



# 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



FCC listed#  
A2LA Certified  
IC recognized #  
3462B

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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 #
<b>Broadcom, Inc.</b>	<b>Wireless LAN PCI-E Mini Card</b>	<b>BCM94311MCAG</b>

**Technical responsibility for area of testing:**

Lothar Schmidt

**August 29, 2007**    **EMC & Radio**    **(Test Lab Manager)**

**Date**                      **Section**                      **Name**                      **Signature**

**Responsible for test report and project leader:**

Juan Martinez  
**(Project Engineer)**

**August 29, 2007**    **EMC & Radio**

**Date**                      **Section**                      **Name**                      **Signature**

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
Antenna Type:	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)
Output Power:	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)**

<b>Frequency range</b>	<b>RF power output</b>
<b>2400-2483.5 MHz</b>	<b>30dBm on Conducted</b>
<b>5725-5850 MHz</b>	<b>30dBm on Conducted</b>

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)**

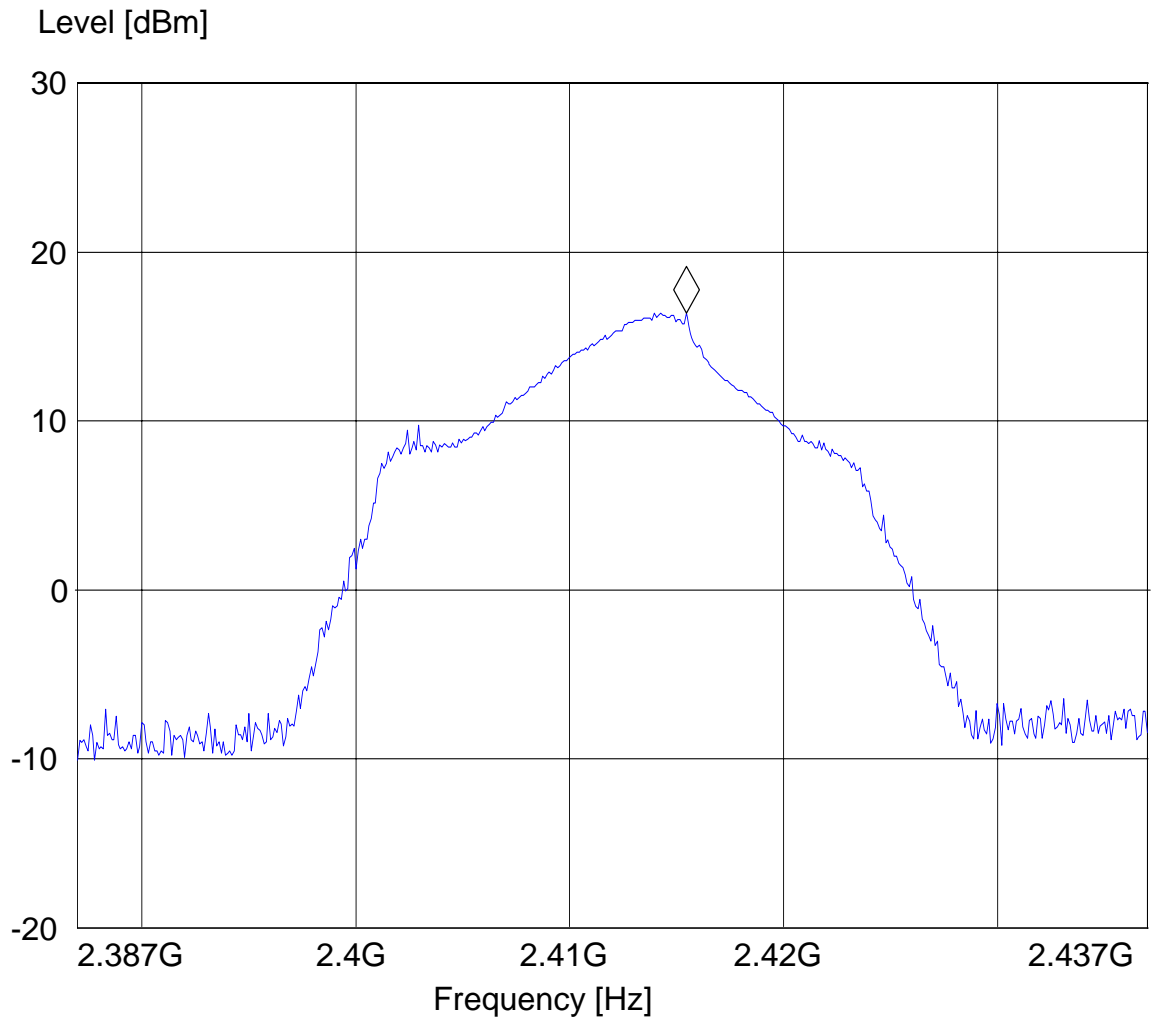
411 Dixon Landing Road, Milpitas CA 95035, USA

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

**SWEEP TABLE: "EIRP RLAN CH1"**

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

Marker: 2.415456914 GHz 16.38 dBm





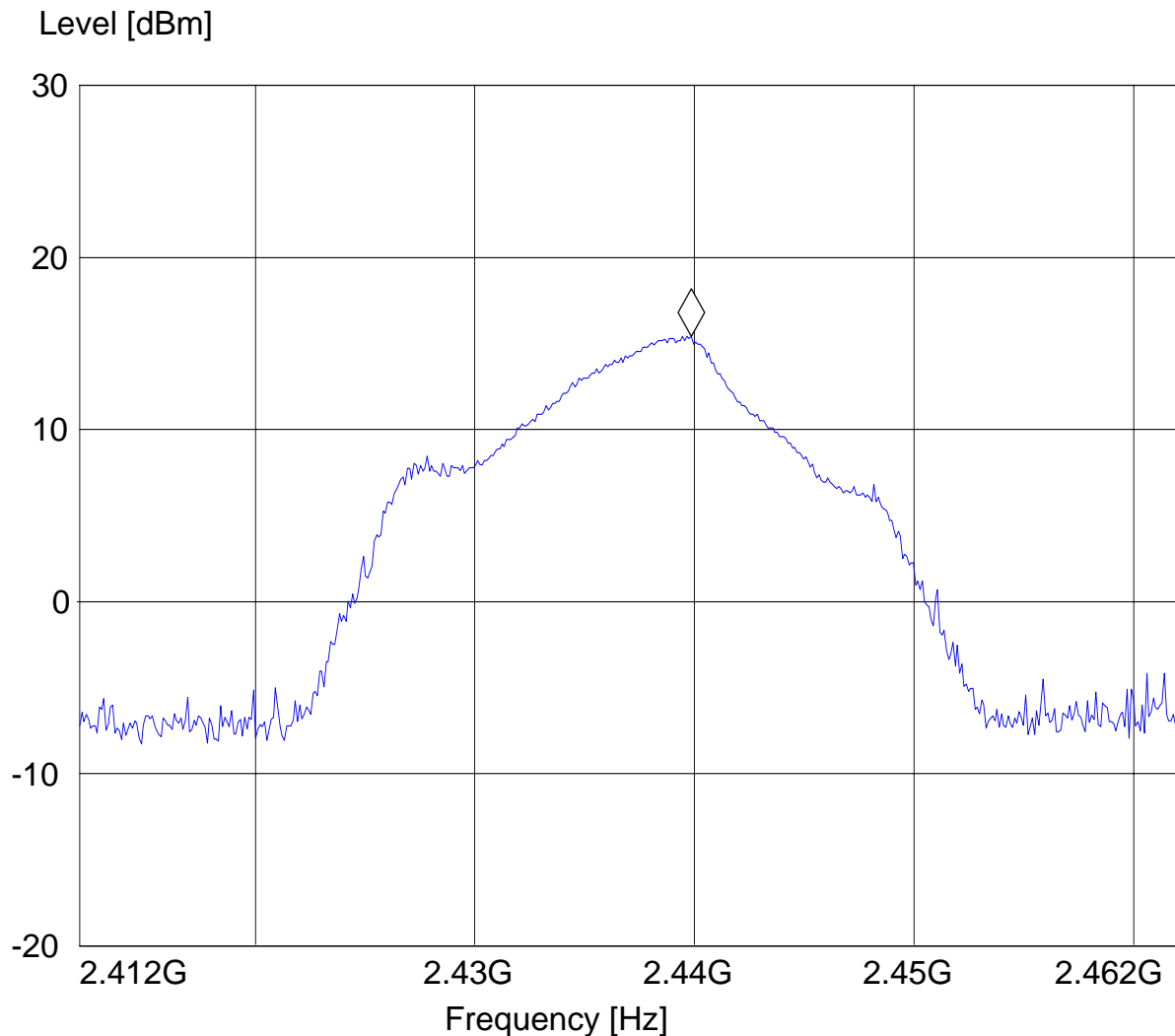
**EIRP: 2437 MHz (802.11b)**

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

**SWEEP TABLE: "EIRP RLAN CH6"**

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

Marker: 2.43985711 GHz 15.4 dBm







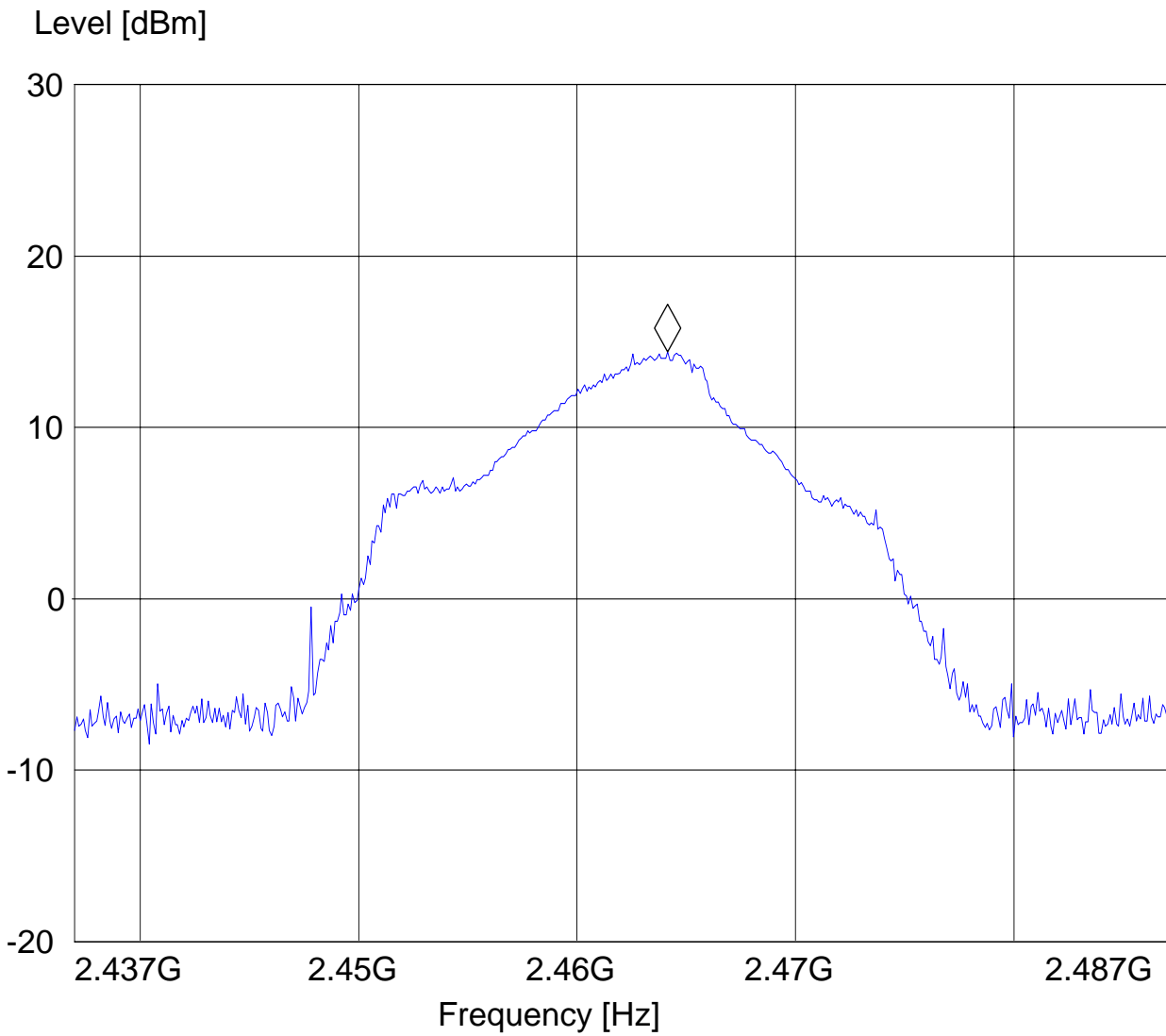
**EIRP: 2462 MHz (802.11b)**

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

**SWEEP TABLE: "EIRP RLAN CH11"**

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

Marker: 2.464154309 GHz 14.43 dBm



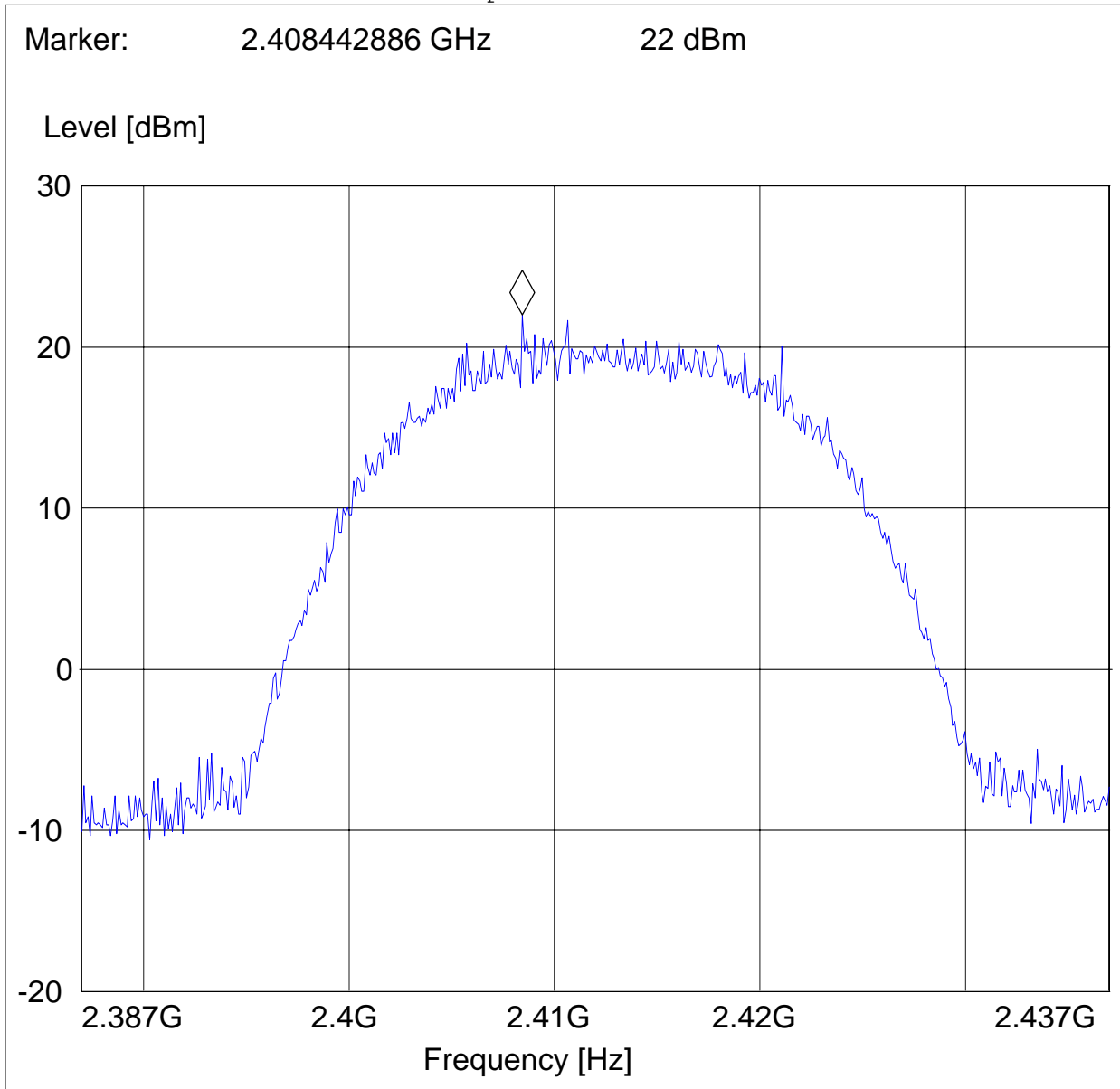


**EIRP: 2412 MHz (802.11g)**

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

**SWEEP TABLE: "EIRP RLAN CH1"**

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



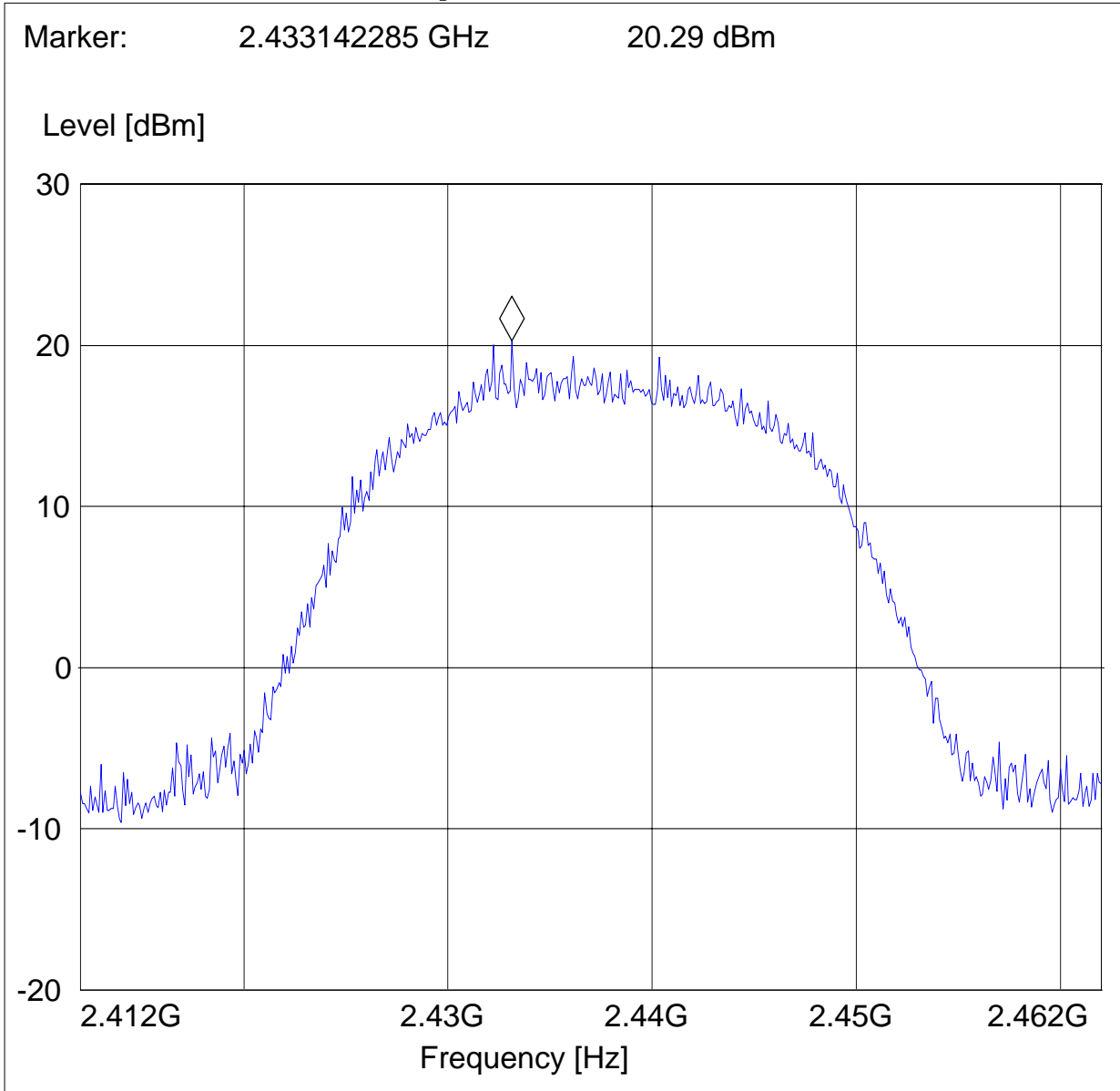


**EIRP: 2437 MHz (802.11g)**

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

**SWEEP TABLE: "EIRP RLAN CH6"**

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



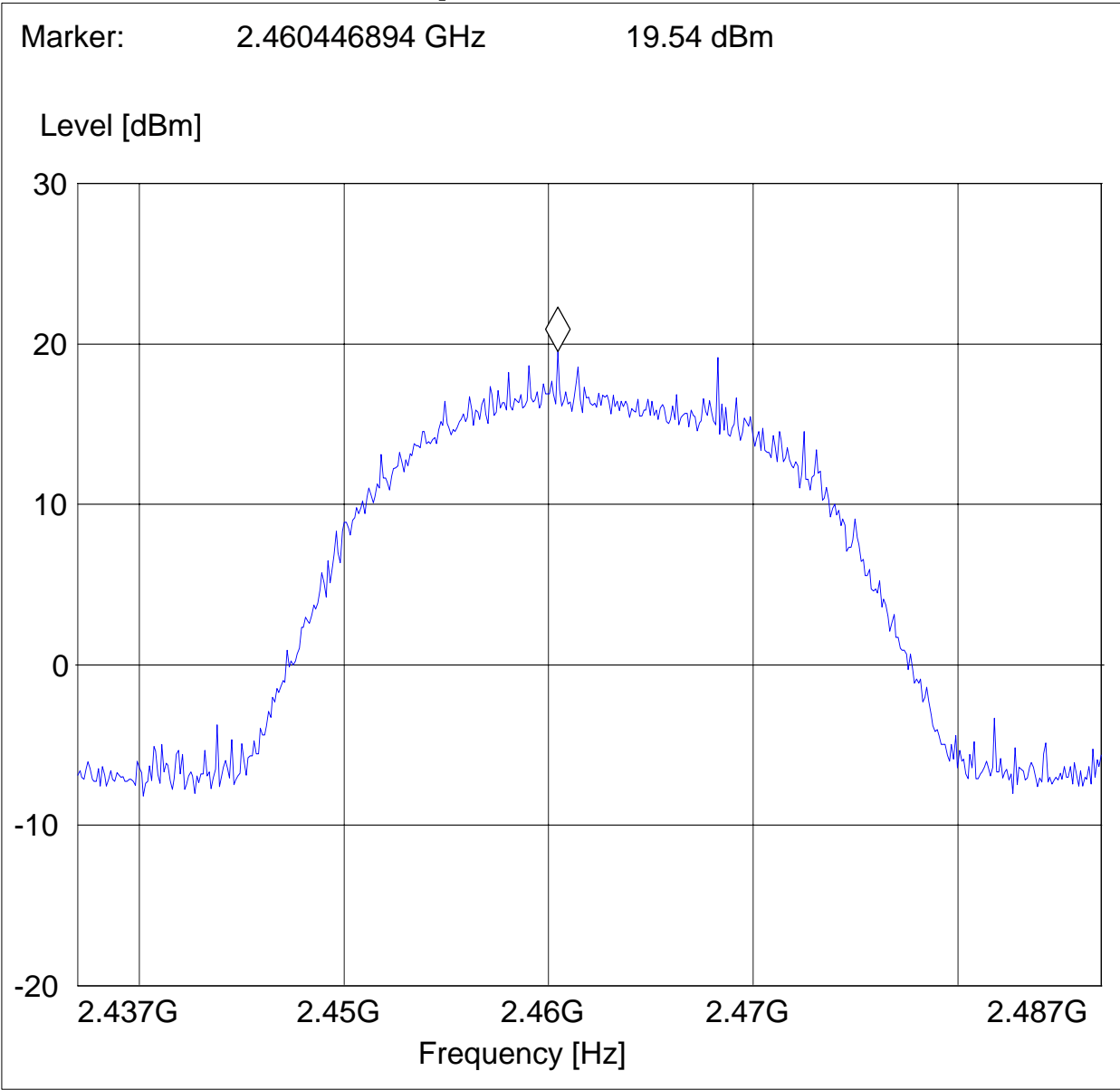


**EIRP: 2462 MHz (802.11g)**

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

**SWEEP TABLE: "EIRP RLAN CH11"**

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



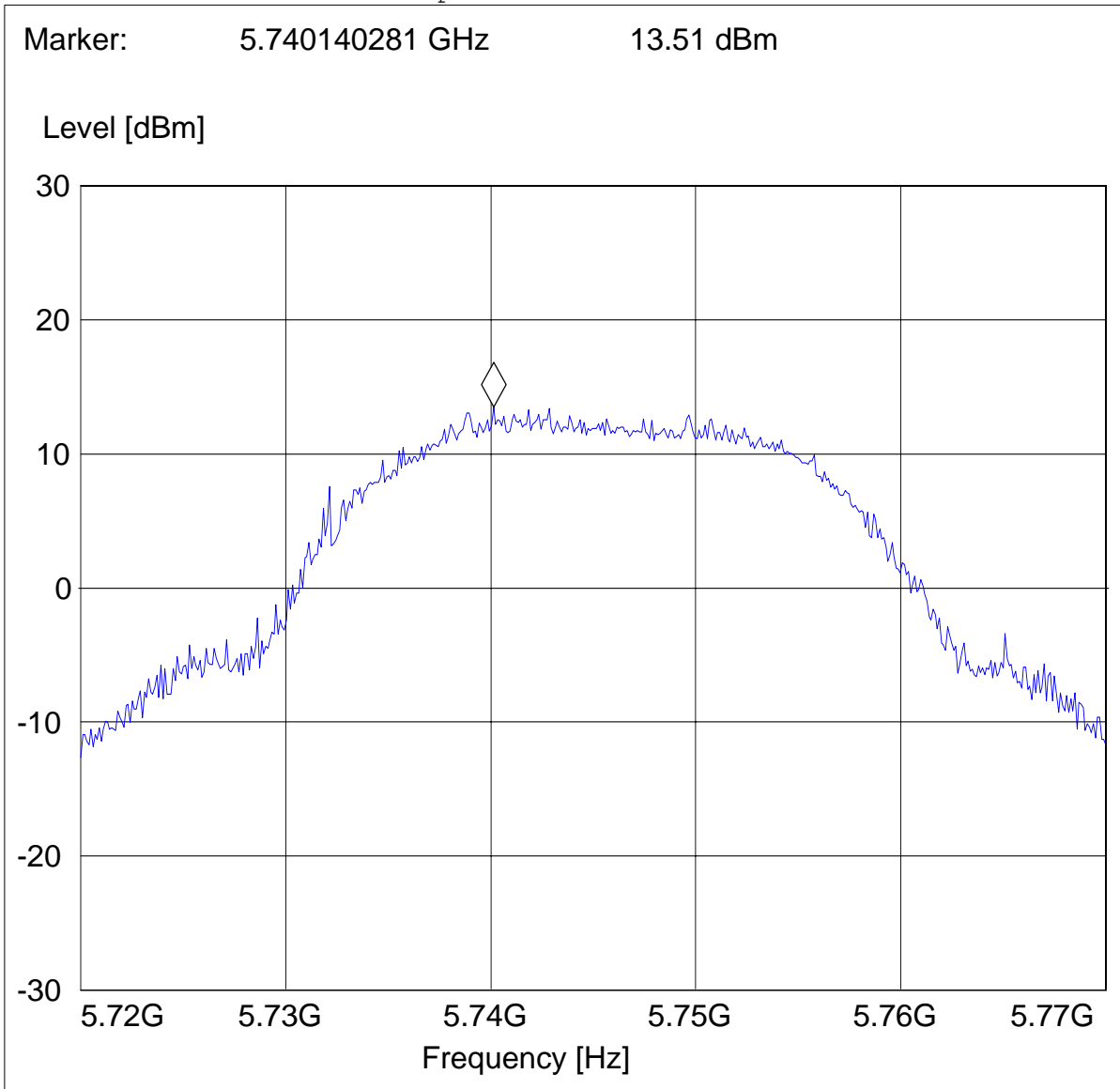


**EIRP: 5745 MHz (802.11a)**

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

**SWEEP TABLE: "EIRP 802.11a\_149"**

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



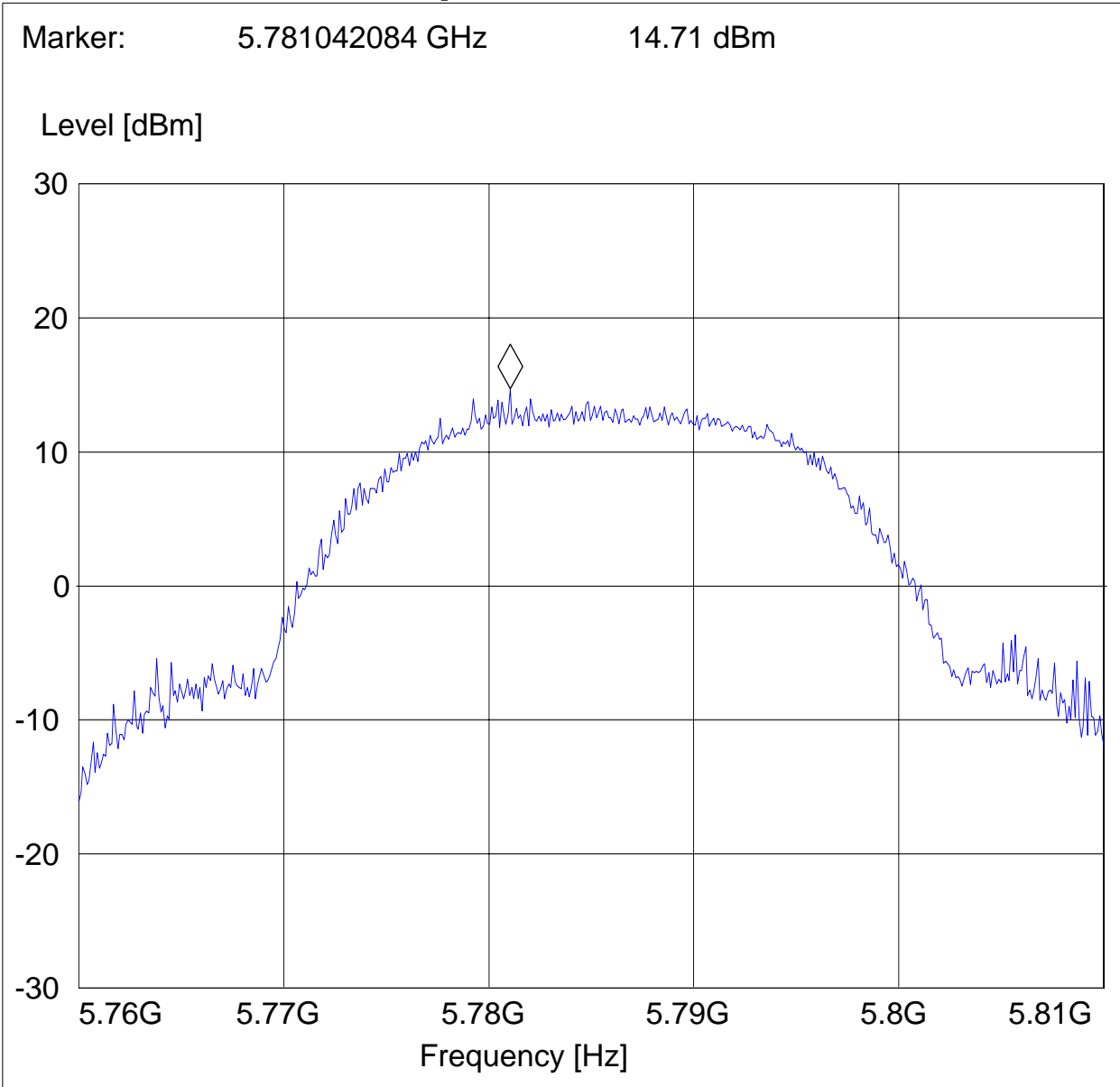


**EIRP: 5785 MHz (802.11a)**

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

**SWEEP TABLE: "EIRP 802.11a\_157"**

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



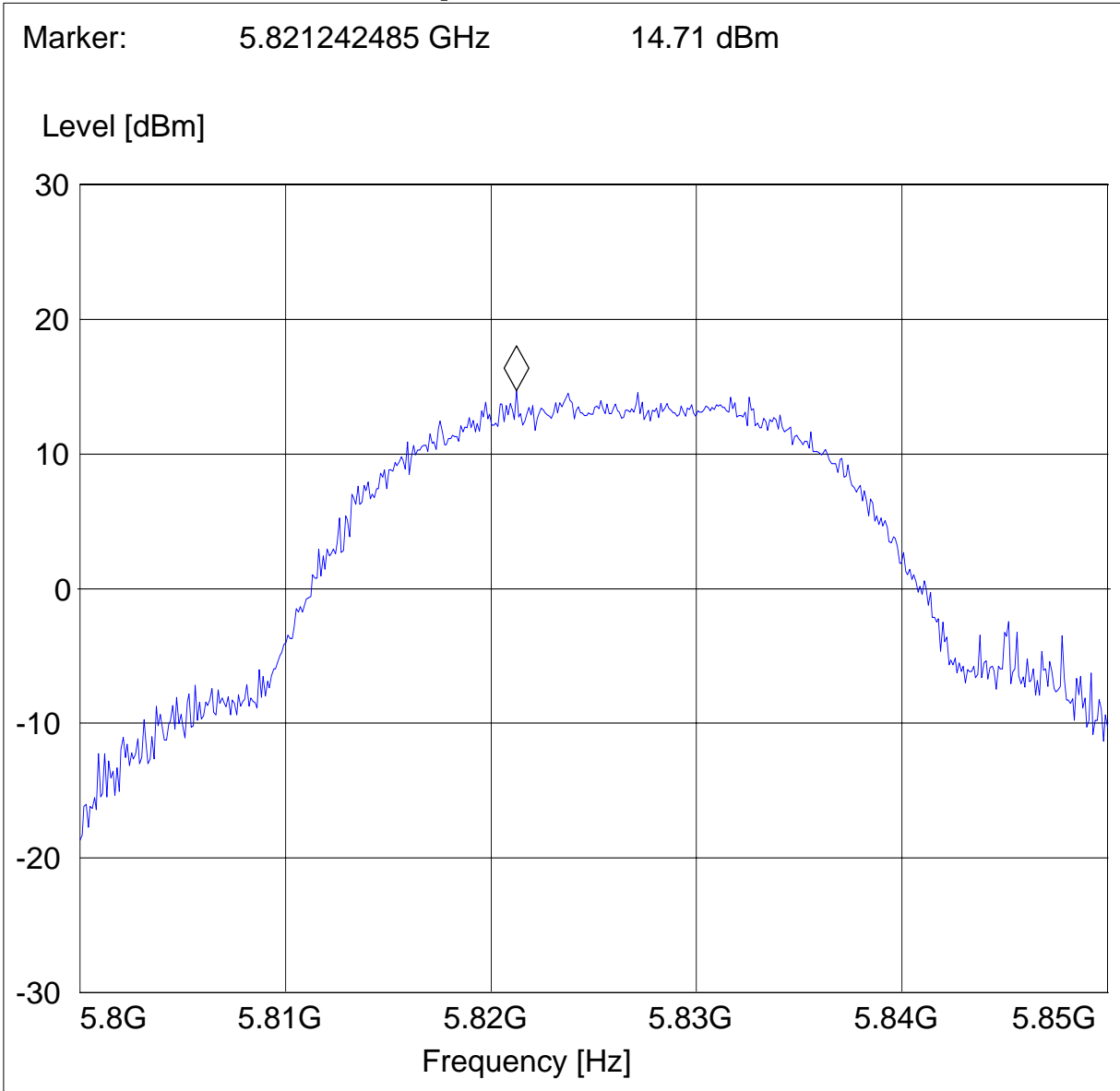


**EIRP: 5825 MHz (802.11a)**

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

**SWEEP TABLE: "EIRP 802.11a\_165"**

Short Description:		EIRP channel-5260 MHz			
Start	Stop	Detector	Meas. Time	IF Bandw.	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

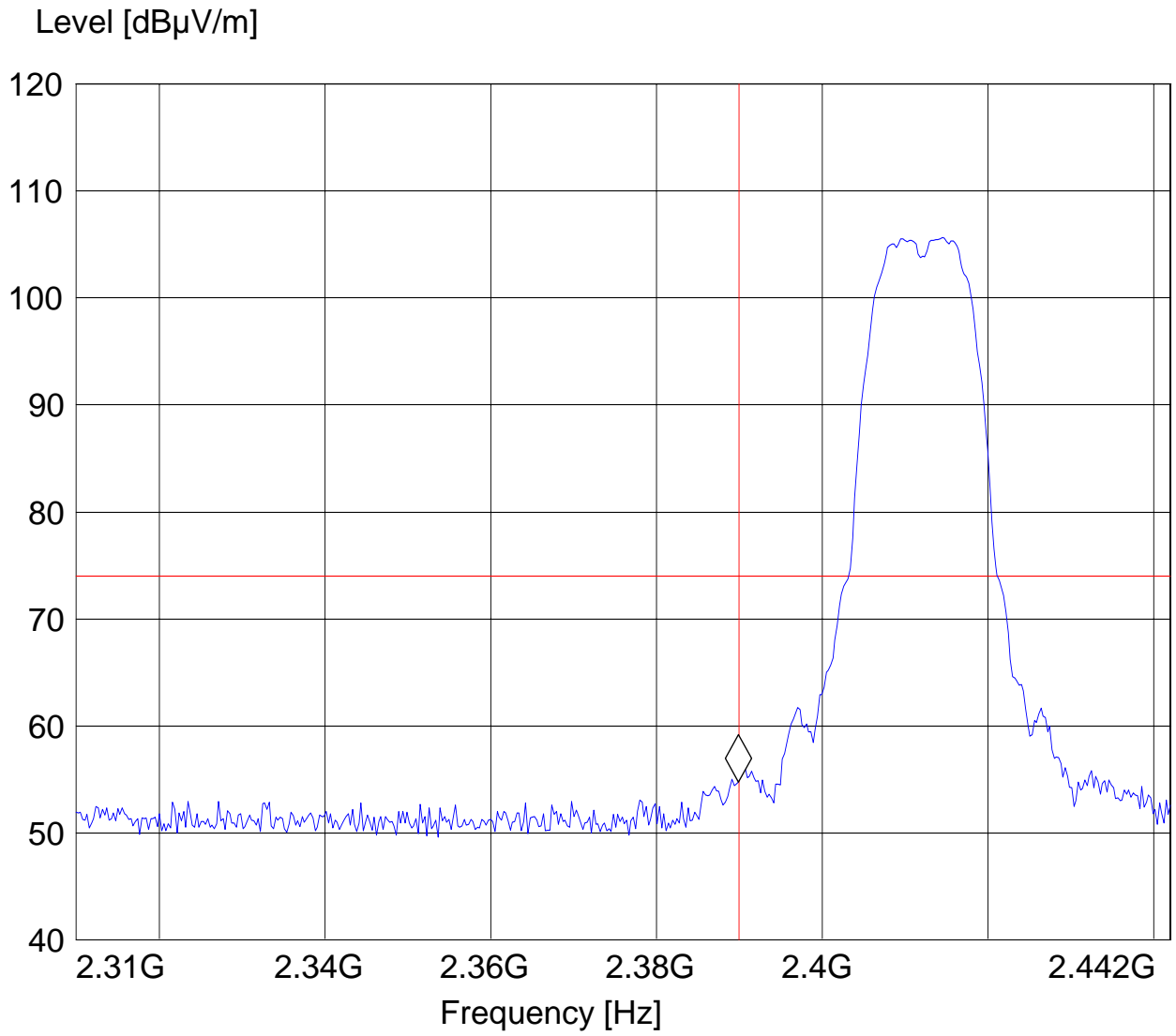
***SWEEP TABLE: "FCC15.247 LBE\_PK"***

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





Marker: 2.389887776 GHz 54.75 dB $\mu$ 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)**

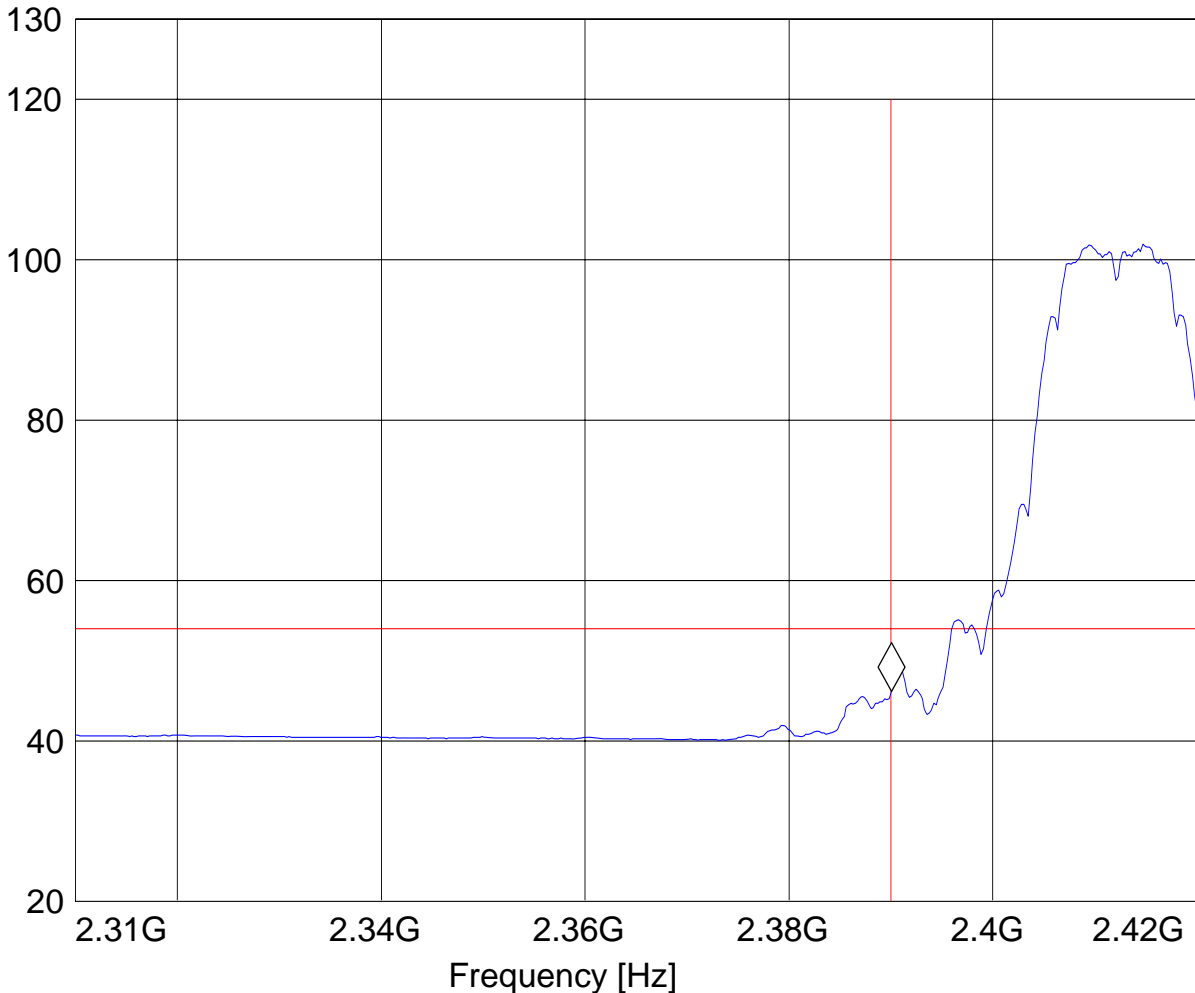
EUT: BCM94311MAG  
 Customer: Broadcom  
 Test Mode: 802.11 b; ch 1; Aux antenna  
 ANT Orientation: V  
 EUT Orientation: H  
 Test Engineer: Juan  
 Power Supply: AC Power Supply

**SWEEP TABLE: "FCC15.247 LBE\_AVG"**

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

Marker: 2.39002004 GHz 46.2 dBµV/m

Level [dBµV/m]





**BAND EDGE COMPLIANCE**

**§15.247 (d) & RSS-210(A8.5)**

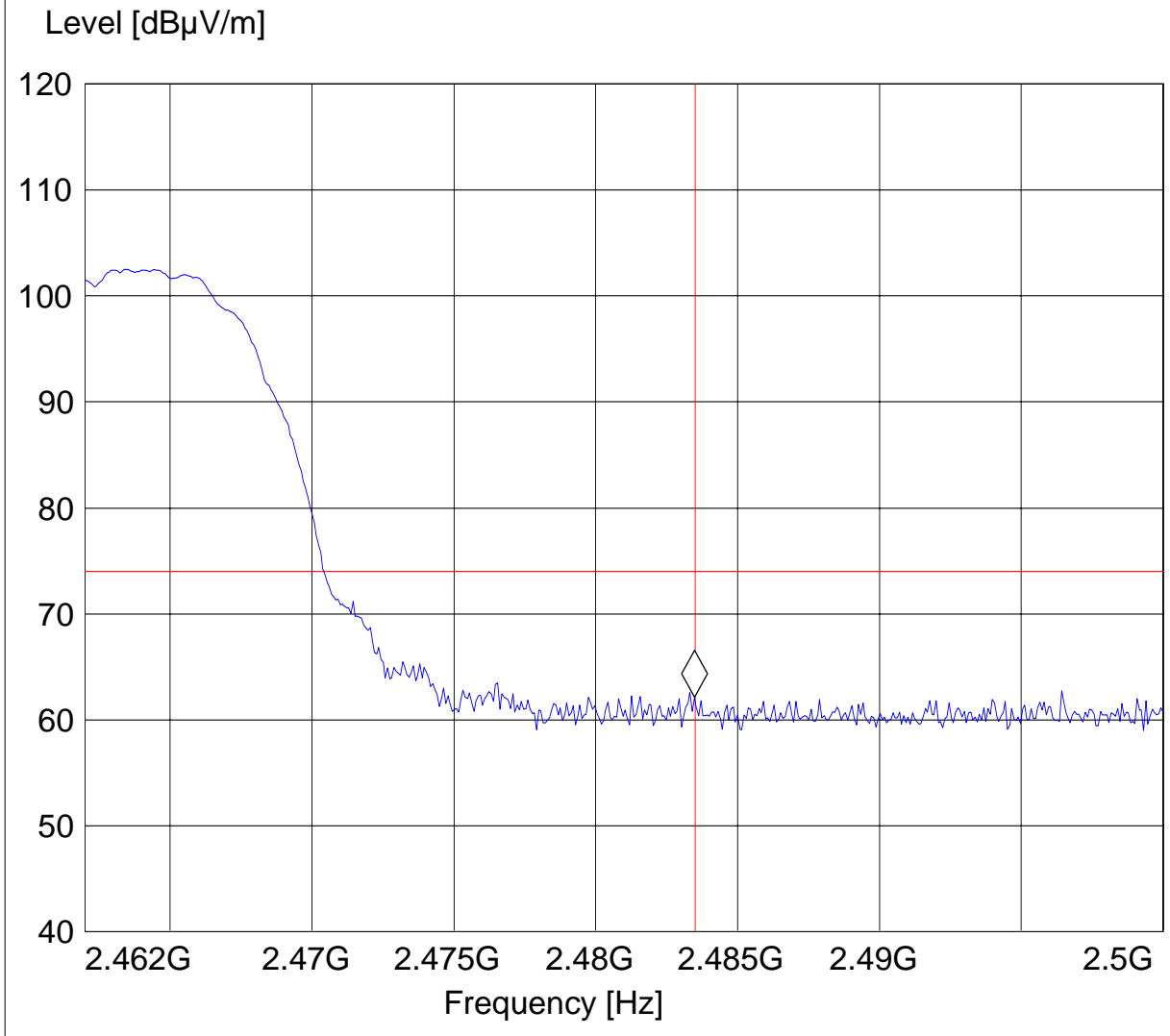
**802.11b High frequency section (spurious in the restricted band 2483.5 – 2500 MHz)**

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

**SWEEP 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 dBµV/m





**BAND EDGE COMPLIANCE**

**§15.247 (d) & RSS-210(A8.5)**

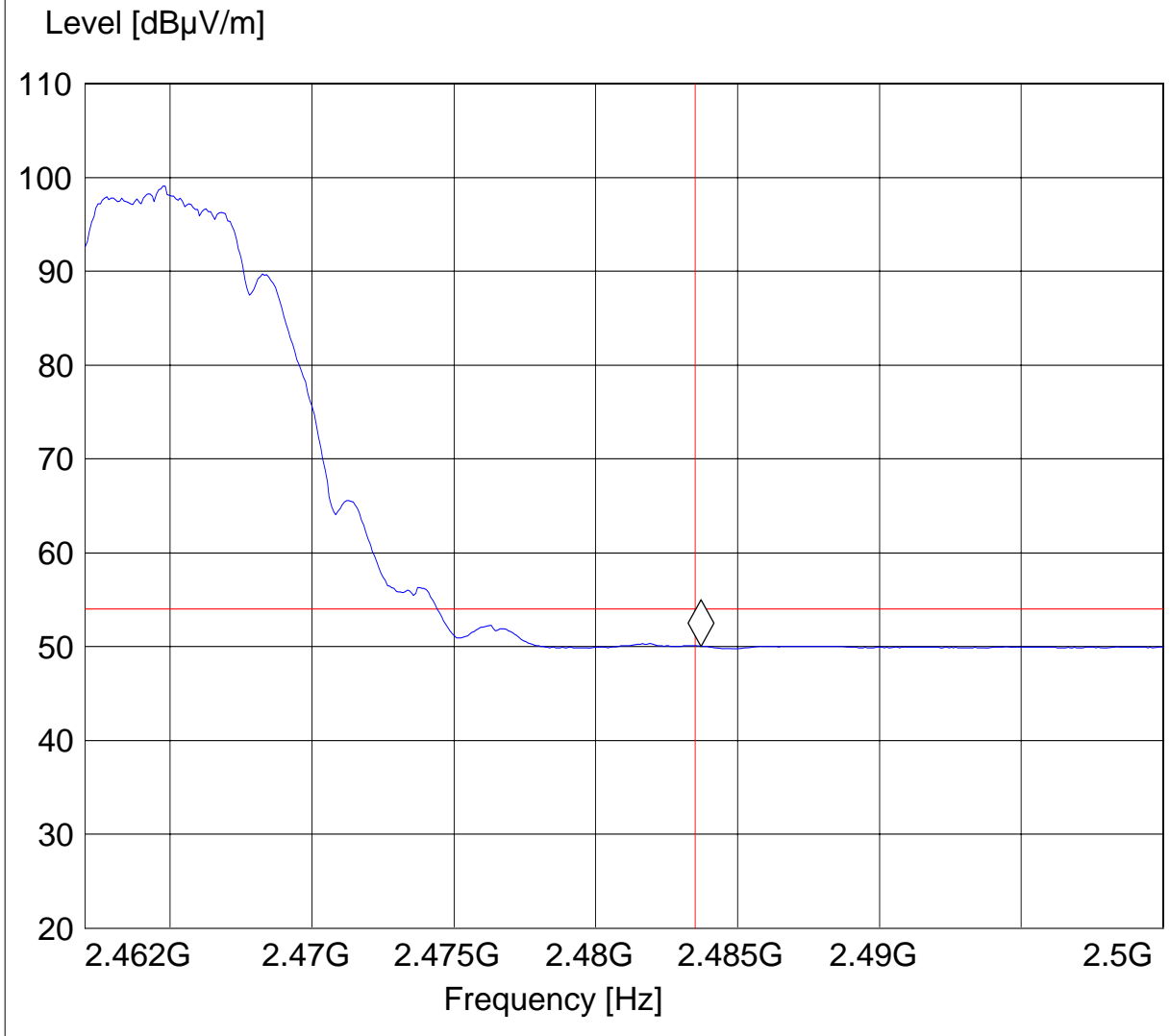
**802.11b High frequency section (spurious in the restricted band 2483.5 – 2500 MHz)**

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

**SWEEP TABLE: "FCC15.247 HBE\_AVG"**

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

Marker: 2.483703407 GHz 50.05 dB $\mu$ 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)**

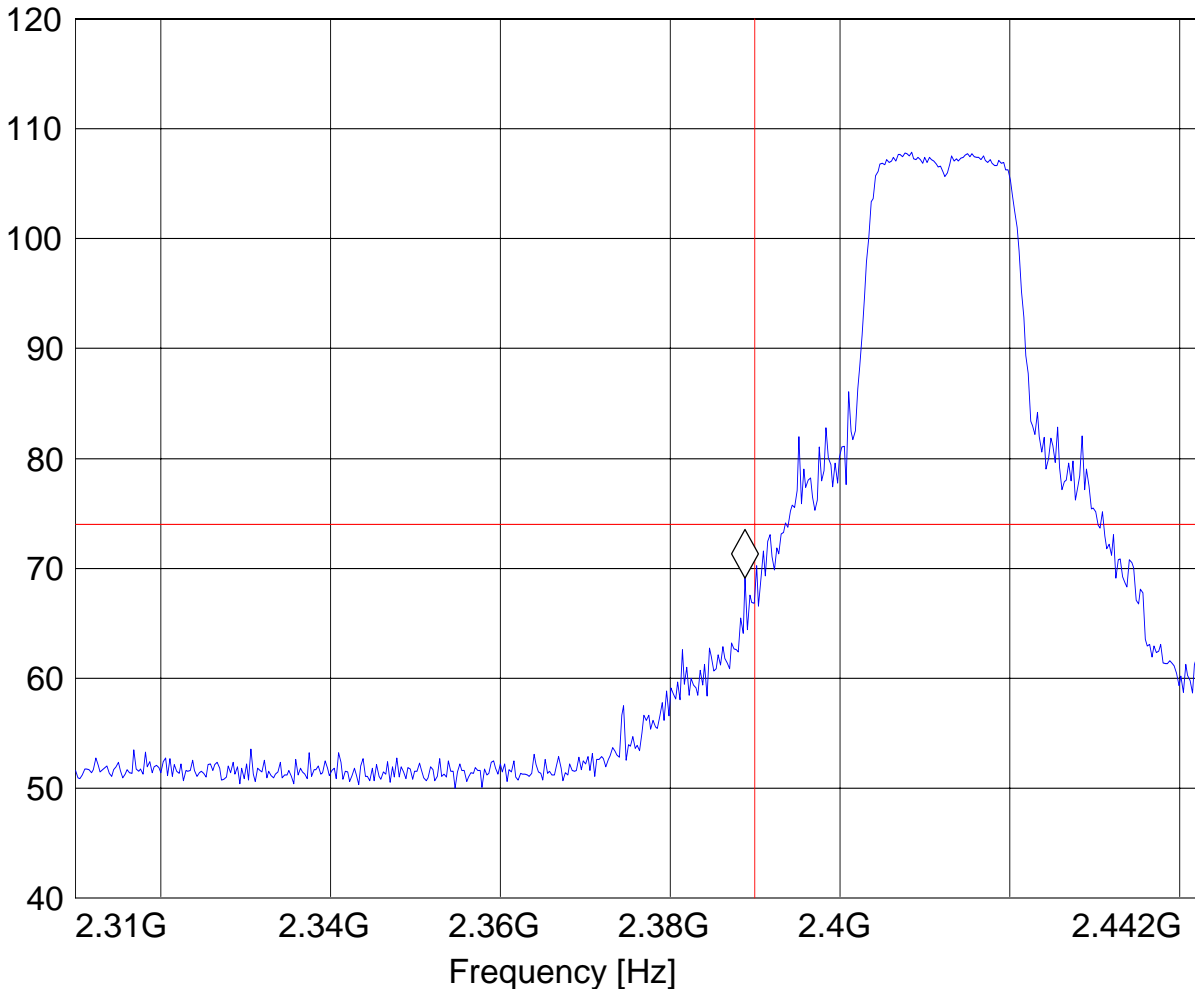
EUT: BCM94311MAG  
 Customer: Broadcom  
 Test Mode: 802.11 g; ch 1; Aux antenna  
 ANT Orientation: V  
 EUT Orientation: H  
 Test Engineer: Juan  
 Power Supply: AC Power Supply

**SWEEP TABLE: "FCC15.247 LBE\_PK"**

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

Marker: 2.388829659 GHz 69.13 dBµV/m

Level [dBµV/m]





**BAND EDGE COMPLIANCE**

**§15.247 (d) & RSS-210(A8.5)**

**802.11g Low frequency section (spurious in the restricted band 2310 – 2390 MHz)**

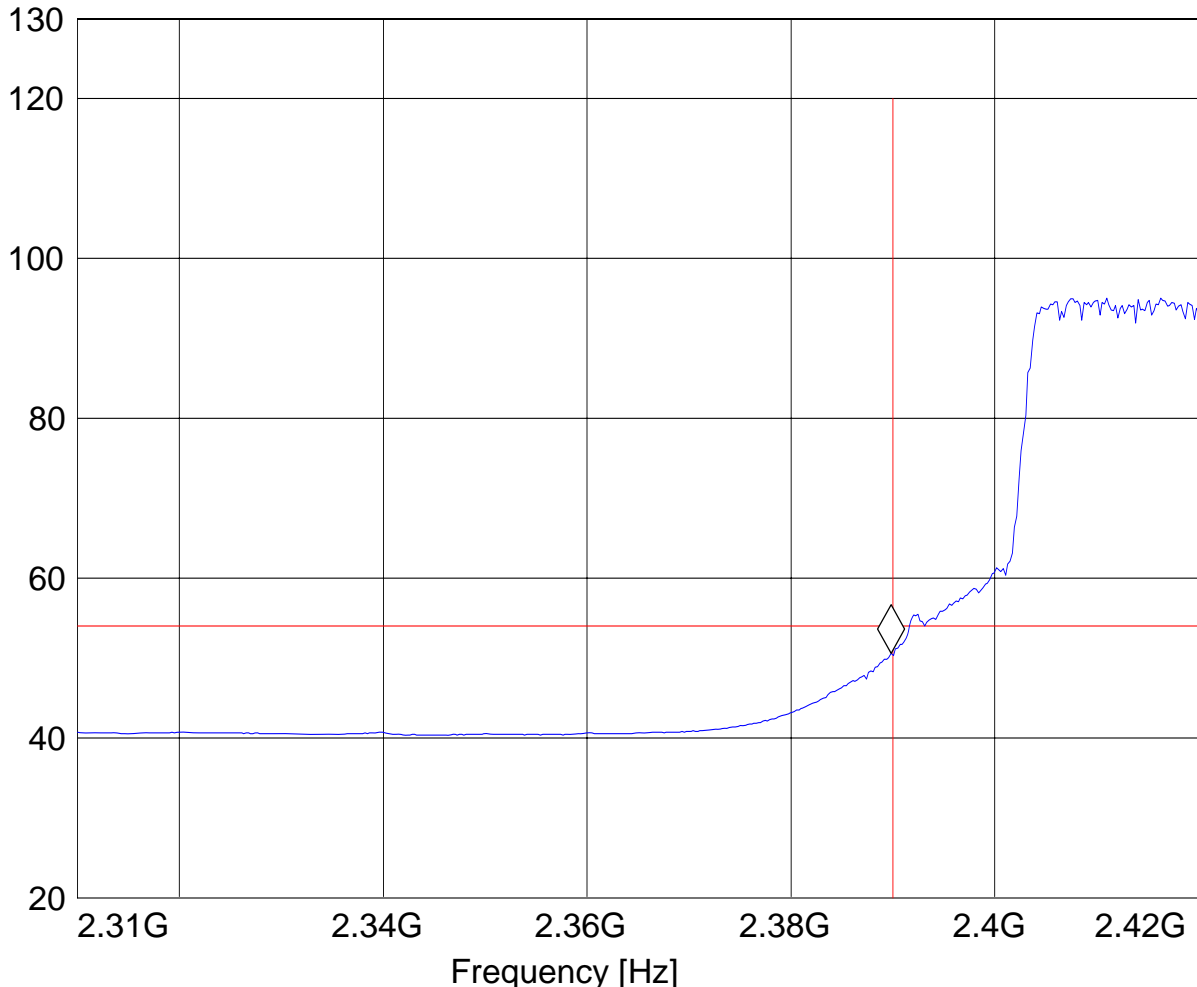
EUT: Dell PP12S with BCM94311MCAG  
Customer: Broadcom  
Test Mode: 802.11 g; ch 1; Aux antenna  
ANT Orientation: V  
EUT Orientation: H  
Test Engineer: Juan  
Power Supply: AC Power Supply

**SWEEP TABLE: "FCC15.247 LBE\_AVG"**

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

Marker: 2.389799599 GHz 50.61 dBµV/m

Level [dBµV/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)**

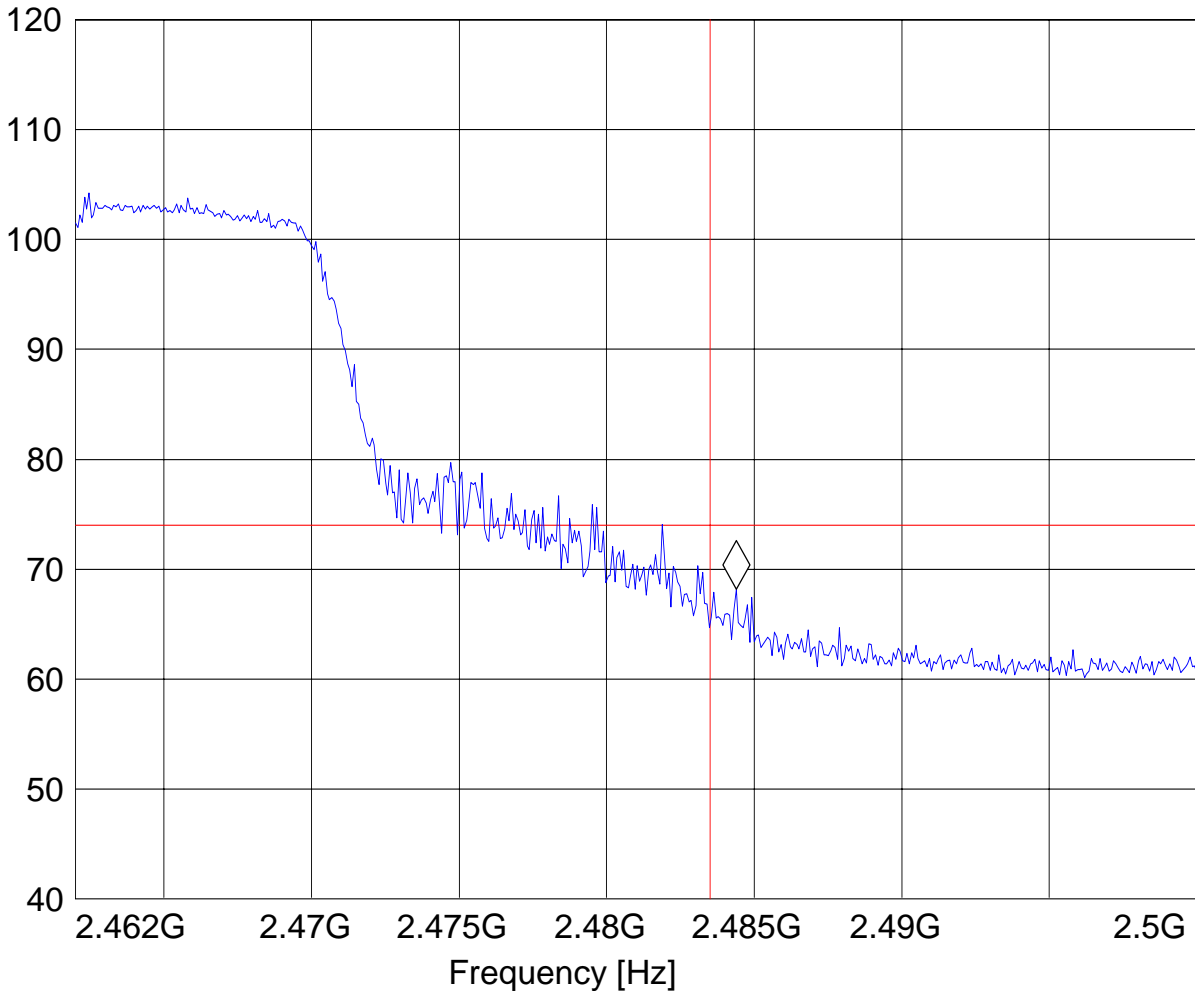
EUT: Dell PP12S with BCM94311MCAG  
Customer: Broadcom  
Test Mode: 802.11 g; ch 11; Aux antenna  
ANT Orientation: V  
EUT Orientation: H  
Test Engineer: Juan  
Power Supply: AC Power Supply

**SWEEP 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: 2.484388778 GHz 68.18 dBµV/m

Level [dBµV/m]





**BAND EDGE COMPLIANCE**

**§15.247 (d) & RSS-210(A8.5)**

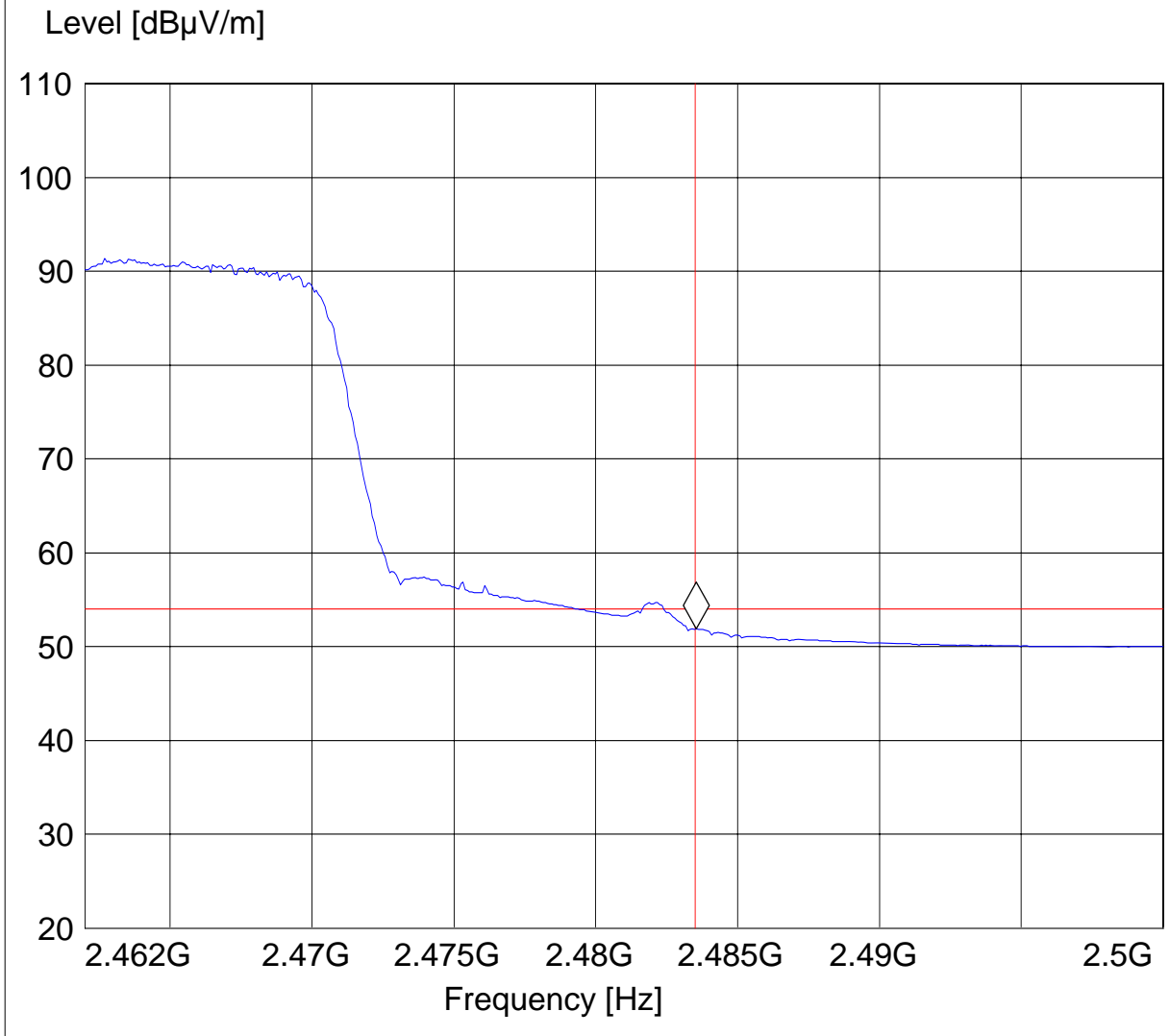
**802.11g High frequency section (spurious in the restricted band 2483.5 – 2500 MHz)**

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

**SWEEP TABLE: "FCC15.247 HBE\_AVG"**

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

Marker: 2.483551102 GHz 51.88 dBµV/m







1.6 BAND EDGE COMPLIANCE (802.11a)

§15.247 (d) & RSS-210(A8.5)

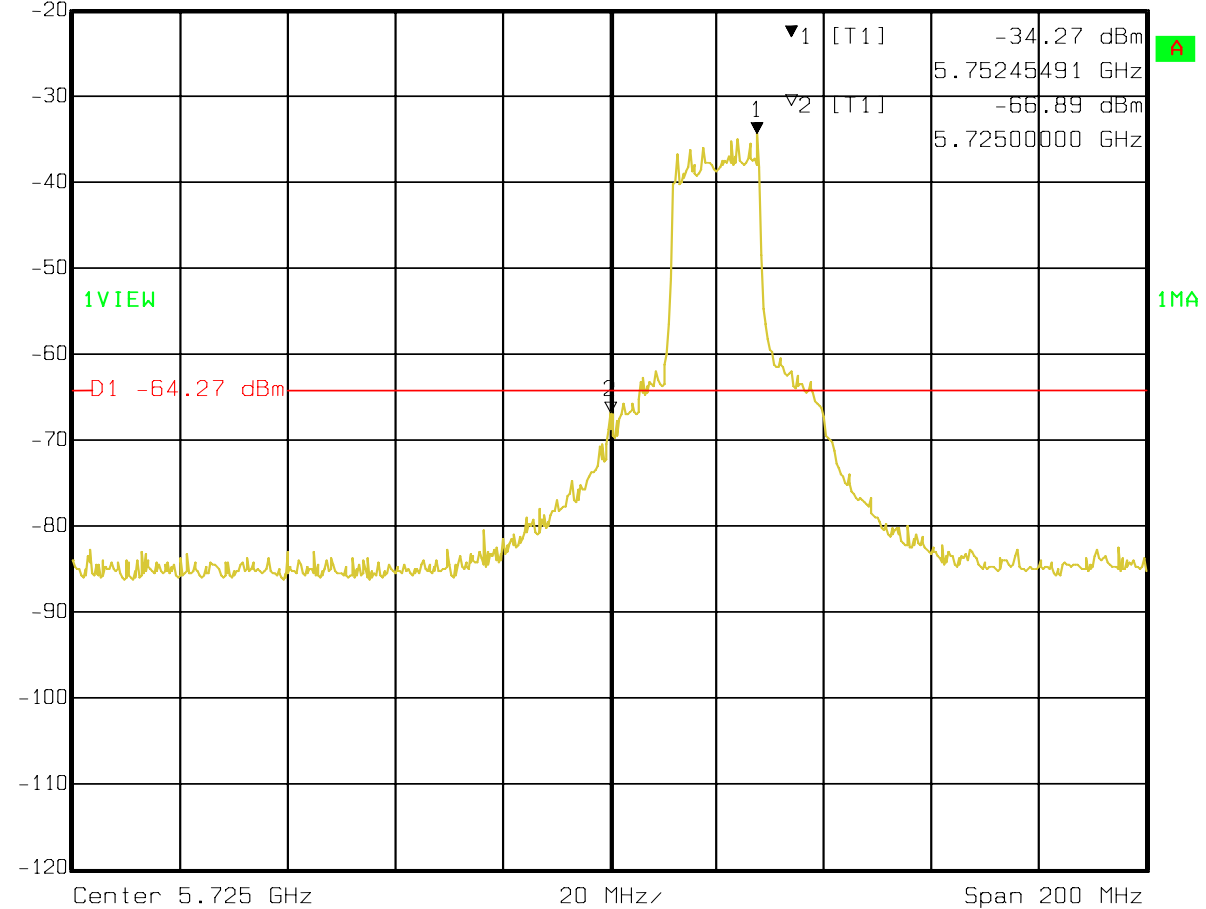
802.11a Low frequency section (spurious in the restricted band 5725 – 5850 MHz)

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:

CONDUCTED MEASUREMENT

	Marker 1 [T1]	RBW	100 kHz	RF Att	0 dB
	Ref Lvl	-34.27 dBm	VBW	100 kHz	
	-20 dBm	5.75245491 GHz	SWT	50 ms	Unit dBm



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



**BAND EDGE COMPLIANCE**

**§15.247 (d) & RSS-210(A8.5)**

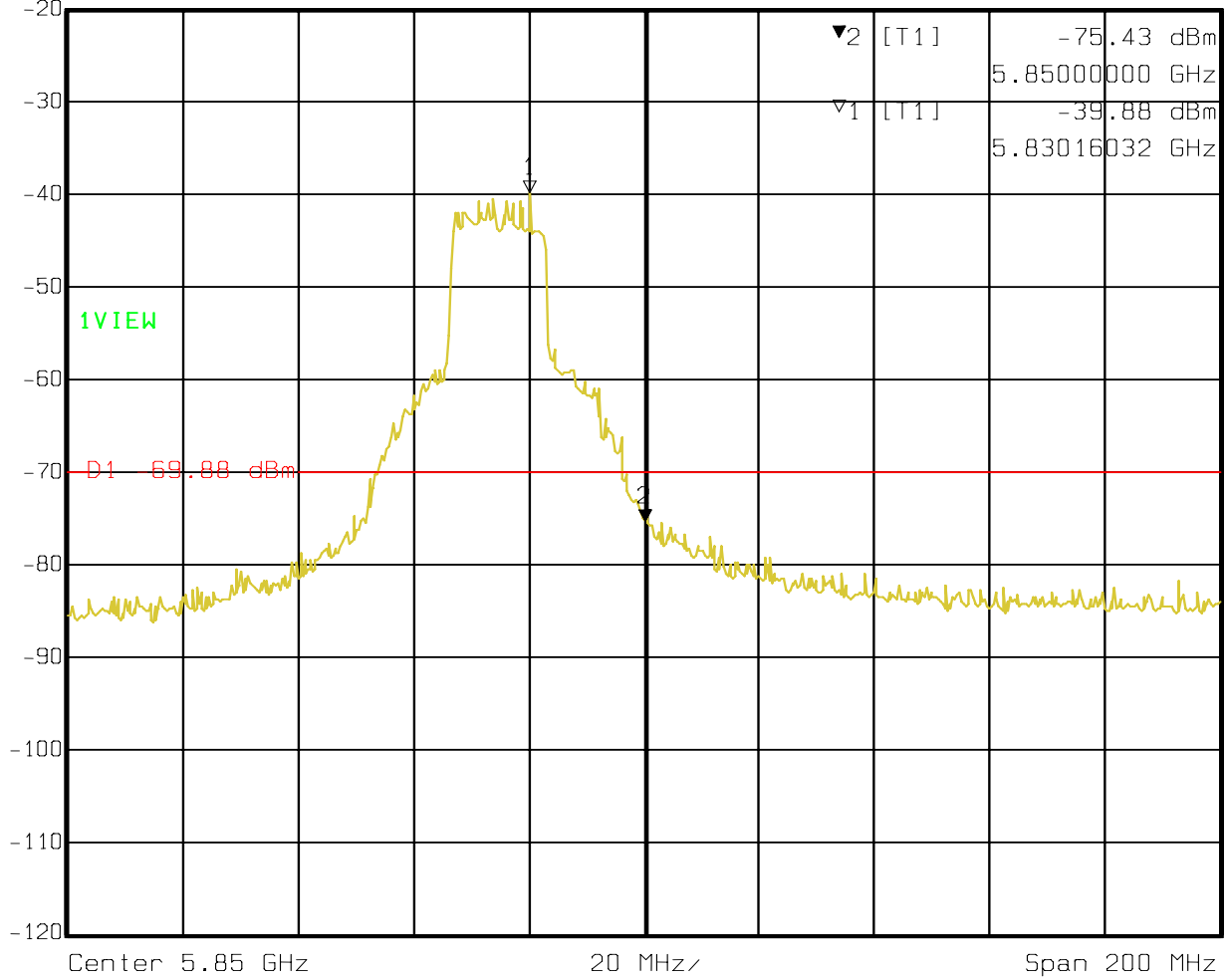
**802.11a High frequency section (spurious in the restricted band 5825 – 5850 MHz)**

**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:

**CONDUCTED MEASUREMENT**

	Ref Lvl	Marker 2 [T1]	RBW	100 kHz	RF Att	0 dB
	-20 dBm	-75.43 dBm	VBW	100 kHz		
		5.85000000 GHz	SWT	50 ms	Unit	dBm





**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):

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



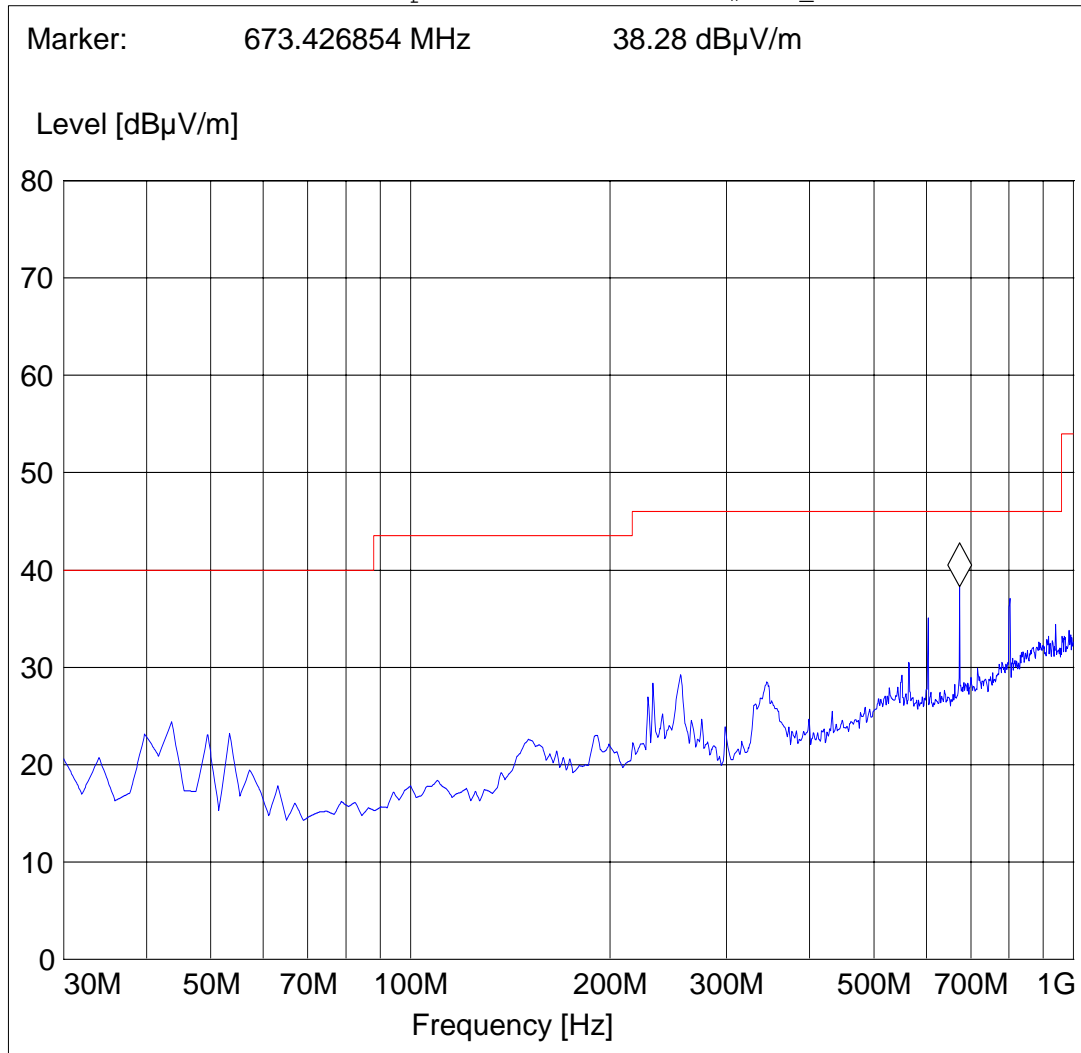
**EMISSION LIMITATIONS - Radiated (Transmitter) §15.247 (d) & RSS-210(A8.5)  
Lowest Channel (2412MHz): 30MHz – 1GHz**

**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:

**SWEEP 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





**EMISSION LIMITATIONS - Radiated (Transmitter) §15.247 (d) & RSS-210(A8.5)**

**Lowest Channel (2412MHz): 30MHz – 1GHz**

**Antenna: Horizontal**

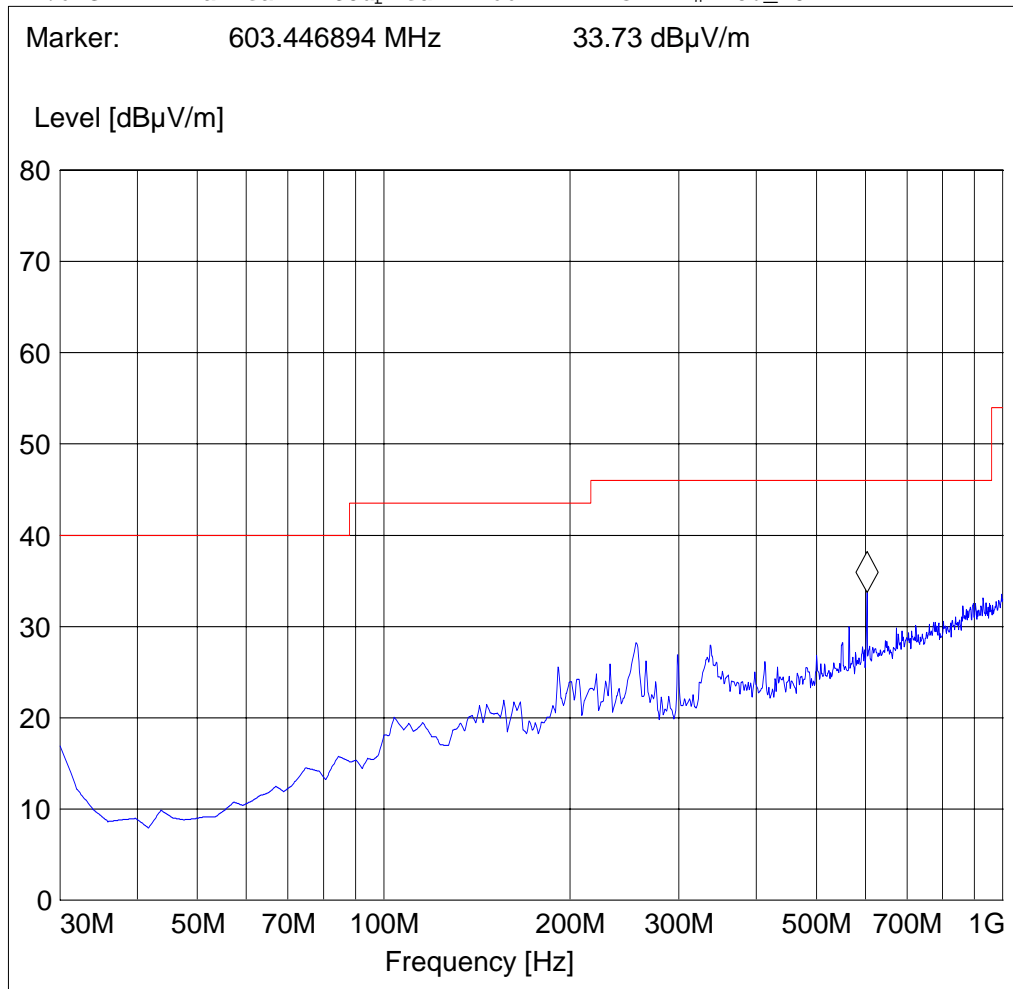
**Note: This plot is valid for low, mid, high channels (worst-case plot)**

**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\_Horz"**

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





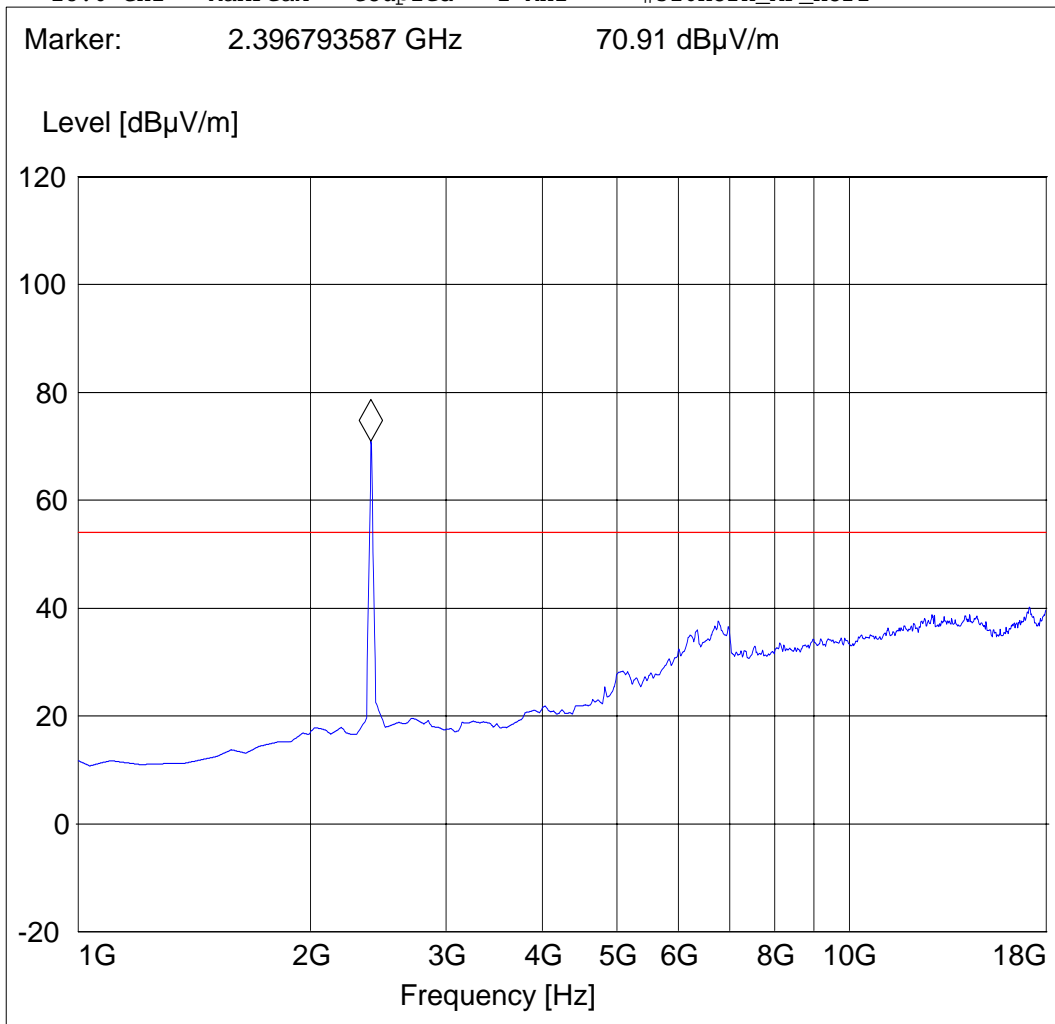
**EMISSION LIMITATIONS - Radiated (Transmitter) §15.247 (d) & RSS-210(A8.5)  
Lowest Channel (2412MHz): 1GHz – 18GHz**

**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

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

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



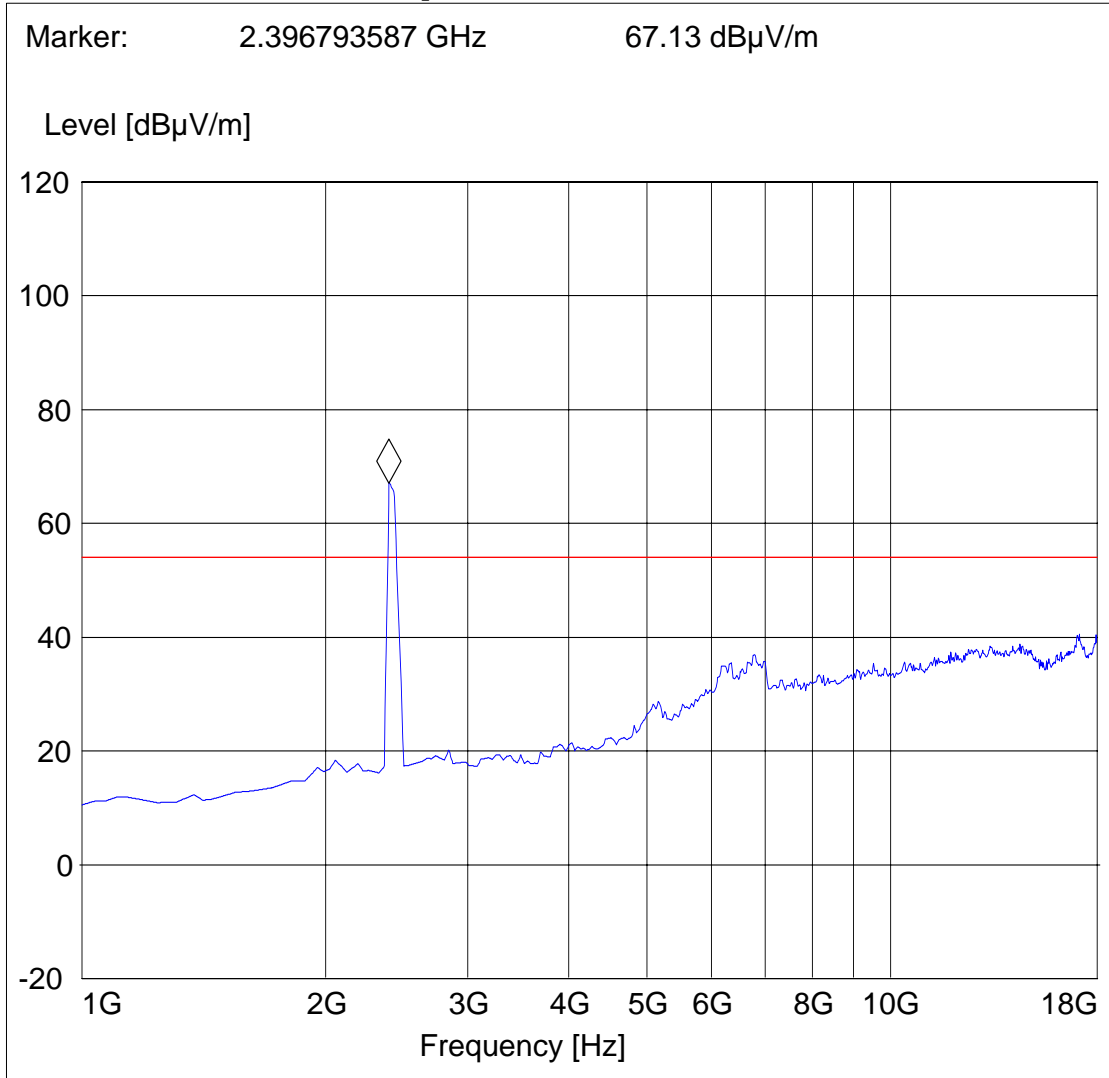


**EMISSION LIMITATIONS - Radiated (Transmitter) §15.247 (d) & RSS-210(A8.5)  
Lowest Channel (2412MHz): 1GHz – 18GHz**

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

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

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





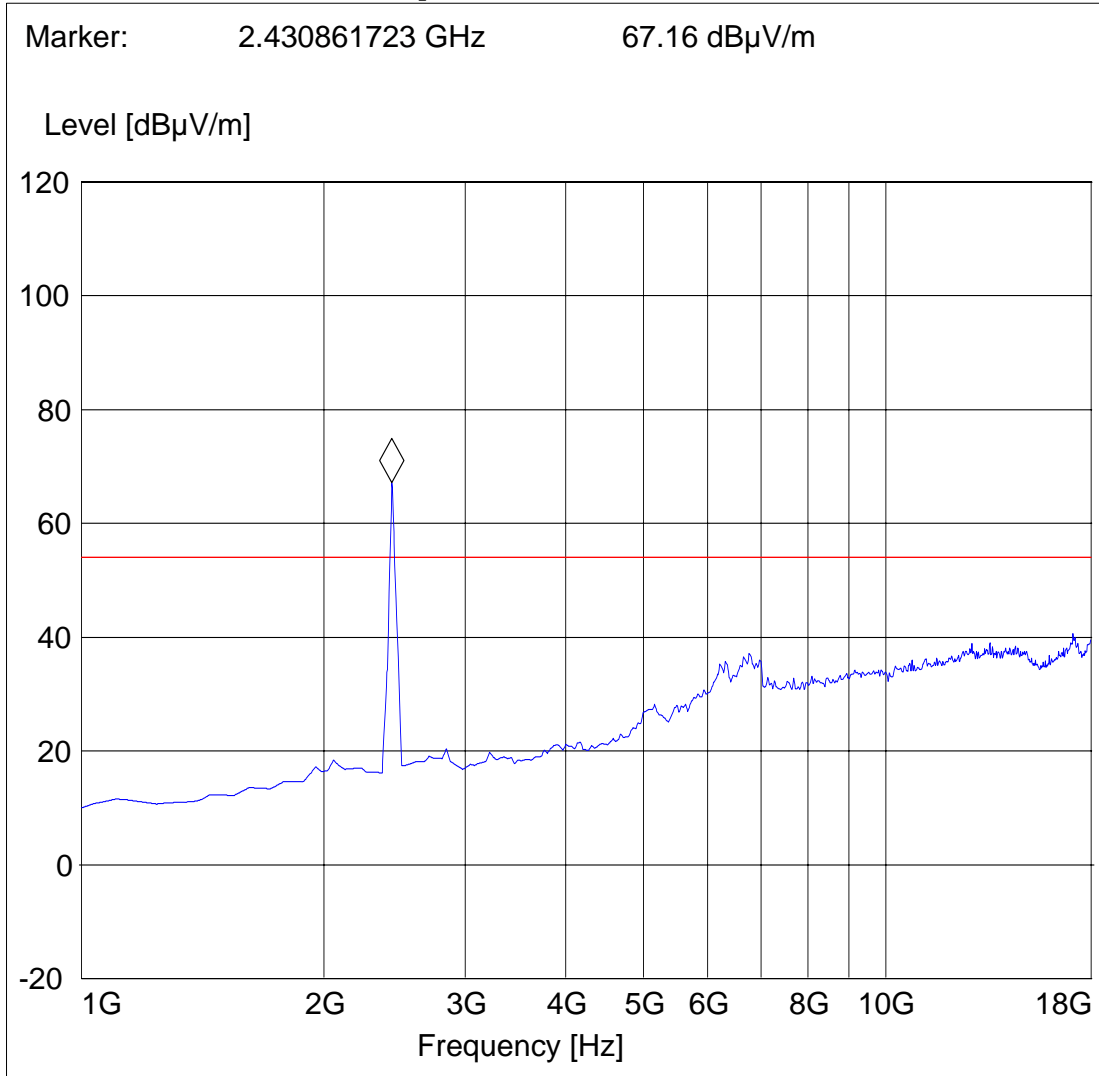


**EMISSION LIMITATIONS - Radiated (Transmitter) §15.247 (d) & RSS-210(A8.5)  
Mid Channel (2437MHz): 1GHz – 18GHz**

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

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

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



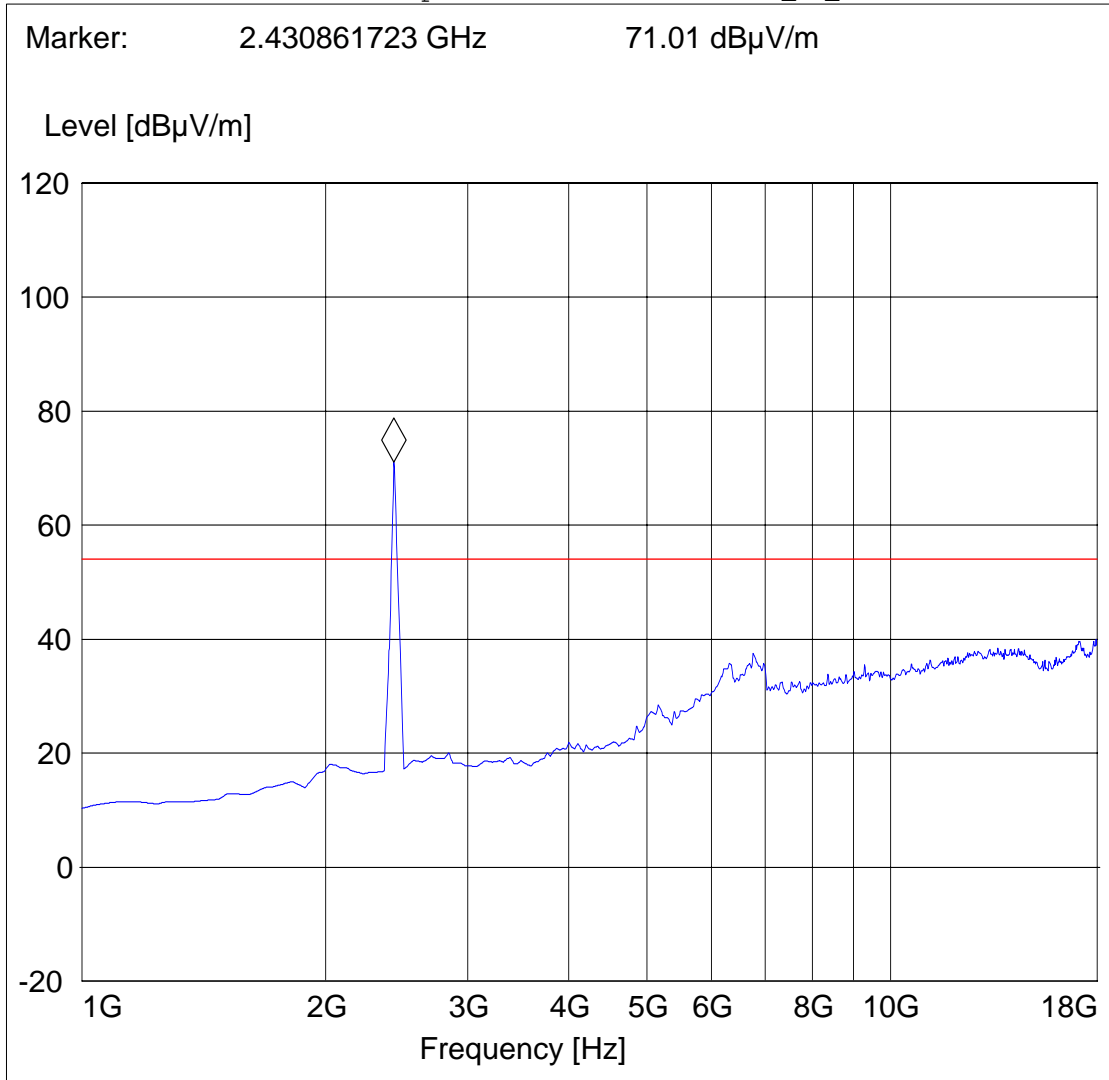


**EMISSION LIMITATIONS - Radiated (Transmitter) §15.247 (d) & RSS-210(A8.5)  
Mid Channel (2437MHz): 1GHz – 18GHz**

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. Time	IF Bandw.	Transducer
1.0 GHz	18.0 GHz	MaxPeak	Coupled	1 MHz	#326horn_AF_horz



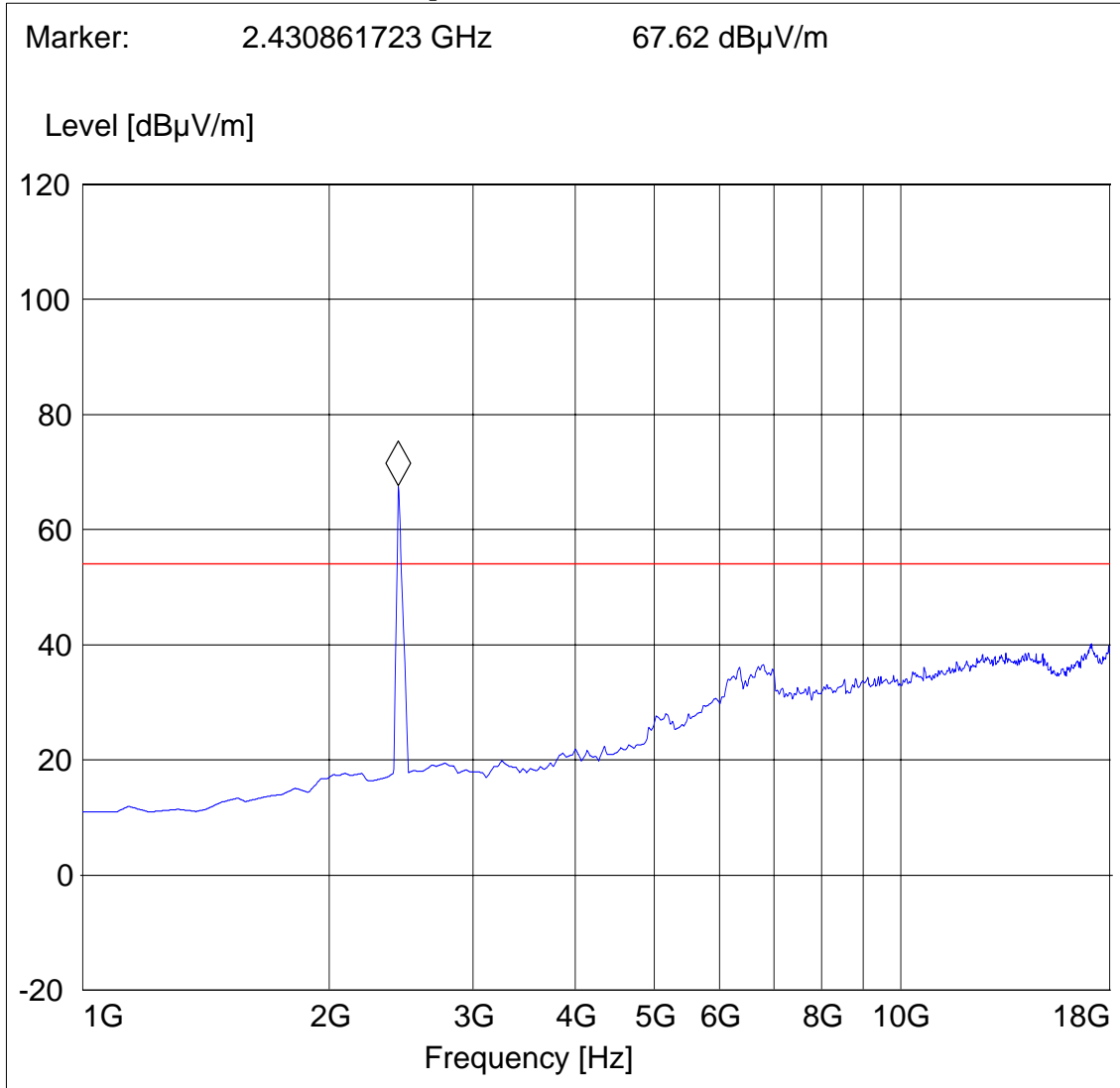


**EMISSION LIMITATIONS - Radiated (Transmitter) §15.247 (d) & RSS-210(A8.5)  
Highest Channel (2462MHz): 1GHz – 18GHz**

EUT / Description: BCM94311MCAG  
 Manufacturer: Broadcom  
 Test mode: 802.11b, Ch. 11 (Aux Antenna)  
 ANT Orientation: V  
 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. Time	IF Bandw.	Transducer
1.0 GHz	18.0 GHz	MaxPeak	Coupled	1 MHz	#326horn_AF_horz



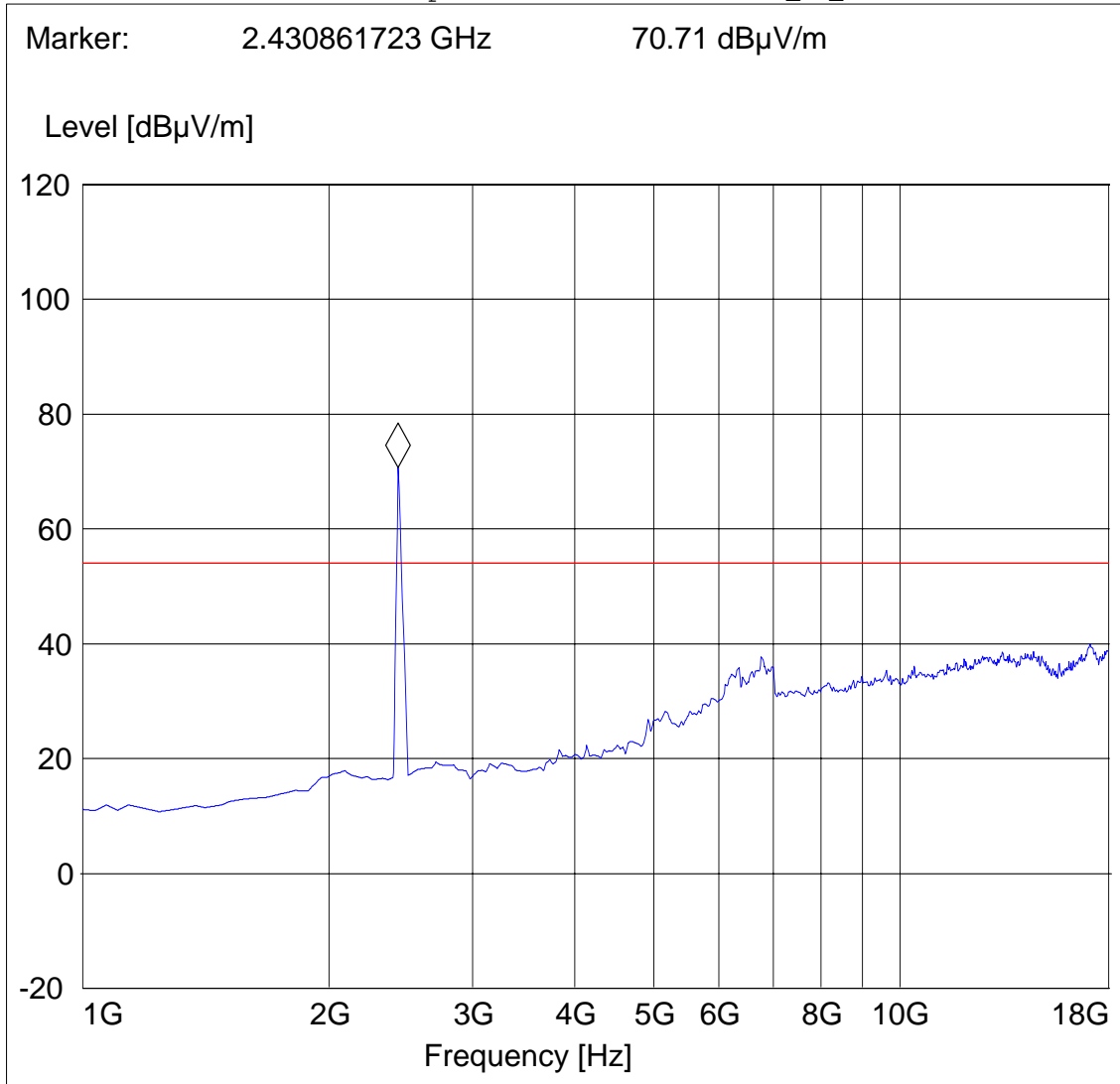


**EMISSION LIMITATIONS - Radiated (Transmitter) §15.247 (d) & RSS-210(A8.5)  
Highest Channel (2462MHz): 1GHz – 18GHz**

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. Time	IF Bandw.	Transducer
1.0 GHz	18.0 GHz	MaxPeak	Coupled	1 MHz	#326horn_AF_horz





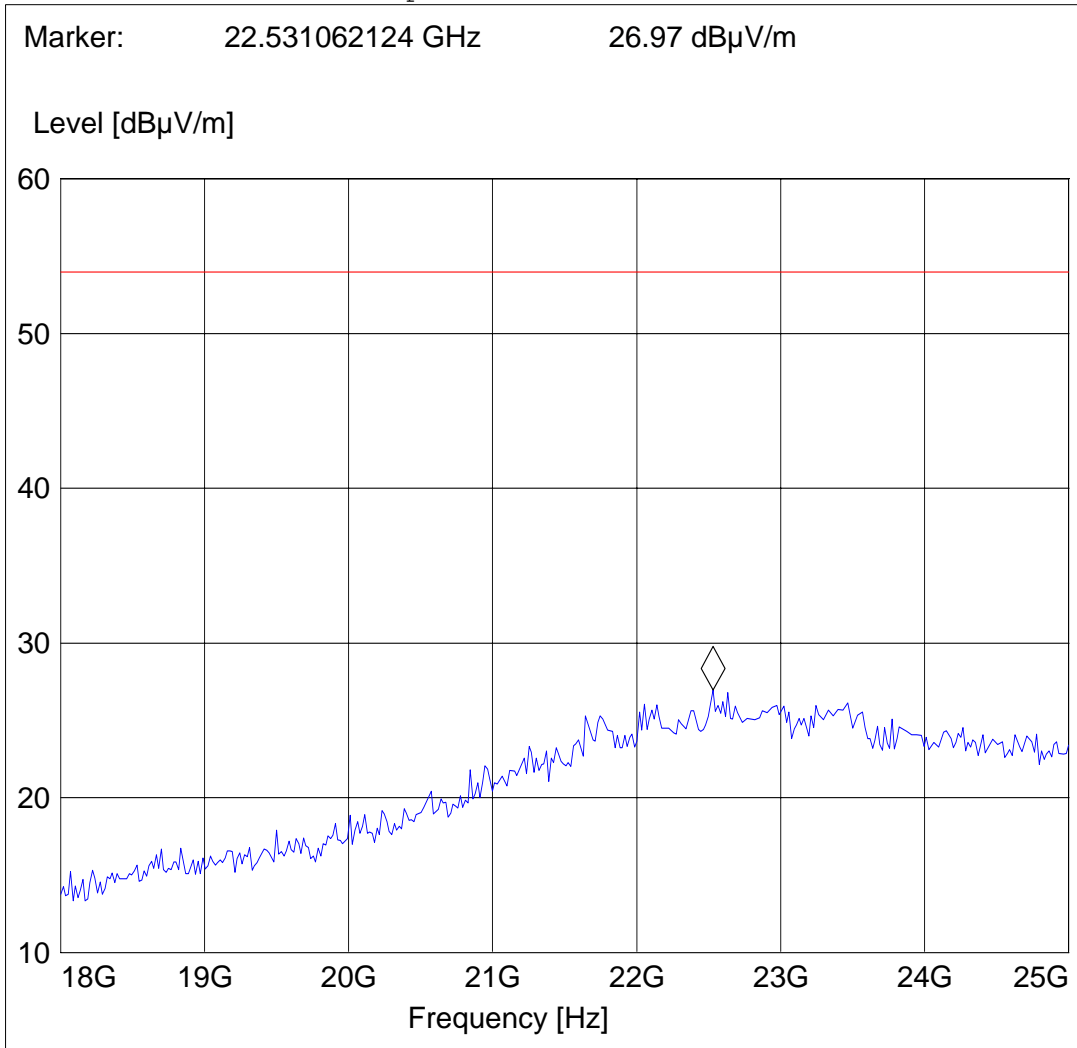
**EMISSION LIMITATIONS - Radiated (Transmitter) §15.247 (d) & RSS-210(A8.5)  
18GHz – 26.5GHz for low, middle, and high channels**

**Note: This plot is valid for low, mid, high channels (worst-case plot)**

EUT / Description: BCM94311MCAG  
 Manufacturer: Broadcom  
 Test Mode: 802.11b, Measurement for low, middle, and high channels  
 ANT Orientation: V  
 EUT Orientation: H  
 Test Engineer: Juan  
 Power Supply: AC Adapter  
 Comments:

**SWEEP 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





**1.9 EMISSION LIMITATIONS - Radiated (Transmitter), 802.11g**

§15.247 (d) & RSS-210(A8.5):

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



**EMISSION LIMITATIONS - Radiated (Transmitter) §15.247 (d) & RSS-210(A8.5)**

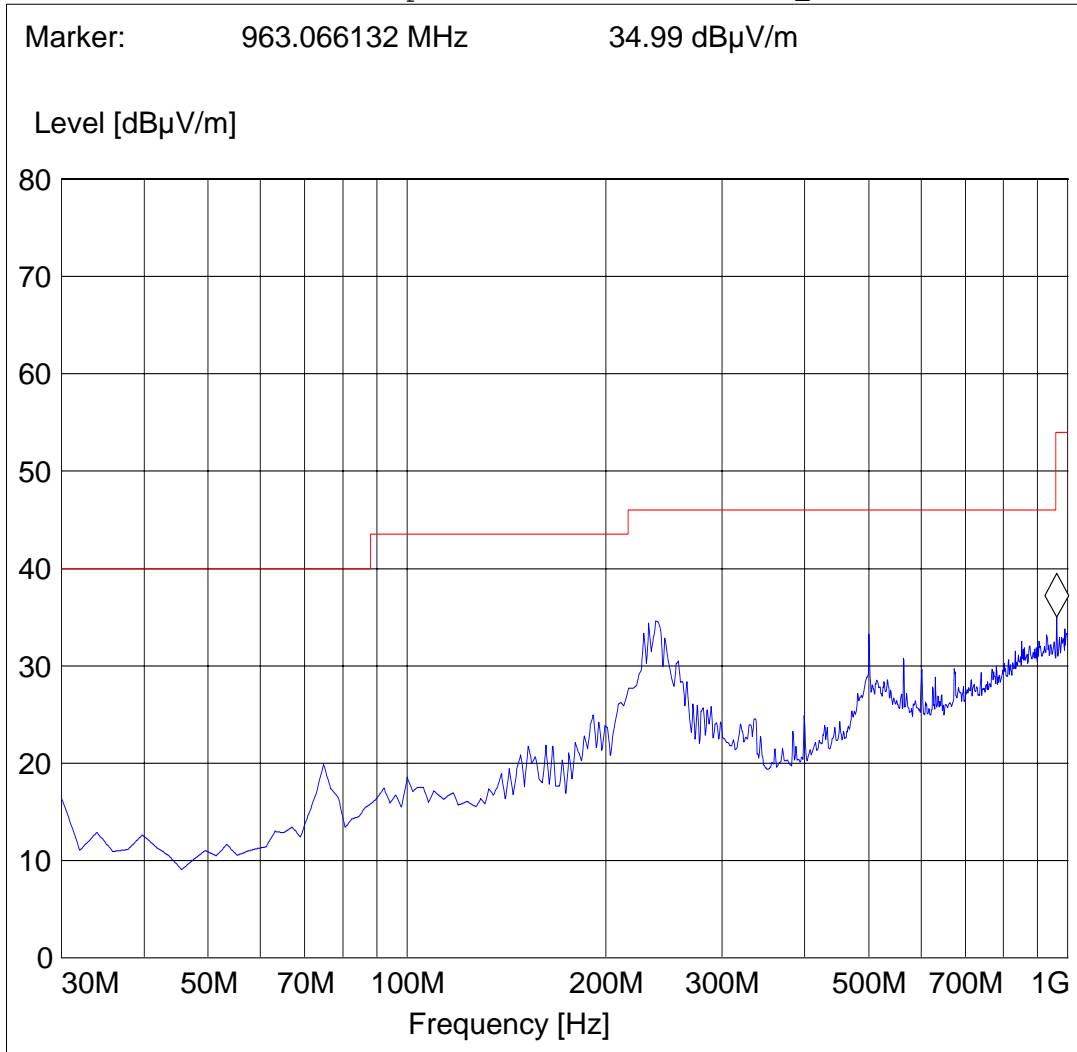
**Lowest Channel (2412MHz): 30MHz – 1GHz**

**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:

**SWEEP 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





**EMISSION LIMITATIONS - Radiated (Transmitter)**

**§15.247 (d) & RSS-210(A8.5)**

**Lowest Channel (2412MHz): 30MHz – 1GHz**

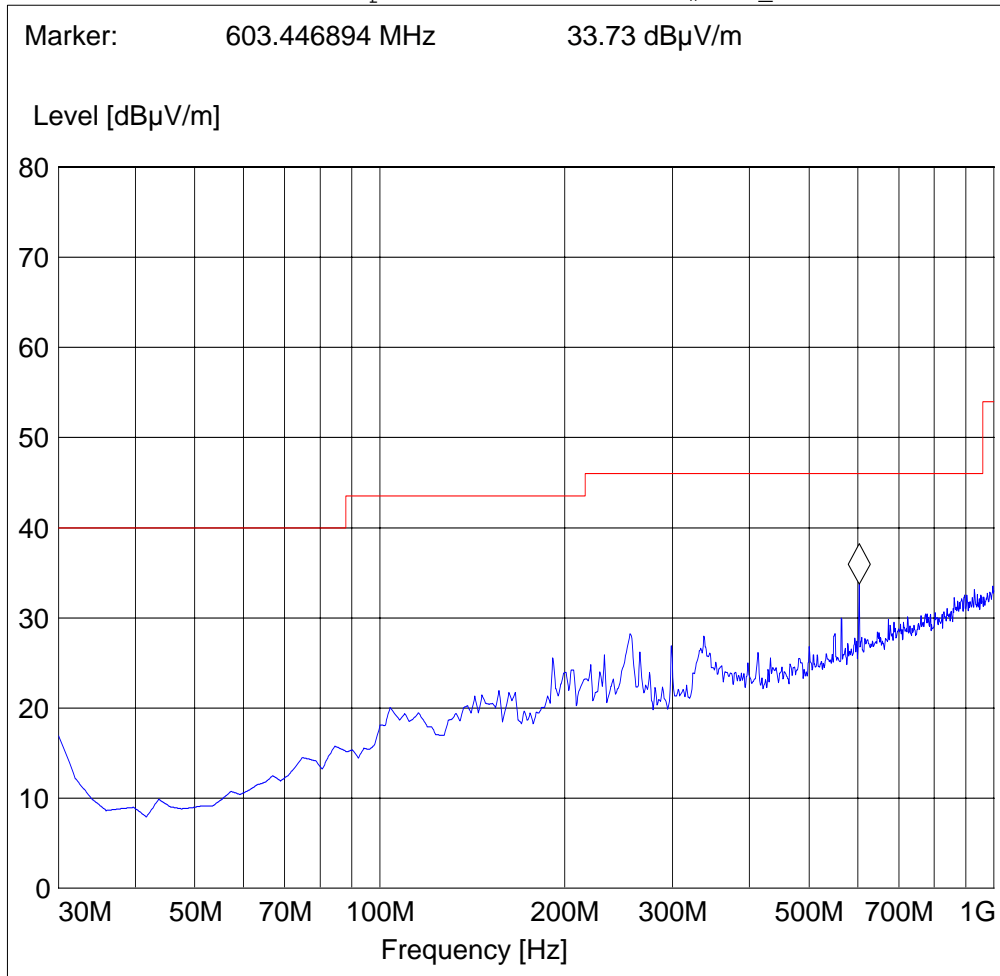
**Antenna: Horizontal**

**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:

**SWEEP 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)**

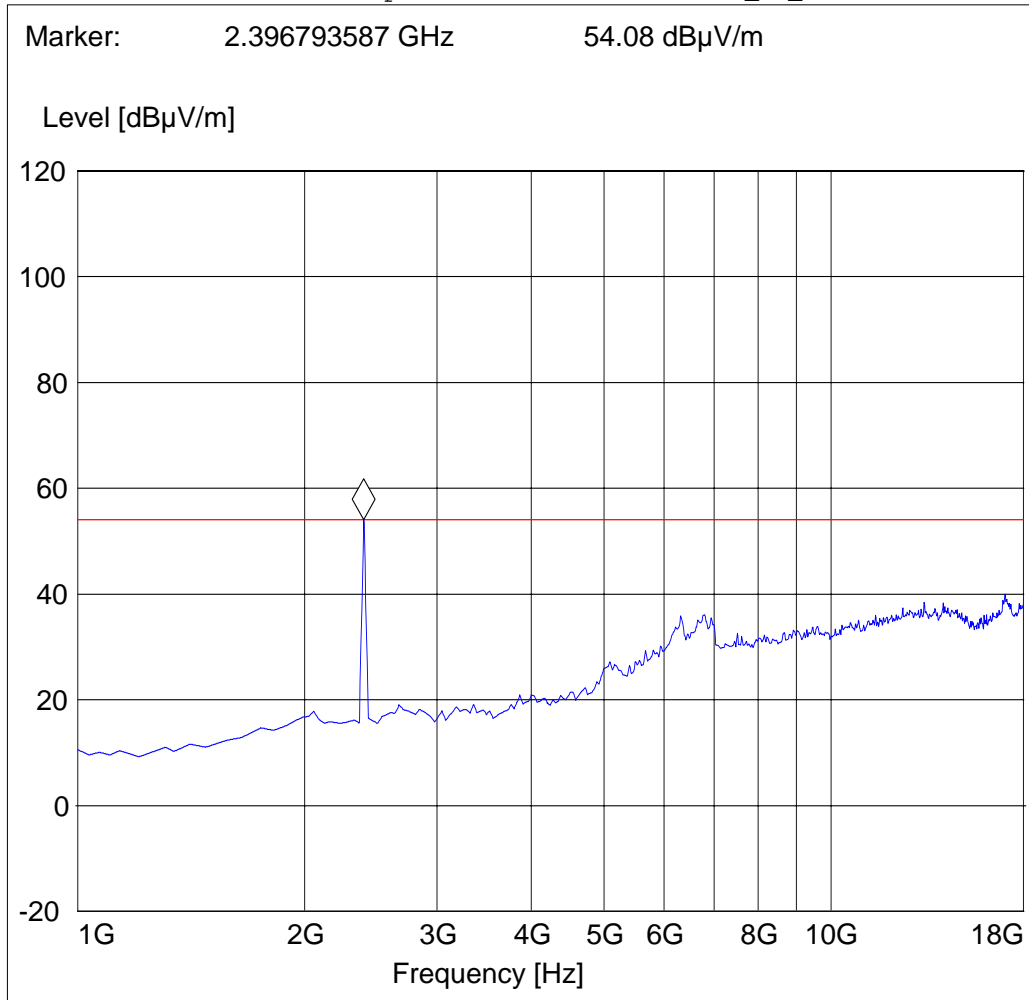
**Lowest Channel (2412MHz): 1GHz – 18GHz**

**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

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

Start Frequency	Stop Frequency	Detector	Meas. Time	IF Bandw.	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)**

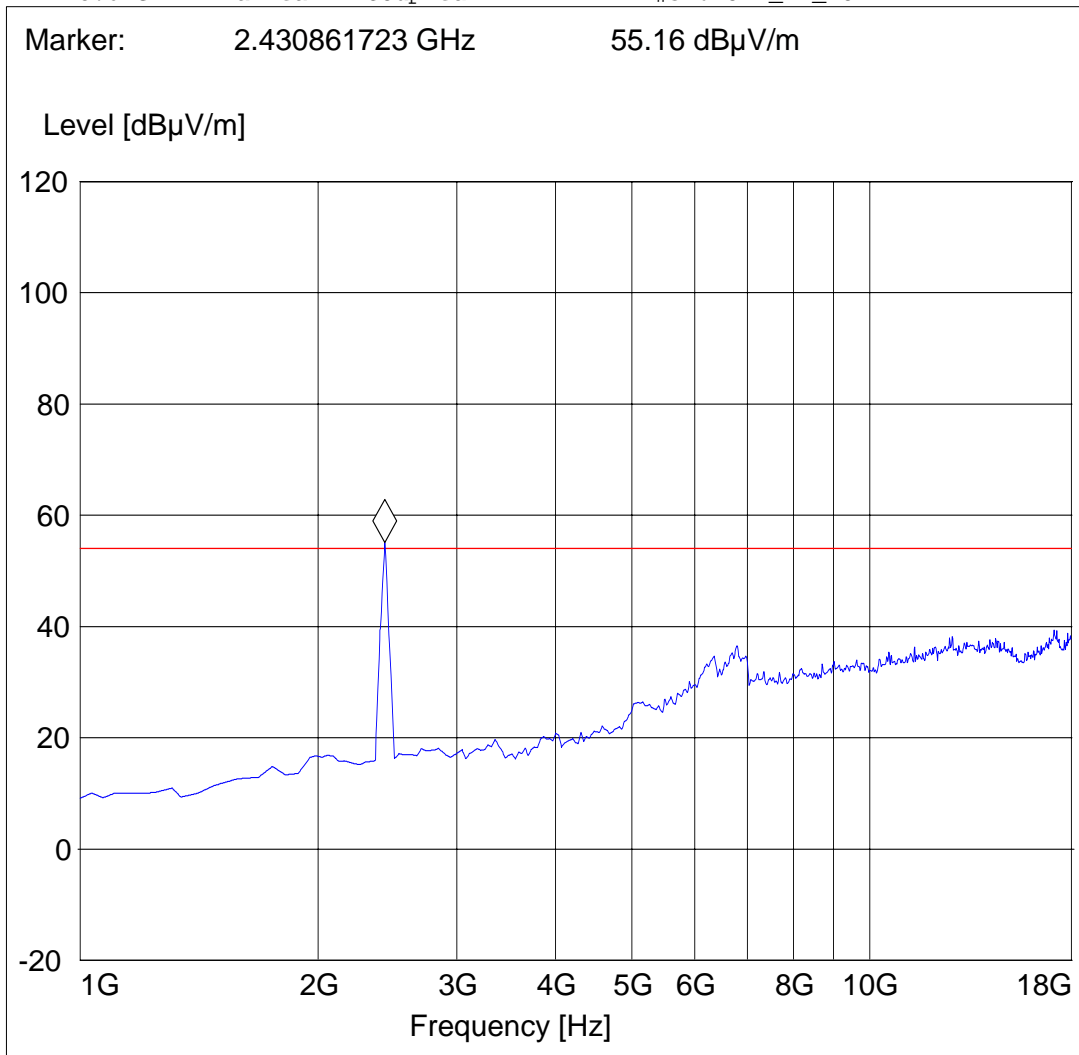
**Mid Channel (2437MHz): 1GHz – 18GHz**

**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

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

Start Frequency	Stop Frequency	Detector	Meas. Time	IF Bandw.	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)

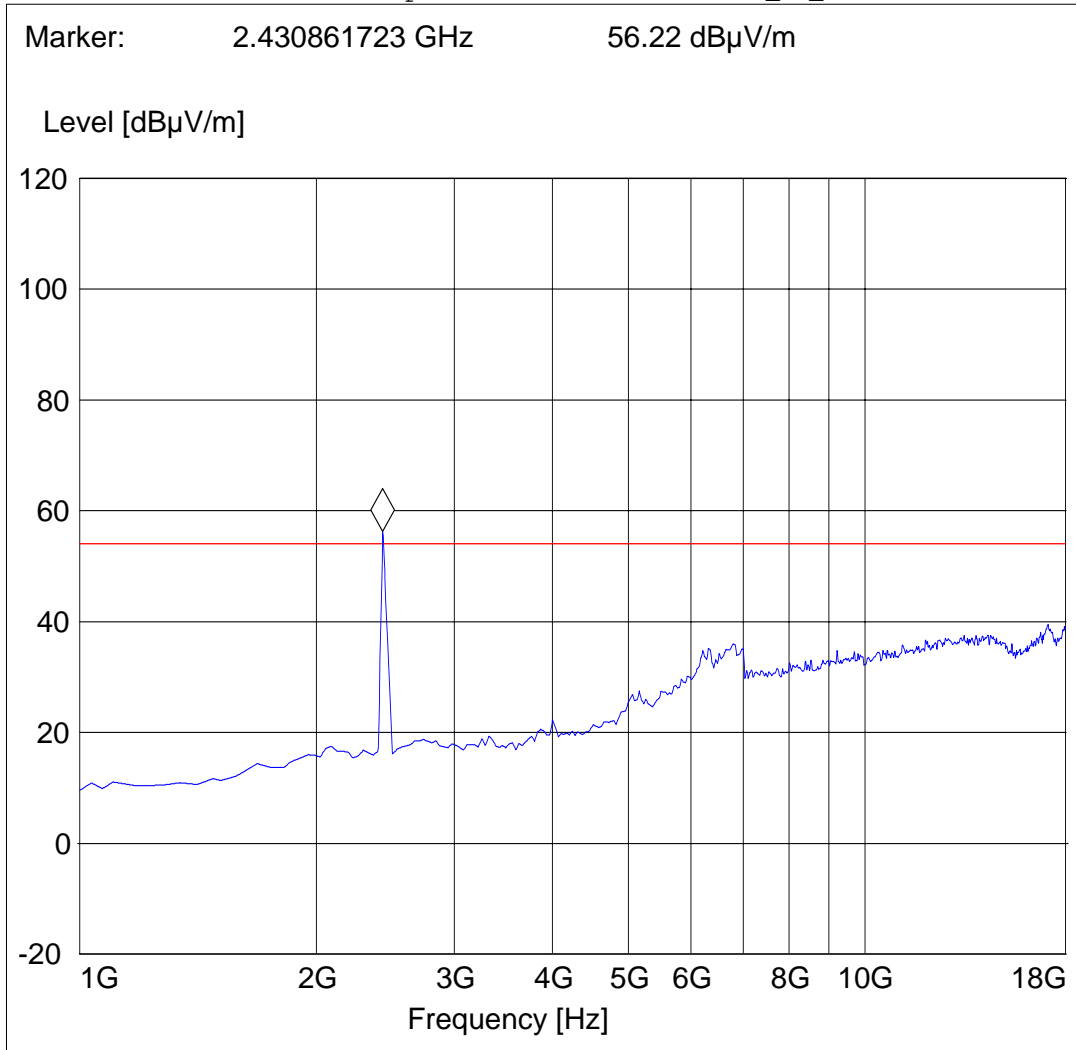
**Highest Channel (2462MHz): 1GHz – 18GHz**

**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

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

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





**EMISSION LIMITATIONS - Radiated (Transmitter)**  
**18GHz – 26.5GHz for low, middle, and high channels**

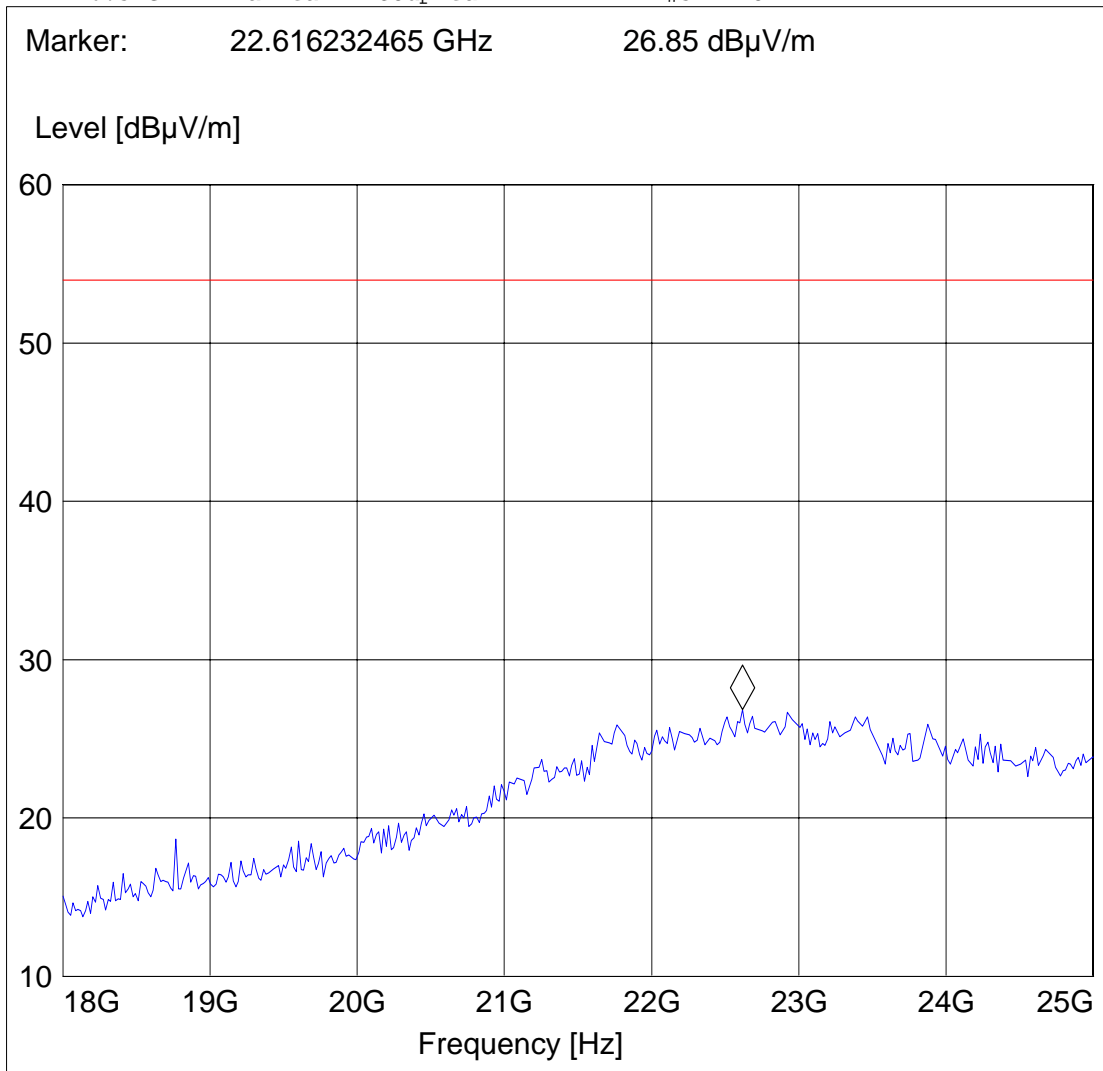
**§15.247 (d) & RSS-210(A8.5)**

**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:

**SWEEP 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





**1.10 EMISSION LIMITATIONS - Radiated (Transmitter), 802.11a**

§15.247 (d) & RSS-210(A8.5):

<b>Transmit at Lowest channel Frequency 5745MHz (802.11a)</b>			
<b>Frequency (MHz)</b>	<b>Level (dBµV/m)</b>		
	<b>Peak</b>	<b>Quasi-Peak</b>	<b>Average</b>
SEE PLOTS			
<b>Transmit at Middle channel Frequency 5785MHz (802.11a)</b>			
<b>Frequency (MHz)</b>	<b>Level (dBµV/m)</b>		
	<b>Peak</b>	<b>Quasi-Peak</b>	<b>Average</b>
SEE PLOTS			
<b>Transmit at Highest channel Frequency 5825MHz (802.11a)</b>			
<b>Frequency (MHz)</b>	<b>Level (dBµV/m)</b>		
	<b>Peak</b>	<b>Quasi-Peak</b>	<b>Average</b>
SEE PLOTS			



**EMISSION LIMITATIONS - Radiated (Transmitter) §15.247 (d) & RSS-210(A8.5)**

**Lowest Channel (5745MHz): 30MHz – 1GHz**

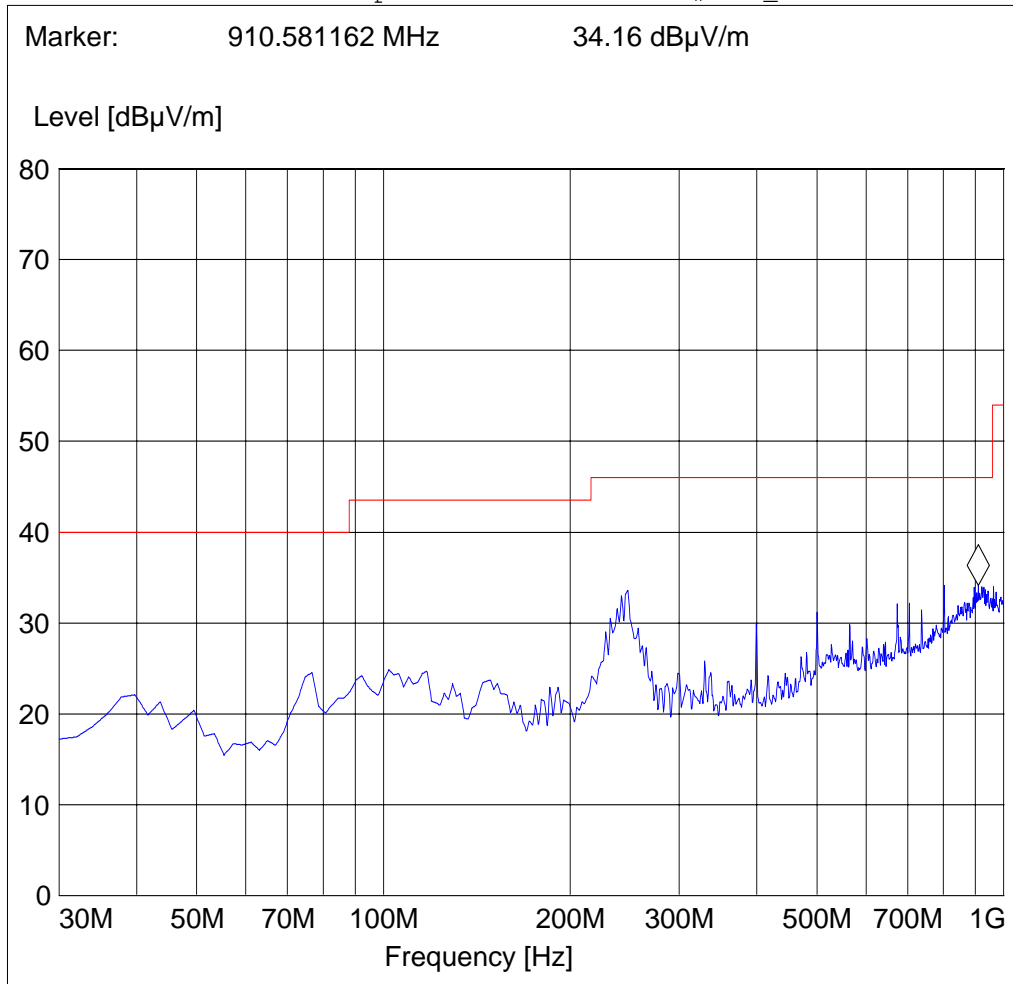
**Antenna: Vertical**

**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. Time	IF Bandw.	Transducer
30.0 MHz	1.0 GHz	MaxPeak	Coupled	100 kHz	3141-#1186_Vert





**EMISSION LIMITATIONS - Radiated (Transmitter)**

**§15.247 (d) & RSS-210(A8.5)**

**Lowest Channel (5745MHz): 30MHz – 1GHz**

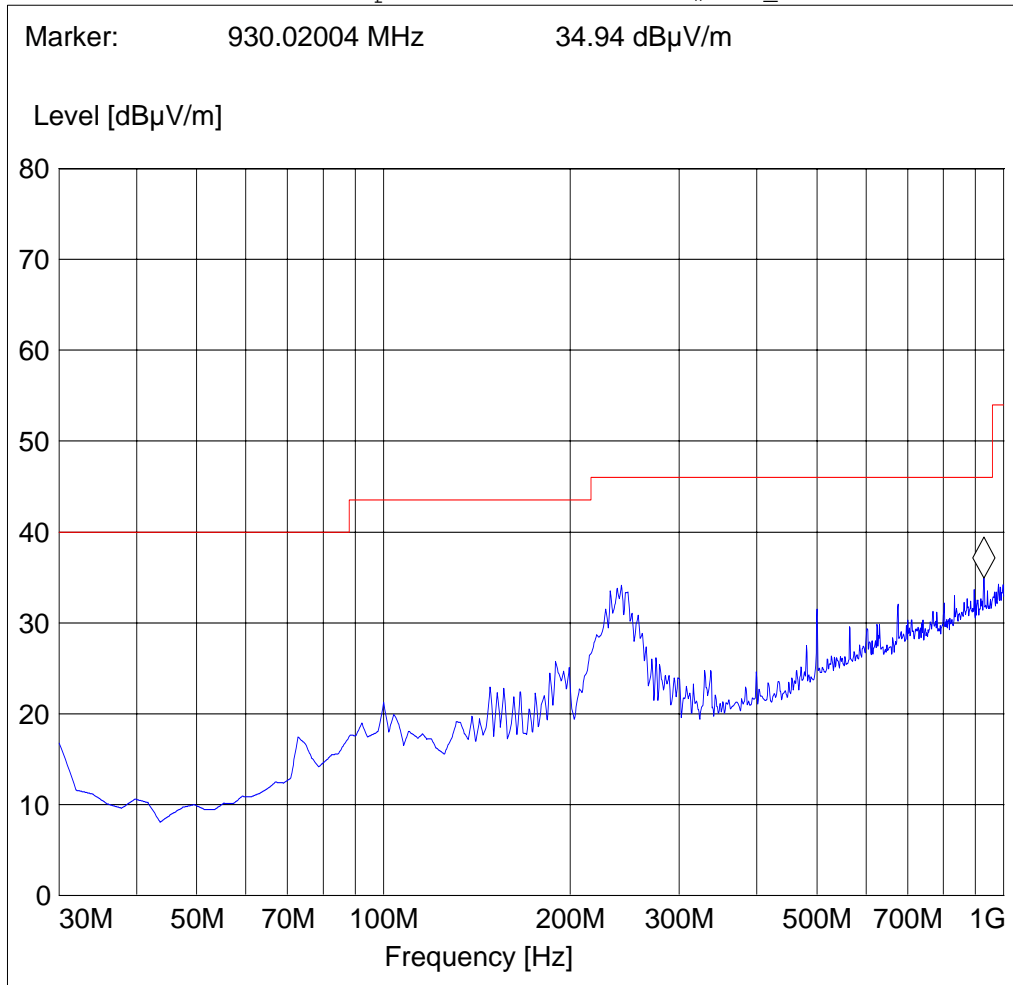
**Antenna: Horizontal**

**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:

**SWEEP 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**

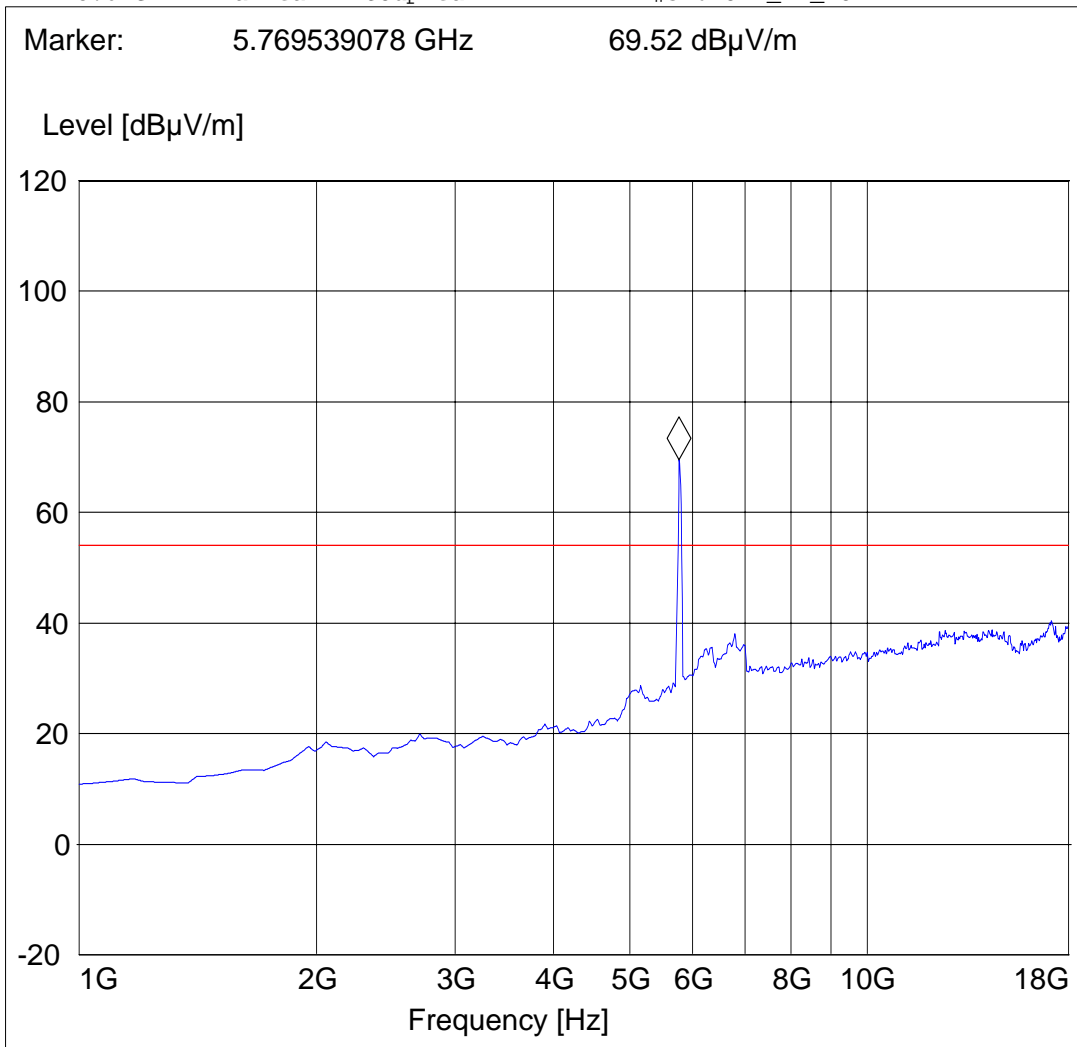
**Note: No significant harmonic emissions detected either in Vertical or Horizontal**

**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

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

Start Frequency	Stop Frequency	Detector	Meas. Time	IF Bandw.	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)**

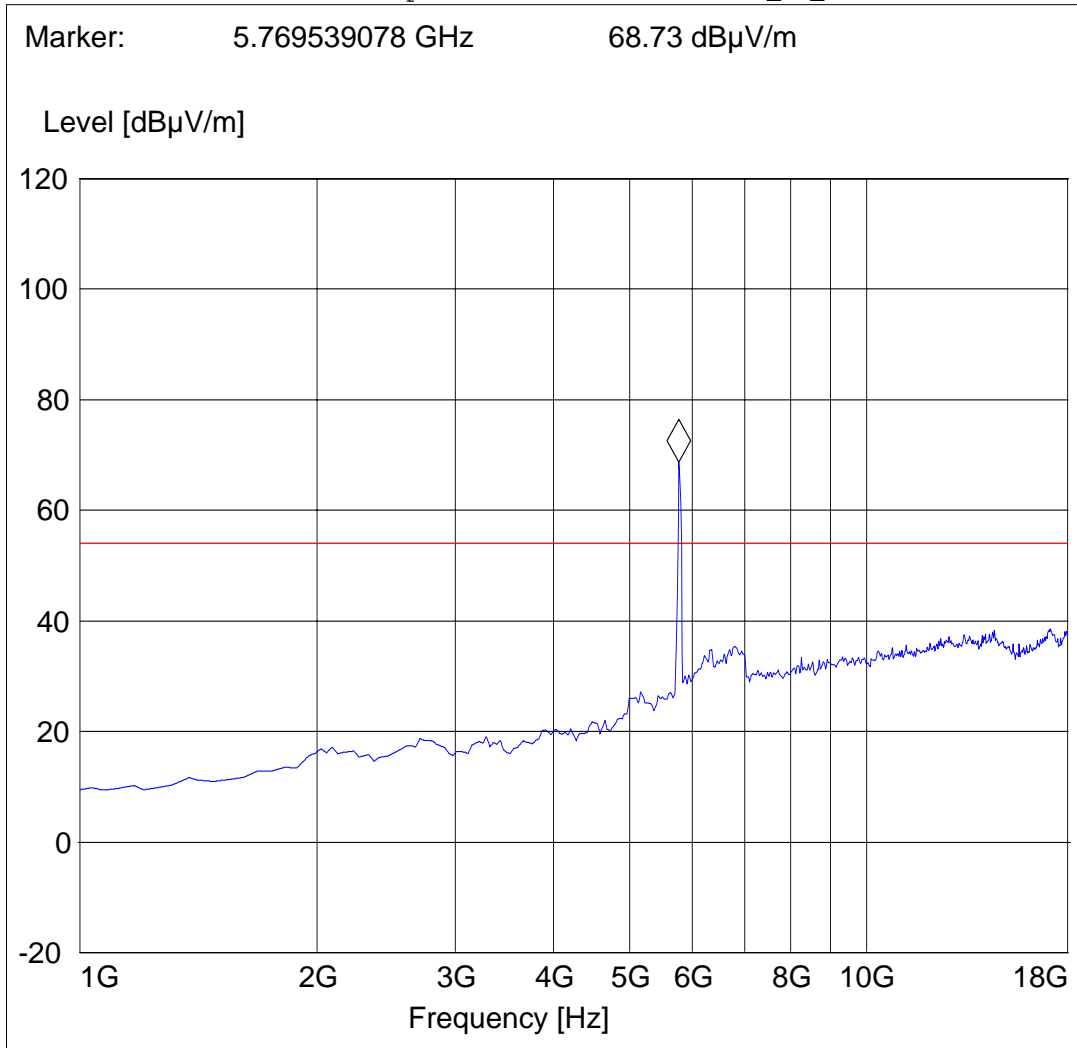
**Mid Channel (5785MHz): 1GHz – 18GHz**

**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

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

Start Frequency	Stop Frequency	Detector	Meas. Time	IF Bandw.	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)**

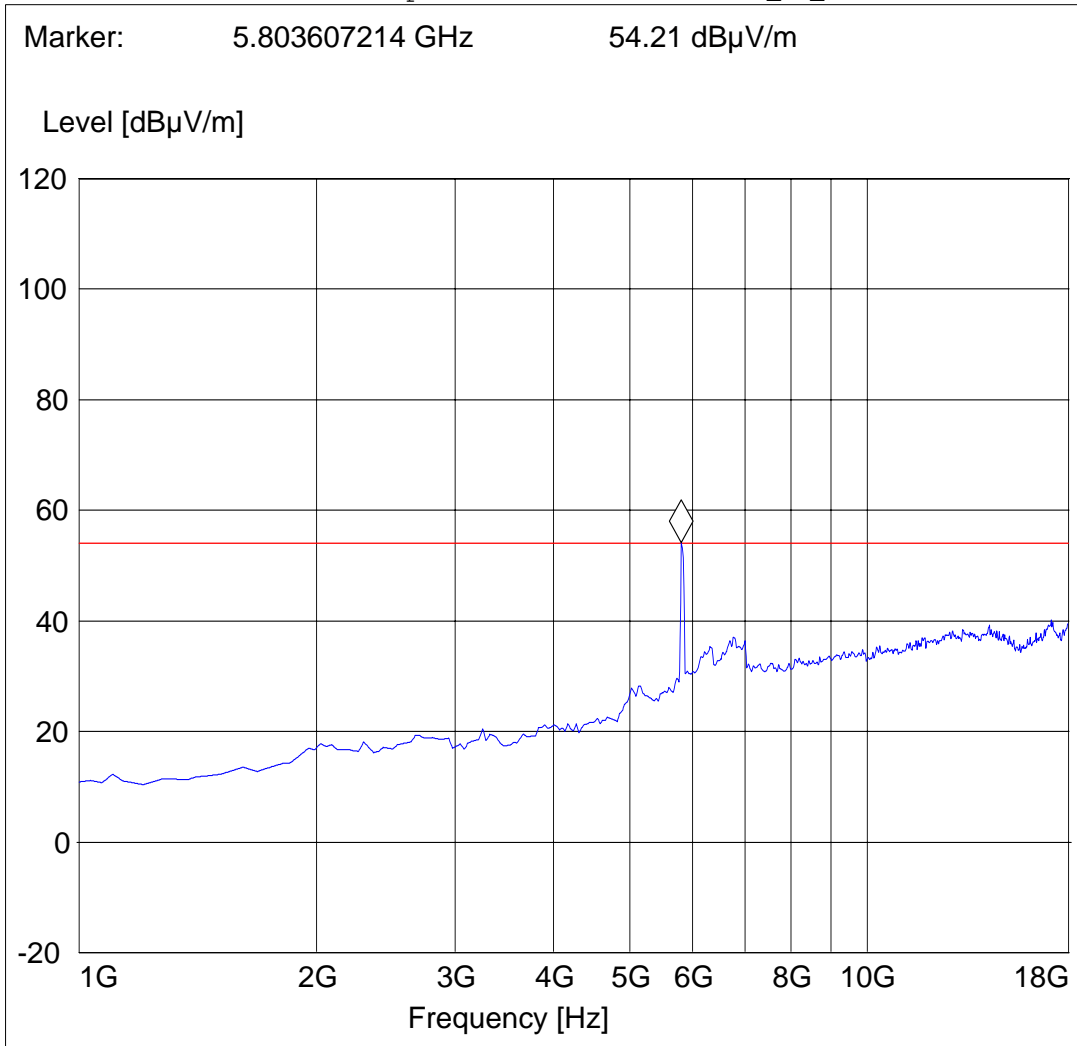
**Highest Channel (5825MHz): 1GHz – 18GHz**

**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. Time	IF Bandw.	Transducer
1.0 GHz	18.0 GHz	MaxPeak	Coupled	1 MHz	#326horn_AF_horz





**EMISSION LIMITATIONS - Radiated (Transmitter)  
18GHz – 26.5GHz for low, middle, and high channels**

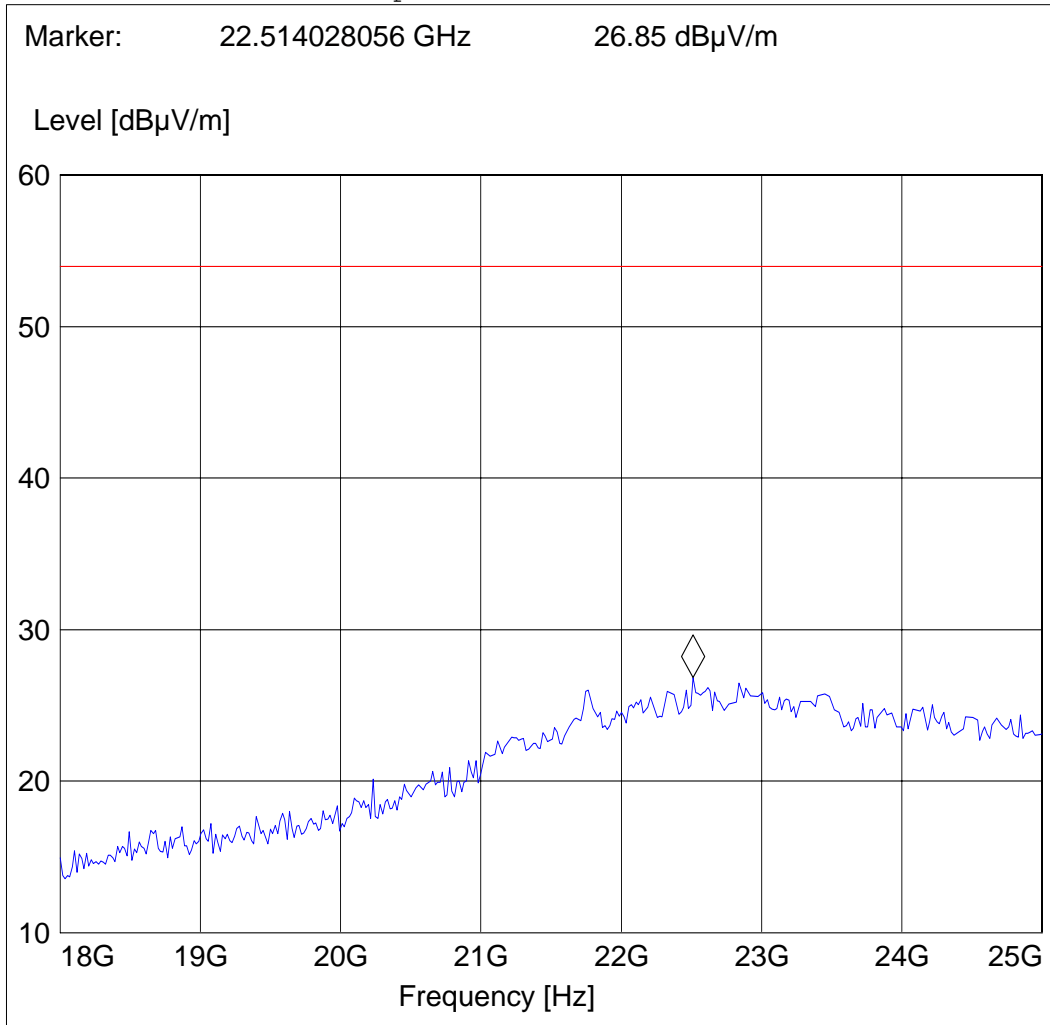
**§15.247 (d) & RSS-210(A8.5)**

**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:

**SWEEP 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





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**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  $\mu$ 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 $\mu$ 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)**

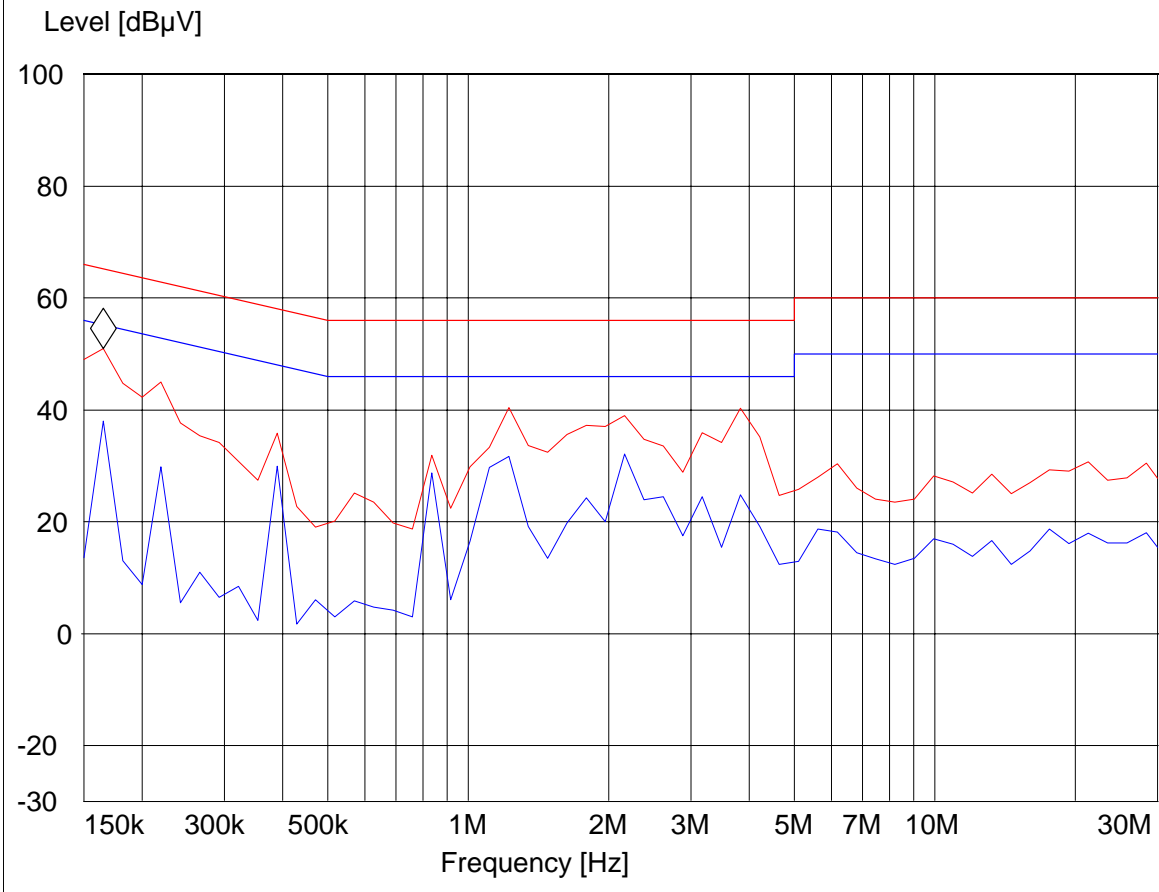
EUT: BCM94311MCAG  
 Manufacturer: Broadcom  
 Operating Condition: Tx Mode  
 ANT Orientation: CONDUCTED  
 EUT Orientation: H  
 Test Engineer: Juan M.  
 Power Supply: AC Adaptor  
 Comments: 120V,60Hz (Line)

**SWEEP TABLE: "55022 cond"**

Short Description: EN 55022 for 150kHz-30MHz  
 Unit: dBµV

Detector: Mode:

Marker: 165 kHz 50.97 dBµV N



- MES 55022 cond MaxPk
- MES 55022 cond Avg
- LIM EN 55022 V QP Voltage QP Limit
- LIM EN 55022 V AV Voltage AV Limit



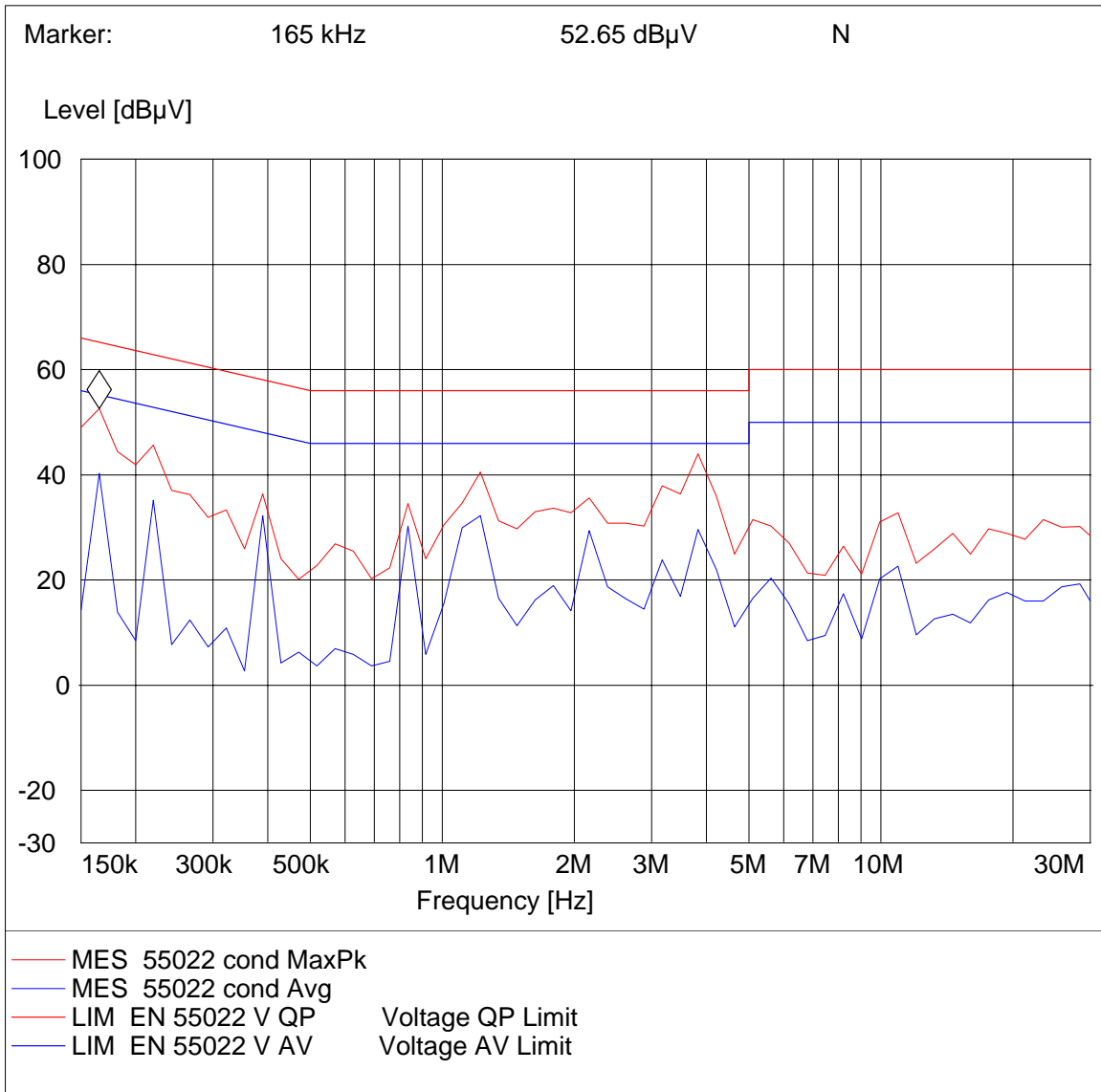
### Voltage Mains Test (Neutral)

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)

#### SWEEP TABLE: "55022 cond"

Short Description: EN 55022 for 150KHz-30MHz  
Unit: dBµV

Detector: Mode:





**2 TEST EQUIPMENT AND ANCILLARIES USED FOR TESTS**

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



### 3 BLOCK DIAGRAMS

#### Radiated Testing

##### 3.1

##### ANECHOIC CHAMBER

