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7.3.3. AVERAGE POWER

AVERAGE POWER LIMIT

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a power meter.

Each chain is measured separately and the total power is calculated using:

Total Power = $10 \log (10^{\circ} (Chain 0 Power / 10) + 10^{\circ} (Chain 2 Power / 10))$

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RESULTS

No non-compliance noted:

The cable assembly insertion loss of 12.3 dB (including 10 dB pad and 2.3 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

Mode	Frequency	Average Power	Average Power	Average Power
Channel		Chain 0	Chain 2	Total
	(MHz)	(dBm)	(dBm)	(dBm)

802.11a Mode

Low	5500	18.3	17.7	21.0
Middle	5600	18.1	17.8	21.0
High	5700	17.8	17.8	20.8

802.11n HT20 Mode

Low	5500	18.3	17.6	21.0
Middle	5600	18.1	17.7	20.9
High	5700	17.8	17.8	20.8

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7.3.4. PEAK POWER SPECTRAL DENSITY

<u>LIMIT</u>

§15.407 (a) (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.

TEST PROCEDURE

The test is performed in accordance with FCC Public Notice: APPENDIX A Guidelines for Assessing Unlicensed National Information Infrastructure (U-NII) Devices – Part 15, Subpart E, August 2002. PPSD method #2 was used.

Each chain is measured separately and the total PPSD is calculated using:

Total PPSD = $10 \log (10^{\circ} (Chain 0 PPSD / 10) + 10^{\circ} (Chain 2 PPSD / 10))$

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RESULTS

No non-compliance noted:

Antenna Gain (dBi)	1
10 Log (# Tx Chains)	3.01
Effective Legacy Gain	4.01

Mode	Frequency	PPSD	PPSD	PPSD	Limit	Margin
Channel		Chain 0	Chain 2	Total		
	(MHz)	(dBm)	(dBm)	(dBm)	(dBm)	(dB)

802.11a Mode

Low	5500	7.57	7.28	10.44	11.00	-0.56
Middle	5600	7.85	7.33	10.60	11.00	-0.40
High	5700	7.14	7.25	10.20	11.00	-0.80

802.11n HT20 Mode

Low	5500	7.37	7.23	10.31	11.00	-0.69
Middle	5600	7.44	7.38	10.42	11.00	-0.58
High	5700	6.89	6.66	9.79	11.00	-1.21

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(802.11a MODE CHAIN 0)



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(802.11a MODE CHAIN 2)



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(802.11n HT20 MODE CHAIN 0)



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(802.11 HT20 MODE CHAIN 2)



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7.3.5. PEAK EXCURSION

<u>LIMIT</u>

§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

The test is performed in accordance with FCC Public Notice: APPENDIX A Guidelines for Assessing Unlicensed National Information Infrastructure (U-NII) Devices – Part 15, Subpart E, August 2002.

Since Method # 1 was used for peak power measurements, Method # 1 settings are used for the second PPSD trace.

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RESULTS

No non-compliance noted:

Mode	Frequency	Peak	Peak	Limit	Worst
Channel		Excursion	Excursion		Case
		Chain 0	Chain 2		Margin
	(MHz)	(dBm)	(dBm)	(dBm)	(dB)

802.11a Mode

Low	5500	9.60	10.61	13	-2.39
Middle	5600	9.63	9.64	13	-3.36
High	5700	10.04	9.92	13	-2.96

802.11n HT20 Mode

Low	5500	9.37	9.30	13	-3.63
Middle	5600	9.77	10.15	13	-2.85
High	5700	10.11	9.71	13	-2.89

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(802.11a MODE CHAIN 0)



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(802.11a MODE CHAIN 2)



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(802.11n HT20 MODE CHAIN 0)



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(802.11 HT20 MODE CHAIN 2)



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7.3.6. CONDUCTED SPURIOUS EMISSIONS

LIMITS

15.407 (b) (3) For transmitters operating in the 5.47–5.725 GHz band: all emissions outside of the 5.47–5.725 GHz band shall not exceed an EIRP of -27 dBm / MHz.

TEST PROCEDURE

Conducted RF measurements of the transmitter output are made to confirm that the EUT antenna port conducted emissions meet the specified limit and to identify any spurious signals that require further investigation or measurements on the radiated emissions site.

The transmitter output is connected to the spectrum analyzer. The resolution bandwidth is set to 1 MHz. The video bandwidth is set to 1 MHz. Peak detection measurements are compared to the average EIRP limit, adjusted for the maximum antenna gain. If necessary, additional average detection measurements are made.

Measurements are made over the 30 MHz to 40 GHz range with the transmitter set to the lowest, middle, and highest channels.

RESULTS

No non-compliance noted:

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SPURIOUS EMISSIONS (802.11a MODE CHAIN 0)



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SPURIOUS EMISSIONS (802.11a MODE CHAIN 2)



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SPURIOUS EMISSIONS (802.11n HT20 MODE CHAIN 0)



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SPURIOUS EMISSIONS (802.11 HT20 MODE CHAIN 2)



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SPURIOUS EMISSIONS (802.11a MODE COMBINED)



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SPURIOUS EMISSIONS (802.11n HT20 MODE COMBINED)



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7.4. RADIATED EMISSIONS

7.4.1. TRANSMITTER RADIATED SPURIOUS EMISSIONS

LIMITS

§15.205 (a) Except as shown in paragraph (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
¹ 0.495 - 0.505	16.69475 - 16.69525	608 - 614	5.35 - 5.46
2.1735 - 2.1905	16.80425 - 16.80475	960 - 1240	7.25 - 7.75
4.125 - 4.128	25.5 - 25.67	1300 - 1427	8.025 - 8.5
4.17725 - 4.17775	37.5 - 38.25	1435 - 1626.5	9.0 - 9.2
4.20725 - 4.20775	73 - 74.6	1645.5 - 1646.5	9.3 - 9.5
6.215 - 6.218	74.8 - 75.2	1660 - 1710	10.6 - 12.7
6.26775 - 6.26825	108 - 121.94	1718.8 - 1722.2	13.25 - 13.4
6.31175 - 6.31225	123 - 138	2200 - 2300	14.47 - 14.5
8.291 - 8.294	149.9 - 150.05	2310 - 2390	15.35 - 16.2
8.362 - 8.366	156.52475 - 156.52525	2483.5 - 2500	17.7 - 21.4
8.37625 - 8.38675	156.7 - 156.9	2655 - 2900	22.01 - 23.12
8.41425 - 8.41475	162.0125 - 167.17	3260 - 3267	23.6 - 24.0
12.29 - 12.293	167.72 - 173.2	3332 - 3339	31.2 - 31.8
12.51975 - 12.52025	240 - 285	3345.8 - 3358	36.43 - 36.5
12.57675 - 12.57725	322 - 335.4	3600 - 4400	$(^{2})$
13.36 - 13.41			

¹ Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz.

² Above 38.6

§15.205 (b) Except as provided in paragraphs (d) and (e), the field strength of emissions appearing within these frequency bands shall not exceed the limits shown in Section 15.209. At frequencies equal to or less than 1000 MHz, compliance with the limits in Section 15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000 MHz, compliance with the emission limits in Section 15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in Section 15.35 apply to these measurements.

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\$15.209 (a) Except as provided elsewhere in this Subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
30 - 88	100 **	3
88 - 216	150 **	3
216 - 960	200 **	3
Above 960	500	3

** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this Part, e.g., Sections 15.231 and 15.241.

§15.209 (b) In the emission table above, the tighter limit applies at the band edges.

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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 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in the 2.4 GHz band.

The spectrum from 30 MHz to 40 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in each 5 GHz 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.

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7.4.2. TRANSMITTER ABOVE 1 GHz FOR 5150 TO 5250 MHz BAND

RESTRICTED BANDEDGE (802.11n MODE HT40, LOW CHANNEL)



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🗧 Agilent		RT	Peak Search
lef 107 dBµV #A	tten 0 dB	Mkr1 5.149 0 GHz 51.04 dBµ∨	Next Peak
	00 GHz		Next Pk Right
6.2 B I			Next Pk Lett
4.0 ΒμV			Min Search
1 S2 3 FC AA			Pk-Pk Search
1): Tun wp			Mkr © C
tart 5.000 0 GHz Res BW 1 MHz	#VBW 10 Hz	Stop 5.150 0 GHz ^ Sweep 11.7 s (601 pts)	More 1 ct 2

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🗧 Agilent					Т	Peak Search
ef 107 dBµV Peak Mari	#Atte	n 0 dB		Mkr1 5.14 65.1	47 8 GHz 13 dBμV	Next Peak
og 5.14 8/ 65.1	7800000 13 dBμV	GHz				Next Pk Right
6.2 B					1	Next Pk Lett
4.0 ΒμV gAv	hliteronateleeneethiji	hungt dependenter tige	weetflannstradding	nathafallannadhagan njundh	reply black to and y	Min Search
1 S2 3 FC						Pk-Pk Search
it): Tun wp						Mkr © C
CP tart 5.000 0 G	Hz z	#VBW	1 MHz	Stop 5.15	50 0 GHz	More 1 ct 2

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HARMONICS AND SPURIOUS EMISSIONS (802.11n MODE HT40)

Complia	High ance Ce	Frequency ertification	y Measure Services, 1	ment Aorgan l	Hill O	oen Fiel	d Site								
•			,	-											
Compan	ny:Athe #.06T11	ros 0495													
ate:8-	4-2006	0405													
est En	gineer:	Chin Pang													
onfigu	ration:H	EUT/Lapto	р												
Iode:a	mode,	5.2GHz, H	IT40, UNI	I Band											
est Eq	uipmen	it:													
							_								
н	lorn 1-	18GHz	Pre-	mplifer	1-26	GHZ	Pre-am	pliter	26-40GH		н	orn > 180	HZ		Limit
T73; 5	S/N: 671	7 @3m	▼ T145	Agilent	3008A0	05(🖵	T88 Mit	eq 26-	40GHz	▼ T89	; ARA 18-2	6GHz; S/N:1	049	-	FCC 15.205 🗸
- U Crev		blaa					1							_	
nineq	quericy ca	DIES													
	2 foot	cable		3 foot o	able		12	foot d	able		HPF	Re	ject Filte	r Pear	W-VDW-1MU-
			Chi	1975380	001		Chin 2	003540	01	і пр	F 7.6GHz			Avera	ge Measurements
			• Chi	n 1975380	001	•	Chin 20	003540	01		F_7.6GHz	•		Avera RBW=	neasurements MHz ; VBW=10Hz
f	Dist	Read Pk	Chi Read Av	1975380 . AF	001 CL	• Amp	Chin 20	003540 Fltr	01 Peak	Avg	F_7.6GHz Pk Lim	• Avg Lim	Pk Mar	Avera Avg Mar	notes
f GHz	Dist (m)	Read Pk dBuV	 Chi Read Av dBuV 	1975380 g. AF dB/m	001 CL dB	• Amp dB	Chin 20 D Corr dB	003540 Fltr dB	01 Peak dBuV/m	HP Avg dBuV/m	F_7.6GHz Pk Lim dBuV/m	• Avg Lim dBuV/m	Pk Mar dB	Avera RBW=	Mensurements MHz ; VBW=10Hz Notes (V/H)
f GHz ow Ch, 5	Dist (m) 5190MHz	Read Pk dBuV	Chi Read Av dBuV 22.0	1975380 5. AF dB/m	OD1 CL dB	• Amp dB	Chin 20 D Corr dB	Fltr dB	01 Peak dBuV/m	Avg dBuV/m	F_7.6GHz Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avera RBW=	www.bww-livinz ige Measurements ilMHz ; VBW=10Hz Notes (V/H)
f GHz ow Ch, 5 5.570 5.570	Dist (m) 5190MH2 3.0 3.0	Read Pk dBuV 2 46.4 45.0	Chi Read Avy dBuV	AF dB/m 38.0 38.0	001 CL dB 5.8 5.8	• Amp dB -32.3 -32.3	Chin 20 D Corr dB 0.0 0.0	003540 Fltr dB 0.7 0.7	01 Peak dBuV/m 58.6 57.2	Avg dBuV/m 45.2 44.4	F_7.6GHz Pk Lim dBuV/m 74 74	Avg Lim dBuV/m	Pk Mar dB -15.4 -16.8	Avg Mar dB	Very Weinstein vge Measurements 1MHz; VBW=10Hz Notes (V/H) V H
f GHz ow Ch, 5 5.570 5.570	Dist (m) 5190MHz 3.0 3.0	Read Pk dBuV z 46.4 45.0	Chi Read Av dBuV	AF dB/m 38.0 38.0	001 CL dB 5.8 5.8	▼ Amp dB -32.3 -32.3	Chin 20 D Corr dB 0.0 0.0	003540 Fltr dB 0.7 0.7	01 Peak dBuV/m 58.6 57.2	HP Avg dBuV/m 45.2 44.4	F_7.6GHz Pk Lim dBuV/m 74 74	Avg Lim dBuV/m	Pk Mar dB -15.4 -16.8	Avera RBW= Avg Mar dB	vyge <u>Measurements</u> 1MHz ; VBW=10Hz Notes (V/H) V H
f GHz ow Ch, 5 5.570 5.570	Dist (m) 5190MHz 3.0 3.0	Read Pk dBuV 46.4 45.0	Chi Read Av dBuV	AF dB/m 38.0 38.0	001 CL dB 5.8 5.8	• Amp dB -32.3 -32.3	Chin 20 D Corr dB 0.0 0.0	003540 Fltr dB 0.7 0.7	01 Peak dBuV/m 58.6 57.2	Avg dBuV/m 45.2 44.4	F_7.6GHz Pk Lim dBuV/m 74 74	Avg Lim dBuV/m 54 54	Pk Mar dB -15.4 -16.8	Avera RBW=	vyge <u>Measurements</u> 1MHz ; VBW=10Hz Notes (V/H) V H
f GHz ow Ch, 5 5.570 5.570	Dist (m) 5190MHz 3.0 3.0	Read Pk dBuV 46.4 45.0	Chi Read Av dBuV	1975380 38.0 38.0	001 CL dB 5.8 5.8	• Amp dB -32.3 -32.3	Chin 20 D Corr dB 0.0 0.0	003540 Fltr dB 0.7 0.7	01 Peak dBuV/m 58.6 57.2	HP Avg dBuV/m 45.2 44.4	F_7.6GHz Pk Lim dBuV/m 74 74	Avg Lim dBuV/m 54 54	Pk Mar dB -15.4 -16.8	Avera RBW=	W=VBW=1NHz ge Measurements 1MHz; VBW=10Hz Notes (V/H) V H
f GHz ow Ch, 5 5.570 5.570	Dist (m) 5190MHz 3.0 3.0 0 0 other em	Read Pk dBuV 46.4 45.0 issions were	Chi Read Av dBuV 33.0 32.2 detected abov	(, AF dB/m 38.0 38.0	CL dB 5.8 5.8 m noise	• Amp dB -32.3 -32.3 e floor.	Chin 20	003540 Fltr dB 0.7 0.7	01 Peak dBuV/m 58.6 57.2	Avg dBuV/m 45.2 44.4	F_7.6GHz Pk Lim dBuV/m 74 74 74	Avg Lim dBuV/m 54 54	Pk Mar dB -15.4 -16.8	Avera RBW=	W=VBW=1NHz ge Measurements 1MHz ; VBW=10Hz Notes (V/H) V H
f GHz ow Ch, 5 5.570 5.570	Dist (m) 5190MHz 3.0 3.0 other em	Read Pk dBuV 46.4 45.0 issions were	Chi Read Avi dBuV	s. AF dB/m 38.0 28.0 28.0 28.0	CL dB 5.8 5.8 m noise	Amp dB -32.3 -32.3 e floor.	Chin 20	003540 Fltr dB 0.7 0.7	01 Peak dBuV/m 58.6 57.2	Avg dBuV/m 45.2 44.4	F_7.6GHz Pk Lim dBuV/m 74 74 74	Avg Lim dBuV/m 54 54	Pk Mar dB -15.4 -16.8	Avera Avera RBW= Avg Mar dB -8.8 -9.6	Notes (V/H) V H
f GHz ow Ch, 5 5.570 5.570	Dist (m) 5190MHz 3.0 3.0 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	Read Pk dBuV 46.4 45.0 issions were Measurem	Chi Read Av; dBuV 33.0 32.2 detected above ent Frequer	t. AF dB/m 38.0 38.0 cy	CL dB 5.8 5.8	Amp dB -32.3 -32.3 efloor.	Chin 20	Gain	01 Peak dBuV/m 58.6 57.2	Avg dBuV/m 45.2 44.4	F_7.6GHz Pk Lim dBuV/m 74 74	Avg Lim dBuV/m 54 54	Pk Mar dB -15.4 -16.8 Average I	Avera Avera RBW= Avg Mar dB 	h Limit
f GHz ow Ch, 5 5.570 5.570	Dist (m) 3190MHz 3.0 3.0 other emi f Dist	Read Pk dBuV 46.4 45.0 issions were Measurem Distance to	Chi Read Avi dBuV 33.0 32.2 detected above ent Frequer o Antenna	t. AF dB/m 38.0 38.0 cy	CL dB 5.8 5.8	Amp dB -32.3 -32.5	Chin 20 D Corr dB 0.0 0.0 Distance	Gain	01 Peak dBuV/m 58.6 57.2	Avg dBuV/m 45.2 44.4	F_7.6GHz Pk Lim dBuV/m 74 74	Avg Lim dBuV/m 54 54 54 Avg Lim Pk Lim	Pk Mar dB -15.4 -16.8 Average I Peak Fiel	Average A	h Limit
f GHz .ow Ch, 5 5.570 5.570 8.000	Dist (m) 3.0 3.0 5 other em f Dist Read AF	Read Pk dBuV 46.4 45.0 issions were Measurem Distance tt Analyzer R Anatonas P	Chi Read Avi dBuV 33.0 32.2 detected above ent Frequer b Antenna Reading actor	a 1975380 AF dB/m 38.0 38.0 38.0 cy	CL dB 5.8 5.8 m noise	Amp dB -32.3 -32.5	Chin 20 D Corr dB 0.0 0.0 Preamp Distance Average Calculate	Gain Corre Field S	Peak dBuV/m 58.6 57.2 ct to 3 met Strength @ k Field Stre	HP Avg dBuV/m 45.2 44.4 ers 3 m	F_7.6GHz Pk Lim dBuV/m 74 74 74	Avg Lim dBuV/m 54 54 54 54 Avg Lim Pk Lim Avg Mar	Pk Mar dB -15.4 -16.8 Average I Peak Fiel Margin vs Margin vs	Aver Mar RBW= Avg Mar dB 	h Limit imit
f GHz .ow Ch, 5 (5.570 (5.570 (5.570) (5.570) (5.570)	Dist (m) 3.0 3.0 other em f Dist Read AF CL	Read Pk dBuV 46.4 45.0 issions were Measurem Distance tt Analyzer R Antenna F. Cable Los	Chi Read Av; dBuV 33.0 32.2 detected above ent Frequer b Antenna teading actor	s. AF dB/m 38.0 38.0 28.0 28.0 28.0 28.0 28.0 28.0 28.0 2	CL dB 5.8 5.8	Amp dB -32.3 -32.3 -32.3 e floor. Amp D Corr Avg Peak HPF	Chin 20 D Corr dB 0.0 0.0 Dreamp Distance Average Calculate High Pas	Gain Gain Corre Field S	Peak dBuV/m 58.6 57.2 ct to 3 met Strength @ k Field Stre	HP Avg dBuV/m 45.2 44.4 ers 3 m mgth	F_7.6GHz Pk Lim dBuV/m 74 74 74	Avg Lim dBuV/m 54 54 54 Avg Lim Pk Lim Avg Mar Pk Mar	Pk Mar dB -15.4 -16.8 Average I Peak Field Margin vs Margin vs	Average L Peak Limit	Notes (V/H) V H h Limit imit

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Compli: Compar Project Date:11 Test En Configu Mode:1	High ance Ce wy:Athe #:06U1 /1/2006 gineer: ration:1 'X, HT4	Frequency ertification 0485 Chin Pang EUT/Laptoj 10, 5230MI	y Measurem Services, M 9 Hz	ent forgan I	Hill Op	oen Field	l Site									
Test Eq H T59; S	uipmen orn 1- S/N: 324	18GHz 5 @3m	Pre-ar	nplifer Agilent 3	1-260	GHz 05(🗸	Pre-am	plifer eq 26-4	26-40GH 40GHz	z •	T89	H ; ARA 18-26	orn > 180 6GHz; S/N:1	GHz 1049	Ţ	Limit FCC 15.205
Hi Free	uency Ca	cable	J Vien	foot c 1872150	able 02	T	12 1 Vien 19	foot c 720900	able		HP	HPF F_7.6GHz	•	ject Filte	r <u>Pea</u> RB <u>Avera</u> RBW=	<u>k Measurements</u> W=VBW=1MHz 19 <u>ge Measurements</u> 11MHz ; VBW=10Hz
f GHz	Dist (m)	Read Pk dBuV	Read Avg. dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Peak dBuV/m	dB	Avg uV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes (V/H)
5230MH																(
15.690	3.0	51.0	36.0	38.4	5.8	-32.3	0.0	0.7	63.6	4	18.6	74	54	-10.4	-5.4	V
15.690	3.0	47.0	34.0	38.4	5.8	-32.3	0.0	0.7	59.6	4	16.6	74	54	-14.4	-7.4	H
Rev. 5.1.6 Note: No	other em	issions were	detected above	the syste	m noise	floor.										
	f	Measurem	ent Frequenc	у		Amp	Preamp (Gain					Avg Lim	Average F	Field Strengt	h Limit
	Dist	Distance to	Antenna			D Corr	Distance	Correc	ct to 3 mete	rs			Pk Lim	Peak Field	d Strength L	imit
	Read	Analyzer R	eading			Avg	Average	Field S	Strength @	3 m			Avg Mar	Margin vs	. Average L	imit
	AF	Antenna E	actor			Peak	Calculate	d Peak	c Field Stre	ngth			Pk Mar	Margin vs	Peak Limi	t
	CL	Cable Los	3			HPF	High Pas	s Filter								

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7.4.3. TRANSMITTER ABOVE 1 GHz FOR 5150 TO 5350 MHz BAND

RESTRICTED BANDEDGE (802.11a MODE, LOW CHANNEL)



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🔆 Agilent	, ,	Т	Peak Search
Ret 107 dBµV ##	tten 0 dB	Mkr1 5.150 0 GHz 48.67 dBµ∨	Next Peak
^{Log} 5.1500000 ^{dB/} 48.67 dBμ	00 GHz		Next Pk Right
36.2 1B DI			Next Pk Left
04.0 dBμV _gAv			Min Search
V1 S2 S3 FC AA			Pk-Pk Search
Pit): FTun Swp			Mkr © CI
Start 5.000 0 GHz #Res BW 1 MHz	#VBW 10 Hz	Stop 5.150 0 GHz Sweep 11.7 s (601 pts)	More 1 ct 2

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🔆 Agilent				Т	Peak Search
Rel 107 dBµV Peak	#Atten 0 dB		Mkr1 5.03 60.7	9 5 GHz 5 dBµ∨	Next Peak
.og 10 1B/ Dilst					Next Pk Right
)I					Next Pk Lett
'4.0 ΙΒμV Μιωλωωγρημίως .gAv	weden for an and and an	er Anna Mallan (Malan Malan)	udjenen Will-karte, rokumer H	white and the second	Min Search
/1 S2 53 FC AA					Pk-Pk Search
(1): Tun Swp					Mkr © C
Start 5.000 0 GHz	#\VF	3W 1 MHz	Stop 5.15 Sween 1 ms (6	0 0 GHz	More 1 ct 2

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🔆 Agilent		Т	Peak Search
Rel 107 dBµV #.	Atten 0 dB	Mkr1 5.149 8 GHz 48.73 dBμ∨	Next Peak
og 5.1498000	00 GHz		Next Pk Right
66.2 IB			Next Pk Left
44.0 ΙΒμV gAv			Min Search
/1 S2 53 FC AA			Pk-Pk Search
(1): Tun Swp			Mkr © Cł
Start 5.000 0 GHz	#VBW 10 Hz	Stop 5.150 0 GHz	More 1 ct 2

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RESTRICTED BANDEDGE (802.11a MODE, HIGH CHANNEL)



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Agilent		Т	Peak Search
et 107 dBµV #A	tten 0 dB	Mkr1 5.350 0 GHz 51.25 dBµ∨	Next Peak
^{og} 5.3500000(^{B/} 51.25 dBμ [']	00 GHz √		Next Pk Right
6.2 B I			Next Pk Lett
4.0 ΒμV Ξ ^Δ ν φ			Min Search
1 S2 3 FC AA			Pk-Pk Search
1): Tun wp			Mkr © Cl
tart 5.350 0 GHz Res BW 1 MHz	#VBW 10 Hz	Stop 5.460 0 GHz	More 1 ct 2

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🔄 Agilent			Т	Peak Search
tet 107 dBμV #At Peak Mostkor	ten 0 dB	Mkr1	5.351 5 GHz 68.25 dBµ∨	Next Peak
og 0 5.35150000 ^{B/} 68.25 dBμ\	0 GHz /			Next Pk Right
6.2 B II				Next Pk Lett
4.0 ΒμV gAv	anthrough a second	waadahandhaartamaatahaadhahaart	Marent-Manushofeytey,Nolandria	Min Search
1 S2 3 FC AA				Pk-Pk Search
it): Tun wp				Mkr © C
itart 5.350 0 GHz Res RW 1 MHz	#VBW 1 M	Stoj Hz Sween 1	o 5.460 0 GHz	More 1 ct 2

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🔆 Agilent			T Peak Search
Rei 107 dBµV #A	tten 0 dB	Mkr1 5.350 6 53.38 d	GHz BµV Next Peak
Marker 0 5.35060000 B/ 53.38 dBμ	00 GHz		Next Pk Right
6.2 B			Next Pk Lett
4.0 ΒμV gAv Φ			Min Search
1 S2 3 FC AA			Pk-Pk Search
1): Tun wp			Mkr © Cl
itart 5.350 0 GHz Res BW 1 MHz	#VBW 10 H	Stop 5.460 0	GHz More

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HARMONICS AND SPURIOUS EMISSIONS (802.11a MODE)

Complia Compan Project # Date:8-4 Cest Eng Configui Aode:a	High nce Ce y:Ather #:06U10 H-2006 gineer: ration:E mode, s	Frequency rtification os 0485 Chin Pang UT/Lapto 5.2GHz, Lo	y Measurer Services, N P egacy, UNN	nent forgan I NI Band	Hill Oj	pen Fiel	d Site								
Lest Equipment: Pre-amplifer 1-26GHz T73; S/N: 6717 @3m T145 Agilent 3008A005(•						Pre-amplifer 26-40GHz			z T	H 89; ARA 18-20	Ţ	Limit FCC 15.205			
Hi Frequency Cables 2 foot cable		3 foot cable			•	12 foot cable Chin 200354001		able		HPF IPF_7.6GHz	Re	eject Filte	r <u>Peak</u> RBV <u>Averas</u> RBW=1	<u>: Measurements</u> W=VBW=1MHz <u>ge Measurements</u> 1MHz : VBW=10Hz	
f GHz	Dist (m)	Read Pk dBuV	Read Avg dBuV	. AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Peak dBuV/m	Avg dBuV/	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes (V/H)
ow Ch, 5	180MHz														
5.540 5.540	3.0 3.0	45.0 44.6	32.0 31.7	38.1 38.1	5.8 5.8	-32.3 -32.3	0.0	0.7 0.7	57.3 56.9	44.3 44.0	74 74	54 54	-16.7 -17.1	-9.7 -10.0	V H
fid ab 52	260MB-			-			-								
5.780	3.0	55.5	40.0	37.5	5.9	-32.2	0.0	0.7	67.3	51.8	74	54	- <mark>6.7</mark>	-2.2	V
5.780	3.0	54.0	39.0	37.5	5.9	-32.2	0.0	0.7	65.8	50.8	74	54	-8.2	-3.2	H
ligh Ch	3.0									ļ					
0.640	3.0	47.0	35.0	37.1	4.3	-34.2	0.0	0.8	54.9	42.9	74	54	-19.1	-11.1	v
5.960	3.0	55.0	39.0	37.1	5.9	-32.2	0.0	0.7	66.5	50.5	74	54	-7.5	-3.5	V
5.960	3.0	50.0	38.0	37.1	4.3 5.9	-34.2	0.0	0.8	57.9 63.5	45.9 47.5	74	54 54	-10.1	-ð.1 -6.5	<u>н</u> Н
.ev. 5.1.6 lote: No o	f Dist Read AF CL	ssions were Measurem Distance to Analyzer R Antenna F Cable Los	detected above ent Frequence Antenna Leading actor s	the syste	m nois	Amp D Corr Avg Peak HPF	Preamp (Distance Average Calculate High Pas	Gain Corre Field S d Peal s Filter	ct to 3 mete Strength @ c Field Stre	ers 3 m ength		Avg Lim Pk Lim Avg Mar Pk Mar	Average I Peak Fiel Margin vs Margin vs	Field Strengtl d Strength Li s. Average Li s. Peak Limit	h Limit mit mit

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RESTRICTED BANDEDGE (802.11n MODE HT20, LOW CHANNEL)



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Agilent		Т	Peak Search
ef 107 dBμV ##	tten 0 dB	Mkr1 5.149 0 GHz 48.69 dBµV	Next Peal
^{eak} Marker ⁹ 5.1490000 ^{1/} 48.69 dBµ	00 GHz		Next Pk Right
.2			Next Pk Lett
.0 μν			Min Searc
S2 FC AA			Pk-Pk Search
): un /P			Mkr © (
art 5.000 0 GHz es BW 1 MHz	#VBW 10 Hz	Stop 5.150 0 GHz Sween 11 7 s (601 n/s)	Mor 1 ct 2

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e Agilent									Т	Peak Search
el 107 dBµV ^{Peak} Mai	rkor	#Atten	0 dB				Mkr1	5.061 2 61.22 (e GHz dBµV	Next Peak
og 5.00 ^{B/} 61.	61200 22 dB	000 βμV ₋	GHz							Next Pk Right
6.2 B										Next Pk Lett
4.0 ΒμV _{κρίνωνος} gAv	magana	terationera	khyhye ⁿ a Arty	of a party of a	n de la d La de la d	humbandu	ush Mayakeense t	mulana	hahrowi	Min Search
1 S2 3 FC AA										Pk-Pk Search
1): Tun wp										Mkr © C
tart 5.000 0 (GHz Hz		#V	BW 1 N	/Hz	s	Stop weep 1	o 5.150 0 ms (601	GHz pts)	More 1 ct 2

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E Agilent		Т	Peak Search
ei 107 dBμV #/	Atten 0 dB	Mkr1 5.150 0 GHz 48.86 dBµ∨	Next Peak
^{og} 5.1500000 ^{B/} 48.86 dBµ	00 GHz		Next Pk Right
6.2 B I			Next Pk Lett
4.0 ΒμV gAv			Min Search
1 S2 3 FC AA			Pk-Pk Search
1): Tun wp			Mkr © C
tart 5.000 0 GHz Res BW 1 MHz	#VBW 10 Hz	Stop 5.150 0 GHz ^ Sween 11 7 s (601 nts)	More 1 ct 2

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RESTRICTED BANDEDGE (802.11n MODE HT20, HIGH CHANNEL)



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🔆 Agilent	CAR(802)	.11n mode	n120, vei	T	Peak Search
Rel 107 dBµV #Atten #Peak Marker	0 dB		Mkr1 5.350 66.71	4 GHz dBµV	Next Peak
Log 5.350400000 dB/ 66.71 dBμV	GHz				Next Pk Right
16.2 18 19 10 1 1 1 1 1 1 1 1 1 1 1 1 1					Next Pk Lett
ra.0 HBμV gΔv gΔv	aluufaanan kaharaha	mlthausentim	gnala farmanta	ndherwengebbe	Min Search
V1 S2 53 FC AA					Pk-Pk Search
(1): Tun Swp					Mkr © Cl
Start 5.350 0 GHz Res BW 1 MHz	#VBW 1	MHz	Stop 5.460 Sweep 1 ms (60	0 GHz 1 pts)	More 1 ct 2

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HARMONICS AND SPURIOUS EMISSIONS (802.11n MODE HT20)

Compliar Company Project # Date:8-4 Cest Eng	High nce Ce (Ather (06U10 -2006 (ineer:0	Frequency rtification ros 0485 Chin Pang	7 Measuren Services, M	ient [organ]	Hill O _j	pen Fiel	d Site								
Configura Mode:a 1	ation:E mode, :	UT/Lapto 5.2GHz, H	p [T20, UNN]	Band											
- (-															
Lest Equ	upmen	19047	Pre-a	mnlifer	1.26	GH7	Pre-am	nlifer	26-40GH	17	н	orn > 18	GH7		Limit
T73; S/	N: 6717	7 @3m	▼ T145 /	Agilent :	3008A0	05(🗸	T88 Mit	eq 26-4	40GHz	- T8	9; ARA 18-20	6GHz; S/N:	1049	-	FCC 15.205
Hi Frequ	iency Cab	oles ———				_								_	
2	2 foot	cable	;	3 foot o	able		12	foot c	able		HPF	Re	eject Filt	er Peal RB	<u>k Measurements</u> W=VBW=1MHz
			• Chin	1975380	01	•	Chin 2	03540	01		PF_7.6GHz	•		▼ Avera RBW=	ge <u>Measurements</u> 1MHz ; VBW=10Hz
f GHz	Dist (m)	Read Pk dBuV	Read Avg. dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes (V/H)
Low Ch, 51	180MHz 3.0	45.7	32.4	38.1	5.8	-32.3	0.0	0.7	58.0	44.7	74	54	-16.0	-9.3	v
5.540	3.0	45.0	32.0	38.1	5.8	-32.3	0.0	0.7	57.3	44.3	74	54	-16.7	-9.7	H
Mid ch, 52	3.0														
15.780	3.0	54.8 53.6	39.0 38 3	37.5	5.9 5 0	-32.2	0.0	0.7	66.6 65.4	50.8	74	54 54	-7.4	-3.2	<u>V</u> н
	5.0	33.0		37.3	3.7	-02.2	0.0	0.7	03.4	30.1	/4		-0.0	-3.2	
ligh Ch, 5	3.0	16.5	25.2	07.1	4.0	24.2	0.0	0.0	51.1	42.2	= 4	= 1	10.6	10.0	v
10.640	3.0	40.5 52.8	35.3	37.1	4.3	-34.2	0.0	0.8	54.4 64.3	43.2	74	54 54	-19.0	-10.8	v
10.640	3.0	48.5	37.6	37.1	4.3	-34.2	0.0	0.8	56.4	45.5	74	54	-17.6	-8.5	H
.5.960	3.0	52.4	36.7	37.1	5.9	-32.2	0.0	0.7	63.9	48.2	74	54	-10.1	-5.8	H
Rev. 5.1.6 Note: No ot	ther emi	ssions were	detected above	the syste	m nois	e floor.									
	f	Measurem	ent Frequenc	v		Amp	Preamp	Gain				Avg Lim	Average	Field Strengt	h Limit
	Dist	Distance to	Antenna	-		D Corr	Distance	Corre	ct to 3 mete	ers		Pk Lim	Peak Fiel	ld Strength L	imit
	Read	Analyzer R	eading			Avg	Average	Field S	Strength @	3 m		Avg Mar	Margin v	s. Average L	imit
	AF	Antenna Fa	actor			Peak	Calculate	d Peal	k Field Stre	ength		Pk Mar	Margin v	s. Peak Limit	
		C 11 T				TIDE	TT' 1 D	a Tiltor	-						

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7.4.4. TRANSMITTER ABOVE 1 GHz FOR 5470 TO 5725 MHz BAND

RESTRICTED BANDEDGE (802.11a MODE, LOW CHANNEL)



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RESTRICTED BANDEDGE (802.11a MODE, HIGH CHANNEL)



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HARMONICS AND SPURIOUS EMISSIONS (802.11a MODE)

Configu Mode:a	2/2006 agineer: aration:H mode, 1	0485 Chin Pang CUT/ Lapto Legacy, 5.: t	op 5GHz Band												
H	orn 1-	<u></u> 18GHz	Pre-a	mplifer	1-26	GHz	Pre-am	plifer	26-40GH	z	н	orn > 180	GHz		Limit
T73; 5	S/N: 671	7 @3m	▼ T145 /	Agilent	3008A0	05(🗸	T88 Mit	eq 26-	40GHz	▼ T89	; ARA 18-20	6GHz; S/N:1	FCC 15.205		
Hi Free	quency Cal	cable	Chin	3 foot c 1975380	able	•	12 Chin 20	foot c 003540	able ⁰¹ ↓	, HF	HPF F_7.6GHz	Re	ject Filt	er Peal RB [*] • <u>Avera</u> RBW=	<u>c Measurements</u> W=VBW=1MHz <u>ge Measurements</u> 1MHz : VBW=10Hz
f GHz	Dist (m)	Read Pk dBuV	Read Avg. dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes (V/H)
.ow Ch, 5	5500MHz	54.0	41.6	37.2	43	-33.8	0.0	0.7	62.5	50.1	74	54	-11.5	_3.0	V
1.000	3.0	56.0	44.3	37.2	4.3	-33.8	0.0	0.7	64.5	52.8	74	54	-9.5	-1.2	H
fid Ch -	5600MHz														
1.570	3.0	54.3	42.0	37.5	4.4	-33.0	0.0	0.7	63.9	51.6	74	54	-10.1	-2.4	<u>v</u>
1.200	3.0	53.7	41.5	37.3	4.4	-33.5	0.0	0.7	02.0	50.4	74	54	-11.4	-3.0	H
ligh Ch,	5700MH	z													
1.400 1.400	3.0 3.0	57.0 54.7	43.0 42.5	37.4 37.4	4.4 4.4	-33.2 -33.2	0.0 0.0	0.7 0.7	66.3 64.0	52.3 51.8	74 74	54 54	-7.7 -10.0	-1.7 -2.2	V H
Rev. 5.1.6 Note: No	other emi	ssions were	detected above	the syste	m noise	e floor									
	f	Measurem	ent Frequenc	y		Amp	Preamp	Gain				Avg Lim	Average	Field Strengt	h Limit
	Dist	Distance to	o Antenna			D Corr	Distance	Corre	ct to 3 mete	rs 2 m		Pk Lim	Peak Fiel	d Strength Li	imit
	AF	Antenna F	actor			Avg Peak	Calculate	d Peal	k Field Stre	ngth		Pk Mar	Margin V	s. Average Li s. Peak Limit	шш
	CL	Cable Los	s			HPF	High Pas	s Filter	r	-					

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RESTRICTED BANDEDGE (802.11n MODE HT20, LOW CHANNEL)



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RESTRICTED BANDEDGE (802.11n MODE HT20, HIGH CHANNEL)



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HARMONICS AND SPURIOUS EMISSIONS (802.11n MODE HT20)

Compan Project Date:8/2 Cest En Configu Mode:a	y:Ather #:06U10 2/2006 gineer: ration:E mode, 1	os 0485 Chin Pang UT/Laptoj HT20, 5.50	p GHz Ba	ind												
<u>est Eq</u>	uipmen				nnlifor	4.06	24-	Bro. om	plifor	26 4000	_	u	orn > 10/	сц .		Limit
Т73; 9	671 1-	7 @3m	- T	145 A	gilent 3	1-200	05(🗸	T88 Mit	eq 26-	40GHz	2 ↓ T8	9; ARA 18-20	GHz; S/N:1	1049	-	FCC 15.205
- Hi Freq	quency Cab 2 foot	cable	•	3 Chin 1	foot c 1975380	able	•	12 Chin 20	foot c 003540	on on other		HPF PF_7.6GHz	Re	eject Filte	er <u>Peal</u> RB <u>Avera</u> RBW=	k Measurements W=VBW=1MHz ge Measurements 1MHz ; VBW=10Hz
f GHz	Dist (m)	Read Pk dBuV	Read dB	Avg. 1V	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Peak dBuV/m	Avg dBuV/n	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes (V/H)
ow Ch, 5	500MHz	52.9	41	0	27.2	4.2	22.0	0.0	0.7	62.2	40.5	74	54	11.7	15	v
L.000	3.0	53.0	41	.0 .0	37.2	4.3	-33.8	0.0	0.7	61.5	49.5	74 74	54 54	-11.7 -12.5	-4.5 -5.5	H
LICE 5	600300-															
10 Ch, 5 1.570	3.0	55.5	43	.0	37.5	4.4	-33.0	0.0	0.7	65.1	52.6	74	54	- 8.9	-1.4	V
1.200	3.0	54.0	41	.5	37.3	4.4	-33.5	0.0	0.7	62.9	50.4	74	54	-11.1	-3.6	H
igh Ch.	5700MH	z														
1.400	3.0	55.0	42	.0	37.4	4.4	-33.2	0.0	0.7	64.3	51.3	74	54	-9.7	-2.7	V
1.400	3.0	56.6	43	.0	37.4	4.4	-33.2	0.0	0.7	65.9	52.3	74	54	- 8.1	-1.7	H
ev. 5.1.6 ate: No o	f Dist Read AF CL	ssions were Measurem Distance to Analyzer R Antenna Fa Cable Loss	detected ent Free Anten leading actor s	above t quency na	the syste	m noise	Amp D Corr Avg Peak HPF	Preamp Distance Average Calculate High Pas	Gain Corre Field S ed Peal s Filter	ct to 3 mete Strength @ k Field Stre	ers 3 m ngth		Avg Lim Pk Lim Avg Mar Pk Mar	Average l Peak Fiel Margin vs Margin vs	Field Strengt Id Strength Li s. Average Li s. Peak Limit	h Limit imit imit

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7.4.5. WORST-CASE RADIATED EMISSIONS BELOW 1 GHz

SPURIOUS EMISSIONS 30 TO 1000 MHz (WORST-CASE CONFIGURATION, HORIZONTAL)



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HORIZO	ONTAL DAT	ΓA						
	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark	Page: 1
	MHz	dBuV	dB	dBuV/m	dBuV/m	dB		
1 2 4 5 6 7 8 9 10 11	MHz 130.880 167.740 198.780 232.730 266.680 300.630 332.640 366.590 733.250 800.180	dBuV 23.92 27.91 27.61 27.50 33.48 28.69 24.76 21.45 19.97 18.82 18.18	dB 14.16 12.41 13.19 11.86 13.07 14.13 14.89 15.63 21.13 21.91	dBuV/m 38.08 40.32 40.80 39.36 45.34 41.76 38.89 36.34 35.60 39.95 40.09	dBuV/m 43.50 43.50 46.00 46.00 46.00 46.00 46.00 46.00 46.00	dB -5.42 -3.18 -2.70 -6.64 -0.66 -4.24 -7.11 -9.66 -10.40 -6.05 -5.91	Peak Peak QP Peak Peak Peak Peak Peak Peak	

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SPURIOUS EMISSIONS 30 TO 1000 MHz (WORST-CASE CONFIGURATION, VERTICAL)



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VERTIC	CAL DATA							
						_		Page: 1
	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark	
	MHz	dBuV	dB	dBuV/m	dBuV/m	dB		
1	128.940	17.98	14.22	32.20	43.50	-11.30	Peak	
2	167.740	19.82	12.41	32.23	43.50	-11.27	Peak	
3	201.690	19.46	13.11	32.57	43.50	-10.93	Peak	
4	232.730	25.46	12.07	37.32	46.00	-8.68	Peak	
5	200.000	18.67	14.13	32.80	46.00	-13.20	Peak	
7	735 190	15 72	21 15	36 87	46.00	-913	Peak	
8	800.180	16.01	21.91	37.92	46.00	-8.08	Peak	

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7.5. DYNAMIC FREQUENCY SELECTION

7.5.1. LIMITS

§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".

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

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

I able 7. Annlicability of DEN requirements during normal or	
$1 a \mu \alpha 2$. Applicability of DTS requirements unring normal of	peration

Requirement	Operational Mode					
	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			

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

Maximum Transmit Power	Value				
	(see note)				
\geq 200 milliwatt	-64 dBm				
< 200 milliwatt	-62 dBm				
Note 1: This is the level at the input of the receiver assuming a 0 dBi receive antenna					
Note 2: Throughout these test procedures an additional 1 dB has been added to the amplitude of					
the test transmission waveforms to account for variations in measurement equipment. This will					
ensure that the test signal is at or above the detection threshold	level to trigger a DFS response.				

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 to facilitate 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.

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Radar Type	Pulse Width	PRI	Pulses	Minimum	Minimum
	(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 (Ra	adar 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 of	Trials
		Burst	(µsec)	(MHz)		Successful	
						Detection	
5	8-20	1-3	50-100	5-20	1000-	80%	30
					2000		

Table 7 – Frequency Hopping Radar Test Signal

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

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7.5.2. DESCRIPTION OF EUT

OVERVIEW OF EUT WITH RESPECT TO §15.407 (h) REQUIREMENTS

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

The EUT is a Client Device that does not have radar detection capability.

The EUT is a MIMO device that uses two transmitters and three receivers, each of which is connected to an integrated antenna.

The Tx/Rx antenna assemblies utilized with the EUT have a gain of 2.0 dBi in the 5250-5350 MHz band and 1.0 dBi in the 5470-5725 MHz band. The Rx only antenna assembly utilized with the EUT has a gain of 1.0 dBi in the 5250-5350 MHz band and 1.0 dBi in the 5470-5725 MHz band.

The highest combined power level within these bands for the 802.11n mode is 23.07 dBm EIRP in the 5250-5350 MHz band and 22.72 dBm EIRP in the 5470-5725 MHz band. The highest combined power level within these bands for the 802.11a legacy mode is 26.16 dBm EIRP in the 5250-5350 MHz band and 25.33 dBm EIRP in the 5470-5725 MHz band.

Both of the 50-ohm Tx/Rx antenna ports are connected to the test system via a power combiner/divider to perform conducted 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 the media player with the V2.61 Codec package.

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

The EUT utilizes an 802.11a/n IP based architecture. One nominal channel bandwidth, 20 MHz, is implemented in channels subject to DFS requirements.

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

The Master Device is an Atheros Access Point, FCC ID: PPD-AR5BAP-00032. The DFS software installed in the Master Device is revision 5.1.0.42.

The rated output power of the Master unit is > 23 dBm (EIRP). Therefore the required interference threshold level is -64 dBm. After correction for antenna gain and procedural adjustments, the required conducted threshold at the antenna port is -64 + 4 + 1 = -59 dBm.

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

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7.5.3. TEST AND MEASUREMENT SYSTEM

SYSTEM OVERVIEW

The measurement system is based on a conducted test method.

The short pulse and long pulse signal generating system utilizes the NTIA software and the same manufacturer / model Vector Signal Generator as the NTIA. The hopping signal generating system utilizes the simulated hopping method.

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 run-time. The hopping type 6 pulse parameters are fixed while the hopping sequence is based on the August 2005 NTIA Hopping Frequency List, with the initial starting point randomized at run-time.

The signal monitoring equipment consists of a spectrum analyzer with the capacity to display 8192 bins on the horizontal axis. A time-domain resolution of 2 msec / bin is achievable with a 16 second sweep time, meeting the 10 second short pulse reporting criteria. 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. A time-domain resolution of 3 msec / bin is achievable with a 24 second sweep time, meeting the 22 second long pulse reporting criteria and allowing a minimum of 10 seconds after the end of the long pulse waveform.

FREQUENCY HOPPING SIGNAL GENERATION

The hopping burst generator is a High Speed Digital I/O card plugged into the control computer. This card utilizes an independent hardware clock reference therefore the output pulse timing is unaffected by host computer operating system latency times.

The software selects the hopping sequence as a 100-length segment of the August 2005 NTIA hopping frequency list. This list contains 274 unique pseudorandom sequences. Each such sequence contains 475 frequencies ordered on a random without replacement basis. Each successive trial uses a contiguous 100-length segment from within each successive 475-length sequence in the list. The initial starting point within the list is randomized at run-time such that the first 100-length segment is entirely contained within the first 475-length sequence. The starting point of each successive trial 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.

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CONDUCTED METHOD SYSTEM BLOCK DIAGRAM



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MEASUREMENT SYSTEM FREQUENCY REFERENCE

Lock the signal generator and the spectrum analyer to the same reference source as follows: Connect the 10 MHz OUT (SWITCHED) on the spectrum analyer to the 10 MHz IN on the signal generator and set the spectrum analyzer 10 MHz Out to On.

SYSTEM CALIBRATION

Adjust the Master Step Attenuator to 40 dB, the Link Step Attenuator to 70 dB, and the Slave Step Attenuator to 70 dB.

If required, disconnect the spectrum analyzer, Master Device, and Slave Device from the test system. Terminate the Common port of the Spectrum Analyzer Combiner/Divider, Port 2 of the Master Diversity Combiner/Divider, and Ports 1 and 2 of the Slave Diversity Combiner/Divider. Leave, or connect, the appropriate cable to Port 1 of the Master Diversity Combiner/Divider and connect the free end (Master Device end) of this cable to the spectrum analyzer.

Adjust the signal generator and spectrum analyzer to the center frequency of the channel to be measured. Set the signal generator to CW mode. Set the RBW of the spectrum analyzer to 10 kHz and the span to 100 kHz. Adjust the amplitude of the signal generator to yield a measured level of -64 dBm on the spectrum analyzer.

Without changing any of the instrument settings, reconnect the spectrum analyer to the Common port of the Spectrum Analyzer Combiner/Divider, then remove the cable from Port 1 of the Master Diversity Combiner/Divider and replace this cable with a termination. Measure the amplitude and calculate the difference from -64 dBm. Adjust the Reference Level Offset of the spectrum analyzer to this difference. Confirm that the signal is displayed at -64 dBm. Readjust the RBW and VBW to 3 MHz, set the span to 10 MHz, and confirm that the signal is still displayed at -64 dBm.

This Reference Level Offset setting is used for all tests for which the Master Step Attenuator is set to 30 dB. 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.

The Link Step Attenuator and Slave Step Attenuator settings may be changed without affecting the System Calibration. The System Calibration process must be repeated for different settings of the Master Step Attenuator to determine the Reference Level Offset associated with each Master Step Attenuator setting.

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INTERFERENCE DETECTION THRESHOLD ADJUSTMENT

Set the signal generator to produce the specified radar waveform, trigger a burst manually and measure the amplitude on the spectrum analyzer. Readjust the amplitude of the signal generator as required so that the peak level of the waveform is at a displayed level equal to the required or desired interference detection threshold.

ADJUSTMENT OF DISPLAYED TRAFFIC LEVEL

Establish a link between the Master and Slave, adjusting the Link Step Attenuator as needed to provide an adequate RSS level at the Master and Slave devices. Stream the video test file to generate WLAN traffic. Adjust the Slave Step Attenuator so that the WLAN traffic level from the Slave, as displayed on the spectrum analyzer, is at lower amplitude than the radar detection threshold.

Confirm that the displayed traffic is from the Slave Device by changing the setting of the Slave Step Attenuator and verifying that the displayed traffic level changes accordingly. Confirm that the displayed traffic does not include Master Device traffic by changing the setting of the Master Step Attenuator and the Link Step Attenuator and verifying that the displayed traffic level does not change. Reset all Step Attenuators to their previous settings.

If the above conditions cannot be met, use a different setting of the Master Step Attenuator, performing a new System Calibration and Interference Detection Threshold Adjustment as required for the new Master Step Attenuator setting.

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7.5.4. SETUP OF EUT AND SUPPORT EQUIPMENT

SUPPORT EQUIPMENT

PERIPHERAL SUPPORT EQUIPMENT LIST						
Description	Manufacturer	Model	Serial Number	FCC ID		
AC Adapter	CUI	DSA-0151A	4403	DoC		
Access Point	Atheros	AP 30	AP 30-50-D7323	PPD-AR5BAP-00032		
Laptop	Compaq	DG956A	CNU327025L	DoC		
AC Adapter	Compaq	PA1900-05H	3300371601	DoC		
Laptop	IBM	Thinkpad 1875	L3-BC892	DoC		
AC Adapter	IBM	92P11020	11S92P1020Z1Z9RM63M9J L	DoC		

I/O CABLES

I/O CABLE LIST							
Cable	Port	# of	Connector Cable		Cable		
No.		Identical	Туре	Туре	Length		
		Ports					
1	AC	1	US 115V	Direct Plug	0m		
2	DC	1	DC	Un-shielded	2m		
3	AC	1	US 115V	Un-shielded	1m		
4	DC	1	DC	Un-shielded	2m		
5	Ethernet	1	RJ45	Un-shielded	2m		
6	Serial	1	USB to DIN	Shielded	2.5m		
7	AC	1	US 115V	Un-shielded	2m		
8	DC	1	DC	Un-shielded	2m		

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TEST SETUP



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7.5.5. PLOTS OF NOISE, RADAR WAVEFORMS, AND WLAN SIGNALS

PLOT OF SYSTEM NOISE FLOOR



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PLOTS OF RADAR WAVEFORM



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PLOT OF WLAN TRAFFIC FROM SLAVE



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7.5.6. TEST CHANNEL AND METHOD

All tests were performed at a channel center frequency of 5300 MHz utilizing a conducted test method.

7.5.7. CHANNEL MOVE TIME AND CHANNEL CLOSING TRANSMISSION TIME

GENERAL 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 aggregate time is calculated begins at (Reference Marker + 200 msec) and ends no earlier than (Reference Marker + 10 sec).

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TYPE 1 CHANNEL MOVE TIME RESULTS

No non-compliance noted:

Channel Move Time	Limit		
(s)	(s)		
2.224	10		



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TYPE 1 CHANNEL CLOSING TRANSMISSION TIME RESULTS

No non-compliance noted:

Aggregate Transmission Time	Limit	Margin	
(ms)	(ms)	(ms)	
2.00	60	58.00	

Only intermittent transmissions are observed during the aggregate monitoring period.



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7.6. POWERLINE CONDUCTED EMISSIONS

<u>LIMIT</u>

\$15.207 (a) Except as shown in paragraphs (b) and (c) of this section, for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table, as measured using a 50 μ H/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal.

The lower limit applies at the boundary between the frequency ranges.

Frequency of Emission (MHz)	Conducted Limit (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 resolution bandwidth is set to 9 kHz for both peak detection and quasi-peak detection measurements. Peak detection is used unless otherwise noted as quasi-peak.

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

RESULTS

No non-compliance noted:

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<u>6 WORST EMISSIONS</u>

Freq.	Reading		Closs Limit EN B		Margin		Remark		
(MHz)	PK (dBuV)	QP (dBuV)	AV (dBuV)	(dB)	QP	AV	QP (dB)	AV (dB)	L1 / L2
0.21	53.00		41.83	0.00	63.37	53.37	-10.37	-11.54	L1
0.27	44.86		34.62	0.00	61.03	51.03	-16.17	-16.41	L1
0.34	41.92		33.85	0.00	59.18	49.18	-17.26	-15.33	L1
0.20	52.50		40.85	0.00	63.45	53.45	-10.95	-12.60	L2
0.27	42.98		33.34	0.00	61.00	51.00	-18.02	-17.66	L2
14.75	31.32		26.92	0.00	60.00	50.00	-28.68	-23.08	L2
6 Worst I	Data								

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LINE 1 RESULTS



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LINE 2 RESULTS



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