FCC 47 CFR PART 15 SUBPART E

CERTIFICATION TEST REPORT

FOR

PORTABLE COMPUTING DEVICE

MODEL NUMBER: 1724

FCC ID: C3K1724

REPORT NUMBER: R10880568-E2A

ISSUE DATE: 2015-10-01

Prepared for
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Revision History

Ver.	Issue Date	Revisions	Revised By
1	2015-09-25	Initial Issue	Jeff Moser
2	2015-10-01	Expanded power summary table to include straddle channels.	Jeff Moser

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: MICROSOFT CORPORATION
ONE MICROSOFT WAY
REDMOND, WA 98052, U.S.A.

EUT DESCRIPTION: PORTABLE COMPUTING DEVICE

MODEL: 1724

SERIAL NUMBER: 012785552253 (RF1), 012756752253 (RF2), 012810252253 (RF3)

DATE TESTED: August 03-17, 2015, September 20-22, 2015

APPLICABLE STANDARDS	
STANDARD	**TEST RESULTS**
CFR 47 Part 15 Subpart E	PASS

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

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

Approved & Released For UL LLC By:	Reviewed By:	Prepared By:
Francisco de Anda Project Lead UL Verification services Inc.	Jeff Moser EMC Program Manager UL – Consumer Technology Division	Jeff Cabrera Laboratory Technician UL – Consumer Technology Division

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2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with FCC CFR 47 Part 2, FCC CFR 47 Part 15, FCC 06-96, FCC KDB 789033 and ANSI C63.10-2013.

3. FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 12 Laboratory Dr., Research Triangle Park, NC 27709, USA and 2800 Suite B Perimeter Park Dr., Morrisville, NC 27560.

12 Laboratory Dr., RTP, NC 27709
☐ Chamber A
☐ Chamber C

2800 Suite B Perimeter Park Dr., Morrisville, NC 27560
☒ Chamber NORTH
☐ Chamber SOUTH

UL LLC (RTP) is accredited by NVLAP, Laboratory Code 200246-0. The full scope of accreditation can be viewed at http://www.nist.gov/nvlap/.

4. CALIBRATION AND UNCERTAINTY

4.1. MEASURING INSTRUMENT CALIBRATION

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

4.2. SAMPLE CALCULATION

Where relevant, the following sample calculation is provided:

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

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

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4.3. MEASUREMENT UNCERTAINTY

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

PARAMETER	UNCERTAINTY
Total RF power, conducted	±0.45 dB
RF power density, conducted	±1.5 dB
Spurious emissions, conducted	±1.46 dB
Radiated Emissions (30-1000 MHz)	+/- 6.04 dB (3m)
Radiated Emissions (1-6 GHz)	+/- 5.96 dB
Radiated Emissions (6-18 GHz)	+/- 6.10 dB
Radiated Emissions (18-26 GHz)	+/- 6.81 dB
Temperature	±0.07°C
Humidity	±2.26% RH
DC and low frequency voltages	±1.27%

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

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5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

The EUT is a handheld computing device with 802.11 2x2, a/b/g/n/ac WLAN, Bluetooth, Bluetooth LE. This report covers 5 GHz 802.11. All other technologies are covered by separate reports.

5.2. MAXIMUM OUTPUT POWER

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

Frequency Range (MHz)	Mode	Output Power (dBm)	Output Power (mW)
5.2 GHz Band			
5180 - 5240	802.11a	10.93	12.39
5180 - 5240	802.11n HT20	10.82	12.08
5190 - 5230	802.11n HT40	10.75	11.89
5210	802.11ac VHT80	7.63	5.79
5.3 GHz Band			
5260 - 5320	802.11a	11.08	12.82
5260 - 5320	802.11n HT20	10.80	12.02
5270 - 5310	802.11n HT40	10.89	12.27
5290	802.11ac VHT80	7.70	5.89
5.6 GHz Band			
5500 - 5700	802.11a	11.60	14.45
5720 Straddle	802.11a	11.68	14.72
5500 - 5700	802.11n HT20	11.63	14.55
5720 Straddle	802.11n HT20	11.48	14.06
5510 - 5670	802.11n HT40	11.57	14.35
5710 Straddle	802.11n HT40	11.55	14.29
5530-5610	802.11ac VHT80	9.23	8.38
5690 Straddle	802.11ac VHT80	9.26	8.43
5.8 GHz Band			
5745-5825	802.11a	12.68	18.54
5720 Straddle	802.11a	5.45	3.51
5745-5825	802.11n HT20	11.69	14.76
5720 Stradddle	802.11n HT20	5.83	3.83
5755-5795	802.11n HT40	11.72	14.86
5710 Straddle	802.11n HT40	1.10	1.29
5775	802.11ac VHT80	8.36	6.85
5690 Straddle	802.11ac VHT80	-4.48	0.36

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5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes an integrated antenna, with a maximum gain as follows:

Frequency Range (MHz)	MAIN Antenna Wi-Fi Main/BT Peak Gain (dBi) Chain B	MIMO Antenna Wi-Fi MIMO Peak Gain (dBi) Chain A
5.15 to 5.25 GHz	2.0	2.2
5.25 to 5.35 GHz	2.2	2.4
5.47 to 5.725 GHz	2.1	2.3
5.725 to 5.85 GHz	1.4	1.7

5.4. SOFTWARE AND FIRMWARE

The EUT driver software installed during testing was Mte OS 1.416.0.

The test utility software used during testing was WiFi tool v2.7.4.

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5.5. WORST-CASE CONFIGURATION AND MODE

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

The fundamental of the EUT was investigated in three orthogonal orientations X,Y,Z and an additional one employing its kickstand, it was determined that the Z orientation was the worst-case orientation; therefore, all final radiated testing was performed with the EUT in the Z orientation.

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

802.11a mode: 6 Mbps
802.11n HT20mode: MCS0
802.11n HT40mode: MCS0
802.11ac VHT80mode: MCS0

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5.6. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List				
Description	**Manufacturer**	**Model**	**Serial Number**	**FCC ID**
Laptop	Lenovo	E545	MP-06P9HP	DoC
Laptop AC/DC adapter	Lenovo	42T4430	11S42T4430Z1ZGWE25Y1ET	DoC
Ethernet to USB Adapter	Linksys	USB300M	C8D719E76E21	N/A
EUT AC/DC adapter	Microsoft	1625	0D130C07VLN51	DoC
Ear buds	-	Generic	-	N/A

I/O CABLES

I/O Cable List						
Cable No	**Port**	**# of identical ports**	**Connector Type**	**Cable Type**	**Cable Length (m)**	**Remarks**
1	Antenna	1	SMA	Un-Shielded	0.3	To spectrum Analyzer
2	USB	1	USB	Shielded	0.2	To EUT
3	DC	1	DC	Un-shielded	1.8	N/A
4	Ether cable	1	RJ45- USB	Un-shielded	1	To laptop
5	DC	1	DC	Un-shielded	0.8	N/A
6	AC	1	2-Prong	Un-shielded	1.5	N/A
7	AC	1	2-Prong	Un-Shielded	0.5	N/A
8	Audio	1	3.5mm stereo	Un-Shielded	1.1	N/A

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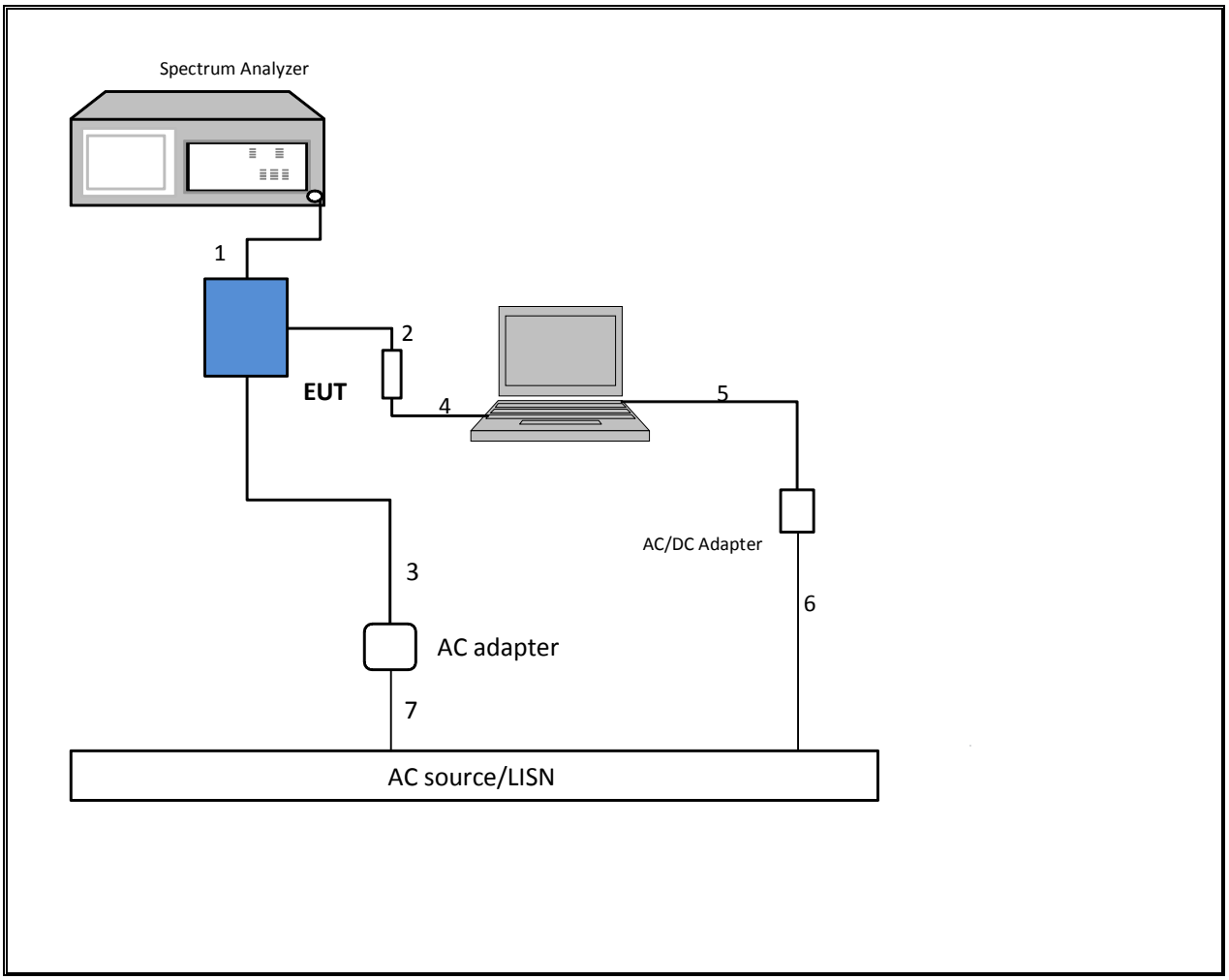
TEST SETUP- CONDUCTED PORT

The EUT was tested connected to a host Laptop via RJ45/USB cable and spectrum analyzer to antenna port. Test software exercised the EUT.

SETUP DIAGRAM



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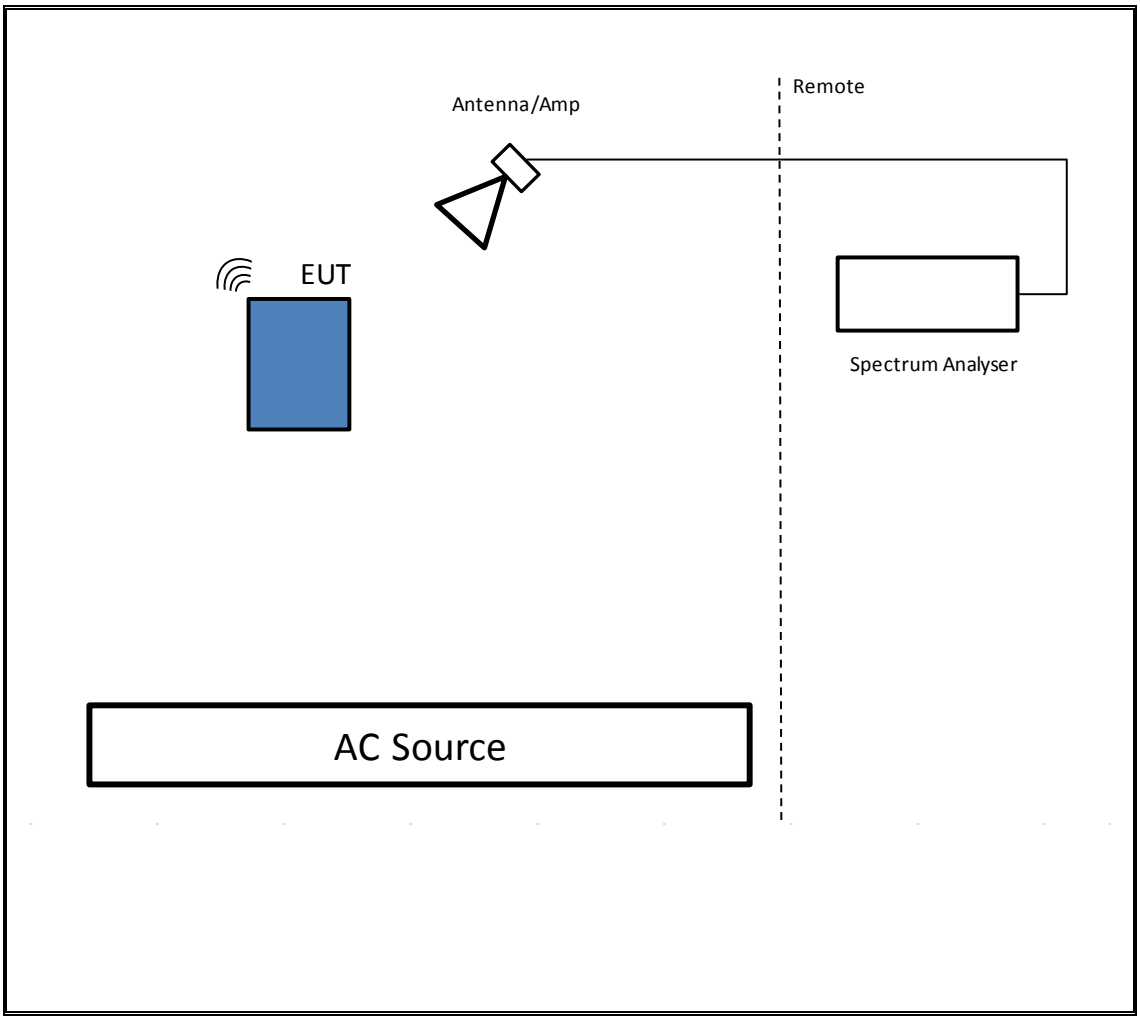
TEST SETUP- RADIATED-ABOVE 1 GHZ

The EUT was tested battery powered. Test software exercised the EUT.

SETUP DIAGRAM



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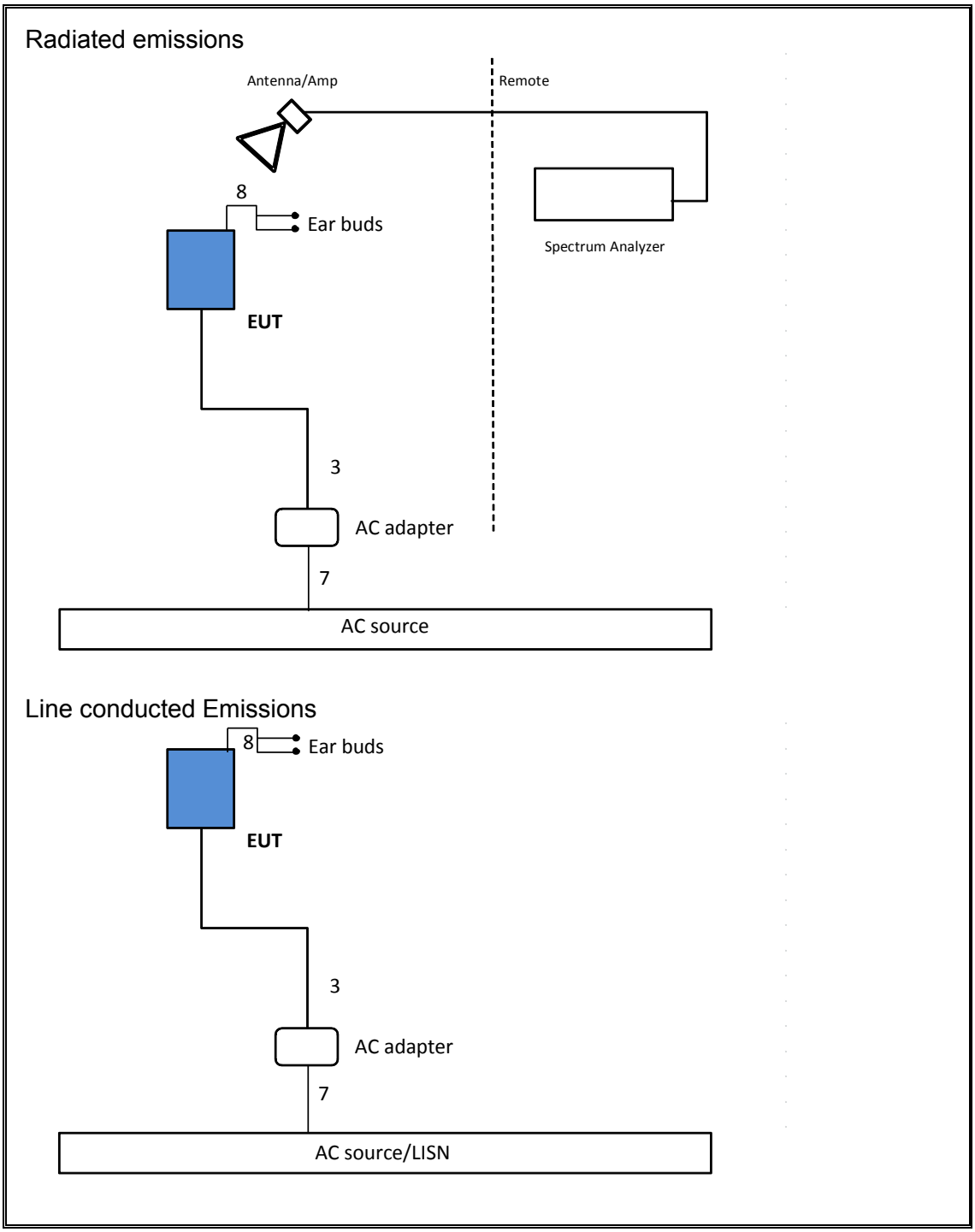
TEST SETUP - BELOW 1GHZ & AC LINE CONDUCTED TESTS

SETUP DIAGRAM



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6. TEST AND MEASUREMENT EQUIPMENT

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

Radiated Disturbance Emissions Test Equipment (Morrisville - North Chamber)

Equip. ID	Description	Manufacturer	Model Number	Last Cal.	Next Cal.
AT0073	Hybrid Broadband Antenna, 30-1000MHz	Sunol Sciences Corp.	JB3	2015-06-10	2016-06-30
AT0072	Double-Ridged Waveguide Horn Antenna, 1 to 18 GHz	ETS Lindgren	3117	2015-02-17	2016-02-29
SAC_N_Hybrid (30-1000MHz)	Gain-Loss string for Hybrid antenna	Various	Various	2015-06-25	2016-06-30
SAC_N_Horn (1-18GHz)	Gain-Loss string for Horn antenna	Various	Various	2015-06-25	2016-06-30
AT0053	Horn Antenna, 18-26.5GHz	ARA	SWH-28 (S/N 1004)	2015-07-28	2016-07-31
	Horn Antenna, 25.5-40GHz	ARA	SWH-29 (S/N 1003)		
	Amplifier (S/Ns 859993, 860112, 859864)	Miteq	JSD42-1800400-30-5A		
	Cable (S/N 204158-001)	Micro-coax	UFA147A-0-1181-200200		
SA0026	Spectrum Analyzer	Agilent	N9030A	2015-03-27	2016-03-31
SOFTEMI	EMI Software	UL	Version 9.5	NA	NA
43733	Temp/Humid/Pressure Meter	Cole Parmer	99760-00	2014-03-24	2016-03-24

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Antenna-port Test Measurement Equipment

Equipment ID	Description	Manufacturer	Model Number	Last Cal.	Next Cal.
	Common Equipment				
T189	Spectrum Analyzer	Agilent Technologies	E4440A	2015-05-13	2016-05-31
PWM002	RF Power Meter	Keysight Technologies	N1911A	2015-06-08	2017-06-08
PWS004	Power Sensor, 50MHz to 6 GHz	Keysight Technologies	E9323A	2015-06-05	2016-06-05
43733	Temp/Humid/Pressure Meter	Cole Parmer	99760-00	2014-03-24	2016-03-24

Line Conducted Test Equipment

Equipment ID	Description	Manufacturer	Model Number	Last Cal.	Next Cal.
SA0021	EMI Test Receiver 9kHz-3.6GHz	Rohde & Schwarz	ESR3	2015-07-08	2016-07-31
ATA508	Transient Limiter, 0.009 to 100 MHz	Electro-Metrics	EM 7600	2015-08-03	2016-08-31
ATA509	Coaxial cable, 20 ft., BNC - male to BNC-male	UL	RG-223	2015-08-03	2016-08-31
HI0069	Temp/Humid/Pressure Meter	Cole-Parmer	99760-00	2015-07-01	2016-07-31
SOFTEMI	EMI Software	UL	Version 9.5	NA	NA
LISN002	LISN, 50-ohm/50-uH, 2-conductor, 25A	Fischer Custom Com.	FCC-LISN-50-25-2-01-550V	2014-09-04	2015-09-30

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7. MEASUREMENT METHODS

26 dB Emission BW: KDB 789033 D02 v01, Section C.

99% Occupied BW: KDB 789033 D02 v01, Section D.

Conducted Output Power: KDB 789033 D02 v01, Section E.3.a (Method PM) and Section E.2.b (Method SA-1).

Power Spectral Density: KDB 789033 D02 v01, Section F (Method SA-2).

Unwanted emissions in restricted bands: KDB 789033 D02 v01, Sections G.3, G.4, G.5, and G.6.

Unwanted emissions in non-restricted bands: KDB 789033 D02 v01, Sections G.3, G.4, and G.5.

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8. ANTENNA PORT TEST RESULTS

8.1. ON TIME AND DUTY CYCLE

LIMITS

None; for reporting purposes only.

PROCEDURE

KDB 789033 Zero-Span Spectrum Analyzer Method.

ON TIME AND DUTY CYCLE RESULTS

Mode	ON Time B (msec)	Period (msec)	Duty Cycle x (linear)	Duty Cycle (%)	Duty Cycle Correction Factor (dB)	1/B Minimum VBW (kHz)
802.11a 2TX	3.080	3.168	0.972	97.22%	0.12	0.325
802.11n HT20 2TX	9.760	9.936	0.982	98.23%	0.00	0.010
802.11n HT40 2TX	4.720	4.808	0.982	98.17%	0.00	0.010
802.11ac VHT80 2TX	2.2160	2.2600	0.981	98.05%	0.00	0.010

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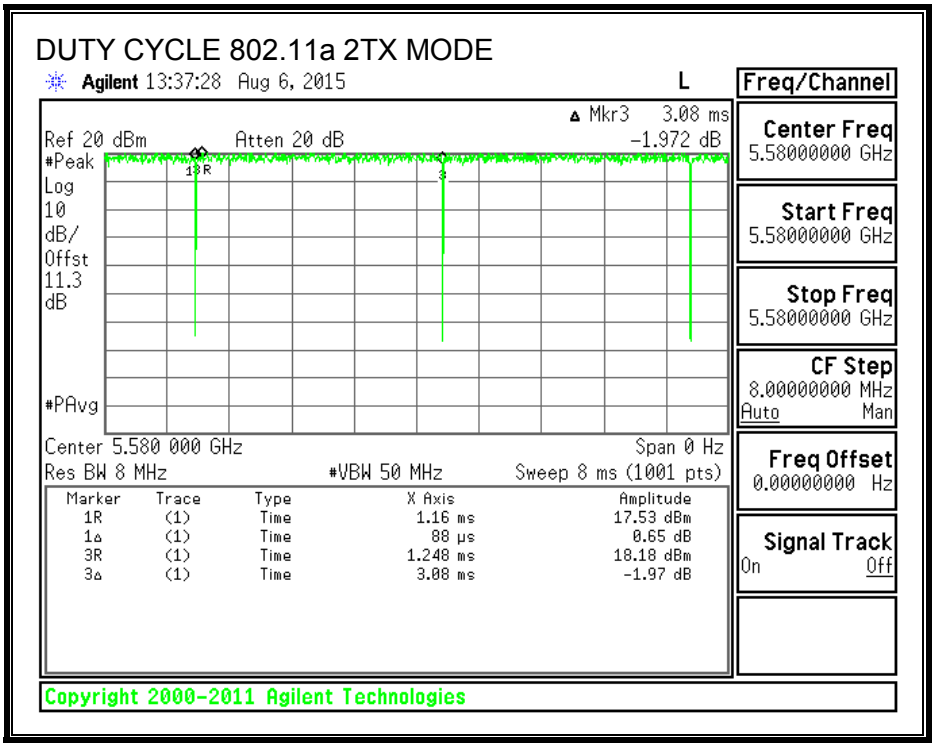
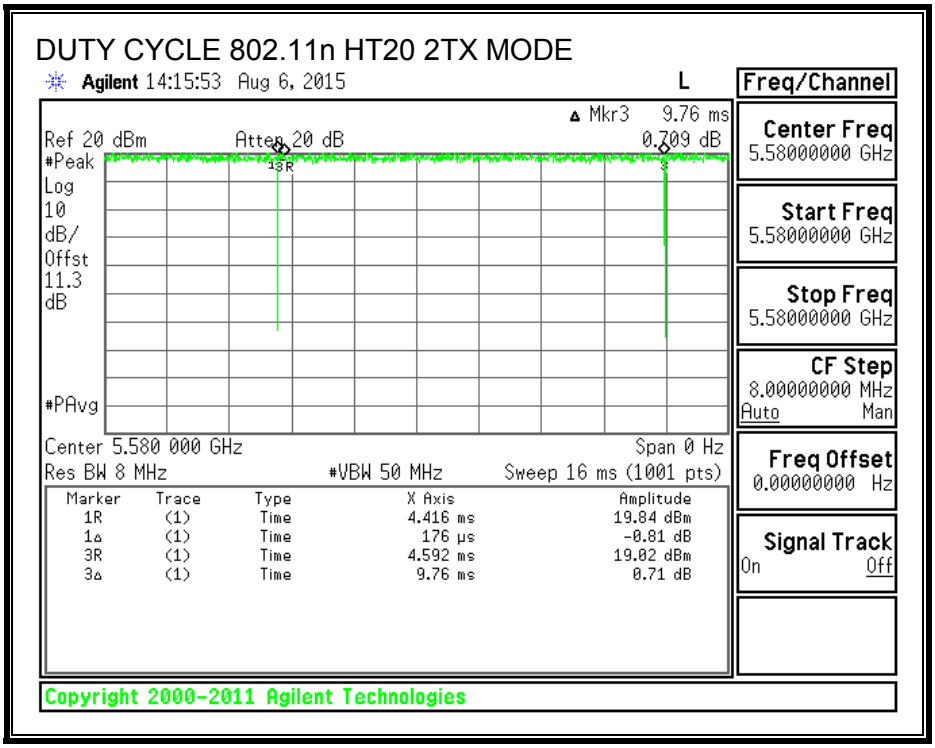
DUTY CYCLE PLOTS





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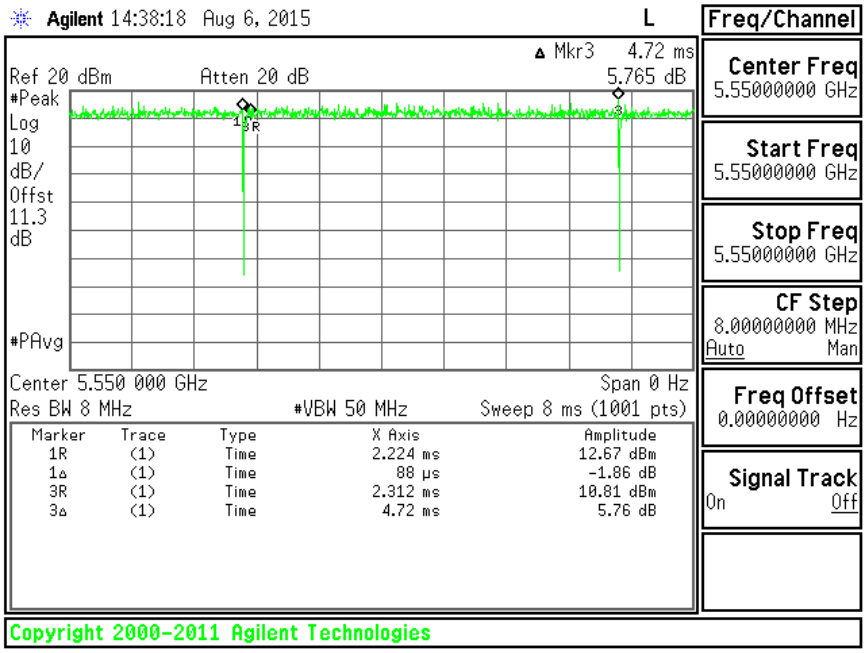
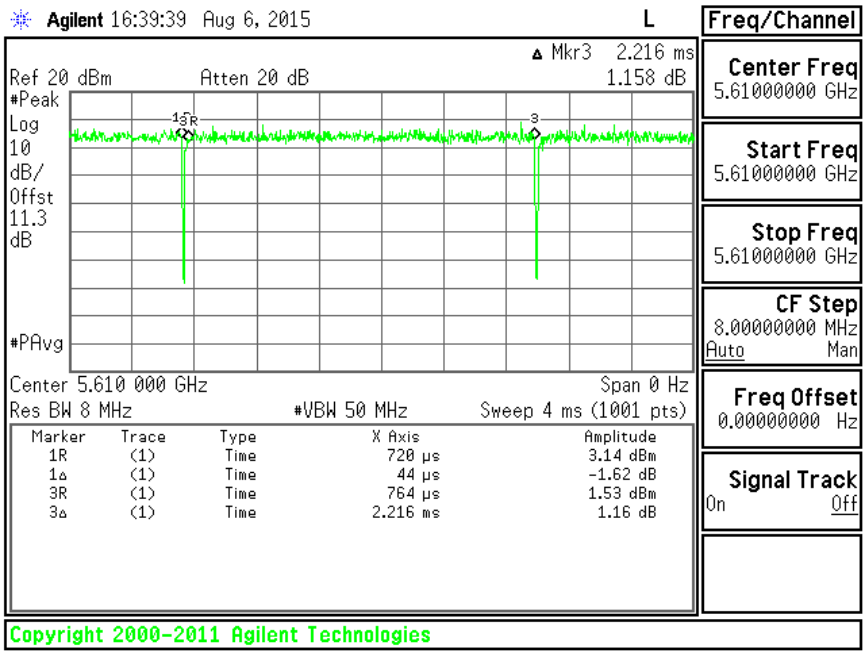
DUTY CYCLE 802.11n HT40 2TX MODE



DUTY CYCLE 802.11ac VHT80 2TX MODE



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8.2. 802.11a MODE IN THE 5.2 GHz BAND

8.2.1. 26 dB BANDWIDTH

LIMITS

None; for reporting purposes only.

RESULTS

Channel	Frequency (MHz)	26 dB BW Chain B (MHz)	26 dB BW Chain A (MHz)
Low	5180	19.20	19.62
Mid	5200	19.83	19.38
High	5240	19.95	19.29

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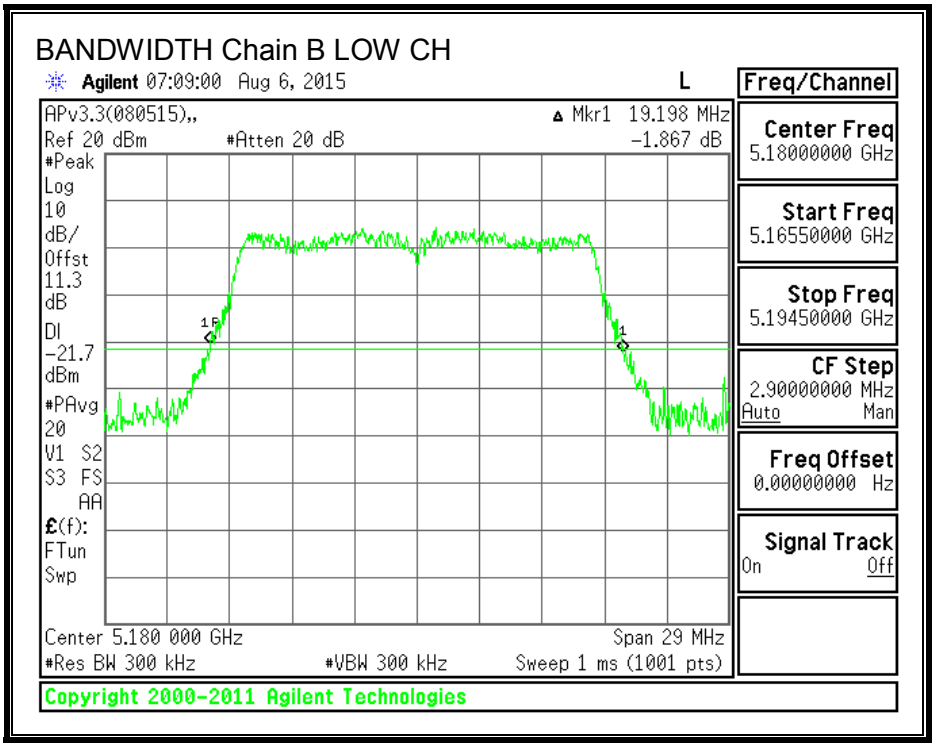
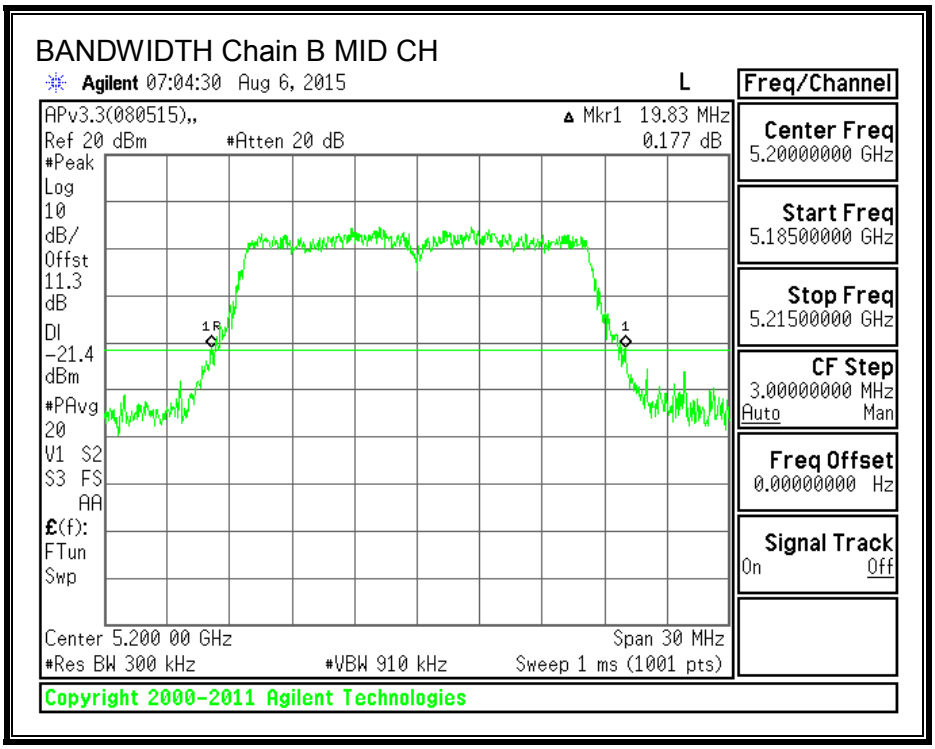
26 dB BANDWIDTH, Chain B





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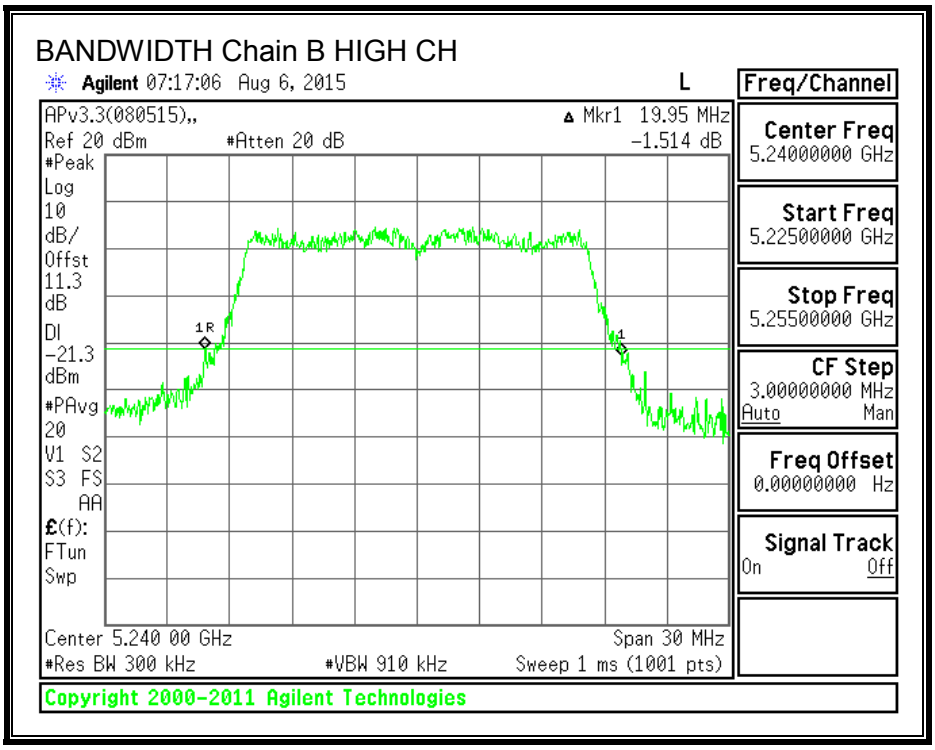
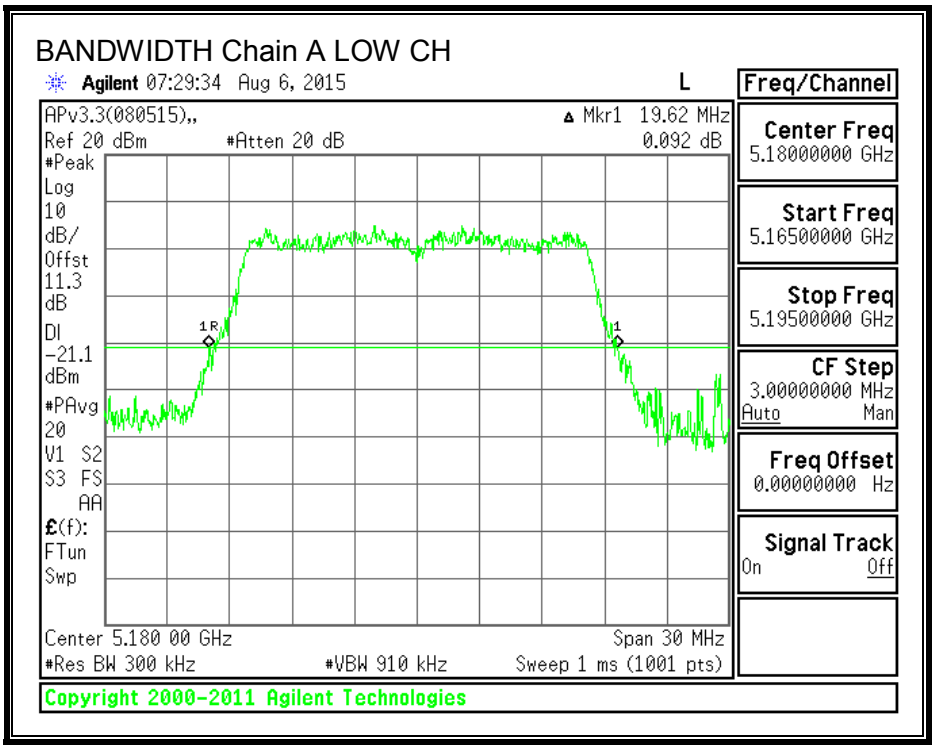


26 dB BANDWIDTH, Chain A



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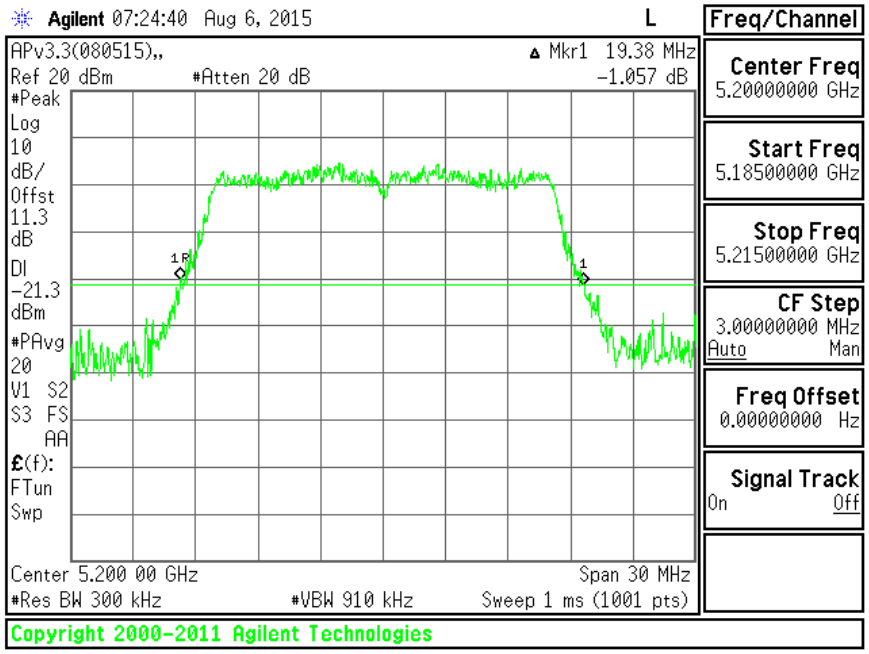
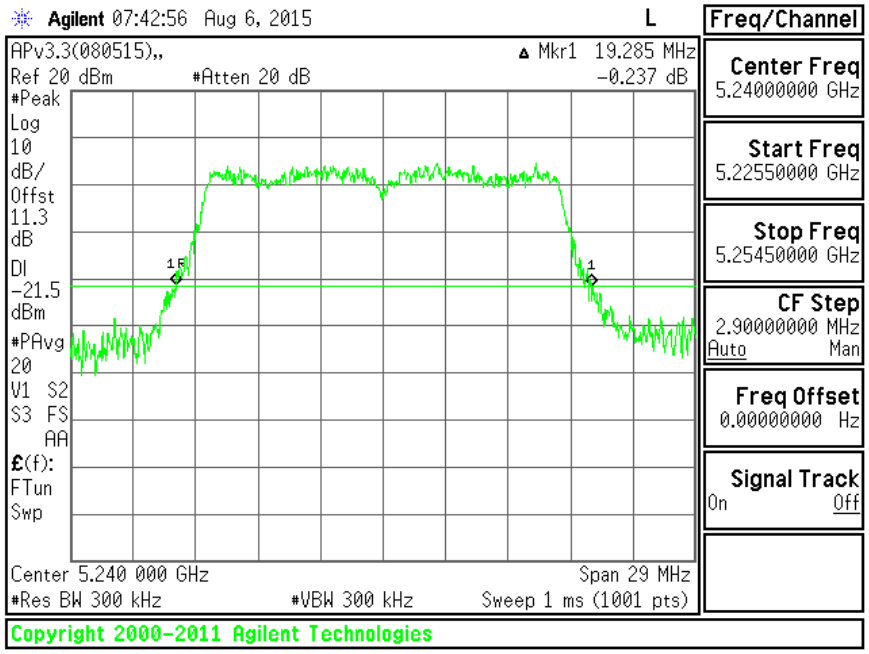
BANDWIDTH Chain A MID CH



BANDWIDTH Chain A HIGH CH



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8.2.2. 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

RESULTS

Channel	Frequency (MHz)	99% BW Chain B (MHz)	99% BW Chain A (MHz)
Low	5180	16.5192	16.5123
Mid	5200	16.5049	16.5067
High	5240	16.5125	16.5129

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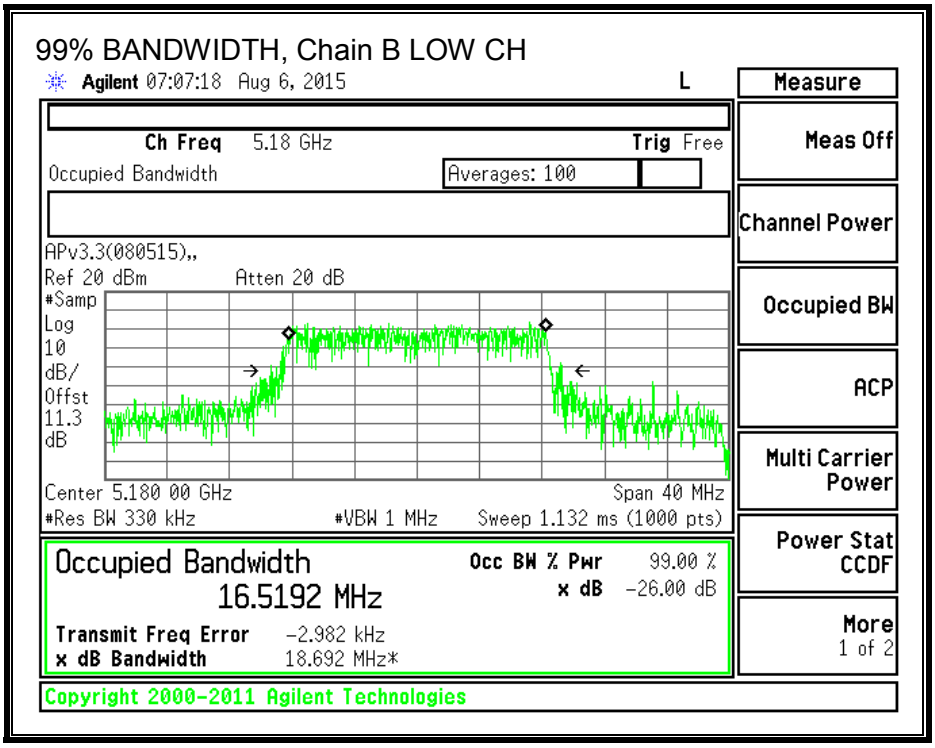
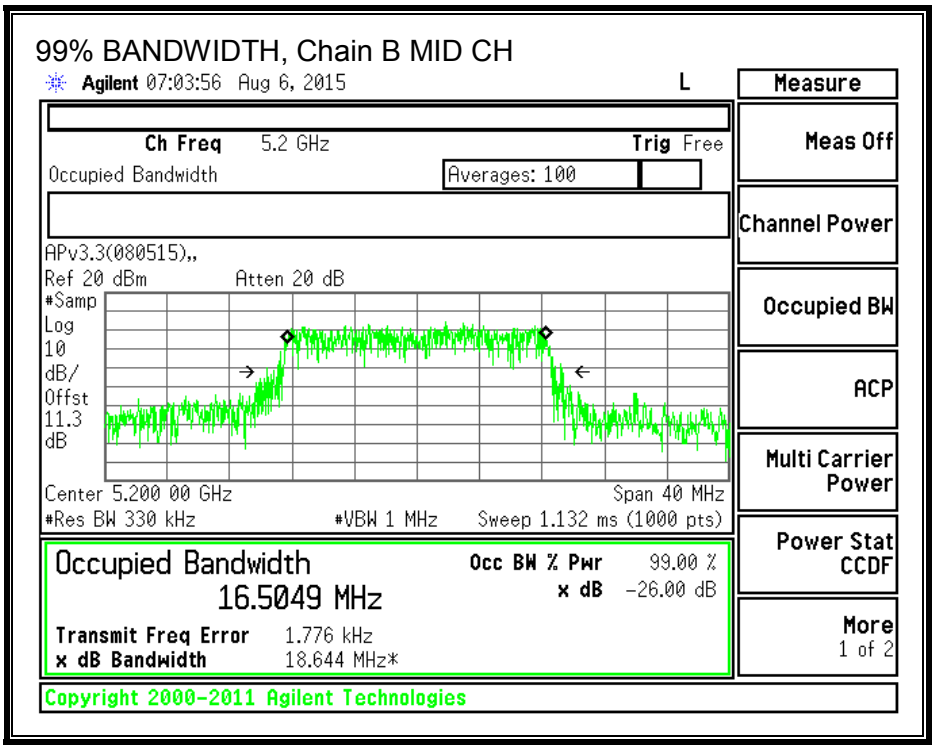
99% BANDWIDTH, Chain B





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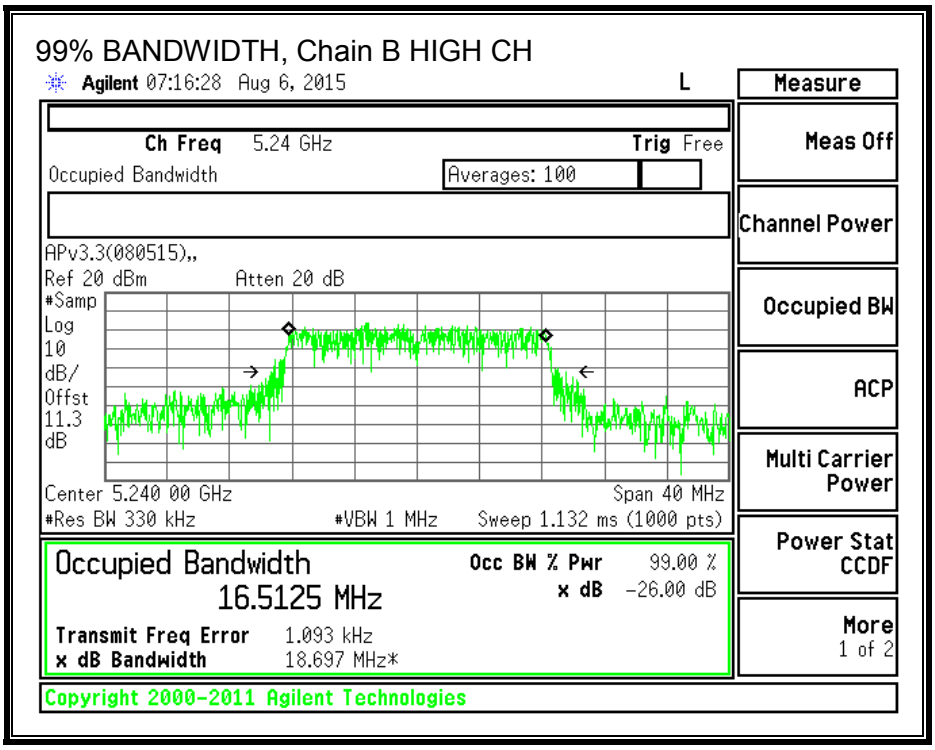
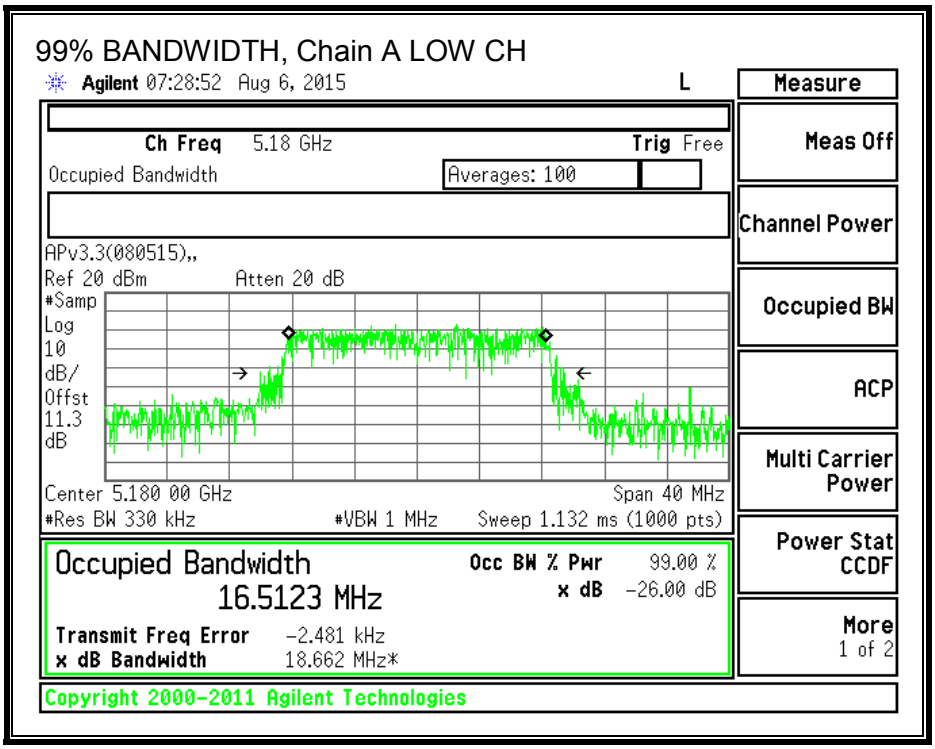


99% BANDWIDTH, Chain A



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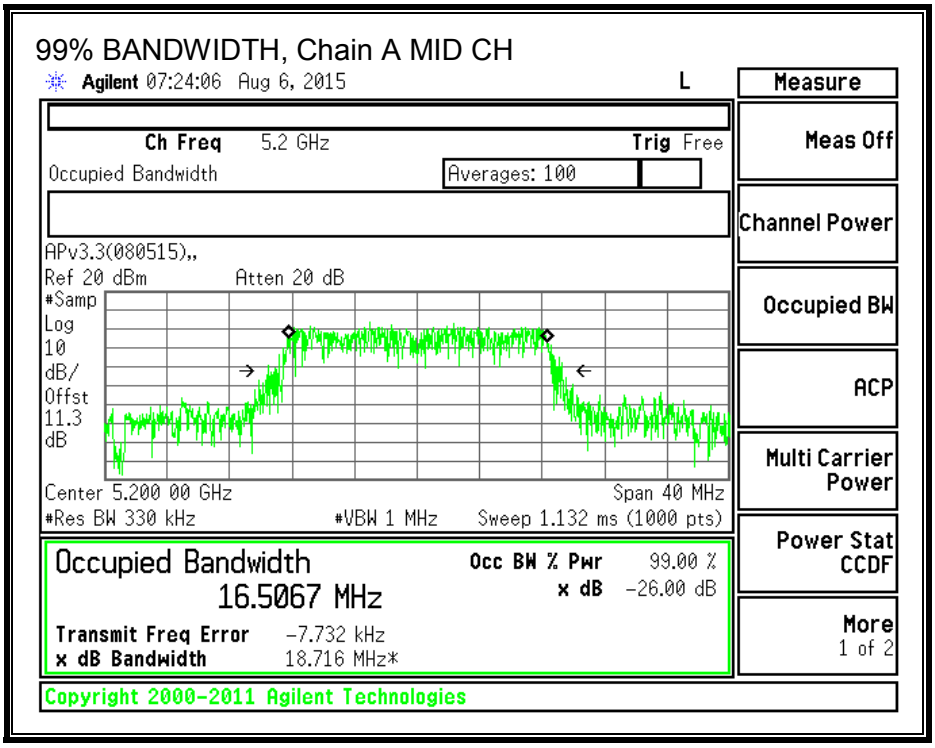

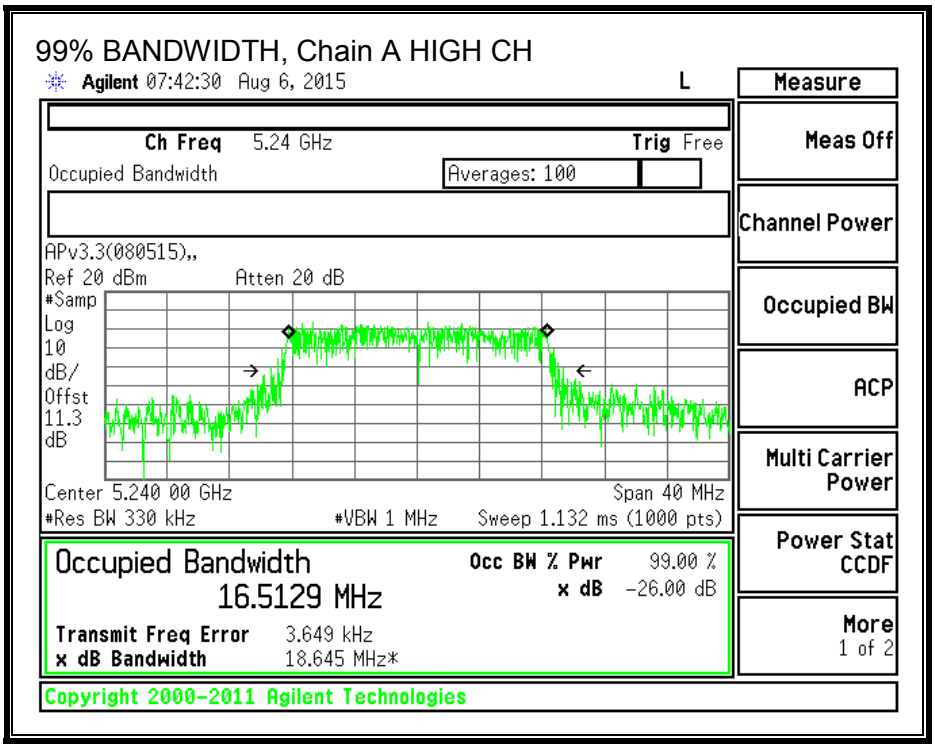

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8.2.3. OUTPUT POWER AND PSD

LIMITS

FCC §15.407 (a) (1)

(i) For an outdoor access point operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 17 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. The maximum e.i.r.p. at any elevation angle above 30 degrees as measured from the horizon must not exceed 125 mW (21 dBm).

(ii) For an indoor access point operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 17 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.

(iii) For fixed point-to-point access points operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. Fixed point-to-point U-NII devices may employ antennas with directional gain up to 23 dBi without any corresponding reduction in the maximum conducted output power or maximum power spectral density. For fixed point-to-point transmitters that employ a directional antenna gain greater than 23 dBi, a 1 dB reduction in maximum conducted output power and maximum power spectral density is required for each 1 dB of antenna gain in excess of 23 dBi. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.

(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.

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DIRECTIONAL ANTENNA GAIN

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

Chain B Antenna Gain (dBi)	Chain A Antenna Gain (dBi)	Uncorrelated Chains Directional Gain (dBi)
2.00	2.20	2.10

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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	2.10	2.10	24.00	11.00
Mid	5200	2.10	2.10	24.00	11.00
High	5240	2.10	2.10	24.00	11.00

Duty Cycle CF (dB)	0.12	**Included in Calculations of Corr'd Power & PSD**

Output Power Results

Channel	Frequency (MHz)	Chain B Meas Power (dBm)	Chain A Meas Power (dBm)	Total Corr'd Power (dBm)	Power Limit (dBm)	Power Margin (dB)
Low	5180	7.60	7.55	10.71	24.00	-13.29
Mid	5200	7.80	7.79	10.93	24.00	-13.07
High	5240	7.74	7.81	10.91	24.00	-13.09

PSD Results

Channel	Frequency (MHz)	Chain B Meas PSD (dBm)	Chain A Meas PSD (dBm)	Total Corr'd PSD (dBm)	PSD Limit (dBm)	PSD Margin (dB)
Low	5180	-3.05	-2.71	0.25	11.00	-10.75
Mid	5200	-3.35	-2.75	0.09	11.00	-10.91
High	5240	-2.95	-2.97	0.17	11.00	-10.83

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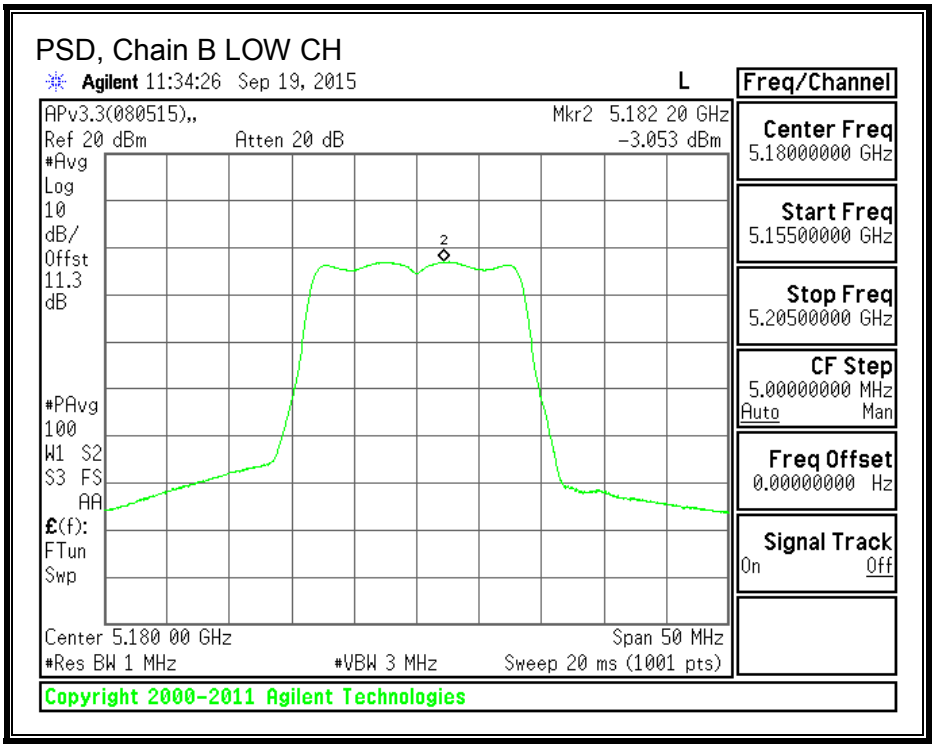
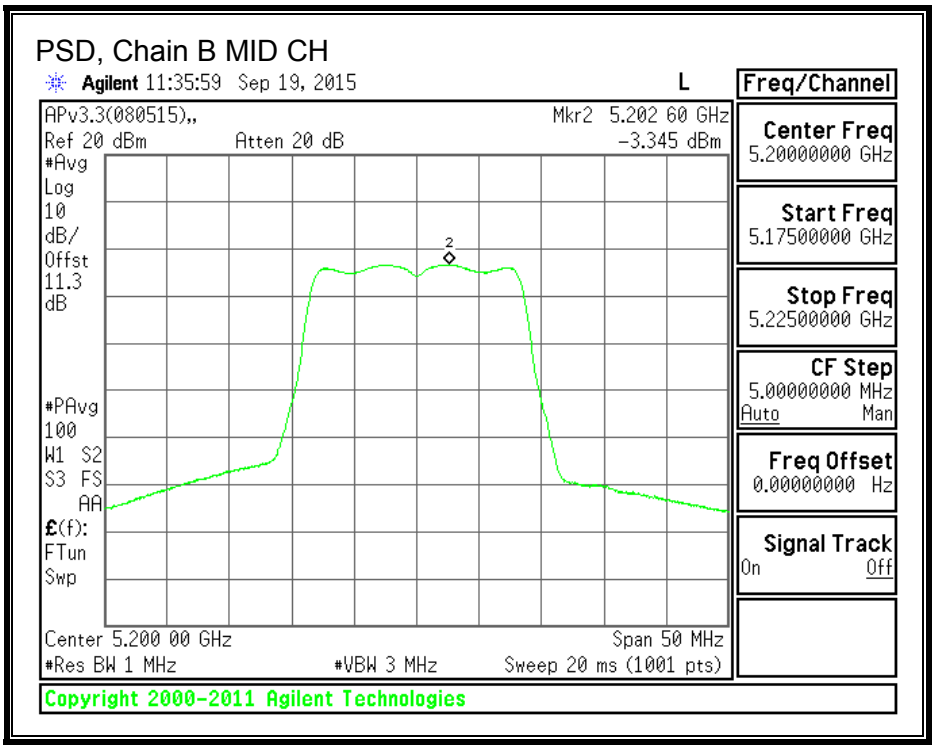
PSD, Chain B





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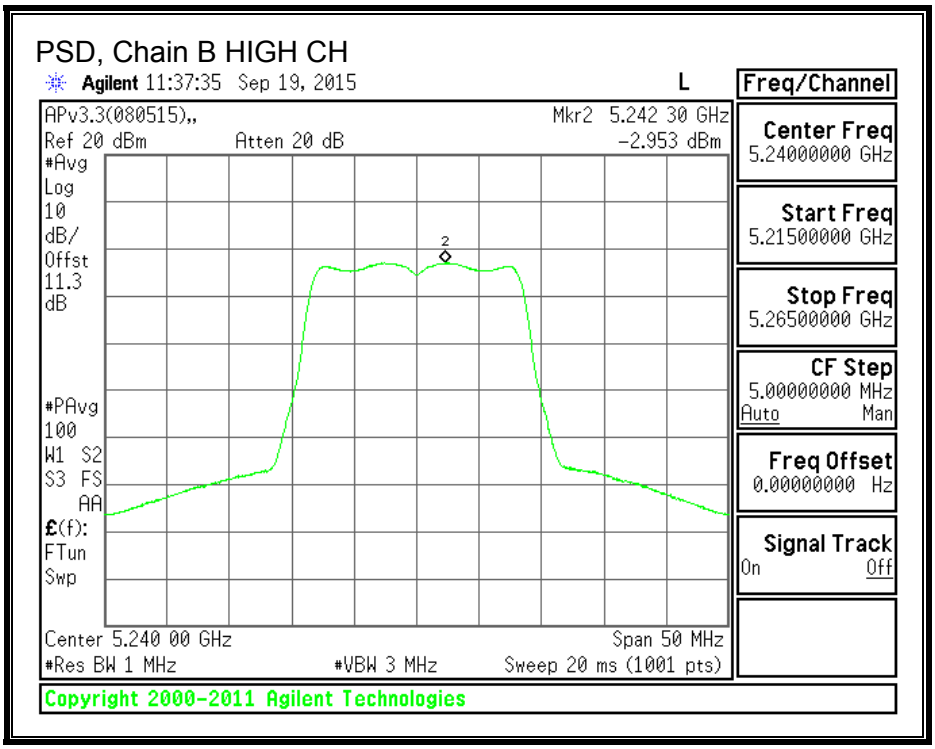
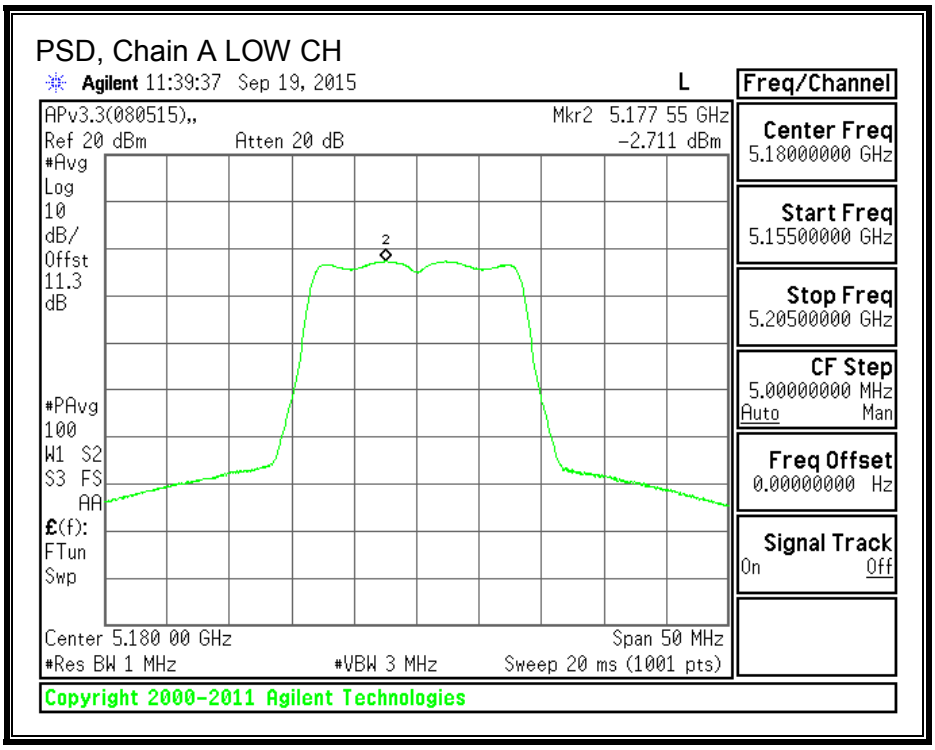


PSD, Chain A



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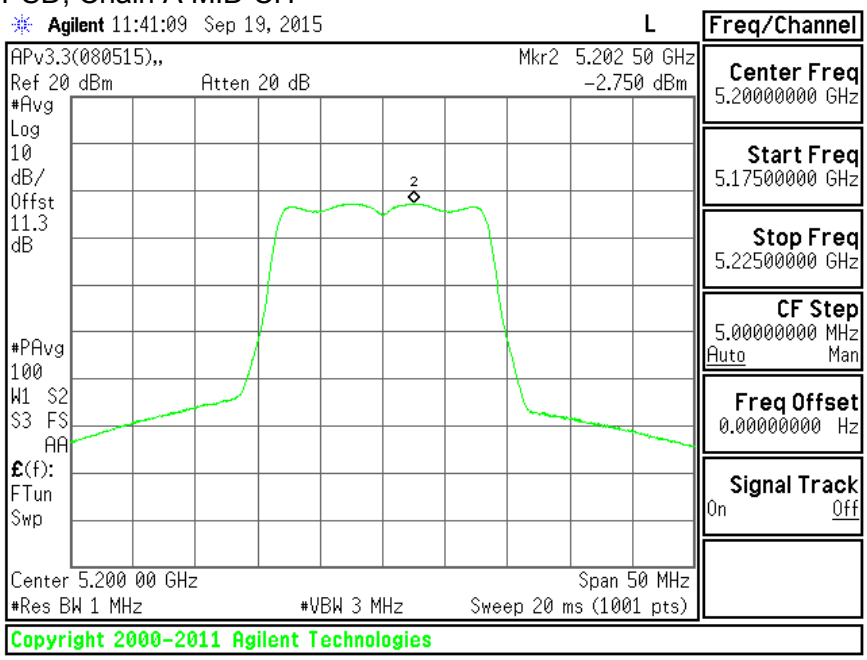
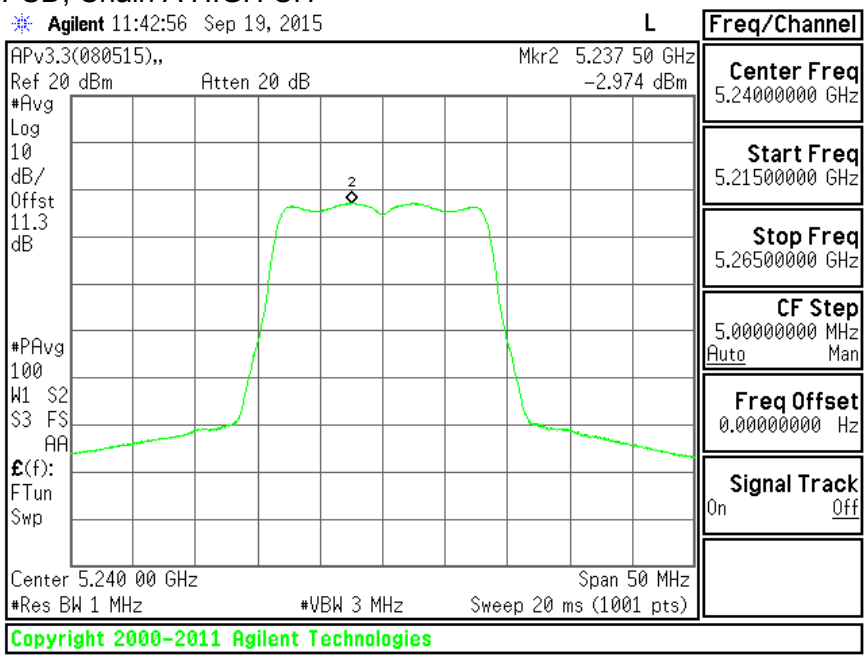
PSD, Chain A MID CH



PSD, Chain A HIGH CH



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8.3. 802.11n HT20 MODE IN THE 5.2 GHz BAND

8.3.1. 26 dB BANDWIDTH

LIMITS

None; for reporting purposes only.

RESULTS

Channel	Frequency (MHz)	26 dB BW Chain B (MHz)	26 dB BW Chain A (MHz)
Low	5180	19.89	19.74
Mid	5200	20.15	19.95
High	5240	19.86	19.86

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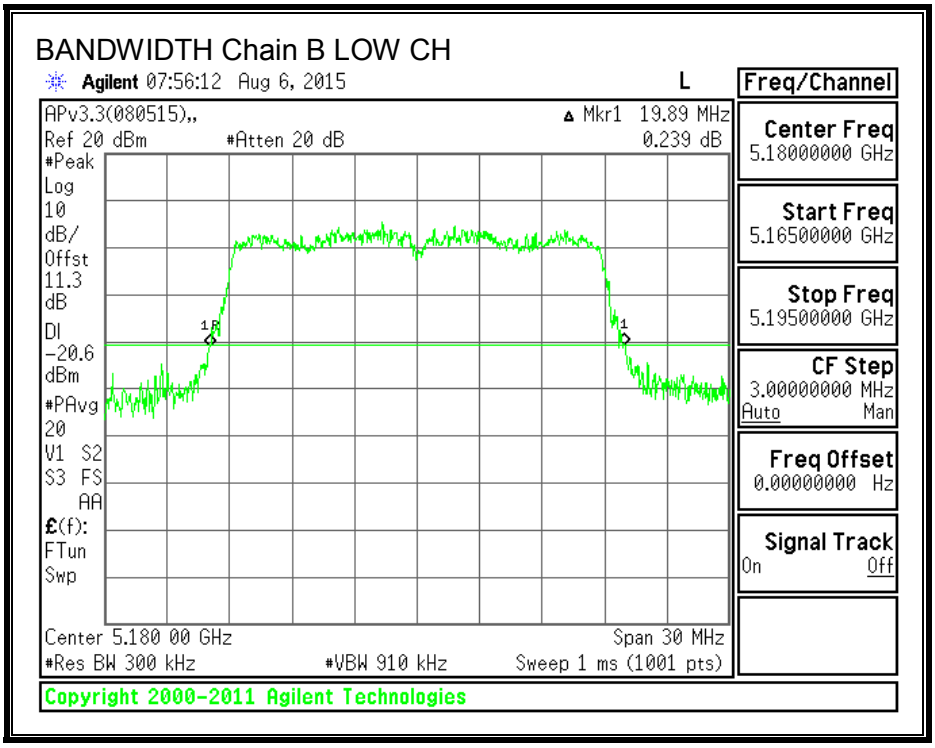
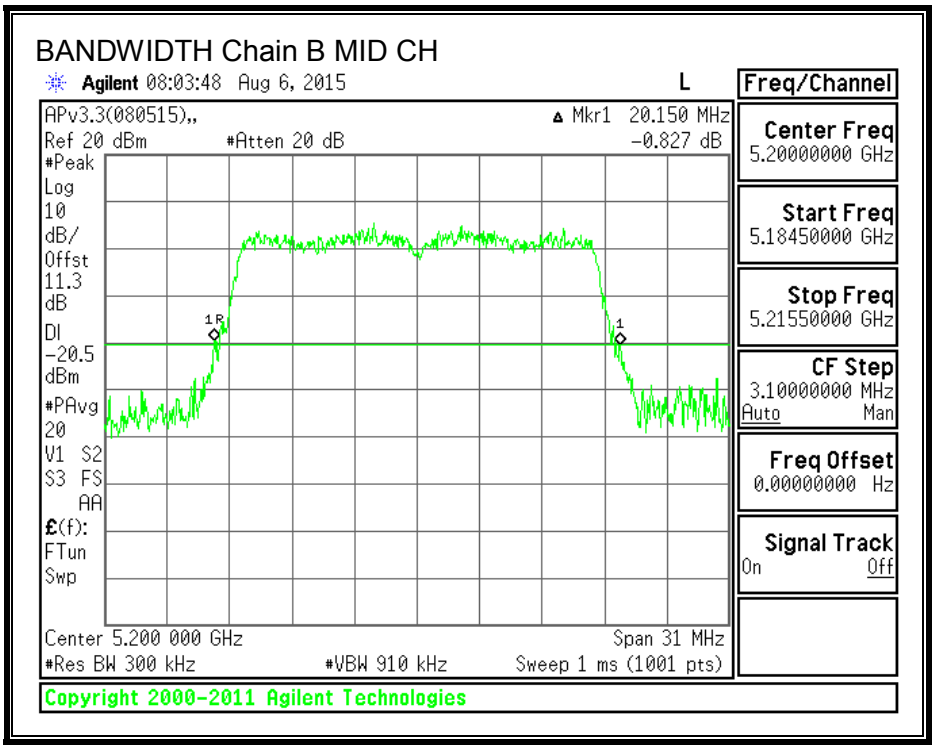
26 dB BANDWIDTH, Chain B





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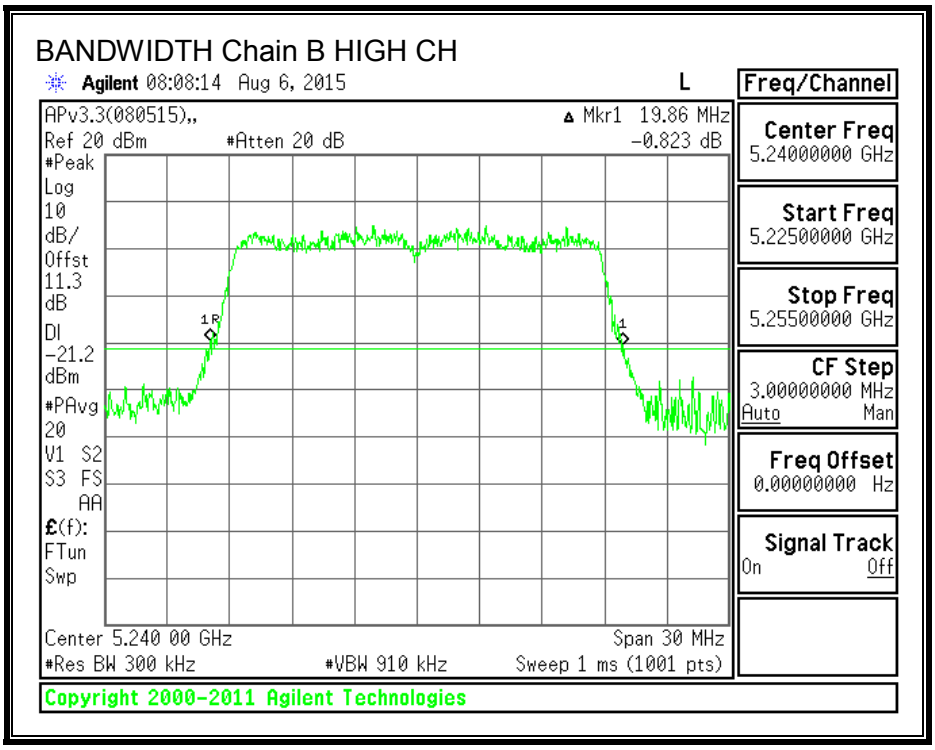
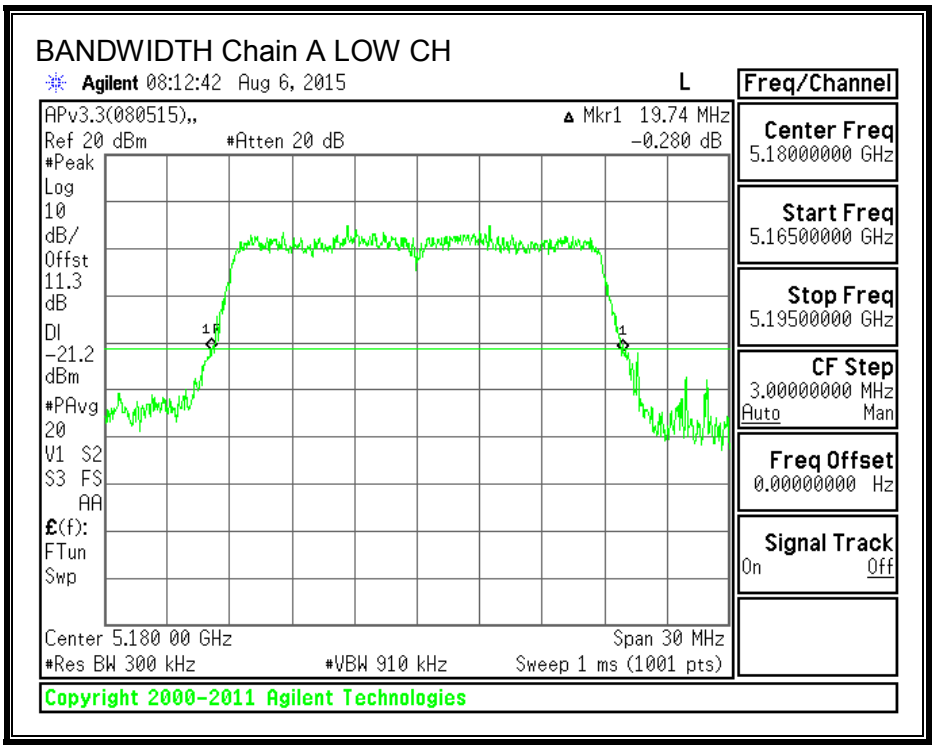


26 dB BANDWIDTH, Chain A



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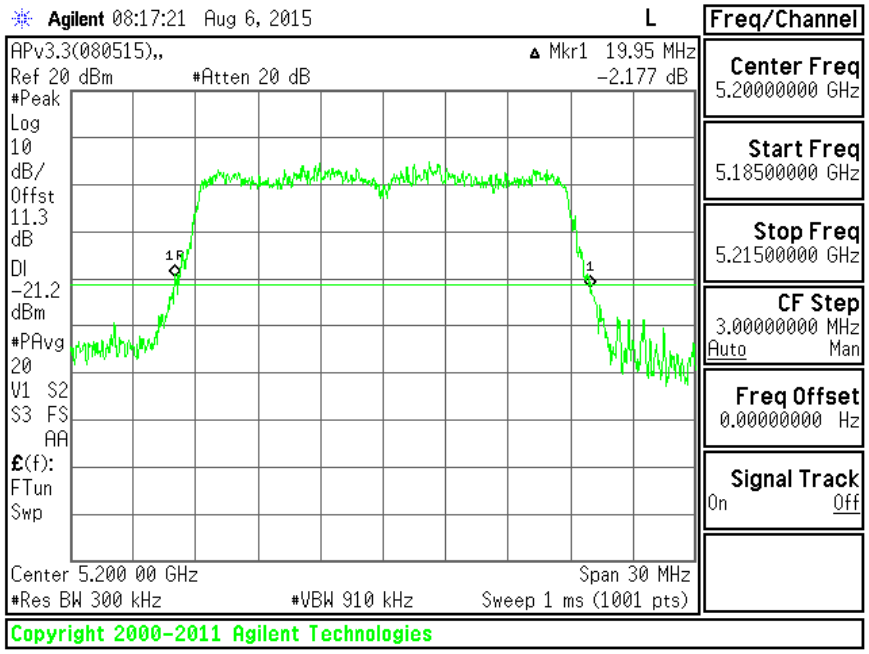
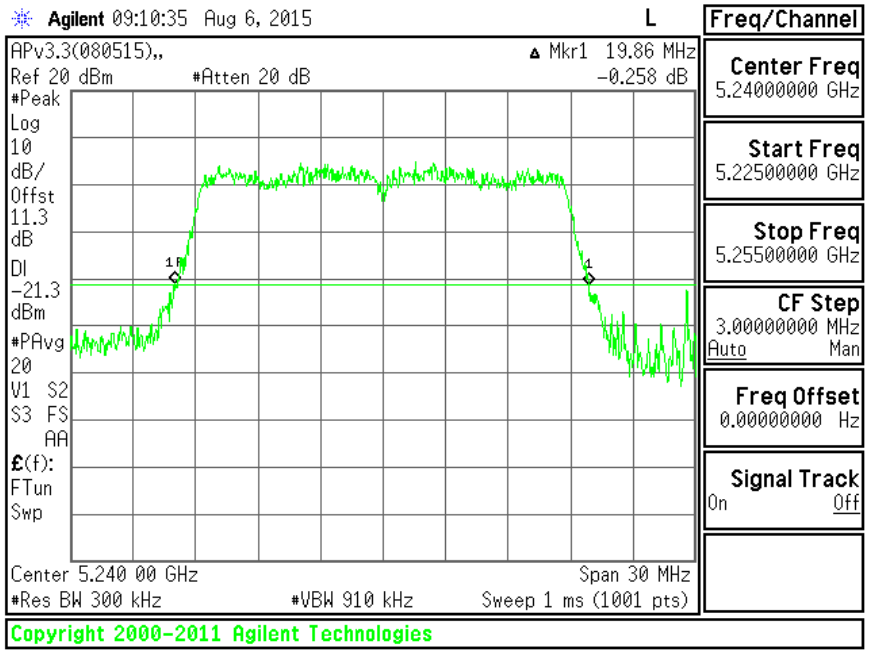
BANDWIDTH Chain A MID CH



BANDWIDTH Chain A HIGH CH



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8.3.2. 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

RESULTS

Channel	Frequency (MHz)	99% BW Chain B (MHz)	99% BW Chain A (MHz)
Low	5180	17.6526	17.6739
Mid	5200	17.6543	17.6708
High	5240	17.6487	17.6306

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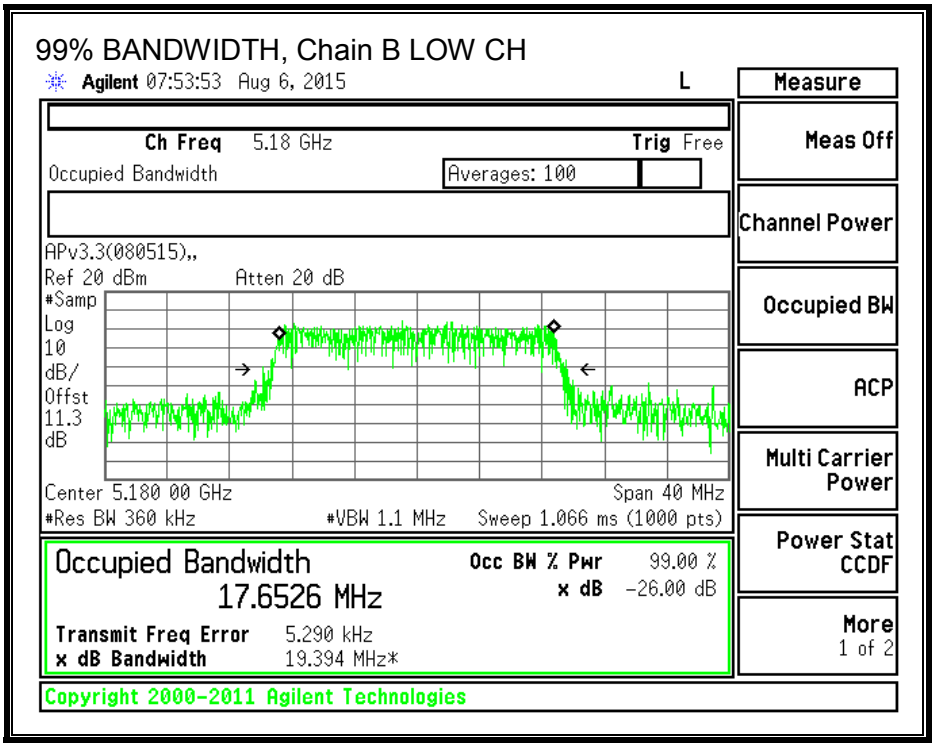
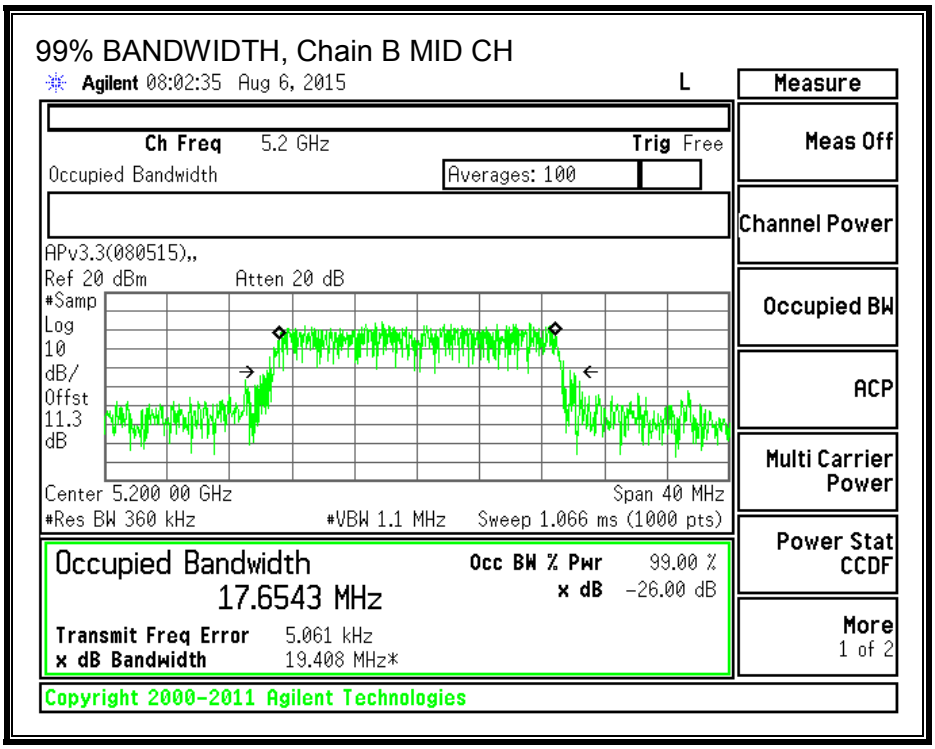
99% BANDWIDTH, Chain B





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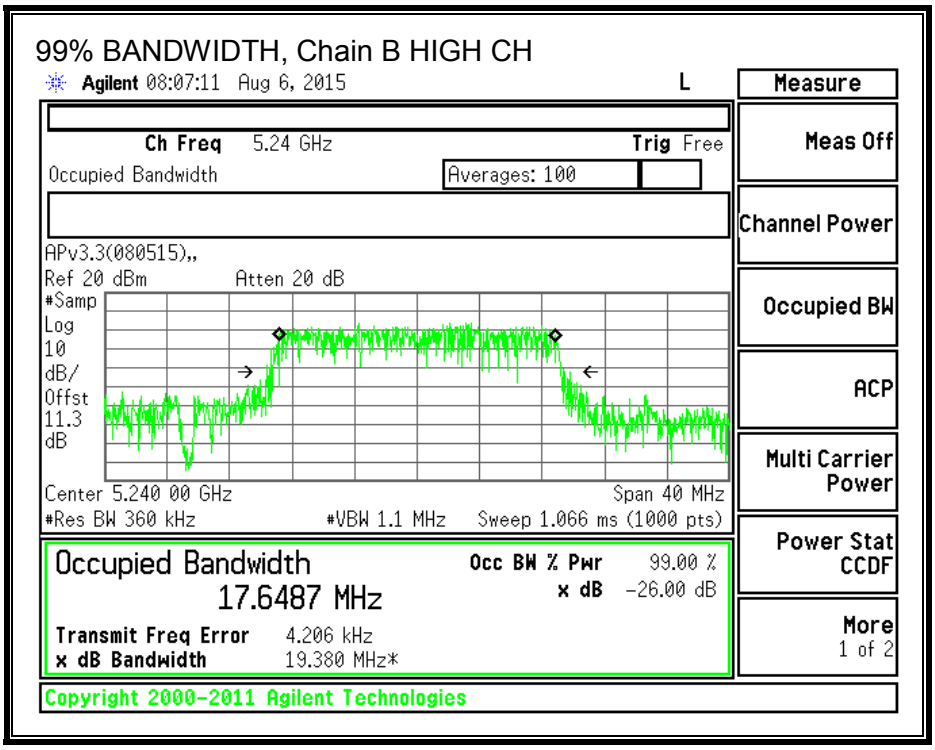
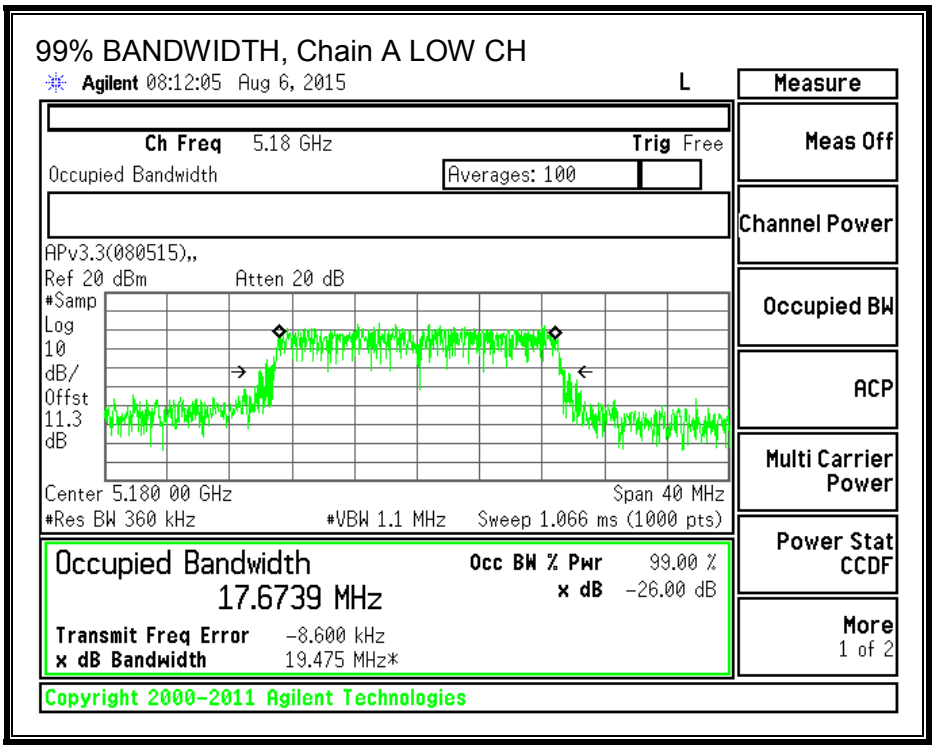


99% BANDWIDTH, Chain A



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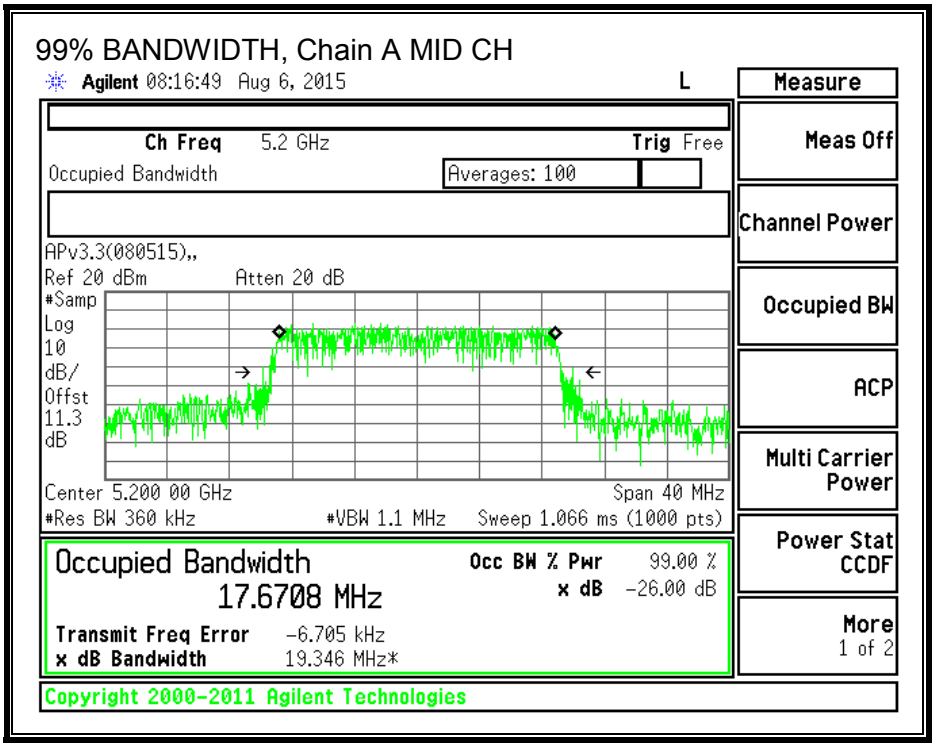

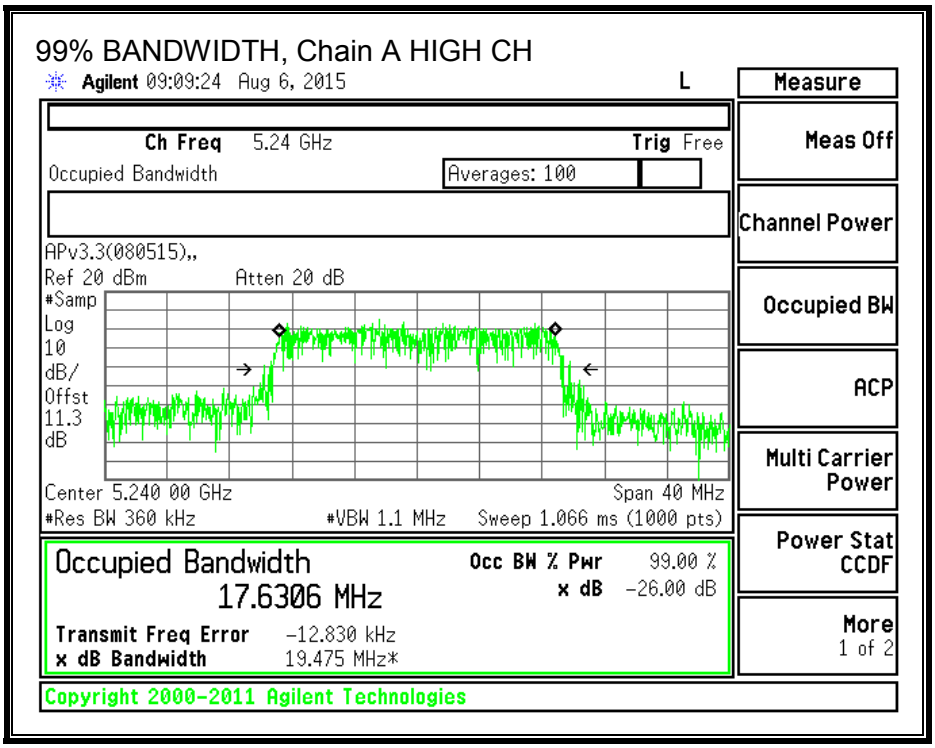

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8.3.3. OUTPUT POWER AND PSD

LIMITS

FCC §15.407 (a) (1)

(i) For an outdoor access point operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 17 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. The maximum e.i.r.p. at any elevation angle above 30 degrees as measured from the horizon must not exceed 125 mW (21 dBm).

(ii) For an indoor access point operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 17 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.

(iii) For fixed point-to-point access points operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. Fixed point-to-point U-NII devices may employ antennas with directional gain up to 23 dBi without any corresponding reduction in the maximum conducted output power or maximum power spectral density. For fixed point-to-point transmitters that employ a directional antenna gain greater than 23 dBi, a 1 dB reduction in maximum conducted output power and maximum power spectral density is required for each 1 dB of antenna gain in excess of 23 dBi. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.

(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.

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DIRECTIONAL ANTENNA GAIN

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

Chain B Antenna Gain (dBi)	Chain A Antenna Gain (dBi)	Uncorrelated Chains Directional Gain (dBi)
2.00	2.20	2.10

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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	2.10	2.10	24.00	11.00
Mid	5200	2.10	2.10	24.00	11.00
High	5240	2.10	2.10	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 B Meas Power (dBm)	Chain A Meas Power (dBm)	Total Corr'd Power (dBm)	Power Limit (dBm)	Power Margin (dB)
Low	5180	7.32	7.69	10.52	24.00	-13.48
Mid	5200	7.61	8.01	10.82	24.00	-13.18
High	5240	7.56	7.76	10.67	24.00	-13.33

PSD Results

Channel	Frequency (MHz)	Chain B Meas PSD (dBm)	Chain A Meas PSD (dBm)	Total Corr'd PSD (dBm)	PSD Limit (dBm)	PSD Margin (dB)
Low	5180	-3.55	-2.88	-0.19	11.00	-11.19
Mid	5200	-3.40	-2.95	-0.16	11.00	-11.16
High	5240	-3.29	-2.80	-0.03	11.00	-11.03

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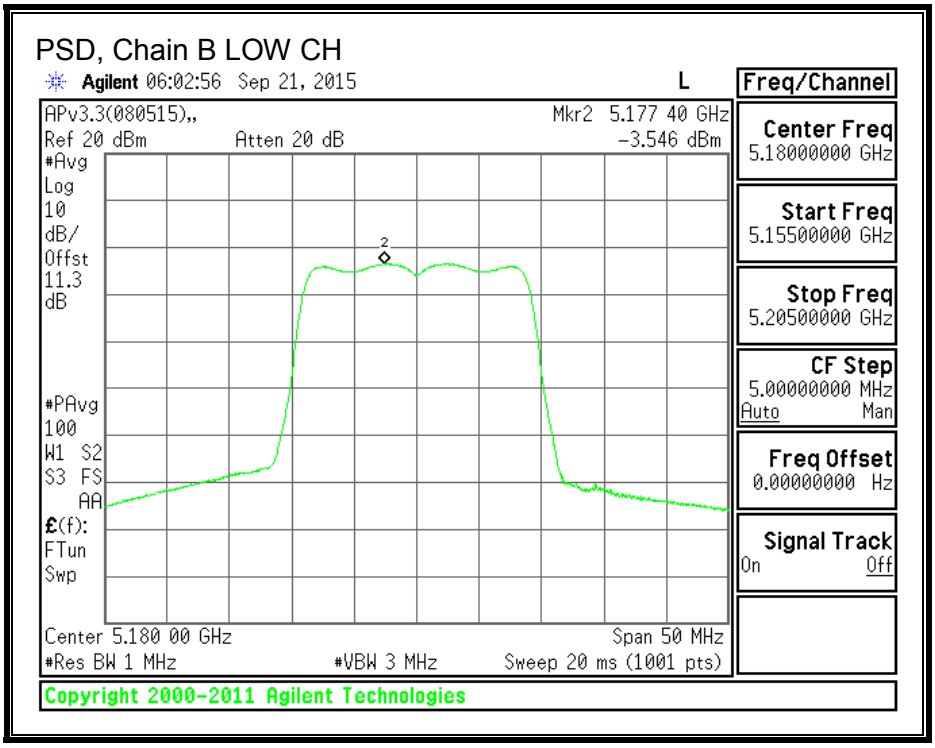
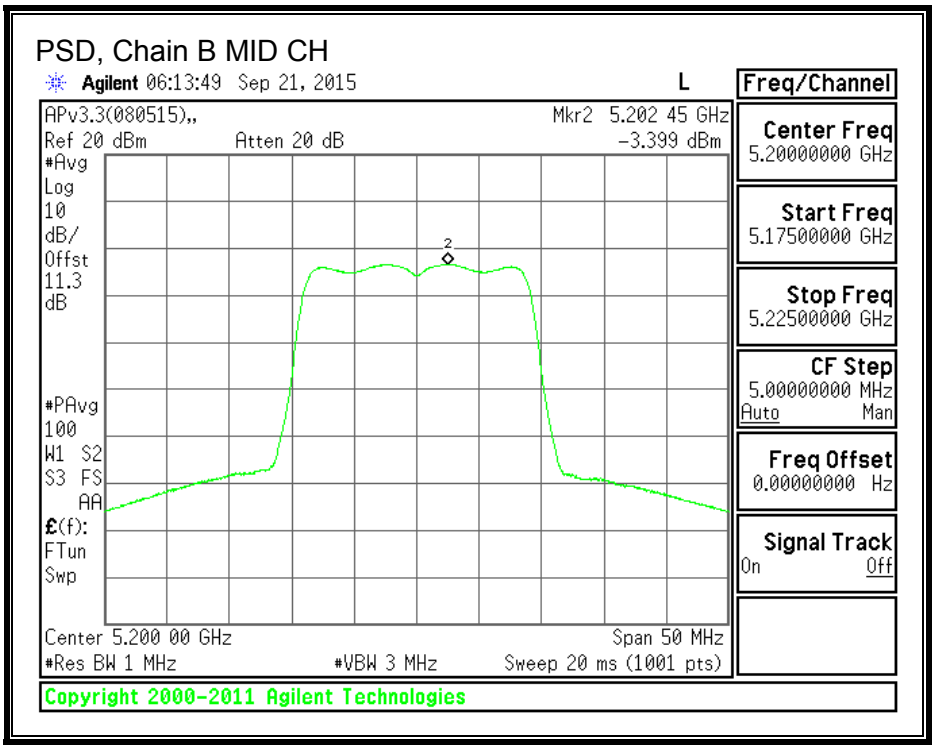
PSD, Chain B





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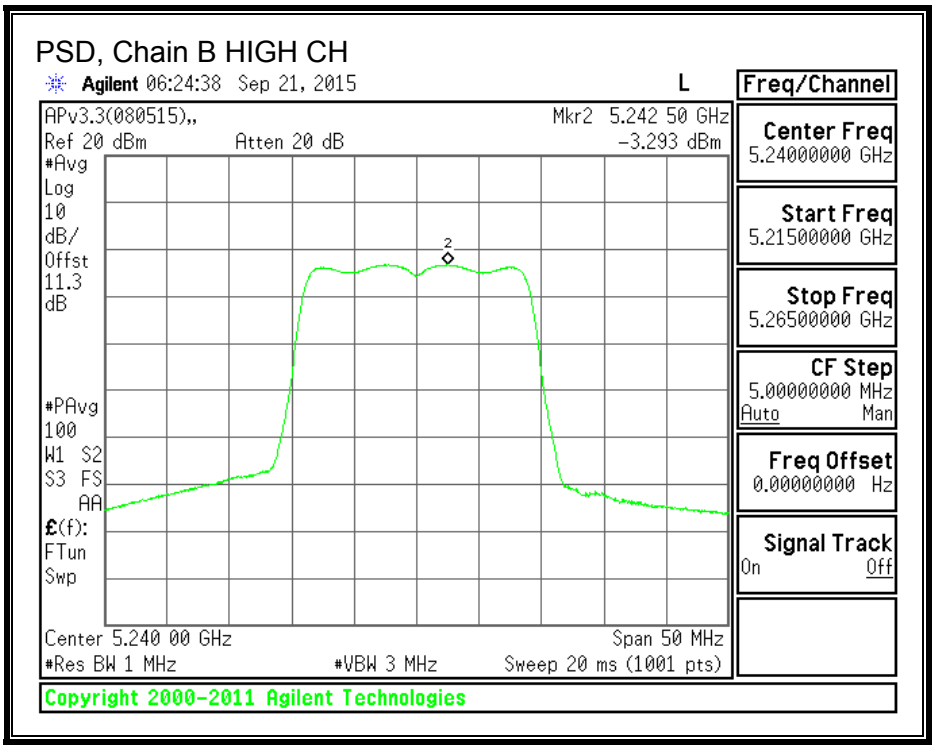
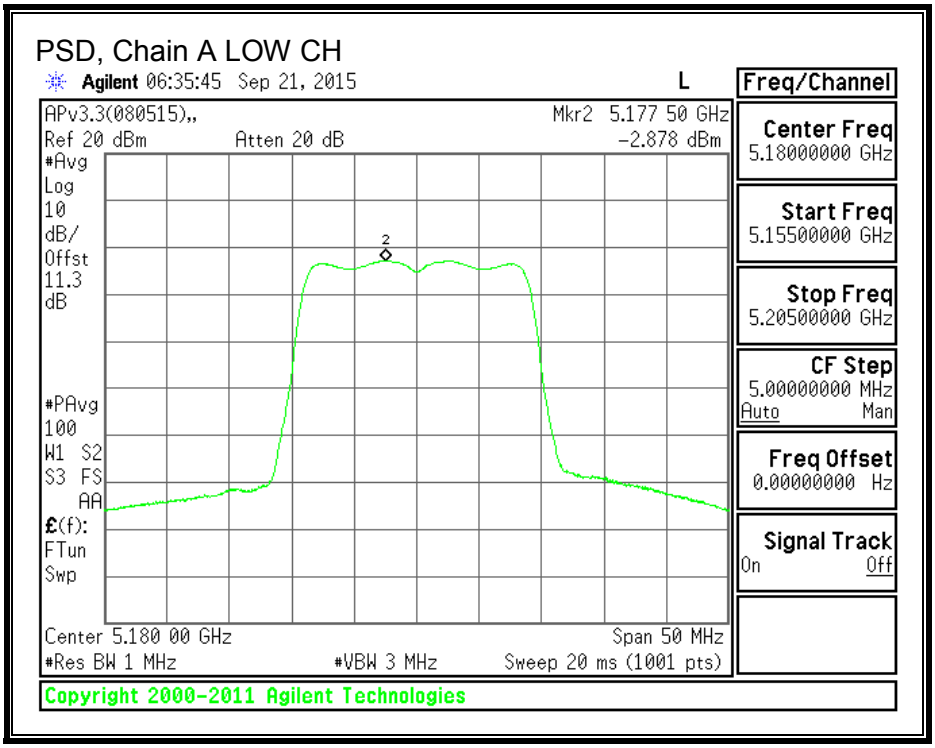


PSD, Chain A



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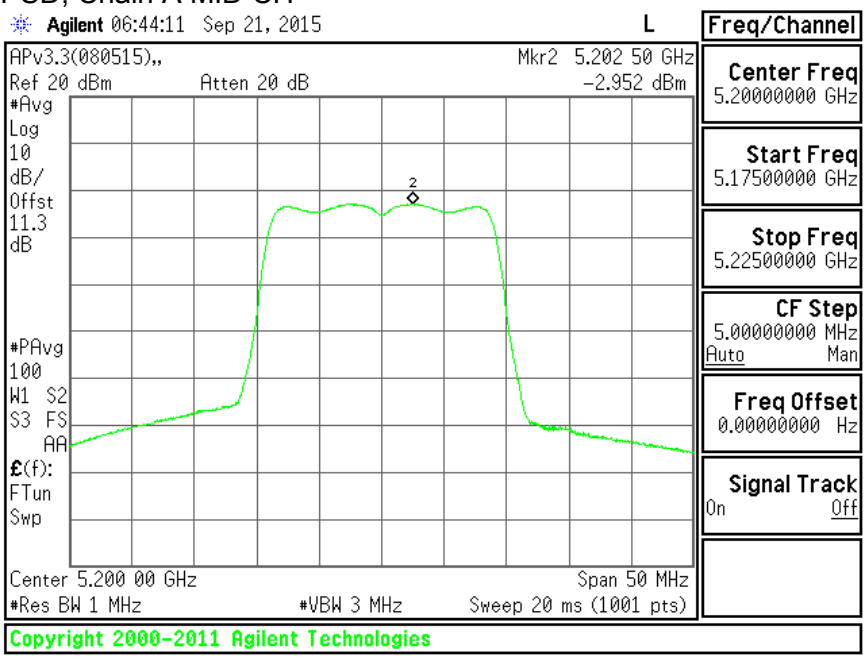
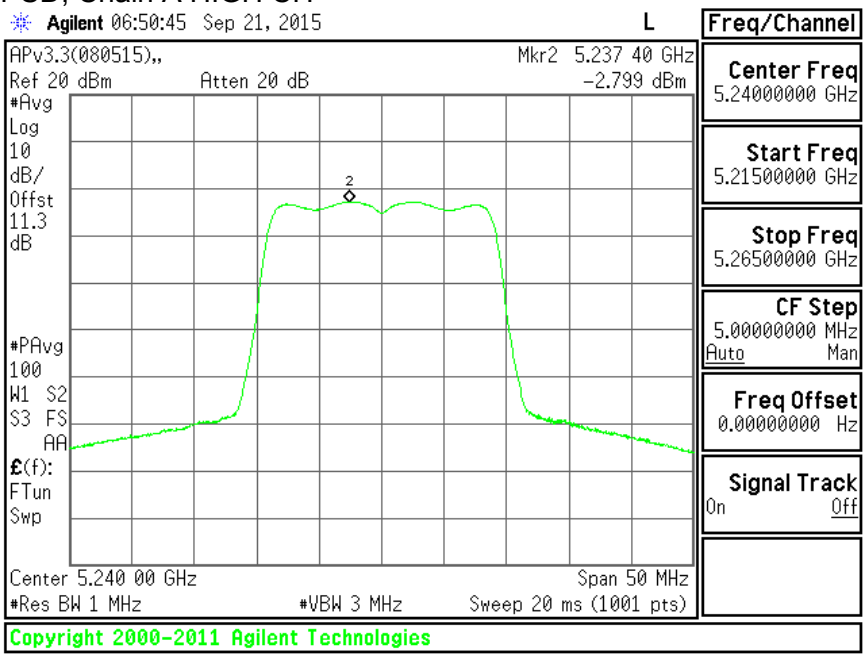
PSD, Chain A MID CH



PSD, Chain A HIGH CH



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8.4. 802.11n HT40 MODE IN THE 5.2 GHz BAND

8.4.1. 26 dB BANDWIDTH

LIMITS

None; for reporting purposes only.

RESULTS

Channel	Frequency (MHz)	26 dB BW Chain B (MHz)	26 dB BW Chain A (MHz)
Low	5190	40.63	40.32
High	5230	40.14	40.50

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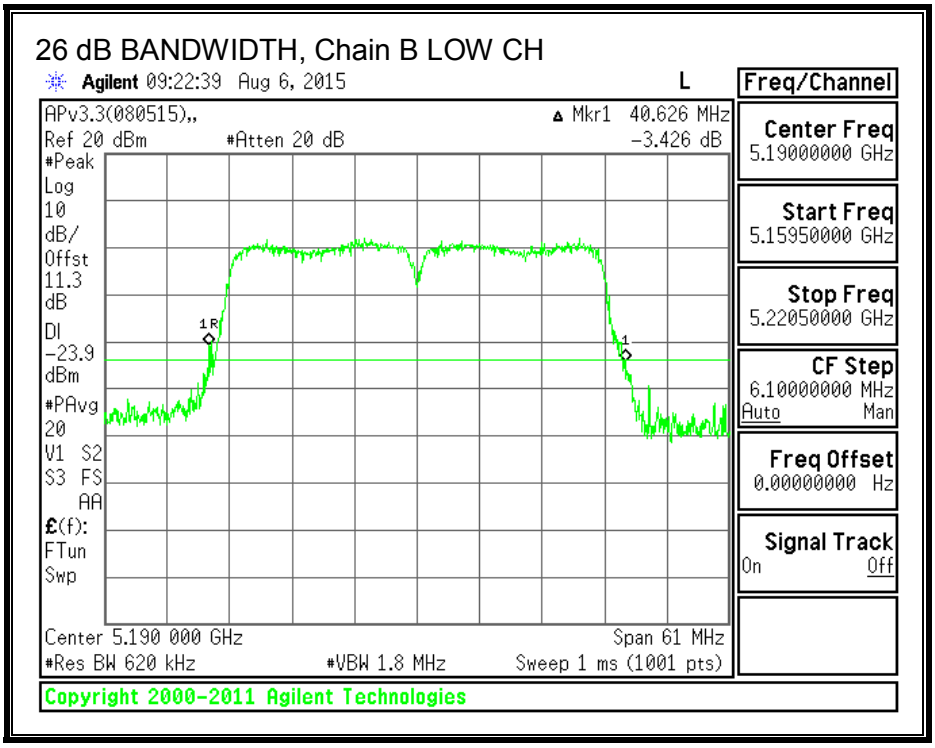
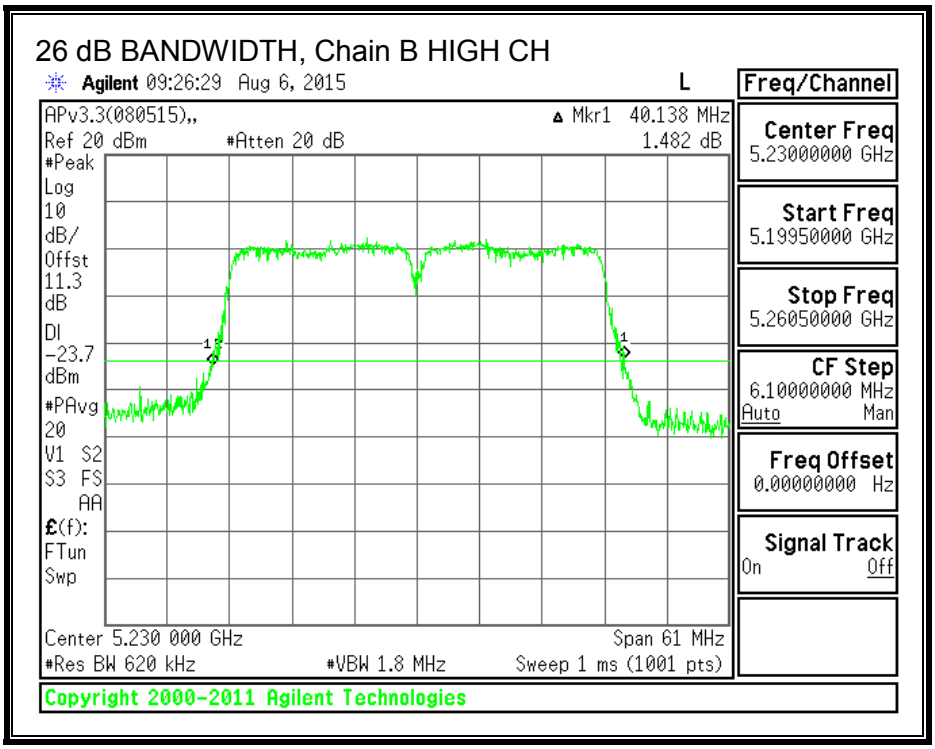
26 dB BANDWIDTH, Chain B





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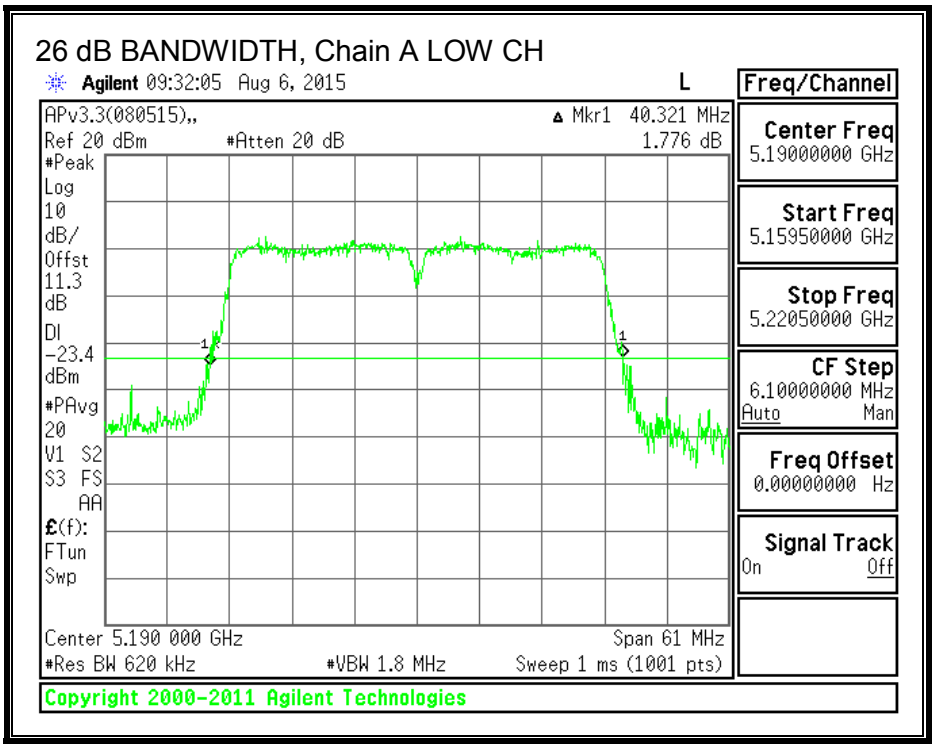
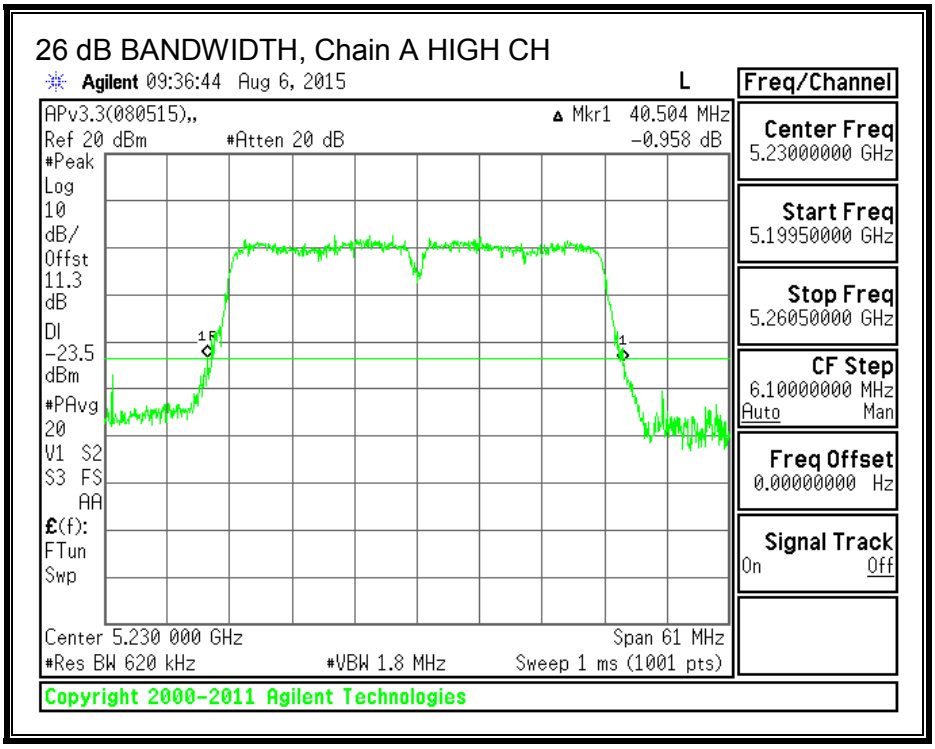
26 dB BANDWIDTH, Chain A





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8.4.2. 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

RESULTS

Channel	Frequency (MHz)	99% BW Chain B (MHz)	99% BW Chain A (MHz)
Low	5190	36.1712	36.1725
High	5230	36.1694	36.1590

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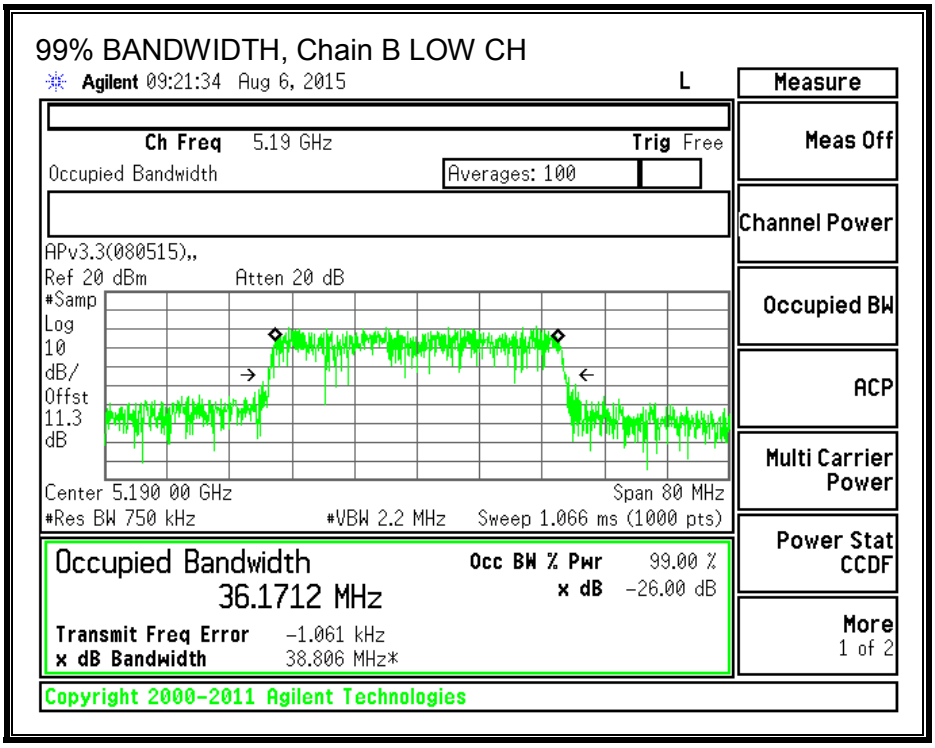
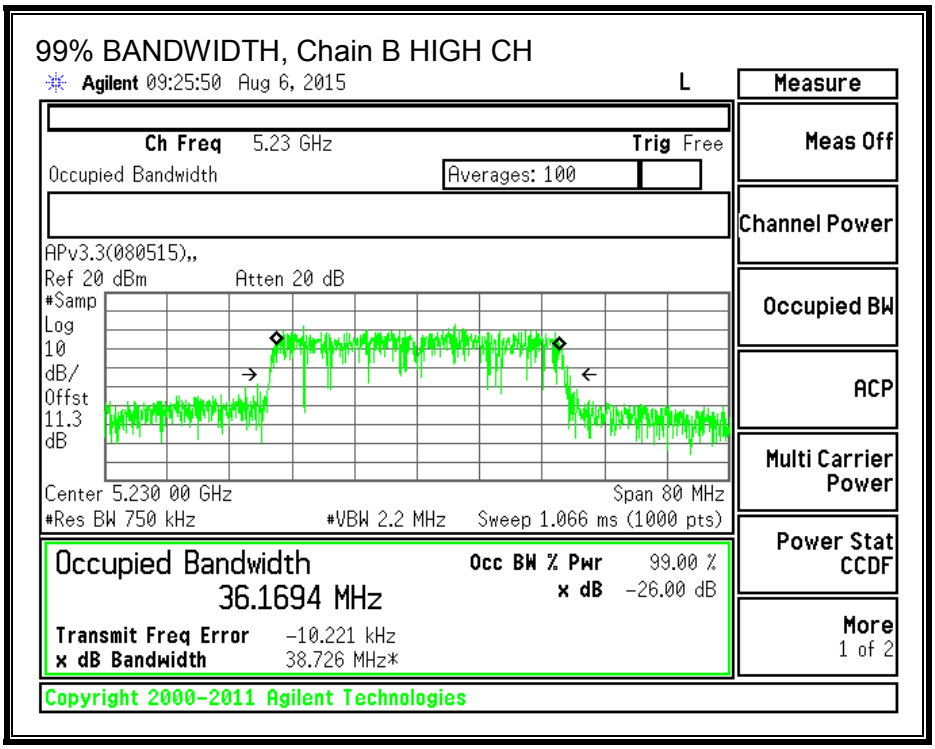
99% BANDWIDTH, Chain B





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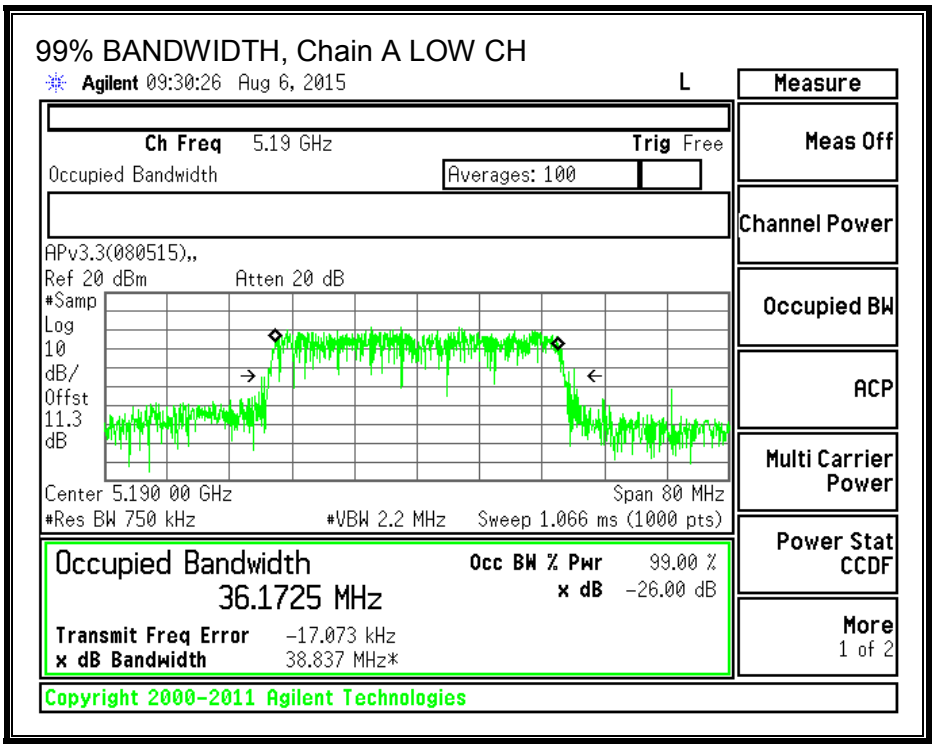
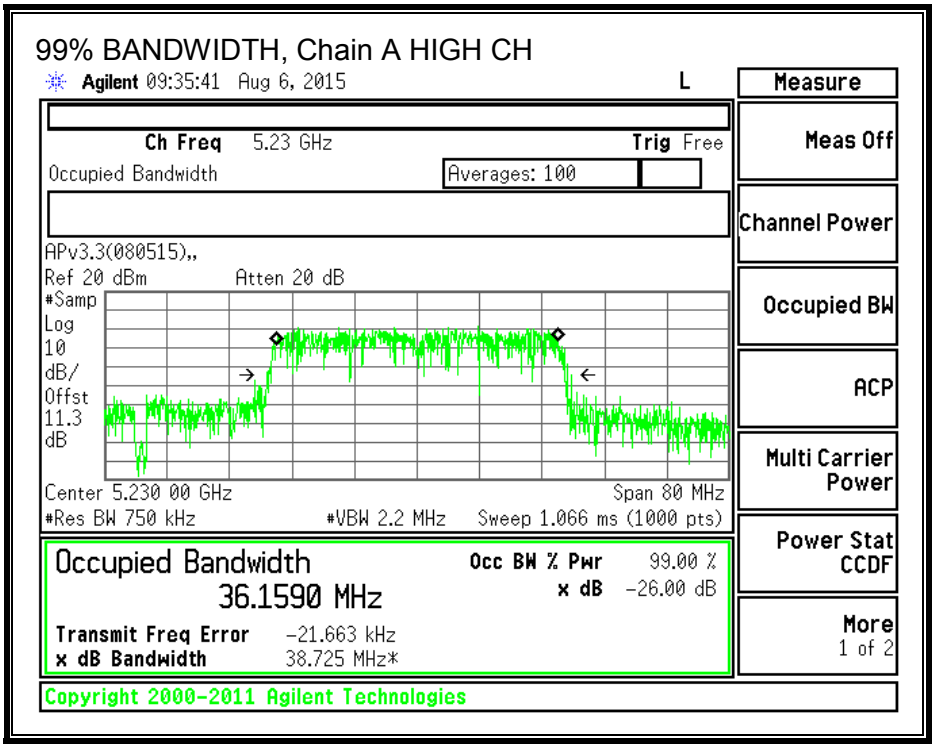
99% BANDWIDTH, Chain A





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8.4.3. OUTPUT POWER AND PSD

LIMITS

FCC §15.407 (a) (1)

(i) For an outdoor access point operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 17 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. The maximum e.i.r.p. at any elevation angle above 30 degrees as measured from the horizon must not exceed 125 mW (21 dBm).

(ii) For an indoor access point operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 17 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.

(iii) For fixed point-to-point access points operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. Fixed point-to-point U-NII devices may employ antennas with directional gain up to 23 dBi without any corresponding reduction in the maximum conducted output power or maximum power spectral density. For fixed point-to-point transmitters that employ a directional antenna gain greater than 23 dBi, a 1 dB reduction in maximum conducted output power and maximum power spectral density is required for each 1 dB of antenna gain in excess of 23 dBi. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.

(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.

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DIRECTIONAL ANTENNA GAIN

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

Chain B Antenna Gain (dBi)	Chain A Antenna Gain (dBi)	Uncorrelated Chains Directional Gain (dBi)
2.00	2.20	2.10

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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	2.10	2.10	24.00	11.00
High	5230	2.10	2.10	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 B Meas Power (dBm)	Chain A Meas Power (dBm)	Total Corr'd Power (dBm)	Power Limit (dBm)	Power Margin (dB)
Low	5190	7.71	7.76	10.75	24.00	-13.25
High	5230	7.45	7.98	10.73	24.00	-13.27

PSD Results

Channel	Frequency (MHz)	Chain B Meas PSD (dBm)	Chain A Meas PSD (dBm)	Total Corr'd PSD (dBm)	PSD Limit (dBm)	PSD Margin (dB)
Low	5190	-6.74	-6.18	-3.44	11.00	-14.44
High	5230	-6.21	-6.00	-3.09	11.00	-14.09

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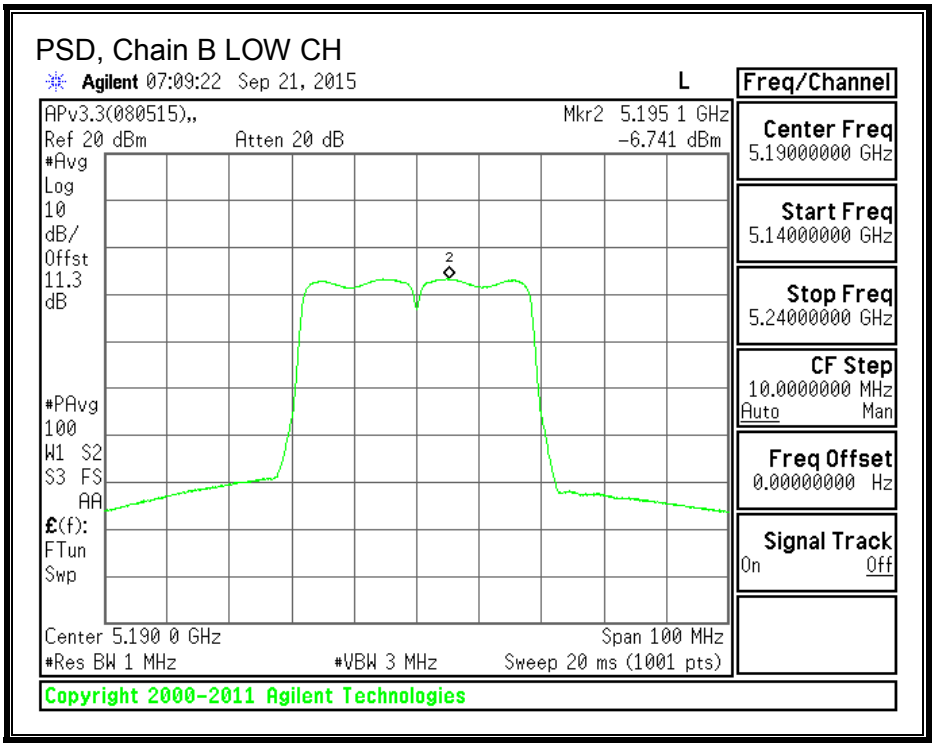
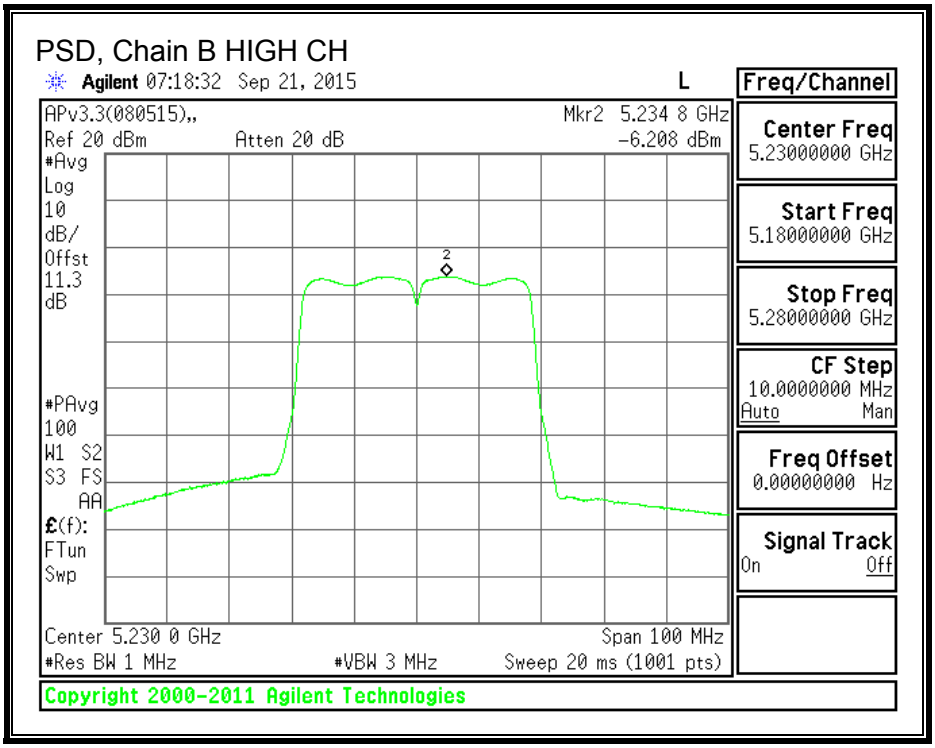
PSD, Chain B





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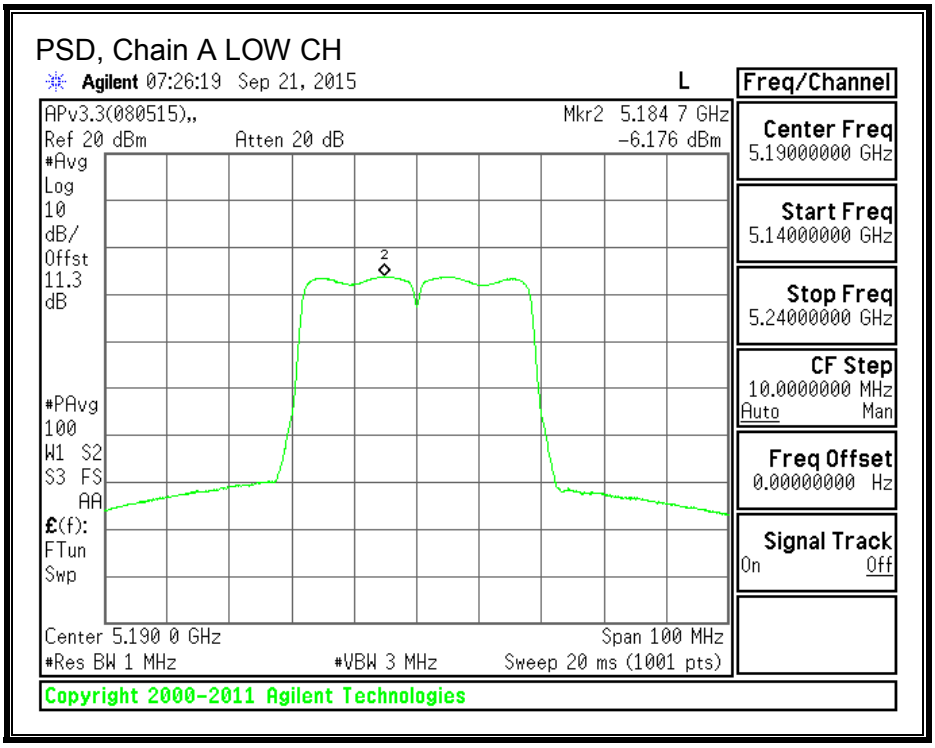
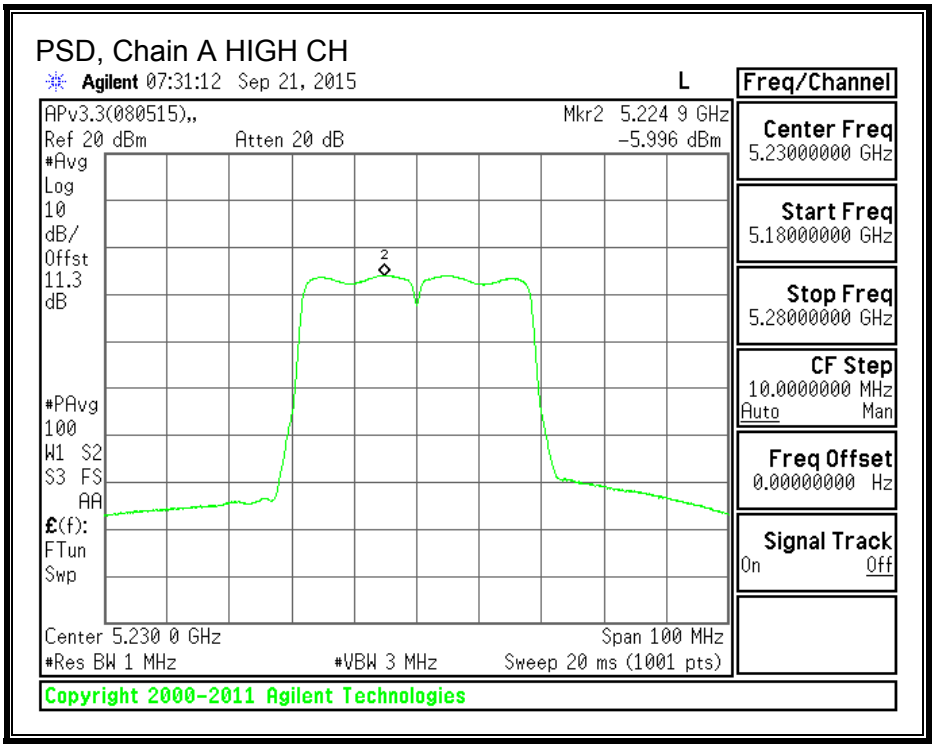
PSD, Chain A





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8.5. 802.11ac VHT80 MODE IN THE 5.2 GHz BAND

8.5.1. 26 dB BANDWIDTH

LIMITS

None; for reporting purposes only.

RESULTS

Channel	Frequency (MHz)	26 dB BW Chain B (MHz)	26 dB BW Chain A (MHz)
Mid	5210	81.43	81.01

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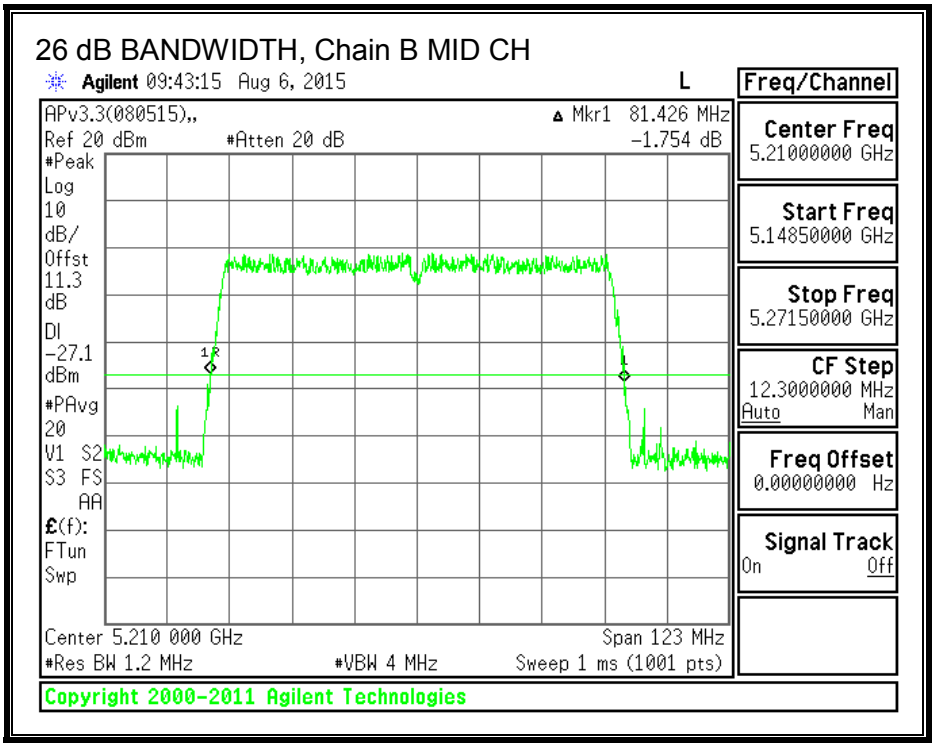
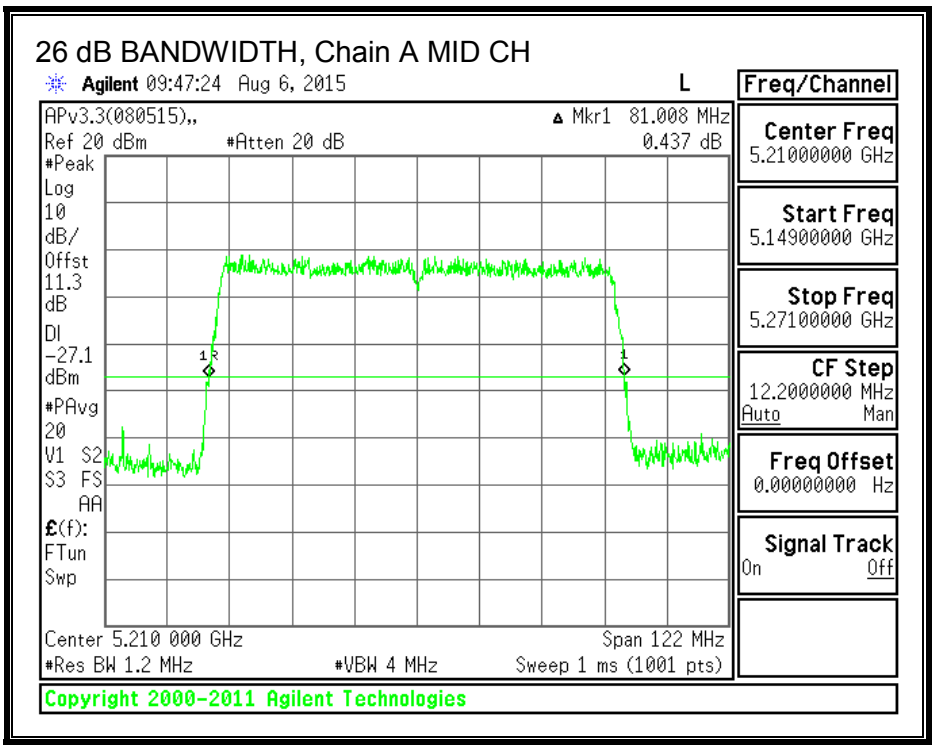
26 dB BANDWIDTH, Chain B



26 dB BANDWIDTH, Chain A



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8.5.2. 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

RESULTS

Channel	Frequency (MHz)	99% BW Chain B (MHz)	99% BW Chain A (MHz)
Mid	5210	76.0329	76.1211

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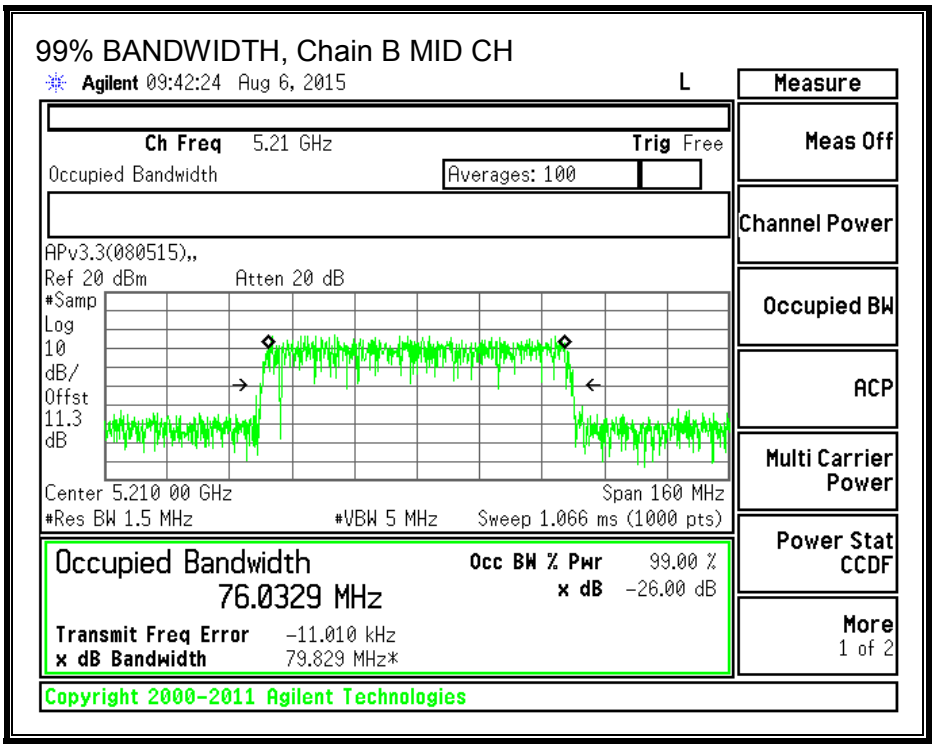
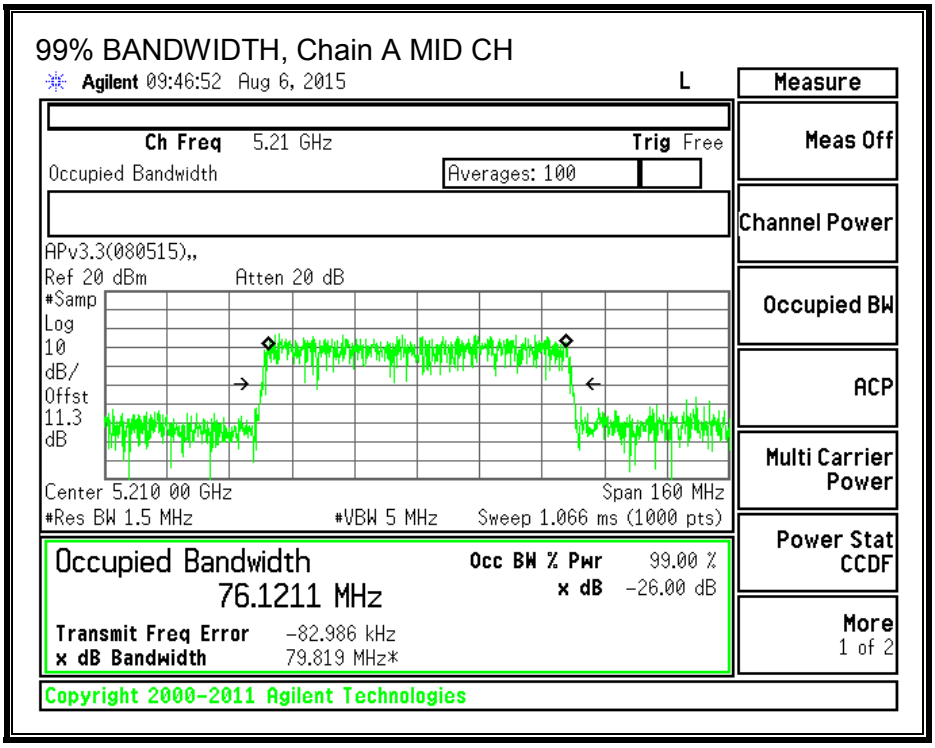
99% BANDWIDTH, Chain B



99% BANDWIDTH, Chain A



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8.5.3. OUTPUT POWER AND PSD

LIMITS

FCC §15.407 (a) (1)

(i) For an outdoor access point operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 17 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. The maximum e.i.r.p. at any elevation angle above 30 degrees as measured from the horizon must not exceed 125 mW (21 dBm).

(ii) For an indoor access point operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 17 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.

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(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.

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DIRECTIONAL ANTENNA GAIN

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

Chain B Antenna Gain (dBi)	Chain A Antenna Gain (dBi)	Uncorrelated Chains Directional Gain (dBi)
2.00	2.20	2.10

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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	2.10	2.10	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 B Meas Power (dBm)	Chain A Meas Power (dBm)	Total Corr'd Power (dBm)	Power Limit (dBm)	Power Margin (dB)
Mid	5210	4.62	4.62	7.63	24.00	-16.37

PSD Results

Channel	Frequency (MHz)	Chain B Meas PSD (dBm)	Chain A Meas PSD (dBm)	Total Corr'd PSD (dBm)	PSD Limit (dBm)	PSD Margin (dB)
Mid	5210	-13.46	-13.16	-10.30	11.00	-21.30

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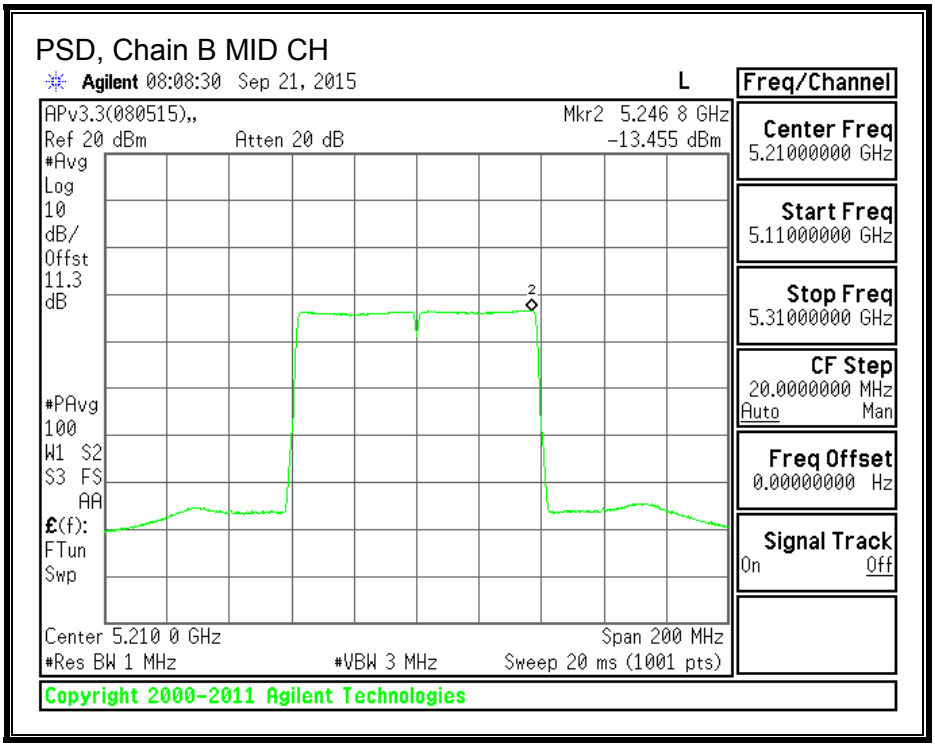
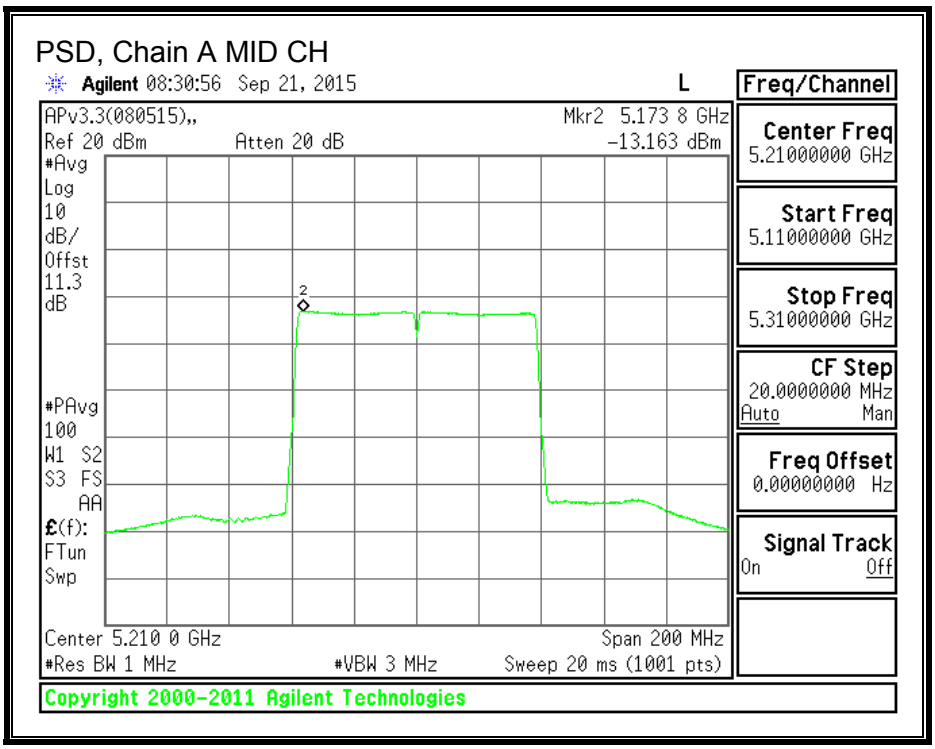
PSD, Chain B



PSD, Chain A



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8.6. 802.11a MODE IN THE 5.3 GHz BAND

8.6.1. 26 dB BANDWIDTH

LIMITS

None; for reporting purposes only.

RESULTS

Channel	Frequency (MHz)	26 dB BW Chain B (MHz)	26 dB BW Chain A (MHz)
Low	5260	19.00	19.71
Mid	5300	19.50	19.47
High	5320	19.38	19.83

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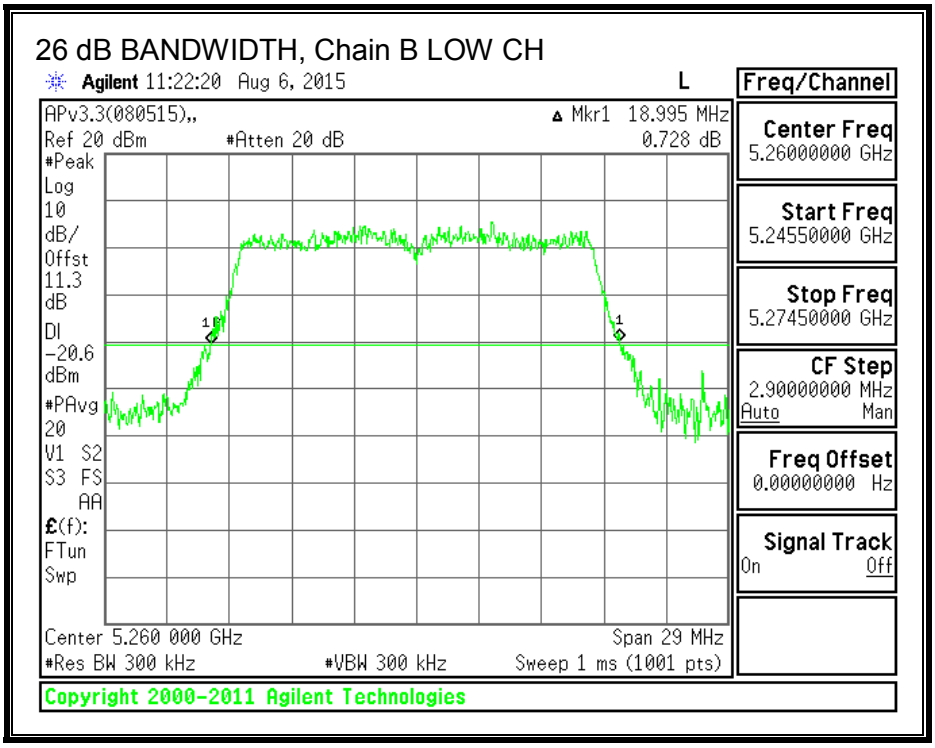
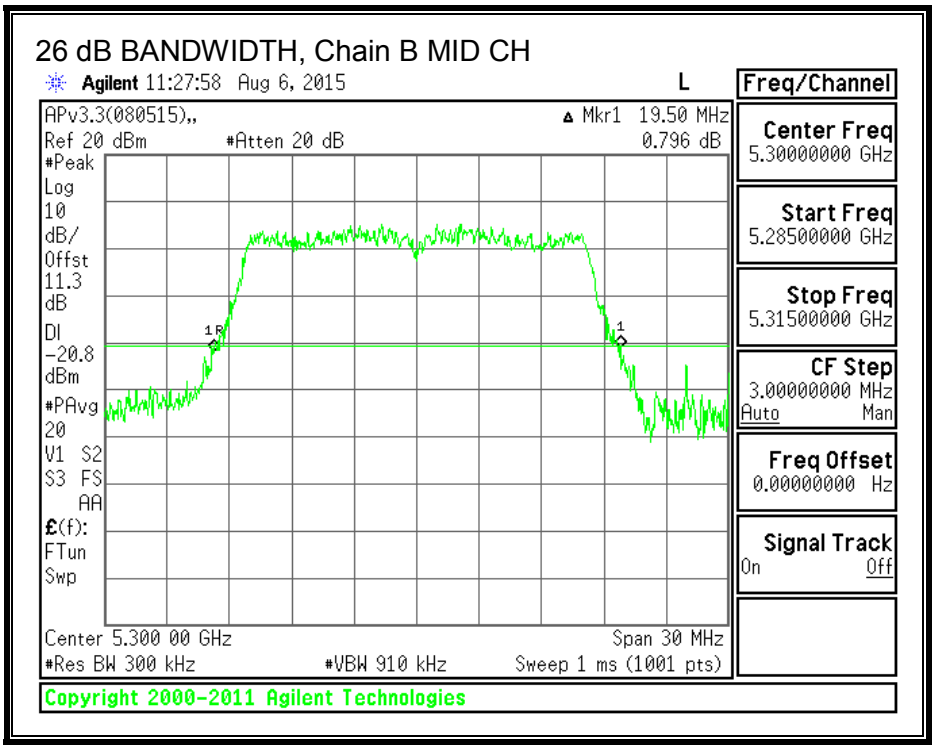
26 dB BANDWIDTH, Chain B





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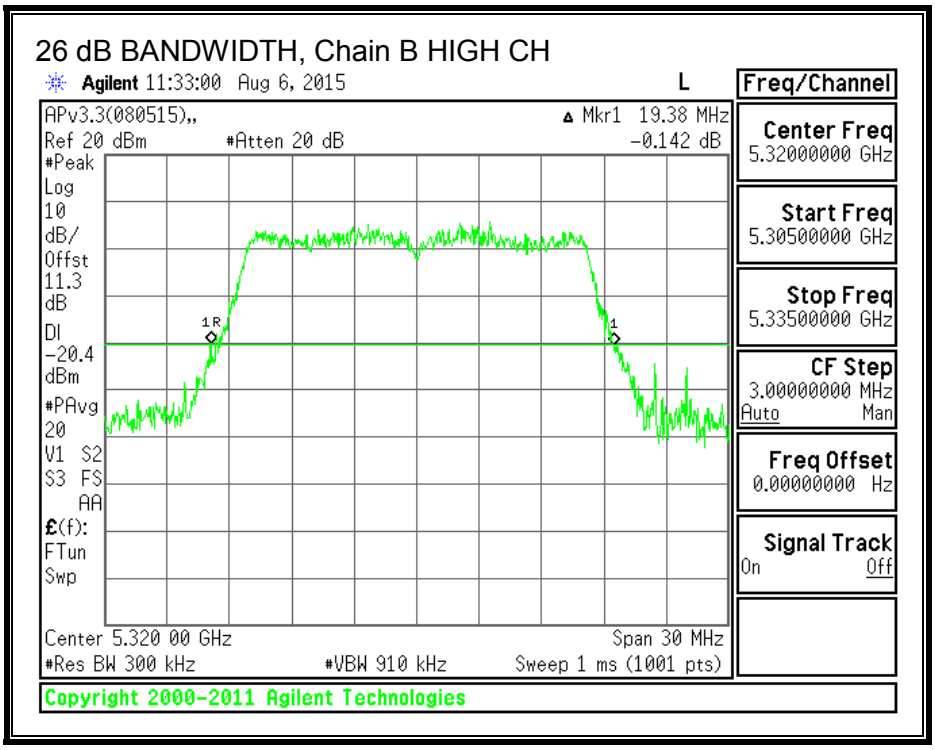
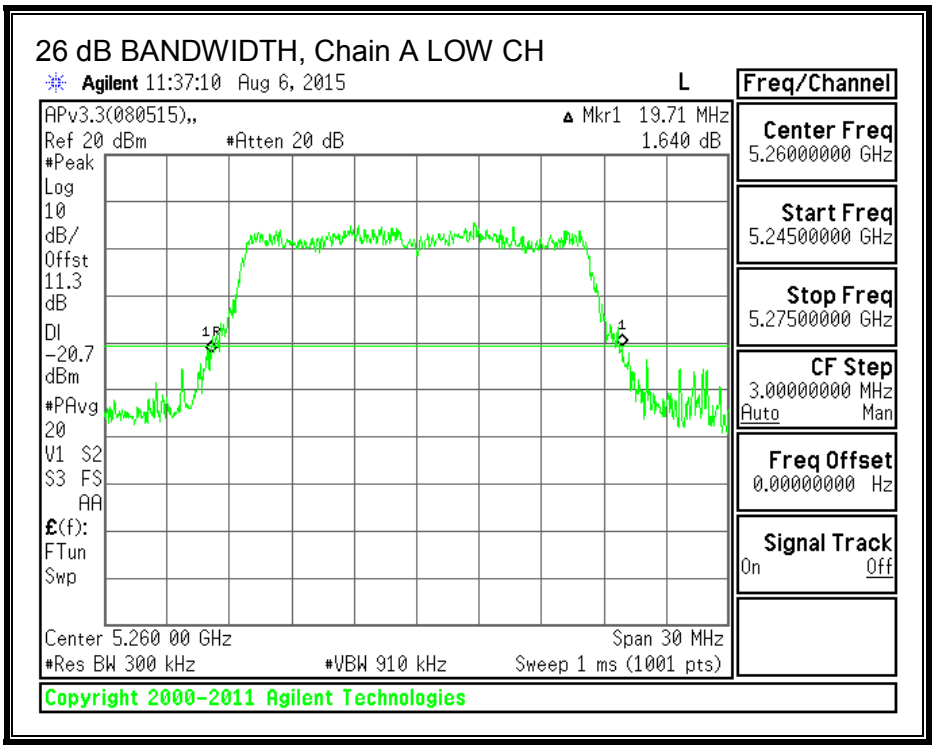


26 dB BANDWIDTH, Chain A



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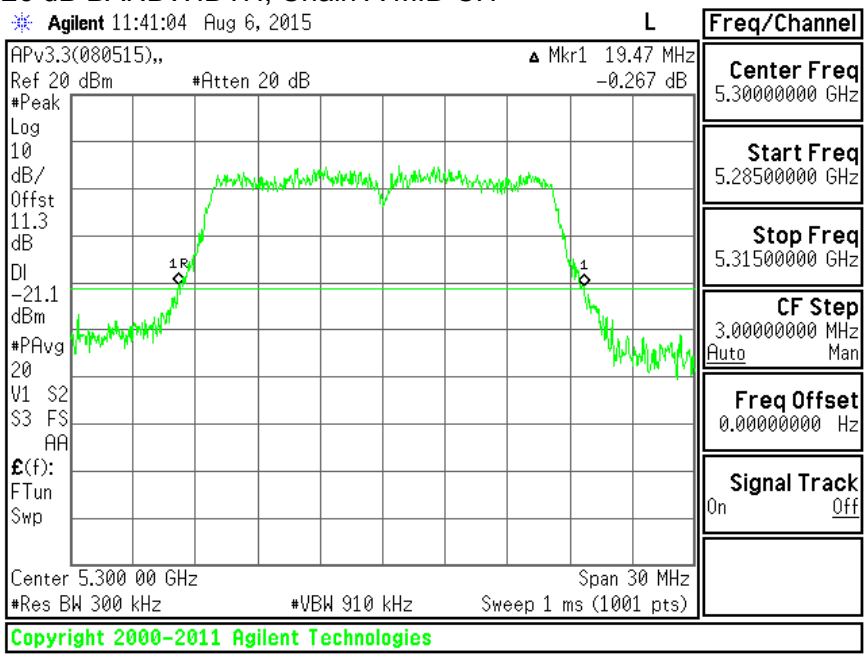
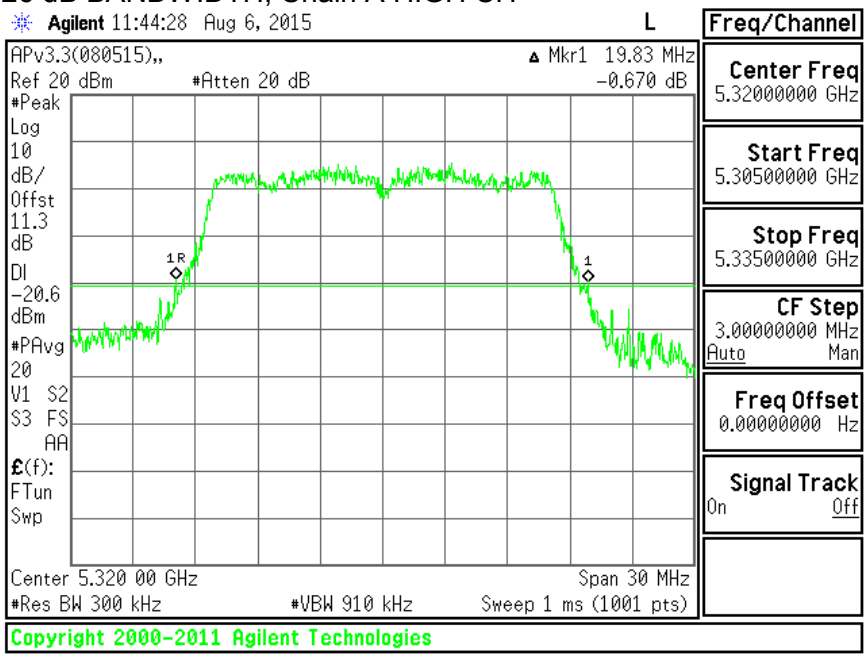
26 dB BANDWIDTH, Chain A MID CH



26 dB BANDWIDTH, Chain A HIGH CH



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8.6.2. 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

RESULTS

Channel	Frequency (MHz)	99% BW Chain B (MHz)	99% BW Chain A (MHz)
Low	5260	16.4965	16.5111
Mid	5300	16.5018	16.5134
High	5320	16.5095	16.5228

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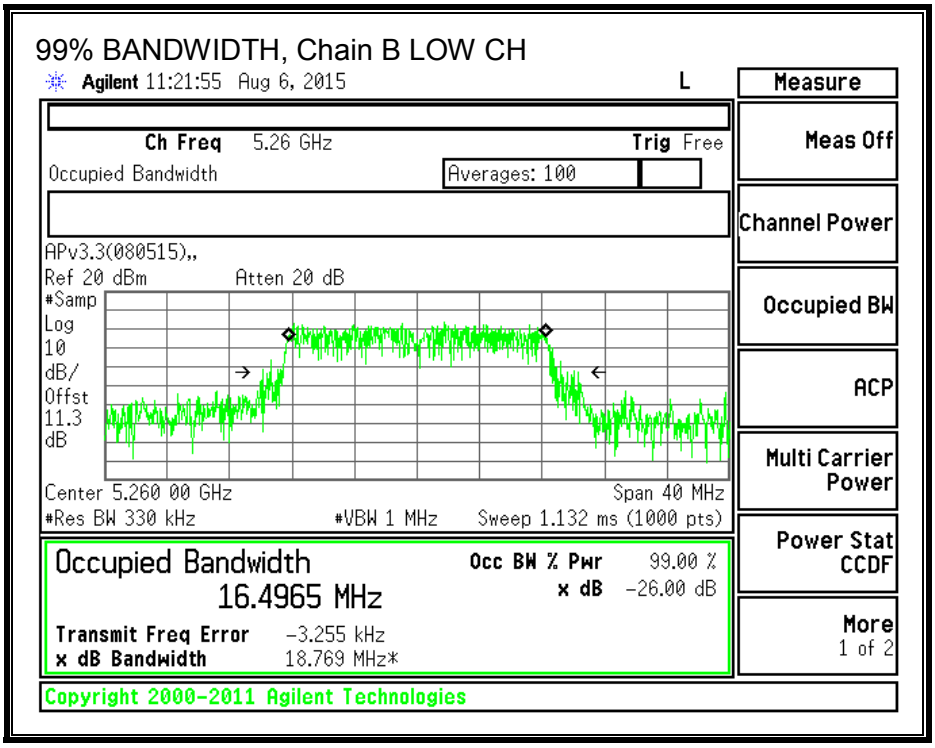
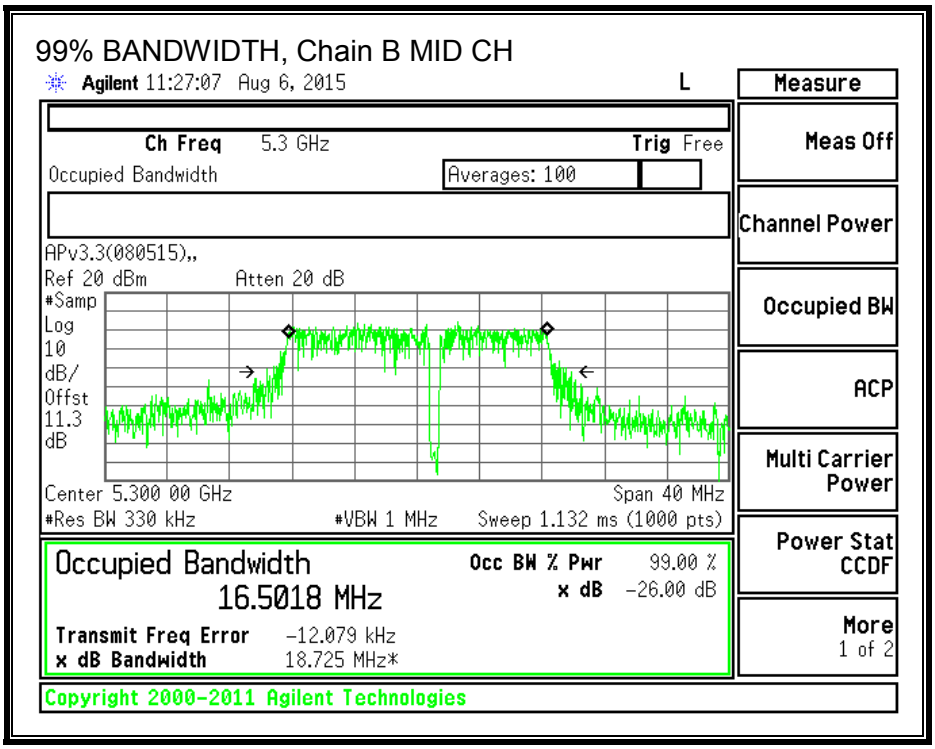
99% BANDWIDTH, Chain B





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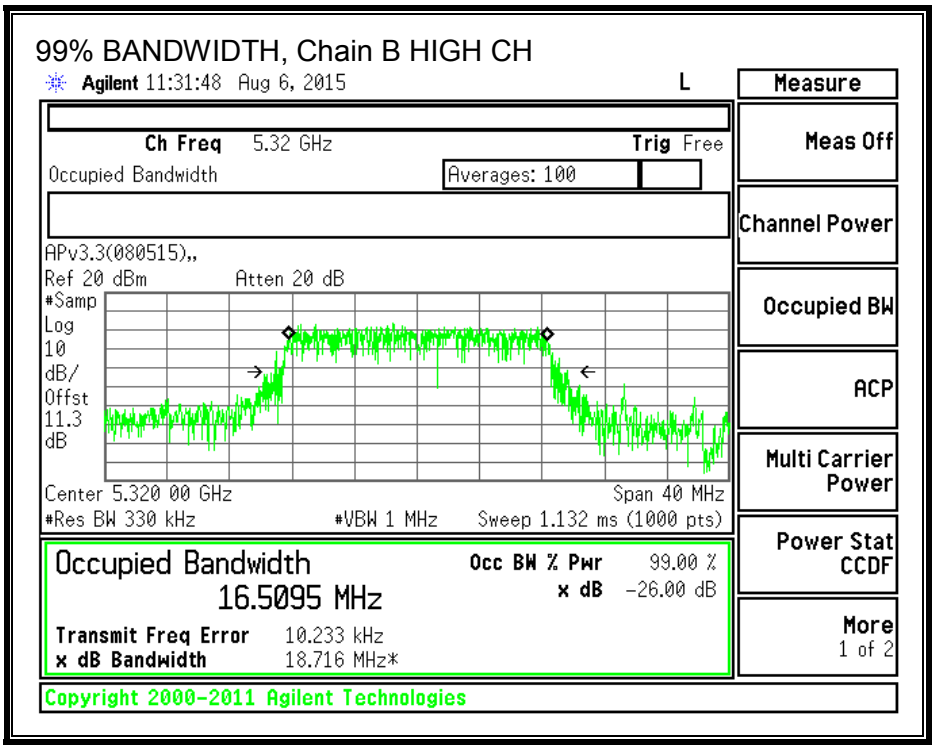
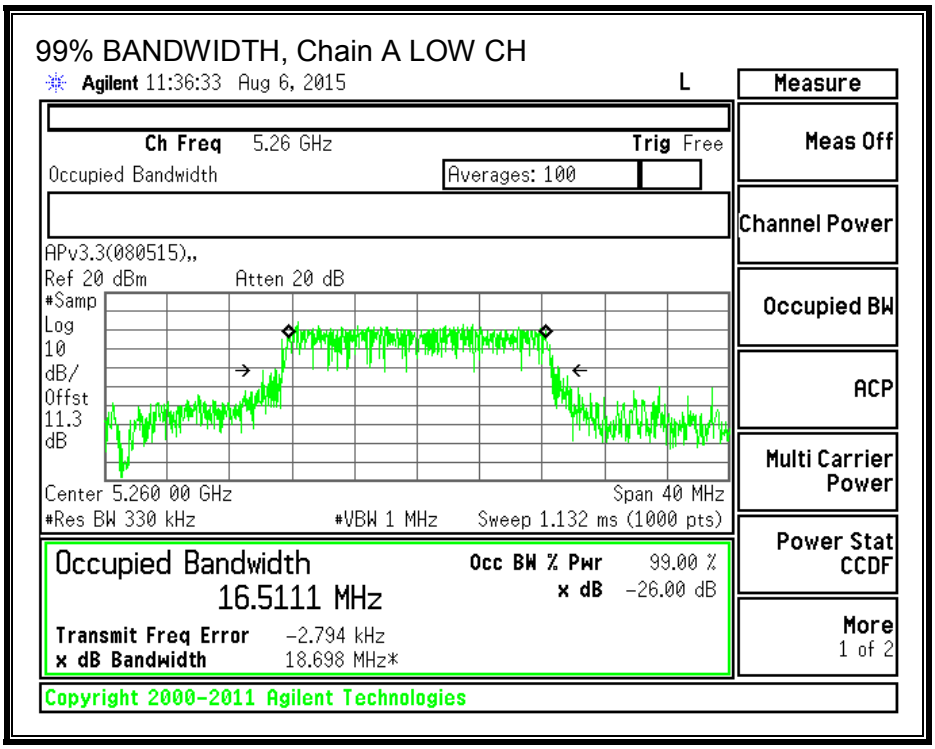


99% BANDWIDTH, Chain A



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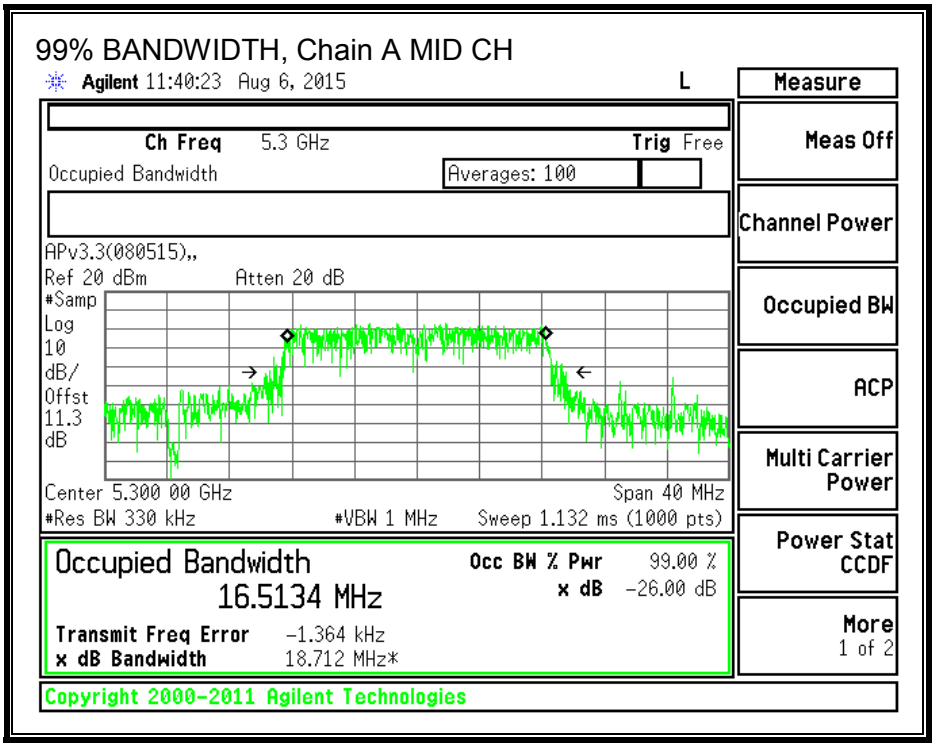

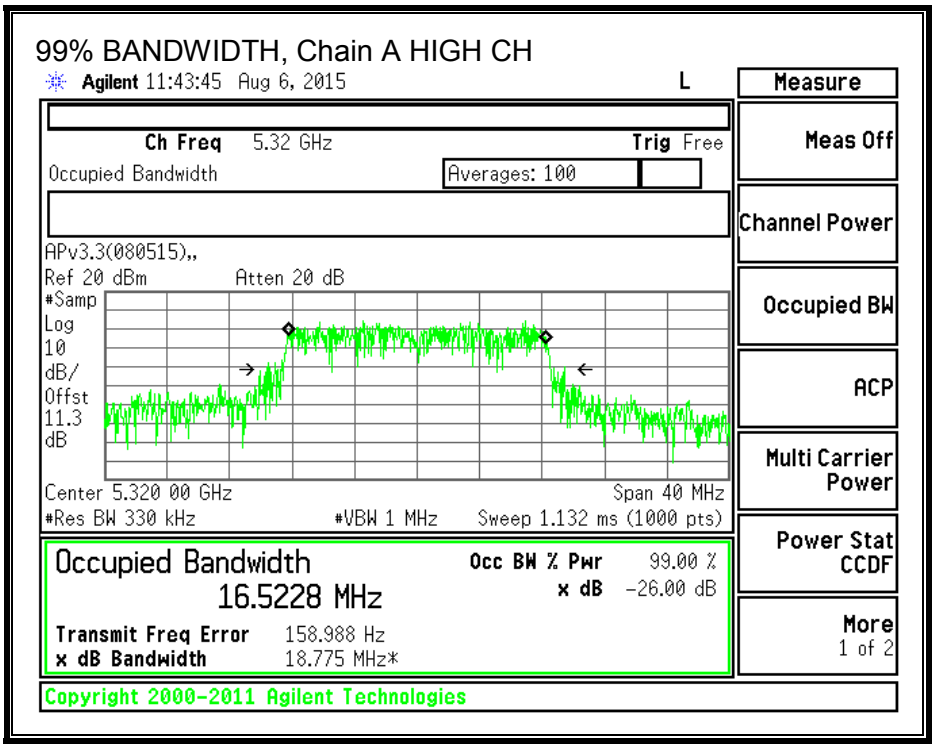

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8.6.3. OUTPUT POWER AND PSD

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

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

Chain B Antenna Gain (dBi)	Chain A Antenna Gain (dBi)	Uncorrelated Chains Directional Gain (dBi)
2.20	2.40	2.30

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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	19.00	2.30	2.30	23.79	11.00
Mid	5300	19.47	2.30	2.30	23.89	11.00
High	5320	19.38	2.30	2.30	23.87	11.00

Duty Cycle CF (dB)	0.12	**Included in Calculations of Corr'd Power & PSD**

Output Power Results

Channel	Frequency (MHz)	Chain B Meas Power (dBm)	Chain A Meas Power (dBm)	Total Corr'd Power (dBm)	Power Limit (dBm)	Power Margin (dB)
Low	5260	7.57	7.78	10.81	23.79	-12.98
Mid	5300	7.78	7.86	10.95	23.89	-12.94
High	5320	7.96	7.94	11.08	23.87	-12.79

PSD Results

Channel	Frequency (MHz)	Chain B Meas PSD (dBm)	Chain A Meas PSD (dBm)	Total Corr'd PSD (dBm)	PSD Limit (dBm)	PSD Margin (dB)
Low	5260	-3.11	-2.73	0.21	11.00	-10.79
Mid	5300	-2.82	-2.74	0.35	11.00	-10.65
High	5320	-2.62	-2.81	0.42	11.00	-10.58

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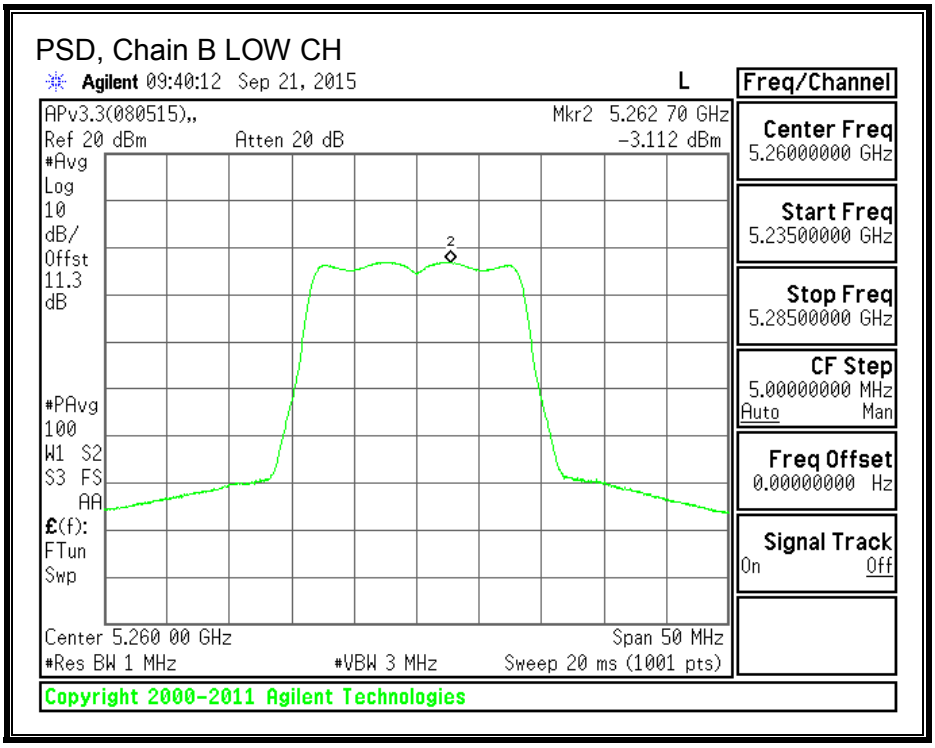
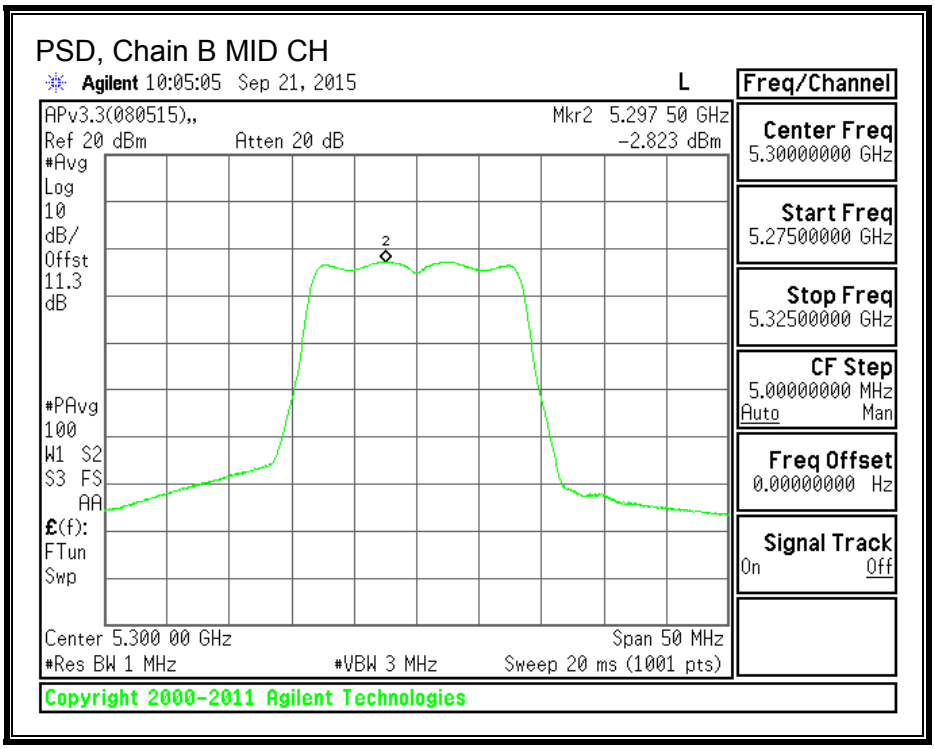
PSD, Chain B





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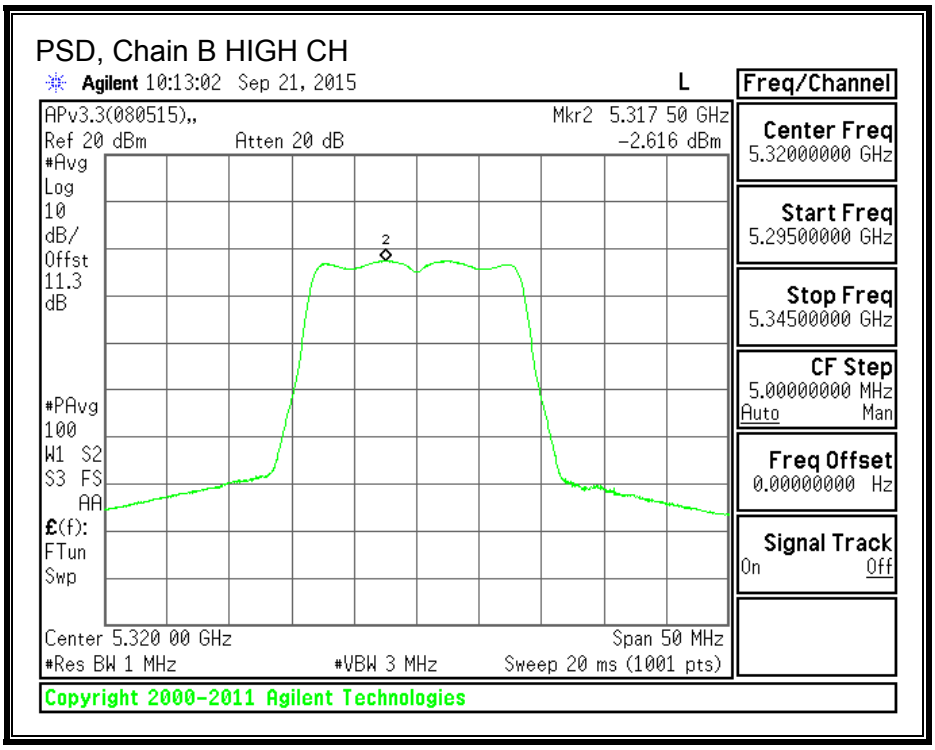
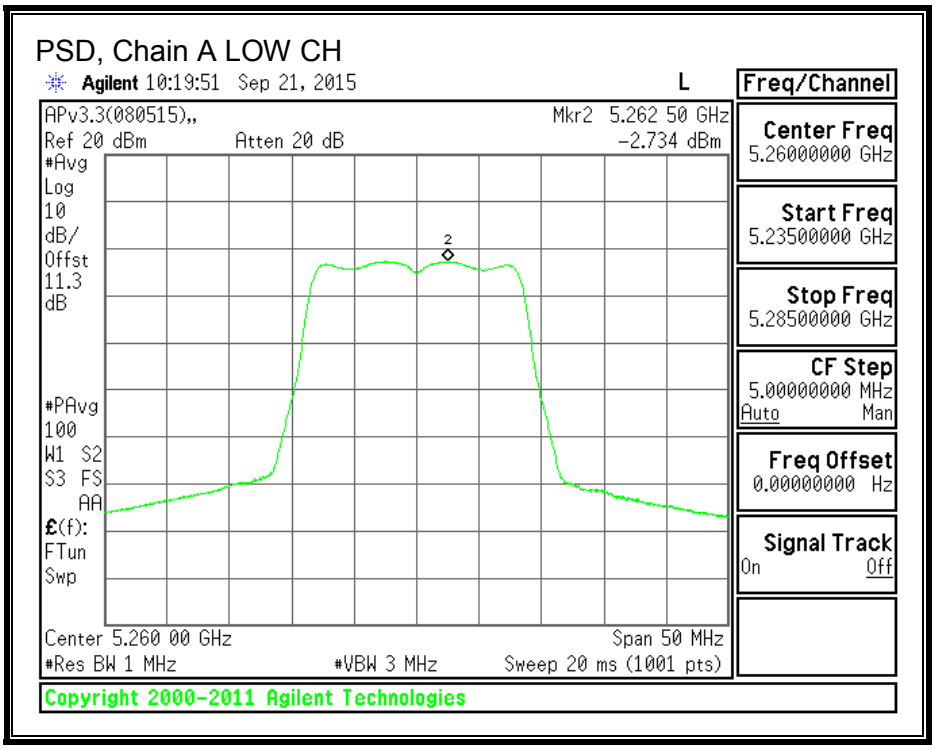


PSD, Chain A



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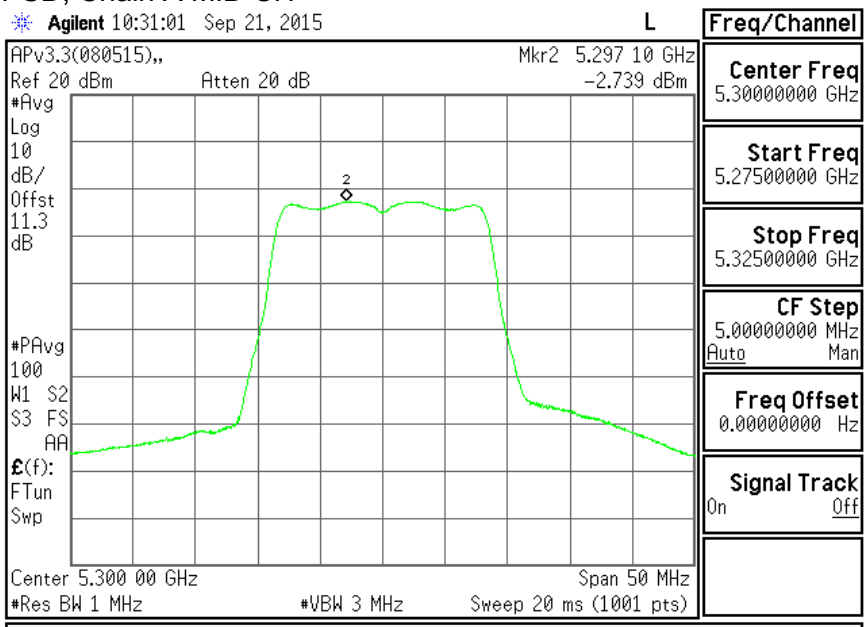
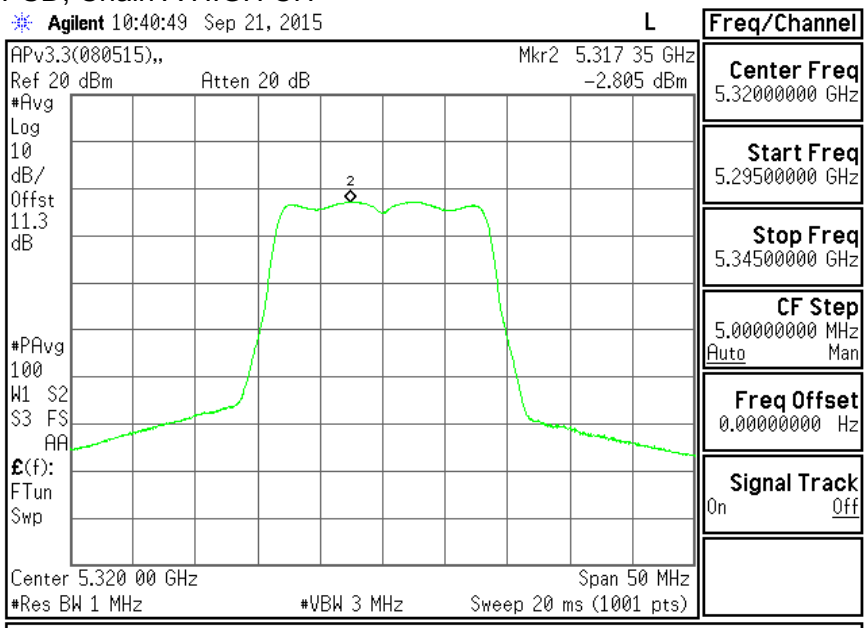
PSD, Chain A MID CH



PSD, Chain A HIGH CH



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8.6.4. TPC POWER

LIMITS

FCC §15.407 (h) (1)

Transmit power control (TPC). U-NII devices operating in the 5.25–5.35 GHz band and the 5.47–5.725 GHz band shall employ a TPC mechanism. The U-NII device is required to have the capability to operate at least 6 dB below the mean EIRP value of 30 dBm. A TPC mechanism is not required for systems with an e.i.r.p. of less than 500 mW.

DIRECTIONAL ANTENNA GAIN

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

Chain B Antenna Gain (dBi)	Chain A Antenna Gain (dBi)	Uncorrelated Chains Directional Gain (dBi)
2.20	2.40	2.30

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RESULTS

TPC Limits

Channel	Frequency (MHz)	Limit EIRP (dBm)	Directional Gain (dBi)	Limit Cond (dBm)
Low	5260	24	2.30	21.70
Mid	5300	24	2.30	21.70
High	5320	24	2.30	21.70

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

TPC Output Power Results

Channel	Frequency (MHz)	Chain B Meas Power (dBm)	Chain A Meas Power (dBm)	Total Corr'd Power (dBm)	Cond Power Limit (dBm)	Margin (dB)
Low	5260	7.57	7.78	10.81	21.70	-10.89
Mid	5300	7.78	7.86	10.95	21.70	-10.75
High	5320	7.96	7.94	11.08	21.70	-10.62

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8.7. 802.11n HT20 MODE IN THE 5.3 GHz BAND

8.7.1. 26 dB BANDWIDTH

LIMITS

None; for reporting purposes only.

RESULTS

Channel	Frequency (MHz)	26 dB BW Chain B (MHz)	26 dB BW Chain A (MHz)
Low	5260	19.80	19.71
Mid	5300	19.95	20.06
High	5320	19.92	19.95

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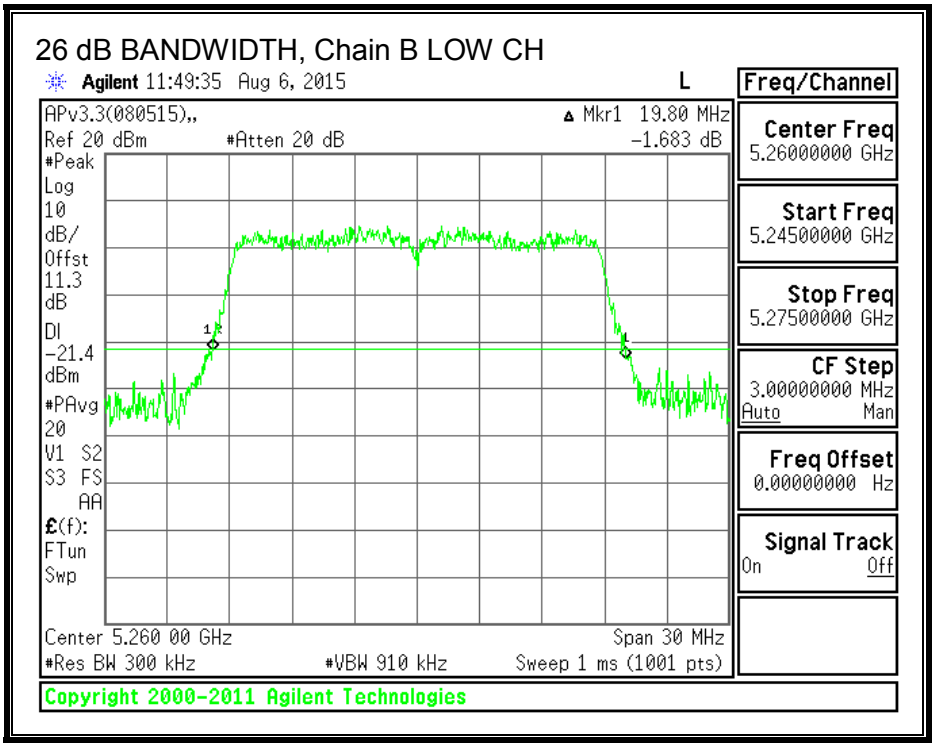
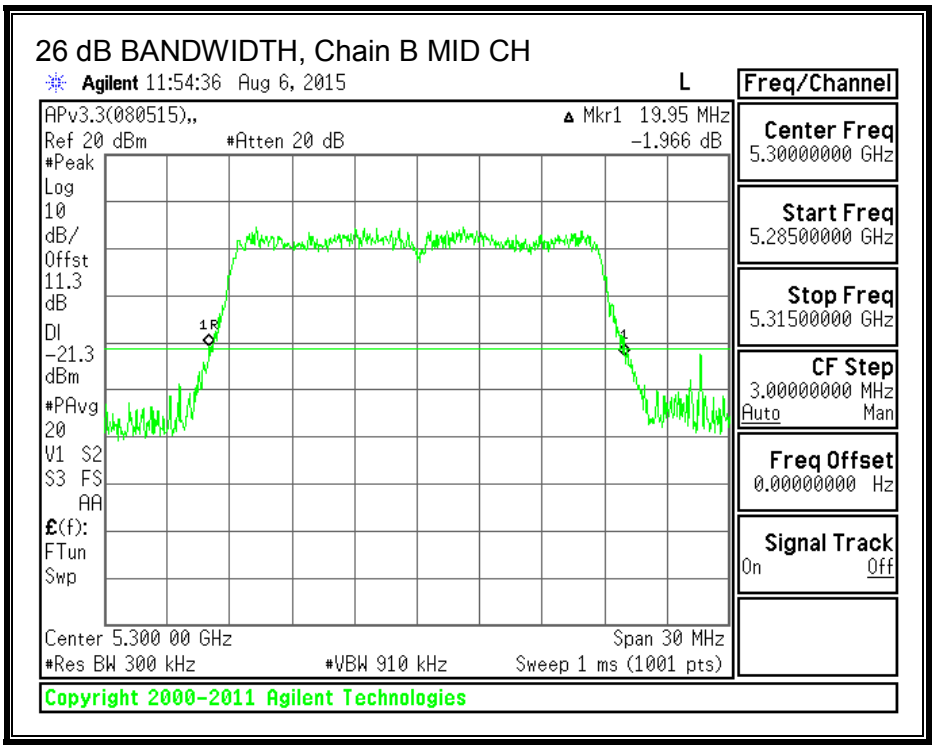
26 dB BANDWIDTH, Chain B





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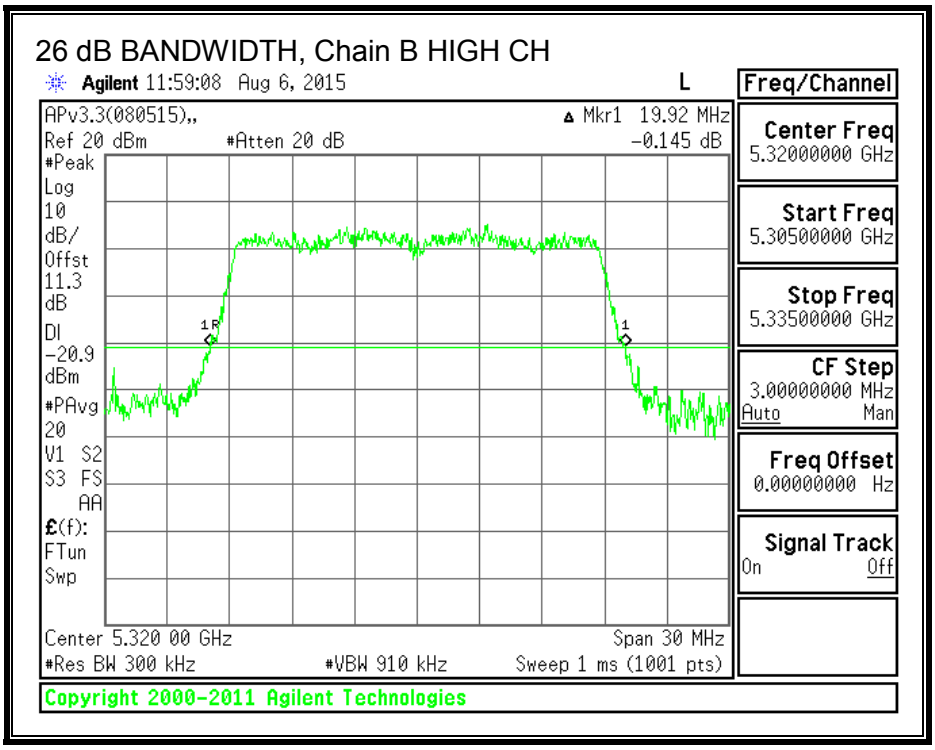
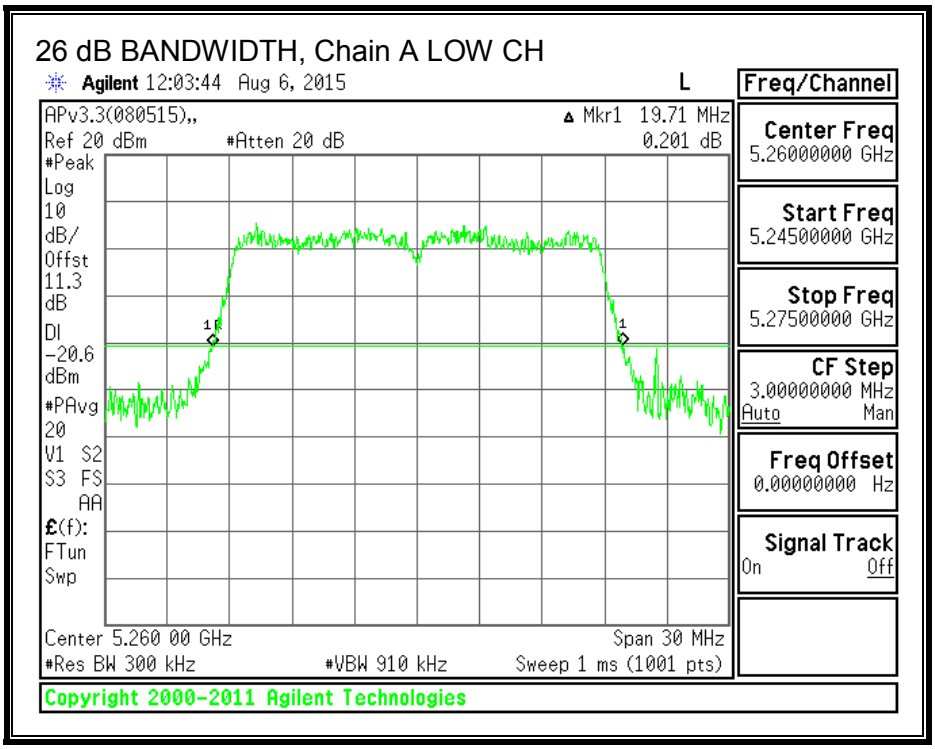


26 dB BANDWIDTH, Chain A



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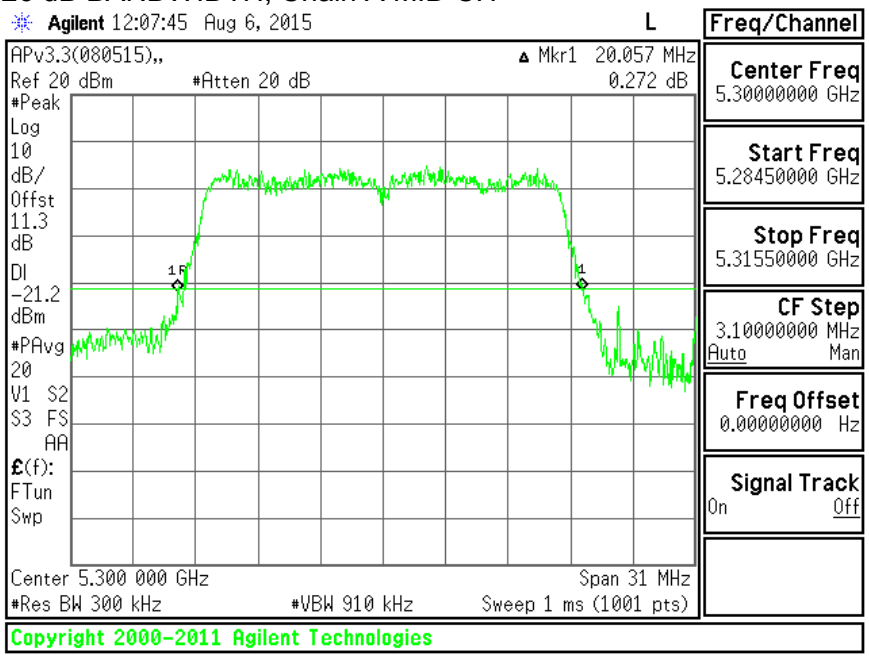
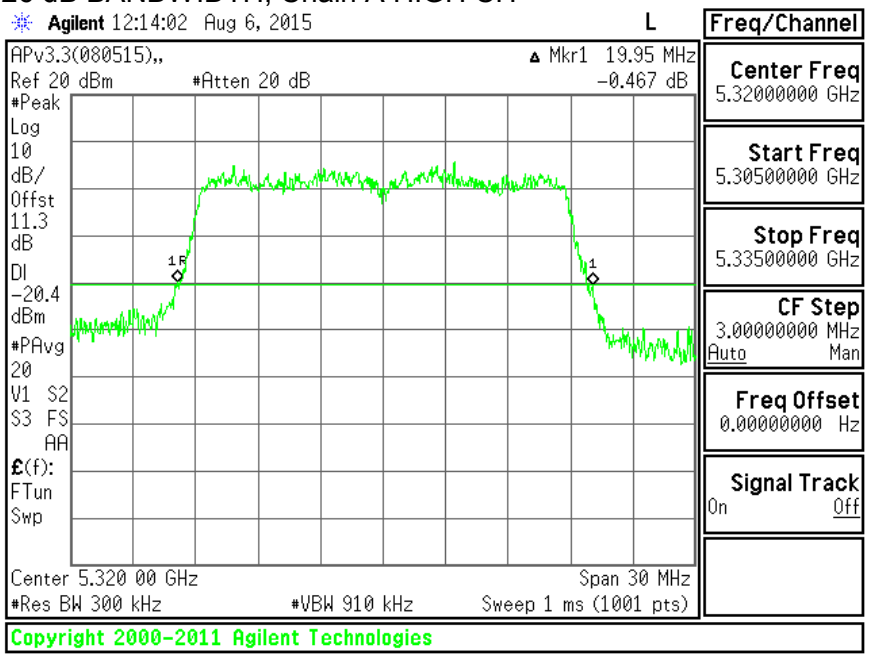
26 dB BANDWIDTH, Chain A MID CH



26 dB BANDWIDTH, Chain A HIGH CH



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8.7.2. 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

RESULTS

Channel	Frequency (MHz)	99% BW Chain B (MHz)	99% BW Chain A (MHz)
Low	5260	17.6570	17.6675
Mid	5300	17.6691	17.6585
High	5320	17.6502	17.6626

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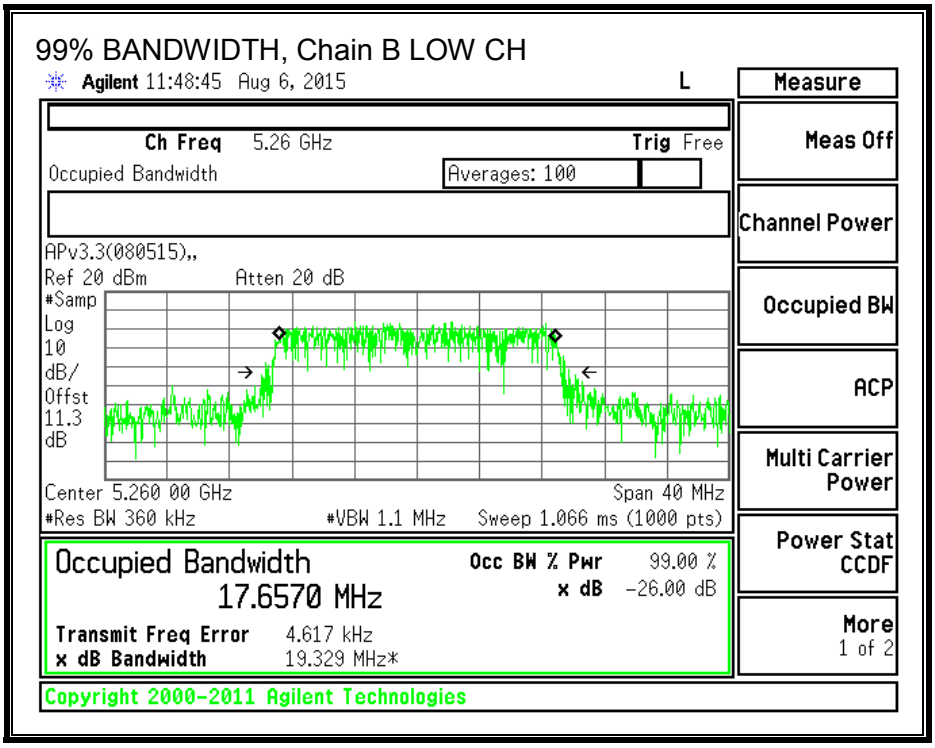
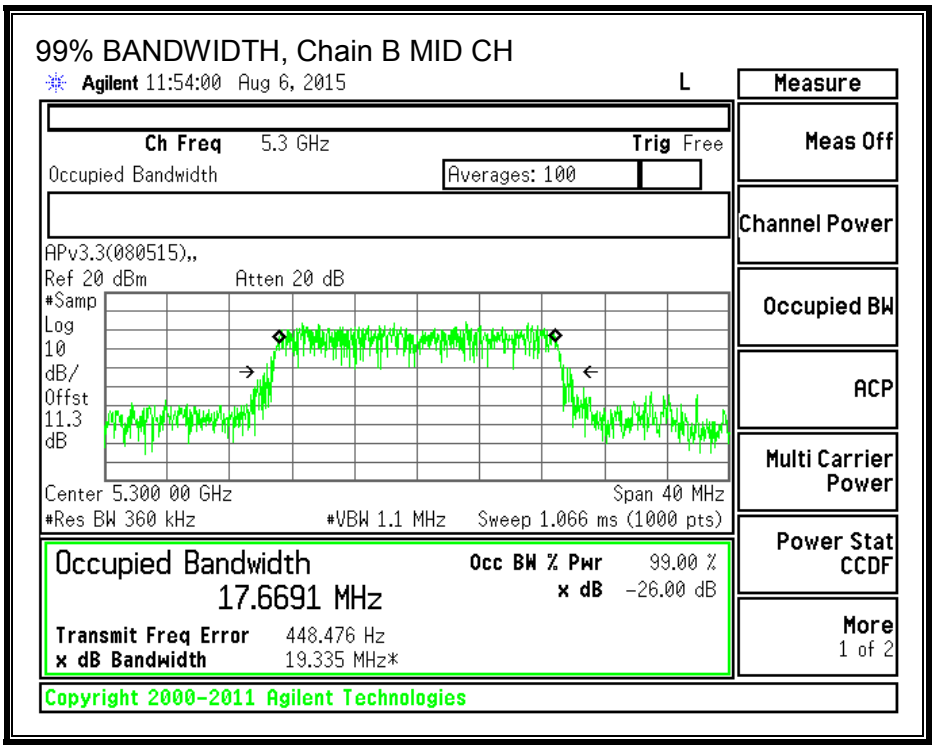
99% BANDWIDTH, Chain B





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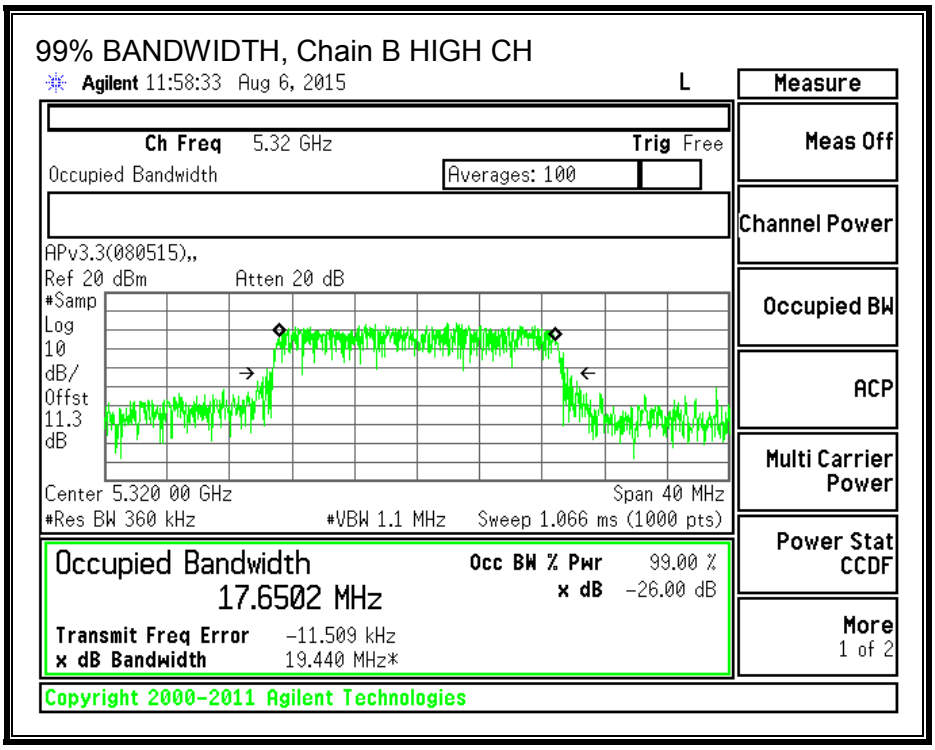
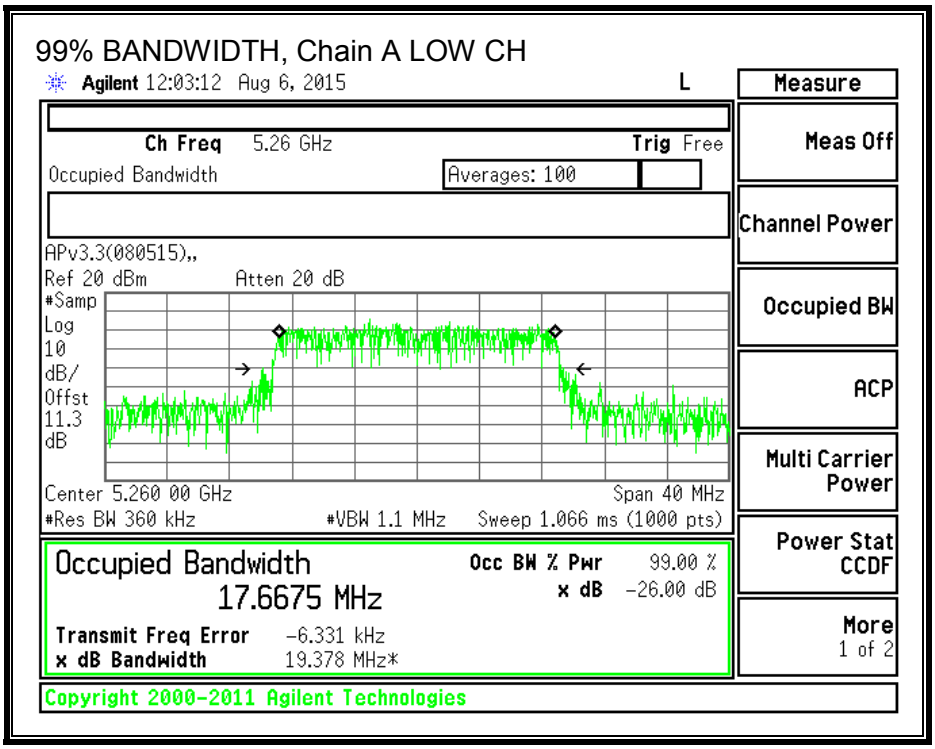


99% BANDWIDTH, Chain A



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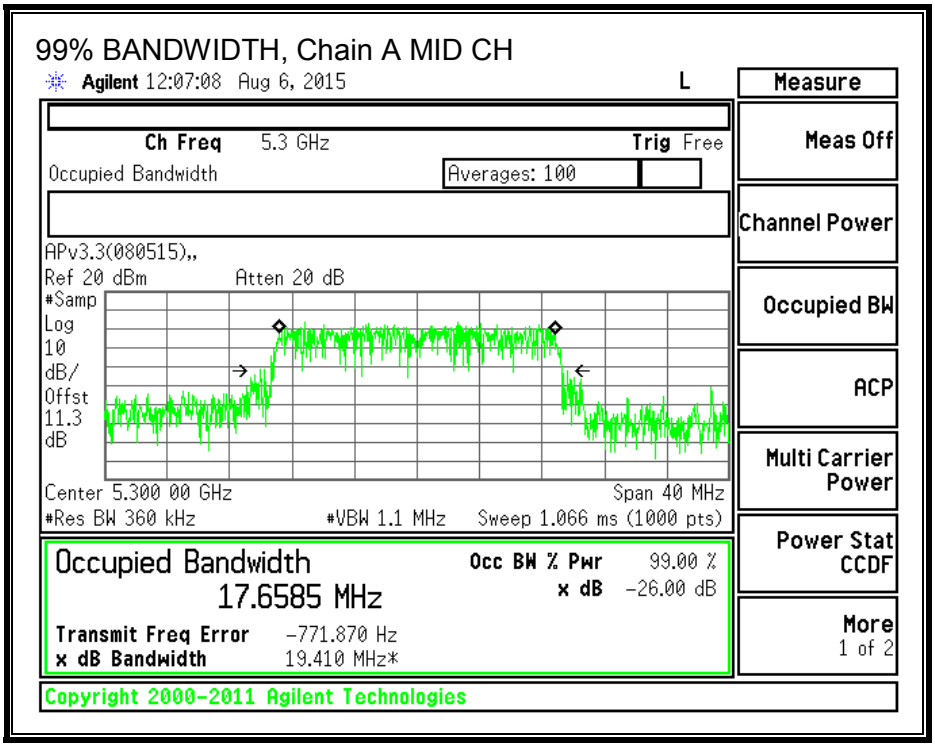

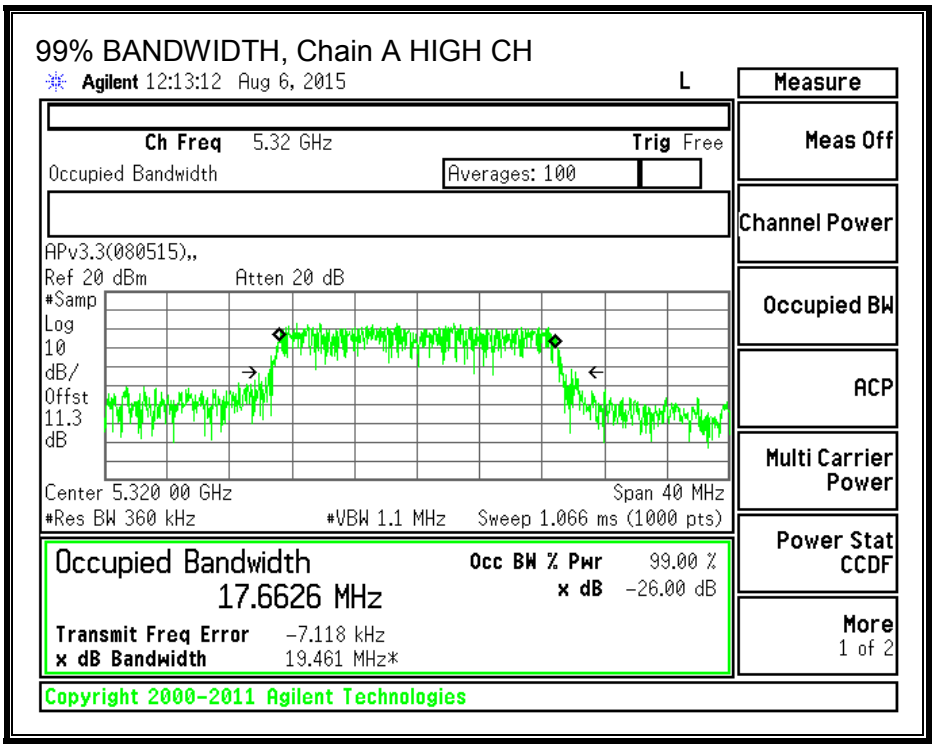

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8.7.3. OUTPUT POWER AND PSD

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

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

Chain B Antenna Gain (dBi)	Chain A Antenna Gain (dBi)	Uncorrelated Chains Directional Gain (dBi)
2.20	2.40	2.30

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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	19.71	2.30	2.30	23.95	11.00
Mid	5300	19.95	2.30	2.30	24.00	11.00
High	5320	19.92	2.30	2.30	23.99	11.00

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

Output Power Results

Channel	Frequency (MHz)	Chain B Meas Power (dBm)	Chain A Meas Power (dBm)	Total Corr'd Power (dBm)	Power Limit (dBm)	Power Margin (dB)
Low	5260	7.25	7.76	10.52	23.95	-13.42
Mid	5300	7.78	7.66	10.73	24.00	-13.27
High	5320	7.69	7.89	10.80	23.99	-13.19

PSD Results

Channel	Frequency (MHz)	Chain B Meas PSD (dBm)	Chain A Meas PSD (dBm)	Total Corr'd PSD (dBm)	PSD Limit (dBm)	PSD Margin (dB)
Low	5260	-3.22	-2.95	-0.08	11.00	-11.08
Mid	5300	-3.09	-2.94	0.00	11.00	-11.00
High	5320	-3.24	-2.79	0.00	11.00	-11.00

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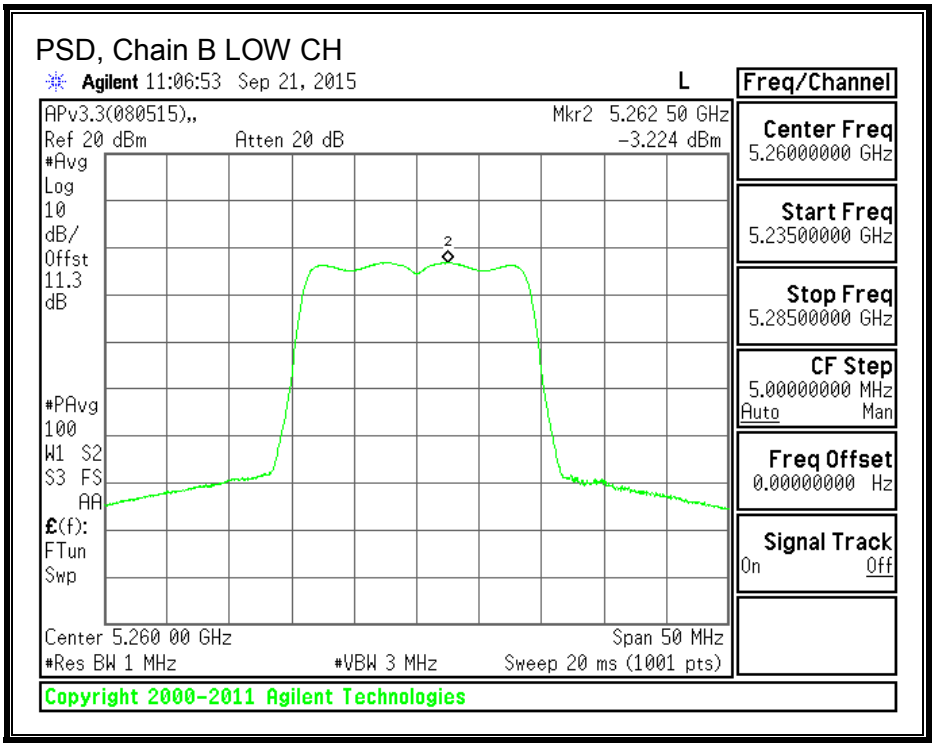
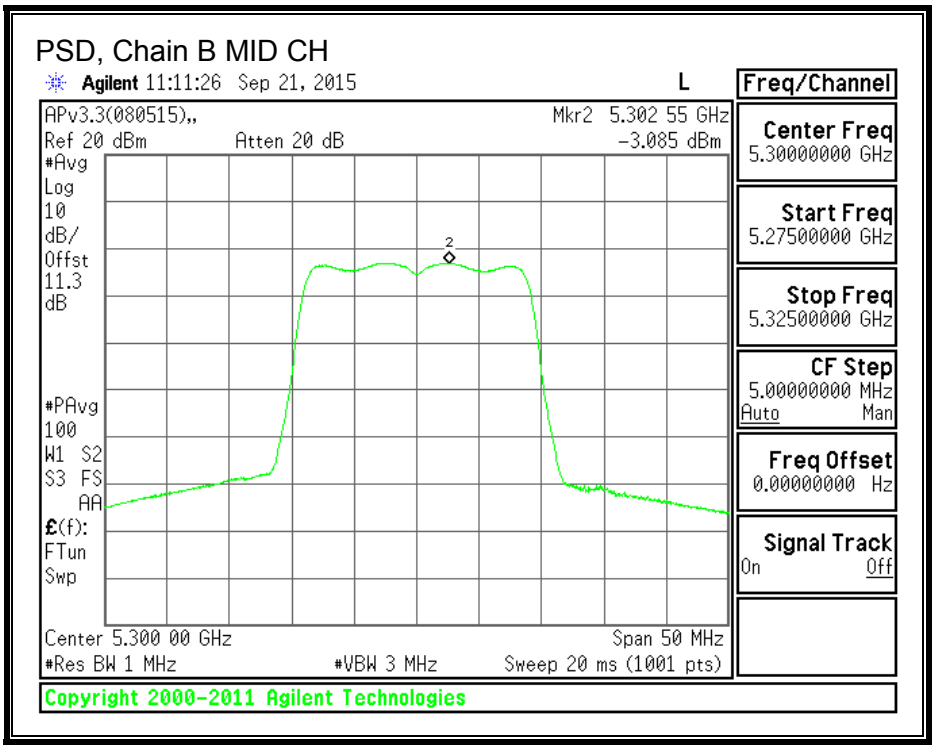
PSD, Chain B





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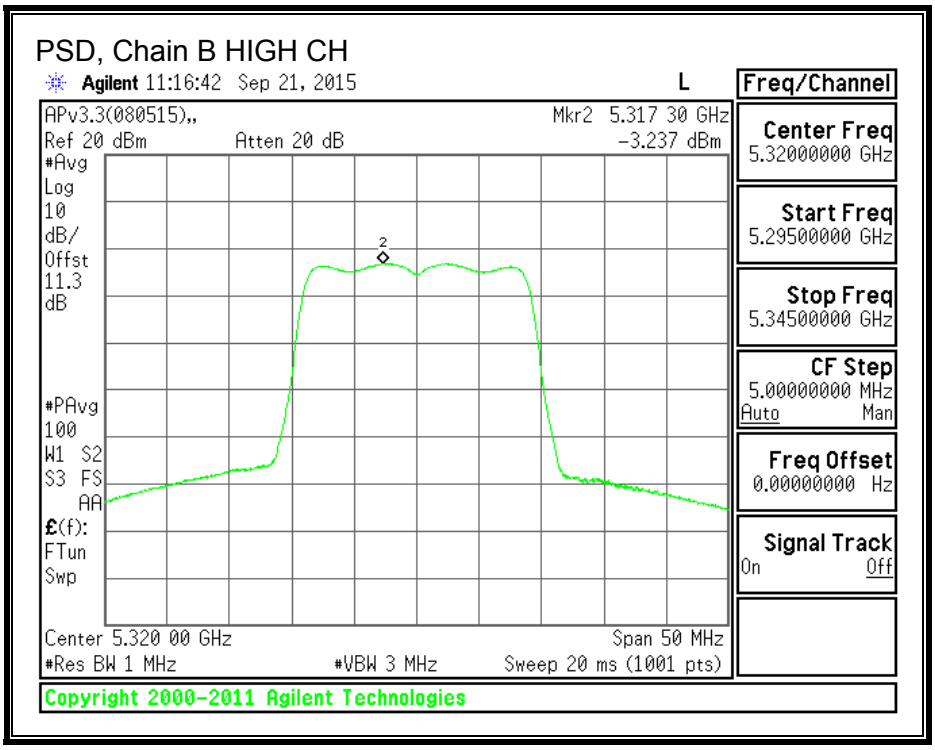
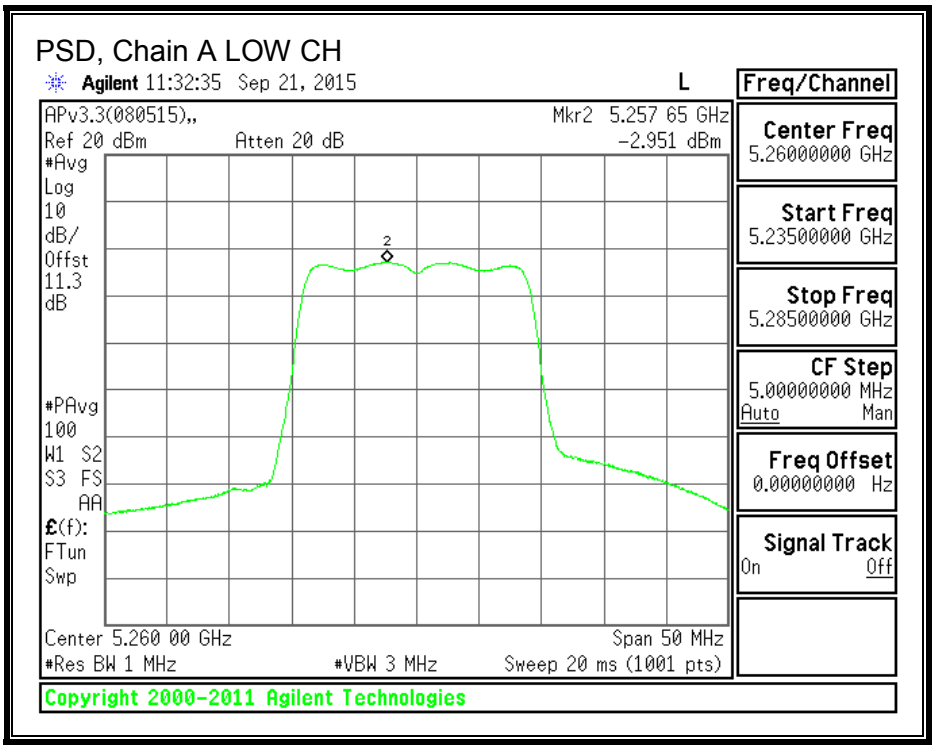


PSD, Chain A



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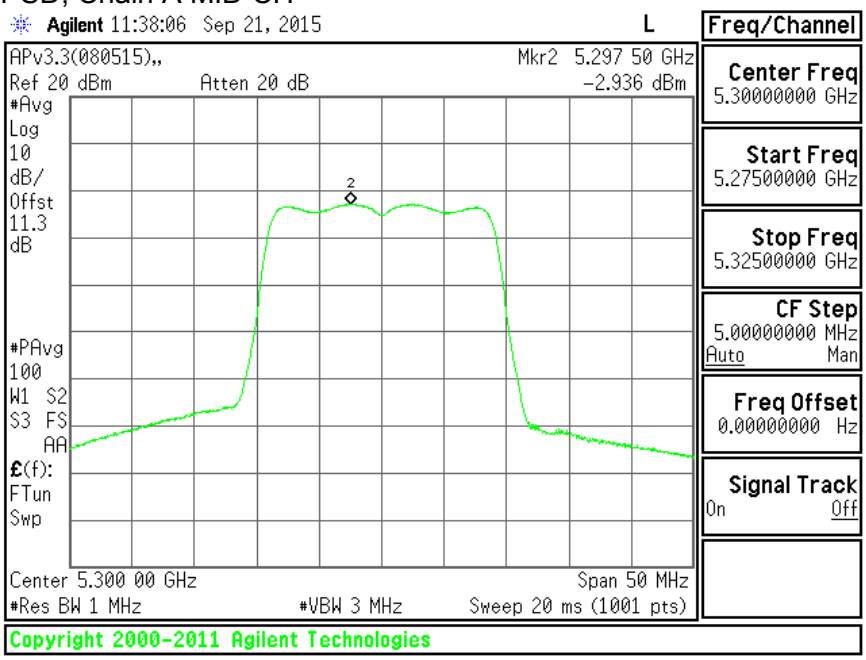
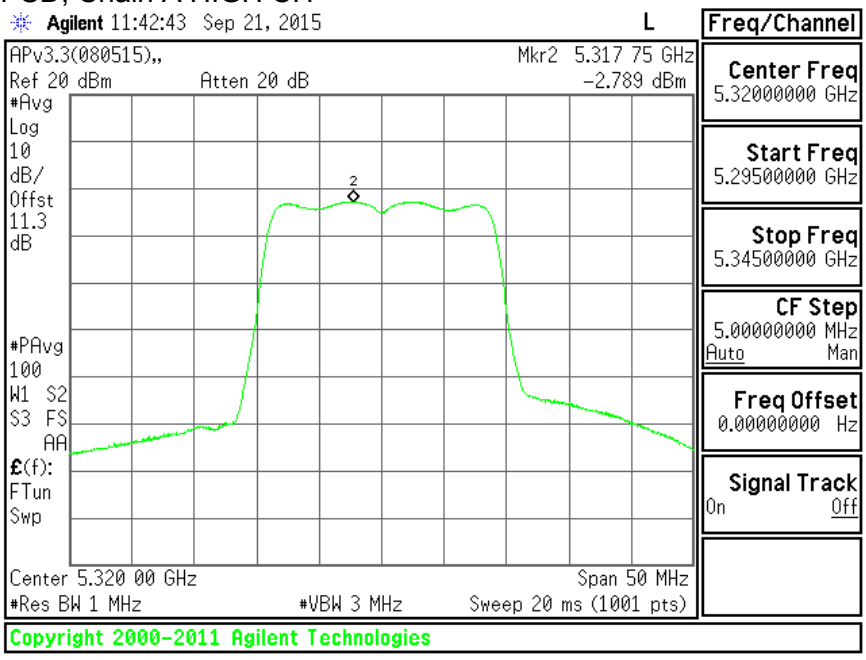
PSD, Chain A MID CH



PSD, Chain A HIGH CH



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8.7.4. TPC POWER

LIMITS

FCC §15.407 (h) (1)

Transmit power control (TPC). U-NII devices operating in the 5.25–5.35 GHz band and the 5.47–5.725 GHz band shall employ a TPC mechanism. The U-NII device is required to have the capability to operate at least 6 dB below the mean EIRP value of 30 dBm. A TPC mechanism is not required for systems with an e.i.r.p. of less than 500 mW.

DIRECTIONAL ANTENNA GAIN

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

Chain B Antenna Gain (dBi)	Chain A Antenna Gain (dBi)	Uncorrelated Chains Directional Gain (dBi)
2.20	2.40	2.30

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RESULTS

TPC Limits

Channel	Frequency (MHz)	Limit EIRP (dBm)	Directional Gain (dBi)	Limit Cond (dBm)
Low	5260	24	2.30	21.70
Mid	5300	24	2.30	21.70
High	5320	24	2.30	21.70

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

TPC Output Power Results

Channel	Frequency (MHz)	Chain B Meas Power (dBm)	Chain A Meas Power (dBm)	Total Corr'd Power (dBm)	Cond Power Limit (dBm)	Margin (dB)
Low	5260	7.25	7.76	10.52	21.70	-11.18
Mid	5300	7.78	7.66	10.73	21.70	-10.97
High	5320	7.69	7.89	10.80	21.70	-10.90

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8.8. 802.11n HT40 MODE IN THE 5.3 GHz BAND

8.8.1. 26 dB BANDWIDTH

LIMITS

None; for reporting purposes only.

RESULTS

Channel	Frequency (MHz)	26 dB BW Chain B (MHz)	26 dB BW Chain A (MHz)
Low	5270	40.42	40.32
High	5310	40.57	39.87

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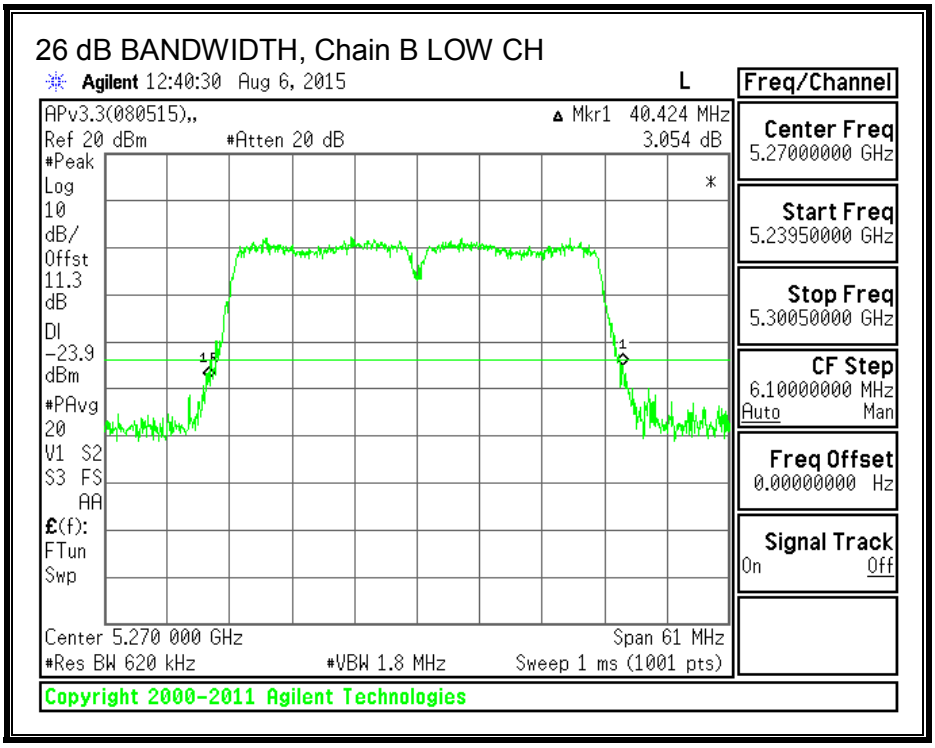
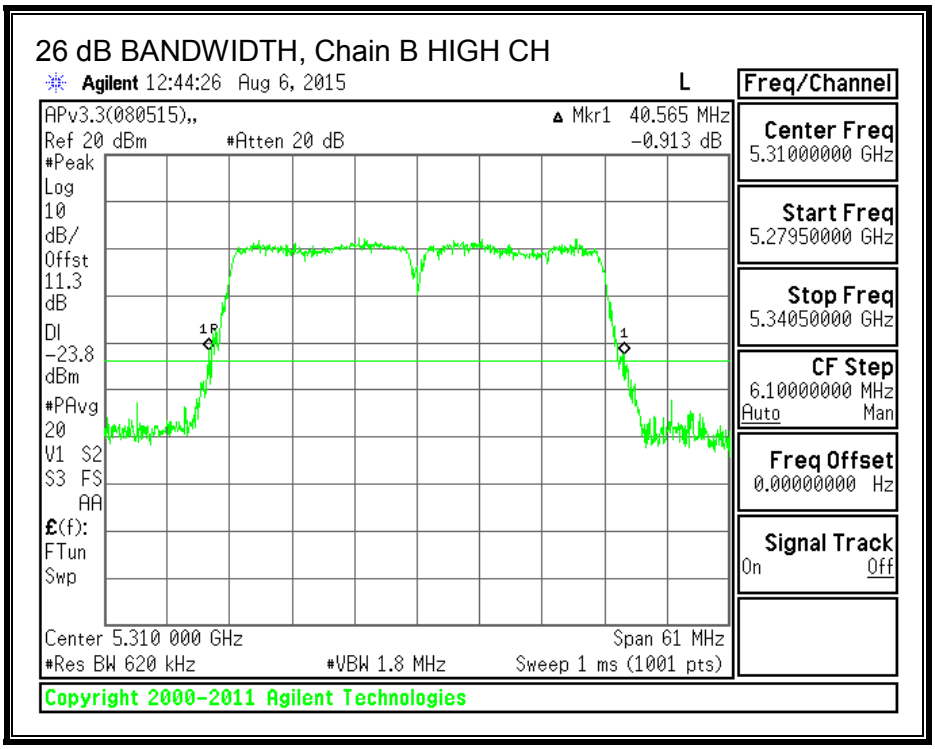
26 dB BANDWIDTH, Chain B





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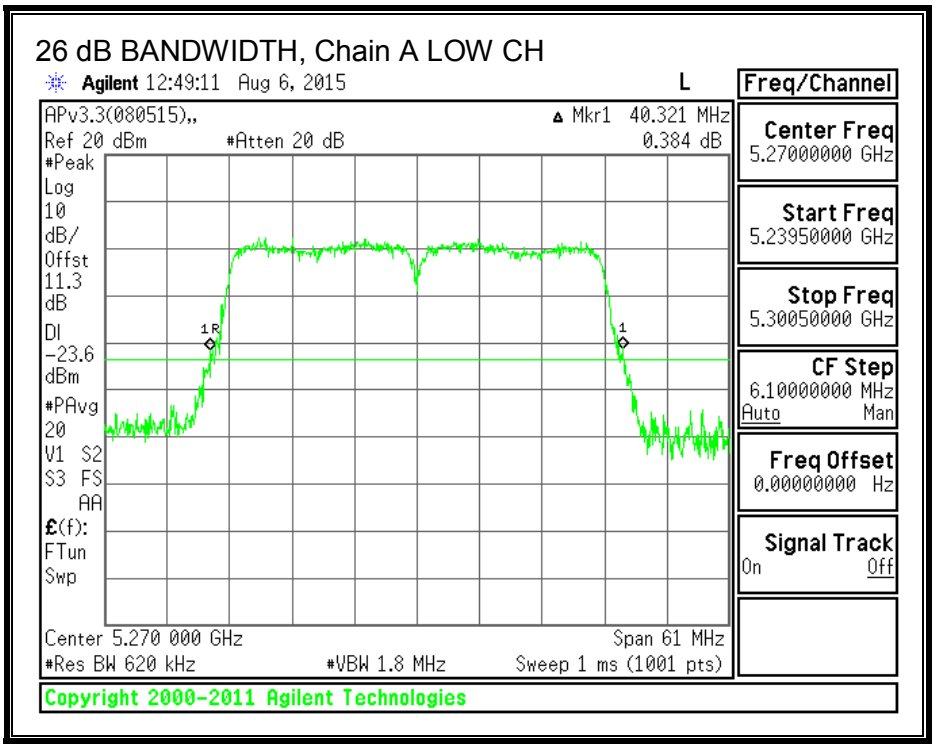
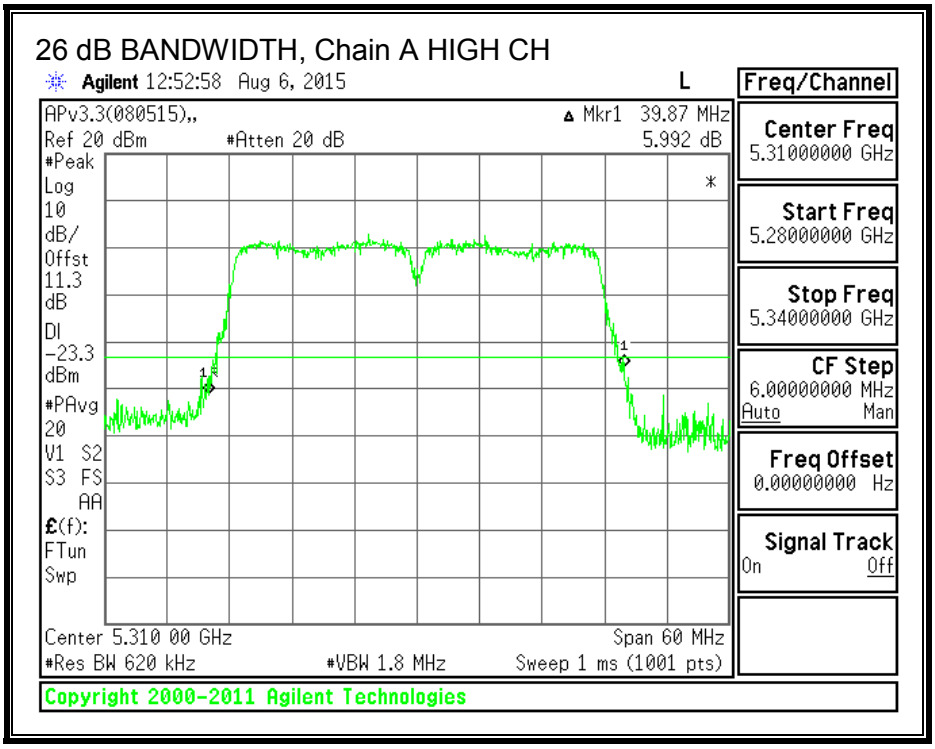
26 dB BANDWIDTH, Chain A





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8.8.2. 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

RESULTS

Channel	Frequency (MHz)	99% BW Chain B (MHz)	99% BW Chain A (MHz)
Low	5270	36.1491	36.1688
High	5310	36.1523	36.1398

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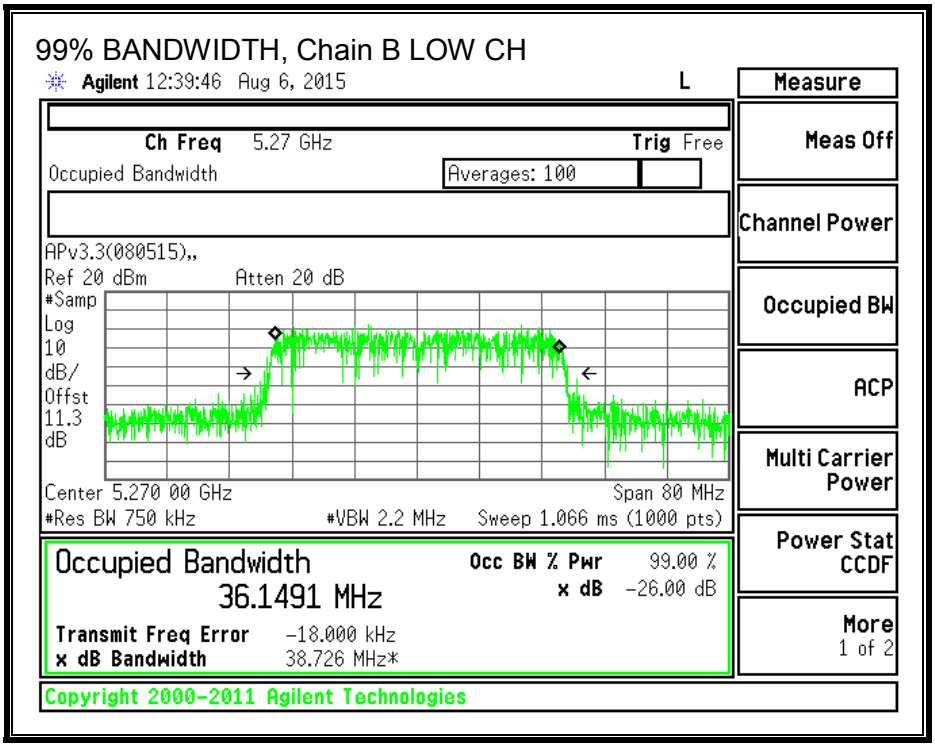
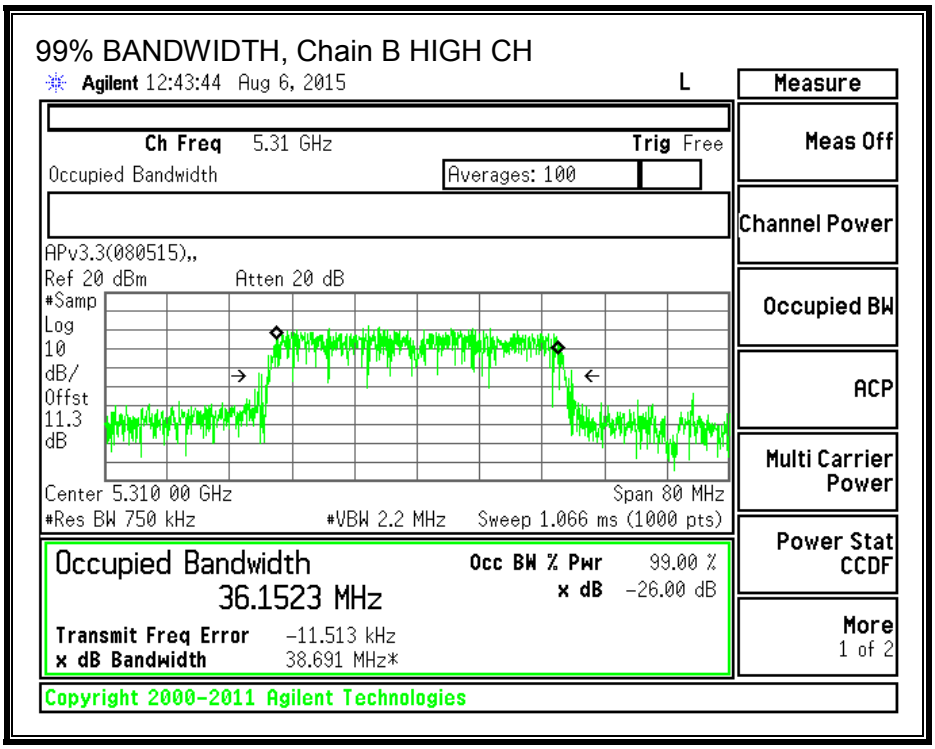
99% BANDWIDTH, Chain B





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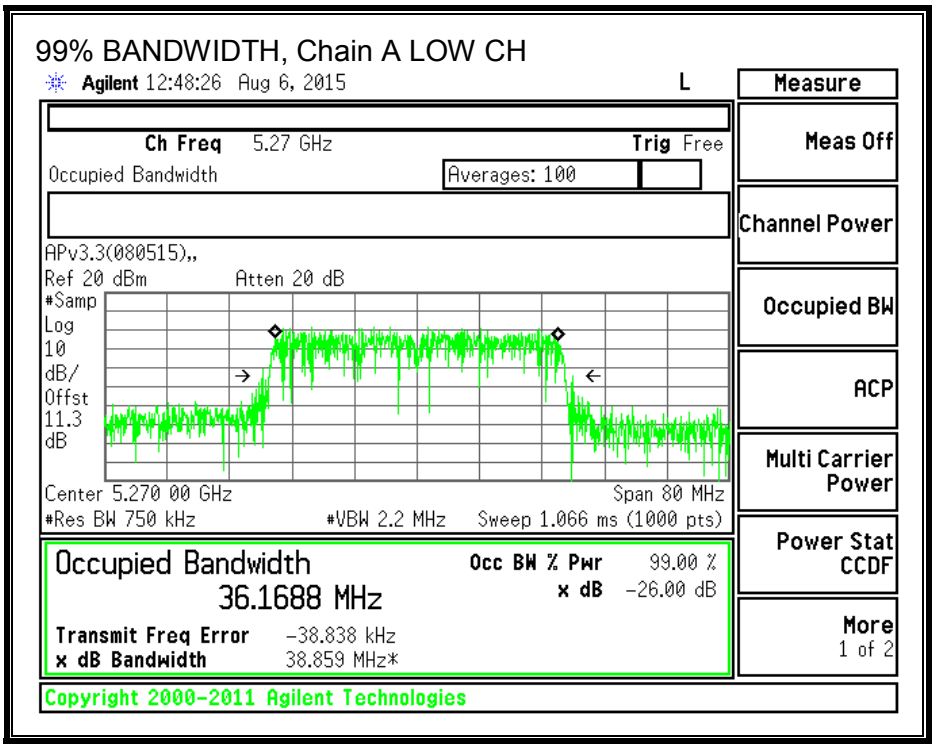
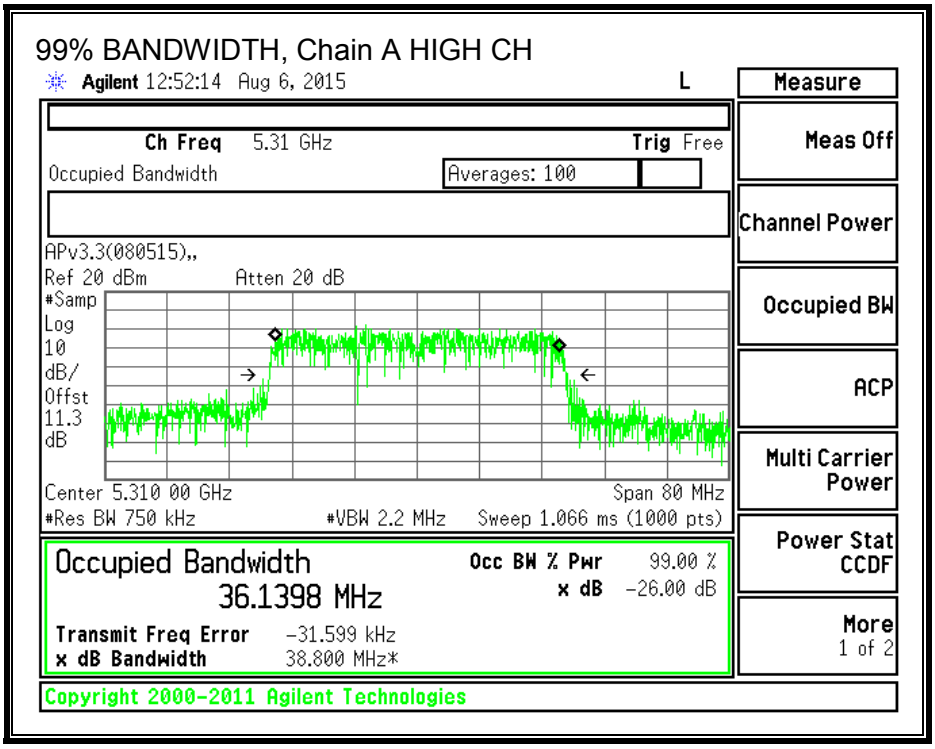
99% BANDWIDTH, Chain A





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8.8.3. 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

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

Chain B Antenna Gain (dBi)	Chain A Antenna Gain (dBi)	Uncorrelated Chains Directional Gain (dBi)
2.20	2.40	2.30

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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	40.32	2.30	2.30	24.00	11.00
High	5310	39.87	2.30	2.30	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 B Meas Power (dBm)	Chain A Meas Power (dBm)	Total Corr'd Power (dBm)	Power Limit (dBm)	Power Margin (dB)
Low	5270	7.75	7.86	10.82	24.00	-13.18
High	5310	7.85	7.90	10.89	24.00	-13.11

PSD Results

Channel	Frequency (MHz)	Chain B Meas PSD (dBm)	Chain A Meas PSD (dBm)	Total Corr'd PSD (dBm)	PSD Limit (dBm)	PSD Margin (dB)
Low	5270	-6.60	-6.43	-3.50	11.00	-14.50
High	5310	-6.59	-6.05	-3.30	11.00	-14.30

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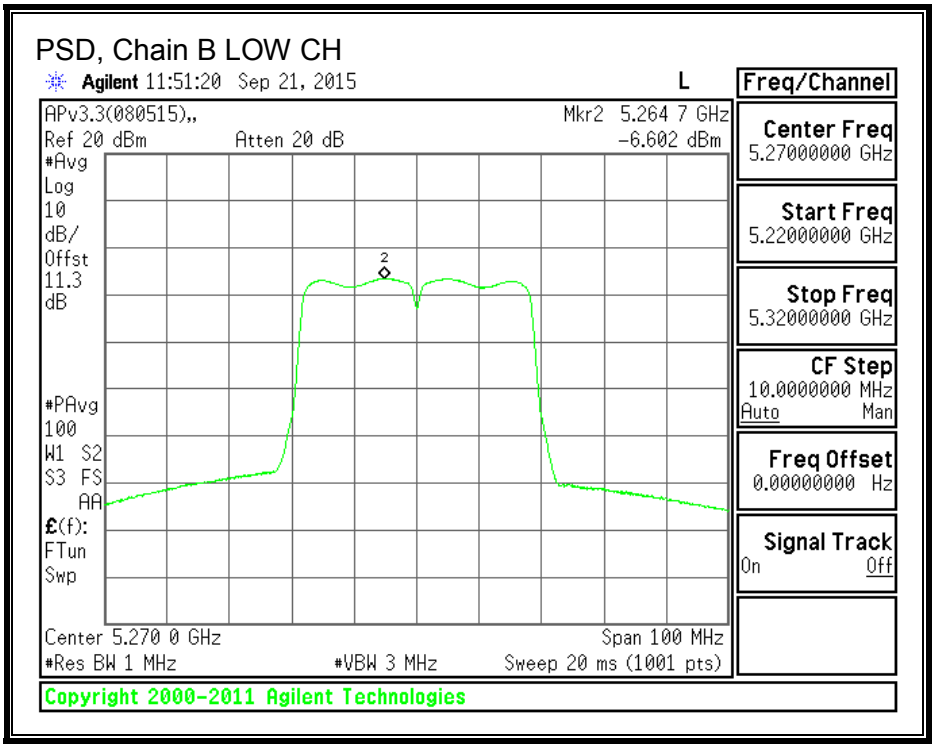
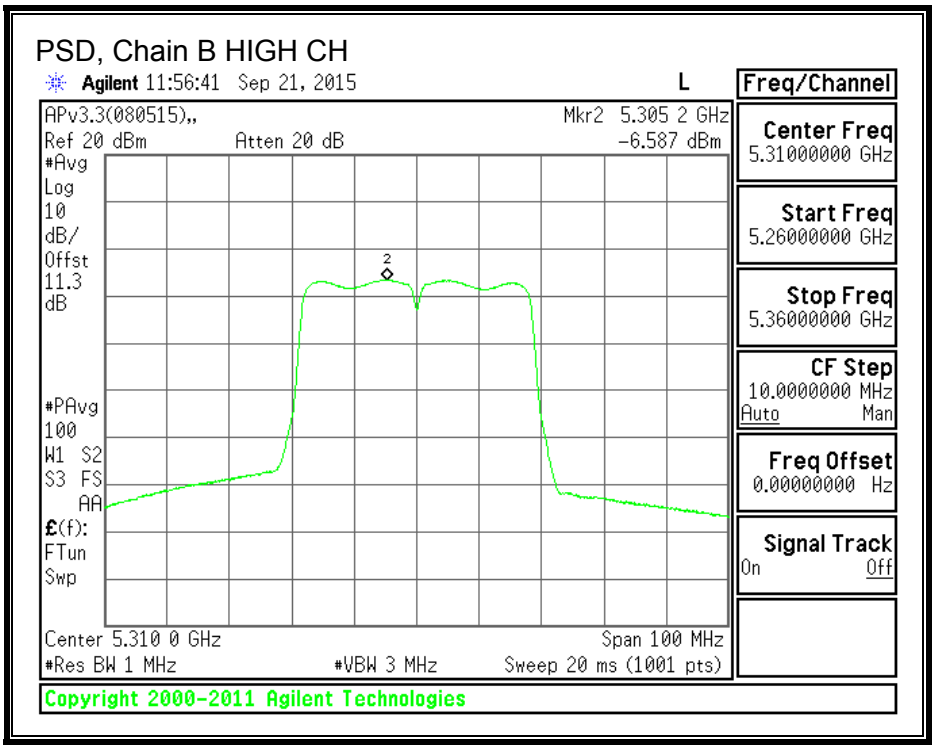
PSD, Chain B





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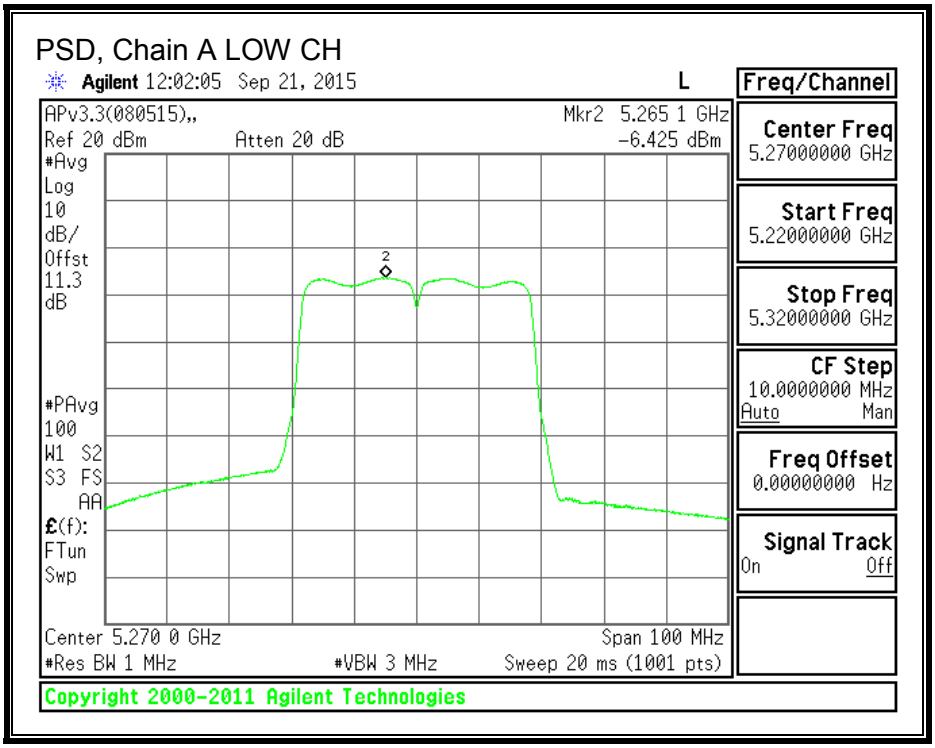
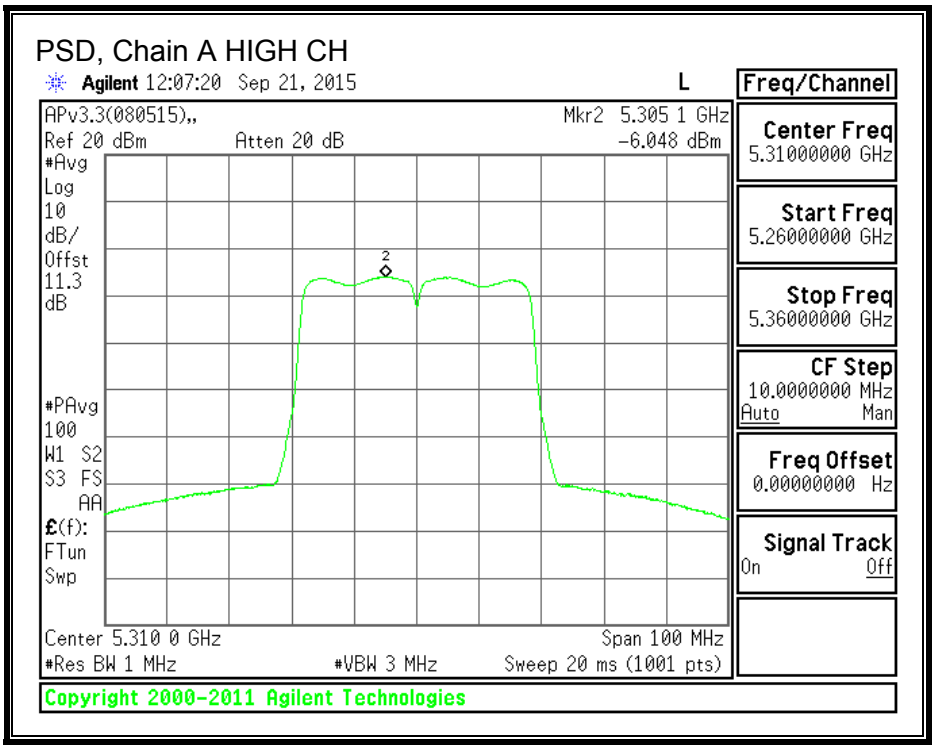
PSD, Chain A





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8.8.4. TPC POWER

LIMITS

FCC §15.407 (h) (1)

Transmit power control (TPC). U-NII devices operating in the 5.25–5.35 GHz band and the 5.47–5.725 GHz band shall employ a TPC mechanism. The U-NII device is required to have the capability to operate at least 6 dB below the mean EIRP value of 30 dBm. A TPC mechanism is not required for systems with an e.i.r.p. of less than 500 mW.

DIRECTIONAL ANTENNA GAIN

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

Chain B Antenna Gain (dBi)	Chain A Antenna Gain (dBi)	Uncorrelated Chains Directional Gain (dBi)
2.20	2.40	2.30

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RESULTS

TPC Limits

Channel	Frequency (MHz)	Limit EIRP (dBm)	Directional Gain (dBi)	Limit Cond (dBm)
Low	5270	24	2.30	21.70
High	5310	24	2.30	21.70

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

TPC Output Power Results

Channel	Frequency (MHz)	Chain B Meas Power (dBm)	Chain A Meas Power (dBm)	Total Corr'd Power (dBm)	Cond Power Limit (dBm)	Margin (dB)
Low	5270	7.75	7.86	10.82	21.70	-10.88
High	5310	7.85	7.90	10.89	21.70	-10.81

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8.9. 802.11ac VHT80 MODE IN THE 5.3 GHz BAND

8.9.1. 26 dB BANDWIDTH

LIMITS

None; for reporting purposes only.

RESULTS

Channel	Frequency (MHz)	26 dB BW Chain B (MHz)	26 dB BW Chain A (MHz)
Mid	5290	81.92	81.43

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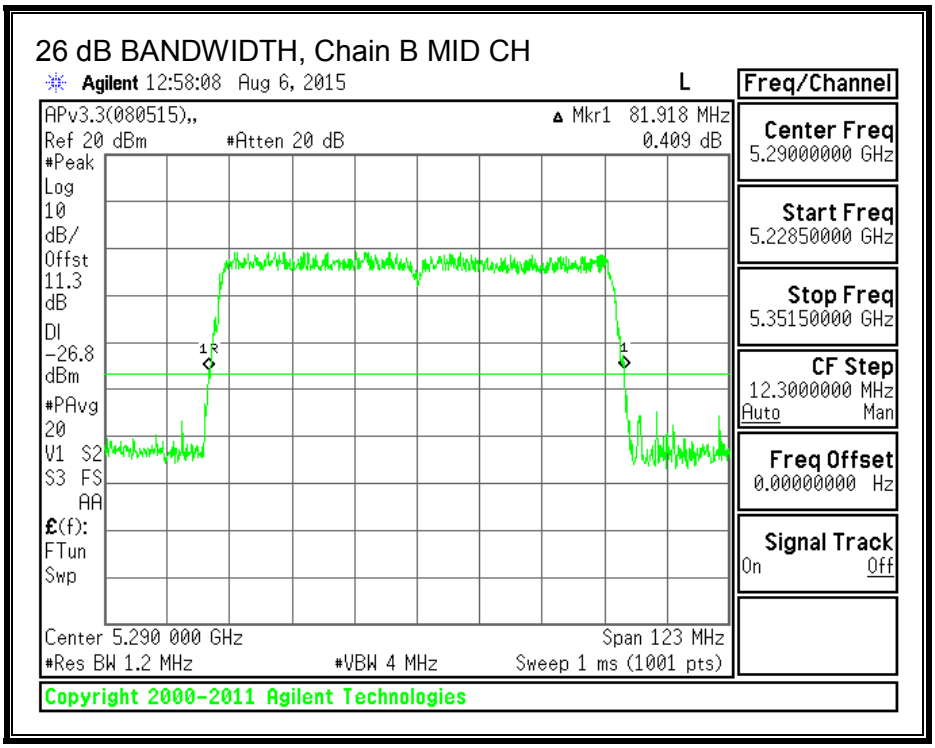
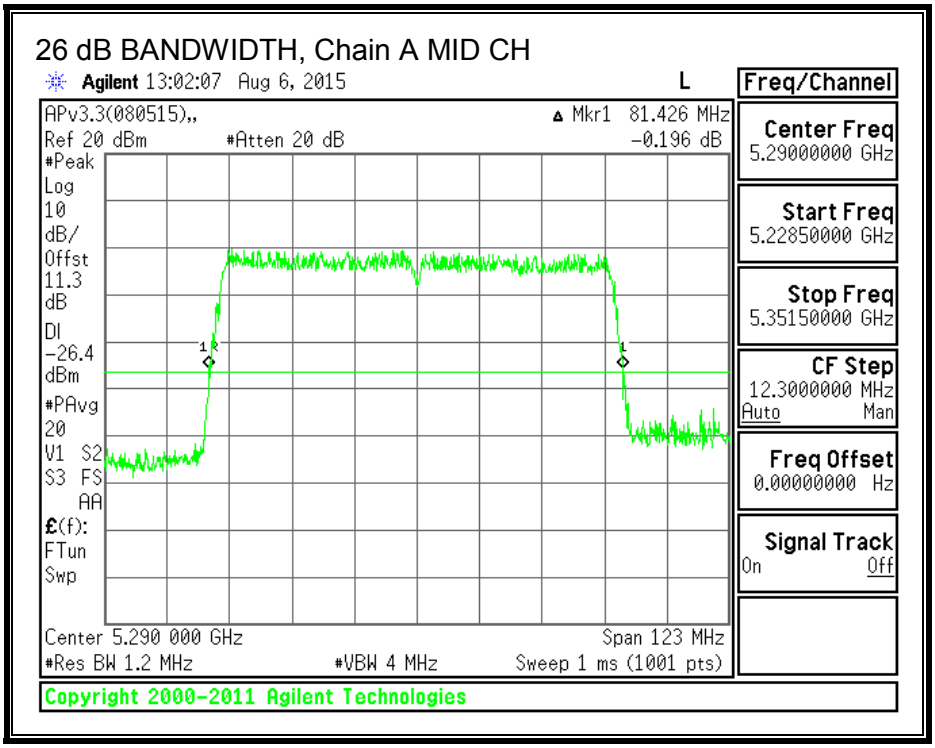
26 dB BANDWIDTH, Chain B



26 dB BANDWIDTH, Chain A



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8.9.2. 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

RESULTS

Channel	Frequency (MHz)	99% BW Chain B (MHz)	99% BW Chain A (MHz)
Mid	5290	76.0937	76.0059

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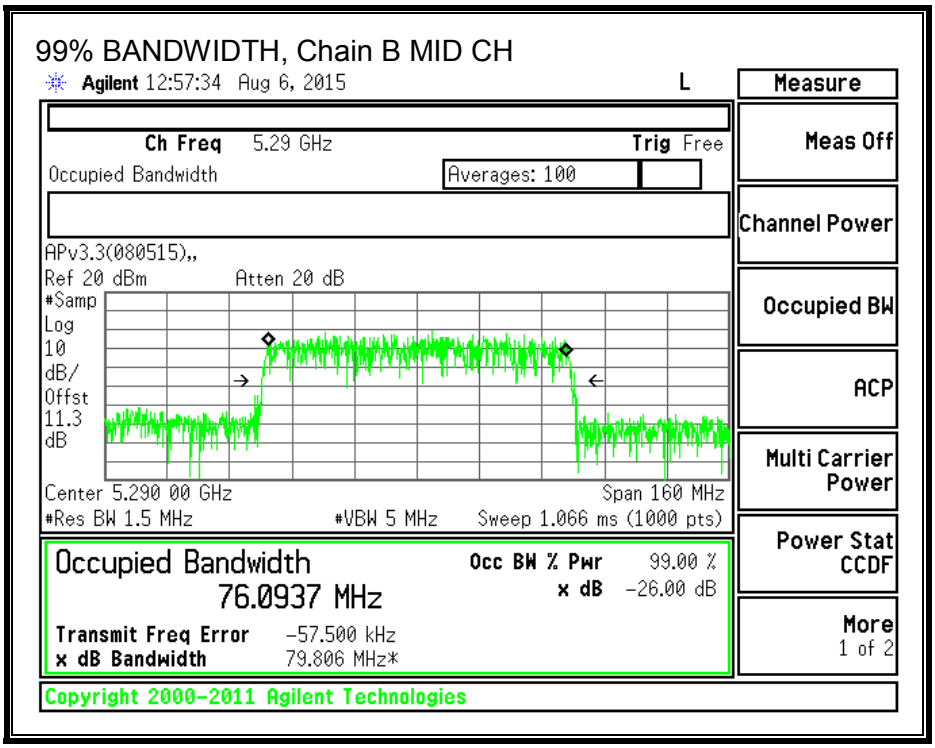
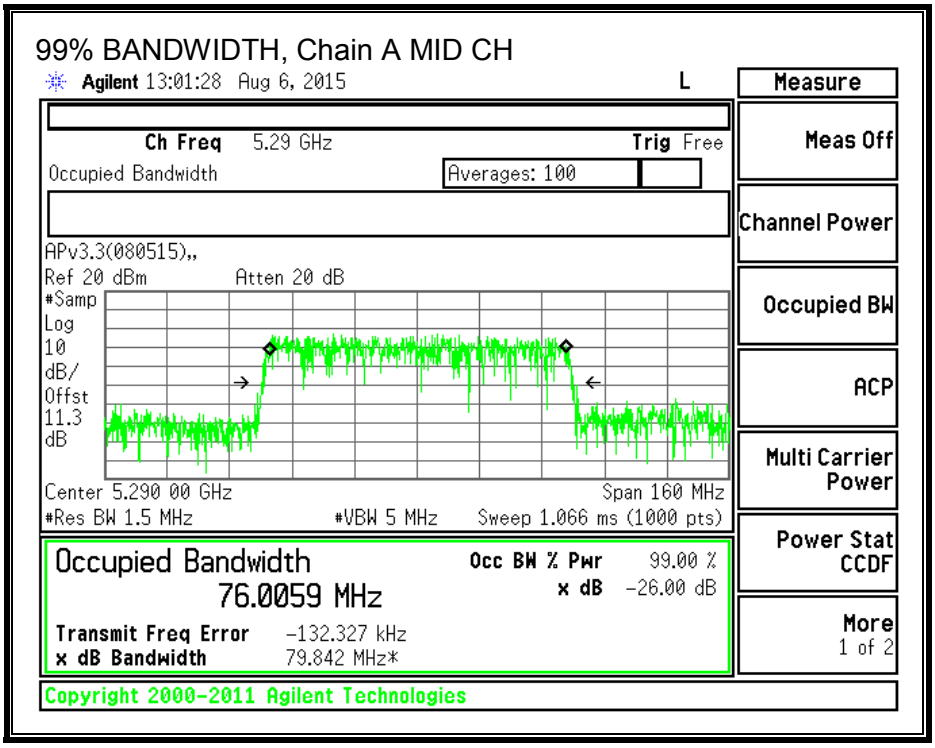
99% BANDWIDTH, Chain B



99% BANDWIDTH, Chain A



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8.9.3. 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

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

Chain B Antenna Gain (dBi)	Chain A Antenna Gain (dBi)	Uncorrelated Chains Directional Gain (dBi)
2.20	2.40	2.30

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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	81.43	2.30	2.30	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 B Meas Power (dBm)	Chain A Meas Power (dBm)	Total Corr'd Power (dBm)	Power Limit (dBm)	Power Margin (dB)
Mid	5290	4.63	4.74	7.70	24.00	-16.30

PSD Results

Channel	Frequency (MHz)	Chain B Meas PSD (dBm)	Chain A Meas PSD (dBm)	Total Corr'd PSD (dBm)	PSD Limit (dBm)	PSD Margin (dB)
Mid	5290	-14.19	-13.64	-10.89	11.00	-21.89

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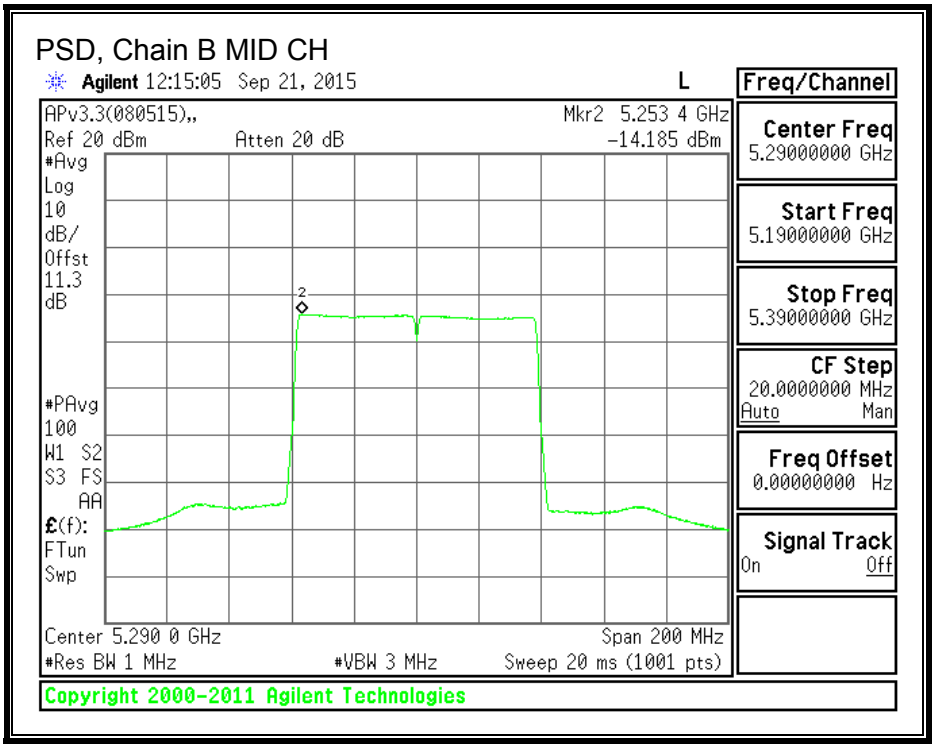
PSD, Chain B



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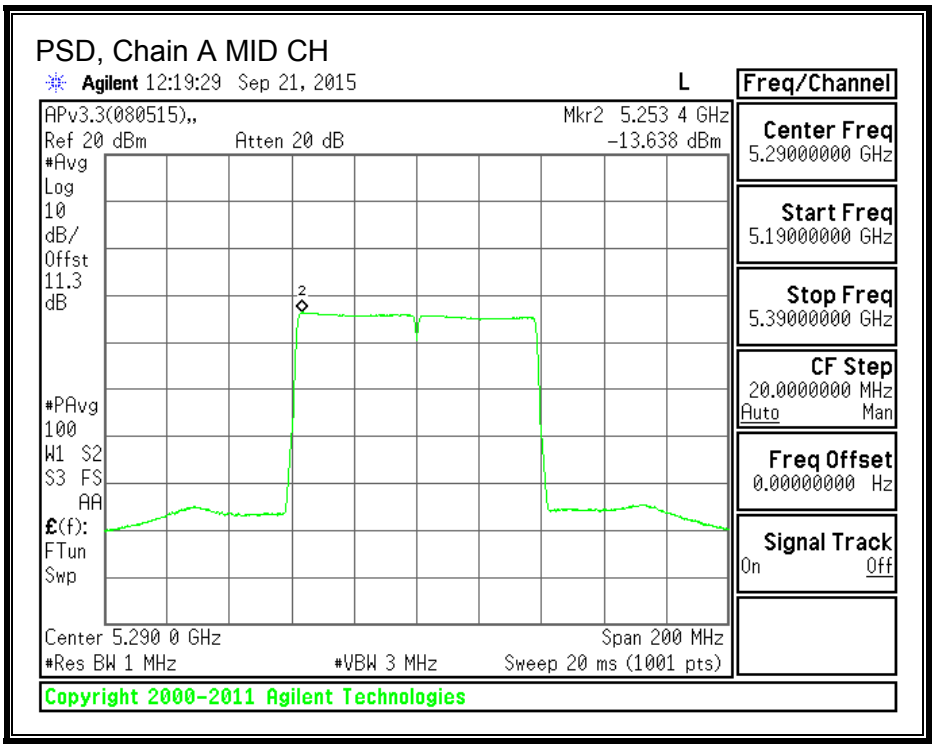
PSD, Chain A



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8.9.4. TPC POWER

LIMITS

FCC §15.407 (h) (1)

Transmit power control (TPC). U-NII devices operating in the 5.25–5.35 GHz band and the 5.47–5.725 GHz band shall employ a TPC mechanism. The U-NII device is required to have the capability to operate at least 6 dB below the mean EIRP value of 30 dBm. A TPC mechanism is not required for systems with an e.i.r.p. of less than 500 mW.

DIRECTIONAL ANTENNA GAIN

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

Chain B Antenna Gain (dBi)	Chain A Antenna Gain (dBi)	Uncorrelated Chains Directional Gain (dBi)
2.20	2.40	2.30

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RESULTS

TPC Limits

Channel	Frequency (MHz)	Limit EIRP (dBm)	Directional Gain (dBi)	Limit Cond (dBm)
Mid	5290	24	2.30	21.70

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

TPC Output Power Results

Channel	Frequency (MHz)	Chain B Meas Power (dBm)	Chain A Meas Power (dBm)	Total Corr'd Power (dBm)	Cond Power Limit (dBm)	Margin (dB)
Mid	5290	4.63	4.74	7.70	21.70	-14.00

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8.10. 802.11a MODE IN THE 5.6 GHz BAND

8.10.1. 26 dB BANDWIDTH

LIMITS

None; for reporting purposes only.

RESULTS

Channel	Frequency (MHz)	26 dB BW Chain B (MHz)	26 dB BW Chain A (MHz)
Low	5500	19.26	19.80
Mid	5580	19.98	19.56
High	5700	19.53	19.38
144	5720	19.83	19.74

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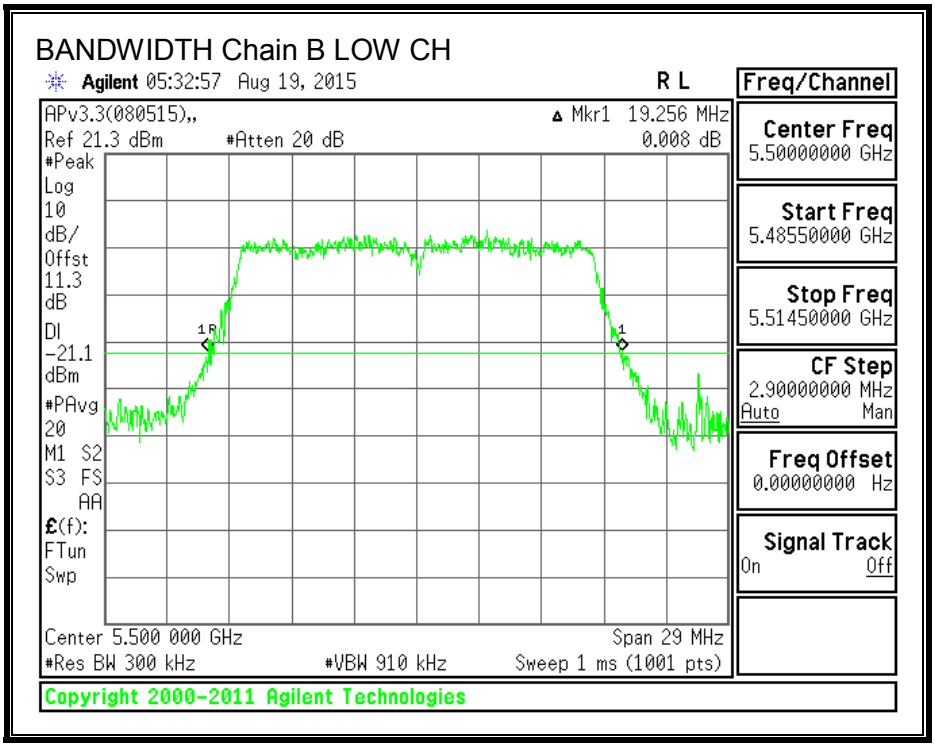
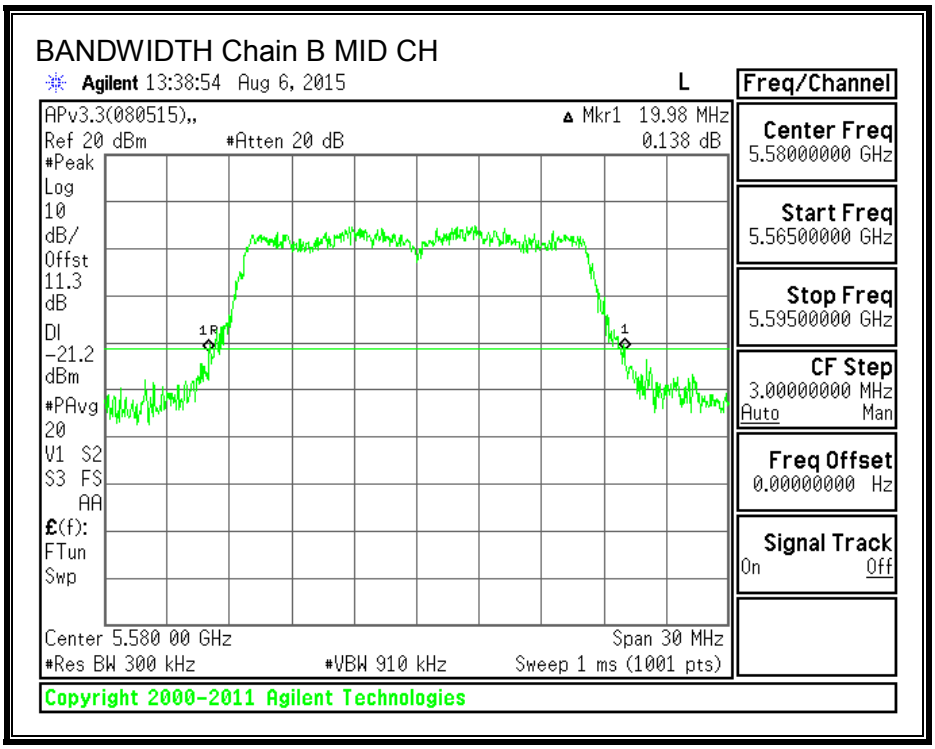
26 dB BANDWIDTH, Chain B





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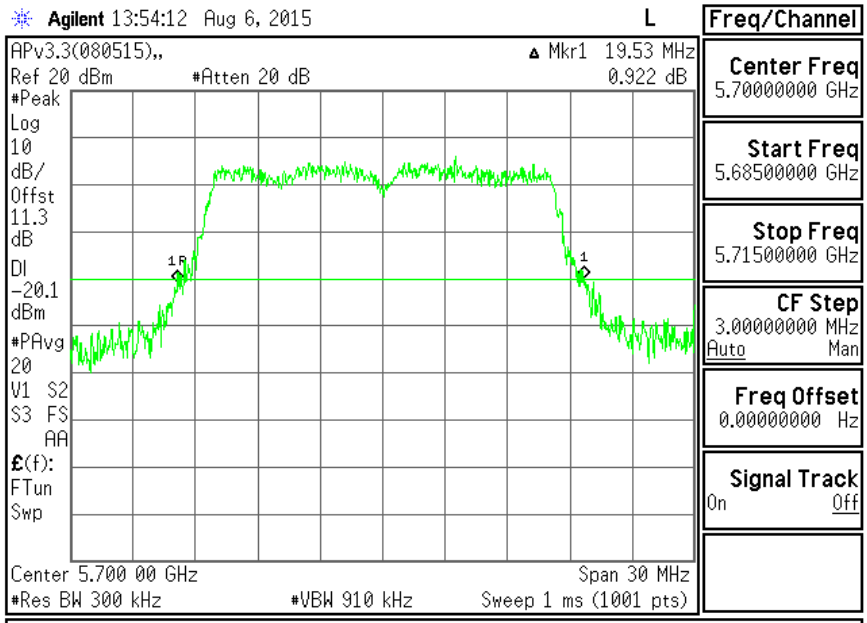
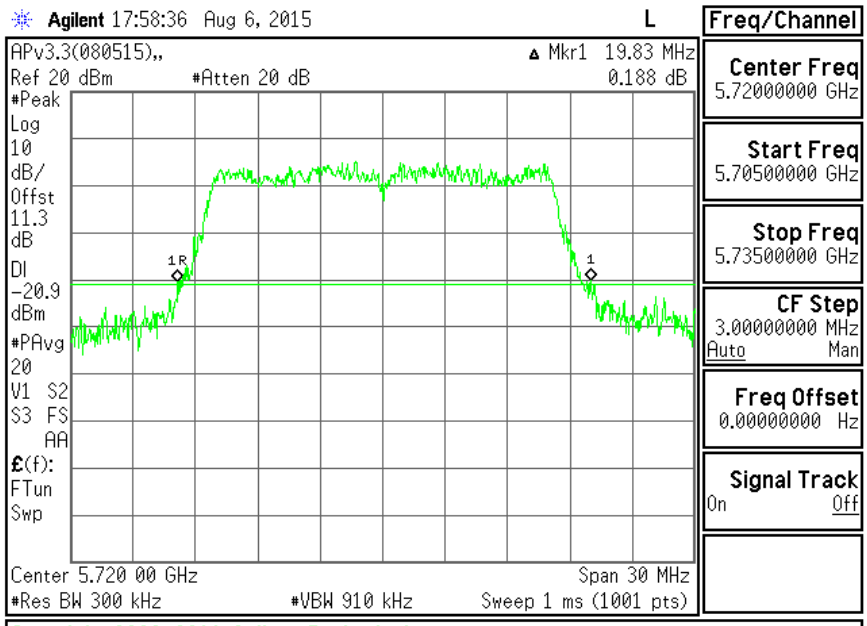
BANDWIDTH Chain B HIGH CH 140



BANDWIDTH Chain B STRADDLE CH 144



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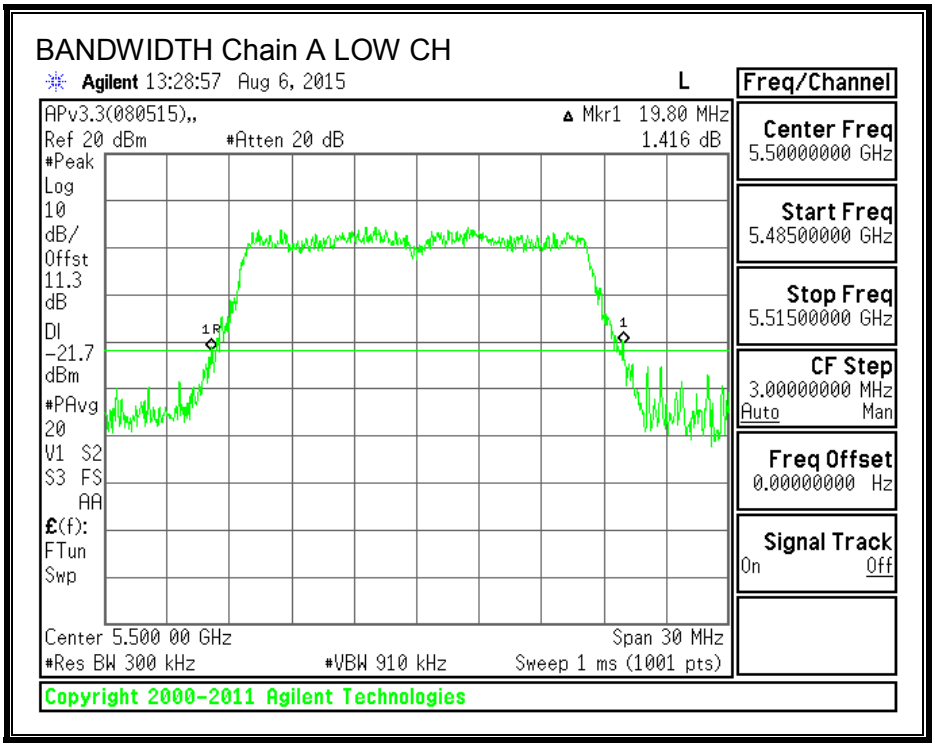
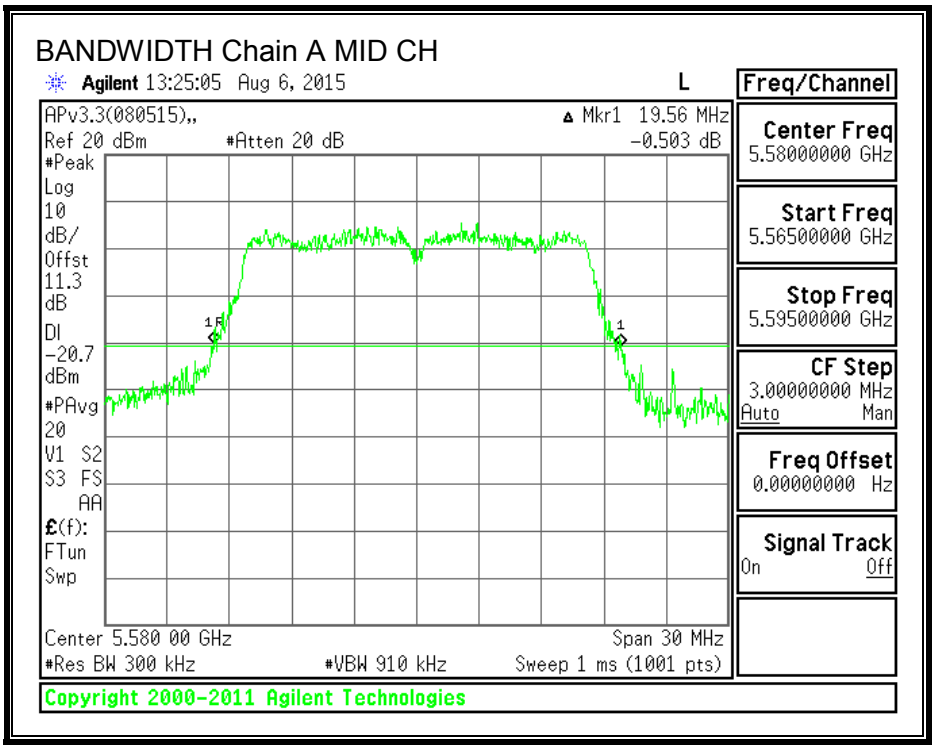
26 dB BANDWIDTH, Chain A





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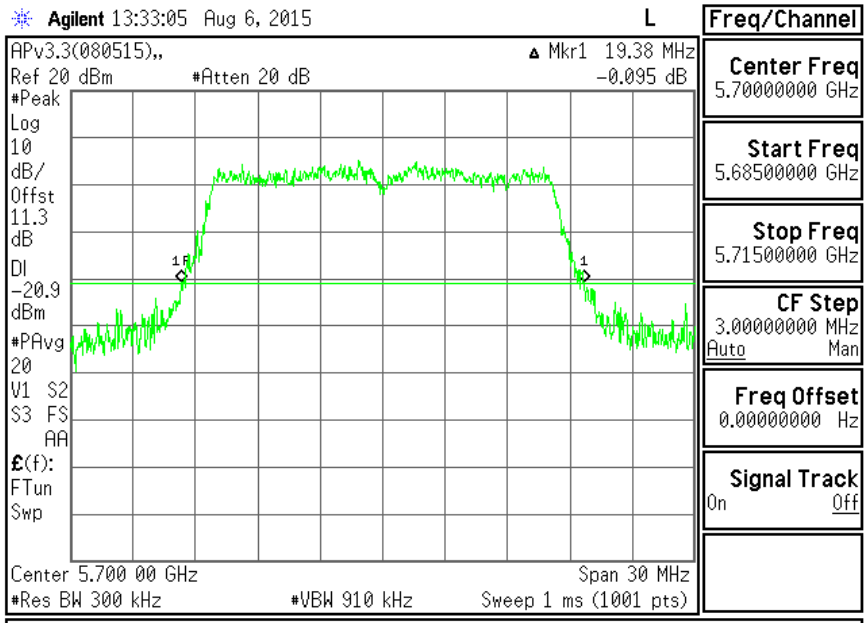
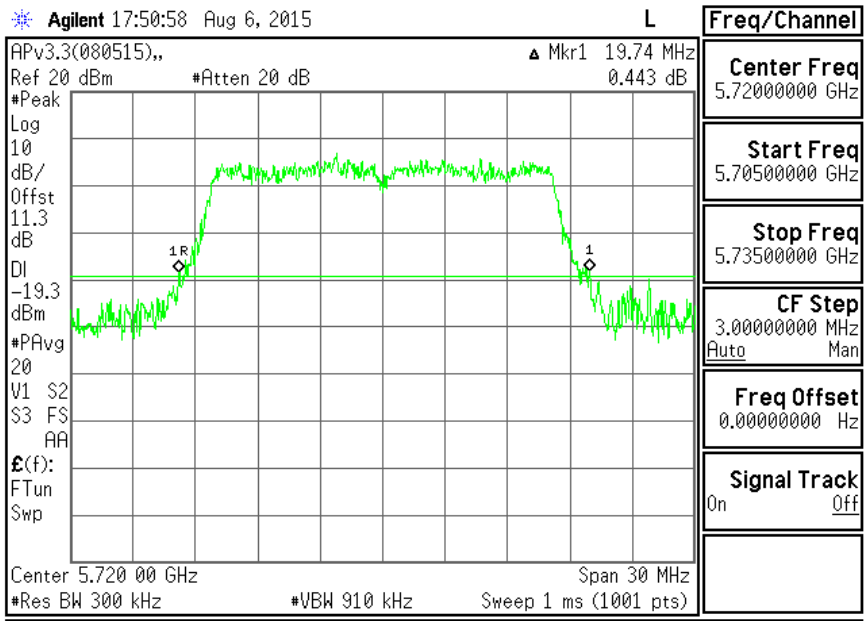
BANDWIDTH Chain A HIGH CH 140



BANDWIDTH Chain A STRADDLE CH 144



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8.10.2. 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

RESULTS

Channel	Frequency (MHz)	99% BW Chain B (MHz)	99% BW Chain A (MHz)
Low	5500	16.5143	16.5123
Mid	5580	16.4956	16.5159
High	5700	16.4998	16.5060
144	5720	16.5233	16.5167

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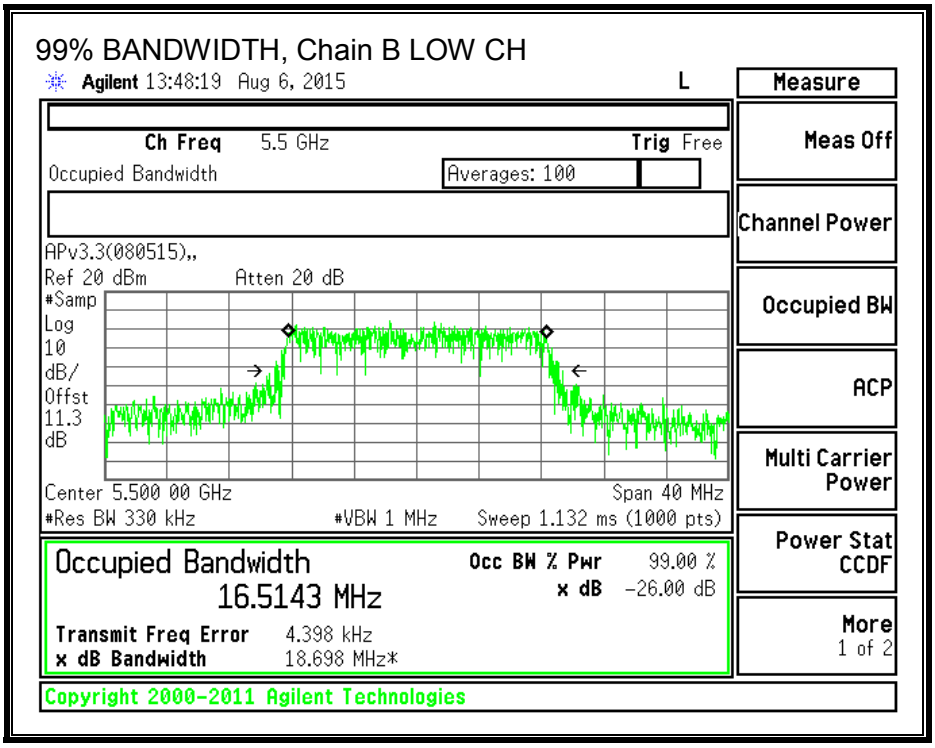
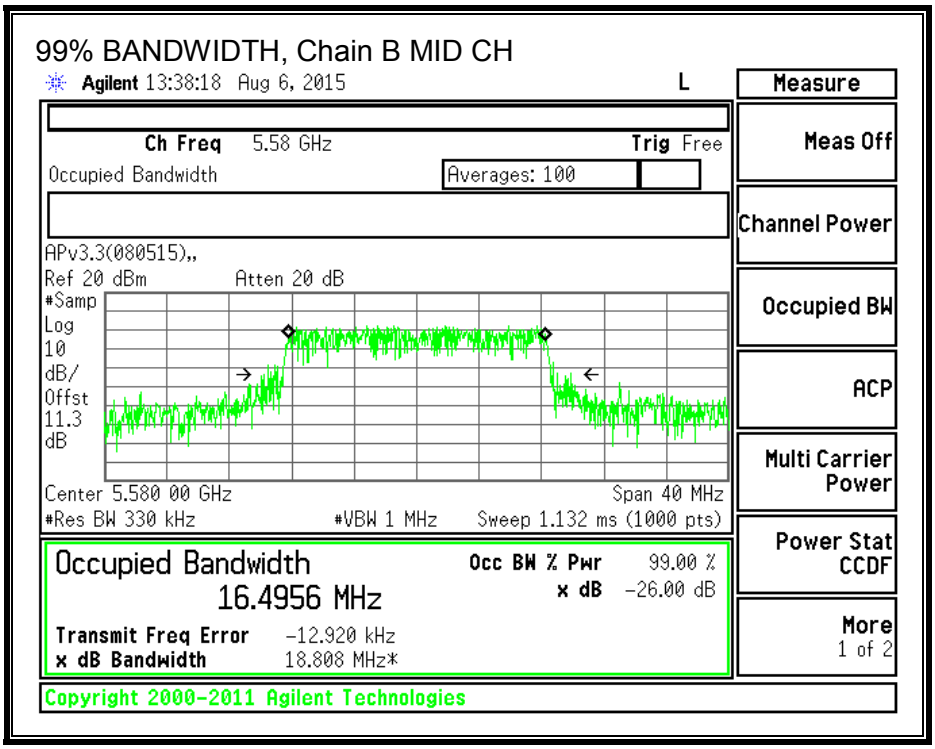
99% BANDWIDTH, Chain B





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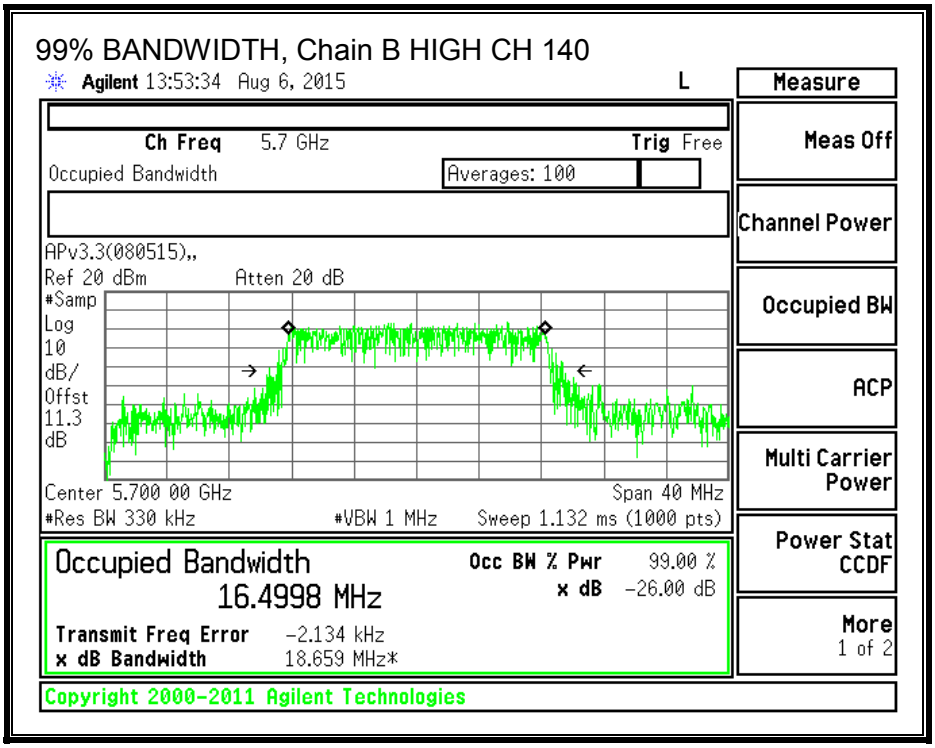

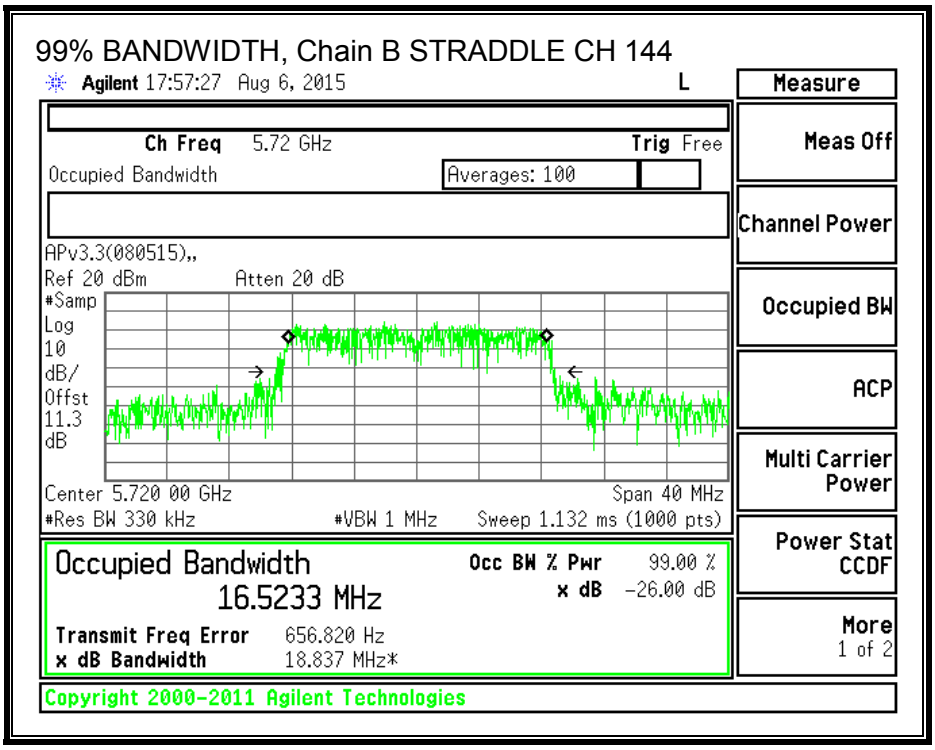

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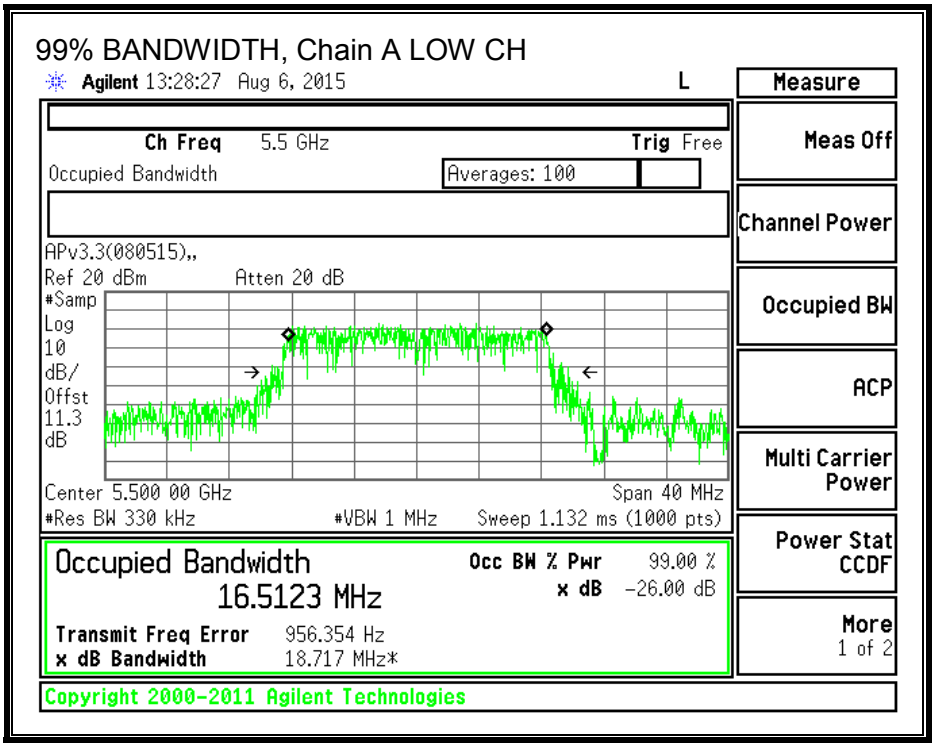
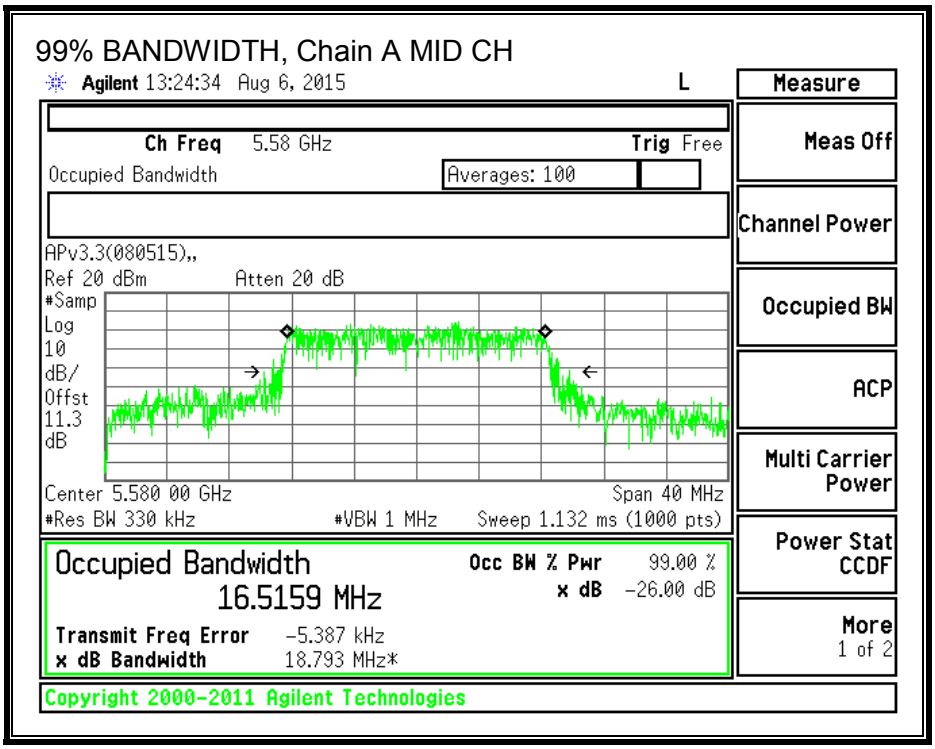
99% BANDWIDTH, Chain A





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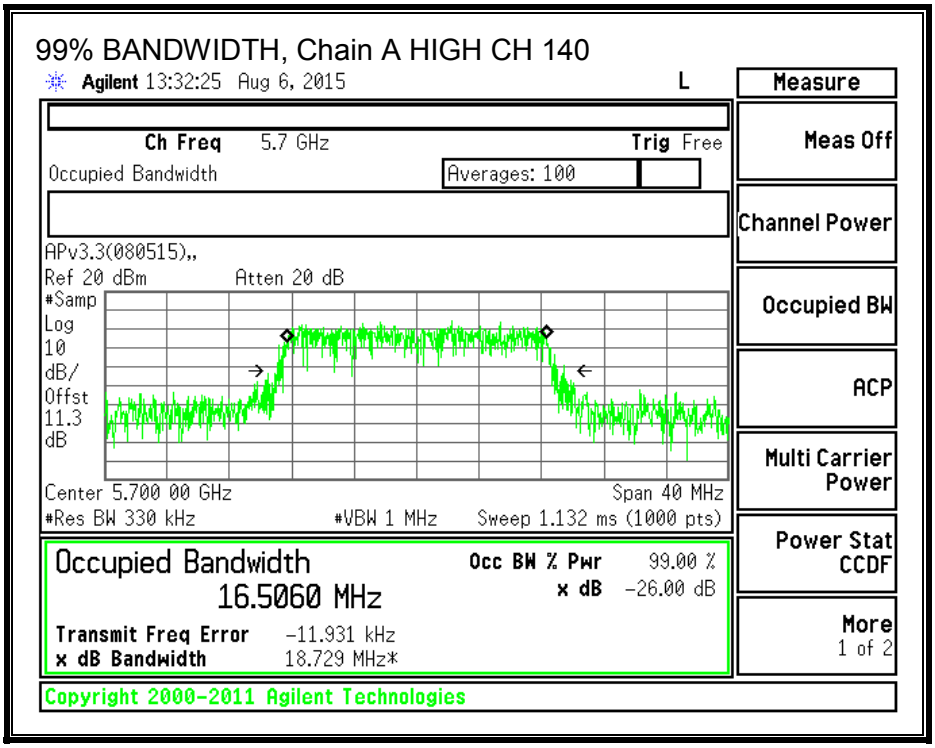

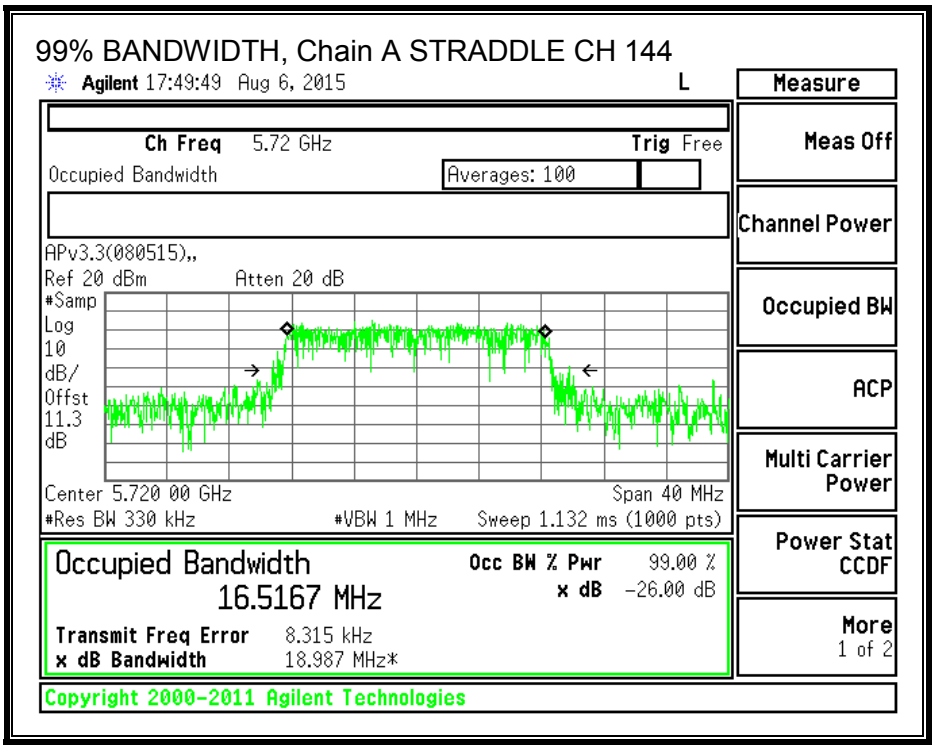

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8.10.3. OUTPUT POWER AND PSD

LIMITS

FCC §15.407 (a) (2)

For the band 5.47–5.725 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

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)
2.10	2.30	2.20

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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	5500	19.26	2.20	2.20	23.85	11.00
Mid	5580	19.56	2.20	2.20	23.91	11.00
High	5700	19.38	2.20	2.20	23.87	11.00

Duty Cycle CF (dB)	0.12	**Included in Calculations of Corr'd Power & PSD**

Output Power Results

Channel	Frequency (MHz)	Chain B Meas Power (dBm)	Chain A Meas Power (dBm)	Total Corr'd Power (dBm)	Power Limit (dBm)	Power Margin (dB)
Low	5500	8.47	8.45	11.59	23.85	-12.26
Mid	5580	8.33	8.47	11.53	23.91	-12.38
High	5700	8.48	8.45	11.60	23.87	-12.28

PSD Results

Channel	Frequency (MHz)	Chain B Meas PSD (dBm)	Chain A Meas PSD (dBm)	Total Corr'd PSD (dBm)	PSD Limit (dBm)	PSD Margin (dB)
Low	5500	-3.49	-3.45	-0.34	11.00	-11.34
Mid	5580	-3.65	-3.75	-0.57	11.00	-11.57
High	5700	-3.51	-3.79	-0.52	11.00	-11.52

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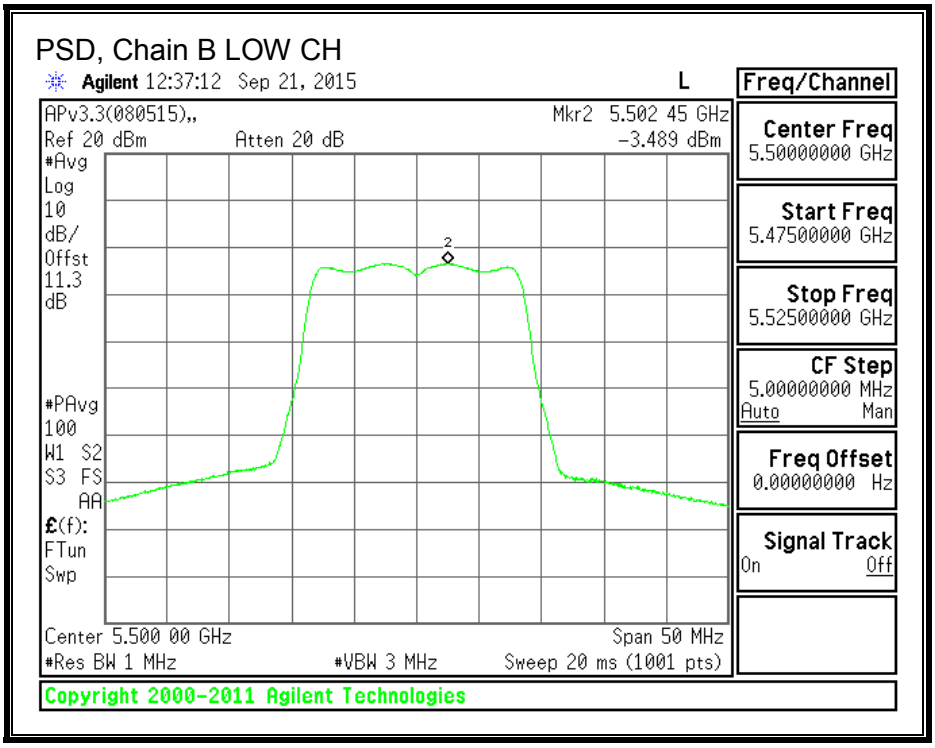
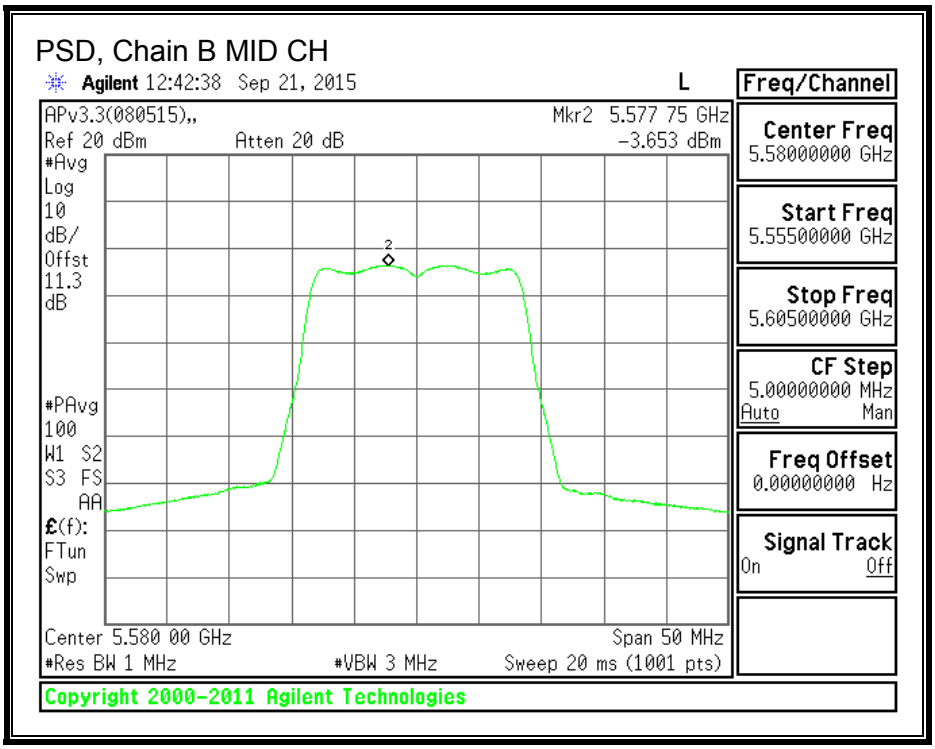
PSD, Chain B





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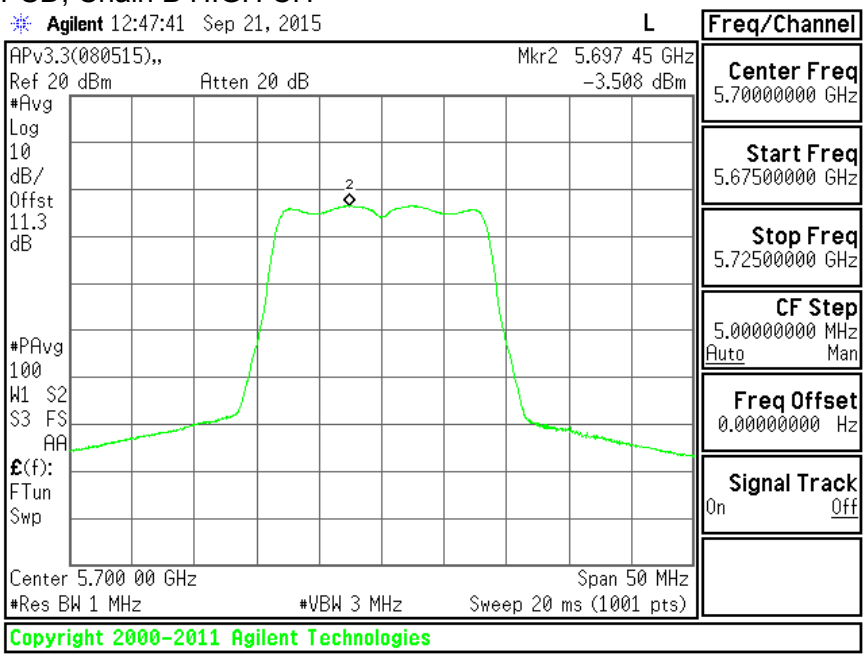
PSD, Chain B HIGH CH



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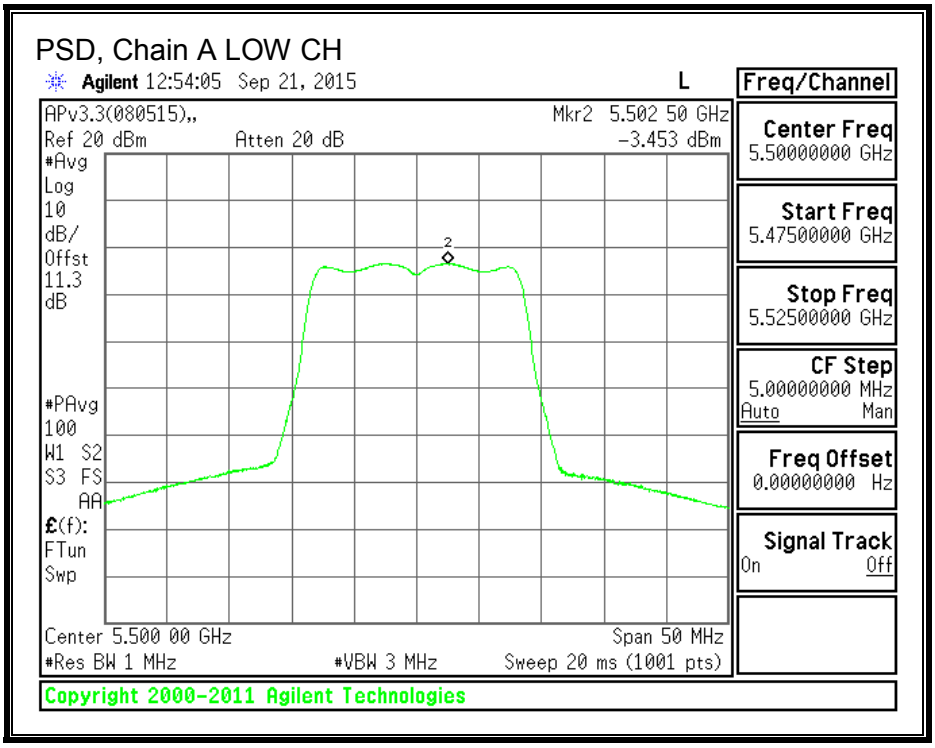
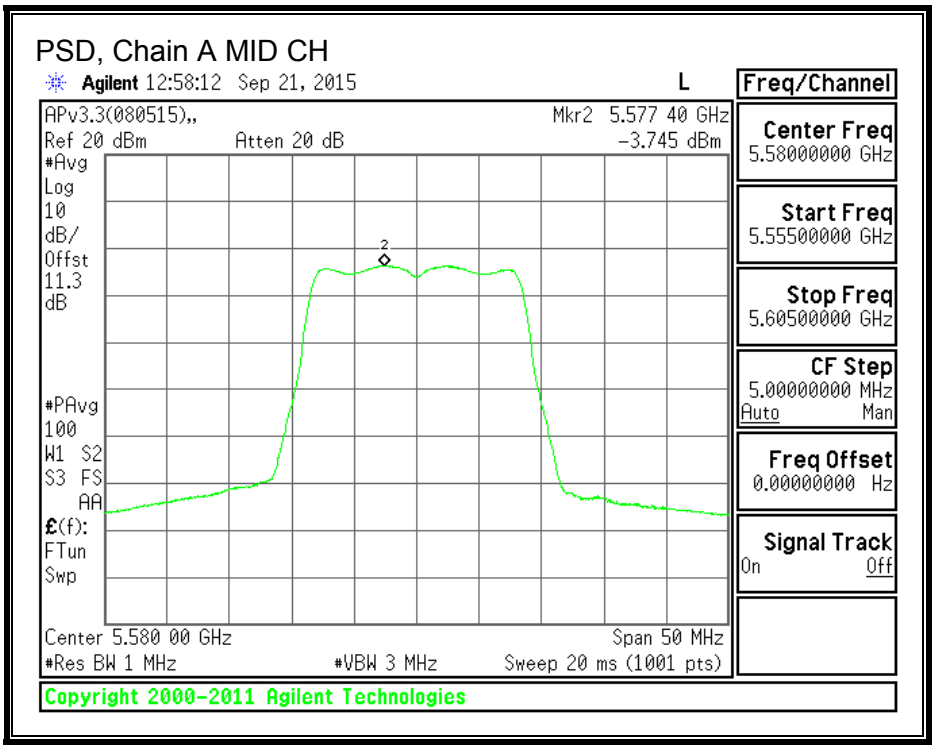
PSD, Chain A





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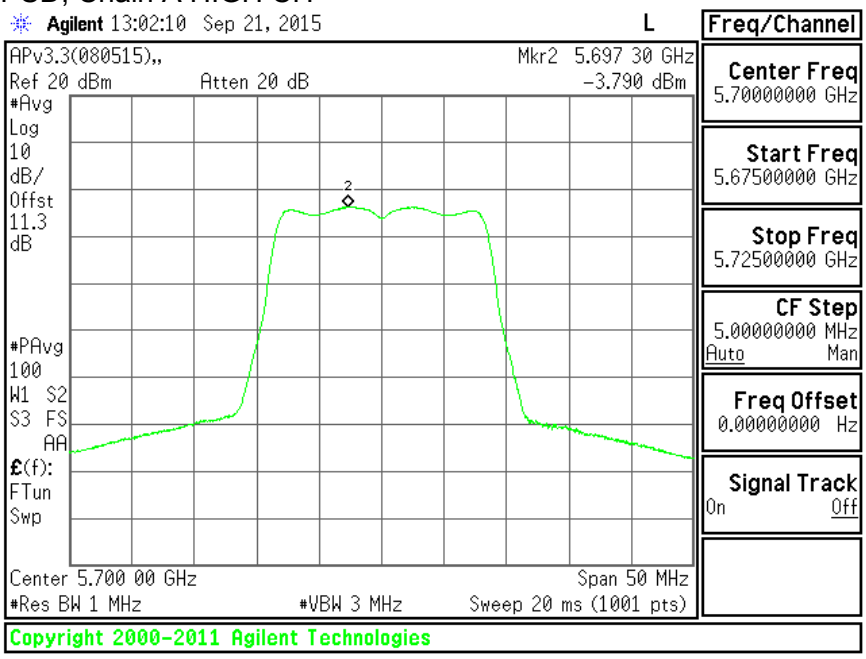
PSD, Chain A HIGH CH



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STRADDLE CHANNEL 144 RESULTS

UNII-2C BAND

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)
144	5720	19.74	2.20	2.20	23.95	11.00

Duty Cycle CF (dB)	0.12	Included in Calculations of Corr'd Power & PSD

Output Power Results

Channel	Frequency (MHz)	Chain B Meas Power (dBm)	Chain A Meas Power (dBm)	Total Corr'd Power (dBm)	Power Limit (dBm)	Power Margin (dB)
144	5720	8.39	8.71	11.68	23.95	-12.27

PSD Results

Channel	Frequency (MHz)	Chain B Meas PSD (dBm)	Chain A Meas PSD (dBm)	Total Corr'd PSD (dBm)	PSD Limit (dBm)	PSD Margin (dB)
144	5720	-1.74	-1.46	1.53	11.00	-9.47

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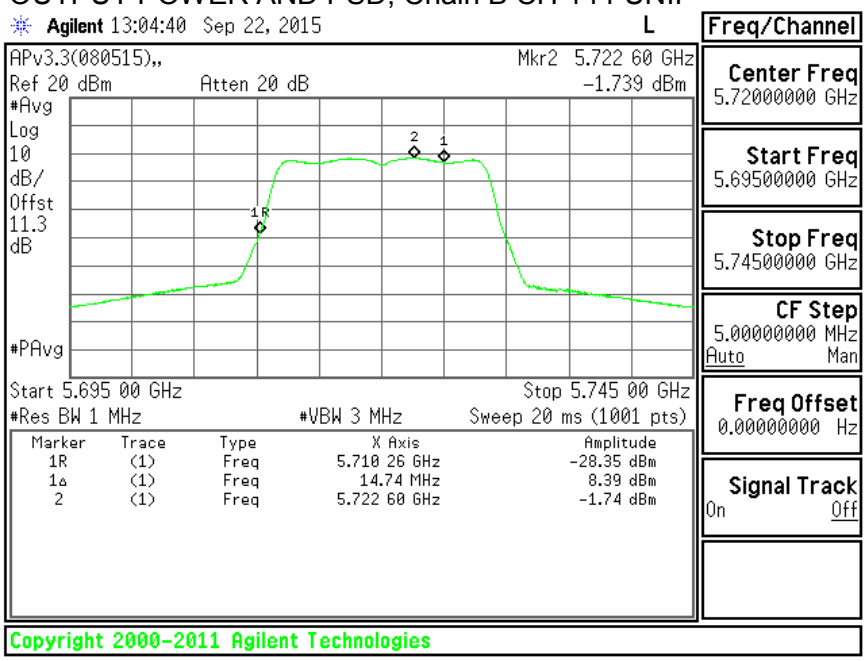
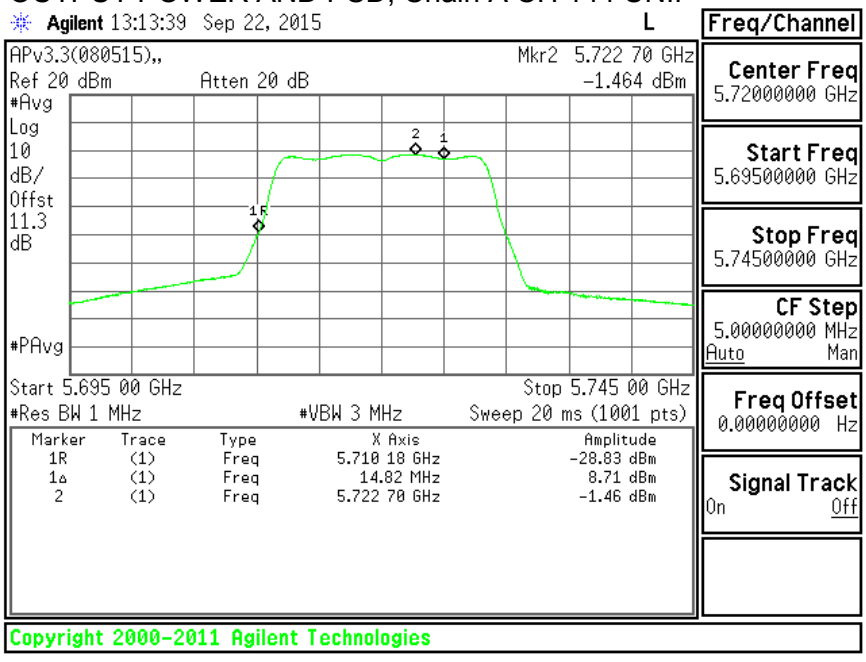
OUTPUT POWER AND PSD, Chain B CH 144 UNII



OUTPUT POWER AND PSD, Chain A CH 144 UNII



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UNII-3 BAND

Antenna Gain and Limit

Channel	Frequency (MHz)	Directional Gain for Power (dBi)	Directional Gain for PSD (dBi)	Power Limit (dBm)	PSD Limit (dBm)
144	5720	2.20	2.20	30.00	30.00

Duty Cycle CF (dB)	0.12	Included in Calculations of Corr'd Power & PSD

Output Power Results

Channel	Frequency (MHz)	Chain B Meas Power (dBm)	Chain A Meas Power (dBm)	Total Corr'd Power (dBm)	Power Limit (dBm)	Power Margin (dB)
144	5720	2.21	2.44	5.45	30.00	-24.55

PSD Results

Channel	Frequency (MHz)	Chain B Meas PSD (dBm)	Chain A Meas PSD (dBm)	Total Corr'd PSD (dBm)	PSD Limit (dBm)	PSD Margin (dB)
144	5720	-5.02	-4.72	-1.74	30.00	-31.74

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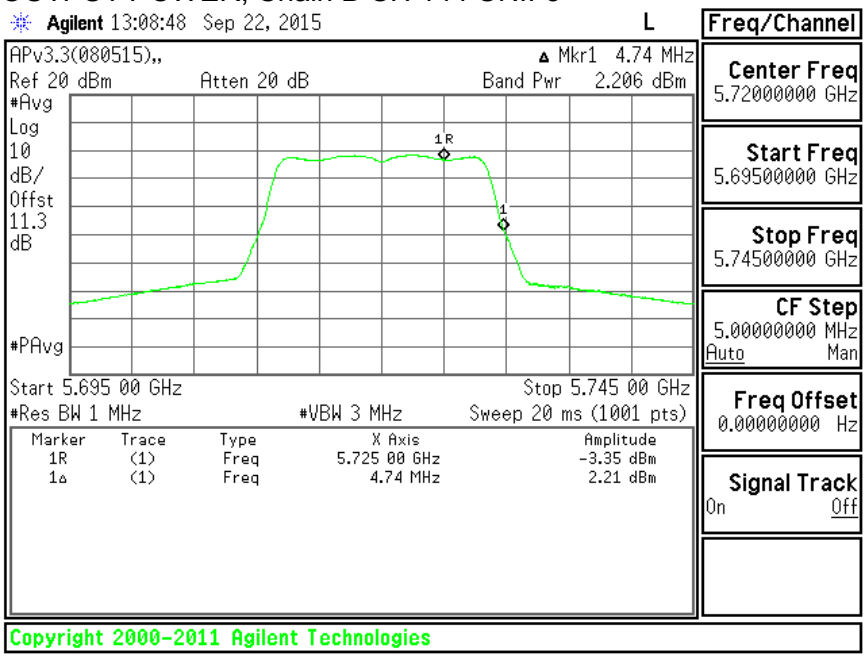
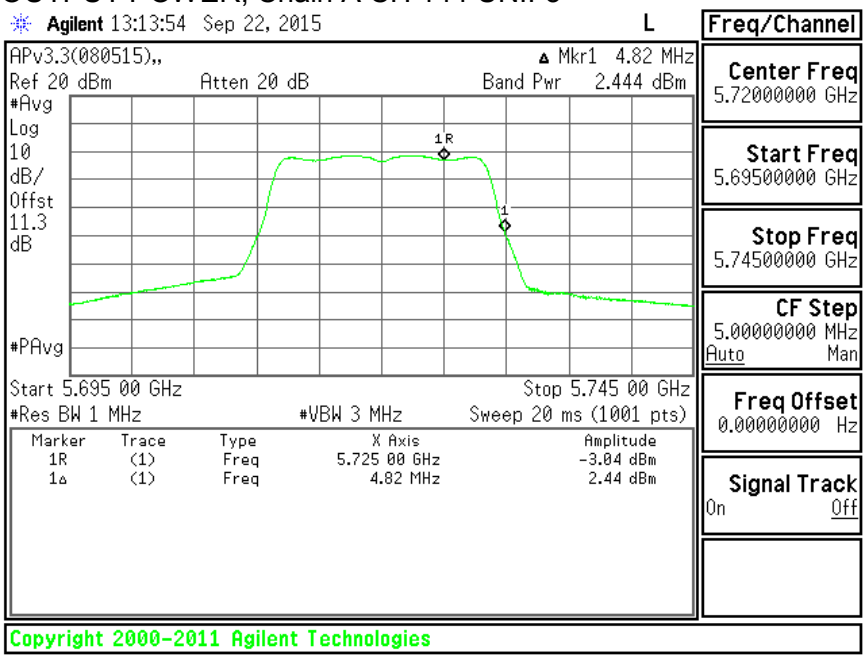
OUTPUT POWER, Chain B CH 144 UNII-3



OUTPUT POWER, Chain A CH 144 UNII-3



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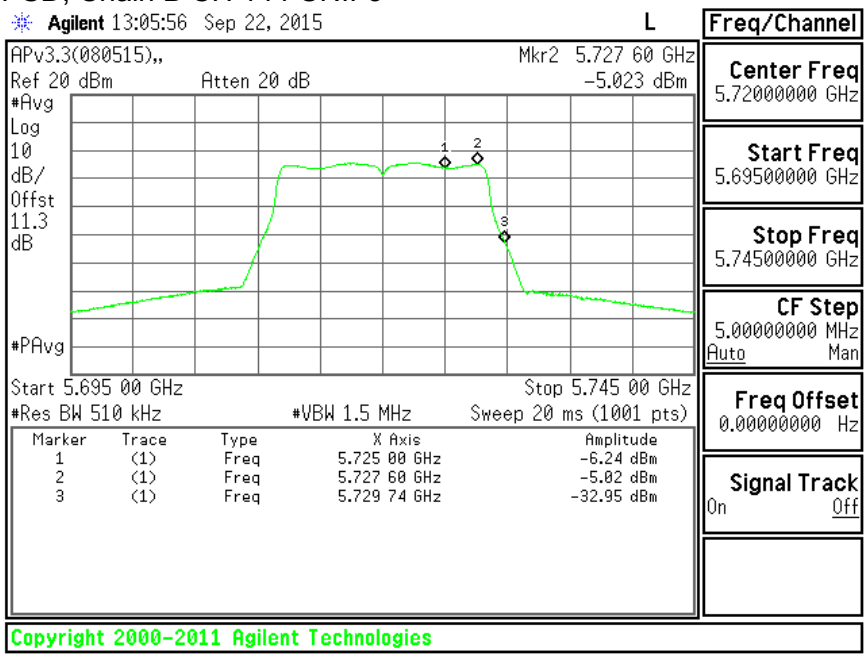
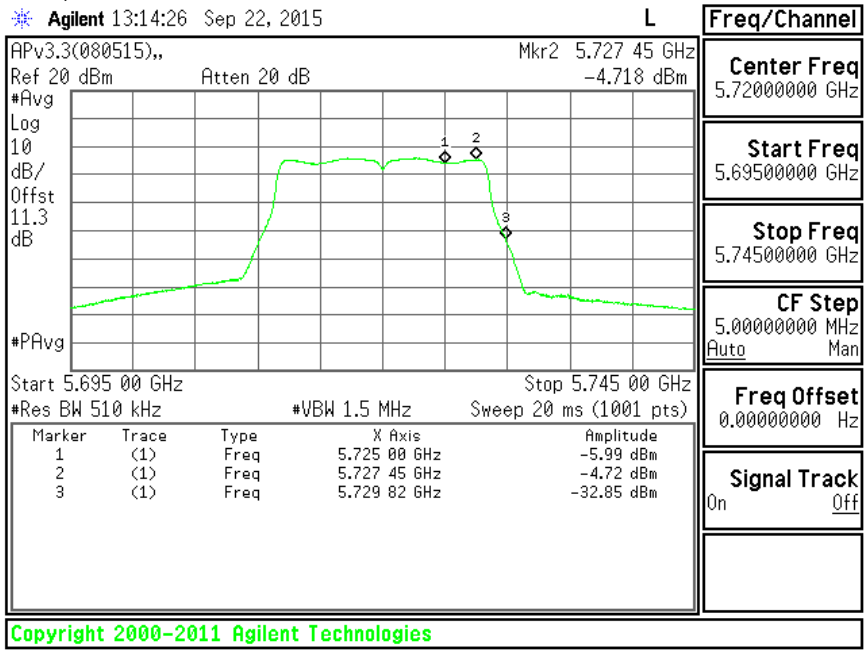
PSD, Chain B CH 144 UNII-3



PSD, Chain A CH 144 UNII-3



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8.10.4. TPC POWER

LIMITS

FCC §15.407 (h) (1)

Transmit power control (TPC). U-NII devices operating in the 5.25–5.35 GHz band and the 5.47–5.725 GHz band shall employ a TPC mechanism. The U-NII device is required to have the capability to operate at least 6 dB below the mean EIRP value of 30 dBm. A TPC mechanism is not required for systems with an e.i.r.p. of less than 500 mW.

DIRECTIONAL ANTENNA GAIN

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

Chain B Antenna Gain (dBi)	Chain A Antenna Gain (dBi)	Uncorrelated Chains Directional Gain (dBi)
2.10	2.30	2.20

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RESULTS

TPC Limits

Channel	Frequency (MHz)	Limit EIRP (dBm)	Directional Gain (dBi)	Limit Cond (dBm)
Low	5500	24	2.20	21.80
Mid	5580	24	2.20	21.80
High	5700	24	2.20	21.80

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

TPC Output Power Results

Channel	Frequency (MHz)	Chain B Meas Power (dBm)	Chain A Meas Power (dBm)	Total Corr'd Power (dBm)	Cond Power Limit (dBm)	Margin (dB)
Low	5500	8.47	8.45	11.59	21.80	-10.21
Mid	5580	8.33	8.47	11.53	21.80	-10.27
High	5700	8.48	8.45	11.60	21.80	-10.20

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8.11. 802.11n HT20 MODE IN THE 5.6 GHz BAND

8.11.1. 26 dB BANDWIDTH

LIMITS

None; for reporting purposes only.

RESULTS

Channel	Frequency (MHz)	26 dB BW Chain B (MHz)	26 dB BW Chain A (MHz)
Low	5500	19.80	19.92
Mid	5580	20.06	20.46
High	5700	19.83	20.43
144	5720	19.89	19.74

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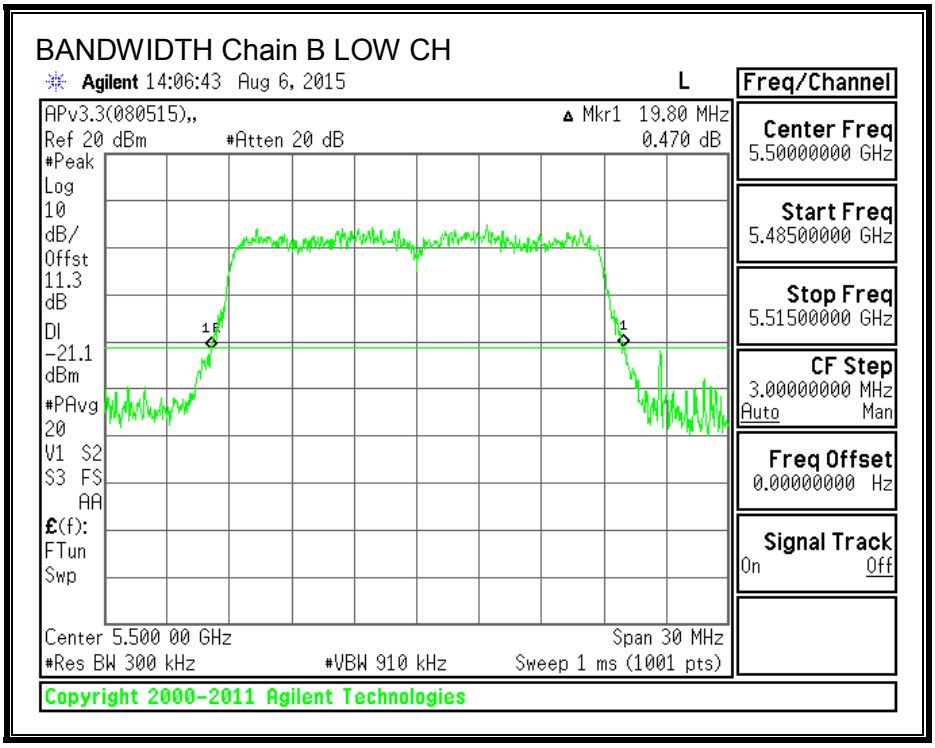
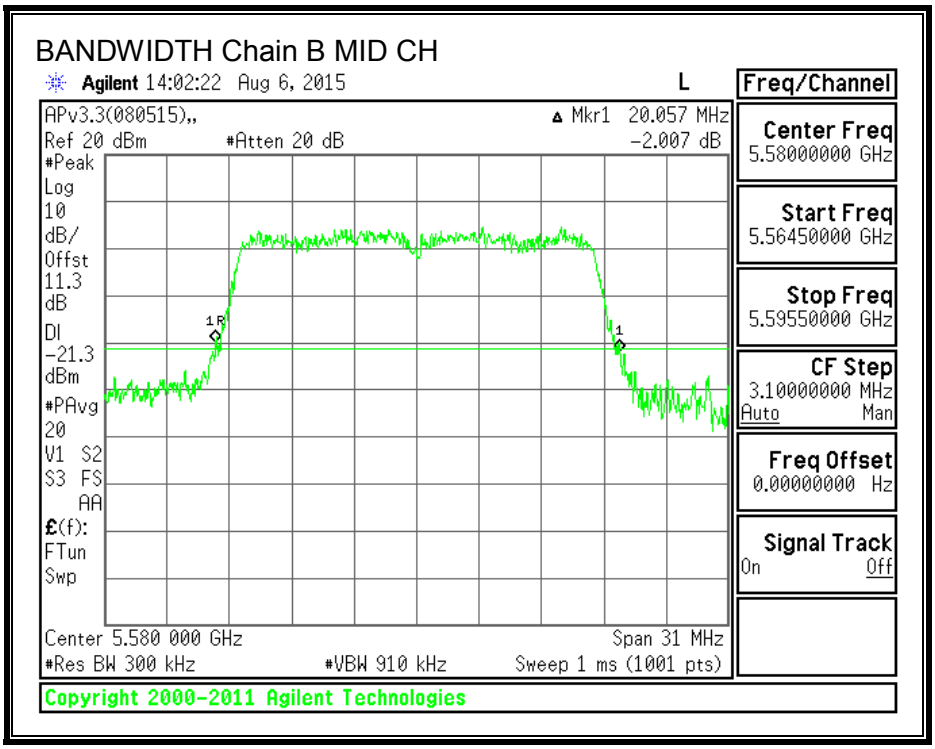
26 dB BANDWIDTH, Chain B





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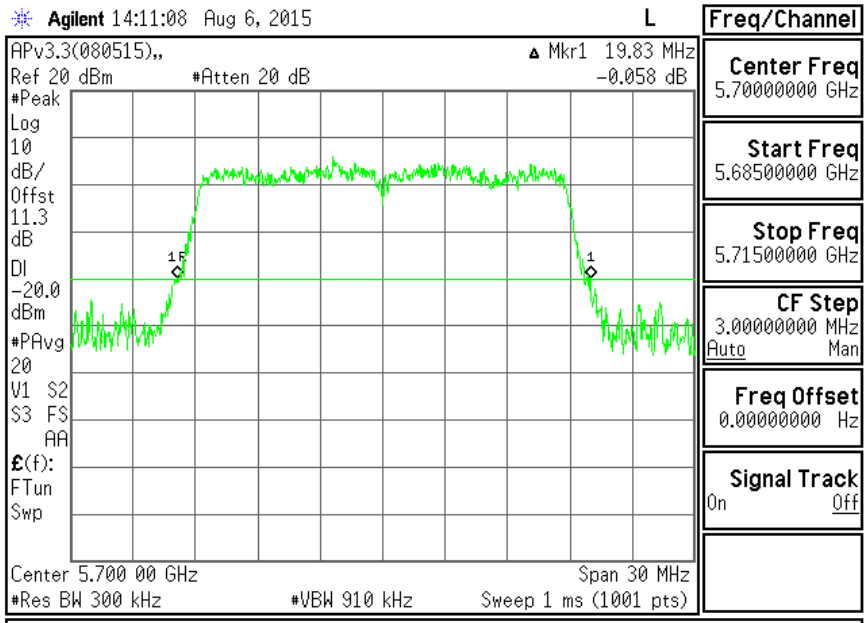
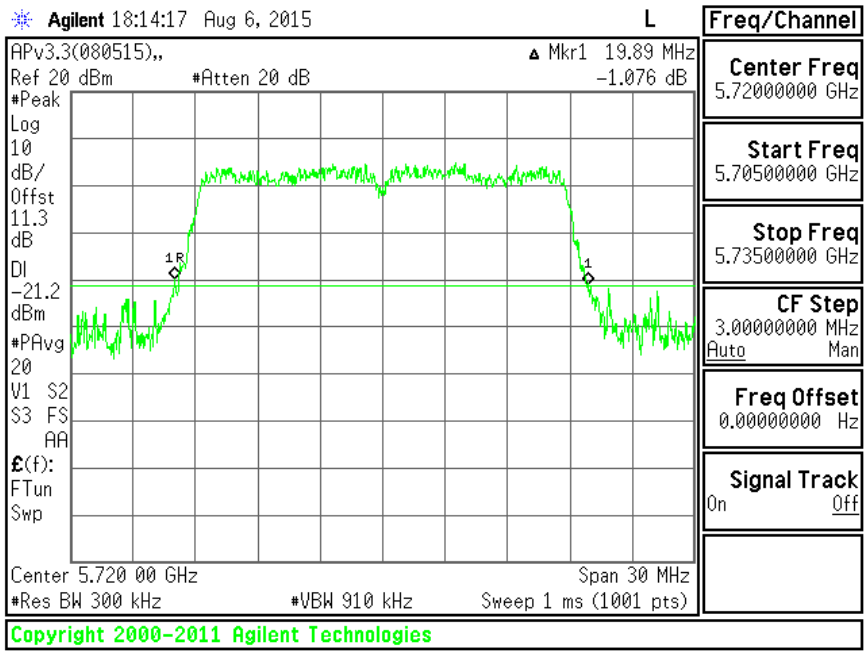
BANDWIDTH Chain B HIGH CH 140



BANDWIDTH Chain B STRADDLE CH 144



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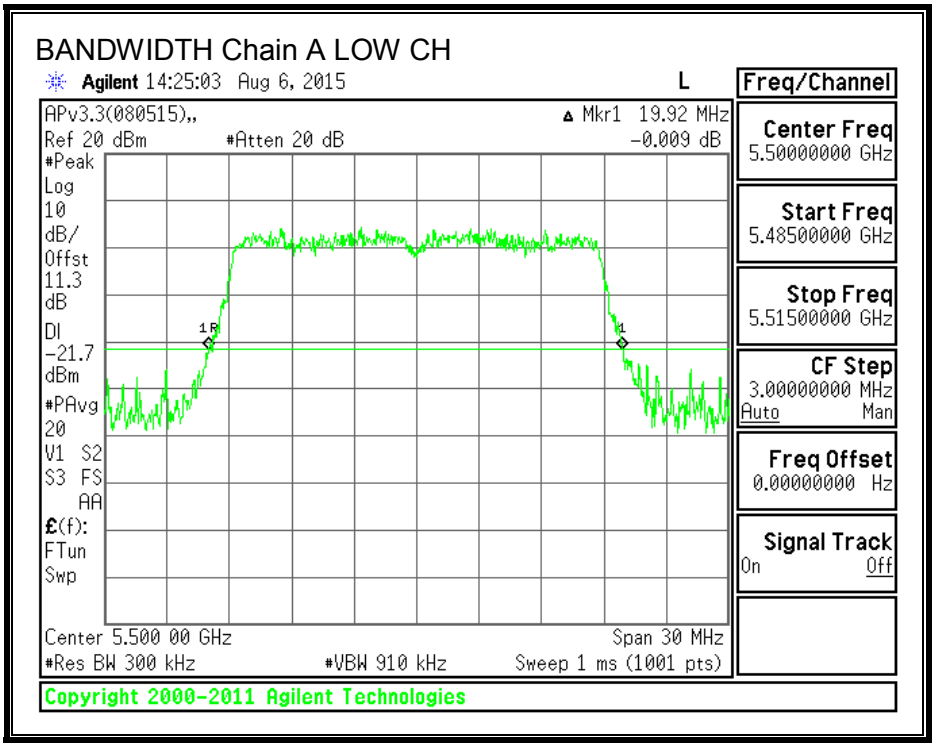
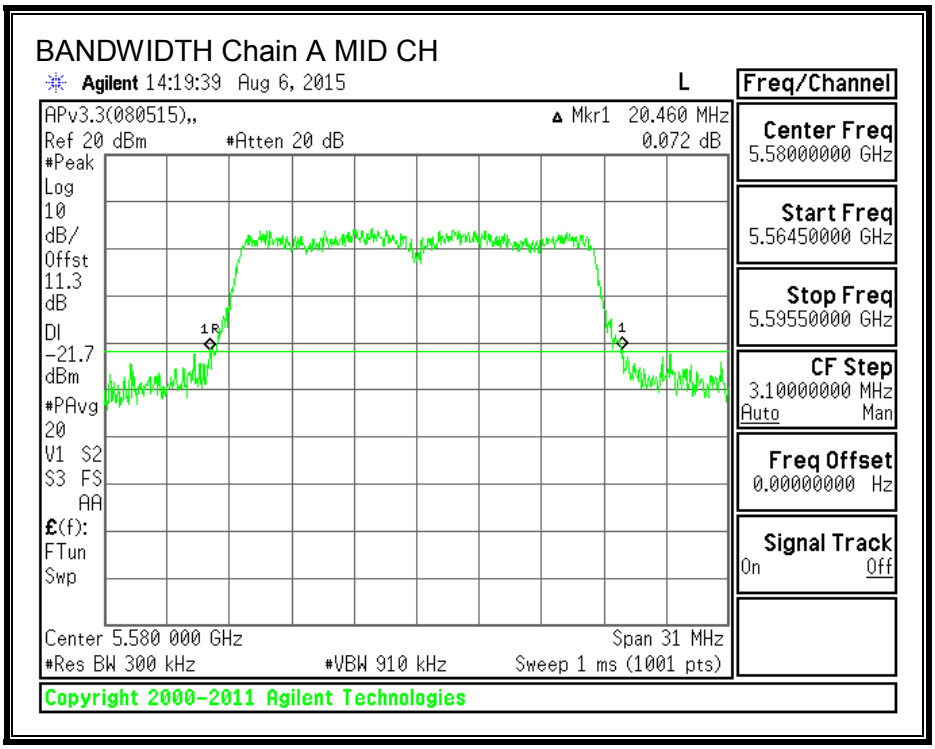
26 dB BANDWIDTH, Chain A





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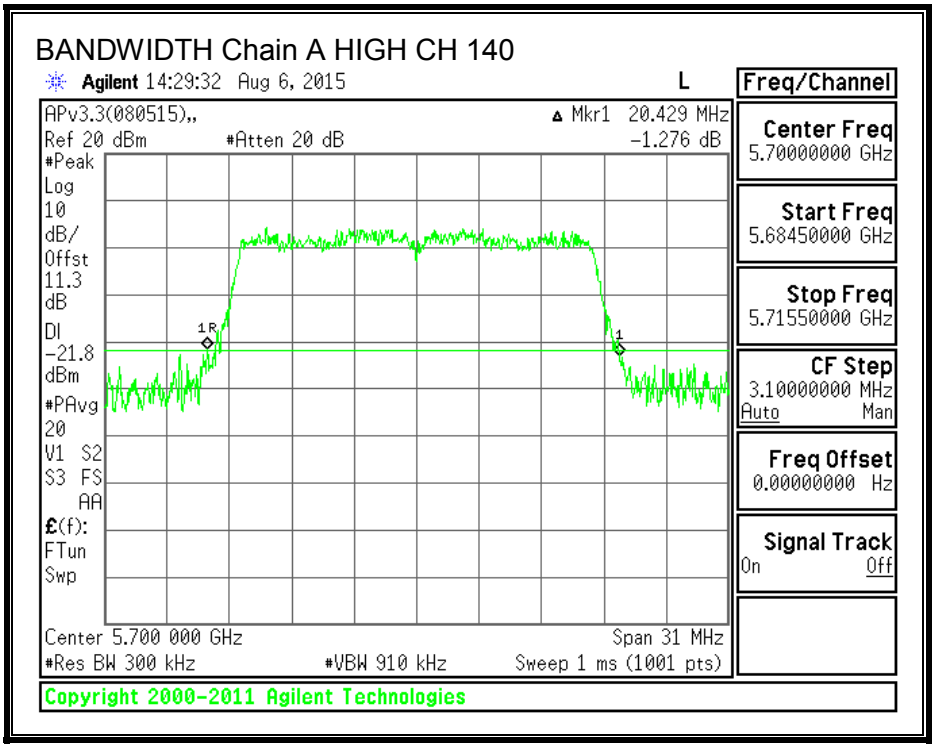

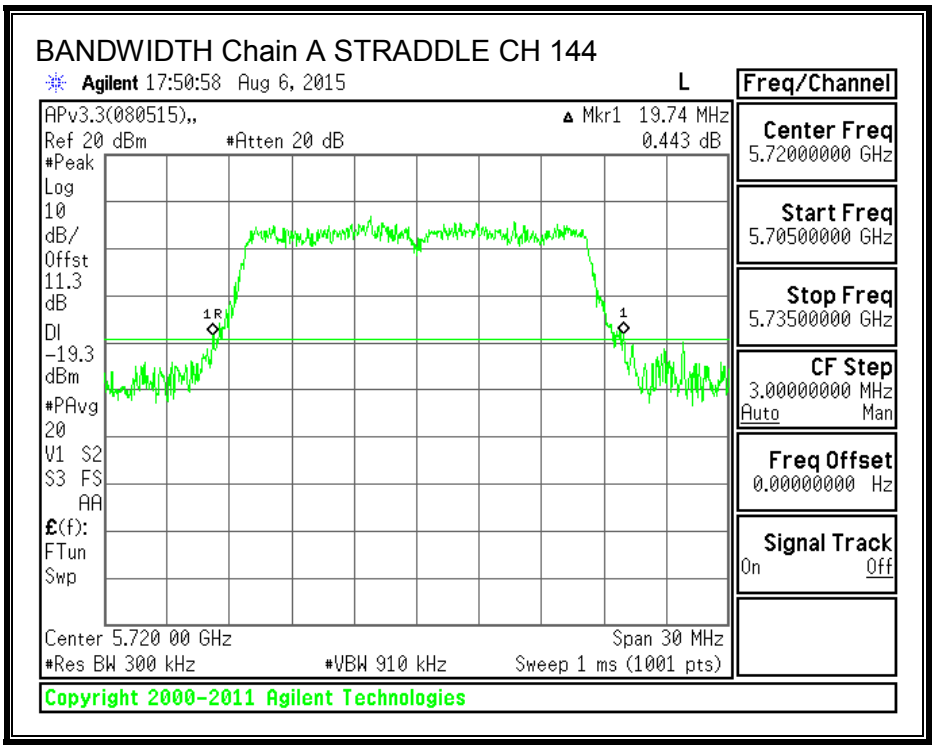

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8.11.2. 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

RESULTS

Channel	Frequency (MHz)	99% BW Chain B (MHz)	99% BW Chain A (MHz)
Low	5500	17.6555	17.6692
Mid	5580	17.6733	17.6774
High	5700	17.6725	17.6670
144	5720	17.6696	17.6685

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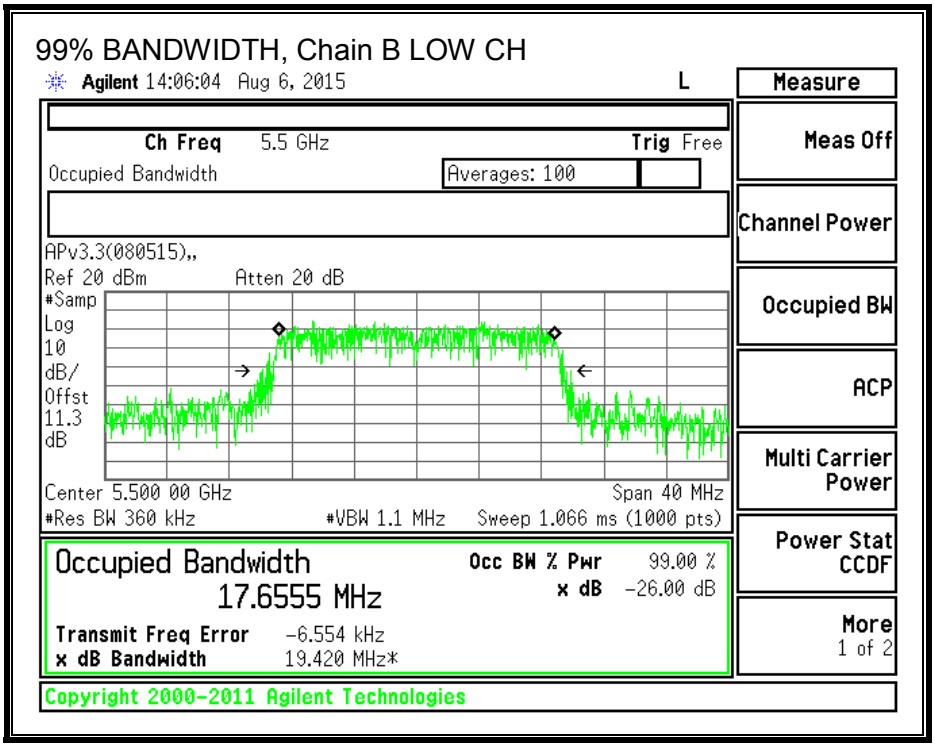
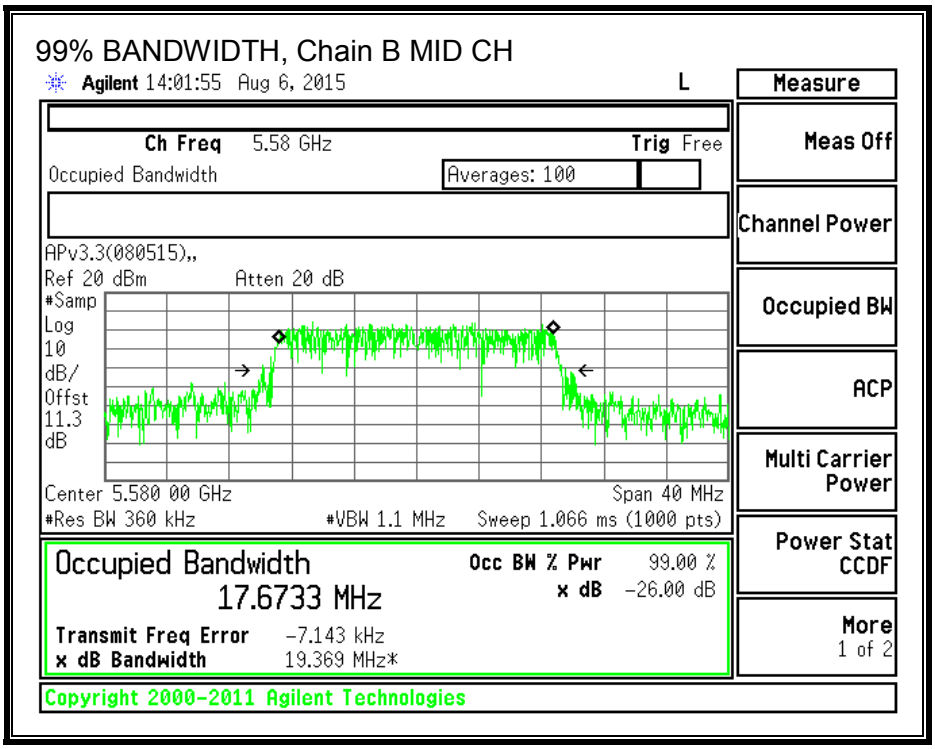
99% BANDWIDTH, Chain B





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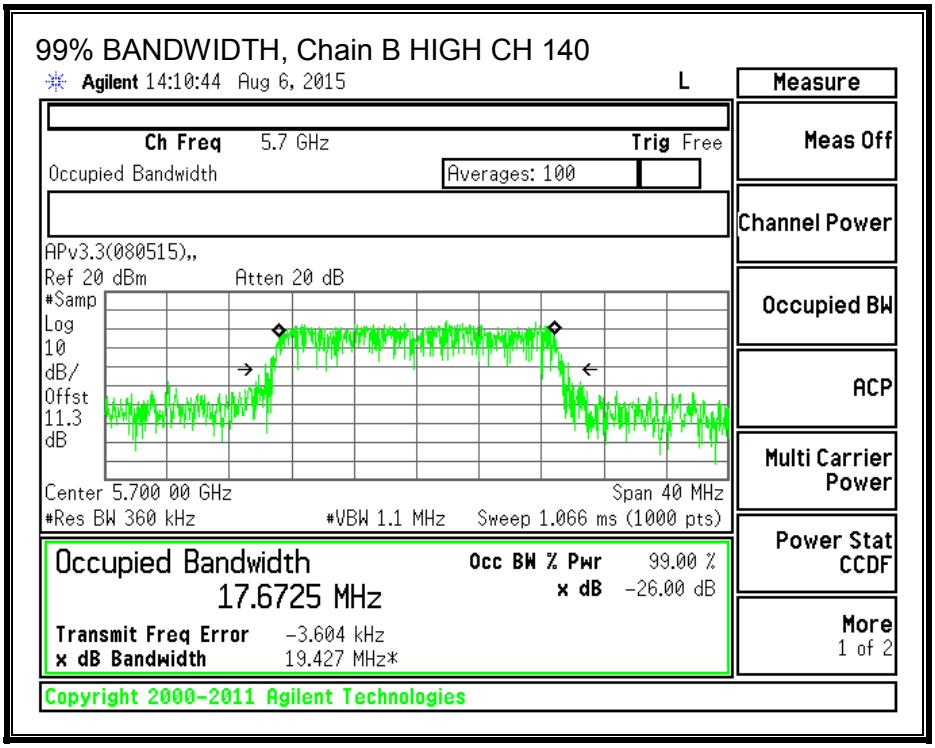

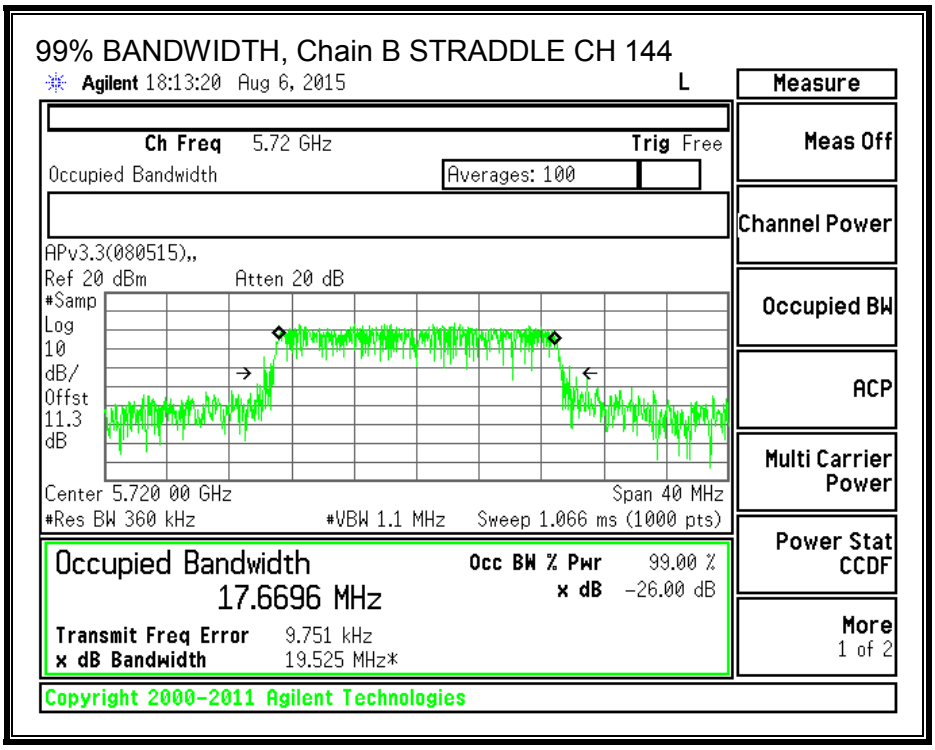

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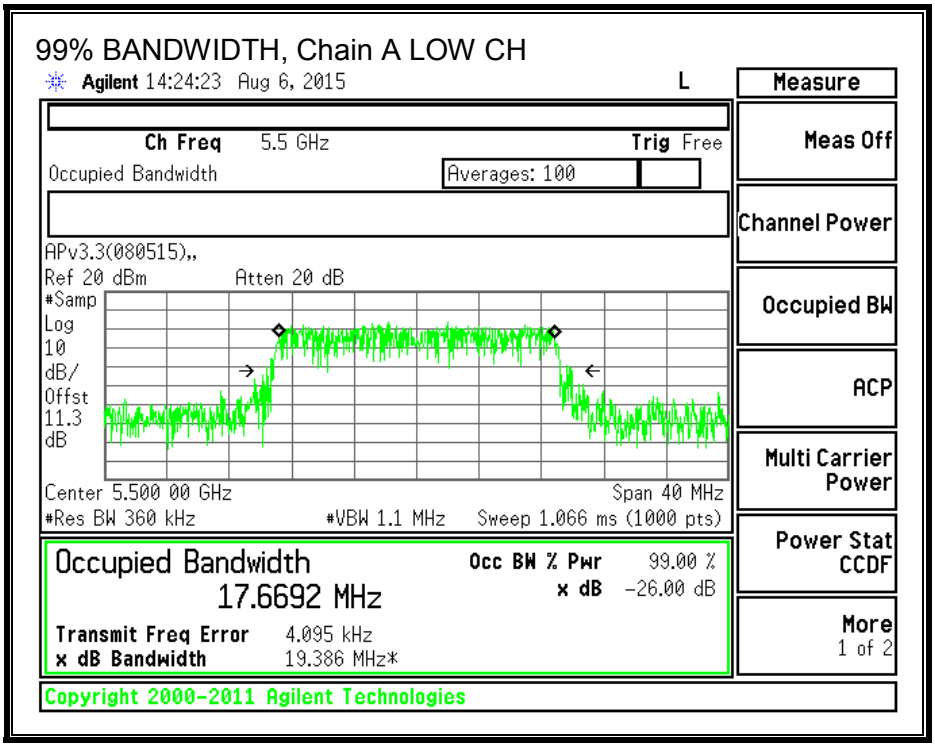
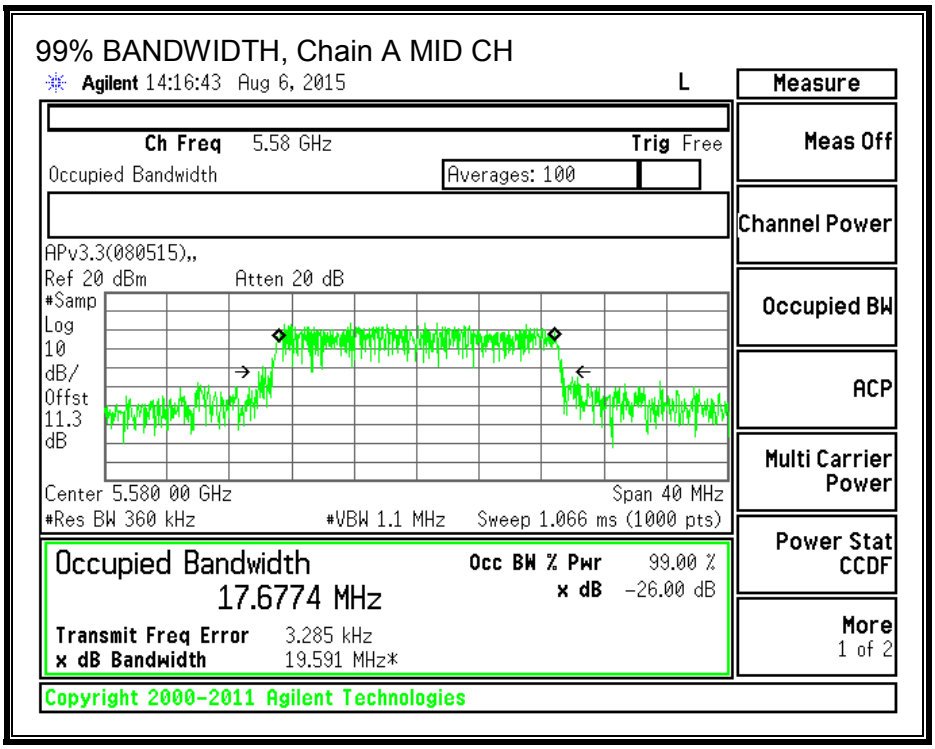
99% BANDWIDTH, Chain A





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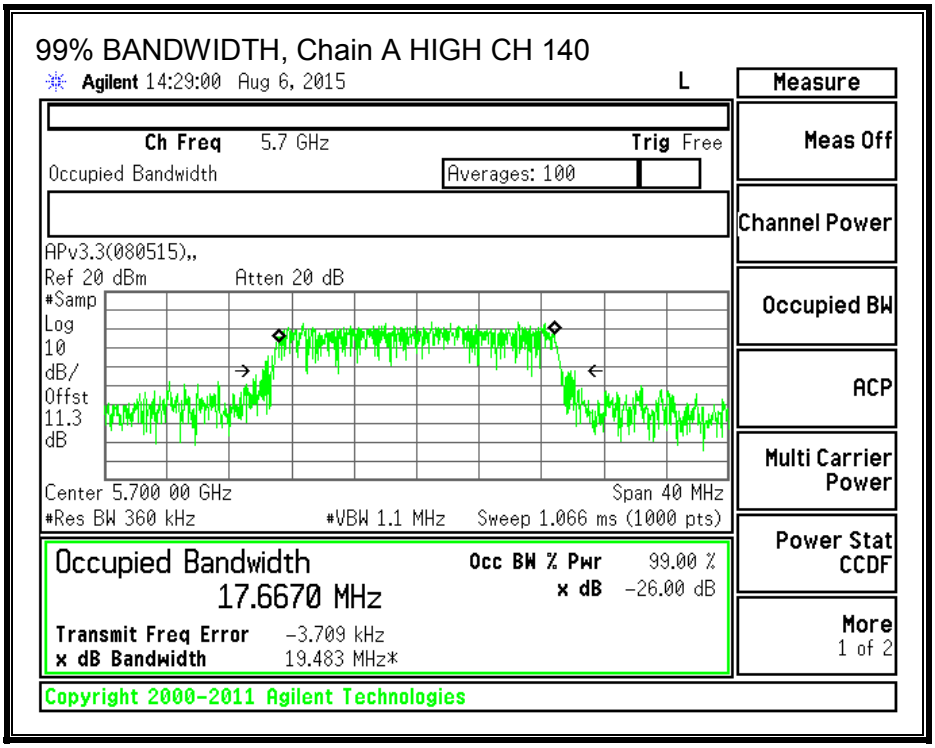

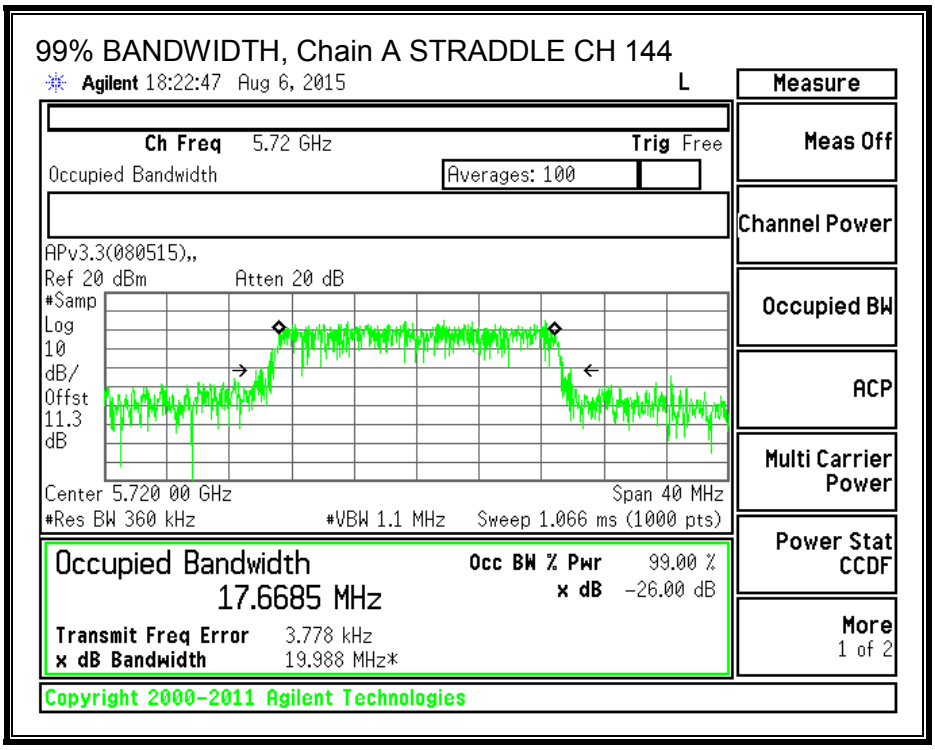

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8.11.3. OUTPUT POWER AND PSD

LIMITS

FCC §15.407 (a) (2)

For the band 5.47–5.725 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

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)
2.10	2.30	2.20

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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	5500	19.80	2.20	2.20	23.97	11.00
Mid	5580	20.06	2.20	2.20	24.00	11.00
High	5700	19.83	2.20	2.20	23.97	11.00

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

Output Power Results

Channel	Frequency (MHz)	Chain B Meas Power (dBm)	Chain A Meas Power (dBm)	Total Corr'd Power (dBm)	Power Limit (dBm)	Power Margin (dB)
Low	5500	8.62	8.62	11.63	23.97	-12.34
Mid	5580	8.62	8.56	11.60	24.00	-12.40
High	5700	8.58	8.61	11.61	23.97	-12.37

PSD Results

Channel	Frequency (MHz)	Chain B Meas PSD (dBm)	Chain A Meas PSD (dBm)	Total Corr'd PSD (dBm)	PSD Limit (dBm)	PSD Margin (dB)
Low	5500	-2.60	-2.64	0.39	11.00	-10.61
Mid	5580	-2.53	-2.39	0.55	11.00	-10.45
High	5700	-2.55	-2.11	0.69	11.00	-10.31

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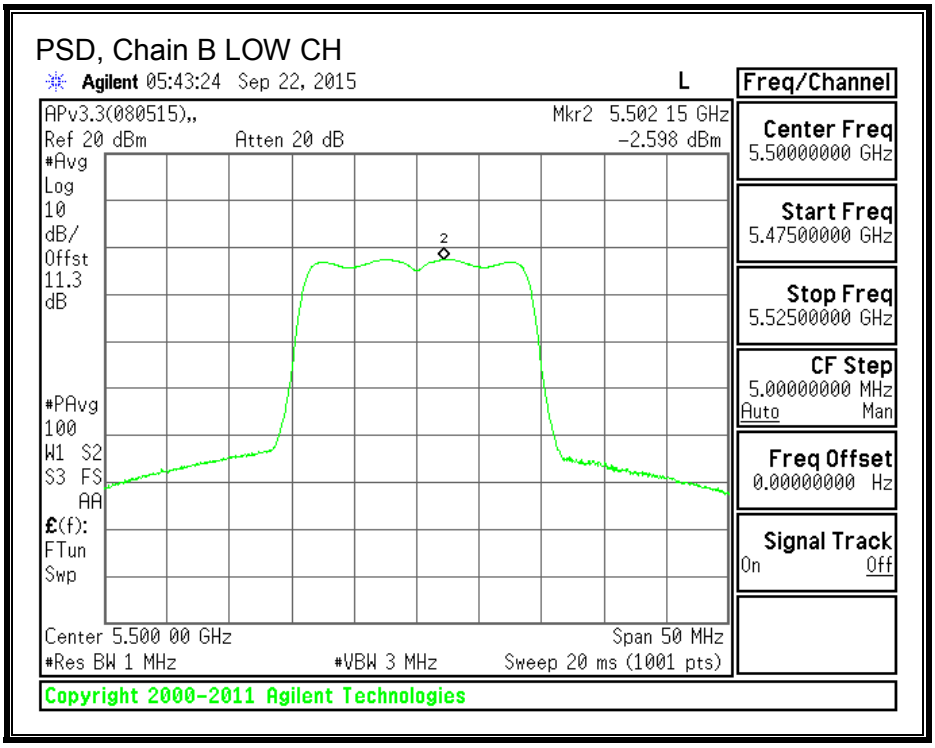
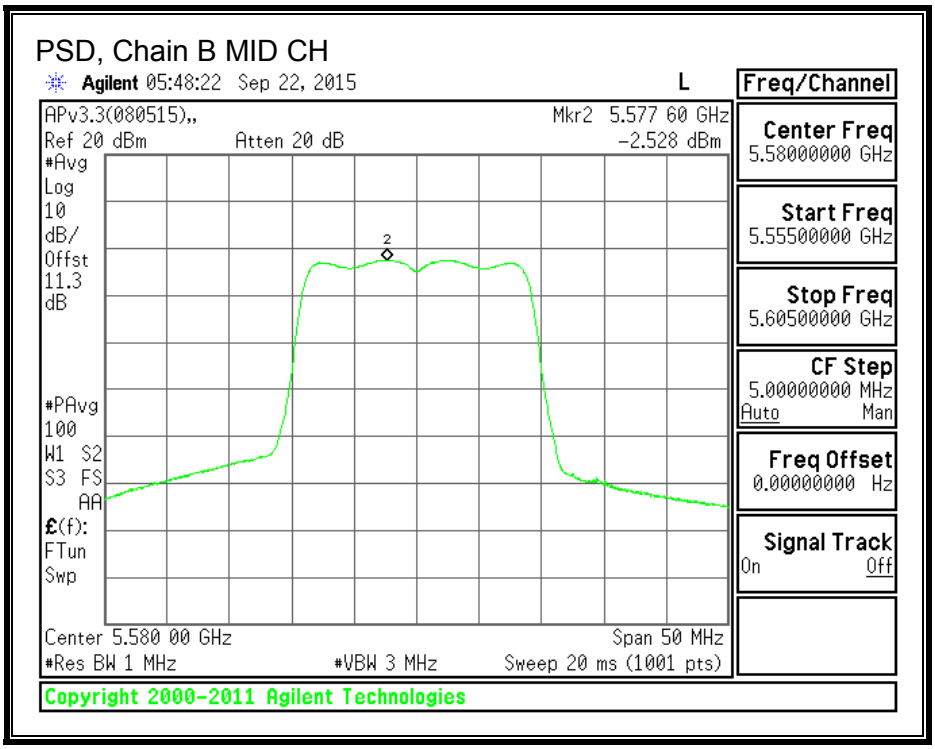
PSD, Chain B





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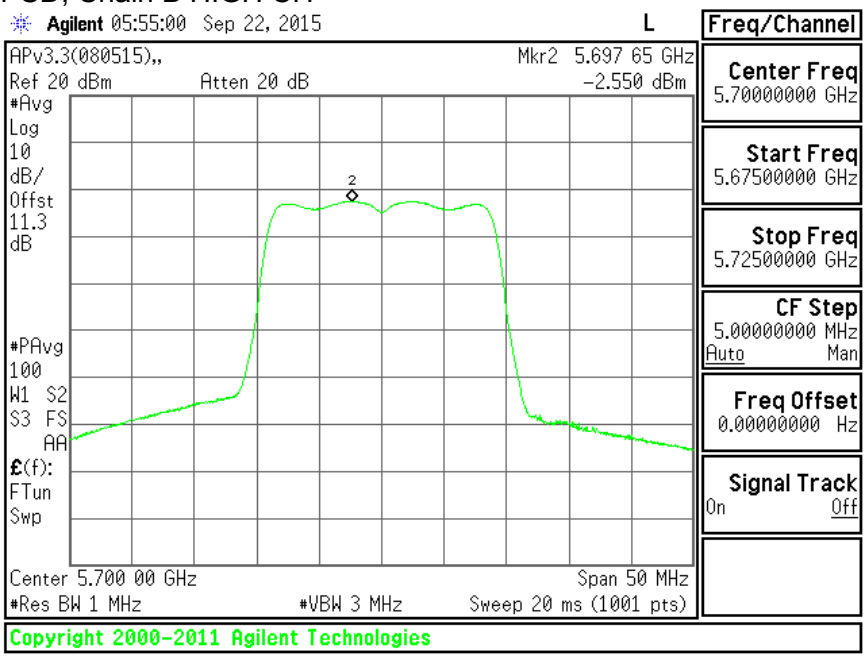
PSD, Chain B HIGH CH



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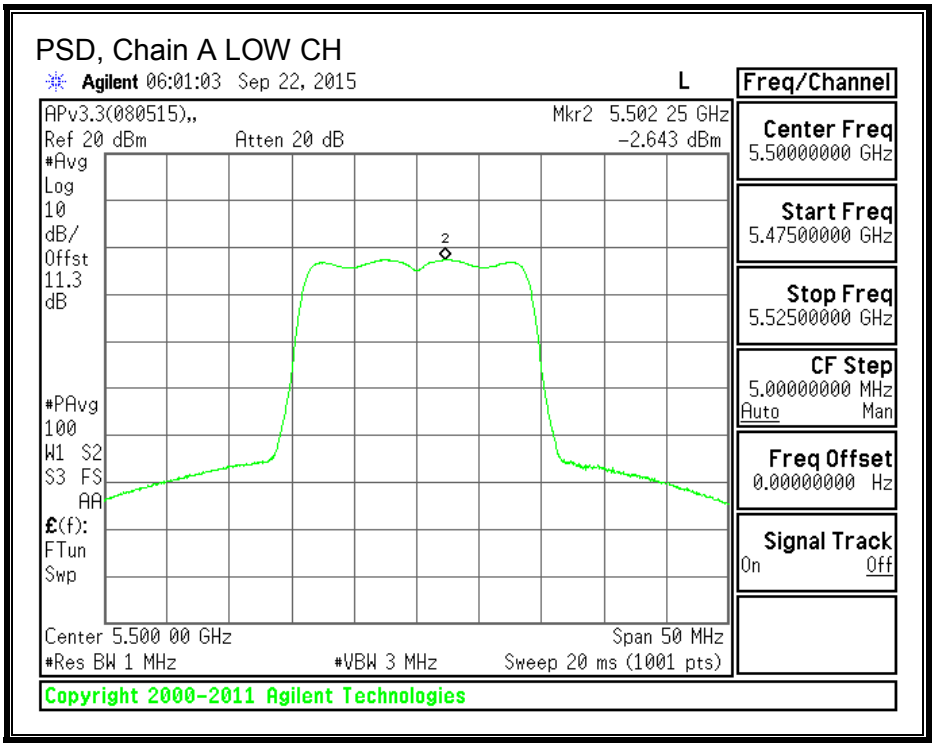
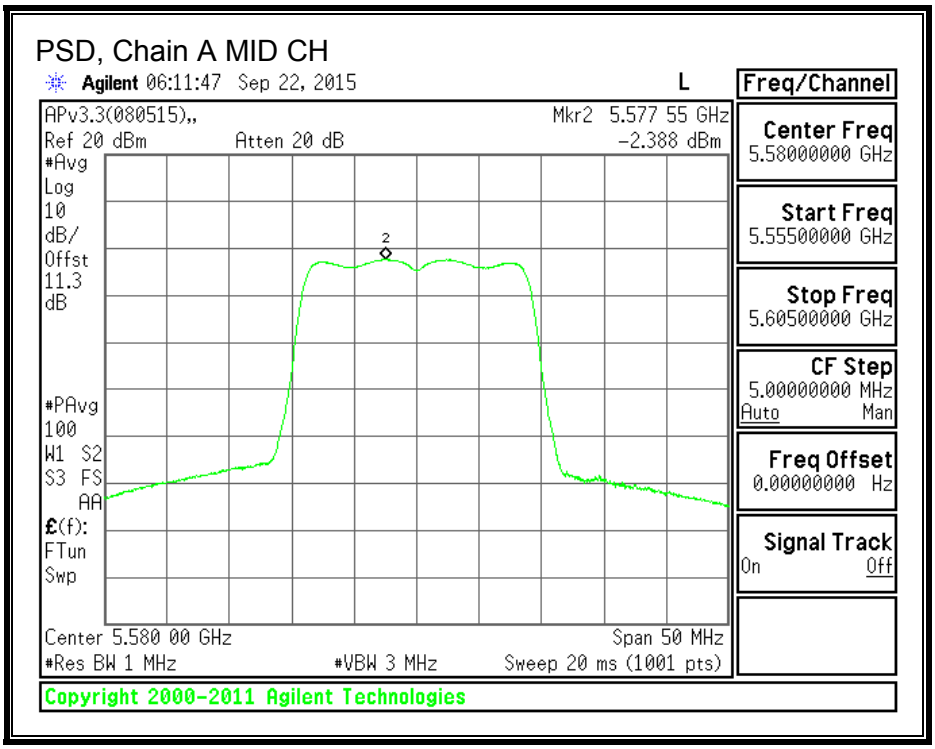
PSD, Chain A





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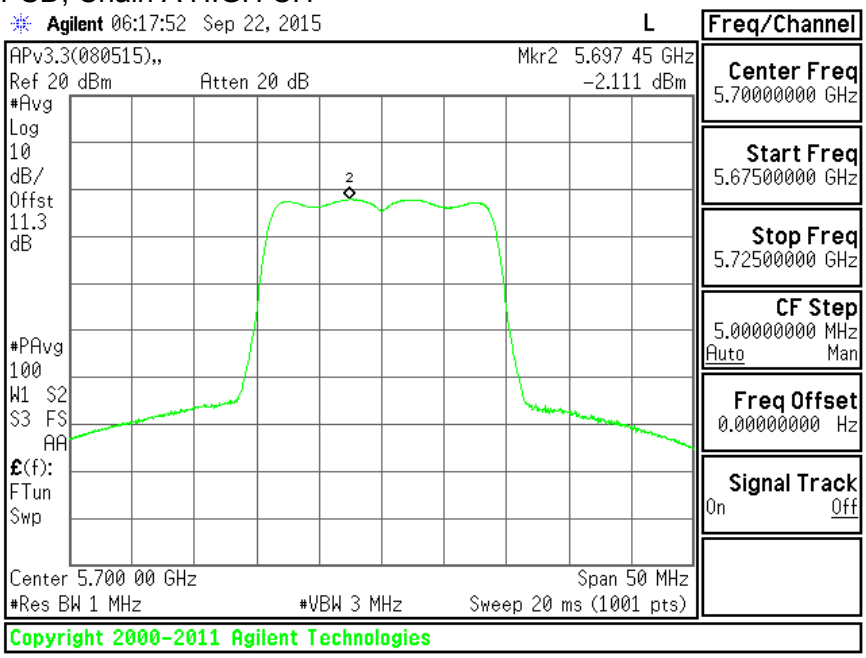
PSD, Chain A HIGH CH



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STRADDLE CHANNEL 144 RESULTS

UNII-2C BAND

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)
144	5720	19.74	2.20	2.20	23.95	11.00

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

Output Power Results

Channel	Frequency (MHz)	Chain B Meas Power (dBm)	Chain A Meas Power (dBm)	Total Corr'd Power (dBm)	Power Limit (dBm)	Power Margin (dB)
144	5720	8.48	8.45	11.48	23.95	-12.48

PSD Results

Channel	Frequency (MHz)	Chain B Meas PSD (dBm)	Chain A Meas PSD (dBm)	Total Corr'd PSD (dBm)	PSD Limit (dBm)	PSD Margin (dB)
144	5720	-1.84	-1.88	1.15	11.00	-9.85

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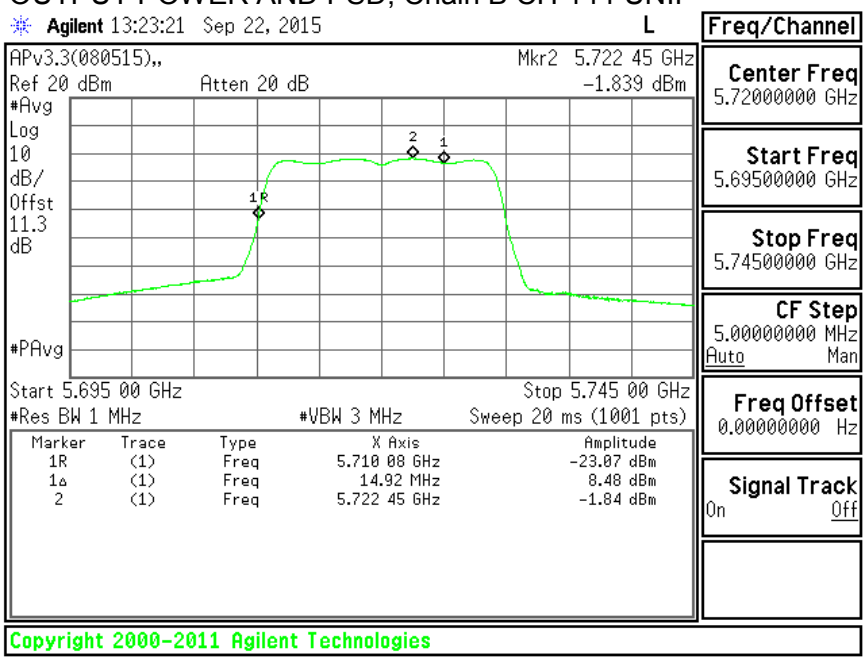
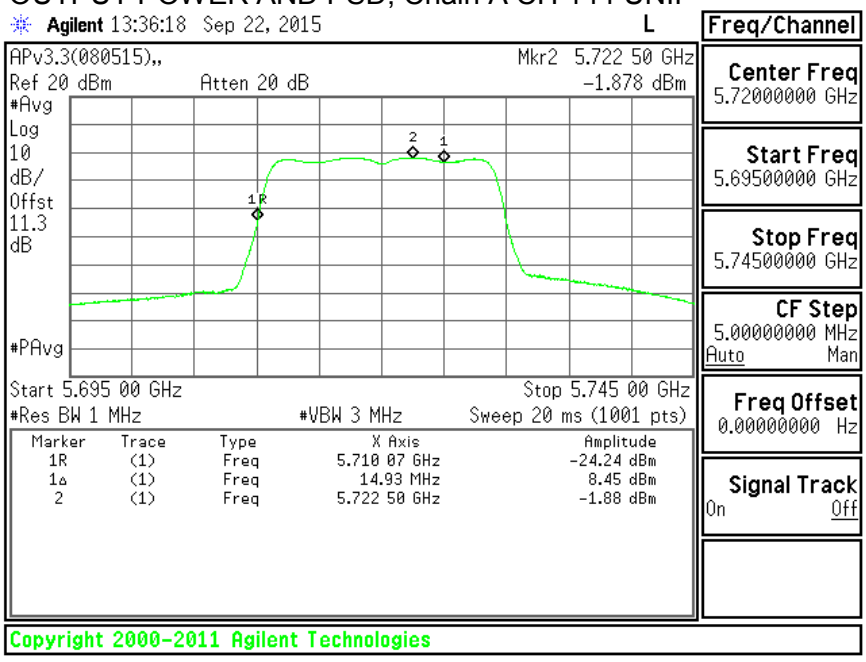
OUTPUT POWER AND PSD, Chain B CH 144 UNII



OUTPUT POWER AND PSD, Chain A CH 144 UNII



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UNII-3 BAND

Antenna Gain and Limit

Channel	Frequency (MHz)	Directional Gain for Power (dBi)	Directional Gain for PSD (dBi)	Power Limit (dBm)	PSD Limit (dBm)
144	5720	2.20	2.20	30.00	30.00

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

Output Power Results

Channel	Frequency (MHz)	Chain B Meas Power (dBm)	Chain A Meas Power (dBm)	Total Corr'd Power (dBm)	Power Limit (dBm)	Power Margin (dB)
144	5720	2.89	2.75	5.83	30.00	-24.17

PSD Results

Channel	Frequency (MHz)	Chain B Meas PSD (dBm)	Chain A Meas PSD (dBm)	Total Corr'd PSD (dBm)	PSD Limit (dBm)	PSD Margin (dB)
144	5720	-5.06	-5.11	-2.07	30.00	-32.07

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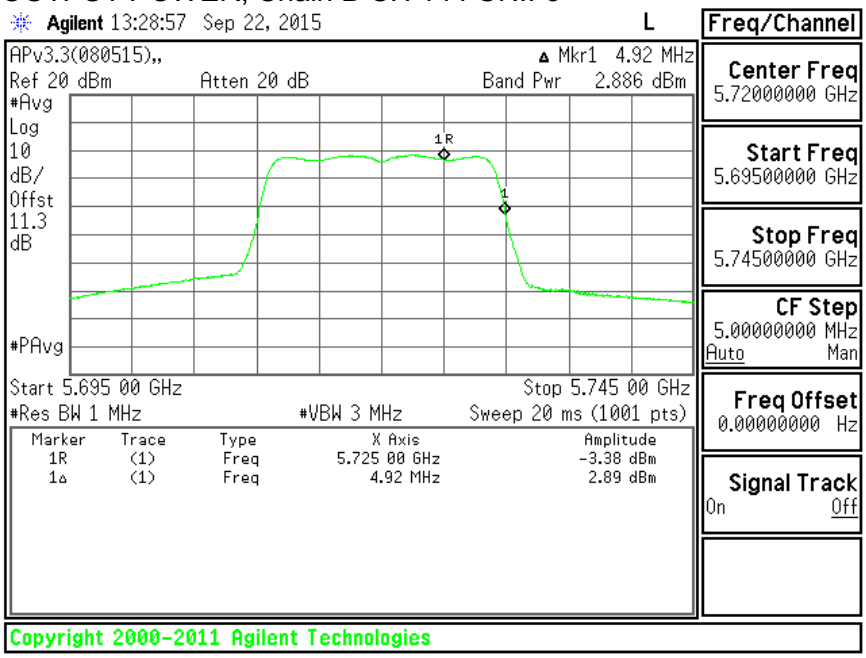
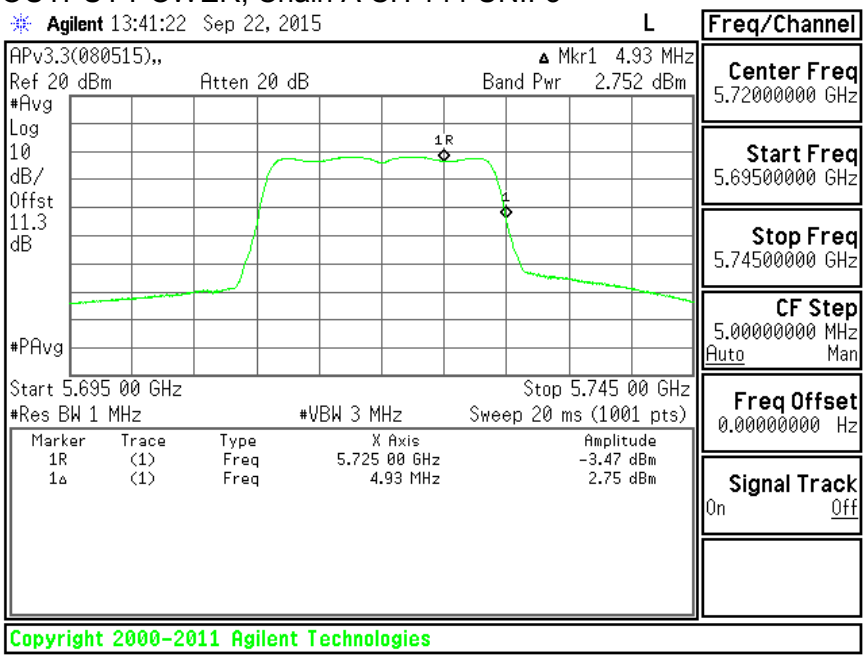
OUTPUT POWER, Chain B CH 144 UNII-3



OUTPUT POWER, Chain A CH 144 UNII-3



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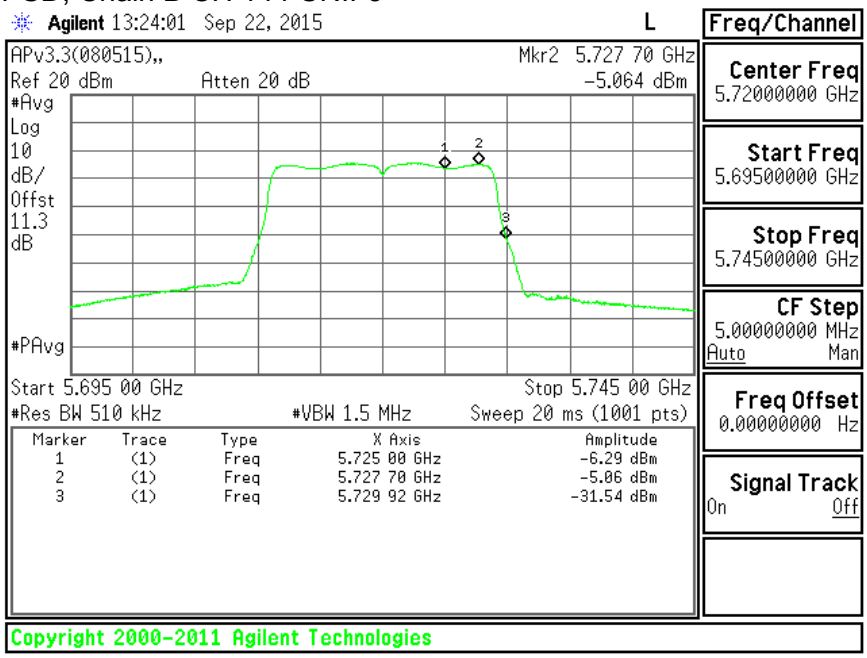
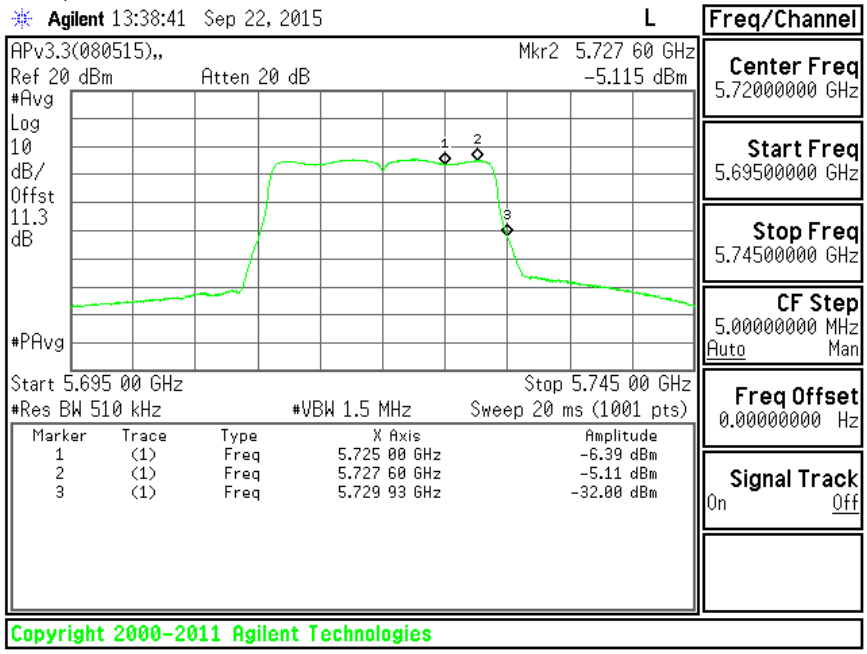
PSD, Chain B CH 144 UNII-3



PSD, Chain A CH 144 UNII-3



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8.11.4. TPC POWER

LIMITS

FCC §15.407 (h) (1)

Transmit power control (TPC). U-NII devices operating in the 5.25–5.35 GHz band and the 5.47–5.725 GHz band shall employ a TPC mechanism. The U-NII device is required to have the capability to operate at least 6 dB below the mean EIRP value of 30 dBm. A TPC mechanism is not required for systems with an e.i.r.p. of less than 500 mW.

DIRECTIONAL ANTENNA GAIN

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

Chain B Antenna Gain (dBi)	Chain A Antenna Gain (dBi)	Uncorrelated Chains Directional Gain (dBi)
2.10	2.30	2.20

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RESULTS

TPC Limits

Channel	Frequency (MHz)	Limit EIRP (dBm)	Directional Gain (dBi)	Limit Cond (dBm)
Low	5500	24	2.20	21.80
Mid	5580	24	2.20	21.80
High	5700	24	2.20	21.80

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

TPC Output Power Results

Channel	Frequency (MHz)	Chain B Meas Power (dBm)	Chain A Meas Power (dBm)	Total Corr'd Power (dBm)	Cond Power Limit (dBm)	Margin (dB)
Low	5500	8.62	8.62	11.63	21.80	-10.17
Mid	5580	8.62	8.56	11.60	21.80	-10.20
High	5700	8.58	8.61	11.61	21.80	-10.19

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8.12. 802.11n HT40 MODE IN THE 5.6 GHz BAND

8.12.1. 26 dB BANDWIDTH

LIMITS

None; for reporting purposes only.

RESULTS

Channel	Frequency (MHz)	26 dB BW Chain B (MHz)	26 dB BW Chain A (MHz)
Low	5510	40.57	40.44
Mid	5550	40.02	40.98
High	5670	40.92	39.84
142	5710	40.80	40.44

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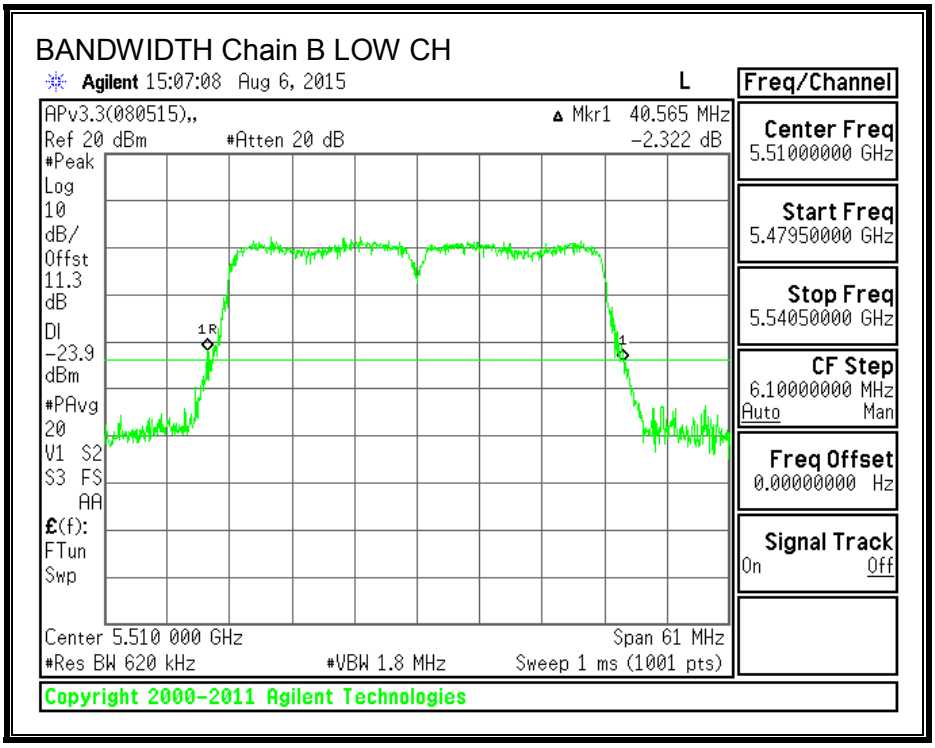
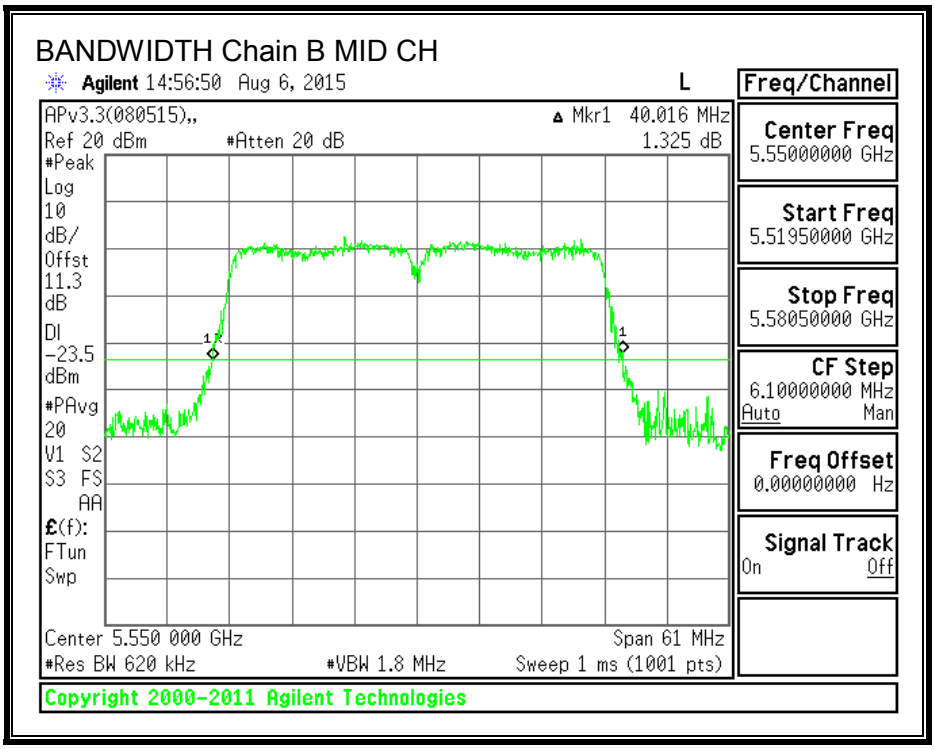
26 dB BANDWIDTH, Chain B





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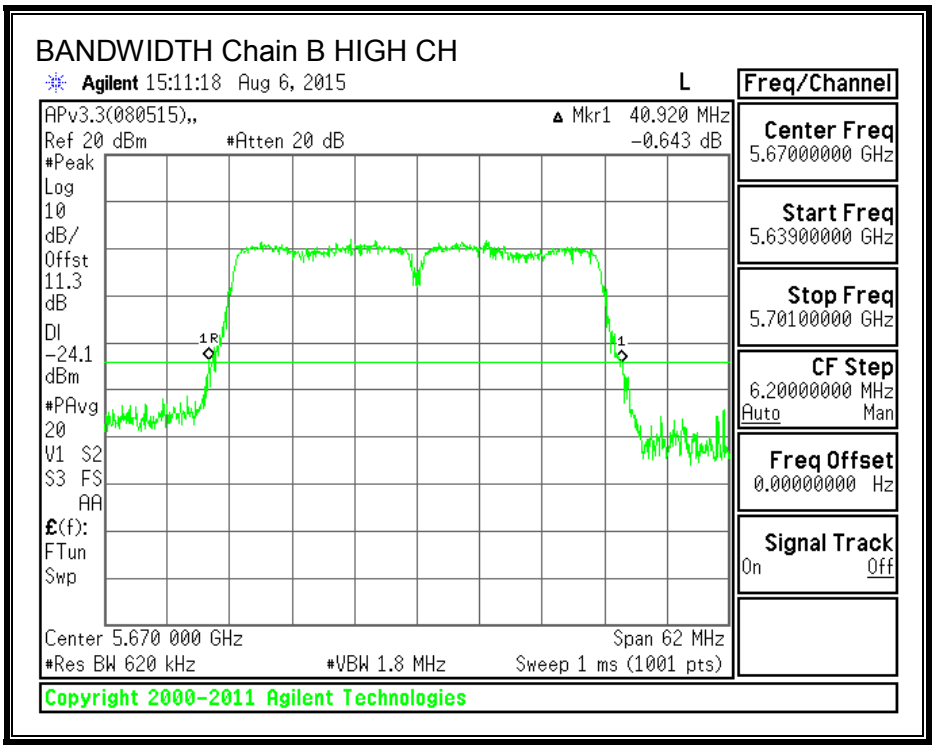
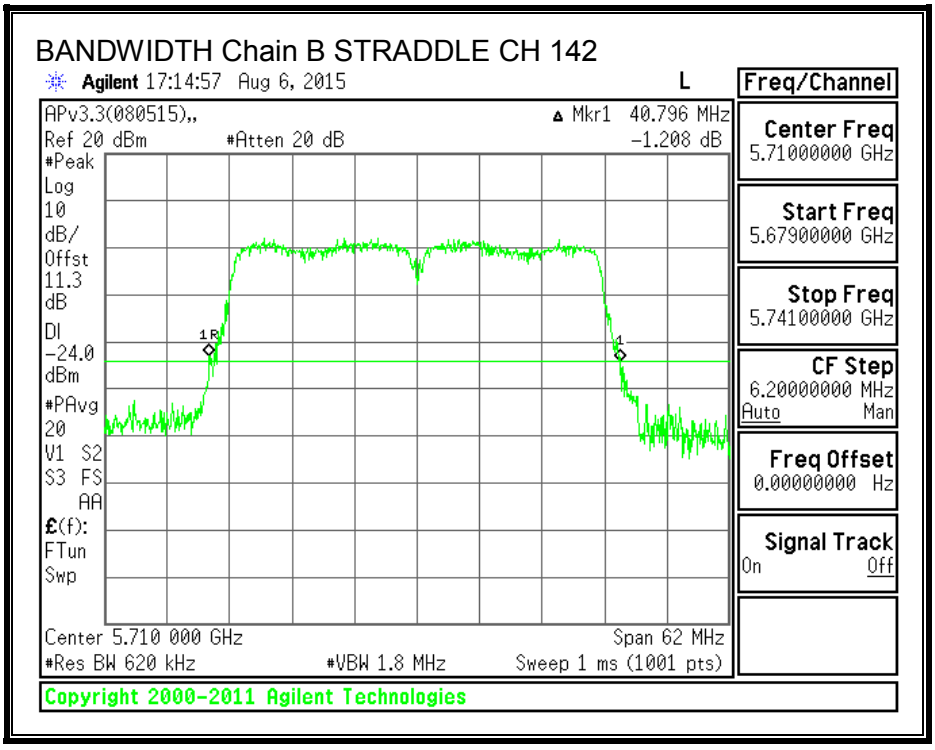
BANDWIDTH Chain B HIGH CH



BANDWIDTH Chain B STRADDLE CH 142



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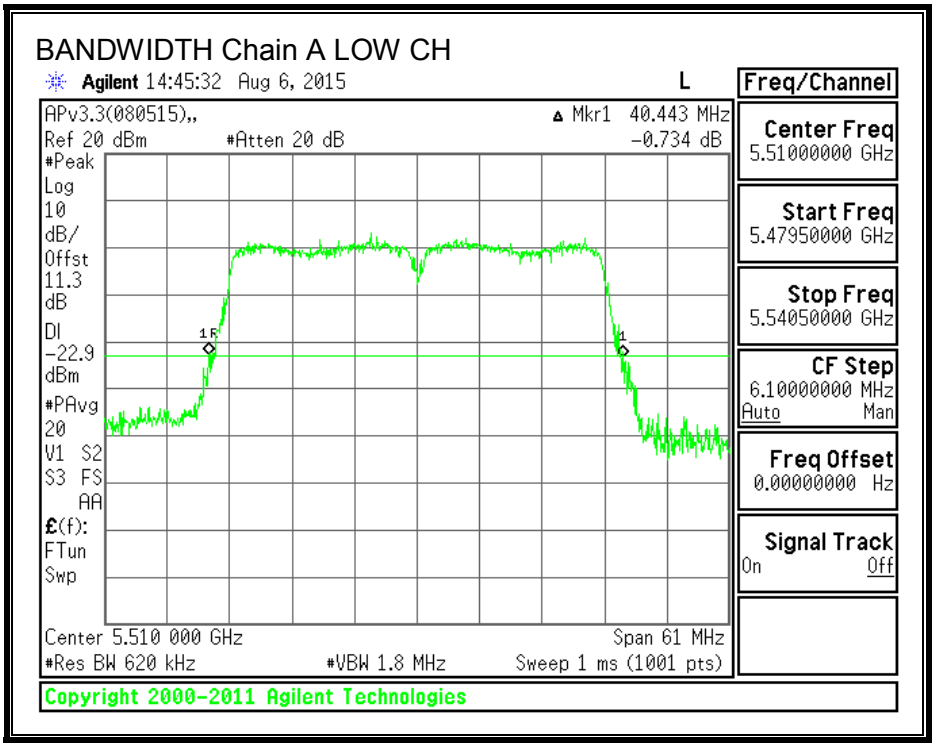
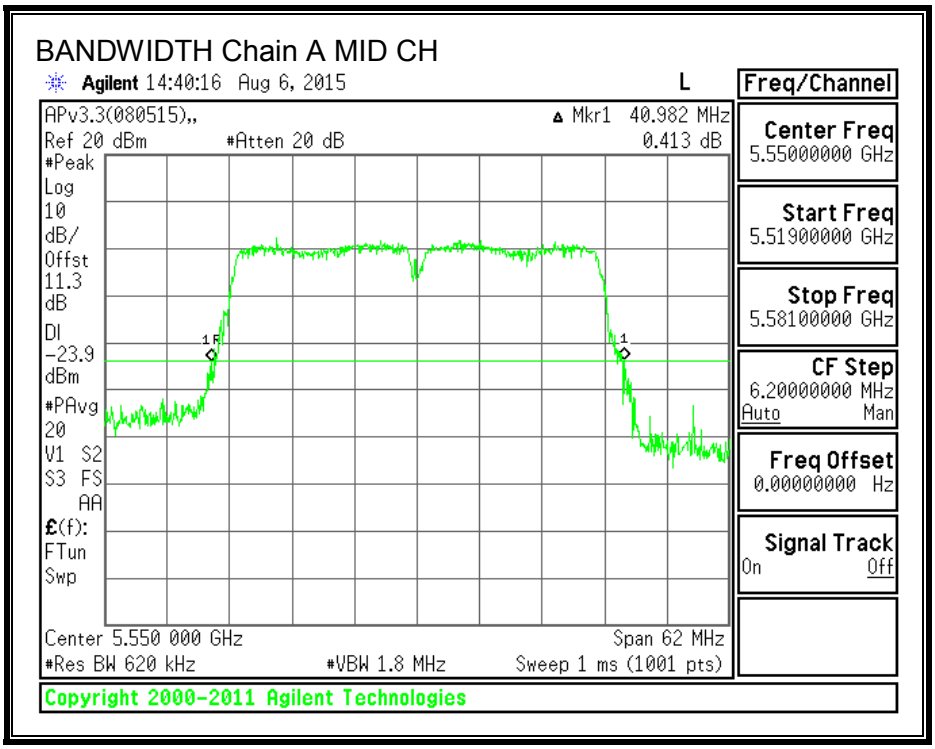
26 dB BANDWIDTH, Chain A





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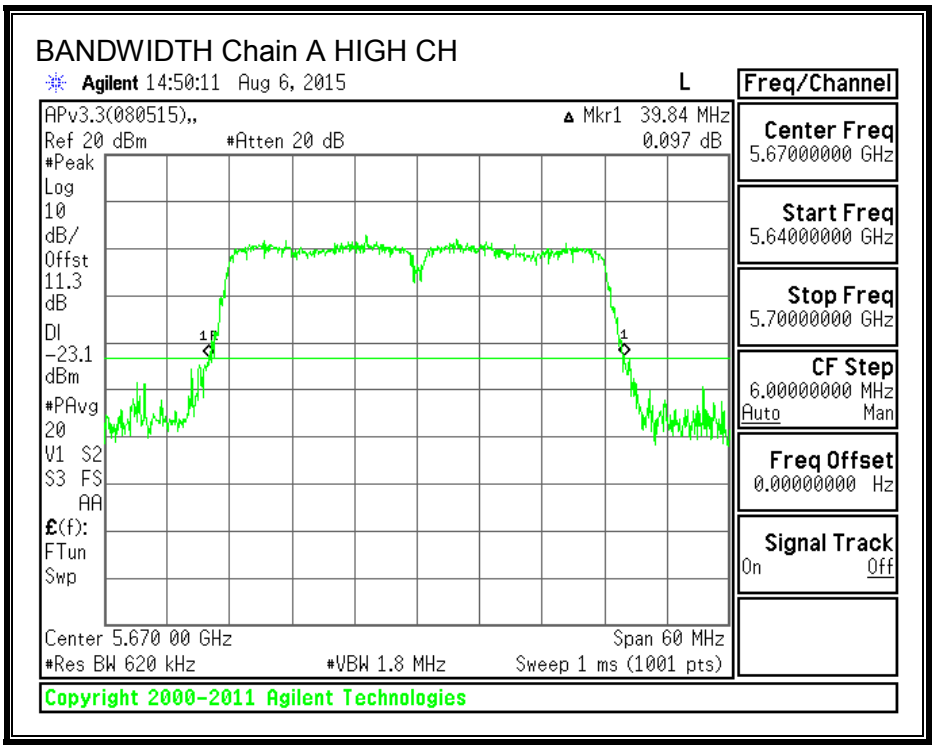
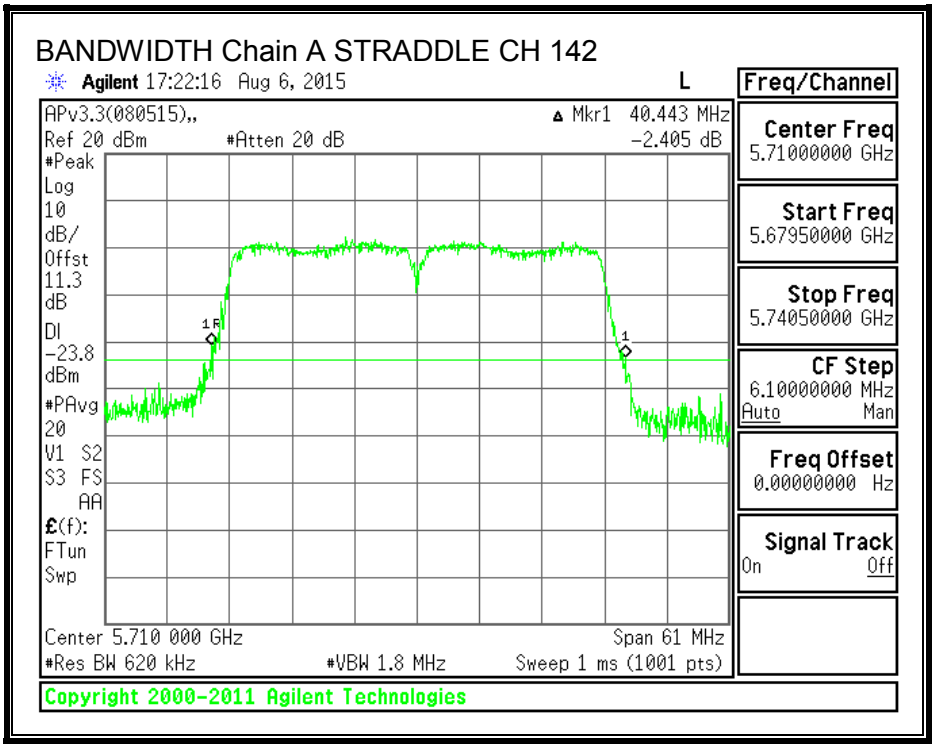
BANDWIDTH Chain A HIGH CH



BANDWIDTH Chain A STRADDLE CH 142



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8.12.2. 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

RESULTS

Channel	Frequency (MHz)	99% BW Chain B (MHz)	99% BW Chain A (MHz)
Low	5510	36.1790	36.1628
Mid	5550	36.1298	36.1403
High	5670	36.1485	36.1731
142	5710	36.1511	36.1695

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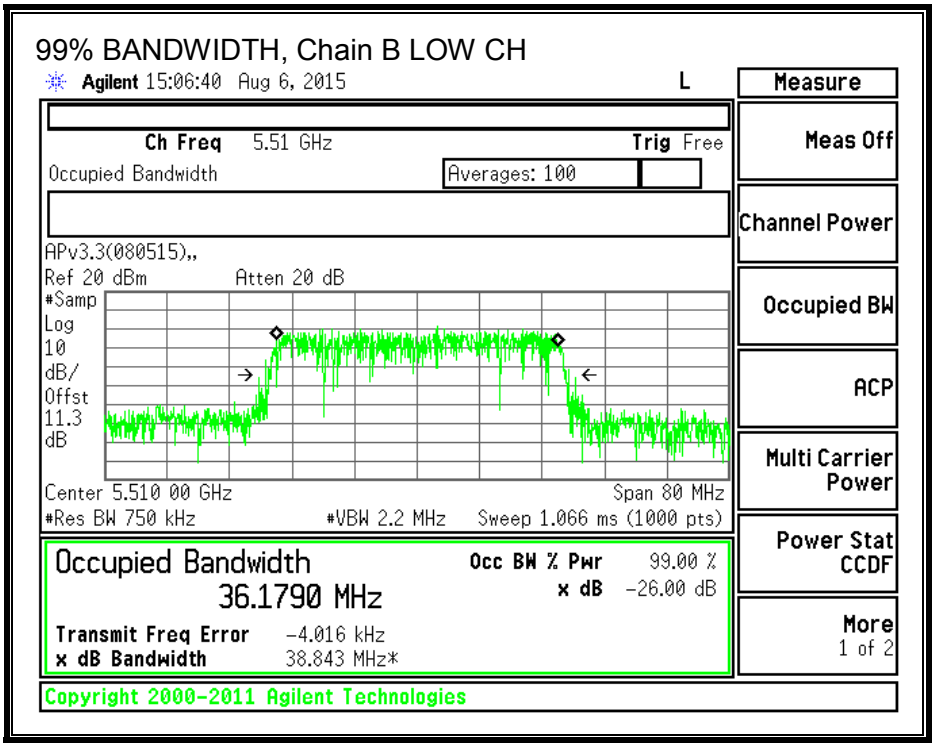
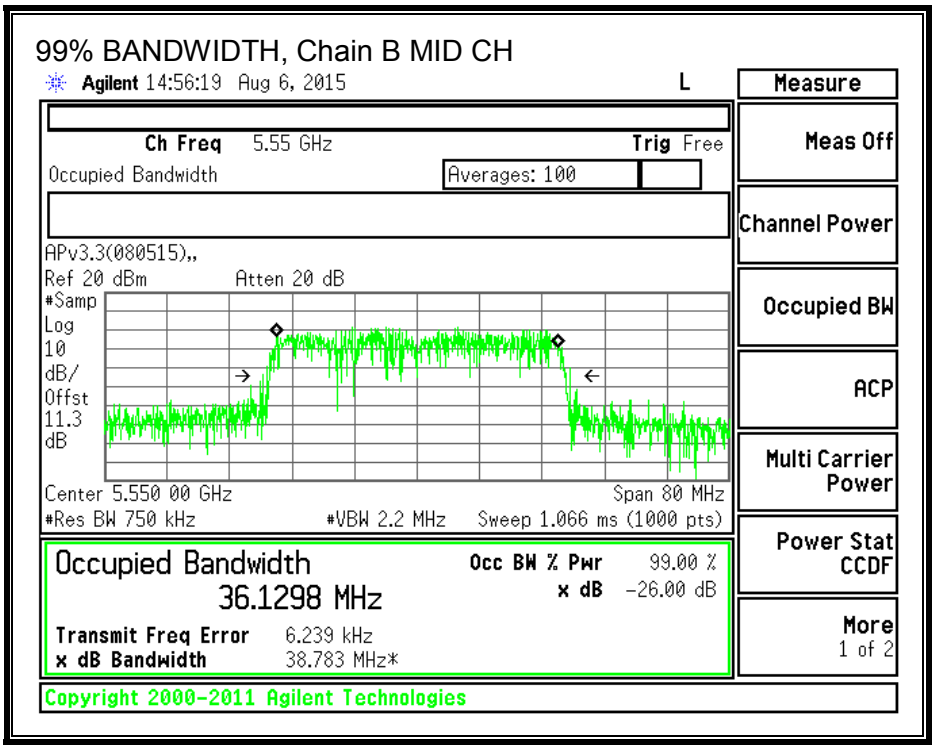
99% BANDWIDTH, Chain B





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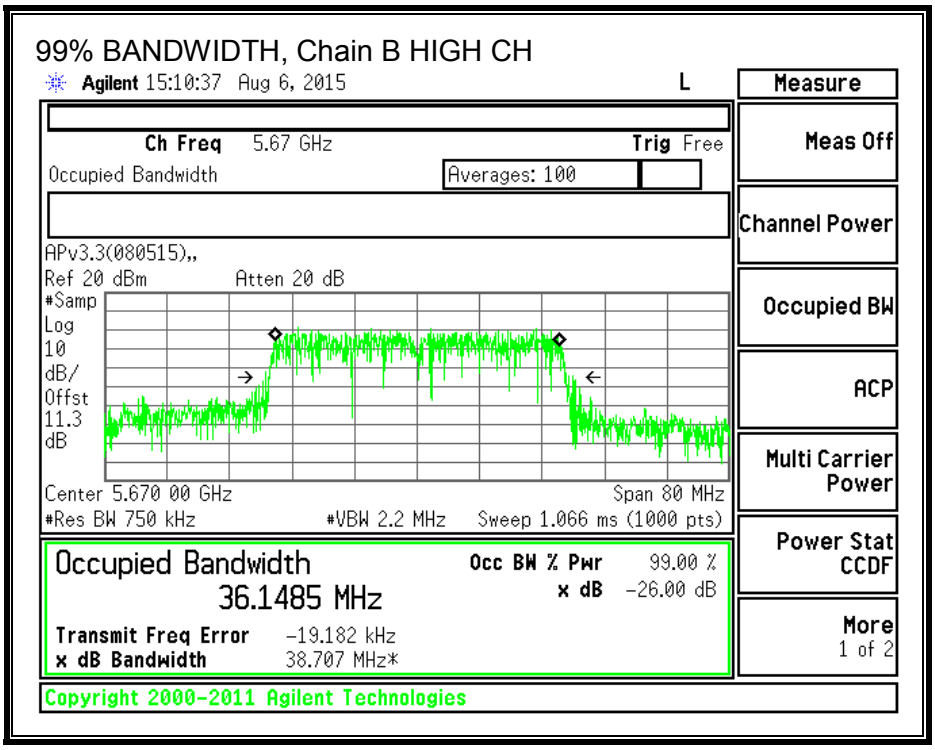

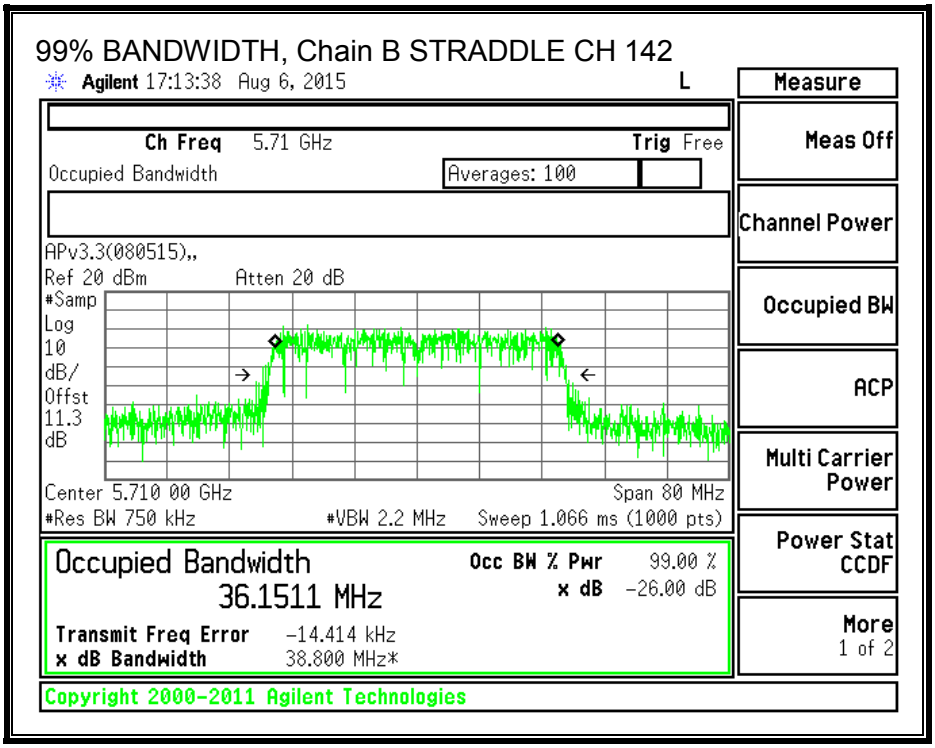

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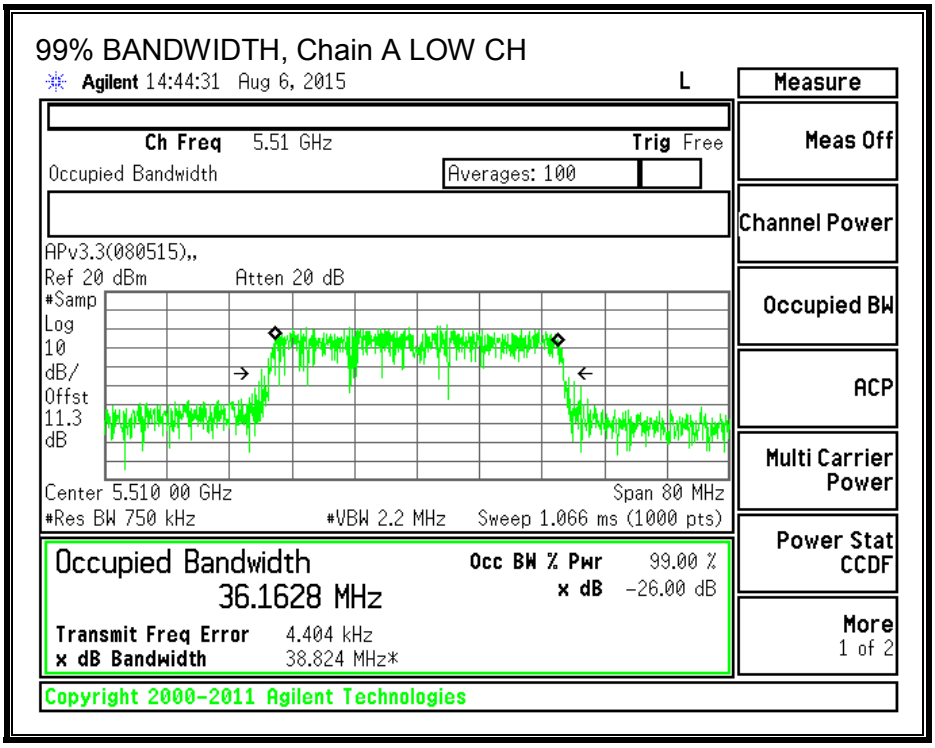
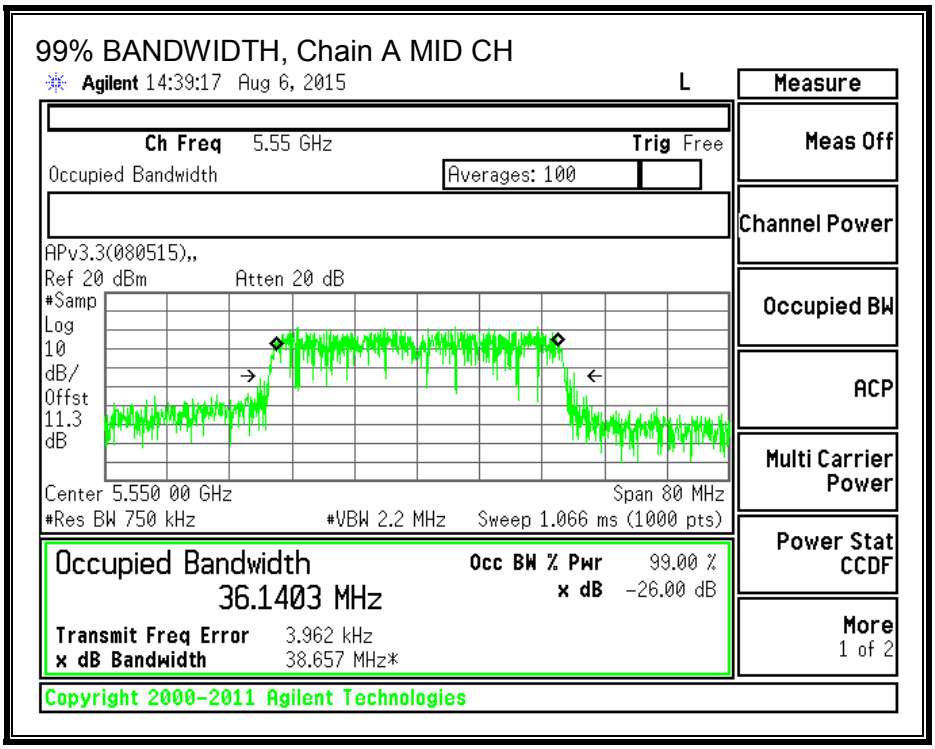
99% BANDWIDTH, Chain A





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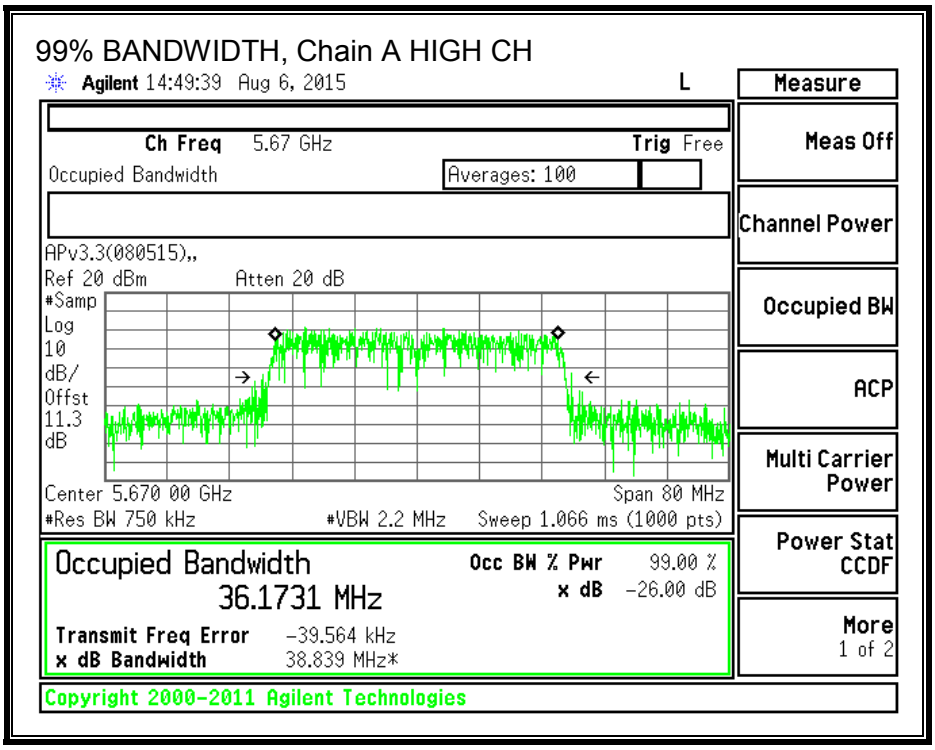

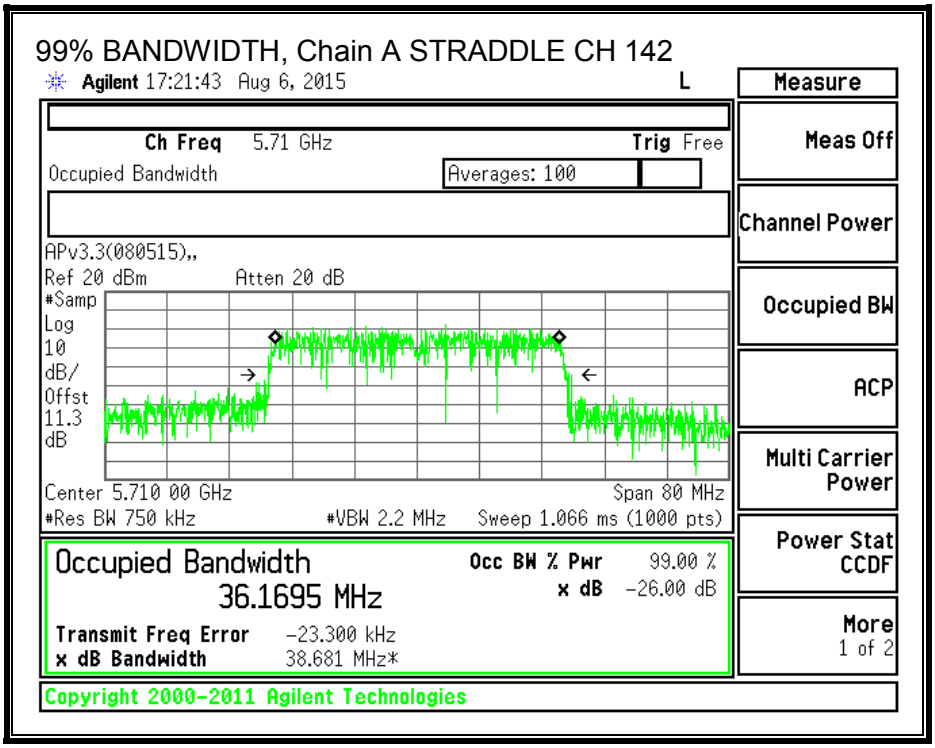

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8.12.3. OUTPUT POWER AND PSD

LIMITS

FCC §15.407 (a) (2)

For the band 5.47–5.725 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

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

Chain B Antenna Gain (dBi)	Chain A Antenna Gain (dBi)	Uncorrelated Chains Directional Gain (dBi)
2.10	2.30	2.20

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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	5510	40.44	2.30	2.30	24.00	11.00
Mid	5550	40.02	2.30	2.30	24.00	11.00
High	5670	39.84	2.30	2.30	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 B Meas Power (dBm)	Chain A Meas Power (dBm)	Total Corr'd Power (dBm)	Power Limit (dBm)	Power Margin (dB)
Low	5510	8.52	8.48	11.51	24.00	-12.49
Mid	5550	8.57	8.54	11.57	24.00	-12.43
High	5670	8.59	8.28	11.45	24.00	-12.55

PSD Results

Channel	Frequency (MHz)	Chain B Meas PSD (dBm)	Chain A Meas PSD (dBm)	Total Corr'd PSD (dBm)	PSD Limit (dBm)	PSD Margin (dB)
Low	5510	-5.79	-5.80	-2.78	11.00	-13.78
Mid	5550	-5.65	-5.66	-2.65	11.00	-13.65
High	5670	-5.58	-5.37	-2.46	11.00	-13.46

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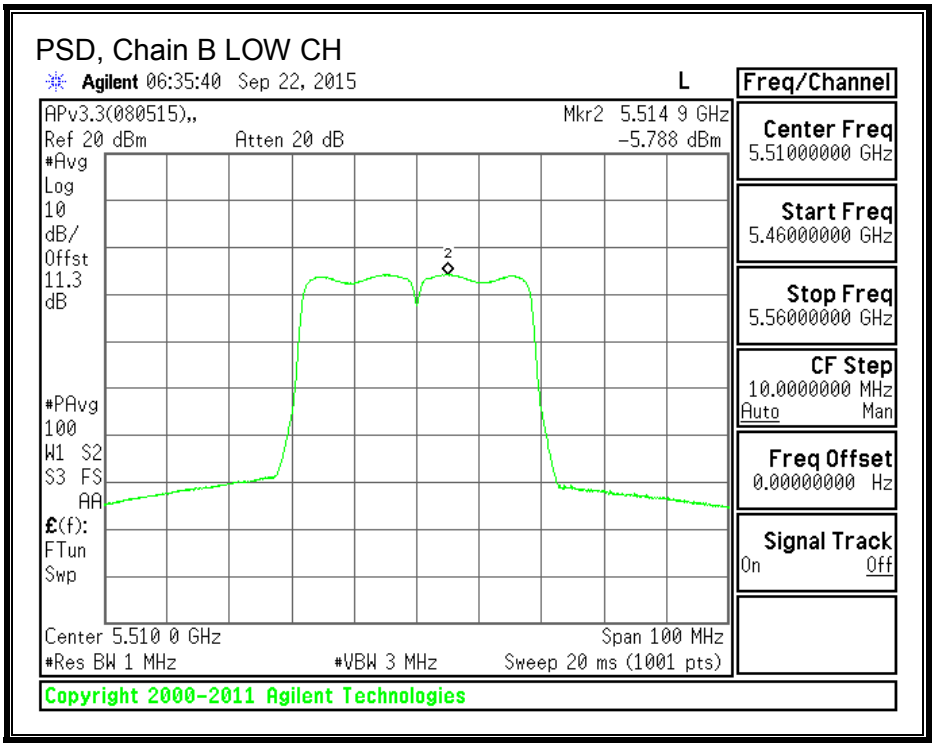
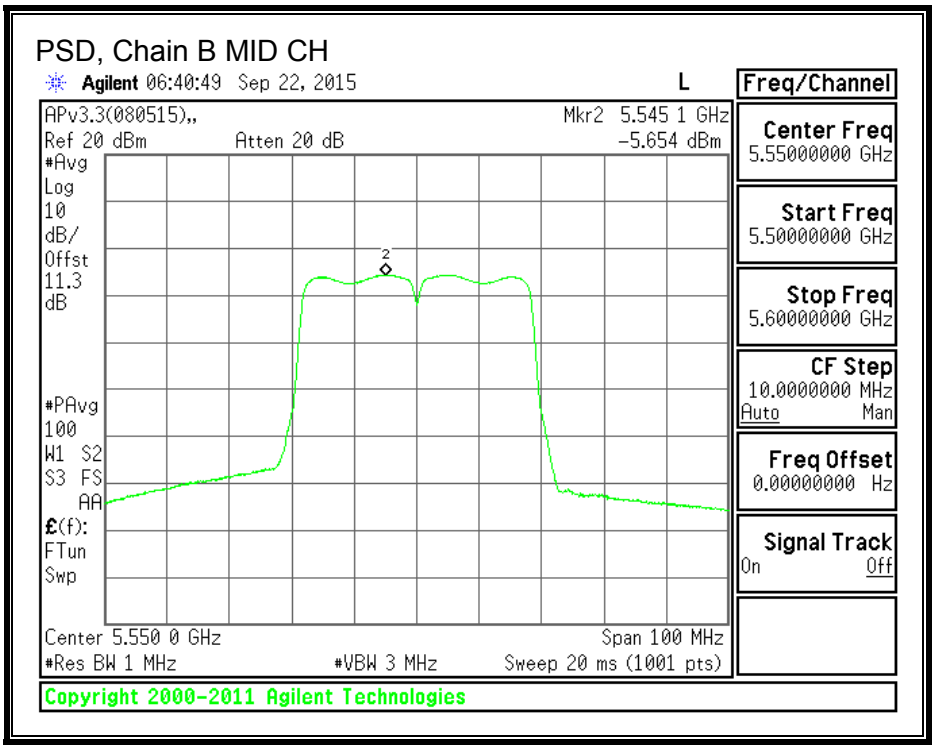
PSD, Chain B





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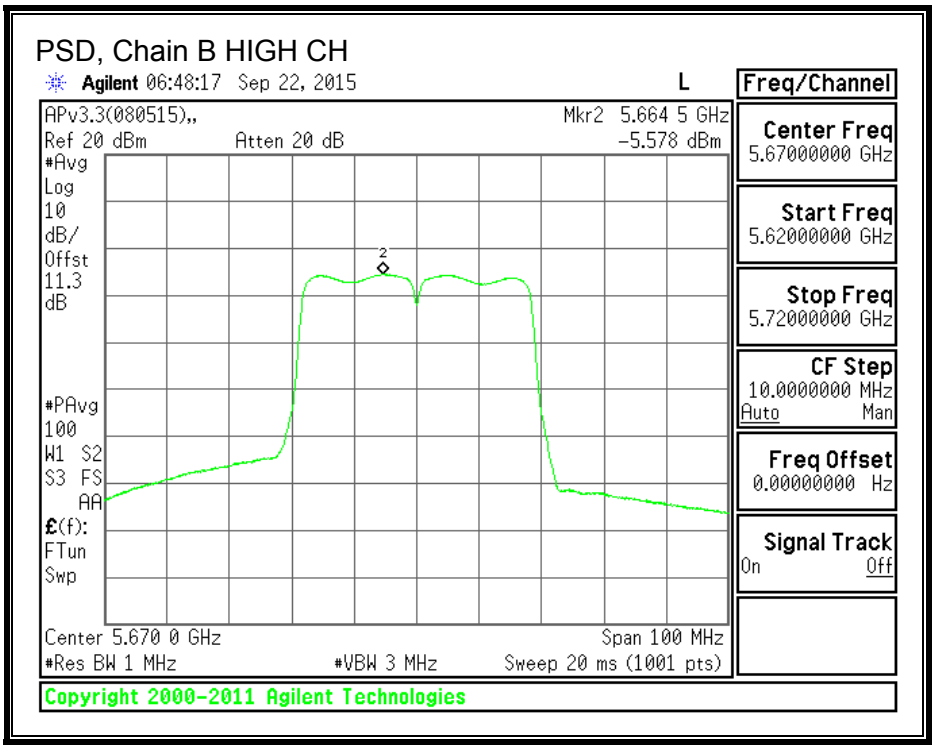
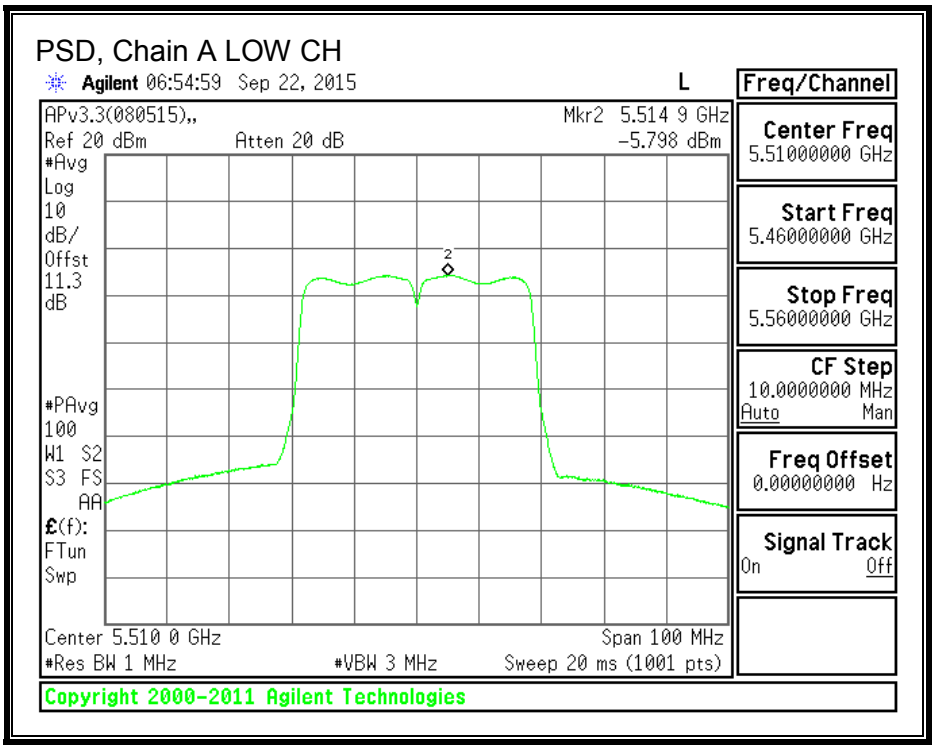


PSD, Chain A



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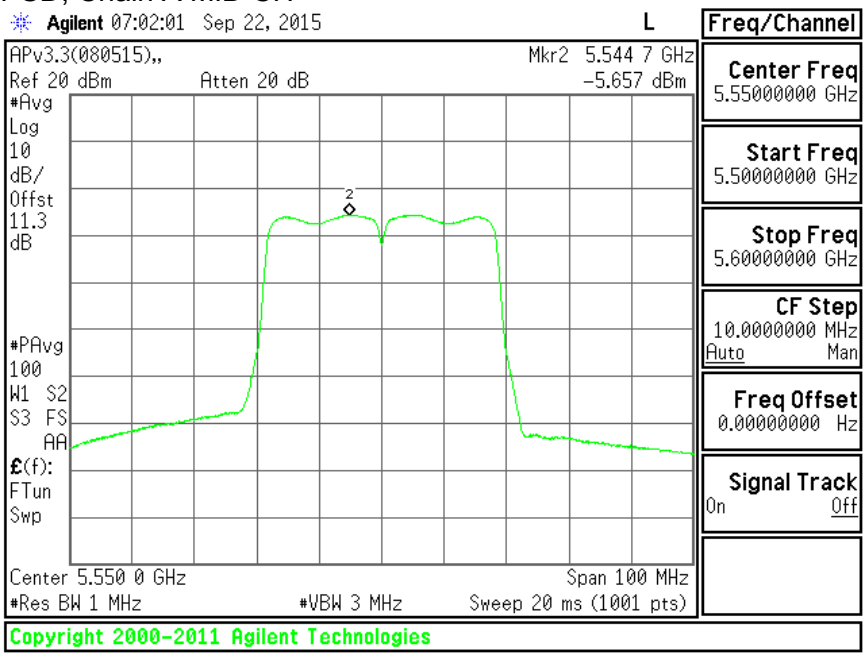
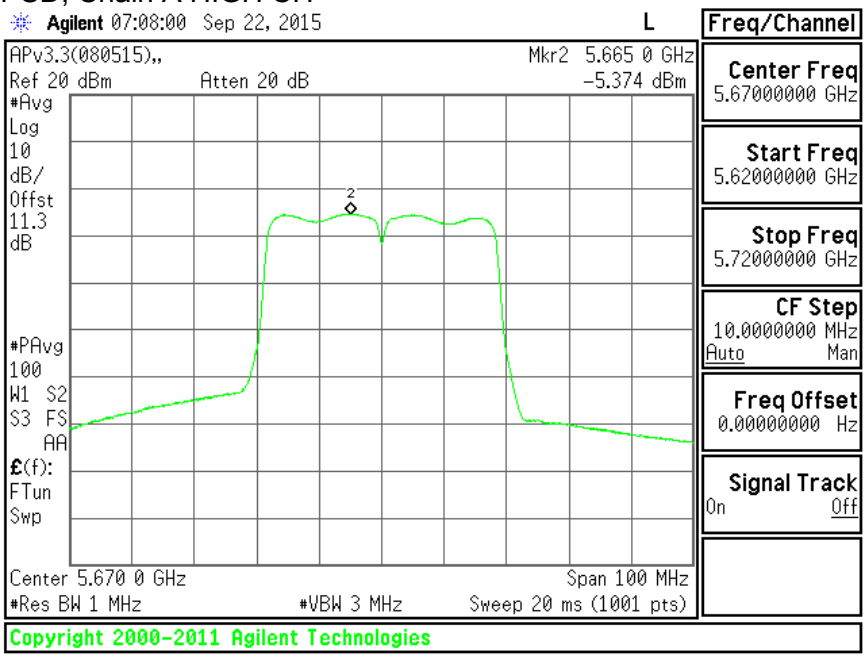
PSD, Chain A MID CH



PSD, Chain A HIGH CH



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STRADDLE CHANNEL 142 RESULTS

UNII-2C BAND

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)
142	5710	40.44	2.20	2.20	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 B Meas Power (dBm)	Chain A Meas Power (dBm)	Total Corr'd Power (dBm)	Power Limit (dBm)	Power Margin (dB)
142	5710	8.40	8.67	11.55	24.00	-12.45

PSD Results

Channel	Frequency (MHz)	Chain B Meas PSD (dBm)	Chain A Meas PSD (dBm)	Total Corr'd PSD (dBm)	PSD Limit (dBm)	PSD Margin (dB)
142	5710	-5.57	-5.31	-2.43	11.00	-13.43

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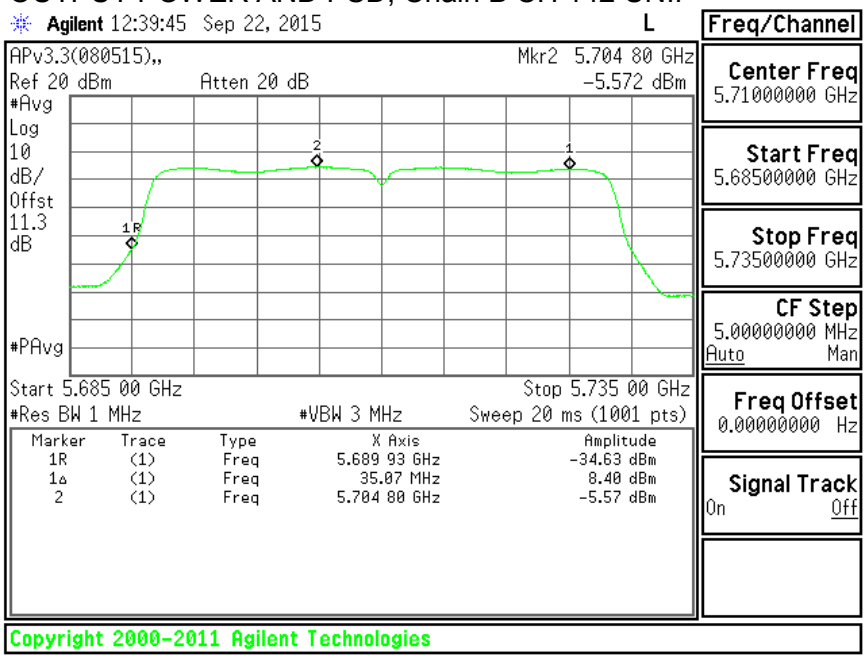
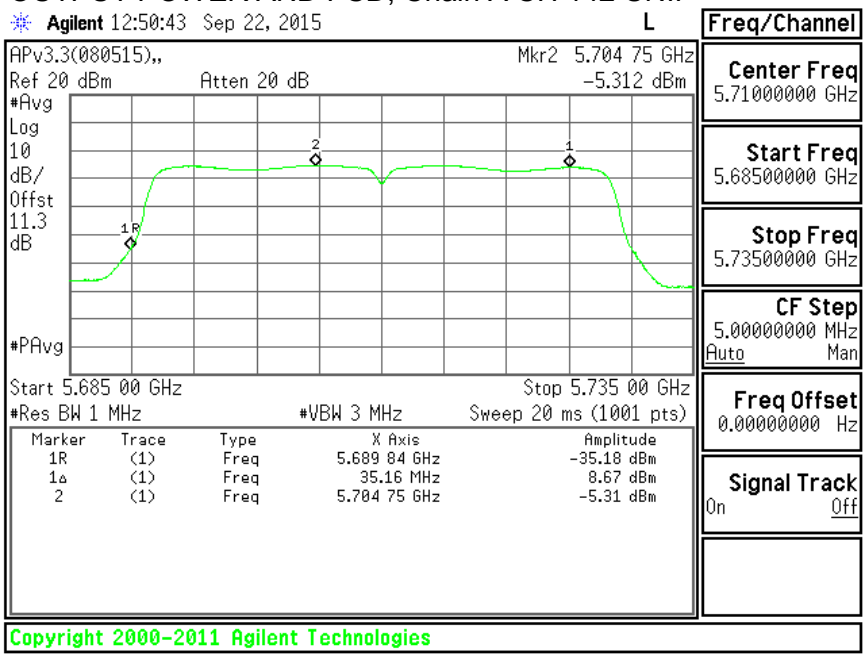
OUTPUT POWER AND PSD, Chain B CH 142 UNII



OUTPUT POWER AND PSD, Chain A CH 142 UNII



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UNII-3 BAND

Antenna Gain and Limit

Channel	Frequency (MHz)	Directional Gain for Power (dBi)	Directional Gain for PSD (dBi)	Power Limit (dBm)	PSD Limit (dBm)
142	5710	2.20	2.20	30.00	30.00

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

Output Power Results

Channel	Frequency (MHz)	Chain B Meas Power (dBm)	Chain A Meas Power (dBm)	Total Corr'd Power (dBm)	Power Limit (dBm)	Power Margin (dB)
142	5710	-1.95	-1.87	1.10	30.00	-28.90

PSD Results

Channel	Frequency (MHz)	Chain B Meas PSD (dBm)	Chain A Meas PSD (dBm)	Total Corr'd PSD (dBm)	PSD Limit (dBm)	PSD Margin (dB)
142	5710	-9.05	-8.90	-5.96	30.00	-35.96

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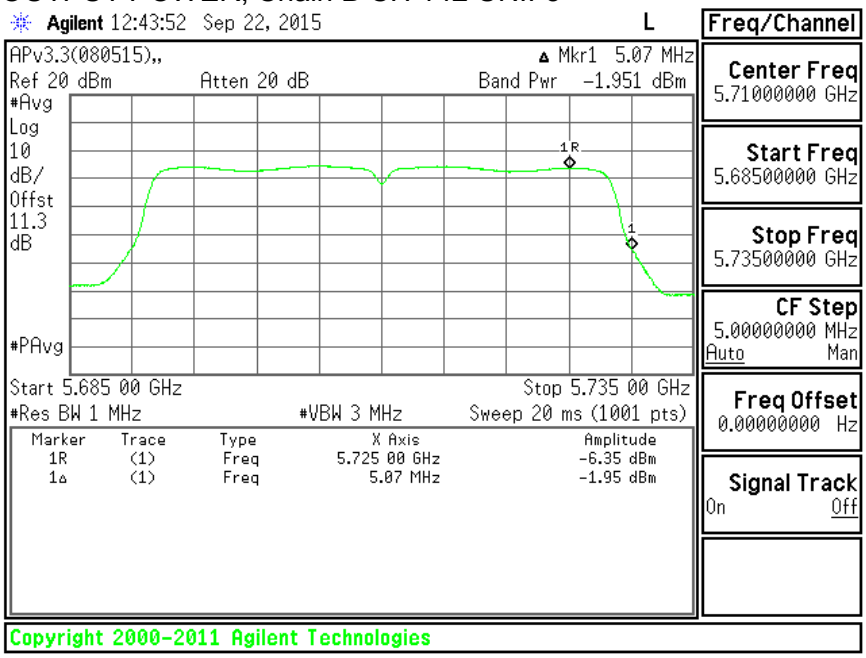
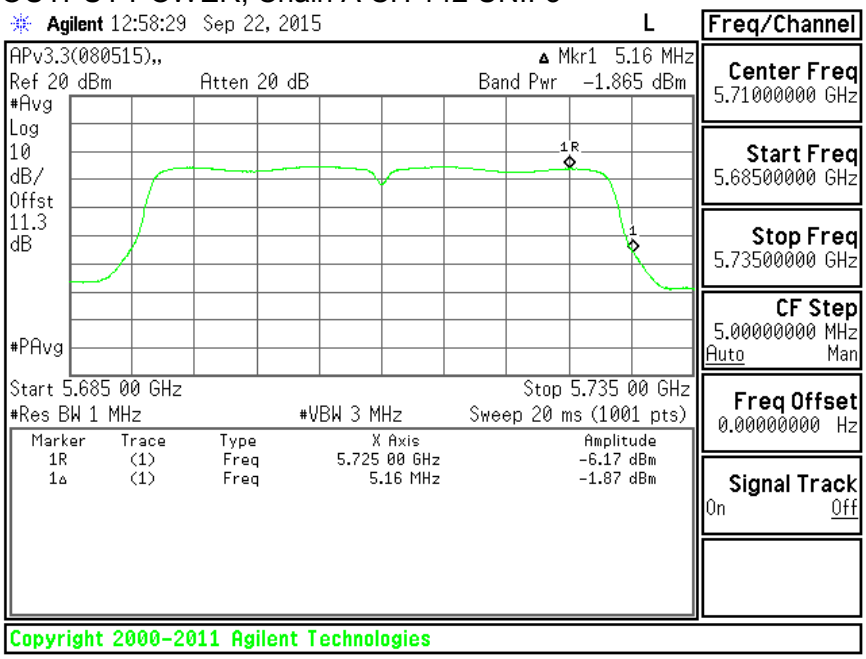
OUTPUT POWER, Chain B CH 142 UNII-3



OUTPUT POWER, Chain A CH 142 UNII-3



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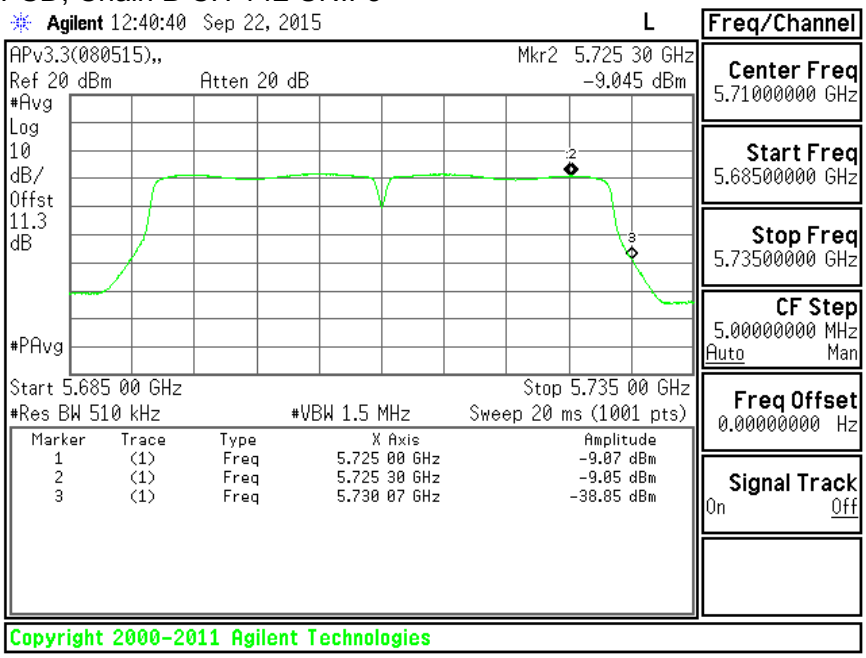
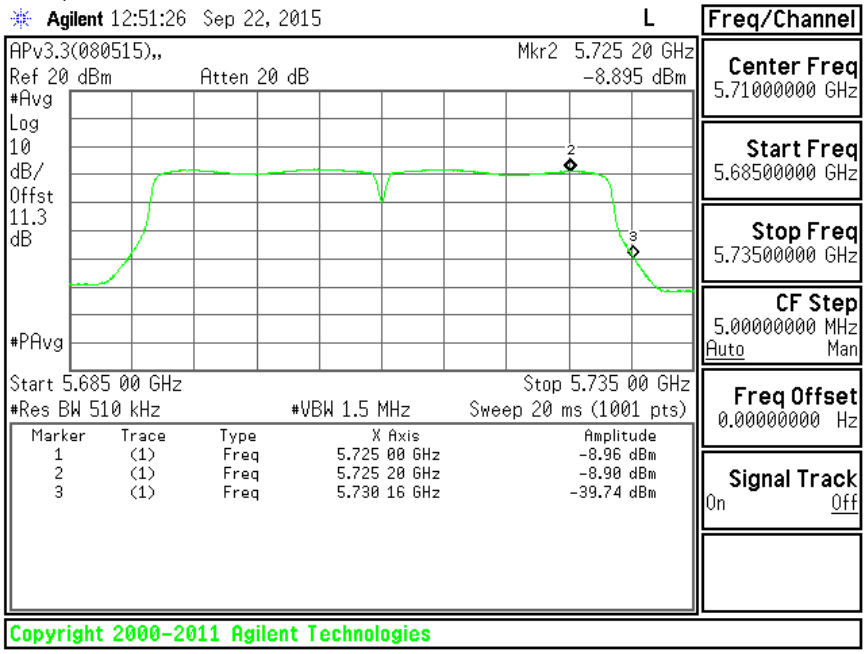
PSD, Chain B CH 142 UNII-3



PSD, Chain A CH 142 UNII-3



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8.12.4. TPC POWER

LIMITS

FCC §15.407 (h) (1)

Transmit power control (TPC). U-NII devices operating in the 5.25–5.35 GHz band and the 5.47–5.725 GHz band shall employ a TPC mechanism. The U-NII device is required to have the capability to operate at least 6 dB below the mean EIRP value of 30 dBm. A TPC mechanism is not required for systems with an e.i.r.p. of less than 500 mW.

DIRECTIONAL ANTENNA GAIN

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

Chain B Antenna Gain (dBi)	Chain A Antenna Gain (dBi)	Uncorrelated Chains Directional Gain (dBi)
2.10	2.30	2.20

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RESULTS

TPC Limits

Channel	Frequency (MHz)	Limit EIRP (dBm)	Directional Gain (dBi)	Limit Cond (dBm)
Low	5510	24	2.20	21.80
Mid	5550	24	2.20	21.80
High	5670	24	2.20	21.80

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

TPC Output Power Results

Channel	Frequency (MHz)	Chain B Meas Power (dBm)	Chain A Meas Power (dBm)	Total Corr'd Power (dBm)	Cond Power Limit (dBm)	Margin (dB)
Low	5510	8.52	8.48	11.51	21.80	-10.29
Mid	5550	8.57	8.54	11.57	21.80	-10.23
High	5670	8.59	8.28	11.45	21.80	-10.35

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8.13. 802.11ac VHT80 MODE IN THE 5.6 GHz BAND

8.13.1. 26 dB BANDWIDTH

LIMITS

None; for reporting purposes only.

RESULTS

Channel	Frequency (MHz)	26 dB BW Chain B (MHz)	26 dB BW Chain A (MHz)
Low	5530	81.55	81.50
High	5610	81.01	81.50
138	5690	81.80	81.01

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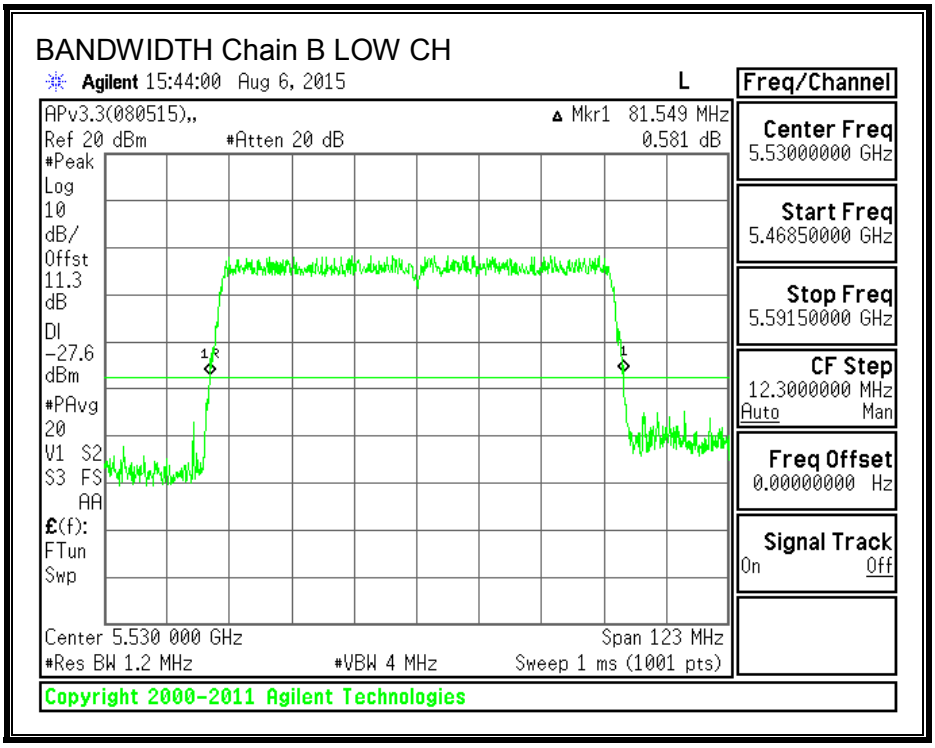
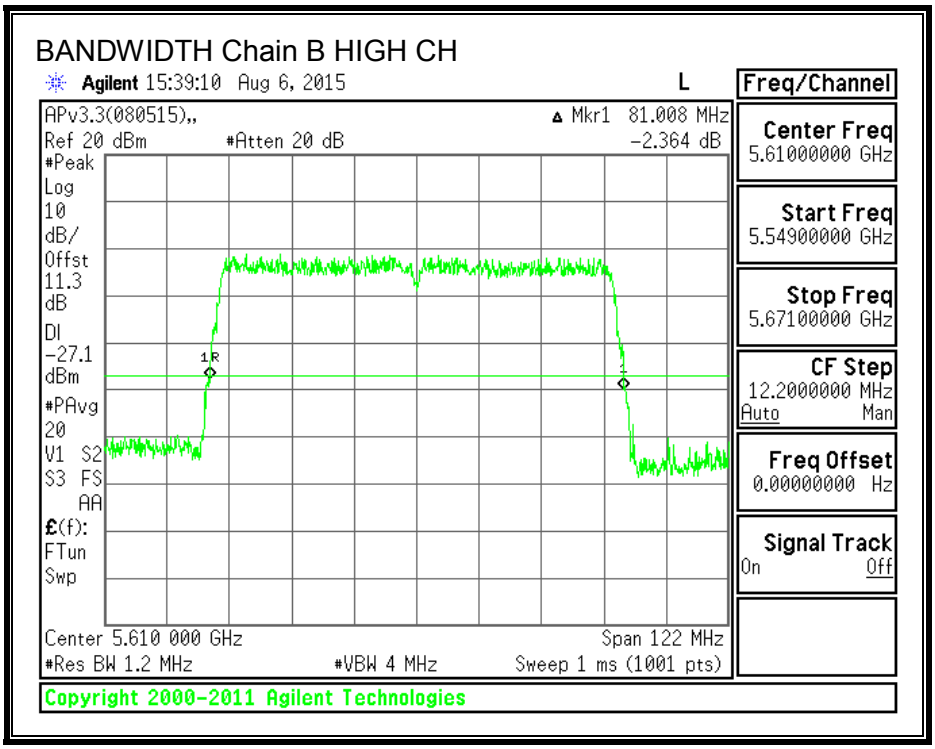
26 dB BANDWIDTH, Chain B





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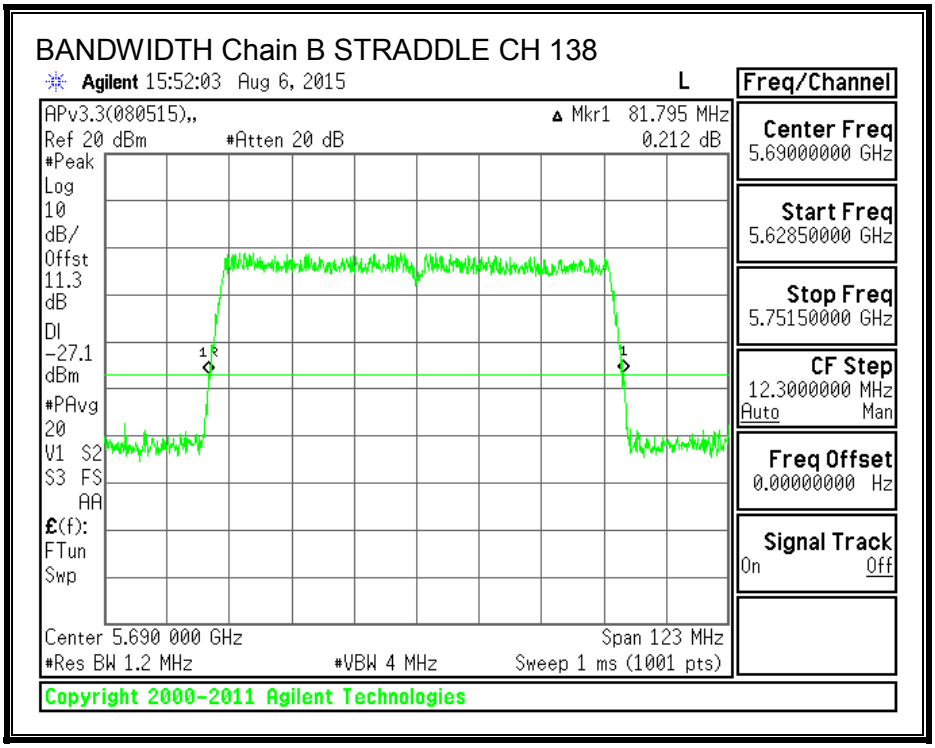
BANDWIDTH Chain B STRADDLE CH 138



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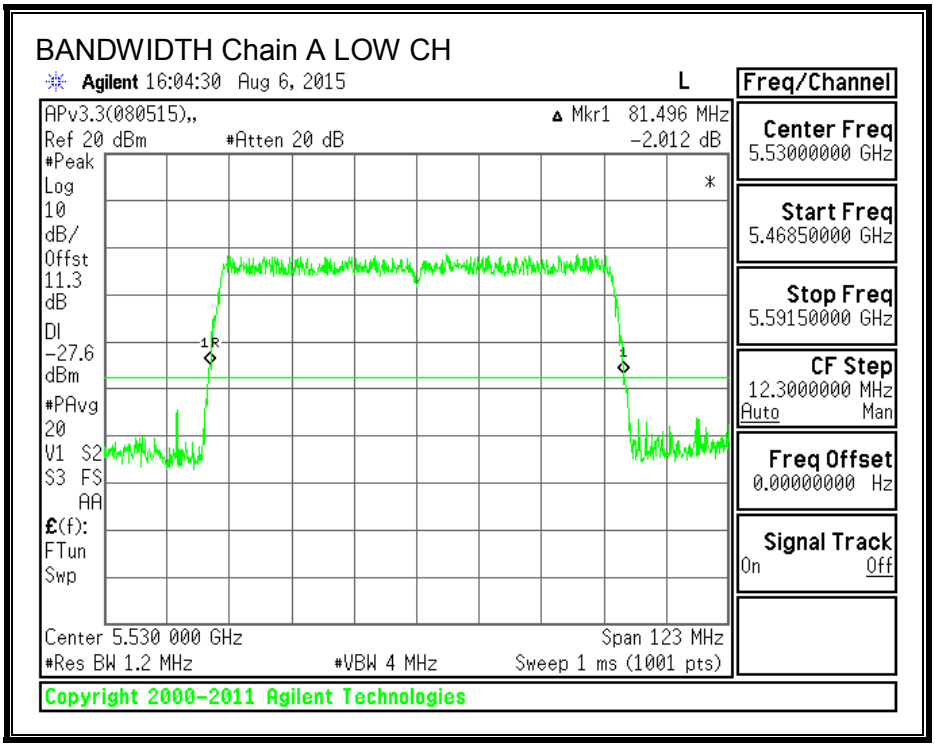
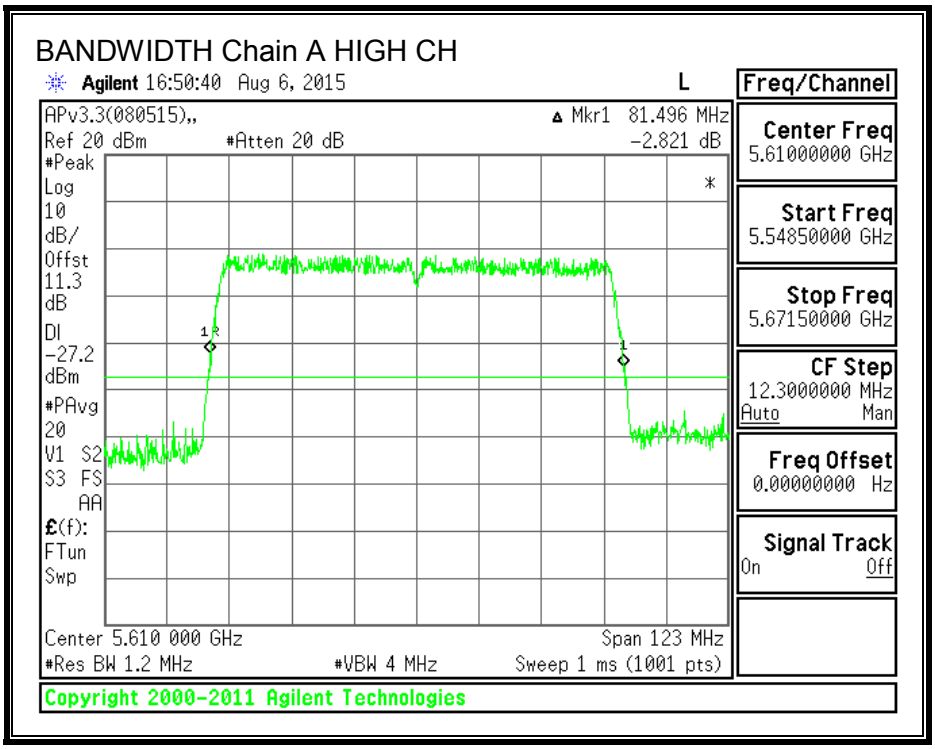
26 dB BANDWIDTH, Chain A





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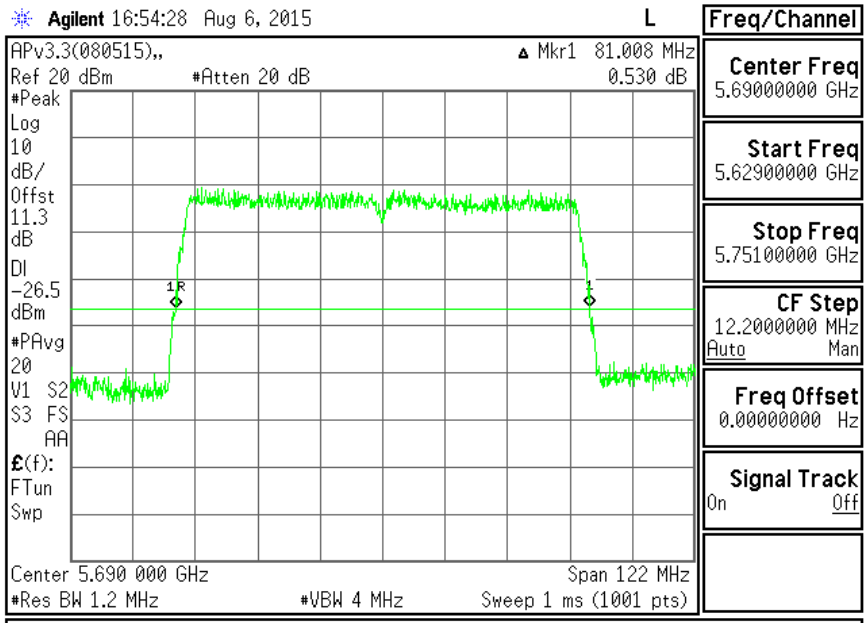
BANDWIDTH Chain A STRADDLE CH 138



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8.13.2. 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

RESULTS

Channel	Frequency (MHz)	99% BW Chain B (MHz)	99% BW Chain A (MHz)
Low	5530	76.0584	76.0690
High	5610	76.0978	76.0926
138	5690	76.0819	76.0870

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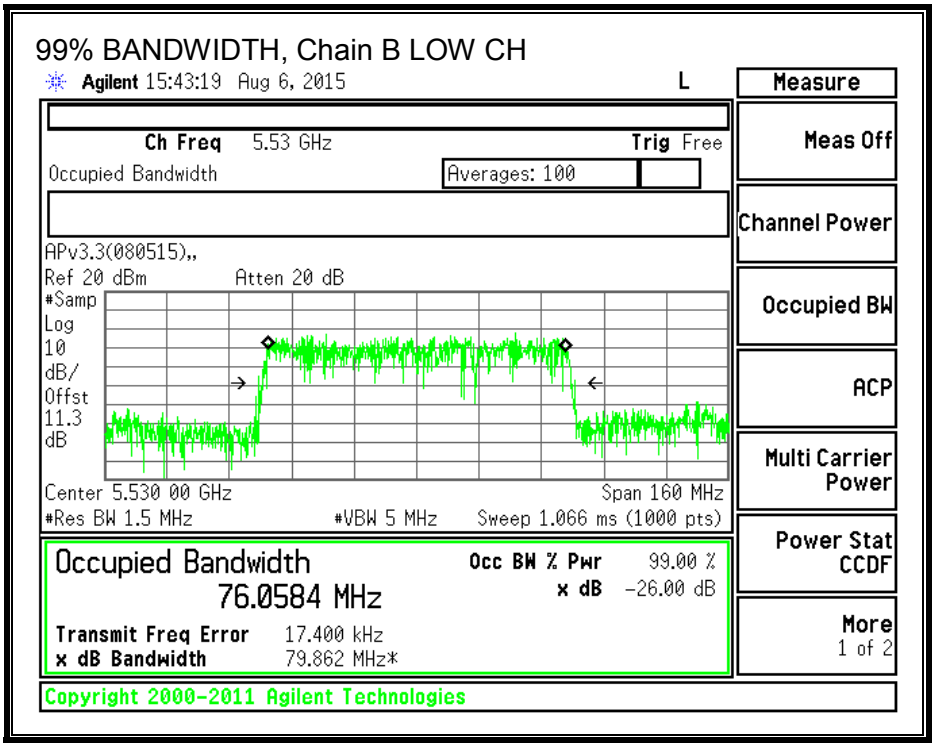
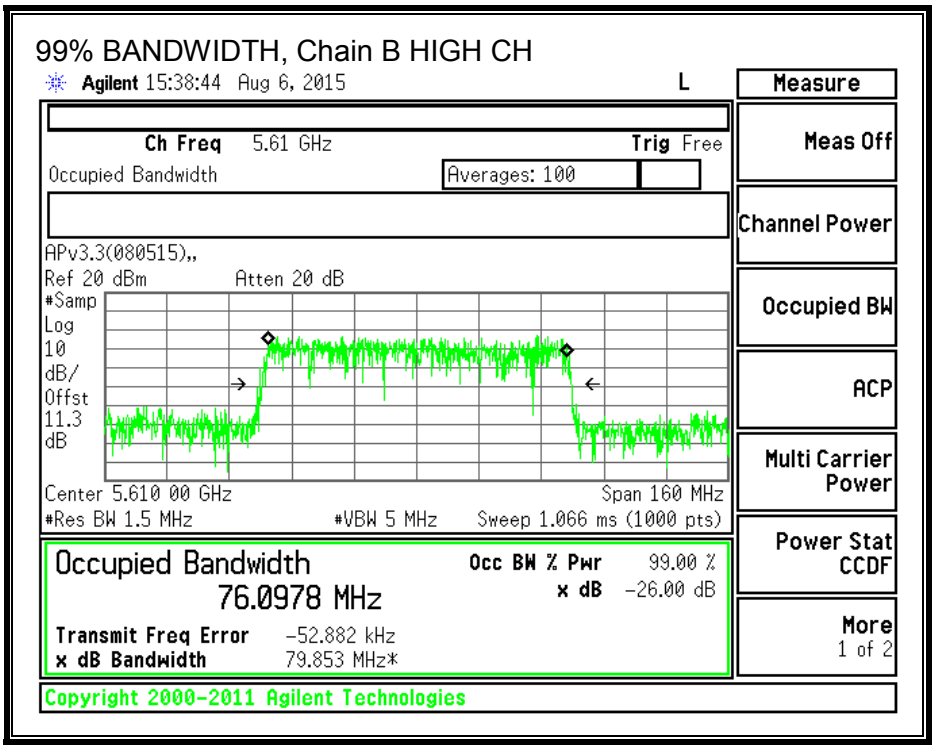
99% BANDWIDTH, Chain B





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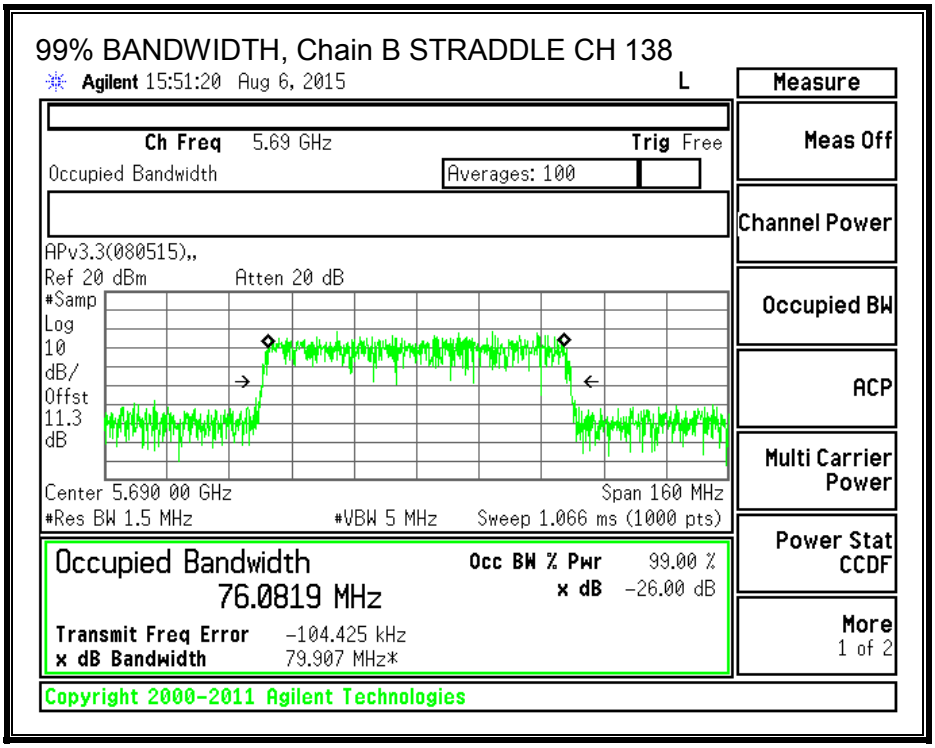

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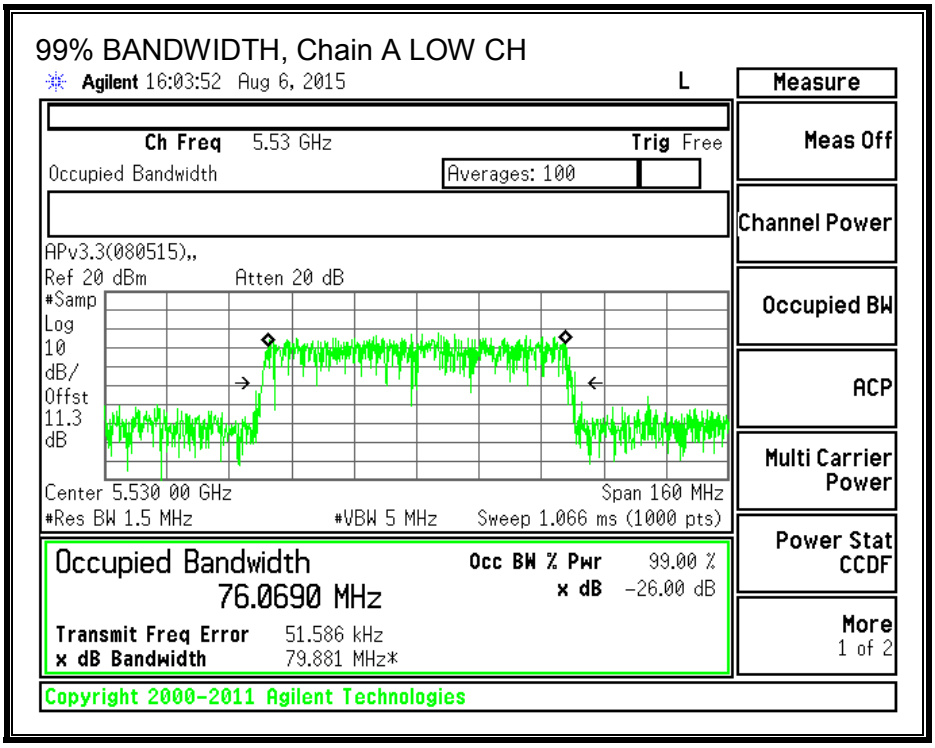
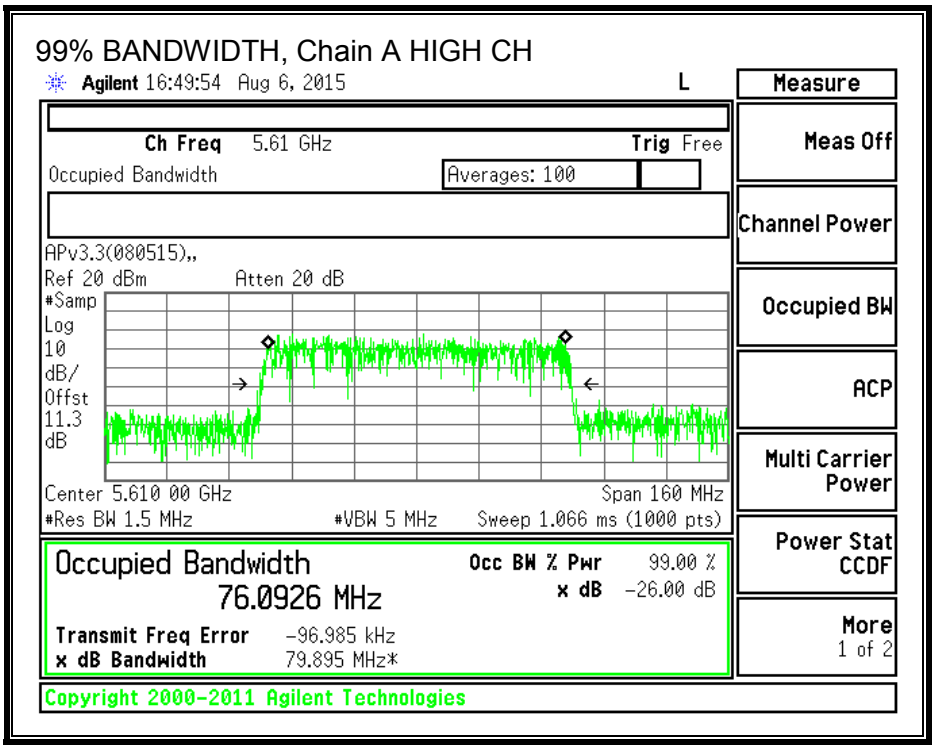
99% BANDWIDTH, Chain A





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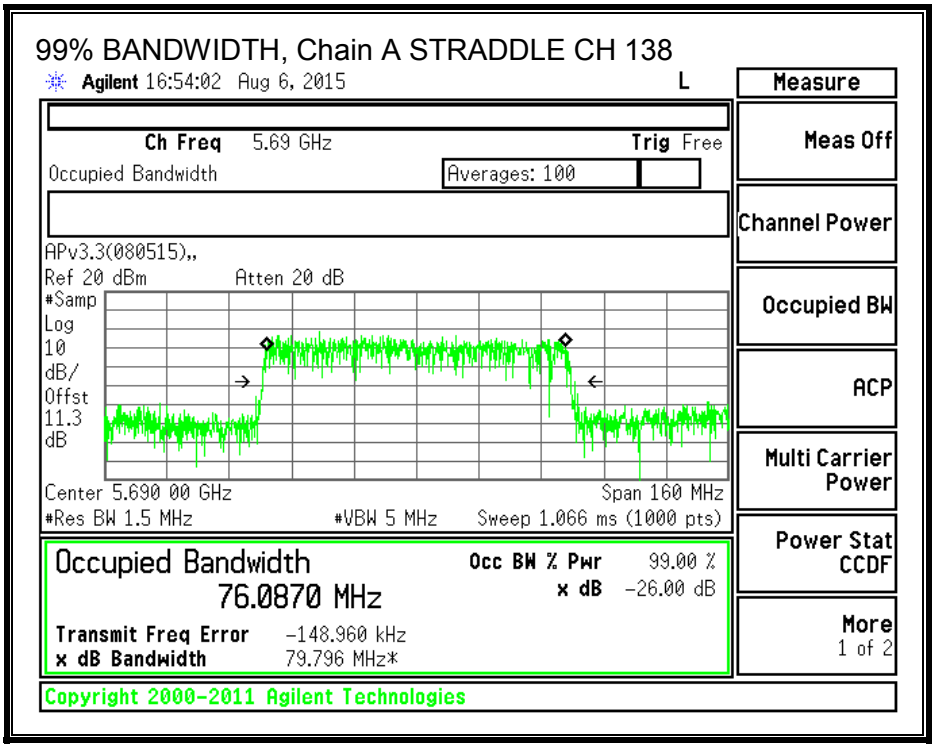
99% BANDWIDTH, Chain A STRADDLE CH 138



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8.13.3. OUTPUT POWER AND PSD

LIMITS

FCC §15.407 (a) (2)

For the band 5.47–5.725 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

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)
2.10	2.30	2.20

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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	5530	81.50	2.20	2.20	24.00	11.00
High	5610	81.01	2.20	2.20	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 B Meas Power (dBm)	Chain A Meas Power (dBm)	Total Corr'd Power (dBm)	Power Limit (dBm)	Power Margin (dB)
Low	5530	6.37	5.84	9.12	24.00	-14.88
High	5610	6.48	5.95	9.23	24.00	-14.77

PSD Results

Channel	Frequency (MHz)	Chain B Meas PSD (dBm)	Chain A Meas PSD (dBm)	Total Corr'd PSD (dBm)	PSD Limit (dBm)	PSD Margin (dB)
Low	5530	-12.44	-11.91	-9.16	11.00	-20.16
High	5610	-12.34	-11.58	-8.93	11.00	-19.93

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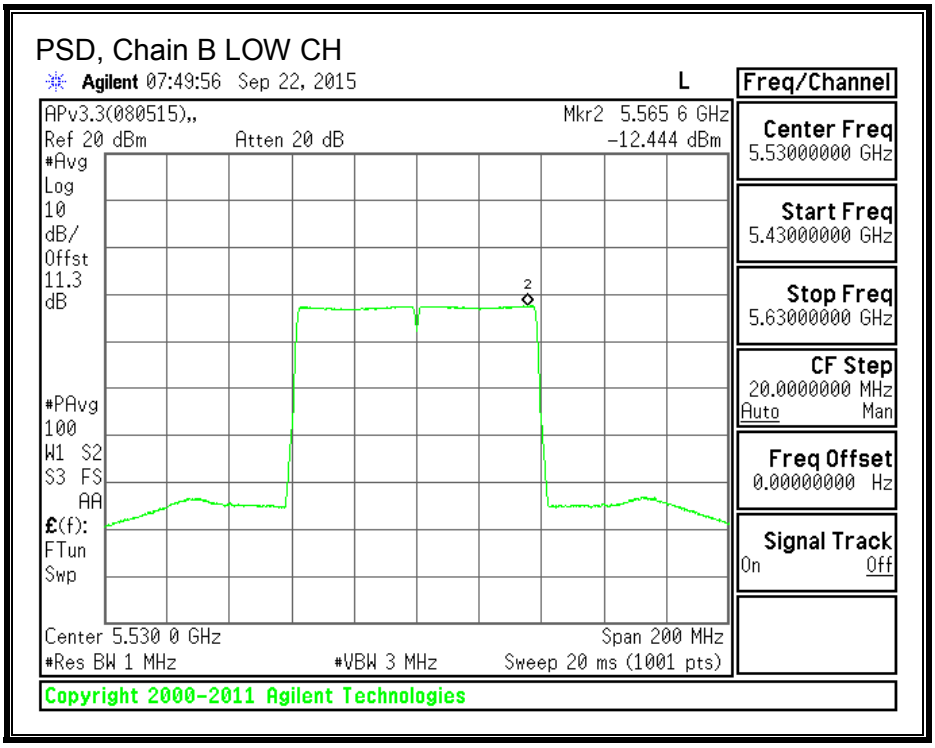
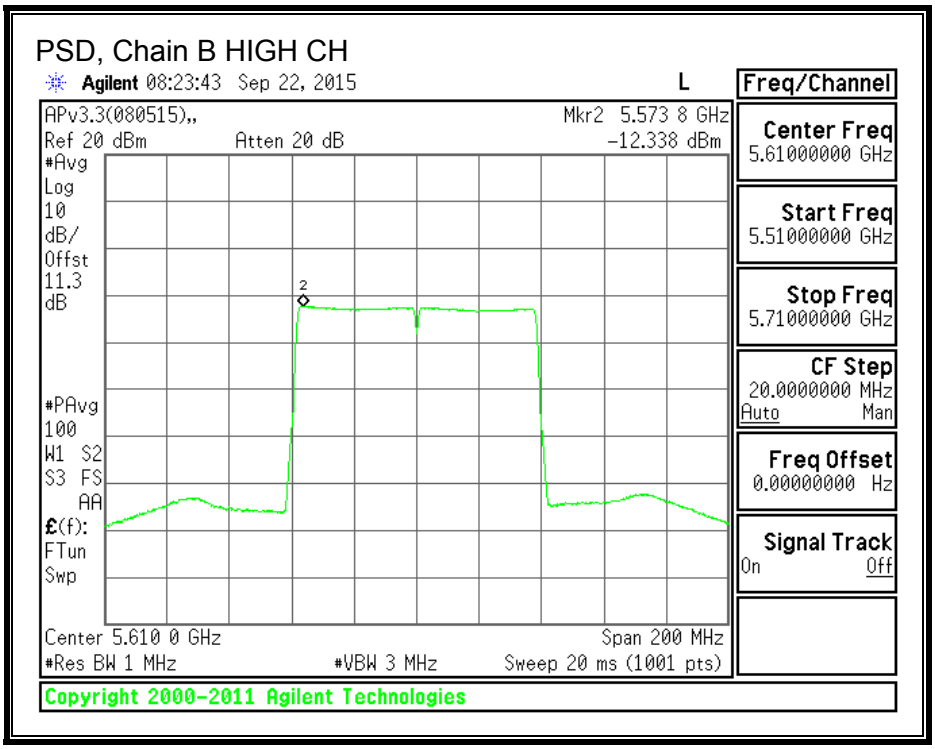
PSD, Chain B





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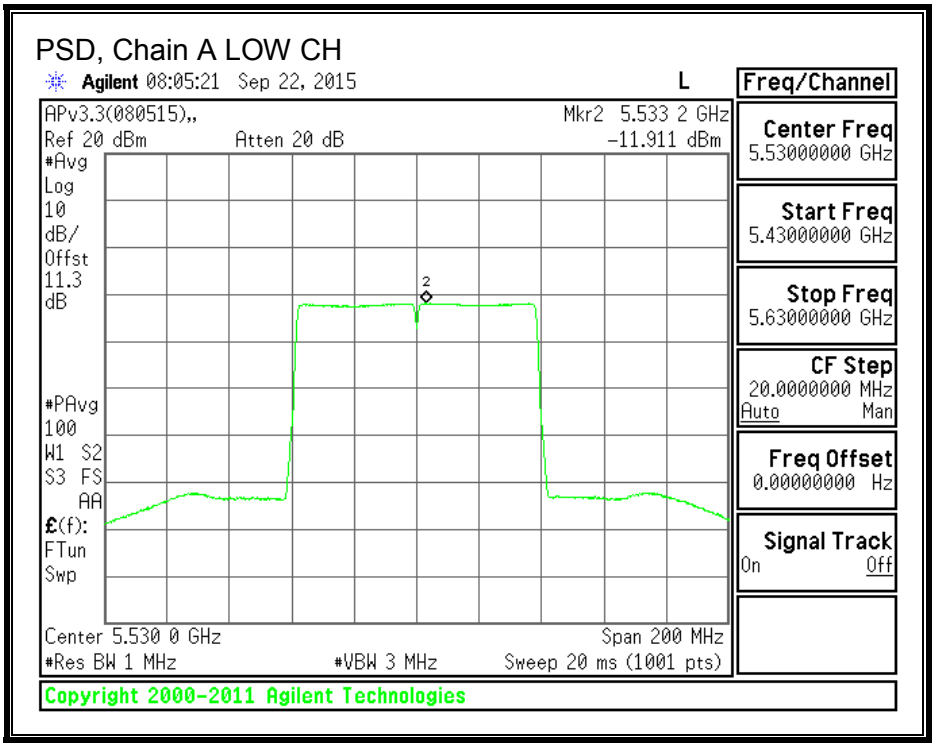
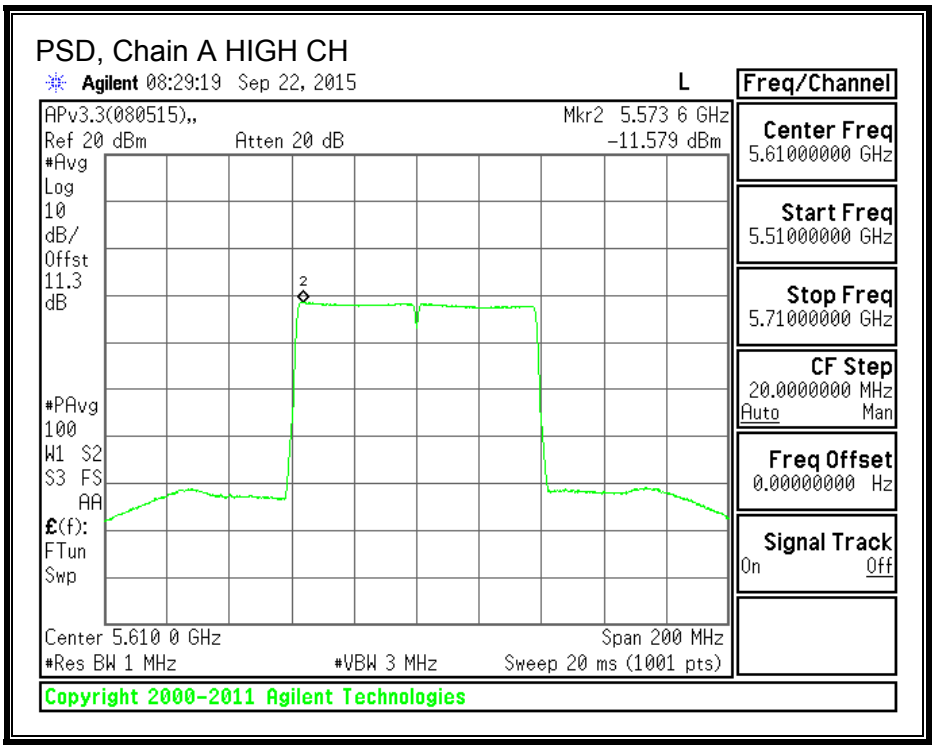
PSD, Chain A





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STRADDLE CHANNEL 138 RESULTS

UNII-2C BAND

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)
138	5690	81.01	2.20	2.20	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 B Meas Power (dBm)	Chain A Meas Power (dBm)	Total Corr'd Power (dBm)	Power Limit (dBm)	Power Margin (dB)
138	5690	5.92	6.55	9.26	24.00	-14.74

PSD Results

Channel	Frequency (MHz)	Chain B Meas PSD (dBm)	Chain A Meas PSD (dBm)	Total Corr'd PSD (dBm)	PSD Limit (dBm)	PSD Margin (dB)
138	5690	-11.71	-11.01	-8.34	11.00	-19.34

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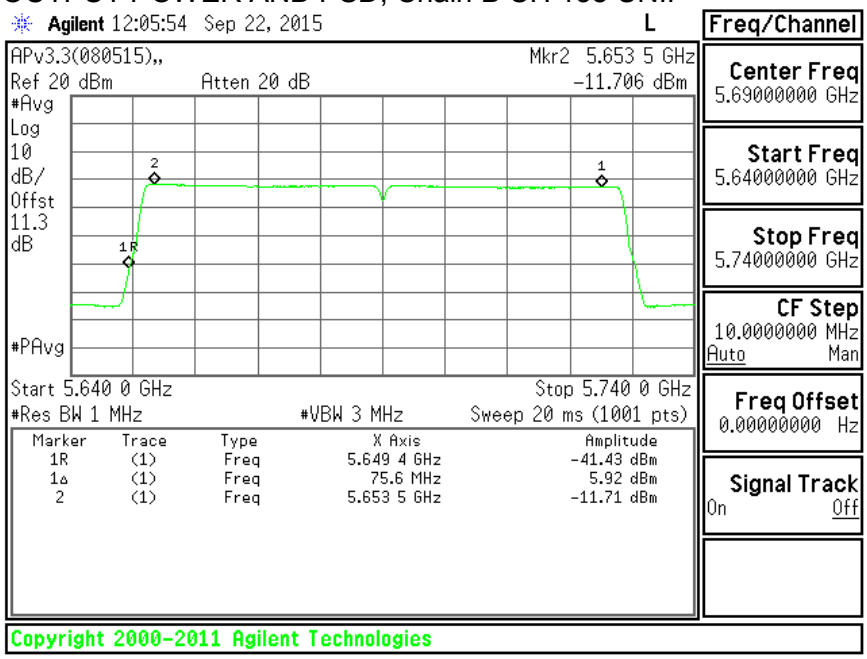
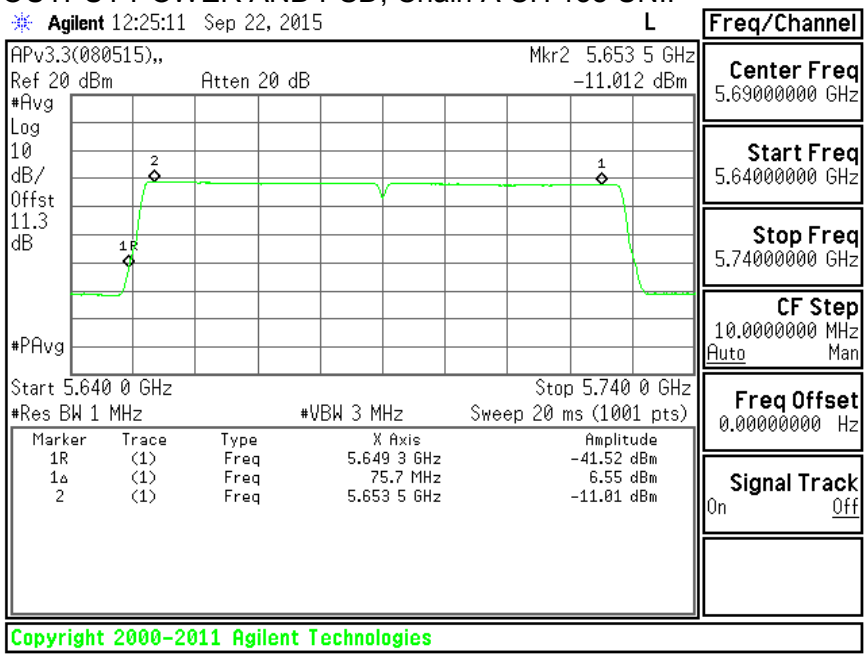
OUTPUT POWER AND PSD, Chain B CH 138 UNII



OUTPUT POWER AND PSD, Chain A CH 138 UNII



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UNII-3 BAND

Antenna Gain and Limit

Channel	Frequency (MHz)	Directional Gain for Power (dBi)	Directional Gain for PSD (dBi)	Power Limit (dBm)	PSD Limit (dBm)
138	5690	2.20	2.20	30.00	30.00

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)
138	5690	-7.69	-7.29	-4.48	30.00	-34.48

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)
138	5690	-15.38	-14.98	-12.17	30.00	-42.17

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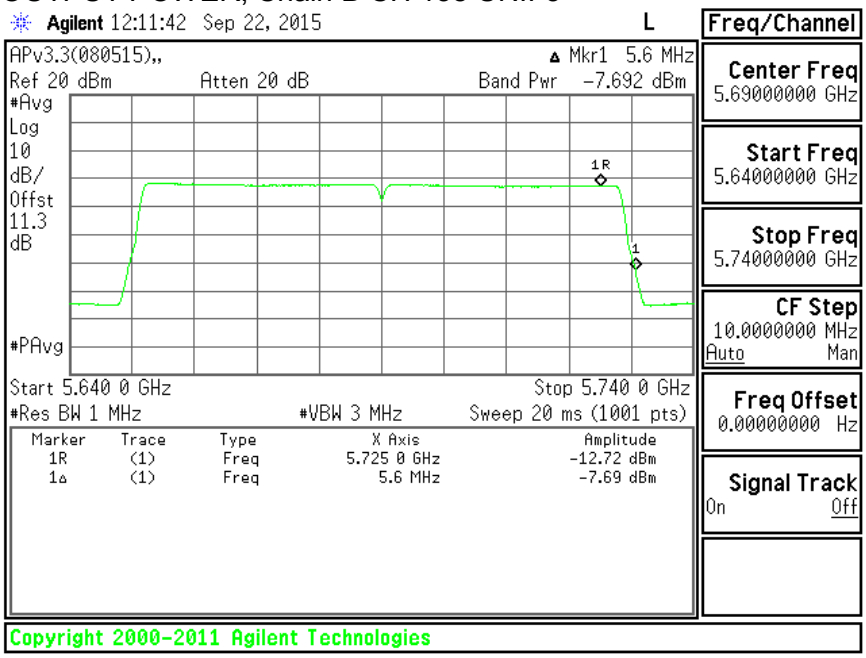
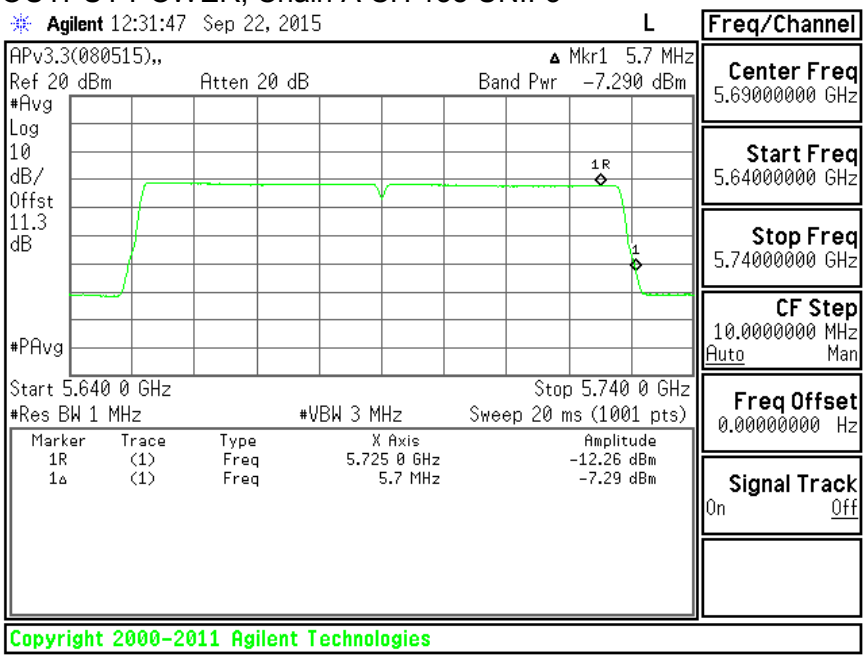
OUTPUT POWER, Chain B CH 138 UNII-3



OUTPUT POWER, Chain A CH 138 UNII-3



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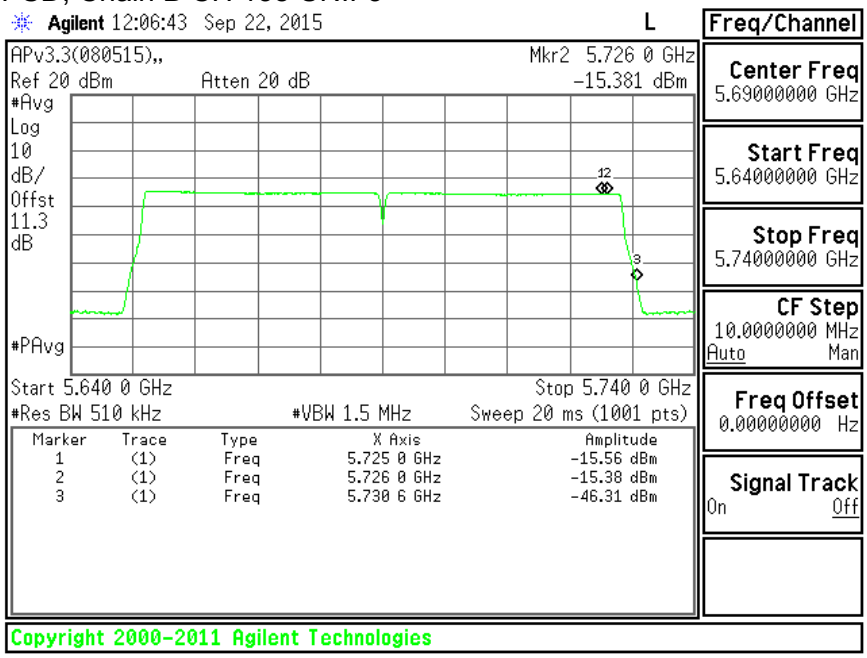
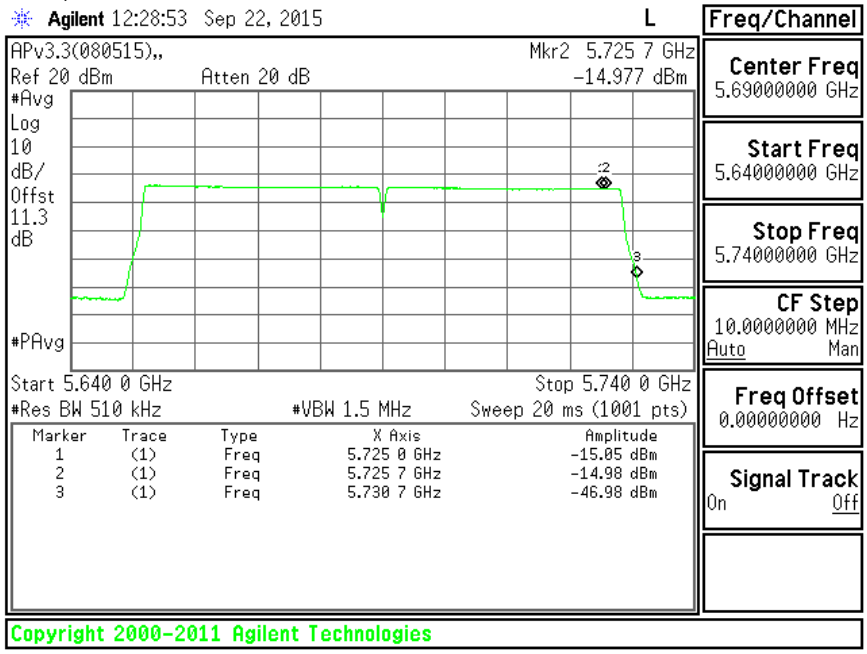
PSD, Chain B CH 138 UNII-3



PSD, Chain A CH 138 UNII-3



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8.13.4. TPC POWER

LIMITS

FCC §15.407 (h) (1)

Transmit power control (TPC). U-NII devices operating in the 5.25–5.35 GHz band and the 5.47–5.725 GHz band shall employ a TPC mechanism. The U-NII device is required to have the capability to operate at least 6 dB below the mean EIRP value of 30 dBm. A TPC mechanism is not required for systems with an e.i.r.p. of less than 500 mW.

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)
2.10	2.30	2.20

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RESULTS

TPC Limits

Channel	Frequency (MHz)	Limit EIRP (dBm)	Directional Gain (dBi)	Limit Cond (dBm)
Low	5530	24	2.20	21.80
Mid	5610	24	2.20	21.80

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

TPC Output Power Results

Channel	Frequency (MHz)	Chain 0 Meas Power (dBm)	Chain 1 Meas Power (dBm)	Total Corr'd Power (dBm)	Cond Power Limit (dBm)	Margin (dB)
Low	5530	6.37	5.84	9.12	21.80	-12.68
Mid	5610	6.48	5.95	9.23	21.80	-12.57

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8.14. 802.11a MODE IN THE 5.8 GHz BAND

8.14.1. 6 dB BANDWIDTH

LIMITS

FCC §15.407 (e)

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

RESULTS

Channel	Frequency (MHz)	6 dB BW Chain B (MHz)	6 dB BW Chain A (MHz)	Minimum Limit (MHz)
Low	5745	16.4500	16.3750	0.5
Mid	5785	16.4000	16.3750	0.5
High	5825	16.4000	16.5750	0.5

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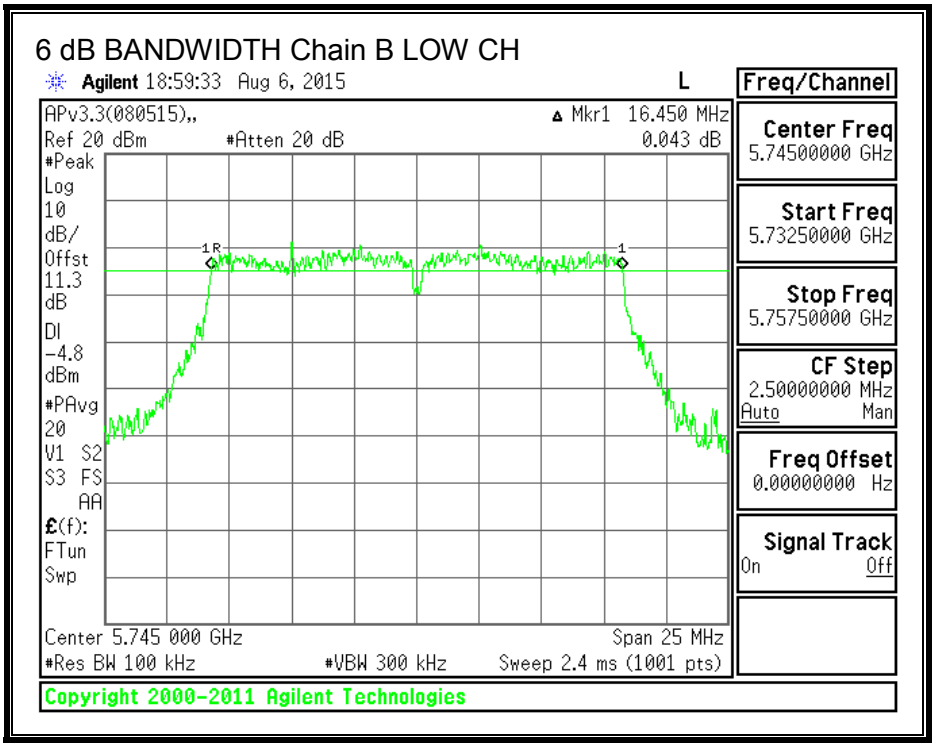
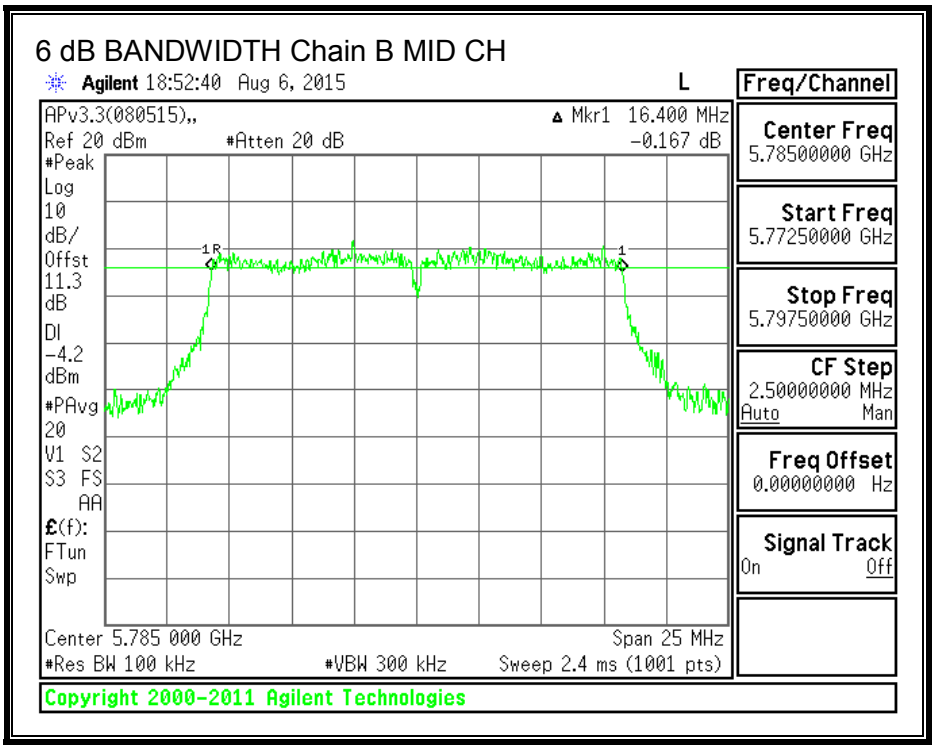
6 dB BANDWIDTH, Chain B





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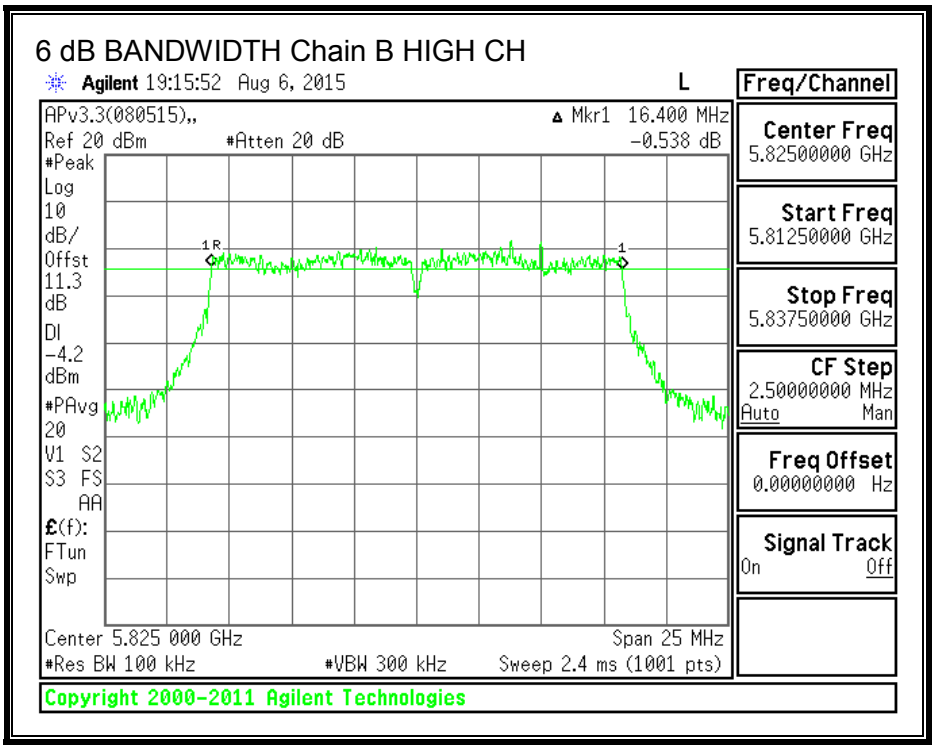
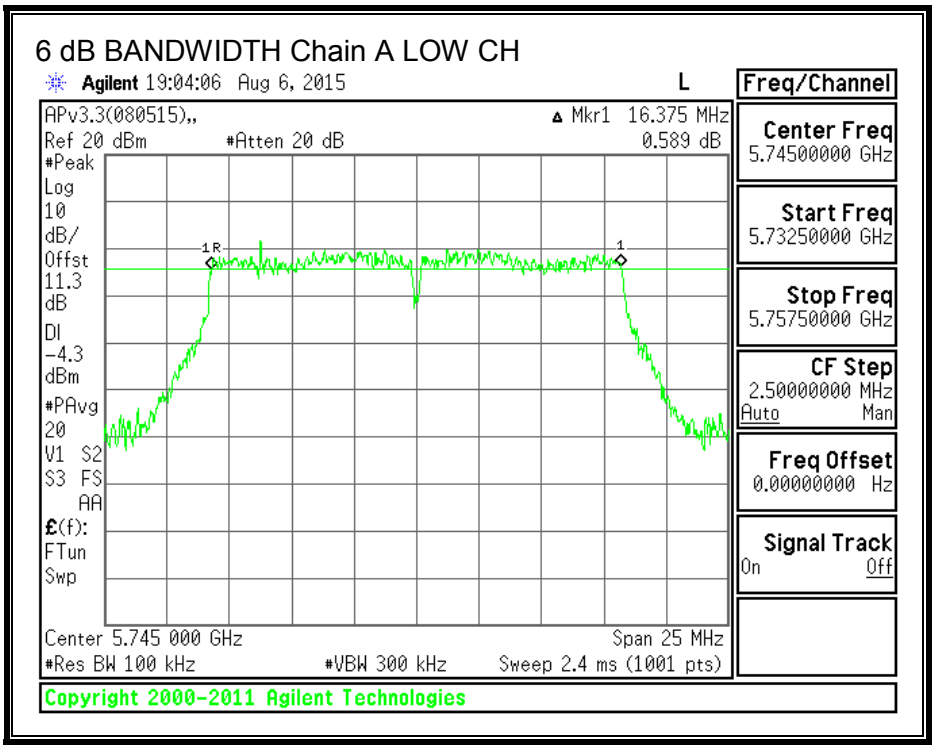


6 dB BANDWIDTH, Chain A



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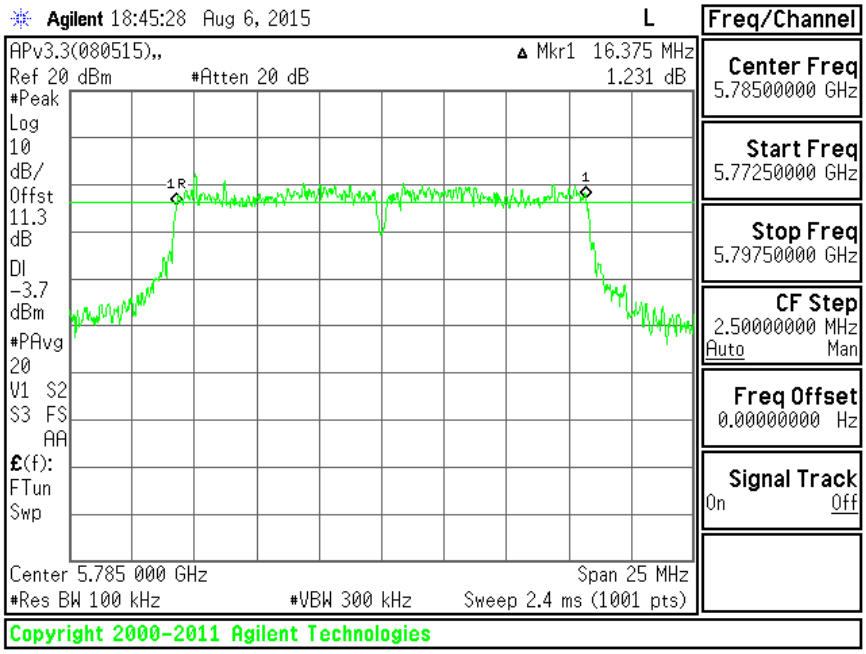
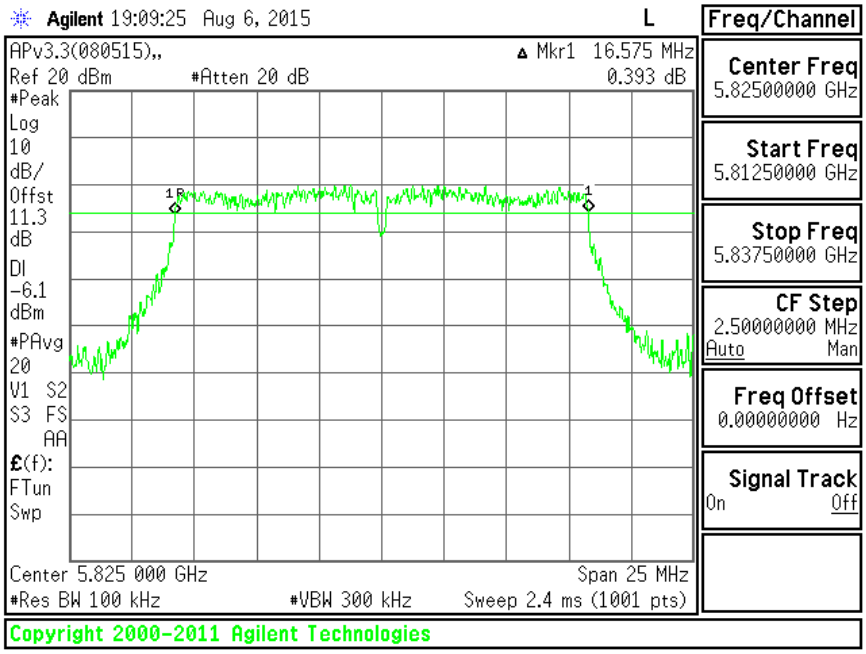
6 dB BANDWIDTH Chain A MID CH



6 dB BANDWIDTH Chain A HIGH CH



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8.14.2. 26 dB BANDWIDTH

LIMITS

None; for reporting purposes only.

RESULTS

Channel	Frequency (MHz)	26 dB BW Chain B (MHz)	26 dB BW Chain A (MHz)
Low	5745	19.59	19.59
Mid	5785	19.74	22.33
High	5825	19.26	19.56

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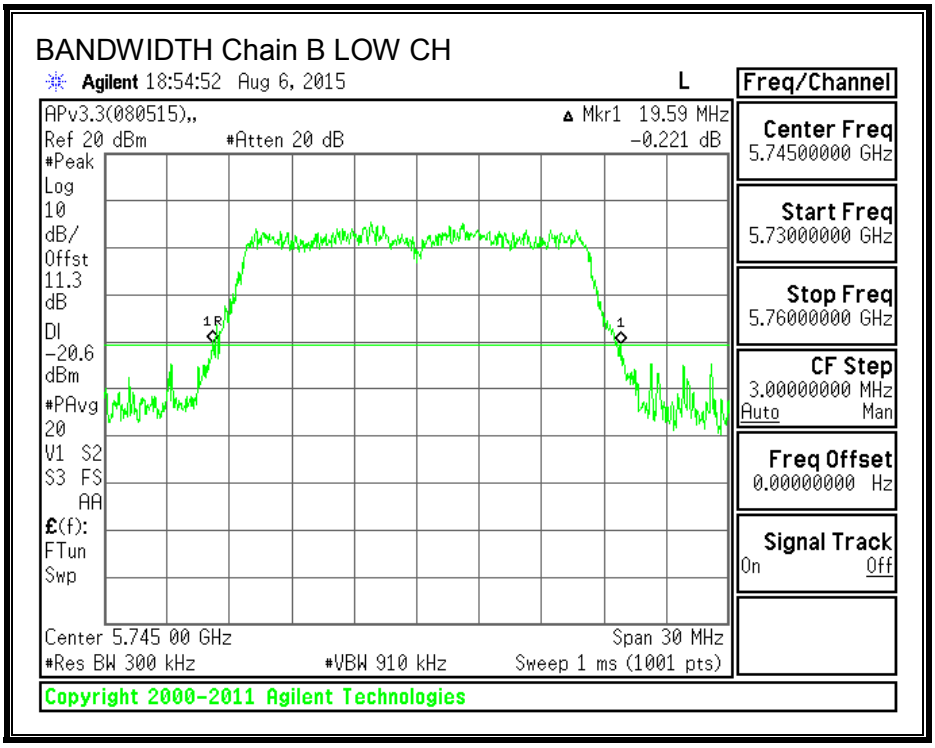
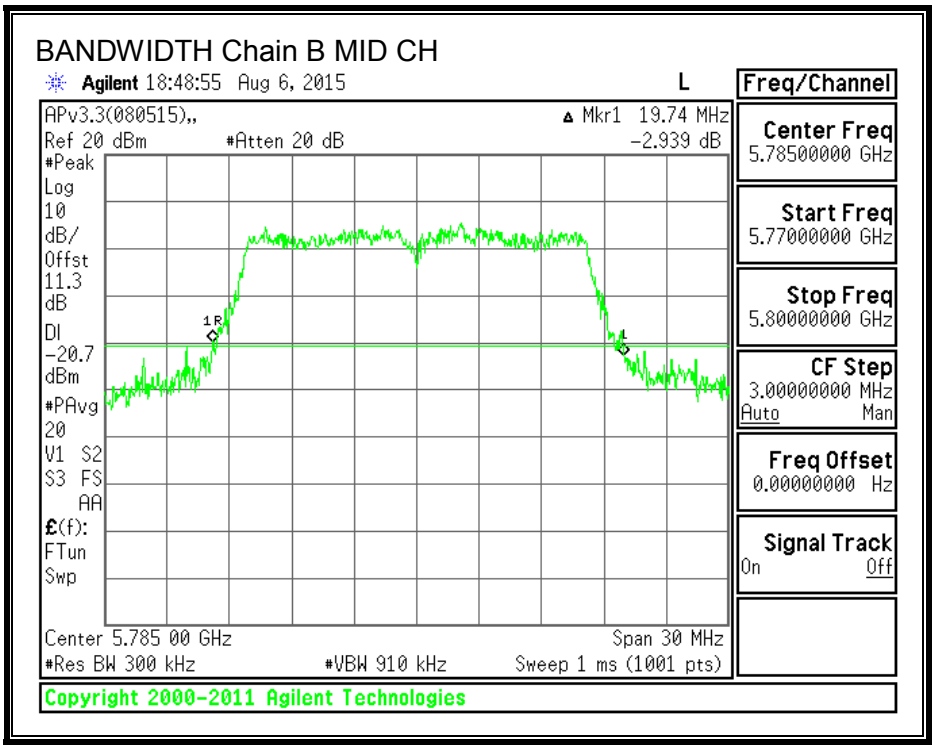
26 dB BANDWIDTH, Chain B





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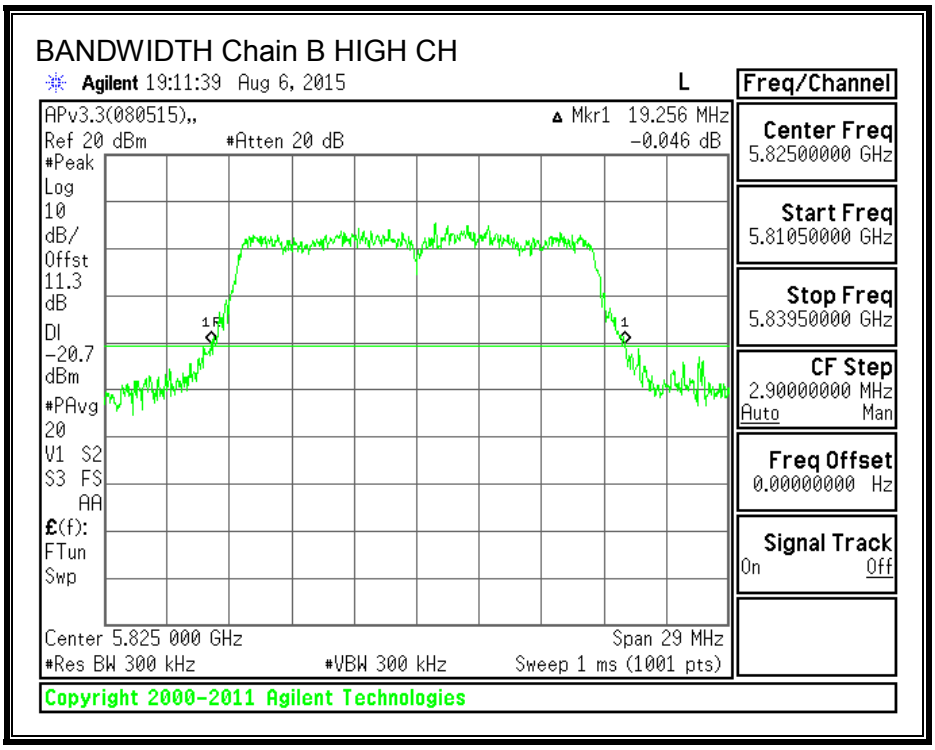
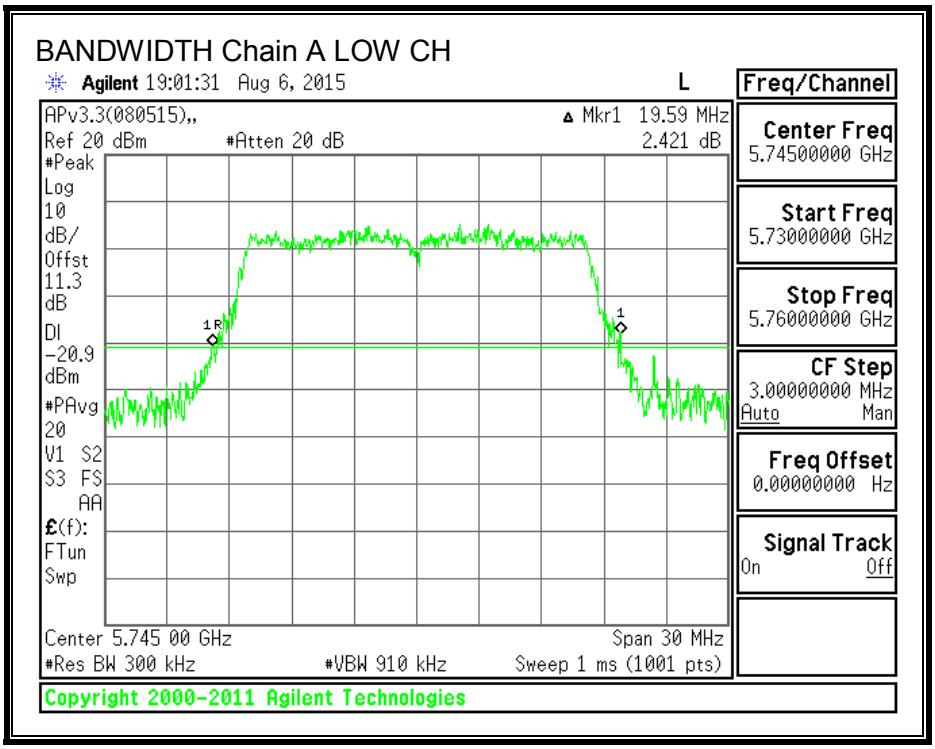


26 dB BANDWIDTH, Chain A



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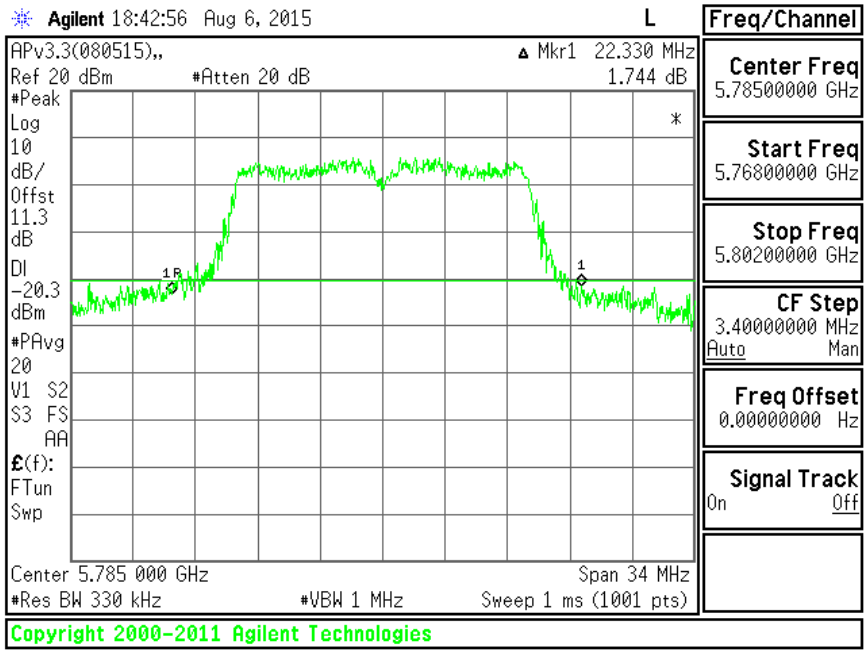
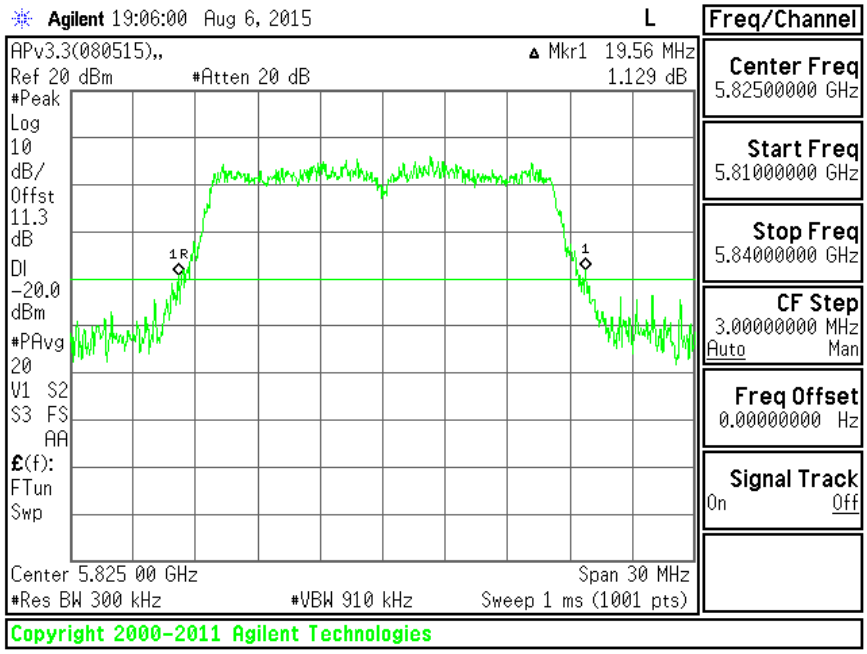
BANDWIDTH Chain A MID CH



BANDWIDTH Chain A HIGH CH



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8.14.3. 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

RESULTS

Channel	Frequency (MHz)	99% BW Chain B (MHz)	99% BW Chain A (MHz)
Low	5745	16.5067	16.5016
Mid	5785	16.5275	16.5640
High	5825	16.5256	16.5255

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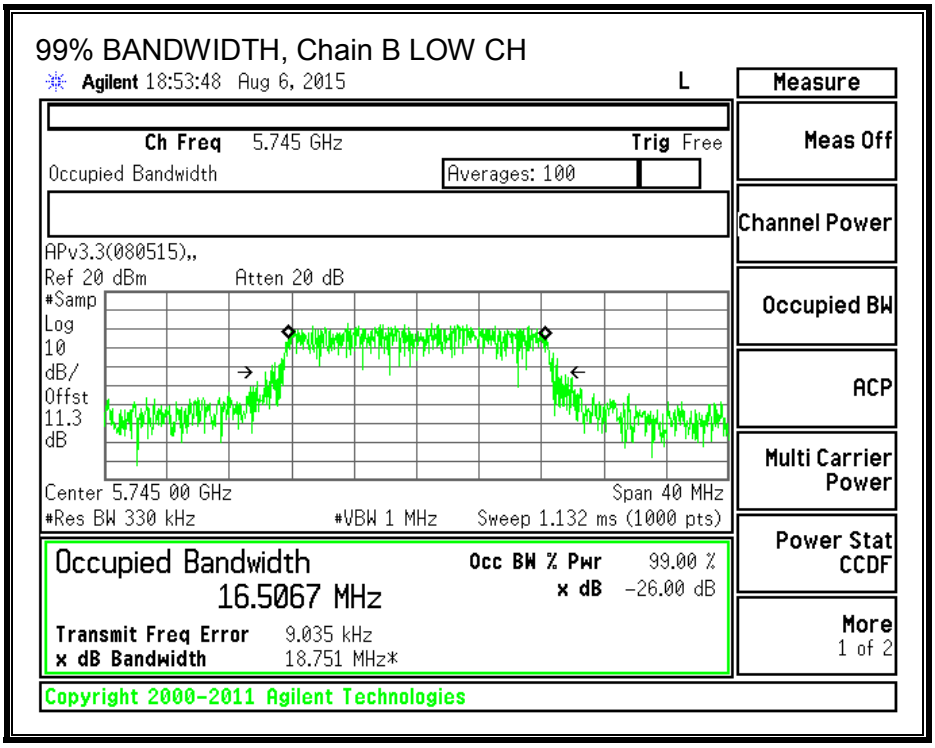
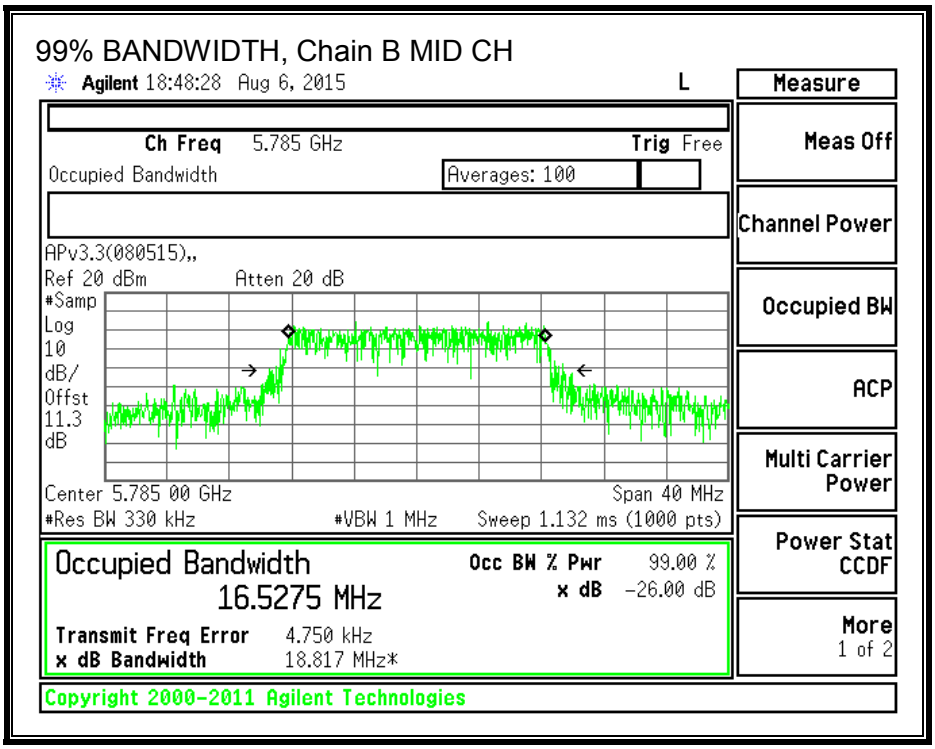
99% BANDWIDTH, Chain B





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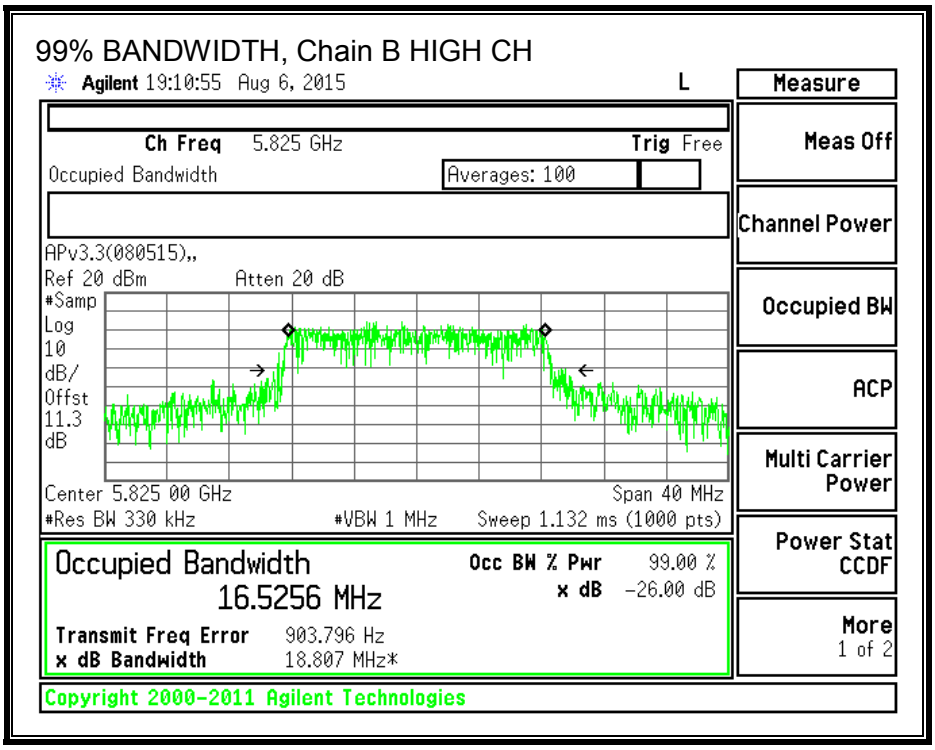
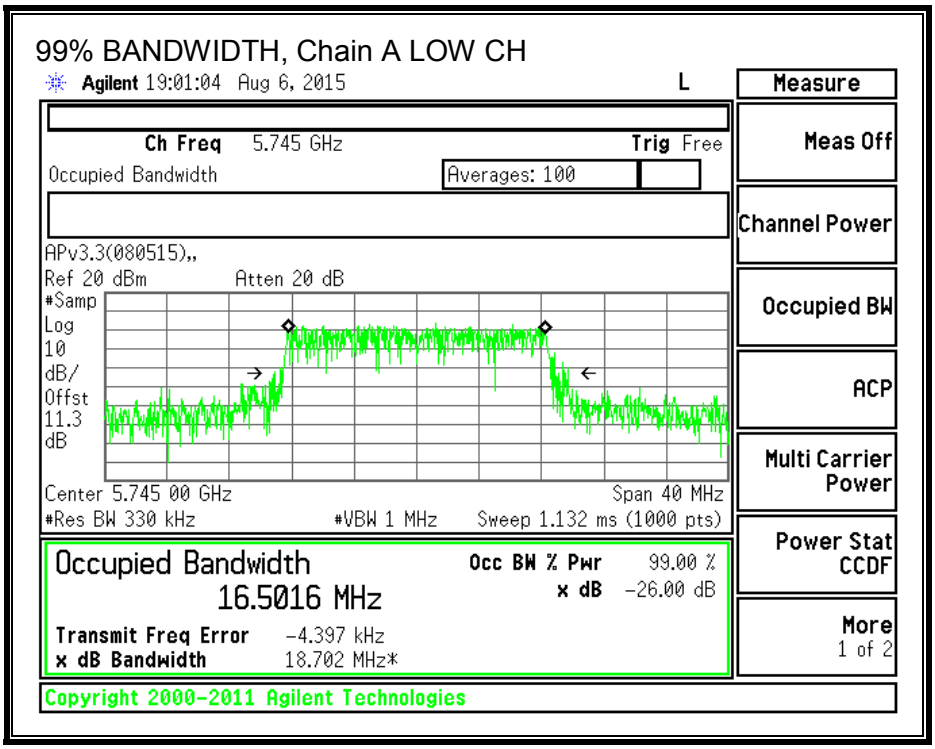


99% BANDWIDTH, Chain A



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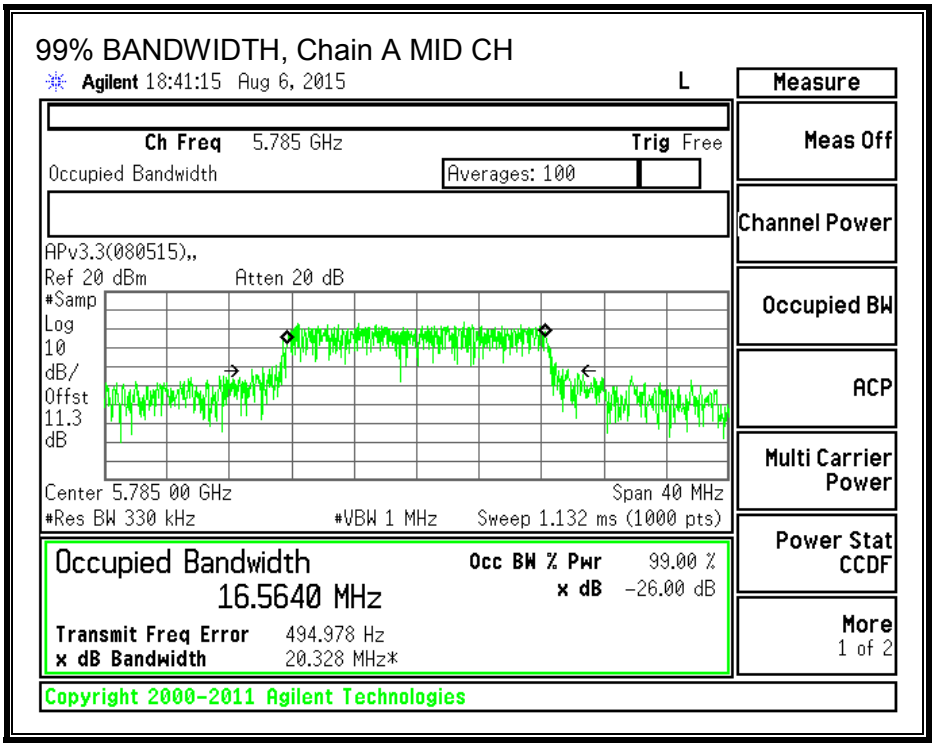

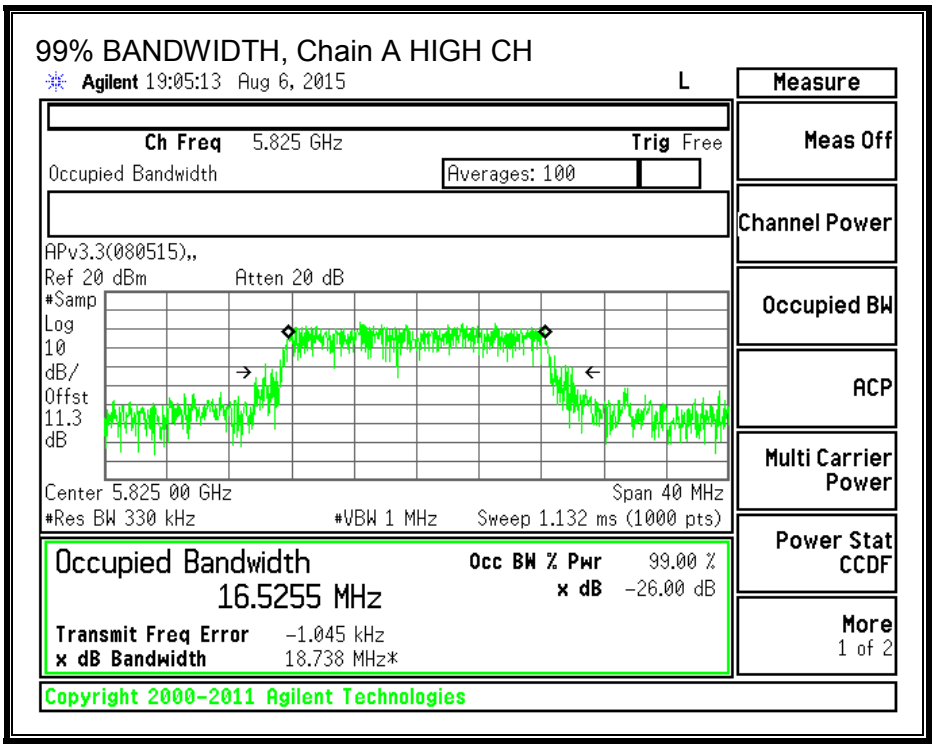

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8.14.4. OUTPUT POWER

LIMITS

FCC §15.407 (a) (3)

For the band 5.725-5.85 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. In addition, the maximum power spectral density shall not exceed 30 dBm in any 500-kHz 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 B Antenna Gain (dBi)	Chain A Antenna Gain (dBi)	Uncorrelated Chains Directional Gain (dBi)
1.40	1.70	1.55

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RESULTS

Antenna Gain and Limit

Channel	Frequency (MHz)	Directional Gain for Power (dBi)	Power Limit (dBm)
Low	5745	1.55	30.00
Mid	5785	1.55	30.00
High	5825	1.55	30.00

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

Output Power Results

Channel	Frequency (MHz)	Chain B Meas Power (dBm)	Chain A Meas Power (dBm)	Total Corr'd Power (dBm)	Power Limit (dBm)	Power Margin (dB)
Low	5745	9.40	9.66	12.66	30.00	-17.34
Mid	5785	9.34	9.37	12.49	30.00	-17.51
High	5825	9.48	9.62	12.68	30.00	-17.32

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8.14.5. Maximum Power Spectral Density (PSD)

LIMITS

FCC §15.407 (a) (3)

For the band 5.725-5.85 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. In addition, the maximum power spectral density shall not exceed 30 dBm in any 500-kHz 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 B Antenna Gain (dBi)	Chain A Antenna Gain (dBi)	Uncorrelated Chains Directional Gain (dBi)
1.40	1.70	1.55

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RESULTS

Antenna Gain and Limits

Channel	Frequency (MHz)	Directional Gain (dBi)	PSD Limit (dBm)
Low	5745	1.55	30.00
Mid	5785	1.55	30.00
High	5825	1.55	30.00

Duty Cycle CF (dB)	0.12	Included in Calculations of Corr'd PSD

PSD Results

Channel	Frequency (MHz)	Chain B Meas PSD (dBm)	Chain A Meas PSD (dBm)	Total Corr'd PSD (dBm)	PSD Limit (dBm)	PSD Margin (dB)
Low	5745	-3.53	-3.70	-0.48	30.00	-30.48
Mid	5785	-3.59	-3.42	-0.37	30.00	-30.37
High	5825	-3.68	-3.54	-0.48	30.00	-30.48

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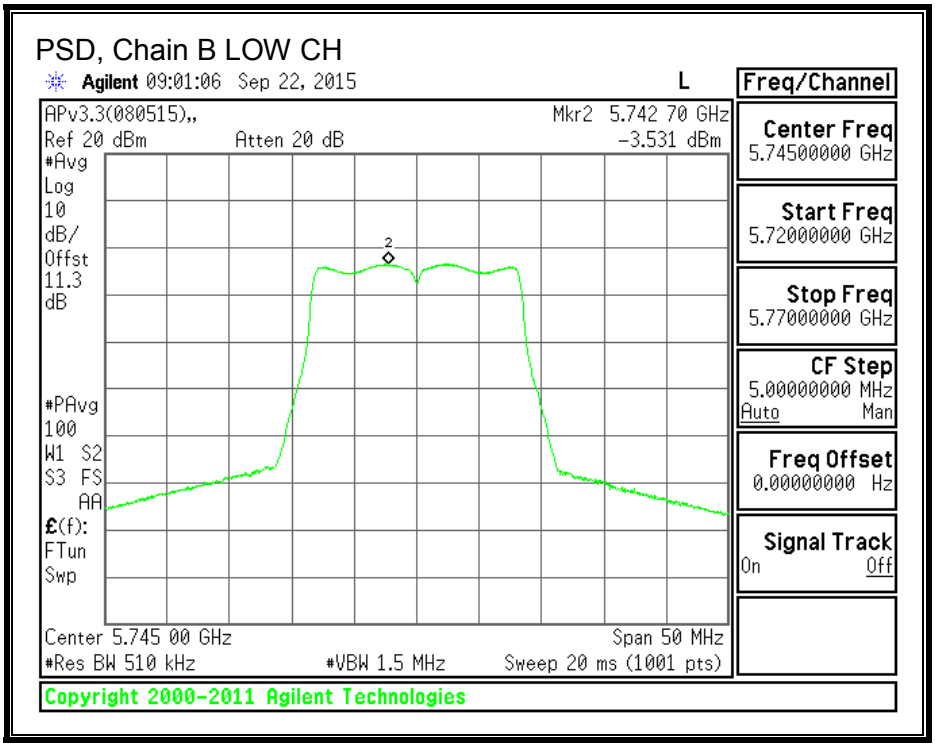
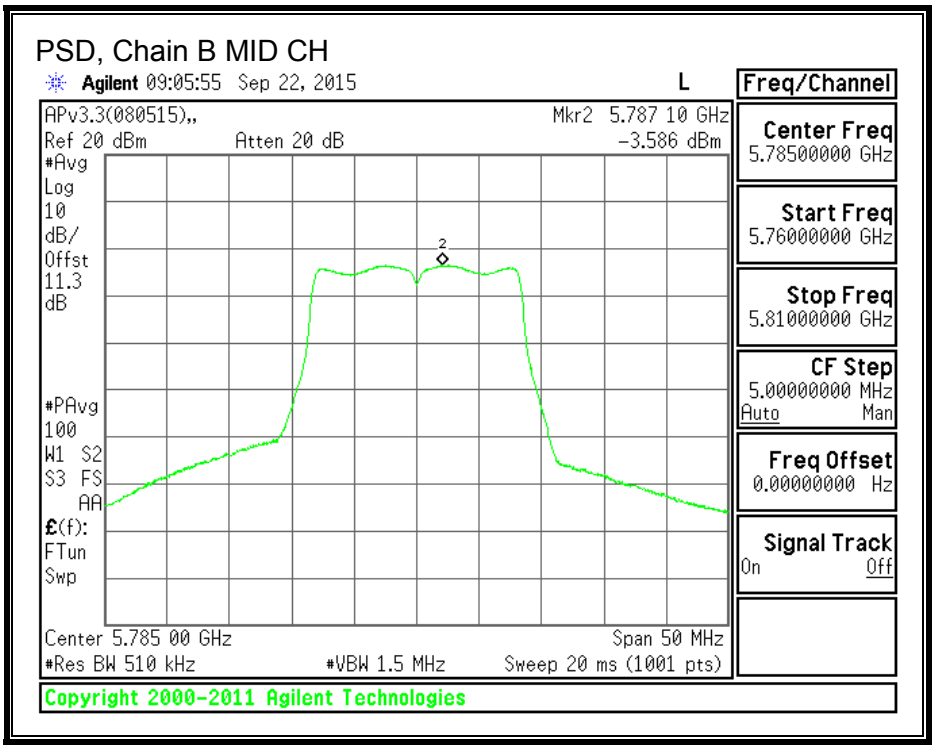
PSD, Chain B





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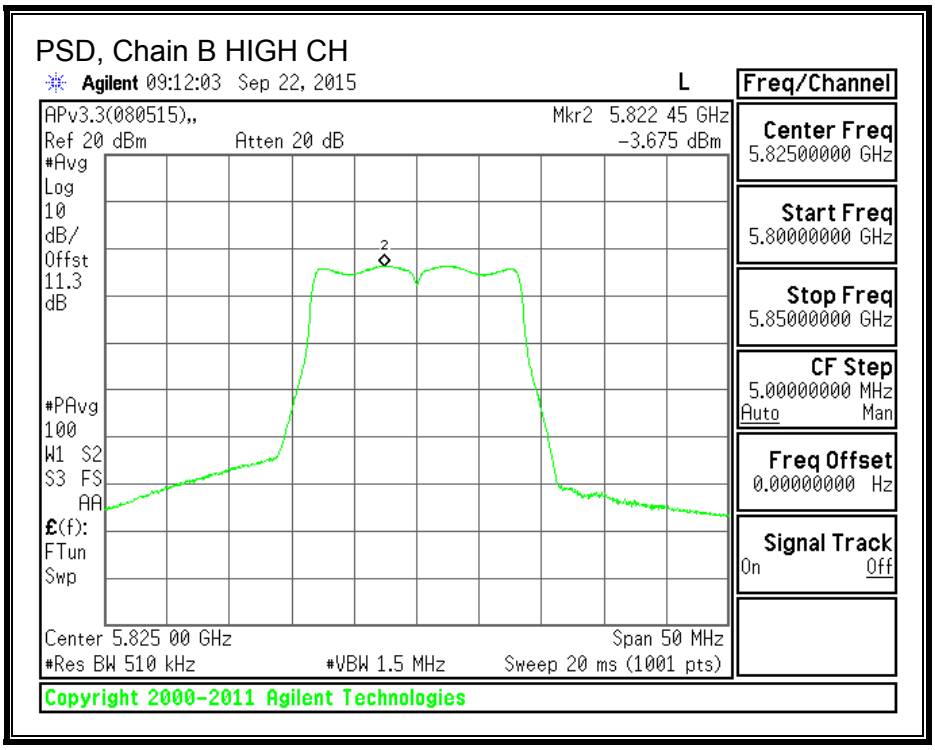
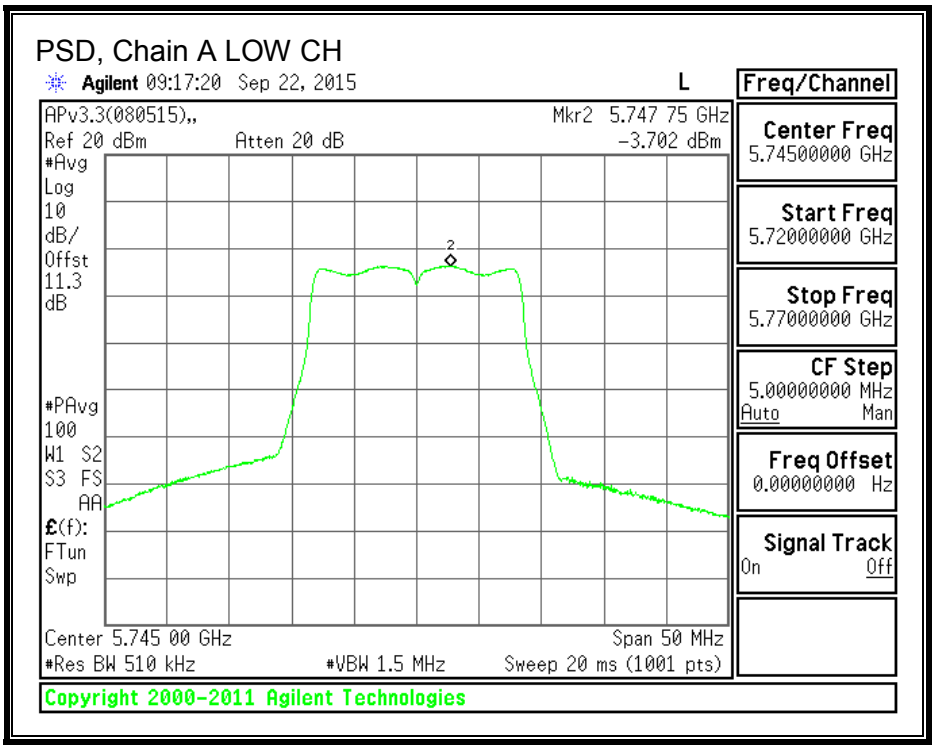


PSD, Chain A



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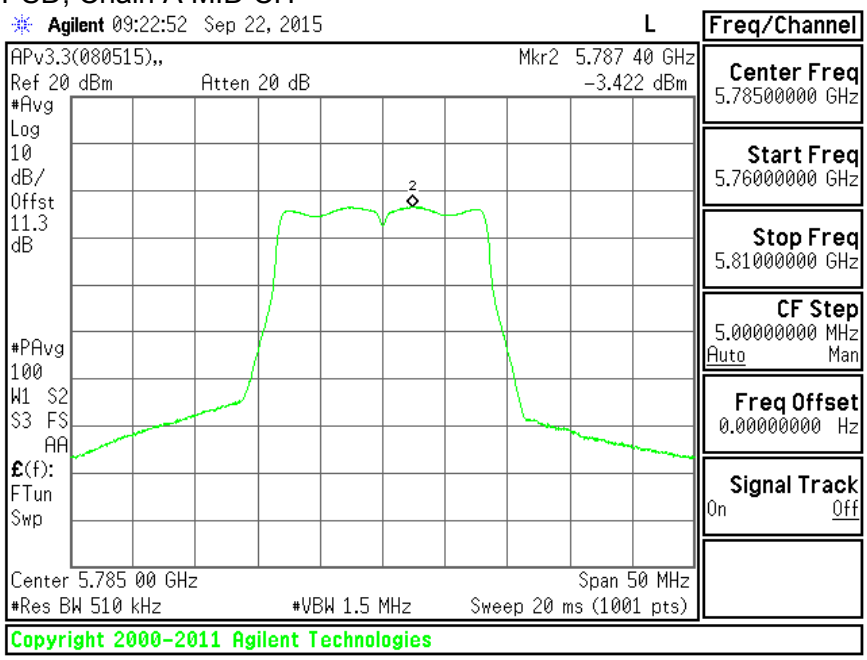
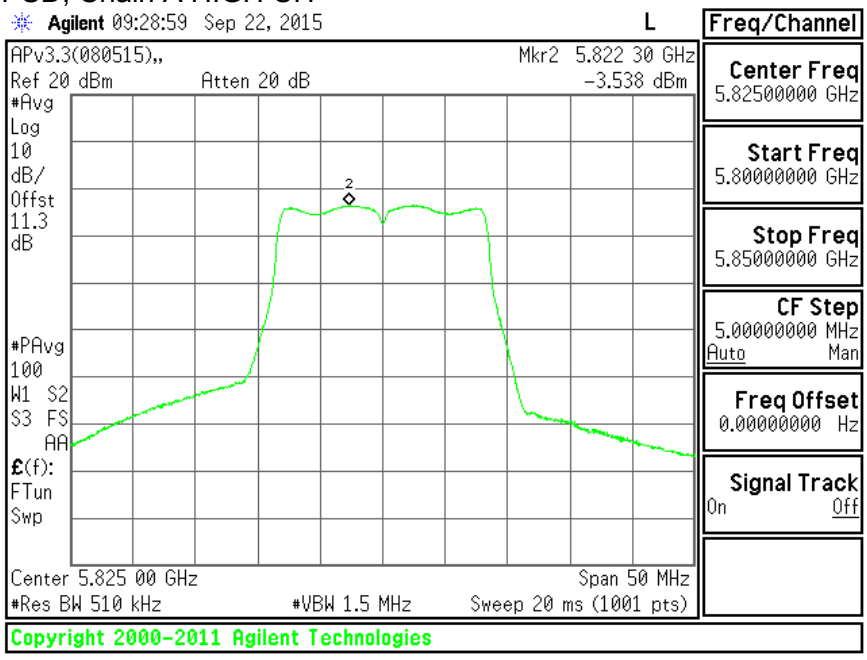
PSD, Chain A MID CH



PSD, Chain A HIGH CH



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8.15. 802.11n HT20 MODE IN THE 5.8 GHz BAND

8.15.1. 6 dB BANDWIDTH

LIMITS

FCC §15.407 (e)

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

RESULTS

Channel	Frequency (MHz)	6 dB BW Chain B (MHz)	6 dB BW Chain A (MHz)	Minimum Limit (MHz)
Low	5745	17.5500	17.6850	0.5
Mid	5785	17.5770	17.7120	0.5
High	5825	17.6310	17.7390	0.5

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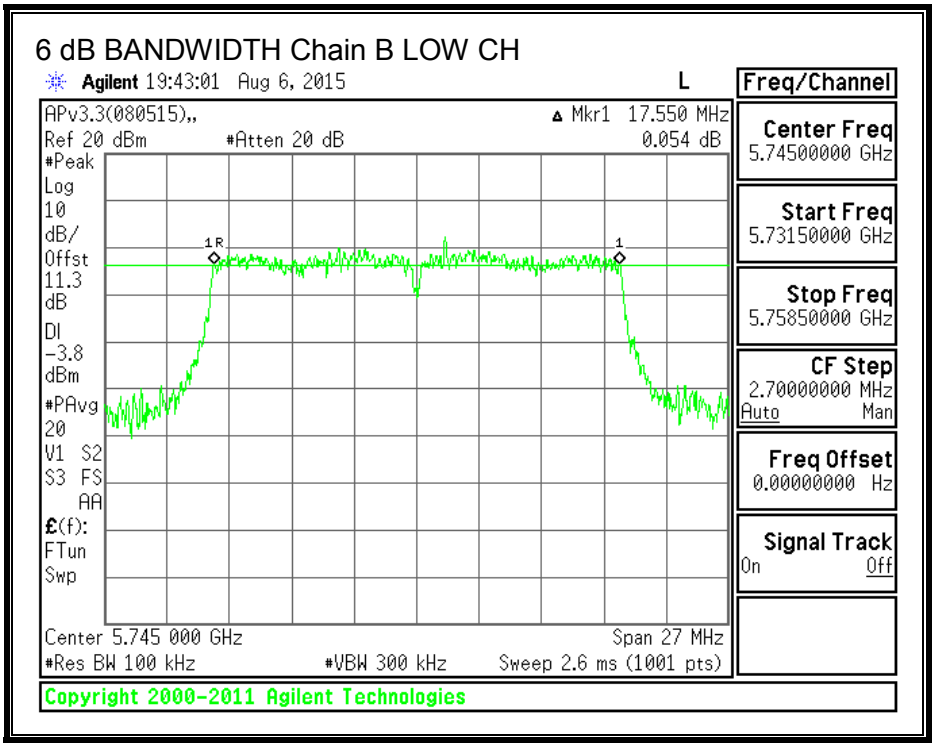
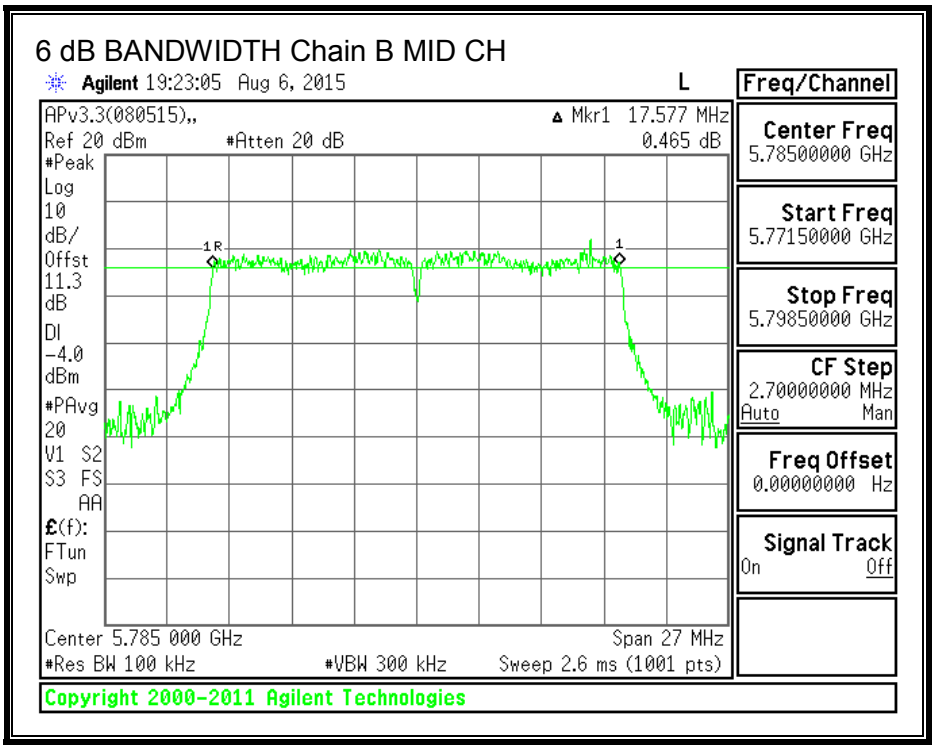
6 dB BANDWIDTH, Chain B





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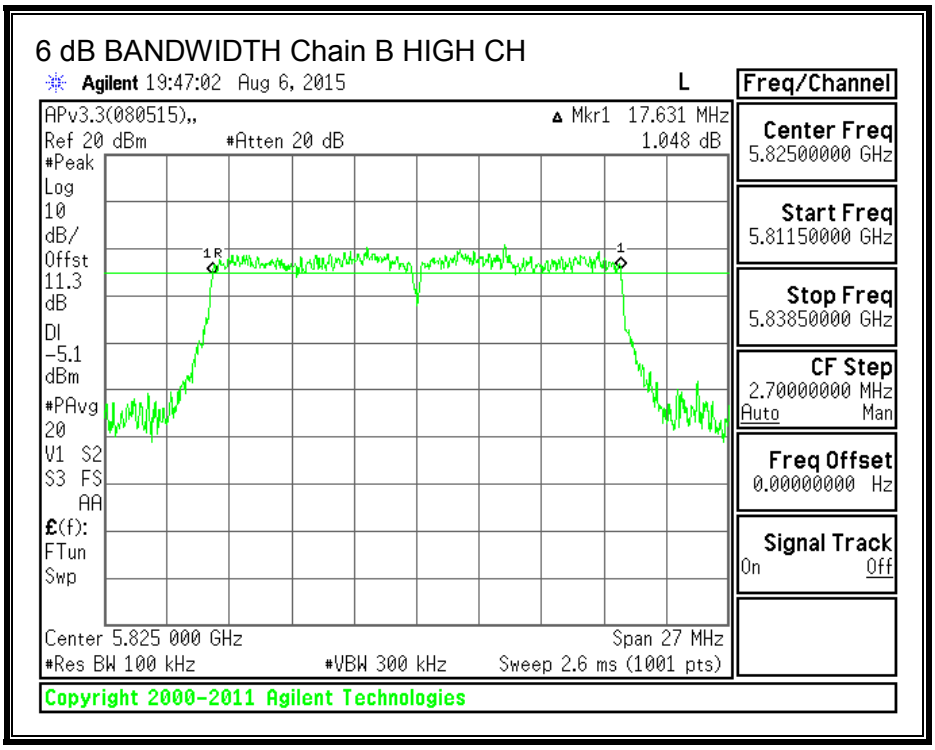
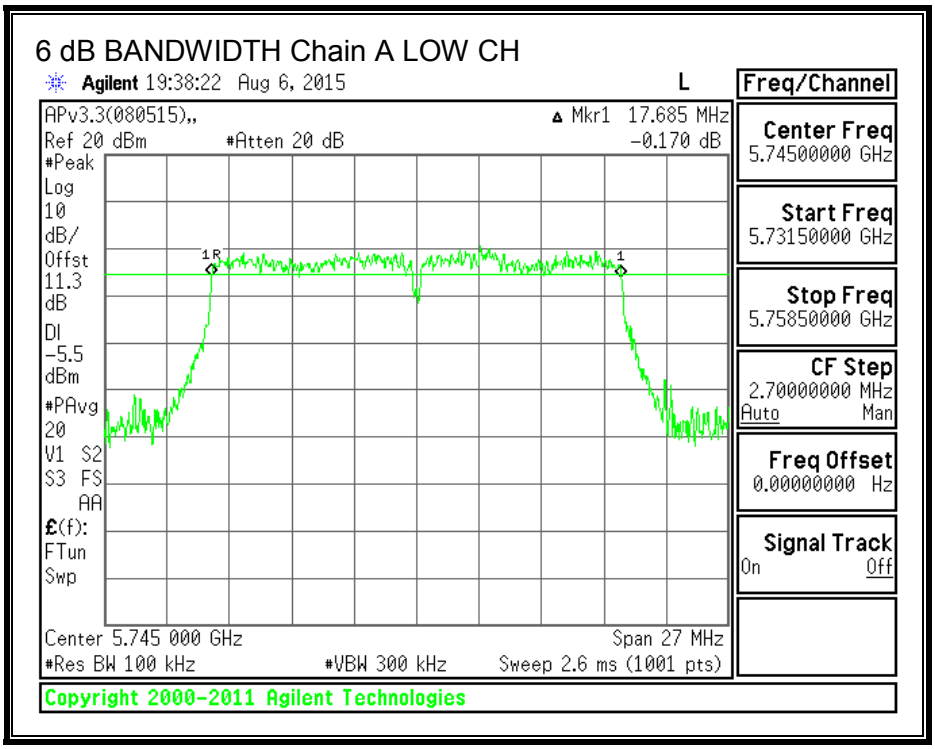


6 dB BANDWIDTH, Chain A



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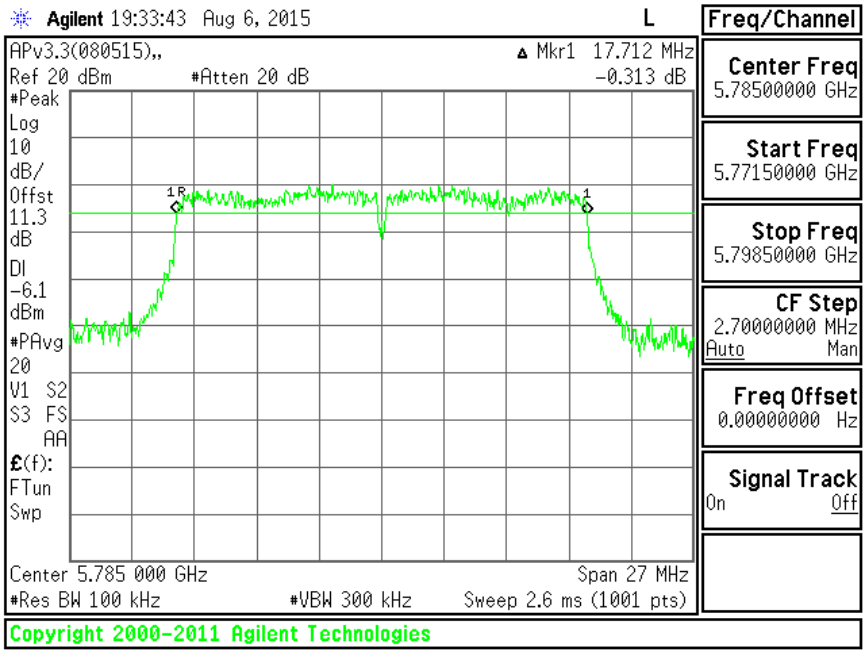
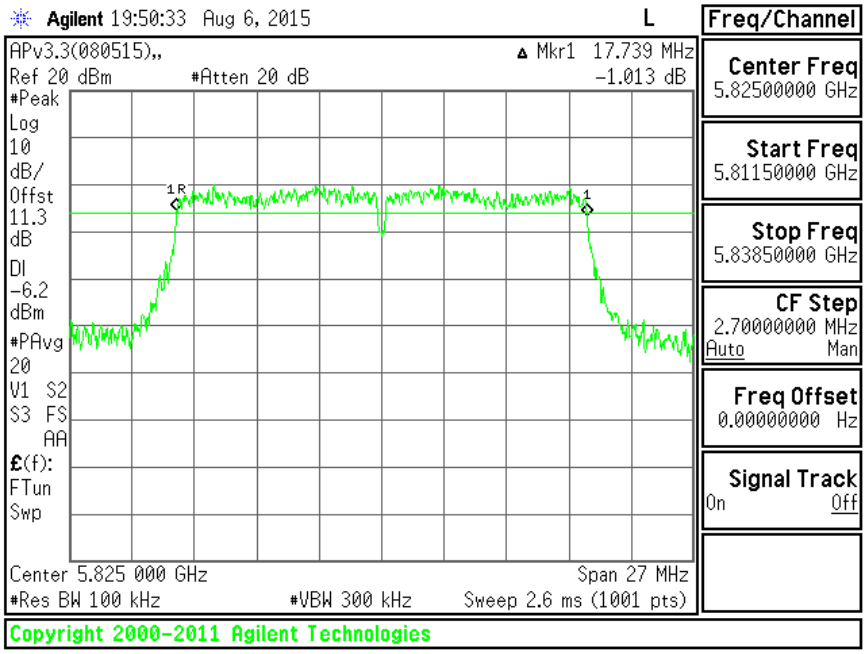
6 dB BANDWIDTH Chain A MID CH



6 dB BANDWIDTH Chain A HIGH CH



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8.15.2. 26 dB BANDWIDTH

LIMITS

None; for reporting purposes only.

RESULTS

Channel	Frequency (MHz)	26 dB BW Chain B (MHz)	26 dB BW Chain A (MHz)
Low	5745	20.16	20.27
Mid	5785	19.95	20.09
High	5825	20.21	20.03

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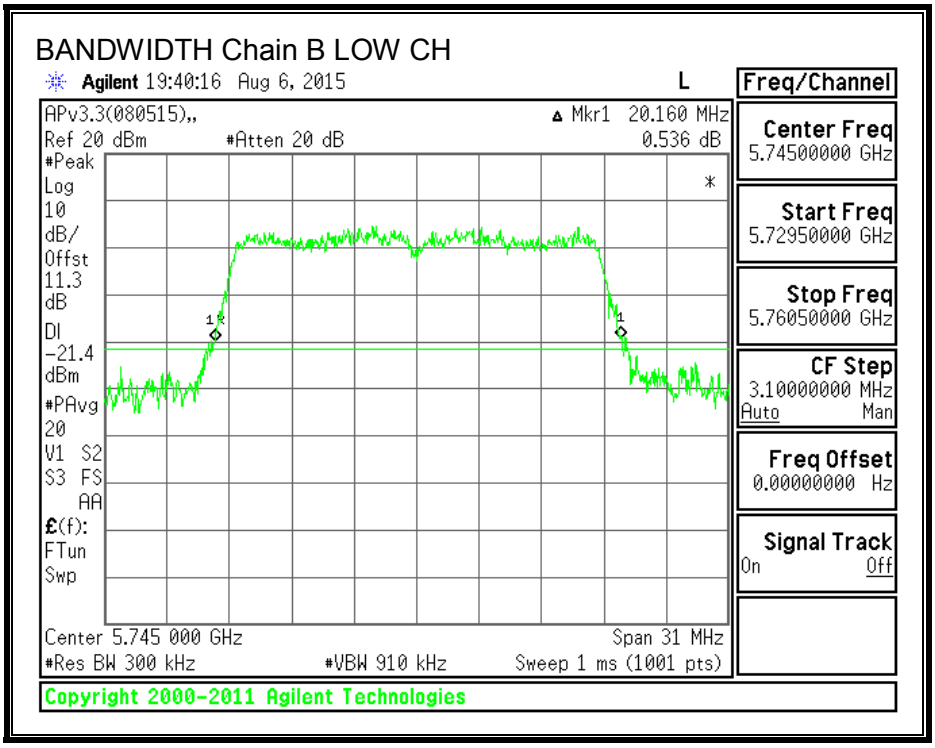
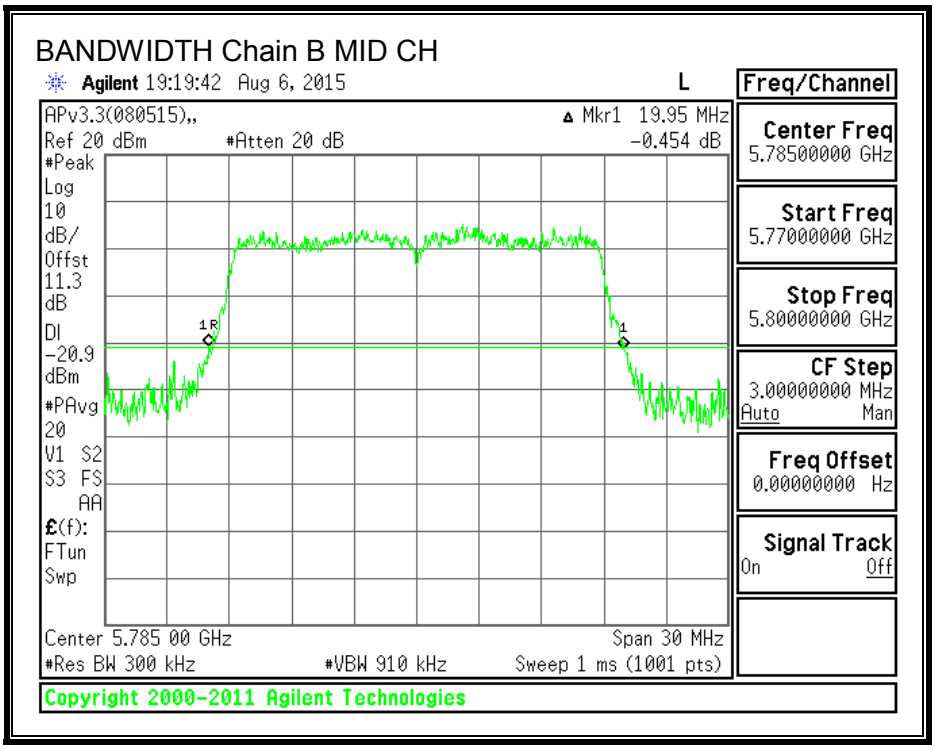
26 dB BANDWIDTH, Chain B





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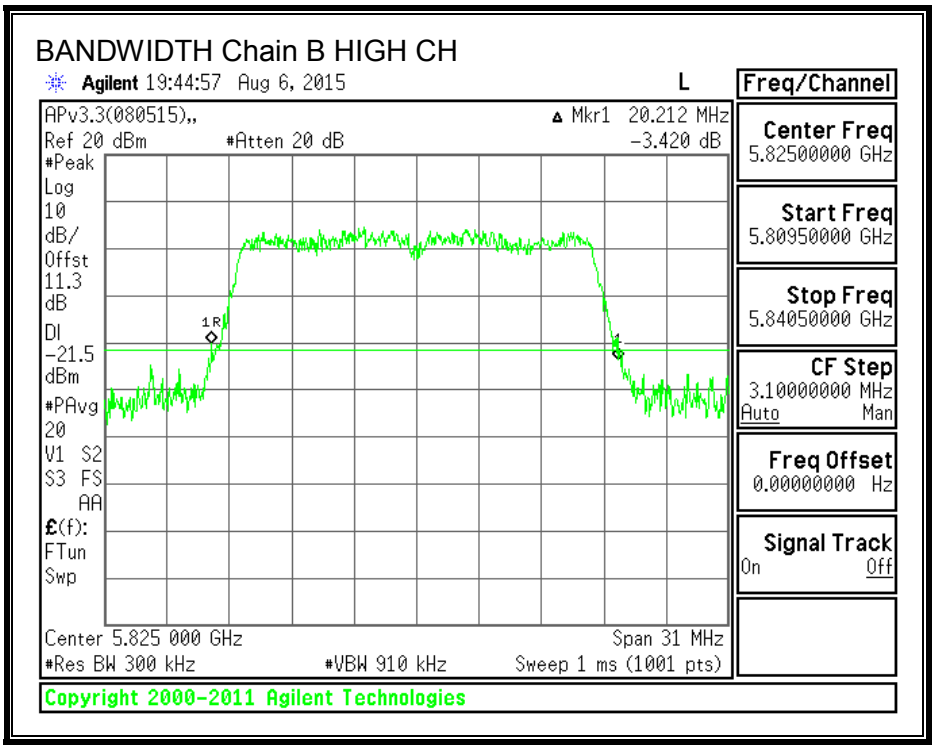
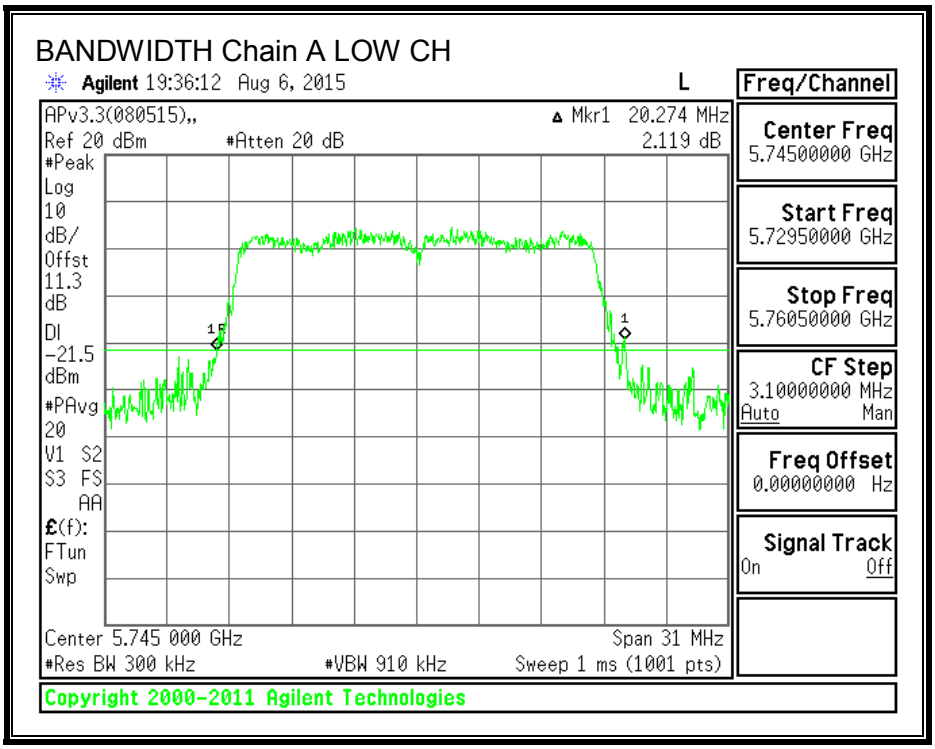


26 dB BANDWIDTH, Chain A



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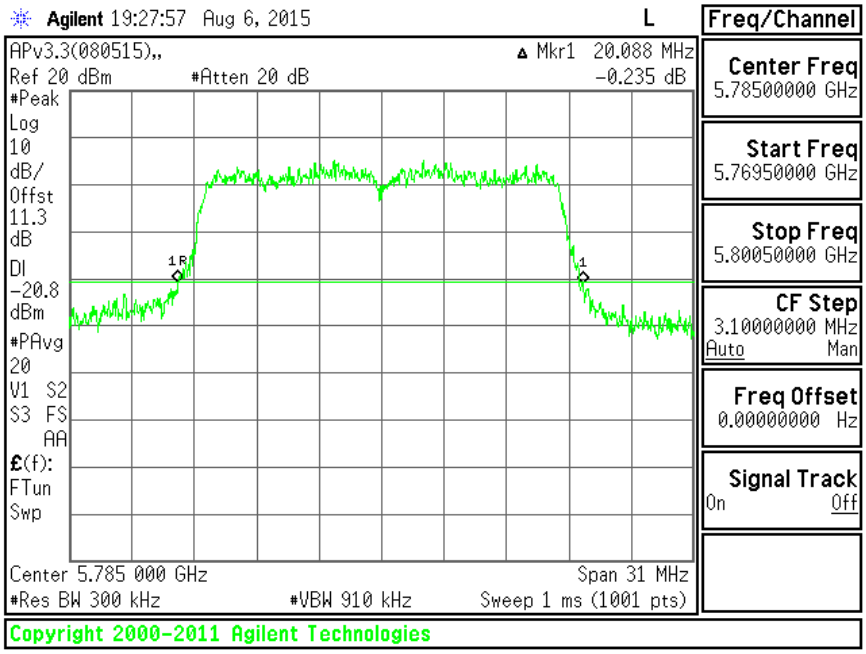
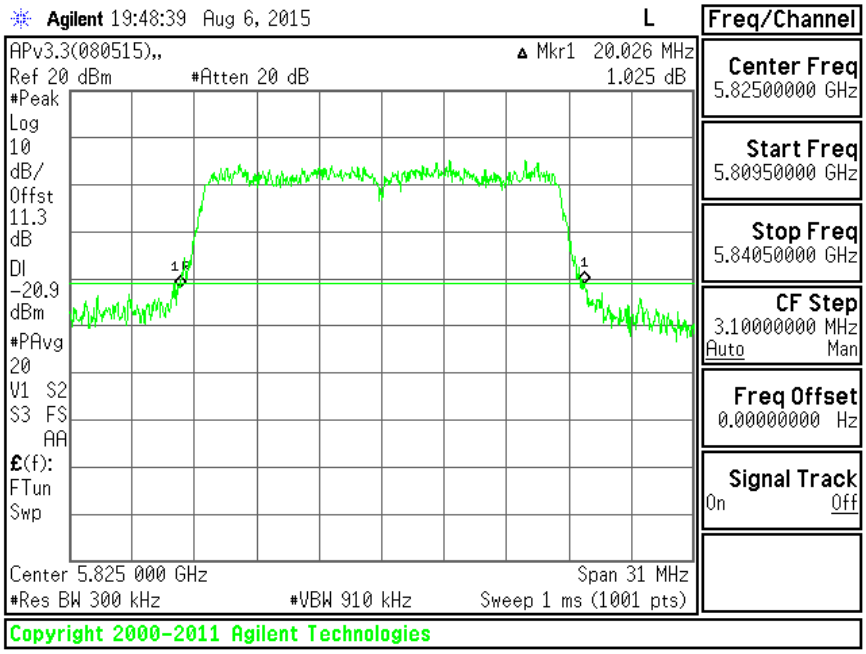
BANDWIDTH Chain A MID CH



BANDWIDTH Chain A HIGH CH



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8.15.3. 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

RESULTS

Channel	Frequency (MHz)	99% BW Chain B (MHz)	99% BW Chain A (MHz)
Low	5745	17.6724	17.6501
Mid	5785	17.6558	17.6849
High	5825	17.6583	17.6832

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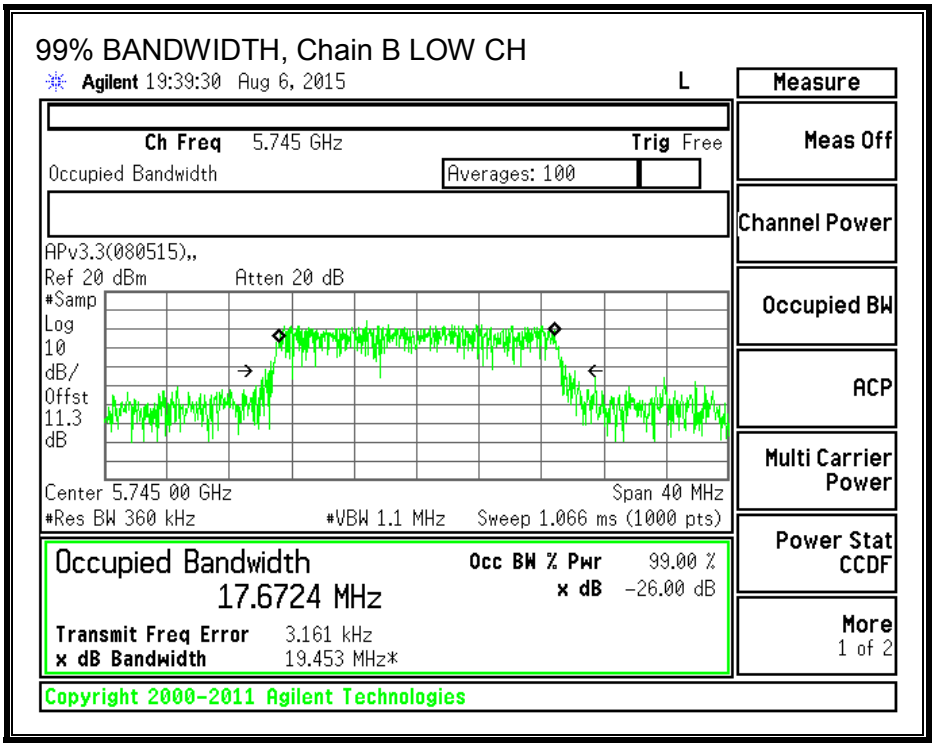
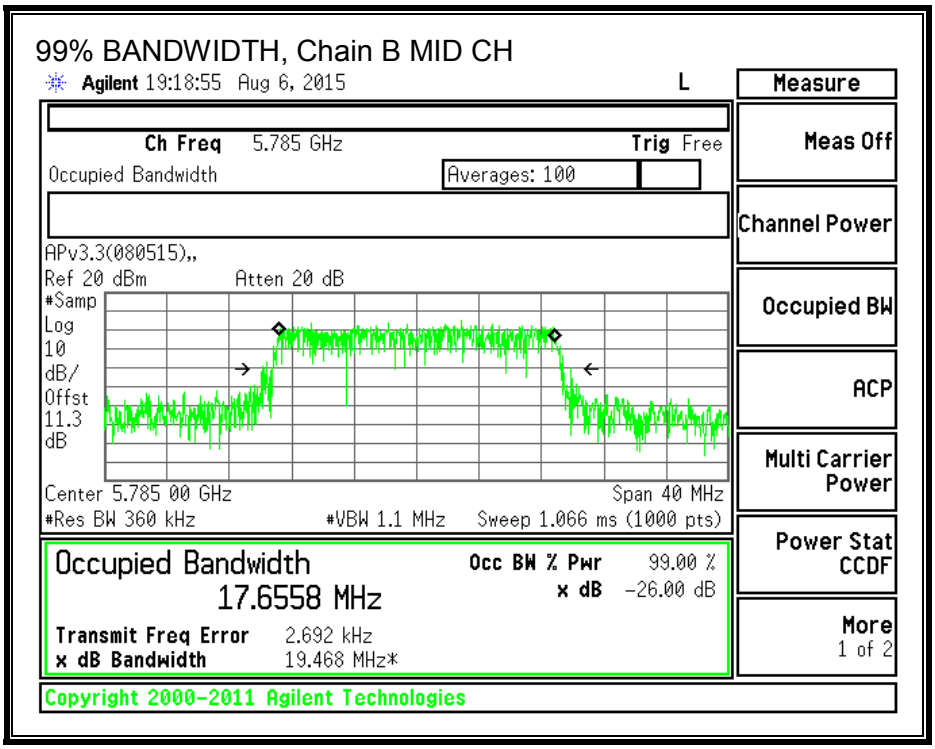
99% BANDWIDTH, Chain B





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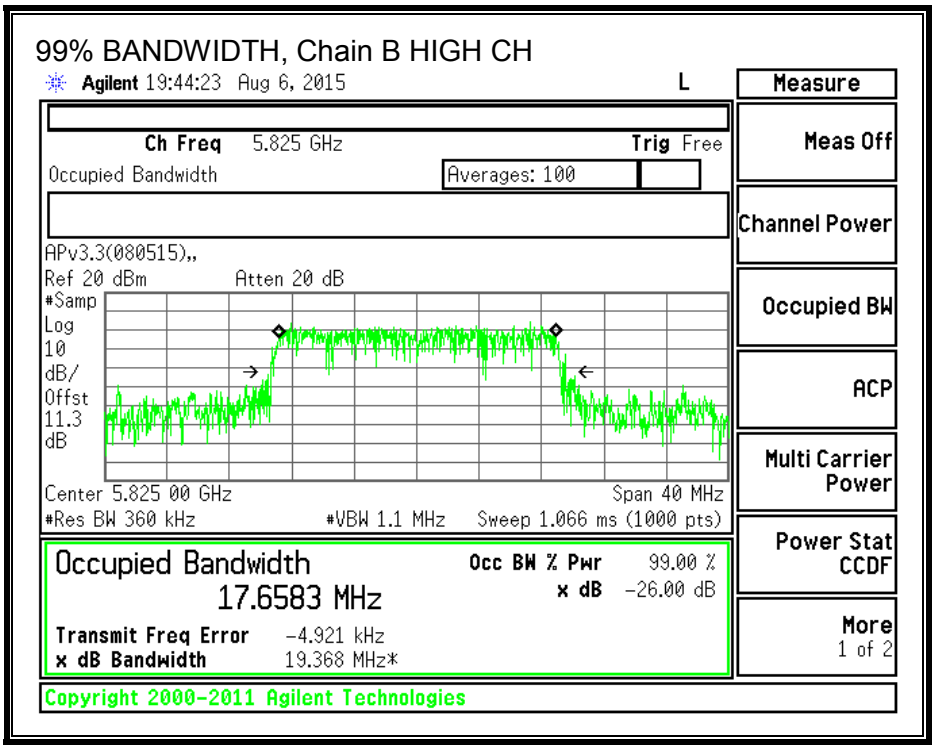
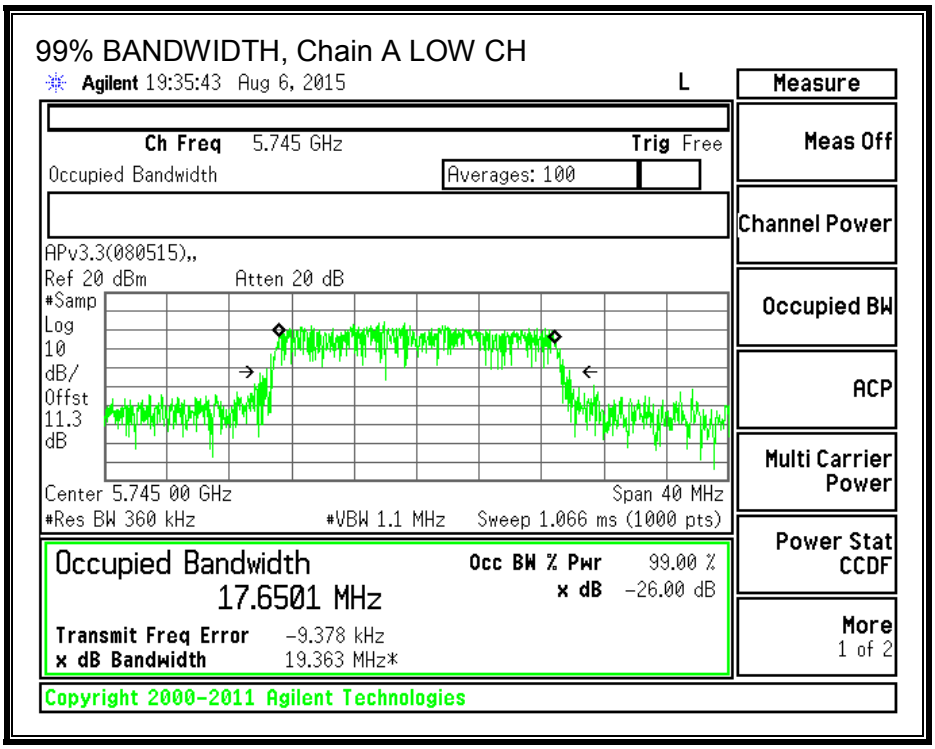


99% BANDWIDTH, Chain A



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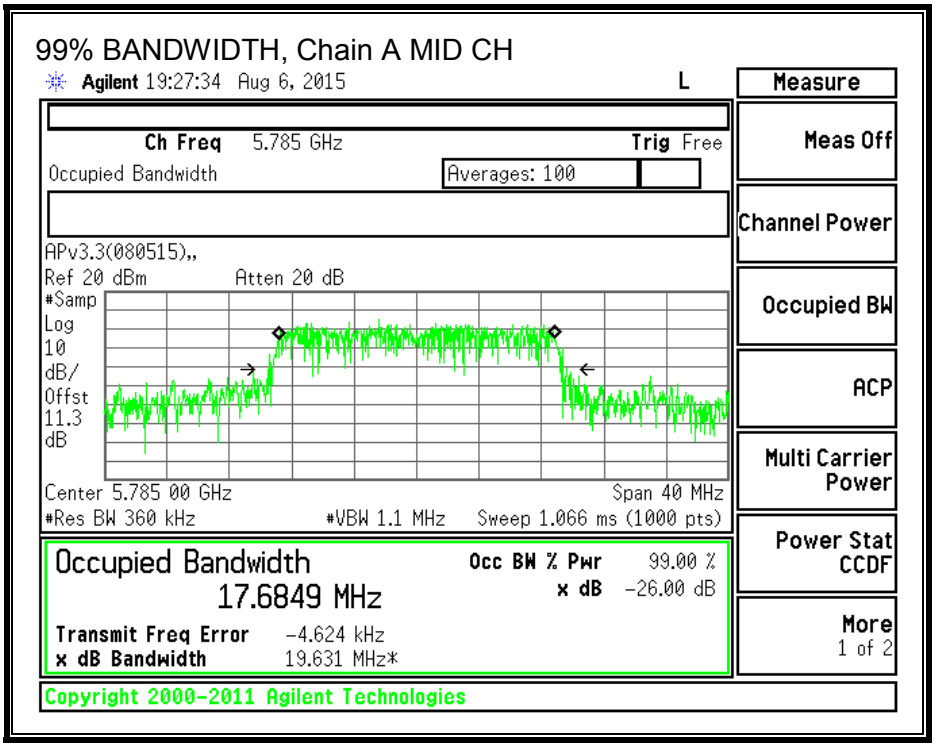

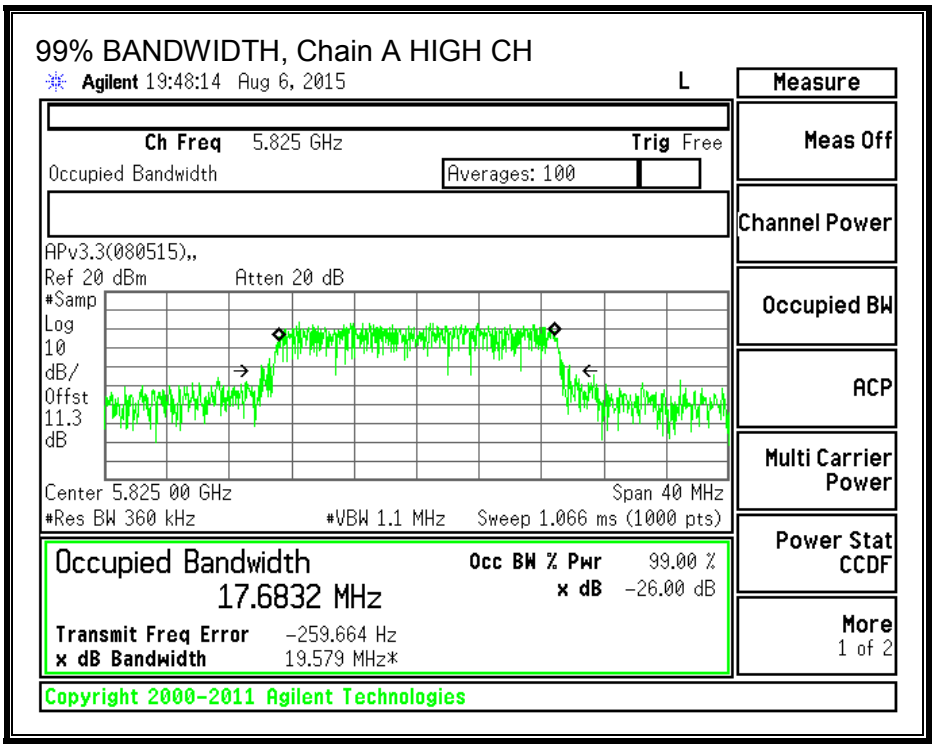

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8.15.4. OUTPUT POWER

LIMITS

FCC §15.407 (a) (3)

For the band 5.725-5.85 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. In addition, the maximum power spectral density shall not exceed 30 dBm in any 500-kHz 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 B Antenna Gain (dBi)	Chain A Antenna Gain (dBi)	Uncorrelated Chains Directional Gain (dBi)
1.40	1.70	1.55

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RESULTS

Antenna Gain and Limit

Channel	Frequency (MHz)	Directional Gain for Power (dBi)	Power Limit (dBm)
Low	5745	1.55	30.00
Mid	5785	1.55	30.00
High	5825	1.55	30.00

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

Output Power Results

Channel	Frequency (MHz)	Chain B Meas Power (dBm)	Chain A Meas Power (dBm)	Total Corr'd Power (dBm)	Power Limit (dBm)	Power Margin (dB)
Low	5745	8.75	8.61	11.69	30.00	-18.31
Mid	5785	8.67	8.59	11.64	30.00	-18.36
High	5825	8.69	8.63	11.67	30.00	-18.33

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8.15.5. Maximum Power Spectral Density (PSD)

LIMITS

FCC §15.407 (a) (3)

For the band 5.725-5.85 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. In addition, the maximum power spectral density shall not exceed 30 dBm in any 500-kHz 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 B Antenna Gain (dBi)	Chain A Antenna Gain (dBi)	Uncorrelated Chains Directional Gain (dBi)
1.40	1.70	1.55

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RESULTS

Antenna Gain and Limits

Channel	Frequency (MHz)	Directional Gain (dBi)	PSD Limit (dBm)
Low	5745	1.55	30.00
Mid	5785	1.55	30.00
High	5825	1.55	30.00

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

PSD Results

Channel	Frequency (MHz)	Chain B Meas PSD (dBm)	Chain A Meas PSD (dBm)	Total Corr'd PSD (dBm)	PSD Limit (dBm)	PSD Margin (dB)
Low	5745	-4.96	-4.97	-1.95	30.00	-31.95
Mid	5785	-4.94	-4.69	-1.80	30.00	-31.80
High	5825	-5.04	-5.09	-2.05	30.00	-32.05

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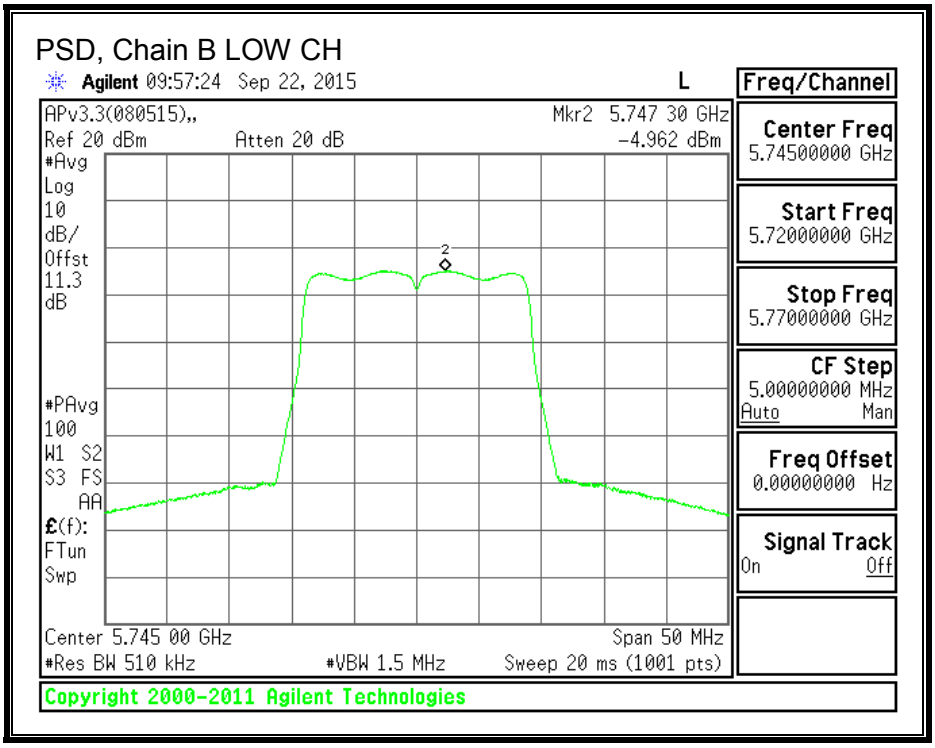
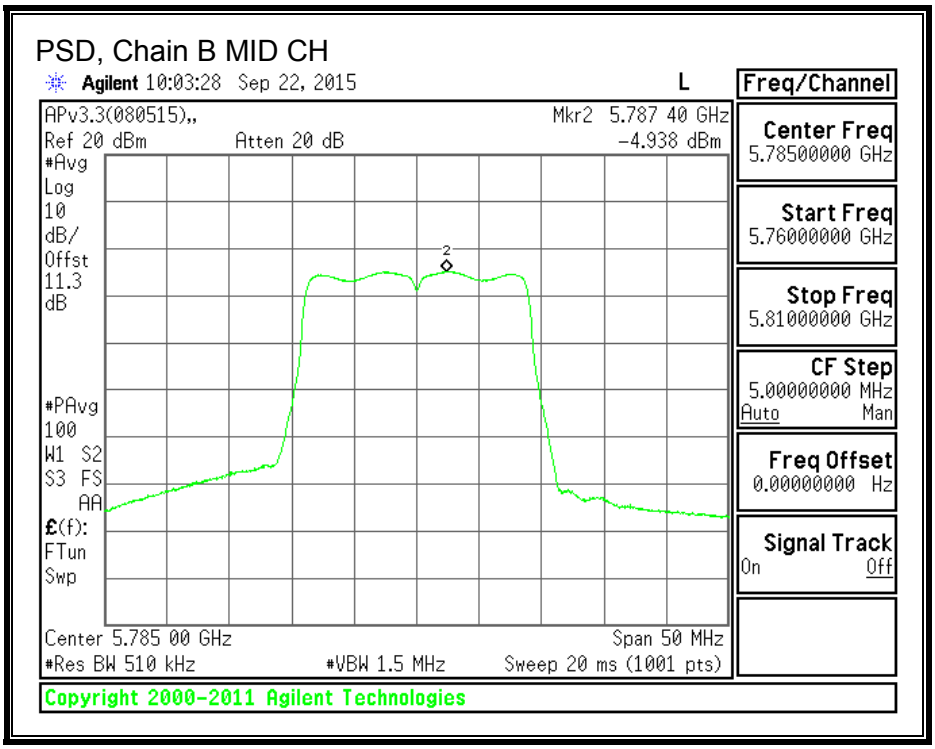
PSD, Chain B





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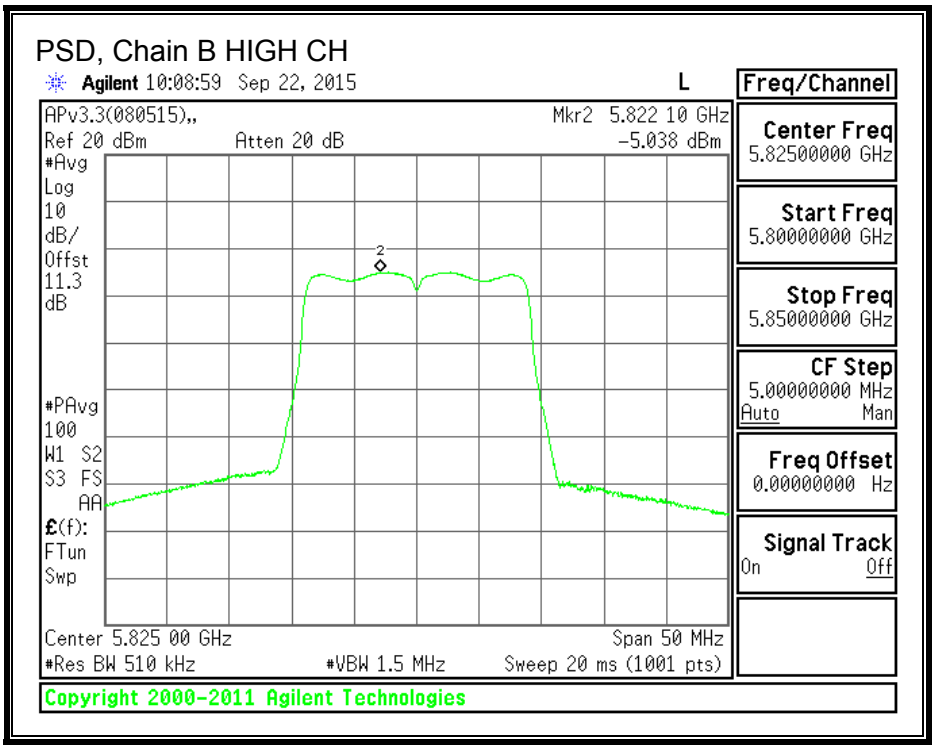
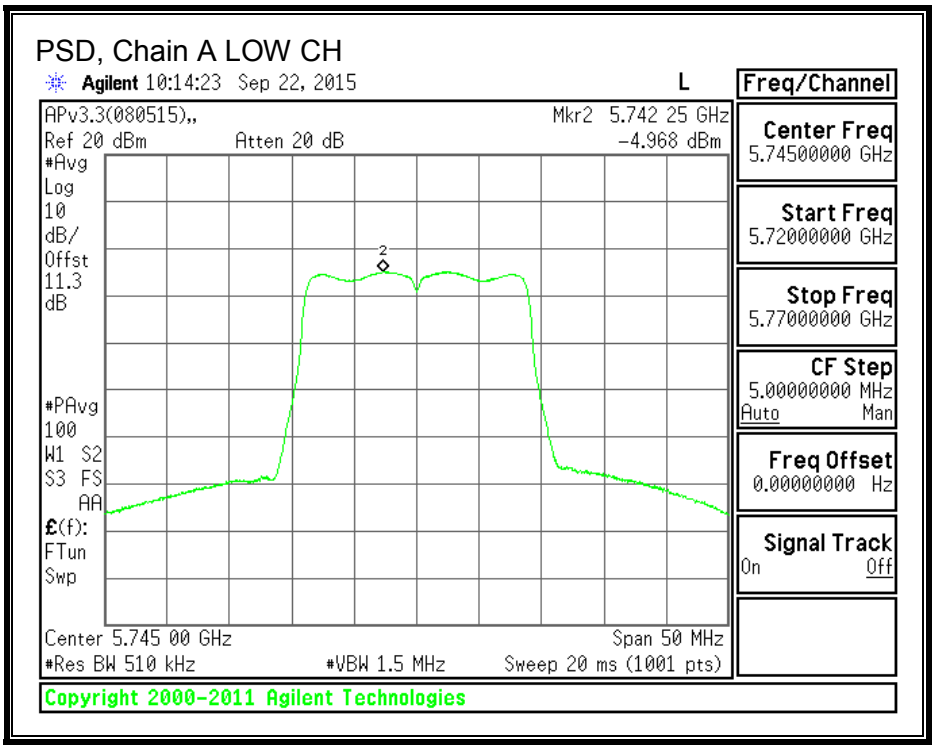


PSD, Chain A



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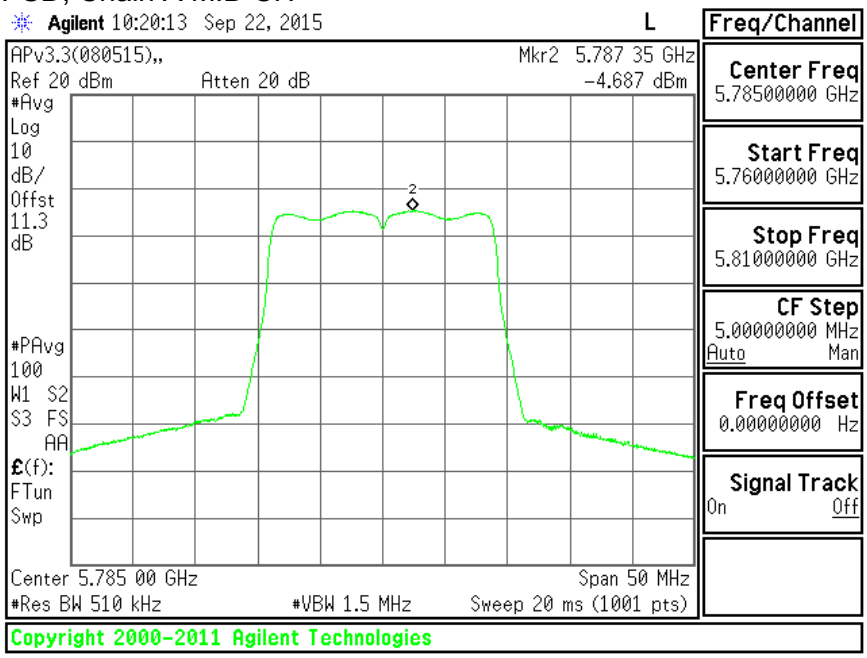
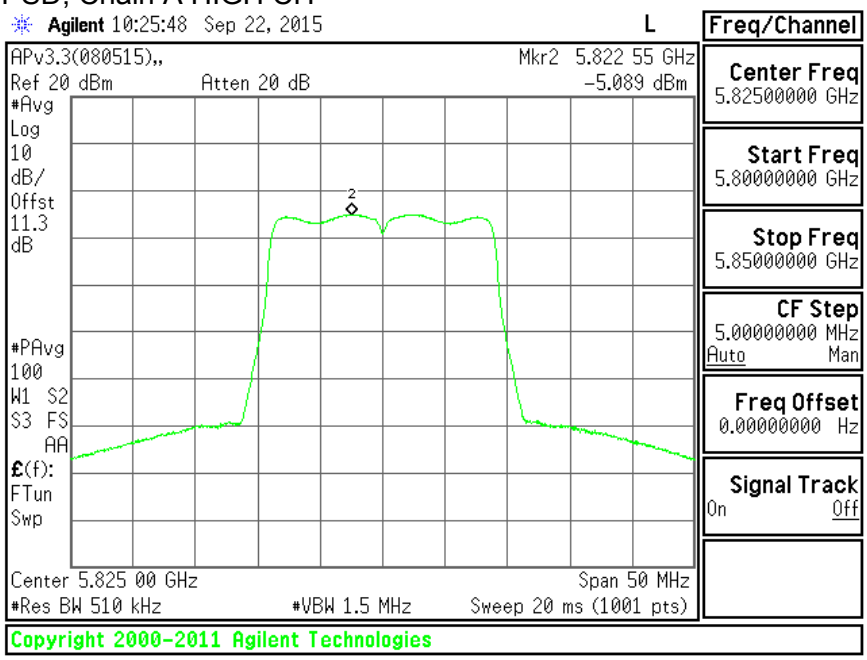
PSD, Chain A MID CH



PSD, Chain A HIGH CH



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8.16. 802.11n HT40 MODE IN THE 5.8 GHz BAND

8.16.1. 6 dB BANDWIDTH

LIMITS

FCC §15.407 (e)

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

RESULTS

Channel	Frequency (MHz)	6 dB BW Chain B (MHz)	6 dB BW Chain A (MHz)	Minimum Limit (MHz)
Low	5755	35.3700	36.3000	0.5
High	5795	36.4100	36.3960	0.5

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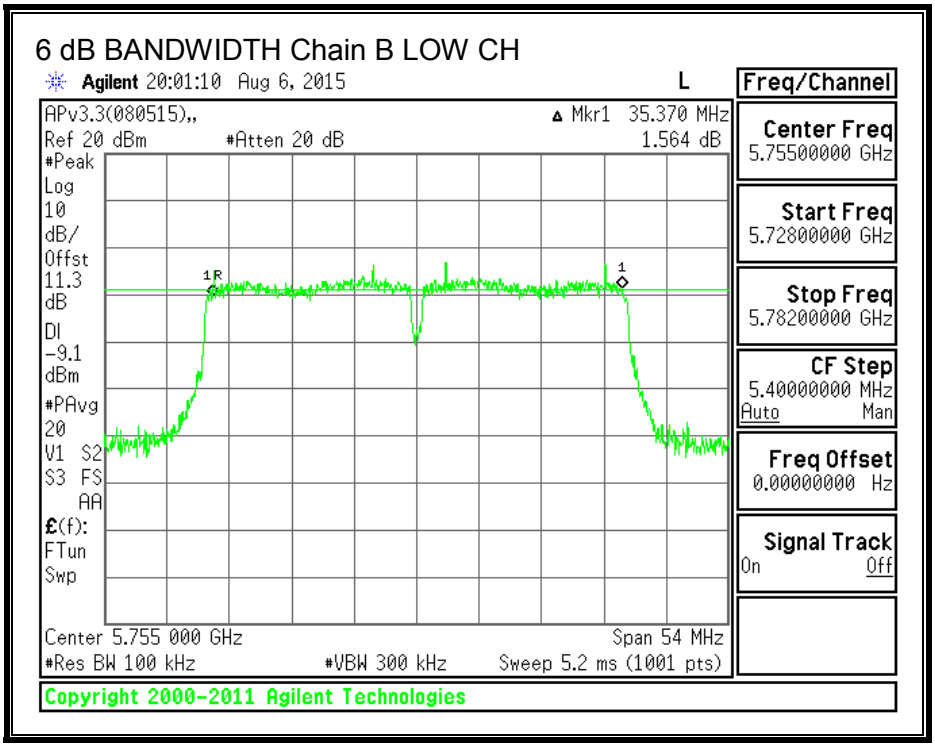
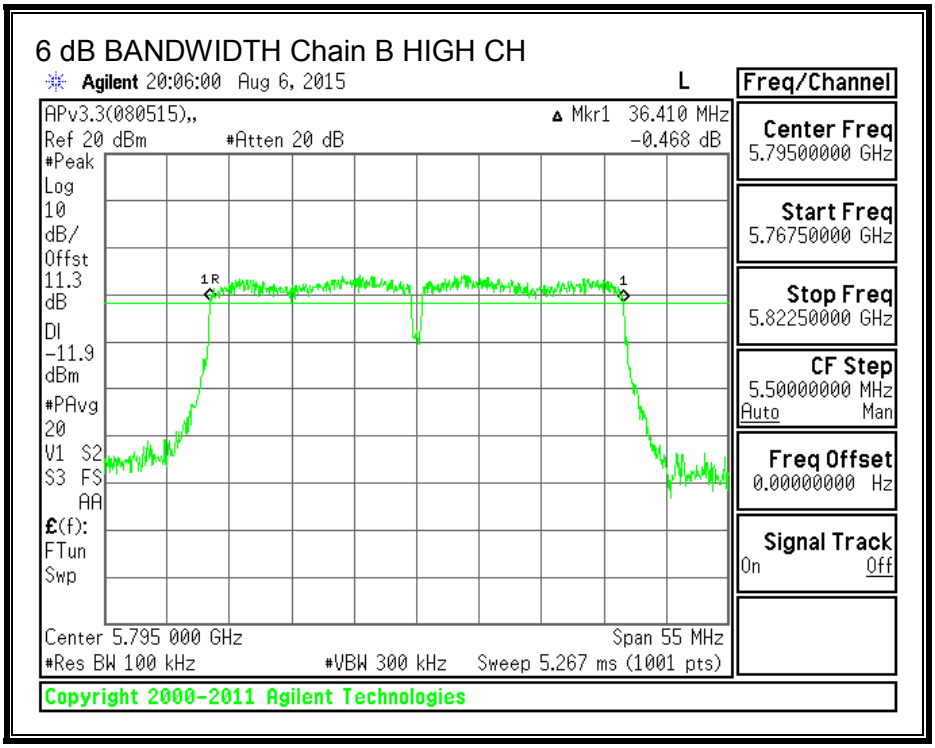
6 dB BANDWIDTH, Chain B





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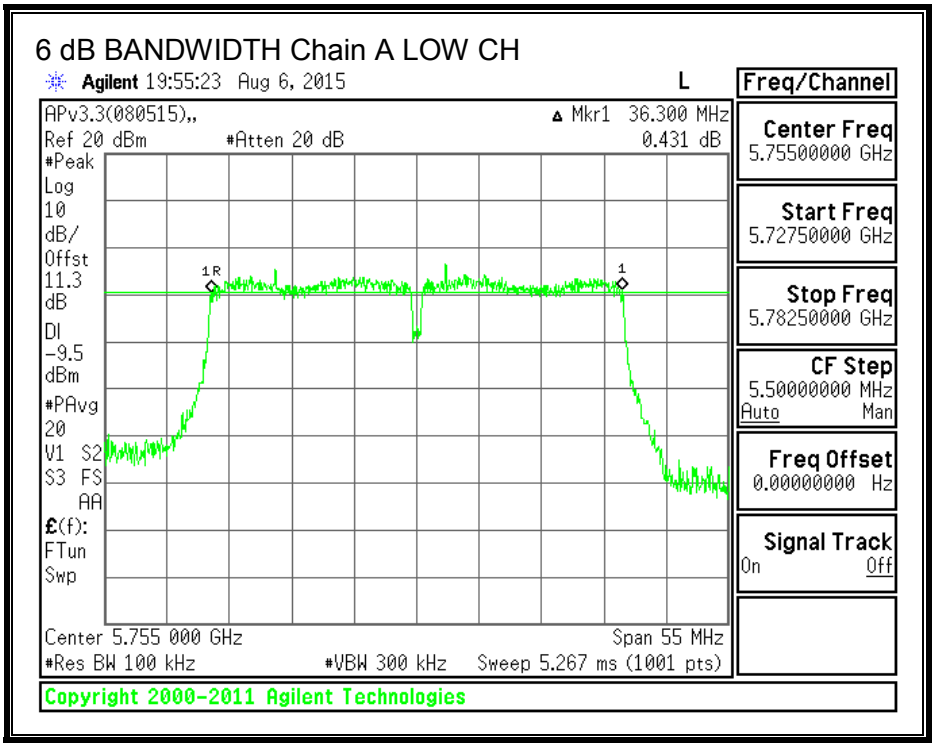
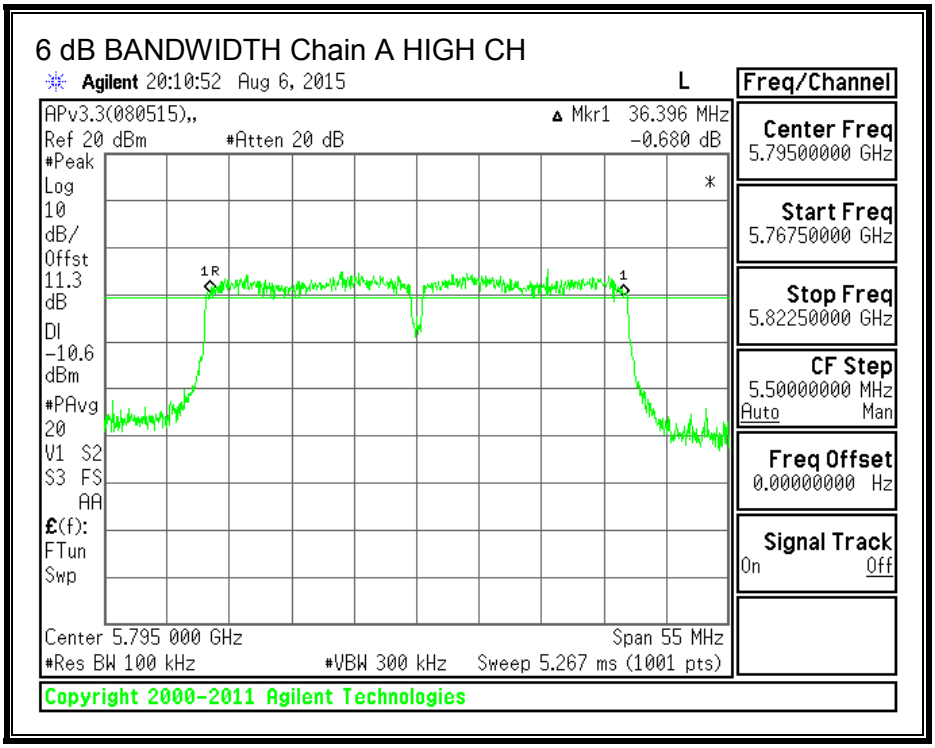
6 dB BANDWIDTH, Chain A





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8.16.2. 26 dB BANDWIDTH

LIMITS

None; for reporting purposes only.

RESULTS

Channel	Frequency (MHz)	26 dB BW Chain B (MHz)	26 dB BW Chain A (MHz)
Low	5755	40.63	40.20
High	5795	40.44	40.63

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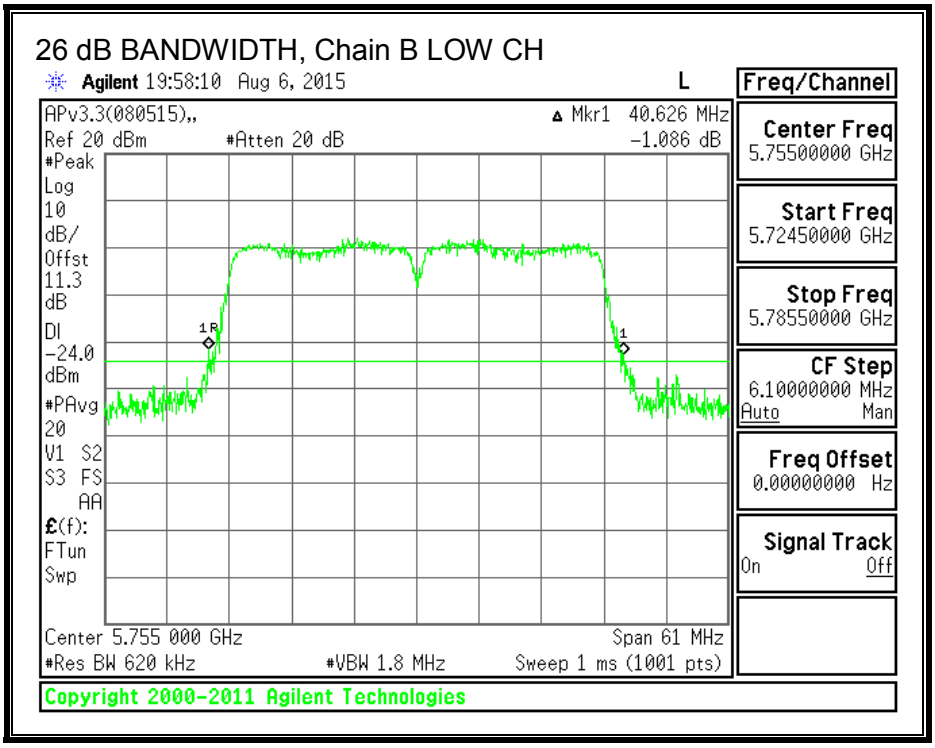
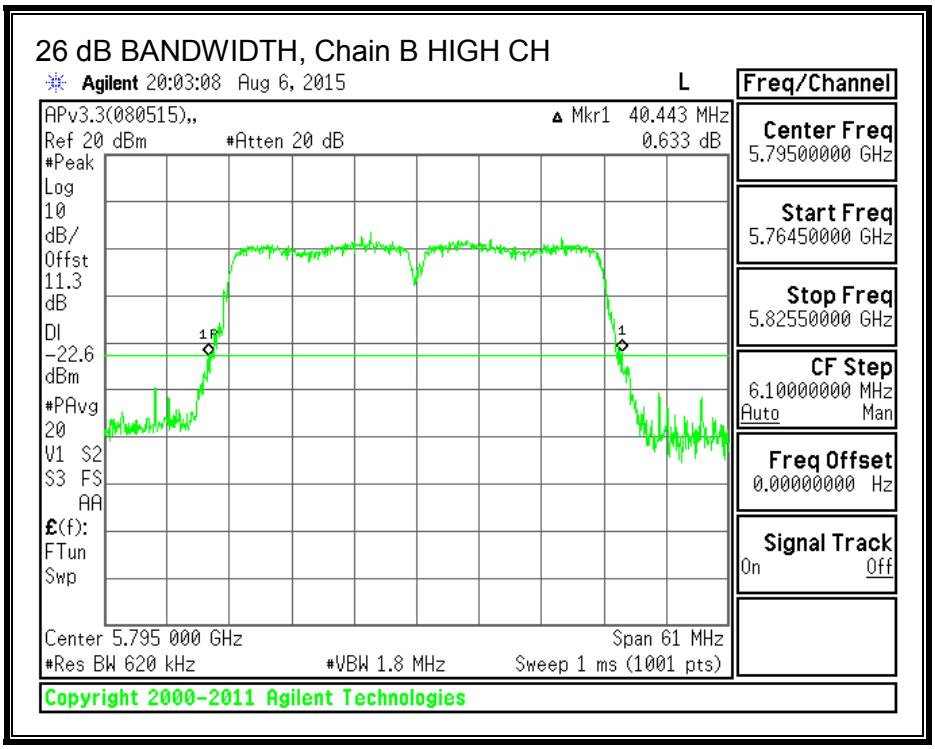
26 dB BANDWIDTH, Chain B





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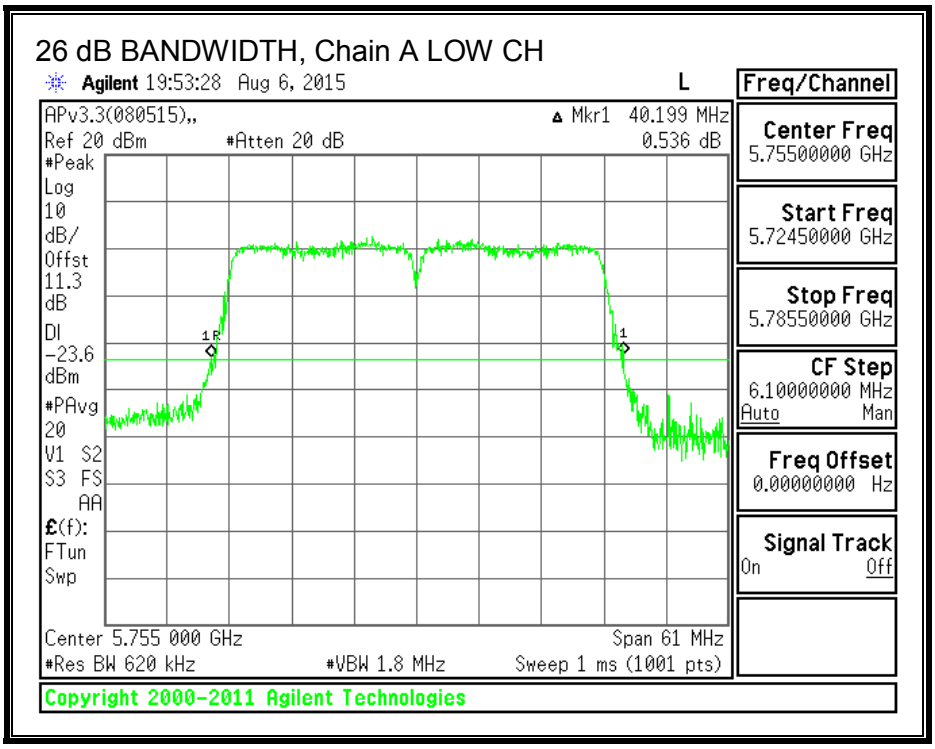
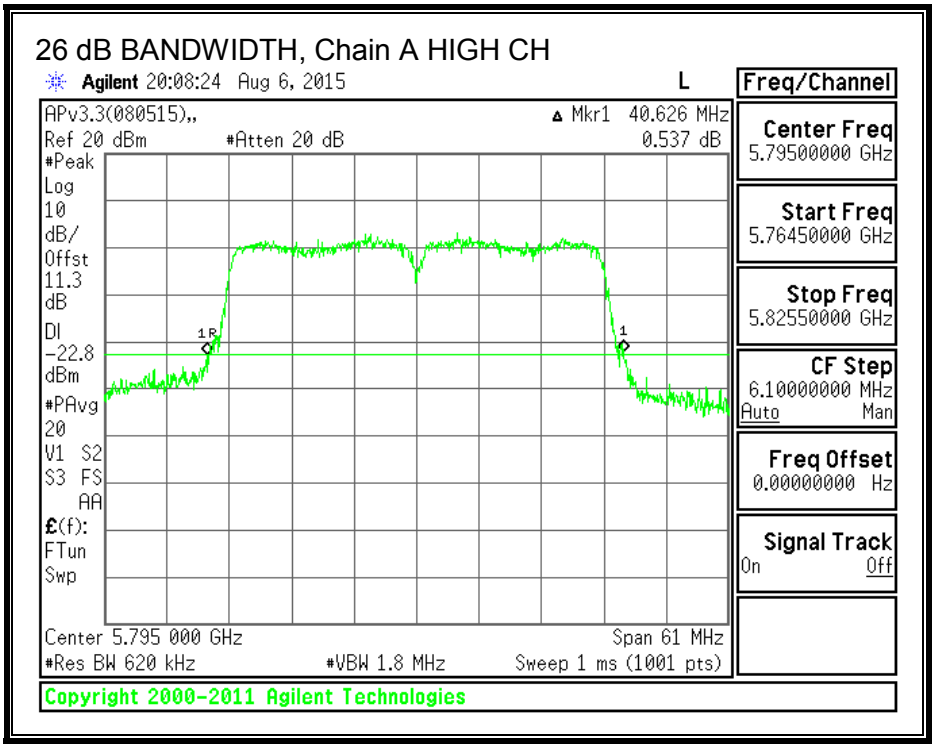
26 dB BANDWIDTH, Chain A





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8.16.3. 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

RESULTS

Channel	Frequency (MHz)	99% BW Chain B (MHz)	99% BW Chain A (MHz)
Low	5755	36.1696	36.1708
High	5795	36.1486	36.2021

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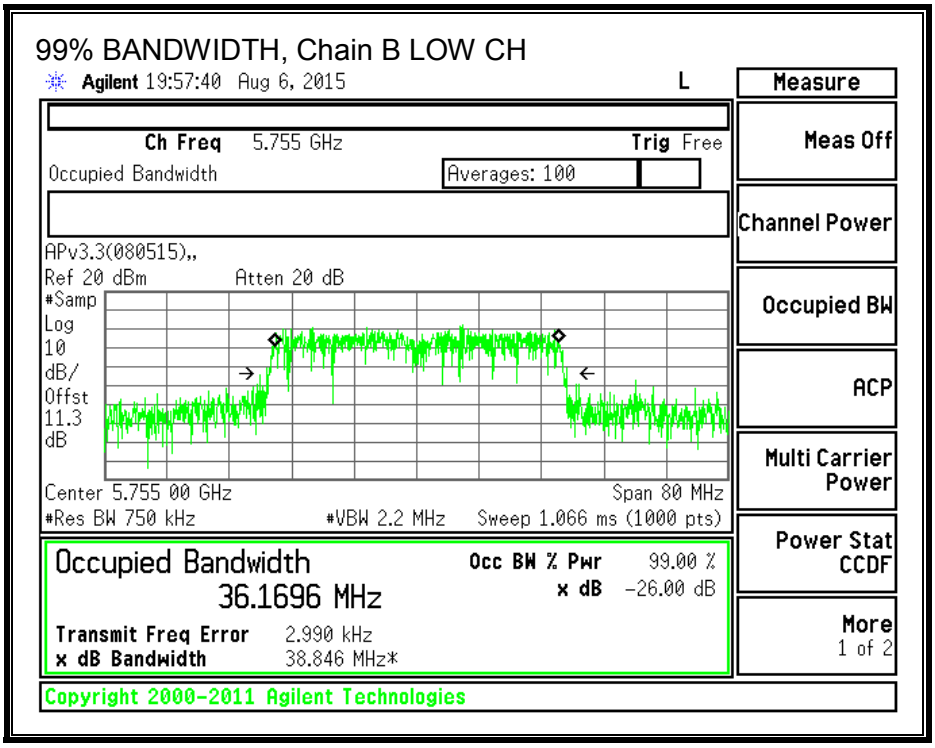
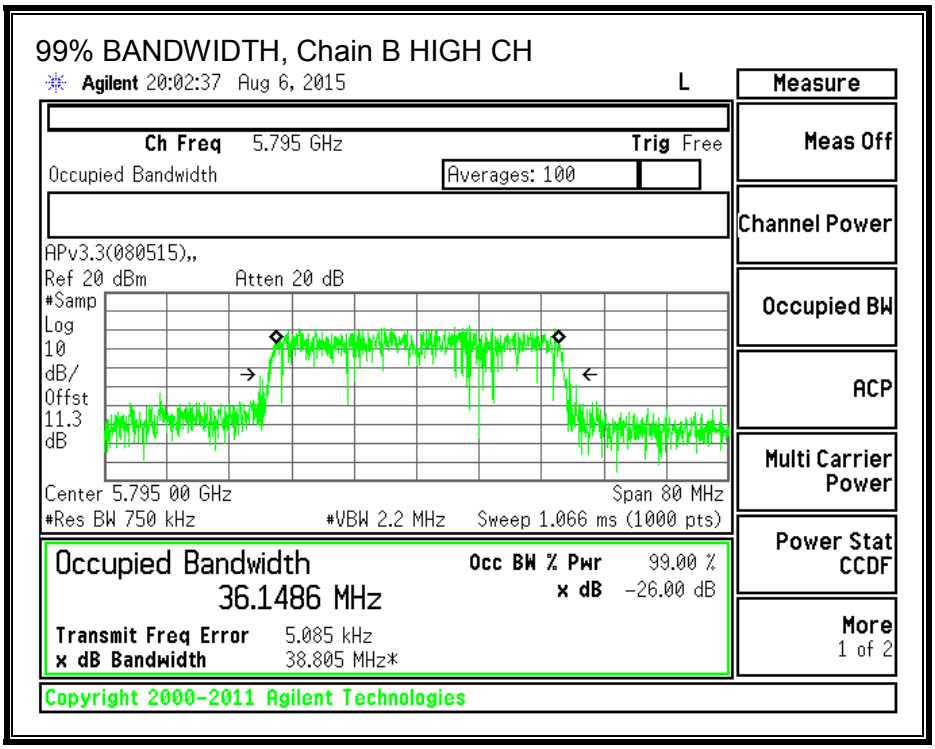
99% BANDWIDTH, Chain B





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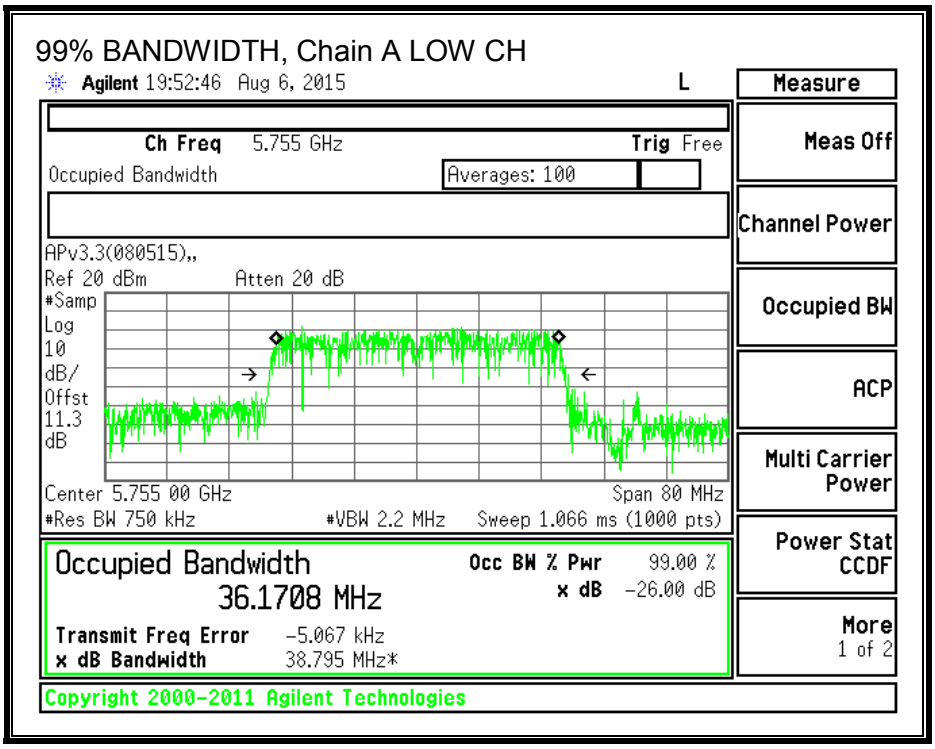
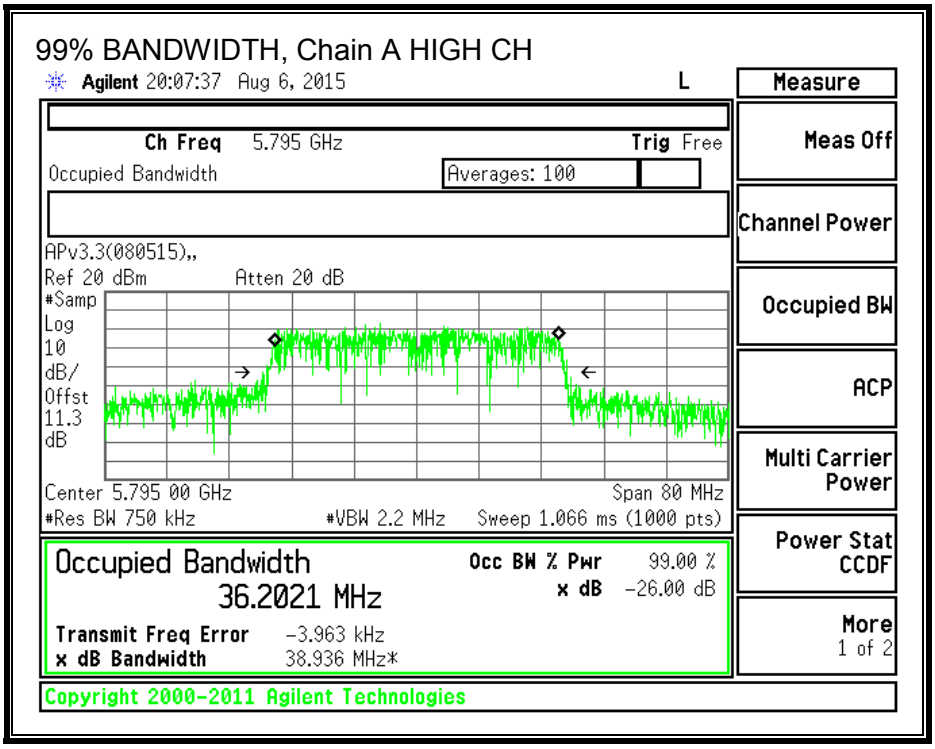
99% BANDWIDTH, Chain A





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8.16.4. OUTPUT POWER

LIMITS

FCC §15.407 (a) (3)

For the band 5.725-5.85 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. In addition, the maximum power spectral density shall not exceed 30 dBm in any 500-kHz 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 B Antenna Gain (dBi)	Chain A Antenna Gain (dBi)	Uncorrelated Chains Directional Gain (dBi)
1.40	1.70	1.55

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RESULTS

Antenna Gain and Limit

Channel	Frequency (MHz)	Directional Gain (dBi)	Power Limit (dBm)
Low	5755	1.55	30.00
High	5795	1.55	30.00

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

Output Power Results

Channel	Frequency (MHz)	Chain B Meas Power (dBm)	Chain A Meas Power (dBm)	Total Corr'd Power (dBm)	Power Limit (dBm)	Power Margin (dB)
Low	5755	8.58	8.83	11.72	30.00	-18.28
High	5795	8.73	8.57	11.66	30.00	-18.34

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8.16.5. Maximum Power Spectral Density (PSD)

LIMITS

FCC §15.407 (a) (3)

For the band 5.725-5.85 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. In addition, the maximum power spectral density shall not exceed 30 dBm in any 500-kHz 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 B Antenna Gain (dBi)	Chain A Antenna Gain (dBi)	Uncorrelated Chains Directional Gain (dBi)
1.40	1.70	1.55

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RESULTS

Antenna Gain and Limit

Channel	Frequency (MHz)	Directional Gain (dBi)	PSD Limit (dBm)
Low	5755	1.55	30.00
High	5795	1.55	30.00

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

PSD Results

Channel	Frequency (MHz)	Chain B Meas PSD (dBm)	Chain A Meas PSD (dBm)	Total Corr'd PSD (dBm)	PSD Limit (dBm)	PSD Margin (dB)
Low	5755	-8.19	-8.05	-5.11	30.00	-35.11
High	5795	-8.41	-7.88	-5.13	30.00	-35.13

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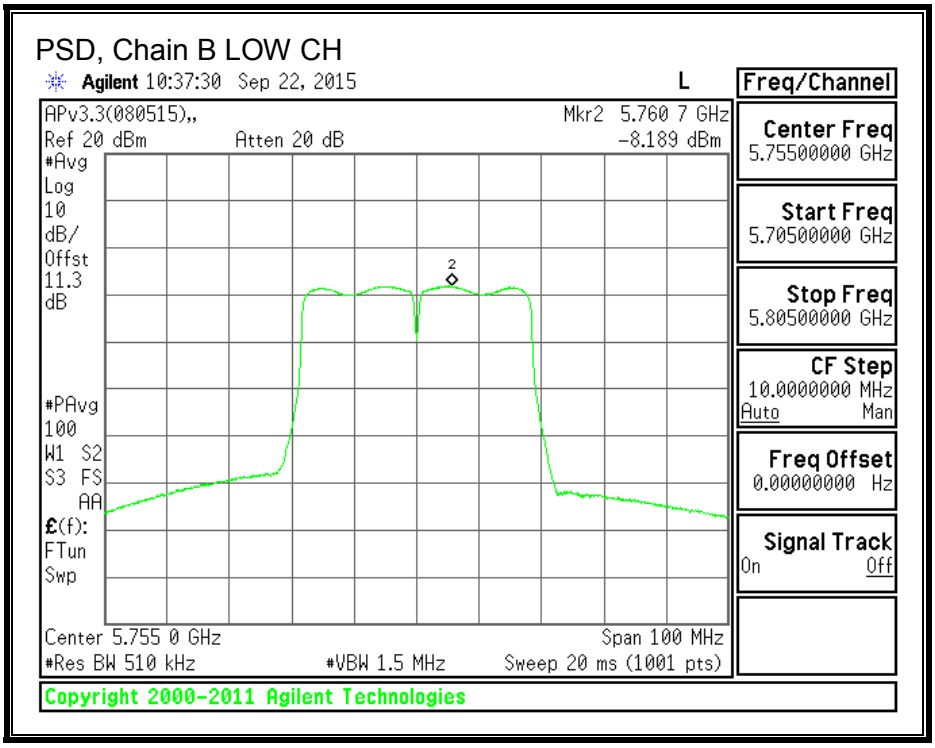
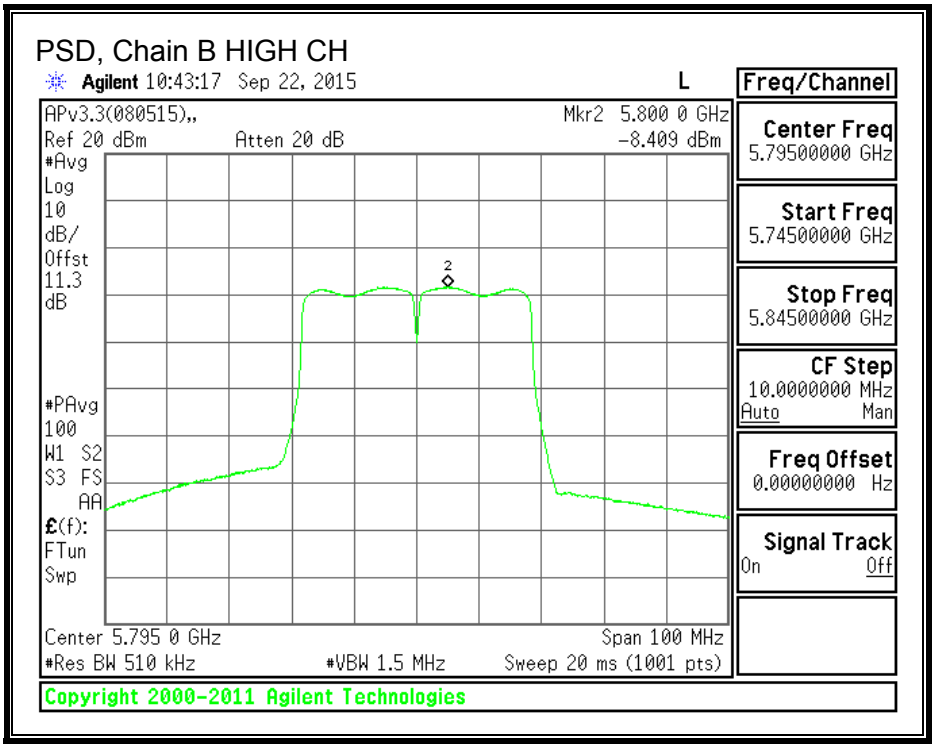
PSD, Chain B





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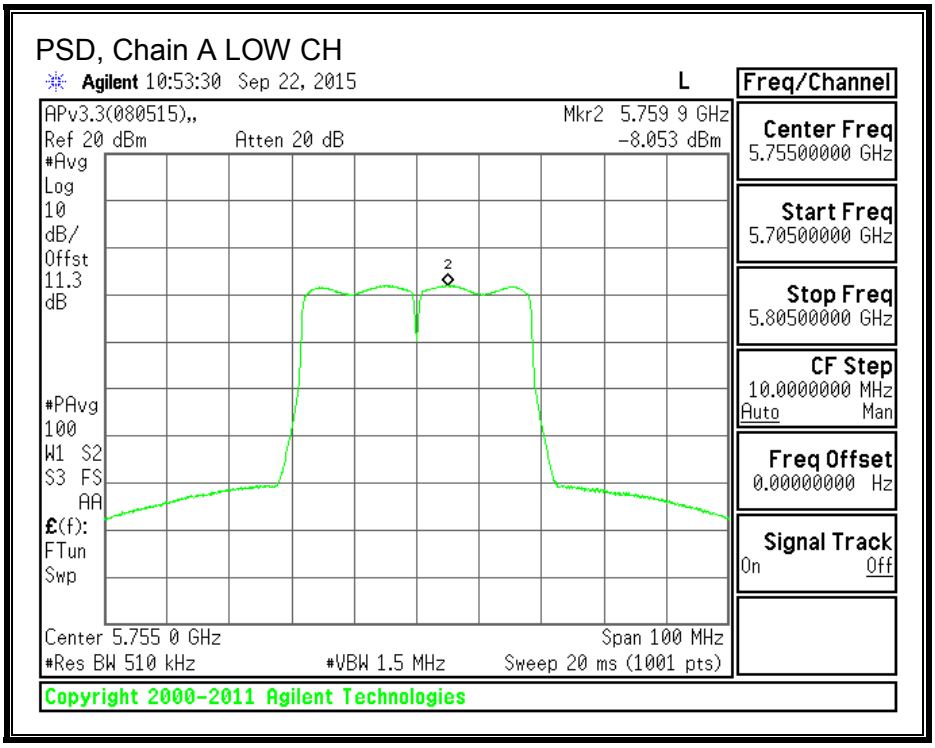
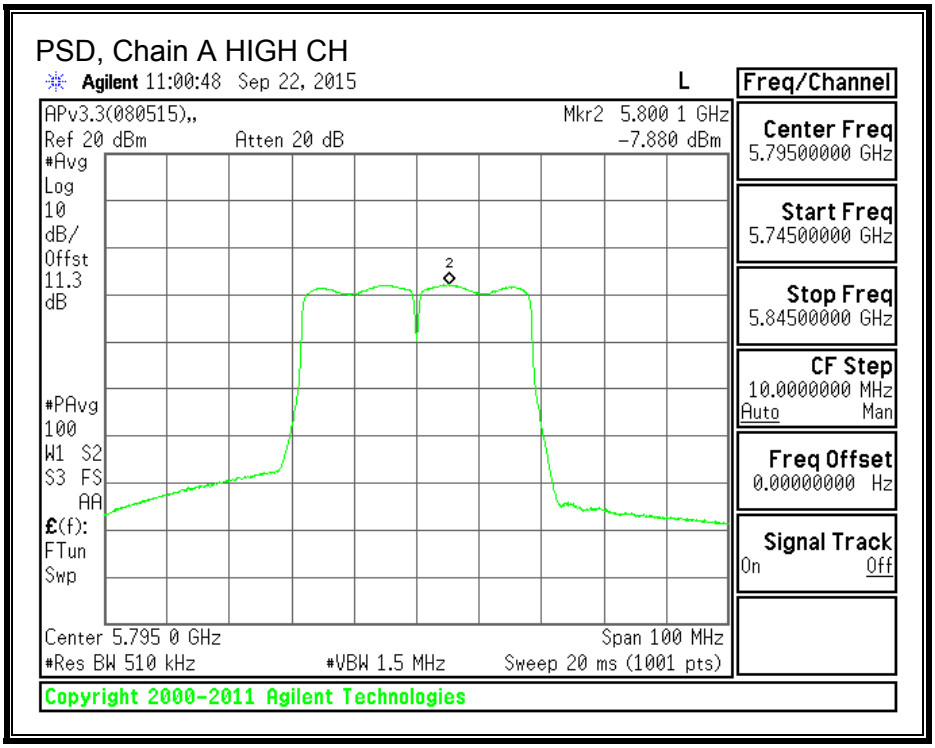
PSD, Chain A





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8.17. 802.11ac VHT80 MODE IN THE 5.8 GHz BAND

8.17.1. 6 dB BANDWIDTH

LIMITS

FCC §15.407 (e)

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

RESULTS

Channel	Frequency (MHz)	6 dB BW Chain B (MHz)	6 dB BW Chain A (MHz)	Minimum Limit (MHz)
Mid	5775	76.3600	76.4800	0.5

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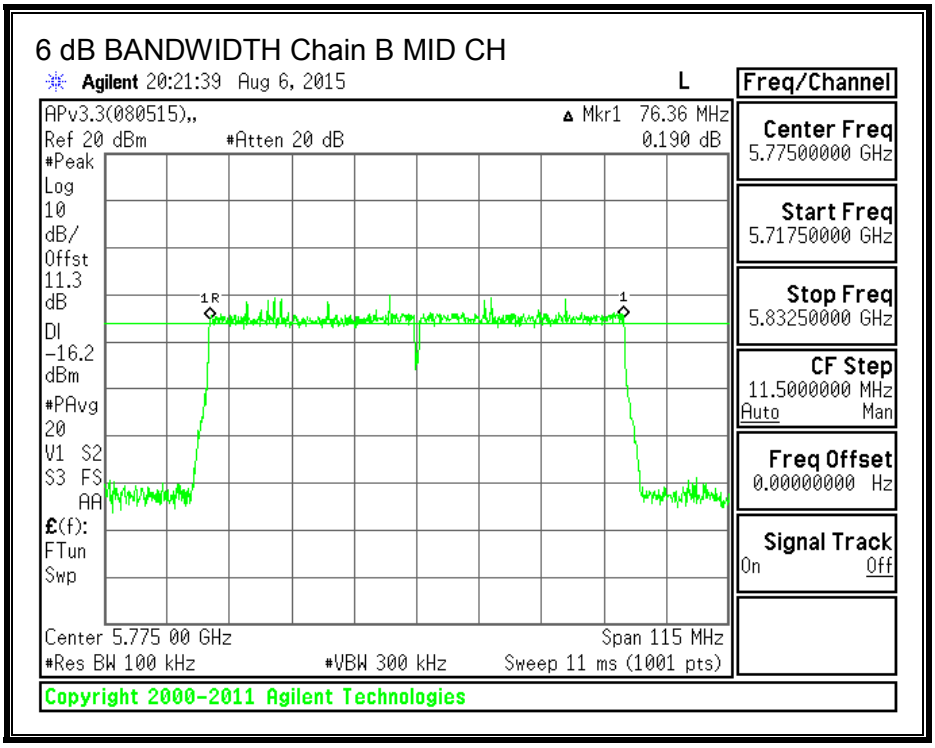
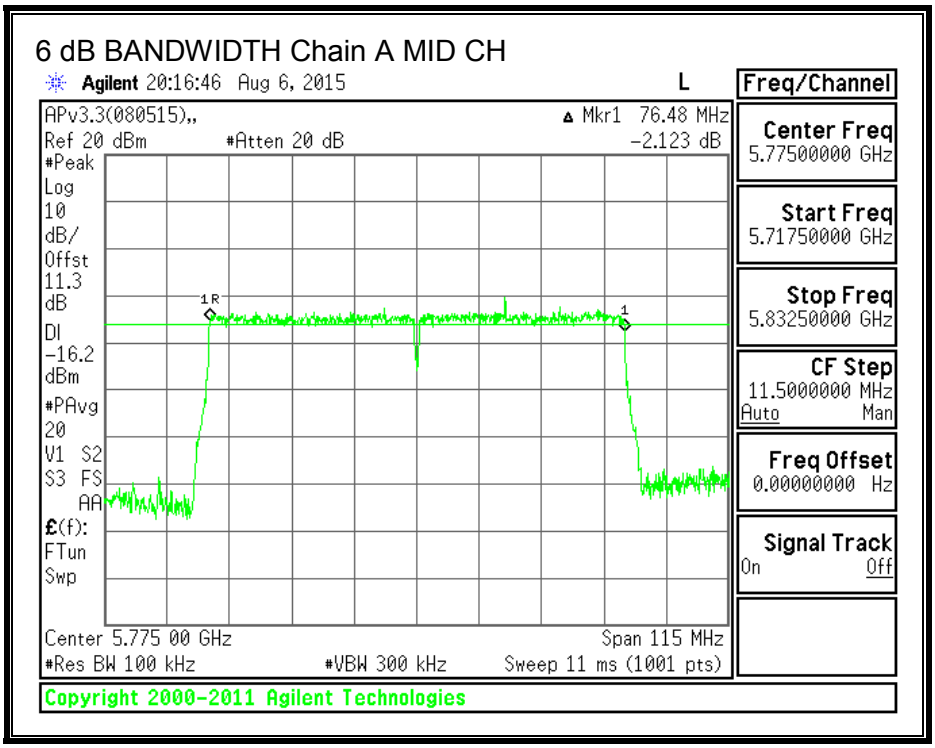
6 dB BANDWIDTH, Chain B



6 dB BANDWIDTH, Chain A



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8.17.2. 26 dB BANDWIDTH

LIMITS

None; for reporting purposes only.

RESULTS

Channel	Frequency (MHz)	26 dB BW Chain B (MHz)	26 dB BW Chain A (MHz)
Mid	5775	81.55	81.43

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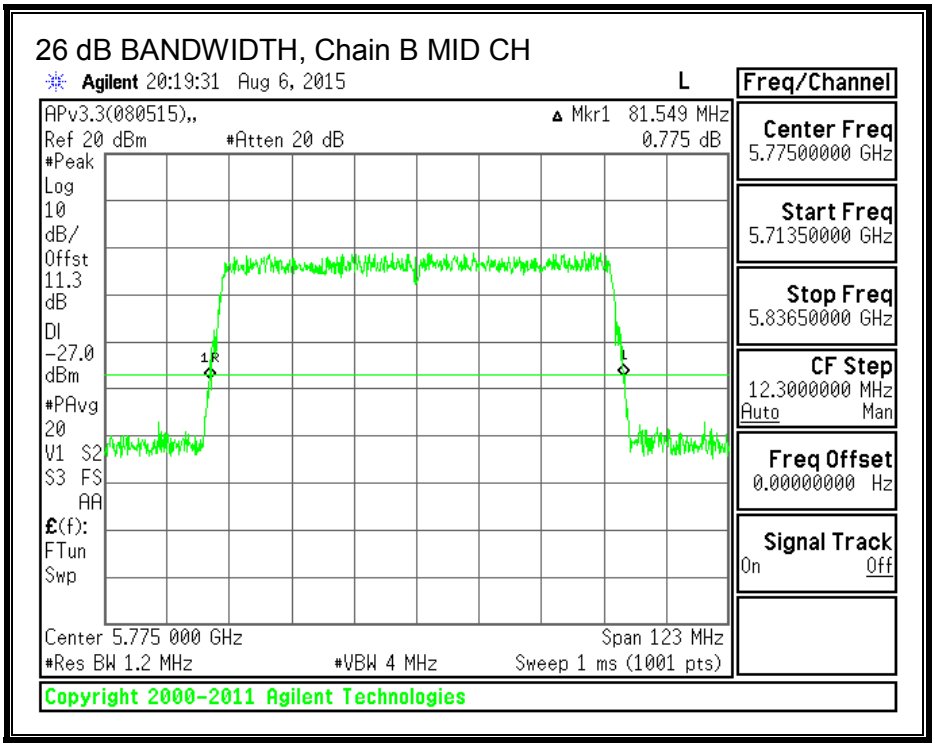
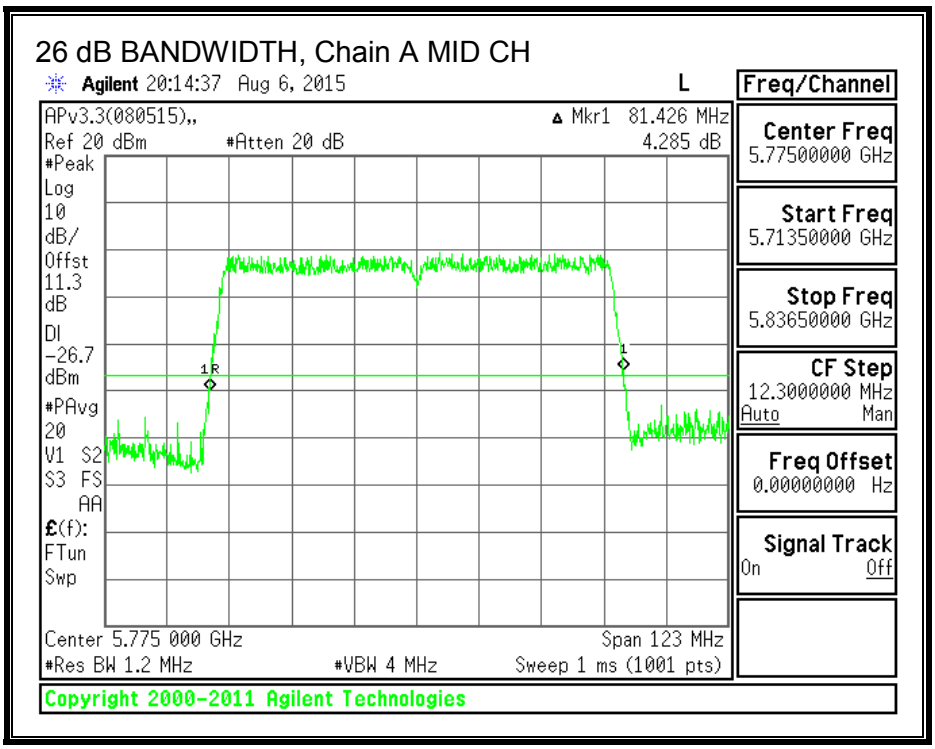
26 dB BANDWIDTH, Chain B



26 dB BANDWIDTH, Chain A



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8.17.3. 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

RESULTS

Channel	Frequency (MHz)	99% BW Chain B (MHz)	99% BW Chain A (MHz)
Mid	5775	76.1741	76.0909

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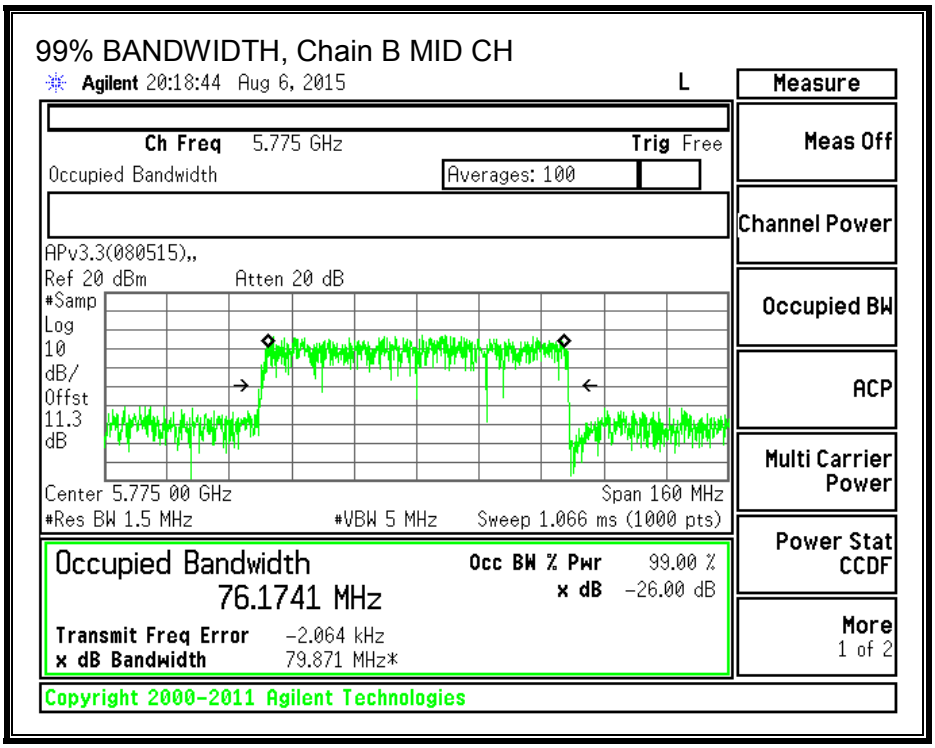
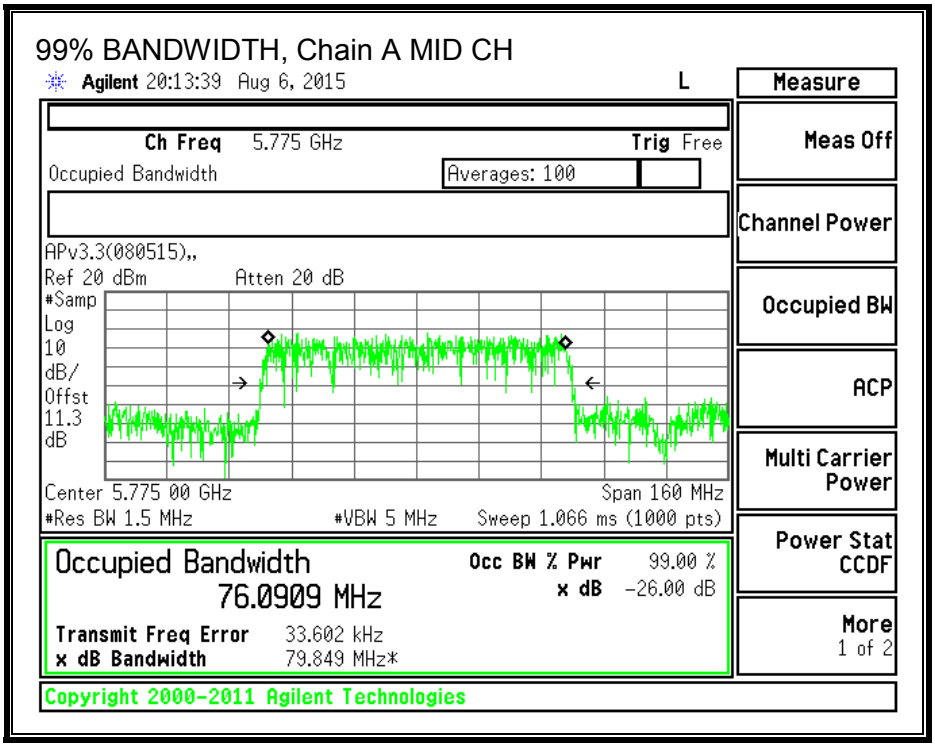
99% BANDWIDTH, Chain B



99% BANDWIDTH, Chain A



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8.17.4. OUTPUT POWER

LIMITS

FCC §15.407 (a) (3)

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DIRECTIONAL ANTENNA GAIN

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

Chain B Antenna Gain (dBi)	Chain A Antenna Gain (dBi)	Uncorrelated Chains Directional Gain (dBi)
1.40	1.70	1.55

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RESULTS

Antenna Gain and Limit

Channel	Frequency (MHz)	Directional Gain (dBi)	Power Limit (dBm)
Mid	5775	1.55	30.00

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

Output Power Results

Channel	Frequency (MHz)	Chain B Meas Power (dBm)	Chain A Meas Power (dBm)	Total Corr'd Power (dBm)	Power Limit (dBm)	Power Margin (dB)
Mid	5775	5.28	5.41	8.36	30.00	-21.64

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8.17.5. Maximum Power Spectral Density (PSD)

LIMITS

FCC §15.407 (a) (3)

For the band 5.725-5.85 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. In addition, the maximum power spectral density shall not exceed 30 dBm in any 500-kHz 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 B Antenna Gain (dBi)	Chain A Antenna Gain (dBi)	Uncorrelated Chains Directional Gain (dBi)
1.40	1.70	1.55

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RESULTS

Antenna Gain and Limit

Channel	Frequency (MHz)	Directional Gain (dBi)	PSD Limit (dBm)
Mid	5775	1.55	30.00

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

PSD Results

Channel	Frequency (MHz)	Chain B Meas PSD (dBm)	Chain A Meas PSD (dBm)	Total Corr'd PSD (dBm)	PSD Limit (dBm)	PSD Margin (dB)
Mid	5775	-15.66	-14.95	-12.28	30.00	-42.28

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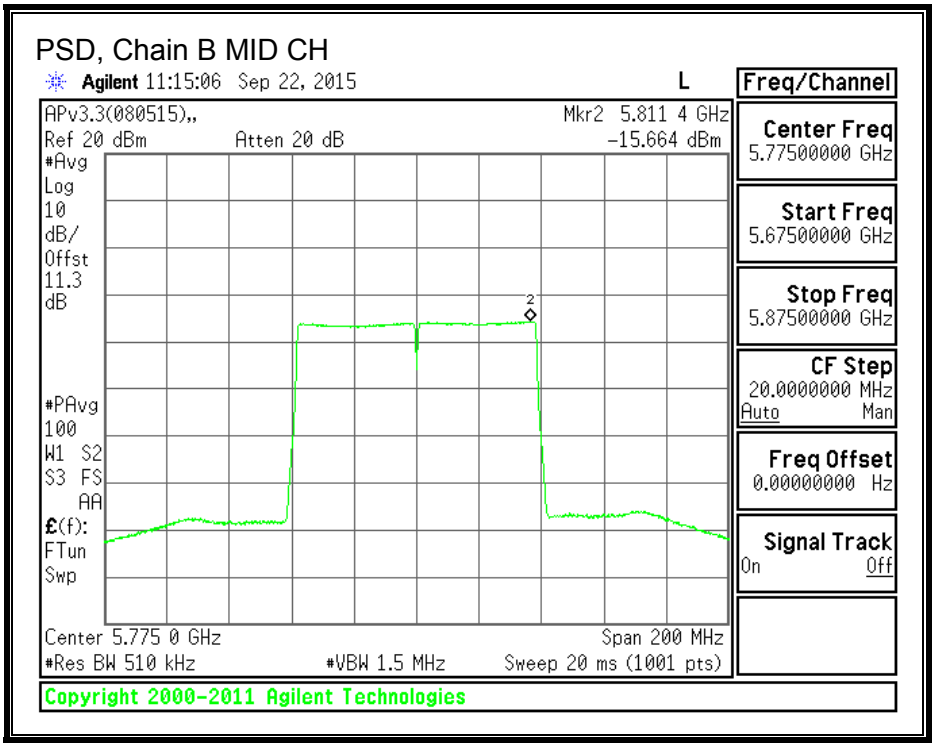
PSD, Chain B



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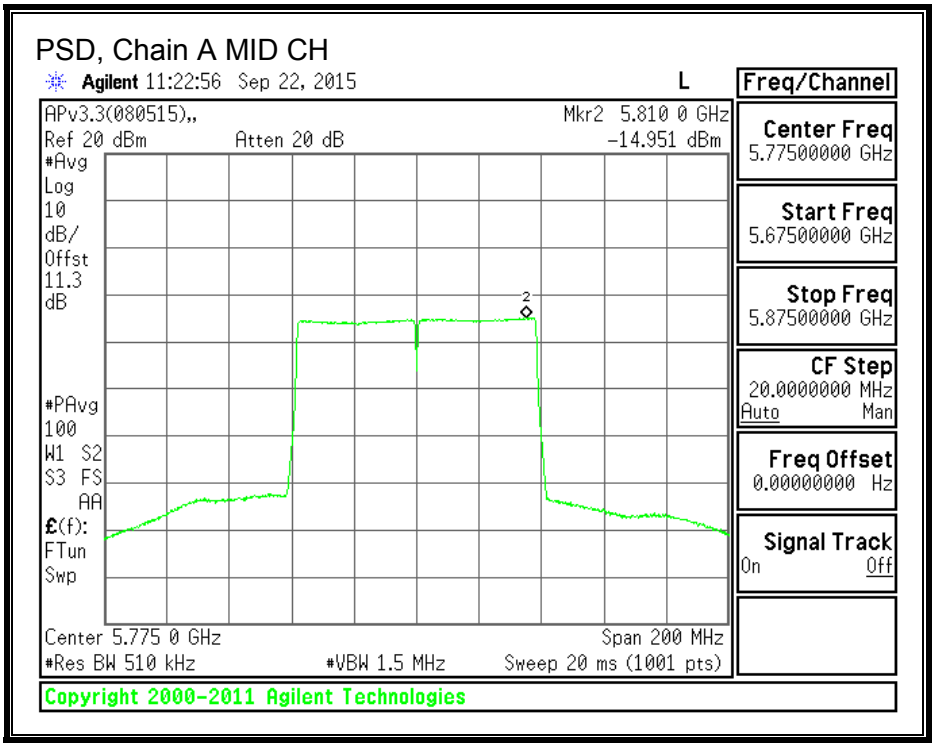
PSD, Chain A



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