



FCC 47 CFR PART 15 SUBPART E

CERTIFICATION TEST REPORT

FOR

PORTABLE COMPUTER

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Prepared for

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TABLE OF CONTENTS

1. ATTESTATION OF TEST RESULTS	10
2. TEST METHODOLOGY	11
3. FACILITIES AND ACCREDITATION	11
4. CALIBRATION AND UNCERTAINTY	11
4.1. MEASURING INSTRUMENT CALIBRATION	11
4.2. SAMPLE CALCULATION	11
4.3. MEASUREMENT UNCERTAINTY	12
5. EQUIPMENT UNDER TEST	13
5.1. DESCRIPTION OF EUT	13
5.2. MAXIMUM OUTPUT POWER	13
5.3. DESCRIPTION OF AVAILABLE ANTENNAS	17
5.4. SOFTWARE AND FIRMWARE	17
5.5. WORST-CASE CONFIGURATION AND MODE	17
5.6. DESCRIPTION OF TEST SETUP	18
6. TEST AND MEASUREMENT EQUIPMENT	22
7. MEASUREMENT METHODS	23
8. ON TIME, DUTY CYCLE AND MEASUREMENT METHODS	24
8.1. ON TIME AND DUTY CYCLE RESULTS	24
8.2. DUTY CYCLE PLOTS	25
9. ANTENNA PORT TEST RESULTS	31
9.1. 802.11a 1TX MODE IN THE 5.2 GHz BAND	31
9.1.1. 26 dB BANDWIDTH	31
9.1.2. 99% BANDWIDTH	34
9.1.3. OUTPUT POWER AND PSD	37
9.2. 802.11n HT20 2TX CDD MODE IN THE 5.2 GHz BAND	41
9.2.1. 26 dB BANDWIDTH	41
9.2.2. 99% BANDWIDTH	45
9.2.3. OUTPUT POWER AND PSD	49
9.3. 802.11n HT20 2TX STBC MODE IN THE 5.2 GHz BAND	54
9.3.1. 26 dB BANDWIDTH	54
9.3.2. 99% BANDWIDTH	58
9.3.3. OUTPUT POWER AND PSD	62
9.4. 802.11ac VHT20 2TX BF IN THE 5.2 GHz BAND	67
9.4.1. OUTPUT POWER AND PSD	67
9.5. 802.11n HT40 1TX MODE IN THE 5.2 GHz BAND	69

9.5.1.	26 dB BANDWIDTH	69
9.5.2.	99% BANDWIDTH	71
9.5.3.	OUTPUT POWER AND PSD	73
9.6.	<i>802.11n HT40 2TX CDD MODE IN THE 5.2 GHz BAND</i>	<i>76</i>
9.6.1.	26 dB BANDWIDTH	76
9.6.2.	99% BANDWIDTH	79
9.6.3.	OUTPUT POWER AND PSD	82
9.7.	<i>802.11n HT40 2TX STBC MODE IN THE 5.2 GHz BAND</i>	<i>86</i>
9.7.1.	26 dB BANDWIDTH	86
9.7.2.	99% BANDWIDTH	89
9.7.3.	OUTPUT POWER AND PSD	92
9.8.	<i>802.11ac VHT40 2TX BF IN THE 5.2 GHz BAND</i>	<i>96</i>
9.8.1.	OUTPUT POWER	96
9.9.	<i>802.11ac VHT80 1TX MODE IN THE 5.2 GHz BAND</i>	<i>98</i>
9.9.1.	26 dB BANDWIDTH	98
9.9.2.	99% BANDWIDTH	99
9.9.3.	OUTPUT POWER AND PSD	100
9.10.	<i>802.11ac VHT80 2TX CDD MODE IN THE 5.2 GHz BAND</i>	<i>103</i>
9.10.1.	26 dB BANDWIDTH	103
9.10.2.	99% BANDWIDTH	105
9.10.3.	OUTPUT POWER AND PSD	107
9.11.	<i>802.11ac VHT80 2TX STBC MODE IN THE 5.2 GHz BAND</i>	<i>110</i>
9.11.1.	26 dB BANDWIDTH	110
9.11.2.	99% BANDWIDTH	112
9.11.3.	OUTPUT POWER AND PSD	114
9.12.	<i>802.11ac VHT80 2TX BF IN THE 5.2 GHz BAND</i>	<i>117</i>
9.12.1.	OUTPUT POWER	117
9.13.	<i>802.11a 1TX MODE IN THE 5.3 GHz BAND</i>	<i>119</i>
9.13.1.	26 dB BANDWIDTH	119
9.13.2.	99% BANDWIDTH	122
9.13.3.	OUTPUT POWER AND PSD	125
9.14.	<i>802.11n HT20 2TX CDD MODE IN THE 5.3 GHz BAND</i>	<i>129</i>
9.14.1.	26 dB BANDWIDTH	129
9.14.2.	99% BANDWIDTH	133
9.14.3.	OUTPUT POWER AND PSD	137
9.15.	<i>802.11n HT20 2TX STBC MODE IN THE 5.3 GHz BAND</i>	<i>142</i>
9.15.1.	26 dB BANDWIDTH	142
9.15.2.	99% BANDWIDTH	146
9.15.3.	OUTPUT POWER AND PSD	150
9.16.	<i>802.11ac VHT20 2TX BF IN THE 5.3 GHz BAND</i>	<i>155</i>
9.16.1.	OUTPUT POWER	155
9.17.	<i>802.11n 1TX HT40 MODE IN THE 5.3 GHz BAND</i>	<i>157</i>
9.17.1.	26 dB BANDWIDTH	157
9.17.2.	99% BANDWIDTH	159
9.17.3.	OUTPUT POWER AND PSD	161
9.18.	<i>802.11n HT40 2TX CDD MODE IN THE 5.3 GHz BAND</i>	<i>164</i>

9.18.1.	26 dB BANDWIDTH	164
9.18.2.	99% BANDWIDTH.....	167
9.18.3.	OUTPUT POWER AND PSD.....	170
9.19.	<i>802.11n HT40 2TX STBC MODE IN THE 5.3 GHz BAND</i>	<i>174</i>
9.19.1.	26 dB BANDWIDTH	174
9.19.2.	99% BANDWIDTH.....	177
9.19.3.	OUTPUT POWER AND PSD.....	180
9.20.	<i>802.11ac VHT40 2TX BF IN THE 5.3 GHz BAND</i>	<i>184</i>
9.20.1.	OUTPUT POWER	184
9.21.	<i>802.11ac VHT80 1TX MODE IN THE 5.3 GHz BAND</i>	<i>186</i>
9.21.1.	26 dB BANDWIDTH	186
9.21.2.	99% BANDWIDTH.....	187
9.21.3.	OUTPUT POWER AND PSD.....	188
9.22.	<i>802.11ac VHT80 2TX CDD MODE IN THE 5.3 GHz BAND</i>	<i>191</i>
9.22.1.	26 dB BANDWIDTH	191
9.22.2.	99% BANDWIDTH.....	193
9.22.3.	OUTPUT POWER AND PSD.....	195
9.23.	<i>802.11ac VHT80 2TX STBC MODE IN THE 5.3 GHz BAND</i>	<i>198</i>
9.23.1.	26 dB BANDWIDTH	198
9.23.2.	99% BANDWIDTH.....	200
9.23.3.	OUTPUT POWER AND PSD.....	202
9.24.	<i>802.11ac VHT80 2TX BF IN THE 5.3 GHz BAND</i>	<i>205</i>
9.24.1.	OUTPUT POWER	205
9.25.	<i>802.11a & 802.11ac 1TX MODE IN THE 5.6 GHz BAND</i>	<i>207</i>
9.25.1.	26 dB BANDWIDTH	207
9.25.2.	99% BANDWIDTH.....	210
9.25.3.	OUTPUT POWER AND PSD.....	213
9.26.	<i>802.11n HT20 2TX CDD MODE IN THE 5.6 GHz BAND</i>	<i>221</i>
9.26.1.	26 dB BANDWIDTH	221
9.26.2.	99% BANDWIDTH.....	226
9.26.3.	OUTPUT POWER AND PSD.....	231
9.27.	<i>802.11n HT20 2TX STBC MODE IN THE 5.6 GHz BAND</i>	<i>241</i>
9.27.1.	26 dB BANDWIDTH	241
9.27.2.	99% BANDWIDTH.....	246
9.27.3.	OUTPUT POWER AND PSD.....	251
9.28.	<i>802.11ac VHT20 2TX BF IN THE 5.6 GHz BAND</i>	<i>261</i>
9.28.1.	OUTPUT POWER	261
9.29.	<i>802.11n HT40 1TX MODE IN THE 5.6 GHz BAND</i>	<i>267</i>
9.29.1.	26 dB BANDWIDTH	267
9.29.2.	99% BANDWIDTH.....	270
9.29.3.	OUTPUT POWER AND PSD.....	273
9.30.	<i>802.11n HT40 2TX CDD MODE IN THE 5.6 GHz BAND</i>	<i>281</i>
9.30.1.	26 dB BANDWIDTH	281
9.30.2.	99% BANDWIDTH.....	286
9.30.3.	OUTPUT POWER AND PSD.....	291
9.31.	<i>802.11n HT40 2TX STBC MODE IN THE 5.6 GHz BAND</i>	<i>301</i>

9.31.1.	26 dB BANDWIDTH	301
9.31.2.	99% BANDWIDTH.....	306
9.31.3.	OUTPUT POWER AND PSD.....	311
9.32.	<i>802.11ac VHT40 2TX BF IN THE 5.6 GHz BAND</i>	<i>321</i>
9.32.1.	OUTPUT POWER	321
9.33.	<i>802.11ac VHT80 1TX MODE IN THE 5.6 GHz BAND</i>	<i>327</i>
9.33.1.	26 dB BANDWIDTH	327
9.33.2.	99% BANDWIDTH.....	330
9.33.3.	OUTPUT POWER AND PSD.....	333
9.34.	<i>802.11ac VHT80 2TX CDD MODE IN THE 5.6 GHz BAND</i>	<i>340</i>
9.34.1.	26 dB BANDWIDTH	340
9.34.2.	99% BANDWIDTH.....	345
9.34.3.	OUTPUT POWER AND PSD.....	350
9.35.	<i>802.11ac VHT80 2TX STBC MODE IN THE 5.6 GHz BAND</i>	<i>359</i>
9.35.1.	26 dB BANDWIDTH	359
9.35.2.	99% BANDWIDTH.....	364
9.35.3.	OUTPUT POWER AND PSD.....	369
9.36.	<i>802.11ac VHT80 2TX BF IN THE 5.6 GHz BAND</i>	<i>378</i>
9.36.1.	OUTPUT POWER AND PSD.....	378
9.37.	<i>802.11a 1TX MODE IN THE 5.8 GHz BAND</i>	<i>386</i>
9.37.1.	6 dB BANDWIDTH	386
9.37.2.	26 dB BANDWIDTH	389
9.37.3.	99% BANDWIDTH.....	392
9.37.4.	OUTPUT POWER	395
9.37.5.	MAXIMUM POWER SPECTRAL DENSITY (PSD)	397
9.38.	<i>802.11n HT20 2TX CDD MODE IN THE 5.8 GHz BAND</i>	<i>401</i>
9.38.1.	6 dB BANDWIDTH	401
9.38.2.	26 dB BANDWIDTH	405
9.38.3.	99% BANDWIDTH.....	409
9.38.4.	OUTPUT POWER	413
9.38.5.	MAXIMUM POWER SPECTRAL DENSITY (PSD)	415
9.39.	<i>802.11n HT20 2TX STBC MODE IN THE 5.8 GHz BAND</i>	<i>420</i>
9.39.1.	6 dB BANDWIDTH	420
9.39.2.	26 dB BANDWIDTH	424
9.39.3.	99% BANDWIDTH.....	428
9.39.4.	OUTPUT POWER	432
9.39.5.	MAXIMUM POWER SPECTRAL DENSITY (PSD)	434
9.40.	<i>802.11ac VHT20 2TX BF IN THE 5.8 GHz BAND</i>	<i>439</i>
9.40.1.	OUTPUT POWER	439
9.41.	<i>802.11n HT40 1TX MODE IN THE 5.8 GHz BAND</i>	<i>441</i>
9.41.1.	6 dB BANDWIDTH	441
9.41.2.	26 dB BANDWIDTH	443
9.41.3.	99% BANDWIDTH.....	445
9.41.4.	OUTPUT POWER	447
9.41.5.	MAXIMUM POWER SPECTRAL DENSITY (PSD)	449
9.42.	<i>802.11n HT40 2TX CDD MODE IN THE 5.8 GHz BAND</i>	<i>452</i>
9.42.1.	6 dB BANDWIDTH	452

9.42.2.	26 dB BANDWIDTH	455
9.42.3.	99% BANDWIDTH.....	458
9.42.4.	OUTPUT POWER	461
9.42.5.	MAXIMUM POWER SPECTRAL DENSITY (PSD)	463
9.43.	<i>802.11n HT40 2TX STBC MODE IN THE 5.8 GHz BAND</i>	<i>467</i>
9.43.1.	6 dB BANDWIDTH	467
9.43.2.	26 dB BANDWIDTH	470
9.43.3.	99% BANDWIDTH.....	473
9.43.4.	OUTPUT POWER	476
9.43.5.	MAXIMUM POWER SPECTRAL DENSITY (PSD)	478
9.44.	<i>802.11ac VHT40 2TX BF IN THE 5.8 GHz BAND</i>	<i>482</i>
9.44.1.	OUTPUT POWER	482
9.45.	<i>802.11ac VHT80 1TX MODE IN THE 5.8 GHz BAND</i>	<i>484</i>
9.45.1.	6 dB BANDWIDTH	484
9.45.2.	26 dB BANDWIDTH	486
9.45.3.	99% BANDWIDTH.....	488
9.45.4.	OUTPUT POWER	490
9.45.5.	MAXIMUM POWER SPECTRAL DENSITY (PSD)	492
9.46.	<i>802.11ac VHT80 2TX CDD MODE IN THE 5.8 GHz BAND</i>	<i>495</i>
9.46.1.	6 dB BANDWIDTH	495
9.46.2.	26 dB BANDWIDTH	497
9.46.3.	99% BANDWIDTH.....	499
9.46.4.	OUTPUT POWER	501
9.46.5.	MAXIMUM POWER SPECTRAL DENSITY (PSD)	503
9.47.	<i>802.11ac VHT80 2TX STBC MODE IN THE 5.8 GHz BAND</i>	<i>507</i>
9.47.1.	6 dB BANDWIDTH	507
9.47.2.	26 dB BANDWIDTH	509
9.47.3.	99% BANDWIDTH.....	511
9.47.4.	OUTPUT POWER	513
9.47.5.	MAXIMUM POWER SPECTRAL DENSITY (PSD)	515
9.48.	<i>802.11ac VHT80 2TX BF IN THE 5.8 GHz BAND</i>	<i>518</i>
9.48.1.	OUTPUT POWER	518
10.	RADIATED TEST RESULTS	520
10.1.	LIMITS.....	520
10.2.	TX ABOVE 1 GHz 802.11a 1TX MODE IN THE 5.2 GHz BAND.....	521
10.3.	TX ABOVE 1 GHz 802.11n HT20 2TX CDD MODE IN THE 5.2 GHz BAND	529
10.4.	TX ABOVE 1 GHz 802.11n HT20 2TX BF MODE IN THE 5.2 GHz BAND	537
10.5.	TX ABOVE 1 GHz 802.11n HT40 1TX CDD MODE IN THE 5.2 GHz BAND	545
10.6.	TX ABOVE 1 GHz 802.11n HT40 2TX CDD MODE IN THE 5.2 GHz BAND	551
10.7.	TX ABOVE 1 GHz 802.11n HT40 2TX BF MODE IN THE 5.2 GHz BAND	557
10.8.	TX ABOVE 1 GHz 802.11ac VHT80 1TX MODE IN THE 5.2 GHz BAND.....	563
10.9.	TX ABOVE 1 GHz 802.11ac VHT80 2TX CDD MODE IN THE 5.2 GHz BAND	567
10.10.	TX ABOVE 1 GHz 802.11ac VHT80 2TX BF MODE IN THE 5.2 GHz BAND	571

10.11.	TX ABOVE 1 GHz 802.11a 1TX MODE IN THE 5.3 GHz BAND.....	575
10.12.	TX ABOVE 1 GHz 802.11n HT20 2TX CDD MODE IN THE 5.3 GHz BAND	583
10.13.	TX ABOVE 1 GHz 802.11n HT20 2TX BF MODE IN THE 5.3 GHz BAND	591
10.14.	TX ABOVE 1 GHz 802.11n HT40 1TX MODE IN THE 5.3 GHz BAND	599
10.15.	TX ABOVE 1 GHz 802.11n HT40 2TX CDD MODE IN THE 5.3 GHz BAND	605
10.16.	TX ABOVE 1 GHz 802.11n HT40 2TX BF MODE IN THE 5.3 GHz BAND	611
10.17.	TX ABOVE 1 GHz 802.11ac VHT80 1TX MODE IN THE 5.3 GHz BAND.....	617
10.18.	TX ABOVE 1 GHz 802.11ac VHT80 2TX CDD MODE IN THE 5.3 GHz BAND	621
10.19.	TX ABOVE 1 GHz 802.11ac VHT80 2TX BF MODE IN THE 5.3 GHz BAND	625
10.20.	TX ABOVE 1 GHz 802.11a 1TX MODE IN THE 5.6 GHz BAND.....	629
10.21.	TX ABOVE 1 GHz 802.11n HT20 2TX CDD MODE IN THE 5.6 GHz BAND	640
10.22.	TX ABOVE 1 GHz 802.11n HT20 2TX BF MODE IN THE 5.6 GHz BAND	651
10.23.	TX ABOVE 1 GHz 802.11n HT40 1TX MODE IN THE 5.6 GHz BAND	662
10.24.	TX ABOVE 1 GHz 802.11n HT40 2TX CDD MODE IN THE 5.6 GHz BAND	673
10.25.	TX ABOVE 1 GHz 802.11n HT40 2TX BF MODE IN THE 5.6 GHz BAND	684
10.26.	TX ABOVE 1 GHz 802.11ac VHT80 1TX MODE IN THE 5.6 GHz BAND.....	695
10.27.	TX ABOVE 1 GHz 802.11ac VHT80 2TX CDD MODE IN THE 5.6 GHz BAND	703
10.28.	TX ABOVE 1 GHz 802.11ac VHT80 2TX BF MODE IN THE 5.6 GHz BAND	711
10.29.	TX ABOVE 1 GHz 802.11a 1TX MODE IN THE 5.8 GHz BAND.....	719
10.30.	TX ABOVE 1 GHz 802.11n HT20 2TX CDD MODE IN THE 5.8 GHz BAND	727
10.31.	TX ABOVE 1 GHz 802.11n HT20 2TX BF MODE IN THE 5.8 GHz BAND	735
10.32.	TX ABOVE 1 GHz 802.11n HT40 1TX MODE IN THE 5.8 GHz BAND	743
10.33.	TX ABOVE 1 GHz 802.11n HT40 2TX CDD MODE IN THE 5.8 GHz BAND	749
10.34.	TX ABOVE 1 GHz 802.11n HT40 2TX BF MODE IN THE 5.8 GHz BAND	755
10.35.	TX ABOVE 1G 802.11ac VHT80 1TX MODE IN THE 5.8 GHz BAND	761
10.36.	TX ABOVE 1G 802.11ac VHT80 2TX CDD MODE IN THE 5.8 GHz BAND	765
10.37.	TX ABOVE 1G 802.11ac VHT80 2TX BF MODE IN THE 5.8 GHz BAND.....	769
10.38.	WORST-CASE BELOW 1 GHz	773
10.39.	WORST-CASE 18 to 26 GHz	775
10.40.	WORST-CASE 26 to 40 GHz	776
11.	AC POWER LINE CONDUCTED EMISSIONS.....	777
12.	DYNAMIC FREQUENCY SELECTION	781
12.1.	OVERVIEW.....	781
12.1.1.	LIMITS.....	781
12.1.2.	TEST AND MEASUREMENT SYSTEM.....	785
12.1.3.	SETUP OF EUT (CLIENT MODE).....	788

12.1.4.	SETUP OF EUT (CLIENT-TO-CLIENT COMMUNICATIONS MODE)	789
12.1.5.	DESCRIPTION OF EUT	790
12.2.	<i>CLIENT MODE RESULTS FOR 20 MHz BANDWIDTH</i>	792
12.2.1.	TEST CHANNEL	792
12.2.2.	RADAR WAVEFORM AND TRAFFIC	792
12.2.3.	OVERLAPPING CHANNEL TESTS	794
12.2.4.	MOVE AND CLOSING TIME	794
12.3.	<i>CLIENT MODE RESULTS FOR 40 MHz BANDWIDTH</i>	798
12.3.1.	TEST CHANNEL	798
12.3.2.	RADAR WAVEFORM AND TRAFFIC	798
12.3.3.	OVERLAPPING CHANNEL TESTS	800
12.3.4.	MOVE AND CLOSING TIME	800
12.3.5.	NON-OCCUPANCY PERIOD	804
12.4.	<i>CLIENT MODE RESULTS FOR 80 MHz BANDWIDTH</i>	805
12.4.1.	TEST CHANNEL	805
12.4.2.	RADAR WAVEFORM AND TRAFFIC	805
12.4.3.	OVERLAPPING CHANNEL TESTS	807
12.4.4.	MOVE AND CLOSING TIME	807
12.4.5.	NON-OCCUPANCY PERIOD	811
12.5.	<i>CLIENT-TO-CLIENT COMMUNICATIONS MODE RESULTS FOR 20 MHz BANDWIDTH</i>	812
12.5.1.	TEST CHANNEL	812
12.5.2.	RADAR WAVEFORM AND TRAFFIC	812
12.5.3.	OVERLAPPING CHANNEL TESTS	814
12.5.4.	MOVE AND CLOSING TIME	814
12.6.	<i>CLIENT-TO-CLIENT COMMUNICATIONS MODE RESULTS FOR 40 MHz BANDWIDTH</i>	818
12.6.1.	TEST CHANNEL	818
12.6.2.	RADAR WAVEFORM AND TRAFFIC	818
12.6.3.	OVERLAPPING CHANNEL TESTS	820
12.6.4.	MOVE AND CLOSING TIME	820
12.7.	<i>CLIENT-TO-CLIENT COMMUNICATIONS MODE RESULTS FOR 80 MHz BANDWIDTH</i>	824
12.7.1.	TEST CHANNEL	824
12.7.2.	RADAR WAVEFORM AND TRAFFIC	824
12.7.3.	OVERLAPPING CHANNEL TESTS	826
12.7.4.	MOVE AND CLOSING TIME	826
13.	SETUP PHOTOS	830

1. ATTESTATION OF TEST RESULTS

COMPANY NAME: APPLE
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CUPERTINO, CA 95014, U.S.A.

EUT DESCRIPTION: PORTABLE COMPUTER

MODEL: A1534

SERIAL NUMBER: C02N900UG17D (Conducted), C02N900KG17D (Radiated)

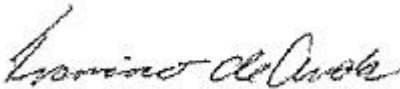
DATE TESTED: SEPTEMBER 22, 2014 – OCTOBER 20, 2014

APPLICABLE STANDARDS	
STANDARD	TEST RESULTS
CFR 47 Part 15 Subpart E	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:



FRANCISCO DE ANDA
PROJECT LEAD
UL Verification Services Inc.

Tested By:



TOM CHEN
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 14-30, FCC KDB 905462 D02 and D03, FCC KDB 789033 D02, ANSI C63.10-2009.

3. FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 47173 and 47266 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
	☐ Chamber G
	☐ Chamber H

The above test sites and facilities are covered under FCC Test Firm Registration # 208313. Chambers A through H are covered under Industry Canada company address code 2324B with site numbers 2324B -1 through 2324B-8, respectively.

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:

$$\begin{aligned}\text{Field Strength (dBuV/m)} &= \text{Measured Voltage (dBuV)} + \text{Antenna Factor (dB/m)} + \text{Cable Loss} \\ &\quad (\text{dB}) - \text{Preamp Gain (dB)} \\ 36.5 \text{ dBuV} + 18.7 \text{ dB/m} + 0.6 \text{ dB} - 26.9 \text{ dB} &= 28.9 \text{ dBuV/m}\end{aligned}$$

4.3. MEASUREMENT UNCERTAINTY

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

PARAMETER	UNCERTAINTY
Conducted Disturbance, 0.15 to 30 MHz	± 3.52 dB
Radiated Disturbance, 30 to 1000 MHz	± 4.94 dB
Radiated Disturbance, 1 to 6 GHz	± 3.86 dB
Radiated Disturbance, 6 to 18 GHz	± 4.23 dB
Radiated Disturbance, 18 to 26 GHz	± 5.30 dB
Radiated Disturbance, 26 to 40 GHz	± 5.23 dB

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

5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

Laptop Device with Bluetooth and WLAN Radios (AC 80 MHZ Beam-Forming)

5.2. MAXIMUM OUTPUT POWER

The transmitter has a maximum conducted output power as follows:

5.2GHz Band

Frequency Range (MHz)	Mode	Output Power (dBm)	Output Power (mW)	Covered Modes
5180 - 5240	802.11a 1TX	17.98	62.81	802.11n HT20 1TX 802.11ac VHT20 1TX
5180 - 5240	802.11n HT20 2TX CDD	18.96	78.70	802.11a 2TX CDD 802.11ac VHT20 2TX CDD
5180 - 5240	802.11n HT20 2TX STBC	20.00	100.00	802.11n HT20 2TX SDM 802.11ac VHT20 2TX SDM
5180 - 5240	802.11ac VHT20 2TX BF	19.08	80.91	802.11a 2TX BF 802.11n HT20 2TX BF
5190 - 5230	802.11n HT40 1TX	17.84	60.81	802.11ac VHT40 1TX
5190 - 5230	802.11n HT40 2TX CDD	20.90	123.03	802.11ac VHT40 2TX CDD
5190 - 5230	802.11n HT40 2TX STBC	20.88	122.46	802.11n HT40 2TX SDM 802.11ac VHT40 2TX SDM
5190 - 5230	802.11ac VHT40 2TX BF	21.02	126.47	
5210	802.11ac VHT80 1TX	12.97	19.82	
5210	802.11ac VHT80 2TX CDD	14.99	31.55	
5210	802.11ac VHT80 2TX STBC	14.99	31.55	802.11ac VHT80 2TX SDM
5210	802.11ac VHT80 2TX BF	15.03	31.84	

Note: "Covered Modes" are test reduction modes. The output powers on the "Covered Modes" are equal to or less than the mode referenced.

5.3GHz Band

Frequency Range (MHz)	Mode	Output Power (dBm)	Output Power (mW)	Covered Modes
5260 - 5320	802.11a 1TX	17.98	62.81	802.11n HT20 1TX 802.11ac VHT20 1TX
5260 - 5320	802.11n HT20 2TX CDD	18.99	79.25	802.11a 2TX CDD 802.11ac VHT20 2TX CDD
5260 - 5320	802.11n HT20 2TX STBC	19.98	99.54	802.11n HT20 2TX SDM 802.11ac VHT20 2TX SDM
5260 - 5320	802.11n HT20 2TX BF	19.11	81.47	802.11a 2TX BF 802.11n HT20 2TX BF
5270 - 5310	802.11n HT40 1TX	17.91	61.80	802.11ac VHT40 1TX
5270 - 5310	802.11n HT40 2TX CDD	20.82	120.78	802.11ac VHT40 2TX CDD
5270 - 5310	802.11n HT40 2TX STBC	20.74	118.58	802.11n HT40 2TX SDM 802.11ac VHT40 2TX SDM
5270 - 5310	802.11n VH40 2TX BF	20.94	124.17	
5290	802.11ac VHT80 1TX	11.98	15.78	
5290	802.11ac VHT80 2TX CDD	12.47	17.66	
5290	802.11ac VHT80 2TX STBC	12.46	17.62	802.11ac VHT80 2TX SDM
5290	802.11ac VHT80 2TX BF	12.51	17.82	

Note: "Covered Modes" are test reduction modes. The output powers on the "Covered Modes" are equal to or less than the mode referenced.

5.6GHz Band

Frequency Range (MHz)	Mode	Output Power (dBm)	Output Power (mW)	Covered Modes
5500 - 5700	802.11a 1TX	17.96	62.52	802.11n HT20 1TX 802.11n VHT20 1TX
5720	802.11a 1TX	17.50	56.23	
5500 - 5700	802.11n HT20 2TX CDD	17.33	54.08	802.11a 2TX CDD 802.11ac VHT20 2TX CDD
5720	802.11n HT20 2TX CDD	17.50	56.23	802.11a 2TX CDD 802.11ac VHT20 2TX CDD
5500 - 5700	802.11n HT20 2TX STBC	19.98	99.54	802.11n HT20 2TX SDM 802.11ac VHT20 2TX SDM
5720	802.11n HT20 2TX STBC	19.50	89.13	802.11n HT20 2TX SDM 802.11ac VHT20 2TX SDM
5500 - 5700	802.11n VHT20 2TX BF	17.45	55.59	802.11a 2TX BF 802.11n HT20 2TX BF
5720	802.11n VHT20 2TX BF	17.62	57.81	802.11a 2TX BF 802.11n HT20 2TX BF
5510 - 5670	802.11n HT40 1TX	17.98	62.81	802.11ac VHT40 1TX
5710	802.11n HT40 1TX	18.00	63.10	802.11ac VHT40 1TX
5510 - 5670	802.11n HT40 2TX CDD	19.97	99.31	802.11ac VHT40 2TX CDD
5710	802.11n HT40 2TX CDD	20.00	100.00	802.11ac VHT40 2TX CDD
5510 - 5670	802.11n HT40 2TX STBC	20.88	122.46	802.11n HT40 2TX SDM 802.11ac VHT40 2TX SDM
5710	802.11n HT40 2TX STBC	19.99	99.77	802.11n HT40 2TX SDM 802.11ac VHT40 2TX SDM
5510 - 5670	802.11n HT40 2TX BF	20.09	102.09	
5710	802.11n VHT40 2TX BF	20.12	102.80	
5530-5610	802.11ac VHT80 1TX	17.96	62.52	
5690	802.11ac VHT80 1TX	18.00	63.10	
5530-5610	802.11ac VHT80 2TX CDD	20.98	125.31	
5690	802.11ac VHT80 2TX CDD	21.00	125.89	
5530-5610	802.11ac VHT80 2TX STBC	20.96	124.74	802.11ac VHT80 2TX SDM 802.11ac VHT80 2TX SDM
5690	802.11ac VHT80 2TX STBC	21.00	125.89	
5530-5610	802.11ac VHT80 2TX BF	20.26	106.17	
5690	802.11ac VHT80 2TX BF	20.00	100.00	

Note: "Covered Modes" are test reduction modes. The output powers on the "Covered Modes" are equal to or less than the mode referenced.

5.8GHz Band

Frequency Range (MHz)	Mode	Output Power (dBm)	Output Power (mW)	Covered Modes
5745 - 5825	802.11a 1TX	18.00	63.10	802.11n HT20 1TX 802.11ac VHT20 1TX
5745 - 5825	802.11n HT20 2TX CDD	20.94	124.17	802.11a 2TX CDD 802.11ac VHT20 2TX CDD
5745 - 5825	802.11n HT20 2TX STBC	20.79	119.95	802.11n HT20 2TX SDM 802.11ac VHT20 2TX SDM
5745 - 5825	802.11ac VHT20 2TX BF	21.06	127.64	802.11a 2TX BF 802.11n HT20 2TX BF
5755 - 5795	802.11n HT40 1TX	17.99	62.95	802.11ac VHT40 1TX
5755 - 5795	802.11n HT40 2TX CDD	19.93	98.40	802.11ac VHT40 2TX CDD
5755 - 5795	802.11n HT40 2TX STBC	19.94	98.63	802.11n HT40 2TX SDM 802.11ac VHT40 2TX SDM
5755 - 5795	802.11ac VHT40 2TX BF	20.05	101.16	
5775	802.11ac VHT80 1TX	15.49	35.40	
5775	802.11ac VHT80 2TX CDD	16.50	44.67	
5775	802.11ac VHT80 2TX STBC	16.50	44.67	802.11ac VHT80 2TX SDM
5775	802.11ac VHT80 2TX BF	16.54	45.08	

Note: "Covered Modes" are test reduction modes. The output powers on the "Covered Modes" are equal to or less than the mode referenced.

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes an inverted-F antenna (IFA), with a maximum gain as below table:

Frequency Band (GHz)	Antenna Gain (dBi)	
	Chain 0	Chain 1
5.15 - 5.25	3.11	2.90
5.25 - 5.35	3.05	3.33
5.50 - 5.70	5.00	4.57
5.725 -5.85	4.78	5.26

5.4. SOFTWARE AND FIRMWARE

The WLAN firmware installed in the EUT during testing was 7.15.147

The test utility software used during testing was 7.15 RC147

5.5. WORST-CASE CONFIGURATION AND MODE

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

For 1Tx modes, both chains have the same power; output power and PSD measurement for 1Tx modes are reported only for the port with higher antenna gain.

All radiated testing was performed with the EUT in normal use orientation.

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

802.11a mode: 6 Mbps
802.11n HT20 mode: MCS0
802.11ac VHT20 BF: MCS0
802.11n HT40 mode: MCS0
802.11ac VHT40 BF: MCS0
802.11ac VHT80 mode: MCS0
802.11ac VHT80 BF: MCS0

5.6. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List				
Description	Manufacturer	Model	Serial Number	FCC ID
AC/ DC Adapter	Apple Inc.	A1540	C4H433700AZFPWW1E	N/A
Earphone	Apple Inc.	N/A	N/A	N/A

I/O CABLES

Cable No	Port	# of identical ports	Connector Type	Cable Type	Cable Length (m)	Remarks
1	Antenna	2	SMA	Un-Shielded	0.2	To Spectrum Analyzer
2	DC	1	Lightning	Un-Shielded	2	

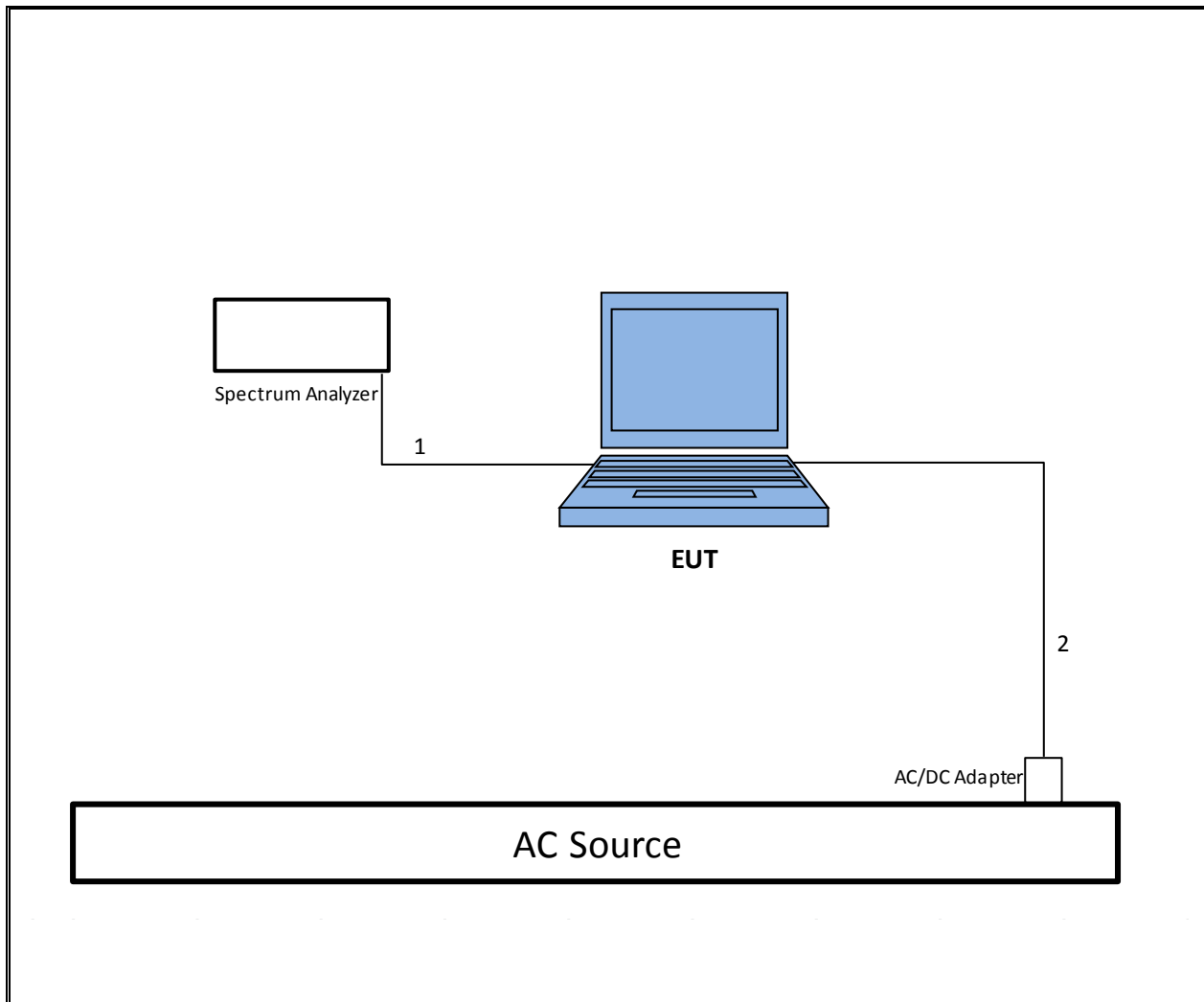
I/O CABLES (RADIATED AND AC POWER CONDUCTED TEST)

I/O Cable List						
Cable No	Port	# of identical ports	Connector Type	Cable Type	Cable Length (m)	Remarks
2	DC	1	Lightning	Un-Shielded	2	NA
3	Audio	1	Jack	Un-Shielded	0.5	NA

TEST SETUP- (CONDUCTED TEST)

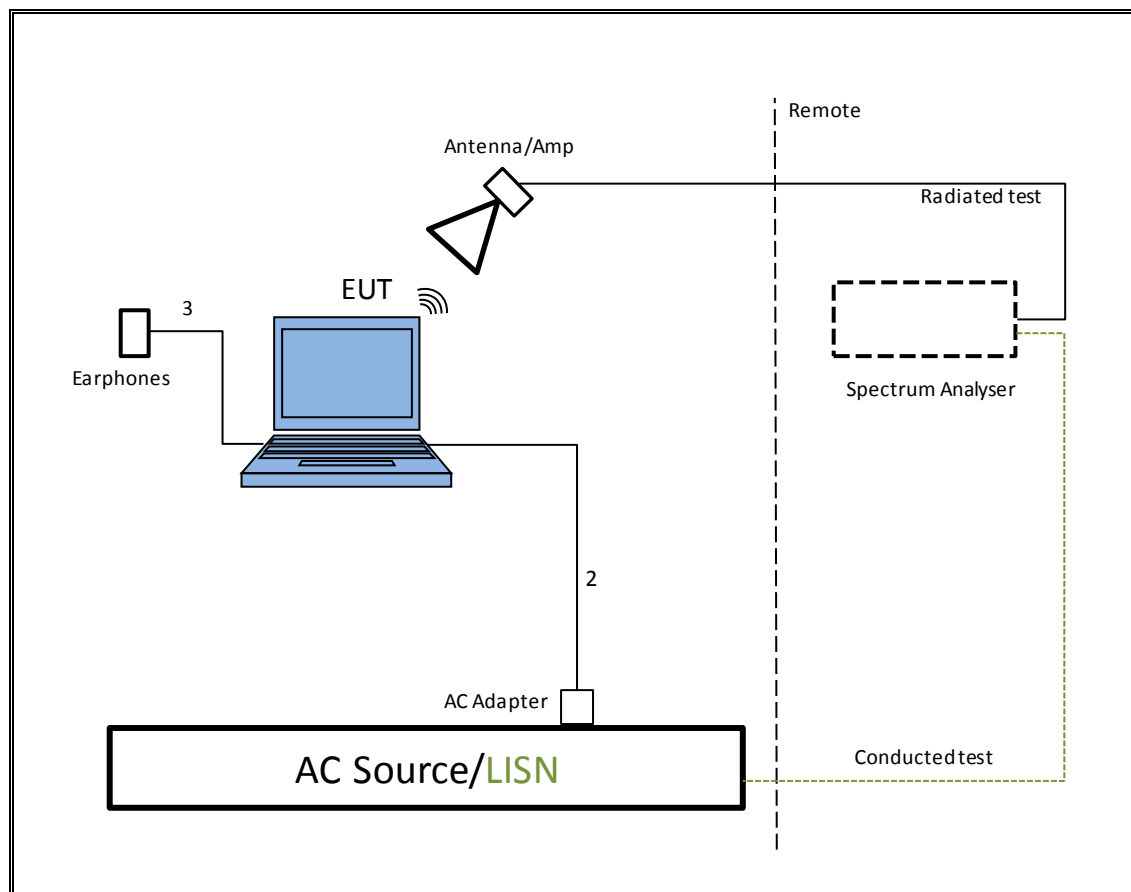
The EUT was tested connected to spectrum analyzer via antenna port. Test software exercised the EUT.

SETUP DIAGRAM



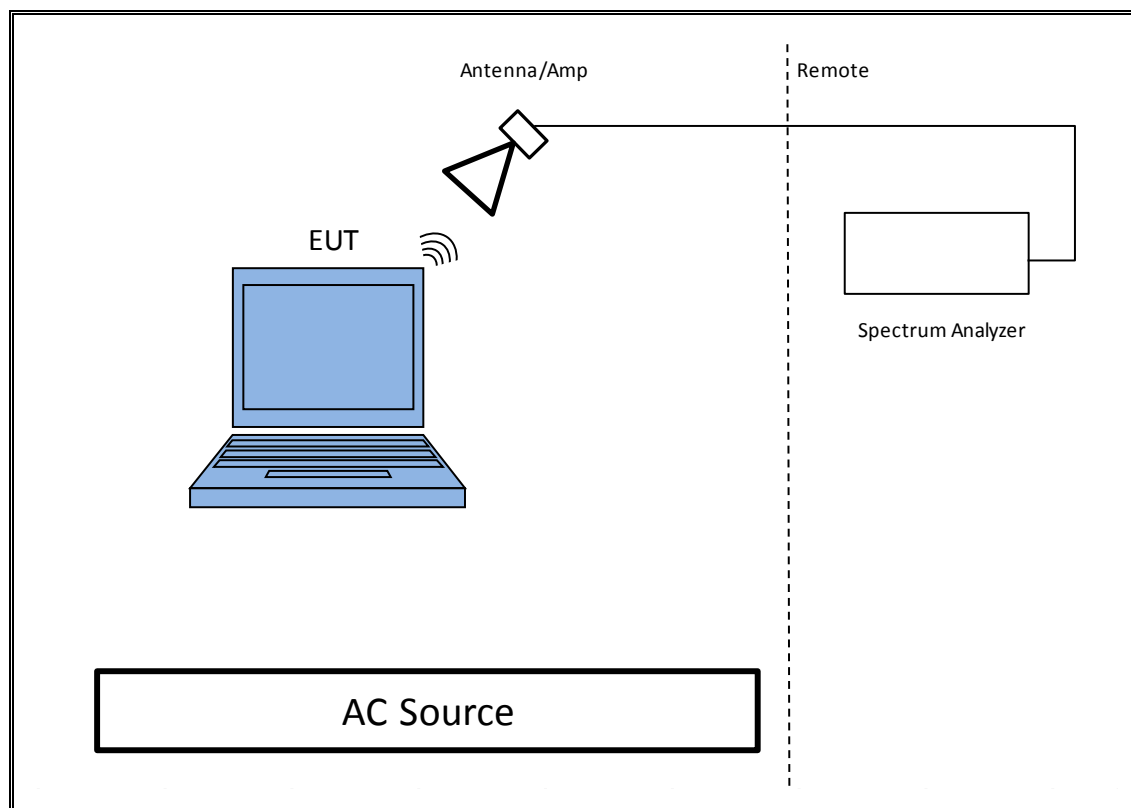
TEST SETUP- RADIATED Below 1 GHz & AC LINE CONDUCTED TESTS

The EUT's test software exercised the radio card.



TEST SETUP- RADIATED ABOVE 1 GHz

The EUT's test software exercised the radio card.



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	T Number	Cal Due
PXA Signal Analyzer	Agilent	N9030A	T342	06/25/15
PXA Signal Analyzer	Agilent	N9030A	T341	02/12/15
Power Meter	Agilent	N1911A	T382	04/09/15
Antenna, Horn 1-18GHz	ETS Lindgren	3117	T862	04/14/15
Antenna, Horn 1-18GHz	ETS Lindgren	3117	T120	03/26/15
Antenna, Hybrid 30MHz to 2GHz	Sunol Sciences	JB3	T899	05/14/15
Antenna, Hybrid 30MHz to 2GHz	Sunol Sciences	JB1	T122	04/22/15
PXA Signal Analyzer 3Hz to 44GHz	Agilent	N9030A	T905	05/17/15
Amplifier, 10KHz to 1GHz	Sonoma	310N	T834	06/05/15
Amplifier, 10KHz to 1GHz	Sonoma	310N	T173	12/30/14
Amplifier, 1 to 18GHz	Miteq	AFS42-00101	T491	06/05/15
Amplifier, 1 to 18GHz	Miteq	AFS42-00101800-25-S-42	T742	01/20/15
PXA Signal Analyzer 3Hz to 44GHz	Agilent	N9030A	T341	02/12/15
Antenna, Horn 1-18GHz	ETS Lindgren	3117	T120	03/20/15
Antenna, Hybrid 30MHz to 2GHz	Sunol Sciences	JB1	T122	04/22/15
Amplifier, 1 to 18GHz	Miteq	AFS42-00101	T742	01/20/15
Amplifier, 10KHz to 1GHz	Sonoma	310N	T173	12/30/14
EMI Test Receiver, 9 kHz-7 GHz	R & S	ESCI 7	T284	09/16/15
LISN, 30 MHz	FCC	LISN-50/250-25-2	T24	01/17/15
Amplifier, 1 to 26.5 Ghz	Agilent	8449B	T404	03/25/15
Antenna Horn 18 to 26.5 Ghz	ARA	MWH-1826/B	T89	11/26/14

7. MEASUREMENT METHODS

26 dB Emission BW: KDB 789033 D01 v01r03, Section C.

99% Occupied BW: KDB 789033 D01 v01r03, Section D.

Conducted Output Power: KDB 789033 D01 v01r03, Section E.3.a (Method PM).

Power Spectral Density: KDB 789033 D01 v01r03, Section F.

Peak Excursion: KDB 789033 D01 v01r03, Section G.

Unwanted emissions in restricted bands: KDB 789033 D01 v01r03, Sections H.3, H.4, H.5, and H.6.

Unwanted emissions in non-restricted bands: KDB 789033 D01 v01r03, Sections H.3, H.4, and H.5.

8. ON TIME, DUTY CYCLE AND MEASUREMENT METHODS

8.1. ON TIME AND DUTY CYCLE RESULTS

LIMITS

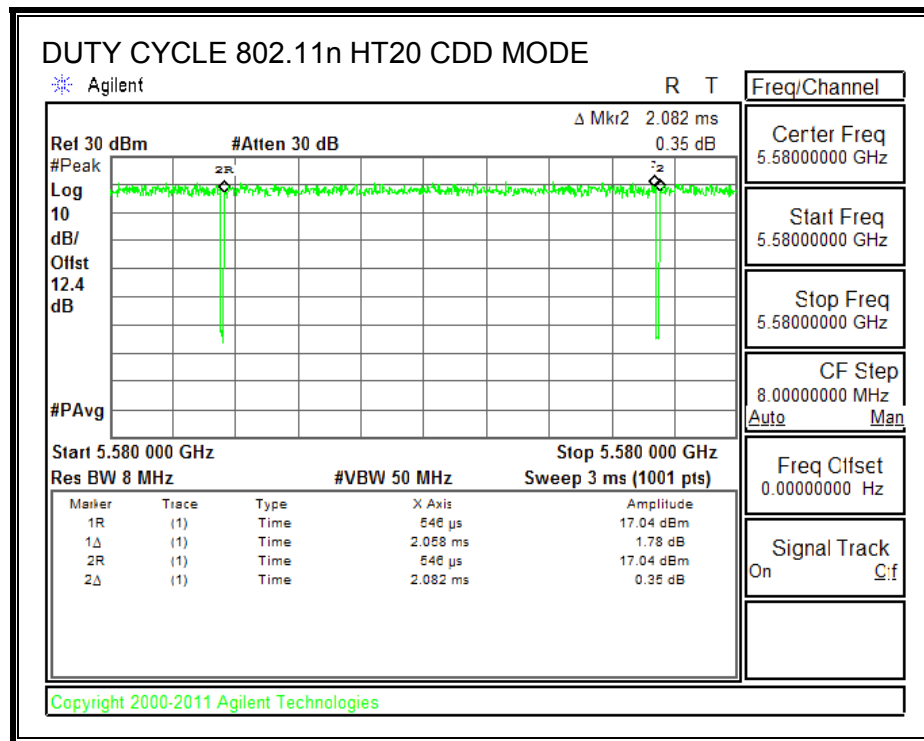
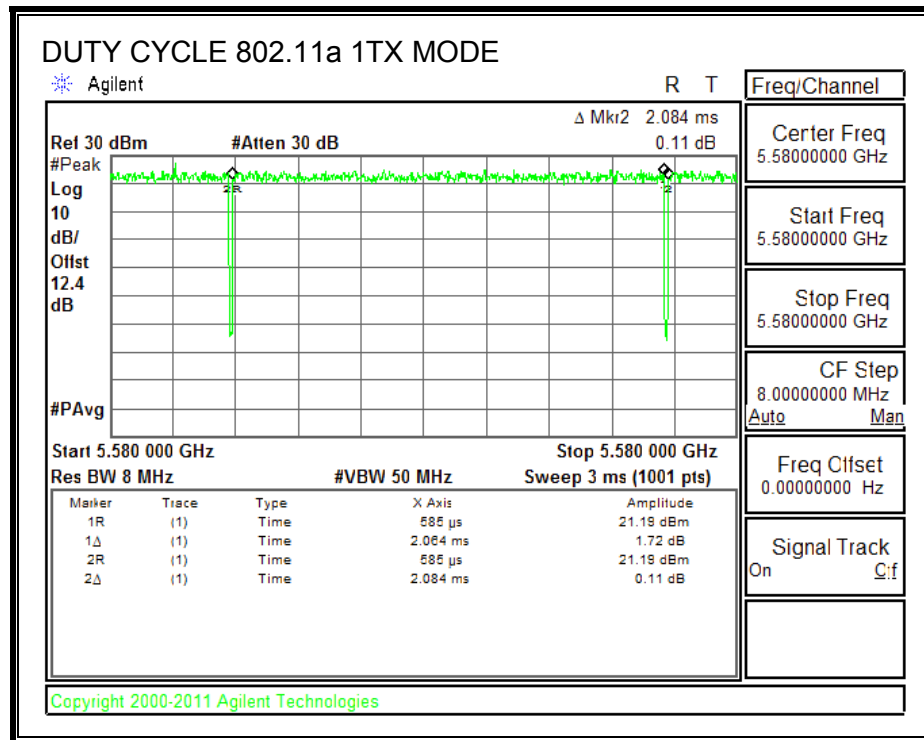
None; for reporting purposes only.

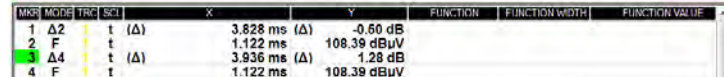
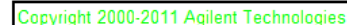
PROCEDURE

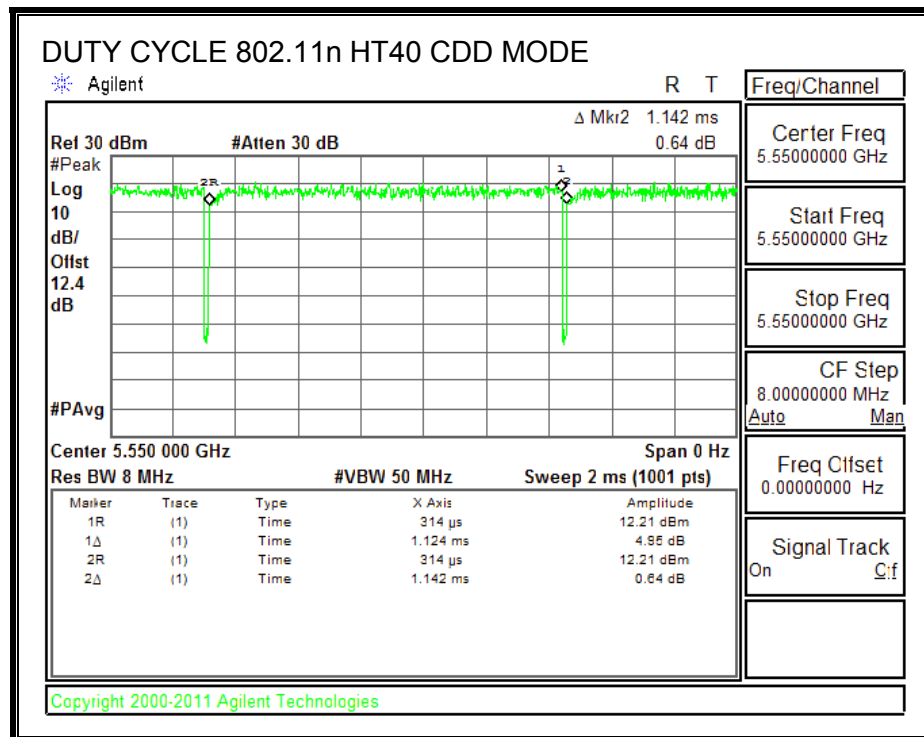
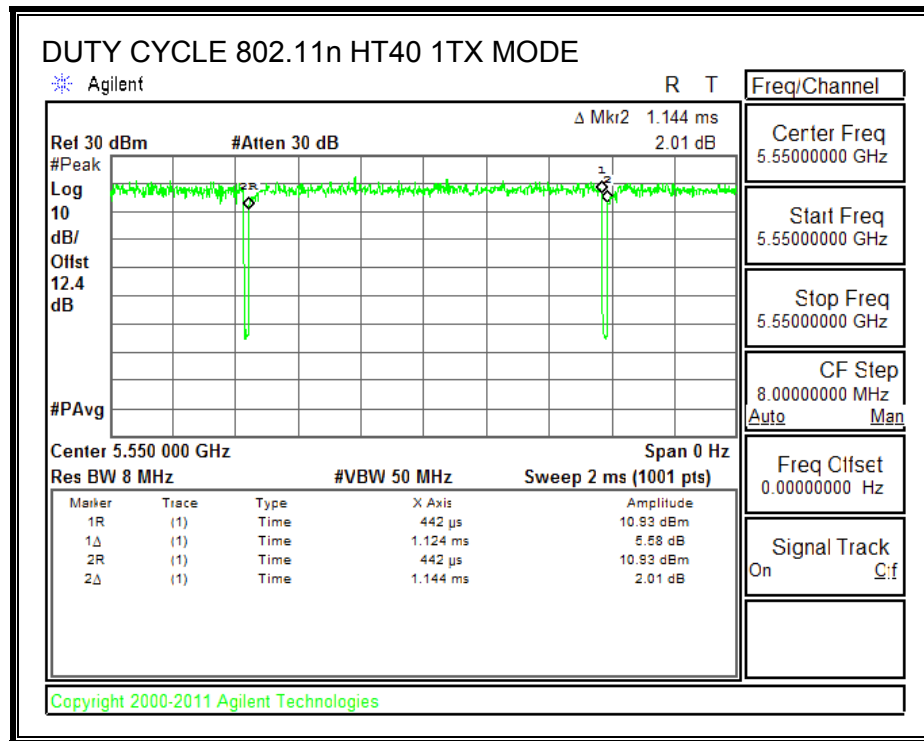
KDB 789033 Zero-Span Spectrum Analyzer Method.

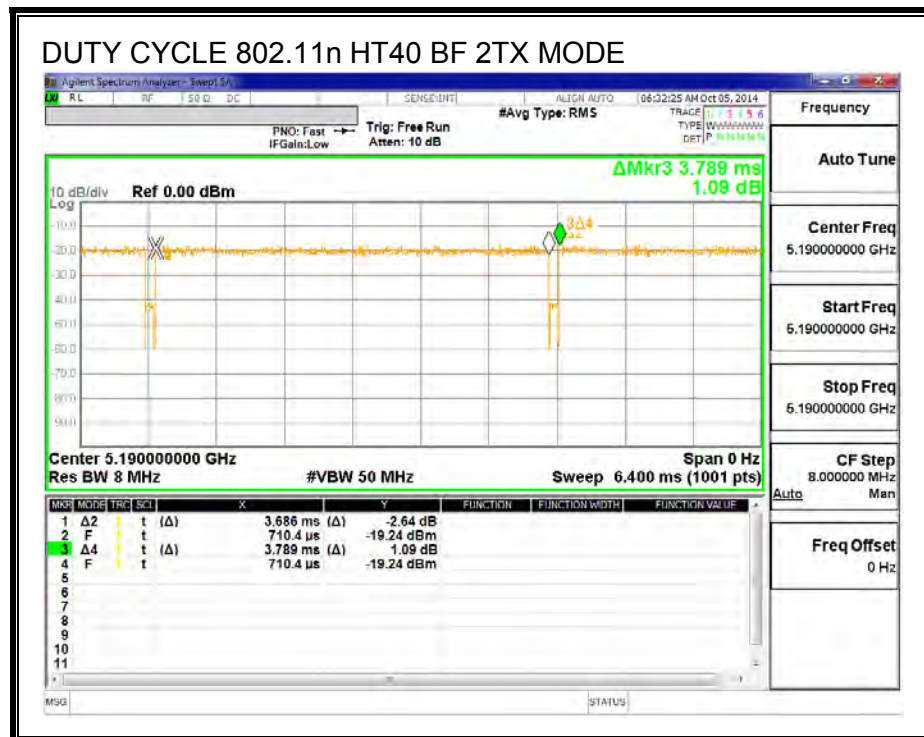
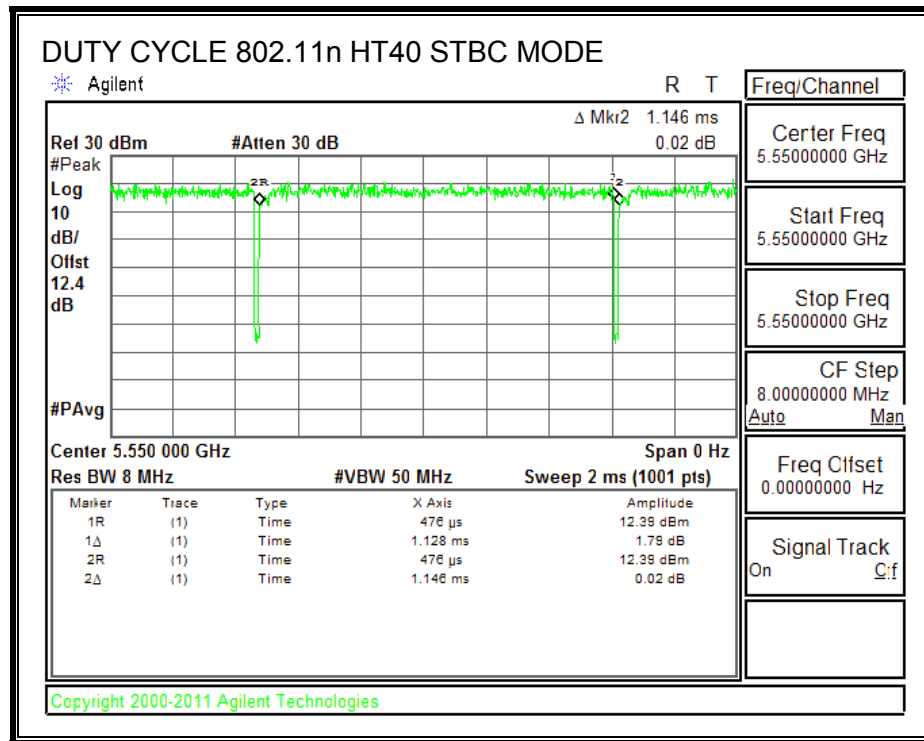
Mode	ON Time B (msec)	Period (msec)	Duty Cycle x (linear)	Duty Cycle (%)	Duty Cycle Correction Factor (dB)	1/B Minimum VBW (kHz)
802.11a 1TX	2.064	2.084	0.990	99.04%	0.00	0.010
802.11n HT20 CDD	2.058	2.082	0.988	98.85%	0.00	0.010
802.11n HT20 STBC	1.926	1.959	0.983	98.32%	0.00	0.010
802.11n HT20 TXBF 2TX	3.828	3.936	0.973	97.26%	0.12	0.261
802.11n HT40 1TX	1.124	1.144	0.983	98.25%	0.00	0.010
802.11n HT40 CDD	1.124	1.142	0.984	98.42%	0.00	0.010
802.11n HT40 STBC	1.128	1.146	0.984	98.43%	0.00	0.010
802.11n HT40 TXBF 2TX	3.686	3.789	0.973	97.28%	0.12	0.271
802.11ac VHT80 1TX	0.458	0.482	0.950	95.02%	0.22	2.183
802.11ac VHT80 CDD	0.459	0.483	0.950	95.03%	0.22	2.179
802.11ac VHT80 STBC	0.467	0.491	0.951	95.11%	0.22	2.141
802.11ac VHT80 TXBF 2TX	5.050	5.360	0.942	94.22%	0.26	0.198

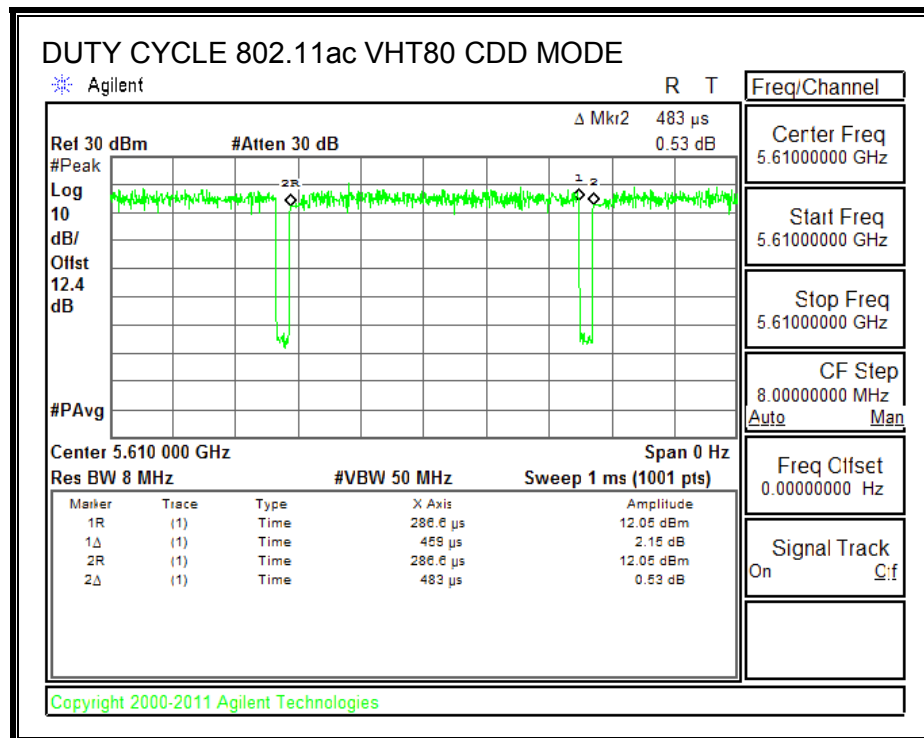
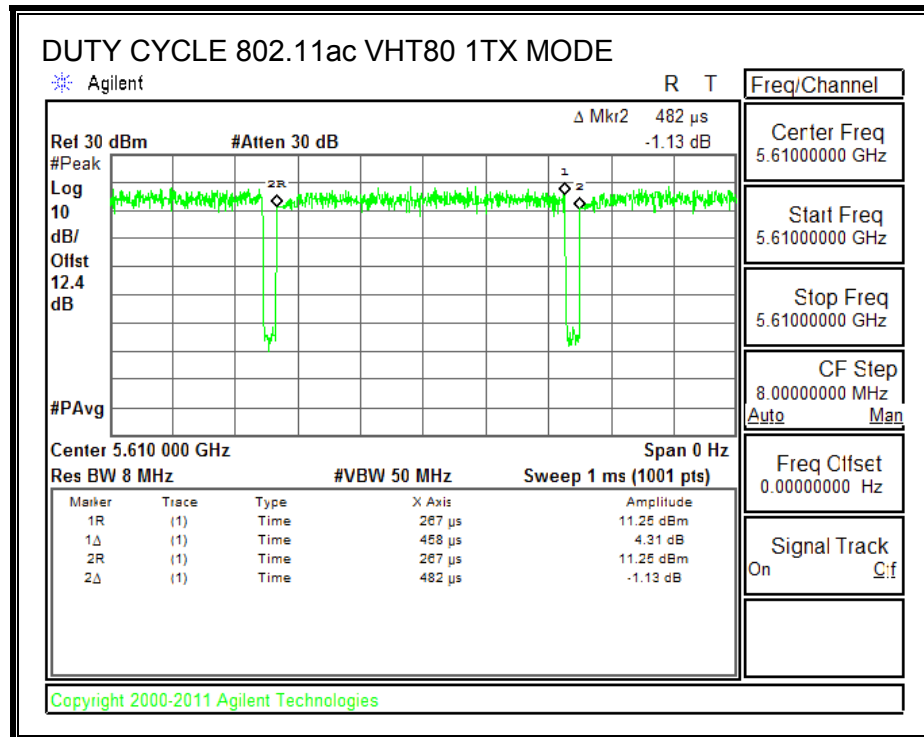
8.2. DUTY CYCLE PLOTS

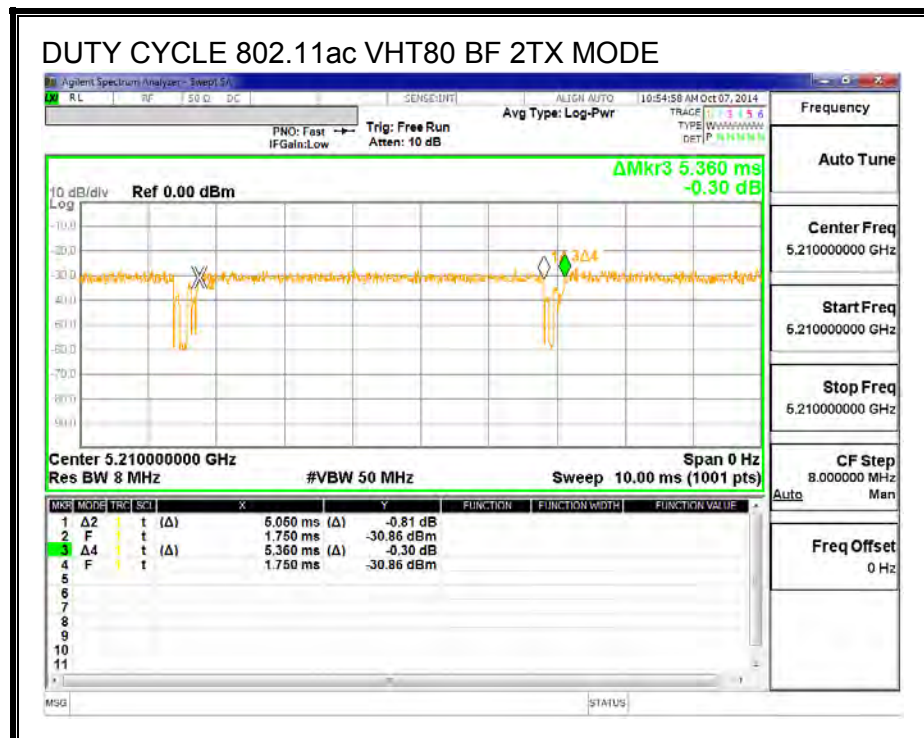
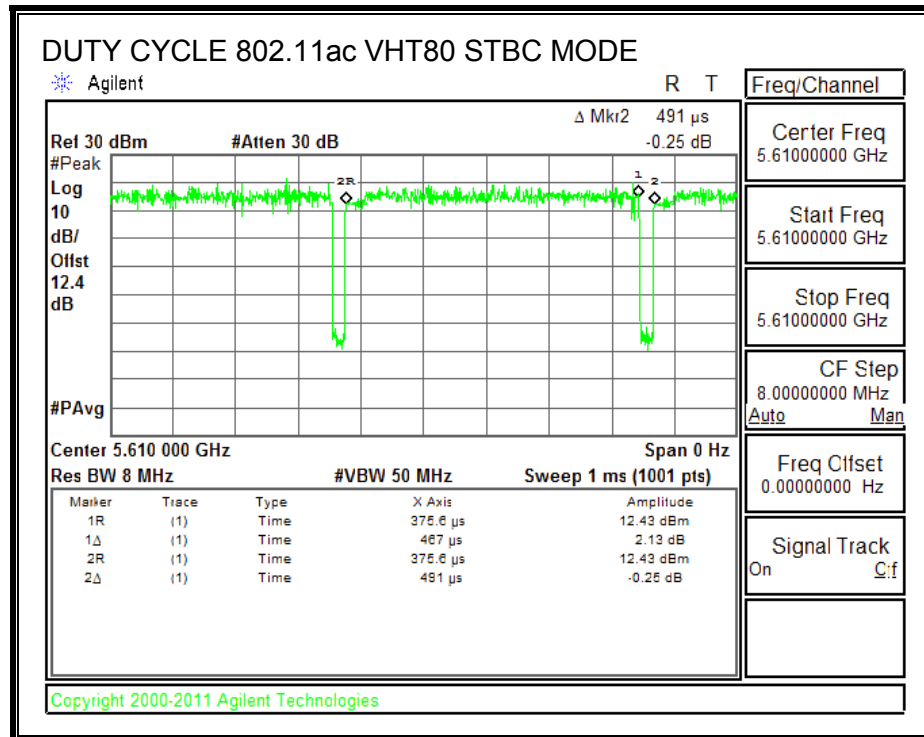












9. ANTENNA PORT TEST RESULTS

9.1. 802.11a 1TX MODE IN THE 5.2 GHz BAND

9.1.1. 26 dB BANDWIDTH

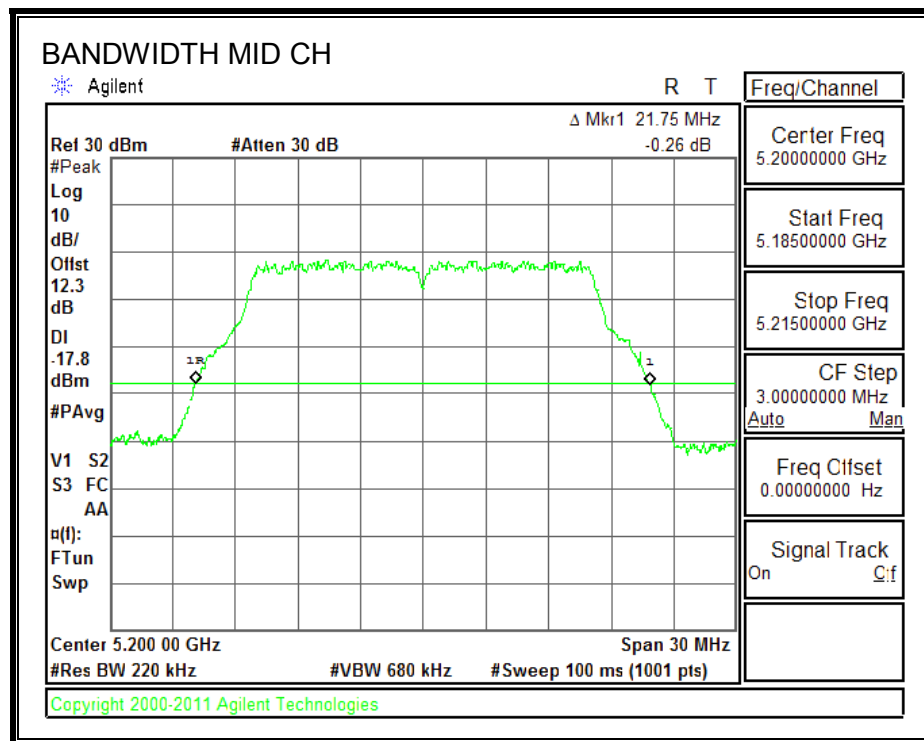
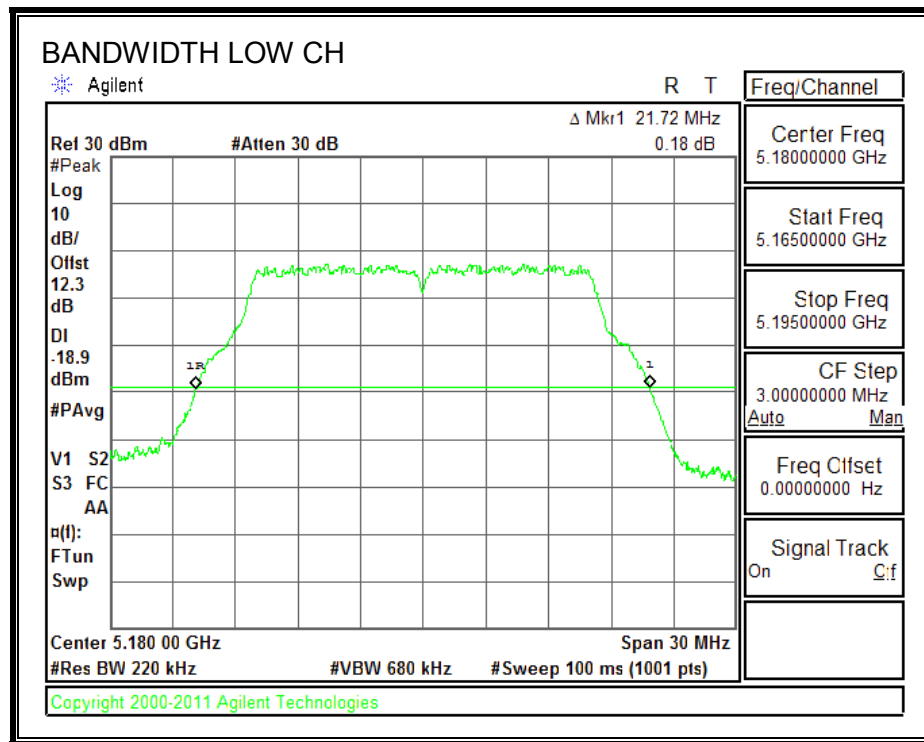
LIMITS

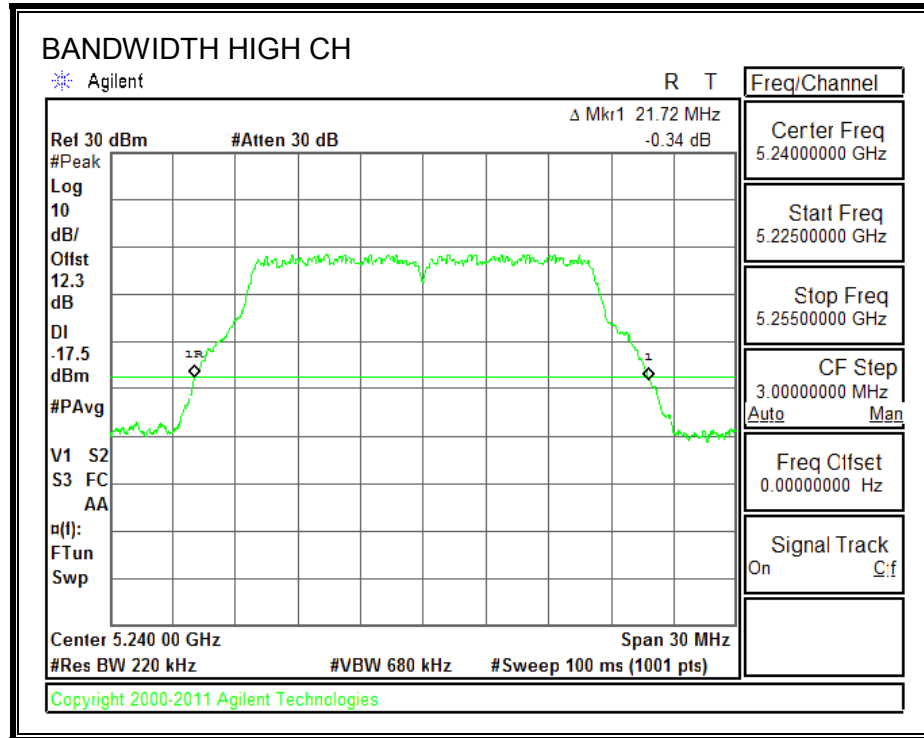
None; for reporting purposes only.

RESULTS

Channel	Frequency (MHz)	26 dB Bandwidth (MHz)
Low	5180	21.72
Mid	5200	21.75
High	5240	21.72

26 dB BANDWIDTH





9.1.2. 99% BANDWIDTH

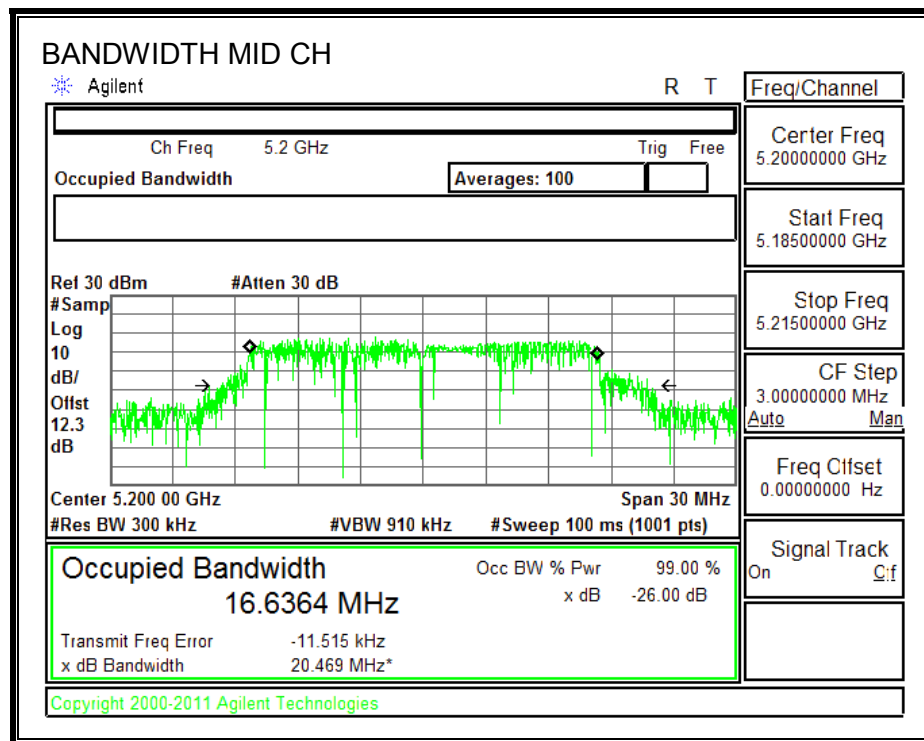
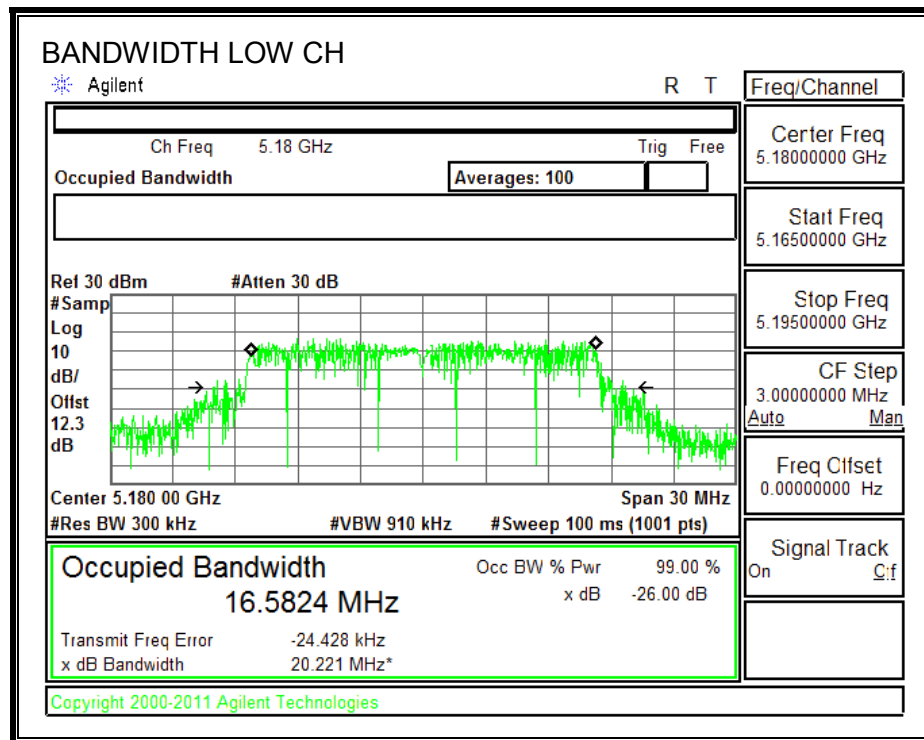
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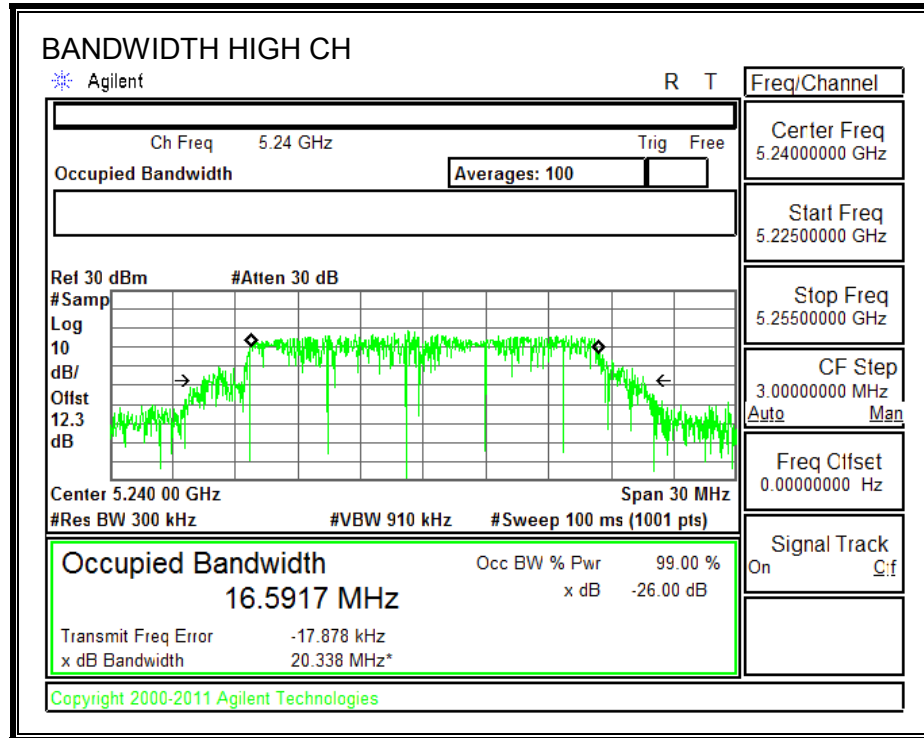
None; for reporting purposes only.

RESULTS

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	5180	16.5824
Mid	5200	16.6364
High	5240	16.5917

99% BANDWIDTH





9.1.3. OUTPUT POWER AND PSD

LIMITS

FCC §15.407 (a) (1)

(iv) For mobile and portable client devices in the 5.15-5.25 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed 250 mW provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

DIRECTIONAL ANTENNA GAIN

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

ANTENNA 0

Antenna Gain (dBi)
3.11

ANTENNA 1

Antenna Gain (dBi)
2.90

RESULTS

Antenna Gain and Limits

Channel	Frequency (MHz)	Directional Gain for Power (dBi)	Directional Gain for PSD (dBi)	Power Limit (dBm)	PSD Limit (dBm)
Low	5180	3.11	3.11	24.00	11.00
Mid	5200	3.11	3.11	24.00	11.00
High	5240	3.11	3.11	24.00	11.00

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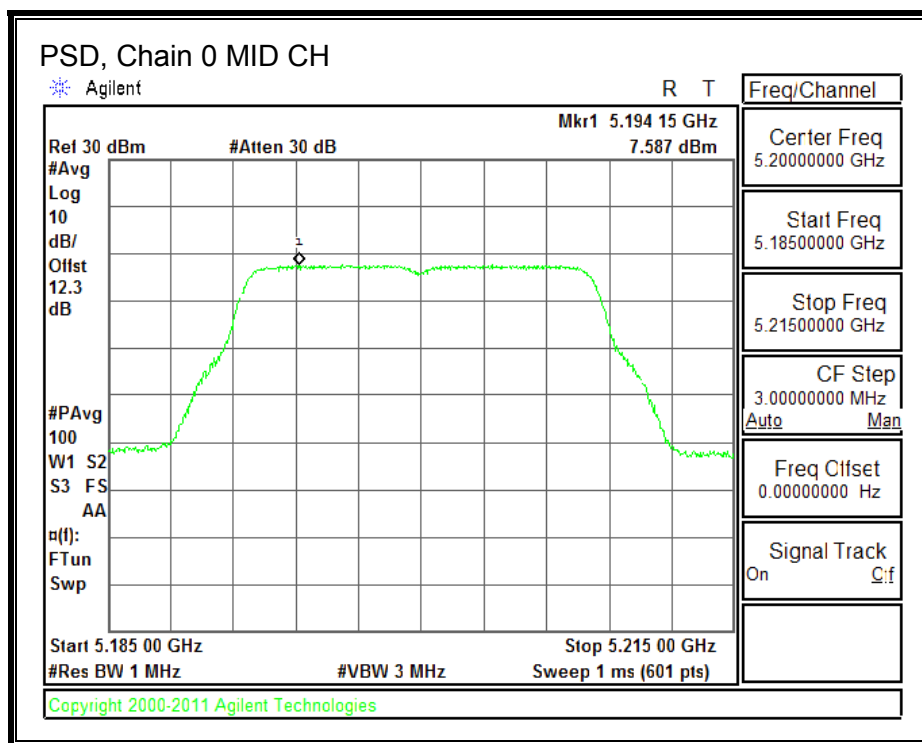
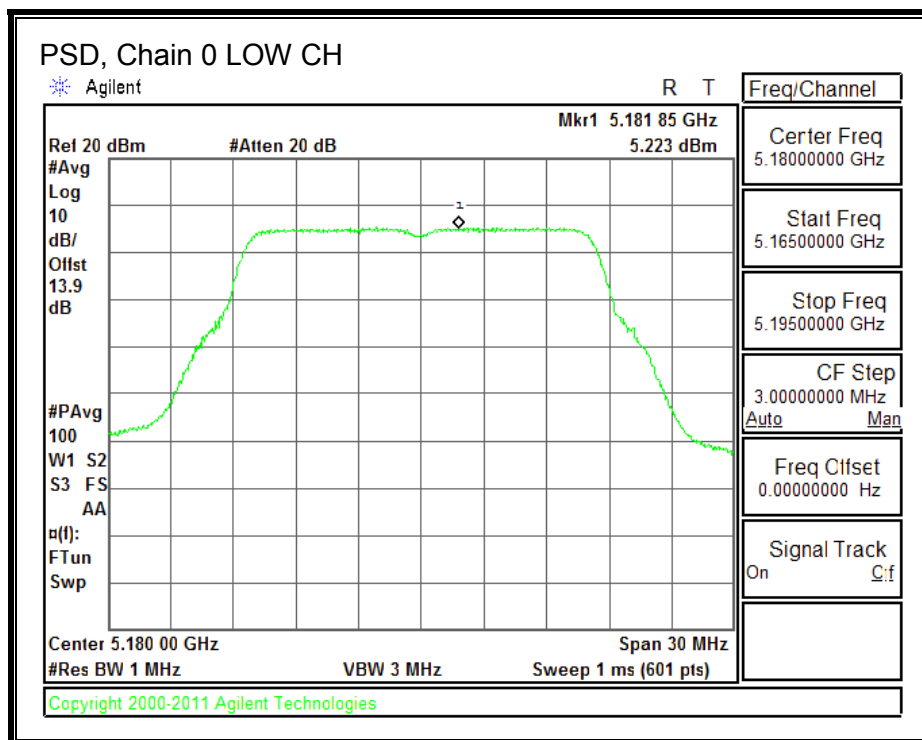
Output Power Results

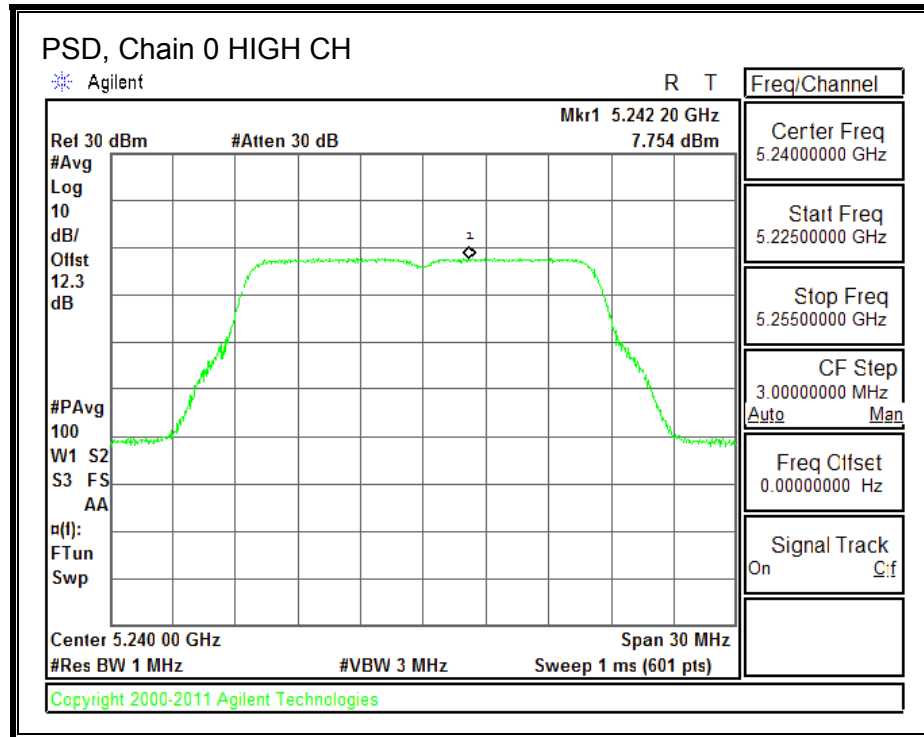
Channel	Frequency (MHz)	Chain 0 Meas Power (dBm)	Total Corr'd Power (dBm)	Power Limit (dBm)	Power Margin (dB)
Low	5180	16.50	16.50	24.00	-7.50
Mid	5200	17.98	17.98	24.00	-6.02
High	5240	17.97	17.97	24.00	-6.03

PSD Results

Channel	Frequency (MHz)	Chain 0 Meas PSD (dBm)	Total Corr'd PSD (dBm)	PSD Limit (dBm)	PSD Margin (dB)
Low	5180	5.22	5.22	11.00	-5.78
Mid	5200	7.59	7.59	11.00	-3.41
High	5240	7.75	7.75	11.00	-3.25

PSD, Chain 0





9.2. 802.11n HT20 2TX CDD MODE IN THE 5.2 GHz BAND

9.2.1. 26 dB BANDWIDTH

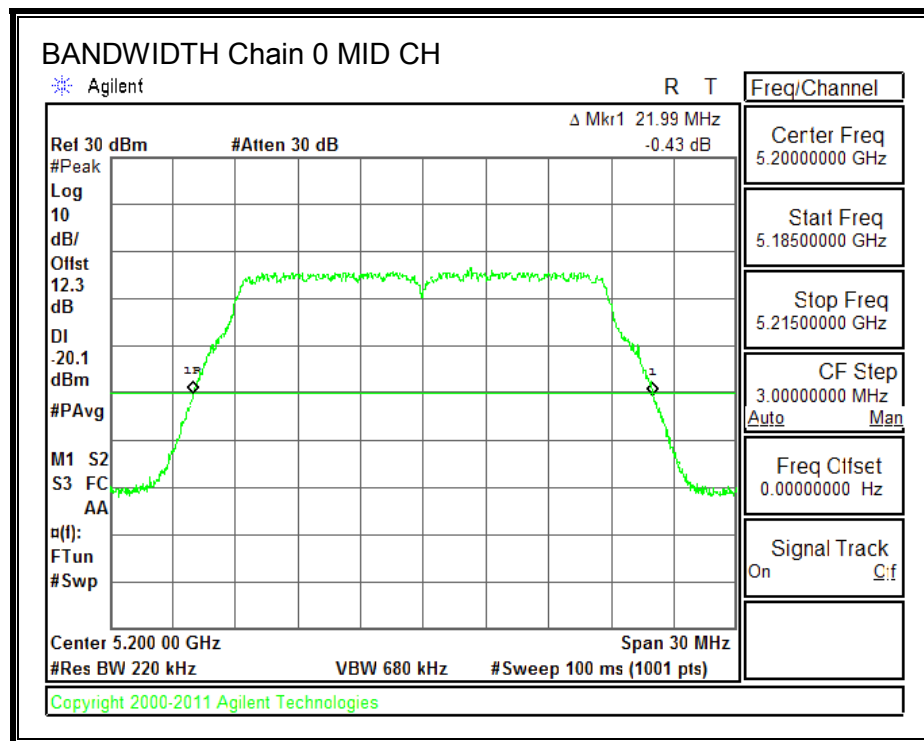
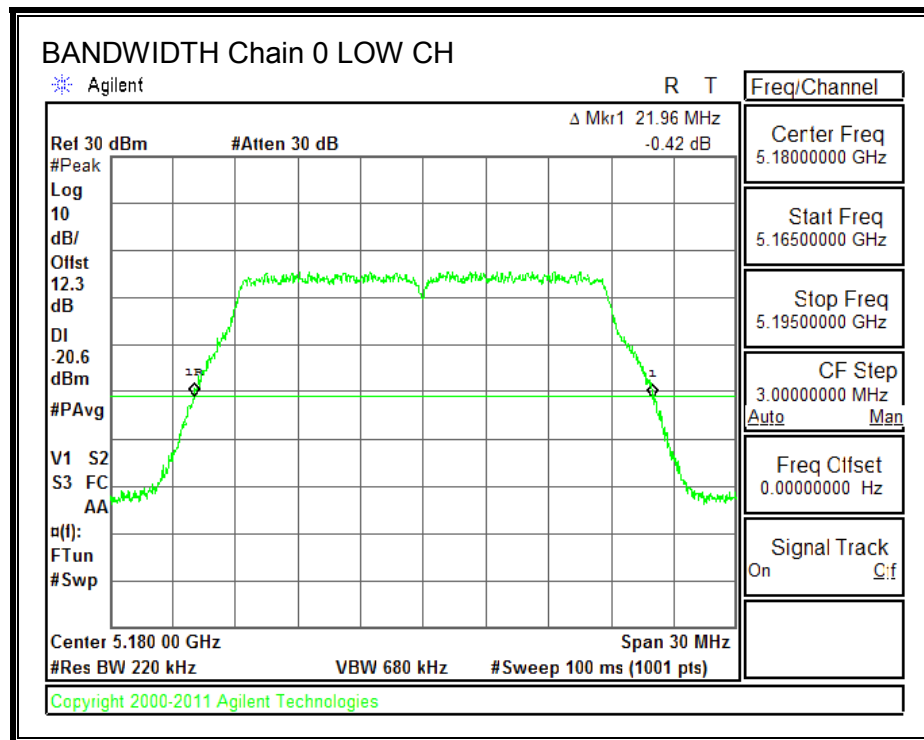
LIMITS

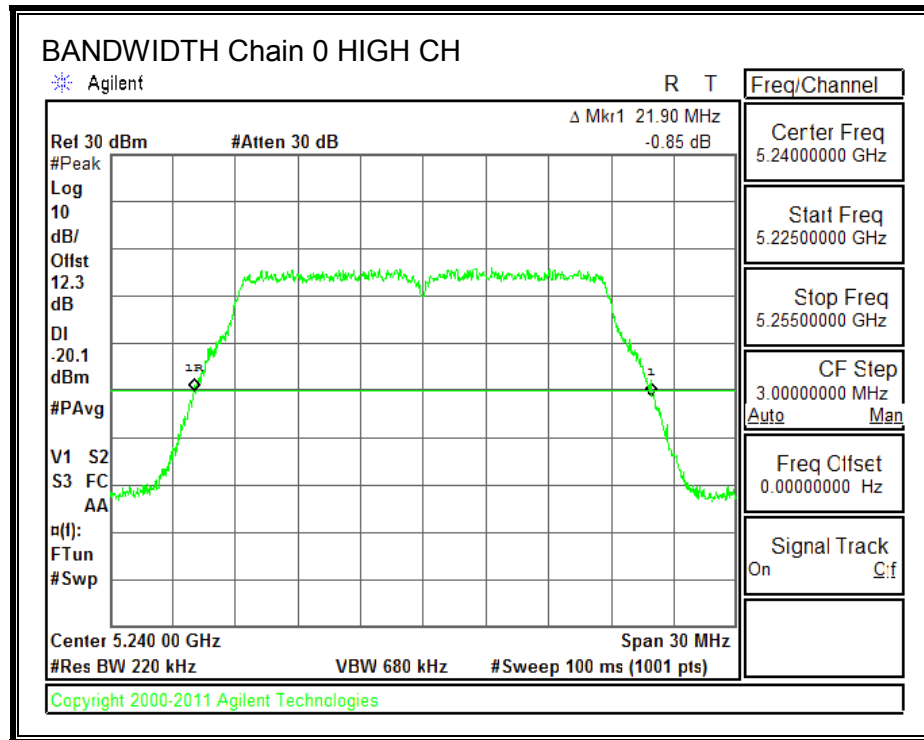
None; for reporting purposes only.

RESULTS

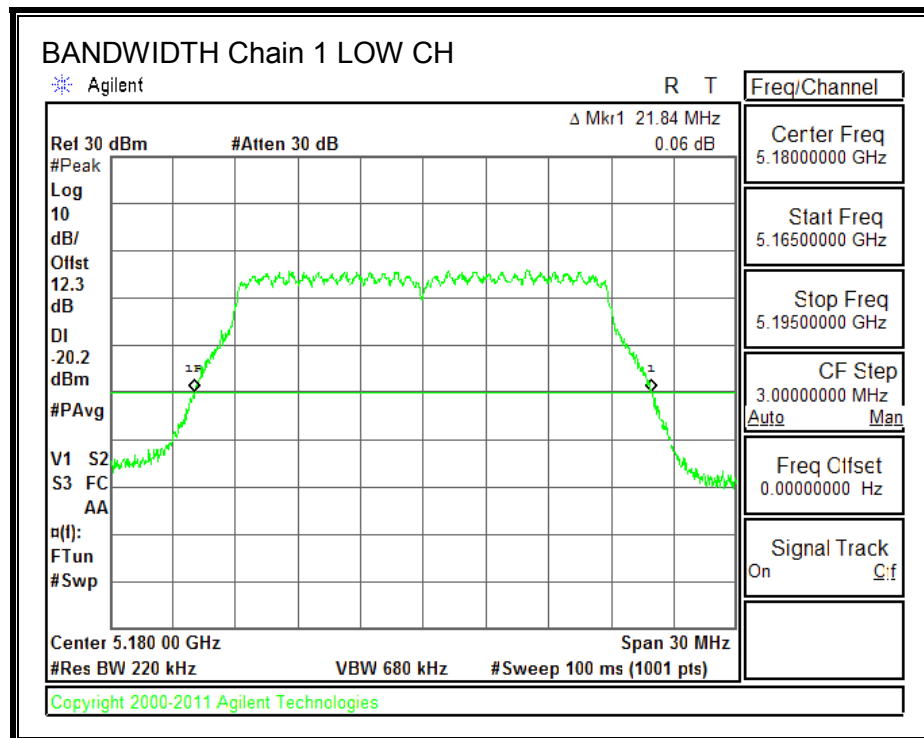
Channel	Frequency (MHz)	26 dB BW Chain 0 (MHz)	26 dB BW Chain 1 (MHz)
Low	5180	21.96	21.84
Mid	5200	21.99	21.81
High	5240	21.90	21.78

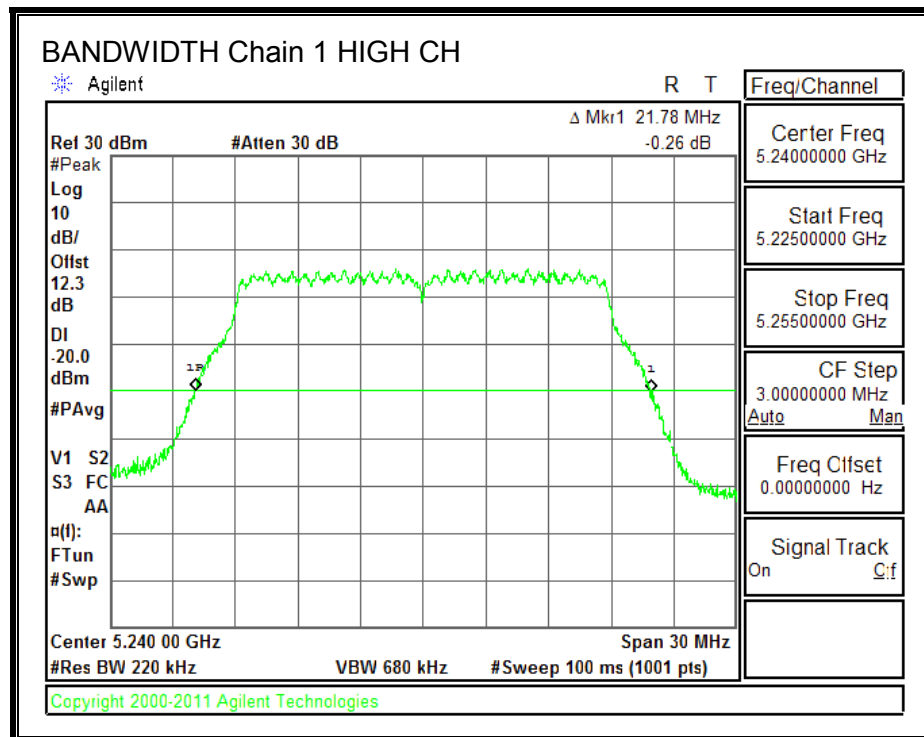
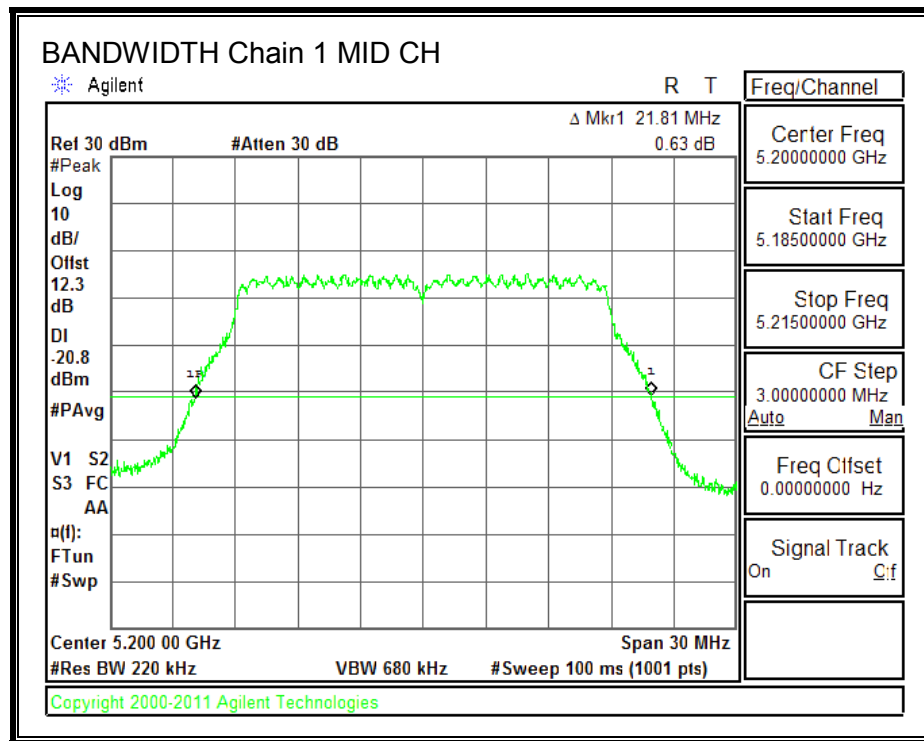
26 dB BANDWIDTH, Chain 0





26 dB BANDWIDTH, Chain 1





9.2.2. 99% BANDWIDTH

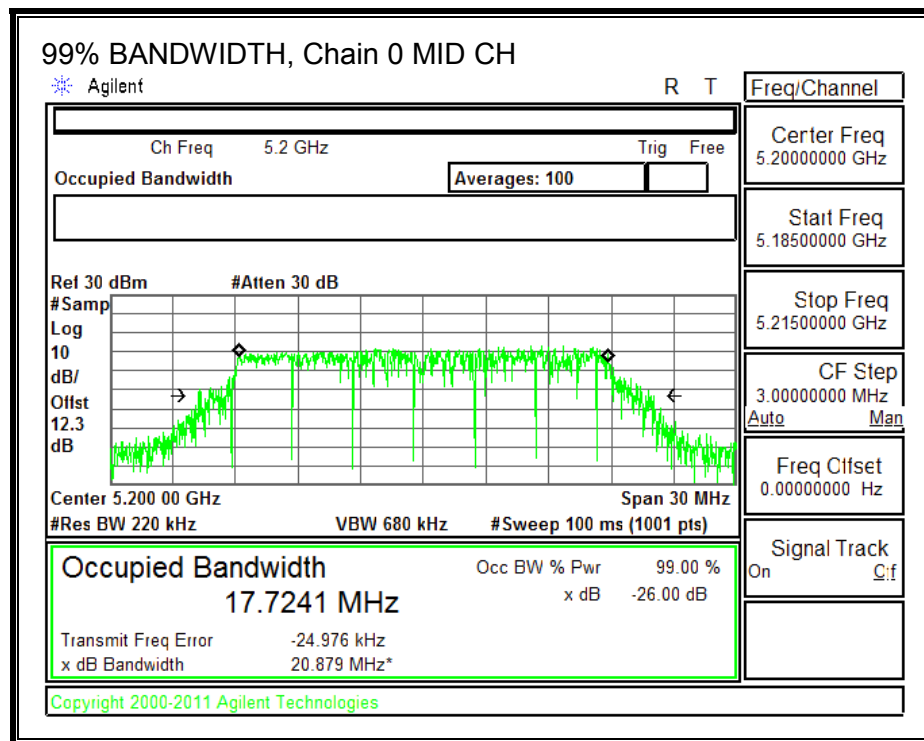
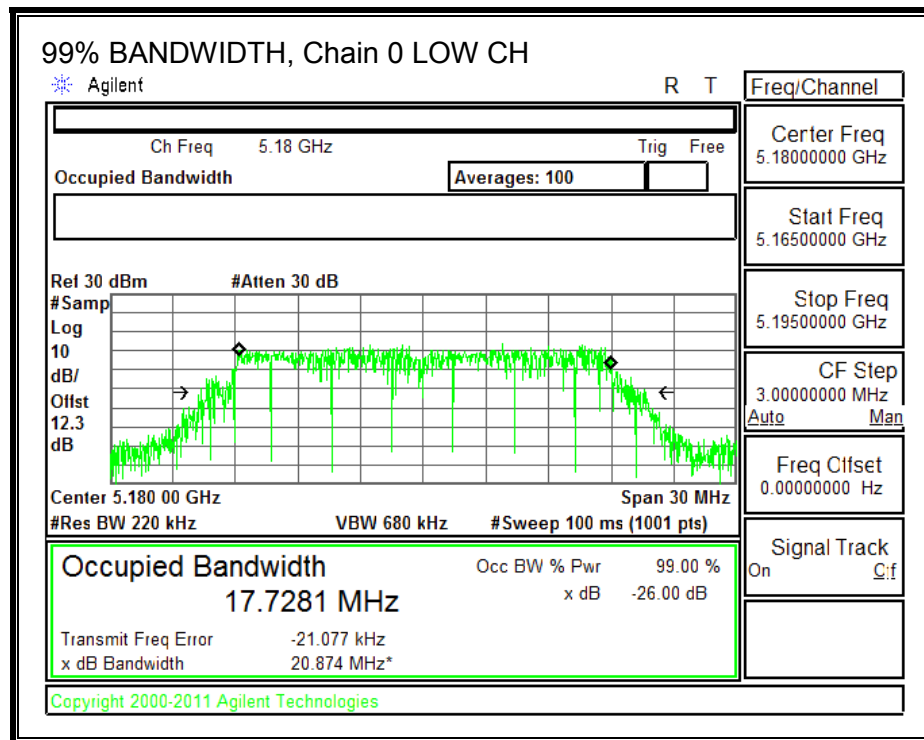
LIMITS

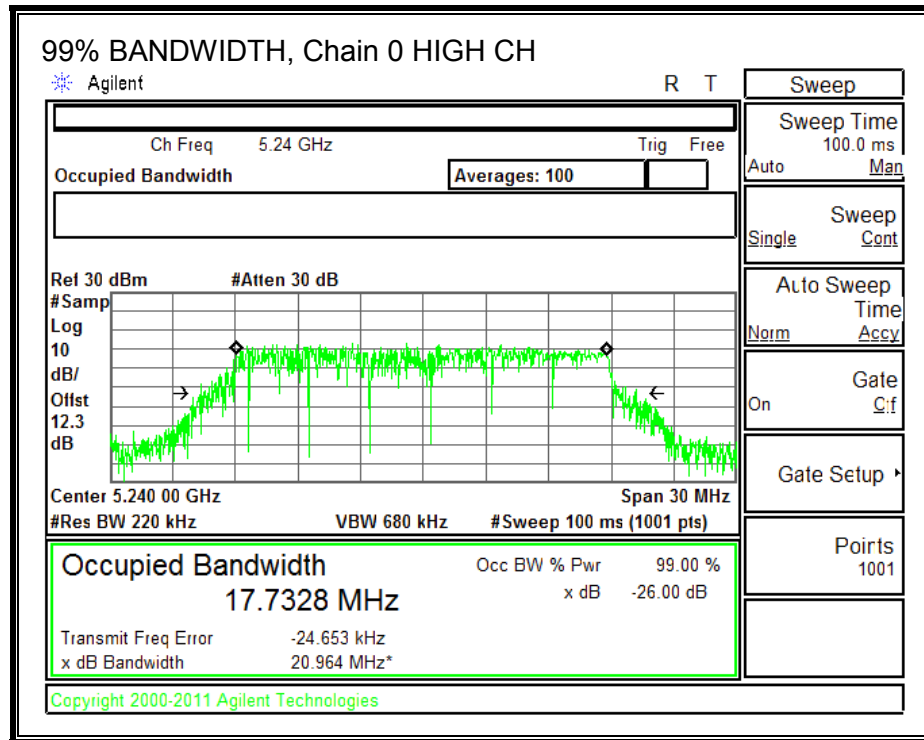
None; for reporting purposes only.

RESULTS

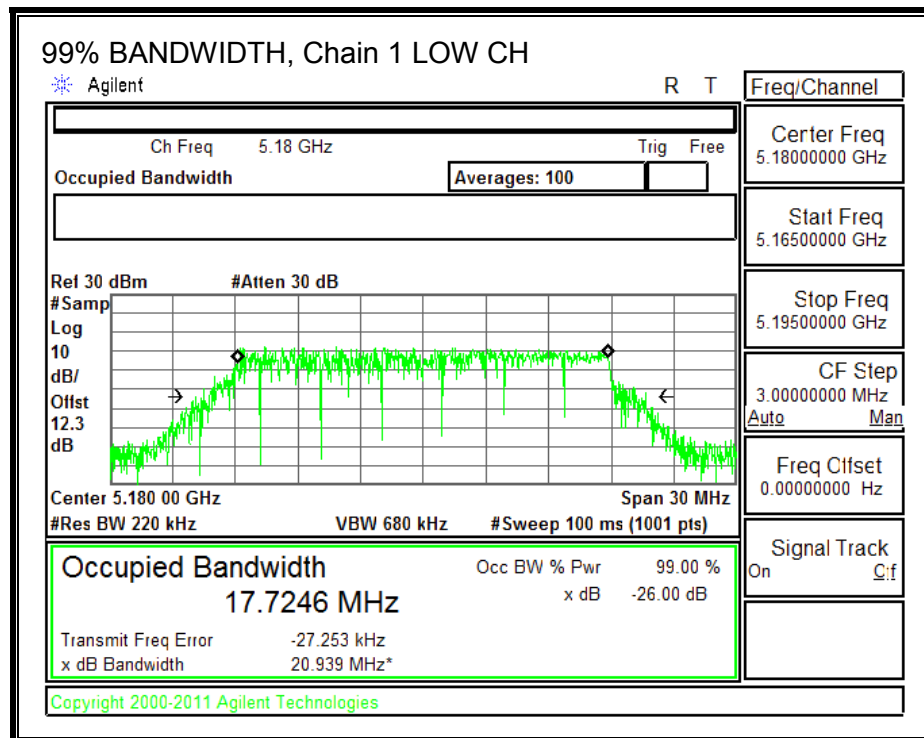
Channel	Frequency (MHz)	99% BW Chain 0 (MHz)	99% BW Chain 1 (MHz)
Low	5180	17.7281	17.7246
Mid	5200	17.7241	17.7269
High	5240	17.7328	17.7332

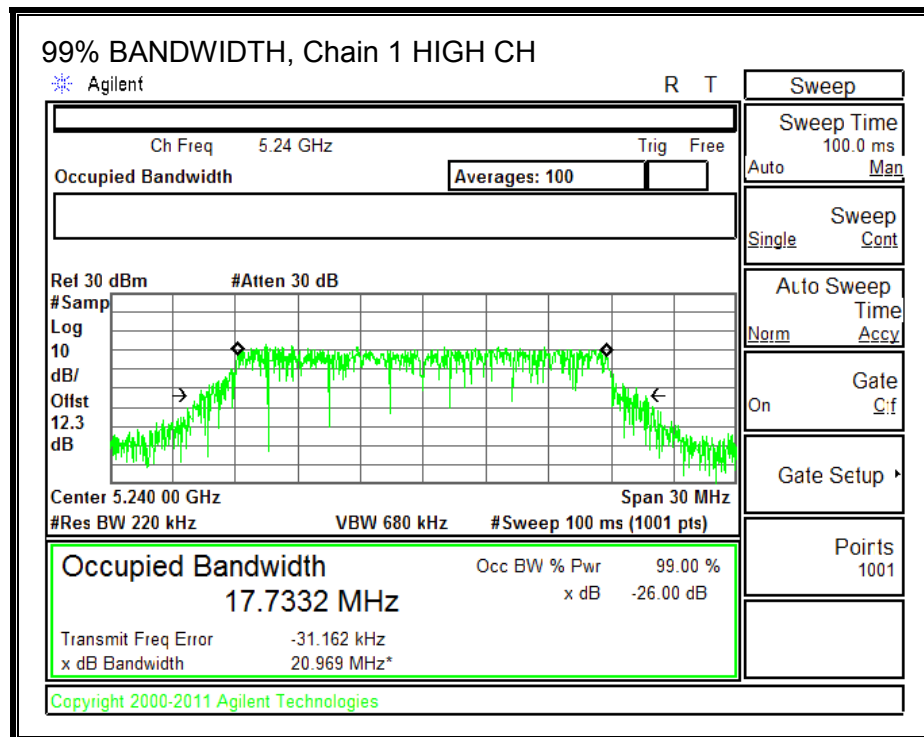
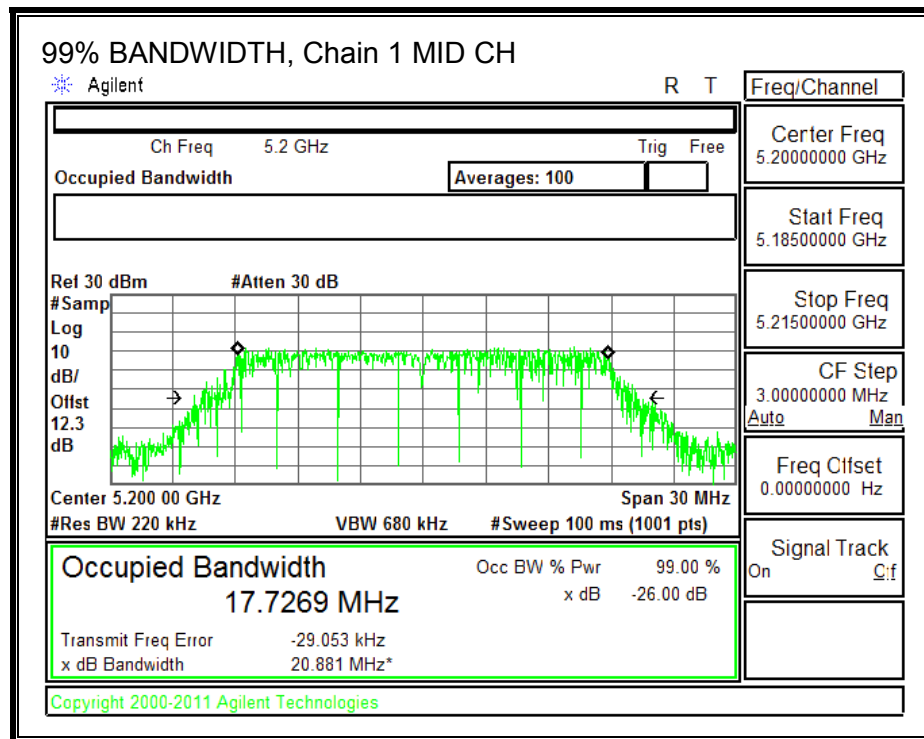
99% BANDWIDTH, Chain 0





99% BANDWIDTH, Chain 1





9.2.3. OUTPUT POWER AND PSD

LIMITS

FCC §15.407 (a) (1)

(iv) For mobile and portable client devices in the 5.15-5.25 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed 250 mW provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

DIRECTIONAL ANTENNA GAIN

The TX chains are uncorrelated and the antenna gain is unequal among the chains. The directional gain is:

Chain 0 Antenna Gain (dBi)	Chain 1 Antenna Gain (dBi)	Uncorrelated Chains Directional Gain (dBi)
3.11	2.90	3.01

The TX chains are correlated and the antenna gain is unequal among the chains. The directional gain is:

Chain 0 Antenna Gain (dBi)	Chain 1 Antenna Gain (dBi)	Correlated Chains Directional Gain (dBi)
3.11	2.90	6.02

RESULTS

Antenna Gain and Limits

Channel	Frequency (MHz)	Directional Gain for Power (dBi)	Directional Gain for PSD (dBi)	Power Limit (dBm)	PSD Limit (dBm)
Low	5180	3.01	6.02	24.00	10.98
Mid	5200	3.01	6.02	24.00	10.98
High	5240	3.01	6.02	24.00	10.98

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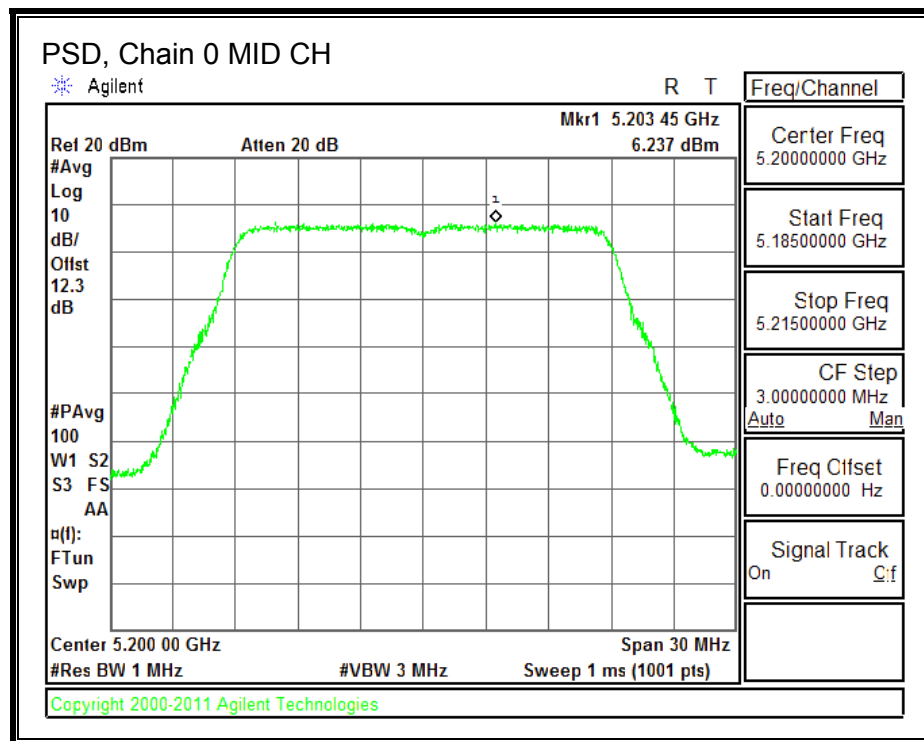
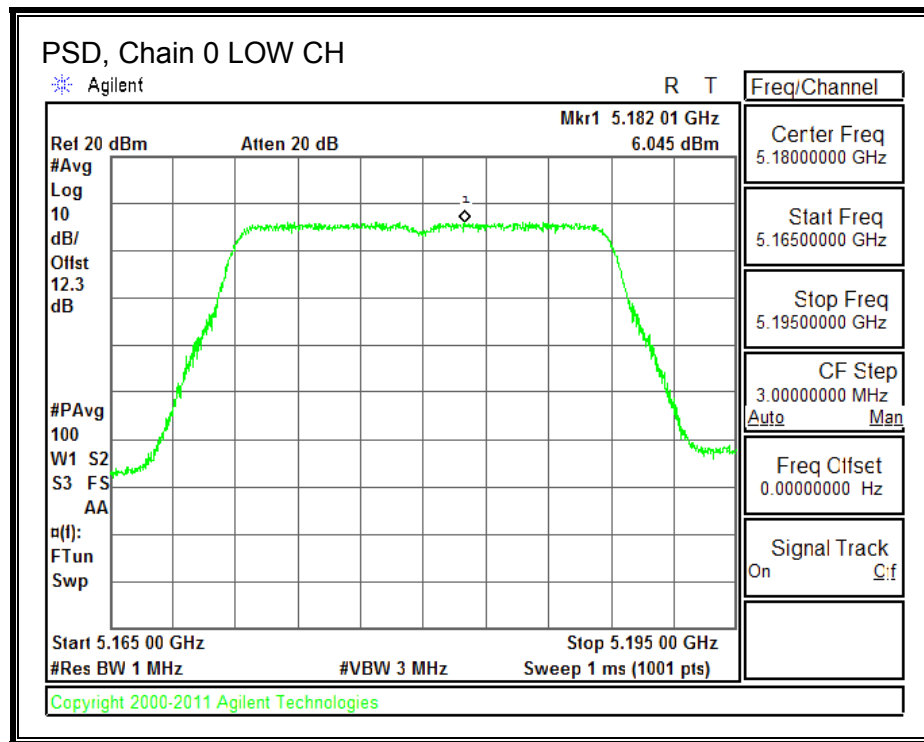
Output Power Results

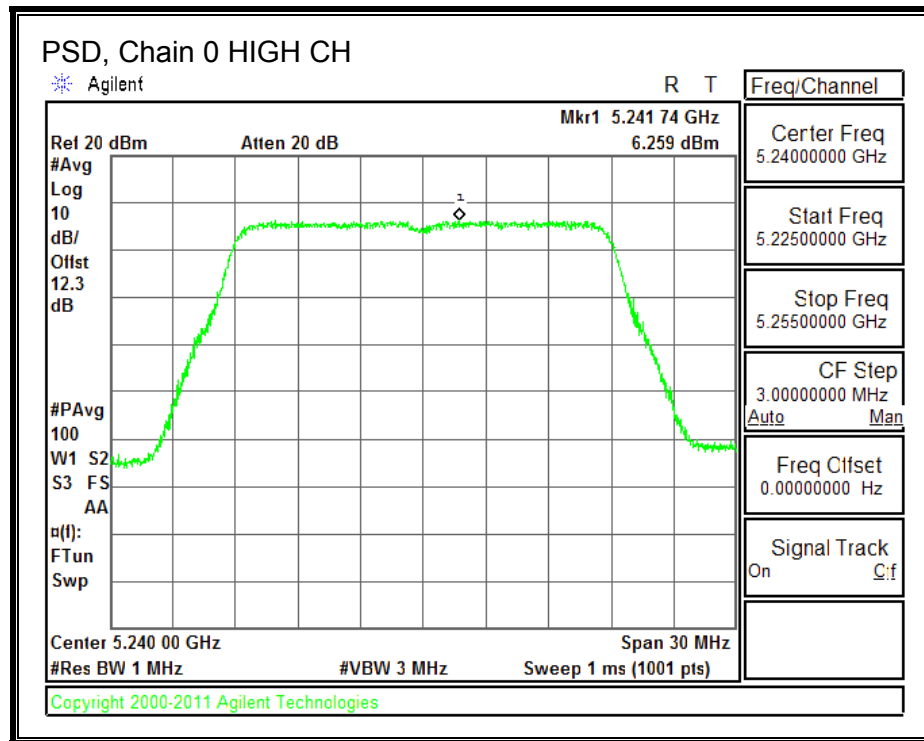
Channel	Frequency (MHz)	Chain 0 Meas Power (dBm)	Chain 1 Meas Power (dBm)	Total Corr'd Power (dBm)	Power Limit (dBm)	Power Margin (dB)
Low	5180	15.97	15.92	18.96	24.00	-5.04
Mid	5200	15.95	15.88	18.93	24.00	-5.07
High	5240	15.99	15.89	18.95	24.00	-5.05

PSD Results

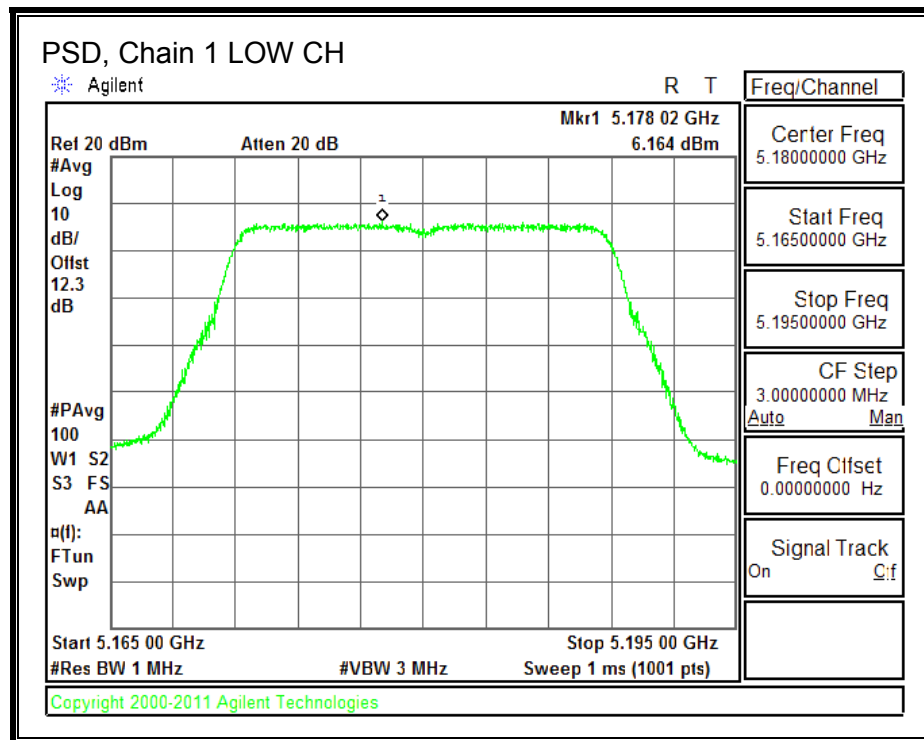
Channel	Frequency (MHz)	Chain 0 Meas PSD (dBm)	Chain 1 Meas PSD (dBm)	Total Corr'd PSD (dBm)	PSD Limit (dBm)	PSD Margin (dB)
Low	5180	6.05	6.16	9.12	10.98	-1.86
Mid	5200	6.24	5.96	9.11	10.98	-1.87
High	5240	6.26	6.05	9.16	10.98	-1.82

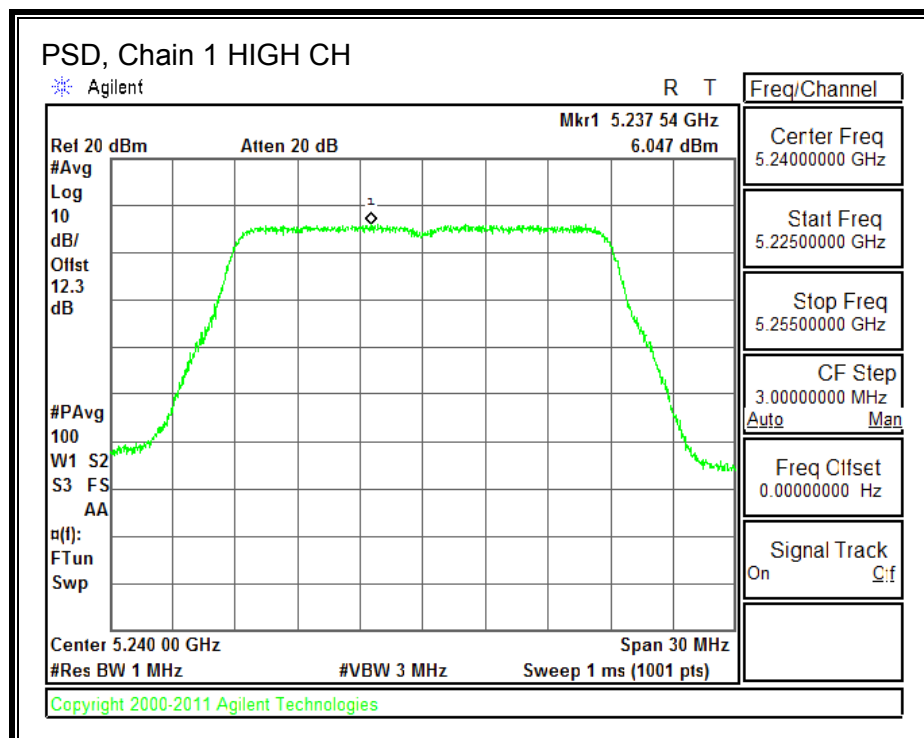
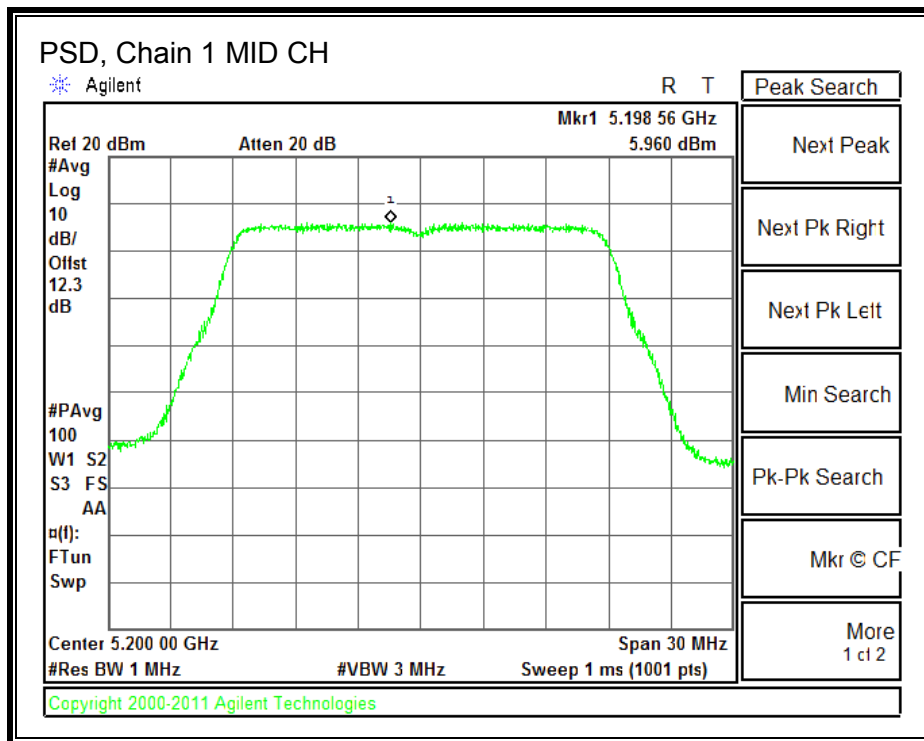
PSD, Chain 0





PSD, Chain 1





9.3. 802.11n HT20 2TX STBC MODE IN THE 5.2 GHz BAND

9.3.1. 26 dB BANDWIDTH

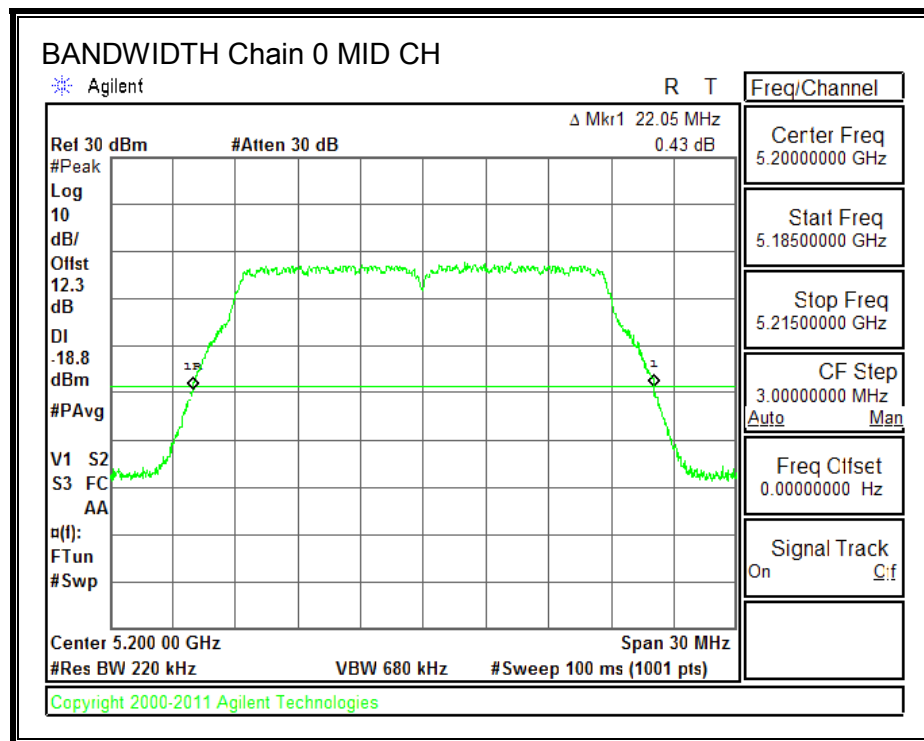
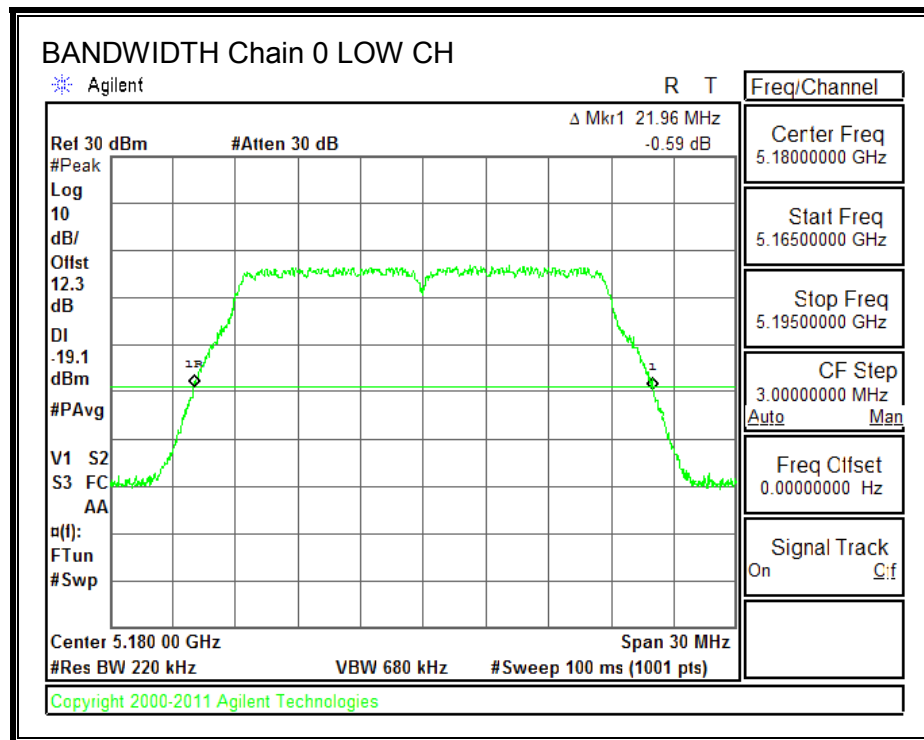
LIMITS

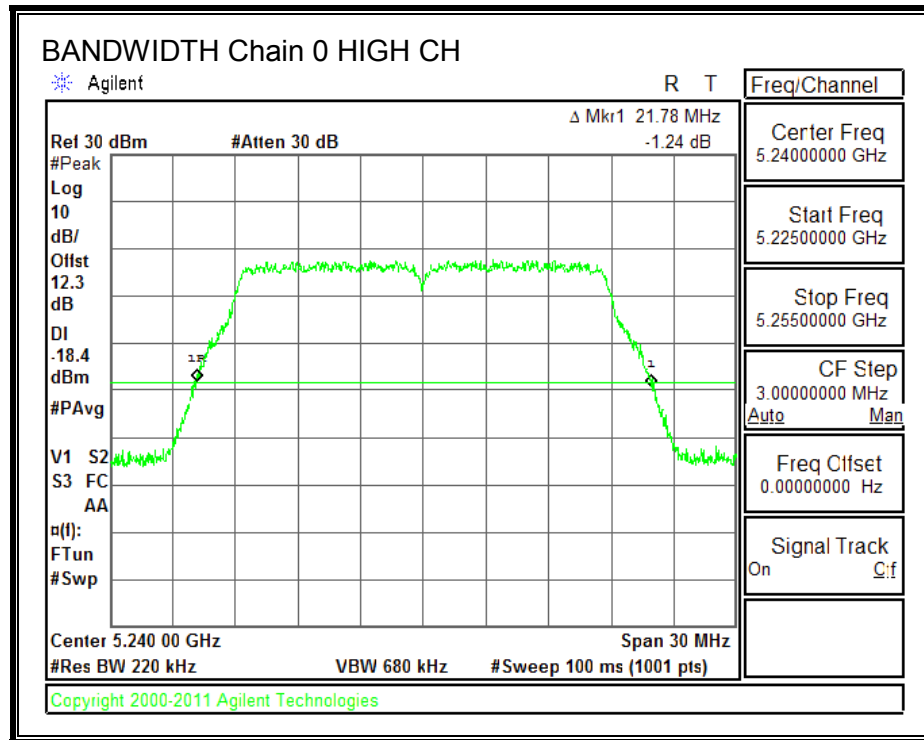
None; for reporting purposes only.

RESULTS

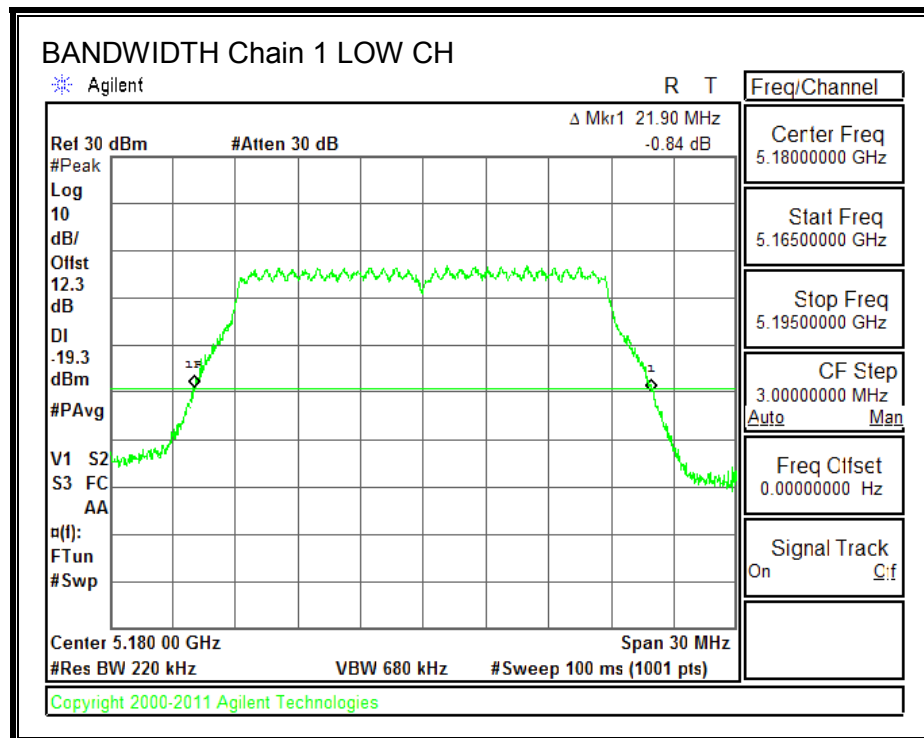
Channel	Frequency (MHz)	26 dB BW Chain 0 (MHz)	26 dB BW Chain 1 (MHz)
Low	5180	21.96	21.90
Mid	5200	22.05	21.72
High	5240	21.78	21.78

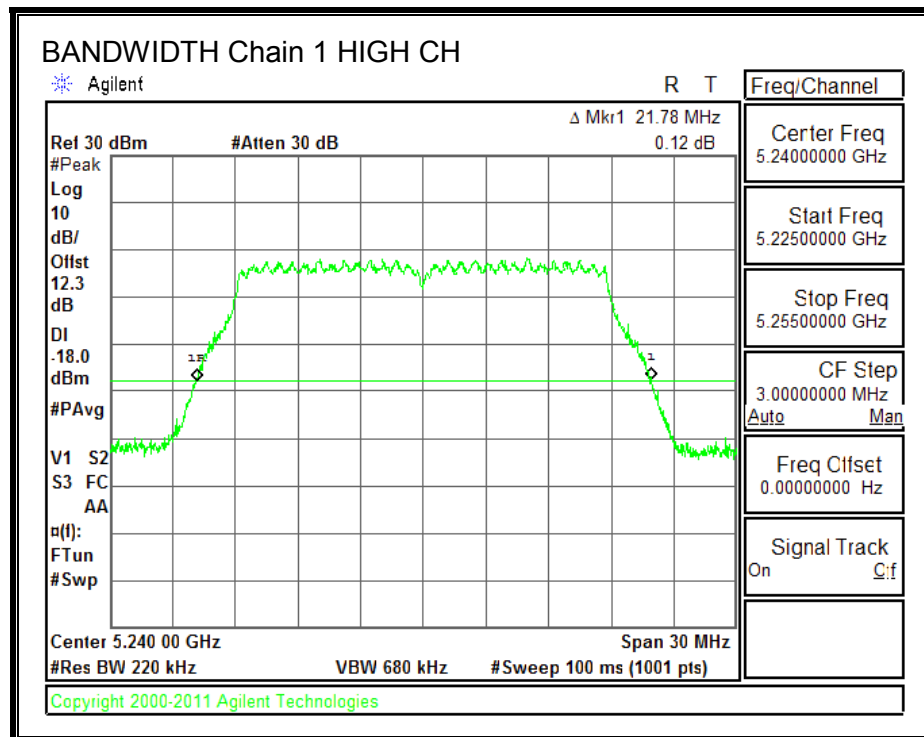
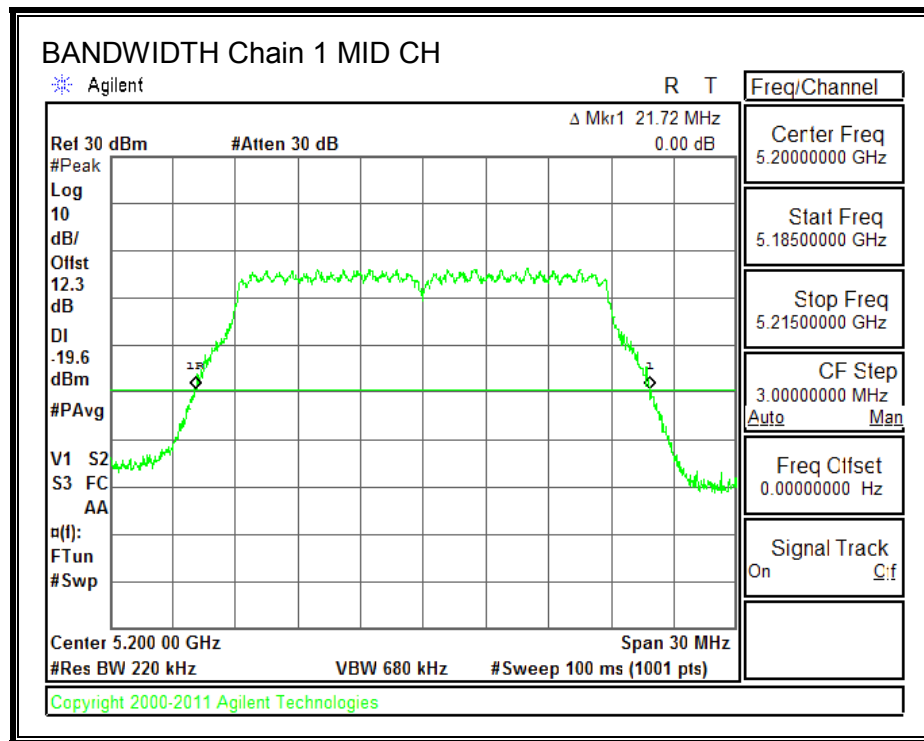
26 dB BANDWIDTH, Chain 0





26 dB BANDWIDTH, Chain 1





9.3.2. 99% BANDWIDTH

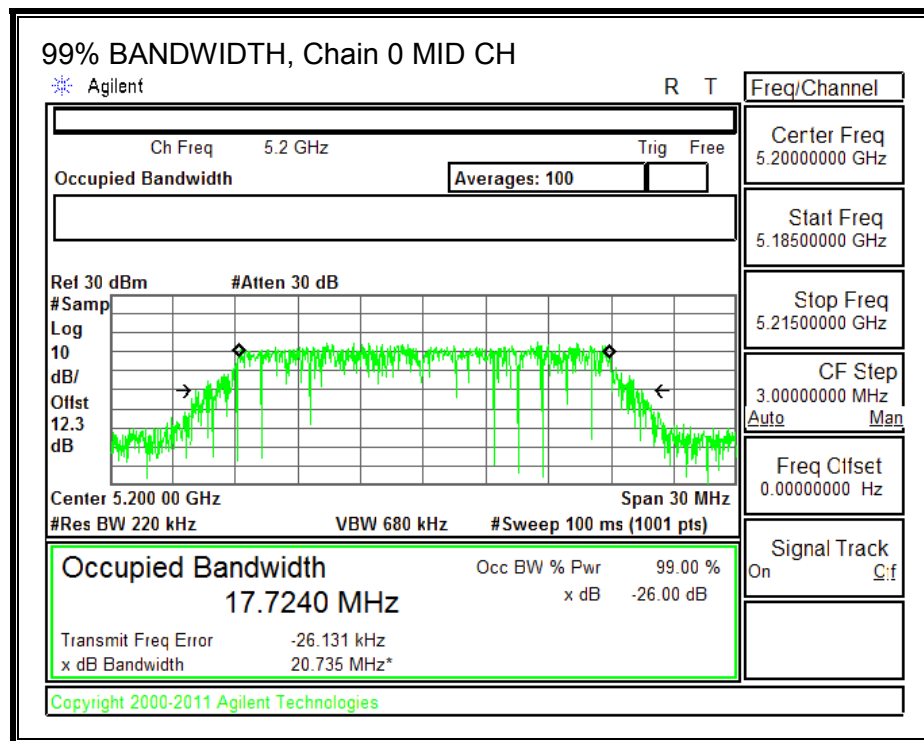
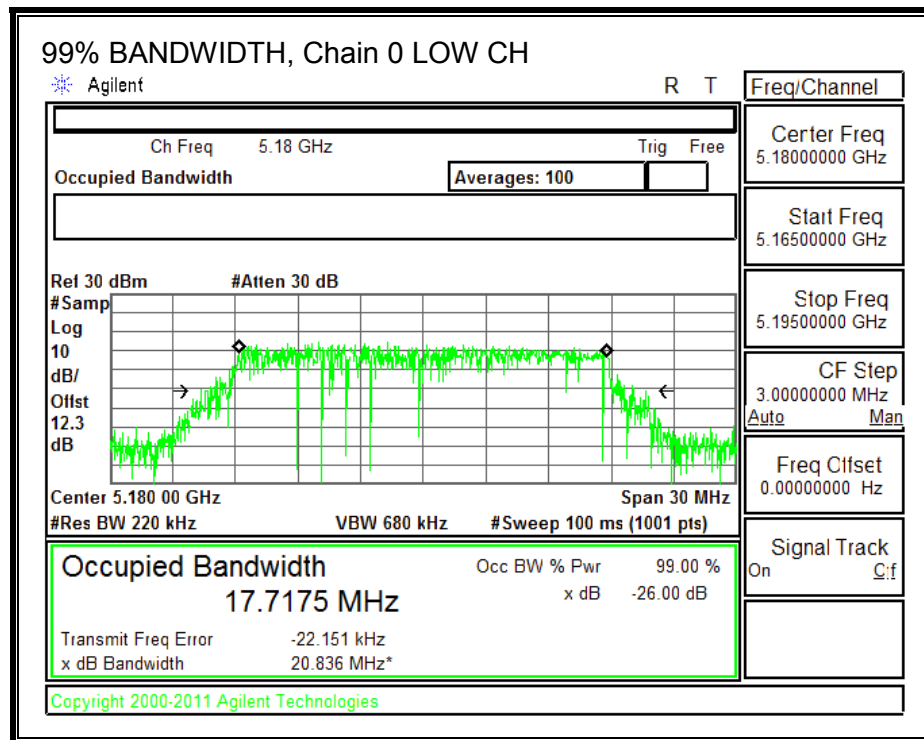
LIMITS

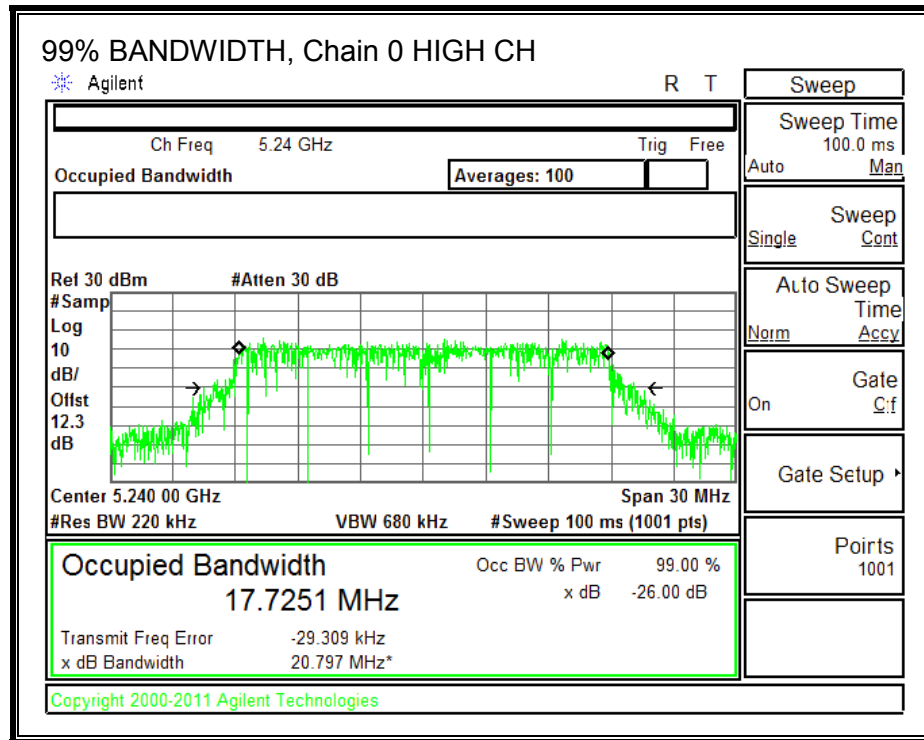
None; for reporting purposes only.

RESULTS

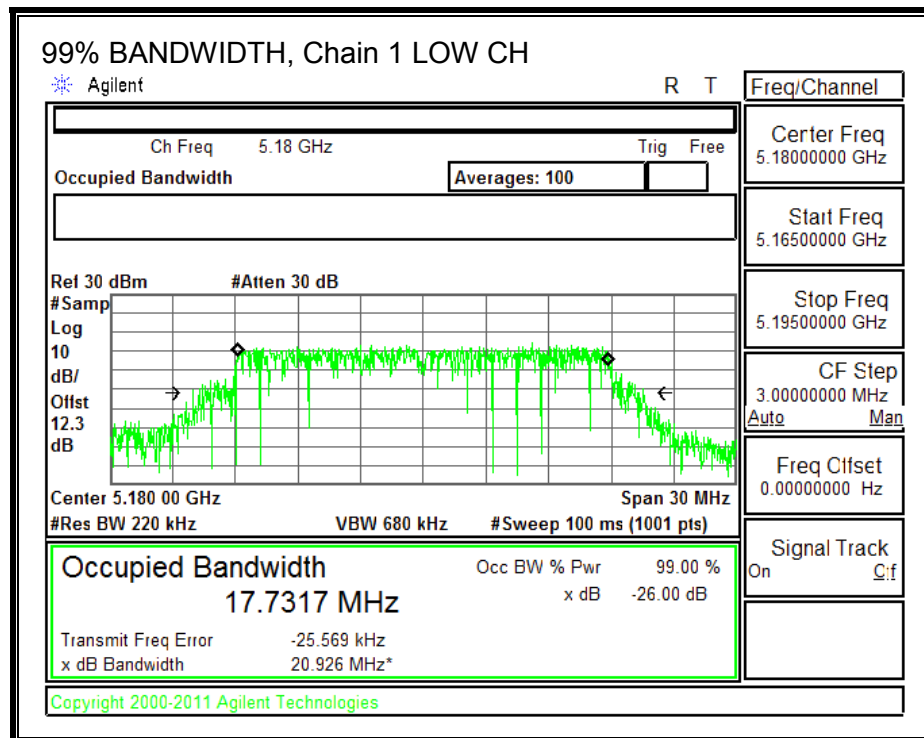
Channel	Frequency (MHz)	99% BW Chain 0 (MHz)	99% BW Chain 1 (MHz)
Low	5180	17.7175	17.7317
Mid	5200	17.7240	17.7225
High	5240	17.7251	17.7251

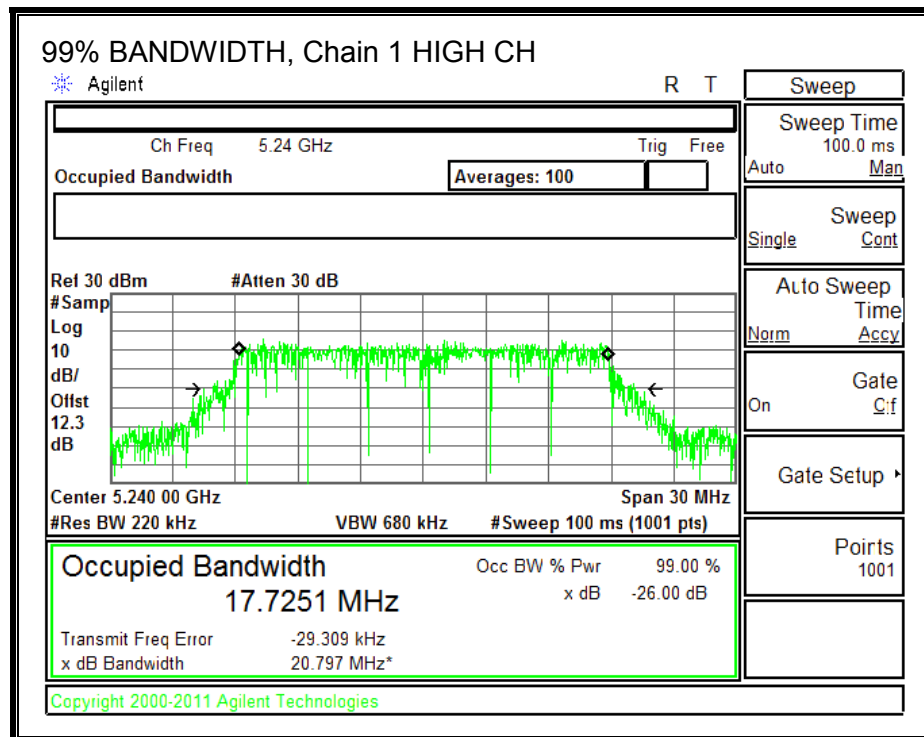
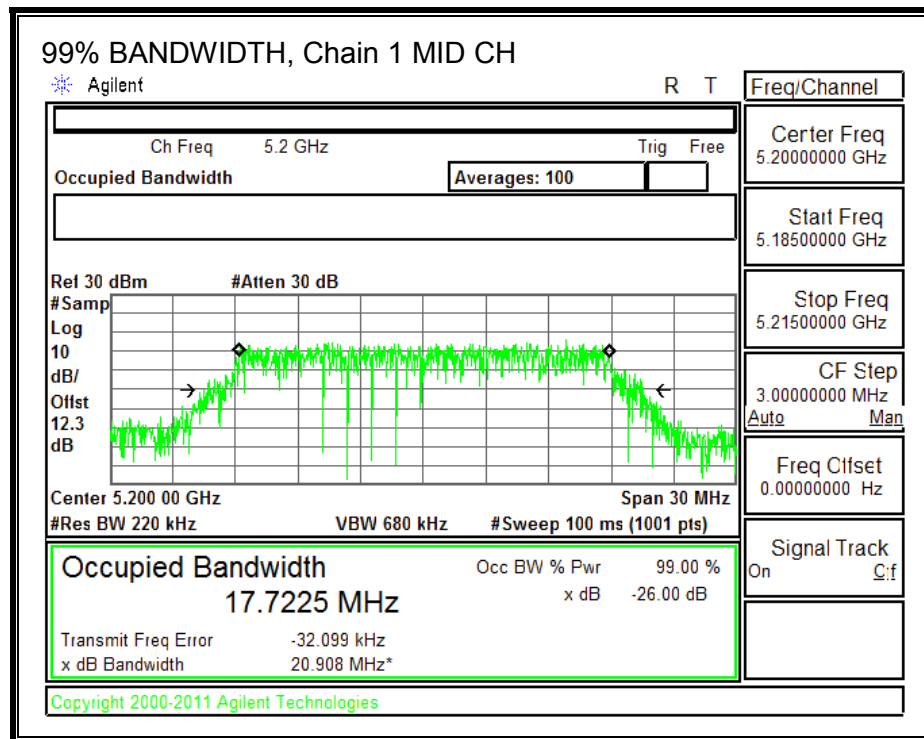
99% BANDWIDTH, Chain 0





99% BANDWIDTH, Chain 1





9.3.3. OUTPUT POWER AND PSD

LIMITS

FCC §15.407 (a) (1)

(iv) For mobile and portable client devices in the 5.15-5.25 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed 250 mW provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

DIRECTIONAL ANTENNA GAIN

The TX chains are uncorrelated and the antenna gain is unequal among the chains. The directional gain is:

Chain 0 Antenna Gain (dBi)	Chain 1 Antenna Gain (dBi)	Uncorrelated Chains Directional Gain (dBi)
3.11	2.90	3.01

RESULTS

Antenna Gain and Limits

Channel	Frequency (MHz)	Directional Gain for Power (dBi)	Directional Gain for PSD (dBi)	Power Limit (dBm)	PSD Limit (dBm)
Low	5180	3.01	3.01	24.00	11.00
Mid	5200	3.01	3.01	24.00	11.00
High	5240	3.01	3.01	24.00	11.00

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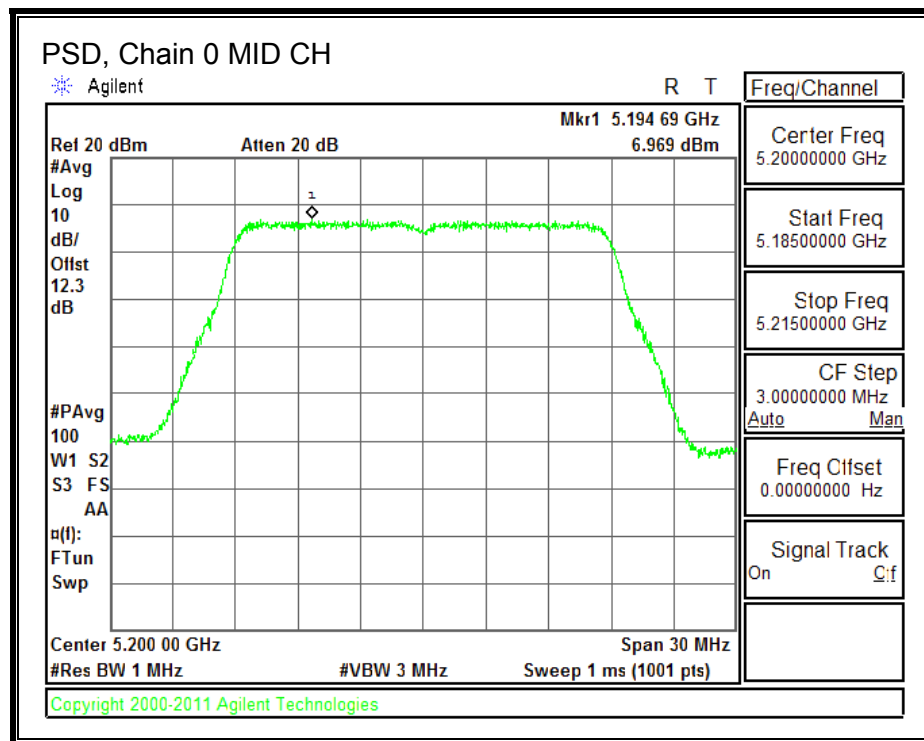
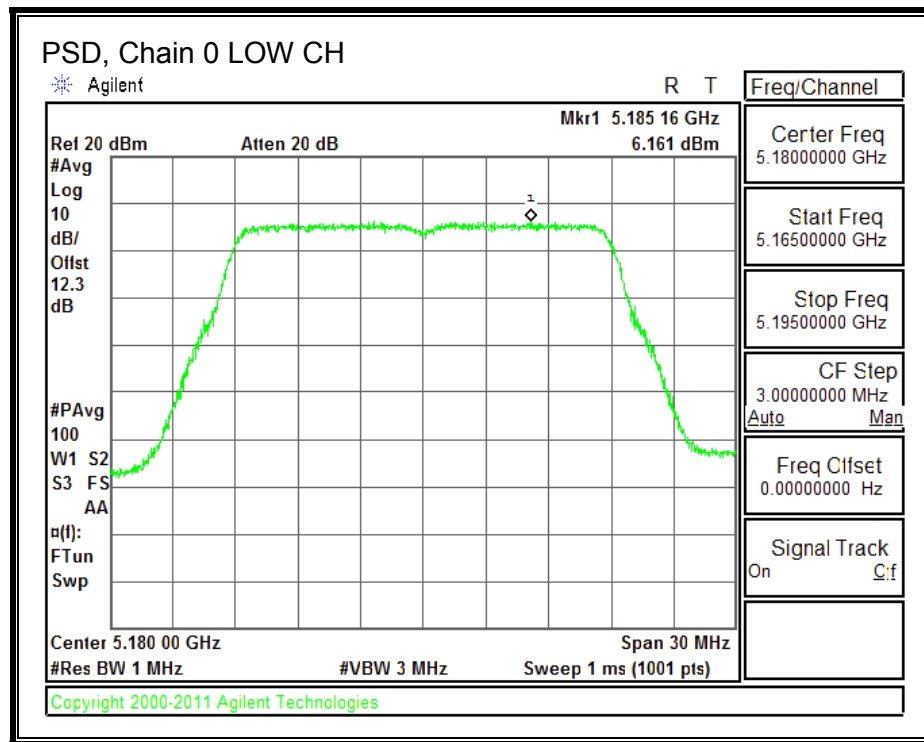
Output Power Results

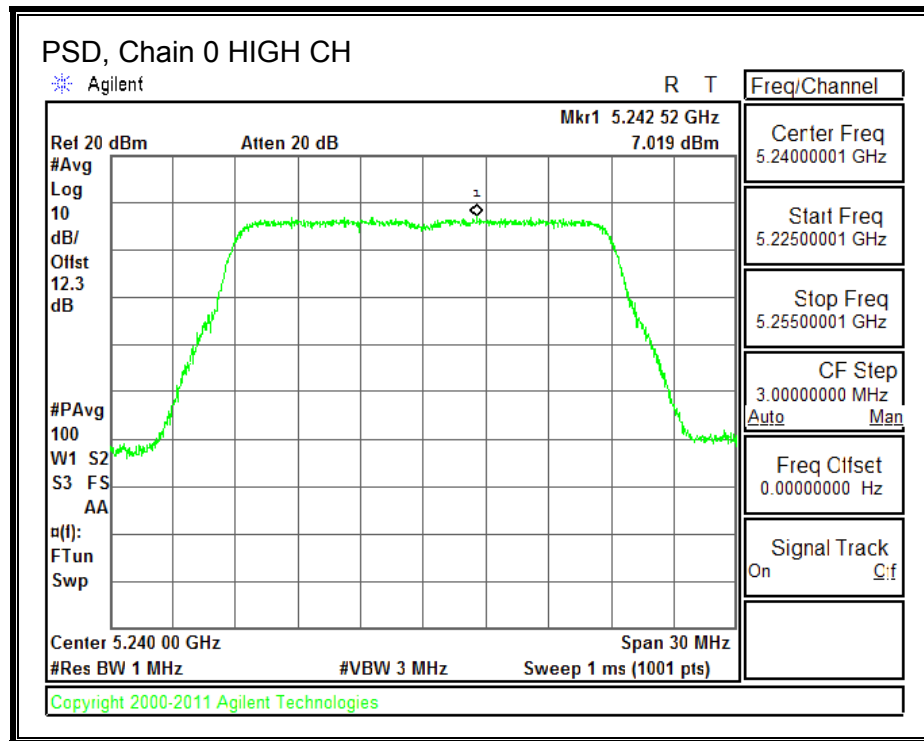
Channel	Frequency (MHz)	Chain 0 Meas Power (dBm)	Chain 1 Meas Power (dBm)	Total Corr'd Power (dBm)	Power Limit (dBm)	Power Margin (dB)
Low	5180	15.94	15.96	18.96	24.00	-5.04
Mid	5200	16.94	16.96	19.96	24.00	-4.04
High	5240	16.99	16.98	20.00	24.00	-4.00

PSD Results

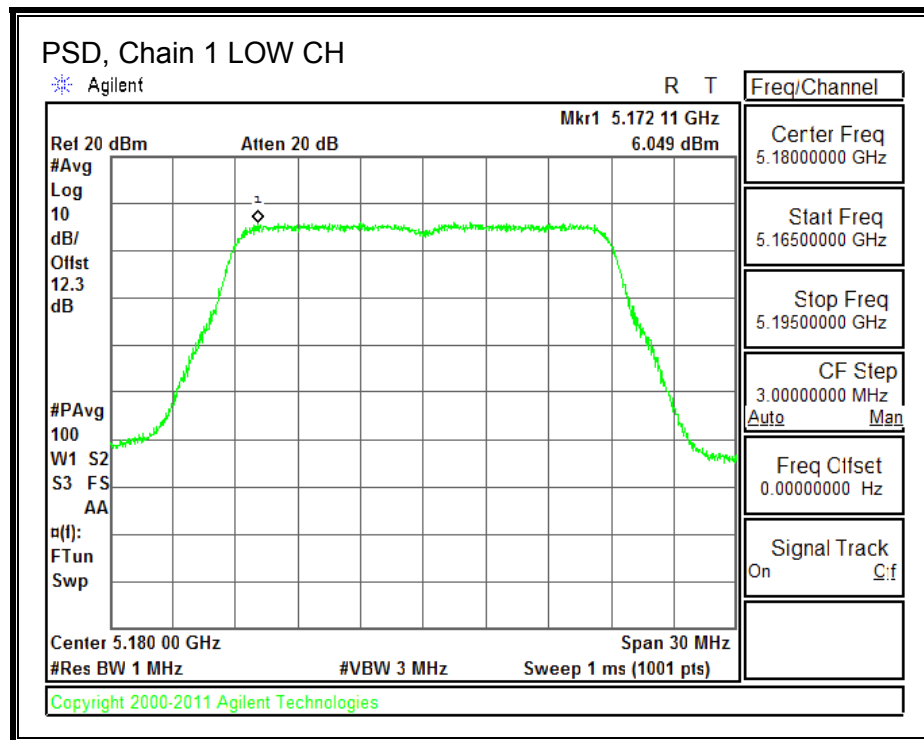
Channel	Frequency (MHz)	Chain 0 Meas PSD (dBm)	Chain 1 Meas PSD (dBm)	Total Corr'd PSD (dBm)	PSD Limit (dBm)	PSD Margin (dB)
Low	5180	6.16	6.05	9.12	11.00	-1.88
Mid	5200	6.97	6.88	9.93	11.00	-1.07
High	5240	7.02	6.65	9.85	11.00	-1.15

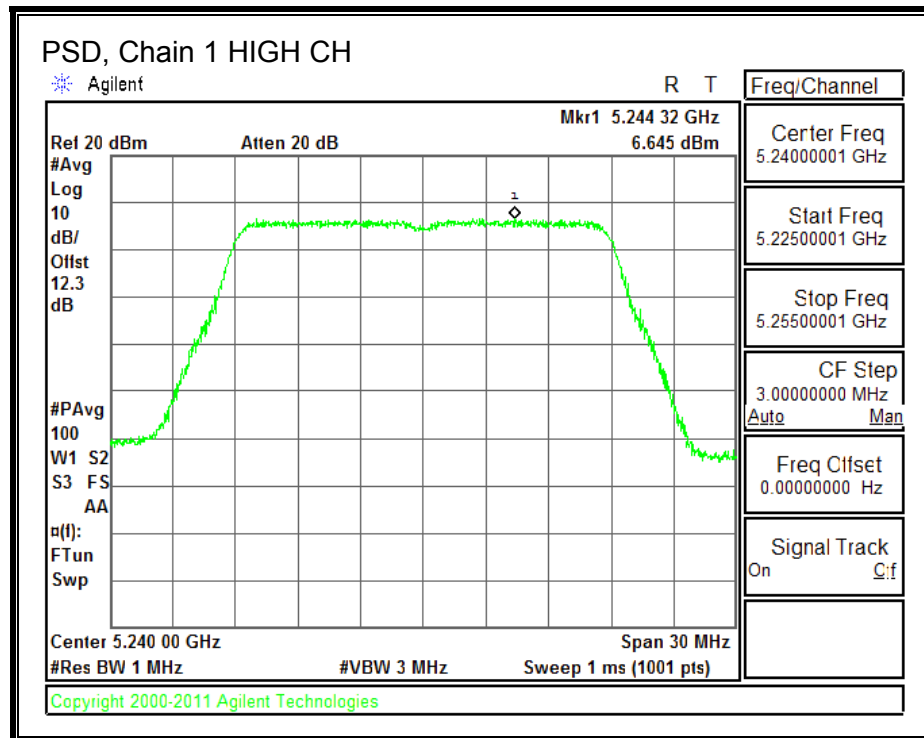
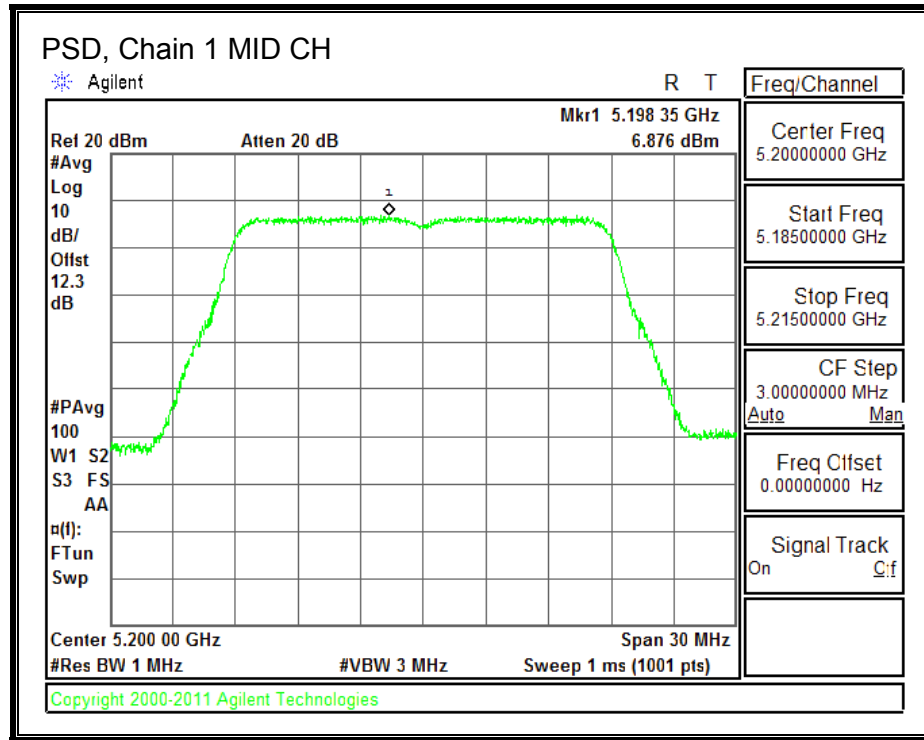
PSD, Chain 0





PSD, Chain 1





9.4. 802.11ac VHT20 2TX BF IN THE 5.2 GHz BAND

Refer to Section 9.2, 802.11n HT20 2TX CDD mode in the 5.2 GHz Band.

The power per chain used for 802.11n HT20 2TX CDD IN THE 5.2 GHz mode is the same power per chain that will be for 802.11n HT20 2TX BF IN THE 5.2 GHz mode. However, since BF is correlated and CDD is uncorrelated for output power, the section below for output power using correlated antenna gain for this mode shows it is still compliant.

9.4.1. OUTPUT POWER AND PSD

LIMITS

FCC §15.407 (a) (1)

(iv) For mobile and portable client devices in the 5.15-5.25 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed 250 mW provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

DIRECTIONAL ANTENNA GAIN

The TX chains are correlated and the antenna gain is unequal among the chains. The directional gain is:

Chain 0 Antenna Gain (dBi)	Chain 1 Antenna Gain (dBi)	Correlated Chains Directional Gain (dBi)
3.11	2.90	6.02

RESULTS

Antenna Gain and Limits

Channel	Frequency (MHz)	Directional Gain for Power (dBi)	Power Limit (dBm)
Low	5180	6.02	23.98
Mid	5200	6.02	23.98
High	5240	6.02	23.98

Duty Cycle CF (dB)	0.12	Included in Calculations of Corr'd Power
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Output Power Results

Channel	Frequency (MHz)	Chain 0 Meas Power (dBm)	Chain 1 Meas Power (dBm)	Total Corr'd Power (dBm)	Power Limit (dBm)	Power Margin (dB)
Low	5180	15.97	15.92	19.08	23.98	-4.90
Mid	5200	15.95	15.88	19.05	23.98	-4.93
High	5240	15.99	15.89	19.07	23.98	-4.91

9.5. 802.11n HT40 1TX MODE IN THE 5.2 GHz BAND

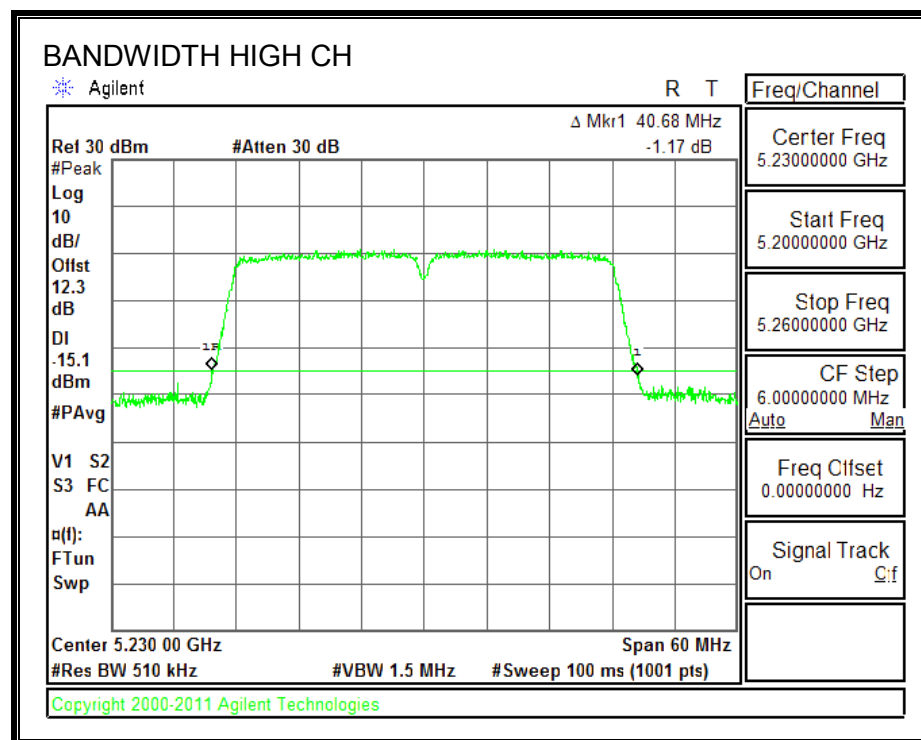
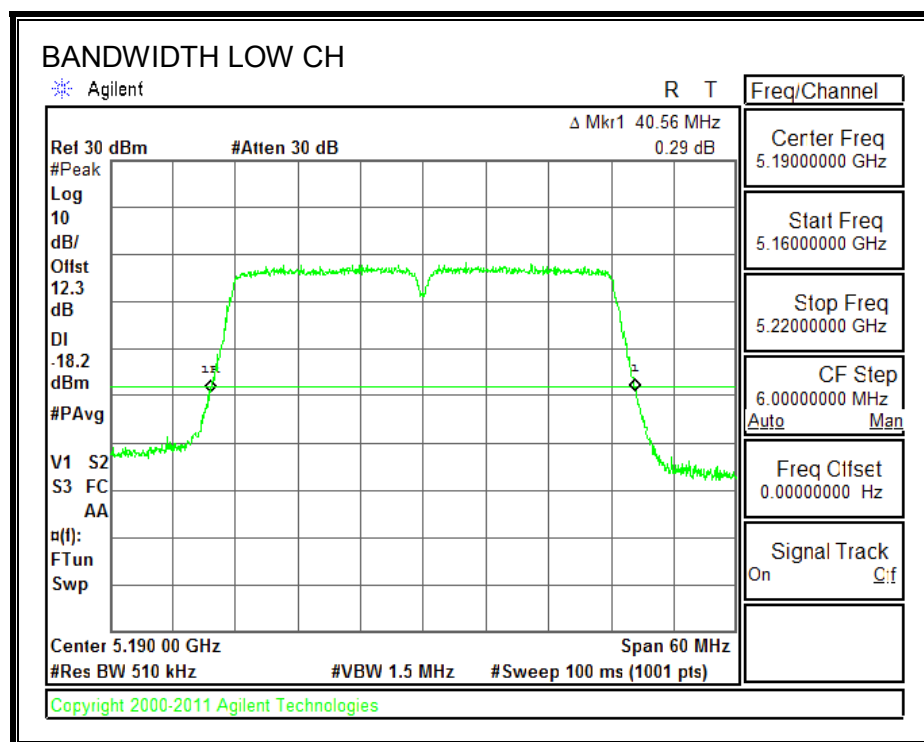
9.5.1. 26 dB BANDWIDTH

LIMITS

None; for reporting purposes only.

RESULTS

Channel	Frequency (MHz)	26 dB Bandwidth (MHz)
Low	5190	40.56
High	5230	40.68



9.5.2. 99% BANDWIDTH

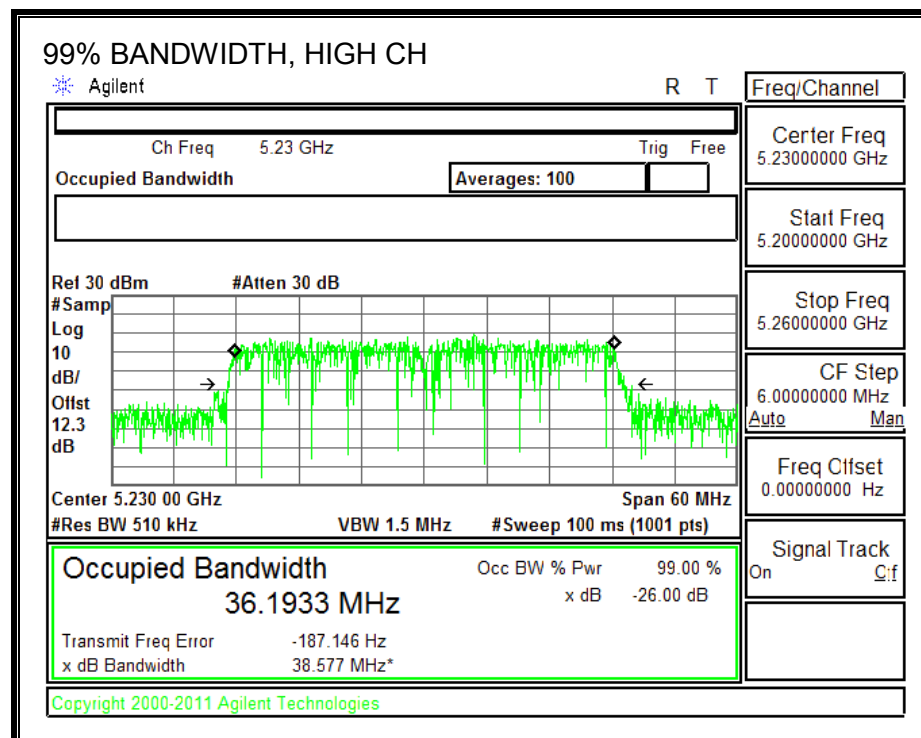
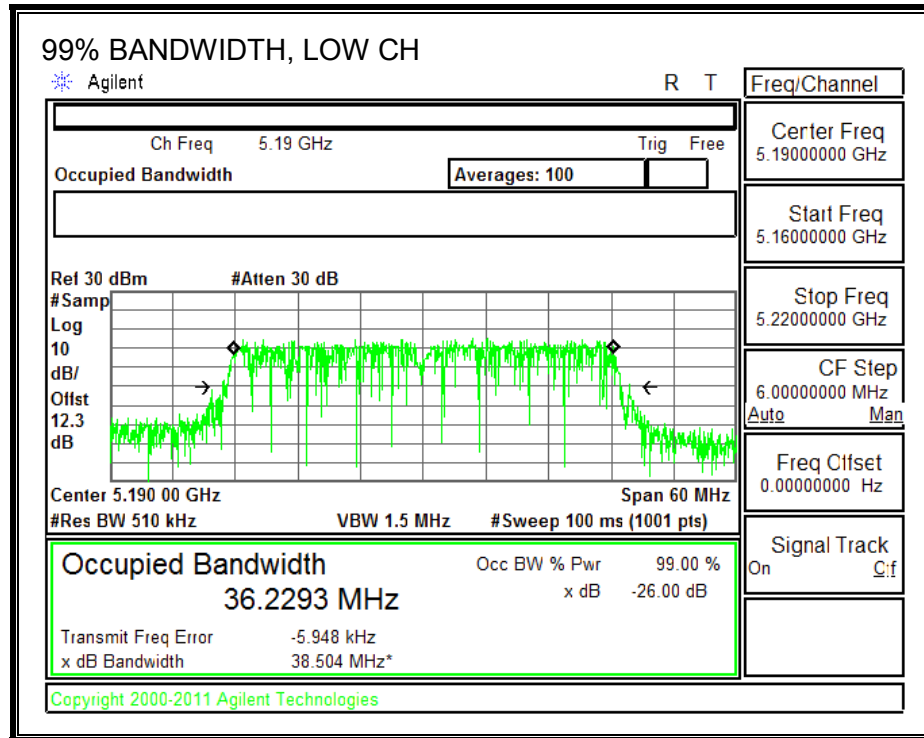
LIMITS

None; for reporting purposes only.

RESULTS

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	5190	36.2293
High	5230	36.1933

99% BANDWIDTH



9.5.3. OUTPUT POWER AND PSD

LIMITS

FCC §15.407 (a) (1)

(iv) For mobile and portable client devices in the 5.15-5.25 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed 250 mW provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

DIRECTIONAL ANTENNA GAIN

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

ANTENNA 0

Antenna Gain (dBi)
3.11

ANTENNA 1

Antenna Gain (dBi)
2.90

RESULTS

Antenna Gain and Limits

Channel	Frequency (MHz)	Directional Gain for Power (dBi)	Directional Gain for PSD (dBi)	Power Limit (dBm)	PSD Limit (dBm)
Low	5190	3.11	3.11	24.00	11.00
High	5230	3.11	3.11	24.00	11.00

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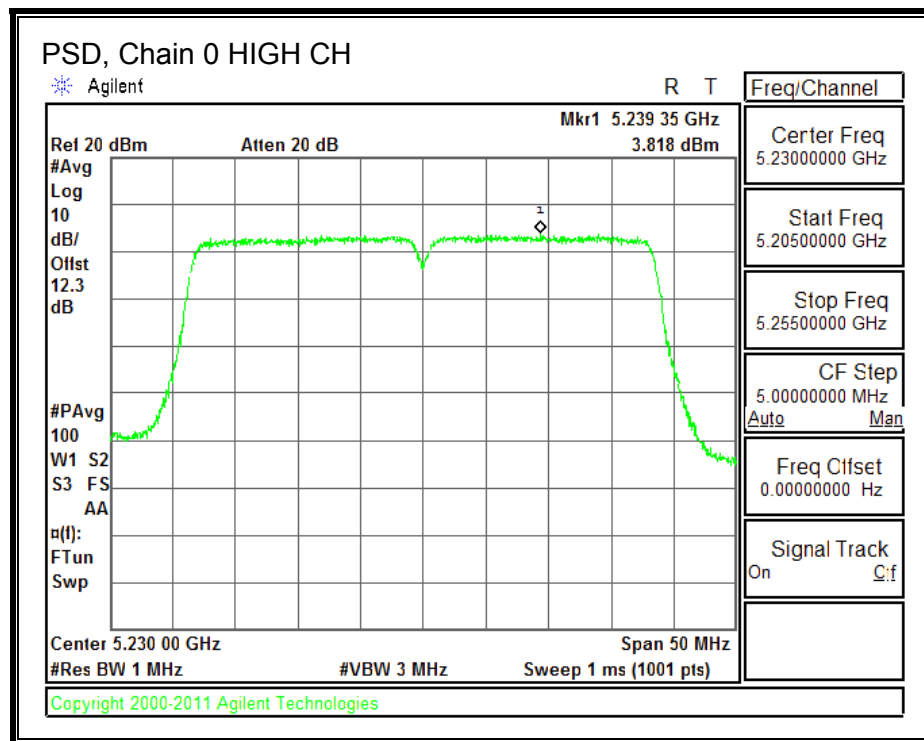
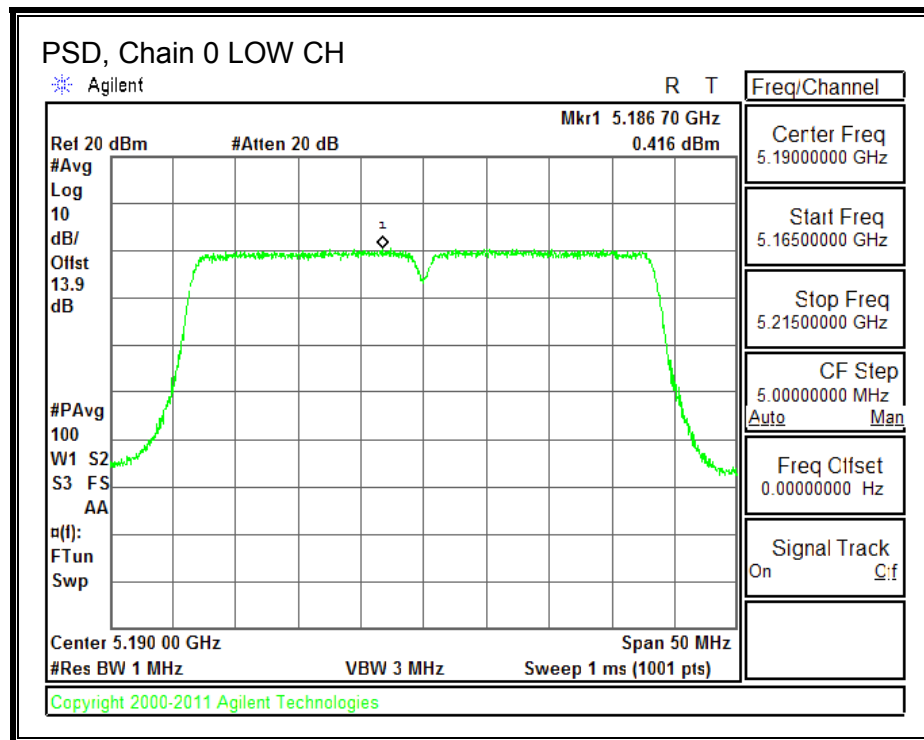
Output Power Results

Channel	Frequency (MHz)	Chain 0 Meas Power (dBm)	Total Corr'd Power (dBm)	Power Limit (dBm)	Power Margin (dB)
Low	5190	14.46	14.46	24.00	-9.54
High	5230	17.84	17.84	24.00	-6.16

PSD Results

Channel	Frequency (MHz)	Chain 0 Meas PSD (dBm)	Total Corr'd PSD (dBm)	PSD Limit (dBm)	PSD Margin (dB)
Low	5190	0.42	0.42	11.00	-10.58
High	5230	3.82	3.82	11.00	-7.18

PSD, Chain 0



9.6. 802.11n HT40 2TX CDD MODE IN THE 5.2 GHz BAND

9.6.1. 26 dB BANDWIDTH

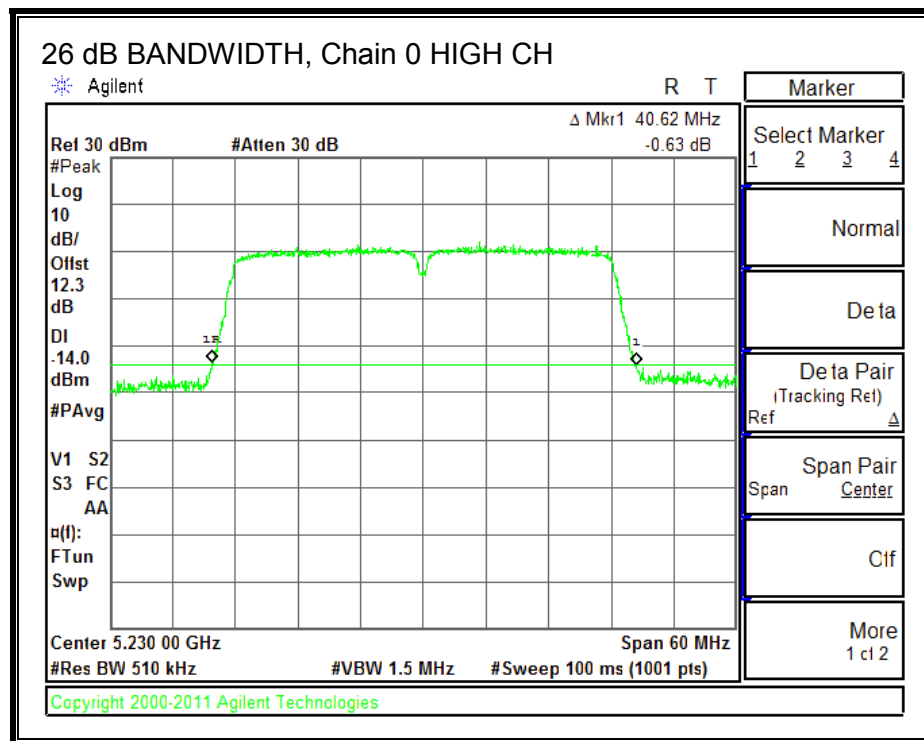
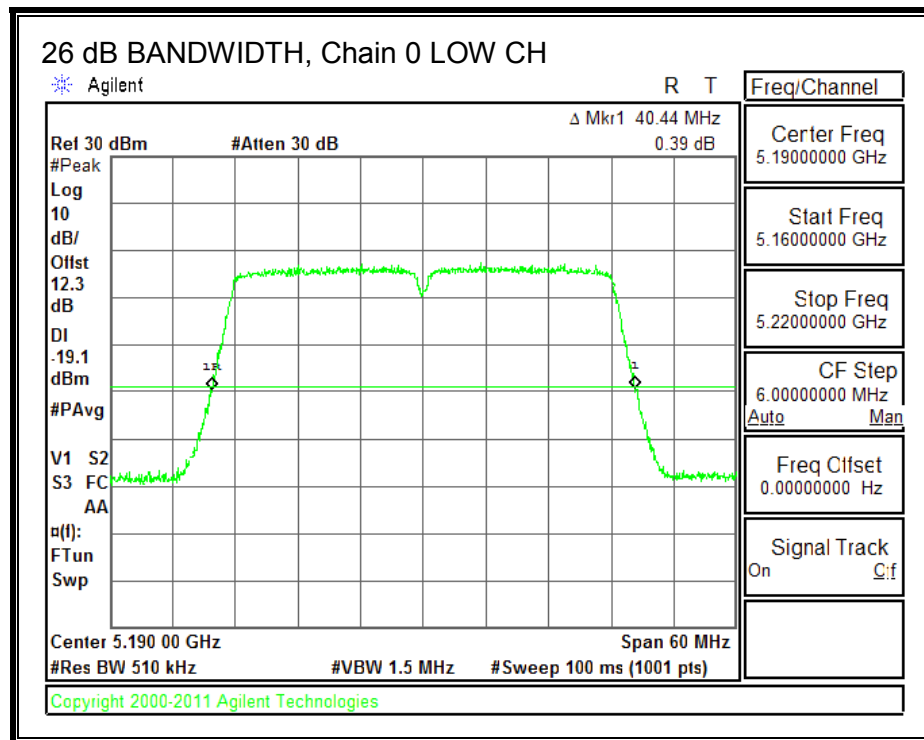
LIMITS

None; for reporting purposes only.

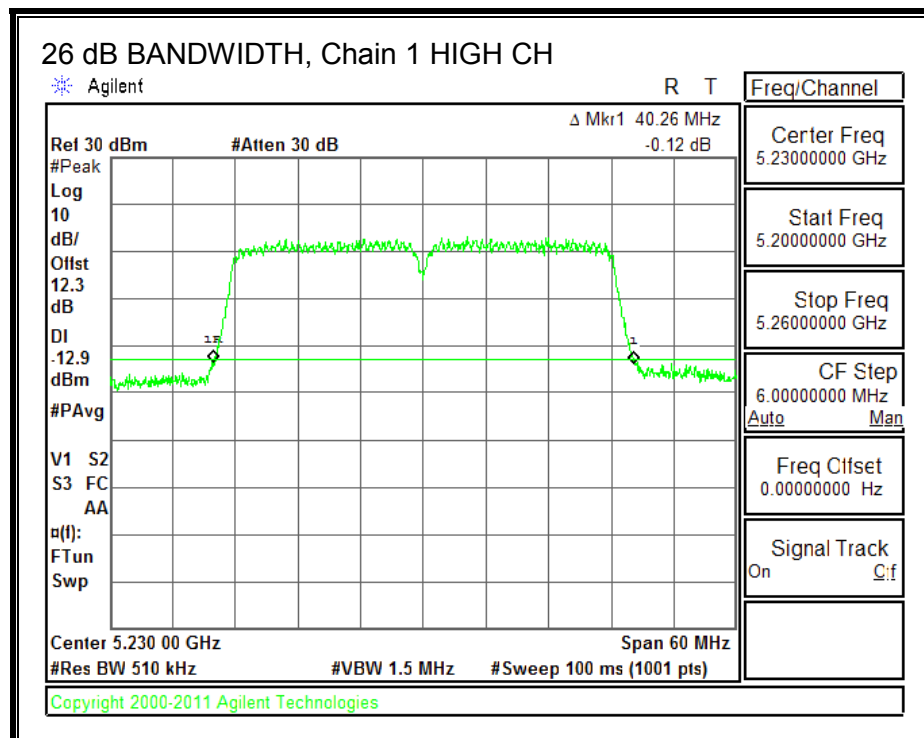
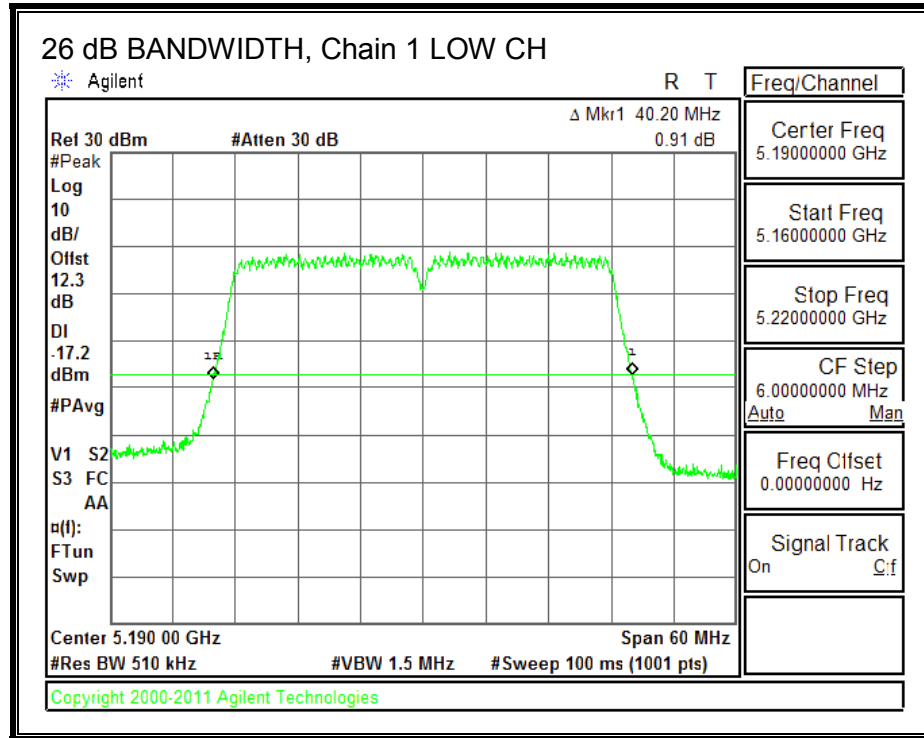
RESULTS

Channel	Frequency (MHz)	26 dB BW Chain 0 (MHz)	26 dB BW Chain 1 (MHz)
Low	5190	40.44	40.20
High	5230	40.62	40.26

26 dB BANDWIDTH, Chain 0



26 dB BANDWIDTH, Chain 1



9.6.2. 99% BANDWIDTH

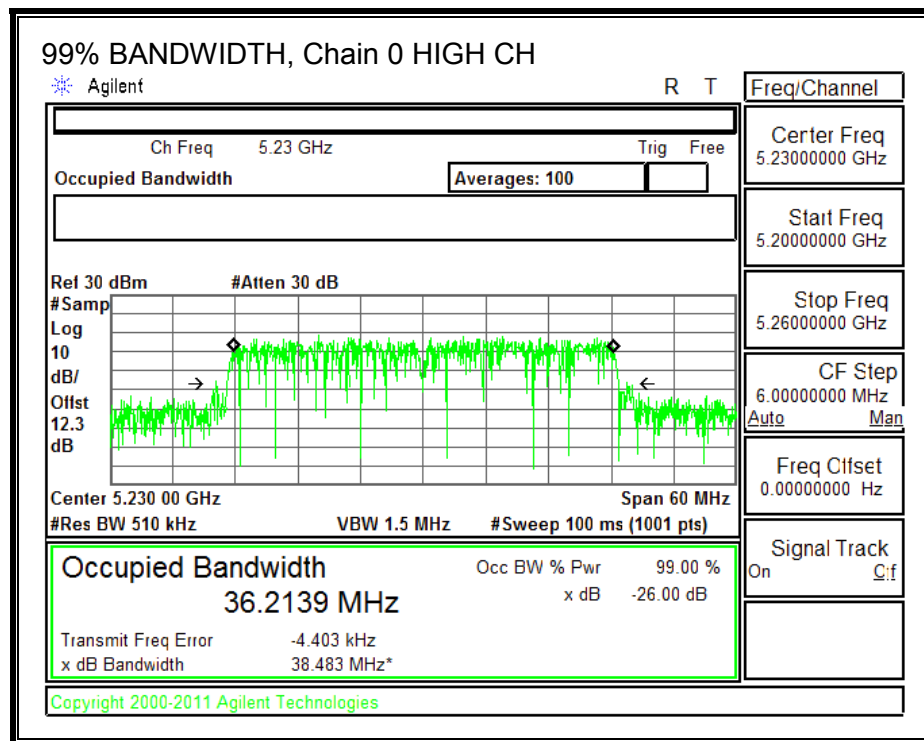
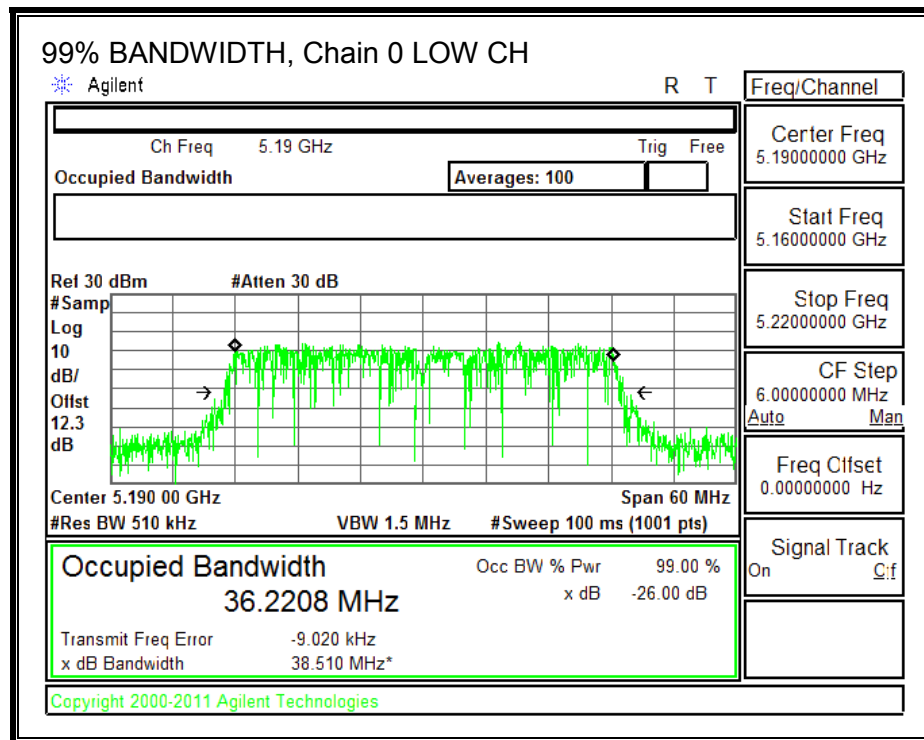
LIMITS

None; for reporting purposes only.

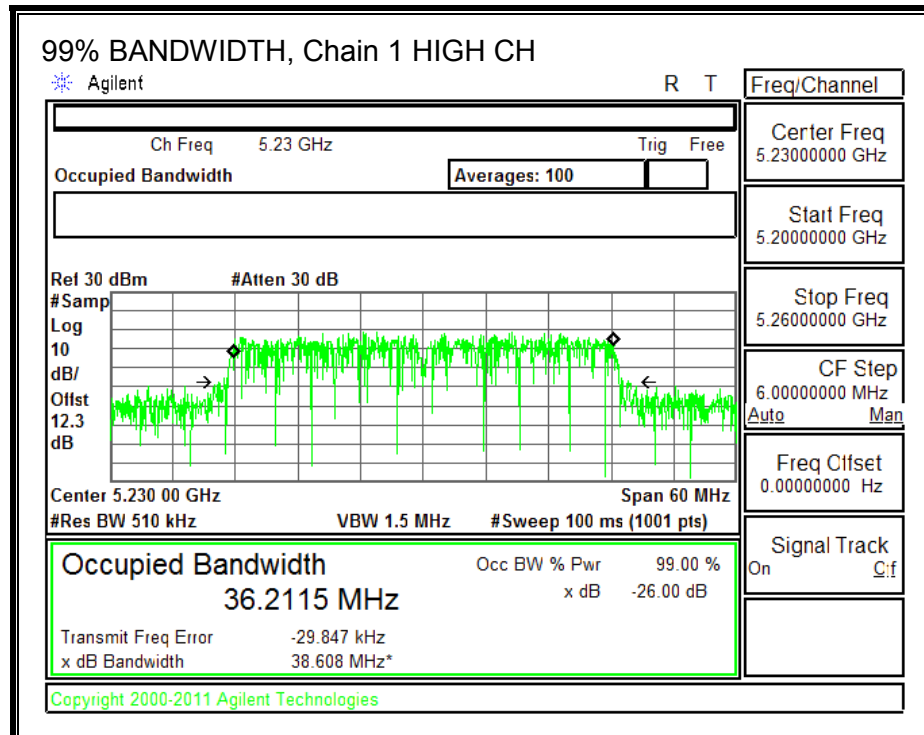
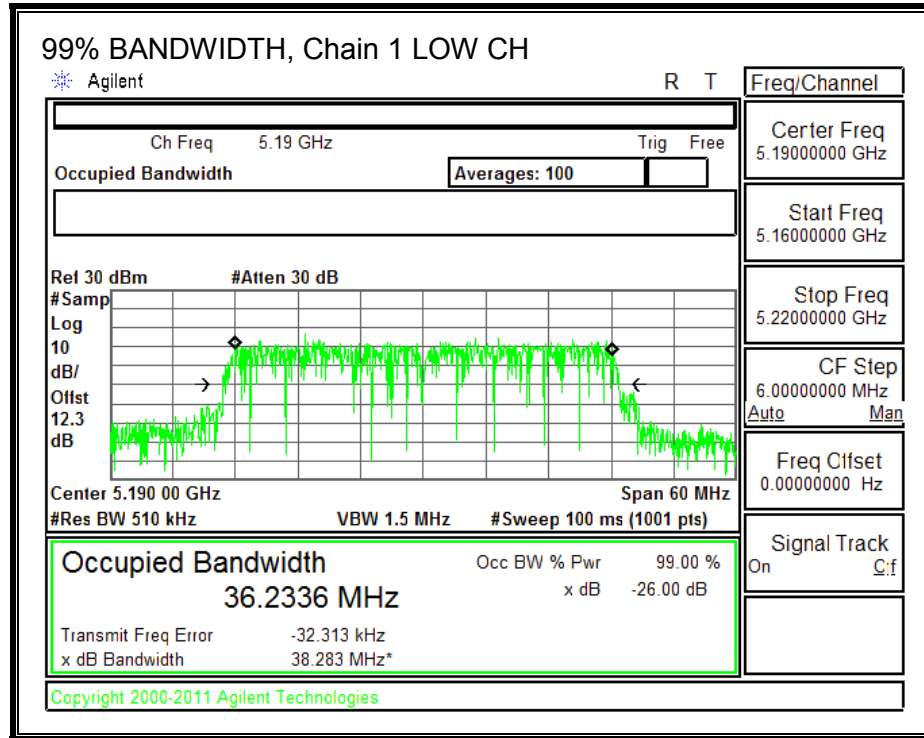
RESULTS

Channel	Frequency (MHz)	99% BW Chain 0 (MHz)	99% BW Chain 1 (MHz)
Low	5190	36.2208	36.2336
High	5230	36.2139	36.2115

99% BANDWIDTH, Chain 0



99% BANDWIDTH, Chain 1



9.6.3. OUTPUT POWER AND PSD

LIMITS

FCC §15.407 (a) (1)

(iv) For mobile and portable client devices in the 5.15-5.25 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed 250 mW provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

DIRECTIONAL ANTENNA GAIN

The TX chains are uncorrelated and the antenna gain is unequal among the chains. The directional gain is:

Chain 0 Antenna Gain (dBi)	Chain 1 Antenna Gain (dBi)	Uncorrelated Chains Directional Gain (dBi)
3.11	2.90	3.01

The TX chains are correlated and the antenna gain is unequal among the chains. The directional gain is:

Chain 0 Antenna Gain (dBi)	Chain 1 Antenna Gain (dBi)	Correlated Chains Directional Gain (dBi)
3.11	2.90	6.02

RESULTS

Antenna Gain and Limits

Channel	Frequency (MHz)	Directional Gain for Power (dBi)	Directional Gain for PSD (dBi)	Power Limit (dBm)	PSD Limit (dBm)
Low	5190	3.01	6.02	24.00	10.98
High	5230	3.01	6.02	24.00	10.98

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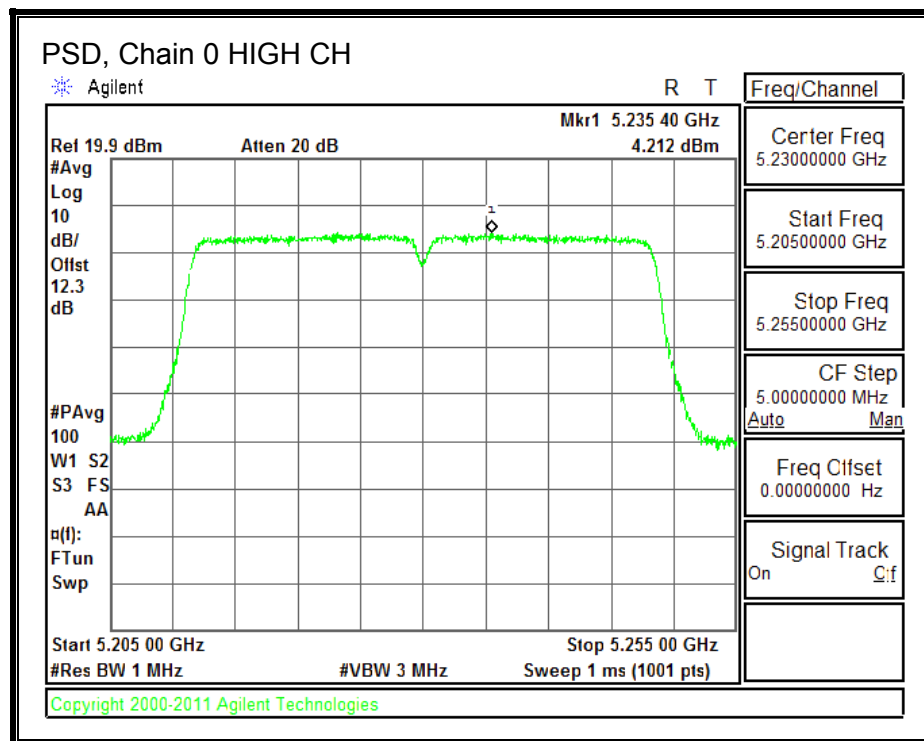
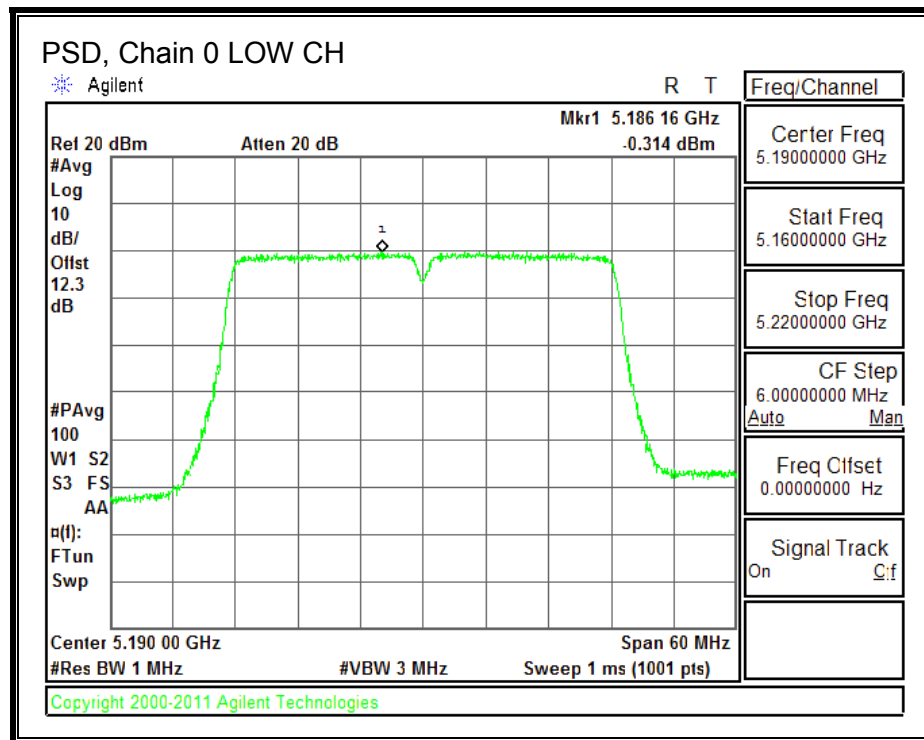
Output Power Results

Channel	Frequency (MHz)	Chain 0 Meas Power (dBm)	Chain 1 Meas Power (dBm)	Total Corr'd Power (dBm)	Power Limit (dBm)	Power Margin (dB)
Low	5190	13.98	13.70	16.85	24.00	-7.15
High	5230	17.98	17.80	20.90	24.00	-3.10

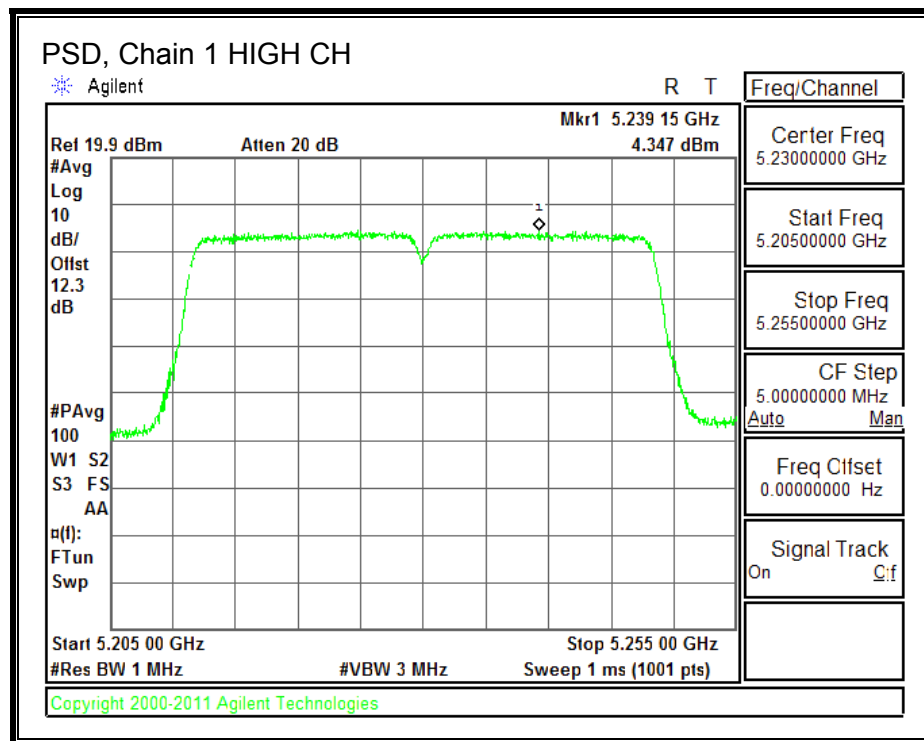
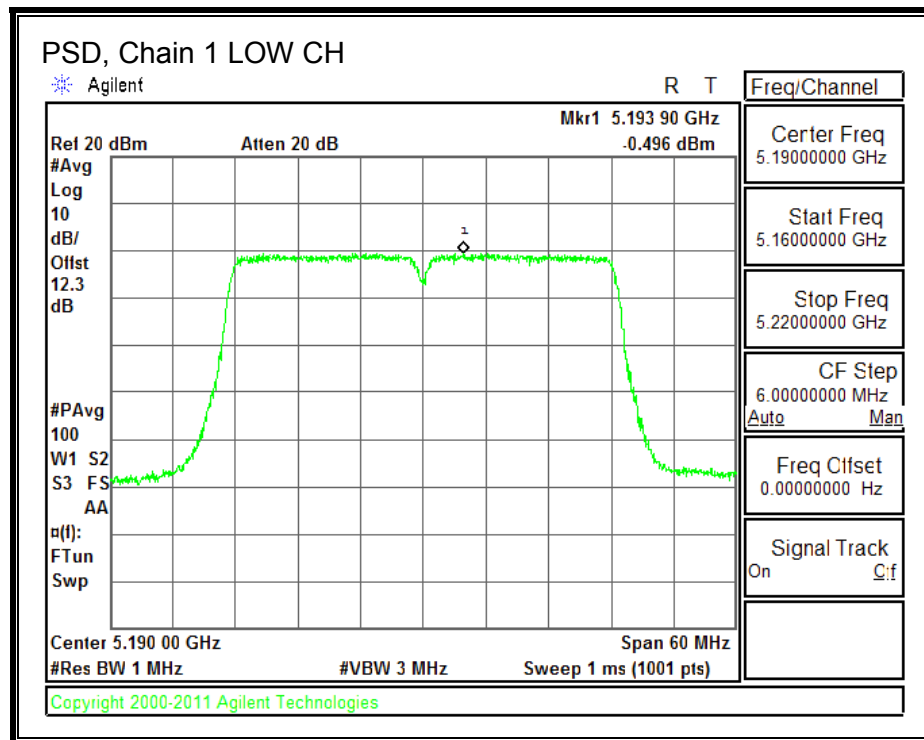
PSD Results

Channel	Frequency (MHz)	Chain 0 Meas PSD (dBm)	Chain 1 Meas PSD (dBm)	Total Corr'd PSD (dBm)	PSD Limit (dBm)	PSD Margin (dB)
Low	5190	-0.31	-0.50	2.61	10.98	-8.37
High	5230	4.21	4.35	7.29	10.98	-3.69

PSD, Chain 0



PSD, Chain 1



9.7. 802.11n HT40 2TX STBC MODE IN THE 5.2 GHz BAND

9.7.1. 26 dB BANDWIDTH

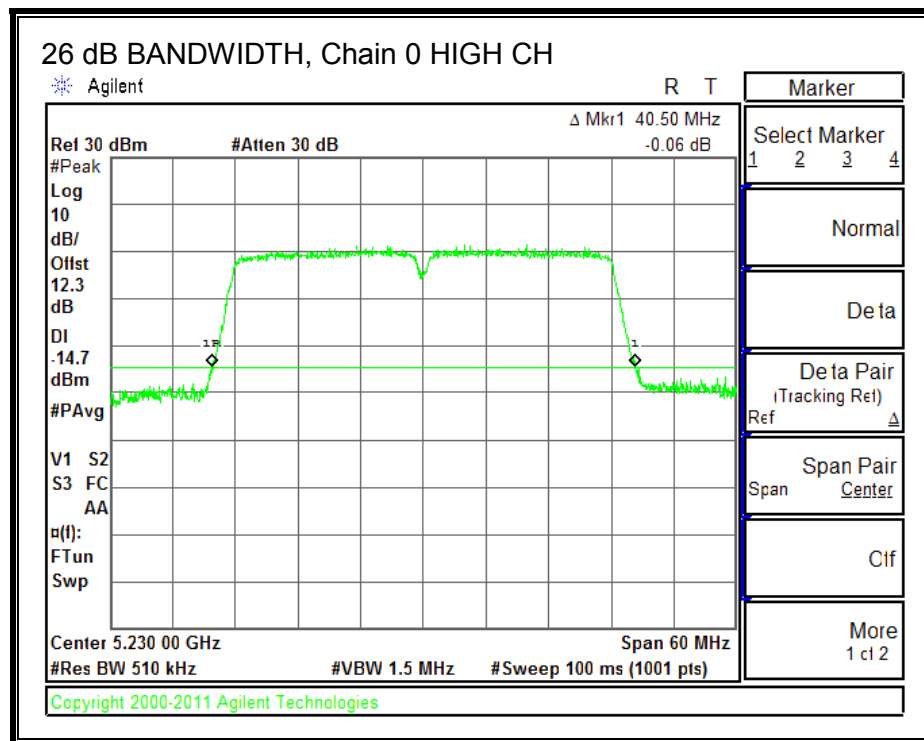
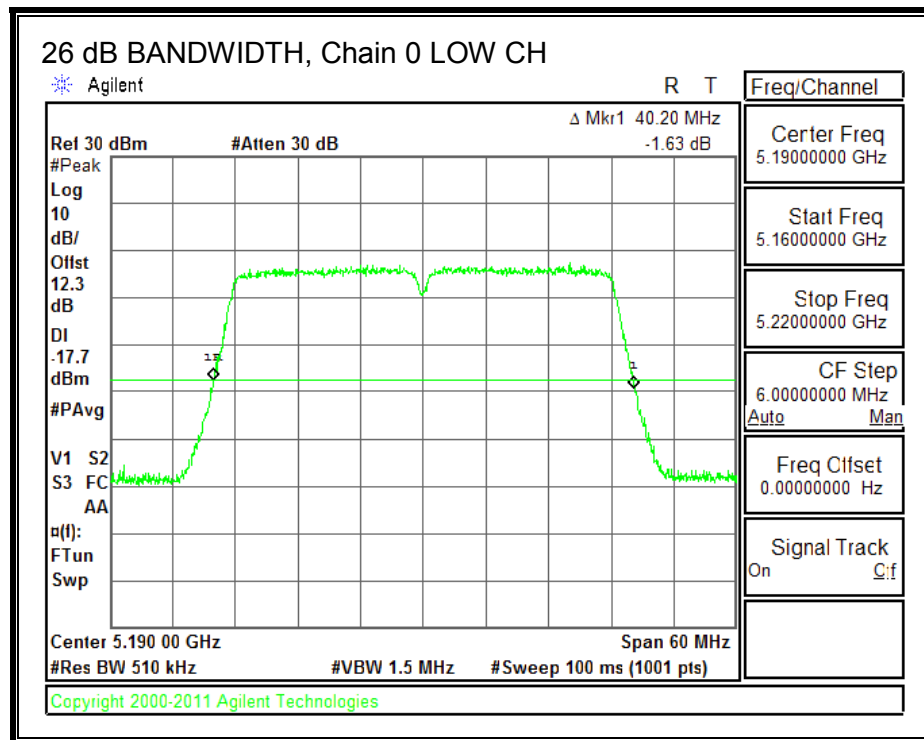
LIMITS

None; for reporting purposes only.

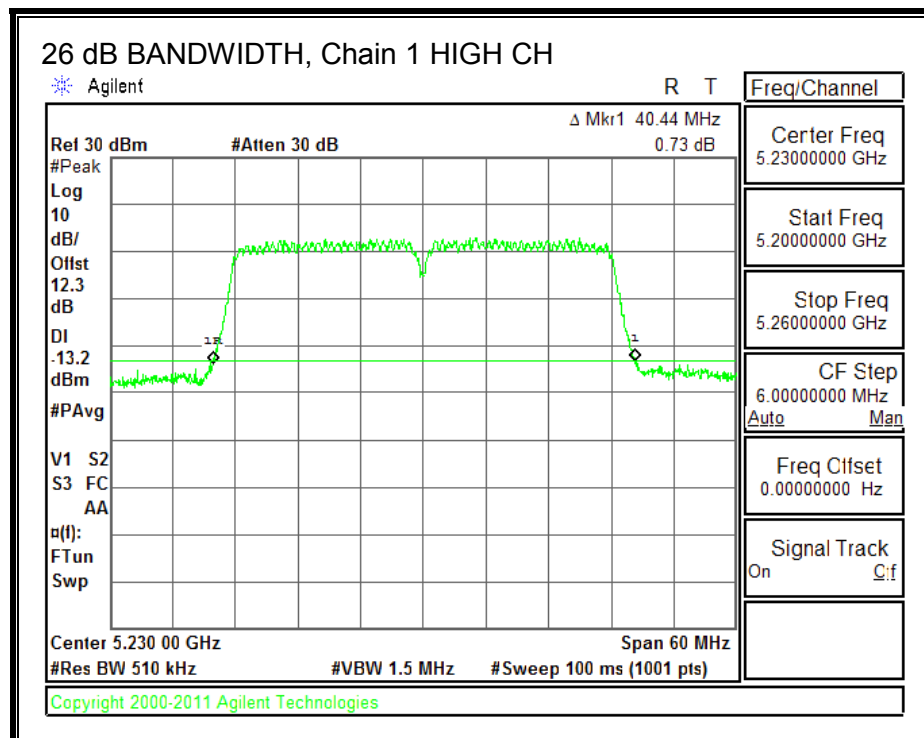
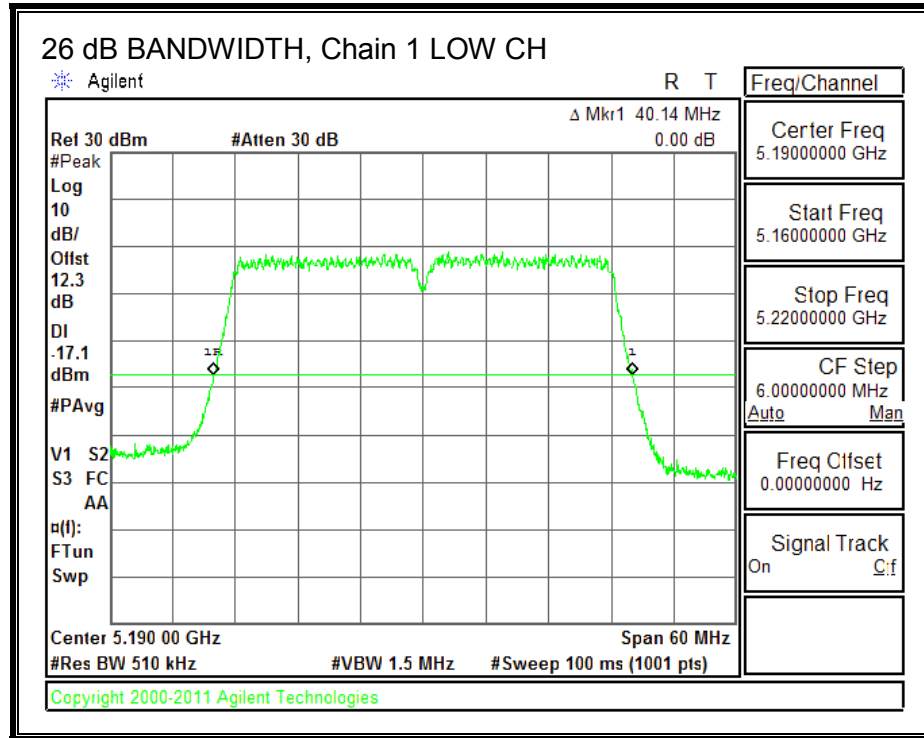
RESULTS

Channel	Frequency (MHz)	26 dB BW Chain 0 (MHz)	26 dB BW Chain 1 (MHz)
Low	5190	40.20	40.14
High	5230	40.50	40.44

26 dB BANDWIDTH, Chain 0



26 dB BANDWIDTH, Chain 1



9.7.2. 99% BANDWIDTH

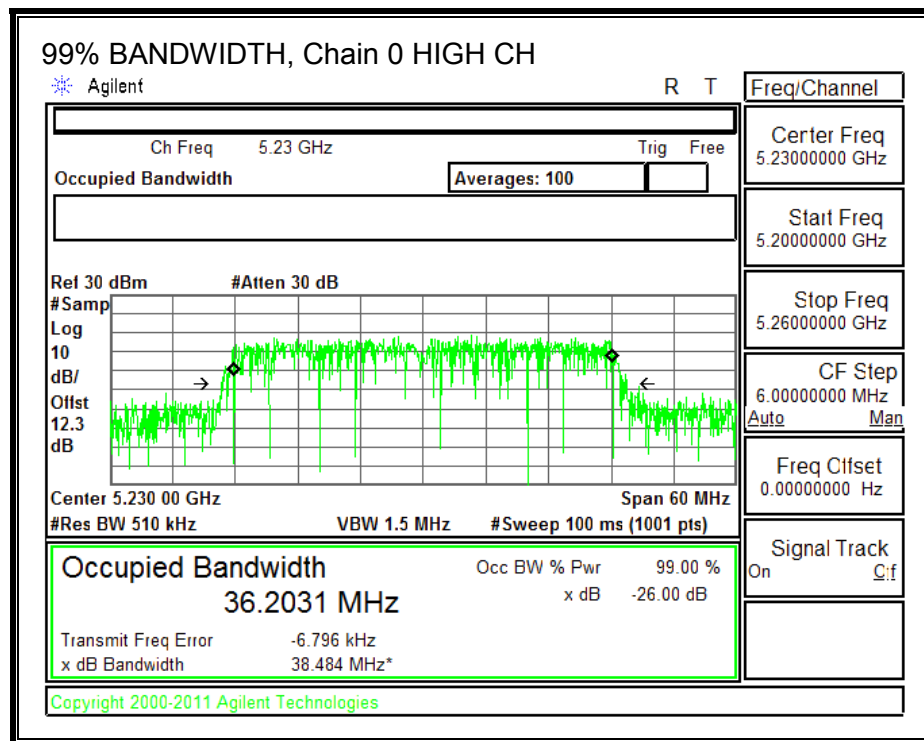
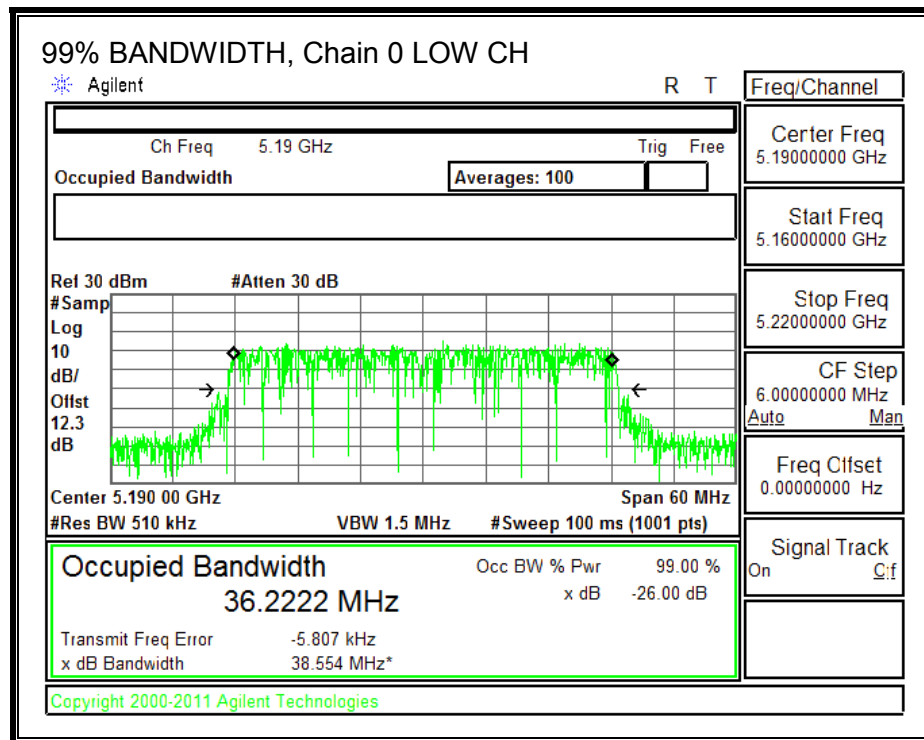
LIMITS

None; for reporting purposes only.

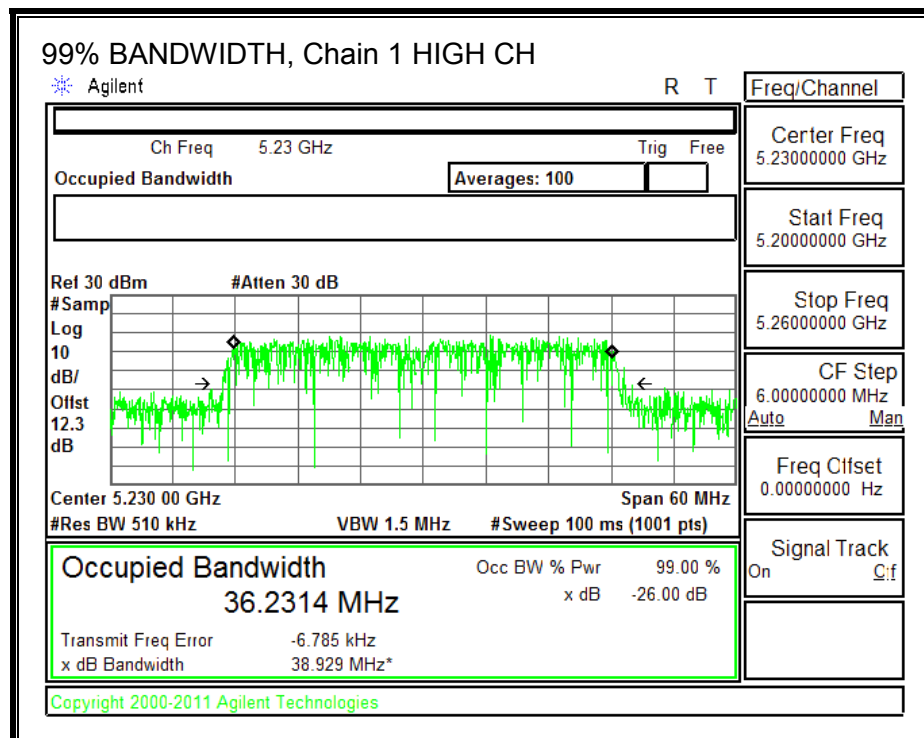
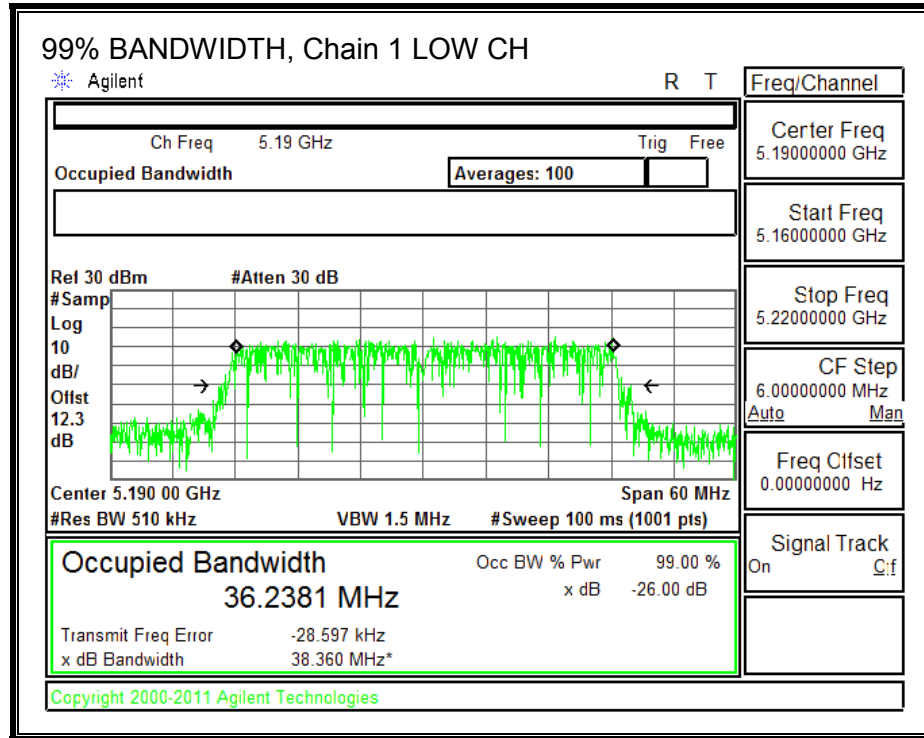
RESULTS

Channel	Frequency (MHz)	99% BW Chain 0 (MHz)	99% BW Chain 1 (MHz)
Low	5190	36.2222	36.2381
High	5230	36.2031	36.2314

99% BANDWIDTH, Chain 0



99% BANDWIDTH, Chain 1



9.7.3. OUTPUT POWER AND PSD

LIMITS

FCC §15.407 (a) (1)

(iv) For mobile and portable client devices in the 5.15-5.25 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed 250 mW provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

DIRECTIONAL ANTENNA GAIN

The TX chains are uncorrelated and the antenna gain is unequal among the chains. The directional gain is:

Chain 0 Antenna Gain (dBi)	Chain 1 Antenna Gain (dBi)	Uncorrelated Chains Directional Gain (dBi)
3.11	2.90	3.01

RESULTS

Antenna Gain and Limits

Channel	Frequency (MHz)	Directional Gain for Power (dBi)	Directional Gain for PSD (dBi)	Power Limit (dBm)	PSD Limit (dBm)
Low	5190	3.01	3.01	24.00	11.00
High	5230	3.01	3.01	24.00	11.00

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

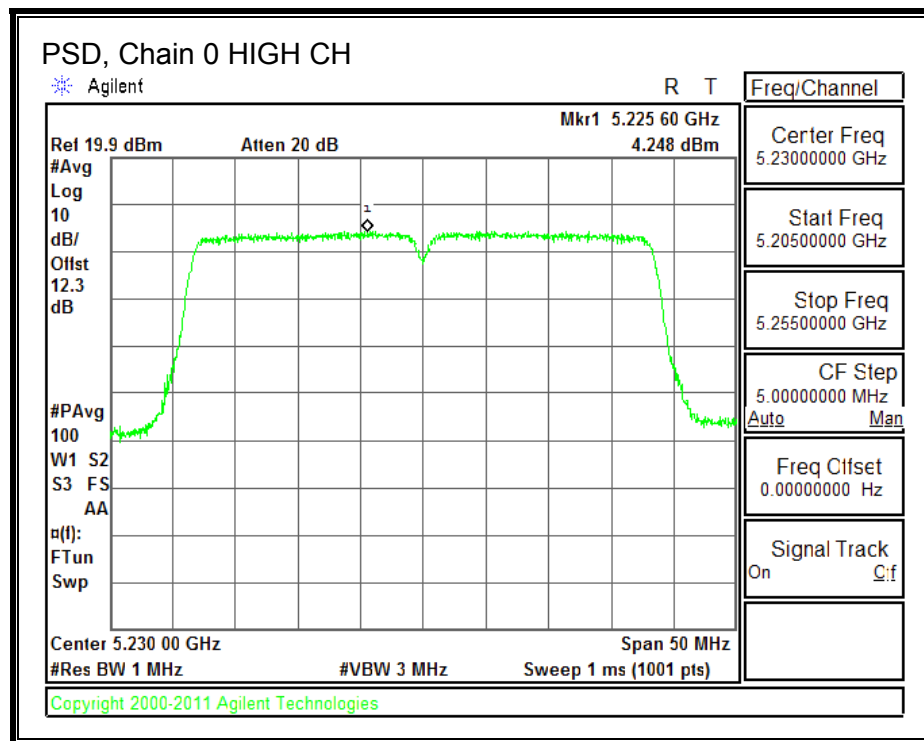
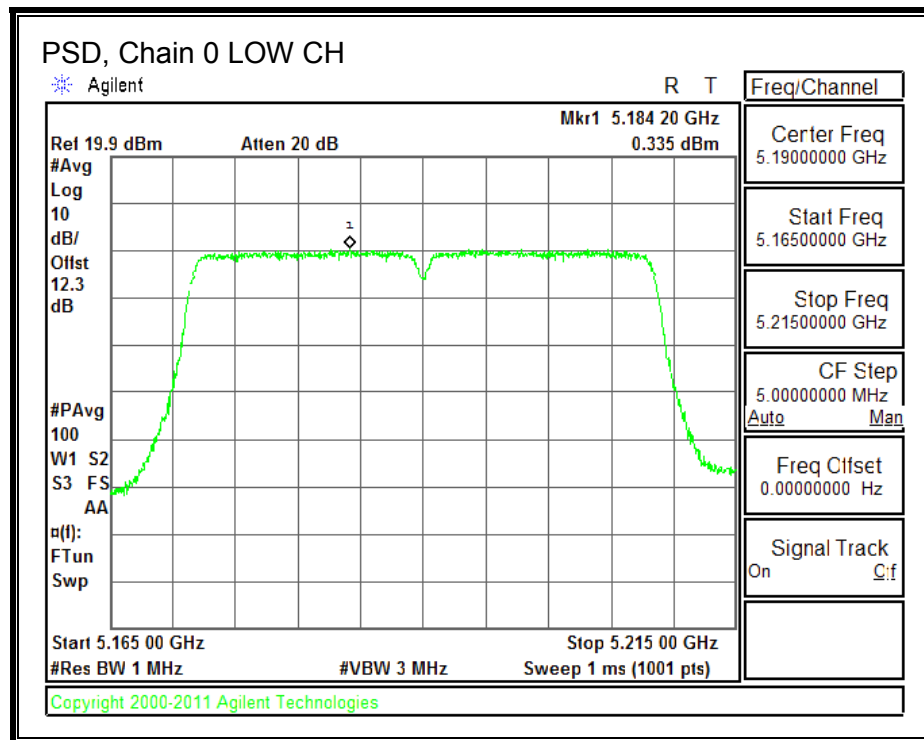
Output Power Results

Channel	Frequency (MHz)	Chain 0 Meas Power (dBm)	Chain 1 Meas Power (dBm)	Total Corr'd Power (dBm)	Power Limit (dBm)	Power Margin (dB)
Low	5190	13.82	13.56	16.70	24.00	-7.30
High	5230	17.84	17.90	20.88	24.00	-3.12

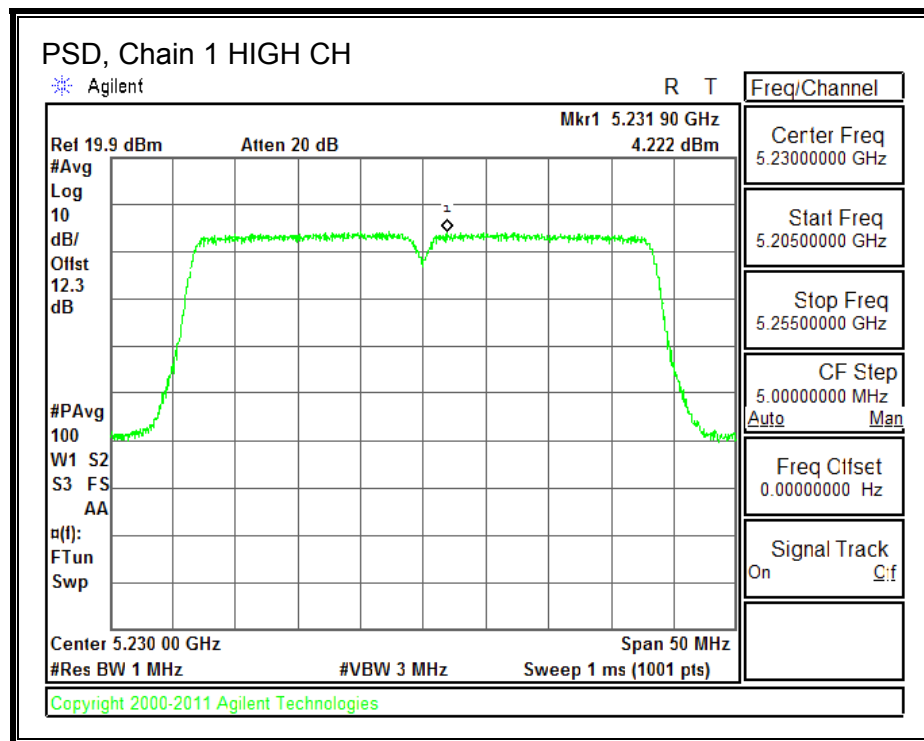
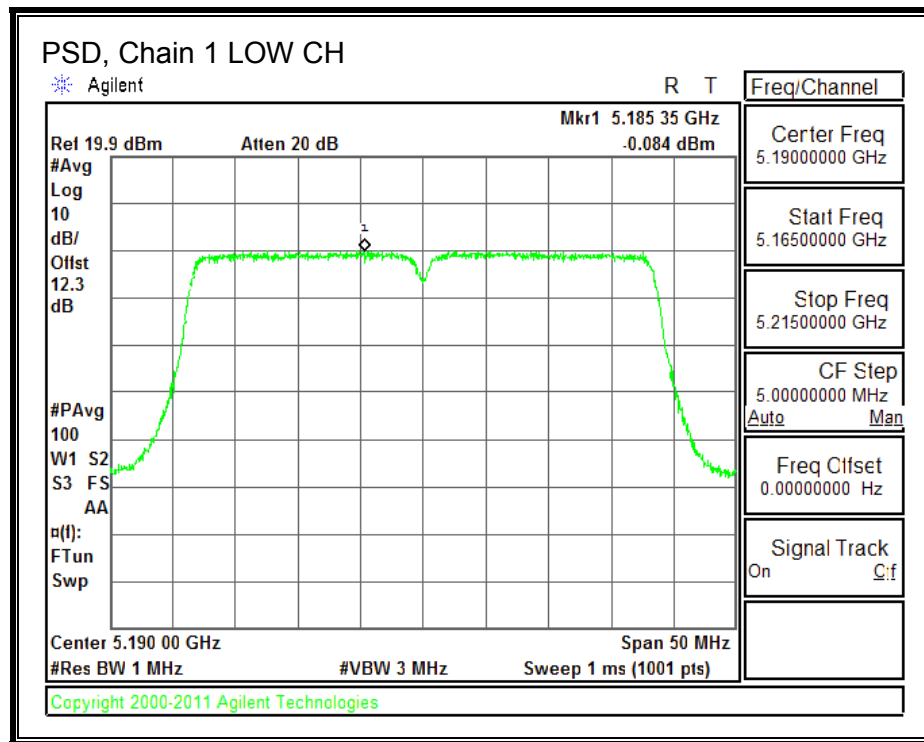
PSD Results

Channel	Frequency (MHz)	Chain 0 Meas PSD (dBm)	Chain 1 Meas PSD (dBm)	Total Corr'd PSD (dBm)	PSD Limit (dBm)	PSD Margin (dB)
Low	5190	0.34	-0.08	3.14	11.00	-7.86
High	5230	4.25	4.22	7.25	11.00	-3.75

PSD, Chain 0



PSD, Chain 1



9.8. 802.11ac VHT40 2TX BF IN THE 5.2 GHz BAND

Refer to Section 9.6, 802.11n HT40 2TX CDD MODE IN THE 5.2 GHz BAND.

The power per chain used for 802.11n HT40 2TX CDD IN THE 5.2 GHz mode is the same power per chain that will be for 802.11n HT40 2TX BF IN THE 5.2 GHz mode. However, since BF is correlated and CDD is uncorrelated for output power, the section below for output power using correlated antenna gain for this mode shows it is still compliant.

9.8.1. OUTPUT POWER

LIMITS

FCC §15.407 (a) (1)

(iv) For mobile and portable client devices in the 5.15-5.25 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed 250 mW provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

DIRECTIONAL ANTENNA GAIN

The TX chains are correlated and the antenna gain is unequal among the chains. The directional gain is:

Chain 0 Antenna Gain (dBi)	Chain 1 Antenna Gain (dBi)	Correlated Chains Directional Gain (dBi)
3.11	2.90	6.02

RESULTS

Antenna Gain and Limits

Channel	Frequency (MHz)	Directional Gain for Power (dBi)	Power Limit (dBm)
Low	5190	6.02	23.98
High	5230	6.02	23.98

Duty Cycle CF (dB)	0.12	Included in Calculations of Corr'd Power
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Output Power Results

Channel	Frequency (MHz)	Chain 0 Meas Power (dBm)	Chain 1 Meas Power (dBm)	Total Corr'd Power (dBm)	Power Limit (dBm)	Power Margin (dB)
Low	5190	13.98	13.70	16.97	23.98	-7.01
High	5230	17.98	17.80	21.02	23.98	-2.96

9.9. 802.11ac VHT80 1TX MODE IN THE 5.2 GHz BAND

9.9.1. 26 dB BANDWIDTH

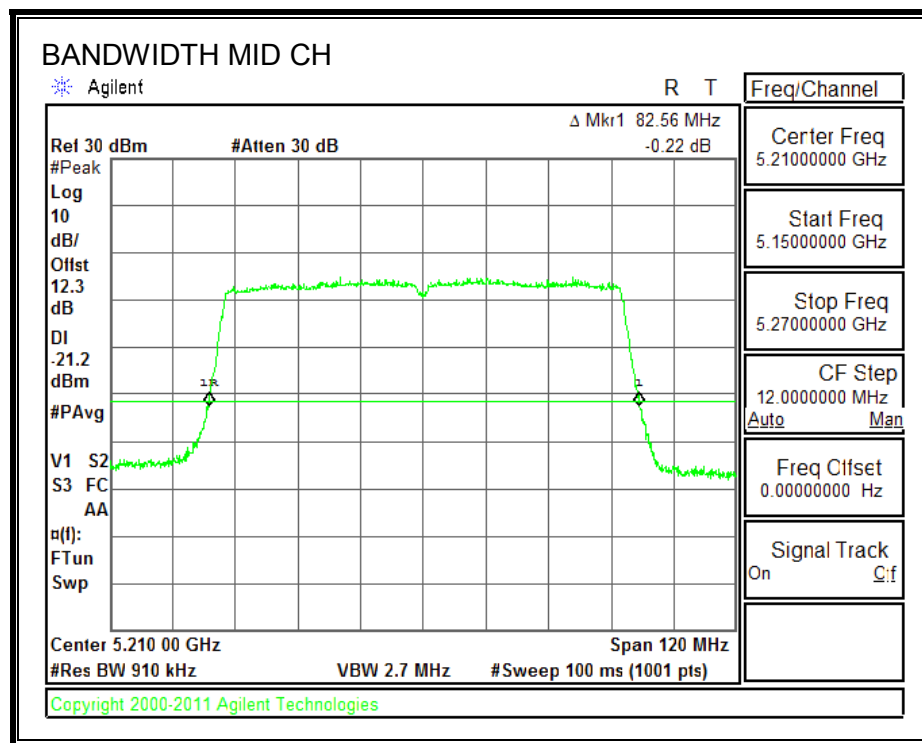
LIMITS

None; for reporting purposes only.

RESULTS

Channel	Frequency (MHz)	26 dB Bandwidth (MHz)
Mid	5210	82.56

26 dB BANDWIDTH



9.9.2. 99% BANDWIDTH

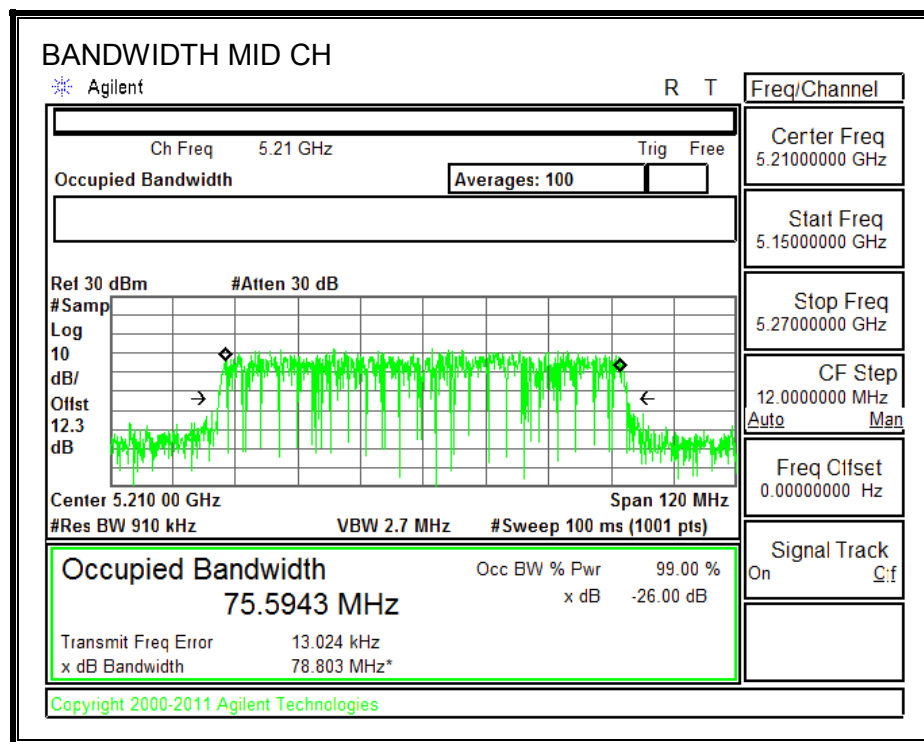
LIMITS

None; for reporting purposes only.

RESULTS

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Mid	5210	75.5943

99% BANDWIDTH



9.9.3. OUTPUT POWER AND PSD

LIMITS

FCC §15.407 (a) (1)

(iv) For mobile and portable client devices in the 5.15-5.25 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed 250 mW provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

DIRECTIONAL ANTENNA GAIN

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

ANTENNA 0

Antenna Gain (dBi)
3.11

ANTENNA 1

Antenna Gain (dBi)
2.90

RESULTS

Antenna Gain and Limits

Channel	Frequency (MHz)	Directional Gain for Power (dBi)	Directional Gain for PSD (dBi)	Power Limit (dBm)	PSD Limit (dBm)
Mid	5210	3.11	3.11	24.00	11.00

Duty Cycle CF (dB)	0.22	Included in Calculations of Corr'd Power & PSD
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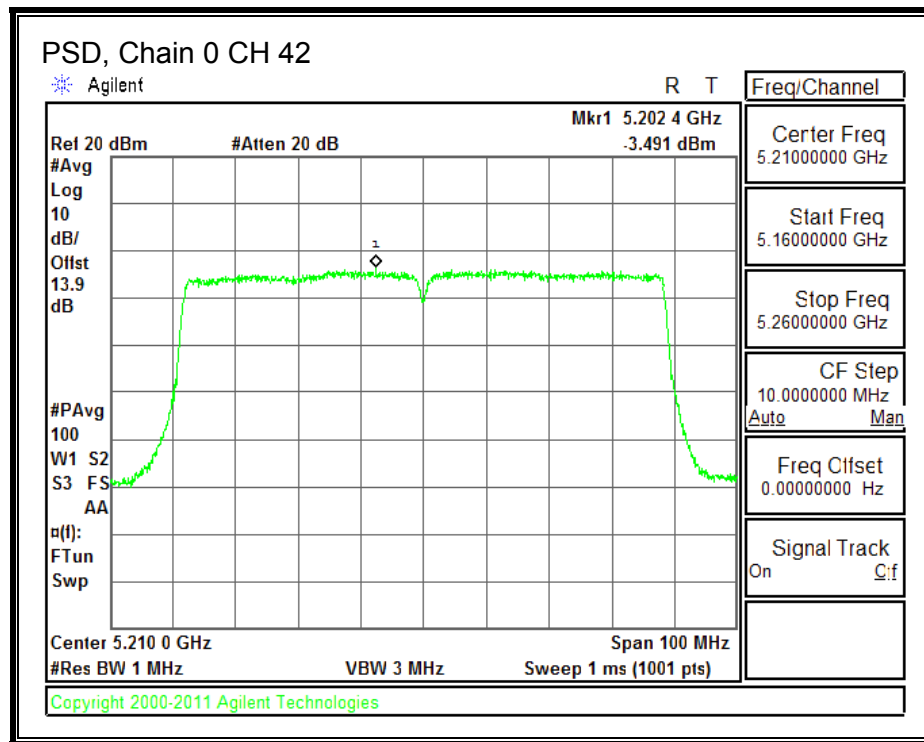
Output Power Results

Channel	Frequency (MHz)	Chain 0 Meas Power (dBm)	Total Corr'd Power (dBm)	Power Limit (dBm)	Power Margin (dB)
Mid	5210	12.75	12.97	24.00	-11.03

PSD Results

Channel	Frequency (MHz)	Chain 0 Meas PSD (dBm)	Total Corr'd PSD (dBm)	PSD Limit (dBm)	PSD Margin (dB)
Mid	5210	-3.49	-3.27	11.00	-14.27

PSD, Chain 0



9.10. 802.11ac VHT80 2TX CDD MODE IN THE 5.2 GHz BAND

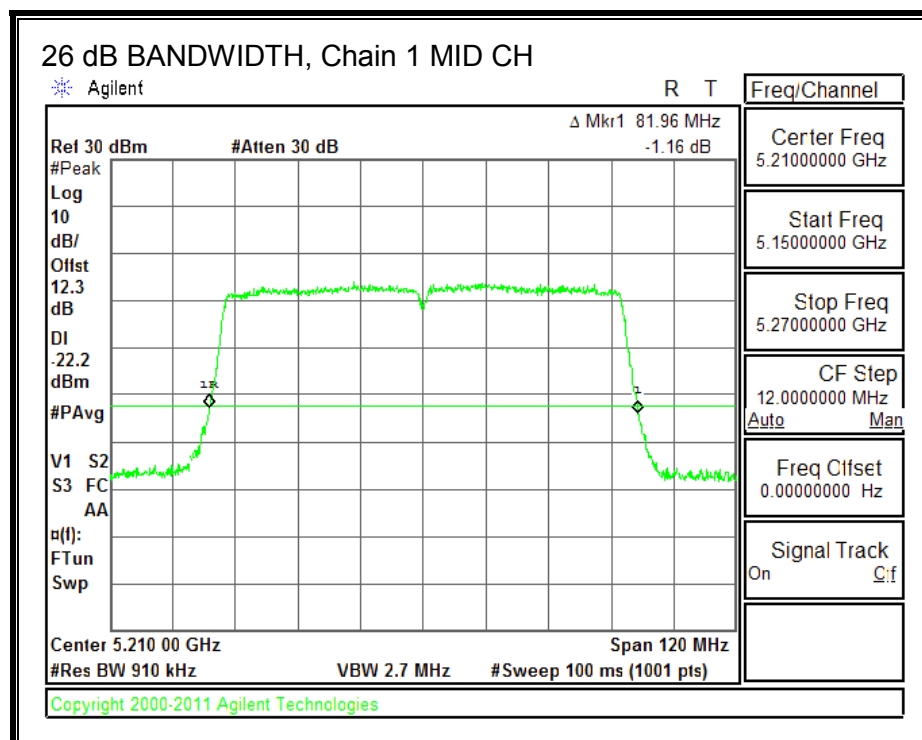
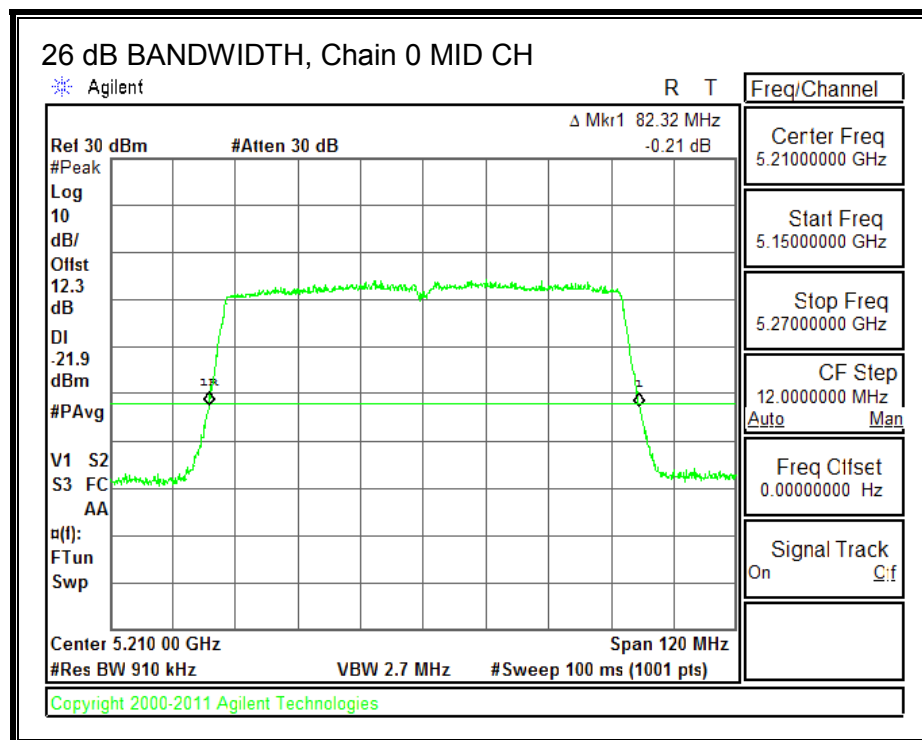
9.10.1. 26 dB BANDWIDTH

LIMITS

None; for reporting purposes only.

RESULTS

Channel	Frequency (MHz)	26 dB BW Chain 0 (MHz)	26 dB BW Chain 1 (MHz)
Mid	5210	82.32	81.96



9.10.2. 99% BANDWIDTH

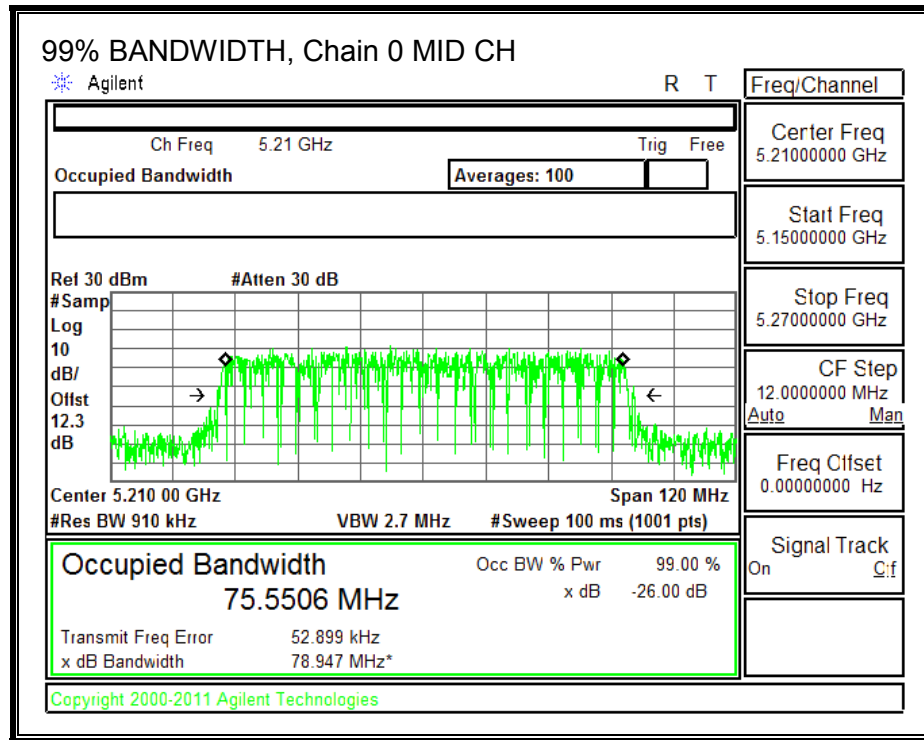
LIMITS

None; for reporting purposes only.

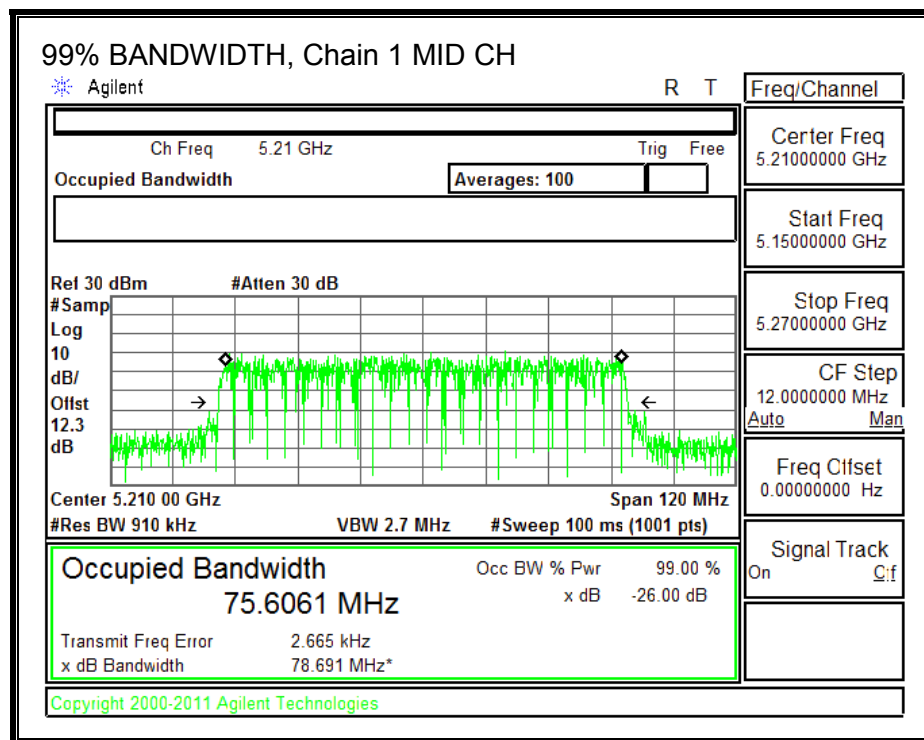
RESULTS

Channel	Frequency (MHz)	99% BW Chain 0 (MHz)	99% BW Chain 1 (MHz)
Mid	5210	75.5506	75.6061

99% BANDWIDTH, Chain 0



99% BANDWIDTH, Chain 1



9.10.3. OUTPUT POWER AND PSD

LIMITS

FCC §15.407 (a) (1)

(iv) For mobile and portable client devices in the 5.15-5.25 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed 250 mW provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

DIRECTIONAL ANTENNA GAIN

The TX chains are uncorrelated and the antenna gain is unequal among the chains. The directional gain is:

Chain 0 Antenna Gain (dBi)	Chain 1 Antenna Gain (dBi)	Uncorrelated Chains Directional Gain (dBi)
3.11	2.90	3.01

The TX chains are correlated and the antenna gain is unequal among the chains. The directional gain is:

Chain 0 Antenna Gain (dBi)	Chain 1 Antenna Gain (dBi)	Correlated Chains Directional Gain (dBi)
3.11	2.90	6.02

RESULTS

Antenna Gain and Limits

Channel	Frequency (MHz)	Directional Gain for Power (dBi)	Directional Gain for PSD (dBi)	Power Limit (dBm)	PSD Limit (dBm)
Mid	5210	3.01	6.02	24.00	10.98

Duty Cycle CF (dB)	0.22	Included in Calculations of Corr'd Power & PSD
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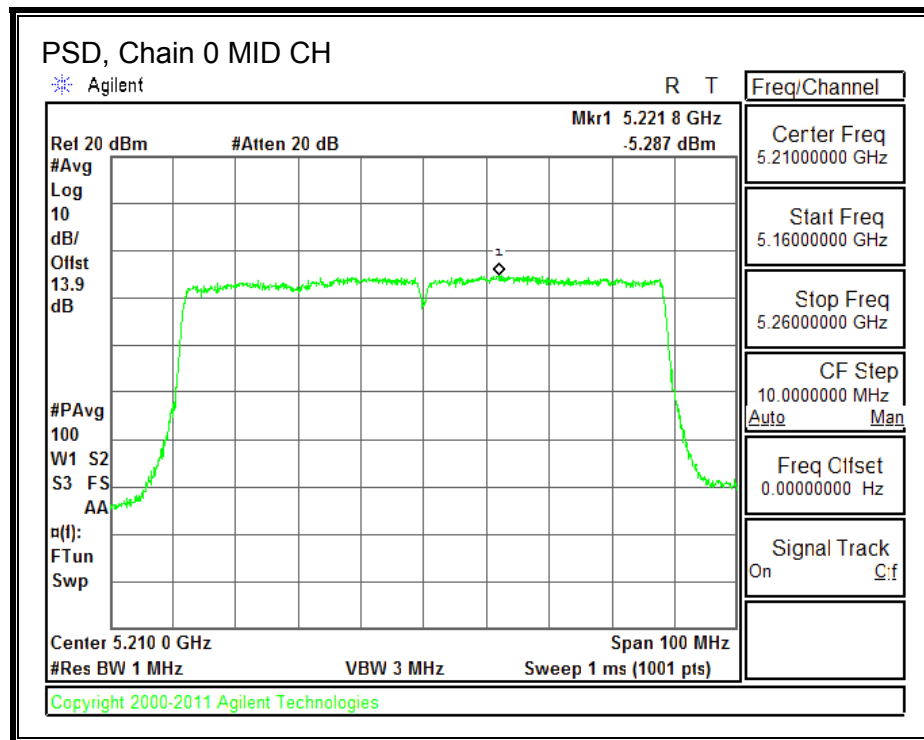
Output Power Results

Channel	Frequency (MHz)	Chain 0 Meas Power (dBm)	Chain 1 Meas Power (dBm)	Total Corr'd Power (dBm)	Power Limit (dBm)	Power Margin (dB)
Mid	5210	11.73	11.78	14.99	24.00	-9.01

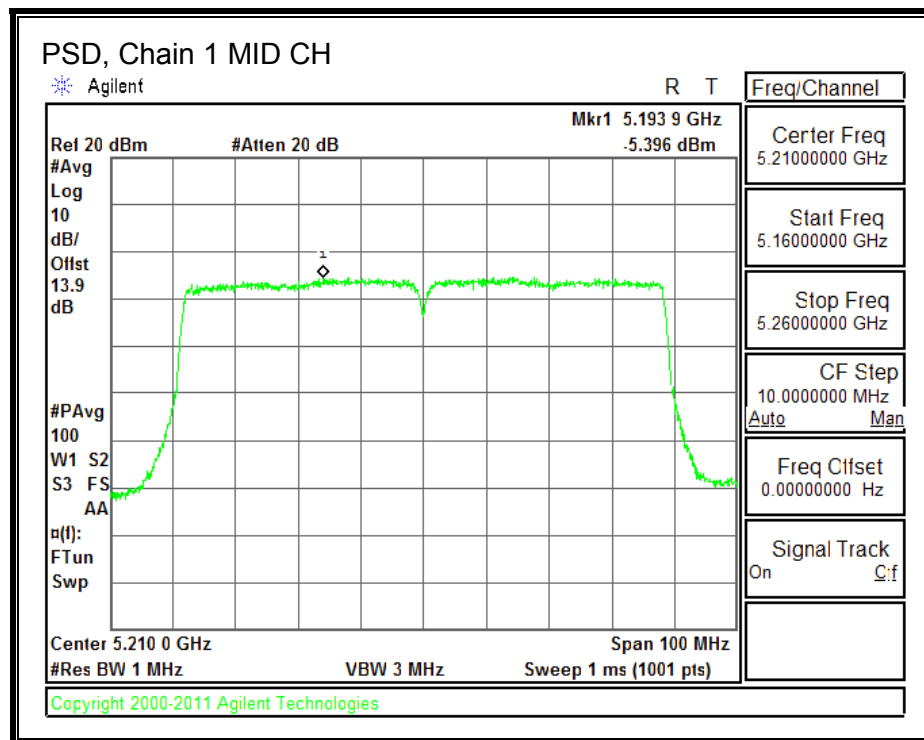
PSD Results

Channel	Frequency (MHz)	Chain 0 Meas PSD (dBm)	Chain 1 Meas PSD (dBm)	Total Corr'd PSD (dBm)	PSD Limit (dBm)	PSD Margin (dB)
Mid	5210	-5.29	-5.40	-2.11	10.98	-13.09

PSD, Chain 0



PSD, Chain 1



9.11. 802.11ac VHT80 2TX STBC MODE IN THE 5.2 GHz BAND

9.11.1. 26 dB BANDWIDTH

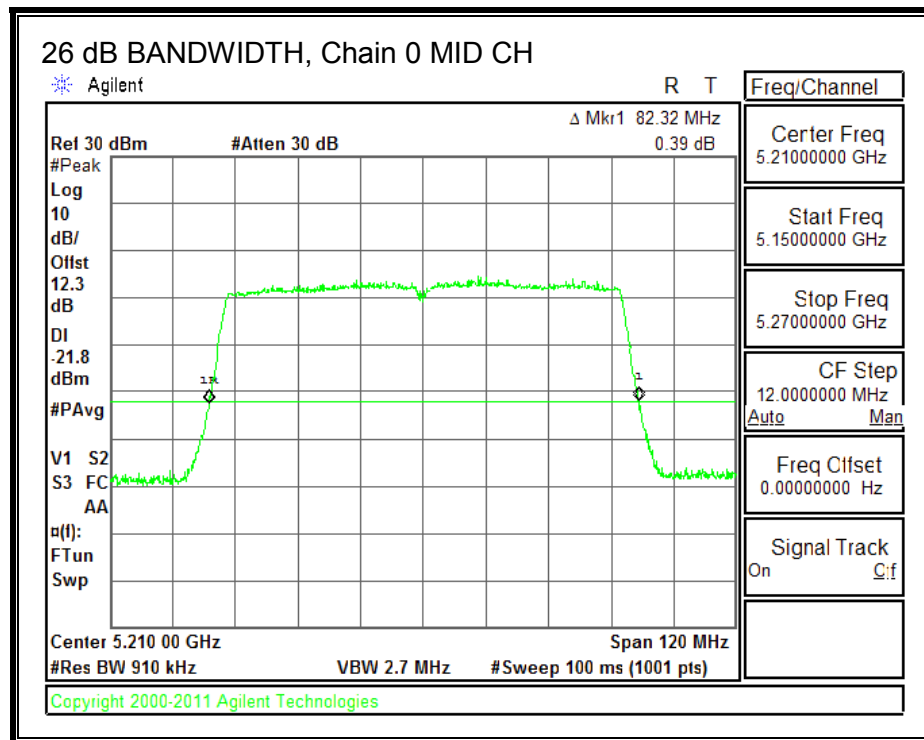
LIMITS

None; for reporting purposes only.

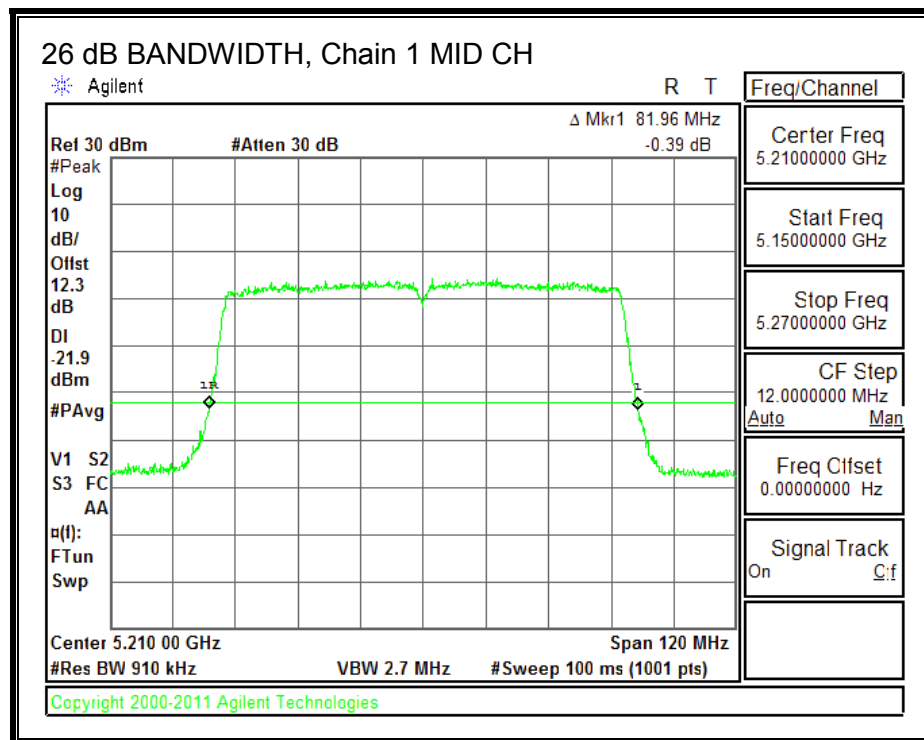
RESULTS

Channel	Frequency (MHz)	26 dB BW Chain 0 (MHz)	26 dB BW Chain 1 (MHz)
Mid	5210	82.32	81.96

26 dB BANDWIDTH, Chain 0



26 dB BANDWIDTH, Chain 1



9.11.2. 99% BANDWIDTH

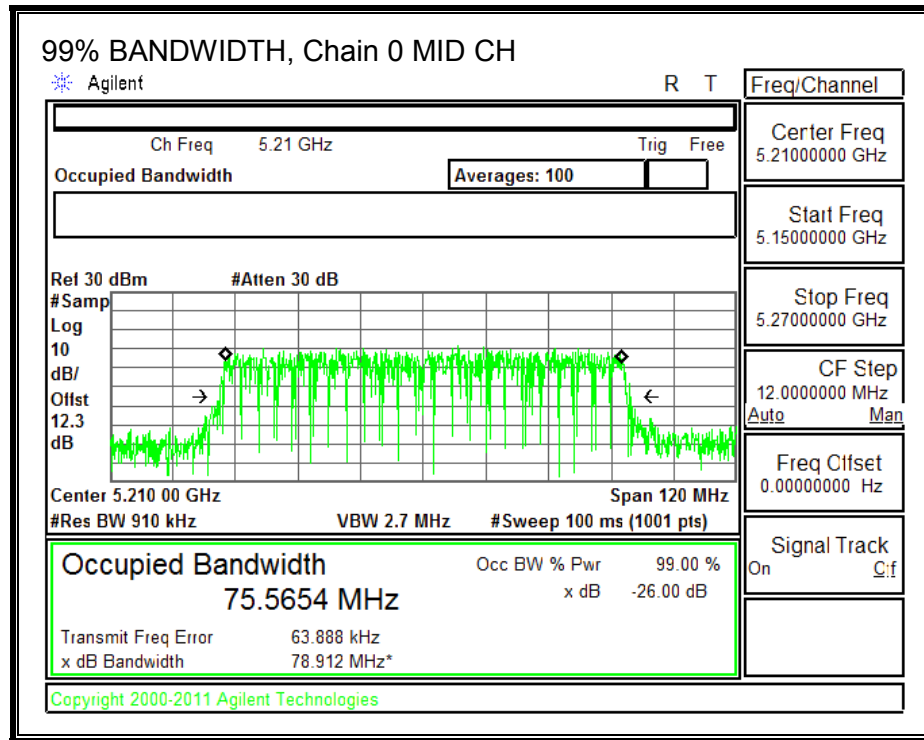
LIMITS

None; for reporting purposes only.

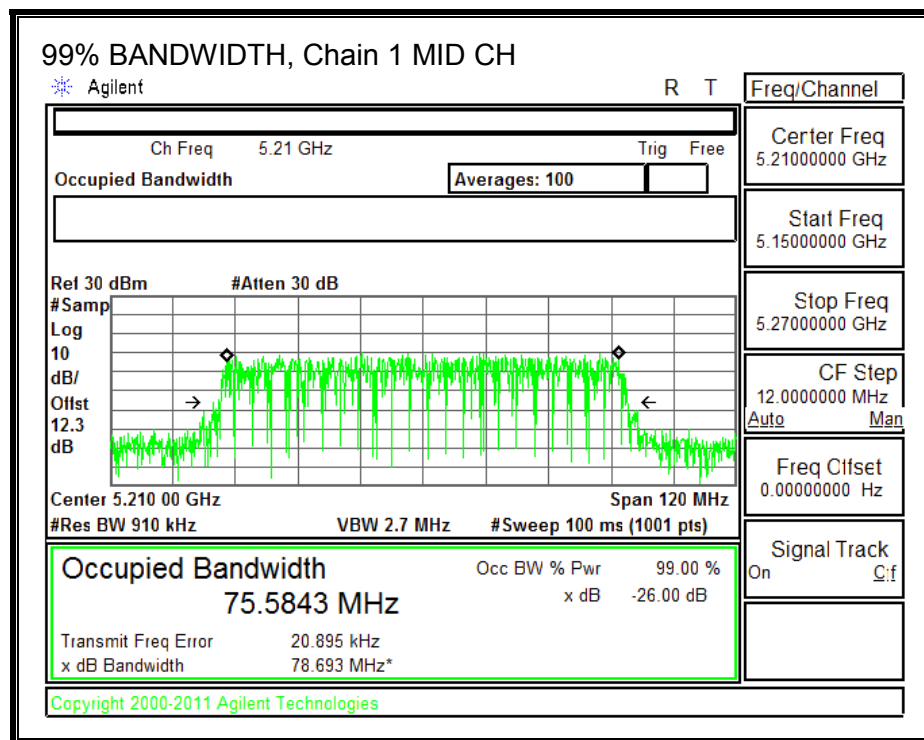
RESULTS

Channel	Frequency (MHz)	99% BW Chain 0 (MHz)	99% BW Chain 1 (MHz)
Mid	5210	75.5654	75.5843

99% BANDWIDTH, Chain 0



99% BANDWIDTH, Chain 1



9.11.3. OUTPUT POWER AND PSD

LIMITS

FCC §15.407 (a) (1)

(iv) For mobile and portable client devices in the 5.15-5.25 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed 250 mW provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

DIRECTIONAL ANTENNA GAIN

The TX chains are uncorrelated and the antenna gain is unequal among the chains. The directional gain is:

Chain 0 Antenna Gain (dBi)	Chain 1 Antenna Gain (dBi)	Uncorrelated Chains Directional Gain (dBi)
3.11	2.90	3.01

RESULTS

Antenna Gain and Limits

Channel	Frequency (MHz)	Directional Gain for Power (dBi)	Directional Gain for PSD (dBi)	Power Limit (dBm)	PSD Limit (dBm)
Mid	5210	3.01	3.01	24.00	11.00

Duty Cycle CF (dB)	0.22	Included in Calculations of Corr'd Power & PSD
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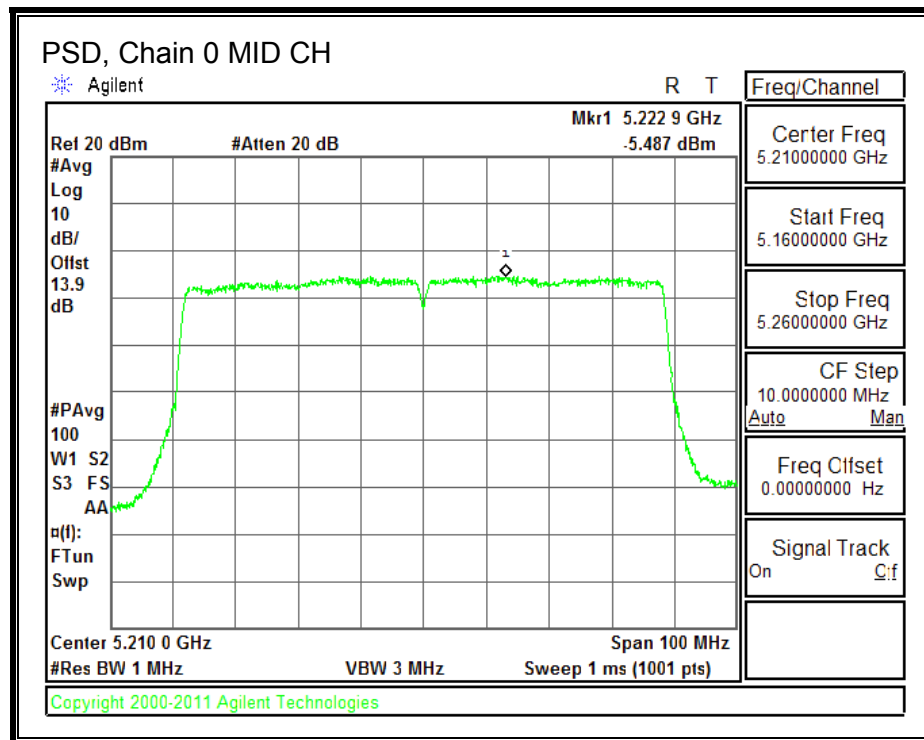
Output Power Results

Channel	Frequency (MHz)	Chain 0 Meas Power (dBm)	Chain 1 Meas Power (dBm)	Total Corr'd Power (dBm)	Power Limit (dBm)	Power Margin (dB)
Mid	5210	11.74	11.77	14.99	24.00	-9.01

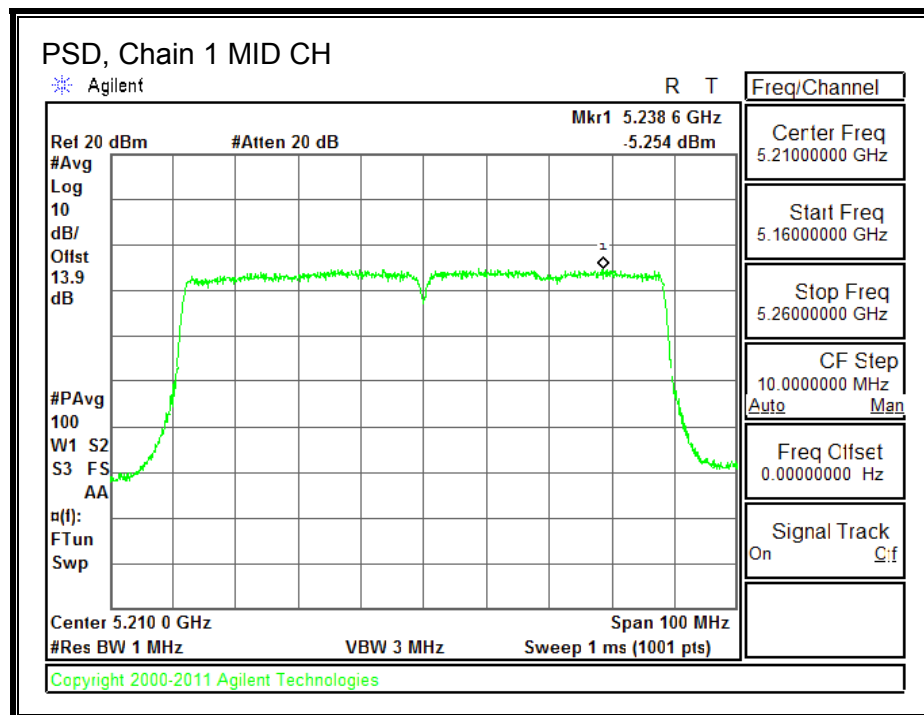
PSD Results

Channel	Frequency (MHz)	Chain 0 Meas PSD (dBm)	Chain 1 Meas PSD (dBm)	Total Corr'd PSD (dBm)	PSD Limit (dBm)	PSD Margin (dB)
Mid	5210	-5.49	-5.25	-2.14	11.00	-13.14

PSD, Chain 0



PSD, Chain 1



9.12. 802.11ac VHT80 2TX BF IN THE 5.2 GHz BAND

Refer to Section 9.10, 802.11ac VHT80 2Tx CDD MODE IN THE 5.2 GHz BAND

The power per chain used for 802.11ac VHT80 2TX CDD IN THE 5.2 GHz mode is the same power per chain that will be for 802.11ac VHT80 2TX BF IN THE 5.2 GHz mode. However, since BF is correlated and CDD is uncorrelated for output power, the section below for output power using correlated antenna gain for this mode shows it is still compliant.

9.12.1. OUTPUT POWER

LIMITS

FCC §15.407 (a) (1)

(iv) For mobile and portable client devices in the 5.15-5.25 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed 250 mW provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

DIRECTIONAL ANTENNA GAIN

The TX chains are correlated and the antenna gain is unequal among the chains. The directional gain is:

Chain 0 Antenna Gain (dBi)	Chain 1 Antenna Gain (dBi)	Correlated Chains Directional Gain (dBi)
3.11	2.90	6.02

RESULTS

Channel	Frequency (MHz)	Directional Gain for Power (dBi)	Power Limit (dBm)
Mid	5210	6.02	23.98

Duty Cycle CF (dB)	0.26	Included in Calculations of Corr'd Power
--------------------	------	--

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)
Mid	5210	11.73	11.78	15.03	23.98	-8.95

9.13. 802.11a 1TX MODE IN THE 5.3 GHz BAND

9.13.1. 26 dB BANDWIDTH

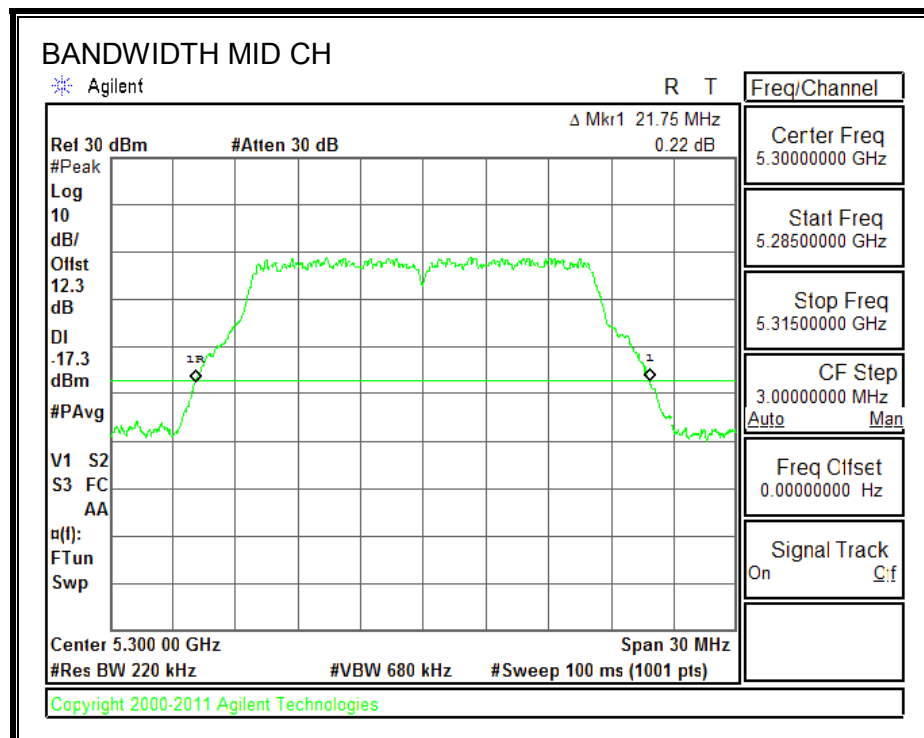
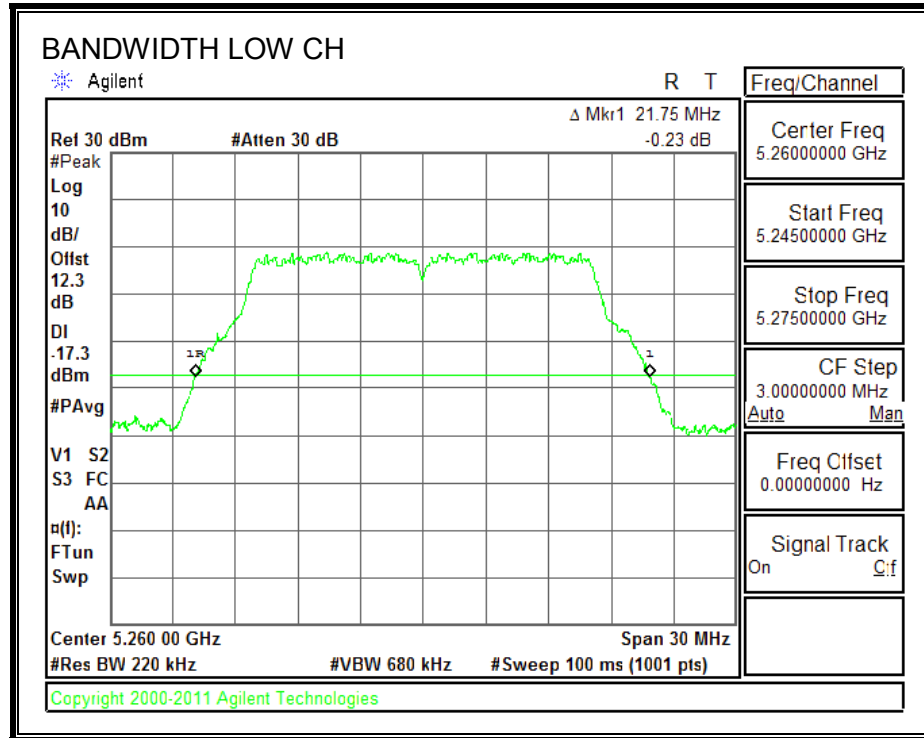
LIMITS

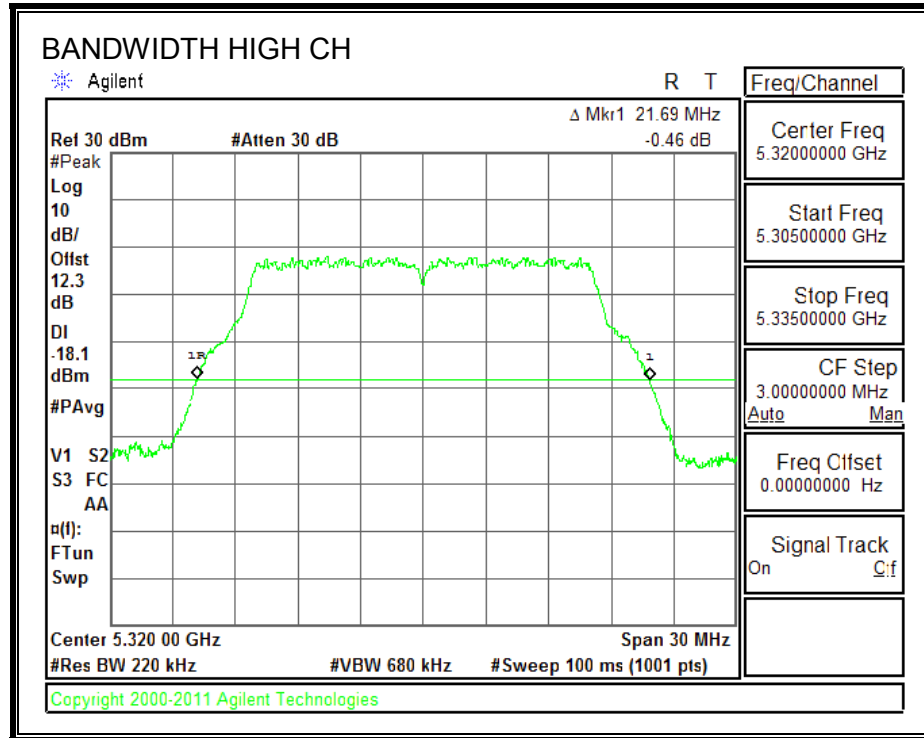
None; for reporting purposes only.

RESULTS

Channel	Frequency (MHz)	26 dB Bandwidth (MHz)
Low	5260	21.75
Mid	5300	21.75
High	5320	21.69

26 dB BANDWIDTH





9.13.2. 99% BANDWIDTH

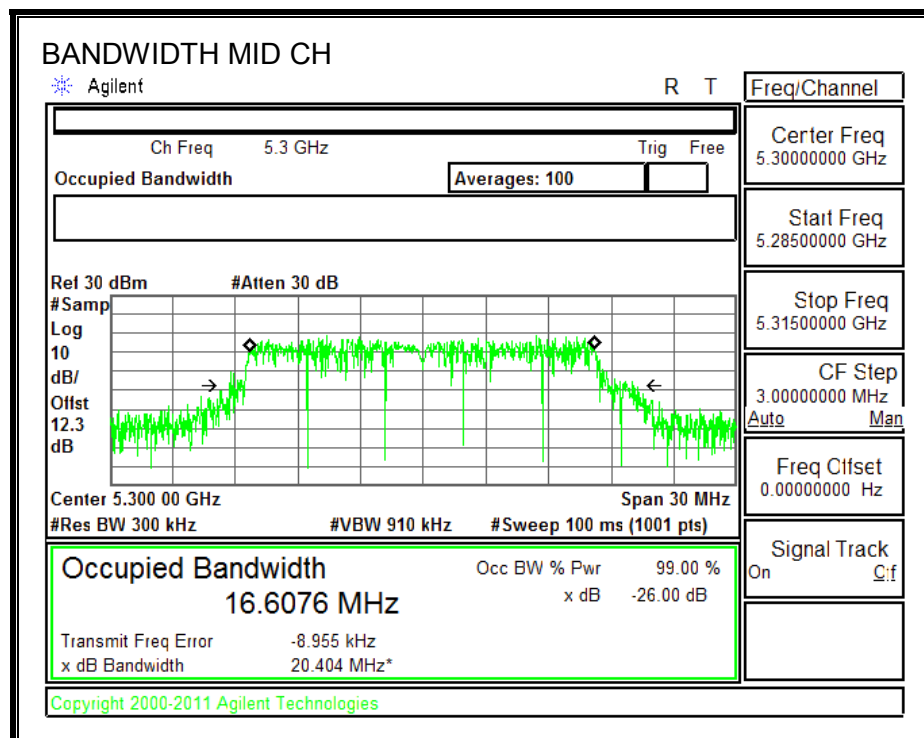
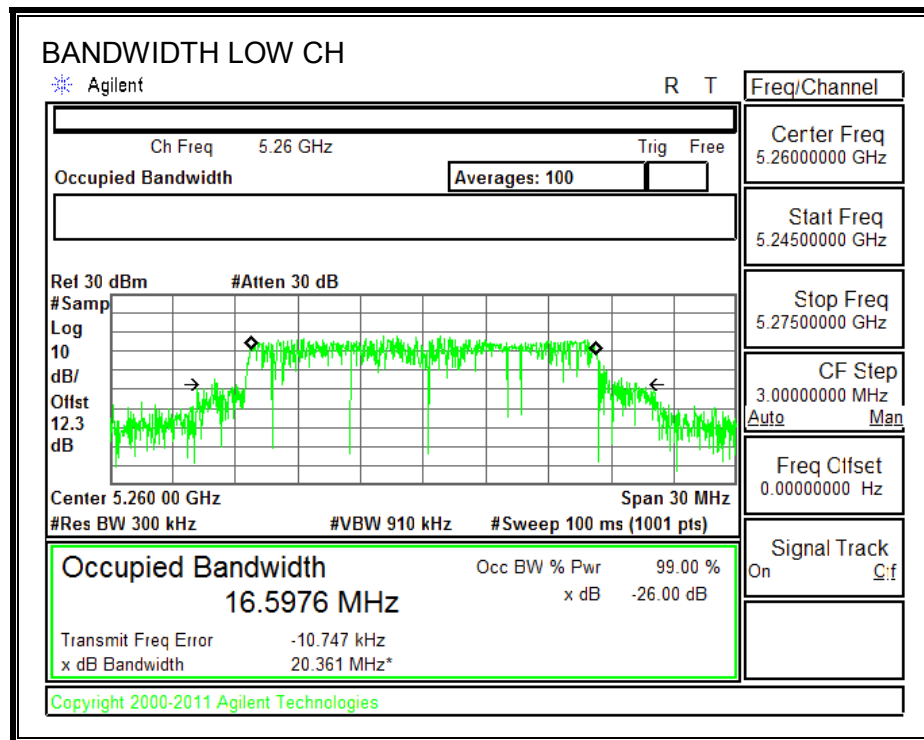
LIMITS

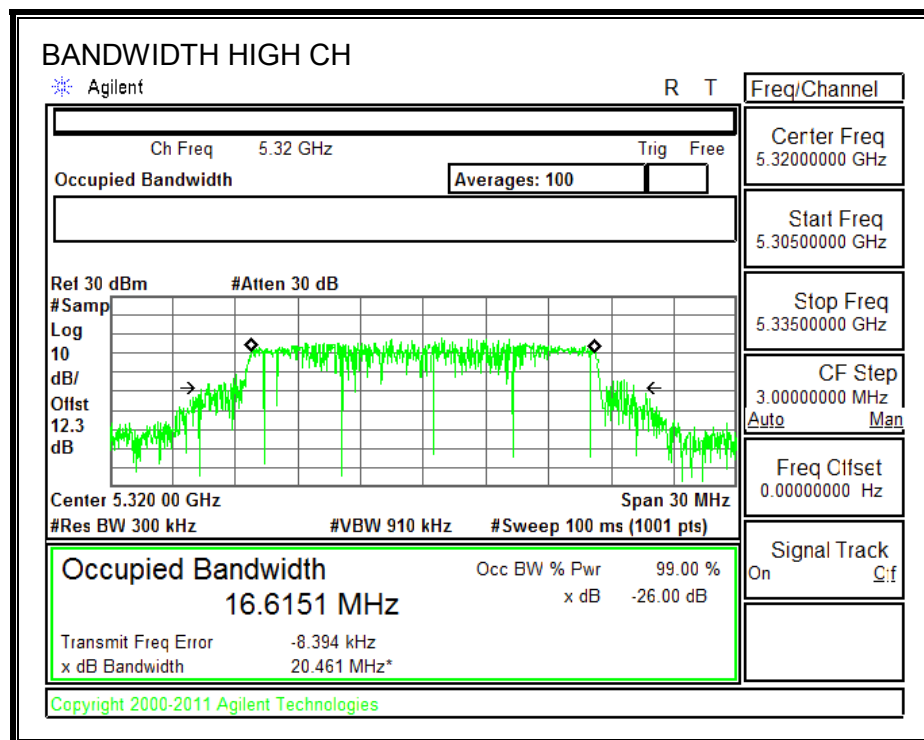
None; for reporting purposes only.

RESULTS

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	5260	16.5976
Mid	5300	16.6076
High	5320	16.6151

99% BANDWIDTH





9.13.3. OUTPUT POWER AND PSD

LIMITS

FCC §15.407 (a) (2)

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 $11 \text{ dBm} + 10 \log B$, where B is the 26–dB emission bandwidth in MHz. In addition, the maximum 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.

DIRECTIONAL ANTENNA GAIN

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

ANTENNA 0

Antenna Gain (dBi)
3.05

ANTENNA 1

Antenna Gain (dBi)
3.33

RESULTS

Bandwidth, Antenna Gain, and Limits

Channel	Frequency (MHz)	Min 26 dB BW (MHz)	Directional Gain (dBi)	Power Limit (dBm)	PSD Limit (dBm)
Low	5260	21.75	3.33	24.00	11.00
Mid	5300	21.75	3.33	24.00	11.00
High	5320	21.69	3.33	24.00	11.00

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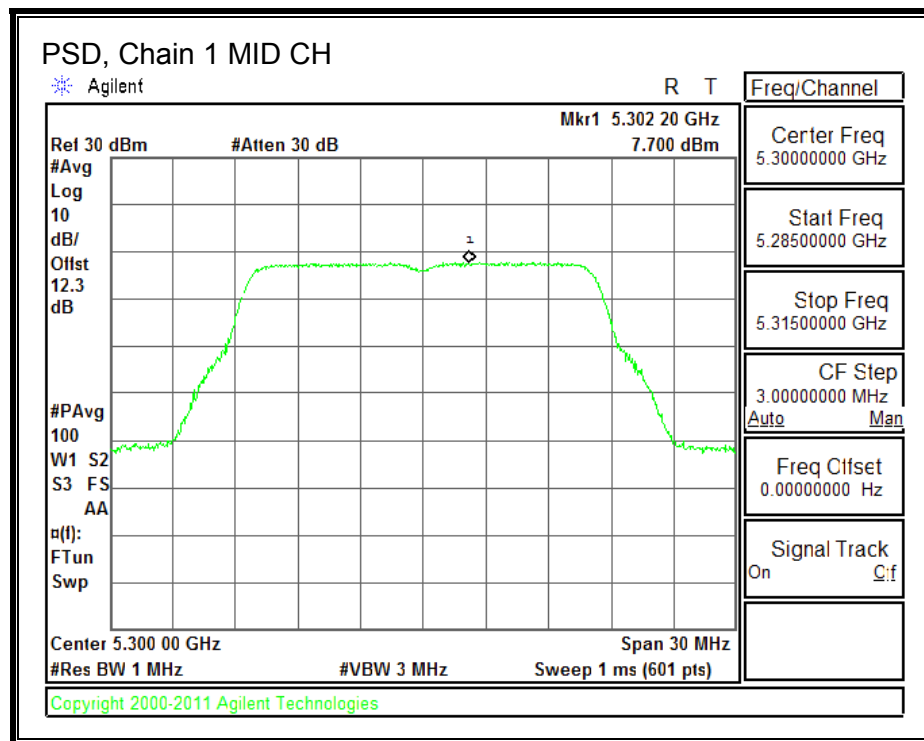
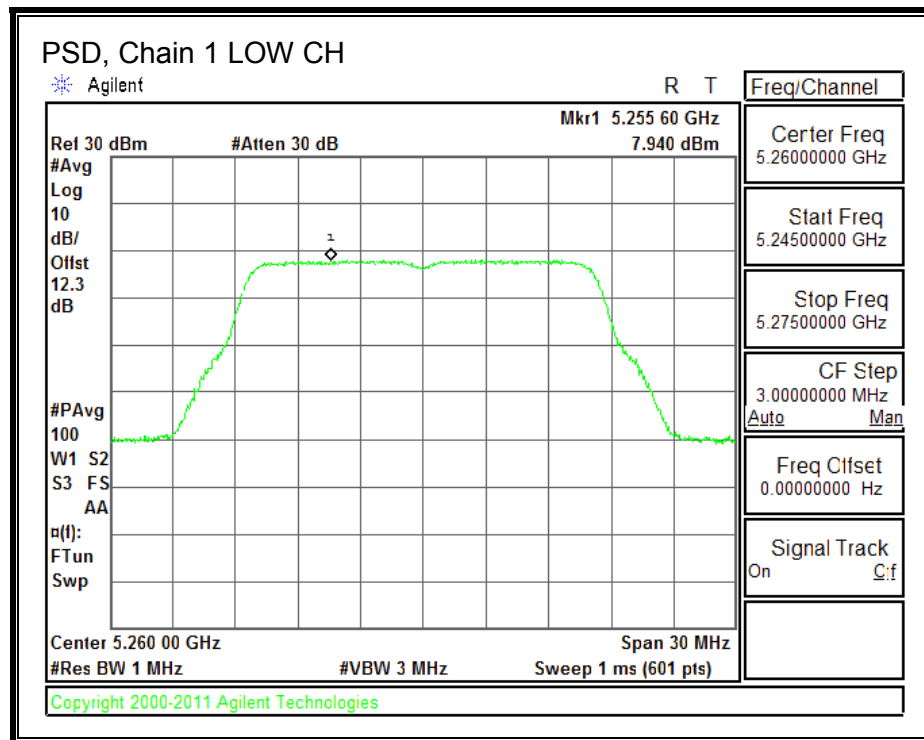
Output Power Results

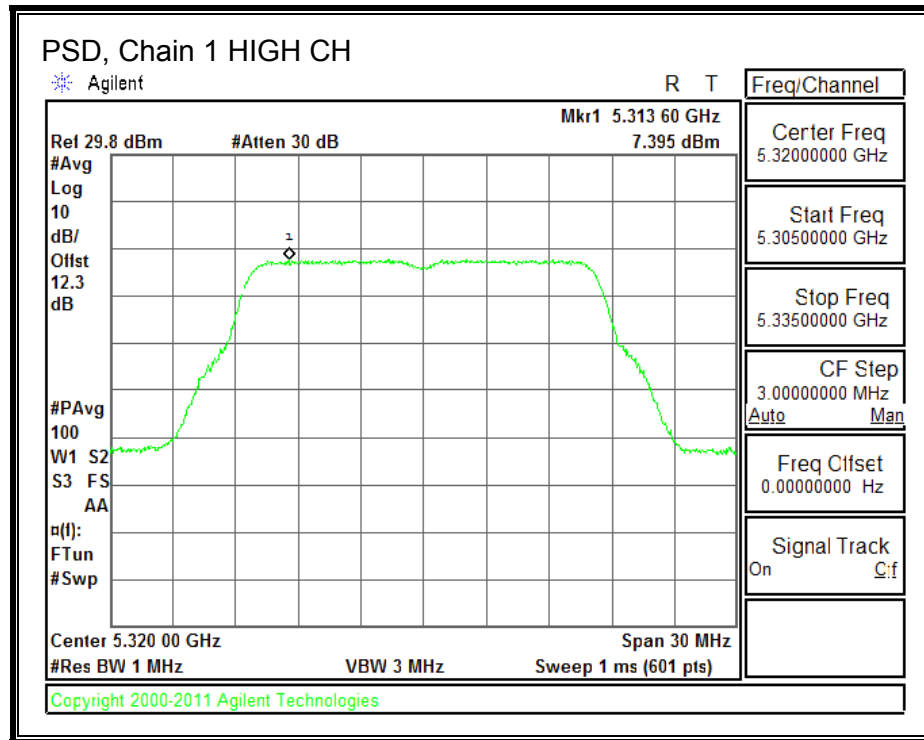
Channel	Frequency (MHz)	Chain 1 Meas Power (dBm)	Total Corr'd Power (dBm)	Power Limit (dBm)	Power Margin (dB)
Low	5260	17.98	17.98	24.00	-6.02
Mid	5300	17.97	17.97	24.00	-6.03
High	5320	17.44	17.44	24.00	-6.56

PSD Results

Channel	Frequency (MHz)	Chain 1 Meas PSD (dBm)	Total Corr'd PSD (dBm)	PSD Limit (dBm)	PSD Margin (dB)
Low	5260	7.94	7.94	11.00	-3.06
Mid	5300	7.70	7.70	11.00	-3.30
High	5320	7.40	7.40	11.00	-3.61

PSD, Chain 1





9.14. 802.11n HT20 2TX CDD MODE IN THE 5.3 GHz BAND

9.14.1. 26 dB BANDWIDTH

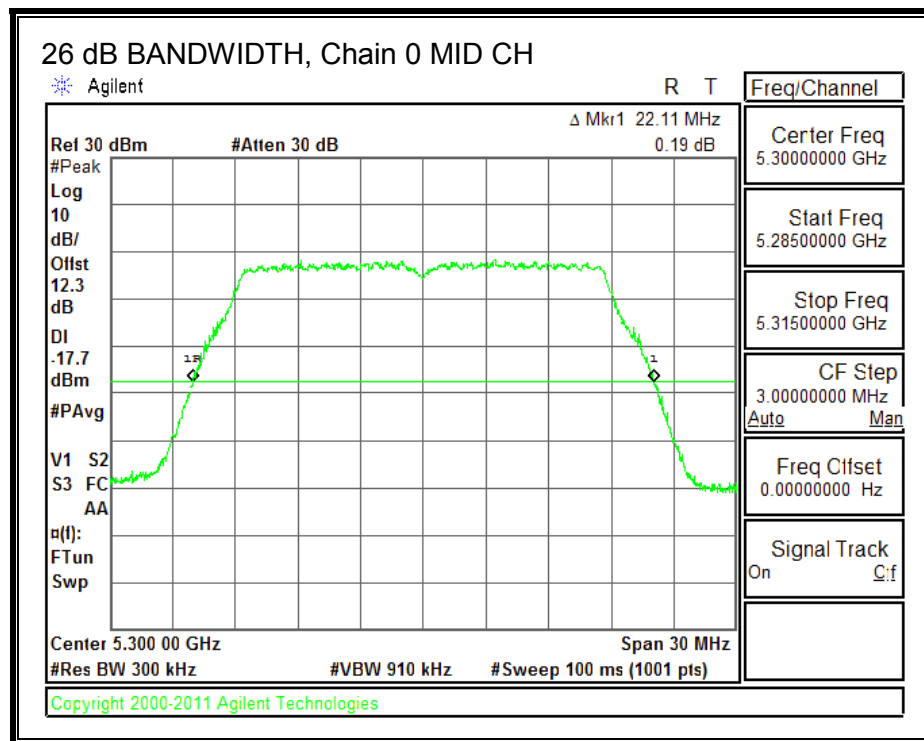
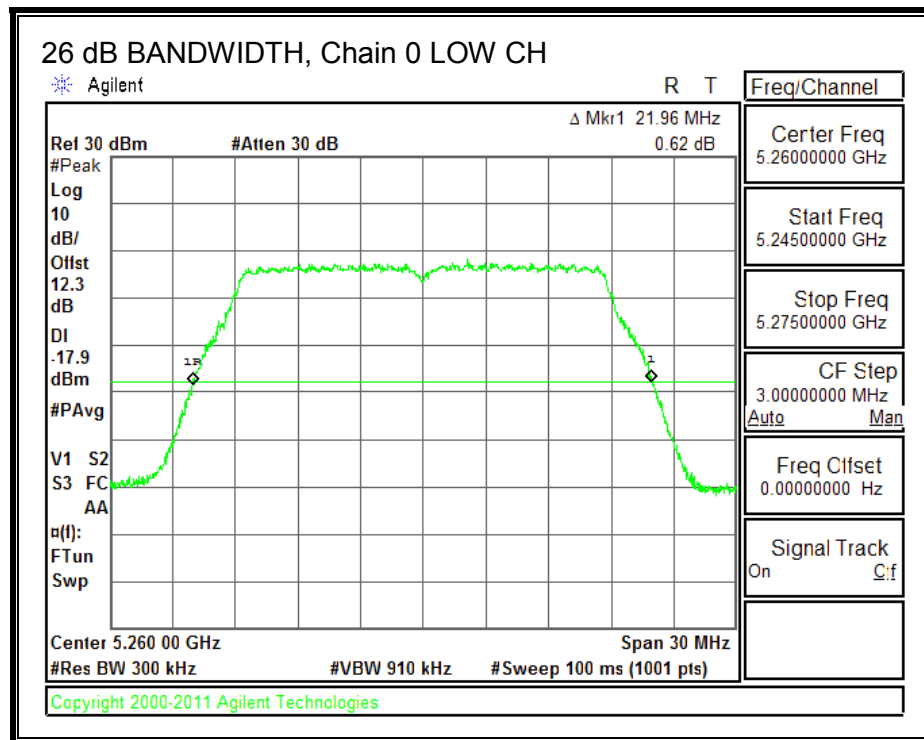
LIMITS

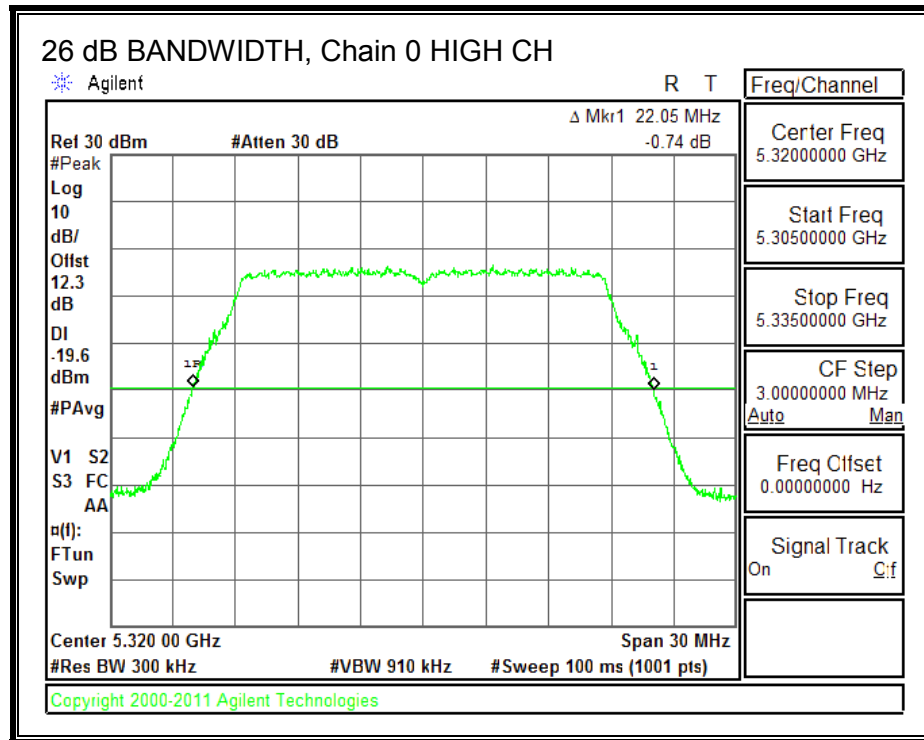
None; for reporting purposes only.

RESULTS

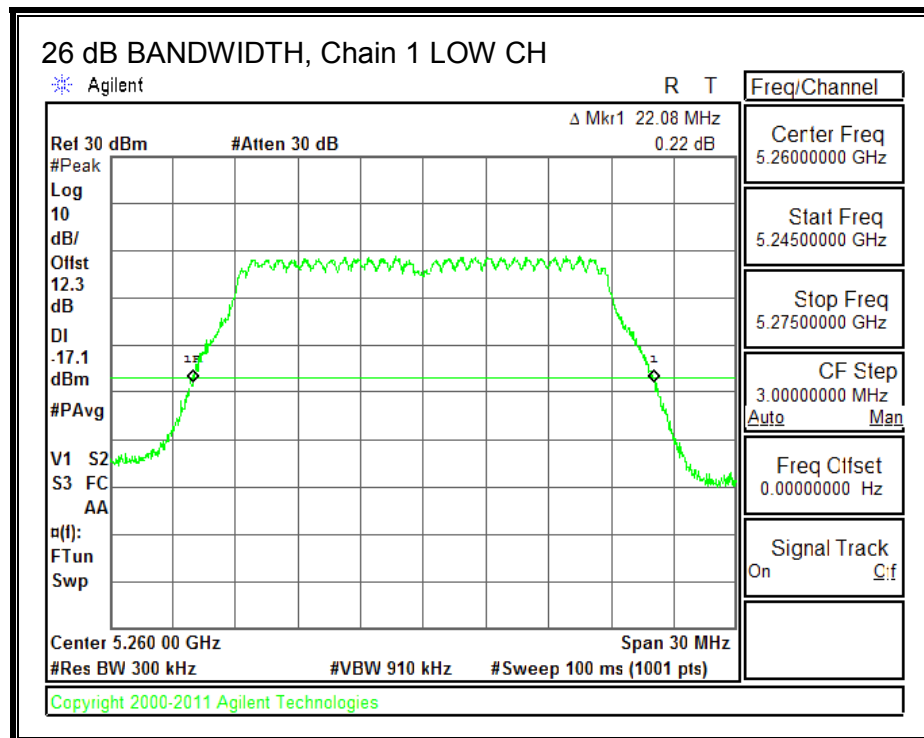
Channel	Frequency (MHz)	26 dB BW Chain 0 (MHz)	26 dB BW Chain 1 (MHz)
Low	5260	21.96	22.08
Mid	5300	22.11	22.02
High	5320	22.05	21.84

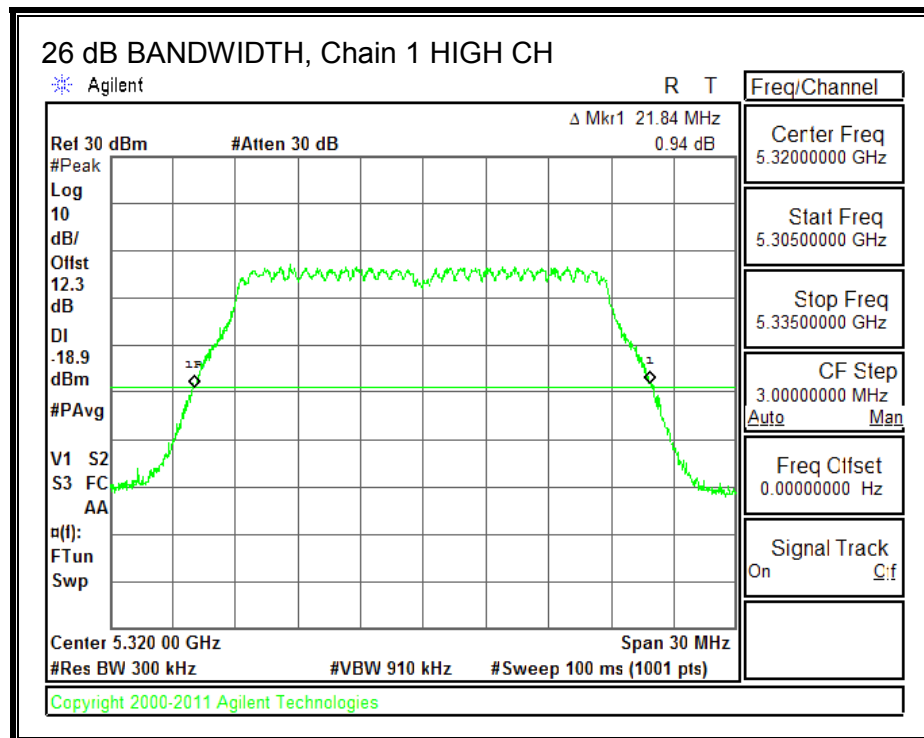
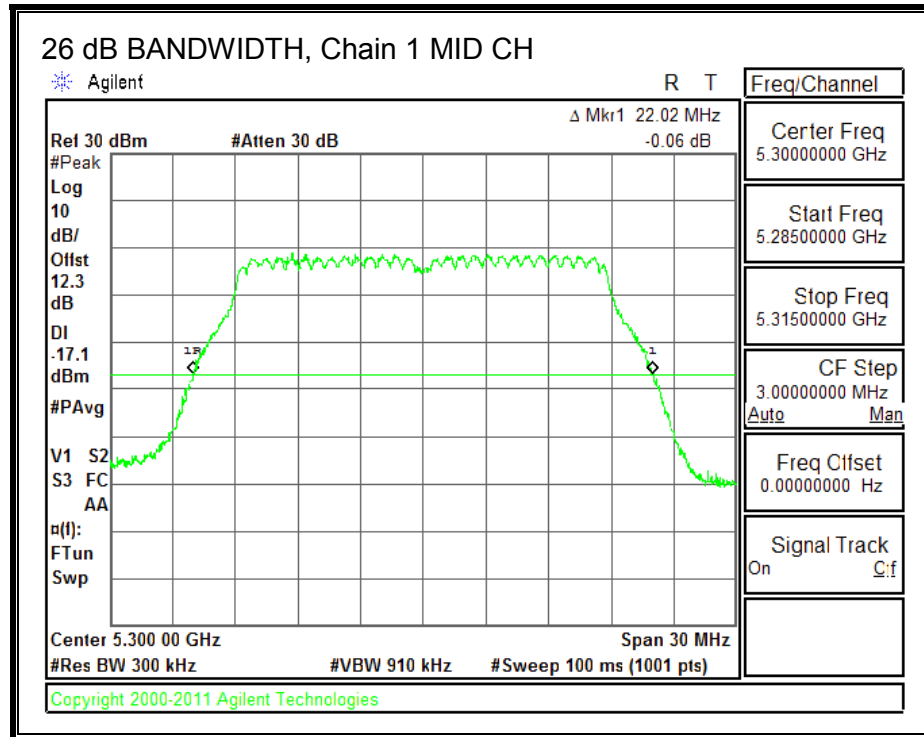
26 dB BANDWIDTH, Chain 0





26 dB BANDWIDTH, Chain 1





9.14.2. 99% BANDWIDTH

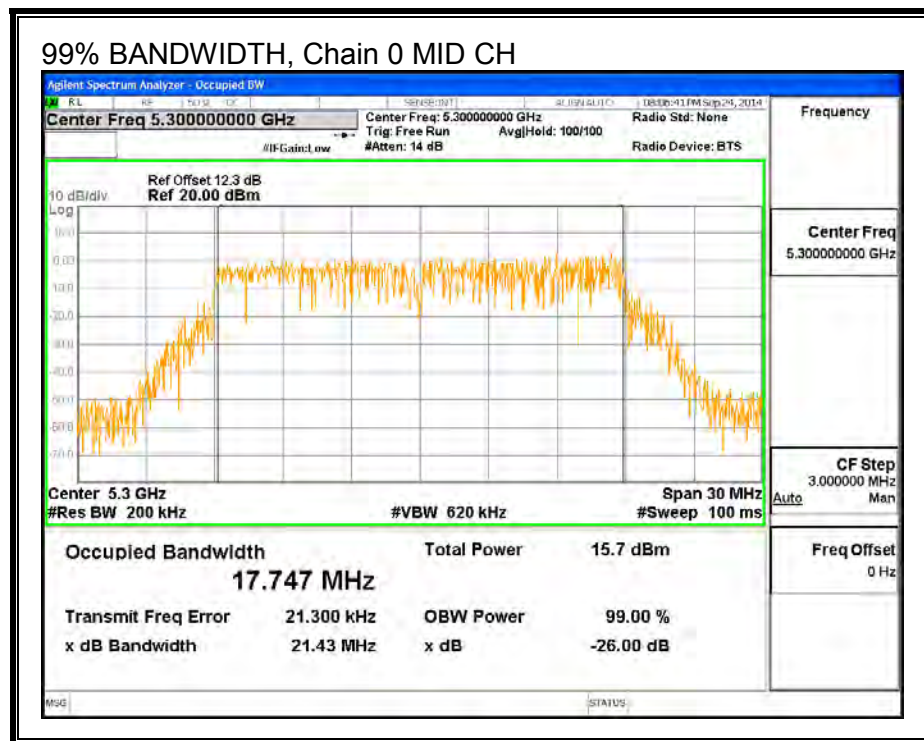
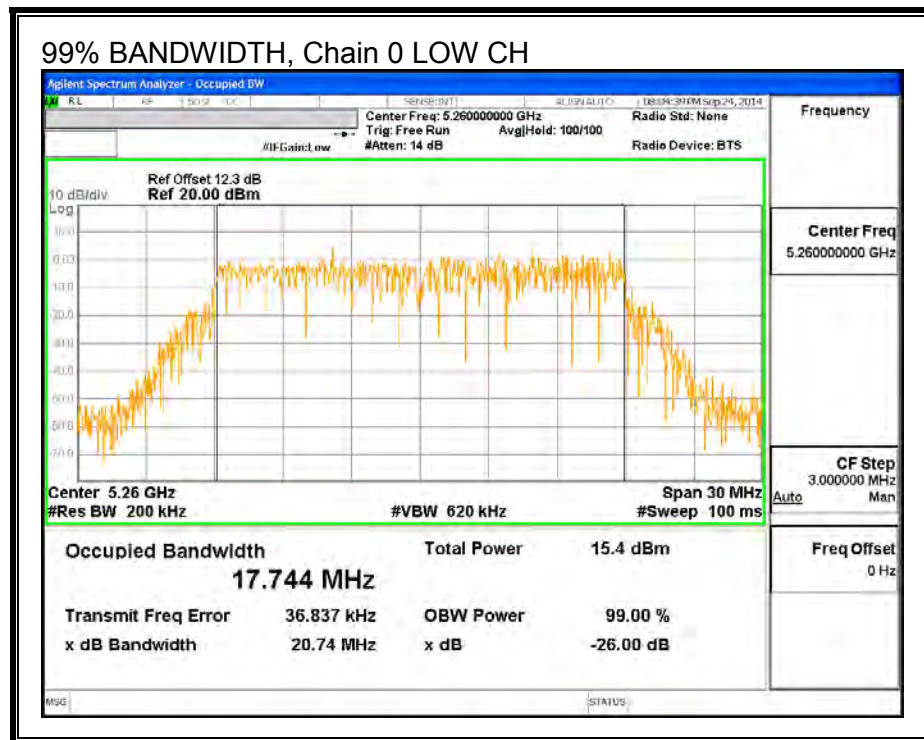
LIMITS

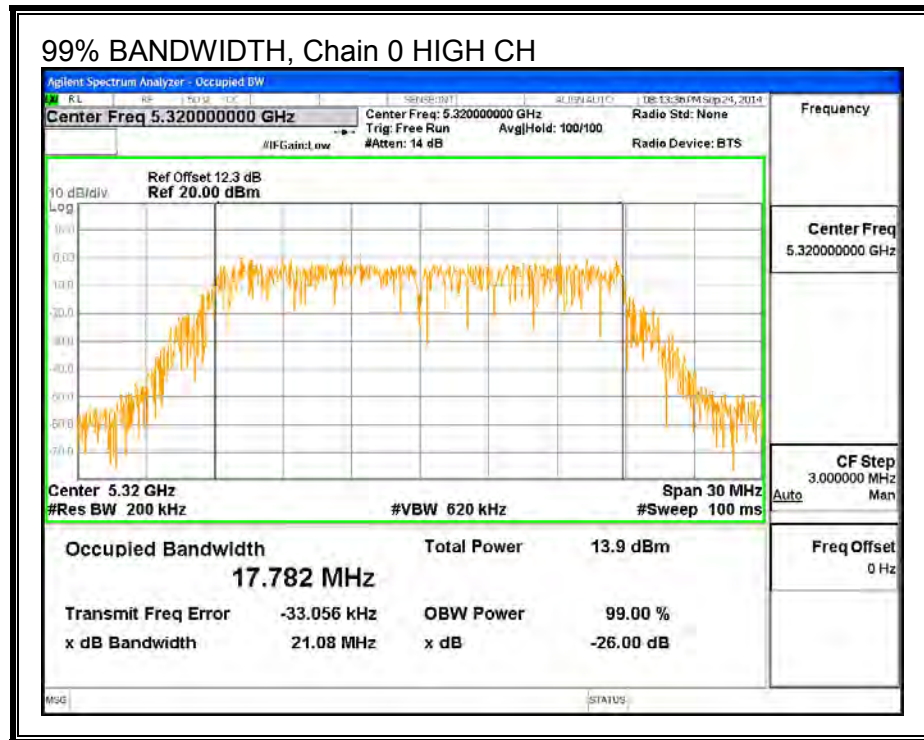
None; for reporting purposes only.

RESULTS

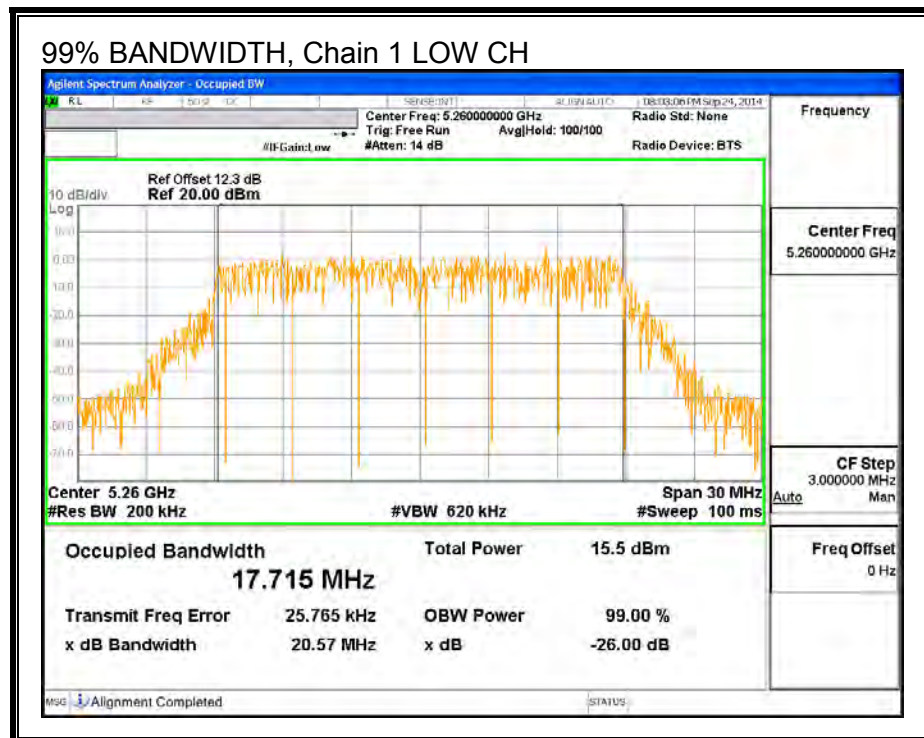
Channel	Frequency (MHz)	99% BW Chain 0 (MHz)	99% BW Chain 1 (MHz)
Low	5260	17.7440	17.7150
Mid	5300	17.7470	17.7540
High	5320	17.7820	17.6670

99% BANDWIDTH, Chain 0

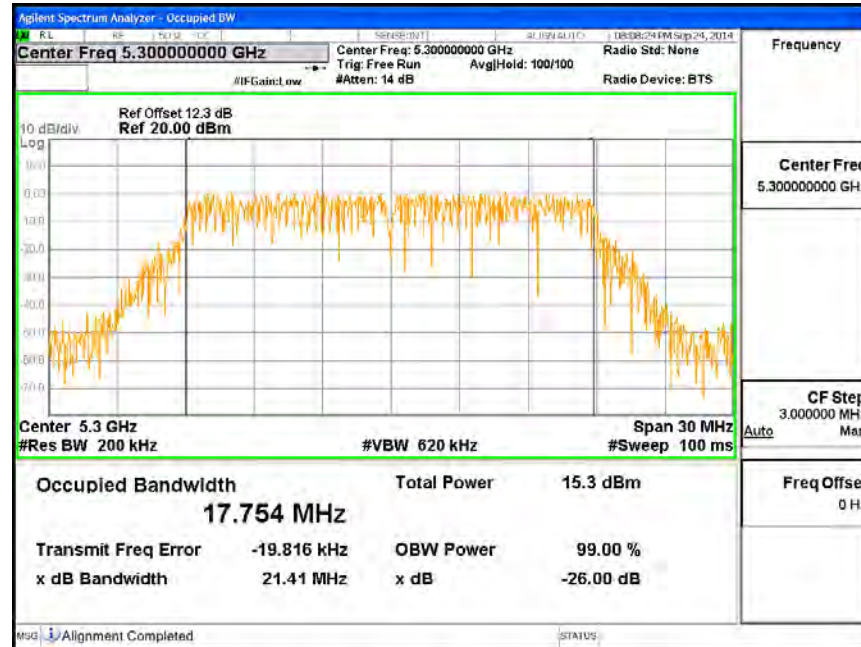




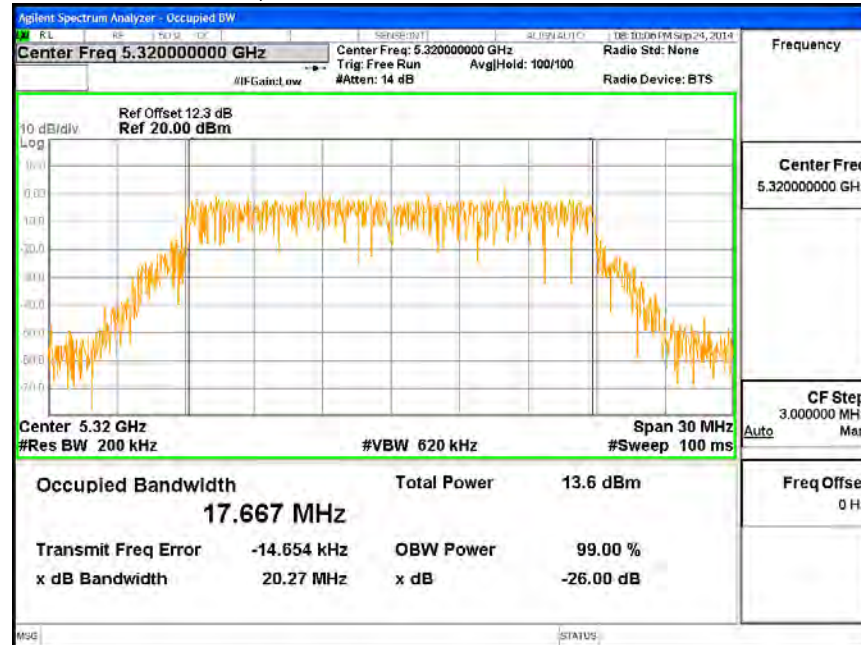
99% BANDWIDTH, Chain 1



99% BANDWIDTH, Chain 1 MID CH



99% BANDWIDTH, Chain 1 HIGH CH



9.14.3. OUTPUT POWER AND PSD

LIMITS

FCC §15.407 (a) (2)

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 $11 \text{ dBm} + 10 \log B$, where B is the 26–dB emission bandwidth in MHz. In addition, the maximum 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.

DIRECTIONAL ANTENNA GAIN

The TX chains are uncorrelated and the antenna gain is unequal among the chains. The directional gain is:

Chain 0 Antenna Gain (dBi)	Chain 1 Antenna Gain (dBi)	Uncorrelated Chains Directional Gain (dBi)
3.05	3.33	3.19

The TX chains are correlated and the antenna gain is unequal among the chains. The directional gain is:

Chain 0 Antenna Gain (dBi)	Chain 1 Antenna Gain (dBi)	Correlated Chains Directional Gain (dBi)
3.05	3.33	6.20

RESULTS

Bandwidth, Antenna Gain and Limits

Channel	Frequency (MHz)	Min 26 dB BW (MHz)	Directional Gain for Power (dBi)	Directional Gain for PSD (dBi)	Power Limit (dBm)	PSD Limit (dBm)
Low	5260	21.96	3.19	6.20	24.00	10.80
Mid	5300	22.02	3.19	6.20	24.00	10.80
High	5320	21.84	3.19	6.20	24.00	10.80

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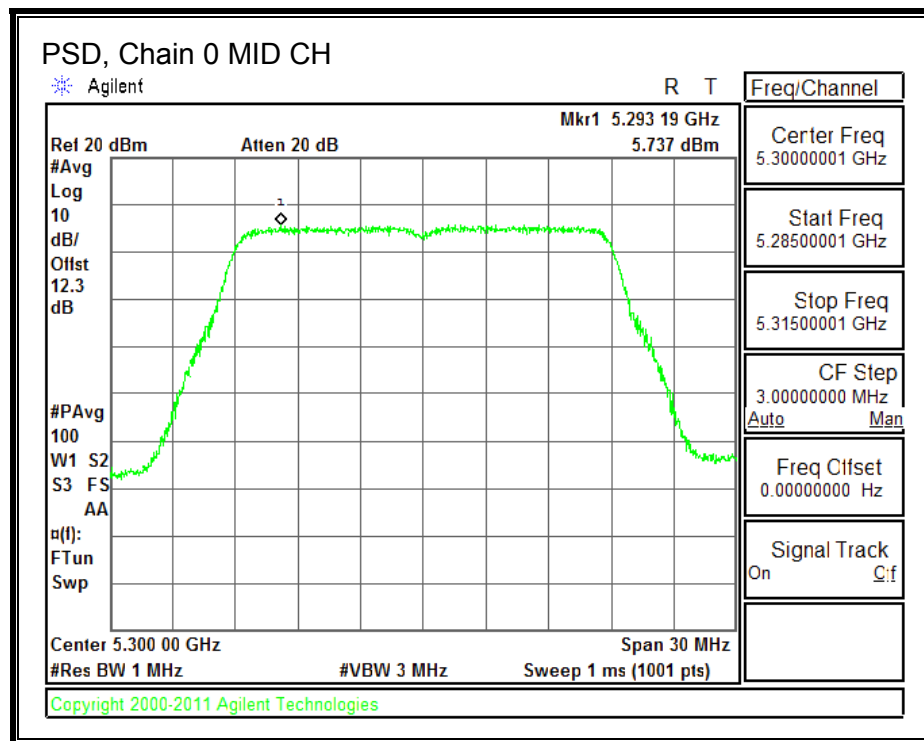
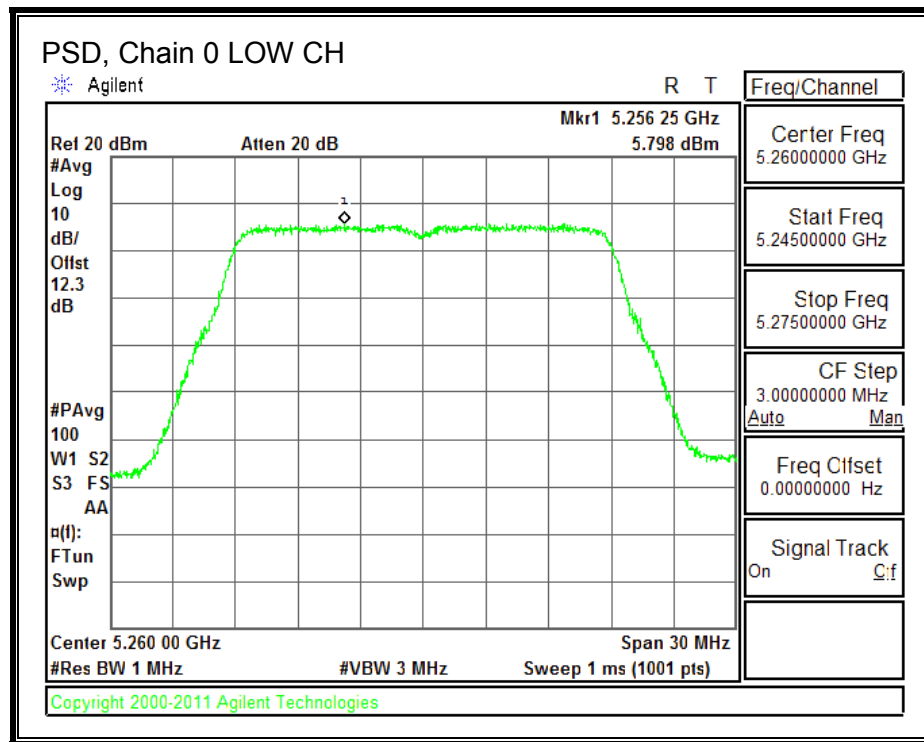
Output Power Results

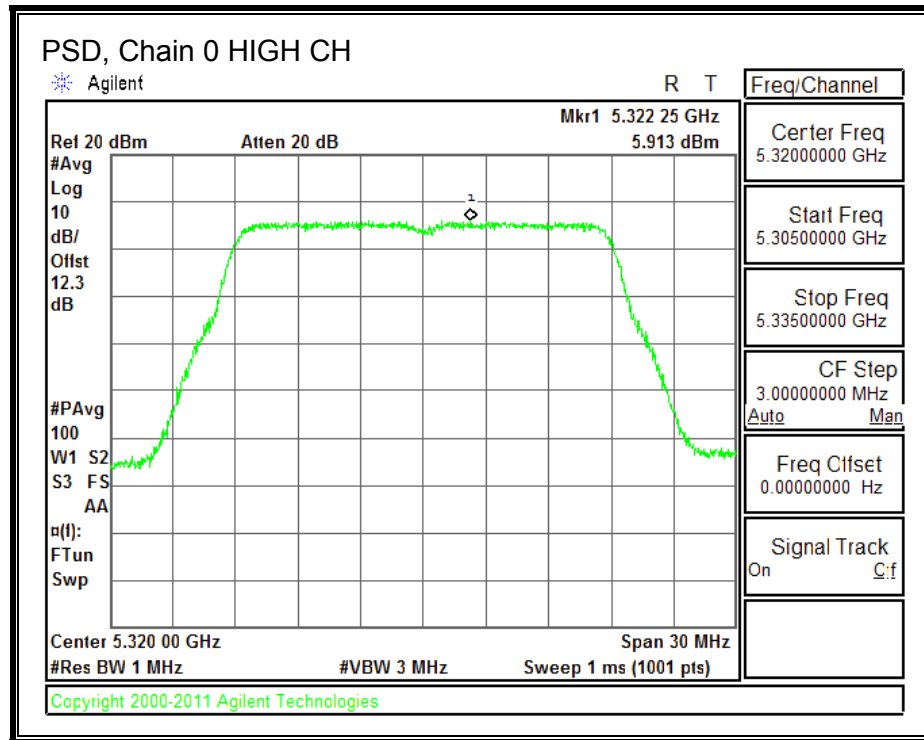
Channel	Frequency (MHz)	Chain 0 Meas Power (dBm)	Chain 1 Meas Power (dBm)	Total Corr'd Power (dBm)	Power Limit (dBm)	Power Margin (dB)
Low	5260	15.97	15.98	18.99	24.00	-5.01
Mid	5300	15.95	15.97	18.97	24.00	-5.03
High	5320	15.98	15.93	18.97	24.00	-5.03

PSD Results

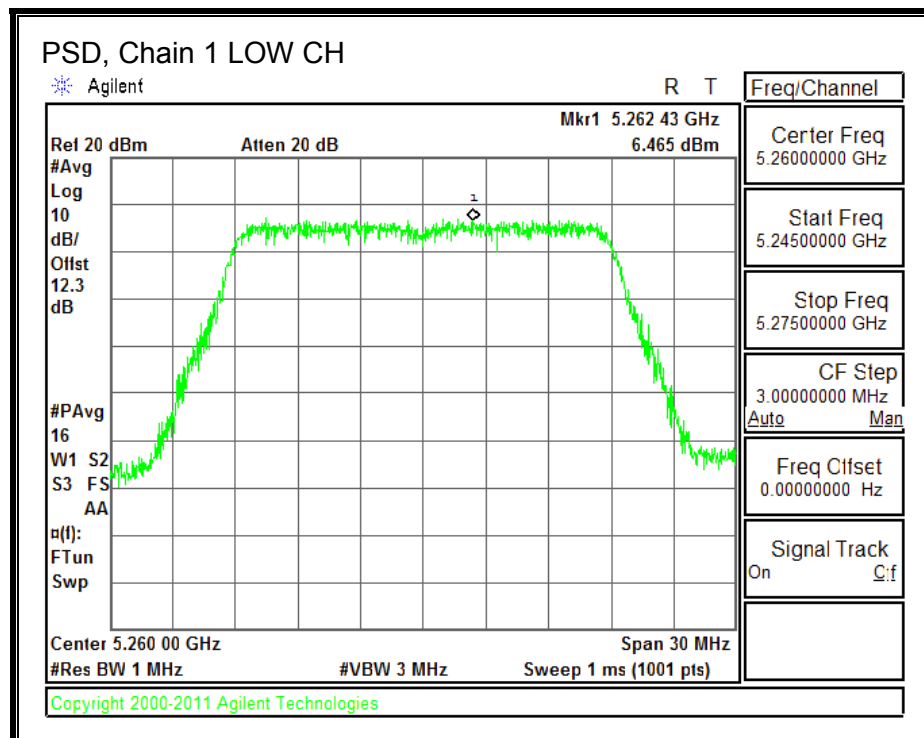
Channel	Frequency (MHz)	Chain 0 Meas PSD (dBm)	Chain 1 Meas PSD (dBm)	Total Corr'd PSD (dBm)	PSD Limit (dBm)	PSD Margin (dB)
Low	5260	5.80	6.47	9.15	10.80	-1.65
Mid	5300	5.74	6.09	8.93	10.80	-1.87
High	5320	5.91	6.23	9.09	10.80	-1.71

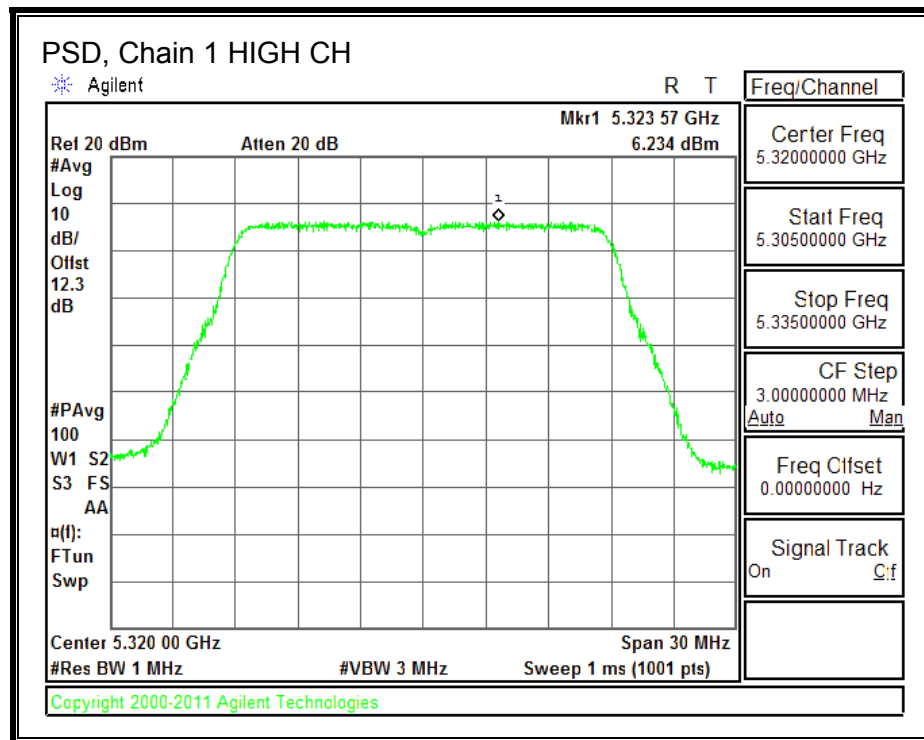
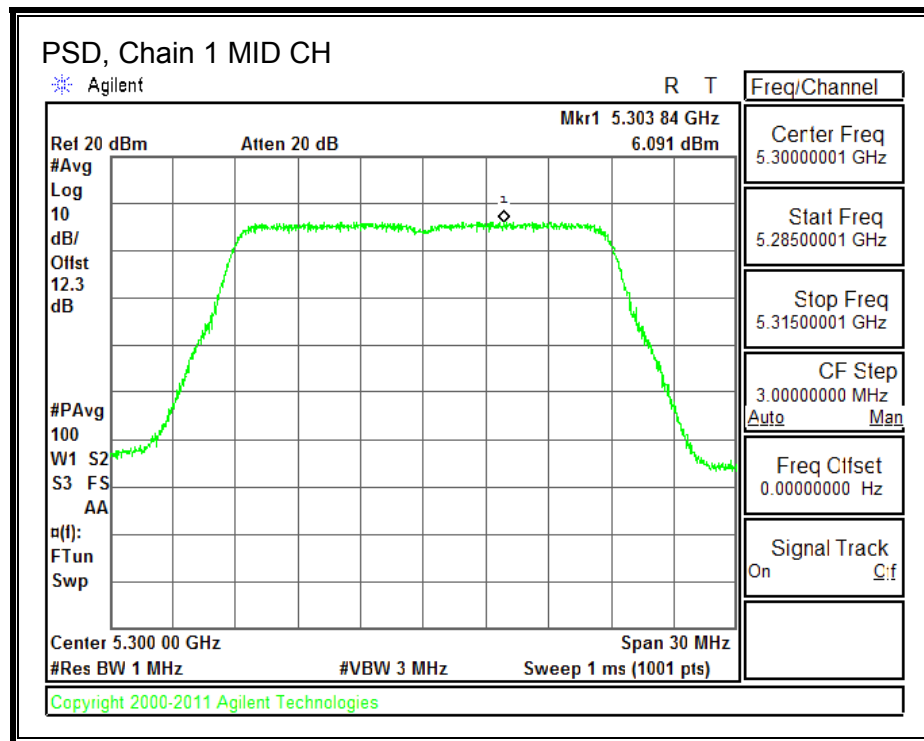
PSD, Chain 0





PSD, Chain 1





9.15. 802.11n HT20 2TX STBC MODE IN THE 5.3 GHz BAND

9.15.1. 26 dB BANDWIDTH

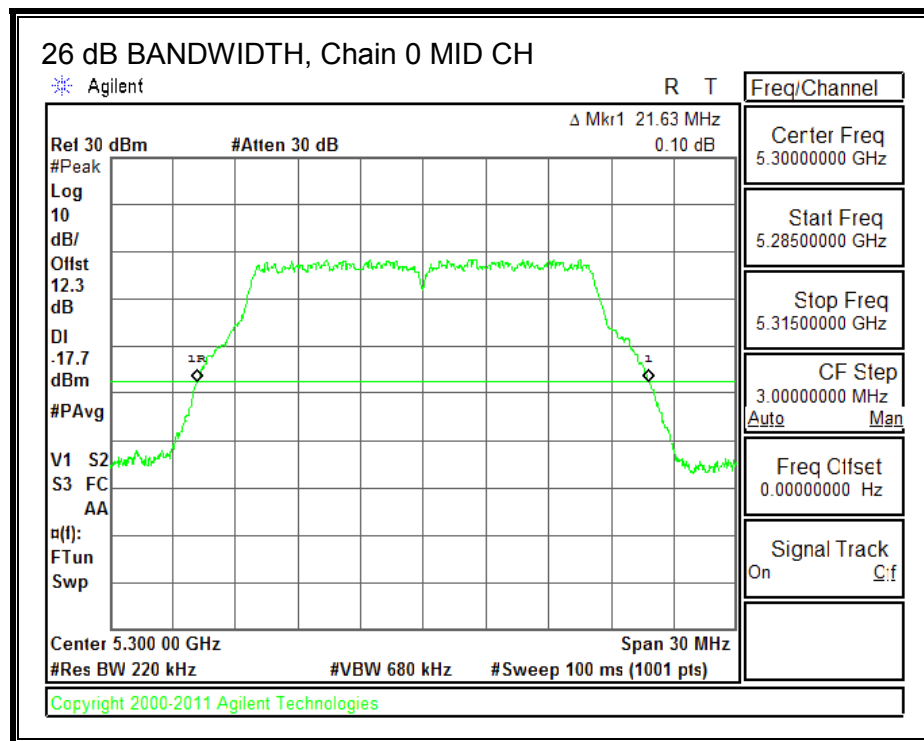
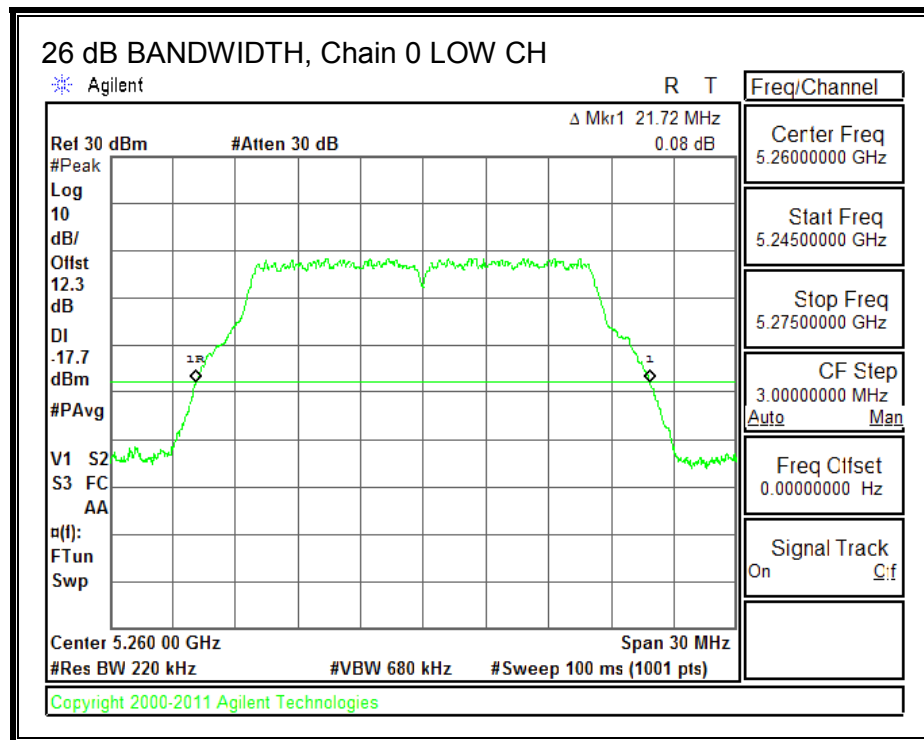
LIMITS

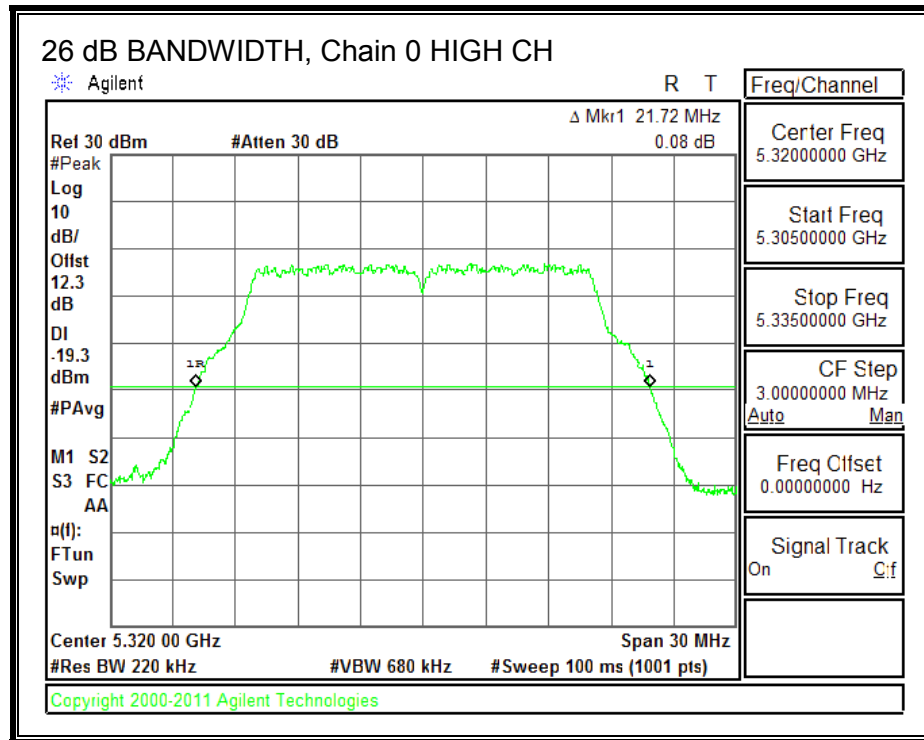
None; for reporting purposes only.

RESULTS

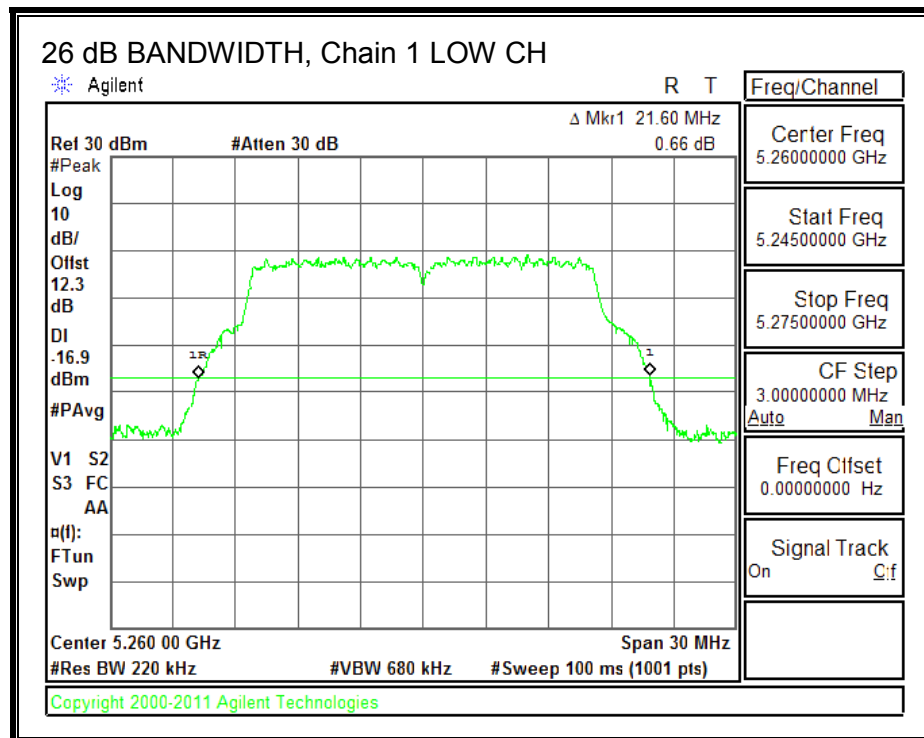
Channel	Frequency (MHz)	26 dB BW Chain 0 (MHz)	26 dB BW Chain 1 (MHz)
Low	5260	21.72	21.60
Mid	5300	21.63	21.57
High	5320	21.72	21.72

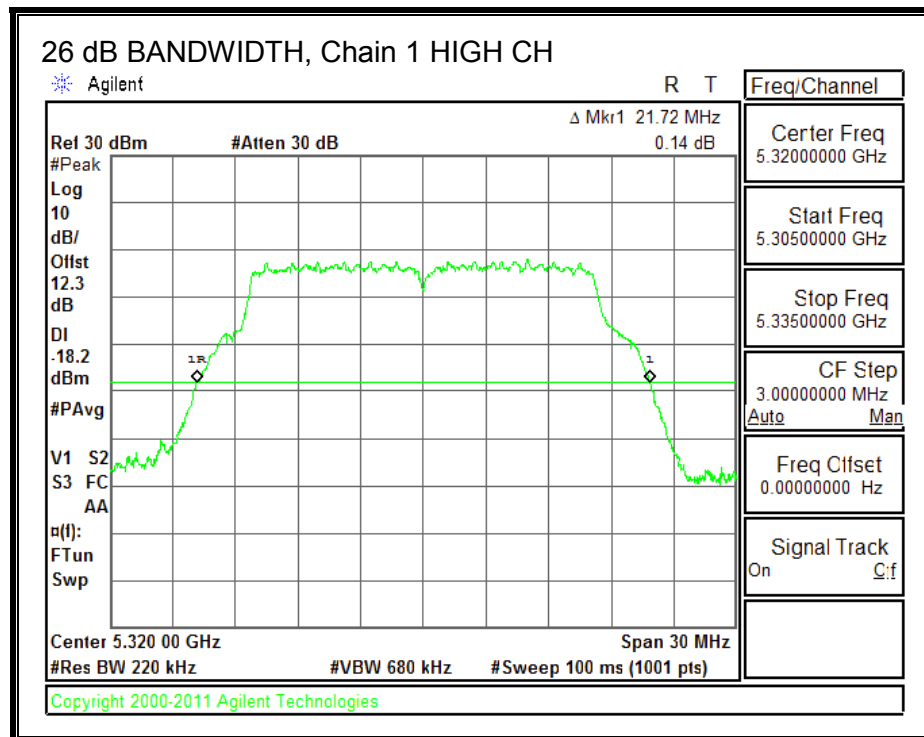
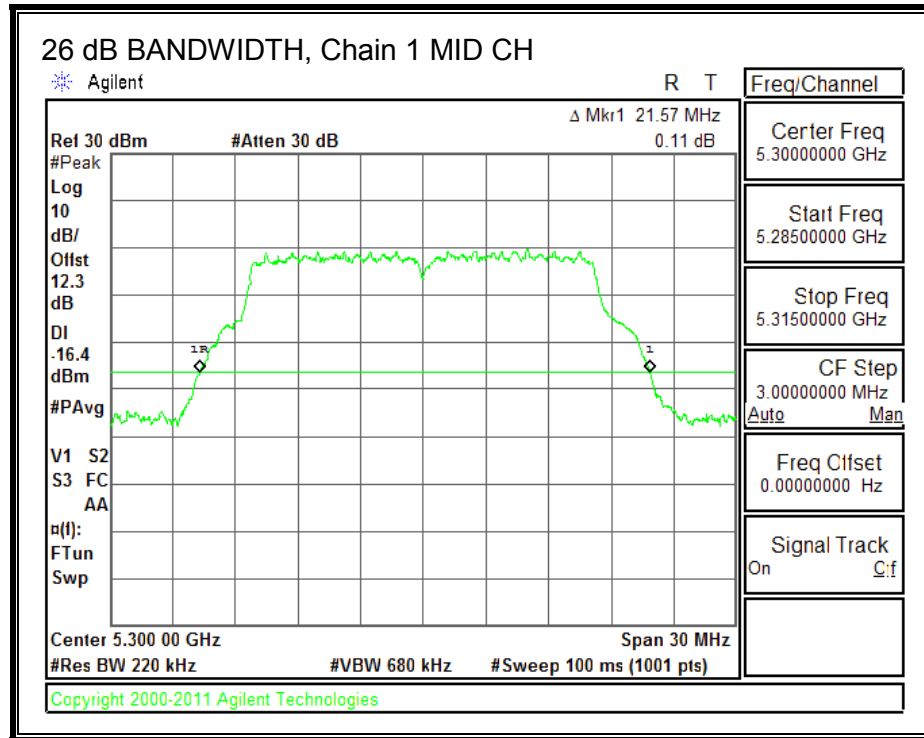
26 dB BANDWIDTH, Chain 0





26 dB BANDWIDTH, Chain 1





9.15.2. 99% BANDWIDTH

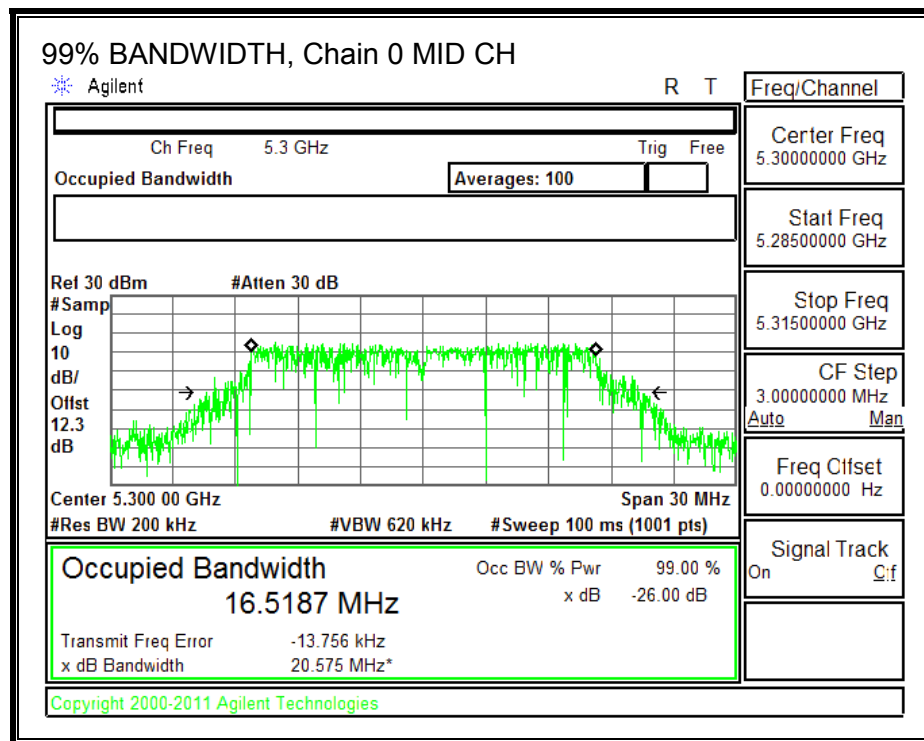
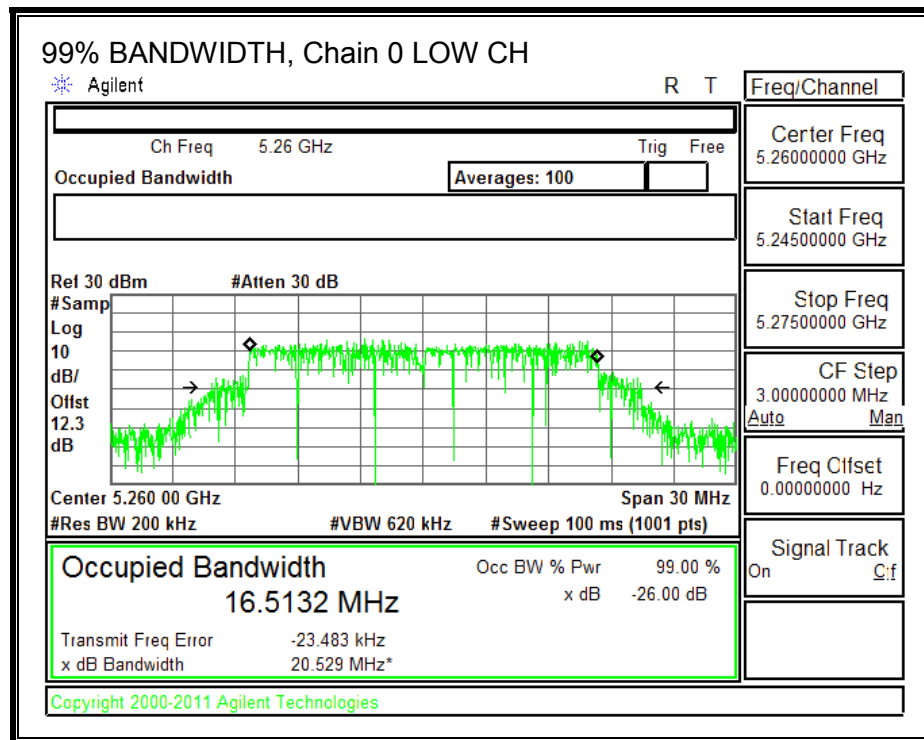
LIMITS

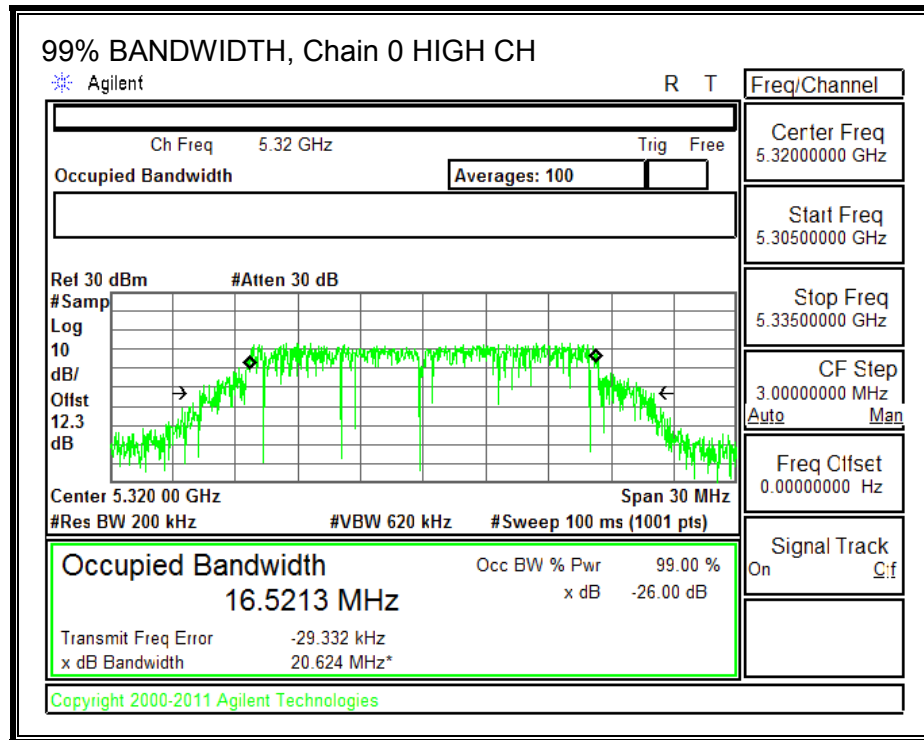
None; for reporting purposes only.

RESULTS

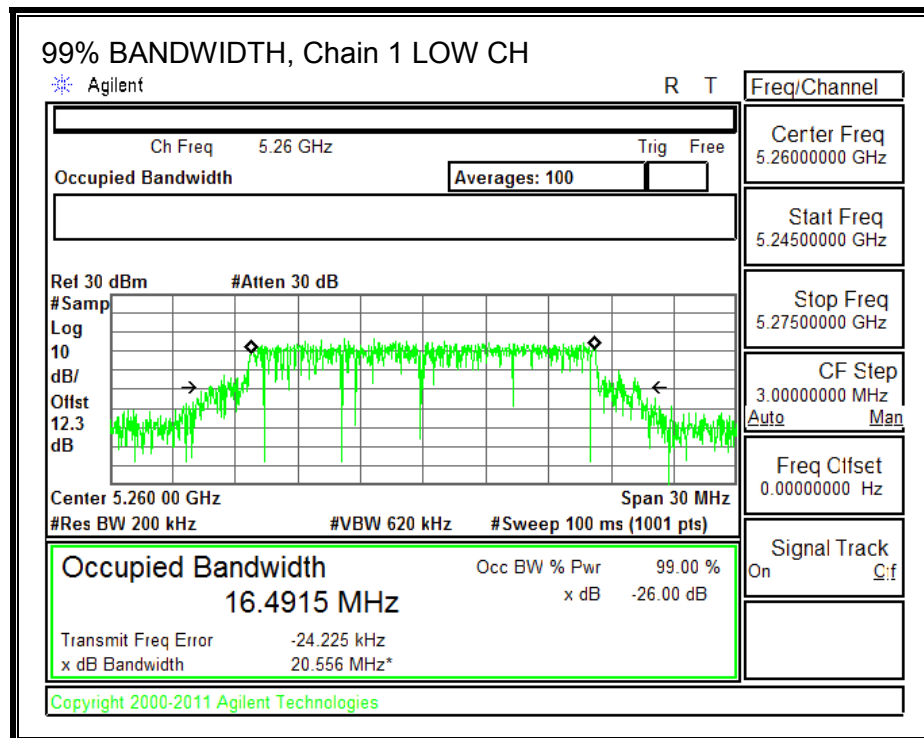
Channel	Frequency (MHz)	99% BW Chain 0 (MHz)	99% BW Chain 1 (MHz)
Low	5260	16.5132	16.4915
Mid	5300	16.5187	16.5162
High	5320	16.5213	16.5076

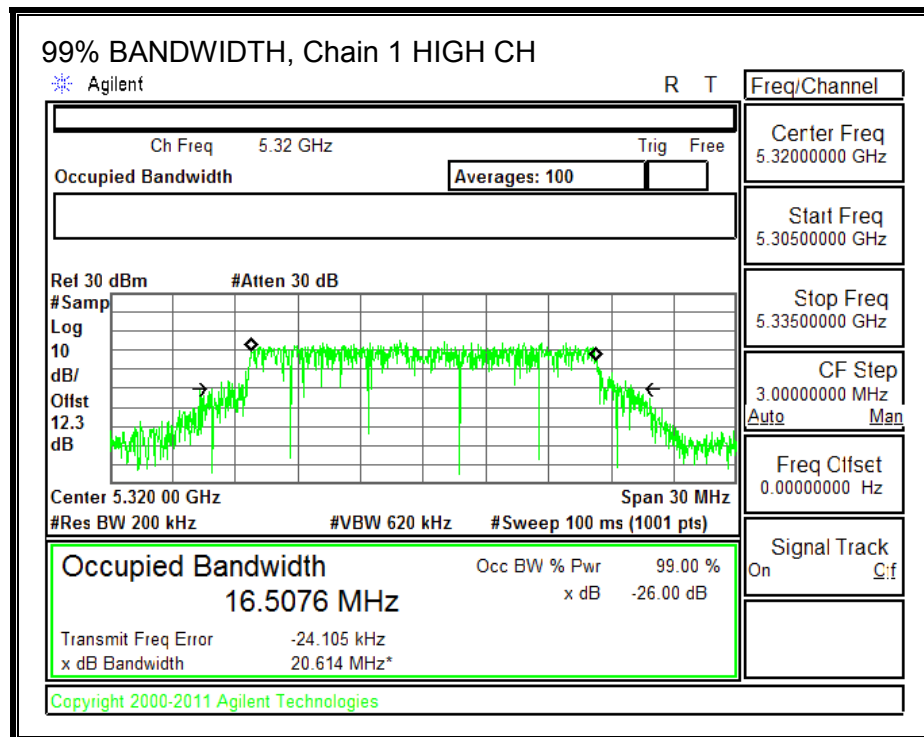
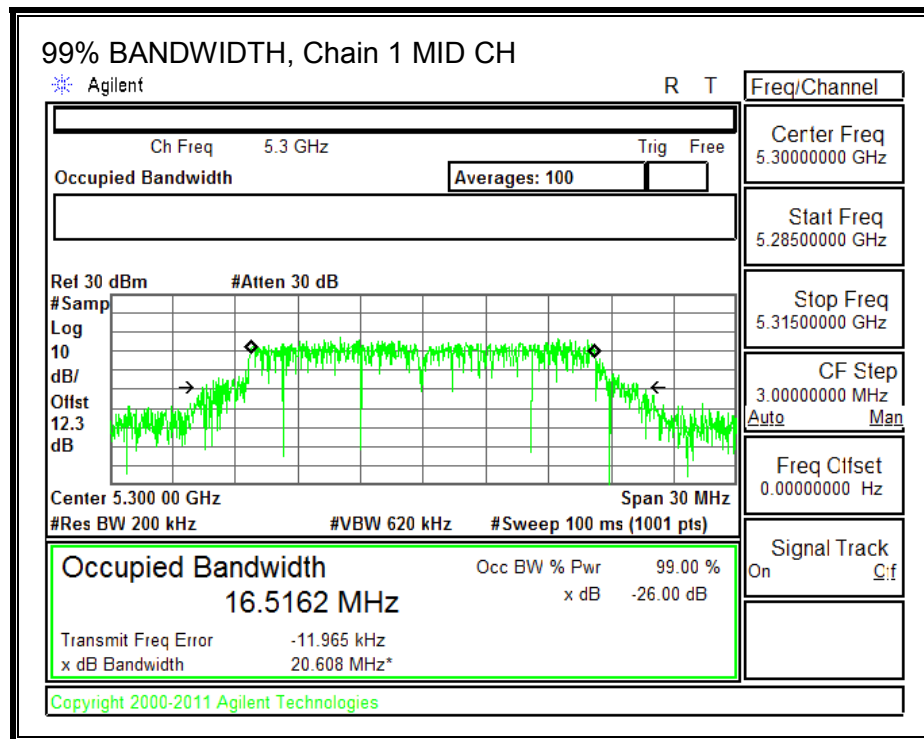
99% BANDWIDTH, Chain 0





99% BANDWIDTH, Chain 1





9.15.3. OUTPUT POWER AND PSD

LIMITS

FCC §15.407 (a) (2)

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 $11 \text{ dBm} + 10 \log B$, where B is the 26–dB emission bandwidth in MHz. In addition, the maximum 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.

DIRECTIONAL ANTENNA GAIN

The TX chains are uncorrelated and the antenna gain is unequal among the chains. The directional gain is:

Chain 0 Antenna Gain (dBi)	Chain 1 Antenna Gain (dBi)	Uncorrelated Chains Directional Gain (dBi)
3.05	3.33	3.19

RESULTS

Bandwidth, Antenna Gain and Limits

Channel	Frequency (MHz)	Min 26 dB BW (MHz)	Directional Gain for Power (dBi)	Directional Gain for PSD (dBi)	Power Limit (dBm)	PSD Limit (dBm)
Low	5260	21.60	3.19	3.19	24.00	11.00
Mid	5300	21.57	3.19	3.19	24.00	11.00
High	5320	21.72	3.19	3.19	24.00	11.00

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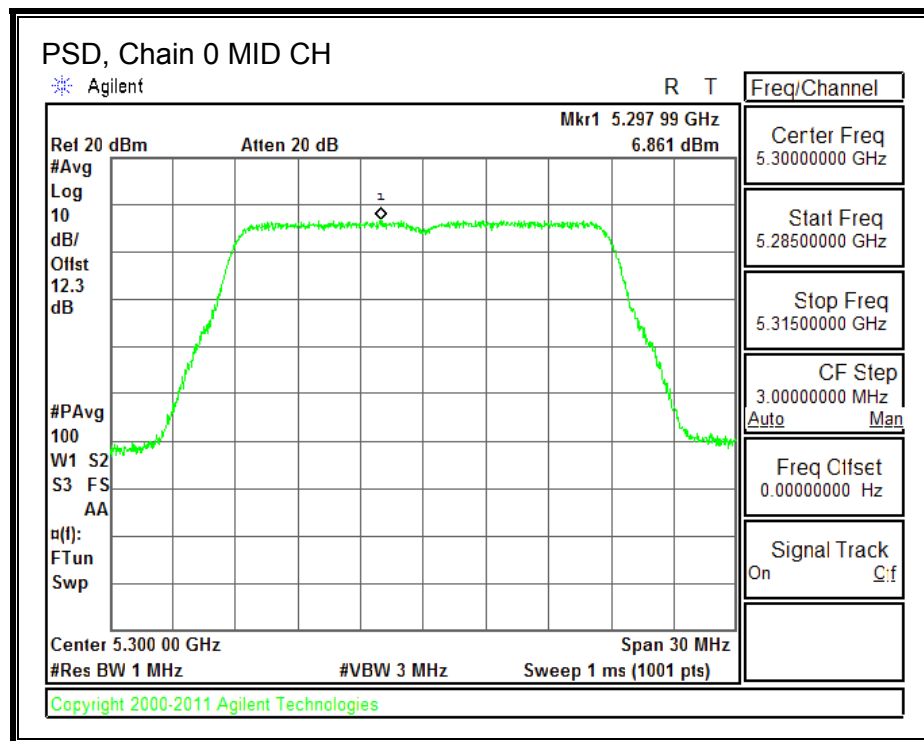
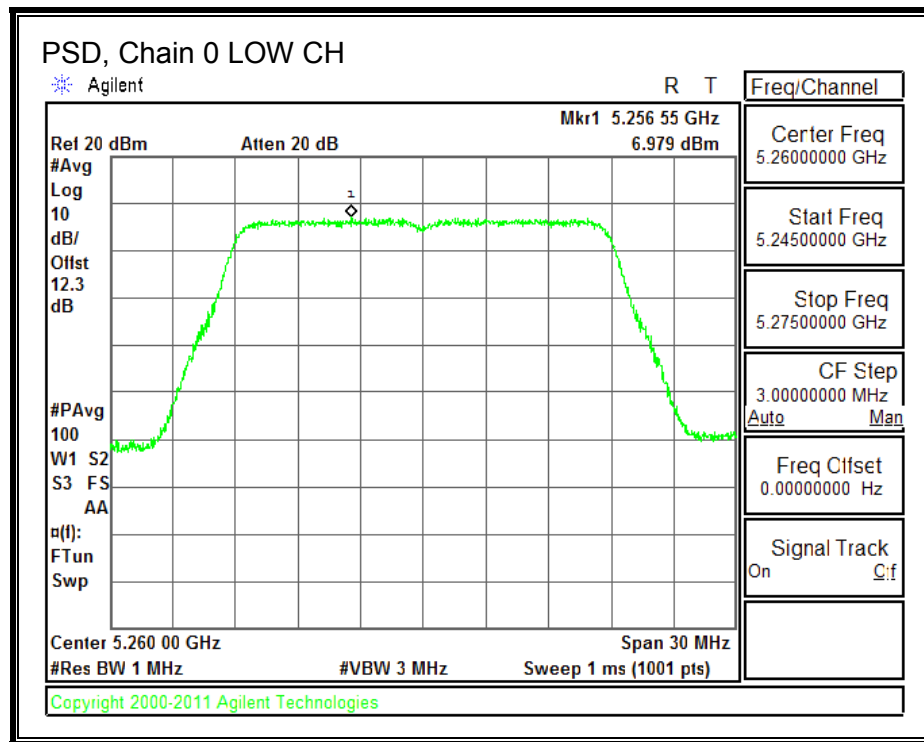
Output Power Results

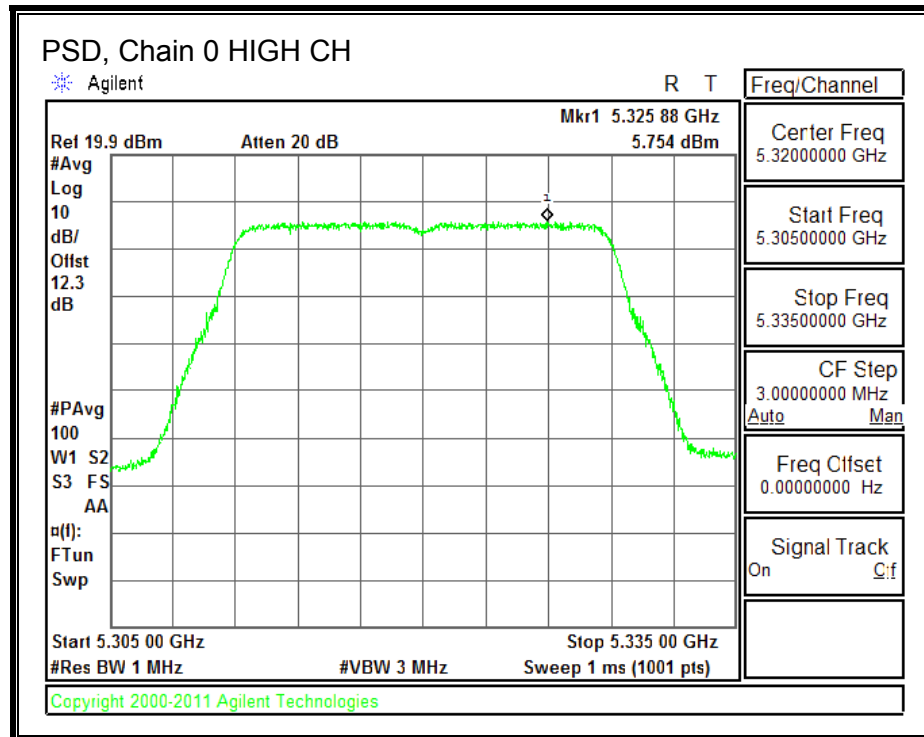
Channel	Frequency (MHz)	Chain 0 Meas Power (dBm)	Chain 1 Meas Power (dBm)	Total Corr'd Power (dBm)	Power Limit (dBm)	Power Margin (dB)
Low	5260	16.95	16.98	19.98	24.00	-4.02
Mid	5300	16.92	16.97	19.96	24.00	-4.04
High	5320	16.12	16.45	19.30	24.00	-4.70

PSD Results

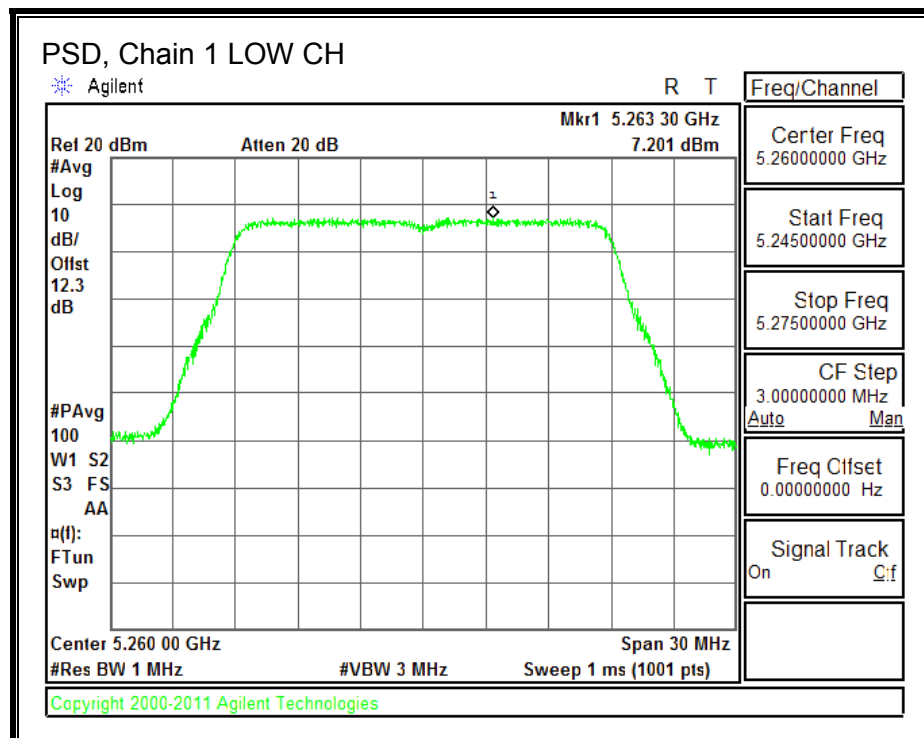
Channel	Frequency (MHz)	Chain 0 Meas PSD (dBm)	Chain 1 Meas PSD (dBm)	Total Corr'd PSD (dBm)	PSD Limit (dBm)	PSD Margin (dB)
Low	5260	6.98	7.20	10.10	11.00	-0.90
Mid	5300	6.86	6.96	9.92	11.00	-1.08
High	5320	5.75	6.45	9.12	11.00	-1.88

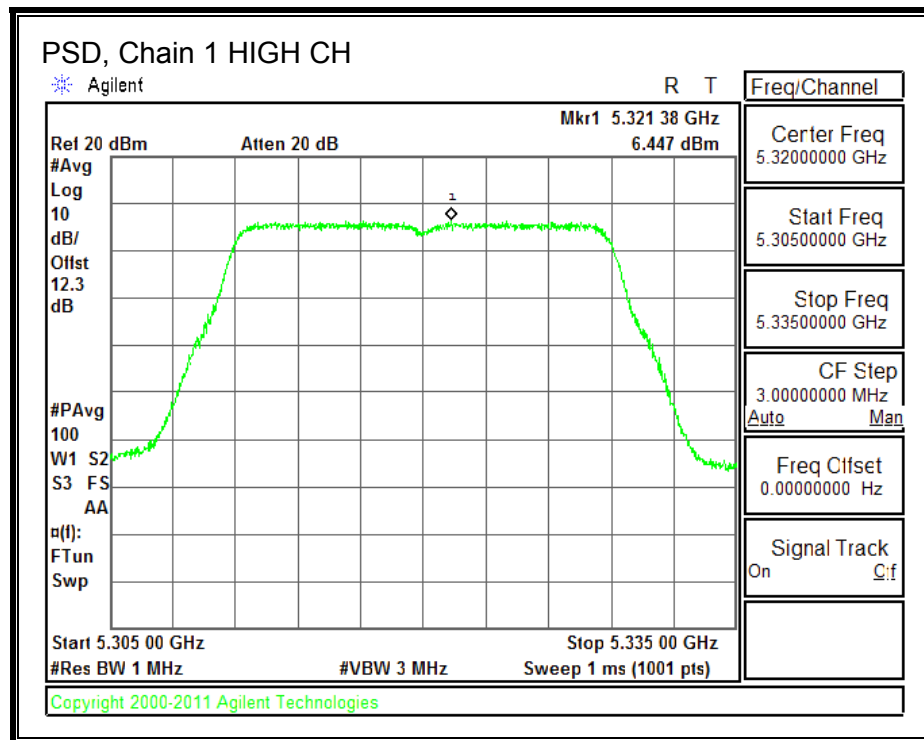
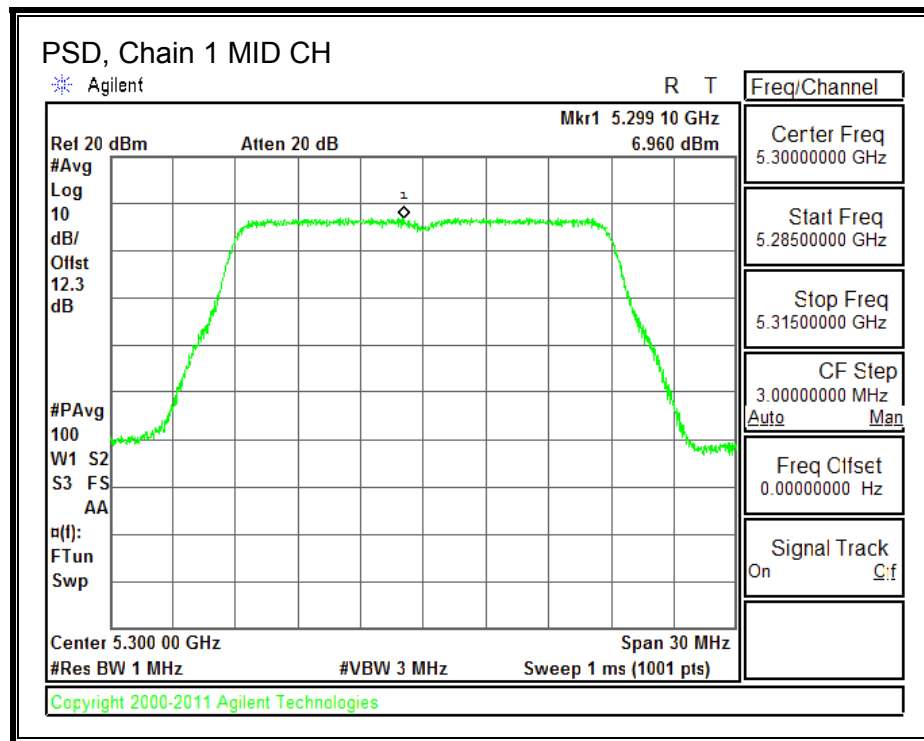
PSD, Chain 0





PSD, Chain 1





9.16. 802.11ac VHT20 2TX BF IN THE 5.3 GHz BAND

Refer to Section 9.14, 802.11n HT20 2TX CDD MODE IN THE 5.3 GHz BAND

The power per chain used for 802.11n HT20 2TX CDD IN THE 5.3 GHz mode is the same power per chain that will be for 802.11n HT20 2TX BF IN THE 5.3 GHz mode. However, since BF is correlated and CDD is uncorrelated for output power, the section below for output power using correlated antenna gain for this mode shows it is still compliant.

9.16.1. OUTPUT POWER

LIMITS

FCC §15.407 (a) (2)

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 $11 \text{ dBm} + 10 \log B$, where B is the 26–dB emission bandwidth in MHz. In addition, the maximum 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.

DIRECTIONAL ANTENNA GAIN

The TX chains are correlated and the antenna gain is unequal among the chains. The directional gain is:

Chain 0 Antenna Gain (dBi)	Chain 1 Antenna Gain (dBi)	Correlated Chains Directional Gain (dBi)
3.05	3.33	6.20

RESULTS

Bandwidth, Antenna Gain and Limits

Channel	Frequency (MHz)	Min 26 dB BW (MHz)	Directional Gain for Power (dBi)	Power Limit (dBm)
Low	5260	21.96	6.20	23.80
Mid	5300	22.02	6.20	23.80
High	5320	21.84	6.20	23.80

Duty Cycle CF (dB)	0.12	Included in Calculations of Corr'd Power
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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	15.97	15.98	19.11	23.80	-4.69
Mid	5300	15.95	15.97	19.09	23.80	-4.71
High	5320	15.98	15.93	19.09	23.80	-4.71

9.17. 802.11n 1TX HT40 MODE IN THE 5.3 GHz BAND

9.17.1. 26 dB BANDWIDTH

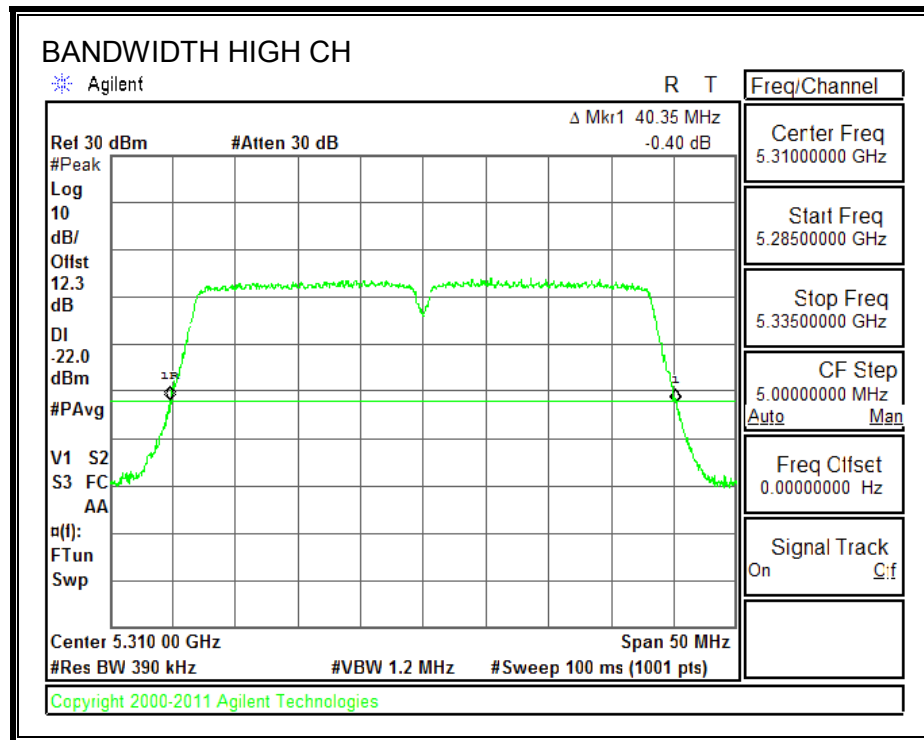
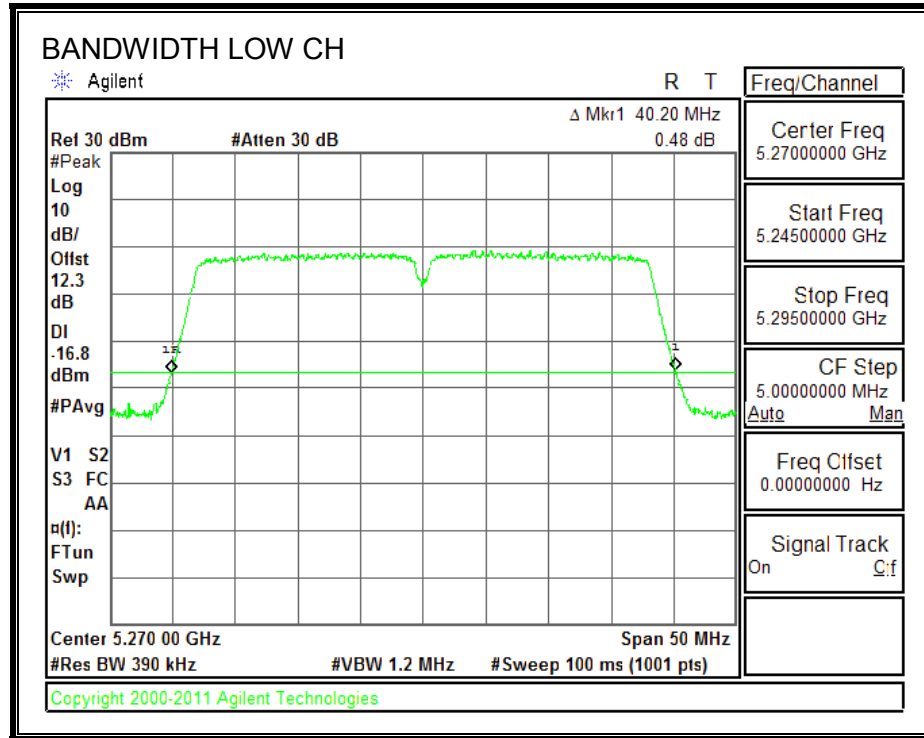
LIMITS

None; for reporting purposes only.

RESULTS

Channel	Frequency (MHz)	26 dB Bandwidth (MHz)
Low	5270	40.20
High	5310	40.35

26 dB BANDWIDTH



9.17.2. 99% BANDWIDTH

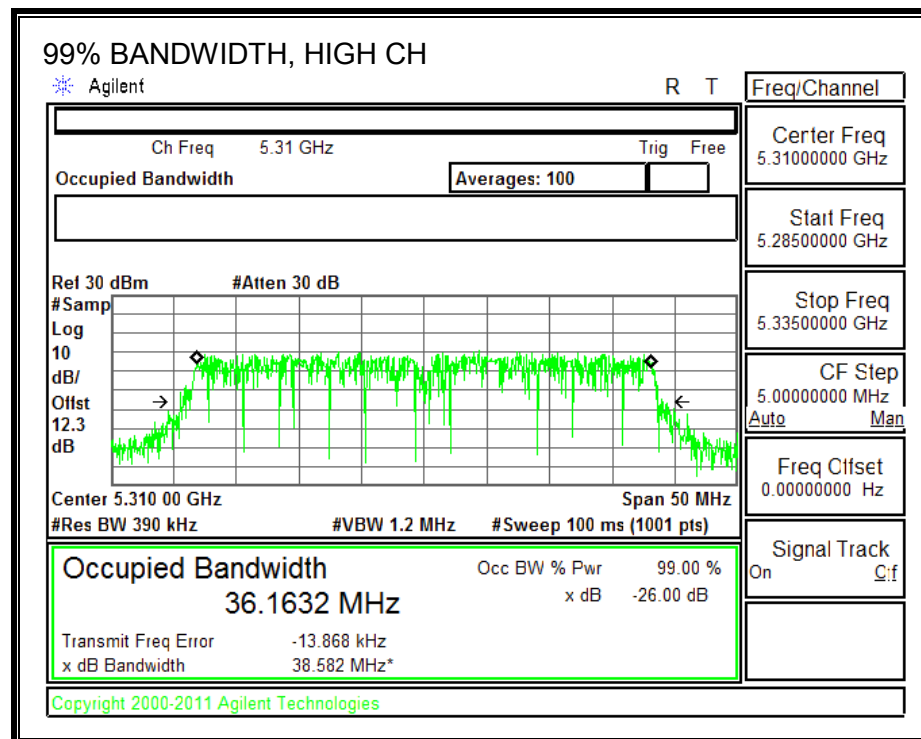
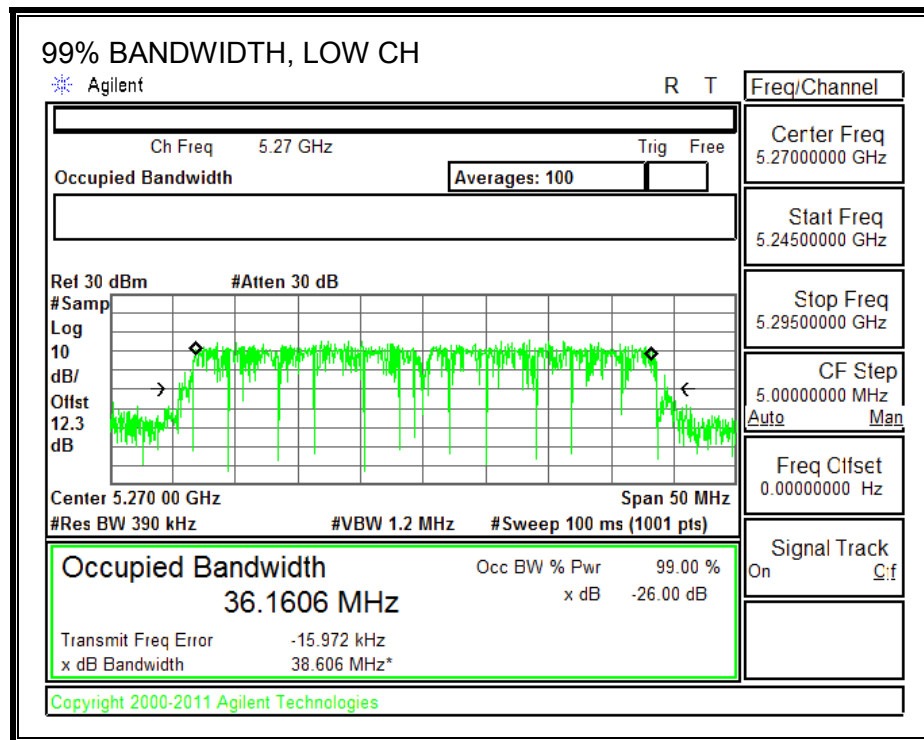
LIMITS

None; for reporting purposes only.

RESULTS

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	5270	36.1606
High	5310	36.1632

99% BANDWIDTH



9.17.3. OUTPUT POWER AND PSD

LIMITS

FCC §15.407 (a) (2)

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 maximum 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.

DIRECTIONAL ANTENNA GAIN

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

ANTENNA 0

Antenna Gain (dBi)
3.05

ANTENNA 1

Antenna Gain (dBi)
3.33

RESULTS

Bandwidth, Antenna Gain, and Limits

Channel	Frequency (MHz)	Min 26 dB BW (MHz)	Directional Gain (dBi)	Power Limit (dBm)	PSD Limit (dBm)
Low	5270	40.20	3.33	24.00	11.00
High	5310	40.35	3.33	24.00	11.00

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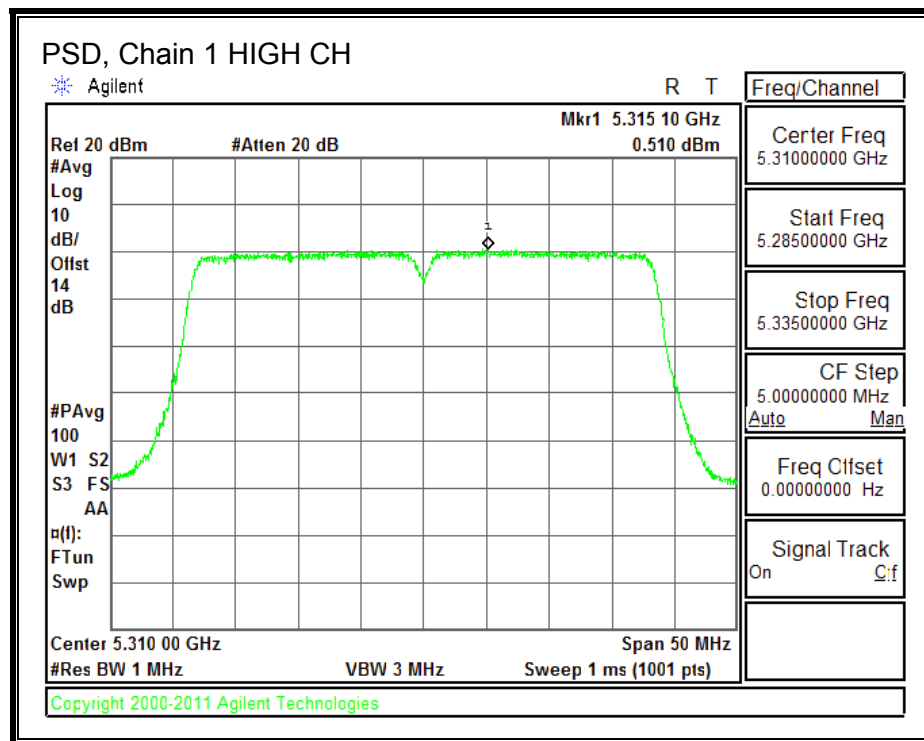
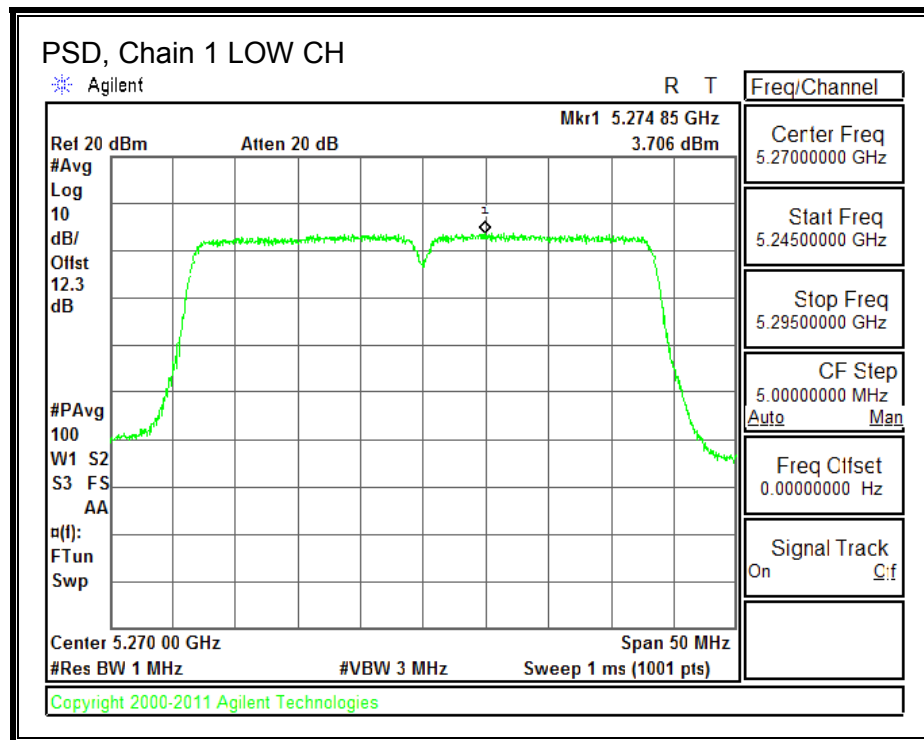
Output Power Results

Channel	Frequency (MHz)	Chain 1 Meas Power (dBm)	Total Corr'd Power (dBm)	Power Limit (dBm)	Power Margin (dB)
Low	5270	17.91	17.91	24.00	-6.09
High	5310	14.49	14.49	24.00	-9.51

PSD Results

Channel	Frequency (MHz)	Chain 1 Meas PSD (dBm)	Total Corr'd PSD (dBm)	PSD Limit (dBm)	PSD Margin (dB)
Low	5270	3.71	3.71	11.00	-7.29
High	5310	0.51	0.51	11.00	-10.49

PSD, Chain 1



9.18. 802.11n HT40 2TX CDD MODE IN THE 5.3 GHz BAND

9.18.1. 26 dB BANDWIDTH

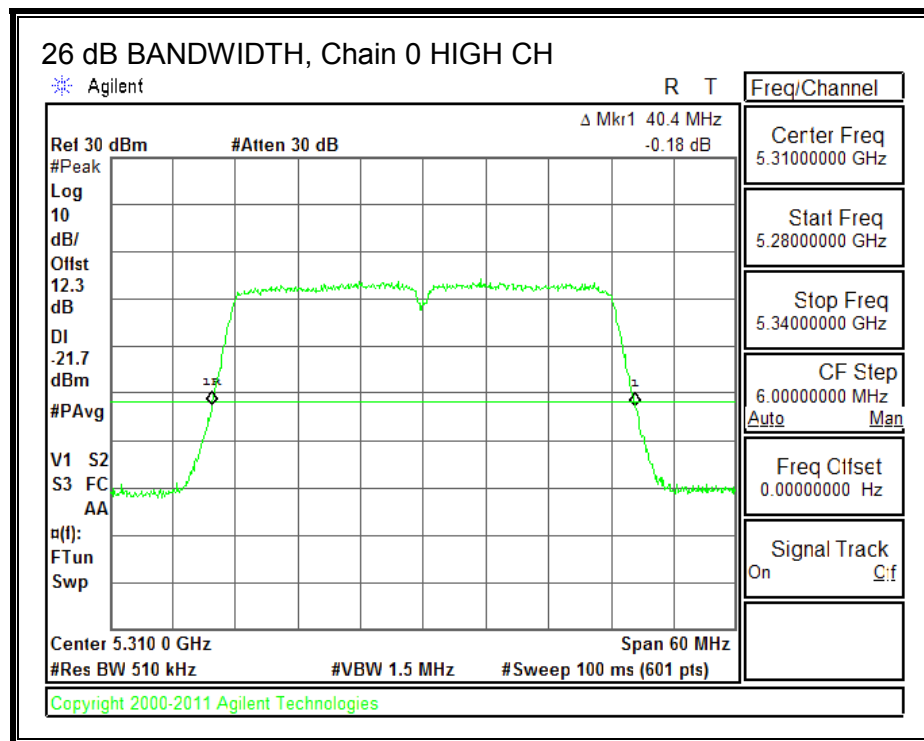
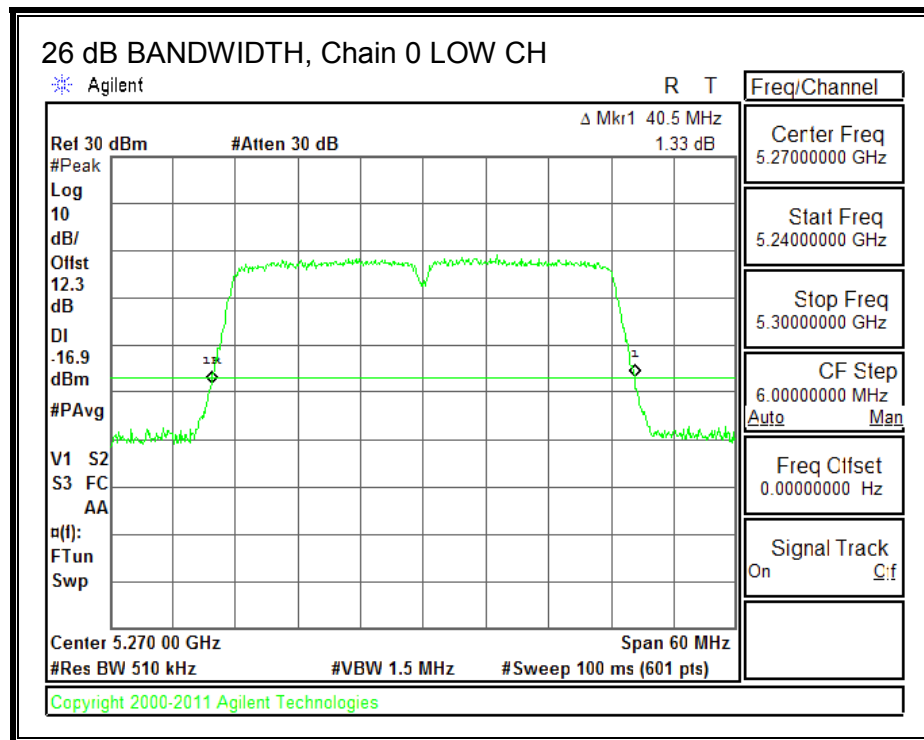
LIMITS

None; for reporting purposes only.

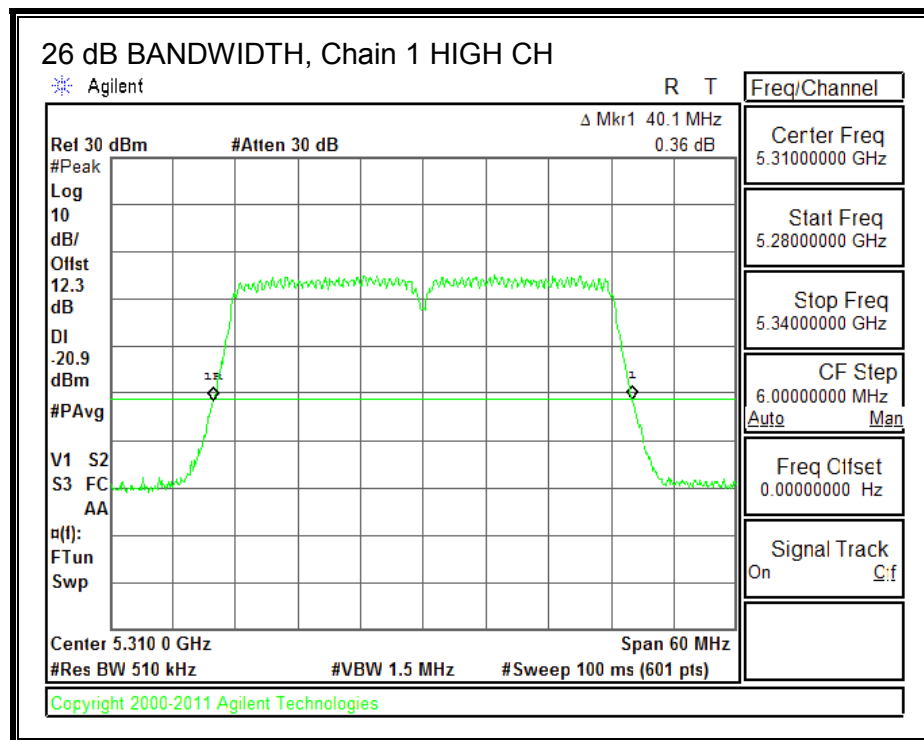
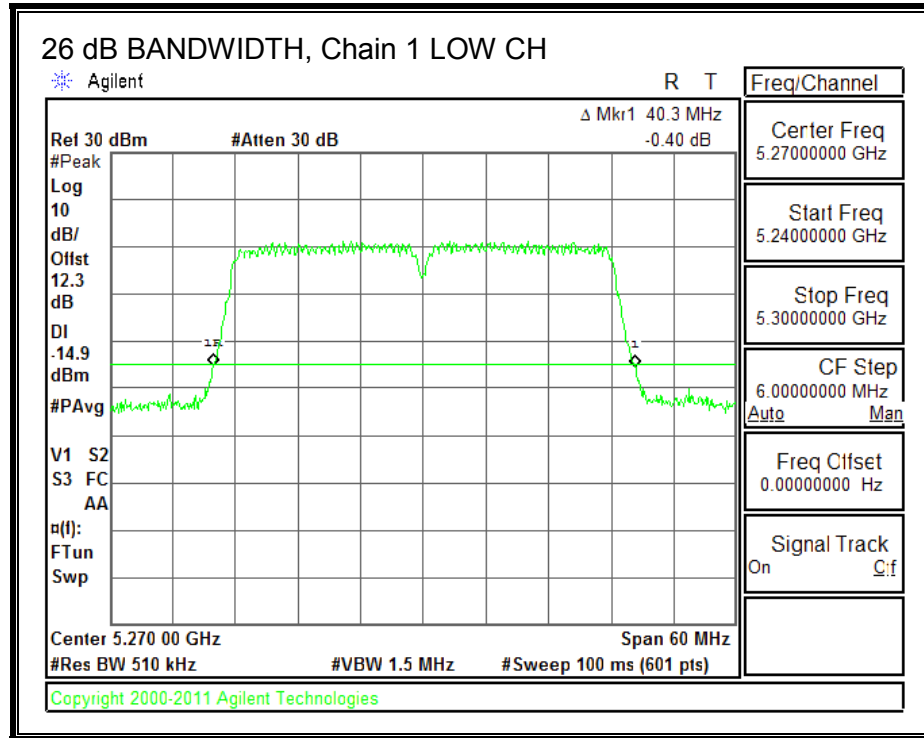
RESULTS

Channel	Frequency (MHz)	26 dB BW Chain 0 (MHz)	26 dB BW Chain 1 (MHz)
Low	5270	40.50	40.30
High	5310	40.40	40.10

26 dB BANDWIDTH, Chain 0



26 dB BANDWIDTH, Chain 1



9.18.2. 99% BANDWIDTH

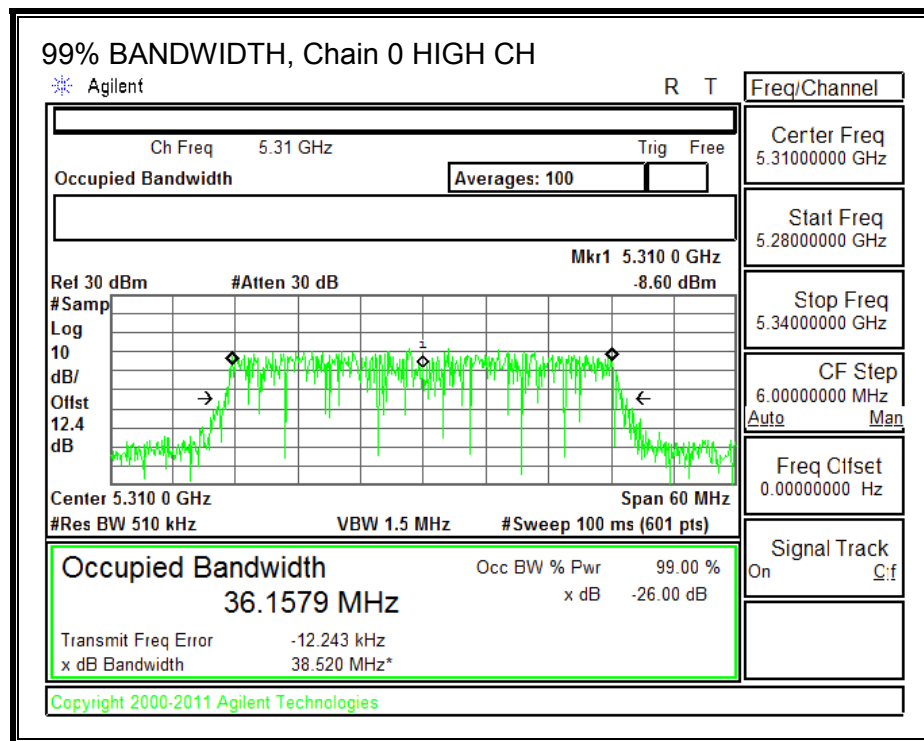
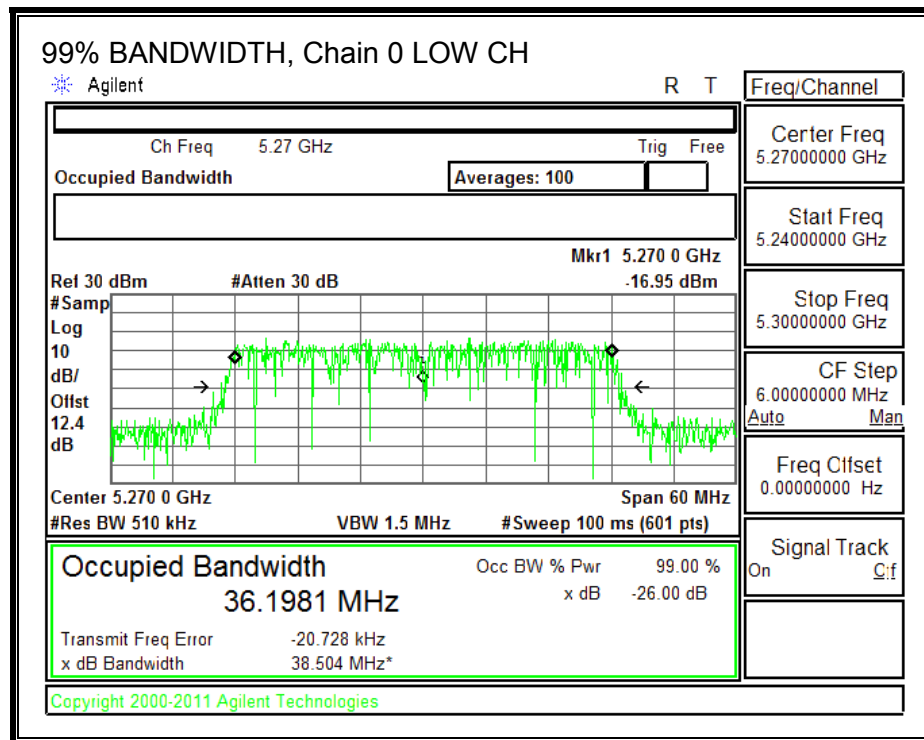
LIMITS

None; for reporting purposes only.

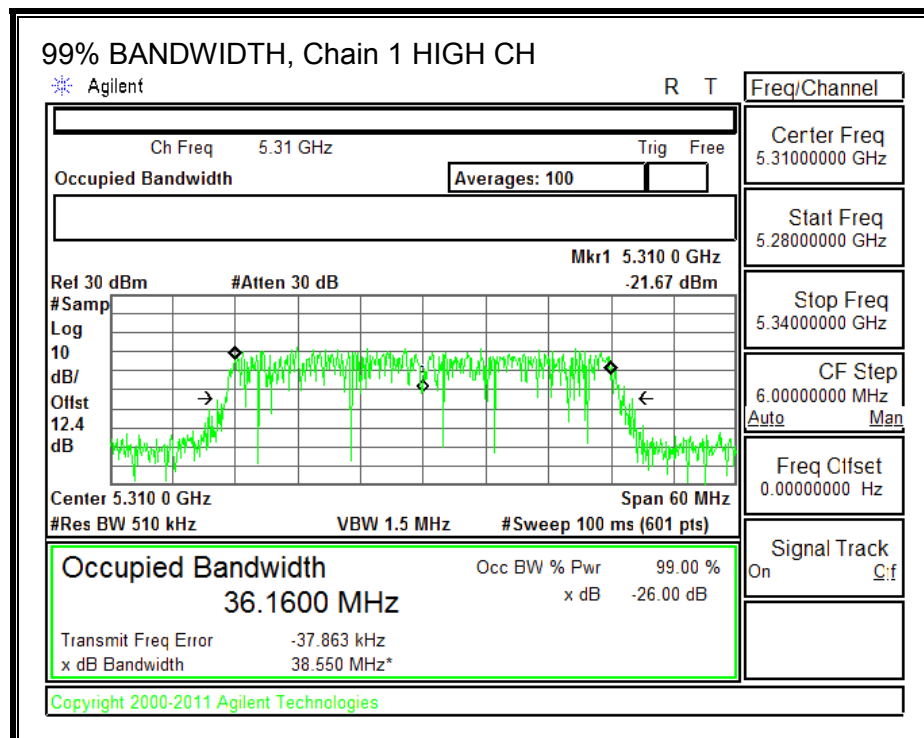
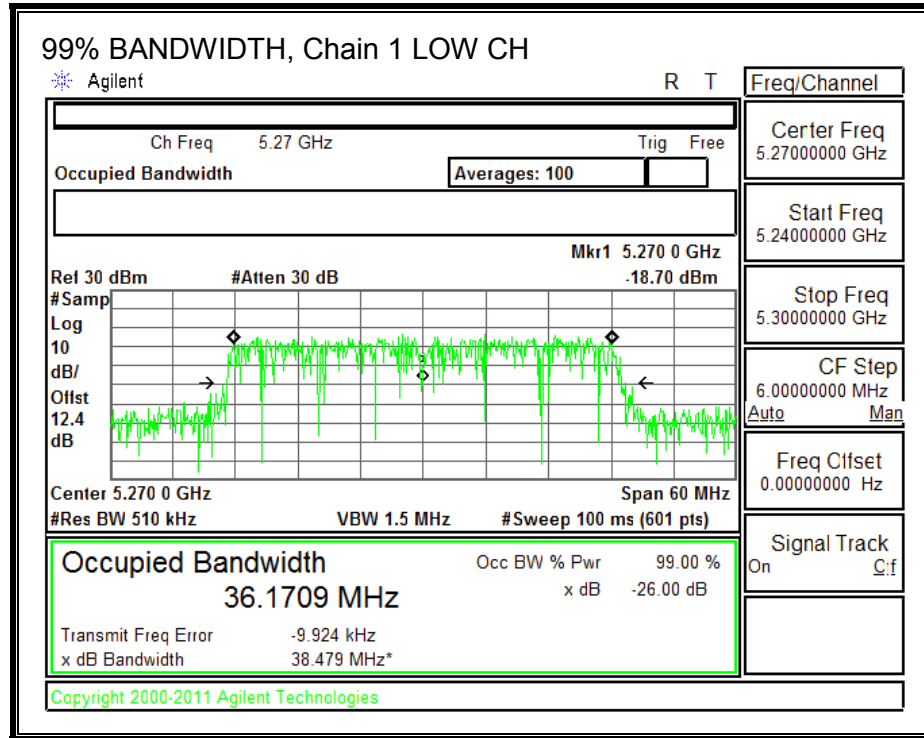
RESULTS

Channel	Frequency (MHz)	99% BW Chain 0 (MHz)	99% BW Chain 1 (MHz)
Low	5270	36.1981	36.1709
High	5310	36.1579	36.1600

99% BANDWIDTH, Chain 0



99% BANDWIDTH, Chain 1



9.18.3. OUTPUT POWER AND PSD

LIMITS

FCC §15.407 (a) (2)

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 $11 \text{ dBm} + 10 \log B$, where B is the 26–dB emission bandwidth in MHz. In addition, the maximum 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.

DIRECTIONAL ANTENNA GAIN

The TX chains are uncorrelated and the antenna gain is unequal among the chains. The directional gain is:

Chain 0 Antenna Gain (dBi)	Chain 1 Antenna Gain (dBi)	Uncorrelated Chains Directional Gain (dBi)
3.05	3.33	3.19

The TX chains are correlated and the antenna gain is unequal among the chains. The directional gain is:

Chain 0 Antenna Gain (dBi)	Chain 1 Antenna Gain (dBi)	Correlated Chains Directional Gain (dBi)
3.05	3.33	6.20

RESULTS

Bandwidth, Antenna Gain and Limits

Channel	Frequency (MHz)	Min 26 dB BW (MHz)	Directional Gain for Power (dBi)	Directional Gain for PSD (dBi)	Power Limit (dBm)	PSD Limit (dBm)
Low	5270	40.30	3.19	6.20	24.00	10.80
High	5310	40.10	3.19	6.20	24.00	10.80

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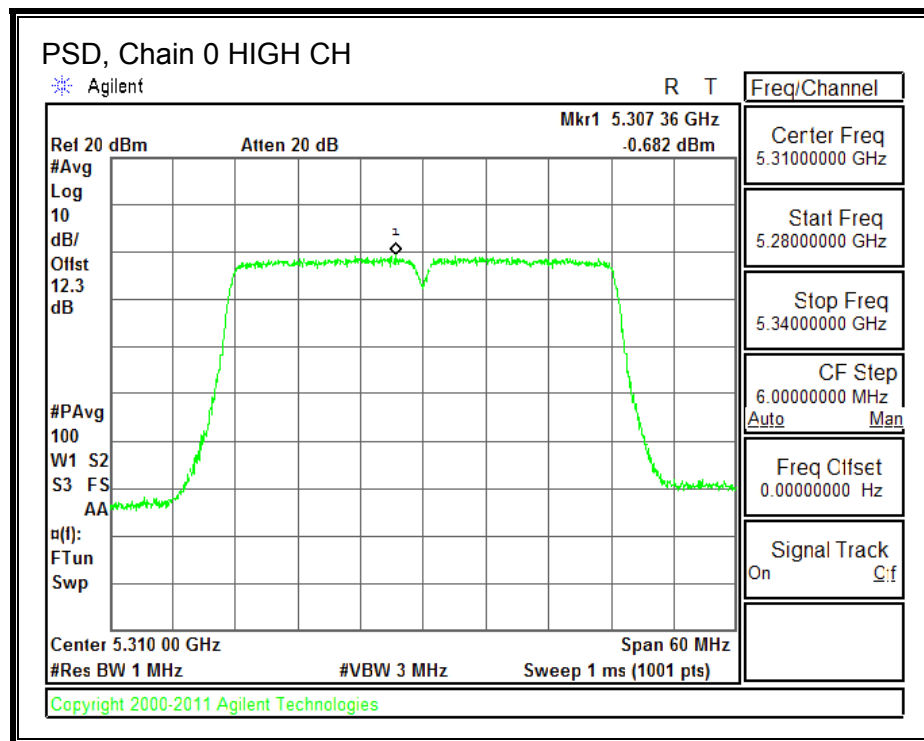
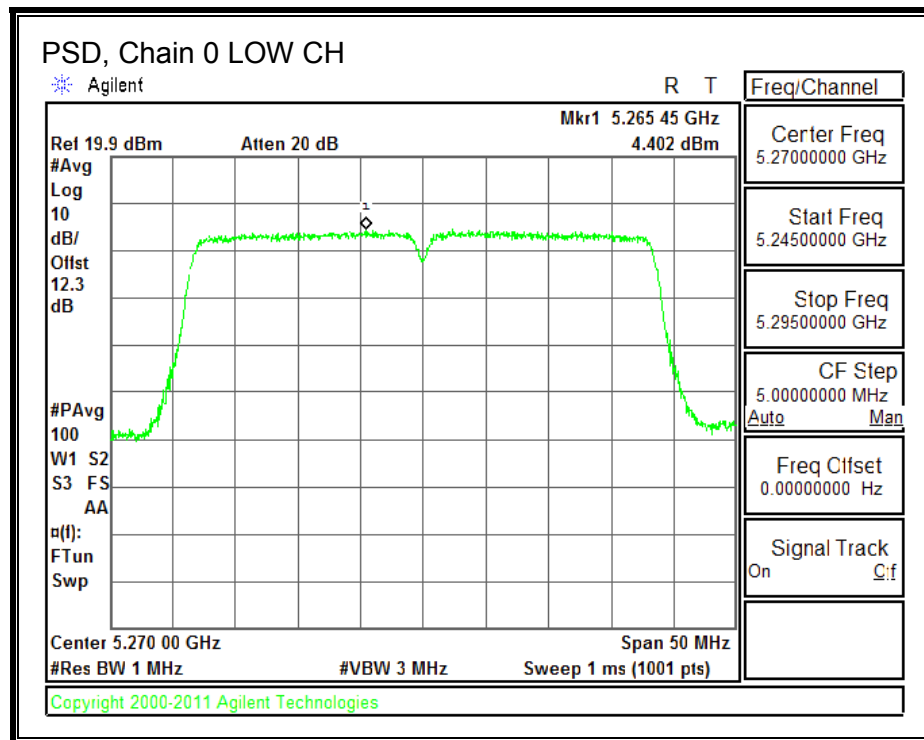
Output Power Results

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	17.85	17.76	20.82	24.00	-3.18
High	5310	12.72	12.92	15.83	24.00	-8.17

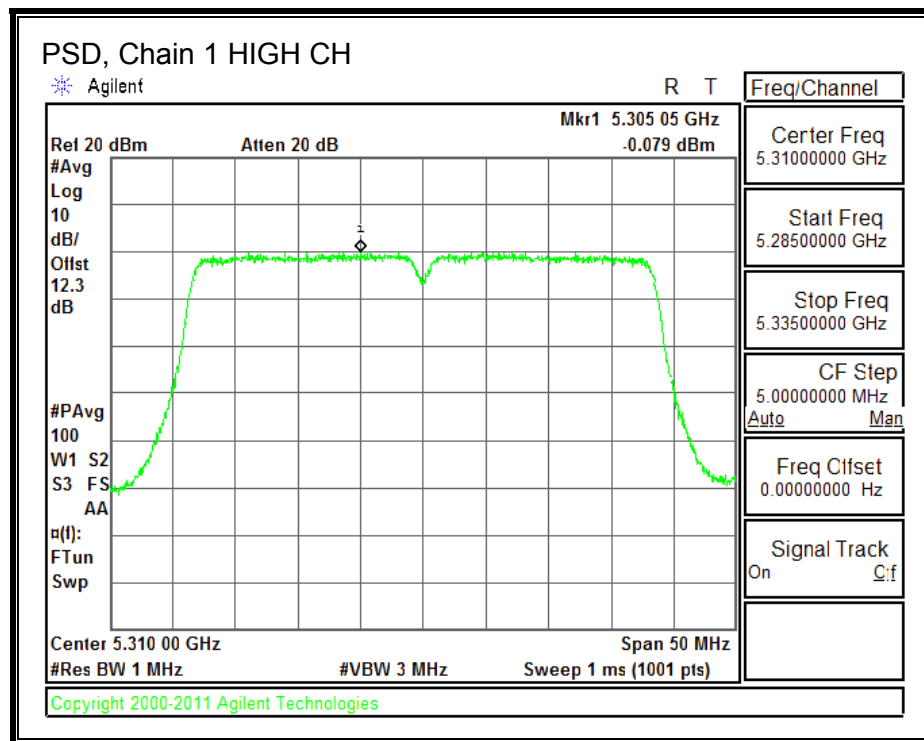
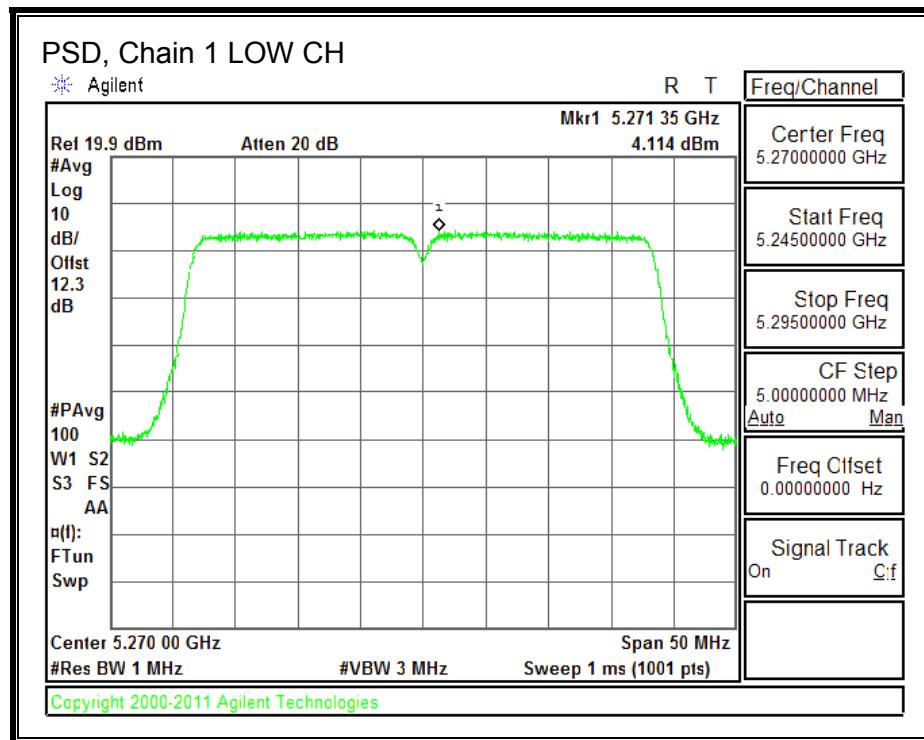
PSD Results

Channel	Frequency (MHz)	Chain 0 Meas PSD (dBm)	Chain 1 Meas PSD (dBm)	Total Corr'd PSD (dBm)	PSD Limit (dBm)	PSD Margin (dB)
Low	5270	4.40	4.11	7.27	10.80	-3.53
High	5310	-0.68	-0.08	2.64	10.80	-8.16

PSD, Chain 0



PSD, Chain 1



9.19. 802.11n HT40 2TX STBC MODE IN THE 5.3 GHz BAND

9.19.1. 26 dB BANDWIDTH

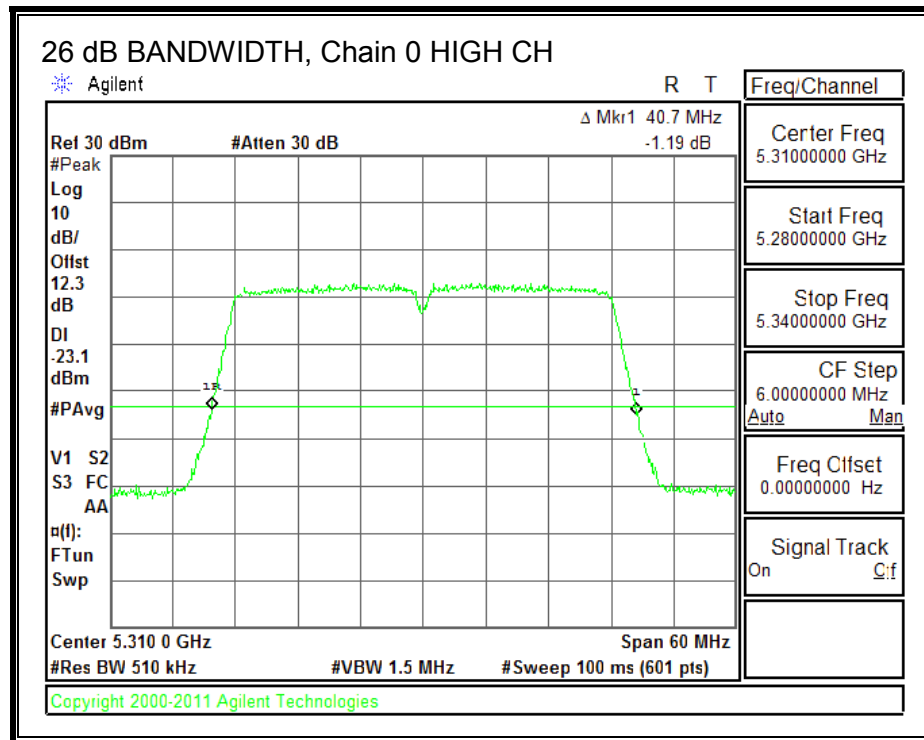
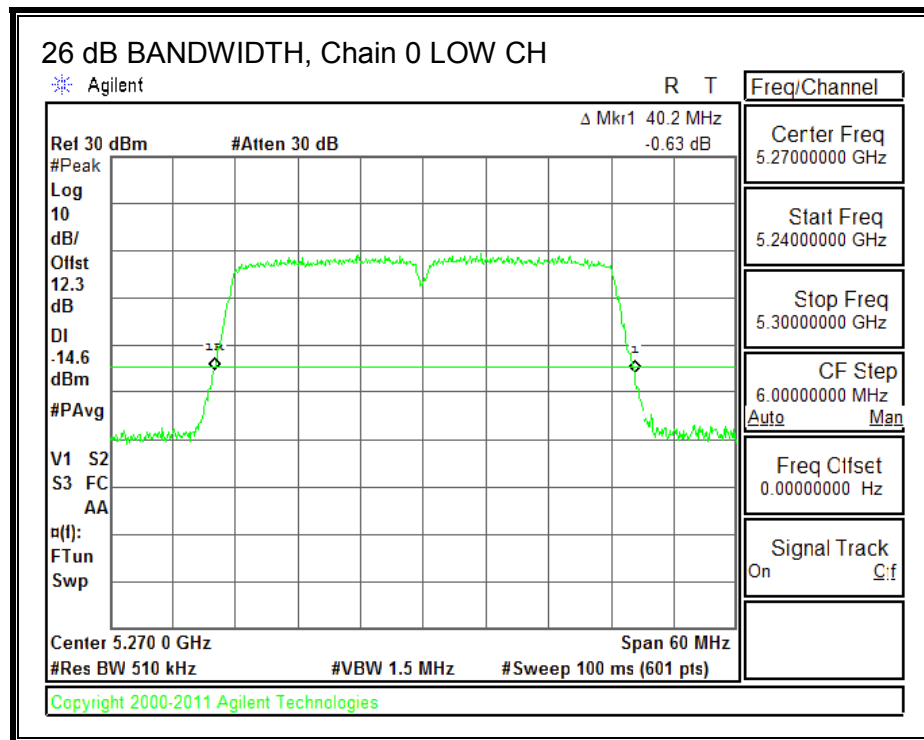
LIMITS

None; for reporting purposes only.

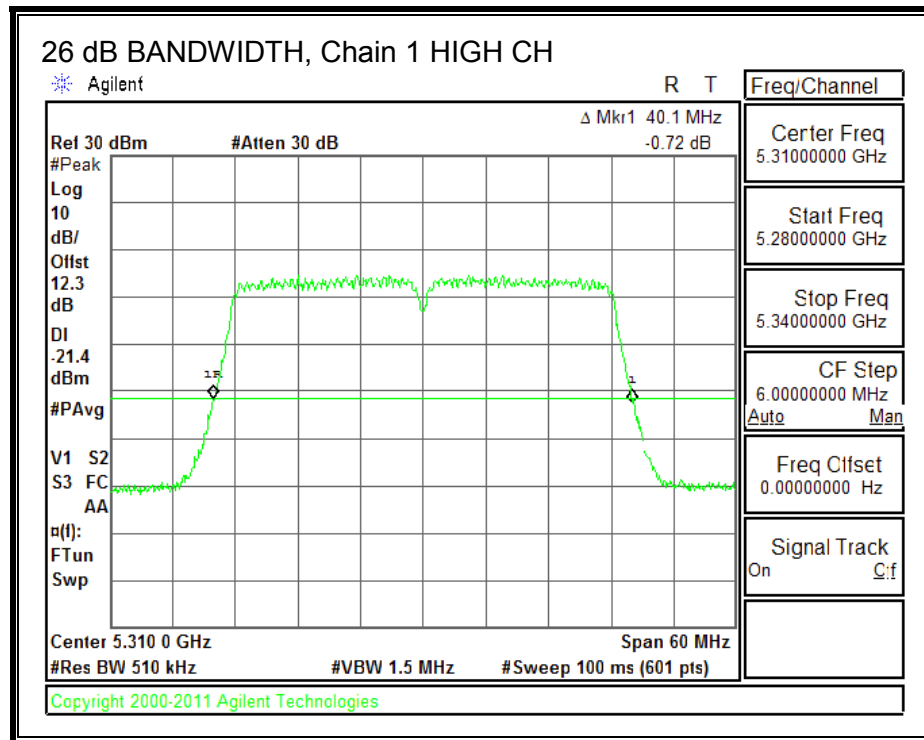
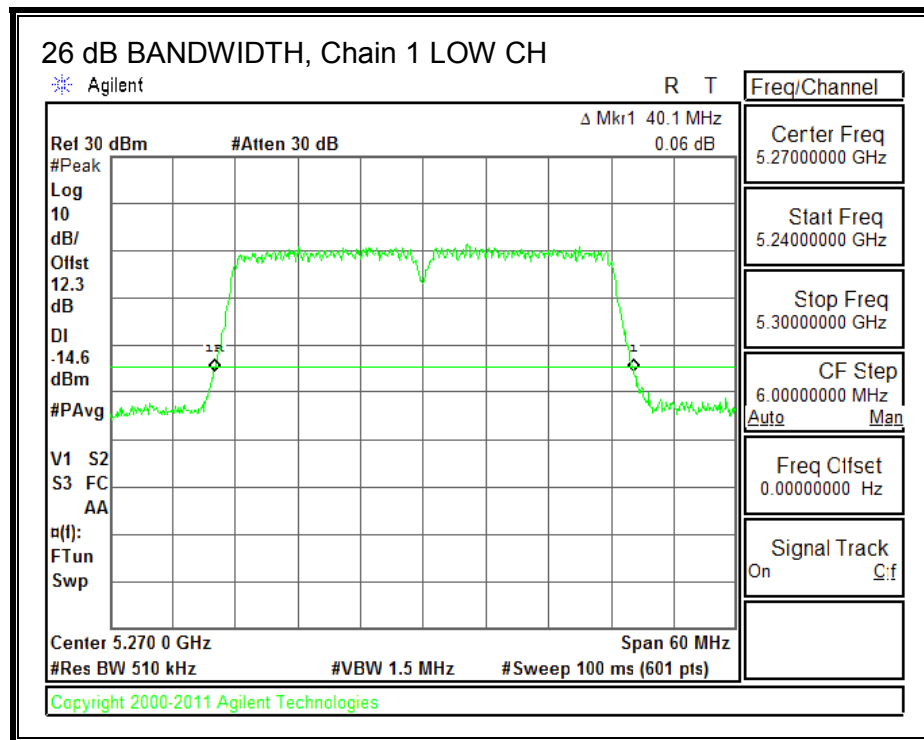
RESULTS

Channel	Frequency (MHz)	26 dB BW Chain 0 (MHz)	26 dB BW Chain 1 (MHz)
Low	5270	40.20	40.10
High	5310	40.70	40.10

26 dB BANDWIDTH, Chain 0



26 dB BANDWIDTH, Chain 1



9.19.2. 99% BANDWIDTH

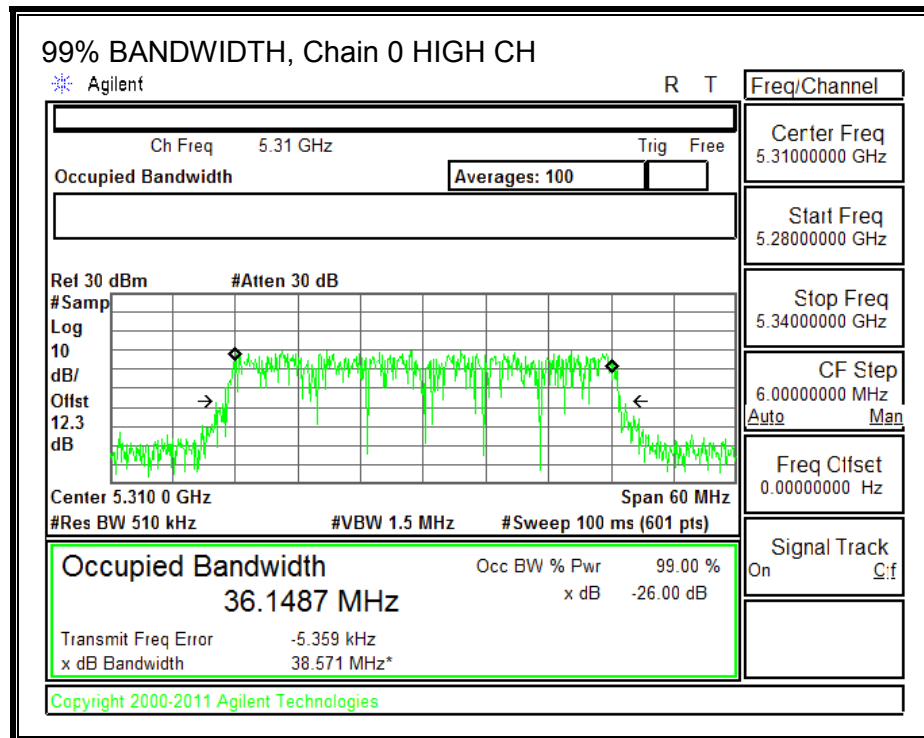
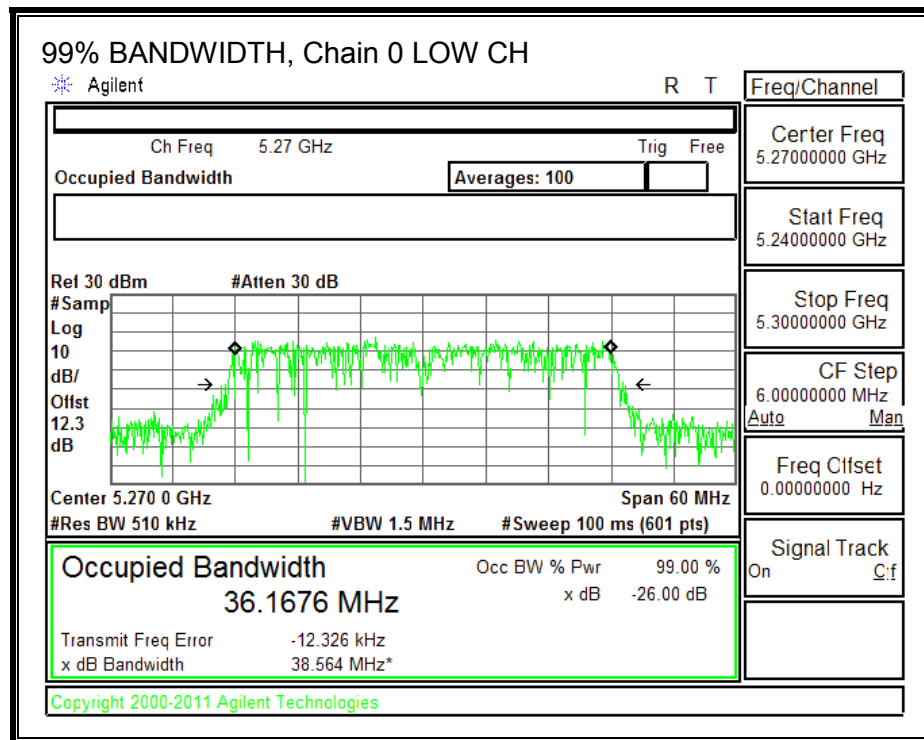
LIMITS

None; for reporting purposes only.

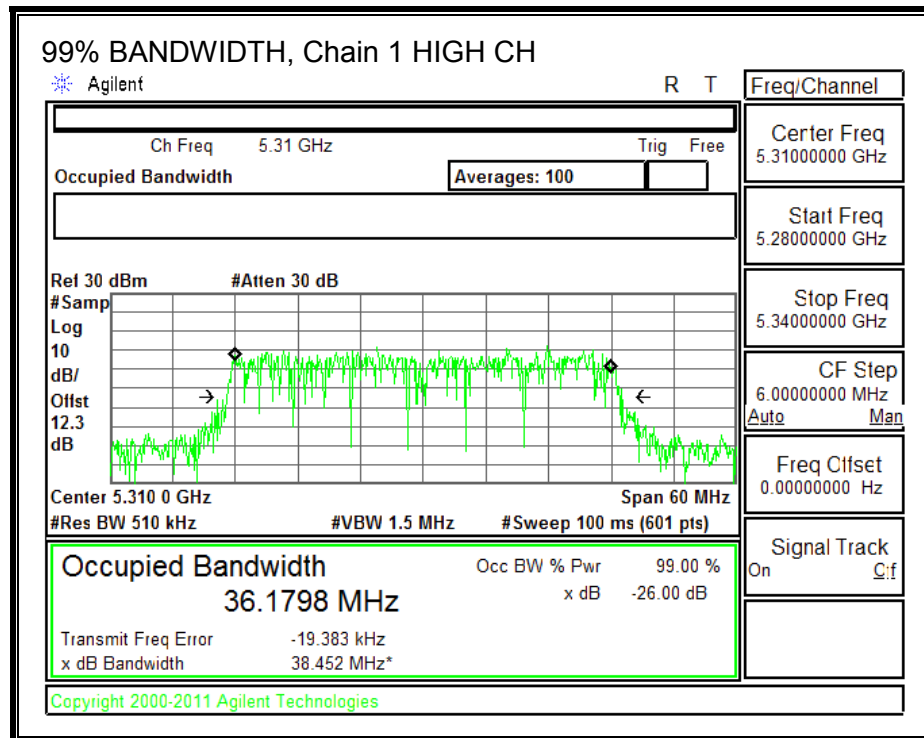
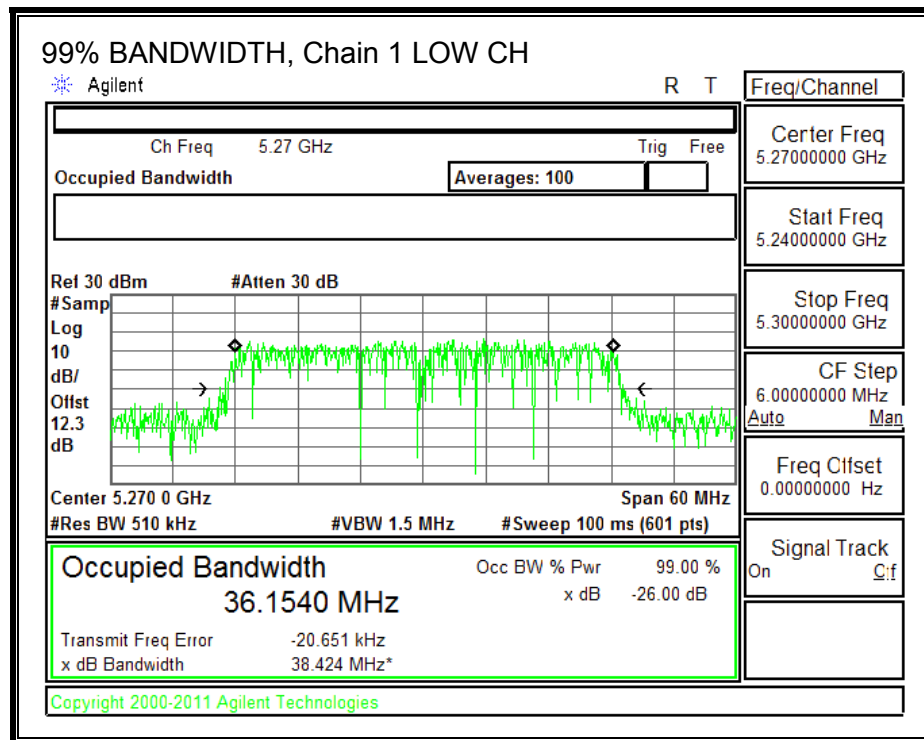
RESULTS

Channel	Frequency (MHz)	99% BW Chain 0 (MHz)	99% BW Chain 1 (MHz)
Low	5270	36.1676	36.1540
High	5310	36.1487	36.1798

99% BANDWIDTH, Chain 0



99% BANDWIDTH, Chain 1



9.19.3. OUTPUT POWER AND PSD

LIMITS

FCC §15.407 (a) (2)

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 $11 \text{ dBm} + 10 \log B$, where B is the 26–dB emission bandwidth in MHz. In addition, the maximum 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.

DIRECTIONAL ANTENNA GAIN

The TX chains are uncorrelated and the antenna gain is unequal among the chains. The directional gain is:

Chain 0 Antenna Gain (dBi)	Chain 1 Antenna Gain (dBi)	Uncorrelated Chains Directional Gain (dBi)
3.05	3.33	3.19

RESULTS

Bandwidth, Antenna Gain and Limits

Channel	Frequency (MHz)	Min 26 dB BW (MHz)	Directional Gain for Power (dBi)	Directional Gain for PSD (dBi)	Power Limit (dBm)	PSD Limit (dBm)
Low	5270	40.10	3.19	3.19	24.00	11.00
High	5310	40.10	3.19	3.19	24.00	11.00

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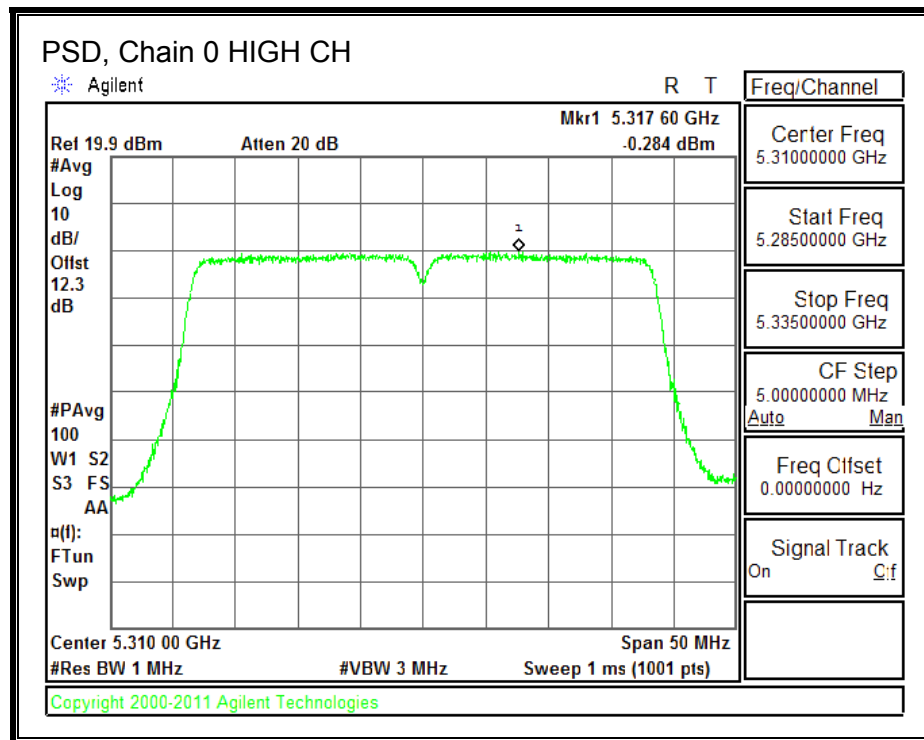
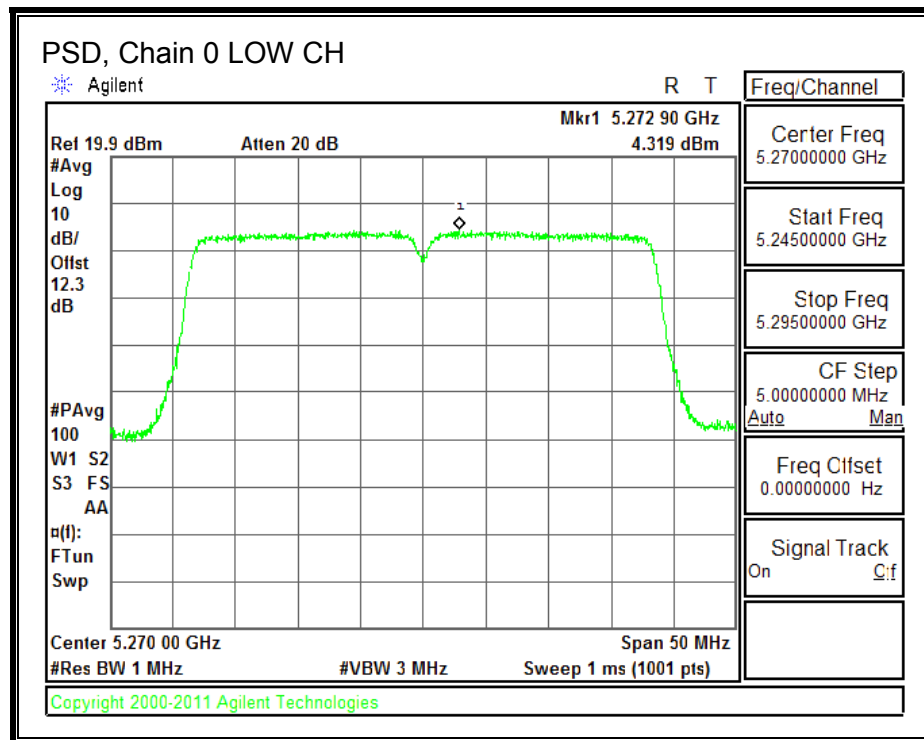
Output Power Results

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	17.71	17.74	20.74	24.00	-3.26
High	5310	12.83	12.85	15.85	24.00	-8.15

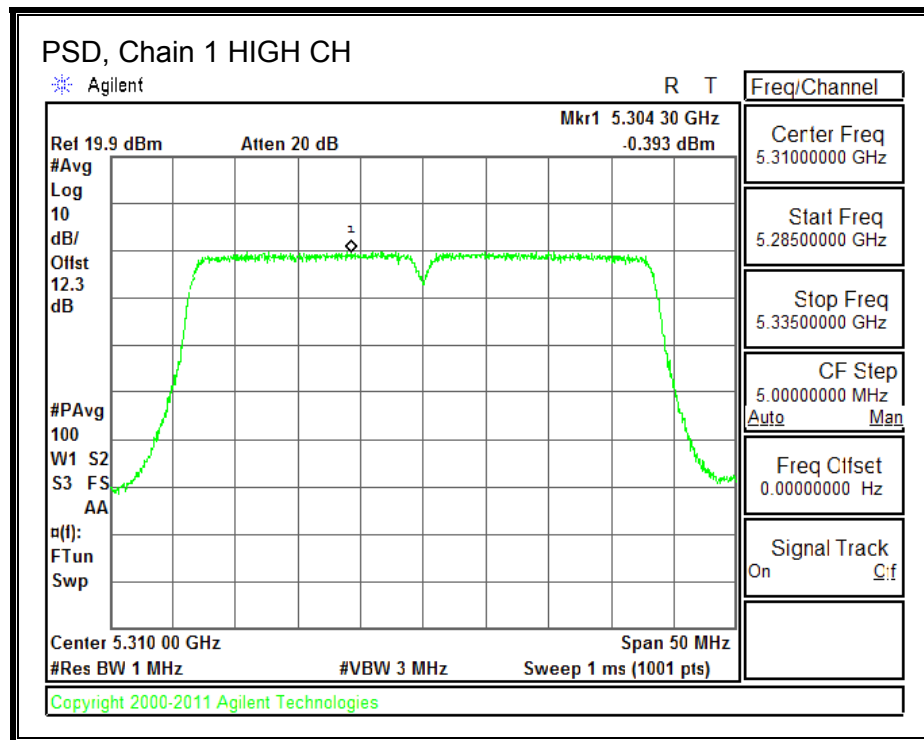
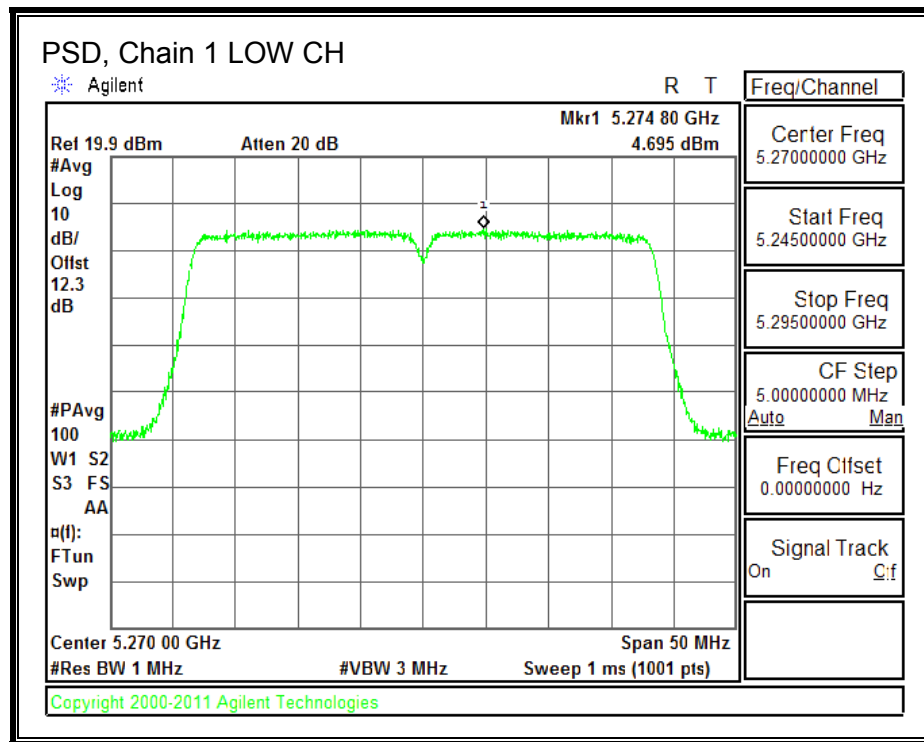
PSD Results

Channel	Frequency (MHz)	Chain 0 Meas PSD (dBm)	Chain 1 Meas PSD (dBm)	Total Corr'd PSD (dBm)	PSD Limit (dBm)	PSD Margin (dB)
Low	5270	4.32	4.70	7.52	11.00	-3.48
High	5310	-0.28	-0.39	2.67	11.00	-8.33

PSD, Chain 0



PSD, Chain 1



9.20. 802.11ac VHT40 2TX BF IN THE 5.3 GHz BAND

Refer to Section 9.18, 802.11n HT40 2TX CDD MODE IN THE 5.3 GHz BAND

The power per chain used for 802.11n HT40 2TX CDD IN THE 5.3 GHz mode is the same power per chain that will be for 802.11n HT40 2TX BF IN THE 5.3 GHz mode. However, since BF is correlated and CDD is uncorrelated for output power, the section below for output power using correlated antenna gain for this mode shows it is still compliant.

9.20.1. OUTPUT POWER

LIMITS

FCC §15.407 (a) (2)

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 $11 \text{ dBm} + 10 \log B$, where B is the 26-dB emission bandwidth in MHz. In addition, the maximum 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.

DIRECTIONAL ANTENNA GAIN

The TX chains are correlated and the antenna gain is unequal among the chains. The directional gain is:

Chain 0 Antenna Gain (dBi)	Chain 1 Antenna Gain (dBi)	Correlated Chains Directional Gain (dBi)
3.05	3.33	6.20

RESULTS

Bandwidth, Antenna Gain and Limits

Channel	Frequency (MHz)	Min 26 dB BW (MHz)	Directional Gain for Power (dBi)	Power Limit (dBm)
Low	5270	40.30	6.20	23.80
High	5310	40.10	6.20	23.80

Duty Cycle CF (dB)	0.12	Included in Calculations of Corr'd Power
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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	17.85	17.76	20.94	23.80	-2.86
High	5310	12.72	12.92	15.95	23.80	-7.85

9.21. 802.11ac VHT80 1TX MODE IN THE 5.3 GHz BAND

9.21.1. 26 dB BANDWIDTH

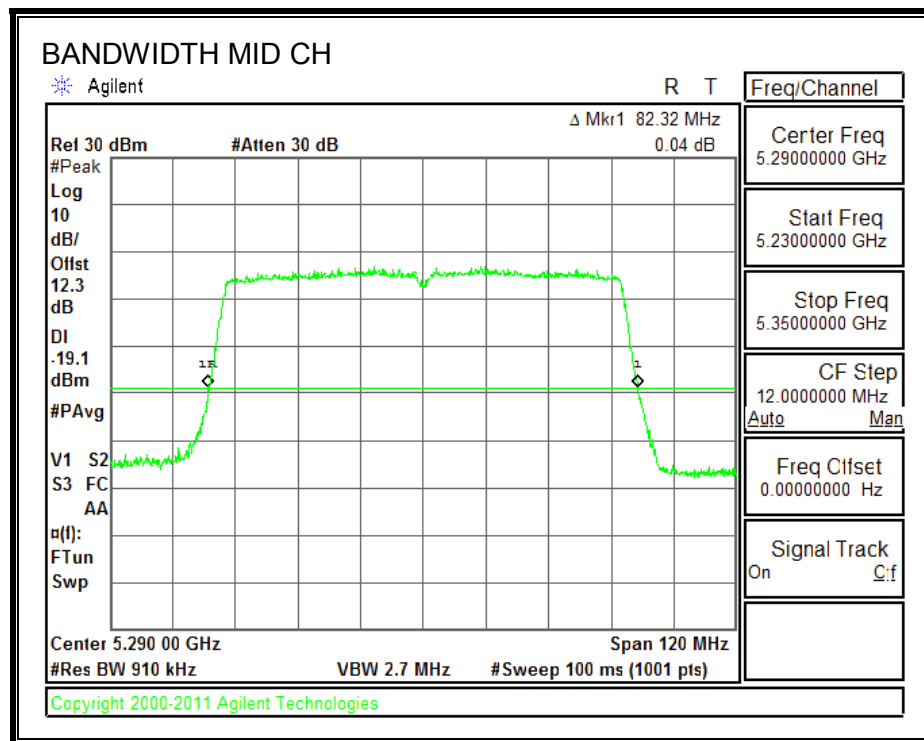
LIMITS

None; for reporting purposes only.

RESULTS

Channel	Frequency (MHz)	26 dB Bandwidth (MHz)
Mid	5290	82.32

26 dB BANDWIDTH



9.21.2. 99% BANDWIDTH

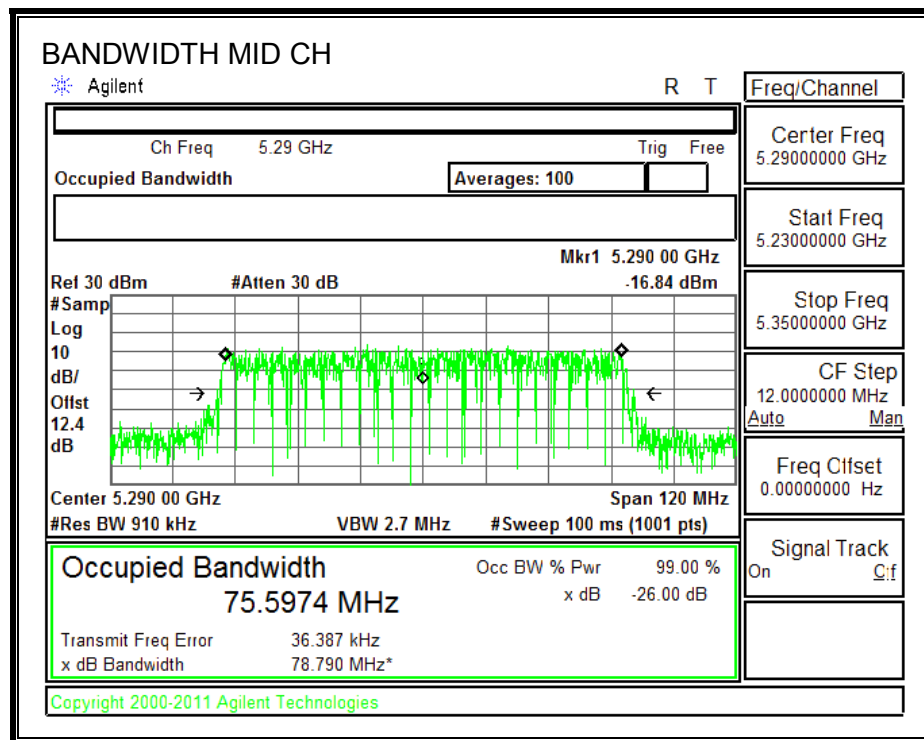
LIMITS

None; for reporting purposes only.

RESULTS

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Mid	5290	75.5974

99% BANDWIDTH



9.21.3. OUTPUT POWER AND PSD

LIMITS

FCC §15.407 (a) (2)

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 $11 \text{ dBm} + 10 \log B$, where B is the 26–dB emission bandwidth in MHz. In addition, the maximum 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.

DIRECTIONAL ANTENNA GAIN

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

ANTENNA 0

Antenna Gain (dBi)
3.05

ANTENNA 1

Antenna Gain (dBi)
3.33

RESULTS

Bandwidth, Antenna Gain, and Limits

Channel	Frequency (MHz)	Min 26 dB BW (MHz)	Directional Gain (dBi)	Power Limit (dBm)	PSD Limit (dBm)
Mid	5290	82.32	3.33	24.00	11.00

Duty Cycle CF (dB)	0.22	Included in Calculations of Corr'd Power & PSD
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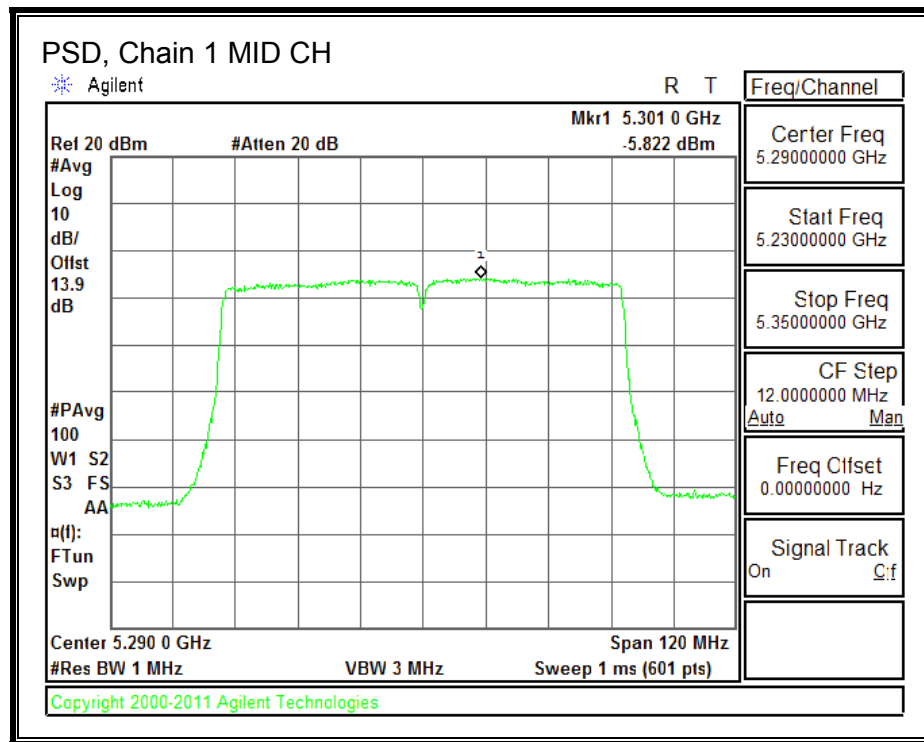
Output Power Results

Channel	Frequency (MHz)	Chain 1 Meas Power (dBm)	Total Corr'd Power (dBm)	Power Limit (dBm)	Power Margin (dB)
Mid	5290	11.76	11.98	24.00	-12.02

PPSD Results

Channel	Frequency (MHz)	Chain 1 Meas PSD (dBm)	Total Corr'd PSD (dBm)	PSD Limit (dBm)	PSD Margin (dB)
Mid	5290	-5.82	-5.60	11.00	-16.60

PSD, Chain 1



9.22. 802.11ac VHT80 2TX CDD MODE IN THE 5.3 GHz BAND

9.22.1. 26 dB BANDWIDTH

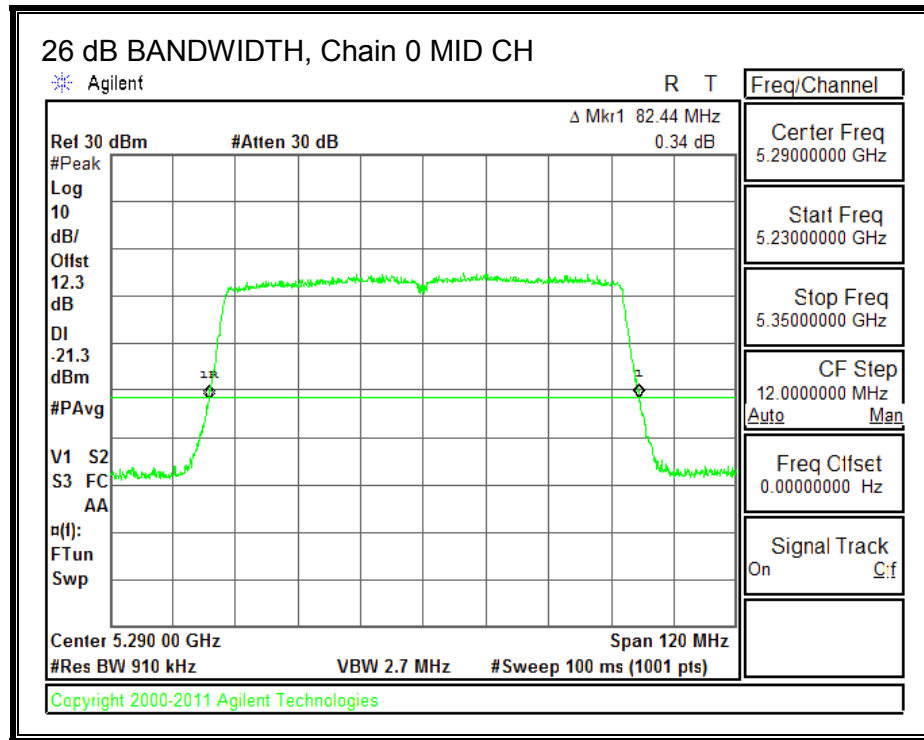
LIMITS

None; for reporting purposes only.

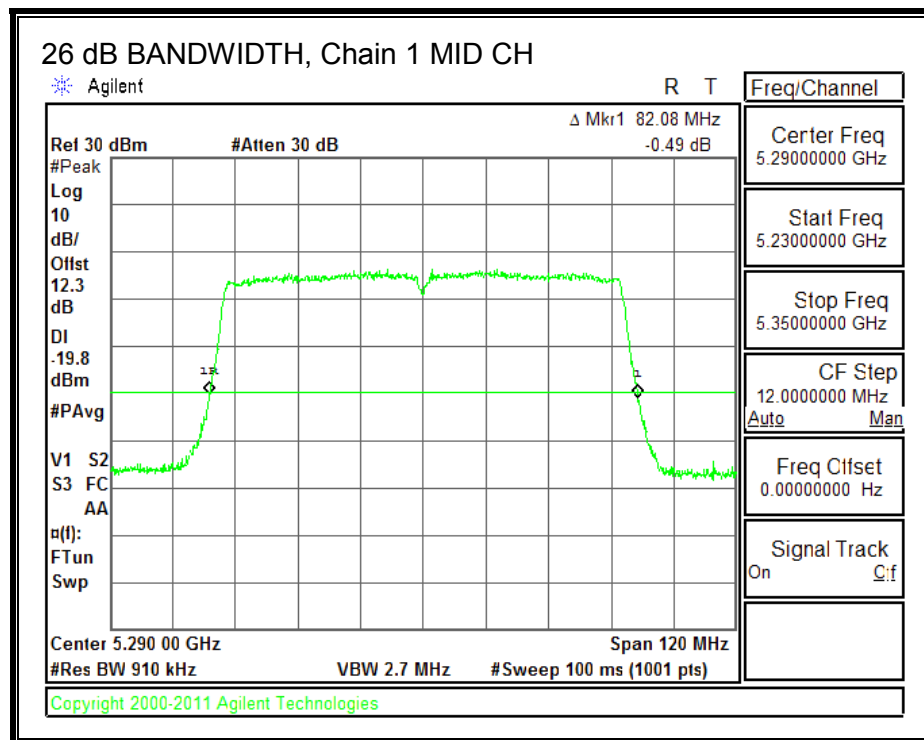
RESULTS

Channel	Frequency (MHz)	26 dB BW Chain 0 (MHz)	26 dB BW Chain 1 (MHz)
Mid	5290	82.44	82.08

26 dB BANDWIDTH, Chain 0



26 dB BANDWIDTH, Chain 1



9.22.2. 99% BANDWIDTH

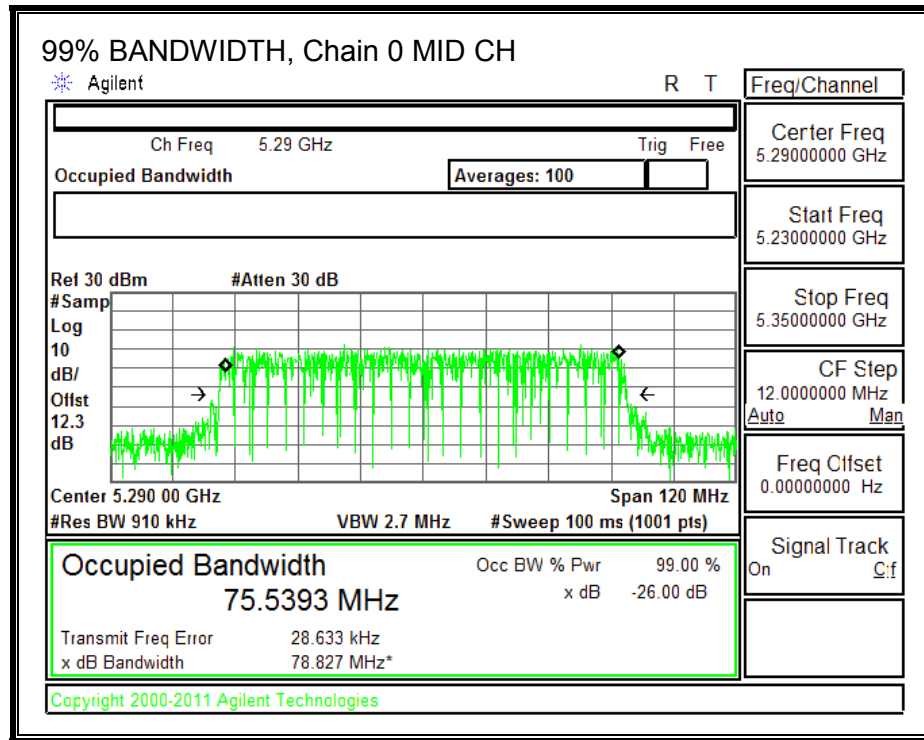
LIMITS

None; for reporting purposes only.

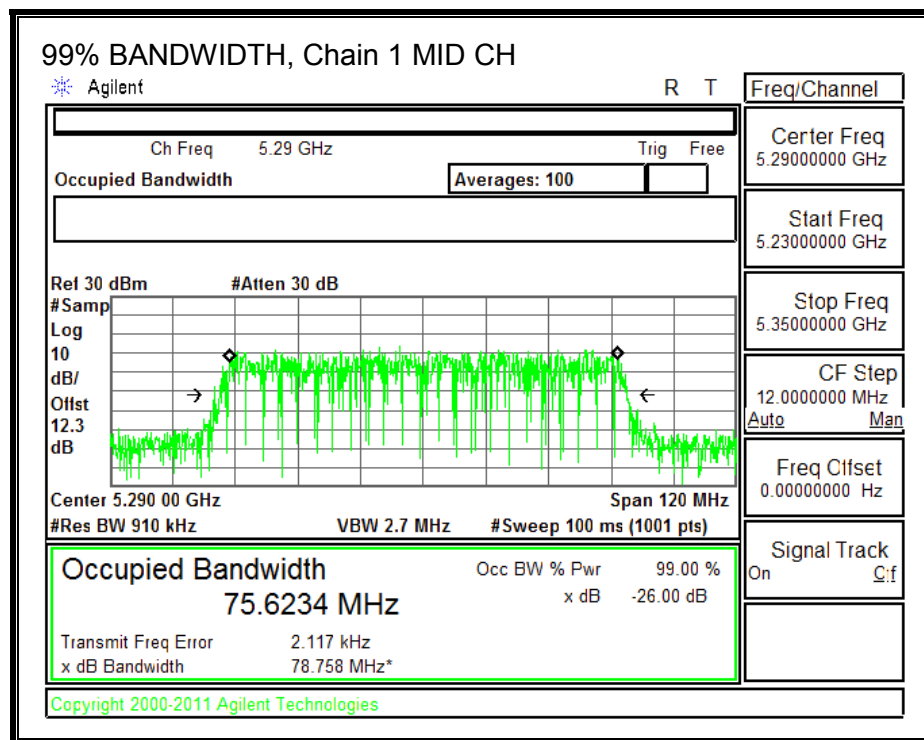
RESULTS

Channel	Frequency (MHz)	99% BW Chain 0 (MHz)	99% BW Chain 1 (MHz)
Mid	5290	75.5393	75.6234

99% BANDWIDTH, Chain 0



99% BANDWIDTH, Chain 1



9.22.3. OUTPUT POWER AND PSD

LIMITS

FCC §15.407 (a) (2)

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 $11 \text{ dBm} + 10 \log B$, where B is the 26–dB emission bandwidth in MHz. In addition, the maximum 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.

DIRECTIONAL ANTENNA GAIN

The TX chains are uncorrelated and the antenna gain is unequal among the chains. The directional gain is:

Chain 0 Antenna Gain (dBi)	Chain 1 Antenna Gain (dBi)	Uncorrelated Chains Directional Gain (dBi)
3.05	3.33	3.19

The TX chains are correlated and the antenna gain is unequal among the chains. The directional gain is:

Chain 0 Antenna Gain (dBi)	Chain 1 Antenna Gain (dBi)	Correlated Chains Directional Gain (dBi)
3.05	3.33	6.20

RESULTS

Bandwidth, Antenna Gain, and Limits

Channel	Frequency (MHz)	Min 26 dB BW (MHz)	Directional Gain for Power (dBi)	Directional Gain for PSD (dBi)	Power Limit (dBm)	PSD Limit (dBm)
Mid	5290	82.08	3.19	6.20	24.00	10.80

Duty Cycle CF (dB)	0.22	Included in Calculations of Corr'd Power & PSD
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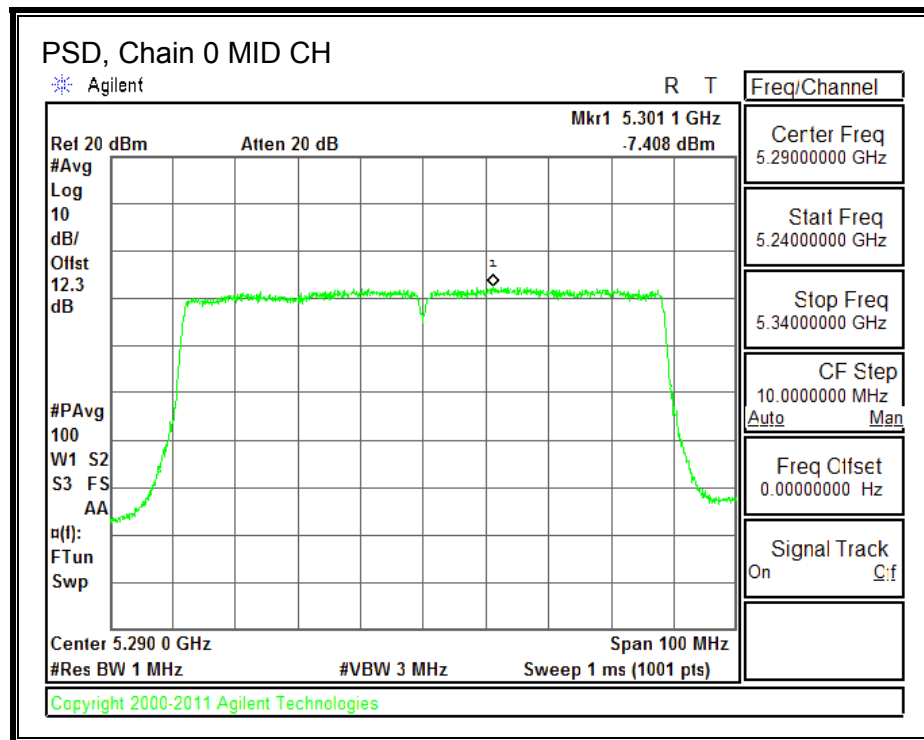
Output Power Results

Channel	Frequency (MHz)	Chain 0 Meas Power (dBm)	Chain 1 Meas Power (dBm)	Total Corr'd Power (dBm)	Power Limit (dBm)	Power Margin (dB)
Mid	5290	9.20	9.28	12.47	24.00	-11.53

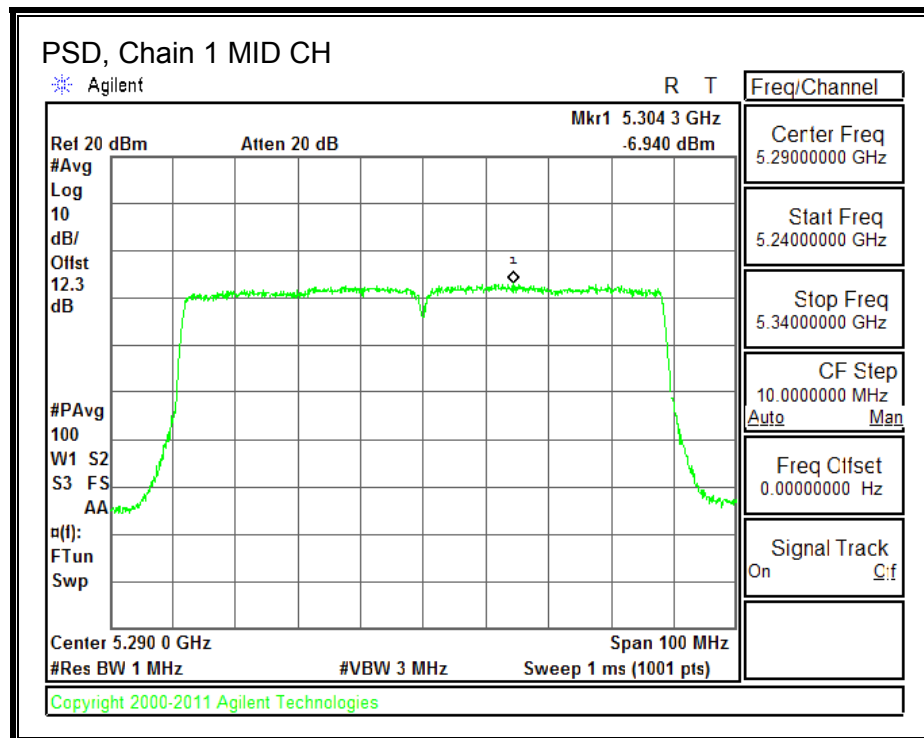
PSD Results

Channel	Frequency (MHz)	Chain 0 Meas PSD (dBm)	Chain 1 Meas PSD (dBm)	Total Corr'd PSD (dBm)	PSD Limit (dBm)	PSD Margin (dB)
Mid	5290	-7.41	-6.94	-3.94	10.80	-14.74

PSD, Chain 0



PSD, Chain 1



9.23. 802.11ac VHT80 2TX STBC MODE IN THE 5.3 GHz BAND

9.23.1. 26 dB BANDWIDTH

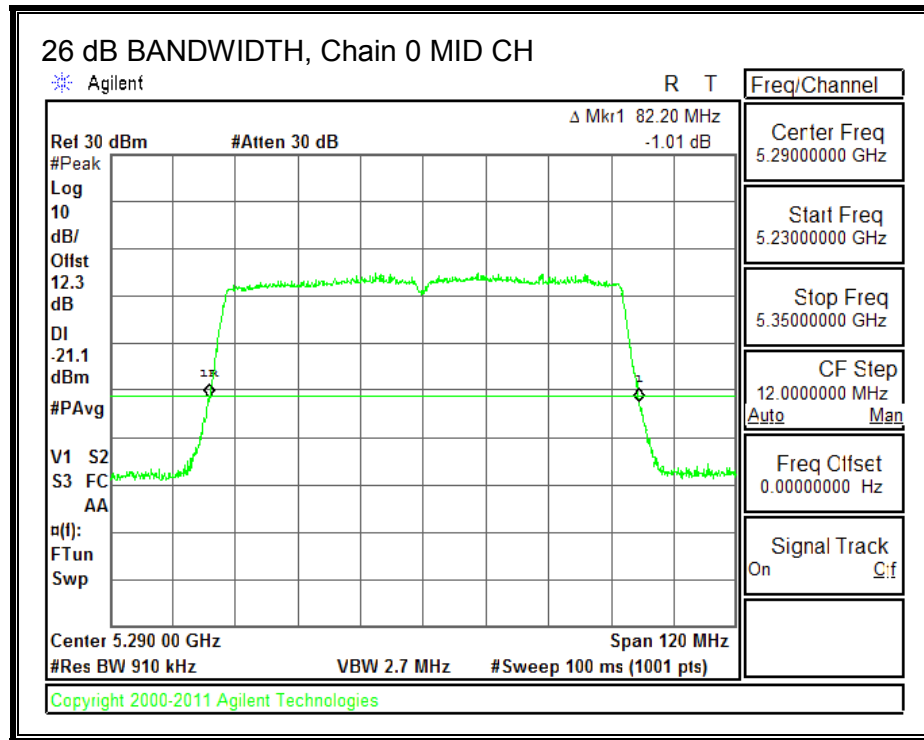
LIMITS

None; for reporting purposes only.

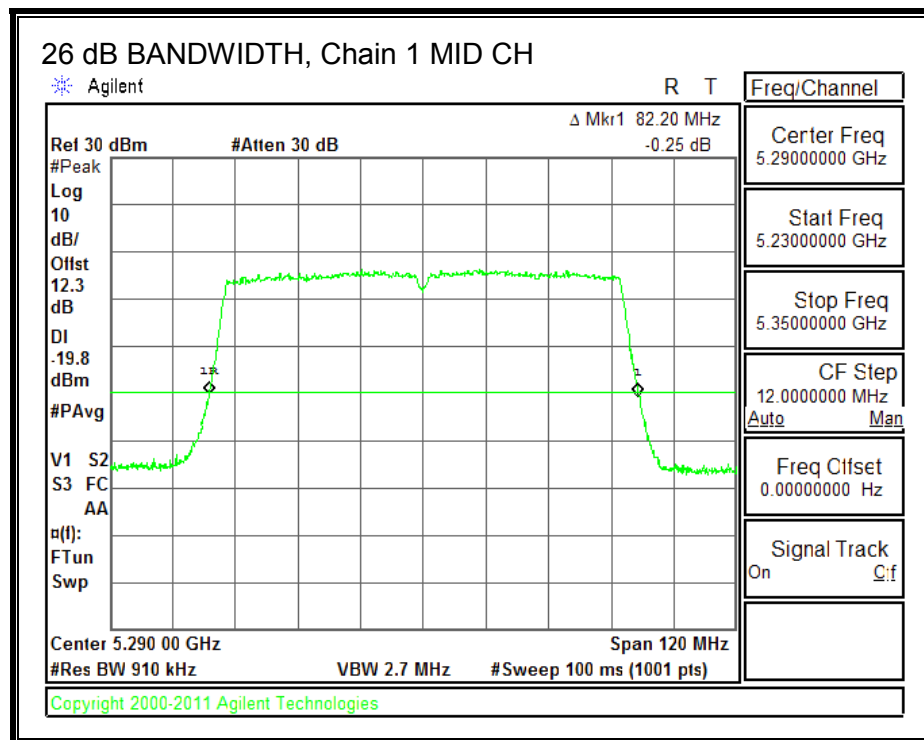
RESULTS

Channel	Frequency (MHz)	26 dB BW Chain 0 (MHz)	26 dB BW Chain 1 (MHz)
Mid	5290	82.20	82.20

26 dB BANDWIDTH, Chain 0



26 dB BANDWIDTH, Chain 1



9.23.2. 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

RESULTS

Channel	Frequency (MHz)	99% BW Chain 0 (MHz)	99% BW Chain 1 (MHz)
Mid	5290	75.5723	75.5583