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

CERTIFICATION TEST REPORT

FOR

WIRELESS CONTROLLER

MODEL NUMBER: 1537

FCC ID: C3K-1537
IC: 3048A-1537

REPORT NUMBER: 13U14963, Revision A

ISSUE DATE: 2013-07-10

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

Prepared by
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NVLAP LAB CODE 100255-0

Revision History

Rev.	Issue Date	Revisions	Revised By
--	7/10/13	Initial Issue	M. Antola
A	10/8/13	Added clarification to Radiated test section to address testing per 15.407	T. Lee

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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 2013-07-10

APPLICABLE STANDARDS	
STANDARD	**TEST RESULTS**
CFR 47 Part 15 Subpart E	Pass
INDUSTRY CANADA RSS-210 Issue 8 Annex 9	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. All indications of Pass/Fail in this report are opinions expressed by UL LLC 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 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 CCS 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 FCC CFR 47 Part 2, FCC CFR 47 Part 15, FCC 06-96, FCC KDB 789033, ANSI C63.4-2003, 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 Road, Melville, New York, USA.

UL LLC 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	±3.52 dB
Radiated Disturbance, 30 to 1000 MHz	±4.94 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/n transceiver, Model: 1537.

5.2. MAXIMUM OUTPUT POWER

The transmitter has a maximum conducted output power as follows:

Frequency Range (MHz)	Mode	Output Power (dBm)	Output Power (mW)
5260 - 5320	802.11a	7.86	6.11
5260 - 5320	802.11n HT20	7.9	6.17
5500 - 5700	802.11a	6.26	4.23
5500 - 5700	802.11n HT20	6.22	4.19

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.

Based on the baseline scan, the worst-case data rates were:

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

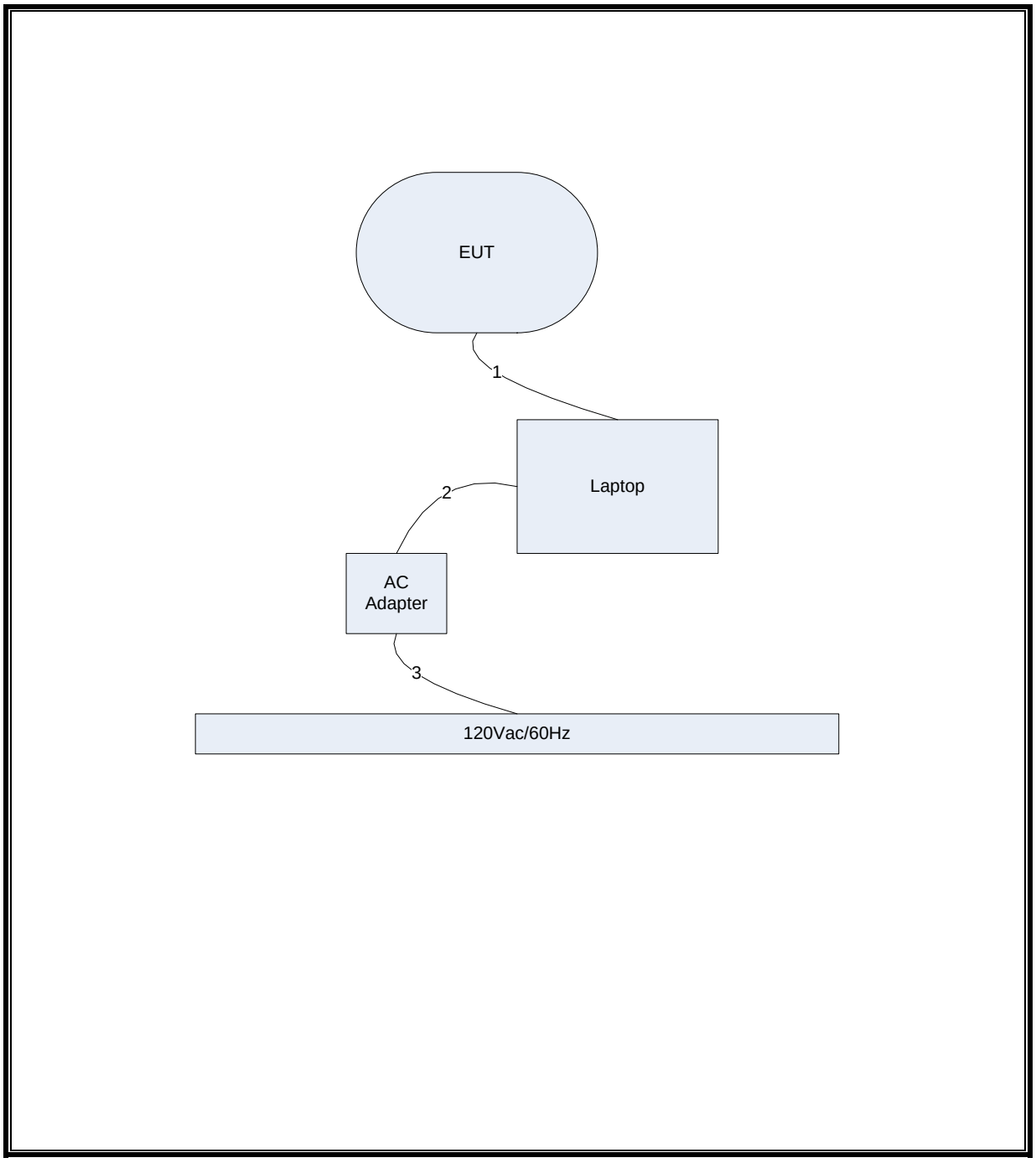
I/O CABLES

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 789033 D01 V01r03 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 (kHz)
802.11a 20 MHz	2.03	2	0.953	95.3%	0.21	0.494
802.11n HT20	1.89	2	0.947	94.7%	0.23	0.529

7.1.2. MEASUREMENT METHOD FOR POWER AND PPSD

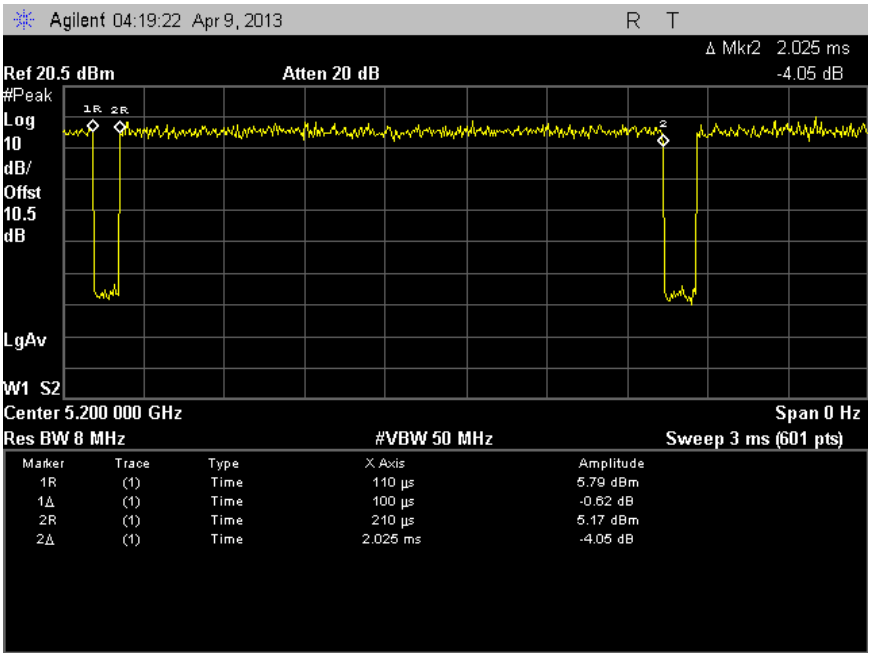
The Duty Cycle is less than 98% and consistent therefore KDB 789033 D01 V01r03 Method SA-2 is used.

7.1.3. MEASUREMENT METHOD FOR AVG SPURIOUS EMISSIONS > 1 GHz

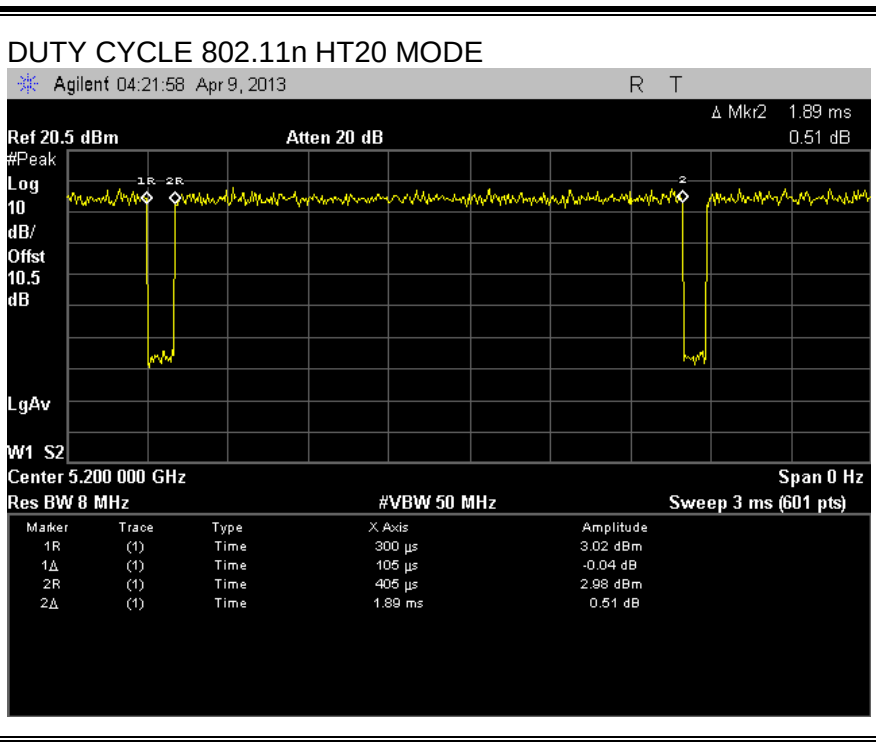
The Duty Cycle is less than 98% and consistent, KDB 789033 D01 V01r03 Method AD with Power RMS Averaging and VB with reduced video bandwidth Averaging and duty cycle correction is used.

7.1.4. DUTY CYCLE PLOTS

DUTY CYCLE 802.11a MODE



DUTY CYCLE 802.11n HT20 MODE



8. ANTENNA PORT TEST RESULTS

8.1. 802.11a MODE IN THE 5.3 GHz BAND

8.1.1. 26 dB BANDWIDTH

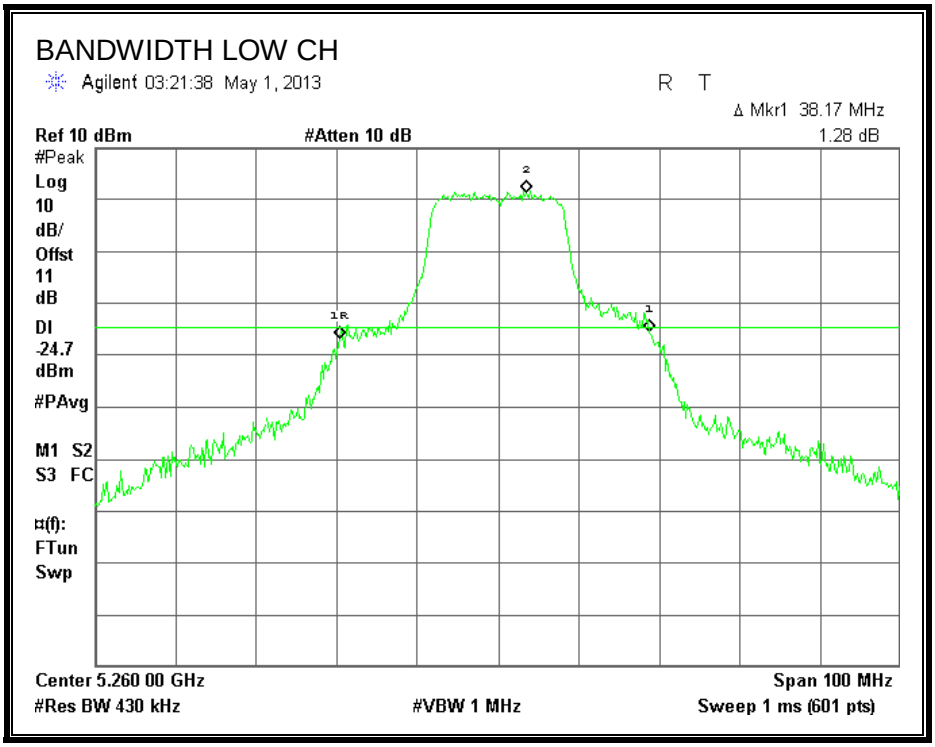
LIMITS

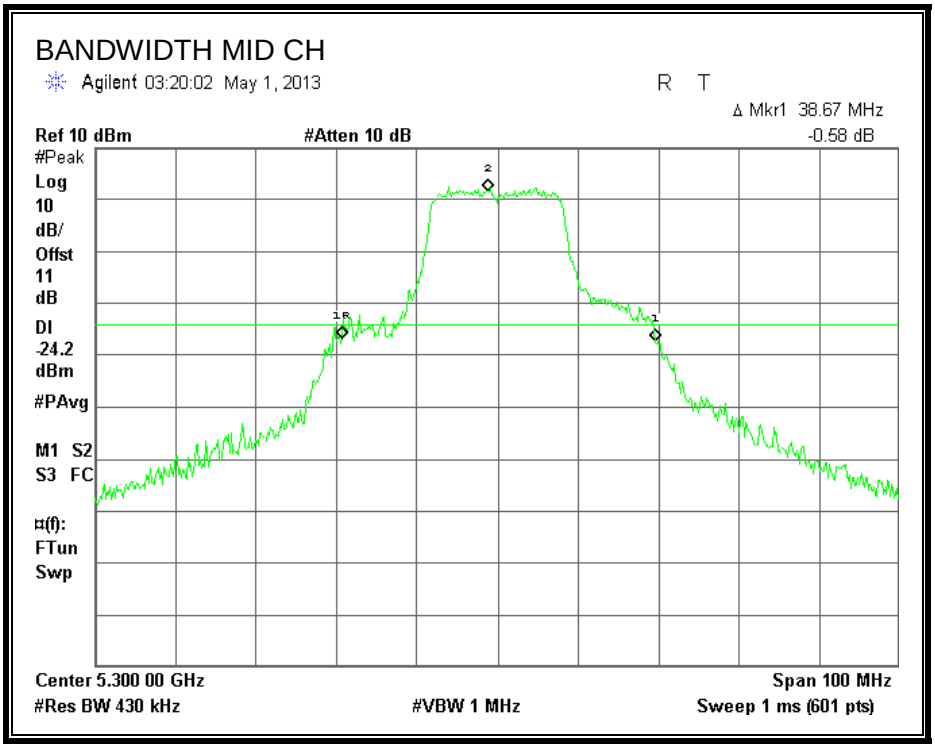
None; for reporting purposes only.

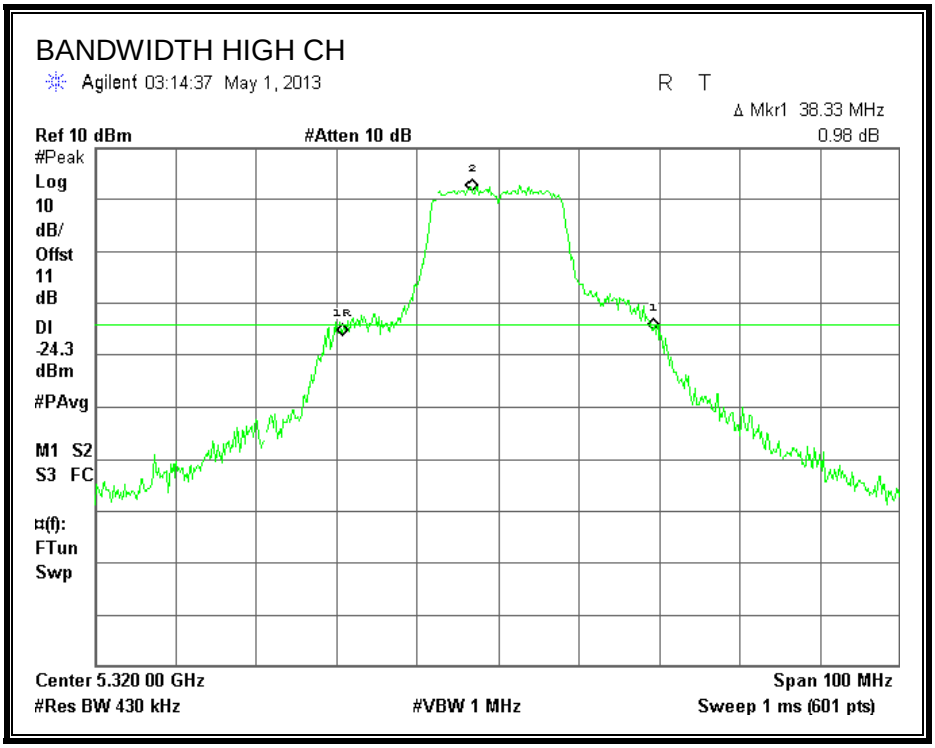
RESULTS

Channel	Frequency (MHz)	26 dB Bandwidth (MHz)
Low	5260	38.2
Mid	5300	38.7
High	5320	38.3

26 dB BANDWIDTH







8.1.2. 99% BANDWIDTH

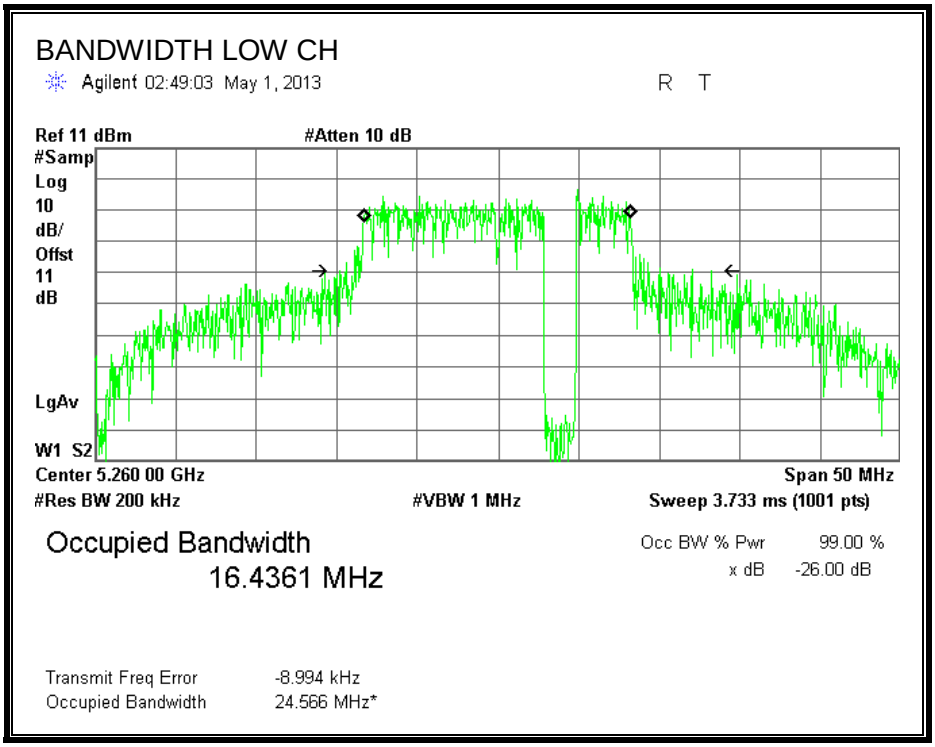
LIMITS

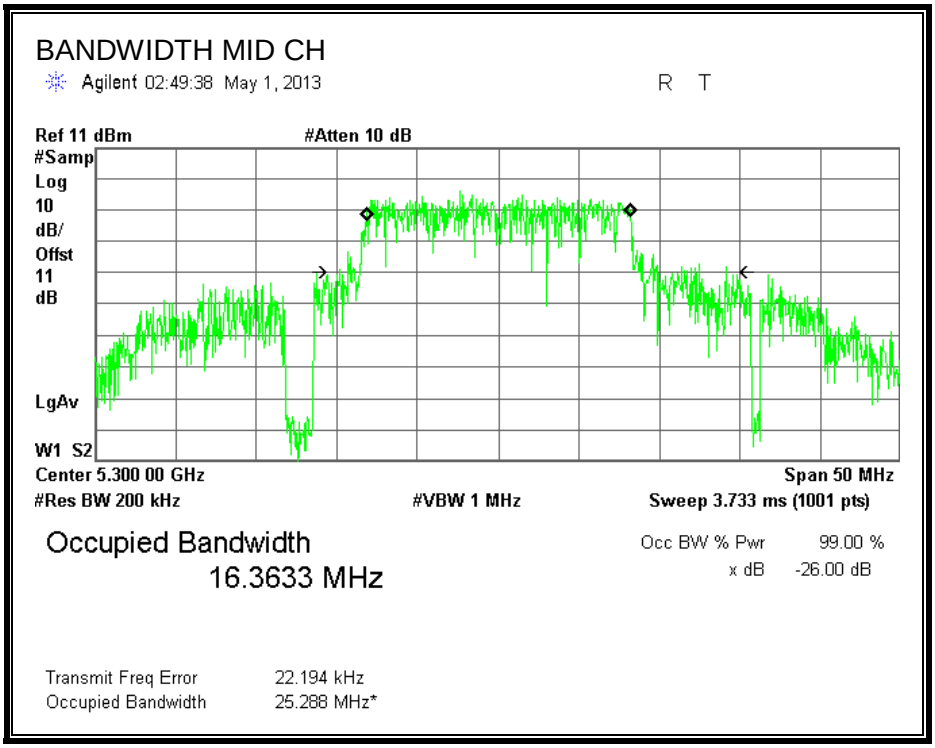
None; for reporting purposes only.

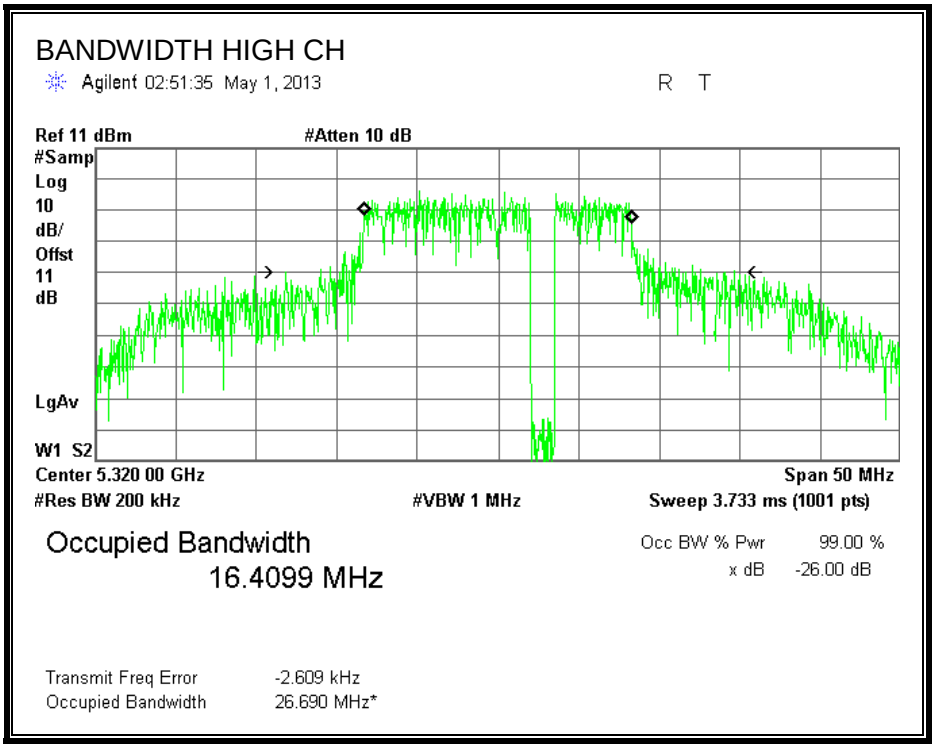
RESULTS

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	5260	16.4
Mid	5300	16.4
High	5320	16.4

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	5260	8.9
Mid	5300	8.9
High	5320	9.1

8.1.4. OUTPUT POWER AND PPSD

LIMITS

FCC §15.407 (a) (1)

For the band 5.25–5.35 GHz, the maximum conducted output power over the frequency band of operation shall not exceed the lesser of 251 mW or 11 dBm + 10 log B, where B is the 26–dB emission bandwidth in MHz. In addition, the peak power spectral density shall not exceed 11 dBm in any 1–MHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

IC RSS-210 A9.2 (1)

The maximum e.i.r.p. shall not exceed 200 mW or 10 + 10 log10 B, dBm, whichever power is less. B is the 99% emission bandwidth in MHz. The e.i.r.p. spectral density shall not exceed 10 dBm in any 1.0 MHz band.

DIRECTIONAL ANTENNA GAIN

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

RESULTS

Bandwidth and Antenna Gain

Channel	Frequency (MHz)	Min 26 dB BW (MHz)	Min 99% BW (MHz)	Directional Gain (dBi)
Low	5260	38.2	16.4	1.00
Mid	5300	38.7	16.4	1.00
High	5320	38.3	16.4	1.00

Limits

Channel	Frequency (MHz)	FCC Power Limit (dBm)	IC Power Limit (dBm)	IC EIRP Limit (dBm)	Power Limit (dBm)	FCC PPSD Limit (dBm)	IC PSD Limit (dBm)	PPSD Limit (dBm)
Low	5260	24.00	23.15	29.15	23.15	11.00	11.00	11.00
Mid	5300	24.00	23.15	29.15	23.15	11.00	11.00	11.00
High	5320	24.00	23.15	29.15	23.15	11.00	11.00	11.00

Duty Cycle CF (dB)	0.20	Included in Calculations of Corr'd Power & PPSD

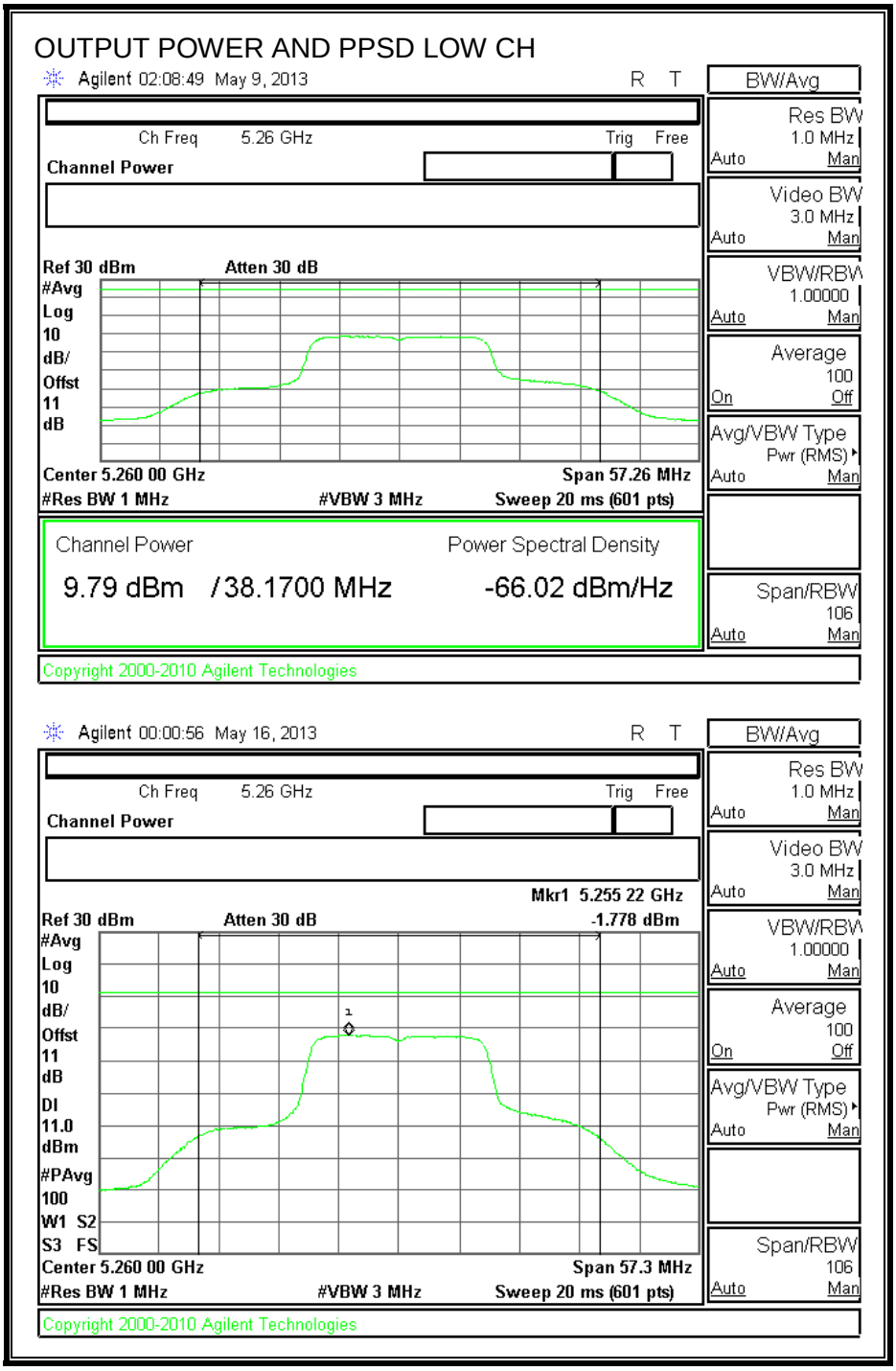
Output Power Results

Channel	Frequency (MHz)	Chain 0 Meas Power (dBm)	Total Corr'd Power (dBm)	Power Limit (dBm)	Power Margin (dB)
Low	5260	9.79	9.99	23.15	-13.16
Mid	5300	9.43	9.63	23.15	-13.52
High	5320	9.72	9.92	23.15	-13.23

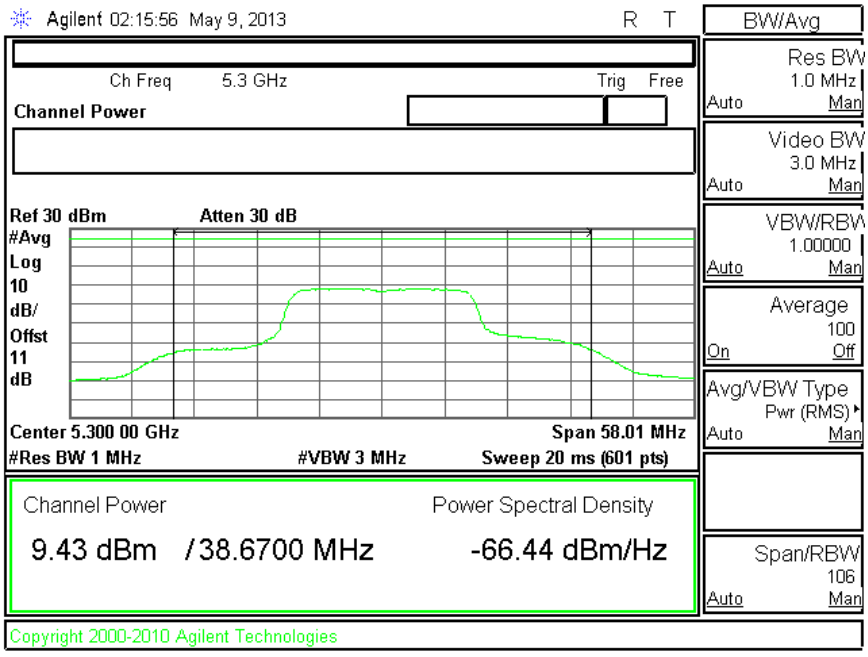
PPSD Results

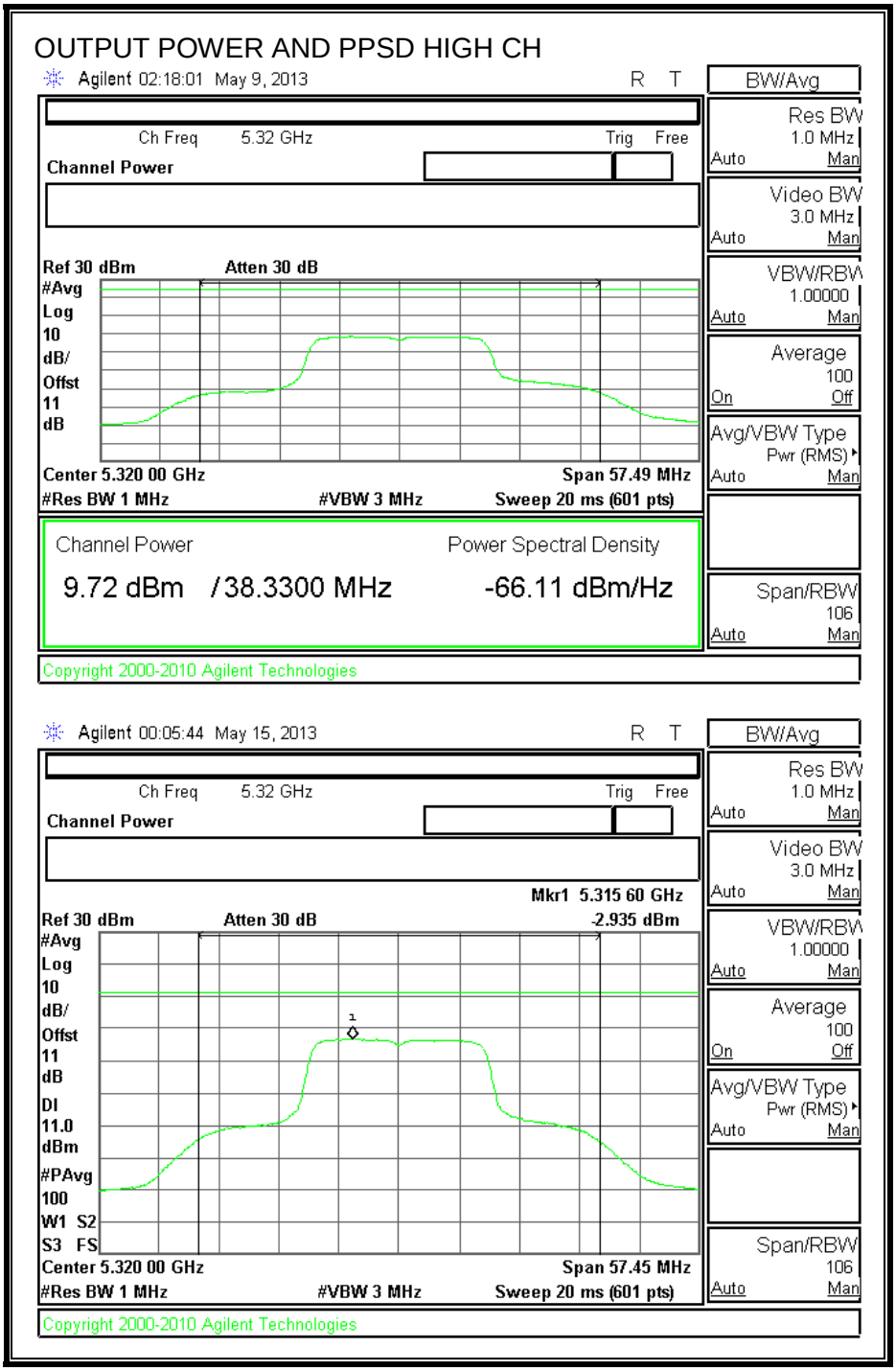
Channel	Frequency (MHz)	Chain 0 Meas PPSD (dBm)	Total Corr'd PPSD (dBm)	PPSD Limit (dBm)	PPSD Margin (dB)
Low	5260	-1.78	-1.58	11.00	-12.58
Mid	5300	-3.04	-2.84	11.00	-13.84
High	5320	-2.94	-2.74	11.00	-13.74

OUTPUT POWER AND PPSD



OUTPUT POWER AND PPSD MID CH





8.1.5. PEAK EXCURSION

LIMITS

FCC §15.407 (a) (6)

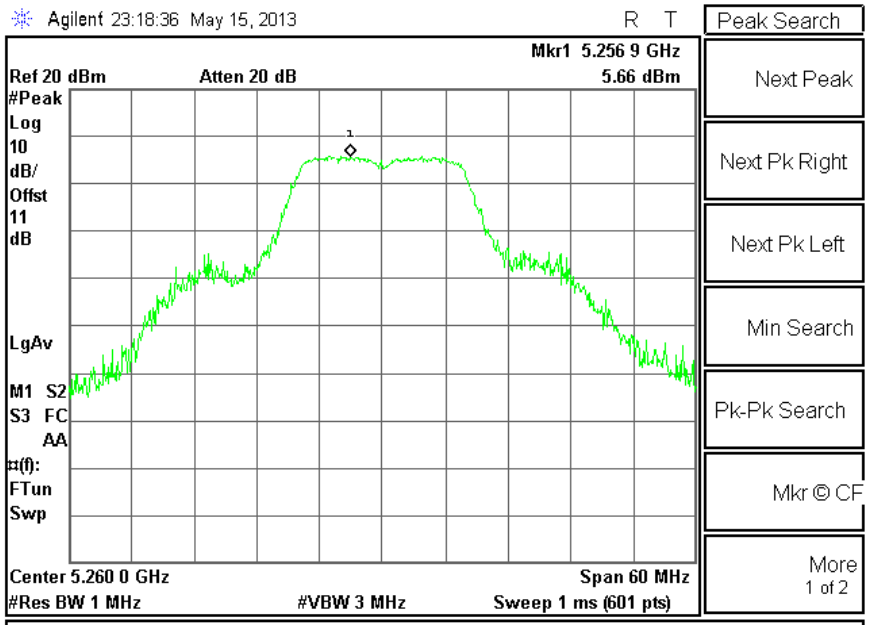
The ratio of the peak excursion of the modulation envelope (measured using a peak hold function) to the peak transmit power (measured as specified above) shall not exceed 13 dB across any 1 MHz bandwidth or the emission bandwidth whichever is less.

RESULTS

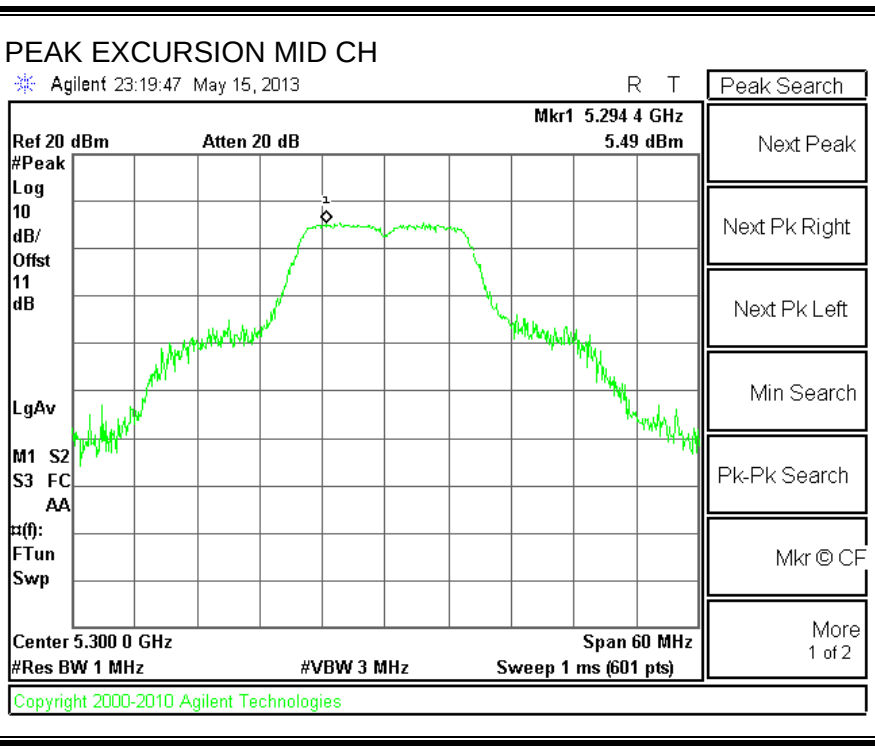
Channel	Frequency (MHz)	PK Level (dBm)	PSD (dBm)	DCCF (dB)	Peak Excursion (dB)	Limit (dB)	Margin (dB)
Low	5260	5.66	-1.78	0.20	7.24	13	-5.76
Mid	5300	5.49	-3.04	0.20	8.33	13	-4.67
High	5320	5.52	-2.94	0.20	8.26	13	-4.74

PEAK EXCURSION

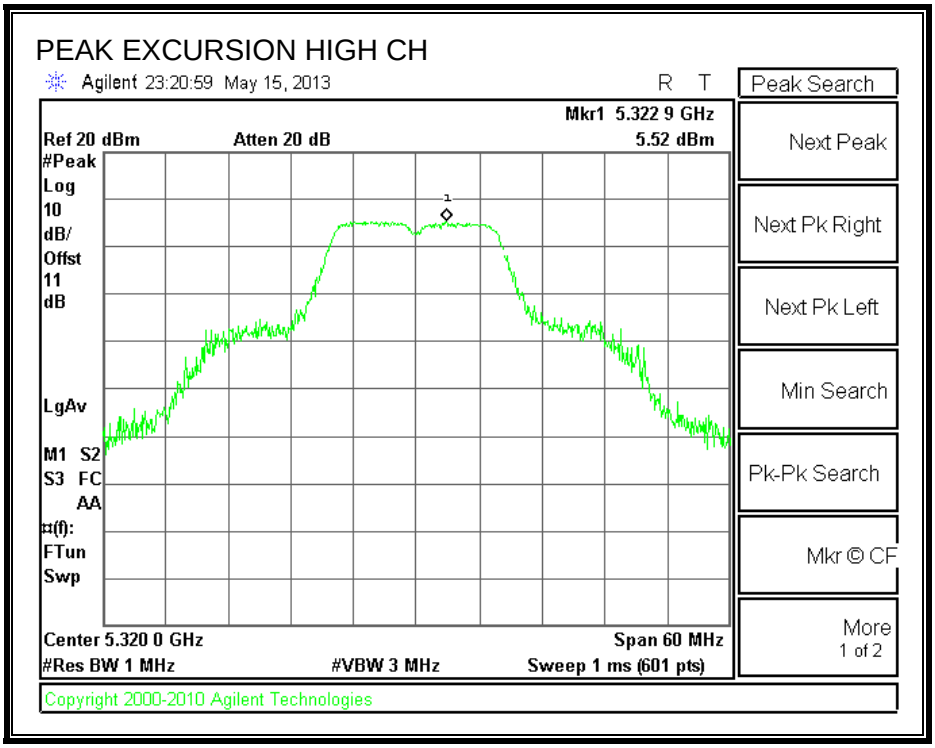
PEAK EXCURSION LOW CH



PEAK EXCURSION MID CH



PEAK EXCURSION HIGH CH



8.2. 802.11n HT20 MODE IN THE 5.3 GHz BAND

8.2.1. 26 dB BANDWIDTH

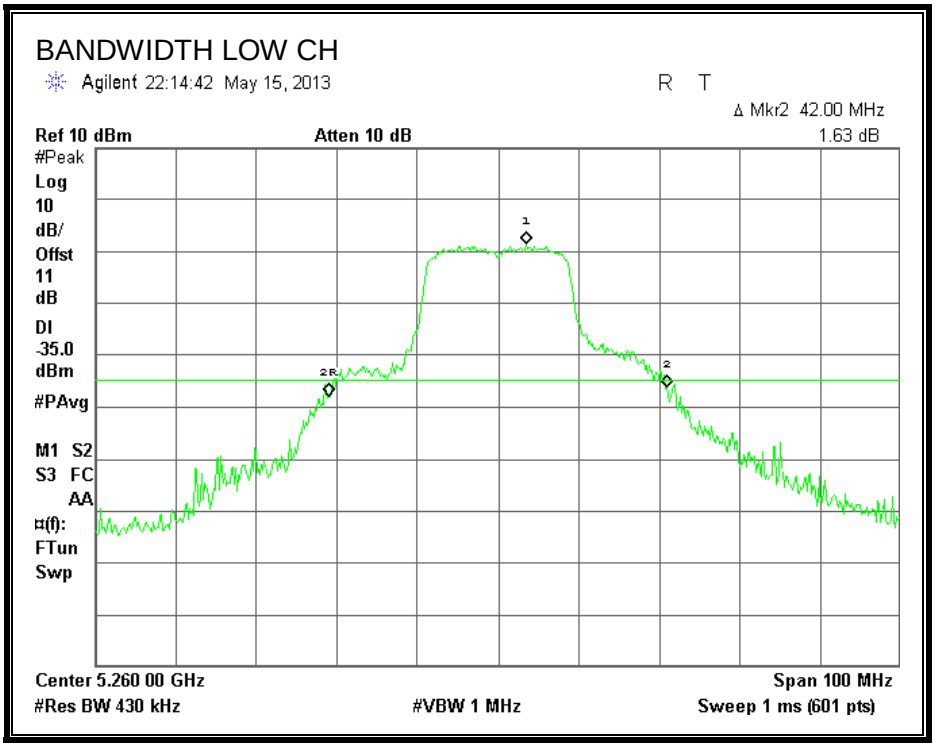
LIMITS

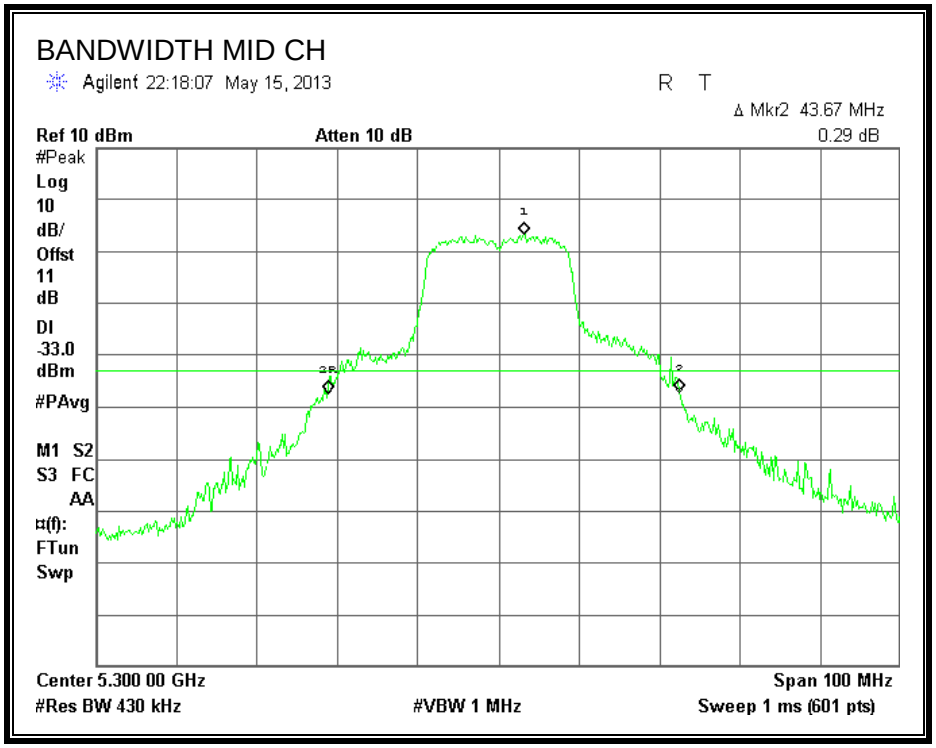
None; for reporting purposes only.

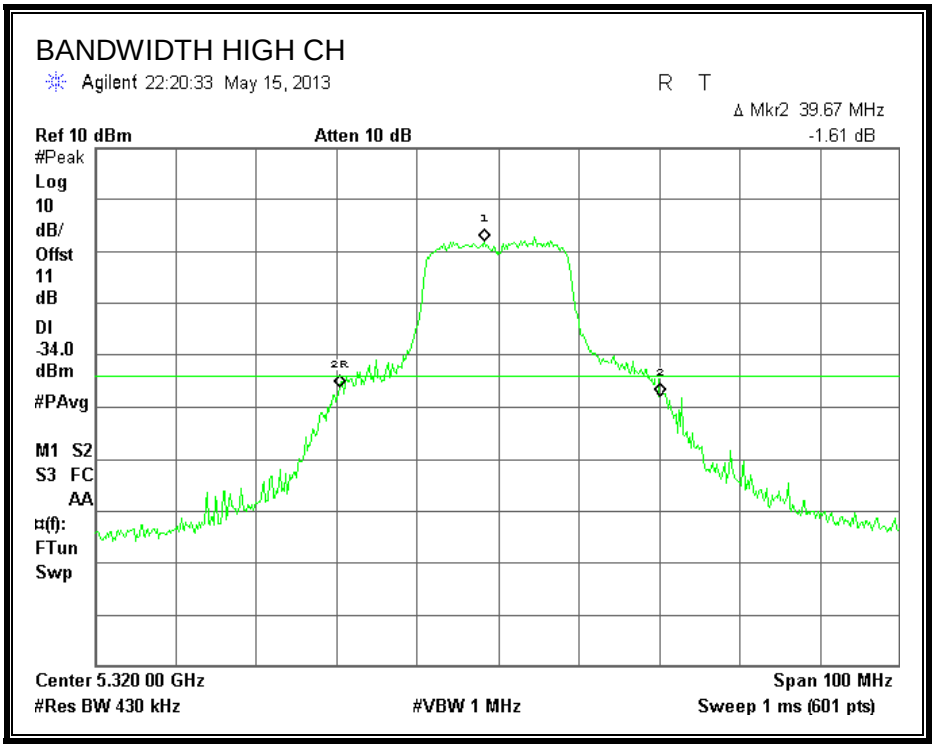
RESULTS

Channel	Frequency (MHz)	26 dB Bandwidth (MHz)
Low	5260	42.0
Mid	5300	43.7
High	5320	39.7

26 dB BANDWIDTH







8.2.2. 99% BANDWIDTH

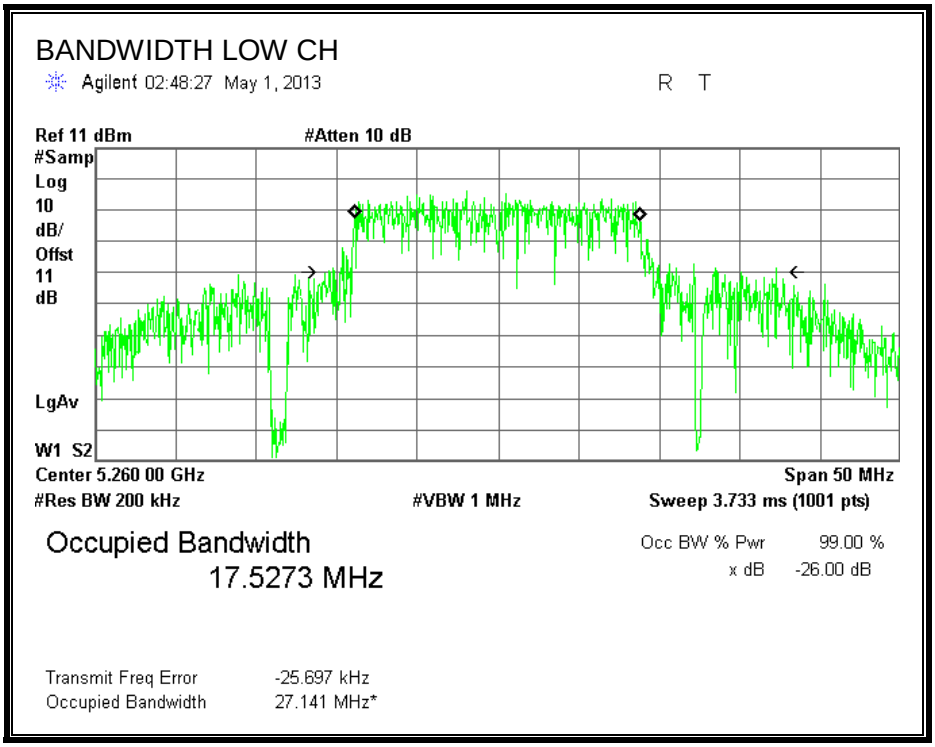
LIMITS

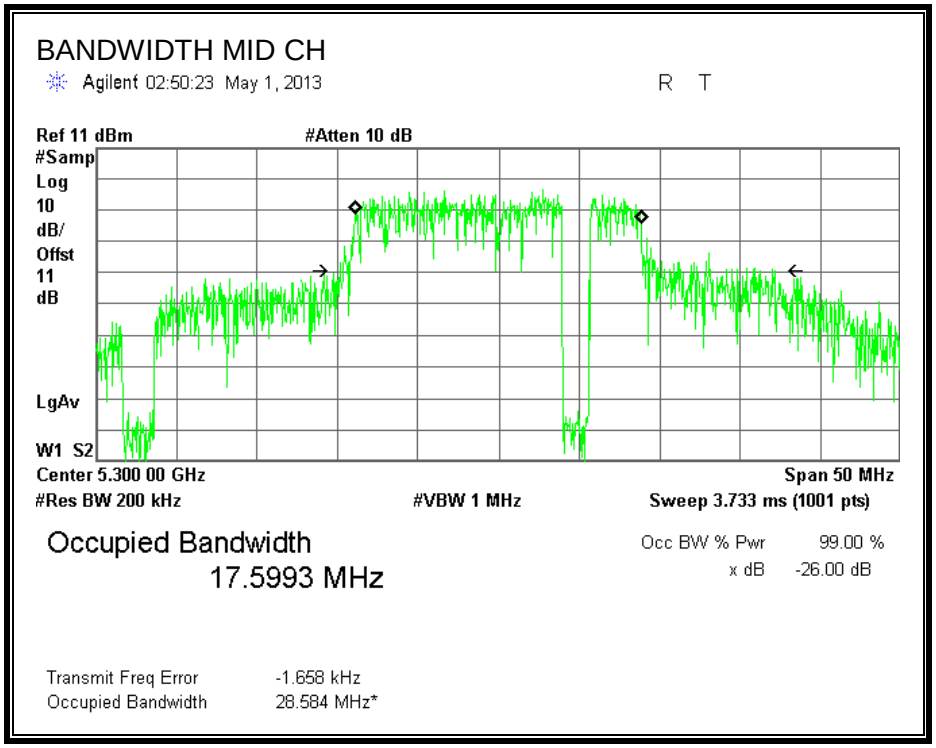
None; for reporting purposes only.

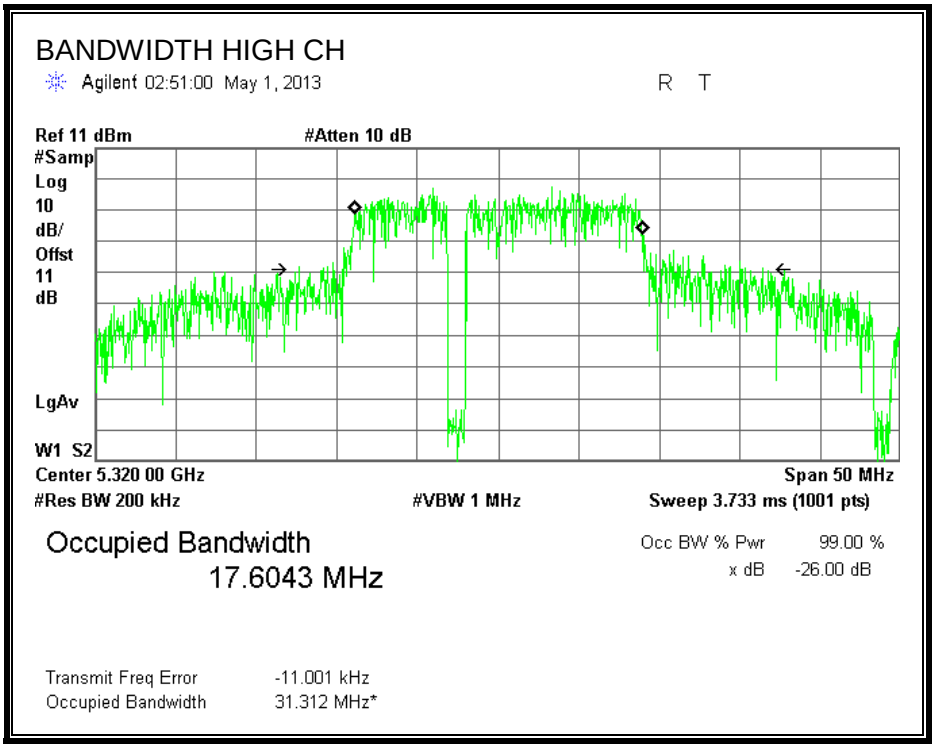
RESULTS

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	5260	17.5
Mid	5300	17.6
High	5320	17.6

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	5260	6.7
Mid	5300	7.0
High	5320	7.0

8.2.4. OUTPUT POWER AND PPSD

LIMITS

FCC §15.407 (a) (1)

For the band 5.25–5.35 GHz, the maximum conducted output power over the frequency band of operation shall not exceed the lesser of 251 mW or 11 dBm + 10 log B, where B is the 26–dB emission bandwidth in MHz. In addition, the peak power spectral density shall not exceed 4 dBm in any 1–MHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

IC RSS-210 A9.2 (1)

The maximum e.i.r.p. shall not exceed 200 mW or 10 + 10 log10 B, dBm, whichever power is less. B is the 99% emission bandwidth in MHz. The e.i.r.p. spectral density shall not exceed 10 dBm in any 1.0 MHz band.

DIRECTIONAL ANTENNA GAIN

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

RESULTS

Bandwidth and Antenna Gain

Channel	Frequency (MHz)	Min 26 dB BW (MHz)	Min 99% BW (MHz)	Directional Gain (dBi)
Low	5260	42.0	17.5	1.00
Mid	5300	43.7	17.6	1.00
High	5320	39.7	17.6	1.00

Limits

Channel	Frequency (MHz)	FCC Power Limit (dBm)	IC Power Limit (dBm)	IC EIRP Limit (dBm)	Power Limit (dBm)	FCC PPSD Limit (dBm)	IC PSD Limit (dBm)	PPSD Limit (dBm)
Low	5260	24.00	23.44	29.44	23.44	11.00	11.00	11.00
Mid	5300	24.00	23.46	29.46	23.46	11.00	11.00	11.00
High	5320	24.00	23.46	29.46	23.46	11.00	11.00	11.00

Duty Cycle CF (dB)	0.20	Included in Calculations of Corr'd Power & PPSD

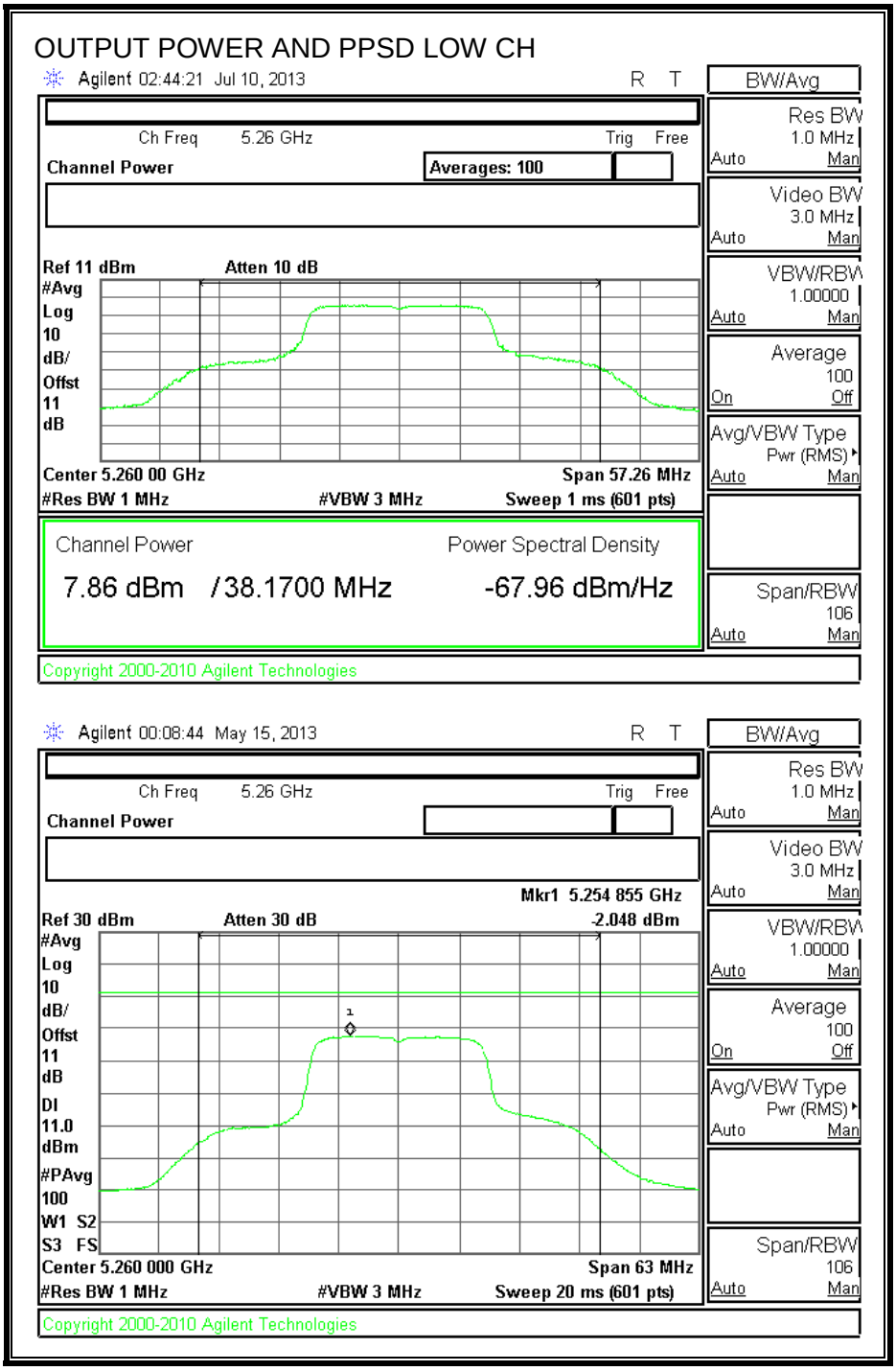
Output Power Results

Channel	Frequency (MHz)	Chain 0 Meas Power (dBm)	Total Corr'd Power (dBm)	Power Limit (dBm)	Power Margin (dB)
Low	5260	7.86	8.06	23.44	-15.38
Mid	5300	7.79	7.99	23.46	-15.47
High	5320	7.76	7.96	23.46	-15.50

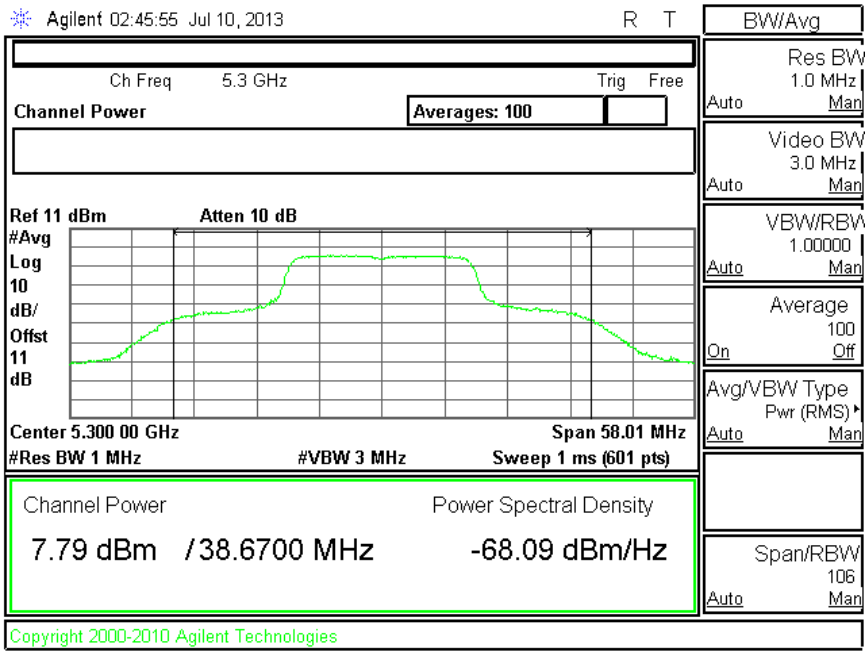
PPSD Results

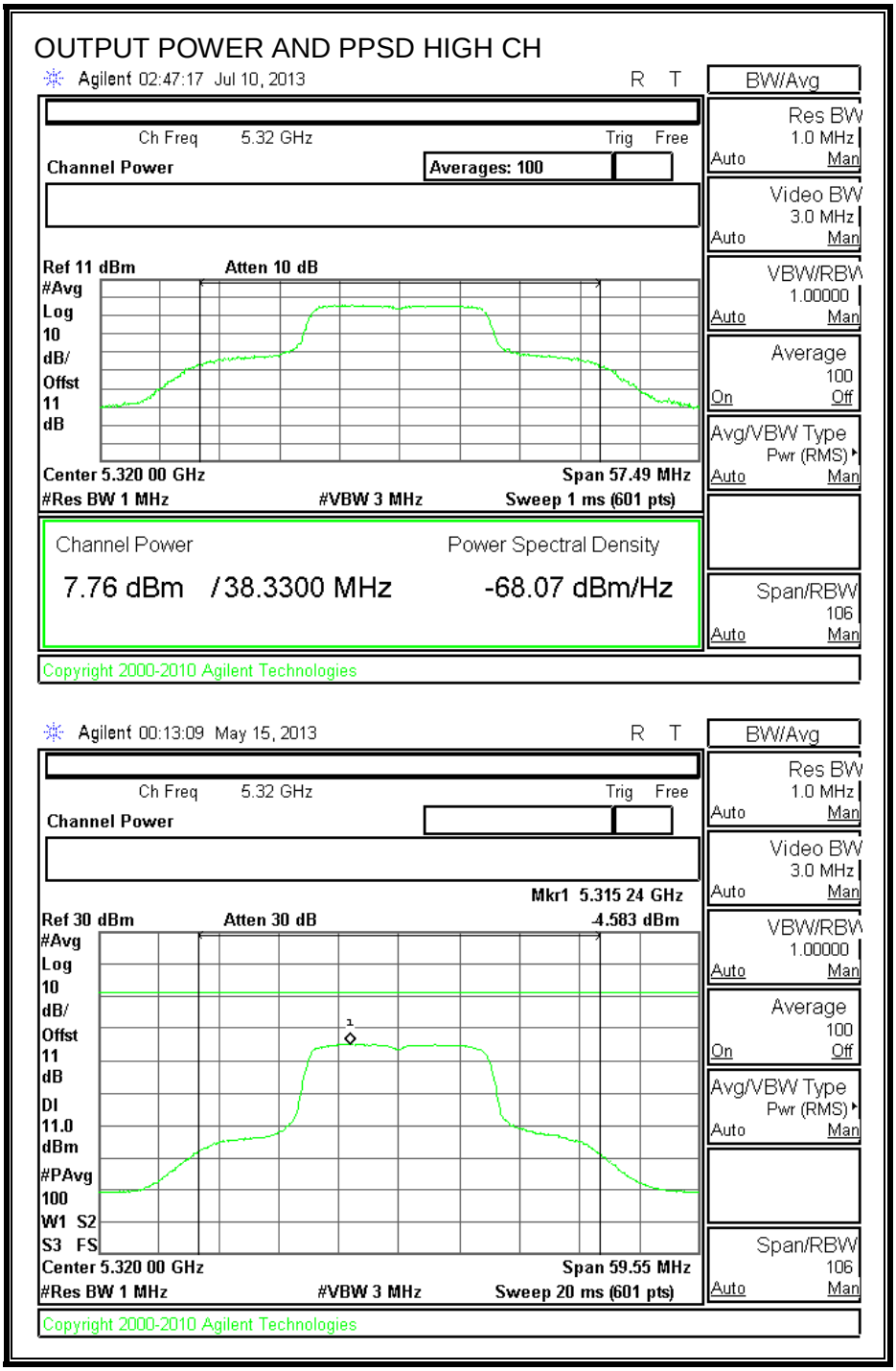
Channel	Frequency (MHz)	Chain 0 Meas PPSD (dBm)	Total Corr'd PPSD (dBm)	PPSD Limit (dBm)	PPSD Margin (dB)
Low	5260	-2.05	-1.85	11.00	-12.85
Mid	5300	-2.49	-2.29	11.00	-13.29
High	5320	-4.58	-4.38	11.00	-15.38

OUTPUT POWER AND PPSD



OUTPUT POWER AND PPSD MID CH





8.2.5. PEAK EXCURSION

LIMITS

FCC §15.407 (a) (6)

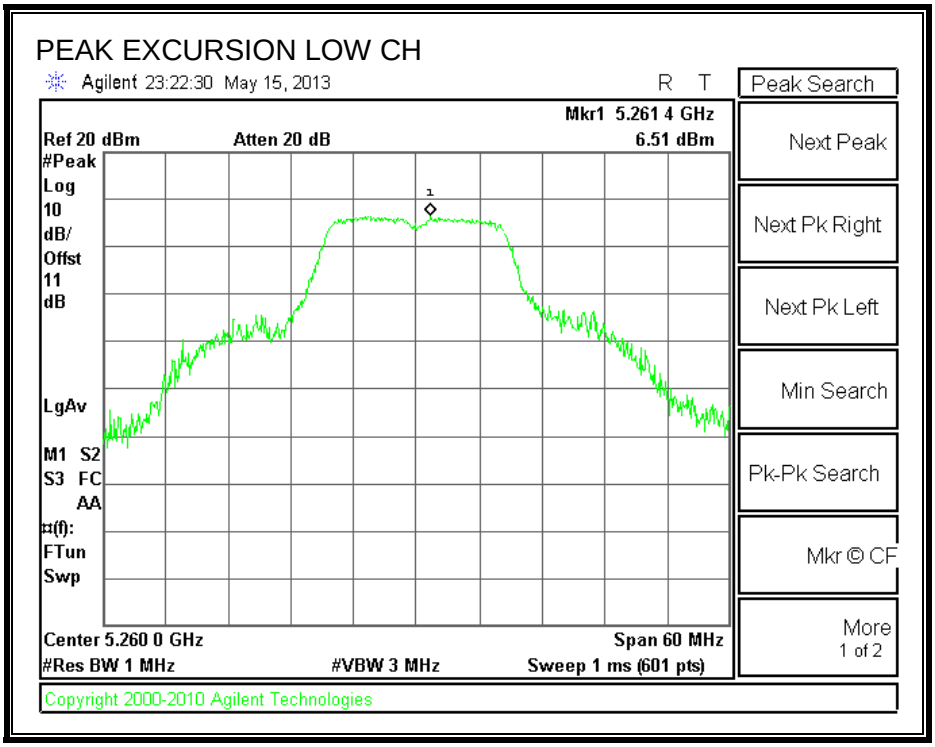
The ratio of the peak excursion of the modulation envelope (measured using a peak hold function) to the peak transmit power (measured as specified above) shall not exceed 13 dB across any 1 MHz bandwidth or the emission bandwidth whichever is less.

RESULTS

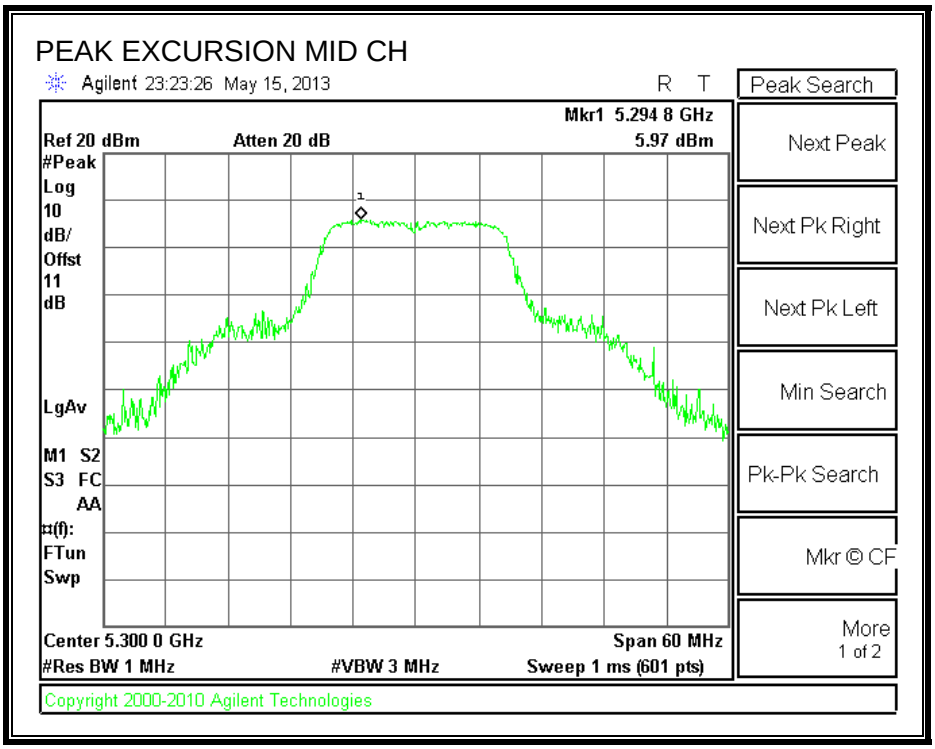
Channel	Frequency (MHz)	PK Level (dBm)	PSD (dBm)	DCCF (dB)	Peak Excursion (dB)	Limit (dB)	Margin (dB)
Low	5260	6.51	-2.05	0.20	8.36	13	-4.64
Mid	5300	5.97	-2.49	0.20	8.26	13	-4.74
High	5320	3.84	-4.58	0.20	8.22	13	-4.78

PEAK EXCURSION

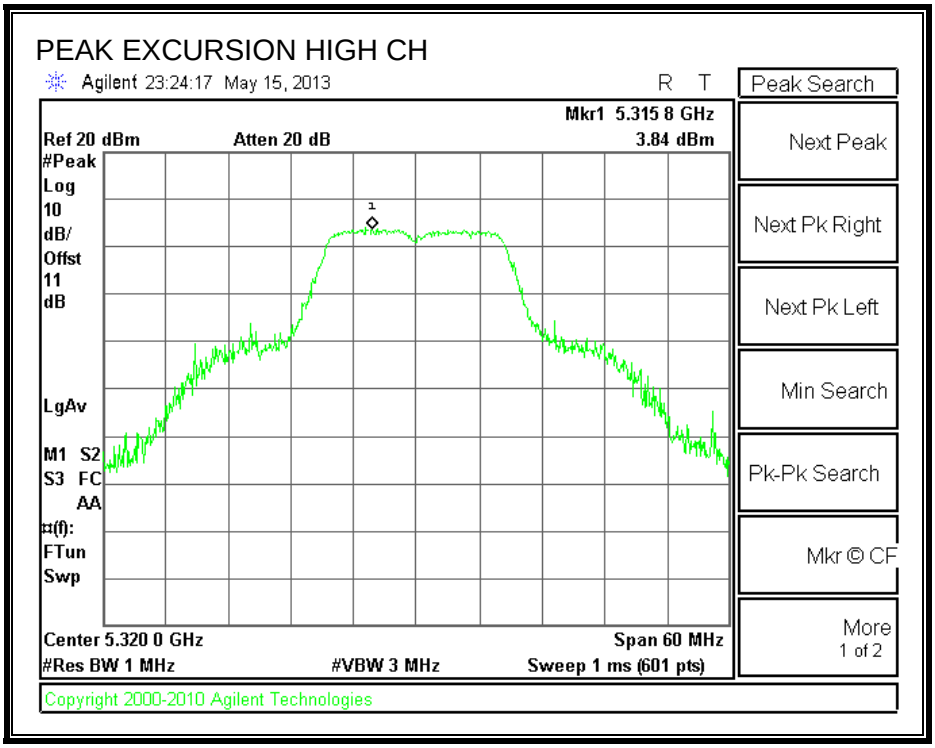
PEAK EXCURSION LOW CH



PEAK EXCURSION MID CH



PEAK EXCURSION HIGH CH



8.3. 802.11a MODE IN THE 5.6 GHz BAND

8.3.1. 26 dB BANDWIDTH

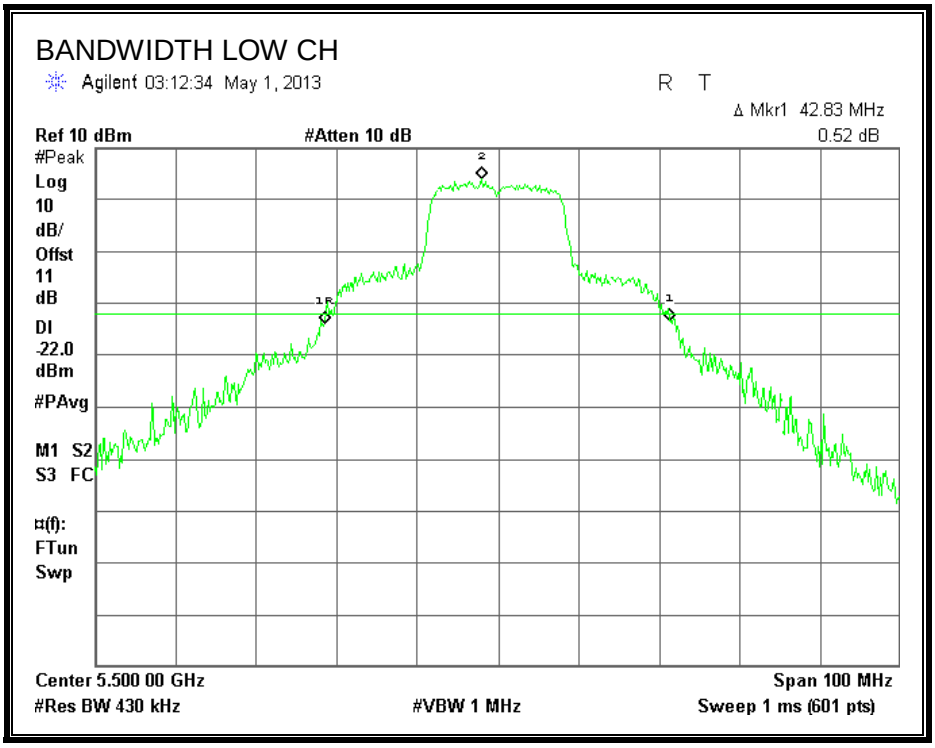
LIMITS

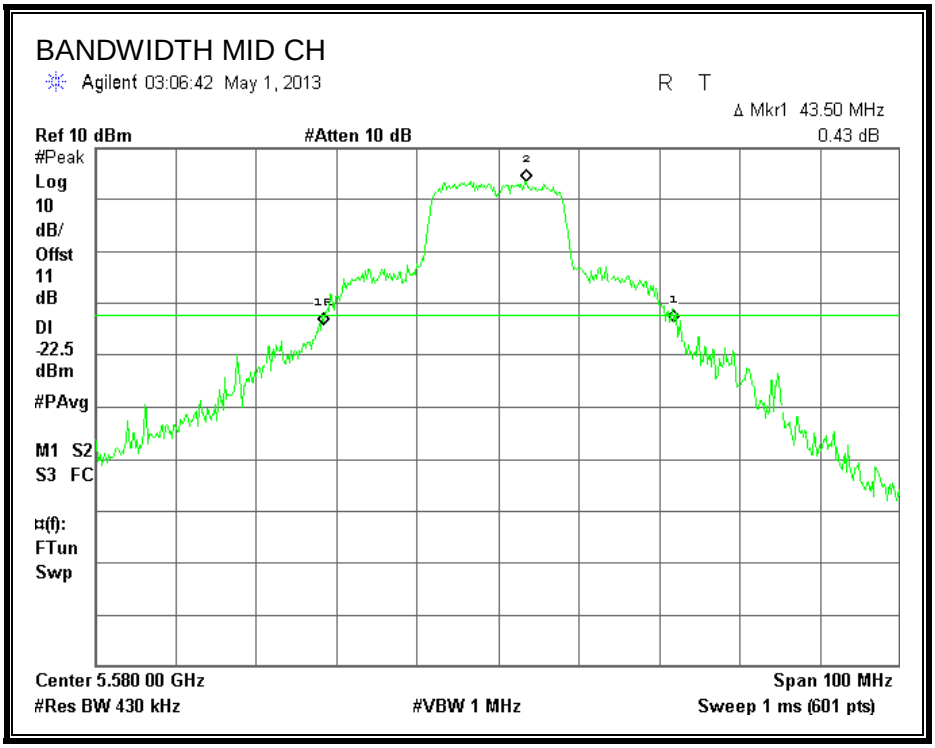
None; for reporting purposes only.

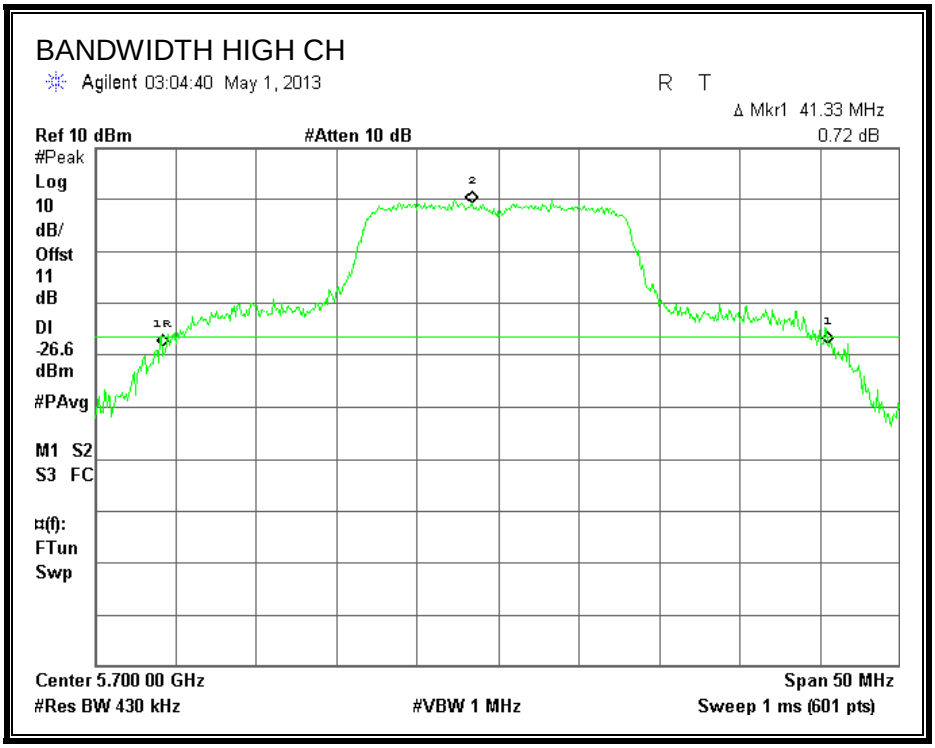
RESULTS

Channel	Frequency (MHz)	26 dB Bandwidth (MHz)
Low	5500	42.8
Mid	5580	43.5
High	5700	41.3

26 dB BANDWIDTH







8.3.2. 99% BANDWIDTH

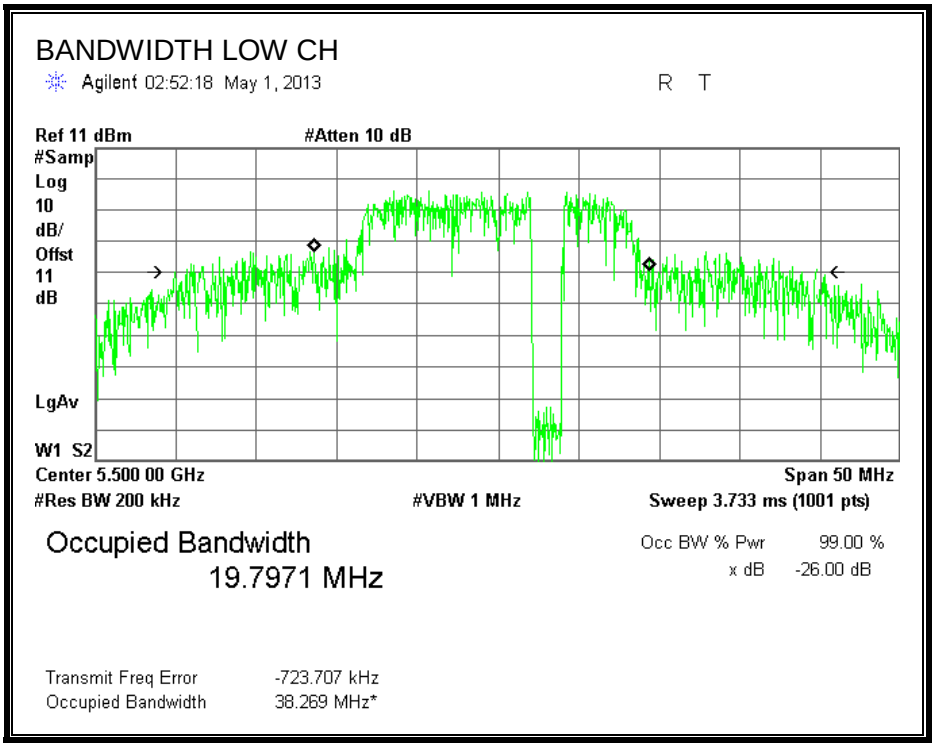
LIMITS

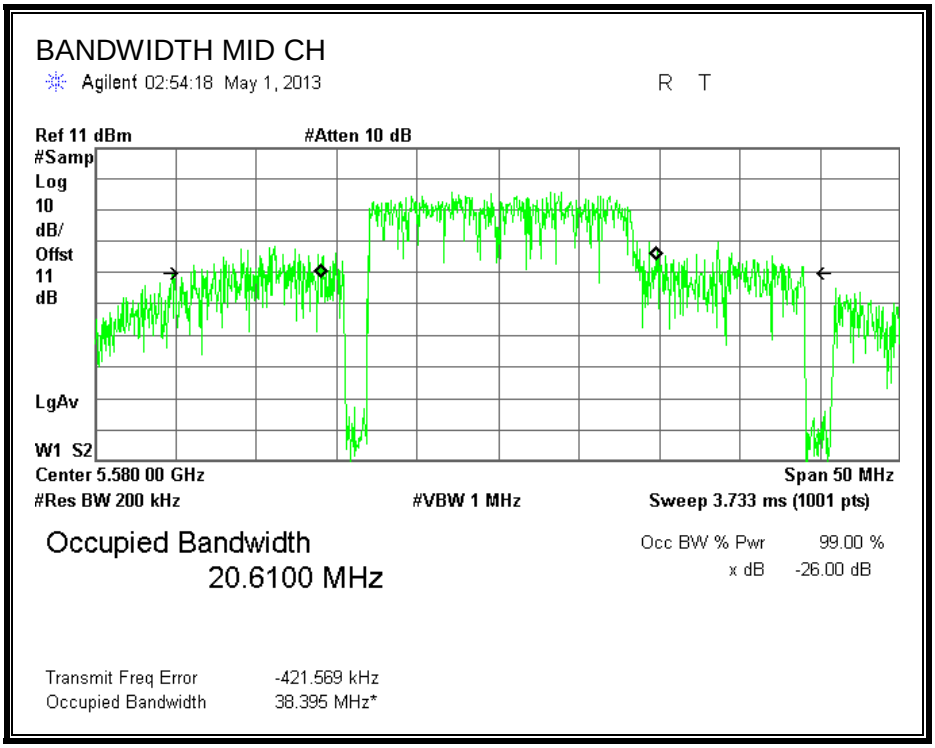
None; for reporting purposes only.

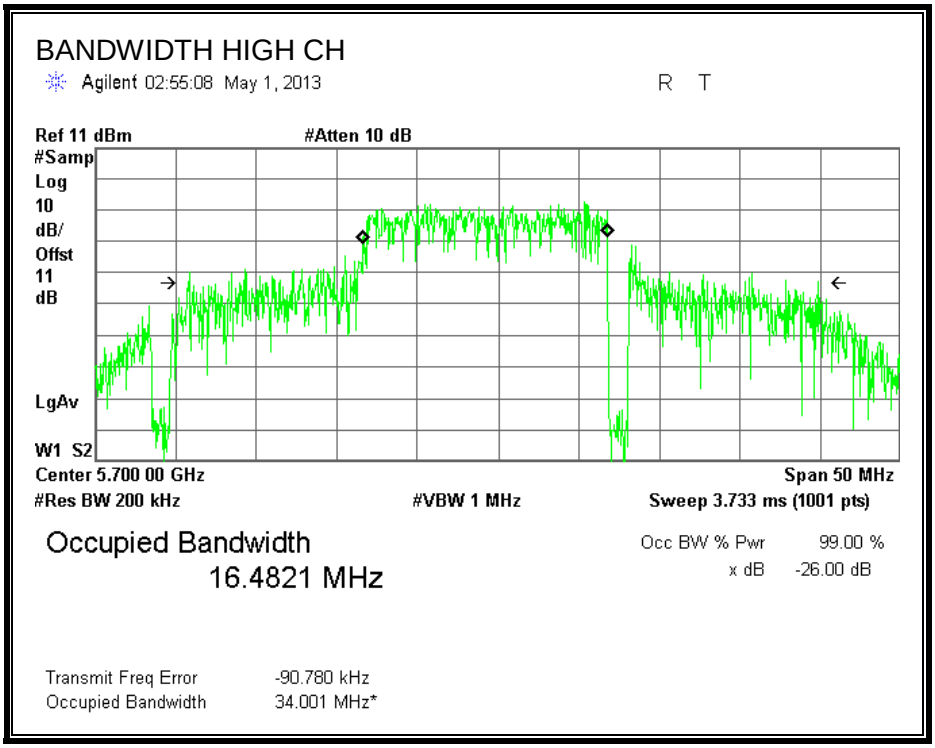
RESULTS

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	5500	19.8
Mid	5580	20.6
High	5700	16.5

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	5500	7.1
Mid	5580	7.3
High	5700	7.4

8.3.4. OUTPUT POWER AND PPSD

LIMITS

FCC §15.407 (a) (1)

For the band 5.5–5.7 GHz, the maximum conducted output power over the frequency band of operation shall not exceed the lesser of 251 mW or 11 dBm + 10 log B, where B is the 26–dB emission bandwidth in MHz. In addition, the peak power spectral density shall not exceed 11 dBm in any 1–MHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

IC RSS-210 A9.2 (1)

The maximum e.i.r.p. shall not exceed 200 mW or 10 + 10 log10 B, dBm, whichever power is less. B is the 99% emission bandwidth in MHz. The e.i.r.p. spectral density shall not exceed 10 dBm in any 1.0 MHz band.

DIRECTIONAL ANTENNA GAIN

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

RESULTS

Bandwidth and Antenna Gain

Channel	Frequency (MHz)	Min 26 dB BW (MHz)	Min 99% BW (MHz)	Directional Gain (dBi)
Low	5500	42.8	19.8	1.00
Mid	5580	43.5	20.6	1.00
High	5700	41.3	16.5	1.00

Limits

Channel	Frequency (MHz)	FCC Power Limit (dBm)	IC Power Limit (dBm)	IC EIRP Limit (dBm)	Power Limit (dBm)	FCC PPSD Limit (dBm)	IC PSD Limit (dBm)	PPSD Limit (dBm)
Low	5500	24.00	23.97	29.97	23.97	11.00	11.00	11.00
Mid	5580	24.00	24.00	30.00	24.00	11.00	11.00	11.00
High	5700	24.00	23.17	29.17	23.17	11.00	11.00	11.00

Duty Cycle CF (dB)	0.20	Included in Calculations of Corr'd Power & PPSD

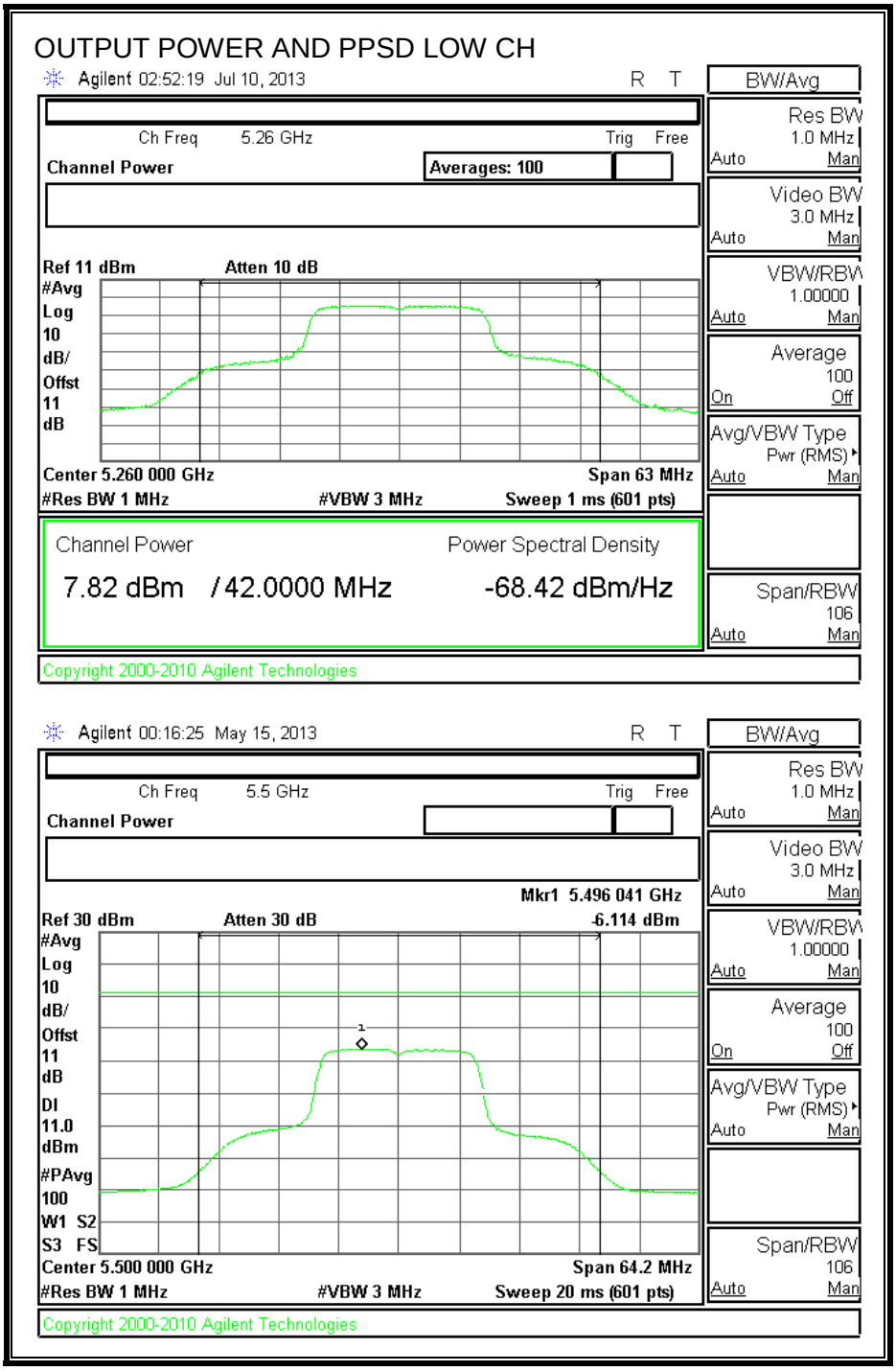
Output Power Results

Channel	Frequency (MHz)	Chain 0 Meas Power (dBm)	Total Corr'd Power (dBm)	Power Limit (dBm)	Power Margin (dB)
Low	5500	7.82	8.02	23.97	-15.95
Mid	5580	7.84	8.04	24.00	-15.96
High	5700	7.90	8.10	23.17	-15.07

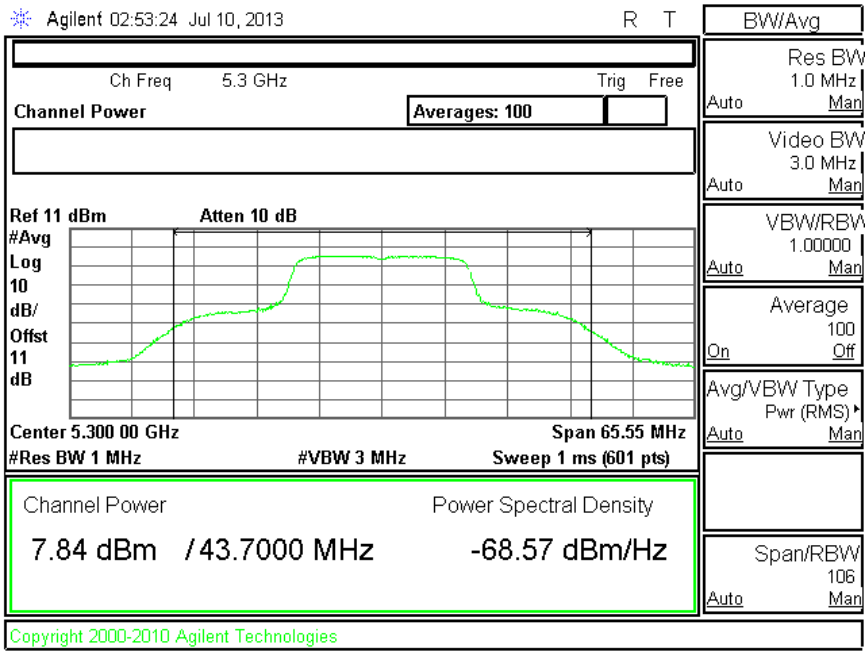
PPSD Results

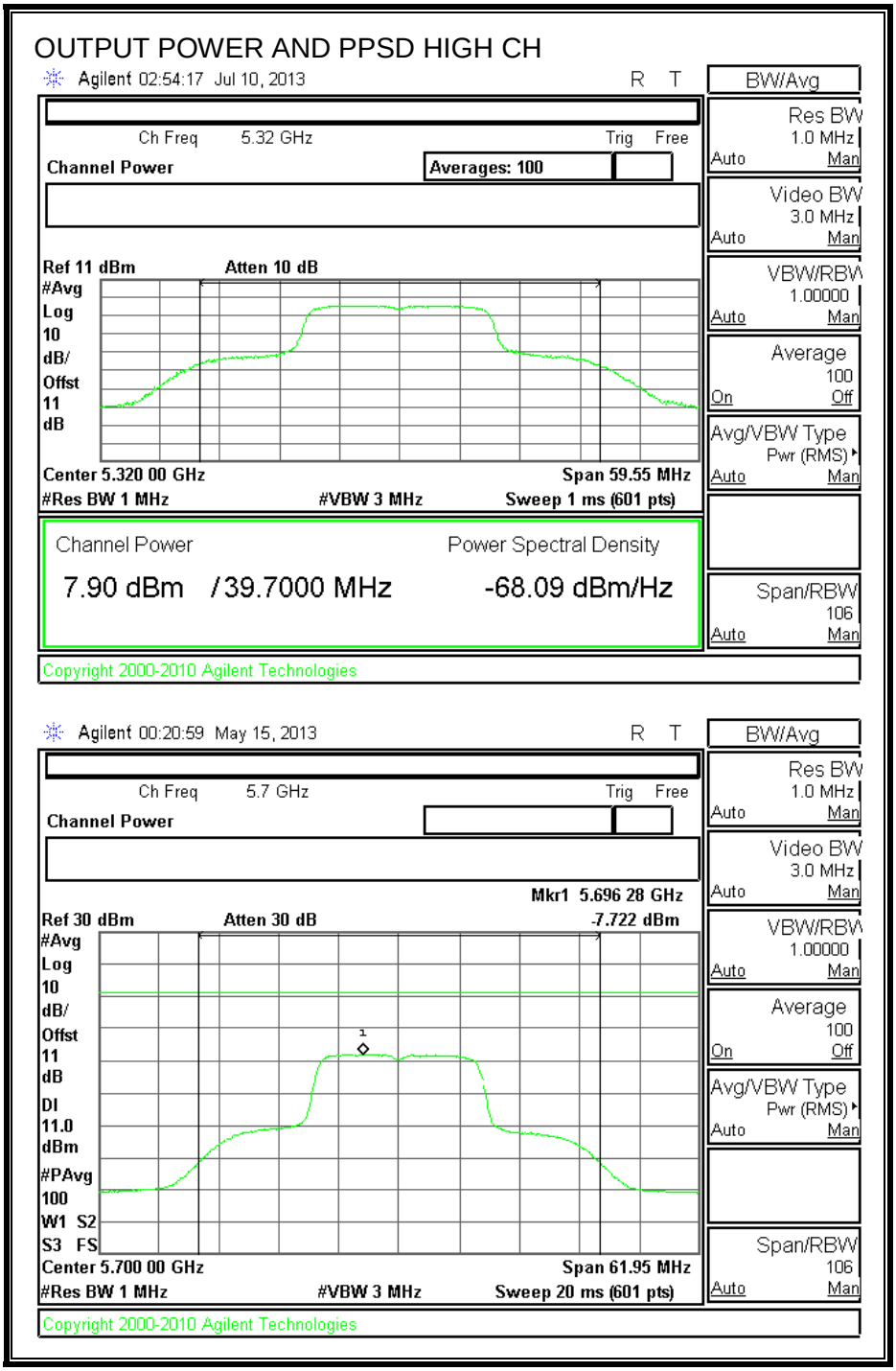
Channel	Frequency (MHz)	Chain 0 Meas PPSD (dBm)	Total Corr'd PPSD (dBm)	PPSD Limit (dBm)	PPSD Margin (dB)
Low	5500	-6.11	-5.91	11.00	-16.91
Mid	5580	-6.25	-6.05	11.00	-17.05
High	5700	-7.72	-7.52	11.00	-18.52

OUTPUT POWER AND PPSD



OUTPUT POWER AND PPSD MID CH





8.3.5. PEAK EXCURSION

LIMITS

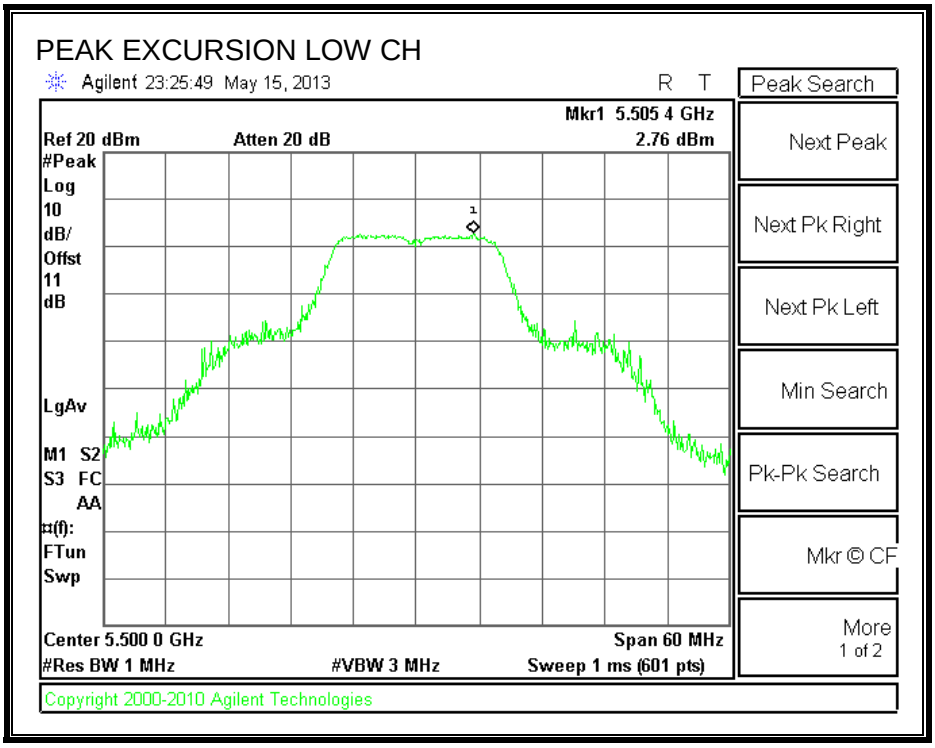
FCC §15.407 (a) (6)

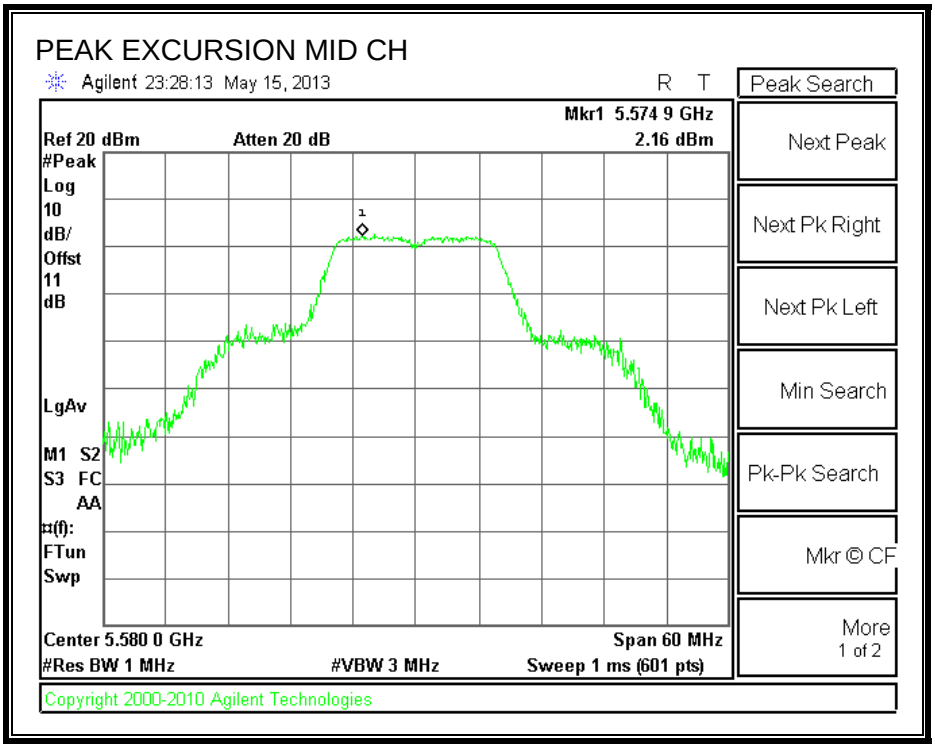
The ratio of the peak excursion of the modulation envelope (measured using a peak hold function) to the peak transmit power (measured as specified above) shall not exceed 13 dB across any 1 MHz bandwidth or the emission bandwidth whichever is less.

RESULTS

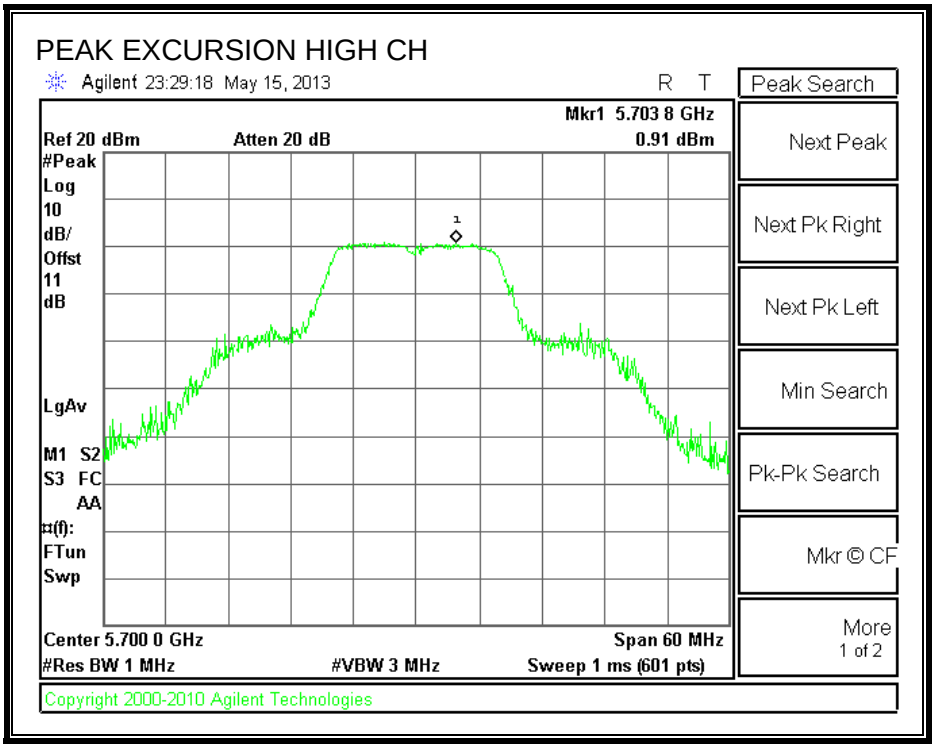
Channel	Frequency (MHz)	PK Level (dBm)	PSD (dBm)	DCCF (dB)	Peak Excursion (dB)	Limit (dB)	Margin (dB)
Low	5500	2.76	-6.11	0.20	8.67	13	-4.33
Mid	5580	2.16	-6.25	0.20	8.21	13	-4.79
High	5700	0.91	-7.72	0.20	8.43	13	-4.57

PEAK EXCURSION





PEAK EXCURSION HIGH CH



8.4. 802.11n HT20 MODE IN THE 5.6 GHz BAND

8.4.1. 26 dB BANDWIDTH

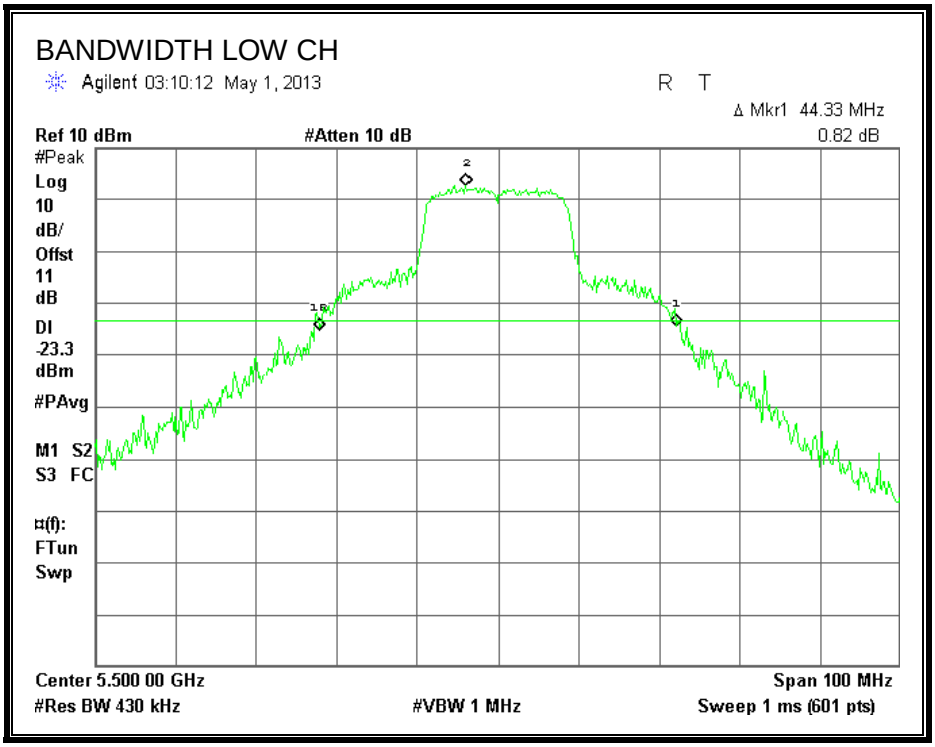
LIMITS

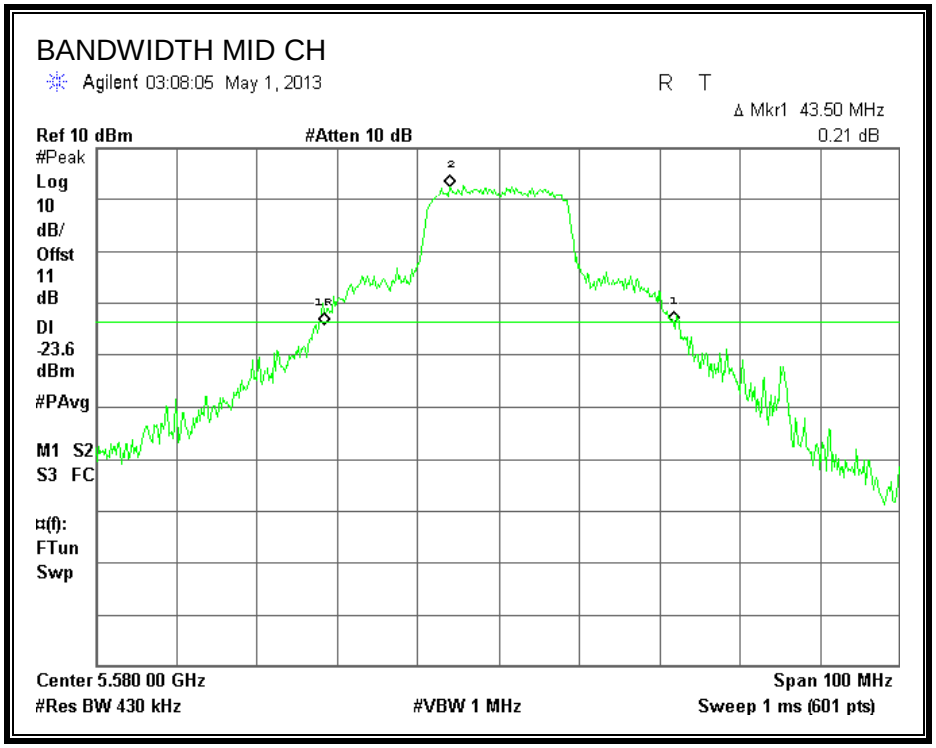
None; for reporting purposes only.

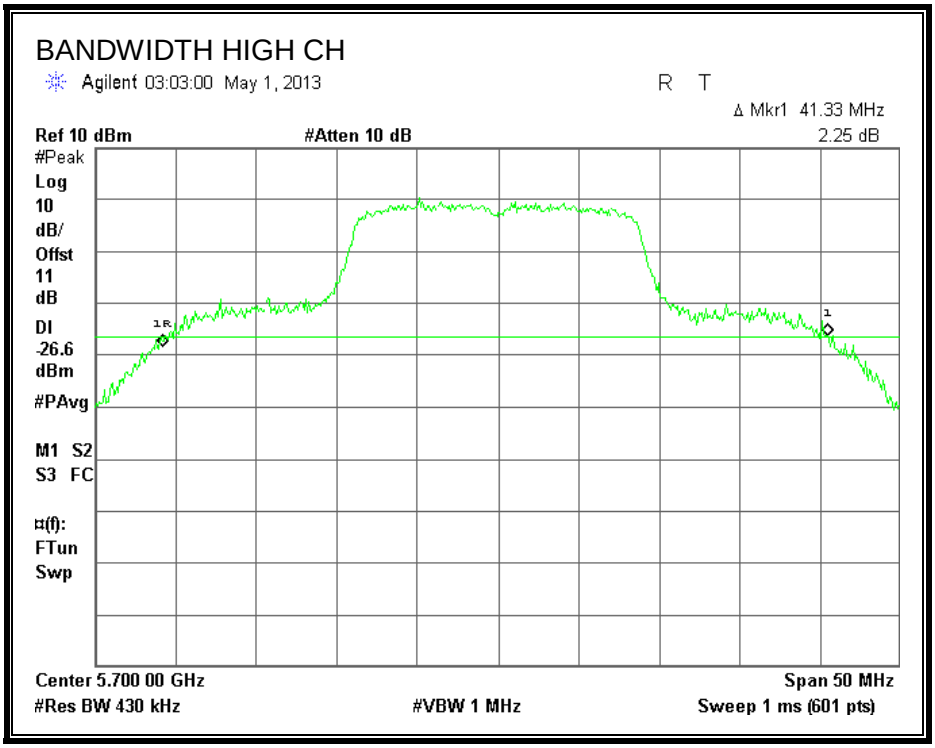
RESULTS

Channel	Frequency (MHz)	26 dB Bandwidth (MHz)
Low	5500	44.3
Mid	5580	43.5
High	5700	41.3

26 dB BANDWIDTH







8.4.2. 99% BANDWIDTH

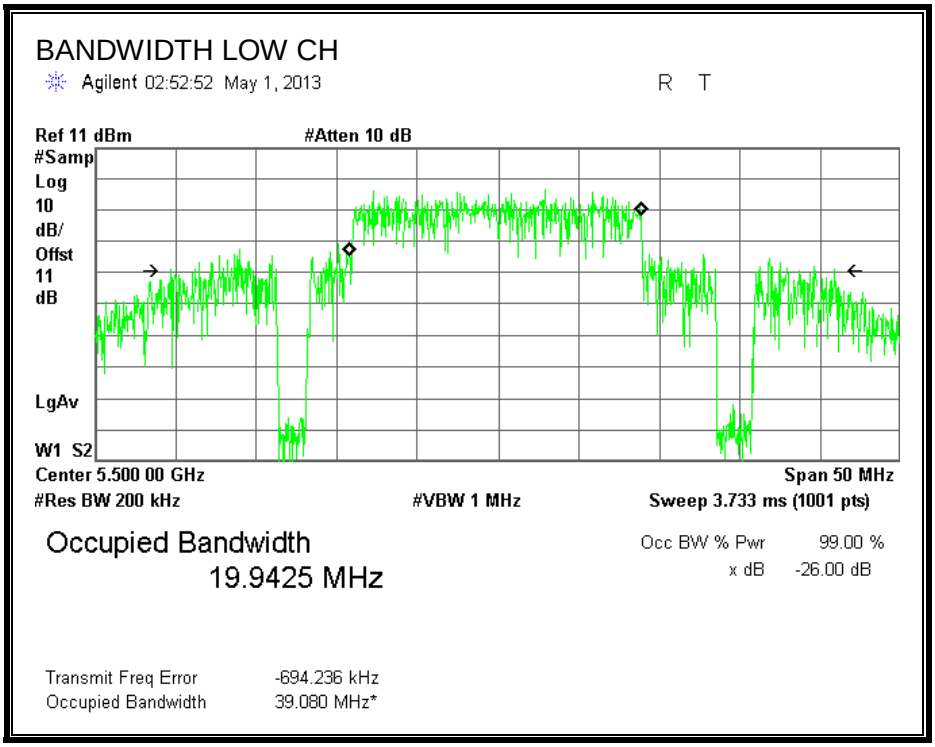
LIMITS

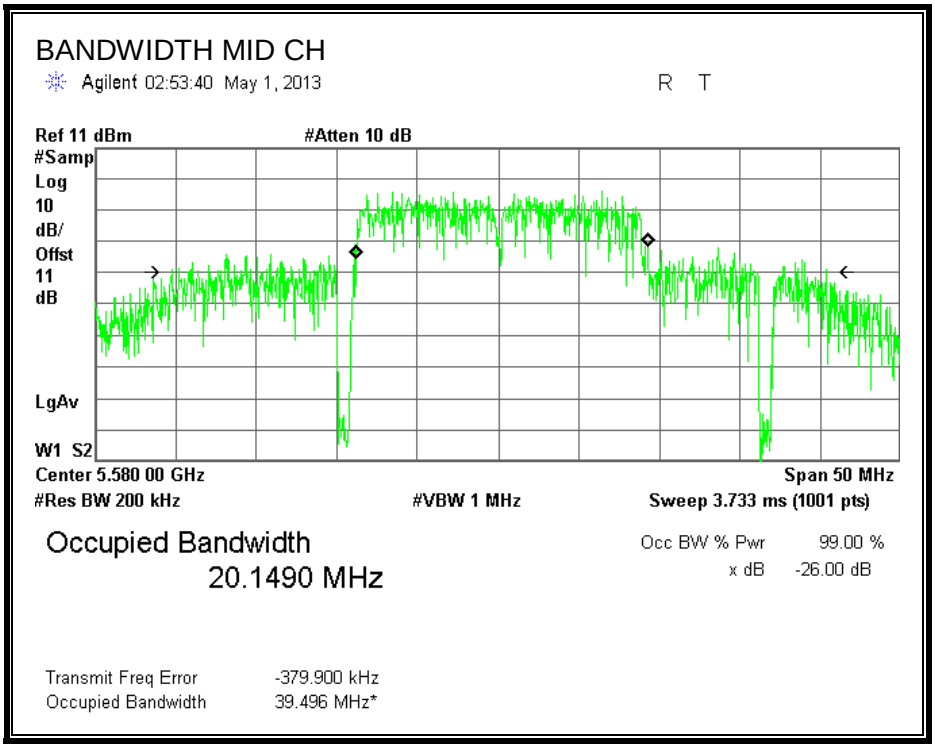
None; for reporting purposes only.

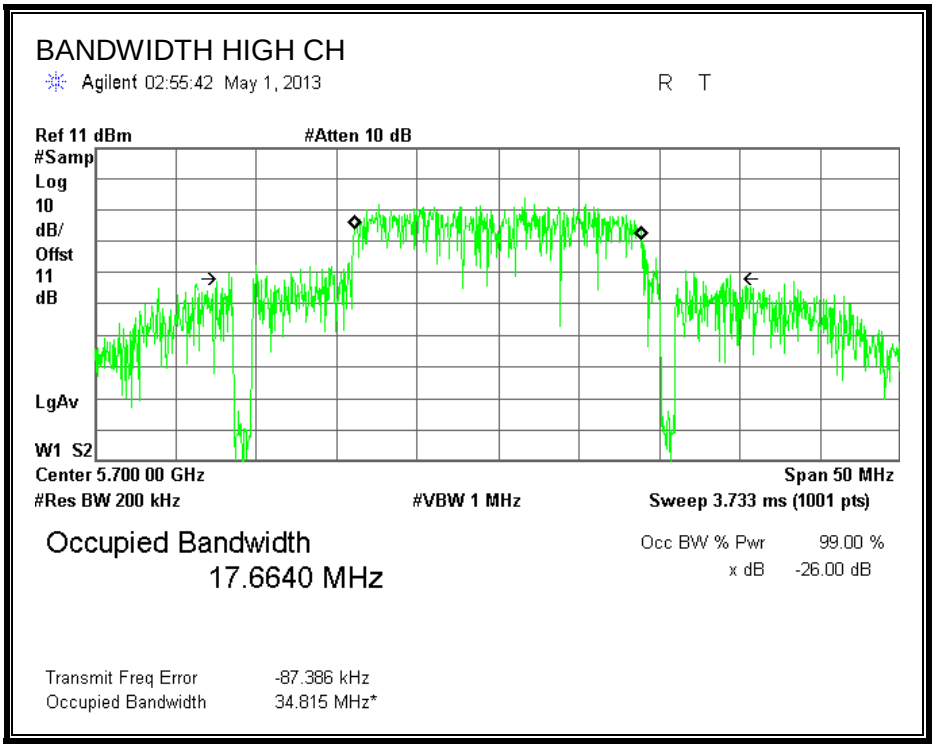
RESULTS

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	5500	19.9
Mid	5580	20.1
High	5700	17.7

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	5500	6.2
Mid	5580	6.2
High	5700	6.0

8.4.4. OUTPUT POWER AND PPSD

LIMITS

FCC §15.407 (a) (1)

For the band 5.5–5.7 GHz, the maximum conducted output power over the frequency band of operation shall not exceed the lesser of 251 mW or 11 dBm + 10 log B, where B is the 26–dB emission bandwidth in MHz. In addition, the peak power spectral density shall not exceed 11 dBm in any 1–MHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

IC RSS-210 A9.2 (1)

The maximum e.i.r.p. shall not exceed 200 mW or 10 + 10 log10 B, dBm, whichever power is less. B is the 99% emission bandwidth in MHz. The e.i.r.p. spectral density shall not exceed 10 dBm in any 1.0 MHz band.

DIRECTIONAL ANTENNA GAIN

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

RESULTS

Bandwidth and Antenna Gain

Channel	Frequency (MHz)	Min 26 dB BW (MHz)	Min 99% BW (MHz)	Directional Gain (dBi)
Low	5500	44.3	19.9	1.00
Mid	5580	43.5	20.1	1.00
High	5700	41.3	17.7	1.00

Limits

Channel	Frequency (MHz)	FCC Power Limit (dBm)	IC Power Limit (dBm)	IC EIRP Limit (dBm)	Power Limit (dBm)	FCC PPSD Limit (dBm)	IC PSD Limit (dBm)	PPSD Limit (dBm)
Low	5500	24.00	23.99	29.99	23.99	11.00	11.00	11.00
Mid	5580	24.00	24.00	30.00	24.00	11.00	11.00	11.00
High	5700	24.00	23.48	29.48	23.48	11.00	11.00	11.00

Duty Cycle CF (dB)	0.20	Included in Calculations of Corr'd Power & PPSD

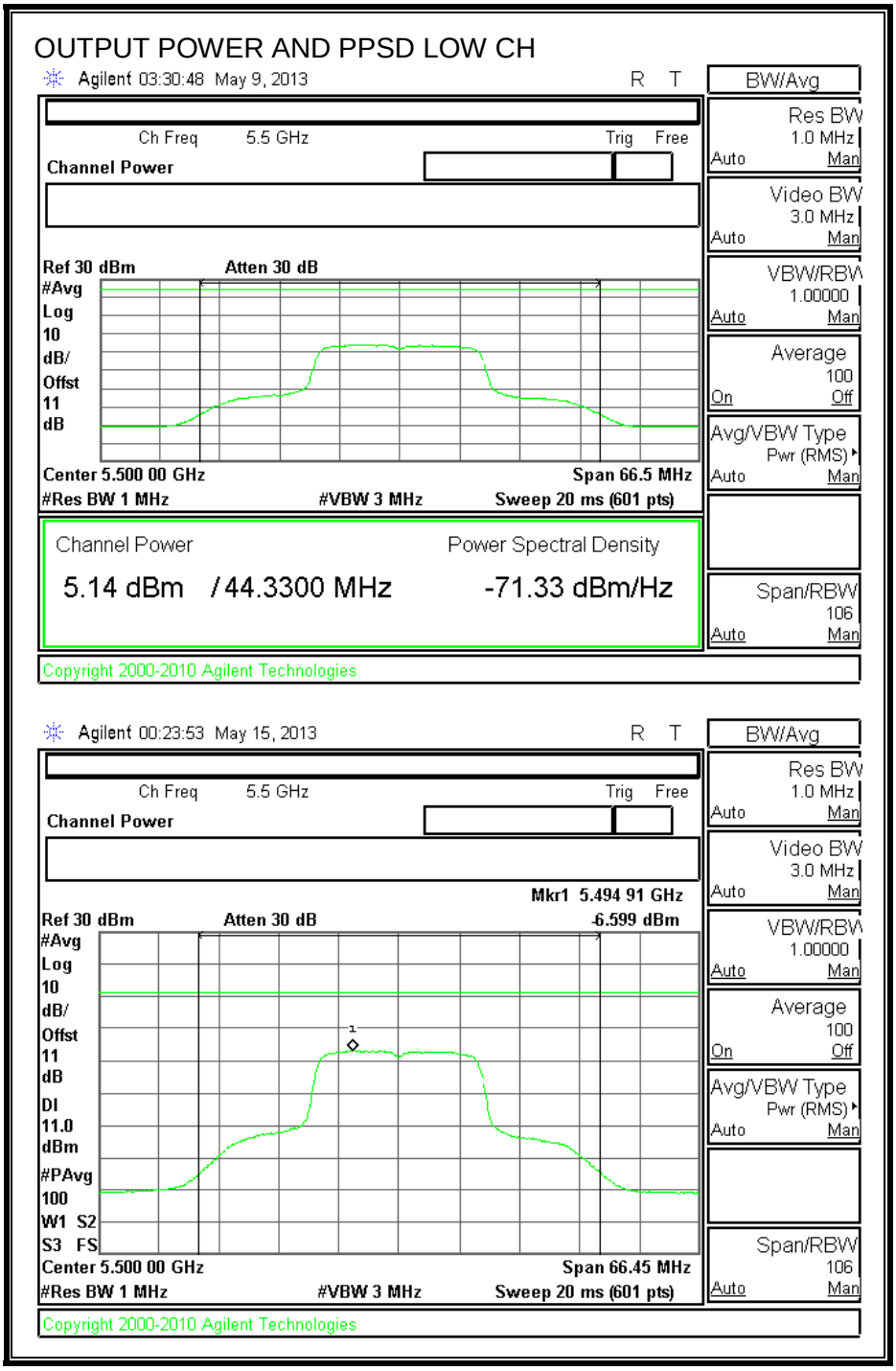
Output Power Results

Channel	Frequency (MHz)	Chain 0 Meas Power (dBm)	Total Corr'd Power (dBm)	Power Limit (dBm)	Power Margin (dB)
Low	5500	5.14	5.34	23.99	-18.65
Mid	5580	6.32	6.52	24.00	-17.48
High	5700	6.41	6.61	23.48	-16.87

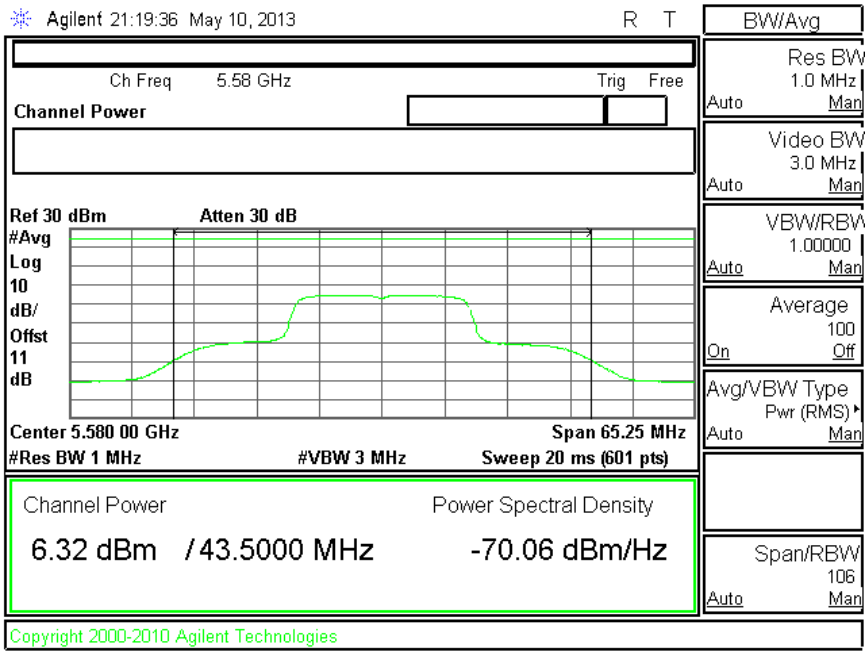
PPSD Results

Channel	Frequency (MHz)	Chain 0 Meas PPSD (dBm)	Total Corr'd PPSD (dBm)	PPSD Limit (dBm)	PPSD Margin (dB)
Low	5500	-6.60	-6.40	11.00	-17.40
Mid	5580	-6.60	-6.40	11.00	-17.40
High	5700	-8.00	-7.80	11.00	-18.80

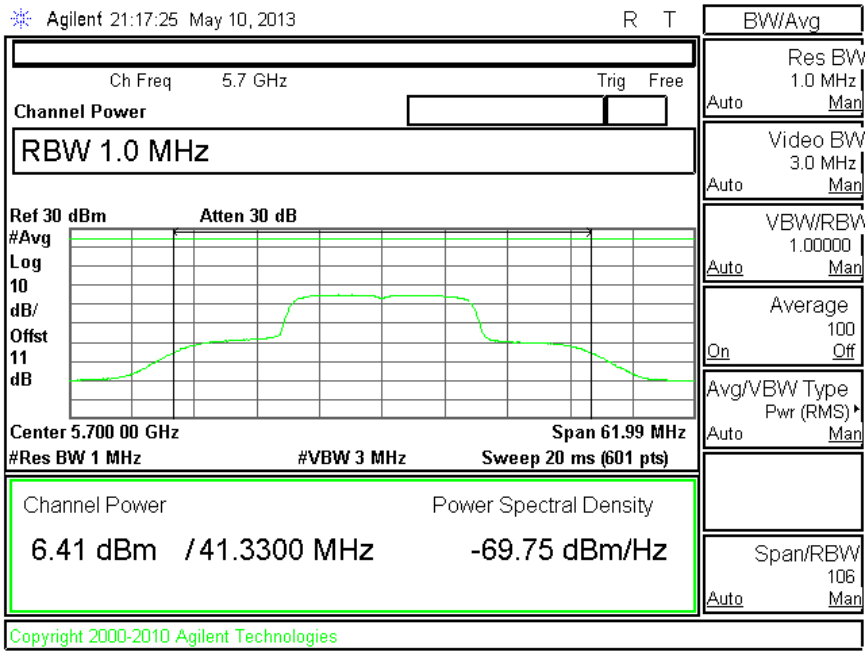
OUTPUT POWER AND PPSD

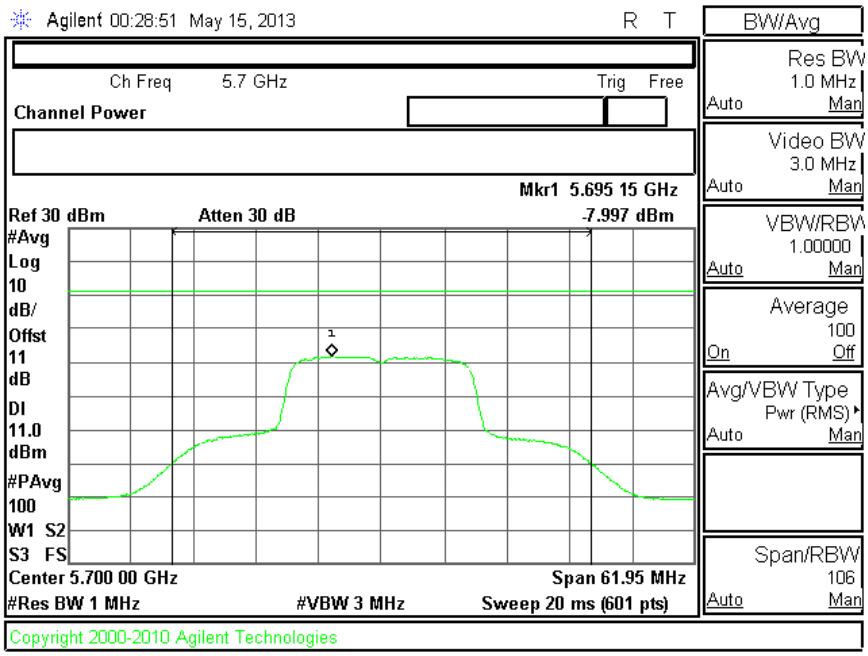


OUTPUT POWER AND PPSD MID CH



OUTPUT POWER AND PPSD HIGH CH





8.4.5. PEAK EXCURSION

LIMITS

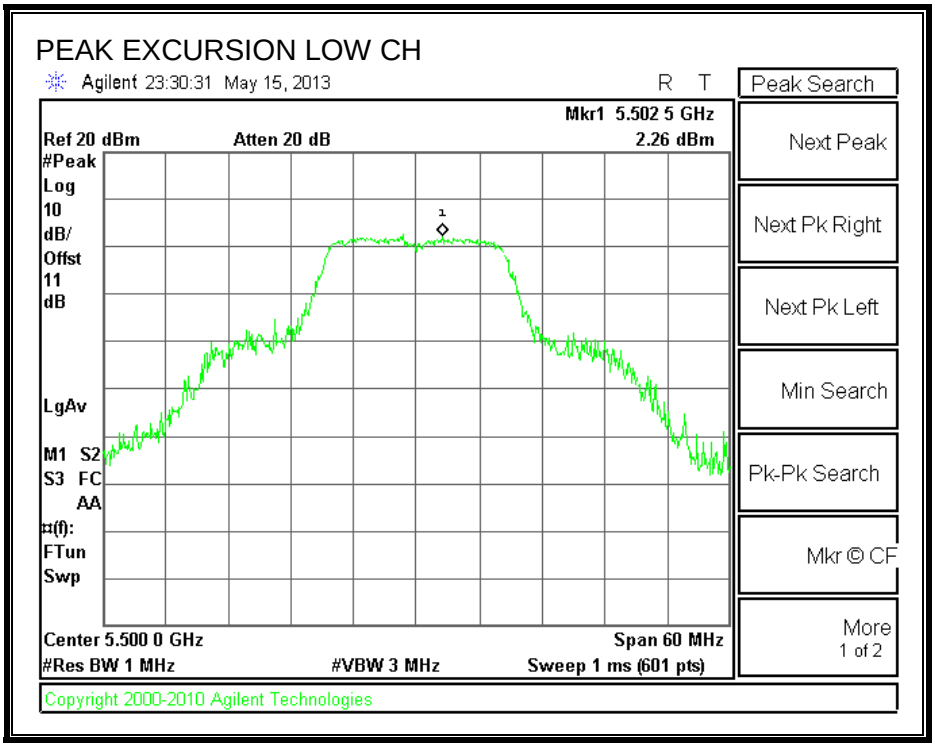
FCC §15.407 (a) (6)

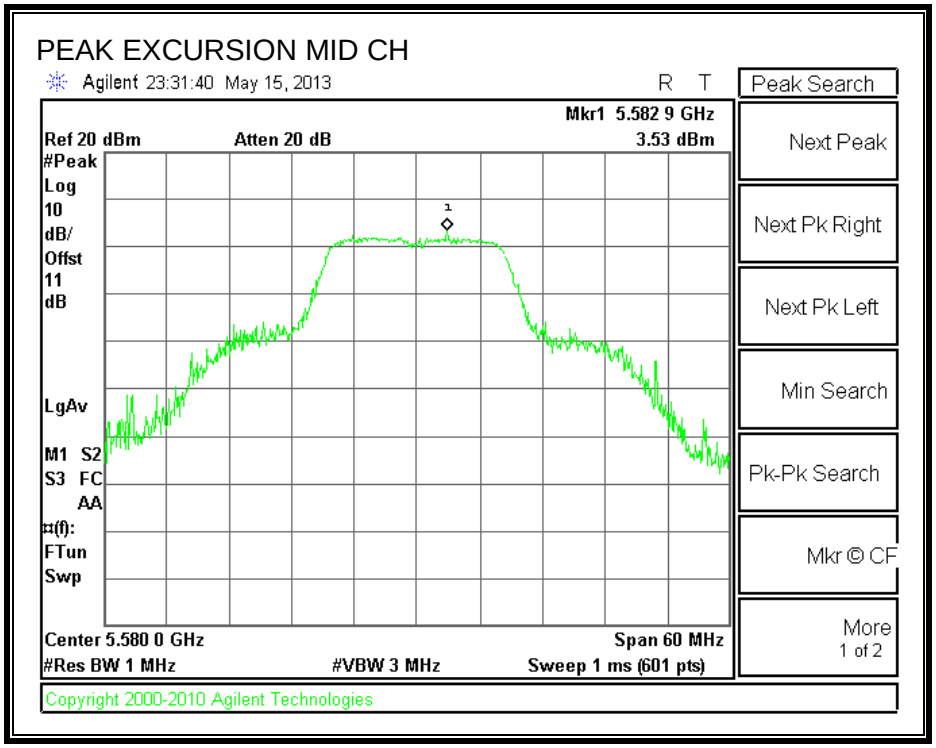
The ratio of the peak excursion of the modulation envelope (measured using a peak hold function) to the peak transmit power (measured as specified above) shall not exceed 13 dB across any 1 MHz bandwidth or the emission bandwidth whichever is less.

RESULTS

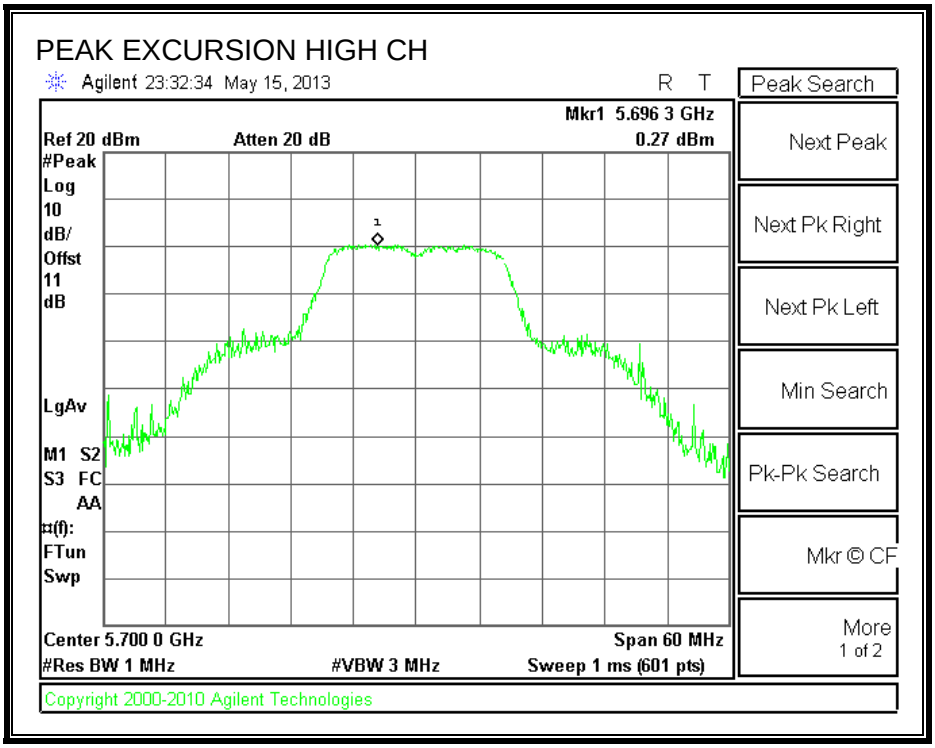
Channel	Frequency (MHz)	PK Level (dBm)	PSD (dBm)	DCCF (dB)	Peak Excursion (dB)	Limit (dB)	Margin (dB)
Low	5500	2.26	-6.60	0.20	8.66	13	-4.34
Mid	5580	3.53	-6.60	0.20	9.93	13	-3.07
High	5700	0.27	-8.00	0.20	8.07	13	-4.93

PEAK EXCURSION





PEAK EXCURSION HIGH CH



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 (see below).

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 duty cycle of this EUT, the VBW used during all average measurements was 1kHz.

The -27dBm EIRP limit per 15.407(b)(1) was converted to field strength based on the following formula, taken from AS/NZS 4268: 2003:

$$E_{lim} = 20*\log_{10} [(\sqrt{30}P_{lim})/d] + 120$$

Where
E_{lim} = Electric Field Strength Limit, in dBµV/m
P_{lim} = EIRP Limit, in Watts
d = Measurement distance, in meters

Sample Calculations

$$E_{lim} = 20*\log_{10} [(\sqrt{30}*2.0E\text{-}6)/3] + 120 = 68.2 \text{ dBµV/m}$$

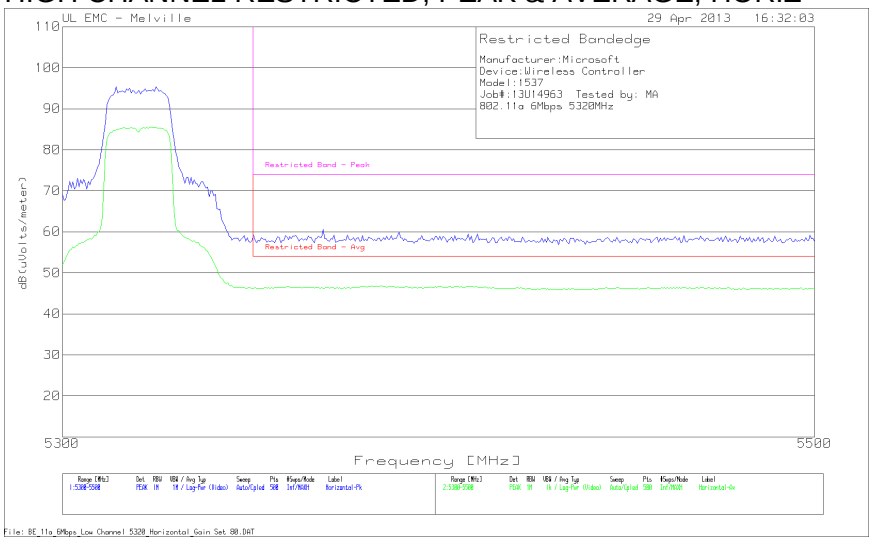
Where
P_{lim} = -27dBm (2.0E-6 Watts)
d = 3 meters

9.2. TRANSMITTER ABOVE 1 GHz

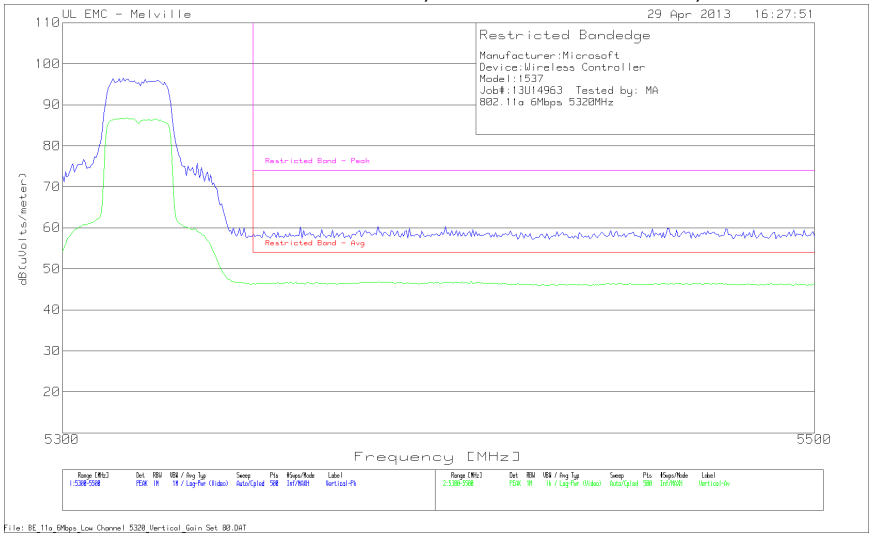
9.2.1. TX ABOVE 1 GHz 802.11a MODE IN THE 5.3 GHz BAND

RESTRICTED BANDEDGE (HIGH CHANNEL)

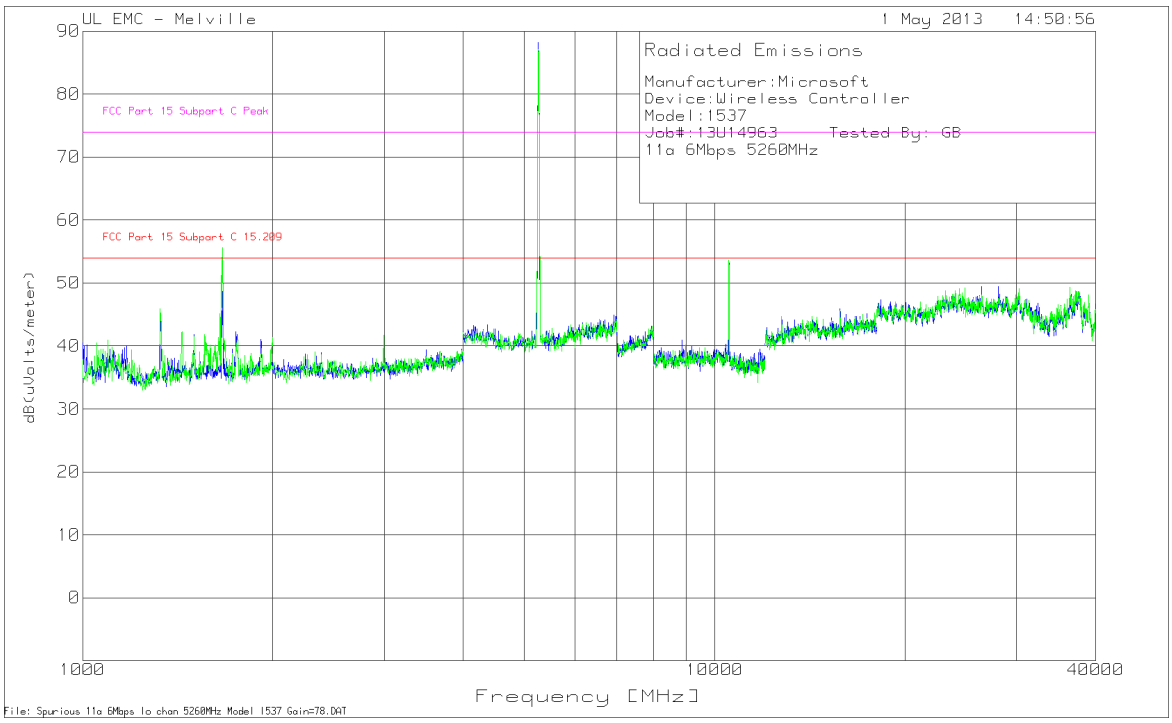
HIGH CHANNEL RESTRICTED, PEAK & AVERAGE, HORIZ



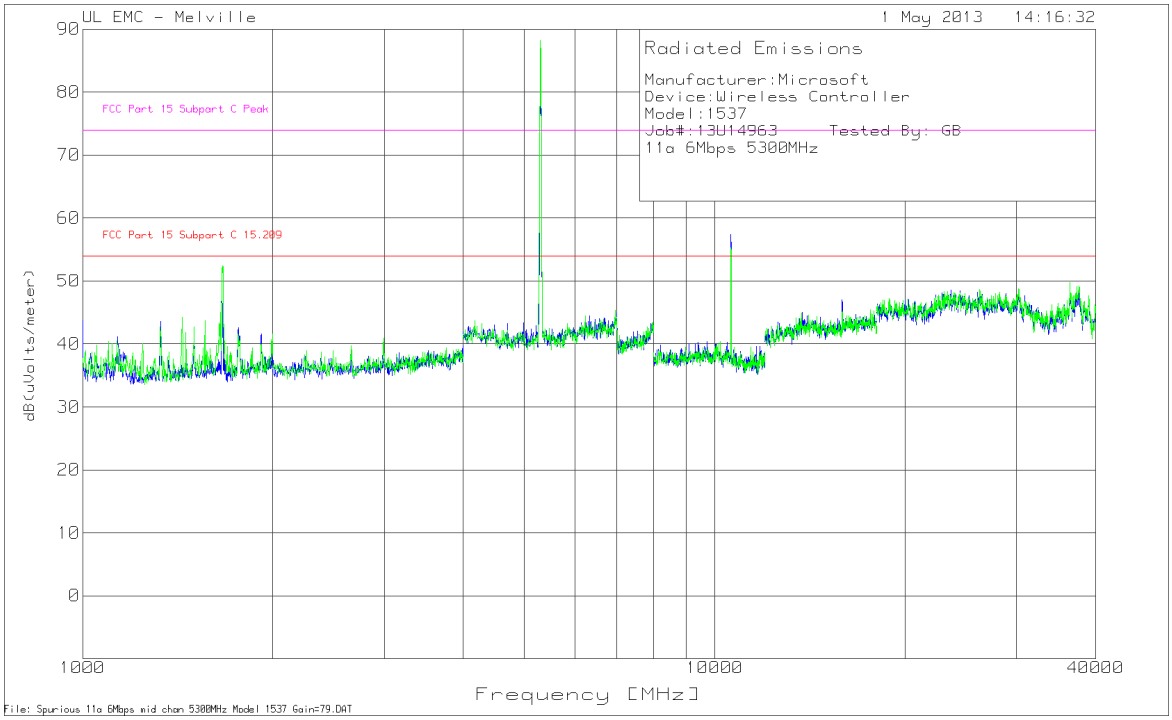
HIGH CHANNEL RESTRICTED, PEAK & AVERAGE, VERT



HARMONICS AND SPURIOUS EMISSIONS

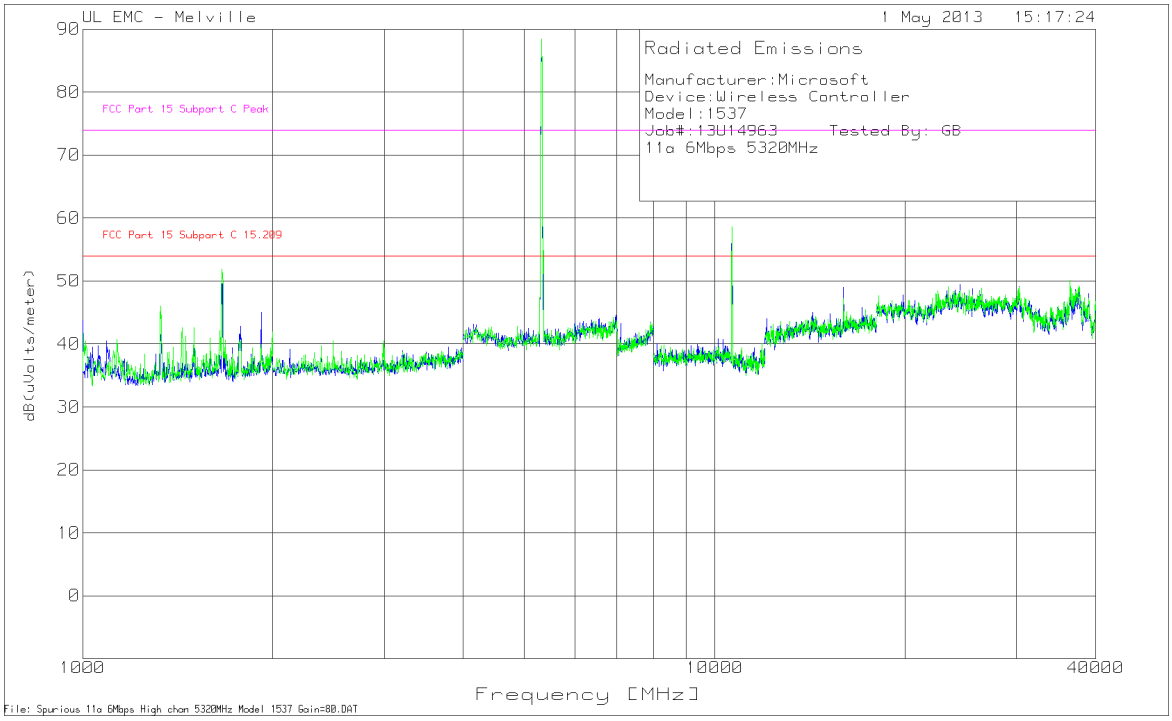


Low Channel



Mid Channel

HARMONICS AND SPURIOUS EMISSIONS (CONT)



High Channel

HARMONICS AND SPURIOUS EMISSIONS (CONT)

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

Low Channel - 5260MHz

Test Frequency	Meter Reading	Detector	AF [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)	EIRP Peak	Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
10525.05	67.67	PK	33.2	-47.67	53.2	-	-	-	-	68.2	-15	236	101	Horz
10517.034	67.89	PK	33.2	-47.46	53.63	-	-	-	-	68.2	-14.57	200	101	Vert
15774.289	63.7	PK	37.3	-48.02	52.98	-	-	74	-21.02	-	-	89	342	Vert
15774.289	64.02	PK	37.3	-48.02	53.3	-	-	74	-20.7	-	-	150	346	Horz
15774.289	48.74	LnAv	37.3	-48.02	38.02	54	-15.98	-	-	-	-	89	342	Vert
15774.289	48.52	LnAv	37.3	-48.02	37.8	54	-16.2	-	-	-	-	150	346	Horz

Mid Channel - 5300MHz

Test Frequency	Meter Reading	Detector	AF [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)	EIRP Peak	Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
10600	77.91	PK	33.2	-48.33	62.78	-	-	74	-11.22	-	-	104	109	Vert
10600	75.72	PK	33.2	-48.33	60.59	-	-	74	-13.41	-	-	217	150	Horz
15900	64.63	PK	37.3	-48.36	53.57	-	-	74	-20.43	-	-	250	300	Vert
15900	60.17	PK	37.3	-48.36	49.11	-	-	74	-24.89	-	-	298	356	Horz
10600	60.79	LnAv	33.2	-48.33	45.66	54	-8.34	-	-	-	-	104	109	Vert
10600	59.88	LnAv	33.2	-48.33	44.75	54	-9.25	-	-	-	-	217	150	Horz
15900	50.65	LnAv	37.3	-48.36	39.59	54	-14.41	-	-	-	-	356	299	Horz
15900	49.69	LnAv	37.3	-48.36	38.63	54	-15.37	-	-	-	-	250	300	Vert

High Channel - 5320MHz

Test Frequency	Meter Reading	Detector	AF [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)	EIRP Peak	Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
10640	79.03	PK	33.2	-48.35	63.88	-	-	74	-10.12	-	-	175	331	Vert
10640	81.9	PK	33.2	-48.35	66.75	-	-	74	-7.25	-	-	164	385	Horz
15960	66.85	PK	37.3	-48.05	56.1	-	-	74	-17.9	-	-	156	338	Horz
15960	62.98	PK	37.3	-48.05	52.23	-	-	74	-21.77	-	-	156	338	Vert
10640	61.09	LnAv	33.2	-48.35	45.94	54	-8.06	-	-	-	-	175	331	Vert
10640	65.34	LnAv	33.2	-48.35	50.19	54	-3.81	-	-	-	-	164	385	Horz
15960	51.25	LnAv	37.3	-48.05	40.5	54	-13.5	-	-	-	-	156	338	Horz
15960	49.11	LnAv	37.3	-48.05	38.36	54	-15.64	-	-	-	-	156	338	Vert

PK - Peak detector
LnAv - Linear Average detector

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

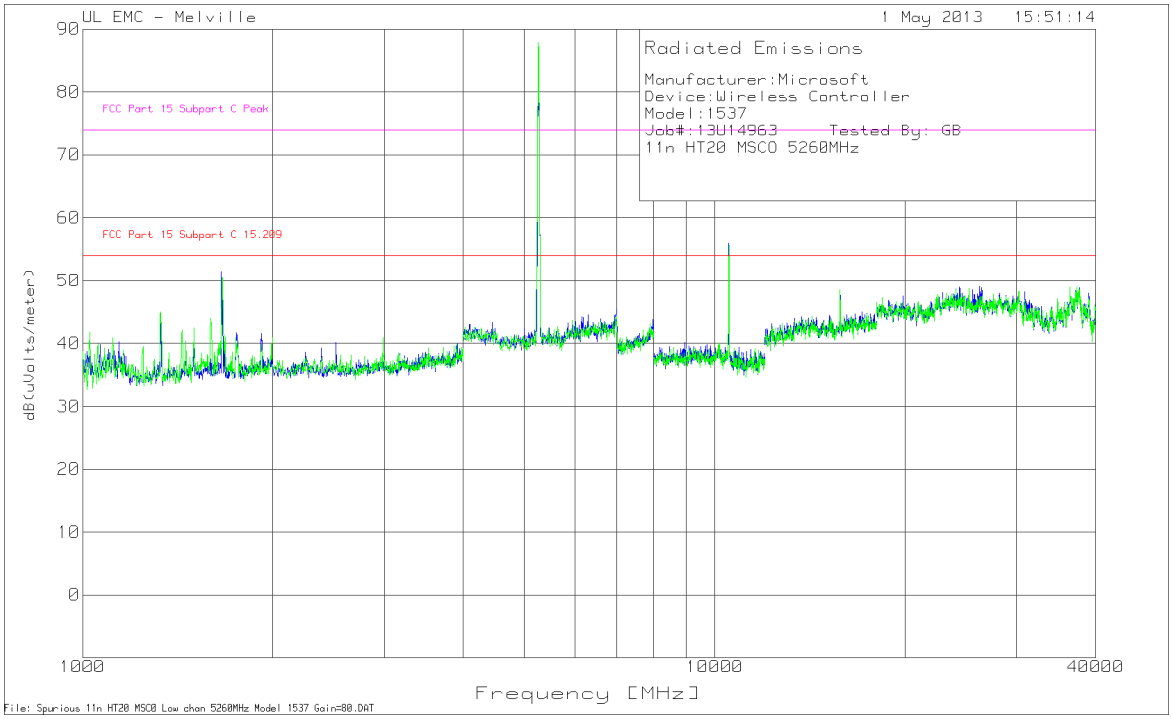
9.2.2. TX ABOVE 1 GHz 802.11n HT20 MODE IN THE 5.3 GHz BAND

RESTRICTED BANDEDGE (HIGH CHANNEL)

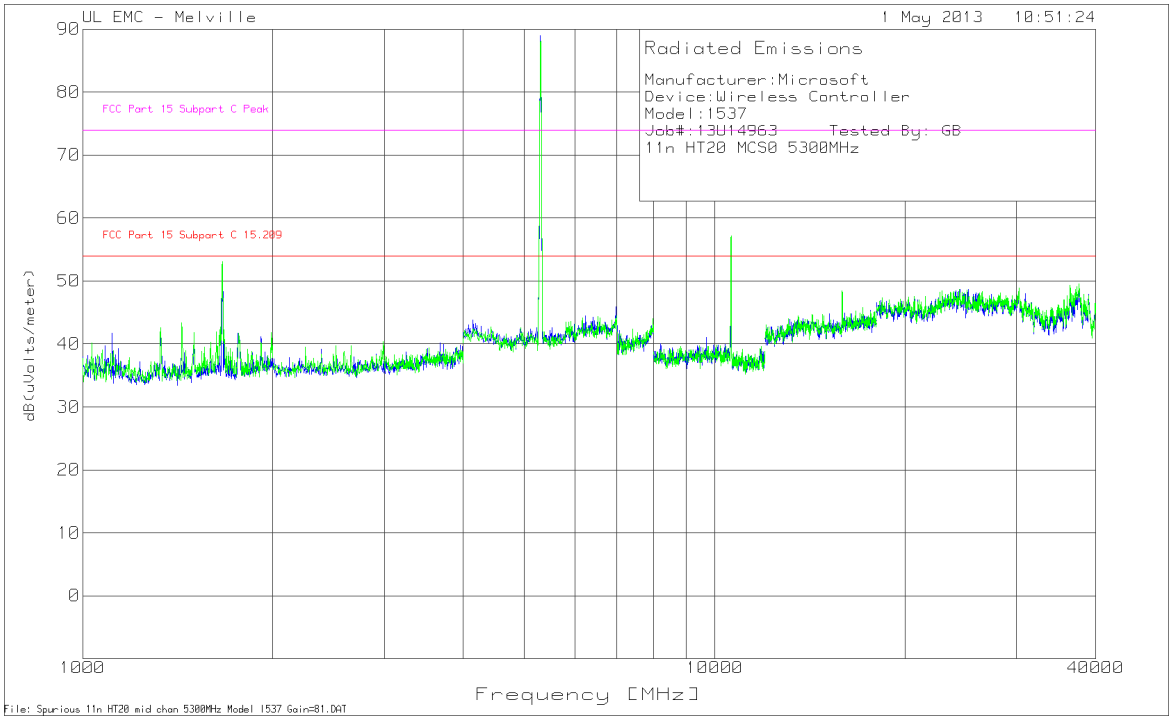
HIGH CHANNEL RESTRICTED, PEAK & AVERAGE, HORIZ

HIGH CHANNEL RESTRICTED, PEAK & AVERAGE, VERT

HARMONICS AND SPURIOUS EMISSIONS

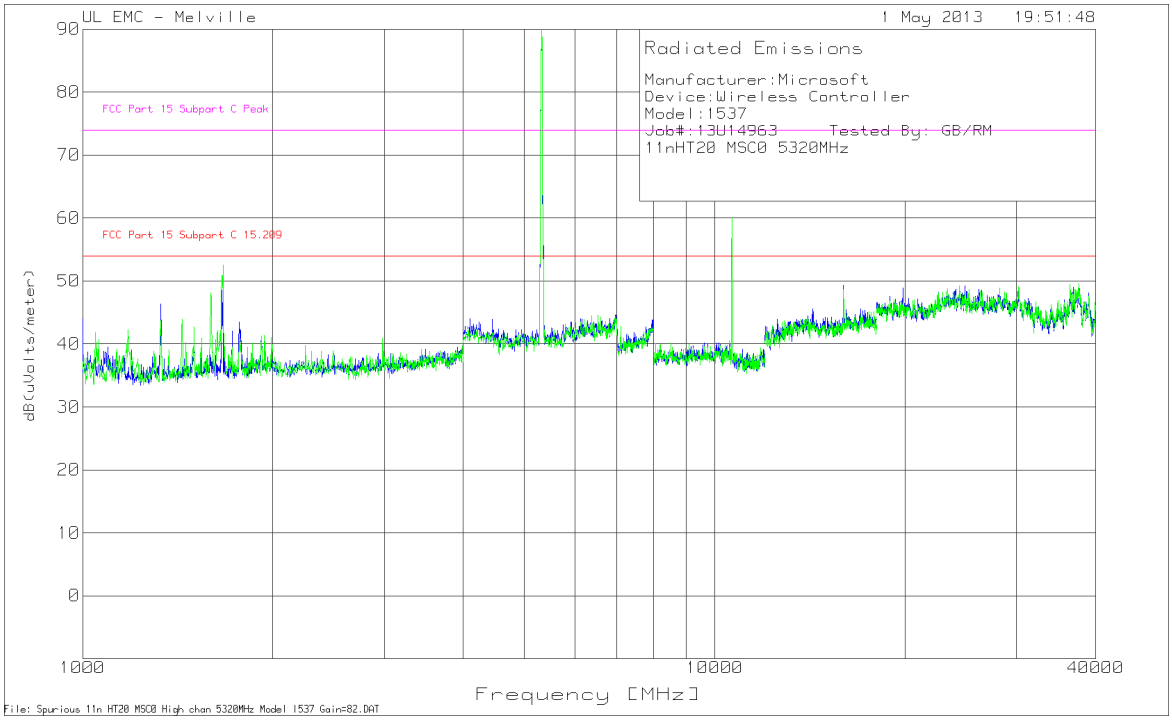


Low Channel



Mid Channel

HARMONICS AND SPURIOUS EMISSIONS (CONT)



High Channel

HARMONICS AND SPURIOUS EMISSIONS (CONT)

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

Low Channel - 5260MHz

Test Frequency	Meter Reading	Detector	AF [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)	EIRP Peak	Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
10517.034	70.26	PK	33.2	-47.46	56	-	-	-	-	68.2	-12.2	236	100	Horz
10533.066	71.56	PK	33.2	-49.08	55.68	-	-	-	-	68.2	-12.52	200	100	Vert
15779.098	65.09	PK	37.3	-48.15	54.24	-	-	74	-19.76	-	-	332	393	Horz
15779.098	60.35	PK	37.3	-48.15	49.5	-	-	74	-24.5	-	-	227	261	Vert
15779.098	48.82	LnAv	37.3	-48.15	37.97	54	-16.03	-	-	-	-	227	261	Vert
15779.098	49.41	LnAv	37.3	-48.15	38.56	54	-15.44	-	-	-	-	332	393	Horz

Mid Channel - 5300MHz

Test Frequency	Meter Reading	Detector	AF [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)	EIRP Peak	Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
10600.351	79.73	PK	33.2	-48.34	64.59	-	-	74	-9.41	-	-	16	109	Vert
10600.351	76.42	PK	33.2	-48.34	61.28	-	-	74	-12.72	-	-	217	120	Horz
15897.244	54.7	PK	37.3	-48.11	43.89	-	-	74	-30.11	-	-	243	364	Horz
15903.858	70	PK	37.3	-48.19	59.11	-	-	74	-14.89	-	-	1	392	Vert
21225	56.8	PK	40.7	-53.34	44.16	-	-	74	-29.84	-	-	225	382	Vert
21176.202	60.88	PK	40.8	-53.38	48.3	-	-	74	-25.7	-	-	144	368	Horz
10600.351	60.07	LnAv	33.2	-48.34	44.93	54	-9.07	-	-	-	-	217	120	Horz
10600.351	61.15	LnAv	33.2	-48.34	46.01	54	-7.99	-	-	-	-	16	109	Vert
15891.333	43.02	LnAv	37.3	-47.74	32.58	54	-21.42	-	-	-	-	243	364	Horz
15903.858	51.71	LnAv	37.3	-48.19	40.82	54	-13.18	-	-	-	-	1	392	Vert
21175.501	48.57	LnAv	40.8	-53.4	35.97	54	-18.03	-	-	-	-	225	382	Vert
21177.806	48.23	LnAv	40.8	-53.48	35.55	54	-18.45	-	-	-	-	144	368	Horz

High Channel - 5320MHz

Test Frequency	Meter Reading	Detector	AF [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)	EIRP Peak	Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
10638.396	81.99	PK1	33.2	-49.34	65.85	-	-	74	-8.15	-	-	177	290	Vert
10639.798	82.15	PK1	33.2	-49.42	65.93	-	-	74	-8.07	-	-	174	327	Horz
15956.152	65.63	PK1	37.3	-48.99	53.94	-	-	74	-20.06	-	-	317	292	Horz
15961.603	66.3	PK1	37.3	-49.09	54.51	-	-	74	-19.49	-	-	250	224	Vert
10641.051	67.65	AD1	33.2	-49.4	51.65	54	-2.35	-	-	-	-	177	290	Vert
10640.449	67.34	AD1	33.2	-49.42	51.32	54	-2.68	-	-	-	-	174	327	Horz
15957.936	53.8	AD1	37.3	-48.99	42.31	54	-11.69	-	-	-	-	317	292	Horz
15959.379	54.39	AD1	37.3	-48.98	42.91	54	-11.09	-	-	-	-	250	224	Vert

PK - Peak detector
LnAv - Linear Average detector
PK1 - KDB 789033 v01r02 G)5) Method: Peak
AD1 - KDB 789033 v01r02 G)6) Method: AD Primary Power Average

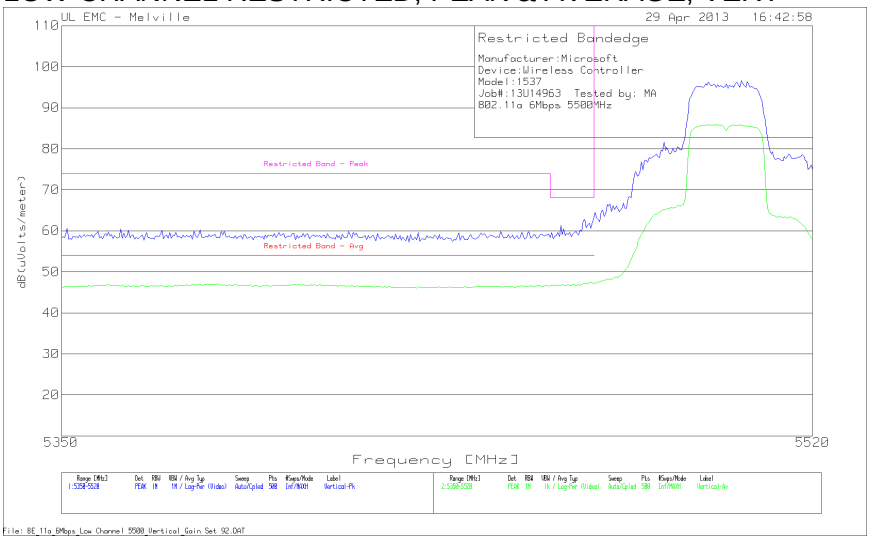
NOTE: No additional emissions detected above the system noise floor.

9.2.3. TX ABOVE 1 GHz 802.11a MODE IN THE 5.6 GHz BAND

RESTRICTED & AUTHORIZED BANDEDGE (LOW CHANNEL)

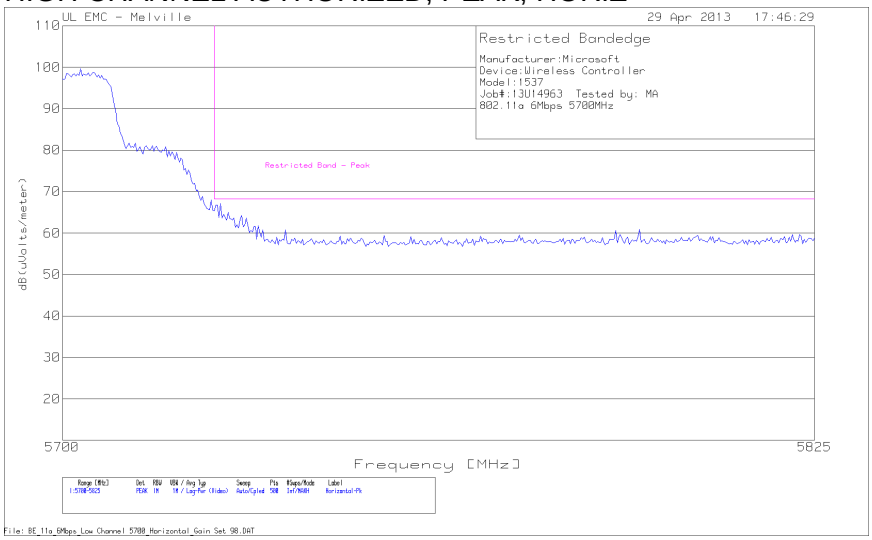
LOW CHANNEL RESTRICTED, PEAK & AVERAGE, HORIZ

LOW CHANNEL RESTRICTED, PEAK & AVERAGE, VERT

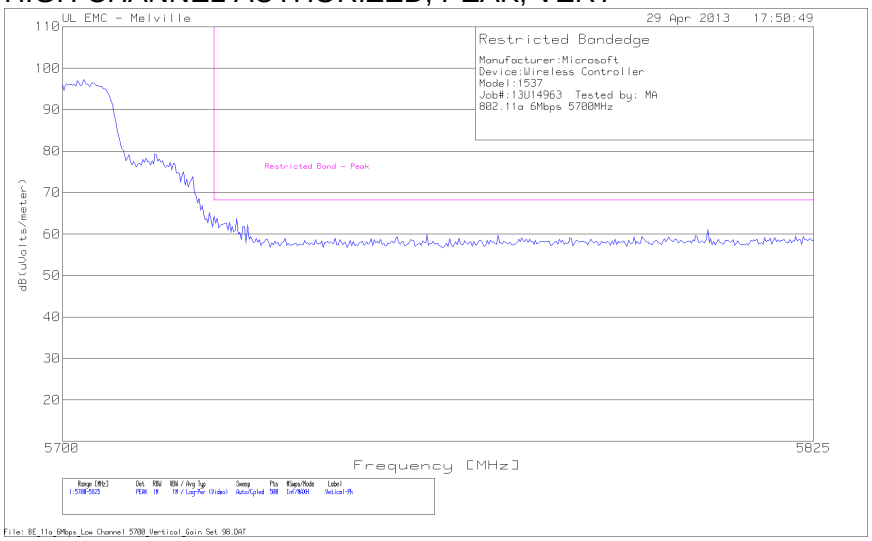


AUTHORIZED BANDEDGE (HIGH CHANNEL)

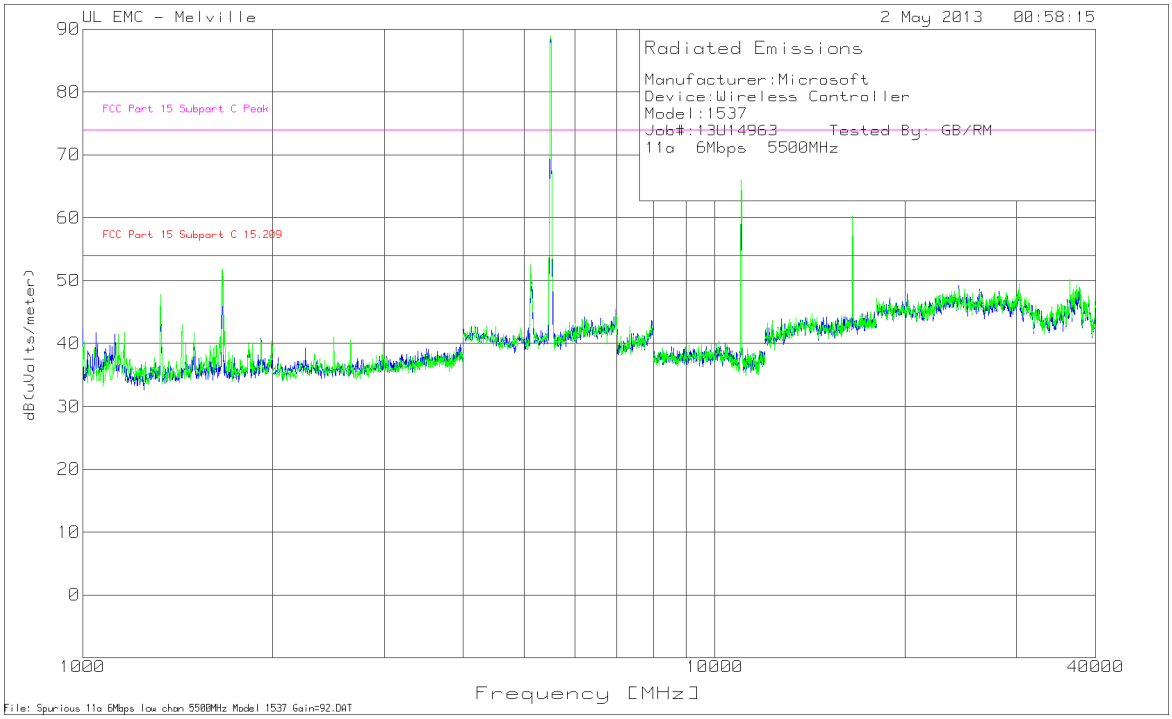
HIGH CHANNEL AUTHORIZED, PEAK, HORIZ



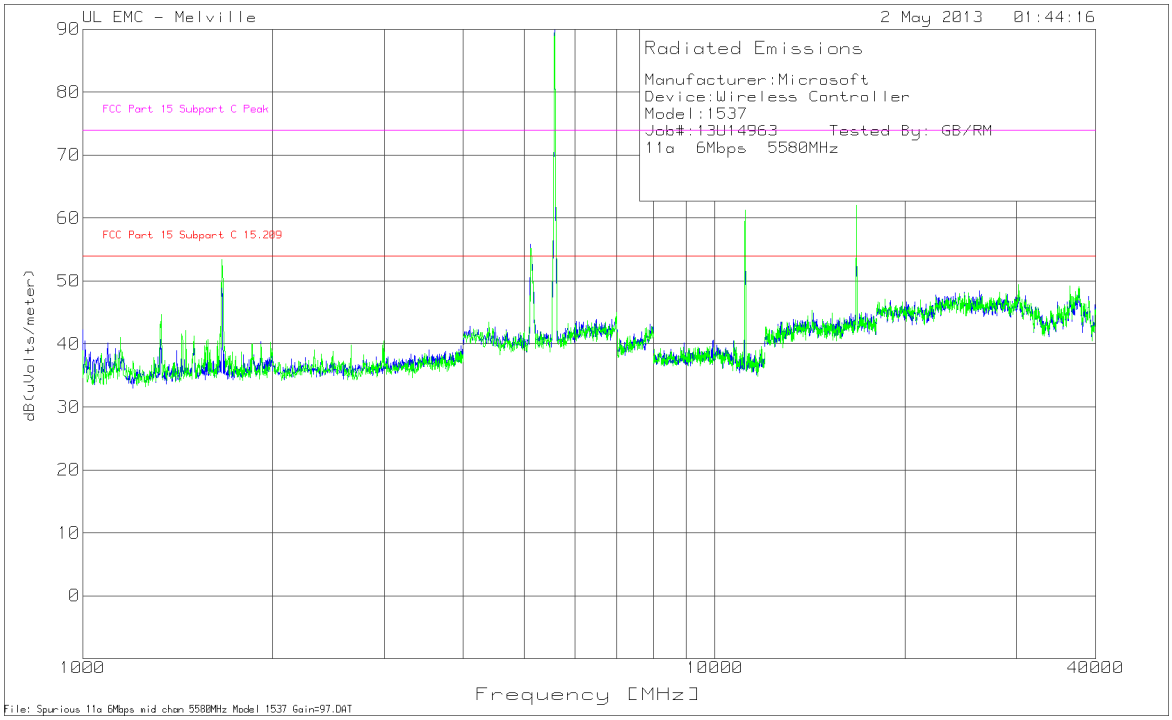
HIGH CHANNEL AUTHORIZED, PEAK, VERT



HARMONICS AND SPURIOUS EMISSIONS

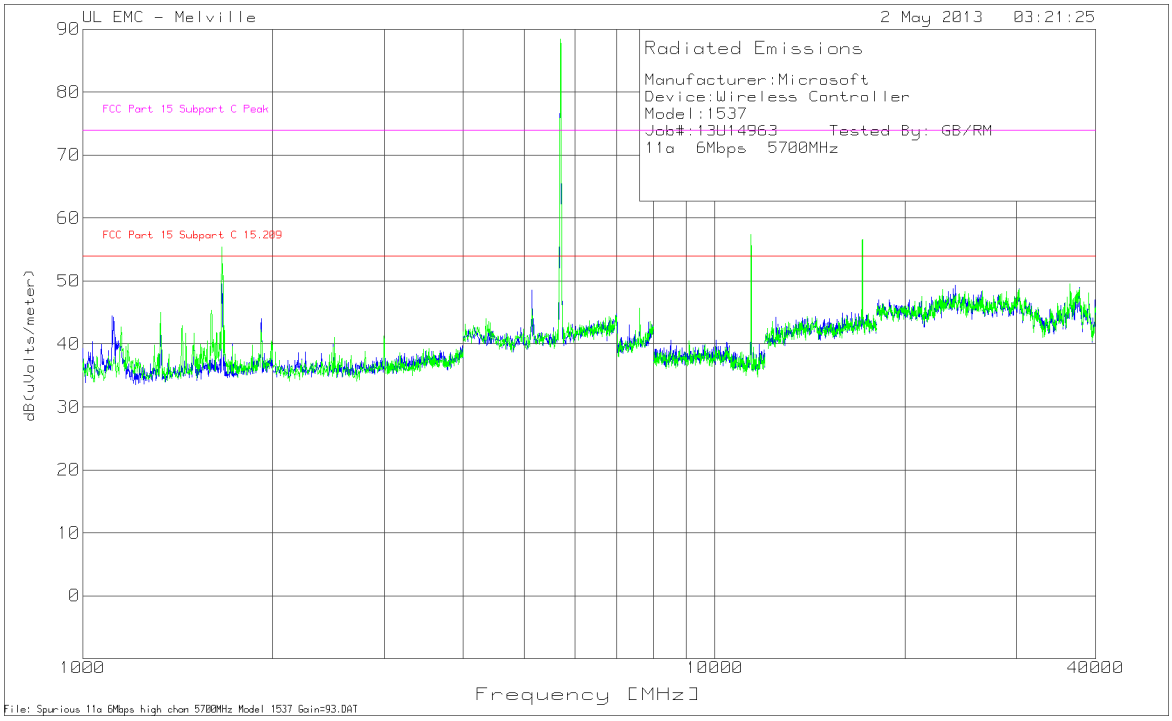


Low Channel



Mid Channel

HARMONICS AND SPURIOUS EMISSIONS (CONT)



High Channel

HARMONICS AND SPURIOUS EMISSIONS (CONT)

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

Low Channel - 5500MHz

Test Frequency	Meter Reading	Detector	AF [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)	EIRP Peak	Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
16509.018	69.04	PK	37.4	-48.4	58.04	-	-	-	-	68.2	-10.16	215	100	Horz
16496.994	71.23	PK	37.4	-48.36	60.27	-	-	-	-	68.2	-7.93	319	100	Vert
11001.724	83.23	PK1	33.4	-49.01	67.62	-	-	74	-6.38	-	-	321	173	Horz
11000.361	79.36	PK1	33.4	-49.07	63.69	-	-	74	-10.31	-	-	237	278	Vert
11001.704	69	AD1	33.4	-49.01	53.39	54	-0.61	-	-	-	-	321	173	Horz
10997.194	68.2	AD1	33.4	-49.16	52.44	54	-1.56	-	-	-	-	237	278	Vert

Mid Channel - 5580MHz

Test Frequency	Meter Reading	Detector	AF [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)	EIRP Peak	Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
16737.475	71.48	PK	37.4	-49.17	59.71	-	-	-	-	68.2	-8.49	212	100	Horz
16749.499	72.66	PK	37.4	-49.08	60.98	-	-	-	-	68.2	-7.22	36	100	Vert
11160.926	72.51	PK1	33.2	-49.26	56.45	-	-	74	-17.55	-	-	234	302	Horz
11164.533	81.09	PK1	33.2	-49.37	64.92	-	-	74	-9.08	-	-	234	302	Vert
22317.796	61.94	PK1	40.8	-53.73	49.01	-	-	74	-24.99	-	-	310	389	Vert
22304.489	61.5	PK1	40.8	-53.79	48.51	-	-	74	-25.49	-	-	53	245	Horz
11159.561	61.42	AD1	33.2	-49.23	45.39	54	-8.61	-	-	-	-	234	302	Horz
11160.412	69.47	AD1	33.2	-49.25	53.42	54	-0.58	-	-	-	-	234	302	Vert
22312.365	54.58	AD1	40.8	-53.66	41.72	54	-12.28	-	-	-	-	310	389	Vert
22302.425	54.11	AD1	40.8	-53.79	41.12	54	-12.88	-	-	-	-	53	245	Horz

High Channel - 5700MHz

Test Frequency	Meter Reading	Detector	AF [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)	EIRP Peak	Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
17110.22	63.32	PK	37.4	-47.9	52.82	-	-	-	-	68.2	-15.38	252	100	Horz
17110.22	67	PK	37.5	-47.9	56.6	-	-	-	-	68.2	-11.6	340	100	Vert
11399.8	77.94	PK	33.3	-48.3	62.94	-	-	74	-11.06	-	-	6	340	Vert
11400.641	74.55	PK	33.3	-48.28	59.57	-	-	74	-14.43	-	-	153	321	Horz
11399.8	61.72	LnAv	33.3	-48.3	46.72	54	-7.28	-	-	-	-	6	340	Vert
11400.641	60.57	LnAv	33.3	-48.28	45.59	54	-8.41	-	-	-	-	153	321	Horz

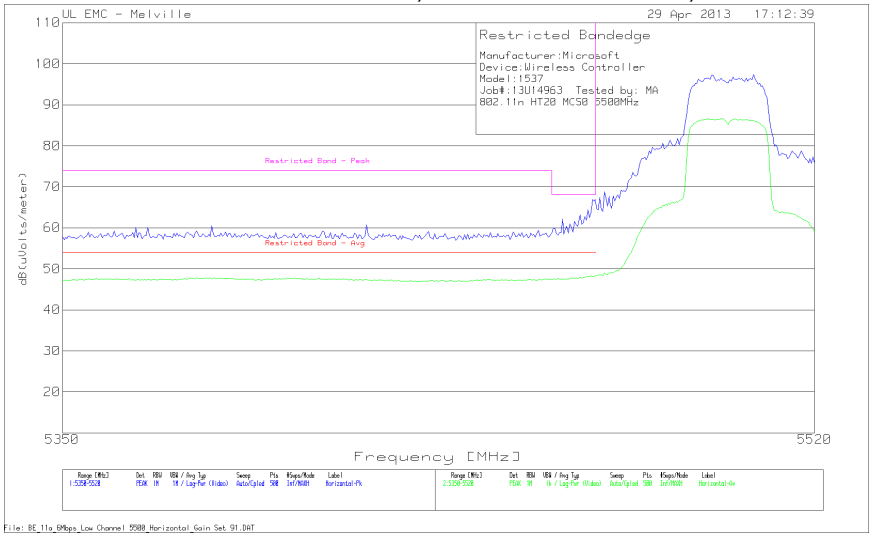
PK - Peak detector
LnAv - Linear Average detector
PK1 - KDB 789033 v01r02 G)5) Method: Peak
AD1 - KDB 789033 v01r02 G)6) Method: AD Primary Power Average

NOTE: No additional emissions detected above the system noise floor

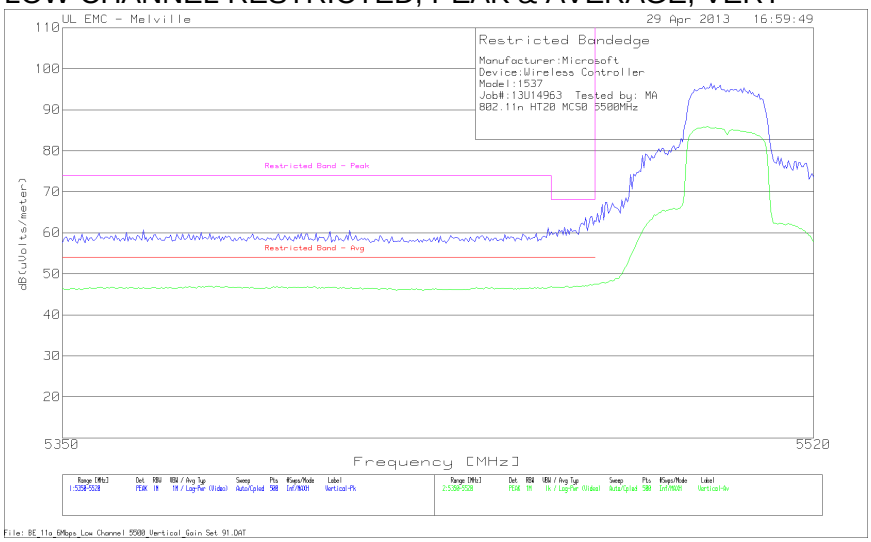
9.2.4. TX ABOVE 1 GHz 802.11n HT20 MODE IN THE 5.6 GHz BAND

RESTRICTED & AUTHORIZED BANDEDGE (LOW CHANNEL)

LOW CHANNEL RESTRICTED, PEAK & AVERAGE, HORIZ

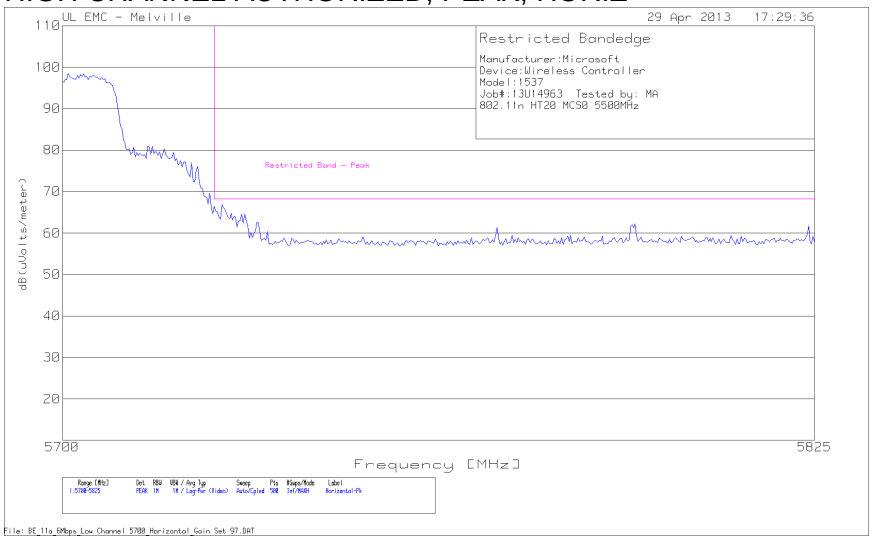


LOW CHANNEL RESTRICTED, PEAK & AVERAGE, VERT



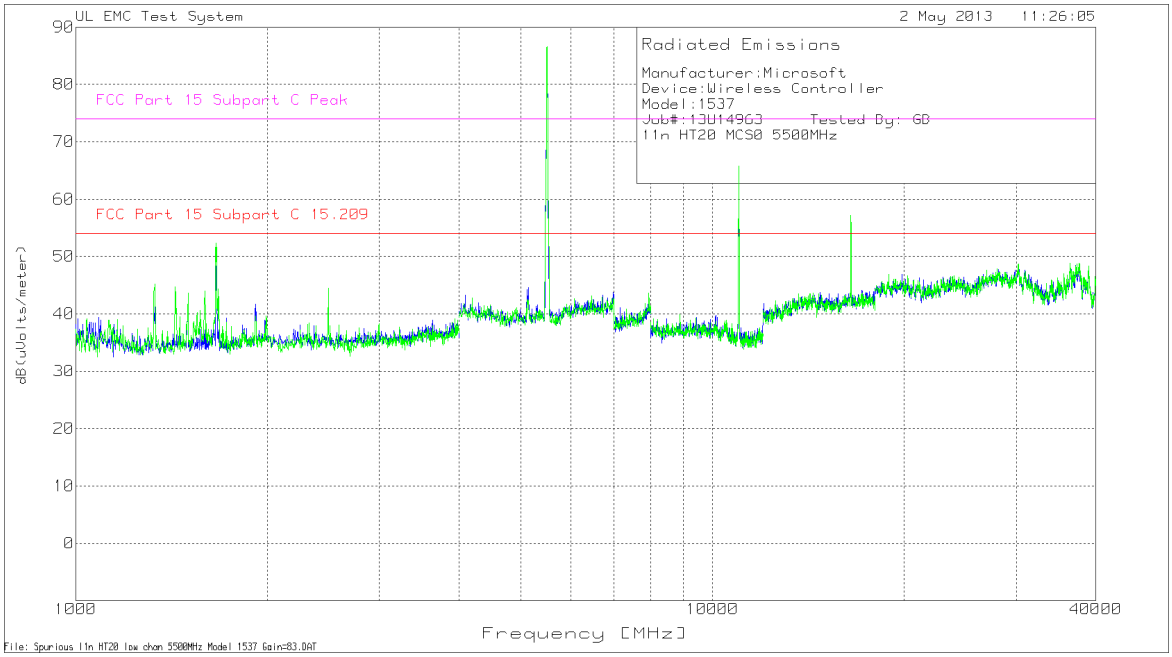
AUTHORIZED BANDEDGE (HIGH CHANNEL)

HIGH CHANNEL AUTHORIZED, PEAK, HORIZ



HIGH CHANNEL AUTHORIZED, PEAK, VERT

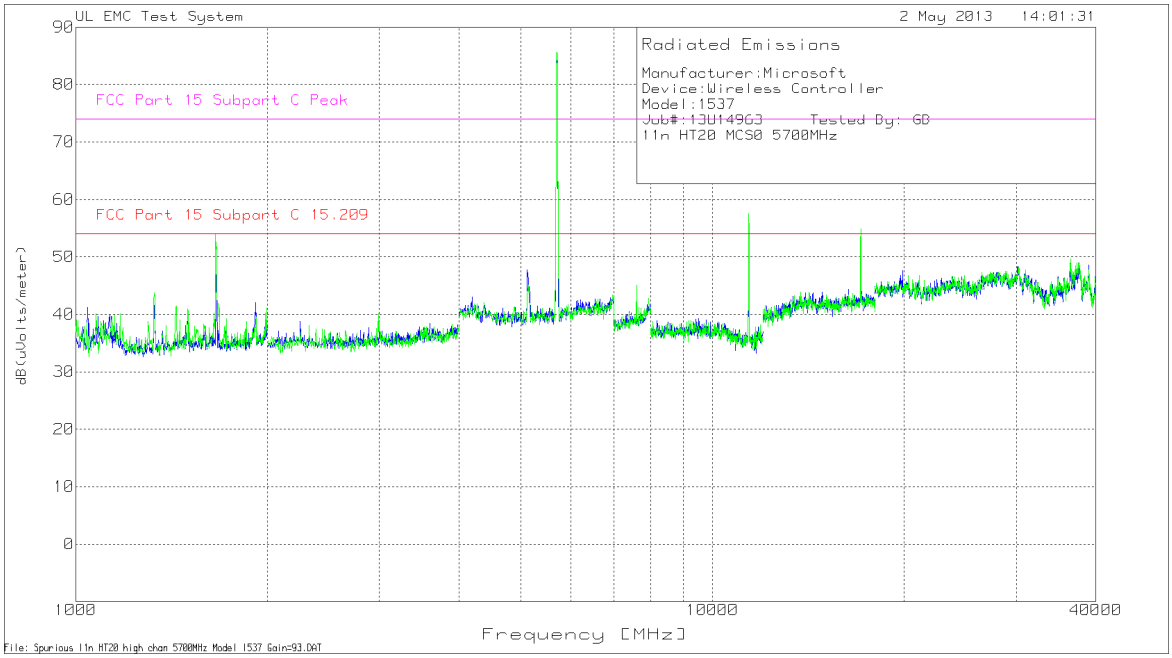
HARMONICS AND SPURIOUS EMISSIONS



Low Channel

Mid Channel

HARMONICS AND SPURIOUS EMISSIONS (CONT)



High Channel

HARMONICS AND SPURIOUS EMISSIONS (CONT)

Manufacturer:Microsoft
Device:Wireless Controller
Model:1537
Job#:13U14963 Tested By: GB
11n MCS0 Mode

Low Channel - 5500MHz

Test Frequency	Meter Reading	Detector	AF [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)	EIRP Peak	Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
16496.994	67.41	PK	37.4	-49.2	55.61	-	-	-	-	68.2	-12.59	215	100	Horz
16496.994	68.99	PK	37.4	-49.2	57.19	-	-	-	-	68.2	-11.01	231	100	Vert
10991.227	82.32	PK1	33.4	-49.18	66.54	-	-	74	-7.46	-	-	321	173	Horz
10995.496	80.27	PK1	33.4	-49.21	64.46	-	-	74	-9.54	-	-	237	278	Vert
10994.684	67.4	AD1	33.4	-49.22	51.58	54	-2.42	-	-	-	-	321	173	Horz
10997.991	65.81	AD1	33.4	-49.14	50.07	54	-3.93	-	-	-	-	237	278	Vert

Mid Channel - 5580MHz

Test Frequency	Meter Reading	Detector	AF [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)	EIRP Peak	Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
16749.499	60.25	PK	37.4	-49.08	48.57	-	-	-	-	68.2	-19.63	214	100	Horz
16737.475	64.55	PK	37.4	-49.17	52.78	-	-	-	-	68.2	-15.42	305	100	Vert
11158.422	73.26	PK1	33.2	-49.2	57.26	-	-	74	-16.74	-	-	202	346	Vert
11168.605	75.75	PK1	33.2	-49.3	59.65	-	-	74	-14.35	-	-	74	385	Horz
22311.232	62.15	PK1	40.8	-53.64	49.31	-	-	74	-24.69	-	-	53	384	Vert
22288.837	61.04	PK1	40.8	-53.61	48.23	-	-	74	-25.77	-	-	345	398	Horz
11162.393	60.8	AD1	33.2	-49.31	44.69	54	-9.31	-	-	-	-	202	346	Vert
11163.207	62.85	AD1	33.2	-49.33	46.72	54	-7.28	-	-	-	-	74	385	Horz
22299.133	51.62	AD1	40.8	-53.45	38.97	54	-15.03	-	-	-	-	53	384	Vert
22278.391	49.85	AD1	40.8	-53.93	36.72	54	-17.28	-	-	-	-	345	398	Horz

High Channel - 5700MHz

Test Frequency	Meter Reading	Detector	AF [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)	EIRP Peak	Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
17110.22	64.52	PK	37.4	-48.86	53.06	-	-	-	-	68.2	-15.14	252	100	Horz
17110.22	66.19	PK	37.5	-48.86	54.83	-	-	-	-	68.2	-13.37	340	100	Vert
11406.238	75.99	PK1	33.3	-49.54	59.75	-	-	74	-14.25	-	-	137	240	Vert
11398.572	76.22	PK1	33.3	-49.65	59.87	-	-	74	-14.13	-	-	25	394	Horz
22746.012	60.9	PK1	40.7	-53.62	47.98	-	-	74	-26.02	-	-	306	373	Horz
22698.637	61.7	PK1	40.7	-53.75	48.65	-	-	74	-25.35	-	-	53	370	Vert
11403.457	61.88	AD1	33.3	-49.53	45.65	54	-8.35	-	-	-	-	137	240	Vert
11398.246	63.66	AD1	33.3	-49.66	47.3	54	-6.7	-	-	-	-	25	394	Horz
22722.024	49.95	AD1	40.7	-53.52	37.13	54	-16.87	-	-	-	-	306	373	Horz
22682.224	49.71	AD1	40.7	-53.19	37.22	54	-16.78	-	-	-	-	53	370	Vert

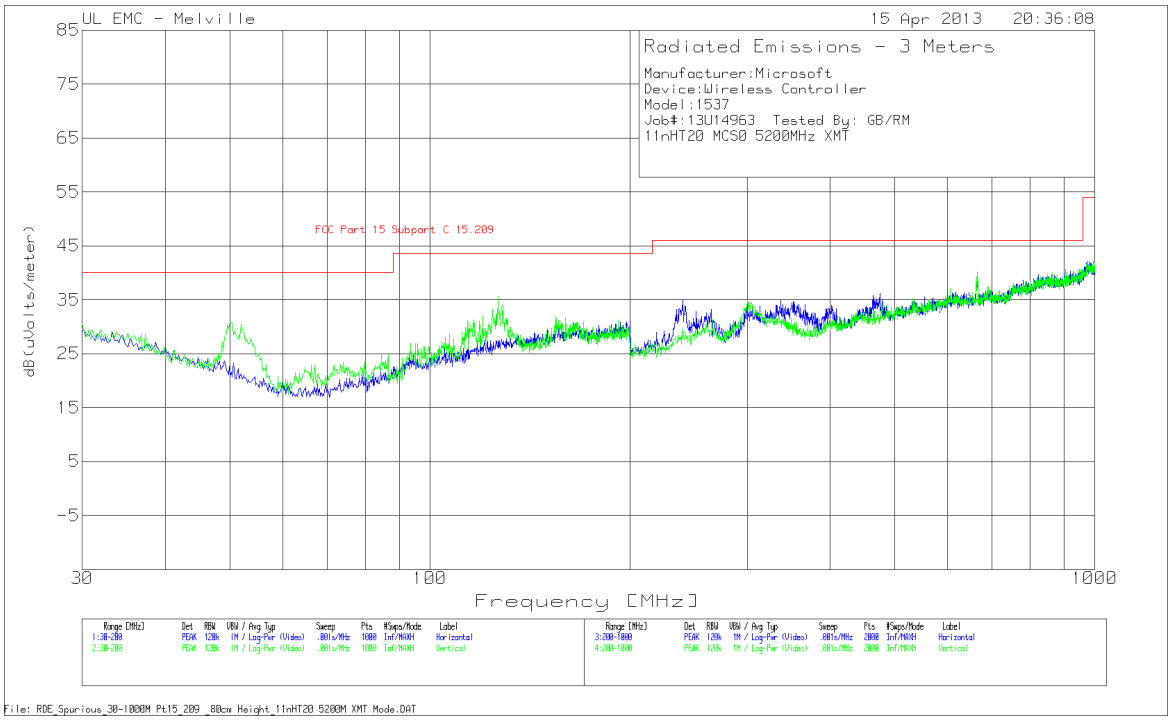
PK - Peak detector
PK1 - KDB 789033 v01r02 G)5) Method: Peak
AD1 - KDB 789033 v01r02 G)6) Method: AD Primary Power Average

NOTE: No additional emissions detected above the system noise floor

9.3. WORST-CASE BELOW 1 GHz

SPURIOUS EMISSIONS 30 TO 1000 MHz (5.2GHZ BAND WORST-CASE CONFIGURATION)

HORIZONTAL & VERTICAL PLOT

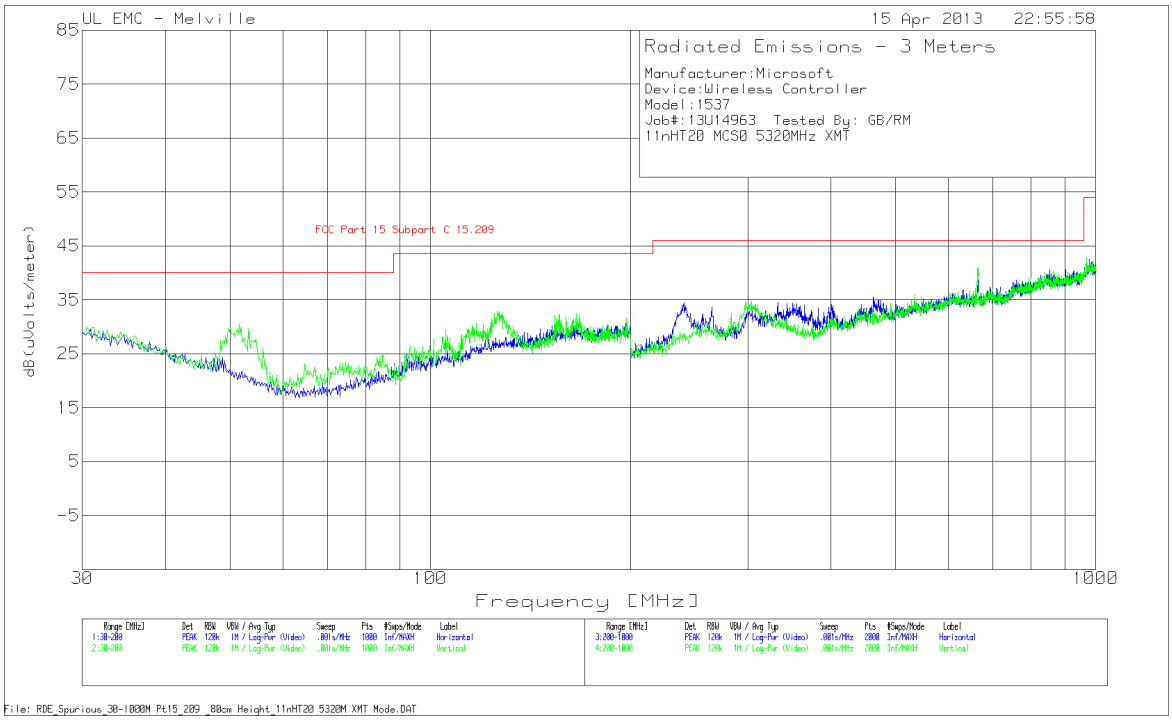


HORIZONTAL & VERTICAL DATA

Manufacturer:Microsoft										
Device:Wireless Controller										
Model:1537										
Job#:13U14963 Tested By: GB/RM										
11nHT20 MCS0 5200MHz 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
50.0249	18.45	QP	10.2	0.1	28.75	40	-11.25	270	100	Vert
113.8404	15.56	QP	12.5	0.4	28.46	43.5	-15.04	42	102	Vert
126.5521	17	QP	13.7	0.5	31.2	43.5	-12.3	52	103	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
240.0015	23.01	QP	11.2	0.8	35.01	46	-10.99	177	120	Horz
665.0524	14.01	QP	20.1	1.9	36.01	46	-9.99	337	110	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
665.0372	15.44	QP	20.1	1.9	37.44	46	-8.56	360	101	Vert
QP - Quasi-Peak detector										

SPURIOUS EMISSIONS 30 TO 1000 MHz (5.3GHZ BAND WORST-CASE CONFIGURATION)

HORIZONTAL & VERTICAL PLOT

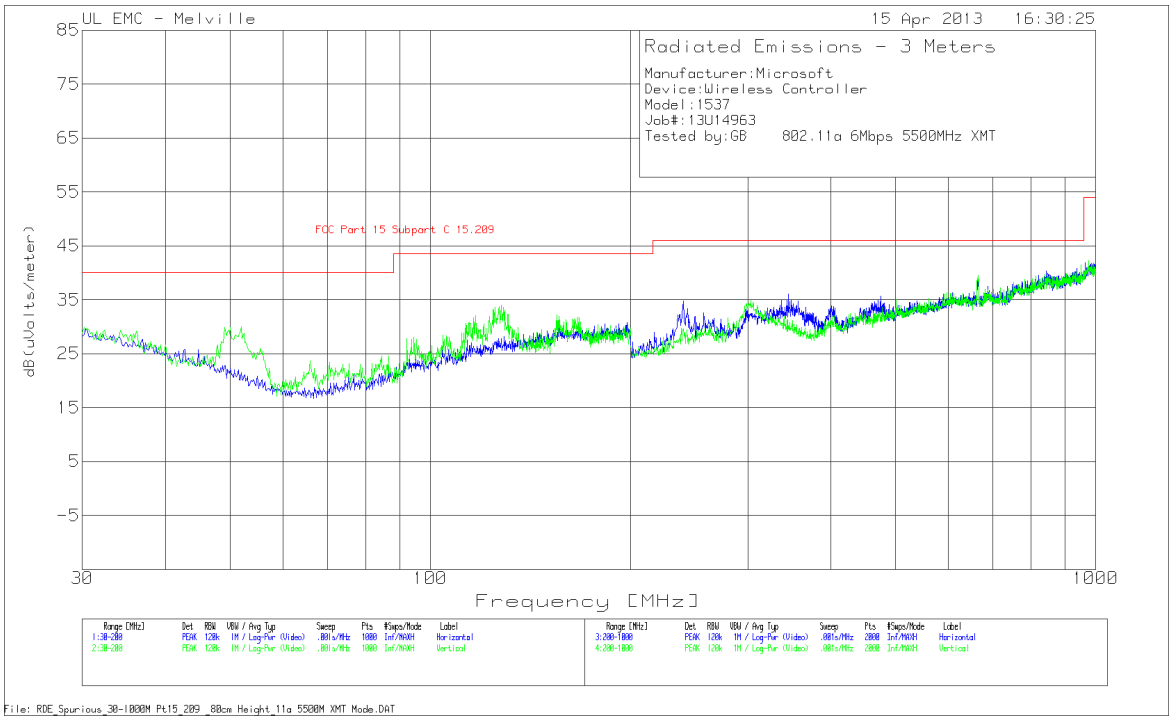


HORIZONTAL & VERTICAL DATA

Manufacturer:Microsoft										
Device:Wireless Controller										
Model:1537										
Job#:13U14963 Tested By: GB/RM										
11nHT20 MCS0 5320MHz 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
50.0181	17.91	QP	10.2	0.1	28.21	40	-11.79	265	101	Vert
52.0121	15.92	QP	9.2	0.1	25.22	40	-14.78	259	101	Vert
126.1774	16.54	QP	13.7	0.5	30.74	43.5	-12.76	76	102	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
239.9992	23.33	QP	11.2	0.8	35.33	46	-10.67	170	132	Horz
665.1462	13.22	QP	20.1	1.9	35.22	46	-10.78	0	261	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
302.2793	17.95	QP	13	1.1	32.05	46	-13.95	345	166	Vert
665.0356	14.23	QP	20.1	1.9	36.23	46	-9.77	314	173	Vert
QP - Quasi-Peak detector										

SPURIOUS EMISSIONS 30 TO 1000 MHz (5.6GHZ BAND WORST-CASE CONFIGURATION)

HORIZONTAL & VERTICAL PLOT



HORIZONTAL & VERTICAL DATA

Manufacturer:Microsoft										
Device:Wireless Controller										
Model:1537										
Job#:13U14963										
Tested by:GB 802.11a 6Mbps 5500MHz 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
51.952	20.66	PK	9.2	0.1	29.96	40	-10.04	309	100	Vert
116.957	18.64	PK	12.9	0.5	32.04	43.5	-11.46	75	100	Vert
127.8478	19.69	PK	13.8	0.5	33.99	43.5	-9.51	21	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
344.8724	20.31	PK	14.6	1.2	36.11	46	-9.89	216	100	Horz
665.4327	17.5	PK	20.1	1.9	39.5	46	-6.5	4	100	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
665.4327	17.55	PK	20.1	1.9	39.55	46	-6.45	0	100	Vert
PK - 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.

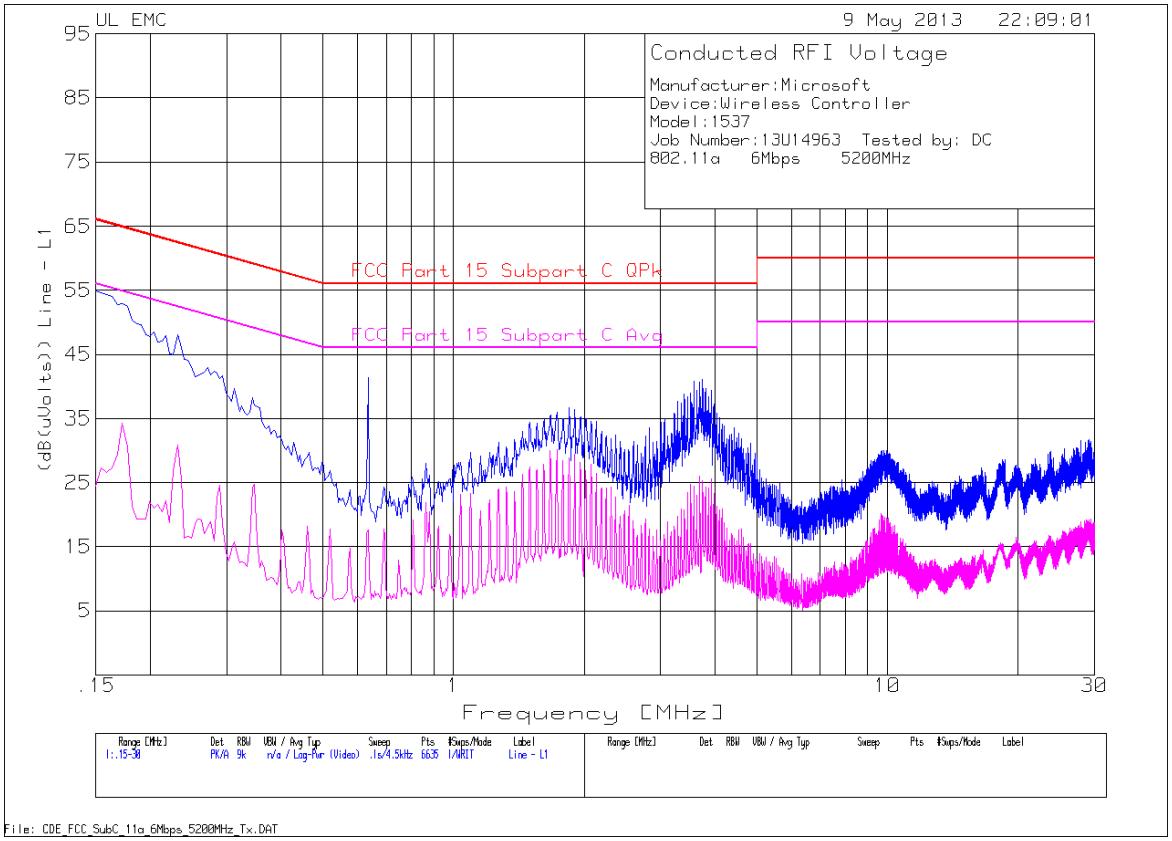
Line conducted data is recorded for both NEUTRAL and HOT lines.

RESULTS

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