



Class II Permissive Change Test Report

FCC Part 15.247 and RSS-210, Issue 7

for the
Broadcom, Inc.

802.11a/g Wireless LAN PCI-E Mini Card

Model Number: BCM94311MCAG

FCC ID: QDS-BRCM1019

TEST REPORT #:EMC_BROAD_041_07001_AG_15.247
DATE: August 29, 2007



Bluetooth™
Bluetooth Qualification
Test Facility
(BQTF)

CTIA Authorized Test Lab
LAB CODE 20020328-00

FCC listed#
A2LA Certified

IC recognized #
3462B

CETECOM Inc.

411 Dixon Landing Road • Milpitas, CA 95035 • U.S.A.

Phone: + 1 (408) 586 6200 • Fax: + 1 (408) 586 6299 • E-mail: info@cetecomusa.com • <http://www.cetecom.com>

CETECOM Inc. is a Delaware Corporation with Corporation number: 2113686
Board of Directors: Dr. Harald Ansorge, Dr. Klaus Matkey, Hans Peter May

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Assessment

The following is in compliance with the applicable criteria specified in FCC rules Part 15.247 of the Code of Federal Regulations and IC RSS-210, Issue 7 Standards.

Company	Description	Model #
Broadcom, Inc.	Wireless LAN PCI-E Mini Card	BCM94311MCAG

Technical responsibility for area of testing:

Lothar Schmidt

August 29, 2007 **EMC & Radio**

(Test Lab Manager)

Date	Section	Name	Signature
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Responsible for test report and project leader:

Juan Martinez

(Project Engineer)

August 29, 2007 **EMC & Radio**

Date	Section	Name	Signature
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The test results of this test report relate exclusively to the test item specified in Identification of the Equipment under Test. The CETECOM Inc. USA does not assume responsibility for any conclusions and generalizations drawn from the test results with regard to other specimens or samples of the type of the equipment represented by the test item. The test report may only be reproduced or published in full. Reproduction or publication of extracts from the report requires the prior written approval of the CETECOM Inc USA.

Administrative Data

Identification of the Testing Laboratory Issuing the Radio Assessment Report

Company Name:	CETECOM, Inc.
Department:	EMC
Address:	411 Dixon Landing Road Milpitas, CA 95035 U.S.A.
Telephone:	+1 (408) 586 6200
Fax:	+1 (408) 586 6299
Project Leader:	Juan Martinez
Responsible Test Lab Manager:	Lothar Schmidt

Identification of the Client

Applicant's Name:	Broadcom, Inc.
Address:	190 Mathilda Place Sunnyvale, CA 94086, USA
Contact Person:	Daniel Lawless
Phone No.	408-922-5870
Fax:	408-543-3399
e-mail:	dlawless@broadcom.com

Identification of the Manufacturer

Manufacturer's Name:	Broadcom, Inc.
Manufacturer's Address:	190 Mathilda Place, Sunnyvale, California 94086 USA

1 Equipment under Test (EUT)

1.1 Specification of the Equipment under Test

Product Type	Wireless LAN PCI-E Mini Card
Marketing Name:	802.11a/g Wireless LAN PCI-E Mini Card
Model No:	BCM94311MCAG
FCC-ID:	QDS-BRCM1019
Frequency Range:	2412 - 2462MHz & 5745 – 5825 MHz
Number of Channels	11
Type(s) of Modulation:	CCK & OFDM
	2.4GHz Spears = PIFA Antenna Aux (3.12dBi)
	2.4GHz Hawke = PIFA Antenna Aux (2.3dBi)
	5GHz Spears = PIFA Antenna Aux (-0.4dBi)
	5GHz Hawke = PIFA Antenna Aux (0.1dBi)
	16.38dBm, 0.043 W @ 2412 MHz, 802.11b
	15.40dBm, 0.035 W @ 2437 MHz, 802.11b
	14.43dBm, 0.028 W @ 2462 MHz, 802.11b
	22.0dBm, 0.158 W @ 2412 MHz, 802.11g
	20.0dBm, 0.107 W @ 2437 MHz, 802.11g
	19.5dBm, 0.089 W @ 2462 MHz, 802.11g
	13.5dBm, 0.022 W @ 2412 MHz, 802.11a
	14.7dBm, 0.029 W @ 2437 MHz, 802.11a
	14.7dBm, 0.029 W @ 2462 MHz, 802.11a

1.2 Class II permissive change laptops to be added

AE #	TYPE	MANF.	MODEL	SERIAL #
1	Laptop	Dell	PP28L (Hawke)	N/A
1	Laptop	Dell	PP29L (Spears)	N/A

Subject Of Investigation

All testing were performed on the PP28L (Hawke) and PP29L (Spears) laptops with the BCM94311MCAG pre-approved module. Data, presented in this report, was collected for a Class II permissive change to add the laptops to the BCM94311MCAG (FCC ID: QDS-BRCM1019) module application.

The objective of the measurements done by Cetecom Inc. was to measure the performance of the EUT as specified by requirements listed in FCC rules Part 15.247 of Title 47 of the Code of Federal Regulations and to Industry Canada RSS-210, Issue 7. The maximization of portable equipment is conducted in accordance with ANSI C63.4.

Measurements**1.3 EIRP****§ 15.247 (b) (3) & RSS-210 (A8.4)(4)**

Frequency range	RF power output
2400-2483.5 MHz	30dBm on Conducted
5725-5850 MHz	30dBm on Conducted

Notes:

1. For 802.11b, 802.11g, and 802.11a powers were set to transmit at the specified average output power. For 2.4 GHz the Spears was tested since it has the highest gain antennas. For 5 GHz the Hawke was tested since it has the highest gain antenna.
2. Measurements were done on the Aux antenna for the 2.4GHz and 5GHz. EIRP values shown in this report are with the device transmitting on the Aux antenna. Both vertical and horizontal were measured. Worst case polarization was vertical for Auxiliary.

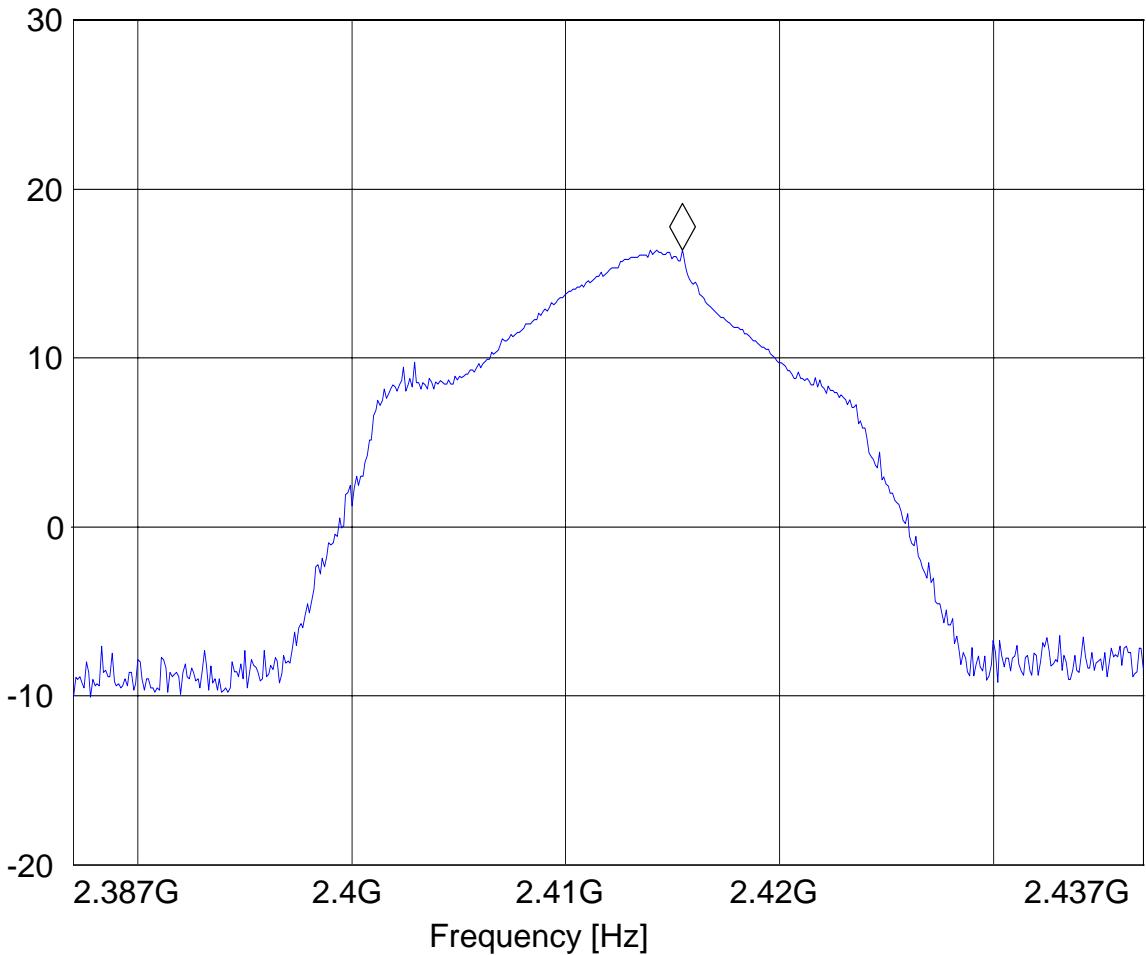
EIRP: 2412 MHz (802.11b)**411 Dixon Landing Road, Milpitas CA 95035, USA**

EUT: BCM94311MAG
 Customer: Broadcom
 Test Mode: 802.11 b; ch 1; Aux antenna
 ANT Orientation: V
 EUT Orientation: H
 Test Engineer: Juan
 Power Supply: AC Power Supply

SWEET TABLE: "EIRP RLAN CH1"

Short Description: EIRP RLAN channel-2412 MHz					
Start Frequency	Stop Frequency	Detector	Meas.	IF Time	Transducer
2.4 GHz	2.4 GHz	MaxPeak	Coupled	10 MHz	DUMMY-DBM

Marker: 2.415456914 GHz 16.38 dBm

Level [dBm]

EIRP: 2437 MHz (802.11b)

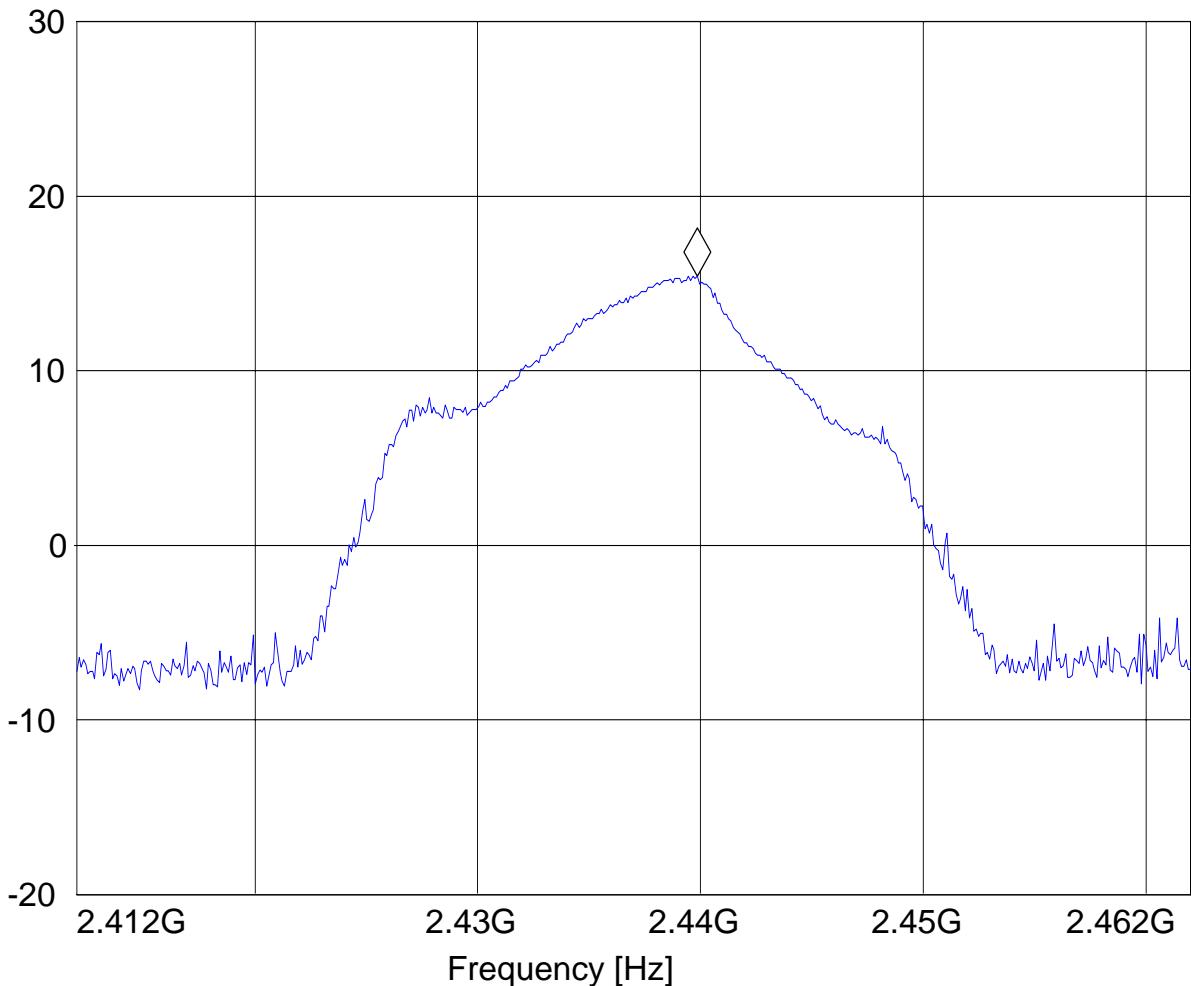
EUT: BCM94311MAG
 Customer: Broadcom
 Test Mode: 802.11 b; ch 6; Aux antenna
 ANT Orientation: V
 EUT Orientation: H
 Test Engineer: Juan
 Power Supply: AC Power Supply

SWEET TABLE: "EIRP RLAN CH6"

Short Description: EIRP RLAN channel-2437 MHz					
Start Frequency	Stop Frequency	Detector	Meas.	IF	Transducer
2.4 GHz	2.5 GHz	MaxPeak	Coupled	10 MHz	DUMMY-DBM

Marker: 2.439855711 GHz 15.4 dBm

Level [dBm]



EIRP: 2462 MHz (802.11b)

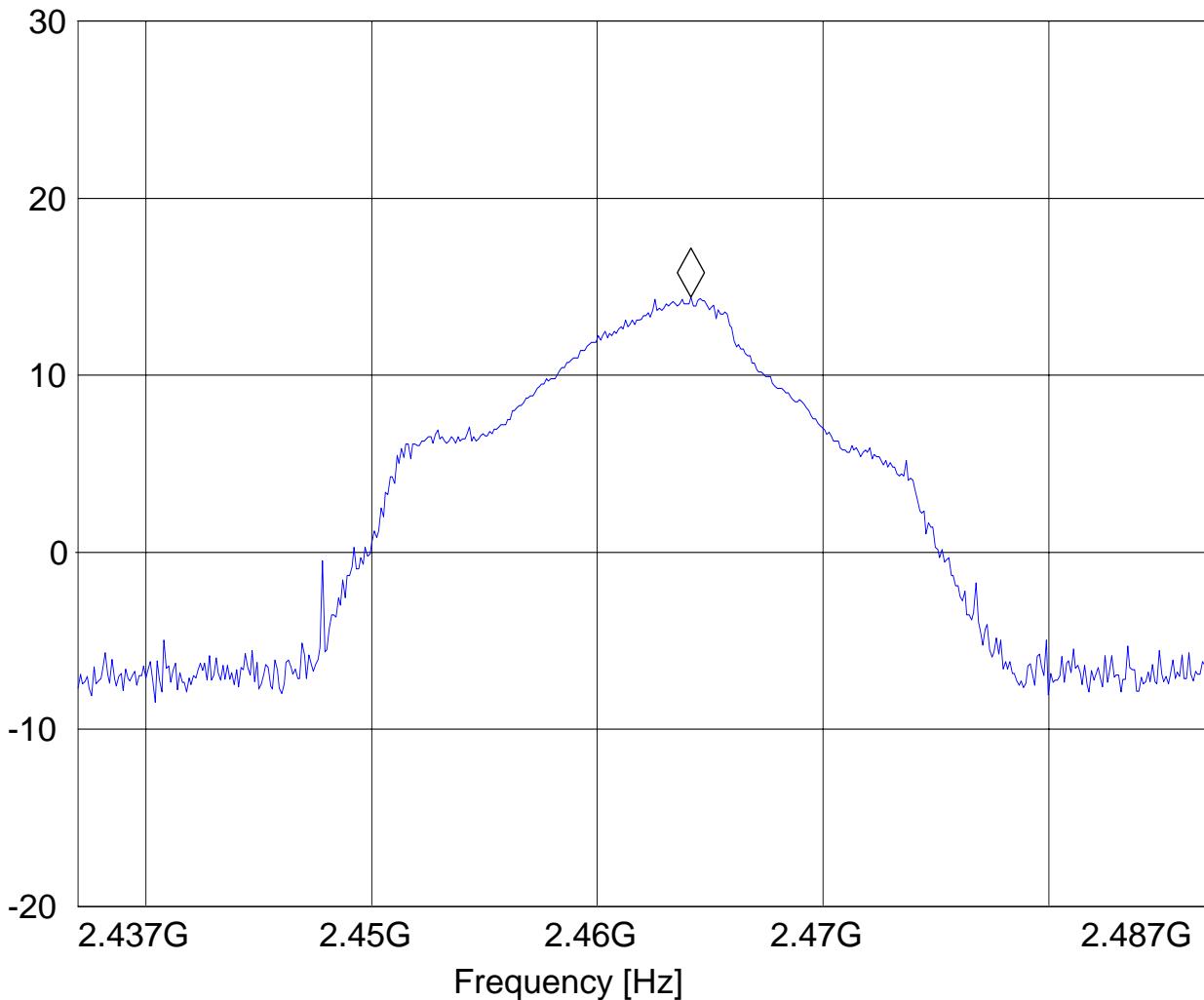
EUT: BCM94311MAG
Customer: Broadcom
Test Mode: 802.11 b; ch 11; Aux antenna
ANT Orientation: V
EUT Orientation: H
Test Engineer: Juan
Power Supply: AC Power Supply

SWEET TABLE: "EIRP RLAN CH11"

Short Description:		EIRP RLAN channel-2462 MHz			
Start Frequency	Stop Frequency	Detector	Meas.	IF	Transducer
2.4 GHz	2.5 GHz	MaxPeak	Coupled	10 MHz	DUMMY-DBM

Marker: 2.464154309 GHz 14.43 dBm

Level [dBm]



EIRP: 2412 MHz (802.11g)

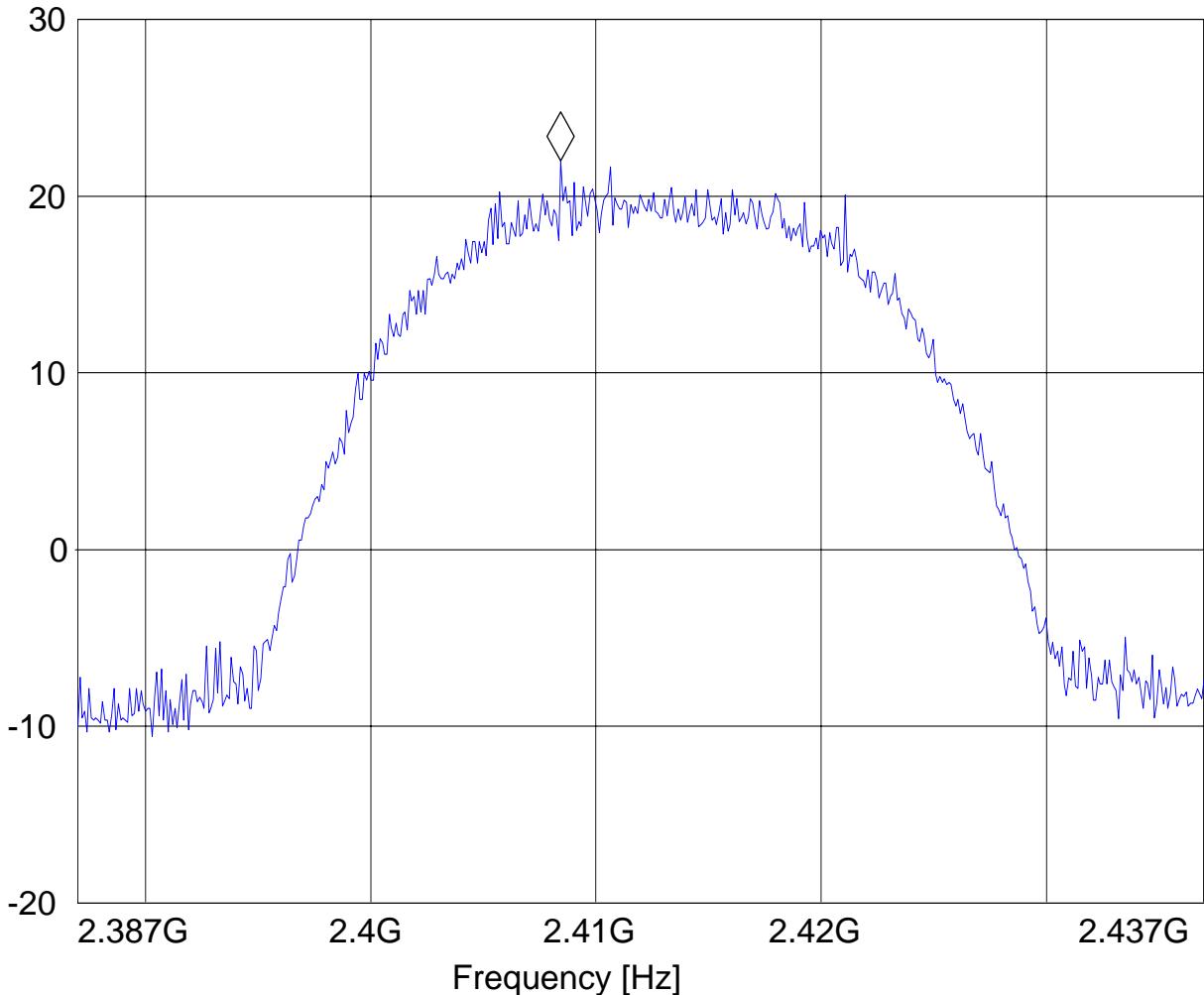
EUT: BCM94311MAG
 Customer: Broadcom
 Test Mode: 802.11 g; ch 1; Aux antenna
 ANT Orientation: V
 EUT Orientation: H
 Test Engineer: Juan
 Power Supply: AC Power Supply

SWEET TABLE: "EIRP RLAN CH1"

Short Description: EIRP RLAN channel-2412 MHz					
Start Frequency	Stop Frequency	Detector	Meas.	IF	Transducer
2.4 GHz	2.4 GHz	MaxPeak	Coupled	10 MHz	DUMMY-DBM

Marker: 2.408442886 GHz 22 dBm

Level [dBm]



EIRP: 2437 MHz (802.11g)

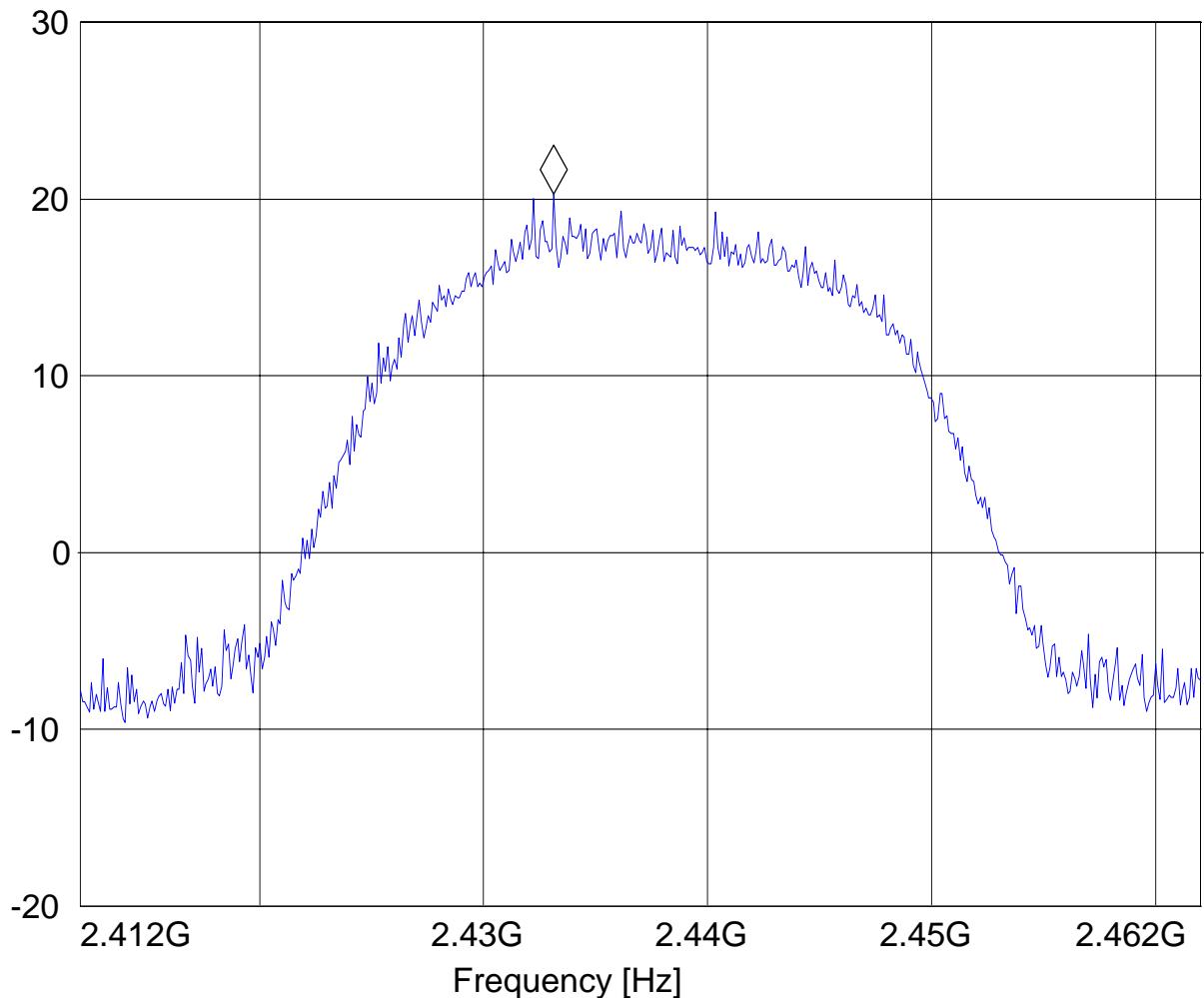
EUT: BCM94311MAG
Customer: Broadcom
Test Mode: 802.11 g; ch 6; Aux antenna
ANT Orientation: V
EUT Orientation: H
Test Engineer: Juan
Power Supply: AC Power Supply

SWEET TABLE: "EIRP RLAN CH6"

Short Description:		EIRP RLAN channel-2437 MHz			
Start Frequency	Stop Frequency	Detector	Meas.	IF	Transducer
2.4 GHz	2.5 GHz	MaxPeak	Coupled	10 MHz	DUMMY-DBM

Marker: 2.433142285 GHz 20.29 dBm

Level [dBm]



EIRP: 2462 MHz (802.11g)

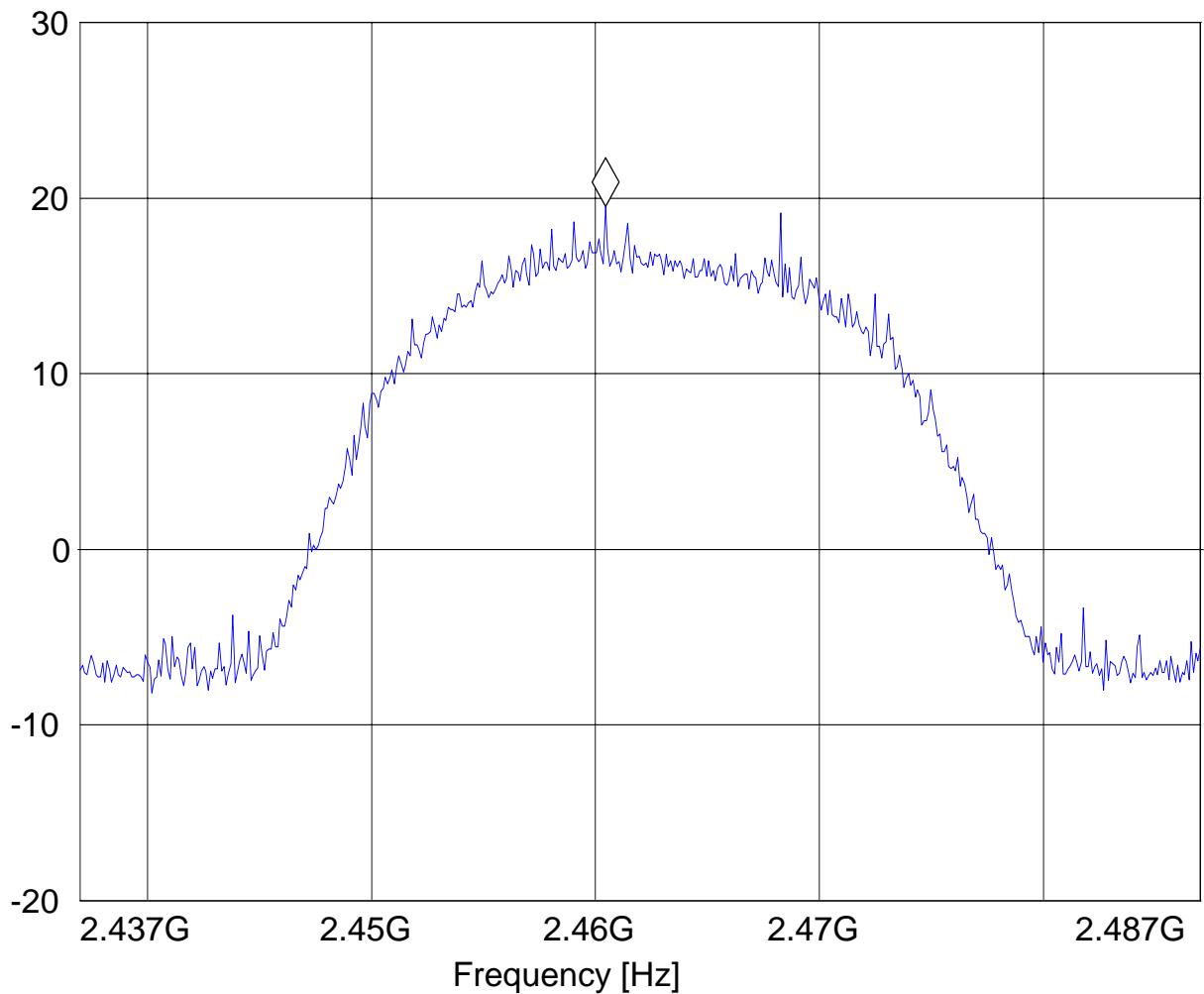
EUT: BCM94311MAG
 Customer: Broadcom
 Test Mode: 802.11 g; ch 11; Aux antenna
 ANT Orientation: V
 EUT Orientation: H
 Test Engineer: Juan
 Power Supply: AC Power Supply

SWEET TABLE: "EIRP RLAN CH11"

Short Description:		EIRP RLAN channel-2462 MHz			
Start Frequency	Stop Frequency	Detector	Meas.	IF	Transducer
2.4 GHz	2.5 GHz	MaxPeak	Coupled	10 MHz	DUMMY-DBM

Marker: 2.460446894 GHz 19.54 dBm

Level [dBm]

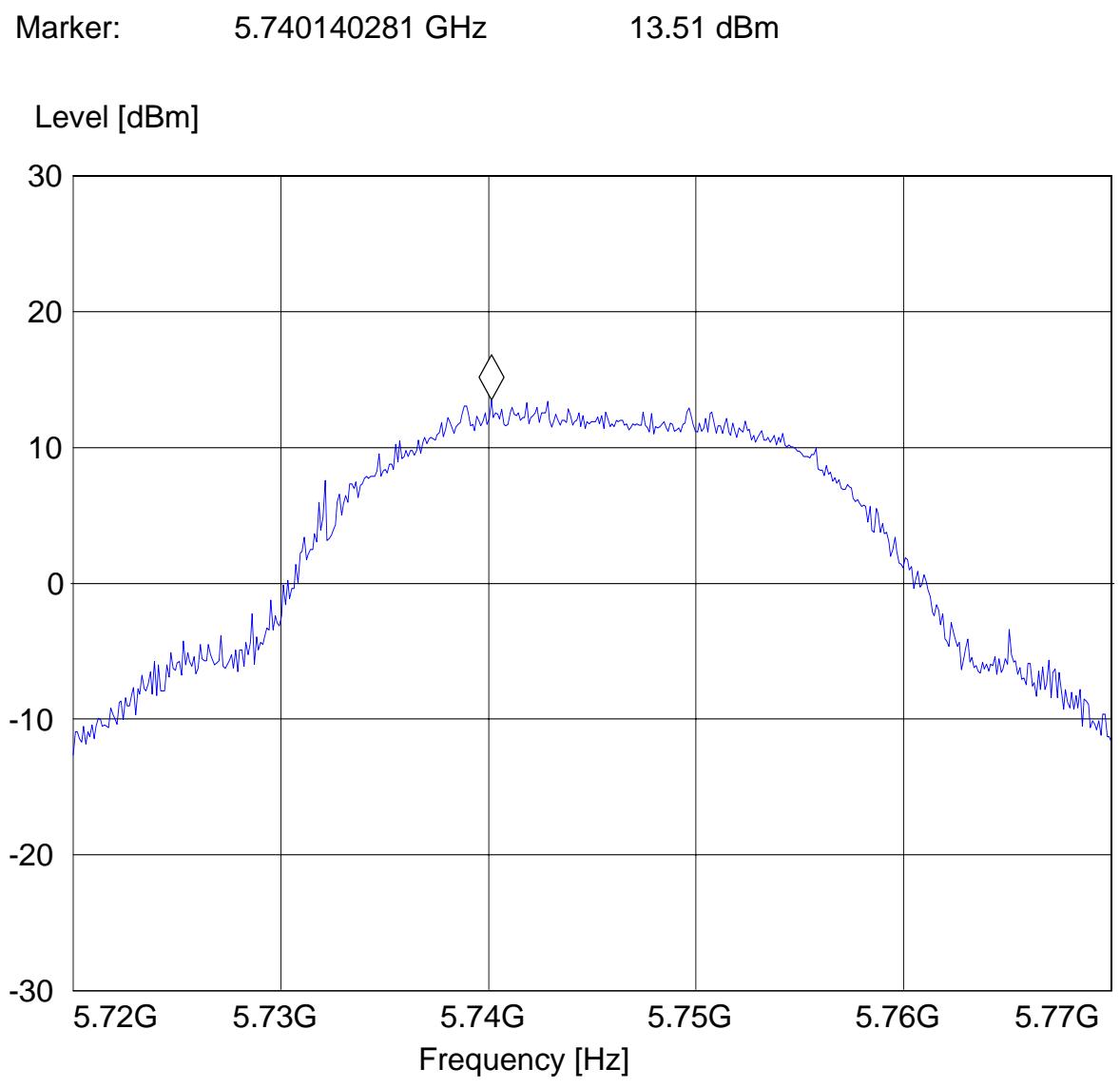


EIRP: 5745 MHz (802.11a)

EUT: BCM94311MAG
Customer: Broadcom
Test Mode: 802.11 a; ch 149; Main antenna
ANT Orientation: H
EUT Orientation: H
Test Engineer: Juan
Power Supply: AC Power Supply

SWEET TABLE: "EIRP 802.11a_149"

Short Description:		EIRP channel-5745 MHz			
Start Frequency	Stop Frequency	Detector	Meas.	IF	Transducer
5.7 GHz	5.8 GHz	MaxPeak	Coupled	10 MHz	DUMMY-DBM



EIRP: 5785 MHz (802.11a)

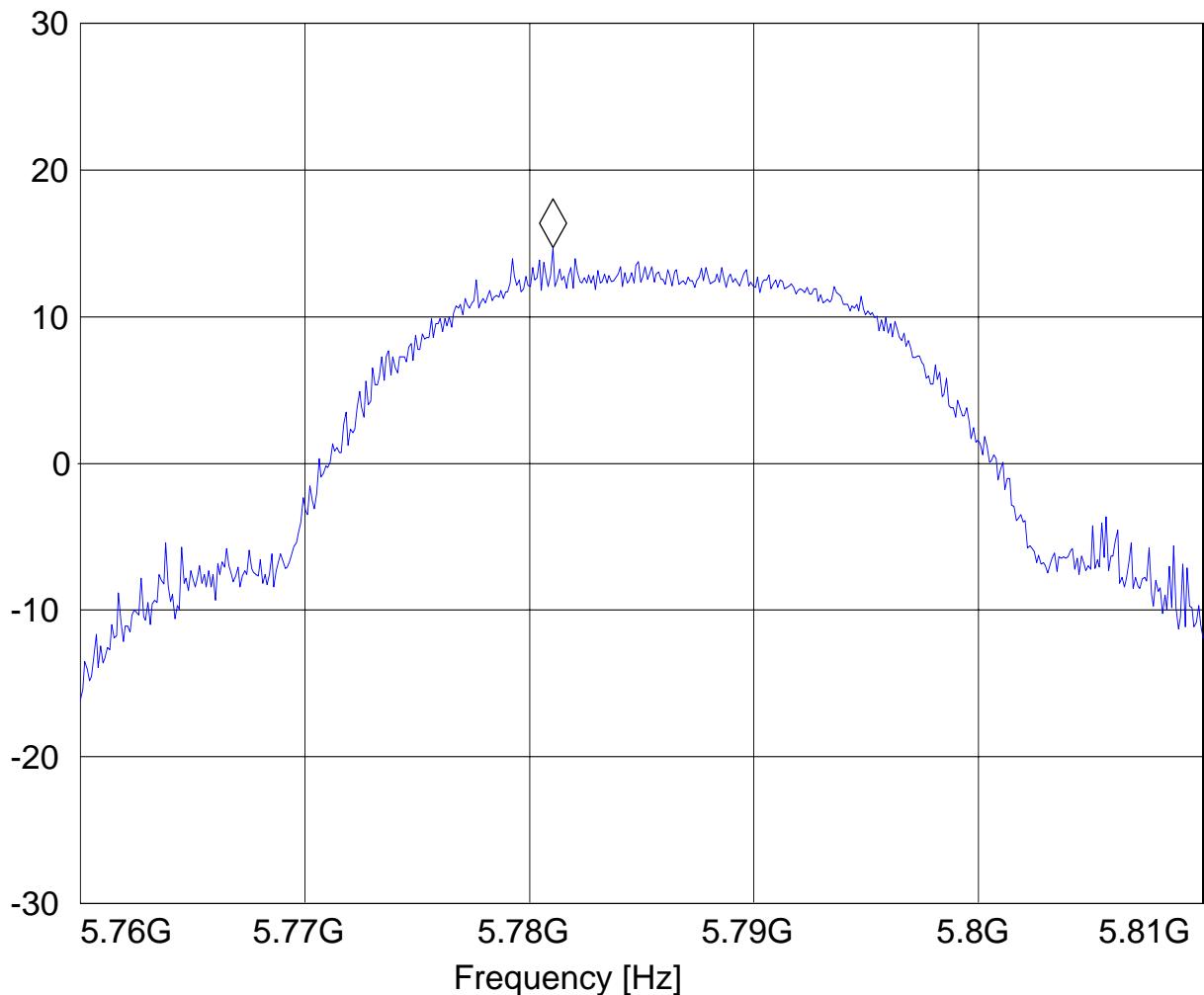
EUT: BCM94311MAG
Customer: Broadcom
Test Mode: 802.11 a; ch 157; Main antenna
ANT Orientation: H
EUT Orientation: H
Test Engineer: Juan
Power Supply: AC Power Supply

SWEET TABLE: "EIRP 802.11a_157"

Short Description:		EIRP channel-5260 MHz			
Start Frequency	Stop Frequency	Detector	Meas.	IF	Transducer
5.8 GHz	5.8 GHz	MaxPeak	Coupled	10 MHz	DUMMY-DBM

Marker: 5.781042084 GHz 14.71 dBm

Level [dBm]

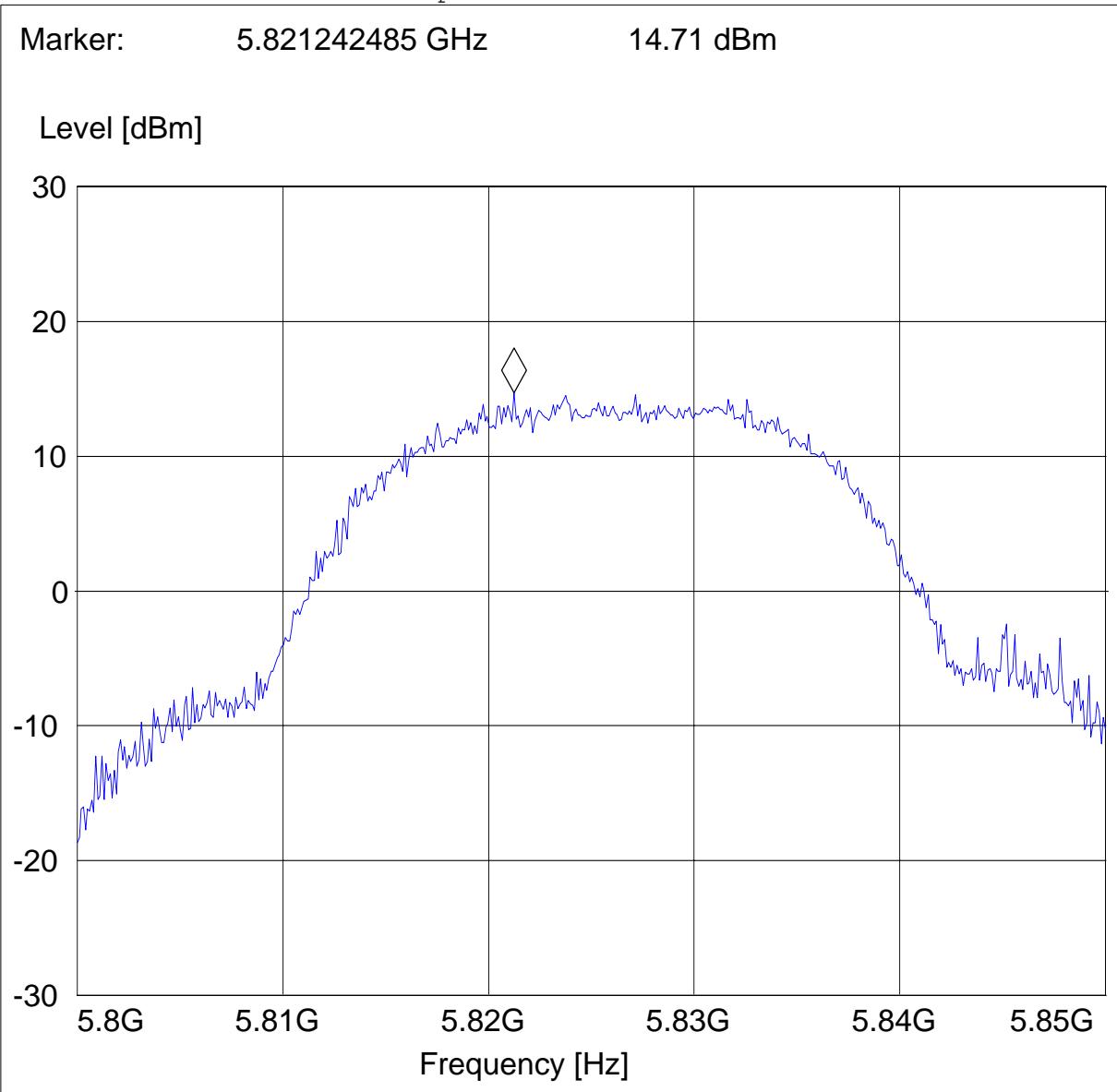


EIRP: 5825 MHz (802.11a)

EUT: BCM94311MAG
Customer: Broadcom
Test Mode: 802.11 a; ch 165; Main antenna
ANT Orientation: H
EUT Orientation: H
Test Engineer: Juan
Power Supply: AC Power Supply

SWEET TABLE: "EIRP 802.11a_165"

Short Description:		EIRP channel-5260 MHz			
Start Frequency	Stop Frequency	Detector	Meas.	IF	Transducer
5.8 GHz	5.9 GHz	MaxPeak	Coupled	10 MHz	DUMMY-DBM



1.4 BAND EDGE COMPLIANCE (802.11b) §15.247 (d) & RSS-210(A8.5)
802.11b Low frequency section (spurious in the restricted band 2310 – 2390 MHz)

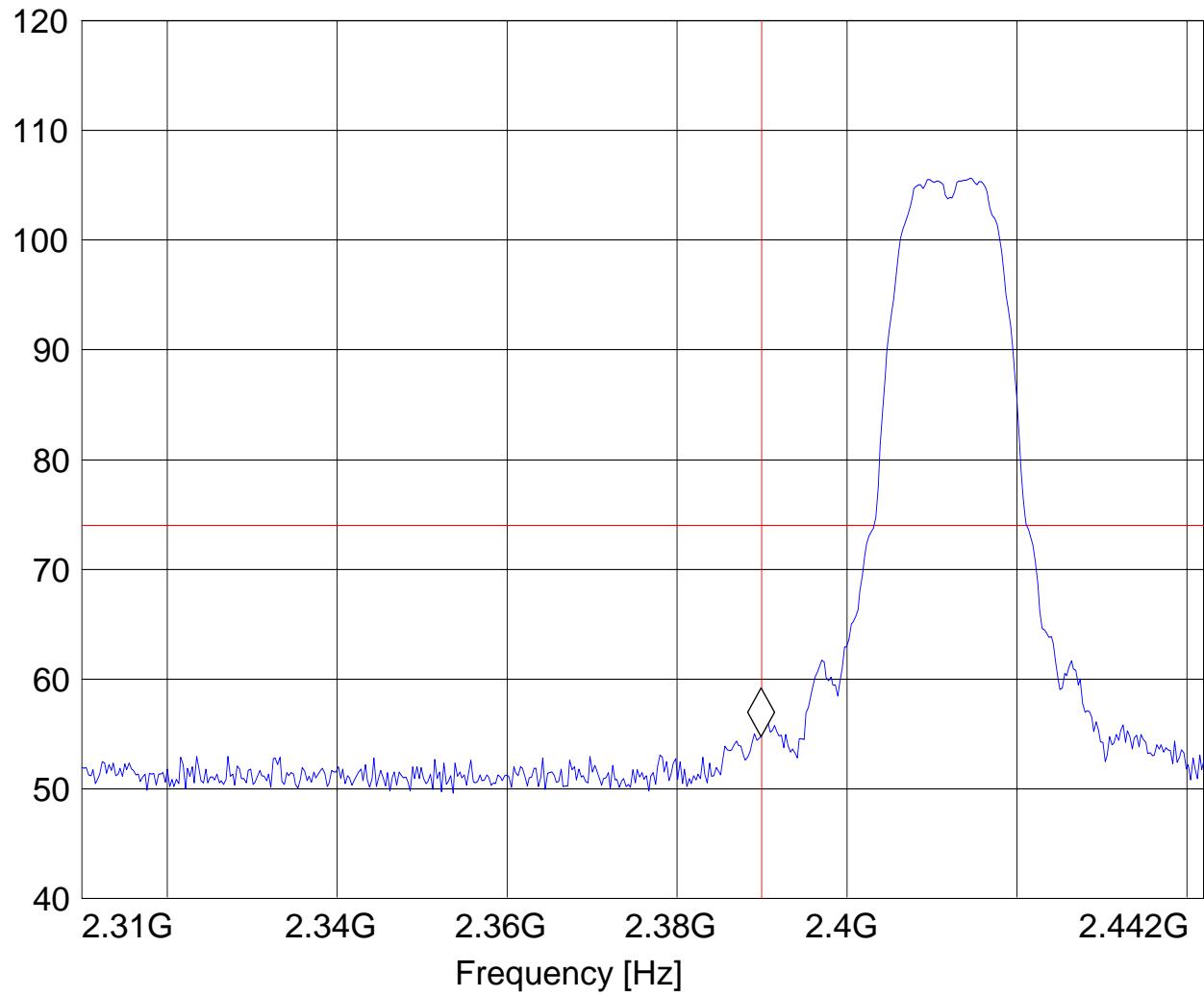
EUT: BCM94311MAG
Customer: Broadcom
Test Mode: 802.11 b; ch 1; Aux antenna
ANT Orientation: V
EUT Orientation: H
Test Engineer: Juan
Power Supply: AC Power Supply

SWEET TABLE: "FCC15.247_LBE_PK"

Start Frequency	Stop Frequency	Detector	Meas.	IF	Transducer
2.3 GHz	2.4 GHz	MaxPeak	Coupled	1 MHz	#326horn_AF_vert

Marker: 2.389887776 GHz 54.75 dB μ V/m

Level [dB μ V/m]



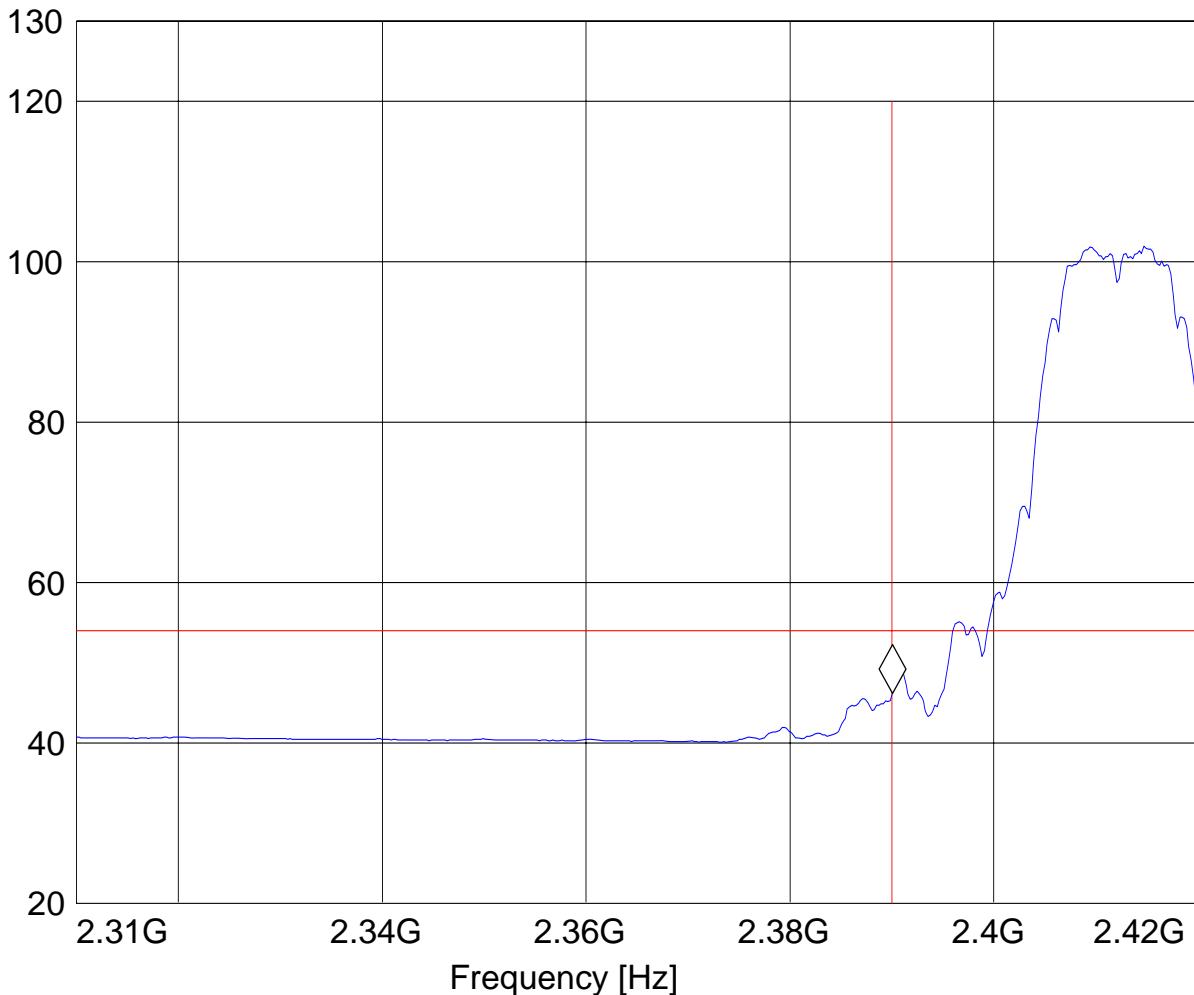
BAND EDGE COMPLIANCE**§15.247 (d) & RSS-210(A8.5)****802.11b Low frequency section (spurious in the restricted band 2310 – 2390 MHz)**

EUT: BCM94311MAG
 Customer: Broadcom
 Test Mode: 802.11 b; ch 1; Aux antenna
 ANT Orientation: V
 EUT Orientation: H
 Test Engineer: Juan
 Power Supply: AC Power Supply

SWEET TABLE: "FCC15.247 LBE_AVG"

Start Frequency	Stop Frequency	Detector	Meas.	IF	Transducer
2.3 GHz	2.4 GHz	MaxPeak	Coupled	1 MHz	#326horn_AF_vert

Marker: 2.39002004 GHz 46.2 dB μ V/m

Level [dB μ V/m]

BAND EDGE COMPLIANCE**§15.247 (d) & RSS-210(A8.5)****802.11b High frequency section (spurious in the restricted band 2483.5 – 2500 MHz)**

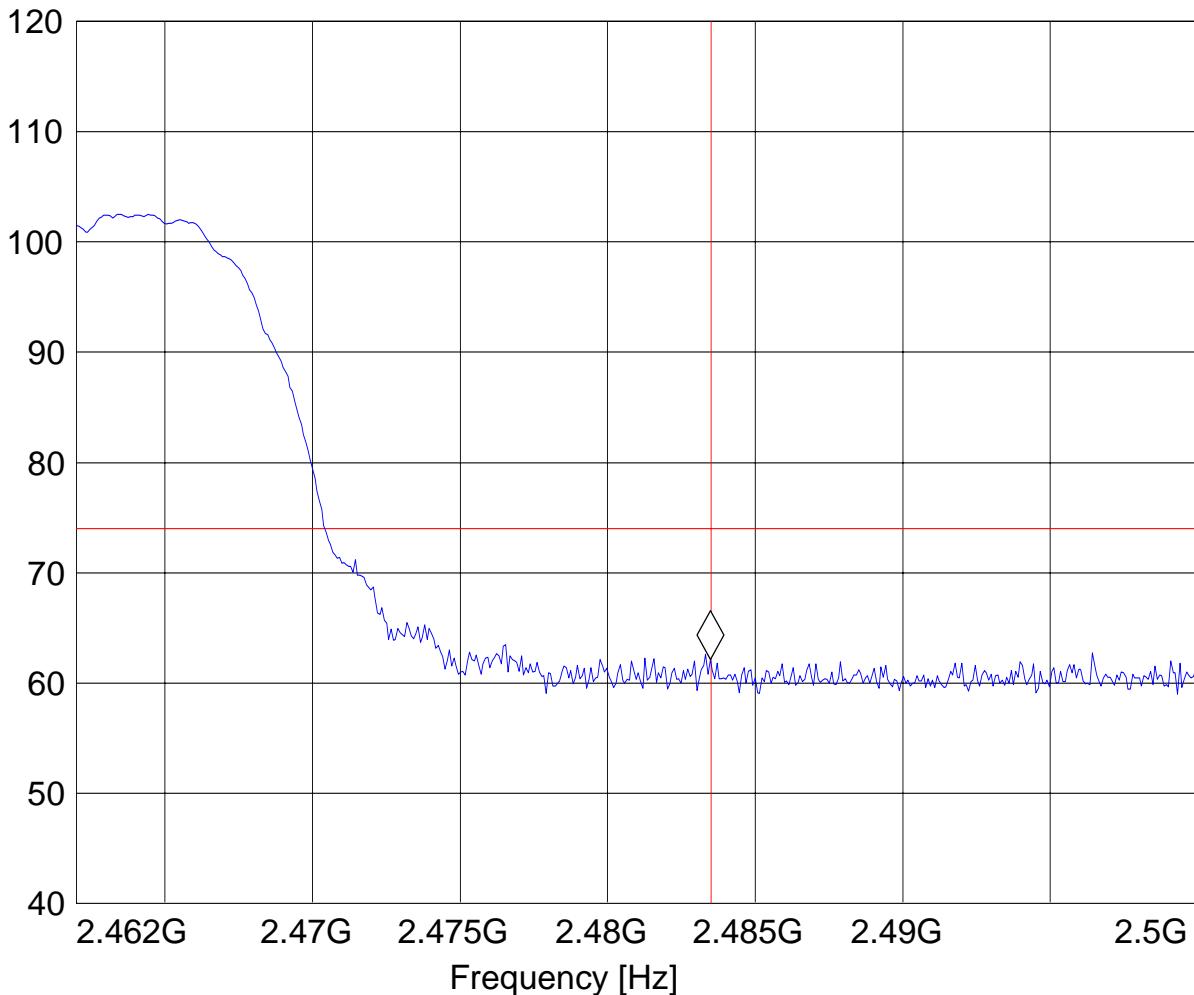
EUT: BCM94311MAG
 Customer: Broadcom
 Test Mode: 802.11 b; ch 11; Aux antenna
 ANT Orientation: V
 EUT Orientation: H
 Test Engineer: Juan
 Power Supply: AC Power Supply

SWEET TABLE: "FCC15.247 HBE_PK"

Start Frequency	Stop Frequency	Detector	Meas. Time	IF Bandw.	Transducer
2.5 GHz	2.5 GHz	MaxPeak	Coupled	1 MHz	#326horn_AF_vert

Marker: **2.48347495 GHz** **62.16 dB μ V/m**

Level [dB μ V/m]



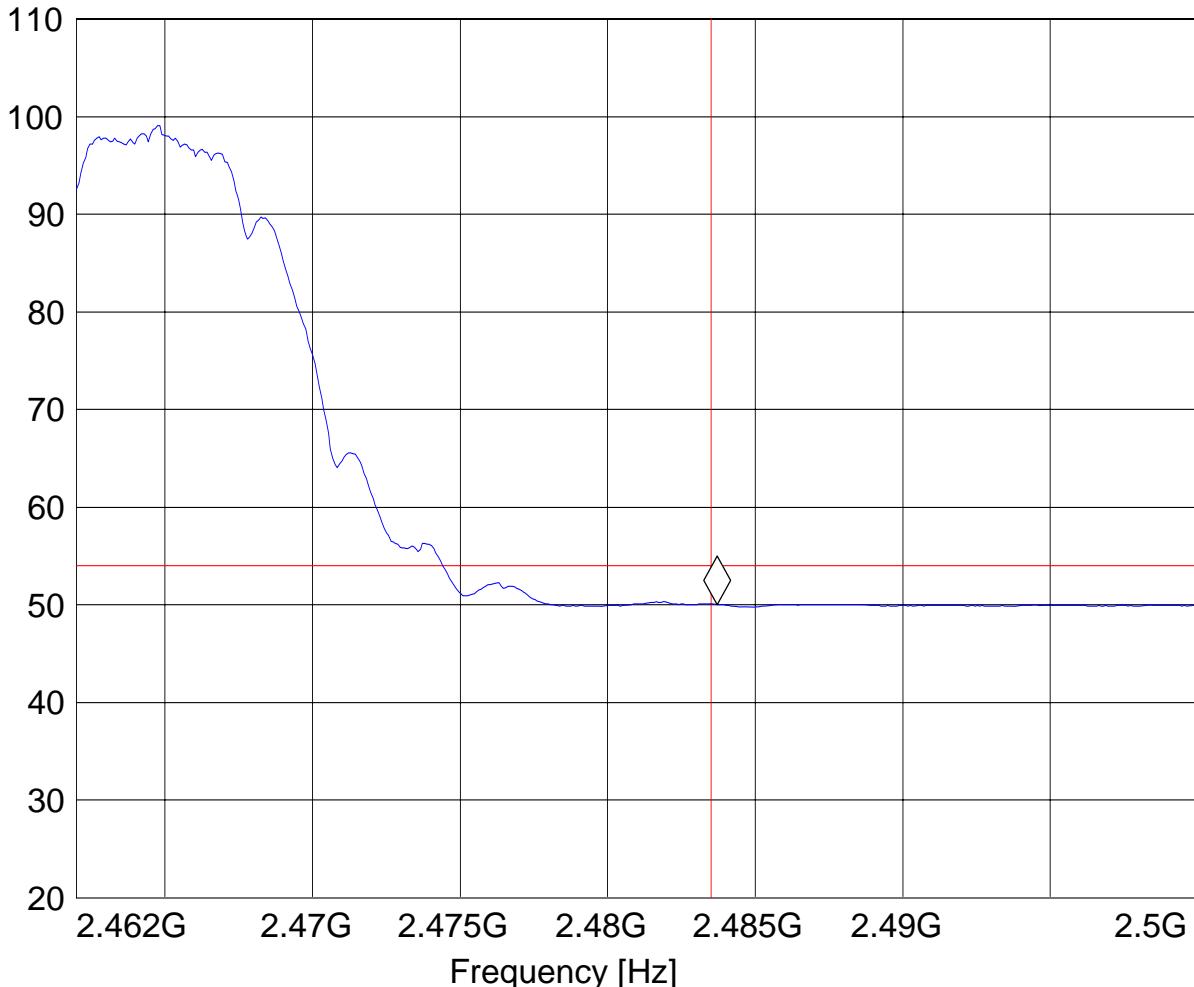
BAND EDGE COMPLIANCE**§15.247 (d) & RSS-210(A8.5)****802.11b High frequency section (spurious in the restricted band 2483.5 – 2500 MHz)**

EUT: BCM94311MAG
 Customer: Broadcom
 Test Mode: 802.11 b; ch 11; Aux antenna
 ANT Orientation: V
 EUT Orientation: H
 Test Engineer: Juan
 Power Supply: AC Power Supply

SWEET TABLE: "FCC15.247 HBE_AVG"

Start Frequency	Stop Frequency	Detector	Meas.	IF	Transducer
2.5 GHz	2.5 GHz	MaxPeak	Coupled	1 MHz	#326horn_AF_horz

Marker: 2.483703407 GHz 50.05 dB μ V/m

Level [dB μ V/m]

1.5 BAND EDGE COMPLIANCE (802.11g)**§15.247 (d) & RSS-210(A8.5)****802.11g Low frequency section (spurious in the restricted band 2310 – 2390 MHz)**

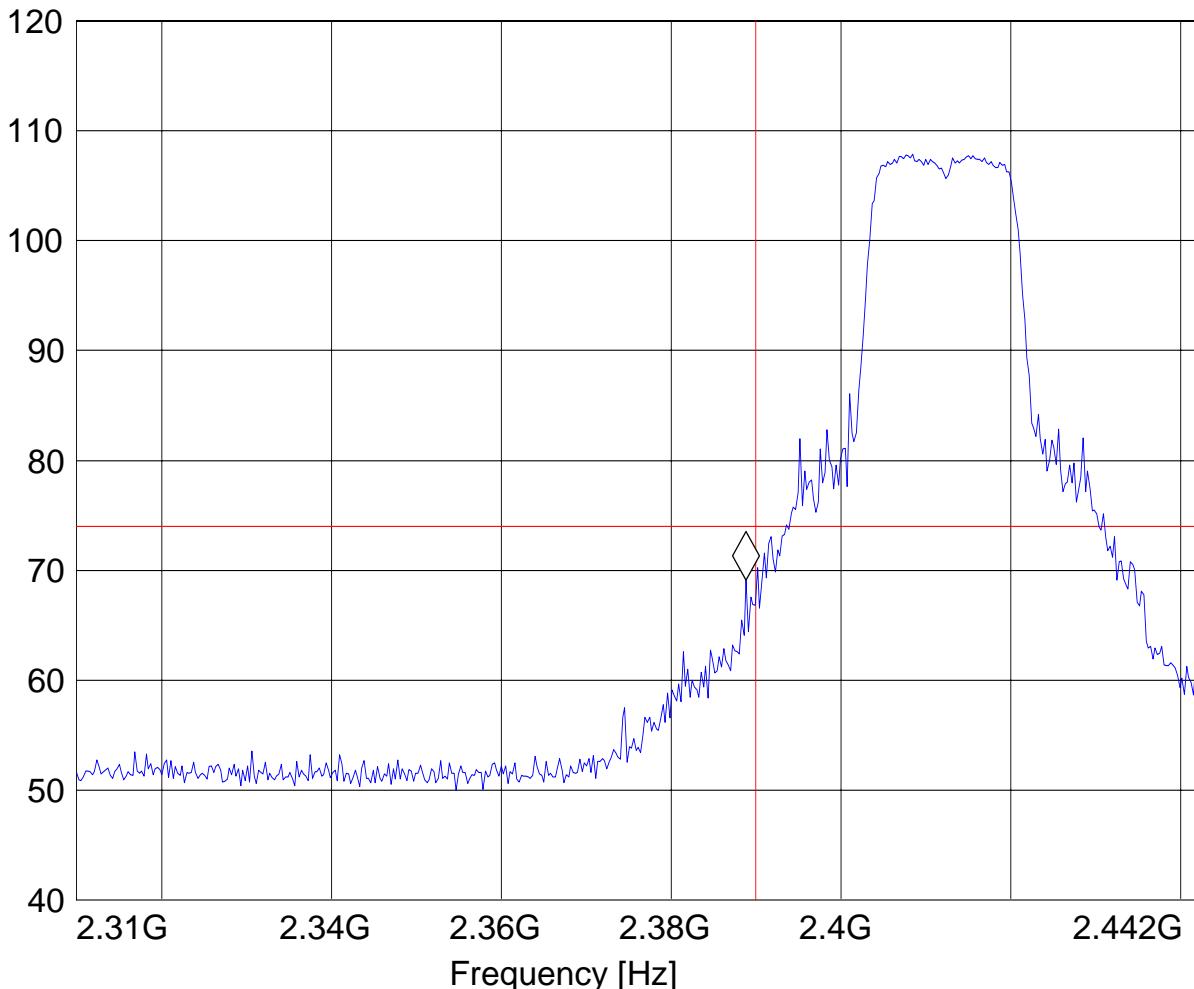
EUT: BCM94311MAG
 Customer: Broadcom
 Test Mode: 802.11 g; ch 1; Aux antenna
 ANT Orientation: V
 EUT Orientation: H
 Test Engineer: Juan
 Power Supply: AC Power Supply

SWEET TABLE: "FCC15.247 LBE_PK"

Start Frequency	Stop Frequency	Detector	Meas.	IF	Transducer
2.3 GHz	2.4 GHz	MaxPeak	Coupled	1 MHz	#326horn_AF_vert

Marker: 2.388829659 GHz 69.13 dB μ V/m

Level [dB μ V/m]



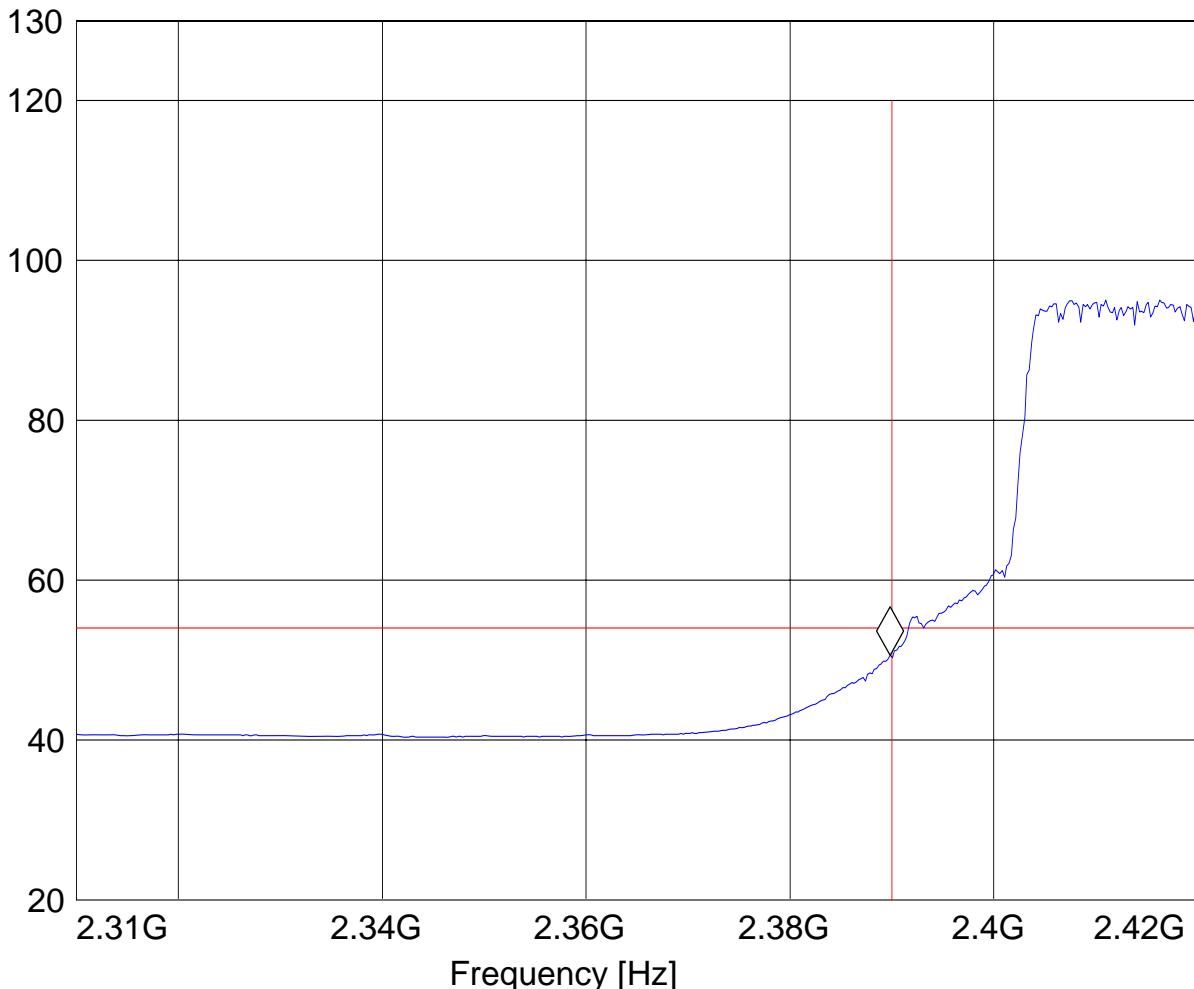
BAND EDGE COMPLIANCE**§15.247 (d) & RSS-210(A8.5)****802.11g Low frequency section (spurious in the restricted band 2310 – 2390 MHz)**

EUT: Dell PP12S with BCM94311MCAG
 Customer: Broadcom
 Test Mode: 802.11 g; ch 1; Aux antenna
 ANT Orientation: V
 EUT Orientation: H
 Test Engineer: Juan
 Power Supply: AC Power Supply

SWEET TABLE: "FCC15.247 LBE_AVG"

Start Frequency	Stop Frequency	Detector	Meas.	IF	Transducer
2.3 GHz	2.4 GHz	MaxPeak	Coupled	1 MHz	#326horn_AF_vert

Marker: 2.389799599 GHz 50.61 dB μ V/m

Level [dB μ V/m]

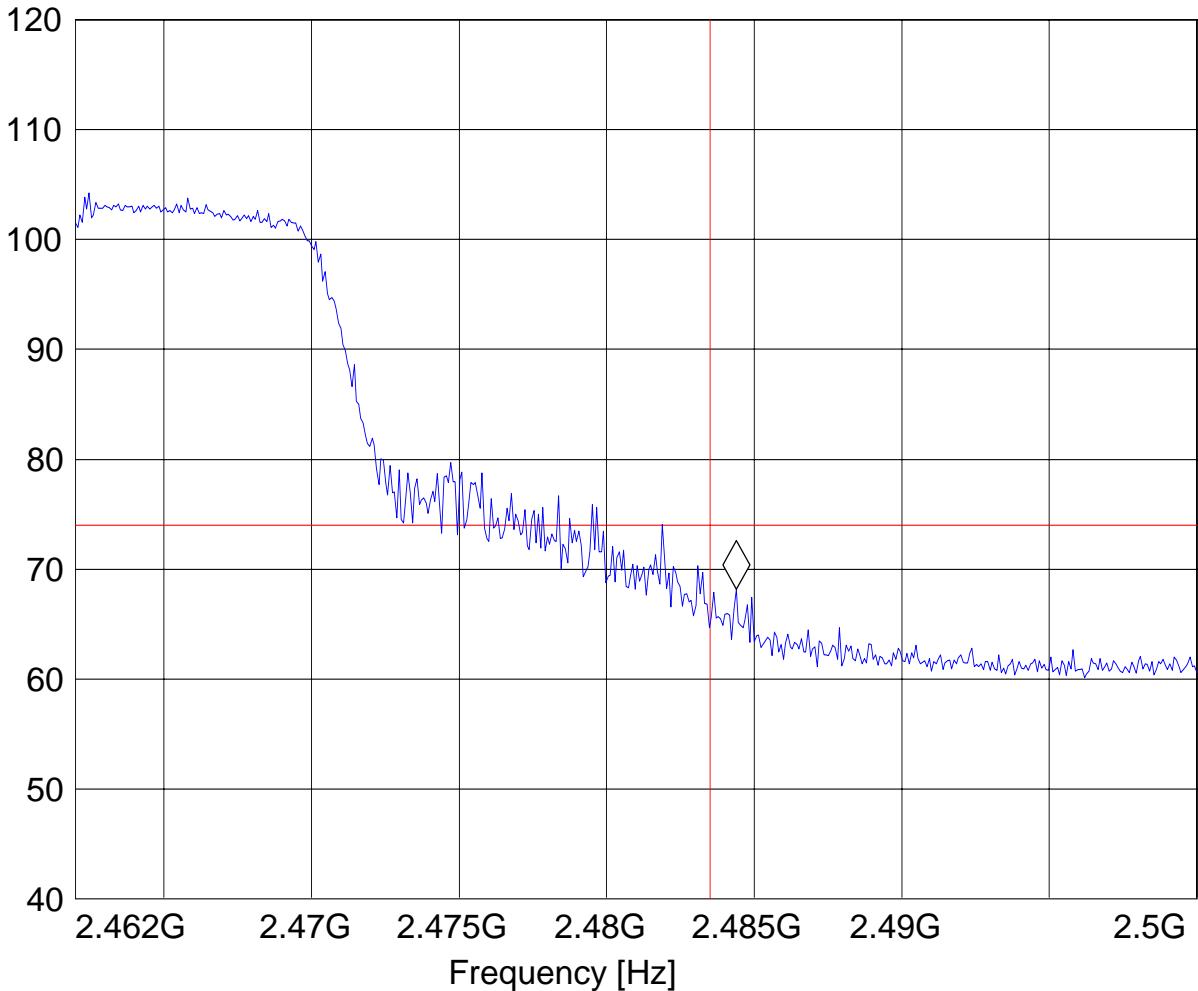
BAND EDGE COMPLIANCE**§15.247 (d) & RSS-210(A8.5)****802.11g High frequency section (spurious in the restricted band 2483.5 – 2500 MHz)**

EUT: Dell PP12S with BCM94311MCAG
 Customer: Broadcom
 Test Mode: 802.11 g; ch 11; Aux antenna
 ANT Orientation: V
 EUT Orientation: H
 Test Engineer: Juan
 Power Supply: AC Power Supply

SWEET TABLE: "FCC15.247 HBE_PK"

Start Frequency	Stop Frequency	Detector	Meas.	IF Time	Transducer
2.5 GHz	2.5 GHz	MaxPeak	Coupled	1 MHz	#326horn_AF_vert

Marker: **2.484388778 GHz** **68.18 dB μ V/m**

Level [dB μ V/m]

BAND EDGE COMPLIANCE**§15.247 (d) & RSS-210(A8.5)****802.11g High frequency section (spurious in the restricted band 2483.5 – 2500 MHz)**

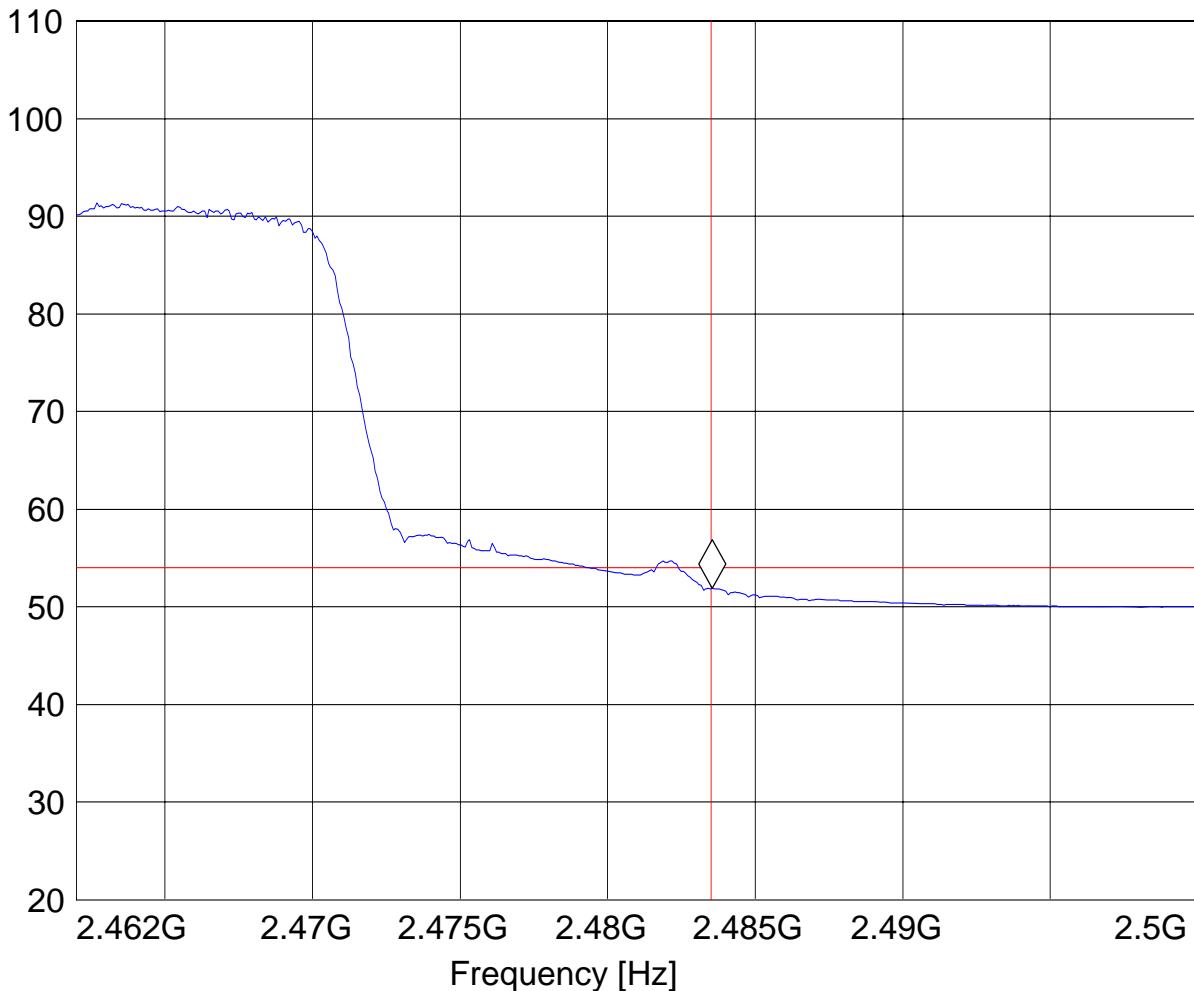
EUT: Dell PP12S with BCM94311MCAG
 Customer: Broadcom
 Test Mode: 802.11 g; ch 11; Aux antenna
 ANT Orientation: V
 EUT Orientation: H
 Test Engineer: Juan
 Power Supply: AC Power Supply

SWEET TABLE: "FCC15.247 HBE_AVG"

Start Frequency	Stop Frequency	Detector	Meas.	IF	Transducer
2.5 GHz	2.5 GHz	MaxPeak	Coupled	1 MHz	#326horn_AF_horz

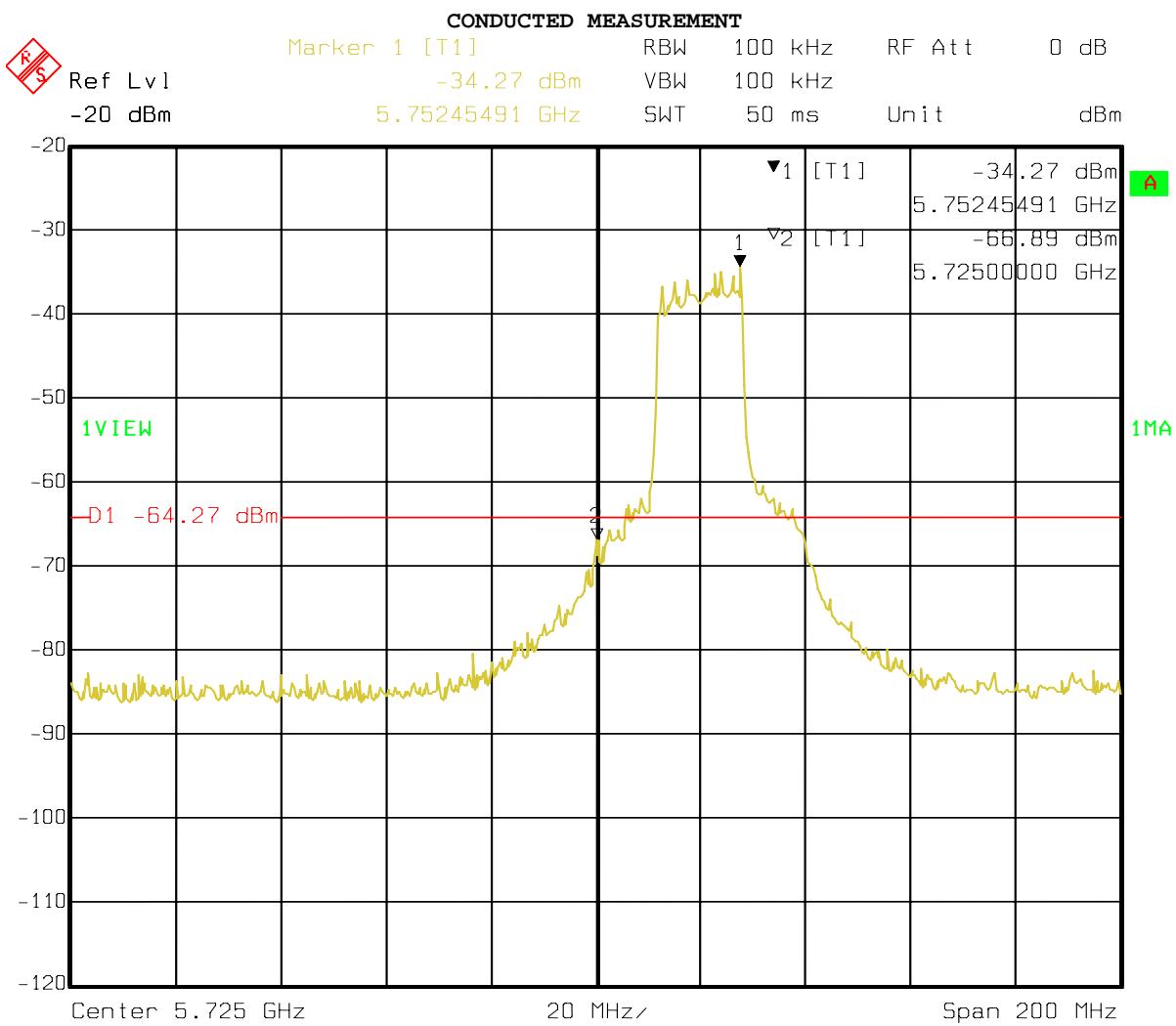
Marker: **2.483551102 GHz** **51.88 dB μ V/m**

Level [dB μ V/m]



1.6 BAND EDGE COMPLIANCE (802.11a)**§15.247 (d) & RSS-210(A8.5)****802.11a Low frequency section (spurious in the restricted band 5725 – 5850 MHz)****CETECOM Inc., 411 Dixon Landing Road, Milpitas CA 95035, USA**

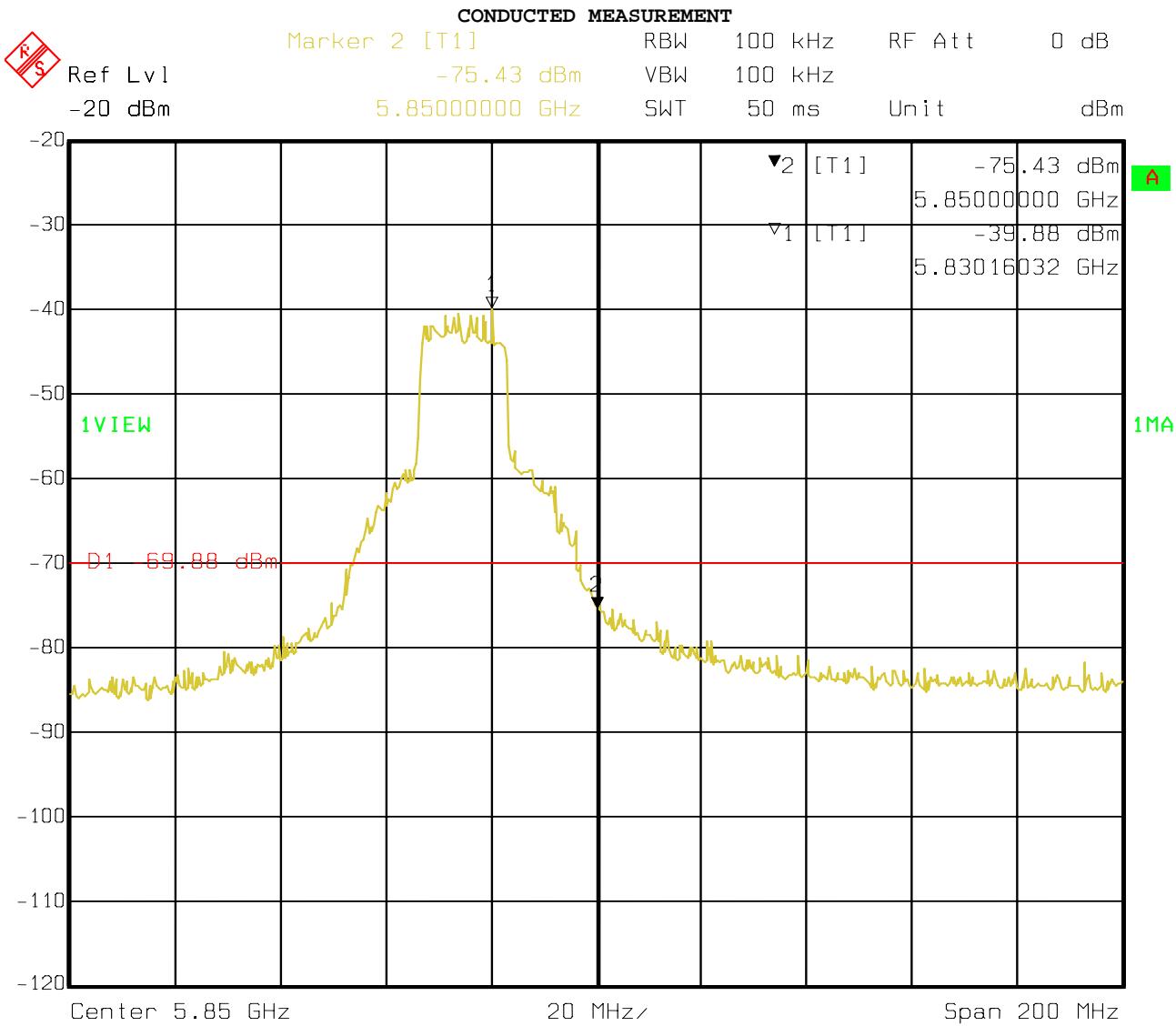
EUT: BCM94311MCAG
 Customer: Broadcom
 Test Mode: 802.11a, ch 149 (Aux Antenna)
 Test Engineer: Juan
 Power Supply: AC Adapter
 Comments:



Date: 07.AUG.2007 10:39:11

BAND EDGE COMPLIANCE**§15.247 (d) & RSS-210(A8.5)****802.11a High frequency section (spurious in the restricted band 5825 – 5850 MHz)****CETECOM Inc., 411 Dixon Landing Road, Milpitas CA 95035, USA**

EUT: BCM94311MCAG
 Customer: Broadcom
 Test Mode: 802.11a, ch 165 (Aux Antenna)
 Test Engineer: Juan
 Power Supply: AC Adapter
 Comments:



Date: 07.AUG.2007 10:34:40

1.7 EMISSION LIMITATIONS

Transmitter (Radiated)

§15.247 (d) & RSS-210(A8.5)

LIMITS

In any 100 kHz bandwidth outside the frequency band at least 20dB below the highest level of the desired power. In addition, radiated emissions, which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

NOTEs:

1. The radiated emissions were done with different settings, using the relevant pre-amplifiers for the relevant frequency ranges. This is the reason that the graphs show different noise levels. In the range between 3 and 26.5 GHz very short cable connections to the antenna was used to minimize the noise level.
2. All measurements are done in peak mode unless specified with the plots.
3. Emissions were measured with the device in 802.11b mode, 802.11g mode, and 802.11a mode.

Results for the radiated measurements below 30MHz according § 15.33

Frequency	Measured values	Remarks
9KHz – 30MHz	No emissions found, caused by the EUT	This is valid for all the tested channels

1.8 EMISSION LIMITATIONS - Radiated (Transmitter), 802.11b

§15.247 (d) & RSS-210(A8.5):

Transmit at Lowest channel Frequency 2412MHz (802.11b)			
Frequency (MHz)	Level (dBμV/m)		
	Peak	Quasi-Peak	Average
SEE PLOTS			
Transmit at Middle channel Frequency 2437MHz (802.11b)			
Frequency (MHz)	Level (dBμV/m)		
	Peak	Quasi-Peak	Average
SEE PLOTS			
Transmit at Highest channel Frequency 2462MHz (802.11b)			
Frequency (MHz)	Level (dBμV/m)		
	Peak	Quasi-Peak	Average
SEE PLOTS			

EMISSION LIMITATIONS - Radiated (Transmitter) §15.247 (d) & RSS-210(A8.5)**Lowest Channel (2412MHz): 30MHz – 1GHz****Note: This plot is valid for low, mid, high channels (worst-case plot)****CETECOM Inc., 411 Dixon Landing Road, Milpitas CA 95035, USA**

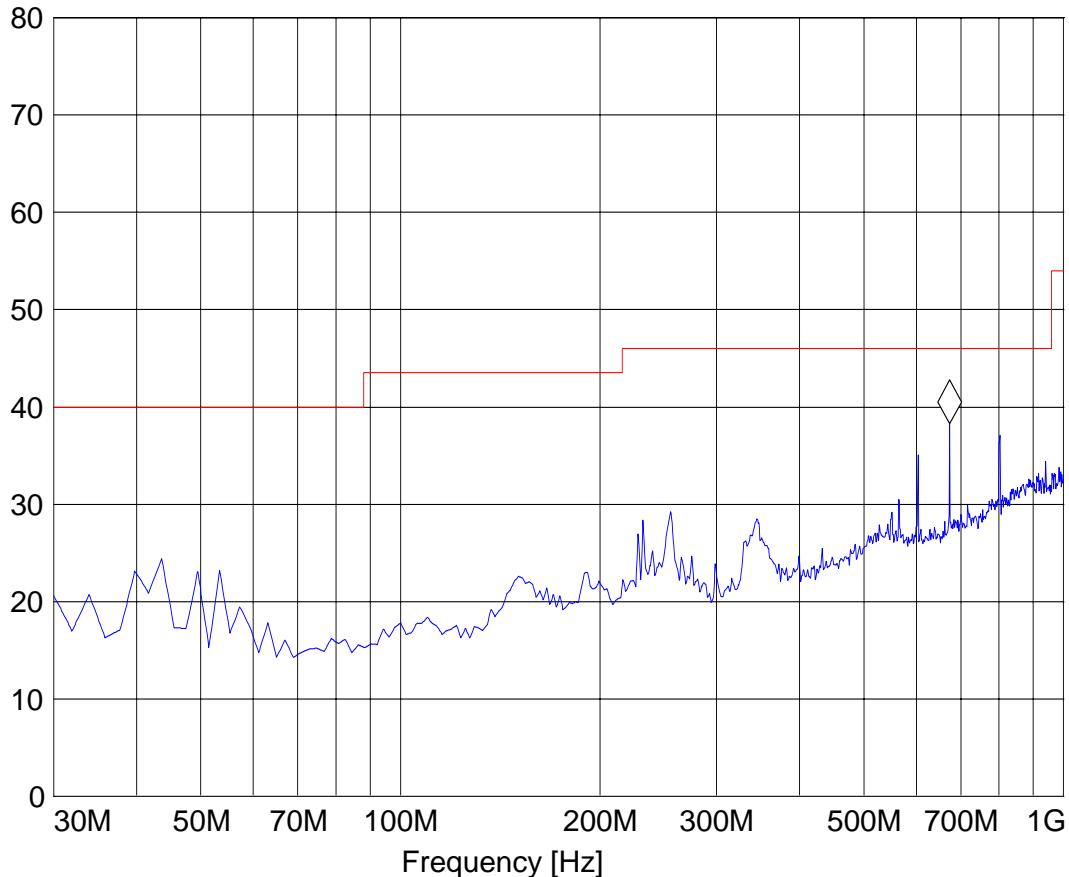
EUT: Dell PP12S with BCM94311MCAG
 Customer: Broadcom
 Test Mode: 802.11b, ch 1 (Aux Antenna)
 ANT Orientation: V
 EUT Orientation: H
 Test Engineer: Ed
 Power Supply: AC Adapter
 Comments:

SWEET TABLE: "FCC15.247_30M-1G_Ver"

Start Frequency	Stop Frequency	Detector	Meas. Time	IF Bandw.	Transducer
30.0 MHz	1.0 GHz	MaxPeak	Coupled	100 kHz	3141-#1186_Vert

Marker: 673.426854 MHz 38.28 dB μ V/m

Level [dB μ V/m]

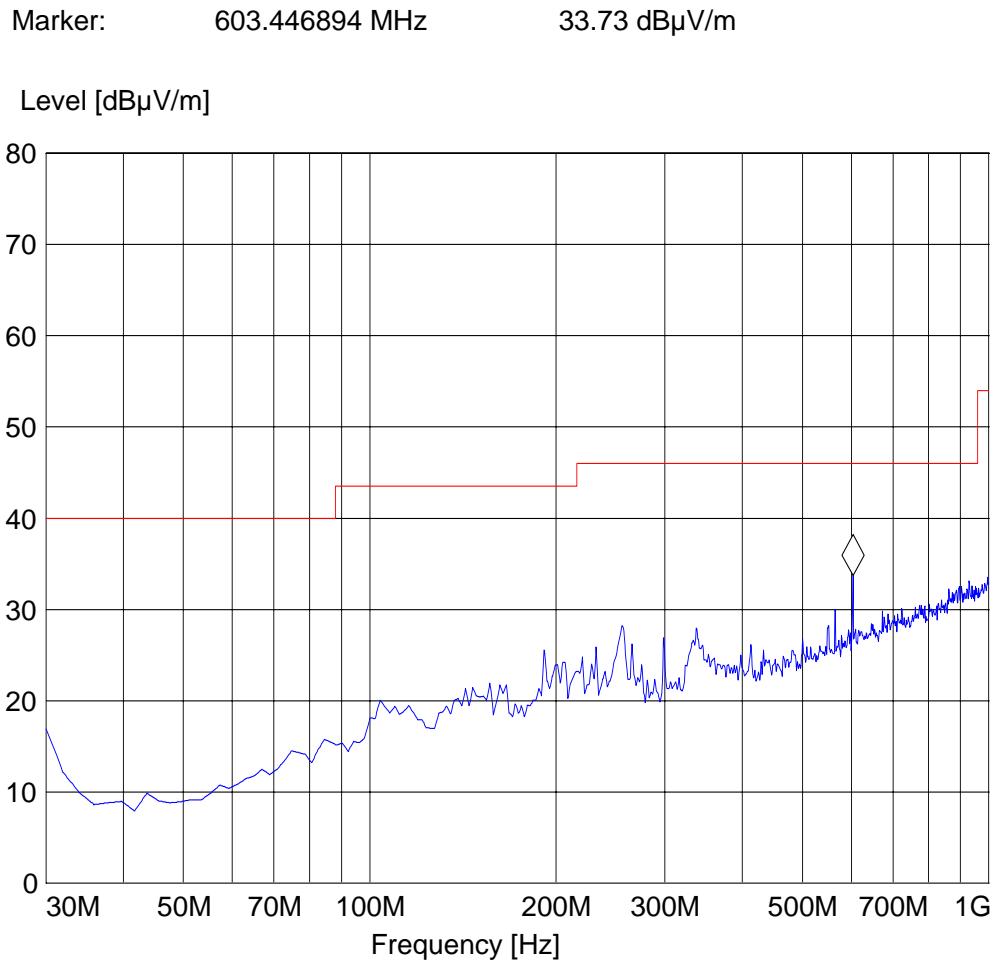


EMISSION LIMITATIONS - Radiated (Transmitter) §15.247 (d) & RSS-210(A8.5)**Lowest Channel (2412MHz): 30MHz – 1GHz****Antenna: Horizontal****Note: This plot is valid for low, mid, high channels (worst-case plot)****CETECOM Inc., 411 Dixon Landing Road, Milpitas CA 95035, USA**

EUT: Dell PP12S with BCM94311MCAG
 Customer: Broadcom
 Test Mode: 802.11b, ch 1 (Aux Antenna)
 ANT Orientation: H
 EUT Orientation: H
 Test Engineer: Ed
 Power Supply: AC Adapter
 Comments:

SWEEP TABLE: "FCC15.247_30M-1G_Hor"

Start Frequency	Stop Frequency	Detector	Meas.	IF Time	Transducer
30.0 MHz	1.0 GHz	MaxPeak	Coupled	100 kHz	3141-#1186_Horz



EMISSION LIMITATIONS - Radiated (Transmitter) §15.247 (d) & RSS-210(A8.5)
Lowest Channel (2412MHz): 1GHz – 18GHz

Note: Peak above the limit line is the carrier freq.

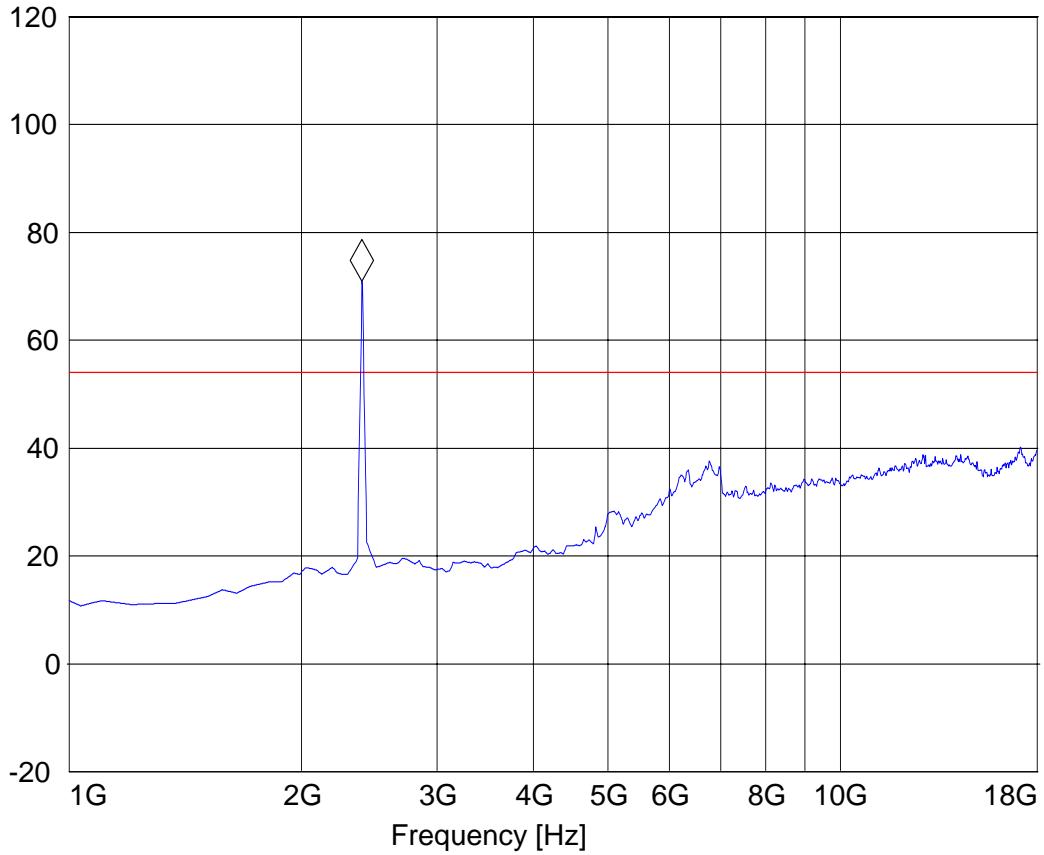
EUT: BCM94311MCAG
 Customer: Broadcom
 Test Mode: 802.11b, ch 1 (Aux Antenna)
 ANT Orientation: V
 EUT Orientation: H
 Test Engineer: Juan
 Voltage: AC Adapter
 Comments: Marker on fundamental signal

SWEET TABLE: "FCC15.247_1-18G"

Start Frequency	Stop Frequency	Detector	Meas.	IF Time	Transducer
1.0 GHz	18.0 GHz	MaxPeak	Coupled	1 MHz	#326horn_AF_horz

Marker: 2.396793587 GHz 70.91 dB μ V/m

Level [dB μ V/m]



EMISSION LIMITATIONS - Radiated (Transmitter) §15.247 (d) & RSS-210(A8.5)**Lowest Channel (2412MHz): 1GHz – 18GHz**

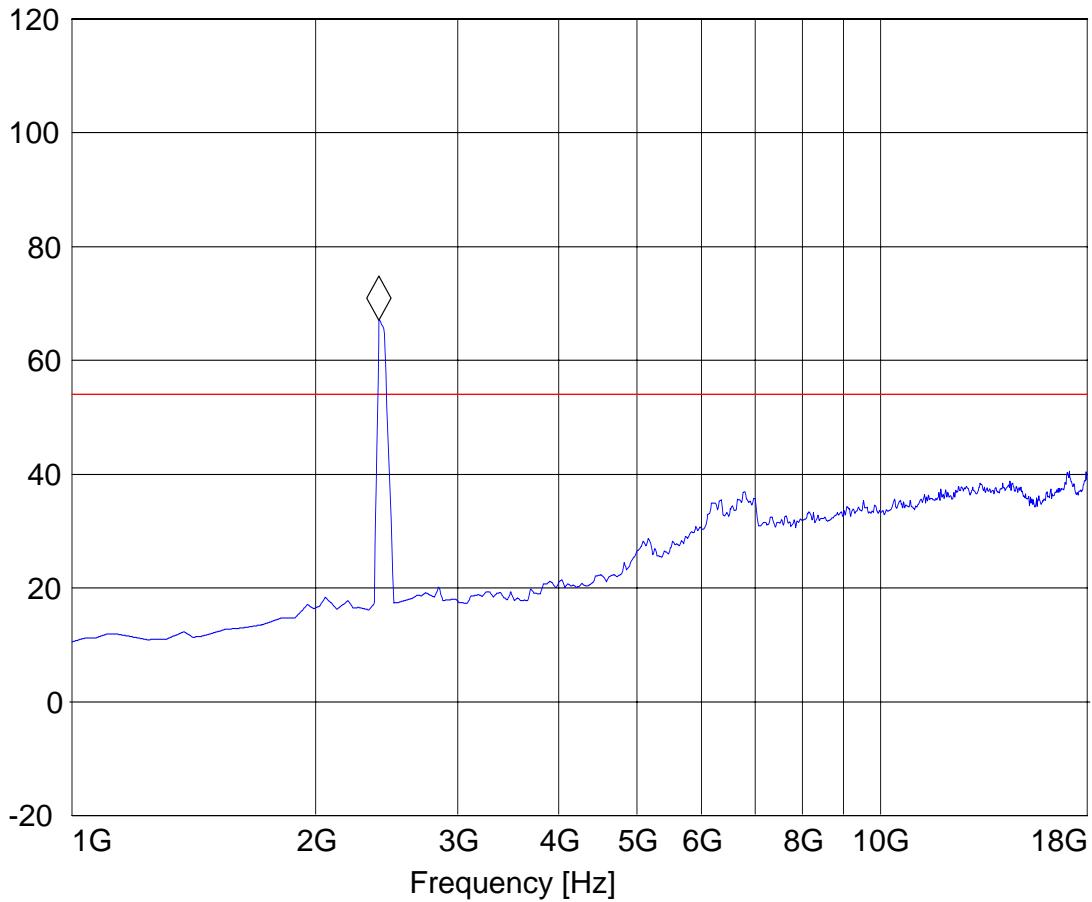
EUT / Description: BCM94311MCAG
 Manufacturer: Broadcom
 Test mode: 802.11b, Ch. 1 (Aux Antenna)
 ANT Orientation: H
 EUT Orientation: H
 Test Engineer: Juan
 Voltage: AC Adapter
 Comments: Marker on fundamental signal

SWEET TABLE: "FCC15.247_1-18G"

Start Frequency	Stop Frequency	Detector	Meas.	IF Time	Transducer
1.0 GHz	18.0 GHz	MaxPeak	Coupled	1 MHz	#326horn_AF_horz

Marker: 2.396793587 GHz 67.13 dB μ V/m

Level [dB μ V/m]



EMISSION LIMITATIONS - Radiated (Transmitter) §15.247 (d) & RSS-210(A8.5)
Mid Channel (2437MHz): 1GHz – 18GHz

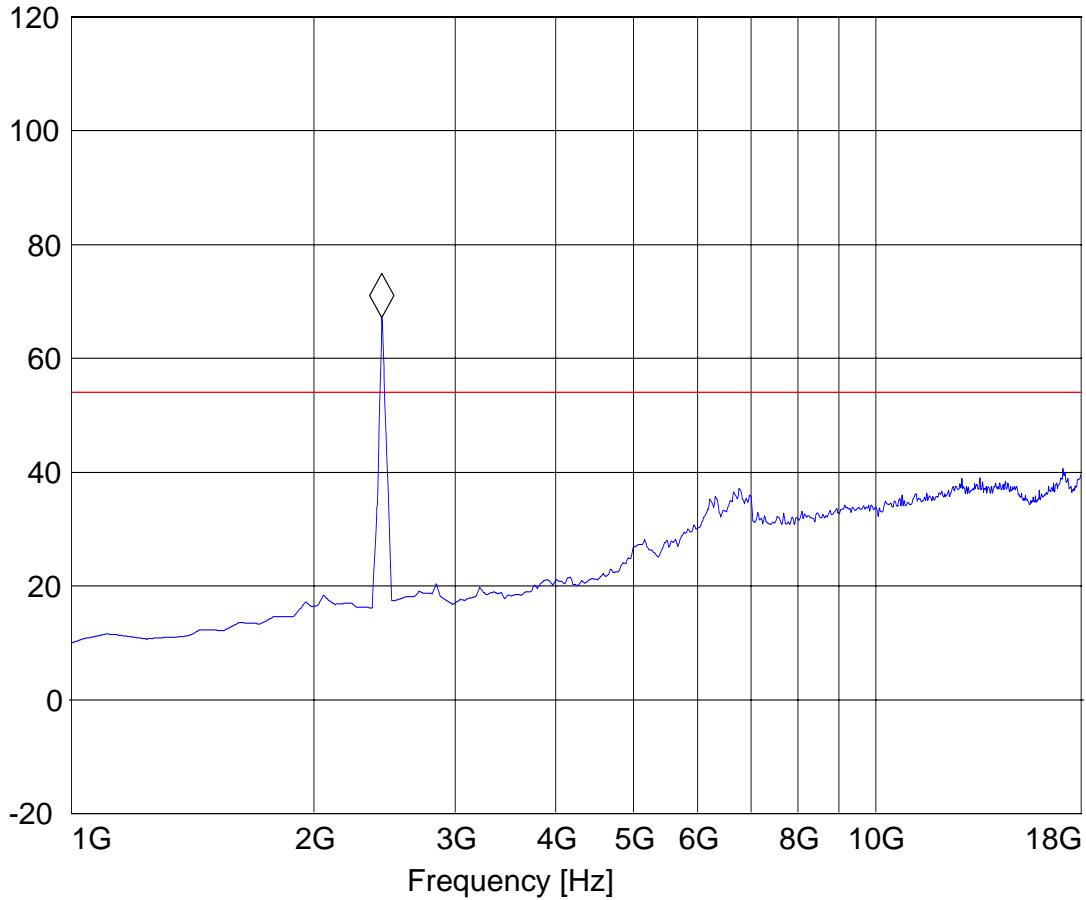
EUT / Description: BCM94311MCAG
 Manufacturer: Broadcom
 Test mode: 802.11b, Ch. 6 (Aux Antenna)
 ANT Orientation: V
 EUT Orientation: H
 Test Engineer: Juan
 Voltage: AC Adapter
 Comments: Marker on fundamental signal

SWEET TABLE: "FCC15.247_1-18G"

Start Frequency	Stop Frequency	Detector	Meas.	IF Time	Transducer
1.0 GHz	18.0 GHz	MaxPeak	Coupled	1 MHz	#326horn_AF_horz

Marker: 2.430861723 GHz 67.16 dB μ V/m

Level [dB μ V/m]



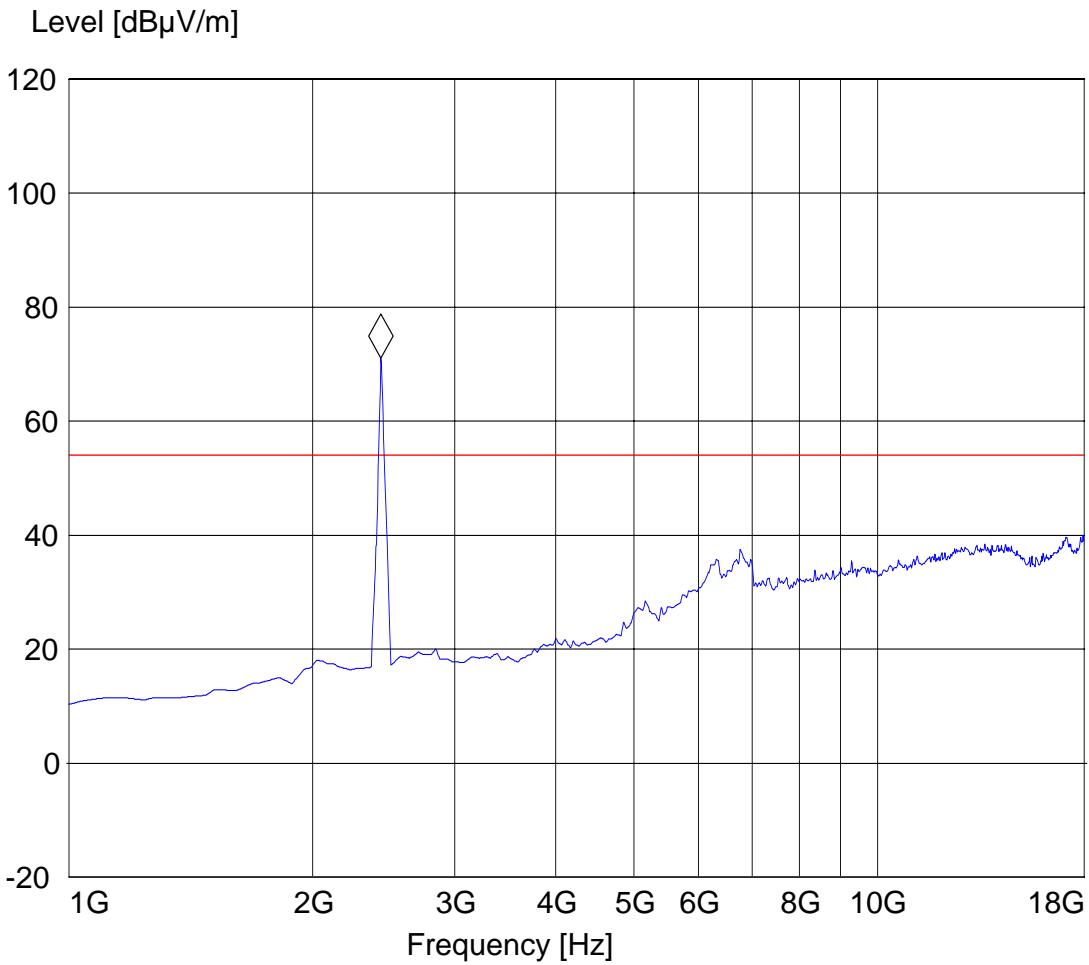
EMISSION LIMITATIONS - Radiated (Transmitter) §15.247 (d) & RSS-210(A8.5)
Mid Channel (2437MHz): 1GHz – 18GHz

EUT / Description: BCM94311MCAG
 Manufacturer: Broadcom
 Test mode: 802.11b, Ch. 6 (Aux Antenna)
 ANT Orientation: H
 EUT Orientation: H
 Test Engineer: Juan
 Voltage: AC Adapter
 Comments: Marker on fundamental signal

SWEEP TABLE: "FCC15.247_1-18G"

Start Frequency	Stop Frequency	Detector	Meas.	IF	Transducer
1.0 GHz	18.0 GHz	MaxPeak	Time Coupled	1 MHz	#326horn_AF_horz

Marker: 2.430861723 GHz 71.01 dB μ V/m

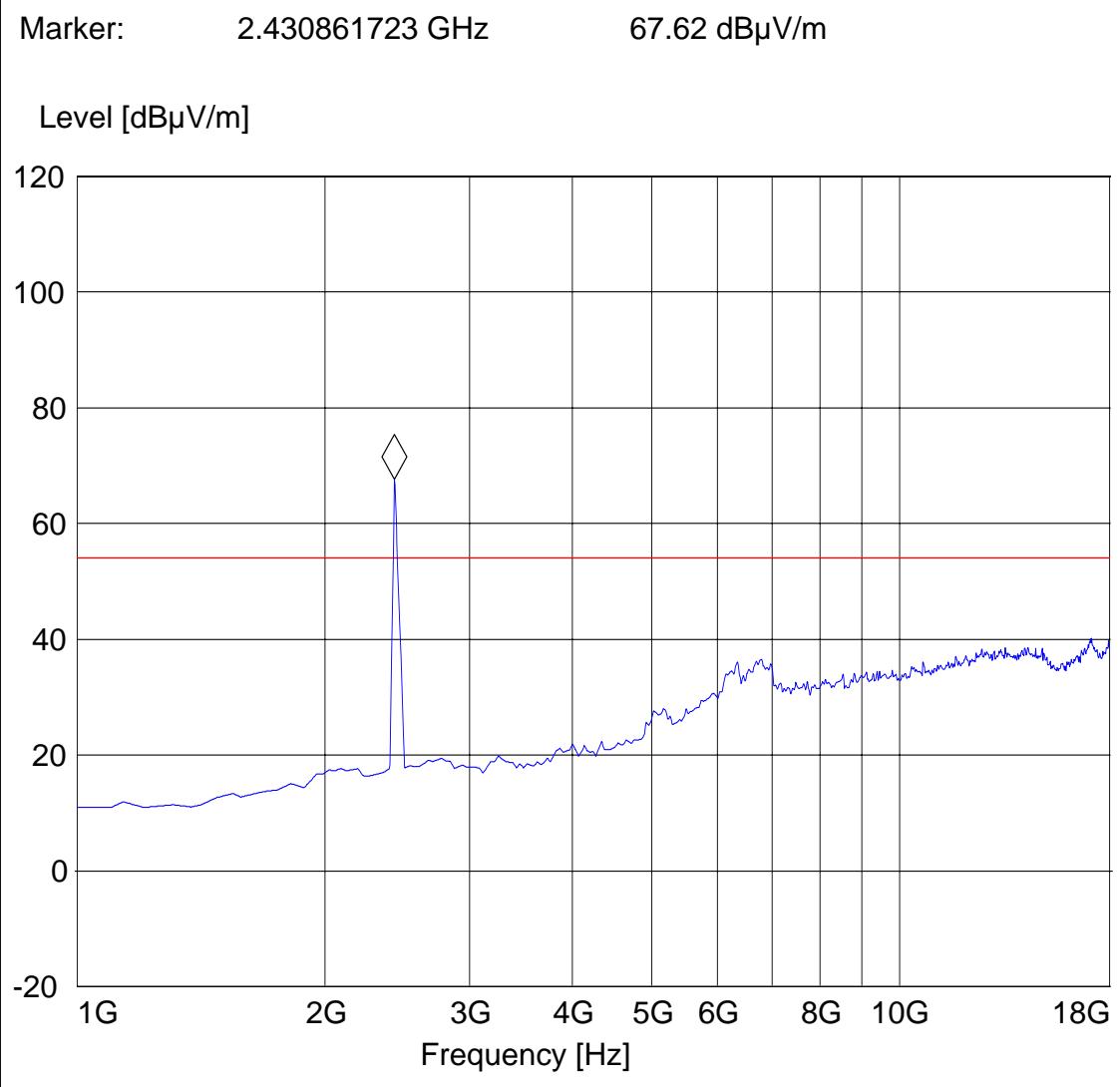


EMISSION LIMITATIONS - Radiated (Transmitter) §15.247 (d) & RSS-210(A8.5)
Highest Channel (2462MHz): 1GHz – 18GHz

EUT / Description: BCM94311MCAG
 Manufacturer: Broadcom
 Test mode: 802.11b, Ch. 11 (Aux Antenna)
 ANT Orientation: V
 EUT Orientation: H
 Test Engineer: Juan
 Voltage: AC Adapter
 Comments: Marker on fundamental signal

SWEET TABLE: "FCC15.247_1-18G"

Start Frequency	Stop Frequency	Detector	Meas.	IF Time	Transducer
1.0 GHz	18.0 GHz	MaxPeak	Coupled	1 MHz	#326horn_AF_horz



EMISSION LIMITATIONS - Radiated (Transmitter) §15.247 (d) & RSS-210(A8.5)**Highest Channel (2462MHz): 1GHz – 18GHz**

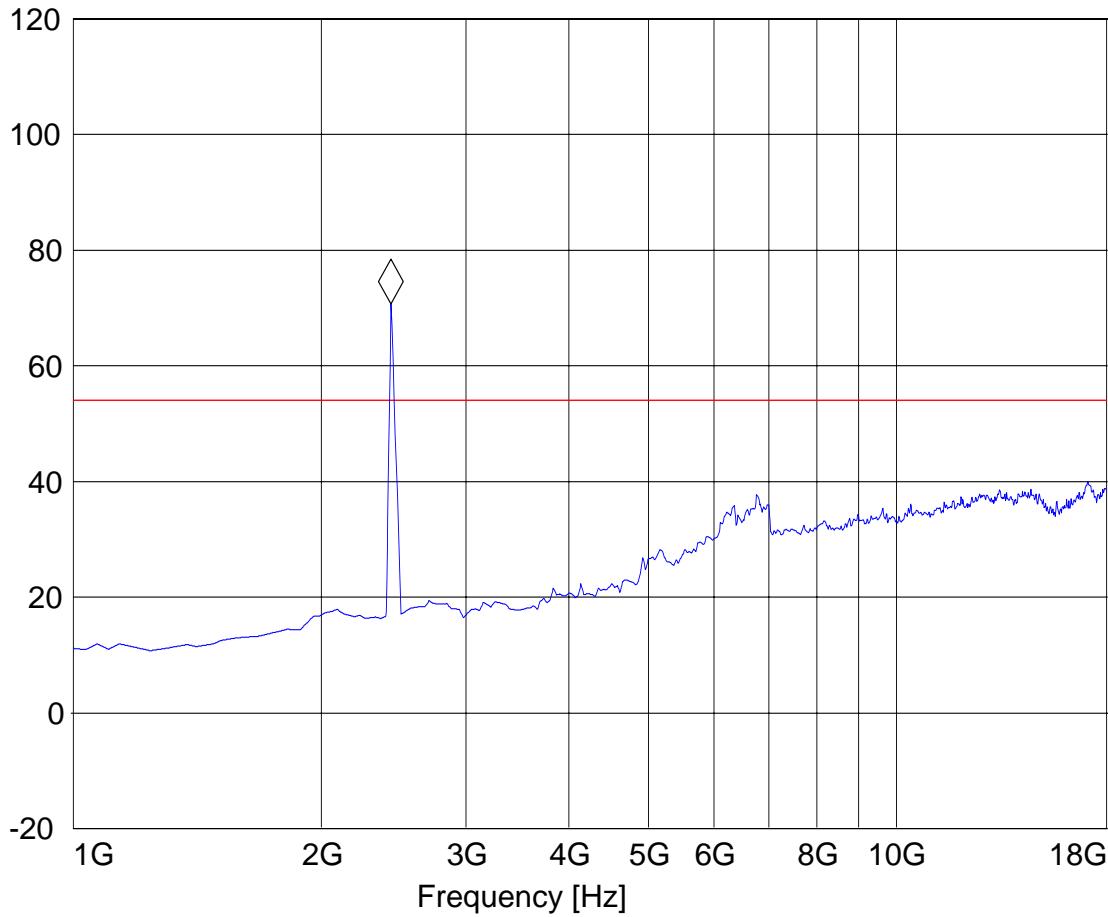
EUT / Description: BCM94311MCAG
 Manufacturer: Broadcom
 Test mode: 802.11b, Ch. 11 (Aux Antenna)
 ANT Orientation: H
 EUT Orientation: H
 Test Engineer: Juan
 Voltage: AC Adapter
 Comments: Marker on fundamental signal

SWEEP TABLE: "FCC15.247_1-18G"

Start Frequency	Stop Frequency	Detector	Meas.	IF	Transducer
1.0 GHz	18.0 GHz	MaxPeak	Time Coupled	1 MHz	#326horn_AF_horz

Marker: 2.430861723 GHz 70.71 dB μ V/m

Level [dB μ V/m]



EMISSION LIMITATIONS - Radiated (Transmitter) §15.247 (d) & RSS-210(A8.5)**18GHz – 26.5GHz for low, middle, and high channels****Note: This plot is valid for low, mid, high channels (worst-case plot)**

EUT / Description: BCM94311MCAG

Manufacturer: Broadcom

Test Mode: 802.11b, Measurement for low, middle, and high channels

ANT Orientation: V

EUT Orientation: H

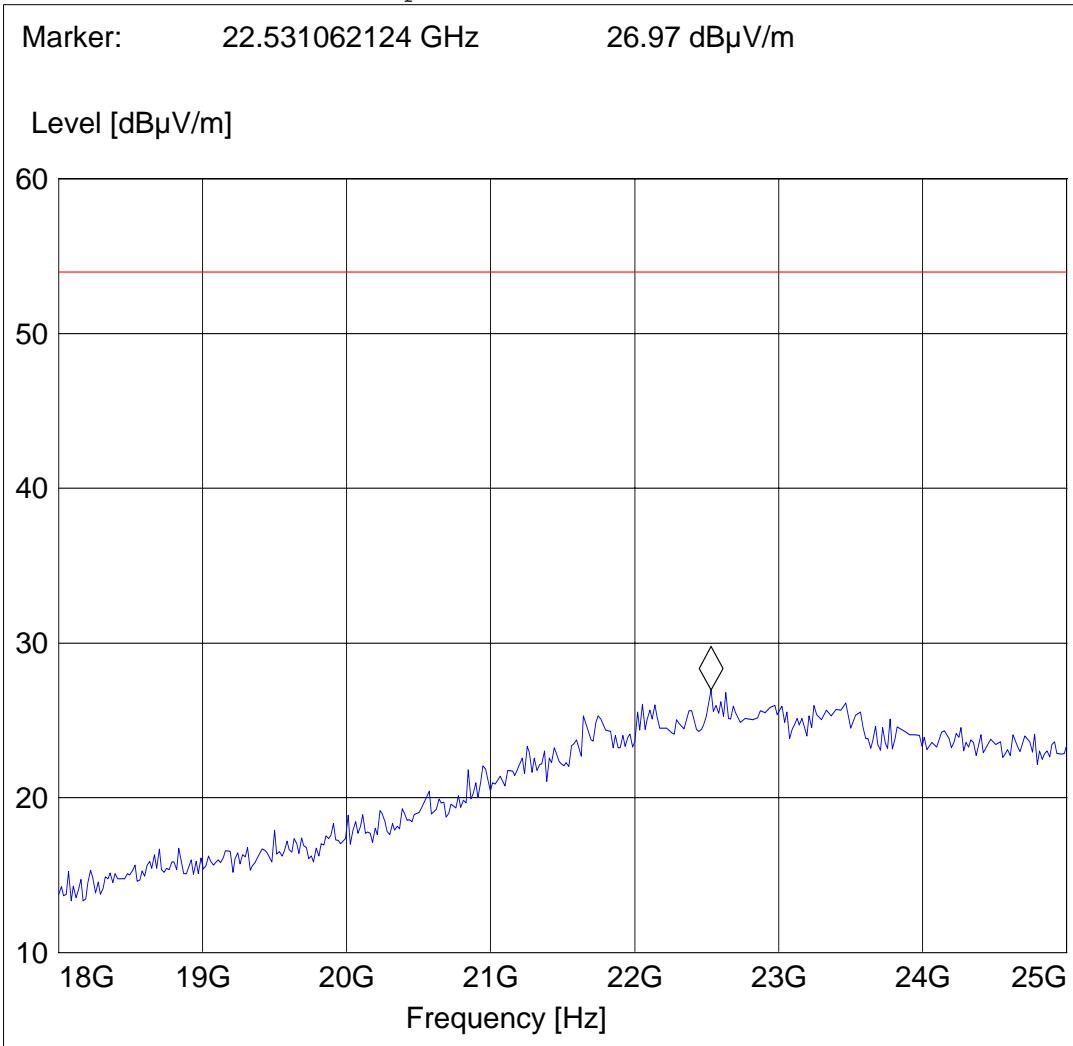
Test Engineer: Juan

Power Supply: AC Adapter

Comments:

SWEET TABLE: "FCC15.247_18-26.5G"

Start Frequency	Stop Frequency	Detector	Meas.	IF Time	Transducer
18.0 GHz	26.5 GHz	MaxPeak	Coupled	1 MHz	#572 horn AF



1.9 EMISSION LIMITATIONS - Radiated (Transmitter), 802.11g

§15.247 (d) & RSS-210(A8.5):

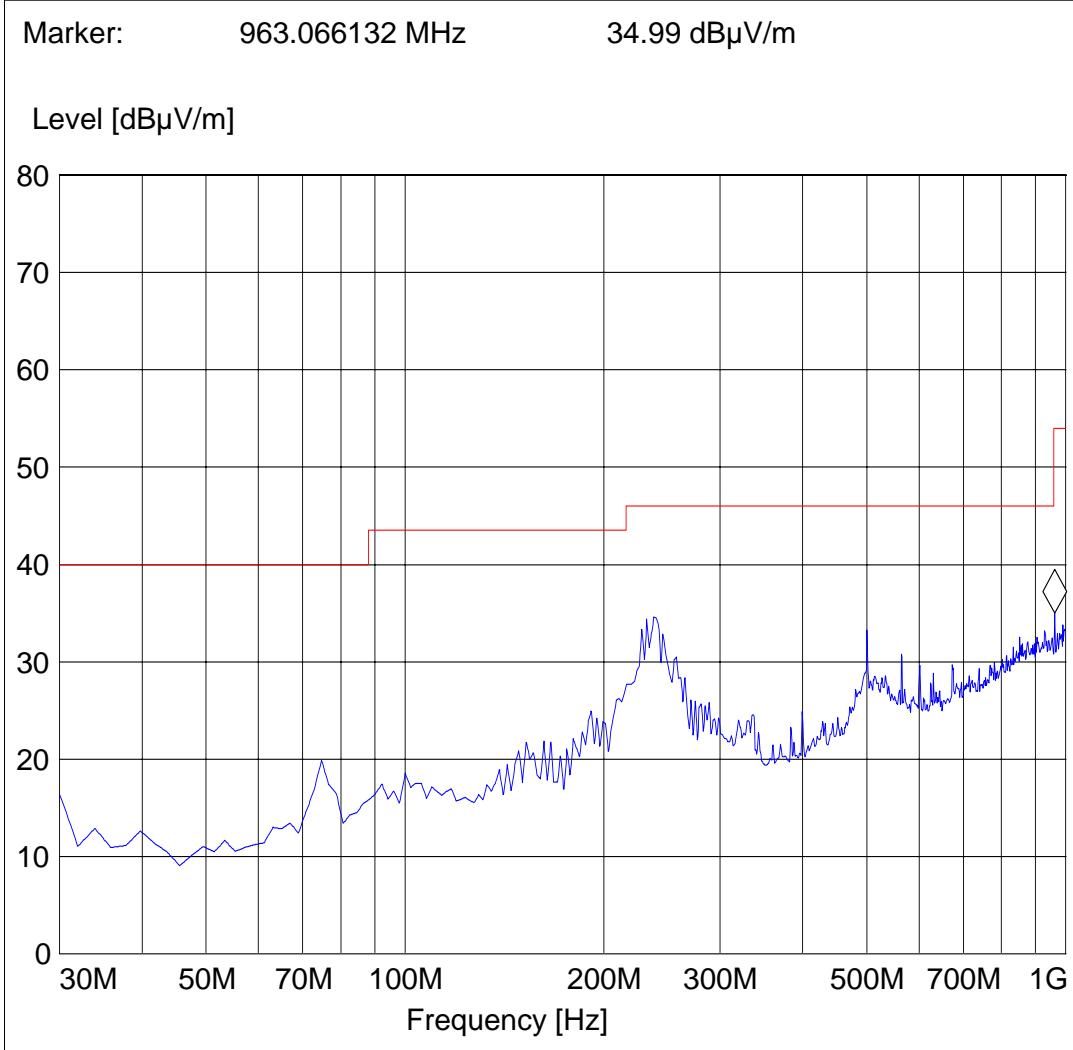
Transmit at Lowest channel Frequency 2412MHz (802.11g)			
Frequency (MHz)	Level (dB μ V/m)		
	Peak	Quasi-Peak	Average
SEE PLOTS			
Transmit at Middle channel Frequency 2437MHz (802.11g)			
Frequency (MHz)	Level (dB μ V/m)		
	Peak	Quasi-Peak	Average
SEE PLOTS			
Transmit at Highest channel Frequency 2462MHz (802.11g)			
Frequency (MHz)	Level (dB μ V/m)		
	Peak	Quasi-Peak	Average
SEE PLOTS			

EMISSION LIMITATIONS - Radiated (Transmitter) §15.247 (d) & RSS-210(A8.5)**Lowest Channel (2412MHz): 30MHz – 1GHz****Note: This plot is valid for low, mid, high channels (worst-case plot)**

EUT: BCM94311MCAG
 Customer: Broadcom
 Test Mode: 802.11g, ch 1 (Aux Antenna)
 ANT Orientation: V
 EUT Orientation: H
 Test Engineer: Ed
 Power Supply: AC Adapter
 Comments:

SWEET TABLE: "FCC15.247_30M-1G_Ver"

Start Frequency	Stop Frequency	Detector	Meas.	IF	Transducer
30.0 MHz	1.0 GHz	MaxPeak	Time Coupled	100 kHz	3141-#1186_Vert



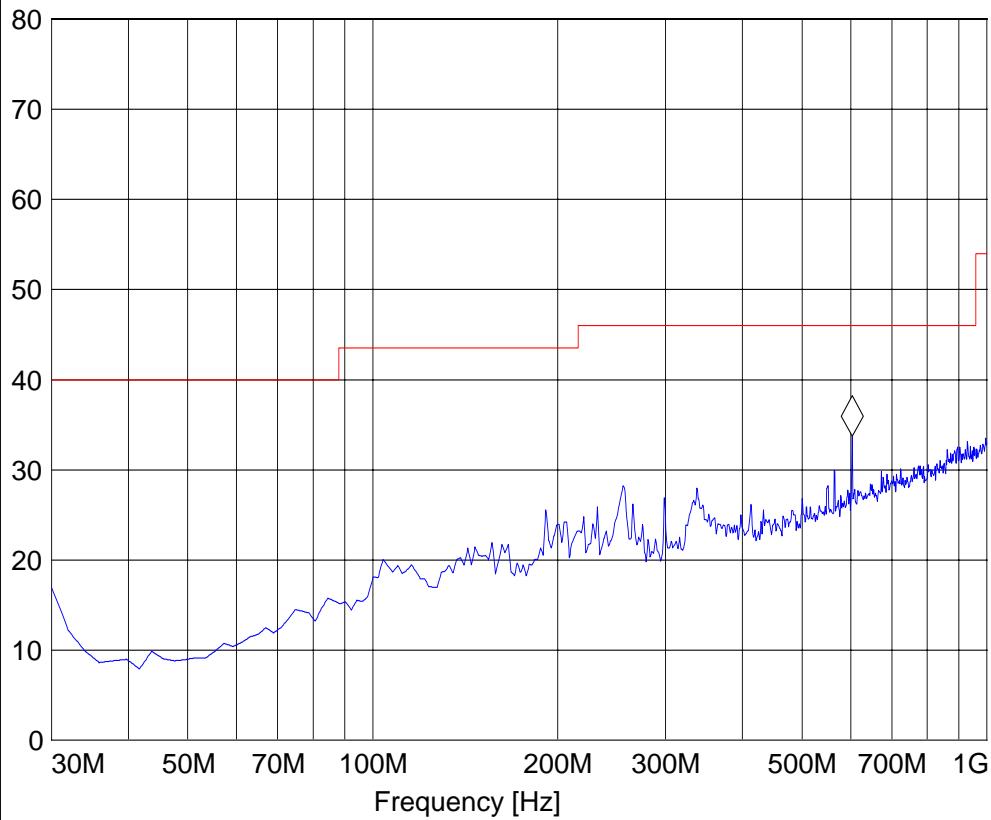
EMISSION LIMITATIONS - Radiated (Transmitter)**§15.247 (d) & RSS-210(A8.5)****Lowest Channel (2412MHz): 30MHz – 1GHz****Antenna: Horizontal****Note: This plot is valid for low, mid, high channels (worst-case plot)**

EUT: BCM94311MCAG
 Customer: Broadcom
 Test Mode: 802.11g, ch 1 (Aux Antenna)
 ANT Orientation: H
 EUT Orientation: H
 Test Engineer: Ed
 Power Supply: AC Adapter
 Comments:

SWEET TABLE: "FCC15.247_30M-1G_Hor"

Start Frequency	Stop Frequency	Detector	Meas.	IF	Transducer
30.0 MHz	1.0 GHz	MaxPeak	Time Coupled	100 kHz	3141-#1186_Horz

Marker: 603.446894 MHz 33.73 dB μ V/m

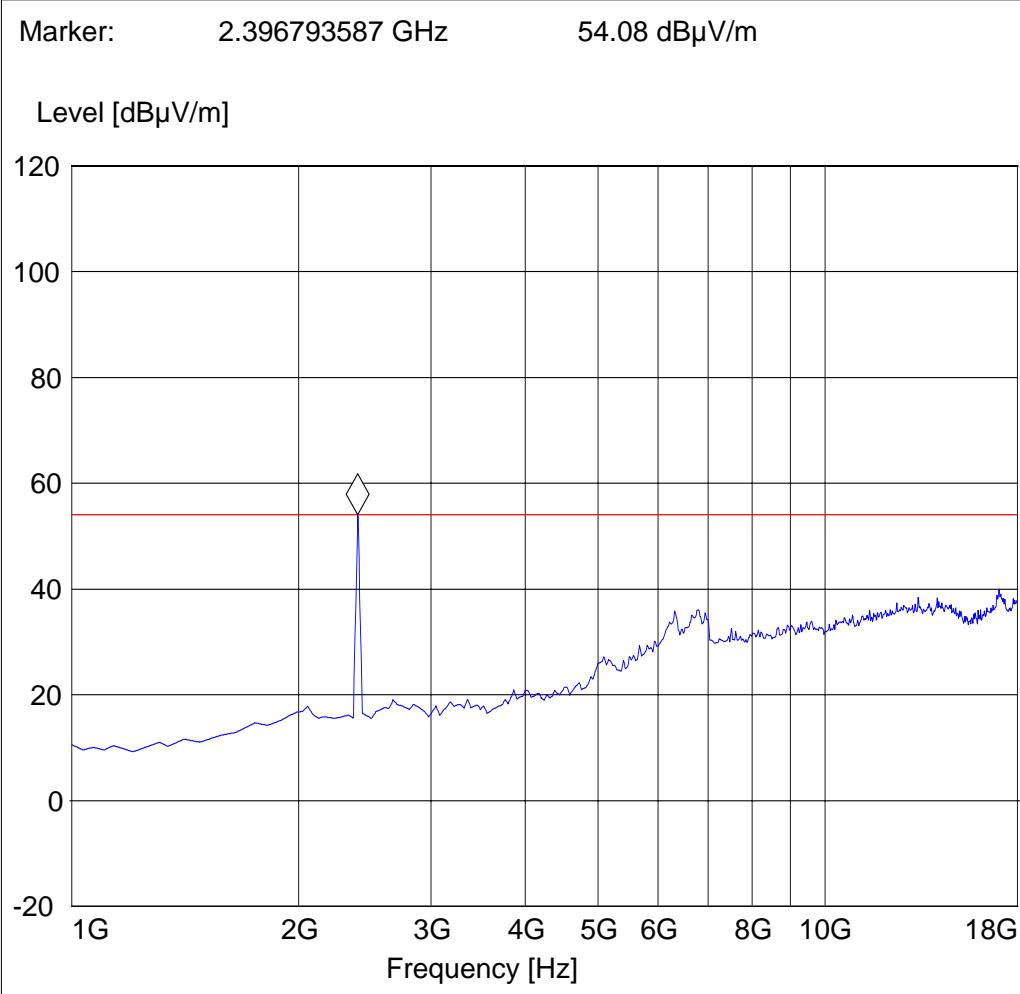
Level [dB μ V/m]

EMISSION LIMITATIONS - Radiated (Transmitter)**§15.247 (d) & RSS-210(A8.5)****Lowest Channel (2412MHz): 1GHz – 18GHz****Note: No significant harmonic emissions detected either in Vertical or Horizontal**

EUT / Description: BCM94311MCAG
 Manufacturer: Broadcom
 Test mode: 802.11g, Ch. 1 (Aux Antenna)
 ANT Orientation: H
 EUT Orientation: H
 Test Engineer: Ed
 Voltage: AC Adapter
 Comments: Marker on fundamental signal

SWEET TABLE: "FCC15.247_1-18G"

Start Frequency	Stop Frequency	Detector	Meas.	IF Time	Transducer
1.0 GHz	18.0 GHz	MaxPeak	Coupled	1 MHz	#326horn_AF_horz

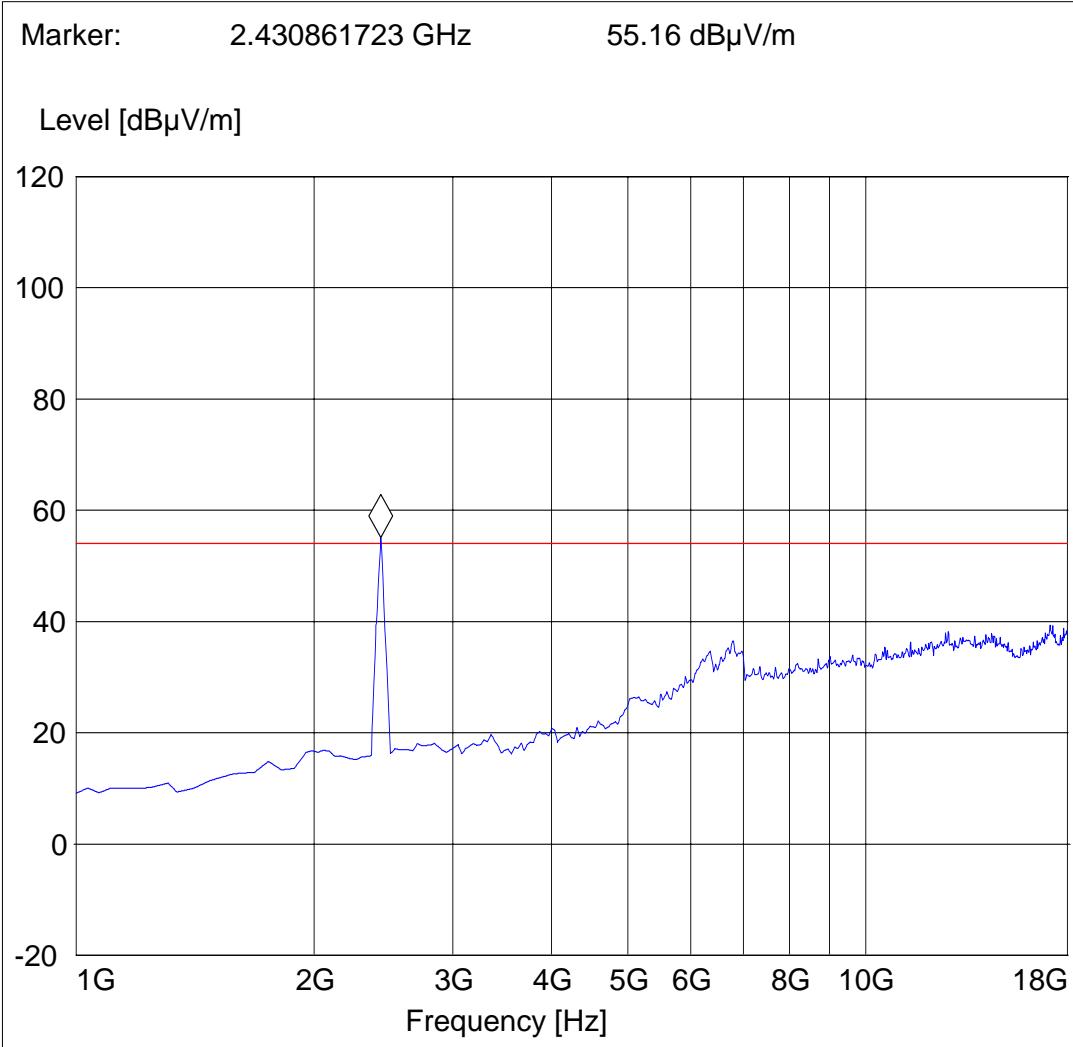


EMISSION LIMITATIONS - Radiated (Transmitter)**§15.247 (d) & RSS-210(A8.5)****Mid Channel (2437MHz): 1GHz – 18GHz****Note: No significant harmonic emissions detected either in Vertical or Horizontal**

EUT / Description: BCM94311MCAG
 Manufacturer: Broadcom
 Test mode: 802.11g, Ch. 6 (Aux Antenna)
 ANT Orientation: H
 EUT Orientation: H
 Test Engineer: Ed
 Voltage: AC Adapter
 Comments: Marker on fundamental signal

SWEET TABLE: "FCC15.247_1-18G"

Start Frequency	Stop Frequency	Detector	Meas.	IF Time	Transducer
1.0 GHz	18.0 GHz	MaxPeak	Coupled	1 MHz	#326horn_AF_horz

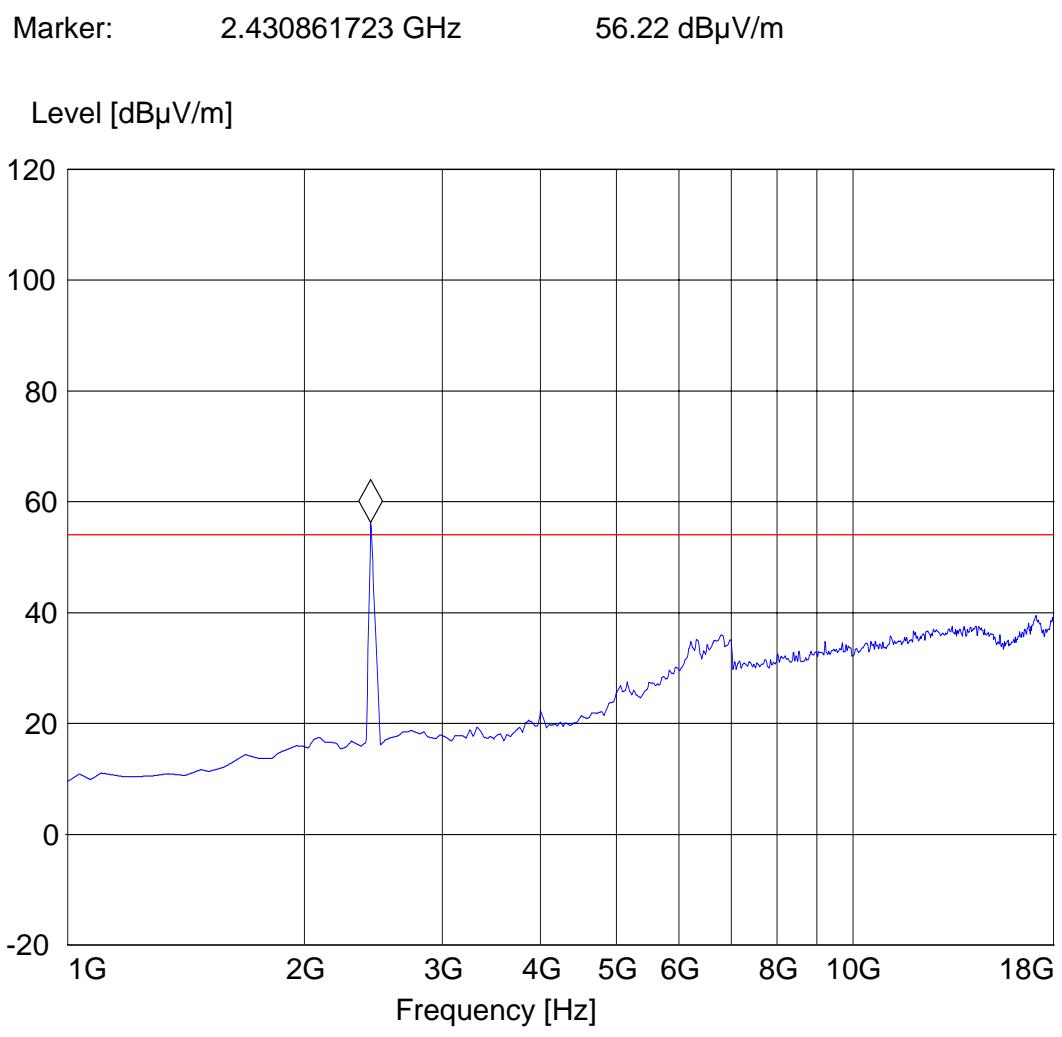


EMISSION LIMITATIONS - Radiated (Transmitter)**§15.247 (d) & RSS-210(A8.5)****Highest Channel (2462MHz): 1GHz – 18GHz****Note: No significant harmonic emissions detected either in Vertical or Horizontal**

EUT / Description: BCM94311MCAG
 Manufacturer: Broadcom
 Test mode: 802.11g, Ch. 11 (Aux Antenna)
 ANT Orientation: H
 EUT Orientation: H
 Test Engineer: Ed
 Voltage: AC Adapter
 Comments: Marker on fundamental signal

SWEET TABLE: "FCC15.247_1-18G"

Start Frequency	Stop Frequency	Detector	Meas.	IF	Transducer
1.0 GHz	18.0 GHz	MaxPeak	Time Coupled	1 MHz	#326horn_AF_horz



EMISSION LIMITATIONS - Radiated (Transmitter)**§15.247 (d) & RSS-210(A8.5)****18GHz – 26.5GHz for low, middle, and high channels****Note: This plot is valid for low, mid, high channels (worst-case plot)**

EUT / Description: BCM94311MCAG

Manufacturer: Broadcom

Test Mode: 802.11g, Measurement for low, middle, and high channels

ANT Orientation: V

EUT Orientation: H

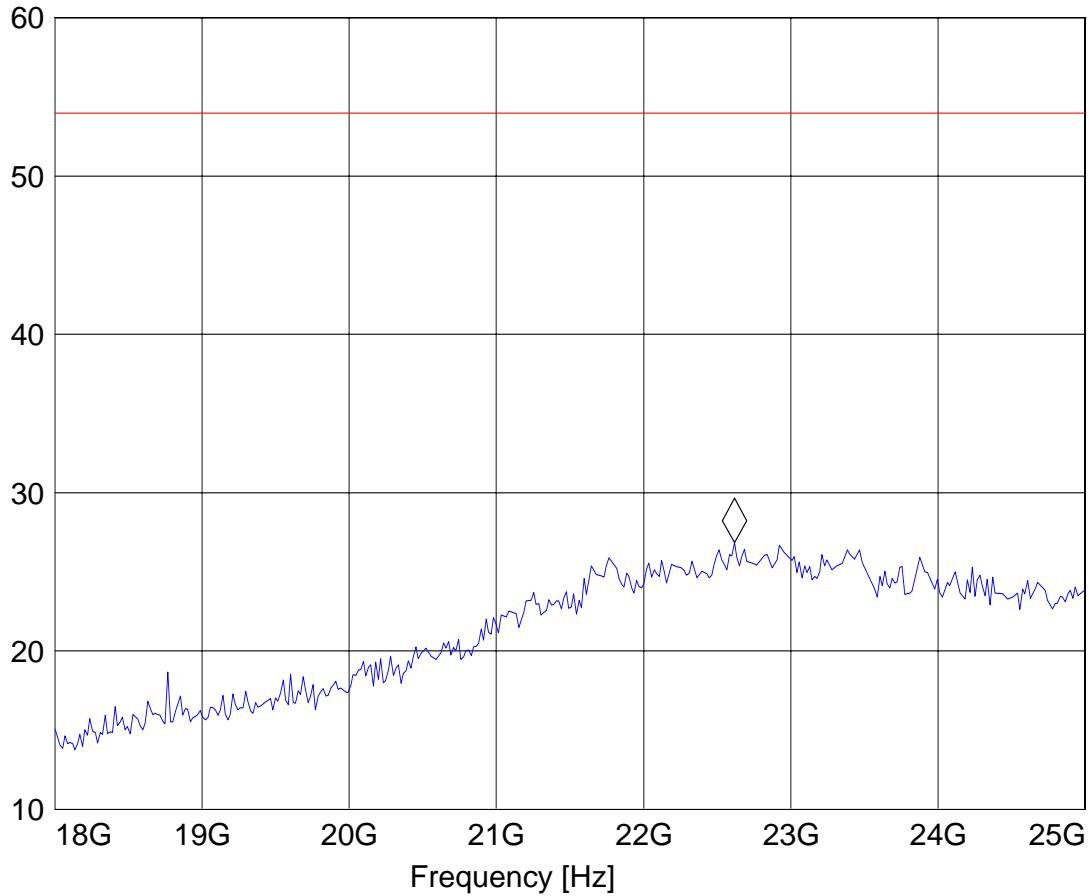
Test Engineer: Juan

Power Supply: AC Adapter

Comments:

SWEET TABLE: "FCC15.247_18-26.5G"

Start Frequency	Stop Frequency	Detector	Meas. Time	IF Bandw.	Transducer
18.0 GHz	26.5 GHz	MaxPeak	Coupled	1 MHz	#572 horn AF

Marker: 22.616232465 GHz 26.85 dB μ V/mLevel [dB μ V/m]

1.10 EMISSION LIMITATIONS - Radiated (Transmitter), 802.11a

§15.247 (d) & RSS-210(A8.5):

Transmit at Lowest channel Frequency 5745MHz (802.11a)			
Frequency (MHz)	Level (dB μ V/m)		
	Peak	Quasi-Peak	Average
SEE PLOTS			
Transmit at Middle channel Frequency 5785MHz (802.11a)			
Frequency (MHz)	Level (dB μ V/m)		
	Peak	Quasi-Peak	Average
SEE PLOTS			
Transmit at Highest channel Frequency 5825MHz (802.11a)			
Frequency (MHz)	Level (dB μ V/m)		
	Peak	Quasi-Peak	Average
SEE PLOTS			

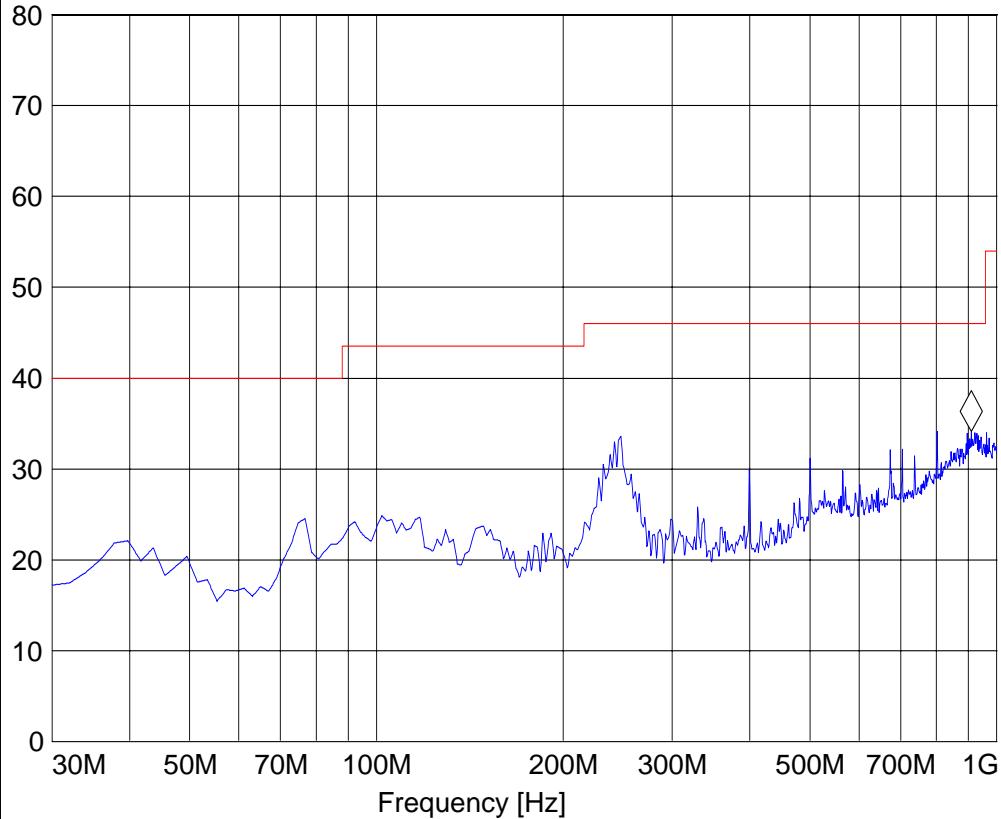
EMISSION LIMITATIONS - Radiated (Transmitter) §15.247 (d) & RSS-210(A8.5)**Lowest Channel (5745MHz): 30MHz – 1GHz****Antenna: Vertical****Note: This plot is valid for low, mid, high channels (worst-case plot)**

EUT: BCM94311MCAG
 Customer: Broadcom
 Test Mode: 802.11a, ch 149 (Aux Antenna)
 ANT Orientation: V
 EUT Orientation: H
 Test Engineer: Ed
 Power Supply: AC Adapter
 Comments:

SWEEP TABLE: "FCC15.247_30M-1G_Ver"

Start Frequency	Stop Frequency	Detector	Meas.	IF Time	Transducer
30.0 MHz	1.0 GHz	MaxPeak	Coupled	100 kHz	3141-#1186_Vert

Marker: 910.581162 MHz 34.16 dB μ V/m

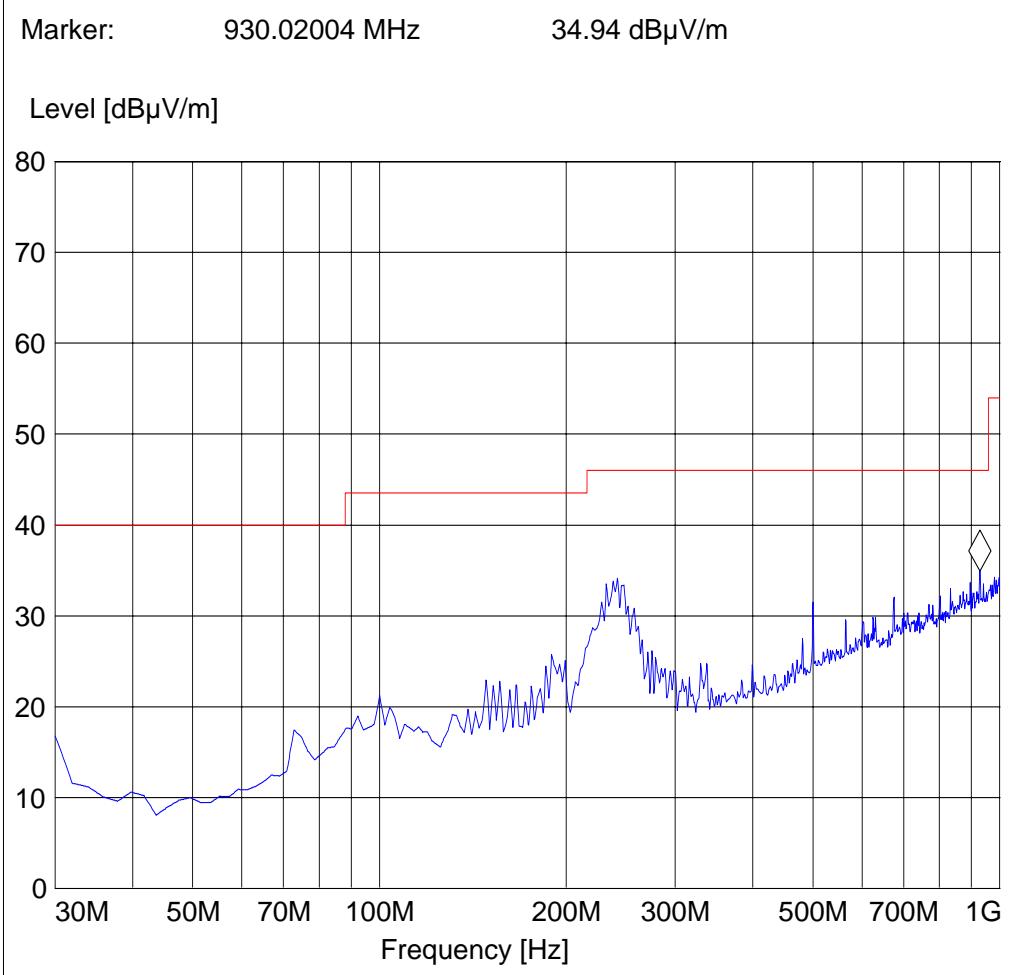
Level [dB μ V/m]

EMISSION LIMITATIONS - Radiated (Transmitter)**§15.247 (d) & RSS-210(A8.5)****Lowest Channel (5745MHz): 30MHz – 1GHz****Antenna: Horizontal****Note: This plot is valid for low, mid, high channels (worst-case plot)**

EUT: BCM94311MCAG
 Customer: Broadcom
 Test Mode: 802.11a, ch 149 (Aux Antenna)
 ANT Orientation: H
 EUT Orientation: H
 Test Engineer: Ed
 Power Supply: AC Adapter
 Comments:

SWEET TABLE: "FCC15.247_30M-1G_Hor"

Start Frequency	Stop Frequency	Detector	Meas. Time	IF Bandw.	Transducer
30.0 MHz	1.0 GHz	MaxPeak	Coupled	100 kHz	3141-#1186_Horz



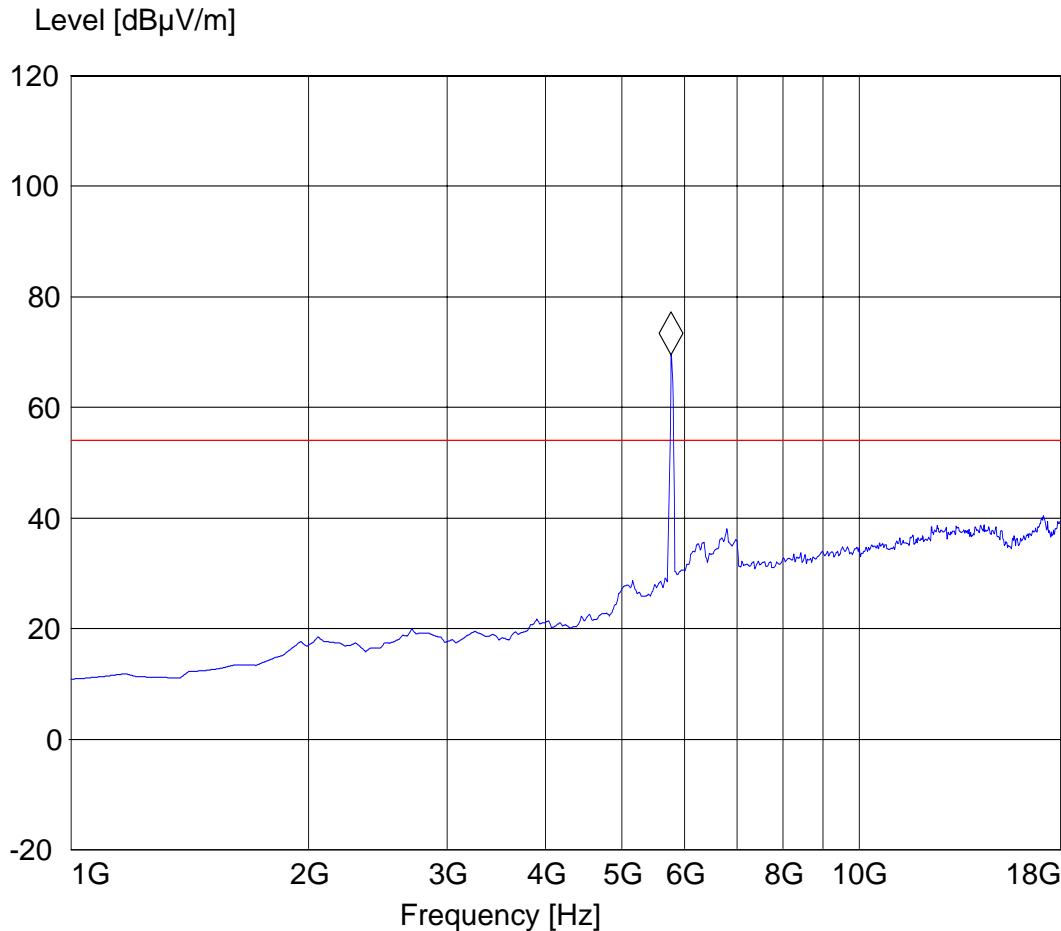
EMISSION LIMITATIONS - Radiated (Transmitter)**§15.247 (d) & RSS-210(A8.5)****Lowest Channel (5745MHz): 1GHz – 18GHz****Note: No significant harmonic emissions detected either in Vertical or Horizontal****CETECOM Inc., 411 Dixon Landing Road, Milpitas CA 95035, USA**

EUT / Description: BCM94311MCAG
 Manufacturer: Broadcom
 Test mode: 802.11a, ch 149 (Aux Antenna)
 ANT Orientation: H
 EUT Orientation: H
 Test Engineer: Ed
 Voltage: AC Adapter
 Comments: Mark is on Fundamental signal

SWEET TABLE: "FCC15.247_1-18G"

Start Frequency	Stop Frequency	Detector	Meas.	IF Time	Transducer
1.0 GHz	18.0 GHz	MaxPeak	Coupled	1 MHz	#326horn_AF_horz

Marker: 5.769539078 GHz 69.52 dB μ V/m

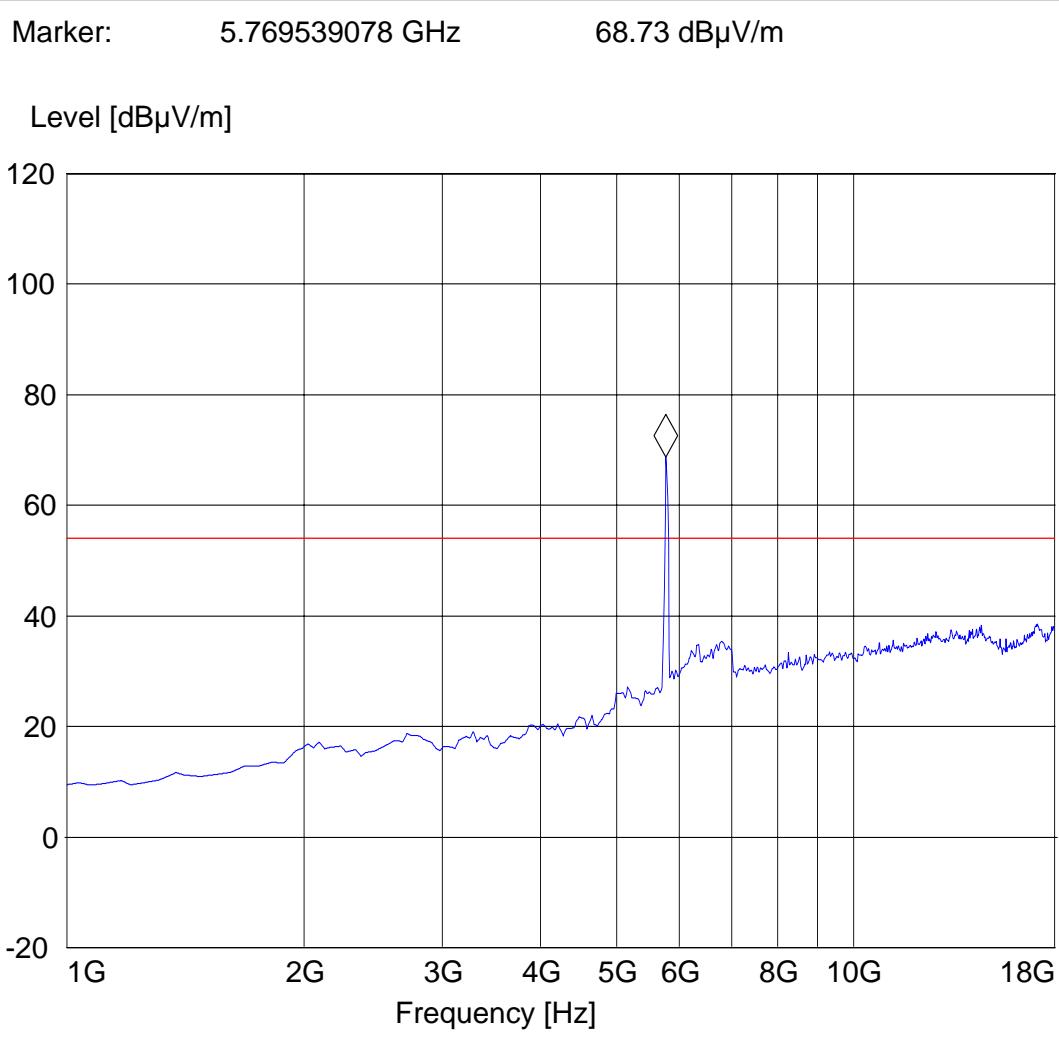


EMISSION LIMITATIONS - Radiated (Transmitter)**§15.247 (d) & RSS-210(A8.5)****Mid Channel (5785MHz): 1GHz – 18GHz****Note: No significant harmonic emissions detected either in Vertical or Horizontal**

EUT / Description: BCM94311MCAG
 Manufacturer: Broadcom
 Test mode: 802.11a, ch 157 (Aux Antenna)
 ANT Orientation: H
 EUT Orientation: H
 Test Engineer: Ed
 Voltage: AC Adapter
 Comments: Mark is on Fundamental signal

SWEET TABLE: "FCC15.247_1-18G"

Start Frequency	Stop Frequency	Detector	Meas.	IF Time	Transducer
1.0 GHz	18.0 GHz	MaxPeak	Coupled	1 MHz	#326horn_AF_horz

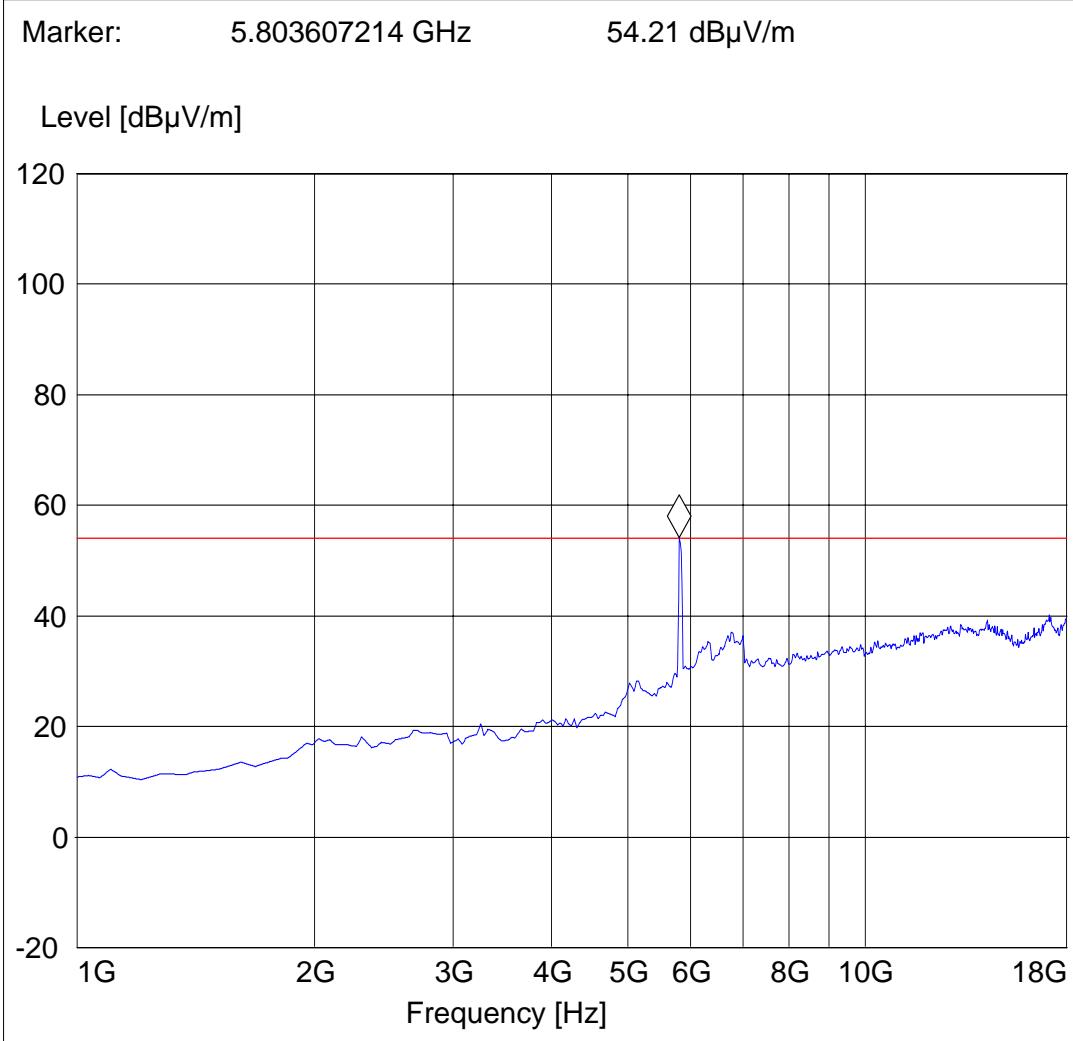


EMISSION LIMITATIONS - Radiated (Transmitter)**§15.247 (d) & RSS-210(A8.5)****Highest Channel (5825MHz): 1GHz – 18GHz****Note: No significant harmonic emissions detected either in Vertical or Horizontal**

EUT / Description: BCM94311MCAG
 Manufacturer: Broadcom
 Test mode: 802.11a, ch 165 (Aux Antenna)
 ANT Orientation: H
 EUT Orientation: H
 Test Engineer: Ed
 Voltage: AC Adapter
 Comments: Mark is on Fundamental signal

SWEEP TABLE: "FCC15.247_1-18G"

Start Frequency	Stop Frequency	Detector	Meas.	IF Time	Transducer
1.0 GHz	18.0 GHz	MaxPeak	Coupled	1 MHz	#326horn_AF_horz

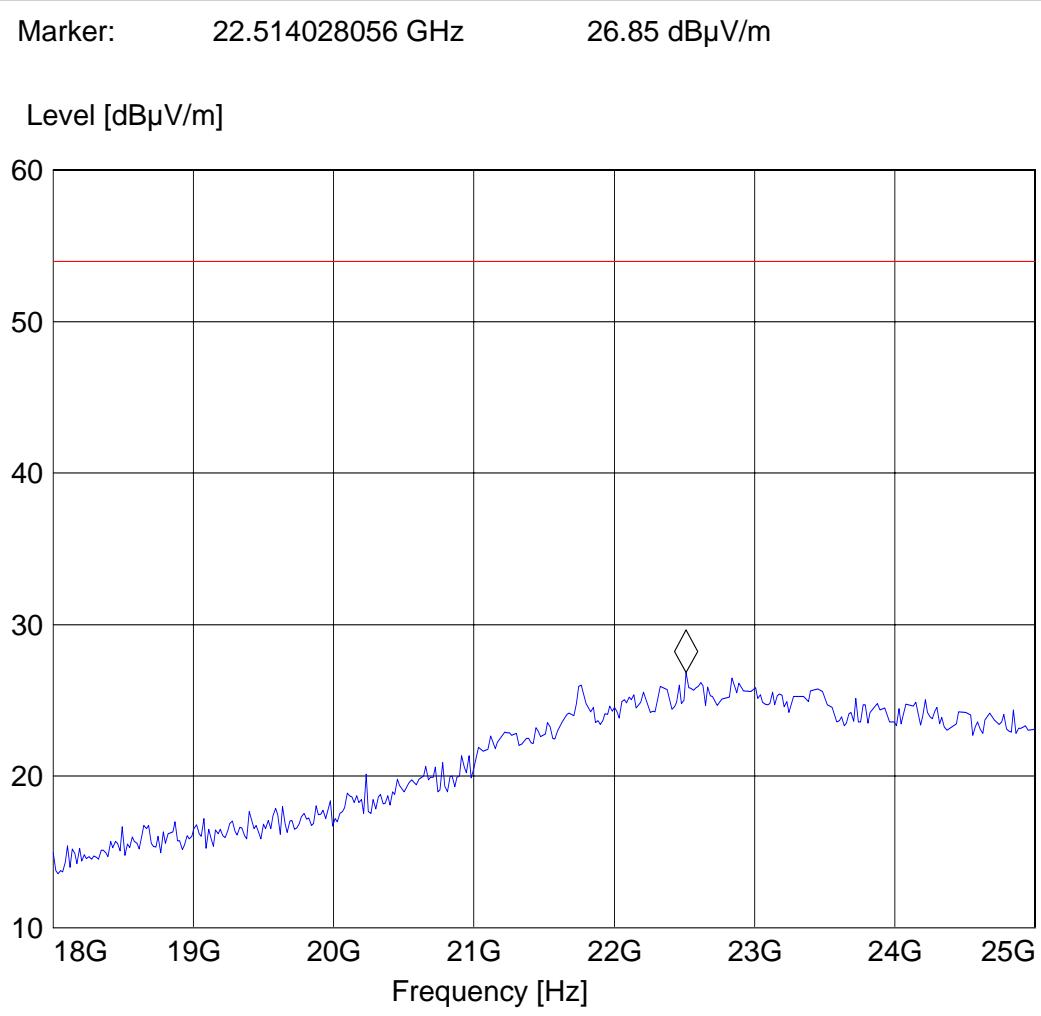


EMISSION LIMITATIONS - Radiated (Transmitter)**§15.247 (d) & RSS-210(A8.5)****18GHz – 26.5GHz for low, middle, and high channels****Note: This plot is valid for low, mid, high channels (worst-case plot)**

EUT / Description: BCM94311MCAG
 Manufacturer: Broadcom
 Test mode: 802.11a, ch 157 (Aux Antenna)
 ANT Orientation: H
 EUT Orientation: H
 Test Engineer: Ed
 Voltage: AC Adapter
 Comments:

SWEET TABLE: "FCC15.247_18-26.5G"

Start Frequency	Stop Frequency	Detector	Meas.	IF Time	Transducer
18.0 GHz	26.5 GHz	MaxPeak	Coupled	1 MHz	#572 horn AF



EMISSION LIMITATIONS - Radiated (Transmitter)
26-40GHz for low, middle and high channels.

§15.247 (d) & RSS-210(A8.5)

Note: Since no harmonic emissions were detected 20-dB of the limit for scans 18 – 26GHz it was determine that no emissions will be detected from 26 – 40 GHz, so no scans were captured.

AC POWER LINE CONDUCTED EMISSIONS § 15.207 & RSS-GEN (7.2.2)

LIMITS

Technical specification: 15.207 (Revised as of August 20, 2002)

§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 boundary between the frequency ranges.

Frequency of Emission (MHz)	Conducted Limit (dB μ V)	
	Quasi-Peak	Average
0.15 – 0.5	66 to 56*	56 to 46*
0.5 – 5	56	46
5 – 30	60	50

* Decreases with logarithm of the frequency

ANALYZER SETTINGS: RBW = 10KHz

VBW = 10KHz

OPERATING MODE

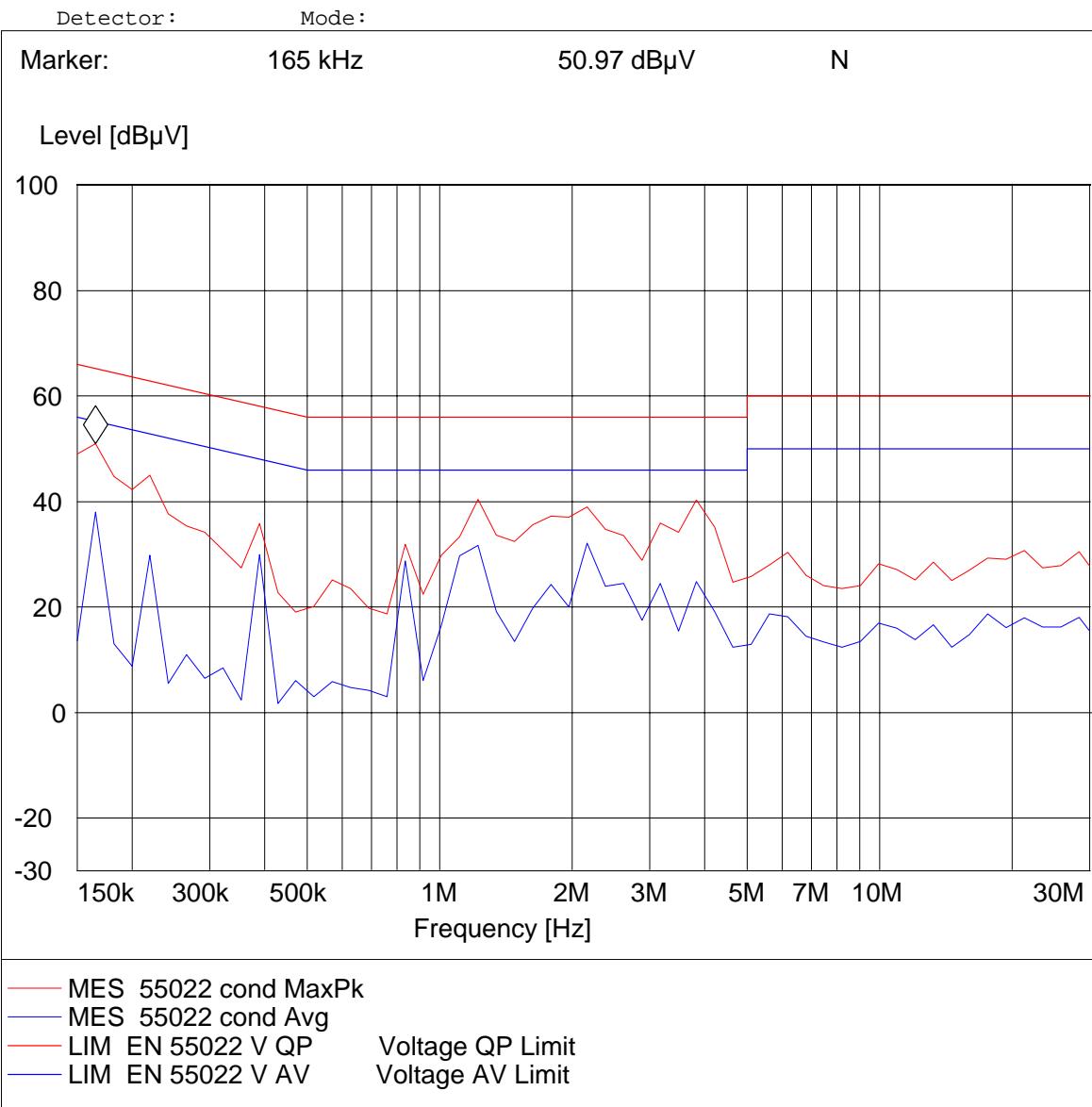
Conducted AC emissions testing were performed with 110 VAC @ 60 Hz with the EUT in 802.11g mode.

Voltage Mains Test (Line)

EUT: BCM94311MCAG
 Manufacturer: Broadcom
 Operating Condition: Tx Mode
 ANT Orientation: CONDUCTED
 EUT Orientation: H
 Test Engineer: Juan M.
 Power Supply: AC Adaptor
 Comments: 120V, 60Hz (Line)

SWEET TABLE: "55022 cond"

Short Description: EN 55022 for 150KHz-30MHz
 Unit: dB μ V



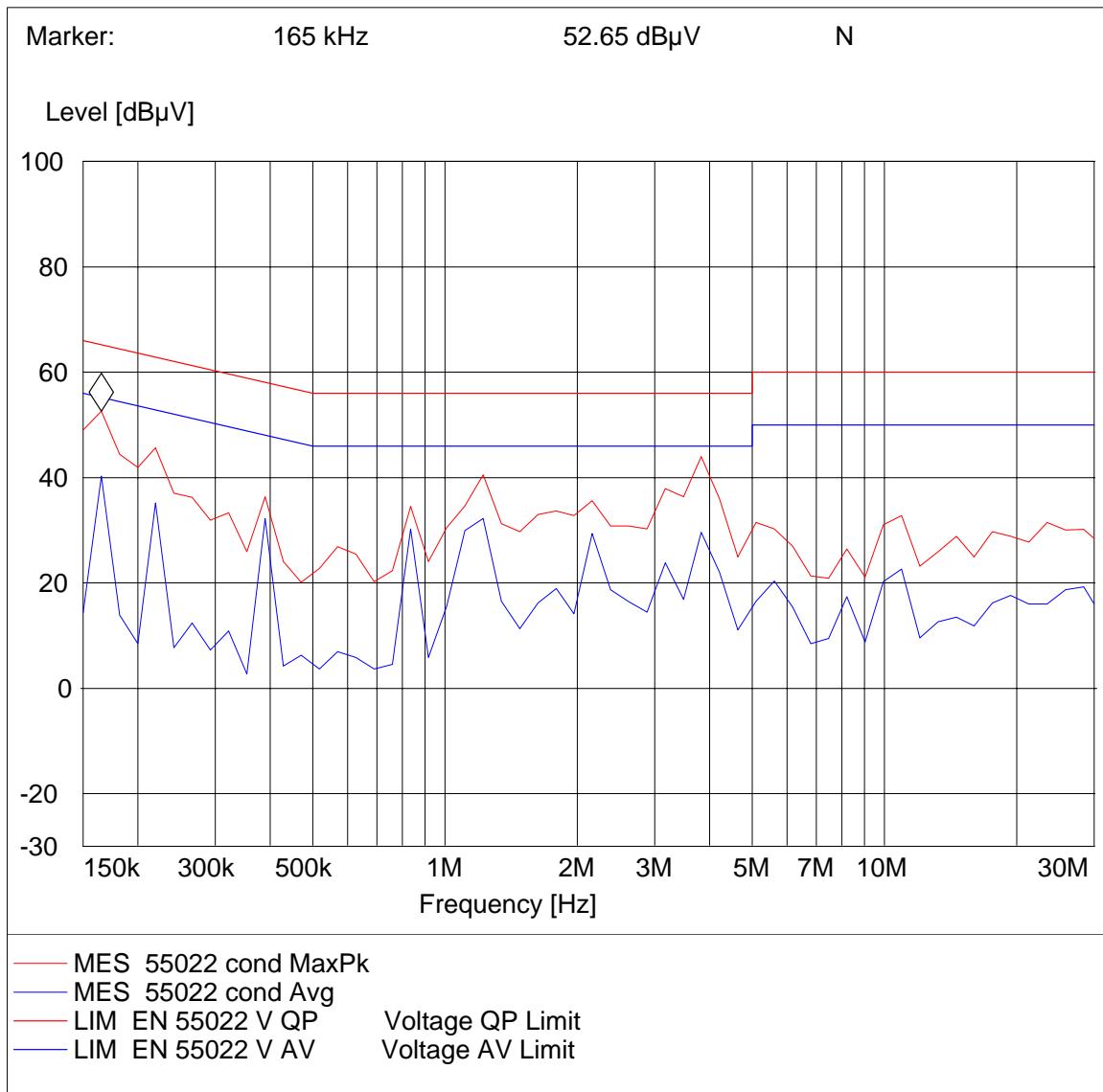
Voltage Mains Test (Neutral)

EUT: BCM94311MCAG
 Manufacturer: Broadcom
 Operating Condition: Tx Mode
 ANT Orientation:: CONDUCTED
 EUT Orientation:: H
 Test Engineer:: Juan M.
 Power Supply: AC Adaptor
 Comments: 120V, 60Hz (Neutral)

SWEET TABLE: "55022 cond"

Short Description: EN 55022 for 150KHz-30MHz
 Unit: dB μ V

Detector: Mode:



2 TEST EQUIPMENT AND ANCILLARIES USED FOR TESTS

No	Instrument/Ancillary	Type	Manufacturer	Serial No.	Cal Due	Interval
01	Spectrum Analyzer	ESIB 40	Rohde & Schwarz	100107	May 2008	1 year
05	Biconilog Antenna	3141	EMCO	0005-1186	June 2008	1 year
06	Horn Antenna (1-18GHz)	SAS-200/571	AH Systems	325	June 2008	1 year
07	Horn Antenna (18-26.5GHz)	3160-09	EMCO	1240	June 2008	1 year
10	High Pass Filter	5HC2700	Trilithic Inc.	9926013	n/a	n/a
11	High Pass Filter	4HC1600	Trilithic Inc.	9922307	n/a	n/a
16	LISN	ESH3-Z5	Rohde & Schwarz	836679/003	May 2008	1 year

3 BLOCK DIAGRAMS

Radiated Testing

3.1

ANECHOIC CHAMBER

