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

CERTIFICATION TEST REPORT

FOR

DUAL-BAND 802.11a/b/g/n ACCESS POINT

MODEL NUMBER: ZONEFLEX 7351

FCC ID: S9GZF7351
IC: 5912A-ZF7351

REPORT NUMBER: 12U14419-28

ISSUE DATE: DECEMBER 21, 2012

Prepared for
RUCKUS WIRELESS, INC.
350 WEST JAVA DRIVE
SUNNYVALE, CA 94089, USA

Prepared by
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NVLAP LAB CODE 200065-0

Revision History

Rev.	Issue Date	Revisions	Revised By
--	12/21/12	Initial Issue	F. Ibrahim

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: RUCKUS WIRELESS, INC.
350 WEST JAVA DRIVE
SUNNYVALE, CA 94089, USA

EUT DESCRIPTION: DUAL-BAND 802.11a/b/g/n ACCESS POINT

MODEL: ZONEFLEX 7351

SERIAL NUMBER: 301204006396

DATE TESTED: OCTOBER 01 - DECEMBER 04, 2012

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 CCS tested the above equipment in accordance with the requirements set forth in the above standards. All indications of Pass/Fail in this report are opinions expressed by UL CCS based on interpretations and/or observations of test results. Measurement Uncertainties were not taken into account and are published for informational purposes only. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

Note: The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. This document may not be altered or revised in any way unless done so by UL CCS and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL CCS will constitute fraud and shall nullify the document. This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, any agency of the Federal Government, or any agency of any government.

Approved & Released For UL CCS By:

FRANK IBRAHIM
WiSE PROJECT LEAD
UL CCS

Tested By:

CHIN PANG
EMC ENGINEER
UL CCS

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 C63.10-2009, RSS-GEN Issue 3, and RSS-210 Issue 8.

3. FACILITIES AND ACCREDITATION

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

UL CCS is accredited by NVLAP, Laboratory Code 200065-0. The full scope of accreditation can be viewed at http://www.ccsemc.com.

4. CALIBRATION AND UNCERTAINTY

4.1. MEASURING INSTRUMENT CALIBRATION

The measuring equipment utilized to perform the tests documented in this report has been calibrated in accordance with the manufacturer's recommendations, and is traceable to recognized national standards.

4.2. SAMPLE CALCULATION

Where relevant, the following sample calculation is provided:

Field Strength (dBuV/m) = Measured Voltage (dBuV) + Antenna Factor (dB/m) + Cable Loss (dB) – Preamp Gain (dB)

36.5 dBuV + 18.7 dB/m + 0.6 dB – 26.9 dB = 28.9 dBuV/m

4.3. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus:

PARAMETER	UNCERTAINTY
Conducted Disturbance, 0.15 to 30 MHz	3.52 dB
Radiated Disturbance, 30 to 1000 MHz	4.94 dB

Uncertainty figures are valid to a confidence level of 95%.

5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

The EUT is an 802.11 a/b/g/n access point designed for mounting on a desktop, wall or ceiling.
The EUT is powered by an external AC adapter, Ruckus P/N 740-64190-001.
The radio module is manufactured by Ruckus Wireless.

5.2. MAXIMUM OUTPUT POWER

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

Frequency Range (MHz)	Mode	Output Power (dBm)	Output Power (mW)
5180 - 5240	802.11a	15.246	33.466
5180 - 5240	802.11n HT20, CDD	15.743	37.523
5180 - 5240	802.11n HT20, SDM	15.512	35.580
5190 - 5230	802.11n HT40, CDD	16.798	47.841
5190 - 5230	802.11n HT40, SDM	16.833	48.228

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes the following antenna:
Proprietary dual-band PCB Omni Antenna; with a maximum peak gain of 1 dBi for 2.4GHz band, and 2 dBi for 5GHz band.

5.4. SOFTWARE AND FIRMWARE

The firmware installed in the EUT during testing was 9.3.1.5.1

The EUT driver software installed during testing was Microsoft Window Version 6.1.7601.

The test utility software used during testing was ZF7351 GD11 ART Ver. V0_9_b7_ar928xALL\ART\ bin.

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, and X orientation was determined to be the worst-case orientation; therefore, all final radiated testing was performed with the EUT in X orientation.

Worst-case data rates as provided by the client were:

802.11b mode: 1 Mbps
802.11g mode: 6 Mbps
802.11a mode: 6 Mbps
802.11n HT20mode: MCS0 for CDD and MCS8 for SDM
802.11n HT40mode: MCS0 for CDD and MCS8 for SDM

5.6. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List				
Description	Manufacturer	Model	Serial Number	FCC ID
Laptop	LENOVO	IdealPad U310	804927703	PD92200BNHU
AC/DC Adapter	LENOVO	ADP40-NH B	11S36001648ZZ6002495ZB	DoC
EUT AC Adapter	RUCKUS	HK-AD-120A 100-US	1010C	DoC

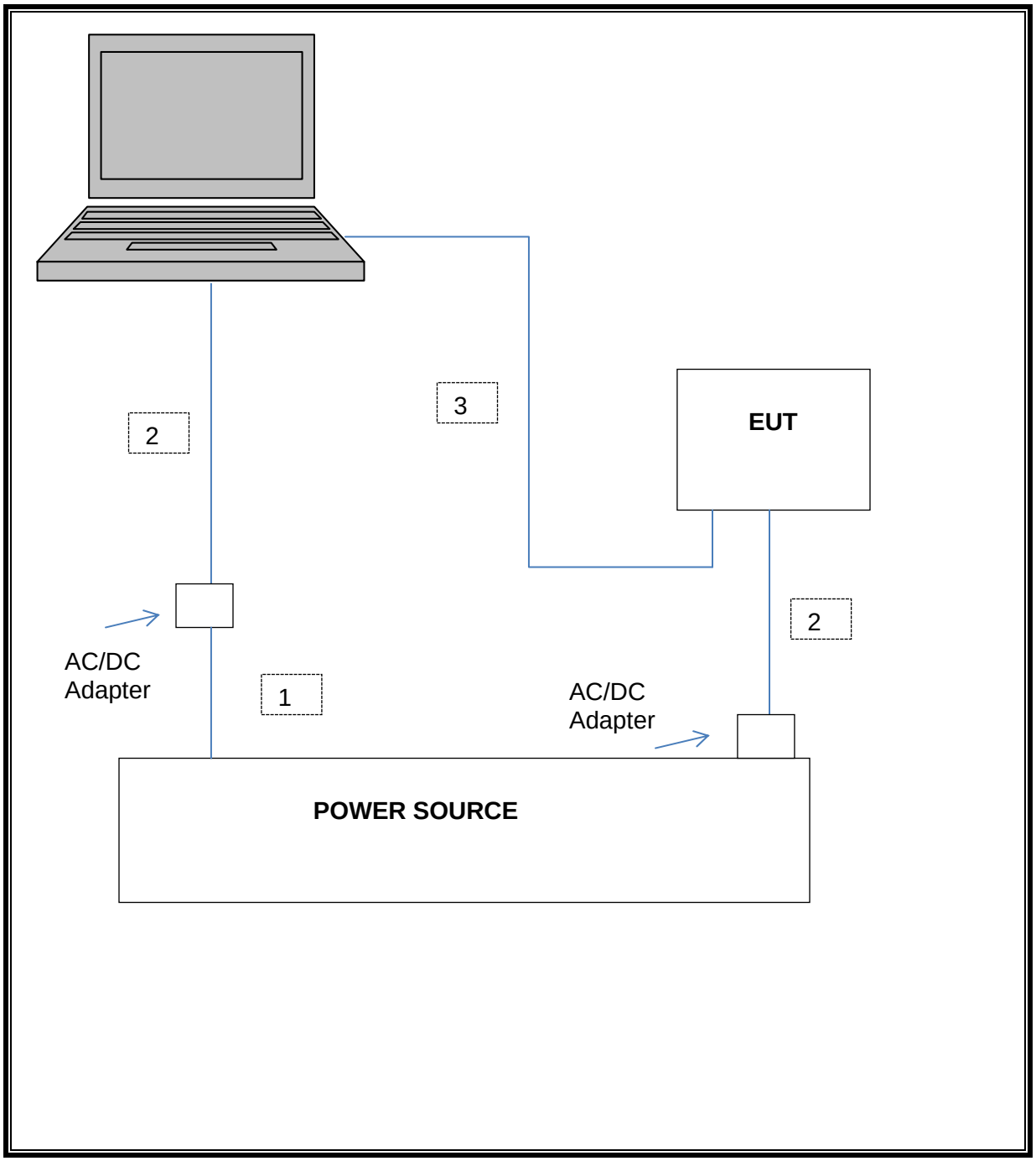
I/O CABLES

I/O Cable List						
Cable No	Port	# of identical ports	Connector Type	Cable Type	Cable Length (m)	Remarks
1	AC/DC	1	US115VAC	Unshielded	1m	N/A
2	DC	2	DC Plug	Unshielded	1.5m	N/A
3	LAN	1	RJ45	Unshielded	2m	N/A

TEST SETUP

The EUT is connected to the host laptop computer during the tests. Test software exercised the radio card.

SETUP DIAGRAM FOR TESTS



6. TEST AND MEASUREMENT EQUIPMENT

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

TEST EQUIPMENT LIST				
Description	**Manufacturer**	**Model**	**Asset**	**Cal Due**
Spectrum Analyzer, 44 GHz	Agilent / HP	E4446A	C01069	12/15/12
Antenna, Horn, 18 GHz	EMCO	3115	C00872	10/25/13
Preamplifier, 26.5 GHz	Agilent / HP	8449B	C00749	06/13/13
Antenna, Bilog, 2 GHz	Sunol Sciences	JB1	C01171	02/07/13
Preamplifier, 1300 MHz	Agilent / HP	8447D	C00558	01/27/13
Peak Power Meter	Agilent / HP	8449B	NA	07/27/13
Peak and Avg Power Sensor	Agilent / HP	E9323A	NA	07/27/13
EMI Test Receiver, 9 kHz-7 GHz	R & S	ESCI 7	1000741	7/2/2013
Reject Filter, 5.15-5.35 GHz	Micro-Tronics	BRC13190	N02679	CNR
Reject Filter, 5.47-5.725 GHz	Micro-Tronics	BRC13191	N02678	CNR
LISN, 30 MHz	FCC	LISN-50/250-25-2	N02625	CNR
Horn Antenna, 26 GHz	ARA	MWH-1826/B	C00980	08/06/13
Horn Antenna, 40 GHz	ARA	MWH-2640/B	C00981	06/14/13
Preamplifier, 40 GHz	Miteq	NSP4000-SP2	C00990	08/02/13

7. ON TIME, DUTY CYCLE AND MEASUREMENT METHODS

LIMITS

None; for reporting purposes only.

PROCEDURE

KDB 789033 Zero-Span Spectrum Analyzer Method.

7.1. 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	3.1330	3.1500	0.995	99.5%	0.00	0.010
802.11n HT20, CDD	2.9080	2.9250	0.994	99.4%	0.00	0.010
802.11n HT20, SDM	2.9670	2.9920	0.992	99.2%	0.00	0.010
802.11n HT40, CDD	1.4040	1.4300	0.982	98.2%	0.00	0.010
802.11n HT40, SDM	0.7362	0.7506	0.981	98.1%	0.00	0.010

7.2. MEASUREMENT METHOD FOR POWER AND PPSD

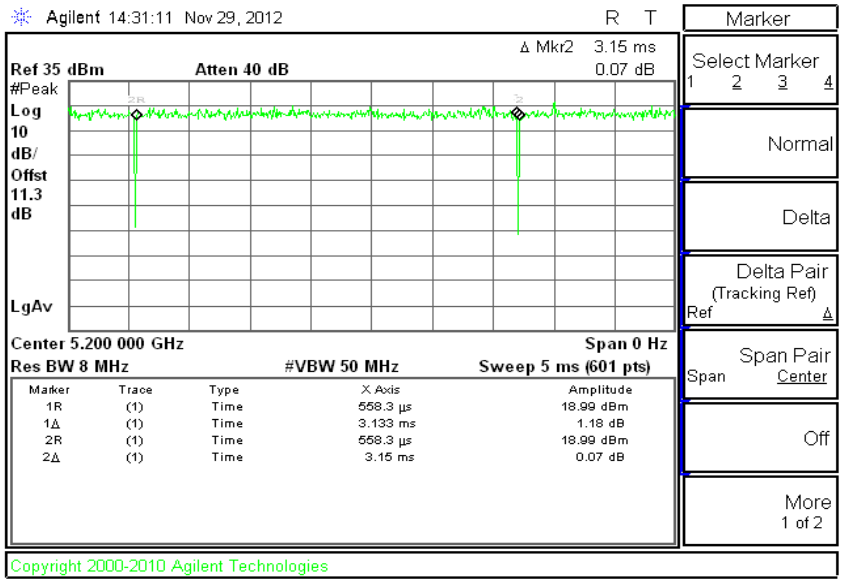
The Duty Cycle is greater than or equal to 98% therefore KDB 789033 Method SA-1 is used.

7.3. MEASUREMENT METHOD FOR AVG SPURIOUS EMISSIONS ABOVE 1 GHz

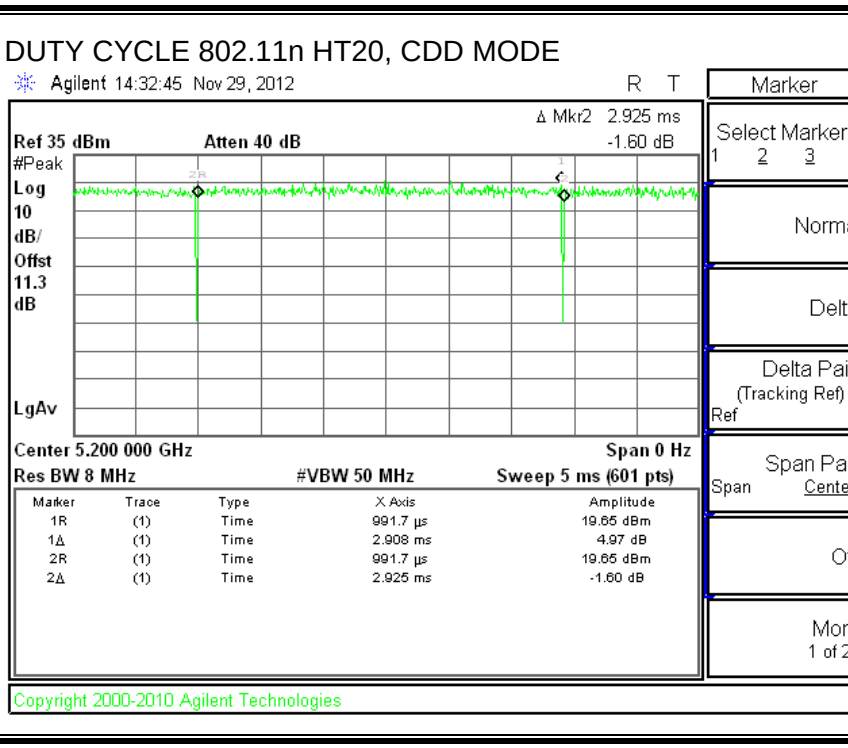
The Duty Cycle is greater than or equal to 98%, KDB 789033 Method VB with Power RMS Averaging is used.

7.4. DUTY CYCLE PLOTS

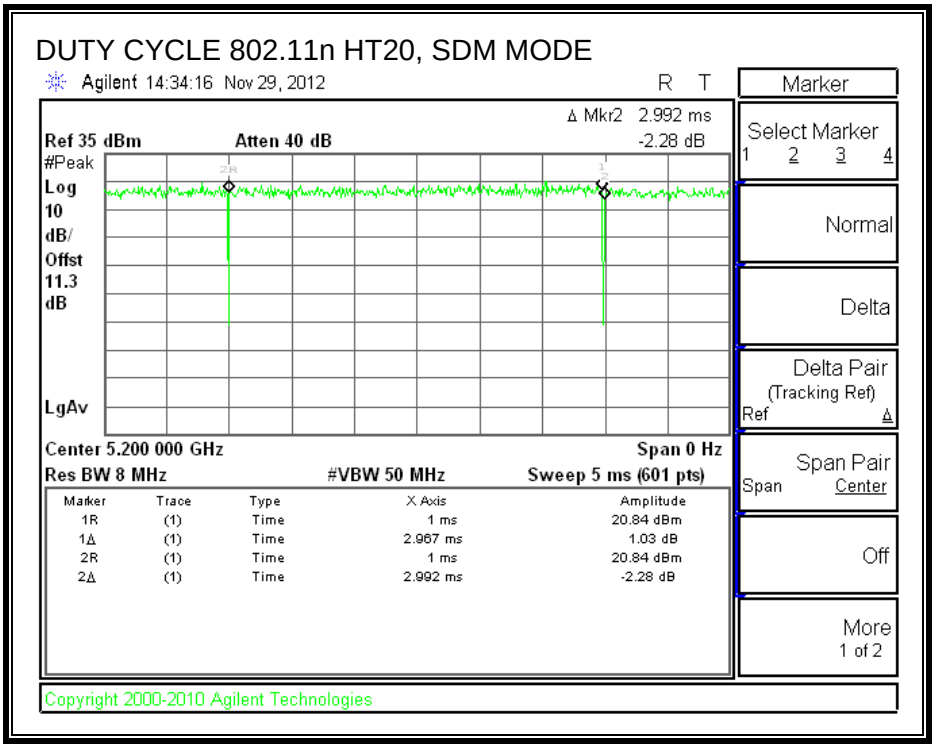
DUTY CYCLE 802.11a MODE



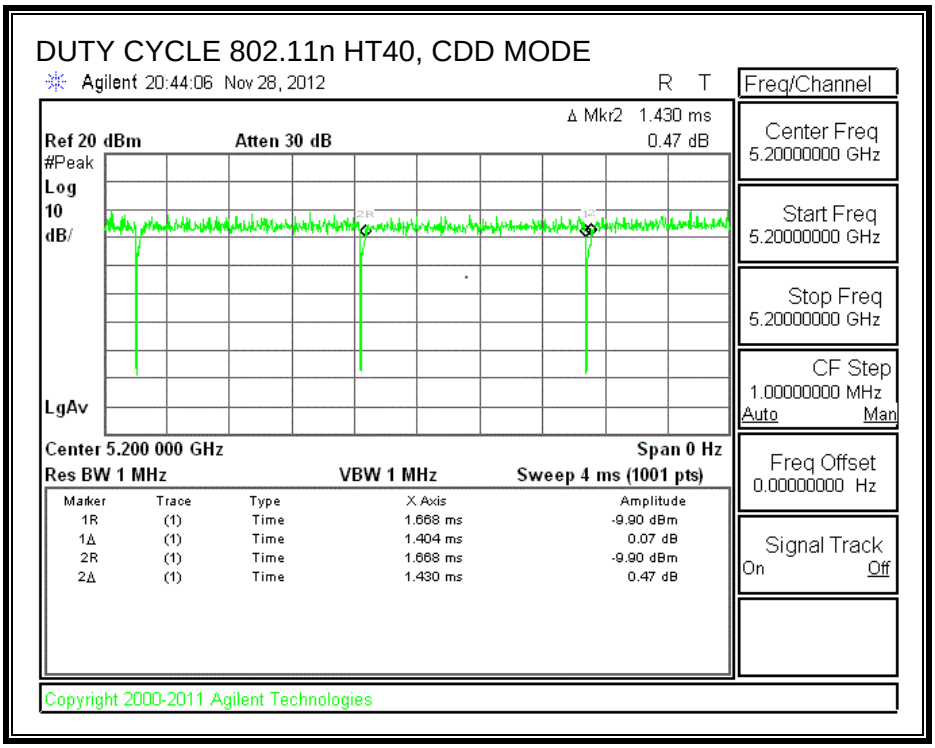
DUTY CYCLE 802.11n HT20, CDD MODE



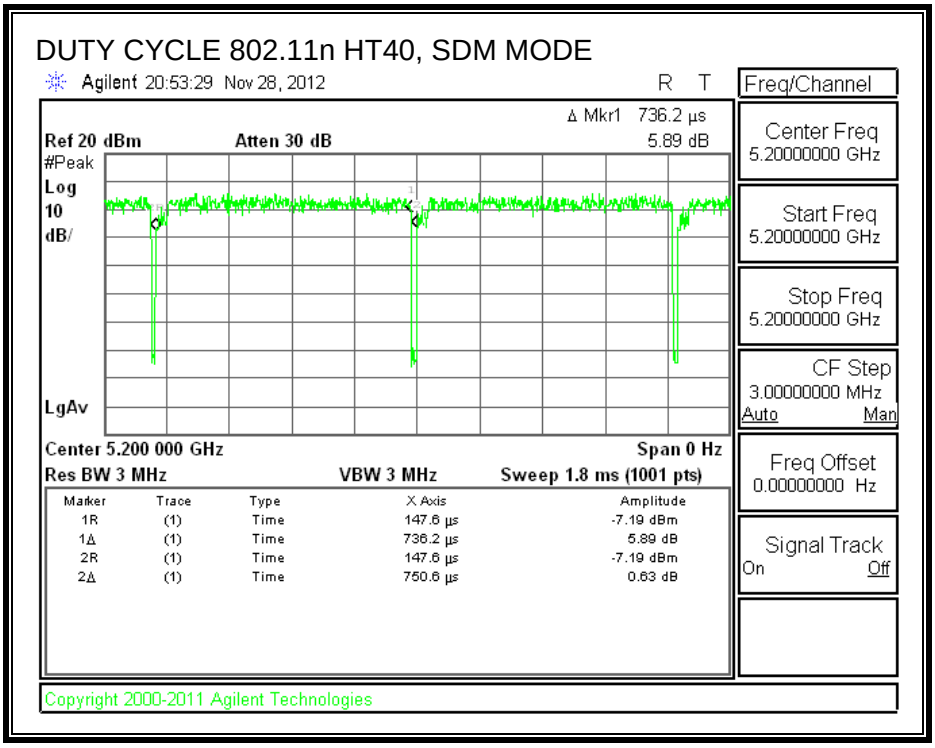
DUTY CYCLE 802.11n HT20, SDM MODE



DUTY CYCLE 802.11n HT40, CDD MODE



DUTY CYCLE 802.11n HT40, SDM MODE



8. ANTENNA PORT TEST RESULTS

8.1. 802.11a MODE IN THE 5.2 GHz BAND

8.1.1. 26 dB and 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

Guidelines for Compliance Testing of Unlicensed National Information Infrastructure (U-NII) Devices - Part 15, Subpart E, dated 10/25/2011.

RESULTS

CHAIN 0

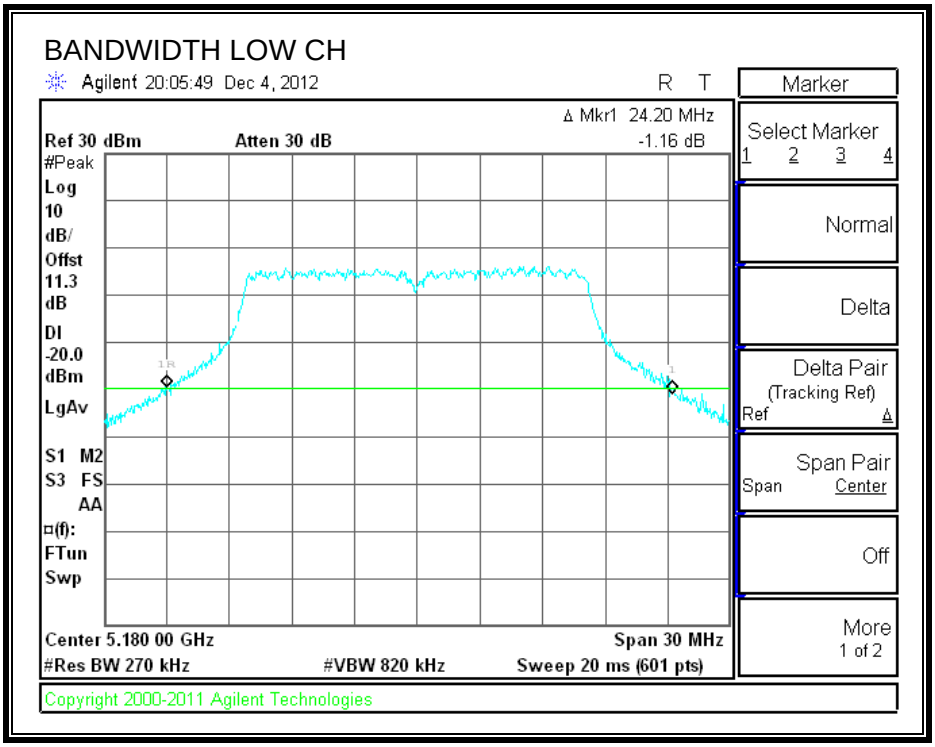
Channel	Frequency (MHz)	26 dB Bandwidth (MHz)	99% Bandwidth (MHz)
Low	5180	24.20	16.5053
Middle	5200	24.50	16.5123
High	5240	27.42	16.5179

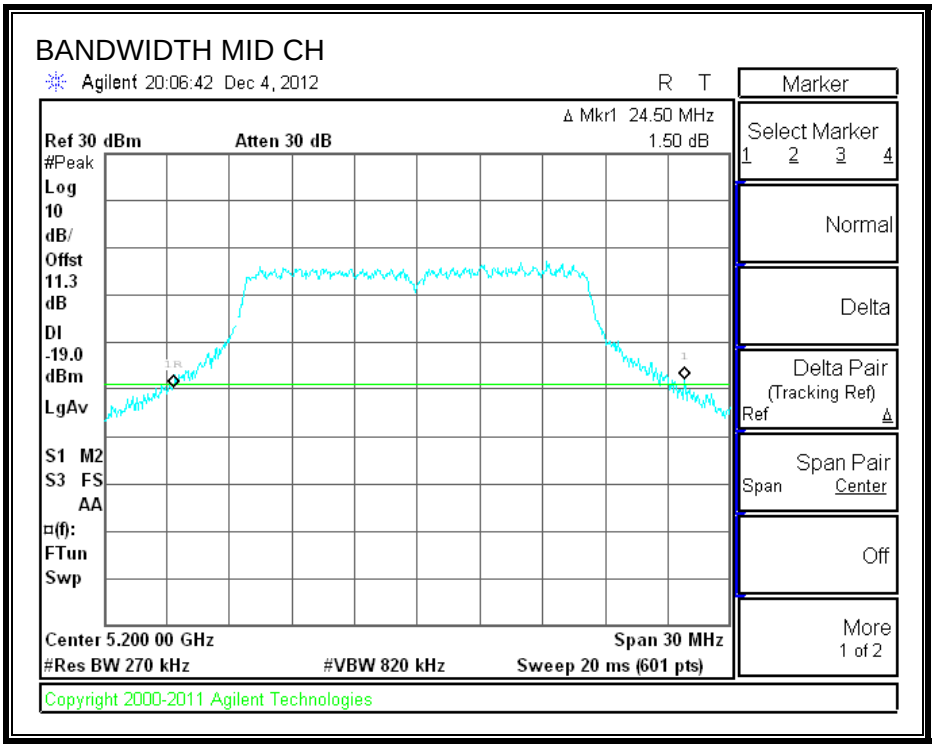
CHAIN 1

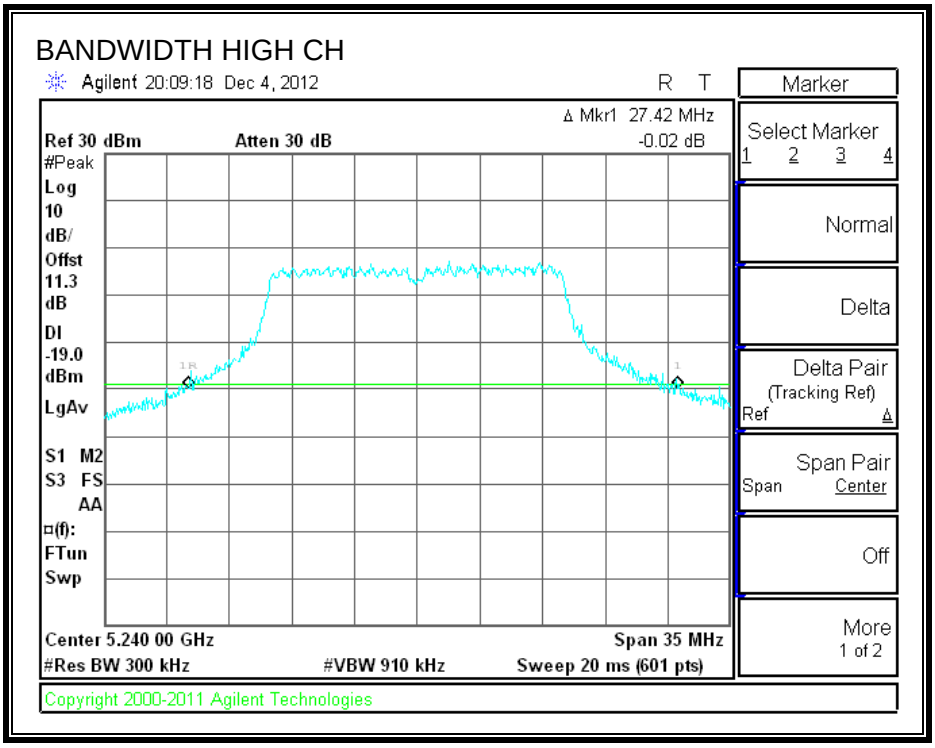
Channel	Frequency (MHz)	26 dB Bandwidth (MHz)	99% Bandwidth (MHz)
Low	5180	25.26	16.4999
Middle	5200	25.32	16.5086
High	5240	25.26	16.5410

CHAIN 0

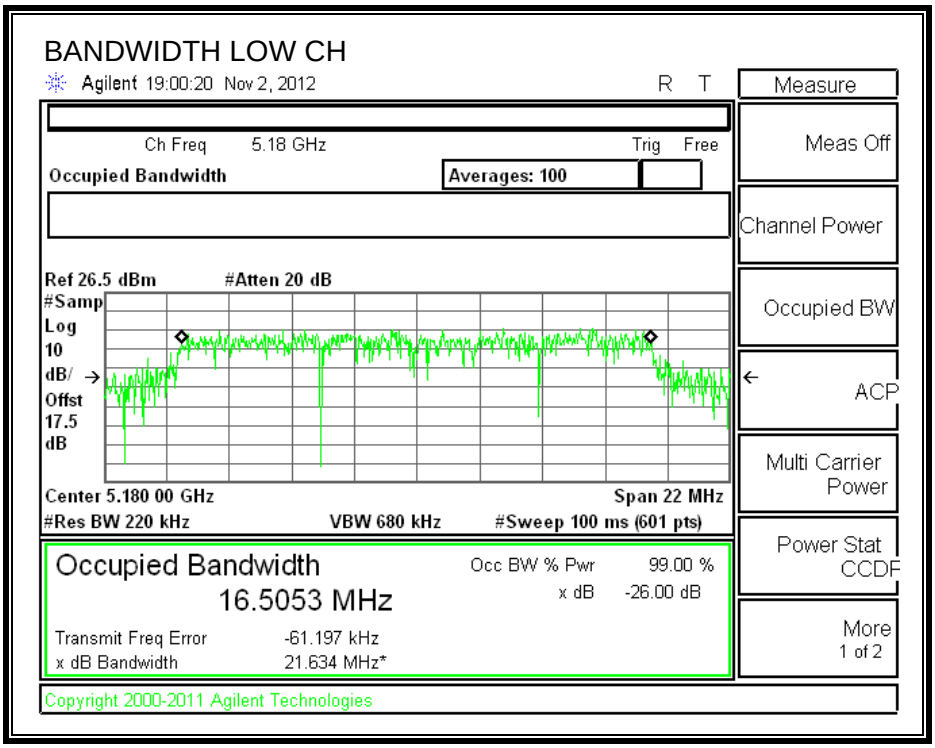
26 dB BANDWIDTH

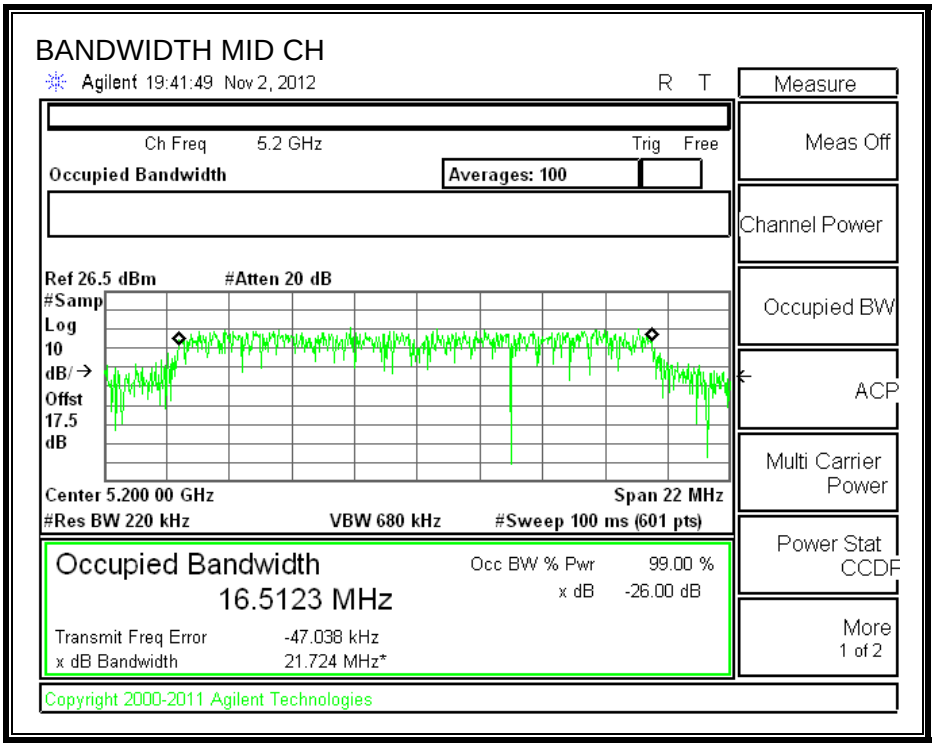


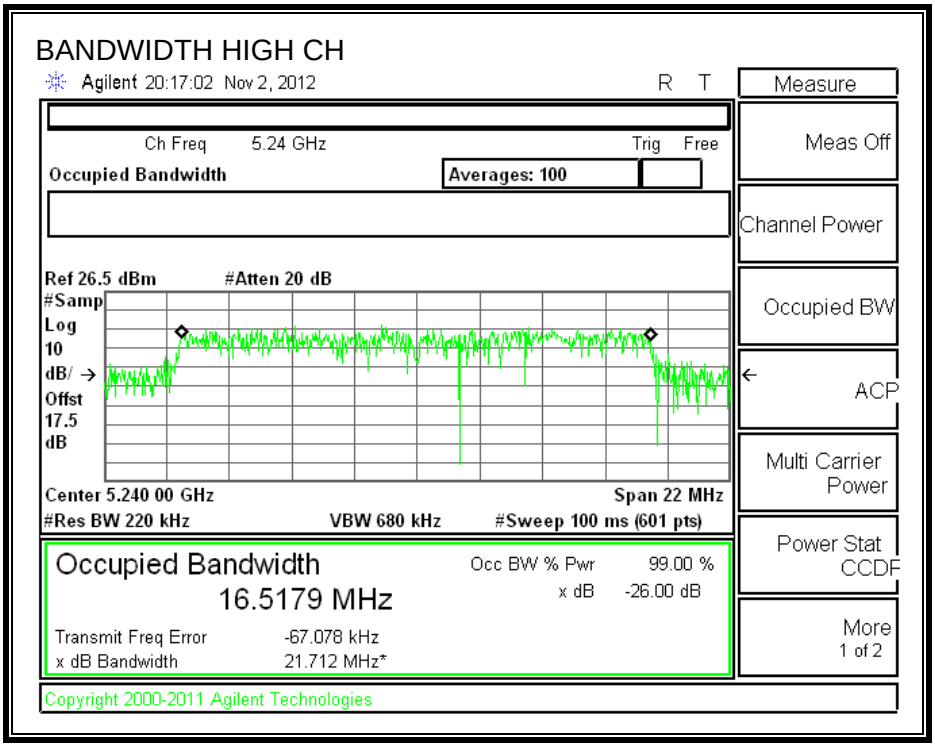




99% BANDWIDTH

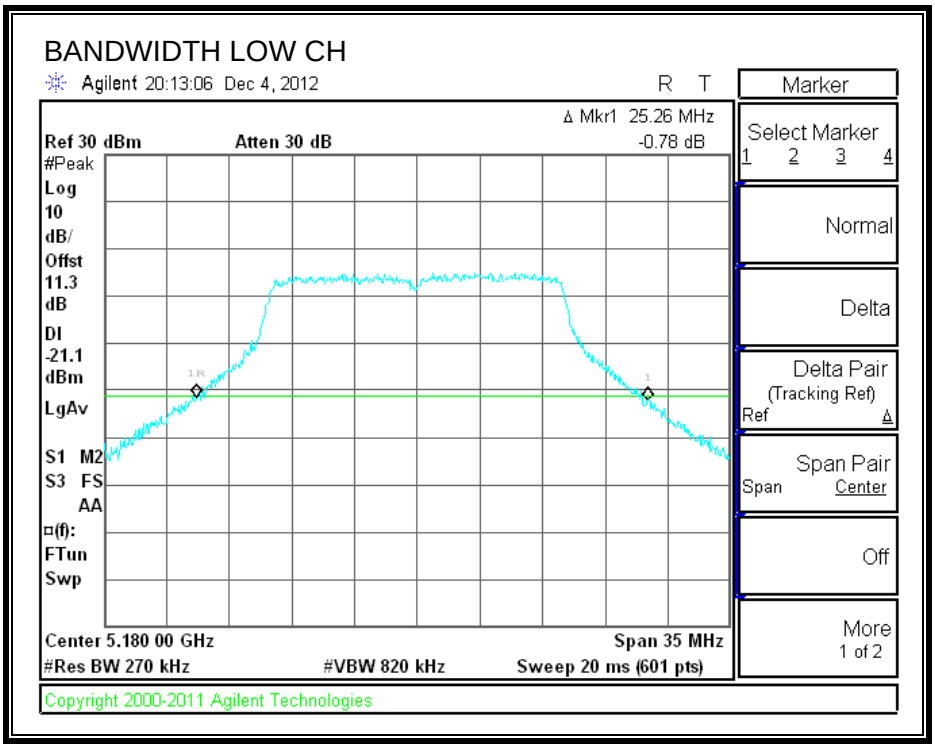


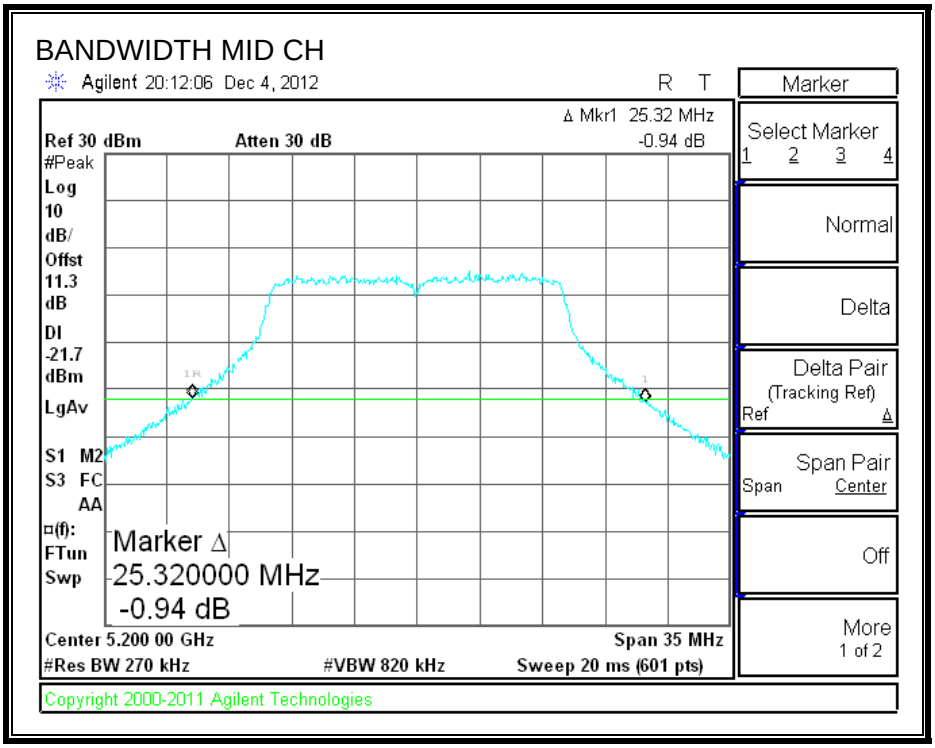


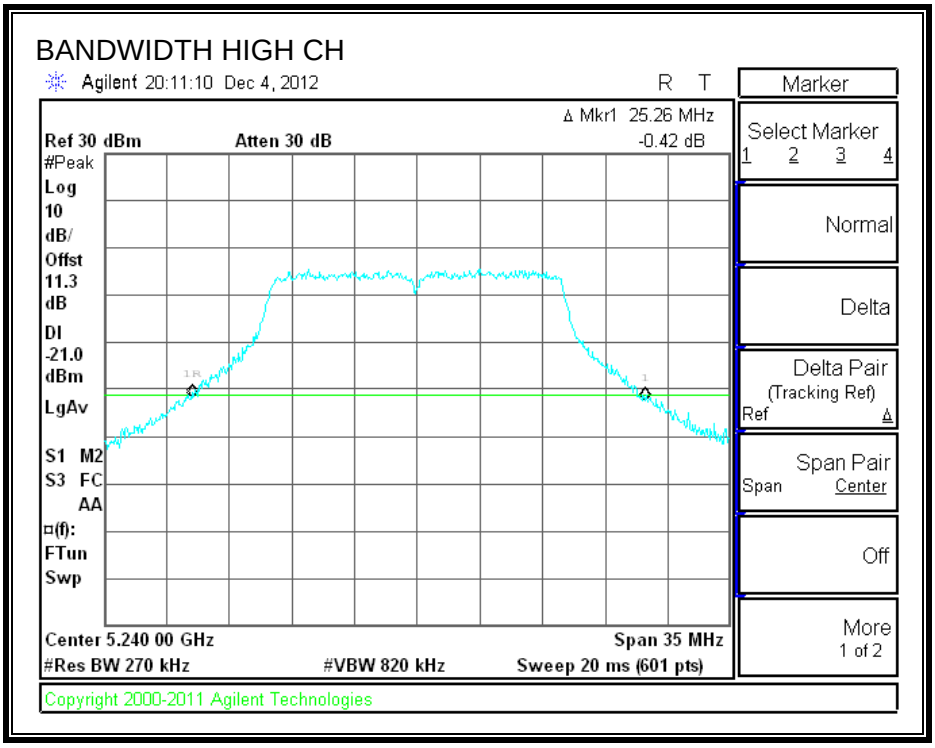


CHAIN 1

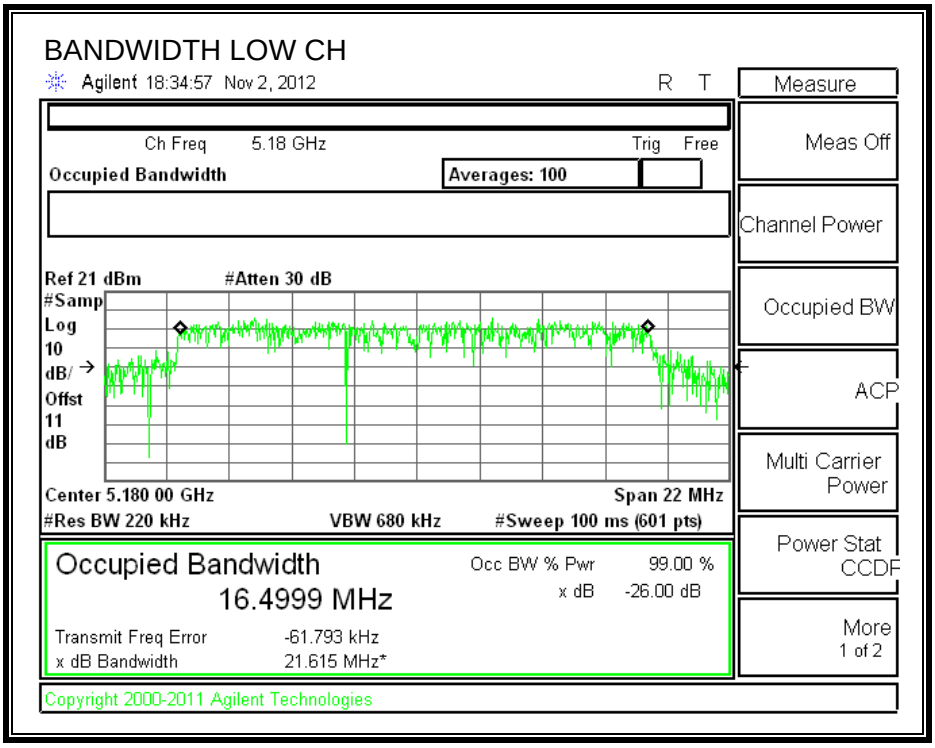
26 dB BANDWIDTH

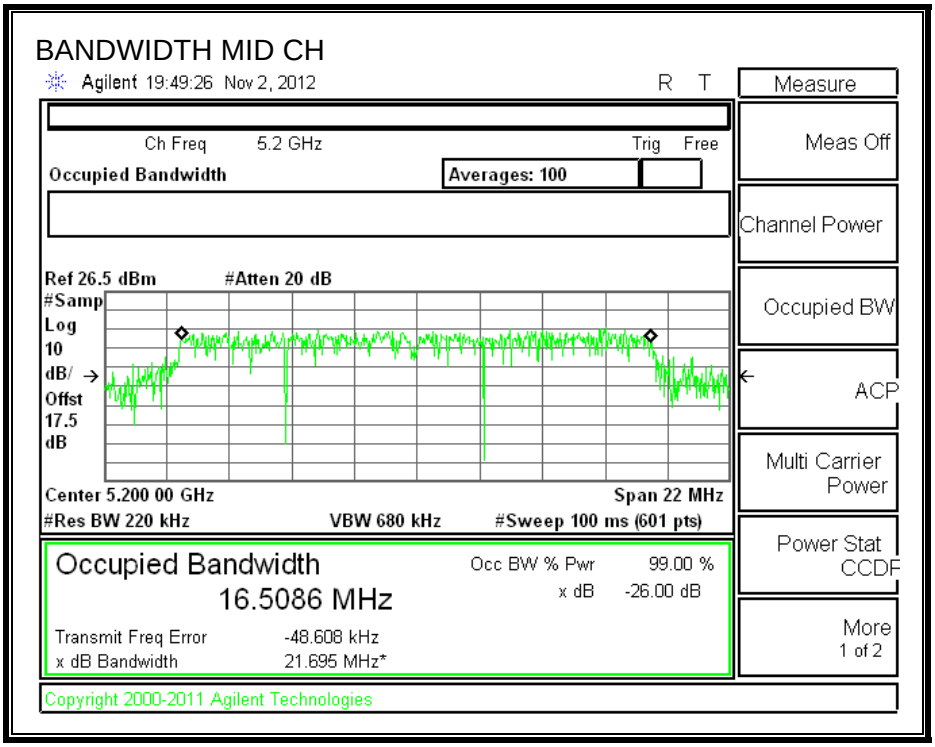


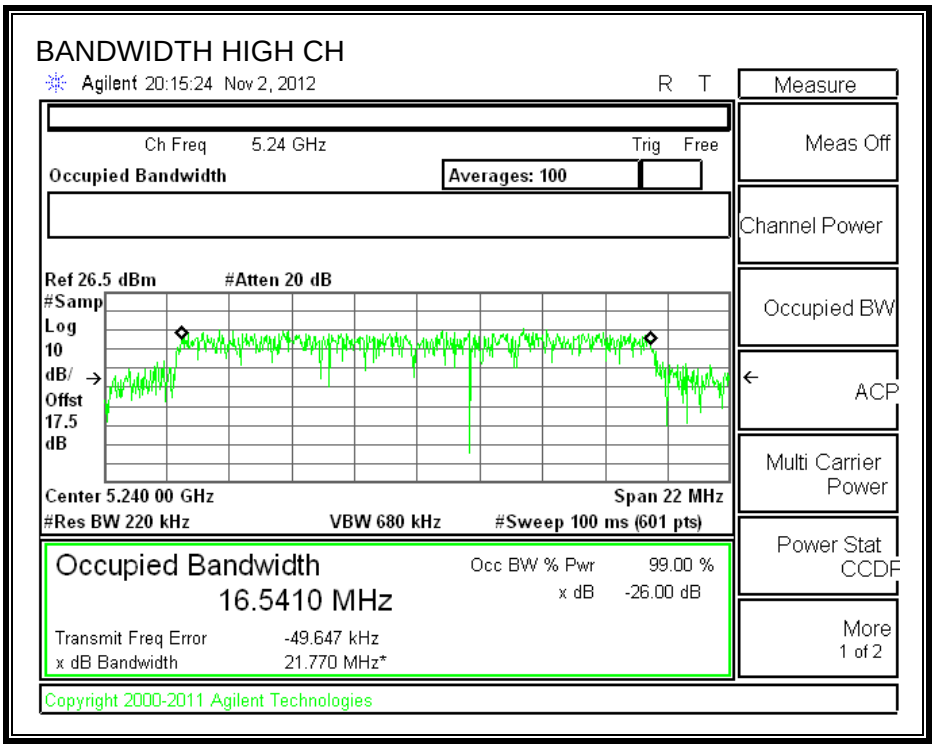




99% BANDWIDTH







8.1.2. OUTPUT POWER AND PPSD

LIMITS

FCC §15.407 (a) (1)

For the band 5.15–5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed the lesser of 50 mW or 4 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

The TX chains are correlated and the antenna gain is the same for each chain. The directional gain is:

Antenna Gain (dBi)	10 * Log (2 chains) (dB)	Correlated Chains Directional Gain (dBi)
2.00	3.01	5.01

Bandwidth and Antenna Gain

Channel	Frequency (MHz)	Min 26 dB BW (MHz)	Min 99% BW (MHz)	Directional Gain (dBi)
Low	5180	24.20	16.4999	5.01
Mid	5200	24.50	16.5086	5.01
High	5240	25.26	16.5179	5.01

Limits

Channel	Frequency (MHz)	FCC Power Limit (dBm)	IC EIRP Limit (dBm)	Max IC Power (dBm)	Power Limit (dBm)	FCC PPSD Limit (dBm)	IC eirp PSD Limit (dBm)	PPSD Limit (dBm)
Low	5180	17.00	22.17	17.16	17.00	4.00	10.00	4.00
Mid	5200	17.00	22.18	17.17	17.00	4.00	10.00	4.00
High	5240	17.00	22.18	17.17	17.00	4.00	10.00	4.00

Duty Cycle CF (dB)	0.00	Included in Calculations of Corr'd Power & PPSD

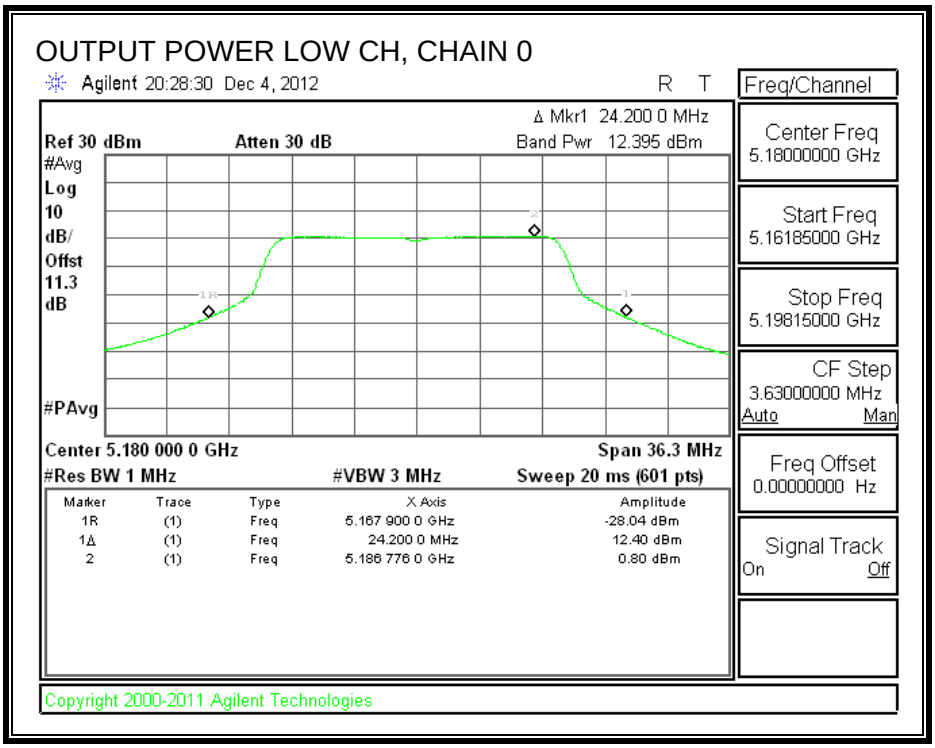
Output Power Results

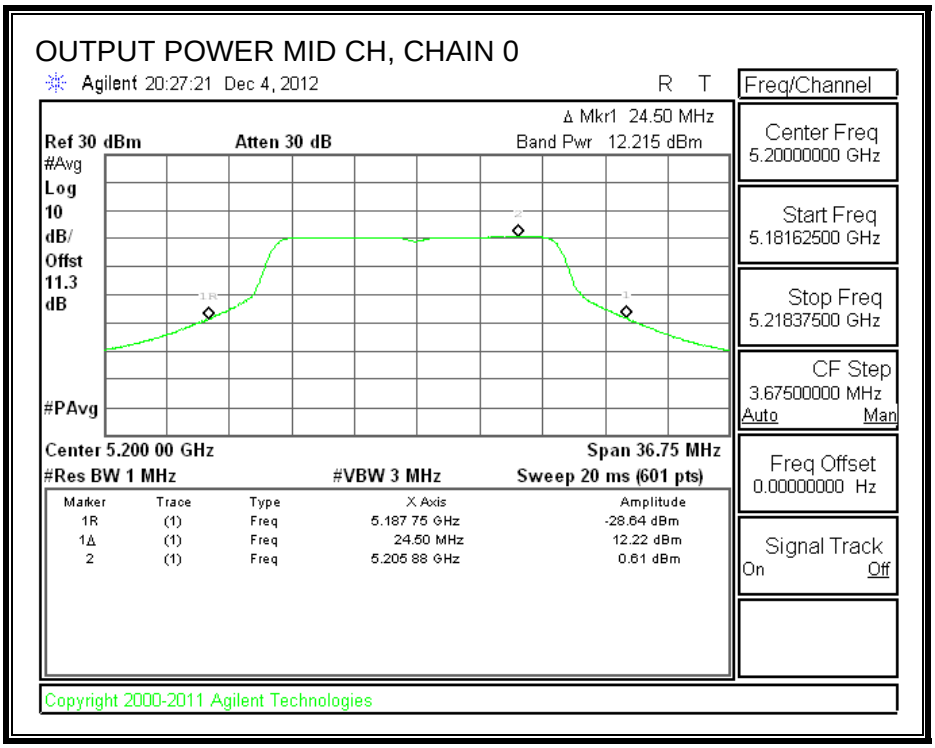
Channel	Frequency (MHz)	Chain 0 Meas Power (dBm)	Chain 1 Meas Power (dBm)	Total Corr'd Power (dBm)	Power Limit (dBm)	Power Margin (dB)
Low	5180	**12.395**	**12.071**	15.246	17.00	-1.754
Mid	5200	**12.215**	**11.680**	14.966	17.00	-2.034
High	5240	**12.544**	**11.761**	15.180	17.00	-1.820

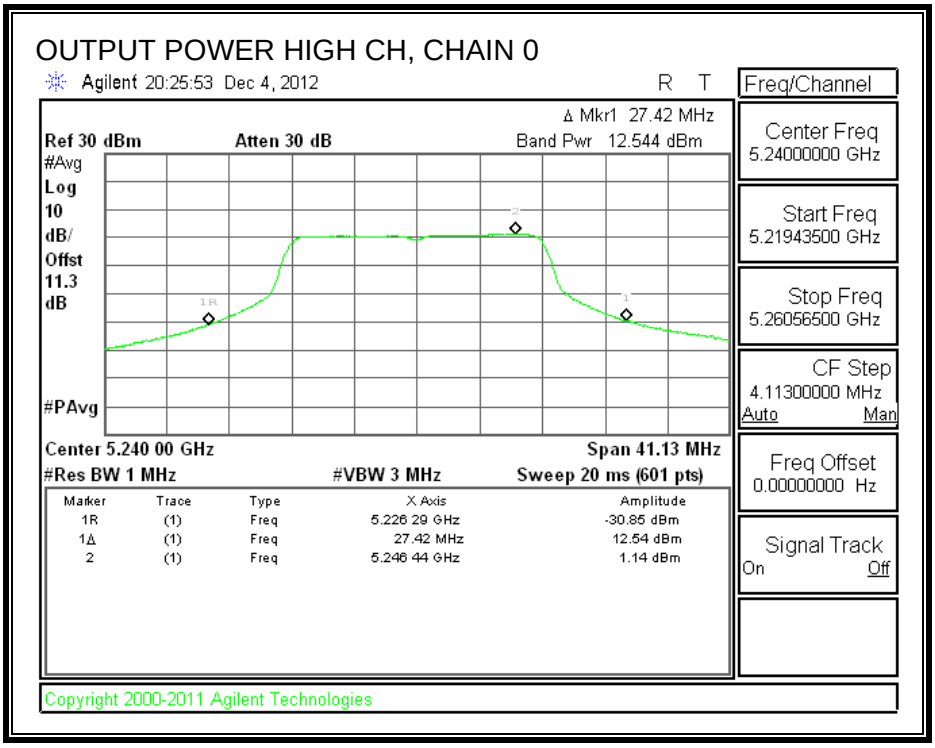
PPSD Results

Channel	Frequency (MHz)	Chain 0 Meas PPSD (dBm)	Chain 1 Meas PPSD (dBm)	Total Corr'd PPSD (dBm)	PPSD Limit (dBm)	PPSD Margin (dB)
Low	5180	**0.80**	**0.52**	3.67	4.00	-0.33
Mid	5200	**0.61**	**0.13**	3.39	4.00	-0.61
High	5240	**1.14**	**0.16**	3.69	4.00	-0.31

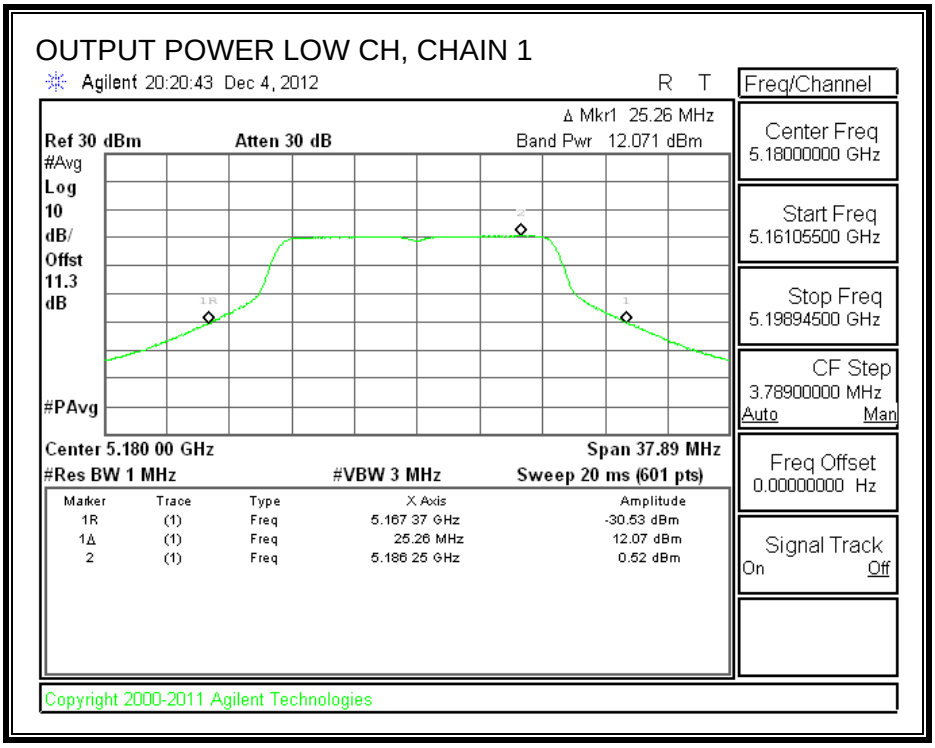
CHAIN 0 OUTPUT POWER



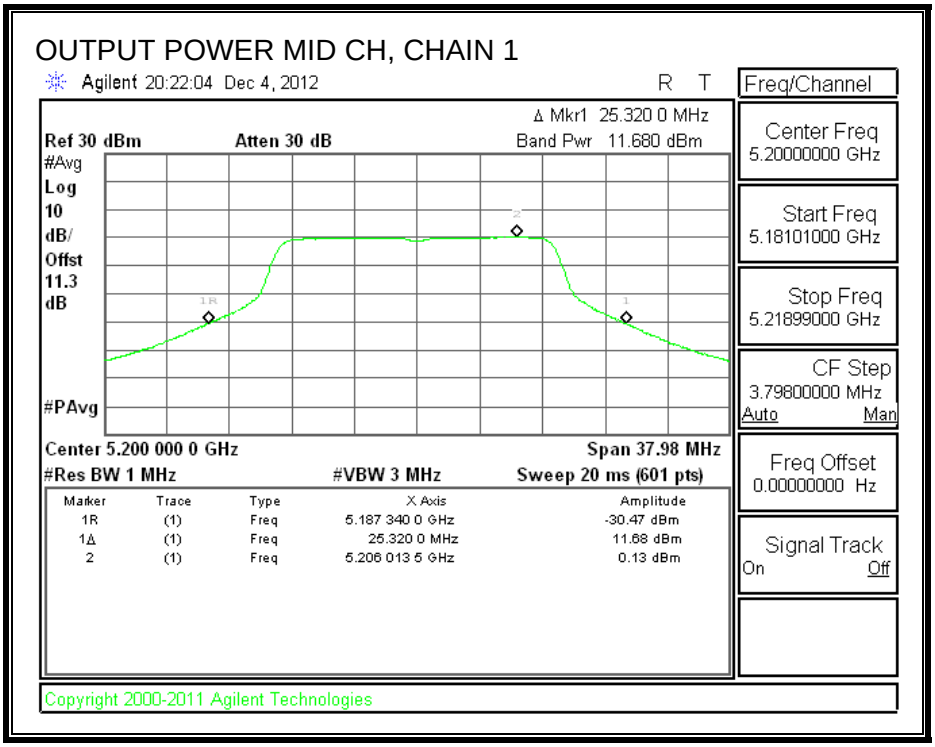




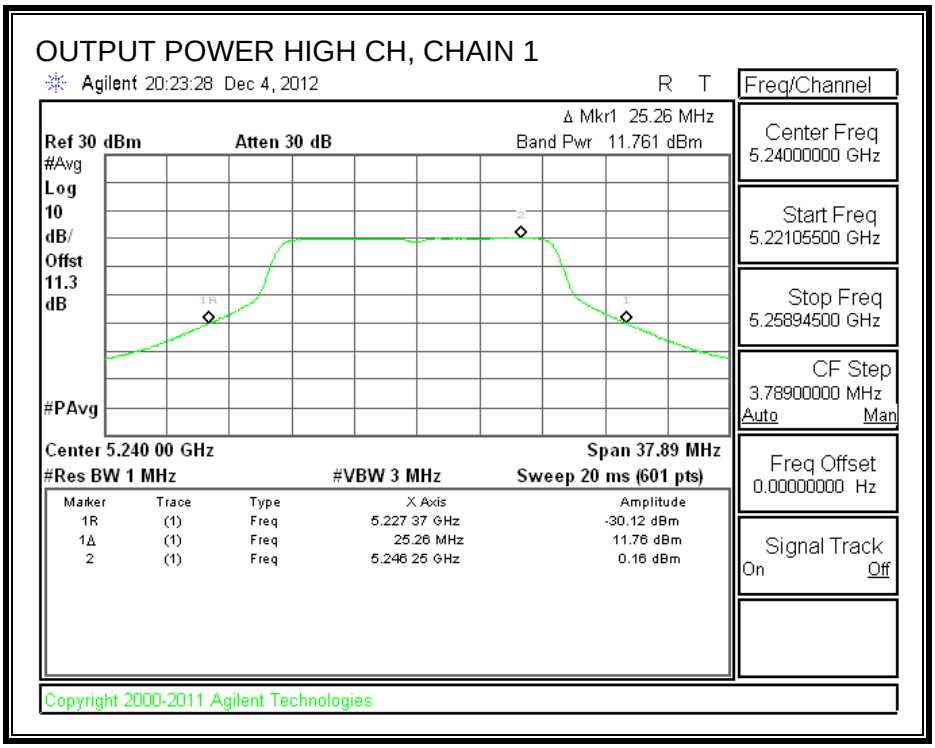
CHAIN 1 OUTPUT POWER



OUTPUT POWER MID CH, CHAIN 1



OUTPUT POWER HIGH CH, CHAIN 1



8.1.3. AVERAGE POWER

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a power meter.

RESULTS

The cable assembly insertion loss of 11.3 dB (including 10 dB pad and 1.3 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

Channel	Frequency (MHz)	Chain 0 Power (dBm)	Chain 1 Power (dBm)	Total Power (dBm)
Low	5180	12.35	12.00	15.19
Middle	5200	12.20	11.65	14.94
High	5240	12.50	11.75	15.15

8.1.4. 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.

TEST PROCEDURE

Guidelines for Compliance Testing of Unlicensed National Information Infrastructure (U-NII) Devices - Part 15, Subpart E, dated 10/25/2011.

RESULTS

CHAIN 0

Channel	Frequency (MHz)	Peak Excursion (dB)	Limit (dB)	Margin (dB)
Low	5180	11.60	13	-1.40
Middle	5200	10.97	13	-2.03
High	5240	10.79	13	-2.21

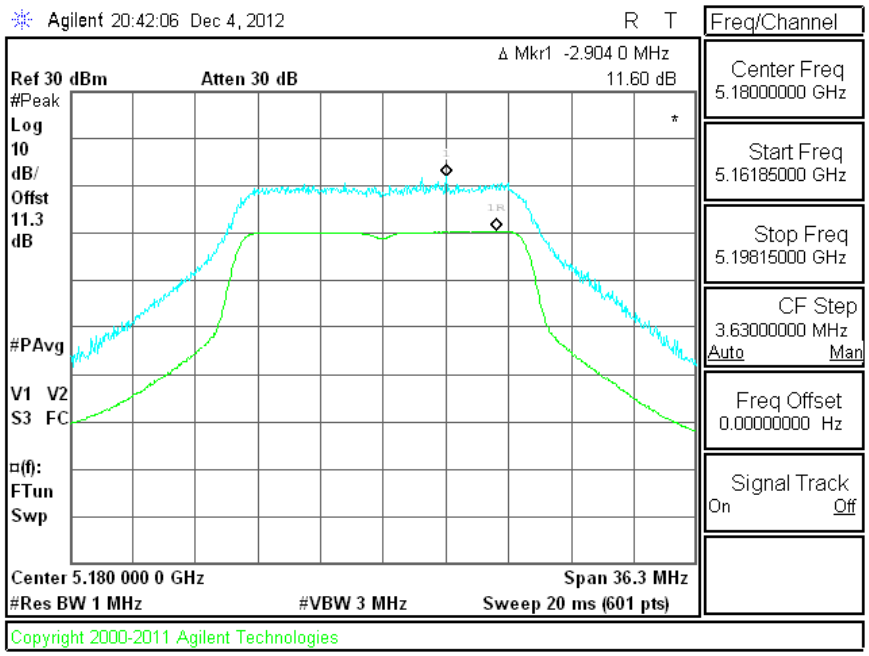
CHAIN 1

Channel	Frequency (MHz)	Peak Excursion (dB)	Limit (dB)	Margin (dB)
Low	5180	9.11	13	-3.89
Middle	5200	9.48	13	-3.52
High	5240	9.95	13	-3.05

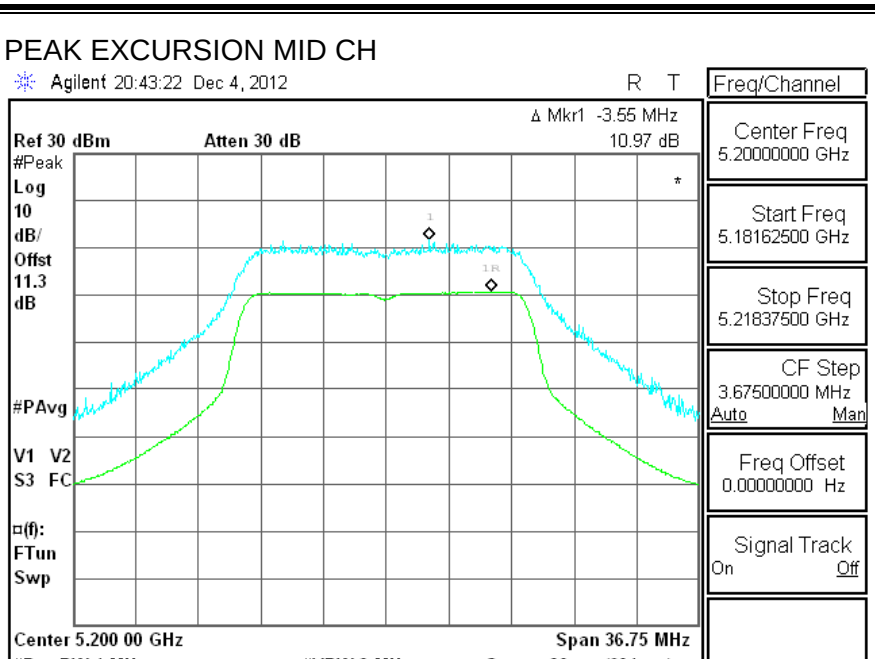
CHAIN 0

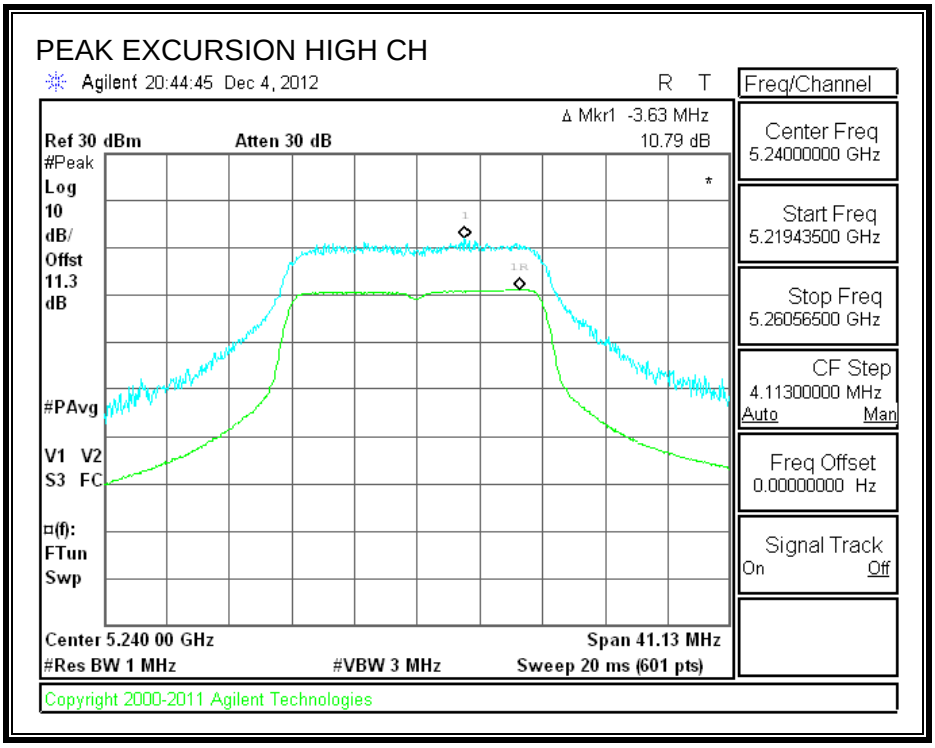
PEAK EXCURSION

PEAK EXCURSION LOW CH



PEAK EXCURSION MID CH

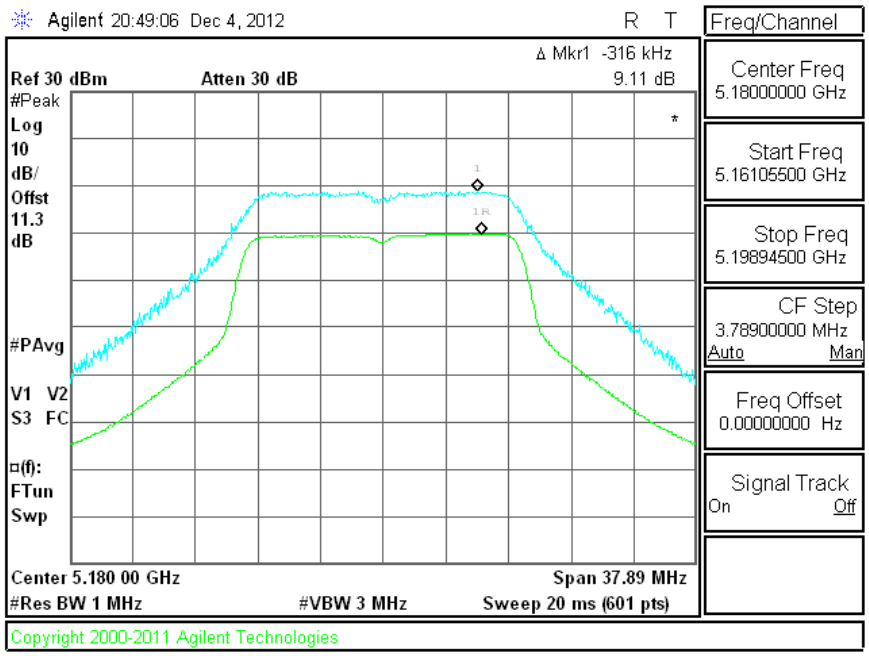




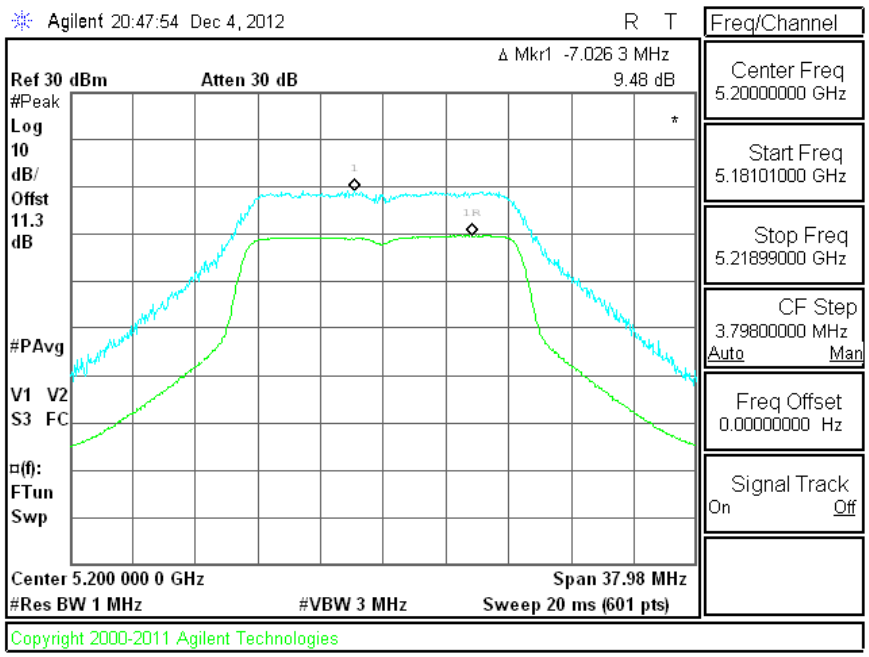
CHAIN 1

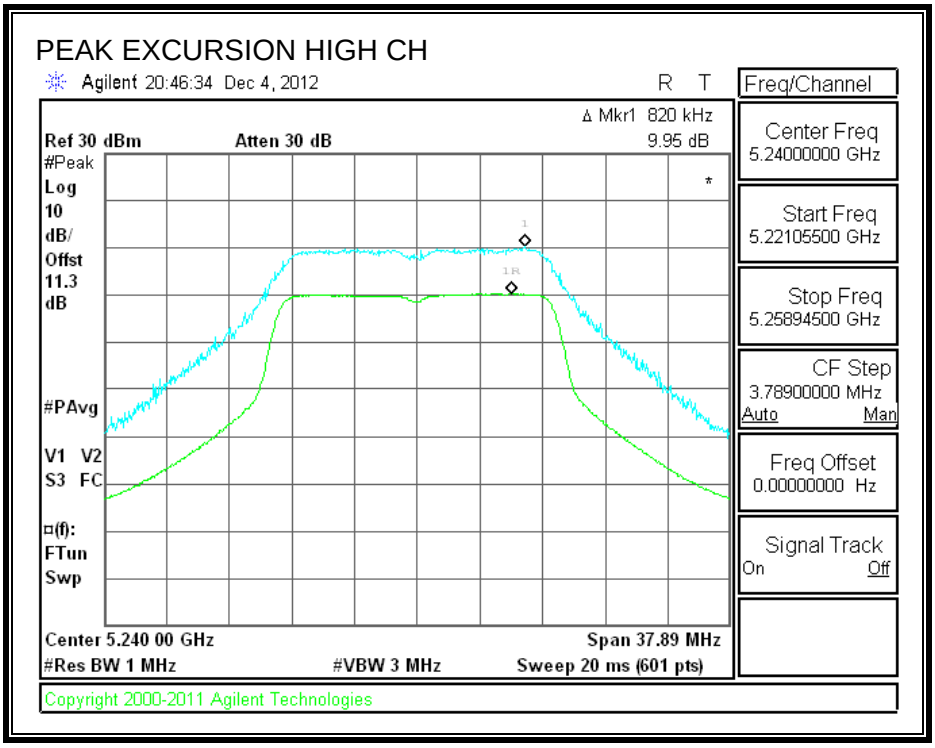
PEAK EXCURSION

PEAK EXCURSION LOW CH



PEAK EXCURSION MID CH





8.2. 802.11n HT20, CDD MODE IN THE 5.2 GHz BAND

8.2.1. 26 dB and 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

Guidelines for Compliance Testing of Unlicensed National Information Infrastructure (U-NII) Devices - Part 15, Subpart E, dated 10/25/2011.

RESULTS

CHAIN 0

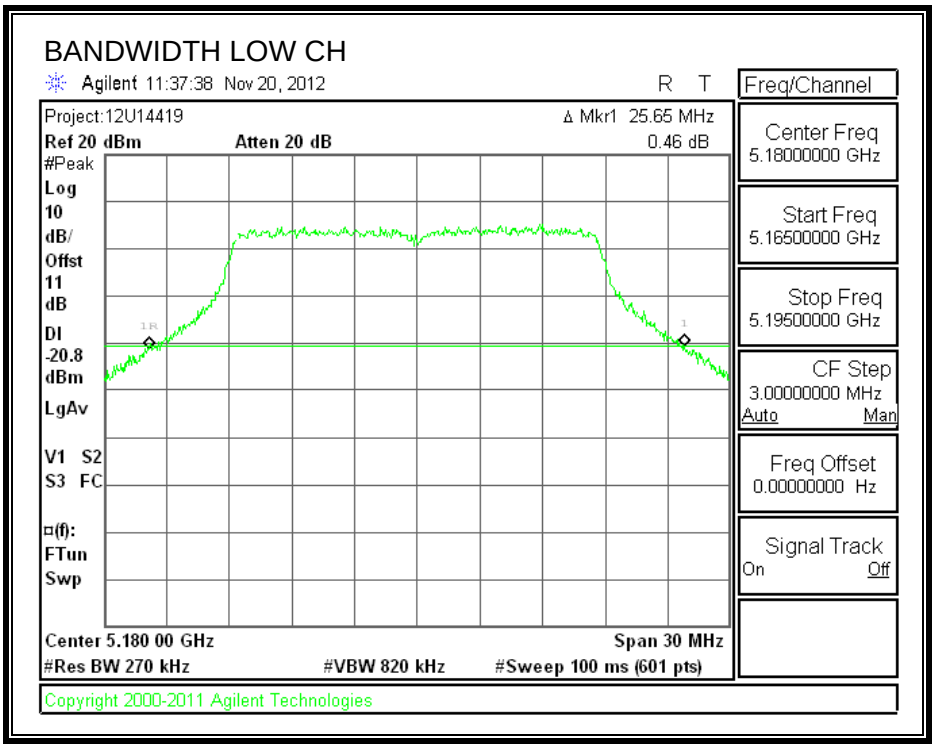
Channel	Frequency (MHz)	26 dB Bandwidth (MHz)	99% Bandwidth (MHz)
Low	5180	25.65	17.6262
Middle	5200	25.95	17.7425
High	5240	26.10	17.7437

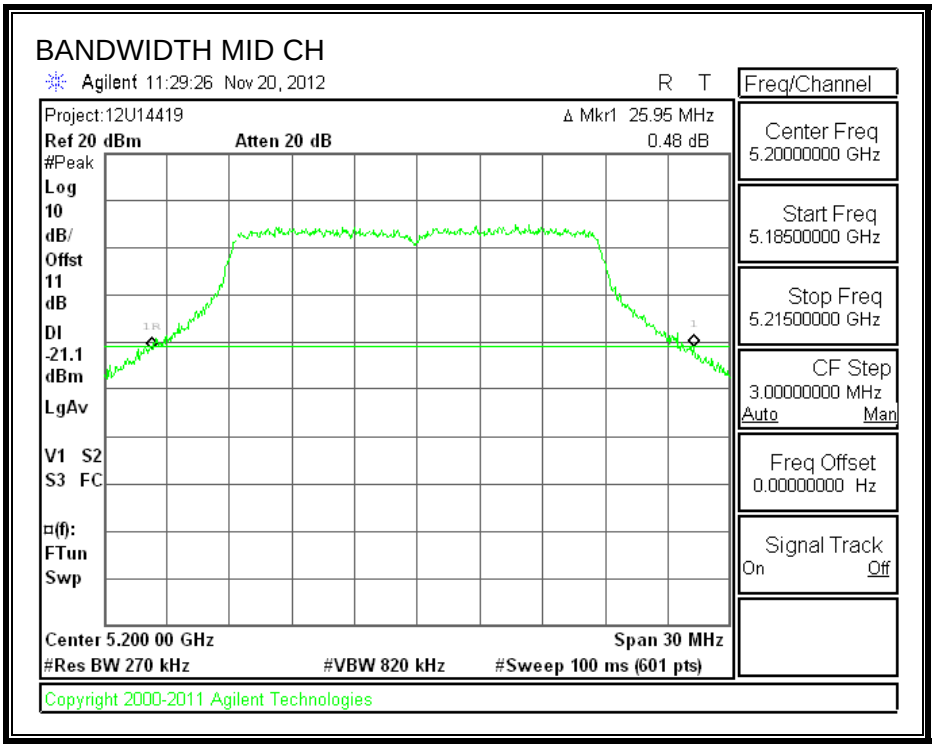
CHAIN 1

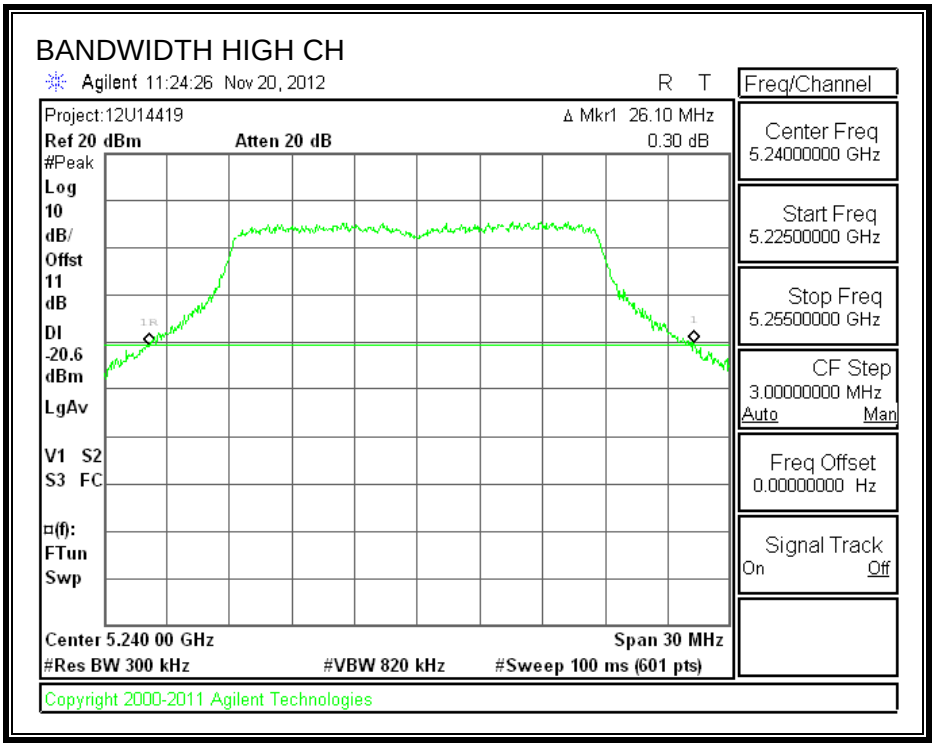
Channel	Frequency (MHz)	26 dB Bandwidth (MHz)	99% Bandwidth (MHz)
Low	5180	25.75	17.7543
Middle	5200	27.80	17.7653
High	5240	32.33	17.7919

CHAIN 0

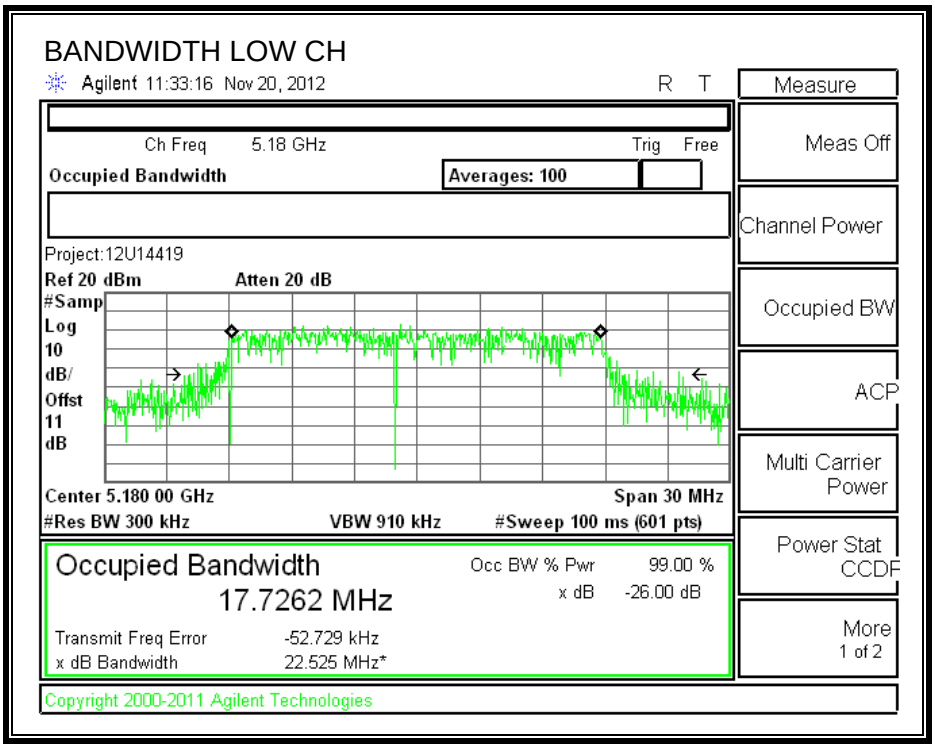
26 dB BANDWIDTH

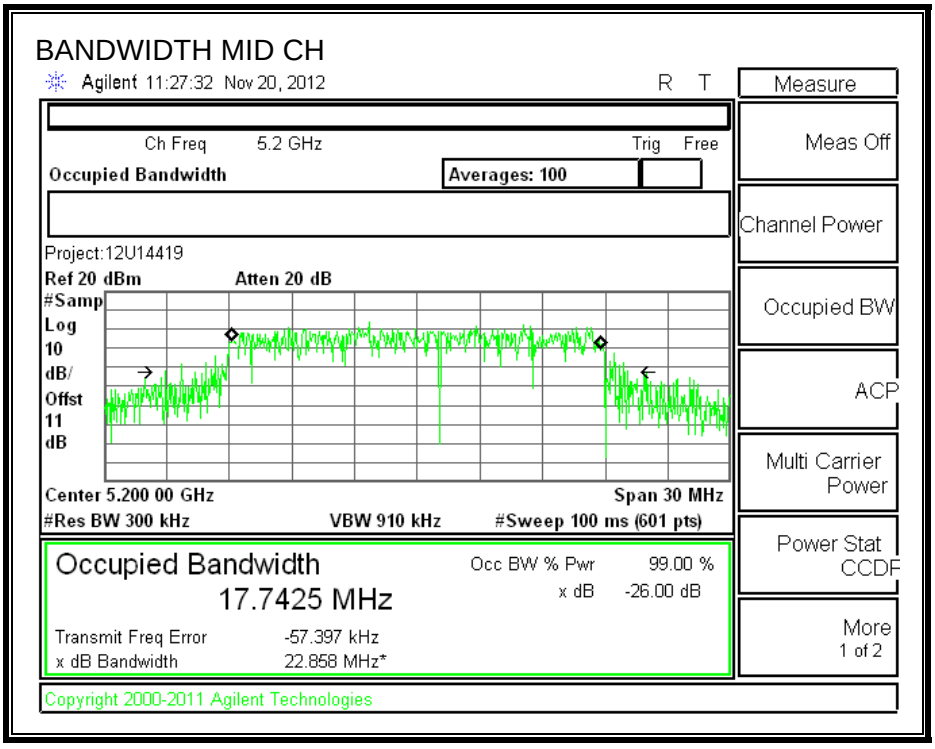


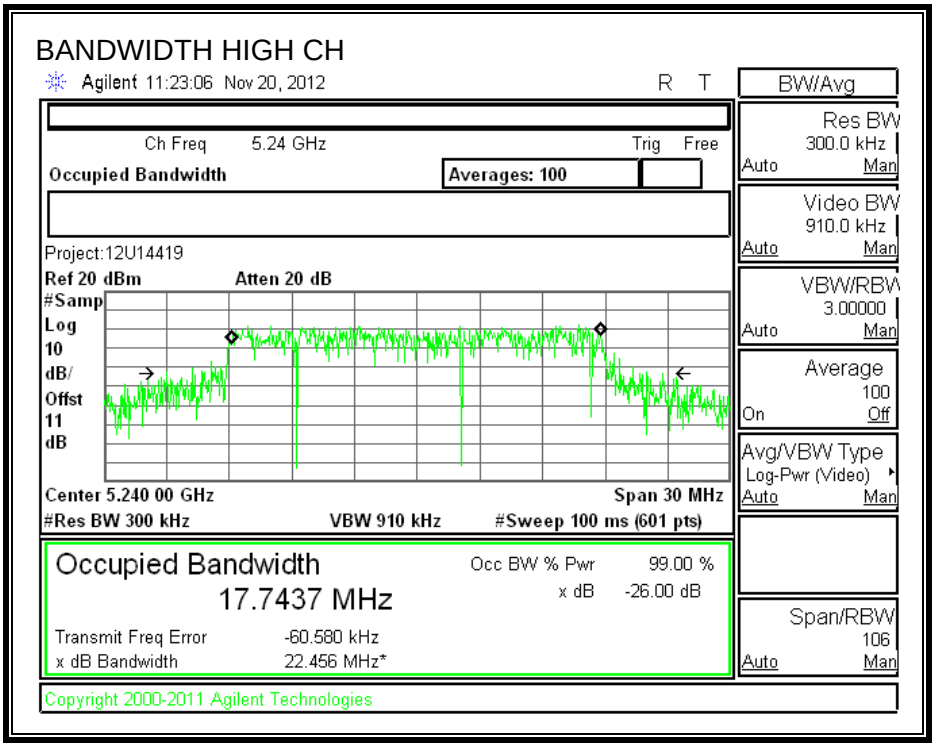




99% BANDWIDTH

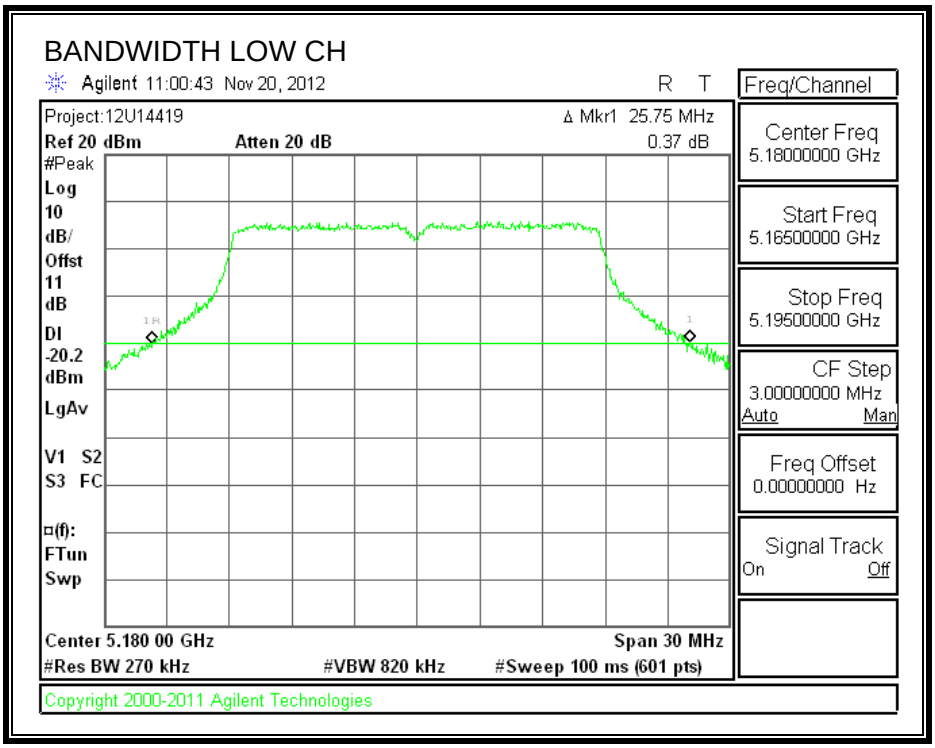


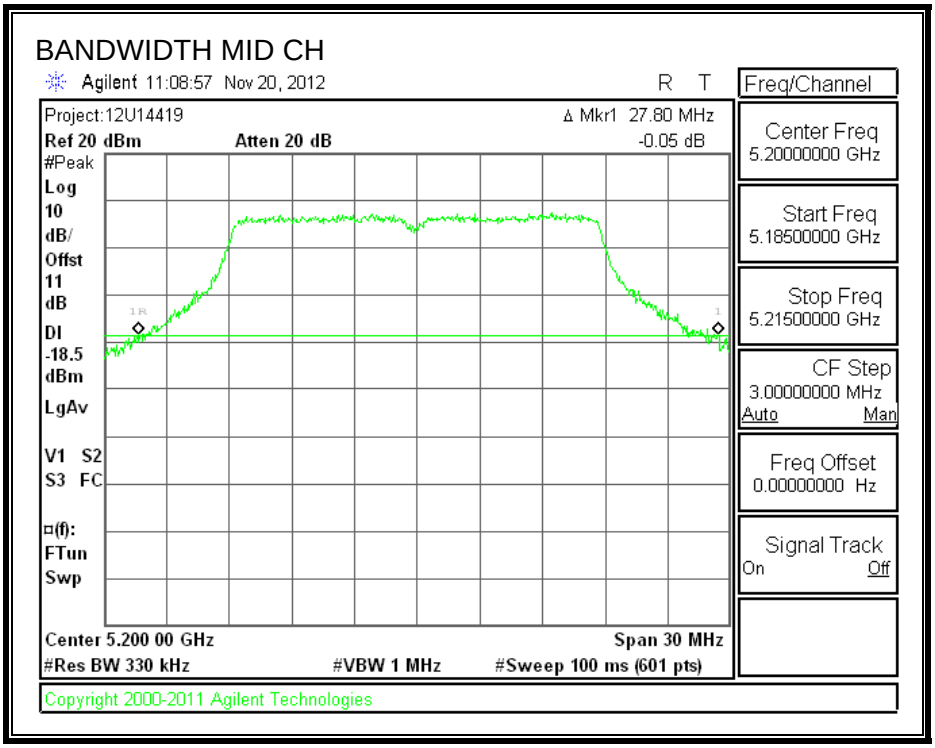


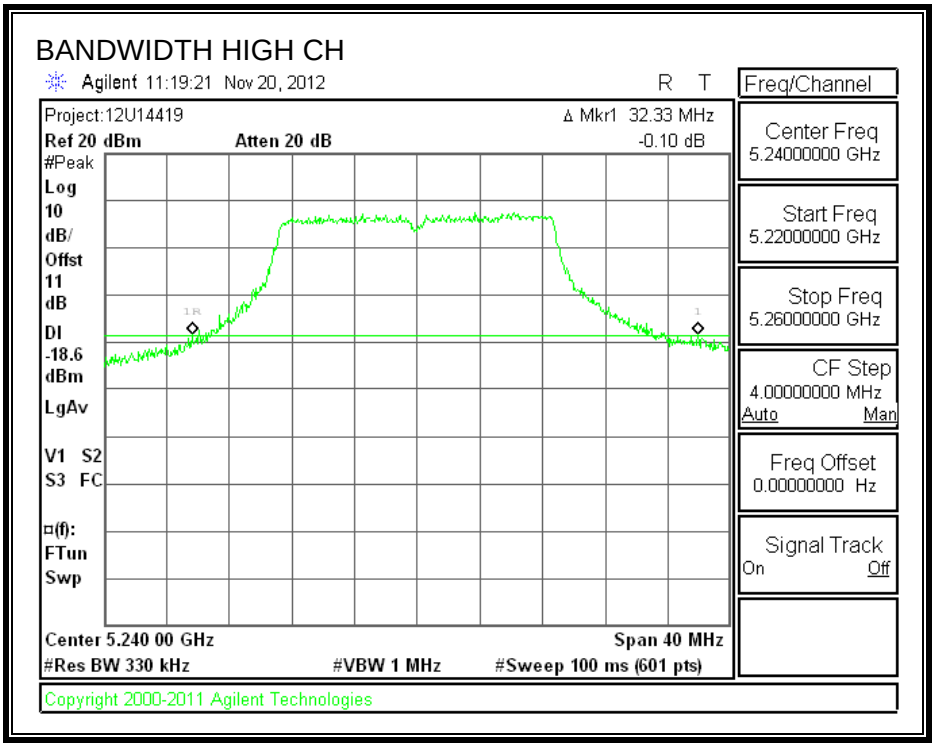


CHAIN 1

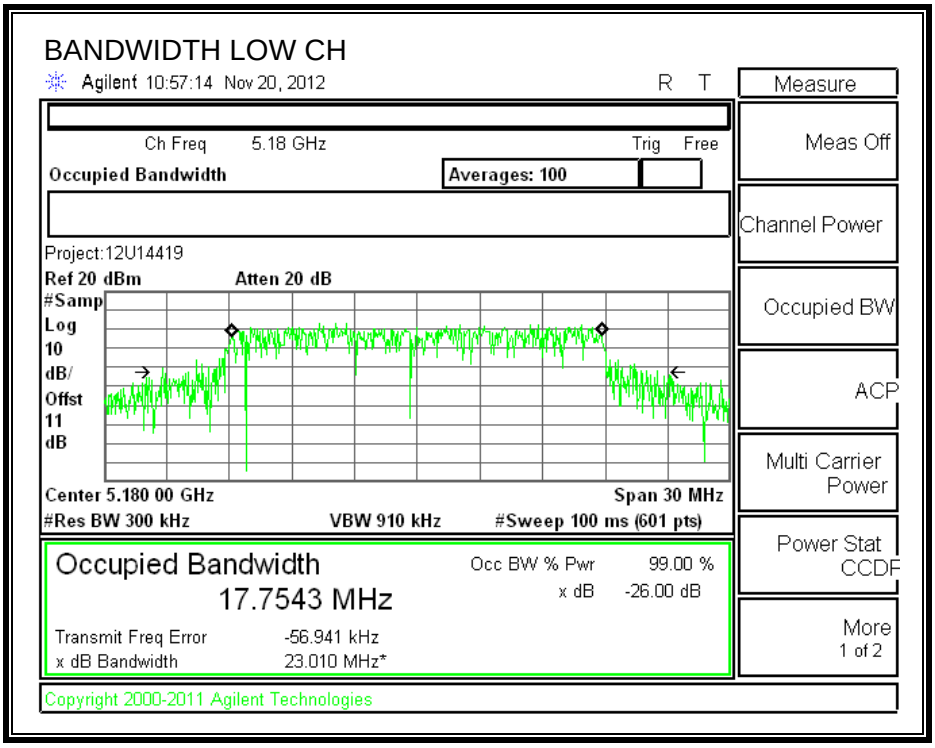
26 dB BANDWIDTH



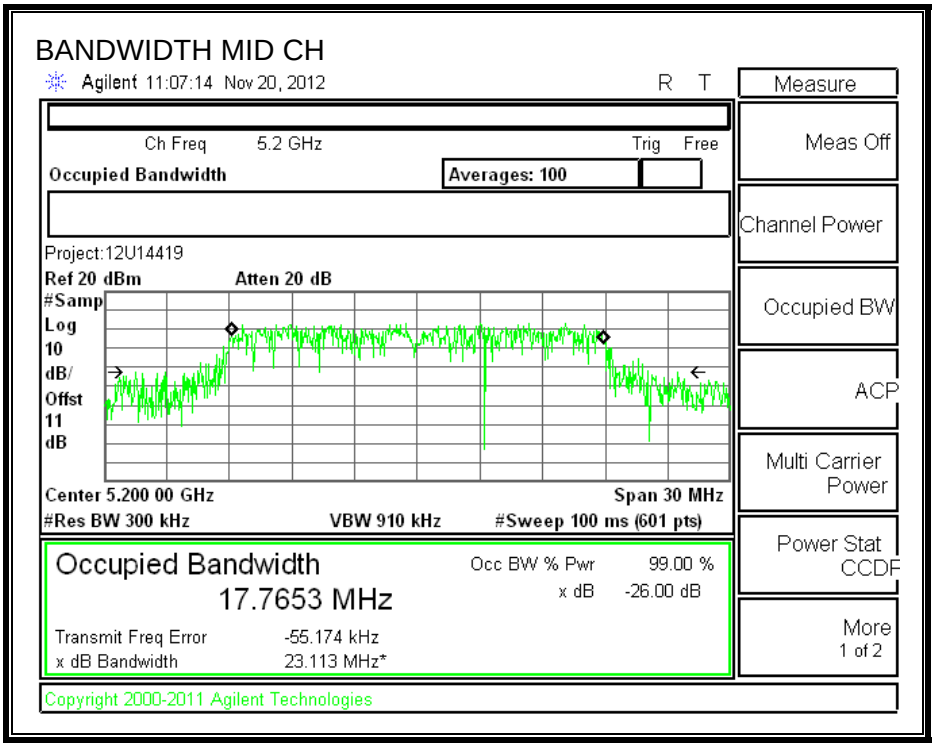




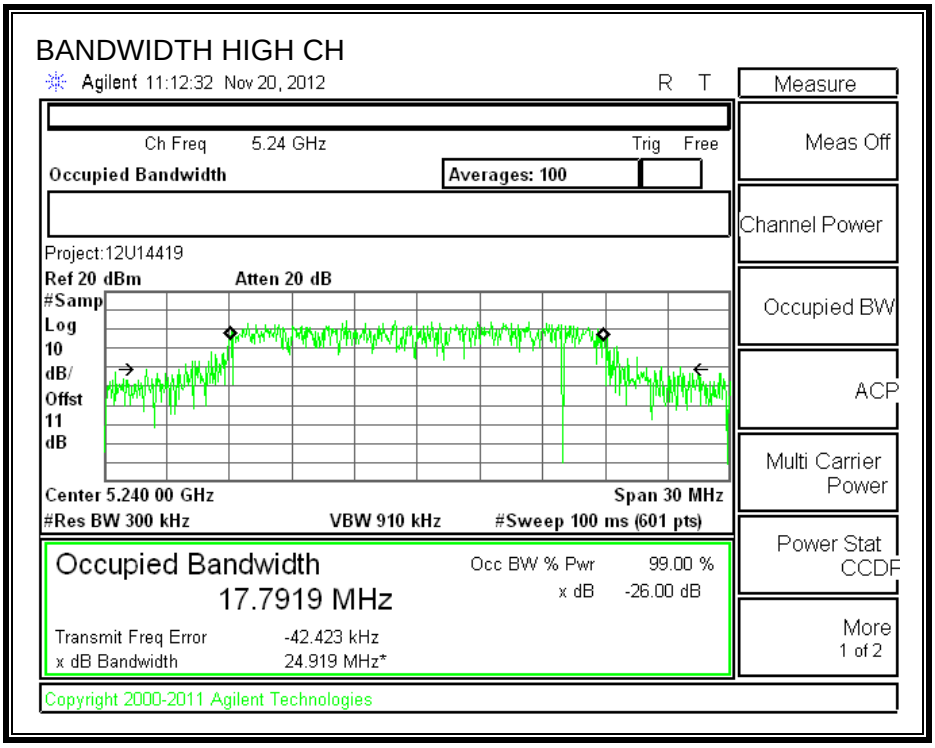
99% BANDWIDTH



BANDWIDTH MID CH



BANDWIDTH HIGH CH



8.2.2. OUTPUT POWER AND PPSD

LIMITS

FCC §15.407 (a) (1)

For the band 5.15–5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed the lesser of 50 mW or 4 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

The TX chains are correlated and the antenna gain is the same for each chain. The directional gain is:

Antenna Gain (dBi)	10 * Log (2 chains) (dB)	Correlated Chains Directional Gain (dBi)
2.00	3.01	5.01

Bandwidth and Antenna Gain

Channel	Frequency (MHz)	Min 26 dB BW (MHz)	Min 99% BW (MHz)	Directional Gain (dBi)
Low	5180	25.65	17.6262	5.01
Mid	5200	25.95	17.7425	5.01
High	5240	26.10	17.7437	5.01

Limits

Channel	Frequency (MHz)	FCC Power Limit (dBm)	IC EIRP Limit (dBm)	Max IC Power (dBm)	Power Limit (dBm)	FCC PPSD Limit (dBm)	IC eirp PSD Limit (dBm)	PPSD Limit (dBm)
Low	5180	17.00	22.46	17.45	17.00	4.00	10.00	4.00
Mid	5200	17.00	22.49	17.48	17.00	4.00	10.00	4.00
High	5240	17.00	22.49	17.48	17.00	4.00	10.00	4.00

Duty Cycle CF (dB)	0.00	Included in Calculations of Corr'd Power & PPSD

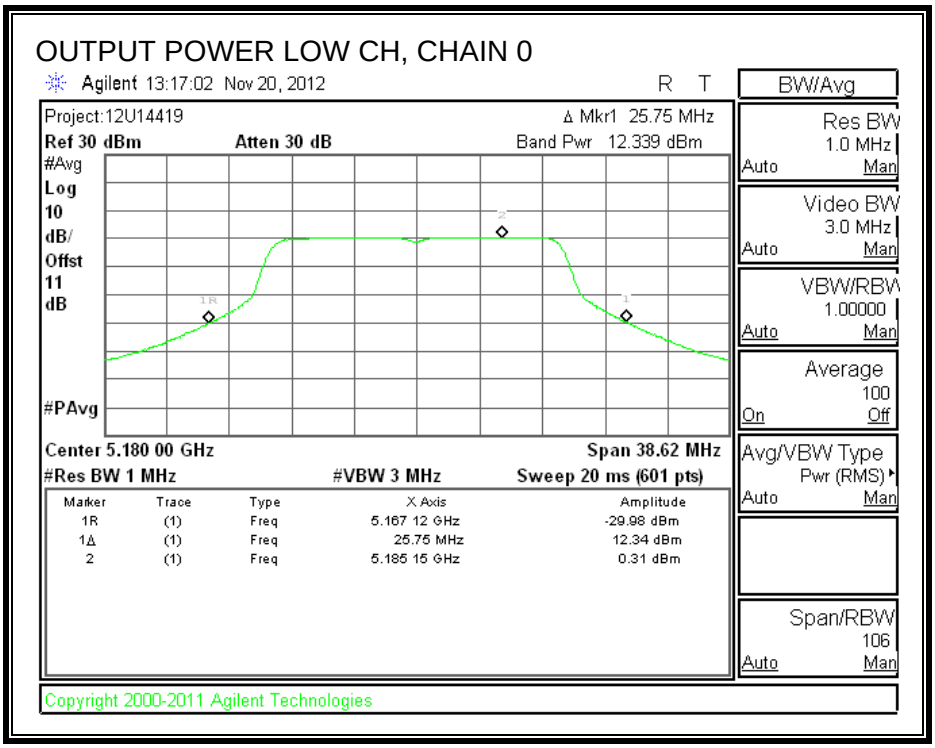
Output Power Results

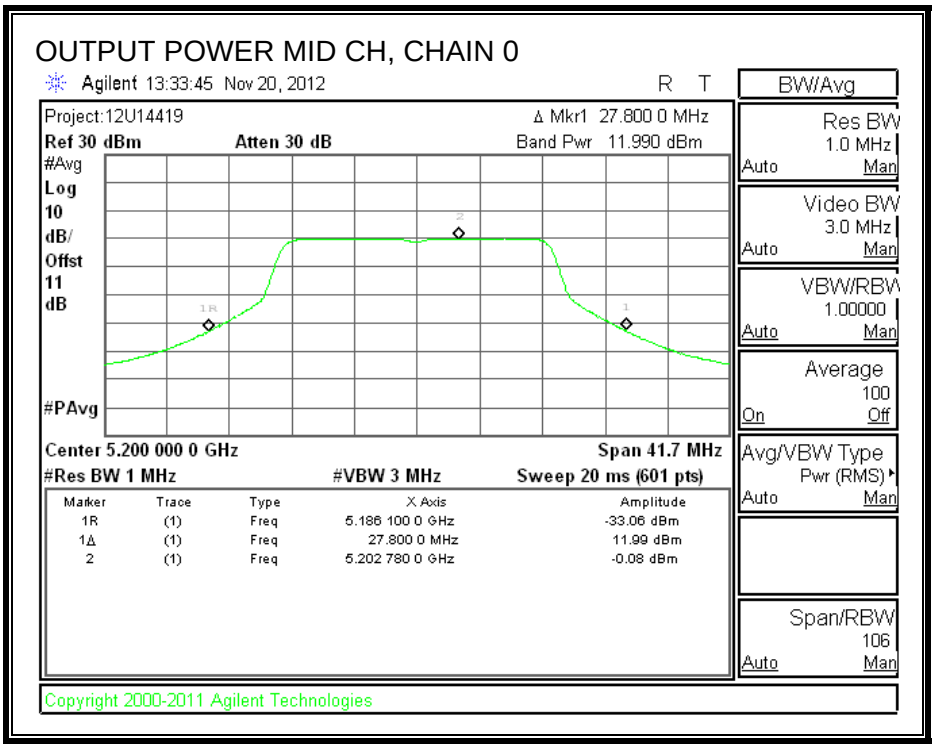
Channel	Frequency (MHz)	Chain 0 Meas Power (dBm)	Chain 1 Meas Power (dBm)	Total Corr'd Power (dBm)	Power Limit (dBm)	Power Margin (dB)
Low	5180	**12.339**	**13.042**	15.715	17.00	-1.285
Mid	5200	**11.990**	**13.142**	15.614	17.00	-1.386
High	5240	**12.153**	**13.244**	15.743	17.00	-1.257

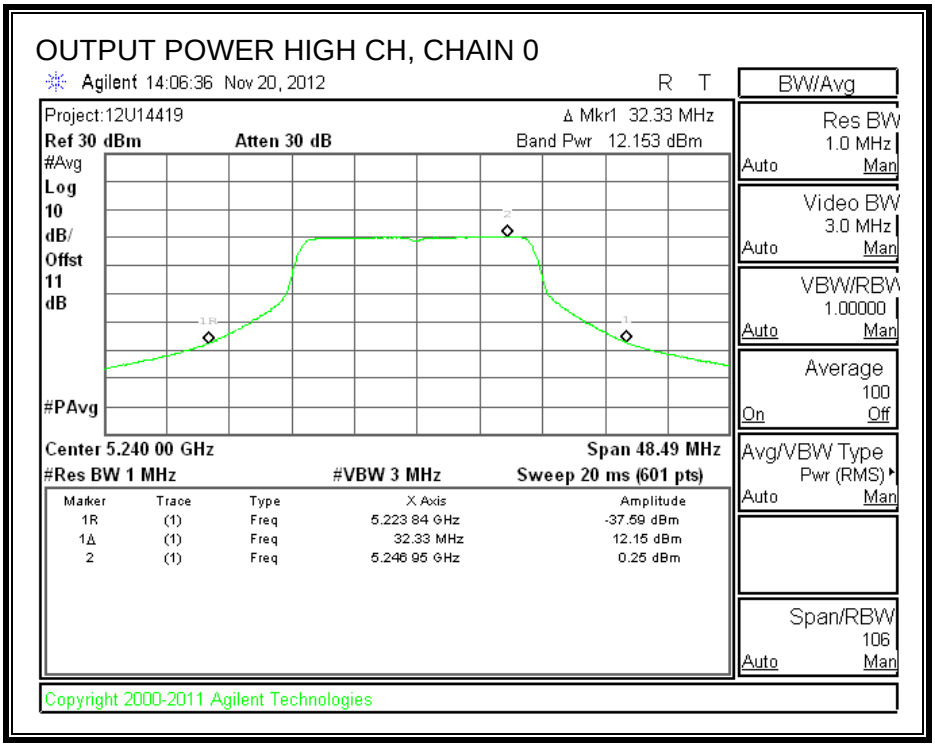
PPSD Results

Channel	Frequency (MHz)	Chain 0 Meas PPSD (dBm)	Chain 1 Meas PPSD (dBm)	Total Corr'd PPSD (dBm)	PPSD Limit (dBm)	PPSD Margin (dB)
Low	5180	**0.31**	**1.17**	3.77	4.00	-0.23
Mid	5200	**-0.08**	**1.25**	3.65	4.00	-0.35
High	5240	**0.25**	**1.54**	3.95	4.00	-0.05

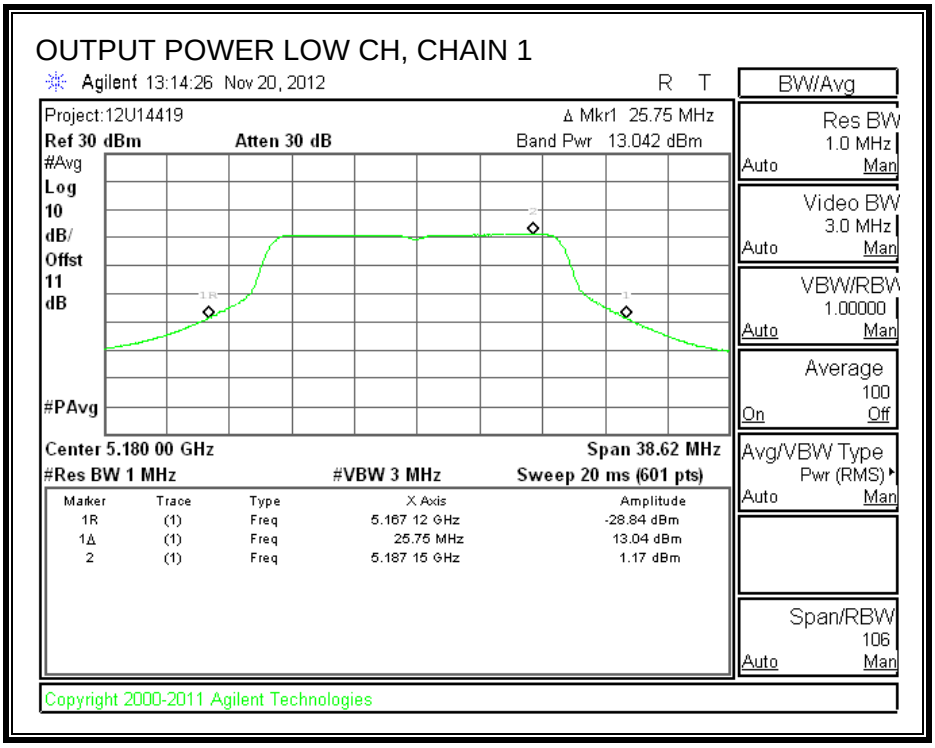
CHAIN 0 OUTPUT POWER



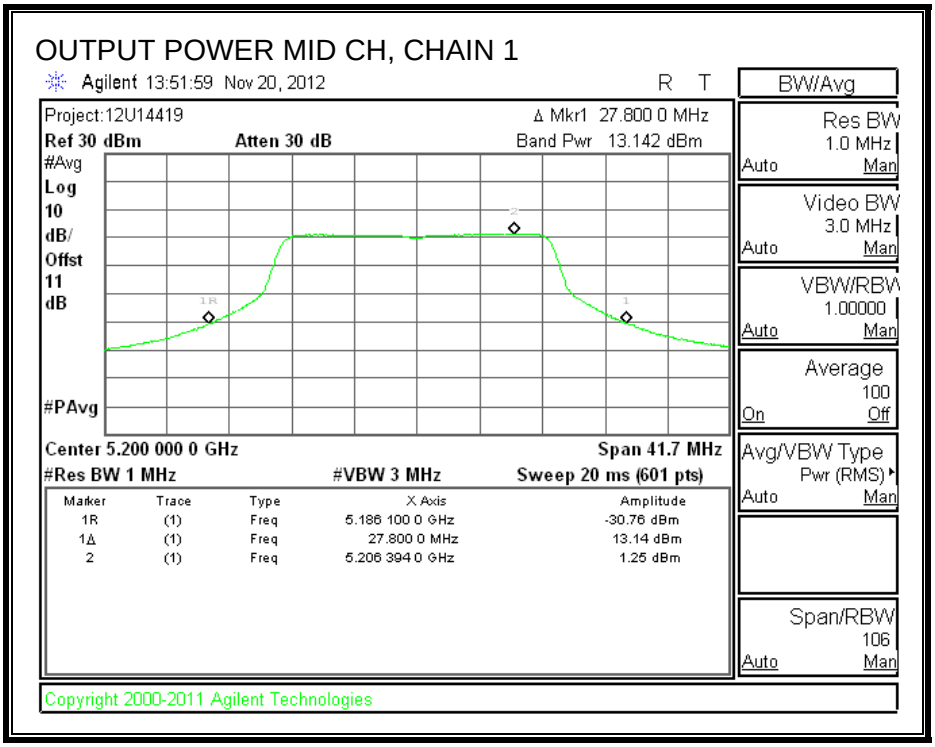




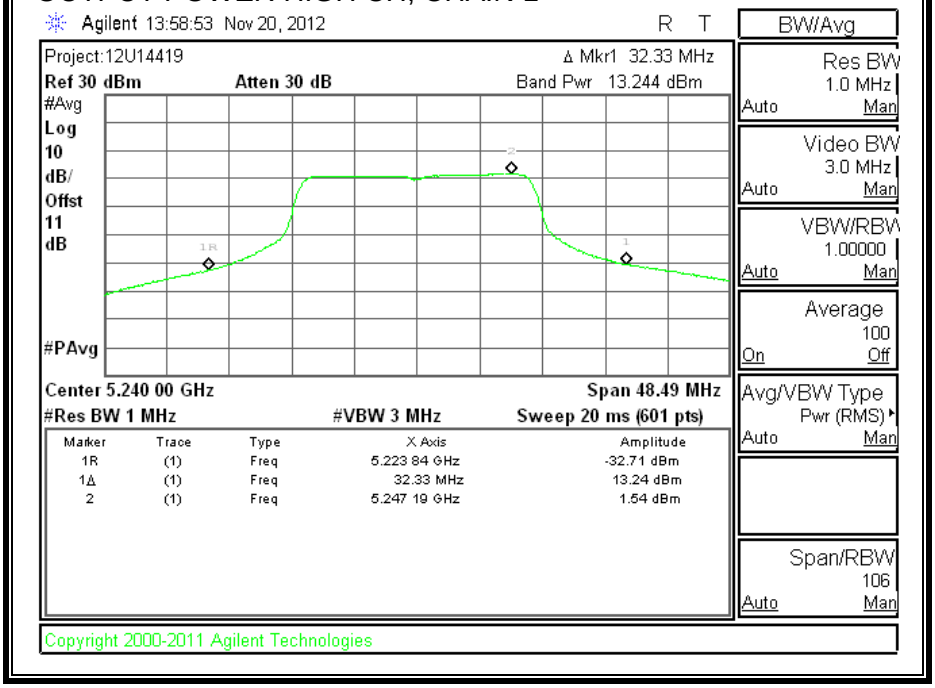
CHAIN 1 OUTPUT POWER



OUTPUT POWER MID CH, CHAIN 1



OUTPUT POWER HIGH CH, CHAIN 1



8.2.3. AVERAGE POWER

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a power meter.

RESULTS

The cable assembly insertion loss of 11.3 dB (including 10 dB pad and 1.3 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

Channel	Frequency (MHz)	Chain 0 Power (dBm)	Chain 1 Power (dBm)	Total Power (dBm)
Low	5180	12.10	12.95	15.56
Middle	5200	11.75	13.00	15.43
High	5240	12.00	13.10	15.60

8.2.4. 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.

TEST PROCEDURE

Guidelines for Compliance Testing of Unlicensed National Information Infrastructure (U-NII) Devices - Part 15, Subpart E, dated 10/25/2011.

RESULTS

CHAIN 0

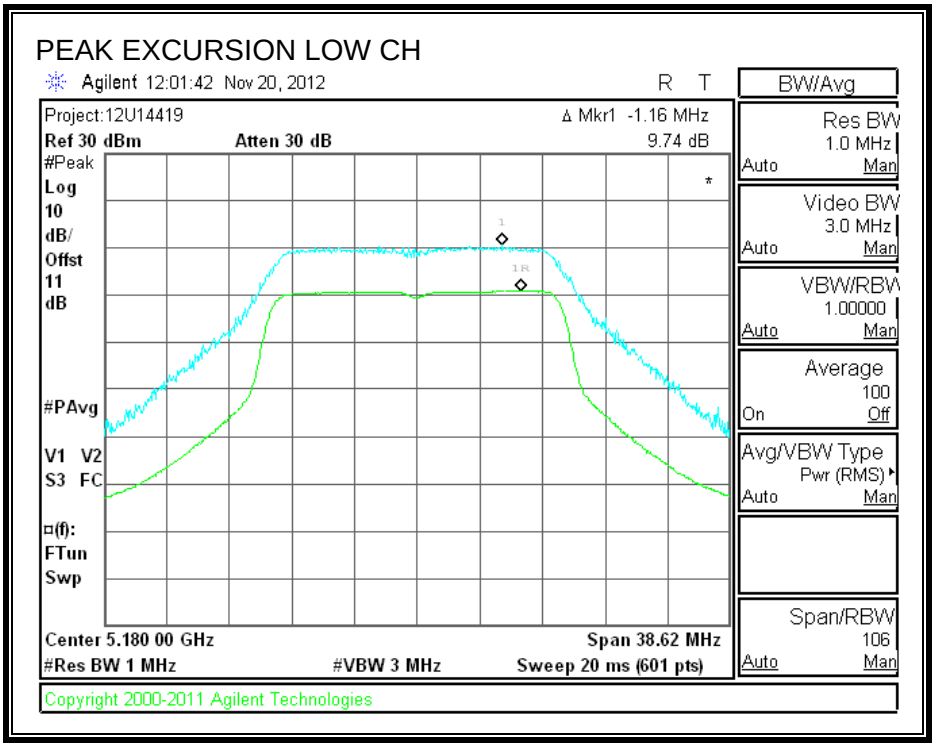
Channel	Frequency (MHz)	Peak Excursion (dB)	Limit (dB)	Margin (dB)
Low	5180	9.74	13	-3.26
Middle	5200	9.45	13	-3.55
High	5240	10.47	13	-2.53

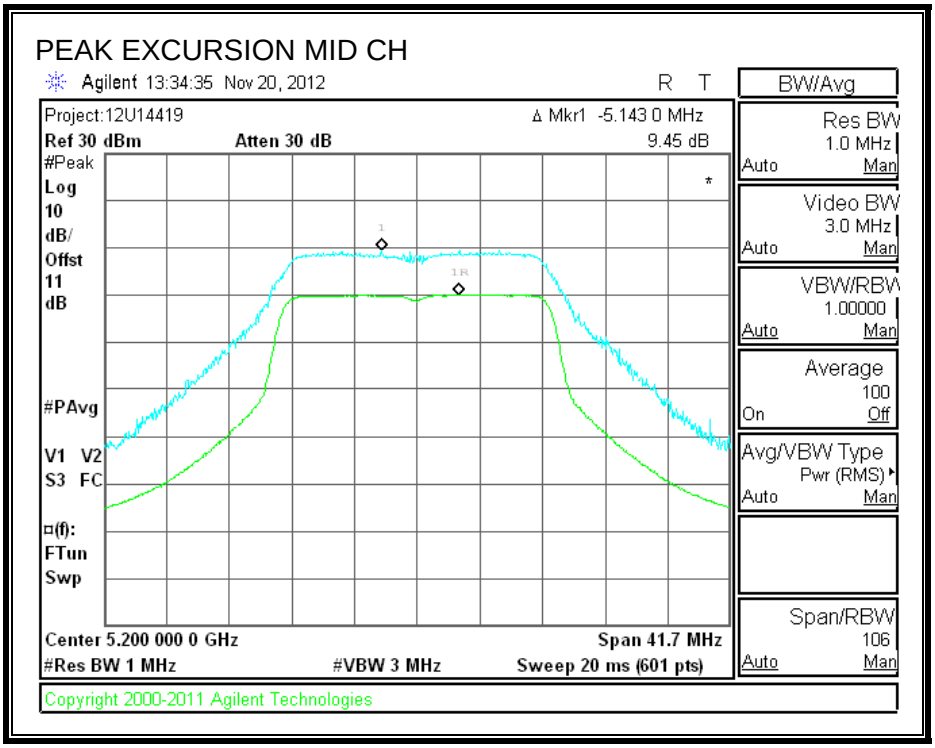
CHAIN 1

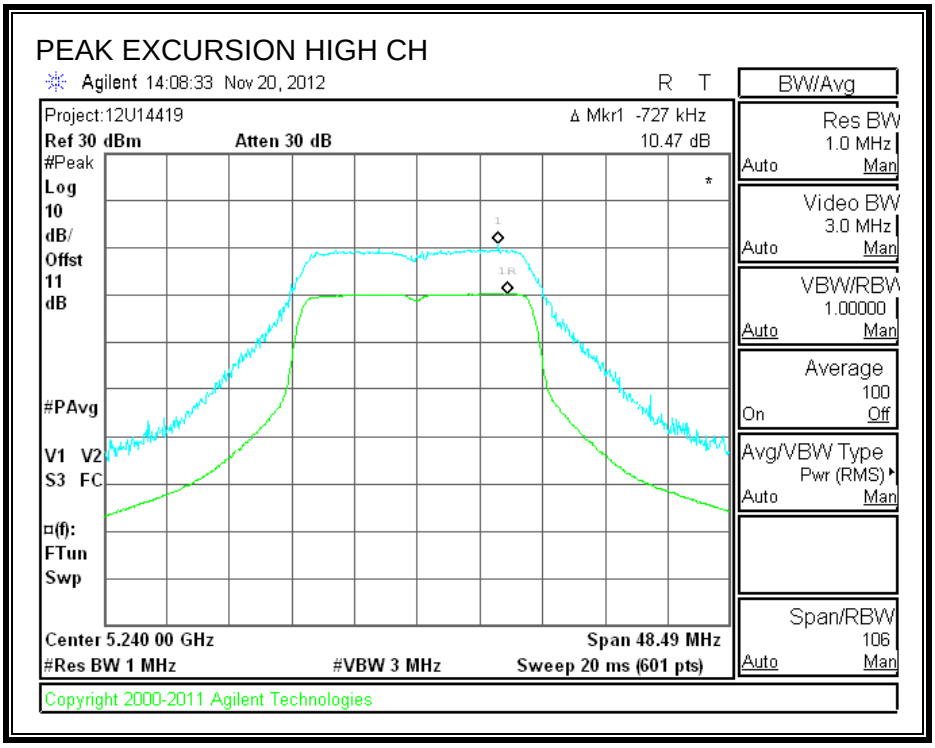
Channel	Frequency (MHz)	Peak Excursion (dB)	Limit (dB)	Margin (dB)
Low	5180	10.18	13	-2.82
Middle	5200	10.02	13	-2.98
High	5240	9.94	13	-3.06

CHAIN 0

PEAK EXCURSION

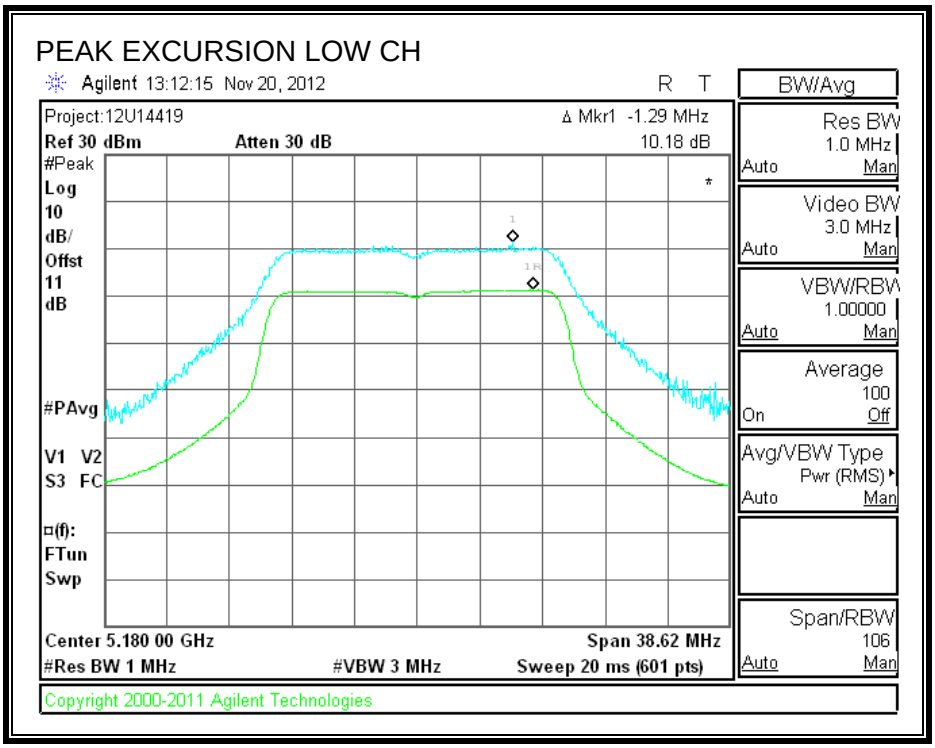


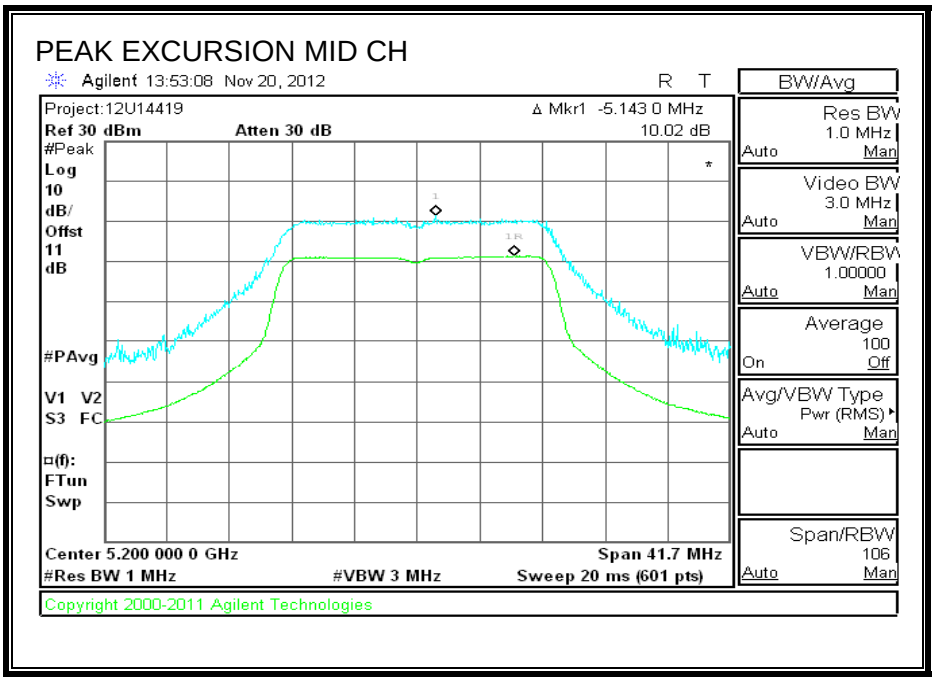


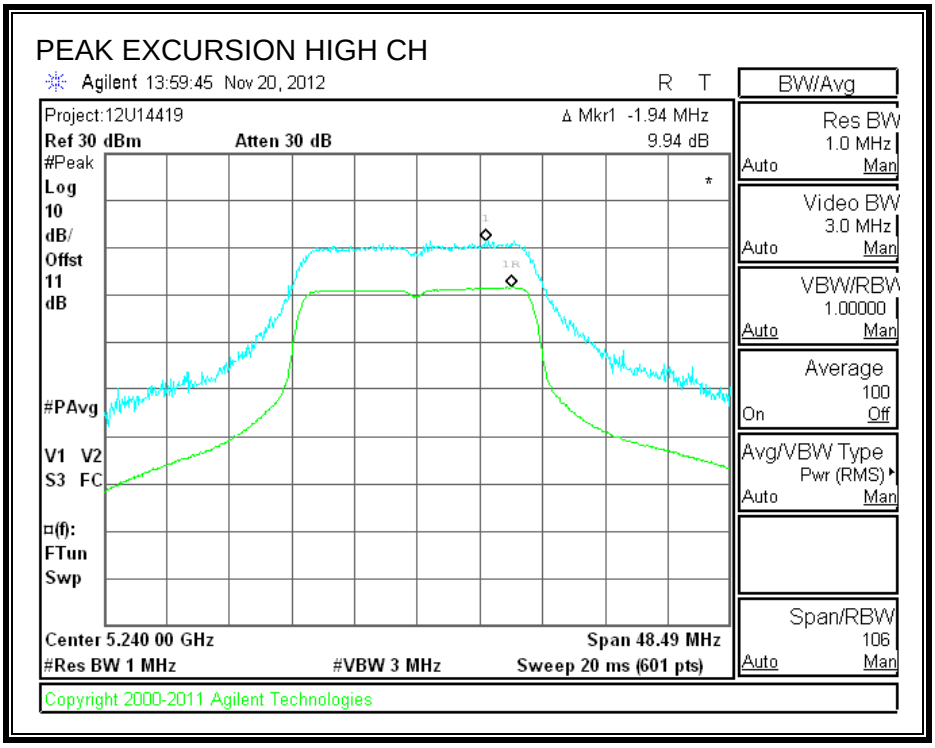


CHAIN 1

PEAK EXCURSION







8.3. 802.11n HT20, SDM MODE IN THE 5.2 GHz BAND

8.3.1. 26 dB and 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

Guidelines for Compliance Testing of Unlicensed National Information Infrastructure (U-NII) Devices - Part 15, Subpart E, dated 10/25/2011.

RESULTS

CHAIN 0

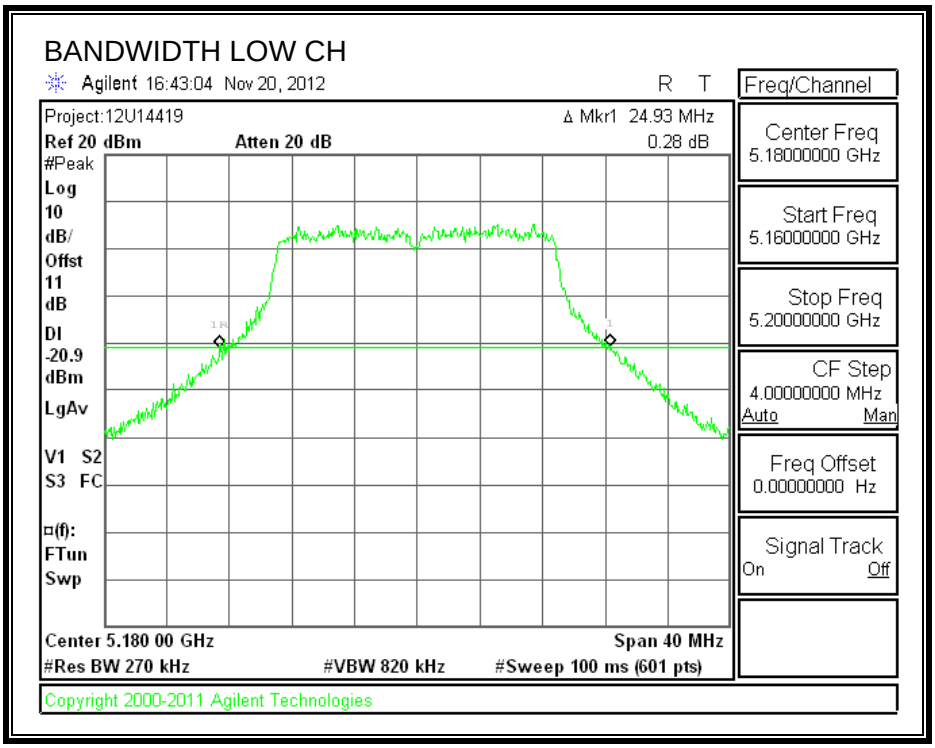
Channel	Frequency (MHz)	26 dB Bandwidth (MHz)	99% Bandwidth (MHz)
Low	5180	24.93	17.6935
Middle	5200	24.60	17.7007
High	5240	24.93	17.7066

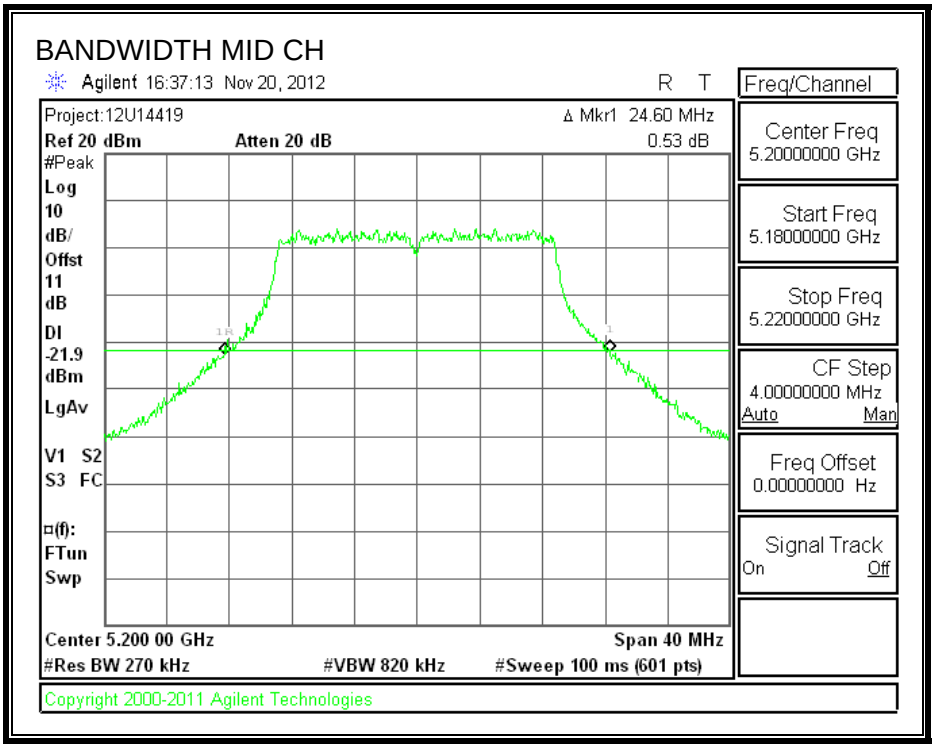
CHAIN 1

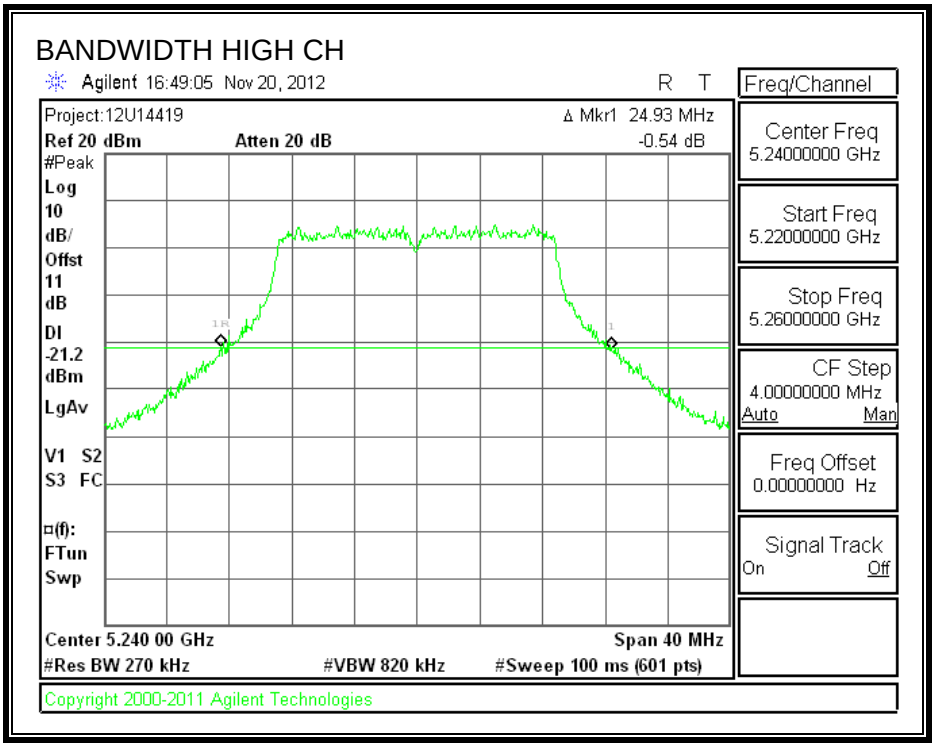
Channel	Frequency (MHz)	26 dB Bandwidth (MHz)	99% Bandwidth (MHz)
Low	5180	24.60	17.6998
Middle	5200	24.93	17.7265
High	5240	26.80	17.7495

CHAIN 0

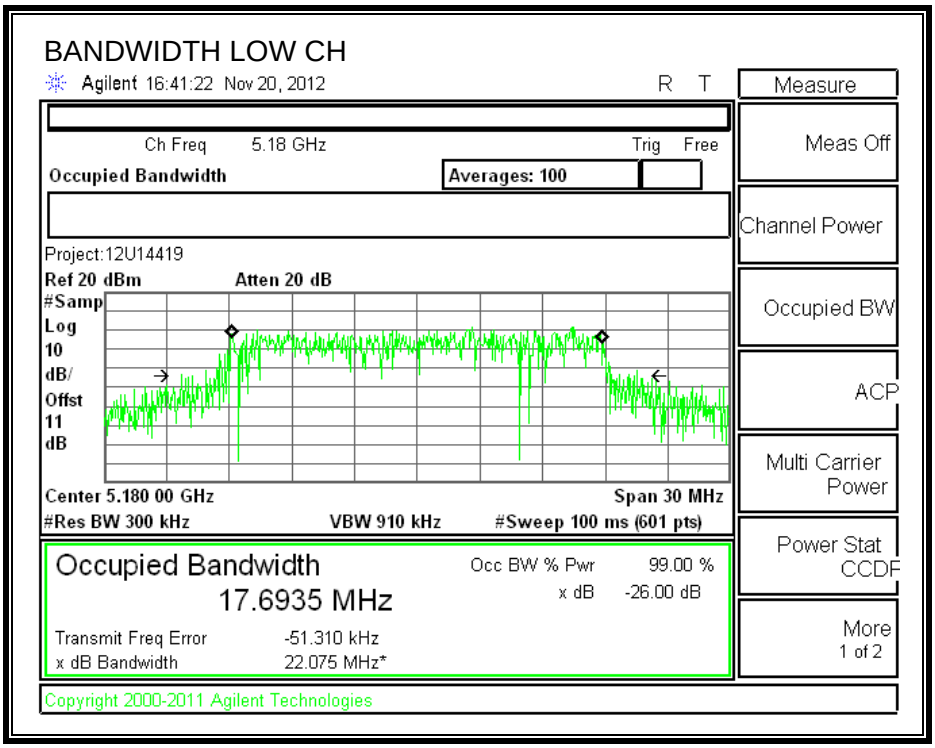
26 dB BANDWIDTH

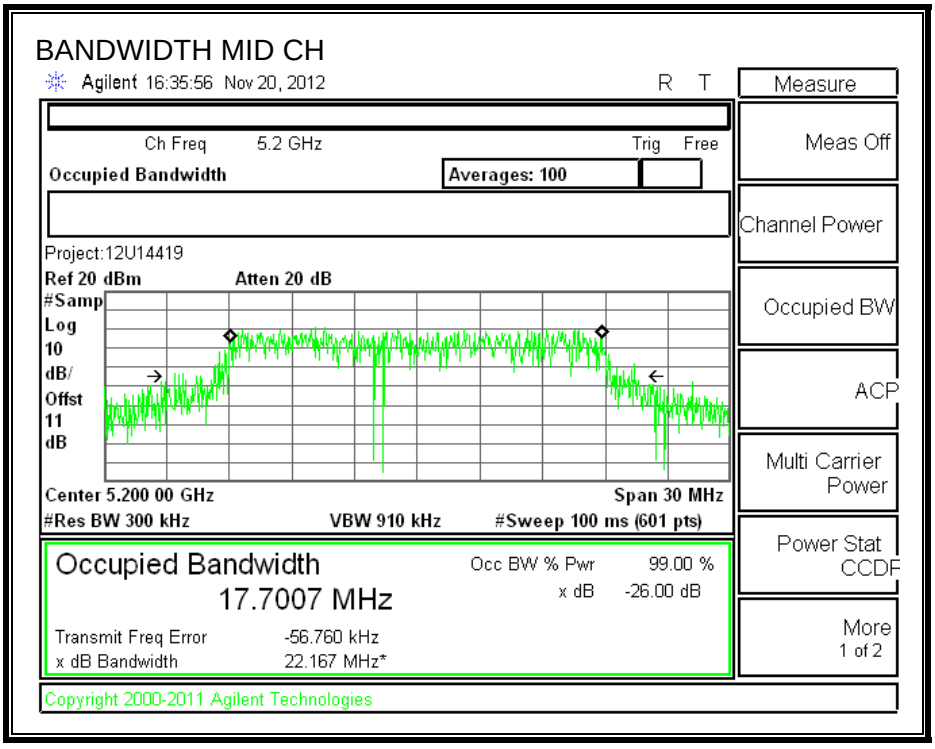


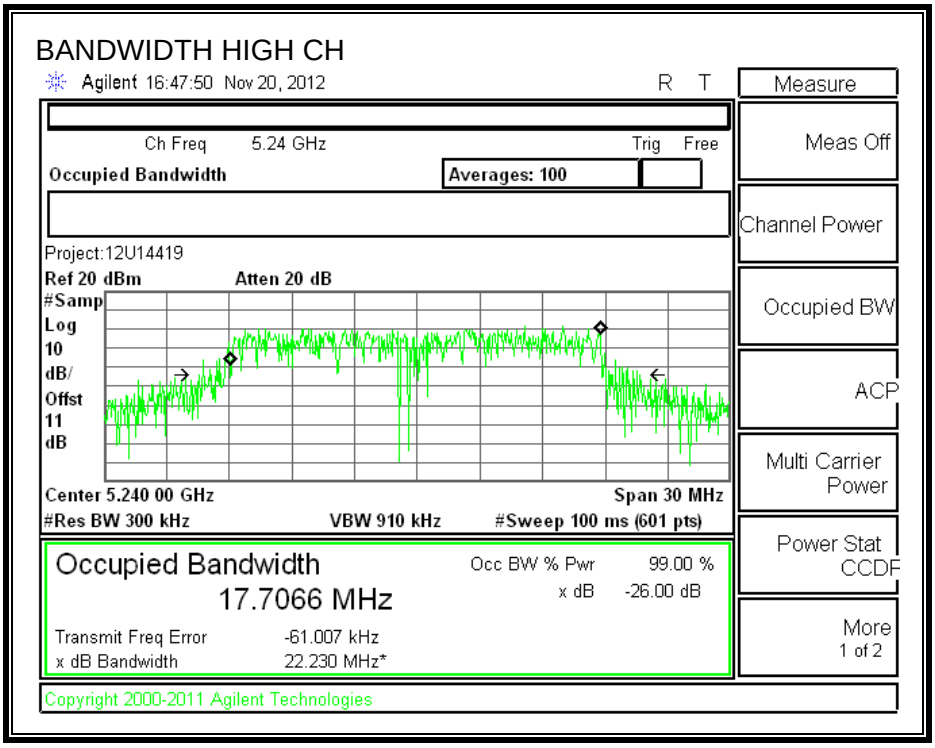




99% BANDWIDTH

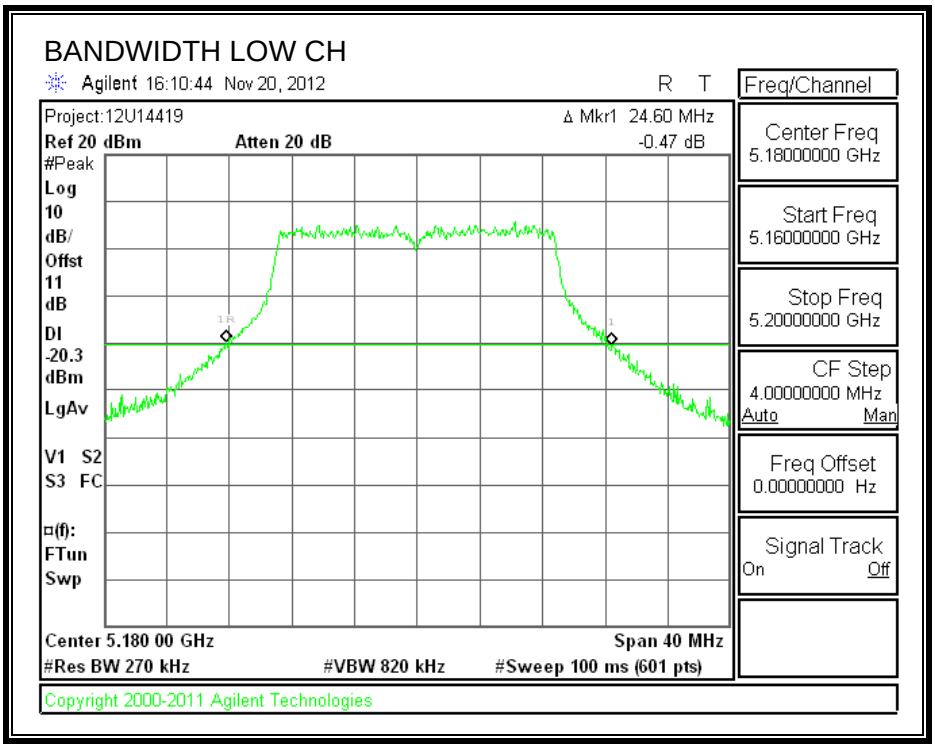


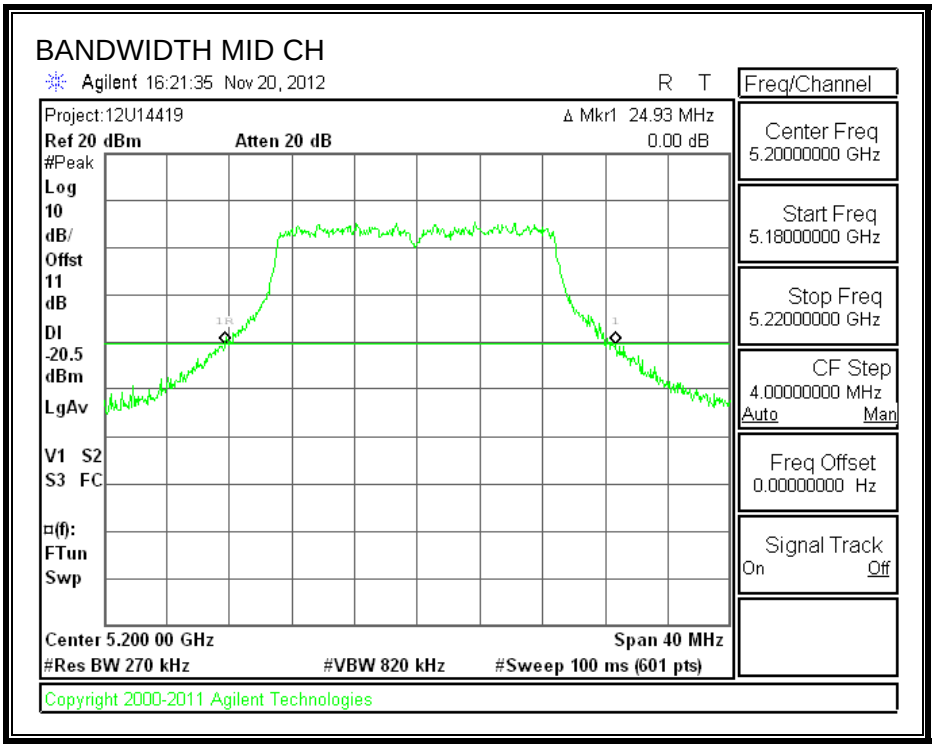


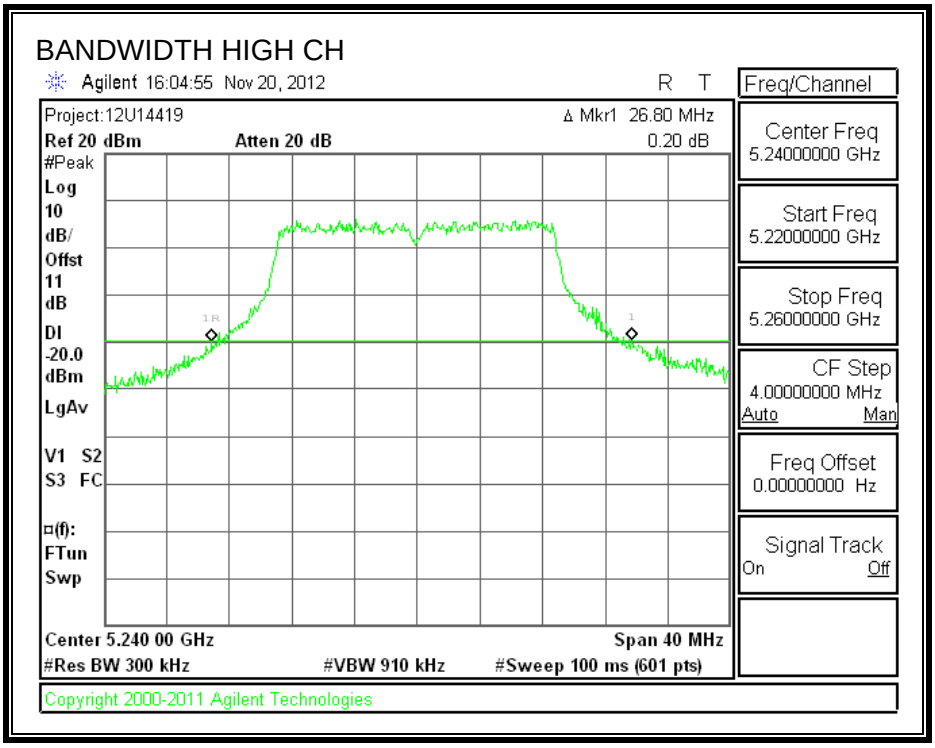


CHAIN 1

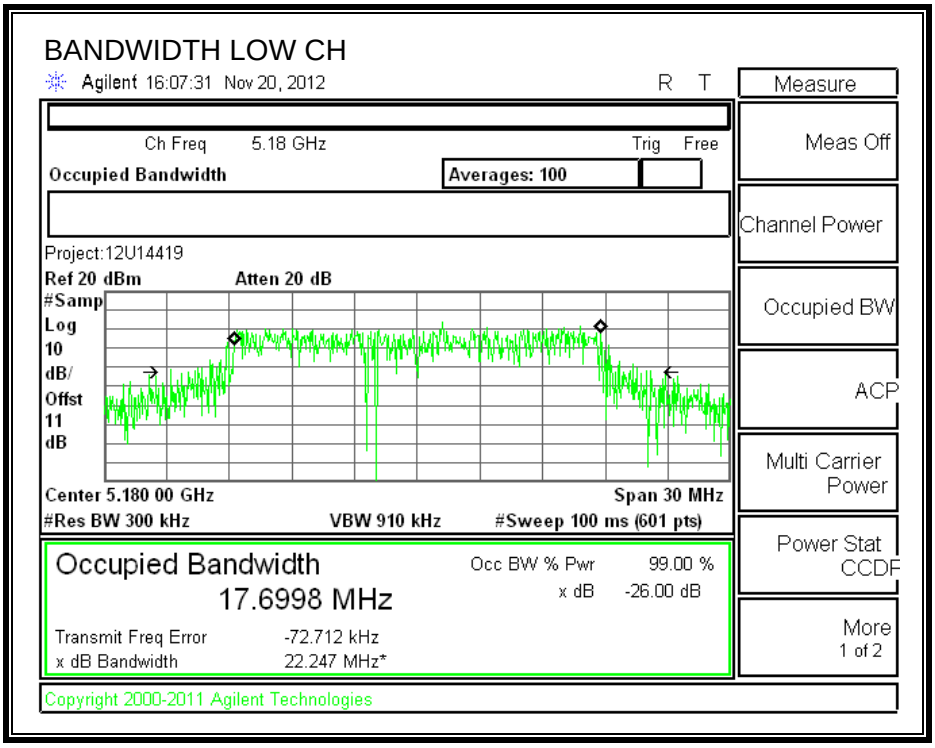
26 dB BANDWIDTH

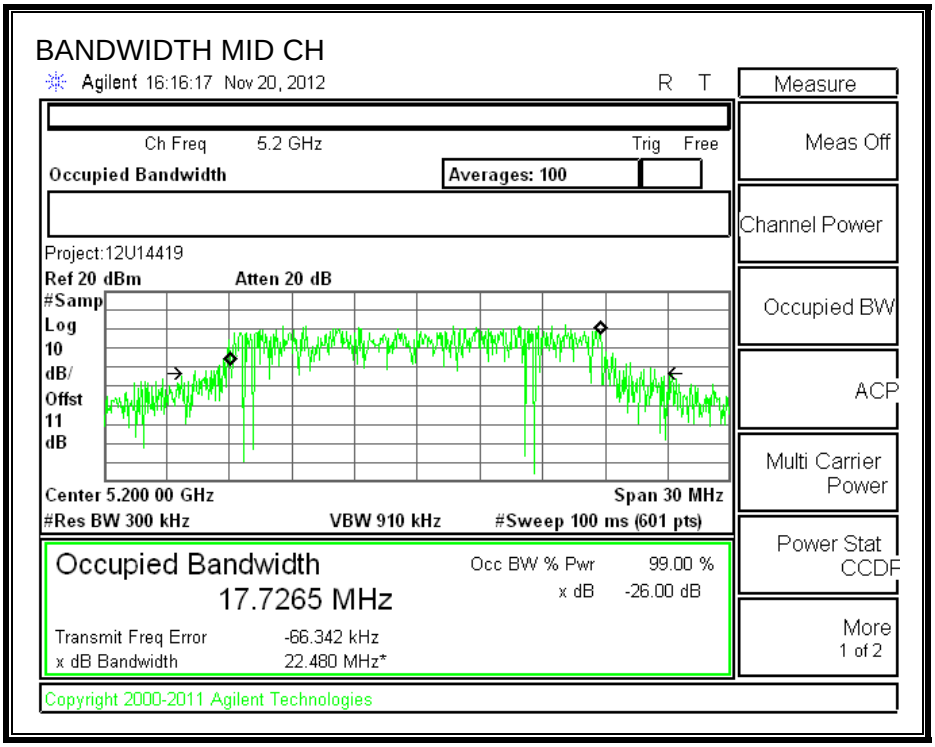


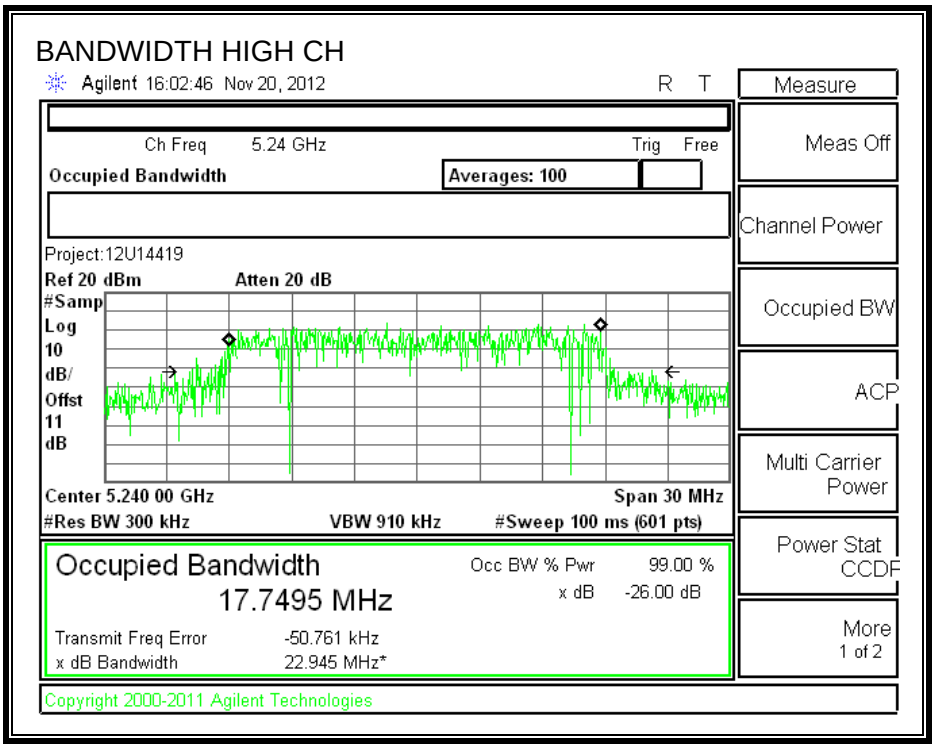




99% BANDWIDTH







8.3.2. OUTPUT POWER AND PPSD

LIMITS

FCC §15.407 (a) (1)

For the band 5.15–5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed the lesser of 50 mW or 4 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

The TX chains are uncorrelated and the antenna gain is the same for each chain. The directional gain is equal to the antenna gain.

OUTPUT POWER

Bandwidth and Antenna Gain

Channel	Frequency (MHz)	Min 26 dB BW (MHz)	Min 99% BW (MHz)	Directional Gain (dBi)
Low	5180	24.60	17.6935	2.00
Mid	5200	24.60	17.7007	2.00
High	5240	93.00	17.7066	2.00

Limits

Channel	Frequency (MHz)	FCC Power Limit (dBm)	IC EIRP Limit (dBm)	Max IC Power (dBm)	Power Limit (dBm)	FCC PPSD Limit (dBm)	IC eirp PSD Limit (dBm)	PPSD Limit (dBm)
Low	5180	17.00	22.48	20.48	17.00	4.00	10.00	4.00
Mid	5200	17.00	22.48	20.48	17.00	4.00	10.00	4.00
High	5240	17.00	22.48	20.48	17.00	4.00	10.00	4.00

Duty Cycle CF (dB)	0.00	Included in Calculations of Corr'd Power & PPSD

Output Power Results

Channel	Frequency (MHz)	Chain 0 Meas Power (dBm)	Chain 1 Meas Power (dBm)	Total Corr'd Power (dBm)	Power Limit (dBm)	Power Margin (dB)
Low	5180	**11.827**	**12.911**	15.413	17.00	-1.587
Mid	5200	**12.004**	**12.949**	15.512	17.00	-1.488
High	5240	**11.776**	**12.690**	15.267	17.00	-1.733

PPSD Results

Channel	Frequency (MHz)	Chain 0 Meas PPSD (dBm)	Chain 1 Meas PPSD (dBm)	Total Corr'd PPSD (dBm)	PPSD Limit (dBm)	PPSD Margin (dB)
Low	5180	**-0.04**	**1.07**	3.56	4.00	-0.44
Mid	5200	**0.09**	**1.14**	3.66	4.00	-0.34
High	5240	**-0.09**	**1.07**	3.54	4.00	-0.46

LIMITS

FCC §15.407 (a) (1)

IC RSS-210 A9.2 (1)

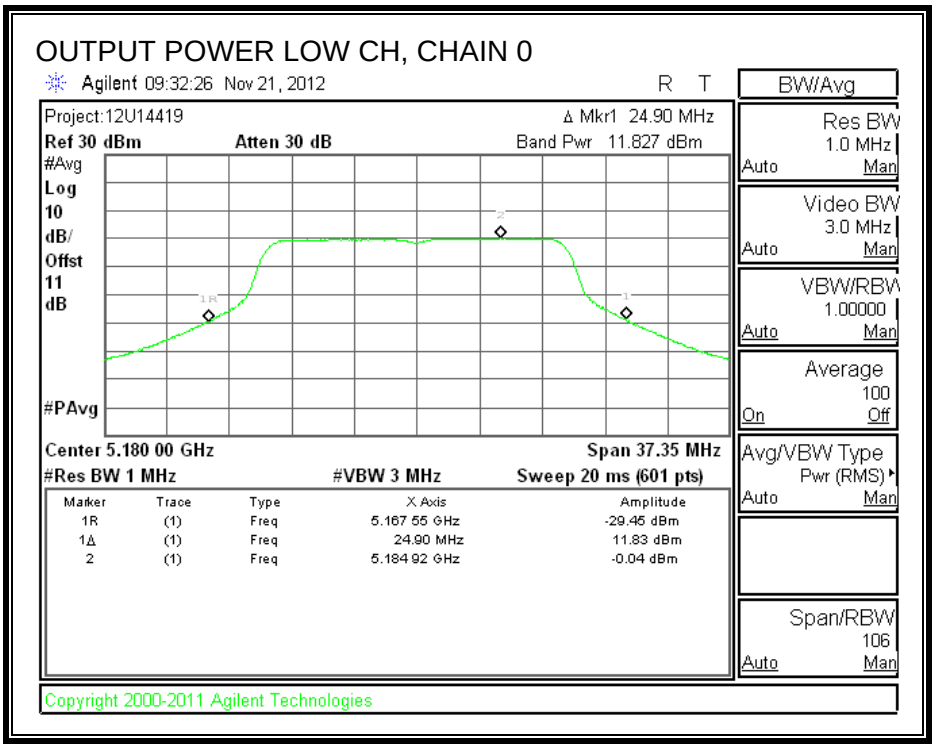
For the 5.15-5.25 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed the lesser of 50 mW or 4 dBm + 10 log B, where B is the 26-dB emission bandwidth in MHz. If transmitting antennas of directional gain greater than 6 dBi are used, both the peak transmit 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.

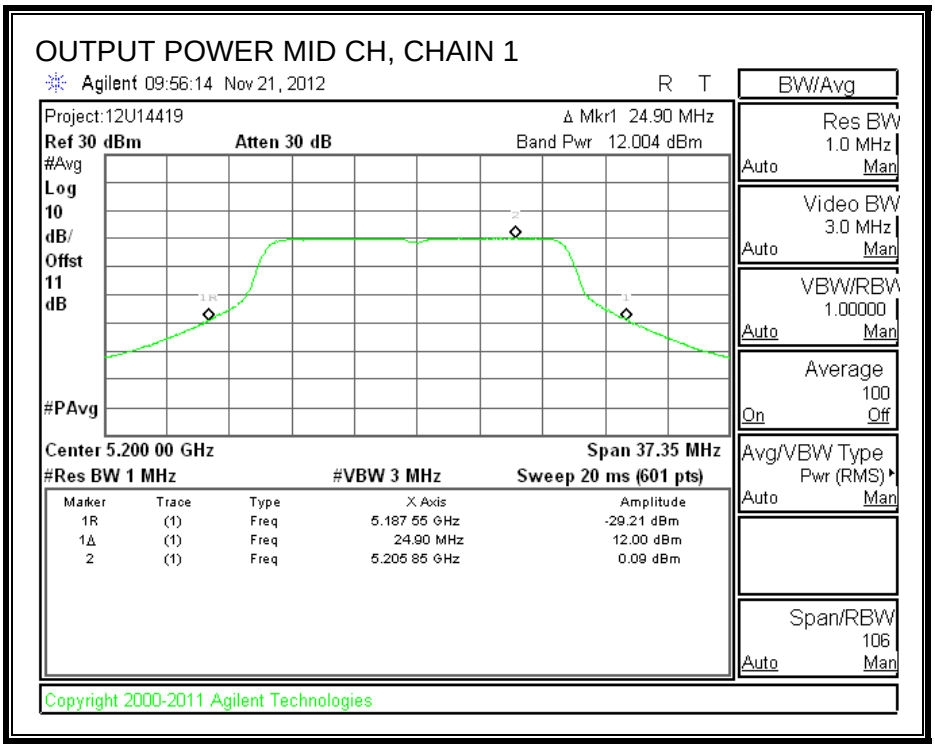
TEST PROCEDURE

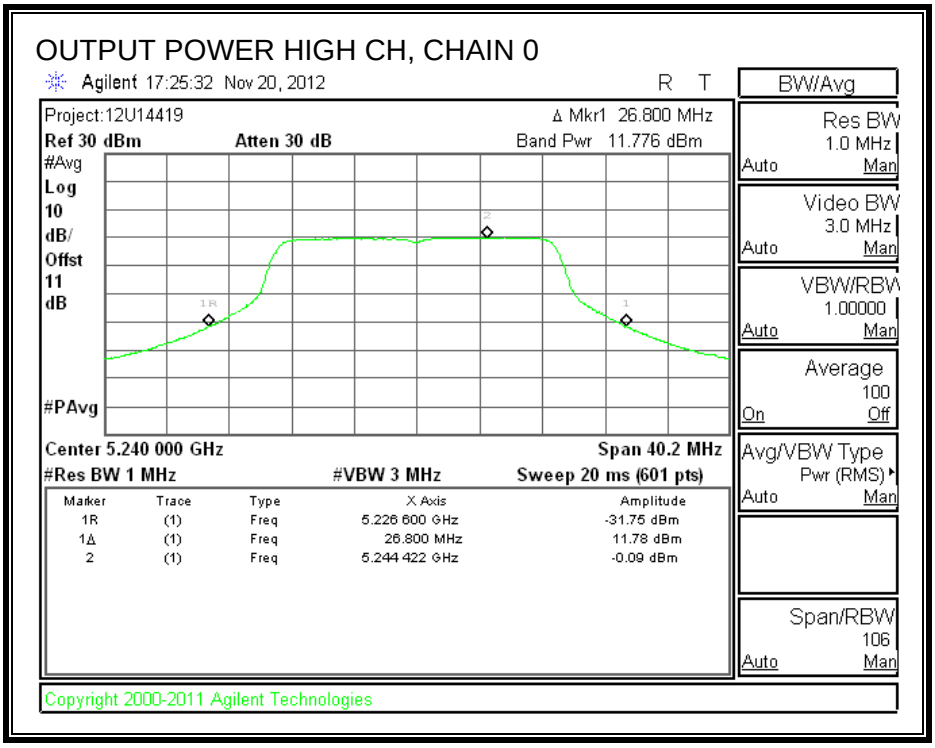
Guidelines for Compliance Testing of Unlicensed National Information Infrastructure (U-NII) Devices - Part 15, Subpart E, dated 10/25/2011.

Based on the characteristics of the EUT and various criteria method SA-3 ALT was selected.

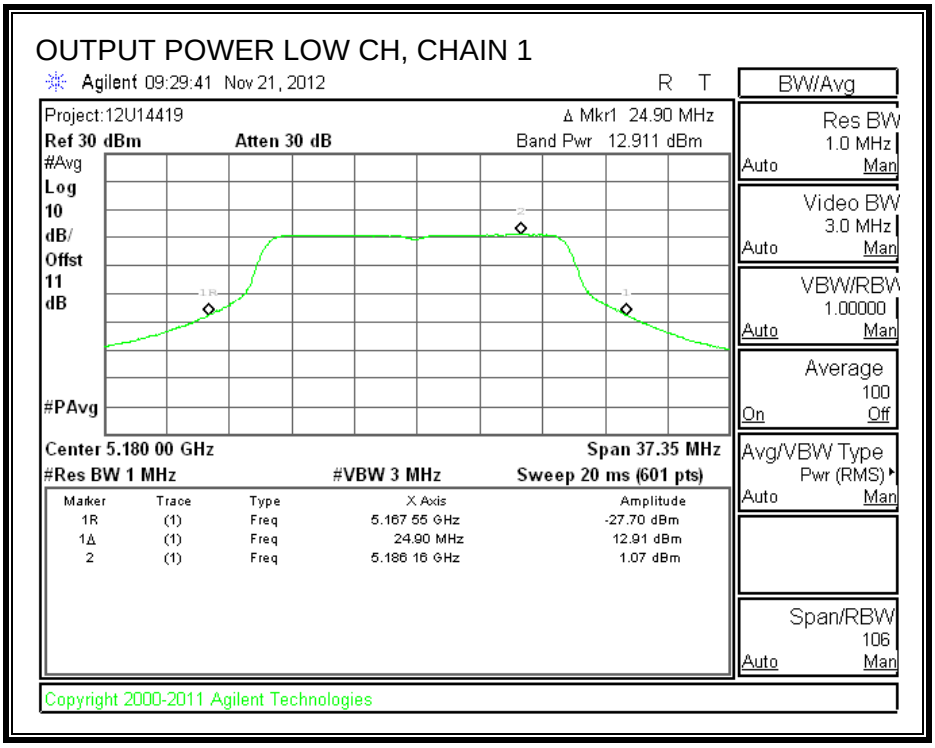
CHAIN 0 OUTPUT POWER



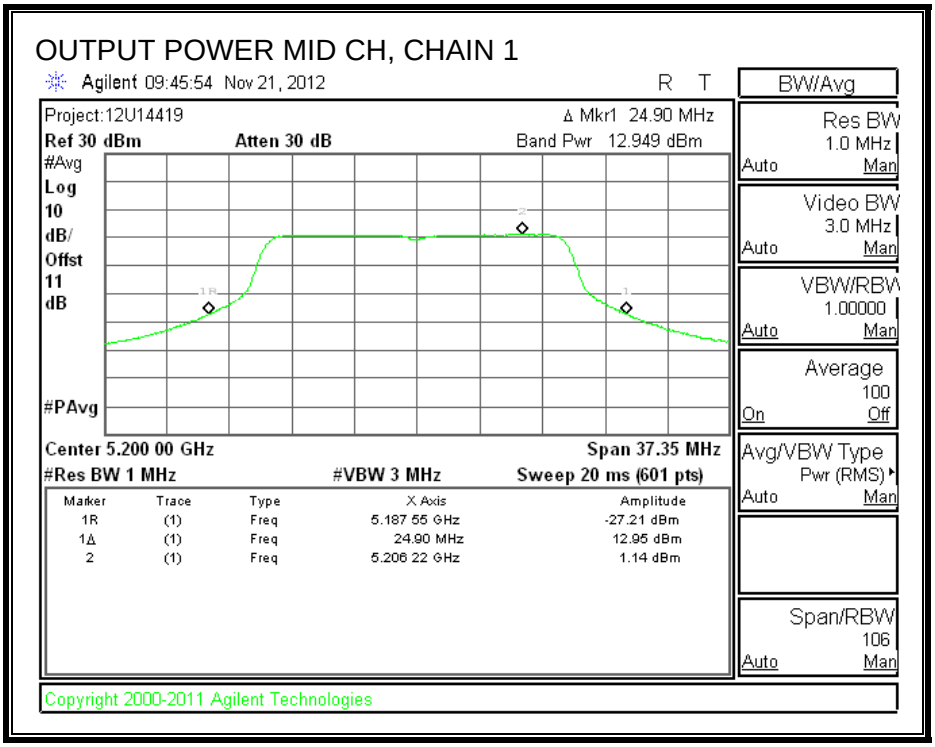




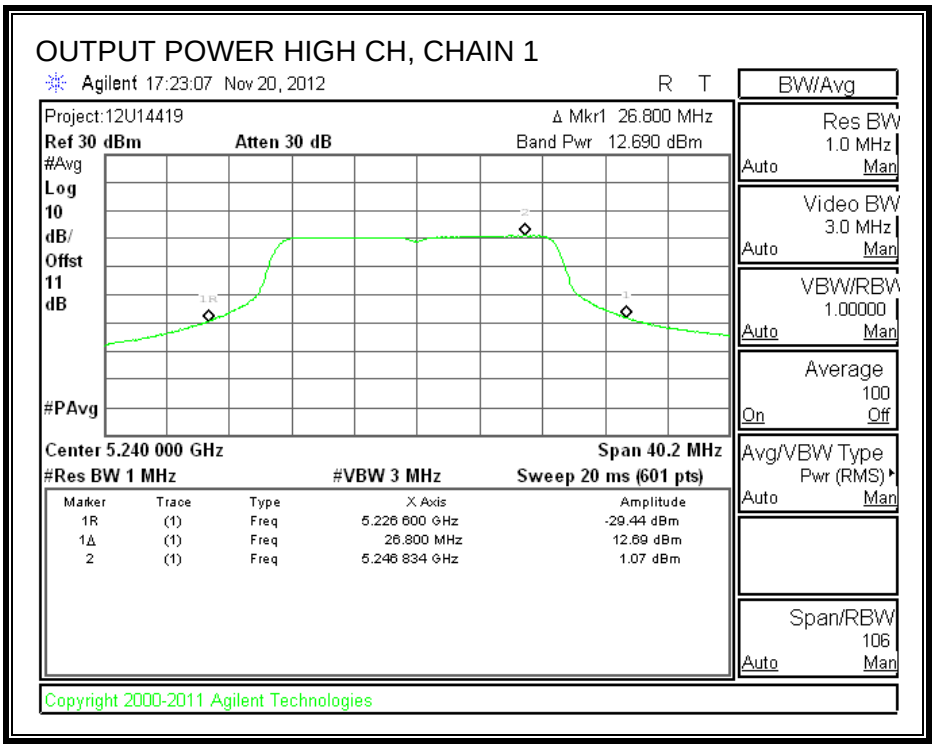
CHAIN 1 OUTPUT POWER



OUTPUT POWER MID CH, CHAIN 1



OUTPUT POWER HIGH CH, CHAIN 1



8.3.3. AVERAGE POWER

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a power meter.

RESULTS

The cable assembly insertion loss of 11.3 dB (including 10 dB pad and 1.3 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

Channel	Frequency (MHz)	Chain 0 Power (dBm)	Chain 1 Power (dBm)	Total Power (dBm)
Low	5180	11.60	12.82	15.26
Middle	5200	11.93	12.85	15.42
High	5240	11.56	12.65	15.15

8.3.4. 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.

TEST PROCEDURE

Guidelines for Compliance Testing of Unlicensed National Information Infrastructure (U-NII) Devices - Part 15, Subpart E, dated 10/25/2011.

RESULTS

CHAIN 0

Channel	Frequency (MHz)	Peak Excursion (dB)	Limit (dB)	Margin (dB)
Low	5180	11.38	13	-1.62
Middle	5200	10.40	13	-2.60
High	5240	10.63	13	-2.37

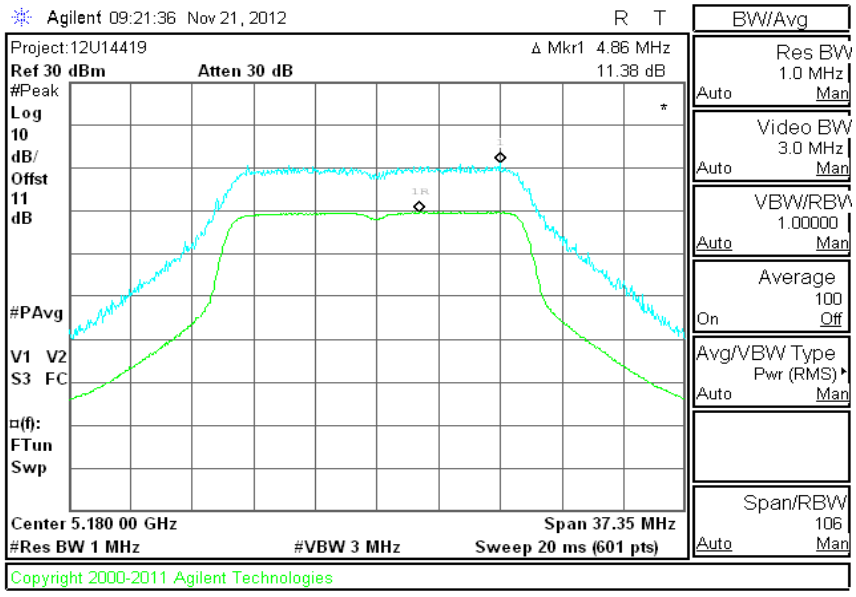
CHAIN 1

Channel	Frequency (MHz)	Peak Excursion (dB)	Limit (dB)	Margin (dB)
Low	5180	10.26	13	-2.74
Middle	5200	10.46	13	-2.54
High	5240	10.45	13	-2.55

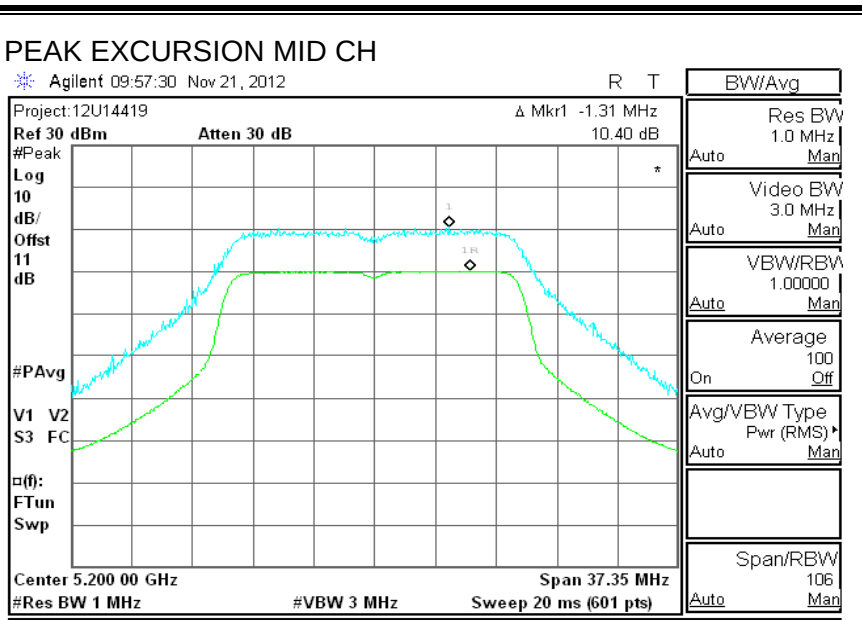
CHAIN 0

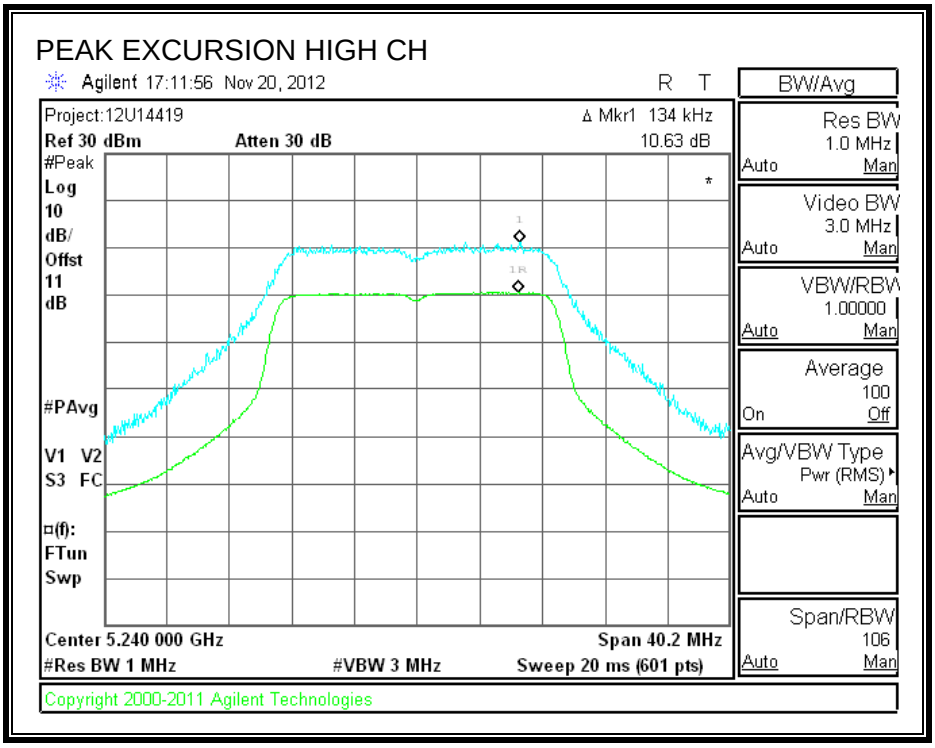
PEAK EXCURSION

PEAK EXCURSION LOW CH



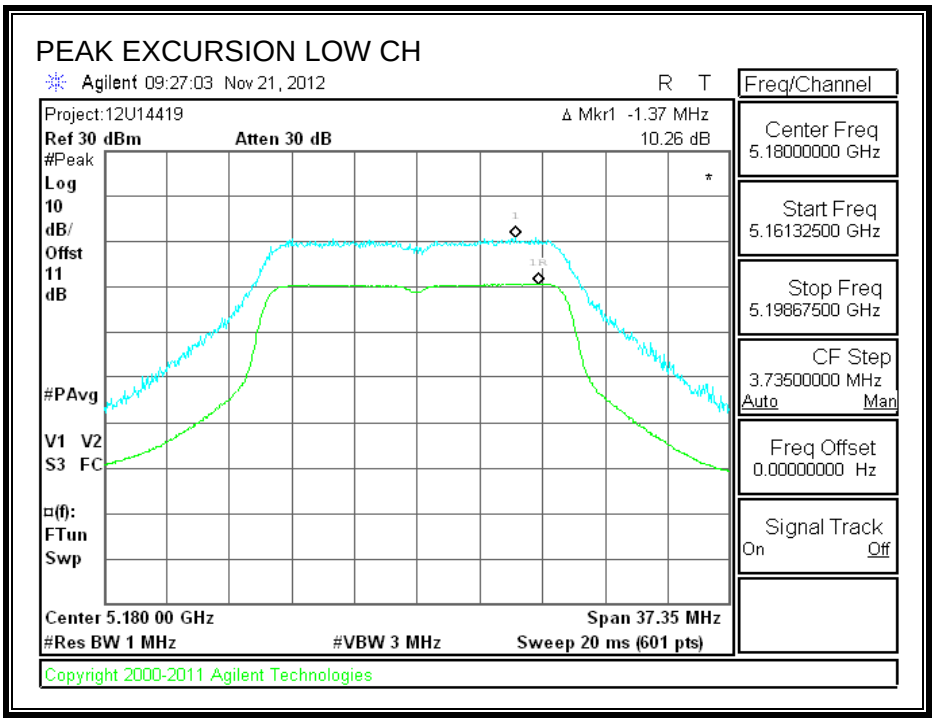
PEAK EXCURSION MID CH

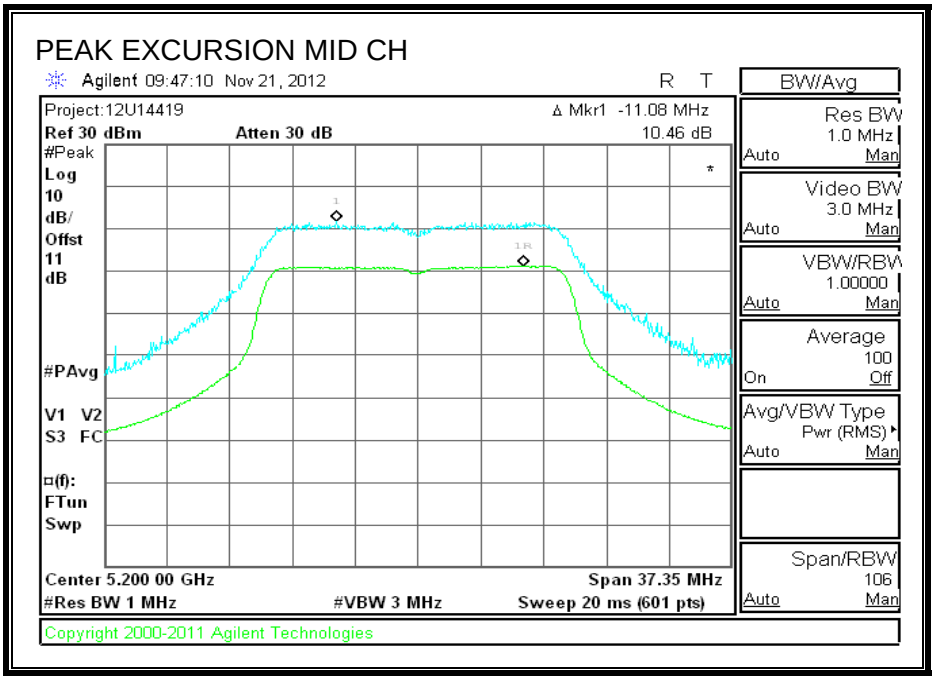




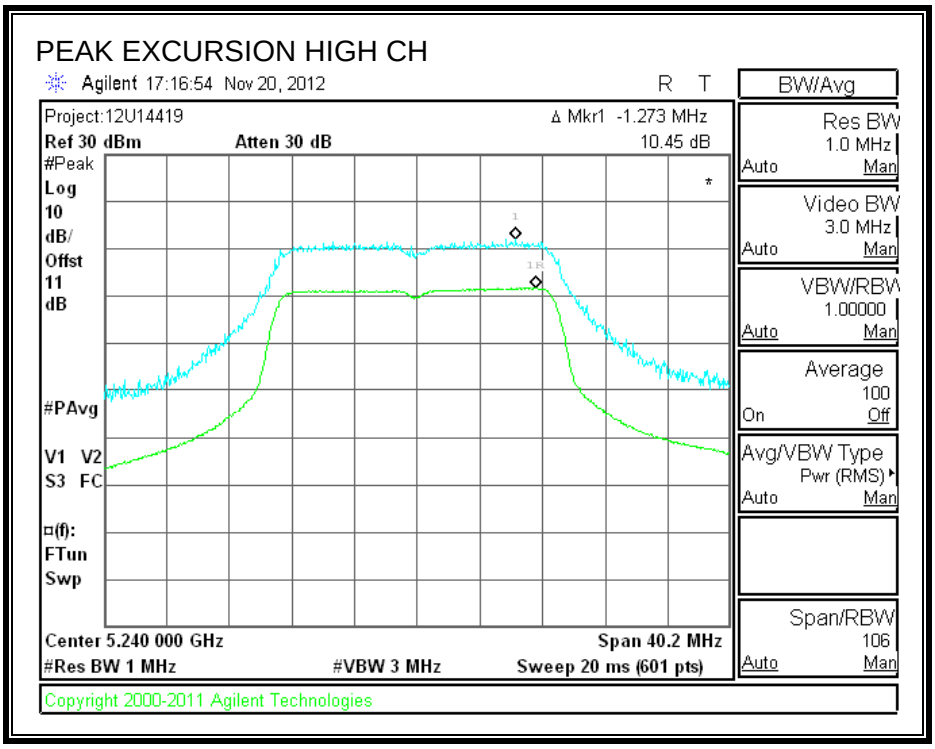
CHAIN 1

PEAK EXCURSION





PEAK EXCURSION HIGH CH



8.4. 802.11n HT40, CDD MODE IN THE 5.2 GHz BAND

8.4.1. 26 dB and 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

Guidelines for Compliance Testing of Unlicensed National Information Infrastructure (U-NII) Devices - Part 15, Subpart E, dated 10/25/2011.

RESULTS

CHAIN 0

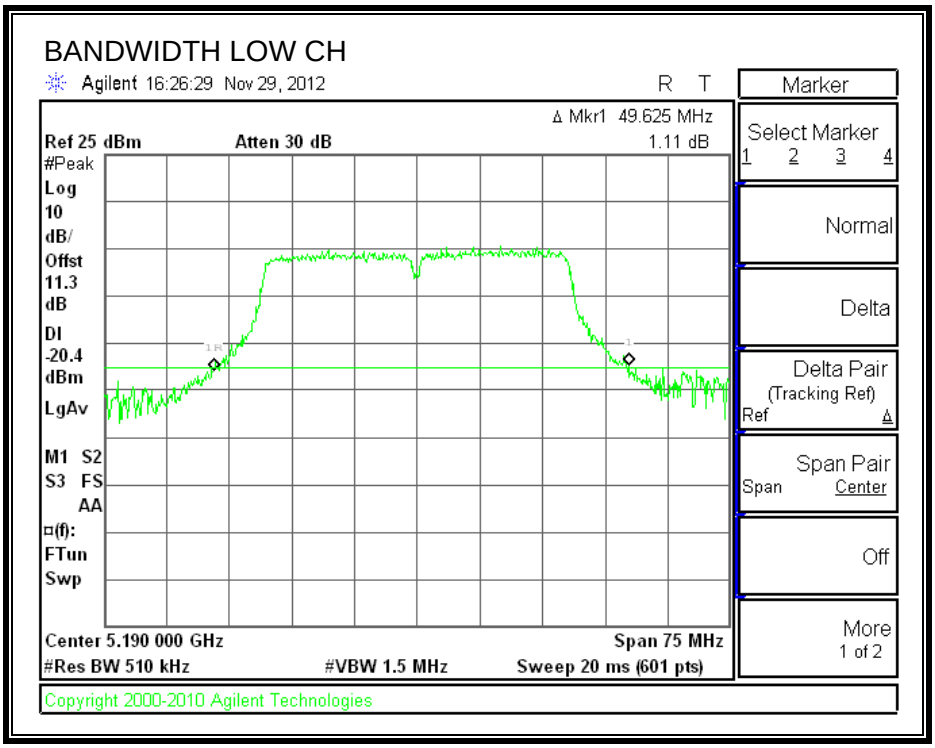
Channel	Frequency (MHz)	26 dB BW Chain 0 (MHz)	99% BW Chain 0 (MHz)
Low	5190	49.625	36.5097
High	5230	50.125	36.5989

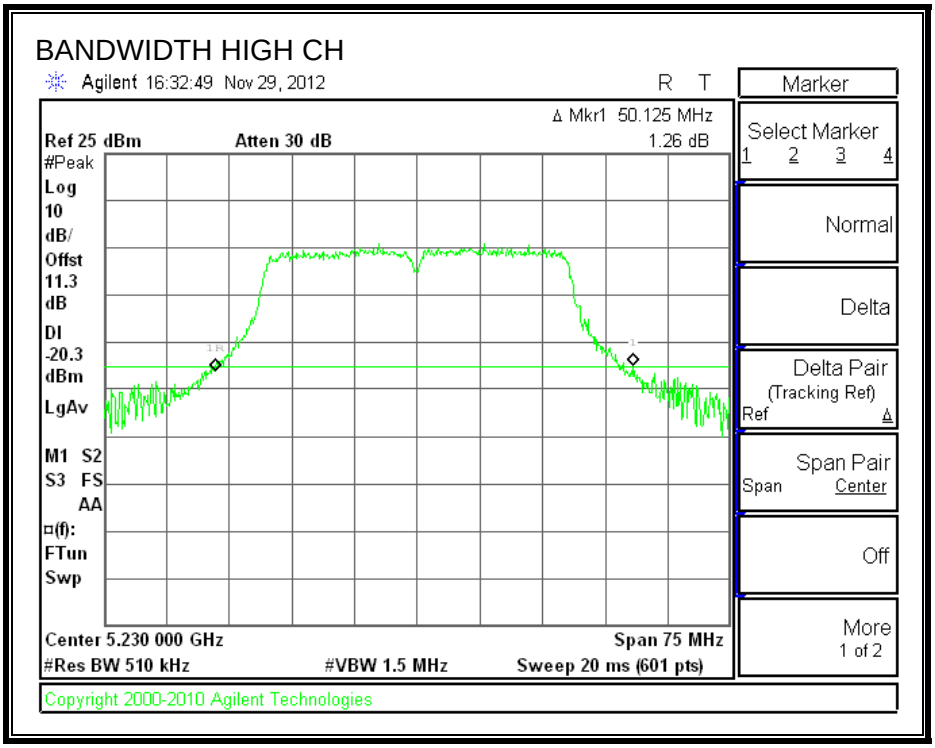
CHAIN 1

Channel	Frequency (MHz)	26 dB BW Chain 1 (MHz)	99% Chain 1 (MHz)
Low	5190	49.600	36.6009
High	5230	48.930	37.0520

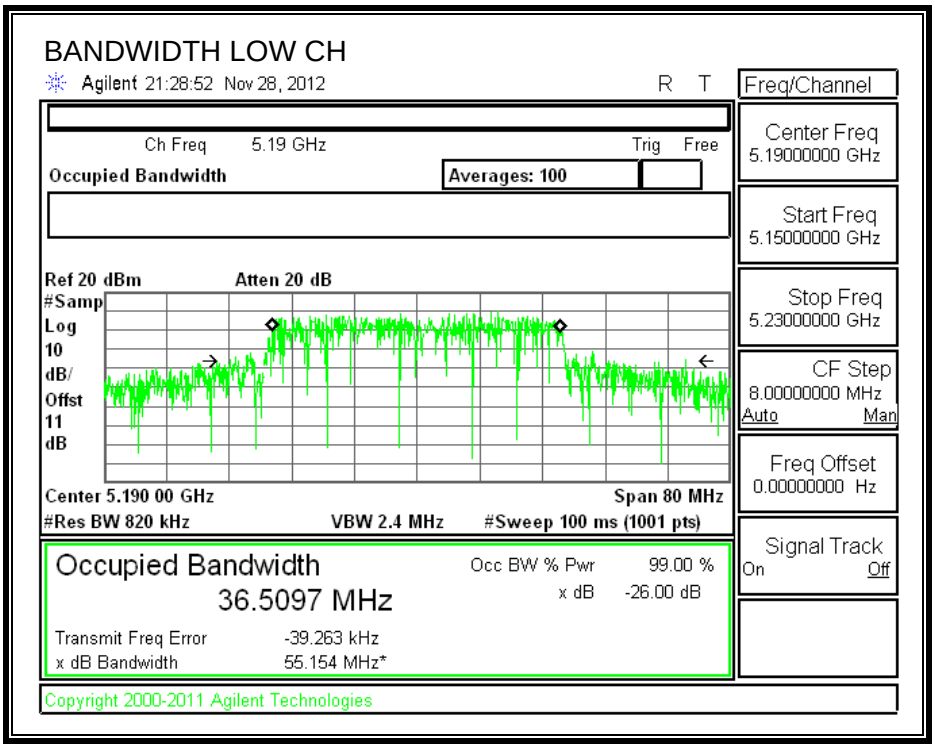
CHAIN 0

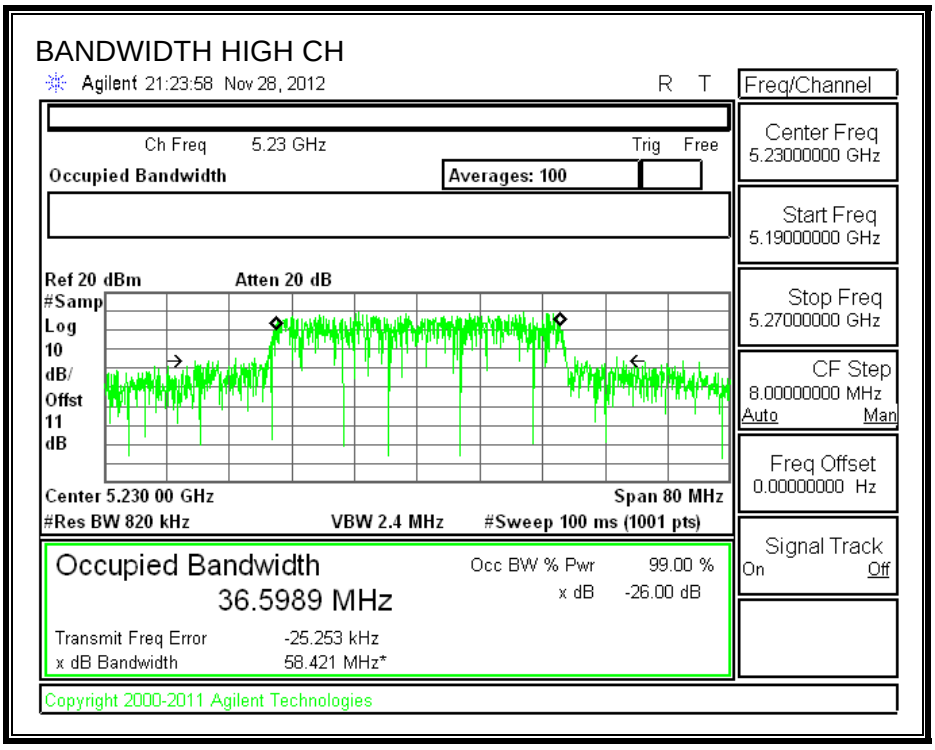
26 dB BANDWIDTH





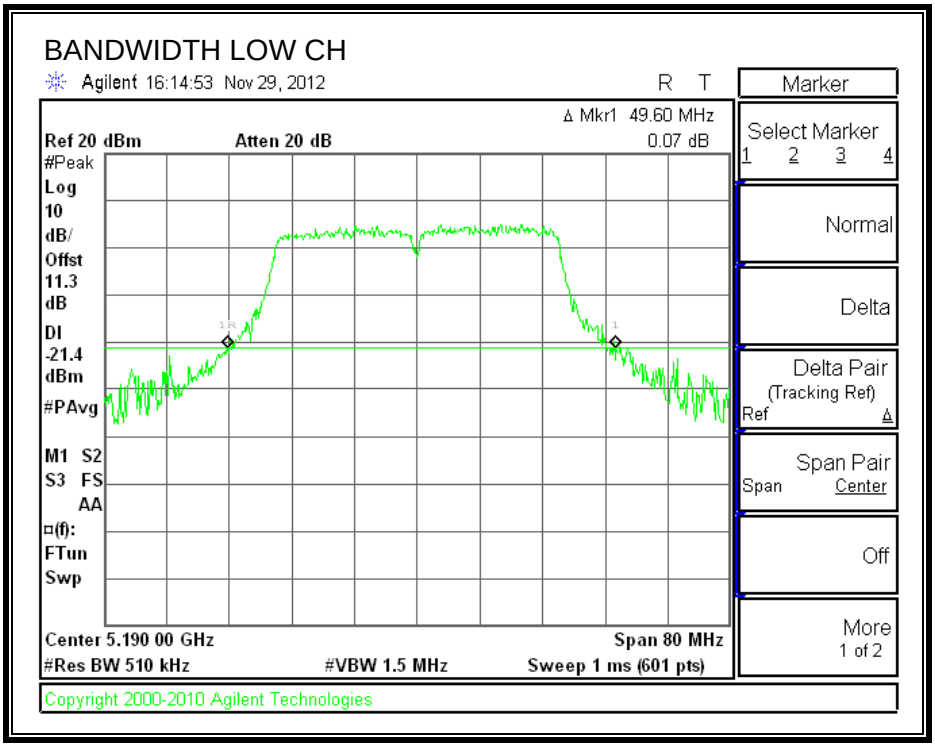
99% BANDWIDTH

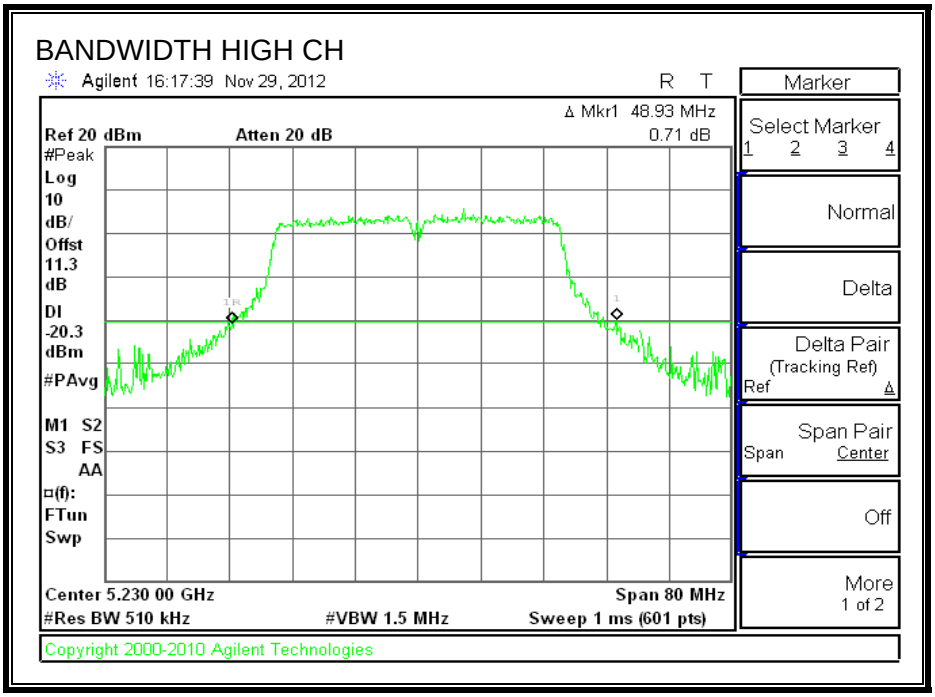




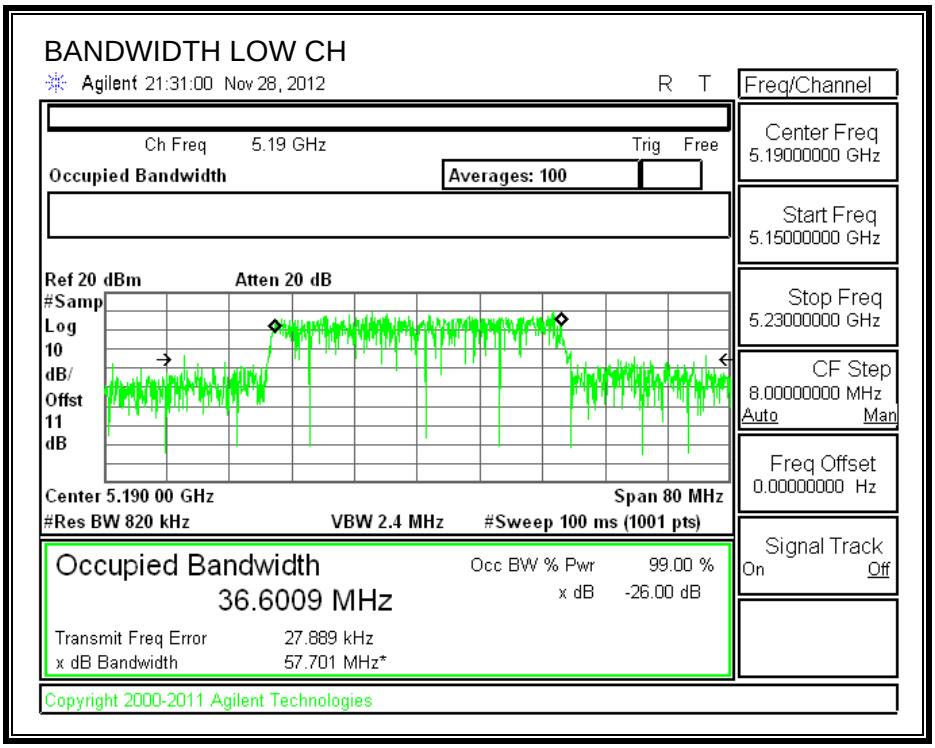
CHAIN 1

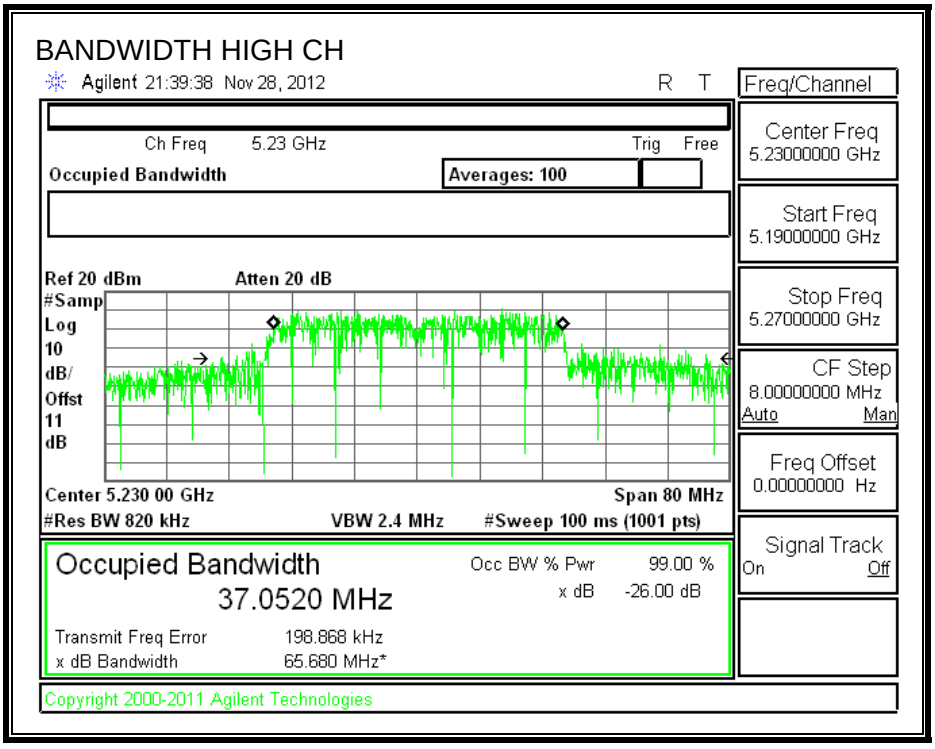
26 dB BANDWIDTH





99% BANDWIDTH





8.4.2. OUTPUT POWER AND PPSD

LIMITS

FCC §15.407 (a) (1)

For the band 5.15–5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed the lesser of 50 mW or 4 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

The TX chains are correlated and the antenna gain is the same for each chain. The directional gain is equal to the antenna gain.

Antenna Gain (dBi)	10 * Log (2 chains) (dB)	Correlated Chains Directional Gain (dBi)
2.00	3.01	5.01

RESULTS

Bandwidth and Antenna Gain

Channel	Frequency (MHz)	Min 26 dB BW (MHz)	Min 99% BW (MHz)	Directional Gain (dBi)
Low	5190	49.600	36.5097	5.01
High	5230	48.930	36.5989	5.01

Limits

Channel	Frequency (MHz)	FCC Power Limit (dBm)	IC EIRP Limit (dBm)	Max IC Power (dBm)	Power Limit (dBm)	FCC PPSD Limit (dBm)	IC eirp PSD Limit (dBm)	PPSD Limit (dBm)
Low	5190	17.00	23.00	17.99	17.00	4.00	10.00	4.00
High	5230	17.00	23.00	17.99	17.00	4.00	10.00	4.00

Duty Cycle CF (dB)	0.00	Included in Calculations of Corr'd Power & PPSD

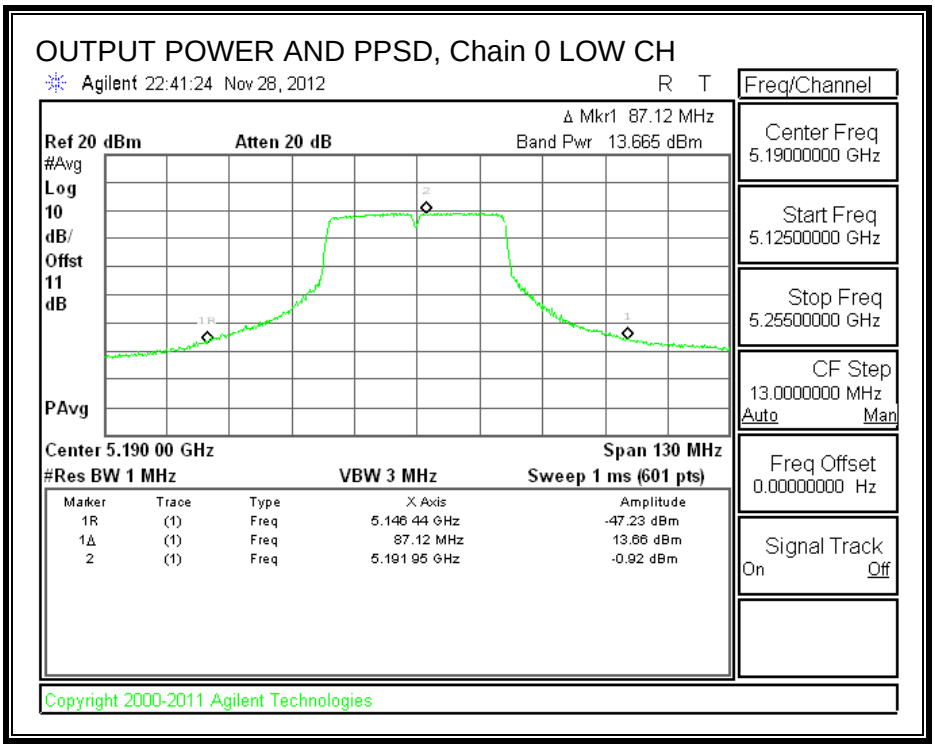
Output Power Results

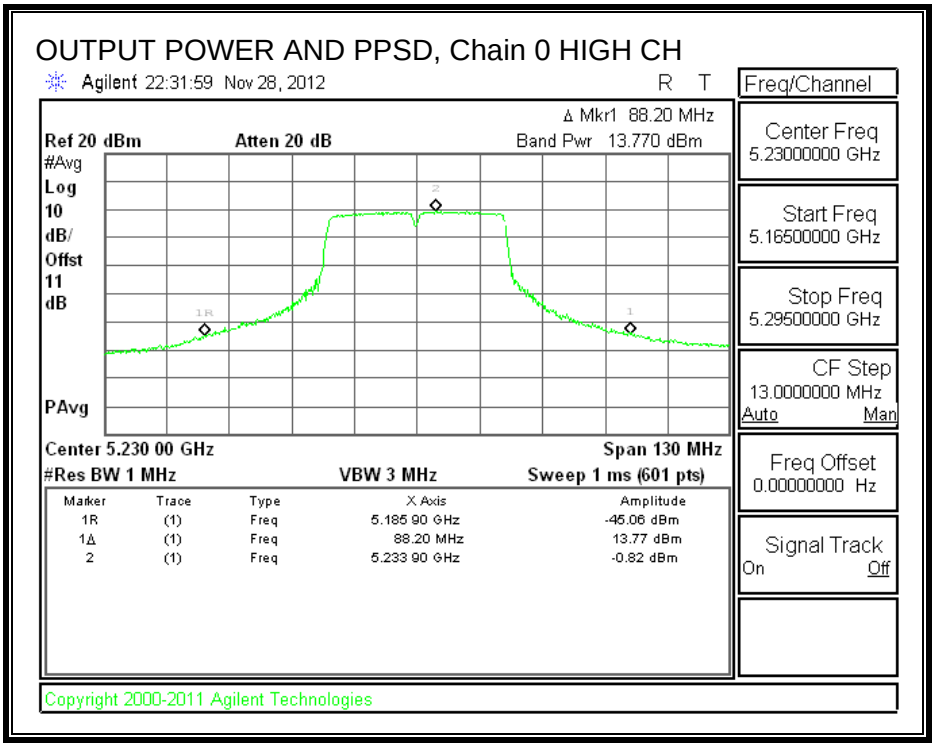
Channel	Frequency (MHz)	Chain 0 Meas Power (dBm)	Chain 1 Meas Power (dBm)	Total Corr'd Power (dBm)	Power Limit (dBm)	Power Margin (dB)
Low	5190	13.665	13.367	16.529	17.00	-0.471
High	5230	13.770	13.805	16.798	17.00	-0.202

PPSD Results

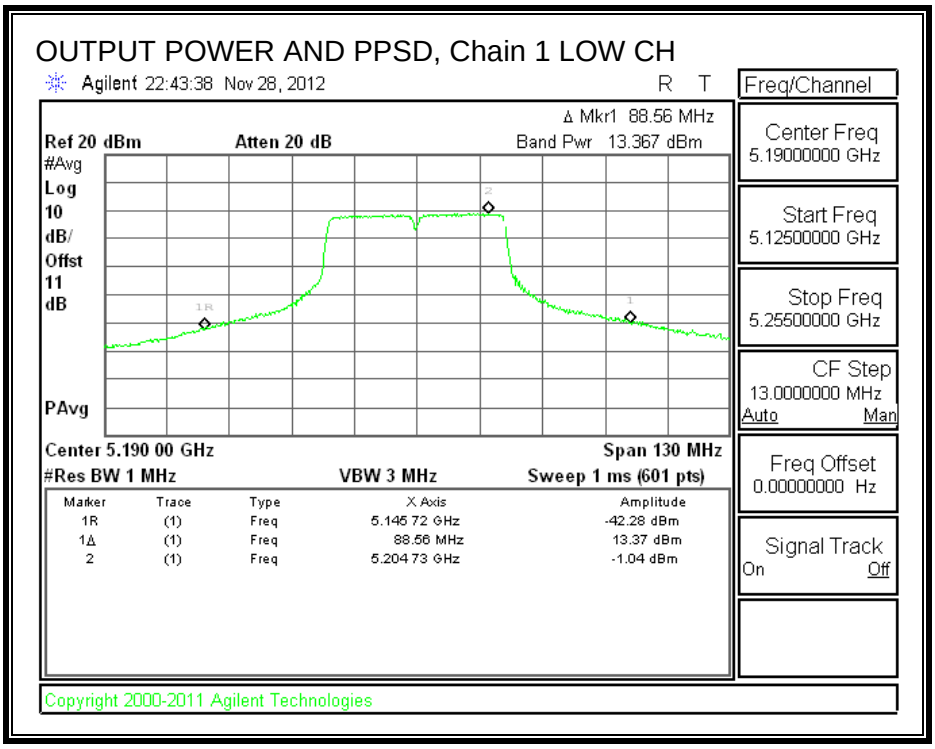
Channel	Frequency (MHz)	Chain 0 Meas PPSD (dBm)	Chain 1 Meas PPSD (dBm)	Total Corr'd PPSD (dBm)	PPSD Limit (dBm)	PPSD Margin (dB)
Low	5190	-0.92	-1.04	2.03	4.00	-1.97
High	5230	-0.82	-0.23	2.50	4.00	-1.50

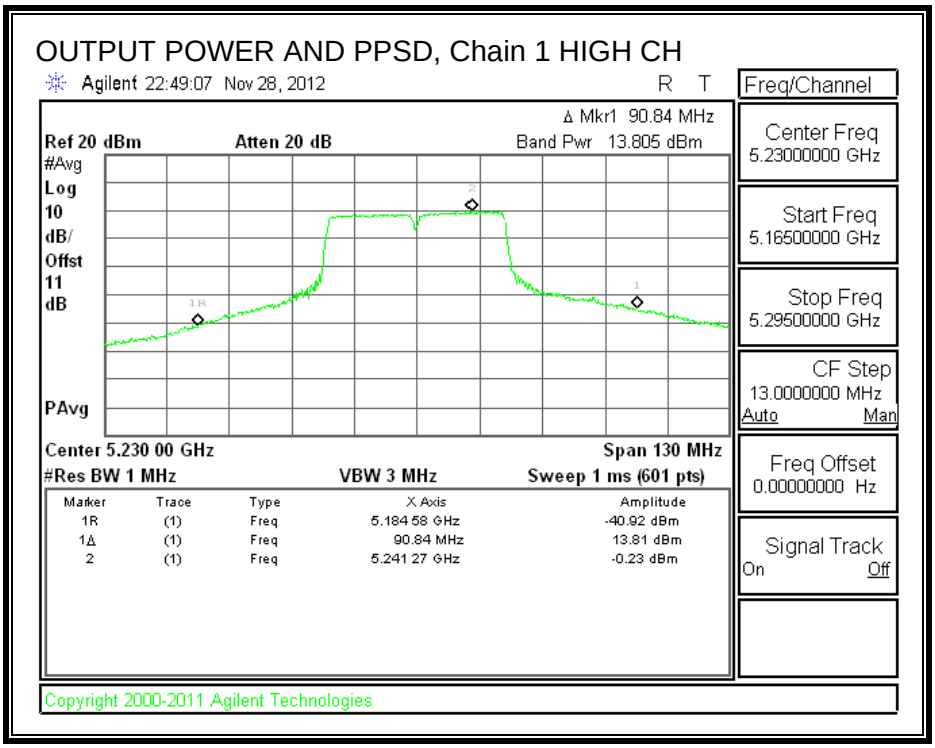
OUTPUT POWER AND PPSD, Chain 0





OUTPUT POWER AND PPSD, Chain 1





8.4.3. AVERAGE POWER

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a power meter.

RESULTS

The cable assembly insertion loss of 11.3 dB (including 10 dB pad and 1.3 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

Average Power Results

Channel	Frequency (MHz)	Chain 0 Power (dBm)	Chain 1 Power (dBm)	Total Power (dBm)
Low	5190	13.55	13.30	16.44
High	5230	13.70	13.78	16.75

8.4.4. 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.

TEST PROCEDURE

Guidelines for Compliance Testing of Unlicensed National Information Infrastructure (U-NII) Devices - Part 15, Subpart E, dated 10/25/2011.

RESULTS

CHAIN 0

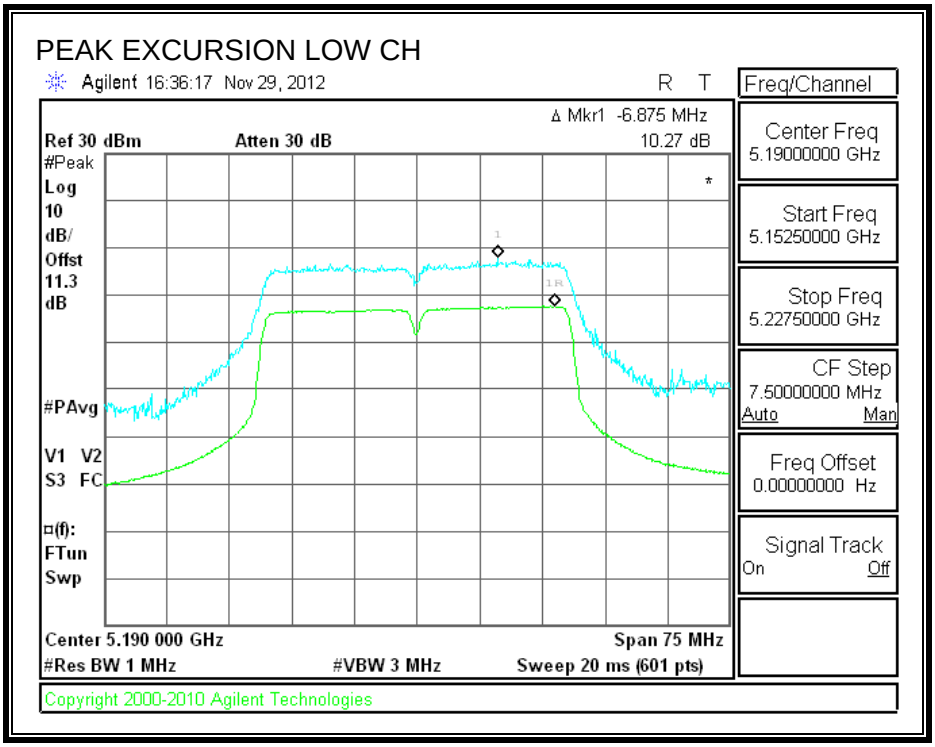
Channel	Frequency (MHz)	Peak Excursion (dB)	Limit (dB)	Margin (dB)
Low	5190	10.27	13	-2.73
High	5230	9.75	13	-3.25

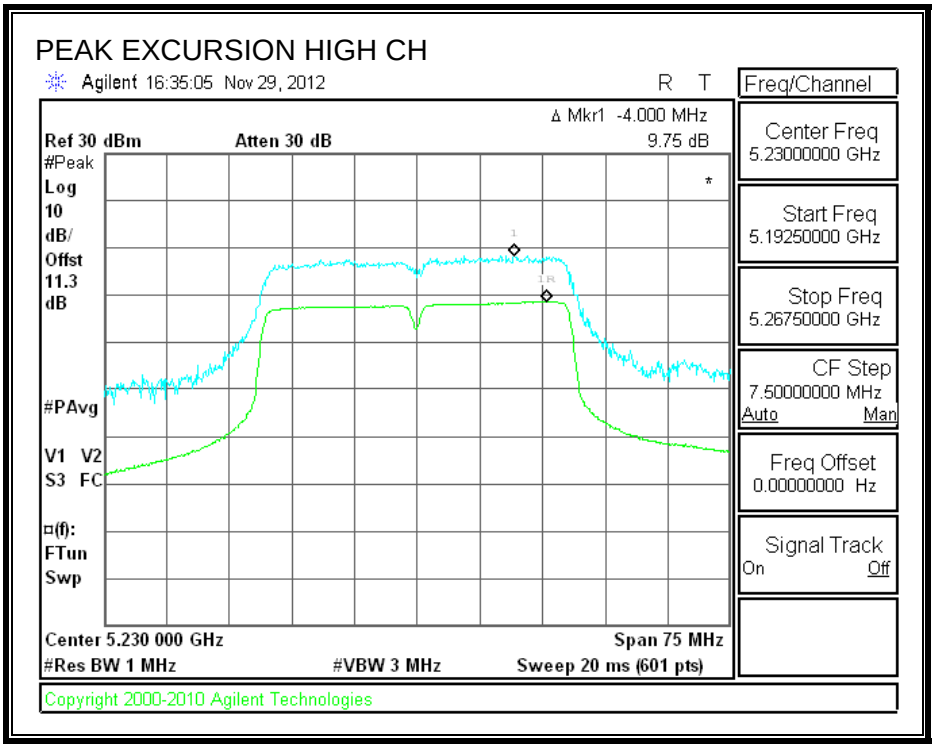
CHAIN 1

Channel	Frequency (MHz)	Peak Excursion (dB)	Limit (dB)	Margin (dB)
Low	5190	9.56	13	-3.44
High	5230	8.68	13	-4.32

CHAIN 0

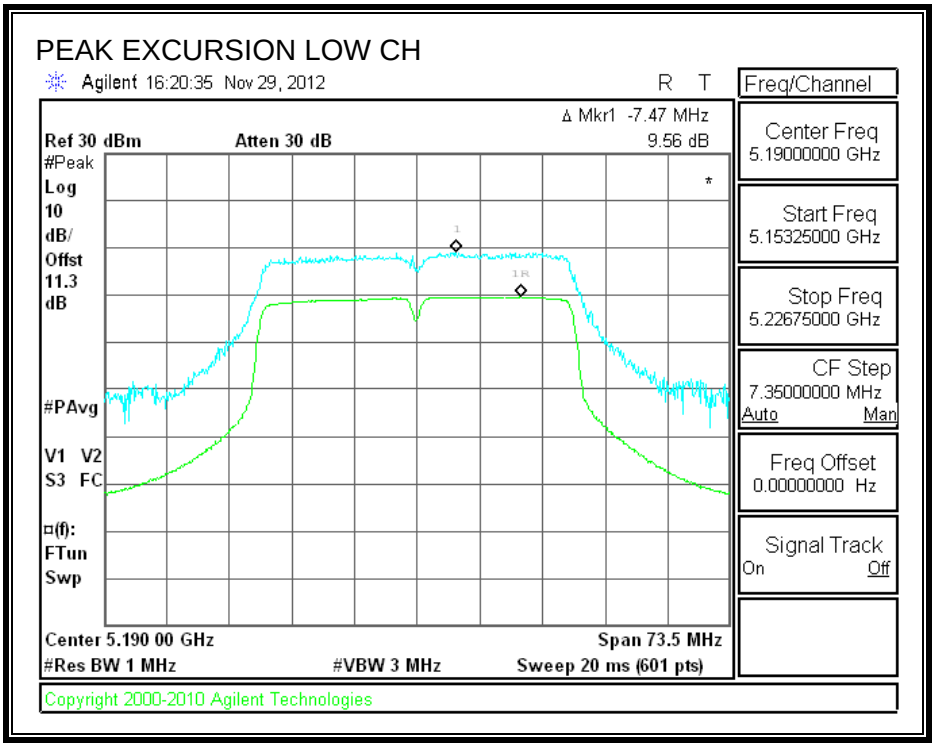
PEAK EXCURSION

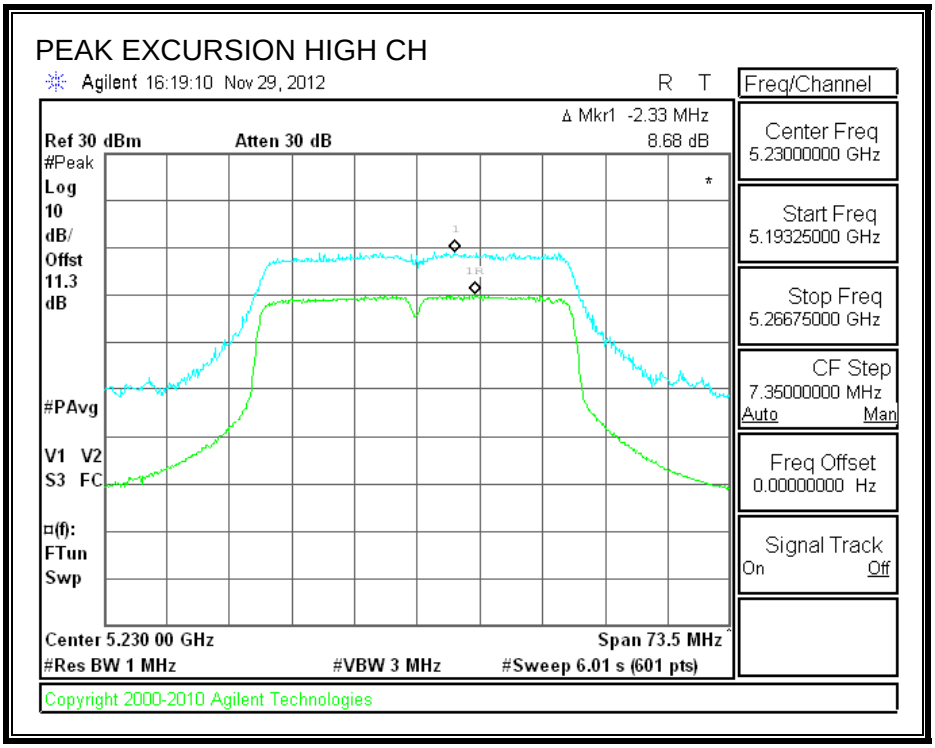




CHAIN 1

PEAK EXCURSION





8.5. 802.11n HT40, SDM MODE IN THE 5.2 GHz BAND

8.5.1. 26 dB and 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

Guidelines for Compliance Testing of Unlicensed National Information Infrastructure (U-NII) Devices - Part 15, Subpart E, dated 10/25/2011.

RESULTS

CHAIN 0

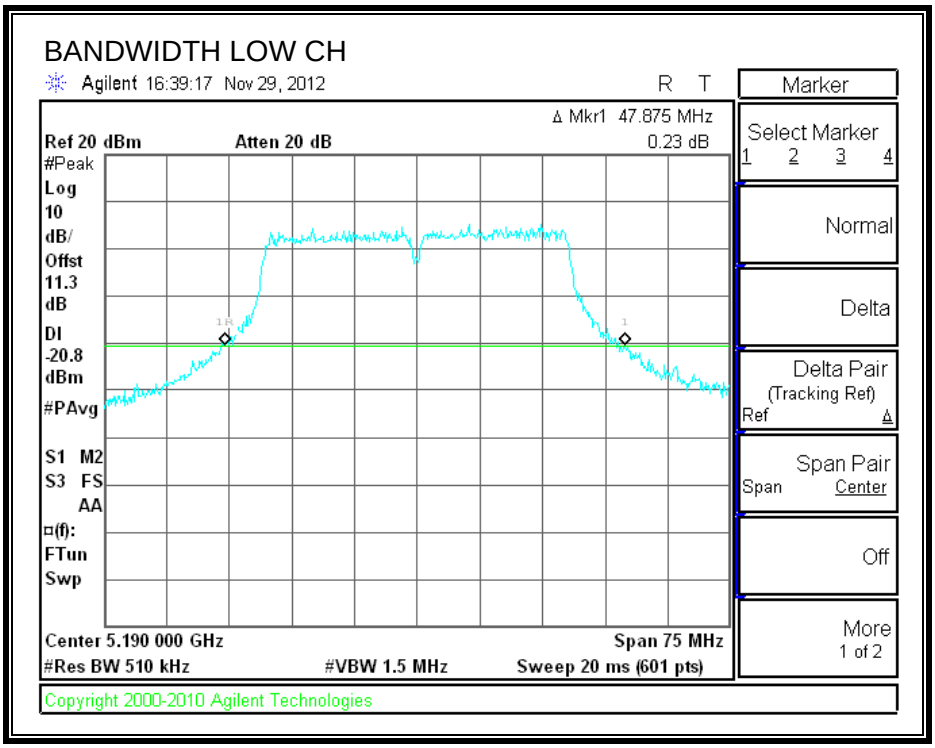
Channel	Frequency (MHz)	26 dB BW Chain 0 (MHz)	99% BW Chain 1 (MHz)
Low	5190	47.875	36.5477
High	5230	49.375	36.5712

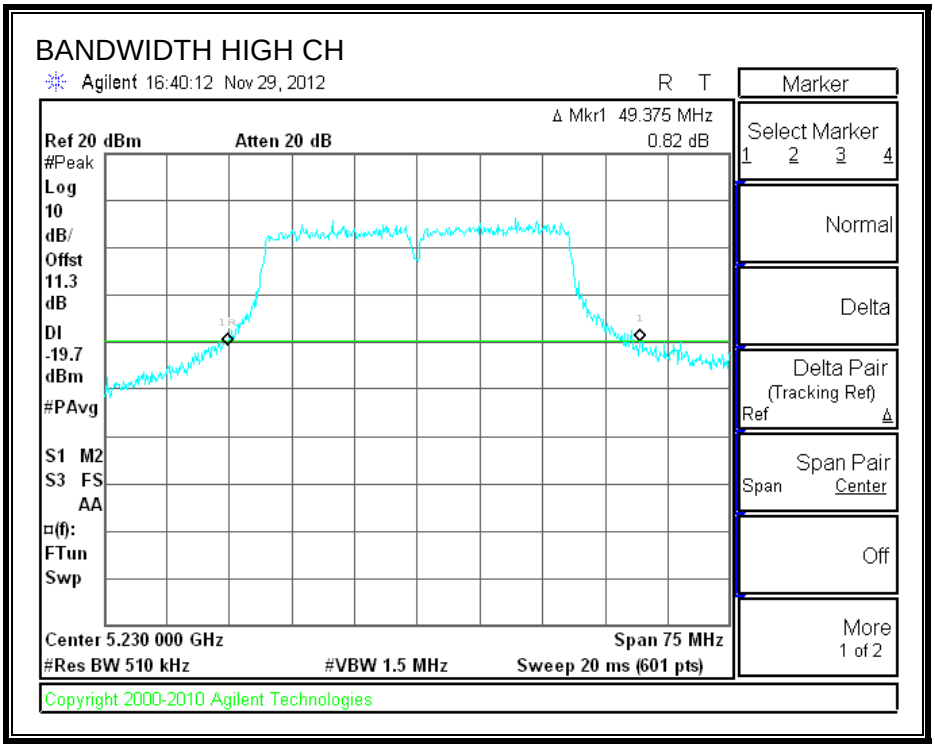
CHAIN 1

Channel	Frequency (MHz)	26 dB BW Chain 0 (MHz)	99% BW Chain 1 (MHz)
Low	5190	46.875	36.5974
High	5230	48.000	37.0095

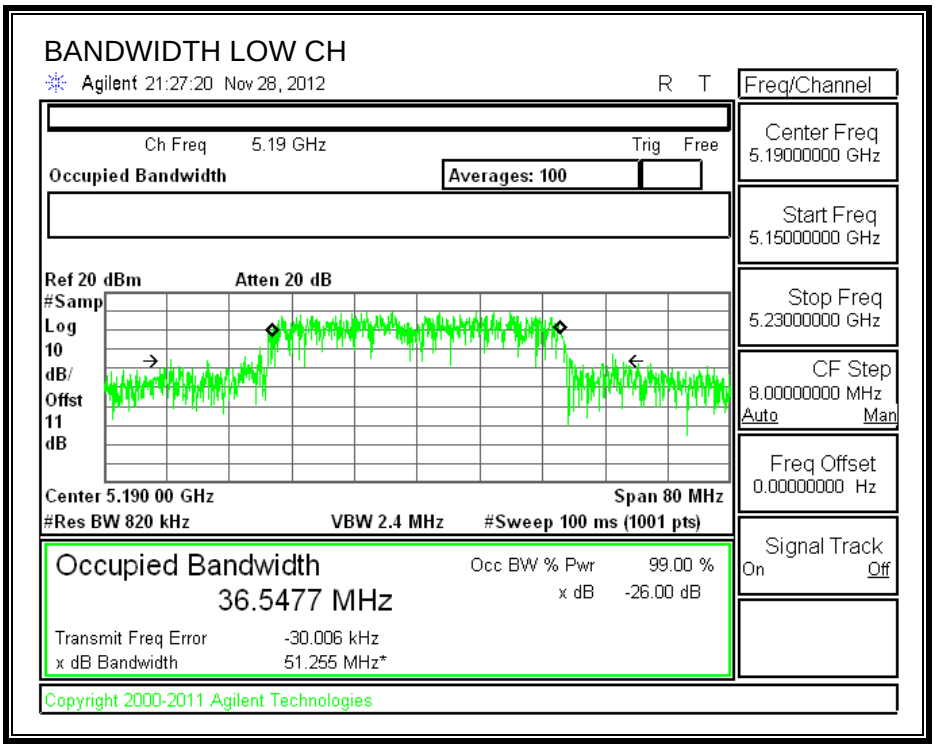
CHAIN 0

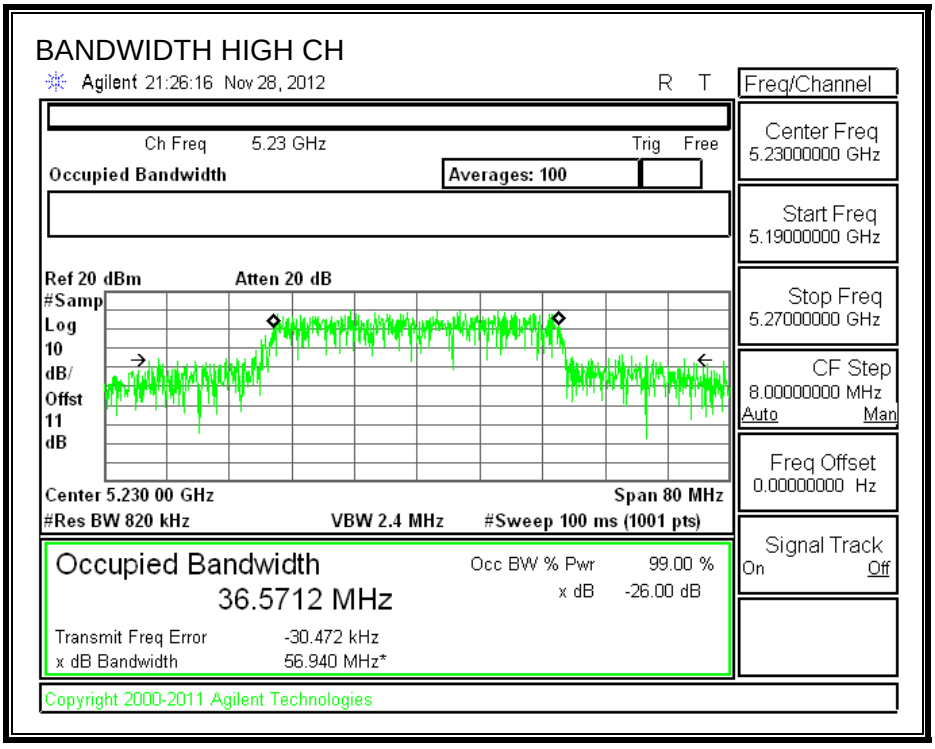
26 dB BANDWIDTH





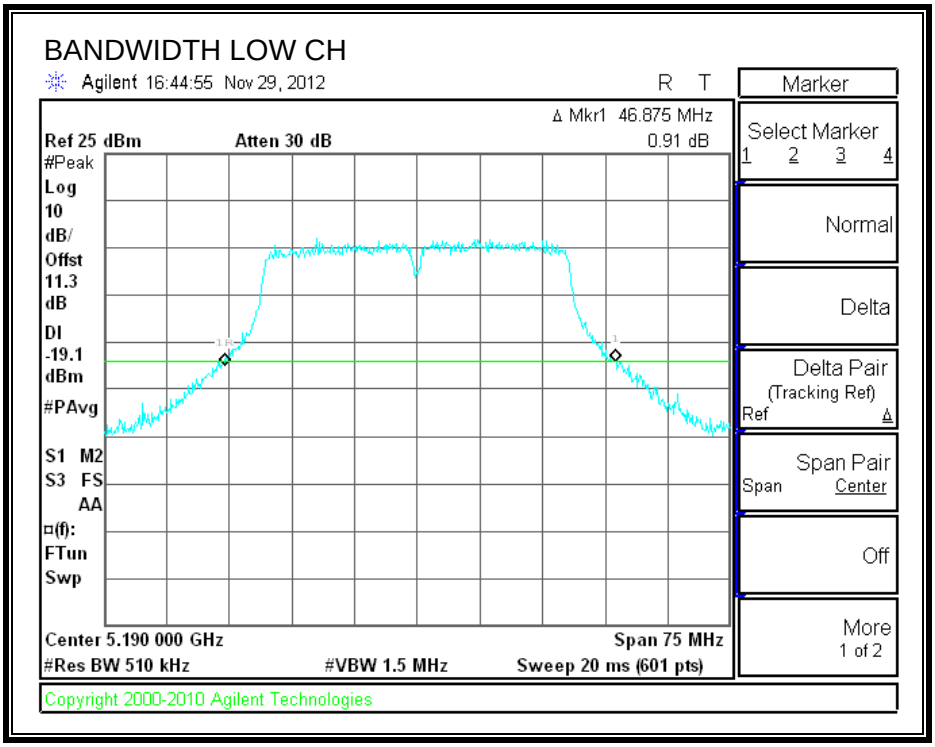
99% BANDWIDTH

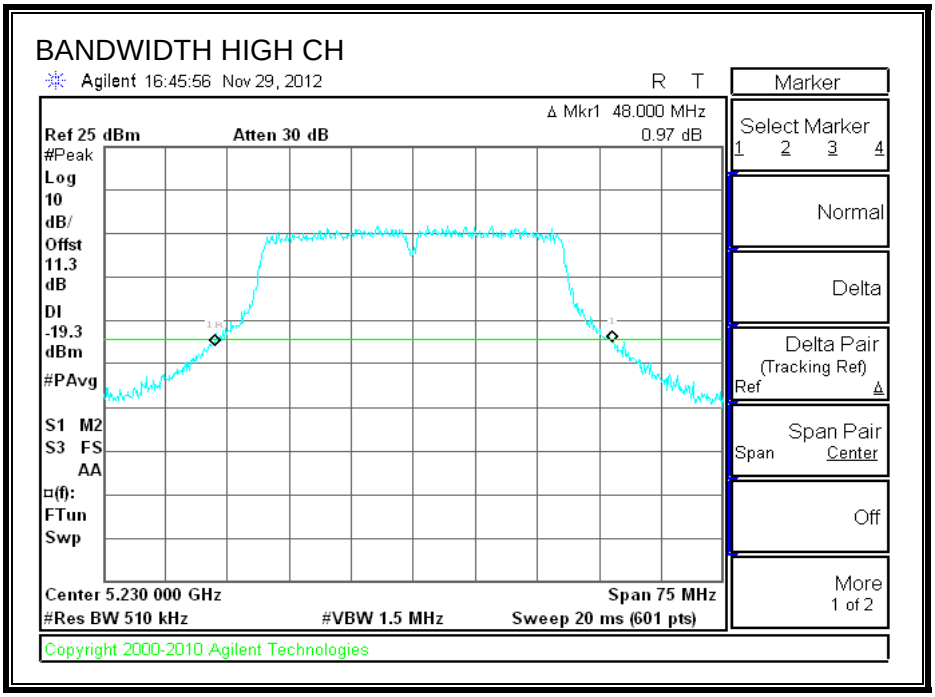




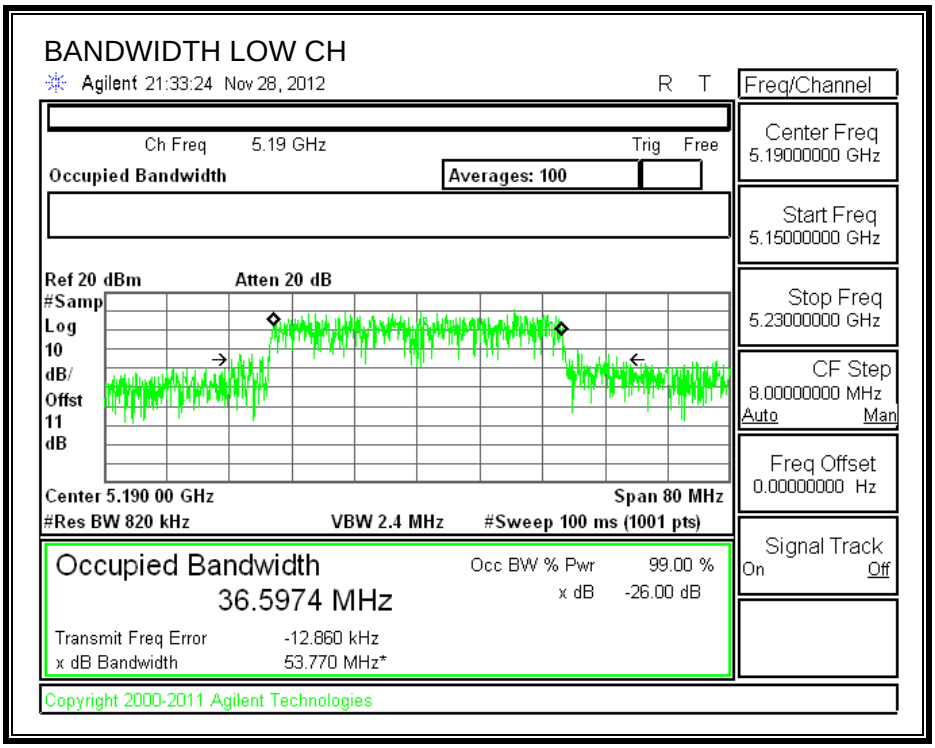
CHAIN 1

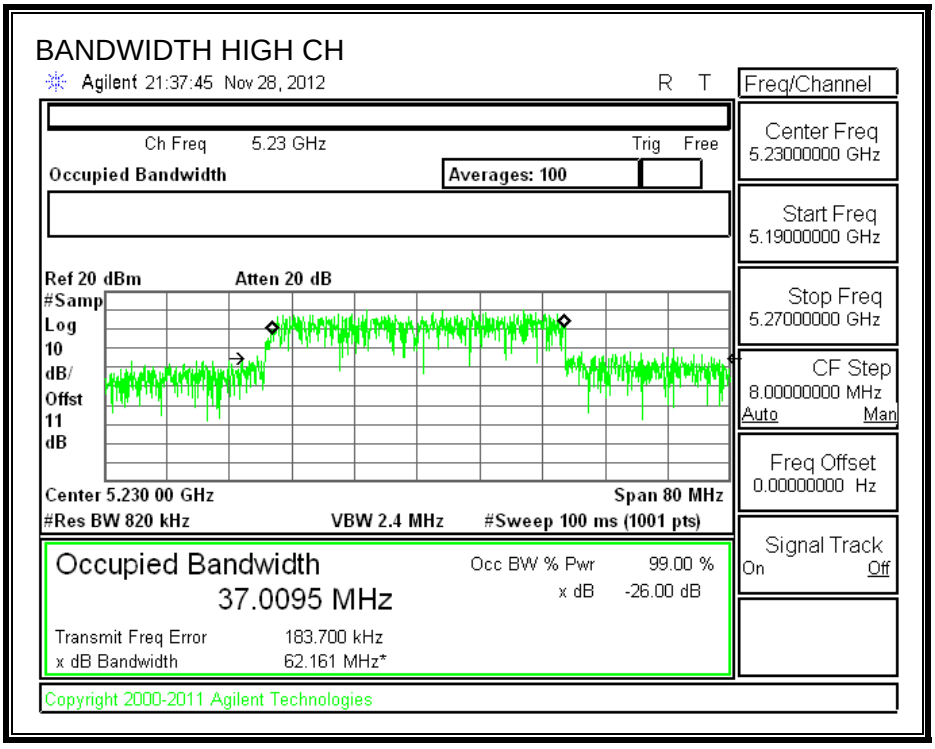
26 dB BANDWIDTH





99% BANDWIDTH





8.5.2. OUTPUT POWER AND PPSD

LIMITS

FCC §15.407 (a) (1)

For the band 5.15–5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed the lesser of 50 mW or 4 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

The TX chains are uncorrelated and the antenna gain is the same for each chain. 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	5190	46.875	36.5477	2.00
High	5230	48.000	36.5712	2.00

Limits

Channel	Frequency (MHz)	FCC Power Limit (dBm)	IC EIRP Limit (dBm)	Max IC Power (dBm)	Power Limit (dBm)	FCC PPSD Limit (dBm)	IC eirp PSD Limit (dBm)	PPSD Limit (dBm)
Low	5190	17.00	23.00	21.00	17.00	4.00	10.00	4.00
High	5230	17.00	23.00	21.00	17.00	4.00	10.00	4.00

Duty Cycle CF (dB)	0.00	Included in Calculations of Corr'd Power & PPSD

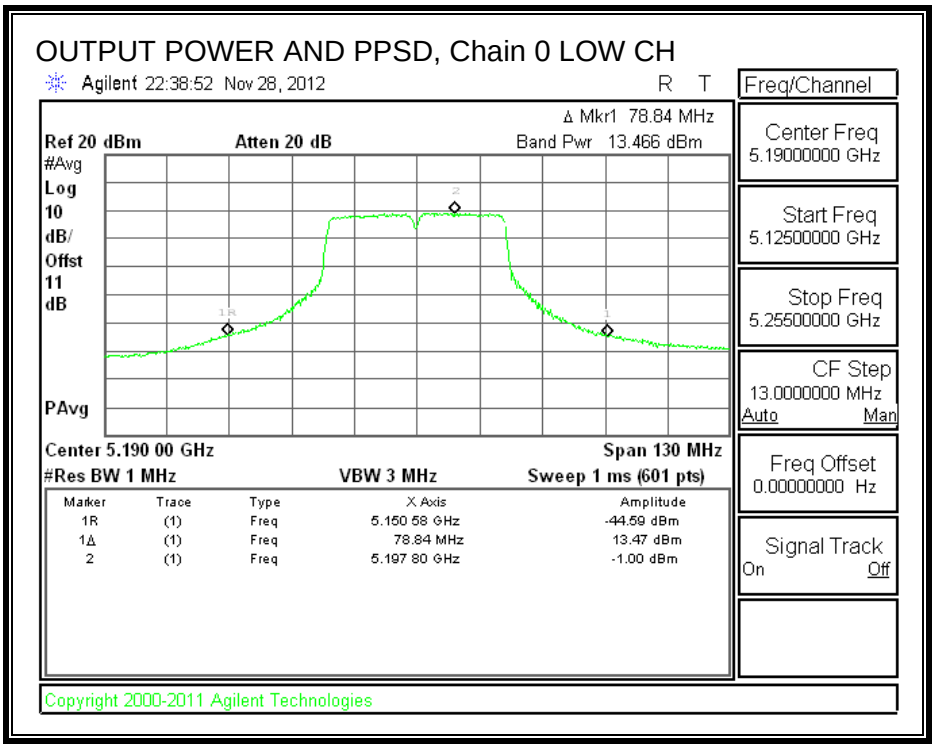
Output Power Results

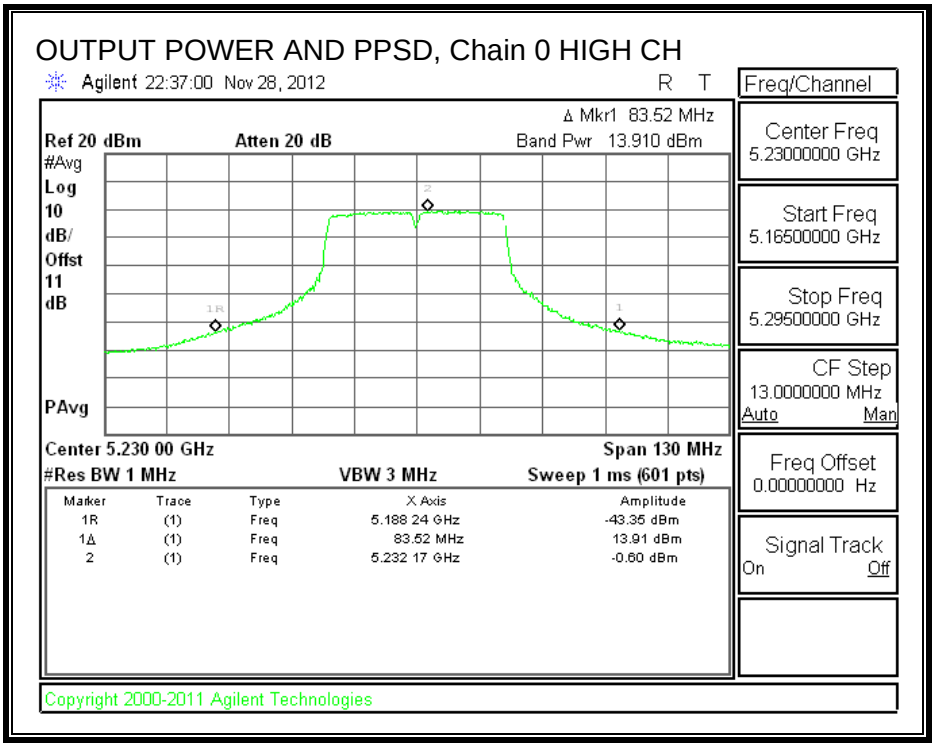
Channel	Frequency (MHz)	Chain 0 Meas Power (dBm)	Chain 1 Meas Power (dBm)	Total Corr'd Power (dBm)	Power Limit (dBm)	Power Margin (dB)
Low	5190	13.466	13.326	16.407	17.00	-0.593
High	5230	13.910	13.734	16.833	17.00	-0.167

PPSD Results

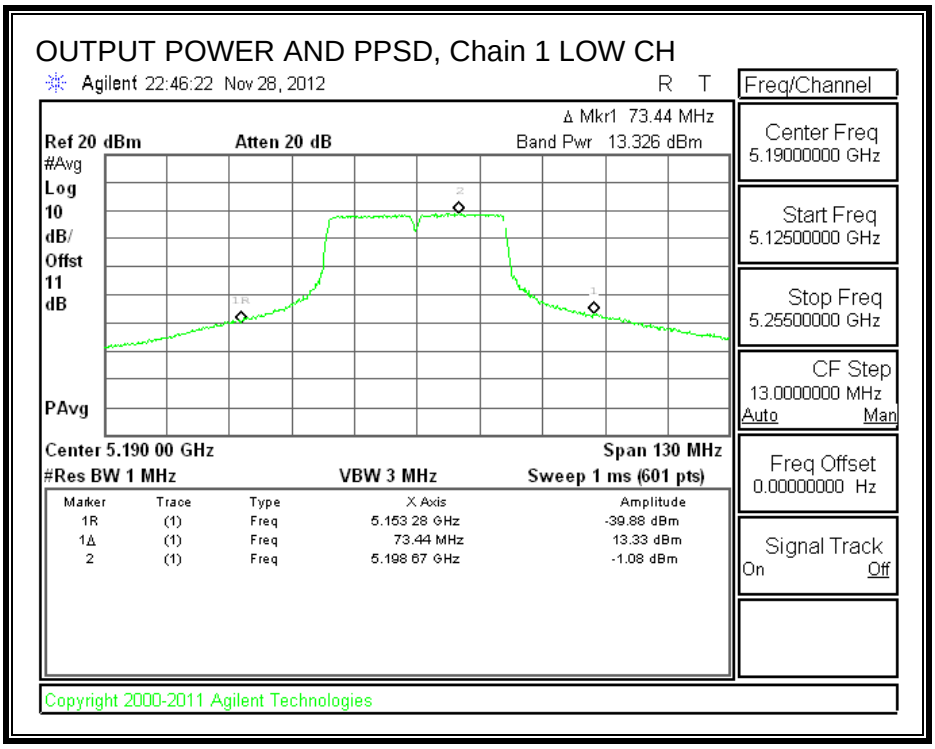
Channel	Frequency (MHz)	Chain 0 Meas PPSD (dBm)	Chain 1 Meas PPSD (dBm)	Total Corr'd PPSD (dBm)	PPSD Limit (dBm)	PPSD Margin (dB)
Low	5190	-1.00	-1.08	1.97	4.00	-2.03
High	5230	-0.60	-0.44	2.49	4.00	-1.51

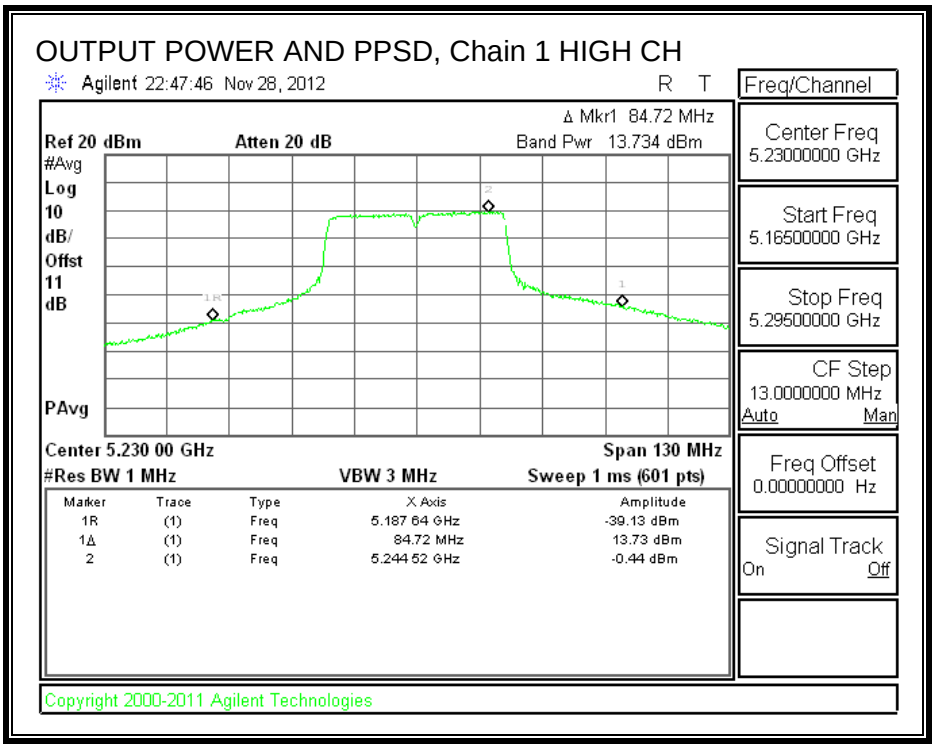
OUTPUT POWER AND PPSD, Chain 0





OUTPUT POWER AND PPSD, Chain 1





8.5.3. AVERAGE POWER

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a power meter.

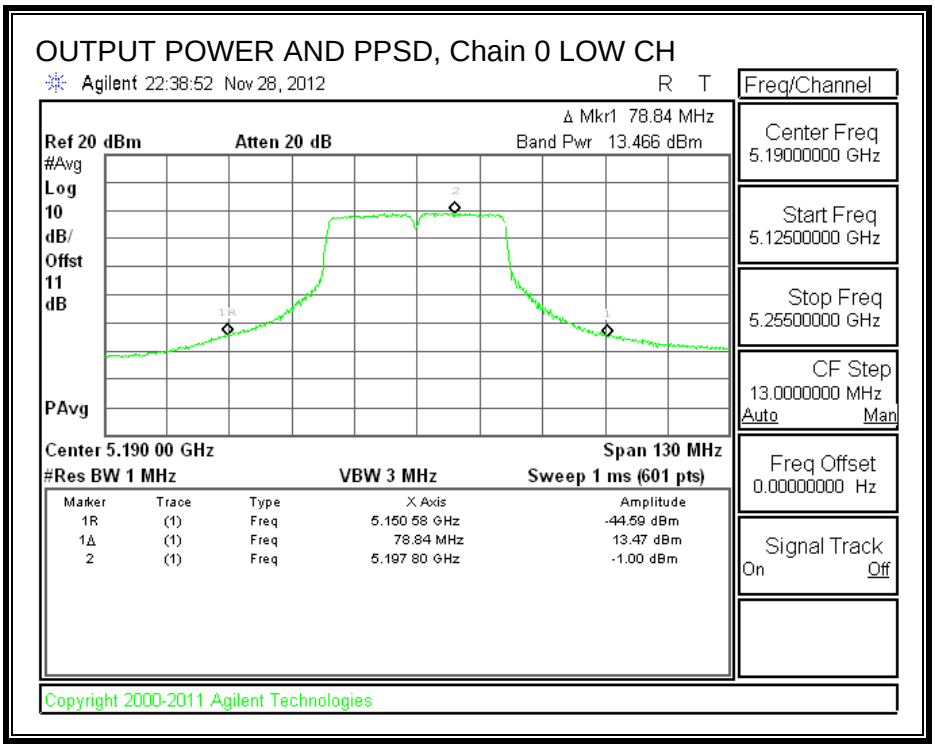
RESULTS

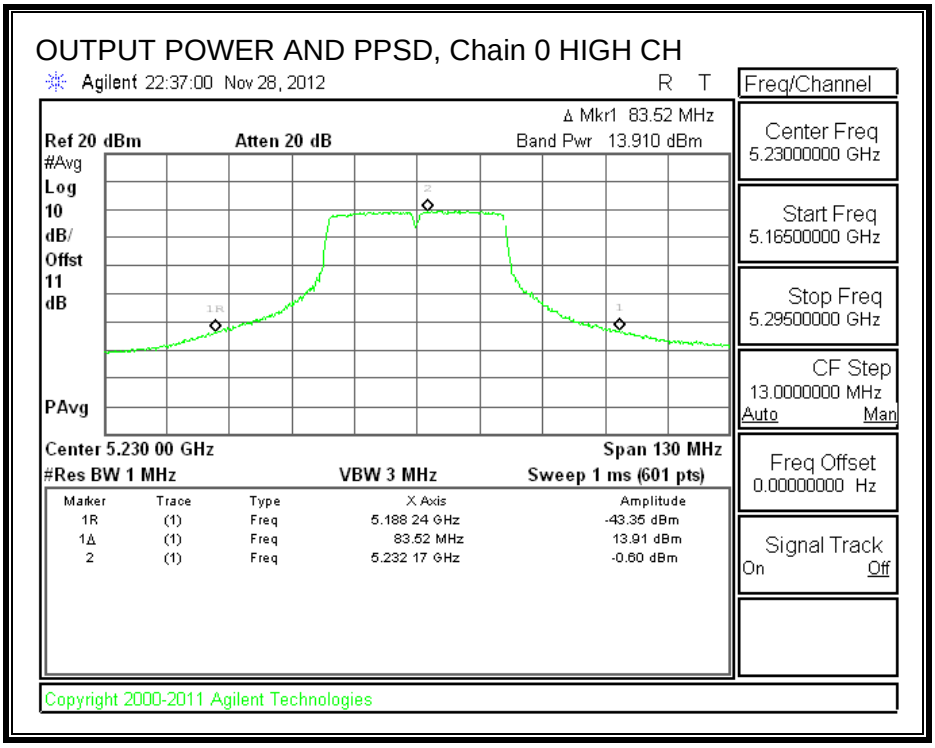
The cable assembly insertion loss of 11.3 dB (including 10 dB pad and 1.3 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

Average Power Results

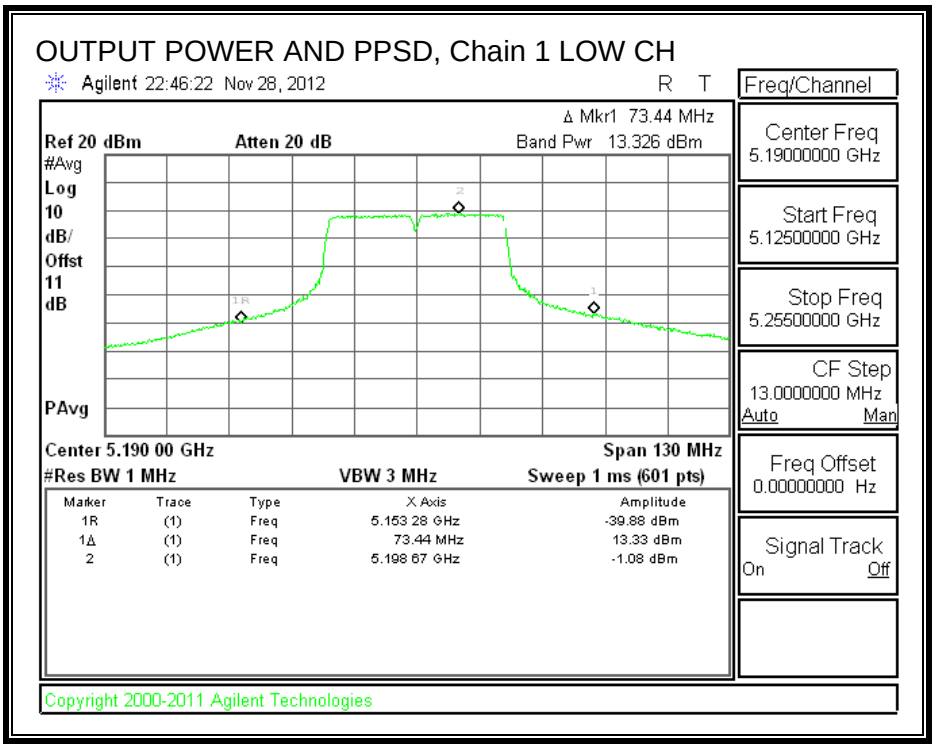
Channel	Frequency (MHz)	Chain 0 Power (dBm)	Chain 1 Power (dBm)	Total Power (dBm)
Low	5190	13.41	13.25	16.34
High	5230	13.85	13.70	16.79

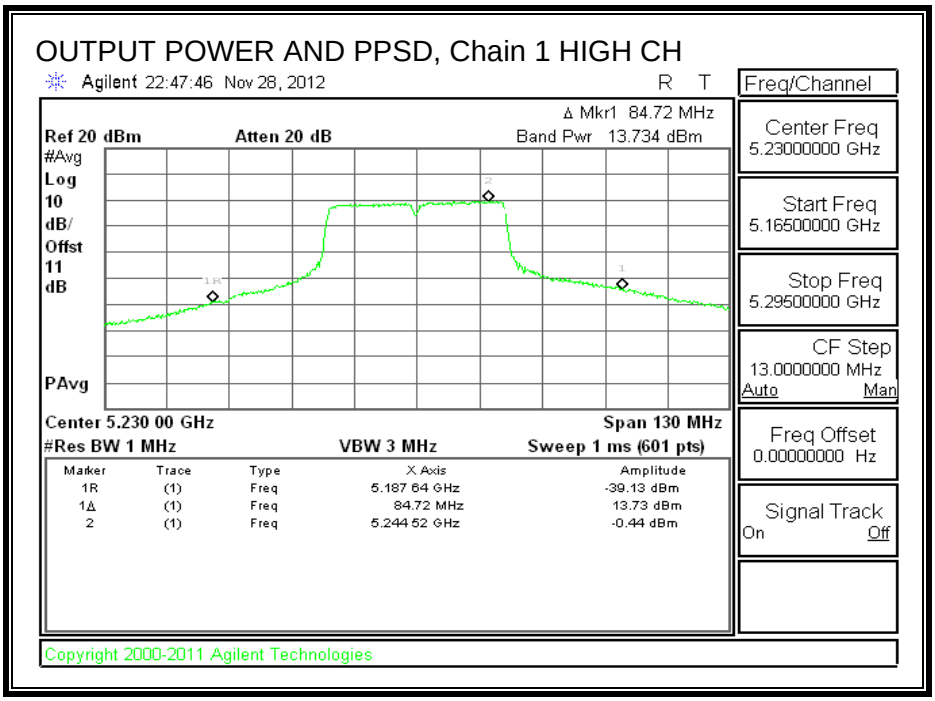
OUTPUT POWER AND PPSD, Chain 0





PPSD, Chain 1





8.5.4. 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.

TEST PROCEDURE

Guidelines for Compliance Testing of Unlicensed National Information Infrastructure (U-NII) Devices - Part 15, Subpart E, dated 10/25/2011.

RESULTS

CHAIN 0

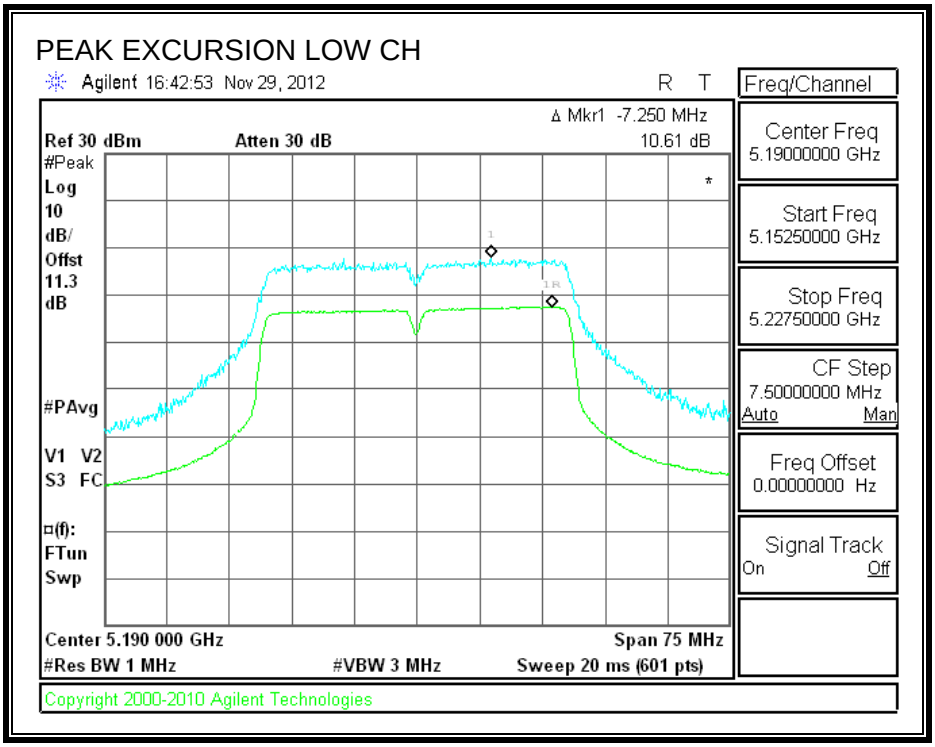
Channel	Frequency (MHz)	Peak Excursion (dB)	Limit (dB)	Margin (dB)
Low	5190	10.61	13	-2.39
High	5230	10.81	13	-2.19

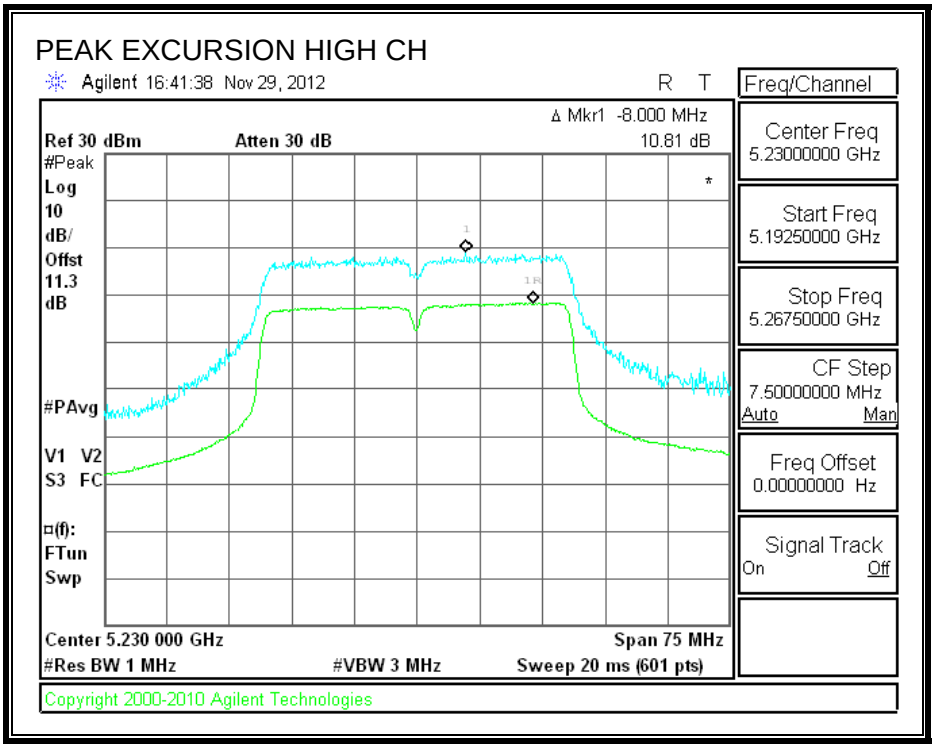
CHAIN 1

Channel	Frequency (MHz)	Peak Excursion (dB)	Limit (dB)	Margin (dB)
Low	5190	10.36	13	-2.64
High	5230	10.91	13	-2.09

CHAIN 0

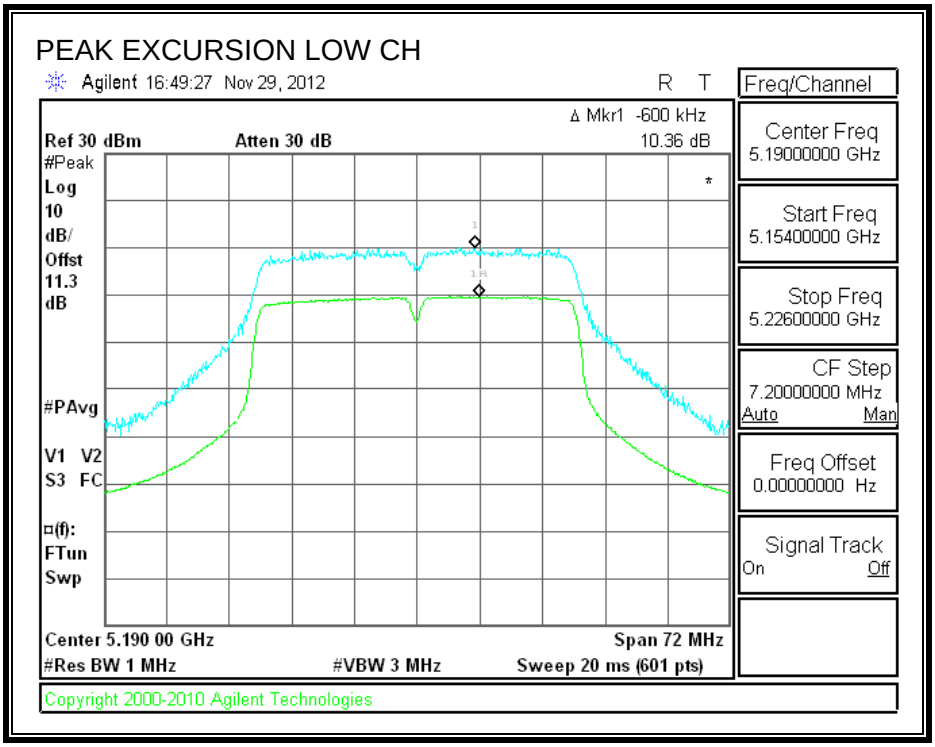
PEAK EXCURSION

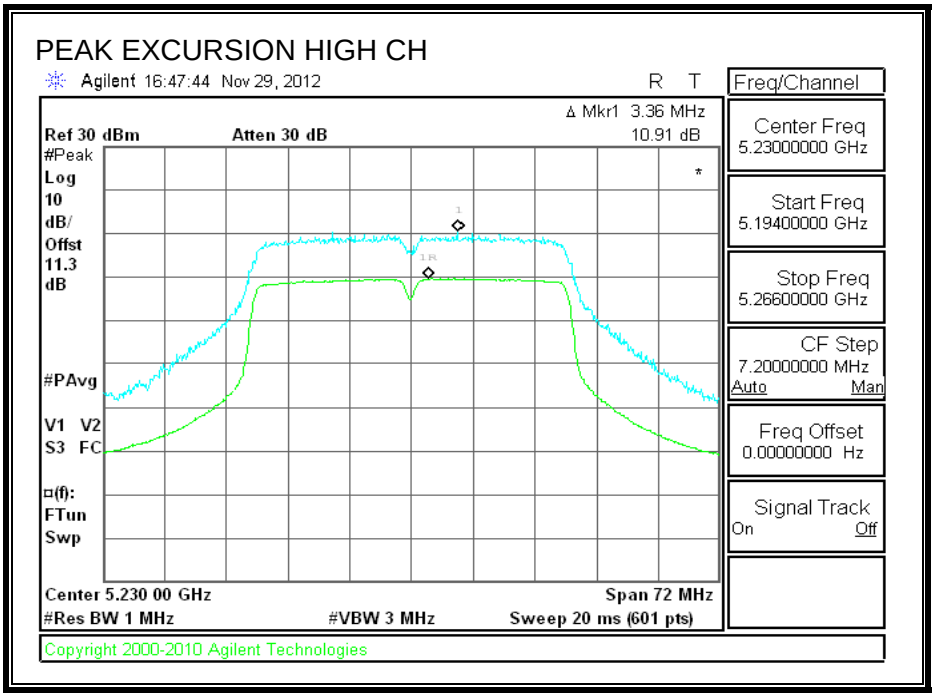




CHAIN 1

PEAK EXCURSION





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. The EUT is configured in accordance with ANSI C63.4. The EUT is set to transmit in a continuous mode.

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

For measurements above 1 GHz the resolution bandwidth is set to 1 MHz, and then the video bandwidth is set to 3 MHz for peak measurements and 3 kHz for average measurements.

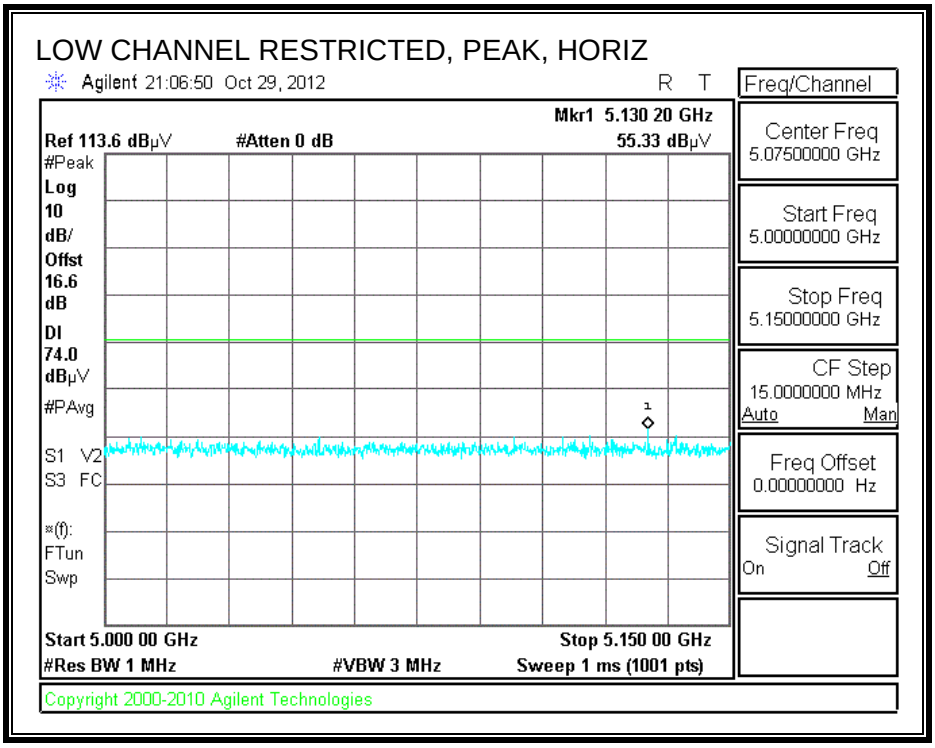
The spectrum from 30 MHz to 40 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in each applicable band.

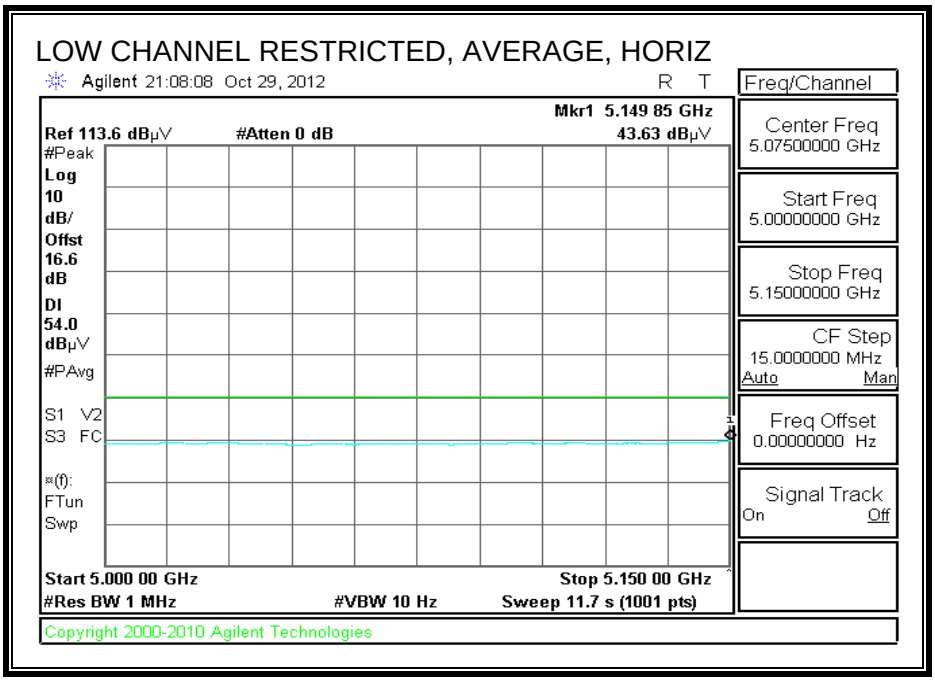
The frequency range of interest is monitored at a fixed antenna height and EUT azimuth. The EUT is rotated through 360 degrees to maximize emissions received. The antenna is scanned from 1 to 4 meters above the ground plane to further maximize the emission. Measurements are made with the antenna polarized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

9.2. TRANSMITTER ABOVE 1 GHz

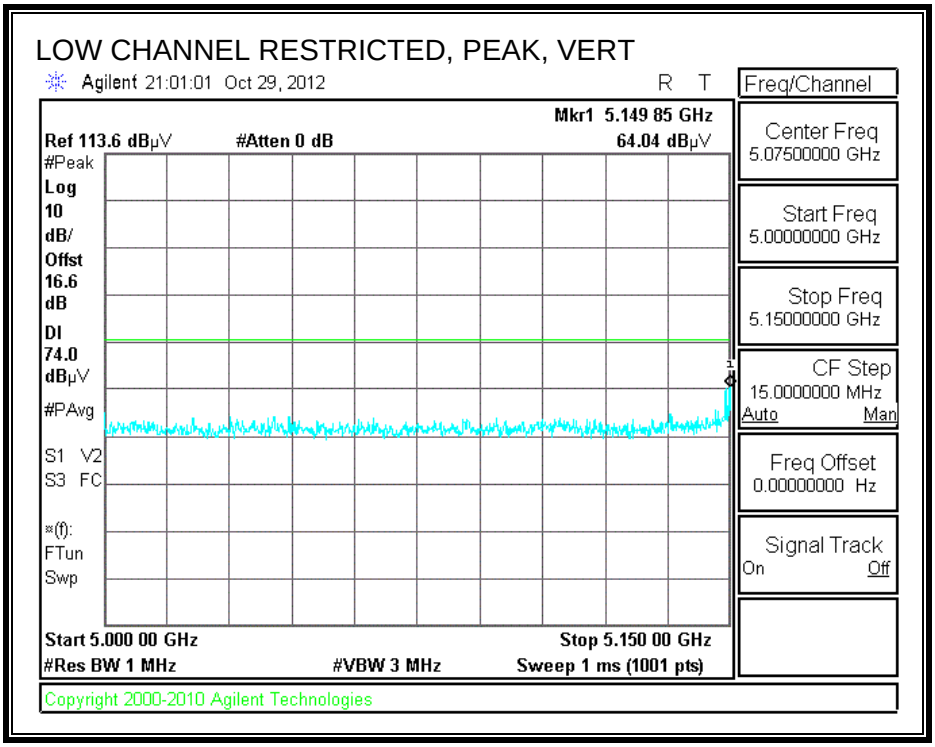
9.2.1. TX ABOVE 1 GHz 802.11a MODE IN THE 5.2 GHz BAND

RESTRICTED BANDEDGE (LOW CHANNEL)

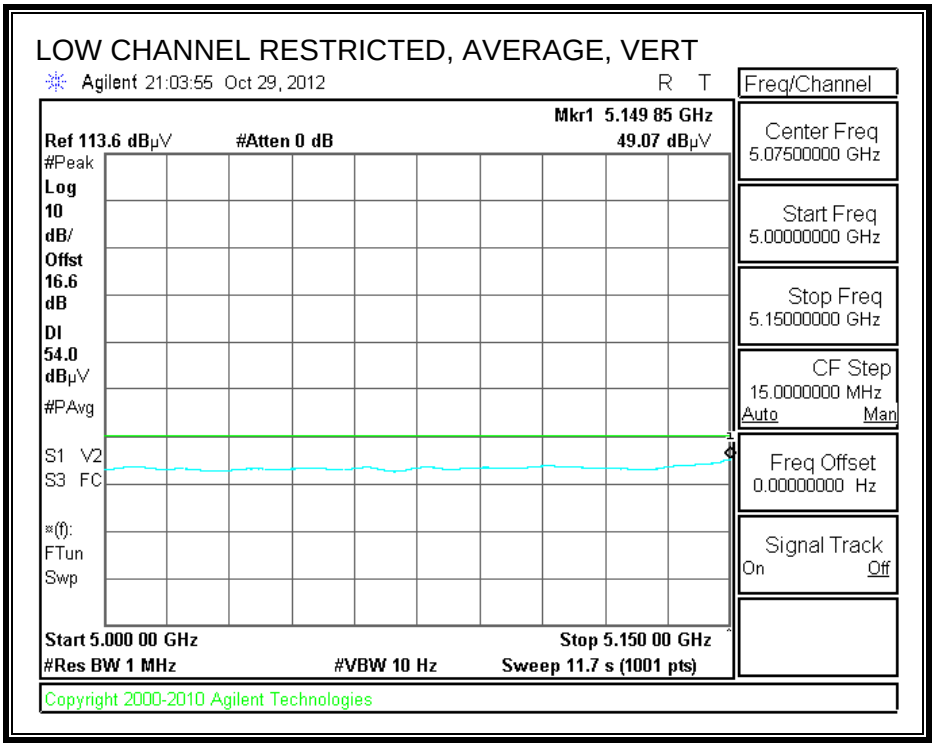




LOW CHANNEL RESTRICTED, PEAK, VERT



LOW CHANNEL RESTRICTED, AVERAGE, VERT



HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement
Compliance Certification Services, Fremont 3m Chamber

Company: Ruckus
Project #: 12U14419
Date: 10/29/2012
Test Engineer: S.Aguilar
Configuration: Standalone with remote laptop control
Mode: 11a, 20MHz

Test Equipment:

Horn 1-18GHz	Pre-amplifer 1-26GHz	Pre-amplifer 26-40GHz	Horn > 18GHz	Limit
T60; S/N: 2238 @3m	T34 HP 8449B		T39; ARA 18-26GHz; S/N:1013	FCC 15.205

Hi Frequency Cables

3' cable 22807700	12' cable 22807600	20' cable 22807500	HPF	Reject Filter
3' cable 22807700	12' cable 22807600	20' cable 22807500		R_001

Peak Measurements
RBW=VBW=1MHz/3MHz
Average Measurements
RBW=1MHz ; VBW=10Hz

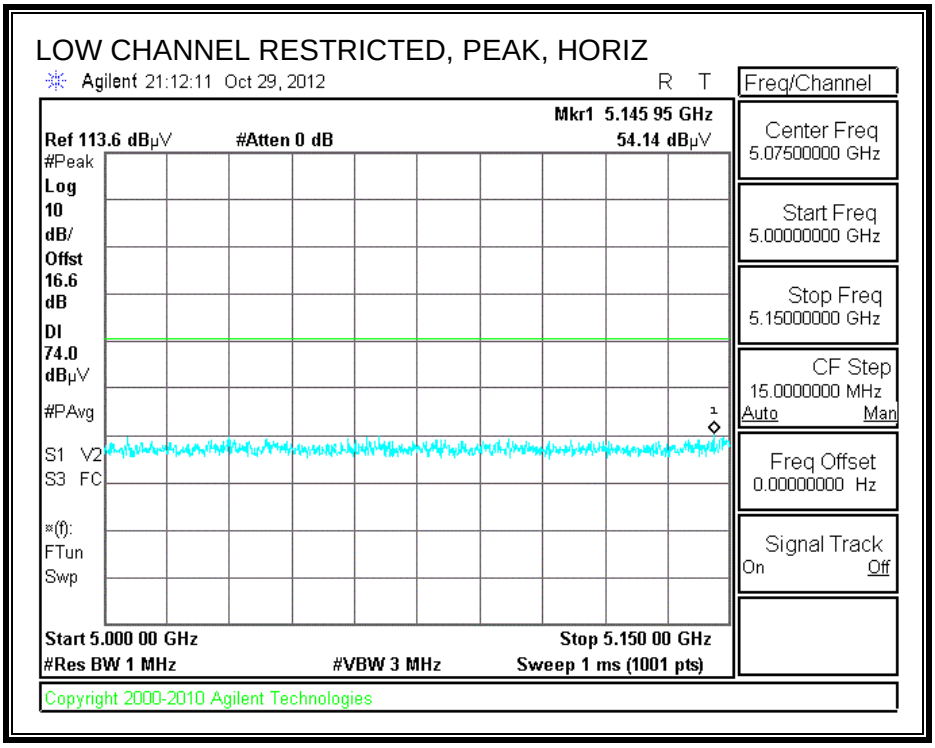
f GHz	Dist (m)	Read Pk dBuV	Read Avg. dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes (V/H)
Low Channel: 5180 MHz															
15.540	3.0	35.15	24.23	39.1	13.0	-31.9	0.0	0.0	55.2	44.3	74	54	-18.8	-9.7	H
15.540	3.0	37.40	25.88	39.1	13.0	-31.9	0.0	0.0	57.5	46.0	74	54	-16.5	-8.0	V
Mid Channel: 5200 MHz															
15.600	3.0	35.20	24.28	38.8	13.0	-31.9	0.0	0.0	55.1	44.2	74	54	-18.9	-9.8	H
15.600	3.0	40.18	28.14	38.8	13.0	-31.9	0.0	0.0	60.1	48.1	74	54	-13.9	-5.9	V
High Channel : 5240 MHz															
15.720	3.0	34.54	23.75	38.4	13.1	-31.9	0.0	0.0	54.1	43.3	74	54	-19.9	-10.7	H
15.720	3.0	34.55	23.76	38.4	13.1	-31.9	0.0	0.0	54.1	43.4	74	54	-19.9	-10.6	V
20.960	3.0	35.15	24.10	33.0	15.6	-32.5	0.0	0.0	51.2	40.2	74	54	-22.8	-13.8	H
20.960	3.0	39.49	26.47	33.0	15.6	-32.5	0.0	0.0	55.6	42.5	74	54	-18.4	-11.5	V

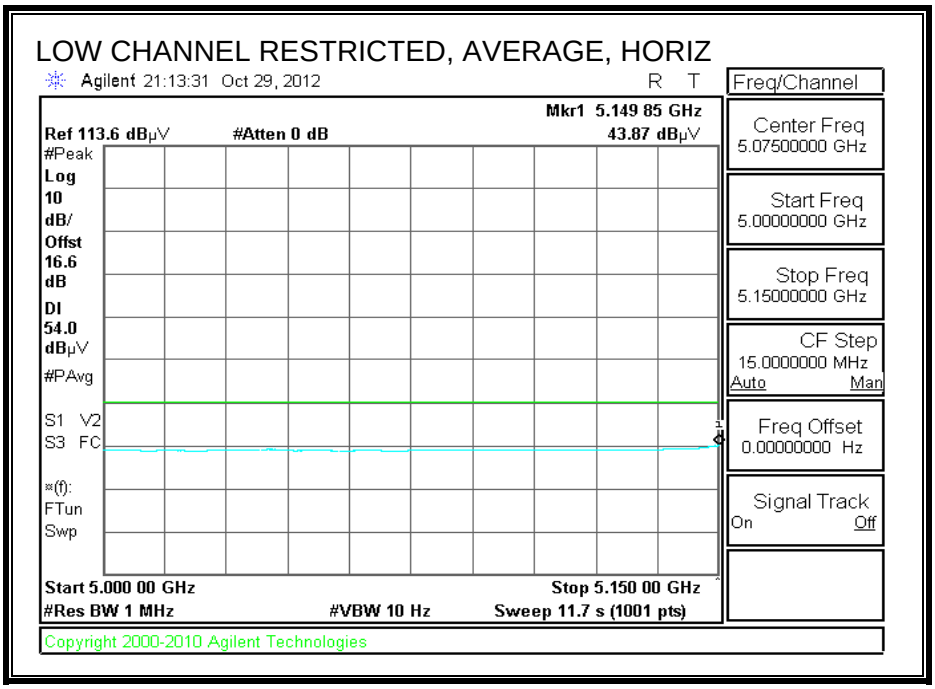
Rev. 11.10.11 Note: No other emissions above the noise floor

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

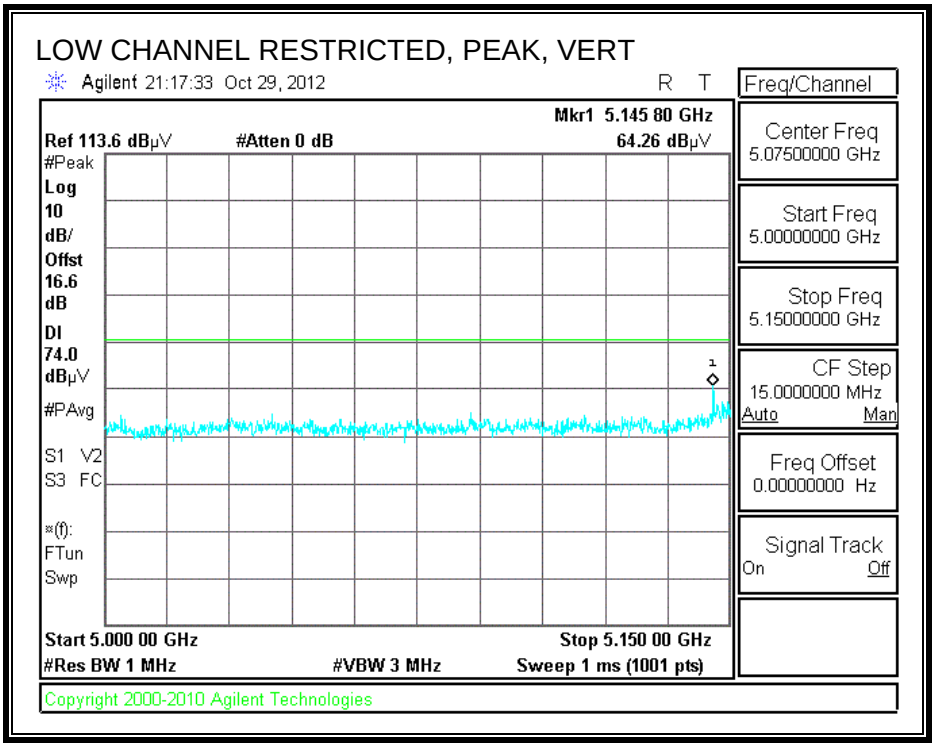
9.2.2. TX ABOVE 1 GHz 802.11n HT20 CDD MODE IN THE 5.2 GHz BAND

RESTRICTED BANDEDGE (LOW CHANNEL)

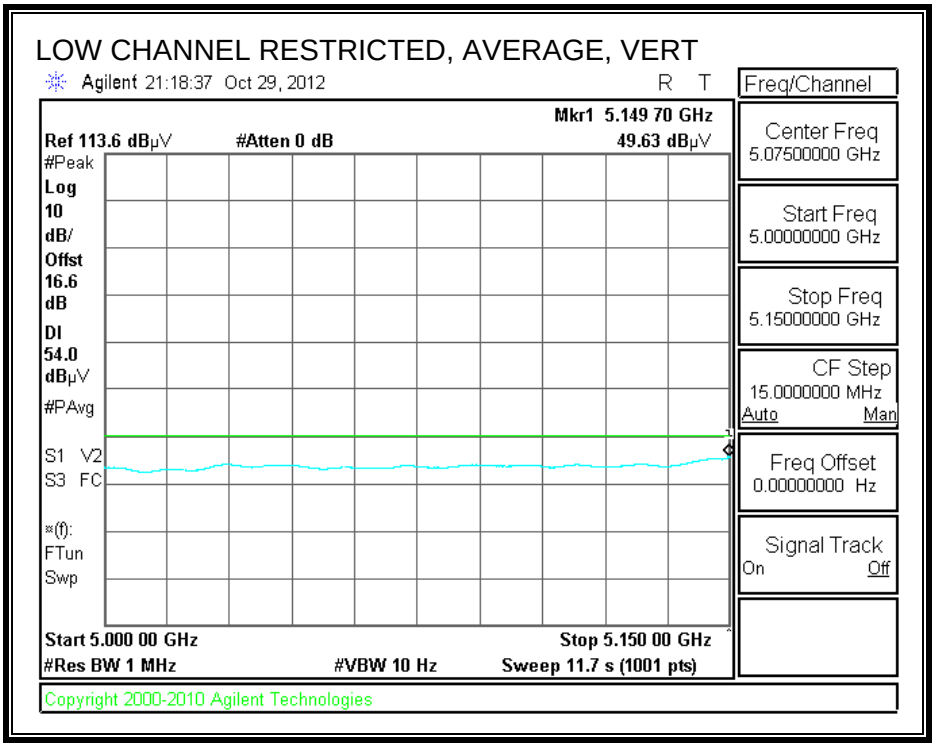




LOW CHANNEL RESTRICTED, PEAK, VERT



LOW CHANNEL RESTRICTED, AVERAGE, VERT



HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement
Compliance Certification Services, Fremont 3m Chamber

Company: Ruckus
Project #: 12U14419
Date: 10/29/2012
Test Engineer: S.Aguilar
Configuration: Standalone with remote laptop control
Mode: 11n, CDD , MCS0, 20MHz

Test Equipment:

Horn 1-18GHz	Pre-amplifer 1-26GHz	Pre-amplifer 26-40GHz	Horn > 18GHz	Limit
T60; S/N: 2238 @3m	T34 HP 8449B		T39; ARA 18-26GHz; S/N:1013	FCC 15.205

Hi Frequency Cables

3' cable 22807700	12' cable 22807600	20' cable 22807500	HPF	Reject Filter
3' cable 22807700	12' cable 22807600	20' cable 22807500		R_001

Peak Measurements
RBW=VBW=1MHz/3MHz
Average Measurements
RBW=1MHz ; VBW=10Hz

f GHz	Dist (m)	Read Pk dBuV	Read Avg. dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes (V/H)
Low Channel: 5180 MHz															
15.540	3.0	35.45	24.06	39.1	13.0	-31.9	0.0	0.0	55.5	44.2	74	54	-18.5	-9.8	H
15.540	3.0	38.27	26.13	39.1	13.0	-31.9	0.0	0.0	58.4	46.2	74	54	-15.6	-7.8	V
20.720	3.0	34.64	23.54	33.0	15.5	-32.5	0.0	0.0	50.6	39.5	74	54	-23.4	-14.5	H
20.720	3.0	35.13	23.98	33.0	15.5	-32.5	0.0	0.0	51.1	39.9	74	54	-22.9	-14.1	V
Mid Channel: 5200 MHz															
15.600	3.0	35.61	24.32	38.8	13.0	-31.9	0.0	0.0	55.5	44.2	74	54	-18.5	-9.8	H
15.600	3.0	39.51	27.59	38.8	13.0	-31.9	0.0	0.0	59.4	47.5	74	54	-14.6	-6.5	V
High Channel : 5240 MHz															
15.720	3.0	33.99	23.48	38.4	13.1	-31.9	0.0	0.0	53.6	43.1	74	54	-20.4	-10.9	H
15.720	3.0	34.85	21.56	38.4	13.1	-31.9	0.0	0.0	54.4	41.2	74	54	-19.6	-12.8	V
20.960	3.0	34.26	23.68	33.0	15.6	-32.5	0.0	0.0	50.3	39.7	74	54	-23.7	-14.3	H
20.960	3.0	36.81	25.68	33.0	15.6	-32.5	0.0	0.0	52.9	41.7	74	54	-21.1	-12.3	V

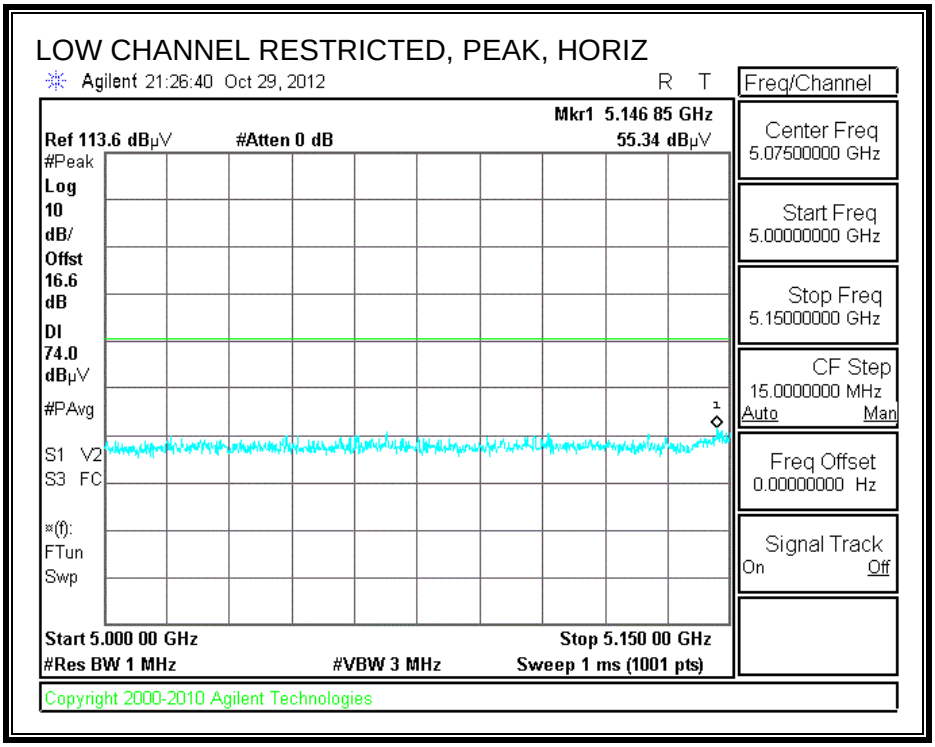
Rev. 11.10.11

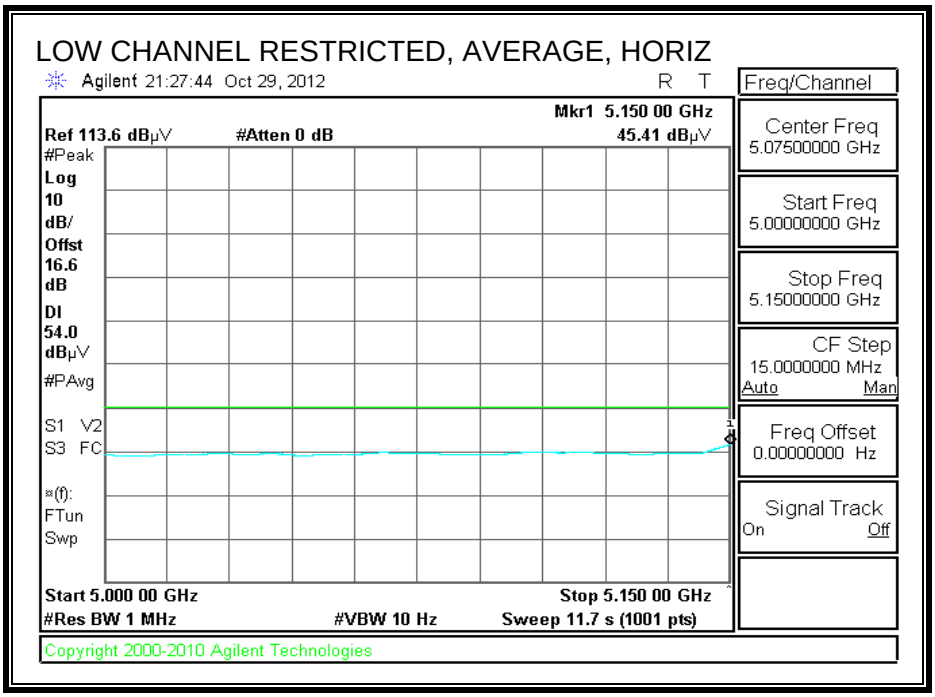
Note: No other emissions above the noise floor

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

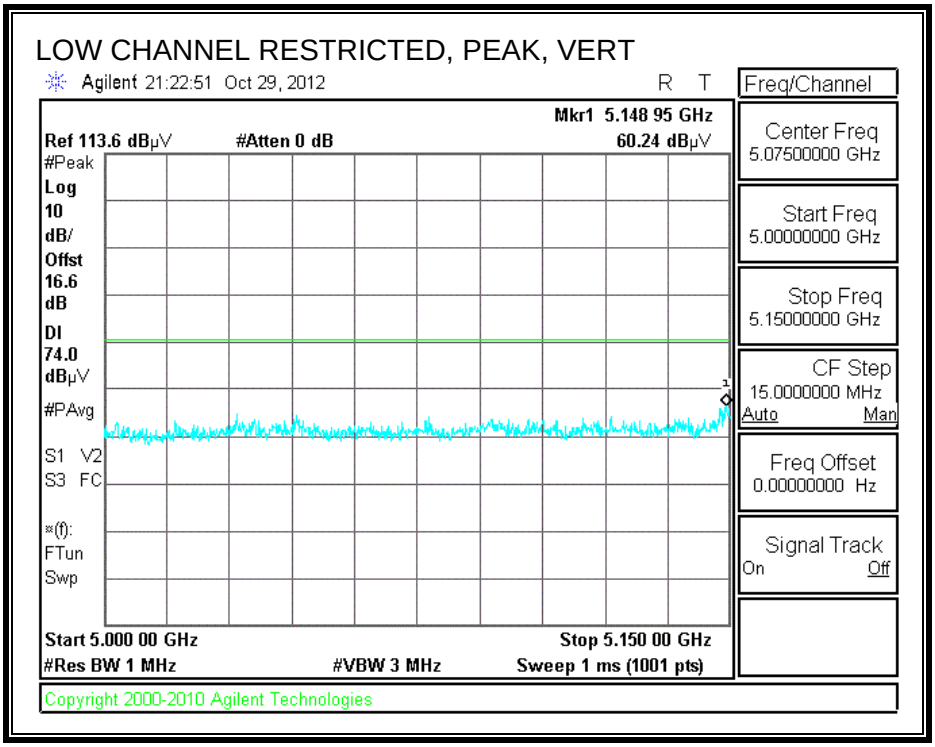
9.2.3. TX ABOVE 1 GHz 802.11n HT20 SDM MODE IN THE 5.2 GHz BAND

RESTRICTED BANDEDGE (LOW CHANNEL)

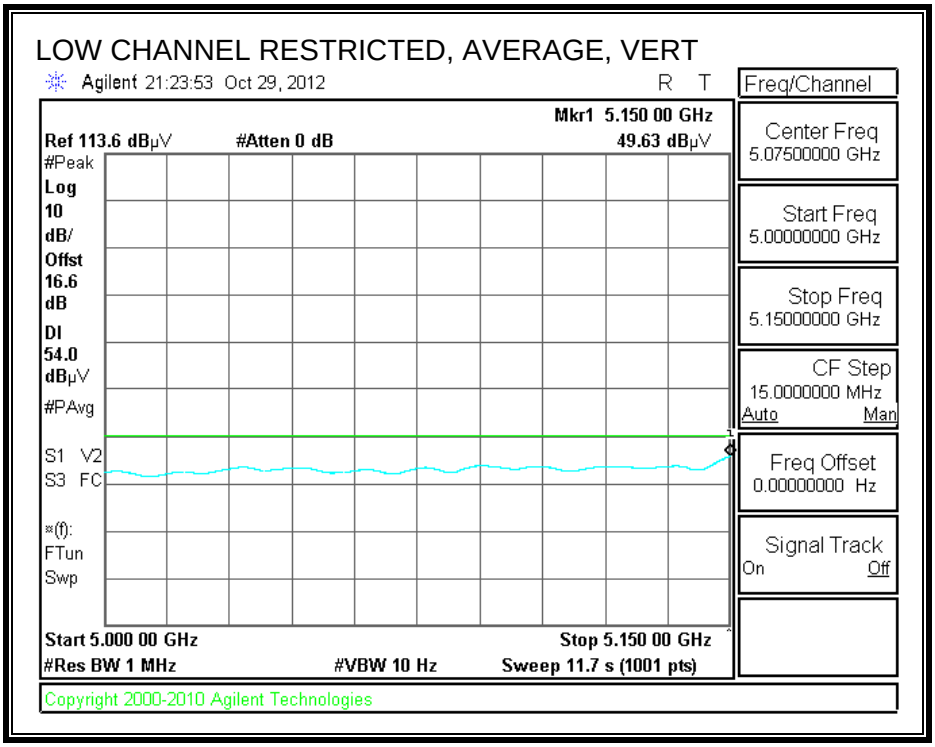




LOW CHANNEL RESTRICTED, PEAK, VERT



LOW CHANNEL RESTRICTED, AVERAGE, VERT



HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement
Compliance Certification Services, Fremont 3m Chamber

Company: Ruckus
Project #: 12U14419
Date: 10/29/2012
Test Engineer: S.Aguilar
Configuration: Standalone with remote laptop control
Mode: 11n, SDM , MCS8, 20MHz

Test Equipment:

Horn 1-18GHz	Pre-amplifer 1-26GHz	Pre-amplifer 26-40GHz	Horn > 18GHz	Limit
T60; S/N: 2238 @3m	T34 HP 8449B		T39; ARA 18-26GHz; S/N:1013	FCC 15.205

Hi Frequency Cables

3' cable 22807700	12' cable 22807600	20' cable 22807500	HPF	Reject Filter
3' cable 22807700	12' cable 22807600	20' cable 22807500		R_001

Peak Measurements
RBW=VBW=1MHz/3MHz
Average Measurements
RBW=1MHz ; VBW=10Hz

f GHz	Dist (m)	Read Pk dBuV	Read Avg. dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes (V/H)
Low Channel: 5180 MHz															
15.540	3.0	35.81	24.43	39.1	13.0	-31.9	0.0	0.0	55.9	44.5	74	54	-18.1	-9.5	H
15.540	3.0	36.94	25.78	39.1	13.0	-31.9	0.0	0.0	57.0	45.9	74	54	-17.0	-8.1	V
Mid Channel: 5200 MHz															
15.600	3.0	35.39	24.80	38.8	13.0	-31.9	0.0	0.0	55.3	44.7	74	54	-18.7	-9.3	H
15.600	3.0	37.71	26.91	38.8	13.0	-31.9	0.0	0.0	57.6	46.8	74	54	-16.4	-7.2	V
High Channel : 5240 MHz															
15.720	3.0	34.18	21.72	38.4	13.1	-31.9	0.0	0.0	53.8	41.3	74	54	-20.2	-12.7	H
15.720	3.0	33.78	23.87	38.4	13.1	-31.9	0.0	0.0	53.4	43.5	74	54	-20.6	-10.5	V

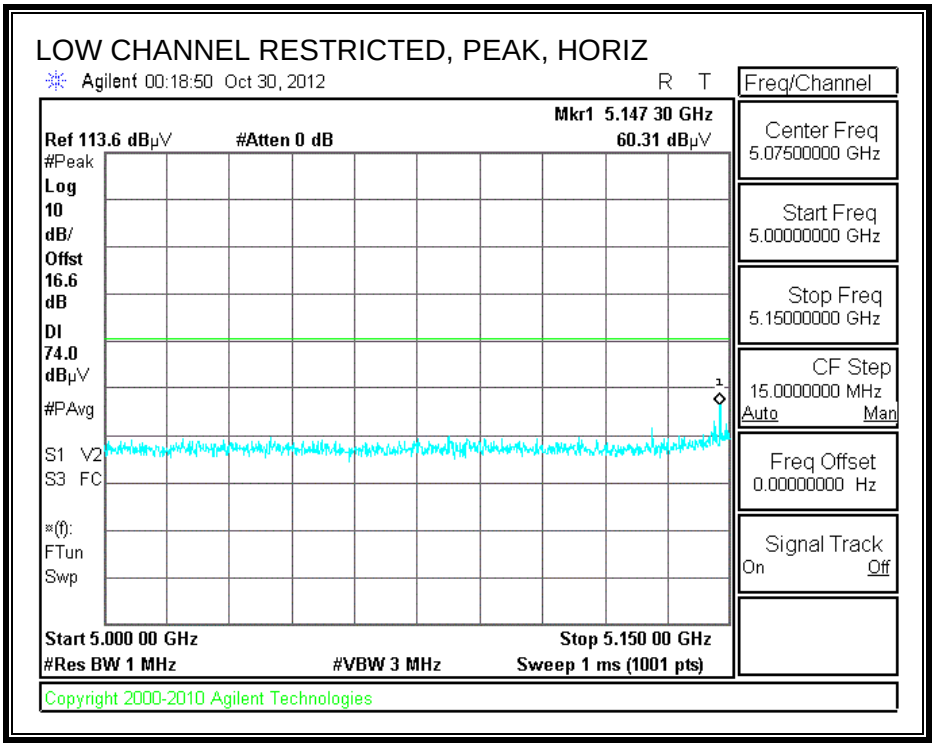
Rev. 11.10.11

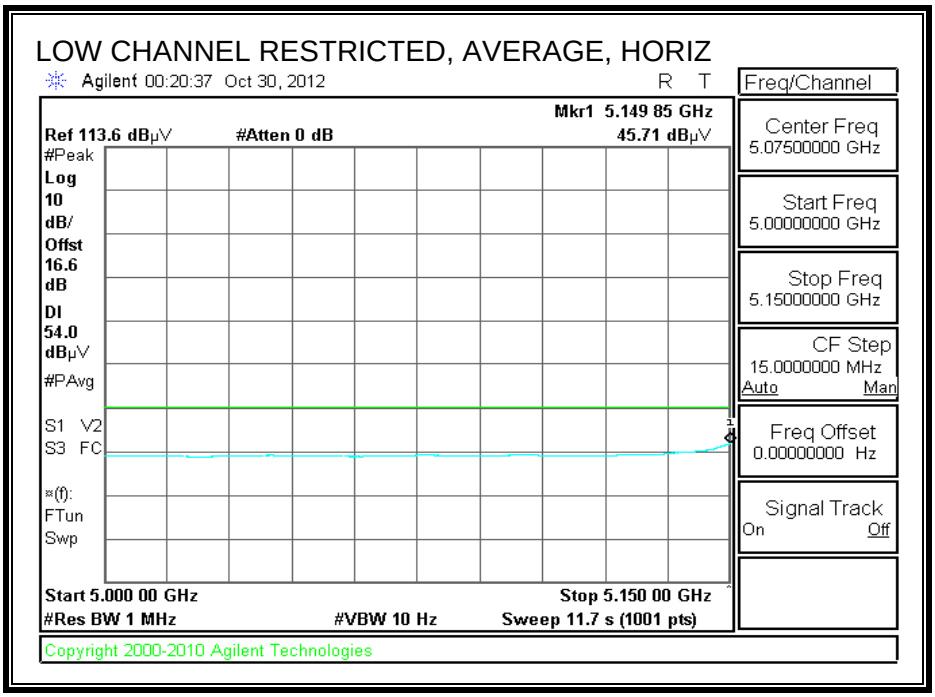
Note: No other emissions above the noise floor.

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

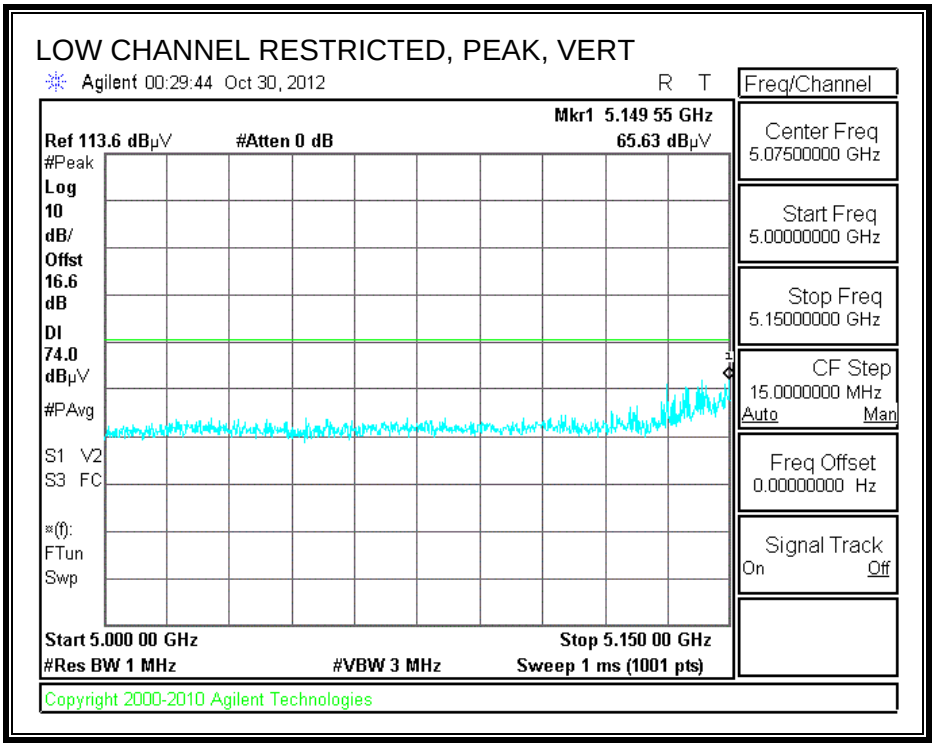
9.2.4. TX ABOVE 1 GHz 802.11n HT40 CDD MODE IN THE 5.2 GHz BAND

RESTRICTED BANDEDGE (LOW CHANNEL)

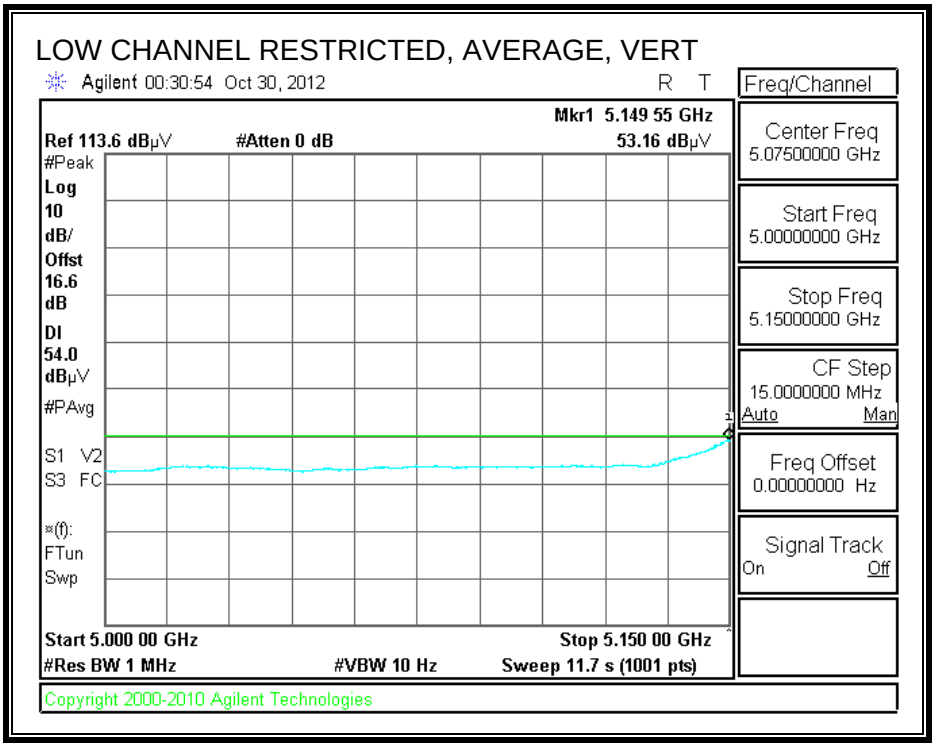




LOW CHANNEL RESTRICTED, PEAK, VERT



LOW CHANNEL RESTRICTED, AVERAGE, VERT



HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement
Compliance Certification Services, Fremont 3m Chamber

Company: Ruckus
Project #: 12U14419
Date: 10/29/2012
Test Engineer: S.Aguilar
Configuration: Standalone with remote laptop control
Mode: 11n, CCD , MCS0, 40MHz

Test Equipment:

Horn 1-18GHz	Pre-amplifer 1-26GHz	Pre-amplifer 26-40GHz	Horn > 18GHz	Limit
T60; S/N: 2238 @3m	T34 HP 8449B		T39; ARA 18-26GHz; S/N:1013	FCC 15.205

Hi Frequency Cables

3' cable 22807700	12' cable 22807600	20' cable 22807500	HPF	Reject Filter
3' cable 22807700	12' cable 22807600	20' cable 22807500		R_001

Peak Measurements
RBW=VBW=1MHz/3MHz
Average Measurements
RBW=1MHz ; VBW=10Hz

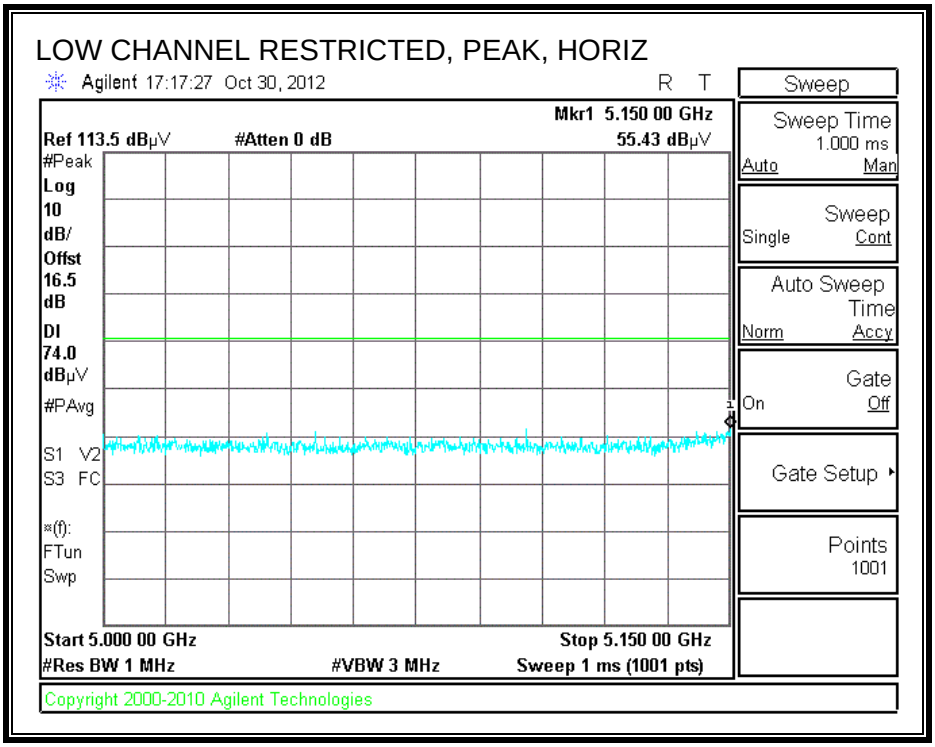
f GHz	Dist (m)	Read Pk dBuV	Read Avg. dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes (V/H)
Low Channel: 5190 MHz															
15.570	3.0	34.84	23.88	38.9	13.0	-31.9	0.0	0.0	54.9	43.9	74	54	-19.1	-10.1	H
15.570	3.0	34.76	24.02	38.9	13.0	-31.9	0.0	0.0	54.8	44.0	74	54	-19.2	-10.0	V
High Channel : 5230 MHz															
15.690	3.0	34.65	23.82	38.5	13.0	-31.9	0.0	0.0	54.3	43.5	74	54	-19.7	-10.5	H
15.690	3.0	34.97	23.79	38.5	13.0	-31.9	0.0	0.0	54.6	43.5	74	54	-19.4	-10.5	V

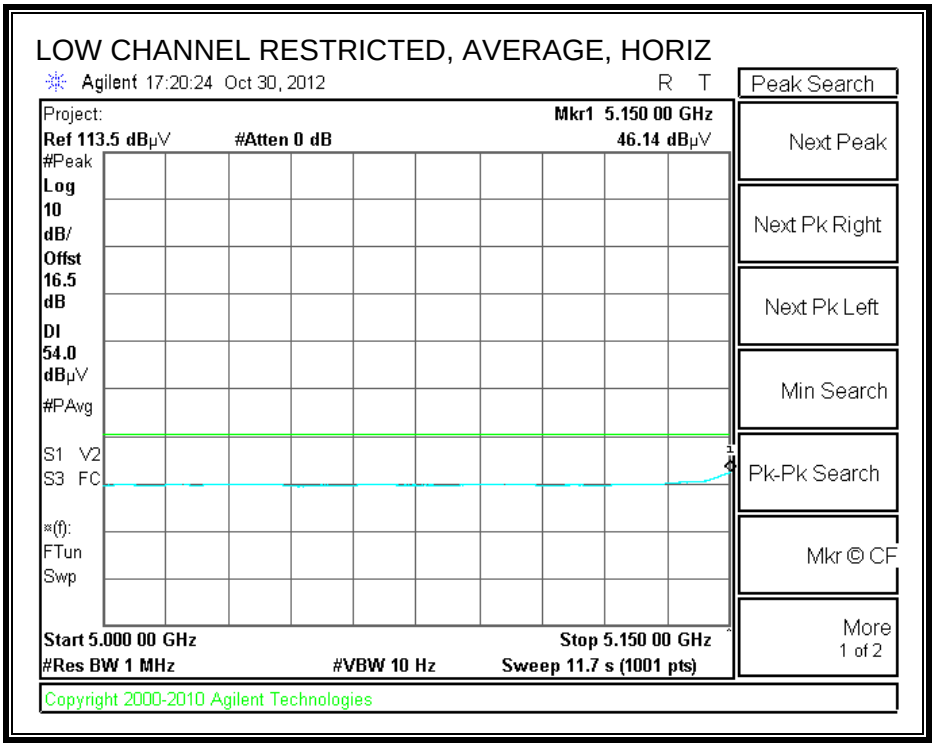
Rev. 11.10.11

Note: No other emissons above the noise floor.

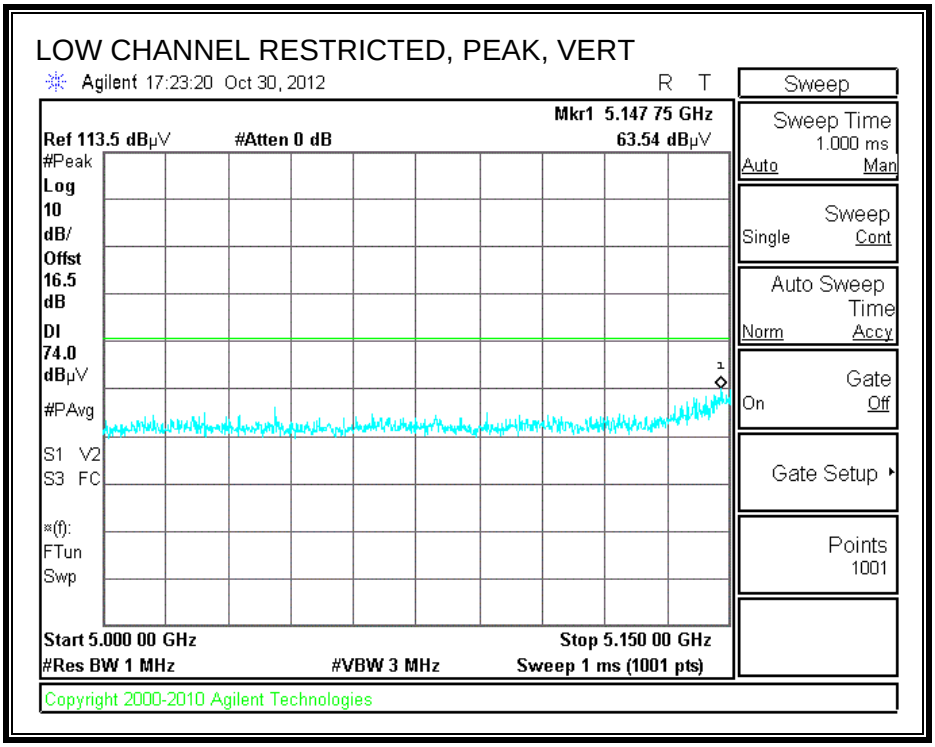
9.2.5. TX ABOVE 1 GHz 802.11n HT40 SDM MODE IN THE 5.2 GHz BAND

RESTRICTED BANDEDGE (LOW CHANNEL)

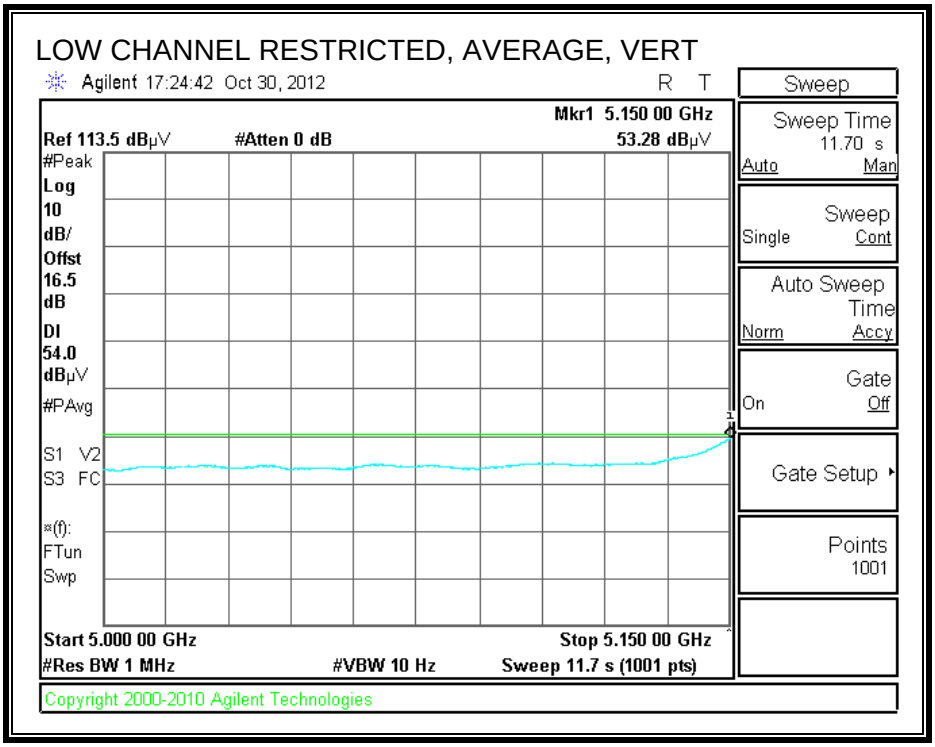




LOW CHANNEL RESTRICTED, PEAK, VERT



LOW CHANNEL RESTRICTED, AVERAGE, VERT



HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement
Compliance Certification Services, Fremont 3m Chamber

Company: Ruckus
Project #: 12U14419
Date: 10/29/2012
Test Engineer: S.Aguilar
Configuration: Standalone with remote laptop control
Mode: 11n, SDM , MCS8, 40MHz

Test Equipment:

Horn 1-18GHz	Pre-amplifer 1-26GHz	Pre-amplifer 26-40GHz	Horn > 18GHz	Limit
T60; S/N: 2238 @3m	T34 HP 8449B		T39; ARA 18-26GHz; S/N:1013	FCC 15.205

Hi Frequency Cables

3' cable 22807700	12' cable 22807600	20' cable 22807500	HPF	Reject Filter
3' cable 22807700	12' cable 22807600	20' cable 22807500		R_001

Peak Measurements
RBW=VBW=1MHz/3MHz
Average Measurements
RBW=1MHz ; VBW=10Hz

f GHz	Dist (m)	Read Pk dBuV	Read Avg. dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes (V/H)
Low Channel: 5190 MHz															
15.570	3.0	35.27	23.88	38.9	13.0	-31.9	0.0	0.0	55.3	43.9	74	54	-18.7	-10.1	
15.570	3.0	35.13	24.16	38.9	13.0	-31.9	0.0	0.0	55.1	44.2	74	54	-18.9	-9.8	
High Channel : 5230 MHz															
15.690	3.0	35.11	23.81	38.5	13.0	-31.9	0.0	0.0	54.8	43.5	74	54	-19.2	-10.5	
15.690	3.0	34.85	23.85	38.5	13.0	-31.9	0.0	0.0	54.5	43.5	74	54	-19.5	-10.5	

Rev. 11.10.11

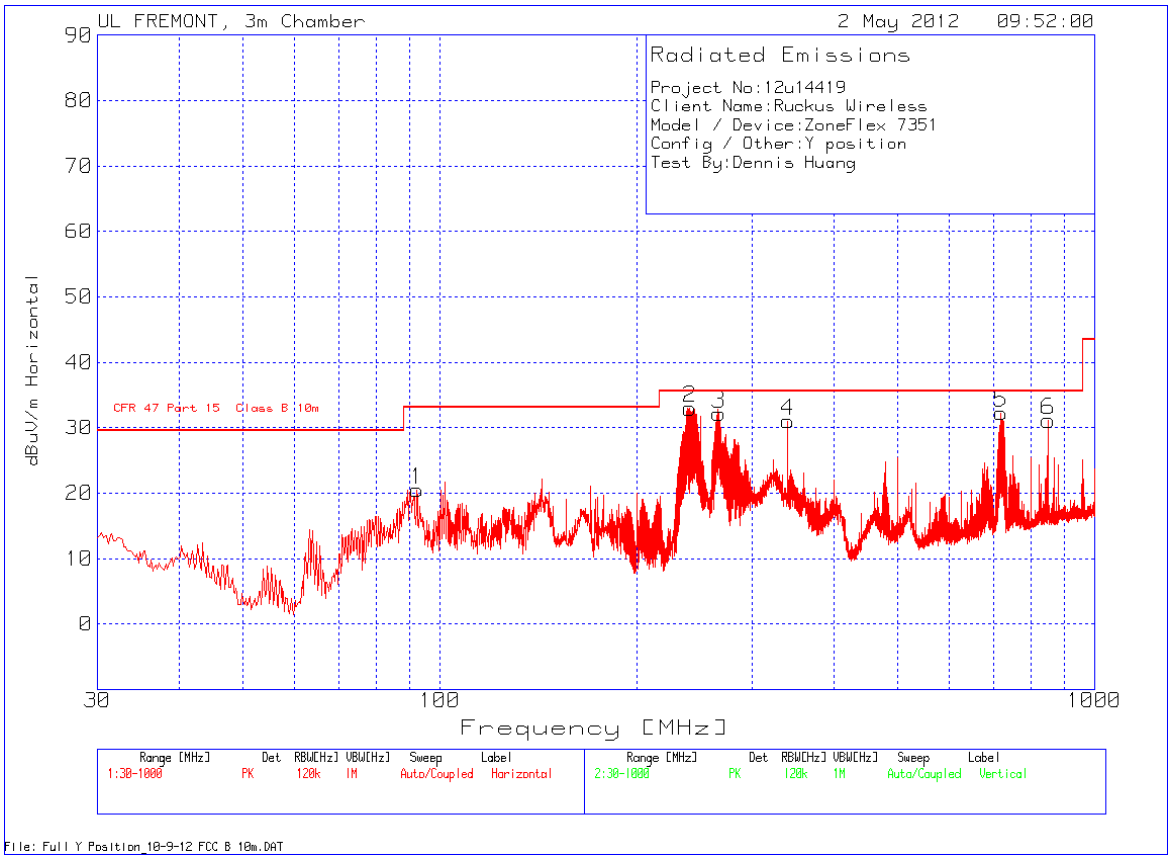
Note: No other emissions above the noise floor.

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

9.3. WORST-CASE BELOW 1 GHz

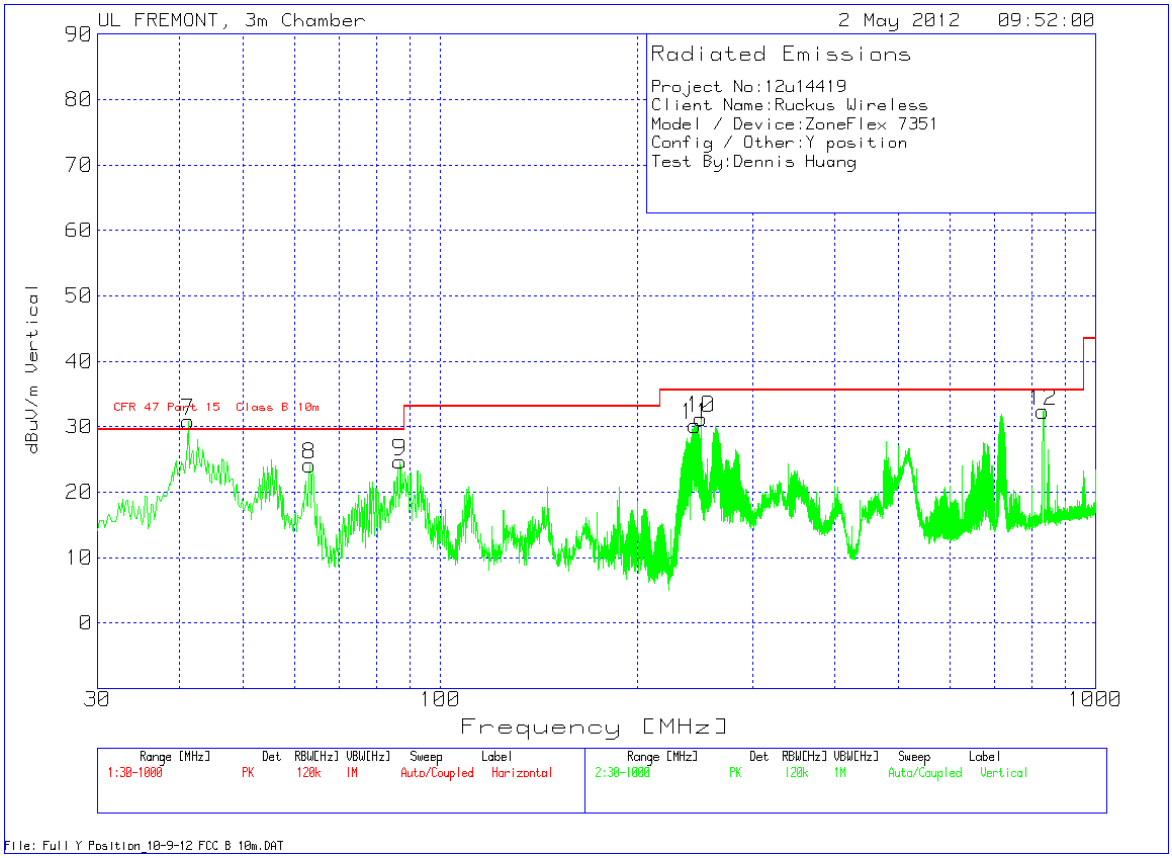
SPURIOUS EMISSIONS 30 TO 1000 MHz (WORST-CASE CONFIGURATION, HORIZONTAL)

HORIZONTAL PLOT



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

VERTICAL PLOT



HORIZONTAL AND VERTICAL DATA

Project No:12u14419
Client Name:Ruckus Wireless
Model / Device:ZoneFlex 7351
Config / Other:Y position
Test By:Dennis Huang

Test Frequency MHz	Meter Reading dB(µV)	Detector	Pre Amp Factor dB	Antenna Factor dB/m	3m to 10m Conversion dB	Corrected dB(µV/m)	Class B limit dB(µV/m)	Margin dB	Height cm	Polarity
92.2242	49.92	PK	-27	8.1	-10.5	20.52	33.1	-12.58	200	Horz
240.9033	58.08	PK	-26	11.4	-10.5	32.98	35.6	-2.62	100	Horz
266.8785	55.57	PK	-25.8	12.9	-10.5	32.17	35.6	-3.43	100	Horz
339.958	53.41	PK	-25.6	13.7	-10.5	31.01	35.6	-4.59	100	Horz
720.0879	46.07	PK	-23.3	20	-10.5	32.27	35.6	-3.33	100	Horz
850.1579	43.3	PK	-23.2	21.5	-10.5	31.1	35.6	-4.5	100	Horz
42.61	49.04	QP	-27.4	12.1	-10.5	23.24	29.6	-6.36	113	Vert
63.1475	54.28	PK	-27.2	7.6	-10.5	24.18	29.6	-5.42	100	Vert
86.7966	54.8	PK	-27	7.4	-10.5	24.7	29.6	-4.9	100	Vert
250.014	56.15	PK	-25.9	11.5	-10.5	31.25	35.6	-4.35	100	Vert
244.7802	55.23	PK	-26	11.5	-10.5	30.23	35.6	-5.37	100	Vert
831.7426	44.74	PK	-23.1	21.2	-10.5	32.34	35.6	-3.26	300	Vert

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

ANSI C63.4

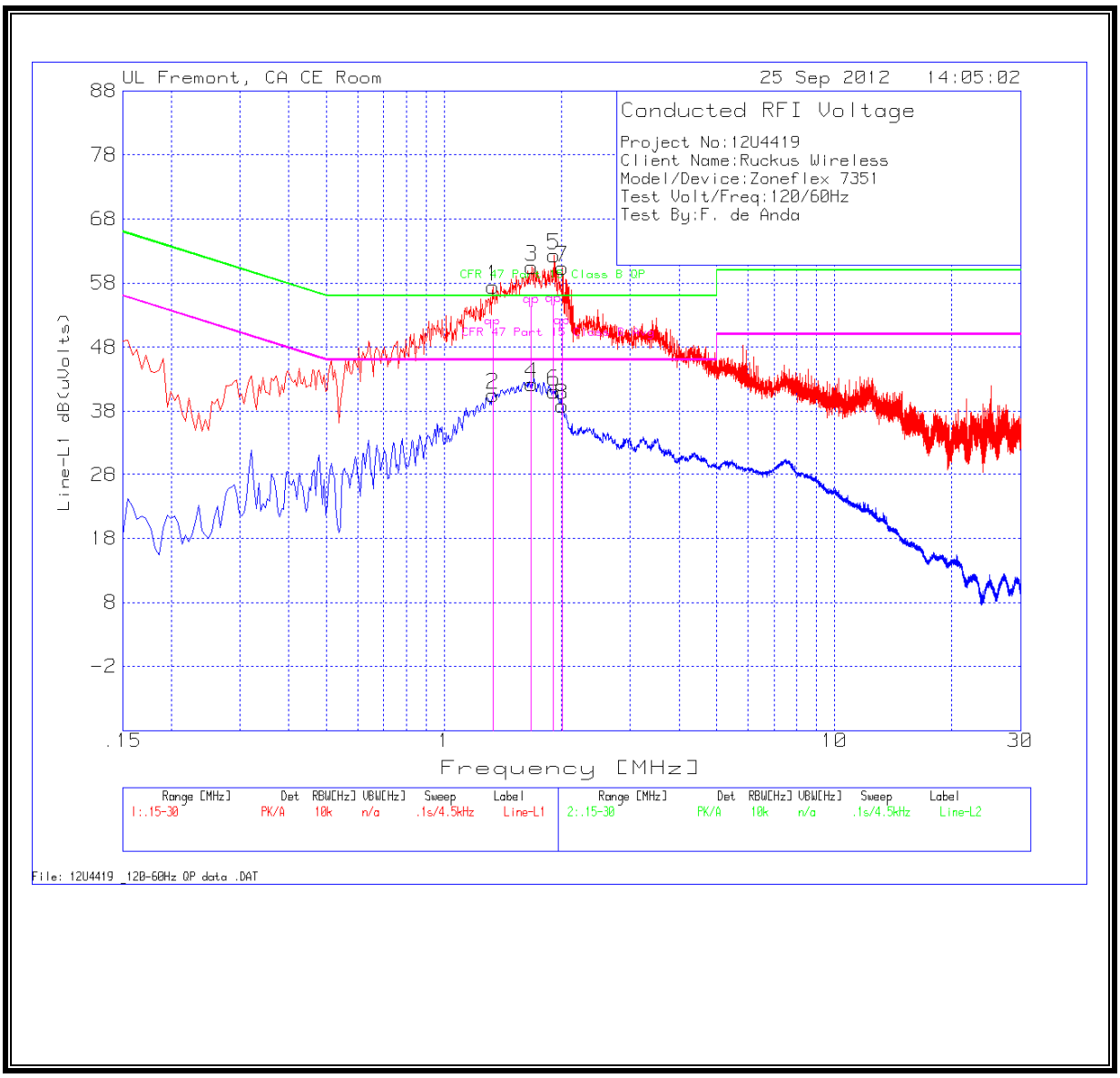
RESULTS

6 WORST EMISSIONS

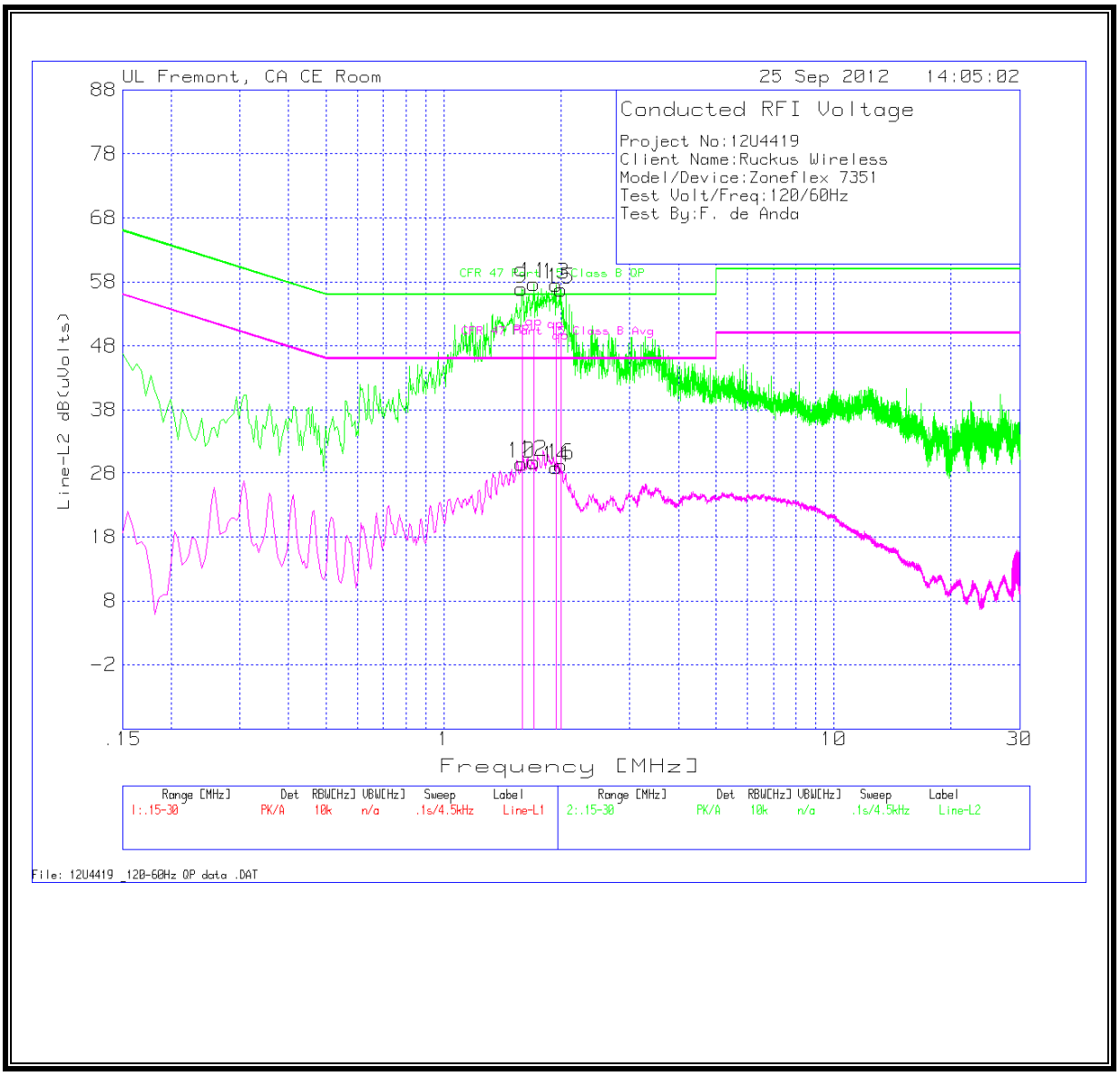
Project No:12U4419
Client Name:Ruckus Wireless
Model/Device:Zoneflex 7351
Test Volt/Freq:120/60Hz
Test By:F. de Anda

Frequency MHz	Reading dB(µV)	Detector	T24 LISN dB	Cables dB	Corrected dB(µV)	Class B QP Limit dB(µV)	QP Margin dB	Class B Av Limit dB(µV)	Av Margin dB
Line-L1									
1.3325	50.78	QP	0.1	0.1	50.98	56	-5.02	--	--
1.3335	40.4	Av	0.1	0.1	40.6	--	--	46	-5.4
1.6735	54.16	QP	0.1	0.1	54.36	56	-1.64	--	--
1.6755	42.08	Av	0.1	0.1	42.28	--	--	46	-3.72
1.9085	54.35	QP	0.1	0.1	54.55	56	-1.45	--	--
1.9095	40.82	Av	0.1	0.1	41.02	--	--	46	-4.98
2.0075	50.88	QP	0.1	0.1	51.08	56	-4.92	--	--
2.0085	38.68	Av	0.1	0.1	38.88	--	--	46	-7.12
Line-L2									
1.5885	49.75	QP	0.1	0.1	49.95	56	-6.05	--	--
1.5855	29.43	Av	0.1	0.1	29.63	--	--	46	-16.37
1.7055	50.46	QP	0.1	0.1	50.66	56	-5.34	--	--
1.7025	29.7	Av	0.1	0.1	29.9	--	--	46	-16.1
1.937	50.06	QP	0.1	0.1	50.26	56	-5.74	--	--
1.941	28.7	Av	0.1	0.1	28.9	--	--	46	-17.1
1.995	48.24	QP	0.1	0.1	48.44	56	-7.56	--	--
1.995	29.15	Av	0.1	0.1	29.35	--	--	46	-16.65

LINE 1 RESULTS



LINE 2 RESULTS



11. SETUP PHOTOS

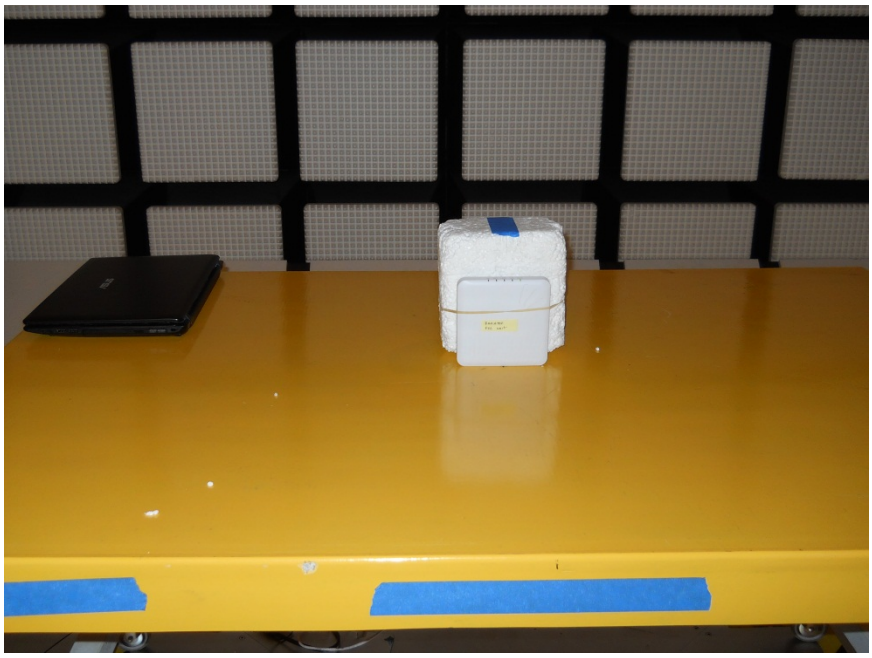
ANTENNA PORT CONDUCTED RF MEASUREMENT SETUP

ANTENNA PORT CONDUCTED PHOTO

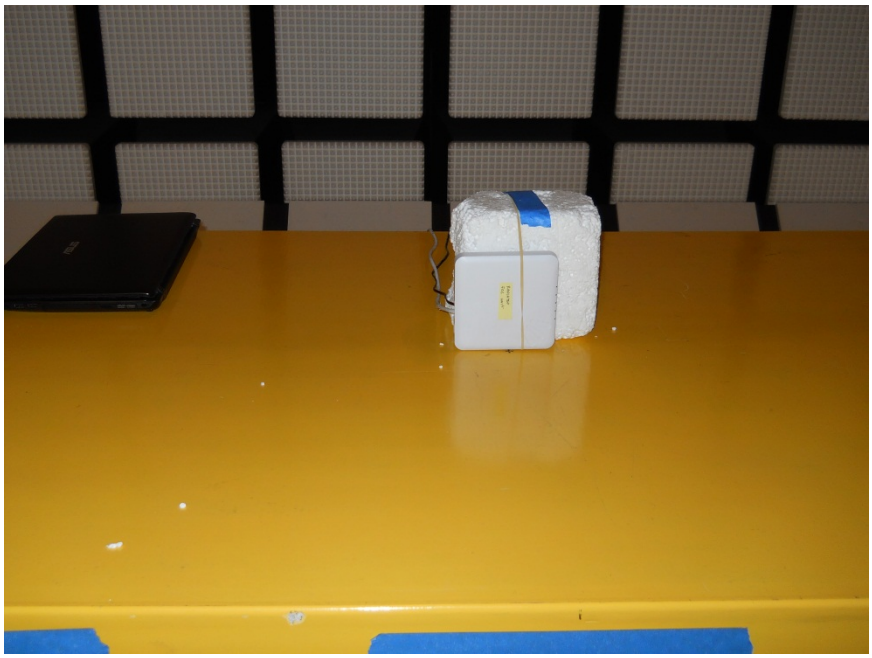
RADIATED RF MEASUREMENT SETUP FOR PORTABLE CONFIGURATION

X-AXIS FRONT PHOTO

Y-AXIS PHOTO



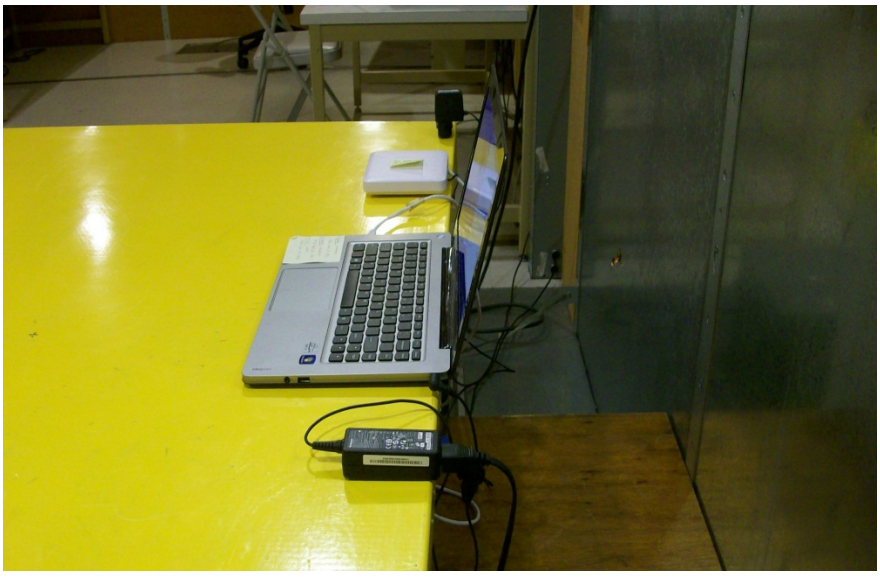
Z-AXIS PHOTO



POWERLINE CONDUCTED EMISSIONS MEASUREMENT SETUP

LINE CONDUCTED FRONT PHOTO

LINE CONDUCTED BACK PHOTO



END OF REPORT