

FCC CFR47 PART 15 SUBPART E INDUSTRY CANADA RSS-210 ISSUE 8

CERTIFICATION TEST REPORT

FOR

802.11 a/b/g/n radio, Bluetooth Radio Function

MODEL NUMBER: A1403

FCC ID: BCGA1403 IC: 579C-A1403

(This report is also used to support FCC ID: BCGA1416 and BCGA1430 based upon permission given by FCC in KDB 154009)

REPORT NUMBER: 11U13938-2, Revision D1

ISSUE DATE: FEBRUARY 03, 2012

Prepared for APPLE, INC. 1 INFINITE LOOP CUPERTINO, CA 95014, U.S.A.

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NVLAP LAB CODE 200065-0

Revision History

Rev.	lssue Date	Revisions	Revised By
	12/12/11	Initial Issue	F. Ibrahim
Α	12/13/11	Revised Antenna Gains	A. Zaffar
В	02/02/12	Updated antenna port and radiated testing per KDB 789033 D01 dated 10/25/2011	F. Ibrahim
С	02/02/12	Revised 1. Model number 2. FCC and IC ID	A. Zaffar
D	02/03/12	Revised EUT description	A. Zaffar
D1	02/15/12	Revised cover page by referencing KDB 154009	A. Zaffar

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	CERTIFICATION SERVICES FORM NO: CCSUP47	
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1. ATTESTATION OF TEST RESULTS

COMPANY NAME:	APPLE, INC.
	1 INFINITE LOOP
	CUPERTINO, CA, 95014, U.S.A.

EUT DESCRIPTION: The Apple iPad, Model A1403 is a tablet device with iPod functions (music, application support, and video), 802.11a/b/g/n radio, Bluetooth radio functions, and cellular using the CDMA/GSM 2G/3G/LTE data radio functions.

MODEL: A1403

SERIAL NUMBER: PT667496, PT654922

DATE TESTED: SEPTEMBER 20 to DECEMBER 10, 2011 AND JANUARY 30-FEBUARY 02, 2012.

APPLICABLE STANDARDS					
STANDARD	TEST RESULTS				
CFR 47 Part 15 Subpart E	Pass				
INDUSTRY CANADA RSS-210 Issue 8 Annex 8	Pass				
INDUSTRY CANADA RSS-GEN Issue 3	Pass				

Compliance Certification Services (UL CCS) 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 CCS 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 CCS and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL CCS 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 CCS By:

FRANK IBRAHIM EMC SUPERVISOR COMPLIANCE CERTIFICATION SERVICES

Tested By:

Chin Pany

CHIN PANG EMC TECHNICIAN COMPLIANCE CERTIFICATION SERVICES

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2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.4-2003, FCC CFR 47 Part 2, FCC CFR 47 Part 15, RSS-GEN Issue 2, ICES-003 ISSUE 4, 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.

CCS 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 Apple iPad, Model A1403 is a tablet device with iPod functions (music, application support, and video), 802.11a/b/g/n radio, Bluetooth radio functions, and cellular using the CDMA/GSM 2G/3G/LTE data radio functions.

5.2. MAXIMUM OUTPUT POWER

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

Frequency Range (MHz)	Mode	Output Power (dBm)	Output Power (mW)
5180 – 5240	802.11a	13.81	24.04
5180 - 5240	802.11n HT20	13.87	24.38
5260 - 5320	802.11a	17.63	57.94
5260 - 5320	802.11n HT20	17.72	59.16
5500 - 5700	802.11a	16.69	46.67
5500 - 5700	802.11n HT20	16.90	48.98

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes a PiFA integrated antenna, with the following gain:

5.2 GHz band: 4.63 dBi 5.6 GHz band: 4.51 dBi

5.4. SOFTWARE AND FIRMWARE

The firmware installed in the EUT during testing was 9B87 The EUT driver software installed during testing was Broadcom_Rel_5_90_156_24 The test utility software used during testing was WL_tool.

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5.5. WORST-CASE CONFIGURATION AND MODE

For Radiated Emissions below 1 GHz and Power line Conducted Emissions, the channel with the highest conducted output power was selected as worst-case scenario.

Worst-case data rates as provided by the manufacturer are:

For 11b mode: 1Mbps For 11g mode: 6Mbps For 11a mode: 6Mbps For 11n HT20: MCS0

EUT is a portable device that has three orientations; therefore, X Y and Z orientations have been investigated, and the worst case was found to be at Z position.

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5.6. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

PERIPHERAL SUPPORT EQUIPMENT LIST							
Description Manufacturer Model Serial Number							
Earphone	Apple	NA	NA				
AC Adaptor							

I/O CABLES (Conducted Setup)

I/O Cable List						
Cable	Cable Port # of Identical Connector Cable Cable Remarks					
No.		Ports	Туре	Туре	Length	
1	Antenna	1	SMA	Shielded	0.1m	To Spectrum Analyzer

I/O CABLES (Radiated Setup)

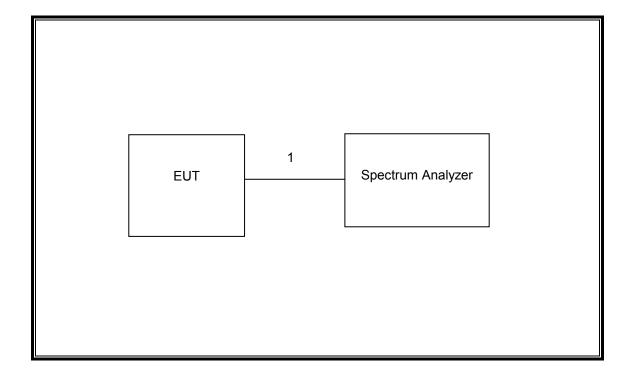
	I/O CABLE LIST							
Cable No.	Port	# of Identical Ports	Connector Type	Cable Type	Cable Length	Remarks		
1	AC	1	AC	unshielded	2m	N/A		
2	DC	1	DC	unshielded	1m	N/A		
3	Jack	1	Earphone	unshielded	0.5m	N/A		

TEST SETUP

The EUT is a stand-alone device.

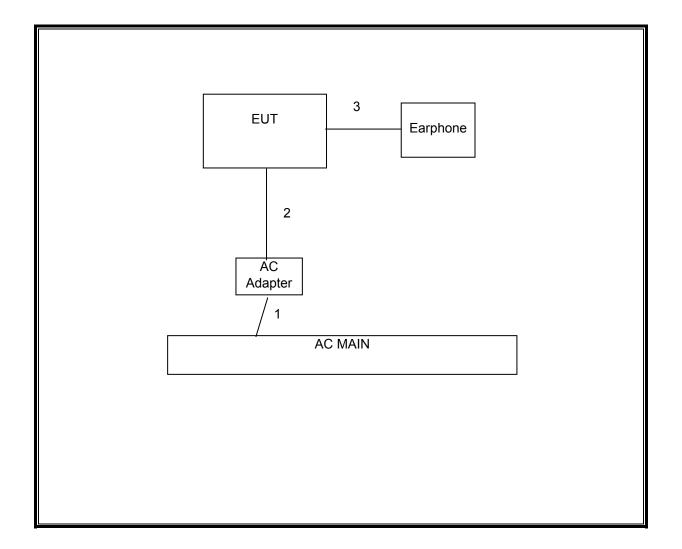
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SETUP DIAGRAM FOR TESTS (CONDUCTED)



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SETUP DIAGRAM FOR TESTS (RADIATED)



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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 D							
Spectrum Analyzer, 44 GHz	Agilent / HP	E4446A	C01012	09-02-11	09-02-12		
Preamplifier, 26.5 GHz	Agilent / HP	8449B	001063	07-12-11	07-12-12		
Preamplifier, 1300 MHz	Agilent / HP	8447D	C00580	01-27-11	01-27-12		
EMI Test Receiver, 9 kHz-7 GHz	R&S	ESCI 7	1000741	07-06-11	07-06-12		
LISN, 30 MHz	FCC	LISN-50/250-25-2	N02625	11-10-11	11-10-12		
Highpass Filter, 7.6 GHz	Micro-Tronics	HPM13195	N02682	CNR	ONR		
Antenna, Horn, 18 GHz	EMCO	3115	000783	06-29-11	06-29-12		
Peak Power Meter	Agilent / HP	E4416A	000963	03-22-11	03-22-13		
Peak / Average Power Sensor	Agilent / HP	E9327A	C00964	04-13-11	04-13-12		
Antenna, Horn, 26.5 GHz	ARA	MWH-1826/B	C00589	07-28-11	07-28-12		
Antenna, Horn, 40 GHz	ARA	MWH-2640/B	C00981	06-14-11	06-14-12		
Preamplifier, 40 GHz	Miteq	NSP4000-SP2	C00990	08-02-11	08-02-12		

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7. ANTENNA PORT TEST RESULTS

7.1. ON TIME, DUTY CYCLE AND MEASUREMENT METHODS

<u>LIMITS</u>

None; for reporting purposes only.

PROCEDURE

KDB 789033 Zero-Span Spectrum Analyzer Method.

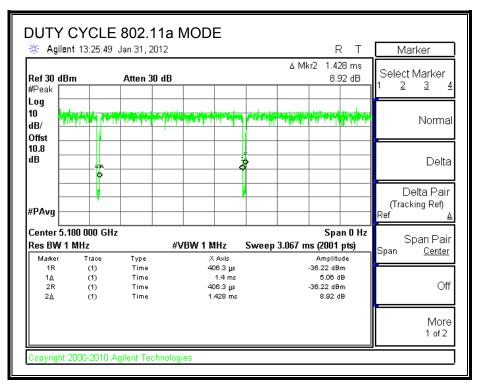
ON TIME AND DUTY CYCLE RESULTS

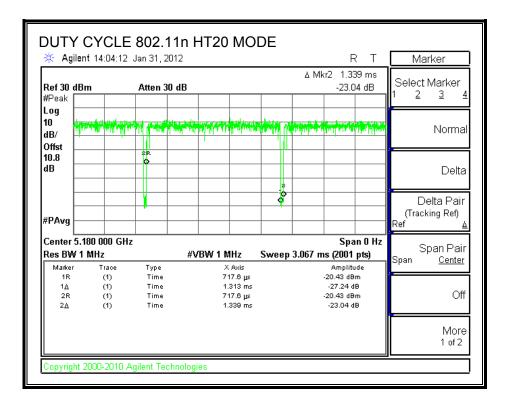
Mode	ON Time	Period	Duty Cycle	Duty	Duty Cycle	1/B
	В		x	Cycle	Correction Factor	Minimum VBW
	(msec)	(msec)	(linear)	(%)	(dB)	(kHz)
5.2GHz, 802.11a	1.400	1.428	0.980	98.0%	0.09	0.714
5.2GHz 802.11HT20	1.313	1.339	0.981	98.1%	0.09	0.762
5.3GHzm 802.11a	1.400	1.428	0.980	98.0%	0.09	0.714
5.3GHz 802.11HT20	1.313	1.337	0.982	98.2%	0.08	0.762
5.6GHz, 802.11a	1.400	1.428	0.980	98.0%	0.09	0.714
5.6GHz, 802.11HT20	1.317	1.342	0.981	98.1%	0.08	0.759

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DUTY CYCLE PLOTS

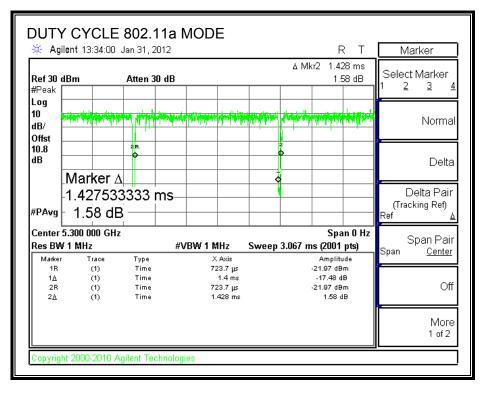
5.2GHz BAND

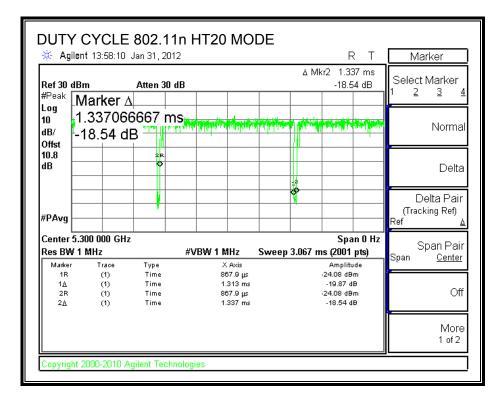




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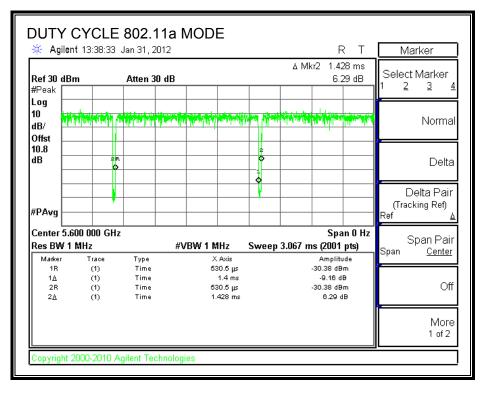
5.3GHz BAND

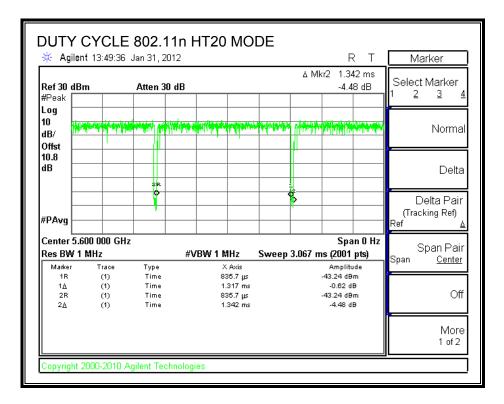




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5.6GHz BAND





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7.2. 802.11a LEGACY MODE IN THE 5.2 GHz BAND

7.2.1. 99% BANDWIDTH

<u>LIMITS</u>

None; for reporting purposes only.

TEST PROCEDURE

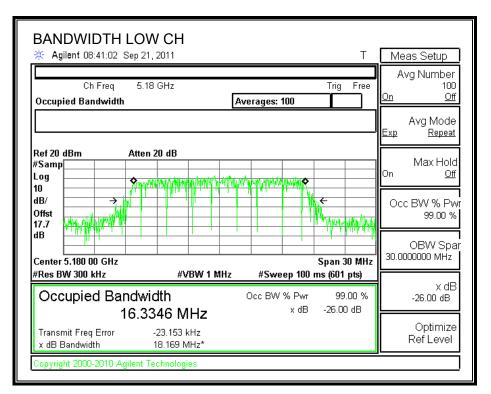
The transmitter outputs are connected to the spectrum analyzer via a combiner. The RBW is set to 1% to 3% of the measured bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal bandwidth function is utilized.

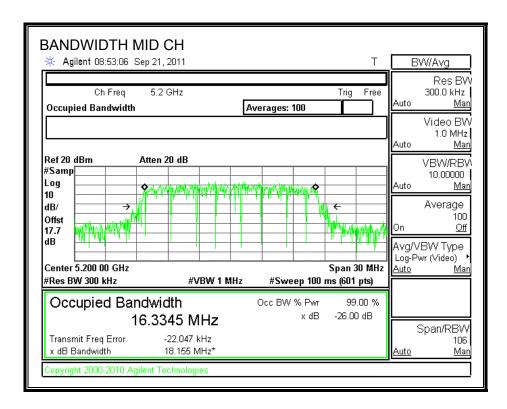
<u>RESULTS</u>

Channel	Frequency	99% Bandwidth
	(MHz)	(MHz)
Low	5180	16.3346
Middle	5200	16.3345
High	5240	16.3458

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99% BANDWIDTH





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BANDWIDTH HIGH # Agilent 09:01:51 Sep 21, 2	•••		Т	В	W/Avg
Ch Freq 5.24 (Occupied Bandwidth	GHz	Averages: 100	Trig Free	Auto	Res BW 300.0 kHz <u>Man</u>
				Auto	Video BW 1.0 MHz <u>Man</u>
Ref 20 dBm Atten 2 #Samp Log 10				Auto	VBW/RBW 10.00000 <u>Man</u>
dB/ →				On	Average 100 <u>Off</u>
dB	#VBW 1 MHz	#Sweep 100 i	Span 30 MHz ms (601 pts)		/BW Type wr (Video) ► <u>Man</u>
Occupied Bandwid		Occ BW % Pwr x dB	99.00 %		
Transmit Freq Error -2	24.752 kHz 8.165 MHz*			: <u>Auto</u>	Span/RBW 106 <u>Man</u>
Copyright 2000-2010 Agilent Tec	chnologies				

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7.2.2. 26dB BANDWIDTH

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

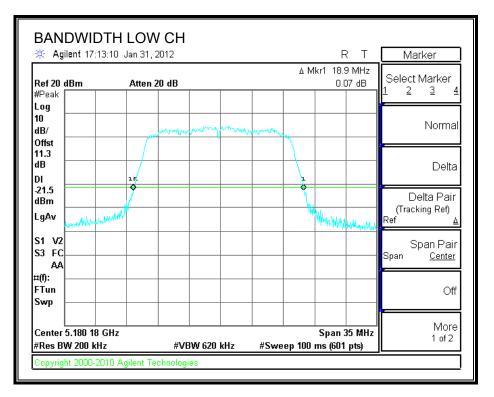
KDB 789033 D01 dated 10/25/2011.

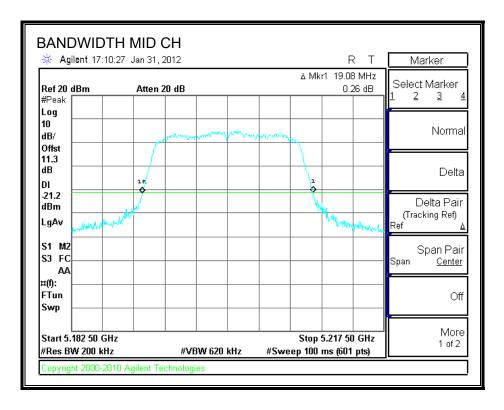
RESULTS

Channel	Frequency	26 dB Bandwidth
	(MHz)	(MHz)
Low	5180	18.90
Middle	5200	19.08
High	5240	19.13

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26dB BANDWIDTH





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🔆 Agilent 17:18	:53 Jan 31, 2012			RT	Marker
Ref 20 dBm #Peak	Atten 20 dE	}	∆ Mk	r1 19.13 MHz 0.93 dB	Select Marker
#Peak Log					
10 dB/		man and the second	man and and the second		Norma
Offst 11.3 dB					Delta
DI -21.7 dBm					Delta Pair
LgAv	MAR .			Mary Mary Mary	(Tracking Ref) Ref <u>∆</u>
S1 M2 S3 FC AA					Span Pair Span <u>Center</u>
¤(f): FTun Swp					Off
Center 5.240 00 G	Hz			Span 35 MHz	More
#Res BW 200 kHz		VBW 620 kHz	#Sweep 100	•	1 of 2

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7.2.3. OUTPUT POWER

LIMITS

FCC §15.407 (a) (1)

IC RSS-210 A9.2 (1)

For the 5.15-5.25 GHz band, 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. If transmitting antennas of directional gain greater than 6 dBi are used, both the peak transmit 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.

TEST PROCEDURE

KDB 789033 D01 dated 10/25/2011.

RESULTS

Limit

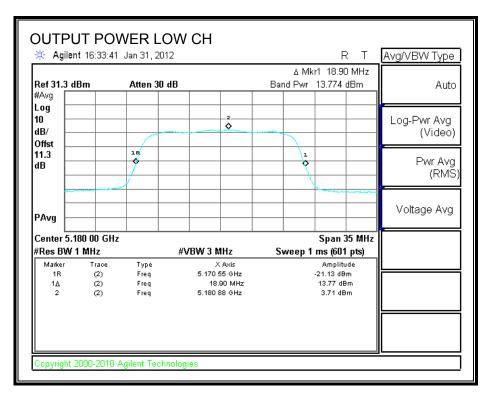
Channel	Frequency	Fixed	В	4 + 10 Log B	Antenna	Limit
		Limit		Limit	Gain	
	(MHz)	(dBm)	(MHz)	(dBm)	(dBi)	(dBm)
Low	5180	17	18.90	16.76	4.63	16.76
Mid	5200	17	19.08	16.81	4.63	16.81
High	5240	17	19.13	16.82	4.63	16.82

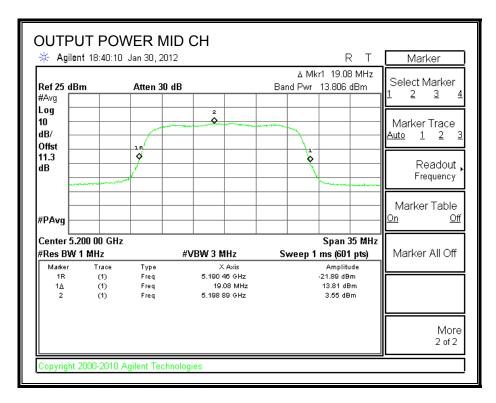
Results

Channel	Frequency	Power	Limit	Margin
	(MHz)	(dBm)	(dBm)	(dB)
Low	5180	13.774	16.76	-2.991
Mid	5200	13.806	16.81	-3.000
High	5240	13.780	16.82	-3.037

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OUTPUT POWER





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A Higher	N 10.50.55	Jan 30, 201	2		R T	Marker
Ref 25 dBi #Avg	m	Atten 30	dB		r1 19.13 MHz 13.780 dBm	Select Marker
Log 10 dB/			2			Marker Trace
Offst 11.3 dB		1R' Ø		\$		Readout Frequency
#PAvg						Marker Table
Center 5.2 #Res BW ⁻		:	#VBW 3 MHz	Sween 1	Span 35 MH ms (601 pts)	z Marker All Off
Marker 1R 1 <u>A</u> 2	Trace (1) (1) (1)	Type Freq Freq Freq	X Axis 5.230 44 GHz 19.13 MHz 5.239 24 GHz		Amplitude -22.23 dBm 13.78 dBm 3.50 dBm	
						More 2 of 2

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7.2.4. AVERAGE POWER

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a power meter.

RESULTS

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.

Channel	Frequency	Power
	(MHz)	(dBm)
Low	5180	13.68
Middle	5200	13.58
High	5240	13.62

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7.2.5. PEAK POWER SPECTRAL DENSITY

LIMITS

FCC §15.407 (a) (1)

IC RSS-210 A9.2 (1)

For the 5.15-5.25 GHz band, 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 peak transmit 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.

The maximum antenna gain is less than or equal to 6 dBi, therefore the limit is 4 dBm.

TEST PROCEDURE

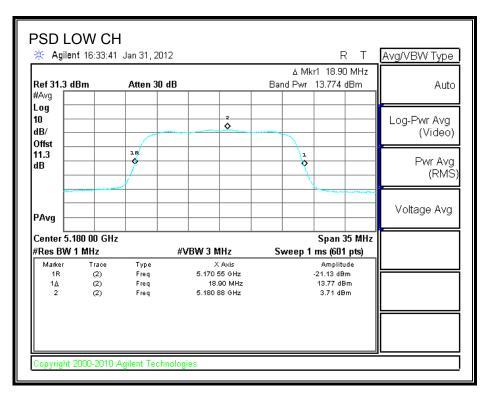
KDB 789033 D01 dated 10/25/2011.

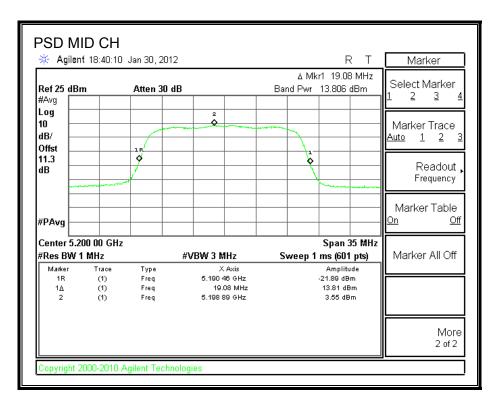
RESULTS

Channel	Frequency	PPSD	Limit	Margin
	(MHz)	(dBm)	(dBm)	(dB)
Low	5180	3.710	4	-0.29
Middle	5200	3.550	4	-0.45
High	5240	3.500	4	-0.50

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POWER SPECTRAL DENSITY





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· · · · · · · · · · · · · · ·	:58:53 Jan 30, 20	J12	R T	mainter
Ref 25 dBm #Avg	Atten 30	dB	∆ Mkr1 19.13 MHz Band Pwr 13.780 dBm	Select Marker
		2		
10 –				Marker Trace
dB/	A			<u>Auto 1 2 3</u>
Offst	18		1	
11.3 dB	9		<u> </u>	Readout
				- Frequency
				~~-
				Marker Table
#PAvg				
Center 5.240 0			Span 35 MH	
#Res BW 1 MF	lz	#VBW 3 MHz	Sweep 1 ms (601 pts)	Marker All Off
	irace Type (1) Freq	X Axis 5.230 44 GHz	Amplitude -22.23 dBm	
	(1) Freq (1) Freq	19.13 MHz	-22.23 dBm 13.78 dBm	
2	(1) Freq	5.239 24 GHz	3.50 dBm	
				htere
				More 2 of 2

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7.2.6. 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.

TEST PROCEDURE

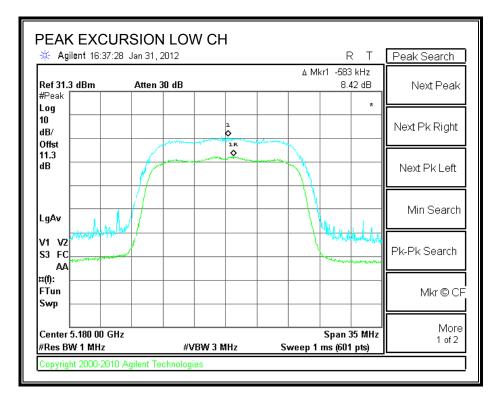
KDB 789033 D01 dated 10/25/2011.

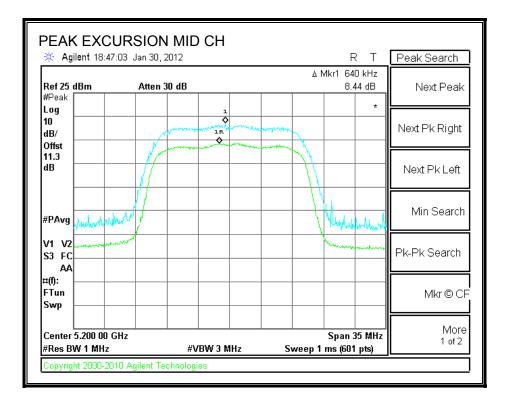
RESULTS

Channel	Frequency	Peak Excursion	Limit	Margin
	(MHz)	(dB)	(dB)	(dB)
Low	5180	8.42	13	-4.58
Middle	5200	8.44	13	-4.56
High	5240	8.70	13	-4.30

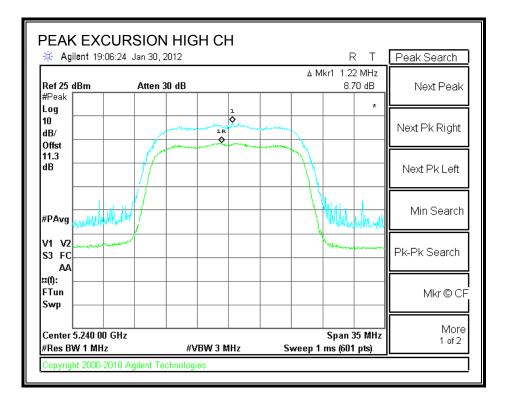
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PEAK EXCURSION





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7.3. 802.11n HT20 MODE IN THE 5.2 GHz BAND

7.3.1. 99% BANDWIDTH

<u>LIMITS</u>

None; for reporting purposes only.

TEST PROCEDURE

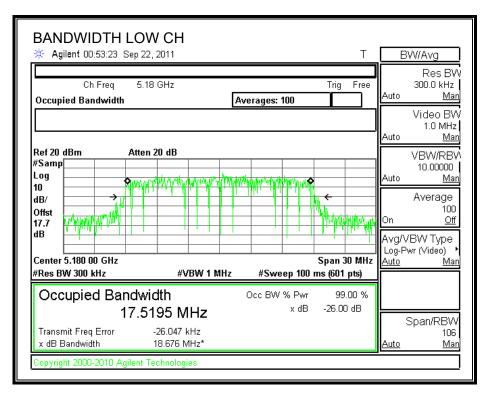
The transmitter outputs are connected to the spectrum analyzer via a combiner. The RBW is set to 1% to 3% of the measured bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal bandwidth function is utilized.

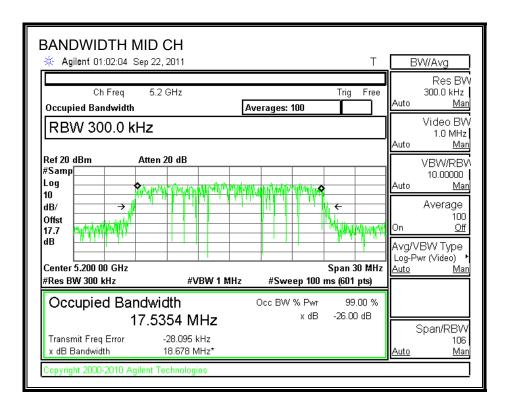
<u>RESULTS</u>

Channel	Frequency	99% Bandwidth
	(MHz)	(MHz)
Low	5180	17.5195
Middle	5200	17.5354
High	5240	17.5156

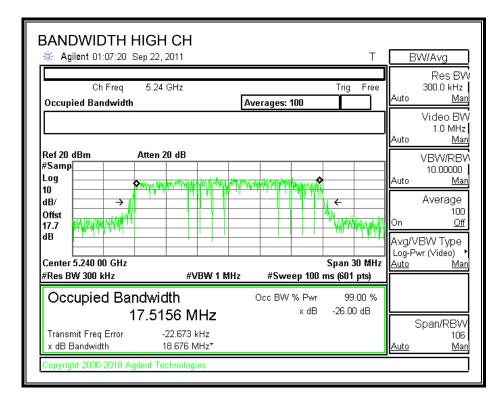
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99% BANDWIDTH





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7.3.2. 26 dB BANDWIDTH

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

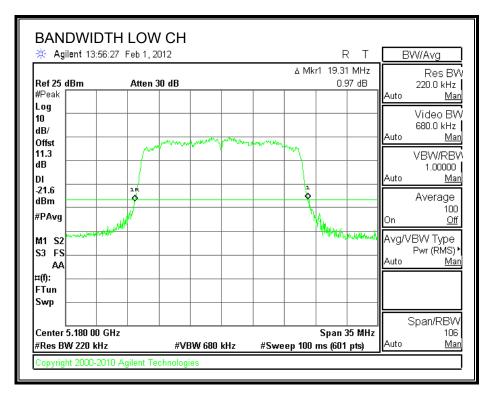
KDB 789033 D01 dated 10/25/2011.

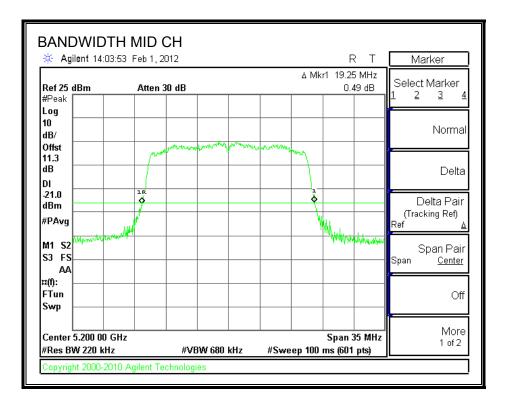
RESULTS

Channel	Frequency	26 dB Bandwidth
	(MHz)	(MHz)
Low	5180	19.31
Middle	5200	19.25
High	5240	19.25

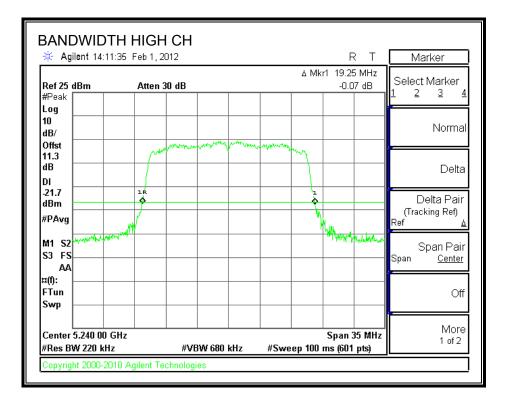
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26 dB BANDWIDTH





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7.3.3. OUTPUT POWER

LIMITS

FCC §15.407 (a) (1)

IC RSS-210 A9.2 (1)

For the 5.15-5.25 GHz band, 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. If transmitting antennas of directional gain greater than 6 dBi are used, both the peak transmit 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.

TEST PROCEDURE

KDB 789033 D01 dated 10/25/2011.

RESULTS

Limit

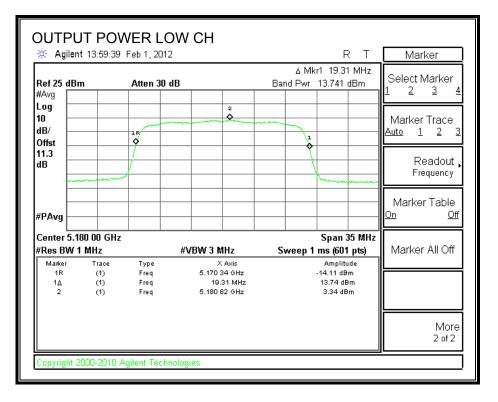
Channel	Frequency	Fixed	В	4 + 10 Log B	Antenna	Limit
		Limit		Limit	Gain	
	(MHz)	(dBm)	(MHz)	(dBm)	(dBi)	(dBm)
Low	5180	17	19.31	16.86	4.63	16.86
Mid	5200	17	19.25	16.84	4.63	16.84
High	5240	17	19.25	16.84	4.63	16.84

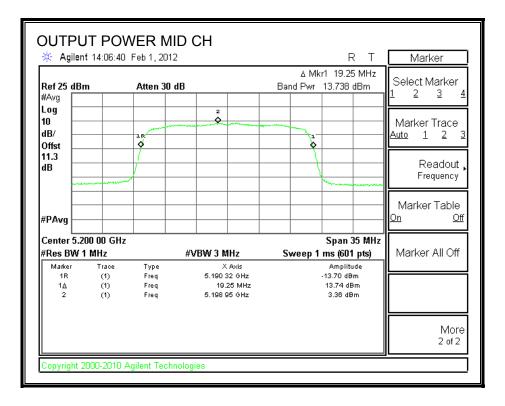
Results

Channel	Frequency	Power	Limit	Margin
	(MHz)	(dBm)	(dBm)	(dB)
Low	5180	13.741	16.86	-3.117
Mid	5200	13.738	16.84	-3.106
High	5240	13.874	16.84	-2.970

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OUTPUT POWER





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	14.15.00	Feb 1, 201:	2	R		Marker
Ref 25 dBr #Avg	m	Atten 30	dB	∆ Mkr1 19.25 Band Pwr 13.874 dt		Select Marker 1 2 3 4
Log 10 dB/			2			Marker Trace Auto 1 2 3
Offst 11.3 dB						Readout , Frequency
#PAvg						Marker Table <u>On Off</u>
Center 5.2 #Res BW ⁻		:	#VBW 3 MHz	Span 35 Sweep 1 ms (601 j		Marker All Off
Marker 1R 1 <u>A</u> 2	Trace (1) (1) (1) (1)	Type Freq Freq Freq	X Axis 5.230 38 GHz 19.25 MHz 5.240 88 GHz	Amplitud -13.00 dBm 13.87 dBm 3.32 dBm	e 1	
						More 2 of 2

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7.3.4. AVERAGE POWER

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a power meter.

RESULTS

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.

Channel	Frequency	Power
	(MHz)	(dBm)
Low	5180	13.57
Middle	5200	13.61
High	5240	13.59

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7.3.5. PEAK POWER SPECTRAL DENSITY

LIMITS

FCC §15.407 (a) (1)

IC RSS-210 A9.2 (1)

For the 5.15-5.25 GHz band, 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 peak transmit 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.

The maximum antenna gain is less than or equal to 6 dBi, therefore the limit is 4 dBm.

TEST PROCEDURE

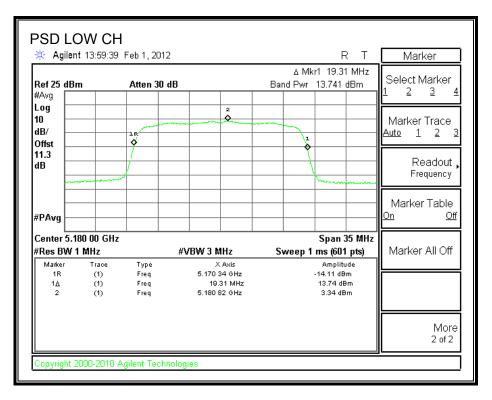
KDB 789033 D01 dated 10/25/2011.

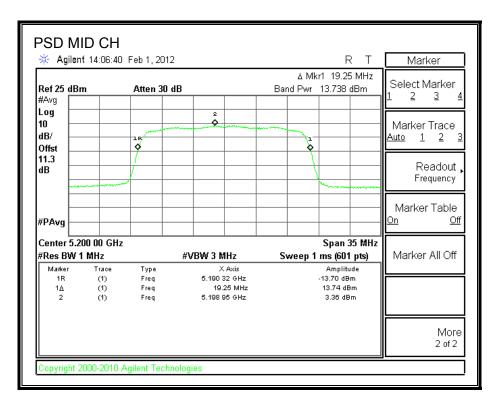
RESULTS

Channel	Frequency	PPSD	Limit	Margin
	(MHz)	(dBm)	(dBm)	(dB)
Low	5180	3.340	4	-0.66
Middle	5200	3.360	4	-0.64
High	5240	3.320	4	-0.68

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POWER SPECTRAL DENSITY





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Ref 25 <u>dBm</u>	.		Δ Mkr1 19.25 MHz	
	Atten 30 o	1B	Band Pwr 13.874 dBm	Select Marker
#Avg				
Log		2		
10				Marker Trace
dB/	1R Ø		1	- <u>Auto 1 2 3</u>
Offst				
11.3 dB				- Readout
				- Frequency
			a martine martine	~ <u> </u>
				Manlus a Tabla
				Marker Table
#PAvg				- <mark>On Of</mark>
Center 5.240 00 GI			Span 35 MH	7
#Res BW 1 MHz	12	#VBW 3 MHz	Sweep 1 ms (601 pts)	Marker All Off
Marker Trace	Туре	X Axis	Amplitude	
1R (1)	Freq	5.230 38 GHz	-13.00 dBm	
1Δ (1)	Freq	19.25 MHz	13.87 dBm	
2 (1)	Freq	5.240 88 GHz	3.32 dBm	
				More

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7.3.6. 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.

TEST PROCEDURE

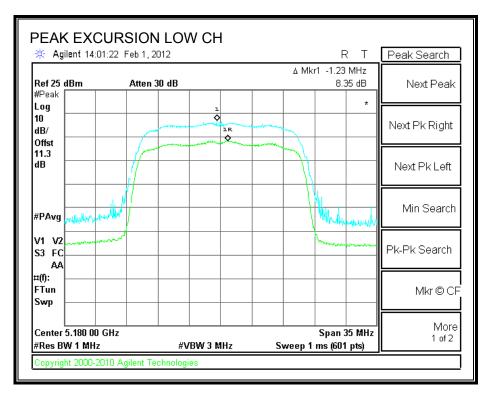
KDB 789033 D01 dated 10/25/2011.

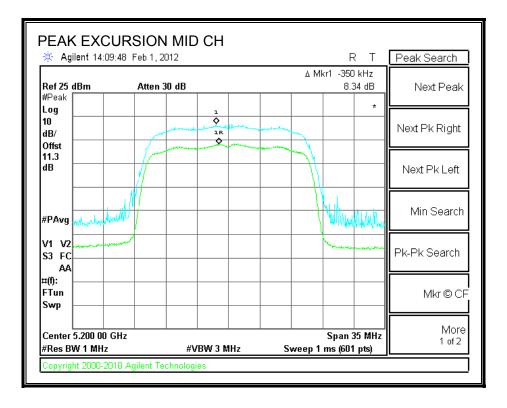
RESULTS

Channel	Frequency	Peak Excursion	Limit	Margin
	(MHz)	(dB)	(dB)	(dB)
Low	5180	8.35	13	-4.65
Middle	5200	8.34	13	-4.66
High	5240	8.06	13	-4.94

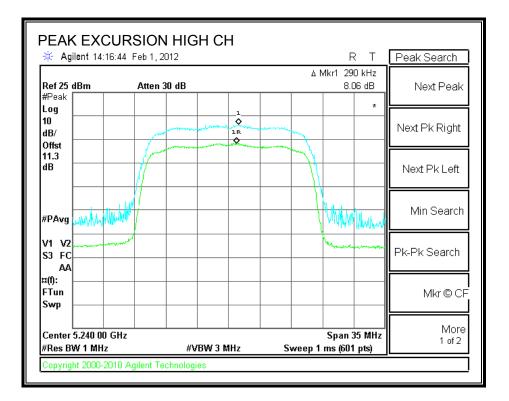
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PEAK EXCURSION





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7.4. 802.11a MODE IN THE 5.3 GHz BAND

7.4.1. 99% BANDWIDTH

<u>LIMITS</u>

None; for reporting purposes only.

TEST PROCEDURE

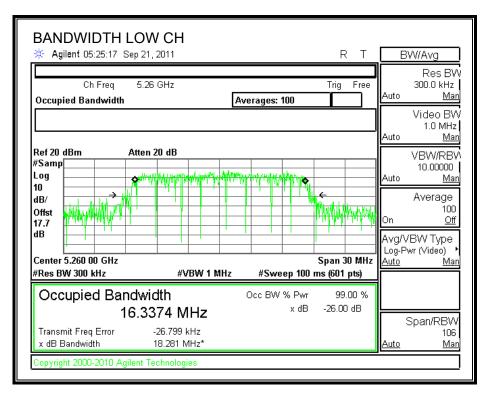
The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the measured bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal bandwidth function is utilized.

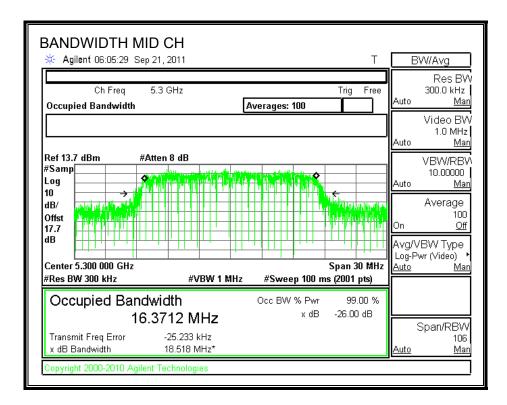
<u>RESULTS</u>

Channel	Frequency	99% Bandwidth
	(MHz)	(MHz)
Low	5260	16.3374
Middle	5300	16.3712
High	5320	16.3393

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99% BANDWIDTH





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BANDWIDTH HIGH # Agilent 06:37:42 Sep 21, 2	•••		Т	B	/V/Avg
Ch Freq 5.32 (Occupied Bandwidth		verages: 100	Trig Free	Auto	Res BW 300.0 kHz <u>Man</u> Video BW 1.0 MHz
Ref 20 dBm Atten 2 #Samp Log 10 dB/ Offst 17.7 dB				Auto On Avg/V	VBW/RBV 10.00000 <u>Man</u> Average 100 <u>Off</u> BW Type vr (Video)
Center 5.320 00 GHz #Res BW 300 kHz	#VBW 1 MHz	#Sweep 100 m	Span 30 MHz is (601 pts)	<u>Auto</u>	Mar Mar
Transmit Freq Error -2	th 93 MHz 21.224 kHz 8.123 MHz*	Occ BW % Pwr x dB	99.00 % -26.00 dB	S Auto	Gpan/RBW 106 <u>Mar</u>
Copyright 2000-2010 Agilent Teo	hnologies				

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7.4.2. 26 dB BANDWIDTH

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

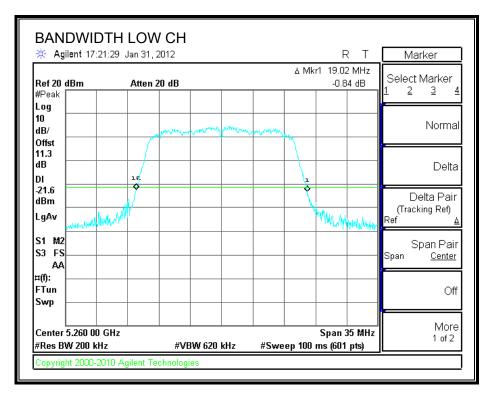
KDB 789033 D01 dated 10/25/2011.

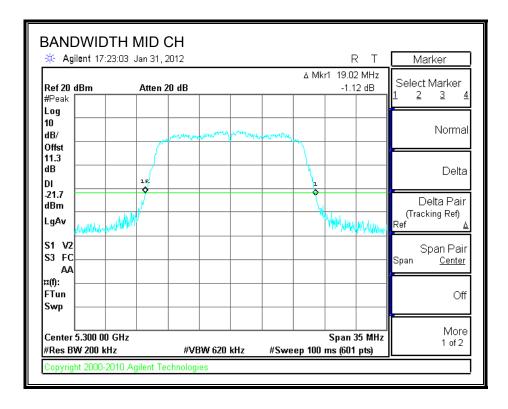
RESULTS

Channel	Frequency	26 dB Bandwidth
	(MHz)	(MHz)
Low	5260	19.02
Middle	5300	19.02
High	5320	19.08

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26 dB BANDWIDTH





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🔆 Agilent 17:24	:54 Jan 31, 2	2012					F	₹ T	Marker
Ref 20 dBm #Peak	Atten 2	20 dB				∆ Mk	r1 19.08 0.0	3 MHz)8 dB	Select Marker
Log									
dB/ Offst		part and the second	harman	pontonio	al and the	×			Norma
11.3 dB						+			Delta
DI						-			Delta Pair
dBm LgAv _{grunden} hivi	NWH-MA					<u> </u>	Manaplan	NYYAYAY	
S1 M2 S3 FC									Span Pair Span <u>Center</u>
AA ¤(f):									
FTun Swp									Off
Center 5.320 00 G #Res BW 200 kHz			W 620			400	Span 3 ms (601	85 MHz	More 1 of 2

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7.4.3. OUTPUT POWER

LIMITS

FCC §15.407 (a) (2)

IC RSS-210 A9.2 (2)

For the 5.25-5.35 GHz band, 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. If transmitting antennas of directional gain greater than 6 dBi are used, both the peak transmit 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.

TEST PROCEDURE

KDB 789033 D01 dated 10/25/2011.

RESULTS

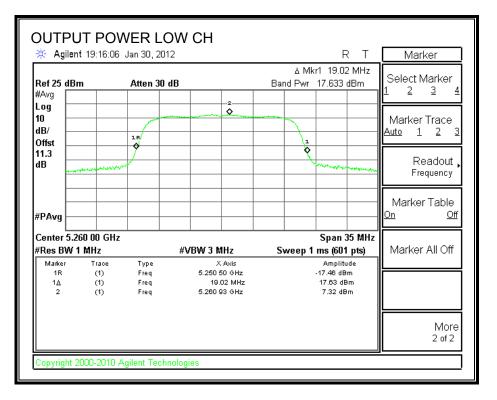
Limit

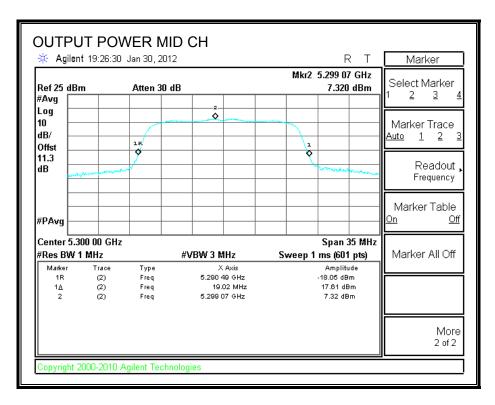
	-	-				
Channel	Frequency	Fixed	В	11 + 10 Log B	Antenna	Limit
		Limit		Limit	Gain	
	(MHz)	(dBm)	(MHz)	(dBm)	(dBi)	(dBm)
Low	5260	24	19.02	23.79	4.63	23.79
Mid	5300	24	19.02	23.79	4.63	23.79
High	5320	24	19.08	23.81	4.63	23.81

Results

Channel	Frequency	Power	Limit	Margin
	(MHz)	(dBm)	(dBm)	(dB)
Low	5260	17.633	23.79	-6.159
Mid	5300	17.610	23.79	-6.182
High	5320	16.630	23.81	-7.176

OUTPUT POWER





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w Aylient	19.36.32	Jan 30, 201	2			R T	Marker
Ref 25 dBn	1	Atten 30	dB		MKIZ	5.320 88 GHz 6.453 dBm	Select Marker
#Avg Log				2			
10 -				♦			Marker Trace
dB/							- Auto 1 2 3
Offst		1R Ø			1		
11.3		<u> </u>			<u> </u>		Readout
dB					۳. ا	have an and the second	Frequency
							- ricqueries
							Marker Table
#PAvg —							<u>On</u> Off
Center 5.32	20 00 GHz				1	Span 35 MH	z
#Res BW 1	MHz		#VBW 3	3 MHz	Sweep 1	ms (601 pts)	Marker All Off
Marker	Trace	Туре		X Axis	· · ·	Amplitude	
1R	(1)	Freq		10 46 GHz		-19.56 dBm	
1 <u>∆</u> 2	(1) (2)	Freq Freq		19.08 MHz 20 88 GHz		16.63 dBm 6.45 dBm	
	(2)	Tred	0.0	20 00 0112		0.40 0.011	
							More
							2 of 2

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7.4.4. AVERAGE POWER

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a power meter.

RESULTS

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

Frequency	Power	
(MHz)	(dBm)	
5260	17.50	
5300	17.50	
5320	16.40	

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7.4.5. PEAK POWER SPECTRAL DENSITY

LIMITS

FCC §15.407 (a) (2)

IC RSS-210 A9.2 (2)

For the 5.25–5.35 GHz band, 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 peak transmit 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.

The maximum antenna gain is less than or equal to 6 dBi, therefore the limit is 11 dBm.

TEST PROCEDURE

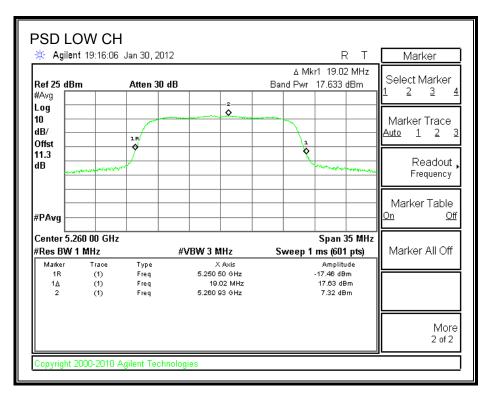
KDB 789033 D01 dated 10/25/2011.

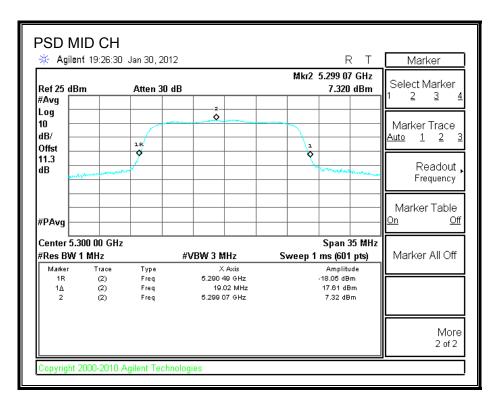
RESULTS

Channel	Frequency	PPSD	Limit	Margin
	(MHz)	(dBm)	(dBm)	(dB)
Low	5260	7.320	11	-3.68
Middle	5300	7.320	11	-3.68
High	5320	6.450	11	-4.55

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POWER SPECTRAL DENSITY





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-					ML-2	5.320 88 GHz	Marker
Ref 25 dBn		Atten 30	4D		IVIKIZ	6.453 dBm	Select Marker
#Avg		Allen Ju				0.455 0.00	1 2 3
				2			
10				♦			
dB/							Marker Trace
Offst		lR					<u>Auto 1 2</u>
11.3							
					¥.		Readout
4D		(und				had many marker again a	Frequency
							Marker Table
#PAvg —				+			- <u>On</u> <u>Of</u>
Center 5.32	20.00.011-					C	J
						Span 35 MHz	
#Res BW 1			#VBW 3 I		Sweep 1	ms (601 pts)	Marker All Off
Marker	Trace	Туре		X Axis		Amplitude	
1R 1∆	(1) (1)	Freq Freq		46 GHz .08 MHz		-19.56 dBm 16.63 dBm	
2	(2)	Freq		88 GHz		6.45 dBm	
							More
							2 of 2

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7.4.6. 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.

TEST PROCEDURE

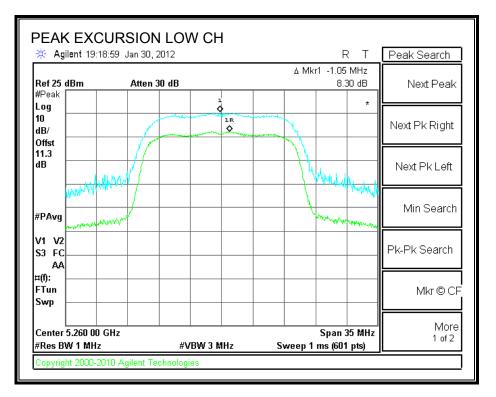
KDB 789033 D01 dated 10/25/2011.

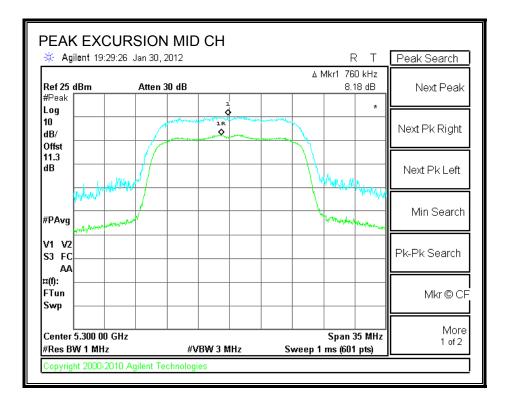
RESULTS

Channel	Frequency	Peak Excursion	Limit	Margin
	(MHz)	(dB)	(dB)	(dB)
Low	5260	8.30	13	-4.70
Middle	5300	8.18	13	-4.82
High	5320	8.24	13	-4.76

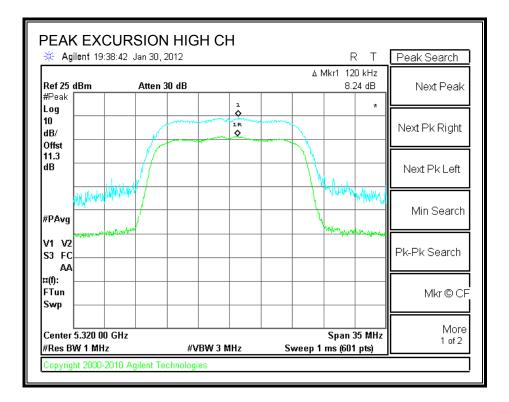
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PEAK EXCURSION





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7.5. 802.11n HT20 MODE IN THE 5.3 GHz BAND

7.5.1. 99% BANDWIDTH

<u>LIMITS</u>

None; for reporting purposes only.

TEST PROCEDURE

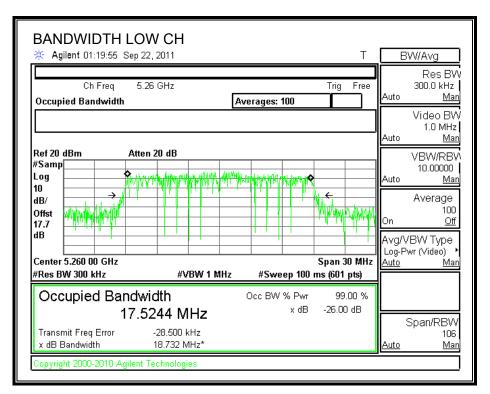
The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the measured bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal bandwidth function is utilized.

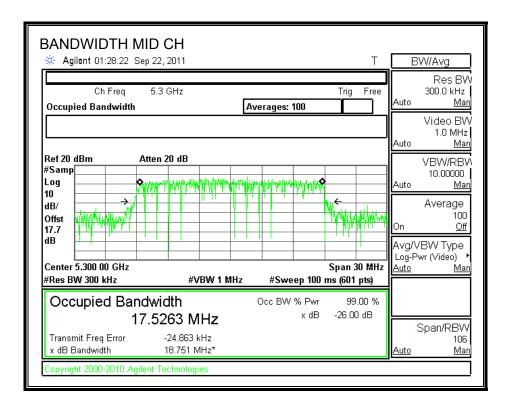
<u>RESULTS</u>

Channel	Frequency	99% Bandwidth
	(MHz)	(MHz)
Low	5260	17.5244
Middle	5300	17.5263
High	5320	17.5193

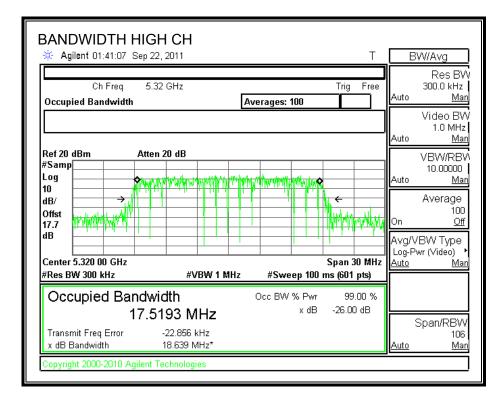
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99% BANDWIDTH





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7.5.2. 26 dB BANDWIDTH

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

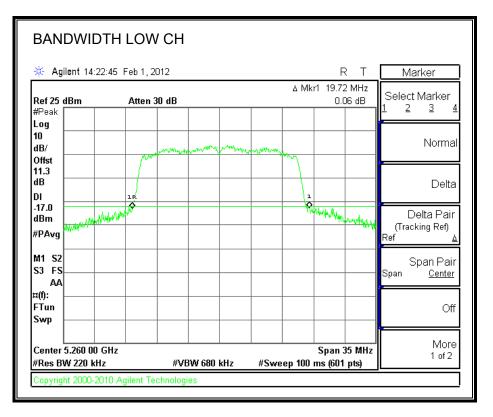
KDB 789033 D01 dated 10/25/2011.

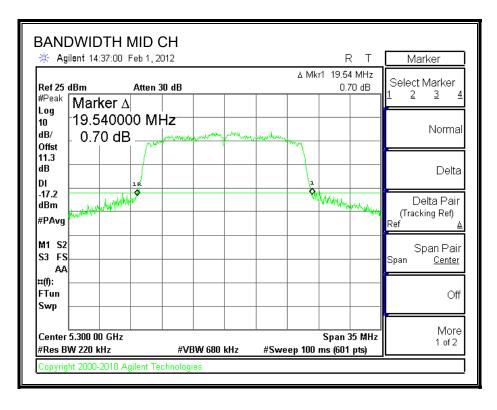
RESULTS

Channel	Frequency	26 dB Bandwidth
	(MHz)	(MHz)
Low	5260	19.72
Middle	5300	19.54
High	5320	19.31

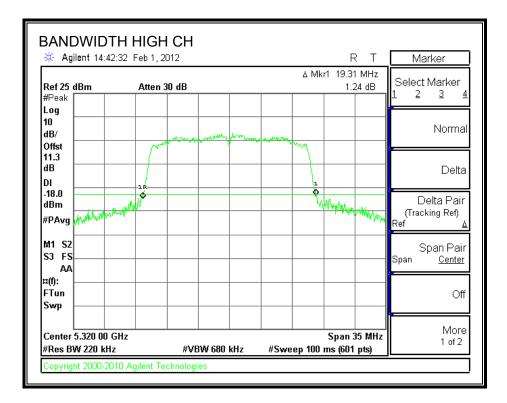
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26 dB BANDWIDTH





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7.5.3. OUTPUT POWER

LIMITS

FCC §15.407 (a) (2)

IC RSS-210 A9.2 (2)

For the 5.25-5.35 GHz band, 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. If transmitting antennas of directional gain greater than 6 dBi are used, both the peak transmit 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.

TEST PROCEDURE

KDB 789033 D01 dated 10/25/2011.

RESULTS

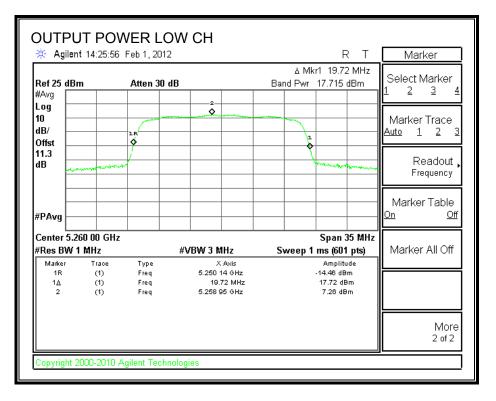
Limit

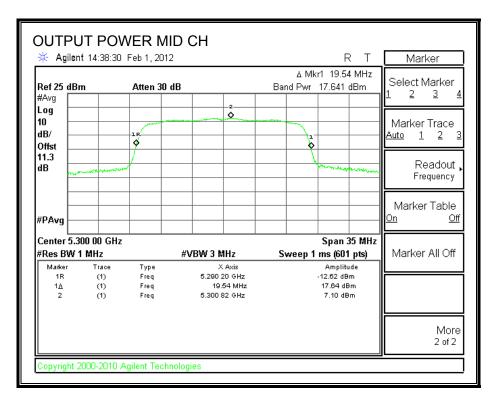
<u></u>						
Channel	Frequency	Fixed	В	11 + 10 Log B	Antenna	Limit
		Limit		Limit	Gain	
	(MHz)	(dBm)	(MHz)	(dBm)	(dBi)	(dBm)
Low	5260	24	19.72	23.95	4.63	23.95
Mid	5300	24	19.54	23.91	4.63	23.91
High	5320	24	19.31	23.86	4.63	23.86

Results

Channel	Frequency	Power	Limit	Margin
	(MHz)	(dBm)	(dBm)	(dB)
Low	5260	17.715	23.95	-6.234
Mid	5300	17.641	23.91	-6.268
High	5320	16.688	23.86	-7.168

OUTPUT POWER





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Agricine Agricine	. 14.44.10	Feb 1, 201	2				R T	Marker	
Ref 25 dBn #Avg	1	Atten 30	dB			Mkr1 19.3 wr 16.688		Select Marke	er 4
Log									
10 -				♦				Marker Trac	е
dB/		1R			`	<u>\</u>		Auto 1 2	3
Offst		Ý				<u> </u>			
11.3								Readou	ı +
dB	-	-				Interrogen	mannen	Frequenc	
								11090010	.)
								Morkor Tob	
								Marker Tabl On	ie Off
#PAvg								<u>on</u> .	
Center 5.32	20 00 GHz	 !			I	Span	35 MHz		
#Res BW 1	MHz		#VBW 3	3 MHz	Swee	p 1 ms (60		Marker All O	ff
Marker	Trace	Туре		X Axis		Amplit	tude		
1R	(1)	Freq		10 34 GHz		-11.49 d			
1 <u>∆</u> 2	(1) (1)	Freq Freq		19.31 MHz 21.22 GHz		16.69 d 6.43 d			
<u> </u>	0	rieq	0.0	1722 VH2		0.46 0	5111		
								Mc Mc	bre
								2 of	2

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7.5.4. AVERAGE POWER

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a power meter.

RESULTS

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.

Frequency	Power
(MHz)	(dBm)
5260	17.40
5300	17.40
5320	16.40

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7.5.5. PEAK POWER SPECTRAL DENSITY

LIMITS

FCC §15.407 (a) (2)

IC RSS-210 A9.2 (2)

For the 5.25–5.35 GHz band, 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 peak transmit 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.

The maximum antenna gain is less than or equal to 6 dBi, therefore the limit is 11 dBm.

TEST PROCEDURE

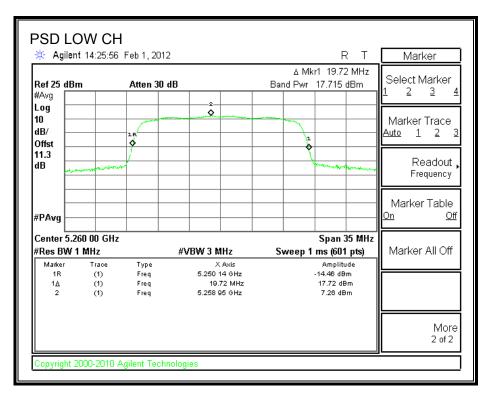
KDB 789033 D01 dated 10/25/2011.

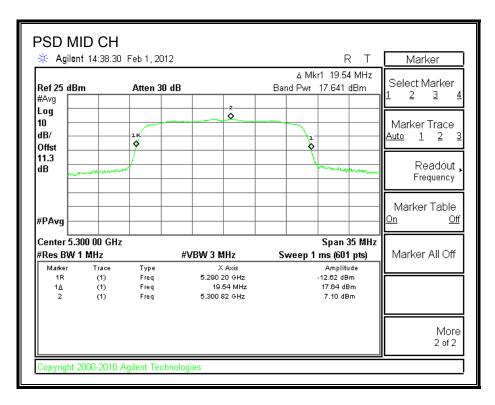
RESULTS

Channel	Frequency	PPSD	Limit	Margin
	(MHz)	(dBm)	(dBm)	(dB)
Low	5260	7.260	11	-3.73
Middle	5300	7.100	11	-3.69
High	5320	6.430	11	-3.57

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POWER SPECTRAL DENSITY





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🔆 Agilent	14:44:10	Feb 1, 201	2		R T	Marker
Ref 25 dBm		Atten 30	dB		r1 19.31 MHz 16.688 dBm	Select Marker
#Avg Log		_	2			
10 –			×			Marker Trace
dB/		1R				<u>Auto 1 2 3</u>
Offst		- `				
dB					N .	Readout
	Select Selection				mangener	Frequency
						Marker Table
#PAvg		_				On Of
Center 5.32	0 00 GHz				Span 35 MHz	
#Res BW 1			#VBW 3 MHz	Sweep 1	ms (601 pts)	Marker All Off
Marker	Trace	Туре	X Axis		Amplitude	
1R 1 <u>A</u>	(1)	Freq	5.310 34 GHz 19.31 MHz		-11.49 dBm 16.69 dBm	
2	(1) (1)	Freq Freq	5.321 22 GHz		6.43 dBm	
						More
						2 of 2

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7.5.6. 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.

TEST PROCEDURE

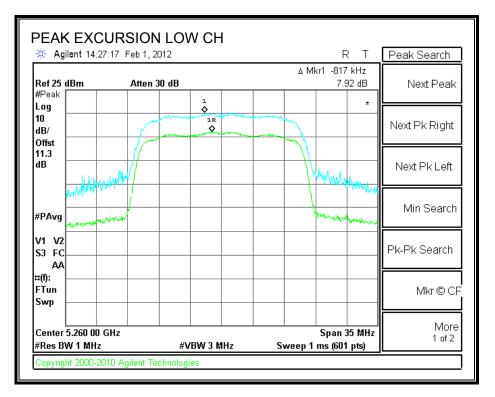
KDB 789033 D01 dated 10/25/2011.

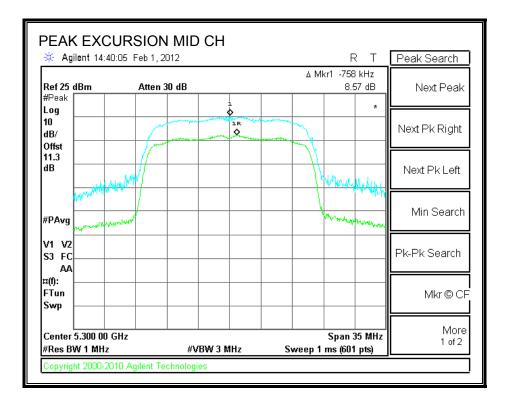
RESULTS

Channel	Frequency	Peak Excursion	Limit	Margin
	(MHz)	(dB)	(dB)	(dB)
Low	5260	7.92	13	-5.08
Middle	5300	8.57	13	-4.43
High	5320	8.28	13	-4.72

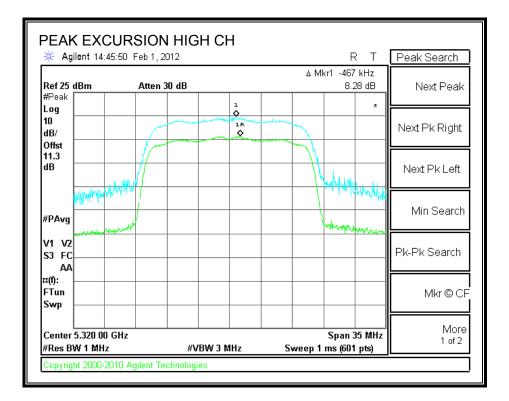
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PEAK EXCURSION





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7.6. 802.11a MODE IN THE 5.6 GHz BAND

7.6.1. 99% BANDWIDTH

<u>LIMITS</u>

None; for reporting purposes only.

TEST PROCEDURE

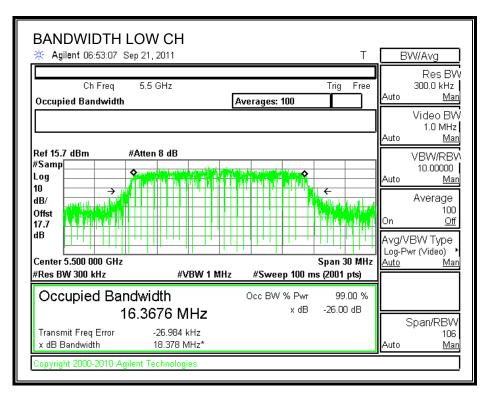
The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the measured bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal bandwidth function is utilized.

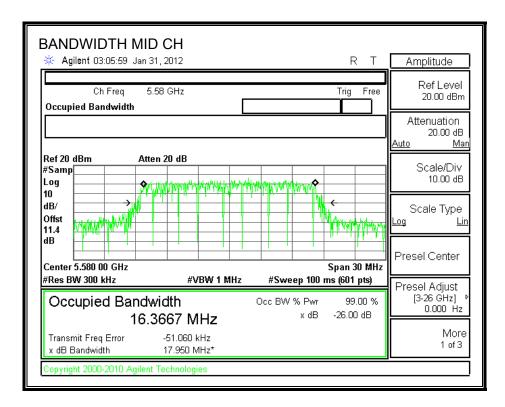
<u>RESULTS</u>

Channel	Frequency	99% Bandwidth
	(MHz)	(MHz)
Low	5500	16.3676
Middle	5580	16.3667
High	5700	16.3352

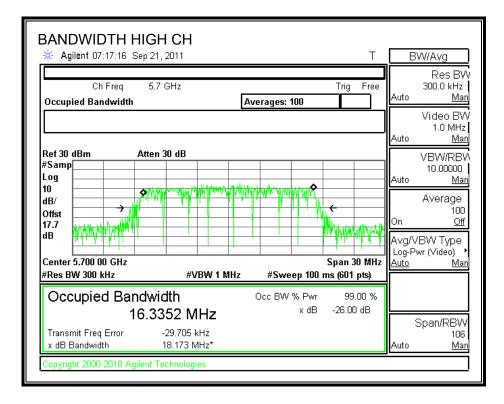
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99% BANDWIDTH





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7.6.2. 26 dB BANDWIDTH

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

KDB 789033 D01 dated 10/25/2011.

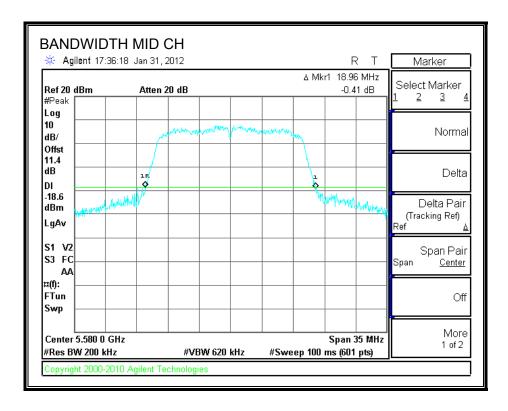
RESULTS

Channel	Frequency	26 dB Bandwidth
	(MHz)	(MHz)
Low	5500	18.90
Middle	5580	18.96
High	5700	18.96

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26 dB BANDWIDTH

#Res B\	5.500 00 GHz N 200 kHz			W 620	kHz	#Swe	ep 100		15 MHz pts)		More 1 of 2
¤(f): FTun Swp											Off
S1 V2 S3 FC AA										Span	Span Pair <u>Center</u>
-18.7 dBm LgAv	and the Assert	ydw ^y					M	alader, mility	4Mainappe		Delta Pair cking Ref) ≜
11.4 dB DI		15					1				Delta
Log 10 dB/ Offst		m	pt - with the pure	rowing	particular	manna	*~~				Normal
Ref 20 o #Peak	1Bm	Atten 2	0 dB				∆ Mk	r1 18.90 -0.3) MHz 0 dB	Selec 1 2	t Marker <u>3</u> 4
	DWIDTH lent 17:30:17							F	? Т	M	arker



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🔆 Agilent 17:37	:26 Jan 31, 2	2012					F	≀ T	Ma	rker
Ref 20 dBm #Peak	Atten 2	20 dB				∆ Mk	r1 18.90 0.7	6 MHz 72 dB	Select I <u>1 2</u>	Marker
Log 10		man	www	man	and the second states				-	Norma
dB/ Offst 11.4 dB										Delta
DI -18.6 dBm	LE A					1	niciliany	Working		elta Pair
LgAv									(Track Ref	ing Ref) ≜
S1 V2 S3 FC AA									S Span	oan Pair <u>Center</u>
¤(f): FTun Swp										Off
Center 5.700 00 G #Res BW 200 kHz		#VB	W 620	kHz	#Swe	ep 100 i	Span 3 ms (601	35 MHz pts)		More 1 of 2

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7.6.3. OUTPUT POWER

LIMITS

FCC §15.407 (a) (2)

IC RSS-210 A9.2 (2)

For the 5.47-5.725 GHz band, 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. If transmitting antennas of directional gain greater than 6 dBi are used, both the peak transmit 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.

TEST PROCEDURE

KDB 789033 D01 dated 10/25/2011.

RESULTS

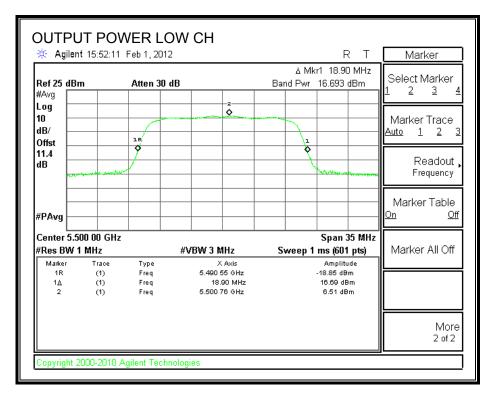
Limit

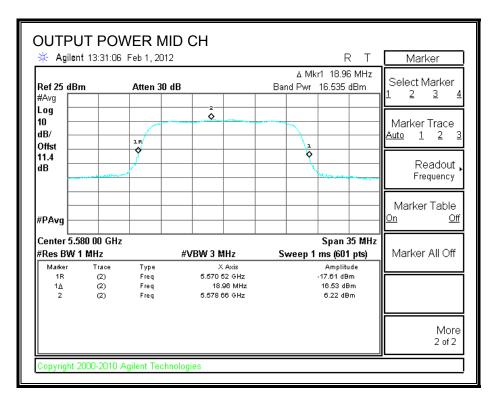
E 11111C						
Channel	Frequency	Fixed	В	11 + 10 Log B	Antenna	Limit
		Limit		Limit	Gain	
	(MHz)	(dBm)	(MHz)	(dBm)	(dBi)	(dBm)
Low	5500	24	18.90	23.76	4.51	23.76
Mid	5580	24	18.96	23.78	4.51	23.78
High	5700	24	18.96	23.78	4.51	23.78

Results

Channel	Frequency	Power	Limit	Margin
	(MHz)	(dBm)	(dBm)	(dB)
Low	5500	16.693	23.76	-7.072
Mid	5580	16.535	23.78	-7.243
High	5700	16.517	23.78	-7.261

OUTPUT POWER





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A Adiren	(10.42.40	Feb 1, 201	2				R		Marker
Ref 25 dBr #Avg	n	Atten 30	dB		Ban		r1 18.96 16.517 (Select Marker
Log									
10 dB/				<u> </u>					Marker Trace <u>Auto 1 2</u>
Offst		18							
dB		~				ľ		******	Readout Frequency
									Marker Table
#PAvg —									<u>On</u> <u>O</u> 1
Center 5.7	00.00.GHz	,					Span 3	5 MHz	
#Res BW 1			#VBW	3 MHz	Sv	weep 1	ms (601		Marker All Off
Marker	Trace	Туре		X Axis			Amplitu		
1R	(1)	Freq	5.6	890 52 GHz			-18.58 dBi		
1 <u>∆</u> 2	(1) (1)	Freq Freq	5.7	18.96 MHz 700 93 GHz			16.52 dB 6.11 dB		
									More 2 of 2

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7.6.4. AVERAGE POWER

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a power meter.

RESULTS

The cable assembly insertion loss of 11.4 dB (including 10 dB pad and 1.4 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

Channel	Frequency	Power
	(MHz)	(dBm)
Low	5500	16.50
Middle	5580	16.45
High	5700	16.50

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7.6.5. PEAK POWER SPECTRAL DENSITY

LIMITS

FCC §15.407 (a) (2)

IC RSS-210 A9.2 (2)

For the 5.47-5.725 GHz band, 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 peak transmit 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.

The maximum antenna gain is less than or equal to 6 dBi, therefore the limit is 11 dBm.

TEST PROCEDURE

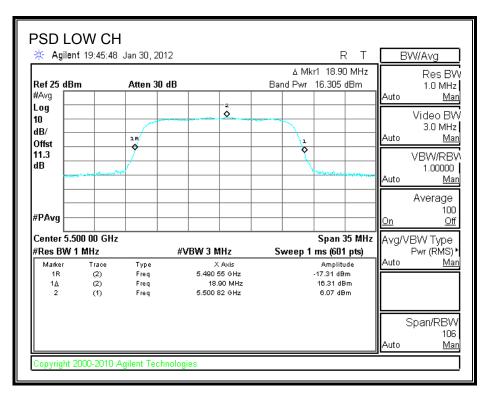
KDB 789033 D01 dated 10/25/2011.

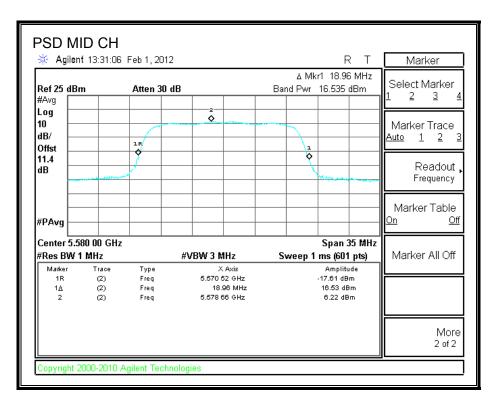
RESULTS

Channel	Frequency	PPSD	Limit	Margin
	(MHz)	(dBm)	(dBm)	(dB)
Low	5500	6.070	11	-4.93
Middle	5580	6.220	11	-4.78
High	5700	6.110	11	-4.89

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POWER SPECTRAL DENSITY





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🔆 Agilen	t 13:42:43	Feb 1, 201	2		RΤ	Marker
Ref 25 dBi	n	Atten 30	dB	∆ Mkr1 Band Pwr 16.	18.96 MHz 517 dBm	Select Marker
#Avg Log			2_			<u> </u>
			×			Marker Trace
dB/		-				Auto 1 2 3
Offst		lR		1		
11.4		9		♦		Deedeut
dB		ul l			United in the second	Readout Frequency
					****	Frequency
						Marker Table
#PAvg —						<u>On</u> <u>Of</u>
Center 5.7	00.00.GHz	,		Sr	an 35 MHz	
#Res BW 1		•	#VBW 3 MHz	Sweep 1 ms		Marker All Off
Marker	Trace	Туре	X Axis	•	mplitude	
1R	(1)	Freq	5.690 52 GH:		58 dBm	
1∆	(1)	Freq	18.96 MH		52 dBm	
2	(1)	Freq	5.700 93 GH:	z 6.	11 dBm	
						More
						2 of 2

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7.6.6. 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.

TEST PROCEDURE

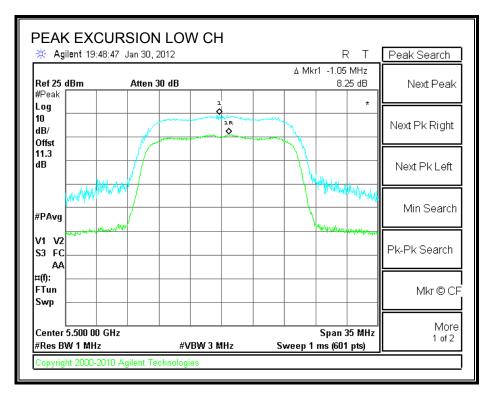
KDB 789033 D01 dated 10/25/2011.

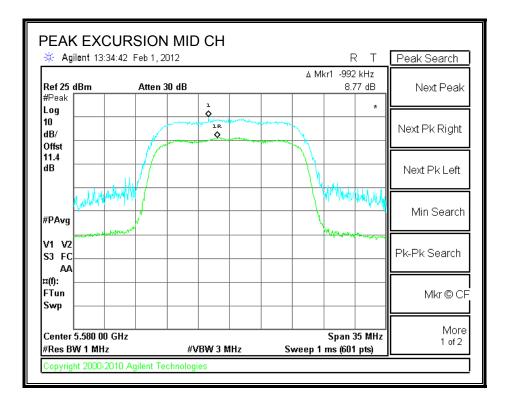
RESULTS

Channel	Frequency	Peak Excursion	Limit	Margin
	(MHz)	(dB)	(dB)	(dB)
Low	5500	8.25	13	-4.75
Middle	5580	8.77	13	-4.23
High	5700	8.29	13	-4.71

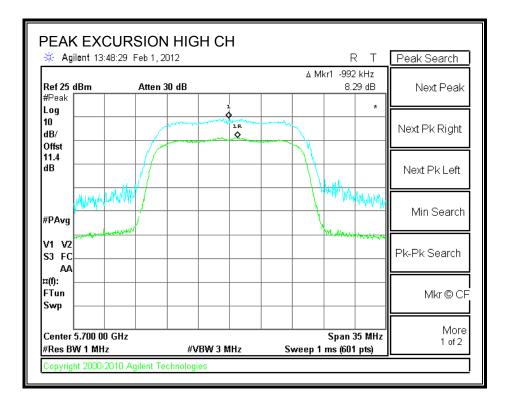
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PEAK EXCURSION





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7.7. 802.11n HT20 MODE IN THE 5.6 GHz BAND

7.7.1. 99% BANDWIDTH

<u>LIMITS</u>

None; for reporting purposes only.

TEST PROCEDURE

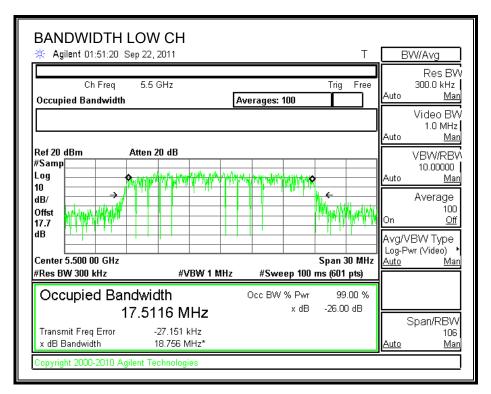
The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the measured bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal bandwidth function is utilized.

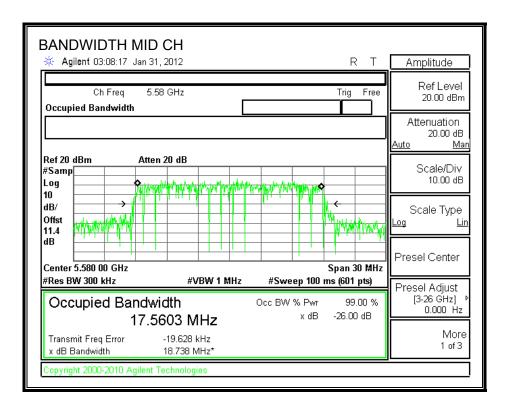
<u>RESULTS</u>

Channel	Frequency	99% Bandwidth
	(MHz)	(MHz)
Low	5500	17.5116
Middle	5580	17.5603
High	5700	17.5181

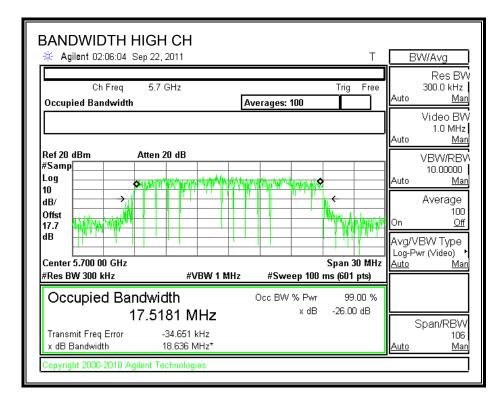
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99% BANDWIDTH





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7.7.2. 26 dB BANDWIDTH

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

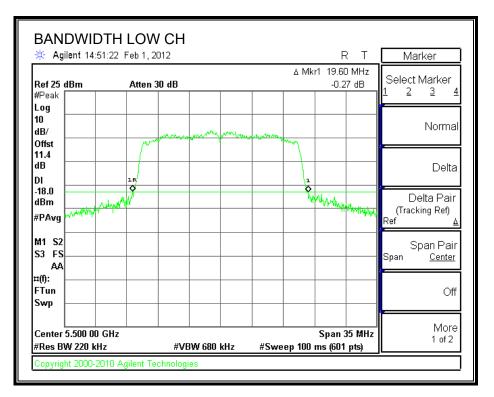
KDB 789033 D01 dated 10/25/2011.

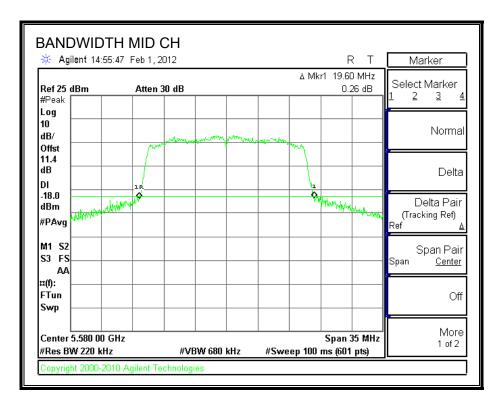
RESULTS

Channel	Frequency	26 dB Bandwidth	99% Bandwidth
	(MHz)	(MHz)	(MHz)
Low	5500	19.60	17.5116
Middle	5580	19.60	17.5264
High	5700	19.37	17.5181

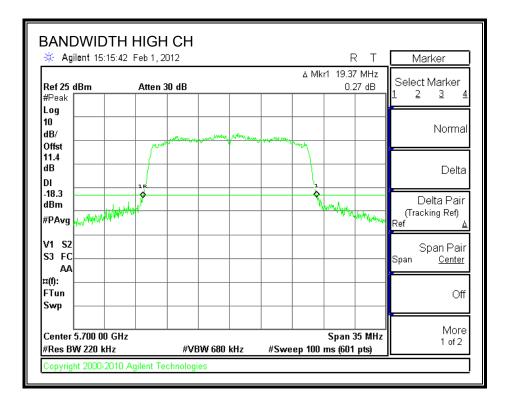
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26 dB BANDWIDTH





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7.7.3. OUTPUT POWER

LIMITS

FCC §15.407 (a) (2)

IC RSS-210 A9.2 (2)

For the 5.47-5.725 GHz band, 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. If transmitting antennas of directional gain greater than 6 dBi are used, both the peak transmit 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.

TEST PROCEDURE

KDB 789033 D01 dated 10/25/2011.

RESULTS

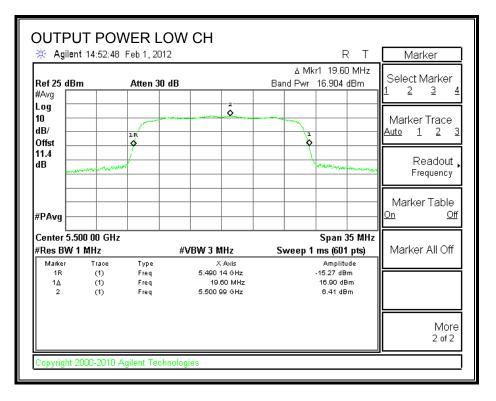
Limit

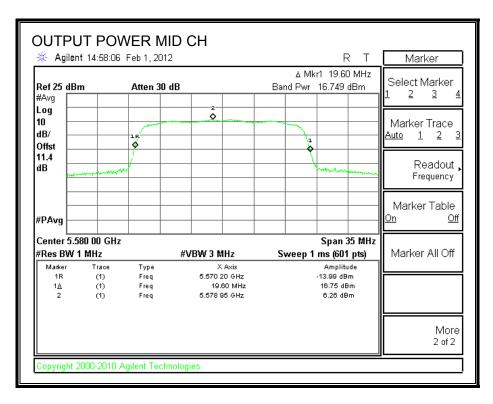
Channel	Frequency	Fixed	В	11 + 10 Log B	Antenna	Limit
		Limit		Limit	Gain	
	(MHz)	(dBm)	(MHz)	(dBm)	(dBi)	(dBm)
Low	5500	24	19.60	23.92	4.51	23.92
Mid	5580	24	19.60	23.92	4.51	23.92
High	5700	24	19.37	23.87	4.51	23.87

Results

Channel	Frequency	Power	Limit	Margin
	(MHz)	(dBm)	(dBm)	(dB)
Low	5500	16.904	23.92	-7.019
Mid	5580	16.749	23.92	-7.174
High	5700	16.843	23.87	-7.028

OUTPUT POWER





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A Adien	(15.10.54	Feb 1, 2012	•		R T	Marker
Ref 25 dBr #Avg	n	Atten 30 d	IB	∆ Mkr1 19 Band Pwr 16.84		Select Marker
Log			2			
10 — dB/ —		18		1		Marker Trace <u>Auto 1</u> 23
Offst 11.4 dB						Readout , Frequency
	Concrete for the State					r requeries
#PAvg —						Marker Table <u>On Off</u>
Center 5.7	00 00 GHz	 !		Spa	n 35 MHz	
#Res BW 1	l MHz		#VBW 3 MHz	Sweep 1 ms (6		Marker All Off
Marker 1R 1∆ 2	Trace (1) (1) (1)	Type Freq Freq Freq	X Axis 5.690 32 GHz 19.37 MHz 5.701 11 GHz	Amp -12.37 16.84 6.46	dBm	
		-				More 2 of 2

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7.7.4. AVERAGE POWER

<u>LIMIT</u>

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a power meter.

RESULTS

The cable assembly insertion loss of 11.4 dB (including 10 dB pad and 1.4 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

Channel	Frequency	Power
	(MHz)	(dBm)
Low	5500	16.50
Middle	5580	16.50
High	5700	16.50

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7.7.5. PEAK POWER SPECTRAL DENSITY

LIMITS

FCC §15.407 (a) (2)

IC RSS-210 A9.2 (2)

For the 5.47-5.725 GHz band, 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 peak transmit 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.

The maximum antenna gain is less than or equal to 6 dBi, therefore the limit is 11 dBm.

TEST PROCEDURE

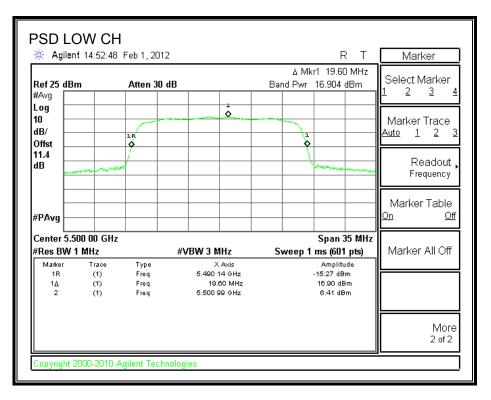
KDB 789033 D01 dated 10/25/2011.

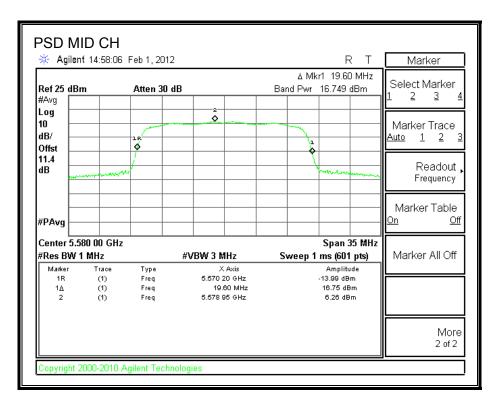
RESULTS

Channel	Frequency	PPSD	Limit	Margin
	(MHz)	(dBm)	(dBm)	(dB)
Low	5500	6.410	11	-4.59
Middle	5580	6.260	11	-4.74
High	5700	6.460	11	-4.54

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POWER SPECTRAL DENSITY





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🔆 Agilen	t 15:18:34	Feb 1, 201	2	R T	Marker
Ref 25 dBr #Avg	n	Atten 30	dB	∆ Mkr1 19.37 MHz Band Pwr 16.843 dBm	Select Marker
Log –			2		
10 — dB/ —		18			Marker Trace
Offst		Ĭ			
dB					Readout
					Marker Table
#PAvg —					<u>On</u> <u>Of</u>
Center 5.7	00 00 GHz	<u> </u>		Span 35 MH	
#Res BW 1	MHz		#VBW 3 MHz	Sweep 1 ms (601 pts)	Marker All Off
Marker 1B	Trace	Туре	X Axis 5.690 32 GHz	Amplitude -12.37 dBm	
16	(1) (1)	Freq Freq	5.690 32 GHZ 19.37 MHz	-12.37 dBm 16.84 dBm	
2	(1)	Freq	5.701 11 GHz	6.46 dBm	
					More 2 of 2

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7.7.6. 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.

TEST PROCEDURE

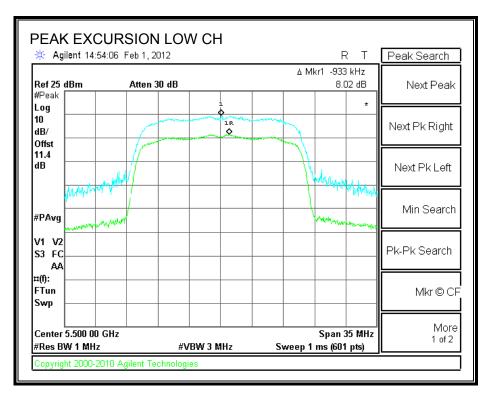
KDB 789033 D01 dated 10/25/2011.

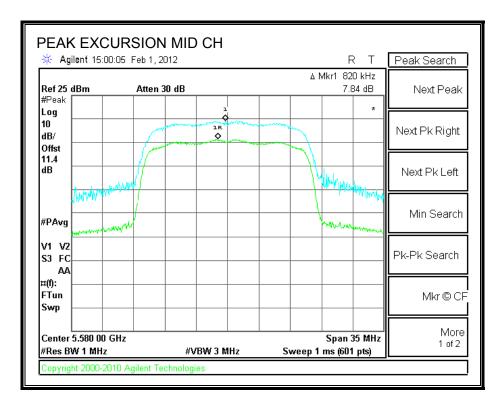
RESULTS

Channel	Frequency	Peak Excursion	Limit	Margin
	(MHz)	(dB)	(dB)	(dB)
Low	5500	8.02	13	-4.98
Middle	5580	7.84	13	-5.16
High	5700	8.11	13	-4.89

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PEAK EXCURSION





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🔆 Agilent 15:19:	50 Feb 1, 2012			RΤ	Peak Search
Ref 25 dBm #Peak	Atten 30 dB		∆ Mkr1	580 kHz 8.11 dB	Next Peak
Log 10 dB/				*	Next Pk Right
Offst 11.4 dB					Next Pk Left
Land Change	hw#/			WWWWWW	
#PAvg	~			and the second second	Min Search
V1 V2 S3 FC AA					Pk-Pk Search
¤(f): FTun Swp					Mkr © CF
Center 5.700 00 G #Res BW 1 MHz		/BW 3 MHz	Sp Sweep 1 ms	an 35 MHz (601 pts)	More 1 of 2

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8. RADIATED TEST RESULTS

8.1. LIMITS AND PROCEDURE

<u>LIMITS</u>

FCC §15.205 and §15.209

IC RSS-210 Clause 2.6 (Transmitter)

IC RSS-GEN Clause 6 (Receiver)

Frequency Range (MHz)	Field Strength Limit (uV/m) at 3 m	Field Strength Limit (dBuV/m) at 3 m
30 - 88	100	40
88 - 216	150	43.5
216 - 960	200	46
Above 960	500	54

TEST PROCEDURE

The EUT is placed on a non-conducting table 80 cm above the ground plane. The antenna to EUT distance is 3 meters. The EUT is configured in accordance with ANSI C63.4. The EUT is set to transmit in a continuous mode.

For measurements below 1 GHz the resolution bandwidth is set to 100 kHz for peak detection measurements or 120 kHz for quasi-peak detection measurements. Peak detection is used unless otherwise noted as quasi-peak.

For measurements above 1 GHz the resolution bandwidth is set to 1 MHz, then the video bandwidth is set to 1 MHz for peak measurements and 10 Hz for average measurements.

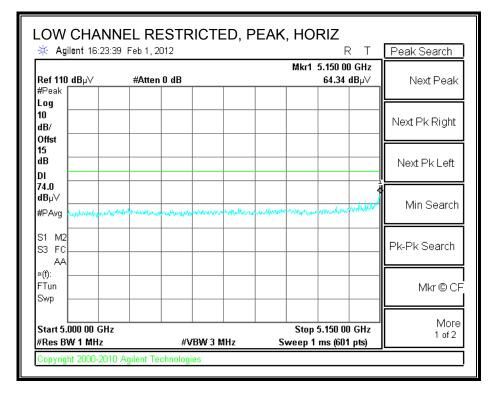
The spectrum from 30 MHz to 40 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in each applicable band.

The frequency range of interest is monitored at a fixed antenna height and EUT azimuth. The EUT is rotated through 360 degrees to maximize emissions received. The antenna is scanned from 1 to 4 meters above the ground plane to further maximize the emission. Measurements are made with the antenna polarized in both the vertical and the horizontal positions.

8.2. TRANSMITTER ABOVE 1 GHz

8.2.1. TX ABOVE 1 GHz FOR 802.11a MODE IN THE 5.2 GHz BAND

RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



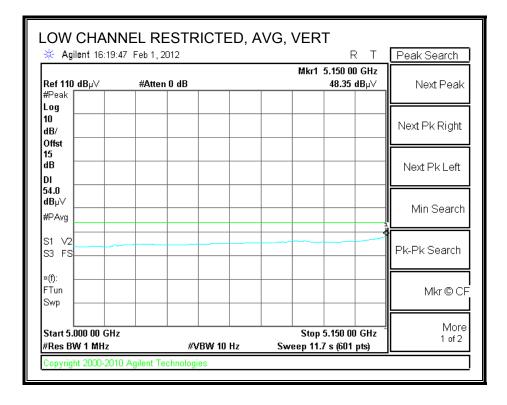
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🔆 Agilent 16:25:	:10 Feb 1, 2012	R T	Peak Search
Ref 110 dB µ∨ #Peak □	#Atten 0 dB	Mkr1 5.150 00 GHz 50.41 dBµ∨	Next Peak
dB/			Next Pk Right
DI 54.0			Next Pk Left
dBµ∨ #PAvg			Min Search
M1 S2			Pk-Pk Search
≈(f): FTun Swp			- Mkr © CF
Start 5.000 00 GH #Res BW 1 MHz	z #VBW 10 H;	Stop 5.150 0Ô GHz z Sweep 11.7 s (601 pts)	More 1 of 2

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RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)

🔆 Agilent 16:18:	NEL RESTRIC :58 Feb 1, 2012	ILD, FL	R	T Peak Search
Ref 110 dB µ∨ #Peak	#Atten 0 dB		Mkr1 5.148 25 Gl 62.44 dB _F	
Log 10 dB/ Offst				Next Pk Right
dB				Next Pk Left
74.0 dBµ∨ #PAvg		rehebert Motherson		Min Search
S1 M2 S3 FS	Terr. ANY Leased all K Ct. Lbb. and a lab			Pk-Pk Search
«(f): FTun Swp				Mkr © CF
Start 5.000 00 GH #Res BW 1 MHz	-	3 MHz	Stop 5.150 00 Gl Sweep 1 ms (601 pts	



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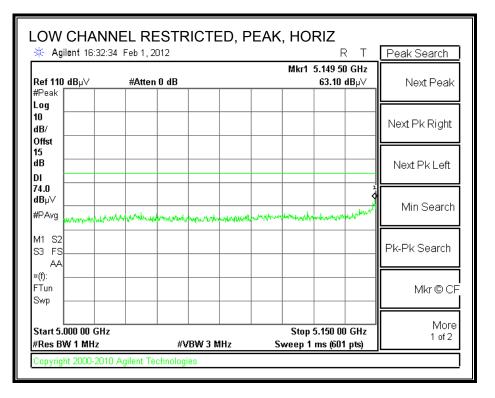
HARMONICS AND SPURIOUS EMISSIONS

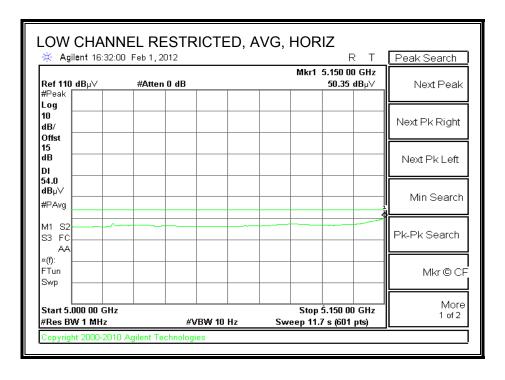
Test Engr Date: Project #: Company Test Targ		Chin Pa 10/27/11 11U1393 Apple FCC 15.	8										
Mode Op	er:	TX, a mo	de, 5.20	Hz b:	and								
	f	Measuren			-	Preamp (_	Field Stren	-	
	Dist	Distance				Distance					ld Strength		
	Read		-		Avg	-		trength @		_	/s. Average		
	AF	Antenna			Peak	Calculate			ength	Margin v	rs. Peak Li	mit	
	CL	Cable Los	55		HPF	High Pas	s Filter	r					
f	Dist	Read	AF	CL	Amp	D Corr		Corr.			Ant. Pol.		Notes
GHz	(m)	dBuV	dB/m	dB	dB	dB	dB	dBuV/m	dBuV/m	dB	V/H	P/A/QP	
Low Ch,		· · · · · · · · · · · · · · · · · · ·											
15.540	3.0	33.3	39.9	11.3	-32.3	0.0	0.7	53.0	74.0	-21.0	V	Р	
15.540	3.0	21.4	39.9	11.3	-32.3	0.0	0.7	41.0	54.0	-13.0	V	A	
15.540	3.0	33.9	39.9	11.3	-32.3	0.0	0.7	53.5	74.0	-20.5	H	P	
15.540	3.0	21.5	39.9	11.3	-32.3	0.0	0.7	41.1	54.0	-12.9	Н	A	
Mid Ch, f	200101	-								<u>.</u>			
15.600	3.0	z 34.0	39.7	11.4	-32.3	0.0	0.7	53.5	74.0	-20.5	v	P	
15.600	3.0	21.9	39.7	11.4	-32.3	0.0	0.7	41.4	54.0	-12.6	v	A	
15.600	3.0	33.7	39.7	11.4	o	0.0	0.7	53.2	74.0	-20.8	H	P	
15.600	3.0	21.6	39.7	¢	-32.3	0.0	0.7	41.2	54.0	-12.8	H	A	
													,
High Ch,	5240M	Hz		•••••	•					•			
15.720	3.0	34.1	39.4	11.4	-32.3	0.0	0.7	53.4	74.0	-20.6	V	Р	
15.720	3.0	21.4	39.4	11.4	-32.3	0.0	0.7	40.7	54.0	-13.3	V	A	
15.720	3.0	33.6	39.4	11.4	-32.3	0.0	0.7	52.8	74.0	-21.2	H	P	
15.720	3.0	21.4	39.4	11.4	-32.3	0.0	0.7	40.6	54.0	-13.4	H	A	
										ļ			
15.720 Rev. 4.1.2 Note: No	3.0	21.4	39.4	11.4	-32.3	0.0	0.7	40.6				·····	

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8.2.2. TX ABOVE 1 GHz FOR 802.11n HT20 MODE IN THE 5.2 GHz BAND

RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)

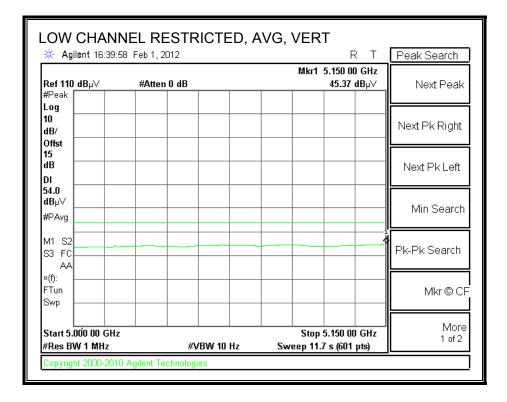




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RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)

🔆 Agilent 16:38:	06 Feb 1, 2012		F	२ т	Peak Search
Ref 110 dB µ∀ ∕Peak	#Atten 0 dB		Mkr1 5.148 2 58.04	5 GHz dBµ∨	Next Peak
.og 0 IB/ Dffst					Next Pk Right
15 18 01					Next Pk Left
/4.0 ΙΒμ∨ /PAvg	doning geologistic de la de		Land room a group of		Min Search
/1 S2 33 FC					Pk-Pk Search
:(f): :Tun Swp					Mkr © Cf
Start 5.000 00 GHz Res BW 1 MHz	//////////////////////////////////////	3 MHz	Stop 5.150 0 Sweep 1 ms (60		More 1 of 2



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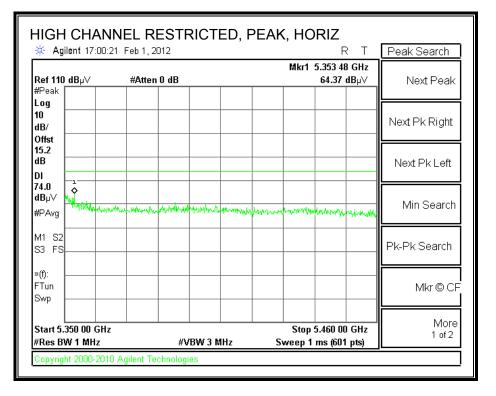
HARMONICS AND SPURIOUS EMISSIONS

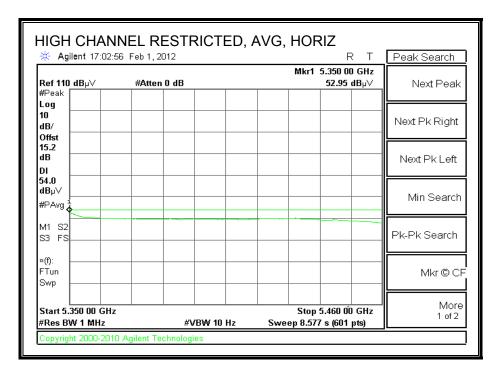
Fest Engr: Date: Project #: Company:		Chin Pa 10/28/11 11U1393 Apple	_										
Test Targe Mode Ope	t:	FCC 15. TX, HT20		z Ban	d								
	f	Measuren			-	Preamp (-	Field Stren	-	
	Dist	Distance				Distance					ld Strength		
	Read	Analyzer	-		Avg	-		trength @		Margin vs. Average Limit			
	AF	Antenna			Peak			Field Stre	ength	Margin v	/s. Peak Lis	nit	
	CL	Cable Los	13		HPF	High Pas	s Filter	r					
f	Dist	Read	AF	CL	Amp	D Corr		Corr.			Ant. Pol.		Notes
GHz	(m)	dBuV	dB/m	dB	dB	dB	dB	dBuV/m	dBuV/m	dB	V/H	P/A/QP	
Low Ch, 5													
15.540	3.0	34.3		11.3		0.0	0.7	54.0	74.0	-20.0	V	P	
15.540	3.0	22.3	39.9	11.3	-32.3	0.0	0.7	41.9	54.0	-12.1	V	A	
15.540	3.0	34.6	39.9	11.3	-32.3	0.0	0.7	54.2	74.0	-19.8	H	P	
15.540	3.0	22.3	39.9	11.3	-32.3	0.0	0.7	41.9	54.0	- 12.1	H	A	
Mid Ch, 5	2002 (11									•			
15.600	3.0	34.4	39.7	114	-32.3	0.0	0.7	53.9	74.0	-20.1	V	P	
15.600	3.0	21.8	39.7	11.4	-32.3	0.0	0.7	41.3	54.0	-12.7	v	A	
15.600	3.0	34.9		11.4	-32.3	0.0	0.7	54.4	74.0	-19.6	H	P	
15.600	3.0	22.4	39.7	\$	-32.3	0.0	0.7	41.9	54.0	-12.1	H	A	
		•		•						¢			
High Ch,	5240MI	Iz								•			
15.720	3.0	33.4	39.4	11.4	-32.3	0.0	0.7	52.7	74.0	-21.3	V	P	
15.720	3.0	21.2		11.4	-32.3	0.0	0.7	40.5	54.0	- 13.5	V	Α	
15.720	3.0	34.1		11.4	-32.3	0.0	0.7	53.4	74.0	-20.6	H	P	
15 550	3.0	21.4	39.4	11.4	-32.3	0.0	0.7	40.6	54.0	-13.4	H	A	
15.720		ļ		Į		ļ				ļ			

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8.2.3. TX ABOVE 1GHz FOR 802.11a MODE IN THE 5.3 GHz BAND

RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)

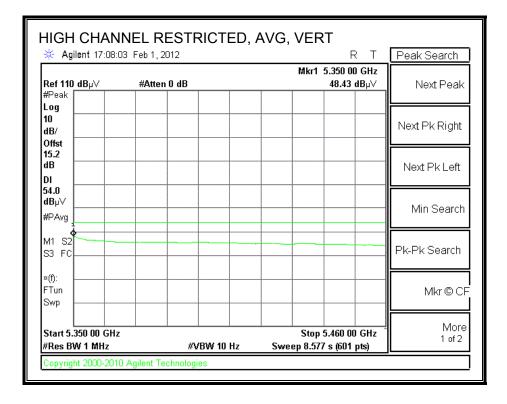




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RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)

HIGH CHANNEL		PEAK, VERT	Deels Cooreb
Agrient 17:00:35 Feb	1,2012	Mkr1 5.350 92 GHz	Peak Search
Ref 110 dB µ∨ # A t #Peak	ten 0 dB	60.94 dBµ∨	Next Peak
Log 10 dB/ Offst			Next Pk Right
15.2 dB DI			Next Pk Left
74.0 1 dBµ∨ #PAvg Multumenter		nahlan kananan kana kana kana kana kana kan	Min Search
M1 S2 S3 FS			Pk-Pk Search
×(f): FTun Swp			Mkr © CF
Start 5.350 00 GHz #Res BW 1 MHz	#VBW 3 MHz	Stop 5.460 00 GHz Sweep 1 ms (601 pts)	More 1 of 2
Copyright 2000-2010 Agilent	Technologies		



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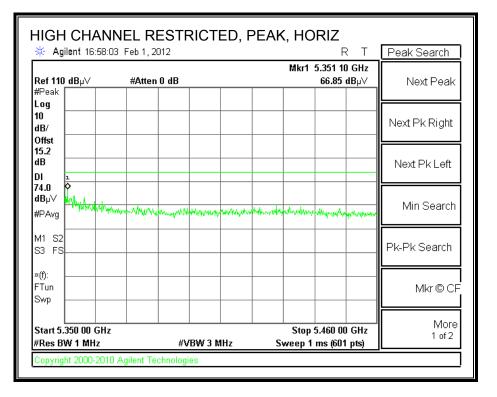
HARMONICS AND SPURIOUS EMISSIONS

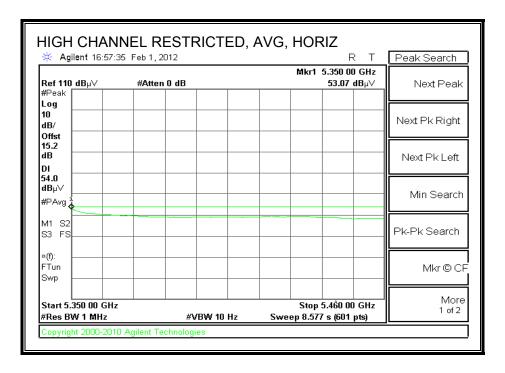
Test Engi		Chin Pa	-										
Date:		10/27/11											
Project #		11U1393	8										
Company		Apple											
Test Targ		FCC 15.											
Mode Op	er:	TX, a mo	de, 5.30	Hz b:	and								
	f	Measuren	nent Fred	uency	Amp	Preamp (Gain			Average	Field Stren	gth Limit	
	Dist	Distance		• •	-	-		t to 3 me	ters	-	ld Strength	-	
	Read	Analyzer			Avg			trength @			s. Average		
	AF	Antenna	-		Peak			Field Stre		_	s. Peak Li		
	CL	Cable Los			HPF	High Pas						-	
f	Dist	Read	AF	CL	Amp	D Corr		Corr.		Margin	Ant. Pol.	Det.	Notes
GHz	(m)	dBuV	dB/m	dB	dB	dB	dB	dBuV/m	dBuV/m	dB	V/H	P/A/QP	
Low Ch,													
15.780	3.0	33.4	39.2	11.5		0.0	0.7	52.5	74.0	-21.5	H	P	
15.780	3.0	21.6	39.2		-32.2	0.0	0.7	40.7	54.0	-13.3	H	A	
15.780	3.0	34.5	39.2	11.5		0.0	0.7	53.6	74.0	-20.4	V	P	
15.780	3.0	21.5	39.2	11.5	-32.2	0.0	0.7	40.7	54.0	-13.3	V	A	
Mid Ch,	2003 FT							•					
10.600	3.0	35.2	38,4	9.0	-34.3	0.0	0.8	49.1	74.0	-24.9	H	P	
10.600	3.0	22.7	38.4	9.0	-34.3	0.0	0.8	36.6	54.0	-17.4	H	A	
15.900	3.0	35.2	38.9		-32.2	0.0	0.7	54.0	74.0	-20.0	H	P	
15.900	3.0	21.5	38.9		-32.2	0.0	0.7	40.3	54.0	-13.7	H	Ā	
10.600	3.0	36.0	38.4		-34.3	0.0	0.8	49.9	74.0	-24.1	V	P	
10.600	3.0	22.7	38.4	9.0	-34.3	0.0	0.8	36.6	54.0	-17.4	V	Α	
15.900	3.0	34.1	38.9	11.5	-32.2	0.0	0.7	52.9	74.0	-21.1	V	P	
15.900	3.0	21.4	38.9	11.5	-32.2	0.0	0.7	40.3	54.0	-13.7	V	A	
High Ch			ļ										
10.640	3.0	35.0	38.4	9.1	-34.2	0.0	0.8	49.0	74.0	-25.0	H	P	
10.640	3.0	22.8	38.4	9.1	-34.2	0.0	0.8	36.8	54.0	-17.2	H	A	
15.960	3.0	34.2	38.7		-32.2	0.0	0.7	52.9	74.0	-21.1	H	P	
15.960	3.0	21.6	38.7 38.4		-32.2	0.0	0.7	40.3	54.0	-13.7	H V	A	
10.640 10.640	3.0	34.9 22.8	38.4 38.4	9.1 9.1	-34.2 -34.2	0.0	0.8	48.9 36.8	74.0 54.0	-25.1 -17.2	V V	P A	
15.960	3.0	34.5	38.7		-34.4	0.0	0.8	53.2	54.0	-17.2	V	P	
15.960	3.0	21.5	38.7	11.5		0.0	0.7	40.3	54.0	-13.7	v	A	
201900						~10			- 10	-4017	•		
			•										
			<u>.</u>					·					
Rev. 4.1.2	17	:		:	:	: :				:			

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8.2.4. TX ABOVE 1GHz FOR 802.11n HT20 MODE IN THE 5.3GHz BAND

RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)

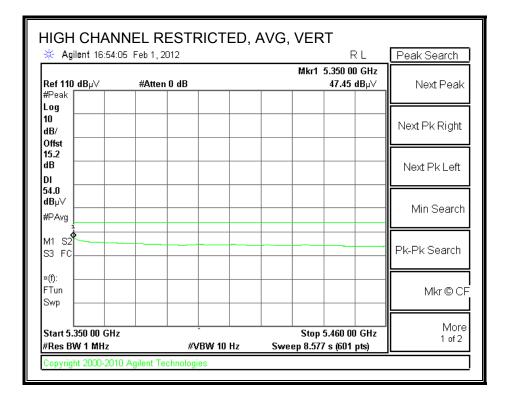




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RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)

HIGH CHANN		TED, PE	-	с т	
🔆 Agilent 16:53:17	Feb 1, 2012			RT	Peak Search
Ref 110 dB µ∨ #Peak	#Atten 0 dB		Mkr1 5.350 5 62.24	73 GHz IdBµ∨	Next Peak
Log 10 dB/ Offst					Next Pk Right
15.2 dB DI					Next Pk Left
74.0 1 dBµ∨ #PAvg	a maharanga kalabétipan kala		A when any mark the mark		Min Search
M1 S2 S3 FC					Pk-Pk Search
»(f): FTun Swp					Mkr © CF
Start 5.350 00 GHz #Res BW 1 MHz	#VBW 3	B MHz	Stop 5.460 (Sweep 1 ms (60		More 1 of 2
Copyright 2000-2010 A	gilent Technologies				



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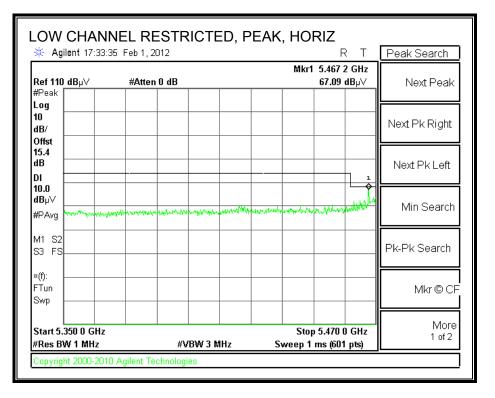
HARMONICS AND SPURIOUS EMISSIONS

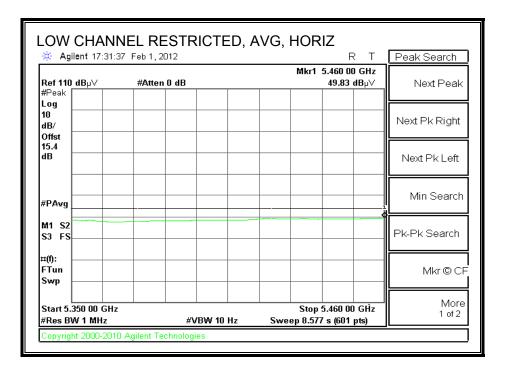
Test Engi		Chin Pa	ng										
Date:		10/28/11	-										
Project #		11U1393	8										
Company		Apple											
Test Targ		FCC 15.4	107										
Mode Op		TX, HT20		z ban	d								
	f	Measurem				Preamp (_	Field Stren	-	
	Dist	Distance				Distance					ld Strength		
	Read	Analyzer	_		Avg	-		trength @		_	vs. Average		
	AF CL	Antenna l Cable Los			Peak HPF	Calculate High Pas			ength	Margin v	vs. Peak Lis	nit	
f	Dist	Read	AF	CL	Amp	D Corr	Fltr	Corr.	Limit	Margin	Ant. Pol.	Det.	Notes
GHz	(m)	dBuV	dB/m	dB	dB	dB	dB	dBuV/m	dBuV/m	dB	V/H	P/A/QP	
Low Ch,	5260MH	z											
15.780	3.0	33.8	39.2	11.5	-32.2	0.0	0.7	53.0	74.0	-21.0	H	P	
15.780	3.0	21.5	39.2	11.5	-32.2	0.0	0.7	40.7	54.0	-13.3	H	A	
15.780	3.0	33.4	39.2	11.5	-32.2	0.0	0.7	52.5	74.0	-21.5	V	P	
15.780	3.0	21.4	39.2	11.5	-32.2	0.0	0.7	40.6	54.0	-13.4	V	A	
Mid Ch, 10.600	3.0	z 36.0	38.4	9.0	-34.3	0.0	0.8	49.9	74.0	24.1	н	D	
10.600	3.0	36.0 23.2	38.4	9.0	-34.3	0.0	0.8	49.9 37.1	74.0 54.0	-24.1 -16.9	п Н	P A	
15.900	3.0	33.4	38.9	9.0 11.5	-32.2	0.0	0.8	52.2	54.0 74.0	-10.9	H H	P	
15.900	3.0	21.2	38.9	11.5	-32.2	0.0	0.7	40.1	54.0	-13.9	H	A	
	3.0	38.5	38.4	9.0	-34.3	0.0	0.8	52.4	74.0	-21.6	v	P	
10.600			38.4	9.0	-34.3	0.0	0.8	38.2	54.0	-15.8	V	A	
	3.0	24.3	38.4		-32.2	0.0	0.7	52.8	74.0	-21.2	V	P	
10.600		24.3 33.9	38.9	11.5							17	Α	
10.600 15.900	3.0	*		11.5 11.5		0.0	0.7	40.1	54.0	-13.9	V		
10.600 15.900 15.900	3.0 3.0 3.0	33.9 21.2	38.9	¢		0.0	0.7	40.1	54.0	-13.9	v	<u>a</u>	
10.600 10.600 15.900 15.900 High Ch	3.0 3.0 3.0 5320MI	33.9 21.2 hz	38.9 38.9	11.5	-32.2	••••••							
10.600 15.900 15.900 High Ch 10.640	3.0 3.0 3.0 5320MI 3.0	33.9 21.2 hz 35.3	38.9 38.9 38.4	11.5 9.1	-32.2 -34.2	0.0	0.8	49.3	74.0	-24.7	H	P	
10.600 15.900 15.900 High Ch 10.640 10.640	3.0 3.0 3.0 5320MI 3.0 3.0	33.9 21.2 hz 35.3 23.3	38.9 38.9 38.4 38.4	11.5 9.1 9.1	-32.2 -34.2 -34.2	0.0 0.0	0.8 0.8	49.3 37.3	74.0 54.0	-24.7 -16.7	H H	P A	
10.600 15.900 15.900 High Ch 10.640 10.640 15.960	3.0 3.0 3.0 5320M 3.0 3.0 3.0 3.0	33.9 21.2 hz 35.3 23.3 33.9	38.9 38.9 38.4 38.4 38.7	11.5 9.1 9.1 11.5	-32.2 -34.2 -34.2 -32.2	0.0 0.0 0.0	0.8 0.8 0.7	49.3 37.3 52.7	74.0 54.0 74.0	-24.7 -16.7 -21.3	H H H	P A P	
10.600 15.900 15.900 High Ch 10.640 10.640 15.960 15.960	3.0 3.0 3.0 5320MI 3.0 3.0 3.0 3.0 3.0	33.9 21.2 hz 35.3 23.3 33.9 21.2	38.9 38.9 38.4 38.4 38.7 38.7	9.1 9.1 11.5 11.5	-32.2 -34.2 -34.2 -32.2 -32.2	0.0 0.0 0.0 0.0	0.8 0.8 0.7 0.7	49.3 37.3 52.7 40.0	74.0 54.0 74.0 54.0	-24.7 -16.7 -21.3 -14.0	H H H H	P A P A	
10.600 15.900 15.900 High Ch 10.640 10.640 15.960 15.960 10.640	3.0 3.0 3.0 5320M 3.0 3.0 3.0 3.0 3.0 3.0	33.9 21.2 35.3 23.3 33.9 21.2 35.8	38.9 38.9 38.4 38.4 38.7 38.7 38.7 38.4	9.1 9.1 11.5 11.5 9.1	-32.2 -34.2 -34.2 -32.2 -32.2 -32.2 -34.2	0.0 0.0 0.0 0.0 0.0	0.8 0.8 0.7 0.7 0.8	49.3 37.3 52.7 40.0 49.8	74.0 54.0 74.0 54.0 74.0	-24.7 -16.7 -21.3 -14.0 -24.2	H H H H V	P A P A P	
10.600 15.900 15.900 High Ch 10.640 10.640 15.960 15.960 10.640 10.640	3.0 3.0 3.0 5320M 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0	33.9 21.2 35.3 23.3 33.9 21.2 35.8 23.7	38.9 38.9 38.4 38.4 38.7 38.7 38.7 38.4 38.4	9.1 9.1 9.1 11.5 9.1 9.1	-32.2 -34.2 -34.2 -32.2 -32.2 -32.2 -34.2 -34.2	0.0 0.0 0.0 0.0 0.0 0.0	0.8 0.8 0.7 0.7 0.8 0.8	49.3 37.3 52.7 40.0 49.8 37.8	74.0 54.0 74.0 54.0 74.0 54.0	-24.7 -16.7 -21.3 -14.0 -24.2 -16.2	H H H V V	P A P A P A	
10.600 15.900 15.900 High Ch 10.640 10.640 15.960 15.960 10.640	3.0 3.0 3.0 5320M 3.0 3.0 3.0 3.0 3.0 3.0	33.9 21.2 35.3 23.3 33.9 21.2 35.8	38.9 38.9 38.4 38.4 38.7 38.7 38.7 38.4	9.1 9.1 11.5 11.5 9.1	-32.2 -34.2 -34.2 -32.2 -32.2 -32.2 -34.2	0.0 0.0 0.0 0.0 0.0	0.8 0.8 0.7 0.7 0.8	49.3 37.3 52.7 40.0 49.8	74.0 54.0 74.0 54.0 74.0	-24.7 -16.7 -21.3 -14.0 -24.2	H H H H V	P A P A P	

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8.2.5. TX ABOVE 1 GHz FOR 802.11a MODE IN THE 5.6 GHz BAND

RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)

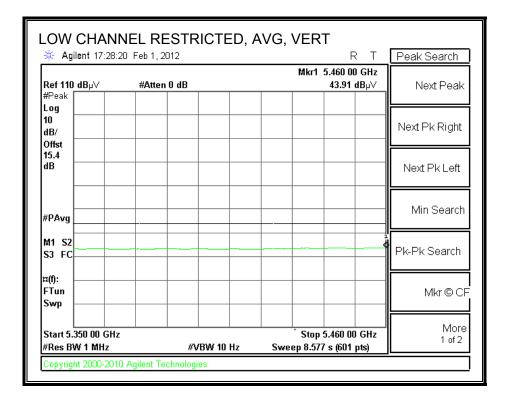




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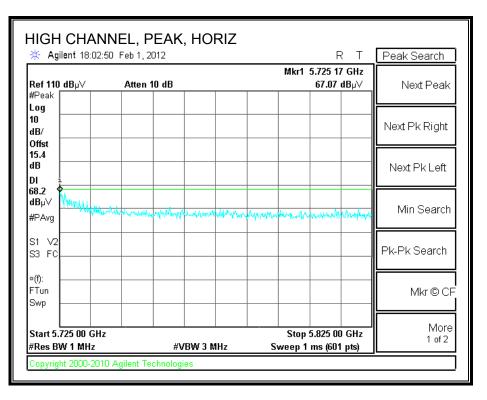
RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)

LOW CHANN Agilent 17:25:4		ICTED, PI	-	₹Т	Peak Search
Ref 110 dBµ∨ #Peak	#Atten 0 dB		Mkr1 5.436 55.19		Next Peak
Log 10 dB/ Offst					Next Pk Right
dB					Next Pk Left
#PAvg	Martin Aurolana - martine and	an marine marine and	n	Hunterma	Min Search
M1 S2 S3 FC					Pk-Pk Search
¤(f): FTun Swp					Mkr © CF
Start 5.350 0 GHz #Res BW 1 MHz	#V	BW 3 MHz	Stop 5.470 Sweep 1 ms (60		More 1 of 2
Copyright 2000-2010) Agilent Technologi	es			

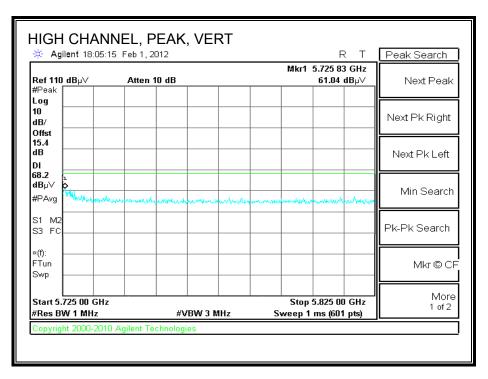


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AUTHORIZED BANDEDGE (HIGH CHANNEL, HORIZONTAL)



AUTHORIZED BANDEDGE (HIGH CHANNEL, VERTICAL)



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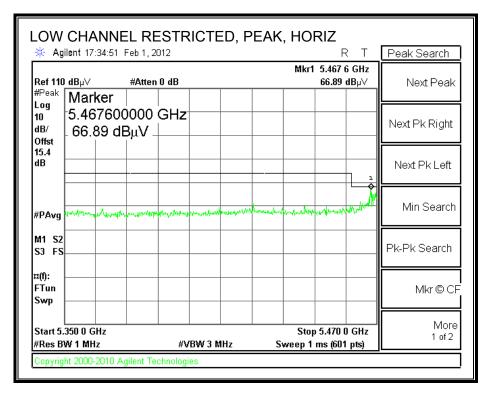
HARMONICS AND SPURIOUS EMISSIONS

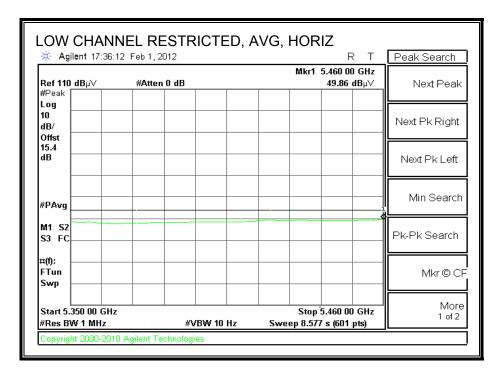
Dist			Hz b	and								
	Measurem				-				-	Field Stren	-	
	Distance Analyzer			Avg	Distance Average		ct to 3 me Strength @			eld Strength vs. Average		
F	-	-		-	_							
L				HPF						0. 1 cun 2	int	
Dist	Read	AF	CL	Amp	D Corr	Fltr	Corr.	Limit	Margin	Ant. Pol.	Det.	Notes
(m)	dBuV	dB/m	dB		dB	:		:		V/H	P/A/QP	
00MH	z	1		1								
3.0	35.3	38.7	9.2		0.0	0.7		74.0	-23.8	V	P	
3.0	22.5	38.7	9.2	-33.8	0.0	0.7		54.0	-16.6	¢		
	¢					Å						
3.0	22.7	38.7	9.2	-33.8	0.0	0.7	37.6	54.0	-16.4	H	A	
H) (O	-				. .		-		+			
		38.9	9.3	-33.5	0.0	0.7	52.2	74.0	-21.8	v	р	
3.0	25.6	38.9	9.3			0.7				¢		
3.0	38.4	38.9	9.3			0.7		74.0	-20.1	H	P	
3.0	26.7	38.9				0.7		54.0	-11.8	H	Ā	
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3.0	23.1	39.1	9.4	-33.2	0.0	0.7	39.1	54.0	-14.9	н	A	
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(BuV/m) Limit (BuV/m) 0MHz - <t< td=""><td>L Cable Loss HPF High Pass Filter Dist (m) Read BuV AF (m) CL dB(m) Amp dB D Corr dB Fltr dB Corr. dB Limit dB Margin dB 0MHz -</td><td>L Cable Loss HPF High Pass Filter Dist (m) Read BuV AF (BuV CL (m) Amp dB D Corr dB Fltr dB Corr. dB Limit dB Margin dB Ant. Pol. V/H 0MHz 0 0 0.0 0.7 50.2 74.0 -23.8 V 3.0 35.3 38.7 9.2 -33.8 0.0 0.7 50.2 74.0 -23.8 V 3.0 35.0 38.7 9.2 -33.8 0.0 0.7 50.9 74.0 -23.1 H 3.0 22.7 38.7 9.2 -33.8 0.0 0.7 50.9 74.0 -23.1 H 3.0 22.7 38.7 9.2 -33.8 0.0 0.7 51.9 74.0 -21.8 V 3.0 26.6 38.9 9.3 -33.5 0.0 0.7 53.9 74.0 -21.8 V 3.0 26.7 38.9 9.3 -33.5</td><td>L Cable Loss HPF High Pass Filter Dist (m) Read dBuV AF dB/m CL dB Anp dB D Corr dB Fltr dB Corr. dB Limit dB Margin dB Ant. Pol. V/H Det. P/A/QP 00 0MHz 35.3 38.7 9.2 -33.8 0.0 0.7 50.2 74.0 -23.8 V P 3.0 35.3 38.7 9.2 -33.8 0.0 0.7 50.2 74.0 -23.8 V P 3.0 22.5 38.7 9.2 -33.8 0.0 0.7 50.9 74.0 -23.1 H P 3.0 36.0 38.7 9.2 -33.8 0.0 0.7 37.6 54.0 -16.4 H A 3.0 25.6 38.9 9.3 -33.5 0.0 0.7 51.2 74.0 -21.8 V P 3.0 36.7 38.9 9.3 -33.5 0.0 0.7 53.9 74.0</td></t<></td>	L Cable Loss HPF High Pass Filter Dist (m) Read dBuV AF dB/m CL dB Amp dB D Corr dB Fltr dB Corr. dB 0MHz - - - - - 3.0 35.3 38.7 9.2 -33.8 0.0 0.7 50.2 3.0 22.5 38.7 9.2 -33.8 0.0 0.7 50.2 3.0 36.0 38.7 9.2 -33.8 0.0 0.7 50.9 3.0 36.0 38.7 9.2 -33.8 0.0 0.7 50.9 3.0 22.7 38.7 9.2 -33.8 0.0 0.7 51.4 3.0 26.6 38.9 9.3 -33.5 0.0 0.7 51.2 3.0 26.7 38.9 9.3 -33.5 0.0 0.7 53.9 3.0 26.7 38.9 9.3 -33.5 0.0 0.7 51.6 3.0	L Cable Loss HPF High Pass Filter Dist Read (m) AF (BuV CL (BuV Amp (BuV D Corr (BuV/m) Fltr (BuV/m) Corr. (BuV/m) Limit (BuV/m) 0MHz - <t< td=""><td>L Cable Loss HPF High Pass Filter Dist (m) Read BuV AF (m) CL dB(m) Amp dB D Corr dB Fltr dB Corr. dB Limit dB Margin dB 0MHz -</td><td>L Cable Loss HPF High Pass Filter Dist (m) Read BuV AF (BuV CL (m) Amp dB D Corr dB Fltr dB Corr. dB Limit dB Margin dB Ant. Pol. V/H 0MHz 0 0 0.0 0.7 50.2 74.0 -23.8 V 3.0 35.3 38.7 9.2 -33.8 0.0 0.7 50.2 74.0 -23.8 V 3.0 35.0 38.7 9.2 -33.8 0.0 0.7 50.9 74.0 -23.1 H 3.0 22.7 38.7 9.2 -33.8 0.0 0.7 50.9 74.0 -23.1 H 3.0 22.7 38.7 9.2 -33.8 0.0 0.7 51.9 74.0 -21.8 V 3.0 26.6 38.9 9.3 -33.5 0.0 0.7 53.9 74.0 -21.8 V 3.0 26.7 38.9 9.3 -33.5</td><td>L Cable Loss HPF High Pass Filter Dist (m) Read dBuV AF dB/m CL dB Anp dB D Corr dB Fltr dB Corr. dB Limit dB Margin dB Ant. Pol. V/H Det. P/A/QP 00 0MHz 35.3 38.7 9.2 -33.8 0.0 0.7 50.2 74.0 -23.8 V P 3.0 35.3 38.7 9.2 -33.8 0.0 0.7 50.2 74.0 -23.8 V P 3.0 22.5 38.7 9.2 -33.8 0.0 0.7 50.9 74.0 -23.1 H P 3.0 36.0 38.7 9.2 -33.8 0.0 0.7 37.6 54.0 -16.4 H A 3.0 25.6 38.9 9.3 -33.5 0.0 0.7 51.2 74.0 -21.8 V P 3.0 36.7 38.9 9.3 -33.5 0.0 0.7 53.9 74.0</td></t<>	L Cable Loss HPF High Pass Filter Dist (m) Read BuV AF (m) CL dB(m) Amp dB D Corr dB Fltr dB Corr. dB Limit dB Margin dB 0MHz -	L Cable Loss HPF High Pass Filter Dist (m) Read BuV AF (BuV CL (m) Amp dB D Corr dB Fltr dB Corr. dB Limit dB Margin dB Ant. Pol. V/H 0MHz 0 0 0.0 0.7 50.2 74.0 -23.8 V 3.0 35.3 38.7 9.2 -33.8 0.0 0.7 50.2 74.0 -23.8 V 3.0 35.0 38.7 9.2 -33.8 0.0 0.7 50.9 74.0 -23.1 H 3.0 22.7 38.7 9.2 -33.8 0.0 0.7 50.9 74.0 -23.1 H 3.0 22.7 38.7 9.2 -33.8 0.0 0.7 51.9 74.0 -21.8 V 3.0 26.6 38.9 9.3 -33.5 0.0 0.7 53.9 74.0 -21.8 V 3.0 26.7 38.9 9.3 -33.5	L Cable Loss HPF High Pass Filter Dist (m) Read dBuV AF dB/m CL dB Anp dB D Corr dB Fltr dB Corr. dB Limit dB Margin dB Ant. Pol. V/H Det. P/A/QP 00 0MHz 35.3 38.7 9.2 -33.8 0.0 0.7 50.2 74.0 -23.8 V P 3.0 35.3 38.7 9.2 -33.8 0.0 0.7 50.2 74.0 -23.8 V P 3.0 22.5 38.7 9.2 -33.8 0.0 0.7 50.9 74.0 -23.1 H P 3.0 36.0 38.7 9.2 -33.8 0.0 0.7 37.6 54.0 -16.4 H A 3.0 25.6 38.9 9.3 -33.5 0.0 0.7 51.2 74.0 -21.8 V P 3.0 36.7 38.9 9.3 -33.5 0.0 0.7 53.9 74.0

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8.2.6. TX ABOVE 1 GHz FOR 802.11n HT20 MODE IN THE 5.6 GHz BAND

RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)

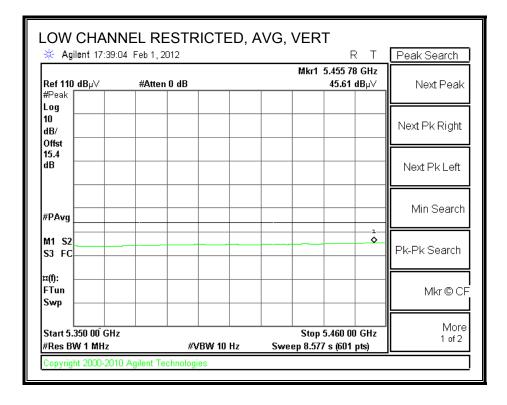




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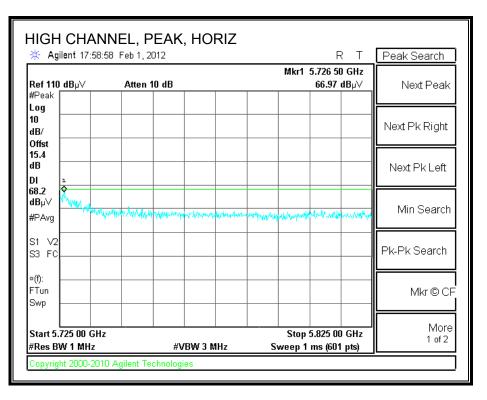
RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)

Agilent 17:40	:50 Feb 1, 2012		R	· ·	Peak Search
l ef 110 dB µ∨ Peak	#Atten 0 dB		Mkr1 5.466 8 58.93 d		Next Peak
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B				1	Next Pk Left
PAvg	where many mark the we	Lan Maria Maria Maria Maria Mari	way with a bear a far in the	n la allul	Min Search
11 S2 3 FC					Pk-Pk Search
(f): Tun wp					Mkr © Cf
tart 5.350 0 GHz Res BW 1 MHz	#VB	W 3 MHz	Stop 5.470 0 Sweep 1 ms (601		More 1 of 2

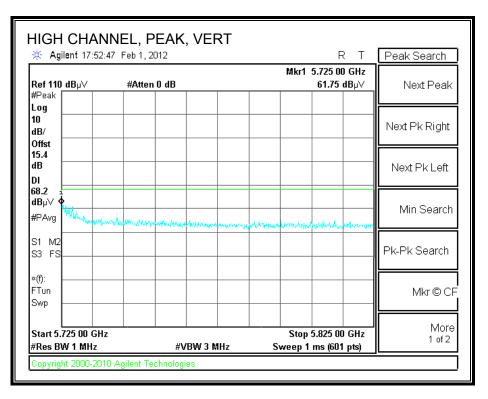


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AUTHORIZED BANDEDGE (HIGH CHANNEL, HORIZONTAL)



AUTHORIZED BANDEDGE (HIGH CHANNEL, VERTICAL)



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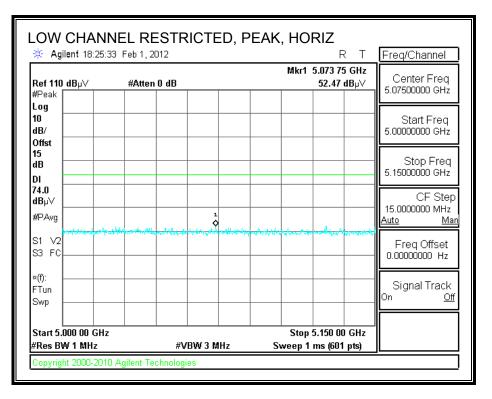
HARMONICS AND SPURIOUS EMISSIONS

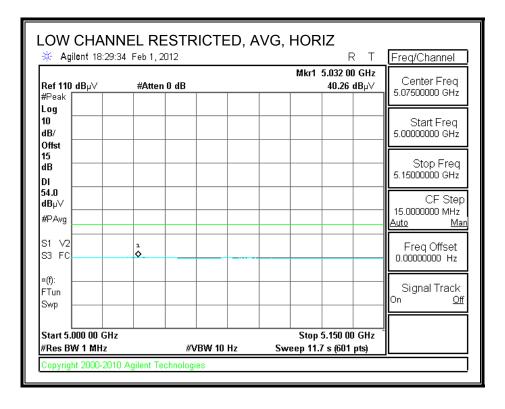
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$ \begin{array}{c c c c c c c c c c c c c c c c c c c $		Dist Read AF	Distance Analyzer Antenna	to Anter Reading Factor	ina	D Corr Avg Peak	Distance Average Calculate	Correc Field S d Peak	trength @ Field Str	3 m	Peak Fie Margin v	ld Strength /s. Average	Limit Limit	
Low Ch, 5500MHz C C 11.000 3.0 35.0 38.7 9.2 -33.8 0.0 0.7 50.0 74.0 -24.0 H P 11.000 3.0 22.5 38.7 9.2 -33.8 0.0 0.7 50.5 74.0 -24.0 H P 11.000 3.0 35.6 38.7 9.2 -33.8 0.0 0.7 50.5 74.0 -23.5 V P 11.000 3.0 23.2 38.7 9.2 -33.8 0.0 0.7 50.5 74.0 -15.8 V A Mid Ch, 5580MHz	-					-					-			Notes
11.000 3.0 35.0 38.7 9.2 -33.8 0.0 0.7 50.0 74.0 -24.0 H P 11.000 3.0 22.5 38.7 9.2 -33.8 0.0 0.7 37.5 54.0 -16.5 H A 11.000 3.0 35.6 38.7 9.2 -33.8 0.0 0.7 50.5 74.0 -23.5 V P 11.000 3.0 23.2 38.7 9.2 -33.8 0.0 0.7 58.5 74.0 -23.5 V P 11.000 3.0 23.2 38.7 9.2 -33.8 0.0 0.7 38.2 54.0 -15.8 V A Mid Ch, 5580MHz				ub/m	-	410					-	•/11	1/12/21	
11.000 3.0 22.5 38.7 9.2 -33.8 0.0 0.7 37.5 54.0 -16.5 H A 11.000 3.0 35.6 38.7 9.2 -33.8 0.0 0.7 50.5 74.0 -23.5 V P 11.000 3.0 23.2 38.7 9.2 -33.8 0.0 0.7 38.2 54.0 -15.8 V A Mid Ch, 5580MHz - - -33.5 0.0 0.7 57.8 74.0 -16.2 H P 11.60 3.0 28.8 38.9 9.3 -33.5 0.0 0.7 54.1 74.0 -16.2 H P 11.60 3.0 28.8 38.9 9.3 -33.5 0.0 0.7 54.1 74.0 -19.9 V P 11.160 3.0 26.3 38.9 9.3 -33.5 0.0 0.7 54.1 74.0 -19.9 V P 11.160 3.0 26.3 38.9 9.3 -33.5 0.0 0				38.7	9.2	-33.8	0.0	0.7	50.0	74.0	-24.0	H	P	,
11.000 3.0 35.6 38.7 9.2 -33.8 0.0 0.7 50.5 74.0 -23.5 V P 11.000 3.0 23.2 38.7 9.2 -33.8 0.0 0.7 38.2 54.0 -15.8 V A Mid Ch, 5580MHz	11.000	3.0	22.5	38.7	9.2	-33.8	0.0	0.7	37.5	54.0	-16.5	H	······	
Mid Ch, 5580MHz All	11.000	3.0	35.6	38.7	9.2	-33.8	0.0	0.7	50.5	74.0	-23.5	V	P	
11.160 3.0 42.3 38.9 9.3 -33.5 0.0 0.7 57.8 74.0 -16.2 H P 11.160 3.0 28.8 38.9 9.3 -33.5 0.0 0.7 44.3 54.0 -9.7 H A 11.160 3.0 38.6 38.9 9.3 -33.5 0.0 0.7 54.1 74.0 -19.9 V P 11.160 3.0 26.3 38.9 9.3 -33.5 0.0 0.7 54.1 74.0 -19.9 V P 11.160 3.0 26.3 38.9 9.3 -33.5 0.0 0.7 41.8 54.0 -12.2 V A High Ch, 5700MHz Integer colspan="4">Integer colspan="4"Integer colspan="4">Integer colspan="4"Integer colspan="4	11.000	3.0	23.2	38.7	9.2	-33.8	0.0	0.7	38.2	54.0		V		
11.160 3.0 42.3 38.9 9.3 -33.5 0.0 0.7 57.8 74.0 -16.2 H P 11.160 3.0 28.8 38.9 9.3 -33.5 0.0 0.7 44.3 54.0 -9.7 H A 11.160 3.0 38.6 38.9 9.3 -33.5 0.0 0.7 54.1 74.0 -19.9 V P 11.160 3.0 26.3 38.9 9.3 -33.5 0.0 0.7 54.1 74.0 -19.9 V P 11.160 3.0 26.3 38.9 9.3 -33.5 0.0 0.7 41.8 54.0 -12.2 V A High Ch, 5700MHz 11.400 3.0 35.8 39.1 9.4 -33.2 0.0 0.7 51.8 74.0 -22.2 H P 11.400 3.0 22.8 39.1 9.4 -33.2 0.0 0.7 58.8 54.0 -15.2 H A 11.400 3.0 2	Mid Ch	5580MH	-											
11.160 3.0 28.8 38.9 9.3 -33.5 0.0 0.7 44.3 54.0 -9.7 H A 11.160 3.0 38.6 38.9 9.3 -33.5 0.0 0.7 54.1 74.0 -19.9 V P 11.160 3.0 26.3 38.9 9.3 -33.5 0.0 0.7 54.1 74.0 -19.9 V P 11.160 3.0 26.3 38.9 9.3 -33.5 0.0 0.7 41.8 54.0 -12.2 V A High Ch, 5700MHz 11.400 3.0 35.8 39.1 9.4 -33.2 0.0 0.7 51.8 74.0 -22.2 H P 11.400 3.0 22.8 39.1 9.4 -33.2 0.0 0.7 38.8 54.0 -15.2 H A 11.400 3.0 23.0 39.1 9.4 -33.2 0.0 0.7 50.8 74.0 -23.2 V P 11.400 3.0 2	······		· · · · · · · · · · · · · · · · · · ·	38.9	9.3	-33.5	0.0	0.7	57.8	74.0	-16.2	н	P	
11.160 3.0 38.6 38.9 9.3 -33.5 0.0 0.7 54.1 74.0 -19.9 V P 11.160 3.0 26.3 38.9 9.3 -33.5 0.0 0.7 41.8 54.0 -12.2 V A High Ch, 5700MHz 11.400 3.0 35.8 39.1 9.4 -33.2 0.0 0.7 51.8 74.0 -22.2 H P 11.400 3.0 22.8 39.1 9.4 -33.2 0.0 0.7 38.8 54.0 -15.2 H A 11.400 3.0 22.8 39.1 9.4 -33.2 0.0 0.7 58.8 54.0 -15.2 H A 11.400 3.0 23.0 39.1 9.4 -33.2 0.0 0.7 50.8 74.0 -23.2 V P 11.400 3.0 23.0 39.1 9.4 -33.2 0.0 0.7 39.0 54.0 -15.0 V A			·		þ	¢	÷				·····			
11.160 3.0 26.3 38.9 9.3 -33.5 0.0 0.7 41.8 54.0 -12.2 V A High Ch, 5700MHz Image: state			• • • • • • • • • • • • • • • • • • • •		þ	*	· • • • • • • • • • • • • • • • • • • •	›····			*		P	
11.400 3.0 35.8 39.1 9.4 -33.2 0.0 0.7 51.8 74.0 -22.2 H P 11.400 3.0 22.8 39.1 9.4 -33.2 0.0 0.7 38.8 54.0 -15.2 H A 11.400 3.0 22.8 39.1 9.4 -33.2 0.0 0.7 38.8 54.0 -15.2 H A 11.400 3.0 34.8 39.1 9.4 -33.2 0.0 0.7 50.8 74.0 -23.2 V P 11.400 3.0 23.0 39.1 9.4 -33.2 0.0 0.7 39.0 54.0 -15.0 V A		3.0	•		9.3	¢	0.0	0.7			*			
11.400 3.0 35.8 39.1 9.4 -33.2 0.0 0.7 51.8 74.0 -22.2 H P 11.400 3.0 22.8 39.1 9.4 -33.2 0.0 0.7 38.8 54.0 -15.2 H A 11.400 3.0 22.8 39.1 9.4 -33.2 0.0 0.7 38.8 54.0 -15.2 H A 11.400 3.0 34.8 39.1 9.4 -33.2 0.0 0.7 50.8 74.0 -23.2 V P 11.400 3.0 23.0 39.1 9.4 -33.2 0.0 0.7 39.0 54.0 -15.0 V A	TT: 1 Cl	55000 0				••••••								
11.400 3.0 22.8 39.1 9.4 -33.2 0.0 0.7 38.8 54.0 -15.2 H A 11.400 3.0 34.8 39.1 9.4 -33.2 0.0 0.7 50.8 74.0 -23.2 V P 11.400 3.0 23.0 39.1 9.4 -33.2 0.0 0.7 50.8 74.0 -23.2 V P 11.400 3.0 23.0 39.1 9.4 -33.2 0.0 0.7 39.0 54.0 -15.0 V A		•••••		20.1	0.4	22.9	0.0	07	<i>5</i> 1 0	74.0	22.2	U	D	
11.400 3.0 34.8 39.1 9.4 -33.2 0.0 0.7 50.8 74.0 -23.2 V P 11.400 3.0 23.0 39.1 9.4 -33.2 0.0 0.7 39.0 54.0 -15.0 V A					þ	¢					*			
11.400 3.0 23.0 39.1 9.4 -33.2 0.0 0.7 39.0 54.0 -15.0 V A						¢					¢			
						¢	÷				*			
					~						-2010	•	**	
Rev. 4.1.2.7 Note: No other emissions were detected above the system noise floor.														

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8.2.7. CO-LOCATION (WLAN+BT) TX ABOVE 1 GHz

RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)

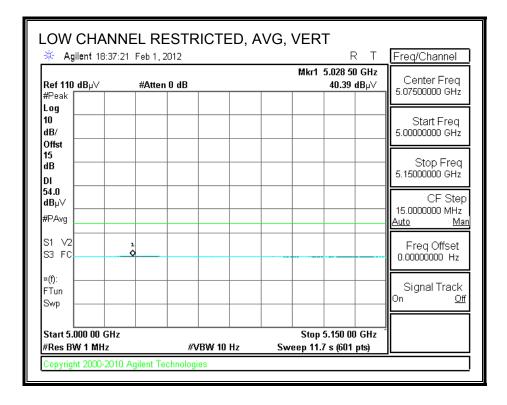




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RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)

OW CHANNEL RE		EAK, VERT	[Frag(Channal]]
≫к Аунен 16.35.35 Гер1, 2	UIZ	Mkr1 5.059 00 GHz	Freq/Channel
Ref 110 dBµ∀ #Atten #Peak	0 dB	52.96 dBµ∀	Center Freq 5.07500000 GHz
Log 10 dB/ Offst			Start Freq 5.0000000 GHz
dB			Stop Freq 5.1500000 GHz
74.0 dBµ∨ #PAvg	1 d		CF Step 15.0000000 MHz Auto Man
S1 V2 S3 FC	generative for the line of the star of the	an and a start and a start and a start and a start a st	Freq Offset 0.00000000 Hz
*(f): FTun Swp			Signal Track On <u>Off</u>
Start 5.000 00 GHz #Res BW 1 MHz	#VBW 3 MHz	Stop 5.150 00 GHz Sweep 1 ms (601 pts)	
Copyright 2000-2010 Agilent Te	chnologies		



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HARMONICS AND SPURIOUS EMISSIONS

Complian		Measureme tification S		Frem	ont 5m	Chamber	r						
Fest Engra		Chin Pan	g										
Date:		11-18-11											
Project #:		11U13938											
Company		Apple											
Test Targe		FCC UNII											
Mode Ope	21:	Co-Locati	on, 5.2(Hz a	nd GFSI	K High C	h						
	f	Measureme	ent Frequ	ency	Amp	Preamp (Gain			Average	Field Stren	gth Limit	
	Dist	Distance to	Antenn	a	D Corr	Distance	Correc	ct to 3 me	ters	Peak Fie	ld Strength	Limit	
	Read	Analyzer R	leading		Avg	Average	Field S	trength @	3 m	Margin v	75. Average	Limit	
	AF	Antenna F	actor		Peak	Calculate	d Peak	r Field Str	ength	Margin v	rs. Peak Li	mit	
	CL	Cable Loss			HPF	High Pas	s Filter	r					
f	Dist		AF	CL	Amp	D Corr					Ant. Pol.		Note <i>s</i>
GHz	(m)	dBuV	dB/m	dB	dB	dB	dB	dBuV/m	dBuV/m	dB	V/H	P/A/QP	
5180MHz 10.360	3.0	45.9	38.2	8.9	-34.6	0.0	0.0	58.4	74.0	-15.6	v	Р	
10.360	3.0	23.5	38.2	8.9	-34.6	0.0	0.0	36.0	54.0	-15.0		A	
15.540	3.0	34.2	39.9	11.3	-32.3	0.0	0.0	53.1	74.0	-20.9	V V	P	
15.540	3.0	21.8	39.9	11.3	-32.3	0.0	0.0	40.7	54.0	-13.3	V	Ā	
10.360	3.0	35.9	38.2	8.9	-34.6	0.0	0.0	48.4	74.0	-25.6	H	Р	
10.360	3.0	23.5	38.2	8.9	-34.6	0.0	0.0	36.0	54.0	-18.0	H	A	
15.540	3.0	34.1	39.9	11.3	-32.3	0.0	0.0	53.0	74.0	-21.0	H	Р	
15.540	3.0	21.7	39.9	11.3	-32.3	0.0	0.0	40.6	54.0	-13.4	H	A	
		:	1	:	:								

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8.3. RECEIVER ABOVE 1 GHz

8.3.1. RX SPURIOUS ABOVE 1GHz IN THE 5.2 GHz BAND

		<u></u> 18GHz	Bro or	nplifer	1.260	U -	Dro am	olifor	26-40GH	-	Цa	orn > 18G	U -		Limit
	orn 1- 5/N: 324			nplirer Agilent 3			re-am	piirer	20-40GH	- -	но	nn > 18G	ΠZ		FCC 15.209
	uency Cal	-		-			I								
		2807700	12' c	able 22	280760	00	20' cat	ole 22	807500		HPF	Re	ject Filte		Measurements
3' ca	able 228	07700	12' ca	ble 2280	17600	_	20' cabl	e 2280	7500					RB'	W=VBW=1MHz ge Measurements
			• 12 00		,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	•			•			•			IMHz; VBW=10Hz
f	Dist	Read Pk	Read Avg.	AF	CL	Amp	D Corr	Fltr	Peak	Avg	Pk Lim			Avg Mar	Notes
Iz	(m)	dBuV	dBuV	dB/m	dB	dB	dB	dB	dBuV/m	dBuV/m	dBuV/m	dBuV/m	dB	dB	(V/H)
2 3	3.0 3.0	47.5	31.5 30.4	24.5 30.8	2.8 5.0	-35.9 -35.2	0.0 0.0	0.0 0.0	38.9 47.4	22.9 31.0	74	54 54	-35.1 -26.6	-31.1 -23.0	H
• }	3.0	40.8	30.4	24.1	2.7	-35.2	0.0	0.0	47.4	22.9	74	54 54	-20.0	-23.0	v n
	3.0	46.5	30.0	29.0	4.4	-35.2	0.0	0.0	44.7	28.2	74	54	-29.3	-25.8	v
07.08 : No c	other emi	Measurem Distance to			1	Amp		Correc Field S	t to 3 mete	3 m		Pk Lim Avg Mar	Peak Field Margin vs	Field Strengtl d Strength Li . Average Li	mit
	Read	-	-												
	Read AF CL	Antenna Fa Cable Loss	actor			Peak HPF	Calculate High Pas:		Field Stre	ngth		Pk Mar	Margin vs	. Peak Limit	

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8.3.2. RX SPURIOUS ABOVE 1GHz IN THE 5.3 GHz BAND

ompan		Apple													
oject : ite:	¥:	11U13938 11/14/2011													
	gineer:	Chin Pang													
	ration:	EUT only													
lode:		RX, 5.3GHz Bat	nd (Worst C	ase)											
ost Fa	uipmen	t•													
езі ц	upmen	<u></u>													
н	orn 1-	18GHz	Pre-an	nplifer	1-260	Hz	Pre-am	plifer	26-40GH	z	He	orn > 18G	Hz		Limit
T50- S	5/N: 324	5 @3m	T145 A	Agilent 3	008400	156	1								FCC 15.209
155, 0	/11. JZ4.	· @ 311		ignent 3	0007400	JU -				_				_	
- Hi Fred	uency Cal	oles				_				ī —					
3' 0	able 2	2807700	12' c	able 22	28076	00	20' cał	ble 22	807500		HPF	Re	ject Filte		<u>Measurements</u>
														RBV	W=VBW=1MHz
3' C	able 228	07700	12' ca	ible 2280	37600	•	20' cabl	e 2280	J7500 -			-			ge <u>Measurements</u> 1MHz ; VBW=10Hz
I			I				<u> </u>			1 1					101112, VD00-10112
f	Dist	Read Pk F	łead Avg.	AF	CL	Amp	D Corr	Fltr	Peak	Avg	Pk Lim	Avg Lim	Pk Mar	Avg Mar	Notes
GHz	(m)	dBuV	dBuV	dB/m	dB	dB	dB	dB	dBuV/m	dBuV/m	dBuV/m	dBuV/m	dB	dB	(V/H)
520	3.0	46.5	30.5	26.2	3.2	-35.7	0.0	0.0	40.3	24.3	74	54	-33.7	-29.7	Н
.560 .615	3.0 3.0	42.0 46.0	29.6 30.3	29.0 26.6	4.4 3.3	-35.2 -35.6	0.0 0.0	0.0 0.0	40.2 40.4	27.8 24.7	74 74	54 54	-33.8 -33.6	-26.2 -29.3	<u>н</u> v
.735	3.0	40.0	28.6	33.1	6.2	-35.0	0.0	0.0	40.4	24./ 33.1	74	54	-33.0	-29.3	
														L	
ev. 07.08	.11														
ote: No o	other emi	isions were dete	cted above th	ie system	noise f	loor.									
	f	Measurement	t Frequency			Amp	Preamp (Tain				Ava Tim	Average F	Field Strength	a Timit
		Distance to A		, 		-			ct to 3 met	ers		-	_	d Strength Li	
		Analyzer Rea				Avg			Strength @					. Average Li	
	AF	Antenna Fact	~			Peak	-		c Field Stre			<u> </u>	<u> </u>	Peak Limit	
	CL	Cable Loss				H₽F	High Pas:			0			0		
		-													

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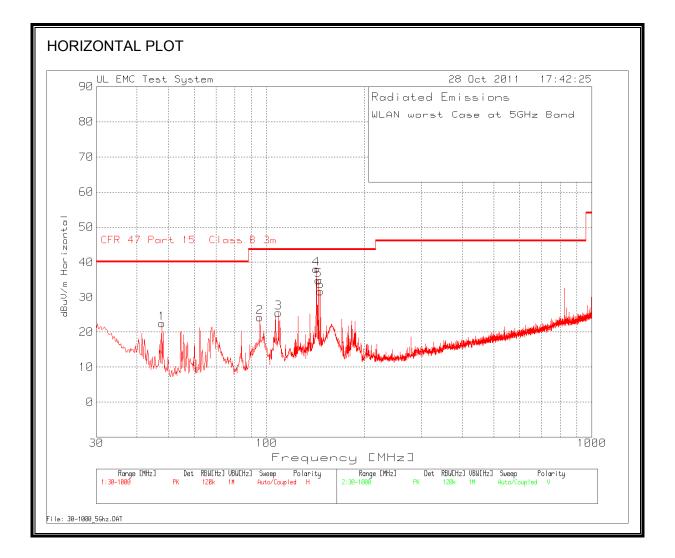
8.3.3. RX SPURIOUS ABOVE 1GHz IN THE 5.6 GHz BAND

, mp = a	-	Frequency rtification S			5m Cha	amber-]	В								
ompan	iy:	Apple													
roject #		11U13938													
ate:		11/14/2011													
		Chin Pang EUT only													
ode:		RX, 5.6GHz B	and (Worst C	ase)											
	uipmen														
н	orn 1-	18GHz	Pre-ar	nplifer	1-260	Hz	Pre-am	plifer	26-40GH	Iz	Но	orn > 18G	Hz		Limit
T59; S	5/N: 3245	5@3m .	, T145 A	lgilent 3	008A00)5E 🗸				-				-	FCC 15.209
- Hi Freq	juency Cab	bles													·
3' c	able 2	2807700	12' c	able 2	28076	00	20' cal	ole 22	2807500		HPF	Re	ject Filte		<u>« Measurements</u>
21	able 228	07700	401	hl= 220	17600		20' cab	0 2201	07500	· · · · ·				RB	W=VBW=1MHz ge Measurements
		007700	12° ca	ble 228	07600	-	20 Cap		••••••			•			1MHz; VBW=10Hz
							I			-				_	······, · · · · · · · · · · ·
f	Dist	Read Pk	Read Avg.	AF	CL	Amp	D Corr		Peak	Avg	Pk Lim			Avg Mar	Notes
f GHz	Dist (m)	dBuV	dBuV	dB/m	dB	dB	D Corr dB	dB	dBuV/m	dBuV/m	dBuV/m	dBuV/m	dB	Avg Mar dB	Notes (V/H)
f GHz 513	Dist (m) 3.0	dBuV 45.0	dBuV 30.1	dB/m 26.2	dB 3.2	dB -35.7	dВ 0.0	dB 0.0	dBuV/m 38.7	dBuV/m 23.8	dBuV/m 74	dBuV/m 54	dB -35.3	Avg Mar dB -30.2	Notes (V/H) H
f GHz 513 267	Dist (m) 3.0 3.0	dBuV 45.0 43.0	dBuV 30.1 29.5	dB/m 26.2 28.4	dB 3.2 4.1	dB -35.7 -35.3	dB 0.0 0.0	dB 0.0 0.0	dBuV/m 38.7 40.3	dBuV/m 23.8 26.8	dBuV/m 74 74	dBuV/m 54 54	dB -35.3 -33.7	Avg Mar dB -30.2 -27.2	Notes (V/H) H H
f GHz 513 267 620	Dist (m) 3.0	dBuV 45.0	dBuV 30.1	dB/m 26.2	dB 3.2	dB -35.7	dВ 0.0	dB 0.0	dBuV/m 38.7	dBuV/m 23.8	dBuV/m 74	dBuV/m 54	dB -35.3	Avg Mar dB -30.2	Notes (V/H) H
f GHz 513 267 520	Dist (m) 3.0 3.0 3.0	dBuV 45.0 43.0 45.0	dBuV 30.1 29.5 30.0	dB/m 26.2 28.4 26.7	dB 3.2 4.1 3.3	dB -35.7 -35.3 -35.6	dB 0.0 0.0 0.0	dB 0.0 0.0 0.0	dBuV/m 38.7 40.3 39.4	dBuV/m 23.8 26.8 24.4	dBuV/m 74 74 74	dBuV/m 54 54 54	dB -35.3 -33.7 -34.6	Avg Mar dB -30.2 -27.2 -29.6	Notes (V/H) H H V
f GHz 513 267 620	Dist (m) 3.0 3.0 3.0	dBuV 45.0 43.0 45.0	dBuV 30.1 29.5 30.0	dB/m 26.2 28.4 26.7	dB 3.2 4.1 3.3	dB -35.7 -35.3 -35.6	dB 0.0 0.0 0.0	dB 0.0 0.0 0.0	dBuV/m 38.7 40.3 39.4	dBuV/m 23.8 26.8 24.4	dBuV/m 74 74 74	dBuV/m 54 54 54	dB -35.3 -33.7 -34.6	Avg Mar dB -30.2 -27.2 -29.6	Notes (V/H) H H V
f GHz 513 267 520 360	Dist (m) 3.0 3.0 3.0 3.0	dBuV 450 430 450 420	dBuV 30.1 29.5 30.0 28.6	dB/m 26.2 28.4 26.7 31.2	dB 3.2 4.1 3.3 5.1	dB -35.7 -35.3 -35.6 -35.1	dB 0.0 0.0 0.0	dB 0.0 0.0 0.0	dBuV/m 38.7 40.3 39.4	dBuV/m 23.8 26.8 24.4	dBuV/m 74 74 74	dBuV/m 54 54 54	dB -35.3 -33.7 -34.6	Avg Mar dB -30.2 -27.2 -29.6	Notes (V/H) H H V
f GHz 513 267 620 360 ev. 07.08	Dist (m) 3.0 3.0 3.0 3.0 3.0 3.0	dBuV 45.0 43.0 45.0 42.0 isions were det	dBuV 30.1 29.5 30.0 28.6 ected above th	dB/m 26.2 28.4 26.7 31.2 1.2	dB 3.2 4.1 3.3 5.1	dB -35.7 -35.3 -35.6 -35.1	dB 0.0 0.0 0.0	dB 0.0 0.0 0.0	dBuV/m 38.7 40.3 39.4	dBuV/m 23.8 26.8 24.4	dBuV/m 74 74 74	dBuV/m 54 54 54 54 54	dB -35.3 -33.7 -34.6 -30.8	Avg Mar dB -30.2 -27.2 -29.6 -24.2	Notes (V/H) H V V V
f GHz 513 267 620 360	Dist (m) 3.0 3.0 3.0 3.0 3.0 4.11 other emit	dBuV 45.0 43.0 45.0 42.0 isions were de	dBuV 30.1 29.5 30.0 28.6 ected above that Frequency	dB/m 26.2 28.4 26.7 31.2 1.2	dB 3.2 4.1 3.3 5.1	dB -35.7 -35.3 -35.6 -35.1 -35.1 -000r.	dB 0.0 0.0 0.0 0.0 Preamp (dB 0.0 0.0 0.0	dBuV/m 38.7 40.3 39.4 43.2	dBuV/m 23.8 26.8 24.4 29.8	dBuV/m 74 74 74	dBuV/m 54 54 54 54 54 54 8 8 8 8 8 8 8 8 8 8 8	dB -35.3 -33.7 -34.6 -30.8 Average F	Avg Mar dB -30.2 -27.2 -29.6 -24.2	Notes (V/H) H V V
f GHz 513 267 620 360 ev. 07.08	Dist (m) 3.0 3.0 3.0 3.0 3.0 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	dBuV 45.0 43.0 45.0 42.0 isions were der Measuremen Distance to	dBuV 30.1 29.5 30.0 28.6 ected above th at Frequency Antenna	dB/m 26.2 28.4 26.7 31.2 1.2	dB 3.2 4.1 3.3 5.1	dB -35.7 -35.3 -35.6 -35.1 -35.1 -000000000000000000000000000000000000	dB 0.0 0.0 0.0 0.0 Preamp (Distance	dB 0.0 0.0 0.0 0.0 Gain Corre	dBuV/m 38.7 40.3 39.4 43.2 ct to 3 met	dBuV/m 23.8 26.8 24.4 29.8	dBuV/m 74 74 74	dBuV/m 54 54 54 54 54 54 Pk Lim	dB -35.3 -33.7 -34.6 -30.8 Average F Peak Field	Avg Mar dB -30.2 -27.2 -29.6 -24.2 Field Strength d Strength Li	Notes (V/H) H V V
f GHz 513 267 620 360	Dist (m) 3.0 3.0 3.0 3.0 3.0 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	dBuV 45.0 43.0 45.0 42.0 isions were der Measuremer Distance to Analyzer Re	dBuV 30.1 29.5 30.0 28.6 ected above the at Frequency Antenna ading	dB/m 26.2 28.4 26.7 31.2 1.2	dB 32 4.1 33 5.1	dB -35.7 -35.3 -35.6 -35.1 -35.1 -35.1 -35.1 -35.1 -35.1 -35.1 -35.1 -35.1 -35.2 -35.1 -35.2 -35	dB 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	dB 0.0 0.0 0.0 Gain Correct	dBuV/m 38.7 40.3 39.4 43.2 ct to 3 met Strength @	dBuV/m 23.8 26.8 24.4 29.8 29.8	dBuV/m 74 74 74	dBuV/m 54 54 54 54 54 74 74 74 74 74 74 74 74 74 74 74 74 74	dB -35.3 -33.7 -34.6 -30.8 Average I Peak Field Margin vs	Avg Mar dB -30.2 -27.2 -29.6 -24.2 	Notes (V/H) H V V
f GHz 513 267 620 360	Dist (m) 3.0 3.0 3.0 3.0 3.0 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	dBuV 45.0 43.0 45.0 42.0 isions were der Measuremen Distance to	dBuV 30.1 29.5 30.0 28.6 ected above the at Frequency Antenna ading	dB/m 26.2 28.4 26.7 31.2 1.2	dB 32 4.1 33 5.1	dB -35.7 -35.3 -35.6 -35.1 -35.1 -000000000000000000000000000000000000	dB 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	dB 0.0 0.0 0.0 5ain Correc Field S d Peal	dBuV/m 38.7 40.3 39.4 43.2 ct to 3 met Strength @ k Field Stre	dBuV/m 23.8 26.8 24.4 29.8 29.8	dBuV/m 74 74 74	dBuV/m 54 54 54 54 54 74 74 74 74 74 74 74 74 74 74 74 74 74	dB -35.3 -33.7 -34.6 -30.8 Average I Peak Field Margin vs	Avg Mar dB -30.2 -27.2 -29.6 -24.2 Field Strength d Strength Li	Notes (V/H) H V V

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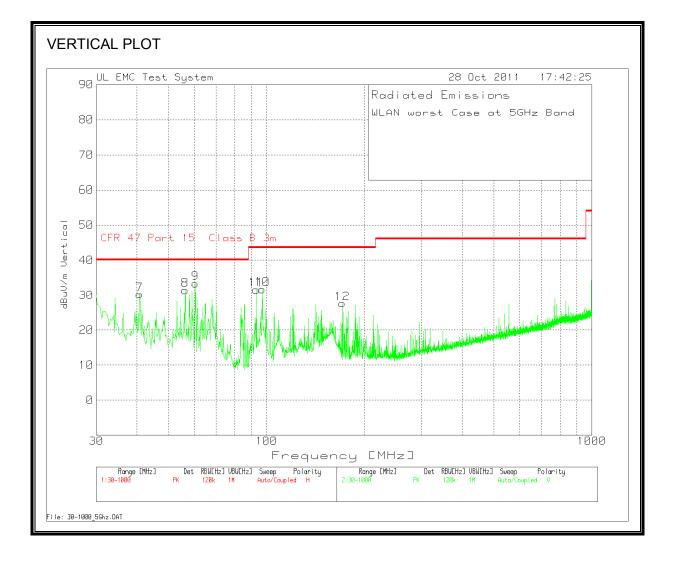
8.4. RADIATED EMISSIONS BELOW 1 GHz

SPURIOUS EMISSIONS 30 TO 1000 MHz



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SPURIOUS EMISSIONS 30 TO 1000 MHz



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DATA

WLAN WOI	st case a	at 5GHz Ba	ina							
Range 1 3	30 - 1000	MHz								
Frequency	Reading	Detector	Cable Loss	Amp Gain	Ant Gain	Corrected	15B Limi†	tMargin	Height	[dPolarity
47.6399	41.46	PK	1	-29.4	9.4	22.46	40	-17.54	100	Horz
95.5196	43.19	PK	1.4	-29.3	8.9	24.19	43.5	-19.31	200	Horz
108.8949	41.59	PK	1.5	-29.3	11.7	25.49	43.5	-18.01	100	Horz
142.4301	52.57	PK	1.7	-29.2	13.1	38.17	43.5	-5.33	100	Horz
144.5624	49.42	PK	1.7	-29.1	12.9	34.92	43.5	-8.58	100	Horz
146.5008	46.39	PK	1.7	-29.1	12.8	31.79	43.5	-11.71	200	Horz
Range 2 3	30 - 1000	MHz								
Frequency	Reading	Detector	Cable Loss	Amp Gain	Ant Gain	Corrected	15B Limi†	tMargin	Height	[dPolarity
40.6615	45.05	PK	0.9	-29.4	13.7	30.25	40	-9.75	109	Vert
56.1691	51.9	PK	1.1	-29.4	7.9	31.5	40	-8.5	109	Vert
60.4337	53.76	PK	1.2	-29.4	7.9	33.46	40	-6.54	109	Vert
97.0703	50.34	PK	1.4	-29.3	9.3	31.74	43.5	-11.76	109	Vert
92.9996	51.23	PK	1.4	-29.3	8.3	31.63	43.5	-11.87	109	Vert
170.9253	44.75	PK	1.8	-29	10.1	27.65	43.5	-15.85	200	Vert

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9. AC POWER LINE CONDUCTED EMISSIONS

LIMITS

FCC §15.207 (a)

RSS-Gen 7.2.2

Frequency of Emission (MHz)	Conducted L	.imit (dBuV)
	Quasi-peak	Average
0.15-0.5	66 to 56 "	56 to 46 *
0.5-5	56	46
5-30	60	50

* Decreases with the logarithm of the frequency.

TEST PROCEDURE

The EUT is placed on a non-conducting table 40 cm from the vertical ground plane and 80 cm above the horizontal ground plane. The EUT is configured in accordance with ANSI C63.4.

The receiver is set to a resolution bandwidth of 9 kHz. Peak detection is used unless otherwise noted as quasi-peak or average.

Line conducted data is recorded for both NEUTRAL and HOT lines.

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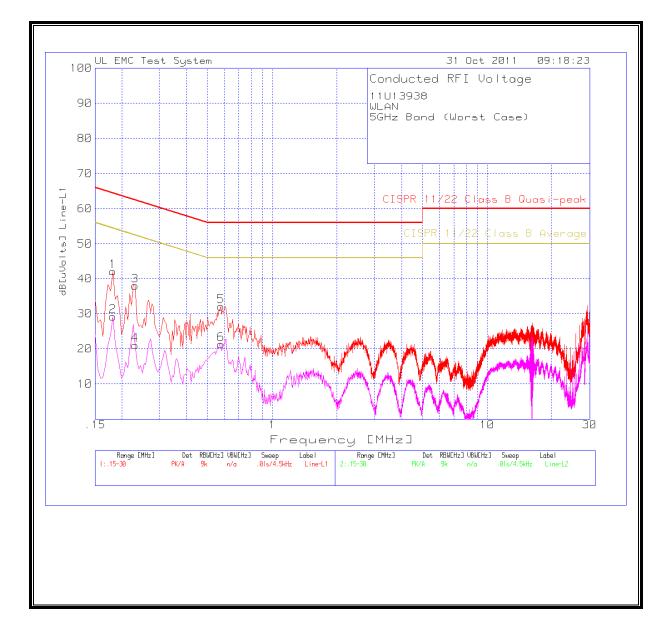
RESULTS

<u>6 WORST EMISSIONS</u>

11U13938	3						
WLAN							
5GHz Bar	nd (Worst	Case)					
Line-L1 .	15 - 30MH	Ηz					
Frequency	Reading	Detector	Corrected Reading	Class B Qp	Margin	Class B Avg	Margin
0.1815	42.2	PK	42.2	64.4	-22.2	54.4	-12.2
0.1815	29.17	Av	29.17	_	-	54.4	-25.23
0.231	38.03	PK	38.03	62.4	-24.37	52.4	-14.37
0.231	21.1	Av	21.1	-	-	52.4	-31.3
0.5775	32	PK	32	56	-24	46	-14
0.5775	21.33	Av	21.33	_	-	46	-24.67
Line-L2 .	15 - 30MH	Ηz					
Frequency	Reading	Detector	Corrected Reading	Class B Qp	Margin	Class B Avg	Margin
0.1815	41.55	PK	41.55	64.4	-22.85	54.4	-12.85
0.1815	30.87	Av	30.87	-	-	54.4	-23.53
0.222	37.53	PK	37.53	62.7	-25.17	52.7	-15.17
0.222	26.69	Av	26.69	_	-	52.7	-26.01
0.582	38.68	PK	38.68	56	-17.32	46	-7.32
0.582	28.19	Av	28.19	_	-	46	-17.81

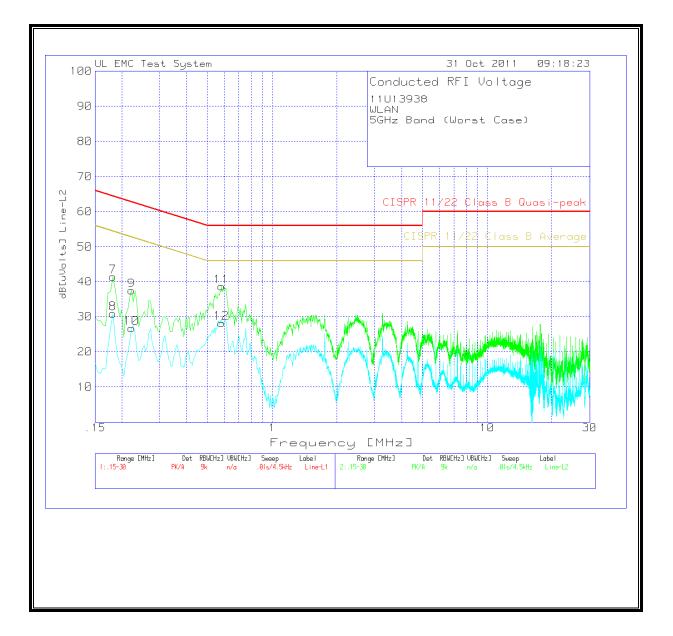
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LINE 1 RESULTS



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LINE 2 RESULTS



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10. DYNAMIC FREQUENCY SELECTION

10.1. OVERVIEW

10.1.1. LIMITS

INDUSTRY CANADA

IC RSS-210 is closely harmonized with FCC Part 15 DFS rules. The deviations are as follows:

RSS-210 Issue 7 A9.4 (b) (ii) Channel Availability Check Time: ...

Additional requirements for the band 5600-5650 MHz: Until further notice, devices subject to this Section shall not be capable of transmitting in the band 5600-5650 MHz, so that Environment Canada weather radars operating in this band are protected.

RSS-210 Issue 7 A9.4 (b) (iv) **Channel closing time:** the maximum channel closing time is 260 ms.

FCC

§15.407 (h) and FCC 06-96 APPENDIX "COMPLIANCE MEASUREMENT PROCEDURES FOR UNLICENSED-NATIONAL INFORMATION INFRASTRUCTURE DEVCIES OPERATING IN THE 5250-5350 MHz AND 5470-5725 MHz BANDS INCORPORATING DYNAMIC FREQUENCY SELECTION".

Table 1: Applicability of DFS requirements prior to use of a channel

Requirement	Operational Mode				
	Master	Client (without radar detection)	Client (with radar detection)		
Non-Occupancy Period	Yes	Not required	Yes		
DFS Detection Threshold	Yes	Not required	Yes		
Channel Availability Check Time	Yes	Not required	Not required		
Uniform Spreading	Yes	Not required	Not required		

Table 2: Applicability of DFS requirements during normal operation

Requirement	Operationa	Operational Mode			
	Master	Master Client Client			
		(without DFS)	(with DFS)		
DFS Detection Threshold	Yes	Not required	Yes		
Channel Closing Transmission Time	Yes	Yes	Yes		
Channel Move Time	Yes	Yes	Yes		

Table 3: Interference Threshold values, Master or Client incorporating In-Service Monitoring

Maximum Transmit Power	Value
	(see note)
≥ 200 milliwatt	-64 dBm
< 200 milliwatt	-62 dBm
Note 1: This is the level at the input of the receiver assuming a Note 2: Throughout these test procedures an additional 1 dB ha of the test transmission waveforms to account for variations in r will ensure that the test signal is at or above the detection thres response.	as been added to the amplitude neasurement equipment. This

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Table 4: DFS Response requirement values

Parameter	Value
Non-occupancy period	30 minutes
Channel Availability Check Time	60 seconds
Channel Move Time	10 seconds
Channel Closing Transmission Time	200 milliseconds + approx. 60 milliseconds over remaining 10 second period

The instant that the *Channel Move Time* and the *Channel Closing Transmission Time* begins is as follows:

For the Short pulse radar Test Signals this instant is the end of the Burst.

For the Frequency Hopping radar Test Signal, this instant is the end of the last radar burst generated.

For the Long Pulse radar Test Signal this instant is the end of the 12 second period defining the radar transmission.

The Channel Closing Transmission Time is comprised of 200 milliseconds starting at the beginning of the Channel Move Time plus any additional intermittent control signals required facilitating channel changes (an aggregate of approximately 60 milliseconds) during the remainder of the 10 second period. The aggregate duration of control signals will not count quiet periods in between transmissions.

Radar	Pulse Width	PRI	Pulses	Minimum	Minimum		
Туре	(Microseconds)	(Microseconds)		Percentage of	Trials		
-				Successful			
				Detection			
1	1	1428	18	60%	30		
2	1-5	150-230	23-29	60%	30		
3	6-10	200-500	16-18	60%	30		
4	11-20	200-500	12-16	60%	30		
Aggregate (F	Radar Types 1-4)			80%	120		

Table 5 – Short Pulse Radar Test Waveforms

Table 6 – Long Pulse Radar Test Signal

Radar	Bursts	Pulses	Pulse	Chirp	PRI	Minimum	Minimum
Waveform		per	Width	Width	(µsec)	Percentage	Trials
		Burst	(µsec)	(MHz)		of Successful	
						Detection	
5	8-20	1-3	50-100	5-20	1000-	80%	30
					2000		

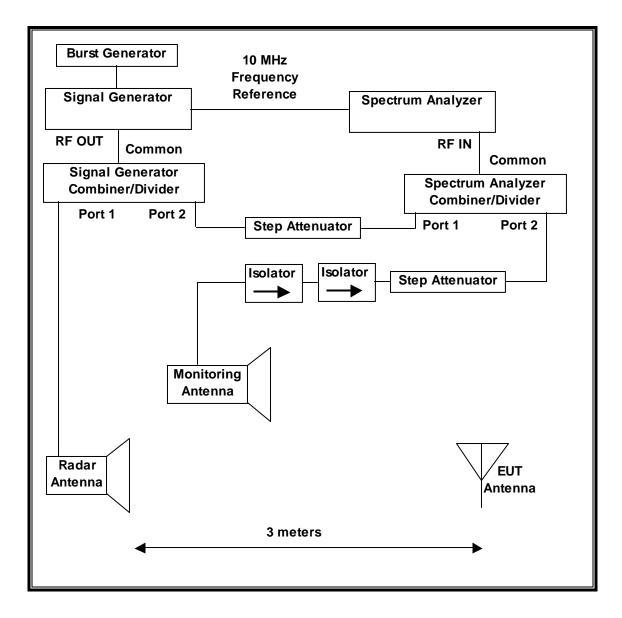
Table 7 – Frequency Hopping Radar Test Signal

Radar Waveform	Pulse Width (µsec)	PRI (µsec)	Burst Length (ms)	Pulses per Hop	Hopping Rate (kHz)	Minimum Percentage of Successful	Minimum Trials
						Detection	
6	1	333	300	9	.333	70%	30

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10.1.2. TEST AND MEASUREMENT SYSTEM

RADIATED METHOD SYSTEM BLOCK DIAGRAM



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SYSTEM OVERVIEW

The short pulse and long pulse signal generating system utilizes the NTIA software. The Vector Signal Generator has been validated by the NTIA. The hopping signal generating system utilizes the CCS simulated hopping method and system, which has been validated by the DoD, FCC and NTIA. The software selects waveform parameters from within the bounds of the signal type on a random basis using uniform distribution.

The short pulse types 2, 3 and 4, and the long pulse type 5 parameters are randomized at runtime.

The hopping type 6 pulse parameters are fixed while the hopping sequence is based on the August 2005 NTIA Hopping Frequency List. The initial starting point randomized at run-time and each subsequent starting point is incremented by 475. Each frequency in the 100-length segment is compared to the boundaries of the EUT Detection Bandwidth and the software creates a hopping burst pattern in accordance with Section 7.4.1.3 Method #2 Simulated Frequency Hopping Radar Waveform Generating Subsystem of FCC 06-96 APPENDIX. The frequency of the signal generator is incremented in 1 MHz steps from F_L to F_H for each successive trial. This incremental sequence is repeated as required to generate a minimum of 30 total trials and to maintain a uniform frequency distribution over the entire Detection Bandwidth.

The signal monitoring equipment consists of a spectrum analyzer. The aggregate ON time is calculated by multiplying the number of bins above a threshold during a particular observation period by the dwell time per bin, with the analyzer set to peak detection and max hold.

SYSTEM CALIBRATION

A 50-ohm load is connected in place of the spectrum analyzer, and the spectrum analyzer is connected to a horn antenna via a coaxial cable, with the reference level offset set to (horn antenna gain – coaxial cable loss). The signal generator is set to CW mode. The amplitude of the signal generator is adjusted to yield a level of –64 dBm as measured on the spectrum analyzer.

Without changing any of the instrument settings, the spectrum analyzer is reconnected to the Common port of the Spectrum Analyzer Combiner/Divider. The Reference Level Offset of the spectrum analyzer is adjusted so that the displayed amplitude of the signal is –64 dBm.

The spectrum analyzer displays the level of the signal generator as received at the antenna ports of the Master Device. The interference detection threshold may be varied from the calibrated value of –64 dBm and the spectrum analyzer will still indicate the level as received by the Master Device.

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ADJUSTMENT OF DISPLAYED TRAFFIC LEVEL

A link is established between the Master and Slave and the distance between the units is adjusted as needed to provide a suitable received level at the Master and Slave devices. The video test file is streamed to generate WLAN traffic. The monitoring antenna is adjusted so that the WLAN traffic level, as displayed on the spectrum analyzer, is at lower amplitude than the radar detection threshold.

TEST AND MEASUREMENT EQUIPMENT

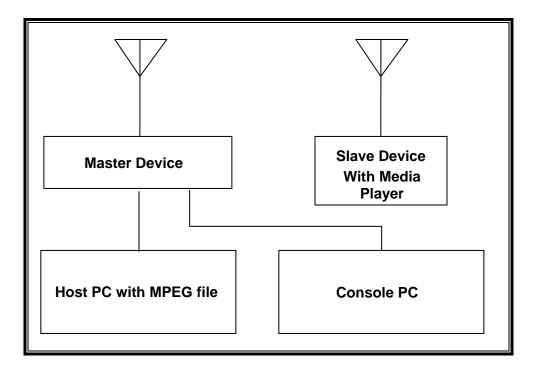
The following test and measurement equipment was utilized for the DFS tests documented in this report:

TEST EQUIPMENT LIST							
Description	Manufacturer	Model	Asset Number	Cal Due			
Spectrum Analyzer, 44 GHz	Agilent / HP	E4446A	C00169	04/07/12			
Arbitrary Waveform Generator	Agilent / HP	33220A	C01146	09/16/12			
MXG MW Analog Sig. Gen.	Agilent / HP	N5183A	N/A	04/26/12			

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10.1.3. SETUP OF EUT

RADIATED METHOD EUT TEST SETUP



SUPPORT EQUIPMENT

The following support equipment was utilized for the DFS tests documented in this report:

PERIPHERAL SUPPORT EQUIPMENT LIST								
Description	Manufacturer	Model	Serial Number	FCC ID				
Wireless Access Point	Cisco	AIR-AP1252AG-A-K9	FTX120690N2	LDK102061				
AC Adapter (AP)	Delta Electronics	EADP-45BB B	DTH112490BD	DoC				
Notebook PC (Console)	Dell	PP18L	10657517725	DoC				
AC Adapter (Console PC)	Dell	LA65SN0-00	CN-ODF263- 71615-6AU-1019	DoC				
Notebook PC (Server)	Apple	17" MacBook Pro	SW860401CV59	DoC				
AC Adapter (Server PC)	Lite On	A1343	C061164078DDJ9	DoC				
	Technologies		4AY					

10.1.4. DESCRIPTION OF EUT

The EUT operates over the 5250-5350 MHz and 5470-5725 MHz ranges.

The EUT is a Slave Device with without Radar Detection.

The highest power level within these bands is 22.23 dBm EIRP in the 5250-5350 MHz band and 21.18 dBm EIRP in the 5470-5725 MHz band.

The only antenna assembly utilized with the EUT has a gain of 4.63 dBi in the 5250-5350 MHz band and 4.51 dBi in the 5470-5725 MHz band.

The rated output power of the Master unit is > 23dBm (EIRP). Therefore the required interference threshold level is -64 dBm. After correction for procedural adjustments, the required radiated threshold at the antenna port is -64 + 1 = -63 dBm.

The calibrated radiated DFS Detection Threshold level is set to –64 dBm. The tested level is lower than the required level hence it provides a margin to the limit.

The EUT uses one transmitter/receiver chain connected to an antenna to perform radiated tests.

WLAN traffic is generated by streaming the video file TestFile.mp2 "6 ½ Magic Hours" from the Master to the Slave in full motion video mode using Quick Time media player.

TPC is not required since the maximum EIRP is less than 500 mW (27 dBm), however TPC is implemented.

The EUT utilizes the 802.11a/n architecture. One nominal channel bandwidth, 20 MHz, is implemented.

MANUFACTURER'S STATEMENT REGARDING UNIFORM CHANNEL SPREADING

This is not applicable to slave devices.

OVERVIEW OF MASTER DEVICE WITH RESPECT TO §15.407 (h) REQUIREMENTS

The Master Device is a Cisco Access Point, FCC ID: LDK102061. The minimum antenna gain for the Master Device is 3.5 dBi.

The rated output power of the Master unit is > 23dBm (EIRP). Therefore the required interference threshold level is -64 dBm. After correction for procedural adjustments, the required radiated threshold at the antenna port is -64 + 1 = -63 dBm.

The calibrated radiated DFS Detection Threshold level is set to –64 dBm. The tested level is lower than the required level hence it provides a margin to the limit.

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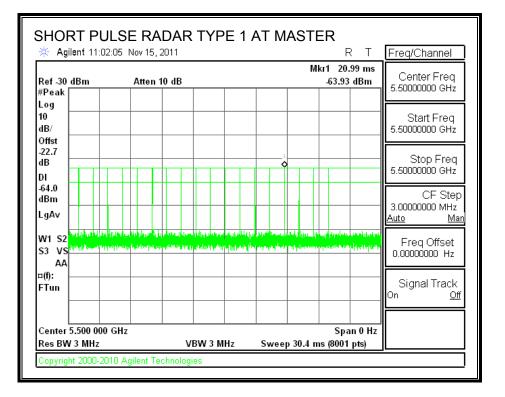
10.2. RESULTS FOR 20 MHz BANDWIDTH

10.2.1. TEST CHANNEL

All tests were performed at a channel center frequency of 5500 MHz.

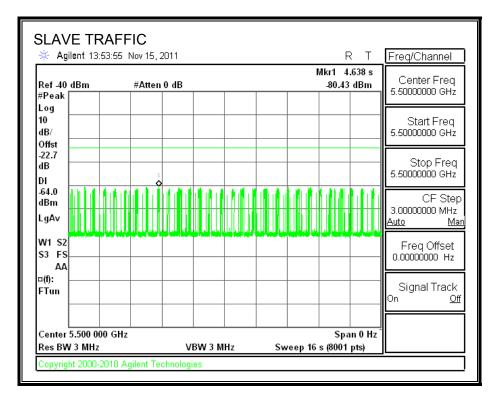
10.2.2. RADAR WAVEFORM AND TRAFFIC

RADAR WAVEFORM



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TRAFFIC



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10.2.3. OVERLAPPING CHANNEL TESTS

RESULTS

These tests are not applicable.

10.2.4. MOVE AND CLOSING TIME

REPORTING NOTES

The reference marker is set at the end of last radar pulse.

The delta marker is set at the end of the last WLAN transmission following the radar pulse. This delta is the channel move time.

The aggregate channel closing transmission time is calculated as follows:

```
Aggregate Transmission Time = (Number of analyzer bins showing transmission) * (dwell time per bin)
```

The observation period over which the FCC aggregate time is calculated begins at (Reference Marker + 200 msec) and ends no earlier than (Reference Marker + 10 sec).

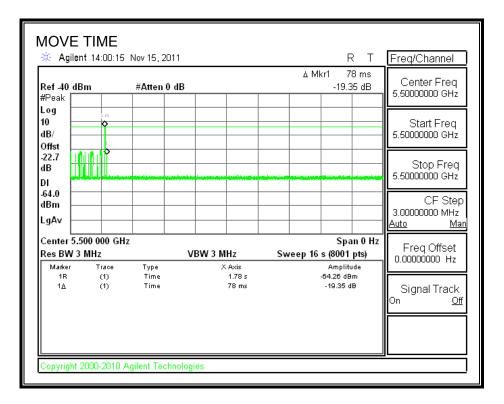
The observation period over which the IC aggregate time is calculated begins at (Reference Marker) and ends no earlier than (Reference Marker + 10 sec).

RESULTS

Agency	Channel Move Time	Limit
	(sec)	(sec)
FCC / IC	0.070	10

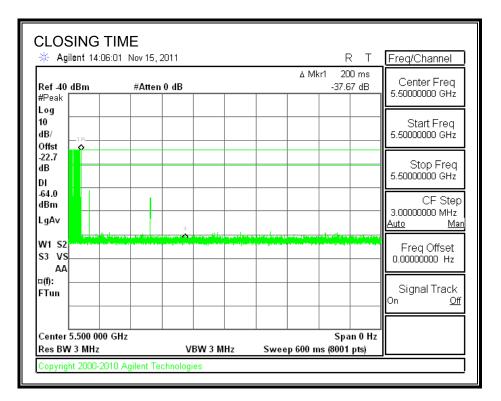
Agency	Aggregate Channel Closing Transmission Time	Limit
	(msec)	(msec)
FCC	0.0	60
IC	2.0	260

MOVE TIME



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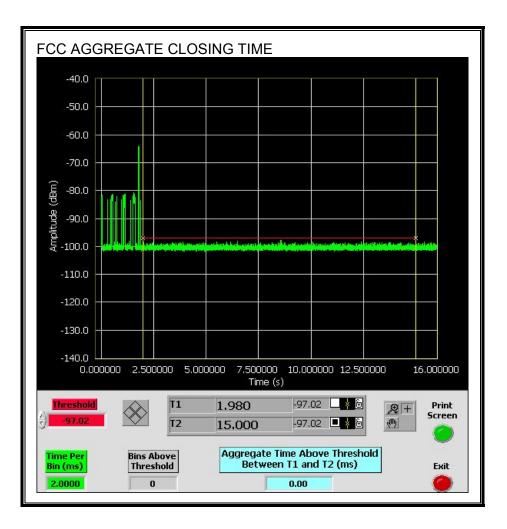
CHANNEL CLOSING TIME



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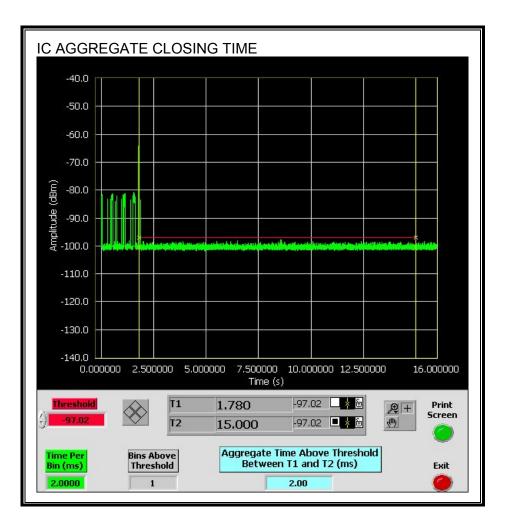
AGGREGATE CHANNEL CLOSING TRANSMISSION TIME

No transmissions are observed during the FCC aggregate monitoring period.



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Only intermittent transmissions are observed during the IC aggregate monitoring period.



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10.2.5. NON-OCCUPANCY PERIOD

RESULTS

No EUT transmissions were observed on the test channel during the 30-minute observation time.

Agilent 14:50:	34 Nov 15, 2011			F	₹Т	Freq/Channel
ef -40 dBm ⊃eak □ □	#Atten 0 dB				.8 ks 50 dB	Center Freq 5.5000000 GHz
og) B/⊥ℝ ffst ♢						Start Freq 5.5000000 GHz
1						Stop Freq 5.5000000 GHz
4.0					1	CF Stej 3.0000000 MHz <u>Auto M</u> a
/1 S2 3 FS AA						Freq Offset 0.00000000 Hz
f): Fun						Signal Track On <u>O</u>
enter 5.500 000 (es BW 3 MHz		VBW 3 MHz	Sweer	Spa 2 ks (8001	an 0 Hz pts)	

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