

FCC CFR47 CLASS II PERMISSIVE CHANGE CERTIFICATION TEST REPORT

FOR

AR5BXB6 802.11abg PCI Express Module

MODEL NUMBER: AR5BXB6

FCC ID: PPD- AR5BXB6-M

REPORT NUMBER: 05U3787-1

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Prepared for ATHEROS COMMUNICATIONS INC. 5480 GREAT AMERICA PARKWAY SANTA CLARA, CA 95054 U.S.A.

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Revision History

Rev.	IssueRev.DateRevisions		Revised By
А	12/20/05	Initial Issue	DG

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1. ATTESTATION OF TEST RESULTS

STANDARD		TEST RESULTS	
	APPLICABI	LE STANDARDS	
DATE TESTED:	DECEMBER 2 -	DECEMBER 14, 2005	
SERIAL NUMBER:	6F54500CMU41	FE	
MODEL:	AR5BXB6		
EUT DESCRIPTION:	AR5BXB6 802.1	1abg PCI Express Module	
COMPANY NAME:	ATHEROS CON 5480 GREAT AI SANTA CLARA	IMUNICATIONS INC. MERICA PARKWAY ., CA 95054	

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.

Approved & Released For CCS By:

Tested By:

DAVID GARCIA EMC SUPERVISOR COMPLIANCE CERTIFICATION SERVICES

VIEN TRAN 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 and FCC CFR 47 Part 15.

3. FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 561F Monterey Road, Morgan Hill, California, USA. The sites are constructed in conformance with the requirements of ANSI C63.4, ANSI C63.7 and CISPR Publication 22. All receiving equipment conforms to CISPR Publication 16-1, "Radio Interference Measuring Apparatus and Measurement Methods."

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
Radiated Emission, 30 to 200 MHz	+/- 3.3 dB
Radiated Emission, 200 to 1000 MHz	+4.5 / -2.9 dB
Radiated Emission, 1000 to 2000 MHz	+4.5 / -2.9 dB
Power Line Conducted Emission	+/- 2.9 dB

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

5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

The EUT is an 802.11 a/b/g transceiver.

The radio module is manufactured by Atheros Communications Inc..

5.2. DESCRIPTION OF CLASS II PERMISSIVE CHANGE

Added new antenna model:

Tyco P/N: 631-0153 12-5, inverted F type.

Full antenna details are included in a separate exhibit.

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes two dual band inverted F antennas on a flexible substrate for diversity, each with a maximum gain of 4.06 dBi.

5.4. SOFTWARE AND FIRMWARE

The firmware installed in the EUT during testing was Devlib Revision 5.3, rev. Build #15.

The EUT driver software installed in the Apple 15" PowerBook equipment during testing was Apple80211, rev. 12_5_05. The serial number of the PowerBook is SW854600JUNO.

The test utility software used during testing was moma, rev. M35aFred_12_5_05.

5.5. WORST-CASE CONFIGURATION AND MODE

The worst-case channel is determined as the channel with the highest output power. The highest measured output power was at 2437 MHz and was.

The worst-case data rate for this channel is determined to be 6 Mb/s, based on previous experience with AR5BXB6 WLAN product design architectures.

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5.6. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

PERIPHERAL SUPPORT EQUIPMENT LIST							
Description Manufacturer Model Serial Number FCC ID							
Laptop PC	Apple	PowerBook	SW854600JUNO	DOC			
AC Adapter	Delta	ADP90UBC	MV54207YSCN	N/A			

I/O CABLES

	I/O CABLE LIST						
Cable	Port	# of	Connector	Cable	Cable	Remarks	
No.		Identical	Туре	Туре	Length		
		Ports					
1	AC	1	AC	Unshielded	1.7		
2	DC	1	DC	Shielded	1.7		

TEST SETUP

The EUT is installed in a host laptop computer via its internal Mini PCIe slot during the tests. Test software exercised the radio card.

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SETUP DIAGRAM FOR TESTS

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SETUP FOR DIGITAL DEVICE TESTS

SUPPORT EQUIPMENT

PERIPHERAL SUPPORT EQUIPMENT LIST						
Description	Manufacturer	Model	Serial Number	FCC ID		
Laptop PC	Apple	PowerBook	SW854600JUNO	DOC		
AC Adapter	Delta	ADP90UBC	MV54207YSCN	N/A		
Mouse	Apple	M5769	VJ5250Q5BNWDA	DOC		
Keyboard	Apple	A1048	KY5230SCEQL3B	DOC		
Combo	Radio Shack	33-1187	N/A	N/A		
Headphone/Microphone						
IPod Mini	Apple	A1015	JQ4104QHPFW	DOC		
IPod 20 GB	Apple	A1059	JQ436KK6PS9	DOC		
Display Monitor	Apple	M6496	CY9374AZGZC	DOC		

I/O CABLES

	I/O CABLE LIST						
Cable	Port	# of	Connector	Cable	Cable	Remarks	
No.		Identical	Туре	Туре	Length		
		Ports					
1	AC	1	AC	Unshielded	1.7		
2	DC	1	DC	Shielded	1.7		
3	USB	1	USB	Shielded	0.75	Mouse	
4	USB	1	USB	Shielded	0.85	Keyboard	
5	Audio	1	Audio Jack	Shielded	2.5	Headphone/Microphone	
6	USB	1	USB	Shielded	1.1	IPod Mini	
7	USB	1	USB	Shielded	1.1	IPod 20GB	
8	Video	1	RGB	Shielded w/Ferrite	1.75	Display	
9	AC	1	AC	Shielded	1.75	Display	

TEST SETUP

The EUT is installed in a host laptop computer via its internal Mini PCIe slot during the tests. Test software exercised the radio card.

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SETUP DIAGRAM FOR DIGITAL DEVICE 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	Serial Number	Cal Due			
Spectrum Analyzer 3 Hz ~ 44 GHz	Agilent	E4446A	US42070220	1/1/2006			
Antenna, Horn 1 ~ 18 GHz	EMCO	3115	6717	4/22/2006			
Preamplifier 1-26.5 GHz	HP	8449B	3008A00931	6/24/2006			
Preamplifier, 1 ~ 26.5 GHz	HP	8449B	3008A00369	8/17/2006			
Spectrum Analyzer, 26.5 GHz	HP	8593EM	3710A00205	1/6/2006			
Preamplifier	HP	8447D	1937A02062	1/7/2006			
Antenna, Bilog 30MHz ~ 2Ghz	Sunol Sciences	JB1	A121003	3/3/2006			

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6.1.1. PEAK OUTPUT POWER 2400 - 2483.5 MHz BAND

PEAK POWER LIMIT

§15.247 (b) The maximum peak output power of the intentional radiator shall not exceed the following:

15.247 (b) (3) For systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz , and 5725-5850 MHz bands: 1 watt.

§15.247 (b) (3) For systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands: 1 watt. As an alternative to a peak power measurement, compliance with the one Watt limit can be based on a measurement of the maximum conducted output power. Maximum Conducted Output Power is defined as the total transmit power delivered to all antennas and antenna elements averaged across all symbols in the signaling alphabet when the transmitter is operating at its maximum power control level. Power must be summed across all antennas and antenna elements. The average must not include any time intervals during which the transmitter is off or is transmitting at a reduced power level. If multiple modes of operation are possible (e.g., alternative modulation methods), the maximum conducted output power is the highest total transmit power occurring in any mode.

§15.247 (b) (4) (i) Systems operating in the 2400–2483.5 MHz band that are used exclusively for fixed, point-to-point operations may employ transmitting antennas with directional gain greater than 6 dBi provided the maximum peak output power of the intentional radiator is reduced by 1 dB for every 3 dB that the directional gain of the antenna exceeds 6 dBi.

TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer and the analyzer's internal channel power integration function is used to integrate the power over a bandwidth greater than or equal to the 99% bandwidth.

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RESULTS

The maximum antenna gain is 4.06 dBi for other than fixed, point-to-point operations, therefore the limit is 30 dBm.

No non-compliance noted:

802.11b Mode

Channel	Frequency	Peak Power	Limit	Margin
	(MHz)	(dBm)	(dBm)	(dB)
Low	2412	15.50	30	-14.50
Middle	2437	19.84	30	-10.16
High	2462	17.26	30	-12.74

802.11g Mode

Channel	Frequency	Peak Power	Limit	Margin
	(MHz)	(dBm)	(dBm)	(dB)
Low	2412	18.71	30	-11.29
Middle	2437	22.33	30	-7.67
High	2462	16.63	30	-13.37

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OUTPUT POWER (802.11b MODE)



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OUTPUT POWER (802.11g MODE)



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6.1.2. PEAK OUTPUT POWER 5725-5850 MHz BAND

PEAK POWER LIMIT

§15.247 (b) The maximum peak output power of the intentional radiator shall not exceed the following:

15.247 (b) (3) For systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz , and 5725-5850 MHz bands: 1 watt.

\$15.247 (b) (4) Except as shown in paragraphs (b)(3) (i), (ii) and (iii) of this section, if transmitting antennas of directional gain greater than 6 dBi are used the peak output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1) or (b)(2) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

§15.247 (b) (4) (ii) Systems operating in the 5725–5850 MHz band that are used exclusively for fixed, point-to-point operations may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter peak output power.

TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer and the analyzer's internal channel power integration function is used to integrate the power over a bandwidth greater than or equal to the 99% bandwidth.

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RESULTS

The maximum antenna gain is 4.06 dBi for other than fixed, point-to-point operations, therefore the limit is 30 dBm.

No non-compliance noted:

802.11a Mode

Channel	Frequency	Peak Power	Limit	Margin
	(MHz)	(dBm)	(dBm)	(dB)
Low	5745	21.21	30	-8.79
Middle	5785	21.19	30	-8.81
High	5825	21.14	30	-8.86

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OUTPUT POWER (802.11a MODE)



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6.2. RADIATED EMISSIONS

6.2.1. 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.

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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6.2.2. TRANSMITTER ABOVE 1 GHz FOR 2400 TO 2483.5 MHz BAND

RESTRICTED BANDEDGE (b MODE, LOW CHANNEL, HORIZONTAL)



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RESTRICTED BANDEDGE (b MODE, LOW CHANNEL, VERTICAL)



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RESTRICTED BANDEDGE (b MODE, HIGH CHANNEL, HORIZONTAL)



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🔆 Agilent 11:44	4:10 Dec 14, 2005	L	Freq/Channel
Restricted Band, I Ref 117 dB µV #Peak	b Mode High Ch. #Atten 0 dB	Mkr1 2.488 06 GH 43.78 dBµ∖	Certer Freq 2.49175000 GHz
Log 10 dB/ Offst			Start Freq 2.48350000 GHz
30.5 dB			Stop Freq 2.5000000 GHz
54.0 dBμV			CF Step 1.65000000 MHz
V1 S2	1		Freq Ctfset
¤(1): FTun Swp			Signal Track
Start 2.483 50 GH	lz #\/B\// 10	Stop 2.500 00 GH	z

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RESTRICTED BANDEDGE (b MODE, HIGH CHANNEL, VERTICAL)



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🔆 Agilent 11:22:	58 Dec 14, 2005	L	Freq/Channel
Restricted Band, b Ref 117 dB µV #Peak	Mode High Ch. #Atten 0 dB	Mkr1 2.487 98 GHz 47.79 dBµ∨	Certer Freq 2.49175000 GHz
Log 10 dB/ Offst			Start Freq 2.48350000 GHz
30.5 dB DI			Stop Freq 2.50000000 GHz
54.0 dBµV LgAv			CF Step 1.6500000 MHz <u>Auto Mar</u>
V1 S2 S3 FC			Freq Olfset 0.00000000 Hz
¤(1): FTun Swp			Signal Track ^{On <u>Q</u>:f}
Start 2.483 50 GH; #Res BW 1 MHz	2 #\VB\V 10 H	Stop 2.500 00 GHz	

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HARMONICS AND SPURIOUS EMISSIONS (b MODE)

Но	orn 1-1	8GHz	Pre-ar	nplifer	1-260	GHz	Pre-am	plifer 2	26-40GHz		Н	orn >180	GHz		
T73; S	/N: 6717	@3m	T145 A	gilent 3	008A0	05(-					•	
	2 foot	cable	3	footc	able		12 1		able	НР	HPF	Re	ject Filte	er <u>Per</u> RE	ak Measurements BW=VBW=1MHz
			Vien	1872150	02	-	vien 13	720300	-		_4.00112	<u> </u>		RBW=	=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. 1 1.824	16dBm 3.0	52.8	50.3	33.7	2.9	-34.8	0.0	0.6	55.2	52.7	74	54	-18.8	-1.3	V
.824	3.0	48.3	42.9	33.7	2.9	-34.8	0.0	0.6	50.7	45.3	74	54	-23.3	-8.7	Н
4id Ch. 1 .874	7.5dBm 3.0	51.8	47.9	33.8	3.0	-34.9	0.0	0.6	54.3	50.4	74	54	-19.7	-3.6	V
.311	3.0	52.5 47.5	46.8 38.2	35.5 33.8	4.2	-34.7 -34.9	0.0	0.6 0.6	58.2 50.0	52.5 40.7	74	54 54	-15.8 -24.0	-1.5 -13.3	V H
.311	3.0	44.0	31.7	35.5	4.2	-34.7	0.0	0.6	49.7	37.4	74	54	-24.3	-16.6	Н
High Ch. 4.924	16dBm 3.0	47.8	41.1	33.8	3.1	-34.9	0.0	0.6	50.5	43.7	74	54	-23.5	-10.3	V
7.386	3.0	48.0	41.8	35.6	4.2	-34.6	0.0	0.6	53.8	47.6	74	54 54	-20.2	-6.4	V U
.386	3.0	44.4	32.4	35.6	4.2	-34.9	0.0	0.6	50.2	38.2	74	54	-27.5	-10.4	H
	f Dist Read AF CL	Measureme Distance to Analyzer R Antenna Fa Cable Loss	ent Frequenc Antenna leading actor	у		Amp D Corr Avg Peak HPF	Preamp O Distance Average Calculate High Pas	Gain Correc Field S ed Peal s Filte	ct to 3 mete Strength @ c Field Stre r	ers 3 m ngth		Avg Lim Pk Lim Avg Mar Pk Mar	Average l Peak Fiel Margin v Margin v	Field Streng d Strength L s. Average I s. Peak Limi	th Limit imit .imit t

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RESTRICTED BANDEDGE (g MODE, LOW CHANNEL, HORIZONTAL)



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RESTRICTED BANDEDGE (g MODE, LOW CHANNEL, VERTICAL)



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🔆 Agilent 11:16:	49 Dec 14, 2005	L	Freq/Channel
Restricted Band, g Rel 117 dB µV #Peak	Mode Low Ch. #Atten 0 dB	Mkr1 2.390 00 GHz 46.81 dBµV	Certer Freq 2.35000000 GHz
Log 10 dB/			Start Freq 2.31000000 GHz
30.3 dB DI			Stop Freq 2.39000000 GHz
54.0 dΒμV LgAv			CF Step 8.0000000 MHz <u>Auto Mar</u>
V1 S2 S3 FC			Freq Olfset 0.00000000 Hz
¤(1): FTun Swp			Signal Track ^{On <u>Q</u>:f}
Start 2.310 00 GH	z #VBW 10 Hz	Stop 2.390 00 GHz	

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RESTRICTED BANDEDGE (g MODE, HIGH CHANNEL, HORIZONTAL)



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🔆 Agilent 11:40	:33 Dec 14, 2005	L	Freq/Channel
Restricted Band, g Rel 117 dB µV #Peak	Mode High Ch. #Atten 0 dB	Mkr1 2.483 53 GHz 44.02 dBµ∨	Certer Freq 2.49175000 GHz
Log 10 dB/ Offst			Start Freq 2.48350000 GHz
30.5 dB DI			Stop Freq 2.5000000 GHz
54.0 dBμV LgAv			CF Step 1.6500000 MHz <u>Auto Ma</u>
V1 S2 S3 FC ¹			Freq Olfset 0.00000000 Hz
¤(1): FTun Swp			Signal Track ^{On <u>Q</u>:f}
Start 2.483 50 GH #Res BW 1 MHz	z #VBW 10 Hz	Stop 2.500 00 GHz	

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RESTRICTED BANDEDGE (g MODE, HIGH CHANNEL, VERTICAL)



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🔆 Agilent 11:32	:41 Dec 14, 2005	L	Freq/Channel
Restricted Band, g Rel 117 dB µV #Peak	Mode High Ch. #Atten 0 dB	Mkr1 2.483 50 GHz 47.14 dBµ∨	Certer Freq 2.49175000 GHz
Log 10 dB/ Otist			Start Freq 2.48350000 GHz
30.5 dB DI			Stop Freq 2.5000000 GHz
54.0 dBμV LgAv			CF Step 1.6500000 MHz <u>Auto Mar</u>
V1 S2 S3 FC			Freq Ctfset 0.00000000 Hz
¤(1): FTun Swp			Signal Track ^{On <u>Q</u>:f}
Start 2.483 50 GH	z #VBW 10 H	Stop 2.500 00 GHz	

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HARMONICS AND SPURIOUS EMISSIONS (g MODE)

Fest En Project Compai	ngr: Vier #:05U3 ny:Apple	n Tran 787 e Computer	rs Inc.												
SUT De	escrip.:8	02.11 abg	WLAN Min	i Card i	n 1 Ap	ple Lap	top with I	l Ante	ппа Туре						
fest Ta	rget:FC	бабо С 15.247													
Mode (Oper: Tx	On_11g M	Iode												
Fest Eq	uipmen	t:													
	I 4	10011-	Draw		4.06/		Draw		06 40 CH			ann > 10/	211-		Linsit
H	iorn 1-	18GHZ	Pre-a	mpiliter	1-200	JHZ	Pre-am	piirer	20-40GH			om > 180	σΠΖ		
173; \$	S/N: 671	7@3m	T145 /	Agilent 3	3008A0	05(•				•	FCC 15.205
Hi Free	quency Ca	oles ———													
	2 foot	cable	3	3 foot c	able		12	footo	able		HPF	Re	ject Filte	r Peal	k Measurements
			Vien	1872150	02		Vien 19	72090	05	и не	E 4 NGHz			Avera	w=vBW=1MHz ge Measurements
			Vien	1072130	02	•		. 2000	•		+.0011E			RBW=	1MHz; VBW=10Hz
f	Diet	Read Pk	Read Ava	ΔF	CI	Δmn	DCor	Filte	Peak	Δνσ	Pl: Lim	Avg I im	Pk Mar	Avg Mar	Notes
GHz	(m)	dBuV	dBuV	dB/m	dB	dB	dB	dB	dBuV/m	dBuV/m	dBuV/m	dBuV/m	dB	dB	(V/H)
Low Ch. 1	13.3dBm														
1.824	3.0	43.6	32.0	33.7	29	-34.8	0.0	0.0	46.0	34.4	74	54	-28.0	-19.6	V
1.824	310	42./	31.8	33./	29	-34.8	0.0	0.0	42.1	34.2	/4	24	-28.9	-19.8	n
Mid Ch. I	17 <i>.5</i> dBm										•				
4.874	3.0	52.4	40.6	33.8	3.0	-34.9	0.0	0.6	54.9	43.1	74	54	-19.1	-10.9	V
1874	3.0		41.1	33.8	4.2 3.0	-34.7	0.0	0.0 0.0	59.2 48.5	40.8	74 74	54 54	-14.8	-7.2	¥ Н
7311	3.0	46.9	34.1	35.5	4.2	-34.7	0.0	0.6	52.6	39.8	74	54	-21.4	-14.2	H
High Ch	13 640														
1924	3.0	44.3	31.7	33.8	3.1	-34.9	0.0	0.6	47.0	34.4	74	54	-27.0	-19.6	v
7.386	3.0	45.D	32.1	35.6	4.2	-34.6	0.0	0.6	50.8	37.9	74	54	-23.2	- 16.1	V
1924	3.0	43.7	31.8	33.8	3.1	-34.9	0.0	0.6	46.4	34.5	74	54	-27.6	-19.5	H
7.386	3.0	43.9	32,0	35.6	4.2	-34.6	0.0	0.6	49.7	37.8	74	54	-24.3	-16.2	Н
		•	•			\$					•				
	f	Measureme	ent Frequenc	v		Amp	Preamp (Gain				Avg Lim	Average F	Field Strengt	h Limit
	- Dist	Distance to	Antenna	/		D Corr	Distance	Corre	ct to 3 mete	ers		Pk Lim	Peak Field	d Strength L	imit
			anding			Avg	Average	Field S	Strength @	3 m		Avg Mar	Margin vs	. Average L	imit
	Read	Analyzer K	cadina												
	Read AF	Analyzer K Antenna Fa	actor			Peak	Calculate	d Peal	k Field Stre	ngth		Pk Mar	Margin vs	. Peak Limit	

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6.2.3. TRANSMITTER ABOVE 1 GHz FOR 5725 TO 5850 MHz BAND

HARMONICS AND SPURIOUS EMISSIONS (802.11a MODE)

.2/14/05 Compli	High ance Ce	Frequency ertification (Measurem Services, M	lent lorgan]	Hill Oj	oen Fiel	d Site								
- Fort Fi	nar Vie	n Tran		-	-										
roject	:#:05U3	7 8 7													
'ompa	ny:Appl	e Computer	s Inc.												
EUT D	escrip.:8	302.11 abg	WLAN Min	i Card i	n 1 Ap	ple Lap	top with I	Ante	nna Type						
UT M	I/N:AR5	BXB6													
fest Ta	arget: FC	CC 15.247													
viode	Oper: 1 A	, 5.8GHZ													
Fest E	quipmen	t:													
	ا مسما	40.011-	Dro. or	mulifar	4.06		Dro. om	nlifer			ц	ava > 10	cu-		Limit
	10111-1-	TOURIZ	Pre-al	npillel	1-200	582	rie-am	hillet	20-4066	<u> </u>			012		
173;	S/N: 671	7 @3m	▼ T145 #	\gilent 3	008A0	05(🖵				 T39 	T88 ARA 1	18-40GHz &	Mixer > 4	OGHz 🚽	FCC 15.205
Hi Fre	quency Ca	bles ———								 					
		a a la la			abla		12	footic	ahla		LIDE	_		Peal	k Measurements
	2 foot	cable		TOOL C	aple		12		able		HPF	Re	eject Filte	RB	W=VBW=1MHz
			Vien	1872150	02	_	Vien 19	72090	05 🖕	Í HF	F_7.6GHz	▼ R	001	Avera	ge Measurements
						•								RBW=	1MHz; VBW=10Hz
f	Dist	Read Plr	Read Avo	ΔF	CI	Δmn	D Corr	Filtr	Peak	Δνσ	Pl: Lim	Δvσ I im	Pk Mar	Δvσ Mar	Notes
GHz	(m)	dBuV	dBuV	dB/m	dB	dB	dB	dB	dBuV/m	dBuV/m	dBuV/m	dBuV/m	dB	dB	(V/H)
Low Ch,	5745MHz	Average =1'	7.4dBm												(
1.490	3.0	49.7	37.5	38.3	4.8	-33.1	0.0	0.7	60.4	48.2	74	54	-13.6	- 5.8	<u>v</u>
1.490	3.0	44.9	32.4	38.3	4.8	-33.1	0.0	0.7	55.6	43.1	74	54	-18.4	-10.9	Н
vlid Ch,	5785MHz	Average=17	.3dBm							•					
1.570	3.0	47.3	35.9	38.3	4.8	-33.0	0.0	0.7	58.1	46.7	74	54	-159	-73	<u>v</u>
1.570	3.0	43.6	31.8	38.3	4.8	-33.0	0.0	0.7	54.4	42.6	74	54	-19.6	-11.4	Н
High Ch	, 5825MH	z_Average=1	7.AdBm							•					
11.650	3.0	48.3	36.5	38.4	4.8	-32.9	0.0	0.7	59.3	47.5	74	54	-14.7	-6.5	V
11.050	3.0	44.8	32.3	38.4	4.8	-329	UU	0.7	55.8	43.3	74	54	-18.2	-10.7	H
	Note: N	o other emiss	ions were dete	cted abov	e the sy	stem noi:	se floor.								
							Preamn (Tain				Avo Tim	Average I	Field Strengt	h Timit
	f	Measureme	ent Frequence	7		Amn	T T COMING V	Juni				11.6 1700		. ICIG D'A CILER	11 12/11/10
	f Dist	Measureme Distance to	ent Frequency Antenna	à		Amp D Corr	Distance	Corre	ct to 3 metr	ers		Pk Lim	Peak Field	d Strength L	imit
	f Dist Read	Measureme Distance to Analyzer R	ent Frequency Antenna eading	у		Amp D Corr Avg	Distance Average	Corre Field :	ct to 3 met: Strength @.	ers 3 m		Pk Lim Avg Mar	Peak Fiel Margin vs	d Strength L . Average L	imit imit
	f Dist Read AF	Measureme Distance to Analyzer R Antenna Fa	ent Frequency Antenna eading actor	У		Amp D Corr Avg Peak	Distance Average Calculate	Corre Field : d Peal	ct to 3 meta Strength @ k Field Stre	ers 3 m ength		Pk Lim Avg Mar Pk Mar	Peak Fiel Margin vs Margin vs	d Strength L . Average L . Peak Limit	imit imit :

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6.2.4. WORST-CASE RADIATED EMISSIONS BELOW 1 GHz

SPURIOUS EMISSIONS 30 TO 1000 MHz (WORST-CASE CONFIGURATION, HORIZONTAL B&G mode)



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HORIZ	ZONTAL DA	ATA						
		Read		T	Limit	Over	Demolo	
	Freq	Tevel	Factor	Level	Line	Limit	Remark	
-	MHz	dBuV	dB	$\overline{\mathrm{dBuV}/\mathrm{m}}$	$\overline{\mathrm{dBuV}/\mathrm{m}}$	dB		
1	124.090	50.72	-12.59	38.13	43.50	-5.37	Peak	
2	145.430	50.19	-13.23	36.97	43.50	-6.54	Peak	
3	203.630	52.45	-13.63	38.82	43.50	-4.68	Peak	
4	240.490	52.26	-14.06	38.20	46.00	-7.80	Peak	
5	264.740	51.34	-13.21	38.14	46.00	-7.86	Peak	
6	295.780	53.08	-12.05	41.03	46.00	-4.97	Peak	
7	904.940	38.20	-0.95	37.25	46.00	-8.75	Peak	

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SPURIOUS EMISSIONS 30 TO 1000 MHz (WORST-CASE CONFIGURATION, VERTICAL B&G mode)



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VERT	ICAL DATA							_
		Read			Limit	Over		-
	Freq	Level	Factor	Level	Line	Limit	Remark	
	MHz	dBuV	dB	\overline{dBuV}/m	$\overline{\mathtt{dBu} \mathbb{V}/\mathtt{m}}$	dB		
1	31.940	46.48	-8.01	38.47	40.00	-1.53	Peak	
2	167.740	51.31	-14.20	37.11	43.50	-6.39	Peak	
3	230.790	51.34	-14.56	36.78	46.00	-9.22	Peak	
4	295.780	49.86	-12.05	37.81	46.00	-8.19	Peak	
5	475.230	44.95	-7.78	37.17	46.00	-8.83	Peak	
6	837.040	39.07	-1.53	37.54	46.00	-8.46	Peak	
7	904.940	39.08	-0.95	38.13	46.00	-7.87	Peak	

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



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ORIZ	CONTAL DA	TA						
	_	Read			Limit	Over		
	Freq	Level	Factor	Level	Line	Limit	Remark	
			dB	dBuV/m	dBuV/m	dB		
	11112	abav	чD	abav/m	aba v/ iii	чъ		
1	125.060	48.92	-12.55	36.38	43.50	-7.13	Peak	
2	207.510	52.55	-14.11	38.44	43.50	-5.06	Peak	
3	264.740	50.52	-13.21	37.32	46.00	-8.68	Peak	
4	295.780	52.75	-12.05	40.70	46.00	-5.30	Peak	
5	669.230	38.19	-3.80	34.39	46.00	-11.61	Peak	
6	790.480	36.65	-1.95	34.70	46.00	-11.30	Peak	
7	838.980	37.07	-1.53	35.54	46.00	-10.46	Peak	
8	904.940	38.08	-0.95	37.13	46.00	-8.87	Peak	

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



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VERTIC	CAL DATA	Deed			T A A	0		
	Freq	Read Level	Factor	Level	Limit	Over Limit	Remark	
	MHz	dBuV	dB	dBuV/m	dBuV/m	dB		
1 2	38.730 167.740	50.23 52.08	-11.81 -14.20	38.42 37.88	40.00 43.50	-1.58 -5.62	Peak Peak	
3 4 5	226.910 295.780 681.840	50.86 50.14 39.72	-14.71 -12.05 -3.45	36.15	46.00 46.00 46.00	-9.85	Peak Peak Peak	
6 7	837.040 904.940	38.42 38.41	-1.53	36.89	46.00	-9.11 -8.54	Peak Peak	

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6.2.5. WORST-CASE RADIATED EMISSIONS BELOW 1 GHz

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



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HORIZON	FAL DATA									_
	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark	Pa	age:	1
-	MHz	dBuV	dB	dBuV/m	dBuV/m	db				
1 2 3	125.060 207.510 264.740	48.92 52.55 50.52	-12.55 -14.11 -13.21	36.38 38.44 37.32	43.50 43.50 46.00	-7.13 -5.06 -8.68	Peak Peak Peak			
4 5 6	295.780 669.230 790.480	52.75 38.19 36.65	-12.05 -3.80 -1.95	40.70 34.39 34.70	46.00 46.00 46.00	-5.30 -11.61 -11.30	Peak Peak Peak			
7	838.980 904.940	37.07 38.08	-1.53 -0.95	35.54 37.13	46.00 46.00	-10.46 -8.87	Peak Peak			

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



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VERTICA	L DATA					
		Read		Limit	Over	Page: 1
	Freq	Level Factor	Level	Line	Limit Remark	
	MHz	dBuV dB	dBuV/m	dBuV/m	dB	
1	38.730	50.23 -11.81	38.42	40.00	-1.58 Peak	
2	167.740	52.08 -14.20	37.88	43.50	-5.62 Peak	
	226.910	50.86 -14.71	30.15	46.00	-9.85 Peak -7.91 Peak	
5	681.840	39.72 -3.45	36.27	46.00	-9.73 Peak	
6	837.040	38.42 -1.53	36.89	46.00	-9.11 Peak	
7	904.940	38.41 -0.95	37.46	46.00	-8.54 Peak	

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