

FCC 47 CFR PART 15 SUBPART C INDUSTRY CANADA RSS-210 ISSUE 8

CERTIFICATION TEST REPORT

FOR

HANDHELD COMPUTING DEVICE

MODEL NUMBER: 1573

FCC ID: C3K1573 IC: 3048A-1573

REPORT NUMBER: 13U15414-14

ISSUE DATE: NOVEMBER 10, 2013

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

Prepared by UL VERIFICATION SERVICES INC. 47173 BENICIA STREET FREMONT, CA 94538, U.S.A. TEL: (510) 771-1000 FAX: (510) 661-0888

NVLAP LAB CODE 200065-0

Revision History

Rev.	Issue Date	Revisions	Revised By
-	11/10/13	Initial Issue	T. LEE

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1. ATTESTATION OF TEST RESULTS

INDUSTRY CANADA RSS-GEN Issue 3

COMPANY NAME:	MICROSOFT CORPORATION	
	ONE MICROSOFT WAY	
	REDMOND, WA 98052, U.S.A.	
EUT DESCRIPTION:	HANDHELD COMPUTING DEVI	CE WITH WWAN, 802.11
	A/B/G/N WLAN AND BLUETOOT	TH RADIOS
MODEL:	1573	
MODEL.	1373	
SERIAL NUMBER:	001925433252	
DATE TESTED:	OCTOBER 23, 2013 – OCTOBER	28, 2013
		,
	APPLICABLE STANDARDS	
STANDARD		TEST RESULTS
CFR 47 P	art 15 Subpart E	Pass
INDUSTRY CANADA	A RSS-210 Issue 8 Annex 9	Pass

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

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

Approved & Released For UL Verification Services Inc. By:

Ti don

TIMOTHY LEE WISE PROGRAM MANAGER UL Verification Services Inc.

Tested By:

Pass

JOE VANG EMC ENGINEER UL Verification Services Inc.

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

3. FACILITIES AND ACCREDITATION

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

UL Verification Services Inc. is accredited by NVLAP, Laboratory Code 200065-0. The full scope of accreditation can be viewed at <u>http://www.ccsemc.com</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

4.3. MEASUREMENT UNCERTAINTY

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

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

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

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5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

The EUT is a handheld computing device with WWAN, 802.11 a/b/g/n WLAN and Bluetooth radios.

5.2. MAXIMUM OUTPUT POWER

The transmitter has a maximum conducted output power as follows:

Frequency Range (MHz)	Mode	Output Power (dBm)	Output Power (mW)
5180 - 5240	802.11a	13.94	24.77
5180 - 5240	802.11n HT20	13.84	24.21
5190 - 5230	802.11n HT40	11.11	12.91
5260 - 5320	802.11a	14.07	25.53
5260 - 5320	802.11n HT20	13.93	24.72
5270 - 5310	802.11n HT40	14.95	31.26
5500 - 5700	802.11a	14.68	29.38
5500 - 5700	802.11n HT20	14.51	28.25
5510 - 5670	802.11n HT40	11.64	14.59

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes an PIFA antenna, with a maximum gain of 3.2 dBi and 3.9 dBi in the 5 GHz band.

5.4. SOFTWARE AND FIRMWARE

The EUT driver software installed during testing was Window RT 8.1 Preview Build 943

The test utility software used during testing was Laptool 189.1.0.9.0\ WIFI Tool.exe

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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, it was determined that Z orientation was worst-case orientation; therefore, all final radiated testing was performed with the EUT in 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

Radiated emissions for EUT with antenna was performed and passed; therefore, antenna port spurious was not performed.

Conducted measurement was conducted on Model 1572 under FCC ID C3K1572. Model 1572 are identical to Model 1573 except Model 1573 includes the WWAN radio.

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5.1. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List									
Description Manufacturer Model Serial Number FCC ID									
USB Ethernet Adaptor	CISCO	USB 300M	CU90MC02233	DoC					
Laptop	Lenovo	L420	7854CT0	DoC					
AC Adaptor (laptop)	Lenovo	92P1156	111S92P1156ZDXN272091	N/A					

I/O CABLES

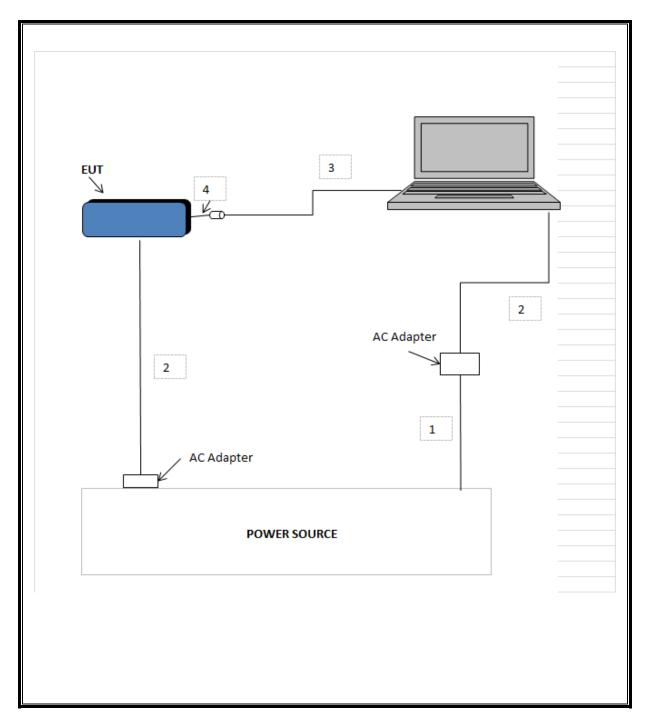
	I/O Cable List								
Cable Port # of identical		Connector Cable Type		Cable	Remarks				
No		ports	Туре		Length (m)				
1	AC	1	AC	Unshielded	1.8	AC adapter			
2	USB	1	USB	Unshielded	0.1	USB to Ethernet adapter			
3	DC	1	DC	Unshielded	1.8				
4	Ethernet	1	RJ 45	Unshielded	7.62	Connects to USB adapter			

TEST SETUP

The EUT is a standalone wireless handheld computing device. Test software exercised the wireless module installed within the device under test.

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SETUP DIAGRAM FOR TESTS



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6. TEST AND MEASUREMENT EQUIPMENT

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

Test Equipment List							
Description	Manufacturer	Model	Asset	Cal Date	Cal Due		
Preamplifier, 1300 MHz	Agilent / HP	8447D	C00558	02/21/12	05/21/14		
Reject Filter, 2.4-2.5 GHz	Micro-Tronics	BRC13192	N02683	CNR	CNR		
Antenna, Horn, 26.5 GHz	ARA	SWH-28	C01015	04/23/12	04/23/14		
Preamplifier, 26.5 GHz	Agilent / HP	8449B	C00749	10/21/12	10/21/13		
Bilog 30-1000MHz	Sunol	JB1	C01011	02/07/12	03/28/14		
LISN, 30 MHz	FCC	LISN-50/250-25	N02625	01/14/13	01/14/14		
Power meter	Agilent	N119A	T198	06/25/12	12/13/13		
Power Sensor	Agilent	E9323A	T397	06/26/12	04/02/14		
Spectrum Analyzer, 26 GHz	Agilent / HP	E4440A	C01176	10/21/12	12/13/13		
Spectrum Analyzer	Agilent	N9030A	F00128	2/22/2013	2/22/2014		
Horn Antenna, 1-18GHz	ETS Lindgren	3117	F00133	2/19/2013	2/19/2014		
Antenna, Biconolog, 30MHz	Sunol Sciences	JB3	F00168	3/7/2013	3/7/2014		
Amplifier	Sonoma	310	F00008	11/6/2012	11/6/2013		

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7. ON TIME, DUTY CYCLE AND MEASUREMENT METHODS

LIMITS

None; for reporting purposes only.

PROCEDURE

KDB 789033 Zero-Span Spectrum Analyzer Method.

7.1.1. ON TIME AND DUTY CYCLE RESULTS

Mode	ON Time	Period	Duty Cycle	Duty	Duty Cycle	1/B
	В		x	Cycle	Correction Factor	Minimum VBW
	(msec)	(msec)	(linear)	(%)	(dB)	(kHz)
5.2 GHz Band						
11a	1.626	1.632	0.996	99.6%	0.02	0.613
11n HT20	0.284	0.289	0.984	98.4%	0.07	3.466
11n HT40	0.299	0.305	0.983	98.3%	0.08	3.284
5.3 GHz Band						
11a	1.626	1.632	0.996	99.6%	0.02	0.613
11n HT20	0.285	0.289	0.985	98.5%	0.07	3.461
11n HT40	0.299	0.304	0.984	98.4%	0.07	3.287
5.6 GHz Band						
11a	1.626	1.632	0.996	99.6%	0.02	0.613
11n HT20	0.284	0.289	0.983	98.3%	0.08	3.465
11n HT40	0.300	0.304	0.987	98.7%	0.06	3.294

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7.1.2. MEASUREMENT METHOD FOR POWER AND PPSD

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

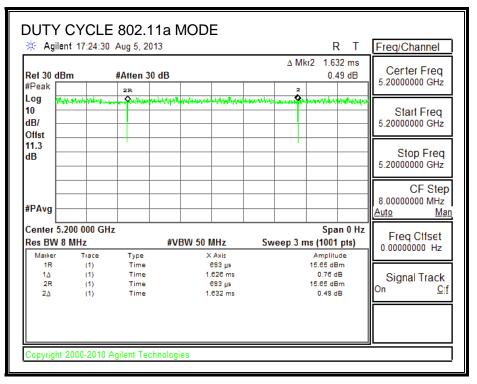
7.1.3. MEASUREMENT METHOD FOR AVERAGE SPURIOUS EMISSIONS ABOVE 1 GHz

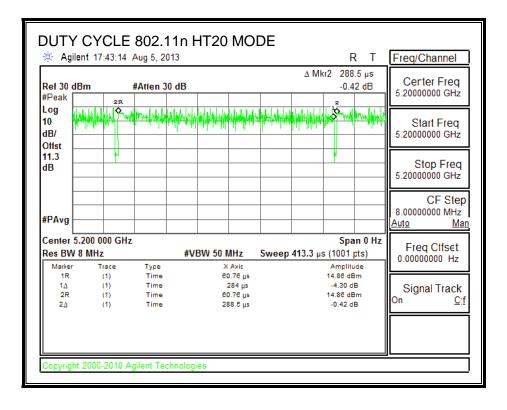
The Duty Cycle is greater than or equal to 98%, KDB 789033 Method AD with Power RMS Averaging is used.

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7.1.4. DUTY CYCLE PLOTS

5.2 GHz BAND





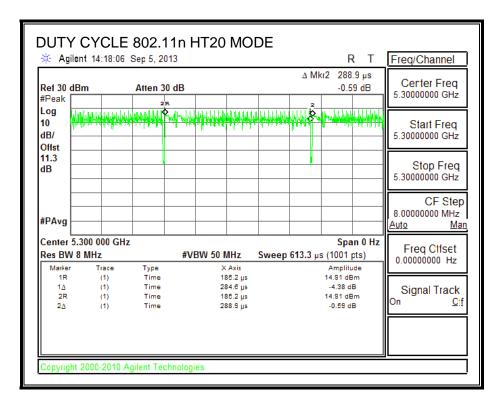
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								Δ Mk	12 304	.5 µs	Freq/Chan	
Ref 30 #Peak	dBm		Atten 3	0 dB						9 dB	Center F 5.19000000	
Log 10 dB/ Offst	****	****	2R	-nati-ttilliti	***	alhahhha	****	1444 177444*7	WY Camp	Athero	Start F 5.19000000	
11.3 dB									V		Stop F 5.19000000	
#PAvg											CF 8.00000000 <u>Auto</u>	Step MHz <u>Mar</u>
	5.190 0									n 0 Hz	Freg Off	set
	V 8 MHz			#V	BW 50 I		Sweep	533.3 µs		· ·	0.00000000	
Marker 1R		ace (1)	Type Time			Axis 152 us			Amplitu 8.00 dB			
14		(1)	Time			102 µs 39.2 µs			1.54 d		Cinnal T	
2R		1)	Time			152 us			8.00 dB	m	Signal Ti	
2∆		(1)	Time		30	04.5 µs			-1.59 d	в	On	Cif
	ht 2000-											

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5.3 GHz BAND

		E 802.11; Sep 5, 2013	a MODI	Ξ			F	кт	Freq/Char	nnel
Ref 30 (#Peak	dBm	Atten 30 d	B			∆ Mk		32 ms 58 dB	Center 5.30000000	
Log 10 dB/ Offst	-transmitheter 	und Dingerund der fi	reliter of the second	fraddiwrai ywnau y	in a holo phone		ann a bhairte	addudra.felor.oor	Start I 5.30000000	
11.3 dB									Stop 5.30000000	
#PAvg									CF 8.00000000 <u>Auto</u>	Step MHz <u>Man</u>
	5.300 000 GH V 8 MHz	Iz	#VBW 50 N	ЛНz	Sw	еер 3 п	Spa ns (1001	n 0 Hz pts)	Freq C	
Marker 1R 1∆ 2R 2∆	Trace (1) (1) (1) (1)	Type Time Time Time Time	e 1.0 e	Axis 348 μs 626 ms 348 μs 632 ms			Amplitu 14.24 dE 1.01 d 14.24 dE 0.58 d	am IB am	Signal T On	
Соругід	ht 2000-2010	Agilent Techno	ologies							



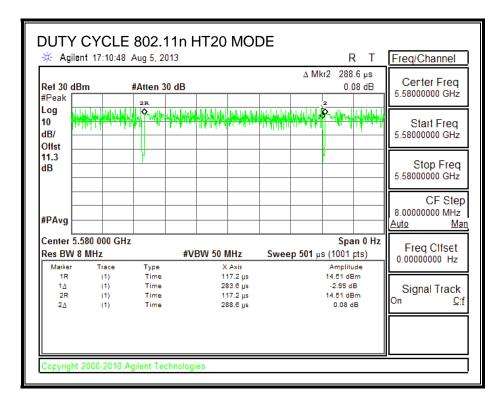
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	Y CYC ilent 14:2				HT40	MO	DE		F	τ ۶	Freq/Cha	Innel
Ref 30 #Peak						∆ Mkr2 304.2 µs 0.24 dB				Certer 5.2700000		
Log 10 dB/ Offst	(tri+1/10+1++++++	10××10×10	23	advhfh#	ender in the second	~ikter/t-t-dayk	n the second	MH MAS		ingdorpinio (Start 5.2700000	
11.3 dB											Stop 5.2700000	Freq 0 GHz
#PAvg											C 8.0000000 <u>Auto</u>	F Step ^{0 MHz} <u>Man</u>
	5.270 00 V 8 MHz	0 GHz		#VI	BW 50 N	ЛНz	Sweep	613.3 μ		n 0 Hz pts)	Freq 0	
Marker 1R 1∆ 2R 2∆	r Tra (1 (1 (1)))	Type Time Time Time Time		18 29 18	Ахіз 80.9 µs 89.3 µs 80.9 µs 04.2 µs			Amplitu 6.74 dE 3.31 d 6.74 dE 0.24 d	im IB im	Signal On	
Copyrig	ht 2000-2	010 Ag	ilent Te	chnologi	es							

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5.6 GHz BAND

	nt 17:06:34	, log 0, 2					∆ Mk		R T 32 ms	Freq/Channel
Ref 30 dB	m	#Atten 3	0 dB					-0.2	29 dB	Certer Freq
Peak			R					2		5.58000000 GHz
.og 🙀	www.	-	Phanet N	-	alest video	A.4.17.4.44	higher	9	mulup	
0 -										Start Freg
IB/ –										5.58000000 GHz
Offst 📃										
1.3			1. A.							
IB 🗌										Stop Freq
										5.58000000 GHz
										CF Step
										8.00000000 MHz
										<u>Auto Ma</u>
Center 5.	580 000 GHz							Spa	an 0 Hz	Ener Ottent
les BW 8	MHz		#V	BW 50 N	ЛНz	Sw	eep 3 m	ns (1001	pts)	Freq Clfset 0.00000000 Hz
Marker	Trace	Туре		х	Axis			Amplitu	Jde	0.0000000 HZ
1R	(1)	Time		9	930 µs			15.59 dE	3m	
1∆	(1)	Time			626 ms			-0.59 d	- 1	Signal Track
2R	(1)	Time			930 µs			15.59 dE		On Cif
2∆	(1)	Time		1.	632 ms			-0.29 d	•	



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Ref 30 dBm #	Atten 30 dB		4	Mkr2 303.6	μο	
	Alleli Ju uD			0.25	dB	Center Freq
				0.24		5.55000000 GHz
_oq	28			2		
0 viniphiniphiniphiniphiniphiniphiniphi	MMM 2 11 MIL	where the second second second second		Wind with the	with the	Start Freq
IB/			1	<u> </u>	nation of the	5.55000000 GHz
Difist						
1.3	4			1		
IB 🛛 👘						Stop Freq
						5.55000000 GHz
						OF Star
						CF Step
PAva						8.0000000 MHz
5						<u>Auto Ma</u>
Center 5.550 000 GHz				Spar	0 Hz	Freq Offset
Res BW 8 MHz	#VI	BW 50 MHz	Sweep 50	1 μs (1001 p	is)	0.00000000 Hz
Marker Trace	Туре	X Axis		Amplitud		0.00000000 112
1R (1)	Time	141.3 µs		7.33 dBn		
1∆ (1) 2R (1)	Time Time	299.6 µs 141.3 µs		1.62 dB 7.33 dBn		Signal Track
2A (1) 2∆ (1)	Time	303.6 µs		0.22 dB		On <u>C</u> :
(1)		p-				

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8. ANTENNA PORT TEST RESULTS8.1. 802.11a MODE IN THE 5.2 GHz BAND

8.1.1. 26 dB BANDWIDTH

LIMITS

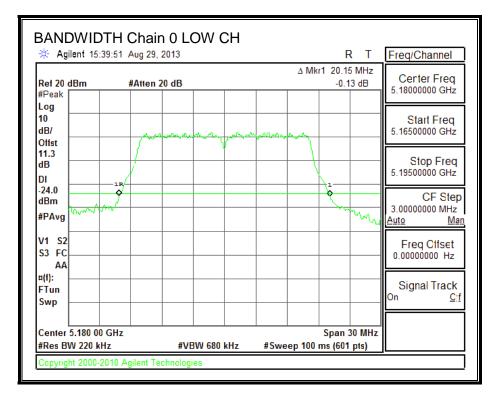
None; for reporting purposes only.

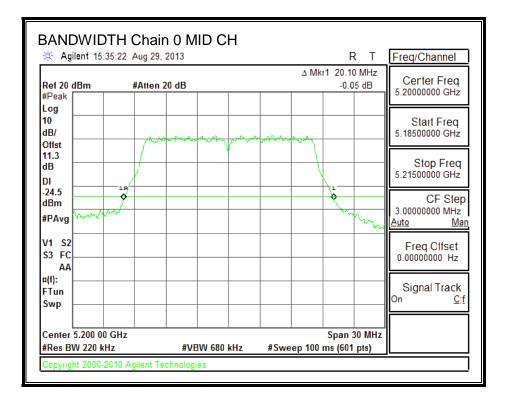
RESULTS

Channel	Frequency	26 dB BW	26 dB BW
		Chain 0	Chain 1
	(MHz)	(MHz)	(MHz)
Low	5180	20.2	19.8
Mid	5200	20.1	19.9
High	5240	19.9	19.7

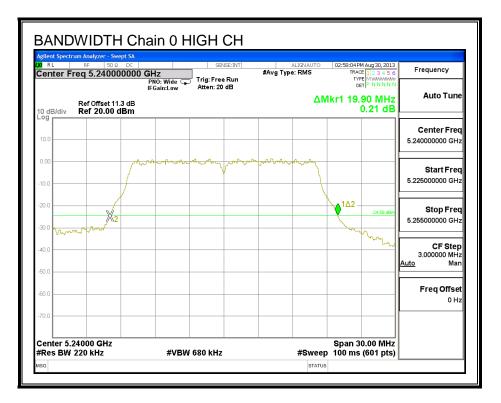
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26 dB BANDWIDTH, Chain 0

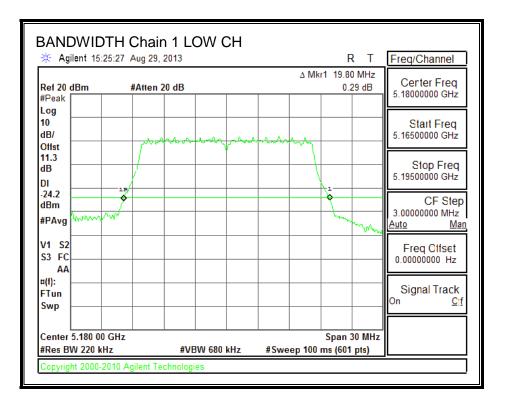




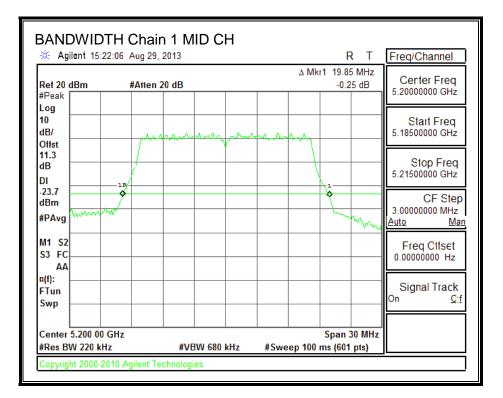
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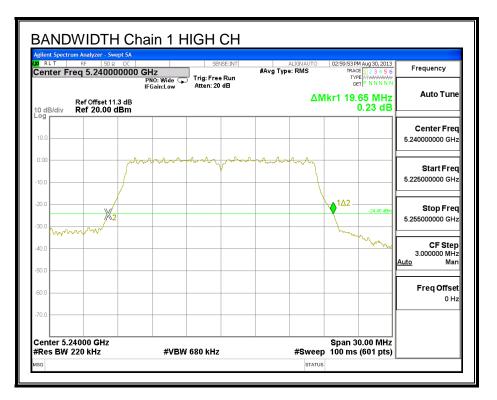


26 dB BANDWIDTH, Chain 1



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8.1.2. 99% BANDWIDTH

LIMITS

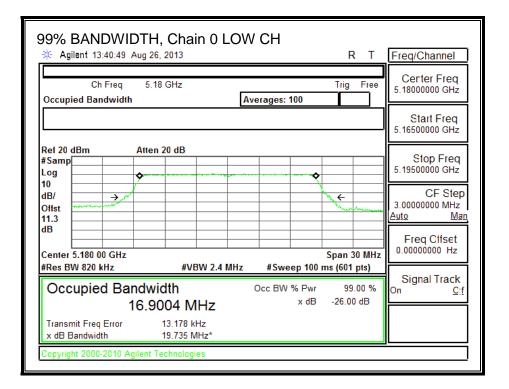
None; for reporting purposes only.

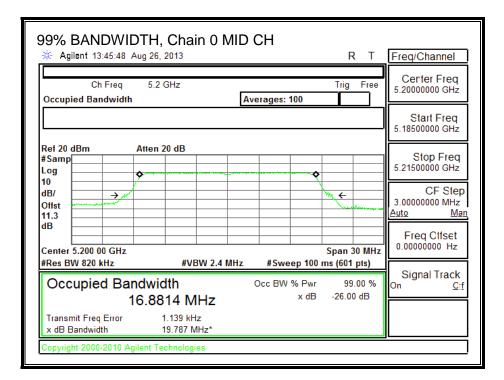
<u>RESULTS</u>

Channel	Frequency	99% BW	99% BW
		Chain 0	Chain 1
	(MHz)	(MHz)	(MHz)
Low	5180	16.90	16.89
Mid	5200	16.88	16.86
High	5240	16.91	16.87

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99% BANDWIDTH, Chain 0

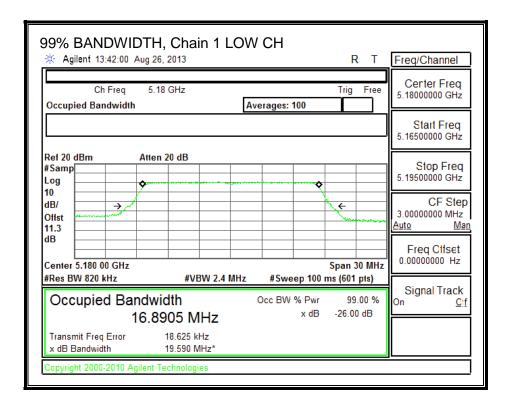




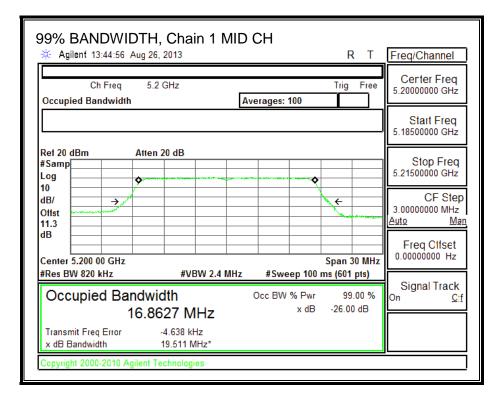
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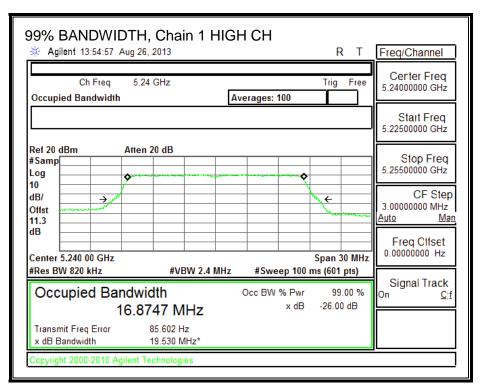
Agilent 13:47:36 Aug 26,	2013		RT	Freq/Channel
Ch Freq 5.24 Occupied Bandwidth	GHz	Averages: 100	Trig Free	Center Freq 5.24000000 GHz
		-		Start Freq 5.22500000 GHz
Ref 20 dBm Atten #Samp Log	20 dB			Stop Freq 5.25500000 GHz
10 dB/ →			¶	CF Step 3.00000000 MHz Auto Man
dB			Span 30 MHz	Freq Clfset 0.00000000 Hz
Occupied Bandwi	#VBW 2.4 MHz	2 #Sweep 100 r		Signal Track
•	18 MHz	x dB		On <u>Cif</u>
	8.022 kHz 19.679 MHz*			

99% BANDWIDTH, Chain 1



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8.1.3. AVERAGE POWER

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a power meter.

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

RESULTS

Average Power Results

Channel	Frequency	Chain 0	Chain 1	Total	
	Power		Power	Power	
	(MHz)	(dBm)	(dBm)	(dBm)	
Low	5180	9.61	10.05	12.85	
Mid	5200	9.38	10.28	12.86	
High	5240	9.39	10.27	12.86	

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8.1.4. OUTPUT POWER AND PPSD

LIMITS

FCC §15.407 (a) (1)

For the band 5.15–5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed the lesser of 50 mW or 4 dBm + 10 log B, where B is the 26–dB emission bandwidth in MHz. In addition, the peak power spectral density shall not exceed 4 dBm in any 1–MHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

IC RSS-210 A9.2 (1)

The maximum e.i.r.p. shall not exceed 200 mW or 10 + 10 log10 B, dBm, whichever power is less. B is the 99% emission bandwidth in MHz. The e.i.r.p. spectral density shall not exceed 10 dBm in any 1.0 MHz band.

DIRECTIONAL ANTENNA GAIN

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

Chain 0	Chain 1	Uncorrelated Chains
Antenna	Antenna	Directional
Gain	Gain	Gain
(dBi)	(dBi)	(dBi)
3.90	3.20	3.56

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RESULTS

Bandwidth and Antenna Gain

Channel	Frequency	Min	Min	Directional
		26 dB	99%	Gain
		BW	BW	
	(MHz)	(MHz)	(MHz)	(dBi)
Low	5180	19.8	16.9	3.56
Mid	5200	19.9	16.9	3.56
High	5240	19.7	16.9	3.56

Limits

Channel	Frequency	FCC	IC	Max	Power	FCC	IC	PPSD
		Power	EIRP	IC	Limit	PPSD	eirp	Limit
		Limit	Limit	Power		Limit	PSD	
							Limit	
	(MHz)	(dBm)						
Low	5180	16.97	22.28	18.72	16.97	4.00	10.00	4.00
Mid	5200	16.99	22.27	18.71	16.99	4.00	10.00	4.00
High	5240	16.94	22.27	18.71	16.94	4.00	10.00	4.00

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

Output Power Results

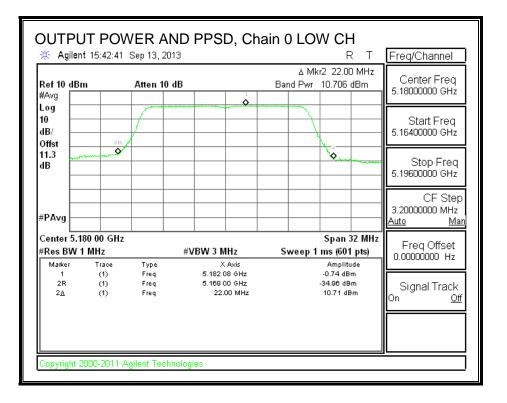
Channel	Frequency	Chain 0	Chain 1	Total	Power	Power
		Meas	Meas	Corr'd	Limit	Margin
		Power	Power	Power		
	(MHz)	(dBm)	(dBm)	(dBm)	(dBm)	(dB)
Low	5180	10.71	10.77	13.75	16.97	-3.22
Mid	5200	10.54	10.94	13.76	16.99	-3.23
High	5240	10.83	11.02	13.94	16.94	-3.01

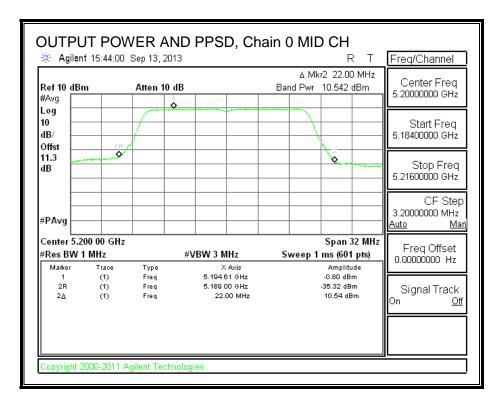
PPSD Results

Channel	Frequency	Chain 0	Chain 1	Total	PPSD	PPSD
		Meas	Meas	Corr'd	Limit	Margin
		PPSD	PPSD	PPSD		
	(MHz)	(dBm)	(dBm)	(dBm)	(dBm)	(dB)
Low	5180	-0.74	-0.36	2.46	4.00	-1.54
Mid	5200	-0.80	-0.29	2.47	4.00	-1.53
High	5240	-0.56	-0.14	2.67	4.00	-1.33

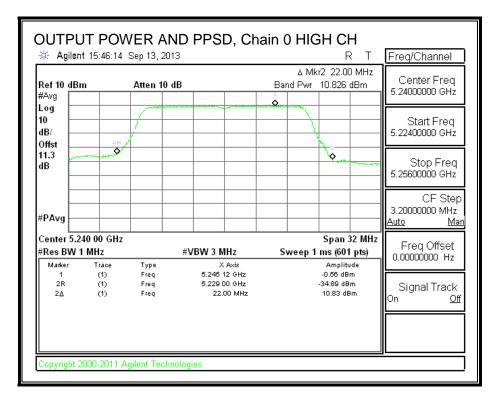
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OUTPUT POWER AND PPSD, Chain 0

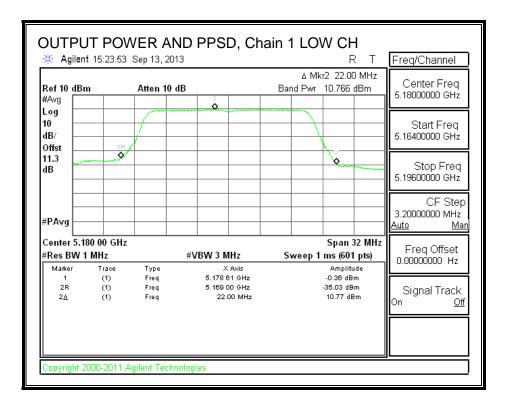




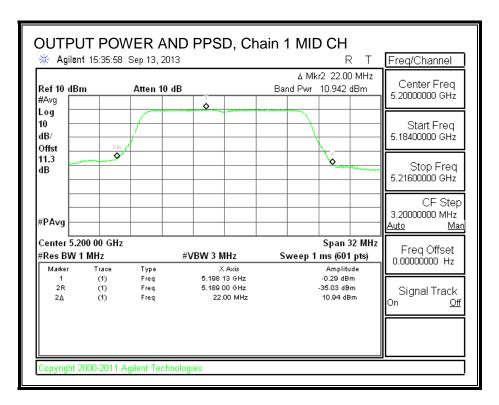
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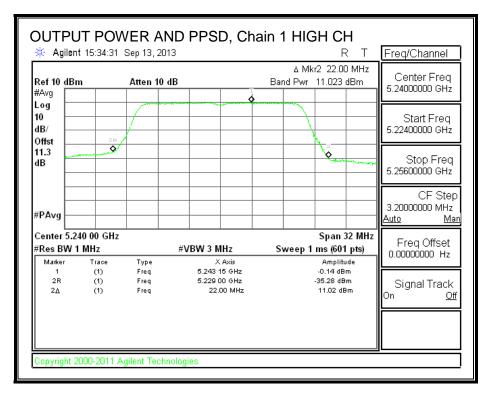


OUTPUT POWER AND PPSD, Chain 1



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8.1.5. PEAK EXCURSION

LIMITS

FCC §15.407 (a) (6)

RESULTS

Refer to the results of 802.11n HT20 mode in the 5.6 GHz band.

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8.2. 802.11n HT20 MODE IN THE 5.2 GHz BAND

8.2.1. 26 dB BANDWIDTH

LIMITS

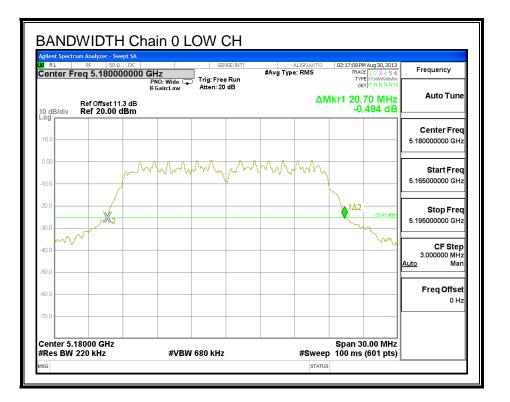
None; for reporting purposes only.

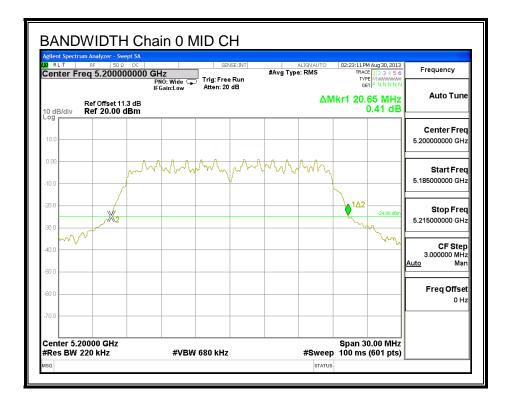
RESULTS

Channel	Frequency	26 dB BW	26 dB BW	
		Chain 0	Chain 1	
	(MHz)	(MHz)	(MHz)	
Low	5180	20.7	20.8	
Mid	5200	20.7	20.8	
High	5240	20.7	20.8	

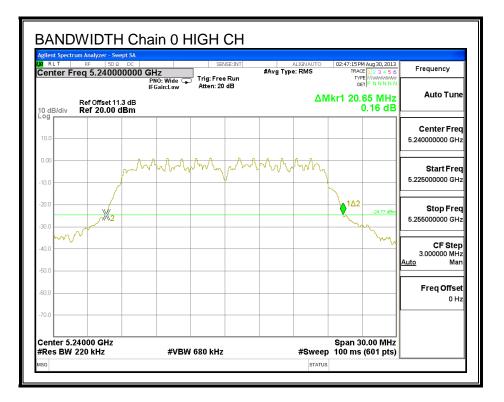
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26 dB BANDWIDTH, Chain 0

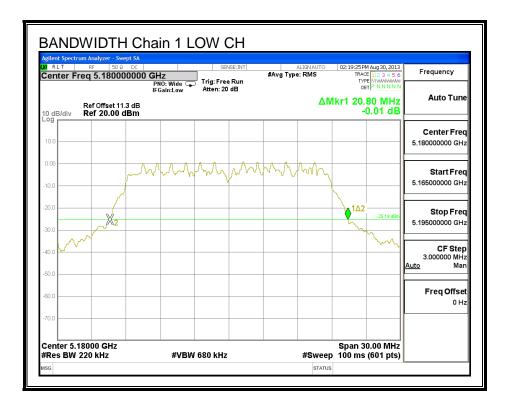




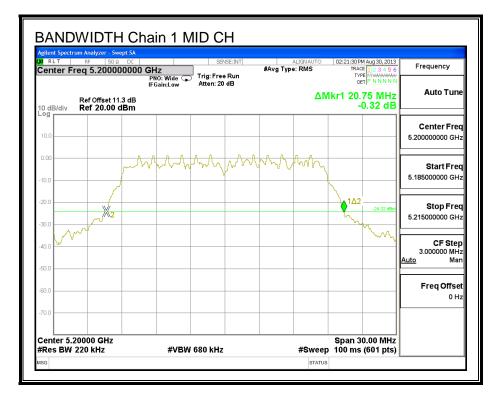
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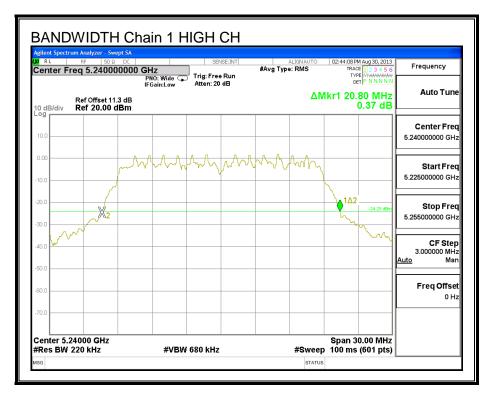


26 dB BANDWIDTH, Chain 1



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8.2.2. 99% BANDWIDTH

LIMITS

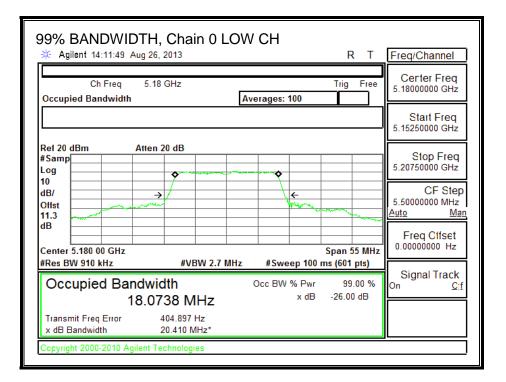
None; for reporting purposes only.

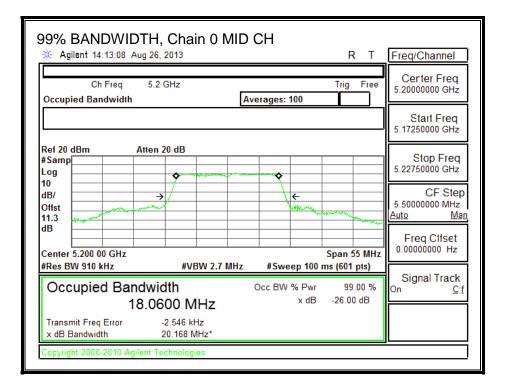
<u>RESULTS</u>

Channel	Frequency	99% BW	99% BW
		Chain 0	Chain 1
	(MHz)	(MHz)	(MHz)
Low	5180	18.07	18.12
Mid	5200	18.06	18.09
High	5240	18.07	18.07

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99% BANDWIDTH, Chain 0

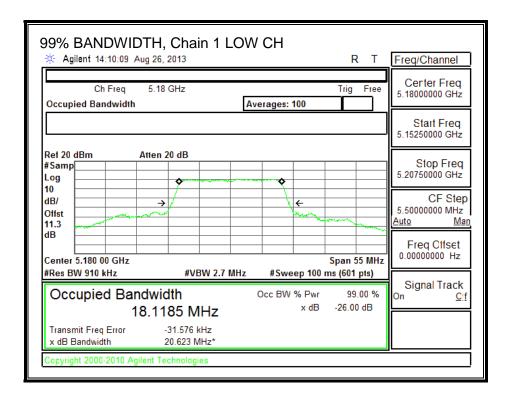




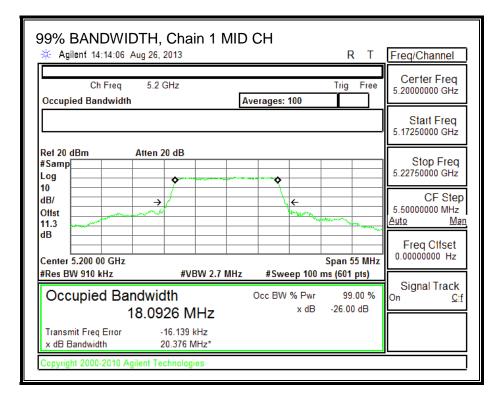
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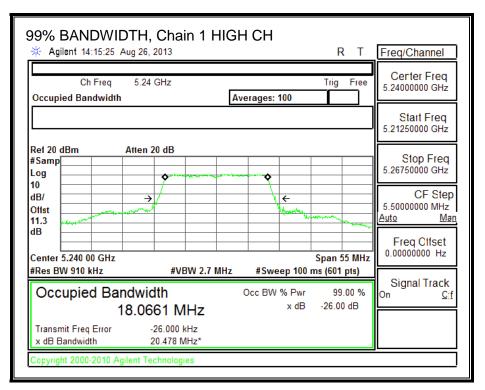
99% BANDWIDTH, Chai	n 0 HIGH CH	RТ	Freq/Channel	
Ch Freq 5.24 GHz		Trig Free	Certer Freq	
Occupied Bandwidth	Averages: 100		Start Freq	
Ref 20 dBm Atten 20 dB #Samp			5.21250000 GHz Stop Freq	
Log 10 dB/ →	•••••••••		5.26750000 GHz CF Step 5.5000000 MHz	
Offst 11.3 dB			Auto Man Freq Clfset	
Center 5.240 00 GHz #Res BW 910 kHz #VE	W 2.7 MHz #Sweep 100	Span 55 MHz ms (601 pts)	0.00000000 Hz	
Occupied Bandwidth Occ BW % Pwr 99.00 % Signal Track 18.0688 MHz x dB -26.00 dB -26.00 dB				
Transmit Freq Error -18.332 k x dB Bandwidth 20.375 M				
Copyright 2000-2010 Agilent Technologi	es			

99% BANDWIDTH, Chain 1



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8.2.3. AVERAGE POWER

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a power meter.

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

RESULTS

Average Power Results

Channel	Frequency	Chain 0	Chain 1	Total
		Power	Power	Power
	(MHz)	(dBm)	(dBm)	(dBm)
Low	5180	9.41	10.08	12.77
Mid	5200	9.28	10.29	12.82
High	5240	9.38	10.31	12.88

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8.2.4. OUTPUT POWER AND PPSD

LIMITS

FCC §15.407 (a) (1)

For the band 5.15–5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed the lesser of 50 mW or 4 dBm + 10 log B, where B is the 26–dB emission bandwidth in MHz. In addition, the peak power spectral density shall not exceed 4 dBm in any 1–MHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

IC RSS-210 A9.2 (1)

The maximum e.i.r.p. shall not exceed 200 mW or 10 + 10 log10 B, dBm, whichever power is less. B is the 99% emission bandwidth in MHz. The e.i.r.p. spectral density shall not exceed 10 dBm in any 1.0 MHz band.

DIRECTIONAL ANTENNA GAIN

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

Chain 0	Chain 1	Uncorrelated Chains
Antenna	Antenna	Directional
Gain	Gain	Gain
(dBi)	(dBi)	(dBi)
3.90	3.20	3.56

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RESULTS

Bandwidth and Antenna Gain

Channel	Frequency	Min	Min	Directional
		26 dB	99%	Gain
		BW	BW	
	(MHz)	(MHz)	(MHz)	(dBi)
Low	5180	20.70	18.07	3.56
Mid	5200	20.65	18.06	3.56
High	5240	20.65	18.06	3.56

Limits

Channel	Frequency	FCC	IC	Max	Power	FCC	IC	PPSD
		Power	EIRP	IC	Limit	PPSD	eirp	Limit
		Limit	Limit	Power		Limit	PSD	
							Limit	
	(MHz)	(dBm)						
Low	5180	17.00	22.57	19.01	17.00	4.00	10.00	4.00
Mid	5200	17.00	22.57	19.01	17.00	4.00	10.00	4.00
High	5240	17.00	22.57	19.01	17.00	4.00	10.00	4.00

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

Output Power Results

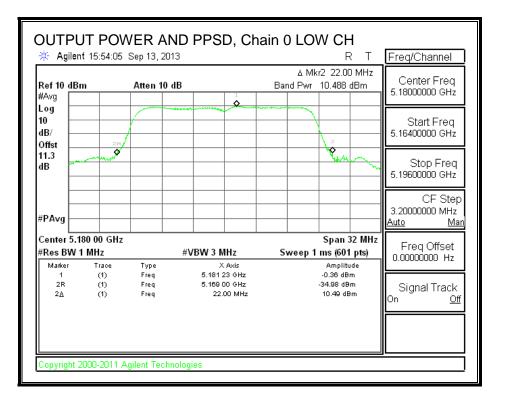
Channel	Frequency	Chain 0	Chain 1	Total	Power	Power
		Meas	Meas	Corr'd	Limit	Margin
		Power	Power	Power		
	(MHz)	(dBm)	(dBm)	(dBm)	(dBm)	(dB)
Low	5180	10.49	10.62	13.56	17.00	-3.44
Mid	5200	10.35	10.82	13.60	17.00	-3.40
High	5240	10.65	11.00	13.84	17.00	-3.16

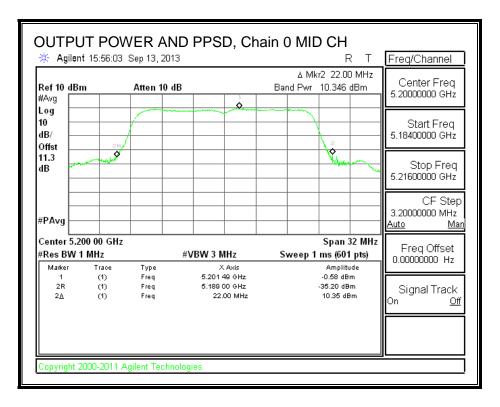
PPSD Results

Channel	Frequency	Chain 0	Chain 1	Total	PPSD	PPSD
		Meas	Meas	Corr'd	Limit	Margin
		PPSD	PPSD	PPSD		
	(MHz)	(dBm)	(dBm)	(dBm)	(dBm)	(dB)
Low	5180	-0.36	-0.37	2.65	4.00	-1.35
Mid	5200	-0.58	-0.16	2.65	4.00	-1.35
High	5240	-0.19	0.27	3.06	4.00	-0.94

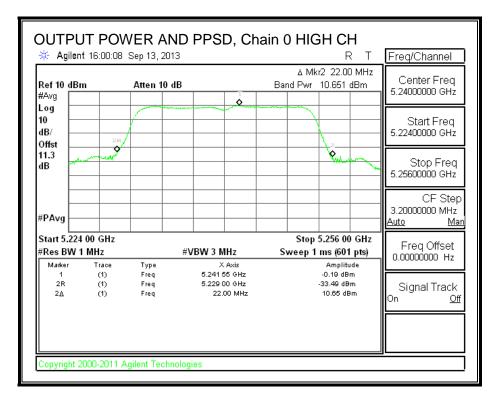
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OUTPUT POWER AND PPSD, Chain 0

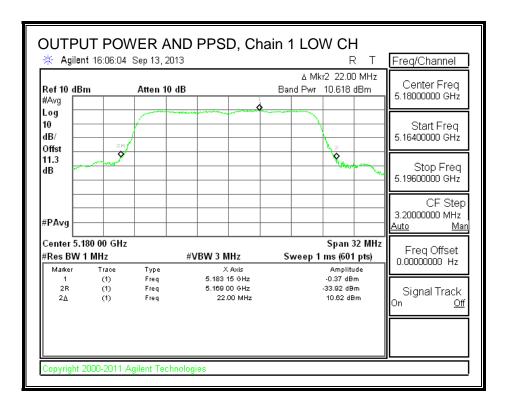




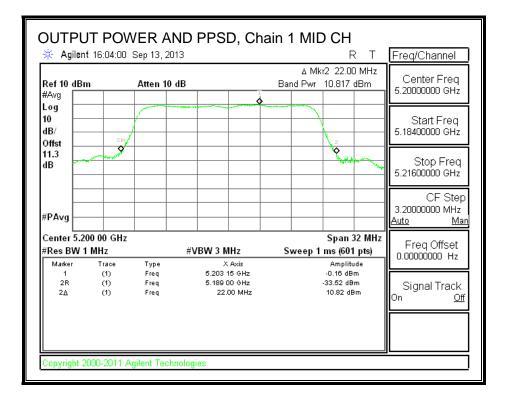
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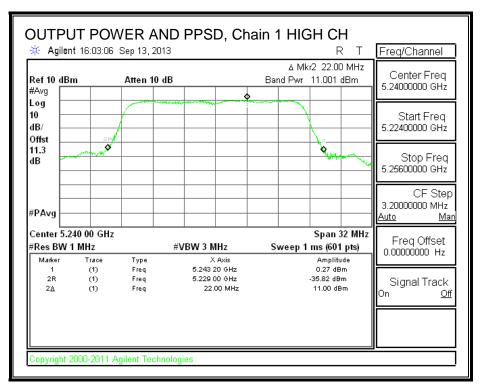


OUTPUT POWER AND PPSD, Chain 1



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8.2.5. PEAK EXCURSION

LIMITS

FCC §15.407 (a) (6)

RESULTS

Refer to the results of 802.11n HT20 mode in the 5.6 GHz band.

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8.3. 802.11n HT40 MODE IN THE 5.2 GHz BAND

8.3.1. 26 dB BANDWIDTH

LIMITS

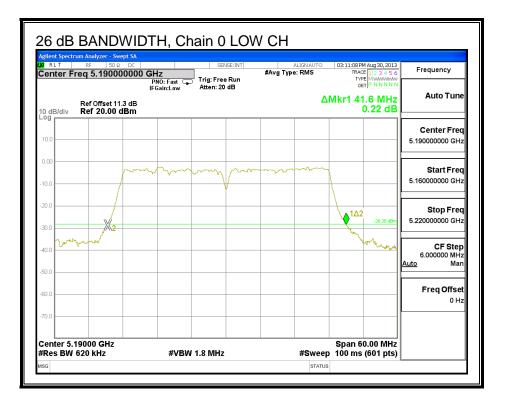
None; for reporting purposes only.

RESULTS

Channel	Frequency	26 dB BW	26 dB BW
		Chain 0	Chain 1
	(MHz)	(MHz)	(MHz)
Low	5190	41.6	42.8
High	5230	41.5	42.6

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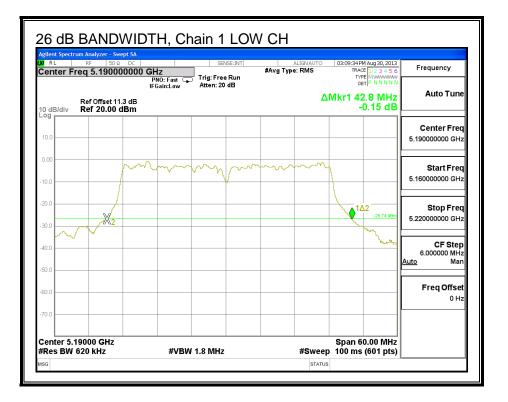
26 dB BANDWIDTH, Chain 0

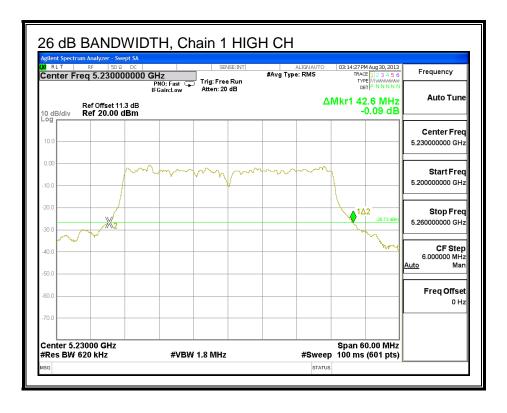




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26 dB BANDWIDTH, Chain 1





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8.3.2. 99% BANDWIDTH

LIMITS

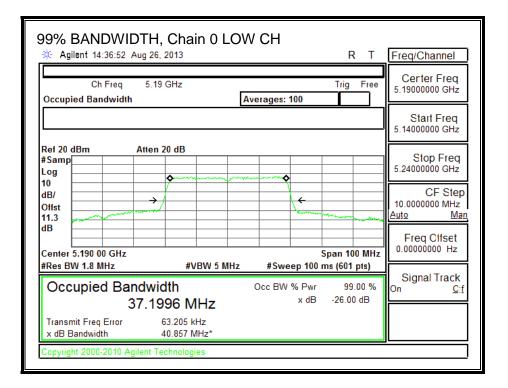
None; for reporting purposes only.

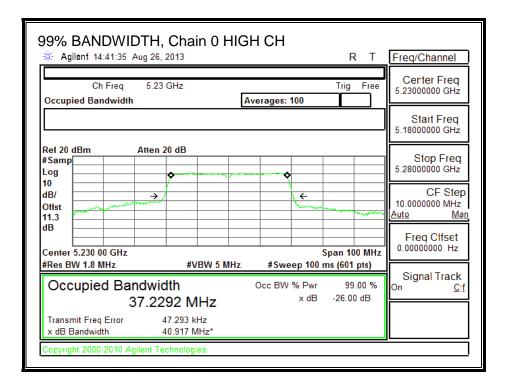
<u>RESULTS</u>

Channel	Frequency	99% BW	99% BW
		Chain 0	Chain 1
	(MHz)	(MHz)	(MHz)
Low	5180	37.20	37.35
High	5240	37.23	37.35

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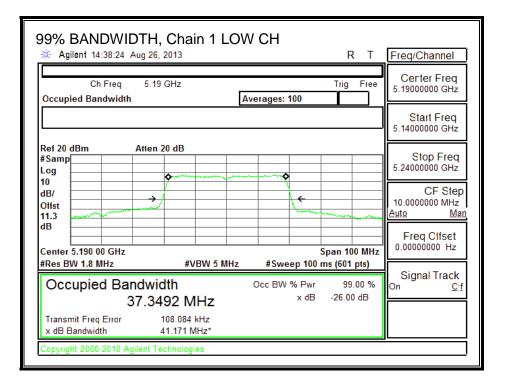
99% BANDWIDTH, Chain 0

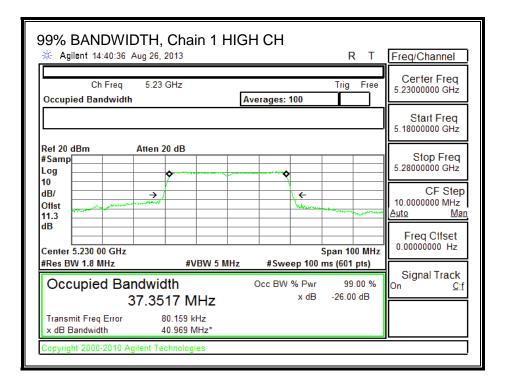




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99% BANDWIDTH, Chain 1





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8.3.3. AVERAGE POWER

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a power meter.

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

RESULTS

Average Power Results

Channel	Frequency	Chain 0	Chain 1	Total
		Power	Power	Power
	(MHz)	(dBm)	(dBm)	(dBm)
Low	5190	7.63	8.15	10.91
High	5230	7.79	7.98	10.90

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8.3.4. OUTPUT POWER AND PPSD

LIMITS

FCC §15.407 (a) (1)

For the band 5.15–5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed the lesser of 50 mW or 4 dBm + 10 log B, where B is the 26–dB emission bandwidth in MHz. In addition, the peak power spectral density shall not exceed 4 dBm in any 1–MHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

IC RSS-210 A9.2 (1)

The maximum e.i.r.p. shall not exceed 200 mW or 10 + 10 log10 B, dBm, whichever power is less. B is the 99% emission bandwidth in MHz. The e.i.r.p. spectral density shall not exceed 10 dBm in any 1.0 MHz band.

DIRECTIONAL ANTENNA GAIN

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

Chain 0	Chain 1	Uncorrelated Chains
Antenna	Antenna	Directional
Gain	Gain	Gain
(dBi)	(dBi)	(dBi)
3.90	3.20	3.56

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RESULTS

Bandwidth and Antenna Gain

Channel	Frequency	Min	Min	Directional
		26 dB	99%	Gain
		BW	BW	
	(MHz)	(MHz)	(MHz)	(dBi)
Low	5190	(IVITZ) 41.60	(IVIFIZ) 37.19	<u>(ав)</u> 3.56

Limits

Channel	Frequency	FCC	IC	Max	Power	FCC	IC	PPSD
		Power	EIRP	IC	Limit	PPSD	eirp	Limit
		Limit	Limit	Power		Limit	PSD	
							Limit	
	(MHz)	(dBm)						
Low	5190	17.00	23.00	19.44	17.00	4.00	10.00	4.00
High	5230	17.00	23.00	19.44	17.00	4.00	10.00	4.00

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

Output Power Results

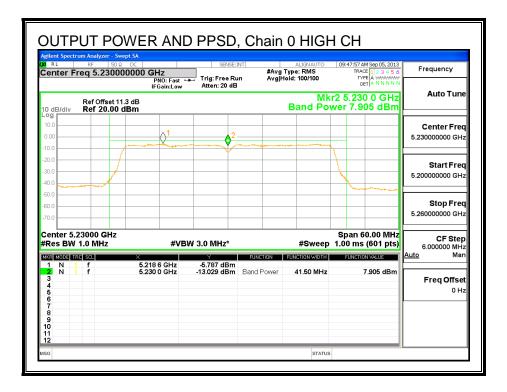
Channel	Frequency	Chain 0	Chain 1	Total	Power	Power
		Meas	Meas	Corr'd	Limit	Margin
		Power	Power	Power		
	(MHz)	(dBm)	(dBm)	(dBm)	(dBm)	(dB)
Low	5190	7.47	7.93	10.72	17.00	-6.28
High	5230	7.91	8.28	11.11	17.00	-5.89

PPSD Results

Channel	Frequency	Chain 0	Chain 1	Total	PPSD	PPSD
		Meas	Meas	Corr'd	Limit	Margin
		PPSD	PPSD	PPSD		
	<i>(</i>)	/ · · · ·	(<i></i>
	(MHz)	(dBm)	(dBm)	(dBm)	(dBm)	(dB)
Low	(MHZ) 5190	(dBm) -6.53	(dBm) -5.68	(dBm) -3.07	(dBm) 4.00	(dB) -7.07

OUTPUT POWER AND PPSD, Chain 0

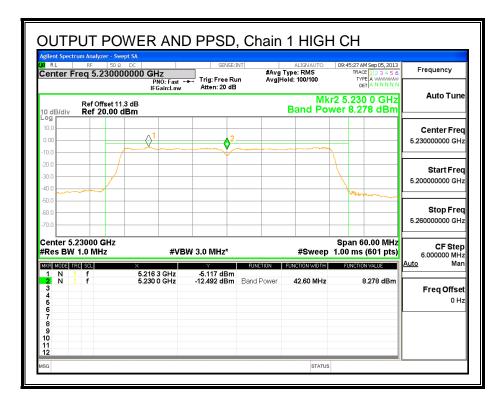
nter Free	RF 50 Ω C q 5.1900000	DOO GHZ PNO: Fast * IFGain:Low	SENSE:] → Trig: Free Ru Atten: 20 dB	#Avg In Avg	ALIGNAUTO Type: RMS Hold: 100/100	09:3	8:40 AM Sep 05, 201 TRACE 1 2 3 4 5 TYPE A WWWWW DET A N N N N	Frequency
dB/div F	tef Offset 11.3 c tef 20.00 dB	d₿					.190 0 GHz 7.473 dBm	
			2 2		Q ¹			Center Free 5.190000000 GH
0								Start Free 5.160000000 GH
.0								Stop Free 5.220000000 GH
nter 5.19 es BW 1.0		#VB	W 3.0 MHz*		#Sweep		an 60.00 MH:) ms (601 pts	
	GCL f f	× 5.205 3 GHz 5.190 0 GHz	-6.527 dBm -13.354 dBm	FUNCTION Band Power	Function width 41.60 MHz	F	UNCTION VALUE	Auto Mai
5 7 3 9								



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OUTPUT POWER AND PPSD, Chain 1

Frequency	2:33 AM Sep 05, 2013 TRACE 1 2 3 4 5 6 TYPE A WWWWWW DET A N N N N N	09:42	ALIGNAUTO Type: RMS Iold: 100/100	#Avg	SENSE:I Trig: Free Ru Atten: 20 dB	PNO: Fast		50 Ω 19000	_R ⊧ req 5.	ter F
Auto Tun	.190 0 GHz 7.928 dBm				Atten: 20 dB	IFGain:Low	3 dB)ffset 11. 20.00 c		B/div
Center Fre 5.19000000 GH					2	21	Q ¹			
Start Fre 5.160000000 GH										
Stop Fre 5.220000000 GH										
CF Ste 6.000000 MH	an 60.00 MHz ms (601 pts)		#Sweep		3.0 MHz*	#VE			.19000 / 1.0 M	
<u>Auto</u> Ma FreqOffse 0 H	7.928 dBm	FU	FUNCTION WIDTH	FUNCTION Band Power	-5.677 dBm -12.795 dBm	'6 4 GHz 10 0 GHz			rrc scl 1 f 1 f	NODE T N



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8.3.5. PEAK EXCURSION

LIMITS

FCC §15.407 (a) (6)

The ratio of the peak excursion of the modulation envelope (measured using a peak hold function) to the peak transmit power (measured as specified above) shall not exceed 13 dB across any 1 MHz bandwidth or the emission bandwidth whichever is less.

RESULTS

Refer to the results of 802.11n HT40 mode in the 5.6 GHz band.

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8.4. 802.11a MODE IN THE 5.3 GHz BAND

8.4.1. 26 dB BANDWIDTH

LIMITS

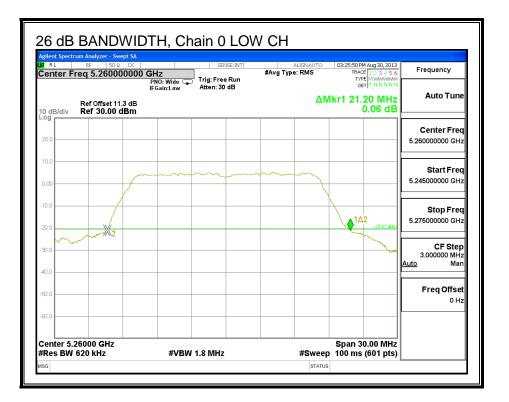
None; for reporting purposes only.

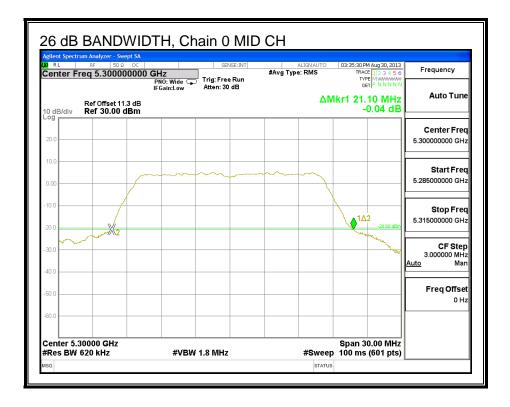
RESULTS

Channel	Frequency 26 dB BW		26 dB BW
		Chain 0	Chain 1
	(MHz)	(MHz)	(MHz)
Low	5260	21.20	20.30
Mid	5300	21.10	20.30
High	5320	21.15	20.30

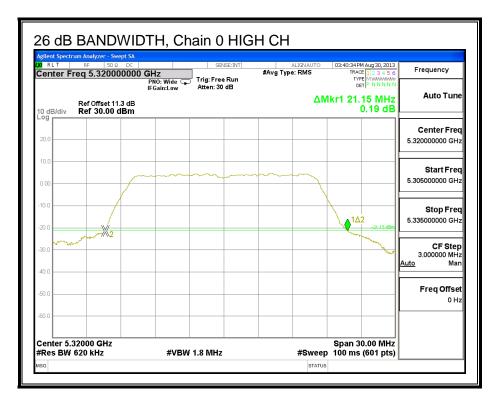
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26 dB BANDWIDTH, Chain 0

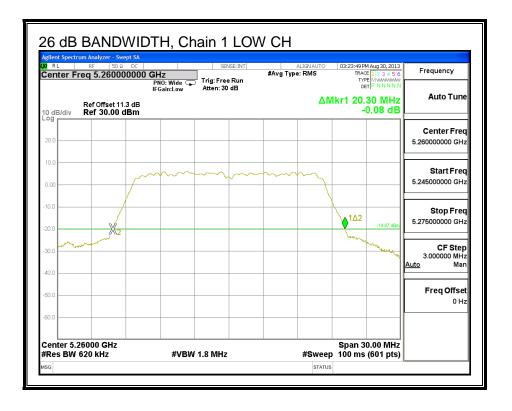




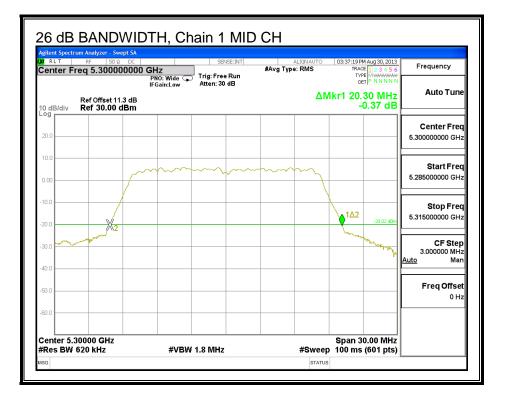
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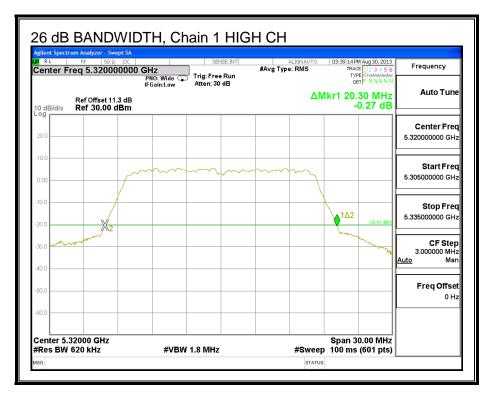


26 dB BANDWIDTH, Chain 1



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8.4.2. 99% BANDWIDTH

LIMITS

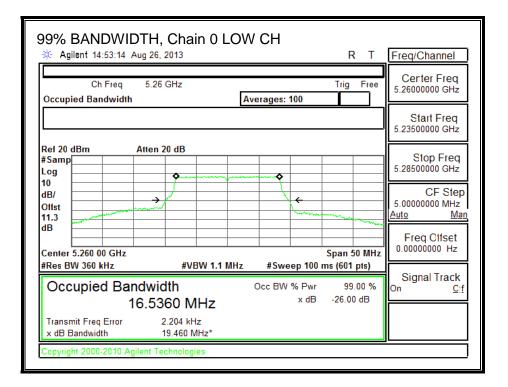
None; for reporting purposes only.

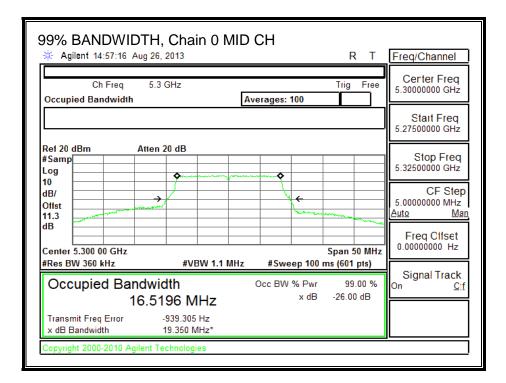
<u>RESULTS</u>

Channel	Frequency	99% BW	99% BW
		Chain 0	Chain 1
	(MHz)	(MHz)	(MHz)
Low	5260	16.5360	16.5152
Mid	5300	16.5196	16.5270
High	5320	16.5320	16.5166

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99% BANDWIDTH, Chain 0

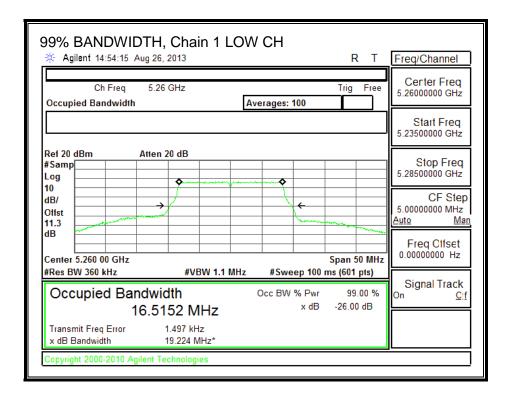




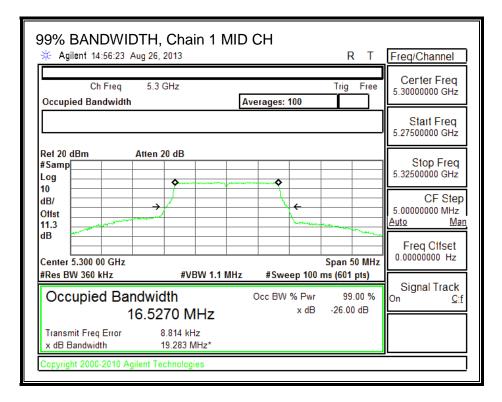
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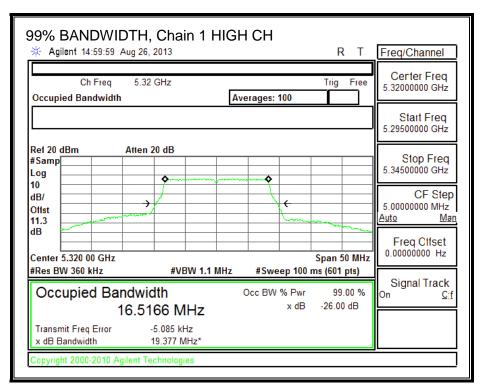
99% BANDWIDTH		ЭН СН	RТ	Freq/Channel
Ch Freq 5.32 Occupied Bandwidth	GHz	Averages: 100	Trig Free	Certer Freq 5.32000000 GHz
	L	0		Start Freq 5.29500000 GHz
Ref 20 dBm Atten #Samp Log	20 dB			Stop Freq 5.34500000 GHz
10 dB/ Offst 11.3		+ +		CF Step 5.0000000 MHz <u>Auto Man</u>
dB			Span 50 MHz	Freq Olfset 0.00000000 Hz
#Res BW 360 kHz Occupied Bandwig 16 53	#VBW 1.1 MHz dth 320 MHz	#Sweep 100 Occ BW % Pwr x dB	99.00 %	Signal Track ^{On <u>C</u>!f}
Transmit Freq Error	752.429 Hz 19.427 MHz*			
Copyright 2000-2010 Agilent Te	echnologies			

99% BANDWIDTH, Chain 1



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8.4.3. AVERAGE POWER

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a power meter.

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

RESULTS

Average Power Results

Channel	Frequency	Chain 0	Chain 1	Total
		Power	Power	Power
	(MHz)	(dBm)	(dBm)	(dBm)
Low	5260	10.21	10.05	13.14
Mid	5300	10.09	9.89	13.00
High	5320	9.80	9.57	12.70

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8.4.4. OUTPUT POWER AND PPSD

LIMITS

FCC §15.407 (a) (1)

For the band 5.25–5.35 GHz, the maximum conducted output power over the frequency band of operation shall not exceed the lesser of 250 mW or 11 dBm + 10 log B, where B is the 26–dB emission bandwidth in MHz. In addition, the peak power spectral density shall not exceed 11 dBm in any 1–MHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

IC RSS-210 A9.2 (1)

The maximum e.i.r.p. shall not exceed 200 mW or 10 + 10 log10 B, dBm, whichever power is less. B is the 99% emission bandwidth in MHz. The e.i.r.p. spectral density shall not exceed 10 dBm in any 1.0 MHz band.

DIRECTIONAL ANTENNA GAIN

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

Chain 0	Chain 1	Uncorrelated Chains
Antenna	Antenna	Directional
Gain	Gain	Gain
(dBi)	(dBi)	(dBi)
3.90	3.20	3.56

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RESULTS

Bandwidth and Antenna Gain

Channel	Frequency	Min	Min	Directional
		26 dB	99%	Gain
		BW	BW	
	(MHz)	(MHz)	(MHz)	(dBi)
Low	5260	20.3	16.5	3.56
Mid	5300	20.3	16.5	3.56
High	5320	20.3	16.5	3.56

Limits

Channel	Frequency	FCC	IC	IC	Power	FCC	IC	PPSD
		Power	Power	EIRP	Limit	PPSD	PSD	Limit
		Limit	Limit	Limit		Limit	Limit	
	(MHz)	(dBm)						
Low	5260	24.00	23.18	29.18	23.18	11.00	11.00	11.00
Mid	5300	24.00	23.18	29.18	23.18	11.00	11.00	11.00
High	5320	24.00	23.18	29.18	23.18	11.00	11.00	11.00

Duty Cycle CF (dB) 0.	.00	Included in Calculations of Corr'd Power & PPSD
-----------------------	-----	---

Output Power Results

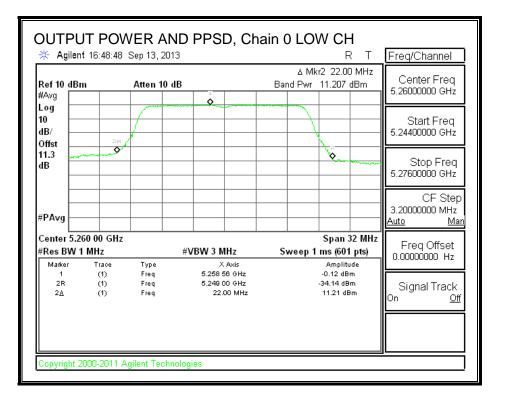
Channel	Frequency	Chain 0	Chain 1	Total	Power	Power	
		Meas	Meas	Corr'd	Limit	Margin	
		Power	Power	Power			
	(MHz)	(dBm)	(dBm)	(dBm)	(dBm)	(dB)	
Low	5260	11.21	10.90	14.07	23.18	-9.11	
Mid	5300	11.07	10.77	13.93	23.18	-9.24	
High	5320	10.89	10.50	13.71	23.18	-9.47	

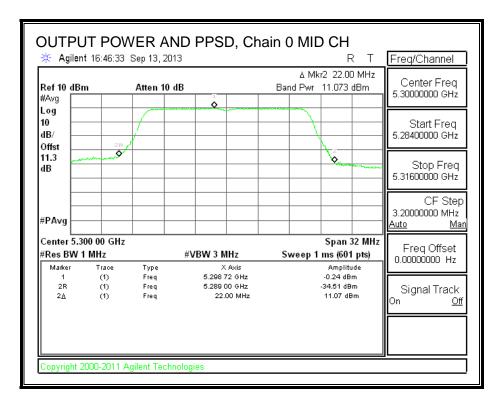
PPSD Results

Channel	Frequency	Chain 0	Chain 1	Total	PPSD	PPSD
		Meas	Meas	Corr'd	Limit	Margin
		DDCD	PPSD	DDCD		
		PPSD		PPSD		
	(MHz)	(dBm)	(dBm)	(dBm)	(dBm)	(dB)
Low	5260	-0.12	-0.43	2.74	11.00	-8.26
Mid	5300	-0.24	-0.50	2.64	11.00	-8.36
High	5320	-0.37	-0.65	2.50	11.00	-8.50

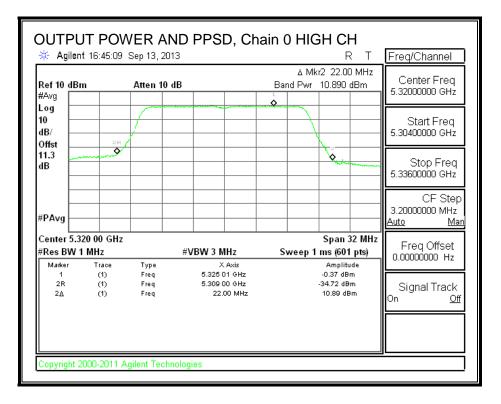
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OUTPUT POWER AND PPSD, Chain 0

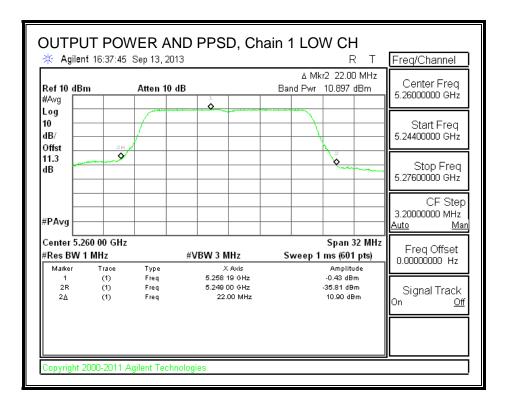




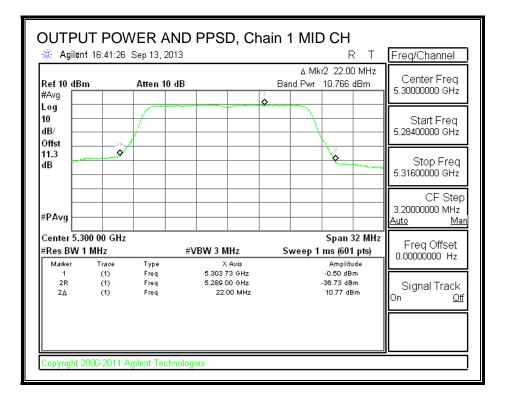
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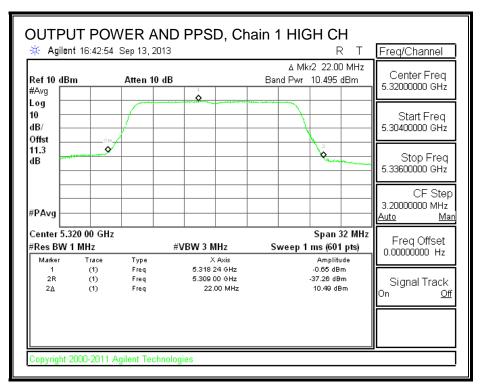


OUTPUT POWER AND PPSD, Chain 1



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8.4.5. PEAK EXCURSION

LIMITS

FCC §15.407 (a) (6)

The ratio of the peak excursion of the modulation envelope (measured using a peak hold function) to the peak transmit power (measured as specified above) shall not exceed 13 dB across any 1 MHz bandwidth or the emission bandwidth whichever is less.

RESULTS

Refer to the results of 802.11n HT20 mode in the 5.6 GHz band.

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8.5. 802.11n HT20 MODE IN THE 5.3 GHz BAND

8.5.1. 26 dB BANDWIDTH

LIMITS

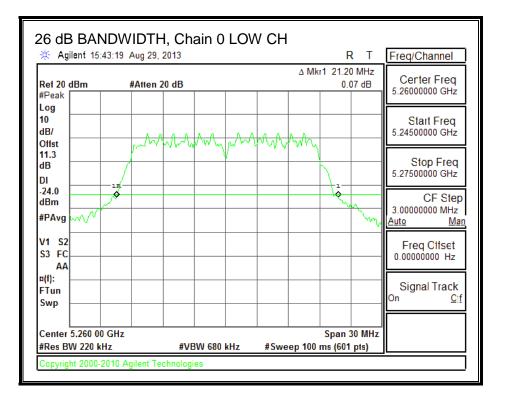
None; for reporting purposes only.

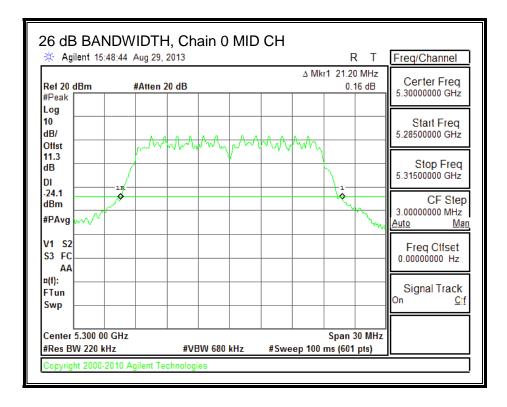
RESULTS

Channel	Frequency 26 dB BW		26 dB BW
	Chain 0		Chain 1
	(MHz)	(MHz)	(MHz)
Low	5260	21.2	21.0
Mid	5300	21.2	21.0
High	5320	21.2	21.0

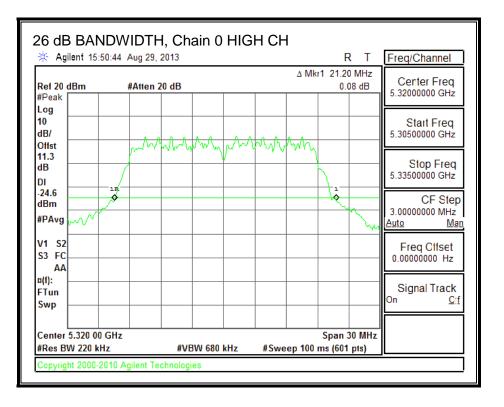
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26 dB BANDWIDTH, Chain 0

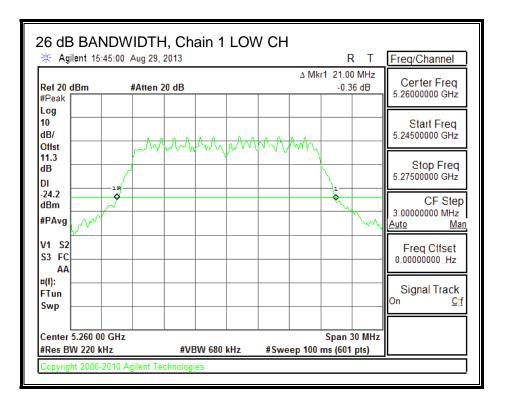




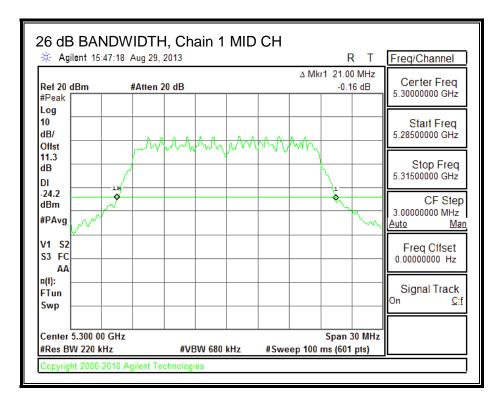
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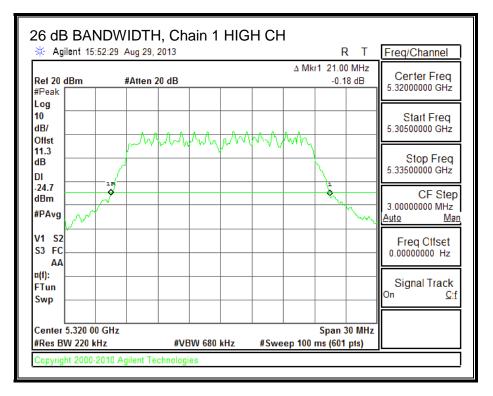


26 dB BANDWIDTH, Chain 1



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8.5.2. 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

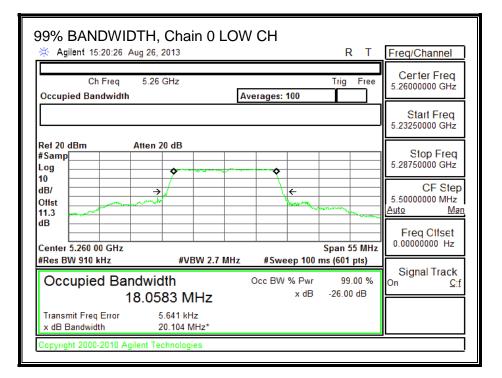
<u>RESULTS</u>

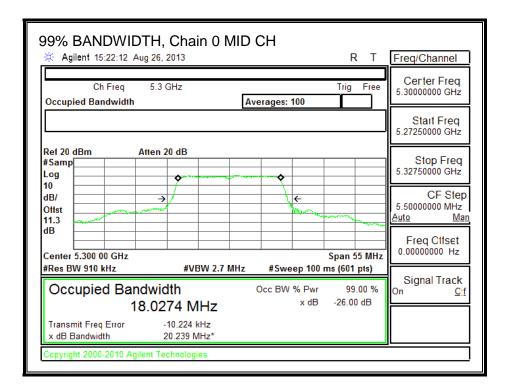
Channel	Frequency	99% BW	99% BW	
		Chain 0	Chain 1	
	(MHz)	(MHz)	(MHz)	
Low	5260	18.06	18.05	
Mid	5300	18.03	18.09	
High	5320	18.06	18.08	

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99% BANDWIDTH

99% BANDWIDTH, Chain 0

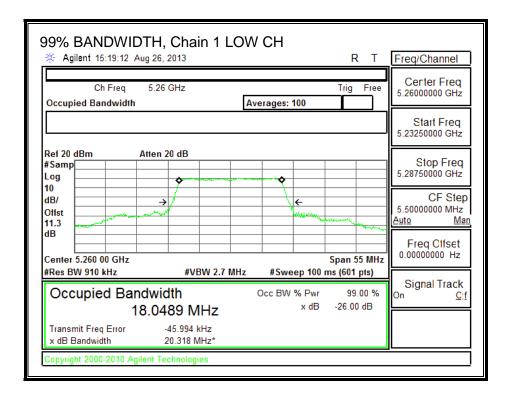




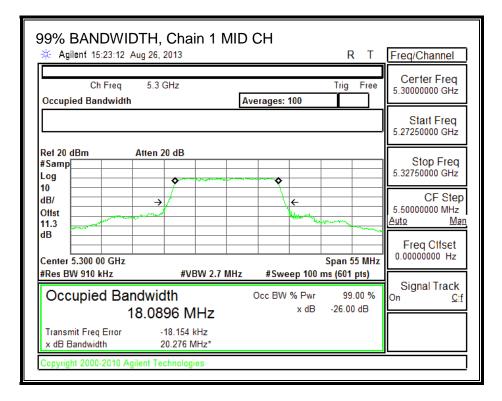
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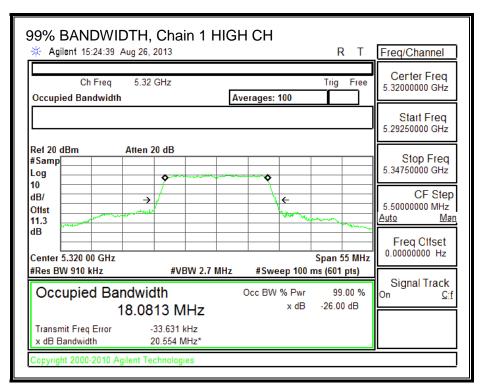
99% BANDWIDTH, Chain 0 HIGH CH	Freedohaanal
Agilent 15:25:30 Aug 26, 2013 R T	Freq/Channel
Ch Freq 5.32 GHz Trig Free Occupied Bandwidth Averages: 100	Certer Freq 5.32000000 GHz
	Start Freq 5.29250000 GHz
Ref 20 dBm Atten 20 dB #Samp Log 10 0000000000000000000000000000000000	Stop Freq 5.34750000 GHz
dB/ → / ←	CF Step 5.5000000 MHz <u>Auto Man</u>
dB Center 5.320 00 GHz Span 55 MHz	Freq Clfset 0.00000000 Hz
#Res BW 910 kHz	Oinnel Treats
Occupied Bandwidth Occ BW % Pwr 99.00 % 18.0564 MHz x dB -26.00 dB	Signal Track ^{On <u>Cif</u>}
Transmit Freq Error -18.556 kHz x dB Bandwidth 20.216 MHz*	
Copyright 2000-2010 Agilent Technologies	

99% BANDWIDTH, Chain 1



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8.5.3. AVERAGE POWER

<u>LIMITS</u>

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a power meter.

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

RESULTS

Average Power Results

Channel	Frequency	Chain 0	Chain 1	Total
		Power	Power	Power
	(MHz)	(dBm)	(dBm)	(dBm)
Low	5260	10.18	10.04	13.12
Mid	5300	10.13	9.91	13.03
High	5320	9.81	9.60	12.72

8.5.4. OUTPUT POWER AND PPSD

LIMITS

FCC §15.407 (a) (1)

For the band 5.25–5.35 GHz, the maximum conducted output power over the frequency band of operation shall not exceed the lesser of 250 mW or 11 dBm + 10 log B, where B is the 26–dB emission bandwidth in MHz. In addition, the peak power spectral density shall not exceed 11 dBm in any 1–MHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

IC RSS-210 A9.2 (1)

The maximum e.i.r.p. shall not exceed 200 mW or 10 + 10 log10 B, dBm, whichever power is less. B is the 99% emission bandwidth in MHz. The e.i.r.p. spectral density shall not exceed 10 dBm in any 1.0 MHz band.

DIRECTIONAL ANTENNA GAIN

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

Chain 0	Chain 1	Uncorrelated Chains
Antenna	Antenna	Directional
Gain	Gain	Gain
(dBi)	(dBi)	(dBi)
3.90	3.20	3.56

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RESULTS

Bandwidth and Antenna Gain

Channel	Frequency	Min	Min	Directional
		26 dB	99%	Gain
		BW	BW	
	(MHz)	(MHz)	(MHz)	(dBi)
Low	5260	21.0	16.5	3.56
Mid	5300	21.0	16.5	3.56
High	5320	21.0	15.6	3.56

Limits

Channel	Frequency	FCC	IC	IC	Power	FCC	IC	PPSD
		Power	Power	EIRP	Limit	PPSD	PSD	Limit
		Limit	Limit	Limit		Limit	Limit	
	(MHz)	(dBm)						
Low	5260	24.00	23.18	29.18	23.18	11.00	11.00	11.00
Mid	5300	24.00	23.18	29.18	23.18	11.00	11.00	11.00
High	5320	24.00	22.93	28.93	22.93	11.00	11.00	11.00

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

Output Power Results

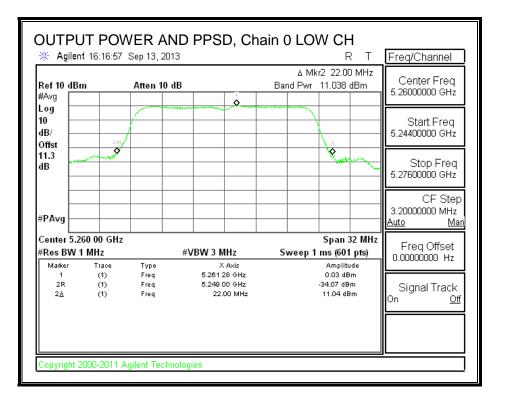
Channel	Frequency	Chain 0	Chain 1	Total	Power	Power
		Meas	Meas	Corr'd	Limit	Margin
		Power	Power	Power		
	(MHz)	(dBm)	(dBm)	(dBm)	(dBm)	(dB)
Low	5260	11.04	10.79	13.93	23.18	-9.25
Mid	5300	10.86	10.65	13.77	23.18	-9.41
High	5320	10.62	10.41	13.53	22.93	-9.41

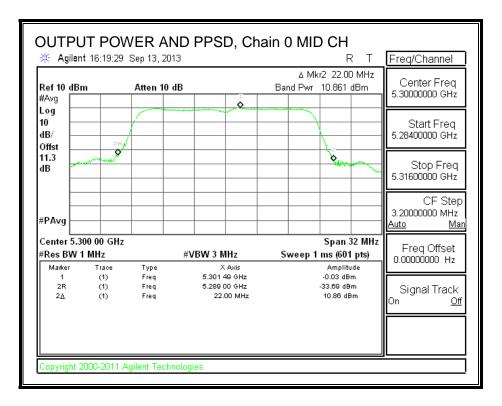
PPSD Results

Channel	Frequency	Chain 0	Chain 1	Total	PPSD	PPSD
		Meas	Meas	Corr'd	Limit	Margin
		PPSD	PPSD	PPSD		
	(MHz)	(dBm)	(dBm)	(dBm)	(dBm)	(dB)
Low	5260	0.03	-0.190	2.93	11.00	-8.07
Mid	5300	-0.03	-0.42	2.79	11.00	-8.21
High	5320	-0.38	-0.57	2.54	11.00	-8.46

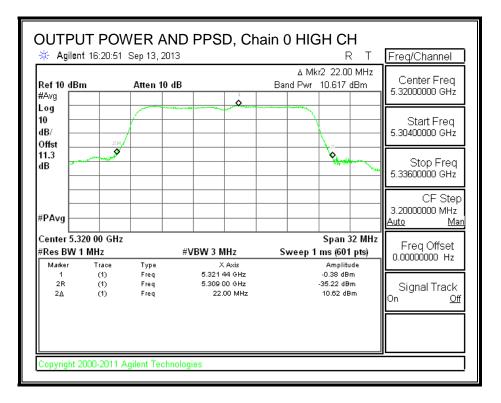
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OUTPUT POWER AND PPSD, Chain 0

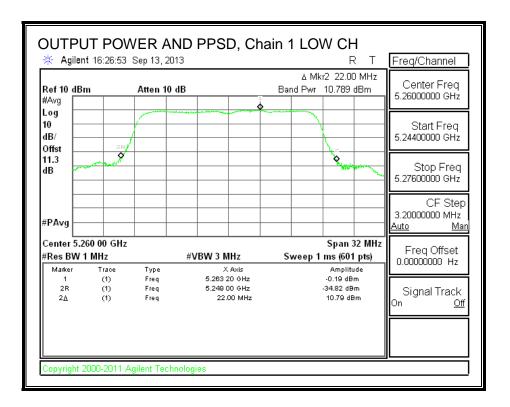




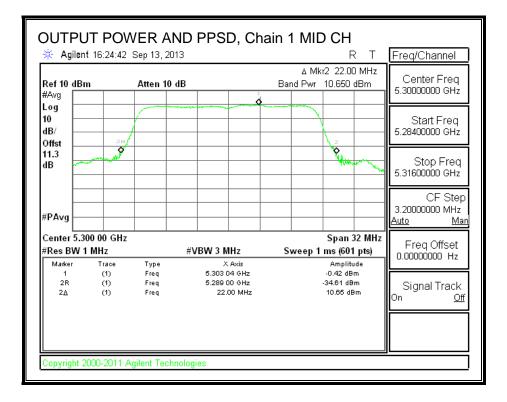
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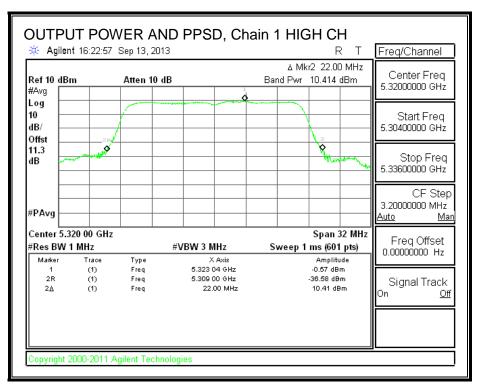


OUTPUT POWER AND PPSD, Chain 1



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8.5.5. PEAK EXCURSION

LIMITS

FCC §15.407 (a) (6)

The ratio of the peak excursion of the modulation envelope (measured using a peak hold function) to the peak transmit power (measured as specified above) shall not exceed 13 dB across any 1 MHz bandwidth or the emission bandwidth whichever is less.

RESULTS

Refer to the results of 802.11n HT20 mode in the 5.6 GHz band.

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8.6. 802.11n HT40 MODE IN THE 5.3 GHz BAND

8.6.1. 26 dB BANDWIDTH

LIMITS

None; for reporting purposes only.

RESULTS

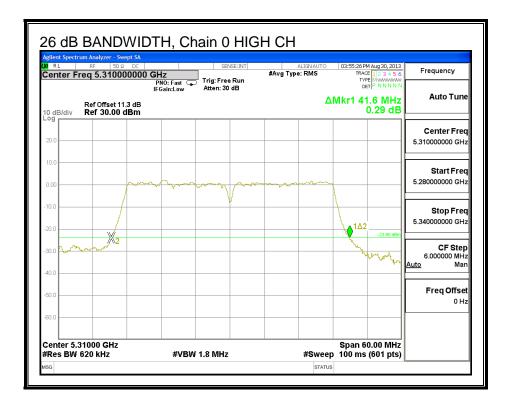
Channel	Frequency	26 dB BW	26 dB BW
		Chain 0	Chain 1
	(MHz)	(MHz)	(MHz)
Low	5270	41.7	42.5
High	5310	41.6	42.6

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26 dB BANDWIDTH

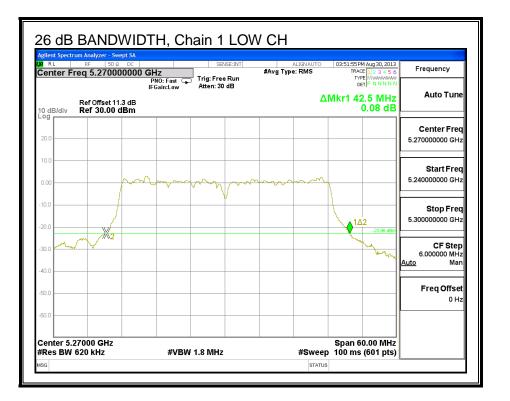
26 dB BANDWIDTH, Chain 0

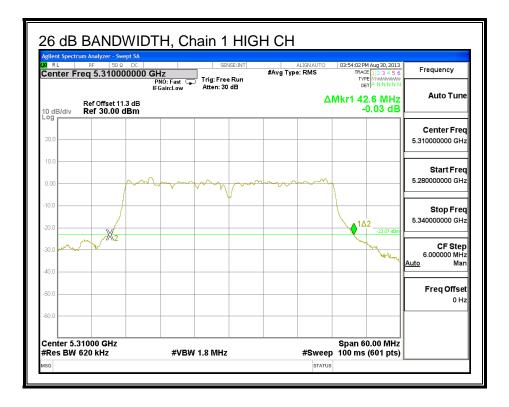




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26 dB BANDWIDTH, Chain 1





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8.6.2. 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

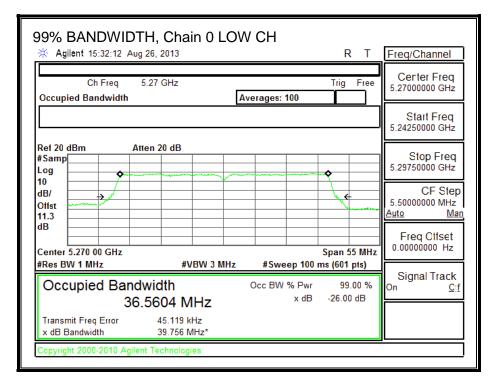
RESULTS

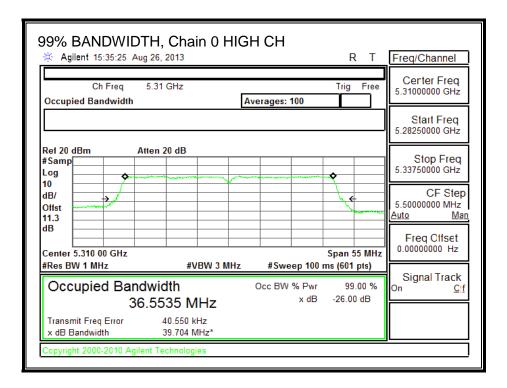
Channel	Frequency	99% BW	99% BW
		Chain 0	Chain 1
	(MHz)	(MHz)	(MHz)
Low	5260	36.56	36.69
High	5320	36.55	36.69

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99% BANDWIDTH

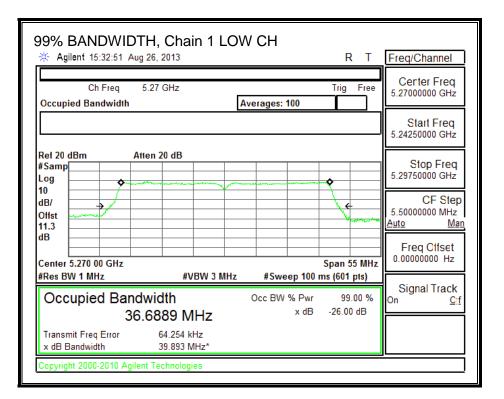
99% BANDWIDTH, Chain 0

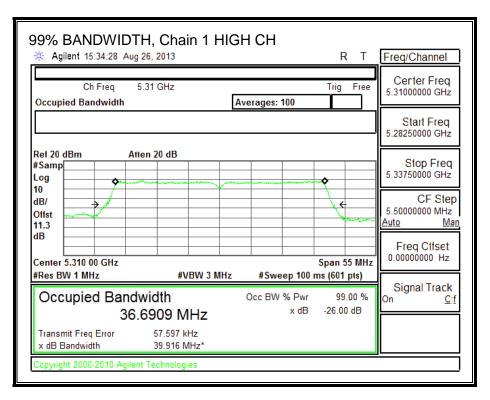




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99% BANDWIDTH, Chain 1





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8.6.3. AVERAGE POWER

<u>LIMITS</u>

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a power meter.

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

RESULTS

Average Power Results

Channel	Frequency	Chain 0	Chain 1	Total
		Power	Power	Power
	(MHz)	(dBm)	(dBm)	(dBm)
Low	5270	11.65	11.32	14.50
High	5310	11.43	11.27	14.36

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8.6.4. OUTPUT POWER AND PPSD

LIMITS

FCC §15.407 (a) (1)

For the band 5.25–5.35 GHz, the maximum conducted output power over the frequency band of operation shall not exceed the lesser of 250 mW or 11 dBm + 10 log B, where B is the 26–dB emission bandwidth in MHz. In addition, the peak power spectral density shall not exceed 11 dBm in any 1–MHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

IC RSS-210 A9.2 (1)

The maximum e.i.r.p. shall not exceed 200 mW or 10 + 10 log10 B, dBm, whichever power is less. B is the 99% emission bandwidth in MHz. The e.i.r.p. spectral density shall not exceed 10 dBm in any 1.0 MHz band.

DIRECTIONAL ANTENNA GAIN

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

Chain 0	Chain 1	Uncorrelated Chains
Antenna	Antenna	Directional
Gain	Gain	Gain
(dBi)	(dBi)	(dBi)
3.90	3.20	3.56

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RESULTS

Bandwidth and Antenna Gain

Channel	Frequency	Min	Min	Directional
		26 dB	99%	Gain
		BW	BW	
	(MHz)	(MHz)	(MHz)	(dBi)
	(11112)	(11112)	((4.2.)
Low	5270	41.7	36.6	3.56

Limits

Channel	Frequency	FCC	IC	IC	Power	FCC	IC	PPSD
		Power	Power	EIRP	Limit	PPSD	PSD	Limit
		Limit	Limit	Limit		Limit	Limit	
	(MHz)	(dBm)						
Low	5270	24.00	24.00	30.00	24.00	11.00	11.00	11.00
High	5310	24.00	24.00	30.00	24.00	11.00	11.00	11.00

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

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)
Low	5270	12.07	11.80	14.95	24.00	-9.05
High	5310	11.84	11.62	14.74	24.00	-9.26

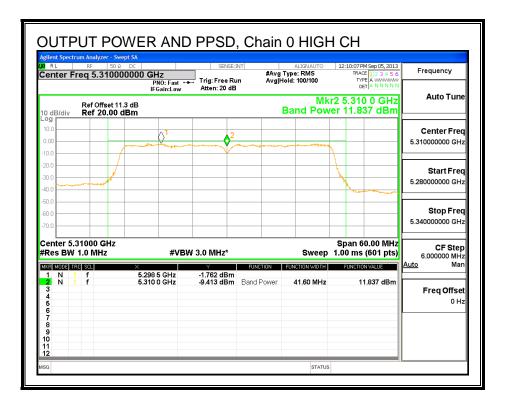
PPSD Results

Channel	Frequency	Chain 0	Chain 1	Total	PPSD	PPSD
		Meas	Meas	Corr'd	Limit	Margin
		PPSD	PPSD	PPSD		
	(MHz)	(dBm)	(dBm)	(dBm)	(dBm)	(dB)
Low	5270	-1.703	-1.698	1.31	11.00	-9.69
High	5310	1.762	-1.931	3.31	11.00	-7.69

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OUTPUT POWER AND PPSD, Chain 0

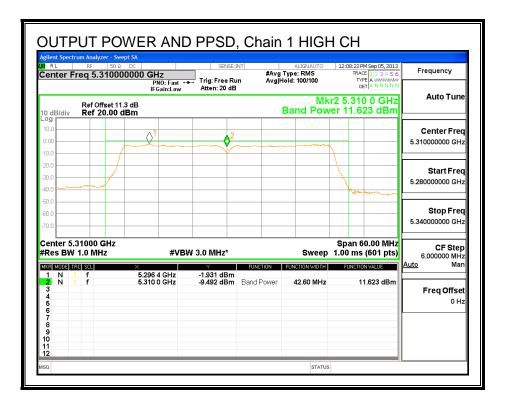
nter Freq 5.2	50 Ω DC 270000000 GHz PNO: Fas		#Avg un Avg I	ALIGNAUTO Type: RMS Hold: 100/100	12:03:13 PM Sep 05, 2013 TRACE 1 2 3 4 5 6 TYPE A WWWWWW DETLA N N N N N	Frequency
	IFGain:Lo ffset 11.3 dB 20.00 dBm	w Atten: 20 db			r2 5.270 0 GHz er 12.070 dBm	Auto Tune
g 		••••••••••••••••••••••••••••••••••••••	-1)	\downarrow ¹		Center Free 5.270000000 GH
).0).0).0						Start Free 5.240000000 GH
1.0 1.0 1.0						Stop Fre 5.300000000 GH
enter 5.27000 Res BW 1.0 MH		/BW 3.0 MHz*		Sweep	Span 60.00 MHz 1.00 ms (601 pts)	CF Stej 6.000000 MH
R Model TRC SCL 1 N 1 f 2 N 1 f 3 4 - - 5 - - - 6 - - - - 7 - - - - -	× 5.285 1 GHz 5.270 0 GHz	-1.703 dBm -9.083 dBm	FUNCTION Band Power	function width 41.70 MHz	FUNCTION VALUE	Auto Mai Freq Offse 0 H
3 9 0						



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OUTPUT POWER AND PPSD, Chain 1

nter Freq 5.	50 Ω DC 270000000 GHz PNO: Fast		#Avg	ALIGNAUTO Type: RMS Iold: 100/100	12:05:03 PM Sep 05, 2013 TRACE 1 2 3 4 5 6 TYPE A WWWWW DET A N N N N N	Frequency
IF Gain:Low Atten: 20 dB Delta Mitra Ref Offset 11.3 dB Mkr2 5.270 0 GHz 0 dB/div Ref 20.00 dBm Band Power 11.801 dBm						
9 0.0 00		¢2	Trangentral growth arrow			Center Free 5.270000000 GH
).0).0).0					Millionar Marine	Start Free 5.240000000 GH
1.0 1.0 1.0						Stop Free 5.30000000 GH
enter 5.27000 Res BW 1.0 MH		/BW 3.0 MHz*		Sweep	Span 60.00 MHz 1.00 ms (601 pts)	CF Step 6.000000 MH
Image TRC SCL SCL </td <td>× 5.256 4 GHz 5.270 0 GHz</td> <td>-1.698 dBm -9.581 dBm</td> <td>FUNCTION Band Power</td> <td>FUNCTION WIDTH 42.50 MHz</td> <td>FUNCTION VALUE 11.801 dBm</td> <td>Auto Mar Freq Offse 0 H:</td>	× 5.256 4 GHz 5.270 0 GHz	-1.698 dBm -9.581 dBm	FUNCTION Band Power	FUNCTION WIDTH 42.50 MHz	FUNCTION VALUE 11.801 dBm	Auto Mar Freq Offse 0 H:
7 3 9 0						



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8.6.5. PEAK EXCURSION

LIMITS

FCC §15.407 (a) (6)

The ratio of the peak excursion of the modulation envelope (measured using a peak hold function) to the peak transmit power (measured as specified above) shall not exceed 13 dB across any 1 MHz bandwidth or the emission bandwidth whichever is less.

RESULTS

Refer to the results of 802.11n HT40 mode in the 5.6 GHz band.

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8.7. 802.11a MODE IN THE 5.6 GHz BAND

8.7.1. 26 dB BANDWIDTH

LIMITS

None; for reporting purposes only.

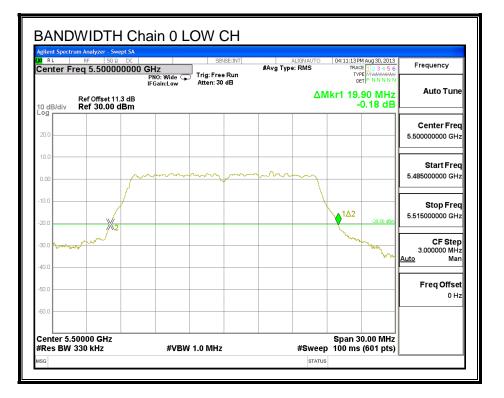
RESULTS

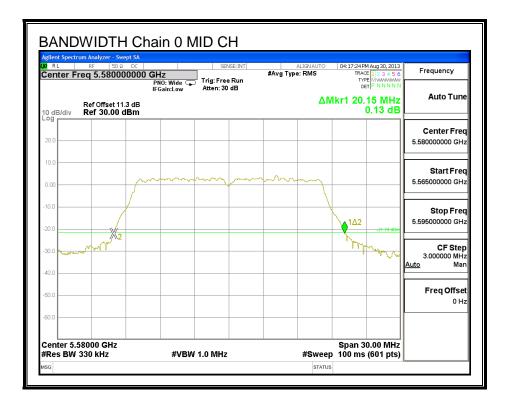
Channel	Frequency	26 dB BW	26 dB BW	
		Chain 0	Chain 1	
	(MHz)	(MHz)	(MHz)	
Low	5500	19.9	19.9	
Mid	5580	20.2	19.9	
High	5700	20.3	20.0	

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26 dB BANDWIDTH

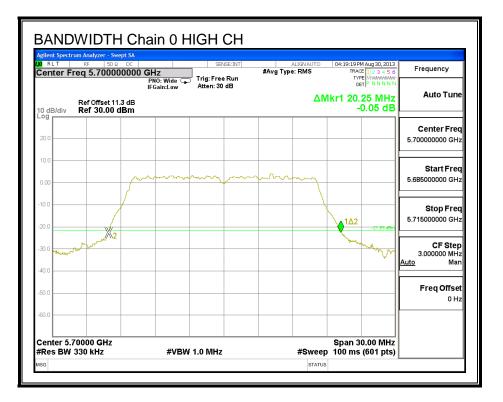
26 dB BANDWIDTH, Chain 0



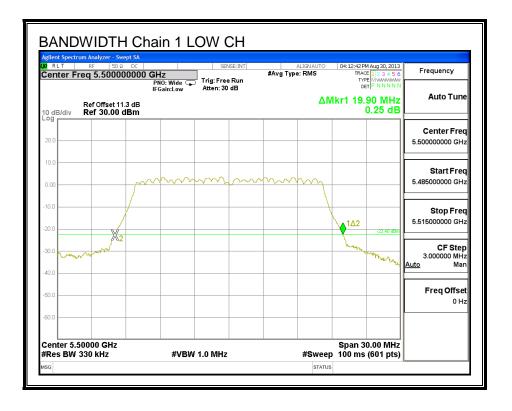


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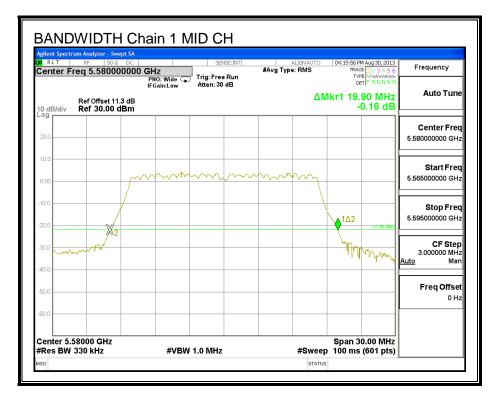
UL VERIFICATION SERVICES INC. 47173 BENICIA STREET, FREMONT, CA 94538, USA This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc. .

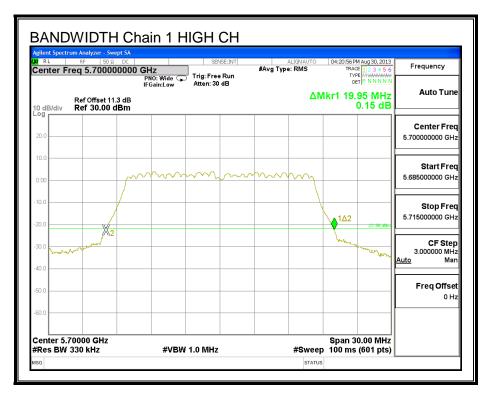


26 dB BANDWIDTH, Chain 1



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8.7.2. 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

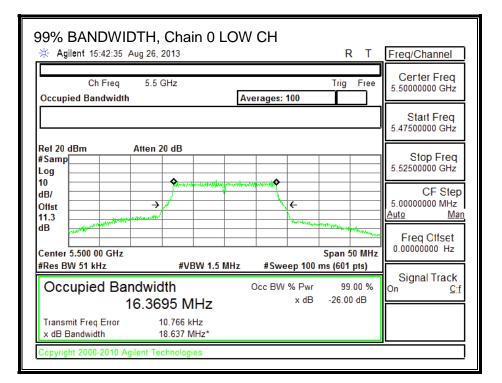
<u>RESULTS</u>

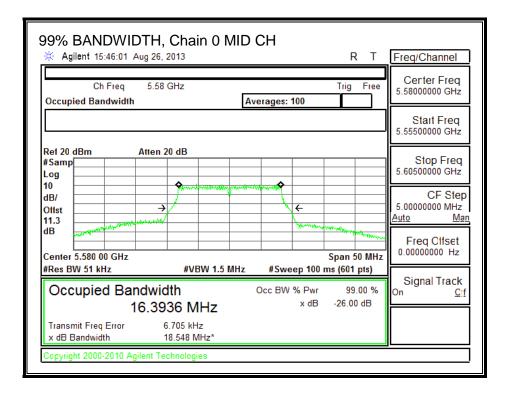
Channel	Frequency	99% BW	99% BW
		Chain 0	Chain 1
	(MHz)	(MHz)	(MHz)
Low	5500	16.37	16.38
Mid	5580	16.39	16.37
High	5700	16.39	16.38

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99% BANDWIDTH

99% BANDWIDTH, Chain 0

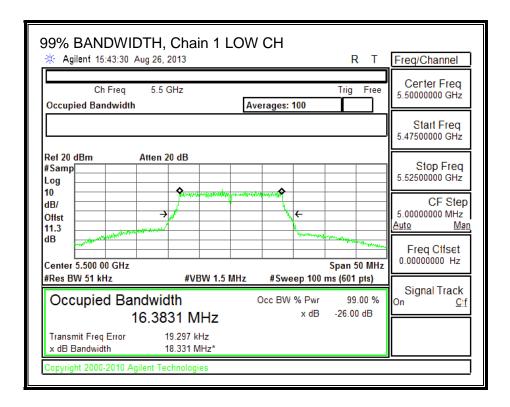




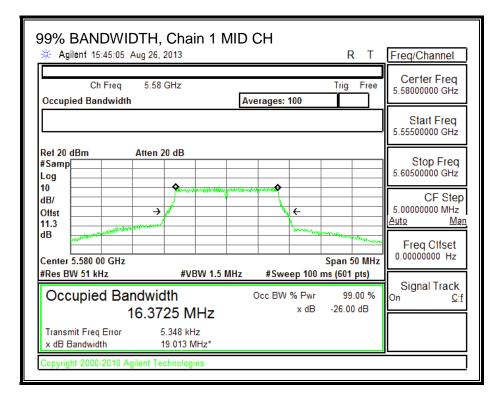
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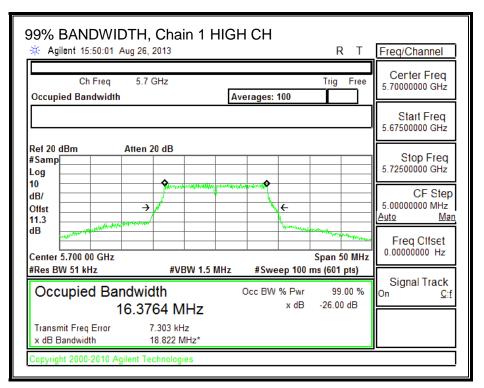
99% BANDWIDT		HIGH CH	RТ	Freq/Channel
Ch Freq	5.7 GHz	Averages: 100	Trig Free	Certer Freq 5.70000000 GHz
				Start Freq 5.67500000 GHz
#Samp	en 20 dB			Stop Freq 5.72500000 GHz
10 dB/ Olist 11.3	→ //			CF Step 5.0000000 MHz <u>Auto Man</u>
11.3 dB			Span 50 MHz	Freq Clfset 0.00000000 Hz
#Res BW 51 kHz Occupied Bandy		MHz #Sweep 100 r Occ BW % Pwr x dB	99.00 %	Signal Track ^{On <u>C</u>if}
ם לשם. Transmit Freq Error x dB Bandwidth	3867 MHz 13.440 kHz 18.517 MHz*	× 45	20.00 05	
Copyright 2000-2010 Agilent	Technologies			

99% BANDWIDTH, Chain 1



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8.7.3. AVERAGE POWER

<u>LIMITS</u>

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a power meter.

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

<u>RESULTS</u>

Average Power Results

Channel	Frequency	Chain 0	Chain 1	Total
		Power	Power	Power
	(MHz)	(dBm)	(dBm)	(dBm)
Low	5500	10.02	11.03	13.56
Mid	5580	9.51	10.30	12.93
High	5700	9.20	10.70	13.02

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8.7.4. OUTPUT POWER AND PPSD

LIMITS

FCC §15.407 (a) (1)

For the band 5.5–5.7 GHz, the maximum conducted output power over the frequency band of operation shall not exceed the lesser of 250 mW or 11 dBm + 10 log B, where B is the 26–dB emission bandwidth in MHz. In addition, the peak power spectral density shall not exceed 11 dBm in any 1–MHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

IC RSS-210 A9.2 (1)

The maximum e.i.r.p. shall not exceed 200 mW or 10 + 10 log10 B, dBm, whichever power is less. B is the 99% emission bandwidth in MHz. The e.i.r.p. spectral density shall not exceed 10 dBm in any 1.0 MHz band.

DIRECTIONAL ANTENNA GAIN

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

Chain 0	Chain 1	Uncorrelated Chains
Antenna	Antenna	Directional
Gain	Gain	Gain
(dBi)	(dBi)	(dBi)
3.90	3.20	3.56

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RESULTS

Bandwidth and Antenna Gain

Channel	Frequency	Min	Min	Directional
		26 dB	99%	Gain
		BW	BW	
	(MHz)	(MHz)	(MHz)	(dBi)
Low	5500	19.9	16.36	3.56
Mid	5580	19.9	16.37	3.56
High	5700	20.0	16.37	3.56

Limits

Channel	Frequency	FCC	IC	IC	Power	FCC	IC	PPSD
		Power	Power	EIRP	Limit	PPSD	PSD	Limit
		Limit	Limit	Limit		Limit	Limit	
	(MHz)	(dBm)						
Low	5500	23.99	23.14	29.14	23.14	11.00	11.00	11.00
Mid	5580	23.99	23.14	29.14	23.14	11.00	11.00	11.00
High	5700	24.00	23.14	29.14	23.14	11.00	11.00	11.00

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

Output Power Results

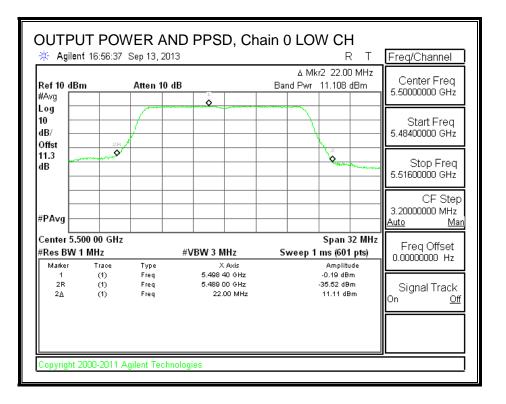
Channel	Frequency	Chain 0	Chain 1	Total	Power	Power
		Meas	Meas	Corr'd	Limit	Margi
		Power	Power	Power		n
	(MHz)	(dBm)	(dBm)	(dBm)	(dBm)	(dB)
Low	5500	11.11	12.16	14.68	23.14	-8.46
Mid	5580	10.46	11.34	13.93	23.14	-9.21
High	5700	9.77	11.52	13.74	23.14	-9.40

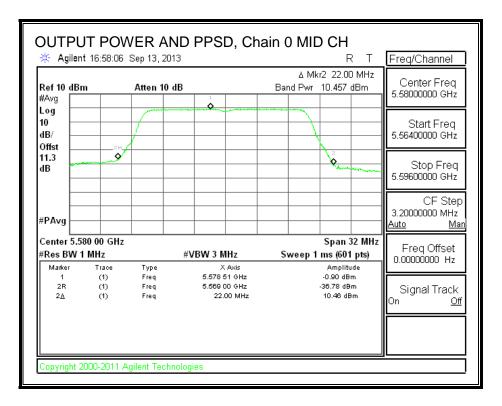
PPSD Results

Channel	Frequency	Chain 0	Chain 1	Total	PPSD	PPSD
		Meas	Meas	Corr'd	Limit	Margi
		PPSD	PPSD	PPSD		n
	(MHz)	(dBm)	(dBm)	(dBm)	(dBm)	(dB)
Low	5500	-0.19	0.89	3.39	11.00	-7.61
Mid	5580	-0.90	0.10	2.64	11.00	-8.36
High	5700	-1.62	0.19	2.39	11.00	-8.61

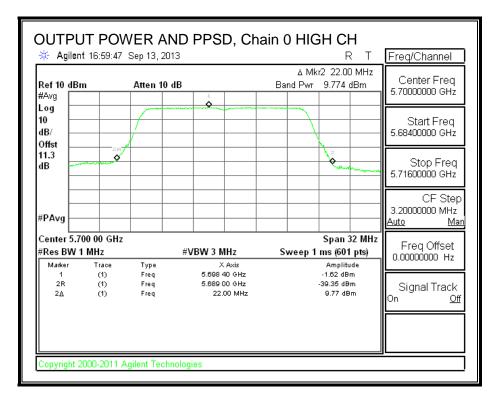
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OUTPUT POWER AND PPSD, Chain 0

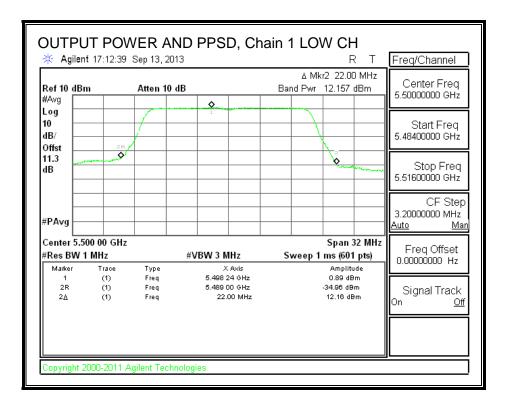




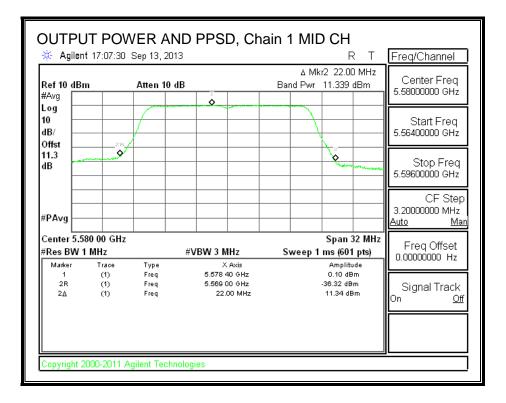
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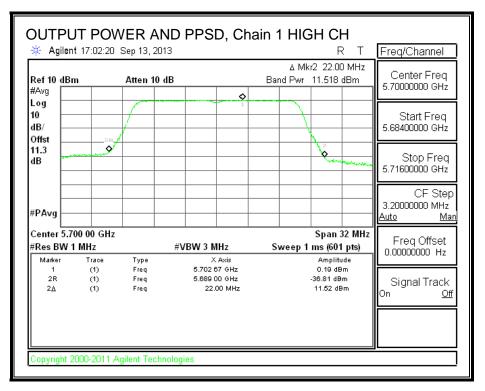


OUTPUT POWER AND PPSD, Chain 1



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8.7.5. PEAK EXCURSION

<u>LIMITS</u>

FCC §15.407 (a) (6)

The ratio of the peak excursion of the modulation envelope (measured using a peak hold function) to the peak transmit power (measured as specified above) shall not exceed 13 dB across any 1 MHz bandwidth or the emission bandwidth whichever is less.

RESULTS

Refer to the results of 802.11n HT20 mode in the 5.6 GHz band.

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8.8. 802.11n HT20 MODE IN THE 5.6 GHz BAND

8.8.1. 26 dB BANDWIDTH

LIMITS

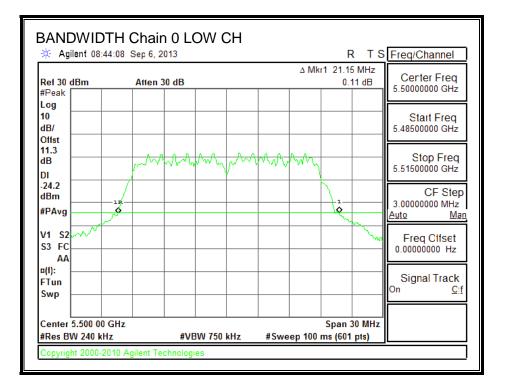
None; for reporting purposes only.

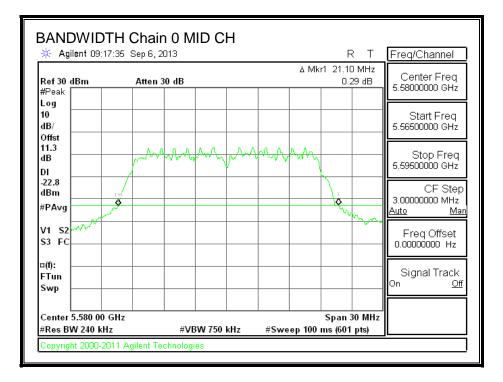
RESULTS

Channel	Frequency 26 dB BW		26 dB BW
		Chain 0	Chain 1
	(MHz)	(MHz)	(MHz)
Low	5500	21.15	20.90
Mid	5580	21.10	20.90
High	5700	21.10	20.85

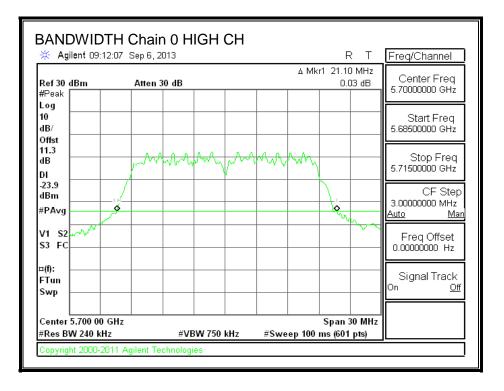
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26 dB BANDWIDTH, Chain 0

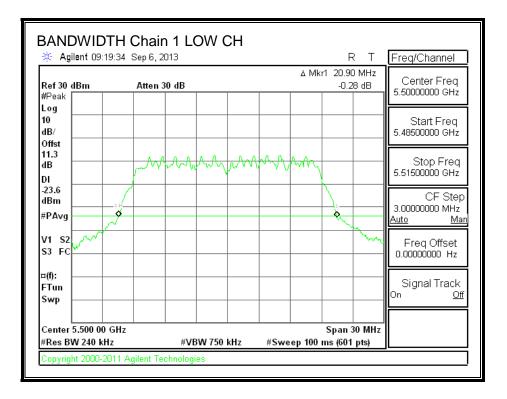




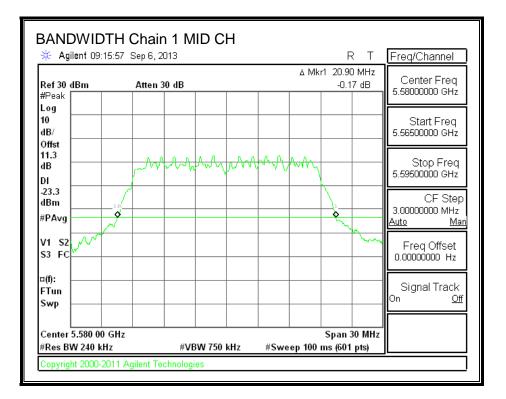
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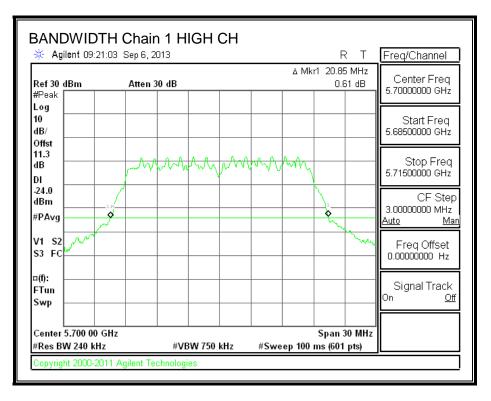


26 dB BANDWIDTH, Chain 1



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8.8.2. 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

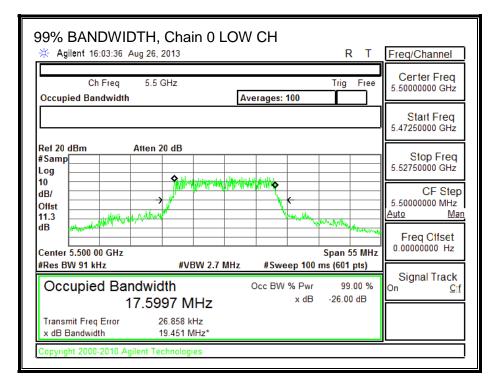
RESULTS

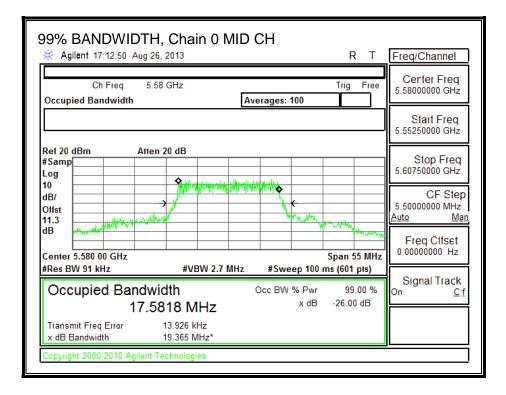
Channel	Frequency	99% BW	99% BW	
		Chain 0	Chain 1	
	(MHz)	(MHz)	(MHz)	
Low	5500	17.600	17.609	
Mid	5580	17.582	17.608	
High	5700	17.576	17.612	

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99% BANDWIDTH

99% BANDWIDTH, Chain 0





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