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

CERTIFICATION TEST REPORT

FOR

WIRELESS CONTROLLER

MODEL NUMBER: 1537

FCC ID: C3K1537
IC: 3048A-1537

REPORT NUMBER: 13U14963

ISSUE DATE: 2013-05-21

Prepared for
MICROSOFT
1 MICROSOFT WAY
REDMOND
WA, 98052, USA

Prepared by
UL LLC
1285 WALT WHITMAN RD.
MELVILLE, NY 11747, U.S.A.
TEL: (631) 271-6200
FAX: (877) 854-3577

NVLAP LAB CODE 100255-0

Revision History

Rev.	Issue Date	Revisions	Revised By
--	5/21/13	Initial Issue	M. Antola

TABLE OF CONTENTS

1. ATTESTATION OF TEST RESULTS

COMPANY NAME: MICROSOFT
1 MICROSOFT WAY
REDMOND, WA, 98052, USA

EUT DESCRIPTION: WIRELESS CONTROLLER

MODEL: 1537

SERIAL NUMBER: NON-SERIALIZED PRODUCTION UNITS

DATE TESTED: 2013-04-08 to 2013-05-09

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

UL LLC tested the above equipment in accordance with the requirements set forth in the above standards, using test results reported in the test report documents referenced below and/or documentation furnished by the applicant. All indications of Pass/Fail in this report are opinions expressed by UL LLC based on interpretations of these calculations. The results show that the equipment 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 by the referenced documents. This document may not be altered or revised in any way unless done so by UL LLC and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL LLC 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 By:

Bob DeLisi
WiSE Principal Engineer
UL LLC

Tested By:

Mike Antola
WiSE Project Lead
UL LLC

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 1285 Walt Whitman Rd. Melville, NY 11747, USA.

UL Melville is accredited by NVLAP, Laboratory Code 100255-0. The full scope of accreditation can be viewed at http://ts.nist.gov/standards/scopes/1002550.htm.

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	± 3.3 dB
Radiated Disturbance, 30 to 1000 MHz	± 4.00 dB
Radiated Emissions, 1-26GHz (worst case, Ground Plane)	± 5.7dB

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 transceiver, Model: 1537.

5.2. MAXIMUM OUTPUT POWER

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

Frequency Range (MHz)	Mode	Output Power (dBm)	Output Power (mW)
2412 - 2462	802.11g	9.09	8.11
2412 - 2462	802.11n HT20	9.28	8.47
5745 - 5825	802.11a	6.00	3.98
5745 - 5825	802.11n HT20	6.19	4.16

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes an integral antenna, with a maximum gain of 1 dBi.

5.4. SOFTWARE AND FIRMWARE

The EUT uses network adapter Atheros AR6006 USB ART_MDK.

The EUT driver software installed during testing was Atheros, ver. 1.0.1.1019.

The test utility software used during testing was Atheros Radio Test 2 (ART2-GUI), ver. 2.3.

5.5. WORST-CASE CONFIGURATION AND MODE

Radiated emission 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 X orientation was worst-case orientation; therefore, all final radiated testing was performed with the EUT in X orientation.

Worst-case data rates as measured during preliminary testing:

802.11g mode: 6 Mbps
802.11a mode: 6 Mbps
802.11n HT20mode: MCS0

5.6. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List			
Description	**Manufacturer**	**Model**	**FCC ID**
Laptop	Dell	Latitude D830	DoC

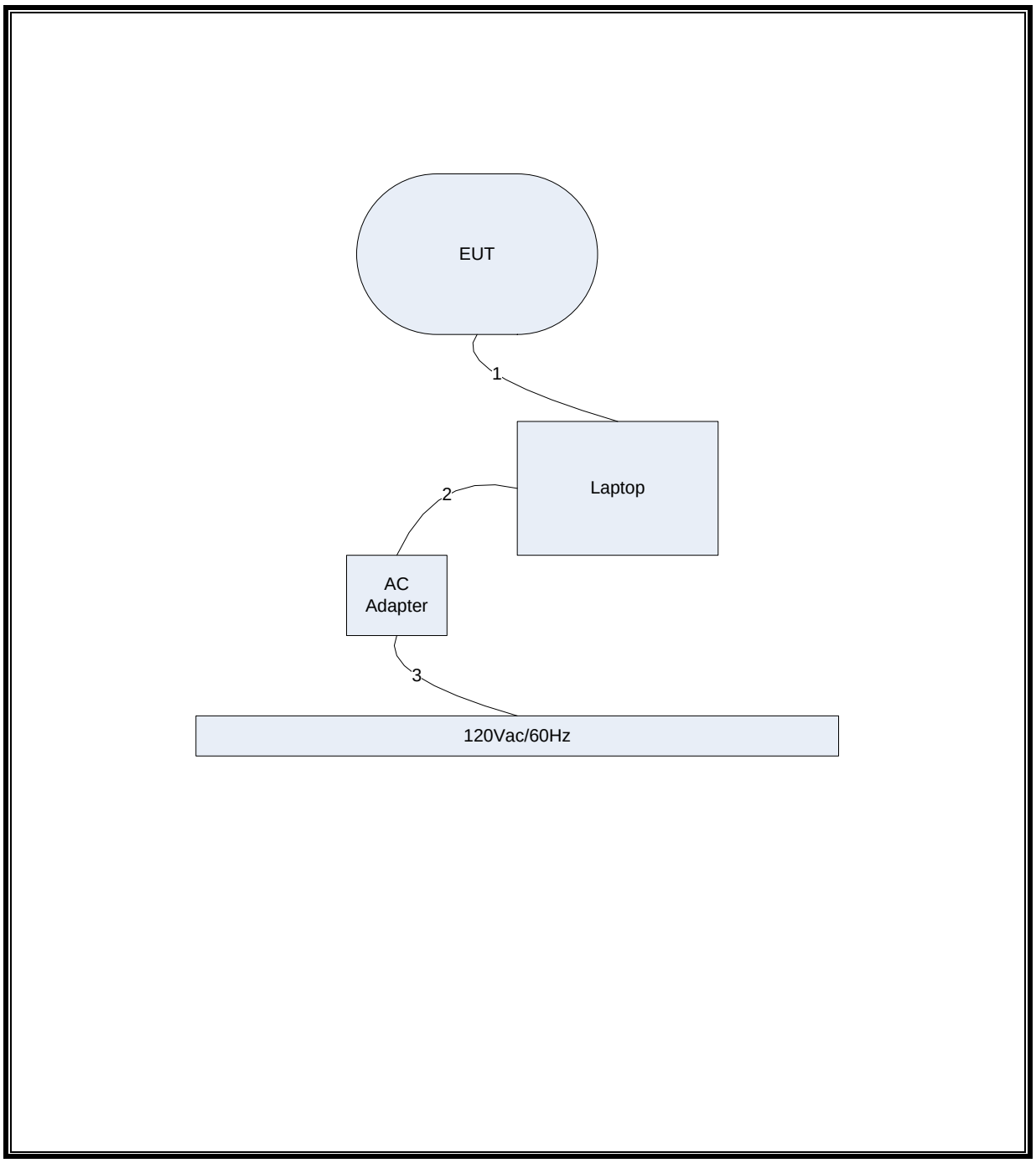
I/O CABLES

I/O Cable List						
Cable No	**Port**	**# of identical ports**	**Connector Type**	**Cable Type**	**Cable Length (m)**	**Remarks**
1	USB	1	USB	Shielded	<3M	None
2	DC	1	Mains	Unshielded	<3M	None
3	AC	1	Mains	Unshielded	<3M	None

TEST SETUP

The EUT is a wireless controller used as a stand-alone device. Test software exercised the radio module.

SETUP DIAGRAM FOR TESTS



6. TEST AND MEASUREMENT EQUIPMENT

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

Radiated Emissions					
Description	Manufacturer	Model	Identifier	Cal Date	Cal Due Date
30-1000MHz					
EMI Receiver	Rohde & Schwarz	ESIB26	ME5B-081	2013-01-29	2014-01-31
Log-P Antenna	Schaffner	UPA6109	44068	2013-04-03	2014-04-03
Bicon Antenna	Schaffner	VBA6106A	54	2013-04-03	2014-04-03
Switch Driver	HP	11713A	ME7A-627	N/A	N/A
System Controller	Sunol Sciences	SC99V	44396	N/A	N/A
Camera Controller	Panasonic	WV-CU254	44395	N/A	N/A
RF Switch Box	UL	1	44398	N/A	N/A
Measurement Software	UL	Version 9.5	44740	N/A	N/A
Temp/Humidity/Pressure Meter	Cole Parmer	99760-00	4268	2012-12-22	2014-12-22
Multimeter	Fluke	83III	ME5B-305	2013-01-28	2014-01-31
Above 1GHz (Band Optimized System)					
EMI Receiver	Rohde & Schwarz	ESIB40	34968	2013-01-30	2014-01-31
Horn Antenna (1-2 GHz)	ETS	3161-01 (26°)**	51442	2008-03-28	See * below
Horn Antenna (2-4 GHz)	ETS	3161-02 (22°)**	48107	2007-09-27	See * below
Horn Antenna (4-8 GHz)	ETS	3161-03 (22°)**	48106	2007-09-27	See * below
Horn Antenna (8-12 GHz)	ETS	3160-07 (26°)**	8933	2008-11-24	See * below
Horn Antenna (12-18 GHz)	ETS	3160-08 (26°)**	8932	2007-09-27	See * below
Horn Antenna (18-26.5 GHz)	ETS	3160-09 (27°)**	8947	2007-09-26	See * below
Horn Antenna (26.5-40 GHz)	ETS	3160-10 (27°)**	73004	2007-09-26	See * below
Signal Path Controller	HP	11713A	50250	N/A	N/A
Gain Controller	HP	11713A	50251	N/A	N/A
RF Switch / Preamp Fixture	UL	BOMS1	50249	N/A	N/A
System Controller	UL	BOMS2	50252	N/A	N/A
Measurement Software	UL	Version 9.5	44740	N/A	N/A
Temp/Humidity/Pressure Meter	Cole Parmer	99760-00	4268	2012-12-22	2014-12-22
Multimeter	Fluke	83III	ME5B-305	2013-01-28	2014-01-31

Radiated Emissions					
Description	Manufacturer	Model	Identifier	Cal Date	Cal Due Date
* - Note: As allowed by the calibration standard ANSI C63.4 Section 4.4.2, standard gain horns need only a one-time calibration. Only if physical damage occurs will the horn antenna require re-calibration. Gain standard horn antennas (sometimes called standard gain horn antennas) need not be calibrated beyond that which is provided by the manufacturer unless they are damaged or deterioration is suspected, or they are used at a distance closer than $2D^2/\lambda$. Gain standard horn antennas have gains that are fixed by their dimensions and dimensional tolerances. ** - Number in parentheses denotes antenna beam width.					

Conducted Emissions					
Description	Manufacturer	Model	Identifier	Cal Date	Cal Due Date
Conducted Emissions – GP 1					
EMI Receiver	Rohde & Schwarz	ESCI 7	75141	2013-01-30	2014-01-31
LISN	Solar	9252-50-R-24-BNC	ME5A-636	2013-01-31	2014-01-31
Switch Driver	HP	11713A	44397	N/A	N/A
RF Switch Box	UL	4	44404	N/A	N/A
Measurement Software	UL	Version 9.5	44736	N/A	N/A
Temp/Humidity/Pressure Meter	Cole Parmer	99760-00	43734	2012-03-13	2014-03-13
Multimeter	Fluke	87V	79648	2013-01-29	2014-01-31

Bench Tests					
Description	Manufacturer	Model	Identifier	Cal Date	Cal Due Date
RF Room 2					
Spectrum Analyzer	Agilent	E4446A	72822	2013-01-29	2014-01-31
Power Sensor	Rohde & Schwarz	NRP-Z81	75345	2013-01-30	2014-01-31
Temp/Humidity/Pressure Meter	Cole Parmer	99760-00	4268	2012-12-22	2014-12-22

7. ON TIME, DUTY CYCLE AND MEASUREMENT METHODS

LIMITS

None; for reporting purposes only.

PROCEDURE

KDB 558074 D01 Zero-Span Spectrum Analyzer Method.

7.1.1. ON TIME AND DUTY CYCLE RESULTS

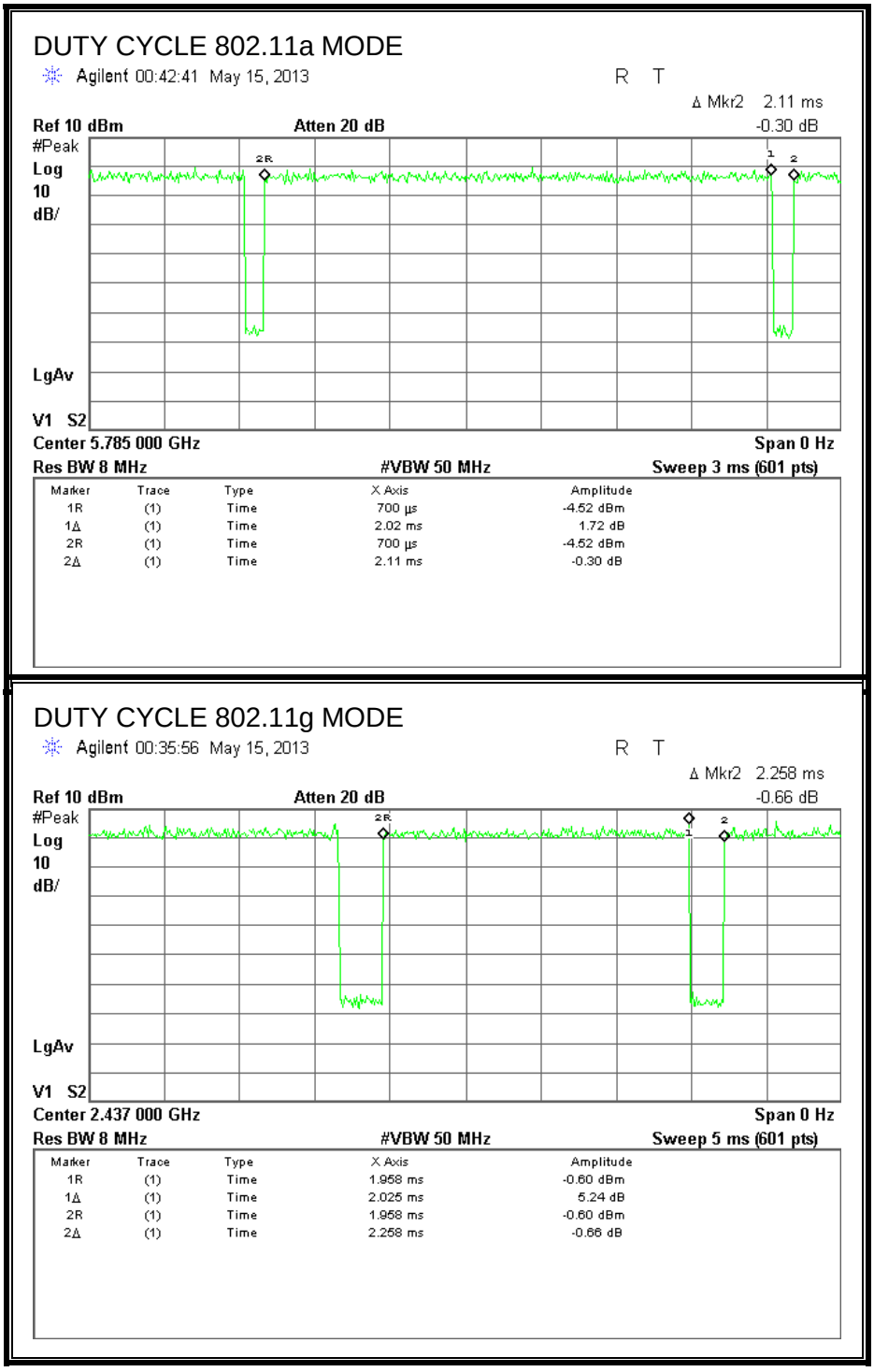
Mode	ON Time B (msec)	Period (msec)	Duty Cycle x (linear)	Duty Cycle (%)	Duty Cycle Correction Factor (dB)	1/B Minimum VBW (Hz)
802.11a	2020.00	2110	0.957	95.7%	0.19	0.495
802.11g	2025.00	2258	0.897	89.7%	0.47	0.494
802.11n HT20	1892.00	2067	0.915	91.5%	0.38	0.529

7.1.2. MEASUREMENT METHOD

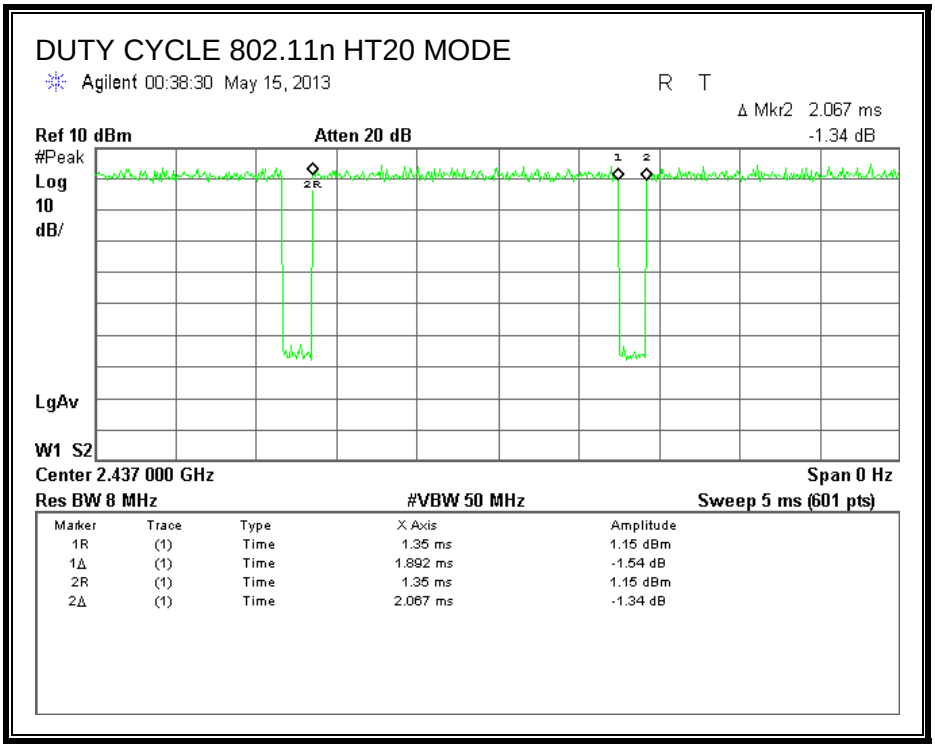
KDB 558074 D01 DTS Measurement Guidance v03 was referenced during testing. Maximum Peak Conducted Power was measured using the method of section 9.1.2, thus method PKPSD is used for power spectral density.

Unwanted emissions within Restricted Bands are measured using traditional radiated procedures.

7.1.3. DUTY CYCLE PLOTS



DUTY CYCLE 802.11n HT20 MODE



8. ANTENNA PORT TEST RESULTS

8.1. 802.11g MODE IN THE 2.4 GHz BAND

8.1.1. 6 dB BANDWIDTH

LIMITS

FCC §15.247 (a) (2)

IC RSS-210 A8.2 (a)

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

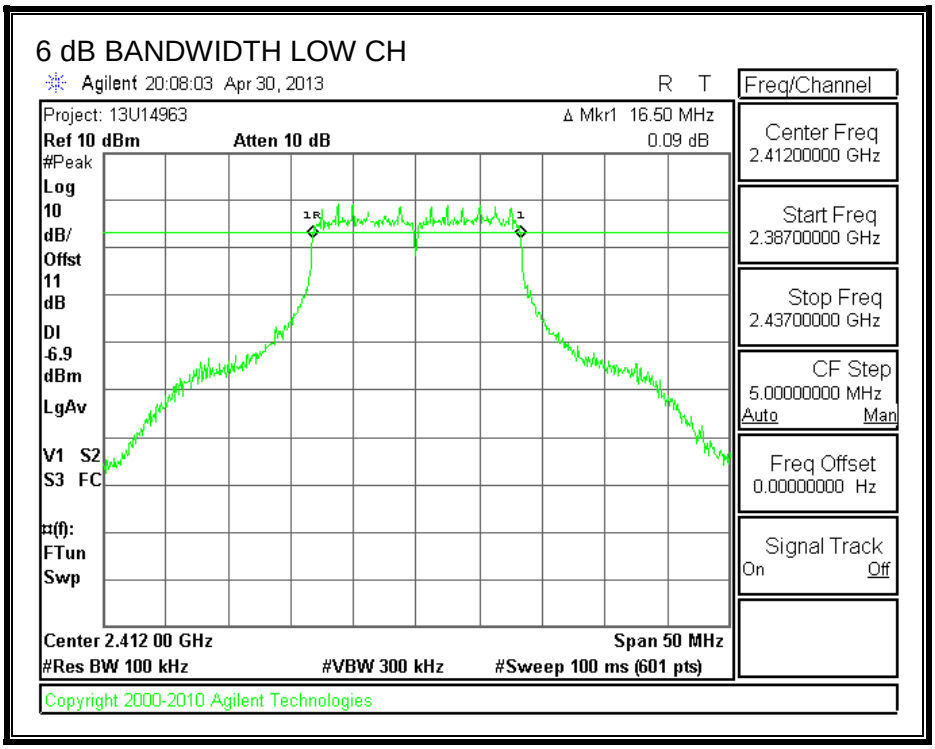
TEST PROCEDURE

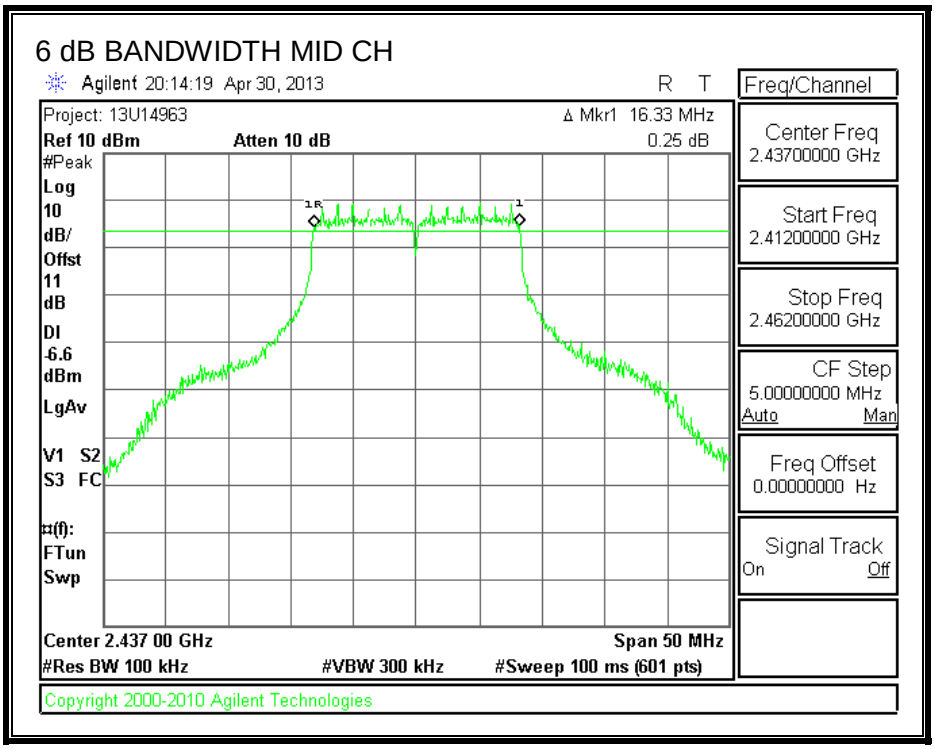
The transmitter output is connected to a spectrum analyzer with the RBW set to 100 kHz, the VBW >= 3 x RBW, peak detector and max hold.

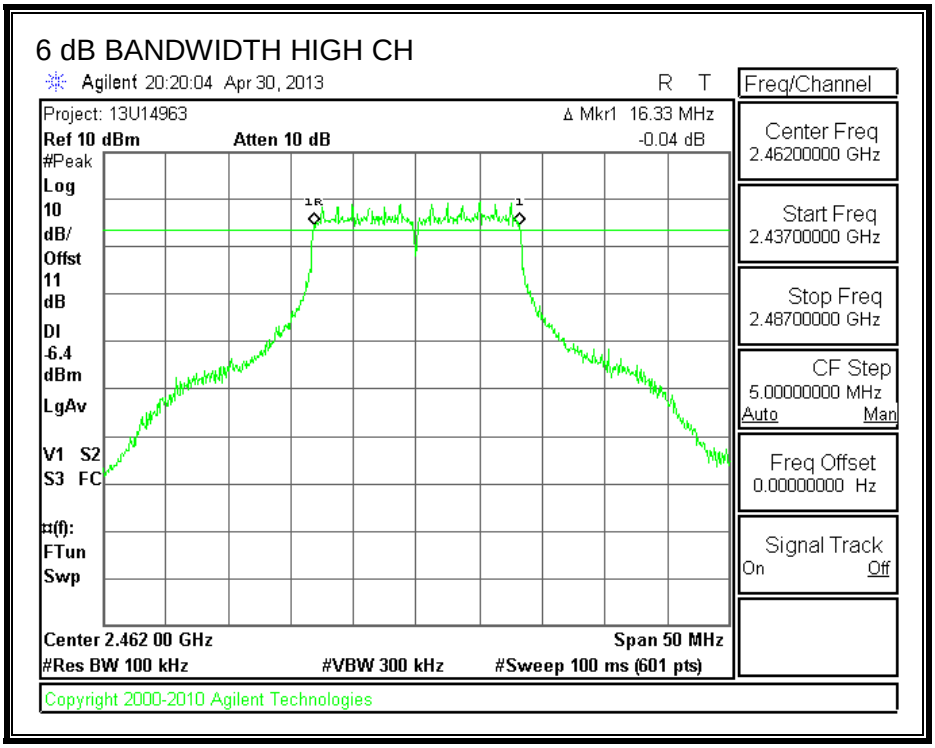
RESULTS

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low	2412	16.500	0.5
Mid	2437	16.330	0.5
High	2462	16.330	0.5

6 dB BANDWIDTH







8.1.2. 99% BANDWIDTH

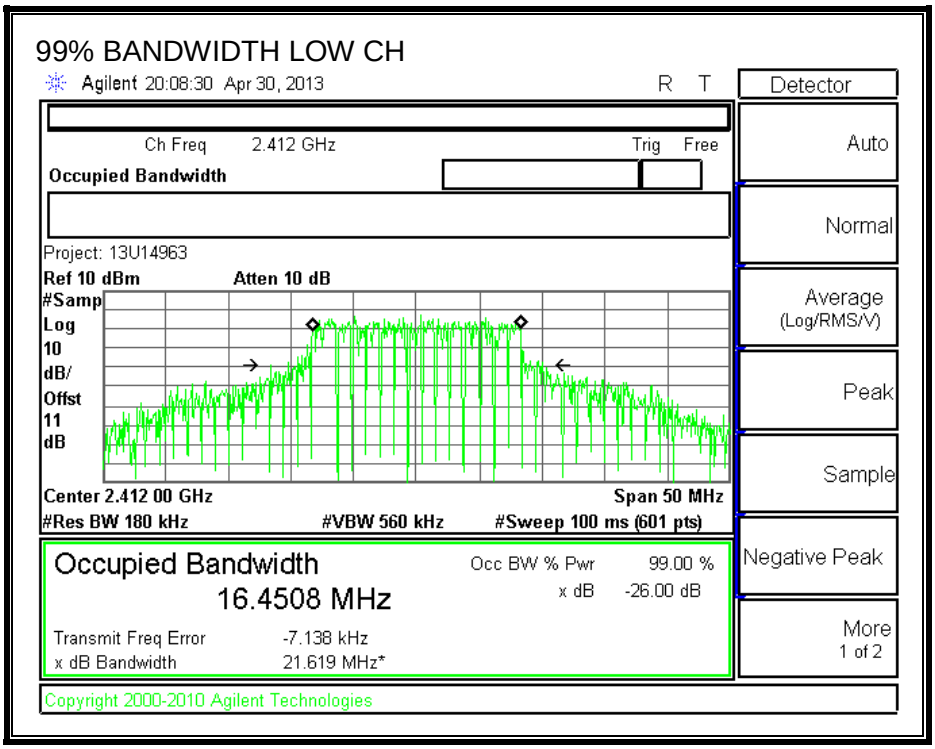
LIMITS

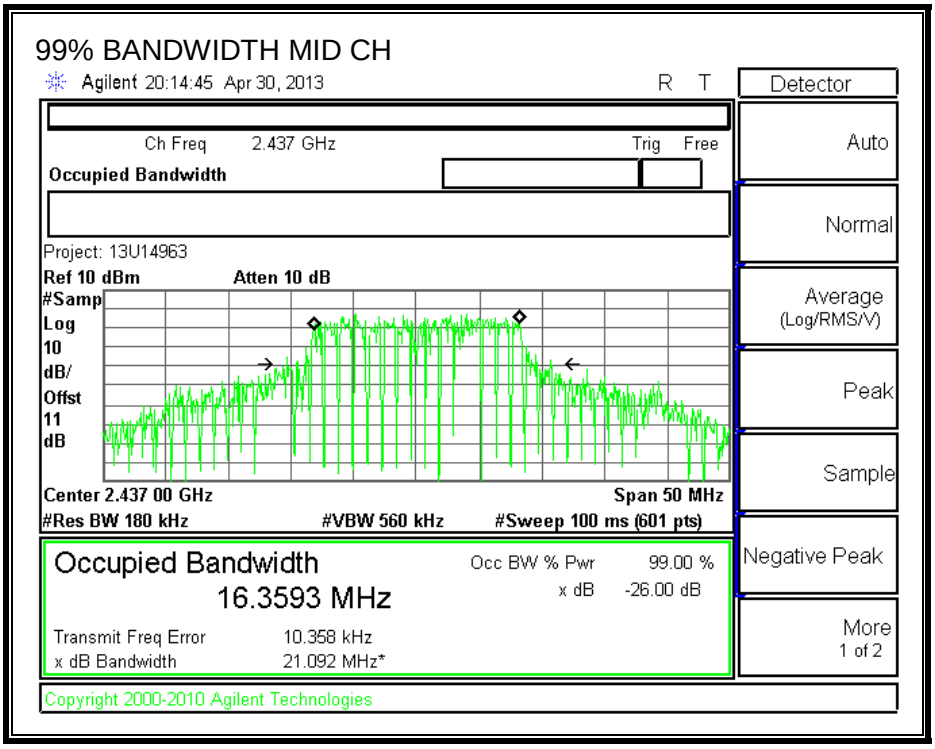
None; for reporting purposes only.

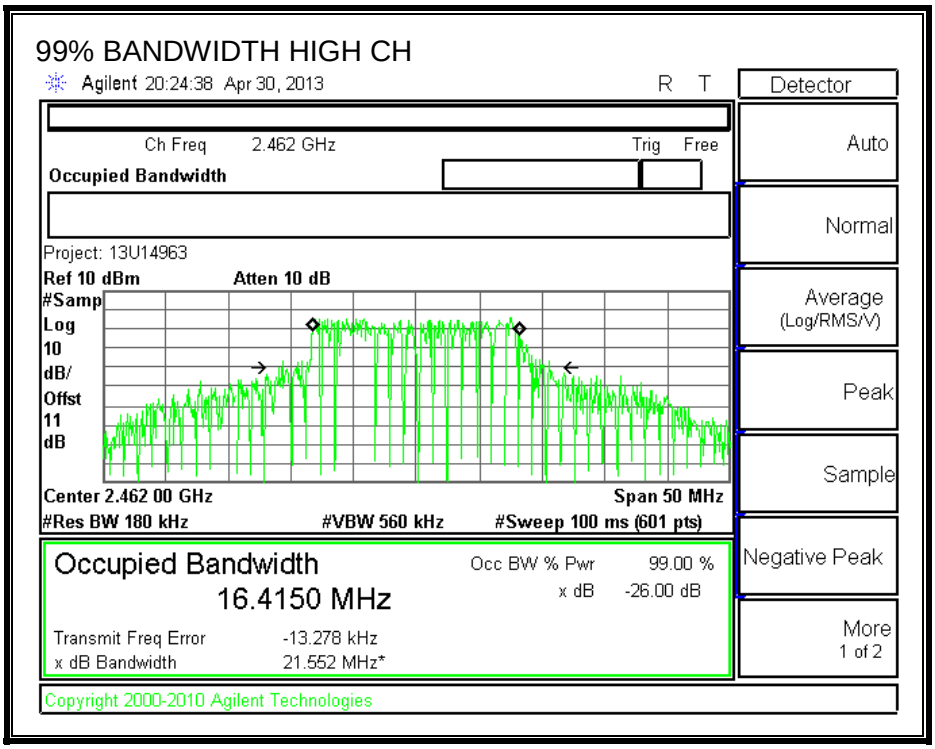
RESULTS

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2412	16.4500
Mid	2437	16.3600
High	2462	16.4200

99% BANDWIDTH







8.1.3. AVERAGE POWER

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a power meter.

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

RESULTS

Channel	Frequency (MHz)	Power (dBm)
Low	2412	8.87
Mid	2437	8.94
High	2462	9.09

8.1.4. OUTPUT POWER

LIMITS

FCC §15.247

IC RSS-210 A8.4

For systems using digital modulation in the 902–928 MHz, 2400–2483.5 MHz, and 5725–5850 MHz bands: 1 Watt, based on the use of antennas with directional gains that do not exceed 6 dBi. If transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

DIRECTIONAL ANTENNA GAIN

There is only one transmitter output therefore the directional gain is equal to the antenna gain.

RESULTS

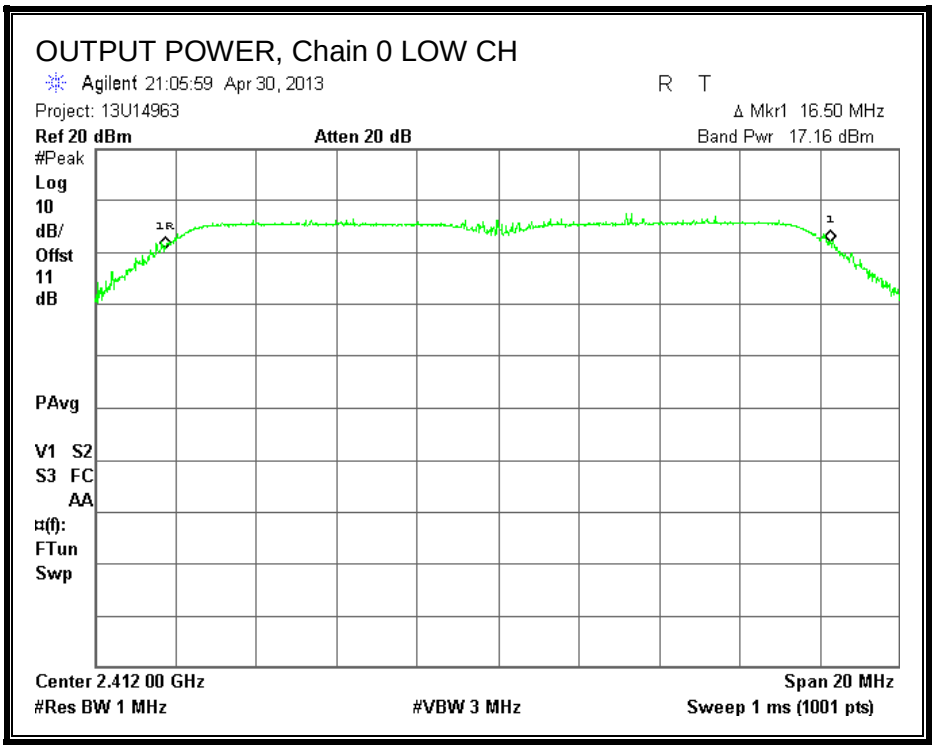
Limits

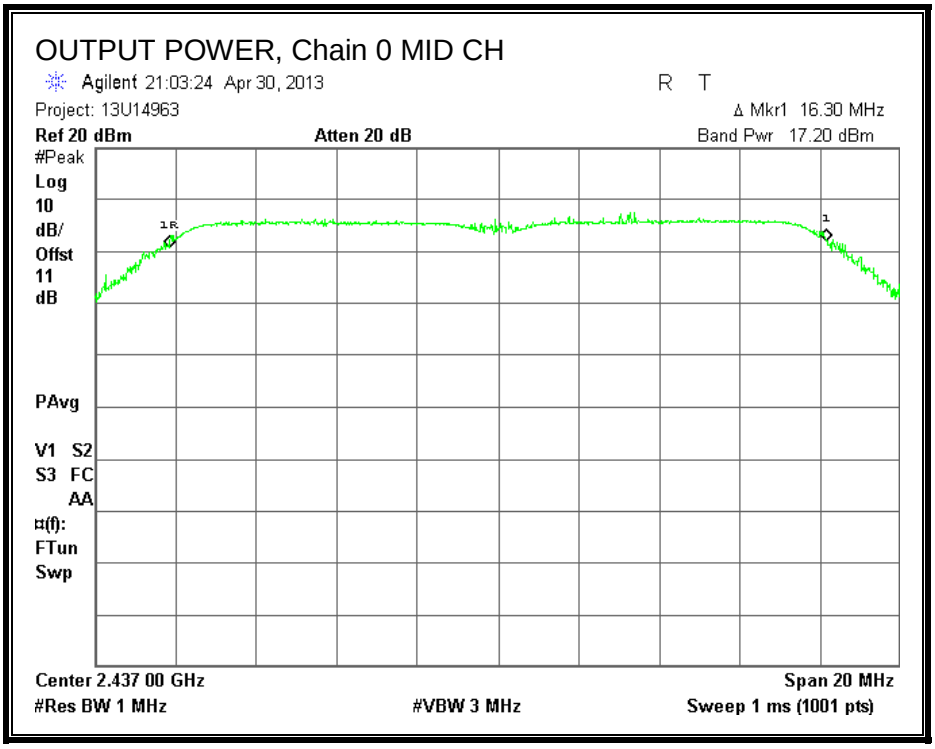
Channel	Frequency (MHz)	Directional Gain (dBi)	FCC Power Limit (dBm)	IC Power Limit (dBm)	IC EIRP Limit (dBm)	Max Power (dBm)
Low	2412	1.00	30.00	30	36	30.00
Mid	2437	1.00	30.00	30	36	30.00
High	2462	1.00	30.00	30	36	30.00

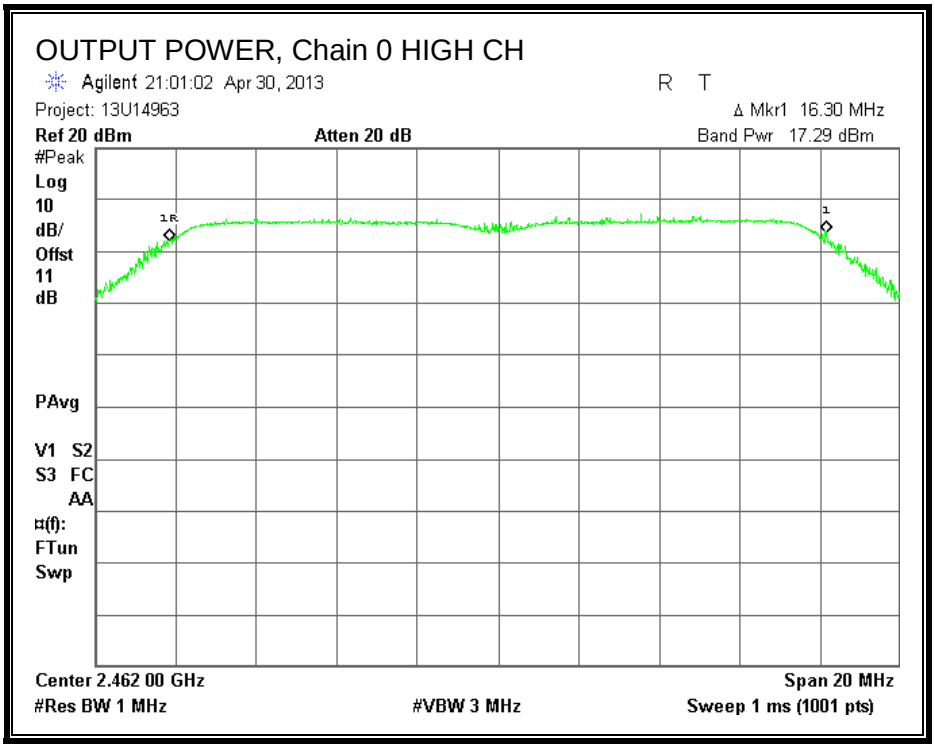
Results

Channel	Frequency (MHz)	Chain 0 Meas Power (dBm)	Total Corr'd Power (dBm)	Power Limit (dBm)	Margin (dB)
Low	2412	17.16	17.16	30.00	-12.84
Mid	2437	17.20	17.20	30.00	-12.80
High	2462	17.29	17.29	30.00	-12.71

OUTPUT POWER, Chain 0







8.1.5. PSD

LIMITS

FCC §15.247

IC RSS-210 A8.2

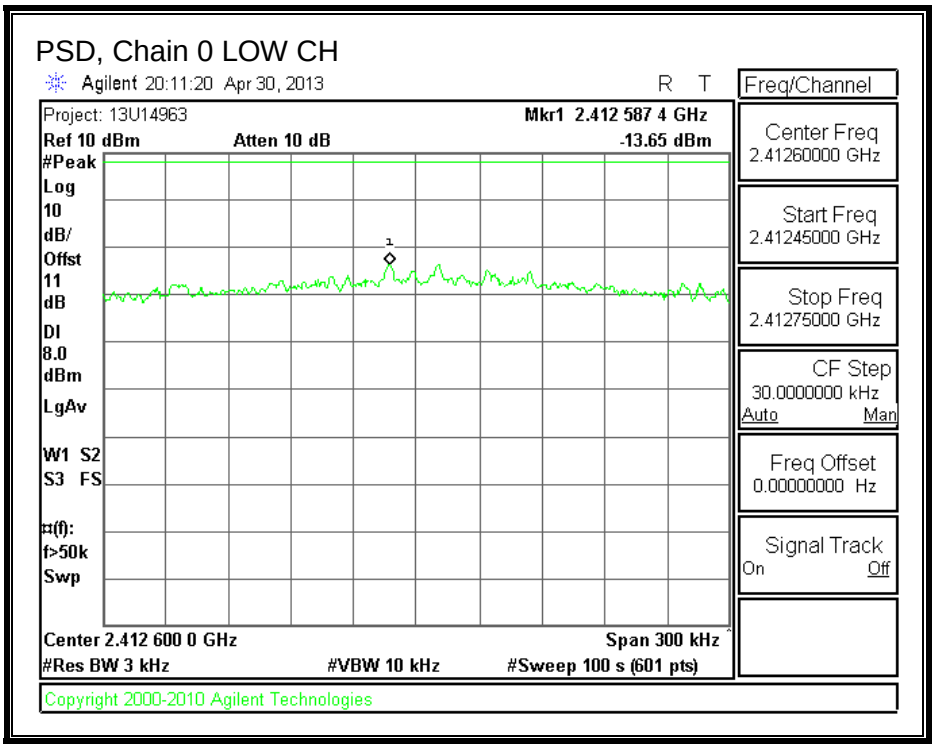
The power spectral density conducted from the transmitter to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

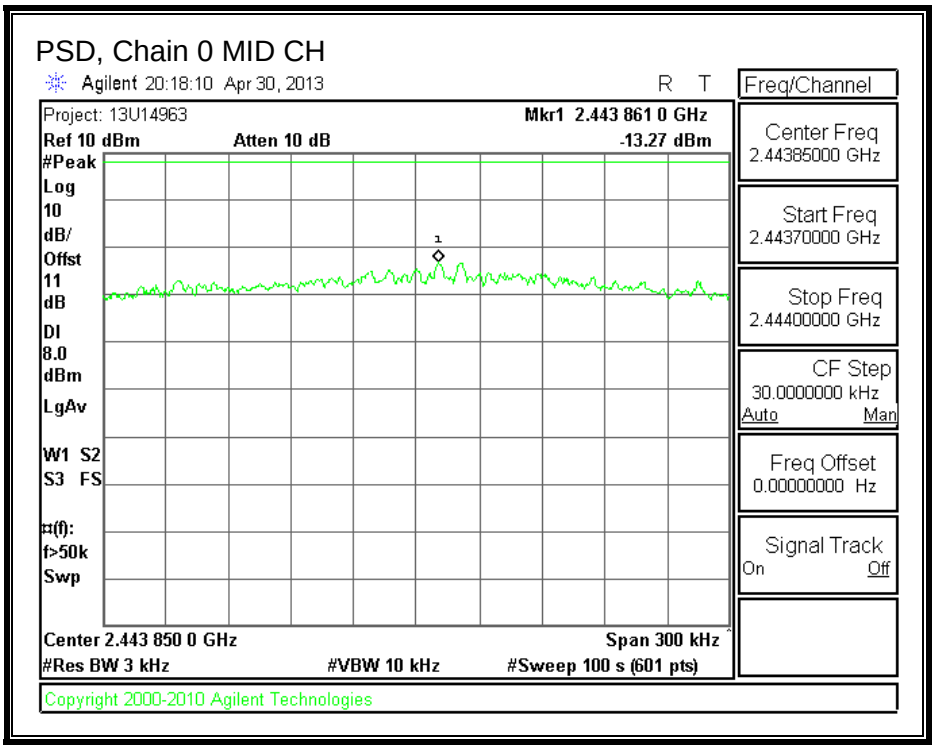
RESULTS

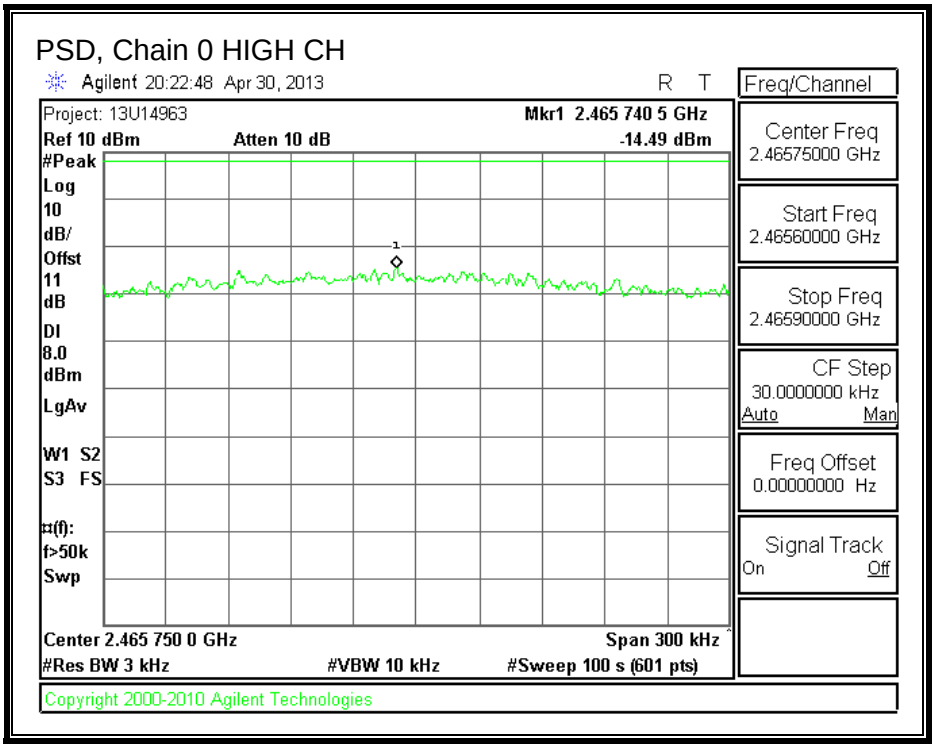
PSD Results

Channel	Frequency (MHz)	Chain 0 Meas (dBm)	Limit (dBm)	Margin (dB)
Low	2412	-13.65	8.0	-21.7
Mid	2437	-13.27	8.0	-21.3
High	2462	-14.49	8.0	-22.5

PSD, Chain 0







8.1.6. OUT-OF-BAND EMISSIONS

LIMITS

FCC §15.247 (d)

IC RSS-210 A8.5

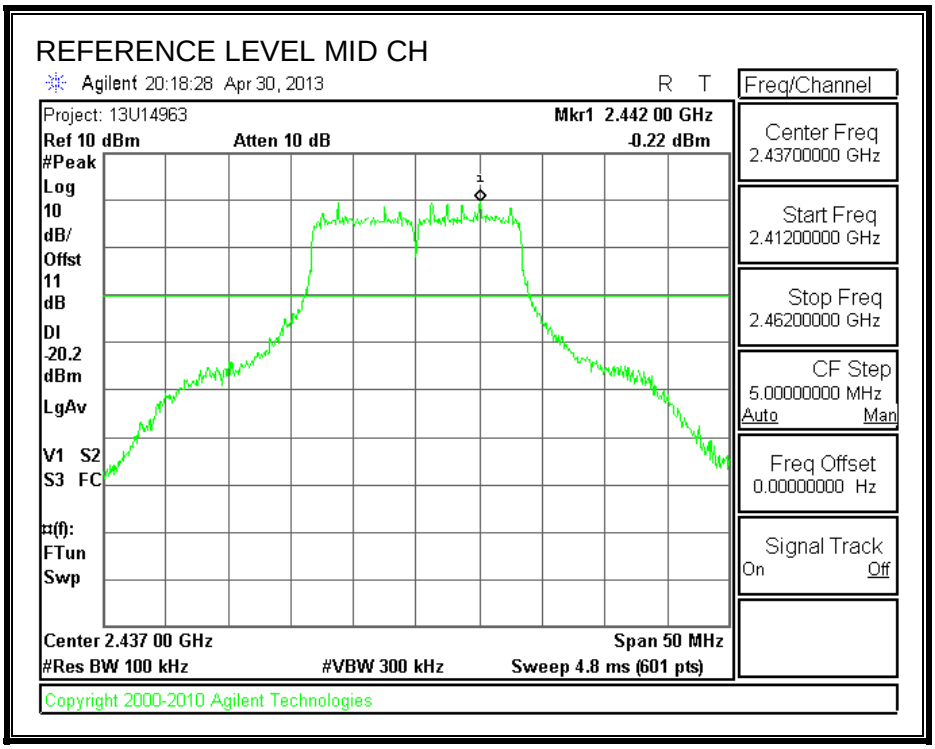
In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required.

TEST PROCEDURE

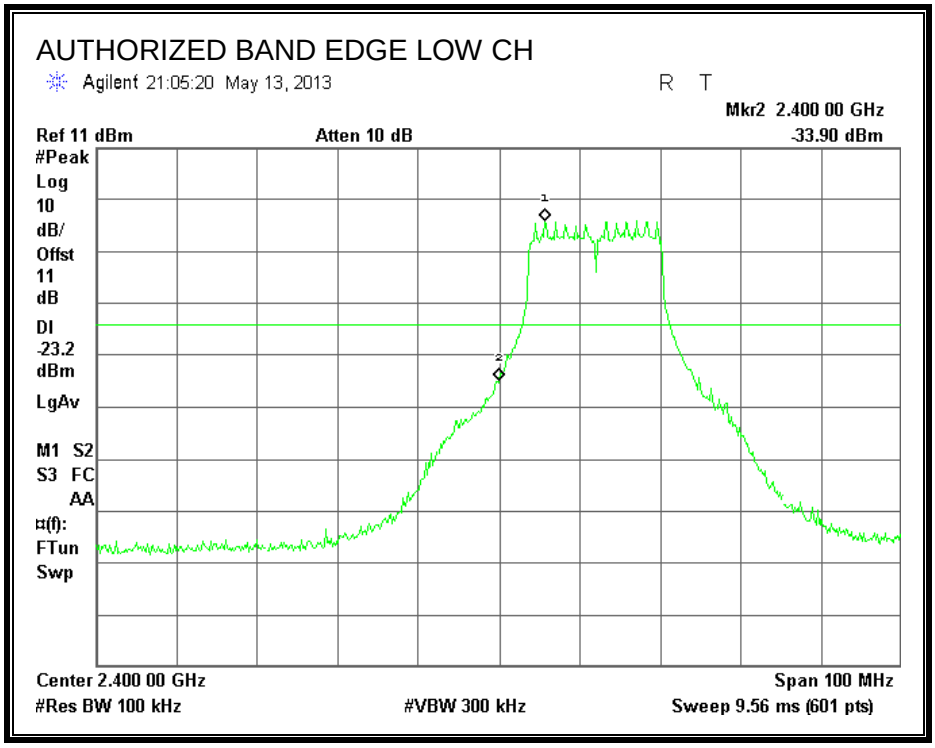
The transmitter output is connected to a spectrum analyzer with RBW = 100 kHz, VBW = 300 kHz, peak detector, and max hold. Measurements utilizing these settings are made of the in-band reference level, bandedge (where measurements to the general radiated limits will not be made) and out-of-band emissions.

RESULTS

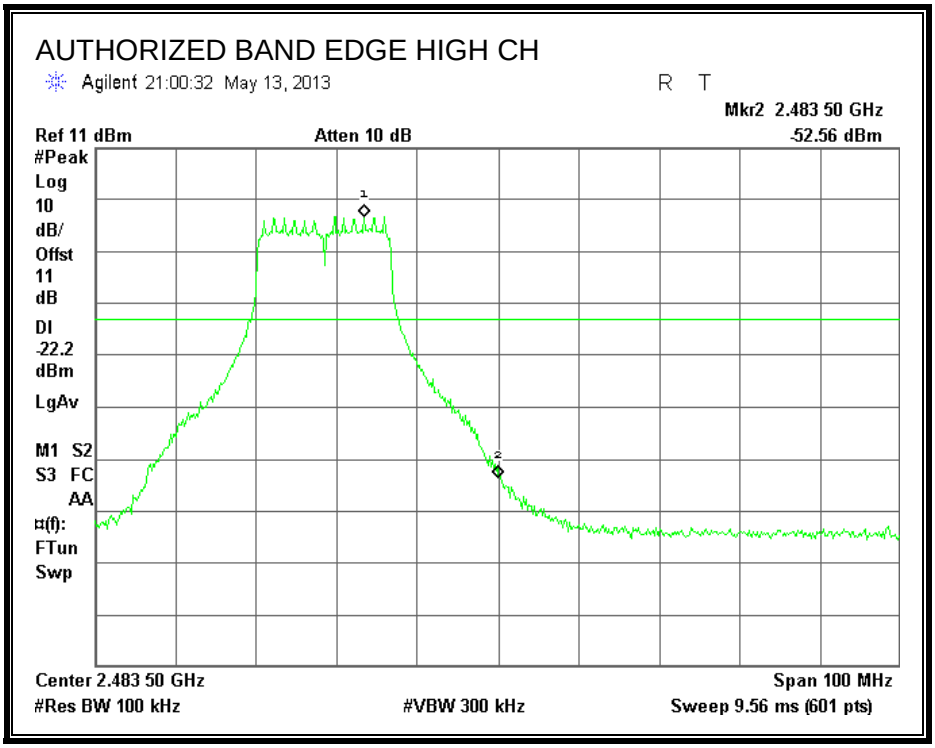
IN-BAND REFERENCE LEVEL



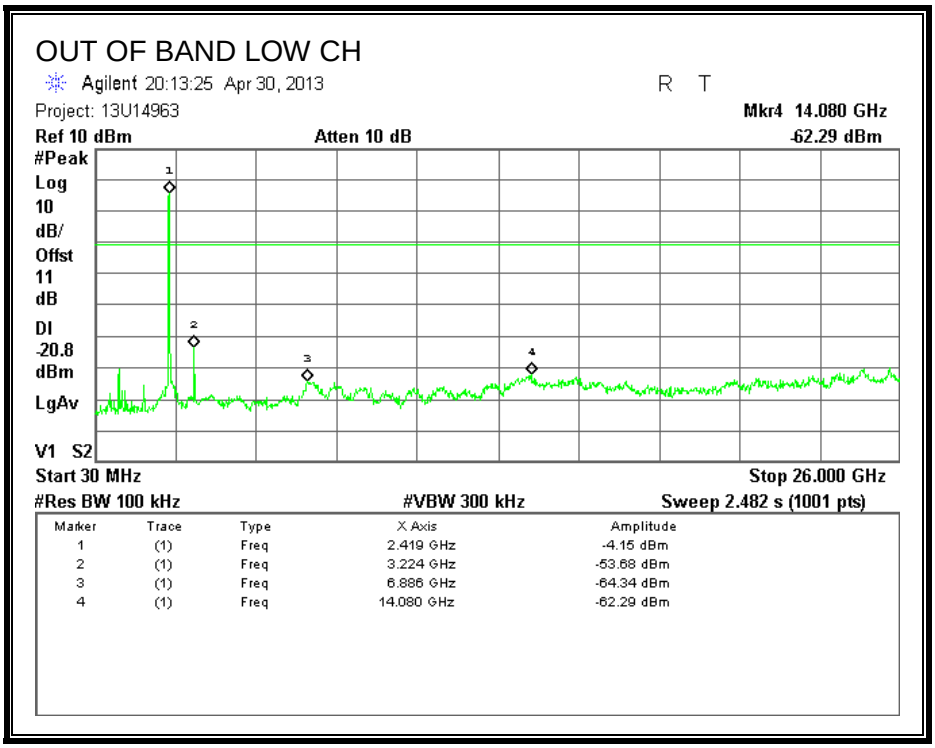
LOW CHANNEL BANDEDGE

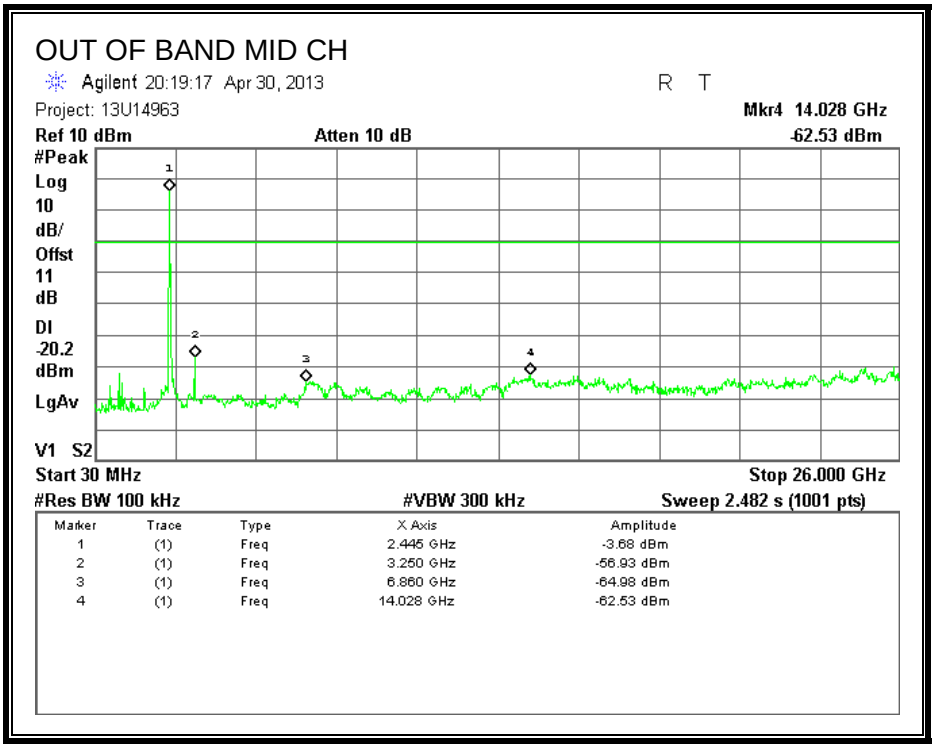


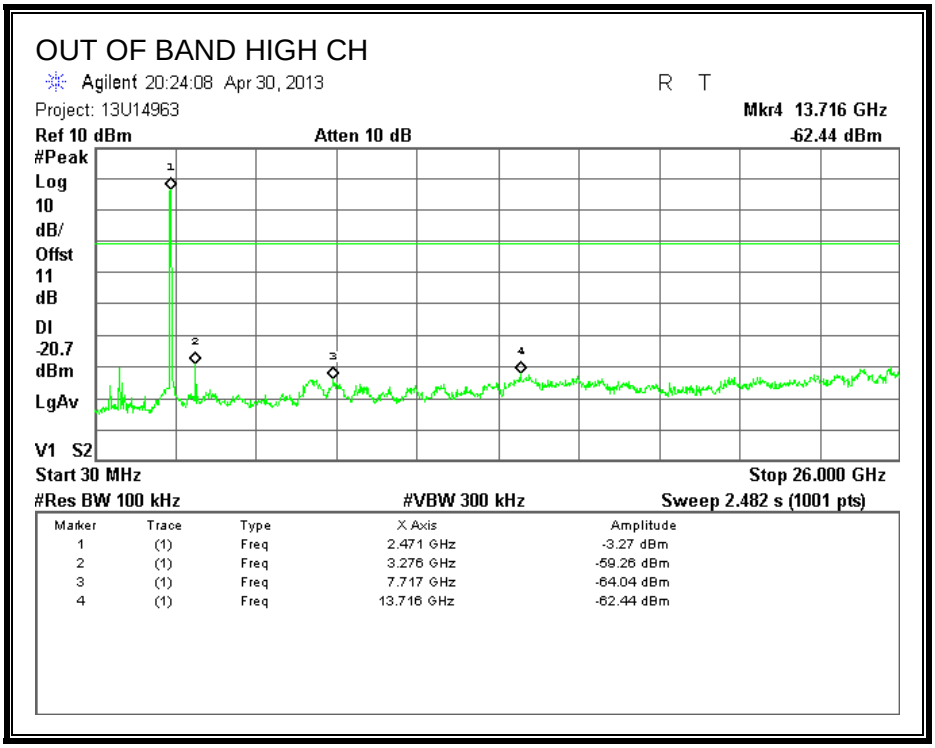
HIGH CHANNEL BANDEDGE



OUT-OF-BAND EMISSIONS







8.2. 802.11n HT20 MODE IN THE 2.4 GHz BAND

8.2.1. 6 dB BANDWIDTH

LIMITS

FCC §15.247 (a) (2)

IC RSS-210 A8.2 (a)

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

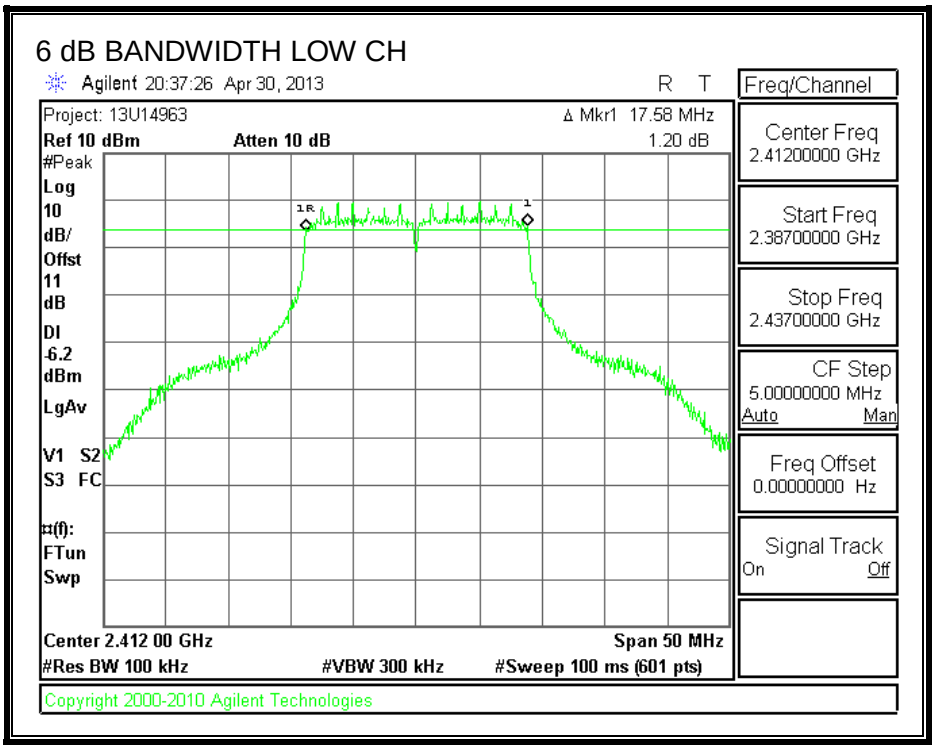
TEST PROCEDURE

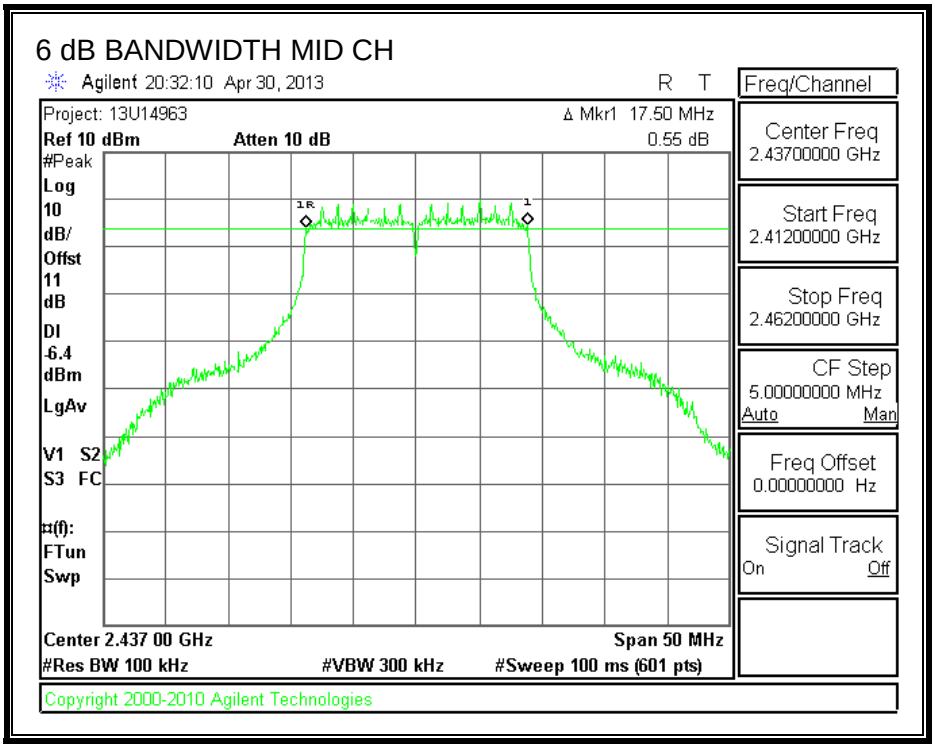
The transmitter output is connected to a spectrum analyzer with the RBW set to 100 kHz, the VBW >= 3 x RBW, peak detector and max hold.

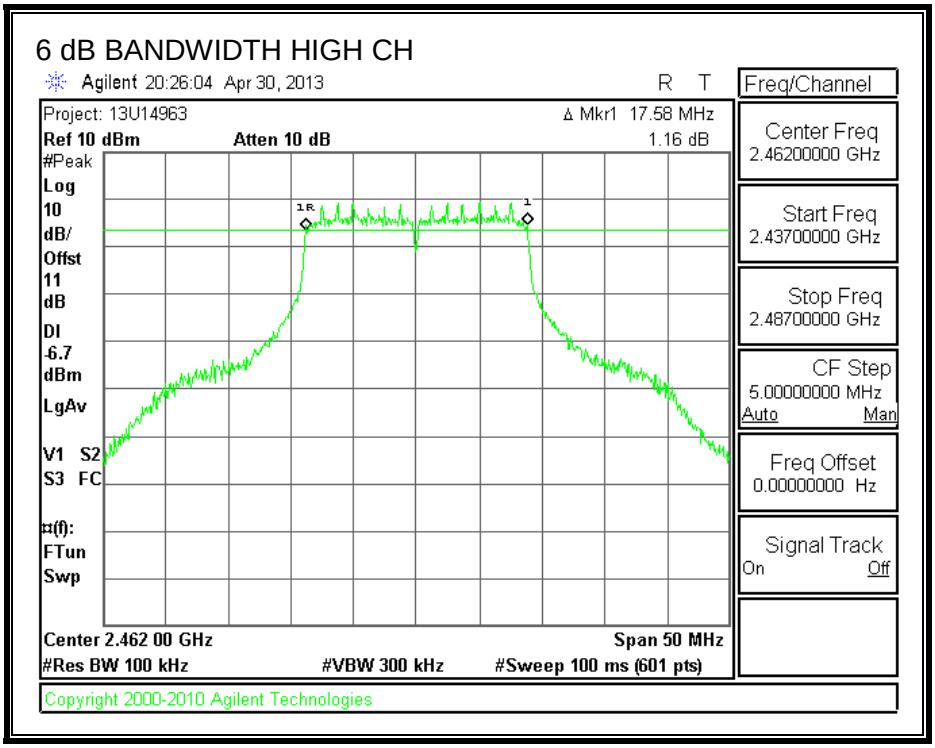
RESULTS

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low	2412	17.580	0.5
Mid	2437	17.500	0.5
High	2462	17.580	0.5

6 dB BANDWIDTH







8.2.2. 99% BANDWIDTH

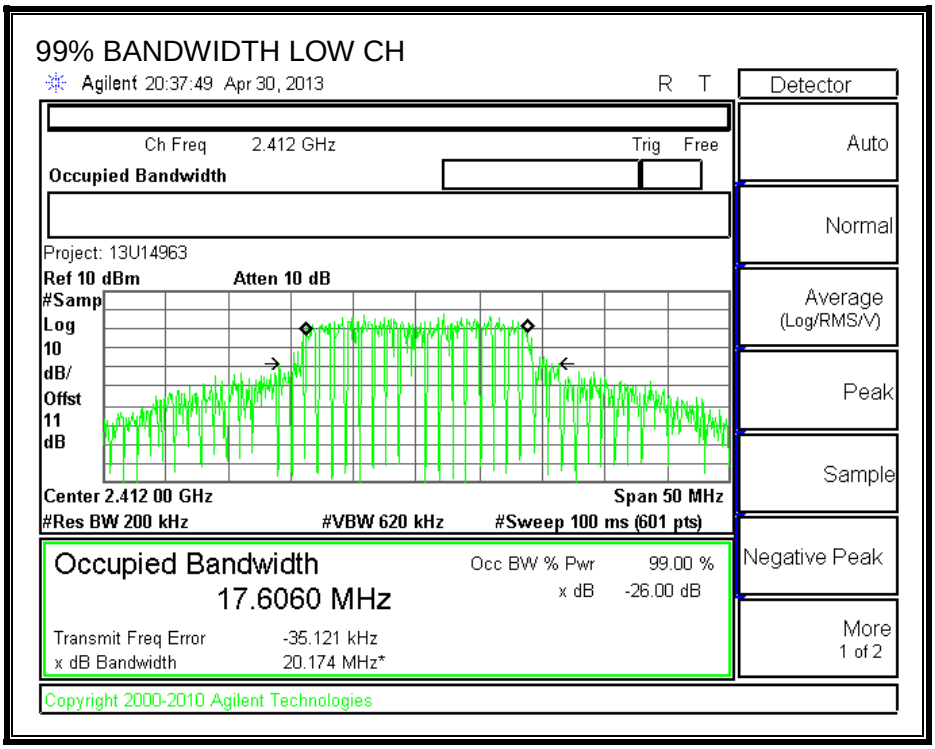
LIMITS

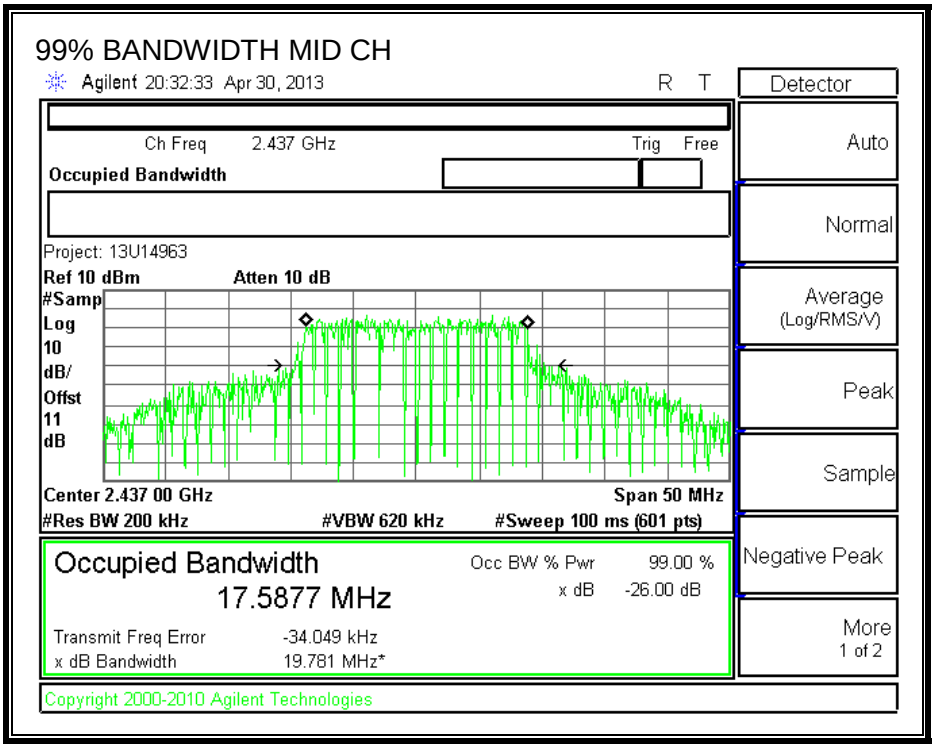
None; for reporting purposes only.

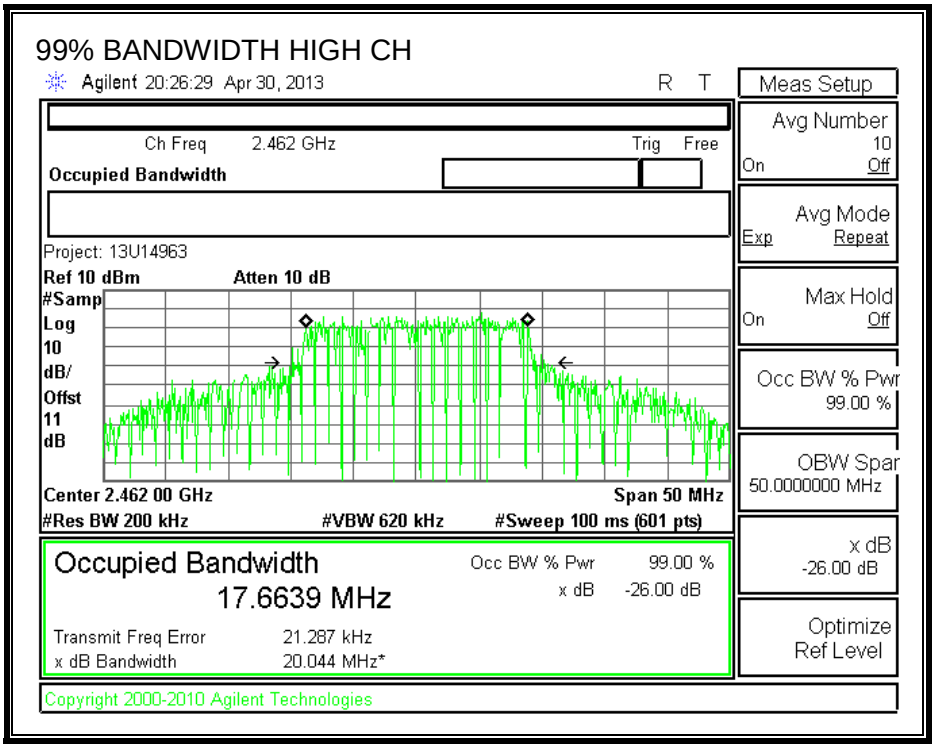
RESULTS

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2412	17.6100
Mid	2437	17.5900
High	2462	17.6600

99% BANDWIDTH







8.2.3. AVERAGE POWER

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a power meter.

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

RESULTS

Channel	Frequency (MHz)	Power (dBm)
Low	2412	9.28
Mid	2437	8.85
High	2462	9.01

8.2.4. OUTPUT POWER

LIMITS

FCC §15.247

IC RSS-210 A8.4

For systems using digital modulation in the 902–928 MHz, 2400–2483.5 MHz, and 5725–5850 MHz bands: 1 Watt, based on the use of antennas with directional gains that do not exceed 6 dBi. If transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

DIRECTIONAL ANTENNA GAIN

There is only one transmitter output therefore the directional gain is equal to the antenna gain.

RESULTS

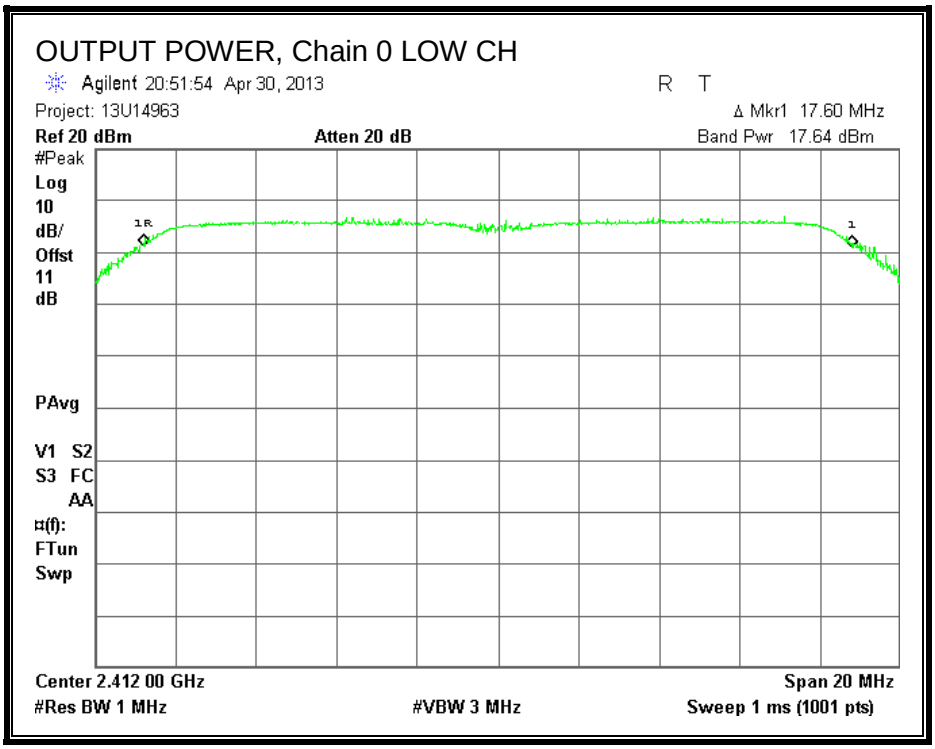
Limits

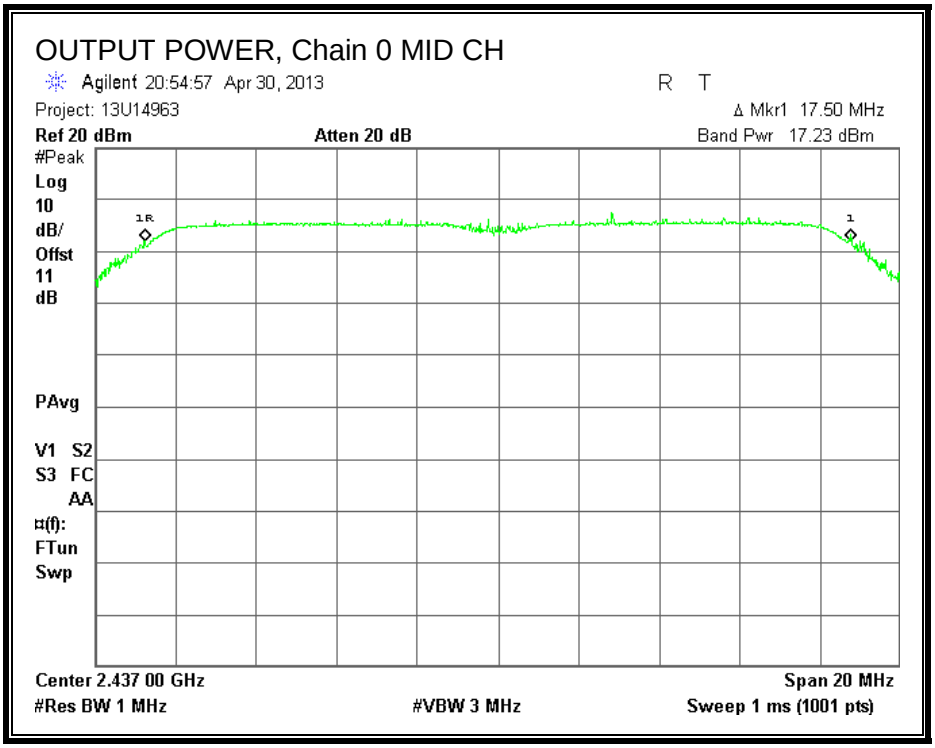
Channel	Frequency (MHz)	Directional Gain (dBi)	FCC Power Limit (dBm)	IC Power Limit (dBm)	IC EIRP Limit (dBm)	Max Power (dBm)
Low	2412	1.00	30.00	30	36	30.00
Mid	2437	1.00	30.00	30	36	30.00
High	2462	1.00	30.00	30	36	30.00

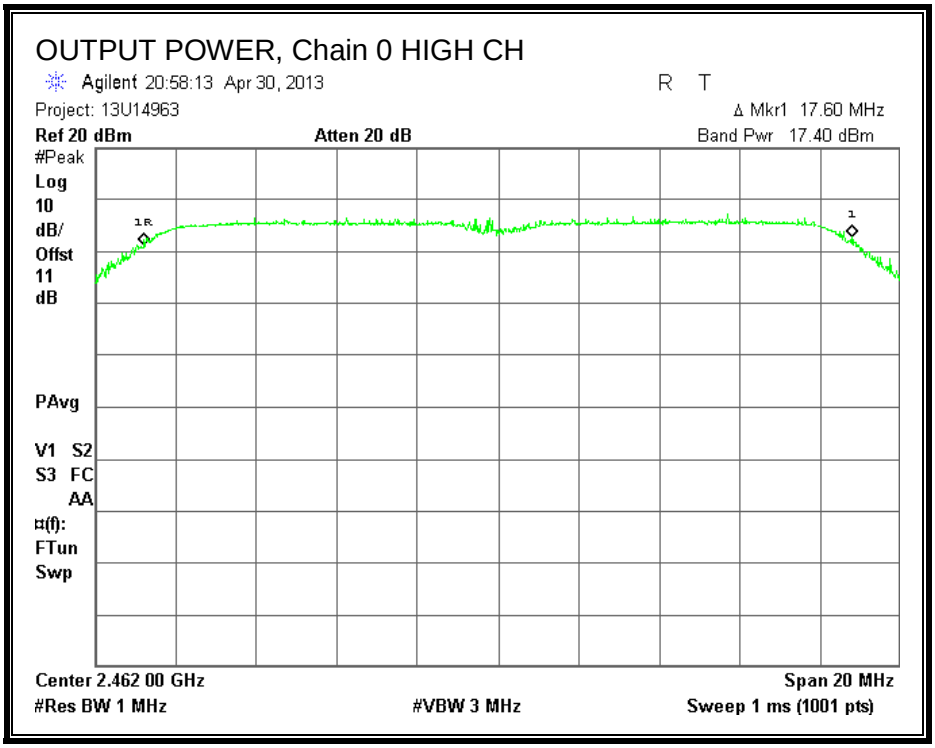
Results

Channel	Frequency (MHz)	Chain 0 Meas Power (dBm)	Total Corr'd Power (dBm)	Power Limit (dBm)	Margin (dB)
Low	2412	17.64	17.64	30.00	-12.36
Mid	2437	17.23	17.23	30.00	-12.77
High	2462	17.40	17.40	30.00	-12.60

OUTPUT POWER, Chain 0







8.2.5. PSD

LIMITS

FCC §15.247

IC RSS-210 A8.2

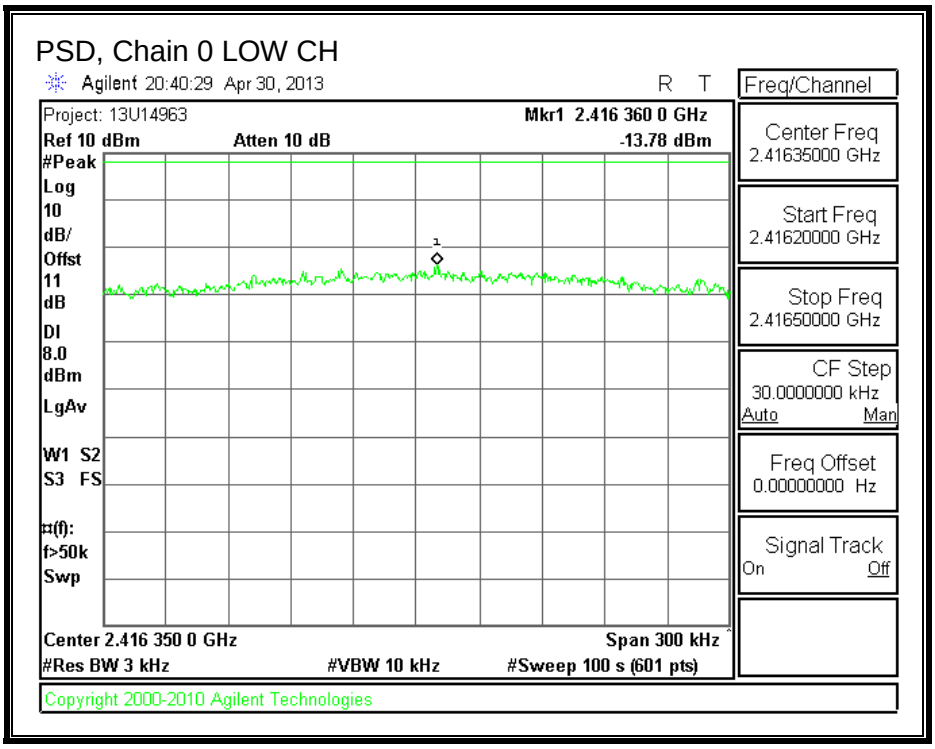
The power spectral density conducted from the transmitter to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

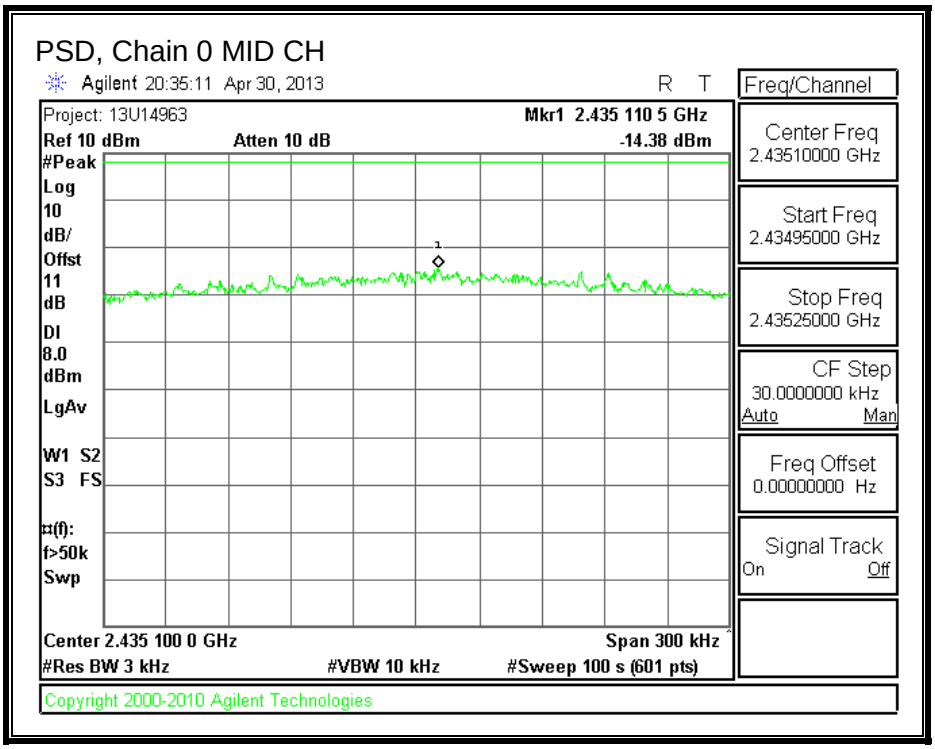
RESULTS

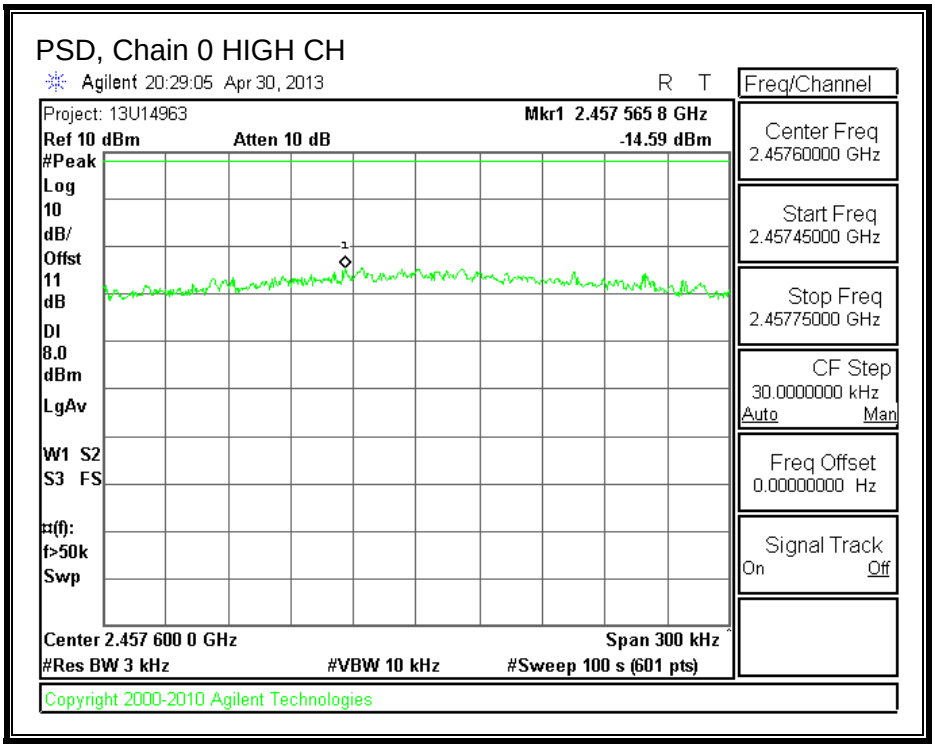
PSD Results

Channel	Frequency (MHz)	Chain 0 Meas (dBm)	Limit (dBm)	Margin (dB)
Low	2412	-13.78	8.0	-21.8
Mid	2437	-14.38	8.0	-22.4
High	2462	-14.59	8.0	-22.6

PSD, Chain 0







8.2.6. OUT-OF-BAND EMISSIONS

LIMITS

FCC §15.247 (d)

IC RSS-210 A8.5

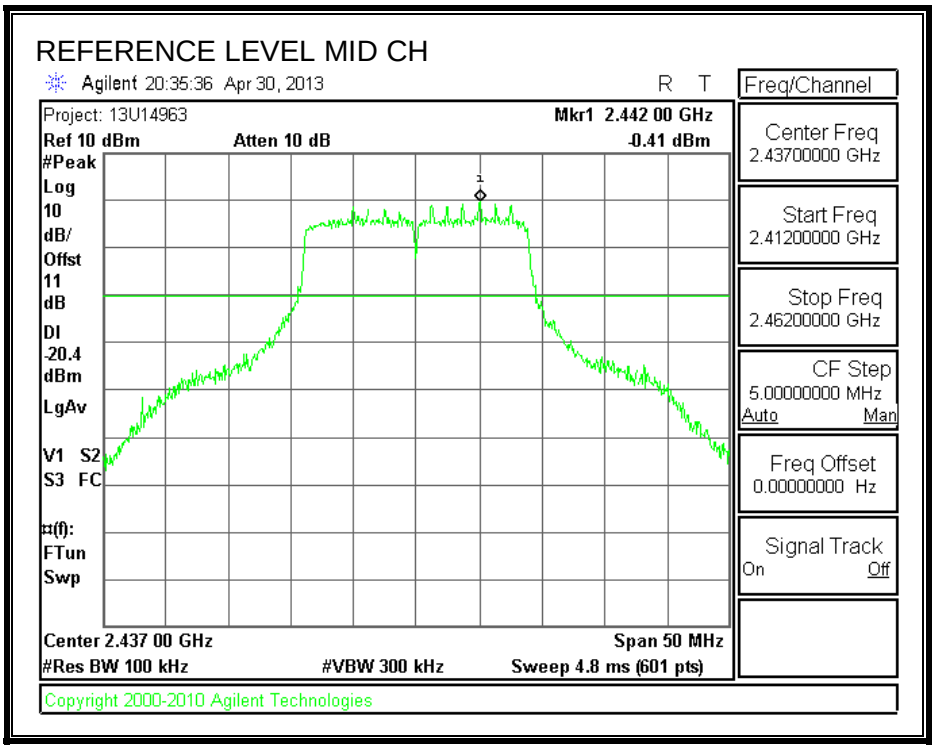
In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required.

TEST PROCEDURE

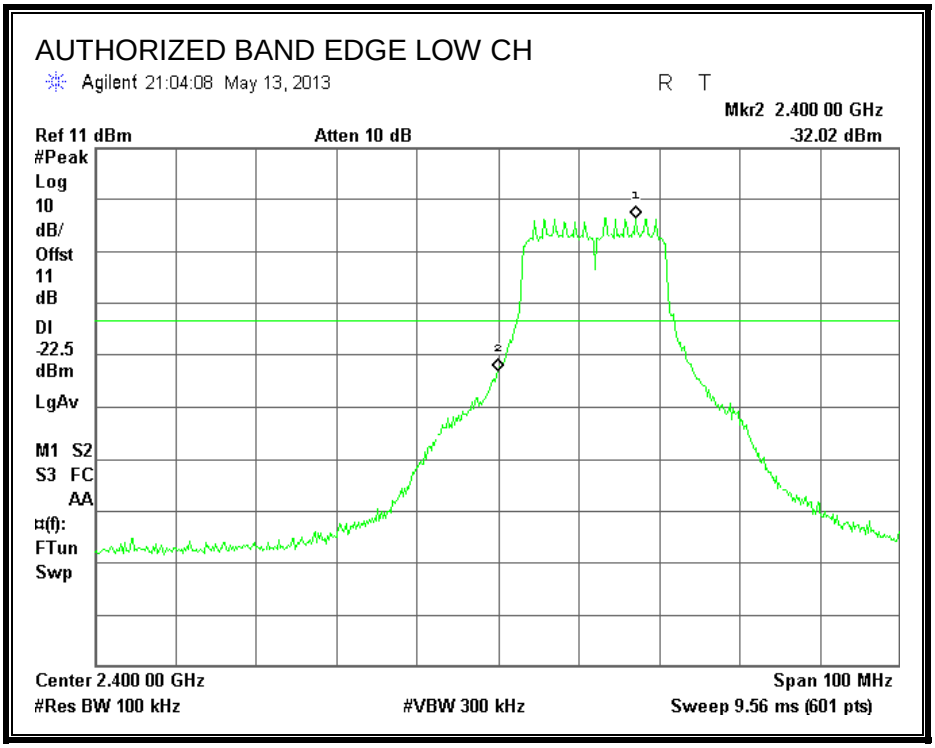
The transmitter output is connected to a spectrum analyzer with RBW = 100 kHz, VBW = 300 kHz, peak detector, and max hold. Measurements utilizing these settings are made of the in-band reference level, bandedge (where measurements to the general radiated limits will not be made) and out-of-band emissions.

RESULTS

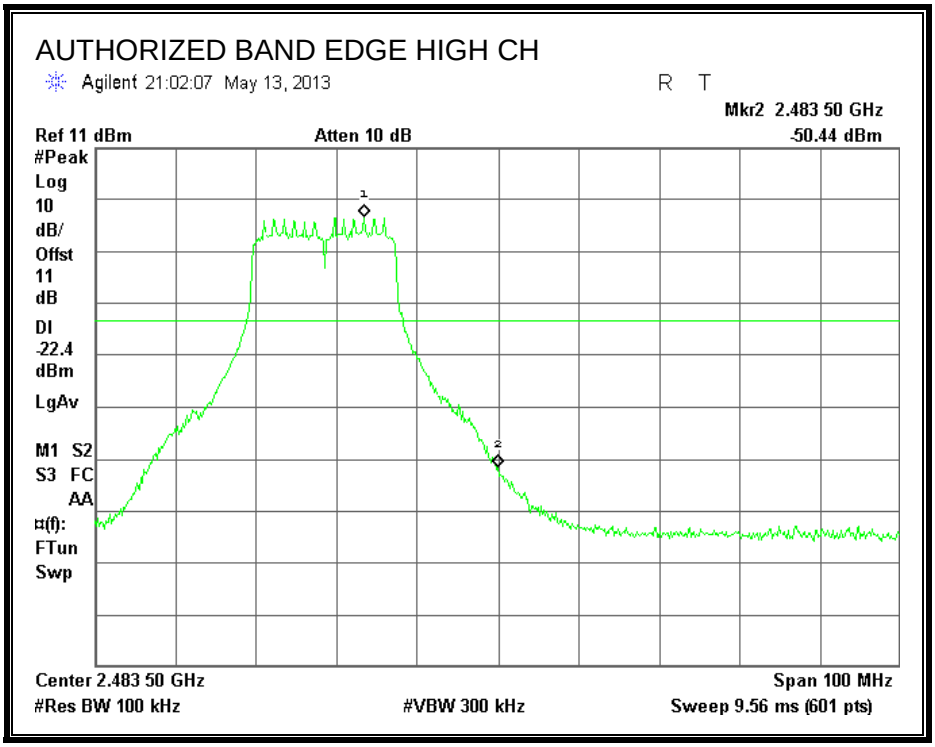
IN-BAND REFERENCE LEVEL



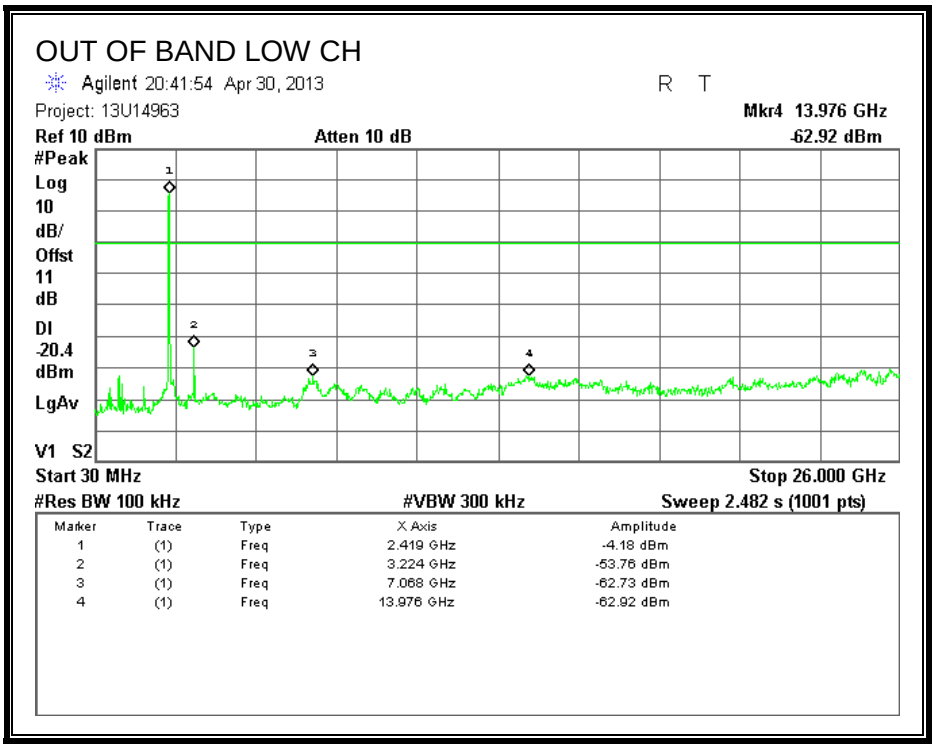
LOW CHANNEL BANDEDGE

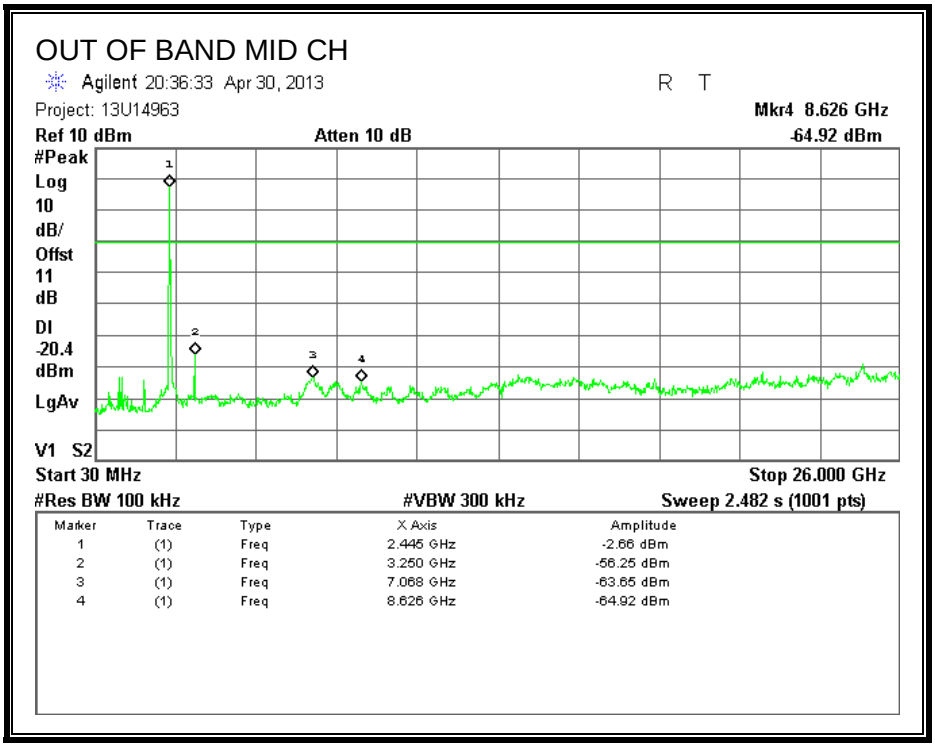


HIGH CHANNEL BANDEDGE

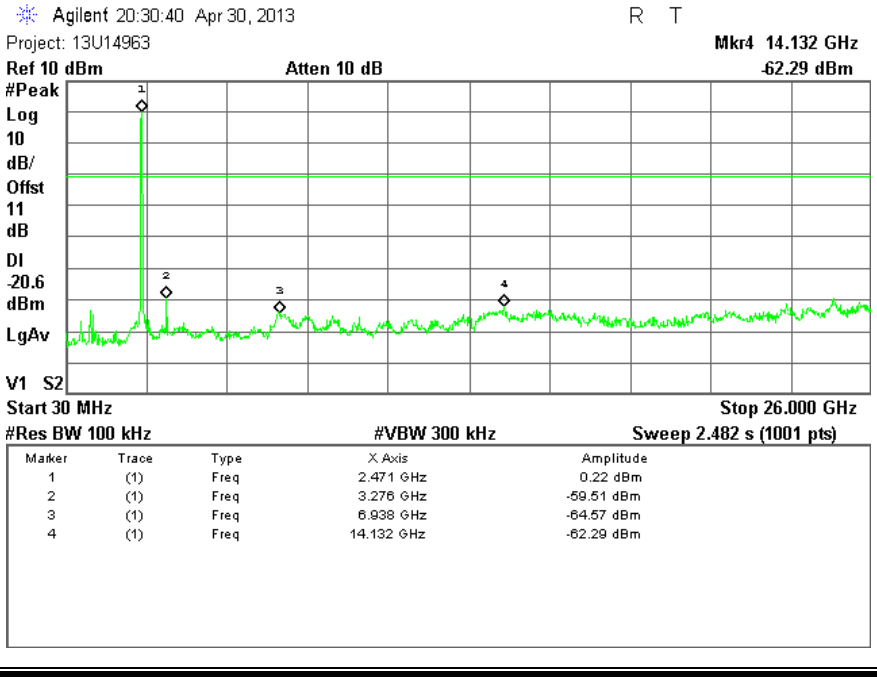


OUT-OF-BAND EMISSIONS





OUT OF BAND HIGH CH



Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	2.471 GHz	0.22 dBm
2	(1)	Freq	3.276 GHz	-59.51 dBm
3	(1)	Freq	6.938 GHz	-64.57 dBm
4	(1)	Freq	14.132 GHz	-62.29 dBm

8.3. 802.11a MODE IN THE 5.8 GHz BAND

8.3.1. 6 dB BANDWIDTH

LIMITS

FCC §15.247 (a) (2)

IC RSS-210 A8.2 (a)

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

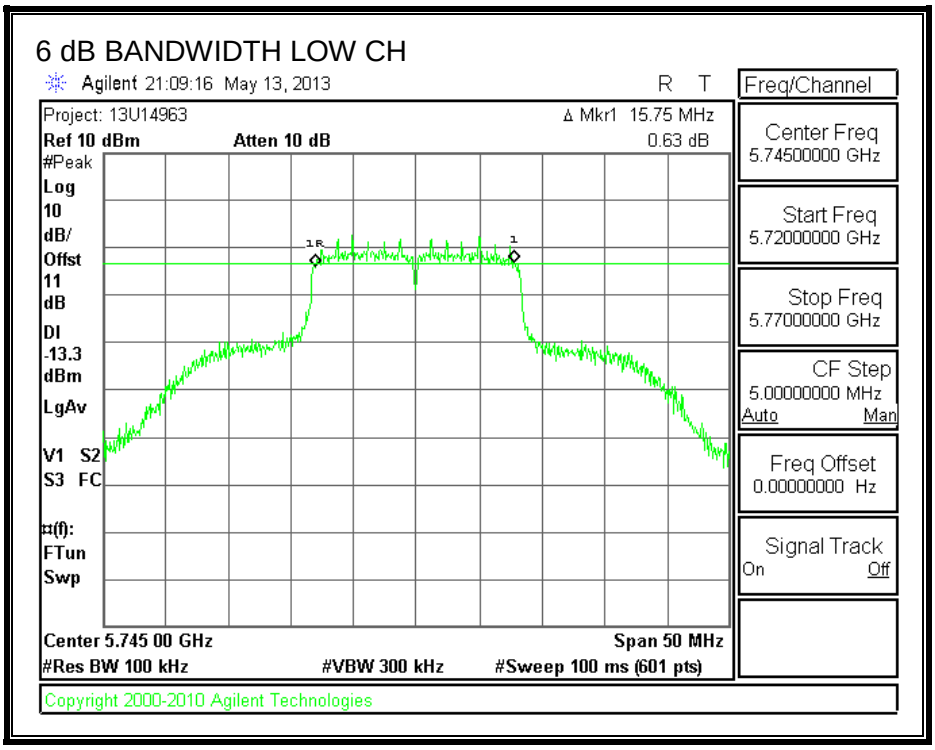
TEST PROCEDURE

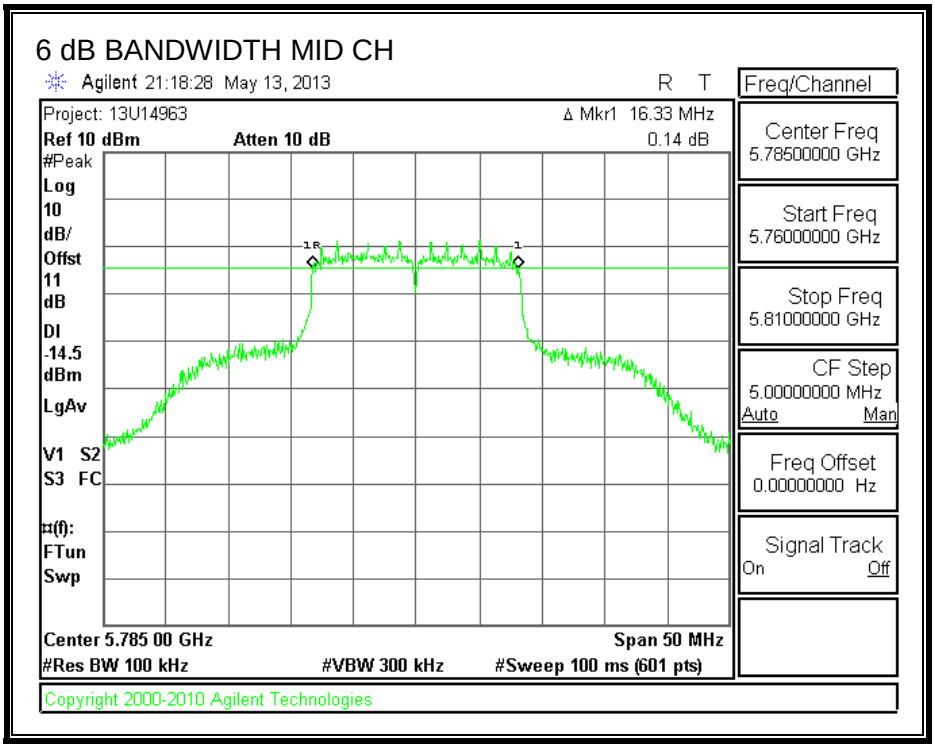
The transmitter output is connected to a spectrum analyzer with the RBW set to 100 kHz, the VBW >= 3 x RBW, peak detector and max hold.

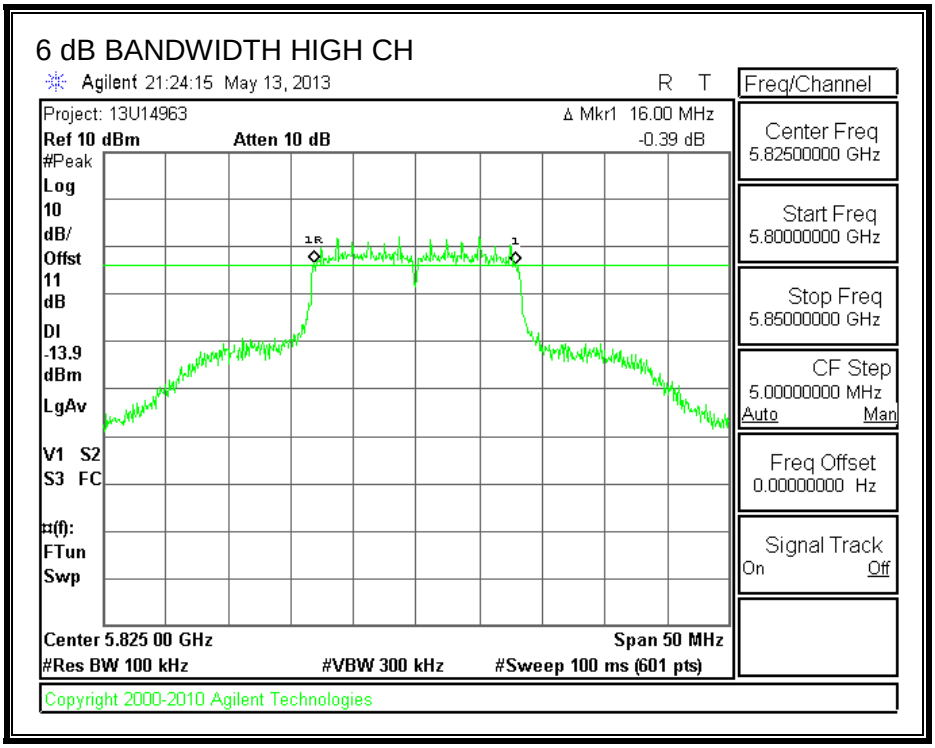
RESULTS

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low	5745	15.750	0.5
Mid	5785	16.330	0.5
High	5825	16.000	0.5

6 dB BANDWIDTH







8.3.2. 99% BANDWIDTH

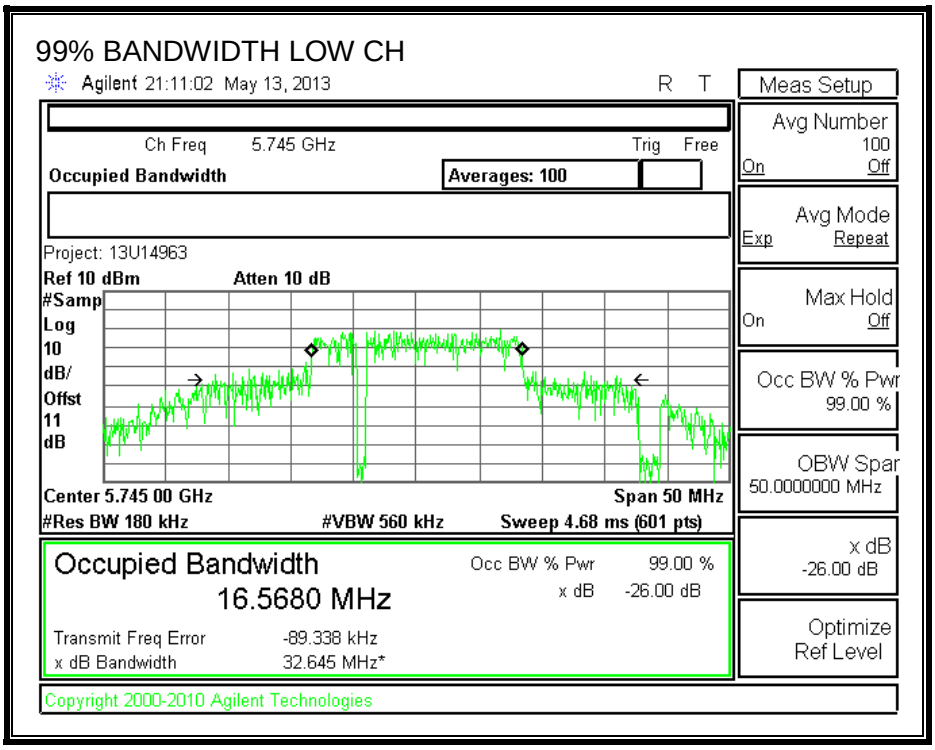
LIMITS

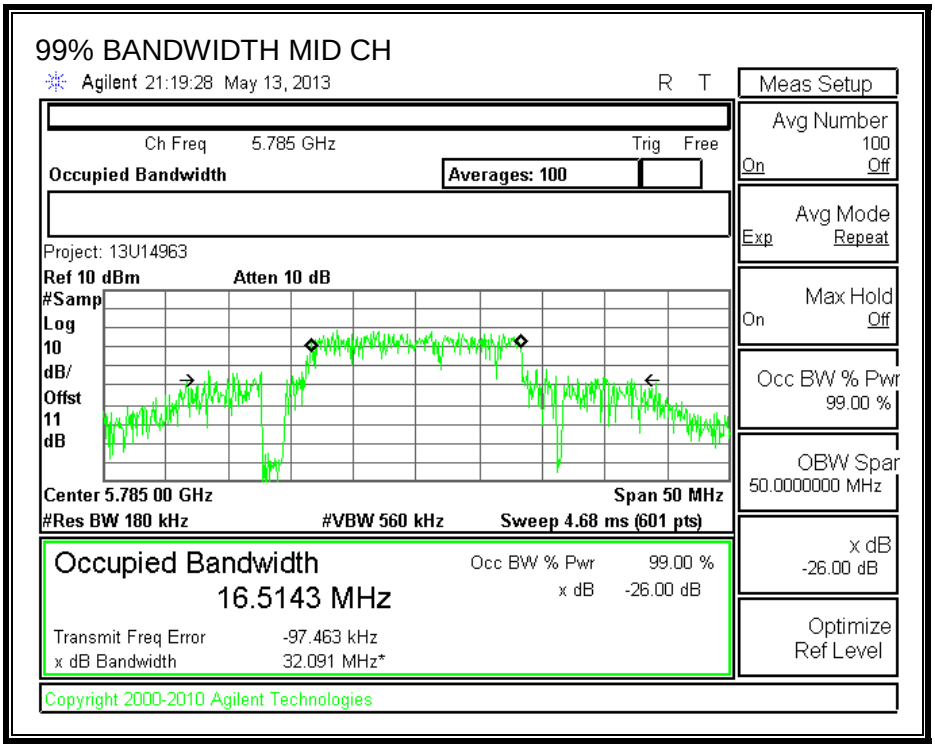
None; for reporting purposes only.

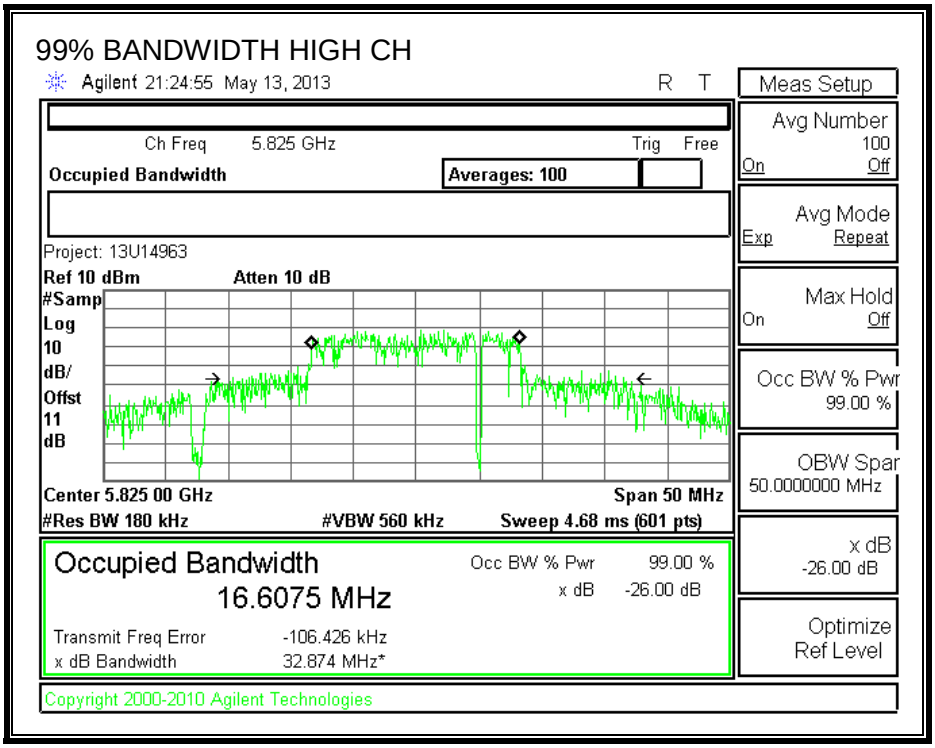
RESULTS

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	5745	16.5700
Mid	5785	16.5100
High	5825	16.6100

99% BANDWIDTH







8.3.3. AVERAGE POWER

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a power meter.

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

RESULTS

Channel	Frequency (MHz)	Power (dBm)
Low	5745	6.00
Mid	5785	5.96
High	5825	5.99

8.3.4. OUTPUT POWER

LIMITS

FCC §15.247

IC RSS-210 A8.4

For systems using digital modulation in the 902–928 MHz, 2400–2483.5 MHz, and 5725–5850 MHz bands: 1 Watt, based on the use of antennas with directional gains that do not exceed 6 dBi. If transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

DIRECTIONAL ANTENNA GAIN

There is only one transmitter output therefore the directional gain is equal to the antenna gain.

RESULTS

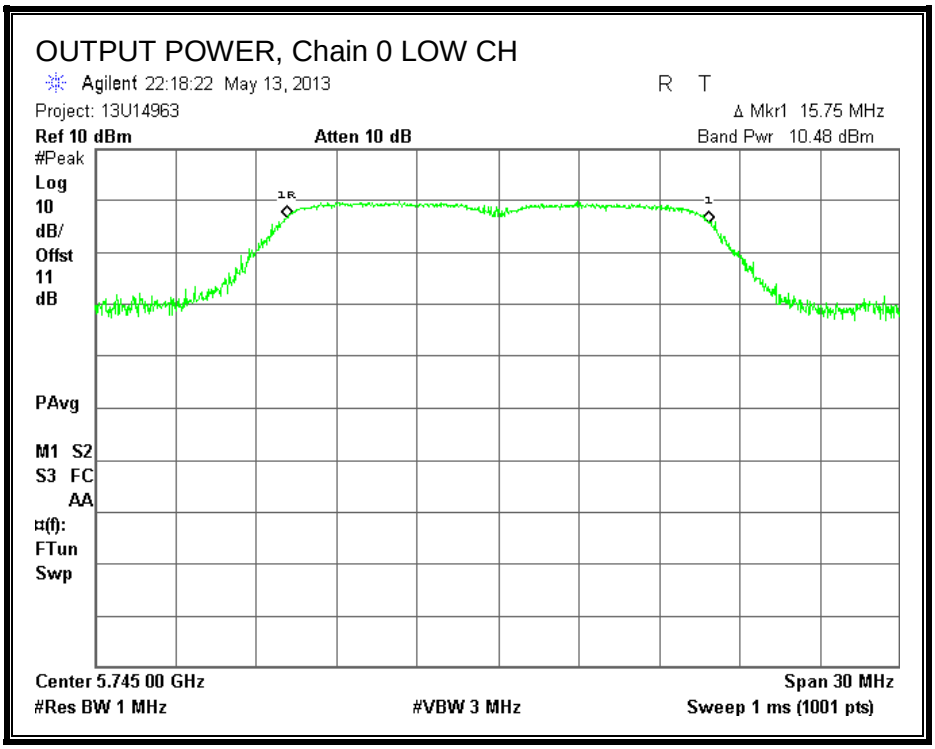
Limits

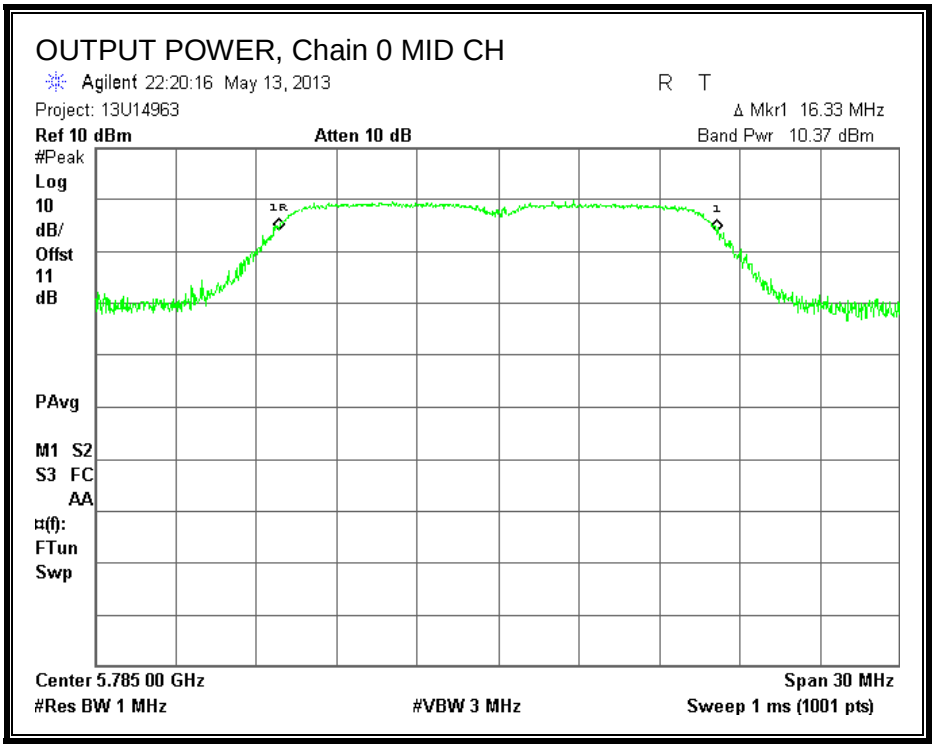
Channel	Frequency (MHz)	Directional Gain (dBi)	FCC Power Limit (dBm)	IC Power Limit (dBm)	IC EIRP Limit (dBm)	Max Power (dBm)
Low	5745	1.00	30.00	30	36	30.00
Mid	5785	1.00	30.00	30	36	30.00
High	5825	1.00	30.00	30	36	30.00

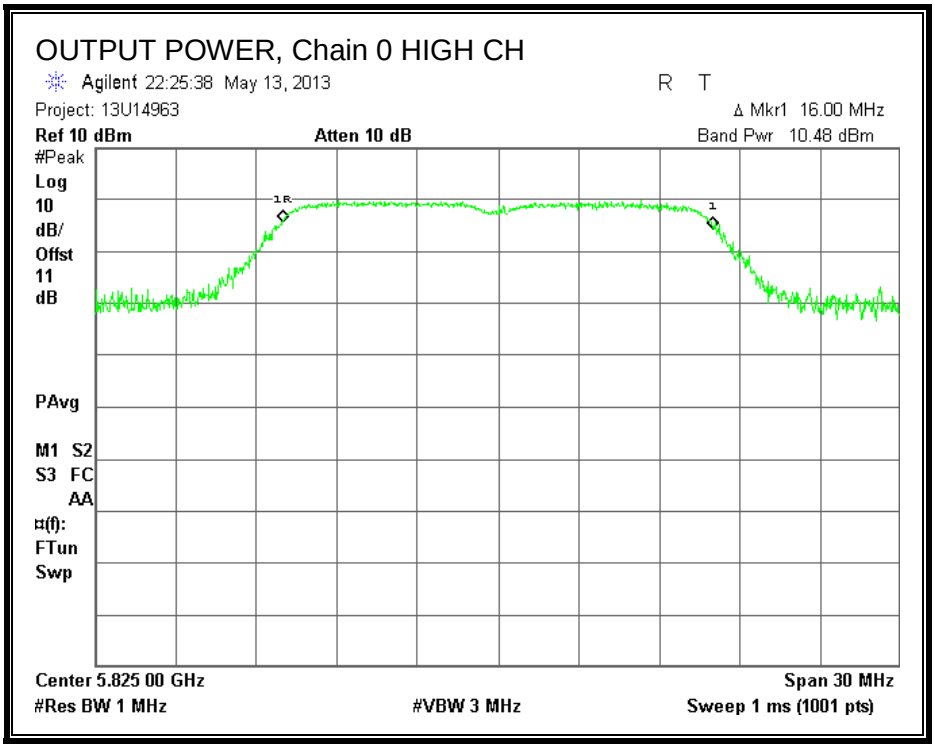
Results

Channel	Frequency (MHz)	Chain 0 Meas Power (dBm)	Total Corr'd Power (dBm)	Power Limit (dBm)	Margin (dB)
Low	5745	10.48	10.48	30.00	-19.52
Mid	5785	10.37	10.37	30.00	-19.63
High	5825	10.48	10.48	30.00	-19.52

OUTPUT POWER, Chain 0







8.3.5. PSD

LIMITS

FCC §15.247

IC RSS-210 A8.2

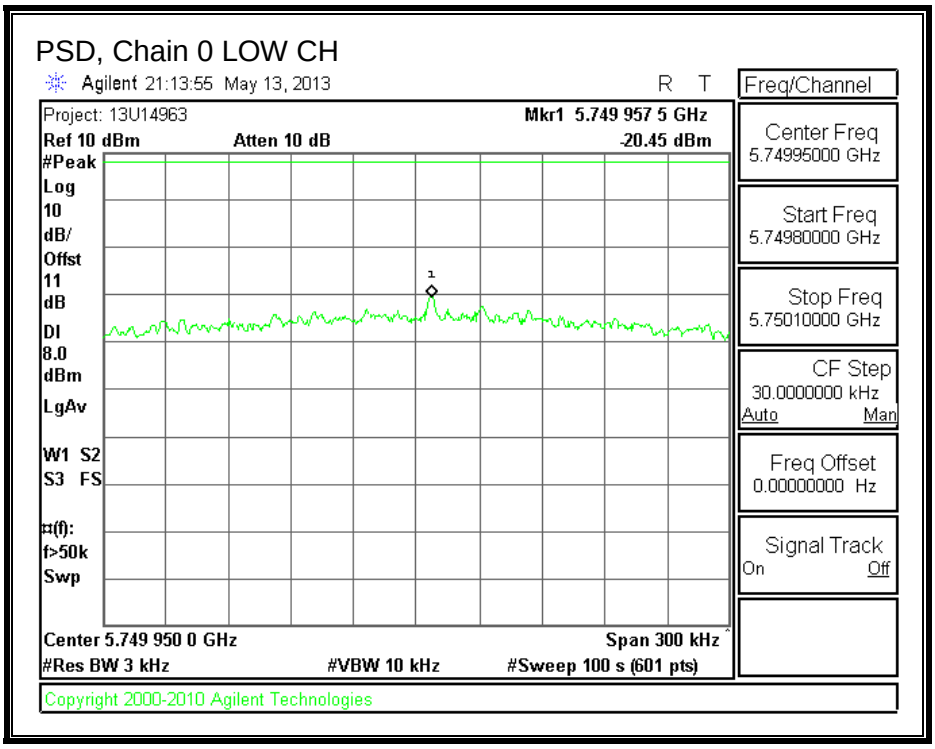
The power spectral density conducted from the transmitter to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

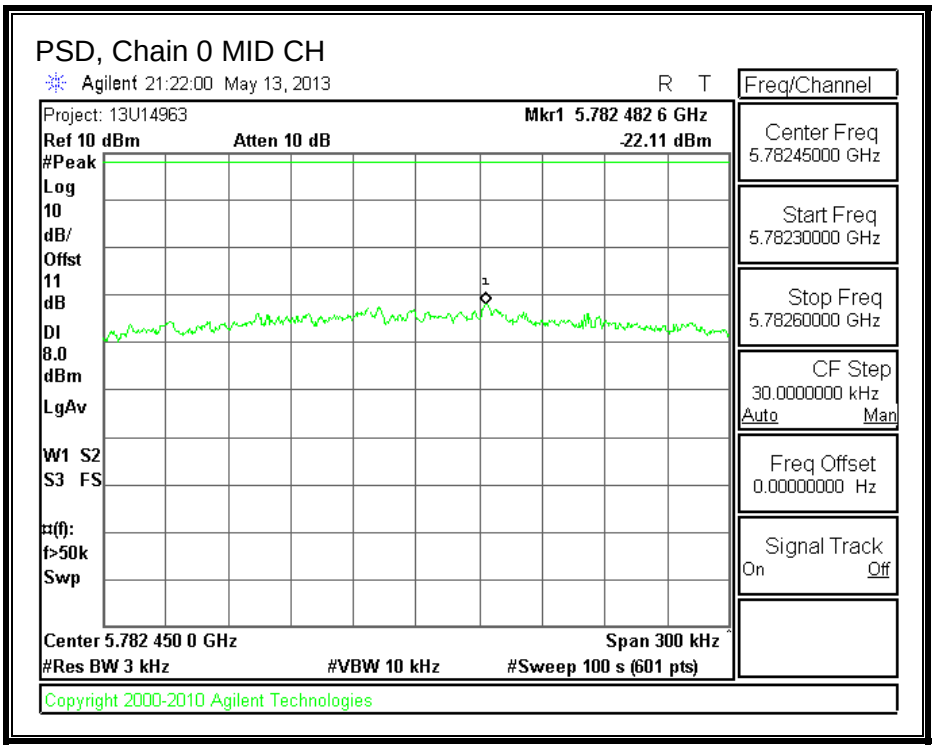
RESULTS

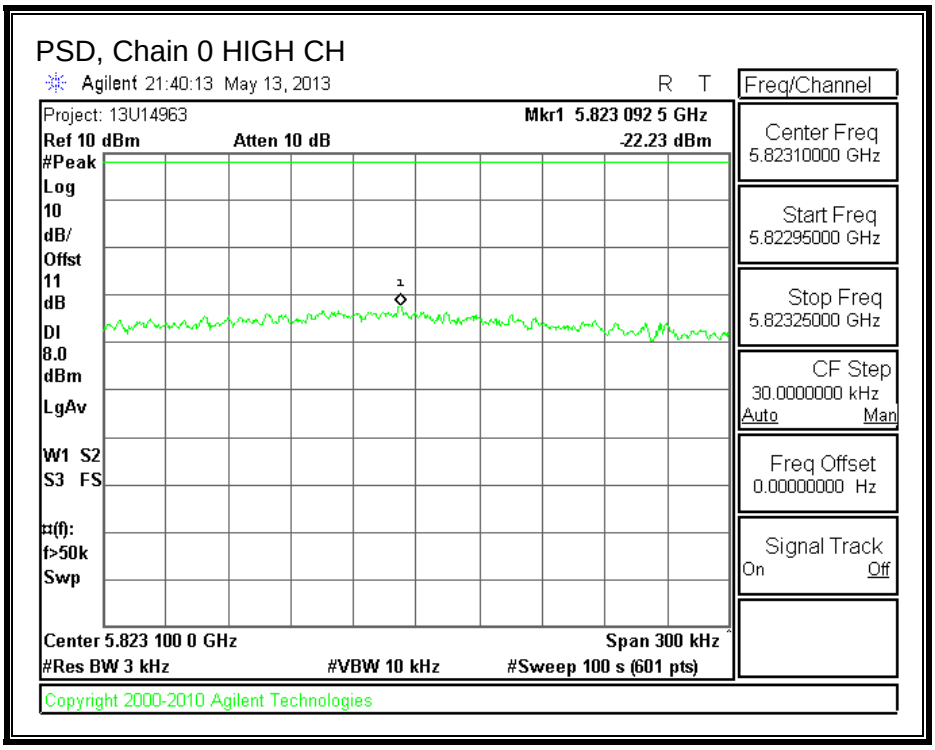
PSD Results

Channel	Frequency (MHz)	Chain 0 Meas (dBm)	Limit (dBm)	Margin (dB)
Low	5745	-20.45	8.0	-28.5
Mid	5785	-22.11	8.0	-30.1
High	5825	-22.23	8.0	-30.2

PSD, Chain 0







8.3.6. OUT-OF-BAND EMISSIONS

LIMITS

FCC §15.247 (d)

IC RSS-210 A8.5

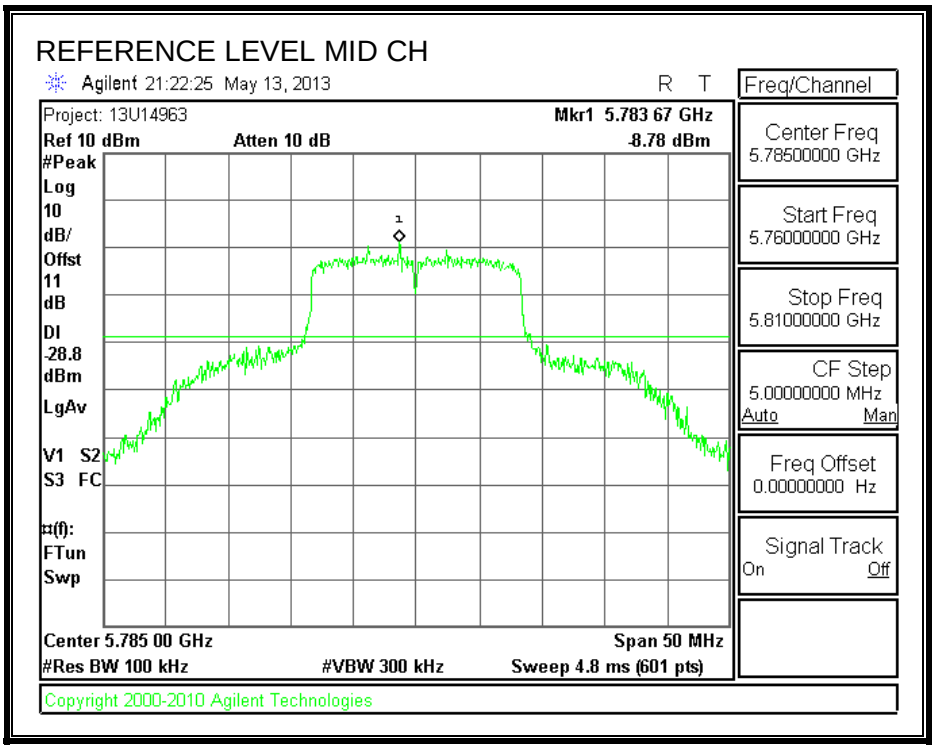
In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required.

TEST PROCEDURE

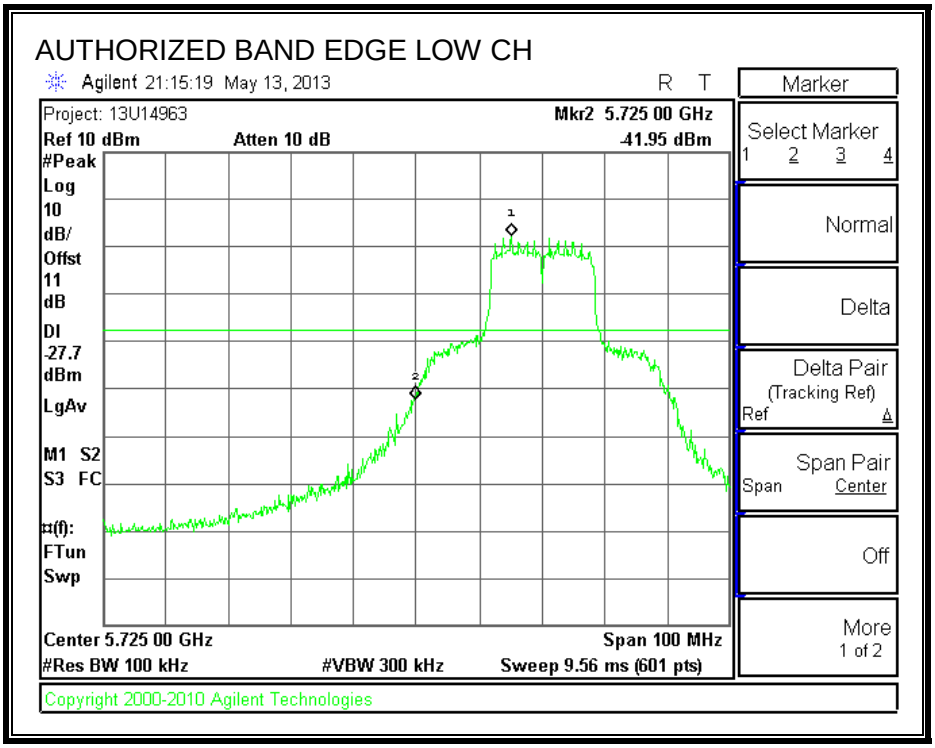
The transmitter output is connected to a spectrum analyzer with RBW = 100 kHz, VBW = 300 kHz, peak detector, and max hold. Measurements utilizing these settings are made of the in-band reference level, bandedge (where measurements to the general radiated limits will not be made) and out-of-band emissions.

RESULTS

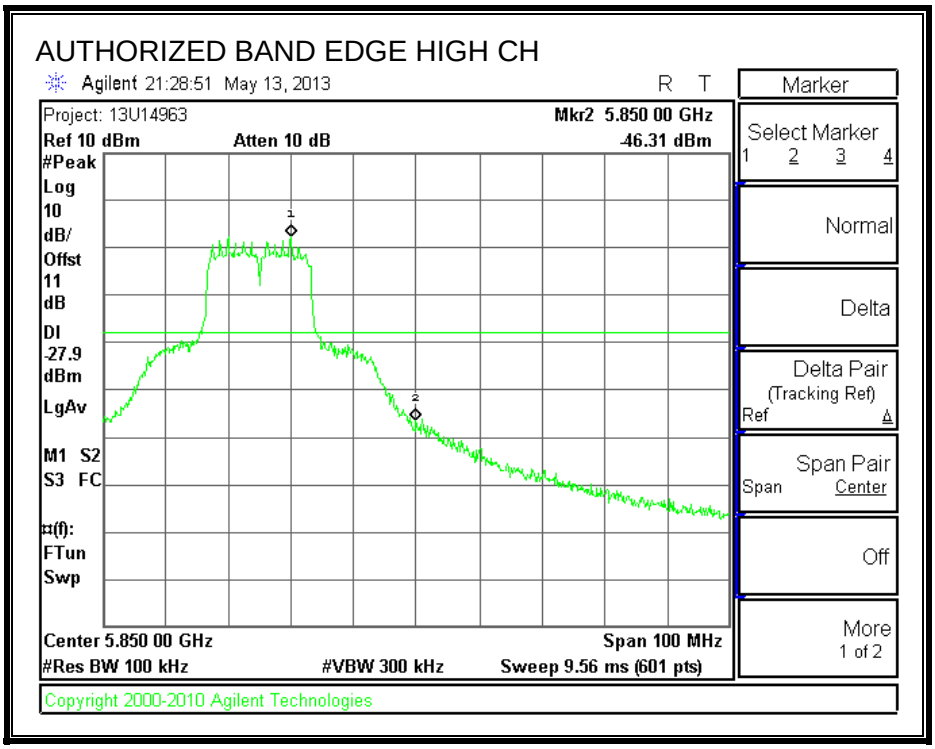
IN-BAND REFERENCE LEVEL



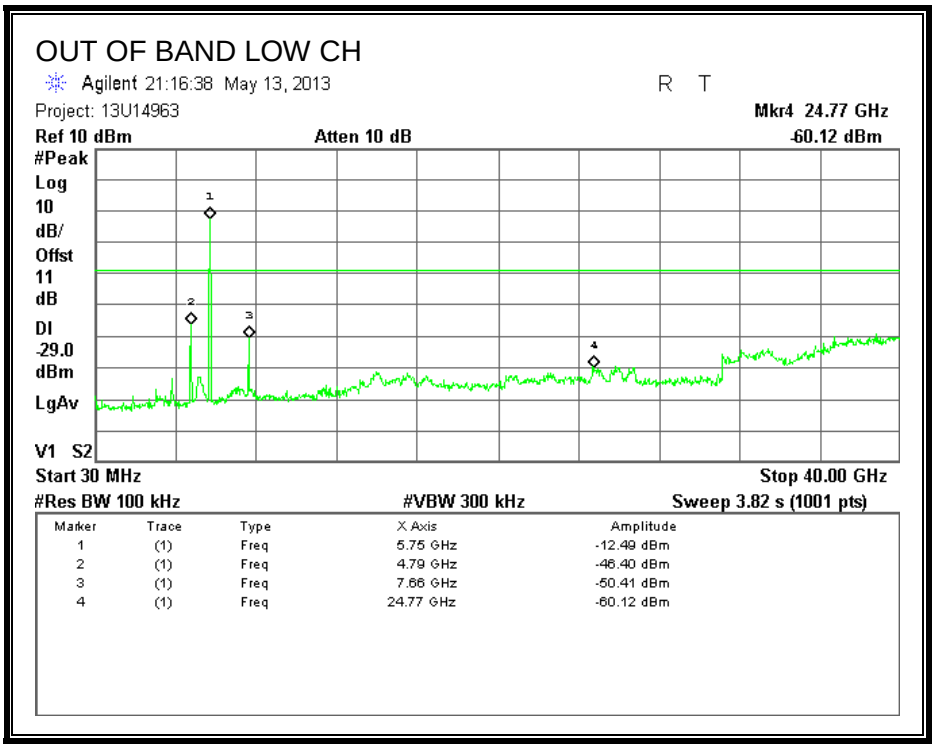
LOW CHANNEL BANDEDGE

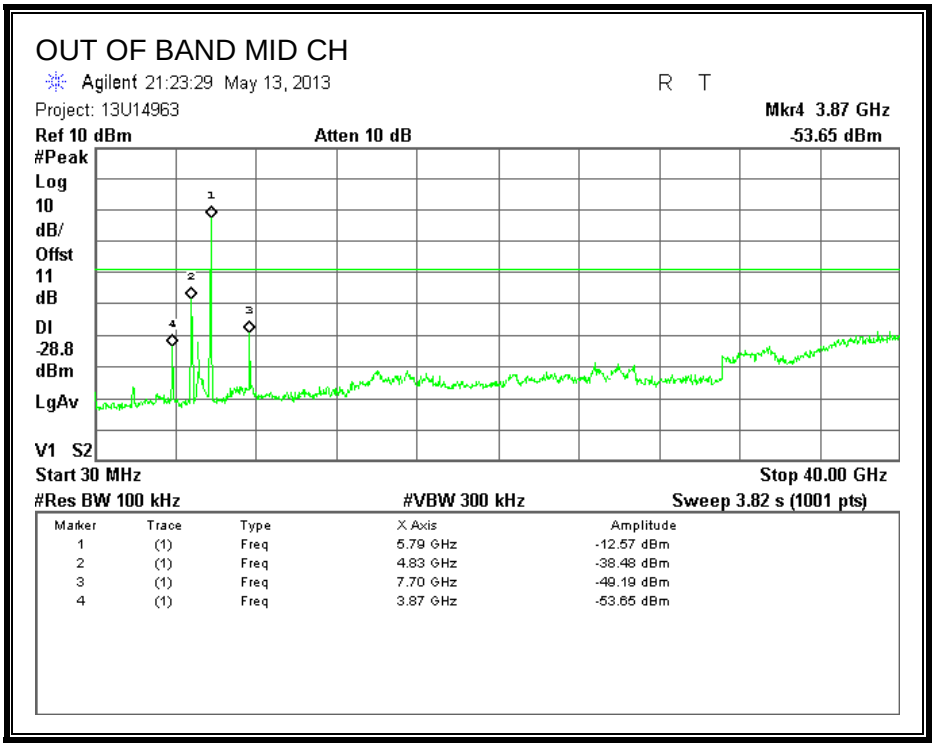


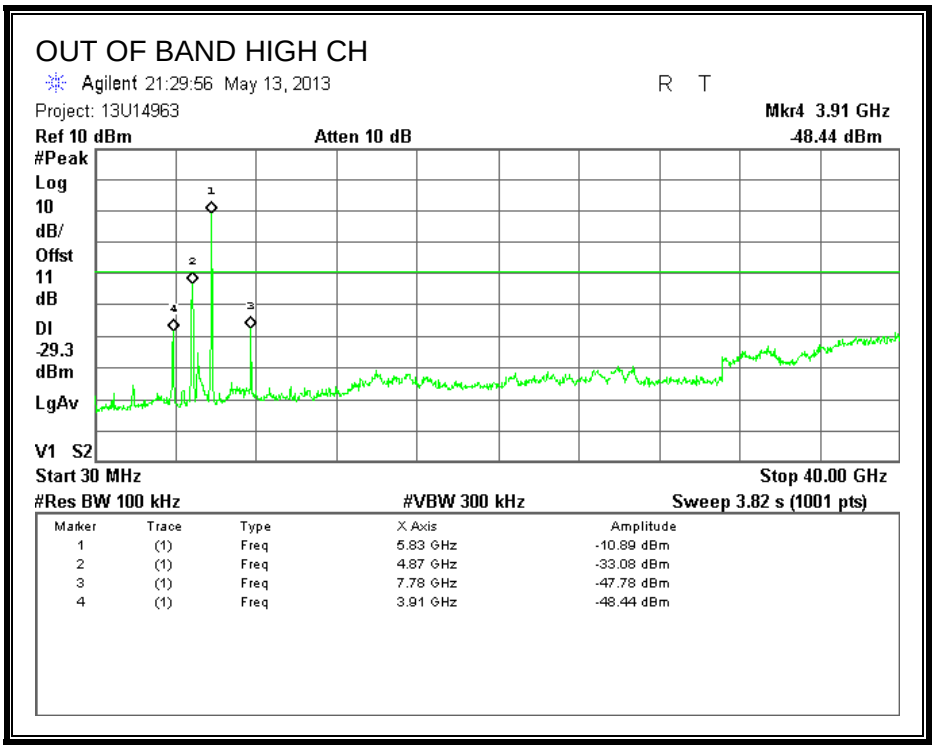
HIGH CHANNEL BANDEDGE



OUT-OF-BAND EMISSIONS







8.4. 802.11n HT20 MODE IN THE 5.8 GHz BAND

8.4.1. 6 dB BANDWIDTH

LIMITS

FCC §15.247 (a) (2)

IC RSS-210 A8.2 (a)

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

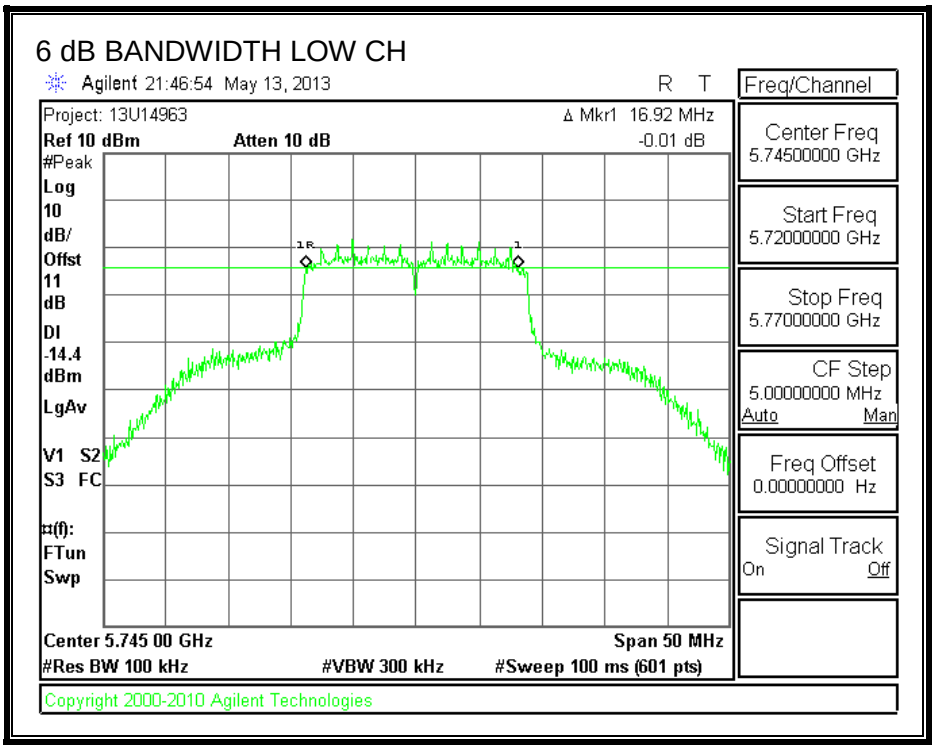
TEST PROCEDURE

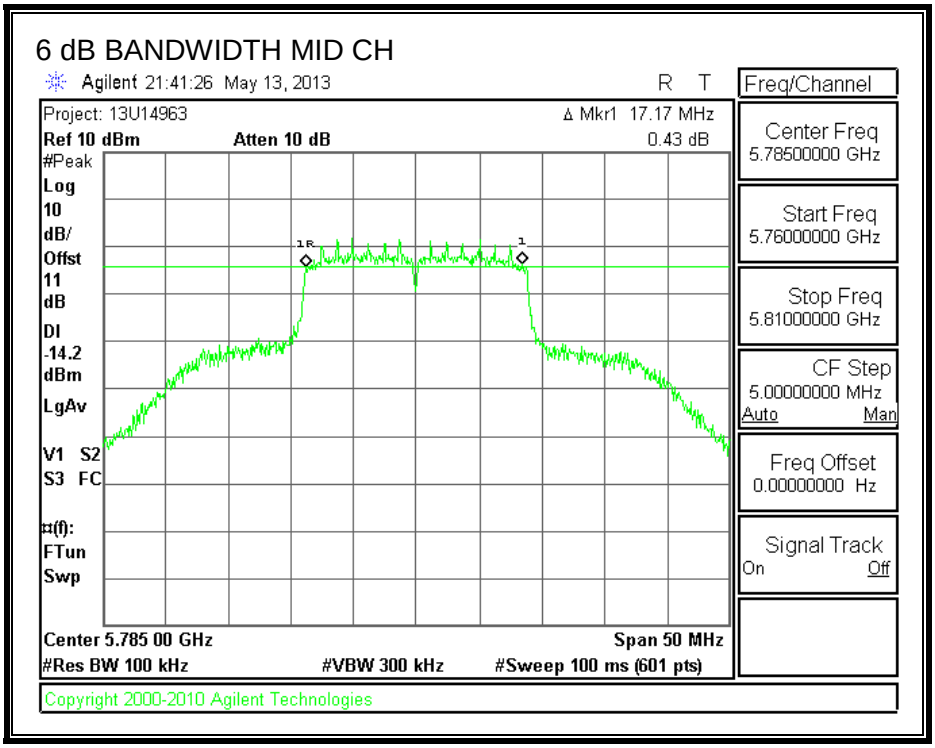
The transmitter output is connected to a spectrum analyzer with the RBW set between 1% and 5% of the EBW, the VBW >= 3 x RBW, peak detector and max hold.

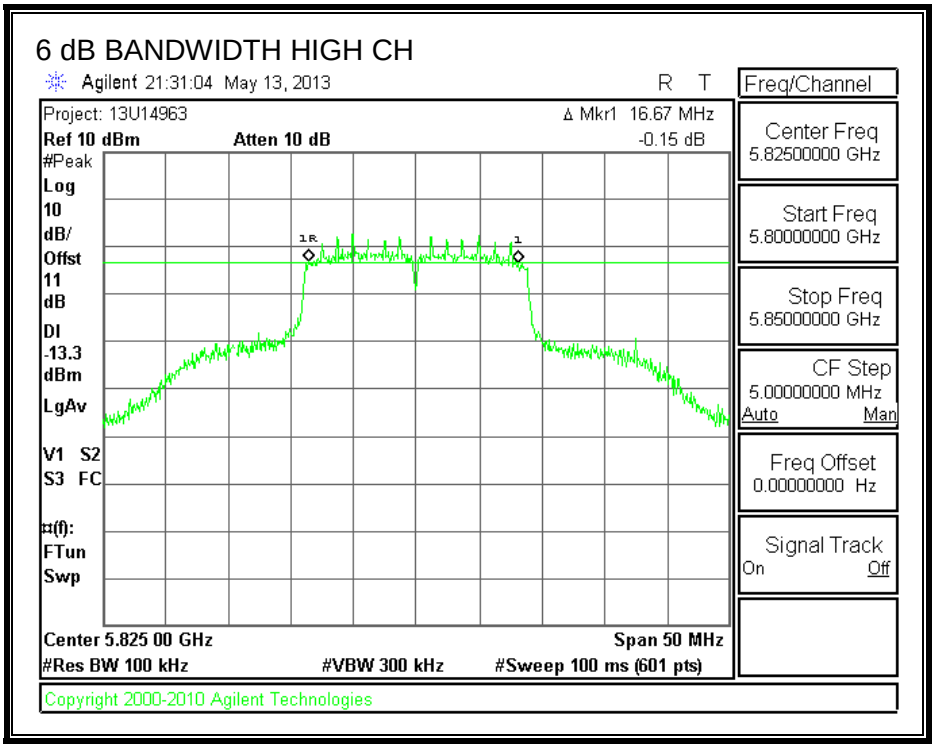
RESULTS

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low	5745	16.920	0.5
Mid	5785	17.170	0.5
High	5825	16.670	0.5

6 dB BANDWIDTH







8.4.2. 99% BANDWIDTH

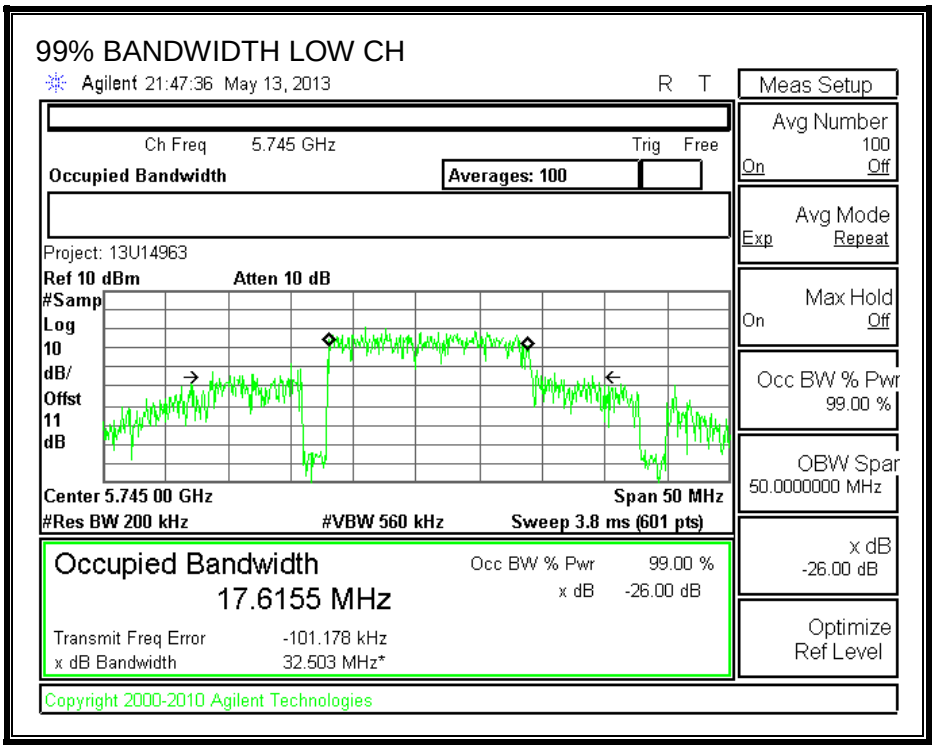
LIMITS

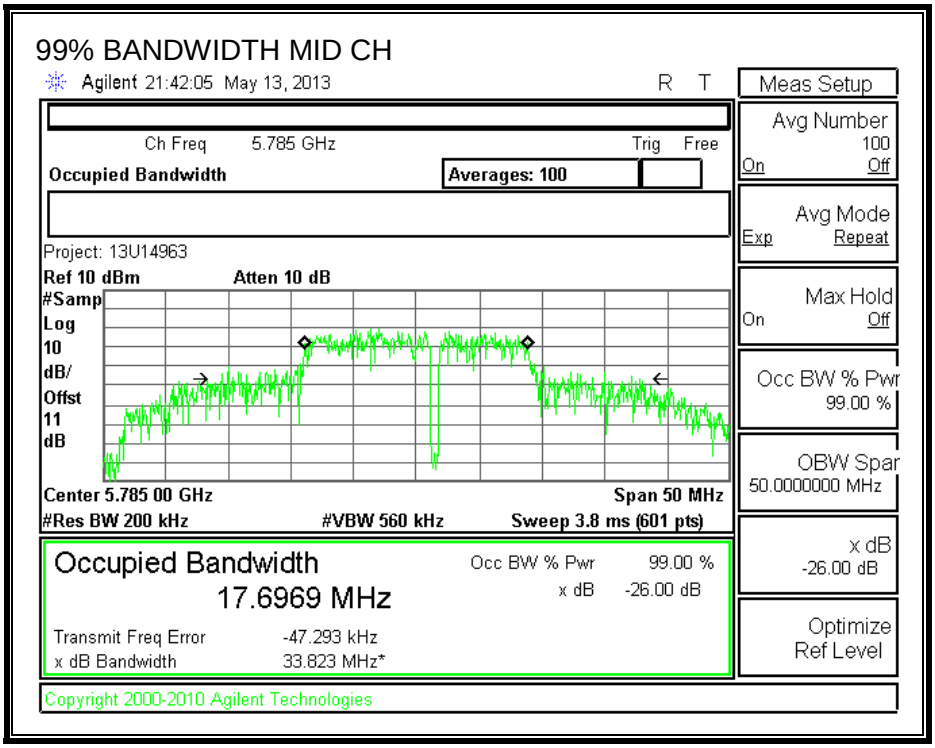
None; for reporting purposes only.

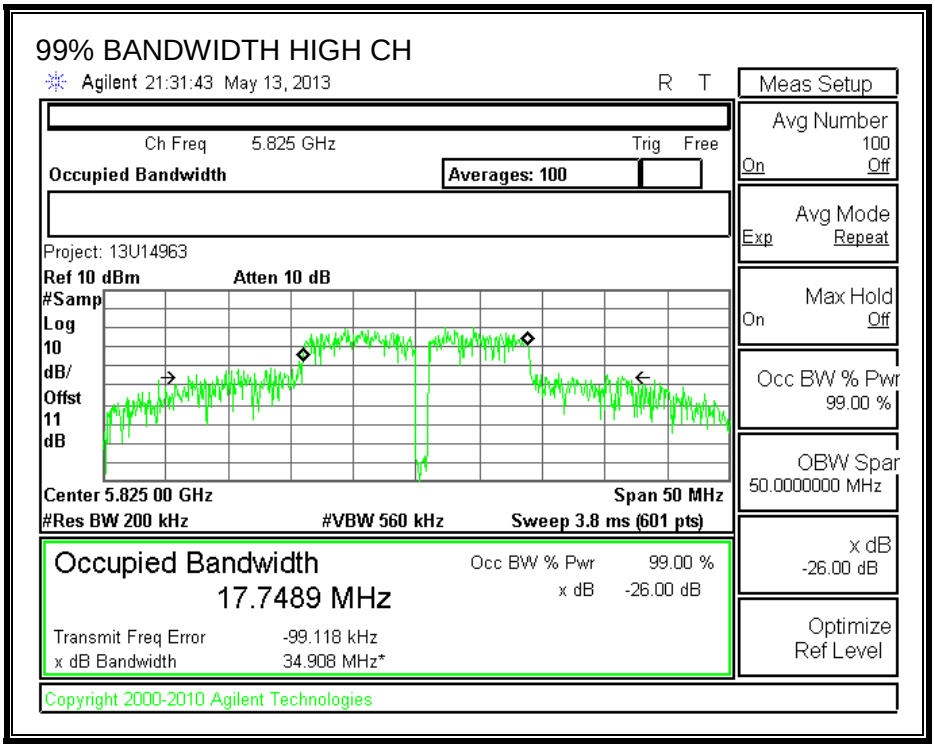
RESULTS

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	5745	17.6200
Mid	5785	17.6900
High	5825	17.7500

99% BANDWIDTH







8.4.3. AVERAGE POWER

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a power meter.

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

RESULTS

Channel	Frequency (MHz)	Power (dBm)
Low	5745	5.96
Mid	5785	6.16
High	5825	6.19

8.4.4. OUTPUT POWER

LIMITS

FCC §15.247

IC RSS-210 A8.4

For systems using digital modulation in the 902–928 MHz, 2400–2483.5 MHz, and 5725–5850 MHz bands: 1 Watt, based on the use of antennas with directional gains that do not exceed 6 dBi. If transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

DIRECTIONAL ANTENNA GAIN

There is only one transmitter output therefore the directional gain is equal to the antenna gain.

RESULTS

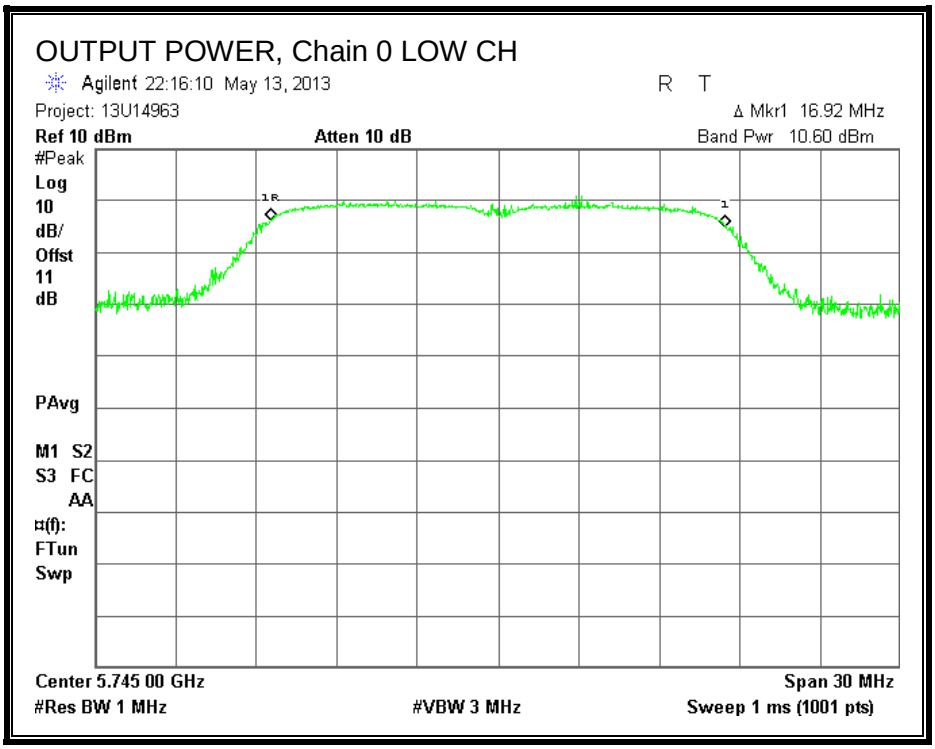
Limits

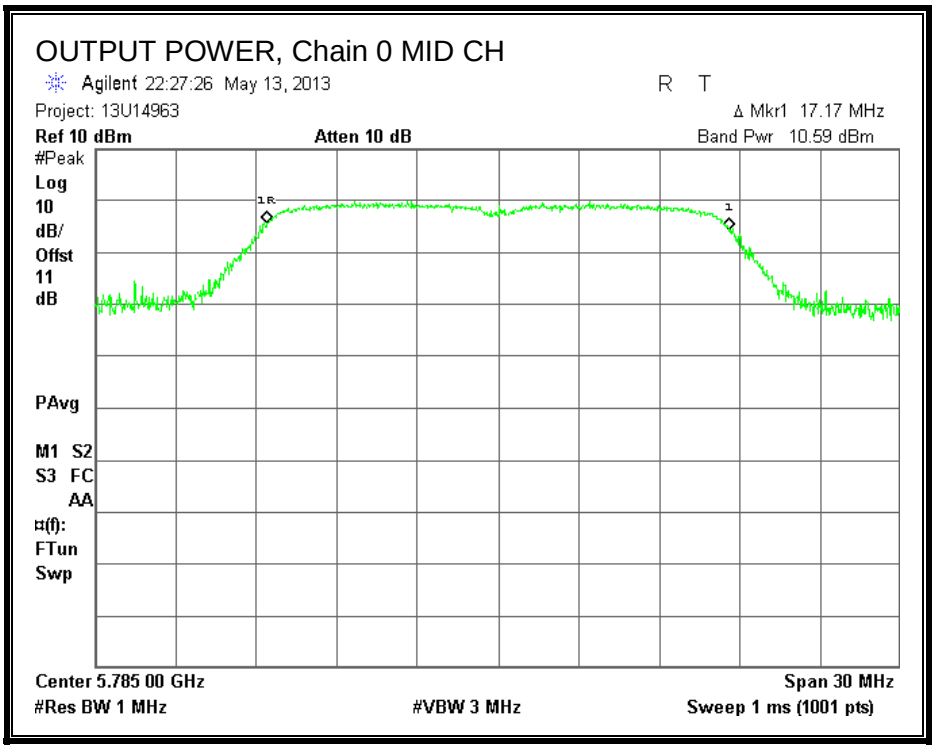
Channel	Frequency (MHz)	Directional Gain (dBi)	FCC Power Limit (dBm)	IC Power Limit (dBm)	IC EIRP Limit (dBm)	Max Power (dBm)
Low	5745	1.00	30.00	30	36	30.00
Mid	5785	1.00	30.00	30	36	30.00
High	5825	1.00	30.00	30	36	30.00

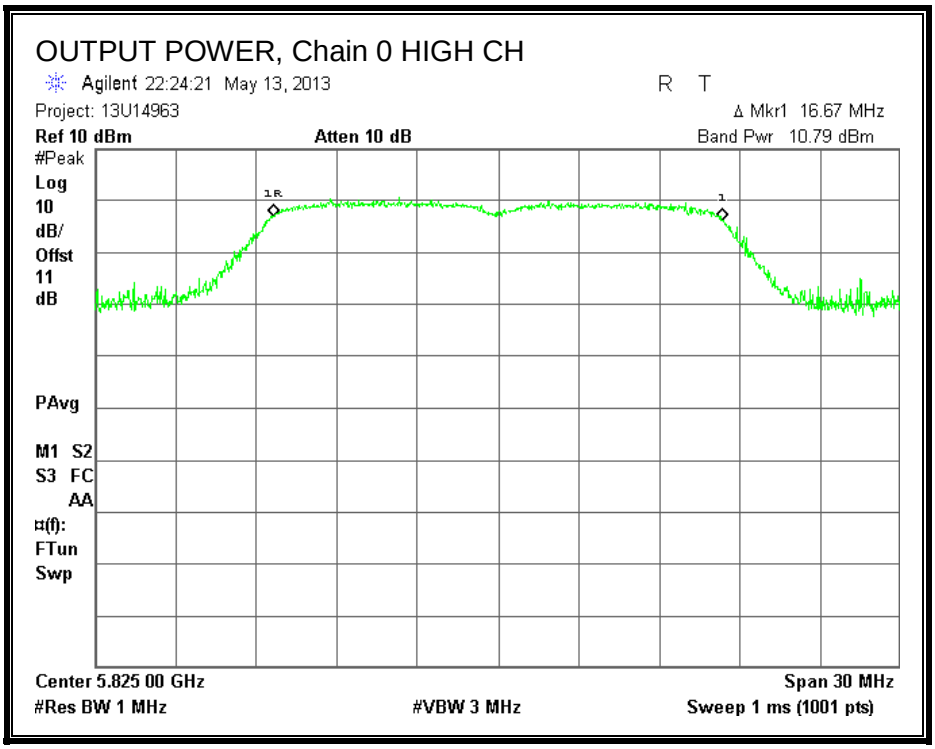
Results

Channel	Frequency (MHz)	Chain 0 Meas Power (dBm)	Total Corr'd Power (dBm)	Power Limit (dBm)	Margin (dB)
Low	5745	10.60	10.60	30.00	-19.40
Mid	5785	10.59	10.59	30.00	-19.41
High	5825	10.79	10.79	30.00	-19.21

OUTPUT POWER, Chain 0







8.4.5. PSD

LIMITS

FCC §15.247

IC RSS-210 A8.2

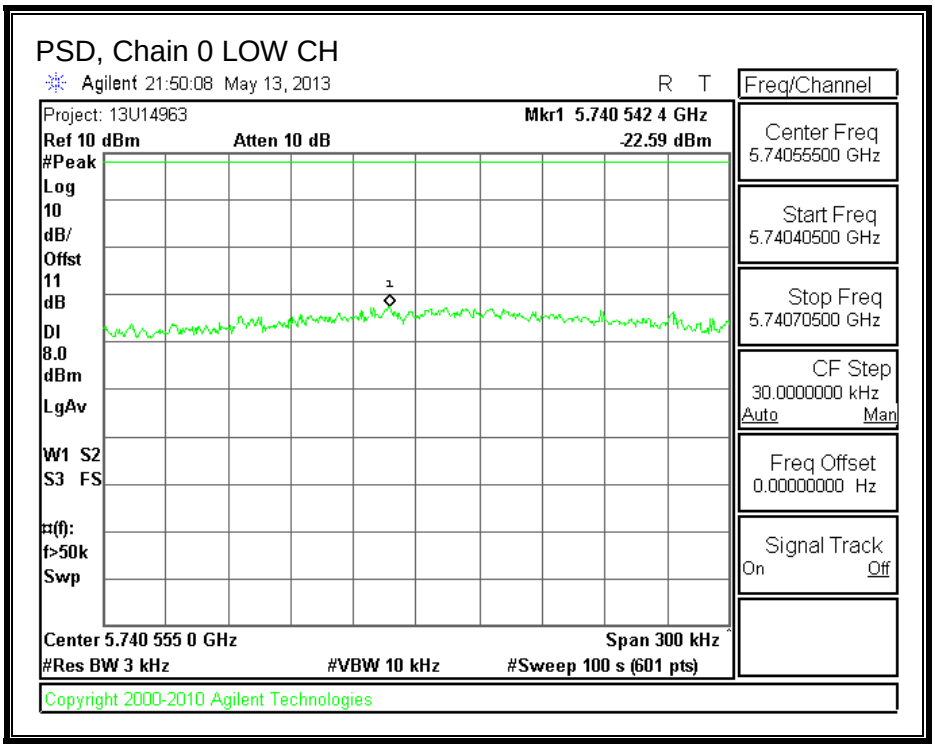
The power spectral density conducted from the transmitter to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

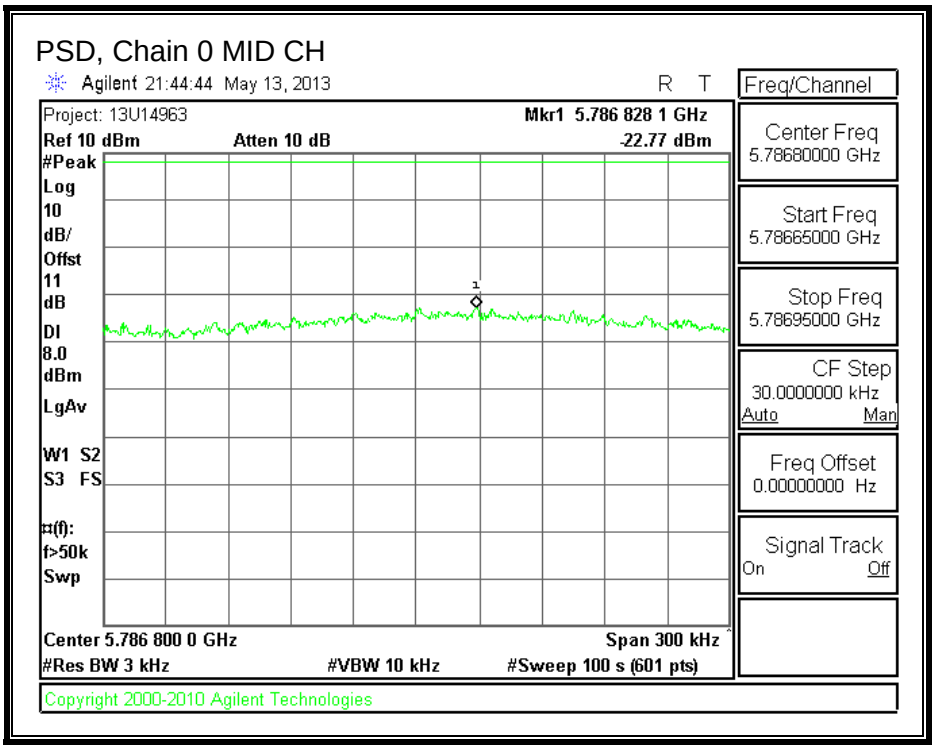
RESULTS

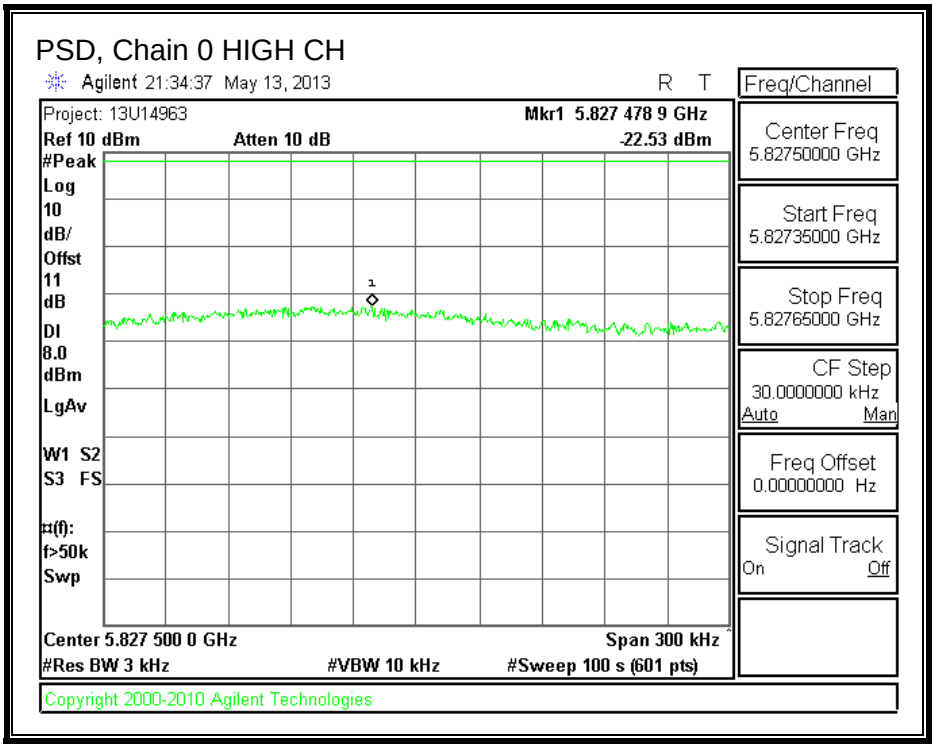
PSD Results

Channel	Frequency (MHz)	Chain 0 Meas (dBm)	Limit (dBm)	Margin (dB)
Low	5745	-22.59	8.0	-30.6
Mid	5785	-22.77	8.0	-30.8
High	5825	-22.53	8.0	-30.5

PSD, Chain 0







8.4.6. OUT-OF-BAND EMISSIONS

LIMITS

FCC §15.247 (d)

IC RSS-210 A8.5

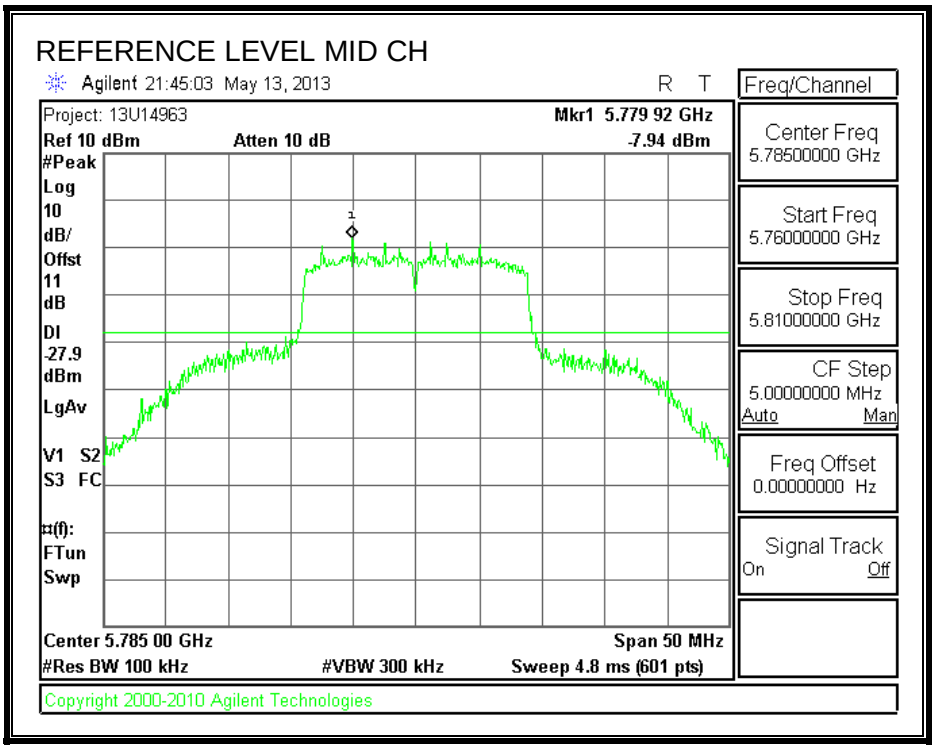
In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required.

TEST PROCEDURE

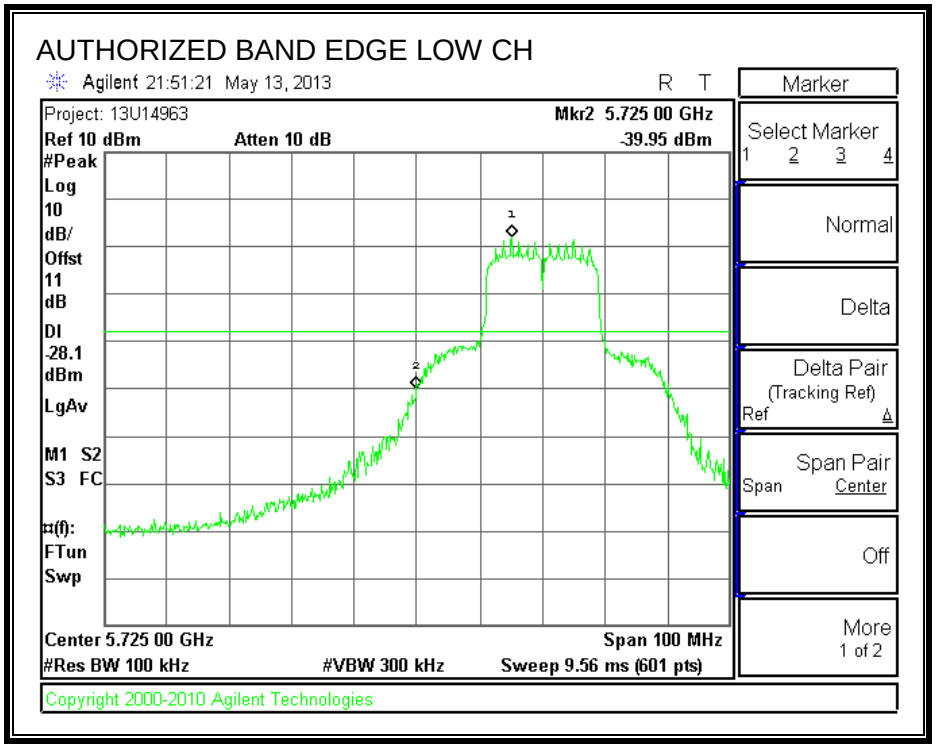
The transmitter output is connected to a spectrum analyzer with RBW = 100 kHz, VBW = 300 kHz, peak detector, and max hold. Measurements utilizing these settings are made of the in-band reference level, bandedge (where measurements to the general radiated limits will not be made) and out-of-band emissions.

RESULTS

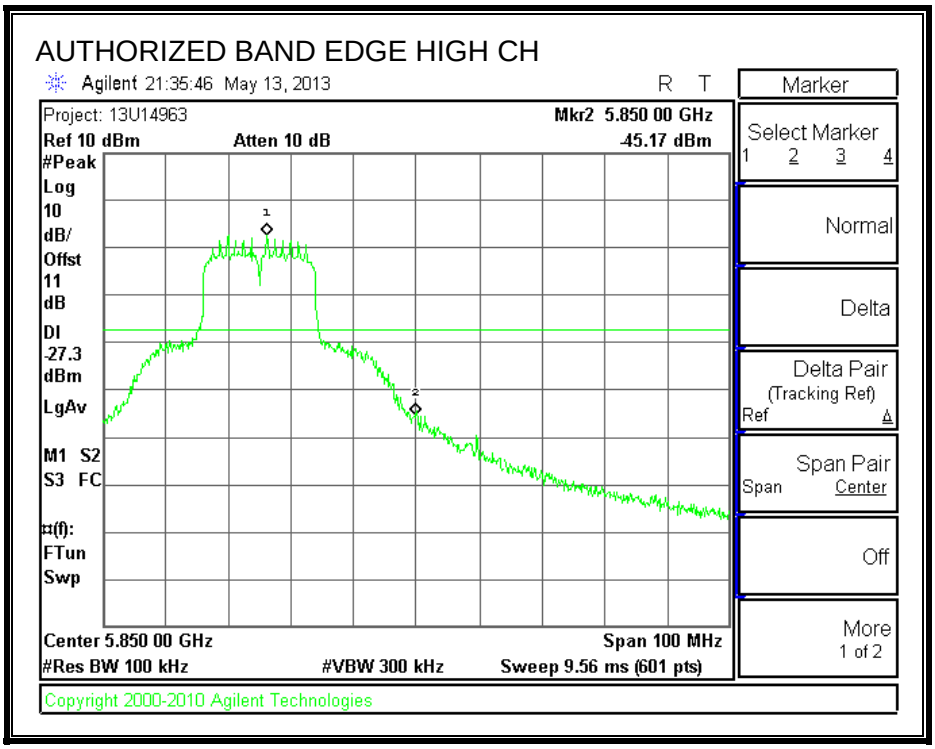
IN-BAND REFERENCE LEVEL



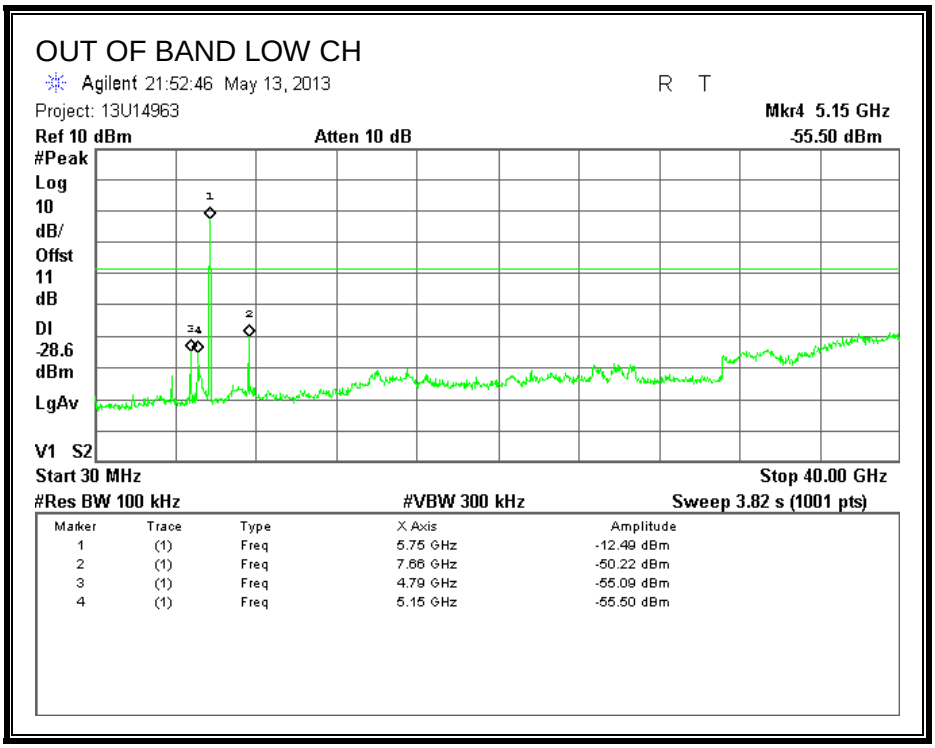
LOW CHANNEL BANDEDGE

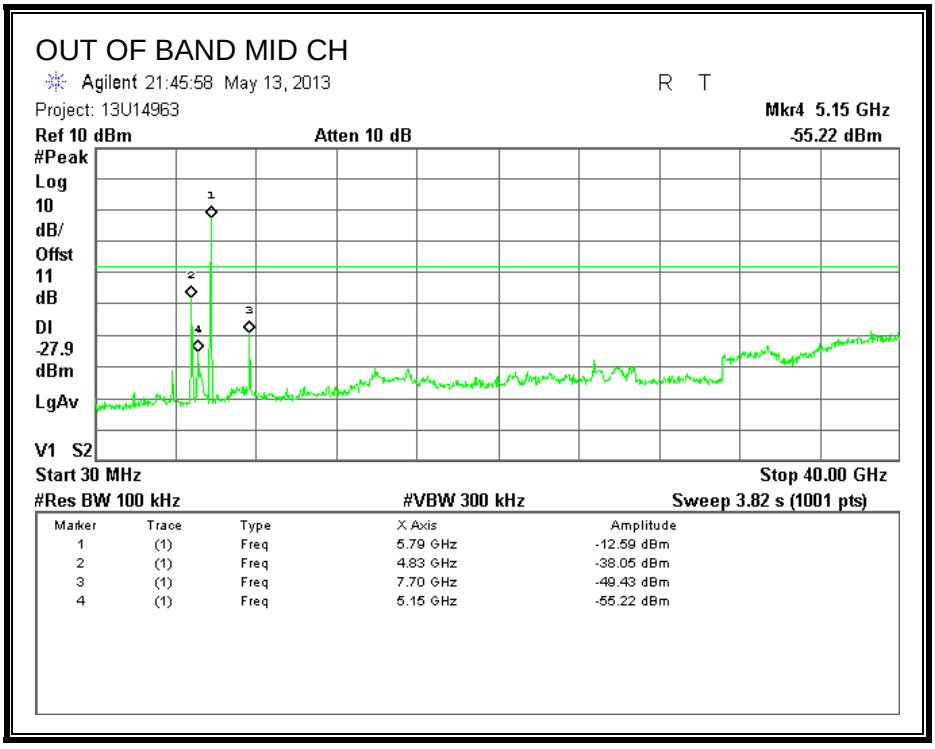


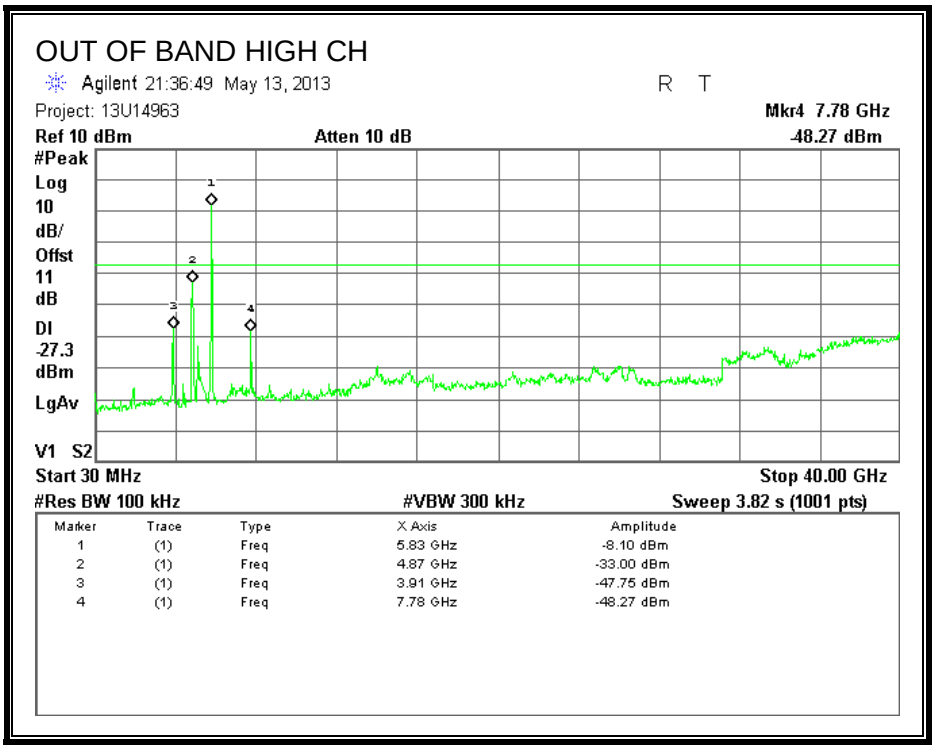
HIGH CHANNEL BANDEDGE



OUT-OF-BAND EMISSIONS







9. RADIATED TEST RESULTS

9.1. 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.

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; the video bandwidth is set to 1 MHz for peak measurements and as applicable for average measurements.

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.

Based on the measured duty cycle of the EUT, the VBW was set to 1 kHz for all final measurements.

9.2. TRANSMITTER ABOVE 1 GHz

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

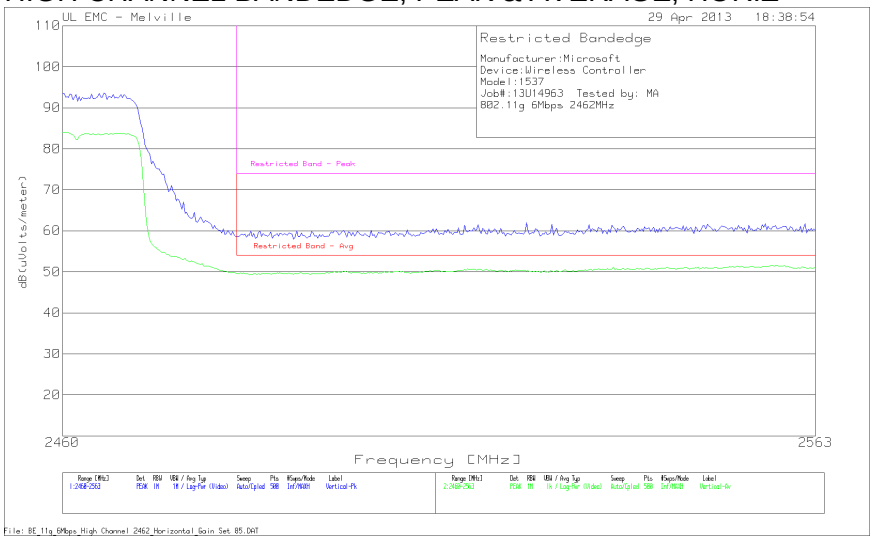
RESTRICTED BANDEDGE (LOW CHANNEL)

LOW CHANNEL RESTRICTED, PEAK & AVERAGE, HORIZ

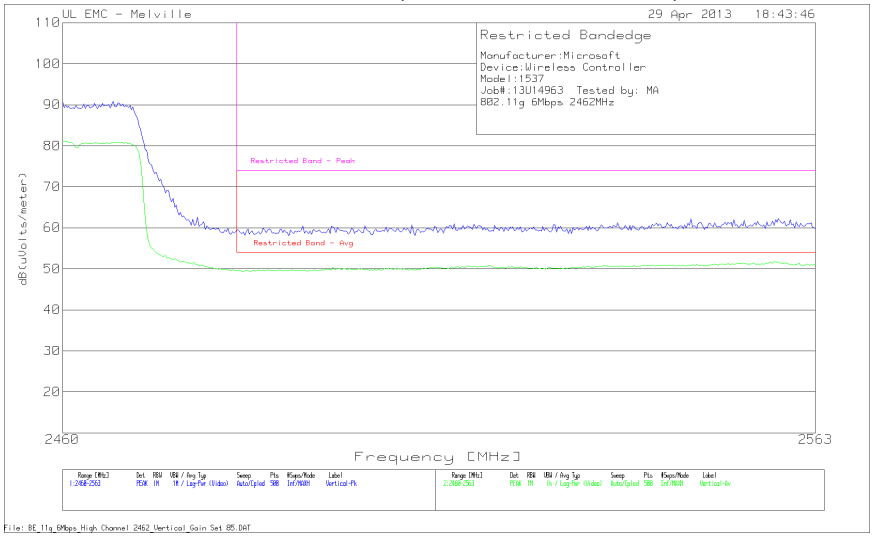
LOW CHANNEL RESTRICTED, PEAK & AVERAGE, VERT

AUTHORIZED BANDEDGE (HIGH CHANNEL)

HIGH CHANNEL BANDEDGE, PEAK & AVERAGE, HORIZ



HIGH CHANNEL BANDEDGE, PEAK & AVERAGE, VERT



HARMONICS AND SPURIOUS EMISSIONS

Manufacturer:Microsoft
Device:Wireless Controller
Model:1537
Job#:13U14963 Tested by: MA/RM
11g 6Mbps Mode

Low Channel - 2412MHz

Test Frequency	Meter Reading	Detector	AF-48106 [dB/m]	BOMS Factor [dB]	dB(uVolts/meter)	FCC Part 15 Subpart C 15.209	Margin (dB)	FCC Part 15 Subpart C Peak	Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
4825.7034	69.59	PK	27.1	-53.52	43.17	-	-	74	-30.83	247	340	Horz
4824.8517	73.49	PK	27.1	-53.54	47.05	-	-	74	-26.95	336	381	Vert
4825.7034	55.29	LnAv	27.1	-53.52	28.87	54	-25.13	-	-	247	340	Horz
4824.8517	59.77	LnAv	27.1	-53.54	33.33	54	-20.67	-	-	336	381	Vert

Mid Channel - 2437MHz

Test Frequency	Meter Reading	Detector	AF-48106 [dB/m]	BOMS Factor [dB]	dB(uVolts/meter)	FCC Part 15 Subpart C 15.209	Margin (dB)	FCC Part 15 Subpart C Peak	Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
4875.022	71.57	PK	27.2	-53.26	45.51	-	-	74	-28.49	317	384	Vert
4875.3527	68.63	PK	27.2	-53.26	42.57	-	-	74	-31.43	77	252	Horz
4875.022	57.55	LnAv	27.2	-53.26	31.49	54	-22.51	-	-	317	384	Vert
4875.3527	55.48	LnAv	27.2	-53.26	29.42	54	-24.58	-	-	77	252	Horz

High Channel - 2462MHz

Test Frequency	Meter Reading	Detector	AF-48106 [dB/m]	BOMS Factor [dB]	dB(uVolts/meter)	FCC Part 15 Subpart C 15.209	Margin (dB)	FCC Part 15 Subpart C Peak	Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
4924.7816	70.41	PK	27.2	-53.36	44.25	-	-	74	-29.75	159	400	Vert
4924.4509	68.59	PK	27.2	-53.34	42.45	-	-	74	-31.55	173	392	Horz
4924.7816	57.62	LnAv	27.2	-53.36	31.46	54	-22.54	-	-	159	400	Vert
4924.4509	55.41	LnAv	27.2	-53.34	29.27	54	-24.73	-	-	173	392	Horz

PK - Peak detector
LnAv - Linear Average detector

NOTE: No other emissions detected above the system noise floor.

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

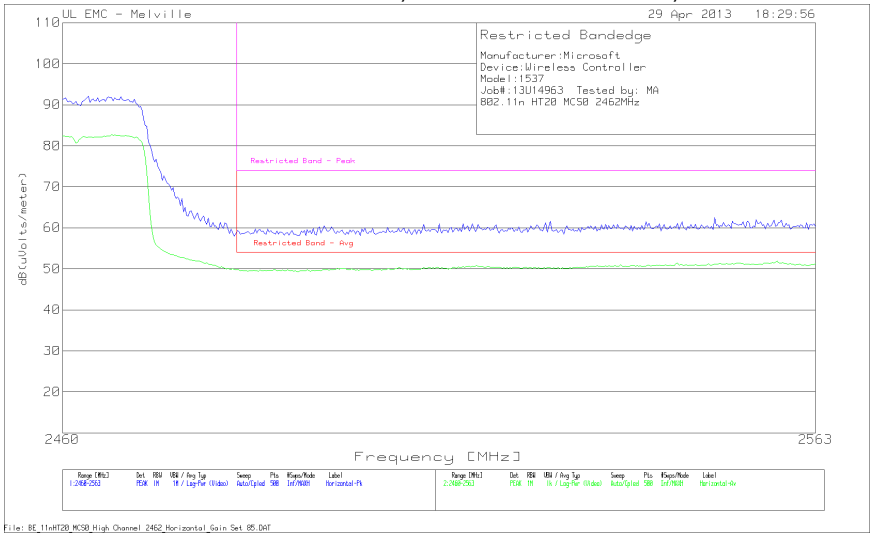
RESTRICTED BANDEDGE (LOW CHANNEL)

LOW CHANNEL RESTRICTED, PEAK & AVERAGE, HORIZ

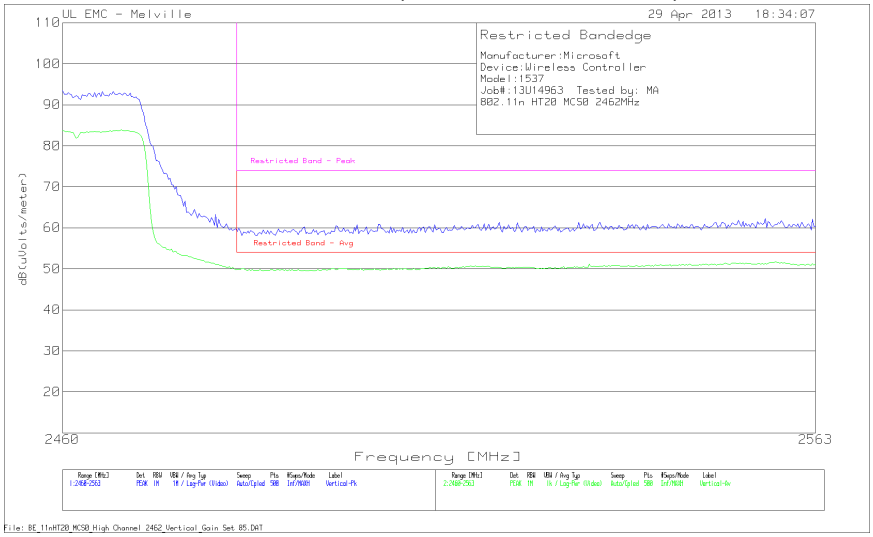
LOW CHANNEL RESTRICTED, PEAK & AVERAGE, VERT

AUTHORIZED BANDEDGE (HIGH CHANNEL)

HIGH CHANNEL BANDEDGE, PEAK & AVERAGE, HORIZ



HIGH CHANNEL BANDEDGE, PEAK & AVERAGE, VERT



HARMONICS AND SPURIOUS EMISSIONS

Manufacturer:Microsoft
Device:Wireless Controller
Model:1537
Job#:13U14963 Tested by: MA/RM
11n HT20 MCS0 Mode

Low Channel - 2412MHz

Test Frequency	Meter Reading	Detector	AF-48106 [dB/m]	BOMS Factor [dB]	dB(uVolts/meter)	FCC Part 15 Subpart C 15.209	Margin (dB)	FCC Part 15 Subpart C Peak	Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
4825.2625	70.86	PK	27.1	-53.54	44.42	-	-	74	-29.58	20	338	Vert
4824.992	69.41	PK	27.1	-53.55	42.96	-	-	74	-31.04	216	150	Horz
4825.2625	57.37	LnAv	27.1	-53.54	30.93	54	-23.07	-	-	20	338	Vert
4824.992	55.57	LnAv	27.1	-53.55	29.12	54	-24.88	-	-	216	150	Horz

Mid Channel - 2437MHz

Test Frequency	Meter Reading	Detector	AF-48106 [dB/m]	BOMS Factor [dB]	dB(uVolts/meter)	FCC Part 15 Subpart C 15.209	Margin (dB)	FCC Part 15 Subpart C Peak	Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
4875.0421	71.23	PK	27.2	-53.26	45.17	-	-	74	-28.83	188	390	Vert
4874.1804	69.8	PK	27.2	-53.25	43.75	-	-	74	-30.25	74	301	Horz
4875.0421	57.35	LnAv	27.2	-53.26	31.29	54	-22.71	-	-	188	390	Vert
4874.1804	56.61	LnAv	27.2	-53.25	30.56	54	-23.44	-	-	74	301	Horz

High Channel - 2462MHz

Test Frequency	Meter Reading	Detector	AF-48106 [dB/m]	BOMS Factor [dB]	dB(uVolts/meter)	FCC Part 15 Subpart C 15.209	Margin (dB)	FCC Part 15 Subpart C Peak	Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
4924.4208	71.65	PK	27.2	-53.33	45.52	-	-	74	-28.48	173	385	Vert
4923.8998	60.01	PK	27.2	-53.3	33.91	-	-	74	-40.09	179	336	Horz
4924.4208	57.99	LnAv	27.2	-53.33	32.06	54	-21.94	-	-	173	385	Vert
4923.8998	55.5	LnAv	27.2	-53.3	29.6	54	-24.4	-	-	179	336	Horz

PK - Peak detector
LnAv - Linear Average detector

NOTE: No other emissions detected above the system noise floor.

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

HARMONICS AND SPURIOUS EMISSIONS

Manufacturer:Microsoft
Device:Wireless Controller
Model:1537
Job#:13U14963 Tested By: RM/DC
11a 6Mbps

Low Channel - 5745MHz

Test Frequency	Meter Reading	Detector	AF-8933 [dB/m]	BOMS Factor [dB]	dB(uVolts/meter)	FCC Part 15 Subpart C 15.209	Margin (dB)	FCC Part 15 Subpart C Peak	Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
11490.18	70.17	PK	33.4	-49.05	54.52	-	-	74	-19.48	142	400	Horz
11489.619	67.17	PK	33.4	-49.04	51.53	-	-	74	-22.47	213	244	Vert
11490.18	61.29	LnAv	33.4	-49.05	45.84	54	-8.16	-	-	142	400	Horz
11489.619	60.4	LnAv	33.4	-49.04	44.96	54	-9.04	-	-	213	244	Vert

Test Frequency	Meter Re	Detector	AF-8947 [dB/m]	BOMS Factor [dB]	dB(uVolts/meter)	FCC Part 15 Subpart C 15.209	Margin (dB)	FCC Part 15 Subpart C Peak	Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
22979.884	57.32	PK	40.6	-53.29	44.63	-	-	74	-29.37	324	387	Vert
22979.884	52.45	PK	40.6	-53.29	39.76	-	-	74	-34.24	199	398	Horz
22979.884	52.91	LnAv	40.6	-53.29	40.42	54	-13.58	-	-	324	387	Vert
22979.884	50.88	LnAv	40.6	-53.29	38.39	54	-15.61	-	-	199	398	Horz

Mid Channel - 5785MHz

Test Frequency	Meter Reading	Detector	AF-8933 [dB/m]	BOMS Factor [dB]	dB(uVolts/meter)	FCC Part 15 Subpart C 15.209	Margin (dB)	FCC Part 15 Subpart C Peak	Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
11570.441	80.69	PK	33.5	-49.66	64.53	-	-	74	-9.47	2	362	Vert
11570.621	69.75	PK	33.5	-49.66	53.59	-	-	74	-20.41	307	381	Horz
11570.441	68.04	LnAv	33.5	-49.66	52.08	54	-1.92	-	-	2	362	Vert
11570.621	61.36	LnAv	33.5	-49.66	45.4	54	-8.6	-	-	307	381	Horz

High Channel - 5825MHz

Test Frequency	Meter Reading	Detector	AF-8933 [dB/m]	BOMS Factor [dB]	dB(uVolts/meter)	FCC Part 15 Subpart C 15.209	Margin (dB)	FCC Part 15 Subpart C Peak	Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
11650.822	80.94	PK	33.6	-49.81	64.73	-	-	74	-9.27	315	390	Horz
11650.441	69.96	PK	33.6	-49.79	53.77	-	-	74	-20.23	312	338	Vert
11650.822	68.45	LnAv	33.6	-49.81	52.44	54	-1.56	-	-	315	390	Horz
11650.441	68.82	LnAv	33.6	-49.79	52.83	54	-1.17	-	-	312	338	Vert

PK - Peak detector
LnAv - Linear Average detector

NOTE: No other emissions detected above the system noise floor.

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

HARMONICS AND SPURIOUS EMISSIONS

Manufacturer:Microsoft
Device:Wireless Controller
Model:1537
Job#:13U14963 Tested By: RM/DC
11n HT20 MCS0

Low Channel - 5745MHz

Test Frequency	Meter Reading	Detector	AF-8933 [dB/m]	BOMS Factor [dB]	dB(uVolts/meter)	FCC Part 15 Subpart C 15.209	Margin (dB)	FCC Part 15 Subpart C Peak	Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
11491.062	78.18	PK	33.4	-49.11	62.47	-	-	74	-11.53	310	383	Horz
11489.78	71.22	PK	33.4	-49.04	55.58	-	-	74	-18.42	307	322	Vert
11491.062	61.74	LnAv	33.4	-49.11	46.23	54	-7.77	-	-	310	383	Horz
11489.78	61.75	LnAv	33.4	-49.04	46.31	54	-7.69	-	-	307	322	Vert

Test Frequency	Meter Re	Detector	AF-8947 [dB/m]	BOMS Factor [dB]	dB(uVolts/meter)	FCC Part 15 Subpart C 15.209	Margin (dB)	FCC Part 15 Subpart C Peak	Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
22979.739	58.35	PK	40.6	-53.3	45.65	-	-	74	-28.35	351	284	Vert
22979.739	55.85	PK	40.6	-53.3	43.15	-	-	74	-30.85	90	296	Horz
22979.739	53.24	LnAv	40.6	-53.3	40.74	54	-13.26	-	-	351	284	Vert
22979.739	51.56	LnAv	40.6	-53.3	39.06	54	-14.94	-	-	90	296	Horz

Mid Channel - 5785MHz

Test Frequency	Meter Reading	Detector	AF-8933 [dB/m]	BOMS Factor [dB]	dB(uVolts/meter)	FCC Part 15 Subpart C 15.209	Margin (dB)	FCC Part 15 Subpart C Peak	Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
11568.357	77.94	PK	33.5	-49.51	61.93	-	-	74	-12.07	19	350	Vert
11569.78	67.6	PK	33.5	-49.64	51.46	-	-	74	-22.54	60	358	Horz
11568.357	61.66	LnAv	33.5	-49.51	45.85	54	-8.15	-	-	19	350	Vert
11569.78	60.68	LnAv	33.5	-49.64	44.74	54	-9.26	-	-	60	358	Horz

High Channel - 5825MHz

Test Frequency	Meter Reading	Detector	AF-8933 [dB/m]	BOMS Factor [dB]	dB(uVolts/meter)	FCC Part 15 Subpart C 15.209	Margin (dB)	FCC Part 15 Subpart C Peak	Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
11650.701	66.05	PK	33.6	-49.8	49.85	-	-	74	-24.15	309	394	Horz
11650.42	74.4	PK	33.6	-49.79	58.21	-	-	74	-15.79	312	397	Vert
11650.701	61.27	LnAv	33.6	-49.8	45.27	54	-8.73	-	-	309	394	Horz
11650.42	68.48	LnAv	33.6	-49.79	52.49	54	-1.51	-	-	312	397	Vert

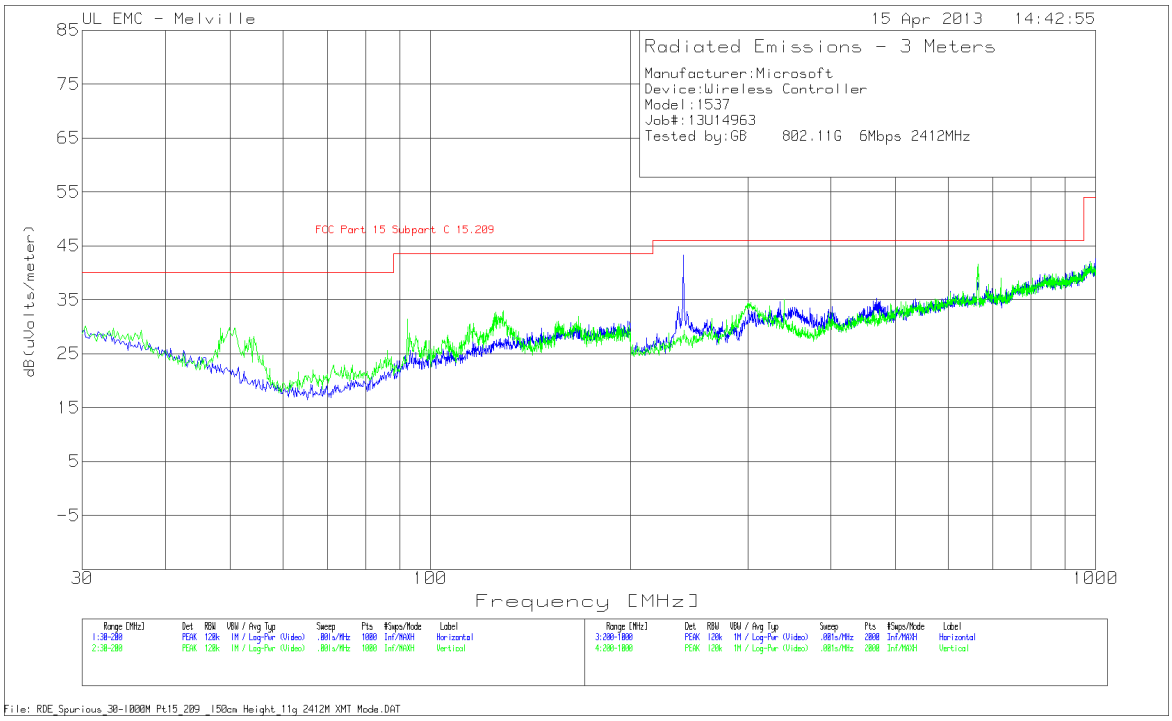
PK - Peak detector
LnAv - Linear Average detector

NOTE: No other emissions detected above the system noise floor.

9.7. WORST-CASE BELOW 1 GHz

SPURIOUS EMISSIONS 30 TO 1000 MHz (2.4GHZ WORST-CASE CONFIGURATION)

HORIZONTAL & VERTICAL PLOT

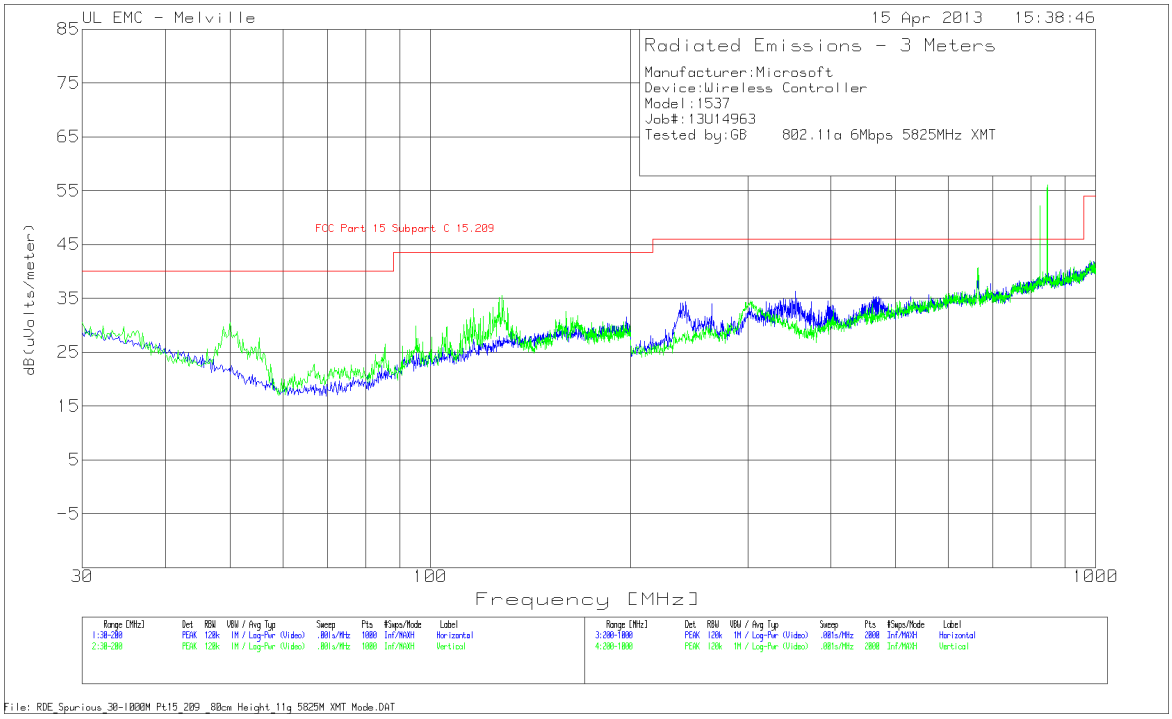


HORIZONTAL & VERTICAL DATA

Manufacturer:Microsoft										
Device:Wireless Controller										
Model:1537										
Job#:13U14963										
Tested by:GB 802.11G 6Mbps 2412MHz										
Vertical 30 - 200MHz										
Test Frequency	Meter Reading	Detector	AF-43441 [dB/m]	GL-3M [dB]	dB(uVolts/meter)	FCC Part 15 Subpart C 15.209	Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
49.8281	16.26	QP	10.2	0.1	26.56	40	-13.44	298	111	Vert
92.45	11.16	QP	9.8	0.4	21.36	43.5	-22.14	315	135	Vert
128.7	13.98	QP	13.8	0.5	28.28	43.5	-15.22	136	117	Vert
Horizontal 200 - 1000MHz										
Test Frequency	Meter Reading	Detector	AF-44067 [dB/m]	GL-3M [dB]	dB(uVolts/meter)	FCC Part 15 Subpart C 15.209	Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
240.015	17.18	QP	11.2	0.8	29.18	46	-16.82	128	324	Horz
664.5499	12.83	QP	20.1	1.8	34.73	46	-11.27	212	105	Horz
Vertical 200 - 1000MHz										
Test Frequency	Meter Reading	Detector	AF-44067 [dB/m]	GL-3M [dB]	dB(uVolts/meter)	FCC Part 15 Subpart C 15.209	Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
664.6561	17.04	QP	20.1	1.9	39.04	46	-6.96	343	102	Vert
QP - Quasi-Peak detector										

SPURIOUS EMISSIONS 30 TO 1000 MHz (5.8GHZ WORST-CASE CONFIGURATION)

HORIZONTAL & VERTICAL PLOT



HORIZONTAL & VERTICAL DATA

Manufacturer:Microsoft										
Device:Wireless Controller										
Model:1537										
Job#:13U14963										
Tested by:GB 802.11a 6Mbps 5825MHz XMT										
Vertical 30 - 200MHz										
Test Frequency	Meter Reading	Detector	AF-43441 [dB/m]	GL-3M [dB]	dB(uVolts/meter)	FCC Part 15 Subpart C 15.209	Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
50.0801	20.32	PK	10.1	0.1	30.52	40	-9.48	229	100	Vert
128.1882	21.28	PK	13.8	0.5	35.58	43.5	-7.92	126	100	Vert
Horizontal 200 - 1000MHz										
Test Frequency	Meter Reading	Detector	AF-44067 [dB/m]	GL-3M [dB]	dB(uVolts/meter)	FCC Part 15 Subpart C 15.209	Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
665.1303	13.5	QP	20.1	1.9	35.5	46	-10.5	62	162	Horz
Vertical 200 - 1000MHz										
Test Frequency	Meter Reading	Detector	AF-44067 [dB/m]	GL-3M [dB]	dB(uVolts/meter)	FCC Part 15 Subpart C 15.209	Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
845.9	9.04	QP	22.8	2.1	33.94	46	-12.06	343	154	Vert
824.7	8.94	QP	22.4	2.1	33.44	46	-12.56	251	132	Vert
664.99	15.39	QP	20.1	1.9	37.39	46	-8.61	222	131	Vert
PK - Peak detector										
QP - Quasi-Peak detector										

10. 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.

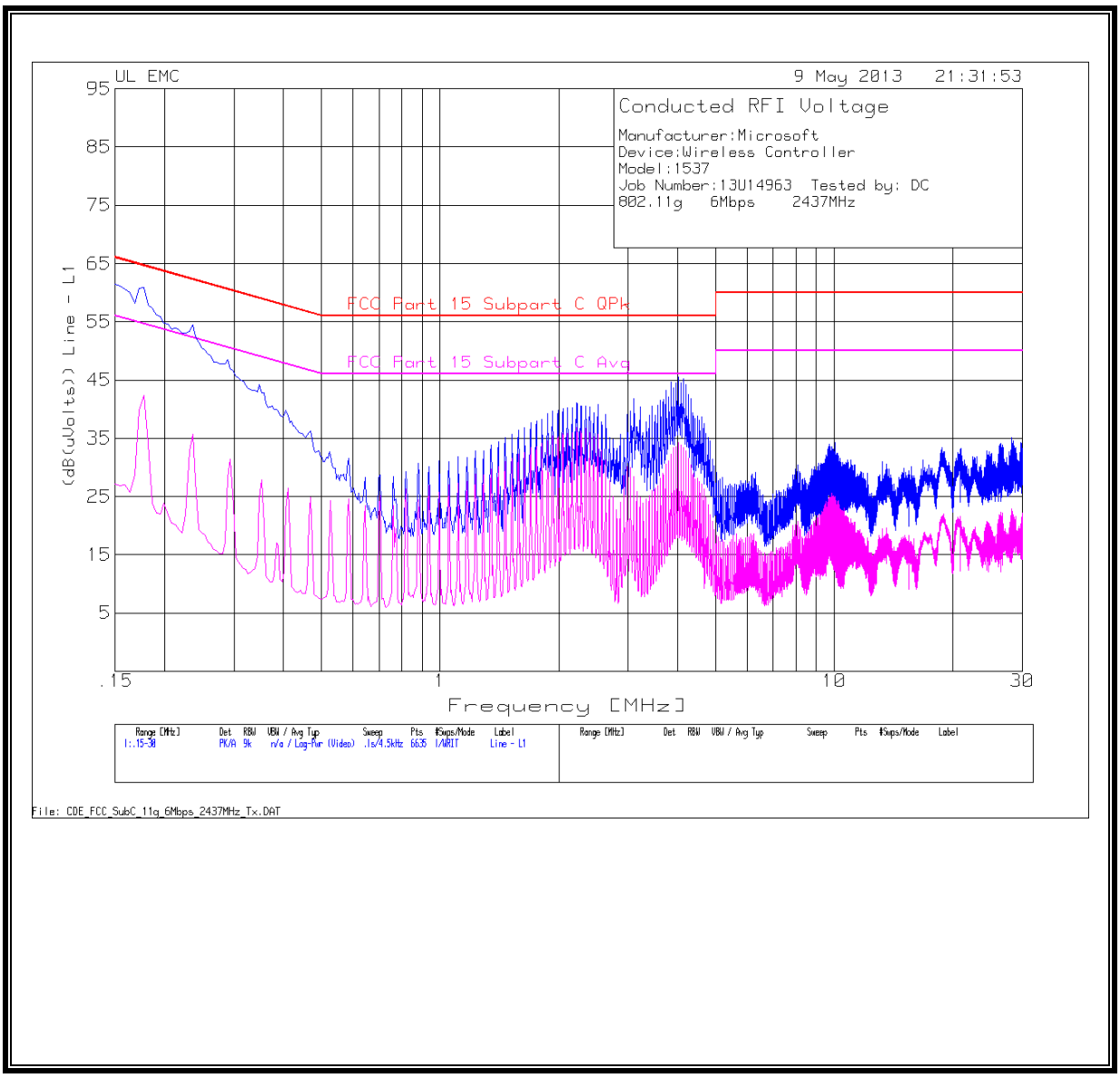
Line conducted data is recorded for both NEUTRAL and HOT lines.

RESULTS – 2.4GHz BAND

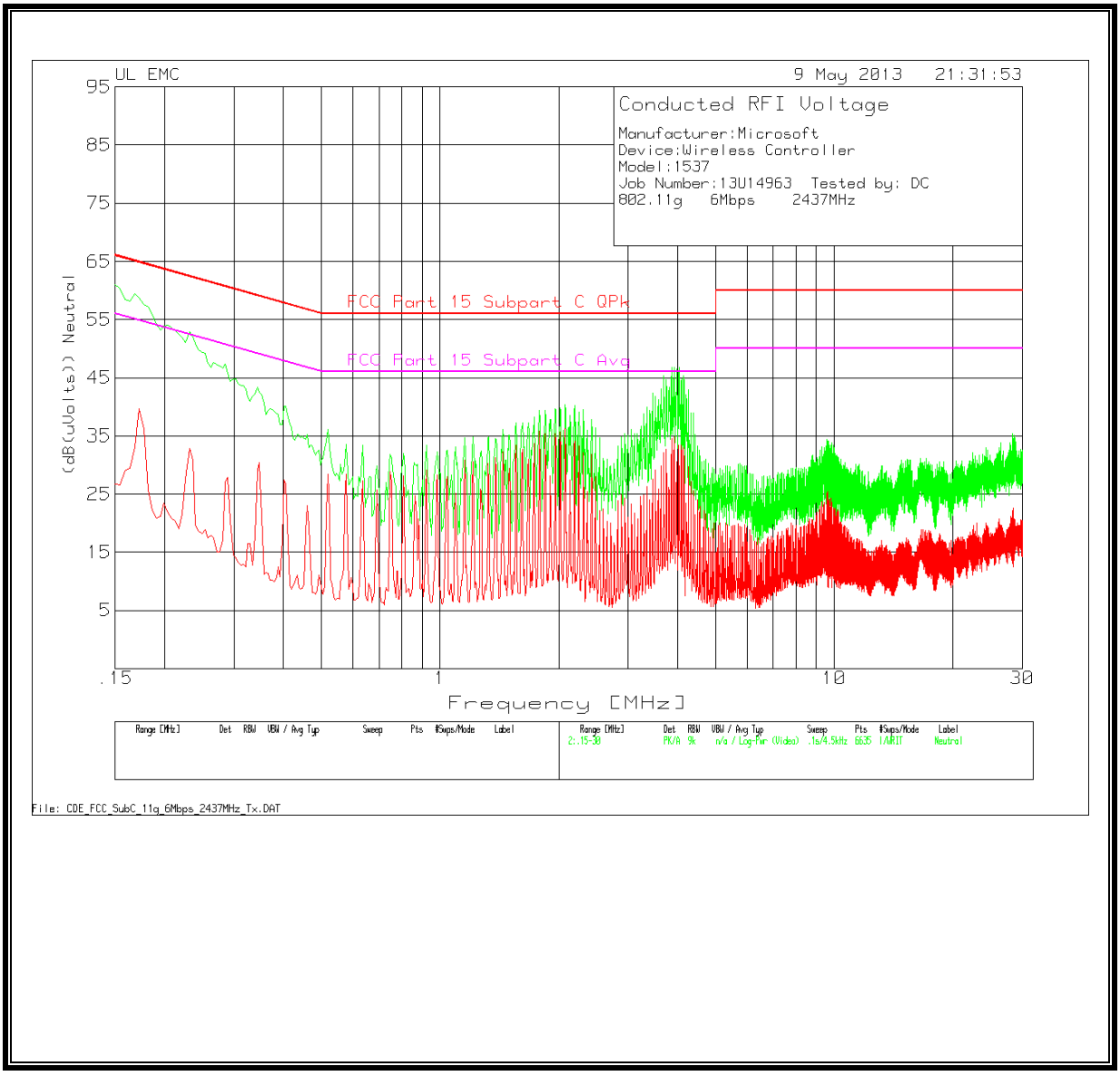
6 WORST EMISSIONS

Manufacturer:Microsoft								
Device:Wireless Controller								
Model:1537								
Job Number:13U14963 Tested by: DC								
802.11g 6Mbps 2437MHz								
Line - L1 .15 - 30MHz								
Test Frequency	Meter Reading	Detector	5A636 L1 [dB]	(dB(uVolts))	FCC Part 15 Subpart C QPk	Margin (dB)	FCC Part 15 Subpart C Avg	Margin (dB)
0.15	51.48	PK	10	61.48	66	-4.52	56	5.48
0.15	17.15	Av	10	27.15	66	-38.85	56	-28.85
0.177	50.81	PK	10	60.81	64.63	-3.82	54.63	6.18
0.177	32.34	Av	10	42.34	64.63	-22.29	54.63	-12.29
0.2355	44.4	PK	10	54.4	62.25	-7.85	52.25	2.15
0.2355	25.63	Av	10	35.63	62.25	-26.62	52.25	-16.62
0.2895	38.43	PK	10	48.43	60.54	-12.11	50.54	-2.11
0.2895	18.27	Av	10	28.27	60.54	-32.27	50.54	-22.27
0.348	34.28	PK	10	44.28	59.01	-14.73	49.01	-4.73
0.348	14.69	Av	10	24.69	59.01	-34.32	49.01	-24.32
4.029	35.25	PK	10.2	45.45	56	-10.55	46	-0.55
4.029	24.05	Av	10.2	34.25	56	-21.75	46	-11.75
0.159	39.66	QP	10	49.66	65.52	-15.86	55.52	-5.86
0.1536	40.92	QP	10	50.92	65.8	-14.88	55.8	-4.88
0.1734	40.5	QP	10	50.5	64.8	-14.3	54.8	-4.3
0.2328	33.05	QP	10	43.05	62.35	-19.3	52.35	-9.3
0.2859	25.27	QP	10	35.27	60.64	-25.37	50.64	-15.37
0.3453	23.06	QP	10	33.06	59.07	-26.01	49.07	-16.01
4.0308	22.74	QP	10.2	32.94	56	-23.06	46	-13.06
Neutral .15 - 30MHz								
Test Frequency	Meter Reading	Detector	5A636 L4Neut [dB]	(dB(uVolts))	FCC Part 15 Subpart C QPk	Margin (dB)	FCC Part 15 Subpart C Avg	Margin (dB)
0.15	50.84	PK	10.1	60.94	66	-5.06	56	4.94
0.15	16.64	Av	10.1	26.74	66	-39.26	56	-29.26
0.1815	47.19	PK	10	57.19	64.42	-7.23	54.42	2.77
0.1815	15.75	Av	10	25.75	64.42	-38.67	54.42	-28.67
0.231	42.85	PK	10	52.85	62.41	-9.56	52.41	0.44
0.231	22.86	Av	10	32.86	62.41	-29.55	52.41	-19.55
0.285	37.33	PK	10	47.33	60.67	-13.34	50.67	-3.34
0.285	17.05	Av	10	27.05	60.67	-33.62	50.67	-23.62
0.3435	33.41	PK	10	43.41	59.12	-15.71	49.12	-5.71
0.3435	19.2	Av	10	29.2	59.12	-29.92	49.12	-19.92
3.921	36.6	PK	10.2	46.8	56	-9.2	46	0.8
3.921	24.68	Av	10.2	34.88	56	-21.12	46	-11.12
0.1536	38.01	QP	10.1	48.11	65.8	-17.69	55.8	-7.69
0.1518	40.98	QP	10.1	51.08	65.9	-14.82	55.9	-4.82
0.177	37.94	QP	10	47.94	64.63	-16.69	54.63	-6.69
0.2265	29.42	QP	10	39.42	62.58	-23.16	52.58	-13.16
0.2868	26.85	QP	10	36.85	60.62	-23.77	50.62	-13.77
0.3471	23.08	QP	10	33.08	59.03	-25.95	49.03	-15.95
3.9192	27.48	QP	10.2	37.68	56	-18.32	46	-8.32
PK - Peak detector								
QP - Quasi-Peak detector								
Av - Average detector								

LINE 1 RESULTS



LINE 2 RESULTS

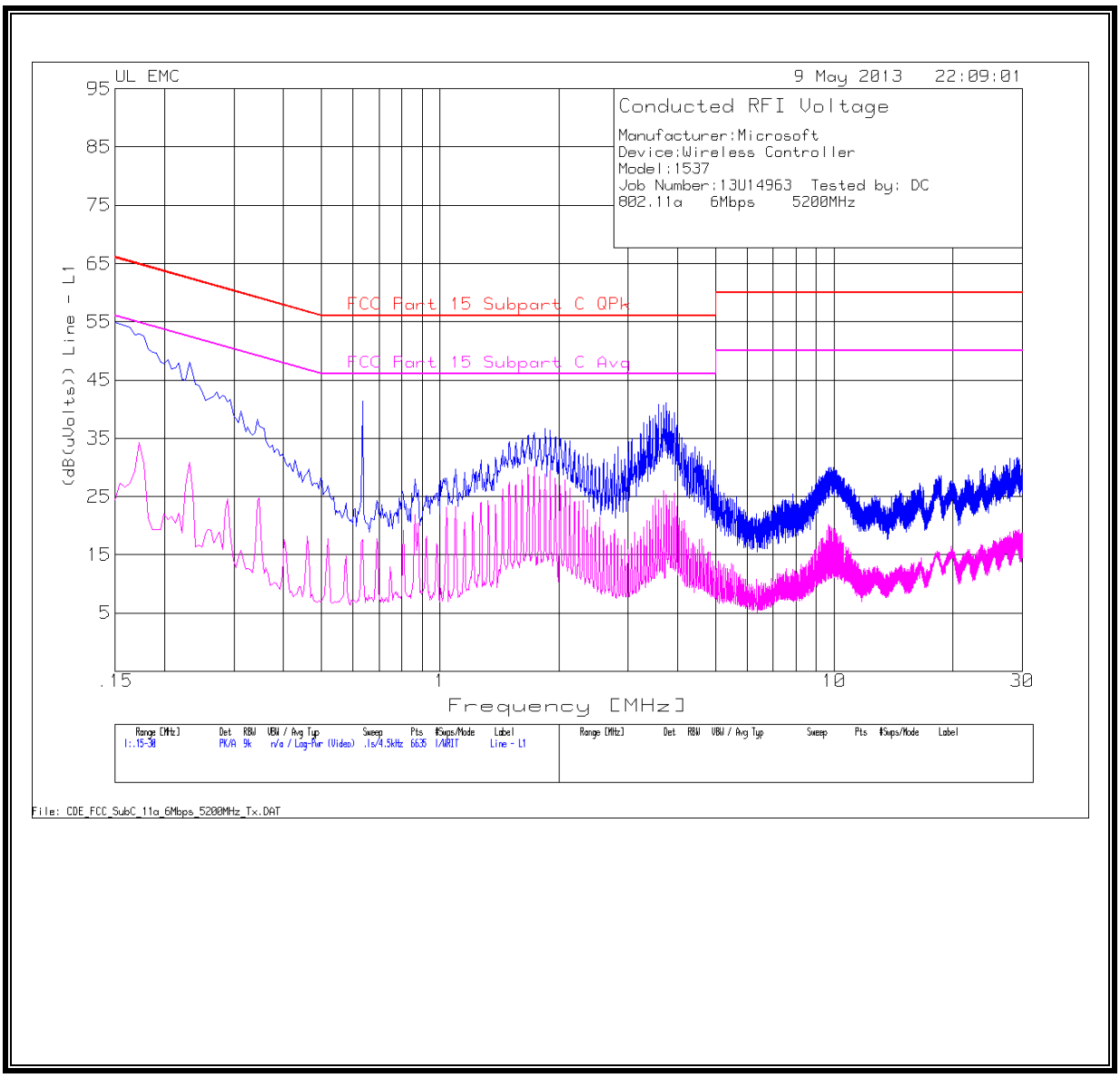


RESULTS – 5GHz BAND

6 WORST EMISSIONS

Manufacturer:Microsoft								
Device:Wireless Controller								
Model:1537								
Job Number:13U14963 Tested by: DC								
802.11a 6Mbps 5200MHz								
Line - L1 .15 - 30MHz								
Test Frequency	Meter Reading	Detector	5A636 L1 [dB]	(dB(uVolts))	FCC Part 15 Subpart C QPk	Margin (dB)	FCC Part 15 Subpart C Avg	Margin (dB)
0.15	44.92	PK	10	54.92	66	-11.08	56	-1.08
0.15	14.48	Av	10	24.48	66	-41.52	56	-31.52
0.1725	42.89	PK	10	52.89	64.84	-11.95	54.84	-1.95
0.1725	24.24	Av	10	34.24	64.84	-30.6	54.84	-20.6
0.231	38.05	PK	10	48.05	62.41	-14.36	52.41	-4.36
0.231	20.87	Av	10	30.87	62.41	-31.54	52.41	-21.54
0.636	31.33	PK	10	41.33	56	-14.67	46	-4.67
0.636	7.64	Av	10	17.64	56	-38.36	46	-28.36
1.8465	26.59	PK	10.1	36.69	56	-19.31	46	-9.31
1.8465	18.77	Av	10.1	28.87	56	-27.13	46	-17.13
3.75	30.93	PK	10.1	41.03	56	-14.97	46	-4.97
3.75	15.23	Av	10.1	25.33	56	-30.67	46	-20.67
Neutral .15 - 30MHz								
Test Frequency	Meter Reading	Detector	5A636 L4Neut [dB]	(dB(uVolts))	FCC Part 15 Subpart C QPk	Margin (dB)	FCC Part 15 Subpart C Avg	Margin (dB)
0.1635	45.05	PK	10	55.05	65.28	-10.23	55.28	-0.23
0.1635	17.57	Av	10	27.57	65.28	-37.71	55.28	-27.71
0.2085	39.25	PK	10	49.25	63.26	-14.01	53.26	-4.01
0.2085	11.01	Av	10	21.01	63.26	-42.25	53.26	-32.25
0.33	31.67	PK	10	41.67	59.45	-17.78	49.45	-7.78
0.33	4.01	Av	10	14.01	59.45	-45.44	49.45	-35.44
0.5775	21.6	PK	10.1	31.7	56	-24.3	46	-14.3
0.5775	15.99	Av	10.1	26.09	56	-29.91	46	-19.91
1.734	26.06	PK	10.1	36.16	56	-19.84	46	-9.84
1.734	17.03	Av	10.1	27.13	56	-28.87	46	-18.87
3.7005	33.02	PK	10.2	43.22	56	-12.78	46	-2.78
3.7005	14.46	Av	10.2	24.66	56	-31.34	46	-21.34
PK - Peak detector								
Av - Average detector								

LINE 1 RESULTS



LINE 2 RESULTS