

FCC CFR47 PART 15 SUBPART C CLASS II PERMISSIVE CHANGE INDUSTRY CANADA RSS-210 ISSUE 7 CERTIFICATION TEST REPORT

FOR

Broadcom 802.11g WLAN PCI-E Mini Card (Dell Pacino PP31L with BCM94312MHG Inside) MODEL NUMBER: BCM94312HMG FCC ID: QDS-BRCM1030 IC: 4324A-BRCM1030

REPORT NUMBER: 08U11716-1A

ISSUE DATE: May 8, 2008

Prepared for BROADCOM CORPORATION 190 MATHILDA PLACE SUNNYVALE, CA 94086, U.S.A.

Prepared by

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(R)

NVLAP LAB CODE 200065-0

Revision History

Rev.	lssue Date	Revisions	Revised By
	4-17-08	Initial Issue	Sunny Shih
A	5-8-08	 Updated sec. 5.2 Description of class II permissive change. 	Sunny Shih
		2. Added Co-located MPE calculations	

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME:	BROADCOM CORPORATION
	190 MATHILDA PLACE
	SUNNYVALE, CA 94086, USA
EUT DESCRIPTION:	Broadcom 802.11g WLAN PCI-E Mini Card
	(Dell Pacino PP31L with BCM94312HMG inside)
MODEL:	BCM94312HMG
SERIAL NUMBER:	COP7C00031
DATE TESTED:	APRIL 8 - 14, 2008

APPLICABLE STANDARDS						
STANDARD	TEST RESULTS					
CFR 47 Part 15 Subpart C and Subpart E	Pass					
RSS-210 Issue 7 Annex 8 and RSS-GEN Issue 2	Pass					

Compliance Certification Services, Inc. (CCS) tested the above equipment in accordance with the requirements set forth in the above standards. All expressions of Pass/Fail in this report are opinions expressed by CCS based on interpretations of the 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:

Sunay Shih

SUNNY SHIH EMC SUPERVISOR COMPLIANCE CERTIFICATION SERVICES

Tested By:

Chang

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, 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 a Broadcom 802.11g WLAN PCI-E Mini Card installed inside Dell Pacino

The radio module is manufactured by Broadcom.

5.2. DESCRIPTION OF CLASS II PERMISSIVE CHANGE

The major changes filed under this application are:

- Adding portable platform, model Dell PP31L.
- Add co-location of UWB+BT module FCC ID: QDS-BRCM1035

Only the Radiated Emission and AC mains line conduction tests are performed.

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio ut	he radio utilizes IFA antennas, with the following maximum gain									
Antenna tested	Manufacture	Model	f (MHz)	Main (dBi), Tx 1	MIMO (dBi), Tx 3 (Used as Aux)					
	Advance- Connectek, Inc (ACON)	AMP8P-700047	2412 - 2462	0.36	-0.54					
\boxtimes	Amphenol	QT0932-11-001- R (Tx1-2) & QT0932-11-004-	2412 - 2462	1.98	3.06					

Tł

SOFTWARE AND FIRMWARE 5.4.

The EUT driver software installed during testing was Broadcom, rev. 4.170.75.0.

R (Tx3)

The test utility software used during testing was wl_tool

5.5. WORST-CASE CONFIGURATION AND MODE

The worst-case data rate for each mode is determined to be as follows, based on original test report 07U11426.

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5.6. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

PERIPHERAL SUPPORT EQUIPMENT LIST										
Description Manufacturer Model Serial Number FCC ID										
Laptop	DELL	PACINO	COP7C00031	N/A						
AC Adapter	DELL	LA90PS0-00	CN-0DF266-	N/A						

I/O CABLES

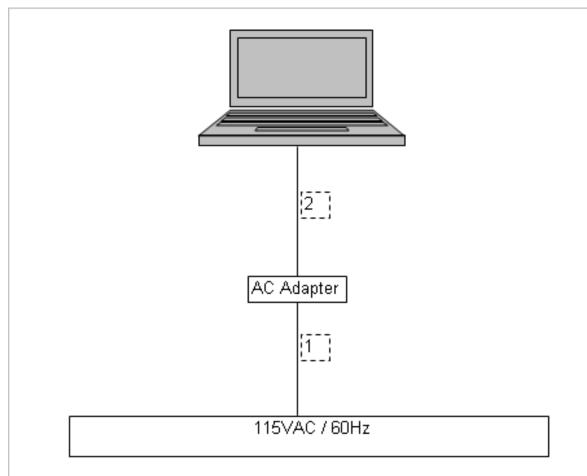
	I/O CABLE LIST										
Cable No.	Port	# of Identica Ports	Connector Type	Cable Type	Cable Length						
1	AC	1	US115V	Unshielded	2.0m	N/A					
2	DC	1	DC	Unshielded	2.0m	N/A					

TEST SETUP

The EUT is installed in a host laptop computer 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			
Antenna, Horn, 18 GHz	EMCO	3115	C00945	4/15/2007	4/15/2008			
Bilog Antenna	Sunol Sciences	JB1	C01016	10/13/2007	10/13/2008			
Preamplifier, 26.5 GHz	Agilent / HP	8449B	C00749	8/3/2007	9/27/2008			
Preamplifier, 1300 MHz	Agilent / HP	8447D	C01064	5/9/2007	5/9/2008			
RF Filter Section, 2.9 GHz	Agilent / HP	85420E	C00958	2/6/2007	6/12/2008			
Peak Power Meter	Agilent / HP	E4416A	C00963	2/14/2007	12/2/2008			
Peak / Average Power Sensor	Agilent	E9327A	C00964	2/14/2007	12/2/2008			
EMI Test Receiver, 30 MHz	R&S	ESHS 20	N02396	10/16/2007	1/27/2009			
LISN, 10 kHz ~ 30 MHz	Solar	8012-50-R-24-BNC	N02481	9/15/2006	9/15/2008			
LISN, 30 MHz	FCC	LISN-50/250-25-2	N02625	9/15/2006	9/15/2008			
Spectrum Analyzer, 44 GHz	Agilent / HP	E4446A	C01012	5/2/2006	8/7/2008			

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7. RADIATED TEST RESULTS

7.1. LIMITS AND PROCEDURE

<u>LIMITS</u>

FCC §15.205 and §15.209

IC RSS-210 Clause 2.6 (Transmitter)

IC RSS-GEN Clause 6 (Receiver)

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

TEST PROCEDURE

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

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

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

The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in the 2.4 GHz band.

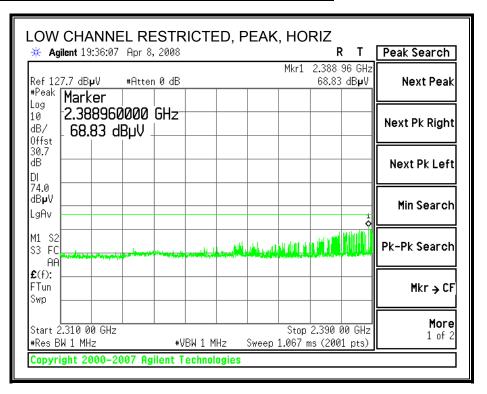
The frequency range of interest is monitored at a fixed antenna height and EUT azimuth. The EUT is rotated through 360 degrees to maximize emissions received. The antenna is scanned from 1 to 4 meters above the ground plane to further maximize the emission. Measurements are made with the antenna polarized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

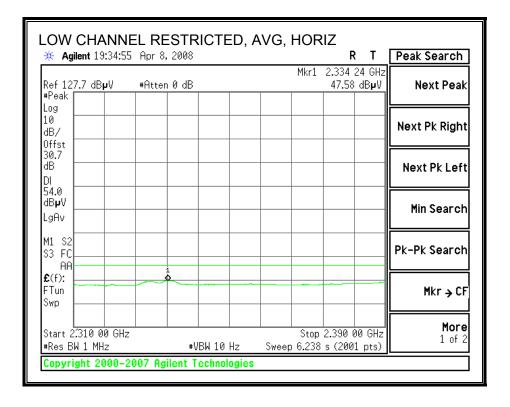
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7.2. TRANSMITTER ABOVE 1 GHz

7.2.1. 802.11b MODE

RESTRICTED BANDEDGE (LOW CHANNEL 1, HORIZONTAL)



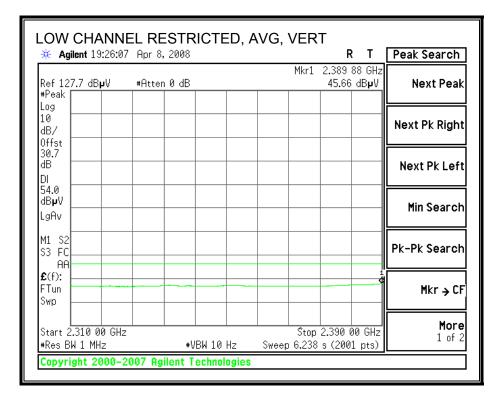


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REPORT NO: 08U11716-1A FCC ID: QDS-BRCM1030

RESTRICTED BANDEDGE (LOW CHANNEL 1, VERTICAL)

🔆 Ag	ilent 19:25:4	2 Apr 8	, 2008				R	T	Peak Search
	7.7 dBµV	#Atte	n 0 dB			Mkr1	2.389 84 66.48 d		Next Peak
0.0	Marker 2.38984 66.48		GHz-						Next Pk Right
30.7 dB DI									Next Pk Left
74.0 dB µ V _gAv									Min Search
M1 S2 S3 FC AA	are and the special attraction	***	4. 10-1-18-48-1-18-1-18-1-18-1-18-1-18-1-18	tali ali stillitikali pratij	and and a second				Pk-Pk Search
€(f): FTun Swp									Mkr → CF
	2.310 00 GH W 1 MHz	z		BW 1 MHz	Swee	Stop 9 1.067 m	2.390 00 ns (2001		More 1 of 2

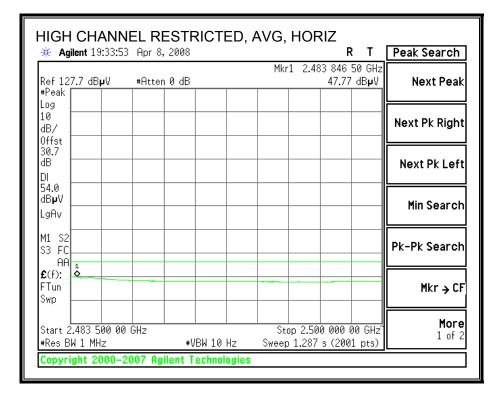


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REPORT NO: 08U11716-1A FCC ID: QDS-BRCM1030

RESTRICTED BANDEDGE (HIGH CHANNEL 11, HORIZONTAL)

HIGH CHANNI # Agilent 19:33:38			RICTE	D, PEA	K, HC	ORIZ R	т	Peak Search
Ref 127.7 dB µ V #Peak Marker	#Attei	n 0 dB		M	lkr1 2.4	83 673 2 62.44		Next Peak
Log 10 2.483673 dB/ 62.44 d		GHz						Next Pk Right
30.7 dB DI								Next Pk Left
74.0 dB µ V LgAv								Min Search
M1 S2 S3 FC	the start		Net i spratt skillige	entre fritadent			the case of the second	Pk-Pk Search
£(f): FTun Swp								Mkr → CF
Start 2.483 500 00 # #Res BW 1 MHz	GHz	<u>+</u>	BW 1 MHz) Stop 2.50 p 1.067 (More 1 of 2
Copyright 2000-20	007 Ag	ilent T	echnolog	ies				

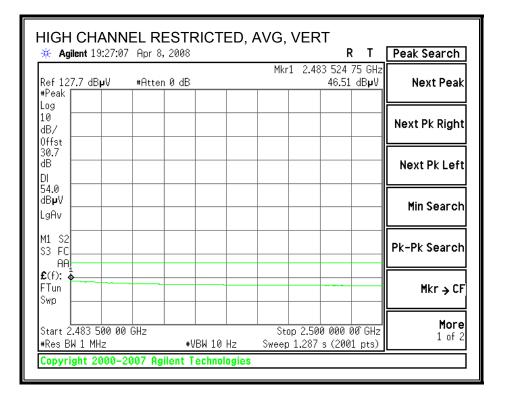


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REPORT NO: 08U11716-1A FCC ID: QDS-BRCM1030

RESTRICTED BANDEDGE (HIGH CHANNEL 11, VERTICAL)

HIGH	CHA ilent 19:2				RICTE	ED, F	PEAK	K, VE	RT R	т	Peak Search
Ref 123 #Peak	7.7 dBµ\ Marke	/ >=	#Attei	n 0 dB			Mkr	1 2.48	34 415 58.60	75 GHz dB µ V	Next Peak
10	2.484 58.6	1415		GHz							Next Pk Right
30.7 dB DI											Next Pk Left
74.0 dB µ V LgAv											Min Search
M1 S2 S3 FC AA		*****		an the state of the state	ungene feitere in er	er,-erethia	al white is the date	and a later birty in a	4.4.		Pk-Pk Search
£(f): FTun Swp											Mkr→CF
	.483 500 W 1 MHz		GHz	 #V	BW 1 MH	łz			0 000 0 ns (200)		More 1 of 2
Copyri	ght 200	00-20	107 Ag	ilent T	echnolo	gies					



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High Frequency Measurement Compliance Certification Services, Fremont 5m Chamber

Company: Broadcom Project #: 08U11716 Date: 04/11/08 Test Engineeer: Devin Chang Configuration: pacino Amphenol antenna Mode: Tx 11b

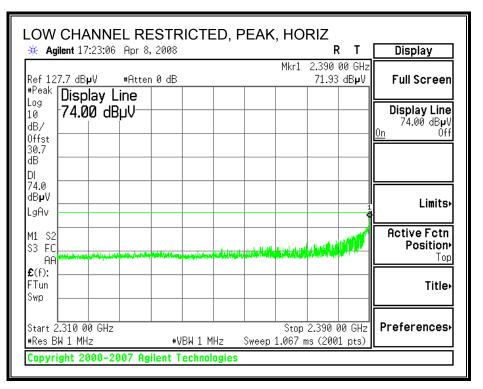
Test Equipment:

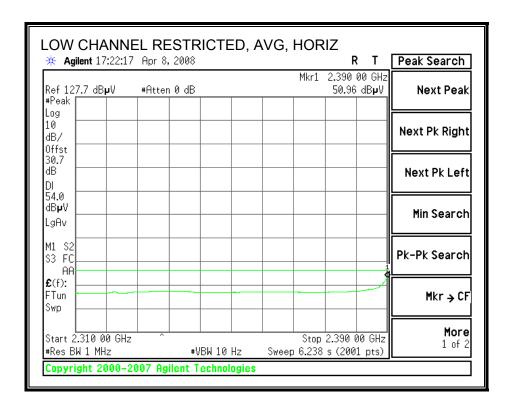
н	orn 1-	18GH7	Pre-a	mplifer	1-260	3Hz	Pre-am	nlifer	26-40GH	7	н	orn > 18	GHz		Limit
				<u> </u>			r ro um	pinor	20 40011						
T60; 9	S/N: 223	3 @3m	- T145	Agilent 3	008A0	056 -				-				-	FCC 15.209 -
- Hi Fred	quency Cal	oles —													
	2 foot	cable	;	3 foot c	able		12	foot c	able		HPF	Re	eject Filte		<u>x Measurements</u> W=VBW=1MHz
			-			•						T	ge Measurements 1MHz ; VBW=10Hz		
f	Dist	Read Pk	Read Avg.	AF	CL	Amp	D Corr	Fltr	Peak	Avg	Pk Lim	Avg Lim	Pk Mar	Avg Mar	Notes
GHz	(m)	dBuV	dBuV	dB/m	dB	dB	dB	dB	dBuV/m	dBuV/m	dBuV/m	dBuV/m	dB	dB	(V/H)
OW, 2	2412 MI	Hz													
216	3.0	51.8	46.7	30.9	0.0	-35.1	0.0	0.0	47.5	42.5	74	54	- 26.5	-11.5	V
824	3.0	46.0	36.2	33.0	0.0	-34.8	0.0	0.0	44.2	34.4	74	54	- 29.8	- 19.6	V
216	3.0	52.1		30.9	0.0	-35.1	0.0	0.0	47.8	-4.2	74	54	- 26.2	- 58.2	H
324	3.0	46.8	35.8	33.0	0.0	-34.8	0.0 0.0 44.9 34.0 74 54 -29.1						-20.0	Н	
IID, 2	437 MI	Iz													
249	3.0	51.9	46.2	31.0	0.0	-35.1	0.0	0.0	47.7	42.0	74	54	-26.3	-12.0	V
874	3.0	47.4	37.8	33.1	0.0	-34.9	0.0	0.0	45.6	36.0	74	54	-28.4	- 18.0	V
249	3.0	51.4	47.1	31.0	0.0	-35.1	0.0	0.0	47.3	43.0	74	54	- 26.7	-11.0	H
874	3.0	45.9	34.5	33.1	0.0	-34.9	0.0	0.0	44.1	32.7	74	54	-29.9	-21.3	Н
IGH.	2462 M	Hz													
283	3.0	48.8	40.1	31.0	0.0	-35.1	0.0	0.0	44.8	36.0	74	54	-29.2	-18.0	v
924	3.0	48.3	41.1	33.1	0.0	-34.9	0.0	0.0	46.5	39.3	74	54	-27.5	-14.7	V
283	3.0	50.5	43.6	31.0	0.0	-35.1	0.0	0.0	46.5	39.6	74	54	-27.5	-14.4	H
924	3.0	45.4	32.6	33.1	0.0	-34.9	0.0	0.0	43.6	30.8	74	54	-30.4	- 23.2	H
ev. 4.12.	.1	I	<u>.</u>			L	<u>.</u>	I	L	L	<u> </u>	<u>.</u>	<u>.</u>	<u> </u>	
	f	Measurem	ent Frequenc	y		Amp	Preamp (Gain				Avg Lim	Average I	Field Strengt	h Limit
		Distance to		-					ct to 3 mete	ers.		Pk Lim	-	d Strength Li	
		Analyzer R				Avg Average Field Strength @ 3 m Avg Mar Margin vs. Average Limit									
		-	-												
	AF	Antenna Fa				Peak Calculated Peak Field Strength Pk Mar Margin vs. Peak Limit									
	CL	Cable Loss				HPF	High Pas	s Filter							

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7.2.2. 802.11g MODE RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)

Channel 1, 2412MHz



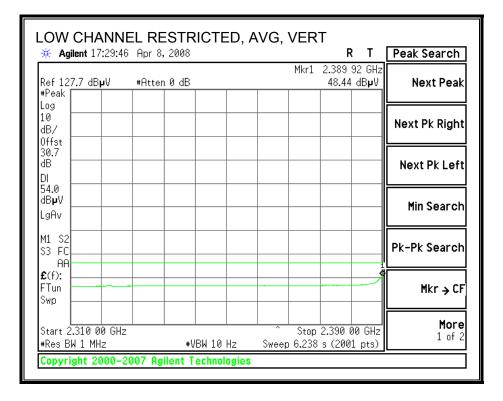


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REPORT NO: 08U11716-1A FCC ID: QDS-BRCM1030 RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)

Channel 1, 2412MHz

	CHANNE ant 17:29:20				_D, I		, •∟1	R	т	Peak Search
Ref 127. #Poak D	.7 dBµV	#Attei	n 0 dB			1	Mkr1	2.389 9 67.96	92 GHz dB µ V	Next Peak
10 4	Marker 2.389920 67.96 d		GHz-							Next Pk Right
30.7 dB - DI -										Next Pk Left
74.0 dB µ V LgAv -										Min Search
M1 S2 S3 FC AA	hinertertyl a standadad	doony it fings		ut-at-poles <mark>hi</mark> nt	ابديدا أقونان	Marta vilada		,		Pk-Pk Search
€ (f): _ FTun Swp _										Mkr → CF
L Start 2.3 #Res BW	310 00 GHz 1 MHz		 #V	BW 1 M	Hz	 Sweep		2.390 0 1s (2001		More 1 of 2

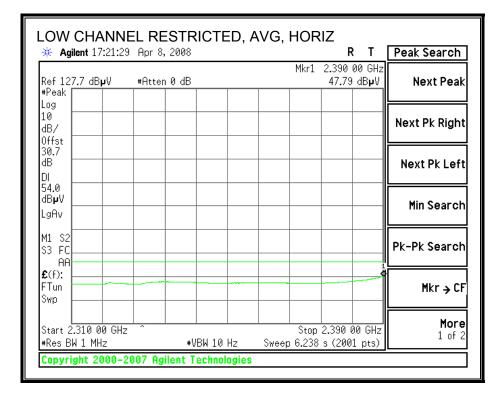


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REPORT NO: 08U11716-1A FCC ID: QDS-BRCM1030 RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)

Channel 2, 2417MHz

	CHANNE ilent 17:21:06			RICTE	ED, P	PEAK	, HO	RIZ R	т	Peak Search
Ref 12 #Peak	7.7 dBµV Marker	#Attei	n 0 dB				Mkr1	2.389 (69.04	04 GHz dB µ V	Next Peak
	12.389040 2.389040 69.04 d		GHz							Next Pk Right
30.7 dB DI										Next Pk Left
74.0 dB µ V LgAv									±	Min Search
M1 S2 S3 FC AA	1781, Aul 14 Surfa and a strategies of	and the state of the		anna lagairtí			nd in still	in heliydd	per per de la constante de la c	Pk-Pk Search
£ (f): FTun Swp										Mkr → CF
	.310 00 GHz W 1 MHz		 #V	 BW 1 M	 Hz	Sweep :		2.390 0 1s (2001		More 1 of 2
Copyri	ght 2000-20	007 Ag	ilent T	echnol	ogies					

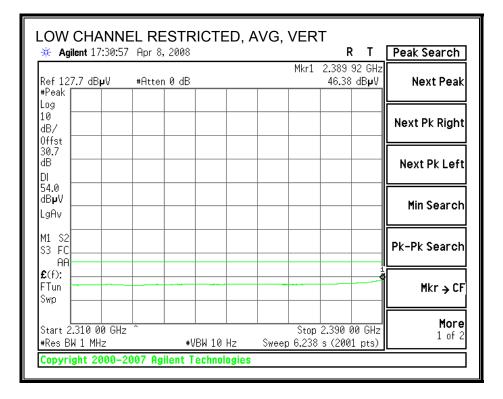


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REPORT NO: 08U11716-1A FCC ID: QDS-BRCM1030 RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)

Channel 2, 2417MHz

🤄 Agi	ilent 17:31:30	Apr 8	, 2008					R	<u> </u>	Peak Search
Ref 12	7.7 dBµV	#Atte	n 0 dB		1	1	Mkr1	2.389 66.31	48 GHz dB µ V	Next Peak
.og .0 IB/ Iffst	Marker 2.389480 66.31 d		GHz							Next Pk Right
30.7 IB)I										Next Pk Left
′4.0 IB µ V .gAv									1	Min Search
11 S2 53 FC AA	4.1. gajili di tingan jegi		6	altrian to a segu		er Lydensensker			IN JUN	Pk-Pk Search
C(f): Tun Swp										Mkr → CF
	.310 00 GHz W 1 MHz		<u> </u> #V	BW 1 M	 1Hz	Sweep		2.390 0 ns (200)		More 1 of 2

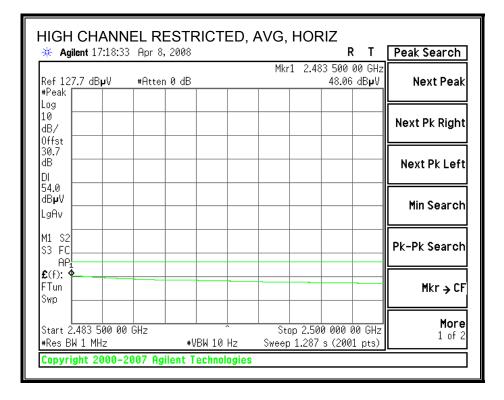


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REPORT NO: 08U11716-1A FCC ID: QDS-BRCM1030 RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)

Channel 10, 2457MHz

HIGH CHANN # Agilent 17:19:34		TED, PEAK, HC	DRIZ R T	Peak Search
Ref 127.7 dB µ V #Peak	#Atten 0 dB	Mkr1 2.4	83 937 25 GHz 67.95 dBµV	Next Peak
Log 10 dB/ 0ffst				Next Pk Right
30.7 dB DI				Next Pk Left
74.0 dBµV LgAv				Min Search
M1 S2 S3 FC AA	Addition of the section of the secti	the landers which and a land		Pk-Pk Search
£(f): FTun Swp				Mkr → CF
Start 2.483 500 00 #Res BW 1 MHz			00 000 00 GHz ms (2001 pts)	More 1 of 2
Copyright 2000-2	007 Agilent Techn	ologies		

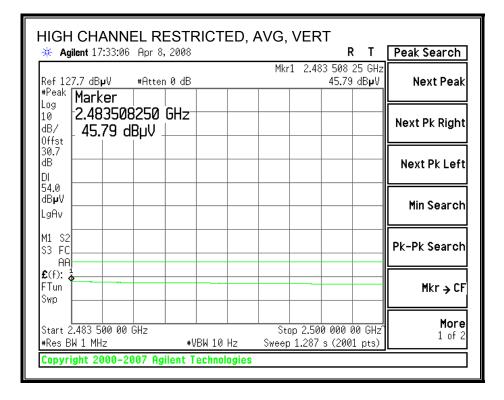


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REPORT NO: 08U11716-1A FCC ID: QDS-BRCM1030 RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)

Channel 10, 2457MHz

	CHANNI ilent 17:32:48			RICT	ED, I	PEAk	K, VE	RT R	т	Peak Search
Ref 12 #Peak	7.7 dBµV Marker	#Atter	n 0 dB		1	Mkr	1 2.48	33 706 2 62.66		Next Peak
	2.483706 62.66 dl		GHz-							Next Pk Right
30.7 dB DI										Next Pk Left
74.0 dB µ V LgAv										Min Search
M1 S2 S3 FC AA		11th Lawy 1	waran anta	Internet	A		1891/11311/84.0		eriteran pakanta	Pk-Pk Search
€(f): FTun Swp										Mkr → CF
	.483 500 00 I W 1 MHz	GHz	 #V	 BW 1 M	 IHz			0 000 0 1s (2001		More 1 of 2
Copyri	ght 2000-20	07 Ag	ilent T	echnol	ogies					

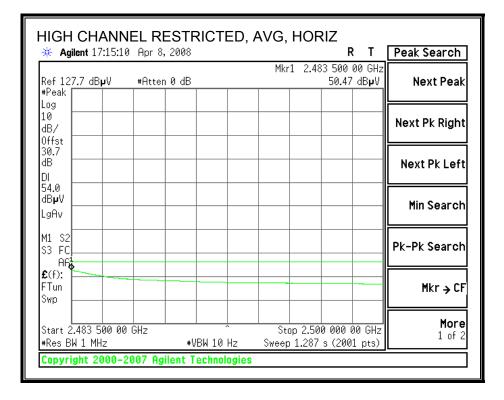


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REPORT NO: 08U11716-1A FCC ID: QDS-BRCM1030 RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)

Channel 11, 2462MHz

	CHANNI lent 17:11:14			RICT	ED, I	PEAk	K, HC	RIZ	т	Peak Search
Ref 127 #Peak F	7.7 dBµV Marker	#Atter	n 0 dB		1	Mkr	1 2.48	33 673 ; 70.76	25 GHz dB µ V	Next Peak
10	2.483673 70.76 d		GHz							Next Pk Right
30.7 dB DI										Next Pk Left
74.0 dB µ V LgAv	1									Min Search
M1 S2 S3 FC AA			*****	fainlight, is p		heresiliheten	ter balle	-414, . 164	terature datas	Pk-Pk Search
£ (f): FTun Swp										Mkr → CF
	 .483 500 00 ⊓ ⊌ 1 MHz	GHz	#V	 BW 1 M	 IHz			0 000 0 ns (200:		More 1 of 2
Copyri	ght 2000-20	007 Ag	ilent T	echnol	ogies					

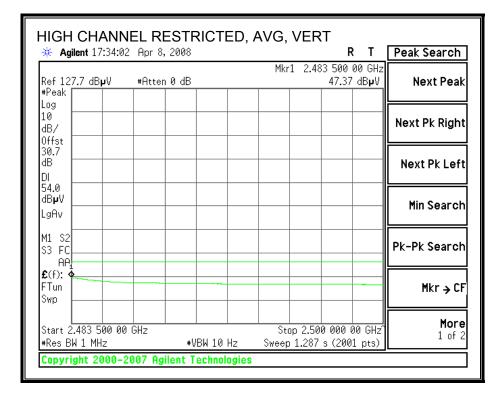


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REPORT NO: 08U11716-1A FCC ID: QDS-BRCM1030 RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)

Channel 11, 2462MHz

	I CHANN ilent 17:34:36			RICTE	ED, F	PEAK	, VE	RT R	т	Peak Search
Ref 123 #Peak	7.7 dBµV	#Atter	n 0 dB			Mkr	1 2.48	3 566 (65.59		Next Peak
10	Marker 2.483560 65.59 d		GHz-							Next Pk Right
30.7 dB DI										Next Pk Left
74.0 dB µ V LgAv	1									Min Search
M1 S2 S3 FC AA		and the state	an the second	الماجنة, وجارفية أ	a, kada data ya wak	Littleman	, de la détaire p	auto,k, to sav fr	25-16 -14	Pk-Pk Search
€(f): FTun Swp										Mkr → CF
	.483 500 00 W 1 MHz	 GHz	 #V	BW 1 M	Hz			0 000 0 1s (2001		More 1 of 2
Copyri	ght 2000-2	007 Ag	ilent T	echnolo	ogies					



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High Frequency Measurement

Compliance Certification Services, Fremont 5m Chamber Company: Broadcom Project #: 08U11716 Date: 04/11/08

Test Engineer: Devin Chang Configuration: pacino Amphenol antenna Mode: Tx 11g

Test Equipment:

CL

Cable Loss

	orn 1- S/N: 223	18GHz 8 @3m		n plifer Agilent 3			Pre-am	plifer	26-40GH	z	н	orn > 180	GHz	-	Limit FCC 15.209 -
- Hi Fred	quency Ca 2 foot		3	foot c	able	•	12 f C-5m C	foot c			HPF		ject Filte 001	RB Avera	<u>x Measurements</u> W=VBW=1MHz ge Measurements 1MHz ; VBW=10Hz
f	Dist	Read Pk	Read Avg.	AF	CL	Amp	D Corr	Fltr	Peak	Avg	Pk Lim	Avg Lim	Pk Mar	Avg Mar	Notes
GHz	(m)	dBuV	dBuV	dB/m	dB	dB	dB	dB	dBuV/m	dBuV/m	dBuV/m	dBuV/m	dB	dB	(V/H)
OW CH	. 2412 M	Hz													
216	3.0	50.6	43.7	30.9	0.0							54	- 27.6	-14.6	V
216	3.0	53.7	49.4	30.9	0.0	-35.1						54	- 24.6	- 8.9	H
D CII	2437 MF	-				•					•				
ш сп, 249	2457 MF 3.0	51.1	46.0	31.0	0.0	-35.1	0.0	0.0	46.9	41.9	74	54	-27.1	-12.1	v
49	3.0	53.1	48.2	31.0	0.0	-35.1	0.0	0.0	48.9	44.0	74	54	-25.1	-10.0	H
				•				•		•		•		•	
	462 MHz														
283 283	3.0 3.0	49.9 50.4	43.6 43.9	31.0 31.0	0.0	-35.1 -35.1	0.0 0.0	0.0 0.0	45.8 46.4	39.5 39.9	74 74	54 54	-28.2 -27.6	-14.5 -14.1	V H
00	3.0	50.4	43.5	31.0	0.0	-35.1	0.0	0.0	40.4	39.9	/4	24	-27.0	-14,1	n
v. 4.12.	7														
	f	Measureme	ent Frequency	y		Amp	Preamp (Gain				Avg Lim	Average I	ield Strengt	h Limit
	Dist	Distance to	Antenna			D Corr Distance Correct to 3 meters						Pk Lim	Peak Field	d Strength L	imit
	Read	Analyzer R	eading			Avg Average Field Strength @ 3 m						Avg Mar	Margin vs	. Average L	imit
	AF	Antenna Fa	ictor			Peak	Calculate	d Peal	c Field Stre	ength		Pk Mar	Margin vs	. Peak Limit	
	-									~			5		

HPF High Pass Filter

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7.3. RECEIVER ABOVE 1 GHz

7.3.1. Receiver above 1 GHz

Complia	_		Measurem Services, Fr		5m Ch	amber									
Compan Project : Date: Test En Configu: Mode: Test Eq	#: gineer: ration:		Broadcom 08U11716 4/11/2008 Devin Chang pacino Ampho Rx mode	enol ante:	nna										
H	orn 1-	18GHz	Pre-ar	mplifer	1-260	GHz	Pre-am	plifer	26-40GH	z	н	orn > 18	GHz		Limit
T60; S	5/N: 223	8 @3m		Agilent 3	008A0	056 🖵				-				-	RX RSS 210 🗸
	uency Cal		3	ð foot c	able	•	12 C-5m C	foot c			HPF	Re T	eject Filte	RB Avera	<u>x Measurements</u> W=VBW=1MHz <u>ge Measurements</u> 1MHz ; VBW=10Hz
f	Dist	1	Read Avg.		CL	Amp	D Corr		Peak	Avg				Avg Mar	Notes
GHz	(m)	dBuV	dBuV	dB/m	dB	dB	dB	dB	dBuV/m		:		dB	dB	(V/H)
498 560	3.0 3.0	63.0 56.3	57.8 37.1	26.7 27.1	0.0 0.0	-35.8 -35.7	0.0	0.0 0.0	53.9 47.8	48.7 28.5	74 74	54 54	-20.1 -26.2	-5.3 -25.5	<u>v</u>
994	3.0	50.5 54.0	41.4	30.5	0.0	-35.7	0.0	0.0	47.8	20.5 36.6	74 74	54 54	-20.2 -24.7	-23.5	v
100	3.0	53.7	48.6	25.7	0.0	-36.1	0.0	0.0	43.3	38.2	74	54	-30.7	-15.8	H
198	3.0	56.4	52.0	26.7	0.0	-35.8	0.0	0.0	47.3	42.9	74	54	- 26.7	-11.1	H
994	3.0	53.4	40.6	30.5	0.0	-35.2	0.0	0.0	48.6	35.8	74	54	-25.4	-18.2	H
ev. 4.12.	7					<u>.</u>	1								
	f		ent Frequency	у		Amp	Preamp (Avg Lim	-	ield Strengt	
		Distance to				D Corr			ct to 3 mete			Pk Lim		1 Strength Li	
	Read	Analyzer R				Avg	-		Strength @			Avg Mar		. Average Li	
	AF	Antenna Fa	actor			Peak	Calculate	d Peal	k Field Stre	ngth		Pk Mar	Margin vs	. Peak Limit	

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7.4. WORST-CASE BELOW 1 GHz

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

HORIZ Trace	ONTAL DATA	A					Ref	Trace:
Test Proje Compa Model Confi	ny: : 	Devin C 08U1161 Broadco BCM9431 Dell pa	Chang 17 om 12HMG acino M case mo	√ith Amr	phenol a	antenna		
		Read			Limit	Over		Page: 1
	Freq	Level H	factor	Level	Line	Limit	Remark	
	MHz	dBuV	dB	dBuV/m	dBuV/m	dB		
1 2 3 4 5 6 7	124.090 198.780 198.780 426.730 547.980 609.090 967.990	49.83 - 54.65 - 44.45 42.82 42.35	-13.63 -13.63 -9.21 -6.15 -5.28	36.20 41.02 35.24 36.67 37.07	43.50 43.50 46.00 46.00 46.00	-2.48 -10.76 -9.33 -8.93	QP Peak Peak Peak Peak	

COMPLIANCE CERTIFICATION SERVICESFORM NO: CCSUP4031B47173 BENICIA STREET, FREMONT, CA 94538, USATEL: (510) 771-1000FAX: (510) 661-0888This report shall not be reproduced except in full, without the written approval of CCS.

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

VERTICAL DATA Trace: 5					Ref	Trace:	
Condition: FCC CLASS-B VERTICAL Test Operator:: Devin Chang Project #: : 08U11617 Company: : Broadcom Model: : BCM94312HMG Configuration:: Dell pacino With Amphenol antenna Mode : : : worst case mode Target: : FCC Class B							
	Read		⊺.imi+	Over		Page: 1	
Freq	Level Factor	Level					
MHz	dBuV dB	dBuV/m	dBuV/m	dB			
2 167.740 3 198.780 4 * 198.780 5 549.920 6 669.230	49.88 -19.33 52.18 -14.50 52.33 -13.63 57.23 -13.63 38.93 -6.25 36.40 -4.36 35.62 -0.90	37.68 38.70 43.60 32.68 32.04	43.50 43.50 43.50 46.00 46.00	-4.80 0.10 -13.32 -13.96	Peak QP Peak Peak Peak		

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8. MAXIMUM PERMISSIBLE EXPOSURE

FCC RULES

§1.1310 The criteria listed in Table 1 shall be used to evaluate the environmental impact of human exposure to radio-frequency (RF) radiation as specified in §1.1307(b), except in the case of portable devices which shall be evaluated according to the provisions of §2.1093 of this chapter.

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm²)	Averaging time (minutes)	
(A) Lin	its for Occupational	/Controlled Exposu	res		
0.3–3.0 3.0–30 30–300 300–1500 1500–100,000	614 1842/f 61.4	1.63 4.89/f 0.163	*(100) *(900/f²) 1.0 f/300 5	6 6 6 6	
(B) Limits	for General Populati	on/Uncontrolled Exp	posure		
0.3–1.34 1.34–30	614 824/f	1.63 2.19/f	*(100) *(180/f²)	30 30	

TABLE 1-LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

TABLE 1-LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)-Continued

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm²)	Averaging time (minutes)	
30–300 300–1500	27.5	0.073	0.2 f/1500	30 30	
1500-100,000			1.0	30	

f = frequency in MHz
 * = Plane-wave equivalent power density NOTE 1 TO TABLE 1: Occupational/controlled limits apply in situations in which persons are exposed as a consequence of their employment provided those persons are fully aware of the potential for exposure and can exercise control over their exposure. Limits for occupational/controlled exposure also apply in situations when an individual is transient through a location where occu-pational/controlled limits apply provided he or she is made aware of the potential for exposure. NOTE 2 TO TABLE 1: General population/uncontrolled exposures apply in situations in which the general public may be ex-posed, or in which persons that are exposed as a consequence of their employment may not be fully aware of the potential for exposure or can not exercise control over their exposure.

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REPORT NO: 08U11716-1A	DATE: May 8, 2008
FCC ID: QDS-BRCM1030	IC: 4324A-BRCM1030
IC RULES	

IC Safety Code 6, Section 2.2.1 (a) A person other than an RF and microwave exposed worker shall not be exposed to electromagnetic radiation in a frequency band listed in Column 1 of Table 5, if the field strength exceeds the value given in Column 2 or 3 of Table 5, when averaged spatially and over time, or if the power density exceeds the value given in Column 4 of Table 5, when averaged spatially and over time.

Table 5

posed Morkers (i	iolaanig tio t			
1 Frequency (MHz)	2 Electric Field Strength; rms (V/m)	3 Magnetic Field Strength; rms (A/m)	4 Power Density (W/m ²)	5 Averaging Time (min)
0.003–1	280	2.19		6
1–10	280/f	2.19/ <i>f</i>		6
10–30	28	2.19/f		6
30–300	28	0.073	2*	6
300–1 500	1.585 <i>f</i> ^{0.5}	0.0042f ^{0.5}	<i>f</i> /150	6
1 500–15 000	61.4	0.163	10	6
15 000–150 000	61.4	0.163	10	616 000 /f ^{1.2}
150 000–300 000	0.158 <i>f</i> ^{0.5}	4.21 x 10 ⁻⁴ f ^{0.5}	6.67 x 10 ⁻⁵ f	616 000 /f ^{1.2}

Exposure Limits for Persons Not Classed As RF and Microwave Exposed Workers (Including the General Public)

* Power density limit is applicable at frequencies greater than 100 MHz.

Notes: 1. Frequency, f, is in MHz.

- 2. A power density of 10 W/m^2 is equivalent to 1 mW/cm².
- A magnetic field strength of 1 A/m corresponds to 1.257 microtesla (μT) or 12.57 milligauss (mG).

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Given

 $E = \sqrt{(30 * P * G)} / d$

and

S = E ^ 2 / 3770

where

E = Field Strength in Volts/meter

P = Power in Watts

G = Numeric antenna gain

d = Distance in meters

S = Power Density in milliwatts/square centimeter

Combining equations, rearranging the terms to express the distance as a function of the remaining variables, changing to units of Power to mW and Distance to cm, and substituting the logarithmic form of power and gain yields:

d = 0.282 * 10 ^ ((P + G) / 20) / √ S

where

d = MPE distance in cm P = Power in dBm G = Antenna Gain in dBi S = Power Density Limit in mW/cm²

Rearranging terms to calculate the power density at a specific distance yields

 $S = 0.0795 * 10 ^ ((P + G) / 10) / (d^2)$

The power density in units of mW/cm² is converted to units of W/m² by multiplying by a factor of 10.

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For multiple colocated transmitters operating simultaneously the total power density can be calculated by summing the Power * Gain product (in linear units) of each transmitter.

yields

d = $0.282 * \sqrt{((P1 * G1) + (P2 * G2) + ... + (Pn * Pn)) / S)}$ where d = distance in cm Px = Power of transmitter x in mW Gx = Numeric gain of antenna x S = Power Density in mW/cm^2

In the table below, Power and Gain are entered in units of dBm and dBi respectively, then converted to their linear forms for the purpose of the calculations.

LIMITS

From FCC §1.1310 Table 1 (B), the maximum value of S = 1.0 mW/cm²

From IC Safety Code 6, Section 2.2 Table 5 Column 4, S = 10 W/m²

<u>RESULTS</u>

(MPE distance equals 20 cm)

Mode	Band	Output	Antenna	MPE	FCC Power	IC Power
		Power	Gain	Distance	Density	Density
		(dBm)	(dBi)	(cm)	(mW/cm^2)	(W/m^2)
Bluetooth	2.4 GHz	0.70	3.15			
WLAN	2.4 GHz	23.05	1.98			
Comb	bined			20.0	0.06	0.64

NOTE: For mobile or fixed location transmitters, the minimum separation distance is 20 cm, even if calculations indicate that the MPE distance would be less.

9. AC POWER LINE CONDUCTED EMISSIONS

LIMITS

FCC §15.207 (a)

RSS-Gen 7.2.2

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

Decreases with the logarithm of the frequency.

TEST PROCEDURE

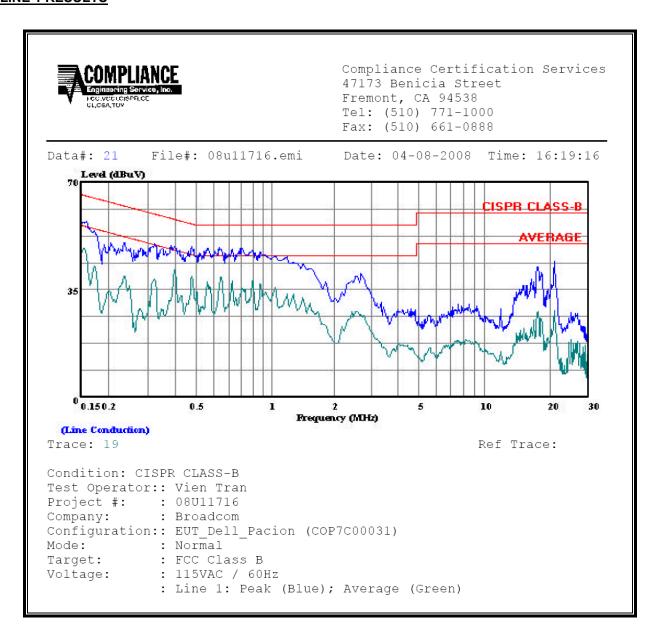
ANSI C63.4

RESULTS

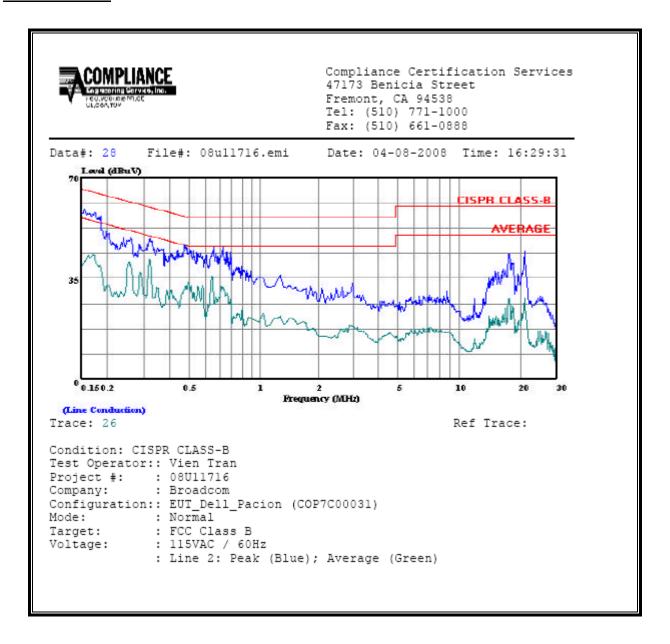
<u>6 WORST EMISSIONS</u>

	CONDUCTED EMISSIONS DATA (115VAC 60Hz)								
Freq.	Reading			Closs	Limit	FCC_B	Marg	in	Remark
(MHz)	PK (dBuV)	QP (dBuV)	AV (dBuV)	(dB)	QP	AV	QP (dB)	AV (dB)	L1/L2
0.16	57. 92		48.60	0.00	65.52	55.52	-7.60	-6.92	L1
0.65	48.61		39.21	0.00	56.00	46.00	-7.39	-6.79	L1
20.92	44.25		28.20	0.00	60.00	50.00	-15.75	-21.80	L1
0.16	59.10		42.75	0.00	65.52	55.52	-6.42	-12.77	L2
0.65	45.72		35.34	0.00	56.00	46.00	-10.28	-10.66	L2
20.92	44.37		28.46	0.00	60.00	50.00	-15.63	-21.54	L2
6 Worst]	Data								

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