

# 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 MICROSOFT CORPORATION ONE MICROSOFT WAY REDMOND, WA 98052, U.S.A.

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NVLAP Lab code: 200246-0

#### Revision History

Ver.	lssue 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.			
<b>EUT DESCRIPTION:</b> PORTABLE COMPUTING DEVICE				
MODEL:	1724			
SERIAL NUMBER:	012785552253 (RF1), 012756752253 (RF2), 012810252253 (RF3)			
DATE TESTED:	August 03-17, 2015, September 20-22, 20	015		
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:

ino de Quele

Francisco de Anda **Project Lead** UL Verification services Inc.

Reviewed By:

Jeff Moser EMC Program Manager UL – Consumer Technology Division

Prepared By:

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 <u>http://www.nist.gov/nvlap/</u>.

# 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 Mode (MHz)		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

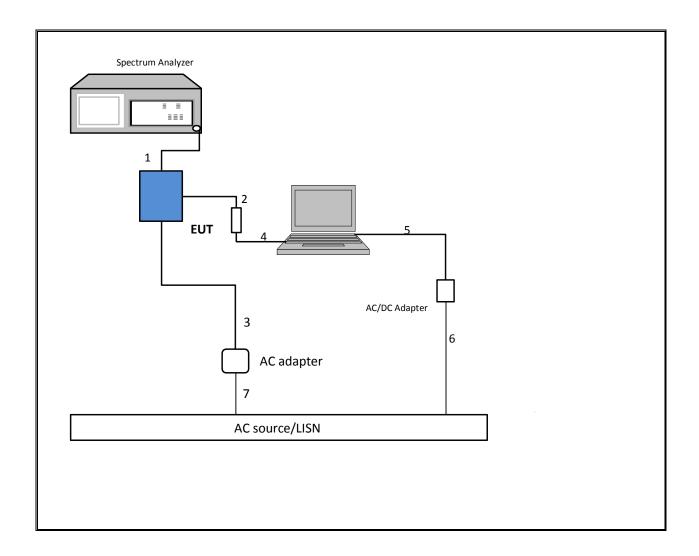
	I/O Cable List							
Cable	Port	# of identical	Connector	Cable Type	Cable	Remarks		
No		ports	Туре		Length (m)			
1	Antenna	1	SMA	Un-Shielded	0.3	To spectrum Analyzer		
2	USB	1	USB	Shielded	0.2	To EUT		
3	DC	1	DC	Un-shielded	1.8	N/A		
4	Ether cable	1	RJ45- USB	Un-shielded	1	To laptop		
5	DC	1	DC	Un-shielded	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	Un-Shielded	1.1	N/A		
			stereo					

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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.

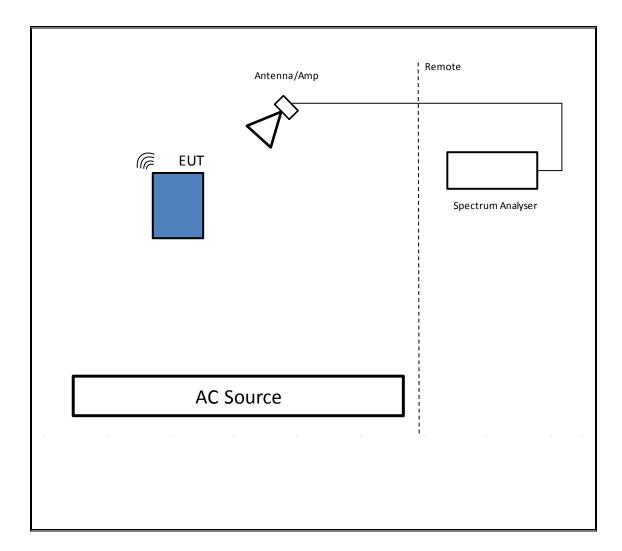
#### SETUP DIAGRAM



## TEST SETUP- RADIATED-ABOVE 1 GHZ

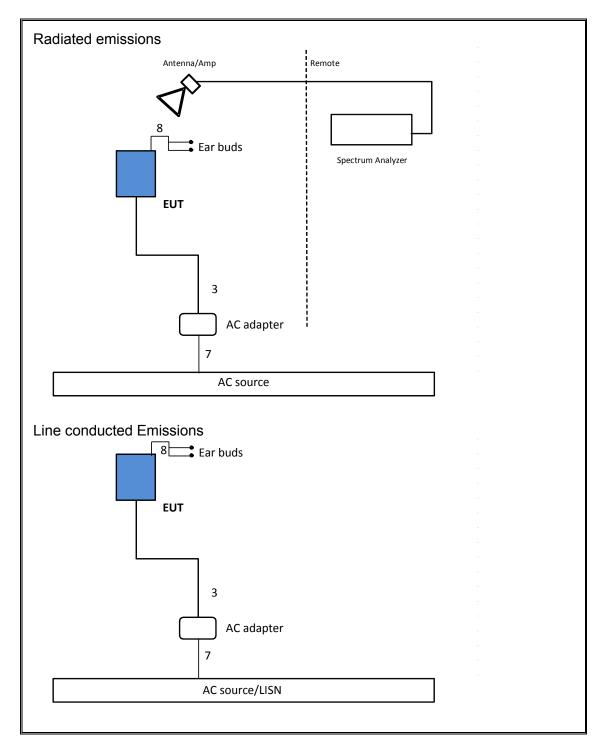
The EUT was tested battery powered. Test software exercised the EUT.

#### SETUP DIAGRAM



## 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:

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)		
	Horn Antenna, 25.5- 40GHz	ARA	SWH-29 (S/N 1003)		
	Amplifier (S/Ns 859993, 860112, 859864)	Miteq	JSD42-1800400- 30-5A	2015-07-28	2016-07-31
	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

Radiated Disturbance Emissions Test Equipment (Morrisville - North Chamber)

## 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.
$S\Delta nn21$	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.

<u>Conducted Output Power</u>: 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).

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

<u>Unwanted emissions in non-restricted bands</u>: 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

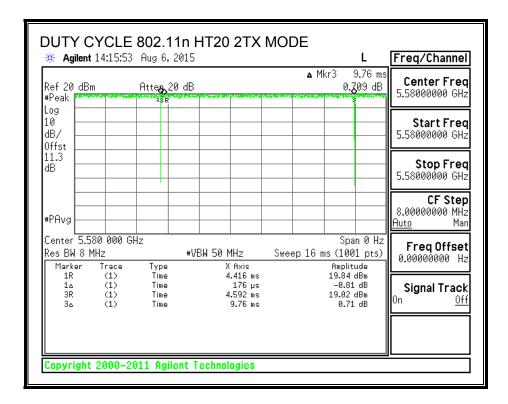
KDB 789033 Zero-Span Spectrum Analyzer Method.

## ON TIME AND DUTY CYCLE RESULTS

Mode	<b>ON Time</b>	Period	<b>Duty Cycle</b>	Duty	Duty Cycle	1/B
	В		х	Cycle	<b>Correction Factor</b>	Minimum VBW
	(msec)	(msec)	(linear)	(%)	(dB)	(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

## **DUTY CYCLE PLOTS**

-		Aug 6,2015	2TX MODE	L	Freq/Channel
Ref 20 df #Peak		Atten 20 dB		▲ Mkr3 3.08 m -1.972 dB	II Contor From
Log 10 dB/ Offst					Start Freq 5.58000000 GHz
11.3 dB					<b>Stop Freq</b> 5.58000000 GHz
#PAvg -					<b>CF Step</b> 8.00000000 MHz <u>Auto</u> Man
Res BW 8 Marker	Trace	#V Type	BW 50 MHz X Axis	Span 0 Hz Sweep 8 ms (1001 pts) Amplitude	Freq Offset 0.00000000 Hz
1R 1∆ 3R 3∆	(1) (1) (1) (1)	Time Time Time Time	1.16 ms 88 µs 1.248 ms 3.08 ms	17.53 dBm 0.65 dB 18.18 dBm -1.97 dB	Signal Track <sup>On <u>Off</u></sup>
Converient	+ 2000 - 2	011 Agilent 1			

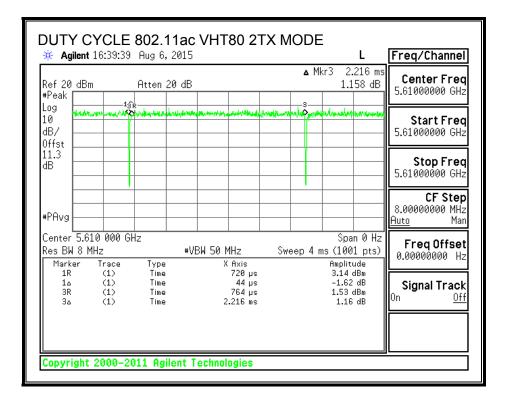


DATE: 2015-10-01

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🗧 Agilen	<b>t</b> 14:38:18	Aug 6, 201	5		L	Freq/Channel
Ref 20 dB Peak		Atten 20 d	B		5,765 dB	Center Freq 5.55000000 GHz
og 0  B/  ffst						Start Freq 5.55000000 GHz
1.3 IB						<b>Stop Freq</b> 5.55000000 GHz
PAvg						<b>CF Step</b> 8.00000000 MHz <u>Auto</u> Mar
Center 5.5 Ces BW 8 Marker	550 000 G MHz Trace	+	VBW 50 MHz X Axis	Sweep 8 r	Span 0 Hz ms (1001 pts)	FreqOffset 0.00000000 Hz
Narker 1R 1∆ 3R 3∆	(1) (1) (1) (1) (1)	Type Time Time Time Time	2.224 ms 2.224 ms 88 µs 2.312 ms 4.72 ms		Amplitude 12.67 dBm -1.86 dB 10.81 dBm 5.76 dB	Signal Track



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# 8.2. 802.11a MODE IN THE 5.2 GHz BAND

# 8.2.1. 26 dB BANDWIDTH

#### **LIMITS**

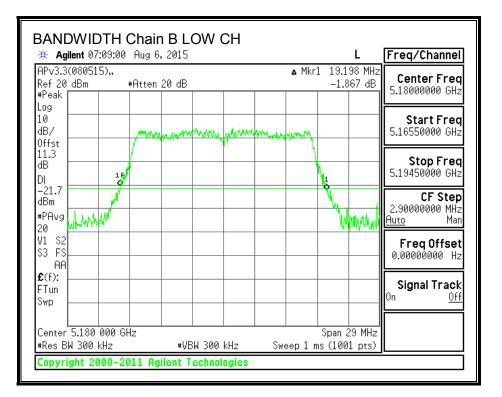
None; for reporting purposes only.

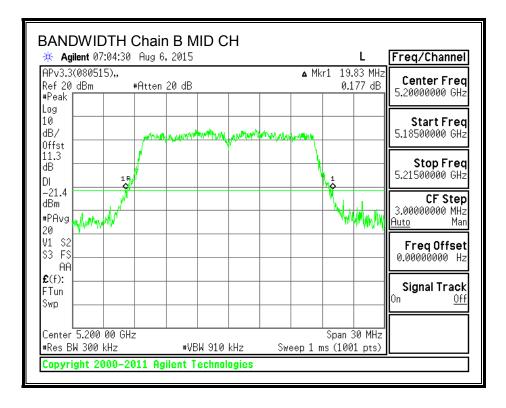
## <u>RESULTS</u>

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

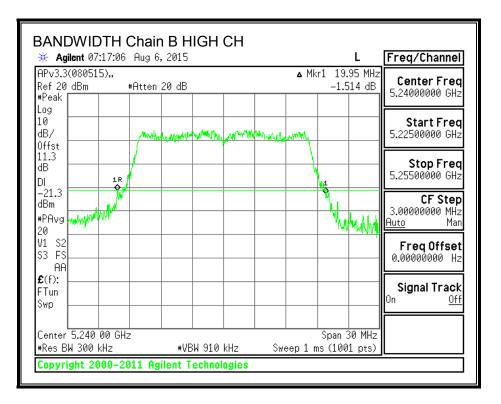
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#### 26 dB BANDWIDTH, Chain B

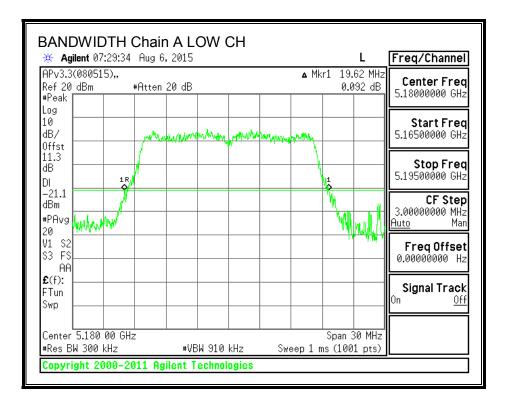




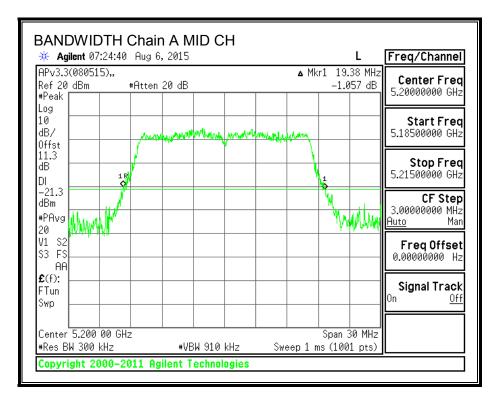
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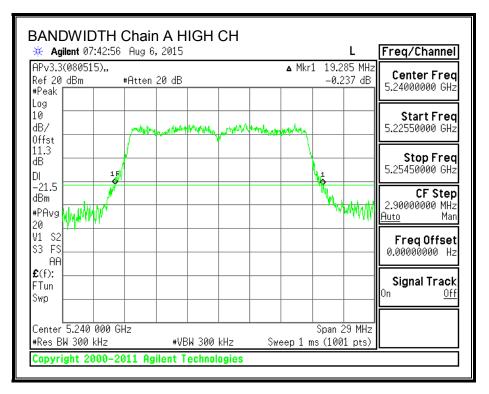


## 26 dB BANDWIDTH, Chain A



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# 8.2.2. 99% BANDWIDTH

## LIMITS

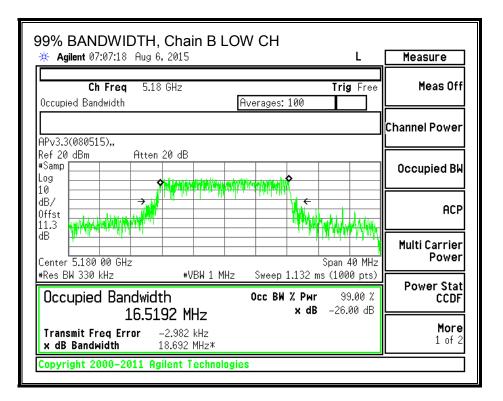
None; for reporting purposes only.

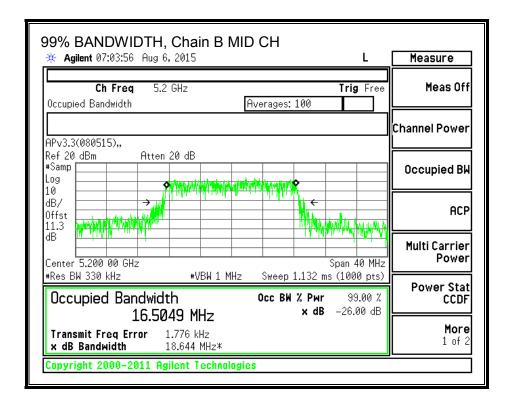
## <u>RESULTS</u>

Channel	Frequency	99% BW	99% BW	
		Chain B	Chain A	
	(MHz)	(MHz)	(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

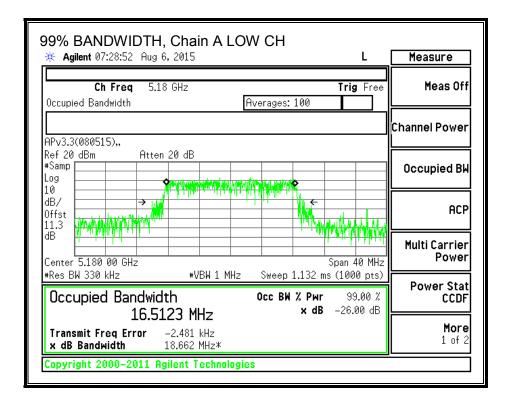




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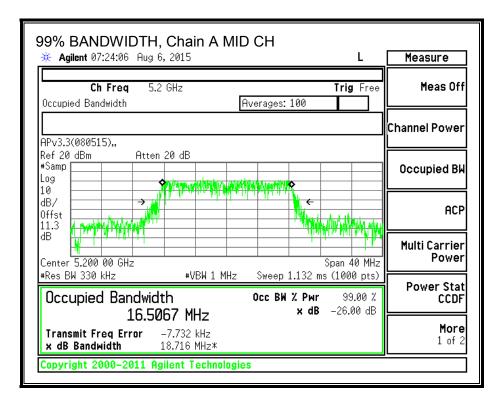
99% BANDWIDTH, Chain B HIGH CH	
₩ Agilent 07:16:28 Aug 6, 2015 L	Measure
Ch Freq 5.24 GHz Trig Free Occupied Bandwidth Averages: 100	Meas Off
	Channel Power
APv3.3(080515),, Ref 20 dBm Atten 20 dB #Samp	Occupied BW
dB/ dB/ offst 11.3 dB / dB /	ACP
Center 5.240 00 GHz Span 40 MHz #Res BW 330 kHz #VBW 1 MHz Sweep 1.132 ms (1000 pts)	Multi Carrier Power
Image: State of the s	Power Stat CCDF
Transmit Freq Error     1.093 kHz       x dB Bandwidth     18.697 MHz*	<b>More</b> 1 of 2
Copyright 2000–2011 Agilent Technologies	

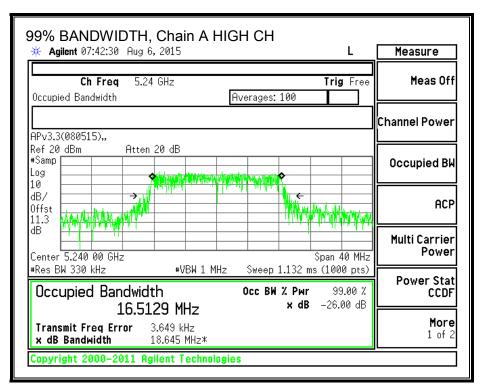
## 99% BANDWIDTH, Chain A



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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-topoint 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	Chain A	<b>Uncorrelated Chains</b>
Antenna	Antenna	Directional
Gain	Gain	Gain
(dBi)	(dBi)	(dBi)
2.00	2.20	2.10

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## **RESULTS**

#### Antenna Gain and Limits

Channel	Frequency	Directional	Directional	Power	PSD
		Gain	Gain	Limit	Limit
		for Power	for PSD		
	(MHz)	(dBi)	(dBi)	(dBm)	(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	Chain B	Chain A	Total	Power	Power
		Meas	Meas	Corr'd	Limit	Margin
		Power	Power	Power		
	(MHz)	(dBm)	(dBm)	(dBm)	(dBm)	(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

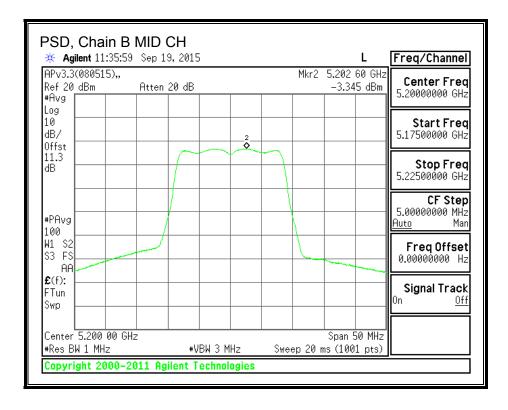
#### **PSD** Results

Channel	Frequency	Chain B	Chain A	Total	PSD	PSD
		Meas	Meas	Corr'd	Limit	Margin
		PSD	PSD	PSD		
	(MHz)	(dBm)	(dBm)	(dBm)	(dBm)	(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

PSD, Chain B LO		L	Freg/Channel
#Avg	en 20 dB	Mkr2 5.182 20 GHz -3.053 dBm	Center Freq 5.18000000 GHz
Log 10 dB/ 0ffst	2		Start Freq 5.15500000 GHz
11.3 dB			Stop Freq 5.20500000 GHz
#PAvg			<b>CF Step</b> 5.00000000 MHz <u>Auto</u> Man
W1 S2 S3 FS AA			FreqOffset 0.00000000 Hz
£(f): FTun Swp			<b>Signal Track</b> On <u>Off</u>
Center 5.180 00 GHz #Res BW 1 MHz	#VBW 3 MHz	Span 50 MHz Sweep 20 ms (1001 pts)	
Copyright 2000-2011	Agilent Technologie	S	

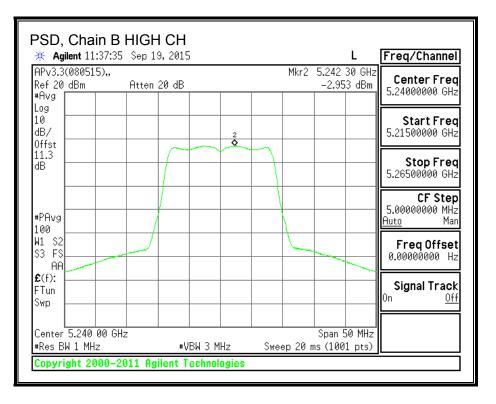


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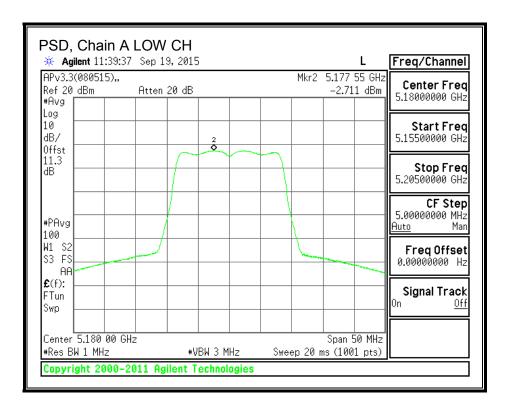
DATE: 2015-10-01

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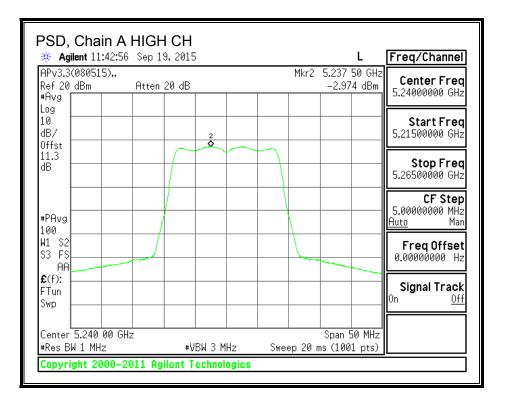


#### PSD, Chain A



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🔆 Agilent 11:41:0	09 Sep 19, 2015			L	Freq/Channel
APv3.3(080515),, Ref 20 dBm #Avg	Atten 20 dB		Mkr2	5.202 50 GHz -2.750 dBm	Center Freq 5.20000000 GHz
Log 10 dB/ 0ffst		2			<b>Start Freq</b> 5.17500000 GHz
dB					<b>Stop Freq</b> 5.22500000 GHz
#PAvg					<b>CF Step</b> 5.00000000 MHz <u>Auto</u> Man
100 W1 S2 S3 FS					FreqOffset 0.00000000 Hz
£(f): FTun Swp					<b>Signal Track</b> <sup>On <u>Off</u></sup>
Center 5.200 00 ( #Res BW 1 MHz		3 MHz	Sweep 20 m	Span 50 MHz s (1001 pts)	



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# 8.3. 802.11n HT20 MODE IN THE 5.2 GHz BAND

# 8.3.1. 26 dB BANDWIDTH

#### <u>LIMITS</u>

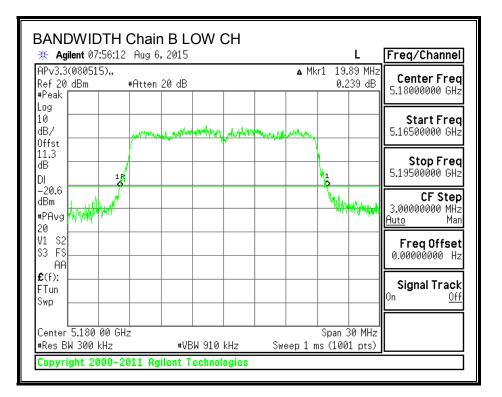
None; for reporting purposes only.

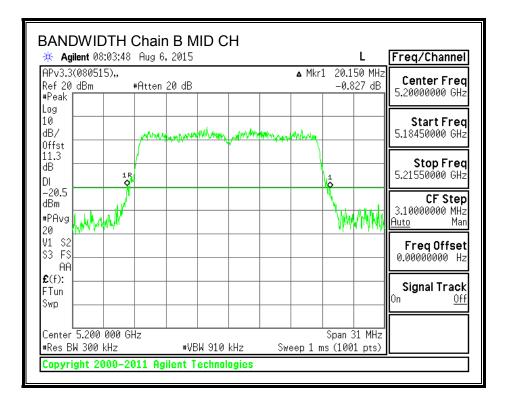
#### **RESULTS**

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

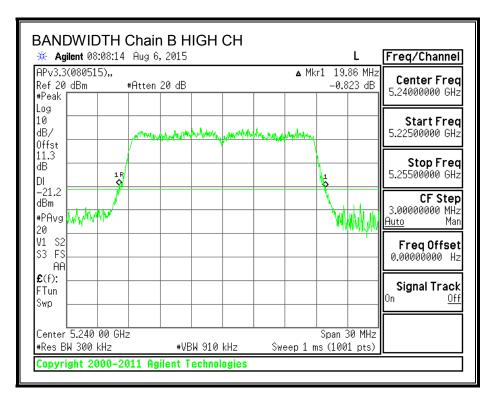
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### 26 dB BANDWIDTH, Chain B

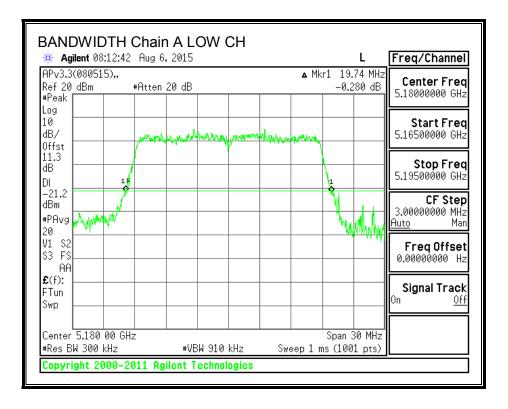




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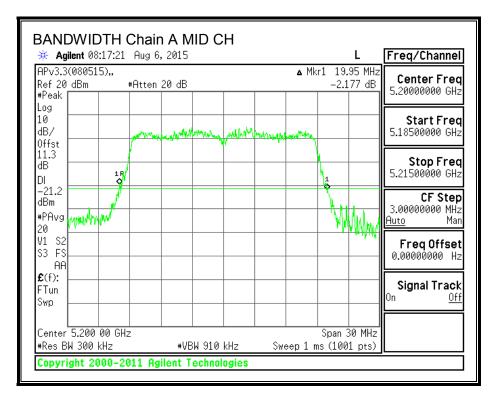


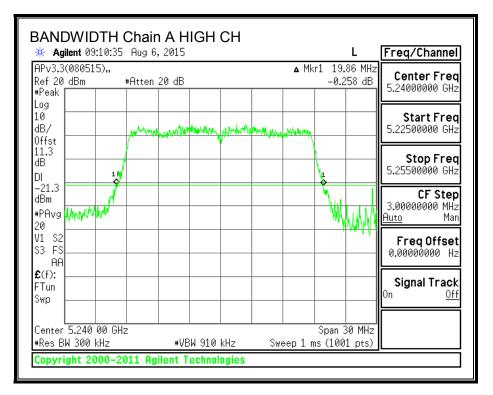
### 26 dB BANDWIDTH, Chain A



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# 8.3.2. 99% BANDWIDTH

### LIMITS

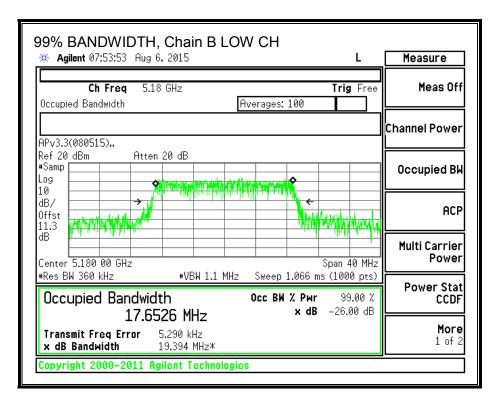
None; for reporting purposes only.

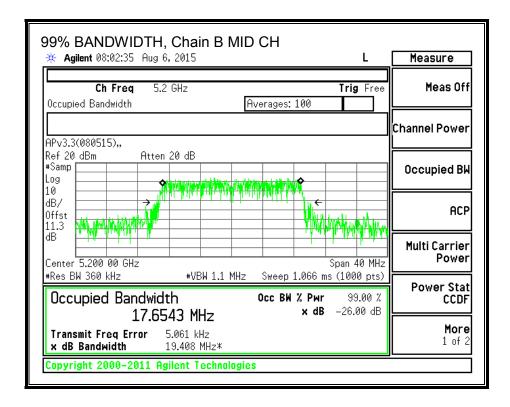
### **RESULTS**

Channel	Frequency	99% BW	99% BW
		Chain B	Chain A
	(MHz)	(MHz)	(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

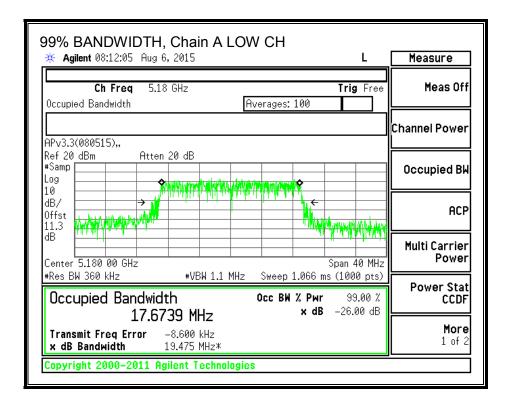




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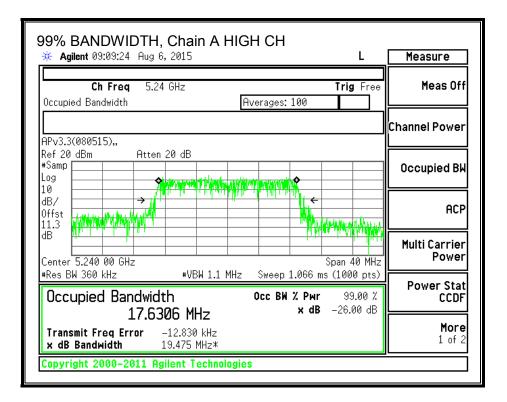
99% BANDWIDTH, Chain B HIGH CH	
🔆 Agilent 08:07:11 Aug 6, 2015 🛛 🕹 🖌 📙	Measure
Ch Freq 5.24 GHz Trig Free Occupied Bandwidth Averages: 100	Meas Off
	Channel Power
APv3.3(080515),, Ref 20 dBm Atten 20 dB #Samp	Occupied BW
dB/ dFst 11.3 Matrix	ACP
dB         """"""""""""""""""""""""""""""""""""	Multi Carrier Power
#Res BW 360 kHz         #VBW 1.1 MHz         Sweep 1.066 ms (1000 pts)           Occupied Bandwidth         Occ BW % Риг         99.00 %           17.6487 MHz         × dB         -26.00 dB	Power Stat CCDF
Transmit Freq Error 4.206 kHz x dB Bandwidth 19.380 MHz*	<b>More</b> 1 of 2
Copyright 2000–2011 Agilent Technologies	

### 99% BANDWIDTH, Chain A



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99% BANDWIDTH, Chain A MID CH	Measure
Ch Freq 5.2 GHz Trig Free	Meas Off
Occupied Bandwidth Averages: 100	i
	Channel Power
APv3.3(080515),, Ref 20 dBm Atten 20 dB	
*Samp	Occupied BW
dB/ → → · · · · · · · · · · · · · · · · ·	АСР
	Multi Carrier Power
Center 5.200 00 GHz Span 40 MHz #Res BW 360 kHz #VBW 1.1 MHz Sweep 1.066 ms (1000 pts)	
Occupied Bandwidth Occ BW % Pwr 99.00 %	Power Stat CCDF
17.6708 MHz × dB -26.00 dB	
Transmit Freq Error -6.705 kHz	More
x dB Bandwidth 19.346 MHz*	1 of 2
Copyright 2000-2011 Agilent Technologies	



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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-topoint 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	Chain A	<b>Uncorrelated Chains</b>
Antenna	Antenna	Directional
Gain	Gain	Gain
(dBi)	(dBi)	(dBi)
2.00	2.20	2.10

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### **RESULTS**

#### Antenna Gain and Limits

Channel	Frequency	Directional	Directional	Power	PSD
		Gain	Gain	Limit	Limit
		for Power	for PSD		
	(MHz)	(dBi)	(dBi)	(dBm)	(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**

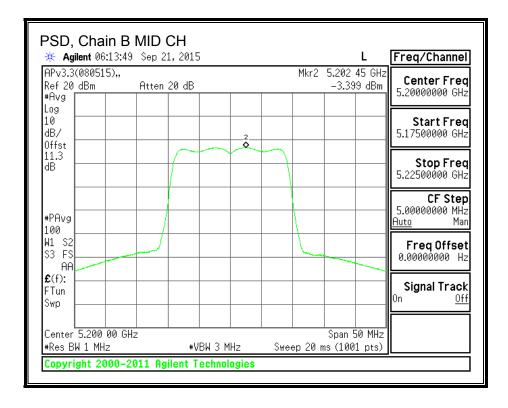
Channel	Frequency	Chain B	Chain A	Total	Power	Power
		Meas	Meas	Corr'd	Limit	Margin
		Power	Power	Power		
	(MHz)	(dBm)	(dBm)	(dBm)	(dBm)	(dB)
Low	5180	7.32	7.69	10.52	24.00	-13.48
Mid	5200	7.61	8.01	10.82	24.00	-13.18
High	5240	7.56	7.76	10.67	24.00	-13.33

#### **PSD Results**

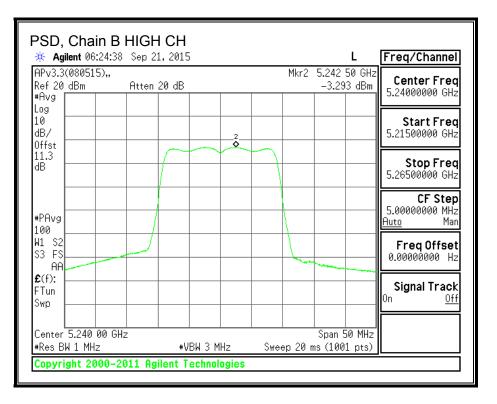
Channel	Frequency	Chain B	Chain A	Total	PSD	PSD
		Meas	Meas	Corr'd	Limit	Margin
		PSD	PSD	PSD		
	(MHz)	(dBm)	(dBm)	(dBm)	(dBm)	(dB)
Low	5180	-3.55	-2.88	-0.19	11.00	-11.19
Mid	5200	-3.40	-2.95	-0.16	11.00	-11.16
High	5240	-3.29	-2.80	-0.03	11.00	-11.03

## PSD, Chain B

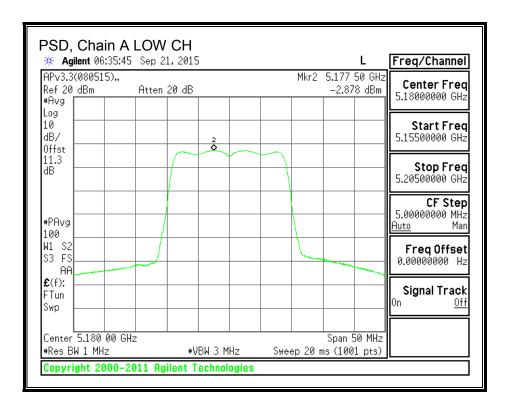
K Agilent 06:02:56	Sep 21, 2015		L	Freq/Channel
Pv3.3(080515),, ef 20 dBm Avg	Atten 20 dB	Mkr2	5.177 40 GHz -3.546 dBm	Center Freq 5.18000000 GHz
og 0 B/ ffst	2			Start Freq 5.15500000 GHz
1.3 B				<b>Stop Freq</b> 5.20500000 GHz
PAvg				<b>CF Step</b> 5.00000000 MHz <u>Auto</u> Man
00 1 S2 3 FS AA			In the second	Freq Offset 0.00000000 Hz
:(f): Tun wp				<b>Signal Track</b> <sup>On <u>Off</u></sup>
ienter 5.180 00 GH Res BW 1 MHz	z #VBW 3 N		Span 50 MHz ms (1001 pts)	



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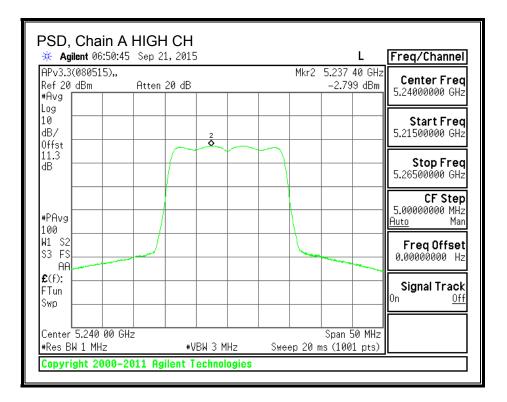


### PSD, Chain A



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PSD, Chain A MID			_	
🔆 Agilent 06:44:11 Sep 2	1,2015		L	Freq/Channel
APv3.3(080515),, Ref 20 dBm Atten #Avg	20 dB		.202 50 GHz -2.952 dBm	Center Freq 5.20000000 GHz
Log 10 dB/ 0ffst	2			<b>Start Freq</b> 5.17500000 GHz
dB				<b>Stop Freq</b> 5.22500000 GHz
#PAvg				<b>CF Step</b> 5.00000000 MHz <u>Auto</u> Man
И1 52 S3 FS АА				FreqOffset 0.00000000 Hz
£(f): FTun Swp				Signal Track <sup>On <u>Off</u></sup>
Center 5.200 00 GHz #Res BW 1 MHz	#VBW 3 MHz	Sweep 20 ms	pan 50 MHz (1001 pts)	
Copyright 2000-2011 Ag	ilent Technologies			



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# 8.4. 802.11n HT40 MODE IN THE 5.2 GHz BAND

# 8.4.1. 26 dB BANDWIDTH

### LIMITS

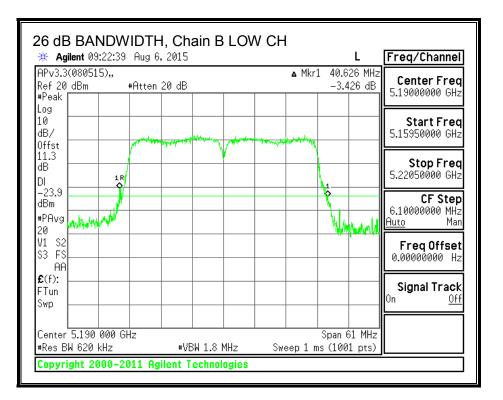
None; for reporting purposes only.

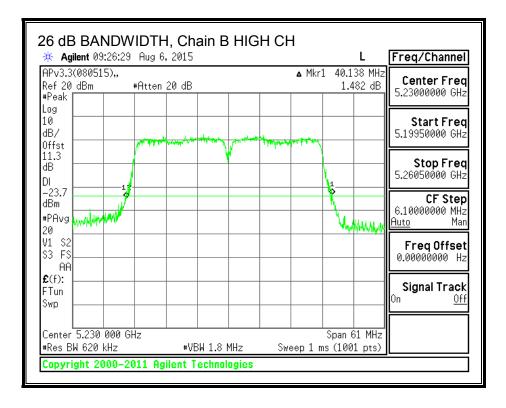
### **RESULTS**

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

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### 26 dB BANDWIDTH, Chain B

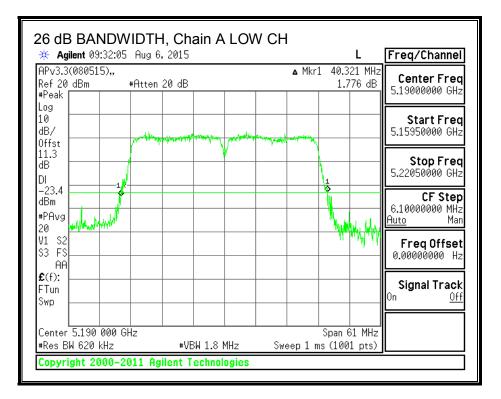


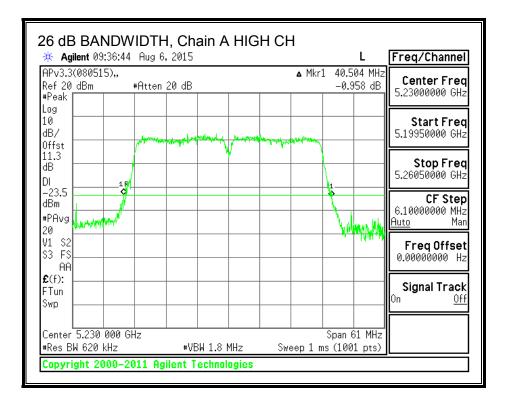


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#### 26 dB BANDWIDTH, Chain A





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# 8.4.2. 99% BANDWIDTH

### LIMITS

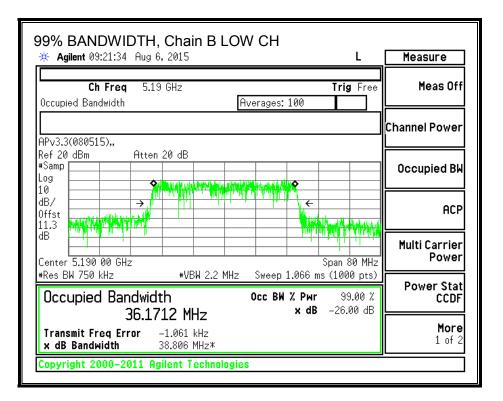
None; for reporting purposes only.

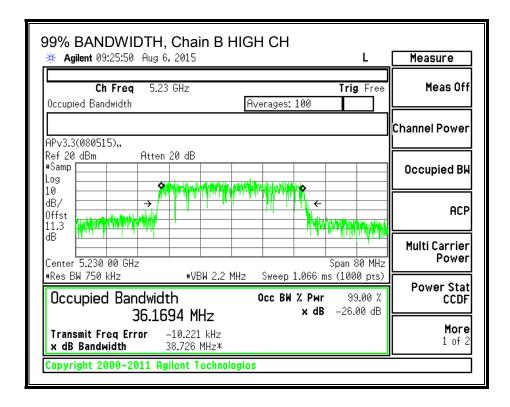
### **RESULTS**

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

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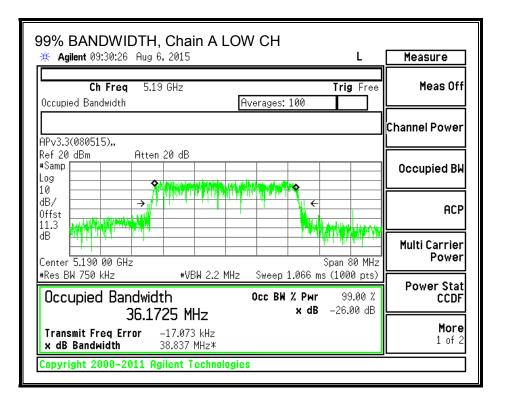
## 99% BANDWIDTH, Chain B

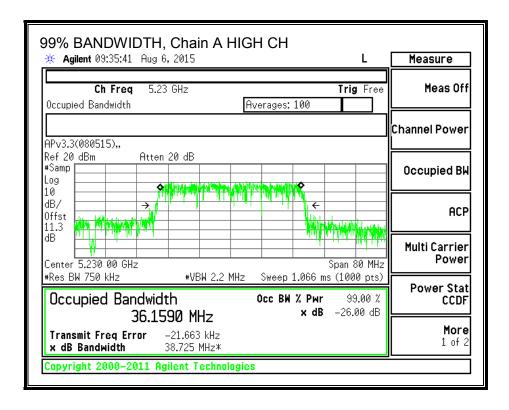




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#### 99% BANDWIDTH, Chain A





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

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## **RESULTS**

#### Antenna Gain and Limits

Channel	Frequency	Directional	Directional	Power	PSD
		Gain	Gain	Limit	Limit
		for Power	for PSD		
	(MHz)	(dBi)	(dBi)	(dBm)	(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	Chain B	Chain A	Total	Power	Power
		Meas	Meas	Corr'd	Limit	Margin
		Power	Power	Power		
	(MHz)	(dBm)	(dBm)	(dBm)	(dBm)	(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

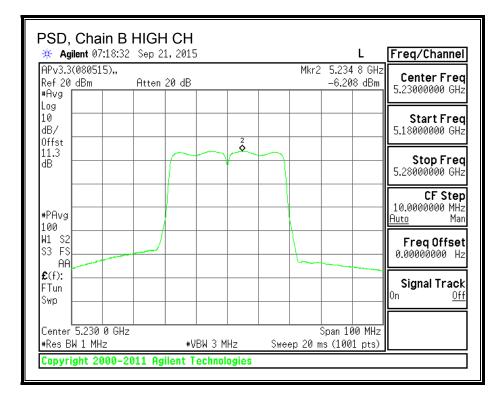
Channel	Frequency	Chain B	Chain A	Total	PSD	PSD
		Meas	Meas	Corr'd	Limit	Margin
		PSD	PSD	PSD		
	(MHz)	(dBm)	(dBm)	(dBm)	(dBm)	(dB)
Low	5190	-6.74	-6.18	-3.44	11.00	-14.44

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## PSD, Chain B

PSD, Chain B L			L Freq/Channel
#Avg	Atten 20 dB	Mkr2 5.195 -6.742	1 GHz L dBm 5.19000000 GHz
₋og L0 dB/ Dffst		2	<b>Start Freq</b> 5.14000000 GHz
11.3 dB		Č	Stop Freq 5.24000000 GHz
*PAvg			CF Step 10.0000000 MHz <u>Auto</u> Man
100 41 S2 53 FS AA			Freq Offset 0.00000000 Hz
<b>E</b> (f): -Tun Swp			Signal Track
Center 5.190 0 GHz #Res BW 1 MHz	#VBW 3 M	Span 10 Span 10 Hz Sweep 20 ms (1001	

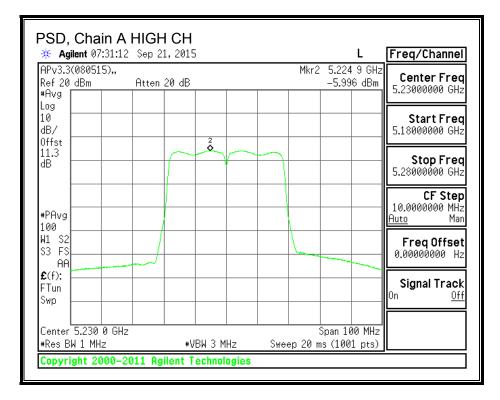


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## PSD, Chain A

* Agilent 07:26:19	Sep 21, 2015	L	Freq/Channel
APv3.3(080515),, Ref 20 dBm ≇Avg	Atten 20 dB	Mkr2 5.184 7 GH -6.176 dBm	II Contor From
Log 10 dB/ Offst			<b>Start Freq</b> 5.14000000 GHz
dB	Č		Stop Freq
#PAvg			<b>CF Step</b> 10.0000000 MHz <u>Auto</u> Man
100 W1 S2 S3 FS			Freq Offset
E(f): FTun Swp			Signal Track
Center 5.190 0 GHz #Res BW 1 MHz	#VBW 31	Span 100 MHz SWeep 20 ms (1001 pts)	



DATE: 2015-10-01

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# 8.5. 802.11ac VHT80 MODE IN THE 5.2 GHz BAND

# 8.5.1. 26 dB BANDWIDTH

#### <u>LIMITS</u>

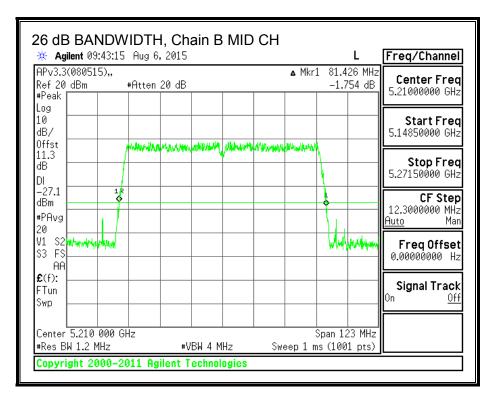
None; for reporting purposes only.

#### **RESULTS**

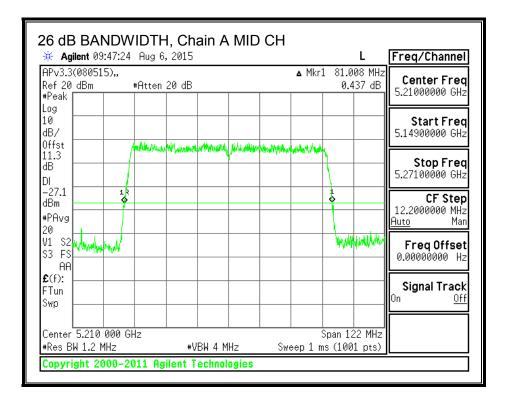
Channel	Frequency	26 dB BW	26 dB BW
		Chain B	Chain A
	(MHz)	(MHz)	(MHz)
Mid	5210	81.43	81.01

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### 26 dB BANDWIDTH, Chain B



#### 26 dB BANDWIDTH, Chain A



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# 8.5.2. 99% BANDWIDTH

### LIMITS

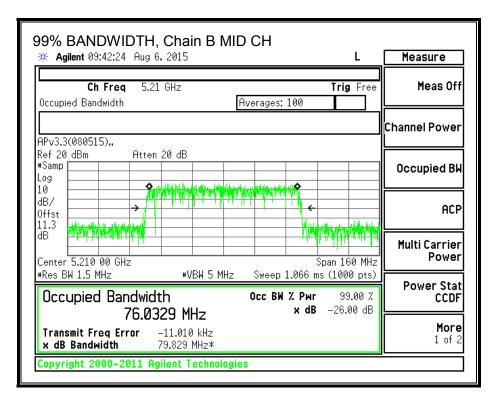
None; for reporting purposes only.

### <u>RESULTS</u>

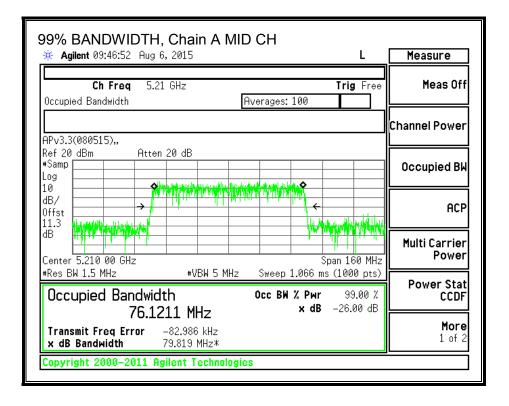
Channel	Frequency	99% BW	99% BW
		Chain B	Chain A
	(MHz)	(MHz)	(MHz)
Mid	5210	76.0329	76.1211

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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.

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

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## <u>RESULTS</u>

#### Antenna Gain and Limits

Channel	Frequency	Directional	Directional	Power	PSD
		Gain	Gain Gain		Limit
		for Power	for PSD		
	(MHz)	(dBi)	(dBi)	(dBm)	(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	Chain B	Chain A	Total	Power	Power
		Meas	Meas	Corr'd	Limit	Margin
		Power	Power	Power		
	(MHz)	(dBm)	(dBm)	(dBm)	(dBm)	(dB)
Mid	5210	4.62	4.62	7.63	24.00	-16.37

## **PSD Results**

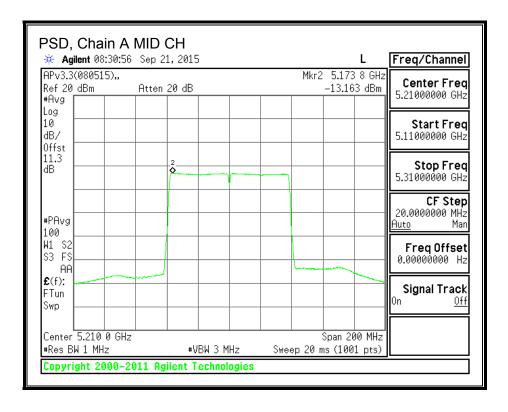
Channel	Frequency	Chain B	Chain A	Total	PSD	PSD
		Meas	Meas	Corr'd	Limit	Margin
		PSD	PSD	PSD		
	(MHz)	(dBm)	(dBm)	(dBm)	(dBm)	(dB)
Mid	5210	-13.46	-13.16	-10.30	11.00	-21.30

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## PSD, Chain B

SD, Chain B MID			( <b>D</b> )
K Agilent 08:08:30 Sep	21, 2015	L	Freq/Channel
Avg	n 20 dB	Mkr2 5.246 8 GHz -13.455 dBm	II Contor From
og Ø IB/			Start Freq 5.11000000 GHz
1.3 B		2	Stop Freq 5.31000000 GHz
PAvg			<b>CF Step</b> 20.0000000 MHz <u>Auto</u> Man
1 S2 3 FS AA			Freq Offset 0.00000000 Hz
:(f): Tun Wp			<b>Signal Track</b> On <u>Off</u>
Center 5.210 0 GHz Res BW 1 MHz	#VBW 3 MHz	Span 200 MHz Sweep 20 ms (1001 pts)	

#### 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**

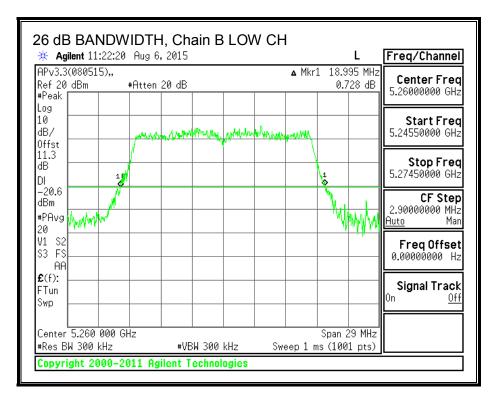
None; for reporting purposes only.

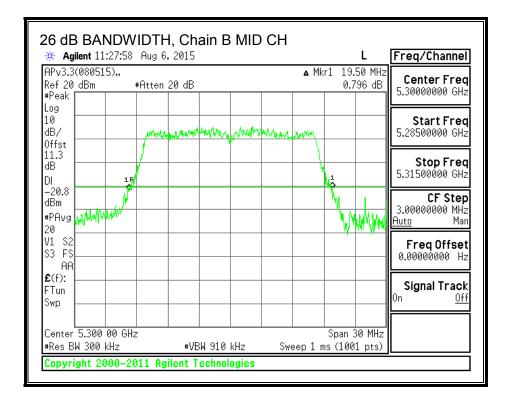
#### **RESULTS**

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

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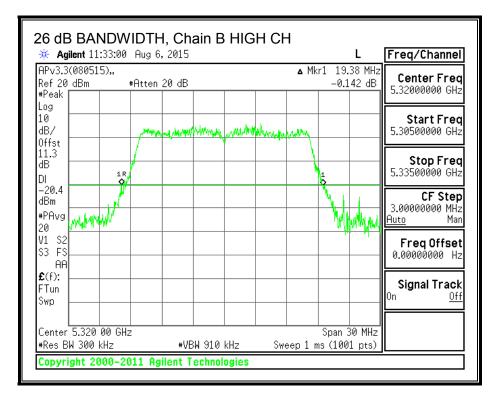
### 26 dB BANDWIDTH, Chain B



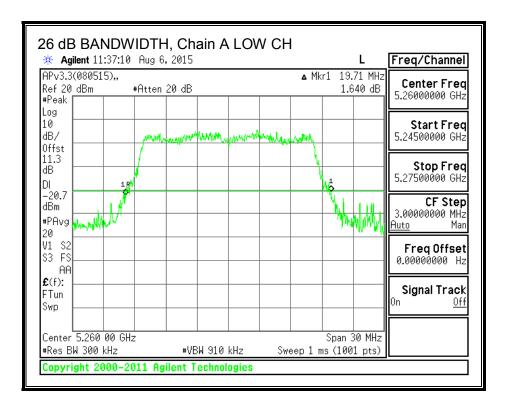


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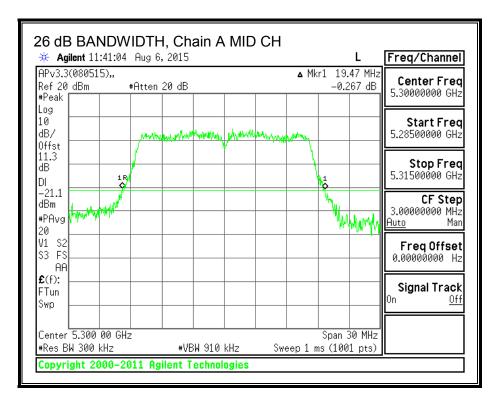


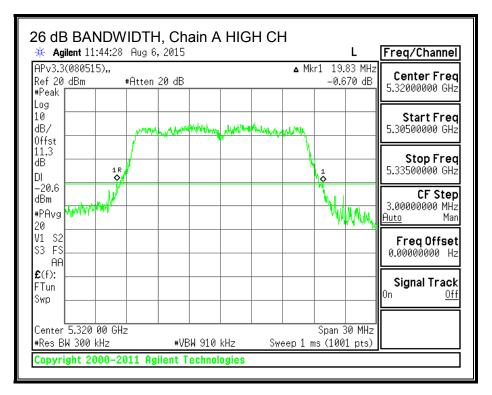
### 26 dB BANDWIDTH, Chain A



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## 8.6.2. 99% BANDWIDTH

## LIMITS

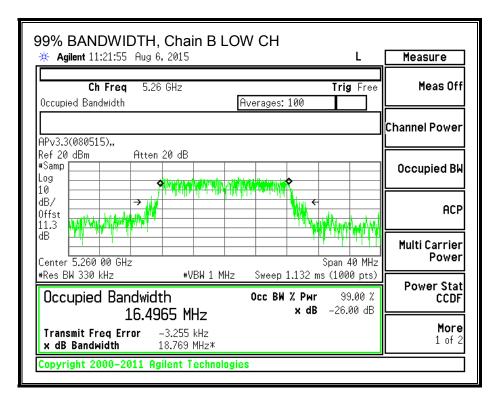
None; for reporting purposes only.

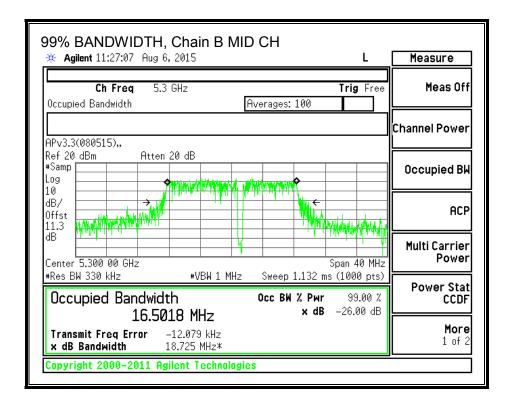
## **RESULTS**

Channel	Frequency	99% BW	99% BW
		Chain B	Chain A
	(MHz)	(MHz)	(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

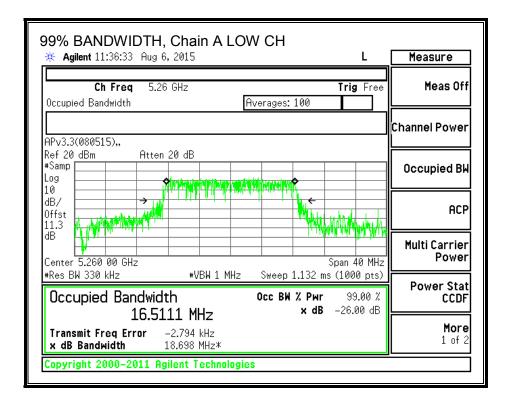




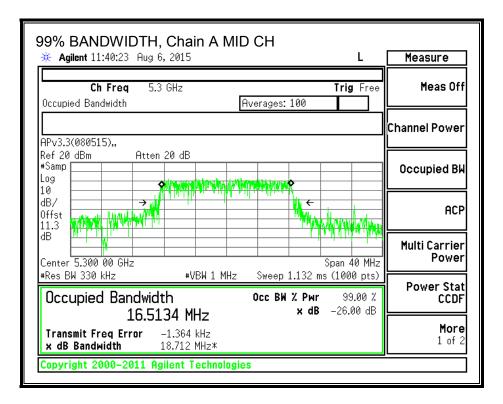
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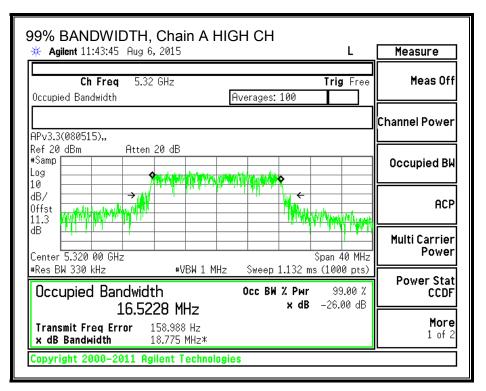
99% BANDWIDTH, Chain B HIGH CH		
ዡ Agilent 11:31:48 Aug 6, 2015	Measure	
Ch Freq 5.32 GHz Trig Free Occupied Bandwidth Averages: 100	Meas Off	
APv3.3(080515),	Channel Power	
Ref 20 dBm Atten 20 dB *Samp	Occupied BW	
dB/ Offst 11.3 Marshyll Market All All All All All All All All All Al	ACP	
dB         rm         rm <th rm<<="" td=""><td>Multi Carrier Power</td></th>	<td>Multi Carrier Power</td>	Multi Carrier Power
Image: Second conduction         Occupied Bandwidth         O	Power Stat CCDF	
Transmit Freq Error       10.233 kHz         x dB Bandwidth       18.716 MHz*	<b>More</b> 1 of 2	
Copyright 2000–2011 Agilent Technologies		

## 99% BANDWIDTH, Chain A



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## 8.6.3. OUTPUT POWER AND PSD

#### <u>LIMITS</u>

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	Chain A	<b>Uncorrelated Chains</b>
Antenna	Antenna	Directional
Gain	Gain	Gain
(dBi)	(dBi)	(dBi)
2.20	2.40	2.30

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## <u>RESULTS</u>

#### Bandwidth, Antenna Gain, and Limits

Channel	Frequency	Min 26 dB BW	Directional Gain for Power	Directional Gain for PSD	Power Limit	PSD Limit
	(MHz)	(MHz)	(dBi)	(dBi)	(dBm)	(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

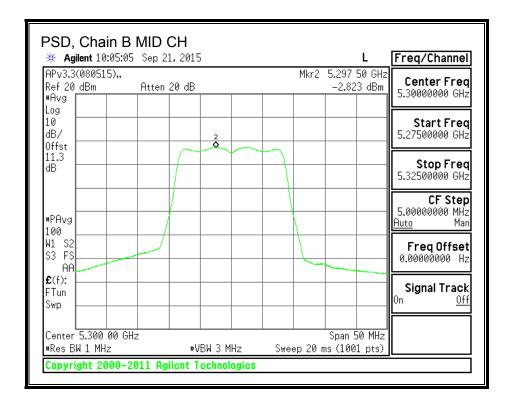
Channel	Frequency	Chain B	Chain A	Total	Power	Power
		Meas	Meas	Corr'd	Limit	Margin
		Power	Power	Power		
	(MHz)	(dBm)	(dBm)	(dBm)	(dBm)	(dB)
Low	5260	7.57	7.78	10.81	23.79	-12.98
Mid	5300	7.78	7.86	10.95	23.89	-12.94
High	5320	7.96	7.94	11.08	23.87	-12.79

#### **PSD Results**

Channel	Frequency	Chain B	Chain A	Total	PSD	PSD
		Meas	Meas	Corr'd	Limit	Margin
		PSD	PSD	PSD		
	(MHz)	(dBm)	(dBm)	(dBm)	(dBm)	(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

DATE: 2015-10-01

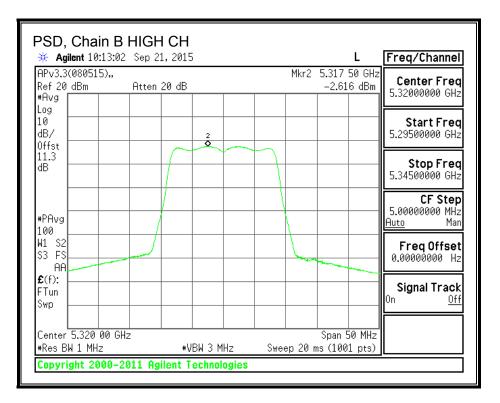
PSD, Chain B L Agilent 09:40:12			L	Freq/Channel
APv3.3(080515),, Ref 20 dBm 1 #Avg	Atten 20 dB	Mkr2	5.262 70 GHz -3.112 dBm	Center Freq 5.26000000 GHz
Log 10 dB/ 0ffst		2		<b>Start Freq</b> 5.23500000 GHz
dB				<b>Stop Freq</b> 5.28500000 GHz
#PAvg 100				<b>CF Step</b> 5.0000000 MHz <u>Auto</u> Man
W1 S2 S3 FS AA				FreqOffset 0.00000000 Hz
£(f): FTun Swp				Signal Track <sup>On <u>Off</u></sup>
Center 5.260 00 GHz #Res BW 1 MHz	#VBW 3 MH	lz Sweep 20 r	Span 50 MHz ns (1001 pts)	
Copyright 2000-201	11 Agilent Technolo	gies		



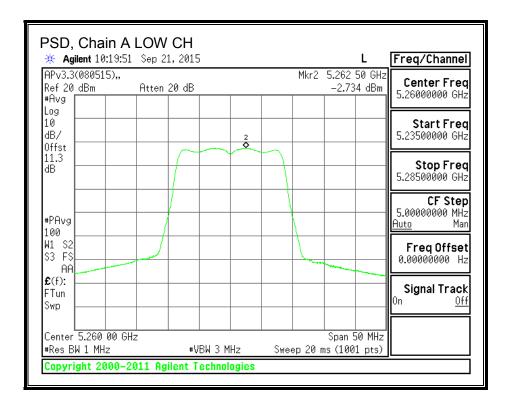
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DATE: 2015-10-01

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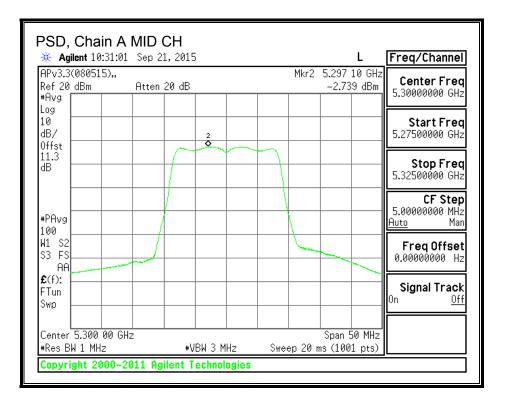


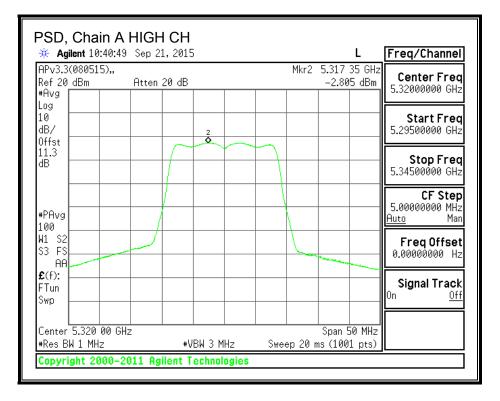
### PSD, Chain A



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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	Chain A	<b>Uncorrelated Chains</b>
Antenna	Antenna	Directional
Gain	Gain	Gain
(dBi)	(dBi)	(dBi)
2.20	2.40	2.30

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#### **TPC Limits**

Channel	Frequency	Limit Directiona		Limit
		EIRP Gain		Cond
	(MHz)	(dBm)	(dBi)	(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	Chain B	Chain A	Total	Cond	Margin
		Meas	Meas	Corr'd	Power	
		Power	Power	Power	Limit	
	(MHz)	(dBm)	(dBm)	(dBm)	(dBm)	(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

# 8.7. 802.11n HT20 MODE IN THE 5.3 GHz BAND

## 8.7.1. 26 dB BANDWIDTH

## LIMITS

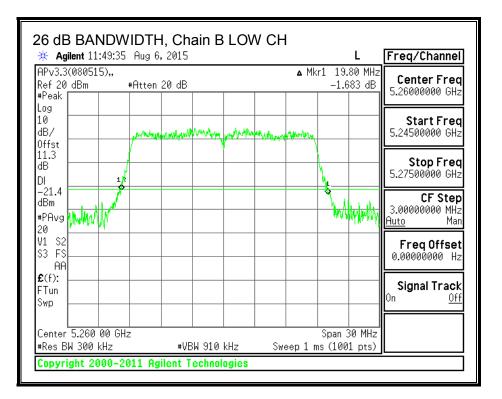
None; for reporting purposes only.

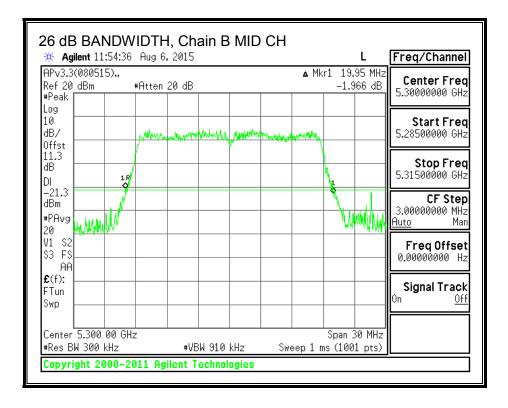
## **RESULTS**

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

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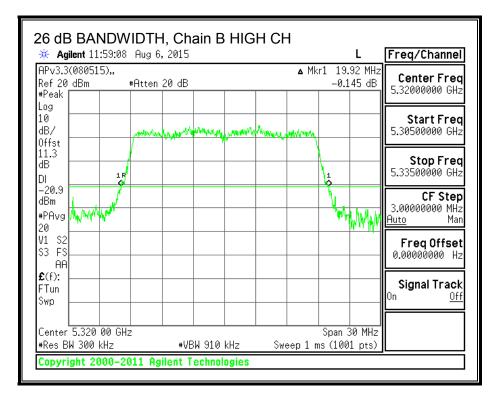
## 26 dB BANDWIDTH, Chain B



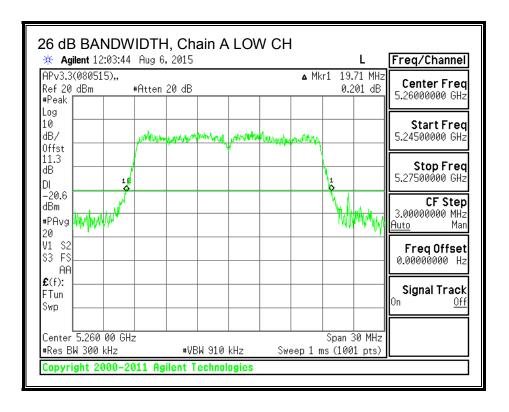


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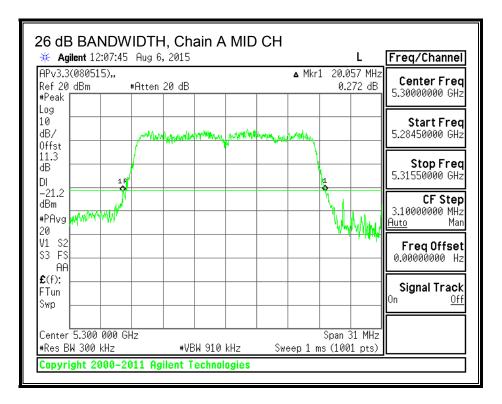
UL LLC FORM NO: 03-EM-F00858 12 Laboratory Dr., RTP, NC 27709 TEL: (919) 549-1400 *This report shall not be reproduced except in full, without the written approval of UL LLC.* 

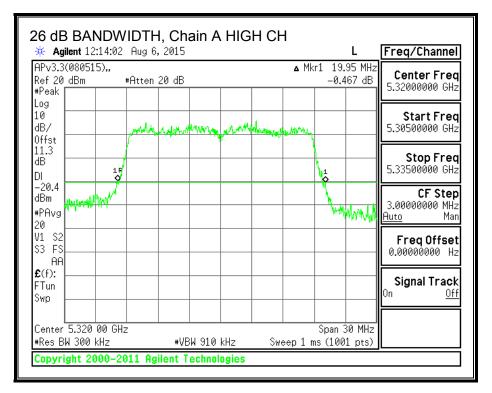


## 26 dB BANDWIDTH, Chain A



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## 8.7.2. 99% BANDWIDTH

## LIMITS

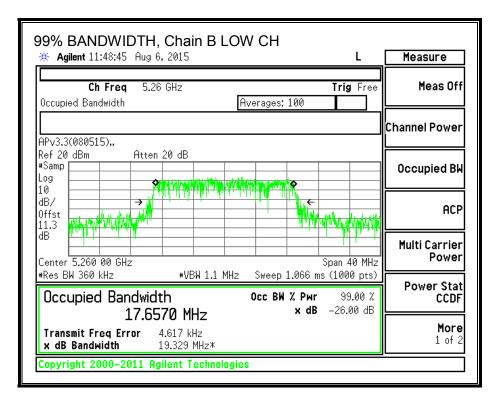
None; for reporting purposes only.

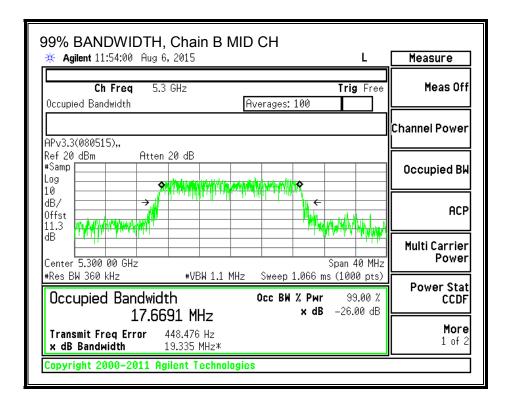
## **RESULTS**

Channel	el Frequency 99% BW			
		Chain B	Chain A	
	(MHz)	(MHz)	(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

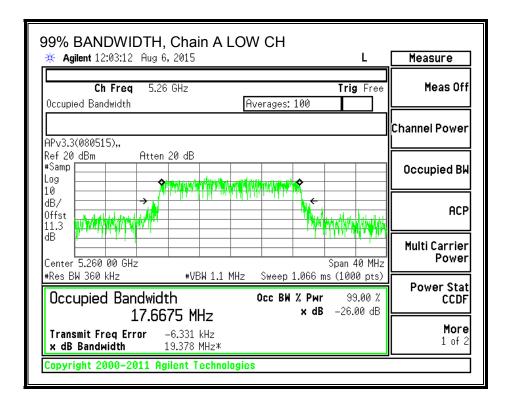




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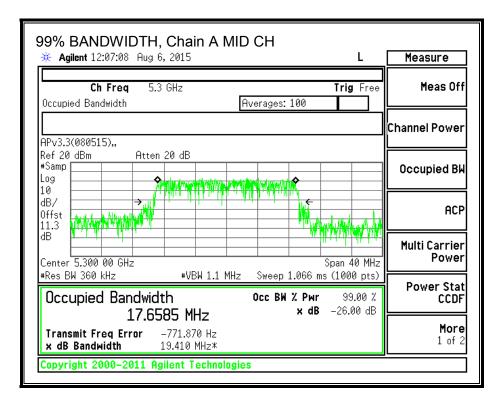
99% BANDWIDTH, Chain B	HIGH CH		
🔆 Agilent 11:58:33 Aug 6, 2015		L	Measure
Ch Freq 5.32 GHz Occupied Bandwidth	Trig Averages: 100	Free	Meas Off
APv3.3(080515)			Channel Power
Ref 20 dBm Atten 20 dB #Samp		_	Occupied BW
dB/ dFfst 11.3 and Weight of the first of			ACP
dB Center 5.320 00 GHz #Res BW 360 kHz #VBW 1.1	Span 4 MHz Sweep 1.066 ms (1000		Multi Carrier Power
Occupied Bandwidth 17.6502 MHz	Occ BW % Pwr 99 x dB -26.0	.00 %	Power Stat CCDF
Transmit Freq Error         -11.509 kHz           x dB Bandwidth         19.440 MHz*			<b>More</b> 1 of 2
Copyright 2000–2011 Agilent Techno	ologies		

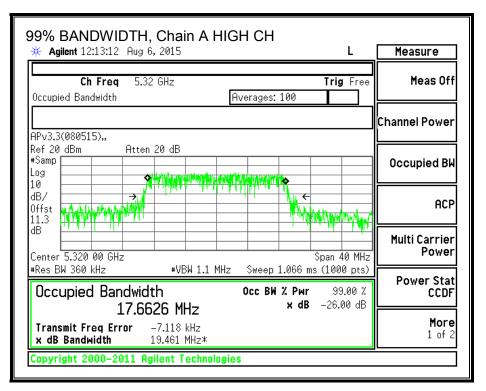
## 99% BANDWIDTH, Chain A



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## 8.7.3. OUTPUT POWER AND PSD

#### <u>LIMITS</u>

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	Chain A	<b>Uncorrelated Chains</b>
Antenna	Antenna	Directional
Gain	Gain	Gain
(dBi)	(dBi)	(dBi)
2.20	2.40	2.30

## **RESULTS**

#### Bandwidth, Antenna Gain, and Limits

Channel	Frequency	Min	Directional	Directional	Power	PSD
		26 dB	Gain	Gain	Limit	Limit
		BW	for Power	for PSD		
	(MHz)	(MHz)	(dBi)	(dBi)	(dBm)	(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

0.00 Duty Cycle CF (dB)

Included in Calculations of Corr'd Power & PSD

### **Output Power Results**

Channel	Frequency	Chain B	Chain A	Total	Power	Power
		Meas	Meas	Corr'd	Limit	Margin
		Power	Power	Power		
	(MHz)	(dBm)	(dBm)	(dBm)	(dBm)	(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

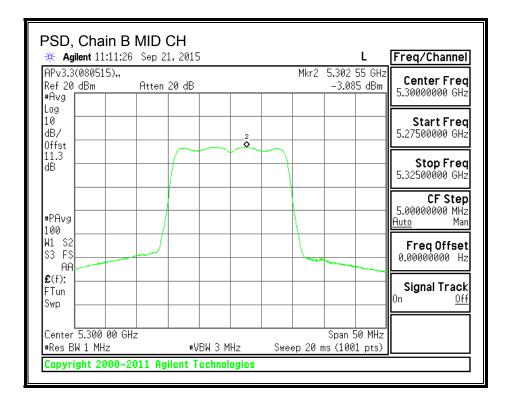
### **PSD** Results

Channel	Frequency	Chain B	Chain A	Total	PSD	PSD
		Meas	Meas	Corr'd	Limit	Margin
		PSD	PSD	PSD		
	(MHz)	(dBm)	(dBm)	(dBm)	(dBm)	(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

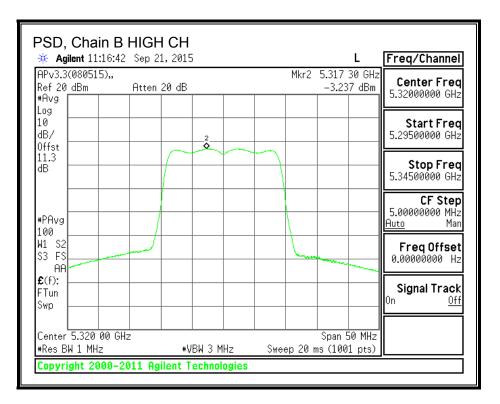
APv3.3(080515),,       Ref 20 dBm     Atten 20 dB       *Avg	2	Mkr2	5.262 5	Center Freq 5.26000000 GHz Start Freq 5.23500000 GHz Stop Freq 5.28500000 GHz
10 dB/ Offst 11.3 dB *PAvg	2			 5.23500000 GHz Stop Freq 5.28500000 GHz
11.3 dB #PAvg				 5.28500000 GHz
100 / /				 <b>CF Step</b> 5.00000000 MHz <u>Auto</u> Man
W1 \$2 \$3 F\$ AA		Lana	Transment you for	Freq Offset 0.00000000 Hz
£(f): FTun Swp				<b>Signal Track</b> On <u>Off</u>
Center 5.260 00 GHz #Res BW 1 MHz #V Copyright 2000-2011 Agilent T	/BW 3 MHz	ep 20 r	Span 50 ms (1001	



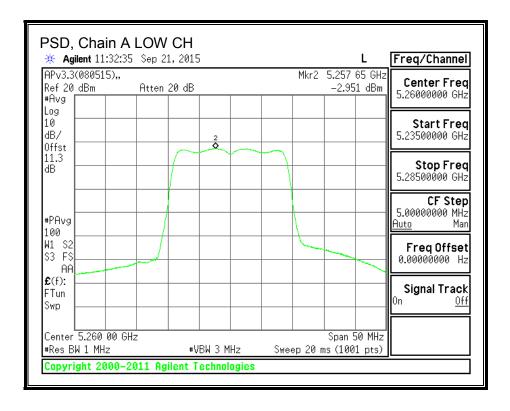
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DATE: 2015-10-01

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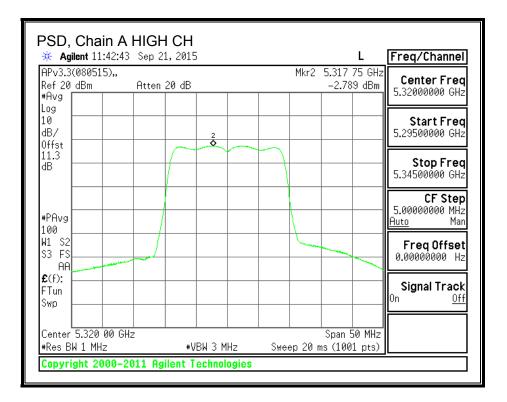


### PSD, Chain A



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PSD, Chain A MID Agilent 11:38:06 Sep 2				Freq/Channel
APv3.3(080515),, Ref 20 dBm Atten #Avg	20 dB		297 50 GHz 2.936 dBm	Center Freq 5.30000000 GHz
Log 10 dB/ 0ffst	2			<b>Start Freq</b> 5.27500000 GHz
11.3 dB				<b>Stop Freq</b> 5.32500000 GHz
#PAvg				<b>CF Step</b> 5.0000000 MHz <u>Auto</u> Man
W1 S2 S3 FS AA		- Andrew		FreqOffset 0.00000000 Hz
<b>£</b> (f): FTun Swp				<b>Signal Track</b> <sup>On <u>Off</u></sup>
Center 5.300 00 GHz #Res BW 1 MHz	+VBW 3 MHz		oan 50 MHz (1001 pts)	
Copyright 2000–2011 Ag	ailent Technologies			



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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	Chain A	<b>Uncorrelated Chains</b>
Antenna	Antenna	Directional
Gain	Gain	Gain
(dBi)	(dBi)	(dBi)
2.20	2.40	2.30

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**TPC Limits** 

Channel	Frequency	Limit	Directional	Limit
		EIRP	Gain	Cond
	(MHz)	(dBm)	(dBi)	(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
Duty Oycle Of (uD)	0.00	included in oalculations of oon a rower

## **TPC Output Power Results**

Channel	Frequency	Chain B	Chain A	Total	Cond	Margin
		Meas	Meas	Corr'd	Power	
		Power	Power	Power	Limit	
	(MHz)	(dBm)	(dBm)	(dBm)	(dBm)	(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

## 8.8. 802.11n HT40 MODE IN THE 5.3 GHz BAND

## 8.8.1. 26 dB BANDWIDTH

### LIMITS

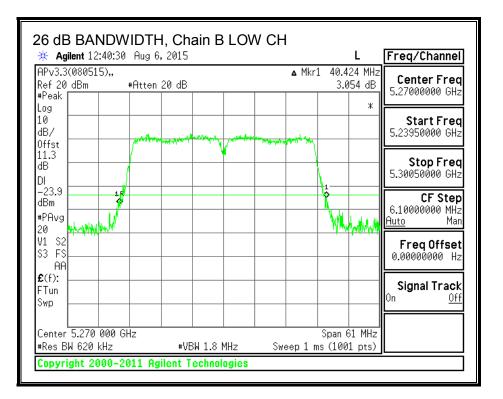
None; for reporting purposes only.

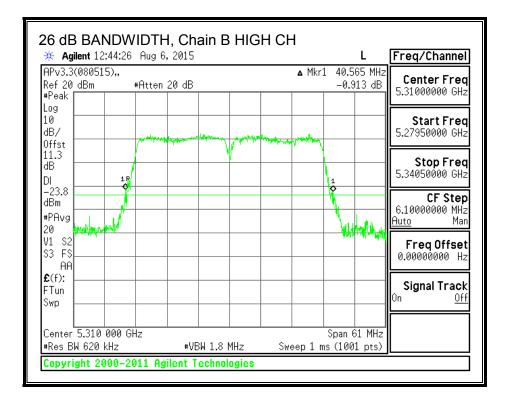
### **RESULTS**

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

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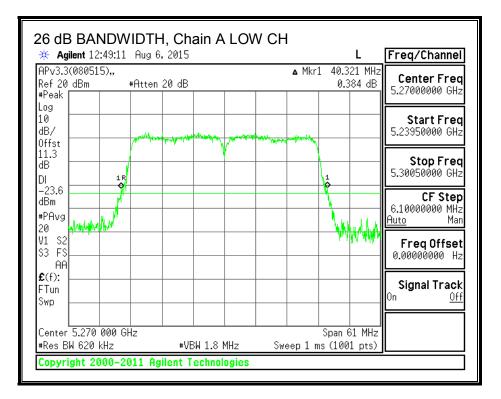
## 26 dB BANDWIDTH, Chain B

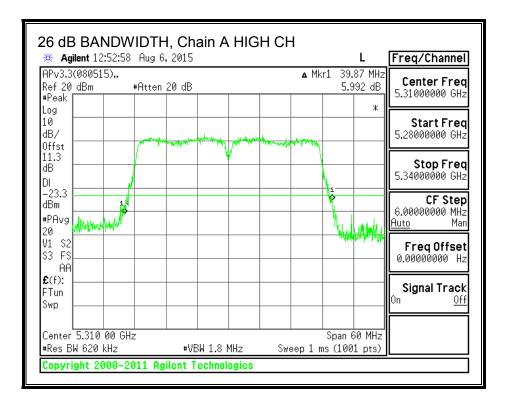




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#### 26 dB BANDWIDTH, Chain A





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## 8.8.2. 99% BANDWIDTH

## LIMITS

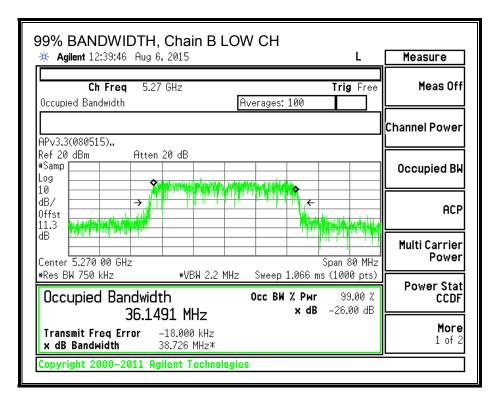
None; for reporting purposes only.

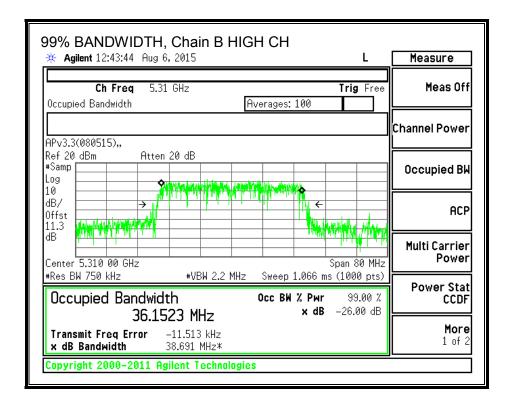
## <u>RESULTS</u>

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

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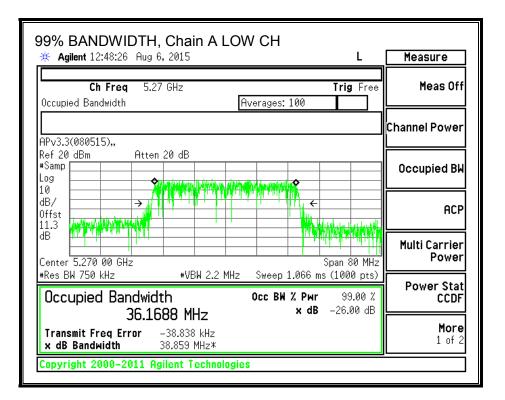
## 99% BANDWIDTH, Chain B

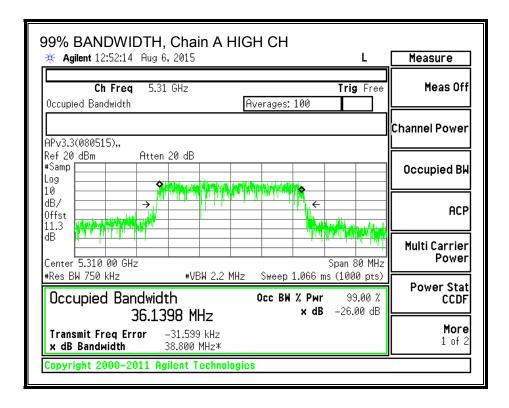




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### 99% BANDWIDTH, Chain A





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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	Chain A	<b>Uncorrelated Chains</b>		
Antenna	Antenna	Directional		
Gain	Gain	Gain		
(dBi)	(dBi)	(dBi)		
2.20	2.40	2.30		

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## **RESULTS**

#### Bandwidth, Antenna Gain, and Limits

Channel	Frequency	Min	Directional	Directional	Power	PSD
		26 dB	Gain	Gain	Limit	Limit
		BW	for Power	for PSD		
	(MHz)	(MHz)	(dBi)	(dBi)	(dBm)	(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

Included in Calculations of Corr'd Power & PSD

## **Output Power Results**

Channel	Frequency	Chain B	Chain A	Total	Power	Power
		Meas	Meas	Corr'd	Limit	Margin
		Power	Power	Power		
	(MHz)	(dBm)	(dBm)	(dBm)	(dBm)	(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

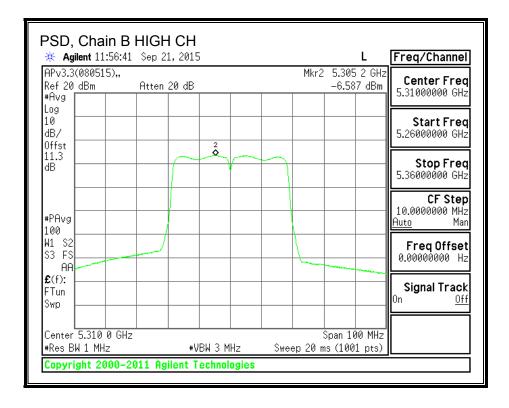
#### **PSD Results**

Channel	Frequency	Chain B	Chain A	Total	PSD	PSD
		Meas	Meas	Corr'd	Limit	Margin
		PSD	PSD	PSD		
	(MHz)	(dBm)	(dBm)	(dBm)	(dBm)	(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

PSD, Chain B L Agilent 11:51:20		L	Freq/Channel
Avg	Atten 20 dB	Mkr2 5.264 7 GHz -6.602 dBm	Center Freq 5.27000000 GHz
.og .0 JB/ Dffst	2		Start Freq 5.22000000 GHz
1.3 #B	Ó		<b>Stop Freq</b> 5.32000000 GHz
PAvg			<b>CF Step</b> 10.0000000 MHz <u>Auto</u> Man
.00 V1 S2 S3 FS AA			Freq Offset 0.00000000 Hz
C(f): Tun Swp			<b>Signal Track</b> <sup>On <u>Off</u></sup>
Center 5.270 0 GHz Res BW 1 MHz	+VBW 3 M	Span 100 MHz Hz Sweep 20 ms (1001 pts)	



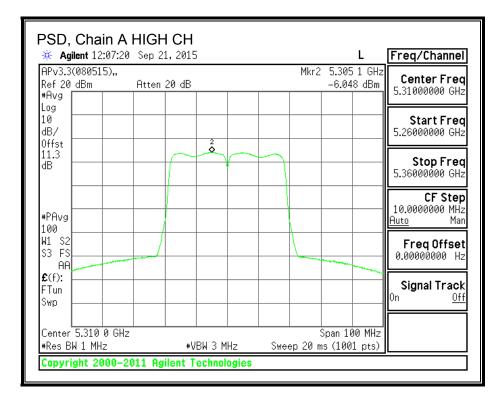
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# PSD, Chain A

🔆 Agilent 12:02:05	Sep 21, 2015	L	Freq/Channel
ŧAvg	Atten 20 dB	Mkr2 5.265 1 GHz -6.425 dBm	Center Freq 5.27000000 GHz
.og L0 HB/	2		Start Freq 5.22000000 GHz
11.3 B	Ó Ó		<b>Stop Freq</b> 5.32000000 GHz
+PAvg			<b>CF Step</b> 10.0000000 MHz <u>Auto</u> Man
L00 V1 S2 S3 FS AA			Freq Offset 0.00000000 Hz
E(f): Tun Swp			<b>Signal Track</b> On <u>Off</u>
Center 5.270 0 GHz +Res BW 1 MHz	#VBW 3 M	Span 100 MHz Iz Sweep 20 ms (1001 pts)	



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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	Chain A	<b>Uncorrelated Chains</b>
Antenna	Antenna	Directional
Gain	Gain	Gain
(dBi)	(dBi)	(dBi)
2.20	2.40	2.30

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#### **RESULTS**

**TPC Limits** 

Channel	Frequency	Limit Directional		Limit
		EIRP Gain		Cond
	(MHz)	(dBm)	(dBi)	(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	Chain B	Chain A	Total	Cond	Margin
		Meas	Meas	Corr'd	Power	
		Power	Power	Power	Limit	
	(MHz)	(dBm)	(dBm)	(dBm)	(dBm)	(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

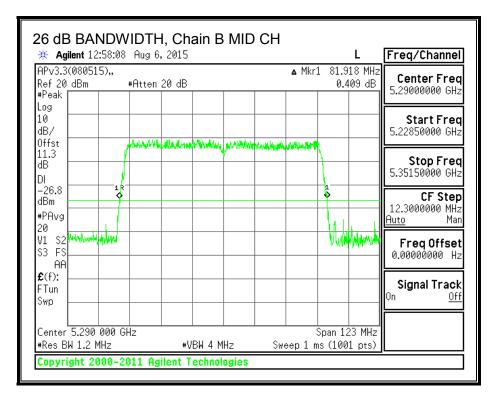
None; for reporting purposes only.

### **RESULTS**

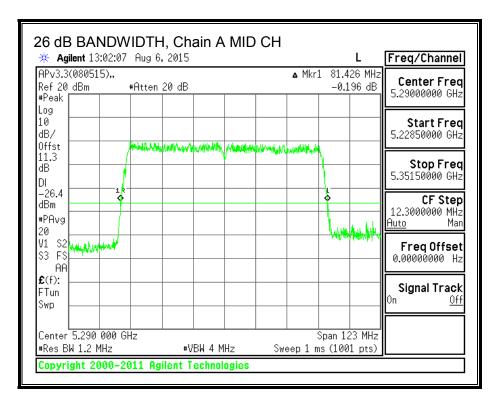
Channel	Frequency	26 dB BW	26 dB BW	
		Chain B	Chain A	
	(MHz)	(MHz)	(MHz)	
Mid	5290	81.92	81.43	

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### 26 dB BANDWIDTH, Chain B



#### 26 dB BANDWIDTH, Chain A



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# 8.9.2. 99% BANDWIDTH

### LIMITS

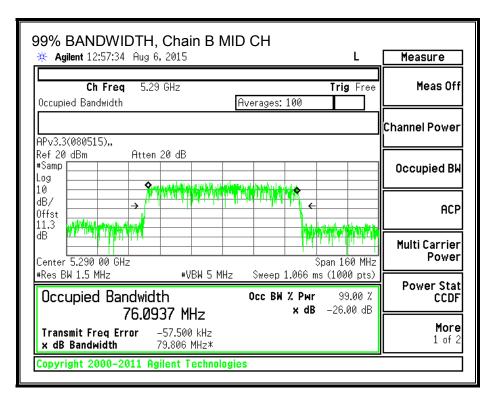
None; for reporting purposes only.

### <u>RESULTS</u>

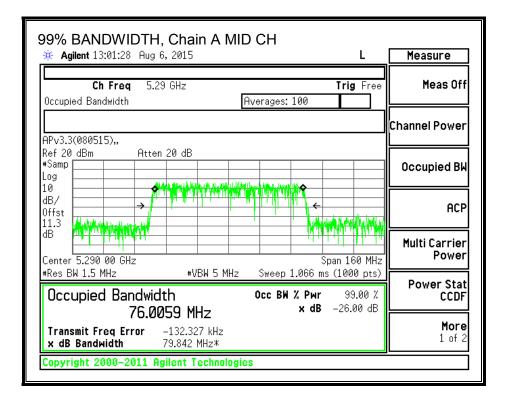
Channel	Frequency	99% BW	99% BW
		Chain B	Chain A
	(MHz)	(MHz)	(MHz)
Mid	5290	76.0937	76.0059

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# 99% BANDWIDTH, Chain B



#### 99% BANDWIDTH, Chain A



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12 Laboratory Dr., RTP, NC 27709

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# 8.9.3. OUTPUT POWER AND PSD

#### <u>LIMITS</u>

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	Chain A	<b>Uncorrelated Chains</b>
Antenna	Antenna	Directional
Gain	Gain	Gain
(dBi)	(dBi)	(dBi)
2.20	2.40	2.30

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#### **RESULTS**

#### Bandwidth, Antenna Gain, and Limits

Channel	Frequency	Min	Directional	Directional	Power	PSD
		26 dB	Gain	Gain	Limit	Limit
		BW	for Power	for PSD		
	(MHz)	(MHz)	(dBi)	(dBi)	(dBm)	(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	Chain B	Chain A	Total	Power	Power
		Meas	Meas	Corr'd	Limit	Margin
		Power	Power	Power		
	(MHz)	(dBm)	(dBm)	(dBm)	(dBm)	(dB)
Mid	5290	4.63	4.74	7.70	24.00	-16.30

#### **PSD Results**

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

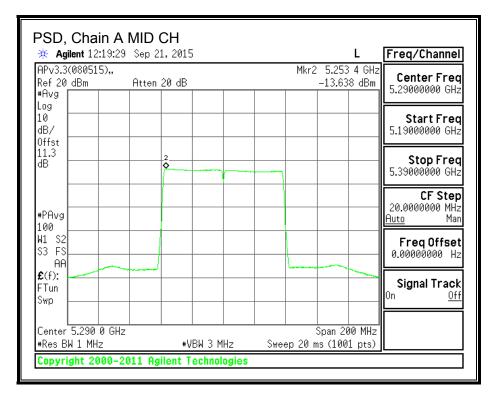
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#### PSD, Chain B

PSD, Chain B MII	) CH		
🔆 🔆 Agilent 12:15:05 Sep	o 21,2015	L	Freq/Channel
#Avg	en 20 dB	Mkr2 5.253 4 GHz -14.185 dBm	Center Freq 5.29000000 GHz
Log 10 dB/ 0ffst			<b>Start Freq</b> 5.19000000 GHz
11.3 dB	2 2 2		Stop Freq 5.39000000 GHz
#PAvg			<b>CF Step</b> 20.0000000 MHz <u>Auto</u> Man
W1 S2 S3 FS AA			Freq Offset 0.00000000 Hz
£(f): FTun Swp			Signal Track <sup>On <u>Off</u></sup>
Center 5.290 0 GHz #Res BW 1 MHz	#VBW 3 MHz	Span 200 MHz Sweep 20 ms (1001 pts)	
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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	Chain A	<b>Uncorrelated Chains</b>
Antenna	Antenna	Directional
Gain	Gain	Gain
(dBi)	(dBi)	(dBi)
2.20	2.40	2.30

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#### **RESULTS**

**TPC Limits** 

Channel	Frequency	Limit	Directional	Limit
		EIRP	Gain	Cond
	(MHz)	(dBm)	(dBi)	(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	Chain B	Chain A	Total	Cond	Margin
		Meas	Meas	Corr'd	Power	
		Power	Power	Power	Limit	
	(MHz)	(dBm)	(dBm)	(dBm)	(dBm)	(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

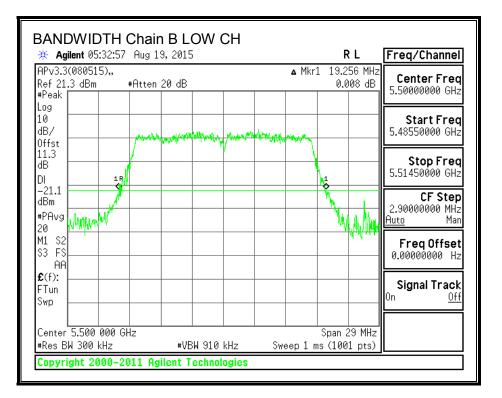
None; for reporting purposes only.

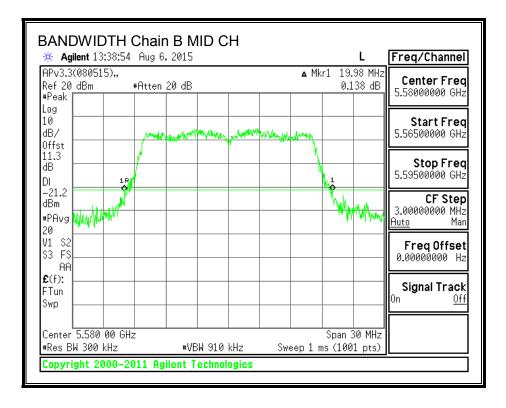
#### **RESULTS**

Channel	Frequency	26 dB BW	26 dB BW
		Chain B	Chain A
	(MHz)	(MHz)	(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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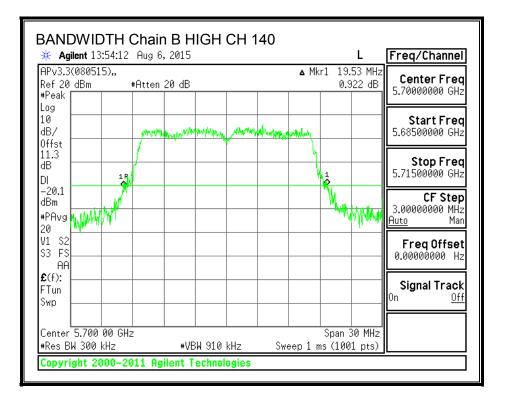
### 26 dB BANDWIDTH, Chain B

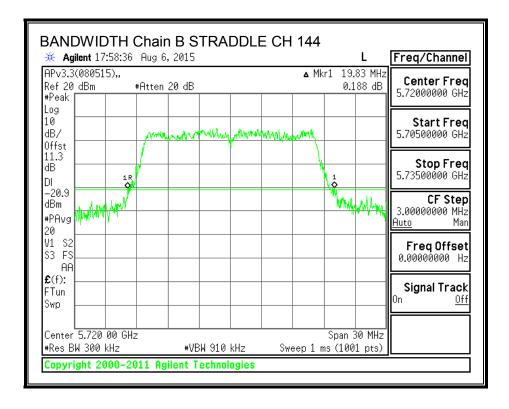




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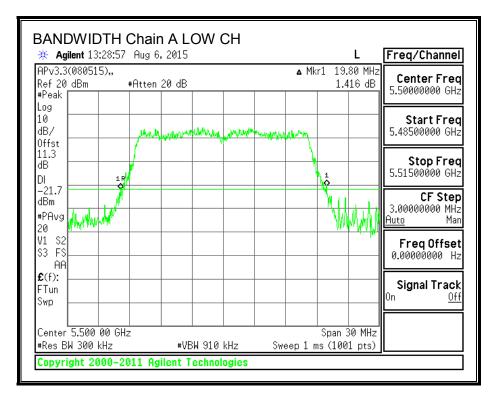
UL LLC FORM NO: 03-EM-F00858 12 Laboratory Dr., RTP, NC 27709 TEL: (919) 549-1400 *This report shall not be reproduced except in full, without the written approval of UL LLC.* 

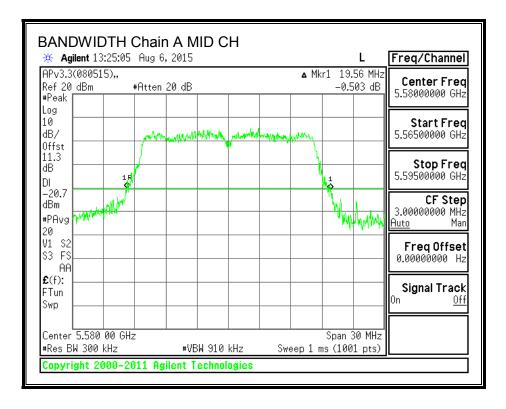




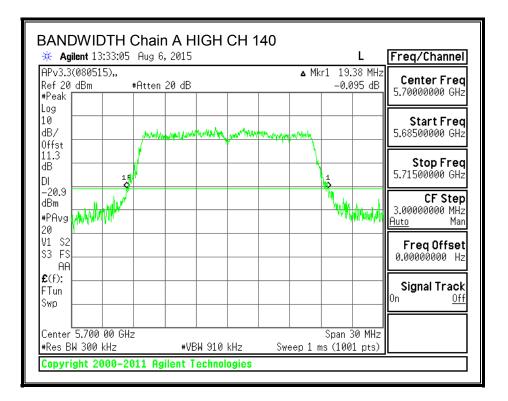
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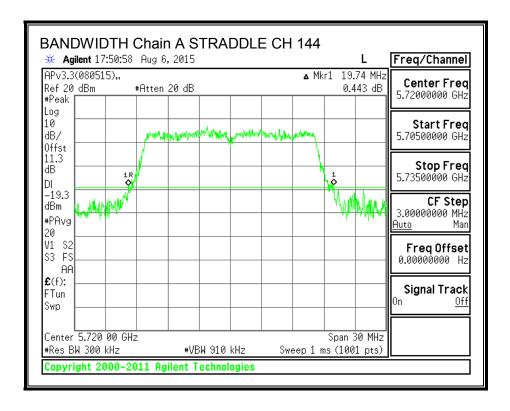
### 26 dB BANDWIDTH, Chain A





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# 8.10.2. 99% BANDWIDTH

#### **LIMITS**

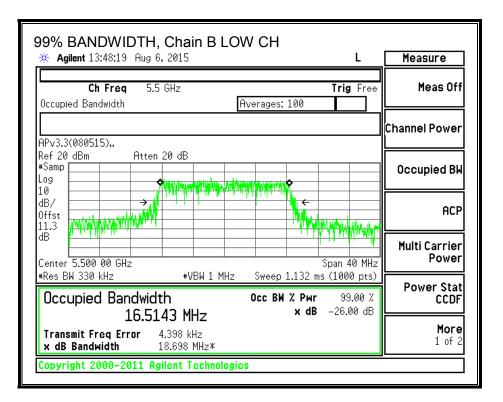
None; for reporting purposes only.

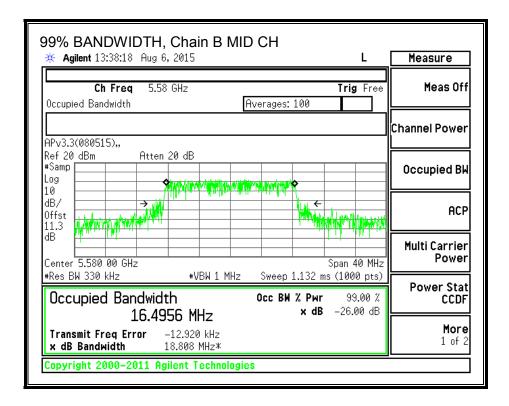
### **RESULTS**

Channel	Frequency	99% BW	99% BW
		Chain B	Chain A
	(MHz)	(MHz)	(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

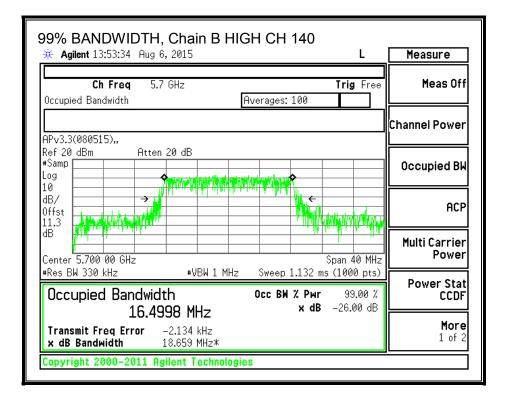
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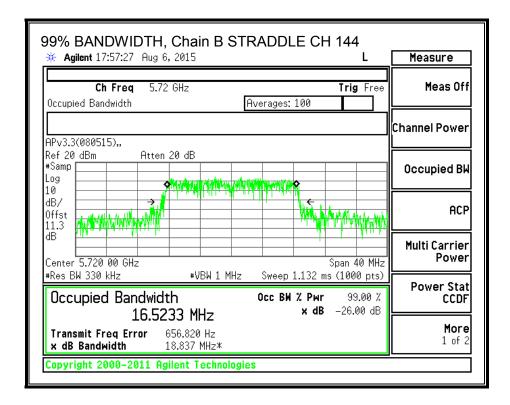
# 99% BANDWIDTH, Chain B





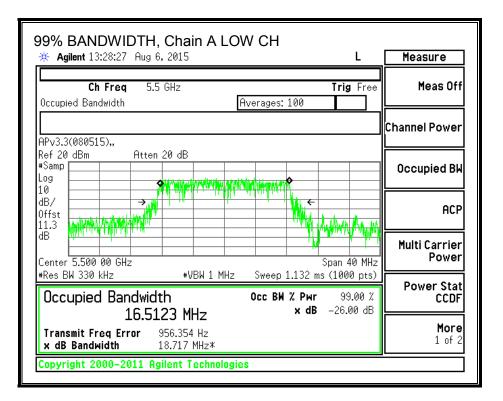
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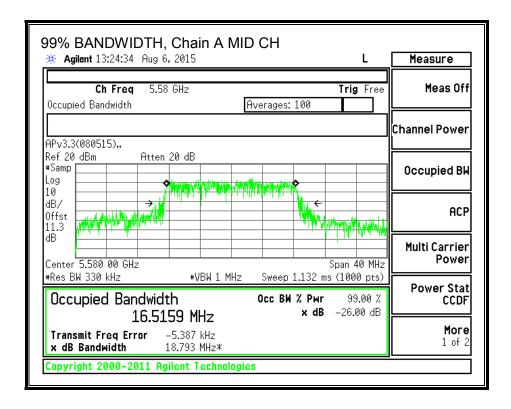




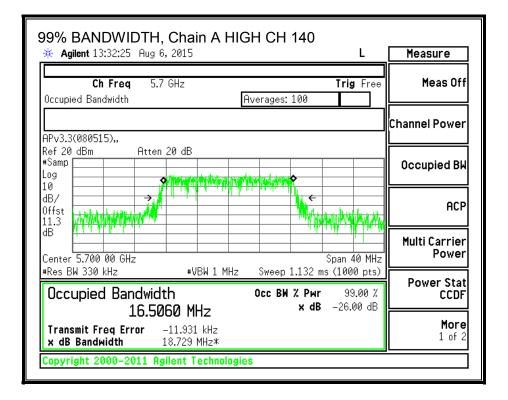
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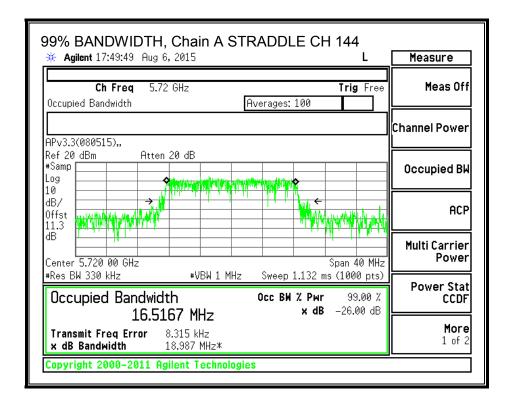
# 99% BANDWIDTH, Chain A





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# 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	Chain 1	<b>Uncorrelated Chains</b>
Antenna	Antenna	Directional
Gain	Gain	Gain
(dBi)	(dBi)	(dBi)
2.10	2.30	2.20

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### **RESULTS**

### Bandwidth, Antenna Gain, and Limits

Channel	Frequency	Min 26 dB BW	Directional Gain for Power	Directional Gain for PSD	Power Limit	PSD Limit
	(MHz)	(MHz)	(dBi)	(dBi)	(dBm)	(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

0.12

#### Duty Cycle CF (dB)

Included in Calculations of Corr'd Power & PSD

#### **Output Power Results**

Channel	Frequency	Chain B	Chain A	Total	Power	Power
		Meas	Meas	Corr'd	Limit	Margin
		Power	Power	Power		
	(MHz)	(dBm)	(dBm)	(dBm)	(dBm)	(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**

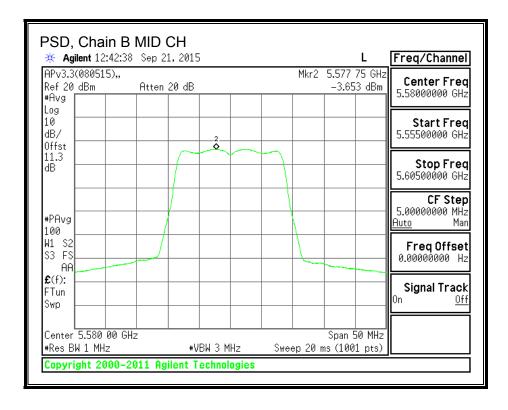
Channel	Frequency	Chain B	Chain A	Total	PSD	PSD
		Meas	Meas	Corr'd	Limit	Margin
		PSD	PSD	PSD		
	(MHz)	(dBm)	(dBm)	(dBm)	(dBm)	(dB)
Low	5500	-3.49	-3.45	-0.34	11.00	-11.34
Mid	5580	-3.65	-3.75	-0.57	11.00	-11.57
High	5700	-3.51	-3.79	-0.52	11.00	-11.52

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# PSD, Chain B

PSD, Chain B LOW Agilent 12:37:12 Sep 2			L	[Freq/Channel]
APv3.3(080515),	.1, 2015	Mkr2	5.502 45 GHz	rreq/channer
	20 dB		-3.489 dBm	Center Freq 5.50000000 GHz
Log 10 dB/ 0ffst	2			<b>Start Freq</b> 5.47500000 GHz
dB		$\square$		<b>Stop Freq</b> 5.52500000 GHz
#PAvg				<b>CF Step</b> 5.00000000 MHz <u>Auto</u> Man
W1 S2 S3 FS АА				Freq Offset 0.00000000 Hz
£(f): FTun Swp				<b>Signal Track</b> <sup>On <u>Off</u></sup>
Center 5.500 00 GHz #Res BW 1 MHz	#VBW 3 MHz	Sweep 20 r	Span 50 MHz ns (1001 pts)	
Copyright 2000-2011 Ag	ilent Technologies			

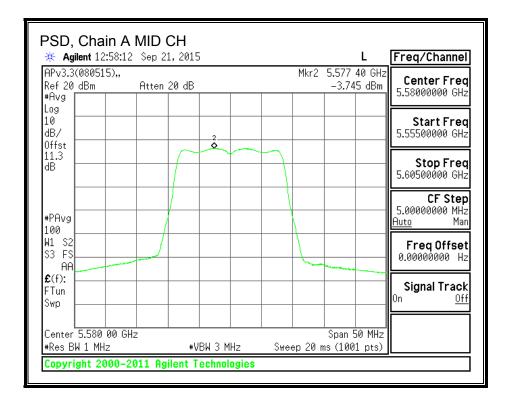


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PSD, Chain B HIGH			L	Freq/Channel
APv3.3(080515),, Ref 20 dBm Atten #Avg	20 dB		97 45 GHz .508 dBm	
Log 10 dB/ Offst	2			Start Freq 5.67500000 GHz
11.3 dB				<b>Stop Freq</b> 5.72500000 GHz
*PAvg				<b>CF Step</b> 5.0000000 MHz <u>Auto</u> Man
W1 S2 S3 FS AA				Freq Offset 0.00000000 Hz
<b>£</b> (f): FTun Swp				Signal Track <sup>On <u>Off</u></sup>
Center 5.700 00 GHz #Res BW 1 MHz	#VBW 3 MHz	Spa Sweep 20 ms (1	an 50 MHz 1001 pts)	
Copyright 2000-2011 Ag	jilent Technologies			

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PSD, Chain A L			L	Freq/Channel
#Avg	Atten 20 dB	Mkr2	5.502 50 GHz -3.453 dBm	Center Freq 5.50000000 GHz
Log 10 dB/ 0ffst		2		<b>Start Freq</b> 5.47500000 GHz
dB				<b>Stop Freq</b> 5.52500000 GHz
#PAvg				<b>CF Step</b> 5.00000000 MHz <u>Auto</u> Man
100 W1 S2 S3 FS				FreqOffset 0.00000000 Hz
£(f): FTun Swp				<b>Signal Track</b> <sup>On <u>Off</u></sup>
Center 5.500 00 GHz #Res BW 1 MHz	#VBW 3 M	Hz Sweep 20	Span 50 MHz ms (1001 pts)	



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🔆 Agilent 13:02:10	) Sep 21, 2015			L	. [	Freq/Channel
#Avg	Atten 20 dB		Mkr2	5.697 30 -3.790		Center Freq 5.70000000 GHz
Log 10 dB/ 0ffst	2					Start Freq 5.67500000 GHz
dB			$\neg  $			<b>Stop Freq</b> 5.72500000 GHz
#PAvg						<b>CF Step</b> 5.00000000 MHz Auto Man
100 W1 S2 S3 FS						FreqOffset 0.00000000 Hz
ft(f):						Signal Track
Center 5.700 00 GH #Res BW 1 MHz	l łz #VBW	3 MH-2	Sweep 20	Span 50		

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#### STRADDLE CHANNEL 144 RESULTS

#### UNII-2C BAND

#### Bandwidth, Antenna Gain, and Limits

Channel	Frequency	Min	Directional	Directional	Power	PSD
		26 dB	Gain	Gain	Limit	Limit
		BW	for Power	for PSD		
	(MHz)	(MHz)	(dBi)	(dBi)	(dBm)	(dBm)
144	5720	19.74	2.20	2.20	23.95	11.00

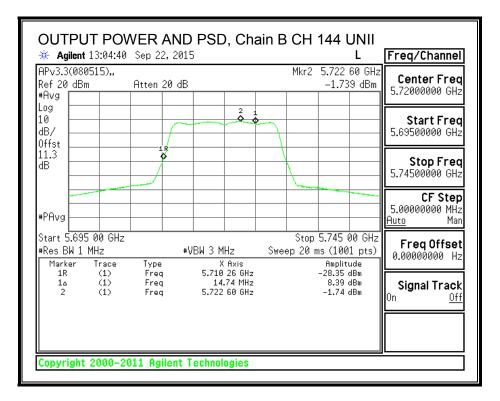
Duty Cycle CF (dB) 0.12 Included i	in Calculations of Corr'd Power & PSD
------------------------------------	---------------------------------------

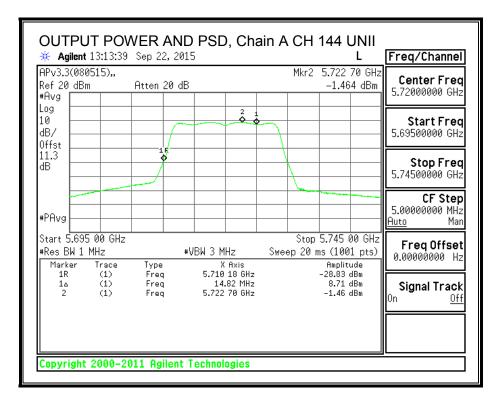
#### **Output Power Results**

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

#### **PSD Results**

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





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### UNII-3 BAND

#### Antenna Gain and Limit

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

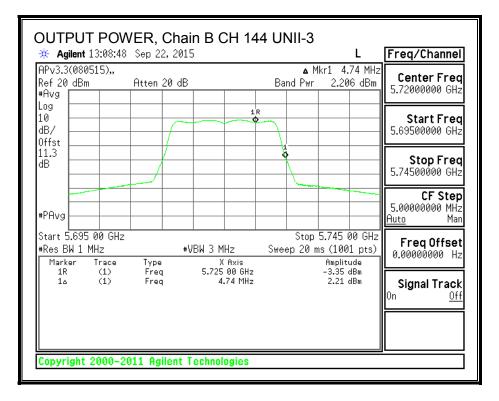
	Duty Cycle CF (dB)	0.12	Included in Calculations of Corr'd Power & PSD
--	--------------------	------	--

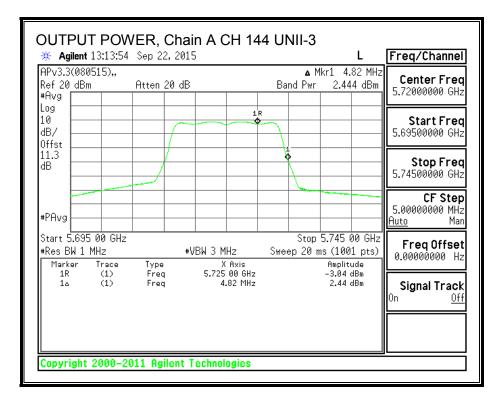
#### **Output Power Results**

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

#### **PSD Results**

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



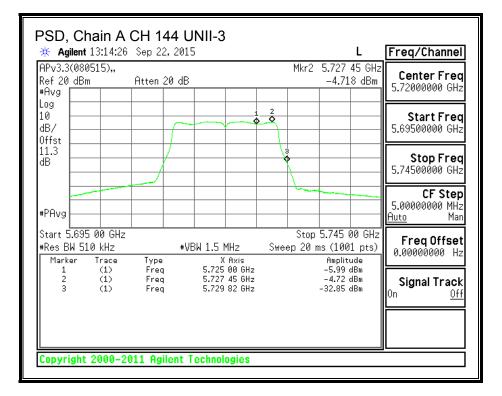


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PSD, Chain E		NII-3		L	Freq/Channel
APv3.3(080515),, Ref 20 dBm #Avg	Atten 20 dB		Mkr2	5.727 60 GHz -5.023 dBm	
Log 10 dB/ 0ffst			2		Start Freq 5.69500000 GHz
11.3 dB			3		<b>Stop Freq</b> 5.74500000 GHz
#PAvg					<b>CF Step</b> 5.00000000 MHz <u>Auto</u> Man
Start 5.695 00 GH #Res BW 510 kHz Marker Trace	#VBk Type	V 1.5 MHz X Axis		5.745 00 GHz is (1001 pts) Amplitude	Freq Offset 0.00000000 Hz
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	Freq Freq Freq	5.725 00 GHz 5.727 60 GHz 5.729 74 GHz		-6.24 dBm -5.02 dBm -32.95 dBm	<b>Signal Track</b> <sup>On <u>Off</u></sup>
Copyright 2000-	2011 Hgilent le	cnnologies			



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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	Chain A	<b>Uncorrelated Chains</b>
Antenna	Antenna	Directional
Gain	Gain	Gain
(dBi)	(dBi)	(dBi)
2.10	2.30	2.20

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#### **RESULTS**

**TPC Limits** 

Channel	Frequency	Limit	Directional	Limit
		EIRP	Gain	Cond
	(MHz)	(dBm)	(dBi)	(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	Chain B	Chain A	Total	Cond	Margin
		Meas Power	Meas Power	Corr'd Power	Power Limit	
	(MHz)	(dBm)	(dBm)	(dBm)	(dBm)	(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

# 8.11. 802.11n HT20 MODE IN THE 5.6 GHz BAND

# 8.11.1. 26 dB BANDWIDTH

#### LIMITS

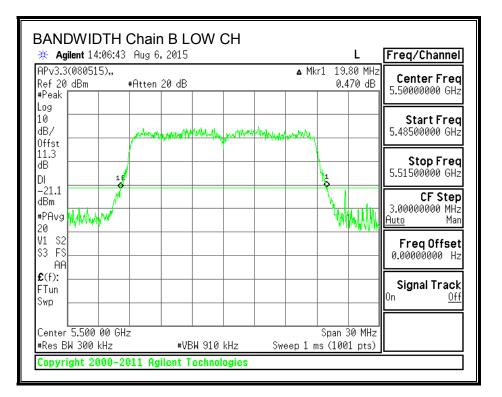
None; for reporting purposes only.

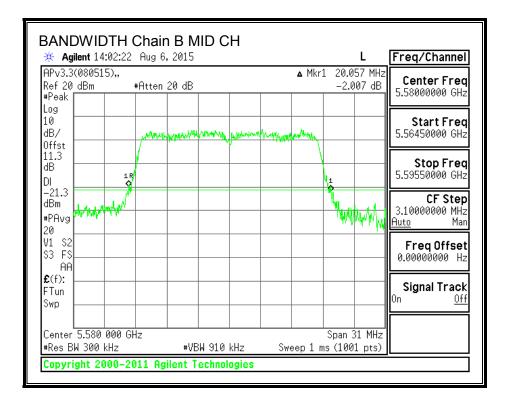
#### **RESULTS**

Channel	Frequency	26 dB BW	26 dB BW
		Chain B	Chain A
	(MHz)	(MHz)	(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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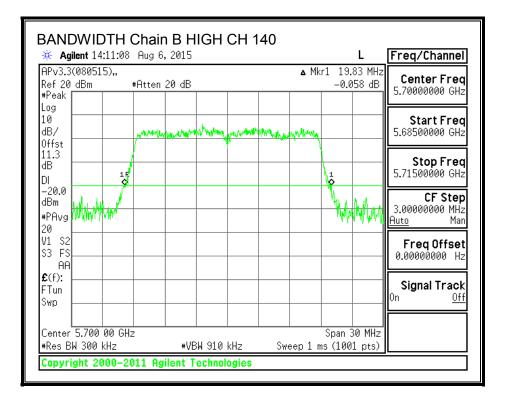
## 26 dB BANDWIDTH, Chain B

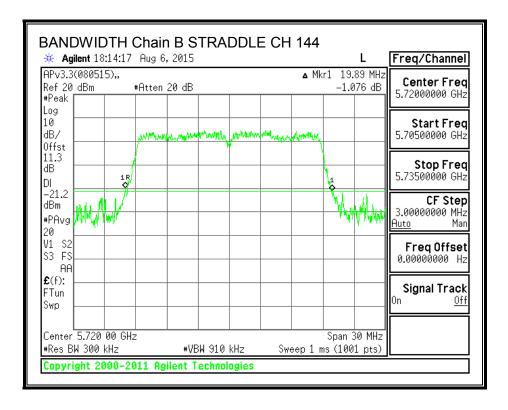




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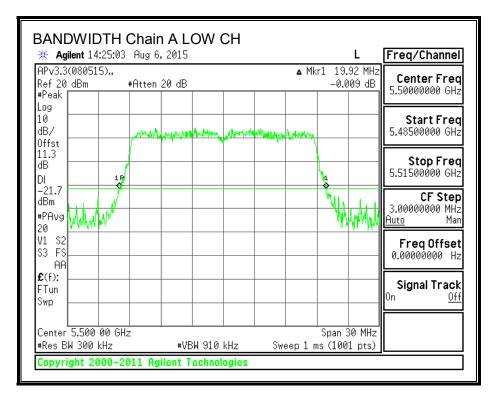
UL LLC FORM NO: 03-EM-F00858 12 Laboratory Dr., RTP, NC 27709 TEL: (919) 549-1400 *This report shall not be reproduced except in full, without the written approval of UL LLC.* 

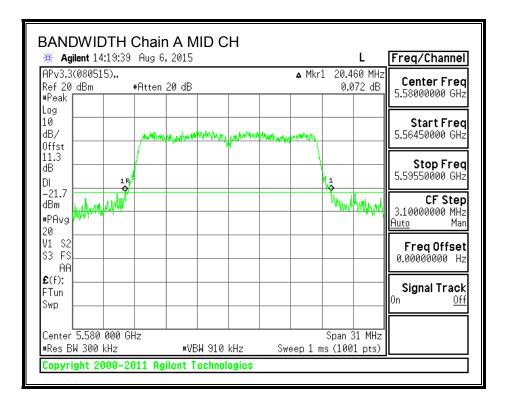




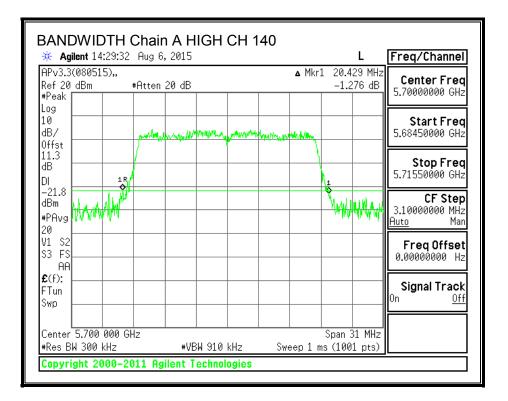
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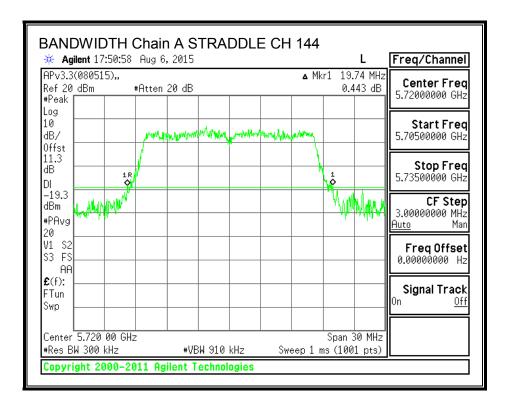
## 26 dB BANDWIDTH, Chain A





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# 8.11.2. 99% BANDWIDTH

## LIMITS

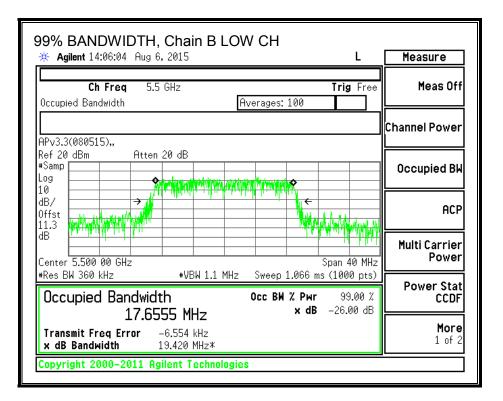
None; for reporting purposes only.

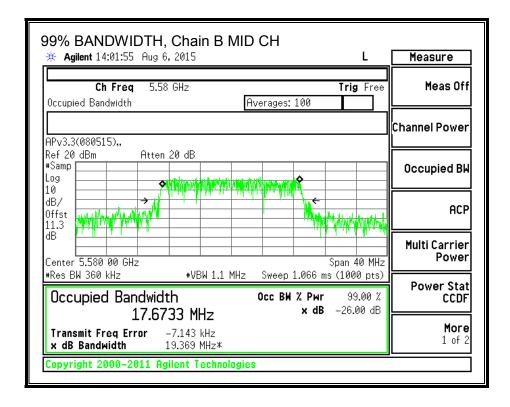
## <u>RESULTS</u>

Channel	Frequency	99% BW	99% BW
		Chain B	Chain A
	(MHz)	(MHz)	(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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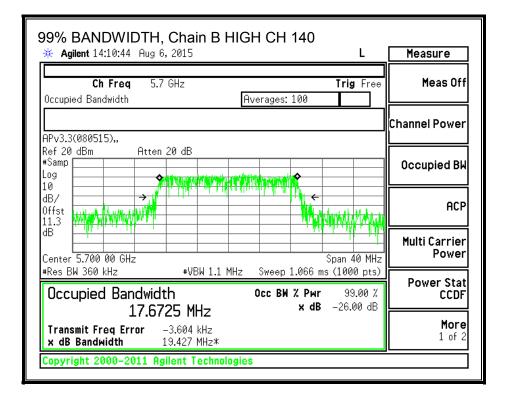
# 99% BANDWIDTH, Chain B

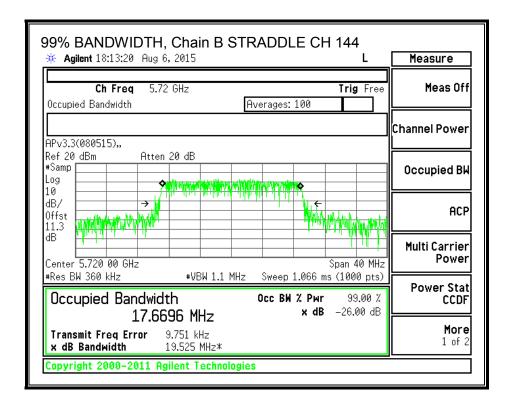




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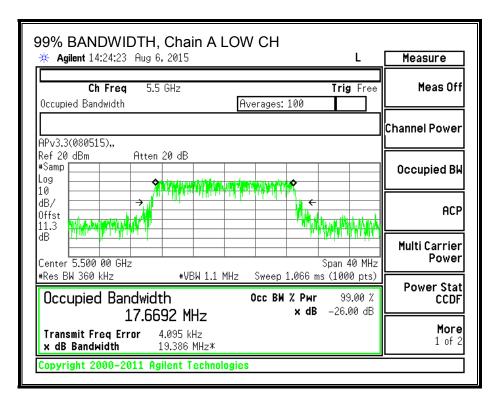
UL LLC FORM NO: 03-EM-F00858 12 Laboratory Dr., RTP, NC 27709 TEL: (919) 549-1400 *This report shall not be reproduced except in full, without the written approval of UL LLC.* 

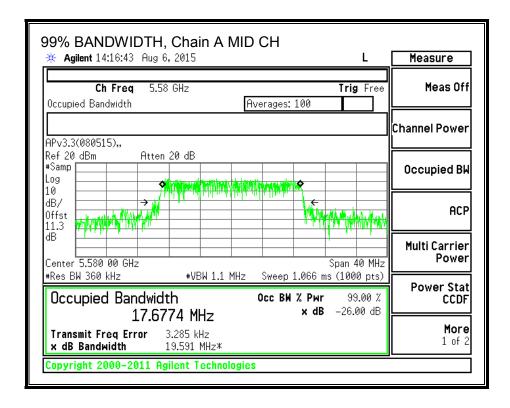




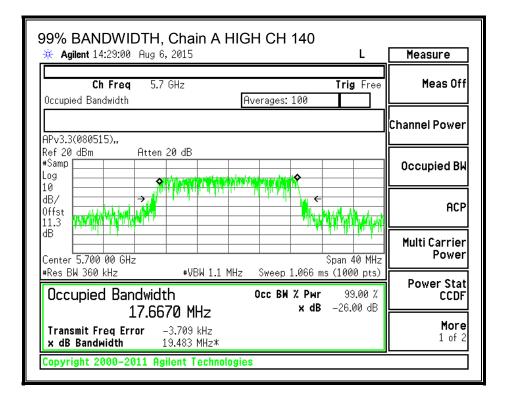
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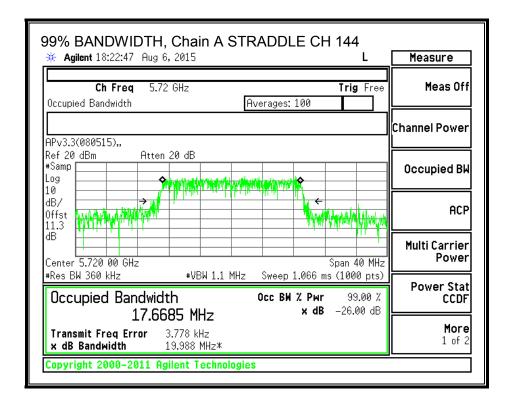
# 99% BANDWIDTH, Chain A





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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	Chain 1	<b>Uncorrelated Chains</b>
Antenna	Antenna	Directional
Gain	Gain	Gain
(dBi)	(dBi)	(dBi)
2.10	2.30	2.20

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## **RESULTS**

# Bandwidth, Antenna Gain, and Limits

Channel	Frequency	Min 26 dB BW	Directional Gain for Power	Directional Gain for PSD	Power Limit	PSD Limit
	(MHz)	(MHz)	(dBi)	(dBi)	(dBm)	(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

0.00 Duty Cycle CF (dB)

Included in Calculations of Corr'd Power & PSD

#### **Output Power Results**

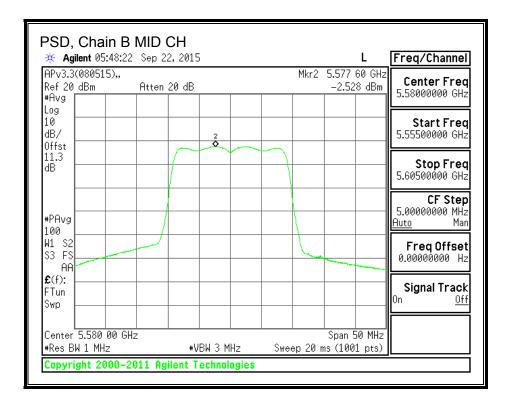
Channel	Frequency	Chain B	Chain A	Total	Power	Power
		Meas	Meas	Corr'd	Limit	Margin
		Power	Power	Power		
	(MHz)	(dBm)	(dBm)	(dBm)	(dBm)	(dB)
Low	5500	8.62	8.62	11.63	23.97	-12.34
Mid	5580	8.62	8.56	11.60	24.00	-12.40
High	5700	8.58	8.61	11.61	23.97	-12.37

#### **PSD Results**

Channel	Frequency	Chain B	Chain A	Total	PSD	PSD
		Meas	Meas	Corr'd	Limit	Margin
		PSD	PSD	PSD		
	(MHz)	(dBm)	(dBm)	(dBm)	(dBm)	(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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🔆 Agilent 05:43:24	Sep 22, 2015			L	Freq/Channel
APv3.3(080515),, Ref 20 dBm #Avg	Atten 20 dB		Mkr2 5.502 	2 15 GHz 598 dBm	Center Freq 5.50000000 GHz
Log 10 dB/ 0ffst		2			Start Freq 5.47500000 GHz
dB		$\square$			<b>Stop Freq</b> 5.52500000 GHz
#PAvg					<b>CF Step</b> 5.00000000 MHz <u>Auto</u> Man
100 W1 S2 S3 FS			- Conservation		FreqOffset 0.00000000 Hz
£(f): FTun Swp					<b>Signal Track</b> <sup>On <u>Off</u></sup>
Center 5.500 00 GH: #Res BW 1 MHz		 MHz Swe	Span Span eep 20 ms (10	50 MHz 01 pts)	



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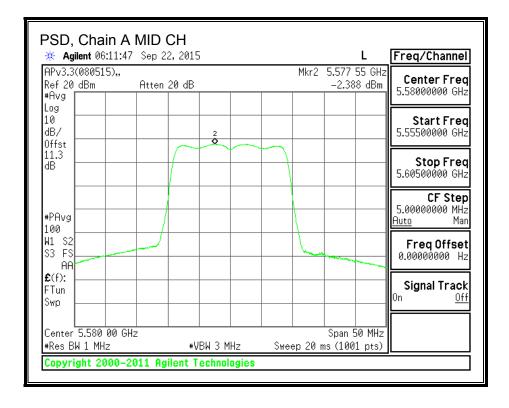
UL LLC

🔆 Agilent 05:55:0	10 Sep 22, 2015			L	Freq/Channel
#Avg	Atten 20 dB		Mkr2	5.697 65 GHz -2.550 dBm	Center Freq 5.70000000 GHz
Log 10 dB/ Offst		2			Start Freq 5.67500000 GHz
dB					<b>Stop Freq</b> 5.72500000 GHz
#PAvg					<b>CF Step</b> 5.00000000 MHz <u>Auto</u> Man
100 W1 S2 S3 FS AA					FreqOffset 0.00000000 Hz
£(f): FTun Swp					<b>Signal Track</b> On <u>Off</u>
Center 5.700 00 G #Res BW 1 MHz		W 3 MHz	Sween 20 J	Span 50 MHz ns (1001 pts)	

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# PSD, Chain A

PSD, Chain A LO' ☀ Agilent 06:01:03 Sep		L	Freq/Channel
#Avg	en 20 dB	Mkr2 5.502 25 G 2.643 dB	II Contor Front
Log 10 dB/ Offst	2		Start Freq 5.47500000 GHz
11.3 dB			<b>Stop Freq</b> 5.52500000 GHz
#PAvg			<b>CF Step</b> 5.00000000 MHz <u>Auto</u> Man
W1 S2 S3 FS AA			Freq Offset 0.00000000 Hz
£(f): FTun Swp			Signal Track
Center 5.500 00 GHz #Res BW 1 MHz	#VBW 3 MHz	Span 50 Mi Span 50 Mi Sweep 20 ms (1001 pt:	



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PSD, Chain A		L	Freq/Channel
APv3.3(080515),, Ref 20 dBm #Avg	Atten 20 dB	Mkr2 5.697 45 -2.111 c	II Contor Front
Log 10 dB/ 0ffst	2		Start Freq 5.67500000 GHz
11.3 dB			<b>Stop Freq</b> 5.72500000 GHz
#PAvg			CF Step 5.00000000 MHz <u>Auto</u> Man
W1 S2 S3 FS AA		- Company	Freq Offset 0.00000000 Hz
£(f): FTun Swp			Signal Track
Center 5.700 00 G #Res BW 1 MHz	Hz #VBW 3 MHz	Span 50   Sweep 20 ms (1001 p	
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### STRADDLE CHANNEL 144 RESULTS

#### UNII-2C BAND

#### Bandwidth, Antenna Gain, and Limits

Channel	Frequency	Min	Directional	Directional	Power	PSD
		26 dB	Gain	Gain	Limit	Limit
		BW	for Power	for PSD		
	(MHz)	(MHz)	(dBi)	(dBi)	(dBm)	(dBm)
144	5720	19.74	2.20	2.20	23.95	11.00

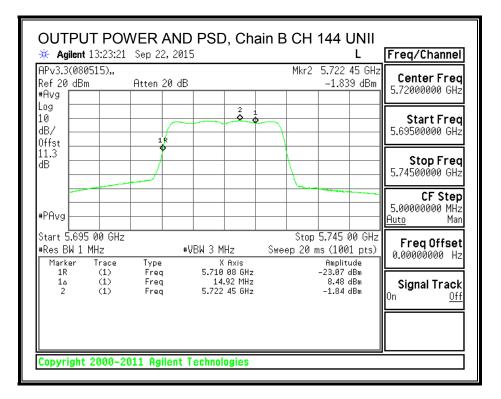
Duty Cycle CF (dB)	0.00	Included in Calculations of Corr'd Power & PSD
--------------------	------	--

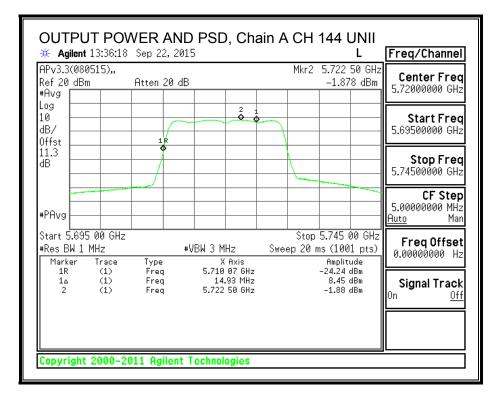
#### **Output Power Results**

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

#### **PSD Results**

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





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# UNII-3 BAND

#### Antenna Gain and Limit

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

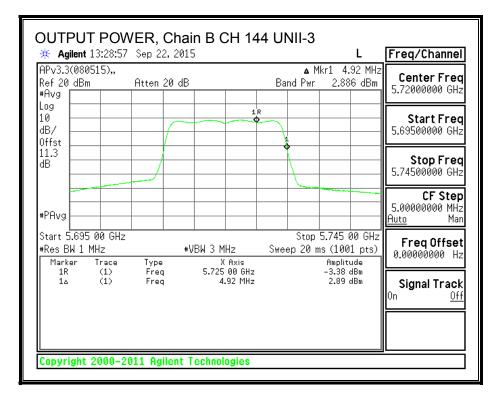
## **Output Power Results**

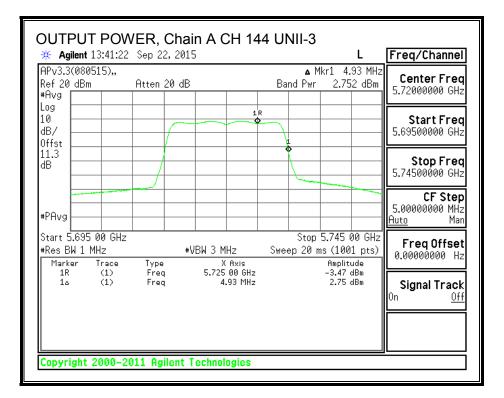
Channel	Frequency	Chain B	Chain A	Total	Power	Power
		Meas	Meas	Corr'd	Limit	Margin
		Power	Power	Power		
	(MHz)	(dBm)	(dBm)	(dBm)	(dBm)	(dB)
144	5720	2.89	2.75	5.83	30.00	-24.17

## **PSD Results**

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

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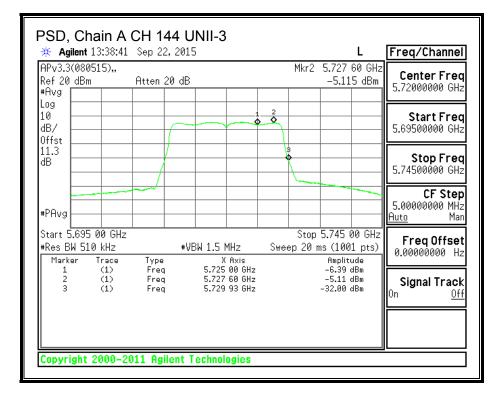
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FORM NO: 03-EM-F00858

		CH 144 U Sep 22, 2015			L	Freq/Channel
APv3.3(08 Ref 20 dB #Avg	30515),,	Atten 20 dB		Mkr2	5.727 70 GHz -5.064 dBm	
Log 10 dB/ 0ffst						Start Freq 5.69500000 GHz
11.3 dB						<b>Stop Freq</b> 5.74500000 GHz
#PAvg						<b>CF Step</b> 5.0000000 MHz <u>Auto</u> Man
Start 5.69 #Res BW 5 Marker	510 kHz Trace	Туре	3W 1.5 MHz X Axis		5.745 00 GHz 1s (1001 pts) Amplitude	Freq Offset 0.00000000 Hz
1 2 3	(1) (1) (1)	Freq Freq Freq	5.725 00 GHz 5.727 70 GHz 5.729 92 GHz		-6.29 dBm -5.06 dBm -31.54 dBm	Signal Track <sup>On <u>Off</u></sup>
Copyrigh	t 2000-2	011 Agilent T	echnologies			



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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	Chain A	<b>Uncorrelated Chains</b>
Antenna	Antenna	Directional
Gain	Gain	Gain
(dBi)	(dBi)	(dBi)
2.10	2.30	2.20

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#### **RESULTS**

## **TPC Limits**

Channel	Frequency	Limit	Directional	Limit
		EIRP	Gain	Cond
	(MHz)	(dBm)	(dBi)	(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	Chain B	Chain A	Total	Cond	Margin
		Meas Power	Meas Power	Corr'd Power	Power Limit	
	(MHz)	(dBm)	(dBm)	(dBm)	(dBm)	(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**

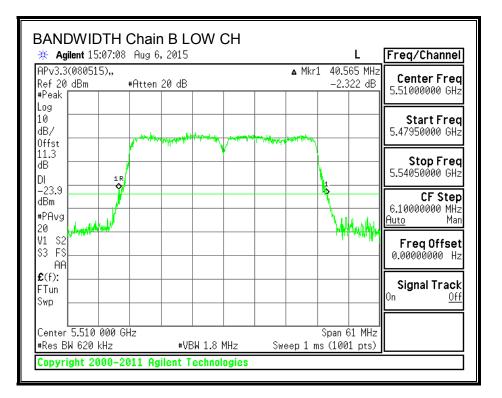
None; for reporting purposes only.

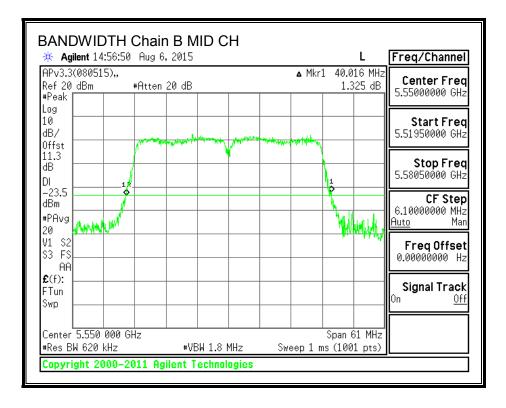
#### **RESULTS**

Channel	Frequency	26 dB BW	26 dB BW
		Chain B	Chain A
	(MHz)	(MHz)	(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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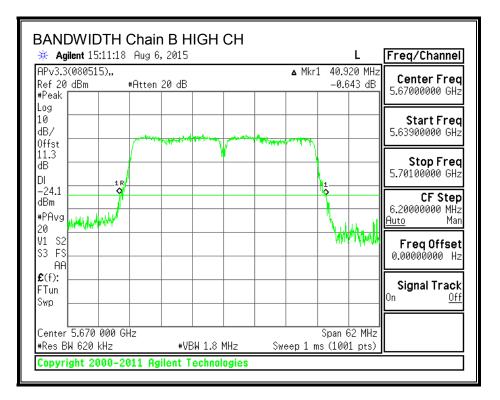
## 26 dB BANDWIDTH, Chain B

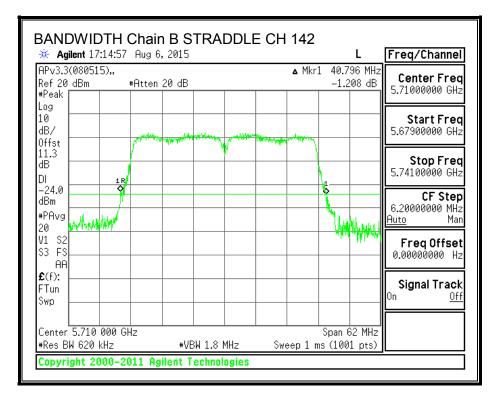




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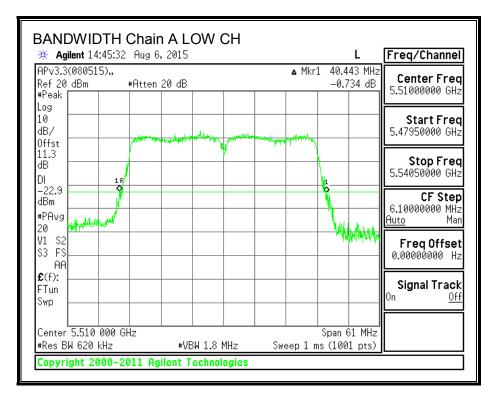


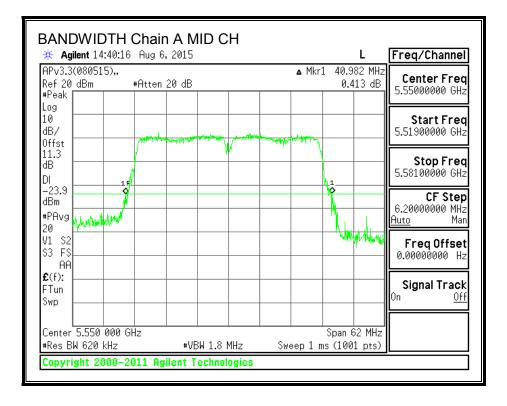


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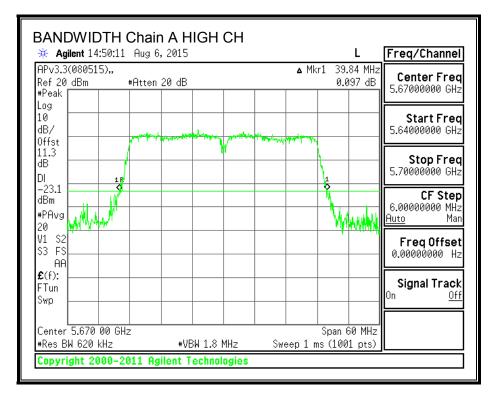
UL LLC FORM NO: 03-EM-F00858 12 Laboratory Dr., RTP, NC 27709 TEL: (919) 549-1400 *This report shall not be reproduced except in full, without the written approval of UL LLC.* 

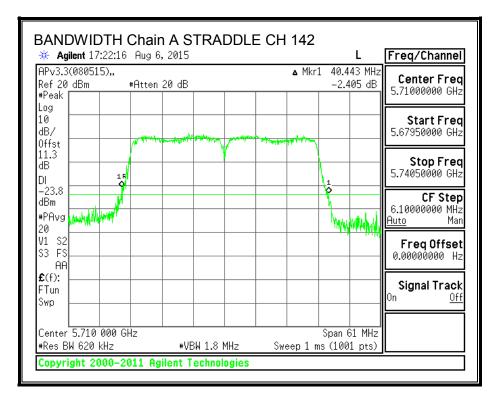
## 26 dB BANDWIDTH, Chain A





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# 8.12.2. 99% BANDWIDTH

## **LIMITS**

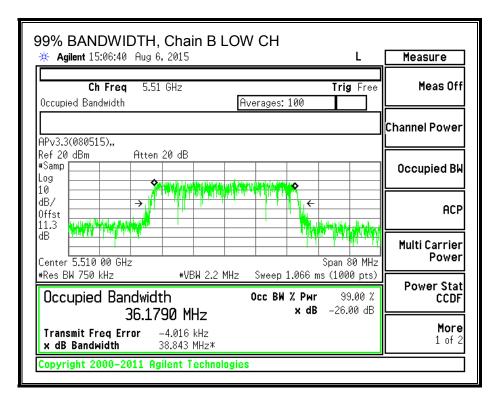
None; for reporting purposes only.

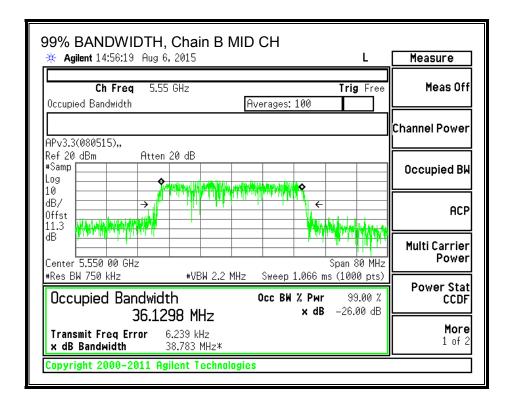
## **RESULTS**

Channel	Frequency	99% BW	99% BW	
			Chain A	
	(MHz)	(MHz)	(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	

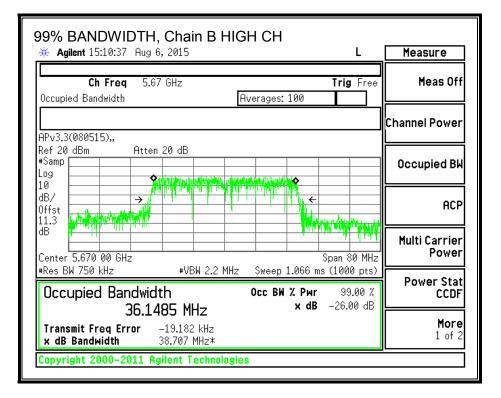
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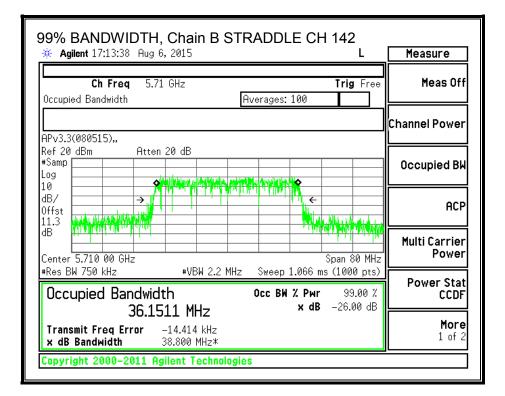
# 99% BANDWIDTH, Chain B





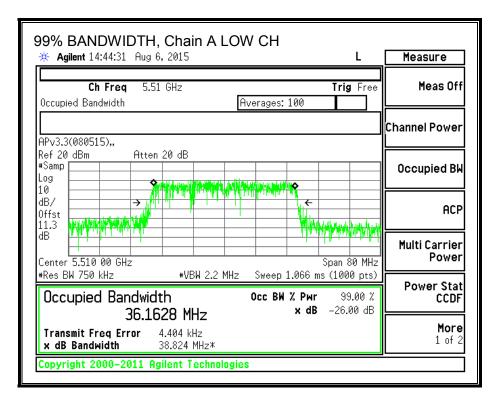
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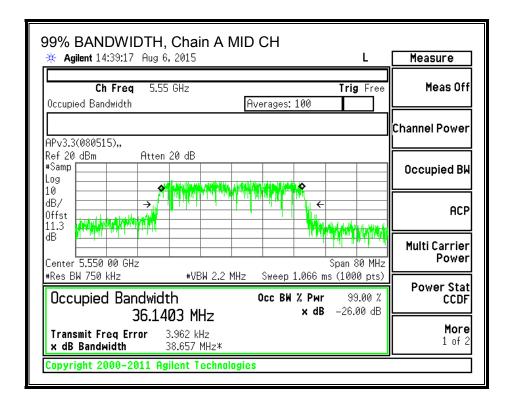




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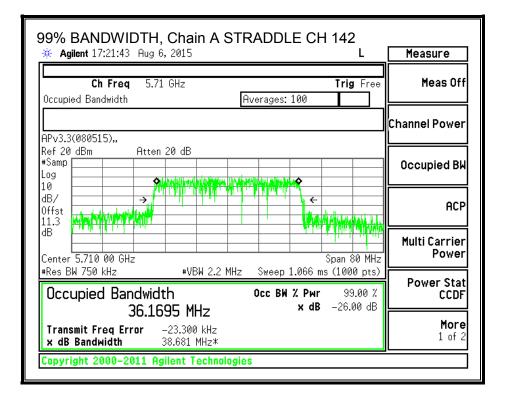
# 99% BANDWIDTH, Chain A





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99% BANDWIDTH, Chair	A HIGH CH	L	Measure
<b>Ch Freq</b> 5.67 GHz Occupied Bandwidth	Averages: 100	Trig Free	Meas Off
APv3.3(080515)			Channel Power
Ref 20 dBm Atten 20 dB #Samp	ullaaturta utsubruklataan oo duma aa 🔊		Occupied BW
dB/ offst 11.3 dB			ACP
Center 5.670 00 GHz		Span 80 MHz	Multi Carrier Power
*Res BW 750 kHz *VBW Occupied Bandwidth 36.1731 MH	2.2 MHz Sweep 1.066 m Occ BW % Pwr 7 × dB		Power Stat CCDF
Transmit Freq Error-39.564x dB Bandwidth38.839 M	<hz< td=""><td></td><td><b>More</b> 1 of 2</td></hz<>		<b>More</b> 1 of 2
Copyright 2000-2011 Agilent Te	chnologies		



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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	Chain A	<b>Uncorrelated Chains</b>		
Antenna	Antenna	Directional		
Gain	Gain	Gain		
(dBi)	(dBi)	(dBi)		
2.10	2.30	2.20		

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## **RESULTS**

#### Bandwidth, Antenna Gain, and Limits

Channel	Frequency	Min	Directional	Directional	Power	PSD
		26 dB	Gain	Gain	Limit	Limit
		BW	for Power	for PSD		
	(MHz)	(MHz)	(dBi)	(dBi)	(dBm)	(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**

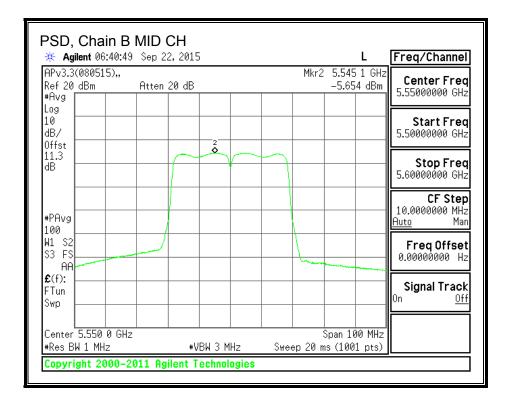
Channel	Frequency	Chain B	Chain A	Total	Power	Power
		Meas	Meas	Corr'd	Limit	Margin
		Power	Power	Power		
	(MHz)	(dBm)	(dBm)	(dBm)	(dBm)	(dB)
Low	5510	8.52	8.48	11.51	24.00	-12.49
Mid	5550	8.57	8.54	11.57	24.00	-12.43
High	5670	8.59	8.28	11.45	24.00	-12.55

## PSD Results

Channel	Frequency	Chain B	Chain A	Total	PSD	PSD
		Meas	Meas	Corr'd	Limit	Margin
		PSD	PSD	PSD		
	(MHz)	(dBm)	(dBm)	(dBm)	(dBm)	(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					
🔆 Agilent 06:35:40	Sep 22, 2015			L	Freq/Channel
APv3.3(080515),, Ref 20 dBm #Avg	Atten 20 dB		Mkr2	5.514 9 GHz -5.788 dBm	Center Freq 5.51000000 GHz
Log 10 dB/ 0ffst		2			<b>Start Freq</b> 5.46000000 GHz
dB		Ŷ			<b>Stop Freq</b> 5.56000000 GHz
#PAvg					<b>CF Step</b> 10.0000000 MHz <u>Auto</u> Man
W1 S2 S3 FS AA			-		Freq Offset 0.00000000 Hz
£(f): FTun Swp					<b>Signal Track</b> On <u>Off</u>
Center 5.510 0 GHz #Res BW 1 MHz		MHz		òpan 100 MHz s (1001 pts)	
Copyright 2000-20	011 Agilent Techn	ologies			

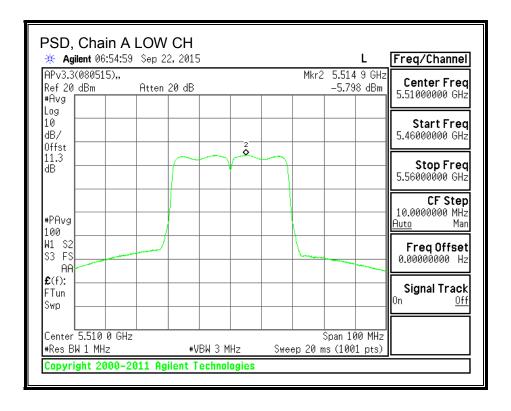


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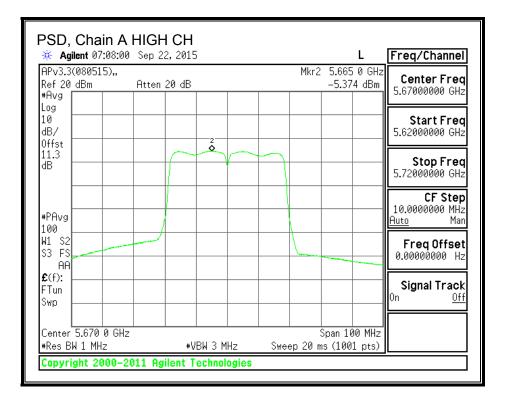
🗱 Agilent 06:48:17	Sep 22, 2015	L F	req/Channel
Avg	Atten 20 dB	64 5 GHz 578 dBm 5	Center Fred 6.67000000 GHz
og Ø IB/	2	5	Start Frec 6.62000000 GHz
I.3 IB		5	<b>Stop Frec</b> .72000000 GHz
PAvg			<b>CF Step</b> 0.0000000 MHz <u>ito</u> Mar
00  1 S2  3 FS  AA			Freq Offset 0.00000000 Hz
C(f): Tun		Or	Signal Track
Center 5.670 0 GHz Res BW 1 MHz	#VBW 3 M	100 MHz 001 nts)	

#### PSD, Chain A



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H 2015		L	Freq/Channel
) dB			Center Freq 5.55000000 GHz
2			Start Freq 5.50000000 GHz
			<b>Stop Freq</b> 5.60000000 GHz
			<b>CF Step</b> 10.0000000 MHz <u>Auto</u> Man
			Freq Offset 0.00000000 Hz
			<b>Signal Track</b> On <u>Off</u>
#VBW 3 MHz			
	2015	2015 Mkr2 0 dB	2015 L Mkr2 5.544 7 GHz -5.657 dBm -5.657 dBm -5.6



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### STRADDLE CHANNEL 142 RESULTS

#### UNII-2C BAND

#### Bandwidth, Antenna Gain, and Limits

Channel	Frequency	Min	Directional	Directional	Power	PSD
		26 dB	Gain	Gain	Limit	Limit
		BW	for Power	for PSD		
	(MHz)	(MHz)	(dBi)	(dBi)	(dBm)	(dBm)
142	5710	40.44	2.20	2.20	24.00	11.00

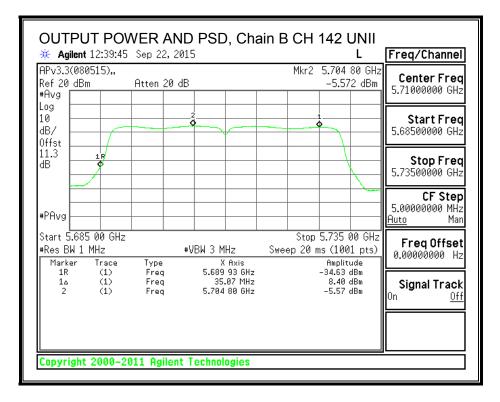
Duty Cycle CF (dB)	0.00	Included in Calculations of Corr'd Power & PSD
--------------------	------	--

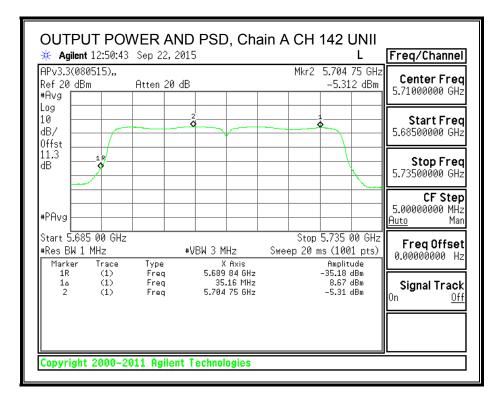
#### **Output Power Results**

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

#### **PSD Results**

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





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# UNII-3 BAND

### Antenna Gain and Limit

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

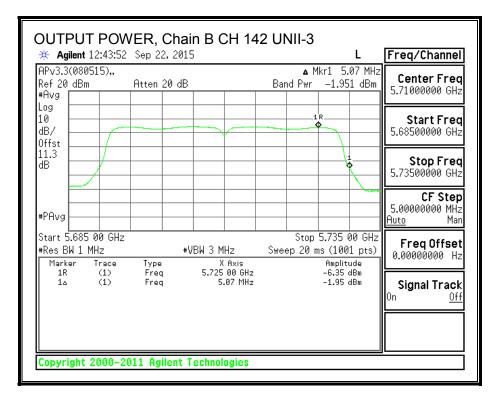
Duty Cycle CF (dB) 0.00 Included in Calculations of Corr a Power & PS	Duty Cycle CF (dB)	0.00	Included in Calculations of Corr'd Power & PS
---	--------------------	------	---

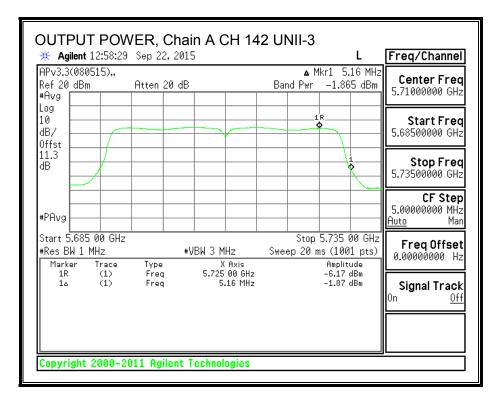
## **Output Power Results**

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

## **PSD Results**

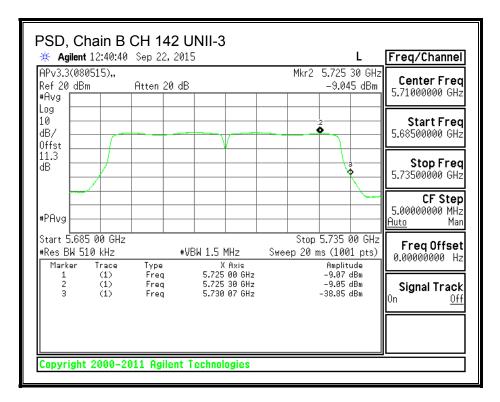
Channel	Frequency	Chain B	Chain A	Total	PSD	PSD
		Meas	Meas	Corr'd	Limit	Margin
		PSD	PSD	PSD		
	(MHz)	(dBm)	(dBm)	(dBm)	(dBm)	(dB)
142	5710	-9.05	-8.90	-5.96	30.00	-35.96

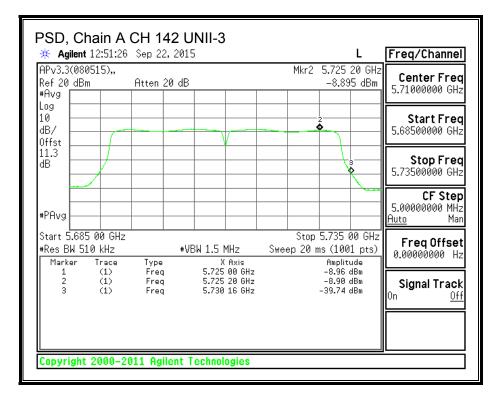




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# 8.12.4. TPC POWER

# 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	Chain A	<b>Uncorrelated Chains</b>
Antenna	Antenna	Directional
Gain	Gain	Gain
(dBi)	(dBi)	(dBi)
2.10	2.30	2.20

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### **RESULTS**

**TPC Limits** 

Channel	Frequency	Limit	Directional	Limit
		EIRP	Gain	Cond
	(MHz)	(dBm)	(dBi)	(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	Chain B	Chain A	Total	Cond	Margin
		Meas Power	Meas Power	Corr'd Power	Power Limit	
	(MHz)	(dBm)	(dBm)	(dBm)	(dBm)	(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.

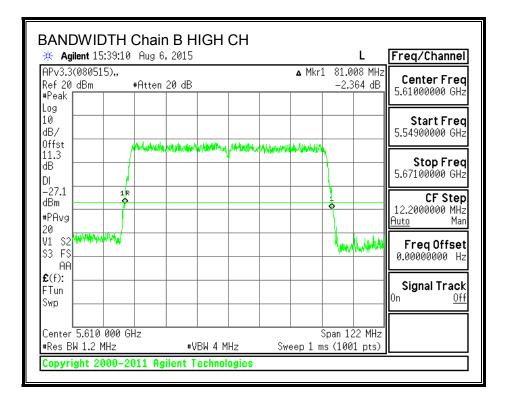
## **RESULTS**

Channel	Frequency	26 dB BW	26 dB BW
	Chain B		Chain A
	(MHz)	(MHz)	(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

🔆 Agilent 15:44:00 Aug 6	B LOW CH	L	Freq/Channel
APv3.3(080515),, Ref 20 dBm #Atten #Peak	20 dB	▲ Mkr1 81.549 0.581	II Contor Frod
Log 10 dB/ Offst			Start Freq 5.46850000 GHz
11.3 dB DI	braillar and the providence of the second		Stop Freq 5.59150000 GHz
-27.6 1/8 dBm #PAvg			CF Step 12.3000000 MHz Auto Man
20 V1 S2 S3 FS 4444444			Freq Offset 0.00000000 Hz
£(f): FTun Swp			Signal Track
Center 5.530 000 GHz #Res BW 1.2 MHz	#VBW 4 MHz	Span 123 M Sweep 1 ms (1001 p	



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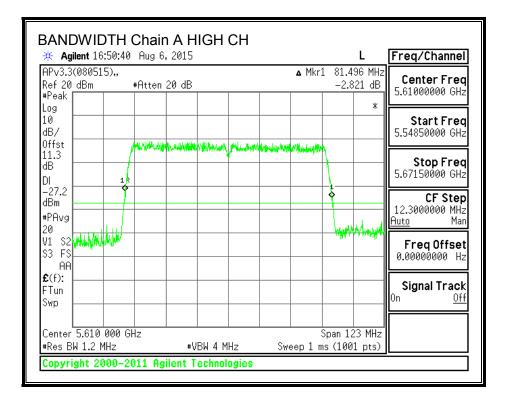
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BANDWIDTH Chair	-	E CH 138	L Freq/Chan	nell
APv3.3(080515),, Ref 20 dBm #Atten #Peak	-	▲ Mkr1 81. 0		eq
Log 10 dB/ Offst	. dir k rolin, ell. 1996k. (Alia Jac.or		<b>Start Fr</b> 5.62850000 (	
11.3 dB DI	rathermentstertendethen (NARdree)d		<b>Stop Fr</b> 5.75150000 (	eq ƏHz
-27.1 1 R dBm #PAvg 20				
V1 S2 WWWWWWW S3 FS AA		- Vila	Freq Offs 0.0000000	
<b>£</b> (f): FTun Swp			Signal Tra	ock Off
Center 5.690 000 GHz #Res BW 1.2 MHz	#VBW 4 MHz	Span S Sweep 1 ms (10	123 MHz 001 pts)	
Copyright 2000-2011 Ag	ilent Technologies			

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### 26 dB BANDWIDTH, Chain A

BANDWIDTH Chair Agilent 16:04:30 Aug 6		L	Freq/Channel
APv3.3(080515),, Ref 20 dBm #Atten #Peak	20 dB	▲ Mkr1 81.496 M -2.012 c	II Contor Frod
Log 10 dB/ 0ffst			* Start Freq 5.46850000 GHz
11.3 dB DI	Alter Alexandre Alter Alexandre Alter Alexandre Alexandre Alexandre Alexandre Alexandre Alexandre Alexandre Ale		Stop Freq 5.59150000 GHz
-27.6			<b>CF Step</b> 12.3000000 MHz <u>Auto</u> Man
V1 S2 MMMA MA		hliniliant	Freq Offset 0.00000000 Hz
£(f): FTun Swp			Signal Track
Center 5.530 000 GHz #Res BW 1.2 MHz	#VBW 4 MHz	Span 123 M Sweep 1 ms (1001 pt	



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🔆 Agilent 16:54:28 Aug	6,2015		L Freq/Channel
#Peak	1 20 dB	▲ Mkr1 81.0 0.1	008 MHz 530 dB 5.69000000 GHz
Log 10 dB/ 0ffst			Start Freq 5.62900000 GHz
11.3 dB DI	rander die		Stop Freq 5.75100000 GHz
-26.5 1R dBm / / / / / / / / / / / / / / / / / / /		•	CF Step 12.2000000 MHz Auto Man
20 V1 S2 S3 FS AA			Freq Offset 0.0000000 Hz
£(f): FTun Swp			Signal Track
Center 5.690 000 GHz #Res BW 1.2 MHz	#VBW 4 MHz	Span 1 Sweep 1 ms (100	22 MHz 01 pts)

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# 8.13.2. 99% BANDWIDTH

### **LIMITS**

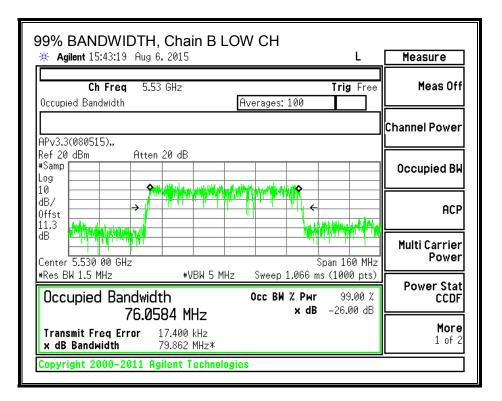
None; for reporting purposes only.

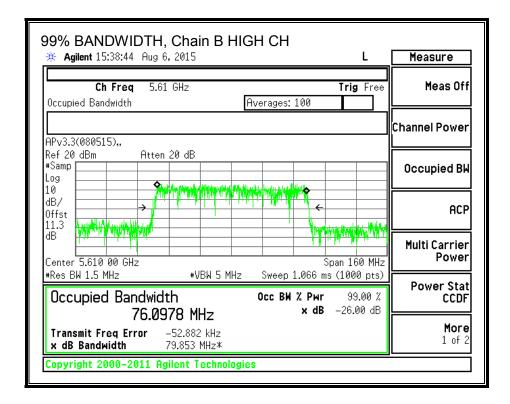
### **RESULTS**

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

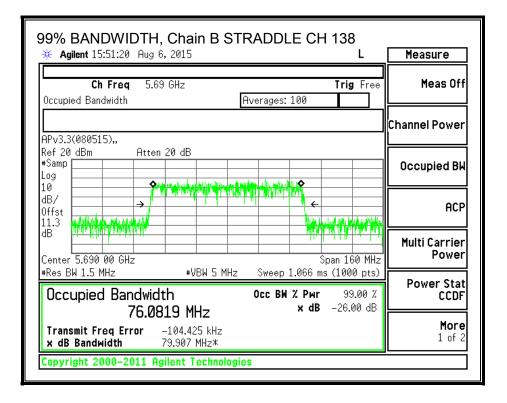
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# 99% BANDWIDTH, Chain B



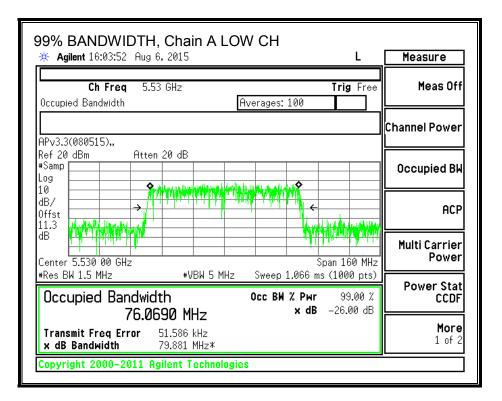


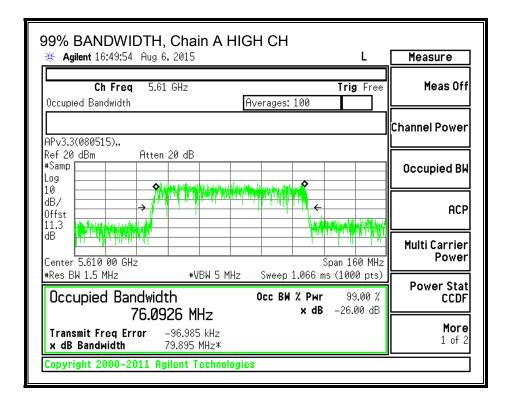
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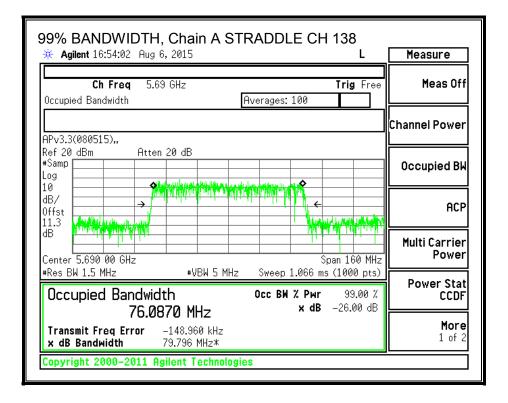
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# 99% BANDWIDTH, Chain A





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# 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	Chain 1	<b>Uncorrelated Chains</b>
Antenna	Antenna	Directional
Gain	Gain	Gain
(dBi)	(dBi)	(dBi)
2.10	2.30	2.20

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### **RESULTS**

#### Bandwidth, Antenna Gain, and Limits

	Channel	Frequency	Min	Directional	Directional	Power	PSD
			26 dB	Gain	Gain	Limit	Limit
I			BW	for Power	for PSD		
I		(MHz)	(MHz)	(dBi)	(dBi)	(dBm)	(dBm)
ſ	Low	5530	81.50	2.20	2.20	24.00	11.00
ſ	High	5610	81.01	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	Chain B	Chain A	Total	Power	Power
		Meas	Meas	Corr'd	Limit	Margin
		Power	Power	Power		
	(MHz)	(dBm)	(dBm)	(dBm)	(dBm)	(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

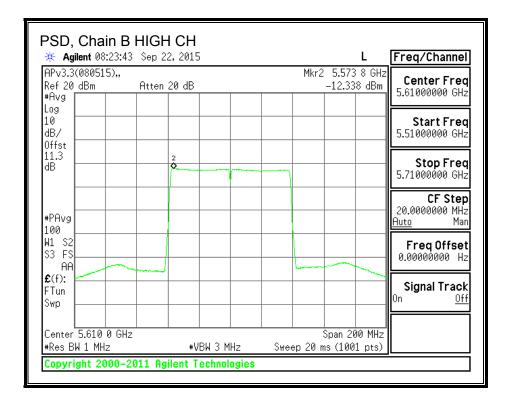
#### **PSD Results**

Channel	Frequency	Chain B	Chain A	Total	PSD	PSD
		Meas	Meas	Corr'd	Limit	Margin
		PSD	PSD	PSD		
	(MHz)	(dBm)	(dBm)	(dBm)	(dBm)	(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

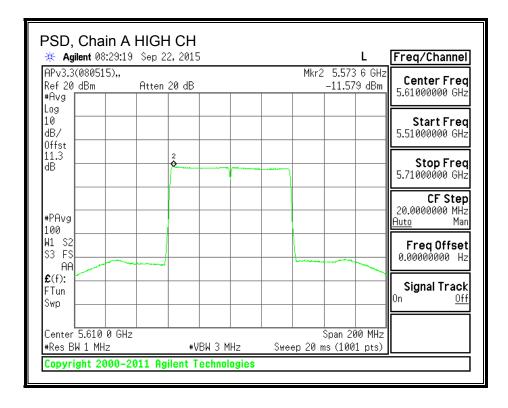
<b>PSD, Chain B LOV</b> <b>* Agilent</b> 07:49:56 Sep 3		L	Freq/Channel
#Avg	1 20 dB	Mkr2 5.565 6 GH -12.444 dBr	II Contor From
Log 10 dB/ Offst			<b>Start Freq</b> 5.43000000 GHz
11.3 dB		2 •••	<b>Stop Freq</b> 5.63000000 GHz
#PAvg			<b>CF Step</b> 20.0000000 MHz <u>Auto</u> Man
H1 S2 S3 FS AA			FreqOffset 0.00000000 Hz
E(f): FTun Swp			Signal Track
Center 5.530 0 GHz #Res BW 1 MHz	#VBW 3 MHz	Span 200 MH Sweep 20 ms (1001 pts	



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# PSD, Chain A

🔆 Agilent 08:05:21 Sep	22,2015	L	Freq/Channel
ŧAvg	en 20 dB	Mkr2 5.533 2 GHz -11.911 dBm	Center Freq 5.53000000 GHz
.og LØ JB/			Start Freq 5.43000000 GHz
лаа лВ	2		<b>Stop Freq</b> 5.63000000 GHz
+PAvg			<b>CF Step</b> 20.0000000 MHz <u>Auto</u> Man
41 S2 53 FS AA			Freq Offset 0.00000000 Hz
E(f):			<b>Signal Track</b> On <u>Off</u>
Center 5.530 0 GHz Res BW 1 MHz	#VBW 3 MHz	Span 200 MHz Sweep 20 ms (1001 pts)	



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### STRADDLE CHANNEL 138 RESULTS

#### UNII-2C BAND

#### Bandwidth, Antenna Gain, and Limits

Channel	Frequency	Min	Directional	Directional	Power	PSD
		26 dB	Gain	Gain	Limit	Limit
		BW	for Power	for PSD		
	(MHz)	(MHz)	(dBi)	(dBi)	(dBm)	(dBm)
138	5690	81.01	2.20	2.20	24.00	11.00

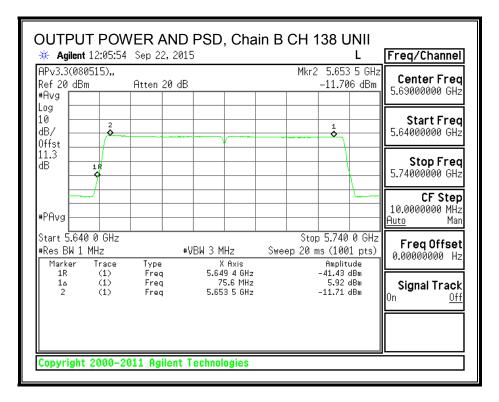
Duty Cycle CF (dB)	0.00	Included in Calculations of Corr'd Power & PSD
--------------------	------	--

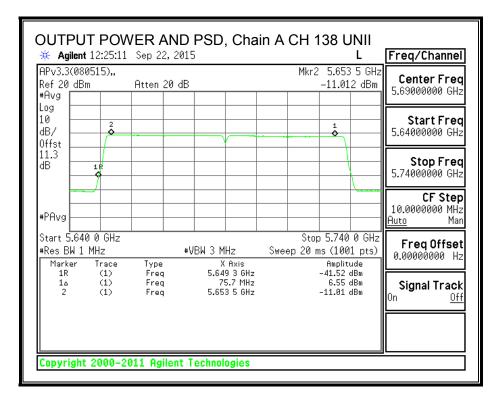
#### **Output Power Results**

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

#### **PSD Results**

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





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# UNII-3 BAND

#### Antenna Gain and Limit

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

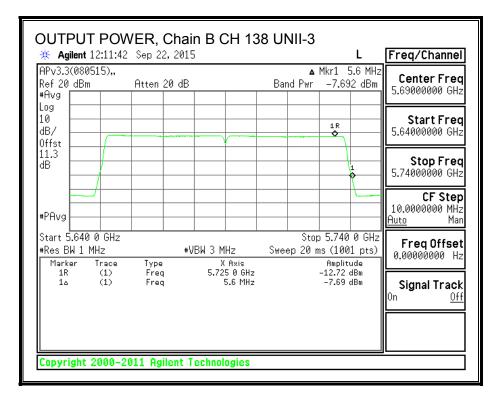
Duty Cycle CF (dB)	0.00	Included in Calculations of Corr'd Power & PSD
--------------------	------	--

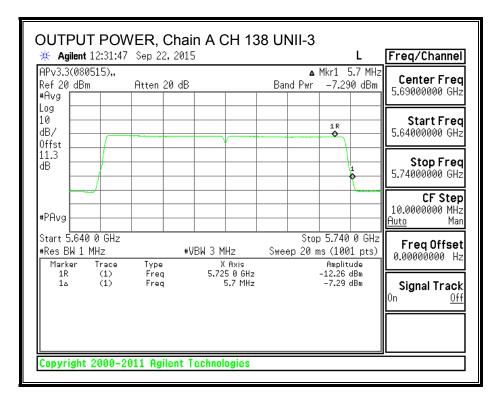
### **Output Power Results**

Channel	Frequency	Chain 0	Chain 1	Total	Power	Power
		Meas	Meas	Corr'd	Limit	Margin
		Power	Power	Power		
	(MHz)	(dBm)	(dBm)	(dBm)	(dBm)	(dB)
138	5690	-7.69	-7.29	-4.48	30.00	-34.48

#### **PSD Results**

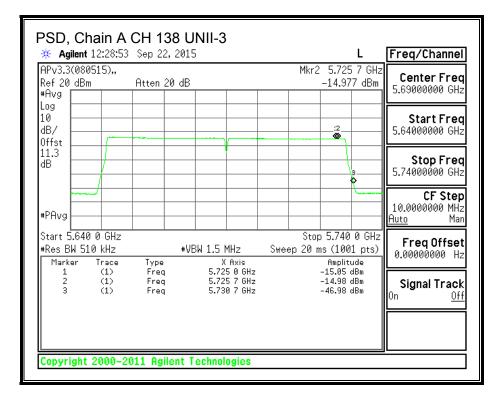
Channel	Frequency	Chain 0	Chain 1	Total	PSD	PSD
		Meas	Meas	Corr'd	Limit	Margin
		PSD	PSD	PSD		
	(MHz)	(dBm)	(dBm)	(dBm)	(dBm)	(dB)
138	5690	-15.38	-14.98	-12.17	30.00	-42.17





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-		3 Sep 22, 2015	)		L	Freq/Channe
Ref20 o ≉Avg [	080515),, dBm	Atten 20 dB			726 0 GHz 5.381 dBm	Center Fred 5.69000000 GH
.og    0  -  B/  - )ffst					12	Start Free 5.64000000 GH
11.3 JB					3	<b>Stop Fre</b> 5.74000000 GH
⊧PAvg –						<b>CF Ste</b> 10.0000000 MH <u>Auto</u> Ma
	640 0 GHz 510 kHz r Trace	+VE	3W 1.5 MHz X Axis	Sweep 20 ms (	740 0 GHz 1001 pts) plitude	<b>Freq Offse</b> 0.00000000 H
1 2 3	(1) (1) (1)	Freq Freq Freq	5.725 0 GHz 5.726 0 GHz 5.730 6 GHz	-15. -15.	56 dBm 38 dBm 31 dBm	Signal Tracl



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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	Chain 1	<b>Uncorrelated Chains</b>
Antenna	Antenna	Directional
Gain	Gain	Gain
(dBi)	(dBi)	(dBi)
2.10	2.30	2.20

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### **RESULTS**

**TPC Limits** 

Channel	Frequency	Limit Directional		Limit
		EIRP	Gain	Cond
	(MHz)	(dBm)	(dBi)	(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	Chain 0	Chain 1	Total	Cond	Margin
		Meas	Meas	Corr'd	Power	
		Power	Power	Power	Limit	
	(MHz)	(dBm)	(dBm)	(dBm)	(dBm)	(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)

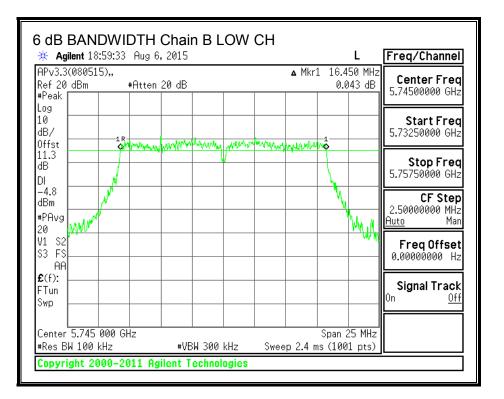
The minimum 6 dB bandwidth shall be at least 500 kHz.

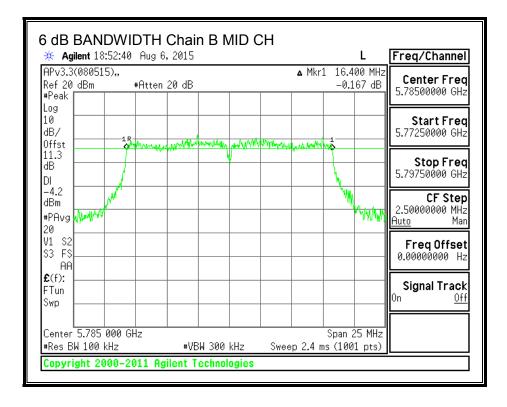
### <u>RESULTS</u>

Channel	Frequency	6 dB BW	6 dB BW	Minimum
		Chain B	Chain A	Limit
	(MHz)	(MHz)	(MHz)	(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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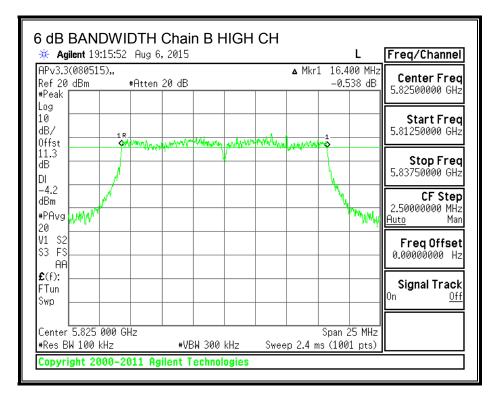
# 6 dB BANDWIDTH, Chain B



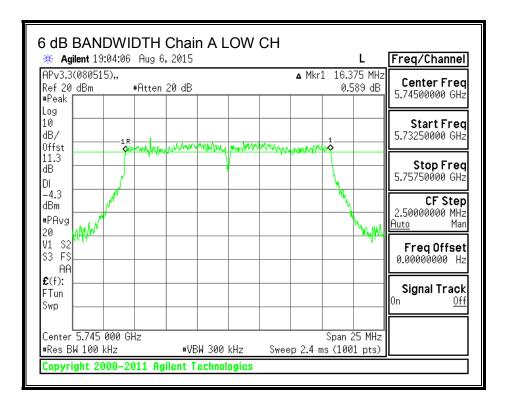


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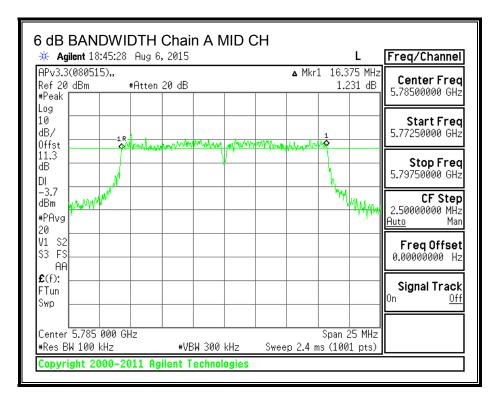
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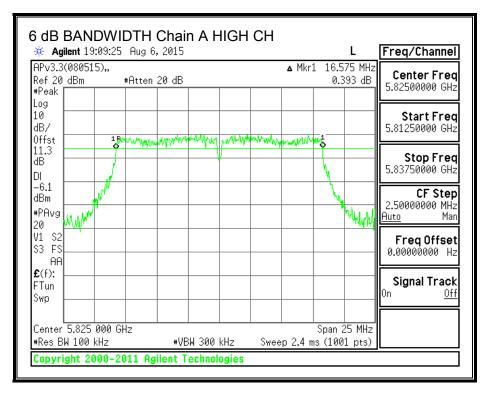


## 6 dB BANDWIDTH, Chain A



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# 8.14.2. 26 dB BANDWIDTH

### LIMITS

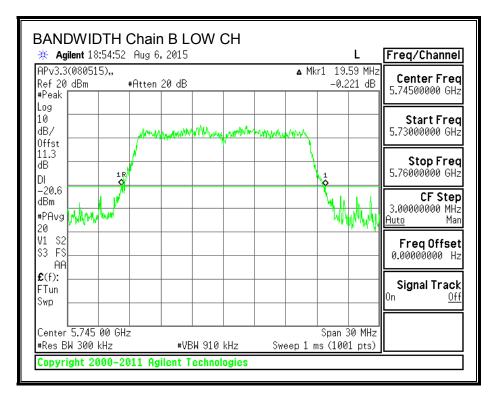
None; for reporting purposes only.

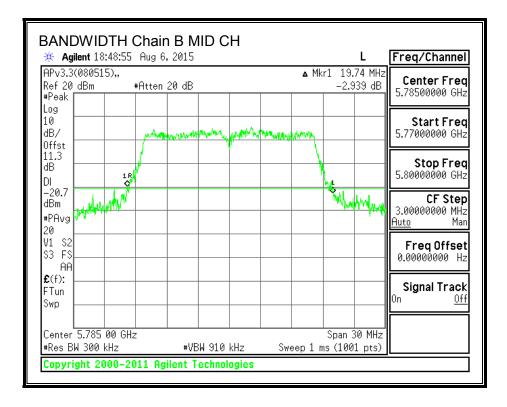
# <u>RESULTS</u>

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

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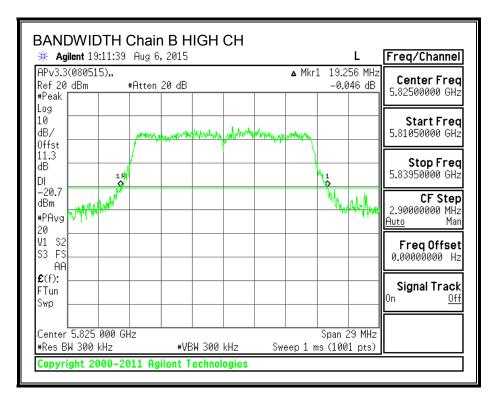
### 26 dB BANDWIDTH, Chain B



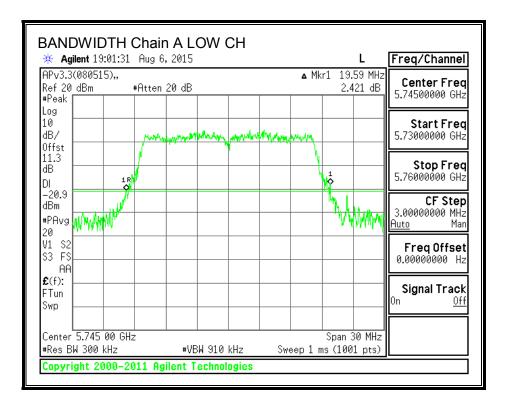


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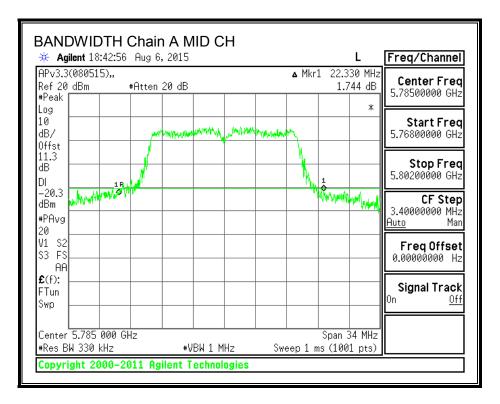
# 26 dB BANDWIDTH, Chain A

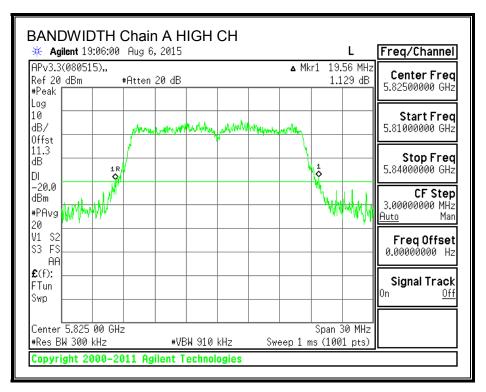


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# 8.14.3. 99% **BANDWIDTH**

# LIMITS

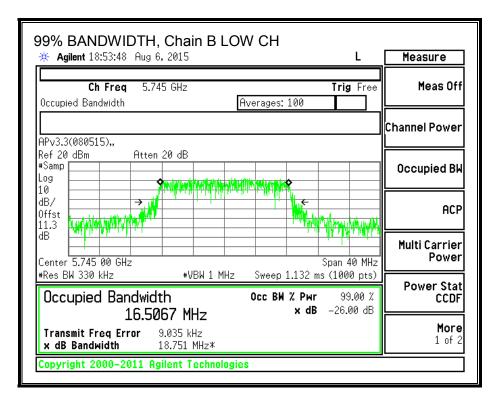
None; for reporting purposes only.

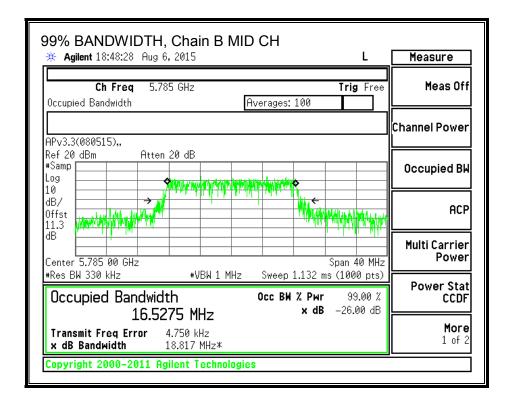
# **RESULTS**

Channel	Frequency	99% BW	99% BW	
		Chain B	Chain A	
	(MHz)	(MHz)	(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

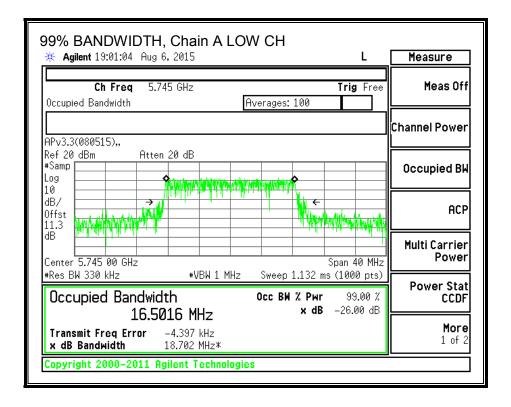




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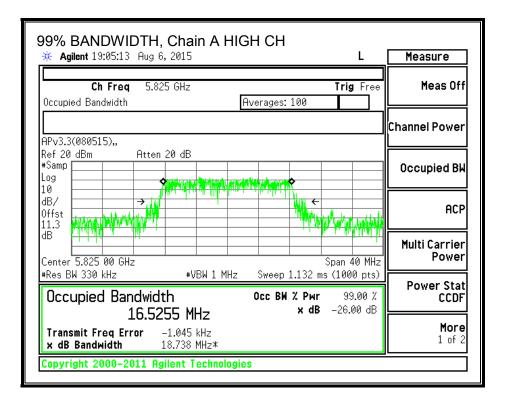
99% BANDWIDTH, Chain B HIGH CH	
* Agilent 19:10:55 Aug 6, 2015	L Measure
Ch Freq 5.825 GHz Occupied Bandwidth Averages: 100	Trig Free Meas Of
	Channel Powe
APv3.3(080515),,	
Ref 20 dBm Atten 20 dB #Samp Log Attended atten	Occupied Bl
dB/ Offst 11.3	ACI
dB	Span 40 MHz Multi Carrie Powe
#Res BW 330 kHz #VBW 1 MHz Sweep 1.1	32 ms (1000 pts)
oooapioa banamaan	Pwr 99.00 % cCDI dB -26.00 dB
Transmit Freq Error 903.796 Hz × dB Bandwidth 18.807 MHz*	More 1 of
Copyright 2000–2011 Agilent Technologies	

# 99% BANDWIDTH, Chain A



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99% BANDWIDTH, Chain A MID CH	
ዡ Agilent 18:41:15 Aug 6, 2015	Measure
Ch Freq 5.785 GHz Trig Free Occupied Bandwidth Averages: 100	Meas Off
	Channel Power
APv3.3(080515),,	
Ref 20 dBm Atten 20 dB #Samp	Occupied BW
dB/ offst 1.3	ACP
dB	Multi Carrier Power
#Res BW 330 kHz	
Occupied Bandwidth Осс ВМ % Рыг 99.00 % 16.5640 MHz × dB -26.00 dB	Power Stat CCDF
Transmit Freq Error 494.978 Hz x dB Bandwidth 20.328 MHz*	<b>More</b> 1 of 2
Copyright 2000-2011 Agilent Technologies	



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# 8.14.4. OUTPUT POWER

### <u>LIMITS</u>

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	Chain A	<b>Uncorrelated Chains</b>
Antenna	Antenna	Directional
Gain	Gain	Gain
(dBi)	(dBi)	(dBi)
1.40	1.70	1.55

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### **RESULTS**

Antenna Gain and Limit

Channel	Frequency	Directional	Power
		Gain	Limit
		for Power	
	(MHz)	(dBi)	(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	Chain B	Chain A	Total	Power	Power
		Meas	Meas	Corr'd	Limit	Margin
		Power	Power	Power		
	(MHz)	(dBm)	(dBm)	(dBm)	(dBm)	(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	Chain A	<b>Uncorrelated Chains</b>
Antenna	Antenna	Directional
Gain	Gain	Gain
(dBi)	(dBi)	(dBi)
1.40	1.70	1.55

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### **RESULTS**

#### Antenna Gain and Limits

Channel	Frequency	Directional	PSD
		Gain	Limit
	(MHz)	(dBi)	(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

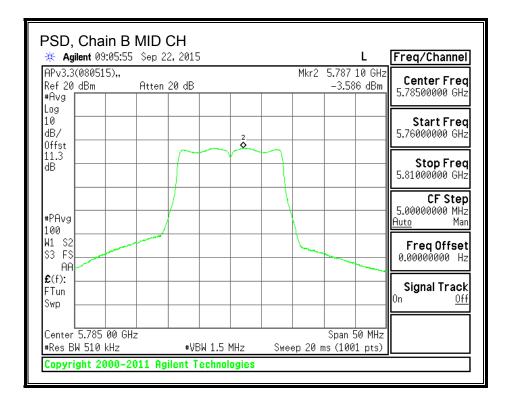
### PSD Results

Channel	Frequency	Chain B	Chain A	Total	PSD	PSD
		Meas	Meas	Corr'd	Limit	Margin
		PSD	PSD	PSD		
	(MHz)	(dBm)	(dBm)	(dBm)	(dBm)	(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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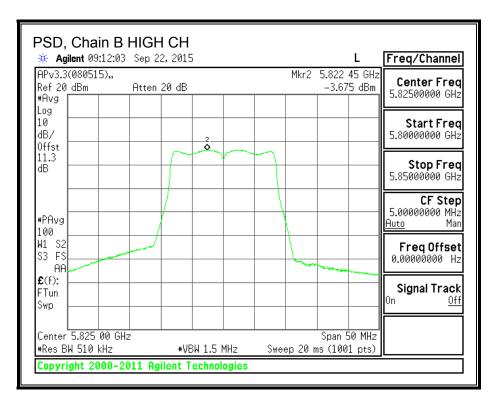
# PSD, Chain B

🔆 Agilent 09:01:06	Sep 22, 2015					 Freq/Channel
APv3.3(080515)" Ref 20 dBm #Avg	Atten 20 dB			Mkr2	5.742 7 -3.53	 Center Freq 5.74500000 GHz
.og L0 dB/ Dffst		2				Start Freq 5.72000000 GHz
ил.з иВ			7			 <b>Stop Freq</b> 5.77000000 GHz
*PAvg						 <b>CF Step</b> 5.00000000 MHz <u>Auto</u> Man
100 41 S2 53 FS ӨӨ				hanne	mandana	 FreqOffset 0.00000000 Hz
E(f): -Tun Swp						 <b>Signal Track</b> <sup>On <u>Off</u></sup>
Center 5.745 00 GHz #Res BW 510 kHz		W 1.5 M	 Swee	n 20 m	Span 5 ns (1001	

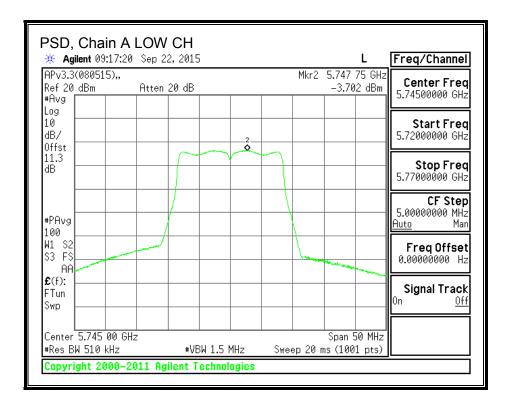


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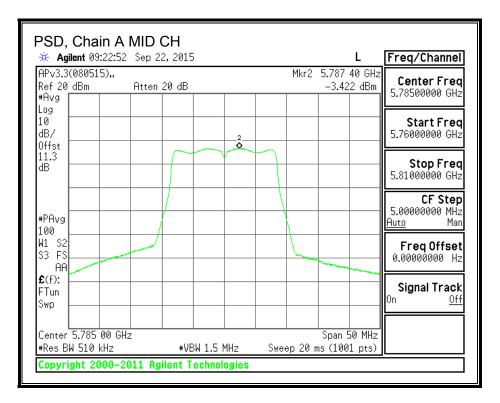
UL LLC FORM NO: 03-EM-F00858 12 Laboratory Dr., RTP, NC 27709 TEL: (919) 549-1400 This report shall not be reproduced except in full, without the written approval of UL LLC.

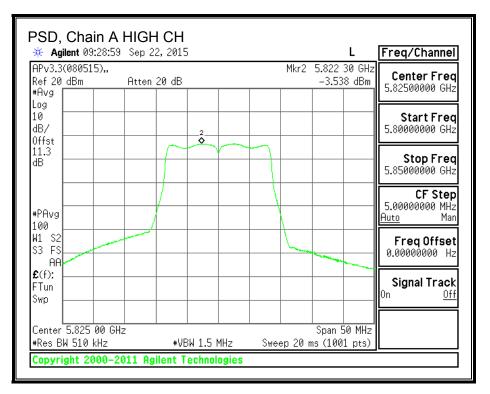


### PSD, Chain A



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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)

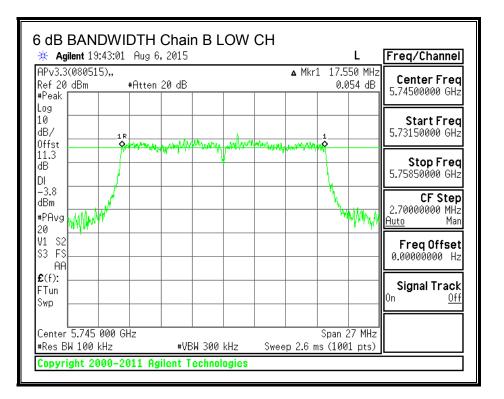
The minimum 6 dB bandwidth shall be at least 500 kHz.

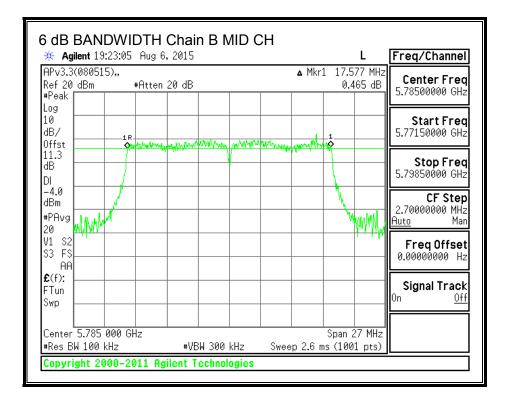
### <u>RESULTS</u>

Channel	Frequency	6 dB BW	6 dB BW	Minimum
		Chain B	Chain A	Limit
	(MHz)	(MHz)	(MHz)	(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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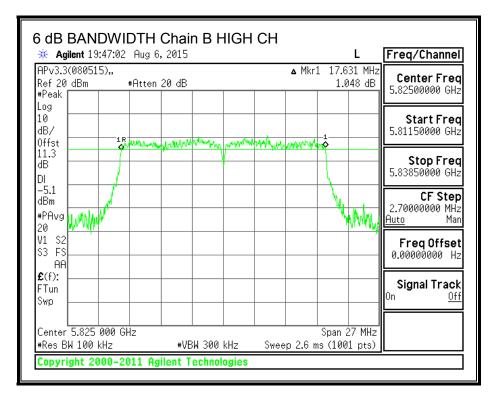
# 6 dB BANDWIDTH, Chain B



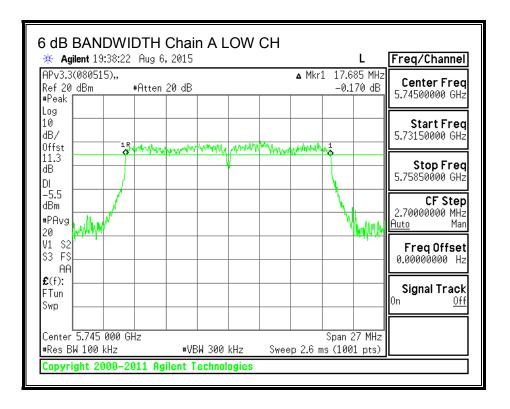


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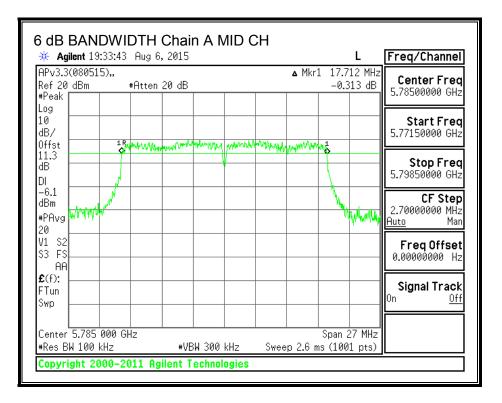


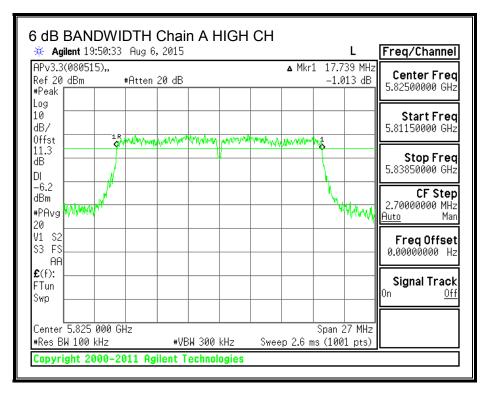
# 6 dB BANDWIDTH, Chain A



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# 8.15.2. 26 dB BANDWIDTH

### LIMITS

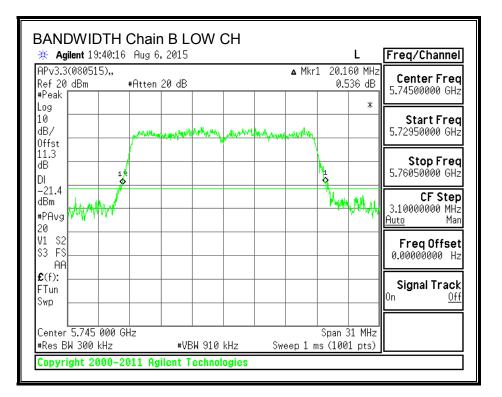
None; for reporting purposes only.

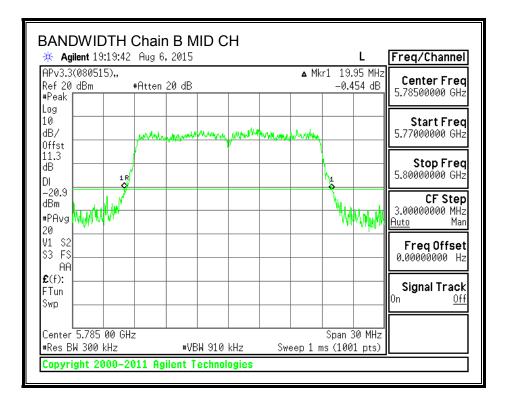
# **RESULTS**

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

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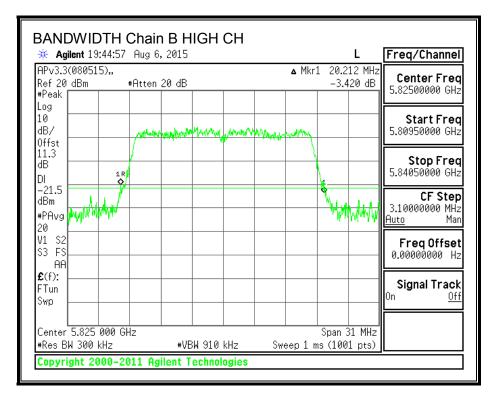
### 26 dB BANDWIDTH, Chain B



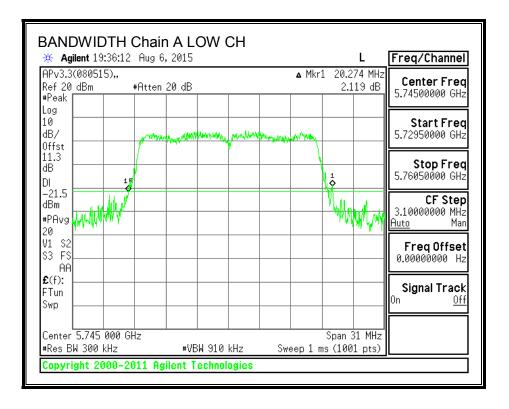


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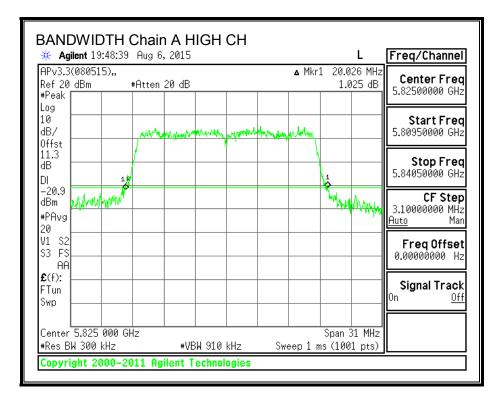


# 26 dB BANDWIDTH, Chain A



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BANE					ID C	Н				L	Freq/Channel
APv3.3 Ref 20 #Peak			ŧAtten	20 dB				▲ Mkr:		88 MHz 35 dB	Center Freq 5.78500000 GHz
Log 10 dB/ Offst			, Andrew	ya,mbanah	whiteway	www.	Mumpulu	ur de la de			Start Freq 5.76950000 GHz
11.3 dB DI		1 R							1		<b>Stop Freq</b> 5.80050000 GHz
#PAvg	want								The work	14 the graph of	CF Step 3.10000000 MHz <u>Auto</u> Man
20 V1 S2 S3 FS AA											FreqOffset 0.00000000 Hz
€(f): FTun Swp											<b>Signal Track</b> On <u>Off</u>
Center #Res Bl			z	#VB	W 910	kHz	Swe	ep 1 m		31 MHz 1 pts)	
			11 Ag	ilent T			Jint	20 L II	13 (100	1 1(3)	



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# 8.15.3. 99% BANDWIDTH

# LIMITS

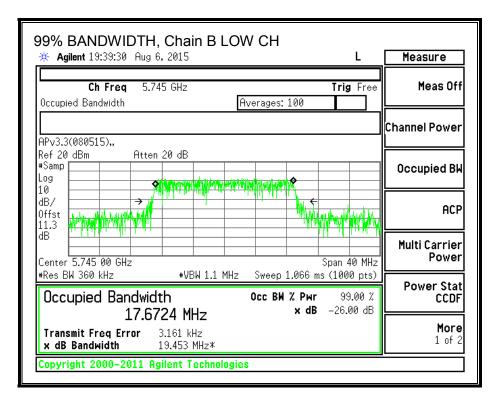
None; for reporting purposes only.

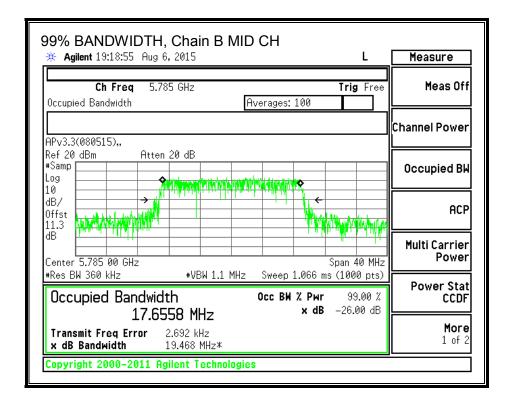
# <u>RESULTS</u>

Channel	Frequency	99% BW	99% BW
		Chain B	Chain A
	(MHz)	(MHz)	(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

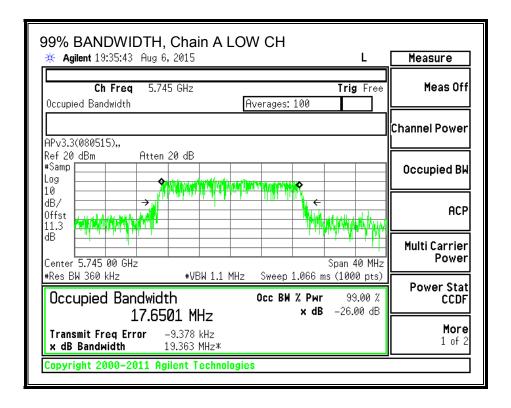




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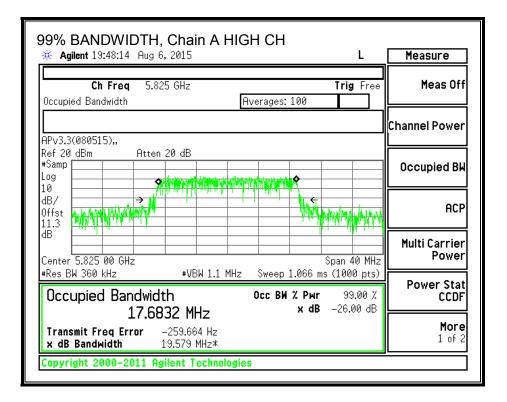
99% BANDWIDTH, Chain B HIGH CH	
ዡ Agilent 19:44:23 Aug 6, 2015	Measure
Ch Freq 5.825 GHz Trig Free Occupied Bandwidth Averages: 100	Meas Off
APv3.3(080515),	Channel Power
Ref 20 dBm Atten 20 dB #Samp	Occupied BW
dB/ Offst 11.3 Harris and a state of the	ACP
dB         100 ml	Multi Carrier Power
Occupied Bandwidth         Occ BW % Pwr         99.00 %           17.6583 MHz         × dB         -26.00 dB	Power Stat CCDF
Transmit Freq Error     -4.921 kHz       x dB Bandwidth     19.368 MHz*	<b>More</b> 1 of 2
Copyright 2000–2011 Agilent Technologies	

# 99% BANDWIDTH, Chain A



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99% BANDWIDTH, Chain A MID CH	Measure
Ch Freq 5.785 GHz Trig Free Occupied Bandwidth Averages: 100	
APv3.3(080515),	Channel Power
Ref 20 dBm Atten 20 dB +Samp Log 10 Arten 10 A	Occupied BW
dB/ dB/ Offst Annual	ACP
Center 5.785 00 GHz	
Image: Solid kind width         Occ вм % Рыг         99.00           17.6849 MHz         × dB         -26.00 d	Power Stat ۲ CCDF
Transmit Freq Error     -4.624 kHz       x dB Bandwidth     19.631 MHz*	More 1 of 2
Copyright 2000-2011 Agilent Technologies	



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# 8.15.4. OUTPUT POWER

### <u>LIMITS</u>

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	Chain A	<b>Uncorrelated Chains</b>
Antenna	Antenna	Directional
Gain	Gain	Gain
(dBi)	(dBi)	(dBi)
1.40	1.70	1.55

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### **RESULTS**

Antenna Gain and Limit

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

0.00

Duty Cycle CF (dB)

Included in Calculations of Corr'd Power

#### **Output Power Results**

Channel	Frequency	Chain B	Chain A	Total	Power	Power
		Meas	Meas	Corr'd	Limit	Margin
		Power	Power	Power		
	(MHz)	(dBm)	(dBm)	(dBm)	(dBm)	(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	Chain A	<b>Uncorrelated Chains</b>
Antenna	Antenna	Directional
Gain	Gain	Gain
(dBi)	(dBi)	(dBi)
1.40	1.70	1.55

### **RESULTS**

Antenna Gain and Limits

Channel	Frequency	Directional	PSD
		Gain	Limit
	(MHz)	(dBi)	(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

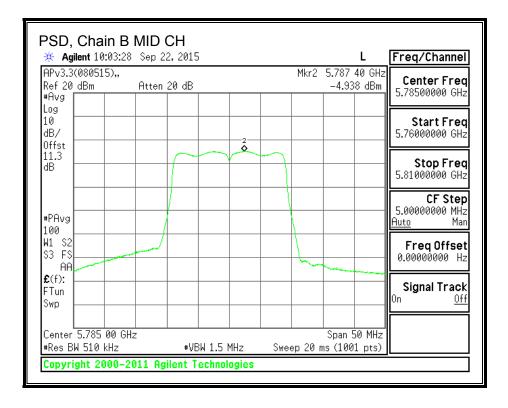
### PSD Results

Channel	Frequency	Chain B	Chain A	Total	PSD	PSD
		Meas	Meas	Corr'd	Limit	Margin
		PSD	PSD	PSD		
	(MHz)	(dBm)	(dBm)	(dBm)	(dBm)	(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

PSD, Chain B L ⊯ Agilent 09:57:24 ≲			L	Freq/Channel
#Avg	itten 20 dB	Mkr2	5.747 30 GHz -4.962 dBm	Center Freq 5.74500000 GHz
Log 10 dB/ Offst		2 •		Start Freq 5.72000000 GHz
dB				<b>Stop Freq</b> 5.77000000 GHz
#PAvg				CF Step 5.0000000 MHz <u>Auto</u> Man
100 И1 S2 S3 FS АА				FreqOffset 0.00000000 Hz
E(f): FTun Swp				<b>Signal Track</b> <sup>On <u>Off</u></sup>
Center 5.745 00 GHz #Res BW 510 kHz	#VBW 1.5 M	1Hz Sweep 20	Span 50 MHz ms (1001 pts)	



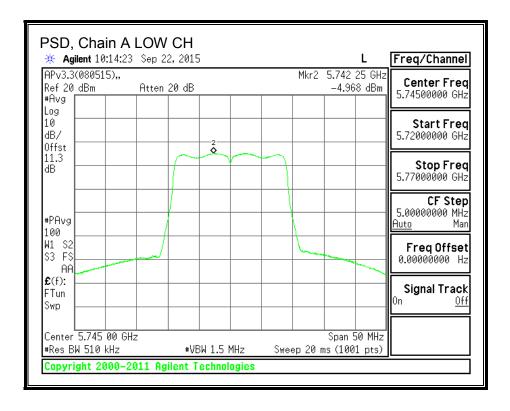
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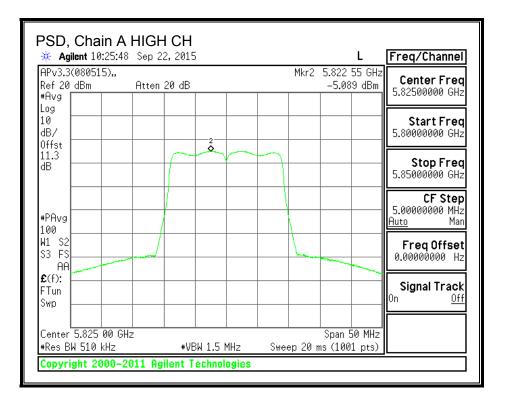
PSD, Chain B H <mark>☀ Agilent</mark> 10:08:59 S			L Freq/Channel
#Avg	tten 20 dB	Mkr2 5.822 -5.0	2 10 GHz 038 dBm 5.82500000 GHz
Log 10 dB/ 0ffst	2		Start Freq 5.80000000 GHz
dB			<b>Stop Freq</b> 5.85000000 GHz
#PAvg			<b>CF Step</b> 5.00000000 MHz <u>Auto</u> Man
100 W1 S2 S3 FS AA			Freq Offset 0.00000000 Hz
£(f): FTun Swp			Signal Track
Center 5.825 00 GHz #Res BW 510 kHz	#VBW 1.5 MHz	Span Sweep 20 ms (10	1 50 MHz 001 pts)

### PSD, Chain A



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PSD, Chain A MID CH						
🔆 Agilent 10:20:13	Sep 22, 2015		L	Freq/Channel		
#Avg	Atten 20 dB		87 35 GHz 1.687 dBm	Center Freq 5.78500000 GHz		
Log 10 dB/ 0ffst	2			<b>Start Freq</b> 5.76000000 GHz		
dB		$\uparrow \downarrow \downarrow$		<b>Stop Freq</b> 5.81000000 GHz		
#PAvg				<b>CF Step</b> 5.00000000 MHz <u>Auto</u> Man		
W1 S2 S3 FS AA				Freq Offset 0.00000000 Hz		
£(f): FTun Swp				<b>Signal Track</b> On <u>Off</u>		
Center 5.785 00 GHz #Res BW 510 kHz	#VBW 1.5 MHz		an 50 MHz 1001 pts)			
Copyright 2000–2011 Agilent Technologies						



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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)

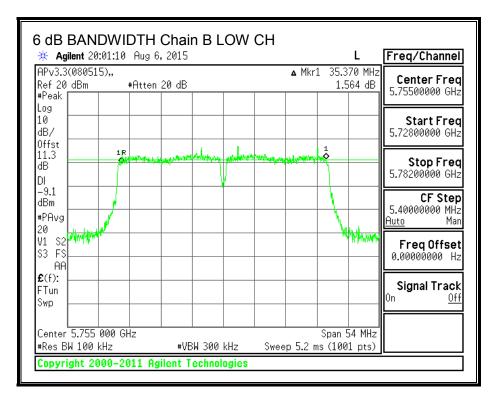
The minimum 6 dB bandwidth shall be at least 500 kHz.

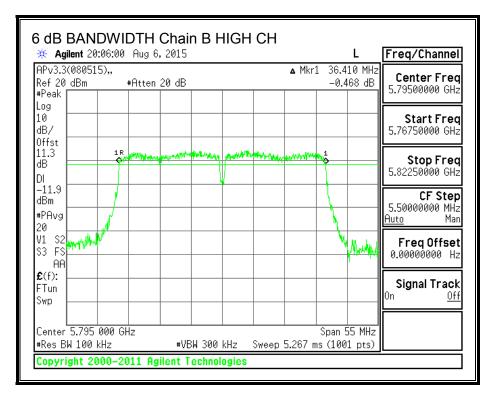
#### **RESULTS**

Channel	Frequency	6 dB BW	6 dB BW	Minimum
		Chain B	Chain A	Limit
	(MHz)	(MHz)	(MHz)	(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

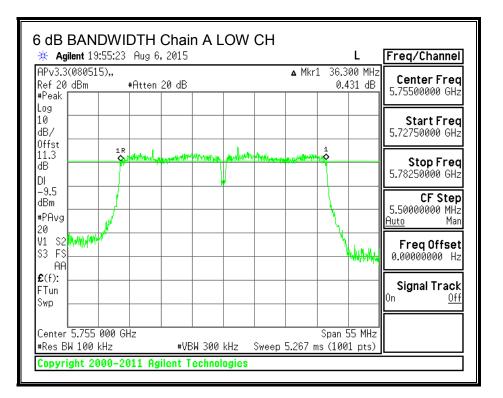


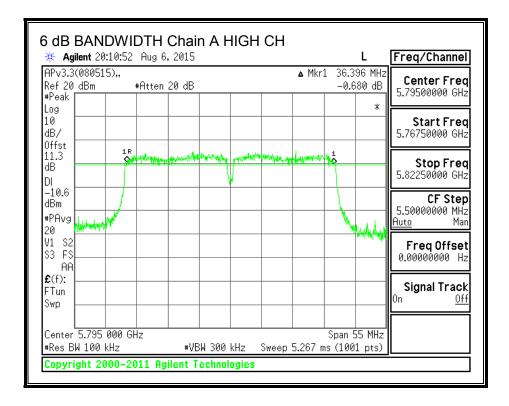


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# 6 dB BANDWIDTH, Chain A





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# 8.16.2. 26 dB BANDWIDTH

# LIMITS

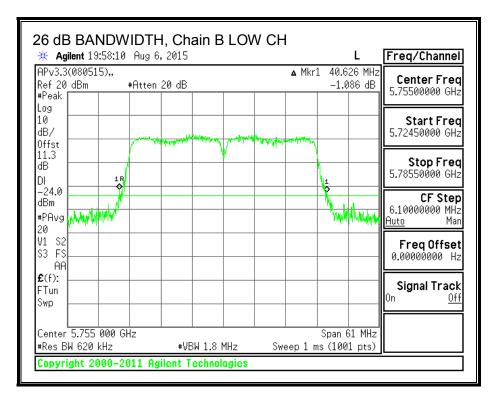
None; for reporting purposes only.

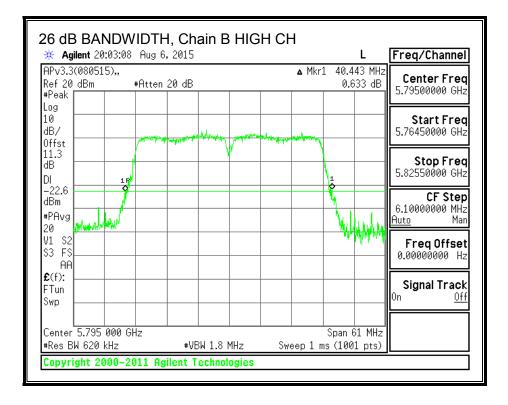
# **RESULTS**

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

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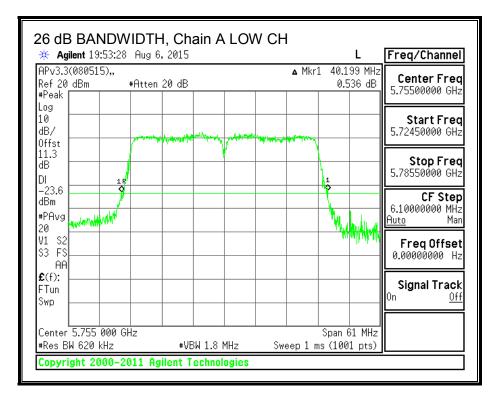
## 26 dB BANDWIDTH, Chain B

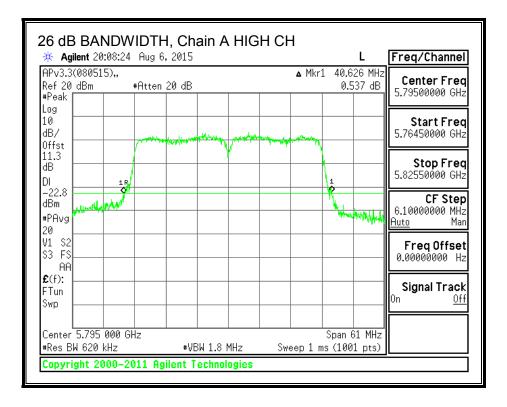




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### 26 dB BANDWIDTH, Chain A





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# 8.16.3. 99% **BANDWIDTH**

## **LIMITS**

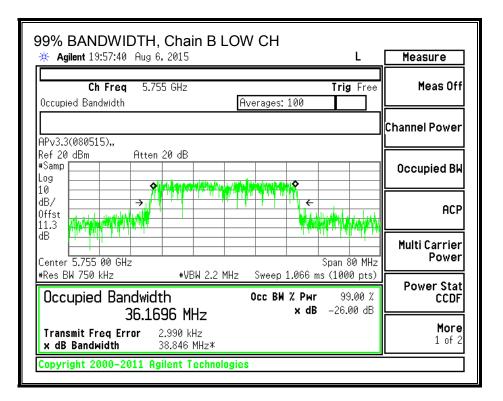
None; for reporting purposes only.

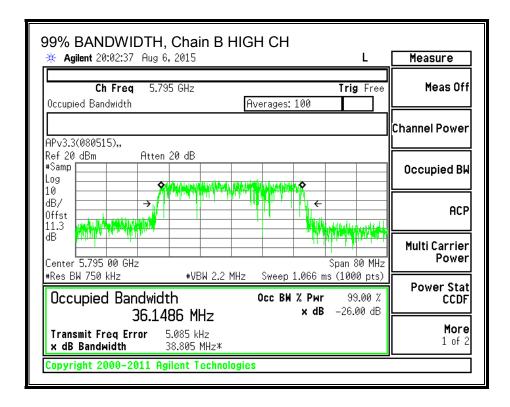
## <u>RESULTS</u>

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

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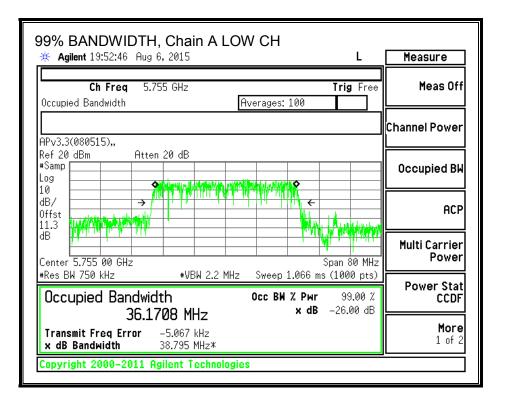
## 99% BANDWIDTH, Chain B

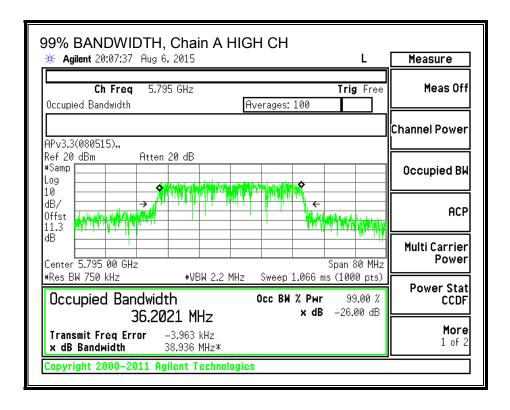




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### 99% BANDWIDTH, Chain A





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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	Chain A	<b>Uncorrelated Chains</b>
Antenna	Antenna	Directional
Gain	Gain	Gain
(dBi)	(dBi)	(dBi)
1.40	1.70	1.55

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## <u>RESULTS</u>

## Antenna Gain and Limit

Channel	Frequency	Directional	Power
		Gain	Limit
	(MHz)	(dBi)	(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	Chain B	Chain A	Total	Power	Power
		Meas	Meas	Corr'd	Limit	Margin
		Power	Power	Power		
	(MHz)	(dBm)	(dBm)	(dBm)	(dBm)	(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

# 8.16.5. Maximum Power Spectral Density (PSD)

### <u>LIMITS</u>

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	Chain A	<b>Uncorrelated Chains</b>
Antenna	Antenna	Directional
Gain	Gain	Gain
(dBi)	(dBi)	(dBi)
1.40	1.70	1.55

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### **RESULTS**

#### Antenna Gain and Limit

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

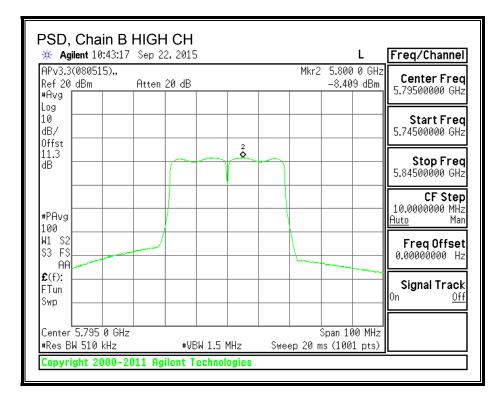
Duty Cycle CF (dB)	0.00	Included in Calculations of Corr'd PSD

### PSD Results

Channel	Frequency	Chain B	Chain A	Total	PSD	PSD
		Meas	Meas	Corr'd	Limit	Margin
		PSD	PSD	PSD		
	(MHz)	(dBm)	(dBm)	(dBm)	(dBm)	(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

## PSD, Chain B

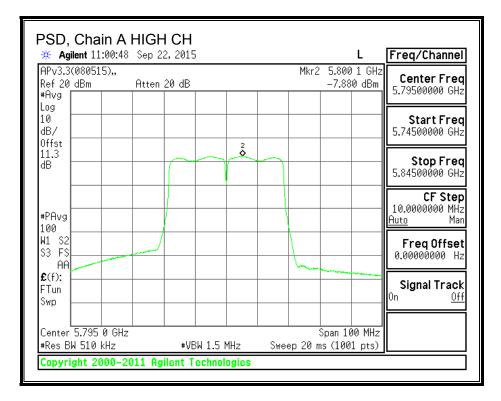
🔆 Agilent 10:37:30	Sep 22, 2015		L Freq.	/Channel
APv3.3(080515),, Ref 20 dBm #Avg	Atten 20 dB		5.760 7 GHz -8.189 dBm 5.755	I <b>ter Freq</b> 00000 GHz
Log 10 dB/ 0ffst				a <b>rt Freq</b> 00000 GHz
dB		2	\$	<b>top Freq</b> 00000 GHz
#PAvg			10.00	<b>CF Step</b> 00000 MHz Man
100 W1 S2 S3 FS			Fre	<b>eq Offset</b> 00000 Hz
£(f): FTun Swp			On Sign	nal Track <u>Off</u>
Center 5.755 0 GHz #Res BW 510 kHz	#VBW 1.5		an 100 MHz (1001 nts)	



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## PSD, Chain A

🔆 Agilent 10:53:30	Sep 22, 2015		L	Freq/Channel
APv3.3(080515),, Ref 20 dBm #Avg	Atten 20 dB		5.759 9 GHz -8.053 dBm	Center Freq 5.75500000 GHz
Log 10 dB/ Offst				Start Freq 5.70500000 GHz
dB		2		<b>Stop Freq</b> 5.80500000 GHz
#PAvg				<b>CF Step</b> 10.0000000 MHz <u>Auto</u> Man
100 W1 S2 S3 FS ӨӨ				Freq Offset 0.00000000 Hz
<b>£</b> (f): FTun Swp				<b>Signal Track</b> <sup>On <u>Off</u></sup>
Center 5.755 0 GHz #Res BW 510 kHz	#VBW 1	L.5 MHz	an 100 MHz (1001 pts)	



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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)

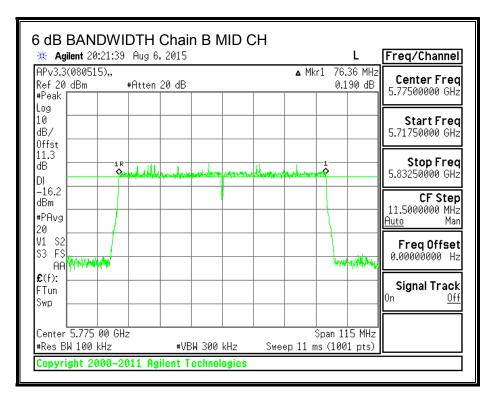
The minimum 6 dB bandwidth shall be at least 500 kHz.

#### **RESULTS**

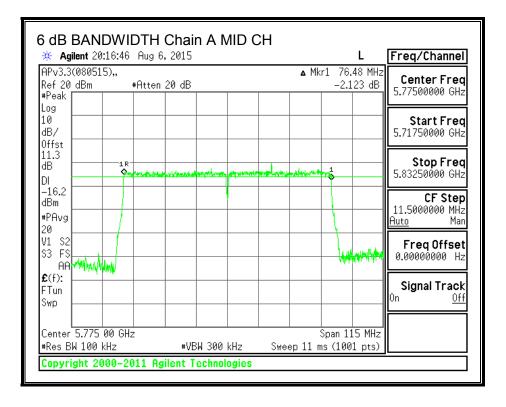
Channel	Frequency	6 dB BW	6 dB BW	Minimum
		Chain B	Chain A	Limit
	(MHz)	(MHz)	(MHz)	(MHz)
Mid	5775	76.3600	76.4800	0.5

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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

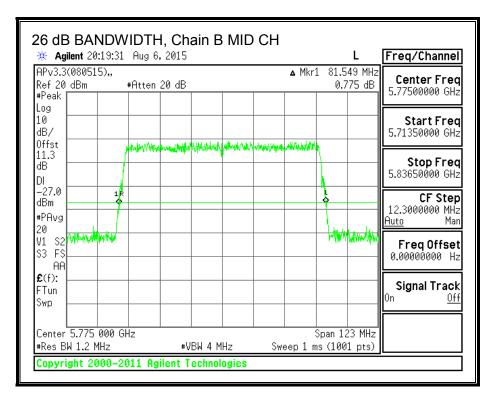
None; for reporting purposes only.

## <u>RESULTS</u>

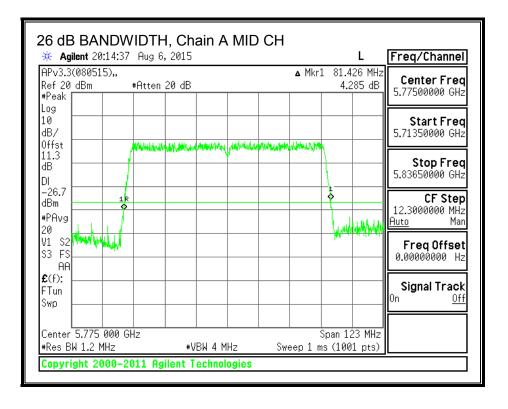
Channel	Frequency	26 dB BW	26 dB BW
		Chain B	Chain A
	(MHz)	(MHz)	(MHz)
Mid	5775	81.55	81.43

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## 26 dB BANDWIDTH, Chain B



#### 26 dB BANDWIDTH, Chain A



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# 8.17.3. 99% BANDWIDTH

## **LIMITS**

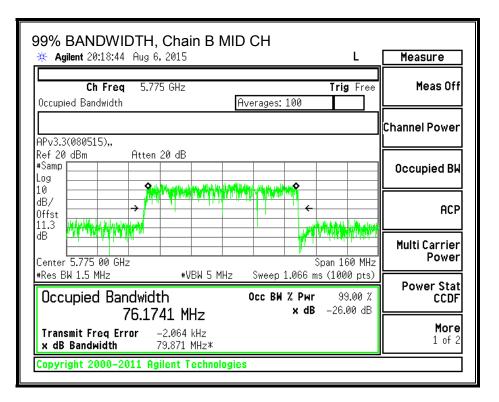
None; for reporting purposes only.

## <u>RESULTS</u>

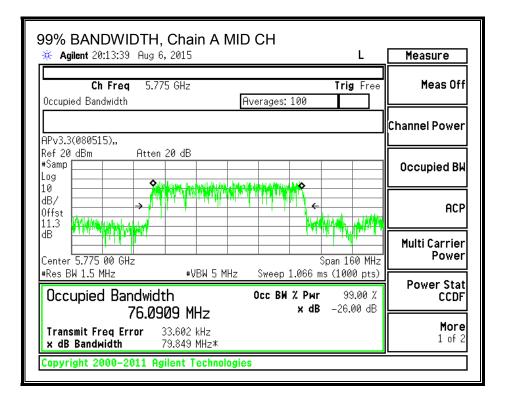
Channel	Frequency	99% BW	99% BW
		Chain B	Chain A
	(MHz)	(MHz)	(MHz)
Mid	5775	76.1741	76.0909

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## 99% BANDWIDTH, Chain B



### 99% BANDWIDTH, Chain A



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# 8.17.4. OUTPUT POWER

### <u>LIMITS</u>

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	Chain A	<b>Uncorrelated Chains</b>
Antenna	Antenna	Directional
Gain	Gain	Gain
(dBi)	(dBi)	(dBi)
1.40	1.70	1.55

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### **RESULTS**

#### Antenna Gain and Limit

Channel	Frequency	Directional	Power
		Gain	Limit
	(MHz)	(dBi)	(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	Chain B	Chain A	Total	Power	Power
		Meas	Meas	Corr'd	Limit	Margin
		Power	Power	Power		
	(MHz)	(dBm)	(dBm)	(dBm)	(dBm)	(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	Chain A	<b>Uncorrelated Chains</b>
Antenna	Antenna	Directional
Gain	Gain	Gain
(dBi)	(dBi)	(dBi)
1.40	1.70	1.55

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### **RESULTS**

### Antenna Gain and Limit

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

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

#### **PSD Results**

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

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## PSD, Chain B

Agilent 11:15:06 Sep	22,2015	L	Freq/Channel
Jvg	n 20 dB	Mkr2 5.811 4 GH -15.664 dBm	II Contor From
9 ) 3/ fst			Start Freq 5.67500000 GHz
		2	Stop Freq 5.87500000 GHz
'Avg			<b>CF Step</b> 20.0000000 MHz <u>Auto</u> Mar
8 52 52 55 55 55 55 55 55 55 55 55 55 55			Freq Offset
(f): Fun 100			Signal Track
enter 5.775 0 GHz es BW 510 kHz	#VBW 1.5 MHz	Span 200 MHz Sweep 20 ms (1001 pts)	

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## PSD, Chain A

SD, Chain A MID Agilent 11:22:56 Sep 3		L	Freq/Channel
Pv3.3(080515),, ∍f20 dBm Atter Avg	1 20 dB	Mkr2 5.810 0 GH —14.951 dBm	II Contor From
19 ) 3/			Start Freq 5.67500000 GHz
3		2 •	<b>Stop Freq</b> 5.87500000 GHz
PAvg			<b>CF Step</b> 20.0000000 MHz <u>Auto</u> Man
L S2 3 FS AA			Freq Offset 0.00000000 Hz
(f): Tun Yp			Signal Track
enter 5.775 0 GHz Res BW 510 kHz	#VBW 1.5 MHz	Span 200 MHz Sweep 20 ms (1001 pts)	

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