FCC CFR47 PART 15 SUBPART E

TEST REPORT

FOR

WIRELESS MESH ROUTER

MODEL NUMBER: MSR4K43N0, MSR4K43N3*

FCC ID: Q9DMSR4000DFS

REPORT NUMBER: 13U14957-1

ISSUE DATE: OCTOBER 24, 2013

Prepared for
ARUBA NETWORKS
1344 CROSSMAN AVENUE
SUNNYVALE, CA 94089, U.S.A.

Prepared by
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*Models differences are explained within the body of this report

NVLAP LAB CODE 200065-0

Revision History

Rev.	Issue Date	Revisions	Revised By
--	10/24/13	Initial Issue	F. Ibrahim

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: ARUBA NETWORKS
1344 CROSSMAN AVENUE
SUNNYVALE, CA 94089, U.S.A.

EUT DESCRIPTION: WIRELESS MESH ROUTER

MODEL: MSR4K43N0, MSR4K43N3

SERIAL NUMBER: BS0000370 (RF) and BS0001469 (DFS)

DATE TESTED: APRIL 8 - OCTOBER 23, 2013 (RF) and
AUGUST 21 - SEPTEMBER 24, 2013 (DFS)

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 Verification Services Inc. 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 Verification Services Inc. 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 Verification Services Inc. and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL Verification Services Inc. 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 Verification Services Inc. By:

FRANK IBRAHIM
WiSE PROGRAM MANAGER
UL Verification Services Inc.

Tested By:

Kristopher Nguyen
EMC ENGINEER
UL Verification Services Inc.

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.

The test sites and measurement facilities used to collect data are located at 47173 Benicia Street, Fremont, California, USA. Line conducted emissions are measured only at the 47173 address. The following table identifies which facilities were utilized for radiated emission measurements documented in this report. Specific facilities are also identified in the test results sections.

47173 Benicia Street	47266 Benicia Street
☐ Chamber A	☐ Chamber D
☒ Chamber B	☐ Chamber E
☐ Chamber C	☐ Chamber F

UL Verification Services Inc. is accredited by NVLAP, Laboratory Code 200065-0. The full scope of accreditation can be viewed at http://ts.nist.gov/standards/scopes/2000650.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

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

5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

The EUT is a Wireless Mesh Router.

5.2. DESCRIPTION OF MODEL(s) DIFFERENCES

Difference between the two models is:

MSR4K43N0 is powered by PoE, and MSR4K43N3 is powered by AC/DC adapter.

The MSR4K43N3 model is chosen as the representative unit to be tested for the radio portion.

5.3. MAXIMUM OUTPUT POWER

The transmitter has a maximum conducted output power as follows:

5260 - 5320	802.11a CDD	13.767	12.975	16.399
5260 - 5320	802.11n HT20 STBC	16.520	16.586	19.563
5270 - 5310	802.11n HT40 STBC	10.192	10.480	13.349
5500 - 5580	802.11a CDD	13.011	13.314	16.175
5660 - 5700	802.11a CDD	13.372	13.284	16.339
5500 - 5580	802.11n HT20 STBC	16.670	16.801	19.746
5660 - 5700	802.11n HT20 STBC	16.257	16.519	19.400
5510 - 5550	802.11n HT40 STBC	17.324	17.987	20.678
5670 - 5670	802.11n HT40 STBC	16.910	17.228	20.082
Patch Antenna (14 dBi)				
5260 - 5320	802.11a CDD	9.364	7.906	11.706
5260 - 5320	802.11n HT20 STBC	12.566	11.889	15.251
5270 - 5310	802.11n HT40 STBC	7.898	7.811	10.865
5500 - 5580	802.11a CDD	7.850	8.928	11.433
5660 - 5700	802.11a CDD	8.395	8.107	11.264
5500 - 5580	802.11n HT20 STBC	11.597	11.877	14.750
5660 - 5700	802.11n HT20 STBC	11.645	11.317	14.494
5510 - 5550	802.11n HT40 STBC	12.646	13.895	16.326
5670 - 5670	802.11n HT40 STBC	12.910	12.936	15.933

5.4. DESCRIPTION OF AVAILABLE ANTENNAS

The radio can utilize two antennas:

1) Dipole Antenna with a maximum peak gain of **9 dBi.**

2) Directional Patch antenna with a maximum peak gain of **14 dBi**.
The 14 dBi antenna comes with a short cable with loss of 0.5 dB, so in effect the antenna gain is **13.5 dBi** if we take the short cable into consideration.

5.5. SOFTWARE AND FIRMWARE

The test utility software used during testing was Atheros Radio Test (ART), rev 09 Build B7.

Operating system is MeshOS_4.7.0.0.

5.6. 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.

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

802.11a mode: 6 Mbps
802.11n HT20mode: MCS0, 6.5 Mbps
802.11n HT40mode: MCS0, 13.5 Mbps

The EUT was attached to a pole in vertical orientation similar to how it will be oriented in the field.

Multiple radios inside the EUT can transmit at the same time but using different antennas; therefore, colocation testing is not required.

The antenna port testing, radiated band edge and harmonics testing were performed on the AC powered unit, MSR4K43N3 as representative unit for the radio portion.

For radiated emissions 30-1000MHz and AC Line Conduction, testing was performed on both models; MSR4K43N0 and MSR4K43N3.

For radiated emission testing from 18 GHz to 40 GHz, mid channel for 11a CDD mode was investigated, for both antennas 9 dBi and 14 dBi, for both bands of 5.3 GHz and 5.6 Hz, at highest output power and no signals were found in that frequency range.

5.7. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List				
Description	**Manufacturer**	**Model**	**Serial Number**	**FCC ID**
Laptop	Lenovo	IMB Thinkpad T60	L3-V8612	N/A
AC Adapter	IBM	92P1109	11S92P1109Z1ZACU59X2M0	N/A

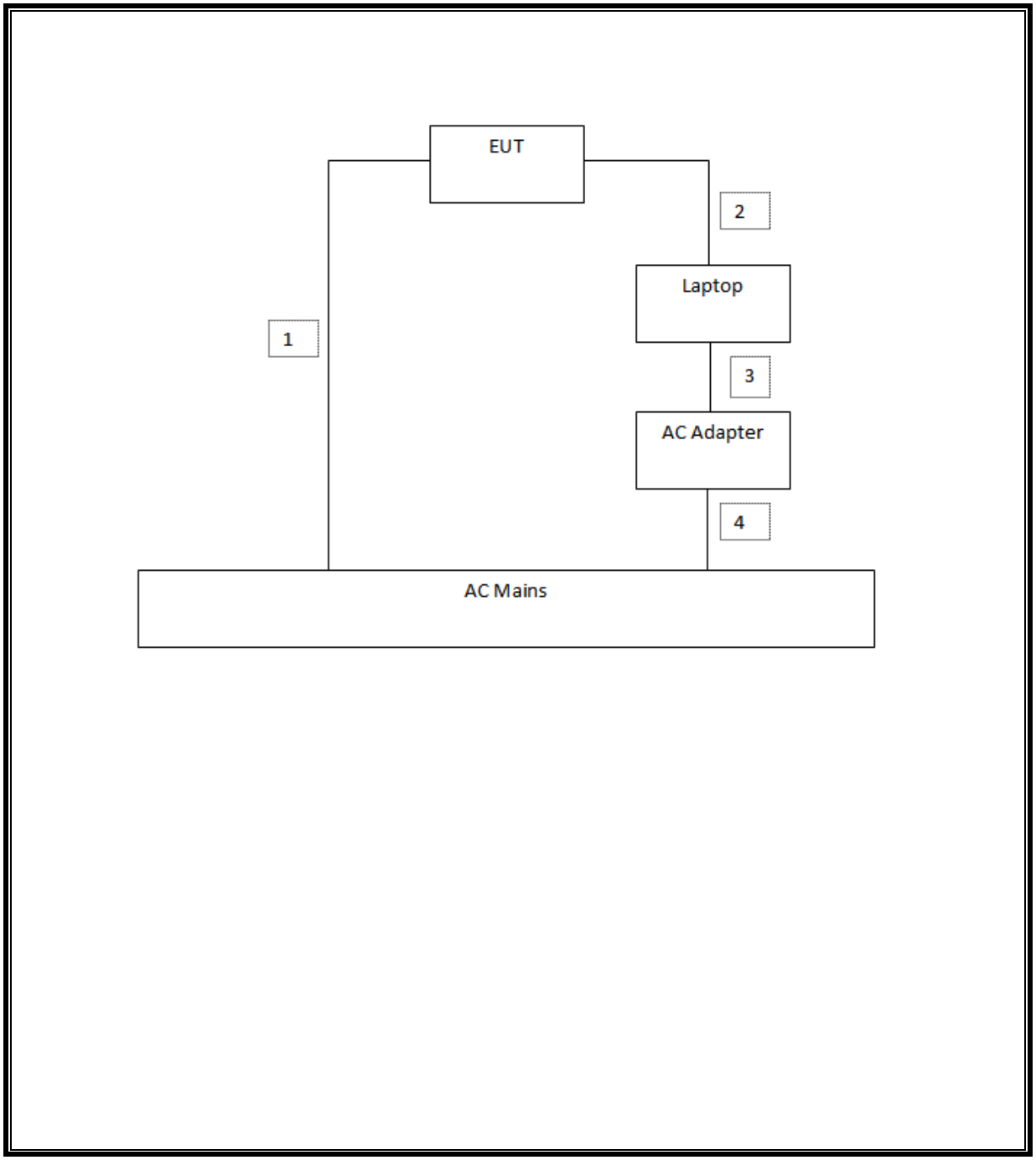
I/O CABLES

I/O Cable List						
Cable No	**Port**	**# of identical ports**	**Connector Type**	**Cable Type**	**Cable Length (m)**	**Remarks**
1	AC	1	US 115V	Un -Shielded	4.5	N/A
2	Ethernet	1	Ethernet	Shielded	2	N/A
3	DC	1	US 115V	Un -Shielded	1	N/A
4	AC	1	DC	Un -Shielded	1.8	N/A

TEST SETUP

The EUT was mounted on a tripod stand and connected through Ethernet to a host laptop computer during the tests. Test software exercised the radio card

SETUP DIAGRAM FOR TESTS



6. TEST AND MEASUREMENT EQUIPMENT

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

Test Equipment List					
Description	**Manufacturer**	**Model**	**Asset**	**Cal Date**	**Cal Due**
Spectrum Analyzer, 26.5 GHz	Agilent / HP	E4440A	C01179	02/16/13	02/16/14
EMI Test Receiver, 9kHz-7GHz	R&S	ESCI 7	1000741	07/13/12	07/13/13
PXA Signal Analyzer	Agilent	N9030A	14615711	01/22/13	01/22/14
Horn Antenna, 1-18GHz	ETS Lindgren	3117	T345	02/19/13	02/19/14
Antenna, Horn, 18 GHz	EMCO	3115	C01218/1000614	01/18/13	01/18/14
Antenna, Horn, 26.5 GHz	ARA	MWH-1826/B	C00980	11/14/12	11/14/13
Antenna, Horn, 40 GHz	ARA	MWH-2640/B	C00981	06/28/13	06/28/14
Preamplifier, 26.5 GHz	Agilent / HP	8449B	C00749	10/19/12	10/19/13
Preamplifier, 40 GHz	Miteq	NSP4000-SP2	C00990	08/20/12	08/20/13
Preamplifier, 40 GHz	Miteq	NSP4000-SP2	C00990	08/20/13	08/20/14
Peak Power Meter	Agilent / HP	E4416A	C00963	12/13/12	12/13/13
Antenna, Bilog, 30MHz-1 GHz	Sunol Sciences	JB1	C01171	02/13/13	02/13/14
Preamplifier, 1300 MHz	Agilent / HP	8447D	C00885	01/16/13	01/16/14
LISN, 30 MHz	FCC	50/250-25-2	C00626	08/15/13	08/15/14
EMI Test Receiver, 30 MHz	R & S	ESHS 20	N02396	01/14/13	01/14/14

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/T Minimum VBW (kHz)
802.11a CDD	3.136	3.150	0.996	99.6%	0.00	0.010
802.11n HT20 STBC	2.918	2.932	0.995	99.5%	0.00	0.010
802.11n HT40 STBC	1.432	1.446	0.990	99.0%	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 CDD MODE

DUTY CYCLE 802.11n HT20 STBC MODE

DUTY CYCLE 802.11n HT40 STBC MODE

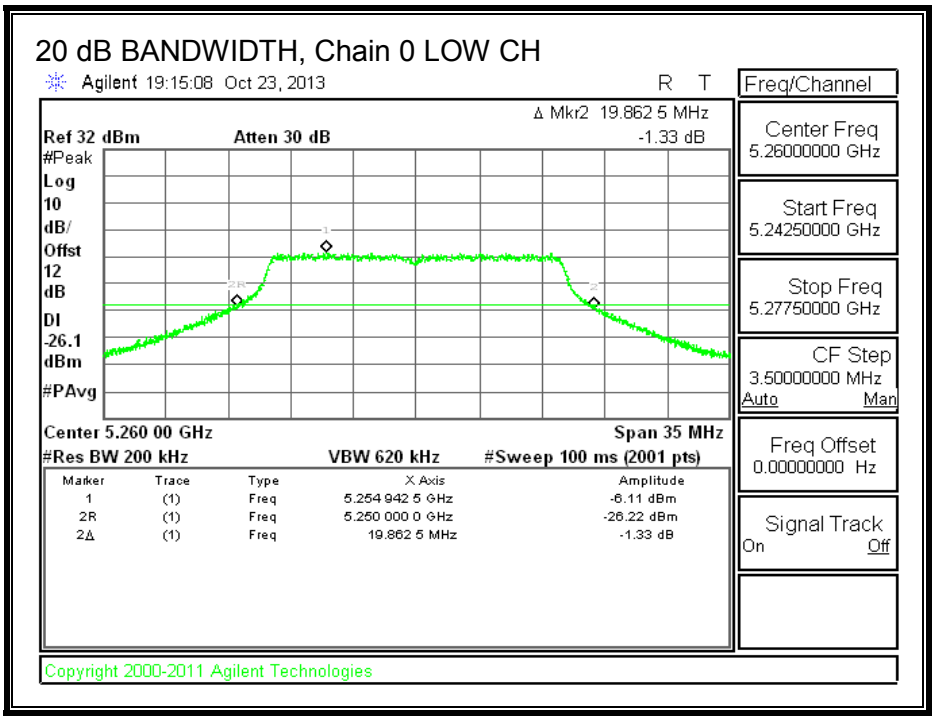
8. ANTENNA PORT TEST RESULTS (Dipole Antenna, 9 dBi)

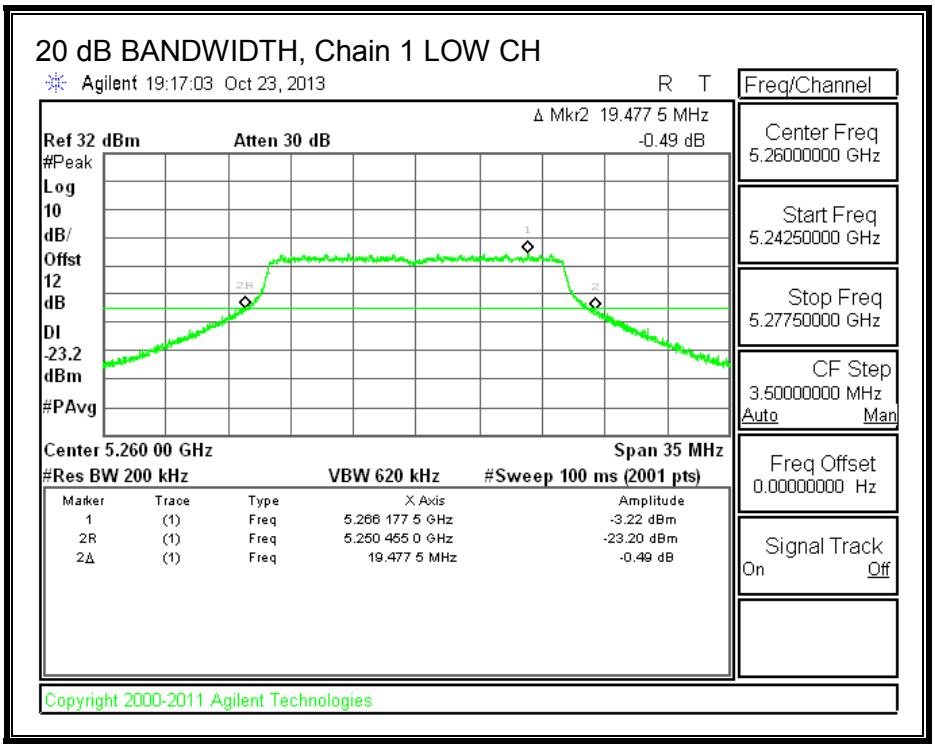
8.1. 802.11a CDD 2TX MODE IN THE 5.3 GHz BAND

8.1.1. 20 dB BANDWIDTH

LIMITS

None; 20 dB bandwidth is shown to ensure operation is within the specified 5250-5350 MHz operation band.





8.1.2. 26 dB BANDWIDTH

LIMITS

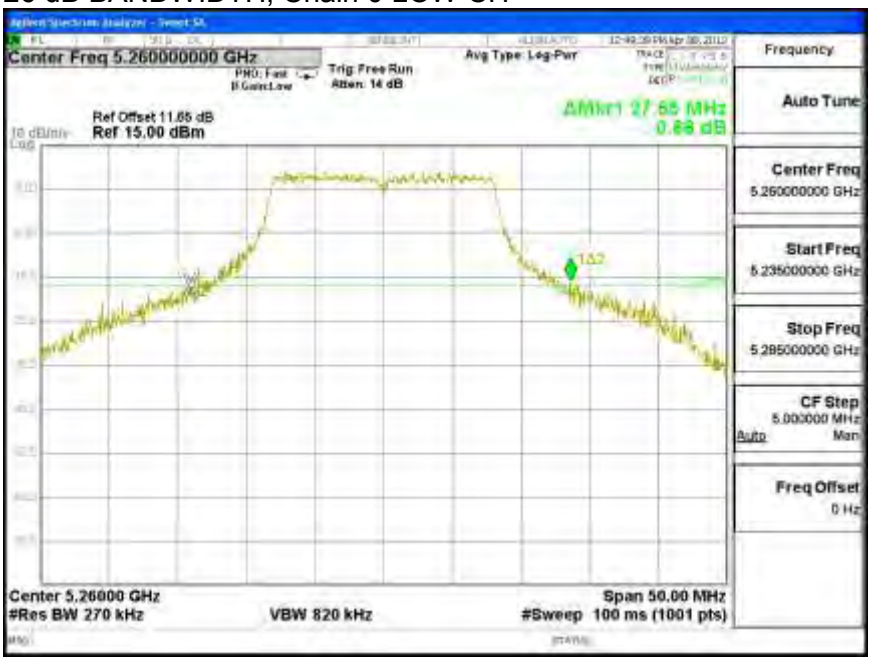
None; for reporting purposes only.

RESULTS

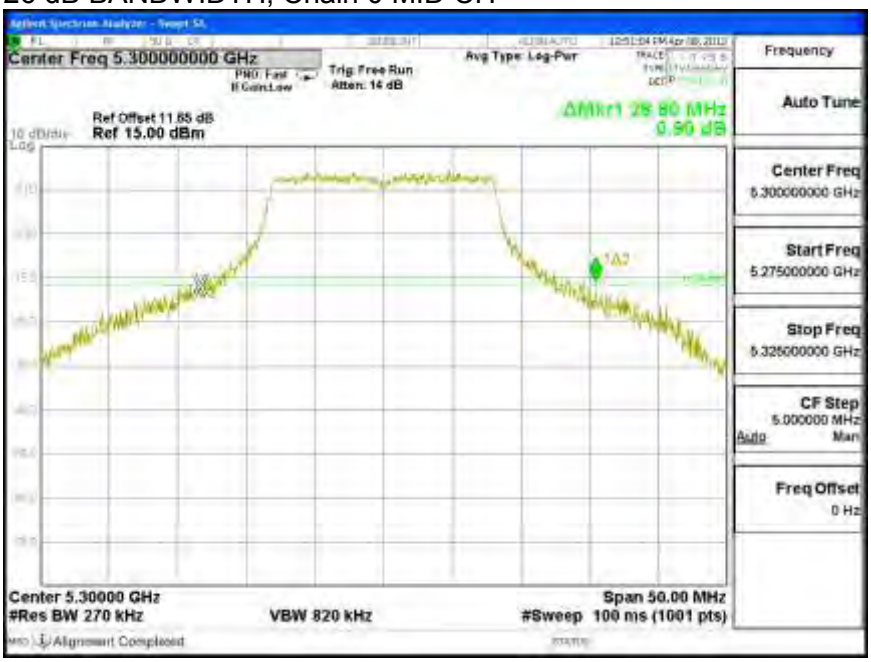
Channel	Frequency (MHz)	26 dB BW Chain 0 (MHz)	26 dB BW Chain 1 (MHz)
Low	5260	27.65	26.15
Mid	5300	28.80	26.25
High	5320	27.35	29.00

26 dB BANDWIDTH, Chain 0

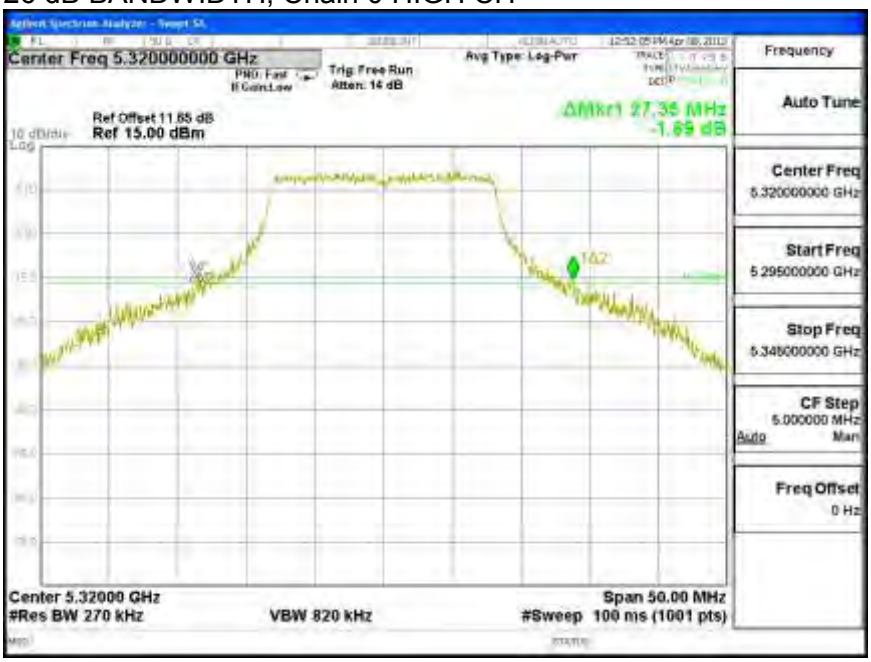
26 dB BANDWIDTH, Chain 0 LOW CH



26 dB BANDWIDTH, Chain 0 MID CH

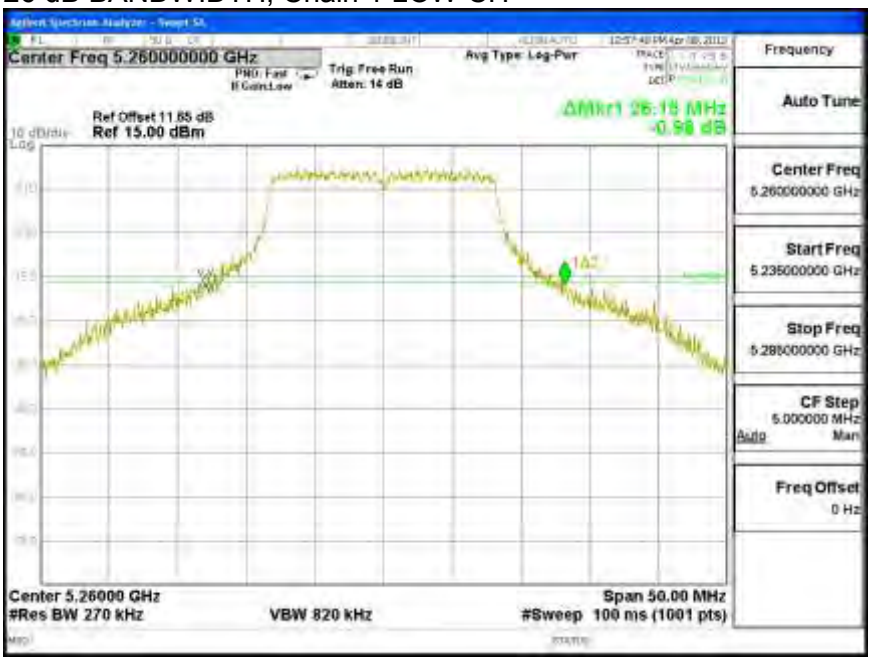


26 dB BANDWIDTH, Chain 0 HIGH CH

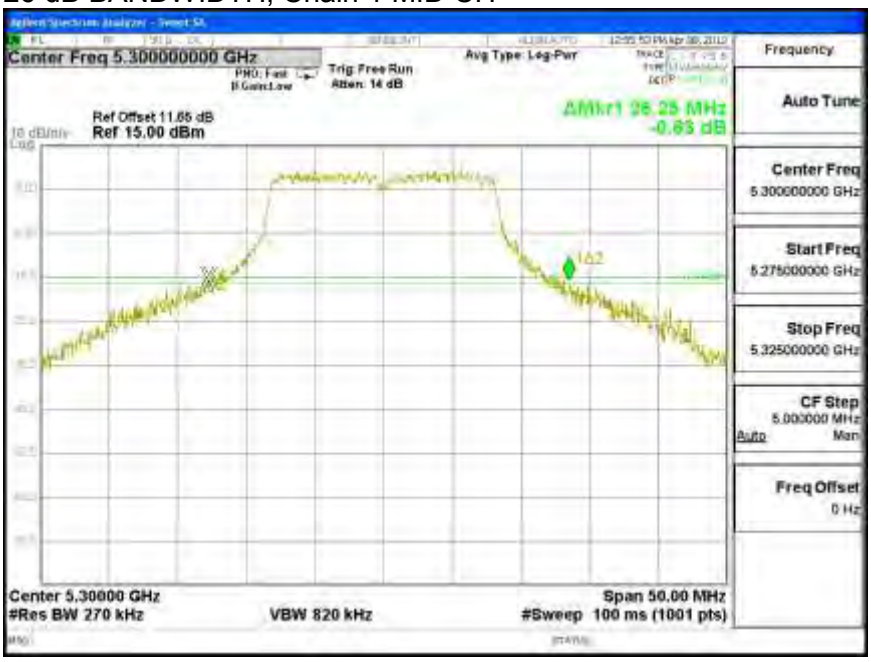


26 dB BANDWIDTH, Chain 1

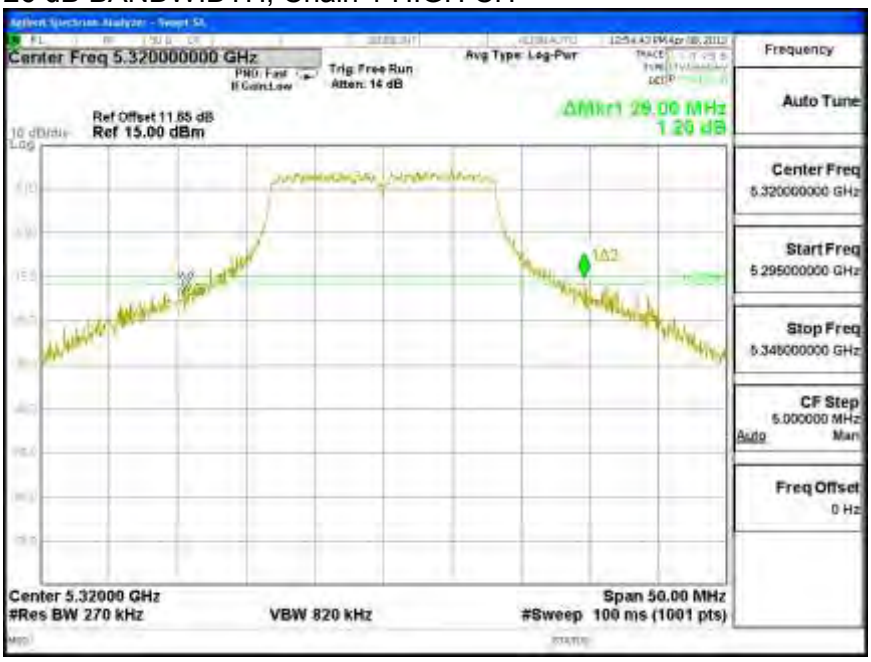
26 dB BANDWIDTH, Chain 1 LOW CH



26 dB BANDWIDTH, Chain 1 MID CH



26 dB BANDWIDTH, Chain 1 HIGH CH



8.1.3. 99% BANDWIDTH

LIMITS

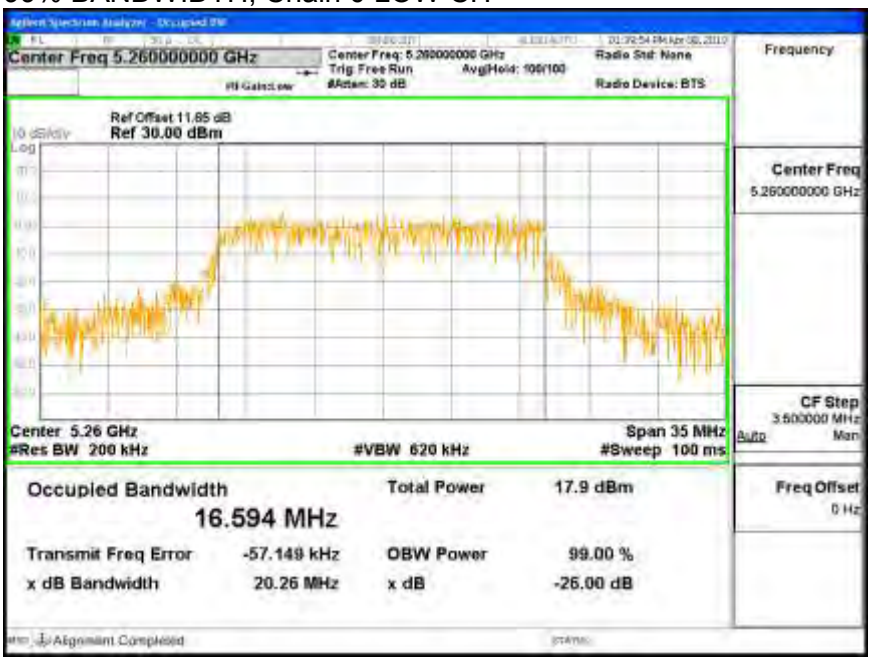
None; for reporting purposes only.

RESULTS

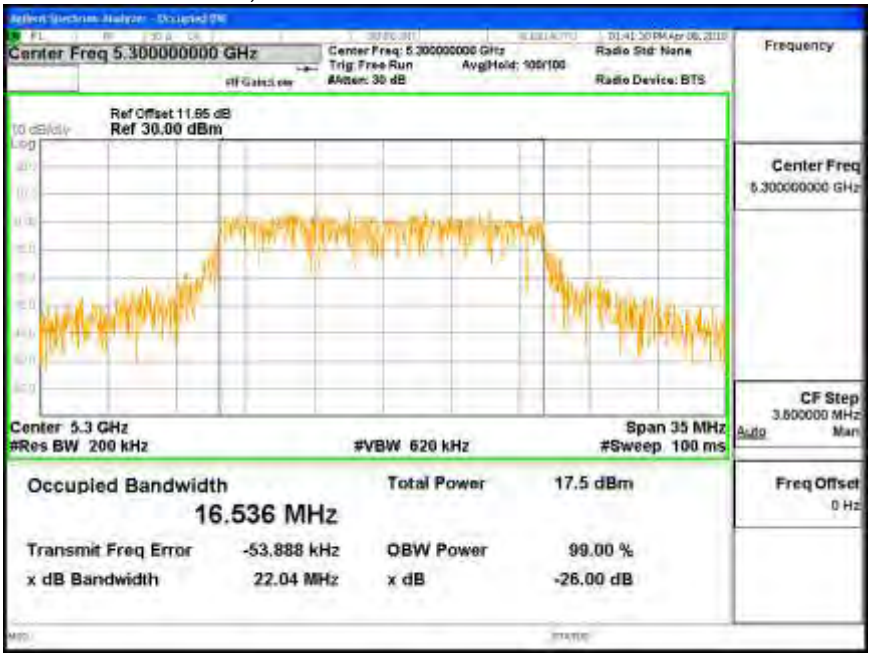
Channel	Frequency (MHz)	99% BW Chain 0 (MHz)	99% BW Chain 1 (MHz)
Low	5260	16.594	16.453
Mid	5300	16.536	16.509
High	5320	16.477	16.553

99% BANDWIDTH, Chain 0

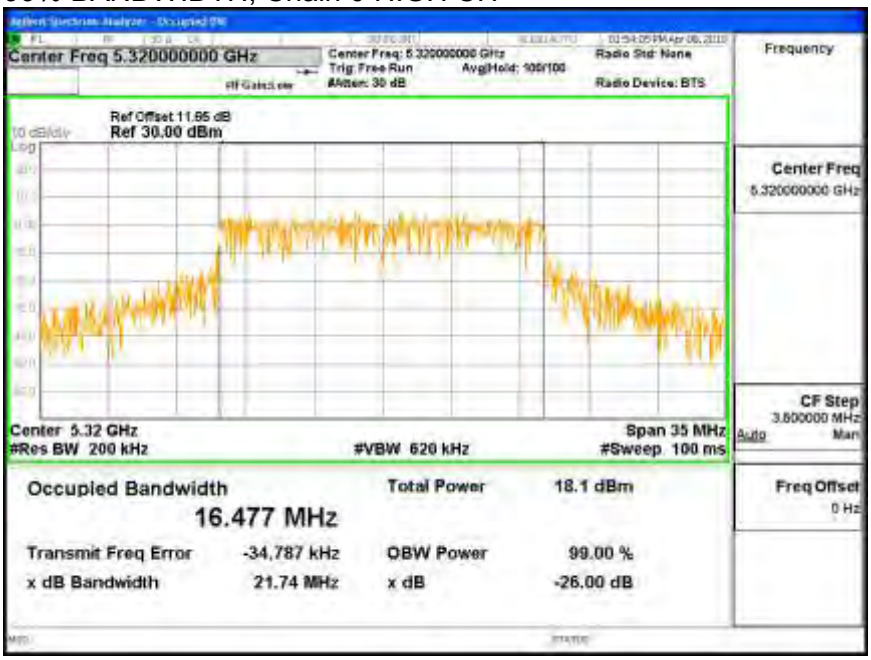
99% BANDWIDTH, Chain 0 LOW CH



99% BANDWIDTH, Chain 0 MID CH

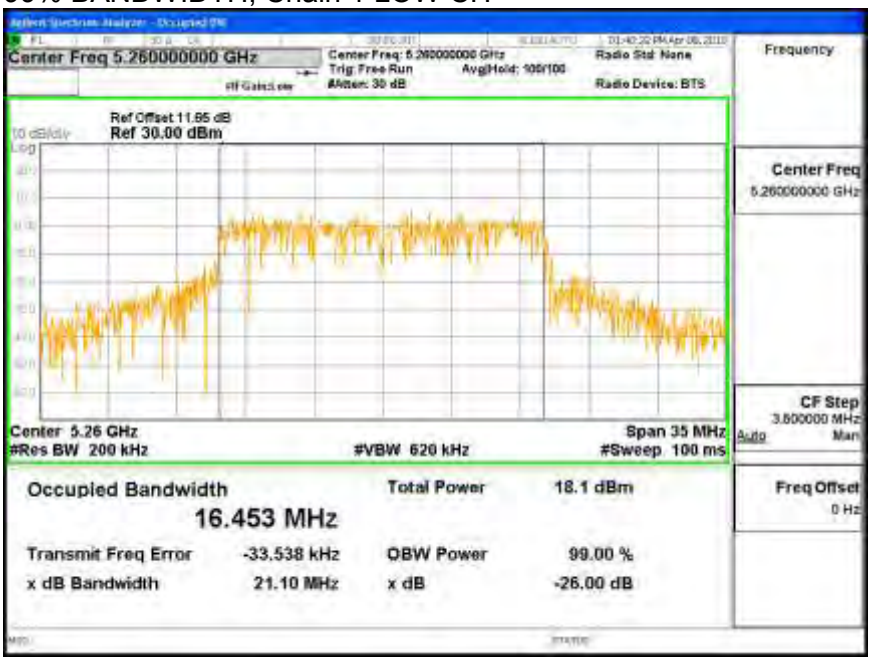


99% BANDWIDTH, Chain 0 HIGH CH

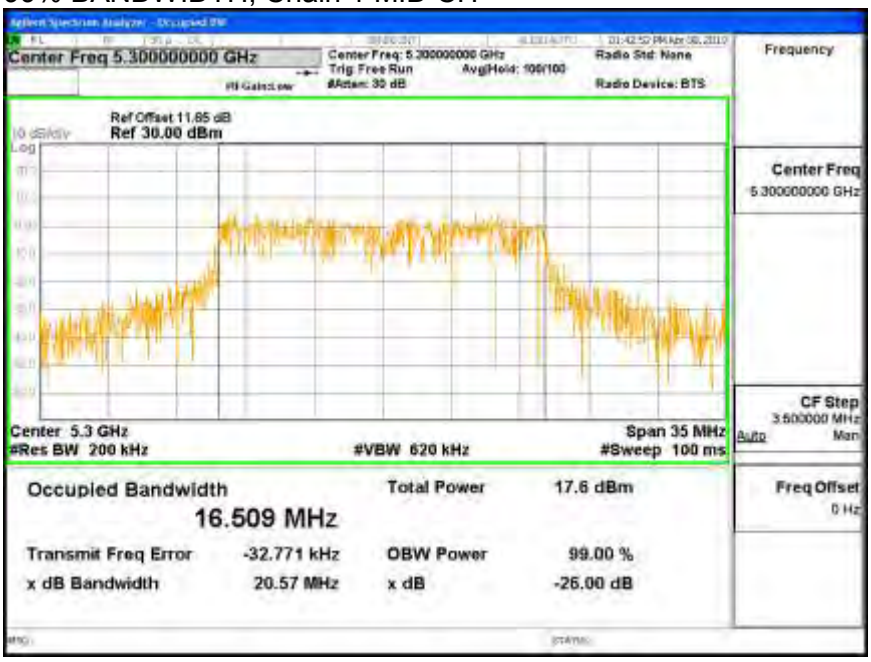


99% BANDWIDTH, Chain 1

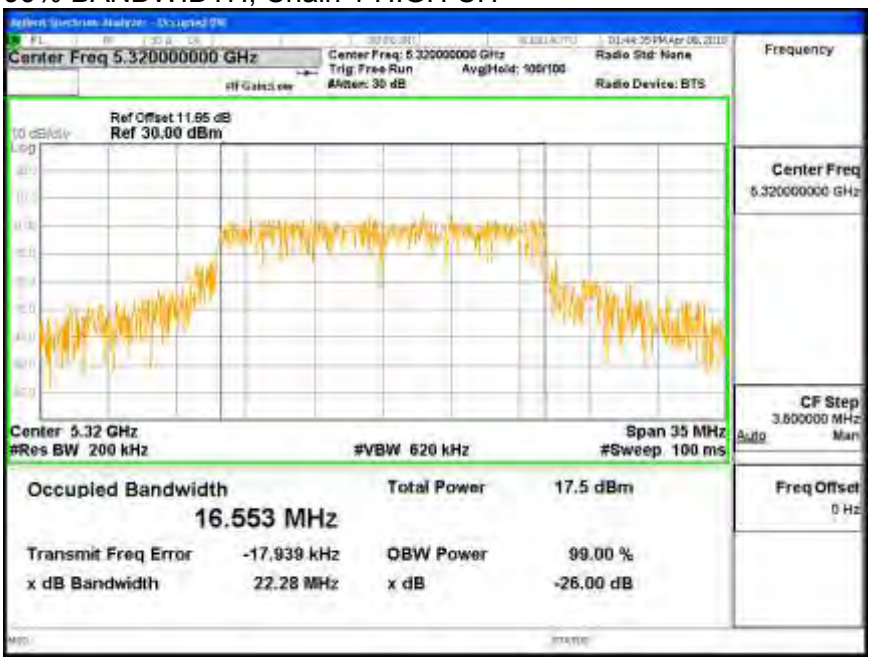
99% BANDWIDTH, Chain 1 LOW CH



99% BANDWIDTH, Chain 1 MID CH



99% BANDWIDTH, Chain 1 HIGH CH



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 250 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

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

Chain 0 Antenna Gain (dBi)	Chain 1 Antenna Gain (dBi)	Uncorrelated Chains Directional Gain (dBi)
9.00	9.00	9.00

For PPSD, 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)
9.00	3.01	12.01

RESULTS

Bandwidth and Antenna Gain

Channel	Frequency (MHz)	Min 26 dB BW (MHz)	Min 99% BW (MHz)	Uncorrelated Directional Gain (dBi)	Correlated Directional Gain (dBi)
Low	5260	26.15	16.453	9.00	12.01
Mid	5300	26.25	16.509	9.00	12.01
High	5320	27.35	16.477	9.00	12.01

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	21.00	23.16	29.16	20.16	4.99	11.00	4.99
Mid	5300	21.00	23.18	29.18	20.18	4.99	11.00	4.99
High	5320	21.00	23.17	29.17	20.17	4.99	11.00	4.99

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

Output Power Results

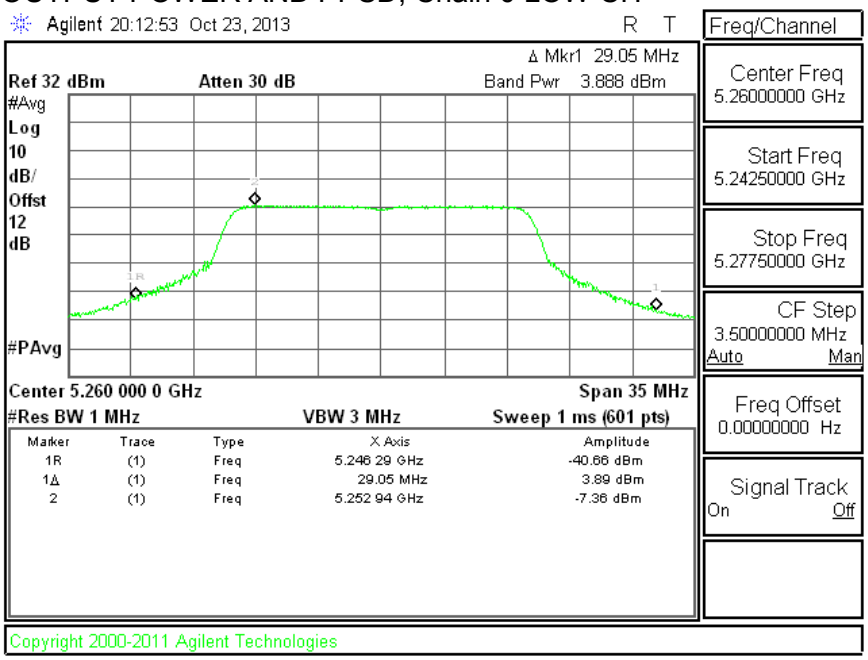
Channel	Frequency (MHz)	Chain 0 Meas Power (dBm)	Chain 1 Meas Power (dBm)	Total Corr'd Power (dBm)	Power Limit (dBm)	Power Margin (dB)
Low	5260	3.888	5.990	8.075	20.16	-12.087
Mid	5300	13.495	12.586	16.075	20.18	-4.103
High	5320	13.767	12.975	16.399	20.17	-3.769

PPSD Results

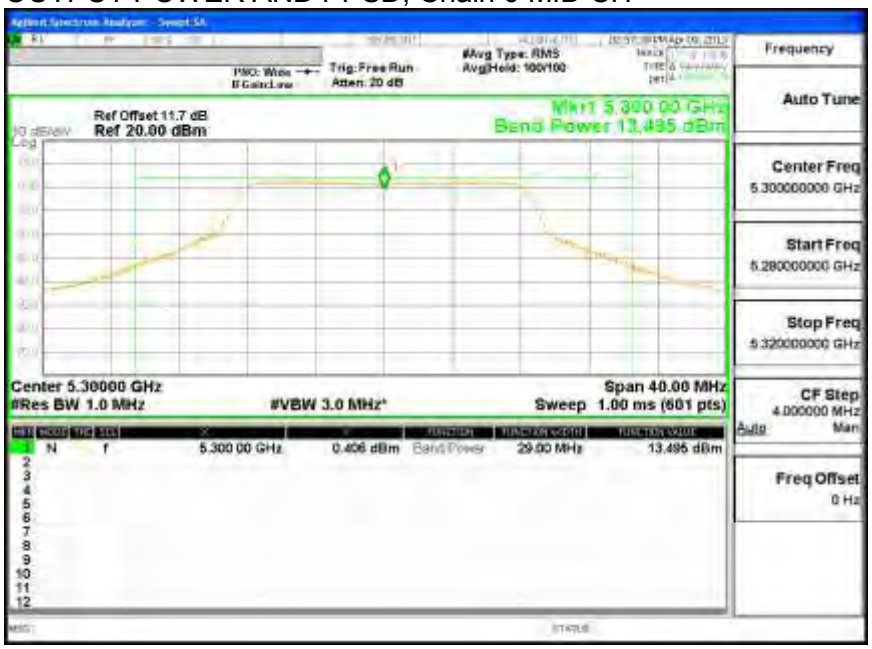
Channel	Frequency (MHz)	Chain 0 Meas PPSD (dBm)	Chain 1 Meas PPSD (dBm)	Total Corr'd PPSD (dBm)	PPSD Limit (dBm)	PPSD Margin (dB)
Low	5260	-7.36	-5.51	-3.33	4.99	-8.32
Mid	5300	2.16	0.76	4.53	4.99	-0.46
High	5320	2.29	1.54	4.94	4.99	-0.05

OUTPUT POWER AND PPSD, Chain 0

OUTPUT POWER AND PPSD, Chain 0 LOW CH

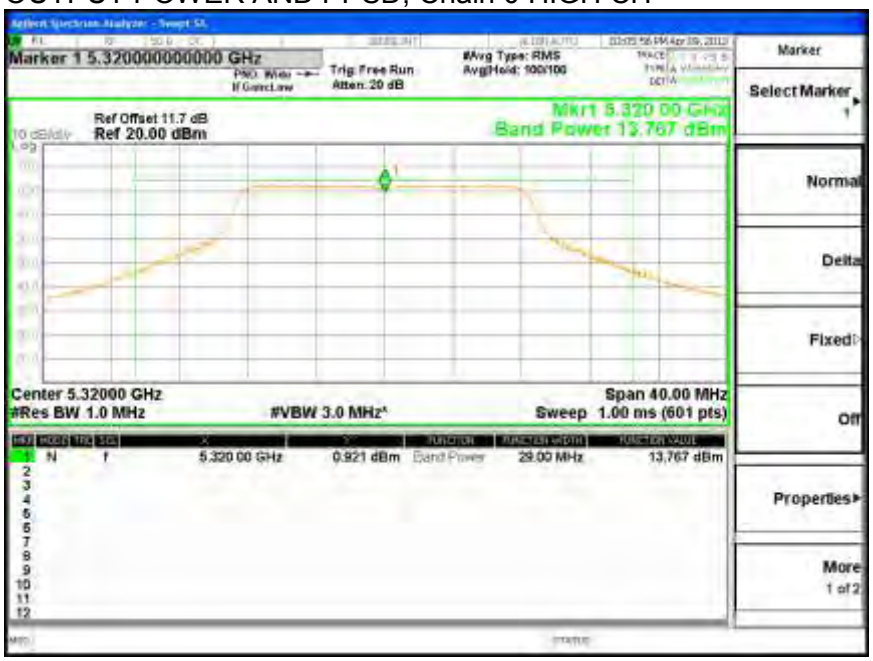


OUTPUT POWER AND PPSD, Chain 0 MID CH



Linear Average=2.16 dBm

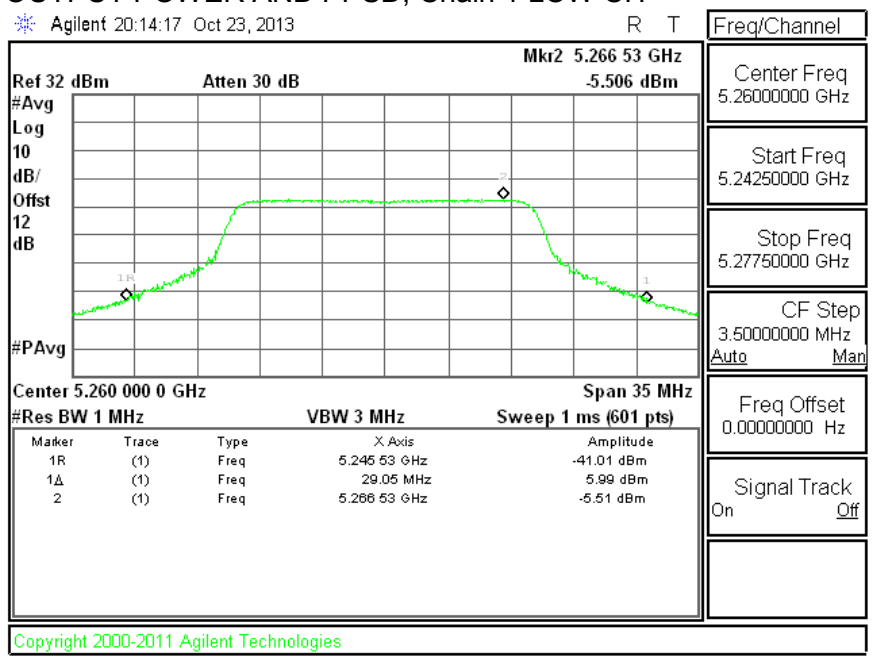
OUTPUT POWER AND PPSD, Chain 0 HIGH CH



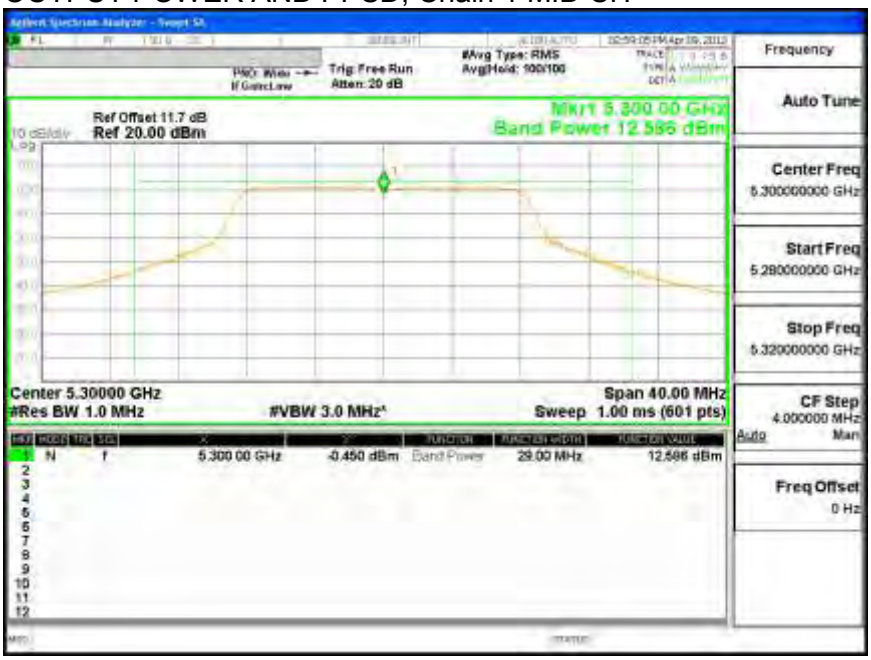
Linear Average=2.29 dBm

OUTPUT POWER AND PPSD, Chain 1

OUTPUT POWER AND PPSD, Chain 1 LOW CH

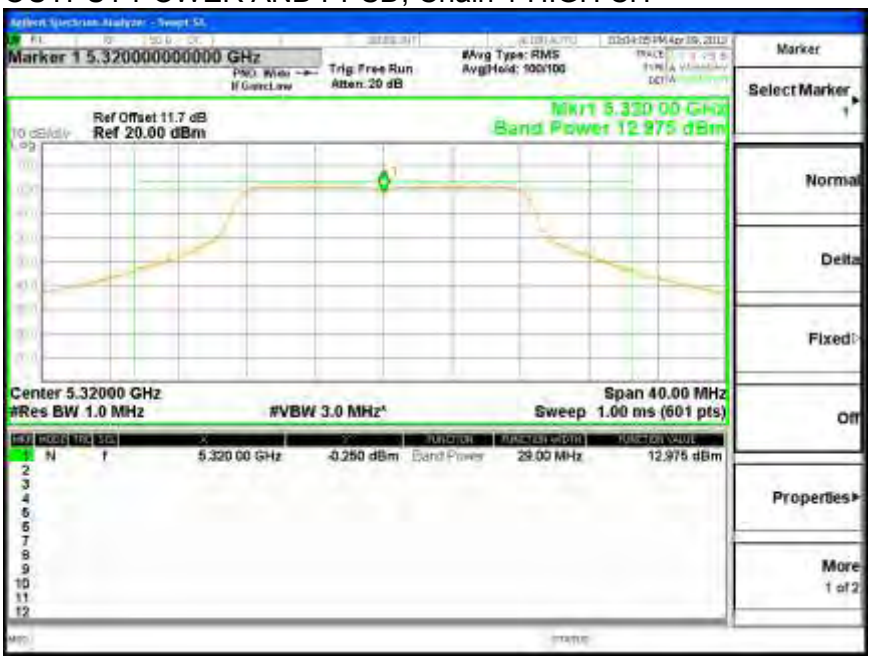


OUTPUT POWER AND PPSD, Chain 1 MID CH



Linear Average=0.76 dBm

OUTPUT POWER AND PPSD, Chain 1 HIGH CH



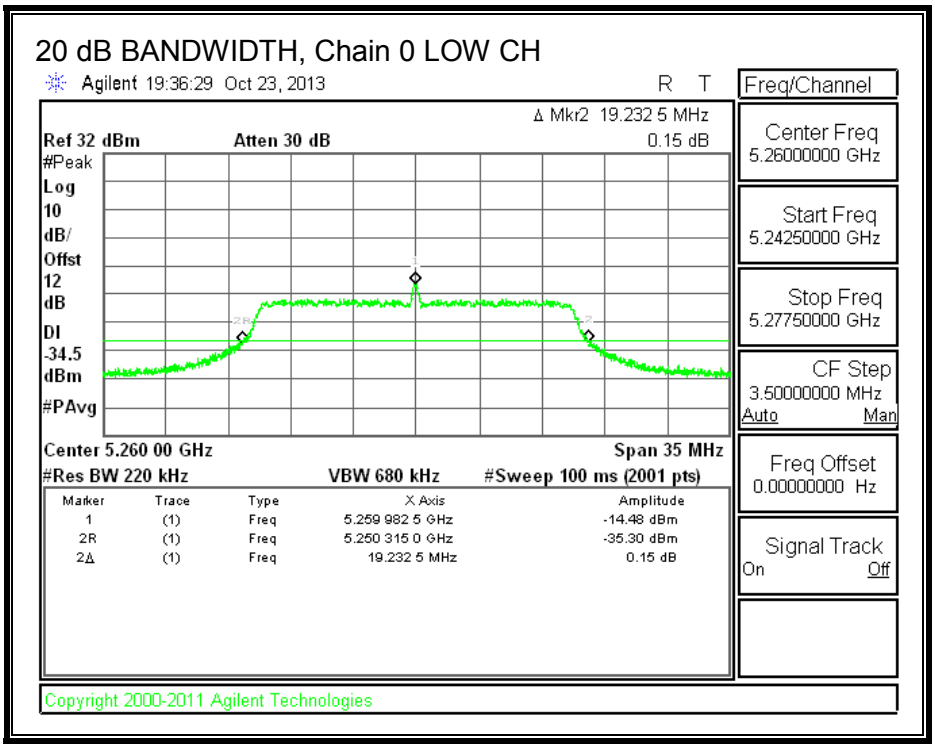
Linear Average=1.54 dBm

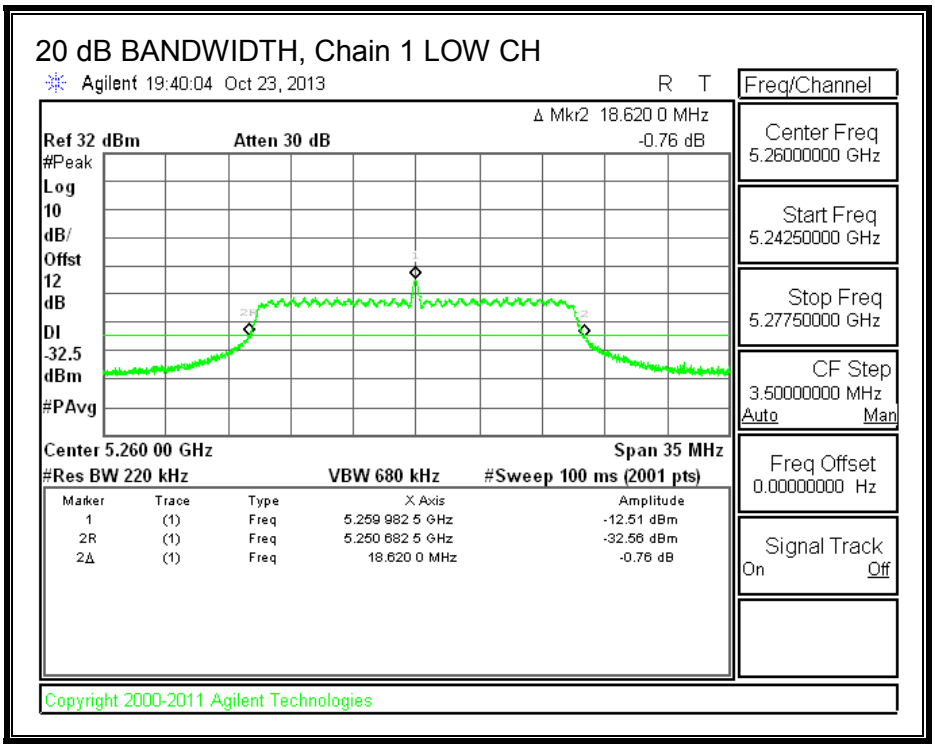
8.2. 802.11n HT20 STBC 2TX MODE IN THE 5.3 GHz BAND

8.2.1. 20 dB BANDWIDTH

LIMITS

None; 20 dB bandwidth is shown to ensure operation is within the specified 5250-5350 MHz operation band.





8.2.2. 26 dB BANDWIDTH

LIMITS

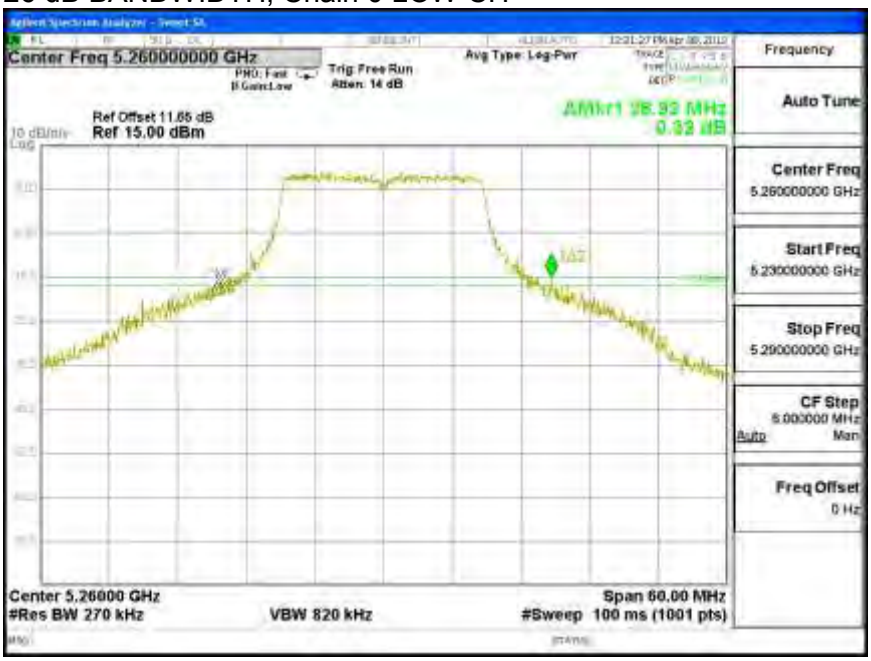
None; for reporting purposes only.

RESULTS

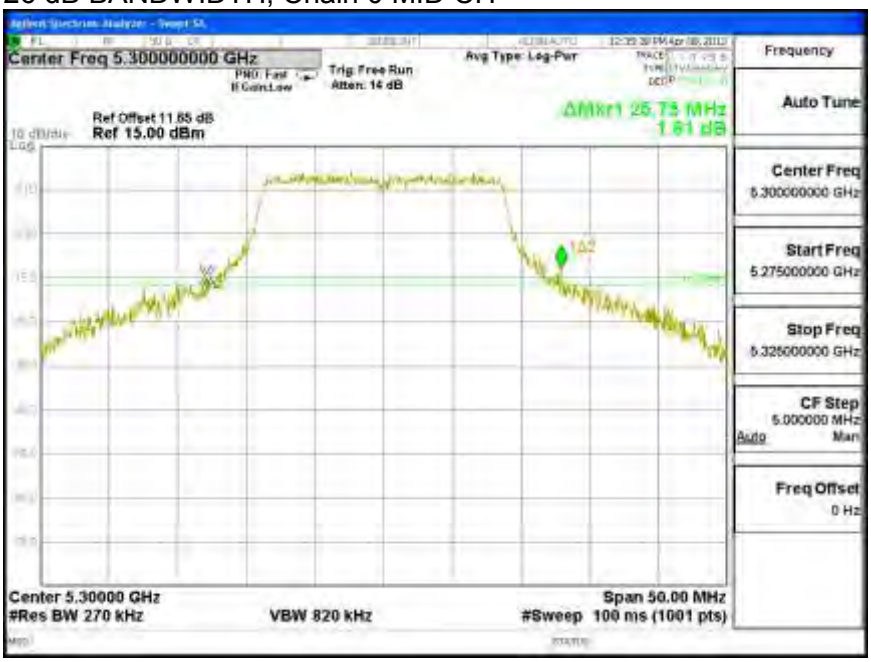
Channel	Frequency (MHz)	26 dB BW Chain 0 (MHz)	26 dB BW Chain 1 (MHz)
Low	5260	28.92	27.60
Mid	5300	25.75	27.10
High	5320	28.45	28.40

26 dB BANDWIDTH, Chain 0

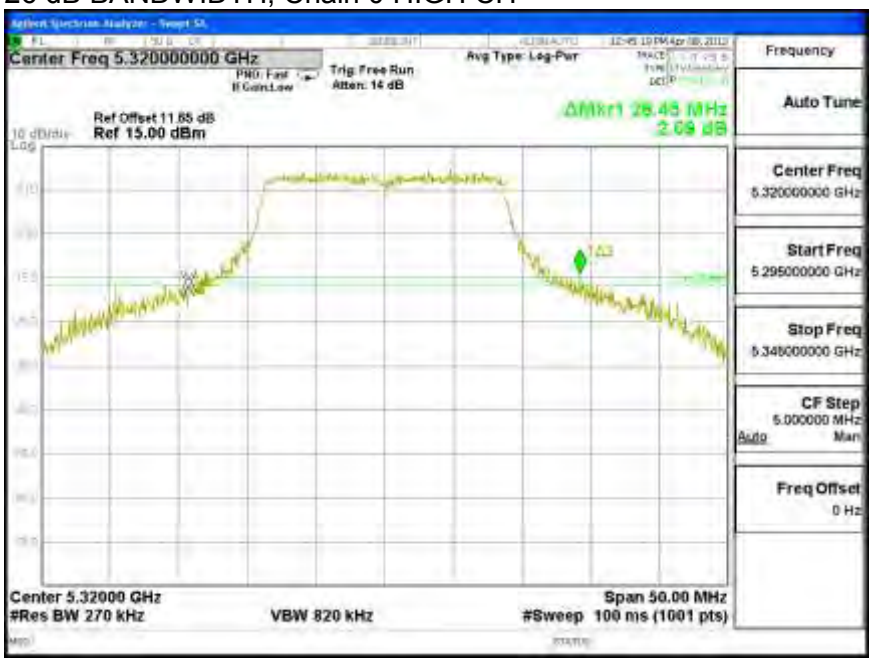
26 dB BANDWIDTH, Chain 0 LOW CH



26 dB BANDWIDTH, Chain 0 MID CH

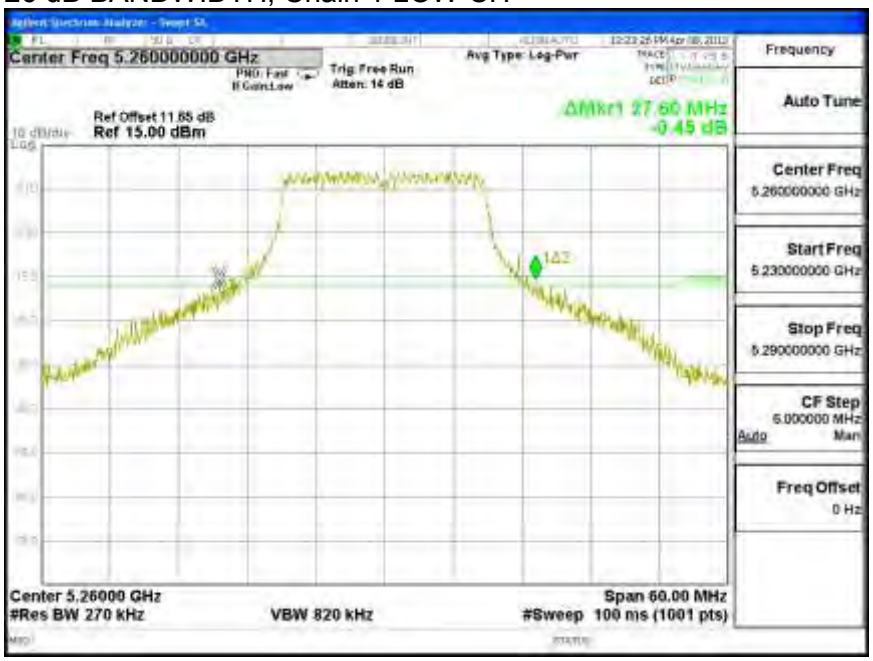


26 dB BANDWIDTH, Chain 0 HIGH CH

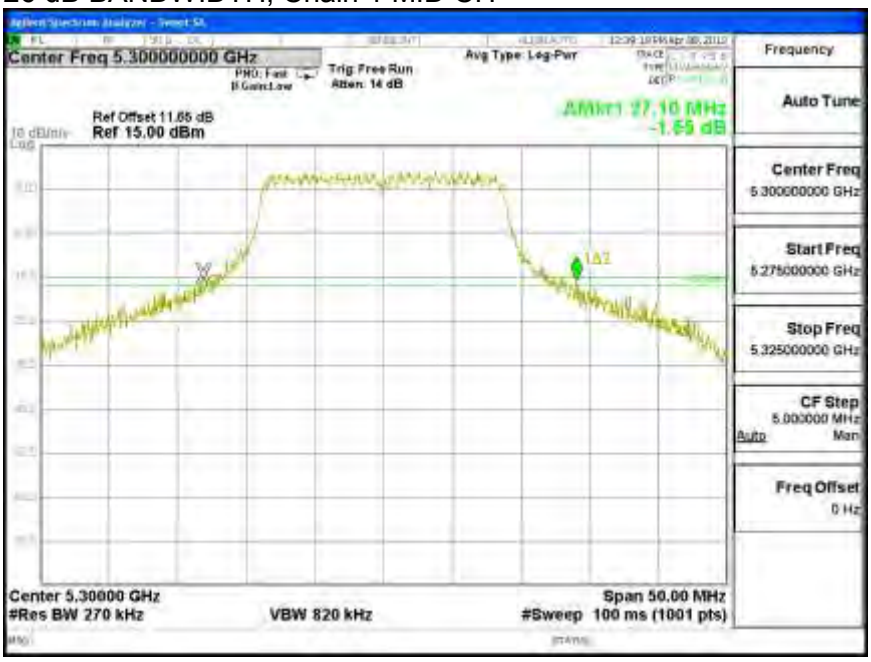


26 dB BANDWIDTH, Chain 1

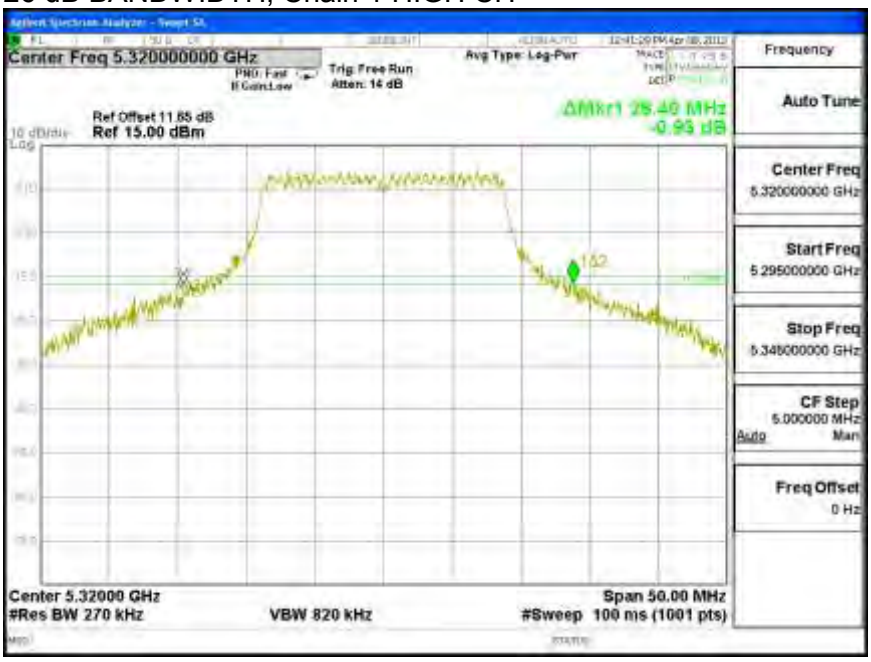
26 dB BANDWIDTH, Chain 1 LOW CH



26 dB BANDWIDTH, Chain 1 MID CH



26 dB BANDWIDTH, Chain 1 HIGH CH



8.2.3. 99% BANDWIDTH

LIMITS

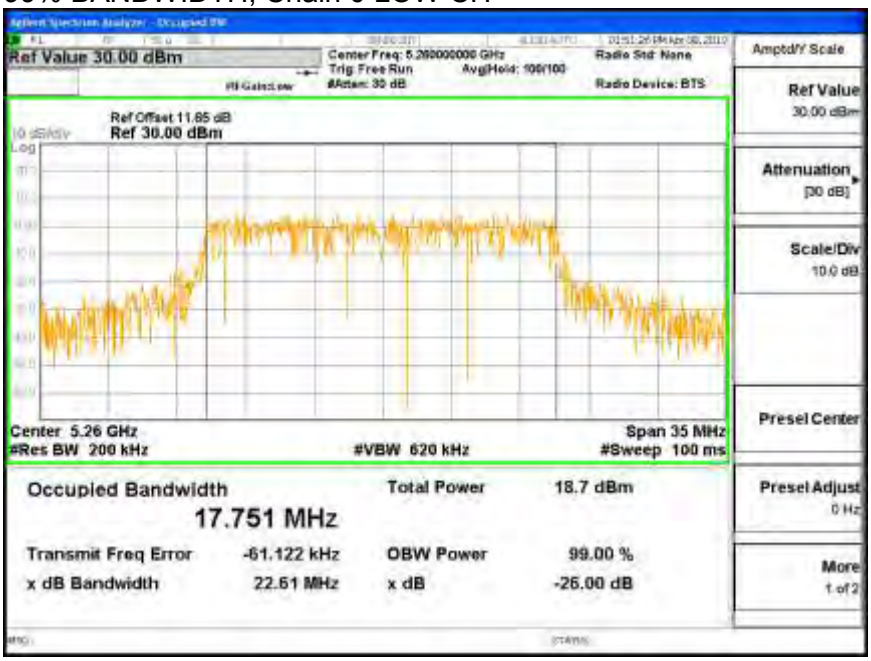
None; for reporting purposes only.

RESULTS

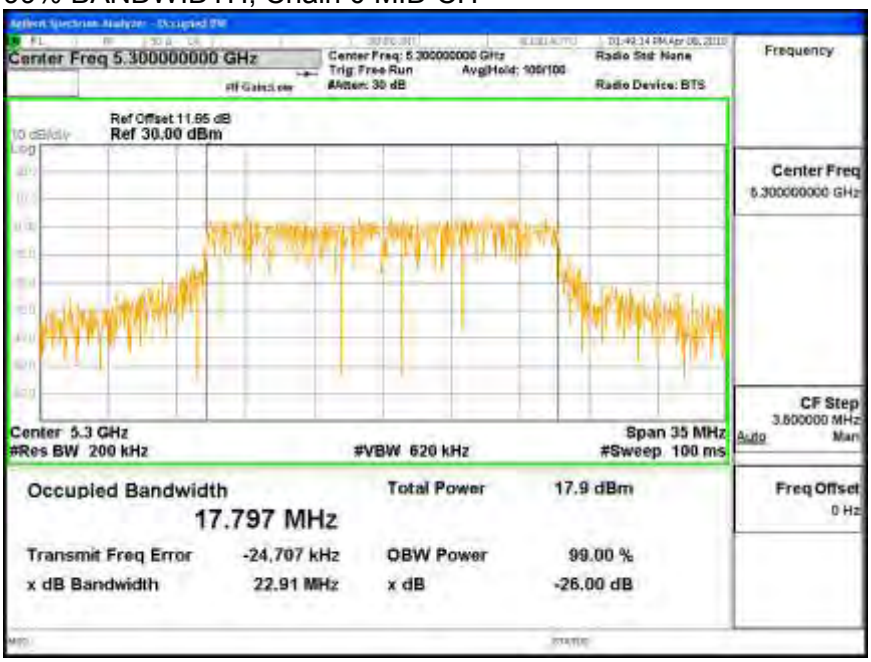
Channel	Frequency (MHz)	99% BW Chain 0 (MHz)	99% BW Chain 1 (MHz)
Low	5260	17.751	17.740
Mid	5300	17.797	17.620
High	5320	17.755	17.665

99% BANDWIDTH, Chain 0

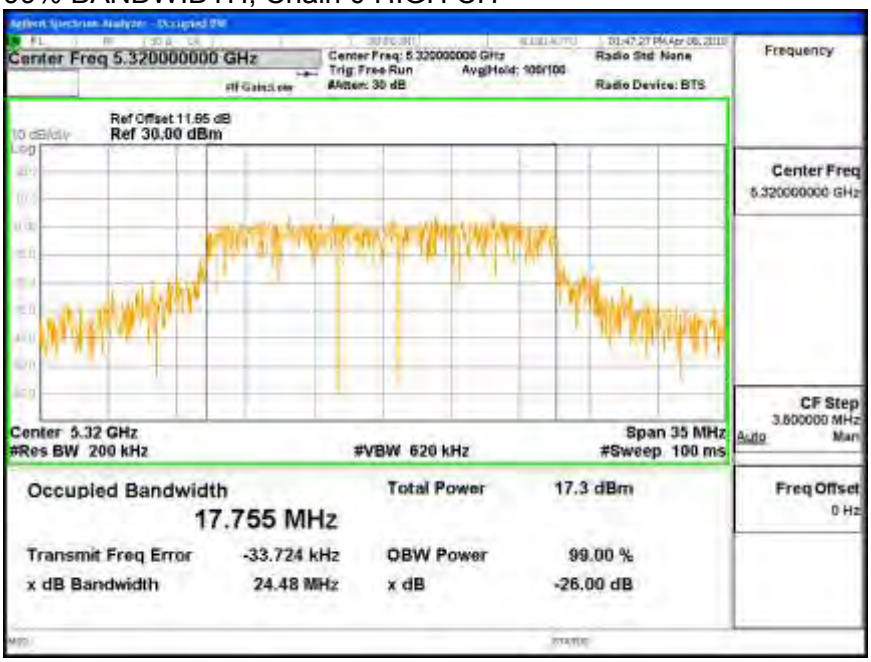
99% BANDWIDTH, Chain 0 LOW CH



99% BANDWIDTH, Chain 0 MID CH

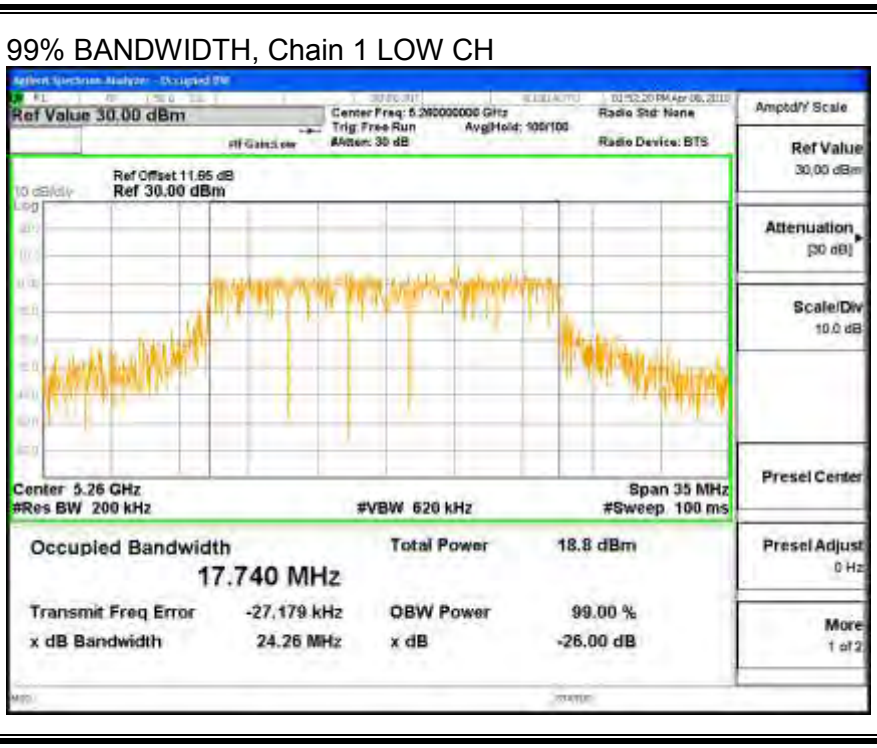


99% BANDWIDTH, Chain 0 HIGH CH

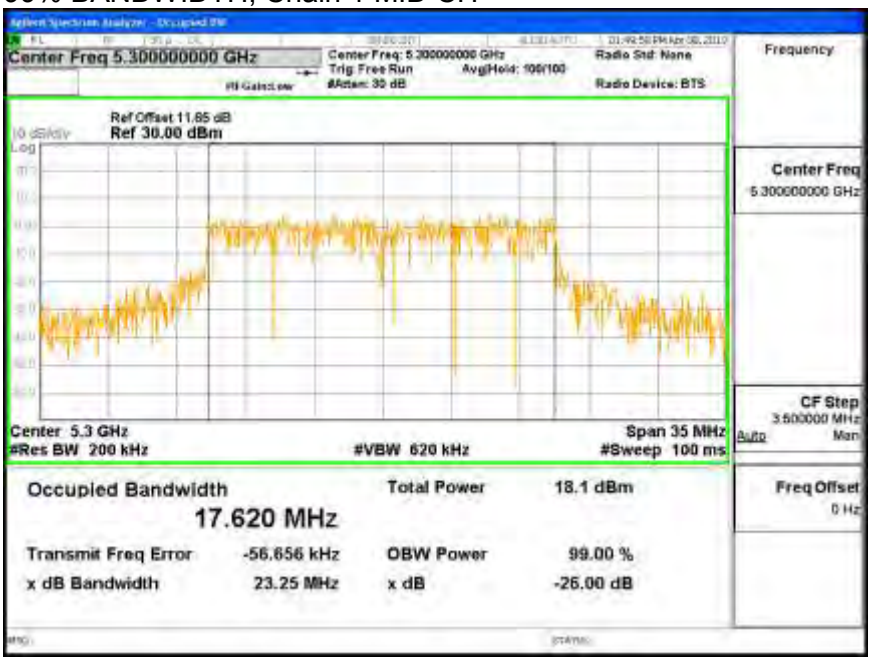


99% BANDWIDTH, Chain 1

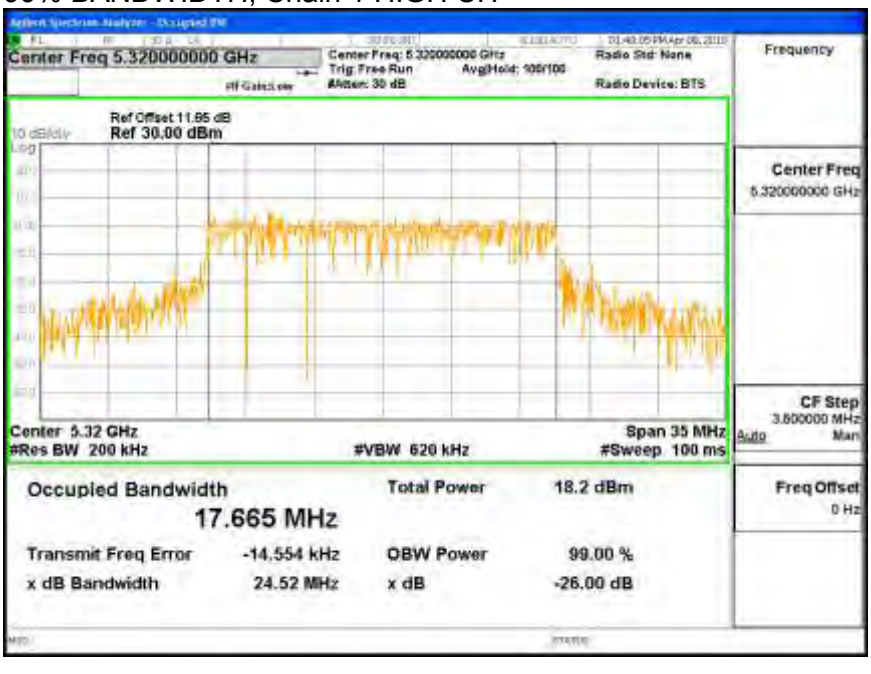
99% BANDWIDTH, Chain 1 LOW CH



99% BANDWIDTH, Chain 1 MID CH



99% BANDWIDTH, Chain 1 HIGH CH



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 250 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

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	5260	27.60	17.740	9.00
Mid	5300	25.75	17.620	9.00
High	5320	28.40	17.665	9.00

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	21.00	23.49	29.49	20.49	8.00	11.00	8.00
Mid	5300	21.00	23.46	29.46	20.46	8.00	11.00	8.00
High	5320	21.00	23.47	29.47	20.47	8.00	11.00	8.00

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

Output Power Results

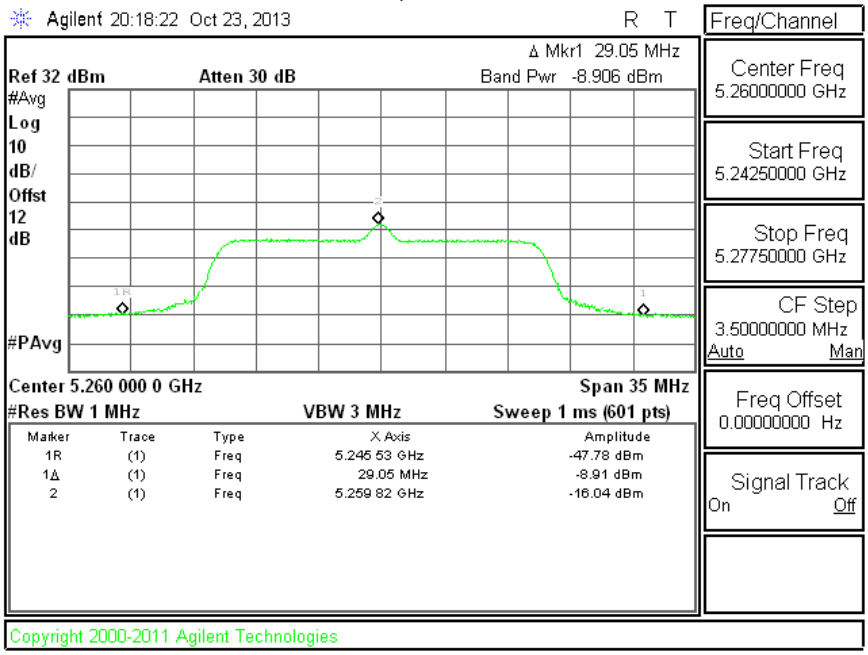
Channel	Frequency (MHz)	Chain 0 Meas Power (dBm)	Chain 1 Meas Power (dBm)	Total Corr'd Power (dBm)	Power Limit (dBm)	Power Margin (dB)
Low	5260	-8.906	-8.743	-5.813	20.49	-26.303
Mid	5300	16.520	16.586	19.563	20.46	-0.897
High	5320	16.655	15.895	19.302	20.47	-1.169

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	5260	-16.04	-17.53	-13.71	8.00	-21.71
Mid	5300	4.85	4.73	7.80	8.00	-0.20
High	5320	4.88	3.95	7.45	8.00	-0.55

OUTPUT POWER AND PPSD, Chain 0

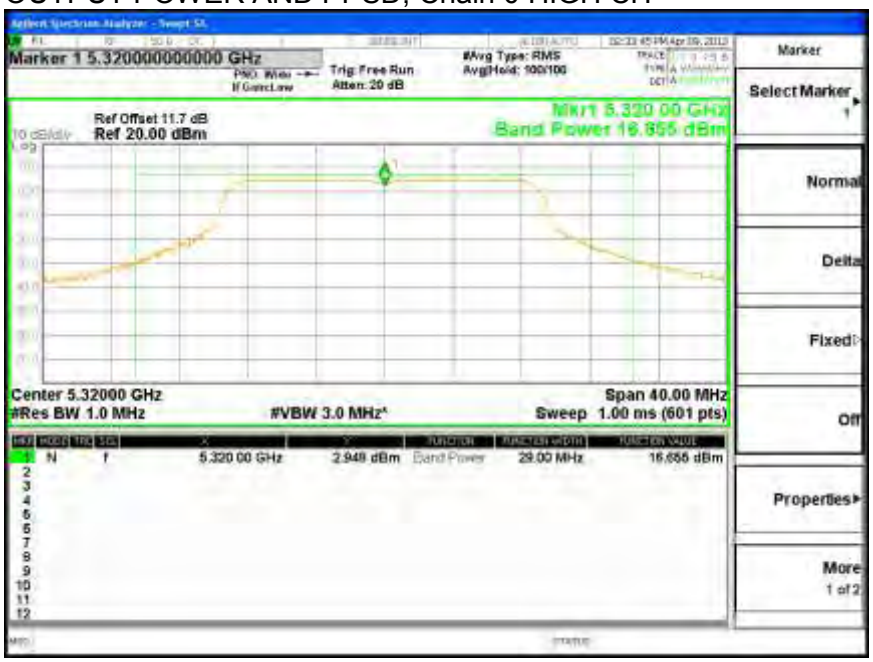
OUTPUT POWER AND PPSD, Chain 0 LOW CH



OUTPUT POWER AND PPSD, Chain 0 MID CH

Linear Average=4.85 dBm

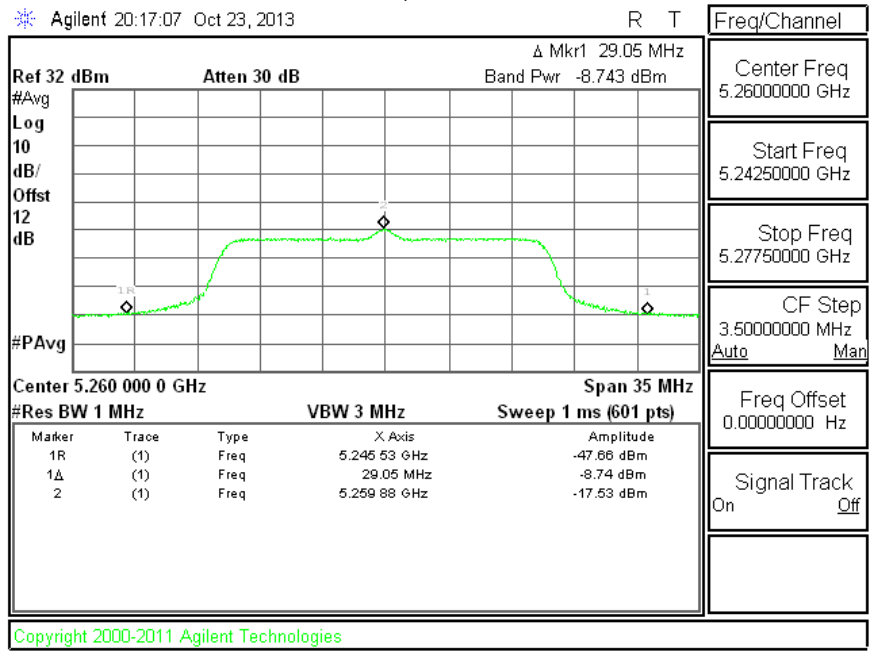
OUTPUT POWER AND PPSD, Chain 0 HIGH CH



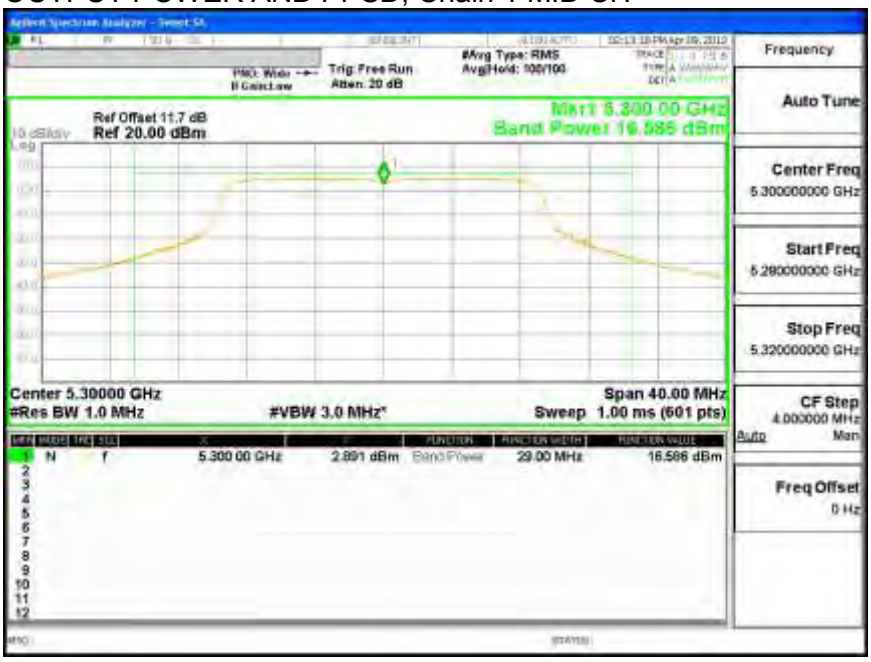
Linear Average=4.88 dBm

OUTPUT POWER AND PPSD, Chain 1

OUTPUT POWER AND PPSD, Chain 1 LOW CH

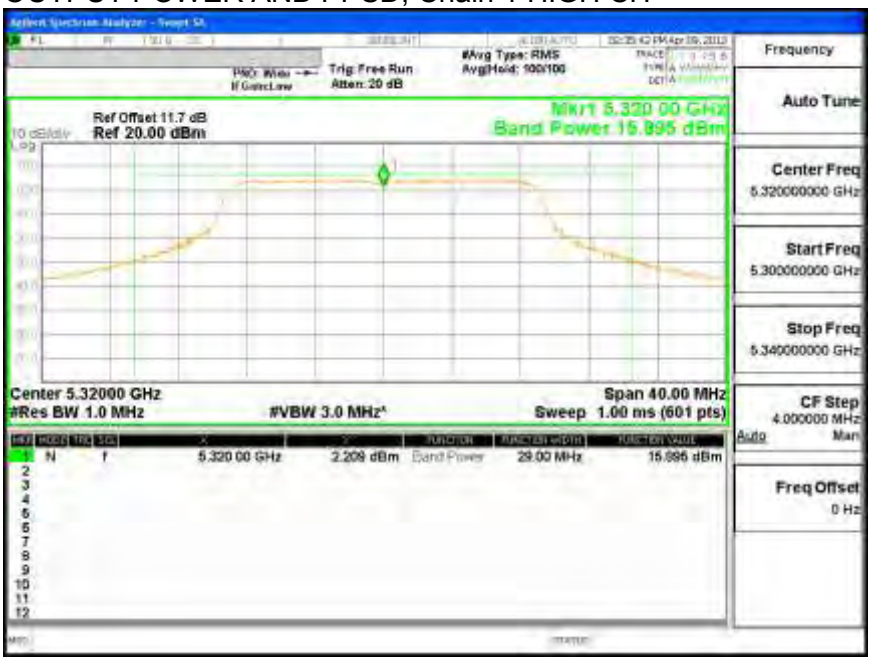


OUTPUT POWER AND PPSD, Chain 1 MID CH



Linear Average=4.73 dBm

OUTPUT POWER AND PPSD, Chain 1 HIGH CH



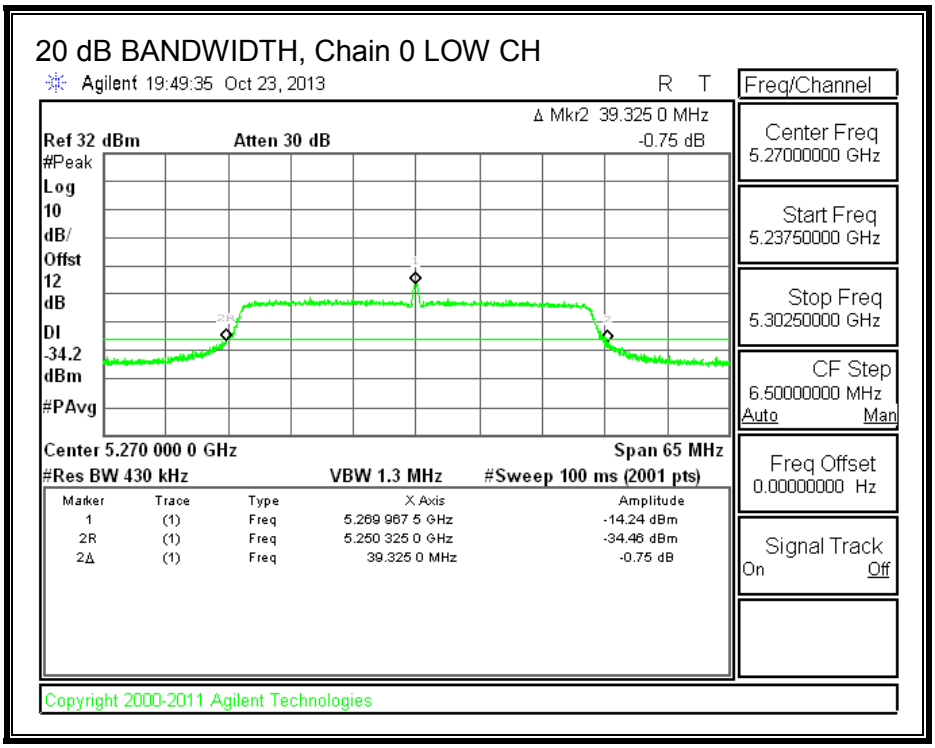
Linear Average=3.95 dBm

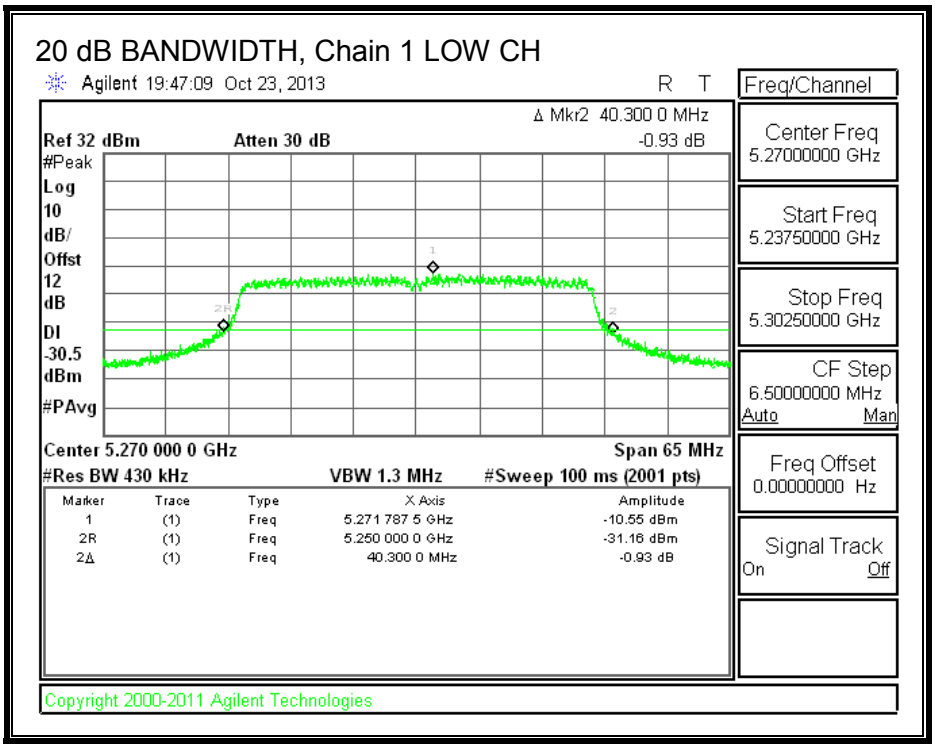
8.3. 802.11n HT40 STBC 2TX MODE IN THE 5.3 GHz BAND

8.3.1. 20 dB BANDWIDTH

LIMITS

None; 20 dB bandwidth is shown to ensure operation is within the specified 5250-5350 MHz operation band.





8.3.2. 26 dB BANDWIDTH

LIMITS

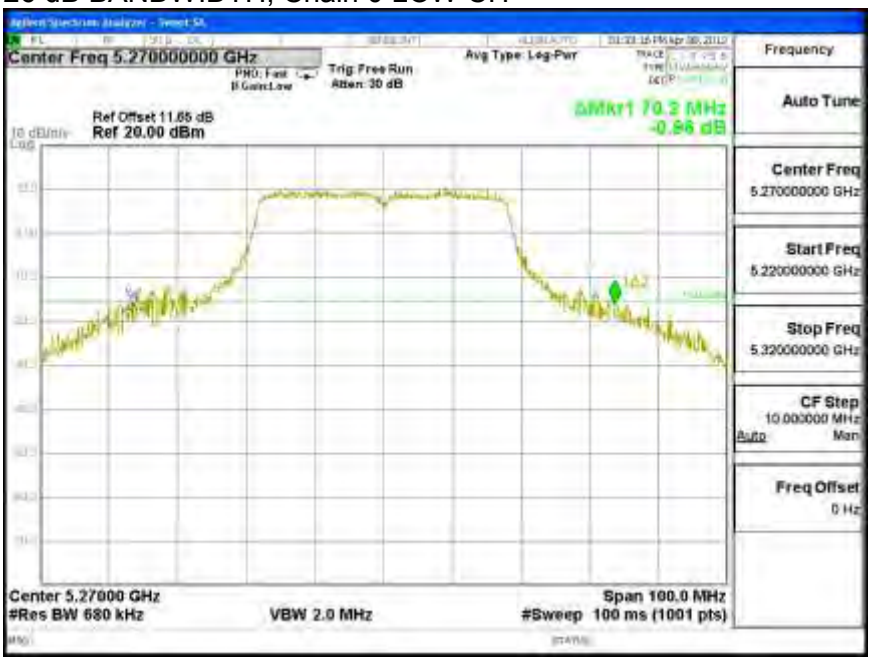
None; for reporting purposes only.

RESULTS

Channel	Frequency (MHz)	26 dB BW Chain 0 (MHz)	26 dB BW Chain 1 (MHz)
Low	5270	70.2	62.2
High	5310	70.4	67.0

26 dB BANDWIDTH, Chain 0

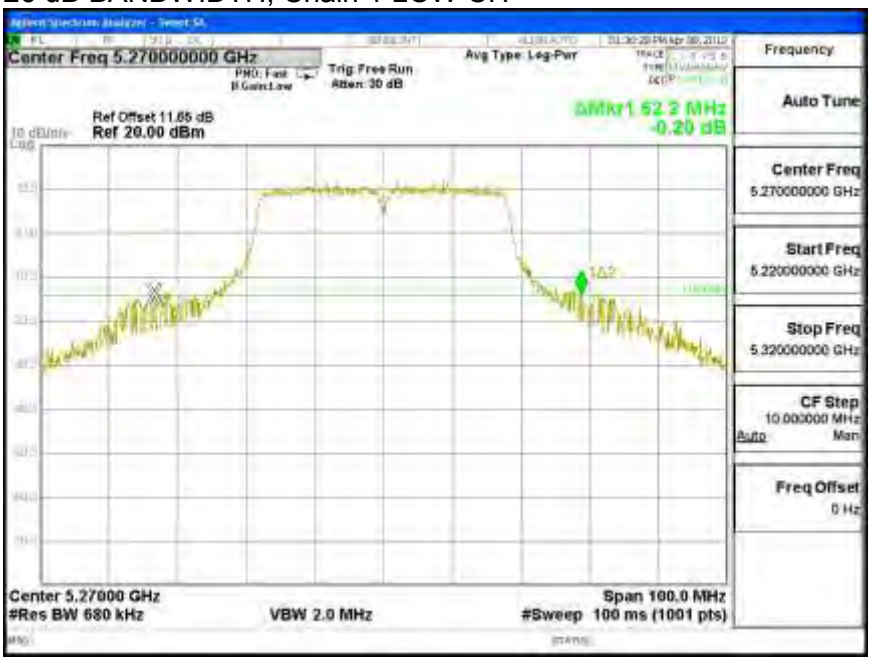
26 dB BANDWIDTH, Chain 0 LOW CH



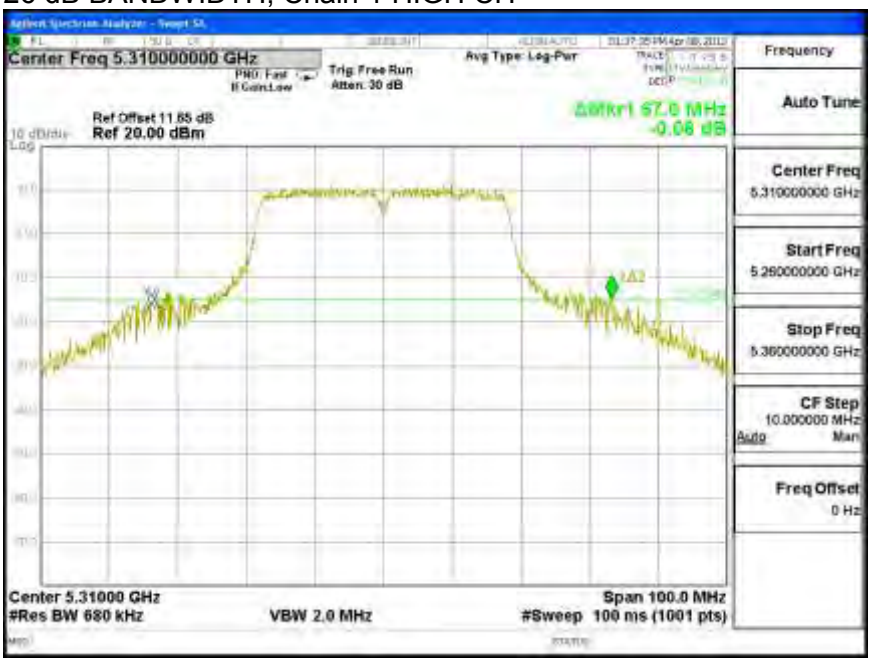
26 dB BANDWIDTH, Chain 0 HIGH CH

26 dB BANDWIDTH, Chain 1

26 dB BANDWIDTH, Chain 1 LOW CH



26 dB BANDWIDTH, Chain 1 HIGH CH



8.3.3. 99% BANDWIDTH

LIMITS

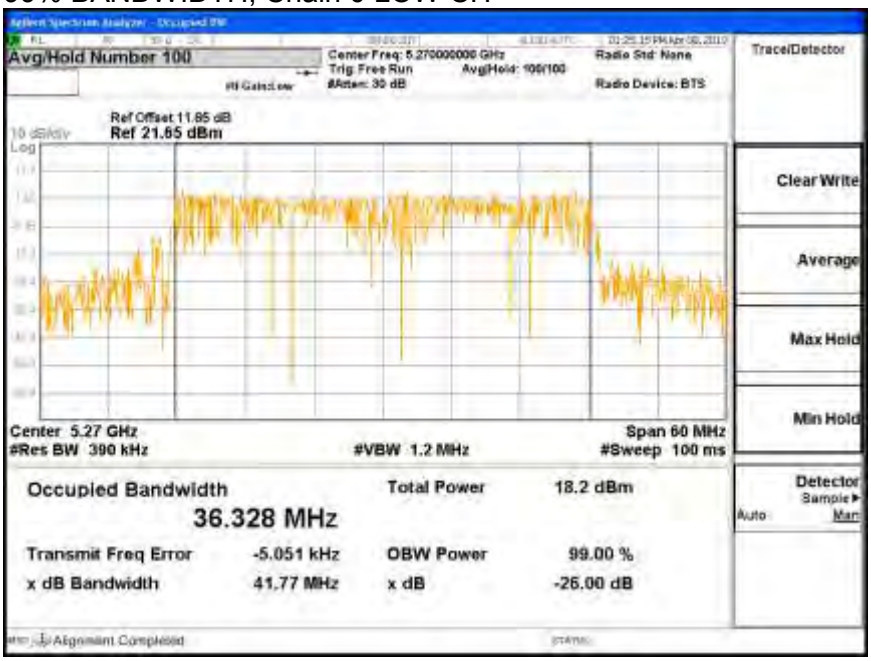
None; for reporting purposes only.

RESULTS

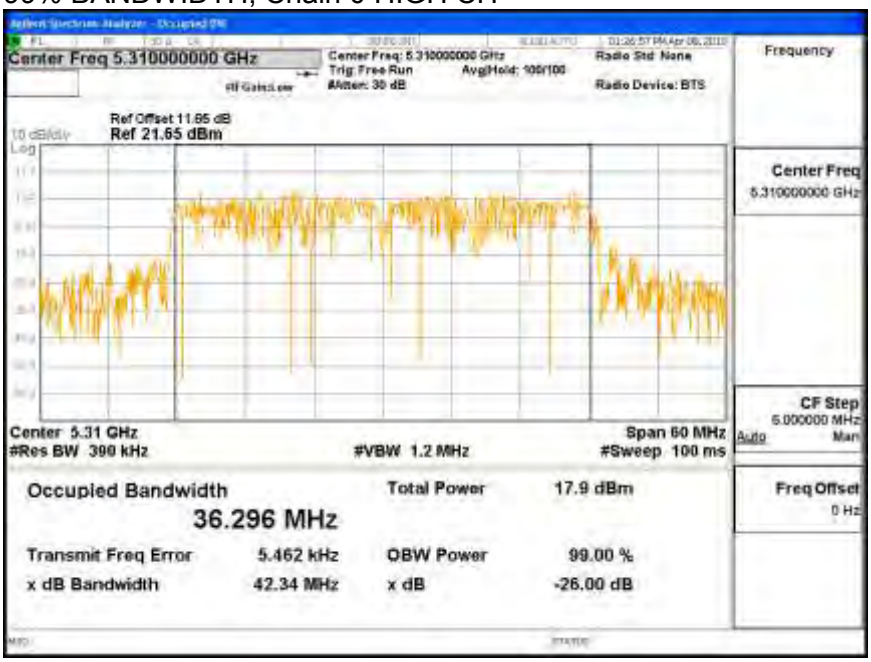
Channel	Frequency (MHz)	99% BW Chain 0 (MHz)	99% BW Chain 1 (MHz)
Low	5270	36.328	36.323
High	5310	36.296	36.310

99% BANDWIDTH, Chain 0

99% BANDWIDTH, Chain 0 LOW CH

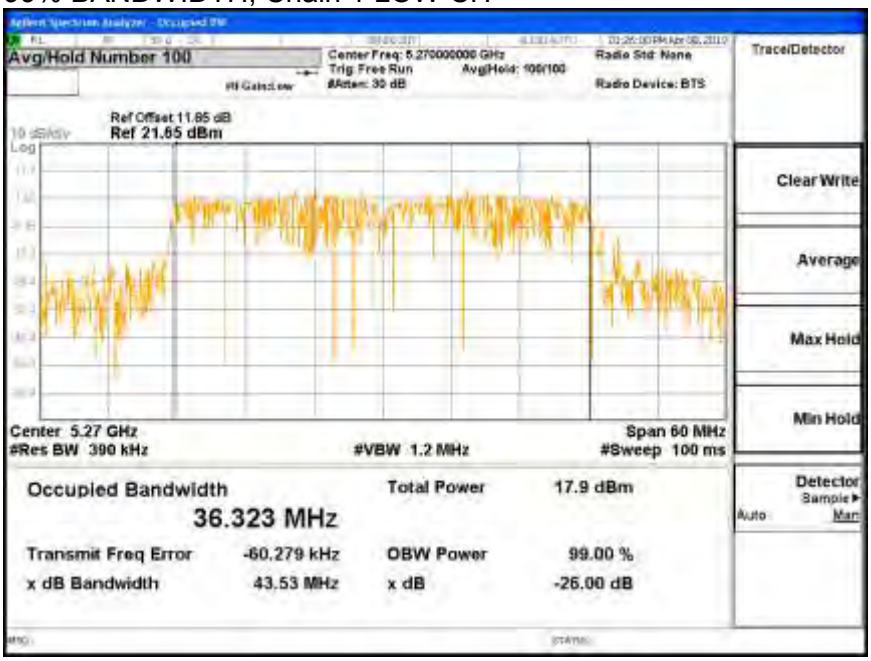


99% BANDWIDTH, Chain 0 HIGH CH

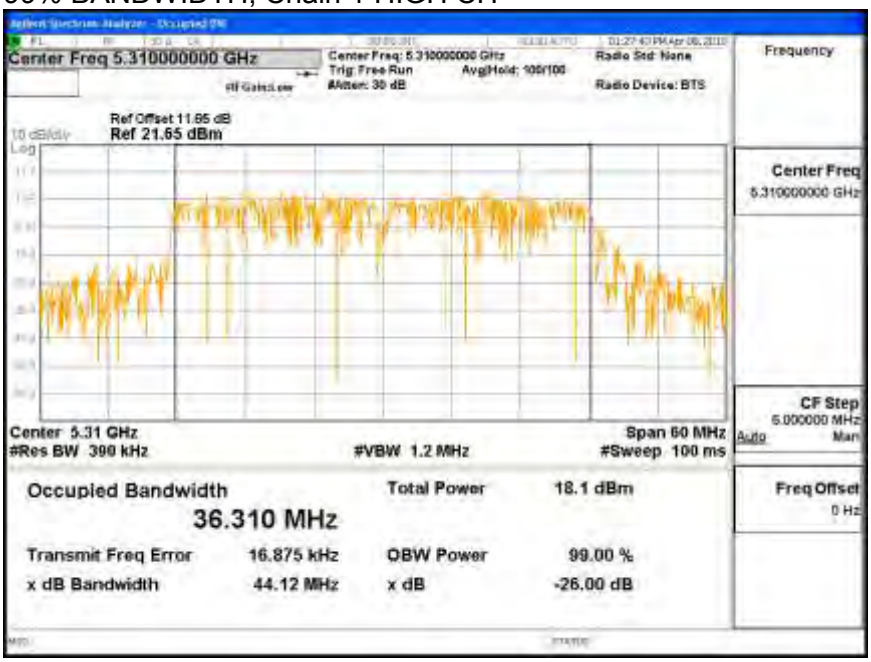


99% BANDWIDTH, Chain 1

99% BANDWIDTH, Chain 1 LOW CH



99% BANDWIDTH, Chain 1 HIGH CH



8.3.4. 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 250 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

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	5270	62.2	36.323	9.00
High	5310	67.0	36.296	9.00

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	5270	21.00	24.00	30.00	21.00	8.00	11.00	8.00
High	5310	21.00	24.00	30.00	21.00	8.00	11.00	8.00

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

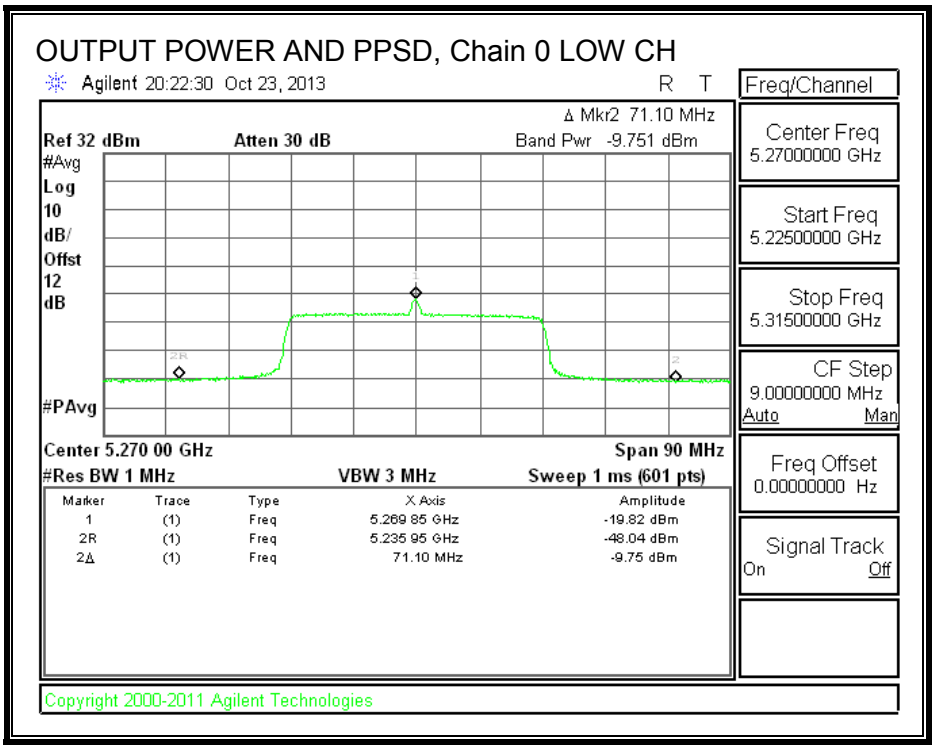
Output Power Results

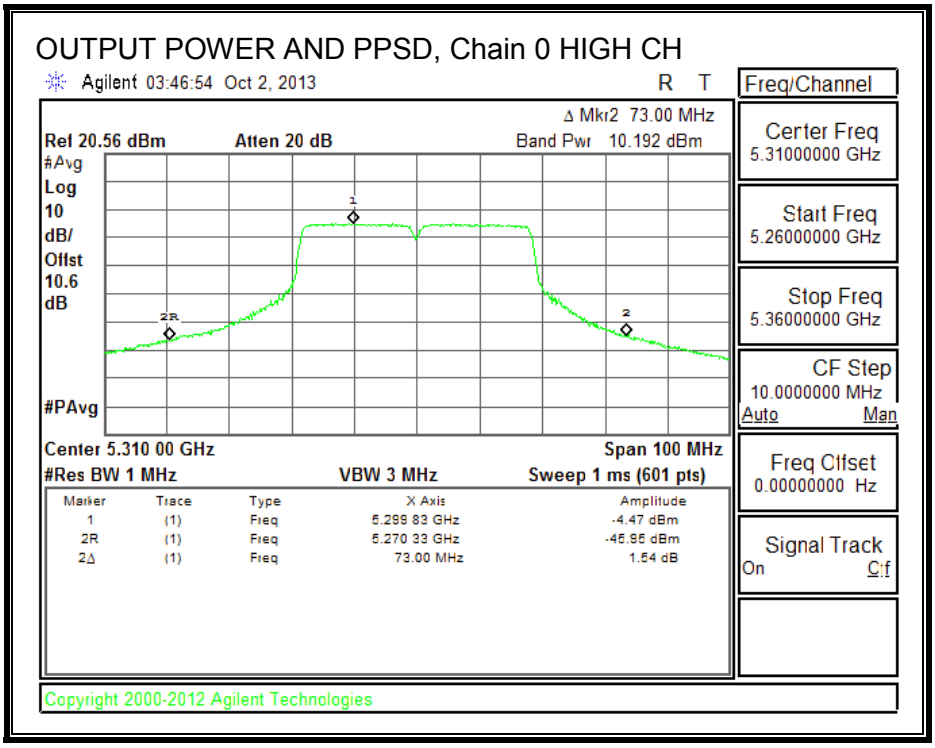
Channel	Frequency (MHz)	Chain 0 Meas Power (dBm)	Chain 1 Meas Power (dBm)	Total Corr'd Power (dBm)	Power Limit (dBm)	Power Margin (dB)
Low	5270	-9.751	-2.662	-1.887	21.00	-22.887
High	5310	10.192	10.480	13.349	21.00	-7.651

PPSD Results

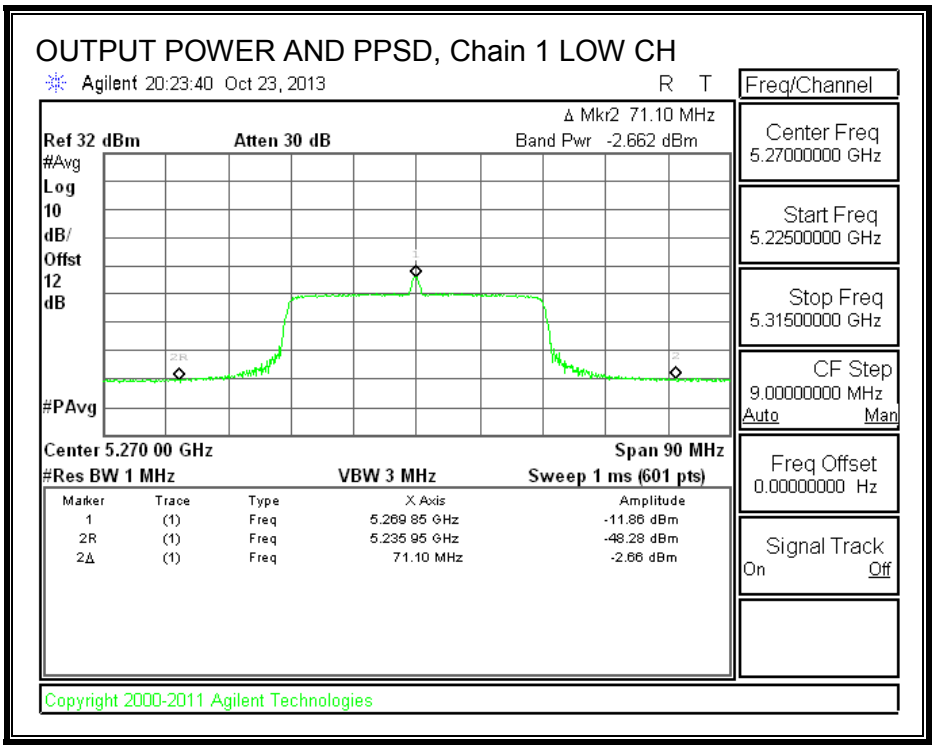
Channel	Frequency (MHz)	Chain 0 Meas PPSD (dBm)	Chain 1 Meas PPSD (dBm)	Total Corr'd PPSD (dBm)	PPSD Limit (dBm)	PPSD Margin (dB)
Low	5270	-19.820	-11.860	-11.22	8.00	-19.22
High	5310	-4.470	-4.356	-1.40	8.00	-9.40

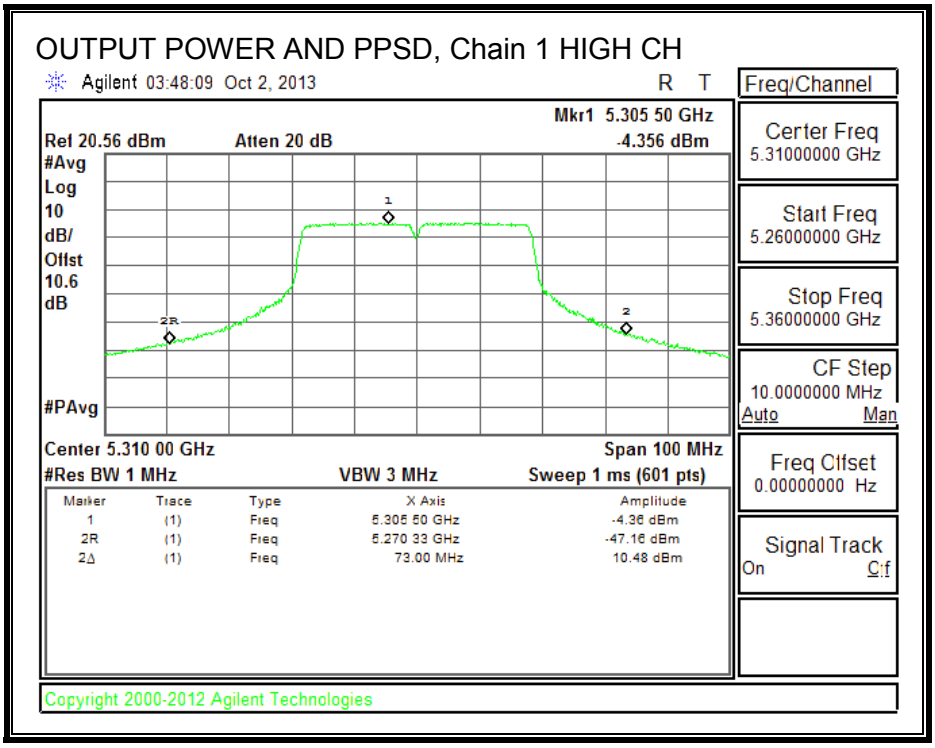
OUTPUT POWER AND PPSD, Chain 0





OUTPUT POWER AND PPSD, Chain 1





8.4. 802.11a CDD 2TX 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 BW Chain 0 (MHz)	26 dB BW Chain 1 (MHz)
Low	5500	27.225	27.525
Mid	5580	29.025	29.325
High	5700	26.100	25.800

26 dB BANDWIDTH, Chain 0

BANDWIDTH Chain 0 LOW CH

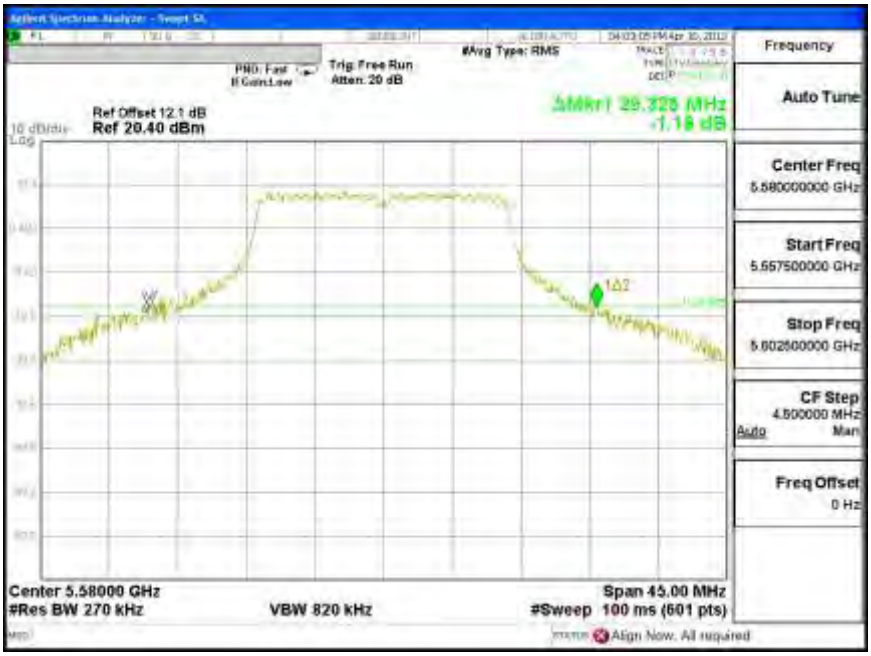
BANDWIDTH Chain 0 MID CH

BANDWIDTH Chain 0 HIGH CH

26 dB BANDWIDTH, Chain 1

BANDWIDTH Chain 1 LOW CH

BANDWIDTH Chain 1 MID CH



BANDWIDTH Chain 1 HIGH CH

8.4.2. 99% BANDWIDTH

LIMITS

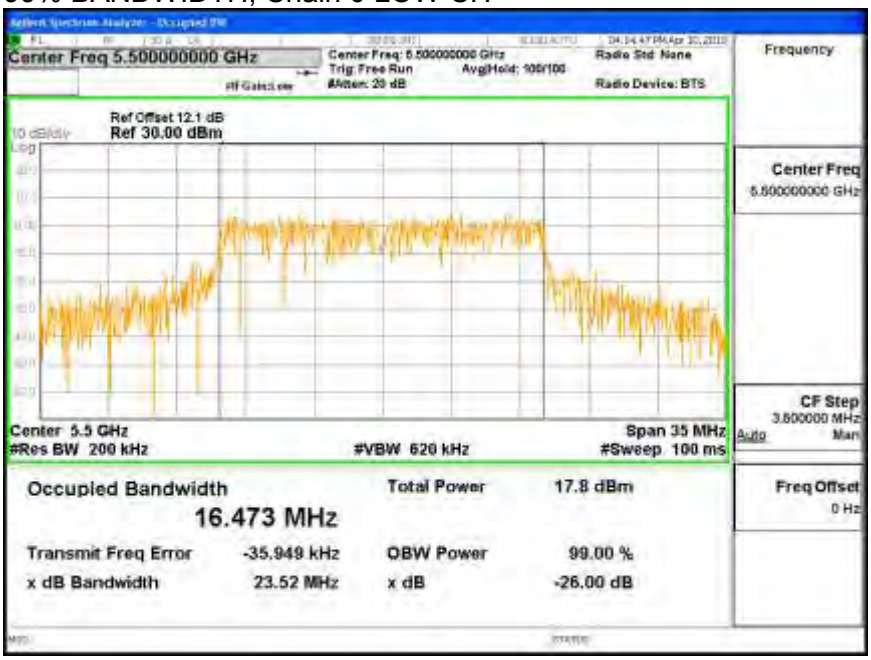
None; for reporting purposes only.

RESULTS

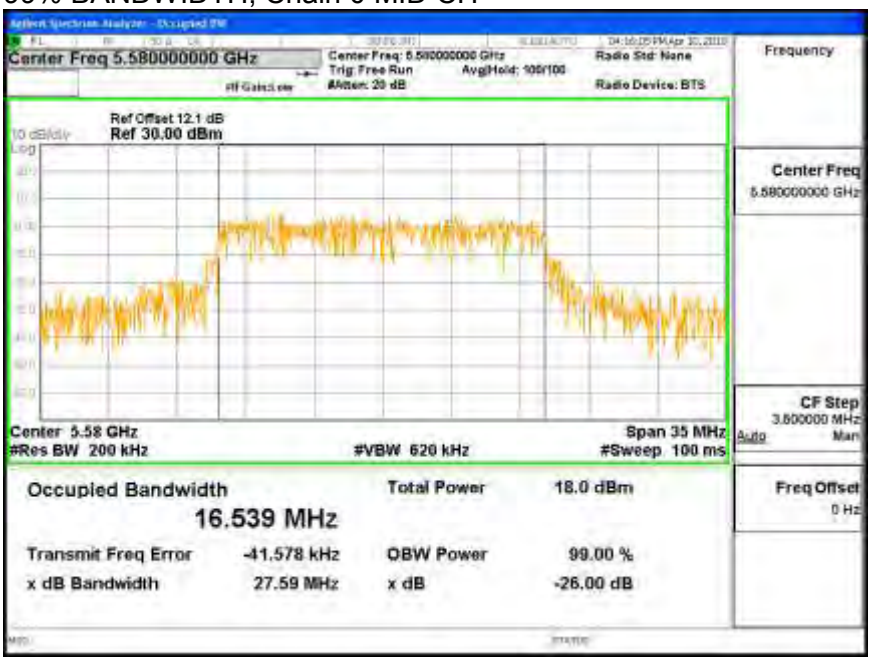
Channel	Frequency (MHz)	99% BW Chain 0 (MHz)	99% BW Chain 1 (MHz)
Low	5500	16.473	16.482
Mid	5580	16.539	16.462
High	5700	16.500	16.445

99% BANDWIDTH, Chain 0

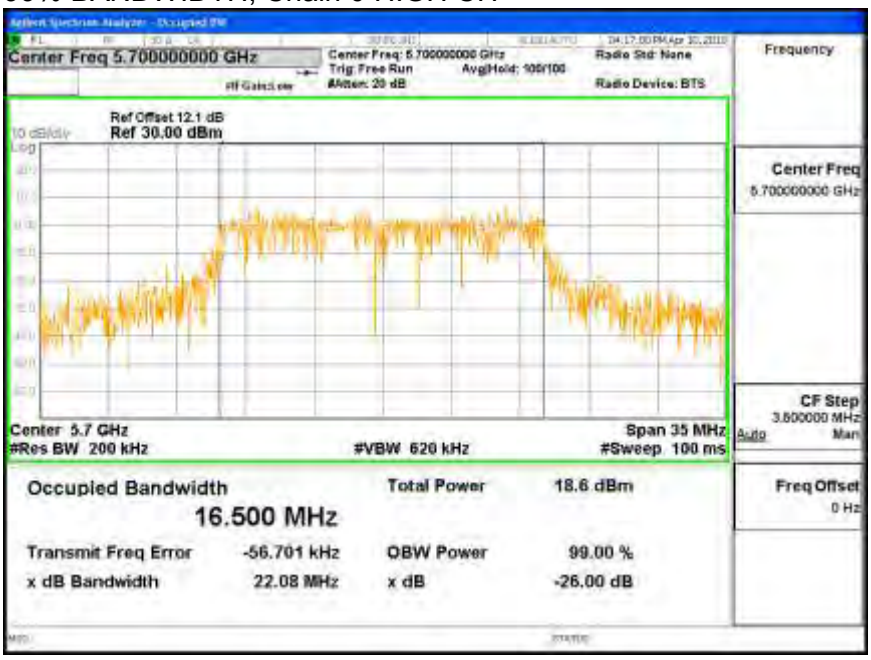
99% BANDWIDTH, Chain 0 LOW CH



99% BANDWIDTH, Chain 0 MID CH

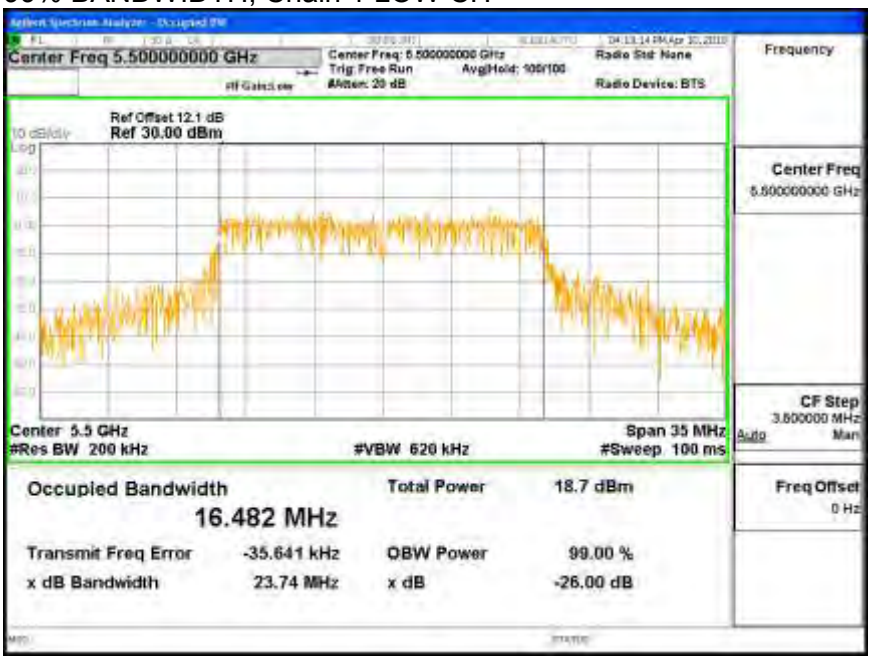


99% BANDWIDTH, Chain 0 HIGH CH

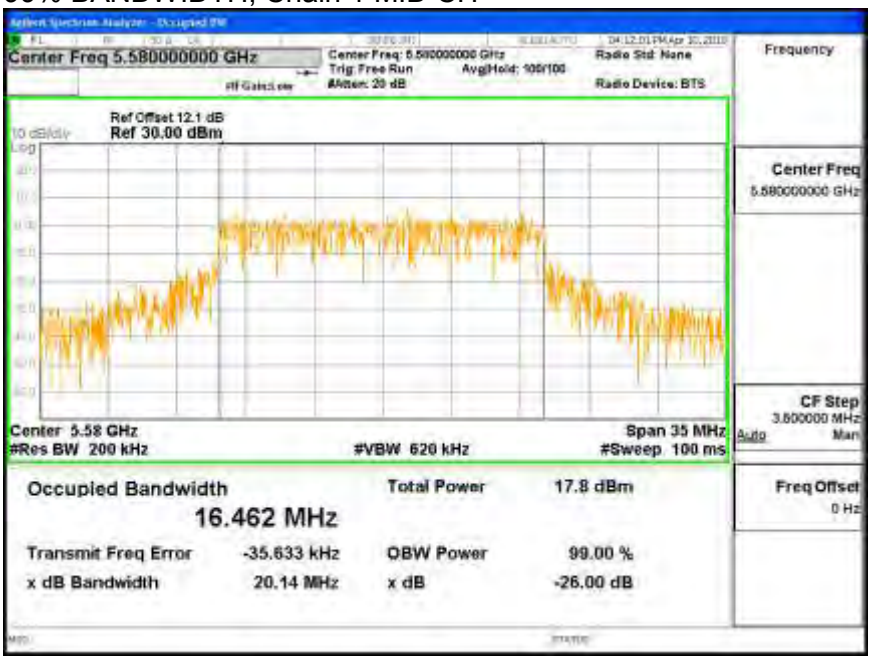


99% BANDWIDTH, Chain 1

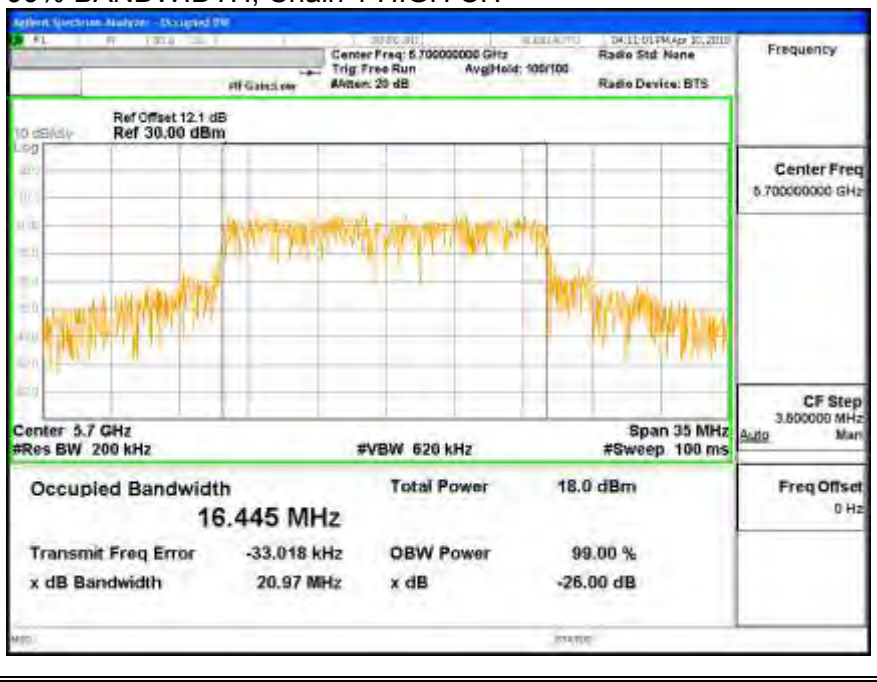
99% BANDWIDTH, Chain 1 LOW CH



99% BANDWIDTH, Chain 1 MID CH



99% BANDWIDTH, Chain 1 HIGH CH



8.4.3. 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 250 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

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

For PPSD, 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)
9.00	3.01	12.01

RESULTS

Bandwidth and Antenna Gain

Channel	Frequency (MHz)	Min 26 dB BW (MHz)	Min 99% BW (MHz)	Uncorrelated Directional Gain (dBi)	Correlated Directional Gain (dBi)
Low	5500	27.225	16.4730	9.00	12.01
Mid	5580	29.025	16.4620	9.00	12.01
High	5700	25.800	16.4450	9.00	12.01

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	21.00	23.17	29.17	20.17	4.99	11.00	4.99
Mid	5580	21.00	23.16	29.16	20.16	4.99	11.00	4.99
High	5700	21.00	23.16	29.16	20.16	4.99	11.00	4.99

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

Output Power Results

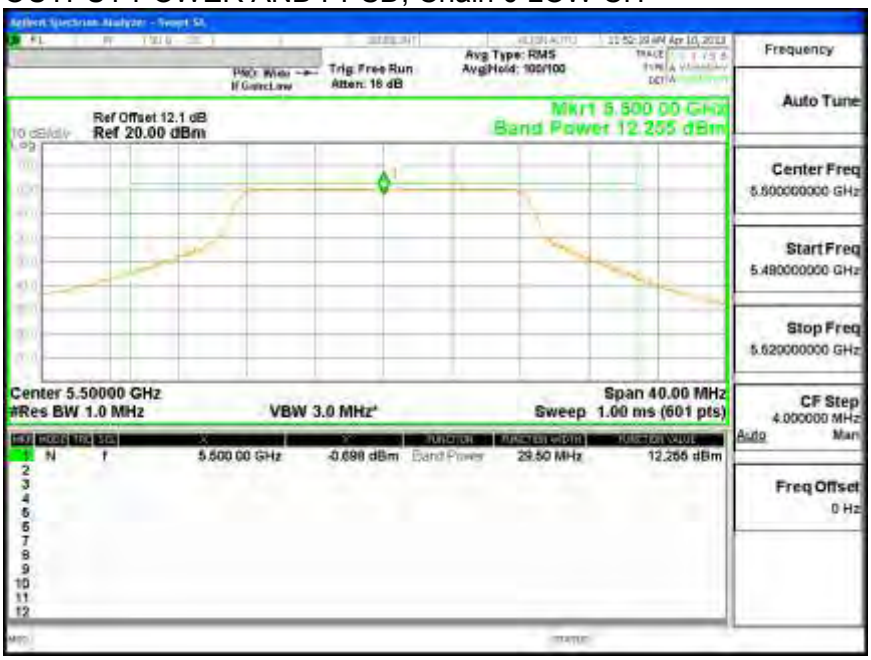
Channel	Frequency (MHz)	Chain 0 Meas Power (dBm)	Chain 1 Meas Power (dBm)	Total Corr'd Power (dBm)	Power Limit (dBm)	Power Margin (dB)
Low	5500	12.255	13.584	15.980	20.17	-4.187
Mid	5580	13.011	13.314	16.175	20.16	-3.989
High	5700	13.372	13.284	16.339	20.16	-3.822

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	5500	2.03	1.58	4.82	4.99	-0.17
Mid	5580	1.49	1.99	4.76	4.99	-0.23
High	5700	0.41	2.26	4.44	4.99	-0.55

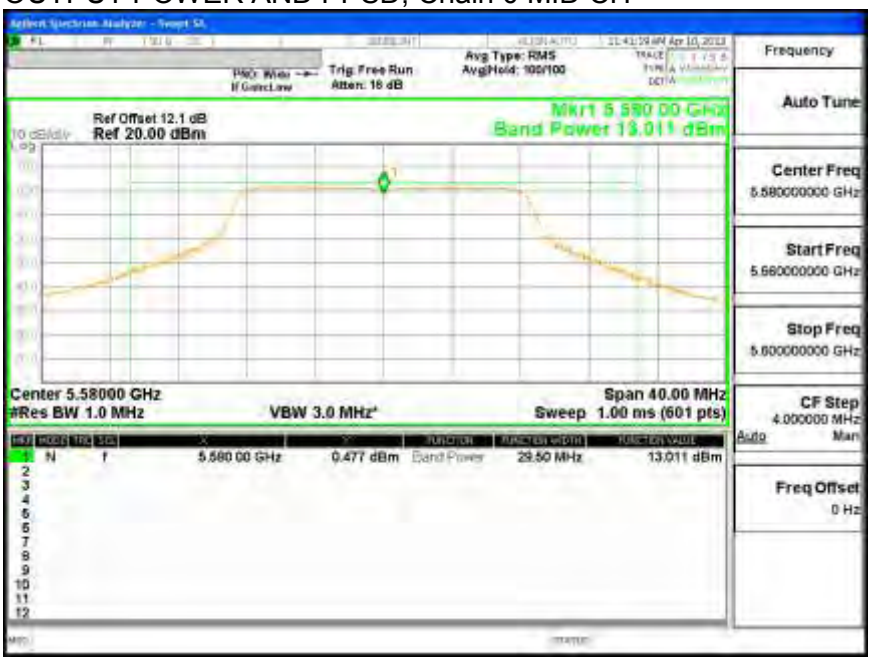
OUTPUT POWER AND PPSD, Chain 0

OUTPUT POWER AND PPSD, Chain 0 LOW CH



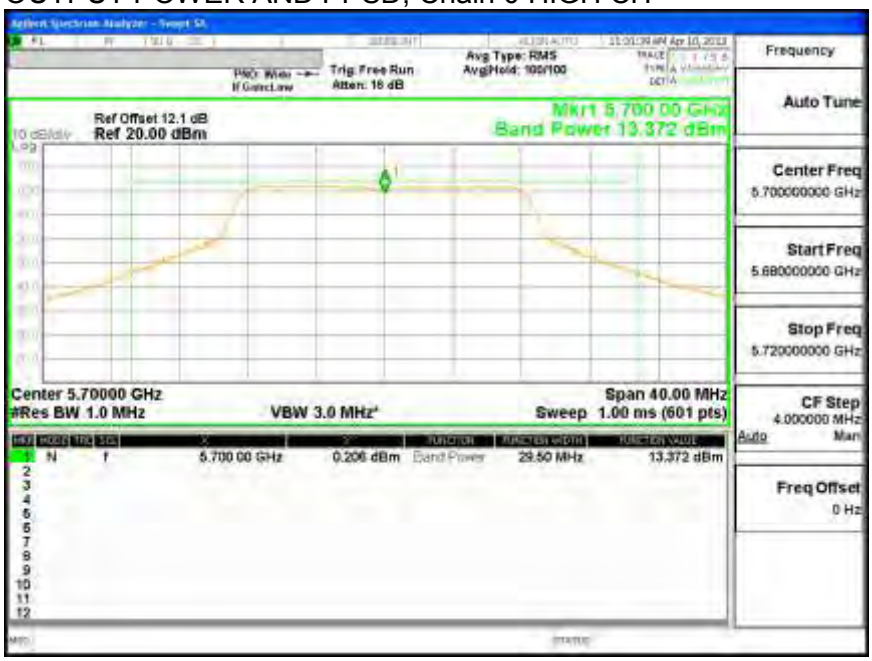
Linear Average=2.03 dBm

OUTPUT POWER AND PPSD, Chain 0 MID CH



Linear Average=1.49 dBm

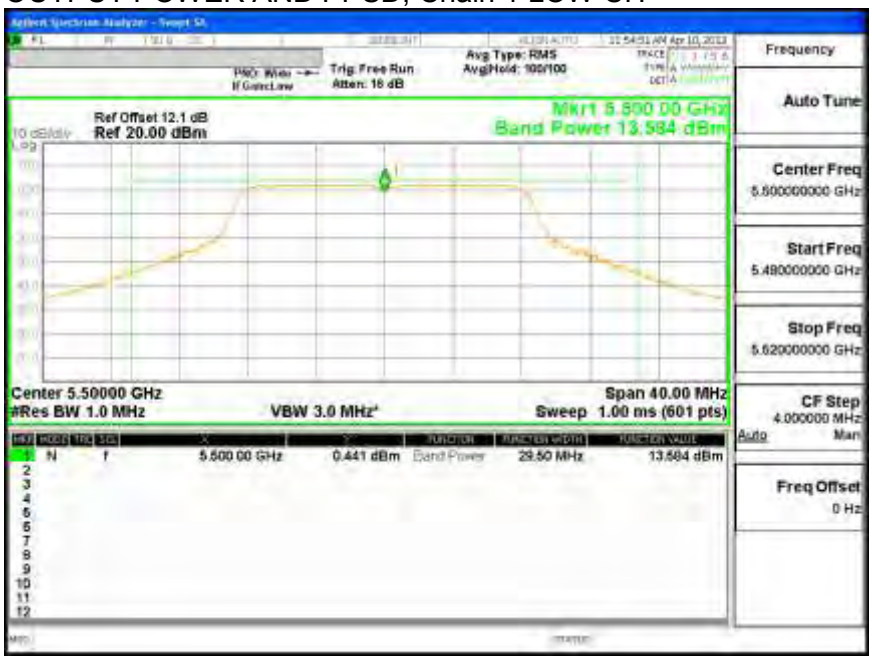
OUTPUT POWER AND PPSD, Chain 0 HIGH CH



Linear Average=0.41 dBm

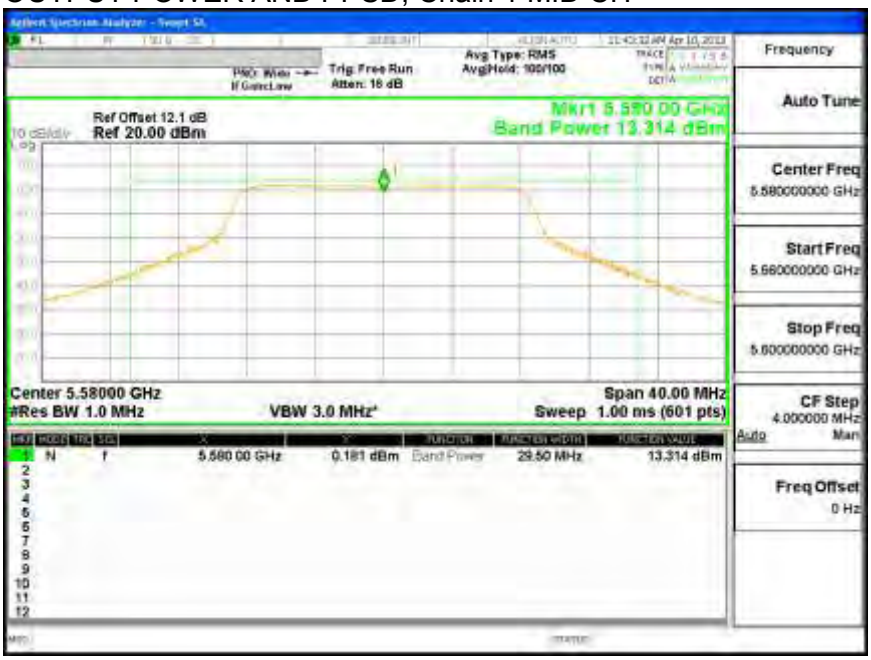
OUTPUT POWER AND PPSD, Chain 1

OUTPUT POWER AND PPSD, Chain 1 LOW CH



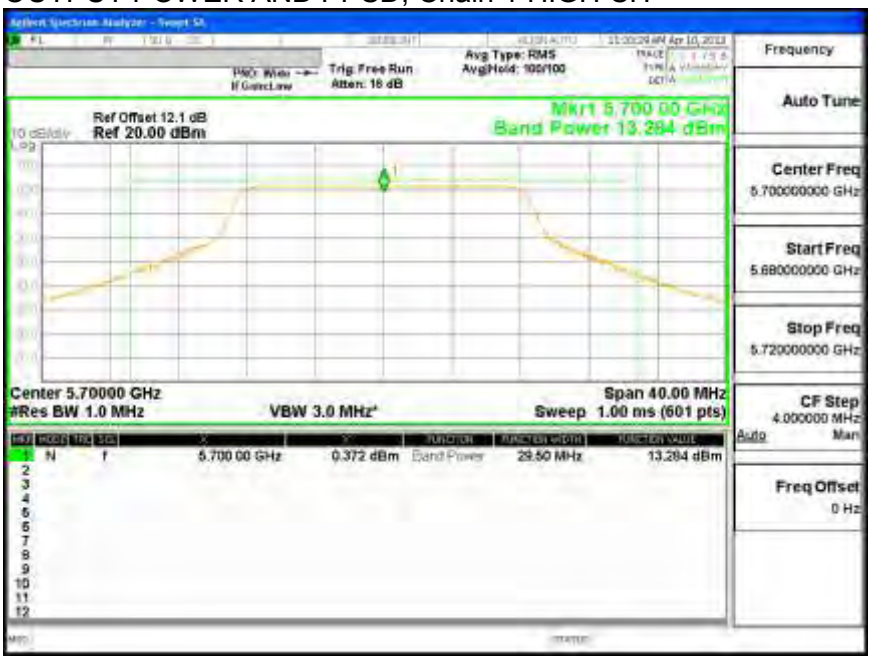
Linear Average=1.58 dBm

OUTPUT POWER AND PPSD, Chain 1 MID CH



Linear Average=1.99 dBm

OUTPUT POWER AND PPSD, Chain 1 HIGH CH



Linear Average=2.26 dBm

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.

RESULTS

Chain 0

Channel	Frequency (MHz)	PK Level (dBm)	PSD (dBm)	DCCF (dB)	Peak Excursion (dB)	Limit (dB)	Margin (dB)
Mid	5580	13.52	1.49	0.00	12.03	13	-0.97

Chain 1

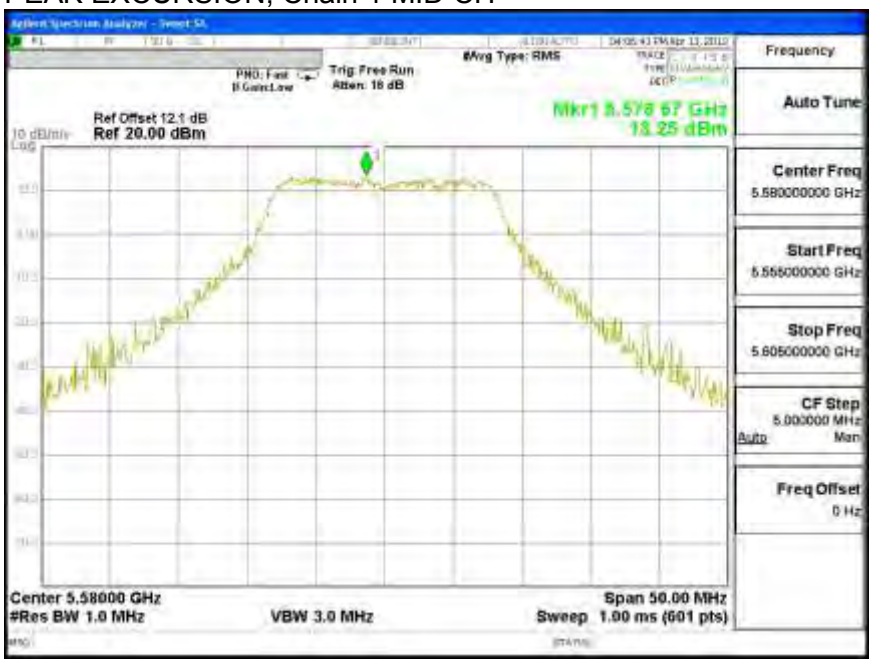
Channel	Frequency (MHz)	PK Level (dBm)	PSD (dBm)	DCCF (dB)	Peak Excursion (dB)	Limit (dB)	Margin (dB)
Mid	5580	13.25	1.99	0.00	11.26	13	-1.74

PEAK EXCURSION, Chain 0

PEAK EXCURSION, Chain 0 MID CH

PEAK EXCURSION, Chain 1

PEAK EXCURSION, Chain 1 MID CH



8.4.5. CONDUCTED WEATHER RADAR BAND EMISSIONS

LIMITS

Within 5600 – 5650 MHz band, -20 dBc relative to highest fundamental output power density per 100 kHz.

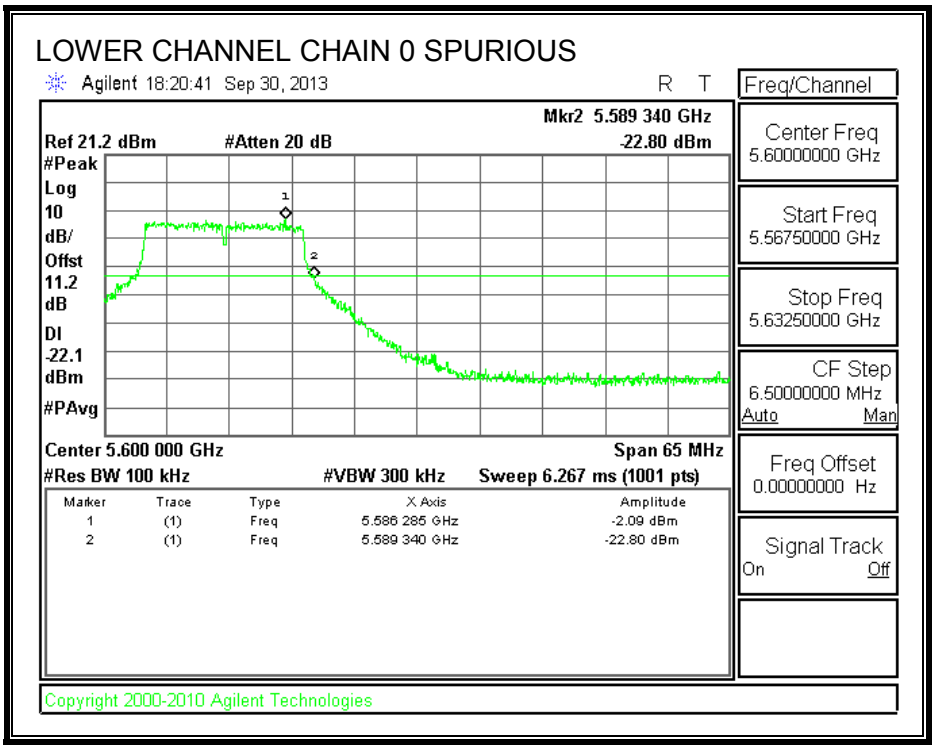
TEST PROCEDURE

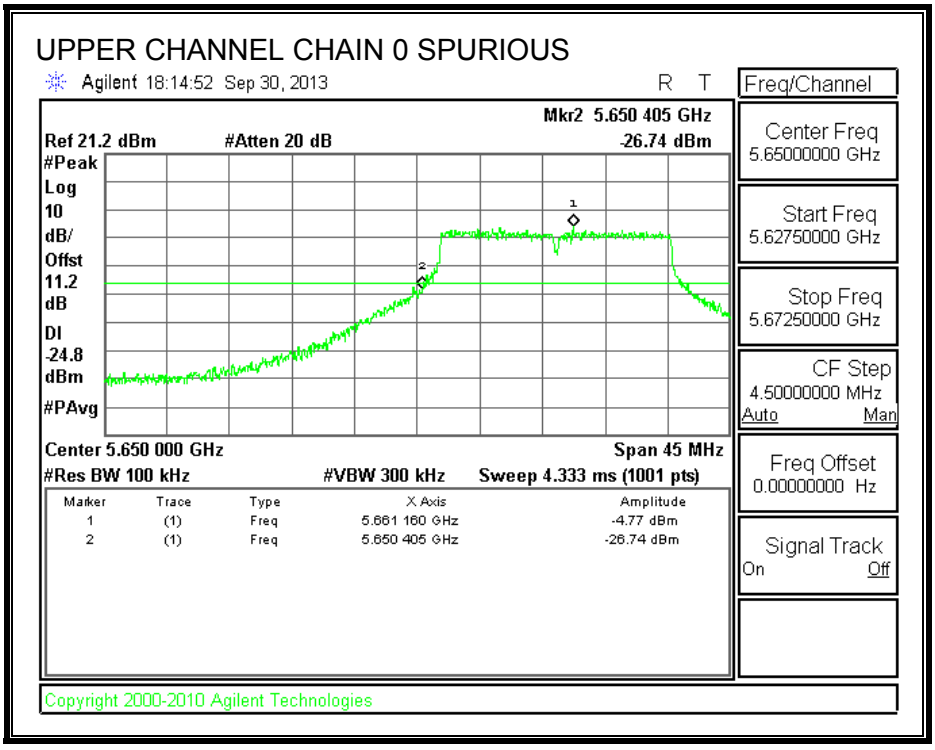
The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

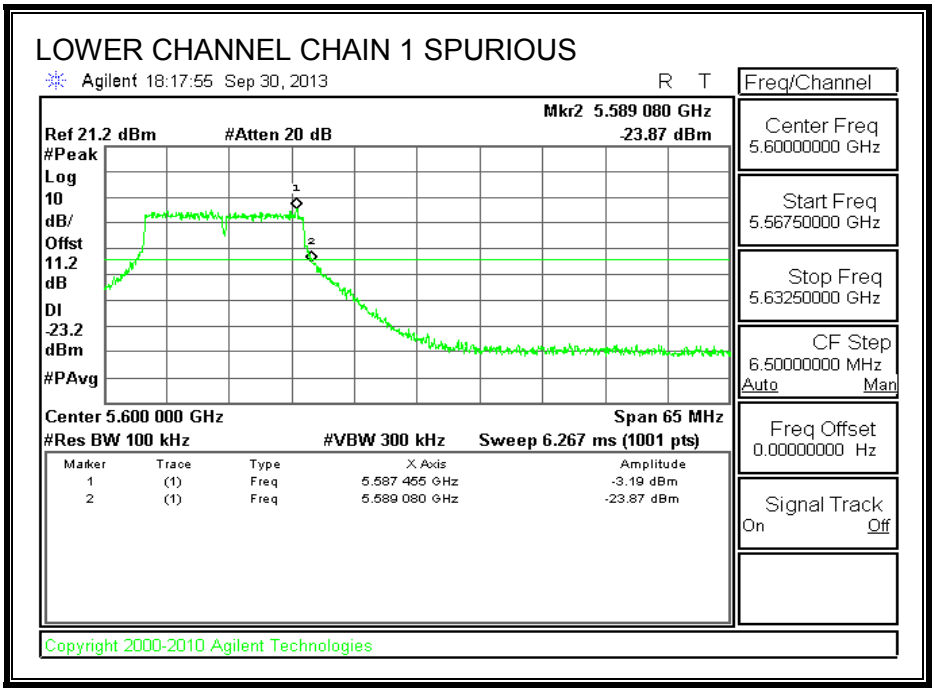
The authorized channel nearest to and less than 5600 MHz is measured.

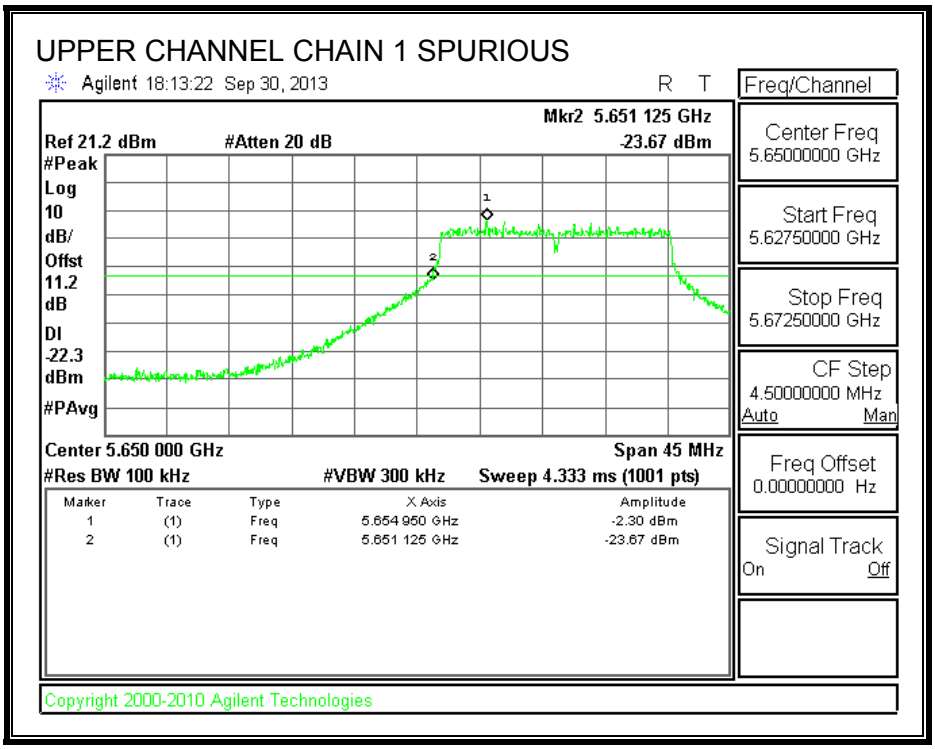
The authorized channel nearest to and greater than 5650 MHz is measured.

SPURIOUS EMISSIONS IN WEATHER RADAR BAND 5600 - 5650 MHz









8.5. 802.11n HT20 STBC 2TX MODE IN THE 5.6 GHz BAND

8.5.1. 26 dB BANDWIDTH

LIMITS

None; for reporting purposes only.

RESULTS

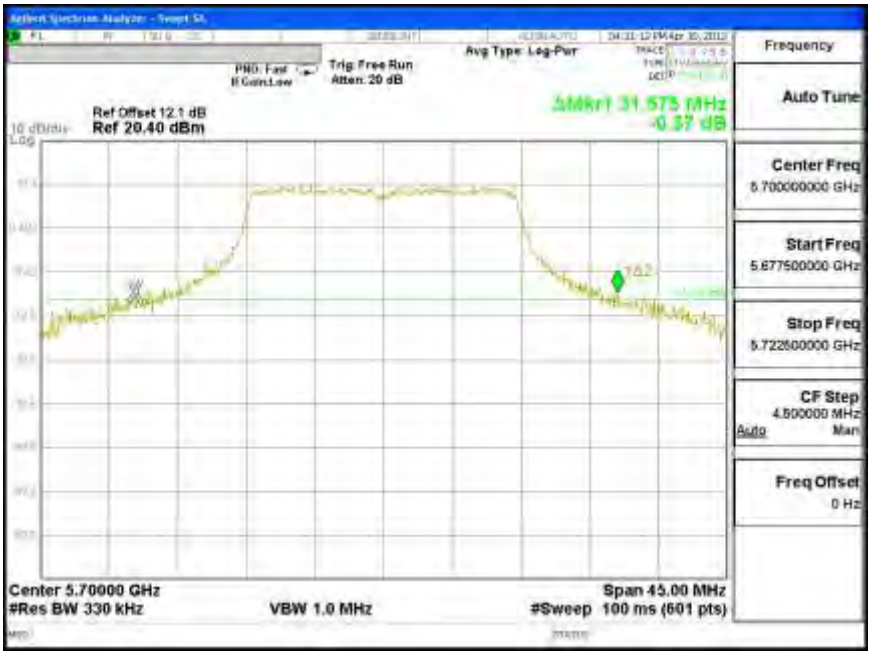
Channel	Frequency (MHz)	26 dB BW Chain 0 (MHz)	26 dB BW Chain 1 (MHz)
Low	5500	33.750	30.150
Mid	5580	33.900	30.825
High	5700	31.575	28.800

26 dB BANDWIDTH, Chain 0

BANDWIDTH Chain 0 LOW CH

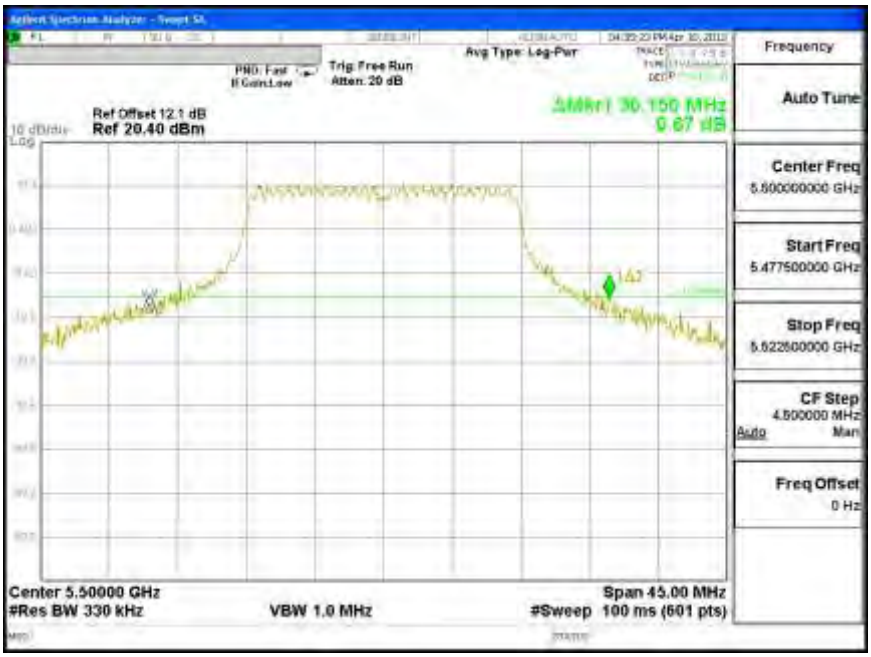
BANDWIDTH Chain 0 MID CH

BANDWIDTH Chain 0 HIGH CH

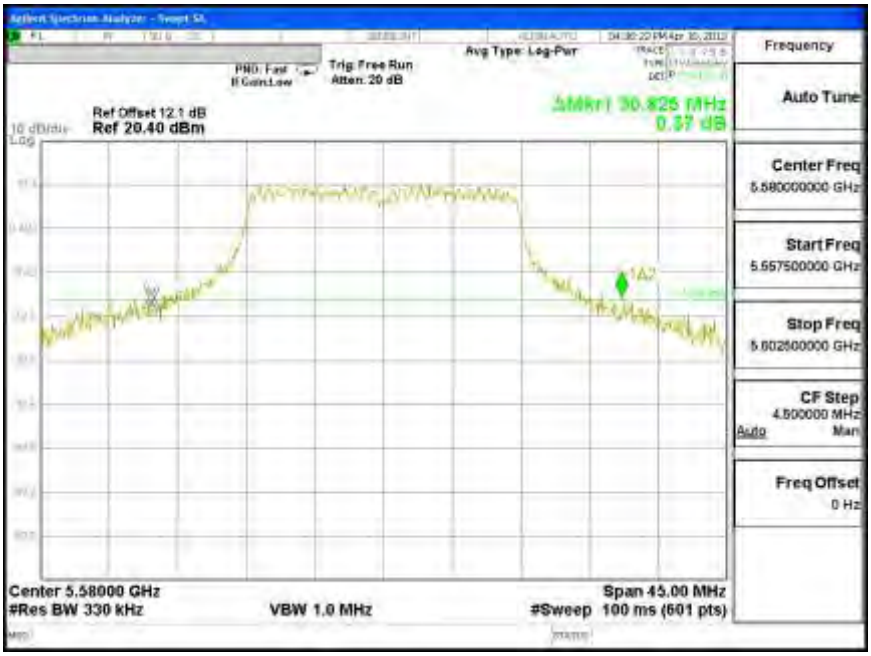


26 dB BANDWIDTH, Chain 1

BANDWIDTH Chain 1 LOW CH



BANDWIDTH Chain 1 MID CH



BANDWIDTH Chain 1 HIGH CH

8.5.2. 99% BANDWIDTH

LIMITS

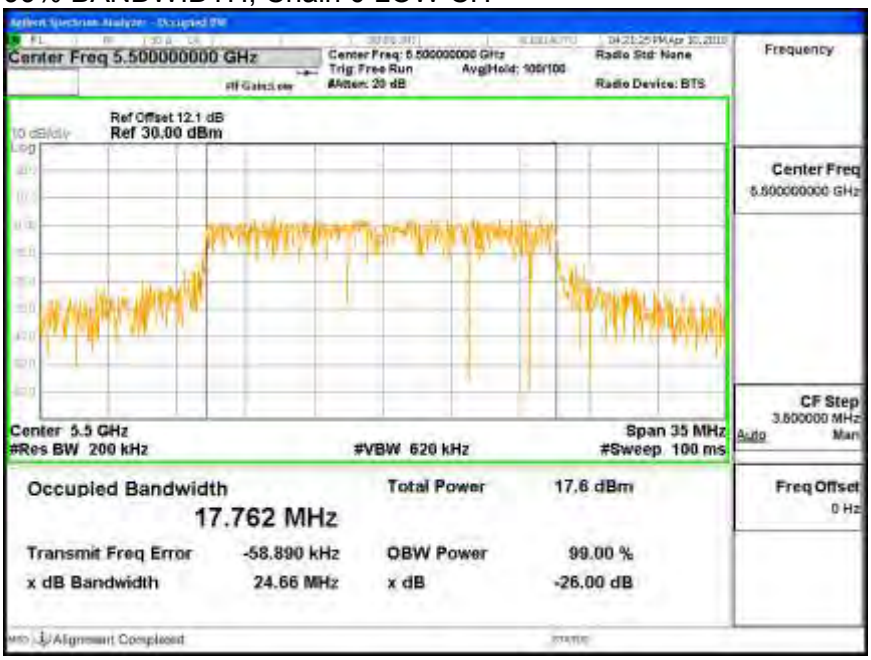
None; for reporting purposes only.

RESULTS

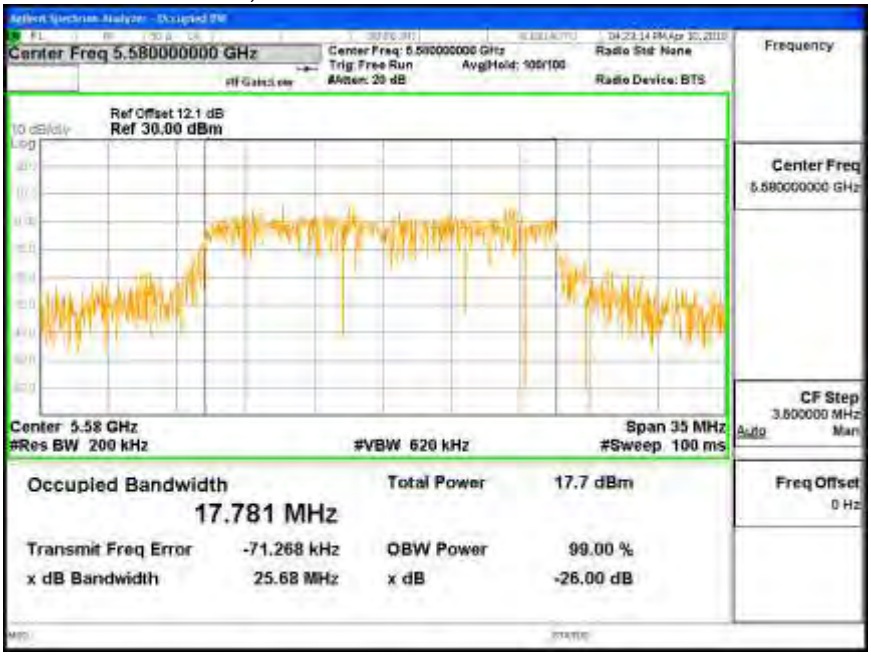
Channel	Frequency (MHz)	99% BW Chain 0 (MHz)	99% BW Chain 1 (MHz)
Low	5500	17.762	17.691
Mid	5580	17.781	17.739
High	5700	17.603	17.770

99% BANDWIDTH, Chain 0

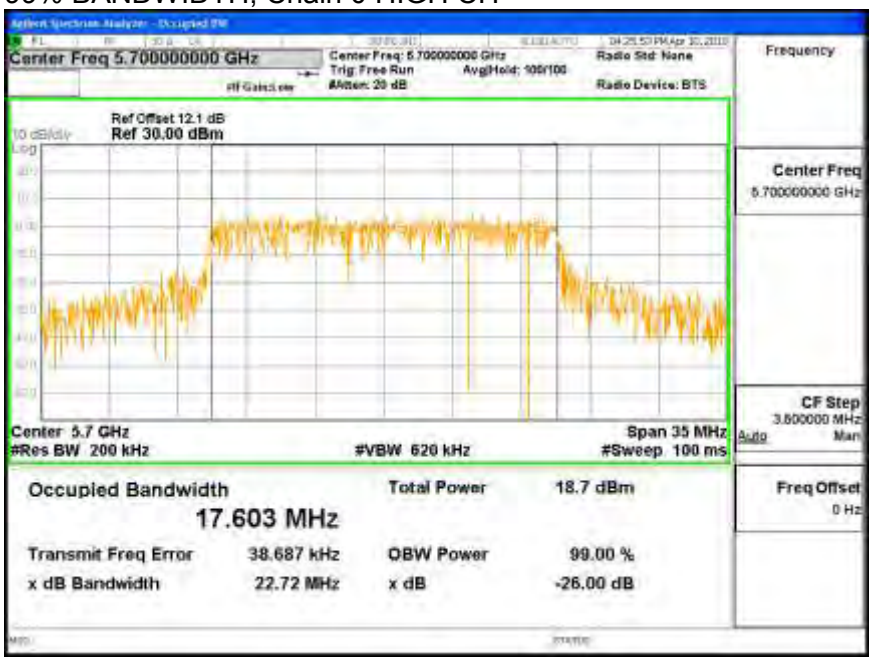
99% BANDWIDTH, Chain 0 LOW CH



99% BANDWIDTH, Chain 0 MID CH

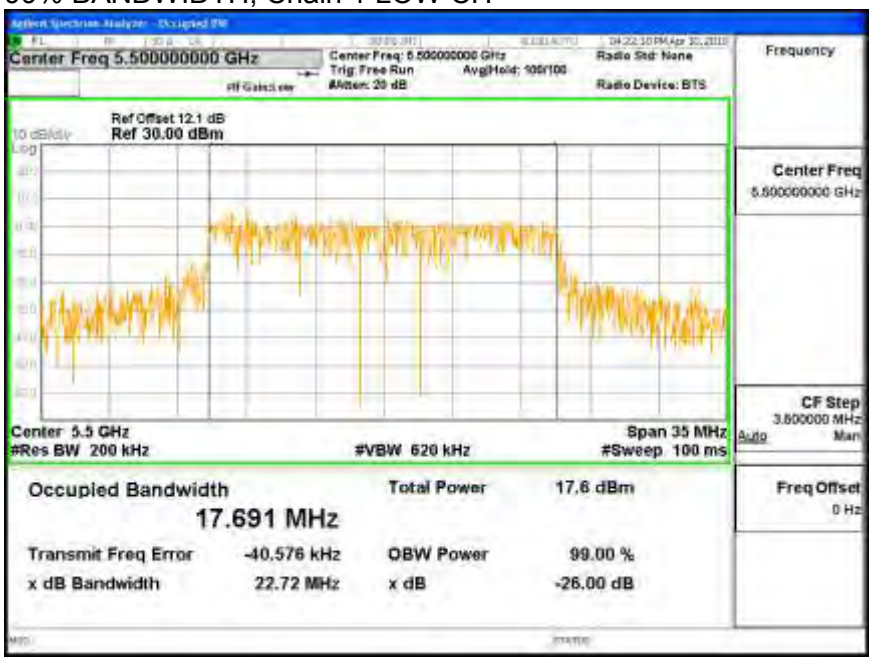


99% BANDWIDTH, Chain 0 HIGH CH

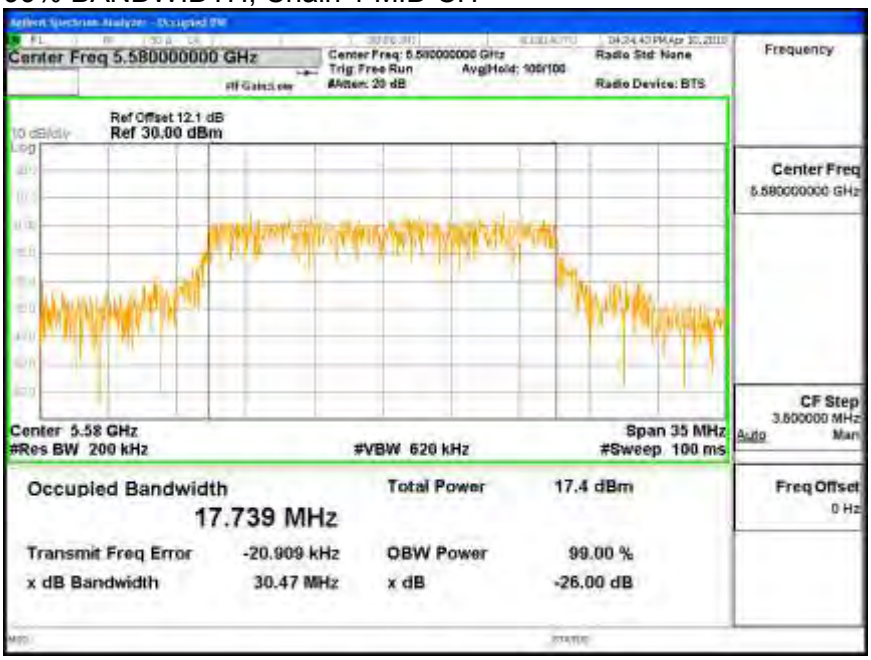


99% BANDWIDTH, Chain 1

99% BANDWIDTH, Chain 1 LOW CH



99% BANDWIDTH, Chain 1 MID CH



99% BANDWIDTH, Chain 1 HIGH CH

8.5.3. 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 250 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

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	5500	30.150	17.691	9.00
Mid	5580	30.825	17.739	9.00
High	5700	28.800	17.603	9.00

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	21.00	23.48	29.48	20.48	8.00	11.00	8.00
Mid	5580	21.00	23.49	29.49	20.49	8.00	11.00	8.00
High	5700	21.00	23.46	29.46	20.46	8.00	11.00	8.00

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

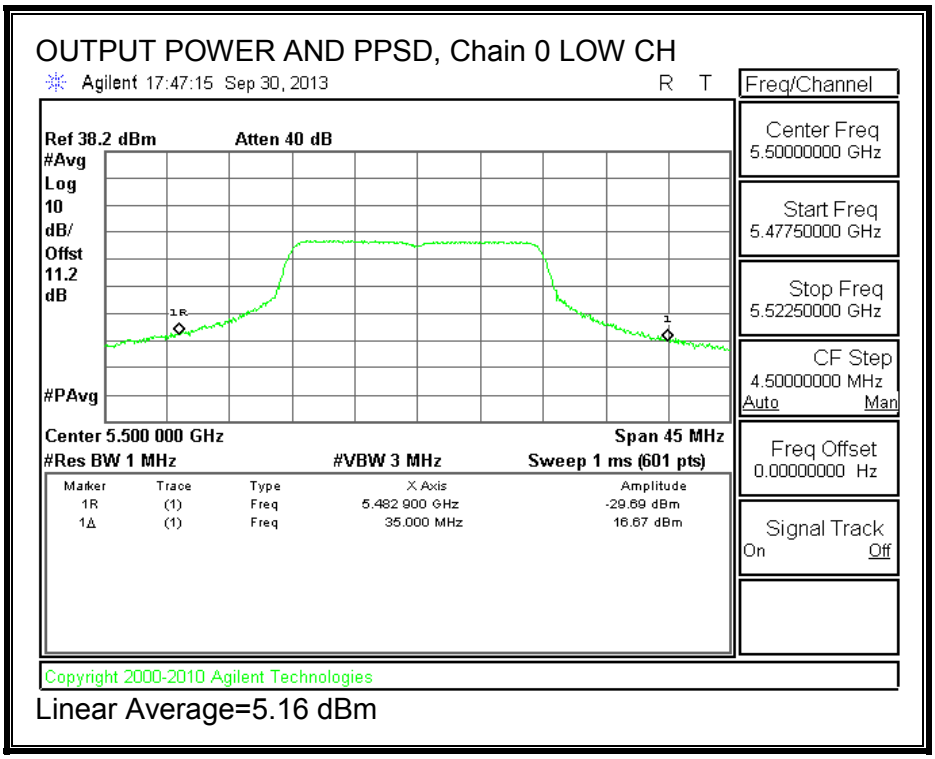
Output Power Results

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	5500	16.670	16.801	19.746	20.48	-0.731
Mid	5580	16.040	16.355	19.211	20.49	-1.279
High	5700	16.257	16.519	19.400	20.46	-1.056

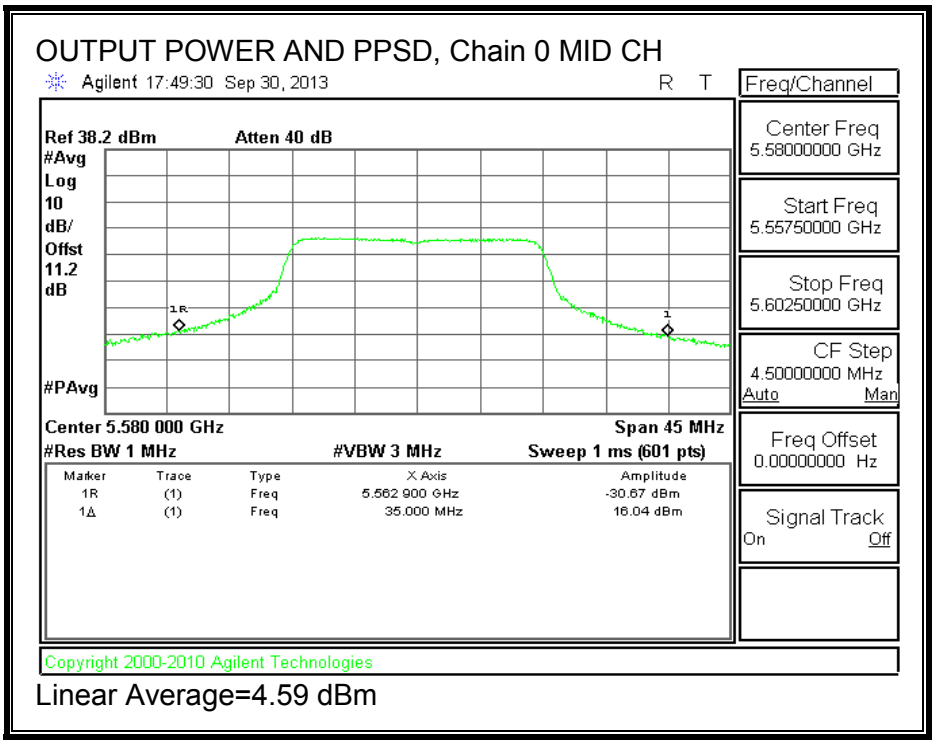
PPSD Results

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	5500	5.16	4.07	7.66	8.00	-0.34
Mid	5580	4.59	4.86	7.74	8.00	-0.26
High	5700	4.63	4.91	7.78	8.00	-0.22

OUTPUT POWER AND PPSD, Chain 0

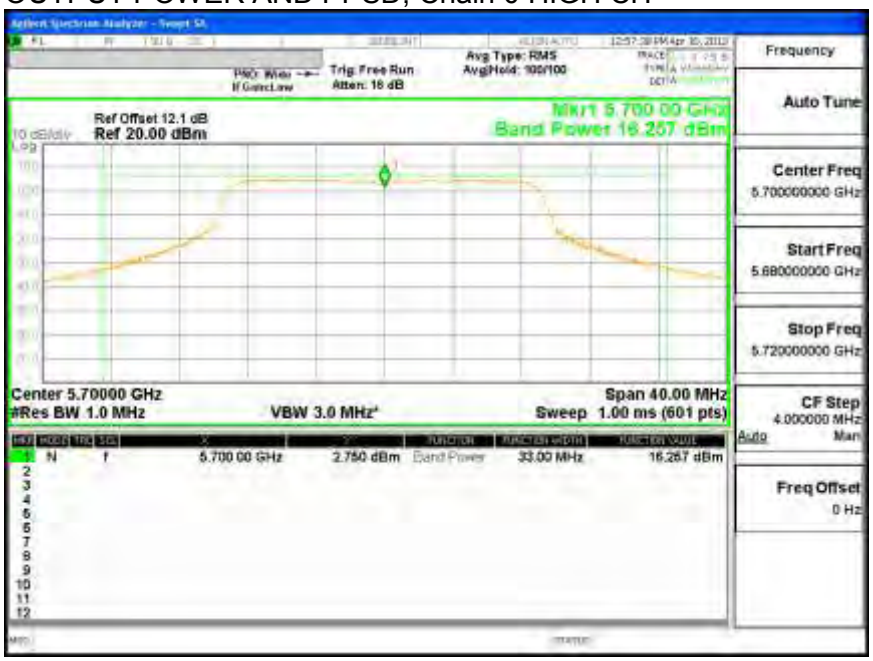


Linear Average=5.16 dBm



Linear Average=4.59 dBm

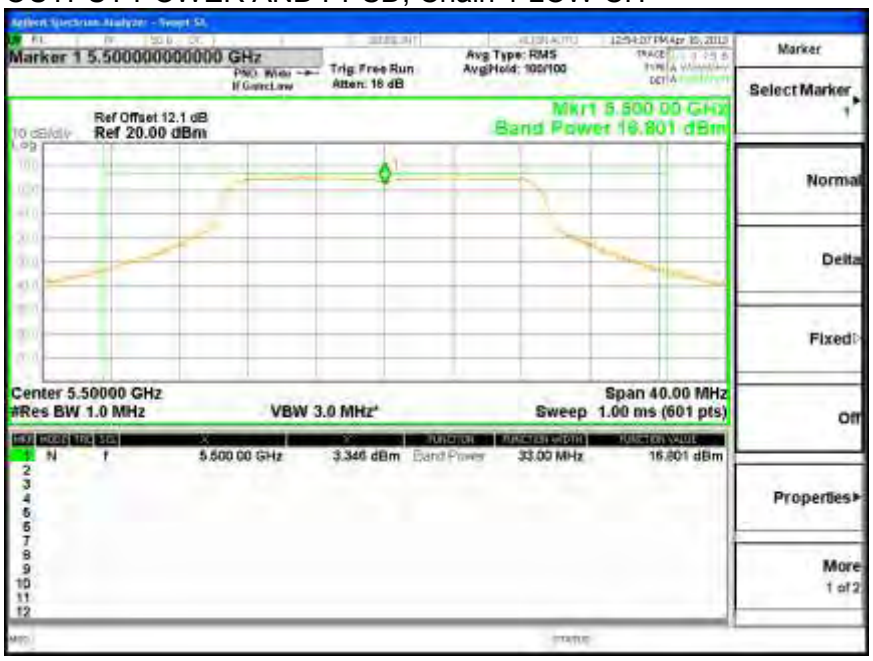
OUTPUT POWER AND PPSD, Chain 0 HIGH CH



Linear Average=4.63 dBm

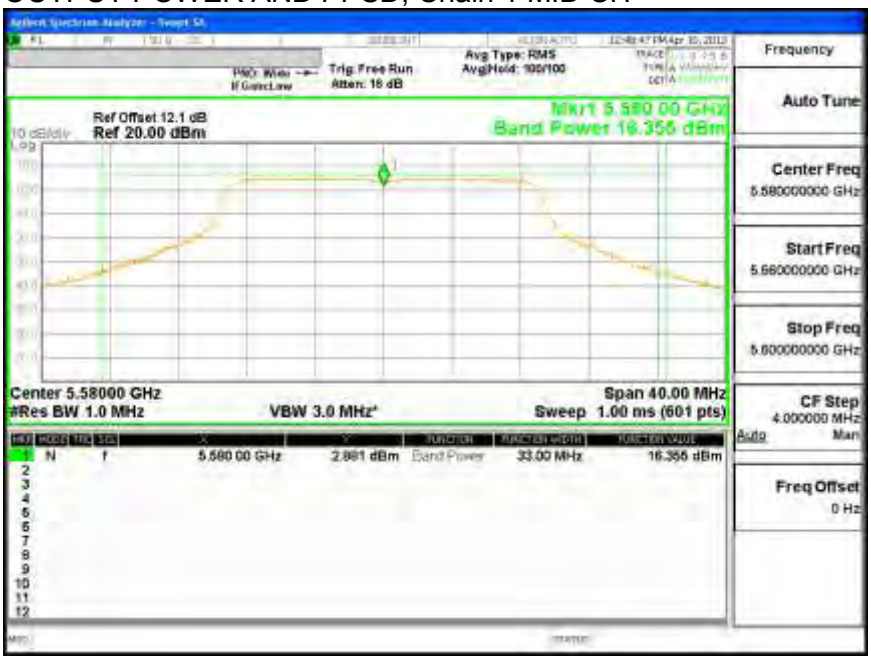
OUTPUT POWER AND PPSD, Chain 1

OUTPUT POWER AND PPSD, Chain 1 LOW CH



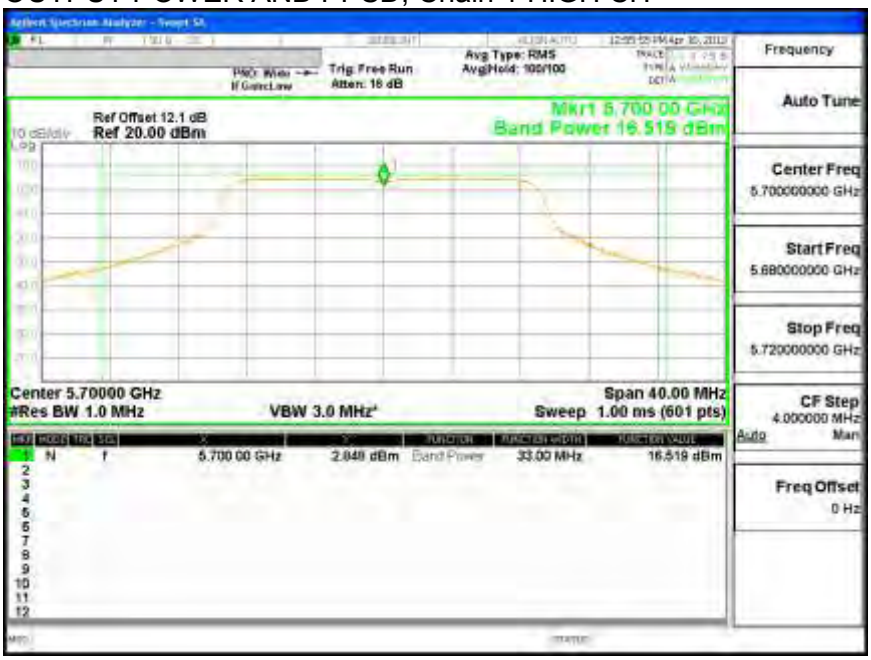
Linear Average=4.07 dBm

OUTPUT POWER AND PPSD, Chain 1 MID CH



Linear Average=4.86 dBm

OUTPUT POWER AND PPSD, Chain 1 HIGH CH



Linear Average=4.91 dBm

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.

RESULTS

Chain 0

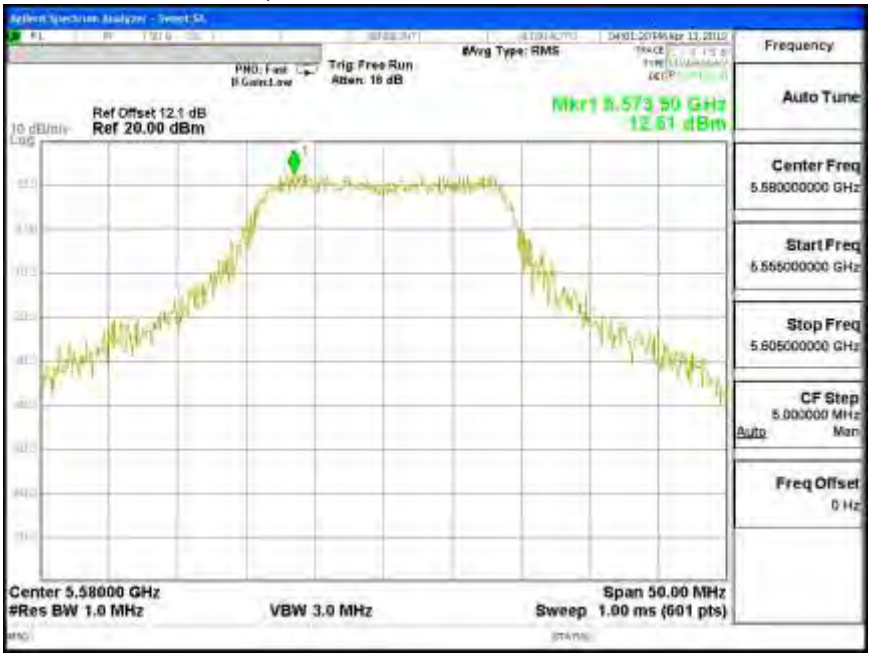
Channel	Frequency (MHz)	PK Level (dBm)	PSD (dBm)	DCCF (dB)	Peak Excursion (dB)	Limit (dB)	Margin (dB)
Mid	5580	12.51	4.62	0.00	7.89	13	-5.11

Chain 1

Channel	Frequency (MHz)	PK Level (dBm)	PSD (dBm)	DCCF (dB)	Peak Excursion (dB)	Limit (dB)	Margin (dB)
Mid	5580	12.85	4.86	0.00	7.99	13	-5.01

PEAK EXCURSION, Chain 0

PEAK EXCURSION, Chain 0 MID CH



PEAK EXCURSION, Chain 1

PEAK EXCURSION, Chain 1 MID CH

8.5.5. CONDUCTED WEATHER RADAR BAND EMISSIONS

LIMITS

Within 5600 – 5650 MHz band, -20 dBc relative to highest fundamental output power density per 100 kHz.

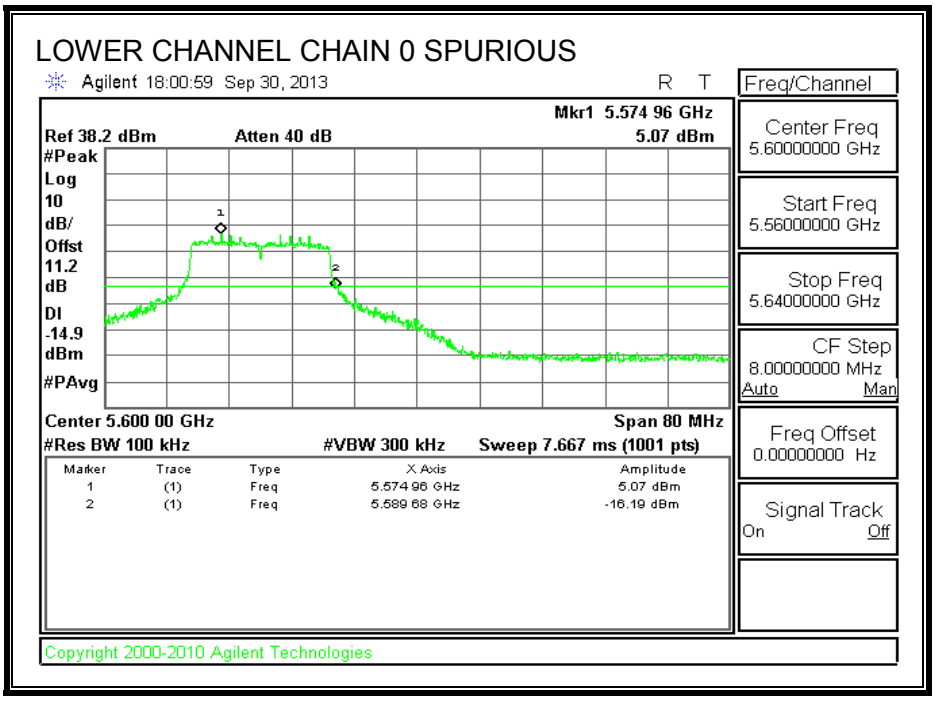
TEST PROCEDURE

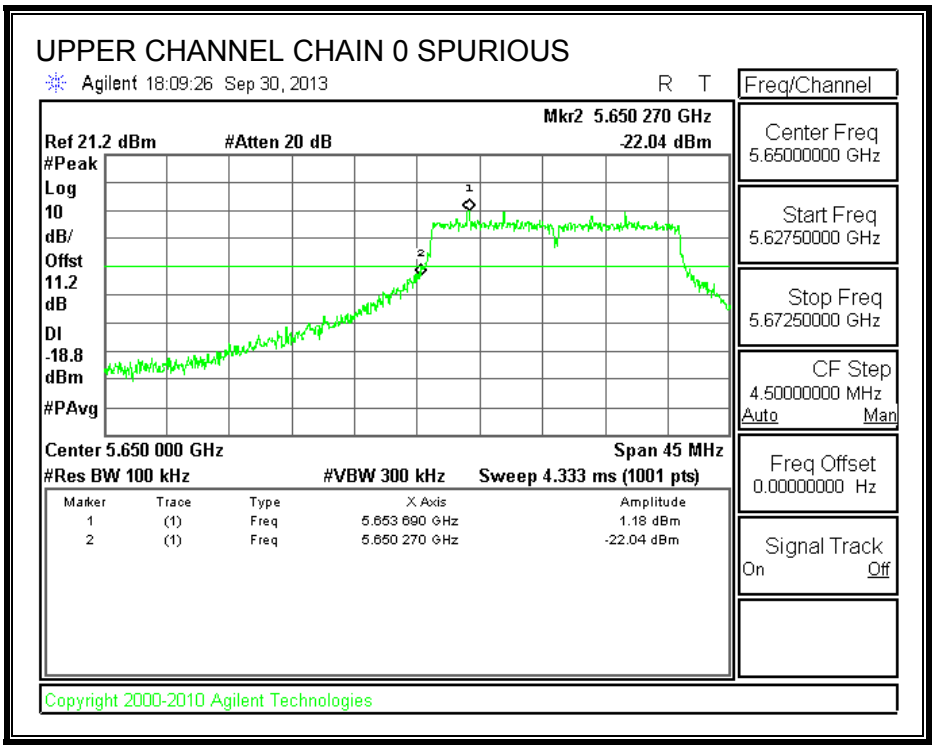
The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

The authorized channel nearest to and less than 5600 MHz is measured.

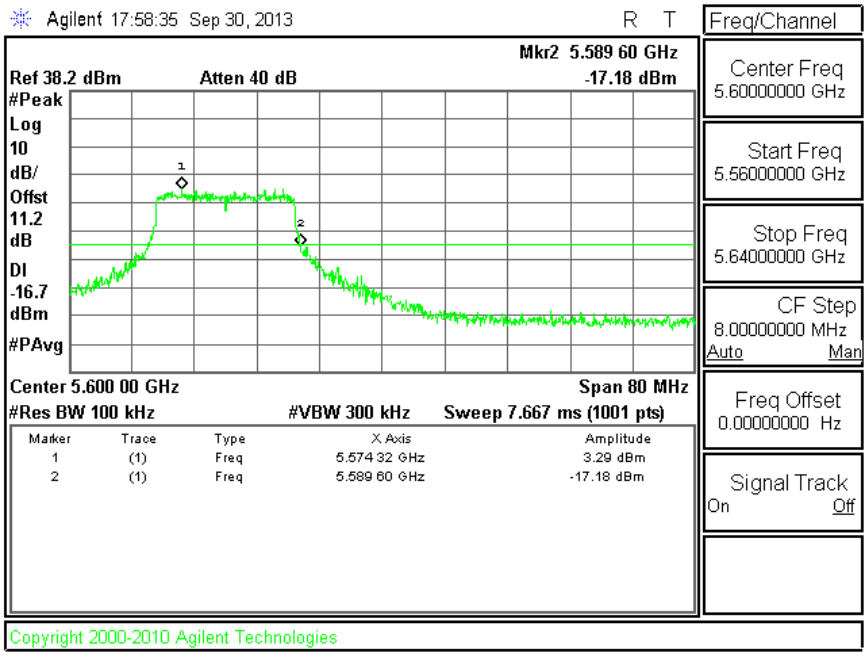
The authorized channel nearest to and greater than 5650 MHz is measured.

SPURIOUS EMISSIONS IN WEATHER RADAR BAND 5600 - 5650 MHz

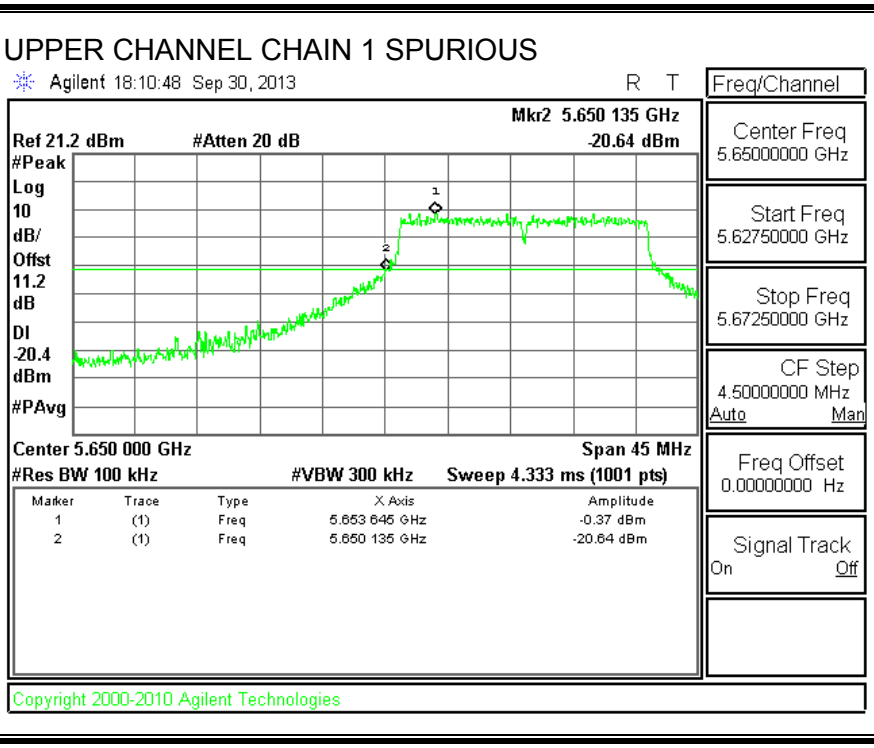




LOWER CHANNEL CHAIN 1 SPURIOUS



UPPER CHANNEL CHAIN 1 SPURIOUS



8.6. 802.11n HT40 STBC 2TX MODE IN THE 5.6 GHz BAND

8.6.1. 26 dB BANDWIDTH

LIMITS

None; for reporting purposes only.

RESULTS

Channel	Frequency (MHz)	26 dB BW Chain 0 (MHz)	26 dB BW Chain 1 (MHz)
Low	5510	69.83	68.33
Mid	5550	71.83	63.00
High	5670	72.17	65.00

26 dB BANDWIDTH, Chain 0

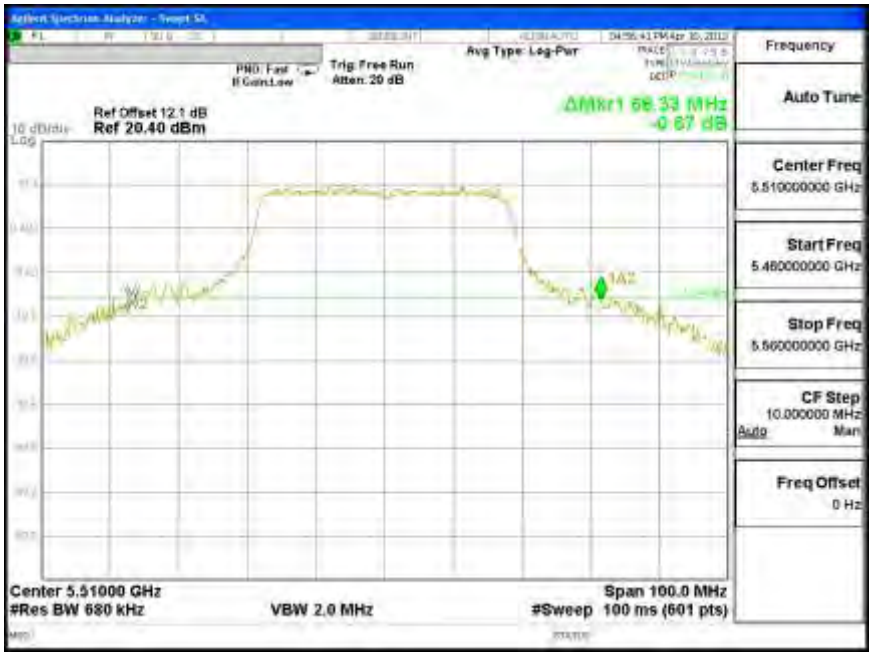
BANDWIDTH Chain 0 LOW CH

BANDWIDTH Chain 0 MID CH

BANDWIDTH Chain 0 HIGH CH

26 dB BANDWIDTH, Chain 1

BANDWIDTH Chain 1 LOW CH



BANDWIDTH Chain 1 MID CH

BANDWIDTH Chain 1 HIGH CH

8.6.2. 99% BANDWIDTH

LIMITS

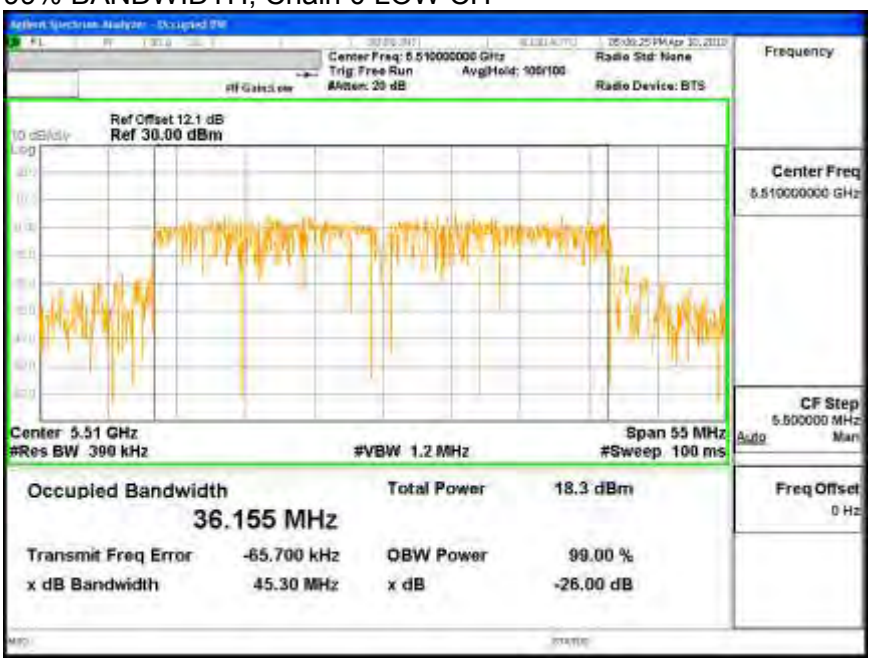
None; for reporting purposes only.

RESULTS

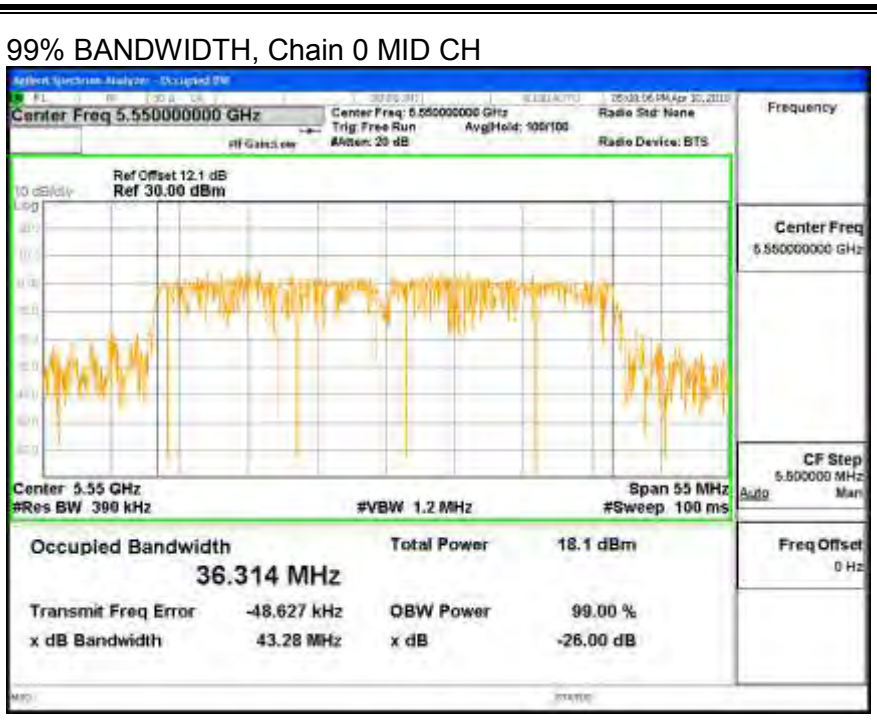
Channel	Frequency (MHz)	99% BW Chain 0 (MHz)	99% BW Chain 1 (MHz)
Low	5510	36.155	36.078
Mid	5550	36.314	36.218
High	5670	36.060	36.279

99% BANDWIDTH, Chain 0

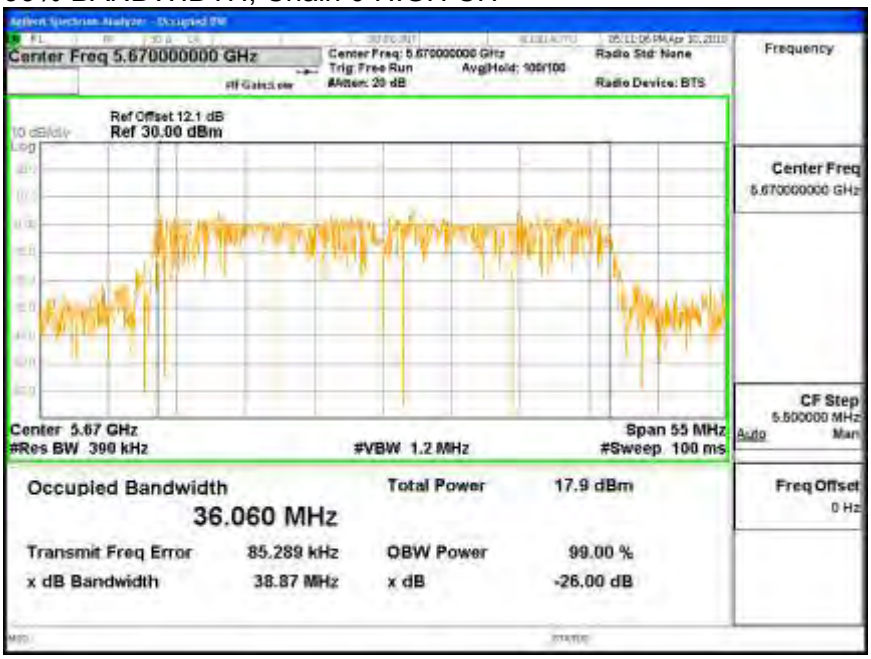
99% BANDWIDTH, Chain 0 LOW CH



99% BANDWIDTH, Chain 0 MID CH

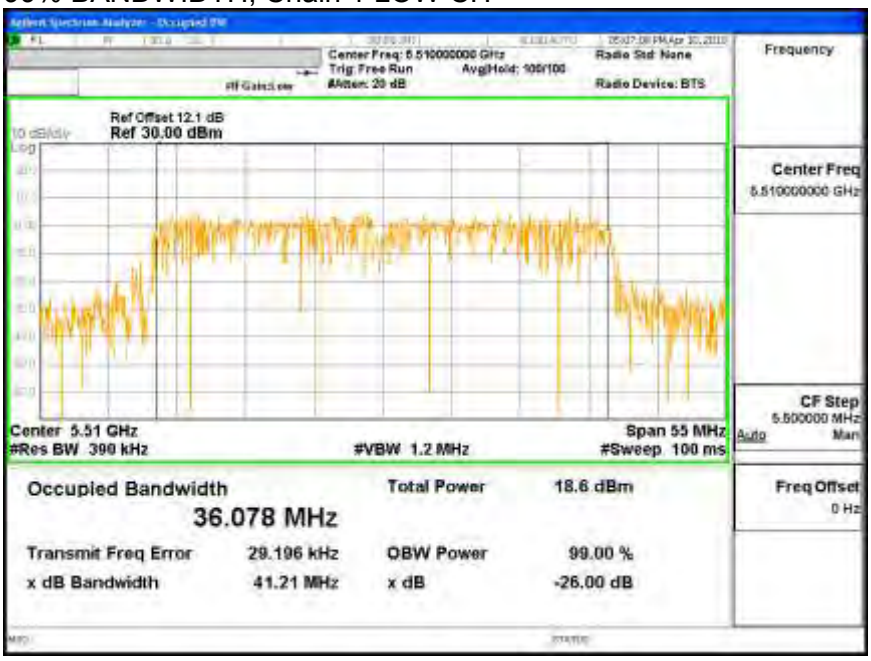


99% BANDWIDTH, Chain 0 HIGH CH

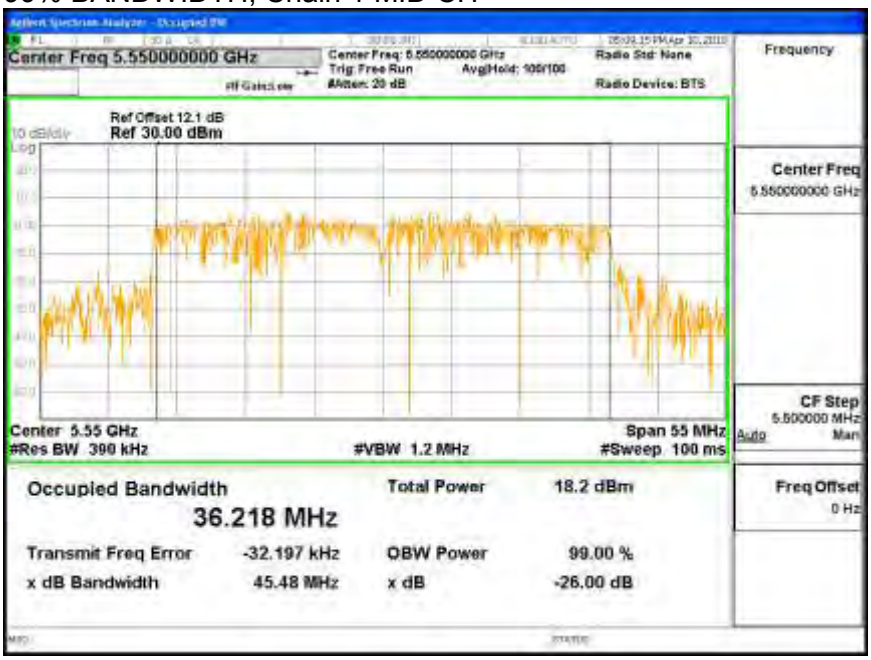


99% BANDWIDTH, Chain 1

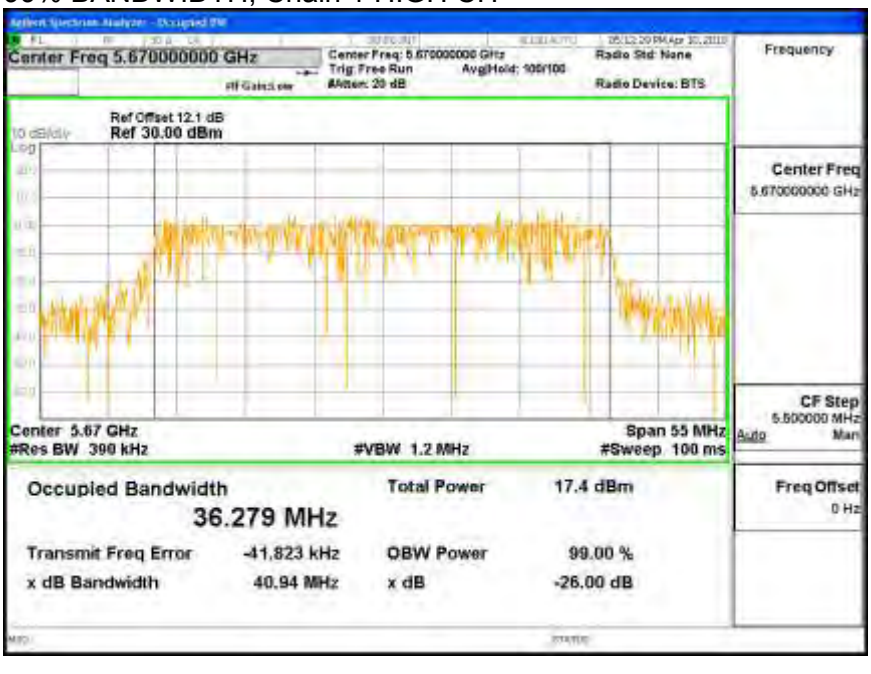
99% BANDWIDTH, Chain 1 LOW CH



99% BANDWIDTH, Chain 1 MID CH



99% BANDWIDTH, Chain 1 HIGH CH



8.6.3. 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 250 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

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	5510	68.33	36.078	9.00
Mid	5550	63.00	36.218	9.00
High	5670	65.00	36.060	9.00

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	5510	21.00	24.00	30.00	21.00	8.00	11.00	8.00
Mid	5550	21.00	24.00	30.00	21.00	8.00	11.00	8.00
High	5670	21.00	24.00	30.00	21.00	8.00	11.00	8.00

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

Output Power Results

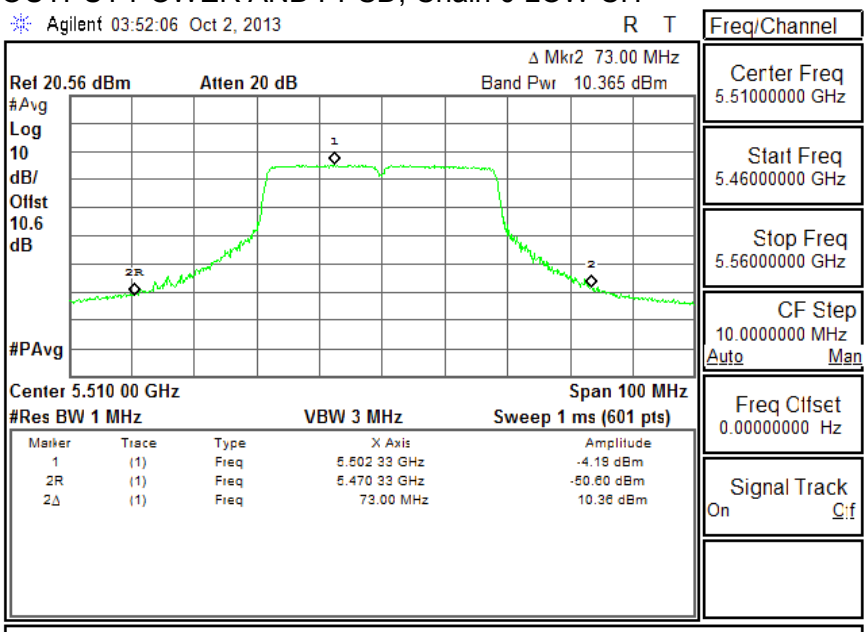
Channel	Frequency (MHz)	Chain 0 Meas Power (dBm)	Chain 1 Meas Power (dBm)	Total Corr'd Power (dBm)	Power Limit (dBm)	Power Margin (dB)
Low	5510	10.365	10.320	13.353	21.00	-7.647
Mid	5550	17.324	17.987	20.678	21.00	-0.322
High	5670	16.910	17.228	20.082	21.00	-0.918

PPSD Results

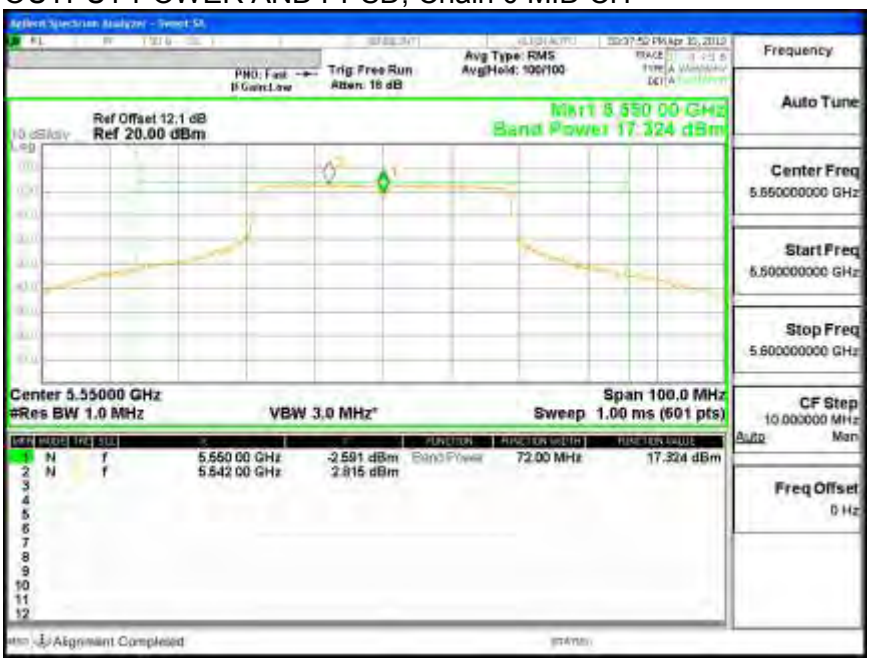
Channel	Frequency (MHz)	Chain 0 Meas PPSD (dBm)	Chain 1 Meas PPSD (dBm)	Total Corr'd PPSD (dBm)	PPSD Limit (dBm)	PPSD Margin (dB)
Low	5510	-4.190	-4.370	-1.269	8.00	-9.269
Mid	5550	2.815	2.941	5.889	8.00	-2.111
High	5670	2.534	2.639	5.597	8.00	-2.403

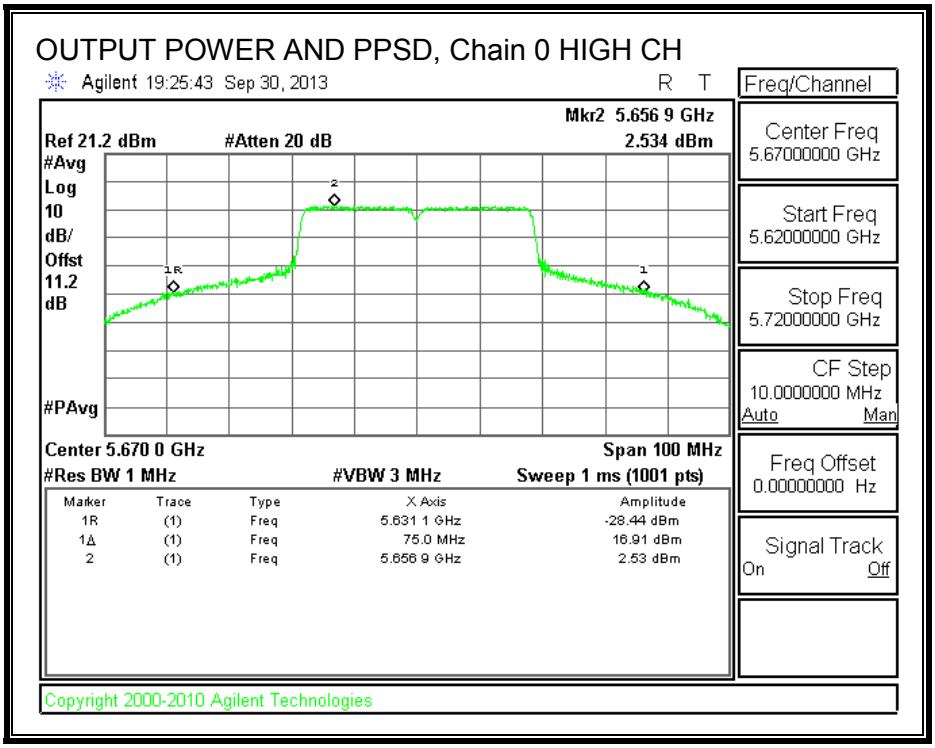
OUTPUT POWER AND PPSD, Chain 0

OUTPUT POWER AND PPSD, Chain 0 LOW CH

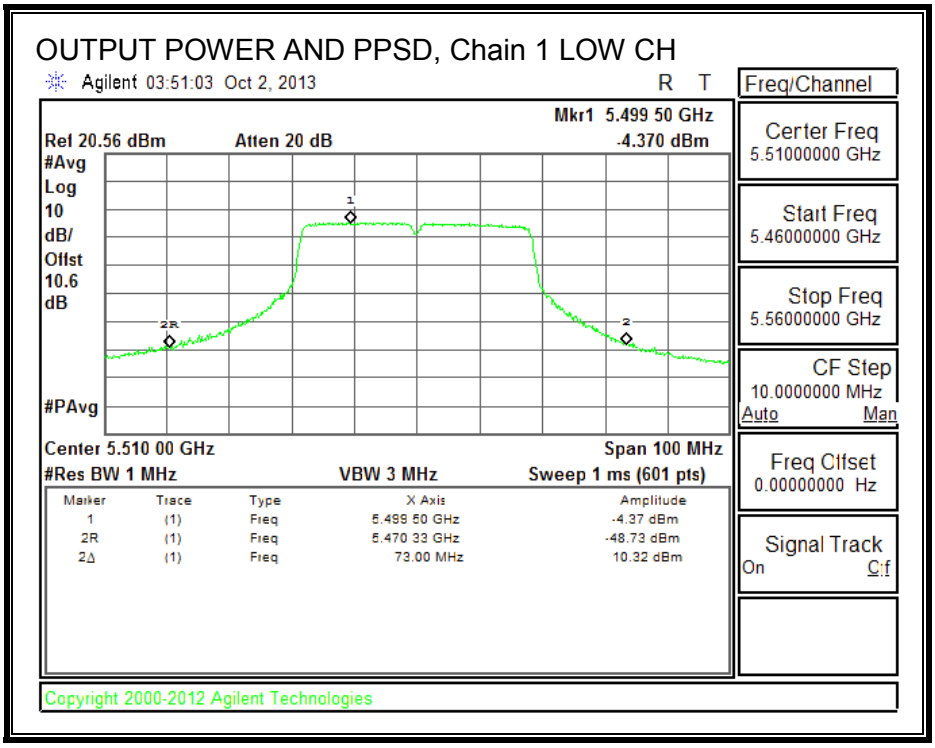


OUTPUT POWER AND PPSD, Chain 0 MID CH





OUTPUT POWER AND PPSD, Chain 1



OUTPUT POWER AND PPSD, Chain 1 MID CH

OUTPUT POWER AND PPSD, Chain 1 HIGH CH

8.6.4. 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.

RESULTS

Chain 0

Channel	Frequency (MHz)	PK Level (dBm)	PSD (dBm)	DCCF (dB)	Peak Excursion (dB)	Limit (dB)	Margin (dB)
Mid	5500	11.54	2.815	0.00	8.73	13	-4.28

Chain 1

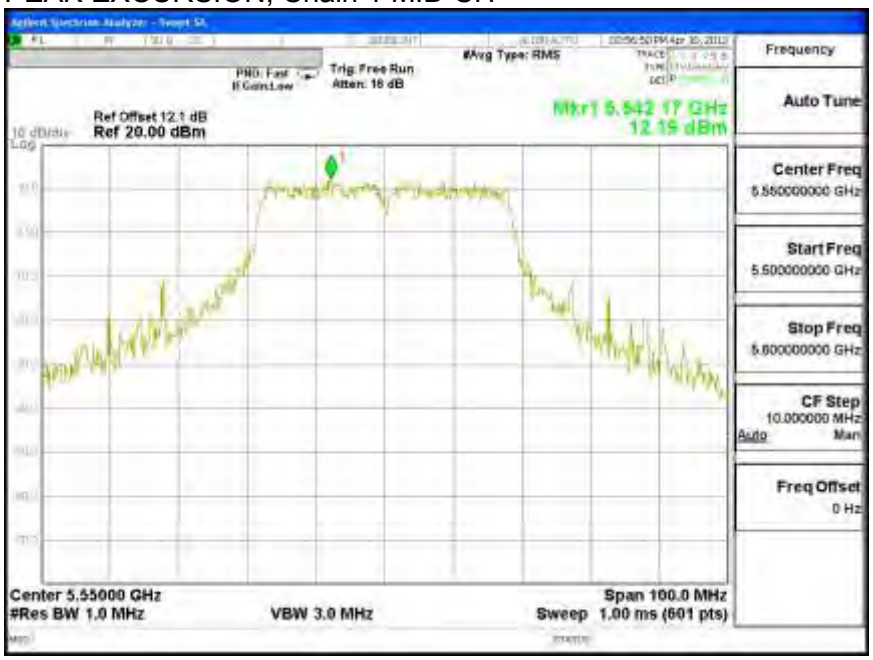
Channel	Frequency (MHz)	PK Level (dBm)	PSD (dBm)	DCCF (dB)	Peak Excursion (dB)	Limit (dB)	Margin (dB)
Mid	5500	12.19	2.941	0.00	9.25	13	-3.75

PEAK EXCURSION, Chain 0

PEAK EXCURSION, Chain 0 MID CH

PEAK EXCURSION, Chain 1

PEAK EXCURSION, Chain 1 MID CH



8.6.5. CONDUCTED WEATHER RADAR BAND EMISSIONS

LIMITS

Within 5600 – 5650 MHz band, -20 dBc relative to highest fundamental output power density per 100 kHz.

TEST PROCEDURE

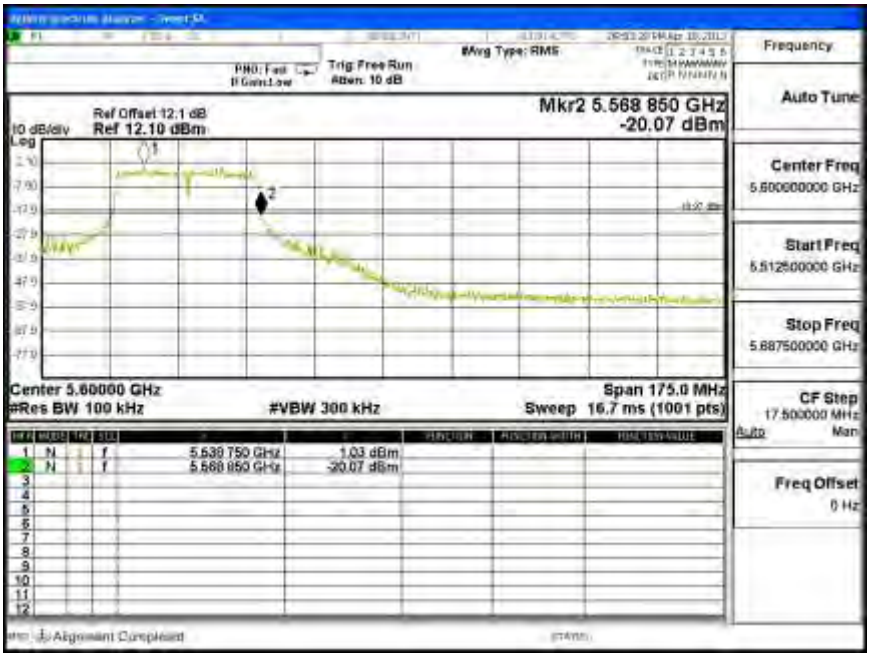
The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

The authorized channel nearest to and less than 5600 MHz is measured.

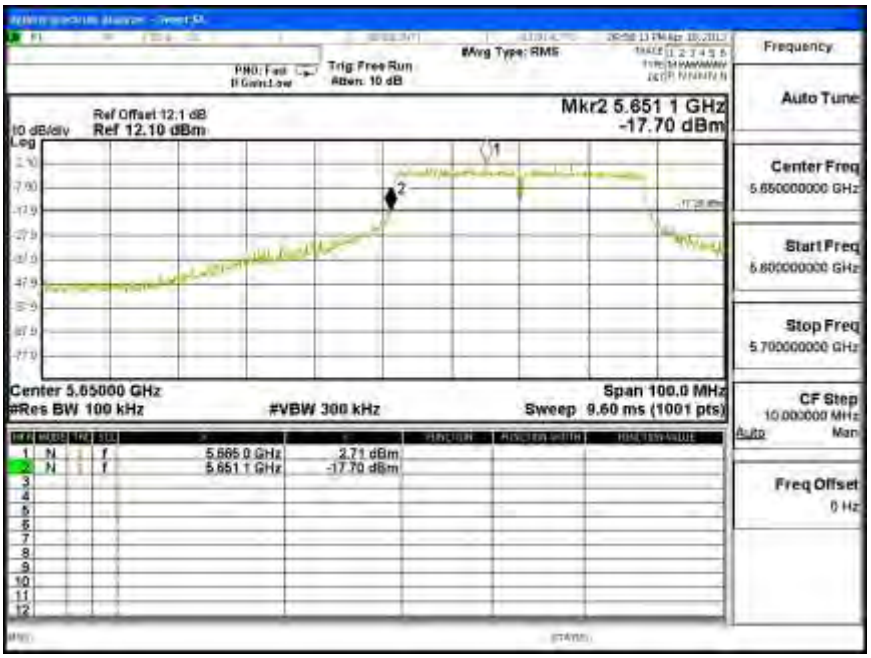
The authorized channel nearest to and greater than 5650 MHz is measured.

SPURIOUS EMISSIONS IN WEATHER RADAR BAND 5600 - 5650 MHz

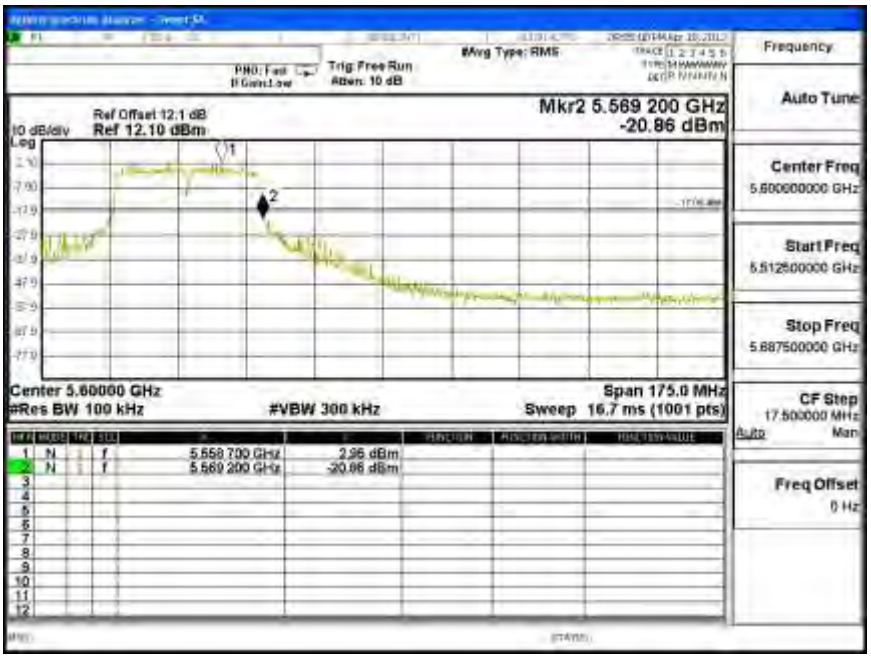
LOWER CHANNEL CHAIN 0 SPURIOUS



UPPER CHANNEL CHAIN 0 SPURIOUS



LOWER CHANNEL CHAIN 1 SPURIOUS



UPPER CHANNEL CHAIN 1 SPURIOUS

9. ANTENNA PORT TEST RESULTS (Patch Antenna, 14 dBi)

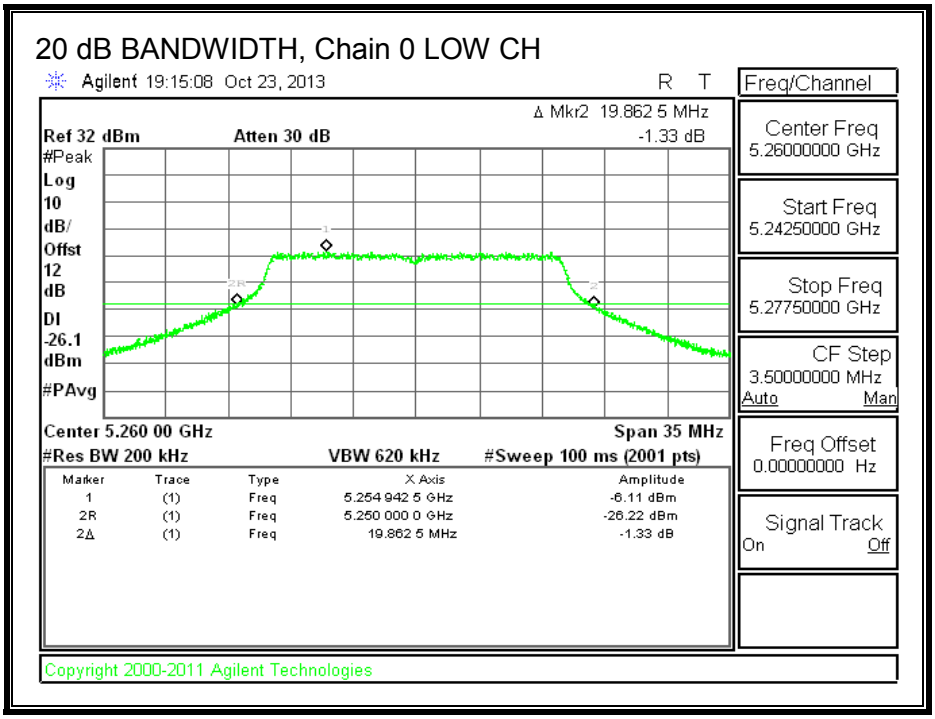
Note: The 14 dBi patch antenna comes with a short cable with loss of 0.5 dB, so in effect the antenna gain is **13.5 dBi** if we take the short cable into consideration.

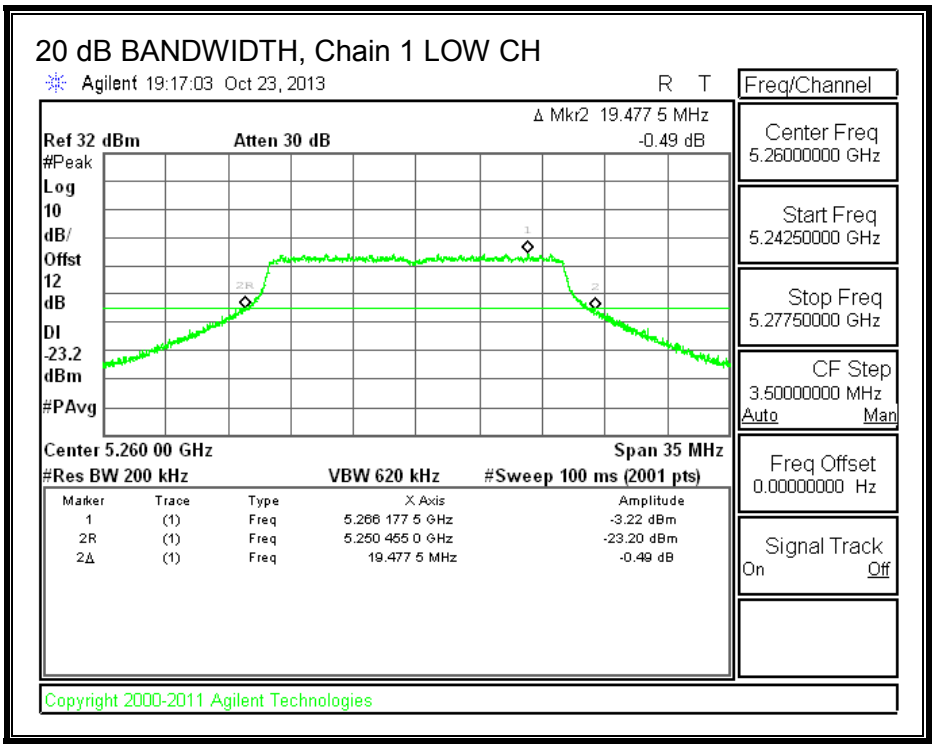
9.1. 802.11a CDD 2TX MODE IN THE 5.3 GHz BAND

9.1.1. 20 dB BANDWIDTH

LIMITS

None; 20 dB bandwidth is shown to ensure operation is within the specified 5250-5350 MHz operation band.





9.1.2. 26 dB BANDWIDTH

LIMITS

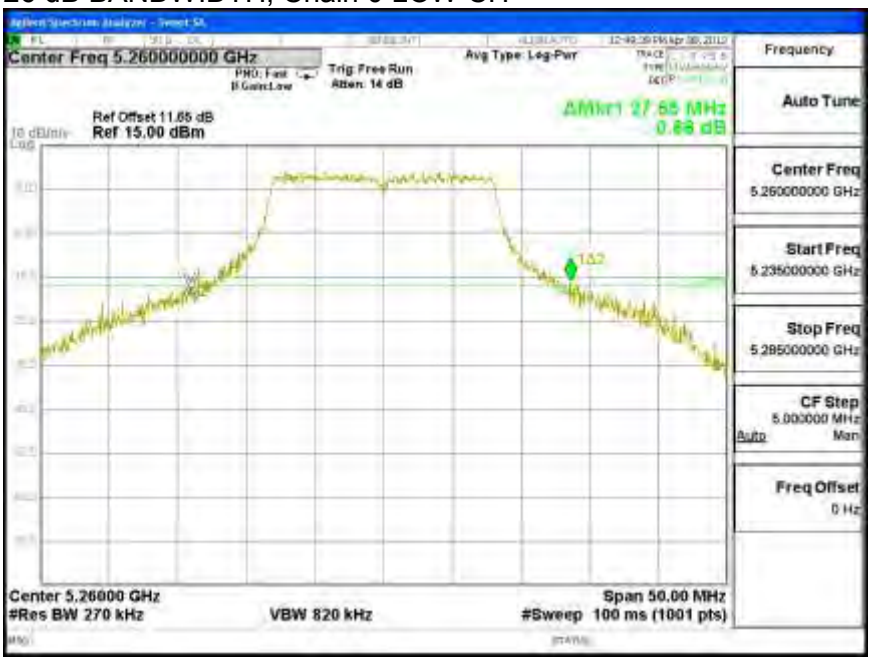
None; for reporting purposes only.

RESULTS

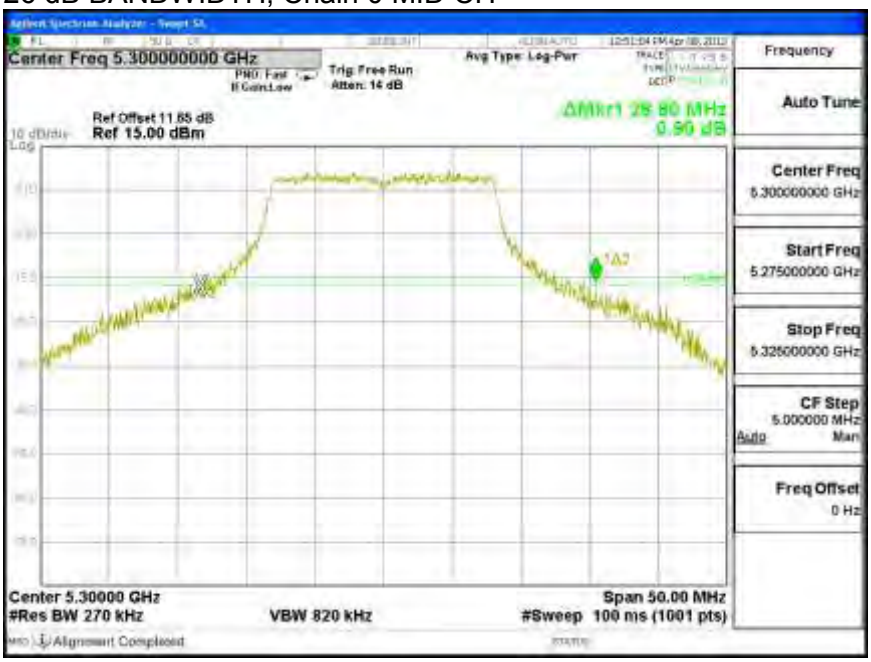
Channel	Frequency (MHz)	26 dB BW Chain 0 (MHz)	26 dB BW Chain 1 (MHz)
Low	5260	27.65	26.15
Mid	5300	28.80	26.25
High	5320	27.35	29.00

26 dB BANDWIDTH, Chain 0

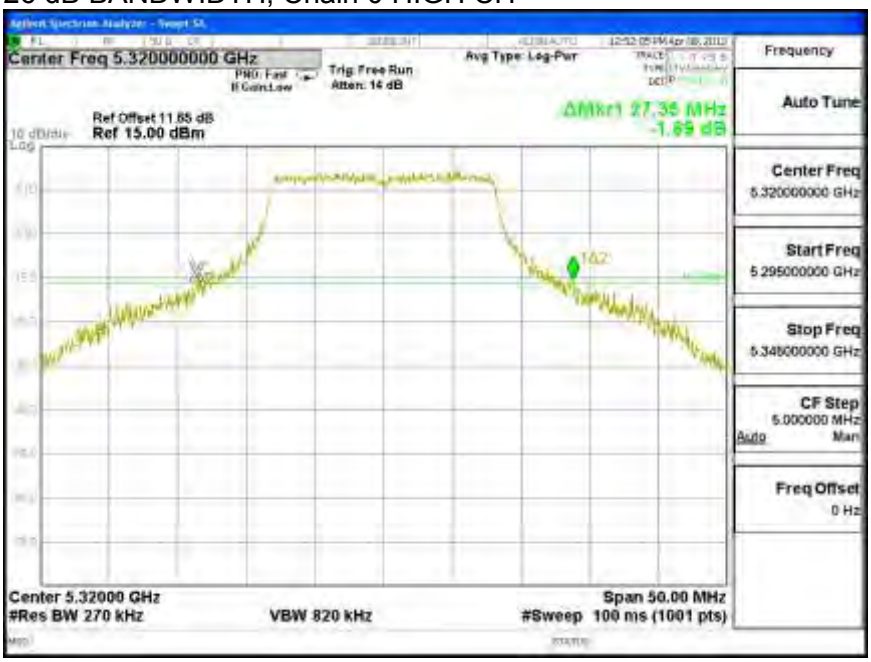
26 dB BANDWIDTH, Chain 0 LOW CH



26 dB BANDWIDTH, Chain 0 MID CH

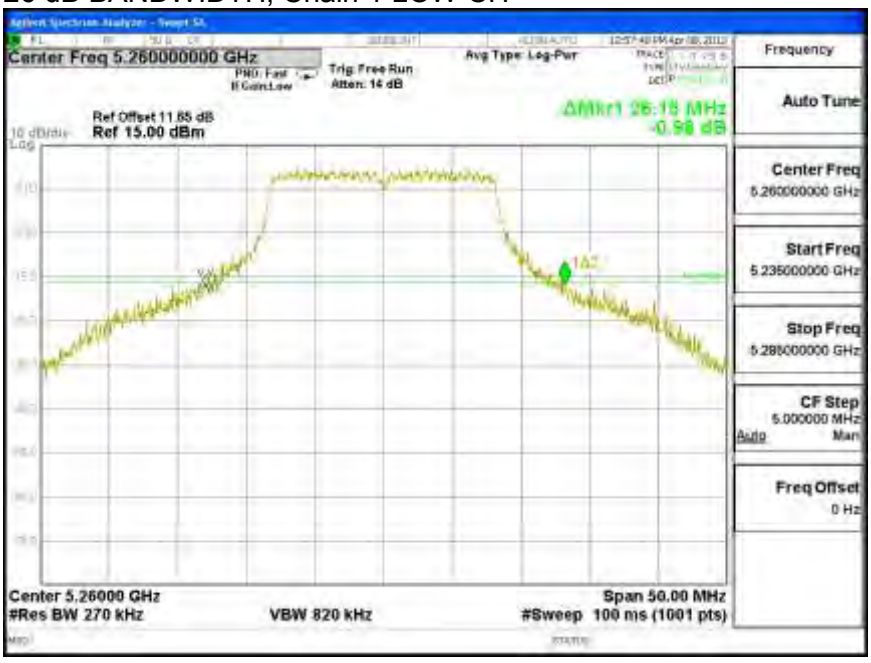


26 dB BANDWIDTH, Chain 0 HIGH CH

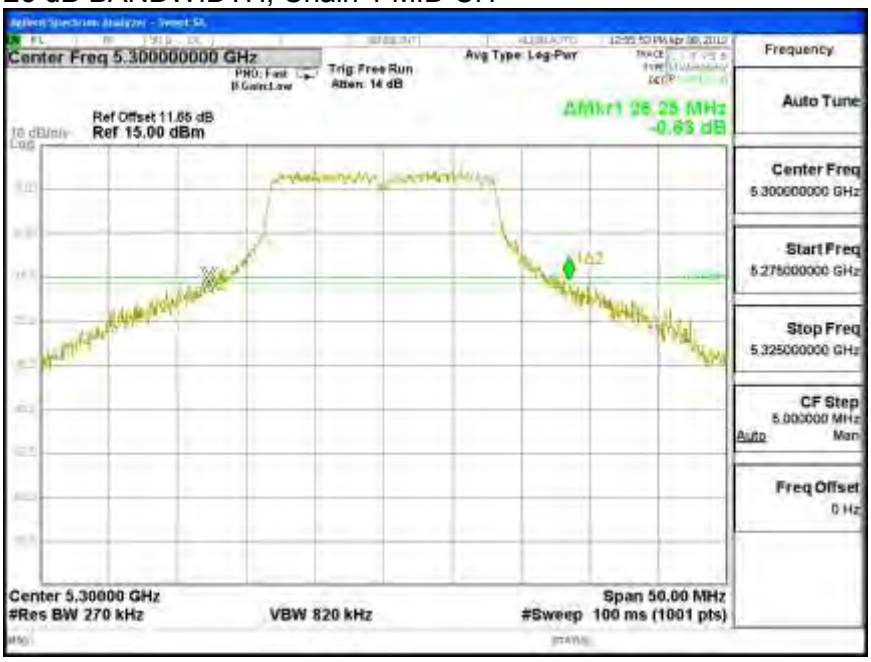


26 dB BANDWIDTH, Chain 1

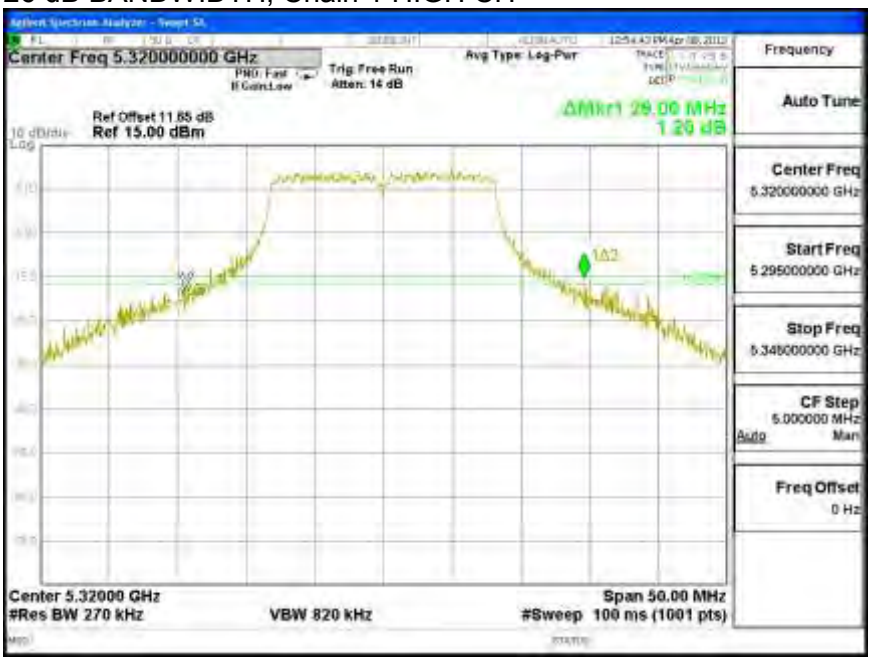
26 dB BANDWIDTH, Chain 1 LOW CH



26 dB BANDWIDTH, Chain 1 MID CH



26 dB BANDWIDTH, Chain 1 HIGH CH



9.1.3. 99% BANDWIDTH

LIMITS

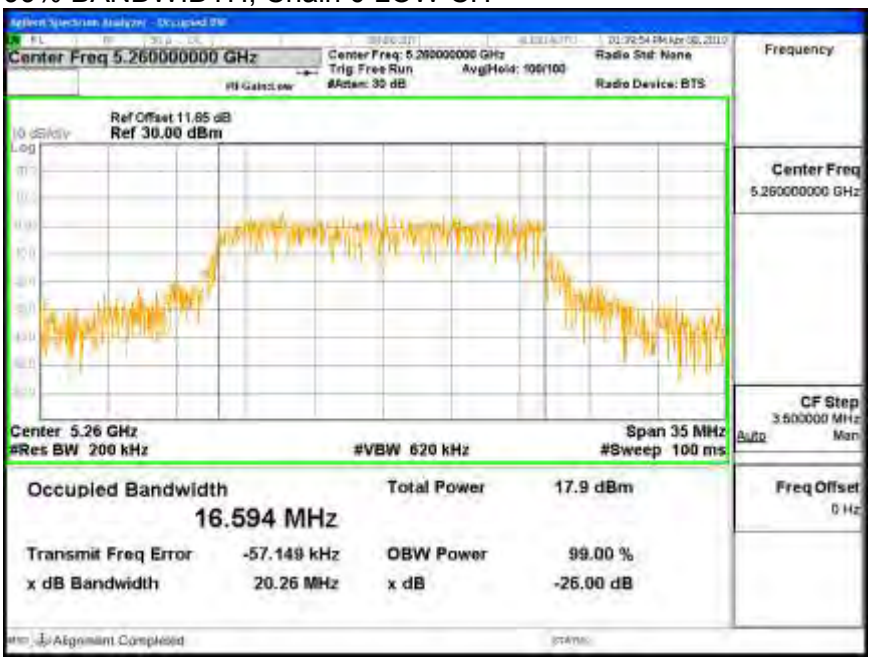
None; for reporting purposes only.

RESULTS

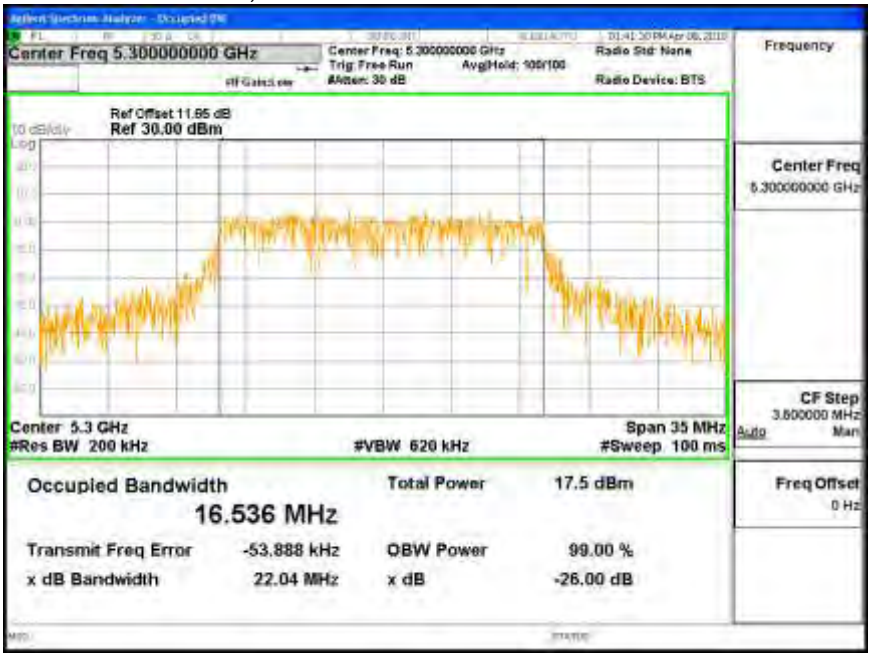
Channel	Frequency (MHz)	99% BW Chain 0 (MHz)	99% BW Chain 1 (MHz)
Low	5260	16.594	16.453
Mid	5300	16.536	16.509
High	5320	16.477	16.553

99% BANDWIDTH, Chain 0

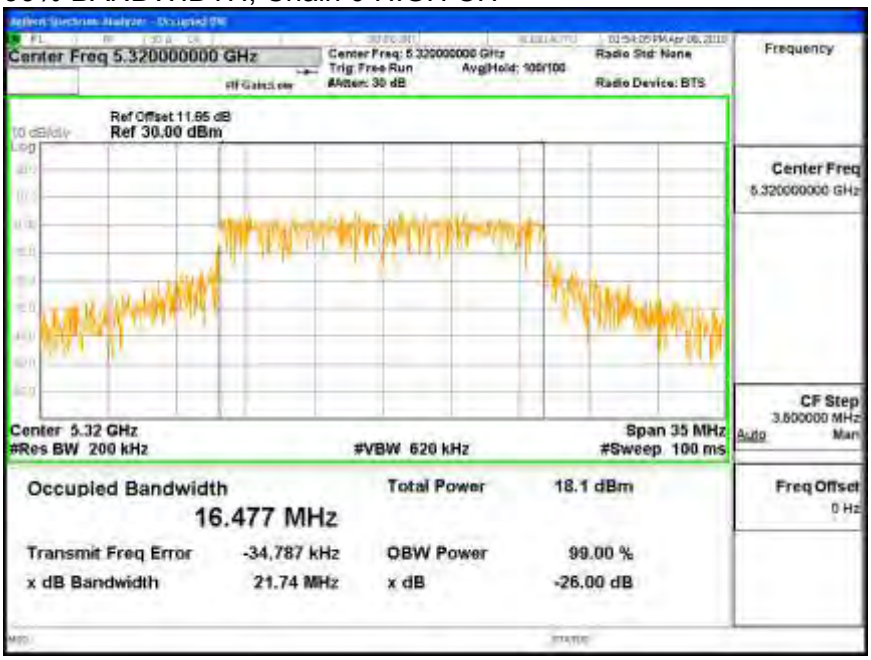
99% BANDWIDTH, Chain 0 LOW CH



99% BANDWIDTH, Chain 0 MID CH

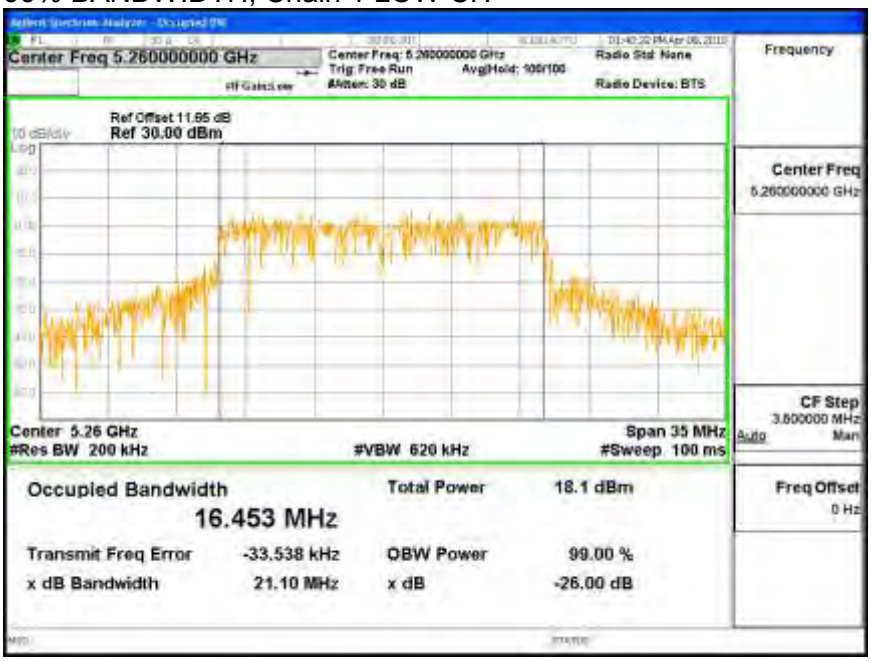


99% BANDWIDTH, Chain 0 HIGH CH

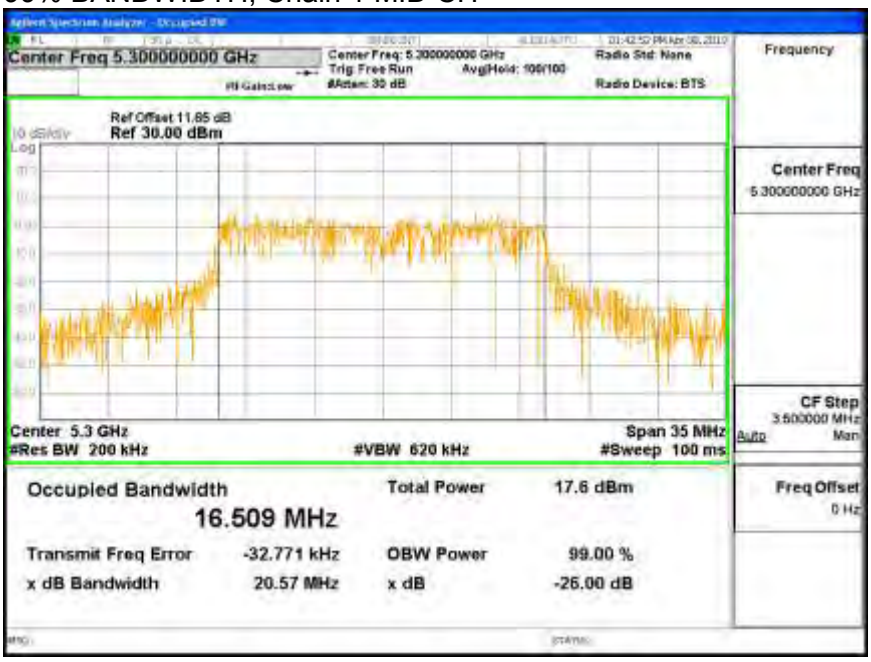


99% BANDWIDTH, Chain 1

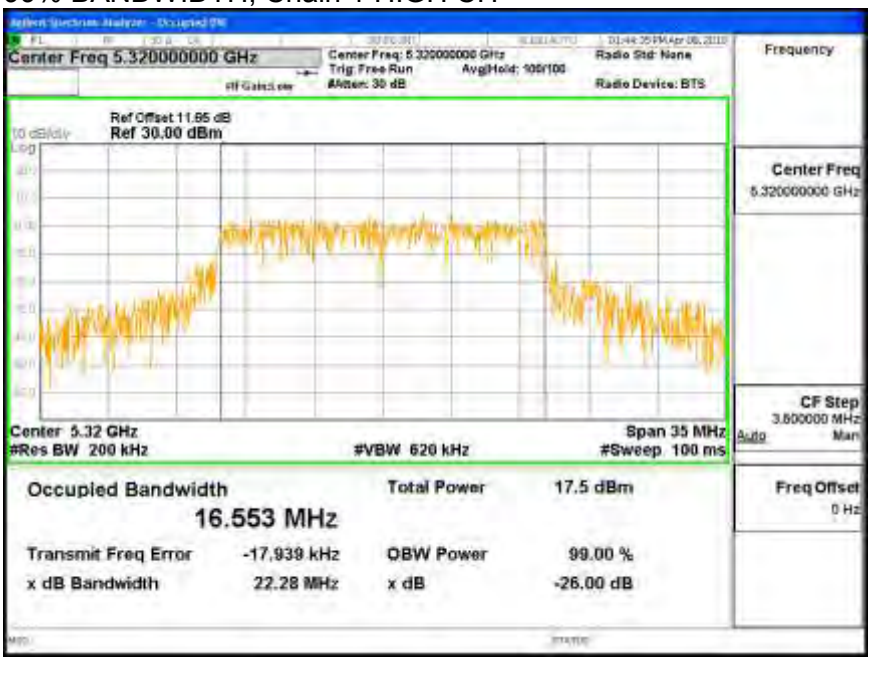
99% BANDWIDTH, Chain 1 LOW CH



99% BANDWIDTH, Chain 1 MID CH



99% BANDWIDTH, Chain 1 HIGH CH



9.1.4. 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 250 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

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

Chain 0 Antenna Gain (dBi)	Chain 1 Antenna Gain (dBi)	Uncorrelated Chains Directional Gain (dBi)
13.50	13.50	13.50

For PPSD, 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)
13.50	3.01	16.51

RESULTS

Bandwidth and Antenna Gain

Channel	Frequency (MHz)	Min 26 dB BW (MHz)	Min 99% BW (MHz)	Uncorrelated Directional Gain (dBi)	Correlated Directional Gain (dBi)
Low	5260	26.15	16.453	13.50	16.51
Mid	5300	26.25	16.509	13.50	16.51
High	5320	27.35	16.477	13.50	16.51

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	16.50	23.16	29.16	15.66	0.49	11.00	0.49
Mid	5300	16.50	23.18	29.18	15.68	0.49	11.00	0.49
High	5320	16.50	23.17	29.17	15.67	0.49	11.00	0.49

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

Output Power Results

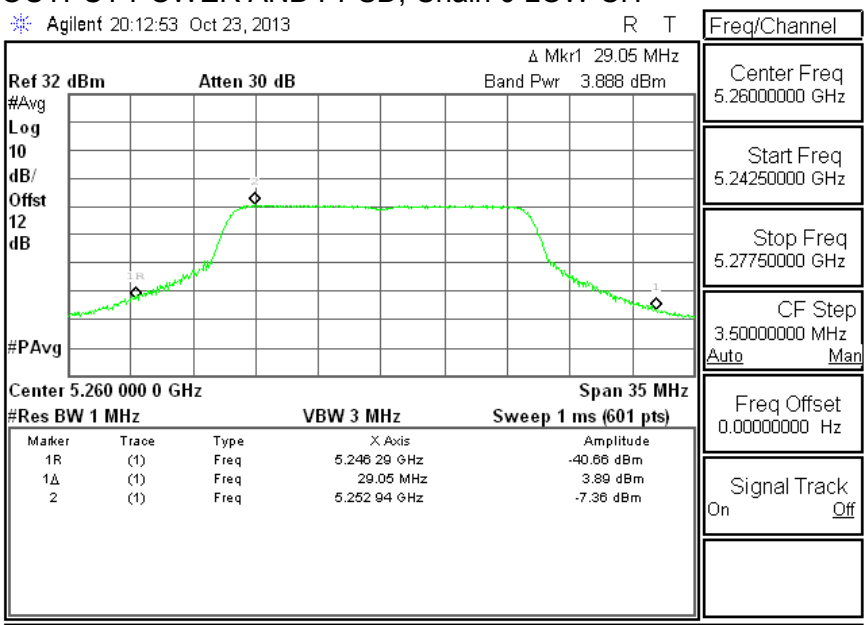
Channel	Frequency (MHz)	Chain 0 Meas Power (dBm)	Chain 1 Meas Power (dBm)	Total Corr'd Power (dBm)	Power Limit (dBm)	Power Margin (dB)
Low	5260	3.888	5.990	8.075	15.66	-7.587
Mid	5300	9.364	7.906	11.706	15.68	-3.971
High	5320	8.872	6.500	10.856	15.67	-4.813

PPSD Results

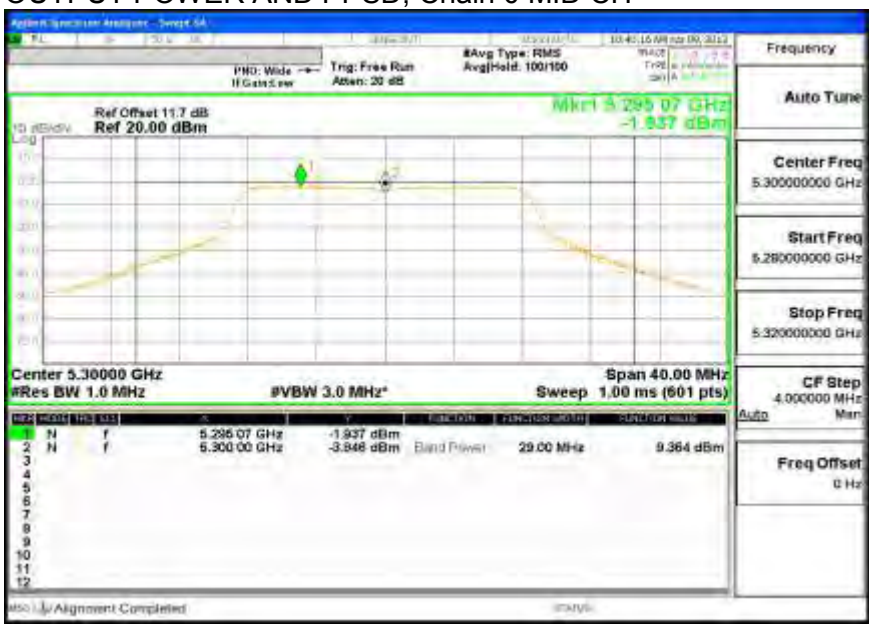
Channel	Frequency (MHz)	Chain 0 Meas PPSD (dBm)	Chain 1 Meas PPSD (dBm)	Total Corr'd PPSD (dBm)	PPSD Limit (dBm)	PPSD Margin (dB)
Low	5260	-7.360	-5.506	-3.325	0.49	-3.815
Mid	5300	-2.092	-3.640	0.213	0.49	-0.277
High	5320	-2.614	-4.093	-0.281	0.49	-0.771

OUTPUT POWER AND PPSD, Chain 0

OUTPUT POWER AND PPSD, Chain 0 LOW CH



OUTPUT POWER AND PPSD, Chain 0 MID CH



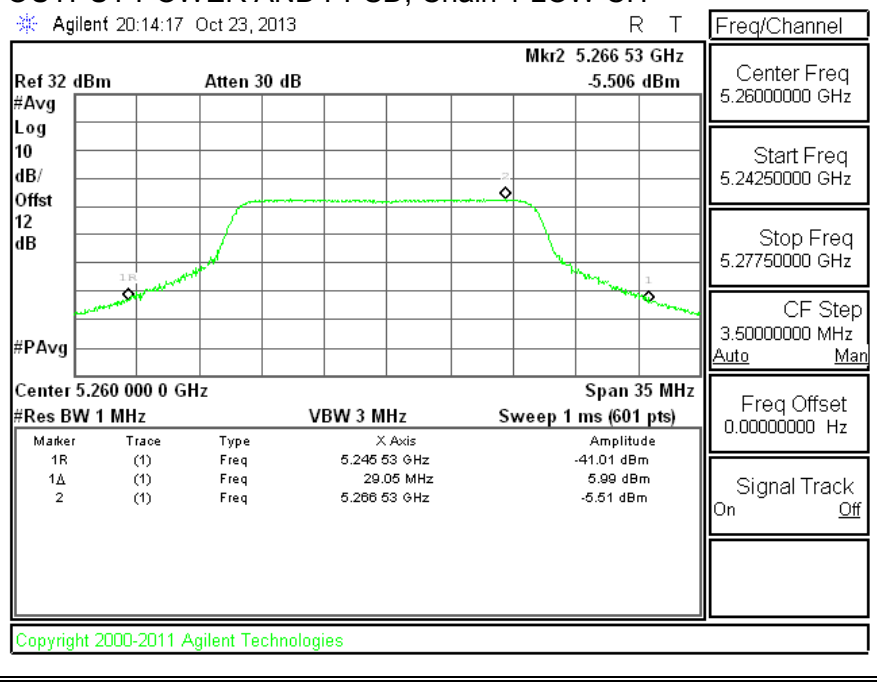
Linear Average=-2.092 dBm

OUTPUT POWER AND PPSD, Chain 0 HIGH CH

Linear Average=-2.614 dBm

OUTPUT POWER AND PPSD, Chain 1

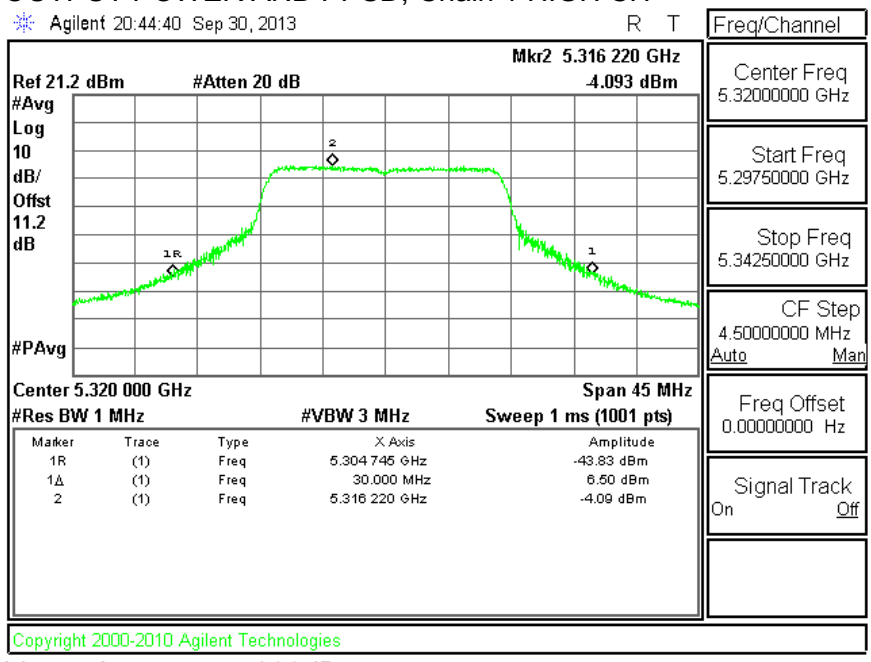
OUTPUT POWER AND PPSD, Chain 1 LOW CH



OUTPUT POWER AND PPSD, Chain 1 MID CH

Linear Average=-3.640 dBm

OUTPUT POWER AND PPSD, Chain 1 HIGH CH



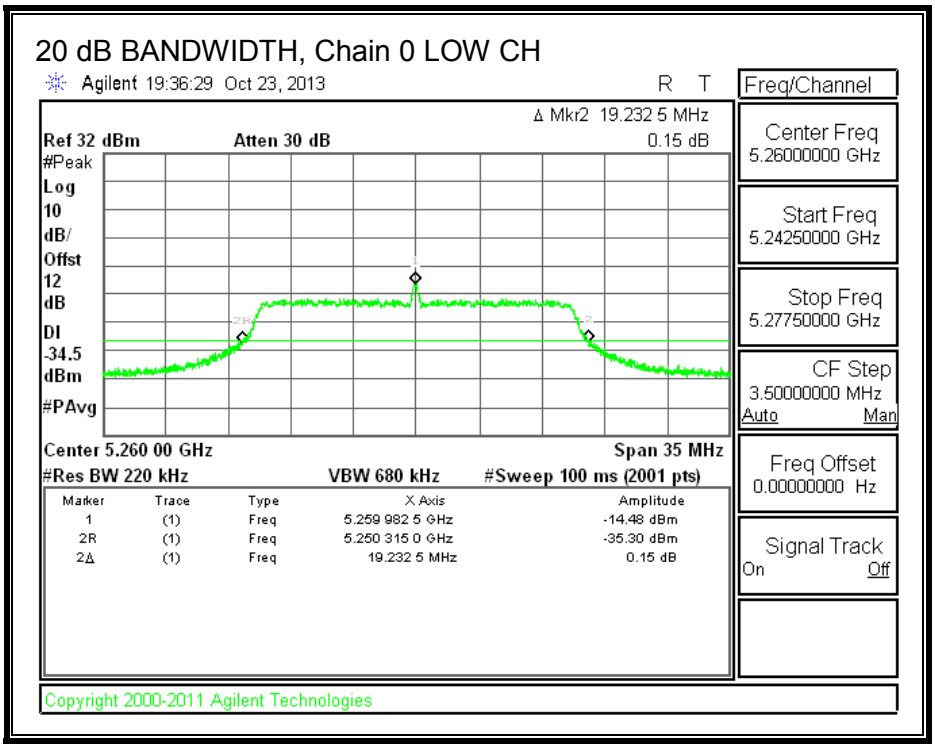
Linear Average=-4.093dBm

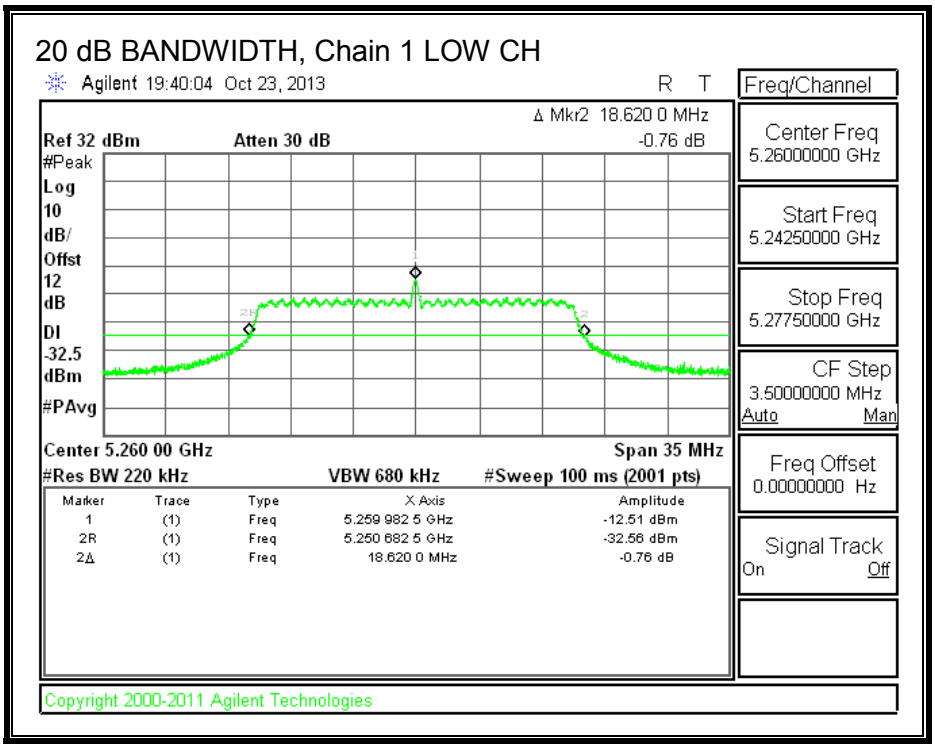
9.2. 802.11n HT20 STBC 2TX MODE IN THE 5.3 GHz BAND

9.2.1. 20 dB BANDWIDTH

LIMITS

None; 20 dB bandwidth is shown to ensure operation is within the specified 5250-5350 MHz operation band.





9.2.2. 26 dB BANDWIDTH

LIMITS

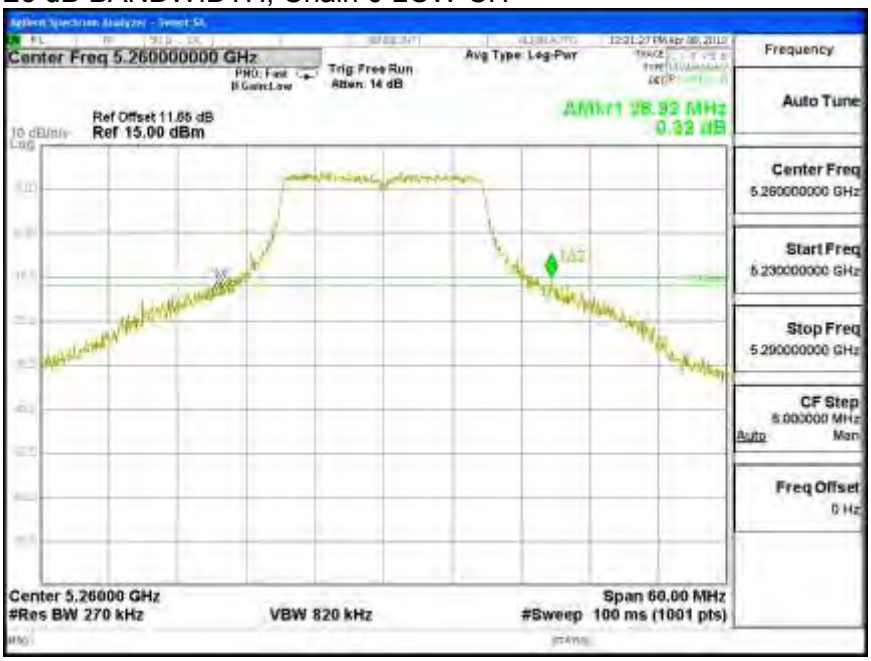
None; for reporting purposes only.

RESULTS

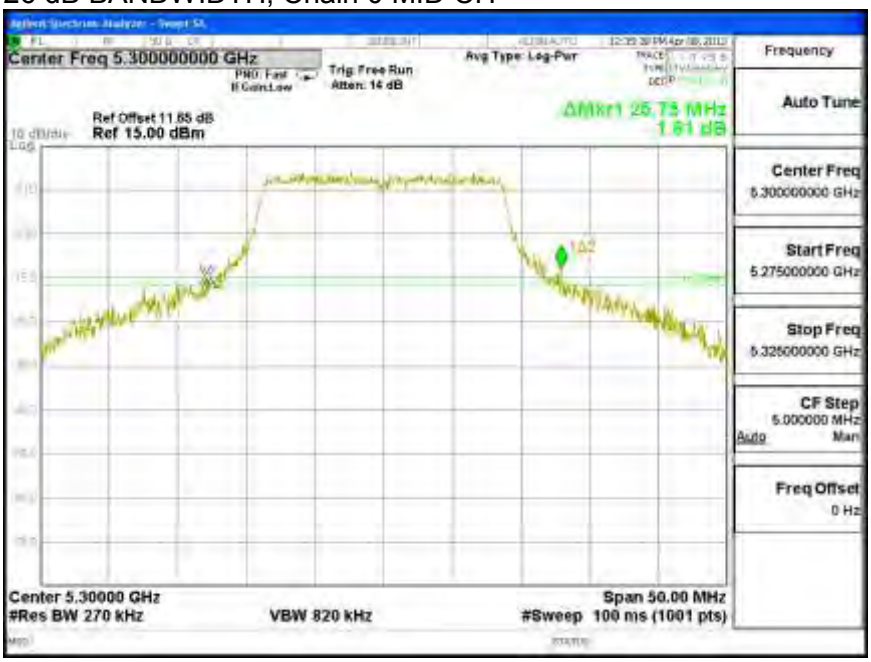
Channel	Frequency (MHz)	26 dB BW Chain 0 (MHz)	26 dB BW Chain 1 (MHz)
Low	5260	28.92	27.60
Mid	5300	25.75	27.10
High	5320	28.45	28.40

26 dB BANDWIDTH, Chain 0

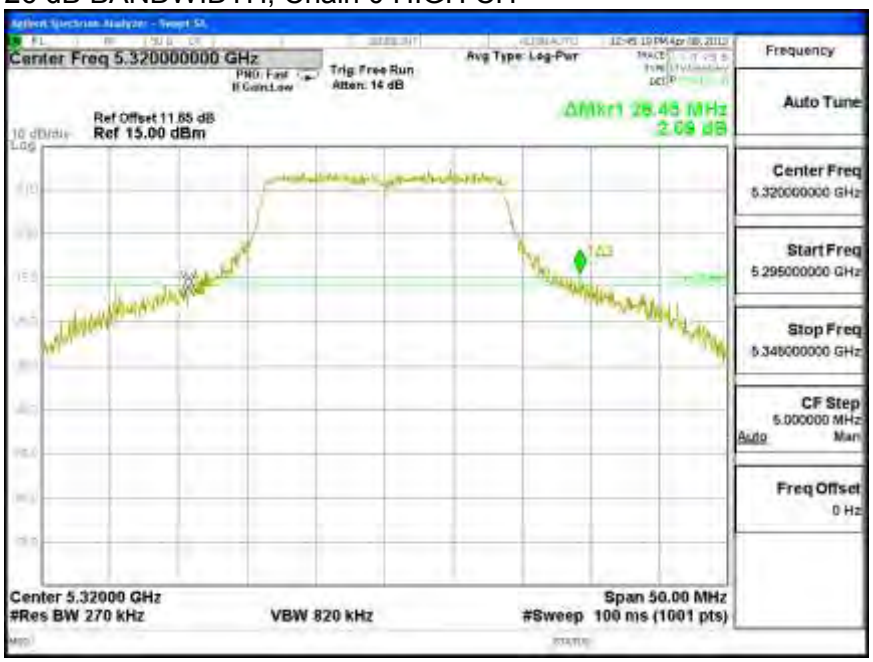
26 dB BANDWIDTH, Chain 0 LOW CH



26 dB BANDWIDTH, Chain 0 MID CH

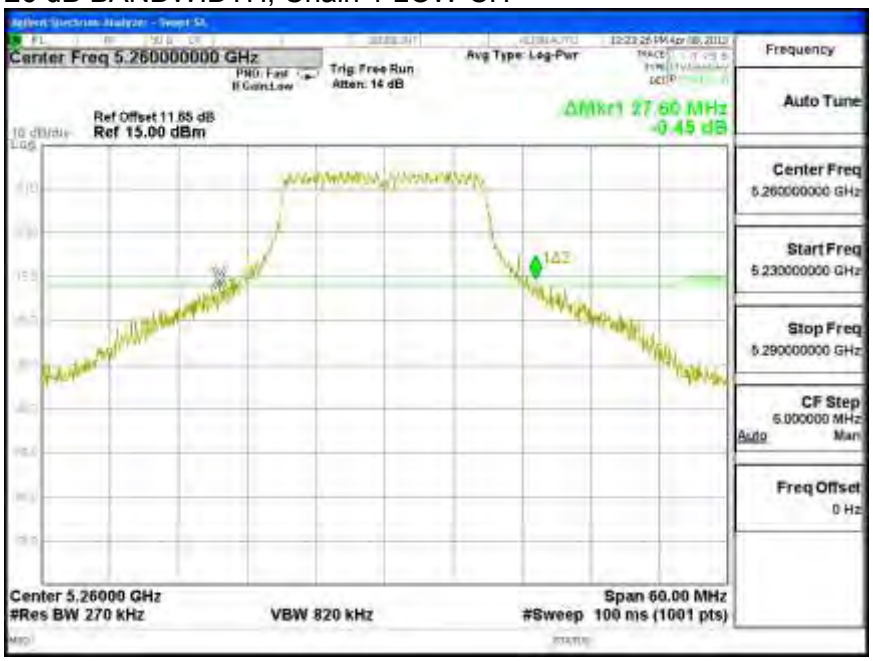


26 dB BANDWIDTH, Chain 0 HIGH CH

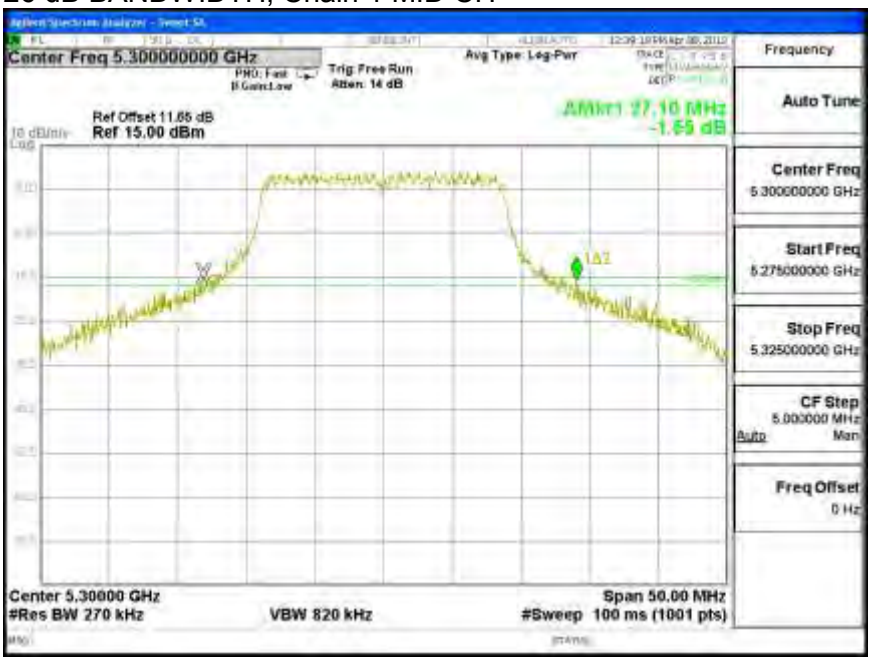


26 dB BANDWIDTH, Chain 1

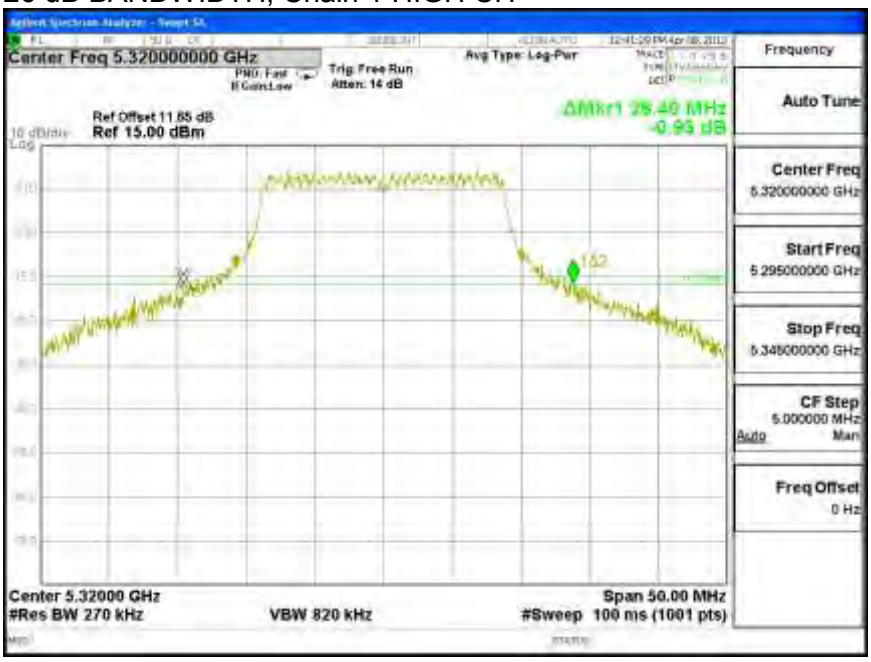
26 dB BANDWIDTH, Chain 1 LOW CH



26 dB BANDWIDTH, Chain 1 MID CH



26 dB BANDWIDTH, Chain 1 HIGH CH



9.2.3. 99% BANDWIDTH

LIMITS

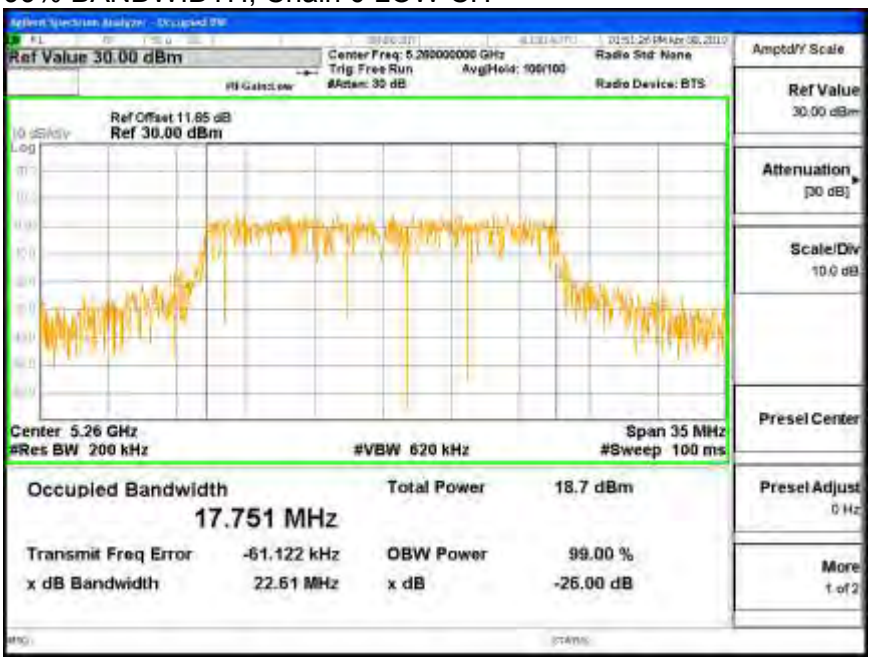
None; for reporting purposes only.

RESULTS

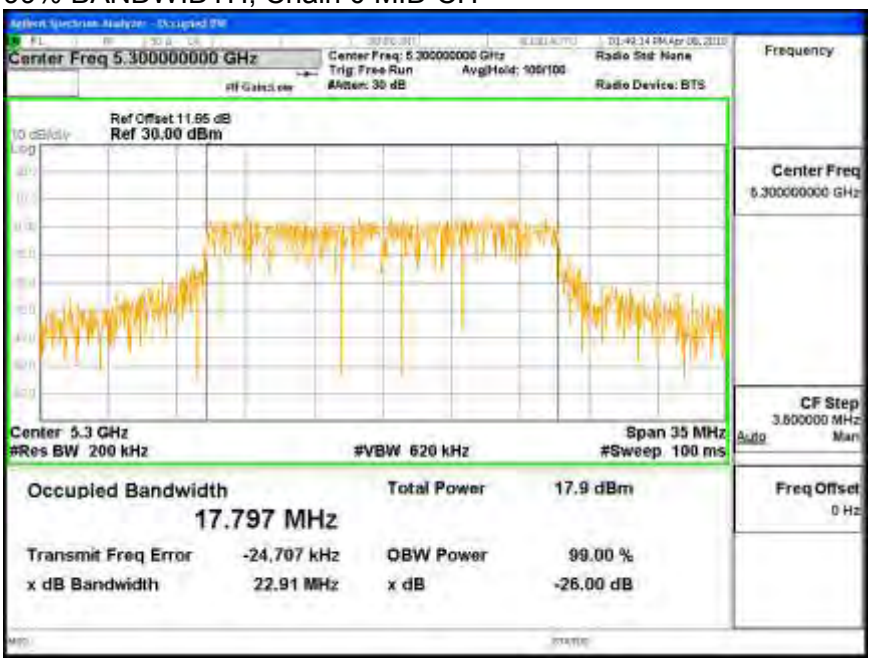
Channel	Frequency (MHz)	99% BW Chain 0 (MHz)	99% BW Chain 1 (MHz)
Low	5260	17.751	17.740
Mid	5300	17.797	17.620
High	5320	17.755	17.665

99% BANDWIDTH, Chain 0

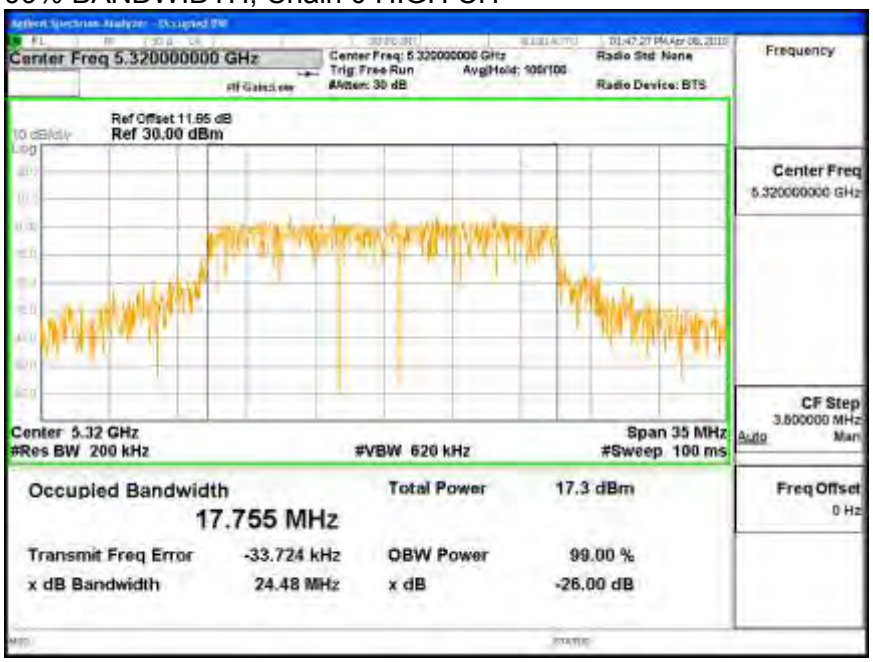
99% BANDWIDTH, Chain 0 LOW CH



99% BANDWIDTH, Chain 0 MID CH

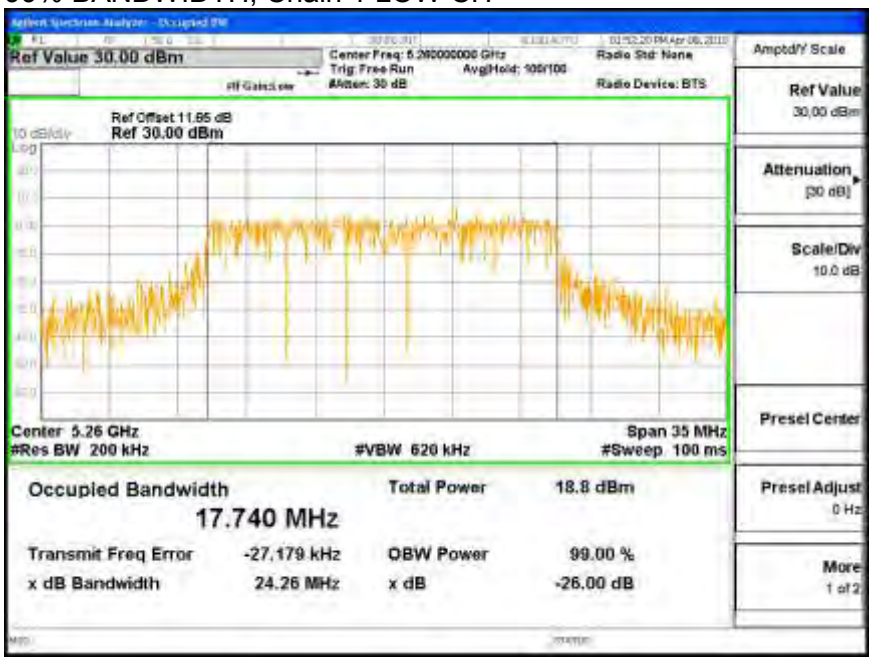


99% BANDWIDTH, Chain 0 HIGH CH

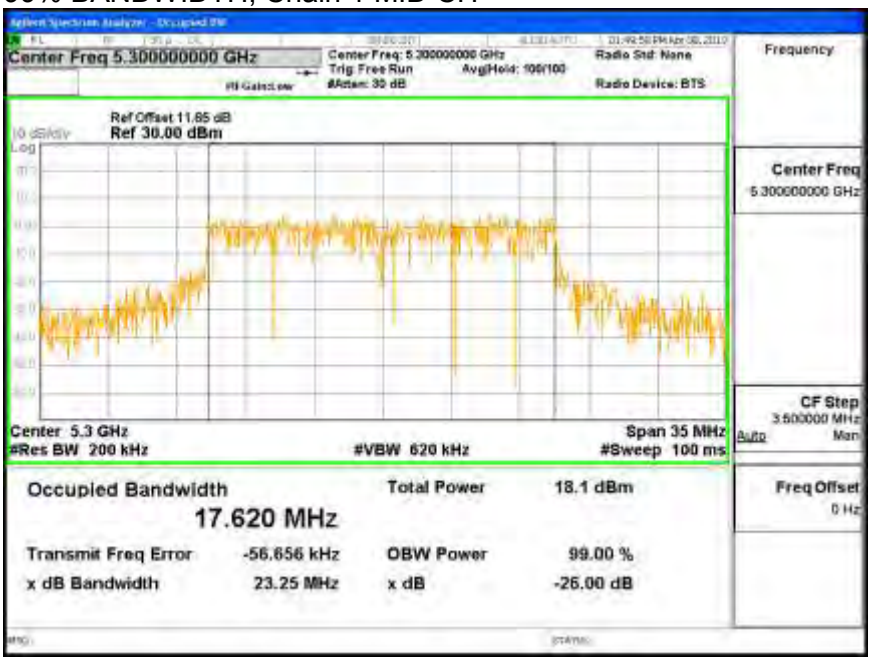


99% BANDWIDTH, Chain 1

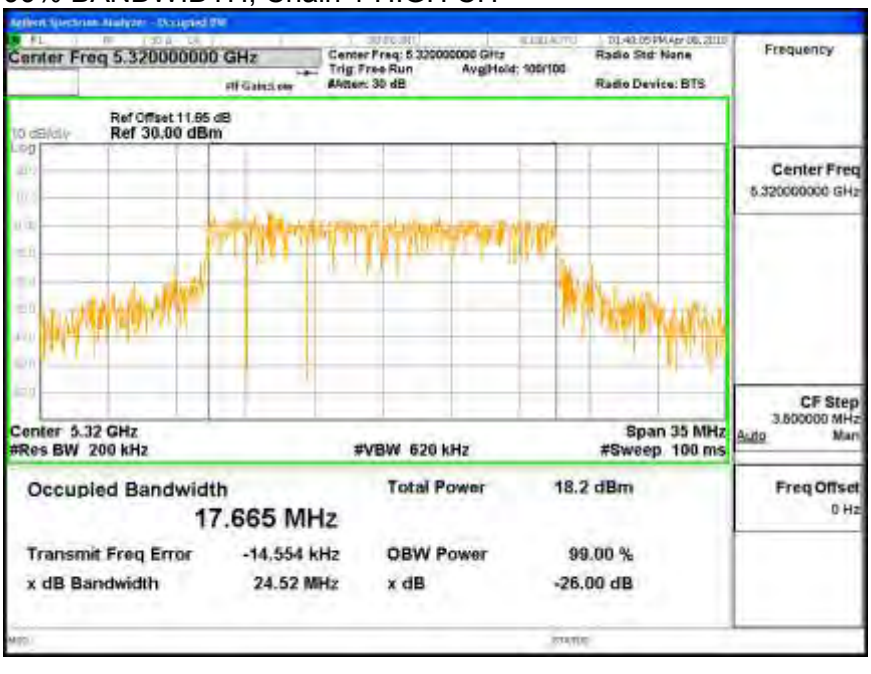
99% BANDWIDTH, Chain 1 LOW CH



99% BANDWIDTH, Chain 1 MID CH



99% BANDWIDTH, Chain 1 HIGH CH



9.2.4. 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 250 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

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	5260	27.60	17.740	13.50
Mid	5300	25.75	17.620	13.50
High	5320	28.40	17.665	13.50

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	16.50	23.49	29.49	15.99	3.50	11.00	3.50
Mid	5300	16.50	23.46	29.46	15.96	3.50	11.00	3.50
High	5320	16.50	23.47	29.47	15.97	3.50	11.00	3.50

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

Output Power Results

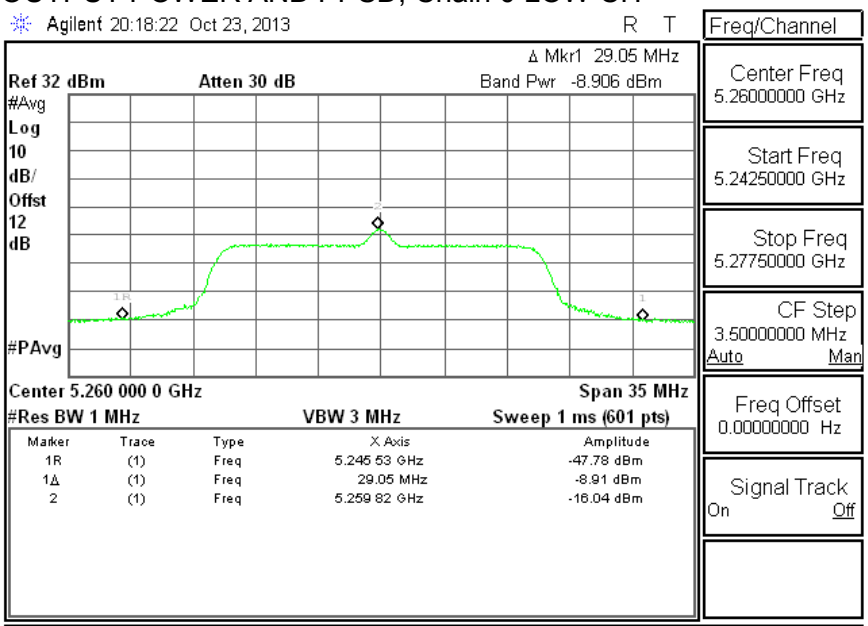
Channel	Frequency (MHz)	Chain 0 Meas Power (dBm)	Chain 1 Meas Power (dBm)	Total Corr'd Power (dBm)	Power Limit (dBm)	Power Margin (dB)
Low	5260	-8.906	-8.743	-5.813	15.99	-21.803
Mid	5300	12.577	11.760	15.198	15.96	-0.762
High	5320	12.566	11.889	15.251	15.97	-0.720

PPSD Results

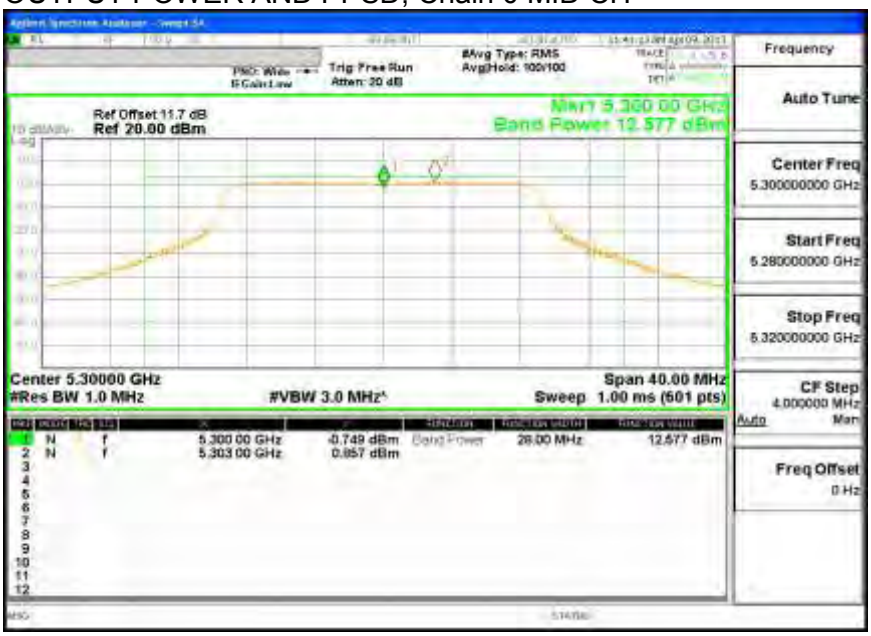
Channel	Frequency (MHz)	Chain 0 Meas PPSD (dBm)	Chain 1 Meas PPSD (dBm)	Total Corr'd PPSD (dBm)	PPSD Limit (dBm)	PPSD Margin (dB)
Low	5260	-16.04	-17.53	-13.71	3.50	-17.21
Mid	5300	0.73	-0.13	3.33	3.50	-0.17
High	5320	0.83	-0.02	3.44	3.50	-0.06

OUTPUT POWER AND PPSD, Chain 0

OUTPUT POWER AND PPSD, Chain 0 LOW CH

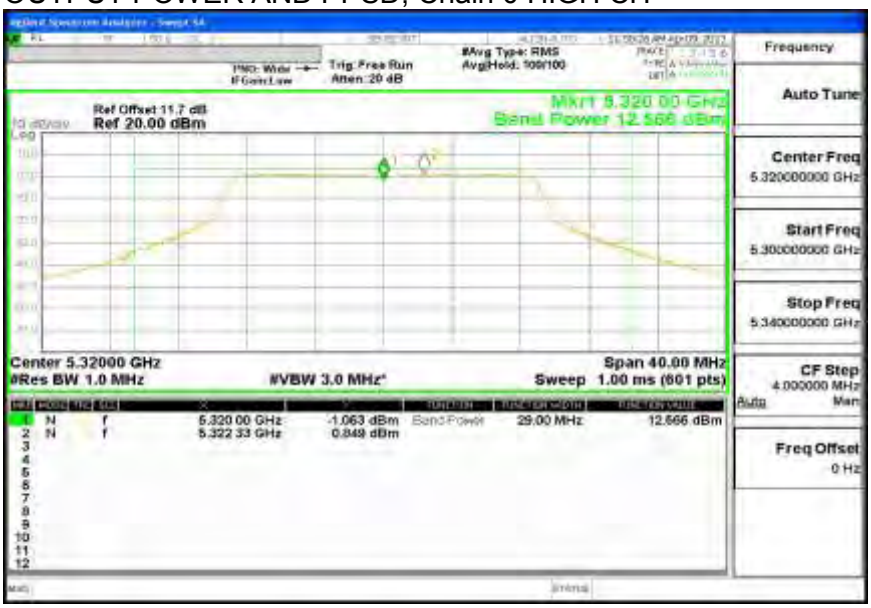


OUTPUT POWER AND PPSD, Chain 0 MID CH



Linear Average=0.73 dBm

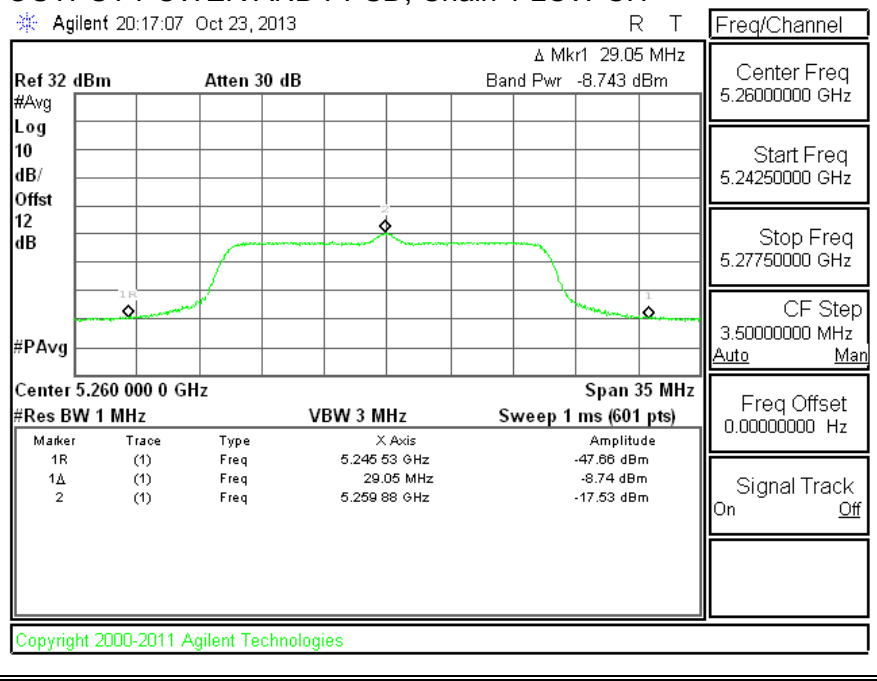
OUTPUT POWER AND PPSD, Chain 0 HIGH CH



Linear Average=0.83 dBm

OUTPUT POWER AND PPSD, Chain 1

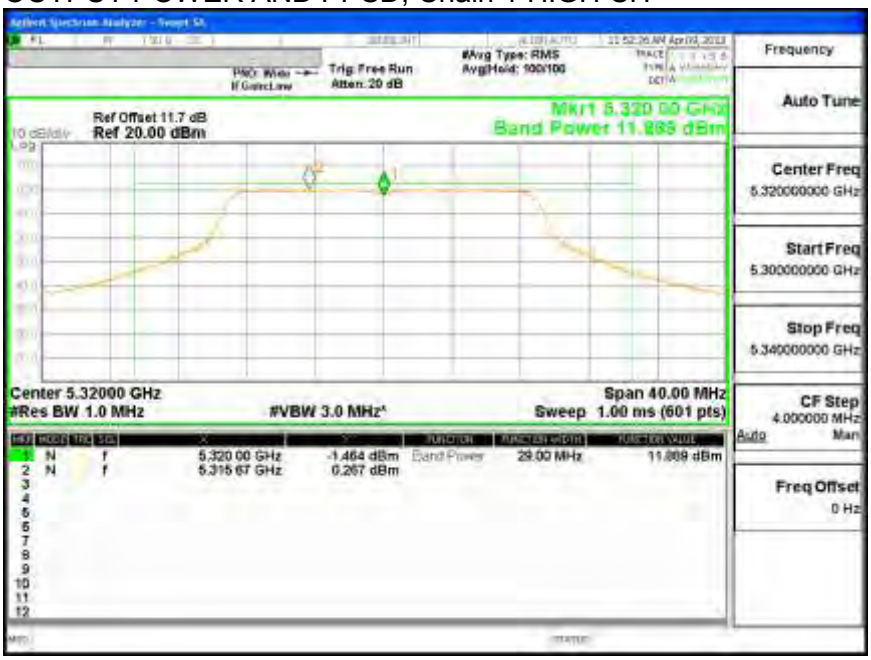
OUTPUT POWER AND PPSD, Chain 1 LOW CH



OUTPUT POWER AND PPSD, Chain 1 MID CH

Linear Average= -0.13 dBm

OUTPUT POWER AND PPSD, Chain 1 HIGH CH



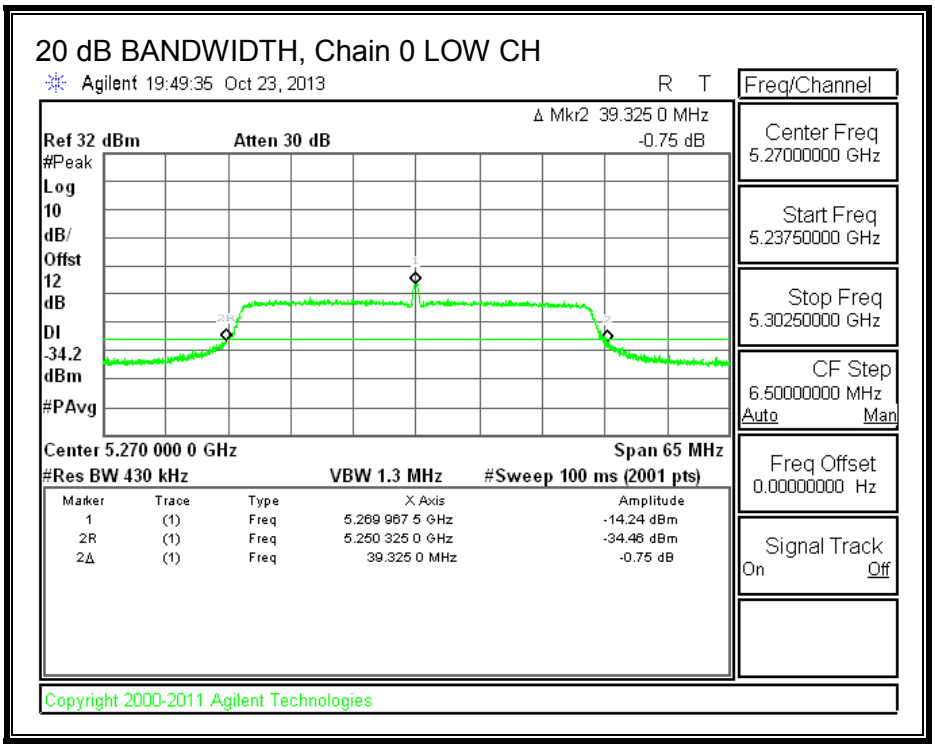
Linear Average= -0.02 dBm

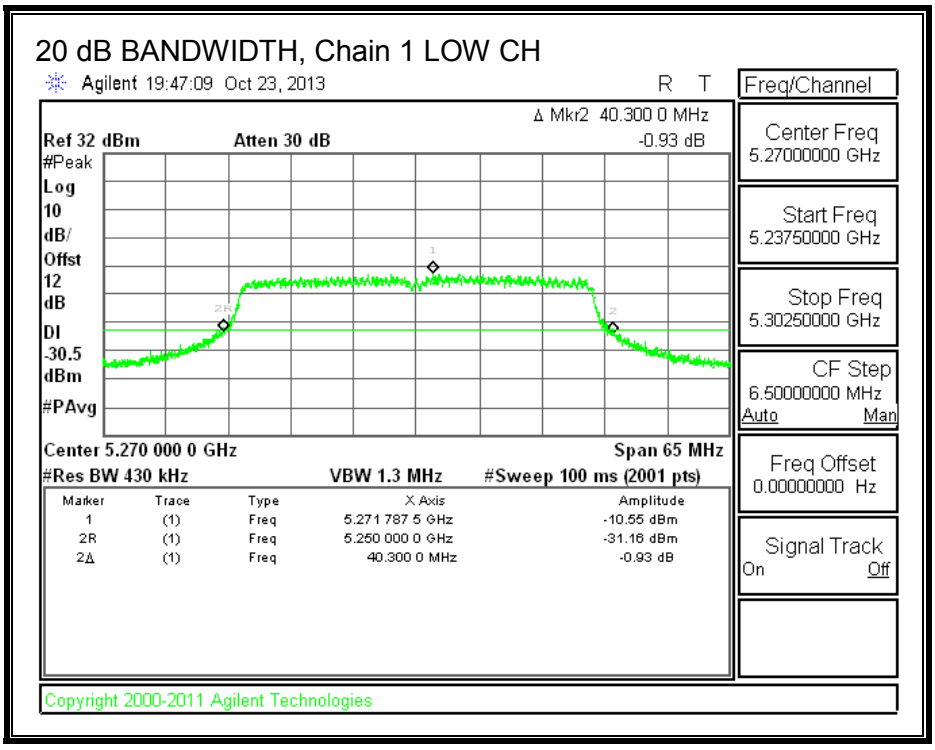
9.3. 802.11n HT40 STBC 2TX MODE IN THE 5.3 GHz BAND

9.3.1. 20 dB BANDWIDTH

LIMITS

None; 20 dB bandwidth is shown to ensure operation is within the specified 5250-5350 MHz operation band.





9.3.2. 26 dB BANDWIDTH

LIMITS

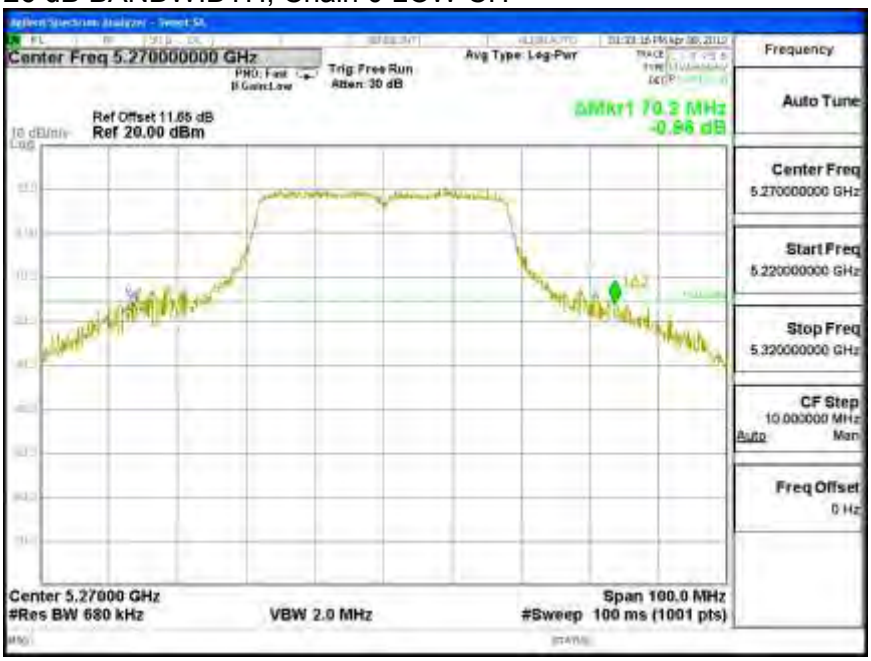
None; for reporting purposes only.

RESULTS

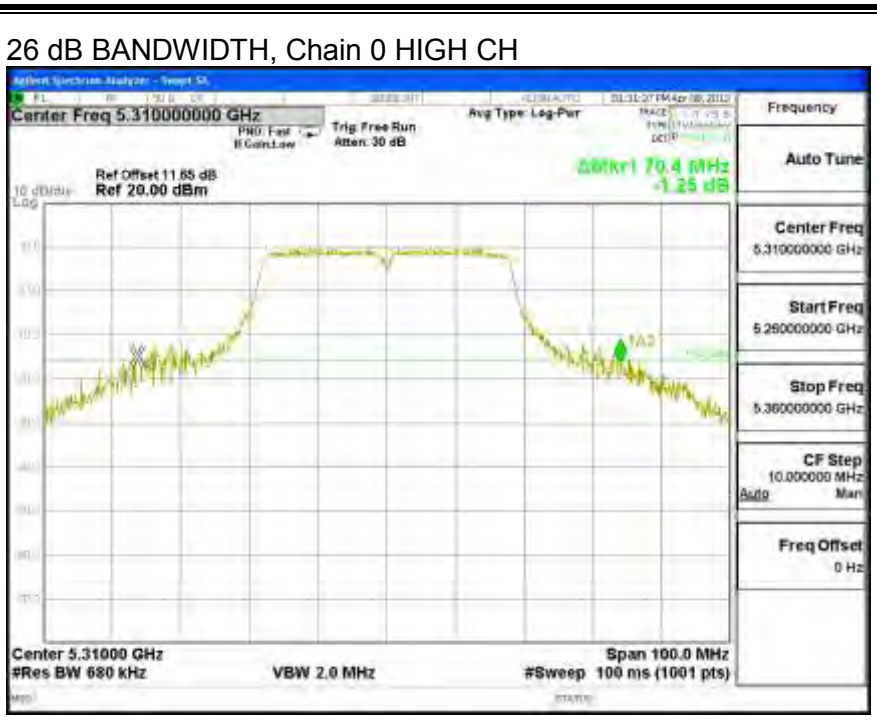
Channel	Frequency (MHz)	26 dB BW Chain 0 (MHz)	26 dB BW Chain 1 (MHz)
Low	5270	70.2	62.2
High	5310	70.4	67.0

26 dB BANDWIDTH, Chain 0

26 dB BANDWIDTH, Chain 0 LOW CH

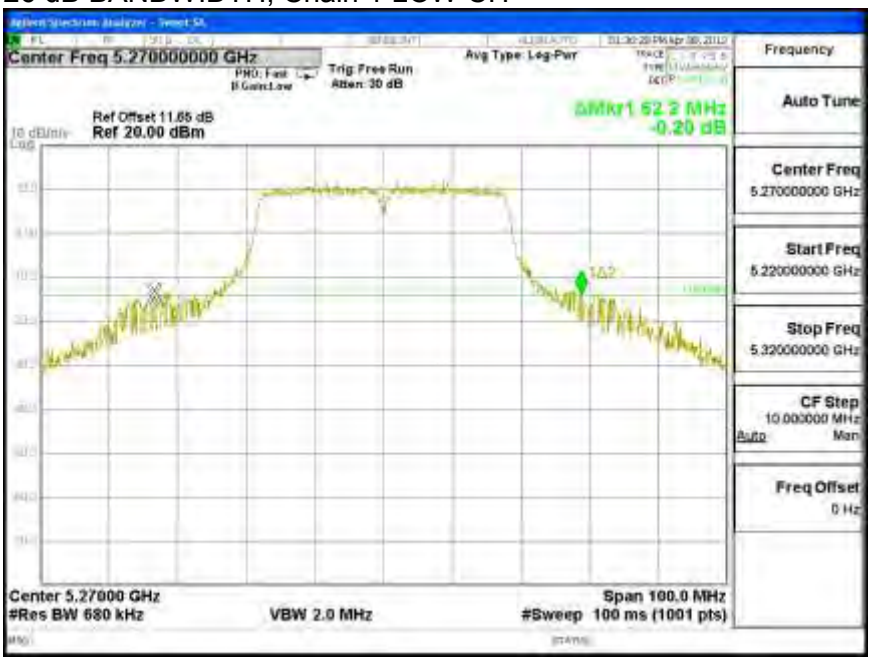


26 dB BANDWIDTH, Chain 0 HIGH CH

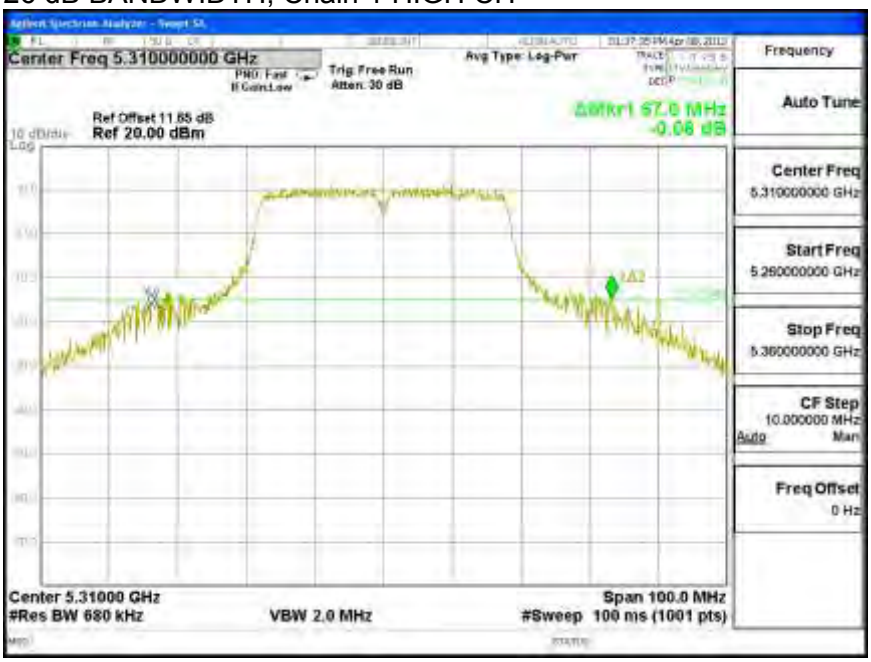


26 dB BANDWIDTH, Chain 1

26 dB BANDWIDTH, Chain 1 LOW CH



26 dB BANDWIDTH, Chain 1 HIGH CH



9.3.3. 99% BANDWIDTH

LIMITS

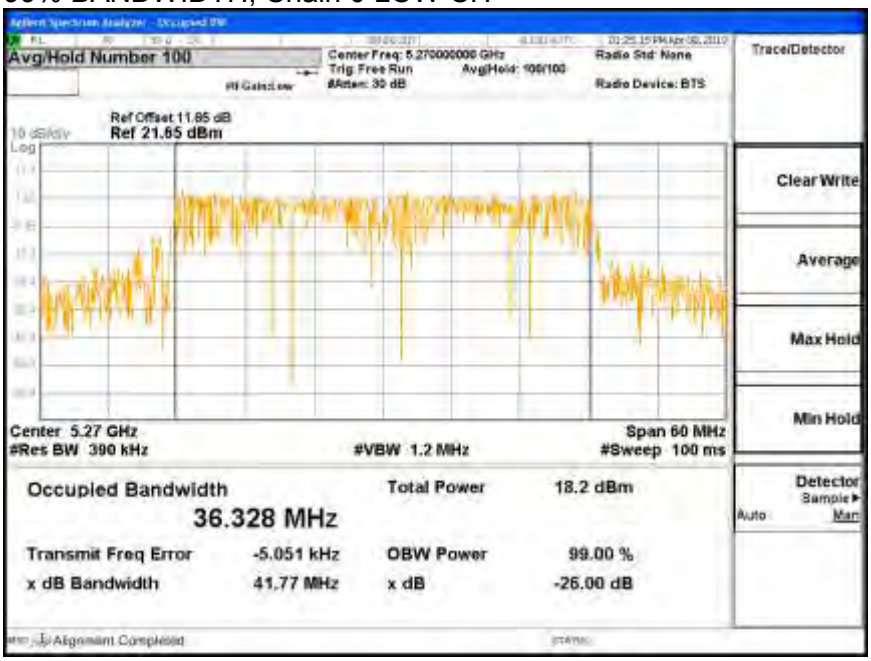
None; for reporting purposes only.

RESULTS

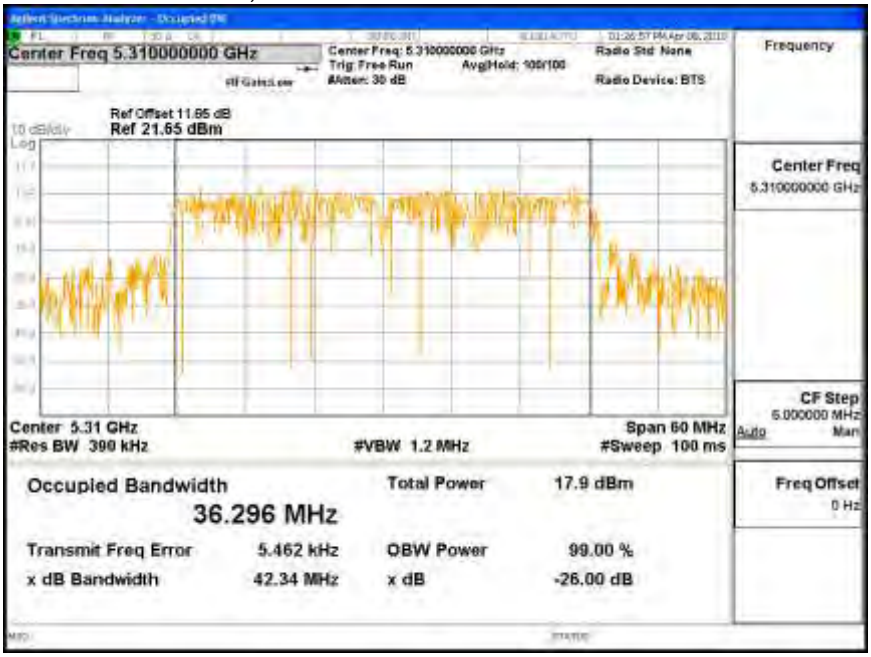
Channel	Frequency (MHz)	99% BW Chain 0 (MHz)	99% BW Chain 1 (MHz)
Low	5270	36.328	36.323
High	5310	36.296	36.310

99% BANDWIDTH, Chain 0

99% BANDWIDTH, Chain 0 LOW CH

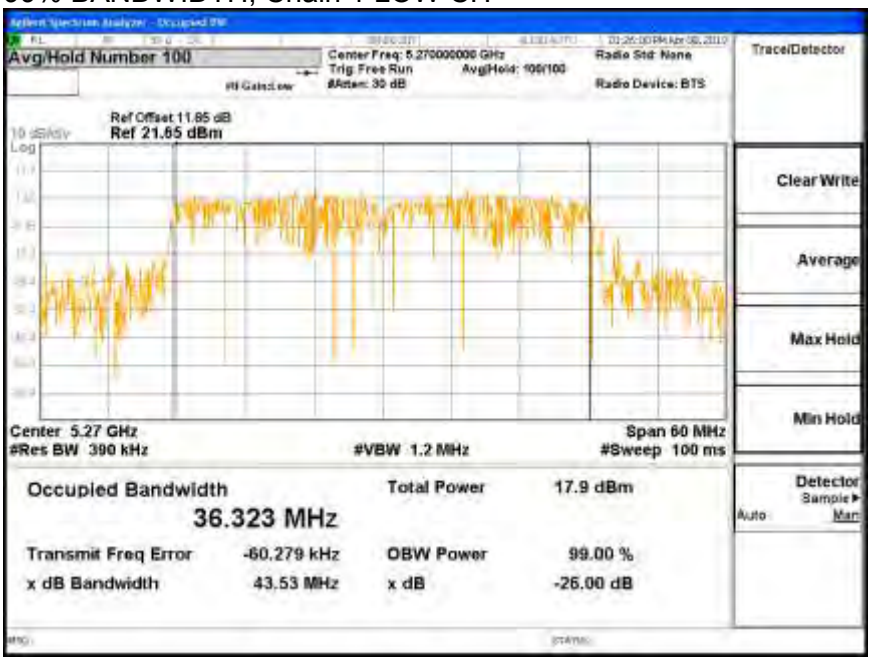


99% BANDWIDTH, Chain 0 HIGH CH

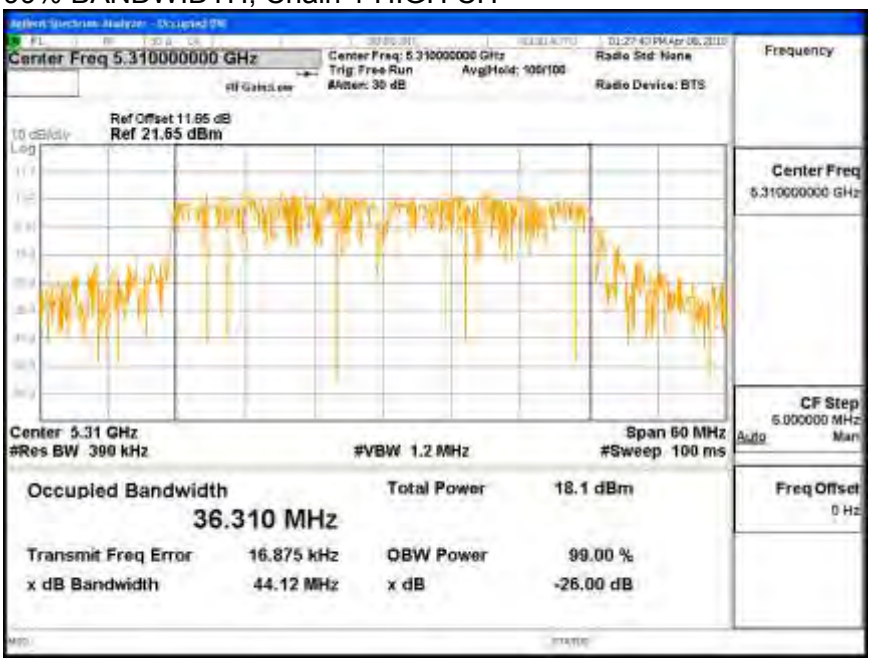


99% BANDWIDTH, Chain 1

99% BANDWIDTH, Chain 1 LOW CH



99% BANDWIDTH, Chain 1 HIGH CH



9.3.4. 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 250 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

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	5270	62.2	36.323	13.50
High	5310	67.0	36.296	13.50

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	5270	16.50	24.00	30.00	16.50	3.50	11.00	3.50
High	5310	16.50	24.00	30.00	16.50	3.50	11.00	3.50

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

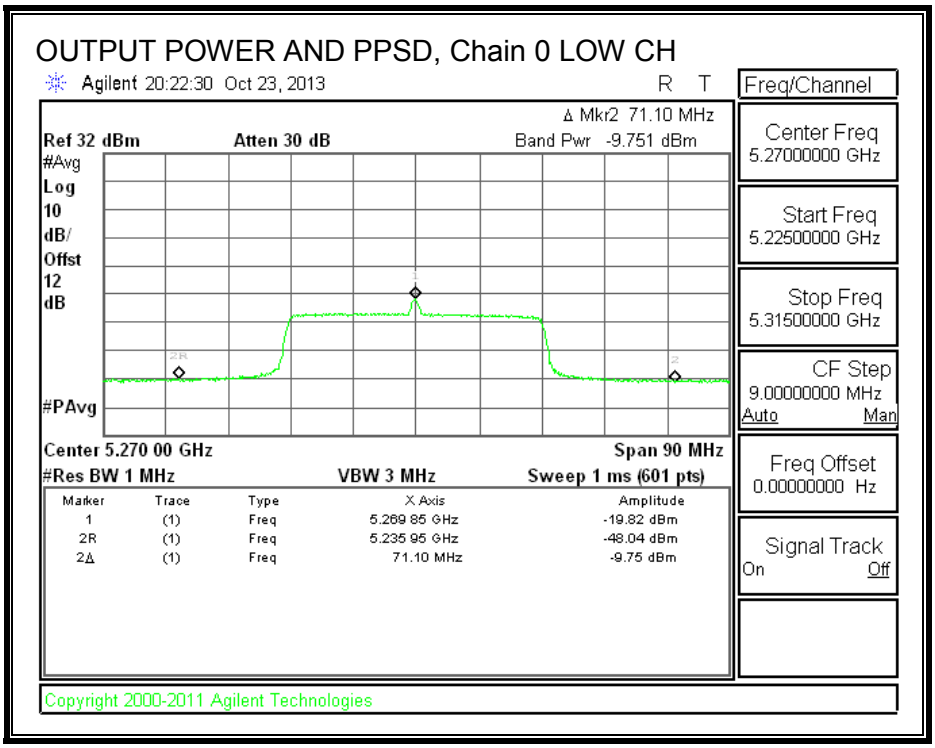
Output Power Results

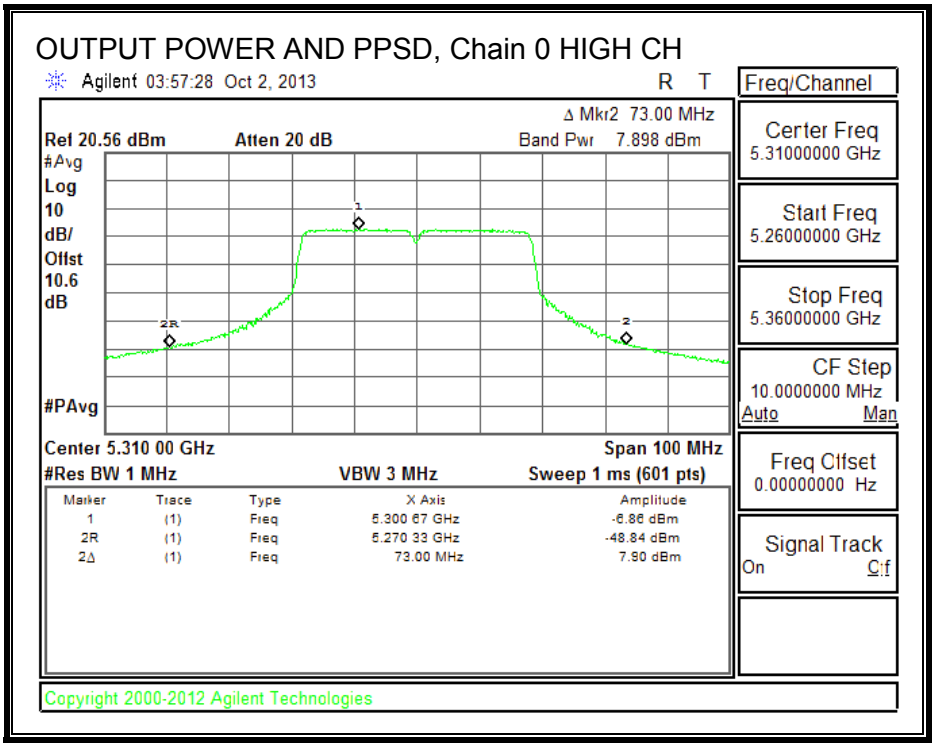
Channel	Frequency (MHz)	Chain 0 Meas Power (dBm)	Chain 1 Meas Power (dBm)	Total Corr'd Power (dBm)	Power Limit (dBm)	Power Margin (dB)
Low	5270	-9.751	-2.662	-1.887	16.50	-18.387
High	5310	7.898	7.811	10.865	16.50	-5.635

PPSD Results

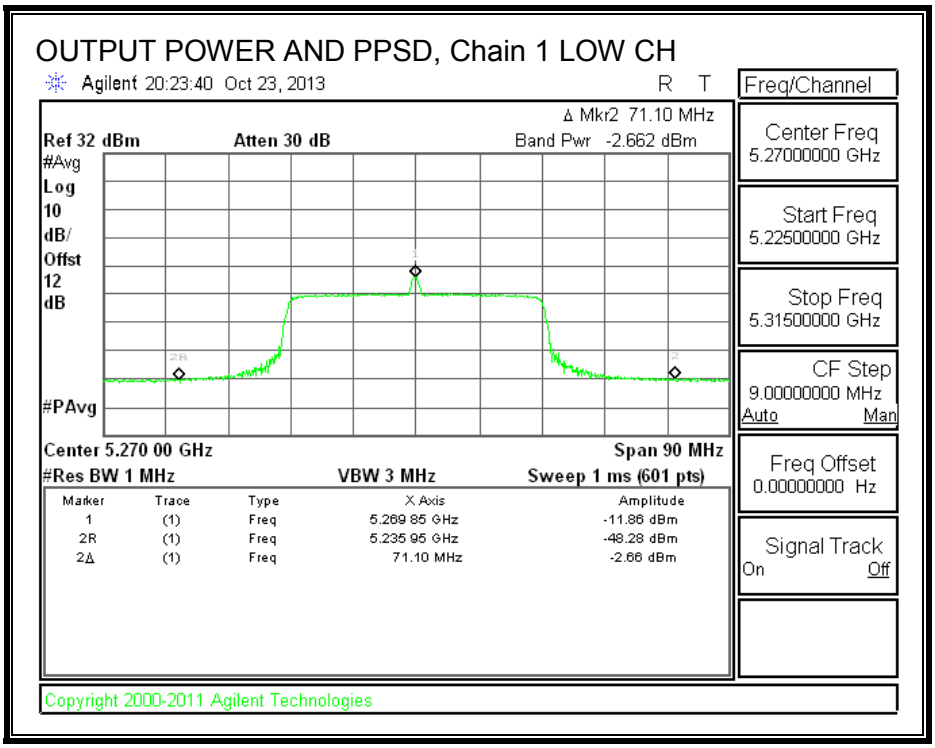
Channel	Frequency (MHz)	Chain 0 Meas PPSD (dBm)	Chain 1 Meas PPSD (dBm)	Total Corr'd PPSD (dBm)	PPSD Limit (dBm)	PPSD Margin (dB)
Low	5270	-19.820	-11.860	-11.216	3.50	-14.716
High	5310	-0.810	-1.746	1.757	3.50	-1.743

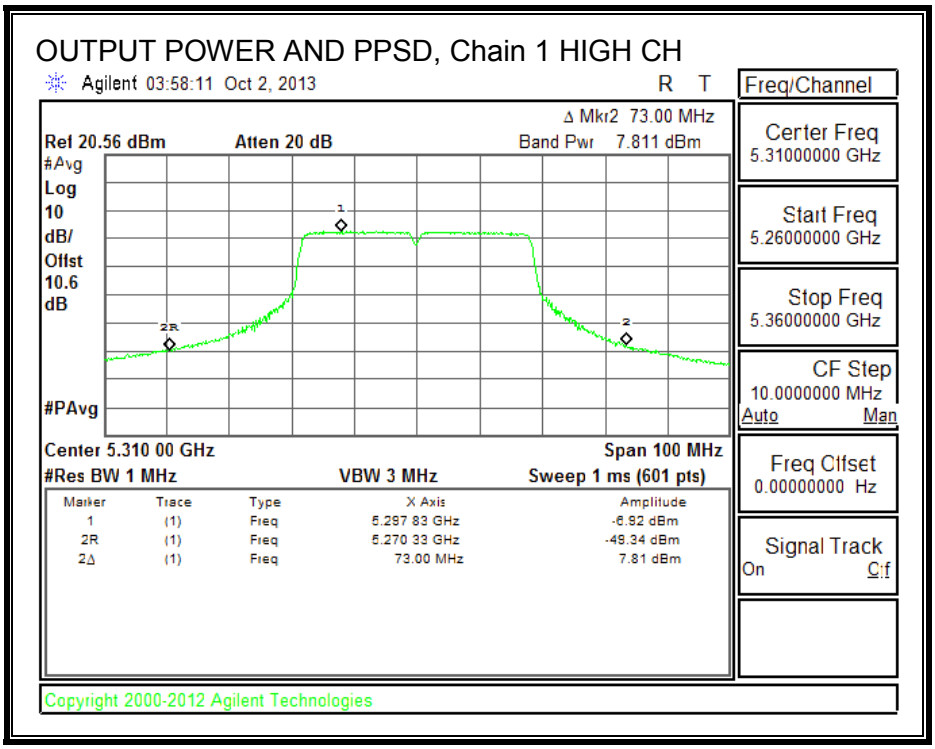
OUTPUT POWER AND PPSD, Chain 0





OUTPUT POWER AND PPSD, Chain 1





9.4. 802.11a CDD 2TX MODE IN THE 5.6 GHz BAND

9.4.1. 26 dB BANDWIDTH

LIMITS

None; for reporting purposes only.

RESULTS

Channel	Frequency (MHz)	26 dB BW Chain 0 (MHz)	26 dB BW Chain 1 (MHz)
Low	5500	27.225	27.525
Mid	5580	29.025	29.325
High	5700	26.100	25.800

26 dB BANDWIDTH, Chain 0

BANDWIDTH Chain 0 LOW CH

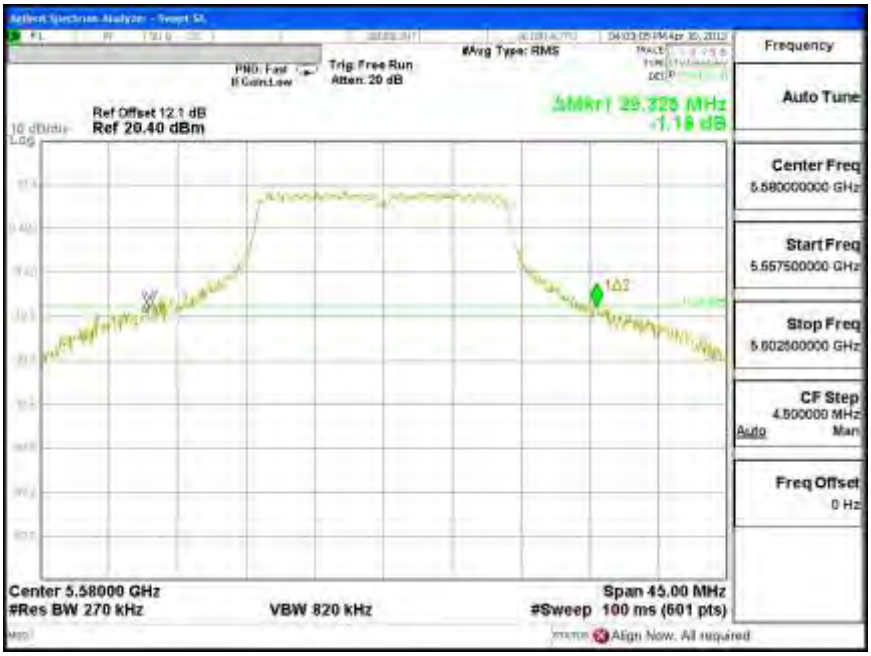
BANDWIDTH Chain 0 MID CH

BANDWIDTH Chain 0 HIGH CH

26 dB BANDWIDTH, Chain 1

BANDWIDTH Chain 1 LOW CH

BANDWIDTH Chain 1 MID CH



BANDWIDTH Chain 1 HIGH CH

9.4.2. 99% BANDWIDTH

LIMITS

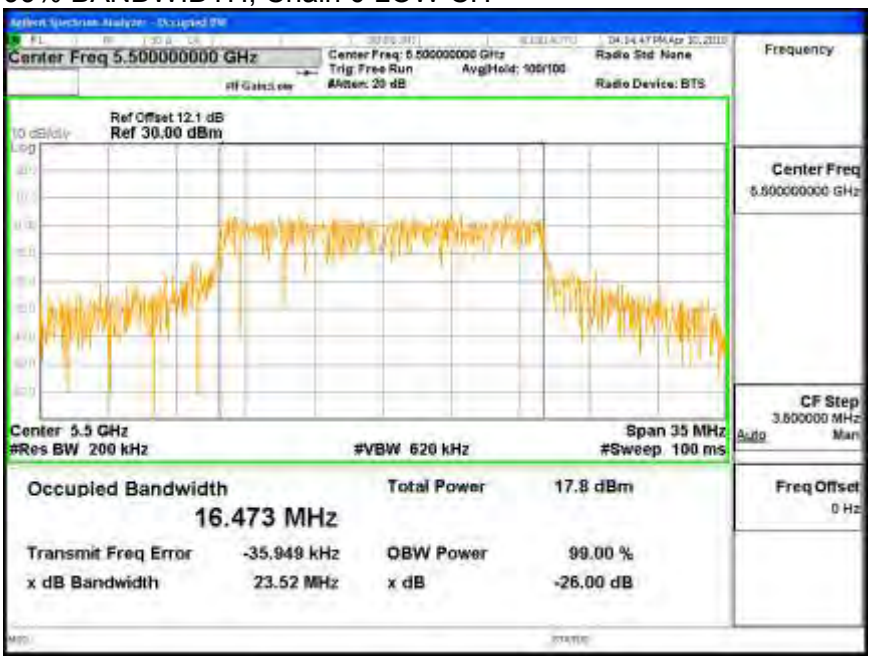
None; for reporting purposes only.

RESULTS

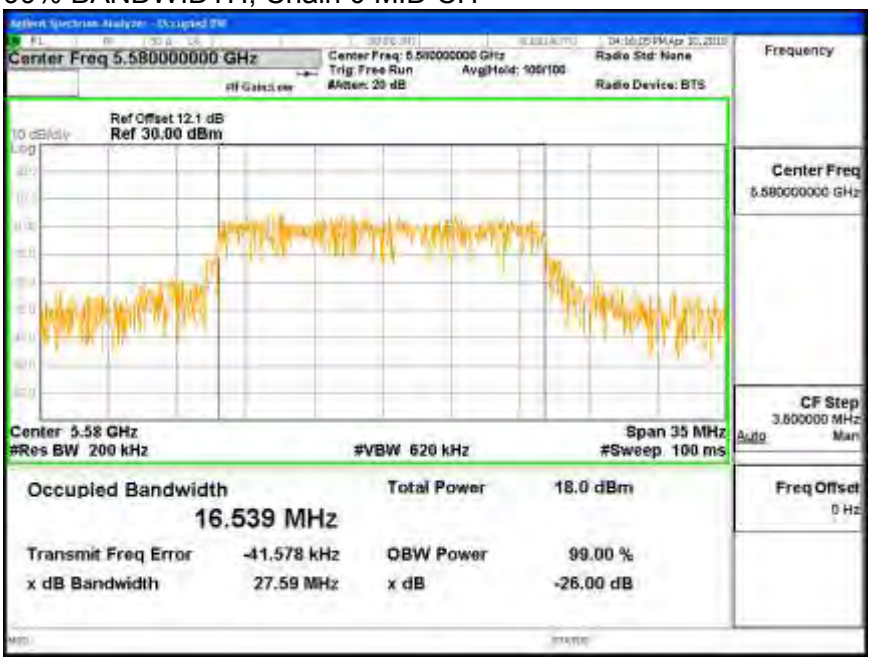
Channel	Frequency (MHz)	99% BW Chain 0 (MHz)	99% BW Chain 1 (MHz)
Low	5500	16.473	16.482
Mid	5580	16.539	16.462
High	5700	16.500	16.445

99% BANDWIDTH, Chain 0

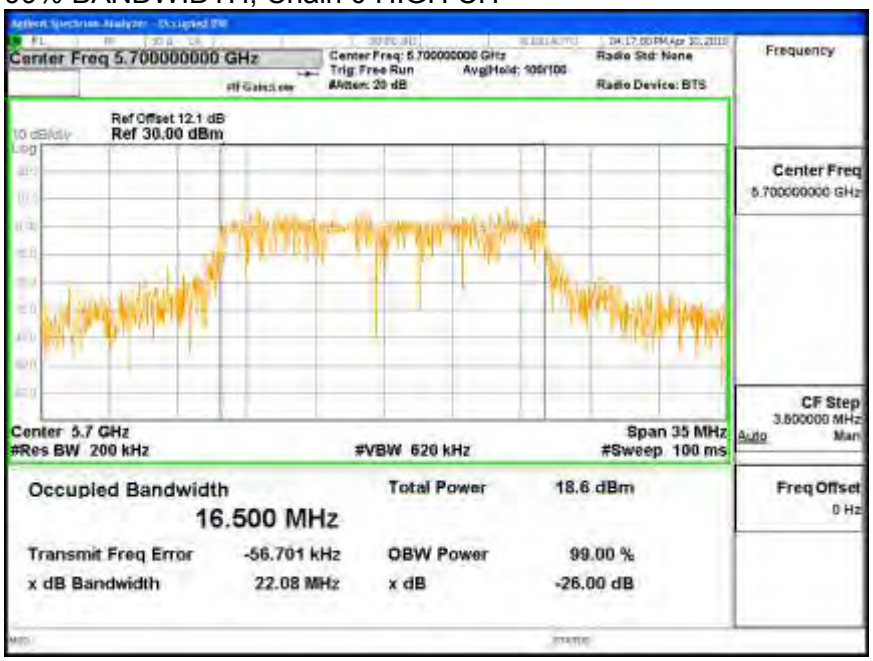
99% BANDWIDTH, Chain 0 LOW CH



99% BANDWIDTH, Chain 0 MID CH

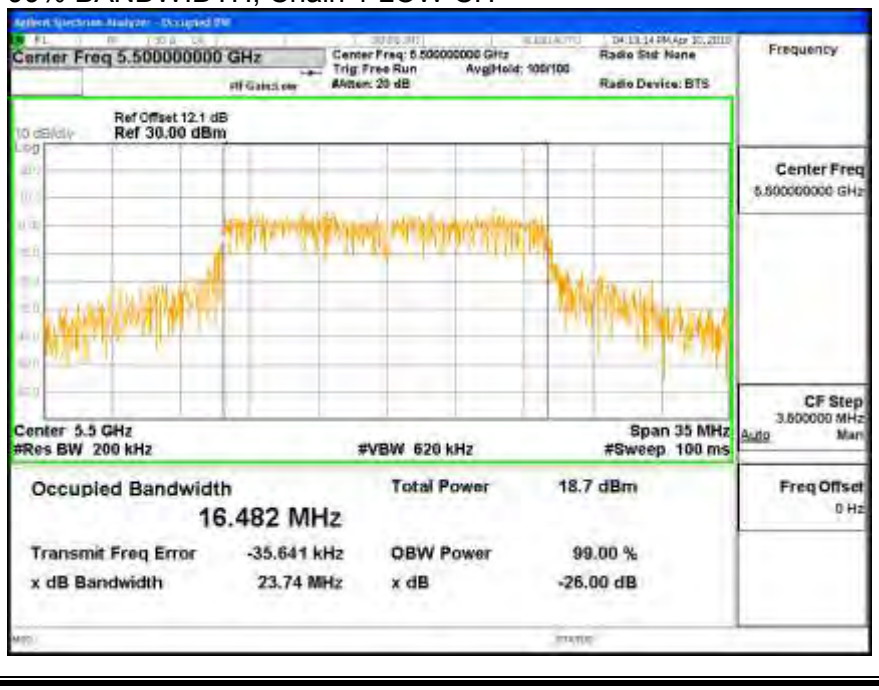


99% BANDWIDTH, Chain 0 HIGH CH

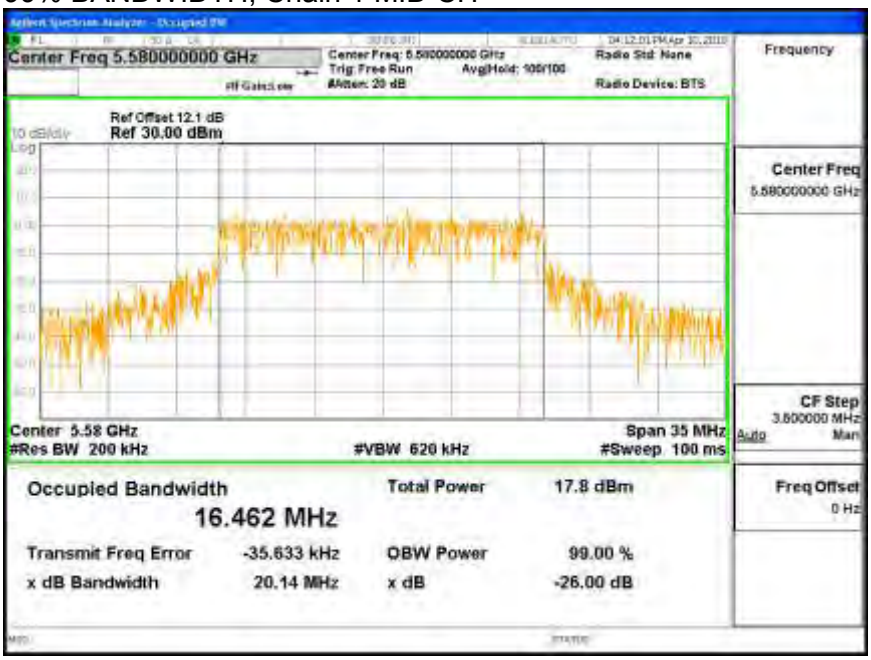


99% BANDWIDTH, Chain 1

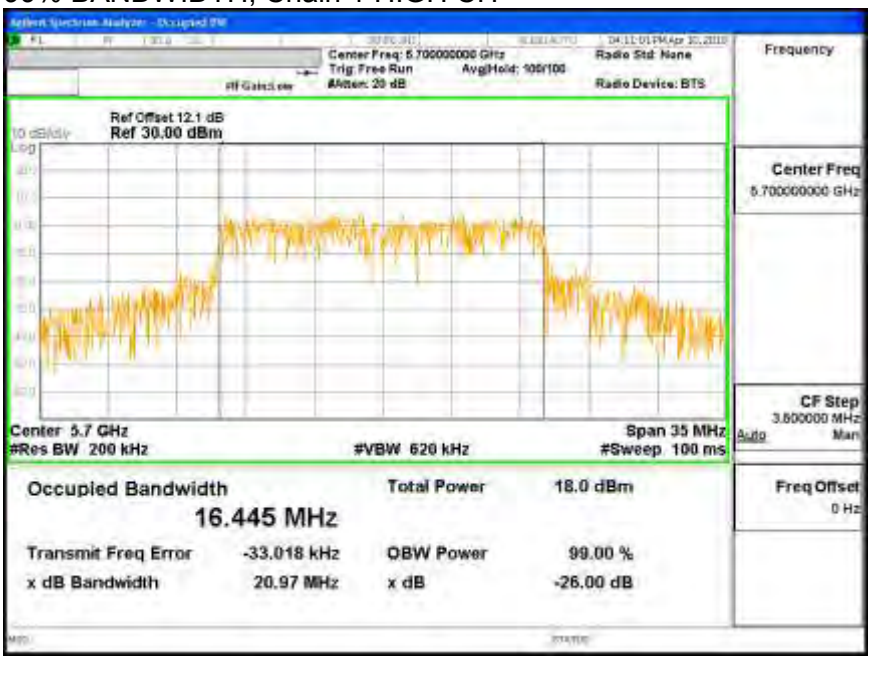
99% BANDWIDTH, Chain 1 LOW CH



99% BANDWIDTH, Chain 1 MID CH



99% BANDWIDTH, Chain 1 HIGH CH



9.4.3. 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 250 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

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

For PPSD, 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)
13.50	3.01	16.51

RESULTS

Bandwidth and Antenna Gain

Channel	Frequency (MHz)	Min 26 dB BW (MHz)	Min 99% BW (MHz)	Uncorrelated Directional Gain (dBi)	Correlated Directional Gain (dBi)
Low	5500	27.225	16.473	13.50	16.51
Mid	5580	29.025	16.462	13.50	16.51
High	5700	25.800	16.445	13.50	16.51

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	16.50	23.17	29.17	15.67	0.49	11.00	0.49
Mid	5580	16.50	23.16	29.16	15.66	0.49	11.00	0.49
High	5700	16.50	23.16	29.16	15.66	0.49	11.00	0.49

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

Output Power Results

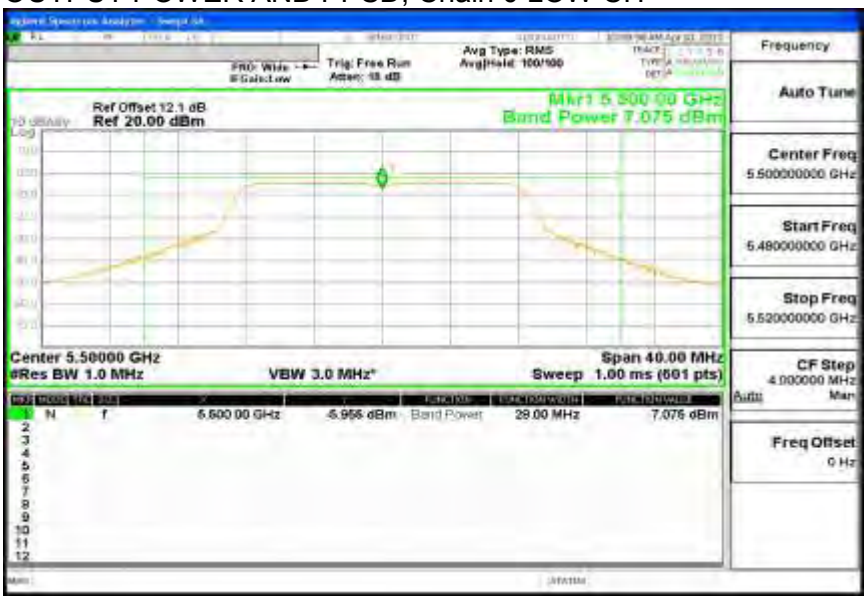
Channel	Frequency (MHz)	Chain 0 Meas Power (dBm)	Chain 1 Meas Power (dBm)	Total Corr'd Power (dBm)	Power Limit (dBm)	Power Margin (dB)
Low	5500	7.075	9.405	11.405	15.67	-4.263
Mid	5580	7.850	8.928	11.433	15.66	-4.232
High	5700	8.395	8.107	11.264	15.66	-4.397

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	5500	-4.23	-1.96	0.06	0.49	-0.43
Mid	5580	-2.62	-2.44	0.48	0.49	-0.01
High	5700	-2.96	-3.32	-0.13	0.49	-0.62

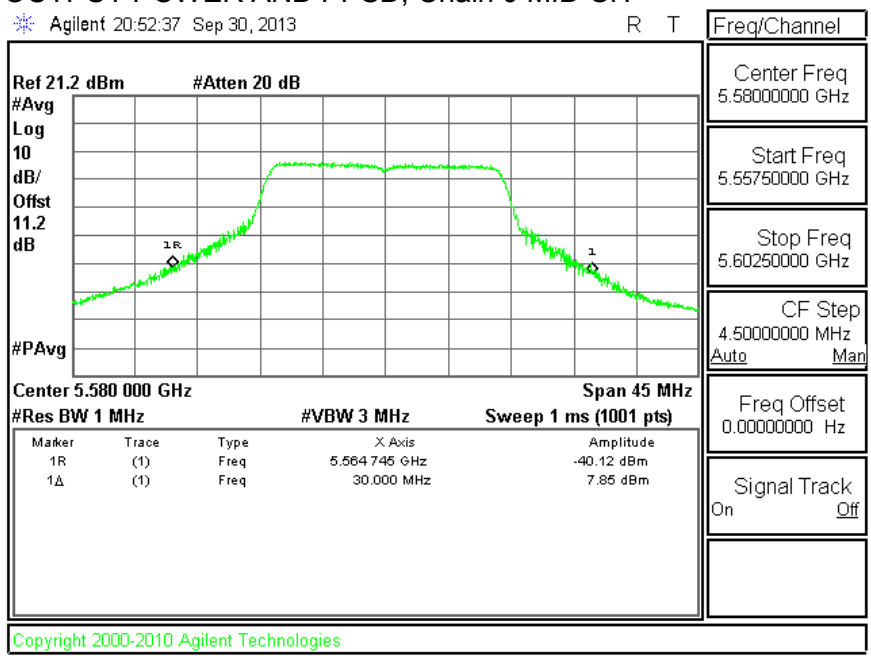
OUTPUT POWER AND PPSD, Chain 0

OUTPUT POWER AND PPSD, Chain 0 LOW CH



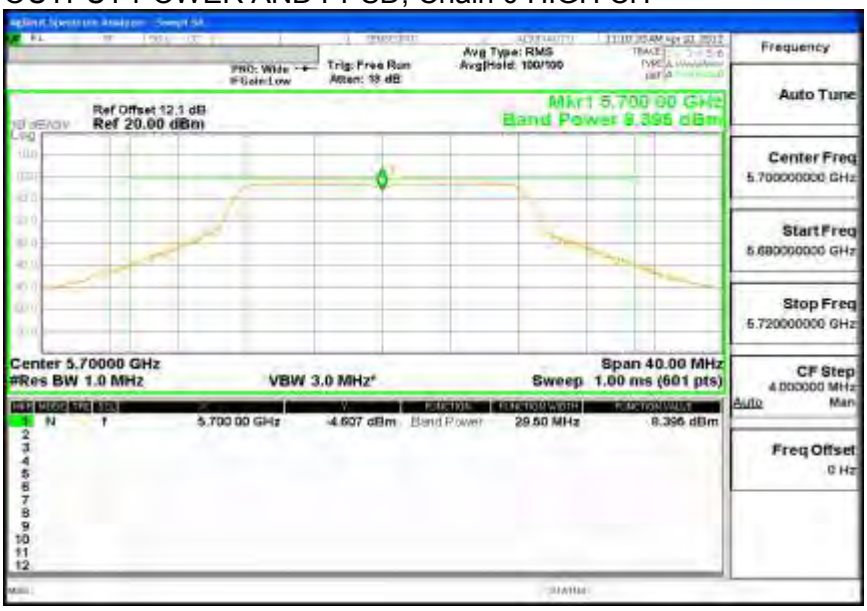
Linear Average= -4.23 dBm

OUTPUT POWER AND PPSD, Chain 0 MID CH



Linear Average= -2.62 dBm

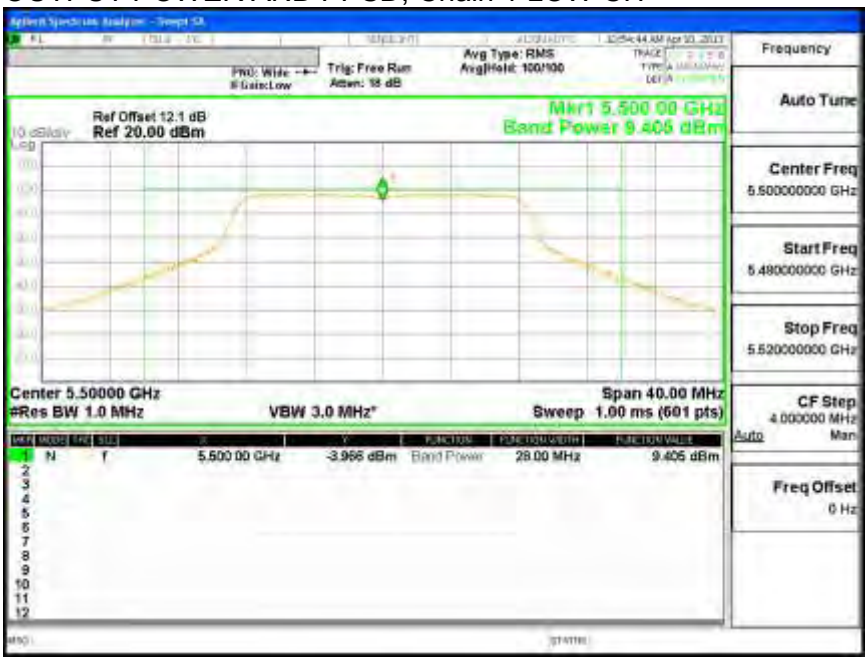
OUTPUT POWER AND PPSD, Chain 0 HIGH CH



Linear Average= -2.96 dBm

OUTPUT POWER AND PPSD, Chain 1

OUTPUT POWER AND PPSD, Chain 1 LOW CH

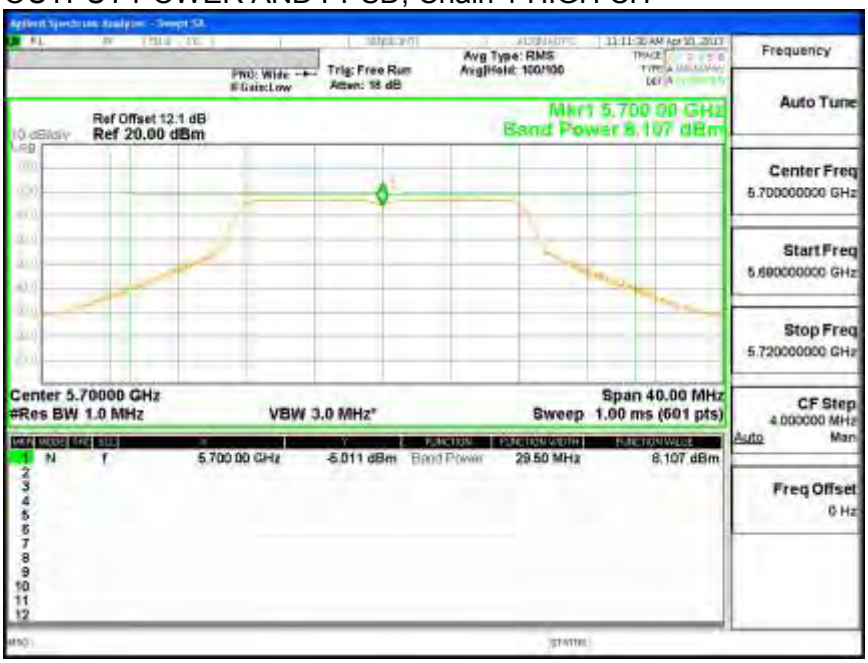


Linear Average= -1.96 dBm

OUTPUT POWER AND PPSD, Chain 1 MID CH

Linear Average= -2.44 dBm

OUTPUT POWER AND PPSD, Chain 1 HIGH CH



Linear Average= -3.32 dBm

9.4.4. 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.

RESULTS

Chain 0

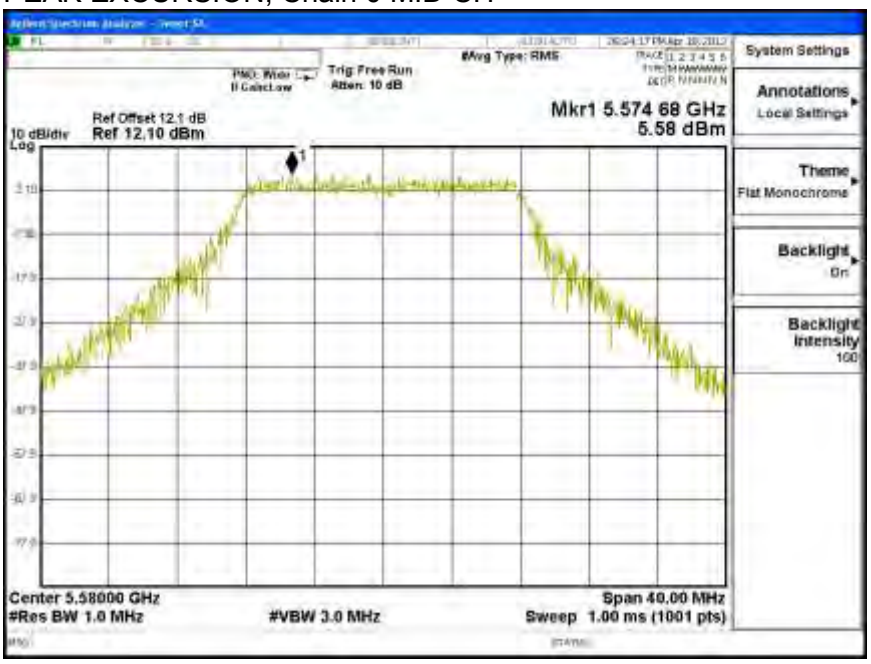
Channel	Frequency (MHz)	PK Level (dBm)	PSD (dBm)	DCCF (dB)	Peak Excursion (dB)	Limit (dB)	Margin (dB)
Mid	5580	5.58	-2.70	0.00	8.28	13	-4.72

Chain 1

Channel	Frequency (MHz)	PK Level (dBm)	PSD (dBm)	DCCF (dB)	Peak Excursion (dB)	Limit (dB)	Margin (dB)
Mid	5580	5.23	-2.44	0.00	7.67	13	-5.33

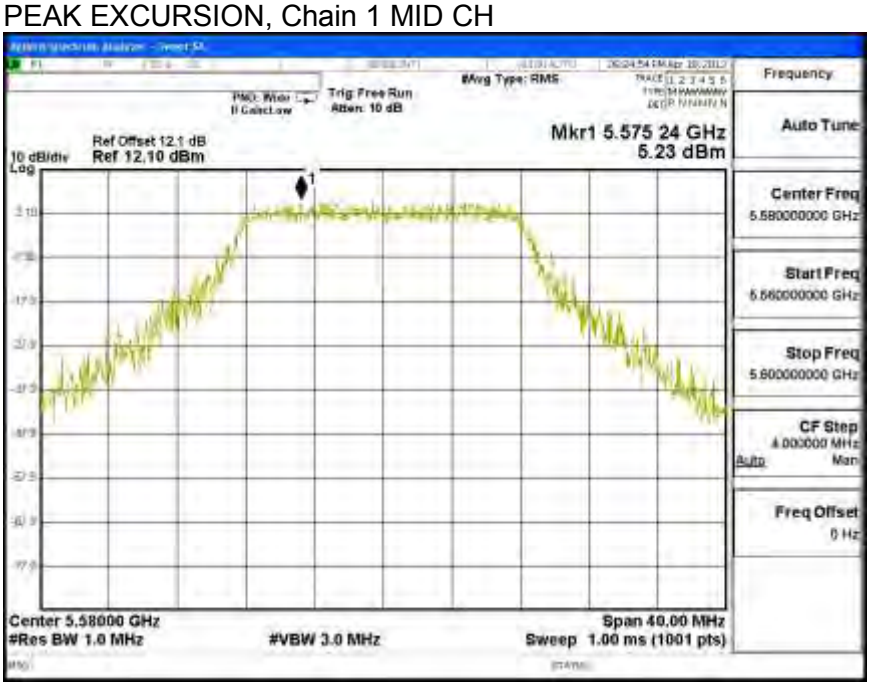
PEAK EXCURSION, Chain 0

PEAK EXCURSION, Chain 0 MID CH



PEAK EXCURSION, Chain 1

PEAK EXCURSION, Chain 1 MID CH



9.4.5. CONDUCTED WEATHER RADAR BAND EMISSIONS

LIMITS

Within 5600 – 5650 MHz band, -20 dBc relative to highest fundamental output power density per 100 kHz.

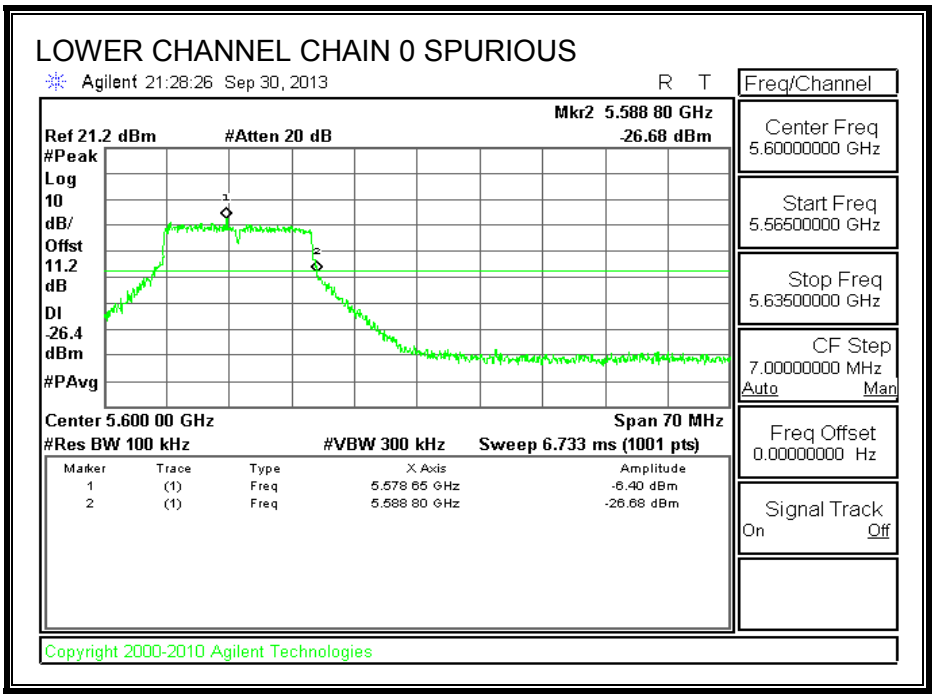
TEST PROCEDURE

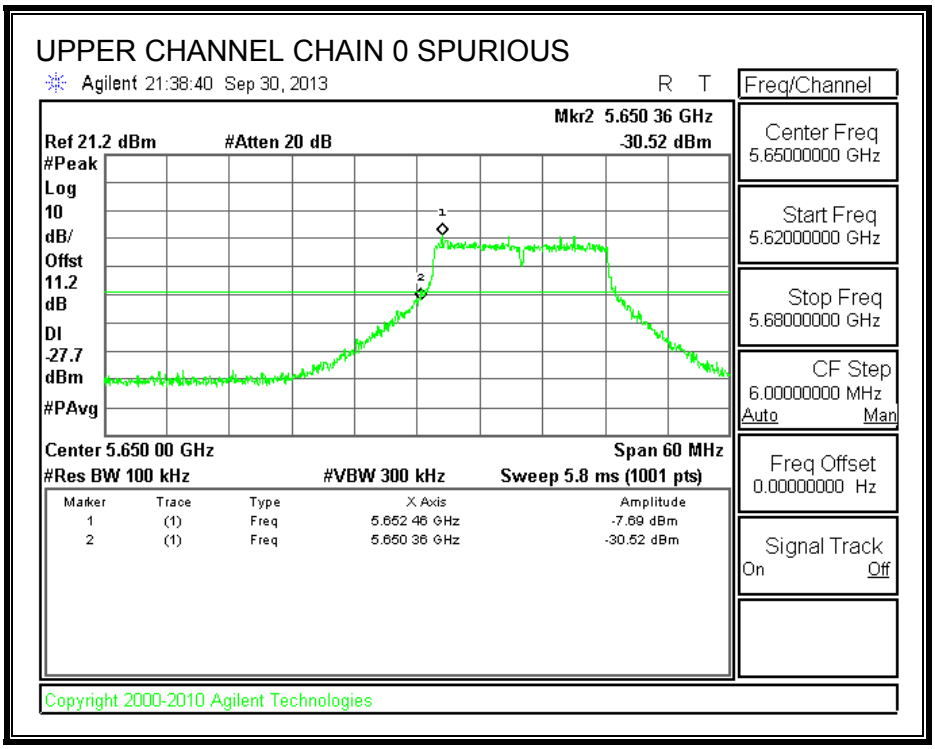
The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

The authorized channel nearest to and less than 5600 MHz is measured.

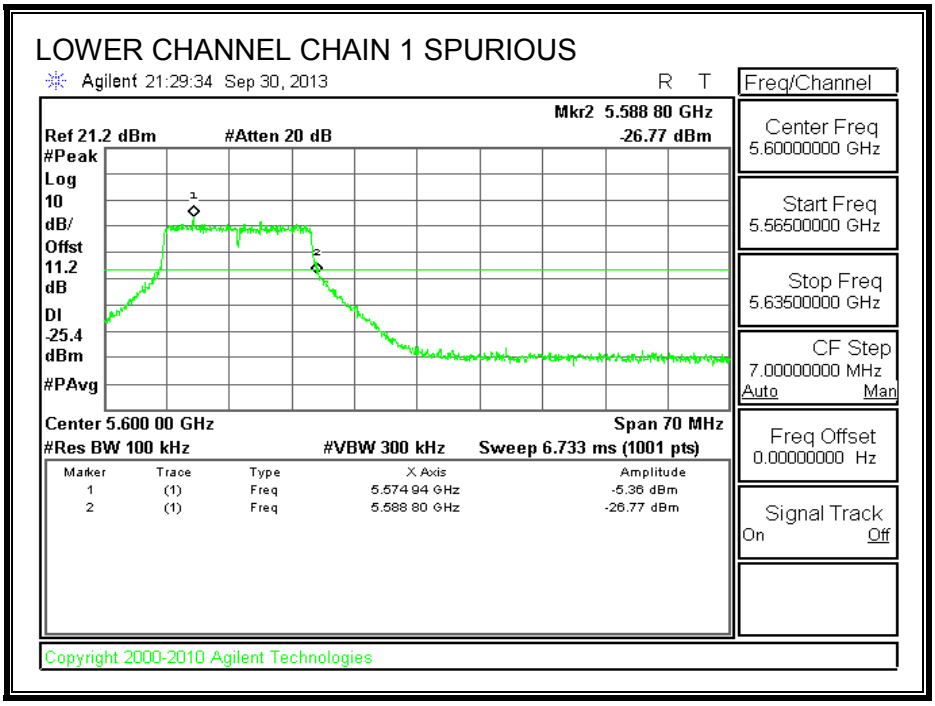
The authorized channel nearest to and greater than 5650 MHz is measured.

SPURIOUS EMISSIONS IN WEATHER RADAR BAND 5600 - 5650 MHz

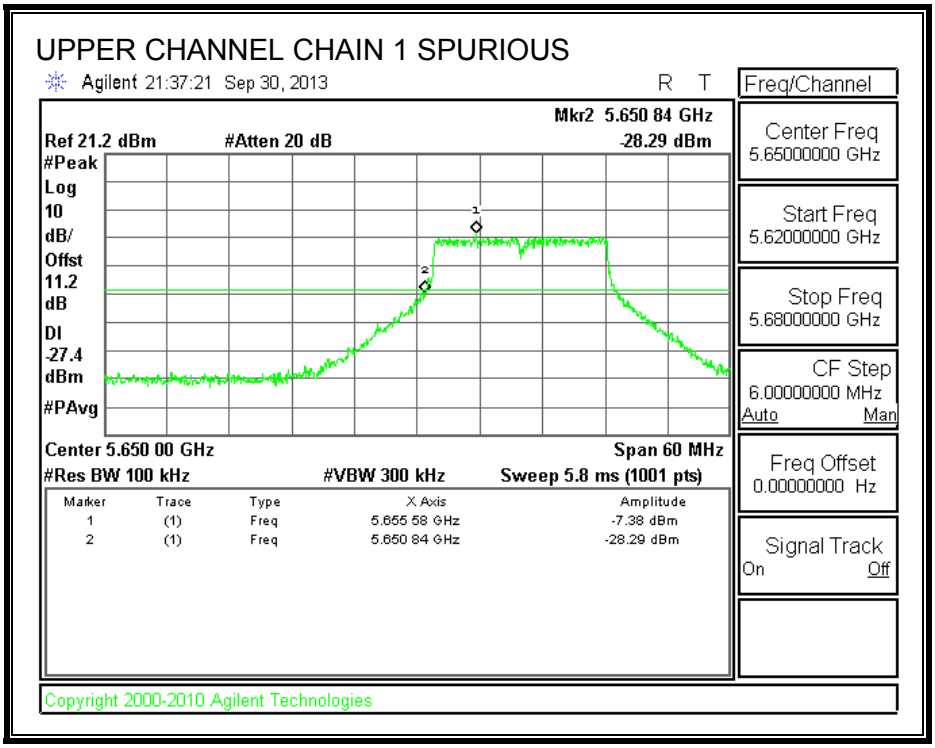




LOWER CHANNEL CHAIN 1 SPURIOUS



UPPER CHANNEL CHAIN 1 SPURIOUS



9.5. 802.11n HT20 STBC 2TX MODE IN THE 5.6 GHz BAND

9.5.1. 26 dB BANDWIDTH

LIMITS

None; for reporting purposes only.

RESULTS

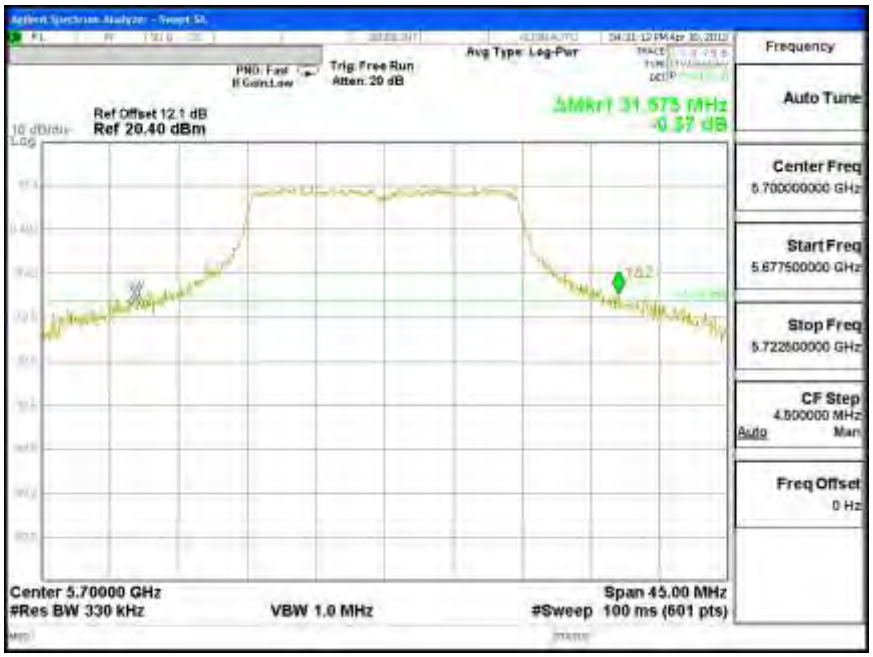
Channel	Frequency (MHz)	26 dB BW Chain 0 (MHz)	26 dB BW Chain 1 (MHz)
Low	5500	33.750	30.150
Mid	5580	33.900	30.825
High	5700	31.575	28.800

26 dB BANDWIDTH, Chain 0

BANDWIDTH Chain 0 LOW CH

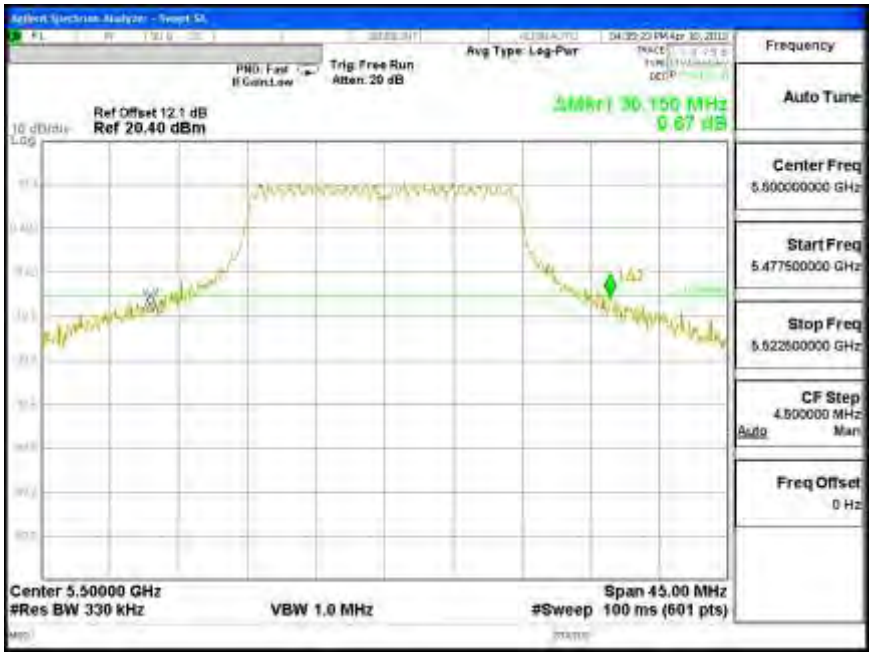
BANDWIDTH Chain 0 MID CH

BANDWIDTH Chain 0 HIGH CH

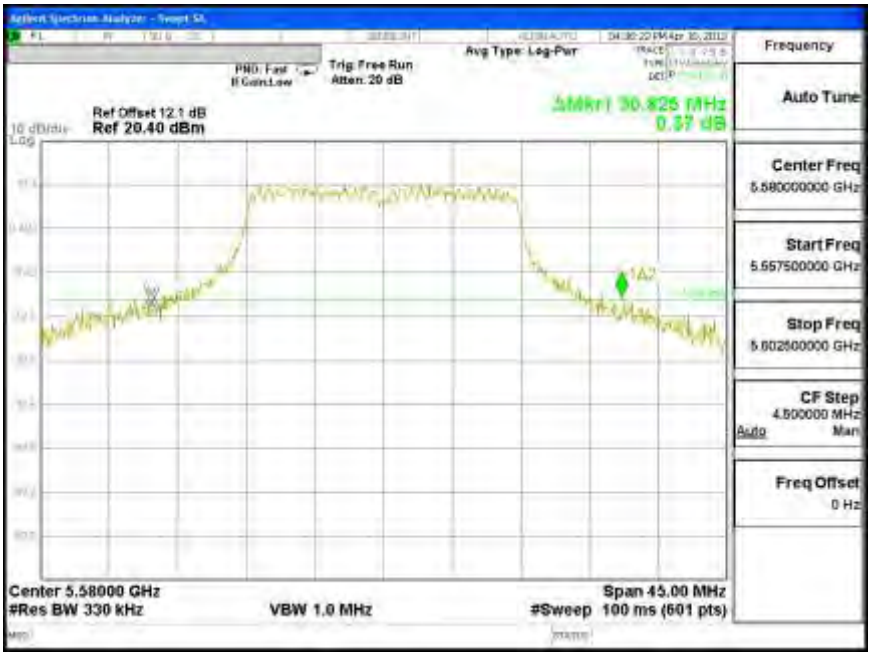


26 dB BANDWIDTH, Chain 1

BANDWIDTH Chain 1 LOW CH



BANDWIDTH Chain 1 MID CH



BANDWIDTH Chain 1 HIGH CH

9.5.2. 99% BANDWIDTH

LIMITS

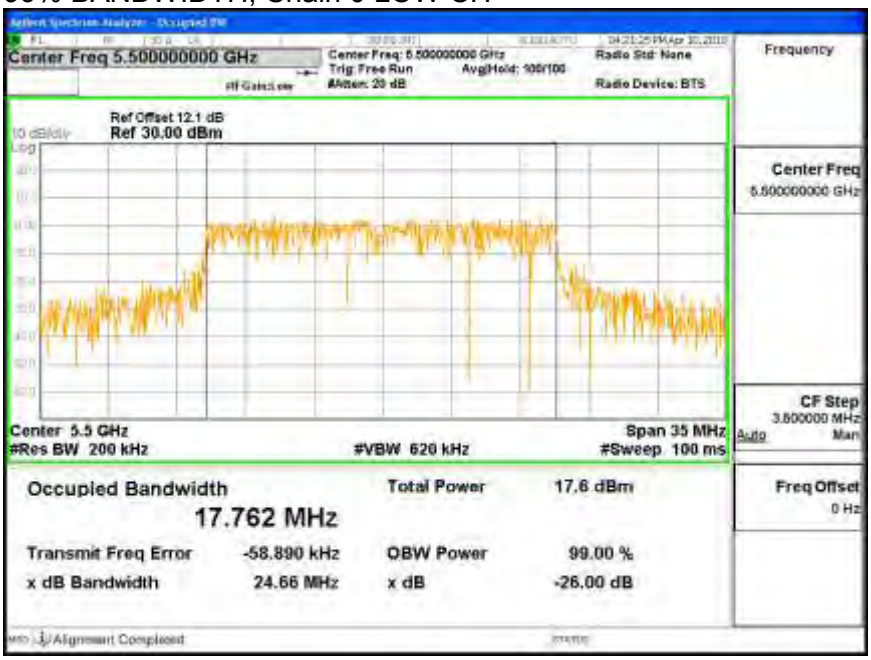
None; for reporting purposes only.

RESULTS

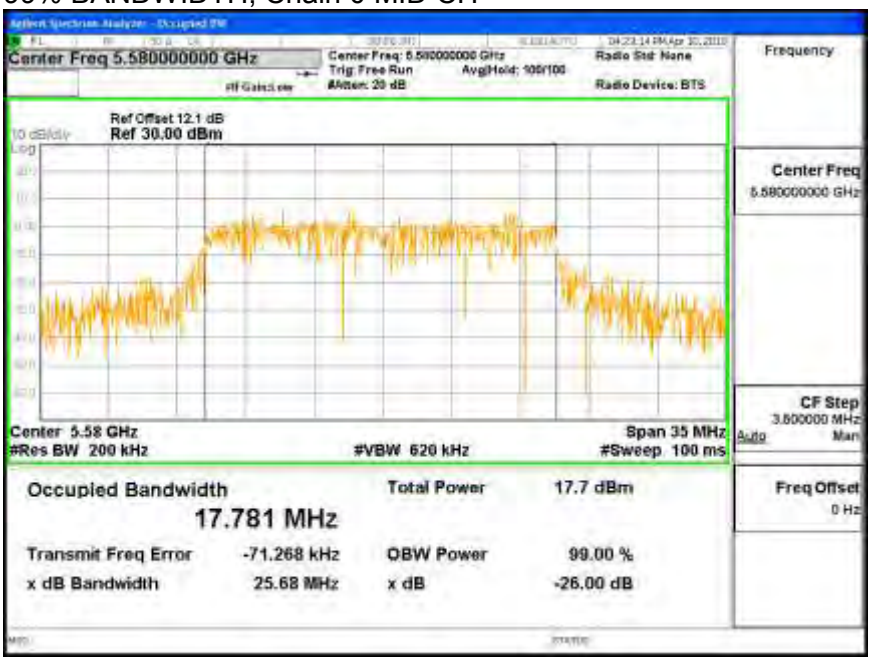
Channel	Frequency (MHz)	99% BW Chain 0 (MHz)	99% BW Chain 1 (MHz)
Low	5500	17.762	17.691
Mid	5580	17.781	17.739
High	5700	17.603	17.770

99% BANDWIDTH, Chain 0

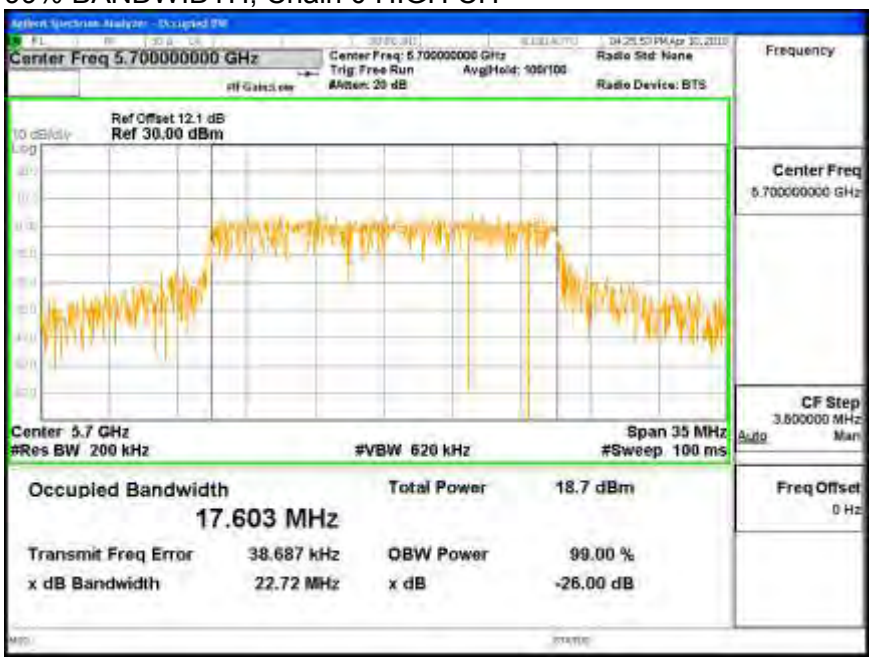
99% BANDWIDTH, Chain 0 LOW CH



99% BANDWIDTH, Chain 0 MID CH

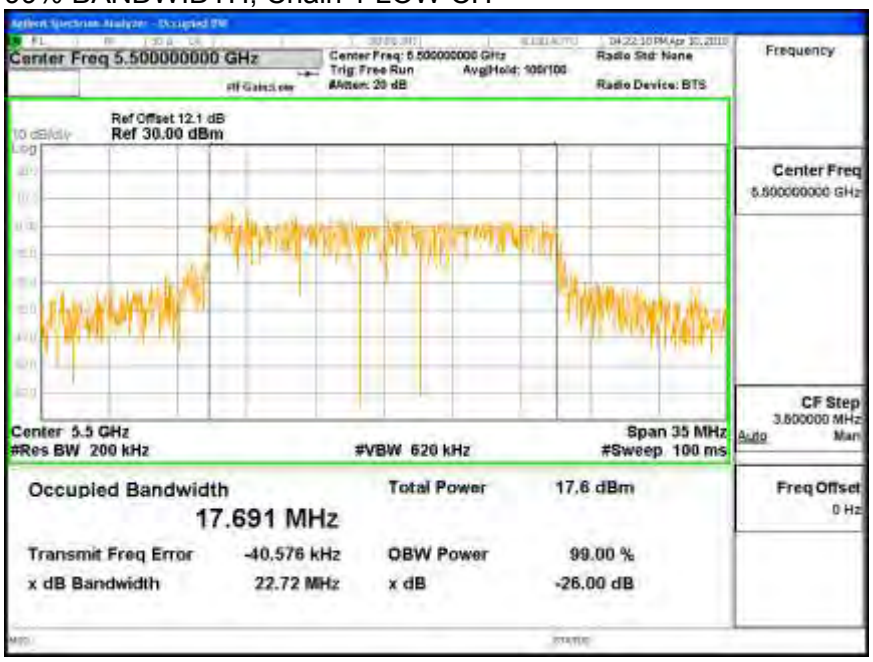


99% BANDWIDTH, Chain 0 HIGH CH

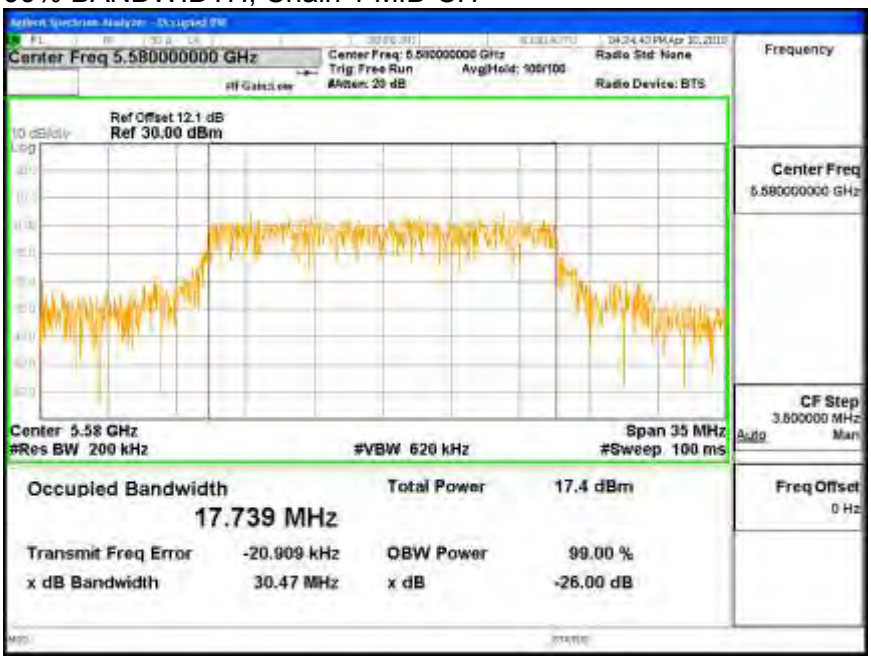


99% BANDWIDTH, Chain 1

99% BANDWIDTH, Chain 1 LOW CH



99% BANDWIDTH, Chain 1 MID CH



99% BANDWIDTH, Chain 1 HIGH CH

9.5.3. 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 250 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

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	5500	30.150	17.691	13.50
Mid	5580	30.825	17.739	13.50
High	5700	28.800	17.603	13.50

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	16.50	23.48	29.48	15.98	3.50	11.00	3.50
Mid	5580	16.50	23.49	29.49	15.99	3.50	11.00	3.50
High	5700	16.50	23.46	29.46	15.96	3.50	11.00	3.50

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

Output Power Results

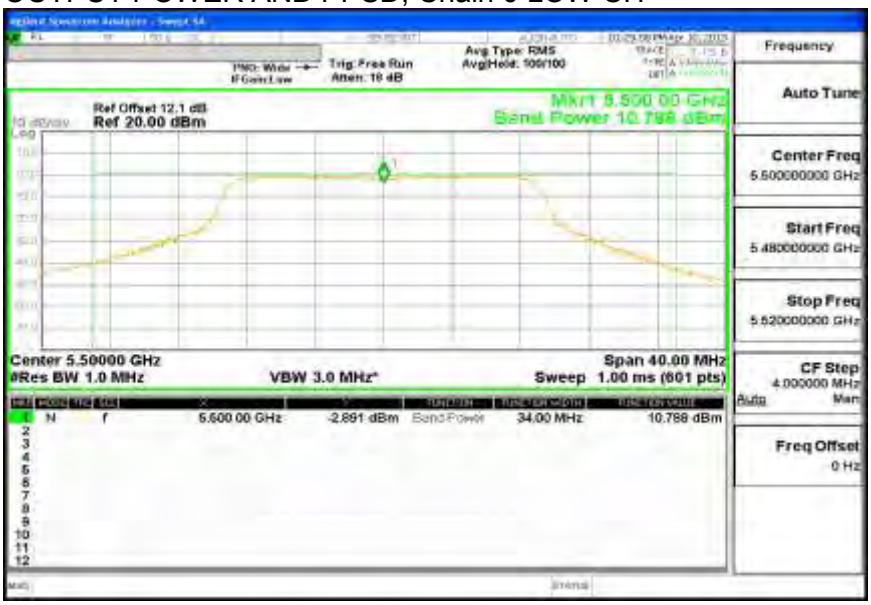
Channel	Frequency (MHz)	Chain 0 Meas Power (dBm)	Chain 1 Meas Power (dBm)	Total Corr'd Power (dBm)	Power Limit (dBm)	Power Margin (dB)
Low	5500	10.788	12.127	14.519	15.98	-1.458
Mid	5580	11.597	11.877	14.750	15.99	-1.240
High	5700	11.645	11.317	14.494	15.96	-1.461

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	5500	-0.87	0.45	2.85	3.50	-0.65
Mid	5580	-0.04	0.31	3.15	3.50	-0.35
High	5700	-0.01	-0.39	2.82	3.50	-0.68

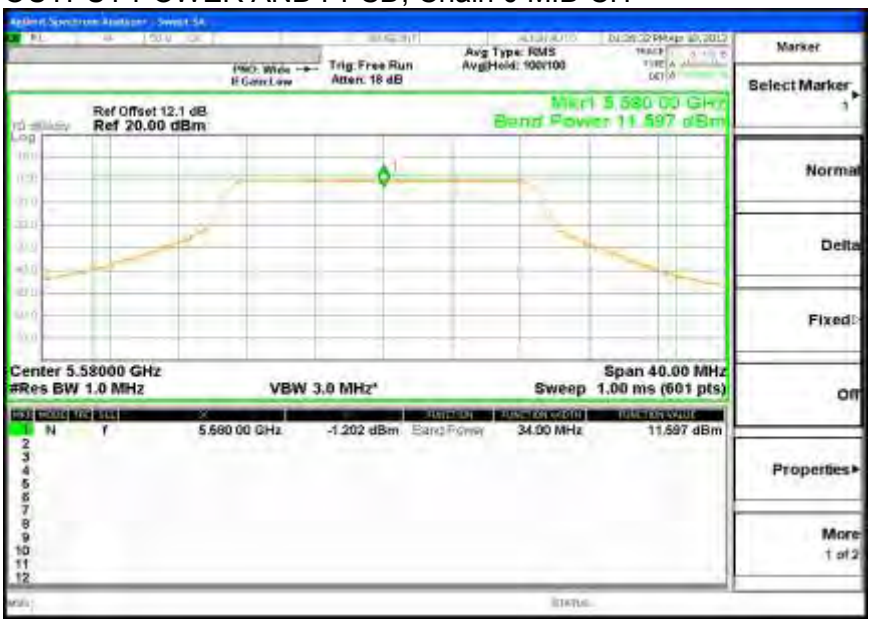
OUTPUT POWER AND PPSD, Chain 0

OUTPUT POWER AND PPSD, Chain 0 LOW CH



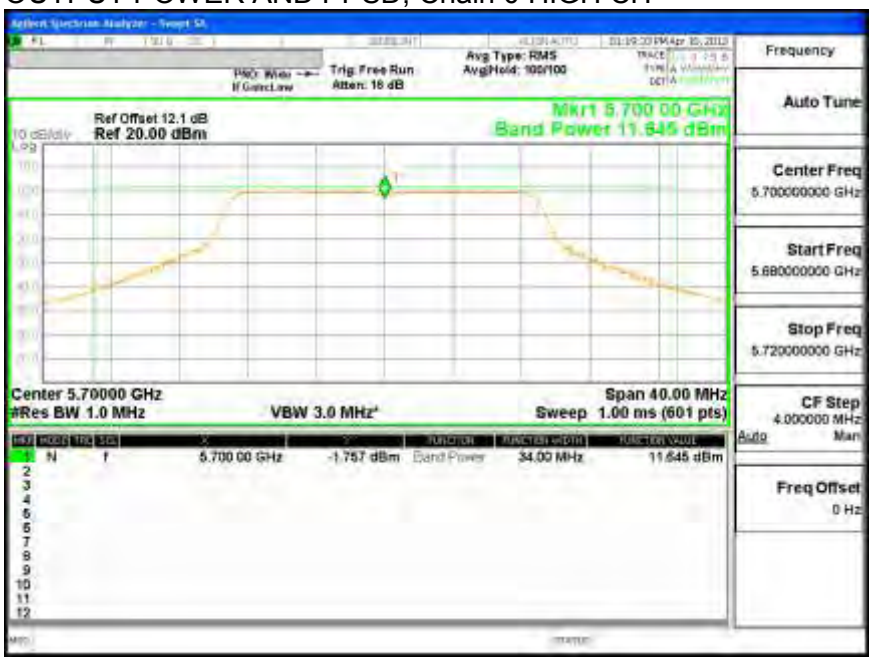
Linear Average= -0.87 dBm

OUTPUT POWER AND PPSD, Chain 0 MID CH



Linear Average= -0.04 dBm

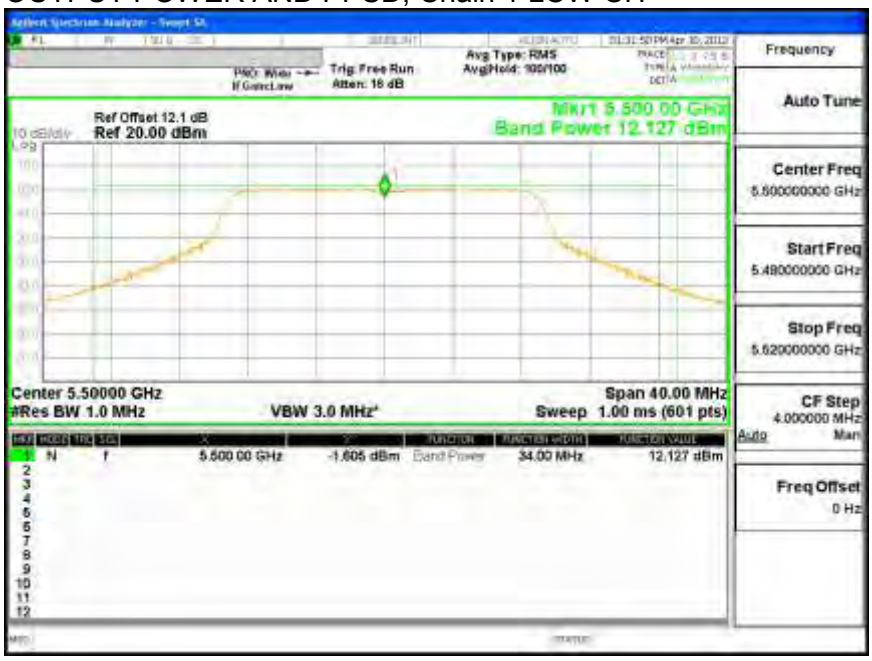
OUTPUT POWER AND PPSD, Chain 0 HIGH CH



Linear Average= -0.01 dBm

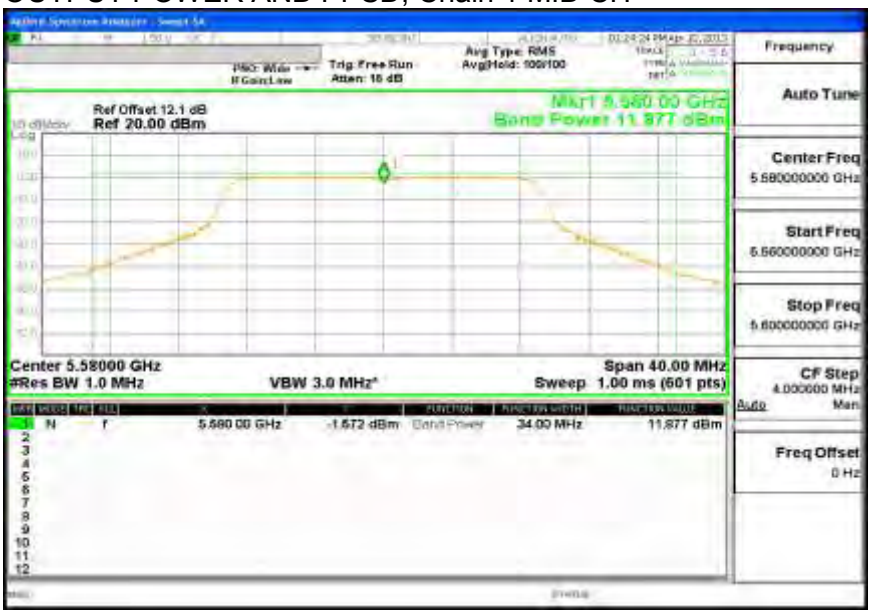
OUTPUT POWER AND PPSD, Chain 1

OUTPUT POWER AND PPSD, Chain 1 LOW CH



Linear Average= 0.45 dBm

OUTPUT POWER AND PPSD, Chain 1 MID CH



Linear Average= 0.31 dBm

OUTPUT POWER AND PPSD, Chain 1 HIGH CH

Linear Average= -0.39 dBm

9.5.4. 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.

RESULTS

Chain 0

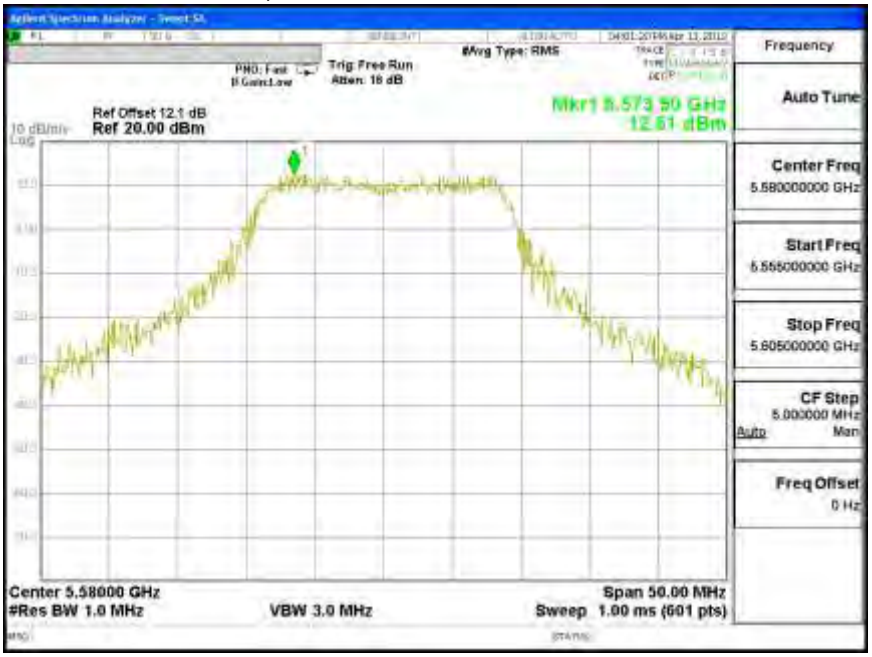
Channel	Frequency (MHz)	PK Level (dBm)	PSD (dBm)	DCCF (dB)	Peak Excursion (dB)	Limit (dB)	Margin (dB)
Mid	5580	12.51	-0.04	0.00	12.55	13	-0.45

Chain 1

Channel	Frequency (MHz)	PK Level (dBm)	PSD (dBm)	DCCF (dB)	Peak Excursion (dB)	Limit (dB)	Margin (dB)
Mid	5580	12.85	0.31	0.00	12.54	13	-0.46

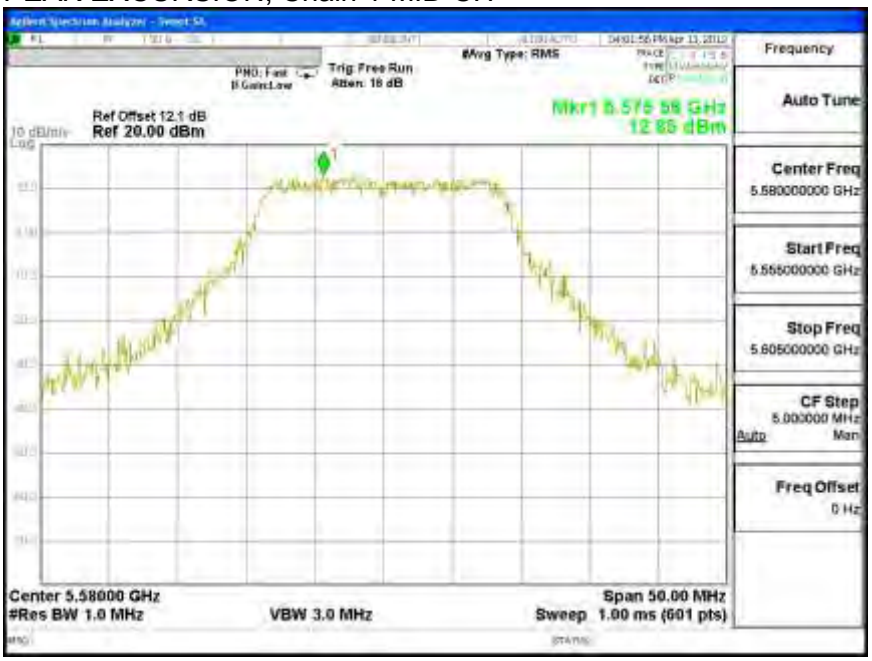
PEAK EXCURSION, Chain 0

PEAK EXCURSION, Chain 0 MID CH



PEAK EXCURSION, Chain 1

PEAK EXCURSION, Chain 1 MID CH



9.5.5. CONDUCTED WEATHER RADAR BAND EMISSIONS

LIMITS

Within 5600 – 5650 MHz band, -20 dBc relative to highest fundamental output power density per 100 kHz.

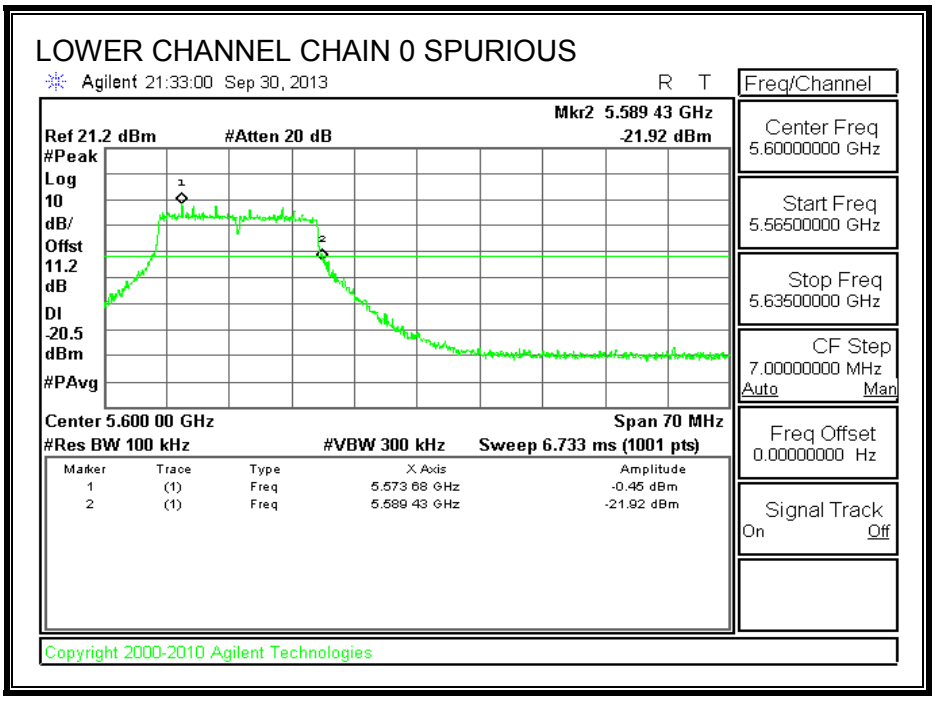
TEST PROCEDURE

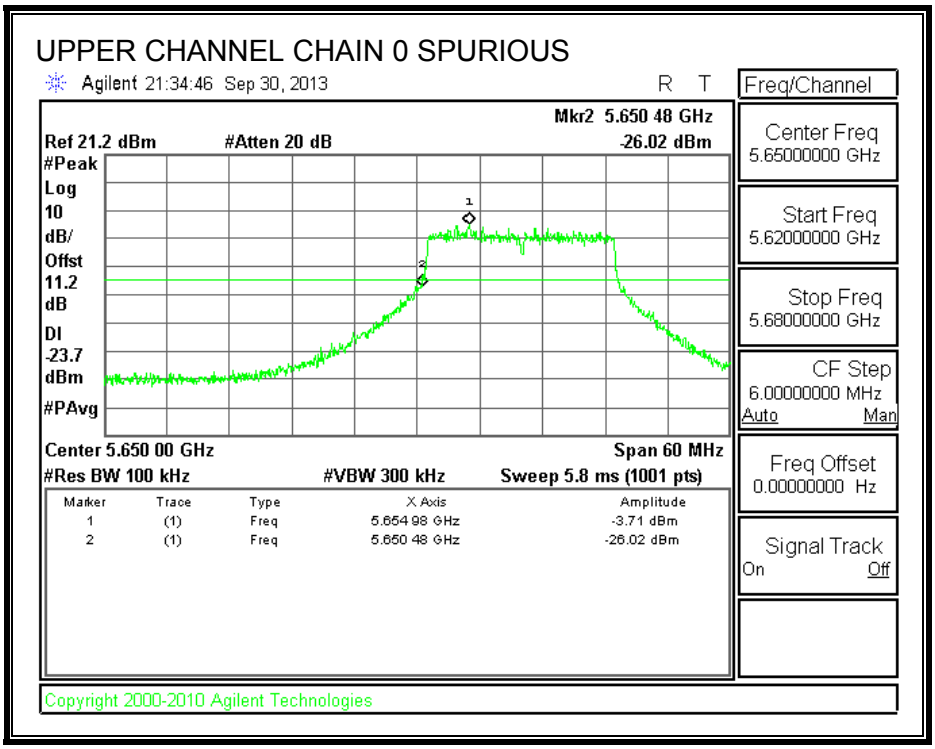
The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

The authorized channel nearest to and less than 5600 MHz is measured.

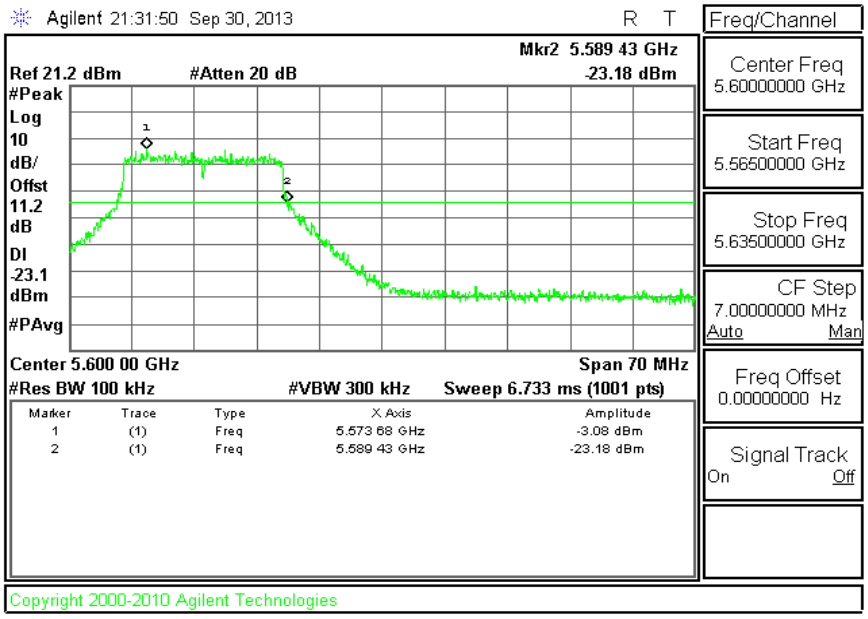
The authorized channel nearest to and greater than 5650 MHz is measured.

SPURIOUS EMISSIONS IN WEATHER RADAR BAND 5600 - 5650 MHz

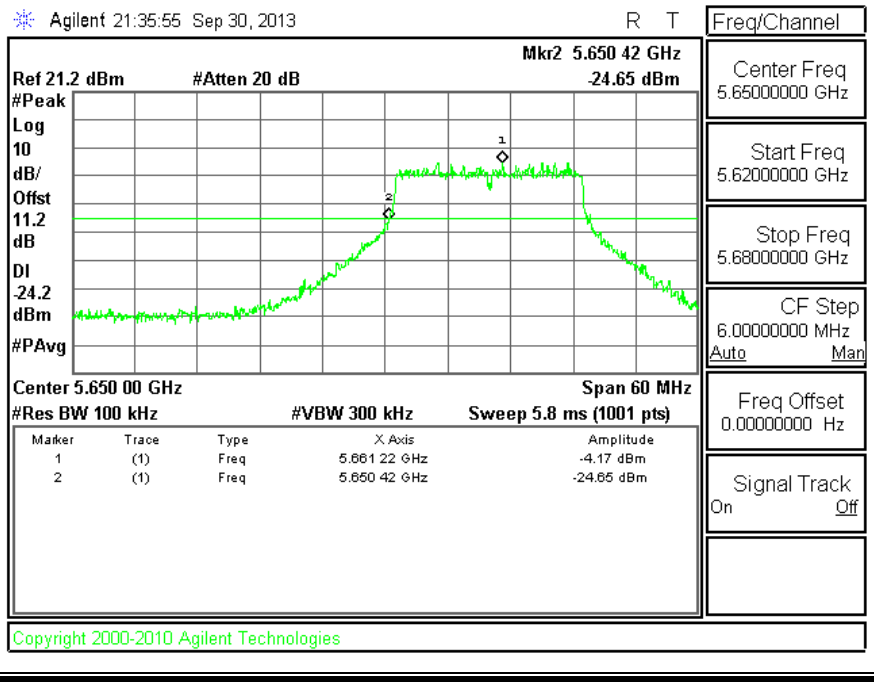




LOWER CHANNEL CHAIN 1 SPURIOUS



UPPER CHANNEL CHAIN 1 SPURIOUS



9.6. 802.11n HT40 STBC 2TX MODE IN THE 5.6 GHz BAND

9.6.1. 26 dB BANDWIDTH

LIMITS

None; for reporting purposes only.

RESULTS

Channel	Frequency (MHz)	26 dB BW Chain 0 (MHz)	26 dB BW Chain 1 (MHz)
Low	5510	69.83	68.33
Mid	5550	71.83	63.00
High	5670	72.17	65.00

26 dB BANDWIDTH, Chain 0

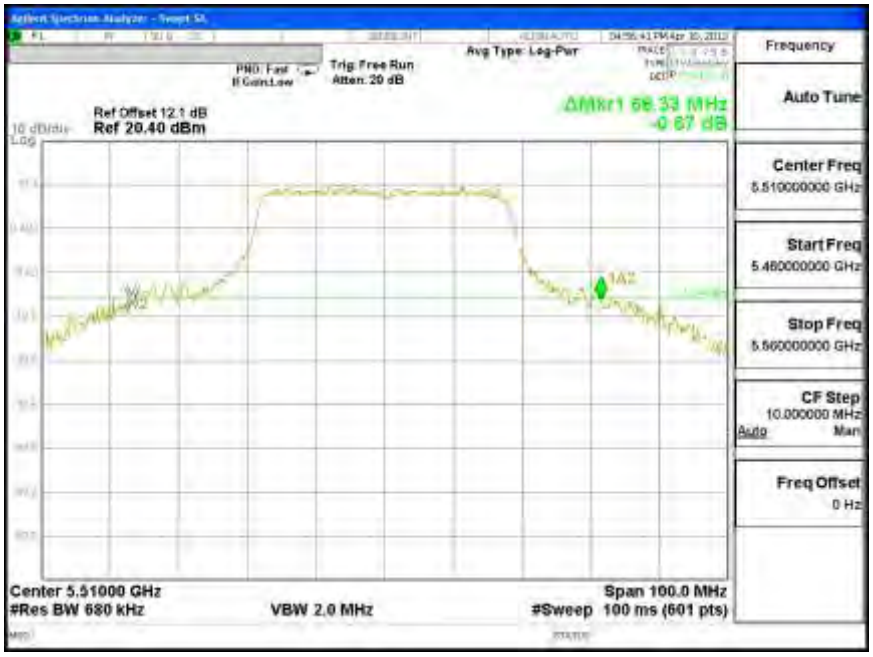
BANDWIDTH Chain 0 LOW CH

BANDWIDTH Chain 0 MID CH

BANDWIDTH Chain 0 HIGH CH

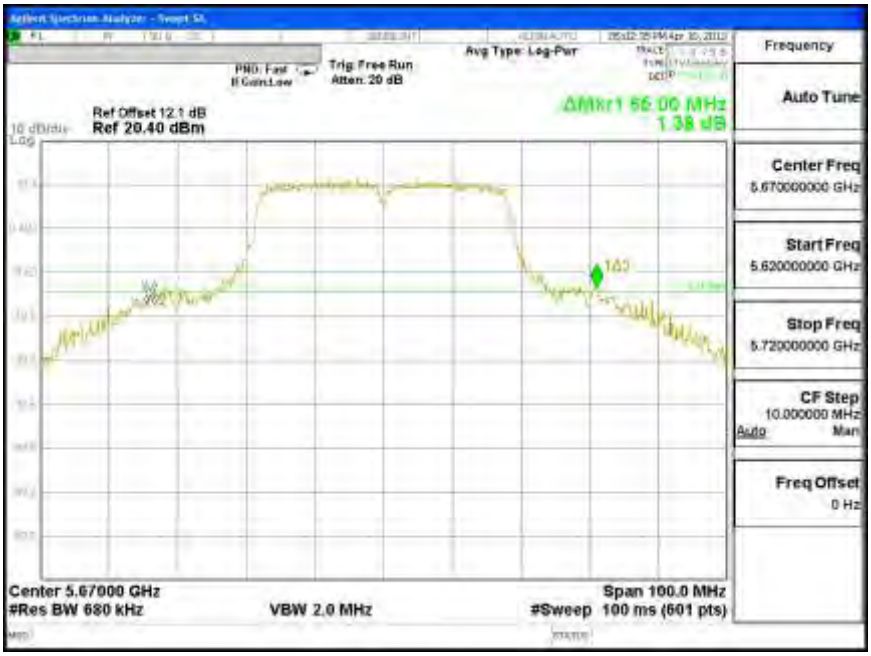
26 dB BANDWIDTH, Chain 1

BANDWIDTH Chain 1 LOW CH



BANDWIDTH Chain 1 MID CH

BANDWIDTH Chain 1 HIGH CH



9.6.2. 99% BANDWIDTH

LIMITS

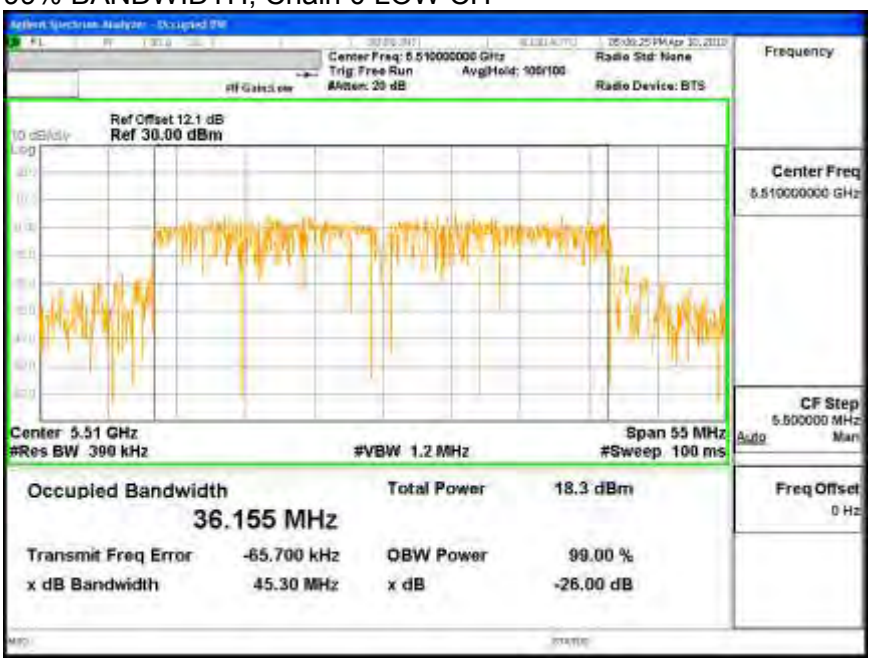
None; for reporting purposes only.

RESULTS

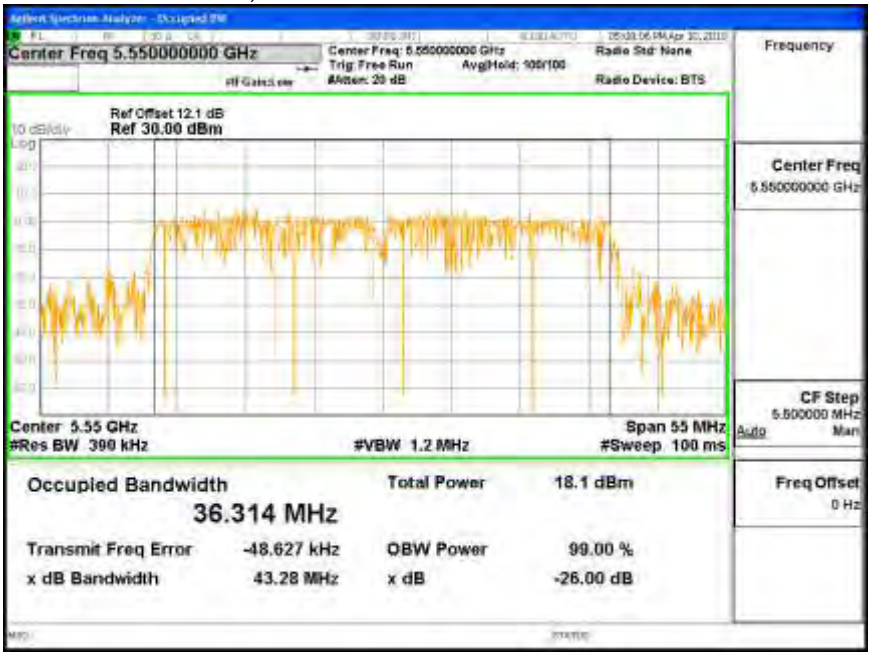
Channel	Frequency (MHz)	99% BW Chain 0 (MHz)	99% BW Chain 1 (MHz)
Low	5510	36.155	36.078
Mid	5550	36.314	36.218
High	5670	36.060	36.279

99% BANDWIDTH, Chain 0

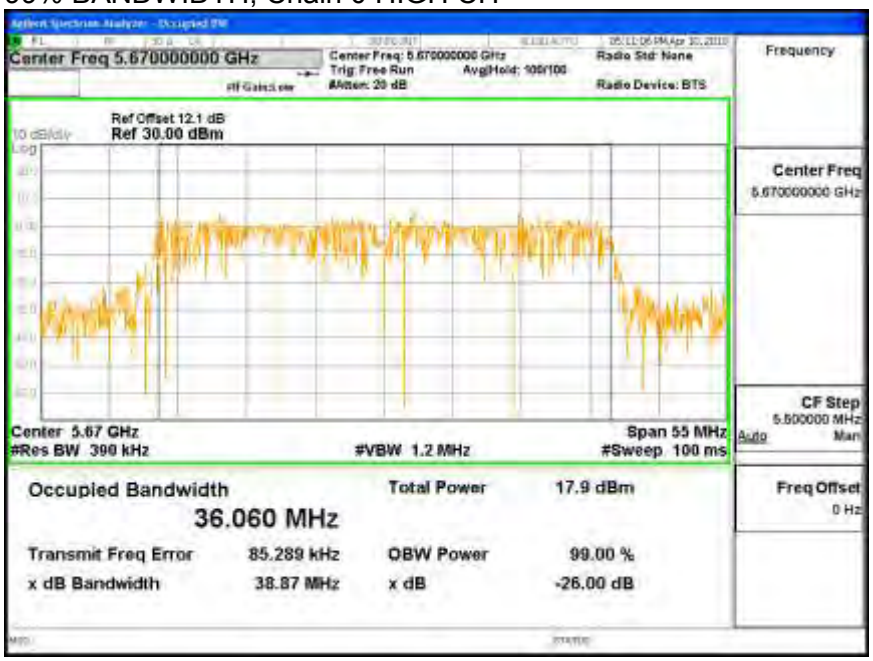
99% BANDWIDTH, Chain 0 LOW CH



99% BANDWIDTH, Chain 0 MID CH

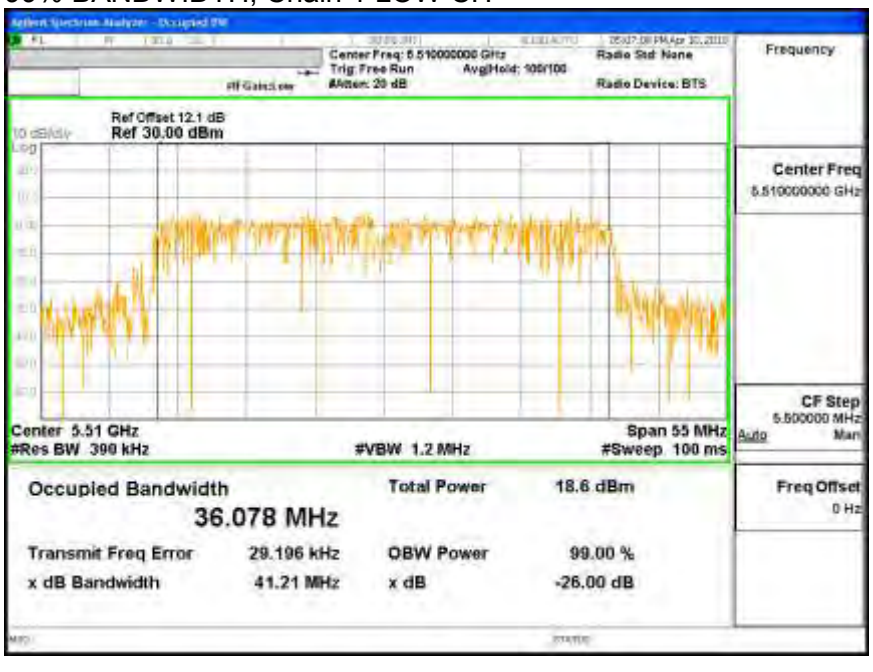


99% BANDWIDTH, Chain 0 HIGH CH

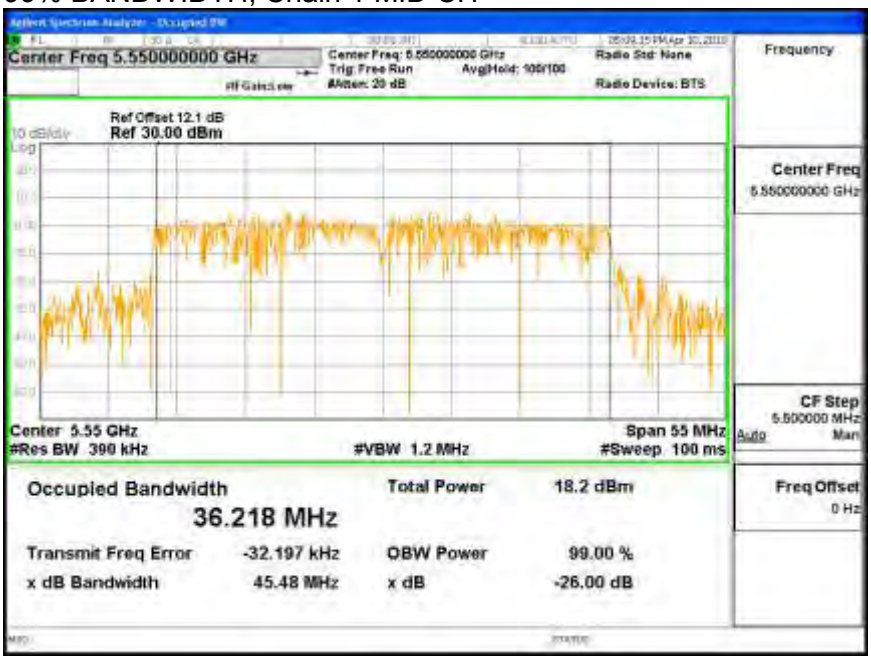


99% BANDWIDTH, Chain 1

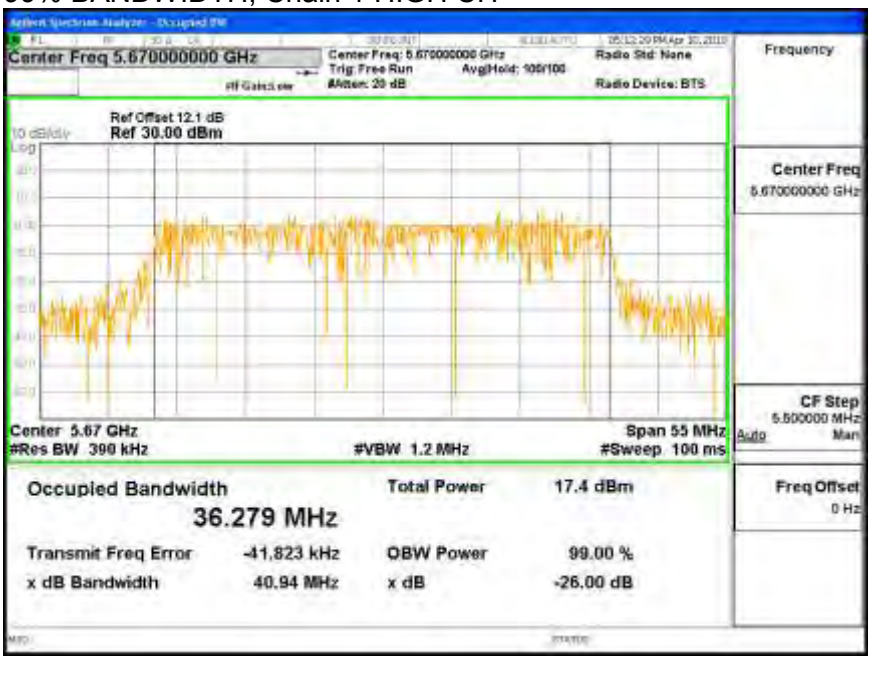
99% BANDWIDTH, Chain 1 LOW CH



99% BANDWIDTH, Chain 1 MID CH



99% BANDWIDTH, Chain 1 HIGH CH



9.6.3. 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 250 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

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	5510	68.33	36.078	13.50
Mid	5550	63.00	36.218	13.50
High	5670	65.00	36.060	13.50

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	5510	16.50	24.00	30.00	16.50	3.50	11.00	3.50
Mid	5550	16.50	24.00	30.00	16.50	3.50	11.00	3.50
High	5670	16.50	24.00	30.00	16.50	3.50	11.00	3.50

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

Output Power Results

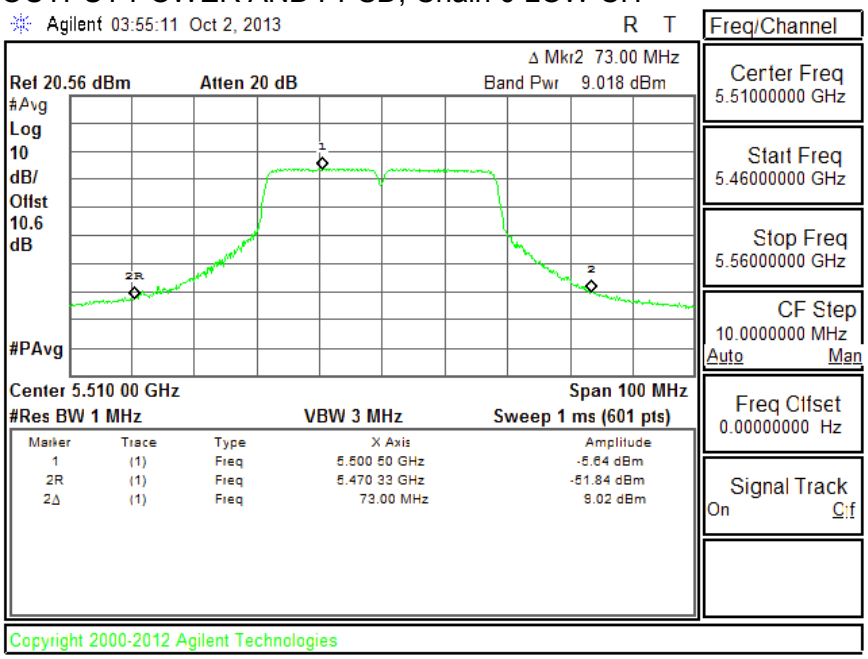
Channel	Frequency (MHz)	Chain 0 Meas Power (dBm)	Chain 1 Meas Power (dBm)	Total Corr'd Power (dBm)	Power Limit (dBm)	Power Margin (dB)
Low	5510	9.018	8.983	12.011	16.50	-4.489
Mid	5550	12.646	13.895	16.326	16.50	-0.174
High	5670	12.910	12.936	15.933	16.50	-0.567

PPSD Results

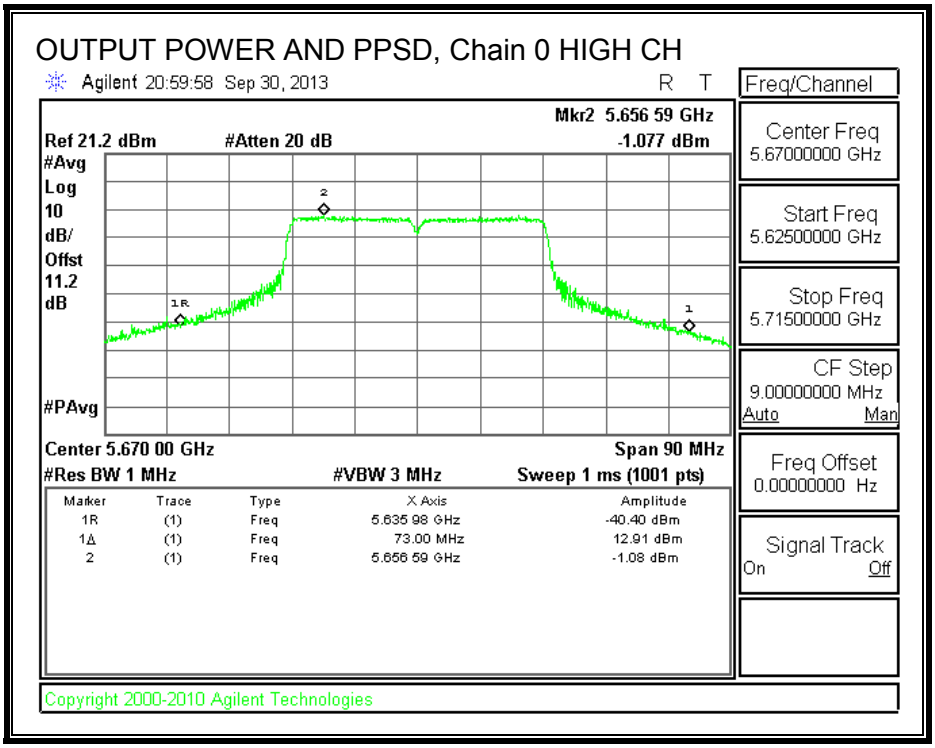
Channel	Frequency (MHz)	Chain 0 Meas PPSD (dBm)	Chain 1 Meas PPSD (dBm)	Total Corr'd PPSD (dBm)	PPSD Limit (dBm)	PPSD Margin (dB)
Low	5510	-5.640	-5.650	-2.63	3.50	-6.13
Mid	5550	-1.950	-0.584	1.80	3.50	-1.70
High	5670	-1.077	-1.612	1.67	3.50	-1.83

OUTPUT POWER AND PPSD, Chain 0

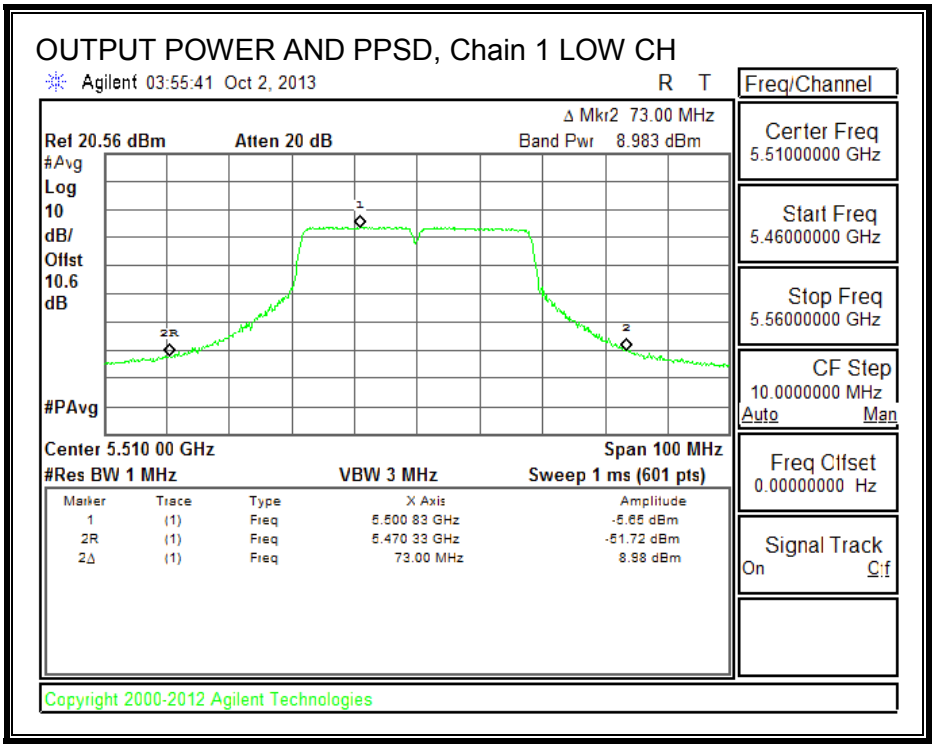
OUTPUT POWER AND PPSD, Chain 0 LOW CH



OUTPUT POWER AND PPSD, Chain 0 MID CH



OUTPUT POWER AND PPSD, Chain 1



OUTPUT POWER AND PPSD, Chain 1 MID CH

OUTPUT POWER AND PPSD, Chain 1 HIGH CH

9.6.4. 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.

RESULTS

Chain 0

Channel	Frequency (MHz)	PK Level (dBm)	PSD (dBm)	DCCF (dB)	Peak Excursion (dB)	Limit (dB)	Margin (dB)
Mid	5550	6.174	-1.950	0.00	8.124	13	-4.876

Chain 1

Channel	Frequency (MHz)	PK Level (dBm)	PSD (dBm)	DCCF (dB)	Peak Excursion (dB)	Limit (dB)	Margin (dB)
Mid	5550	5.790	-0.584	0.00	6.374	13	-6.626