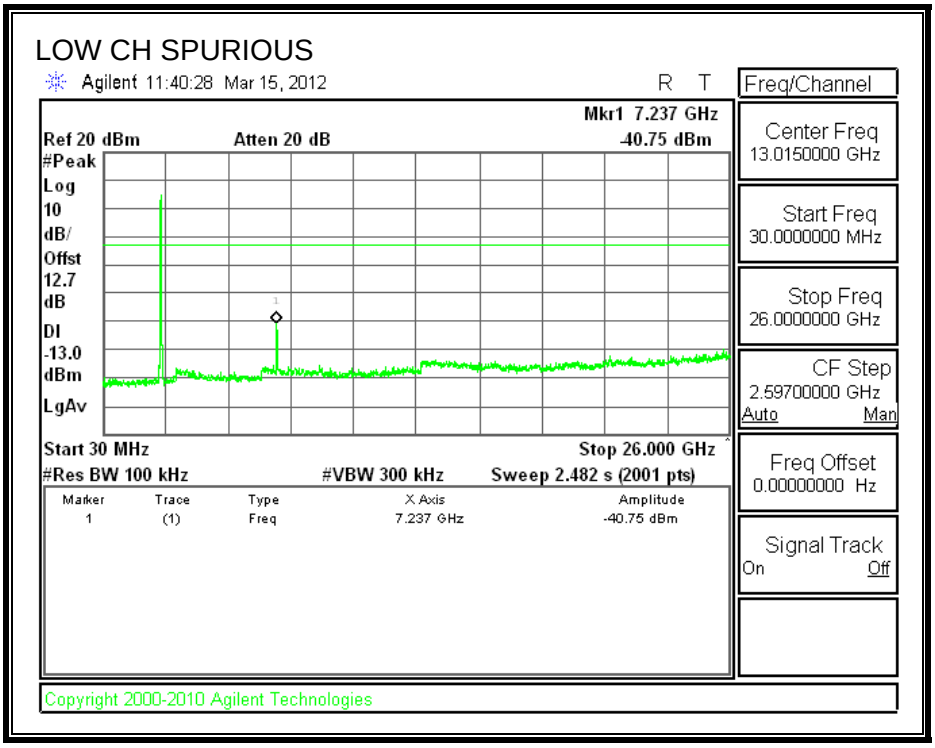
TEST PROCEDURE

KDB 558074 D01 DTS Measurement Guidance V01 dated 01-18-12.

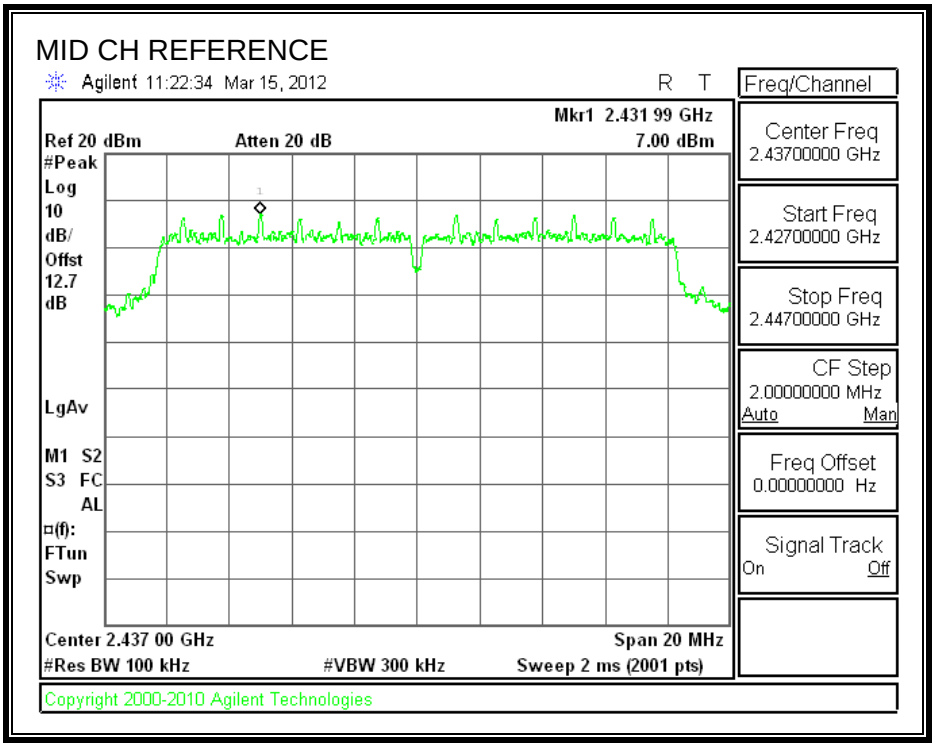
RESULTS

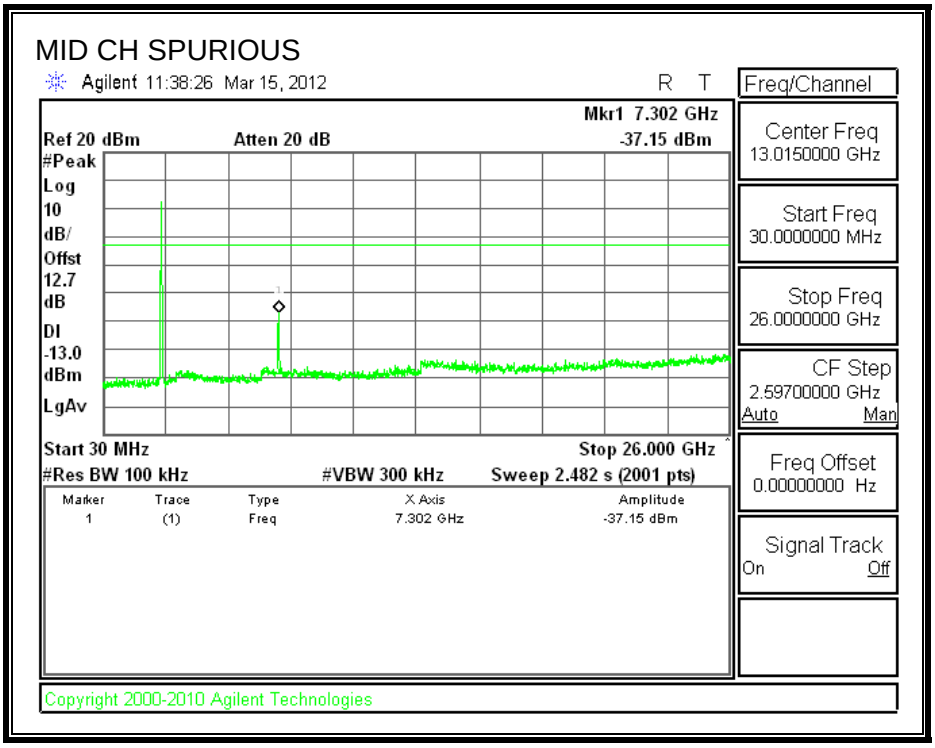
SPURIOUS EMISSIONS, LOW CHANNEL



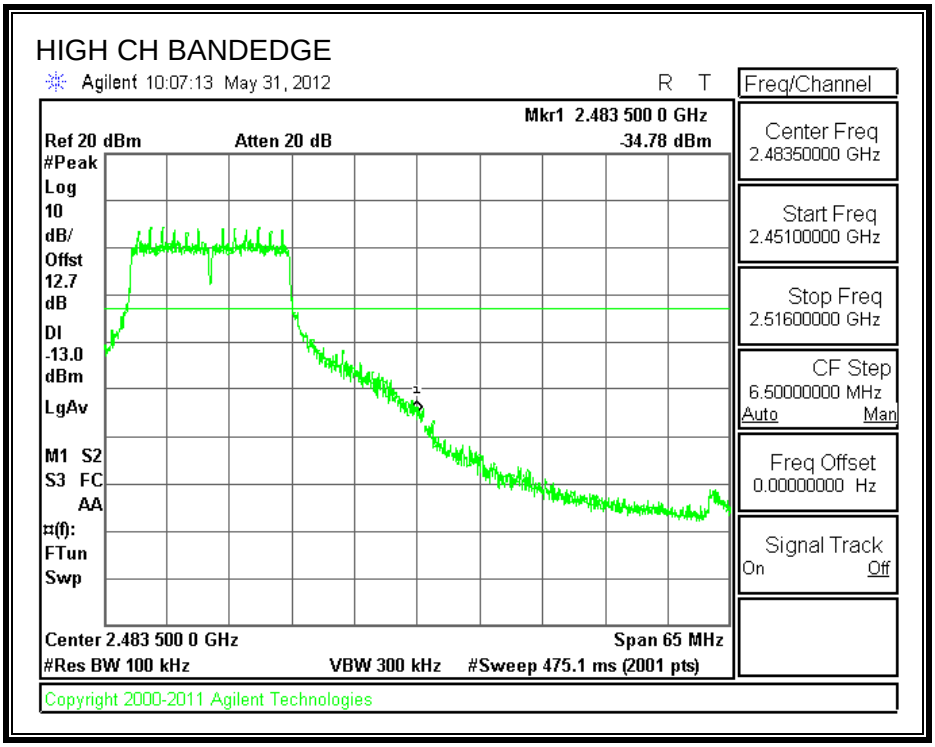


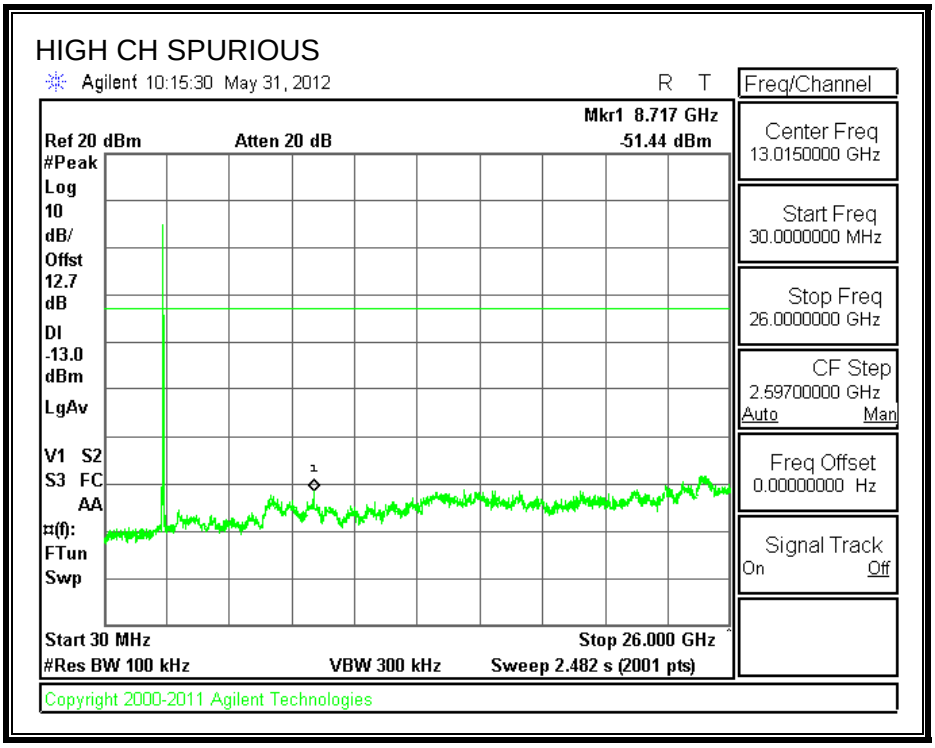
SPURIOUS EMISSIONS, MID CHANNEL





SPURIOUS EMISSIONS, HIGH CHANNEL





7.3. 802.11n HT20 MODE IN THE 2.4 GHz BAND

7.3.1. 6 dB BANDWIDTH

LIMITS

FCC §15.247 (a) (2)

IC RSS-210 A8.2 (a)

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

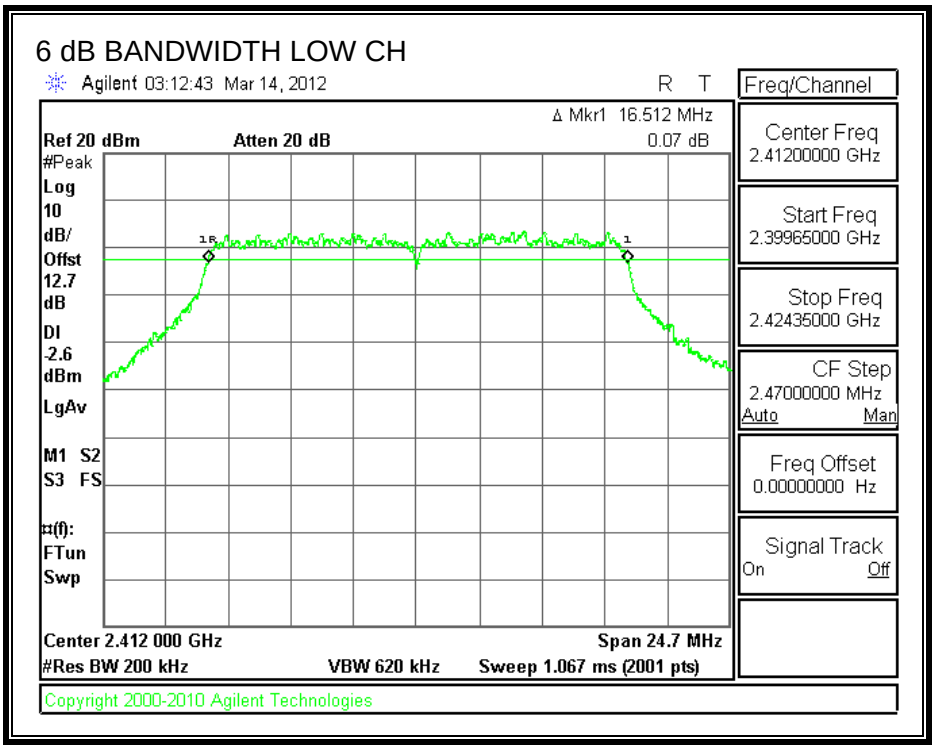
TEST PROCEDURE

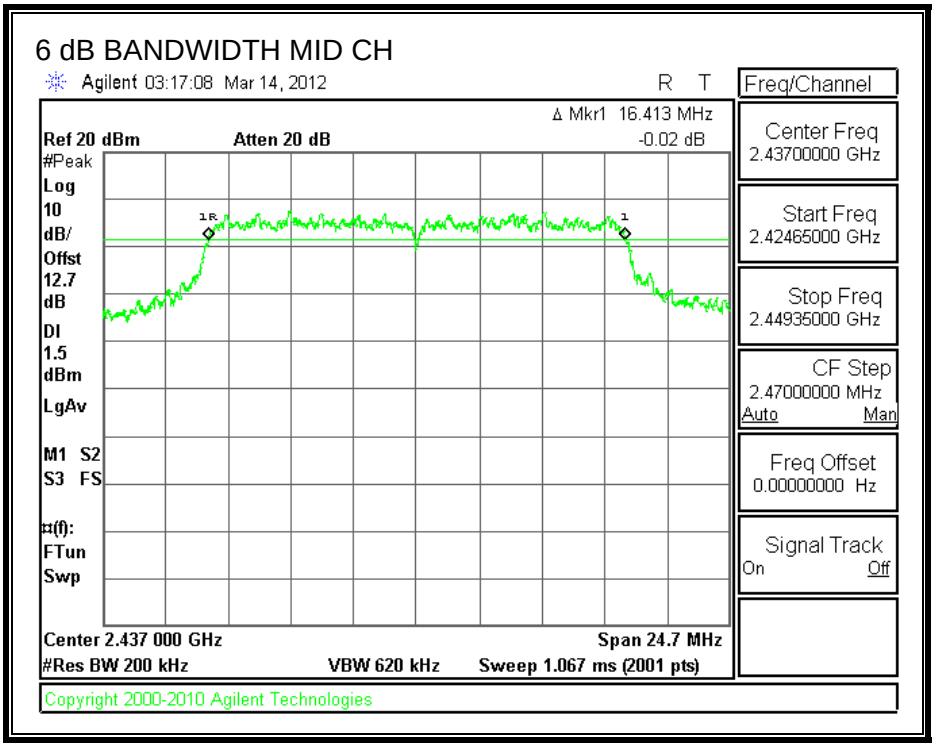
KDB 558074 D01 DTS Measurement Guidance V01 dated 01-18-12.

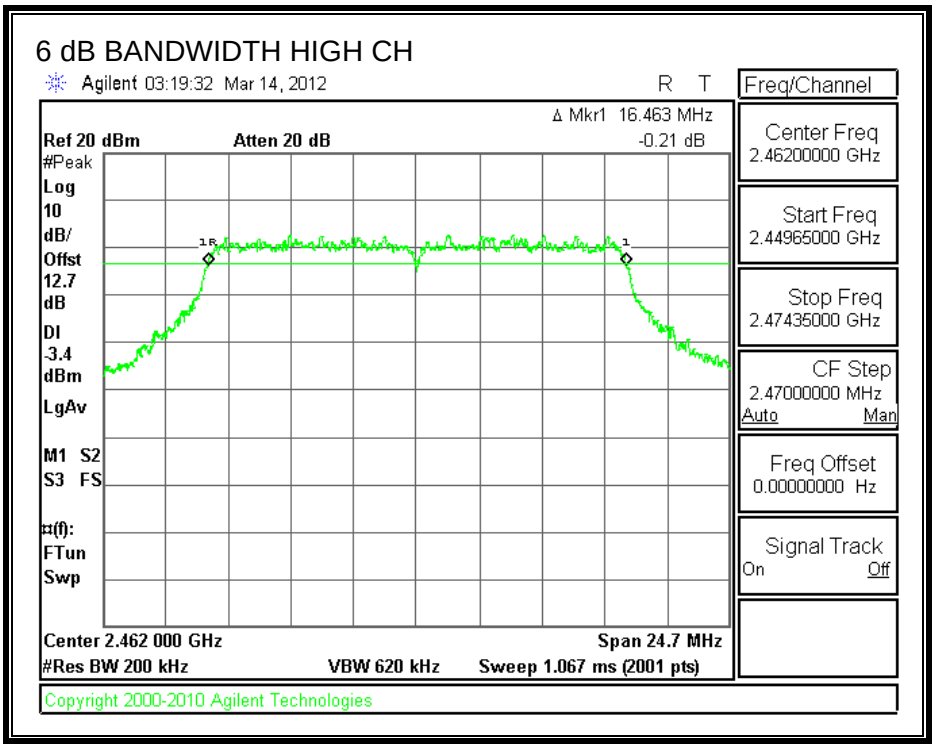
RESULTS

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low	2412	16.512	0.5
Middle	2437	16.413	0.5
High	2462	16.463	0.5

6 dB BANDWIDTH







7.3.2. 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

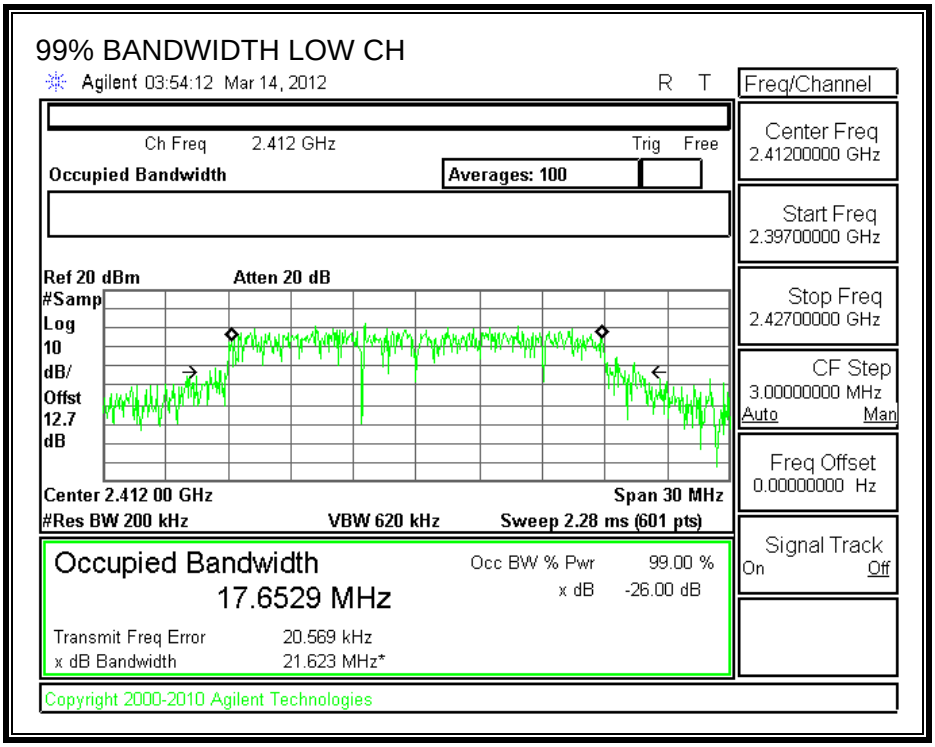
TEST PROCEDURE

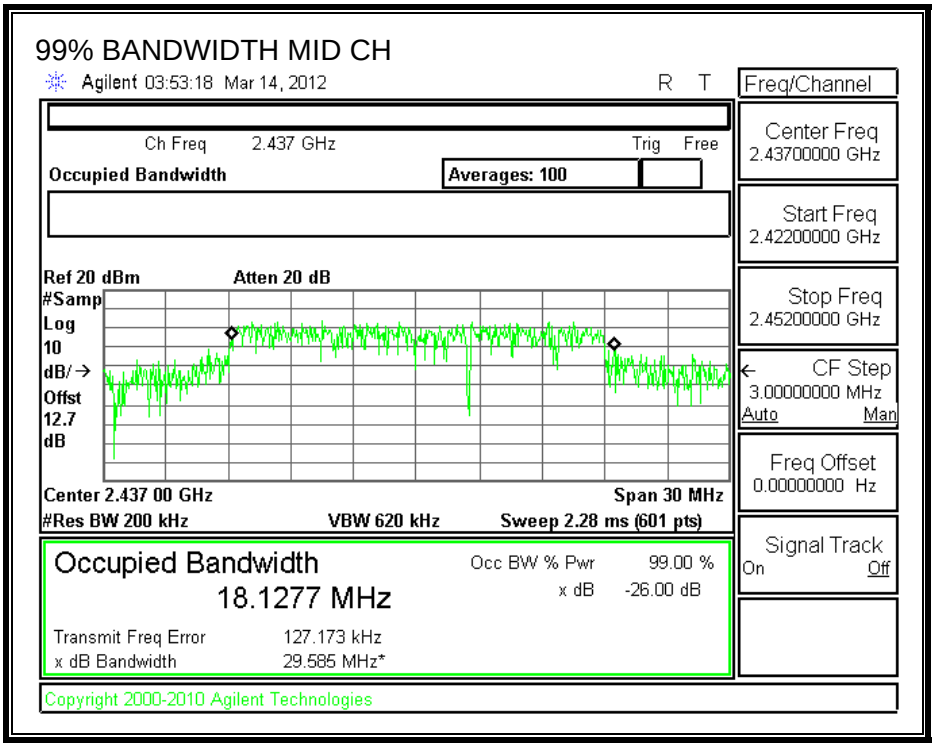
The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the 99 % bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal 99% bandwidth function is utilized.

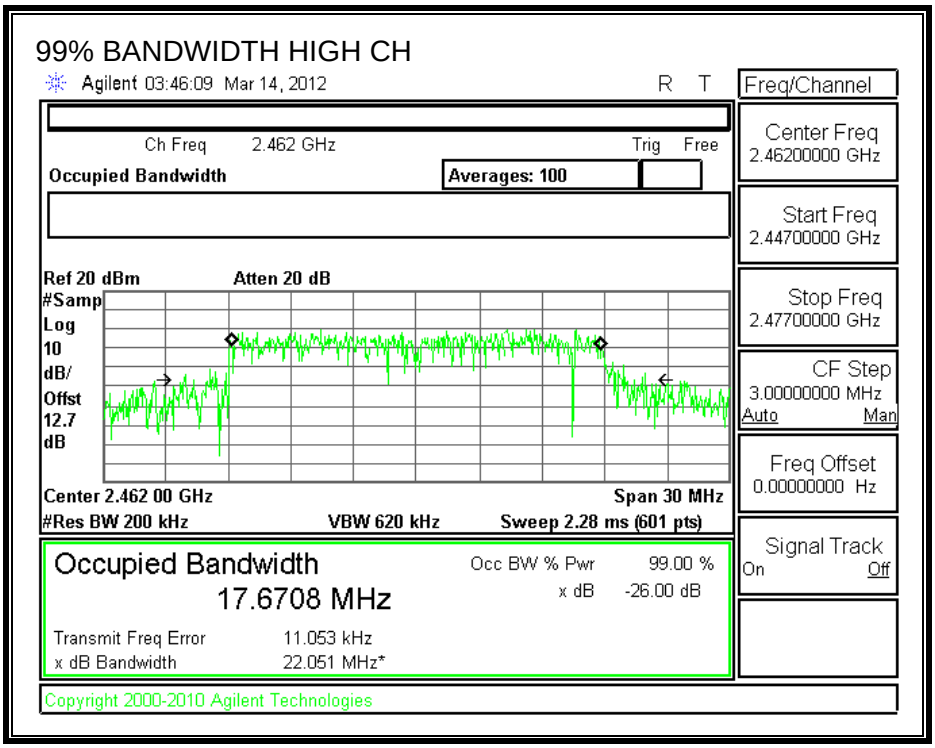
RESULTS

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2412	17.6529
Middle	2437	18.1277
High	2462	17.6708

99% BANDWIDTH







7.3.3. OUTPUT POWER

LIMITS

FCC §15.247 (b)

IC RSS-210 A8.4

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

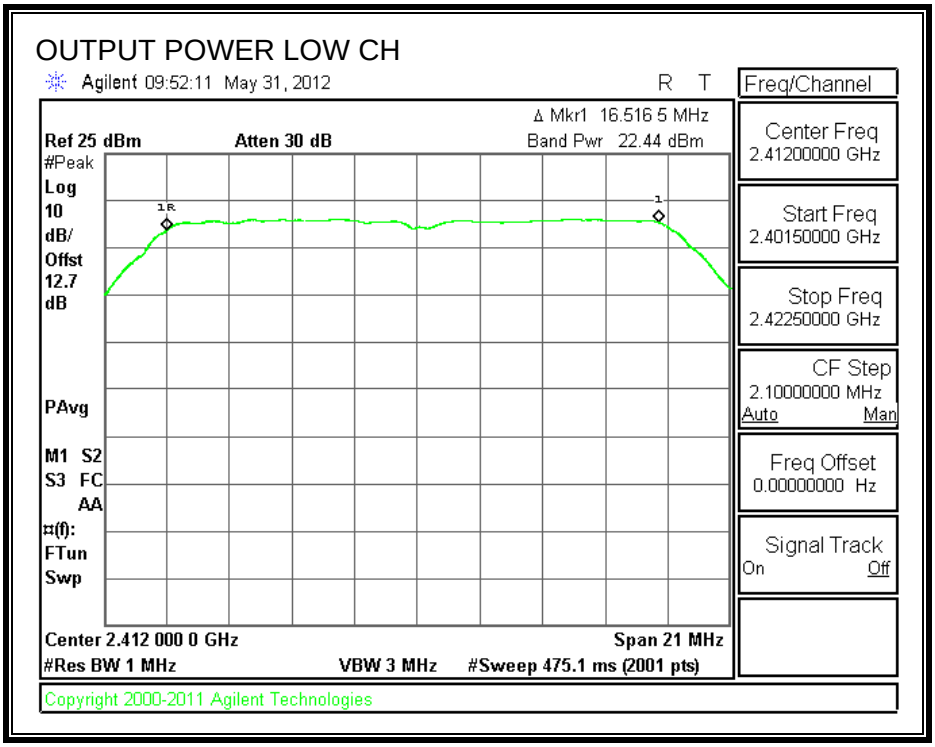
TEST PROCEDURE

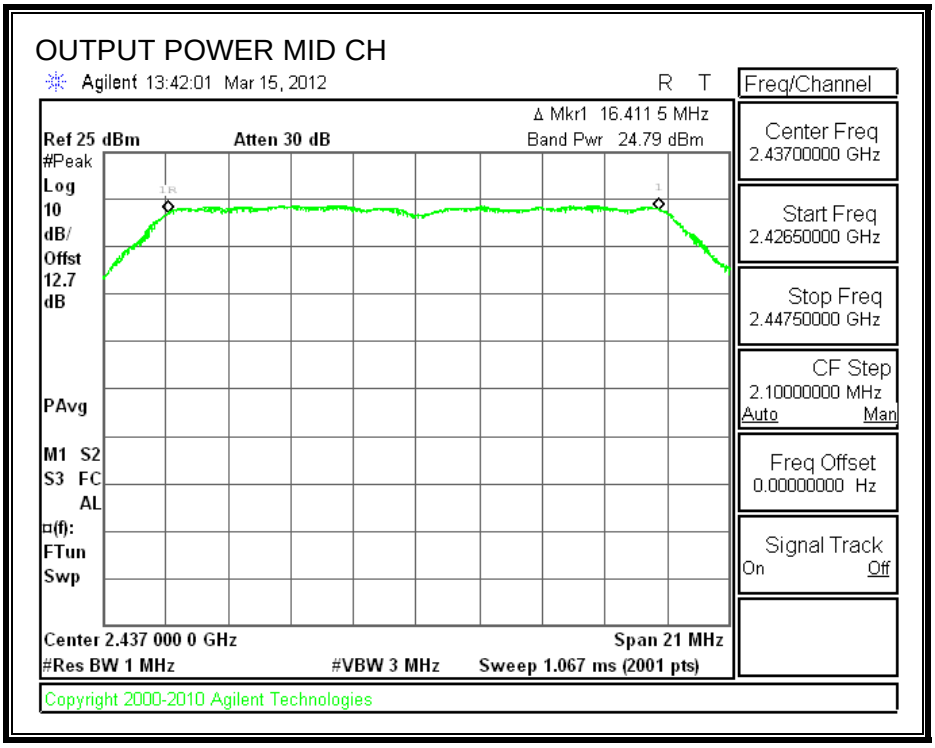
KDB 558074 D01 DTS Measurement Guidance V01 dated 01-18-12.

RESULTS

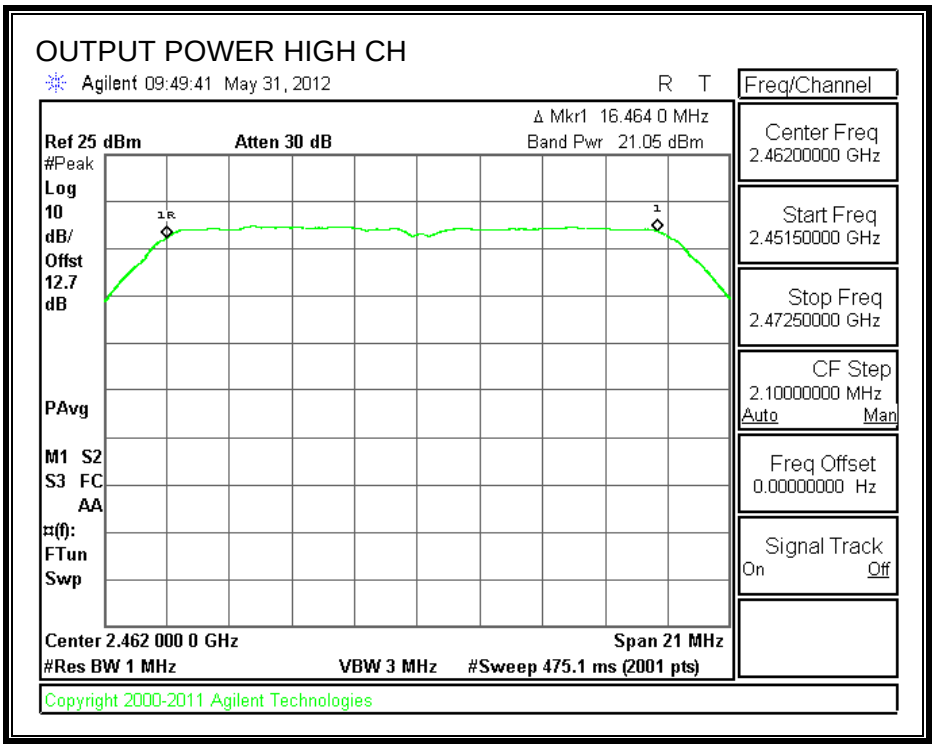
Channel	Frequency (MHz)	Peak Power Reading (dBm)	Limit (dBm)	Margin (dB)
Low	2412	22.44	30	-7.56
Middle	2437	24.79	30	-5.21
High	2462	21.05	30	-8.95

OUTPUT POWER





OUTPUT POWER HIGH CH



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 12.7dB (including 12 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	14.40
Middle	2437	16.80
High	2462	13.10

7.3.5. POWER SPECTRAL DENSITY

LIMITS

FCC §15.247 (e)

IC RSS-210 A8.2 (b)

TEST PROCEDURE

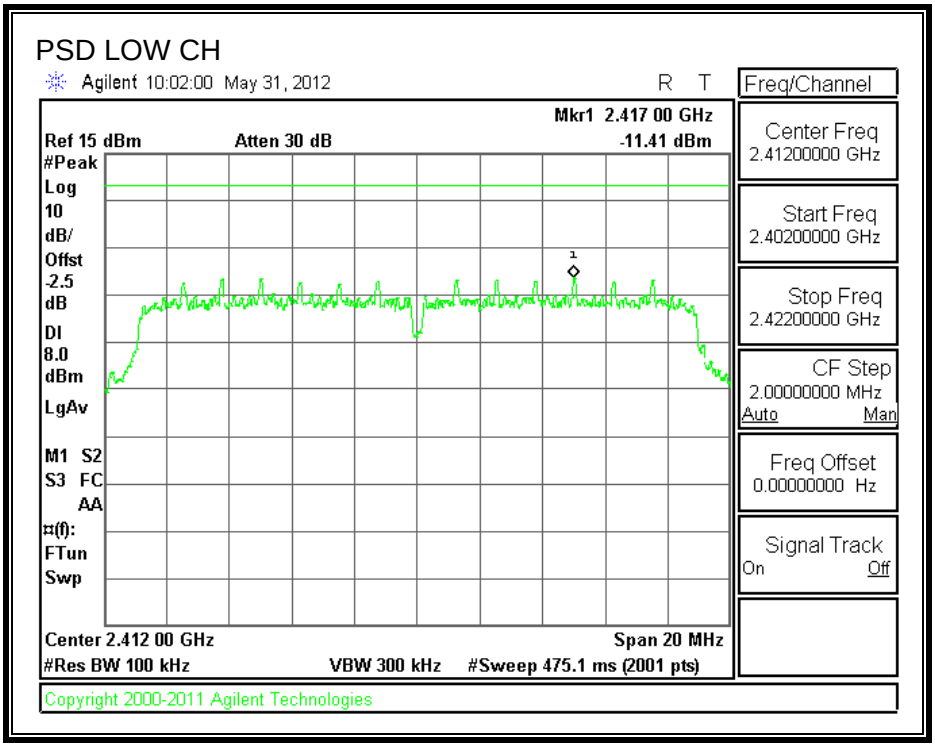
KDB 558074 D01 DTS Measurement Guidance V01 dated 01-18-12.

RESULTS

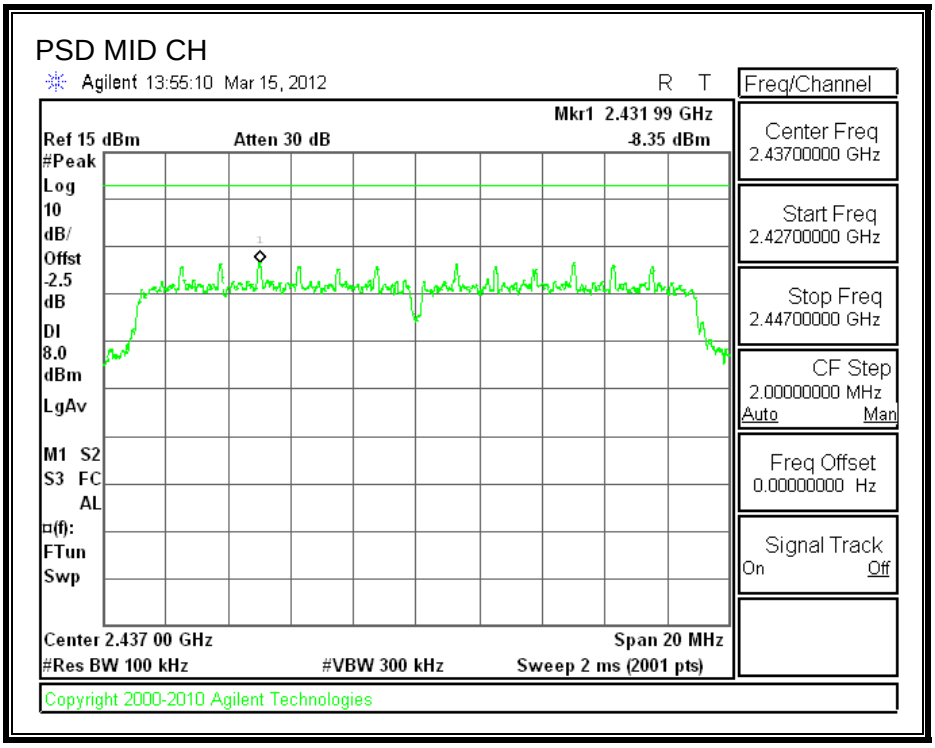
Note: analyzer offset = cable loss + attenuator + 10 log (3/100 kHz) = -2.5 dB

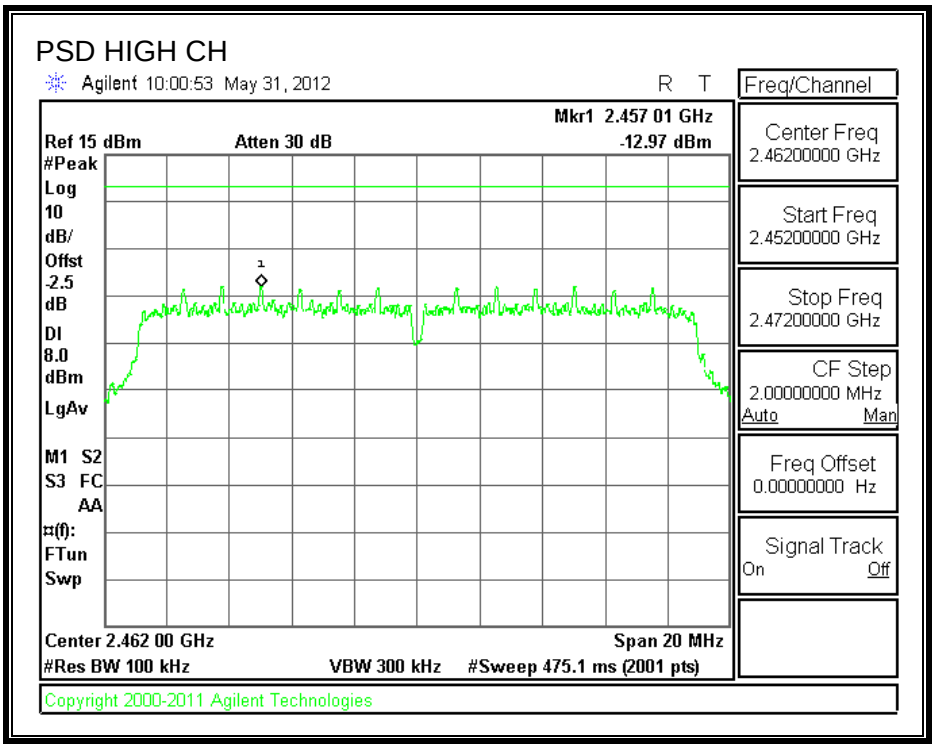
Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Margin (dB)
Low	2412	-11.41	8	-19.41
Middle	2437	-8.35	8	-16.35
High	2462	-12.97	8	-20.97

POWER SPECTRAL DENSITY



PSD MID CH





7.3.6. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.247 (d)

IC RSS-210 A8.5

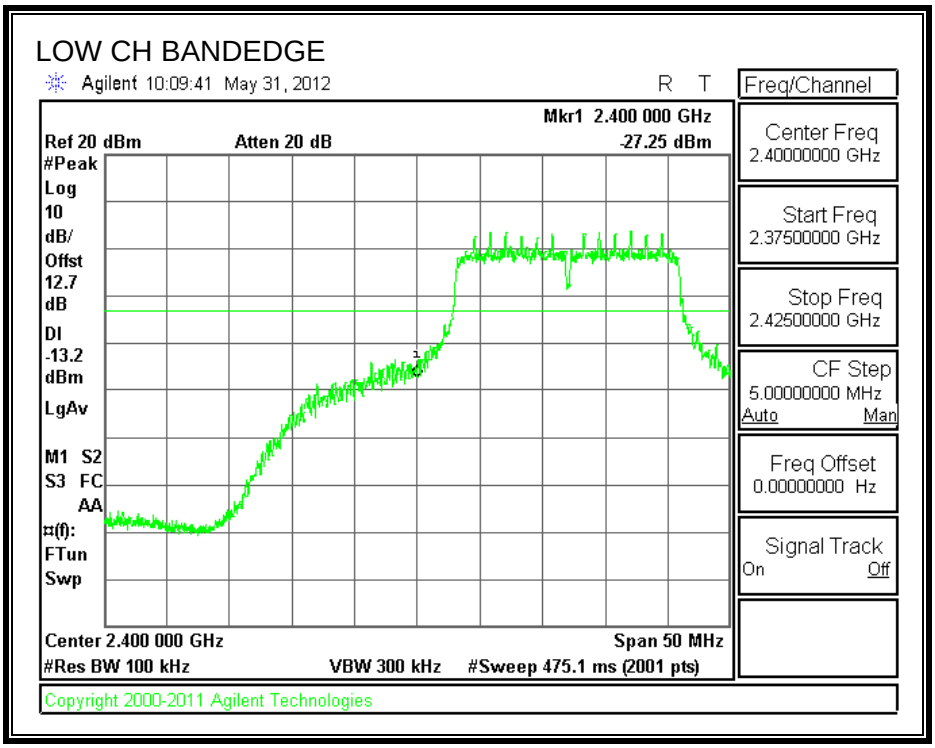
Output power was measured based on the use of a peak measurement, therefore the required attenuation is 20 dB.

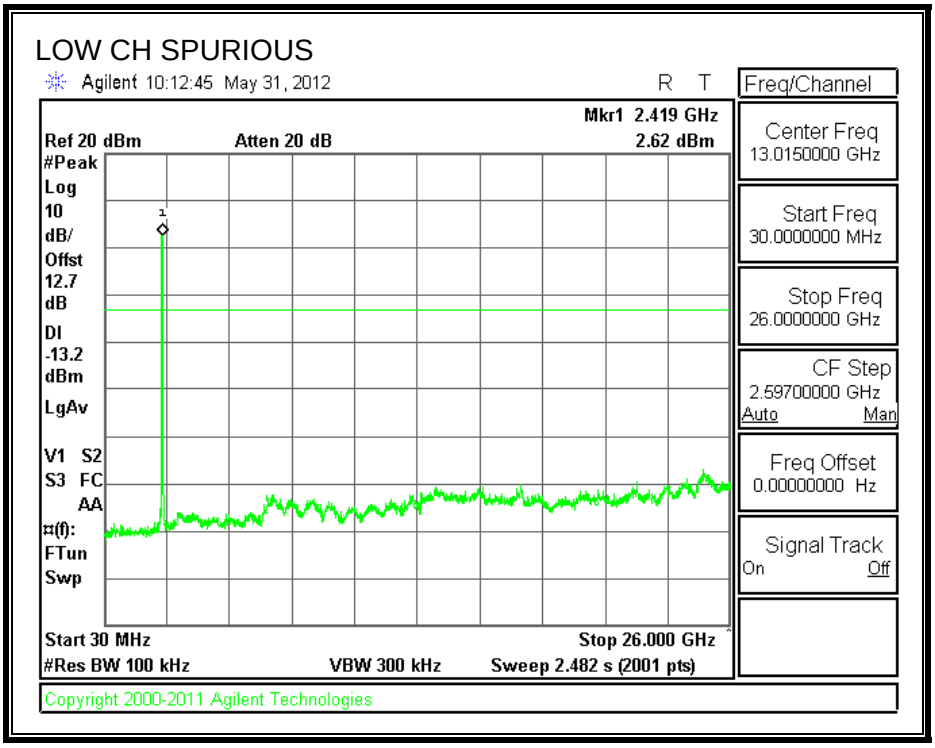
TEST PROCEDURE

KDB 558074 D01 DTS Measurement Guidance V01 dated 01-18-12.

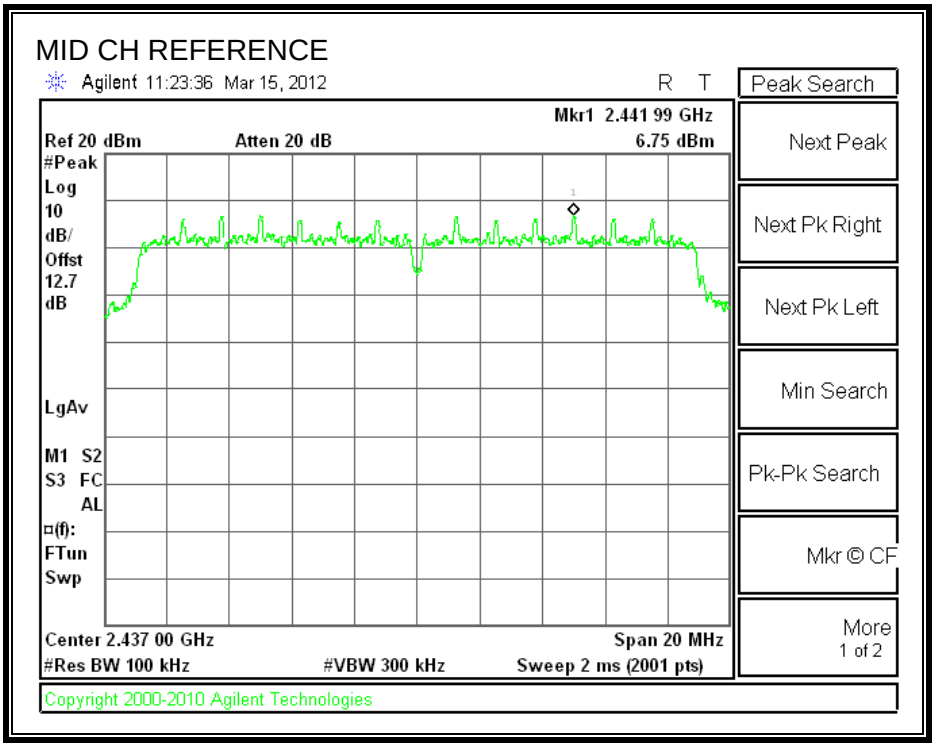
RESULTS

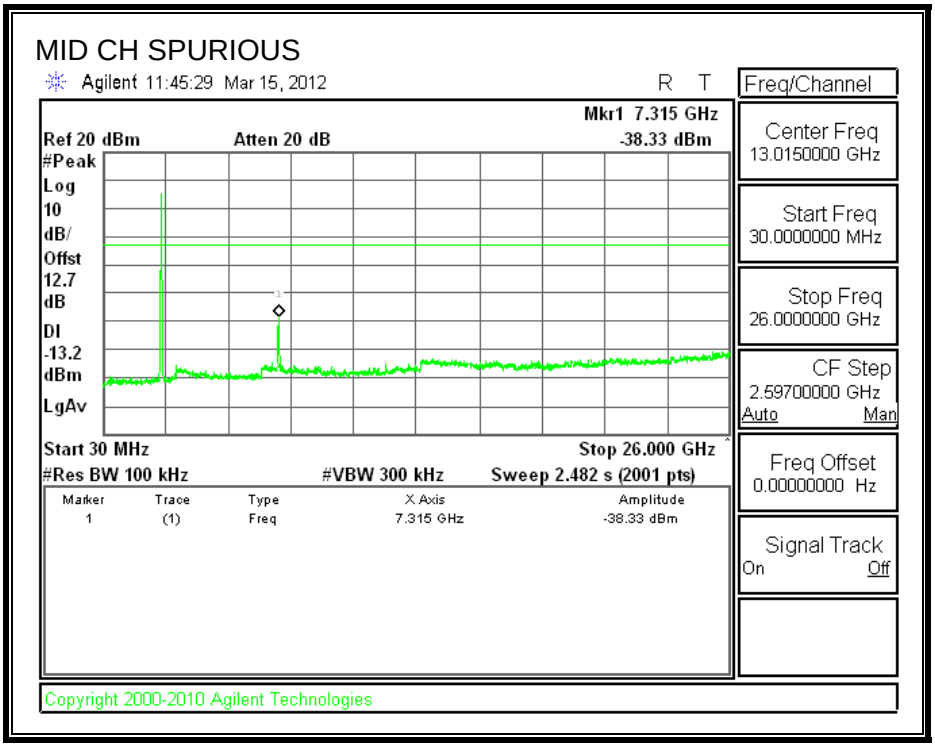
SPURIOUS EMISSIONS, LOW CHANNEL



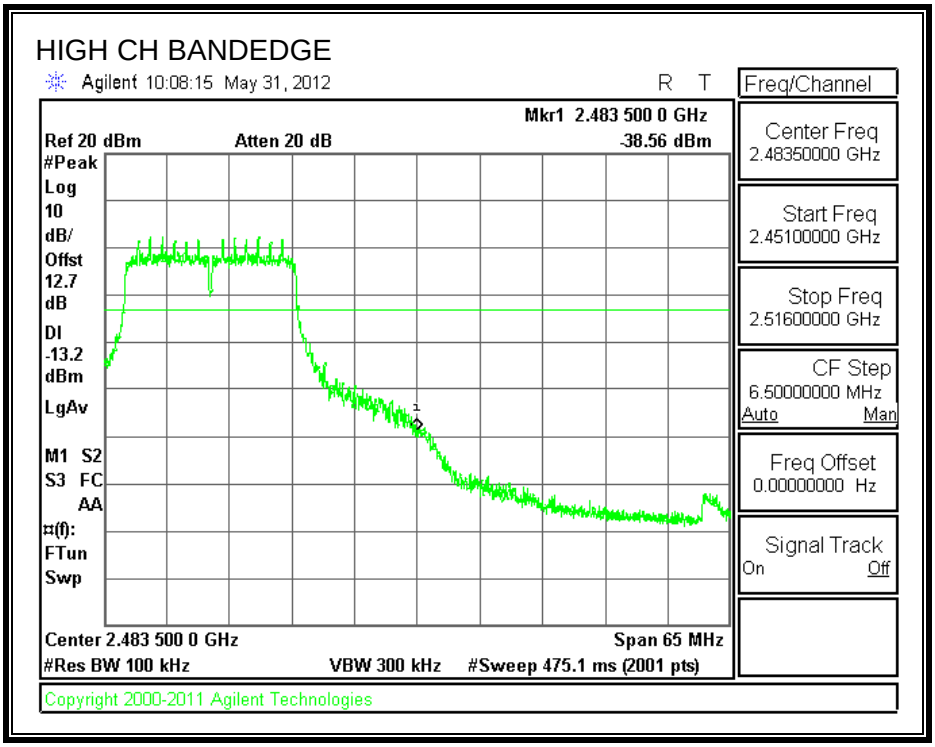


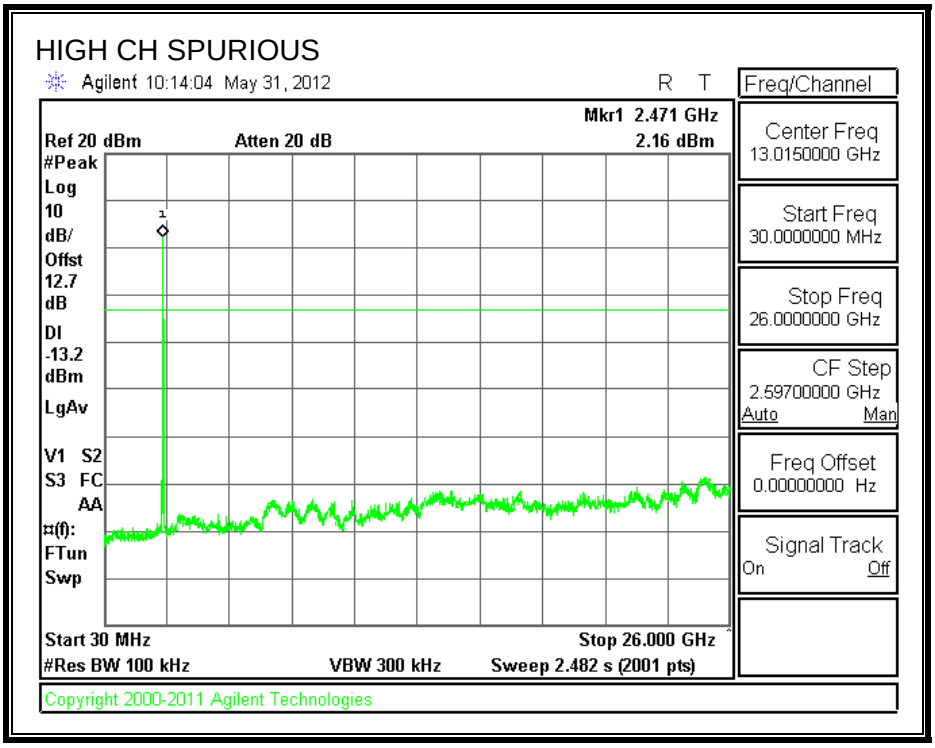
SPURIOUS EMISSIONS, MID CHANNEL





SPURIOUS EMISSIONS, HIGH CHANNEL





7.4. 802.11a 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.

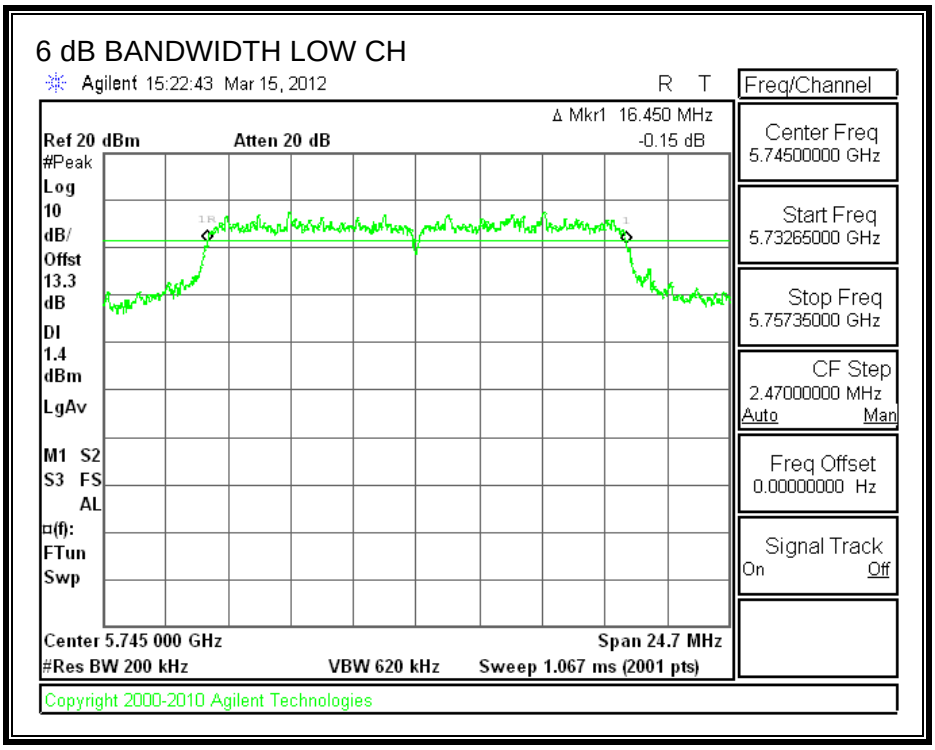
TEST PROCEDURE

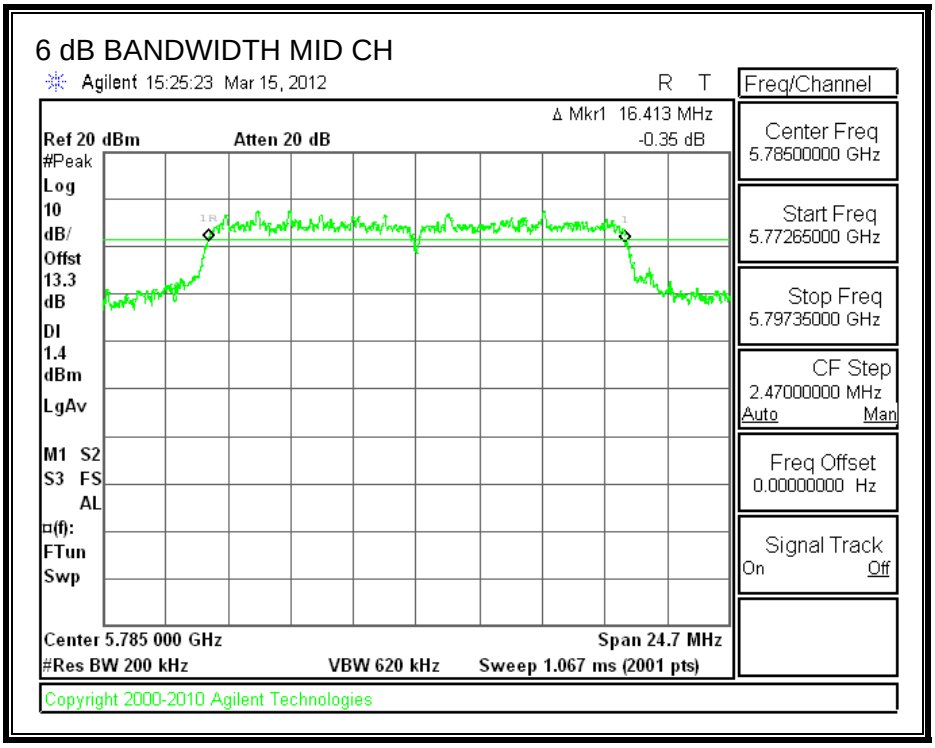
KDB 558074 D01 DTS Measurement Guidance V01 dated 01-18-12.

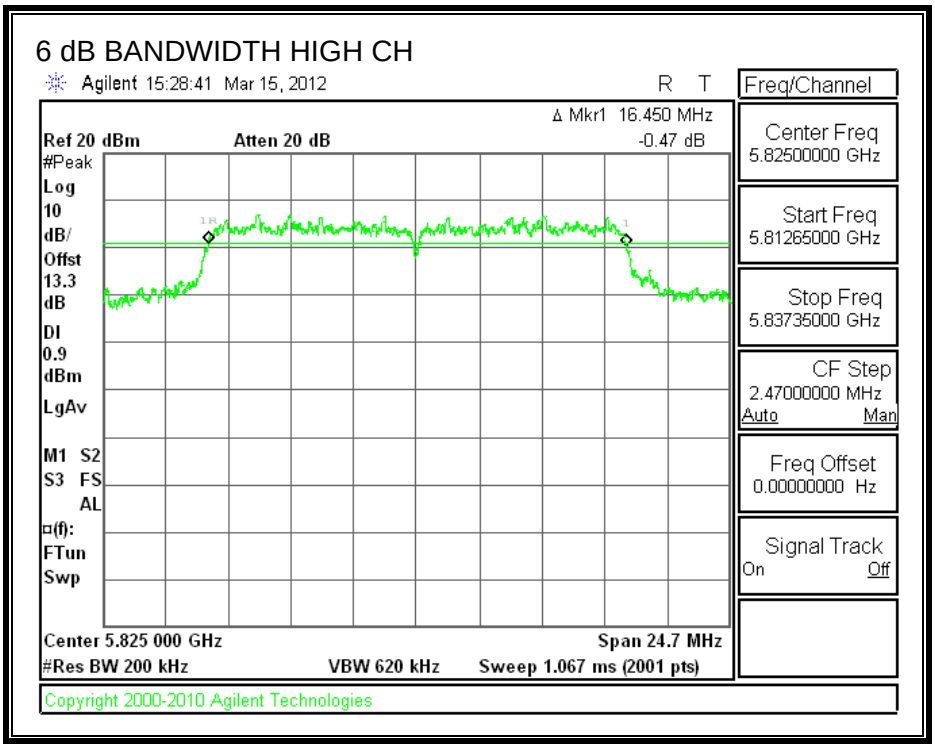
RESULTS

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low	5745	16.450	0.5
Middle	5785	16.413	0.5
High	5825	16.450	0.5

6 dB BANDWIDTH







7.4.2. 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

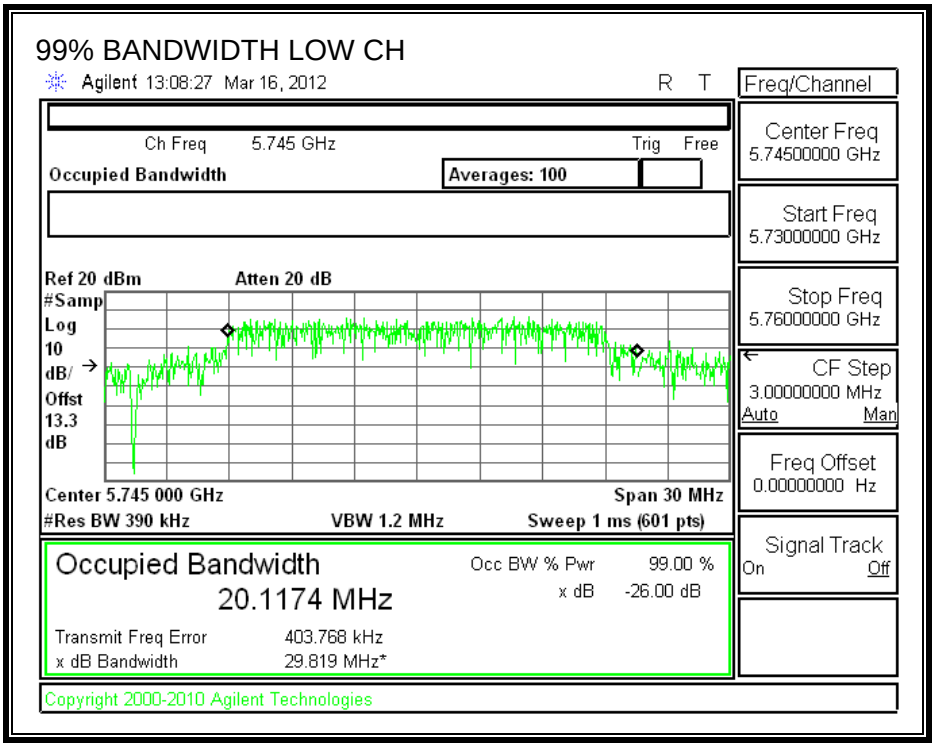
TEST PROCEDURE

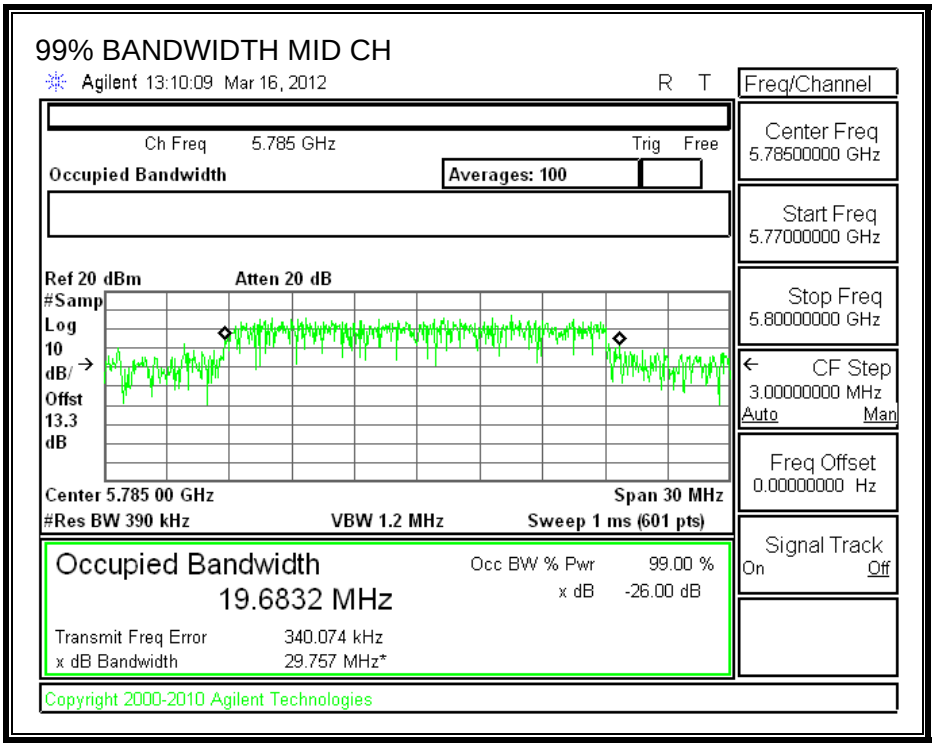
The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the 99 % bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal 99% bandwidth function is utilized.

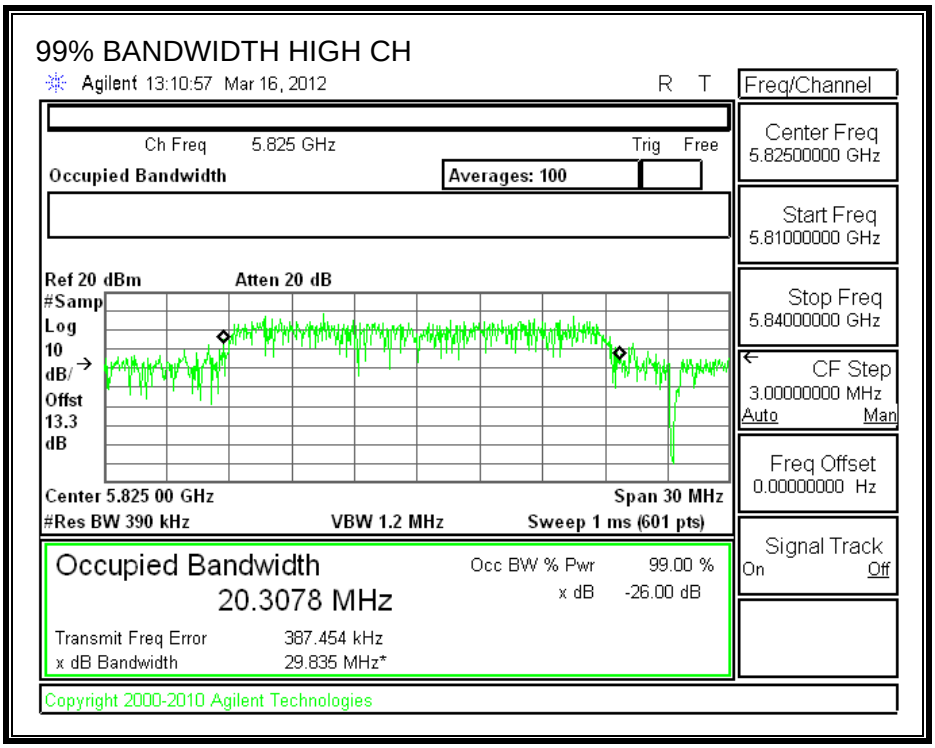
RESULTS

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	5745	20.1174
Middle	5785	19.6832
High	5825	20.3078

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.

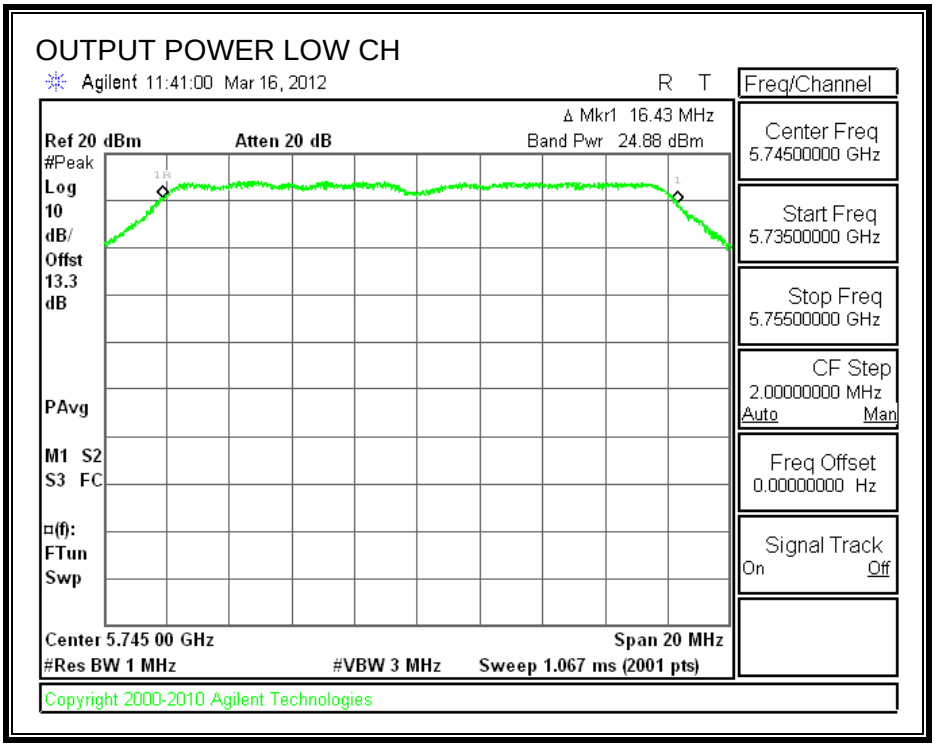
TEST PROCEDURE

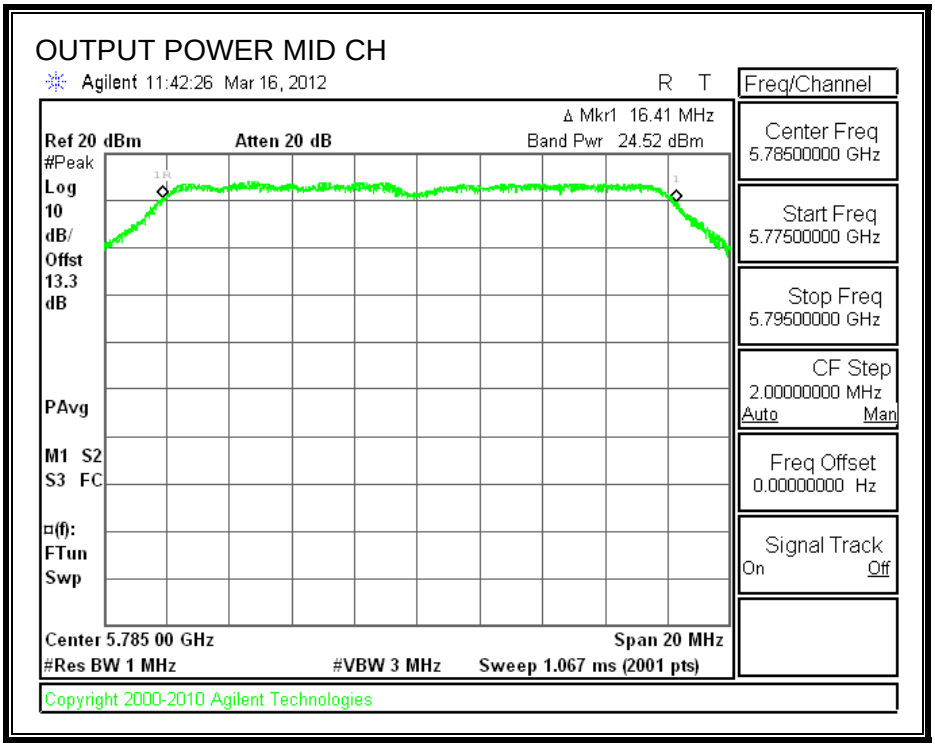
KDB 558074 D01 DTS Measurement Guidance V01 dated 01-18-12.

RESULTS

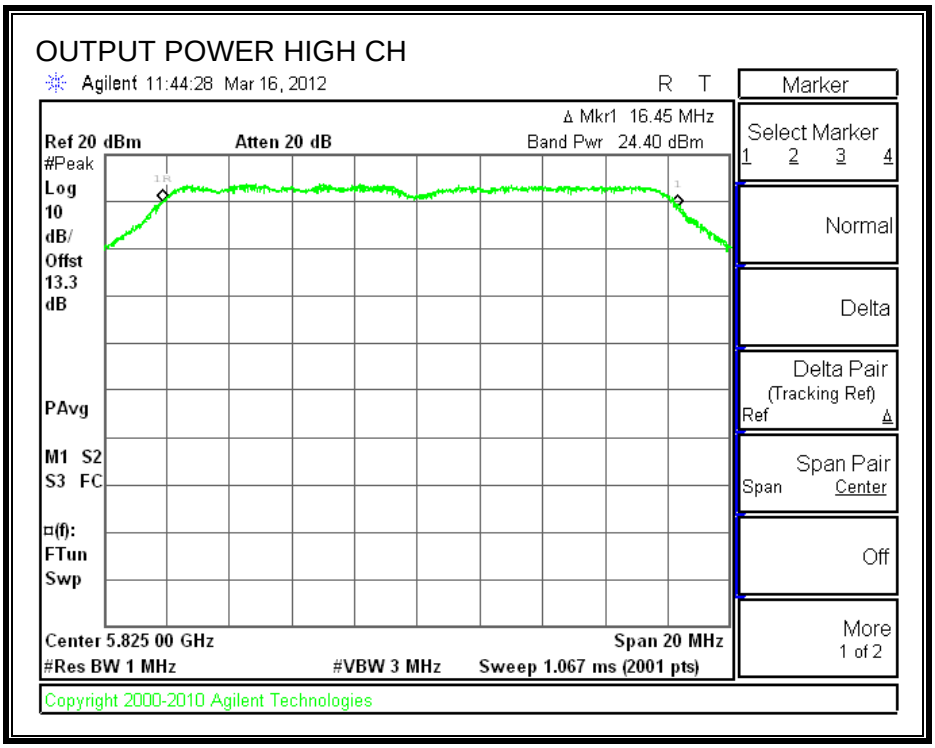
Channel	Frequency (MHz)	Peak Power Reading (dBm)	Limit (dBm)	Margin (dB)
Low	5745	24.88	30	-5.12
Middle	5785	24.52	30	-5.48
High	5825	24.40	30	-5.60

OUTPUT POWER





OUTPUT POWER HIGH CH



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 13.3 dB (including 12 dB pad and 1.3 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	16.00
Middle	5785	16.00
High	5825	16.00

7.4.5. POWER SPECTRAL DENSITY

LIMITS

FCC §15.247 (e)

IC RSS-210 A8.2 (b)

TEST PROCEDURE

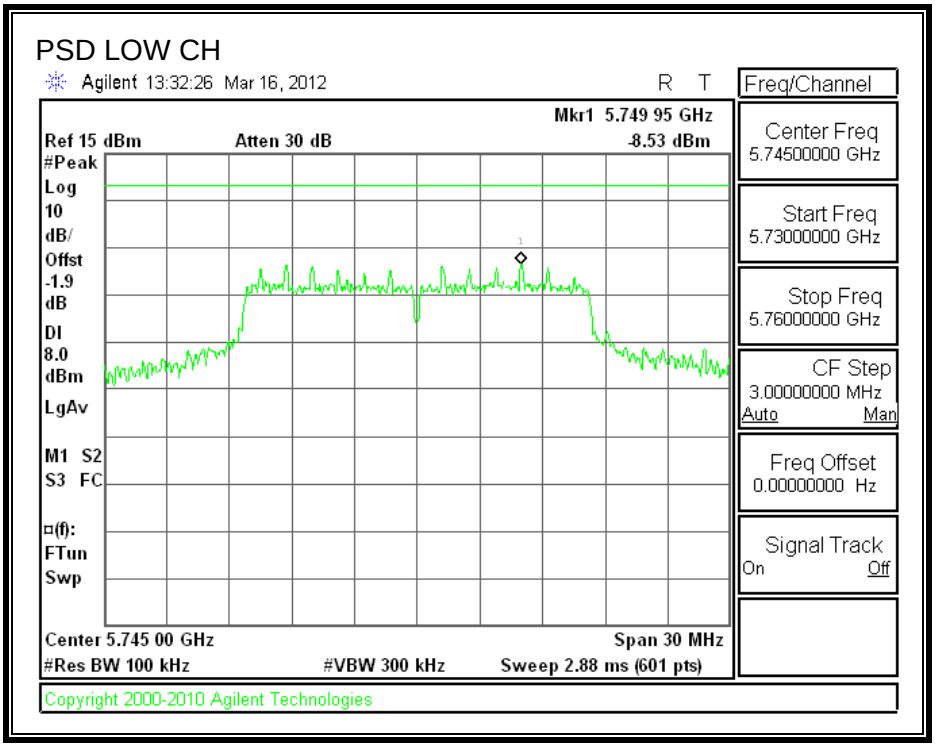
KDB 558074 D01 DTS Measurement Guidance V01 dated 01-18-12.

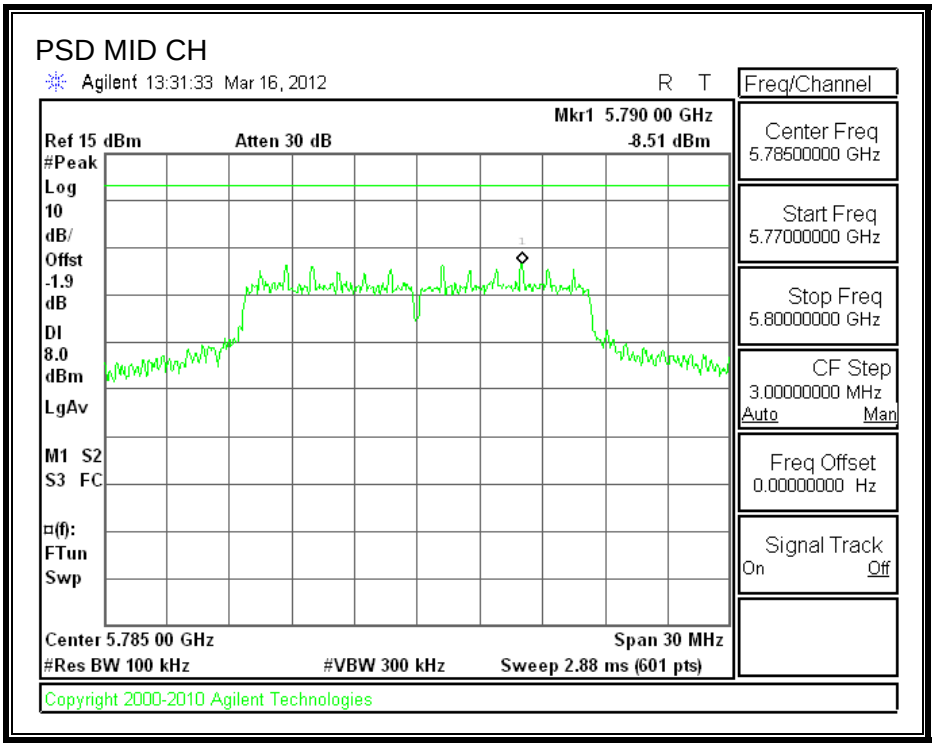
RESULTS

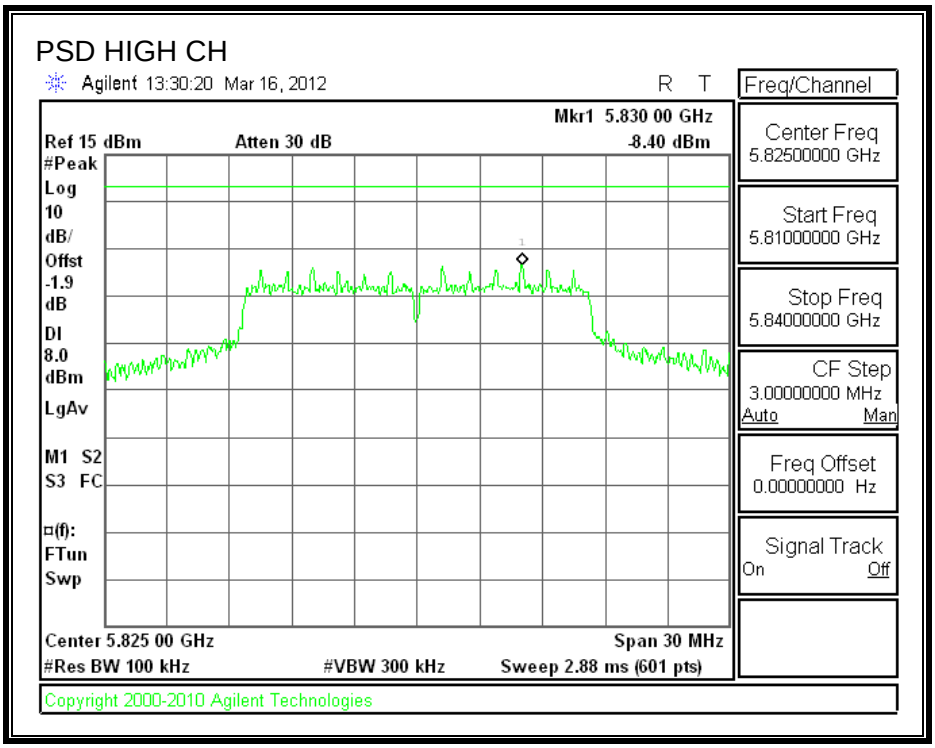
Note: analyzer offset = cable loss + attenuator + 10 log (3/100 kHz) = -1.9 dB

Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Margin (dB)
Low	5745	-8.53	8	-16.53
Middle	5785	-8.51	8	-16.51
High	5825	-8.40	8	-16.40

POWER SPECTRAL DENSITY







7.4.6. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.247 (d)

IC RSS-210 A8.5

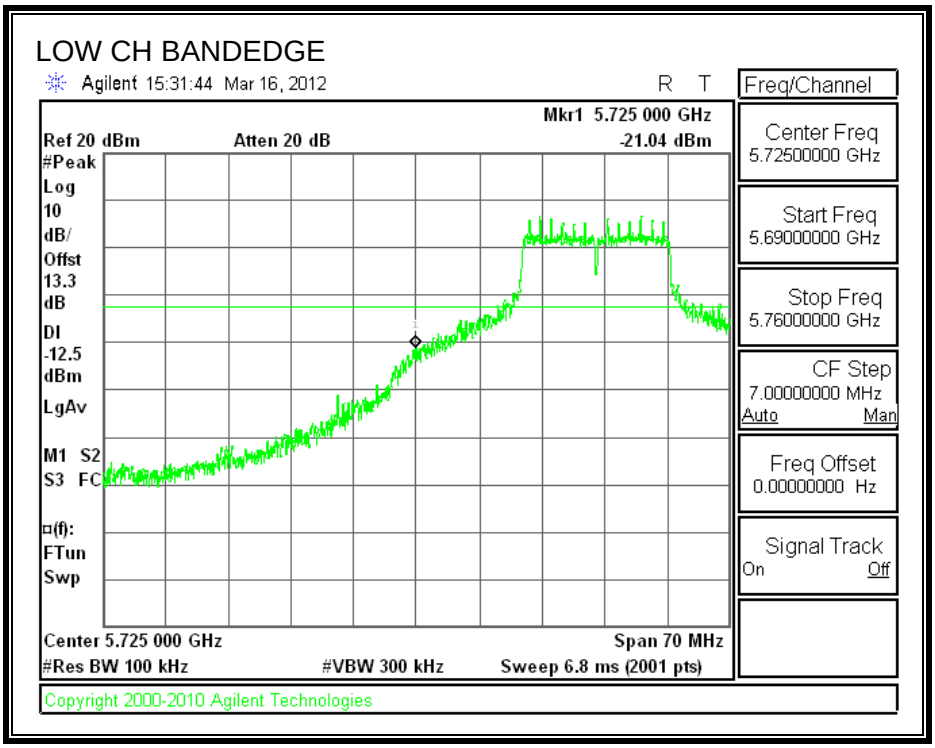
Output power was measured based on the use of a peak measurement, therefore the required attenuation is 20 dB.

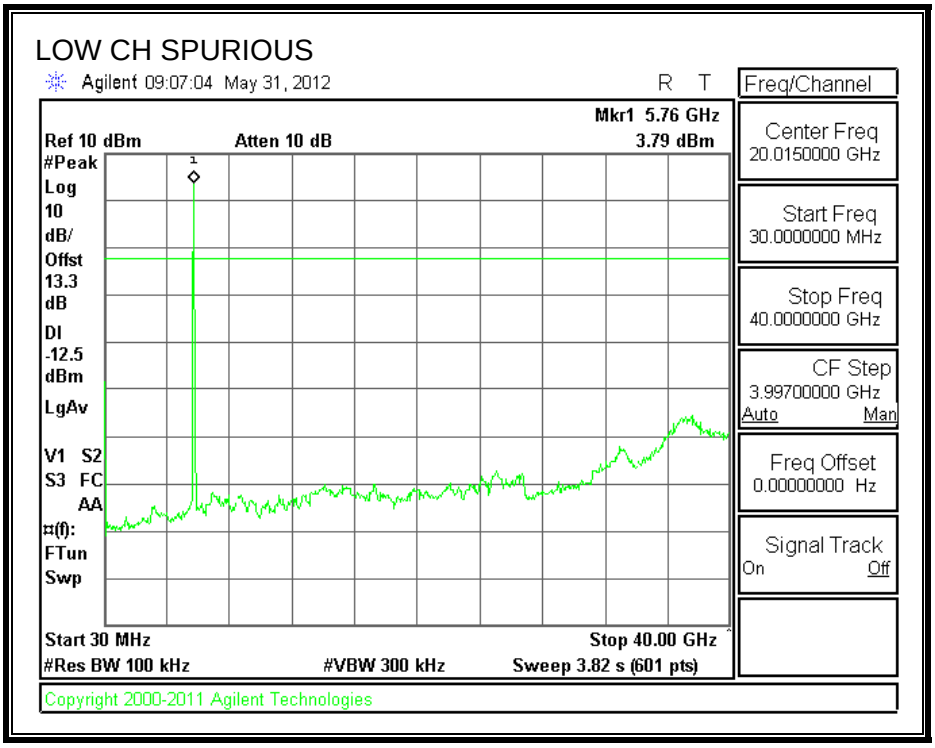
TEST PROCEDURE

KDB 558074 D01 DTS Measurement Guidance V01 dated 01-18-12.

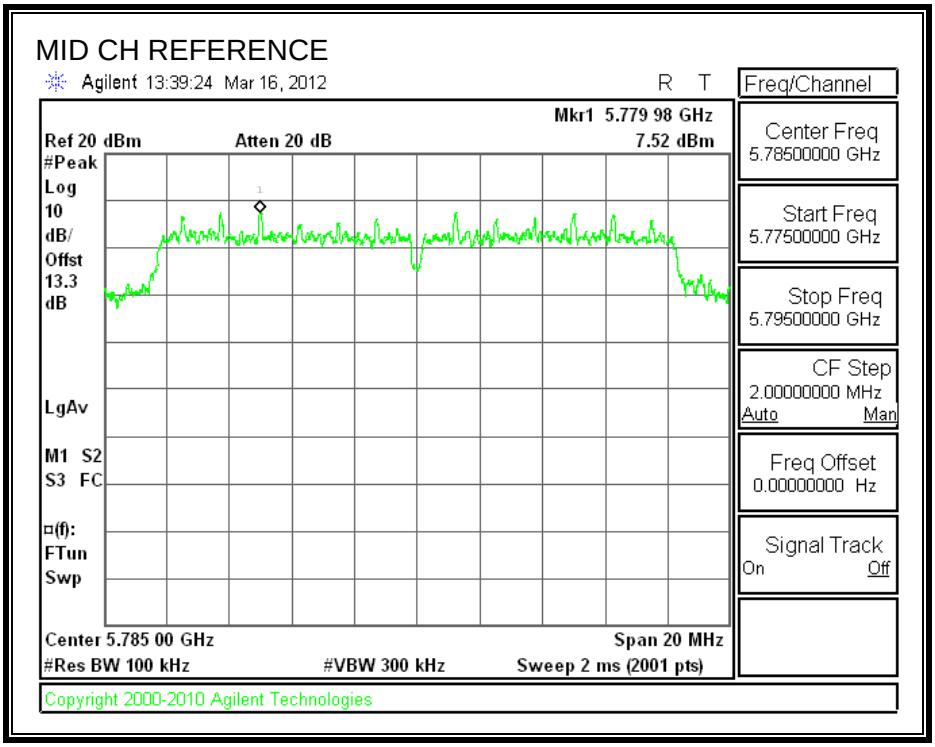
RESULTS

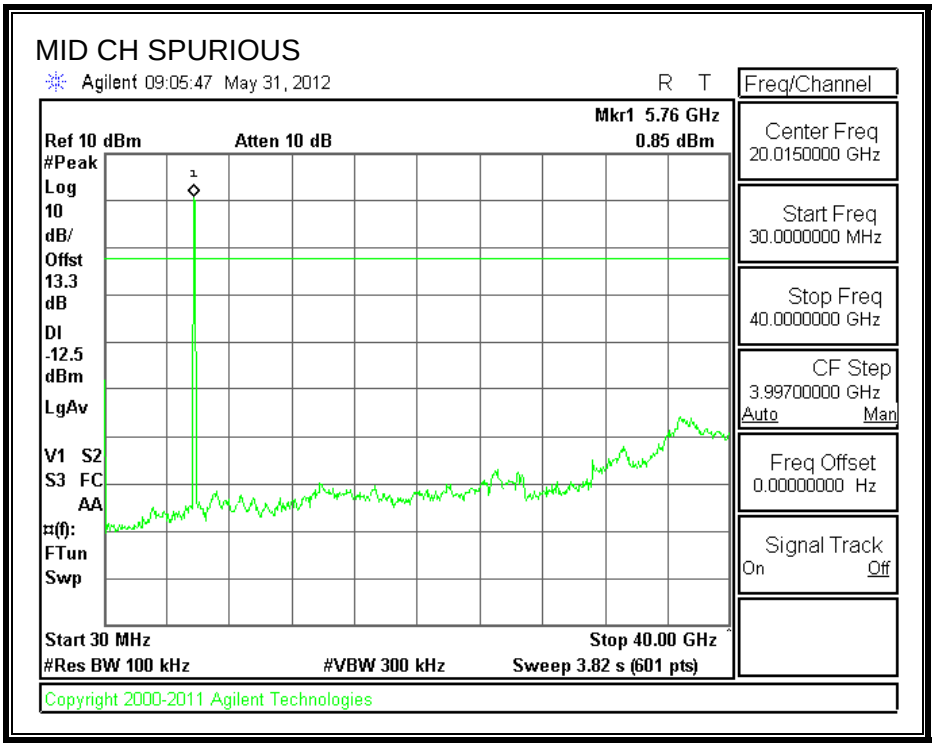
SPURIOUS EMISSIONS, LOW CHANNEL



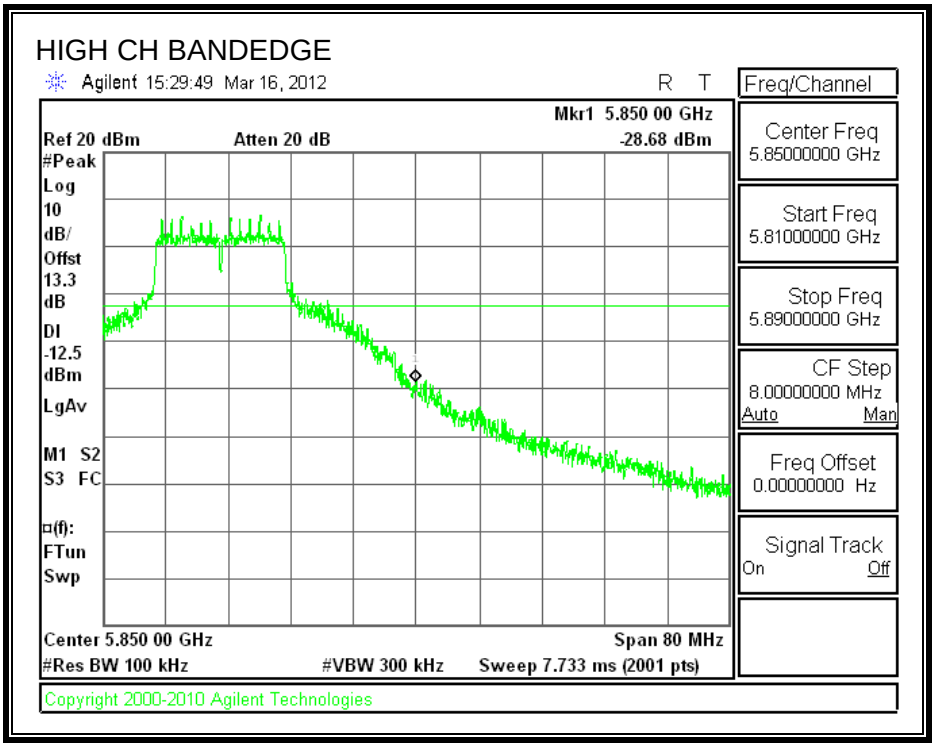


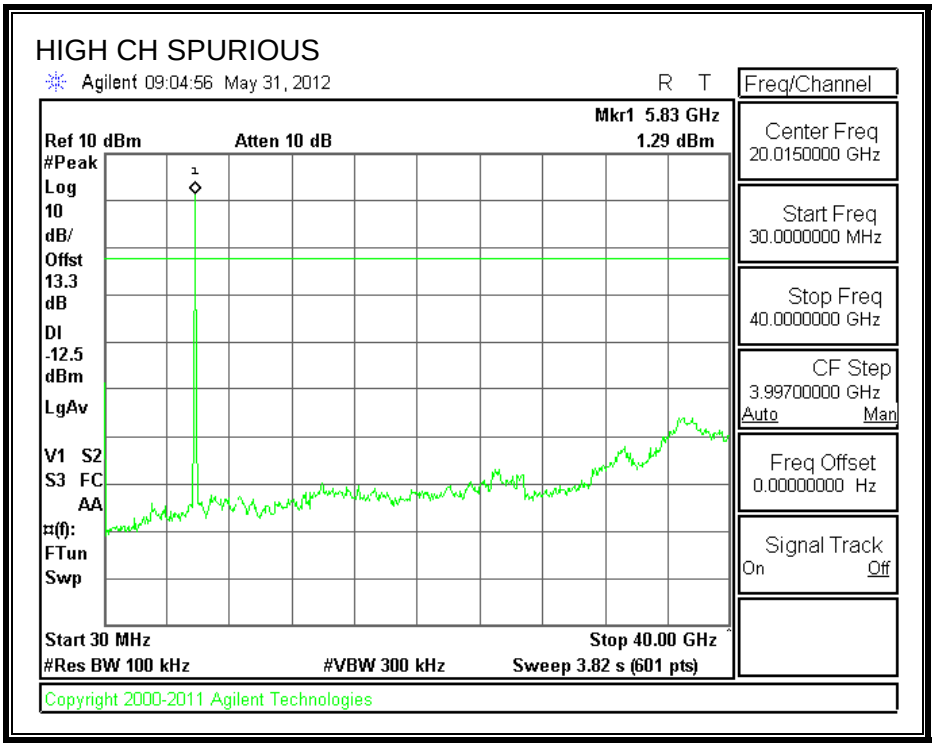
SPURIOUS EMISSIONS, MID CHANNEL





SPURIOUS EMISSIONS, HIGH CHANNEL





7.5. 802.11n HT20 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.

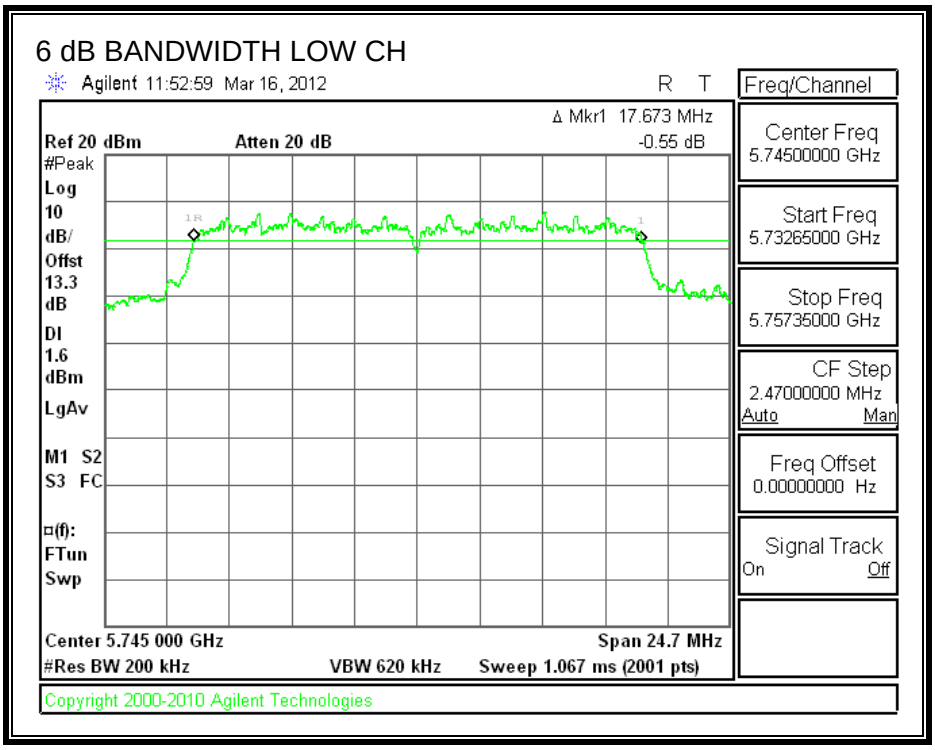
TEST PROCEDURE

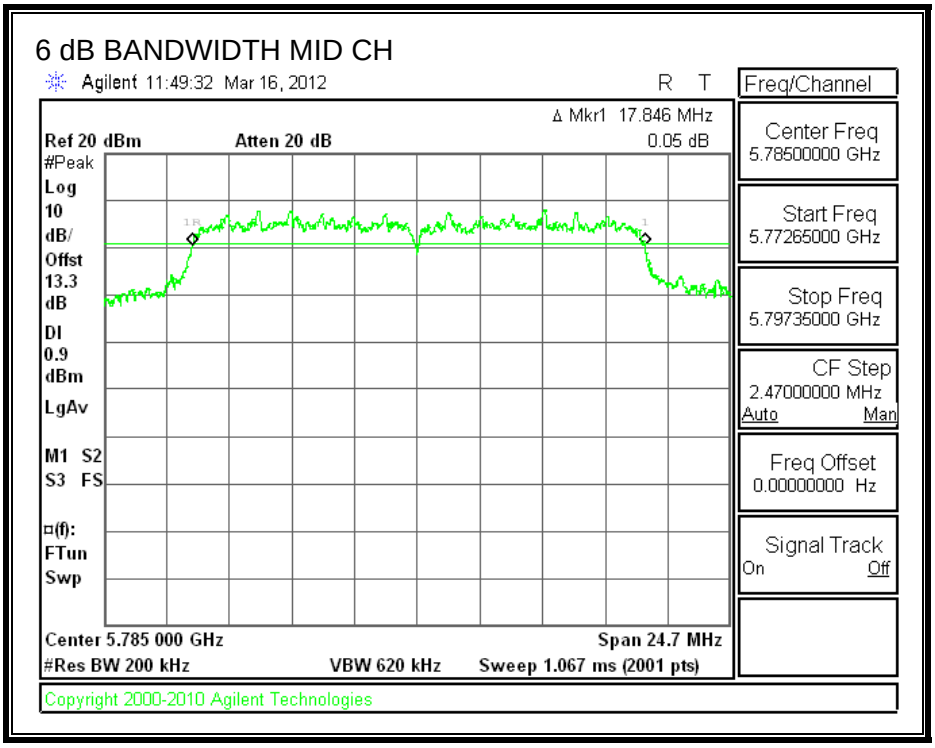
KDB 558074 D01 DTS Measurement Guidance V01 dated 01-18-12.

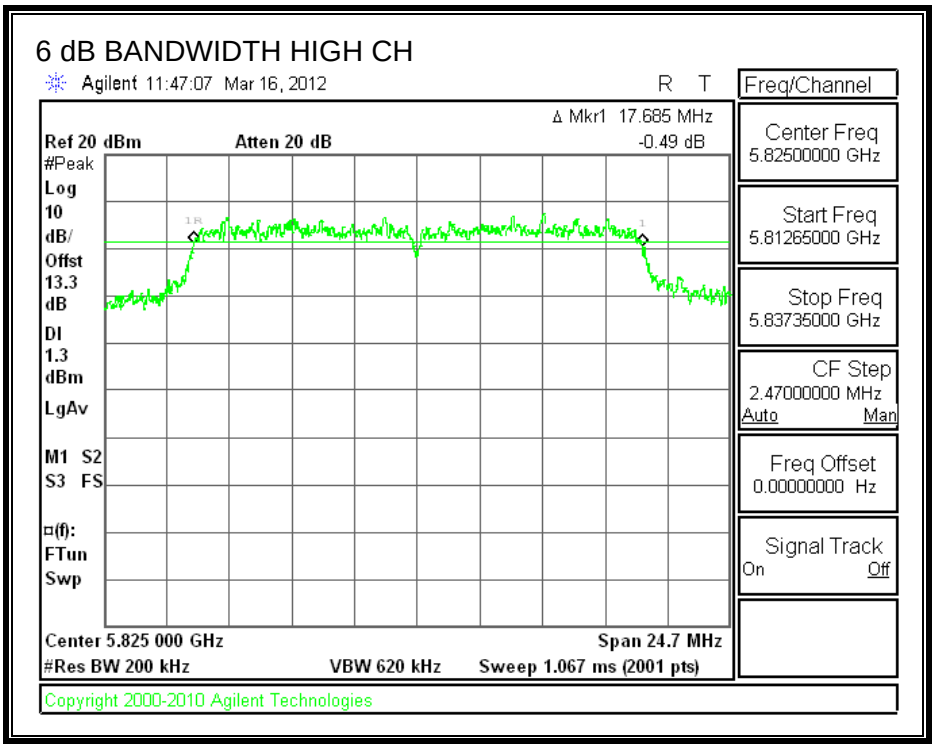
RESULTS

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low	5745	17.673	0.5
Middle	5785	17.846	0.5
High	5825	17.685	0.5

6 dB BANDWIDTH







7.5.2. 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

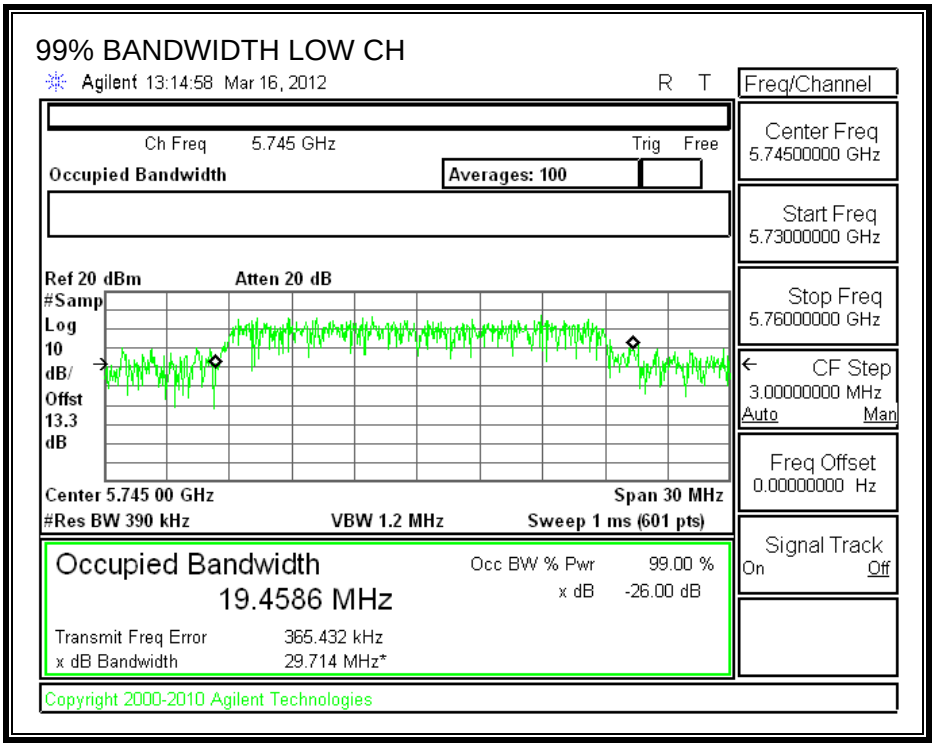
TEST PROCEDURE

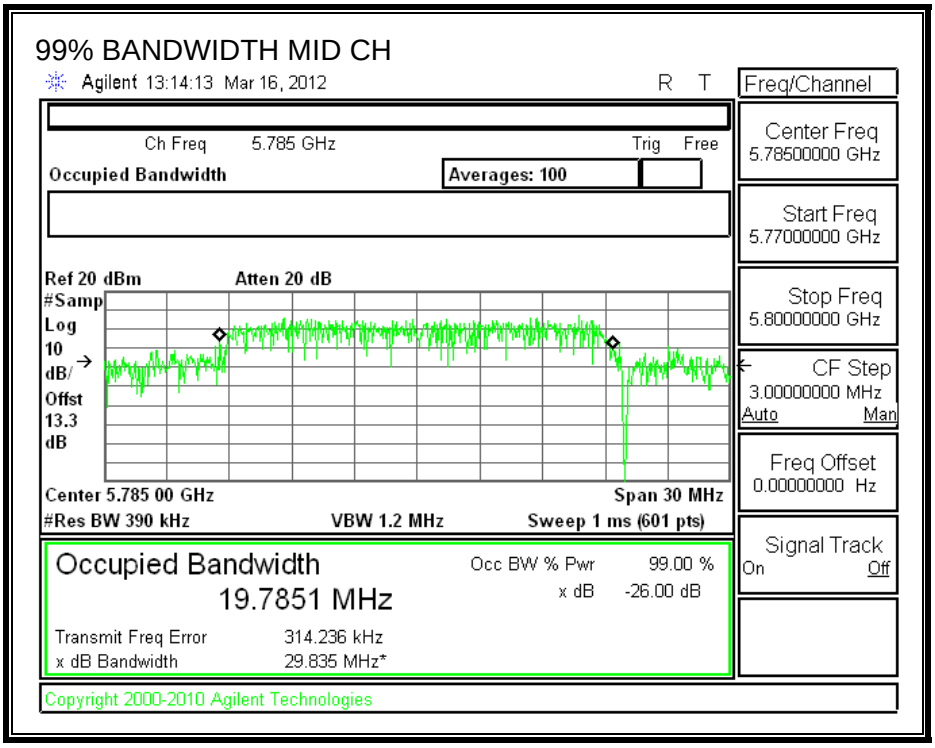
The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the 99 % bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal 99% bandwidth function is utilized.

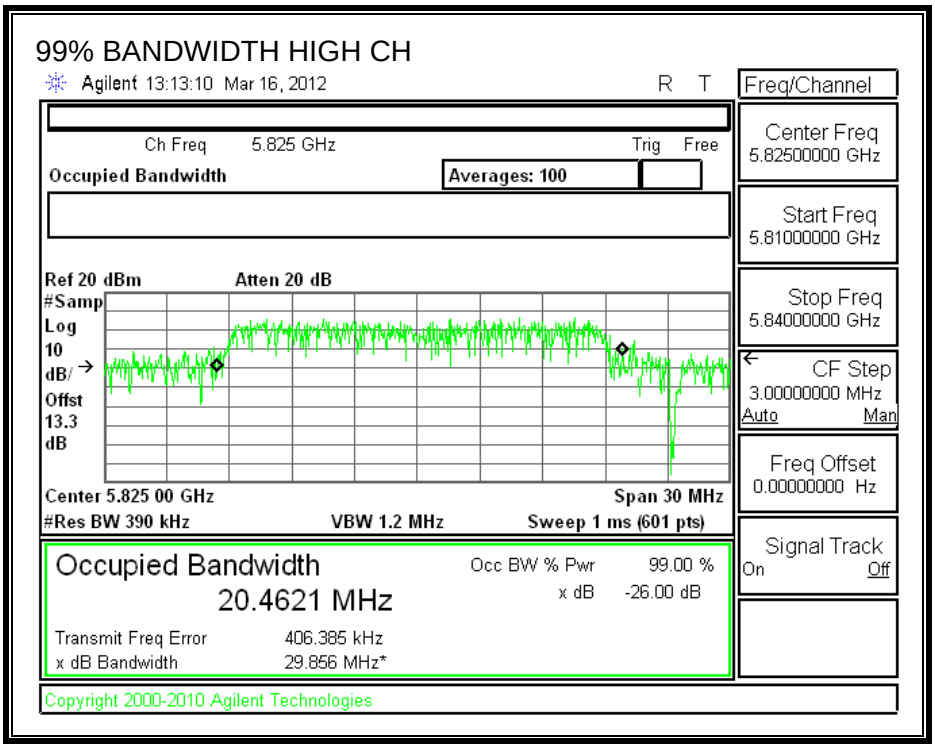
RESULTS

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	5745	19.4586
Middle	5785	19.7851
High	5825	20.4621

99% BANDWIDTH







7.5.3. OUTPUT POWER

LIMITS

FCC §15.247 (b)

IC RSS-210 A8.4

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

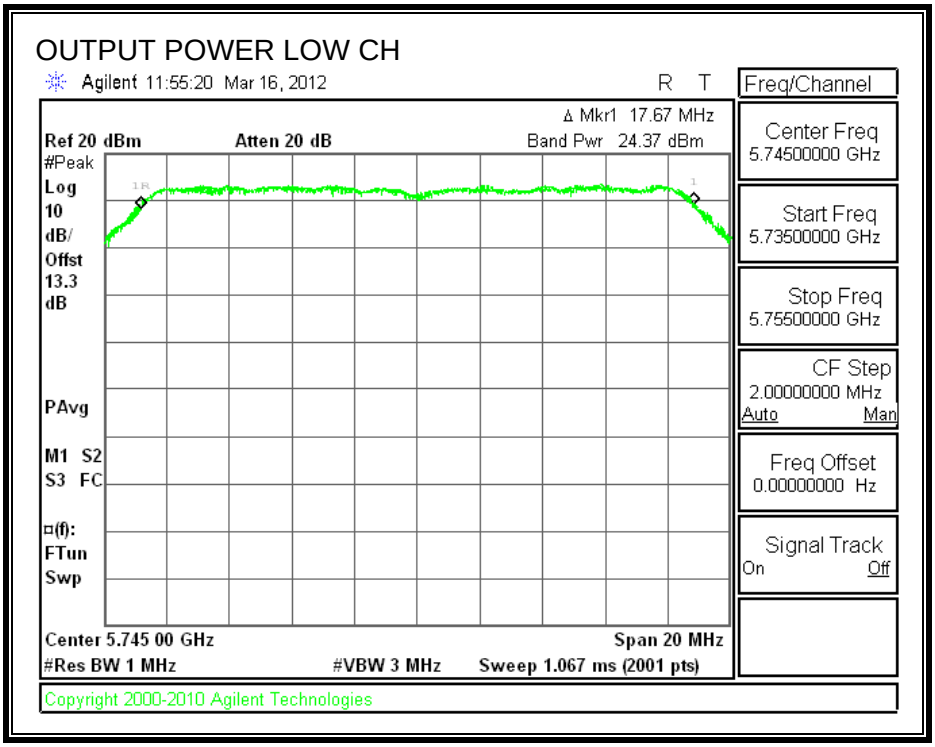
TEST PROCEDURE

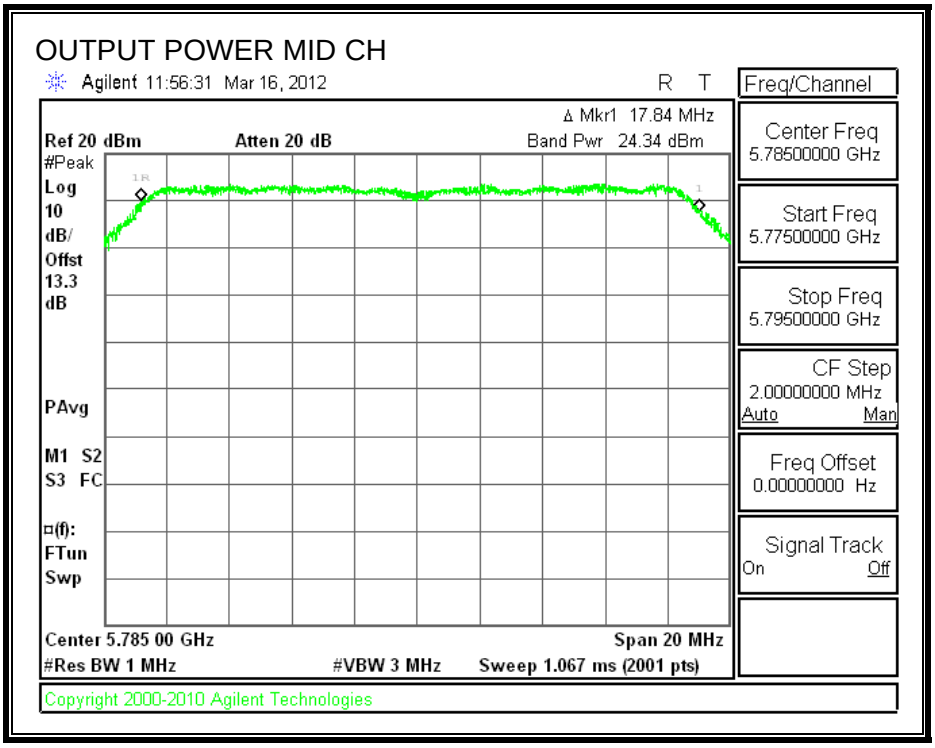
KDB 558074 D01 DTS Measurement Guidance V01 dated 01-18-12.

RESULTS

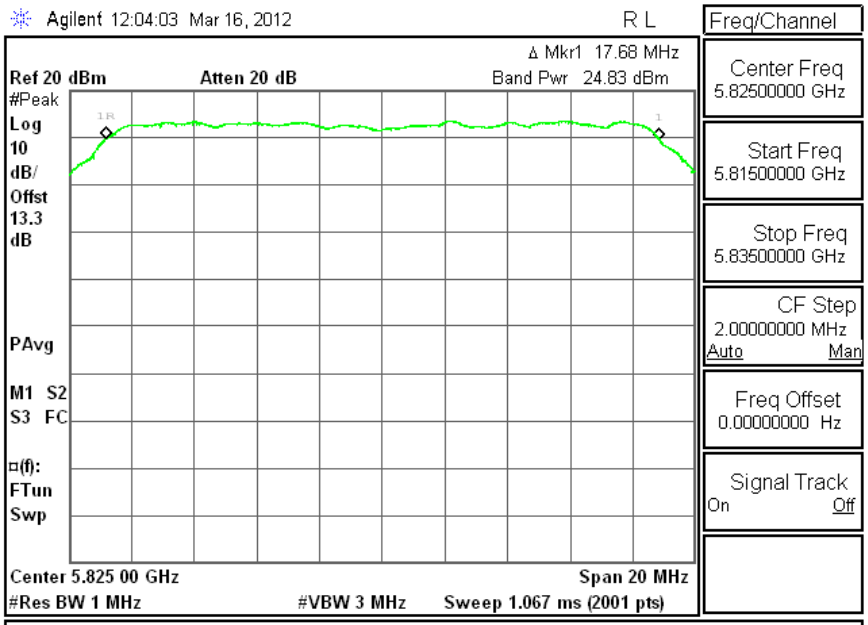
Channel	Frequency (MHz)	Peak Power Reading (dBm)	Limit (dBm)	Margin (dB)
Low	5745	24.37	30	-5.63
Middle	5785	24.34	30	-5.66
High	5825	24.83	30	-5.17

OUTPUT POWER





OUTPUT POWER HIGH CH



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 13.3 dB (including 12 dB pad and 1.3 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	16.00
Middle	5785	16.00
High	5825	16.00

7.5.5. POWER SPECTRAL DENSITY

LIMITS

FCC §15.247 (e)

IC RSS-210 A8.2 (b)

TEST PROCEDURE

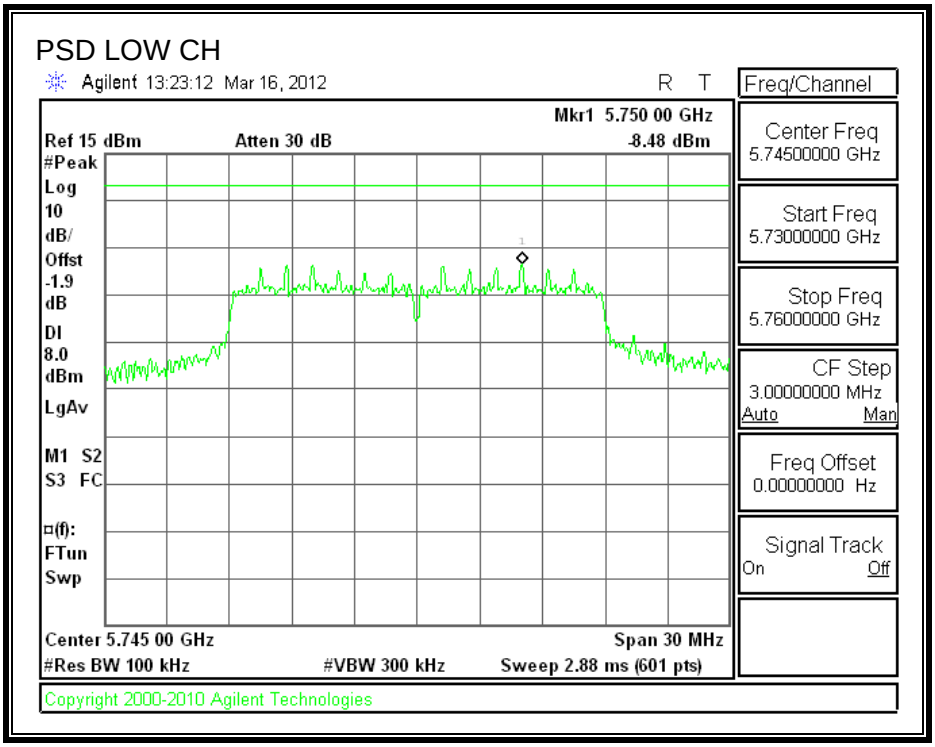
KDB 558074 D01 DTS Measurement Guidance V01 dated 01-18-12.

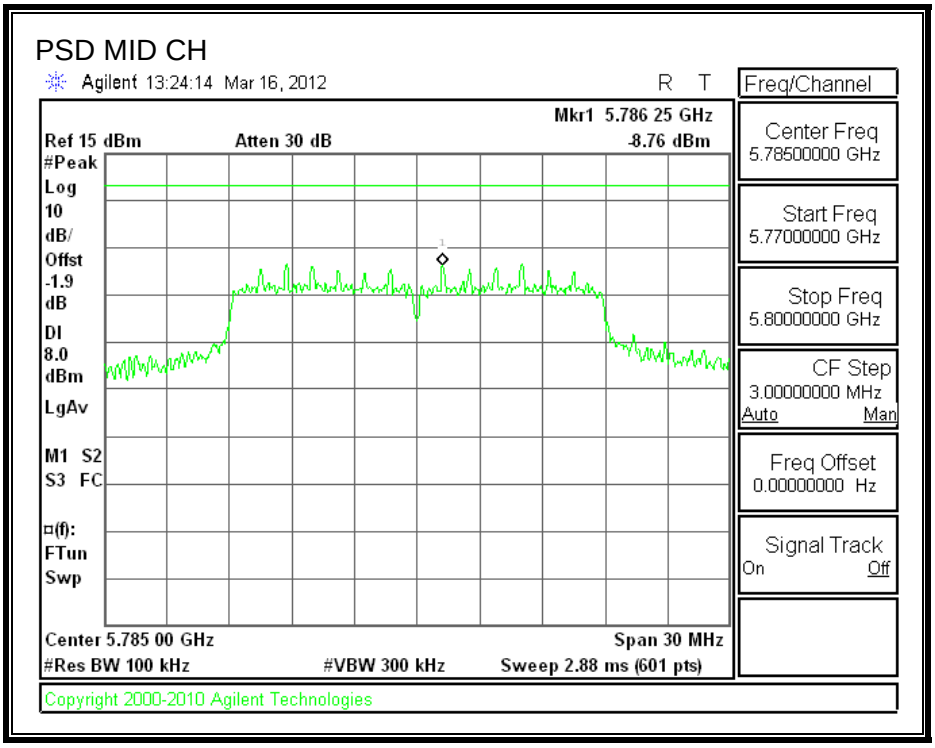
RESULTS

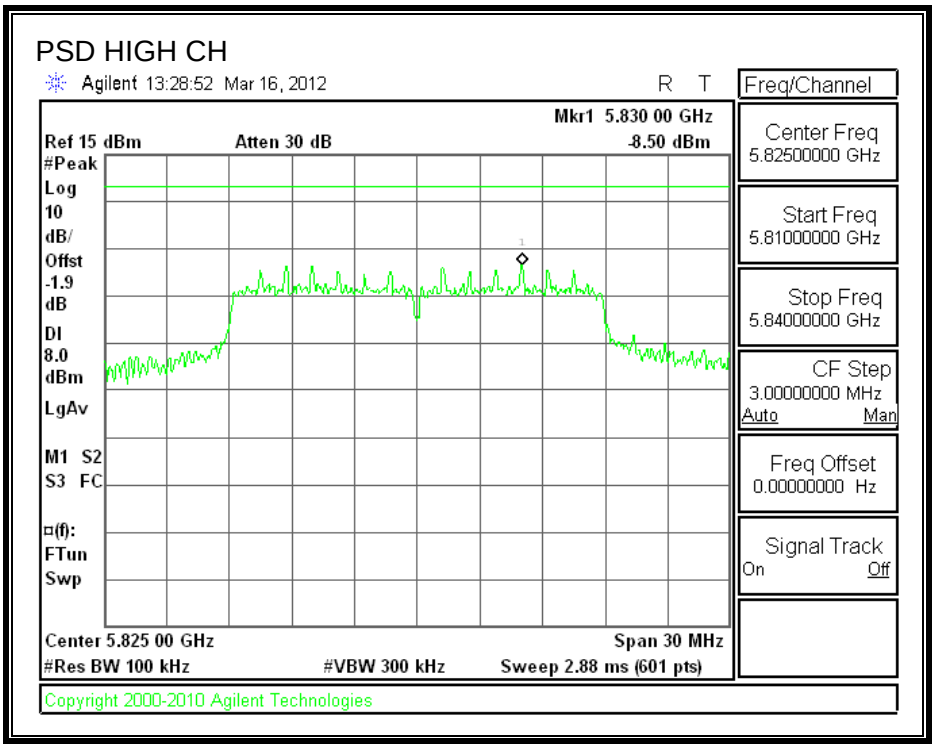
Note: analyzer offset = cable loss + attenuator + 10 log (3/100 kHz) = -1.9 dB

Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Margin (dB)
Low	5745	-8.48	8	-16.48
Middle	5785	-8.76	8	-16.76
High	5825	-8.50	8	-16.50

POWER SPECTRAL DENSITY







7.5.6. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.247 (d)

IC RSS-210 A8.5

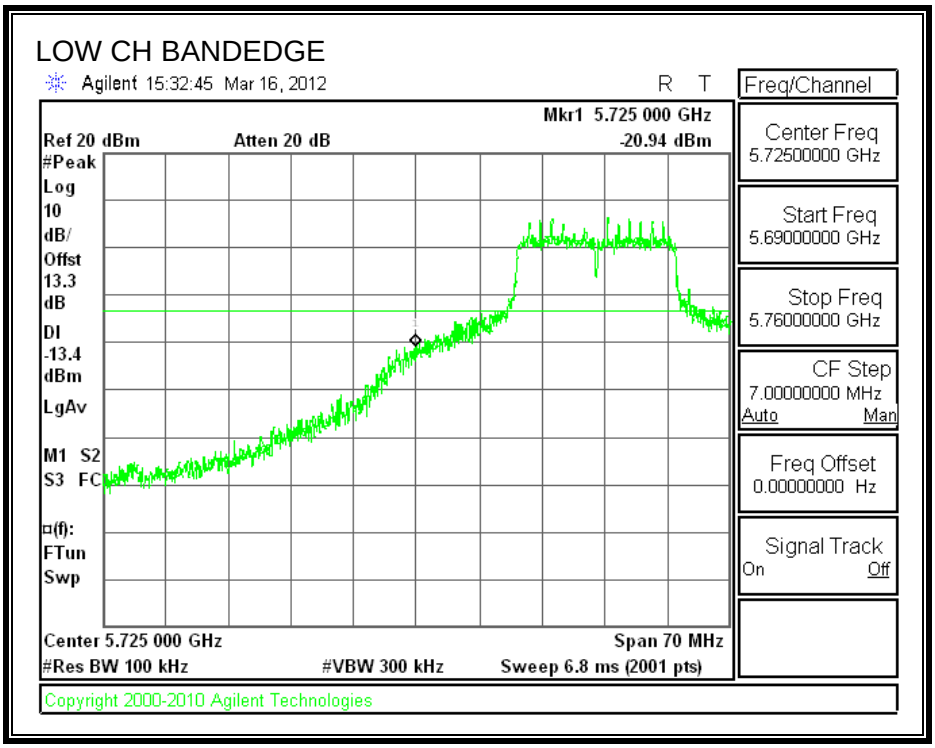
Output power was measured based on the use of a peak measurement, therefore the required attenuation is 20 dB.

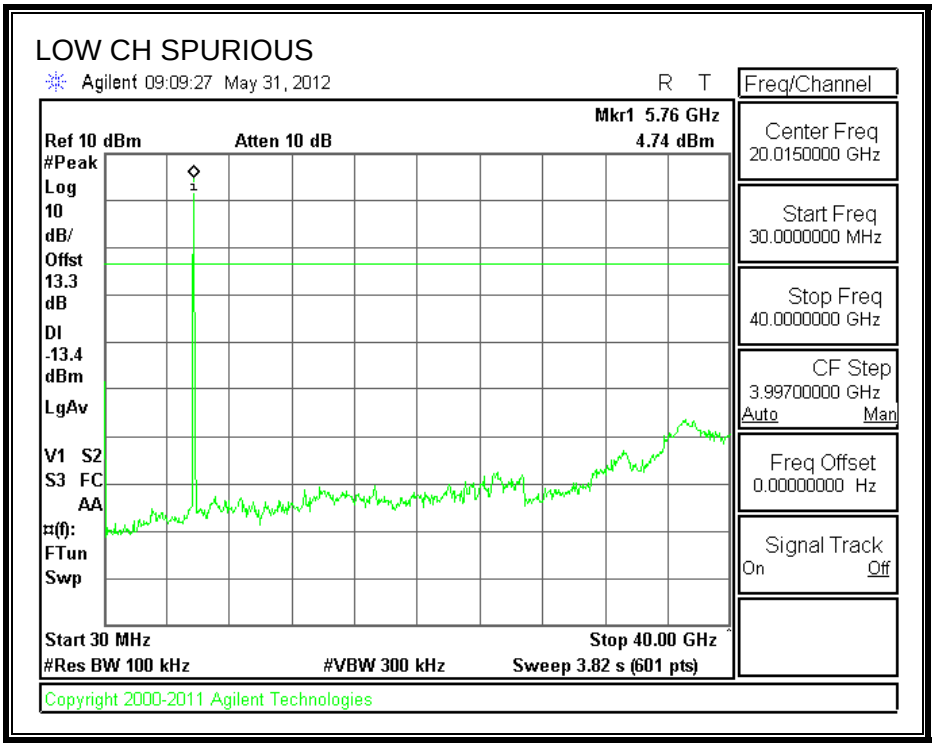
TEST PROCEDURE

KDB 558074 D01 DTS Measurement Guidance V01 dated 01-18-12.

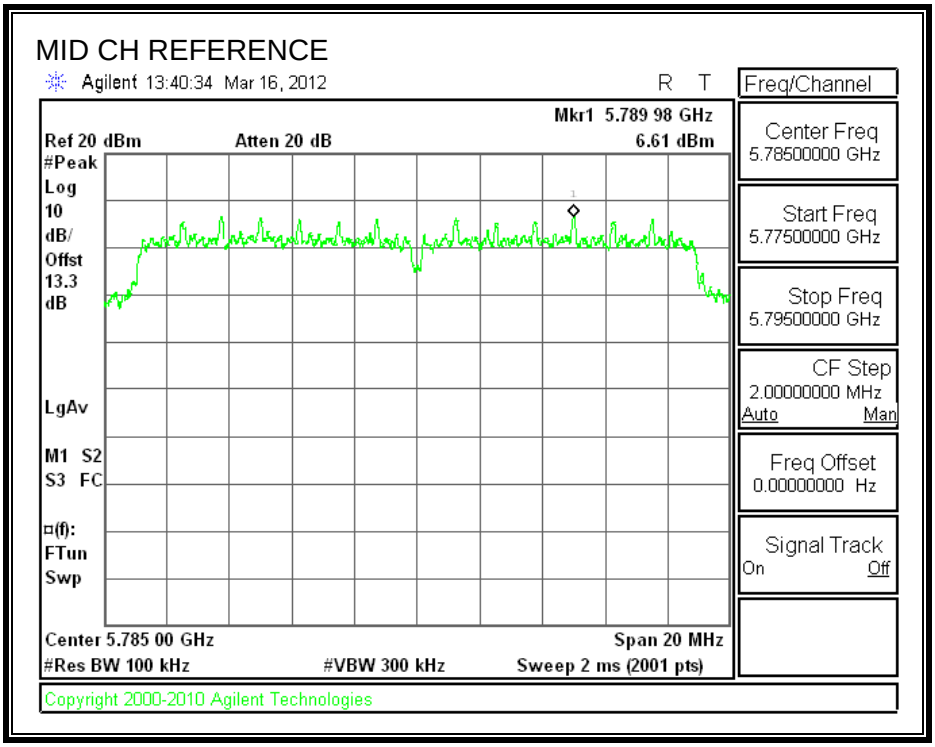
RESULTS

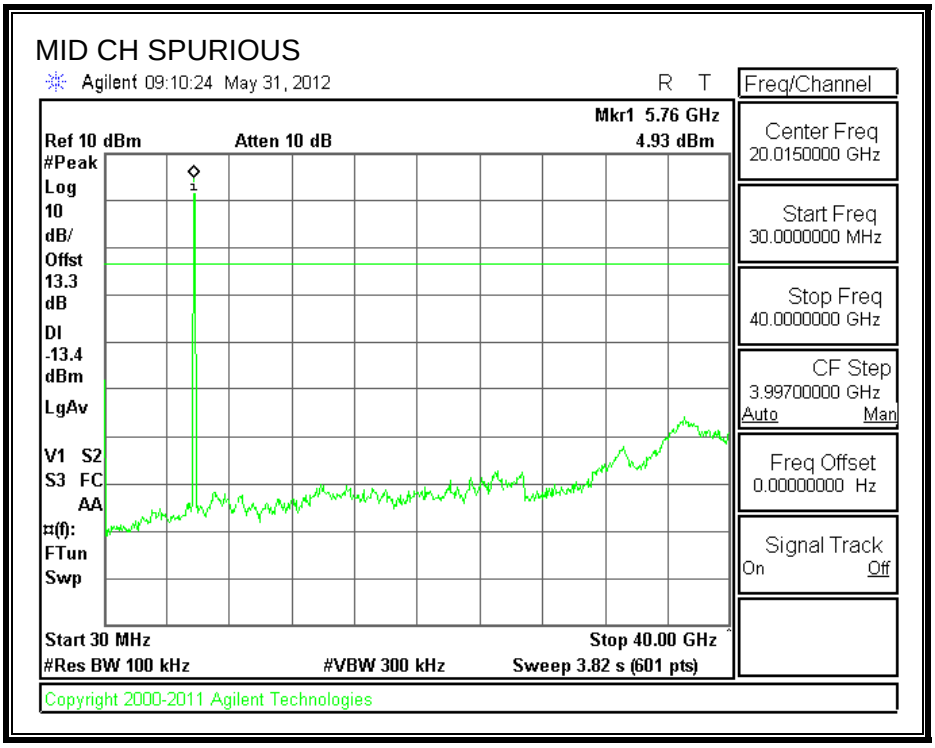
SPURIOUS EMISSIONS, LOW CHANNEL



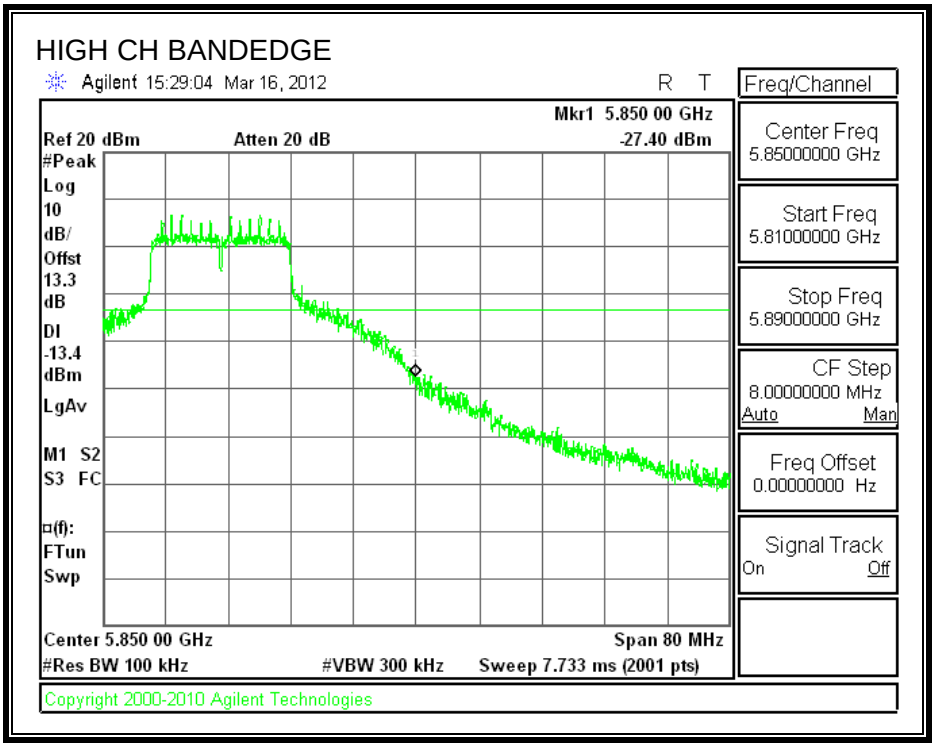


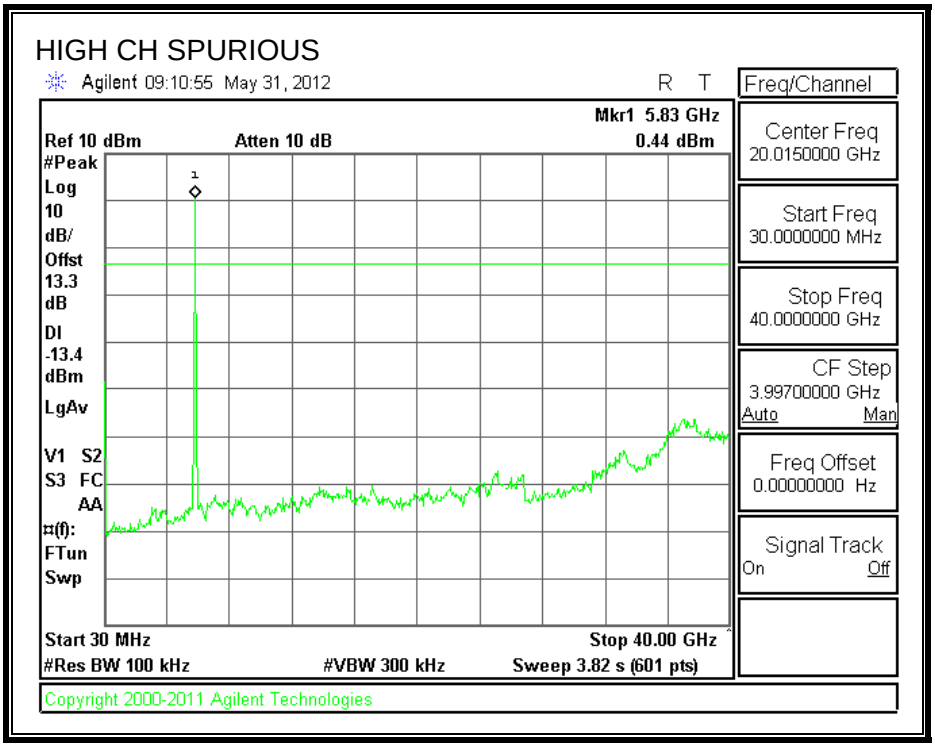
SPURIOUS EMISSIONS, MID CHANNEL





SPURIOUS EMISSIONS, HIGH CHANNEL





7.6. 802.11n HT40 MODE IN THE 5.8 GHz BAND

7.6.1. 6 dB BANDWIDTH

LIMITS

FCC §15.247 (a) (2)

IC RSS-210 A8.2 (a)

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

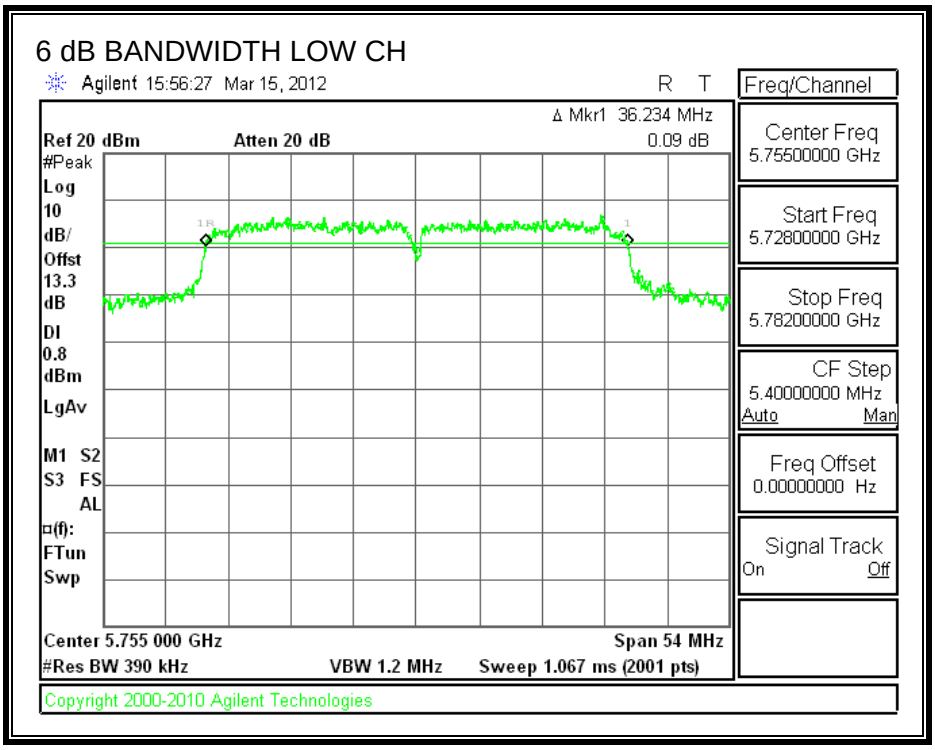
TEST PROCEDURE

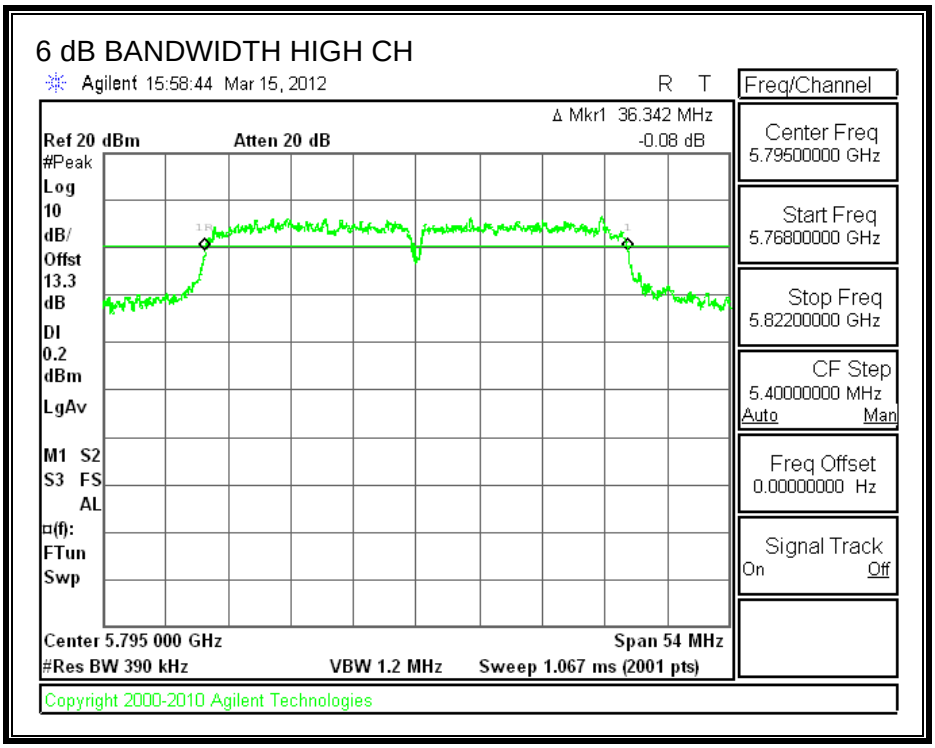
KDB 558074 D01 DTS Measurement Guidance V01 dated 01-18-12.

RESULTS

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low	5755	36.234	0.5
High	5795	36.342	0.5

6 dB BANDWIDTH





7.6.2. 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

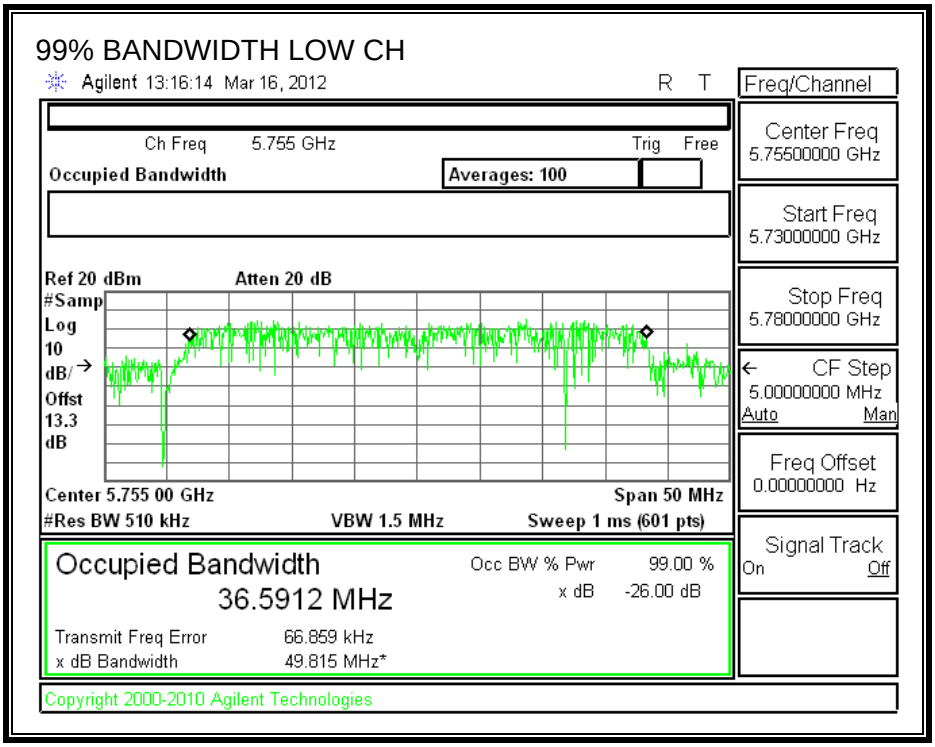
TEST PROCEDURE

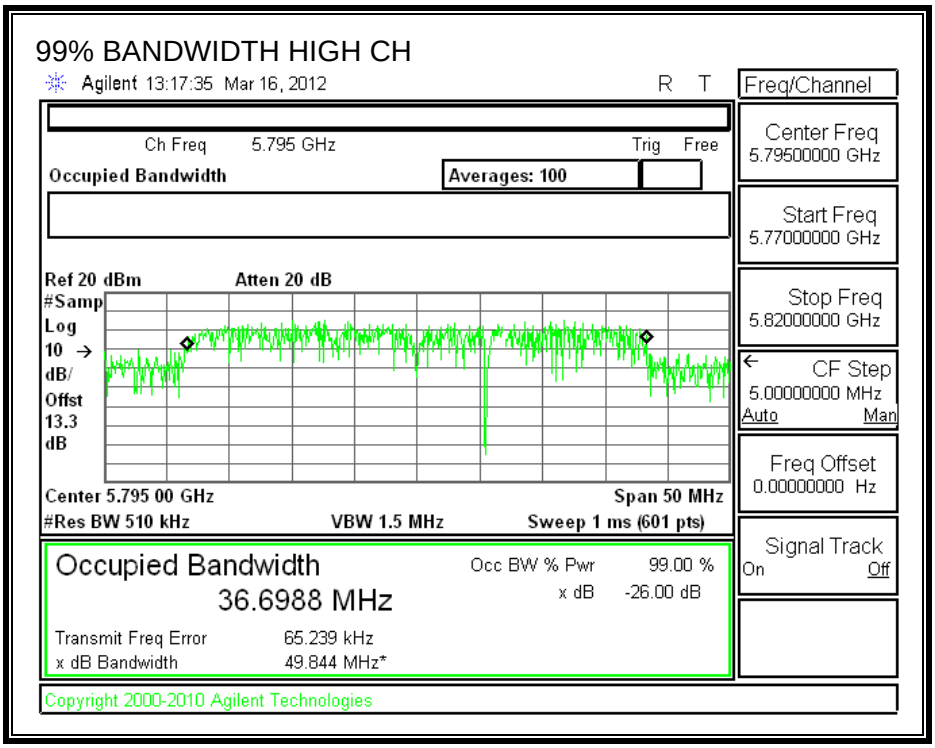
The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the 99 % bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal 99% bandwidth function is utilized.

RESULTS

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	5755	36.5912
High	5795	36.6988

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.

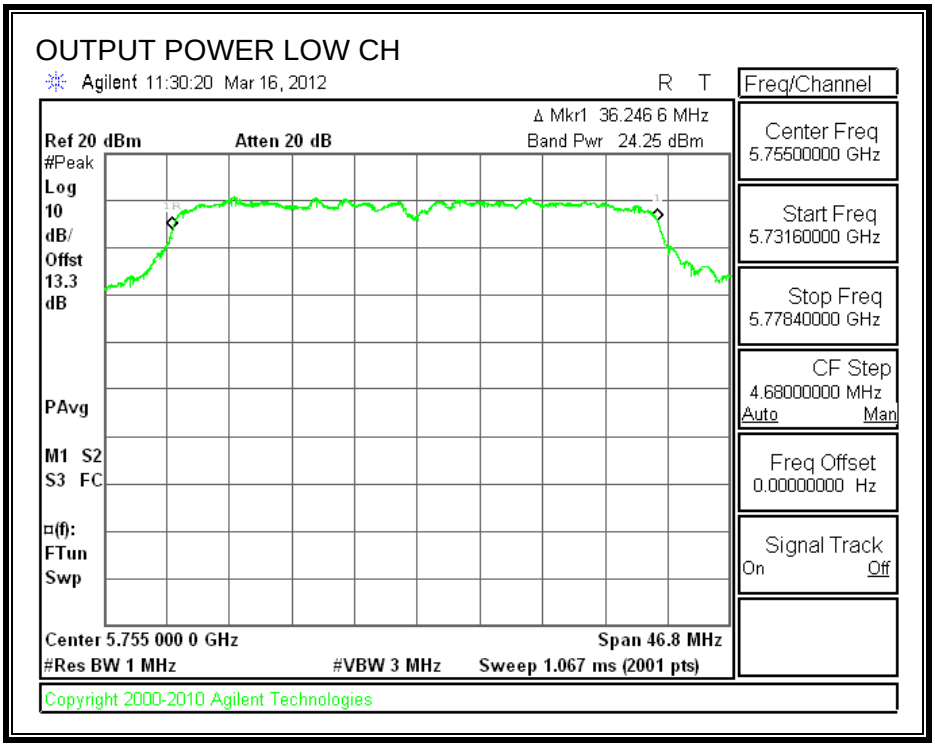
TEST PROCEDURE

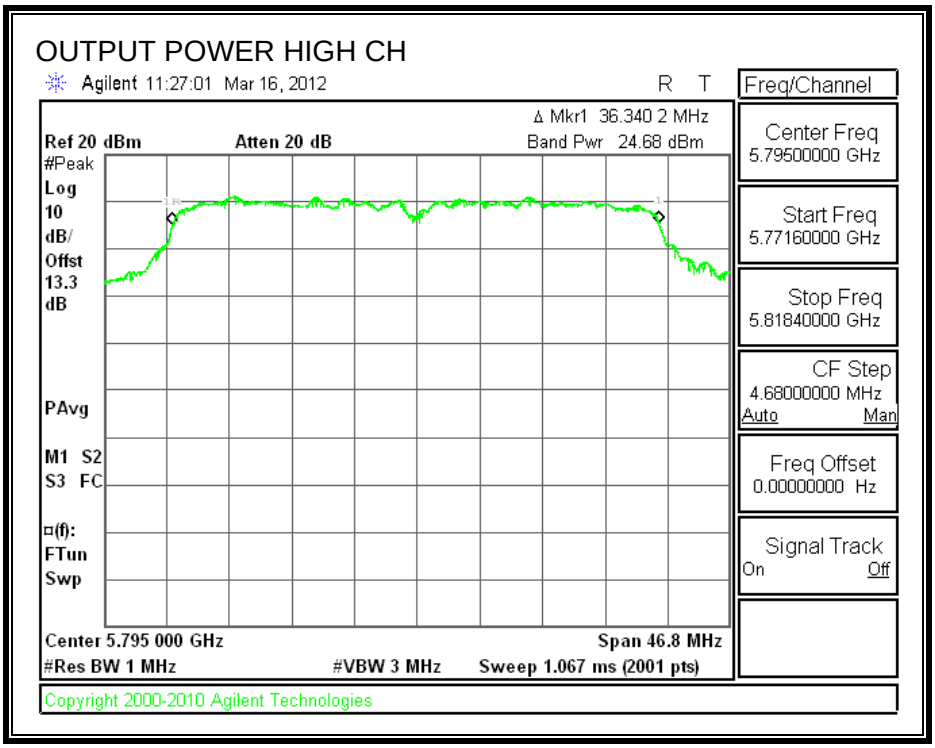
KDB 558074 D01 DTS Measurement Guidance V01 dated 01-18-12.

RESULTS

Channel	Frequency (MHz)	Peak Power Reading (dBm)	Limit (dBm)	Margin (dB)
Low	5755	24.25	30	-5.75
High	5795	24.68	30	-5.32

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 13.3 dB (including 12 dB pad and 1.3 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	15.00
High	5795	16.00

7.6.5. POWER SPECTRAL DENSITY

LIMITS

FCC §15.247 (e)

IC RSS-210 A8.2 (b)

TEST PROCEDURE

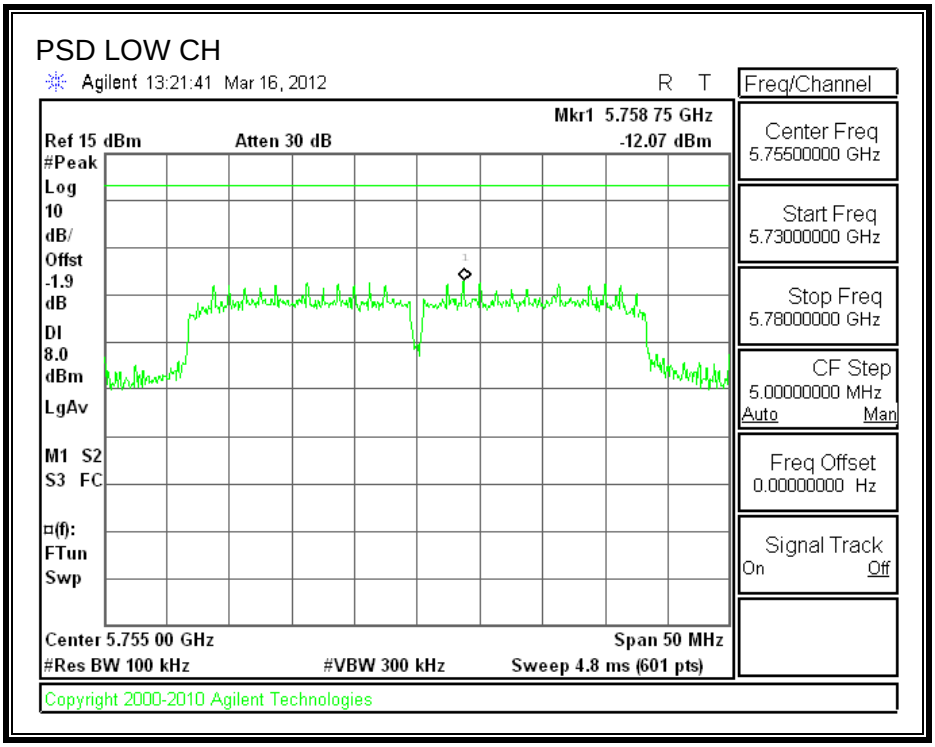
KDB 558074 D01 DTS Measurement Guidance V01 dated 01-18-12.

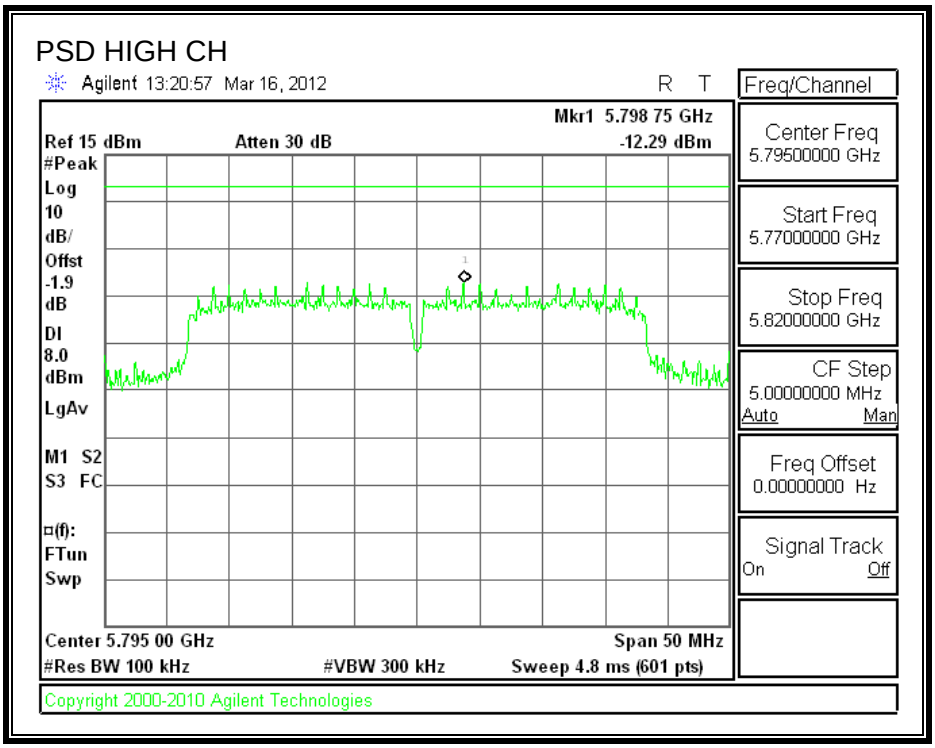
RESULTS

Note: analyzer offset = cable loss + attenuator + 10 log (3/100 kHz) = -1.9 dB

Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Margin (dB)
Low	5755	-12.07	8	-8.00
High	5795	-12.29	8	-8.00

POWER SPECTRAL DENSITY





7.6.6. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.247 (d)

IC RSS-210 A8.5

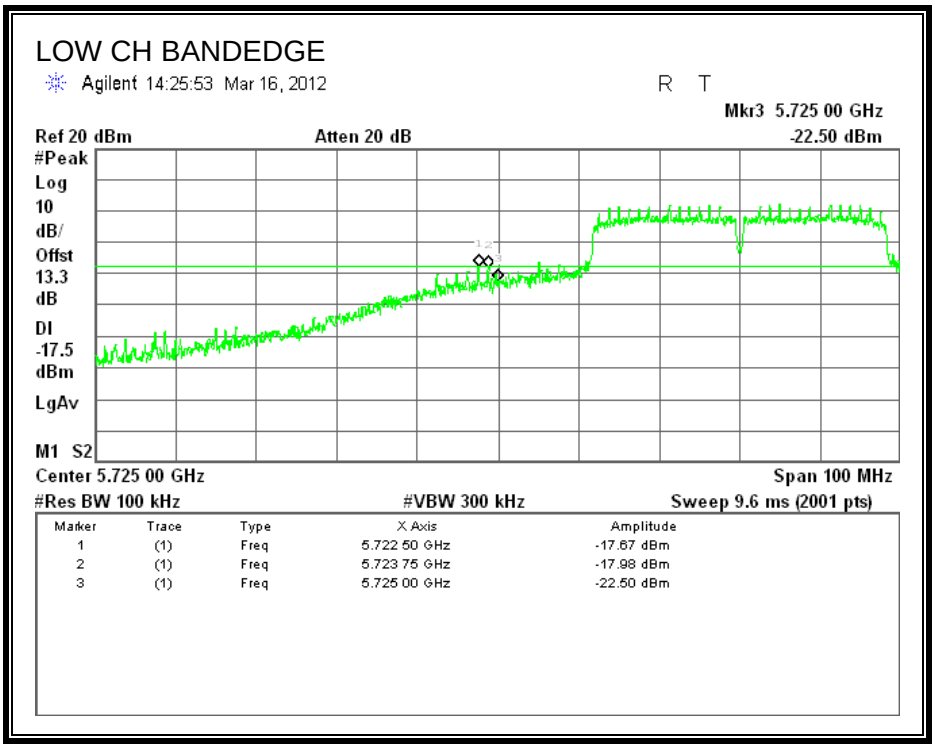
Output power was measured based on the use of a peak measurement, therefore the required attenuation is 20 dB.

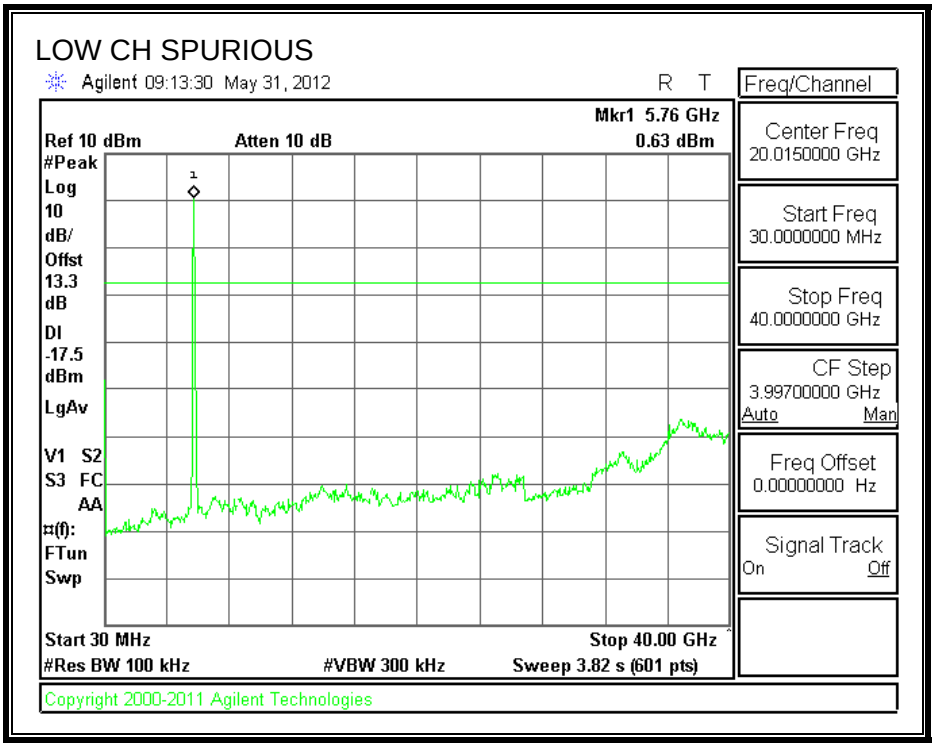
TEST PROCEDURE

KDB 558074 D01 DTS Measurement Guidance V01 dated 01-18-12.

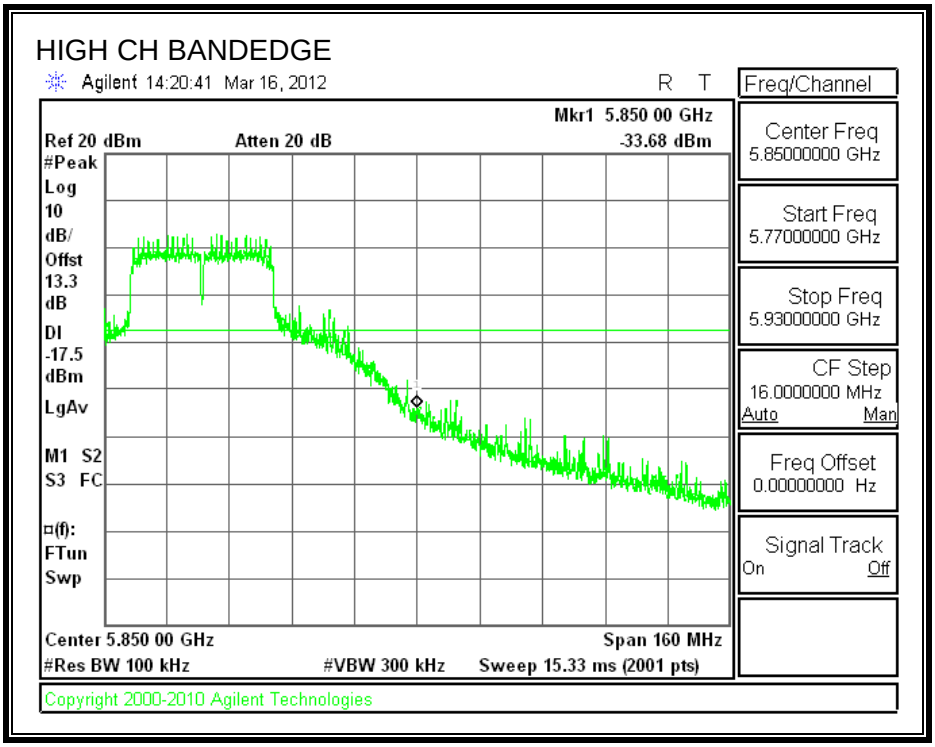
RESULTS

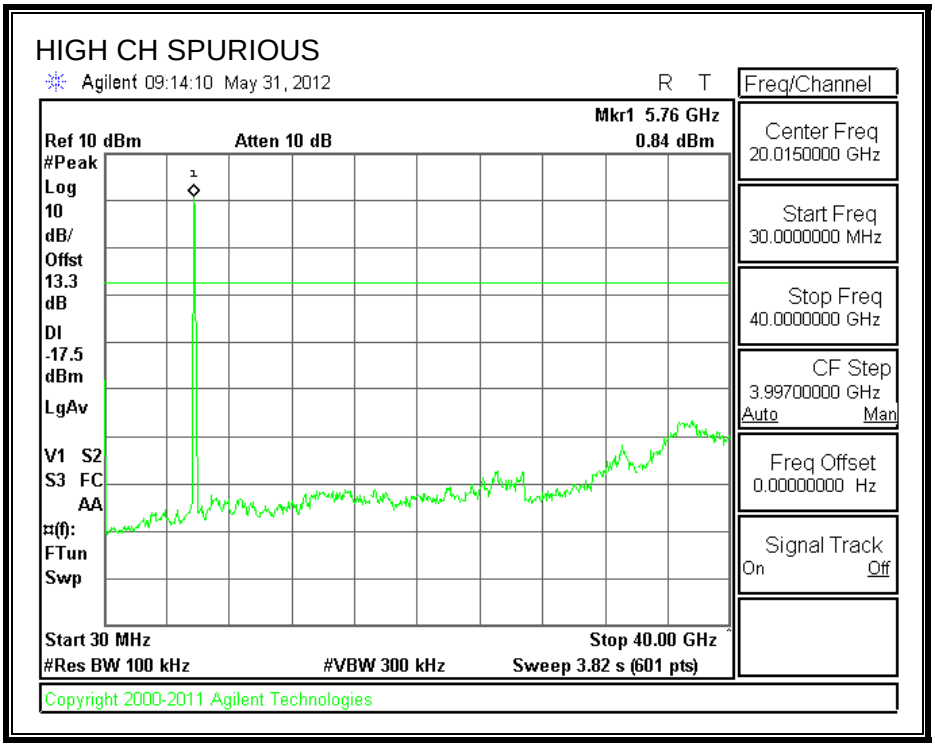
SPURIOUS EMISSIONS, LOW CHANNEL





SPURIOUS EMISSIONS, HIGH CHANNEL





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.

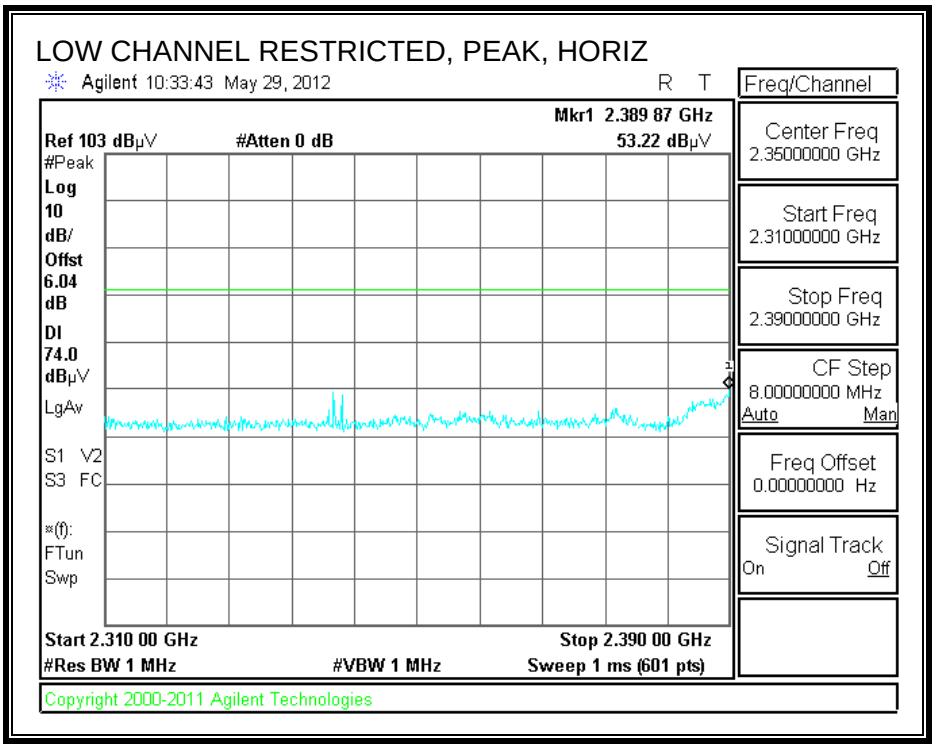
The spectrum from 30 MHz to 40 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in each applicable band.

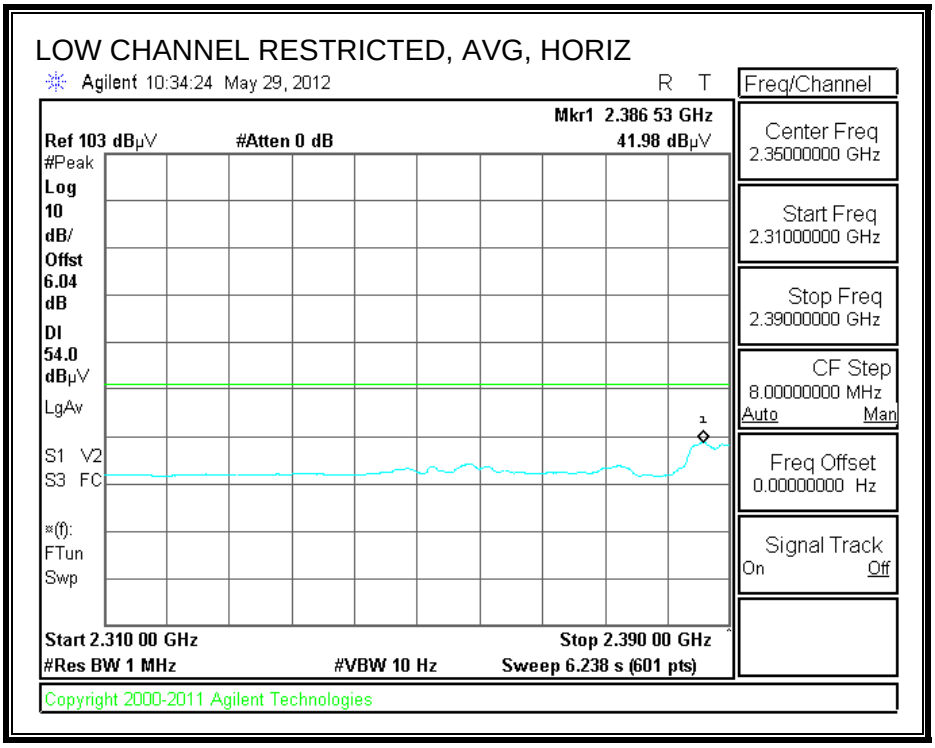
The frequency range of interest is monitored at a fixed antenna height and EUT azimuth. The EUT is rotated through 360 degrees to maximize emissions received. The antenna is scanned from 1 to 4 meters above the ground plane to further maximize the emission. Measurements are made with the antenna polarized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

8.2. TRANSMITTER ABOVE 1 GHz

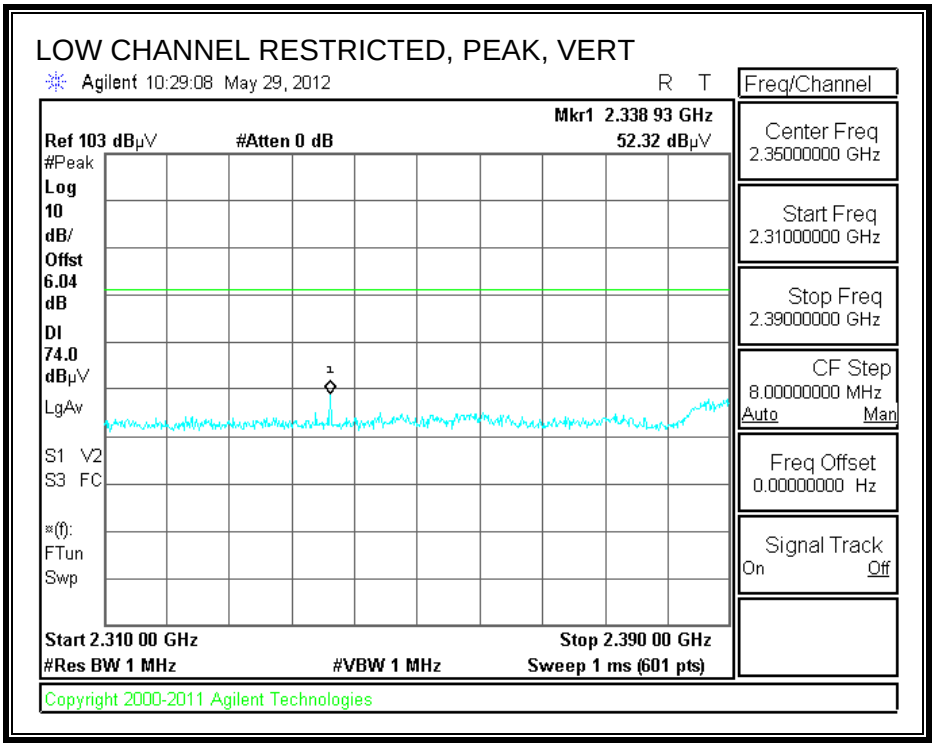
8.2.1. TX ABOVE 1 GHz FOR 802.11b 1TX MODE IN THE 2.4 GHz BAND

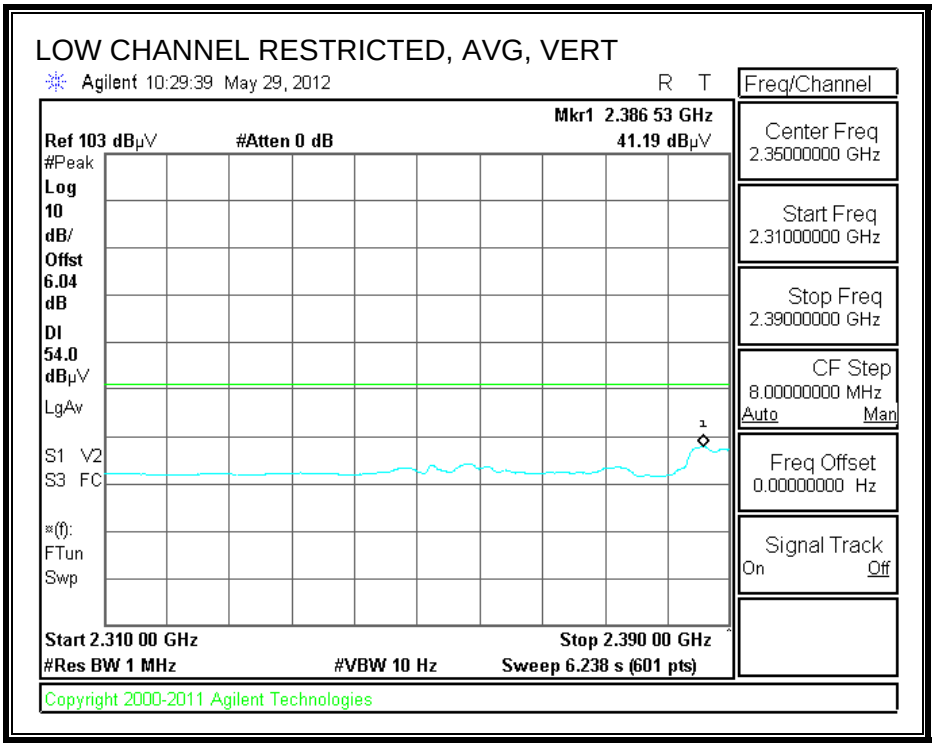
RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



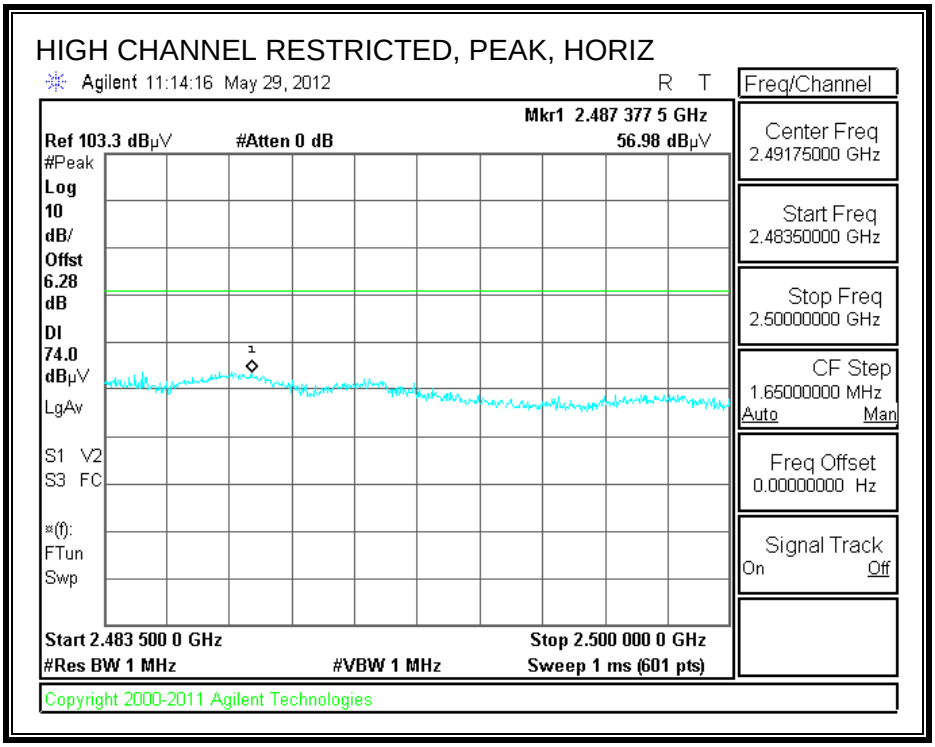


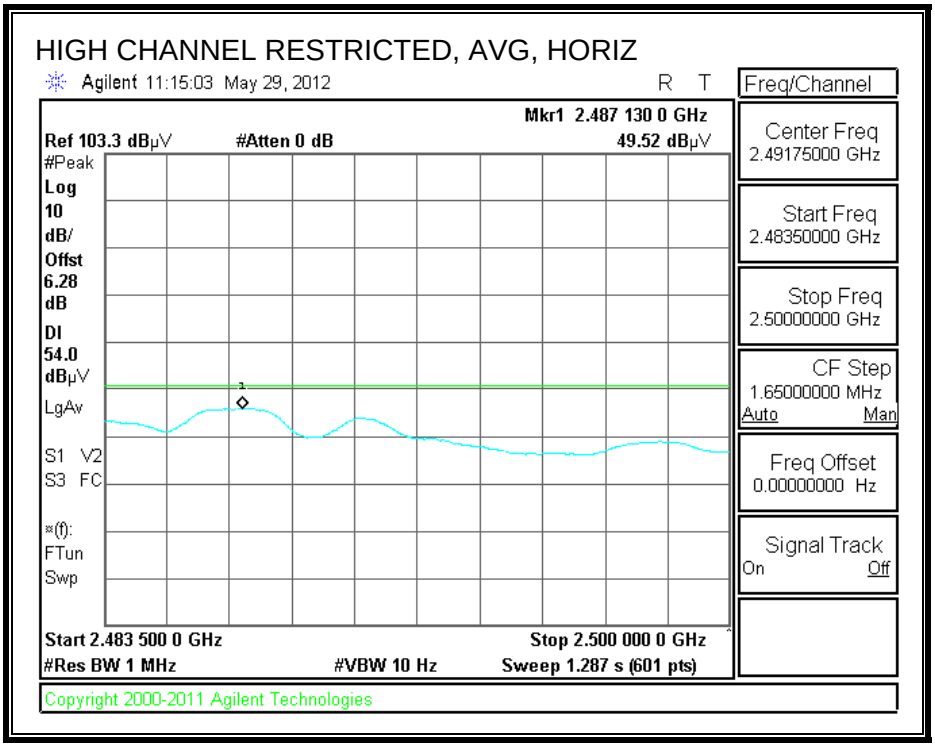
RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)



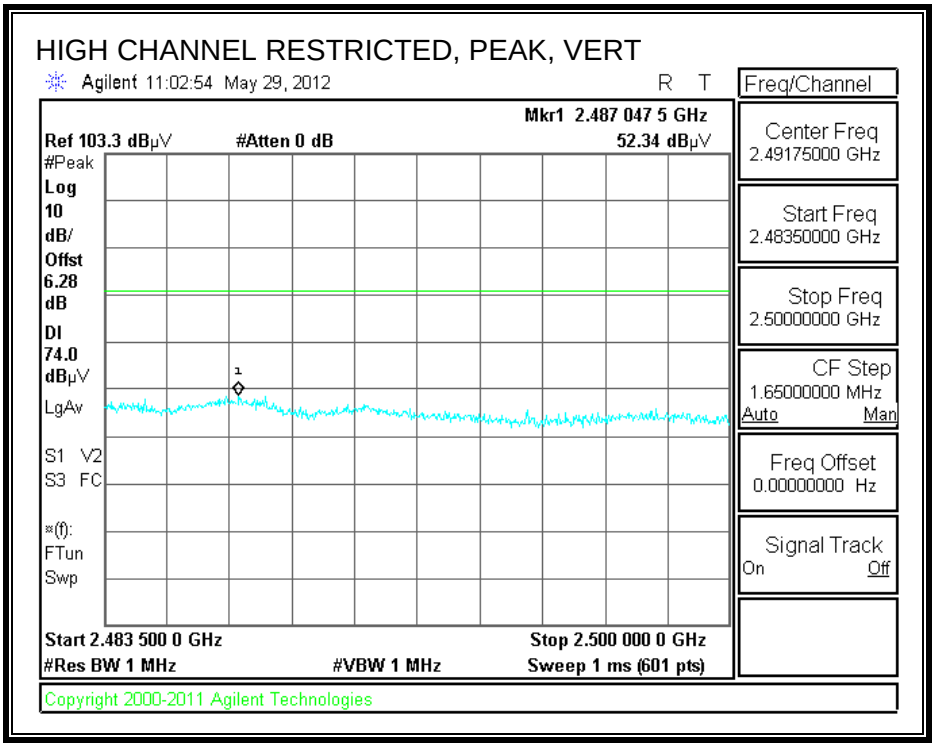


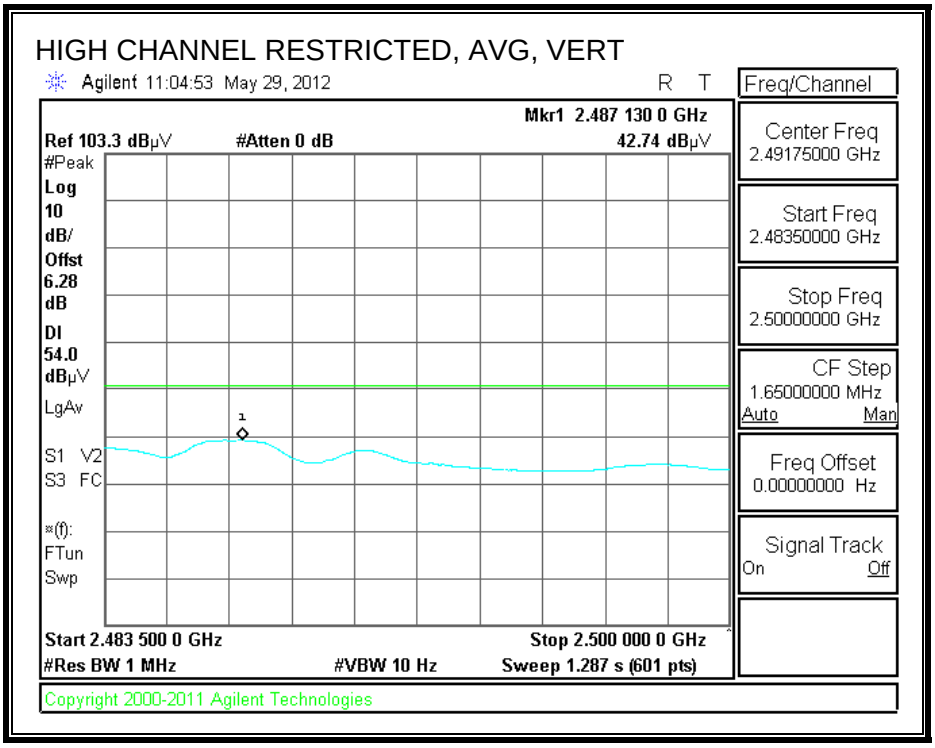
RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)





RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)





HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement
Compliance Certification Services, Fremont 5m A Chamber

Test Engr: Dennis Huang
Date: 5/25/2012 - 5/29/2012
Project #: 12U14222
Company: Qualcomm Atheros
Test Target: FCC 15.205
Mode Oper: 802.11b Tx

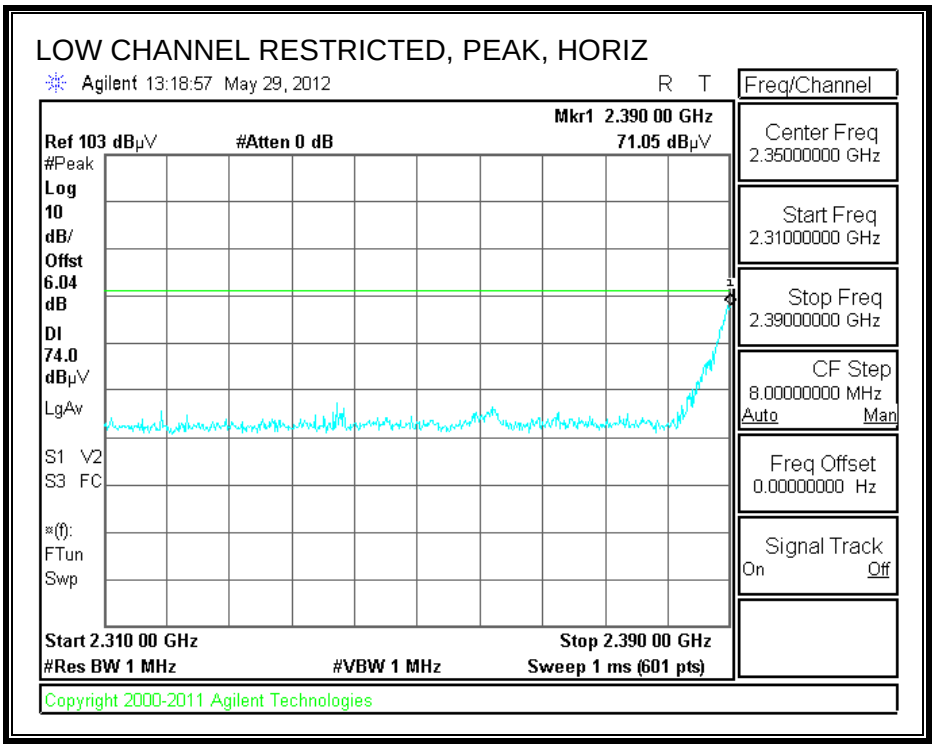
f	Measurement Frequency	Amp	Preamp Gain		Average Field Strength Limit
Dist	Distance to Antenna	D Corr	Distance Correct to 3 meters		Peak Field Strength Limit
Read	Analyzer Reading	Avg	Average Field Strength @ 3 m		Margin vs. Average Limit
AF	Antenna Factor	Peak	Calculated Peak Field Strength		Margin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

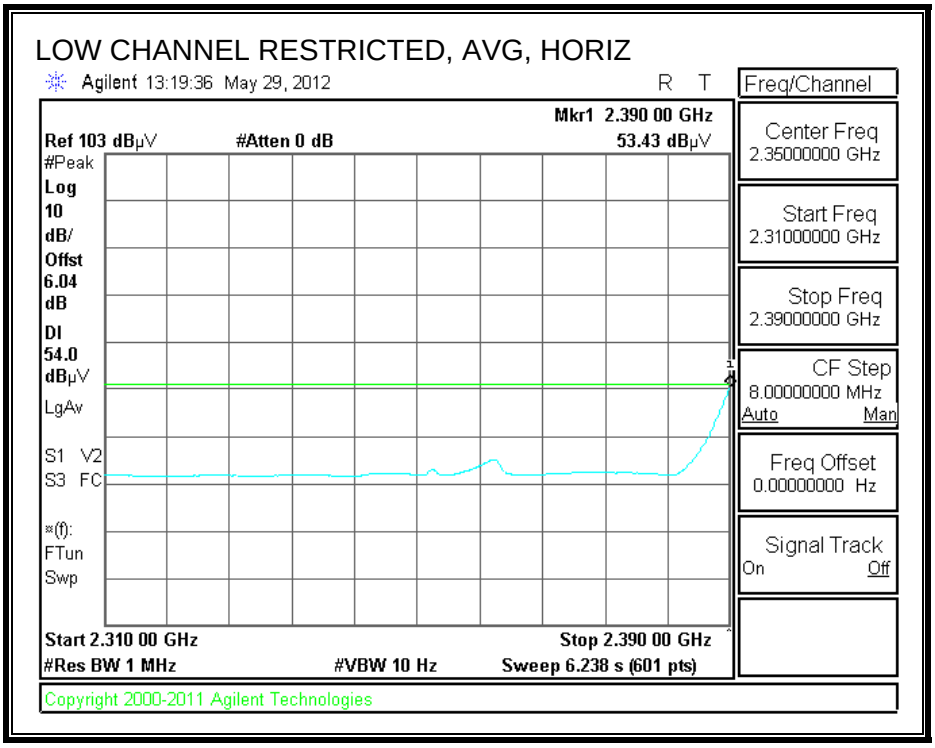
f GHz	Dist (m)	Read dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Corr. dBuV/m	Limit dBuV/m	Margin dB	Ant. Pol. V/H	Det. P/A/QP	Ant.High cm	Table Angle Degree	Notes
Low Channel - 2412MHz															
4.824	3.0	38.7	33.4	6.2	-35.5	0.0	0.0	42.8	74.0	-31.2	V	P	100.8	295.3	
4.824	3.0	31.0	33.4	6.2	-35.5	0.0	0.0	35.1	54.0	-18.9	V	A	100.8	295.3	
4.824	3.0	38.0	33.4	6.2	-35.5	0.0	0.0	42.2	74.0	-31.8	H	P	146.0	265.4	
4.824	3.0	28.9	33.4	6.2	-35.5	0.0	0.0	33.1	54.0	-20.9	H	A	146.0	265.4	
Mid Channel - 2437MHz															
4.874	3.0	38.5	33.5	6.2	-35.5	0.0	0.0	42.7	74.0	-31.3	V	P	100.5	117.2	
4.874	3.0	30.6	33.5	6.2	-35.5	0.0	0.0	34.8	54.0	-19.2	V	A	100.5	117.2	
4.874	3.0	36.3	33.5	6.2	-35.5	0.0	0.0	40.5	74.0	-33.5	H	P	100.4	78.4	
4.874	3.0	26.0	33.5	6.2	-35.5	0.0	0.0	30.3	54.0	-23.7	H	A	100.4	78.4	
7.311	3.0	36.3	35.7	8.4	-35.4	0.0	0.0	45.0	74.0	-29.0	V	P	195.1	120.4	
7.311	3.0	23.8	35.7	8.4	-35.4	0.0	0.0	32.5	54.0	-21.5	V	A	195.1	120.4	
7.311	3.0	36.0	35.7	8.4	-35.4	0.0	0.0	44.6	74.0	-29.4	H	P	123.8	288.5	
7.311	3.0	23.5	35.7	8.4	-35.4	0.0	0.0	32.1	54.0	-21.9	H	A	123.8	288.5	
High Channel - 2462MHz															
4.924	3.0	38.1	33.5	6.3	-35.5	0.0	0.0	42.5	74.0	-31.5	V	P	129.7	267.2	
4.924	3.0	29.6	33.5	6.3	-35.5	0.0	0.0	33.9	54.0	-20.1	V	A	129.7	267.2	
4.924	3.0	38.9	33.5	6.3	-35.5	0.0	0.0	43.3	74.0	-30.7	H	P	122.5	134.5	
4.924	3.0	30.5	33.5	6.3	-35.5	0.0	0.0	34.8	54.0	-19.2	H	A	122.5	134.5	
7.386	3.0	40.6	35.8	8.4	-35.5	0.0	0.0	49.4	74.0	-24.6	V	P	190.1	184.7	
7.386	3.0	32.3	35.8	8.4	-35.5	0.0	0.0	41.1	54.0	-13.0	V	A	190.1	184.7	
7.386	3.0	37.8	35.8	8.4	-35.5	0.0	0.0	46.6	74.0	-27.4	H	P	100.0	125.6	
7.386	3.0	27.0	35.8	8.4	-35.5	0.0	0.0	35.7	54.0	-18.3	H	A	100.0	125.6	

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

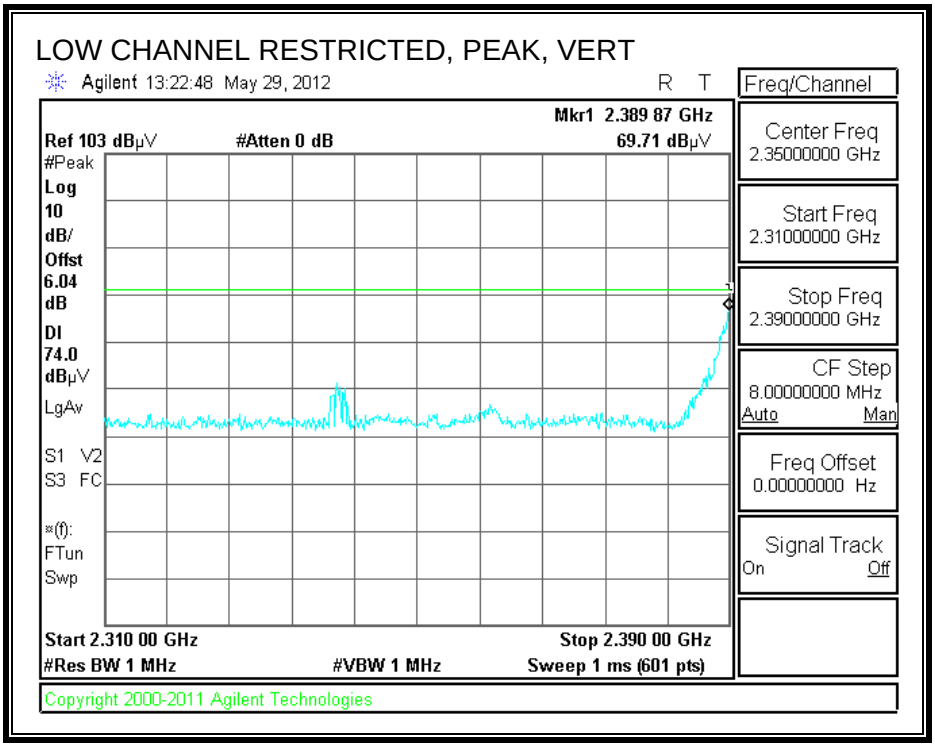
8.2.2. TX ABOVE 1 GHz FOR 802.11g 1TX MODE IN THE 2.4 GHz BAND

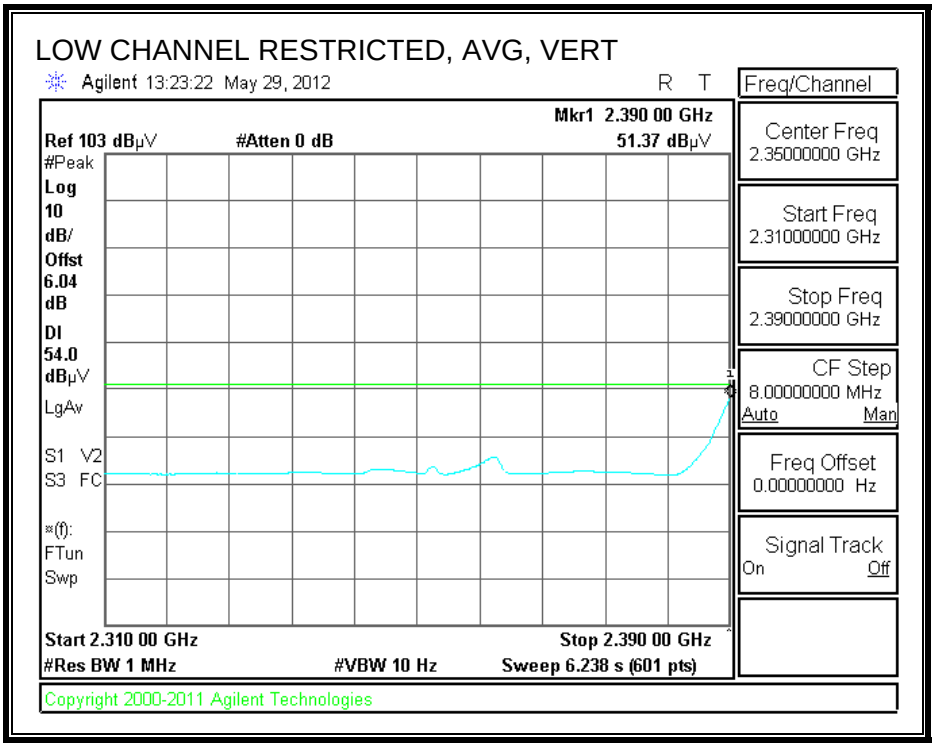
RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



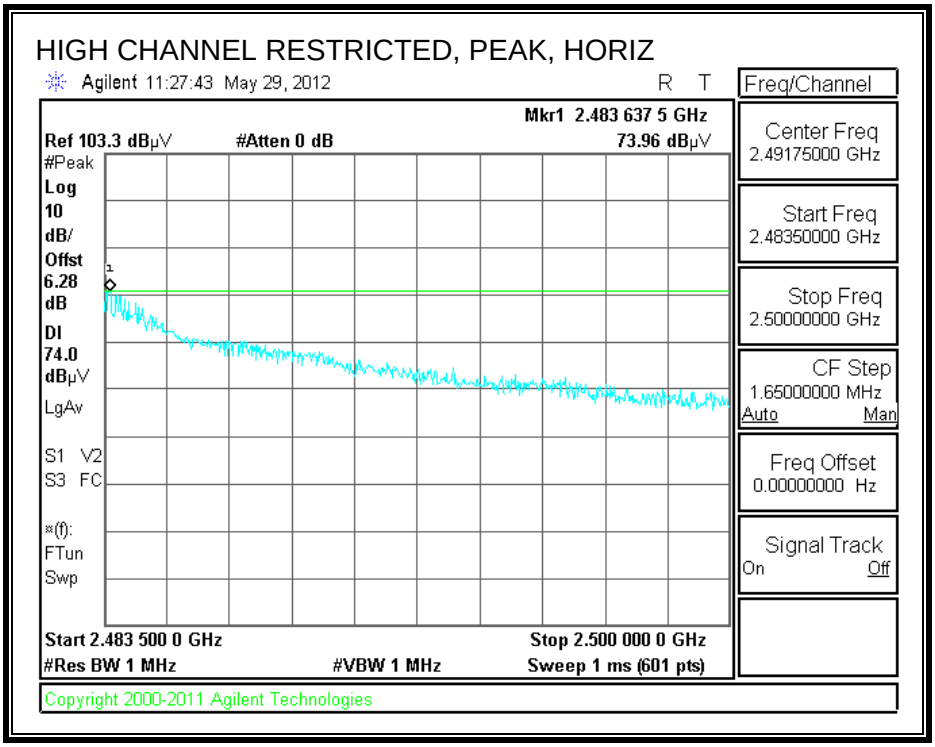


RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)

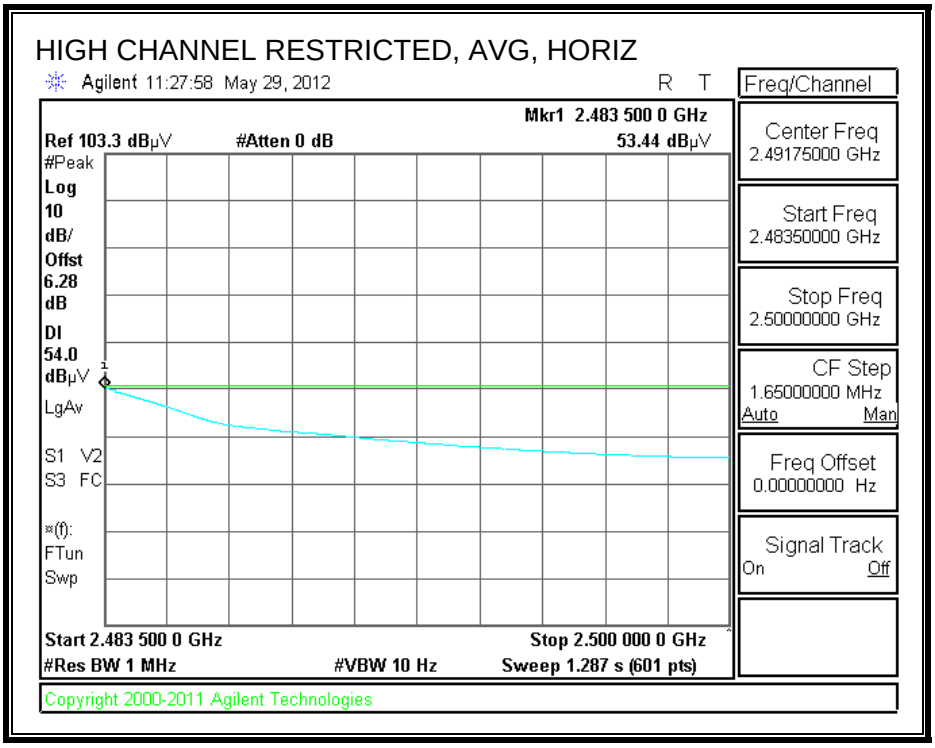




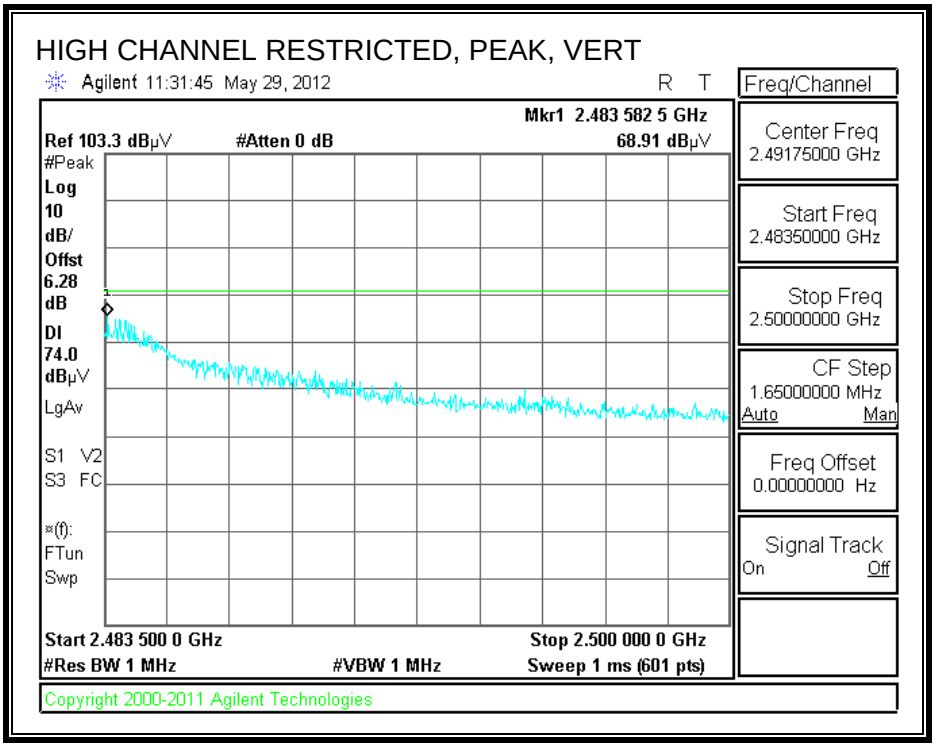
RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)

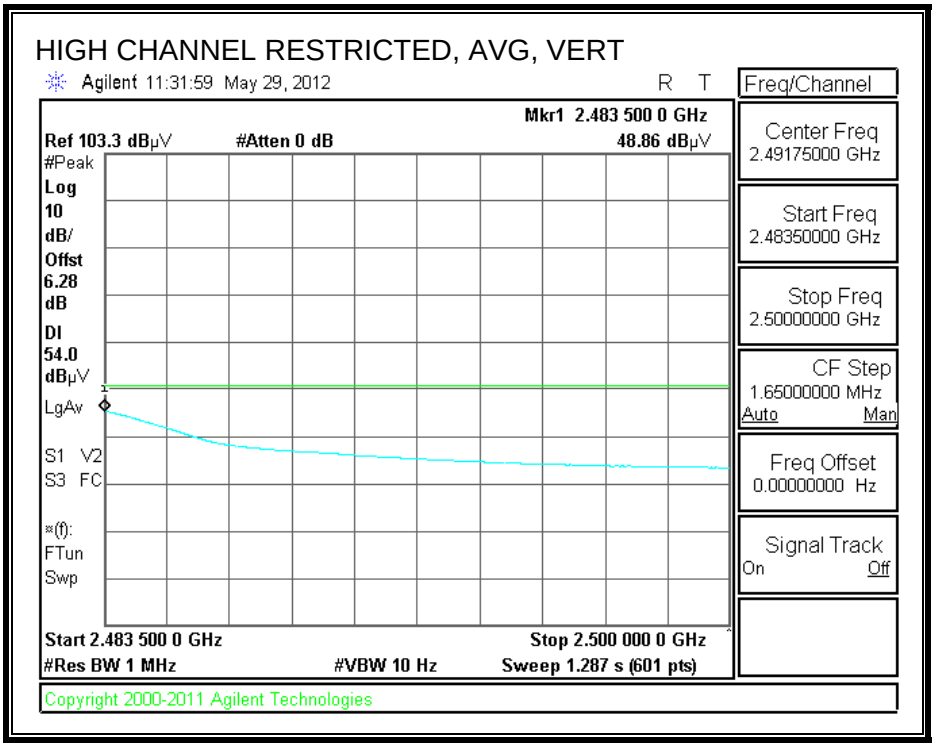


HIGH CHANNEL RESTRICTED, AVG, HORIZ



RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)





HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement
Compliance Certification Services, Fremont 3m Chamber

Test Engr: Dennis Huang
Date: 5/25/2012 - 5/29/2012
Project #: 12U14222
Company: Qualcomm Atheros
Test Target: FCC 15.247
Mode Oper: 802.11g Tx

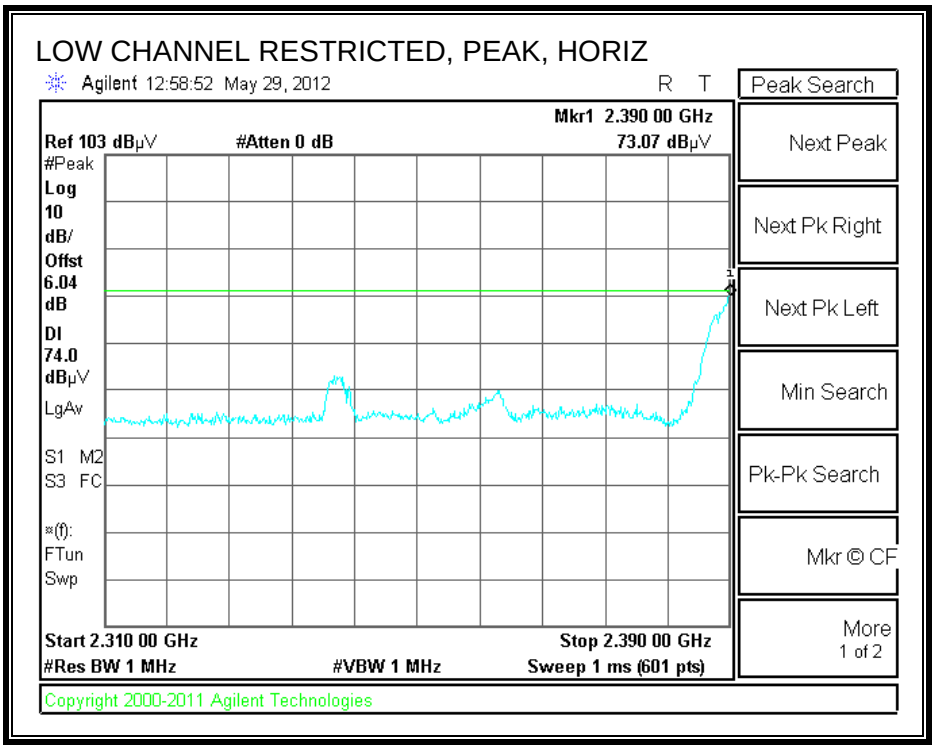
f	Measurement Frequency	Amp	Preamp Gain		Average Field Strength Limit
Dist	Distance to Antenna	D Corr	Distance Correct to 3 meters		Peak Field Strength Limit
Read	Analyzer Reading	Avg	Average Field Strength @ 3 m		Margin vs. Average Limit
AF	Antenna Factor	Peak	Calculated Peak Field Strength		Margin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

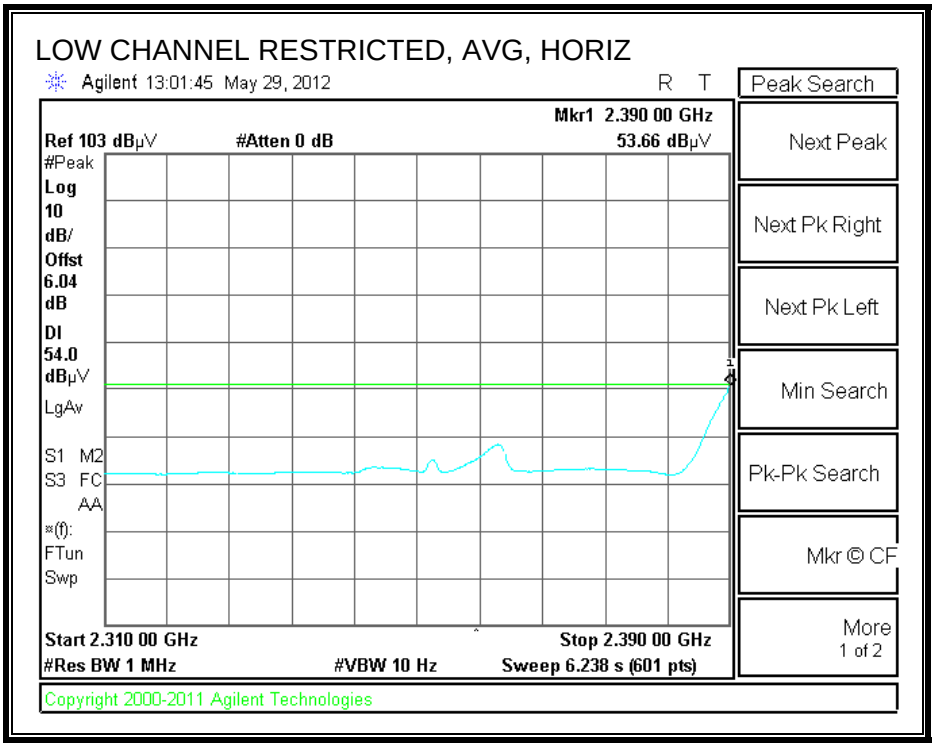
f GHz	Dist (m)	Read dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Corr. dBuV/m	Limit dBuV/m	Margin dB	Ant. Pol. V/H	Det. P/A/QP	Ant.High cm	Table Angle Degree	Notes
Low Channel - 2412MHz															
4.824	3.0	36.4	33.4	6.2	-35.5	0.0	0.0	40.6	74.0	-33.4	V	P	100.0	159.6	
4.824	3.0	24.4	33.4	6.2	-35.5	0.0	0.0	28.5	54.0	-25.5	V	A	100.0	159.6	
4.824	3.0	36.0	33.4	6.2	-35.5	0.0	0.0	40.2	74.0	-33.8	H	P	121.8	32.8	
4.824	3.0	24.0	33.4	6.2	-35.5	0.0	0.0	28.1	54.0	-25.9	H	A	121.8	32.8	
Mid Channel - 2437MHz															
4.874	3.0	36.6	33.5	6.2	-35.5	0.0	0.0	40.9	74.0	-33.1	V	P	143.5	150.0	
4.874	3.0	24.5	33.5	6.2	-35.5	0.0	0.0	28.7	54.0	-25.3	V	A	143.5	150.0	
4.874	3.0	36.9	33.5	6.2	-35.5	0.0	0.0	41.1	74.0	-32.9	H	P	126.5	229.9	
4.874	3.0	24.0	33.5	6.2	-35.5	0.0	0.0	28.2	54.0	-25.8	H	A	126.5	229.9	
7.311	3.0	37.7	35.7	8.4	-35.4	0.0	0.0	46.4	74.0	-27.6	V	P	189.4	207.0	
7.311	3.0	24.3	35.7	8.4	-35.4	0.0	0.0	32.9	54.0	-21.1	V	A	189.4	207.0	
7.311	3.0	35.7	35.7	8.4	-35.4	0.0	0.0	44.3	74.0	-29.7	H	P	183.2	32.8	
7.311	3.0	23.4	35.7	8.4	-35.4	0.0	0.0	32.1	54.0	-21.9	H	A	183.2	32.8	
High Channel - 2462MHz															
4.924	3.0	36.8	33.5	6.3	-35.5	0.0	0.0	41.1	74.0	-32.9	V	P	198.7	47.4	
4.924	3.0	24.7	33.5	6.3	-35.5	0.0	0.0	29.0	54.0	-25.0	V	A	198.7	47.4	
4.924	3.0	37.0	33.5	6.3	-35.5	0.0	0.0	41.4	74.0	-32.6	H	P	151.6	114.7	
4.924	3.0	24.6	33.5	6.3	-35.5	0.0	0.0	28.9	54.0	-25.1	H	A	151.6	114.7	
7.386	3.0	38.0	35.8	8.4	-35.5	0.0	0.0	46.8	74.0	-27.2	V	P	176.6	186.3	
7.386	3.0	25.5	35.8	8.4	-35.5	0.0	0.0	34.3	54.0	-19.7	V	A	176.6	186.3	
7.386	3.0	36.9	35.8	8.4	-35.5	0.0	0.0	45.7	74.0	-28.3	H	P	198.5	319.9	
7.386	3.0	24.0	35.8	8.4	-35.5	0.0	0.0	32.8	54.0	-21.2	H	A	198.5	319.9	

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

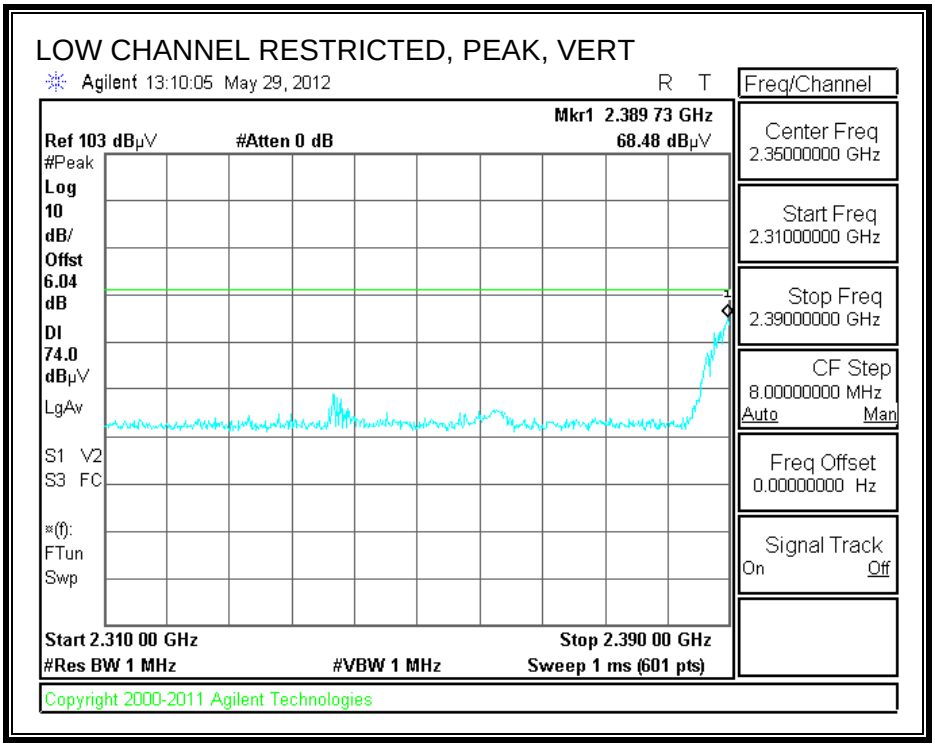
8.2.3. TX ABOVE 1 GHz FOR 802.11n HT20 1TX MODE IN THE 2.4 GHz BAND

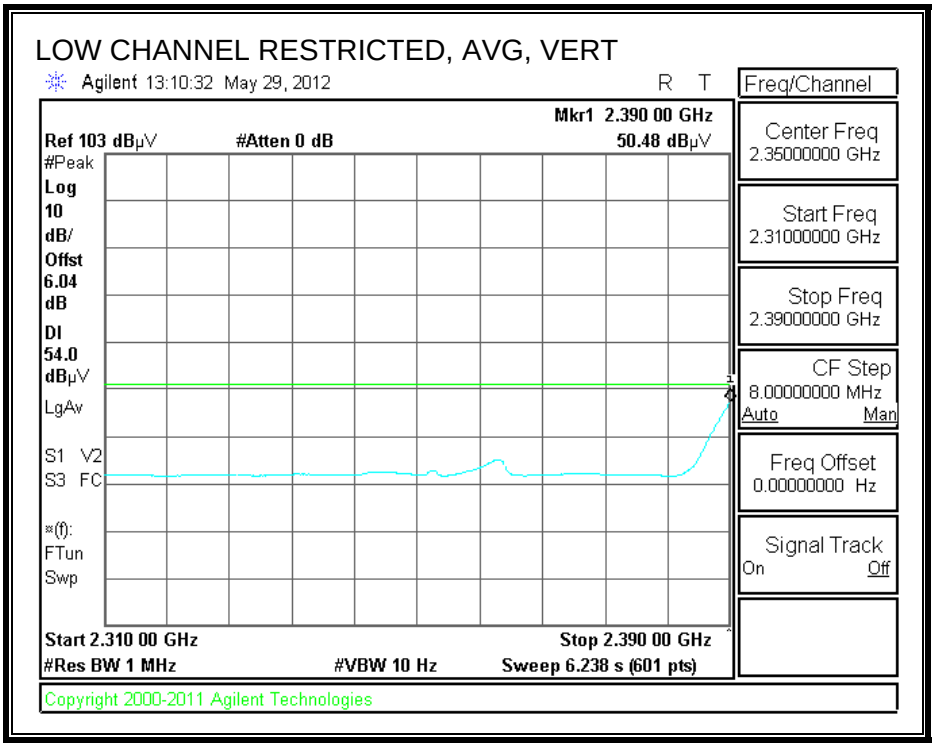
RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



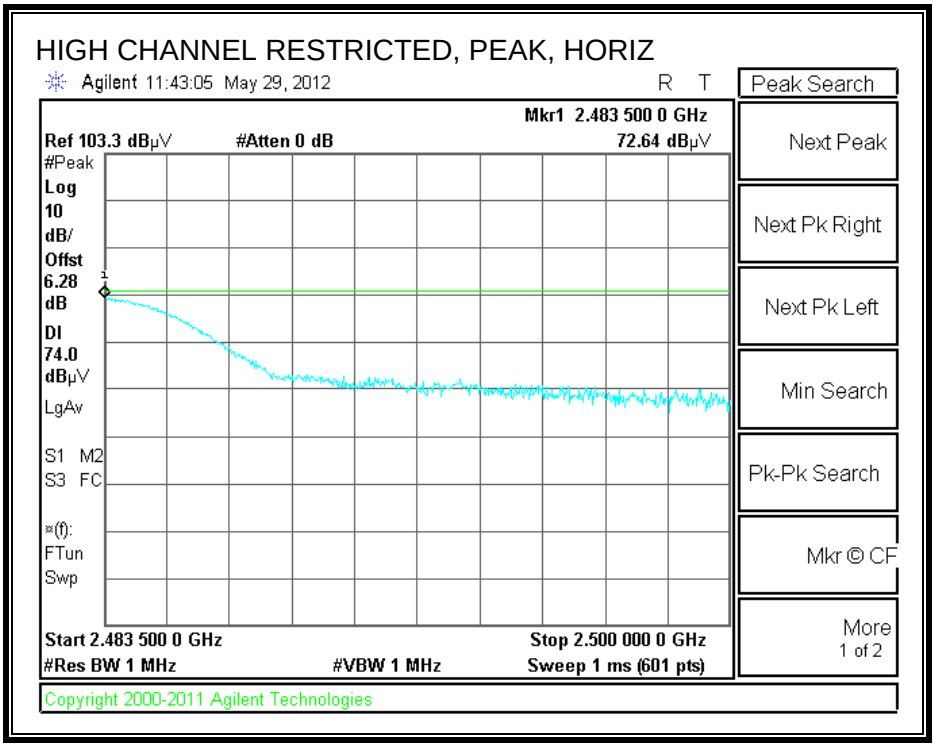


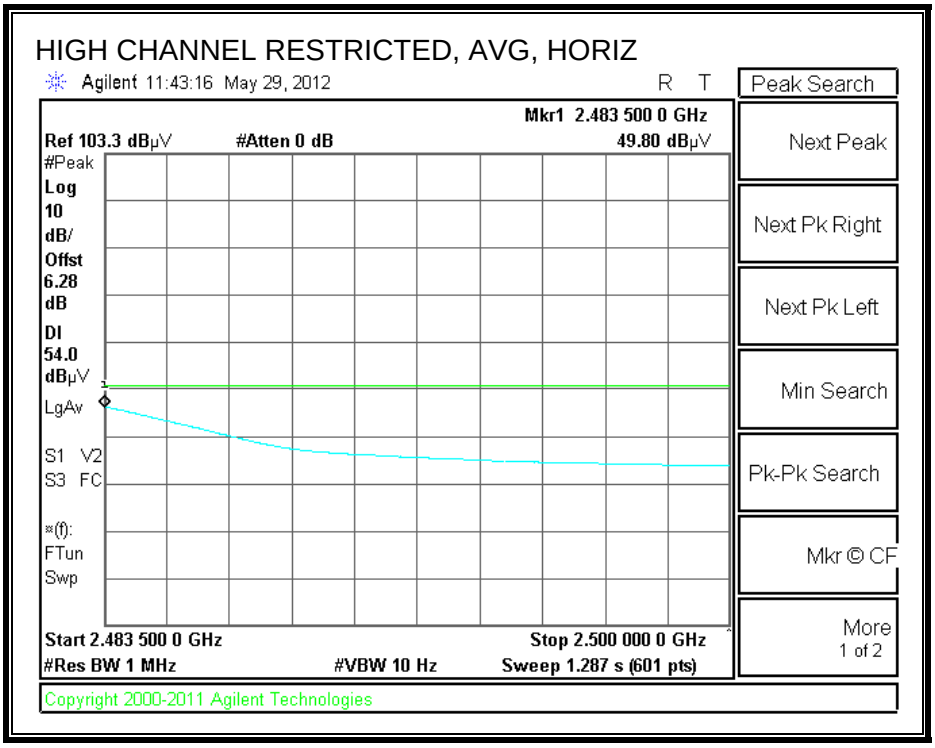
RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)



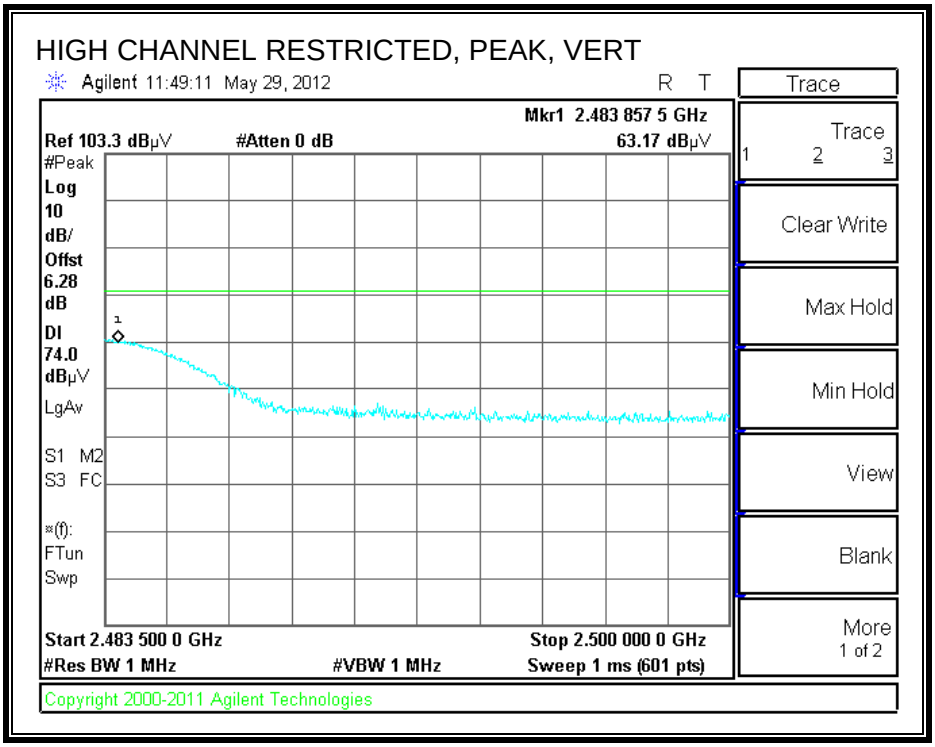


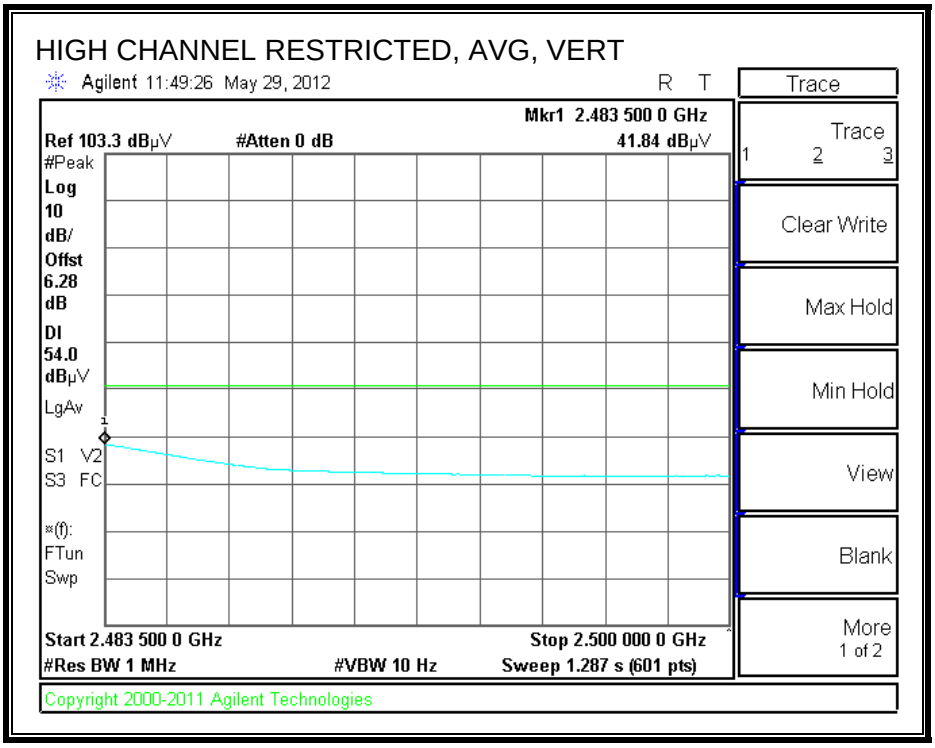
RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)





RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)





HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement
Compliance Certification Services, Fremont 3m Chamber

Test Engr: Dennis Huang
Date: 05/29/12
Project #: 12U14222
Company: Qualcomm Atheros
Test Target: FCC 15.205
Mode Oper: 802.11n HT20 Tx

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 - 2412MHz															
4.824	3.0	38.6	33.4	6.2	-35.5	0.0	0.0	42.8	74.0	-31.2	V	P	192.8	134.0	
4.824	3.0	25.0	33.4	6.2	-35.5	0.0	0.0	29.1	54.0	-24.9	V	A	192.8	134.0	
4.824	3.0	37.9	33.4	6.2	-35.5	0.0	0.0	42.1	74.0	-31.9	H	P	153.5	160.3	
4.824	3.0	24.8	33.4	6.2	-35.5	0.0	0.0	28.9	54.0	-25.1	H	A	153.5	160.3	
Mid Channel - 2437MHz															
4.874	3.0	38.5	33.5	6.2	-35.5	0.0	0.0	42.7	74.0	-31.3	V	P	199.2	327.4	
4.874	3.0	25.8	33.5	6.2	-35.5	0.0	0.0	30.0	54.0	-24.0	V	A	199.2	327.4	
4.874	3.0	36.9	33.5	6.2	-35.5	0.0	0.0	41.1	74.0	-32.9	H	P	143.8	348.9	
4.874	3.0	24.3	33.5	6.2	-35.5	0.0	0.0	28.6	54.0	-25.4	H	A	143.8	348.9	
7.311	3.0	36.1	35.7	8.4	-35.4	0.0	0.0	44.7	74.0	-29.3	V	P	196.9	298.3	
7.311	3.0	24.1	35.7	8.4	-35.4	0.0	0.0	32.7	54.0	-21.3	V	A	196.9	298.3	
7.311	3.0	36.2	35.7	8.4	-35.4	0.0	0.0	44.8	74.0	-29.2	H	P	105.7	35.5	
7.311	3.0	24.1	35.7	8.4	-35.4	0.0	0.0	32.7	54.0	-21.3	H	A	105.7	35.5	
High Channel - 2462MHz															
4.924	3.0	37.3	33.5	6.3	-35.5	0.0	0.0	41.6	74.0	-32.4	V	P	190.6	102.1	
4.924	3.0	26.4	33.5	6.3	-35.5	0.0	0.0	30.7	54.0	-23.3	V	A	190.6	102.1	
4.924	3.0	36.5	33.5	6.3	-35.5	0.0	0.0	40.8	74.0	-33.2	H	P	132.8	163.9	
4.924	3.0	24.7	33.5	6.3	-35.5	0.0	0.0	29.0	54.0	-25.0	H	A	132.8	163.9	
7.386	3.0	36.9	35.8	8.4	-35.5	0.0	0.0	45.7	74.0	-28.3	V	P	166.2	228.8	
7.386	3.0	24.2	35.8	8.4	-35.5	0.0	0.0	33.0	54.0	-21.0	V	A	166.2	228.8	
7.386	3.0	36.3	35.8	8.4	-35.5	0.0	0.0	45.1	74.0	-28.9	H	P	132.9	280.3	
7.386	3.0	24.1	35.8	8.4	-35.5	0.0	0.0	32.9	54.0	-21.1	H	A	132.9	280.3	

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

8.2.4. TX ABOVE 1 GHz FOR 802.11a MODE IN THE 5.8 GHz BAND

HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement
Compliance Certification Services, Fremont 5m A Chamber

Test Engr: Dennis Huang
Date: 5/24/2012 - 5/25/2012
Project #: 12U14222
Company: Qualcomm Atheros
Test Target: FCC 15.205
EUT: 802.11a Mode,RF Module: N10G84TRF

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 - 5745MHz															
11.490	3.0	36.7	38.8	10.7	-35.5	0.0	0.7	51.4	74.0	-22.6	V	P	135.7	12.1	
11.490	3.0	28.5	38.8	10.7	-35.5	0.0	0.7	43.3	54.0	-10.7	V	A	135.7	12.1	
11.490	3.0	35.0	38.8	10.7	-35.5	0.0	0.7	49.8	74.0	-24.3	H	P	102.6	59.8	
11.490	3.0	24.8	38.8	10.7	-35.5	0.0	0.7	39.5	54.0	-14.5	H	A	102.6	59.8	
Mid Channel - 5785MHz															
11.570	3.0	34.9	38.9	10.8	-35.5	0.0	0.7	49.7	74.0	-24.3	V	P	156.5	3.4	
11.570	3.0	26.0	38.9	10.8	-35.5	0.0	0.7	40.9	54.0	-13.1	V	A	156.5	3.4	
11.570	3.0	35.3	38.9	10.8	-35.5	0.0	0.7	50.2	74.0	-23.8	H	P	100.2	96.2	
11.570	3.0	25.0	38.9	10.8	-35.5	0.0	0.7	39.9	54.0	-14.1	H	A	100.2	96.2	
High Channel - 5825MHz															
11.650	3.0	35.2	39.0	10.9	-35.5	0.0	0.7	50.3	74.0	-23.7	V	P	169.0	10.2	
11.650	3.0	27.2	39.0	10.9	-35.5	0.0	0.7	42.3	54.0	-11.7	V	A	169.0	10.2	
11.650	3.0	36.5	39.0	10.9	-35.5	0.0	0.7	51.6	74.0	-22.4	H	P	136.0	64.2	
11.650	3.0	27.2	39.0	10.9	-35.5	0.0	0.7	42.2	54.0	-11.8	H	A	136.0	64.2	

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

8.2.5. TX ABOVE 1 GHz FOR 802.11n HT20 MODE IN THE 5.8 GHz BAND

HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement
Compliance Certification Services, Fremont 5m A Chamber

Test Engr: Dennis Huang
Date: 5/24/2012 - 5/25/2012
Project #: 12U14222
Company: Qualcomm Atheros
Test Target: FCC 15.205
EUT: 802.11n HT20 Mode, RF Module: N10G84TRF

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 - 5745MHz															
11.490	3.0	38.4	38.8	10.7	-35.5	0.0	0.7	53.1	74.0	-20.9	V	P	136.9	256.0	
11.490	3.0	33.1	38.8	10.7	-35.5	0.0	0.7	47.9	54.0	-6.1	V	A	136.9	256.0	
11.490	3.0	34.9	38.8	10.7	-35.5	0.0	0.7	49.6	74.0	-24.4	H	P	173.0	119.7	
11.490	3.0	26.6	38.8	10.7	-35.5	0.0	0.7	41.3	54.0	-12.7	H	A	173.0	119.7	
Mid Channel - 5785MHz															
11.570	3.0	39.1	38.9	10.8	-35.5	0.0	0.7	54.0	74.0	-20.0	V	P	122.4	254.6	
11.570	3.0	33.8	38.9	10.8	-35.5	0.0	0.7	48.7	54.0	-5.3	V	A	122.4	254.6	
11.570	3.0	35.1	38.9	10.8	-35.5	0.0	0.7	50.0	74.0	-24.0	H	P	197.6	272.0	
11.570	3.0	24.7	38.9	10.8	-35.5	0.0	0.7	39.6	54.0	-14.4	H	A	197.6	272.0	
High Channel - 5825MHz															
11.650	3.0	40.7	39.0	10.9	-35.5	0.0	0.7	55.8	74.0	-18.2	V	P	108.9	257.8	
11.650	3.0	36.0	39.0	10.9	-35.5	0.0	0.7	51.1	54.0	-2.9	V	A	108.9	257.8	
11.650	3.0	38.4	39.0	10.9	-35.5	0.0	0.7	53.4	74.0	-20.6	H	P	151.2	15.7	
11.650	3.0	33.2	39.0	10.9	-35.5	0.0	0.7	48.3	54.0	-5.7	H	A	151.2	15.7	

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

8.2.6. TX ABOVE 1 GHz FOR 802.11n HT40 MODE IN THE 5.8 GHz BAND

HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement
Compliance Certification Services, Fremont 5m A Chamber

Test Engr: Dennis Huang
Date: 5/24/2012 - 5/25/2012
Project #: 12U14222
Company: Qualcomm Atheros
Test Target: FCC 15.205
EUT: 802.11n HT40 Mode, RF Module: N10G84TRF

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		

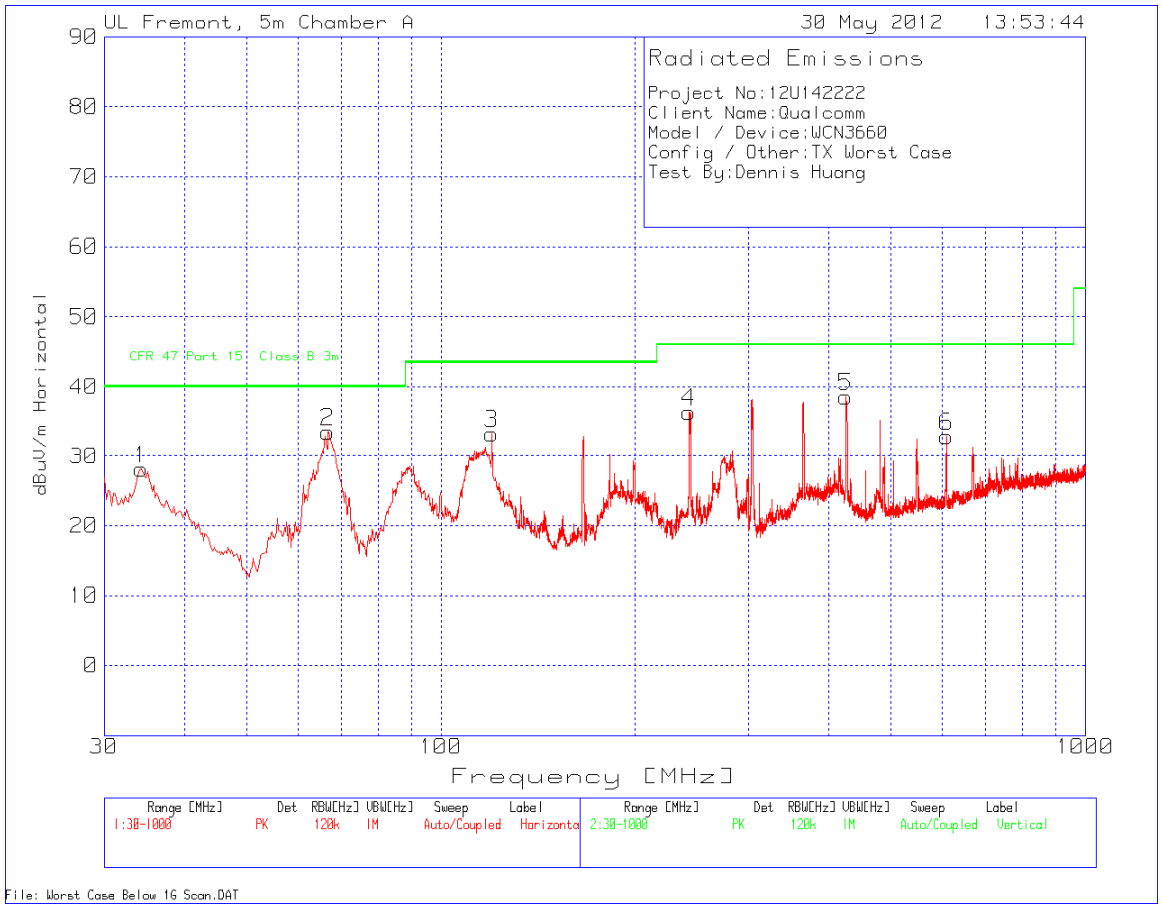
f GHz	Dist (m)	Read dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Corr. dBuV/m	Limit dBuV/m	Margin dB	Ant. Pol. V/H	Det. P/A/QP	Ant.High cm	Table Angle Degree	Notes
Low Channel - 5755MHz															
11.510	3.0	37.8	38.8	10.7	-35.5	0.0	0.7	52.6	74.0	-21.4	V	P	131.0	255.5	
11.510	3.0	32.7	38.8	10.7	-35.5	0.0	0.7	47.4	54.0	-6.6	V	A	131.0	255.5	
11.510	3.0	34.2	38.8	10.7	-35.5	0.0	0.7	49.0	74.0	-25.0	H	P	100.0	324.1	
11.510	3.0	24.4	38.8	10.7	-35.5	0.0	0.7	39.1	54.0	-14.9	H	A	100.0	324.1	
High Channel - 5795MHz															
11.590	3.0	38.9	38.9	10.8	-35.5	0.0	0.7	53.8	74.0	-20.2	V	P	110.2	257.9	
11.590	3.0	34.0	38.9	10.8	-35.5	0.0	0.7	48.9	54.0	-5.1	V	A	110.2	257.9	
11.590	3.0	37.9	38.9	10.8	-35.5	0.0	0.7	52.8	74.0	-21.2	H	P	165.5	14.4	
11.590	3.0	31.3	38.9	10.8	-35.5	0.0	0.7	46.3	54.0	-7.7	H	A	165.5	14.4	

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

8.3. WORST-CASE BELOW 1 GHz

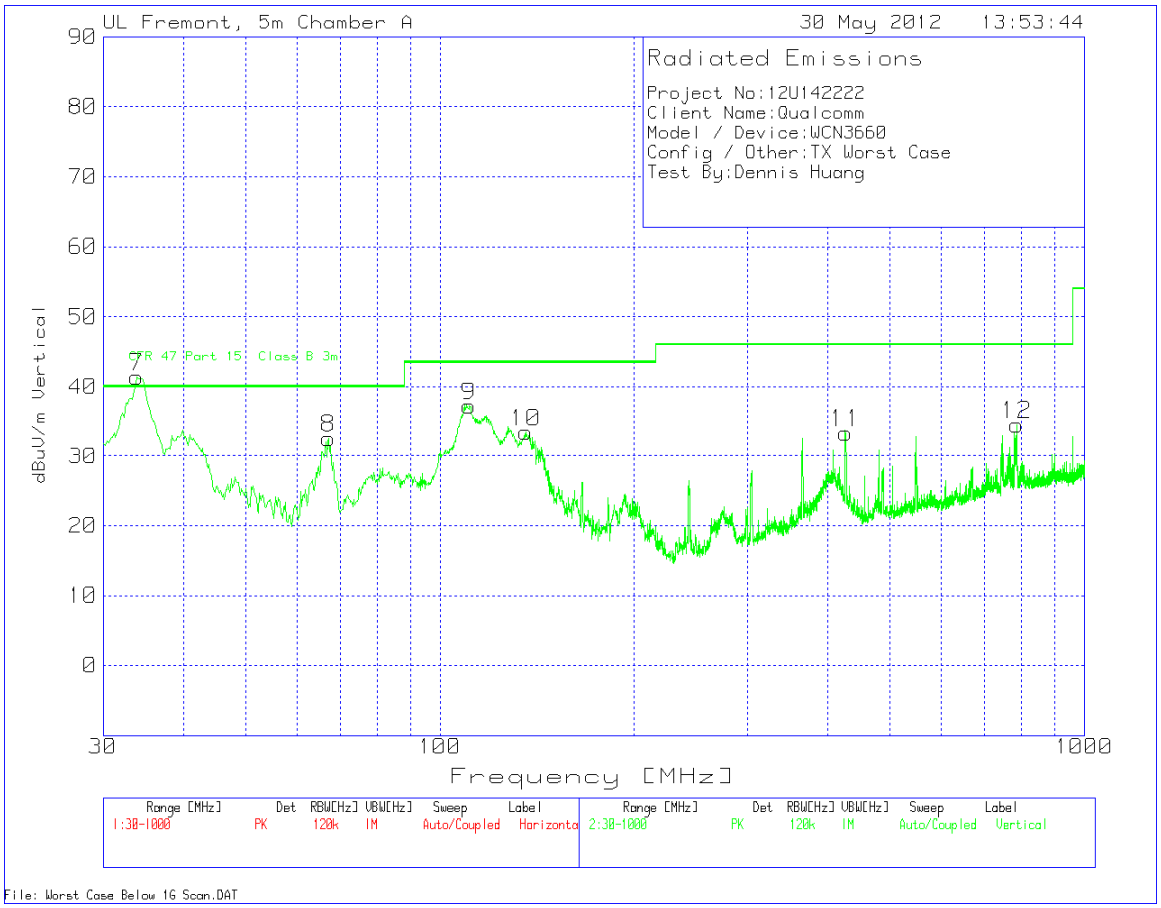
SPURIOUS EMISSIONS 30 TO 1000 MHz (WORST-CASE CONFIGURATION, HORIZONTAL)

HORIZONTAL PLOT



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

VERTICAL PLOT



HORIZONTAL AND VERTICAL DATA

Project No:12U14222
Client Name:Qualcomm
Model / Device:WCN3660
Config / Other:TX Worst Case
Test By:Dennis Huang

Test Frequency (MHz)	Raw Reading (dBuV/m)	Detector	Amplifier + Cable Loss [dB]	Bilog Antenna Loss [dB]	Corrected Reading (dBuV/m)	Part 15 Class B Limit (dBuV/m)	Margin	Antenna Height [cm]	Polarity
34.2646	37.67	PK	-27.6	18.1	28.17	40	-11.83	300	Horz
66.8305	52.82	PK	-27.2	7.9	33.52	40	-6.48	400	Horz
119.944	46.15	PK	-26.7	13.8	33.25	43.5	-10.25	300	Horz
243.0356	50.89	PK	-26	11.5	36.39	46	-9.61	100	Horz
425.056	47.42	PK	-25.3	16.4	38.52	46	-7.48	200	Horz
609.7902	38.34	PK	-24	18.5	32.84	46	-13.16	100	Horz

Test Frequency (MHz)	Raw Reading (dBuV/m)	Detector	Amplifier + Cable Loss [dB]	Bilog Antenna Loss [dB]	Corrected Reading (dBuV/m)	Part 15 Class B Limit (dBuV/m)	Margin	Ant Height [cm]	Polarity
34.39	44.67	QP	-27.6	18	35.07	40	-4.93	100	Vert
67.2182	51.91	PK	-27.2	7.9	32.61	40	-7.39	400	Vert
111.0272	51.01	PK	-26.7	12.9	37.21	43.5	-6.29	100	Vert
136.0332	47.17	PK	-26.7	13	33.47	43.5	-10.03	100	Vert
426.8006	42.35	PK	-25.4	16.4	33.35	46	-12.65	200	Vert
787.1583	37.15	PK	-23.3	20.7	34.55	46	-11.45	100	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: below 1ghz.TXT
File: below 1ghz.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

ANSI C63.4

LINE 1 RESULTS

6 WORST EMISSIONS

Line-L1 .15 - 30MHz

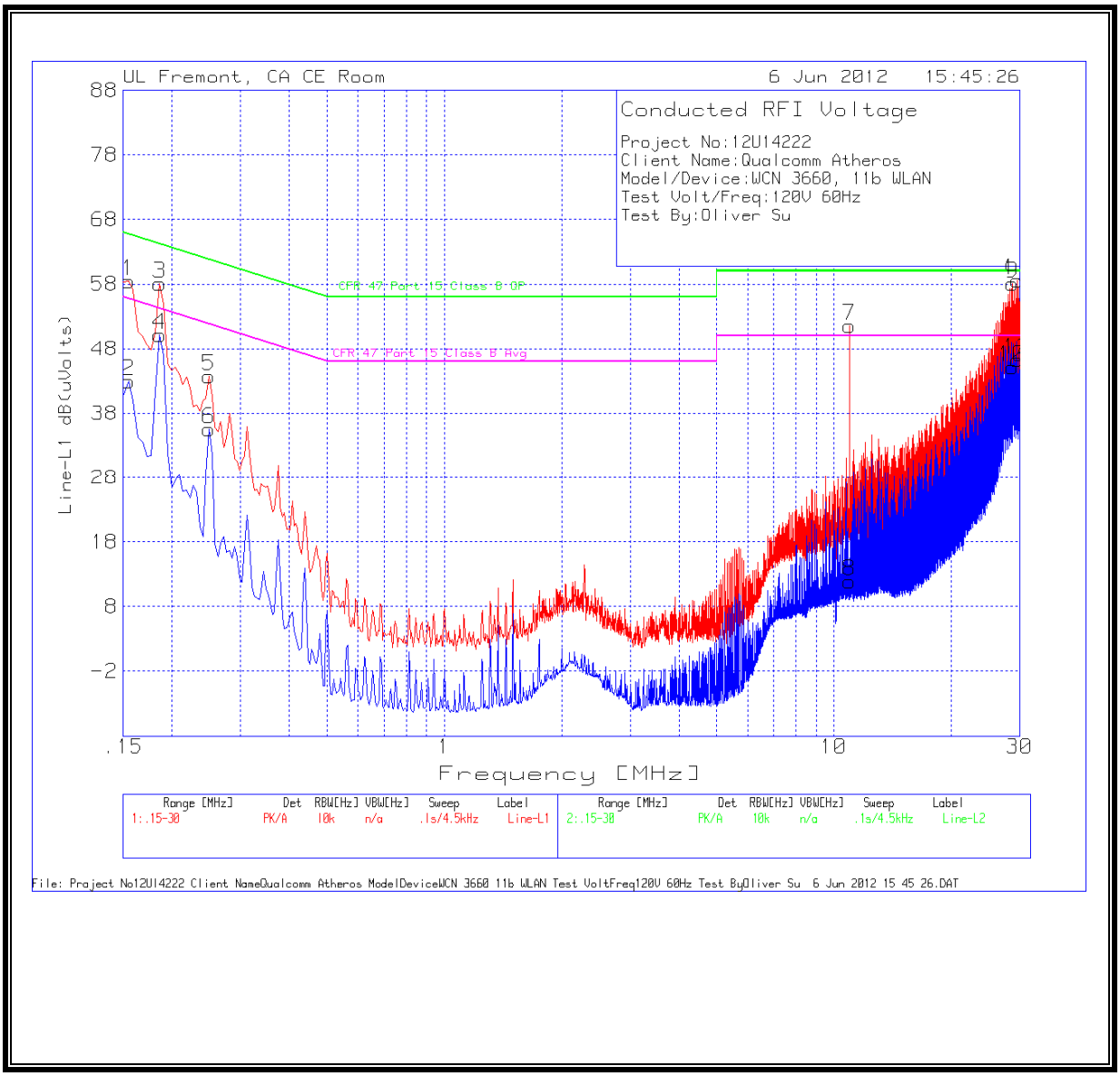
Trace Markers

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	T24 IL L1 (dB)	LC Cables 1&3 (dB)	Corrected Reading dB(uVolts)	CFR 47 Part 15 Class B QP	Margin to Limit (dB)	CFR 47 Part 15 Class B Avg	Margin to Limit (dB)
1	.1545	58.32	PK	.1	0	58.42	65.8	-7.38	-	-
2	.1545	42.86	Av	.1	0	42.96	-	-	55.8	-12.84
3	.186	57.92	PK	.1	0	58.02	64.2	-6.18	-	-
4	.186	50	Av	.1	0	50.1	-	-	54.2	-4.1
5	.249	43.65	PK	.1	0	43.75	61.8	-18.05	-	-
6	.249	35.47	Av	.1	0	35.57	-	-	51.8	-16.23
7	10.986	51.3	PK	.1	.2	51.6	60	-8.4	-	-
8	10.986	11.57	Av	.1	.2	11.87	-	-	50	-38.13
9	28.77	57.29	PK	.5	.3	58.09	60	-1.91	-	-
10	28.77	44.34	Av	.5	.3	45.14	-	-	50	-4.86
11	29.5215	57.75	PK	.5	.3	58.55	60	-1.45	-	-
12	29.5215	45.53	Av	.5	.3	46.33	-	-	50	-3.67

PK - Peak detector

Av - average detection

LINE 1 RESULTS



LINE 2 RESULTS

6 WORST EMISSIONS

Line-L2 .15 - 30MHz

Trace Markers

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	T24 IL L2 (dB)	LC Cables 2&3 (dB)	Corrected Reading dB(uVolts)	CFR 47 Part 15 Class B QP	Margin to Limit (dB)	CFR 47 Part 15 Class B Avg	Margin to Limit (dB)
13	.15	58.22	PK	.1	0	58.32	66	-7.68	-	-
14	.15	38.85	Av	.1	0	38.95	-	-	56	-17.05
15	.186	56.59	PK	.1	0	56.69	64.2	-7.51	-	-
16	.186	52.66	Av	.1	0	52.76	-	-	54.2	-1.44
17	.249	44.09	PK	.1	0	44.19	61.8	-17.61	-	-
18	.249	37.67	Av	.1	0	37.77	-	-	51.8	-14.03
19	28.77	56.28	PK	.5	.3	57.08	60	-2.92	-	-
20	28.77	43.53	Av	.5	.3	44.33	-	-	50	-5.67
21	29.2695	56.44	PK	.5	.3	57.24	60	-2.76	-	-
22	29.2695	44.14	Av	.5	.3	44.94	-	-	50	-5.06
23	29.769	56.08	PK	.5	.3	56.88	60	-3.12	-	-
24	29.769	42.81	Av	.5	.3	43.61	-	-	50	-6.39

PK - Peak detector

Av - average detection

LINE 2 RESULTS