



FCC CFR47 PART 15 SUBPART B

**TEST REPORT
FOR**

802.11ag/Draft 802.11n WLAN PCI-E Mini Card

MODEL NUMBER: BCM94322USA

REPORT NUMBER: 08U11756-3

ISSUE DATE: JULY 8, 2008

Prepared for

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Prepared by

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NVLAP LAB CODE 200065-0

Revision History

<u>Rev.</u>	<u>Issue Date</u>	<u>Revisions</u>	<u>Revised By</u>
--	July 8, 2008	Initial Issue	Sunny Shih

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: BROADCOM CORPORATION
190 MATHILDA PLACE
SUNNYVALE, CA 94086, USA

EUT DESCRIPTION: 802.11ag / Draft 802n WLAN PCI-E MINI CARD

MODEL: BCM94322USA

SERIAL NUMBER: 39670851A0036

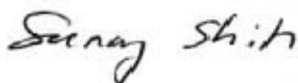
DATE TESTED: MAY 20 to JUNE 17, 2008

APPLICABLE STANDARDS	
STANDARD	TEST RESULTS
FCC PART 15 SUBPART B	Pass

Compliance Certification Services, Inc. (CCS) tested the above equipment in accordance with the requirements set forth in the above standards. All indications of Pass/Fail in this report are opinions expressed by CCS based on interpretations and/or observations of test results. 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 CCS and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by CCS 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:



SUNNY SHIH
EMC SUPERVISOR
COMPLIANCE CERTIFICATION SERVICES

Tested By:



VIEN TRAN
EMC ENGINEER
COMPLIANCE CERTIFICATION SERVICES

2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.4-2003.

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 <http://www.ccsemc.com>.

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%.

5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

The EUT is an 802.11ag/Draft 802.11n Wireless LAN Transceiver module and manufactured by Broadcom. Model number is BCM94322USA.

5.2. PRELIMINARY TEST CONFIGURATIONS

The following configuration was investigated during testing:

EUT Configuration	Description
Typical Configuration	EUT connected to laptop via extended board with minimum configuration such as printer, modem, keyboard, USB mouse.

5.3. MODE(S) OF OPERATION

Mode	Description
EMCTest & TX	All I/O ports activate with H' patterns scrolling on the screen display with TX on.

5.4. SOFTWARE AND FIRMWARE

The test software used during the tests was EMCTest and epi_tcp program.

5.5. MODIFICATIONS

No modifications were made during testing.

5.6. DETAILS OF TESTED SYSTEM

SUPPORT EQUIPMENT & PERIPHERALS

PERIPHERAL SUPPORT EQUIPMENT LIST				
Description	Manufacturer	Model	Serial Number	FCC ID
Modem	Hayes	4714US	A02247143261	BFJUSA-31719-M5-E
Printer	Microline 186	D22300A	AC5C018494A0	DoC
Monitor	LG	Microline 186	512MXAY0A752	DoC
Keyboard	Microsoft	KC-0405	7.6198E+12	DoC
Mouse	Dell	0YH958	HC6450C2BP9	DoC
Desktop	Dell	DCNE	FR17YD1	DoC

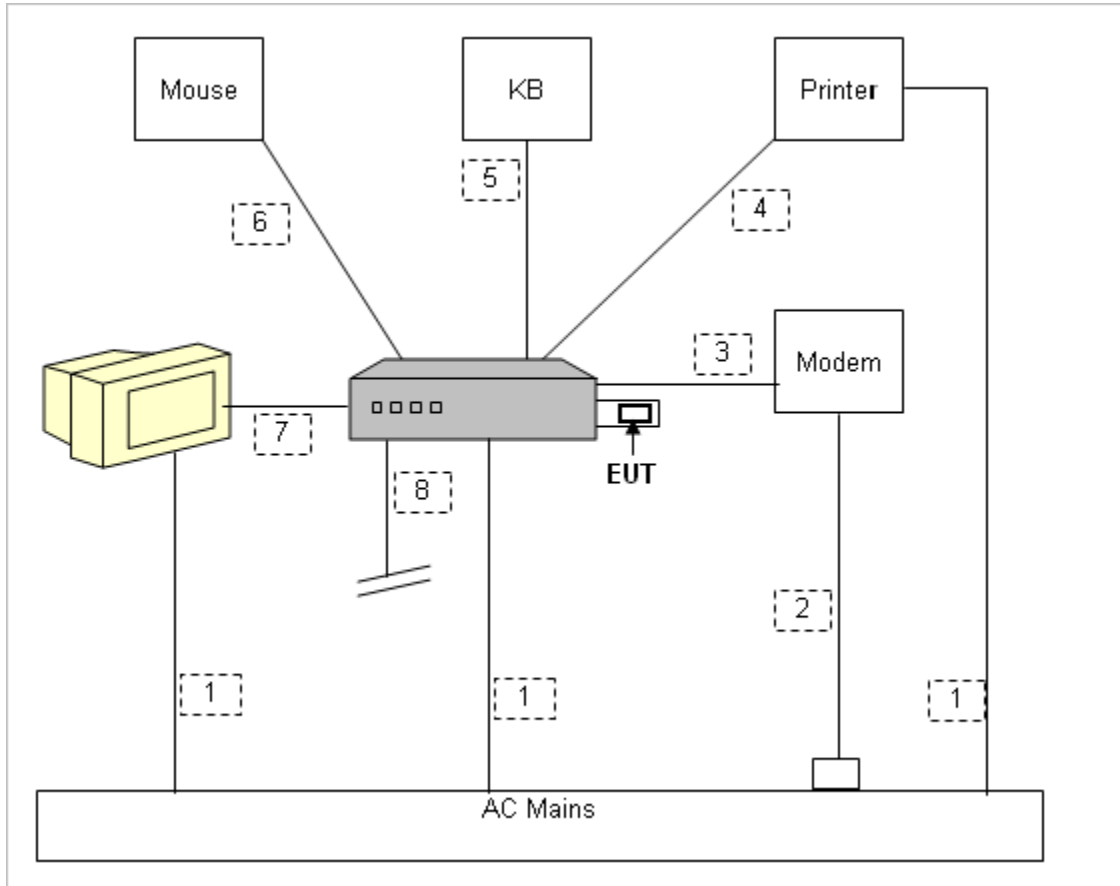
I/O CABLES

I/O CABLE LIST						
Cable No.	Port	# of Identical Ports	Connector Type	Cable Type	Cable Length	Remarks
1	AC	3	US 115V	Un-shielded	2m	No
2	DC	1	DC Plug	Un-shielded	1.5m	No
3	RS-232	1	DB9	Un-shielded	.8m	Yes
4	USB Printer	1	USB	Shielded	1m	Yes
5	USB Keyboard	1	USB	Shielded	1m	No
6	USB Mouse	1	USB	Shielded	1m	No
7	Video	1	DB15	Shielded	1m	No
8	RJ45	1	Ethernet	Un-shielded	1m	No

TEST SETUP

The EUT connected to desktop via extended board with a typical configuration. Test software exercised the radio card and activated all I/O ports.

TEST SETUP DIAGRAM



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
EMI Receiver, 2.9 GHz	Agilent / HP	8542E	C00957	2/6/2008	6/12/2009
RF Filter Section, 2.9 GHz	Agilent / HP	85420E	C00958	2/6/2008	6/12/2009
30MHz-2GHz Antenna	Sunol Sciences	JB1	C01011	9/28/2007	9/28/2008
Preamplifier, 1300 MHz	Agilent / HP	8447D	C00885	5/9/2008	5/9/2009
LISN, 30 MHz	FCC	LISN-50/250-25-2	N02625	10/25/2007	10/25/2008
LISN, 10 kHz ~ 30 MHz	Solar	8012-50-R-24-BNC	N02481	10/25/2007	10/25/2008
EMI Test Receiver, 30 MHz	R & S	ESHS 20	N02396	10/16/2007	1/27/2009

7. APPLICABLE LIMITS AND TEST RESULTS

7.1. RADIATED EMISSIONS

TEST PROCEDURE

ANSI C63.4

The highest clock frequency generated or used in the EUT is 20 MHz; therefore the frequency range was investigated from 30 MHz to 1 GHz.

LIMIT

§15.109 (a) except for Class A digital devices, the field strength of radiated emissions from unintentional radiators at a distance of 3 meters shall not exceed the following values:

Limits for radiated disturbance of Class B ITE at measuring distance of 3 m	
Frequency range (MHz)	Quasi-peak limits (dB μ V/m)
30 to 88	40
88 to 216	43.5
216 to 960	46
Above 960 MHz	54

Note: The lower limit shall apply at the transition frequency.

RESULTS

No non-compliance noted:

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

HORIZONTAL DATA



Compliance Certification Services
47173 Benicia Street
Fremont, CA 94538
Tel: (510) 771-1000
Fax: (510) 661-0888

Data#: 15 File#: 08u11756.emi Date: 06-16-2008 Time: 14:06:16

Condition: FCC CLASS-B HORIZONTAL
Test Operator:: Vien Tran
Project #: : 08U11756
Company: : Broadcom
Configuration:: BUT with minimum peripherals
Mode : : Digital EMC Test software
Target: : FCC Part 15B

Page: 1

	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dBuV/m	dBuV/m	dB	
1	294.810	52.17	-12.53	39.64	46.00	-6.36	Peak
2	336.520	50.00	-11.43	38.57	46.00	-7.43	Peak
3	500.450	44.00	-7.30	36.70	46.00	-9.30	Peak
4	589.690	43.33	-5.21	38.12	46.00	-7.88	Peak
5	796.300	42.00	-2.50	39.50	46.00	-6.50	Peak
6	995.150	42.67	-0.26	42.41	54.00	-11.59	Peak

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

VERTICAL DATA



Compliance Certification Services
47173 Benicia Street
Fremont, CA 94538
Tel: (510) 771-1000
Fax: (510) 661-0888

Data#: 18 File#: 08u11756.emi Date: 06-16-2008 Time: 14:11:31

Condition: FCC CLASS-B VERTICAL
Test Operator:: Vien Tran
Project #: : 08U11756
Company: : Broadcom
Configuration:: EUT with minimum peripherals
Mode : : Digital EMC Test software
Target: : FCC Part 15B

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	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dBuV/m	dBuV/m	dB	
1	110.510	52.67	-15.06	37.61	43.50	-5.89	Peak
2	253.100	52.33	-14.17	38.16	46.00	-7.84	Peak
3	442.250	45.33	-8.85	36.49	46.00	-9.51	Peak
4	699.300	41.33	-3.75	37.58	46.00	-8.42	Peak
5	995.150	44.50	-0.26	44.24	54.00	-9.76	Peak

7.2. AC MAINS LINE CONDUCTED EMISSIONS

TEST PROCEDURE

ANSI C63.4

LIMIT

§15.107 (a) Except for Class A digital devices, for equipment that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table, as measured using a 50 μ H/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the band edges.

Frequency range (MHz)	Limits (dB μ V)	
	Quasi-peak	Average
0.15 to 0.50	66 to 56	56 to 46
0.50 to 5	56	46
5 to 30	60	50

Notes:

1. The lower limit shall apply at the transition frequencies
2. The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz.

RESULTS

6 WORST EMISSIONS

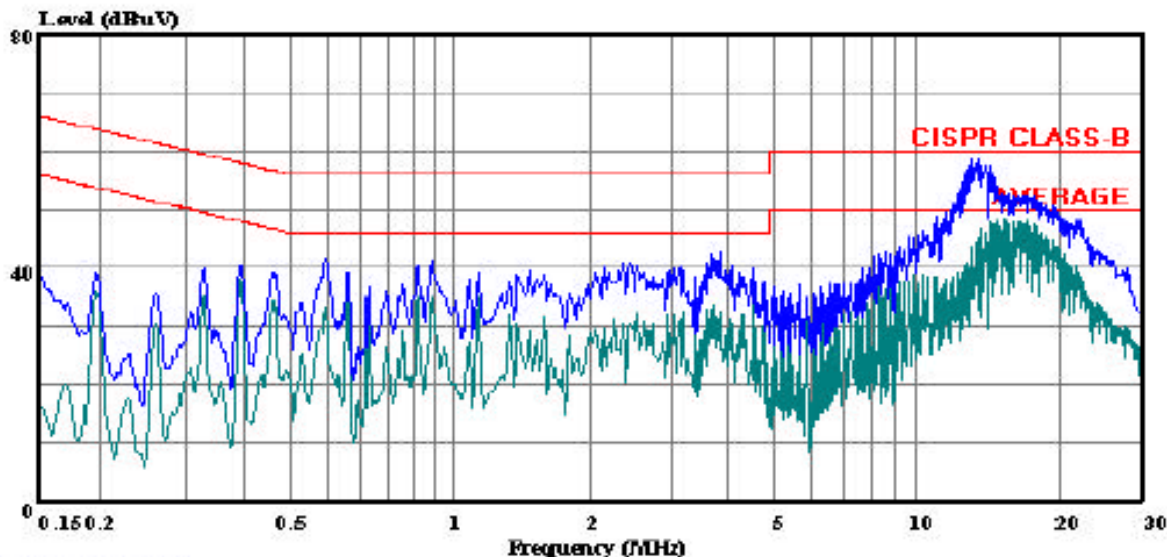
CONDUCTED EMISSIONS DATA (115VAC 60Hz)									
Freq.	Reading			Class	Limit	FCC B	Margin		Remark
(MHz)	PK (dBuV)	QP (dBuV)	AV (dBuV)	(dB)	QP	AV	QP (dB)	AV (dB)	L1 / L2
0.40	40.51	--	32.32	0.00	57.94	47.94	-17.43	-15.62	L1
3.94	42.51	--	32.50	0.00	56.00	46.00	-13.49	-13.50	L1
13.48	58.48	--	42.80	0.00	60.00	50.00	-1.52	-7.20	L1
0.40	38.49	--	35.90	0.00	57.94	47.94	-19.45	-12.04	L2
3.94	41.55	--	31.14	0.00	56.00	46.00	-14.45	-14.86	L2
13.48	57.48	--	45.11	0.00	60.00	50.00	-2.52	-4.89	L2
6 Worst Data									

LINE 1 RESULTS



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Data#: 28 File#: LC 08U11756.EMI Date: 06-17-2008 Time: 09:35:30



(Line Conduction)

Trace: 26

Ref Trace:

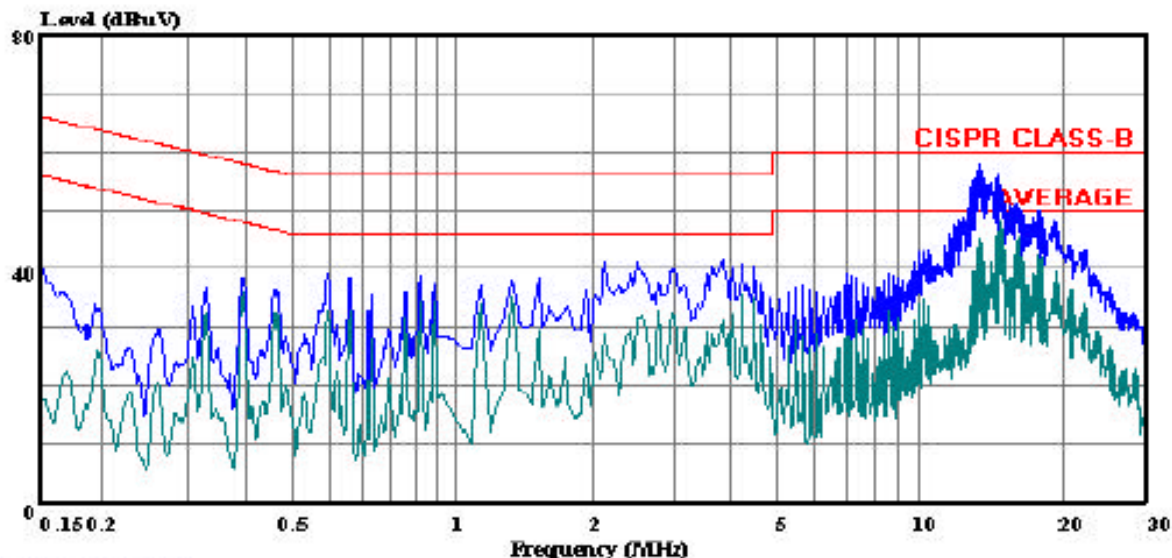
Condition: CISPR CLASS-B
Test Operator:: Vien Tran
Project #: : 08U11756
Company: : Broadcom
Configuration:: EUT with minimum peripherals
Mode: : Digital EMC test software
Target: : FCC Class B_part 15B
Voltage: : 115VAC / 60HZ
: L1: Peak (Blue); Avg (Green)

LINE 2 RESULTS



Compliance Certification Services
47173 Benicia Street
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Tel: (510) 771-1000
Fax: (510) 661-0888

Data#: 35 File#: LC 08U11756.EMI Date: 06-17-2008 Time: 09:54:11



(Line Conduction)

Trace: 33

Ref Trace:

Condition: CISPR CLASS-B
Test Operator:: Vien Tran
Project #: : 08U11756
Company: : Broadcom
Configuration:: BUT with minimum peripherals
Mode: : Digital EMC test software
Target: : FCC Class B_part 15B
Voltage: : 115VAC / 60Hz
: L2: Peak (Blue) ; Avg (Green)