

FCC CFR47 PART 15 SUBPART E INDUSTRY CANADA RSS-210 ISSUE 7 CERTIFICATION TEST REPORT

FOR

802.11n 2x2 PCIe MINICARD TRANSCEIVER MODEL NUMBER: AR5BXB92 FCC ID: PPD-AR5BXB92 IC: 4104A-AR5BXB92

> REPORT NUMBER: 08U11572-3 ISSUE DATE: MARCH 10, 2008

> > Prepared for

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME:	ATHEROS COMMUNICATION, INC			
	5480 GREAT AMERICA PARKWAY			
	SANTA CLARA, CA 95054 USA			
EUT DESCRIPTION:	802.11n 2x2 PCIe Minicard Transceiver			
MODEL:	AR5BXB92			
SERIAL NUMBER:	XB92-040-S0660 & XB92-040-S0579			
DATE TESTED:	MARCH 07, 2008			

APPLICABLE STANDARDS						
STANDARD	TEST RESULTS					
CFR 47 Part 15 Subpart E	No Non-Compliance Noted					
RSS-210 Issue 7 Annex 9 and RSS-GEN Issue 2	No Non-Compliance Noted					

Compliance Certification Services, Inc. tested the above equipment in accordance with the requirements set forth in the above standards. 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 Compliance Certification Services and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by Compliance Certification Services will constitute fraud and shall nullify the document. No part of this report may be used to claim product certification, approval, or endorsement by NVLAP, NIST, or any government agency.

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Tested By:

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DEVIN CHANG EMC ENGINEER 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, FCC MO&O 06-96, RSS-GEN Issue 2, and RSS-210 Issue 7.

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. MEASUREMENT UNCERTAINTY

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

PARAMETER	UNCERTAINTY
Power Line Conducted Emission	+/- 2.3 dB
Radiated Emission	+/- 3.4 dB

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

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5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

The EUT is an 802.11n 2x2 PCIe minicard transceiver, model AR5BXB92. Two front-end module parts were evaluated; Vendors are SiGe (FEM1) and Hitachi (FEM2).

The radio module is manufactured by Atheros Communications, Inc.

5.2. MAXIMUM OUTPUT POWER

Frequency Range	Mode	Chain 0	Chain 1	Total Power	Total Power
(MHz)		(dBm)	(dBm)	(dBm)	(mW)
5180 - 5240	802.11a	12.26	13.17	15.75	37.58
5180 - 5240	802.11n HT20	14.09	13.72	16.92	49.20
5190 - 5230	802.11n HT40	13.63	14.32	16.99	50.05
5260 - 5320	802.11a	17.98	17.90	20.95	124.47
5260 - 5320	802.11n HT20	20.36	20.95	23.68	233.09
5270 - 5310	802.11n HT40	20.30	21.35	23.87	243.61
5500 - 5700	802.11a	18.24	18.01	21.14	129.92
5500 - 5700	802.11n HT20	19.29	19.07	22.19	165.64
5510 - 5670	802.11n HT40	19.34	19.50	22.43	175.03

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

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The 2x2 configuration utilizes a set of PIFA antennas with maximum gain of 3.62 dBi from 2400 - 2483.5 MHz, 4.63 dBi from 5150 - 5350 MHz, 5.56 dBi from 5250 - 5350 MHz, 5.34 dBi from 5470 - 5725 MHz, and 4.76 dBi from 5725 - 5850 MHz.

5.4. SOFTWARE AND FIRMWARE

The test utility and driver software used during testing was Art ANWI 1.4 and Devlib Revision 0.6 Build #18 Art_11n.

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5.5. WORST-CASE CONFIGURATION AND MODE

The 2x2 configuration was used for all testing in this report.

Both FEM1 and FEM2 boards were evaluated on conducted and radiated emissions tests to find the worst case.

The worst-case data rates are determined to be as follows for each mode, based on the investigations by measuring the average power, peak power and PPSD across all the data rates, bandwidths, modulations and spatial stream modes.

Thus all emissions tests were made with following data rates:

- 802.11b mode, 20 MHz Channel Bandwidth, 1 Mb/s, CCK Modulation, Spatial Stream 1.
- 802.11g mode, 20 MHz Channel Bandwidth, 9 Mb/s, OFDM Modulation, Spatial Stream 1.
- 802.11a mode, 20 MHz Channel Bandwidth, 9 Mb/s, OFDM Modulation, Spatial Stream 1.
- 802.11n HT20 mode, 20 MHz Channel Bandwidth, MCS0, 6.5 Mb/s, OFDM Modulation, Spatial Stream 1.
- 802.11n HT40 mode, 40 MHz Channel Bandwidth, MCS0, 13.5 Mb/s, OFDM Modulation, Spatial Stream 1.

Baseline testing demonstrated that the Power Spectral Density as measured through a combiner with both chains operating simultaneously is worst case.

For RF conducted emissions, all tests were performed on FEM2 board excepted conducted spurious to use FEM1 board.

For RF radiated emissions, all tests were performed on FEM1 boards.

For radiated emissions bandedge, both FEM1 and FEM2 boards were performed at both vertical and horizontal polarizations.

For radiated emissions TX below 1 GHz, RX spurious, and AC line conduction were performed at FEM1 board.

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5.6. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

PERIPHERAL SUPPORT EQUIPMENT LIST							
Description	Manufacturer	Model	Serial Number	FCC ID			
Laptop	IBM	ThinkPad T42	ZZ-27001	DoC			
AC Adapter	IBM	02K6749	11S02K6749Z122OM2436ST	DoC			

I/O CABLES

VO CABLE LIST								
Cable	Port	# of	Connector	Cable	Cable	Remarks		
No.		Identica	Туре	Туре	Length			
		Ports						
1	AC	1	US 115V	Un-shielded	2m	One Ferrite at Laptop End		
2	DC	1	DC	Un-shielded	2m	N/A		

TEST SETUP

The EUT is connected to a laptop PC via a PCI extension card during the tests. Test software exercised the radio card.

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SETUP DIAGRAM FOR TESTS



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6. TEST AND MEASUREMENT EQUIPMENT

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

TEST EQUIPMENT LIST								
Description	Manufacturer	Model	Asset	Cal Date	Cal Due			
Spectrum Analyzer, 44 GHz	Agilent / HP	E4446A	C01012	12/3/2007	3/3/2009			
Peak Power Meter	Agilent / HP	E4416A	C00963	12/4/2007	12/4/2009			
Peak / Average Power Sensor	Agilent	E9327A	C00964	12/7/2007	12/7/2009			
Antenna, Bilog, 2 GHz	Sund Sciences	JB1	C01011	9/28/2007	9/28/2008			
Antenna, Hom, 18 GHz	EMCO	3115	C00945	4/15/2007	4/15/2008			
Preamplifier, 26.5 GHz	Agilent / HP	8449B	C01063	9/27/2007	9/27/2008			
EMI Receiver, 2.9 GHz	Agilent / HP	8542E	C00957	2/6/2007	6/12/2008			
RF Filter Section, 2.9 GHz	Agilent / HP	85420E	C00958	2/6/2007	6/12/2008			
EMI Test Receiver, 30 MHz	R&S	ESHS 20	N02396	2/6/2008	8/6/2009			
LISN, 30 MHz	FCC	LISN-50/250-25-2	N02625	10/25/2007	10/25/2008			
Preamplifier, 26.5 GHz	Agilent / HP	8449B	C00749	8/3/2007	9/27/2008			
Antenna, Horn, 26.5 GHz	ARA	MWH-1826/B	C00589	9/29/2007	9/29/2008			
Preamplifier, 40 GHz	Miteq	NSP4000-SP2	C00990	10/11/2007	10/11/2008			
2.4-2.5GHz Reject Filter	Micro Tronics	BRM50702	N02685	CNR	CNR			
Reject Filter, 5.15-5.35 GHz	Micro-Tronics	BRC13190	N02679	CNR	CNR			
Reject Filter, 5.47-5.725 GHz	Micro-Tronics	BRC13191	N02678	CNR	CNR			
Reject Filter, 5.725-5.85 GHz	Micro-Tronics	BRC13192	N02676	CNR	CNR			

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7. ANTENNA PORT TEST RESULTS

7.1. 802.11a DUAL CHAIN LEGACY MODE IN THE LOWER 5.2 GHz BAND

7.1.1. 26 dB and 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.

RESULTS

Channel	Frequency	26 dB Bandwidth	99% Bandwidth
	(MHz)	(MHz)	(MHz)
Low	5180	23.018	16.6190
Middle	5220	22.554	16.6360
High	5240	22.238	16.6225

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26 dB and 99% BANDWIDTH



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7.1.2. OUTPUT POWER

LIMITS

FCC §15.407 (a) (1) IC RSS-210 A9.2 (1)

Directional gain = gain of antenna element + 10 log (# of TX antenna elements)

Effective Legacy Gain
(dBi)
7.06

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

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.

The transmitter output operates continuously therefore Method # 1 is used.

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RESULTS

Limit

Channel	Frequency	Fixed	В	4 + 10 Log B	Antenna	Limit
		Limit		Limit	Gain	
	(MHz)	(dBm)	(MHz)	(dBm)	(dBi)	(dBm)
Low	5180	17.00	23.018	17.62	7.06	15.94
Mid	5220	17.00	22.554	17.53	7.06	15.94
High	5240	17.00	22.238	17.47	7.06	15.94

Individual Chain Results

Channel	Frequency	Chain 0	Chain 1	Total	Limit	Margin
		Power	Power	Power		
	(MHz)	(dBm)	(dBm)	(dBm)	(dBm)	(dB)
Low	5180	12.26	13.17	15.75	15.94	-0.19
Mid	5220	12.30	12.45	15.39	15.94	-0.55
High	5240	12.31	12.34	15.34	15.94	-0.60

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CHAIN 0 OUTPUT POWER



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CHAIN 1 OUTPUT POWER



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7.1.3. 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 17.2 dB (including 16 dB pad and 1.2 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

Channel	Frequency	Chain 0	Chain 1	Total
		Power	Power	Power
	(MHz)	(dBm)	(dBm)	(dBm)
Low	5180	12.30	13.10	15.73
Middle	5220	12.16	12.33	15.26
High	5240	12.09	12.07	15.09

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7.1.4. PEAK POWER SPECTRAL DENSITY

LIMITS

FCC §15.407 (a) (1) IC RSS-210 A9.2 (1)

Directional gain = gain of antenna element + 10 log (# of TX antenna elements)

Effective Legacy Gain
(dBi)
7.06

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 7.06 dBi, therefore the limit is 2.94 dBm.

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.

RESULTS

Channel	Frequency	PPSD With Combiner	Limit	Margin
	(MHz)	(dBm)	(dBm)	(dB)
Low	5180	2.64	2.94	-0.30
Middle	5220	2.29	2.94	-0.65
High	5240	2.35	2.94	-0.59

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POWER SPECTRAL DENSITY WITH COMBINER



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7.1.5. PEAK EXCURSION

LIMITS

FCC §15.407 (a) (6)

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

TEST PROCEDURE

The transmitter outputs are connected to the spectrum analyzer via a combiner.

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.

<u>RESULTS</u>

Channel	Frequency	Peak Excursion	Limit	Margin
	(MHz)	(dB)	(dB)	(dB)
Low	5180	10.28	13	-2.72
Middle	5220	10.82	13	-2.18
High	5240	12.24	13	-0.76

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PEAK EXCURSION

PEAK EXCURSION LOW	CH		
🔆 Agilent 09:52:48 Feb 29, 2008		Т	Freq/Channel
Ch Freq 5.18 GHz Channel Power		Trig Free	Center Freq 5.18000000 GHz
Center 5.180000000 GH	lz		Start Freq 5.15750000 GHz
Ref 30 dBm Atten 30 dB #Peak			Stop Freq 5.20250000 GHz
dB/ offst 17.2		March	CF Step 4.5000000 MHz <u>Auto Man</u>
dB Center 5.180 000 GHz #Res BW 1 MHz #VB	W 3 MHz Sv	Span 45 MHz /eep 20 ms (601 pts)	Freq Offset 0.00000000 Hz
Channel Power	Power	Spectral Density	Signal Track On <u>Off</u>
23.02 dBm / 30.0000 N	1Hz -5 [.]	1.75 dBm/Hz	
L Copyright 2000-2007 Agilent Technologies	6		<u> </u>

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PEAK EXCURSION MID CH					
- Agrient 10:10:33 Feb 29, 2008	Freq/Channel				
Ch Freq 5.22 GHz Trig Free	Center Freq 5.22000000 GHz				
∆ Mkr1 0 Hz	Start Freq 5.19750000 GHz				
Ref 30 dBm Atten 30 dB 10.82 dB #Peak	Stop Freq 5.24250000 GHz				
10 dB/ Offst 17.2	CF Step 4.5000000 MHz <u>Auto Man</u>				
dB Center 5.220 000 GHz #Res BW 1 MHz #VBW 3 MHz Sweep 20 ms (601 pts)	Freq Offset 0.00000000 Hz				
Channel Power Power Spectral Density	Signal Track				
23.11 dBm / 30.0000 MHz -51.67 dBm/Hz					
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PEAK EXCURSION HIGH CH				
✤ Agilent 10:12:10 Feb 29, 2008	Freq/Channel			
Ch Freq 5.24 GHz Trig Free Channel Power	Center Freq 5.24000000 GHz			
۵ Mkr1 O Hz	Start Freq 5.21750000 GHz			
Ref 30 dBm Atten 30 dB 12.24 dB	Stop Freq 5.26250000 GHz			
10 dB/ Offst 17.2	CF Step 4.5000000 MHz Auto Man			
dB Center 5.240 000 GHz Span 45 MH:	Freq Offset 0.00000000 Hz			
#Res BW 1 MHz #VBW 3 MHz Sweep 20 ms (601 pts)	Signal Track			
Channel Power Power Spectral Density	On <u>Off</u>			
21.88 dBm / 30.0000 MHz -52.89 dBm/Hz				
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7.1.6. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.407 (b) (1)

IC RSS-210 A9.3 (1)

For transmitters operating in the 5.15-5.25 GHz band: all emissions outside of the 5.15-5.35 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

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SPURIOUS EMISSIONS WITH COMBINER



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7.2. 802.11n HT20 MODE IN THE LOWER 5.2 GHz BAND

7.2.1. 26 dB and 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.

RESULTS

Frequency	26 dB Bandwidth	99% Bandwidth
(MHz)	(MHz)	(MHz)
5180	24.516	17.8863
5220	25.355	17.8530
5240	27.255	17.7772

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26 dB and 99% BANDWIDTH



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7.2.2. 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

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.

The transmitter output operates continuously therefore Method # 1 is used.

RESULTS

Limit

Channel	Frequency	Fixed	В	4 + 10 Log B	Antenna	Limit
		Limit		Limit	Gain	
	(MHz)	(dBm)	(MHz)	(dBm)	(dBi)	(dBm)
Low	5180	17.00	24.516	17.89	4.63	17.00
Mid	5220	17.00	25.355	18.04	4.63	17.00
High	5240	17.00	27.255	18.35	4.63	17.00

Individual Chain Results

Channel	Frequency	Chain 0	Chain 1	Total	Limit	Margin
		Power	Power	Power		
	(MHz)	(dBm)	(dBm)	(dBm)	(dBm)	(dB)
Low	5180	13.18	14.08	16.66	17.00	-0.34
Mid	5220	13.58	14.13	16.87	17.00	-0.13
High	5240	14.09	13.72	16.92	17.00	-0.08

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CHAIN 0 OUTPUT POWER



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OUTPUT POWER MID CH, CHAIN 0	
🔆 Agilent 14:21:51 Feb 28, 2008 R T	Freq/Channel
Ch Freq 5.22 GHz Trig Free Channel Power Averages: 100	Center Freq 5.22000000 GHz
Mkr1 5.221 755 0 GHz	Start Freq 5.19750000 GHz
Ref 20 dBm #Atten 30 dB 0.703 dBm #Samp	Stop Freq 5.24250000 GHz
IO IO<	CF Step 20.0000000 MHz Auto <u>Man</u>
dB Center 5.220 000 0 GHz Span 45 MHz	Freq Offset 0.00000000 Hz
#Res BW 1 MHz #VBW 3 MHz Sweep 20 ms (2001 pts) Channel Power Power Spectral Density	Signal Track On <u>Off</u>
13.58 dBm / 30.0000 MHz -61.19 dBm/Hz	
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OUTPUT POWER HIGH CH, CHAIN 0	
∰ Agilent 14:13:37 Feb 28, 2008 R	T Freq/Channel
Ch Freq 5.24 GHz Trig F Channel Power Averages: 100	ree Center Freq 5.24000000 GHz
Mkr1 5.241 665 0 GH	Start Freq 5.21750000 GHz
Ref 20 dBm #Atten 30 dB 1.132 dB #Samp	Stop Freq 5.26250000 GHz
IdB/	CF Step 20.000000 MHz Auto <u>Man</u>
dB Center 5.240 000 0 GHz Span 45 M	Freq Offset 0.00000000 Hz
#Res BW 1 MHz #VBW 3 MHz Sweep 20 ms (2001 pts Channel Power Power Spectral Density) Signal Track On <u>Off</u>
14.09 dBm / 30.0000 MHz -60.58 dBm/Hz	2
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CHAIN 1 OUTPUT POWER



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OUTPUT POWER HIGH CH, CHAIN 1	
* Agilent 14:12:11 Feb 28, 2008 R T	Freq/Channel
Ch Freq 5.24 GHz Trig Free Channel Power Averages: 100	Center Freq 5.24000000 GHz
Mkr1 5.248 415 0 GHz	Start Freq 5.21750000 GHz
Ref 20 dBm #Atten 30 dB 0.666 dBm #Samp	Stop Freq 5.26250000 GHz
IOB/	CF Step 20.0000000 MHz Auto <u>Man</u>
dB Center 5.240 000 0 GHz Span 45 MHz	Freq Offset 0.00000000 Hz
#Res BW 1 MHz #VBW 3 MHz Sweep 20 ms (2001 pts) Channel Power Power Spectral Density	Signal Track On <u>Off</u>
13.72 dBm / 30.0000 MHz -60.86 dBm/Hz	
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7.2.3. 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 17.2 dB (including 16 dB pad and 1.2 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

Frequency	Chain 0	Chain 1	Total
	Power	Power	Power
(MHz)	(dBm)	(dBm)	(dBm)
5180	13.15	14.03	16.62
5220	13.51	14.04	16.79
5240	13.96	13.70	16.84

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7.2.4. 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

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.

RESULTS

Channel	Frequency	PPSD With Combiner	Limit	Margin
	(MHz)	(dBm)	(dBm)	(dB)
Low	5180	3.51	4	-0.49
Middle	5220	3.68	4	-0.33
High	5240	3.87	4	-0.13

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POWER SPECTRAL DENSITY WITH COMBINER



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PSD HIGH CH, WITH COMBINER	
Channel Power	Center Freq 5.24000000 GHz
Mkr1 5.244 612 5 GHz	Start Freq 5.21750000 GHz
Ref 20 dBm #Atten 30 dB 3.873 dBm #Samp	Stop Freq 5.26250000 GHz
dB/ Offst	CF Step 20.000000 MHz Auto <u>Man</u>
dB	Freq Offset 0.00000000 Hz
Channel Power Power Spectral Density	Signal Track On <u>Off</u>
16.82 dBm / 30.0000 MHz -57.95 dBm/Hz	
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7.2.5. PEAK EXCURSION

LIMITS

FCC §15.407 (a) (6)

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

TEST PROCEDURE

The transmitter outputs are connected to the spectrum analyzer via a combiner.

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.

<u>RESULTS</u>

Channel	Frequency	Peak Excursion	Limit	Margin
	(MHz)	(dB)	(dB)	(dB)
Low	5180	11.61	13	-1.39
Middle	5220	11.27	13	-1.73
High	5240	11.47	13	-1.53

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PEAK EXCURSION

PEAK EXCURSION LOW	СН		Т	Freq/Channel
Ch Freq 5.18 GHz Channel Power			Trig Free	Center Freq 5.18000000 GHz
			Δ Mkr1 O Hz	Start Freq 5.15750000 GHz
Ref 30 dBm Atten 30 dB #Peak Log		and the second	11.61 dB	Stop Freq 5.20250000 GHz
dB/ offst 17.2			Iberalleral Westerreichtung	CF Step 4.5000000 MHz <u>Auto Man</u>
dB	W 3 MHz	Sweep 20 r	Span 45 MHz ns (601 pts)	Freq Offset 0.00000000 Hz
Channel Power		Power Spectral	Density	Signal Track ^{On <u>Off</u>}
23.58 dBm / 30.0000 M	IHz	-51.19 d	Bm/Hz	
Copyright 2000-2007 Agilent Technologies	3			<u>ا</u> ــــــــــــــــــــــــــــــــــــ

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PEAK EXCURSION MID CH	
Agrient 10:17:28 Feb 29, 2008 I Ch Freq 5.22 GHz Trig Free	Center Freq
Channel Power	Start Freq
∆ Mkr1 0 Hz Ref 30 dBm Atten 30 dB 11.27 dB #Peak	5.19750000 GHz Stop Frea
Log log dB/	5.24250000 GHz CF Step
Offst 17.2 dB	4.50000000 MHz <u>Auto Man</u>
Center 5.220 000 GHz Span 45 MHz #Res BW 1 MHz #VBW 3 MHz Sweep 20 ms (601 pts)	0.00000000 Hz
Channel Power Power Spectral Density	Signal Track On <u>Off</u>
24.14 dBm / 30.0000 MHz -50.63 dBm/Hz	
Copyright 2000-2007 Agilent Technologies	

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PEAK EXCURSION HIGH CH					
* Agilent 10:16:10 Feb 29, 2008 T	Freq/Channel				
Ch Freq 5.24 GHz Trig Free Channel Power	Center Freq 5.24000000 GHz				
Δ Mkr1 0 Hz	Start Freq 5.21750000 GHz				
Ref 30 dBm Atten 30 dB 11.47 dB #Peak	Stop Freq 5.26250000 GHz				
10 dB/ Offst 17.2	CF Step 4.50000000 MHz <u>Auto Man</u>				
dB Center 5.240 000 GHz CB Span 45 MHz CC Span 45 MHz	Freq Offset 0.00000000 Hz				
#Res BW 1 MHz #VBW 3 MHz Sweep 20 ms (601 pts) Channel Power Power Spectral Density	Signal Track On <u>Off</u>				
19.80 dBm / 30.0000 MHz -54.97 dBm/Hz					
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7.2.6. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.407 (b) (1)

IC RSS-210 A9.3 (1)

For transmitters operating in the 5.15-5.25 GHz band: all emissions outside of the 5.15-5.35 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

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SPURIOUS EMISSIONS WITH COMBINER



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7.3. 802.11n HT40 MODE IN THE LOWER 5.2 GHz BAND

7.3.1. 26 dB and 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.

RESULTS

Channel	Frequency	26 dB Bandwidth	99% Bandwidth	
	(MHz)	(MHz)	(MHz)	
Low	5190	45.859	36.1300	
High	5230	45.791	36.3730	

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26 dB and 99% BANDWIDTH



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BANDWIDTH HIGH CH	
券 Agilent 16:44:56 Feb 28, 2008 R T	Freq/Channel
Ch Freq 5.23 GHz Trig Free Occupied Bandwidth	Center Freq 5.23000000 GHz
	Start Freq 5.20500000 GHz
Ref 20 dBm #Atten 30 dB #Samp Log	Stop Freq 5.25500000 GHz
dB/ dB/ 0ffst 17.2 19.0	CF Step 20.0000000 MHz Auto <u>Man</u>
Center 5.230 000 GHz Span 50 MHz	Freq Offset 0.00000000 Hz
#Res BW 510 kHz #VBW 1 MHz #Sweep 100 ms (2001 pts)	Signal Track
Occupied Bandwidth Occ BW % Pwr 99.00 % 36.3730 MHz × dB -26.00 dB	On <u>Off</u>
Transmit Freq Error 36.092 kHz x dB Bandwidth 45.791 MHz*	
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7.3.2. 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

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.

The transmitter output operates continuously therefore Method # 1 is used.

RESULTS

Limit

Channel	Frequency	Fixed	В	4 + 10 Log B	Antenna	Limit
		Limit		Limit	Gain	
	(MHz)	(dBm)	(MHz)	(dBm)	(dBi)	(dBm)
Low	5190	17.00	45.859	20.61	4.63	17.00
High	5230	17.00	45.791	20.61	4.63	17.00

Individual Chain Results

Channel	Frequency	Chain 0	Chain 1	Total	Limit	Margin
		Power	Power	Power		_
	(MHz)	(dBm)	(dBm)	(dBm)	(dBm)	(dB)
Low	5190	11.21	11.22	14.23	17.00	-2.77
High	5230	13.63	14.32	16.99	17.00	-0.01
CHAIN 0 OUTPUT POWER

OUTPUT POWER LOW CH, C * Agilent 11:06:53 Feb 28, 2008	HAIN 0 R T	Freq/Channel
Ch Freq 5.19 GHz Channel Power	Trig Free Averages: 100	Center Freq 5.19000000 GHz
	Mkr1 5.202 600 GHz	Start Freq 5.14500000 GHz
Ref 20 dBm #Atten 30 dB #Samp	-6.506 dBm	Stop Freq 5.23500000 GHz
dB/ Offst 17.2		CF Step 20.0000000 MHz Auto <u>Man</u>
dB	Span 90 MHz	Freq Offset 0.00000000 Hz
#Res BW 1 MHz #VBW 3 MHz Channel Power	Sweep 20 ms (2001 pts) Power Spectral Density	Signal Track On <u>Off</u>
11.21 dBm /60.0000 MHz	-68.16 dBm/Hz	
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OUTPUT POWER HIGH CH, CHAIN 0	
₩ Agilent 11:04:11 Feb 28, 2008 R T	Freq/Channel
Ch Freq 5.23 GHz Trig Free Channel Power Averages: 100	Center Freq 5.23000000 GHz
	Start Freq 5.18500000 GHz
Ref 20 dBm #Atten 30 dB -2.435 dBm #Samp	Stop Freq 5.27500000 GHz
0 dB/ Offst 17.2	CF Step 20.0000000 MHz Auto <u>Man</u>
dB Center 5.230 000 GHz Span 90 MHz	Freq Offset 0.00000000 Hz
#Res BW 1 MHz #VBW 3 MHz Sweep 20 ms (2001 pts) Channel Power Power Spectral Density	Signal Track On <u>Off</u>
13.63 dBm / 60.0000 MHz -64.15 dBm/Hz	
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CHAIN 1 OUTPUT POWER

OUTPUT POWER LOW CH, CHAIN 1	Freq/Channel				
Ch Freq 5.19 GHz Trig Free Channel Power Averages: 100	Center Freq 5.19000000 GHz				
	Start Freq 5.14500000 GHz				
Ref 20 dBm #Atten 30 dB -5.994 dBm #Samp	Stop Freq 5.23500000 GHz				
dB/ Offst 17.2	CF Step 20.000000 MHz Auto <u>Man</u>				
dB Center 5.190 000 GHz Span 90 MHz	Freq Offset 0.00000000 Hz				
#Res BW 1 MHz #VBW 3 MHz Sweep 20 ms (2001 pts) Channel Power Power Spectral Density On <u>Off</u>					
11.22 dBm / 60.0000 MHz -67.86 dBm/Hz					
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OUTPUT POWER HIGH CH, CHAIN 1	
₩ Agilent 11:05:04 Feb 28, 2008 R T	Freq/Channel
Ch Freq 5.23 GHz Trig Free Channel Power Averages: 100	Center Freq 5.23000000 GHz
Mkr1 5.239 495 GHz	Start Freq 5.18500000 GHz
Ref 20 dBm #Atten 30 dB -1.819 dBm #Samp 1 1 Log 1 1 10 1 1	Stop Freq 5.27500000 GHz
dB/ Offst 17.2	CF Step 20.0000000 MHz Auto <u>Man</u>
dB Center 5.230 000 GHz Span 90 MHz	Freq Offset 0.00000000 Hz
#Res BW 1 MHz #VBW 3 MHz Sweep 20 ms (2001 pts) Channel Power Power Spectral Density	Signal Track On <u>Off</u>
14.32 dBm / 60.0000 MHz -63.46 dBm/Hz	
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7.3.3. 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 17.2 dB (including 16 dB pad and 1.2 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

Channel	Frequency	Chain 0	Chain 1	Total
		Power	Power	Power
	(MHz)	(dBm)	(dBm)	(dBm)
Low	5190	11.07	11.11	14.10
High	5230	13.50	14.11	16.83

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7.3.4. 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

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.

RESULTS

Channel	Frequency	PPSD With Combiner	Limit	Margin
	(MHz)	(dBm)	(dBm)	(dB)
Low	5190	-3.35	4	-7.35
High	5230	0.52	4	-3.48

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POWER SPECTRAL DENSITY WITH COMBINER



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7.3.5. PEAK EXCURSION

LIMITS

FCC §15.407 (a) (6)

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

TEST PROCEDURE

The transmitter outputs are connected to the spectrum analyzer via a combiner.

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.

<u>RESULTS</u>

Channel	Frequency	Peak Excursion	Limit	Margin
	(MHz)	(dB)	(dB)	(dB)
Low	5190	11.18	13	-1.82
High	5230	11.67	13	-1.33

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PEAK EXCURSION

PEAK EXCURSION LOW	/ CH				
🔆 Agilent 10:22:39 Feb 29, 2008			Т	Freq/Channel	
Ch Freq 5.19 GHz Channel Power		Trig	Free	Center Freq 5.19000000 GHz	
		۵ Mkr1 () Hz	Start Freq 5.14500000 GHz	
Ref 30 dBm Atten 30 dB #Peak Log		11.18	dB *	Stop Freq 5.23500000 GHz	
dB/ Offst www.wikebuch.com.com.com.com.com.com.com.com.com.com		A Contraction of the Contraction		CF Step 9.00000000 MHz <u>Auto Man</u>	
dB	3W 3 MHz	Span 90	MHz	Freq Offset 0.00000000 Hz	
	D.	Sweep 20 IIIs (001 p	,	Signal Track	
19.82 dBm / 60.0000 MHz -57.96 dBm/Hz					
L Copyright 2000-2007 Agilent Technologie	IS				

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7.3.6. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.407 (b) (1)

IC RSS-210 A9.3 (1)

For transmitters operating in the 5.15-5.25 GHz band: all emissions outside of the 5.15-5.35 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

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SPURIOUS EMISSIONS WITH COMBINER



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7.4. 802.11a DUAL CHAIN LEGACY MODE IN THE UPPER 5.2 GHz BAND

7.4.1. 26 dB and 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.

RESULTS

Channel	Frequency	26 dB Bandwidth	99% Bandwidth
	(MHz)	(MHz)	(MHz)
Low	5260	24.856	16.6878
Middle	5300	26.063	16.5773
High	5320	23.132	16.5994

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26 dB and 99% BANDWIDTH



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BANDWIDTH MID CH	
R Ryllent 16.52.44 Feb 26, 2006	Freq/Channel
Ch Freq 5.3 GHz Trig Free Occupied Bandwidth	Center Freq 5.30000000 GHz
	Start Freq 5.27500000 GHz
Ref 20 dBm #Atten 30 dB #Samp Log 10 dB/ Offst 17.2 dB	Stop Freq 5.32500000 GHz CF Step 20.0000000 MHz Auto <u>Man</u>
Center 5.300 000 GHz Span 50 MHz #Res BW 300 kHz #VBW 1 MHz #Sweep 100 ms (2001 pts)	Freq Offset 0.00000000 Hz
Occupied Bandwidth Occ BW % Pwr 99.00 % 16.5773 MHz × dB -26.00 dB	Signal Track ^{On <u>Off</u>}
Transmit Freq Error -21.203 kHz x dB Bandwidth 26.063 MHz*	
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7.4.2. OUTPUT POWER

<u>LIMITS</u>

FCC §15.407 (a) (2) IC RSS-210 A9.2 (2)

Directional gain = gain of antenna element + 10 log (# of TX antenna elements)

Effective Legacy Gain
(dBi)
7.76

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

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.

The transmitter output operates continuously therefore Method # 1 is used.

<u>RESULTS</u>

Limit

Channel	Frequency	Fixed	В	11 + 10 Log B	Antenna	Limit
		Limit		Limit	Gain	
	(MHz)	(dBm)	(MHz)	(dBm)	(dBi)	(dBm)
Low	5260	24	24.856	24.95	7.76	22.24
Mid	5300	24	26.063	25.16	7.76	22.24
High	5320	24	23.132	24.64	7.76	22.24

Individual Chain Results

Channel	Frequency	Chain 0	Chain 1	Total	Limit	Margin
		Power	Power	Power		
	(MHz)	(dBm)	(dBm)	(dBm)	(dBm)	(dB)
Low	5260	18.04	17.77	20.92	22.24	-1.32
Mid	5300	17.98	17.90	20.95	22.24	-1.29
High	5320	16.83	16.91	19.88	22.24	-2.36

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CHAIN 0 OUTPUT POWER

OUTPUT POWER LOW CH, CHAIN 0				
🔆 Agilent 14:38:39 Feb 28, 2008 R T	Freq/Channel			
Ch Freq 5.26 GHz Trig Free Channel Power Averages: 100	Center Freq 5.26000000 GHz			
Mkr1 5.264 027 5 GHz	Start Freq 5.23750000 GHz			
Ref 20 dBm #Atten 30 dB 5.536 dBm #Samp Log	Stop Freq 5.28250000 GHz			
10 dB/ Offst 17.2	CF Step 20.0000000 MHz Auto <u>Man</u>			
dB Center 5.260 000 0 GHz Span 45 MHz	Freq Offset 0.00000000 Hz			
#Res BW 1 MHz #VBW 3 MHz Sweep 20 ms (2001 pts) Signal Track Channel Power Power Spectral Density On Off				
18.04 dBm / 30.0000 MHz -56.73 dBm/Hz				
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Ch Freq 5.3 GHz	Trig Free Center Freq 5.30000000 GHz			
	Mkr1 5.306 255 0 GHz			
Ref 20 dBm #Atten 30 dB #Samp Log	5.260 dBm Stop Freq 5.32250000 GHz			
dB/ 0ffst 17.2	CF Step 20.0000000 MHz Auto Man			
dBCenter 5.300 000 0 GHz	Span 45 MHz			
#Res BW 1 MHz #VBW 3 Channel Power	MHz Sweep 20 ms (2001 pts) Power Spectral Density Signal Track On Off			
17.98 dBm / 30.0000 MHz -56.80 dBm/Hz				
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OUTPUT POWER HIGH CH, CHAIN 0				
⅔ Agilent 14:43:37 Feb 28, 2008	Freq/Channel			
Ch Freq 5.32 GHz Trig Free Channel Power Averages: 100	Center Freq 5.32000000 GHz			
	Start Freq 5.29750000 GHz			
Ref 20 dBm #Atten 30 dB 4.669 dBm #Samp	Stop Freq 5.34250000 GHz			
ID ID<	CF Step 20.0000000 MHz Auto <u>Man</u>			
dB Center 5.320 000 0 GHz Span 45 MHz	Freq Offset 0.00000000 Hz			
#Res BW 1 MHz #VBW 3 MHz Sweep 20 ms (2001 pts)	Signal Track			
Channel Power Power Spectral Density	On <u>Off</u>			
16.83 dBm / 30.0000 MHz -57.94 dBm/Hz				
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CHAIN 1 OUTPUT POWER



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OUTPUT POWER MID CH, CHAIN 1				
✤ Agilent 14:40:55 Feb 28, 2008	Freq/Channel			
Ch Freq 5.3 GHz Trig Free Channel Power Averages: 100	Center Freq 5.30000000 GHz			
	Start Freq 5.27750000 GHz			
Ref 20 dBm #Atten 30 dB 5.334 dBm #Samp	Stop Freq 5.32250000 GHz			
10	CF Step 20.0000000 MHz Auto <u>Man</u>			
dB Center 5.300 000 0 GHz Span 45 MHz	Freq Offset 0.00000000 Hz			
#Res BW 1 MHz #VBW 3 MHz Sweep 20 ms (2001 pts) Channel Power Power Spectral Density	Signal Track On <u>Off</u>			
17.90 dBm / 30.0000 MHz -56.88 dBm/Hz				
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OUTPUT POWER HIGH CH, CHAIN 1				
* Agilent 14:42:36 Feb 28, 2008 R T	Freq/Channel			
Ch Freq 5.32 GHz Trig Free Channel Power Averages: 100	Center Freq 5.32000000 GHz			
Mkr1 5.323 802 5 GHz	Start Freq 5.29750000 GHz			
Ref 20 dBm #Atten 30 dB 4.131 dBm #Samp	Stop Freq 5.34250000 GHz			
IO IO<	CF Step 20.0000000 MHz Auto <u>Man</u>			
dB Center 5.320 000 0 GHz Span 45 MHz	Freq Offset 0.00000000 Hz			
#Res BW 1 MHz #VBW 3 MHz Sweep 20 ms (2001 pts) Channel Power Power Spectral Density	Signal Track On <u>Off</u>			
16.91 dBm / 30.0000 MHz -57.86 dBm/Hz				
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7.4.3. 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 17.2 dB (including 16 dB pad and 1.2 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

Frequency	Chain 0	Chain 1	Total
	Power	Power	Power
(MHz)	(dBm)	(dBm)	(dBm)
5260	17.80	17.48	20.65
5300	17.74	17.66	20.71
5320	16.57	16.62	19.61

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7.4.4. PEAK POWER SPECTRAL DENSITY

LIMITS

FCC §15.407 (a) (2) IC RSS-210 A9.2 (2)

Directional gain = gain of antenna element + 10 log (# of TX antenna elements)

Effective Legacy Gain
(dBi)
7.76

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 7.76 dBi, therefore the limit is 9.24 dBm.

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.

RESULTS

Channel	Frequency	PPSD With Combiner	Limit	Margin
	(MHz)	(dBm)	(dBm)	(dB)
Low	5260	7.99	9.24	-1.25
Middle	5300	8.15	9.24	-1.09
High	5320	7.21	9.24	-2.03

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POWER SPECTRAL DENSITY WITH COMBINER



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PSD HIGH CH, WITH COMBINER	
Image: Agilent 10:12:56 Feb 28, 2008	Freq/Channel
Ch Freq 5.32 GHz Trig Free Channel Power Averages: 100	Center Freq 5.32000000 GHz
Mkr1 5.323 802 5 GHz	Start Freq 5.29750000 GHz
Ref 20 dBm #Atten 30 dB 7.210 dBm #Samp	Stop Freq 5.34250000 GHz
10 dB/ Offst 17.2	CF Step 20.0000000 MHz Auto <u>Man</u>
dB Center 5.320 000 0 GHz Span 45 MHz	Freq Offset 0.00000000 Hz
#Res BW 1 MHz #VBW 3 MHz Sweep 20 ms (2001 pts) Channel Power Power Spectral Density	Signal Track On <u>Off</u>
20.32 dBm / 30.0000 MHz -54.45 dBm/Hz	
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7.4.5. PEAK EXCURSION

LIMITS

FCC §15.407 (a) (6)

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

TEST PROCEDURE

The transmitter outputs are connected to the spectrum analyzer via a combiner.

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.

RESULTS

Channel	Frequency	Peak Excursion	Limit	Margin
	(MHz)	(dB)	(dB)	(dB)
Low	5260	11.24	13	-1.76
Middle	5300	11.31	13	-1.69
High	5320	11.96	13	-1.04

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PEAK EXCURSION

PEAK EXCURSION LOW CH	т	Freq/Channel
Ch Freq 5.26 GHz Channel Power	Trig Free	Center Freq 5.26000000 GHz
	∆ Mkr1 0 Hz	Start Freq 5.23750000 GHz
Ref 30 dBm Atten 30 dB #Peak Log	11.24 dB	Stop Freq 5.28250000 GHz
dB/ where the second of the se		CF Step 4.5000000 MHz <u>Auto Man</u>
dB	Span 45 MHz Sweep 20 ms (601 pts)	Freq Offset 0.00000000 Hz
Channel Power	Power Spectral Density	Signal Track On <u>Off</u>
27.60 dBm /30.0000 MHz	-47.17 dBm/Hz	
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PEAK EXCURSION MID CH	
Image: Weight with the second seco	Freq/Channel
Ch Freq 5.3 GHz Trig Free Channel Power	Center Freq 5.30000000 GHz
Δ Mkr1 0 Hz	Start Freq 5.27750000 GHz
Ref 30 dBm Atten 30 dB 11.31 dB #Peak	Stop Freq 5.32250000 GHz
10 dB/ or entropy of the second of the sec	CF Step 4.5000000 MHz <u>Auto Man</u>
dB Center 5.300 000 GHz Span 45 MHz	Freq Offset 0.00000000 Hz
#Res BW 1 MHz #VBW 3 MHz Sweep 20 ms (601 pts)	Signal Track
Channel Power Power Spectral Density	On <u>Off</u>
27.37 dBm / 30.0000 MHz -47.40 dBm/Hz	
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PEAK EXCURSION HIGH CH	
* Agilent 10:44:14 Feb 29, 2008 T	Freq/Channel
Ch Freq 5.32 GHz Trig Free Channel Power	Center Freq 5.32000000 GHz
	Start Freq 5.29750000 GHz
Ref 30 dBm Atten 30 dB 11.96 dB #Peak Log	Stop Freq 5.34250000 GHz
10 dB/ Offst 17.2	CF Step 4.5000000 MHz <u>Auto Man</u>
dB Center 5.320 000 GHz Span 45 MHz #Dec BW 1 MHz #V/BW 3 MHz Sweep 20 ms (601 ntc)	Freq Offset 0.00000000 Hz
Channel Power Power Power Spectral Density	Signal Track On <u>Off</u>
27.25 dBm / 30.0000 MHz -47.52 dBm/Hz	
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7.4.6. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.407 (b) (2)

IC RSS-210 A9.3 (2)

For transmitters operating in the 5.25-5.35 GHz band: all emissions outside of the 5.25-5.35 GHz band shall not exceed an EIRP of -27 dBm / MHz.

Devices operating in the 5.25-5.35 GHz band that generate emissions in the 5.15-5.25 GHz band must meet all applicable technical requirements for operation in the 5.15-5.25 GHz band (including indoor use) or alternatively meet an out-of-band emission EIRP limit of -27 dBm/MHz in the 5.15-5.25 GHz band.

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.

<u>RESULTS</u>

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SPURIOUS EMISSIONS WITH COMBINER



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7.5. 802.11n HT20 MODE IN THE UPPER 5.2 GHz BAND

7.5.1. 26 dB and 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.

RESULTS

Channel	Frequency	26 dB Bandwidth	99% Bandwidth
	(MHz)	(MHz)	(MHz)
Low	5260	37.718	18.9300
Middle	5300	37.775	21.2748
High	5320	26.483	17.9102

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26 dB and 99% BANDWIDTH



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BANDWIDTH MID (СН			
🔆 🔆 Agilent 16:37:37 Feb 28, 2	2008		RΤ	Freq/Channel
Ch Freq 5.3 (Occupied Bandwidth	GHz		Trig Free	Center Freq 5.30000000 GHz
				Start Freq 5.27500000 GHz
Ref 20 dBm #Atten 3 #Samp Log	0 dB			Stop Freq 5.32500000 GHz
10 dB/ Offst 17.2				CF Step 20.000000 MHz Auto <u>Man</u>
dB Center 5.300 000 GHz			Span 50 MHz	Freq Offset 0.00000000 Hz
#Res BW 300 kHz	#VBW 1 MHz	#Sweep 100 m	ıs (2001 pts)	Signal Track
Occupied Bandwid 21.27	lth 48 MHz	Occ BW % Pwr x dB	99.00 % -26.00 dB	On <u>Off</u>
Transmit Freq Error 2 x dB Bandwidth 3	50.526 kHz 7.775 MHz*			
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BANDWIDTH HIGH CH	
🔆 Agilent 16:35:06 Feb 28, 2008 R T	Freq/Channel
Ch Freq 5.32 GHz Trig Free Occupied Bandwidth	Center Freq 5.32000000 GHz
	Start Freq 5.29500000 GHz
Ref 20 dBm #Atten 30 dB #Samp Log 10 dB/ Offst 17.2 dB Center 5.320 000 GHz #Res BW 300 kHz #VBW 1 MHz #Sweep 100 ms (2001 pts)	Stop Freq 5.34500000 GHz 20.0000000 MHz Auto <u>Man</u> Freq Offset 0.00000000 Hz
Occupied Bandwidth Occ BW % Pwr 99.00 % 17.9102 MHz x dB -26.00 dB Transmit Freg Error -4 781 kHz	Signal Track ^{On <u>Off</u>}
x dB Bandwidth 26.483 MHz* Copyright 2000-2007 Agilent Technologies	

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7.5.2. 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

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.

The transmitter output operates continuously therefore Method # 1 is used.

RESULTS

Limit

Channel	Frequency	Fixed	В	11 + 10 Log B	Antenna	Limit
		Limit		Limit	Gain	
	(MHz)	(dBm)	(MHz)	(dBm)	(dBi)	(dBm)
Low	5260	24.00	37.718	26.77	5.56	24.00
Mid	5300	24.00	37.775	26.77	5.56	24.00
High	5320	24.00	26.483	25.23	5.56	24.00

Individual Chain Results

Channel	Frequency	Chain 0	Chain 1	Total	Limit	Margin
		Power	Power	Power		
	(MHz)	(dBm)	(dBm)	(dBm)	(dBm)	(dB)
Low	5260	20.02	20.88	23.48	24.00	-0.52
Mid	5300	20.36	20.95	23.68	24.00	-0.32
High	5320	16.41	16.37	19.40	24.00	-4.60

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CHAIN 0 OUTPUT POWER

✤ Agilent 15:01:05 Feb 28,	2008		RТ	Freq/Channel
Ch Freq 5.26 Channel Power	GHz	Trig	Free	Center Freq 5.26000000 GHz
		Mkr1 5.266 367	5 GHz	Start Freq 5.23750000 GHz
Ref 20 dBm #Atten #Samp Log 10 dP/	30 dB	6.90	0 dBm	Stop Freq 5.28250000 GHz
dD Offst 17.2 dB				20.0000000 MHz Auto <u>Ma</u>
Center 5.260 000 0 GHz #Res BW 1 MHz	#VBW 3 MHz	Span Sweep 20 ms (200	45 MHz 1 pts)	0.00000000 Hz
Channel Power 20.02 dBm /30.0	000 MHz	Power Spectral Den -54.75 dBm	sity /Hz	On <u>Off</u>
Convright 2000-2007 Agilent T	achaelogiac			

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OUTPUT POWER MID CH, CHAIN 0		
🔆 Agilent 14:56:07 Feb 28, 2008	RΤ	Freq/Channel
Ch Freq 5.3 GHz Channel Power Averages: 100	Trig Free	Center Freq 5.30000000 GHz
	005 0 GHz	Start Freq 5.27750000 GHz
Ref 20 dBm #Atten 30 dB 7 #Samp Log	7.397 dBm	Stop Freq 5.32250000 GHz
ID ID<		CF Step 20.0000000 MHz Auto <u>Man</u>
dB Center 5.300 000 0 GHz Sp	oan 45 MHz	Freq Offset 0.00000000 Hz
#Res BW 1 MHz #VBW 3 MHz Sweep 20 ms (a Channel Power Power Spectral D	2001 pts) Density	Signal Track On <u>Off</u>
20.36 dBm / 30.0000 MHz -54.41 dB	im/Hz	
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OUTPUT POWER HIGH CH, CHAIN 0				
🔆 Agilent 14:50:19 Feb 28, 2008 🛛 💦 T	Freq/Channel			
Ch Freq 5.32 GHz Trig Free Channel Power Averages: 100	Center Freq 5.32000000 GHz			
	Start Freq 5.29750000 GHz			
Ref 20 dBm #Atten 30 dB 3.579 dBm #Samp - - Log - - 10 - -	Stop Freq 5.34250000 GHz			
dB/ dB/ 0ffst 17.2	CF Step 20.0000000 MHz Auto <u>Man</u>			
dB Center 5.320 000 0 GHz Span 45 MHz	Freq Offset 0.00000000 Hz			
#Res BW 1 MHz #VBW 3 MHz Sweep 20 ms (2001 pts) Channel Power Power Spectral Density	Signal Track On <u>Off</u>			
16.41 dBm / 30.0000 MHz -58.36 dBm/Hz				
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CHAIN 1 OUTPUT POWER

OUTPUT POWER LOW CH, CHAIN 1 * Agilent 15:02:13 Feb 28, 2008 R T	Freq/Channel
Ch Freq 5.26 GHz Trig Free Channel Power Averages: 100	Center Freq 5.26000000 GHz
Mkr1 5.254 915 0 GHz	Start Freq 5.23750000 GHz
Ref 20 dBm #Atten 30 dB 8.053 dBm #Samp Log	Stop Freq 5.28250000 GHz
dB/	CF Step 20.000000 MHz Auto <u>Man</u>
dB Center 5.260 000 0 GHz Span 45 MHz	Freq Offset 0.00000000 Hz
#Res BW 1 MHz #VBW 3 MHz Sweep 20 ms (2001 pts) Channel Power Power Spectral Density	Signal Track On <u>Off</u>
20.88 dBm / 30.0000 MHz -53.89 dBm/Hz	
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OUTPUT POWER MID CH, CHAIN 1	
R R	Freq/Channel
Ch Freq 5.3 GHz Trig Free Channel Power Averages: 100	Center Freq 5.30000000 GHz
Mkr1 5.305 197 5 GHz	Start Freq 5.27750000 GHz
Ref 20 dBm #Atten 30 dB 8.000 dBm #Samp	Stop Freq 5.32250000 GHz
10 dB/ Offst	CF Step 20.0000000 MHz Auto <u>Man</u>
dB Center 5.300 000 0 GHz Span 45 MHz	Freq Offset 0.00000000 Hz
#Res BW 1 MHz #VBW 3 MHz Sweep 20 ms (2001 pts) Channel Power Power Spectral Density	Signal Track On <u>Off</u>
20.95 dBm / 30.0000 MHz -53.82 dBm/Hz	
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OUTPUT POWER HIGH CH, CHAIN 1				
₩ Agilent 14:51:50 Feb 28, 2008 R T	Freq/Channel			
Ch Freq 5.32 GHz Trig Free Channel Power Averages: 100	Center Freq 5.32000000 GHz			
	Start Freq 5.29750000 GHz			
Ref 20 dBm #Atten 30 dB 3.232 dBm #Samp - - - Log - - - - 10 - - - - -	Stop Freq 5.34250000 GHz			
dB/ offst 17.2	CF Step 20.0000000 MHz Auto <u>Man</u>			
dB Center 5.320 000 0 GHz Span 45 MHz	Freq Offset 0.00000000 Hz			
#Kes BW 1 MHz #VBW 3 MHz Sweep 20 ms (2001 pts) Channel Power Power Spectral Density Signal Track On Off				
16.37 dBm / 30.0000 MHz -58.40 dBm/Hz				
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7.5.3. 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 17.2 dB (including 16 dB pad and 1.2 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

Frequency	Chain 0	Chain 1	Total
	Power	Power	Power
(MHz)	(dBm)	(dBm)	(dBm)
5260	19.78	20.64	23.24
5300	20.15	20.71	23.45
5320	16.20	16.12	19.17

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7.5.4. 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

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.

RESULTS

Channel	Frequency	PPSD With Combiner	Limit	Margin
	(MHz)	(dBm)	(dBm)	(dB)
Low	5260	10.85	11	-0.15
Middle	5300	10.58	11	-0.42
High	5320	7.07	11	-3.93

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POWER SPECTRAL DENSITY WITH COMBINER



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PSD MID CH, WITH COMBINER			
✤ Agilent 10:15:14 Feb 28, 2008	Peak Search		
Ch Freq 5.3 GHz Trig Free Channel Power Averages: 100	Next Peak		
Marker 5.304207500 GHz	Next Pk Right		
Ref 20 dBm #Atten 30 dB 10.580 dBm #Samp Compared to the second s	Next Pk Left		
10	Min Search		
dB Center 5.300 000 0 GHz Span 45 MHz	Pk-Pk Search		
#Res BW 1 MHz #VBW 3 MHz Sweep 20 ms (2001 pts) Channel Power Power Spectral Density	Mkr © CF		
23.72 dBm / 30.0000 MHz -51.06 dBm/Hz	More 1 of 2		
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PSD HIGH CH, WITH COMBINER			
₩ Agilent 10:13:41 Feb 28, 2008 R T	Freq/Channel		
Ch Freq 5.32 GHz Trig Free Channel Power Averages: 100	Center Freq 5.32000000 GHz		
Mkr1 5.326 817 5 GHz	Start Freq 5.29750000 GHz		
Ref 20 dBm #Atten 30 dB 7.069 dBm #Samp	Stop Freq 5.34250000 GHz		
10 dB/ Offst 17.2	CF Step 20.0000000 MHz Auto <u>Man</u>		
dB Center 5.320 000 0 GHz Span 45 MHz	Freq Offset 0.00000000 Hz		
#Res BW 1 MHz #VBW 3 MHz Sweep 20 ms (2001 pts) Channel Power Power Spectral Density	Signal Track ^{On <u>Off</u>}		
19.98 dBm / 30.0000 MHz -54.79 dBm/Hz			
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7.5.5. PEAK EXCURSION

LIMITS

FCC §15.407 (a) (6)

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

TEST PROCEDURE

The transmitter outputs are connected to the spectrum analyzer via a combiner.

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.

<u>RESULTS</u>

Channel	Frequency	Peak Excursion	Limit	Margin
	(MHz)	(dB)	(dB)	(dB)
Low	5260	11.15	13	-1.85
Middle	5300	11.29	13	-1.71
High	5320	11.48	13	-1.52

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PEAK EXCURSION

PEAK EXCURSION L	OW CH		т	
Agrient 10:38:25 Feb 29, 2008	5			
Ch Freq 5.26 GH: Channel Power	ź		Trig Free	5.26000000 GHz
		٨	Mkr1 0 Hz	Start Freq 5.23750000 GHz
Ref 30 dBm Atten 30 d #Peak Log	B		11.15 dB	Stop Freq 5.28250000 GHz
dB/			A CONTRACTOR OF	CF Step 4.5000000 MHz <u>Auto Man</u>
dB	4\/DW 2 MU-	Sp.	oan 45 MHz	Freq Offset 0.00000000 Hz
Channel Power	#VBW 3 MHz	Sweep 20 ms	(601 pts) ensity	Signal Track On <u>Off</u>
31.69 dBm / 30.0000 MHz -43.08 dBm/Hz				
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PEAK EXCURSION MID CH			
☆ Agilent 10:40:29 Feb 29, 2008	Freq/Channel		
Ch Freq 5.3 GHz Trig Free Channel Power	Center Freq 5.3000000 GHz		
ے۔ ۵ Mkr1 0 Hz	Start Freq 5.27750000 GHz		
Ref 30 dBm Atten 30 dB 11.29 dB #Peak	Stop Freq 5.32250000 GHz		
dB/	CF Step 4.5000000 MHz <u>Auto Man</u>		
dB Center 5.300 000 GHz Span 45 MHz	Freq Offset 0.00000000 Hz		
#Res BW 1 MHz #VBW 3 MHz Sweep 20 ms (601 pts)	Signal Track		
Channel Power Power Spectral Density	On <u>Off</u>		
28.46 dBm / 30.0000 MHz -46.32 dBm/Hz			
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PEAK EXCURSION HIGH CH			
₩ Agilent 10:42:13 Feb 29, 2008 T	Freq/Channel		
Ch Freq 5.32 GHz Trig Free Channel Power	Center Freq 5.32000000 GHz		
Δ Mkr1 0 Hz	Start Freq 5.29750000 GHz		
Ref 30 dBm Atten 30 dB 11.48 dB	Stop Freq 5.34250000 GHz		
dB/ offst 17.2	CF Step 4.50000000 MHz <u>Auto Man</u>		
dB Center 5.320 000 GHz #Deo BW 1 MHz #VBW 2 MHz Sweep 20 pp (601 pt)	Freq Offset 0.00000000 Hz		
Channel Power Power Power Spectral Density	Signal Track On <u>Off</u>		
26.68 dBm / 30.0000 MHz -48.09 dBm/Hz			
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7.5.6. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.407 (b) (2)

IC RSS-210 A9.3 (2)

For transmitters operating in the 5.25-5.35 GHz band: all emissions outside of the 5.25-5.35 GHz band shall not exceed an EIRP of -27 dBm / MHz.

Devices operating in the 5.25-5.35 GHz band that generate emissions in the 5.15-5.25 GHz band must meet all applicable technical requirements for operation in the 5.15-5.25 GHz band (including indoor use) or alternatively meet an out-of-band emission EIRP limit of -27 dBm/MHz in the 5.15-5.25 GHz band.

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.

<u>RESULTS</u>

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SPURIOUS EMISSIONS WITH COMBINER



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7.6. 802.11n HT40 MODE IN THE UPPER 5.2 GHz BAND

7.6.1. 26 dB and 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.

RESULTS

Channel	Frequency	26 dB Bandwidth	99% Bandwidth
	(MHz)	(MHz)	(MHz)
Low	5270	49.765	36.7061
High	5310	45.099	36.2236

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26 dB and 99% BANDWIDTH



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BANDWIDTH HIGH CH	
🔆 Agilent 16:41:25 Feb 28, 2008 R T	Freq/Channel
Ch Freq 5.31 GHz Trig Free Occupied Bandwidth	Center Freq 5.31000000 GHz
	Start Freq 5.28500000 GHz
Ref 20 dBm #Atten 30 dB #Samp Log	Stop Freq 5.33500000 GHz
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	CF Step 20.0000000 MHz Auto <u>Man</u>
Center 5.310 000 GHz Span 50 MHz	Freq Offset 0.00000000 Hz
#Res BW 510 kHz #VBW 1 MHz #Sweep 100 ms (2001 pts)	Signal Track
Occupied Bandwidth Occ BW % Pwr 99.00 % 36.2236 MHz × dB -26.00 dB	On <u>Off</u>
Transmit Freq Error -3.837 kHz x dB Bandwidth 45.099 MHz*	
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7.6.2. 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

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.

The transmitter output operates continuously therefore Method # 1 is used.

RESULTS

Limit

Channel	Frequency	Fixed	В	11 + 10 Log B	Antenna	Limit
		Limit		Limit	Gain	
	(MHz)	(dBm)	(MHz)	(dBm)	(dBi)	(dBm)
Low	5270	24.00	49.765	27.97	5.60	24.00
High	5310	24.00	45.099	27.54	5.56	24.00

Individual Chain Results

Channel	Frequency	Chain 0	Chain 1	Total	Limit	Margin
		Power	Power	Power		
	(MHz)	(dBm)	(dBm)	(dBm)	(dBm)	(dB)
Low	5270	20.30	21.35	23.87	24.00	-0.13
High	5310	13.59	13.64	16.63	24.00	-7.37

CHAIN 0 OUTPUT POWER



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OUTPUT POWER HIGH CH, CHAIN 0	
🔆 Agilent 11:22:58 Feb 28, 2008 R T	Freq/Channel
Ch Freq 5.31 GHz Trig Free Channel Power Averages: 100	Center Freq 5.31000000 GHz
Mkr1 5.318 370 GHz	Start Freq 5.26500000 GHz
Ref 20 dBm #Atten 30 dB -1.991 dBm #Samp	Stop Freq 5.35500000 GHz
0 dB/ Offst 17.2	CF Step 20.0000000 MHz Auto <u>Man</u>
dB Center 5.310 000 GHz Span 90 MHz	Freq Offset 0.00000000 Hz
#Res BW 1 MHz #VBW 3 MHz Sweep 20 ms (2001 pts) Channel Power Power Spectral Density	Signal Track ^{On <u>Off</u>}
13.59 dBm / 60.0000 MHz -64.20 dBm/Hz	
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CHAIN 1 OUTPUT POWER

OUTPUT POWER LOW CH, CHAIN 1	RT	Freq/Channel
Ch Freq 5.27 GHz Channel Power Averages: 100	Trig Free	Center Freq 5.27000000 GHz
	4 330 GHz	Start Freq 5.22500000 GHz
Ref 20 dBm #Atten 30 dB #Samp 20 dBm #Atten 30 dB 20 dBm 2	5.313 dBm	Stop Freq 5.31500000 GHz
dB/		CF Step 20.000000 MHz Auto <u>Man</u>
dB Center 5.270 000 GHz Synthesis Synthesynthesis Synthesis Synthesis Synthesis Synthe	pan 90 MHz	Freq Offset 0.00000000 Hz
Channel Power Power Power Spectral D	Density	Signal Track On <u>Off</u>
21.35 dBm / 60.0000 MHz -56.43 dE	3m/Hz	
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OUTPUT POWER HIGH CH, CHAIN 1	
🔆 Agilent 11:22:05 Feb 28, 2008 🛛 💦 T	Freq/Channel
Ch Freq 5.31 GHz Trig Free Channel Power Averages: 100	Center Freq 5.31000000 GHz
Mkr1 5.317 425 GHz	Start Freq 5.26500000 GHz
Ref 20 dBm #Atten 30 dB -2.061 dBm #Samp	Stop Freq 5.35500000 GHz
10 dB/ 0ffst 17.2 d	CF Step 20.0000000 MHz Auto <u>Man</u>
dB Center 5.310 000 GHz Span 90 MHz	Freq Offset 0.00000000 Hz
#Res BW 1 MHz #VBW 3 MHz Sweep 20 ms (2001 pts) Channel Power Power Spectral Density	Signal Track On <u>Off</u>
13.64 dBm / 60.0000 MHz -64.14 dBm/Hz	
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