



# Permissive Class II Change FCC Test Report

FCC Part 15.247 & RSS-210, Issue 7 for Digital Transmission Systems

**FOR:**

**Broadcom, Inc.**

**802.11b/g Wireless LAN PCI-E Mini Card**

**Model Number: BCM94312MCG**

**FCC ID: QDS-BRCM1028**

**IC UPN: 4324A-BRCM1028**

**TEST REPORT #:EMC\_BROAD\_051\_08001\_G\_DTS**

**DATE: March 18, 2008**



**FCC listed#  
A2LA Certified  
IC recognized #  
3462B**

**CETECOM Inc.**

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Board of Directors: Dr. Harald Ansorge, Dr. Klaus Matkey, Hans Peter May

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## 1 Assessment

The following is in compliance with the applicable criteria specified in FCC rules Part 15.247 of the Code of Federal Regulations and in compliance with the applicable criteria specified in Industry Canada rules RSS-210.

Company	Description	Model #
Broadcom, Inc.	Wireless LAN PCI-E Mini Card	BCM94312MCG

Technical responsibility for area of testing:

March 18, Val Tankov  
2008 EMC & Radio (Project Engineer)

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

March 18, Juan Martinez  
2008 EMC & Radio (Project Engineer)

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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.

## **2 Administrative Data**

### **2.1 Identification of the Testing Laboratory Issuing the EMC Test Report**

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

### **2.2 Identification of the Client**

<b>Applicant's Name:</b>	<b>Broadcom, Inc.</b>
<b>Address:</b>	<b>190 Mathilda Place, Sunnyvale, CA 94086, USA</b>
<b>Contact Person:</b>	<b>Daniel Lawless</b>
<b>Phone No.</b>	<b>408 965-3346</b>
<b>Fax:</b>	<b>408 324-4840</b>
<b>e-mail:</b>	<b>dlawless@broadcom.com</b>

### **2.3 Identification of the Manufacturer**

<b>Manufacturer's Name:</b>	<b>Broadcom, Inc.</b>
<b>Manufacturer's Address:</b>	<b>190 Mathilda Place, Sunnyvale, CA 94086 USA</b>

### 3 Equipment under Test (EUT)

#### 3.1 Specification of the Equipment under Test

<b>Product Type</b>	<b>Wireless LAN PCI-E Mini Card</b>
<b>Marketing Name:</b>	<b>802.11b/g Wireless LAN PCI-E Mini Card</b>
<b>Model No:</b>	<b>BCM94312MCG</b>
<b>FCC-ID:</b>	<b>QDS-BRCM1028</b>
<b>IC UPN:</b>	<b>4324A-BRCM1028</b>
<b>Frequency Range:</b>	<b>2412 – 2462 MHz</b>
<b>Number of Channels</b>	<b>11</b>
<b>Type(s) of Modulation:</b>	<b>CCK &amp; OFDM</b>
<b>Antenna Type:</b>	<b>WNC PIFA 2412 – 2462 MHz Main (2.79dBi) &amp; Aux (2.82dBi), YAGEO PIFA 2412 – 2412 Main (2.09dBi) &amp; Aux (0.75dBi)</b>

#### 3.2 Class II permissive change laptops to be added

<b>EUT #</b>	<b>TYPE</b>	<b>MANF.</b>	<b>MODEL</b>	<b>SERIAL #</b>
1	Laptop	HP	HSTNN-I46C	N/A

#### 3.3 Identification of Accessory equipment

<b>TYPE</b>	<b>MANF.</b>	<b>MODEL</b>
AC ADAPTOR	HP	N/A

#### **4 Subject Of Investigation**

All testing were performed on the HP HSTNN-I46C laptop with the BCM94312MCG pre-approved module. Measurements were performed on the WNC and Yageo antenna. Data, presented in this report, was collected for a Class II permissive change to add the laptop to the BCM94312MCG (FCC ID: QDS-BRCM1028) module application.

During the testing process the EUT was tested in “b” 1Mbps and “g” 6Mbps data rate which yielded the worst case results. All testing was performed on Main and Aux antenna all data in this report shows the worst case between horizontal and vertical polarization for above 1GHz.

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 Industry Canada rules RSS-210.

**4.1 MAXIMUM PEAK OUTPUT POWER  
(RADIATED)**

§ 15.247 (b) (3) & RSS-210 (A8.4)(4)

**EIRP:**

**802.11b**

TEST CONDITIONS		MAXIMUM PEAK OUTPUT POWER (dBm)		
Frequency (MHz)		2412	2437	2462
WNC Antenna				
T <sub>nom</sub> (23)°C	V <sub>nom</sub>	23.61	24.46	23.16
YAGEO Antenna				
T <sub>nom</sub> (23)°C	V <sub>nom</sub>	24.19	26.11	22.66
Measurement uncertainty		±0.5dBm		

**802.11g**

TEST CONDITIONS		MAXIMUM PEAK OUTPUT POWER (dBm)		
Frequency (MHz)		2412	2437	2462
WNC Antenna				
T <sub>nom</sub> (23)°C	V <sub>nom</sub>	27.06	27.24	27.87
YAGEO Antenna				
T <sub>nom</sub> (23)°C	V <sub>nom</sub>	24.48	26.86	24.98
Measurement uncertainty		±0.5dBm		

**LIMIT**

**SUBCLAUSE § 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>

Notes:

1. For 802.11b and 802.11g powers were set to transmit at the specified conducted average output power.
2. EIRP was measured with the device transmitting on either the auxiliary or the main antenna. The EIRP was highest when transmitting on the 802.11b Aux antenna for the WNC and Yageo. For 802.11g EIRP was the highest on Main for the Yageo and Aux for the WNC antennas. EIRP values shown in this report are with the device transmitting on the main antenna.
3. Both vertical and horizontal were measured. Worst case polarization was horizontal for all modes.

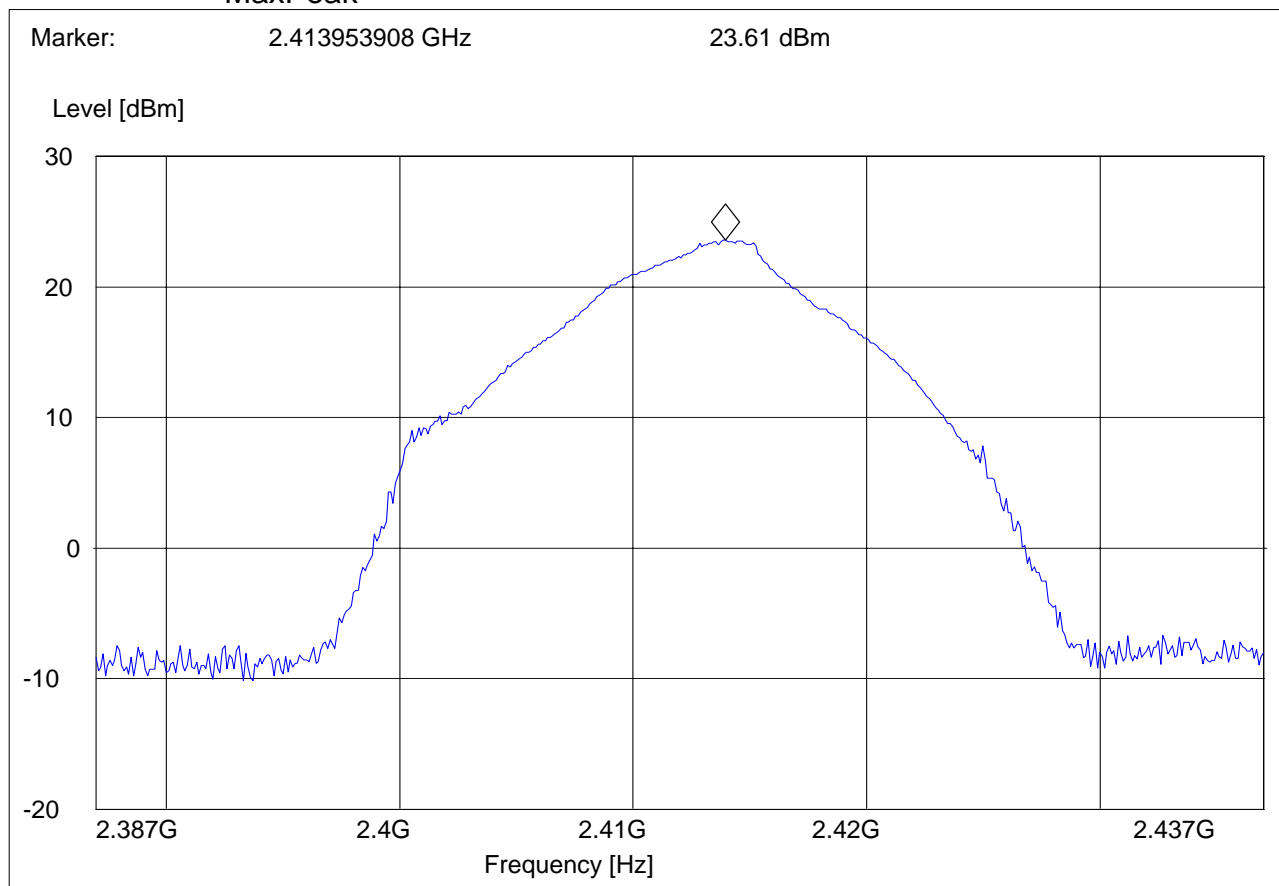


**EIRP: 2412 MHz (802.11b)**

EUT: 94312MCG  
Customer:: Broadcom  
Test Mode: 802.11b Ch.1, Aux WNC  
ANT Orientation: H  
EUT Orientation: H  
Test Engineer: Chris  
Voltage: AC Adapter

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

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





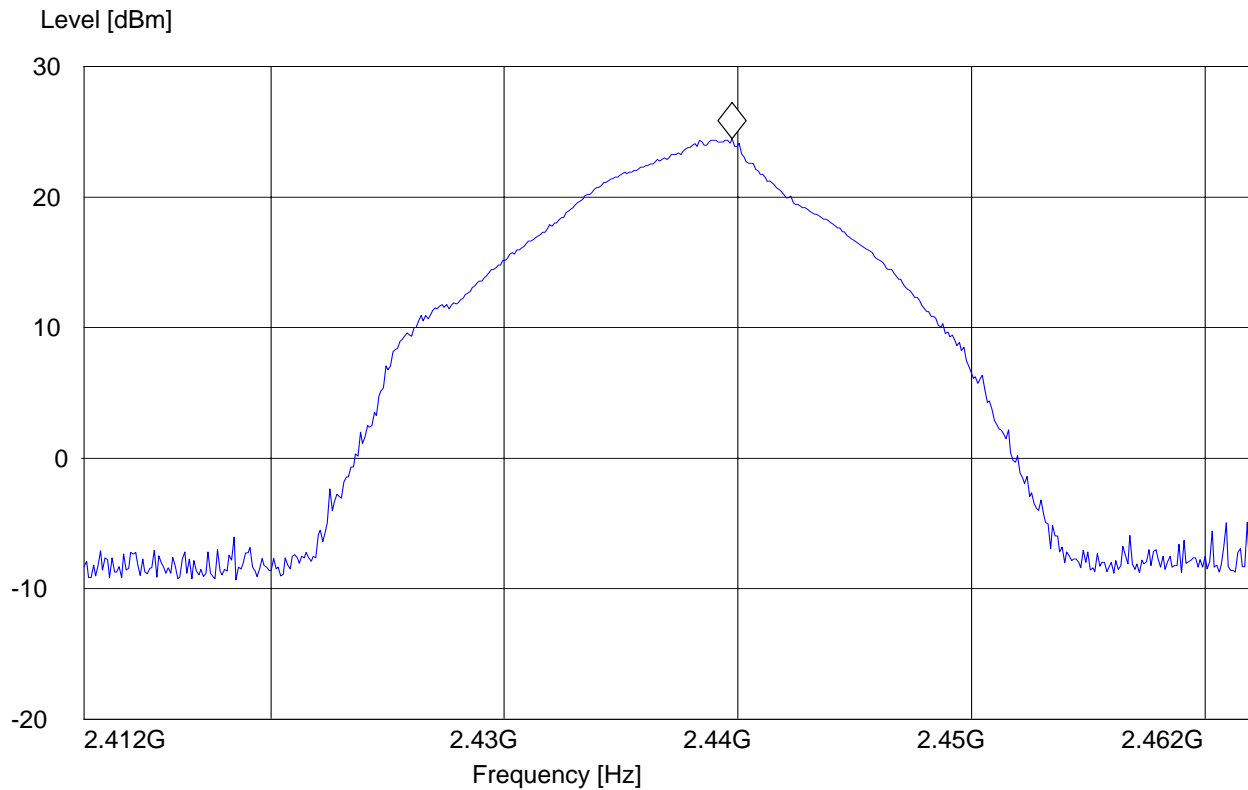
## EIRP: 2437 MHz (802.11b)

EUT: 94312MCG  
Customer:: Broadcom  
Test Mode: 802.11b Ch.6, Aux WNC  
ANT Orientation: H  
EUT Orientation: H  
Test Engineer: Chris  
Voltage: AC Adapter

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

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

Marker: 2.43975511 GHz 24.46 dBm

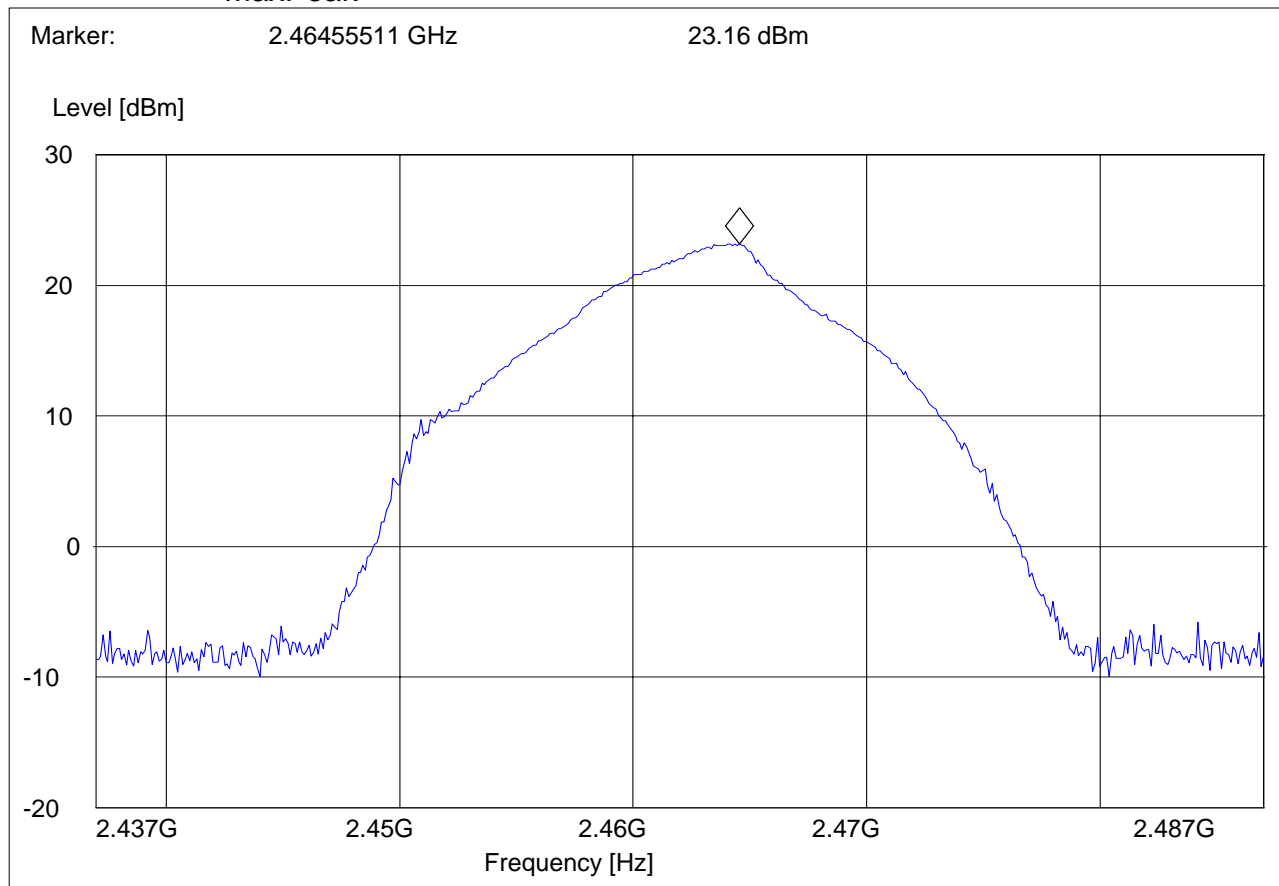


**EIRP: 2462 MHz (802.11b)**

EUT: 94312MCG  
Customer:: Broadcom  
Test Mode: 802.11b Ch.11, Aux WNC  
ANT Orientation: H  
EUT Orientation: H  
Test Engineer: Chris  
Voltage: AC Adapter

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

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

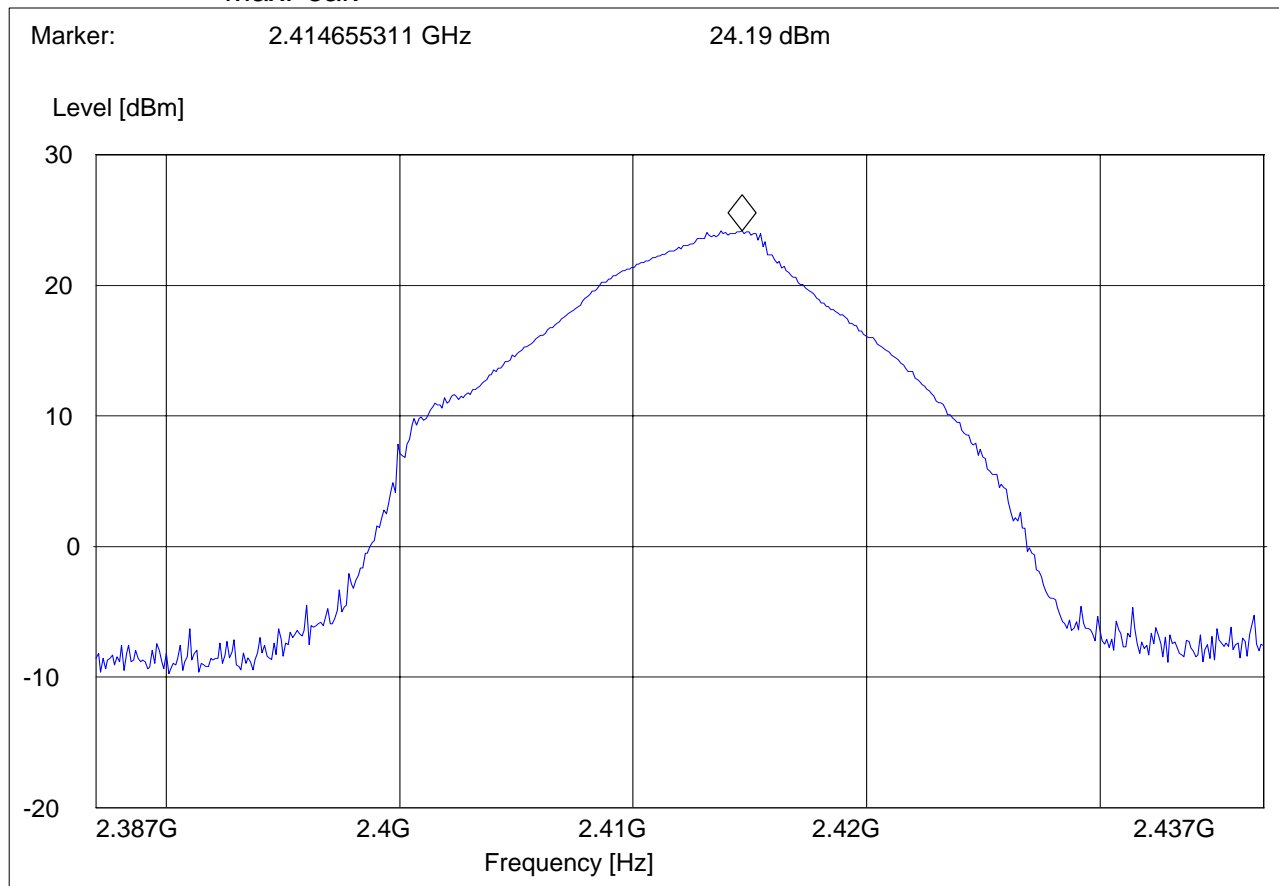


**EIRP: 2412 MHz (802.11b)**

EUT: 94312MCG  
Customer:: Broadcom  
Test Mode: 802.11b Ch.1, Aux Yageo  
ANT Orientation: H  
EUT Orientation: H  
Test Engineer: SAM  
Voltage: AC Adapter

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

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

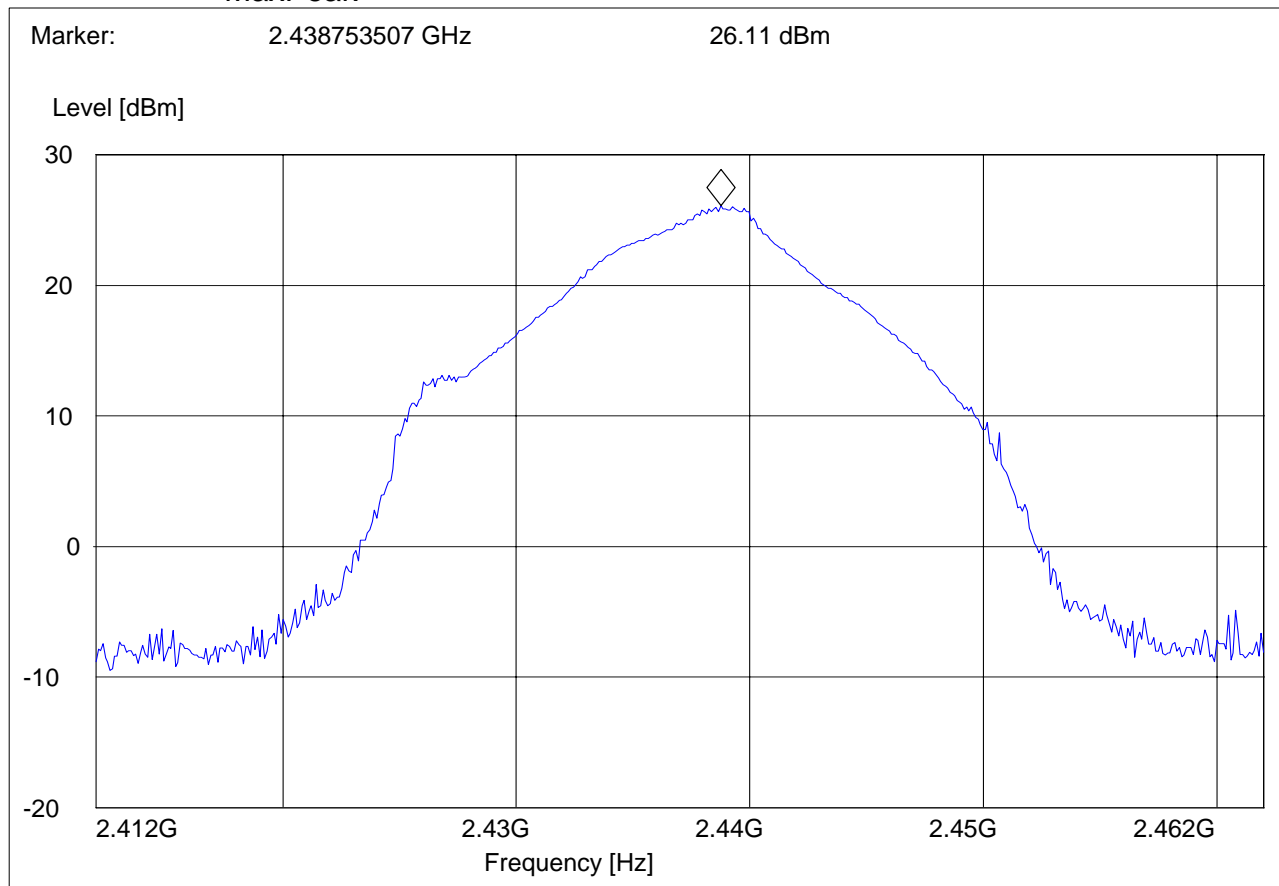


**EIRP: 2437 MHz (802.11b)**

EUT: 94312MCG  
Customer:: Broadcom  
Test Mode: 802.11b Ch.6, Aux Yageo  
ANT Orientation: H  
EUT Orientation: H  
Test Engineer: SAM  
Voltage: AC Adapter

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

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

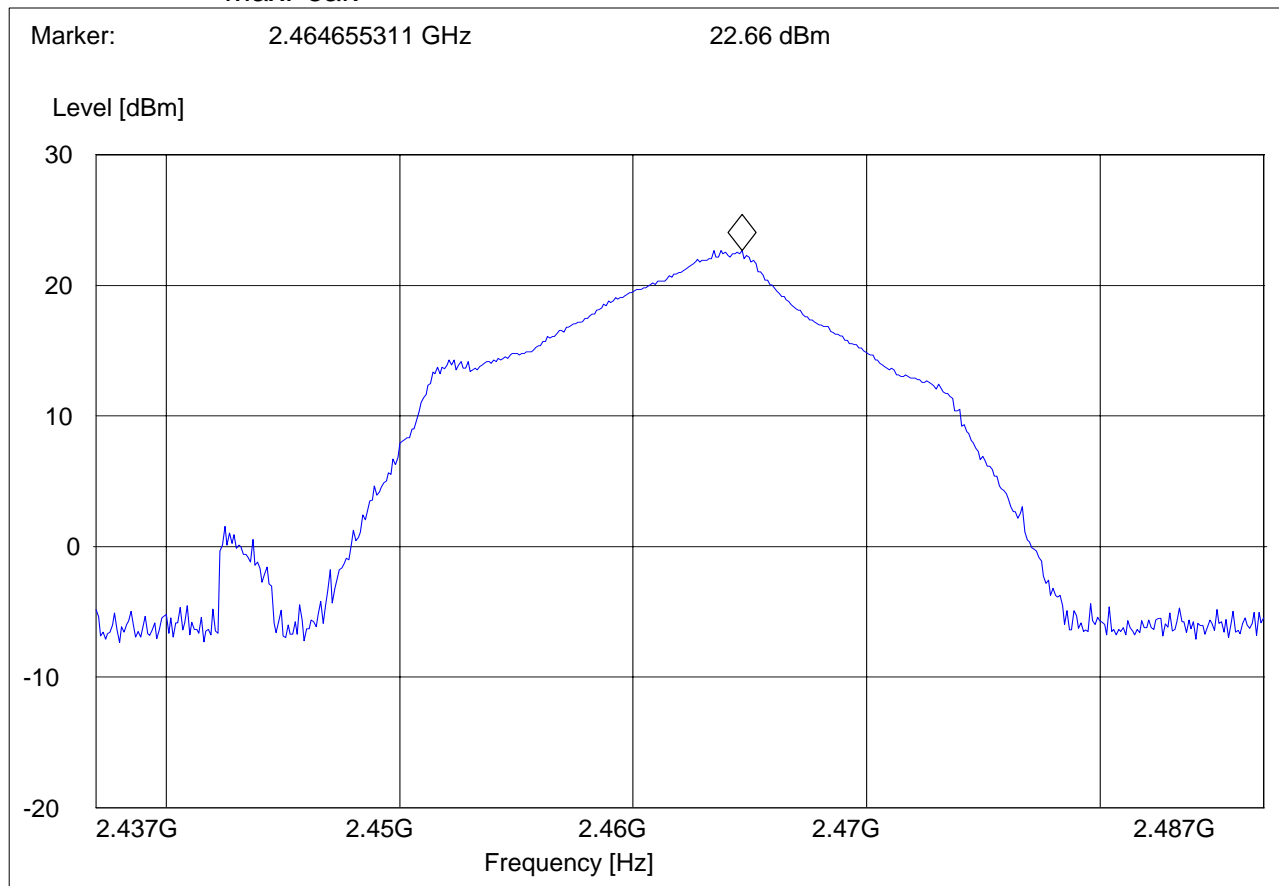


**EIRP: 2462 MHz (802.11b)**

EUT: 94312MCG  
Customer:: Broadcom  
Test Mode: 802.11b Ch.11, Aux Yageo  
ANT Orientation: H  
EUT Orientation: H  
Test Engineer: SAM  
Voltage: AC Adapter

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

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

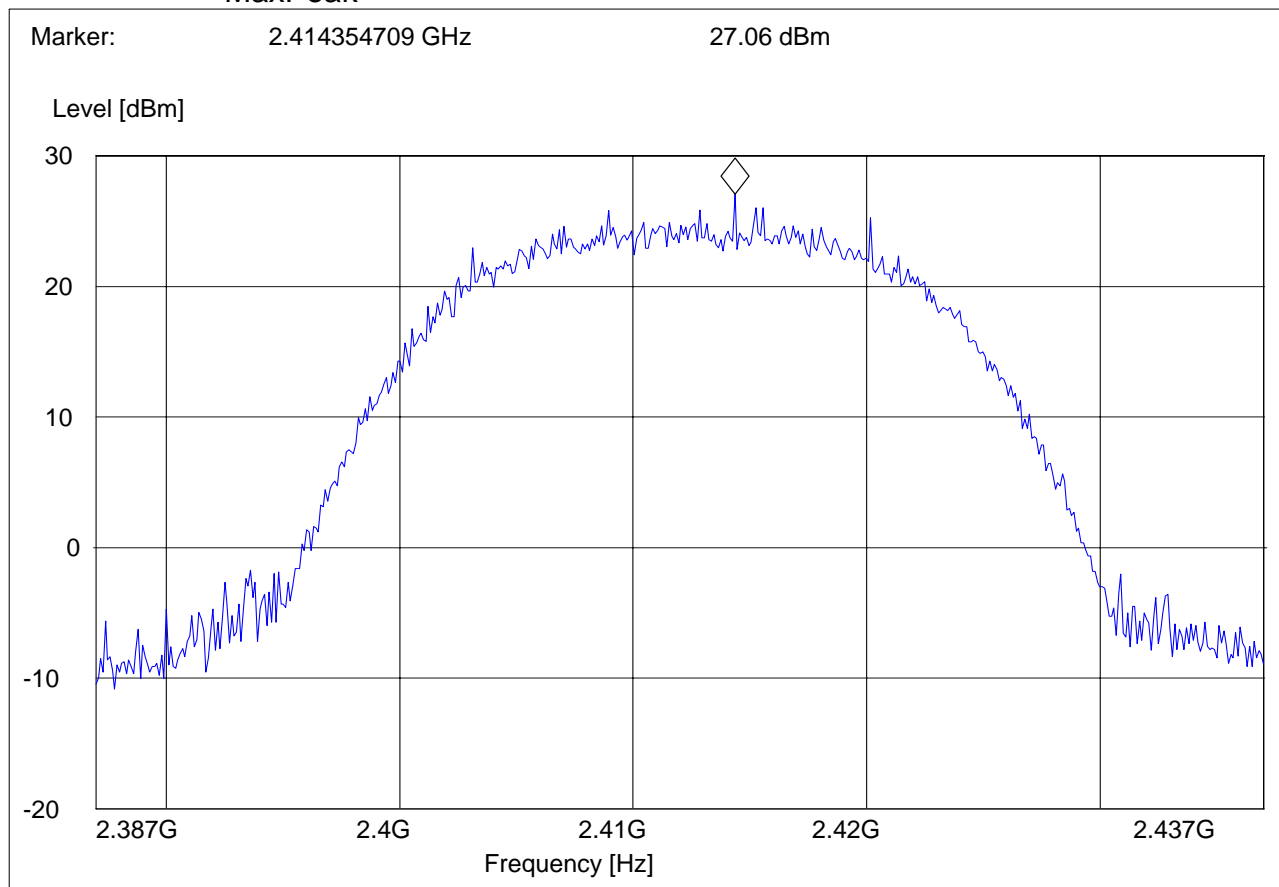


**EIRP: 2412 MHz (802.11g)**

EUT: 94312MCG  
Customer:: Broadcom  
Test Mode: 802.11g Ch.1, Aux WNC  
ANT Orientation: H  
EUT Orientation: H  
Test Engineer: Chris  
Voltage: AC Adapter

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

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

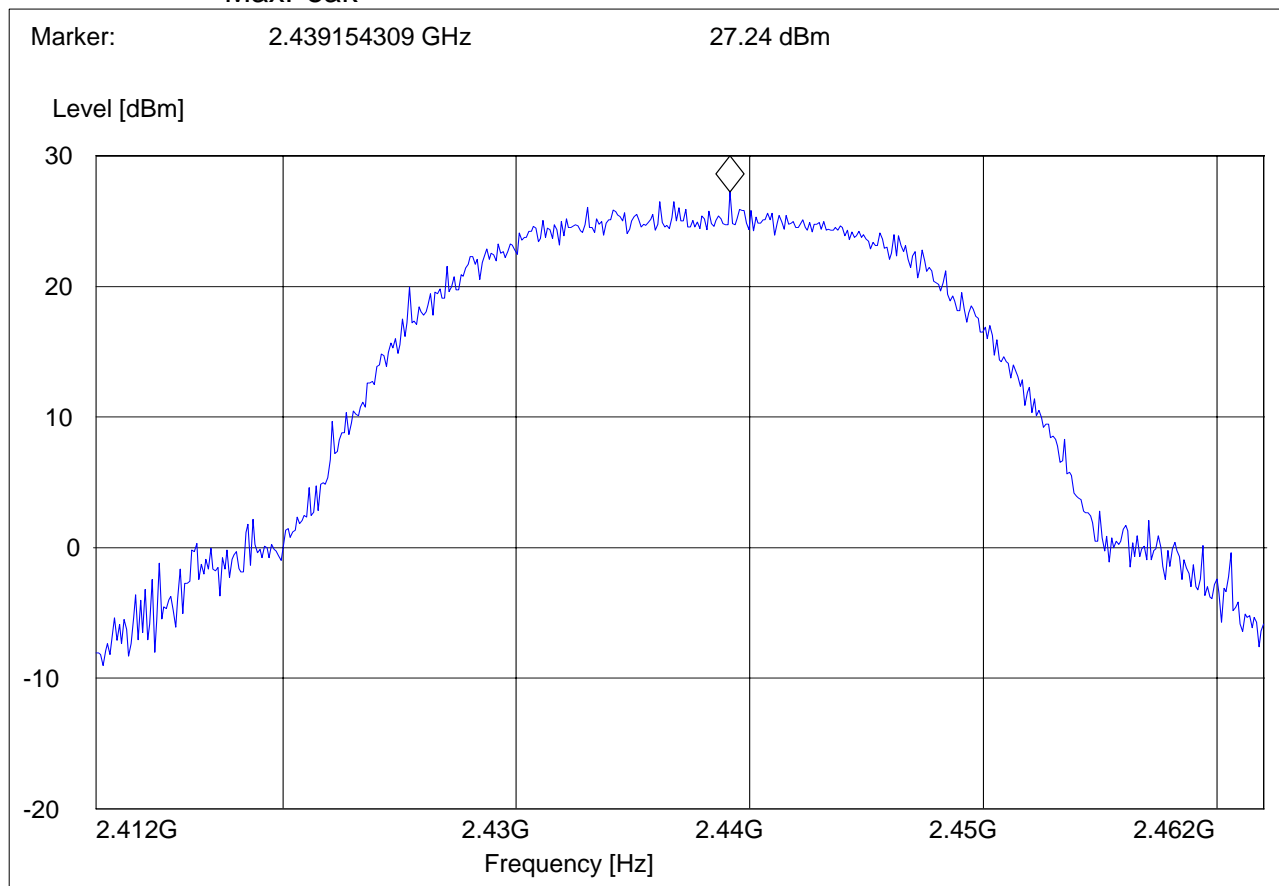


**EIRP: 2437 MHz (802.11g)**

EUT: 94312MCG  
Customer:: Broadcom  
Test Mode: 802.11g Ch.6, Aux WNC  
ANT Orientation: H  
EUT Orientation: H  
Test Engineer: Chris  
Voltage: AC Adapter

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

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



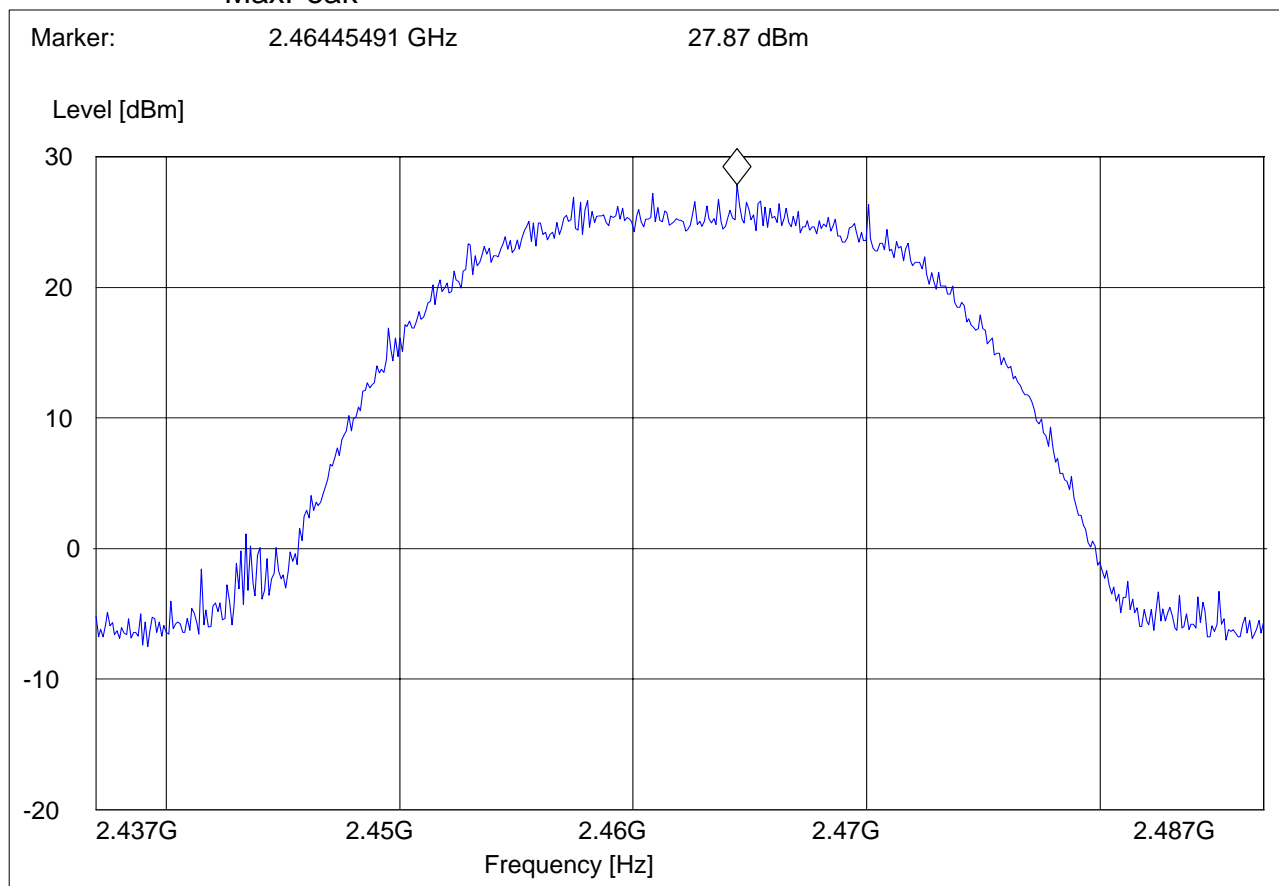


**EIRP: 2462 MHz (802.11g)**

EUT: 94312MCG  
Customer:: Broadcom  
Test Mode: 802.11g Ch.11, Aux WNC  
ANT Orientation: H  
EUT Orientation: H  
Test Engineer: Chris  
Voltage: AC Adapter

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

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

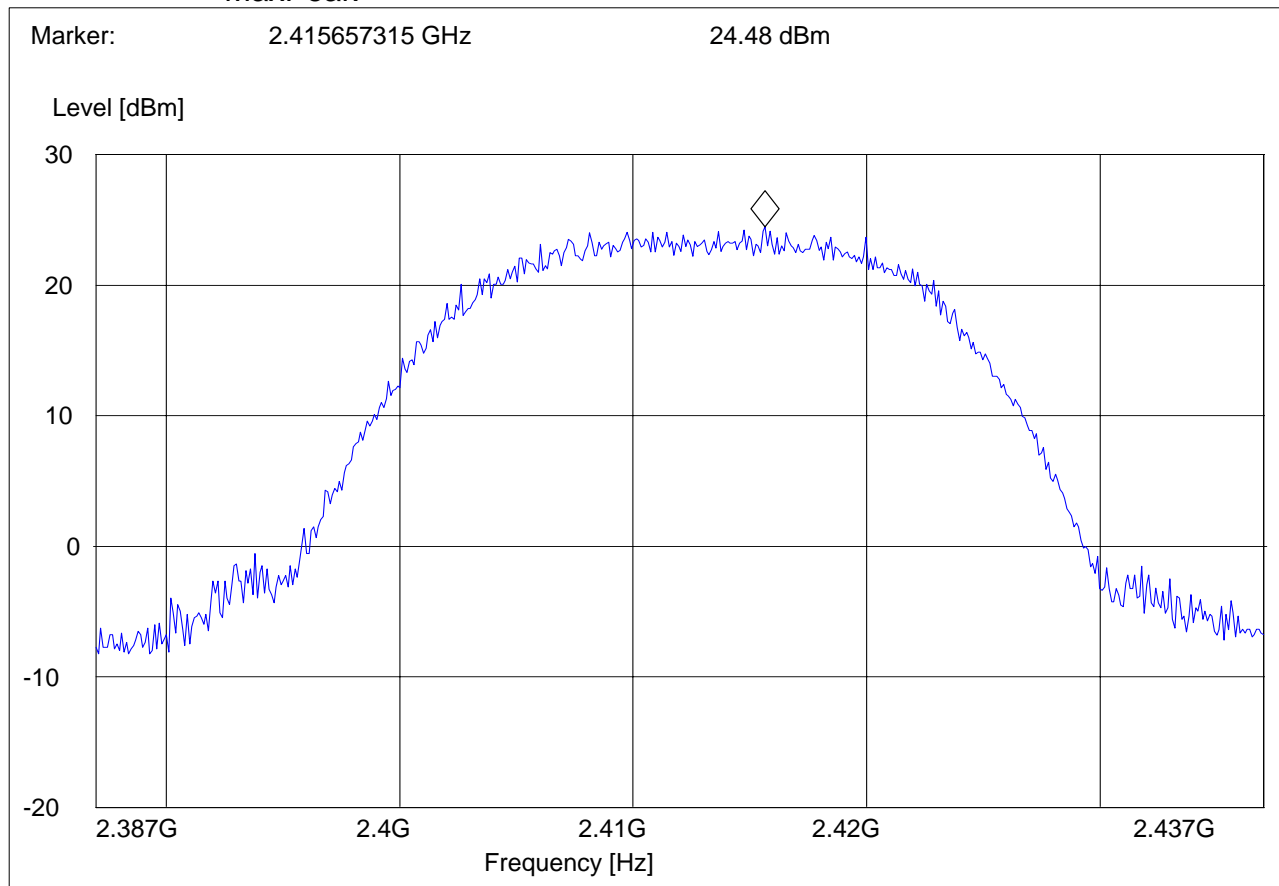


**EIRP: 2412 MHz (802.11g)**

EUT: 94312MCG  
Customer:: Broadcom  
Test Mode: 802.11g Ch.1, MAIN Yageo  
ANT Orientation: H  
EUT Orientation: H  
Test Engineer: SAM  
Voltage: AC Adapter  
Comments: TT@123°

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

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

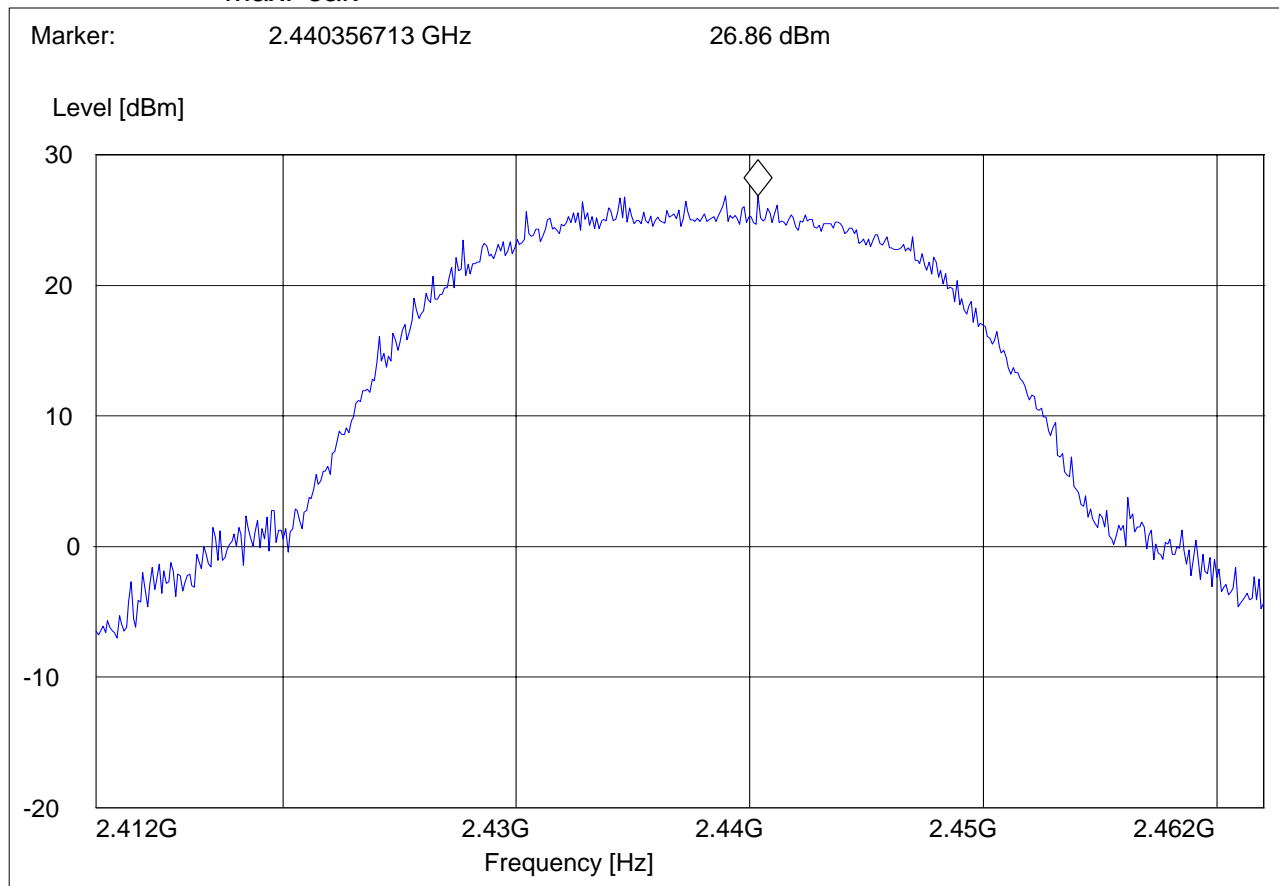


**EIRP: 2437 MHz (802.11g)**

EUT: 94312MCG  
Customer:: Broadcom  
Test Mode: 802.11g Ch.6, MAIN Yageo  
ANT Orientation: H  
EUT Orientation: H  
Test Engineer: SAM  
Voltage: AC Adapter

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

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

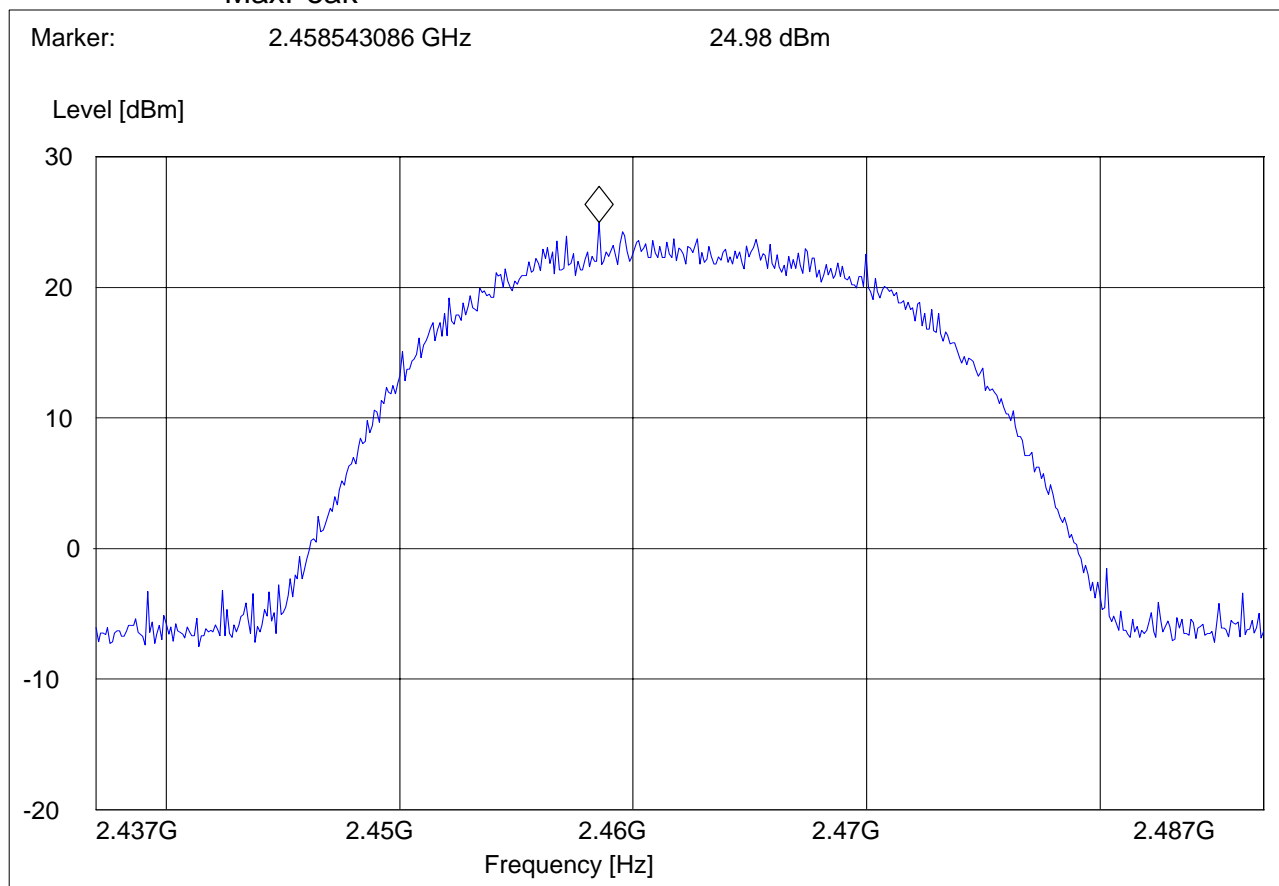


**EIRP: 2462 MHz (802.11g)**

EUT: 94312MCG  
Customer:: Broadcom  
Test Mode: 802.11g Ch.11, MAIN Yageo  
ANT Orientation: H  
EUT Orientation: H  
Test Engineer: SAM  
Voltage: AC Adapter

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

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



## 4.2 BAND EDGE COMPLIANCE (802.11b)

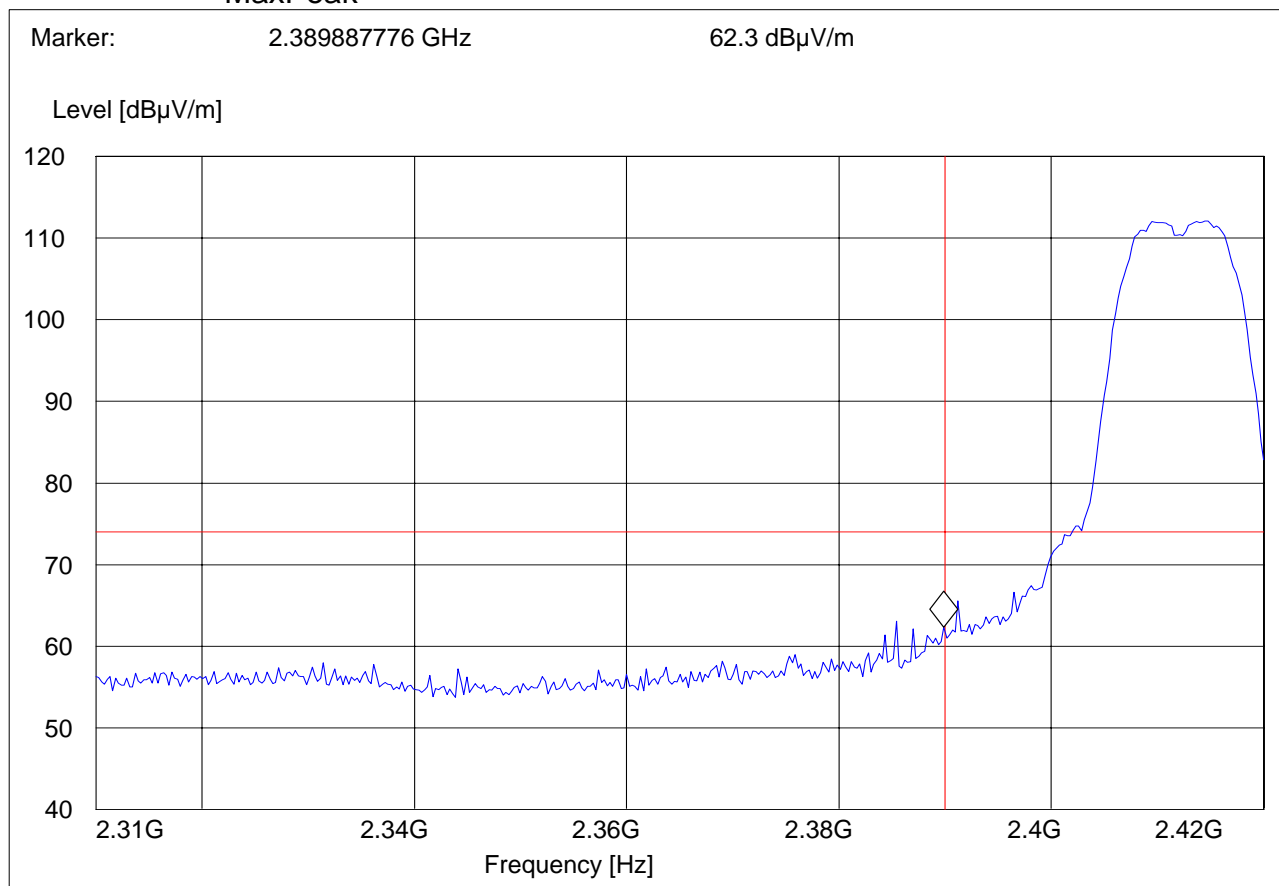
§15.247 (d) & RSS-210(A8.5)

### 802.11b Low frequency section (spurious in the restricted band 2310 – 2390 MHz)

EUT: 94312MCG  
Customer:: Broadcom  
Test Mode: 802.11b Ch.1, Aux WNC  
ANT Orientation: H  
EUT Orientation: H  
Test Engineer: Chris  
Voltage: AC Adapter

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

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



**BAND EDGE COMPLIANCE**

**§15.247 (d) & RSS-210(A8.5)**

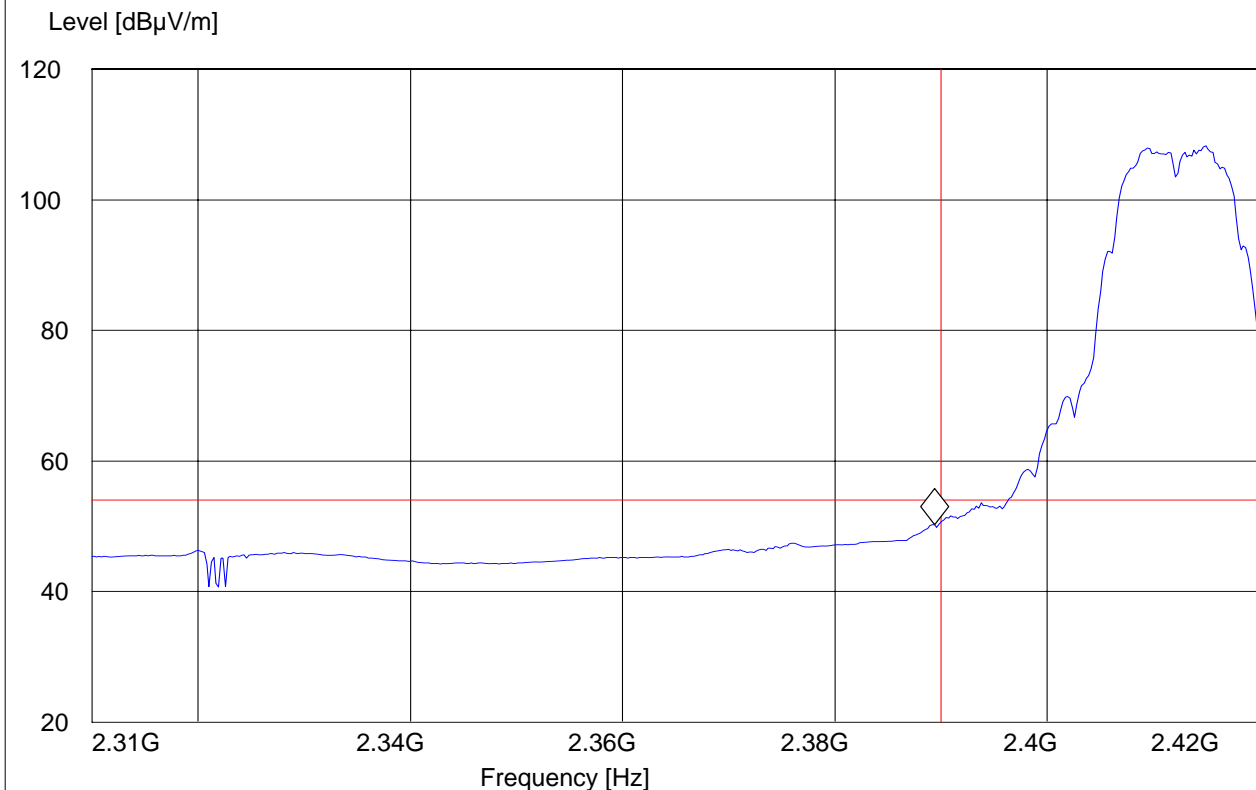
**802.11b Low frequency section (spurious in the restricted band 2310 – 2390 MHz)**

EUT: 94312MCG  
Customer:: Broadcom  
Test Mode: 802.11b Ch.1, Aux WNC  
ANT Orientation: H  
EUT Orientation: H  
Test Engineer: Chris  
Voltage: AC Adapter

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

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

Marker: 2.389358717 GHz 50.3 dBμV/m



**BAND EDGE COMPLIANCE**

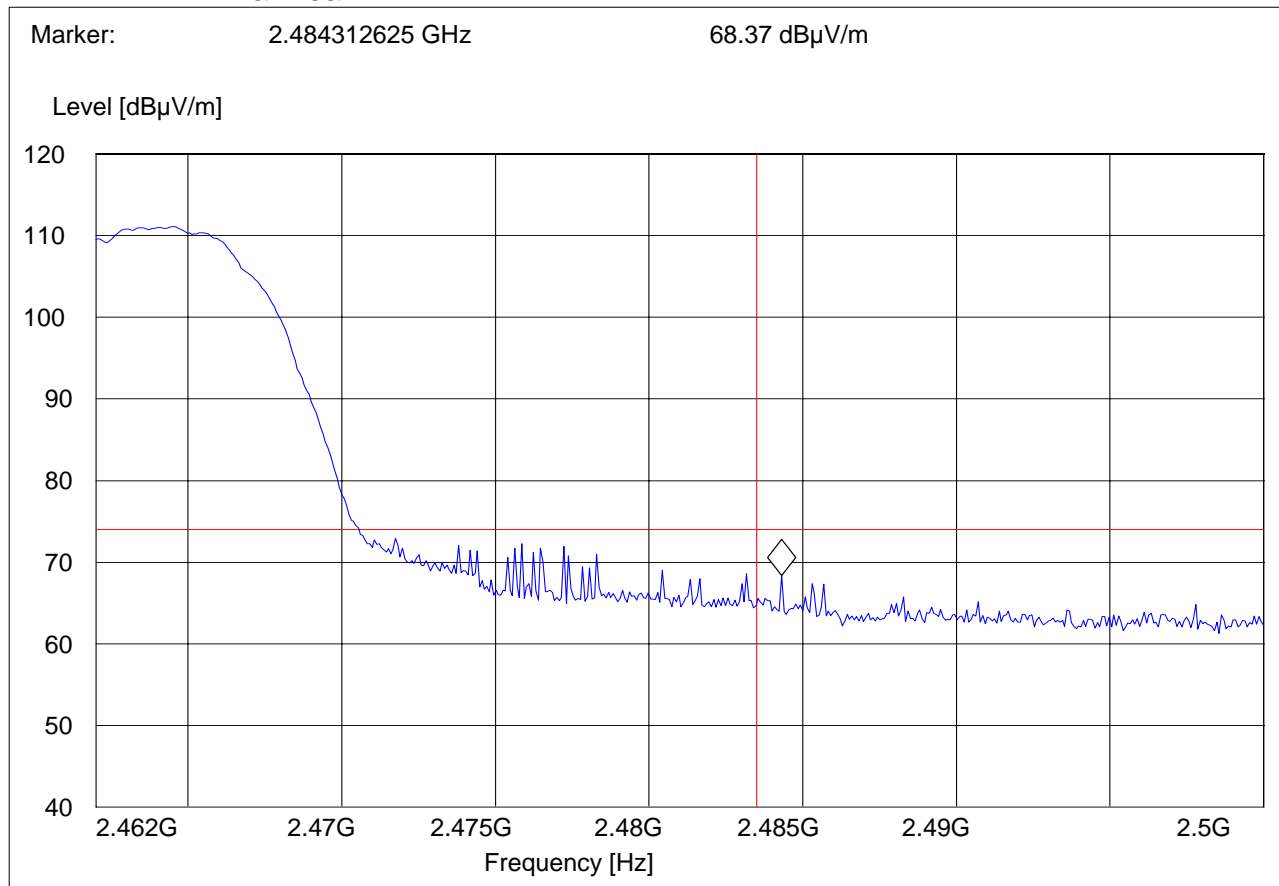
**§15.247 (d) & RSS-210(A8.5)**

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

EUT: 94311MCAG  
Customer:: Broadcom  
Test Mode: 802.11b Ch.11, Aux WNC  
ANT Orientation: H  
EUT Orientation: H  
Test Engineer: Chris  
Voltage: AC Adapter

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

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



**BAND EDGE COMPLIANCE**

**§15.247 (d) & RSS-210(A8.5)**

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

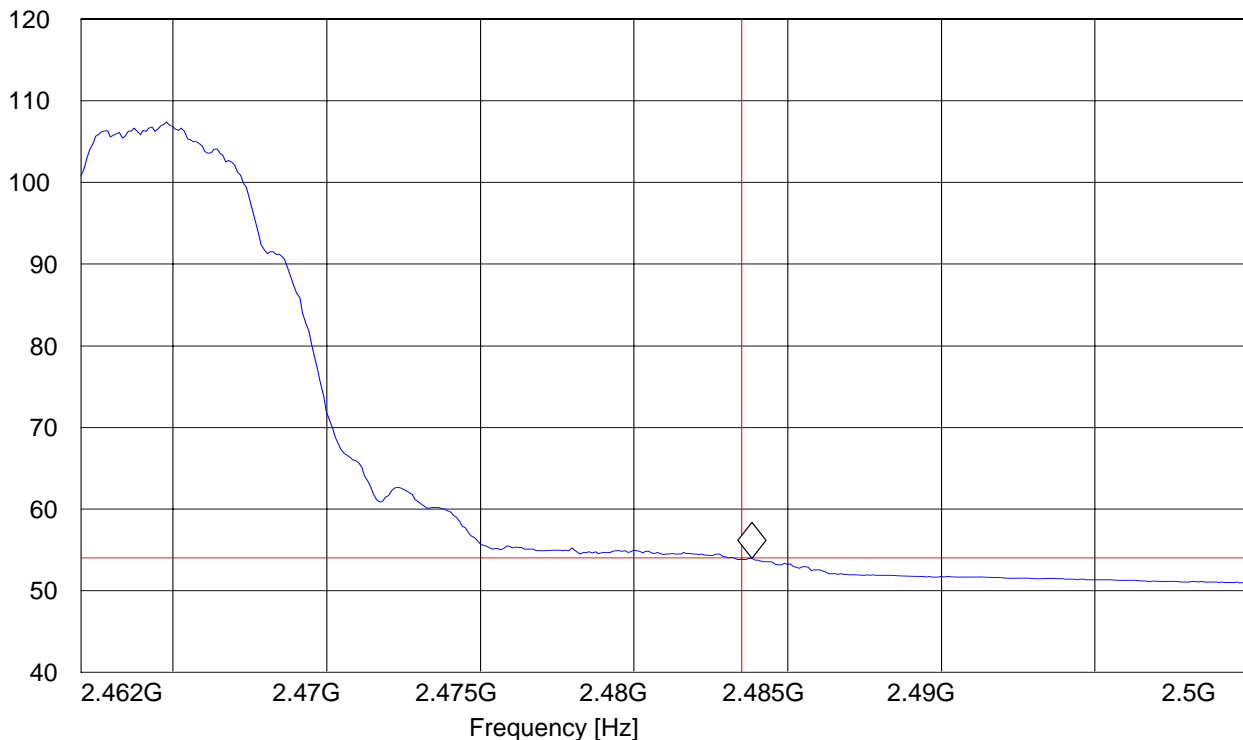
EUT: 94312MCG  
Customer:: Broadcom  
Test Mode: 802.11b Ch.11, Aux WNC  
ANT Orientation: H  
EUT Orientation: H  
Test Engineer: Chris  
Voltage: AC Adapter

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

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

Marker: 2.483835671 GHz 53.96 dBμV/m

Level [dBμV/m]





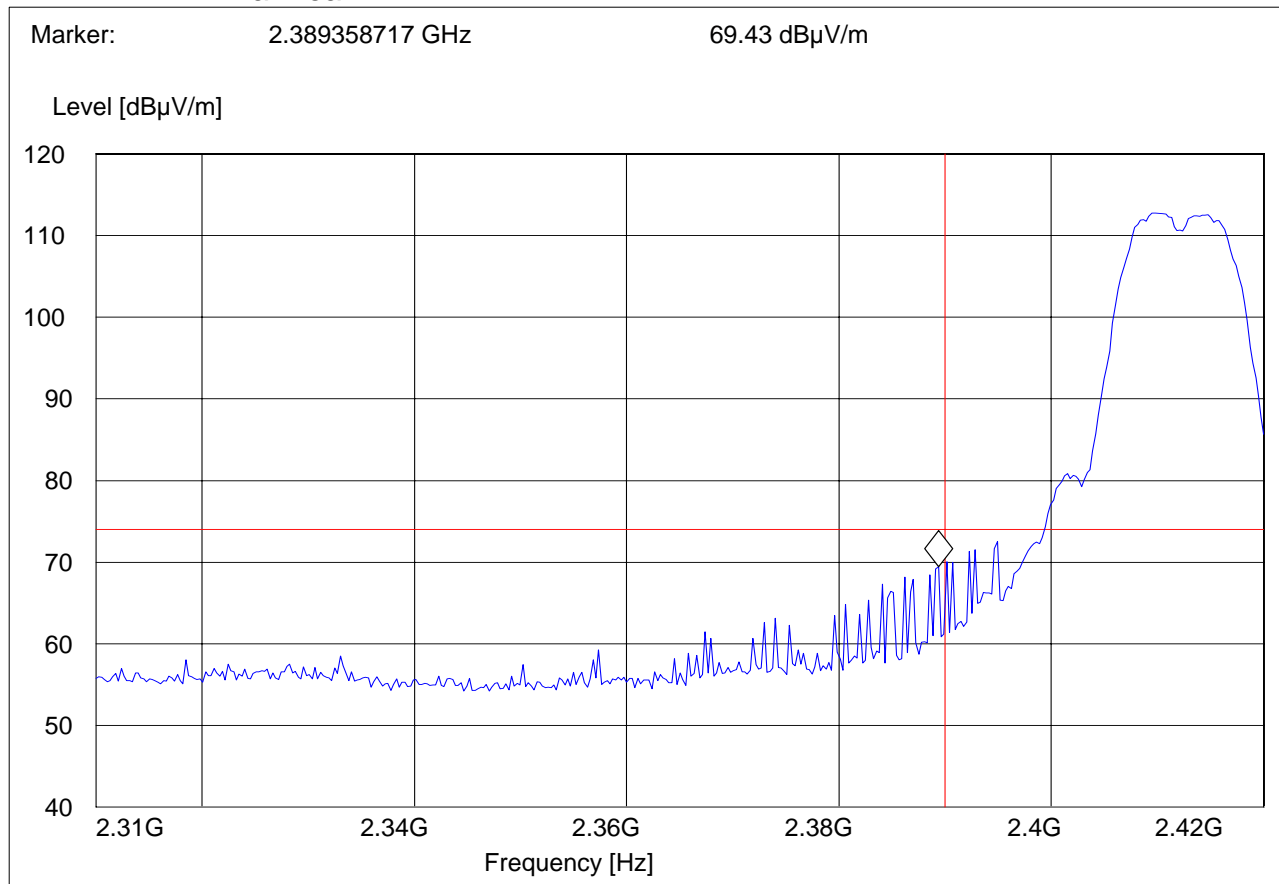


**802.11b Low frequency section (spurious in the restricted band 2310 – 2390 MHz)**

EUT: 94312MCG  
Customer:: Broadcom  
Test Mode: 802.11b Ch.1, Aux Yageo  
ANT Orientation: H  
EUT Orientation: H  
Test Engineer: SAM  
Voltage: AC Adapter

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

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



**BAND EDGE COMPLIANCE**

**§15.247 (d) & RSS-210(A8.5)**

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

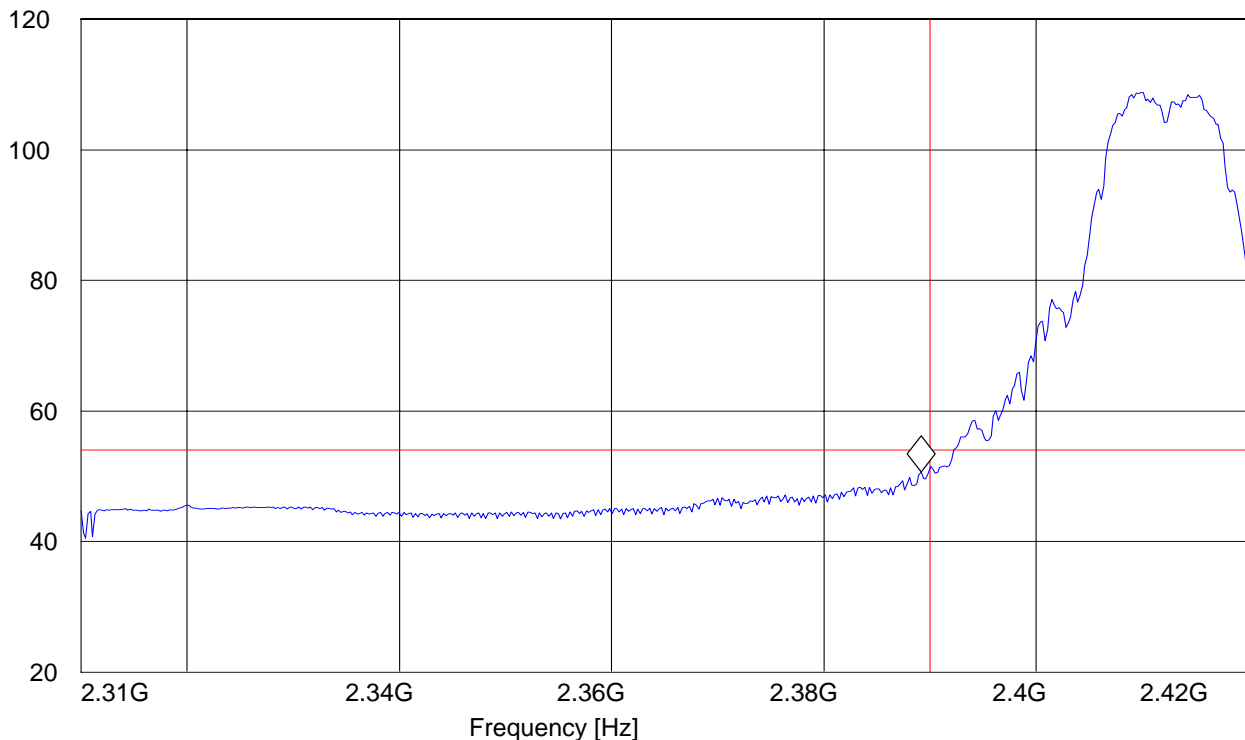
EUT: 94312MCG  
Customer:: Broadcom  
Test Mode: 802.11b Ch.1, Aux Yageo  
ANT Orientation: H  
EUT Orientation: H  
Test Engineer: SAM  
Voltage: AC Adapter

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

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

Marker: 2.389138277 GHz 50.64 dBμV/m

Level [dBμV/m]



**BAND EDGE COMPLIANCE**

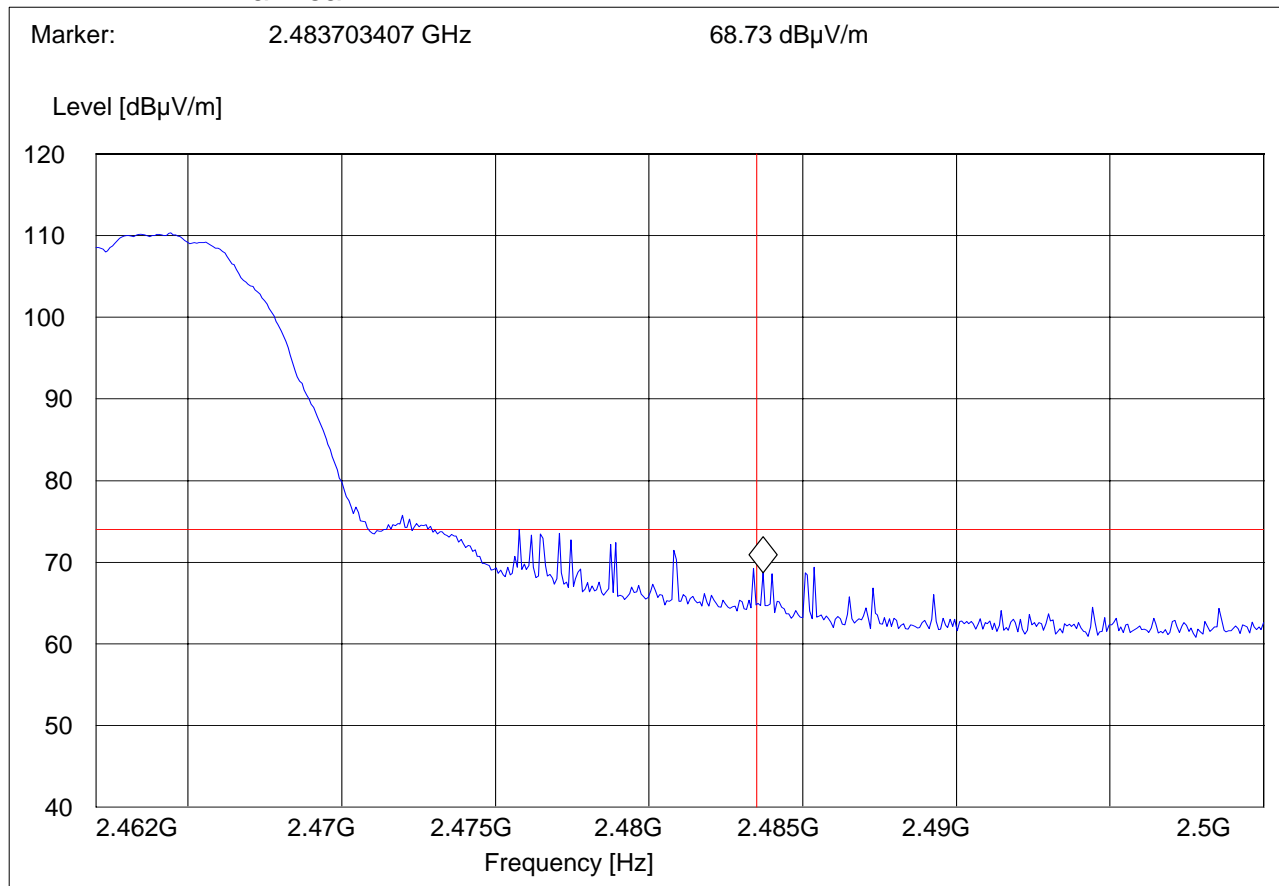
**§15.247 (d) & RSS-210(A8.5)**

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

EUT: 94312MCG  
Customer:: Broadcom  
Test Mode: 802.11b Ch.11, Aux  
ANT Orientation: H  
EUT Orientation: H  
Test Engineer: SAM  
Voltage: AC Adapter

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

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



**BAND EDGE COMPLIANCE**

**§15.247 (d) & RSS-210(A8.5)**

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

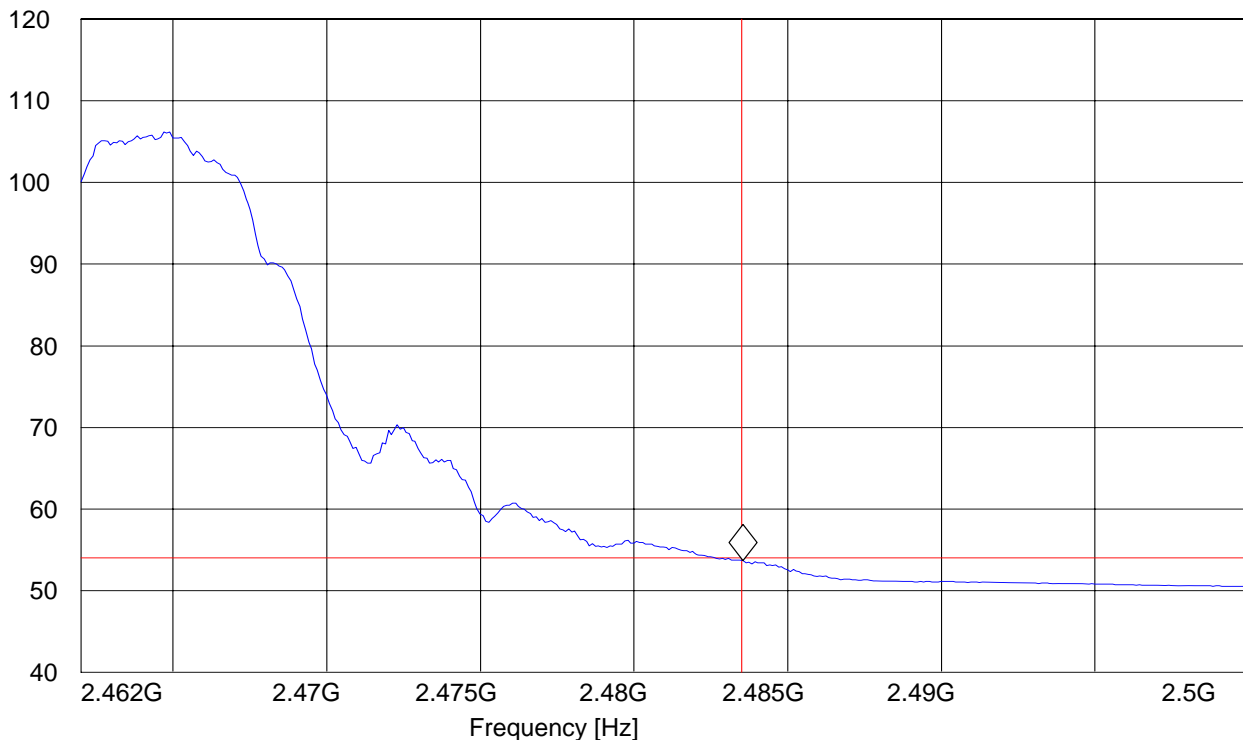
EUT: 94312MCG  
Customer:: Broadcom  
Test Mode: 802.11b Ch.11, Aux Yageo  
ANT Orientation: H  
EUT Orientation: H  
Test Engineer: SAM  
Voltage: AC Adapter

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

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

Marker: 2.483547094 GHz 53.66 dBμV/m

Level [dBμV/m]



### 4.3 BAND EDGE COMPLIANCE (802.11g)

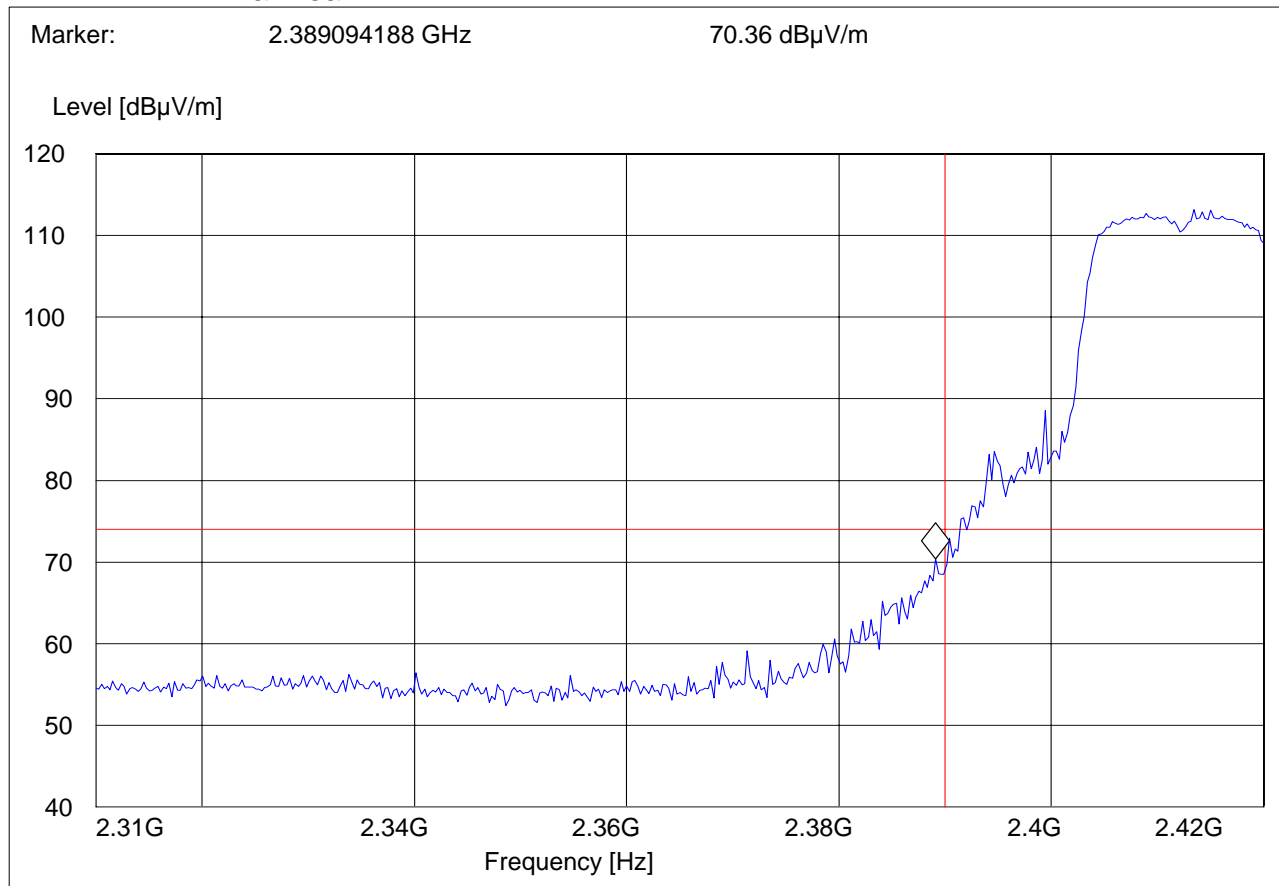
§15.247 (d) & RSS-210(A8.5)

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

EUT: 94312MCG  
Customer:: Broadcom  
Test Mode: 802.11g Ch.1, Aux WNC  
ANT Orientation: H  
EUT Orientation: H  
Test Engineer: Chris  
Voltage: AC Adapter

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

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



**BAND EDGE COMPLIANCE**

**§15.247 (d) & RSS-210(A8.5)**

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

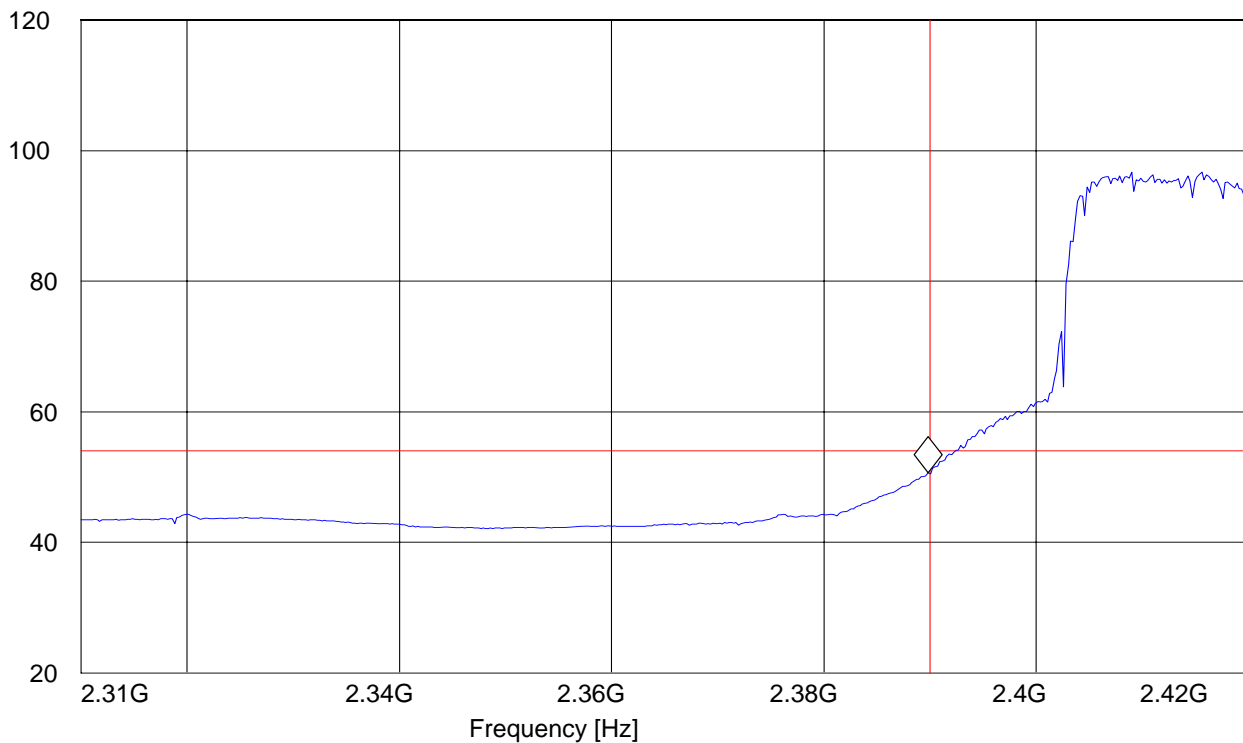
EUT: 94312MCG  
Customer:: Broadcom  
Test Mode: 802.11g Ch.1, Aux WNC  
ANT Orientation: H  
EUT Orientation: H  
Test Engineer: Chris  
Voltage: AC Adapter

***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 50.65 dBμV/m

Level [dBμV/m]



**BAND EDGE COMPLIANCE**

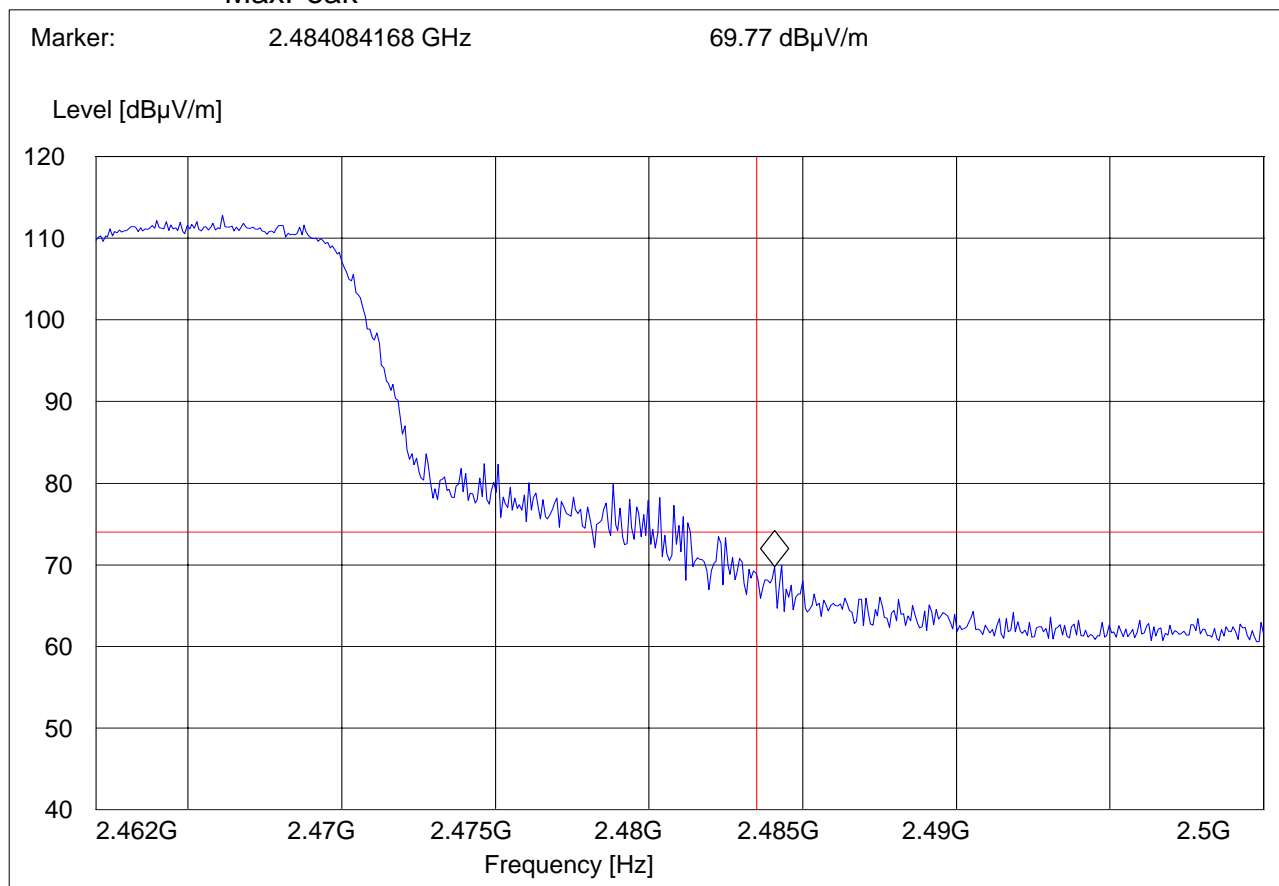
**§15.247 (d) & RSS-210(A8.5)**

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

EUT: 94312MCG  
Customer:: Broadcom  
Test Mode: 802.11g Ch.11, Aux WNC  
ANT Orientation: H  
EUT Orientation: H  
Test Engineer: Chris  
Voltage: AC Adapter

***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
MaxPeak					





**BAND EDGE COMPLIANCE**

**§15.247 (d) & RSS-210(A8.5)**

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

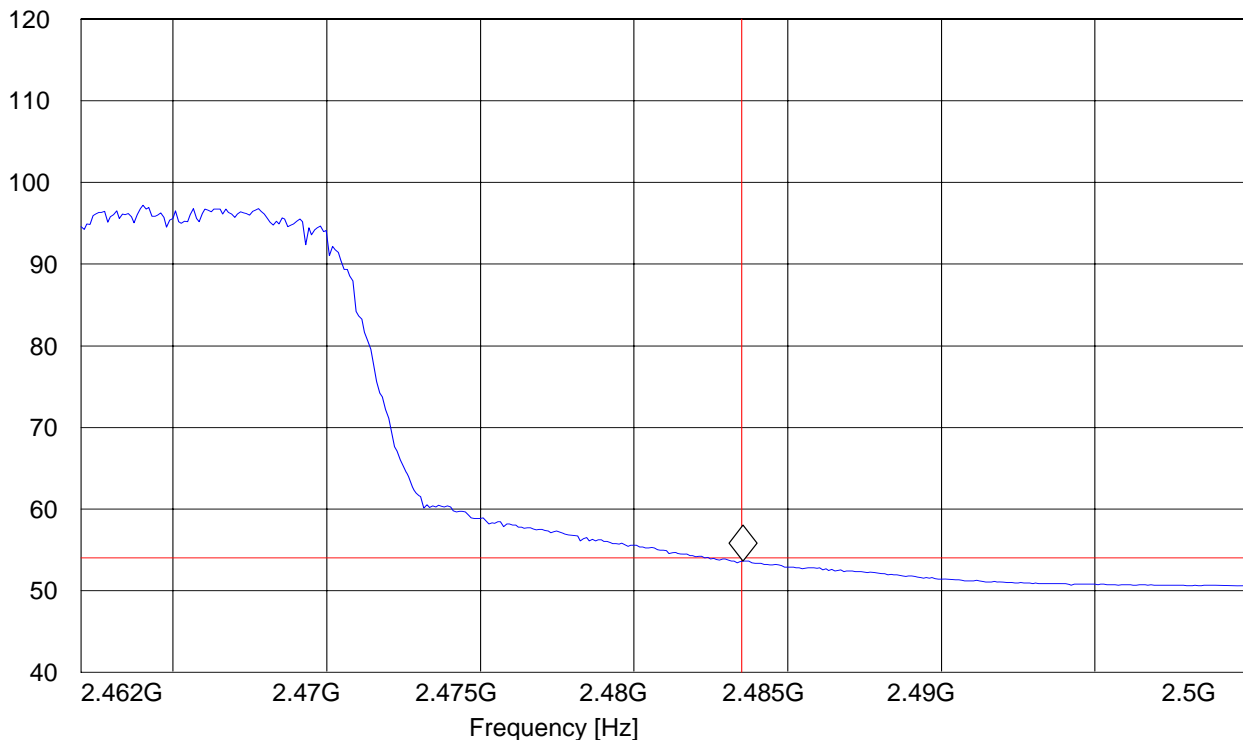
EUT: 94312MCG  
Customer:: Broadcom  
Test Mode: 802.11g Ch.11, Aux WNC  
ANT Orientation: H  
EUT Orientation: H  
Test Engineer: Chris  
Voltage: AC Adapter

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

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

Marker: 2.483547094 GHz 53.62 dBμV/m

Level [dBμV/m]



**BAND EDGE COMPLIANCE**

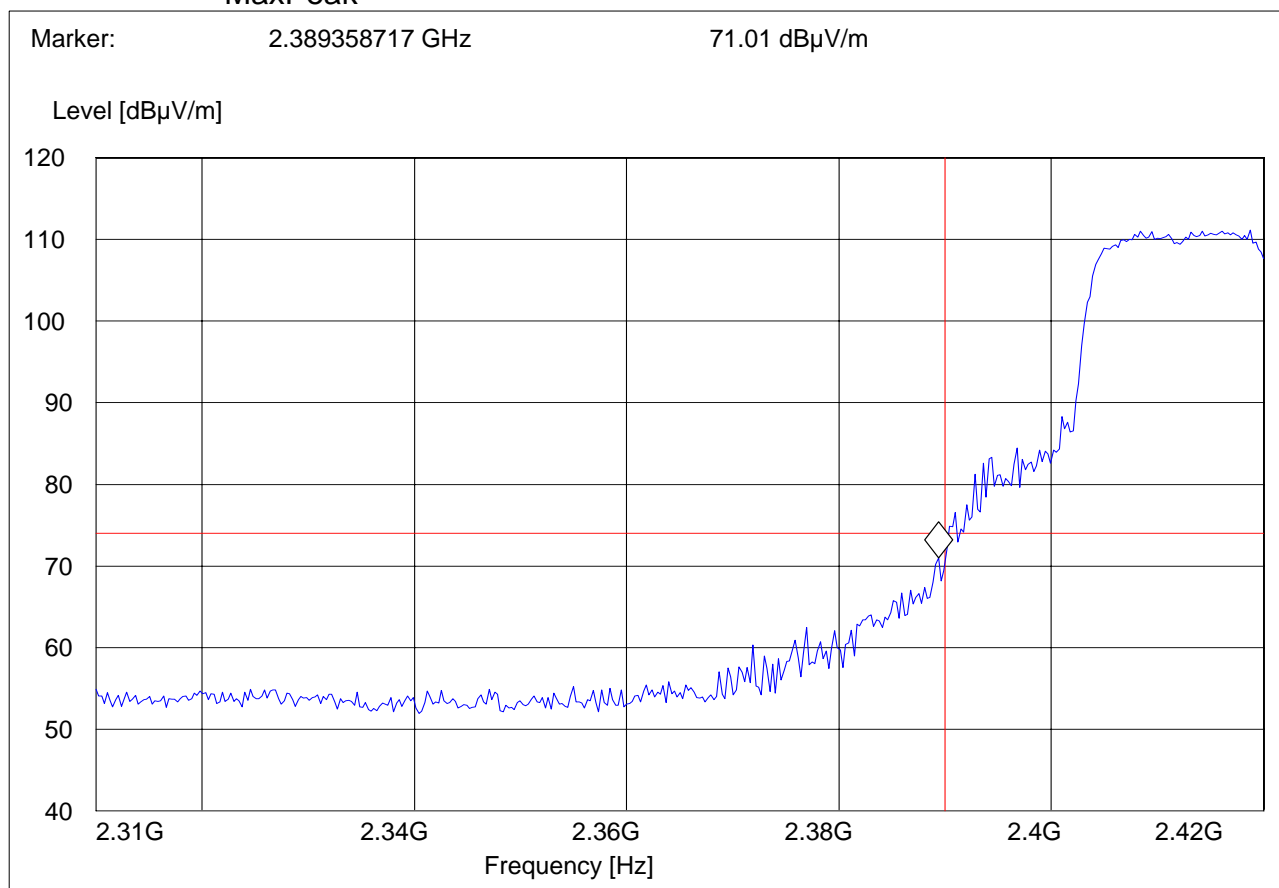
**§15.247 (d) & RSS-210(A8.5)**

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

EUT: 94312MCG  
Customer:: Broadcom  
Test Mode: 802.11g Ch.1, MAIN Yageo  
ANT Orientation: H  
EUT Orientation: H  
Test Engineer: SAM  
Voltage: AC Adapter  
Comments: TT@123°

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

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





**BAND EDGE COMPLIANCE**

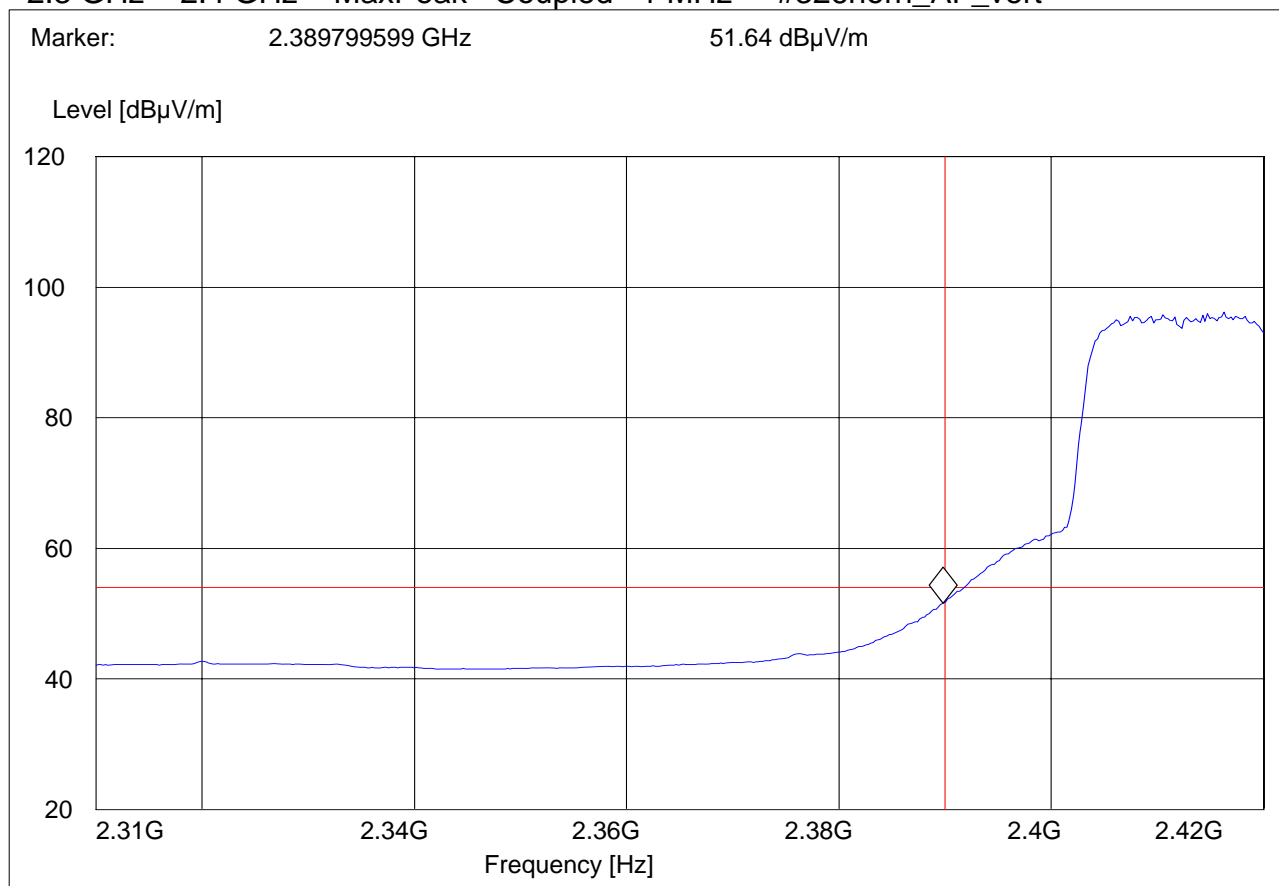
**§15.247 (d) & RSS-210(A8.5)**

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

EUT: 94312MCG  
Customer:: Broadcom  
Test Mode: 802.11g Ch.1, MAIN Yageo  
ANT Orientation: H  
EUT Orientation: H  
Test Engineer: SAM  
Voltage: AC Adapter  
Comments: TT@123°

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

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



**BAND EDGE COMPLIANCE**

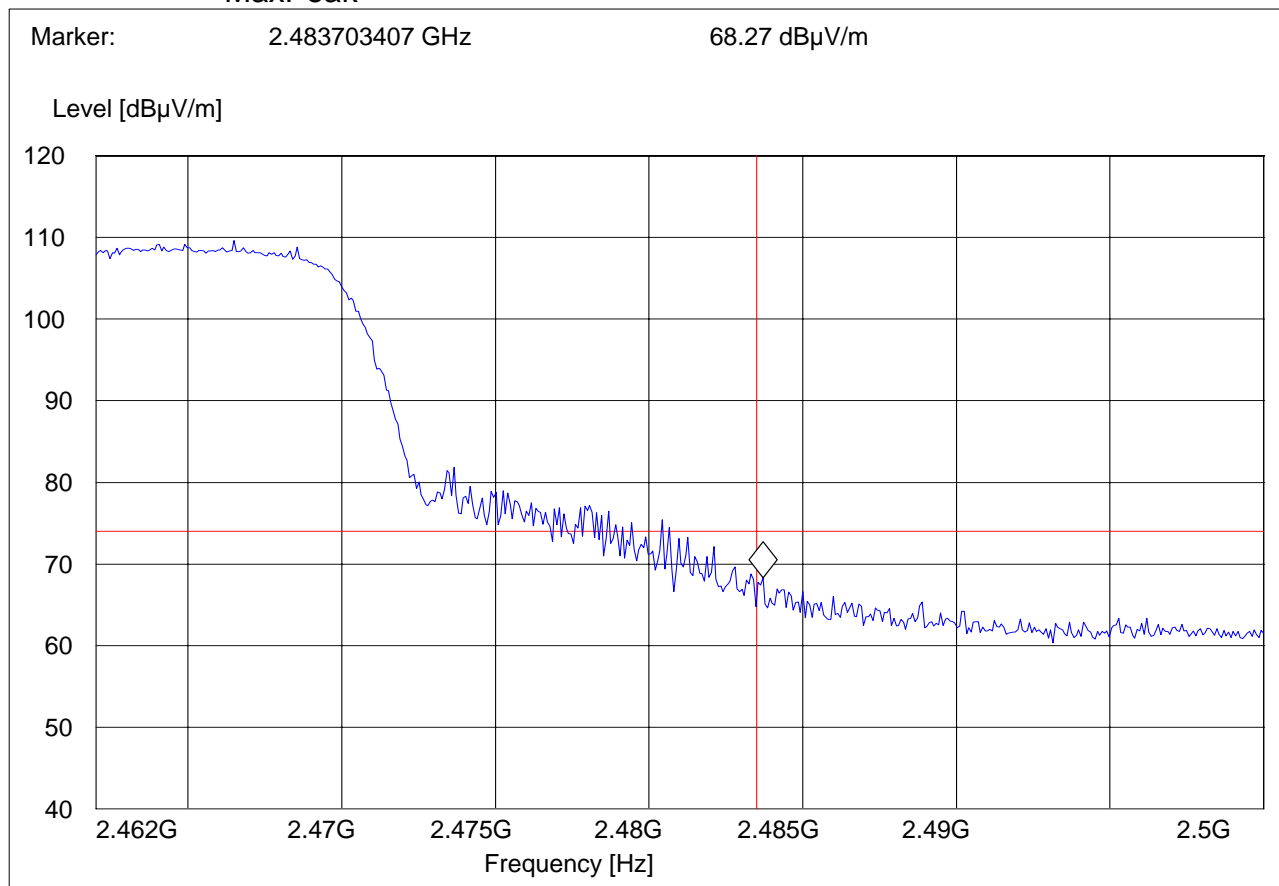
**§15.247 (d) & RSS-210(A8.5)**

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

EUT: 94312MCG  
Customer:: Broadcom  
Test Mode: 802.11g Ch.11, MAIN Yageo  
ANT Orientation: H  
EUT Orientation: H  
Test Engineer: SAM  
Voltage: AC Adapter  
Comments: TT@61°

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

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





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

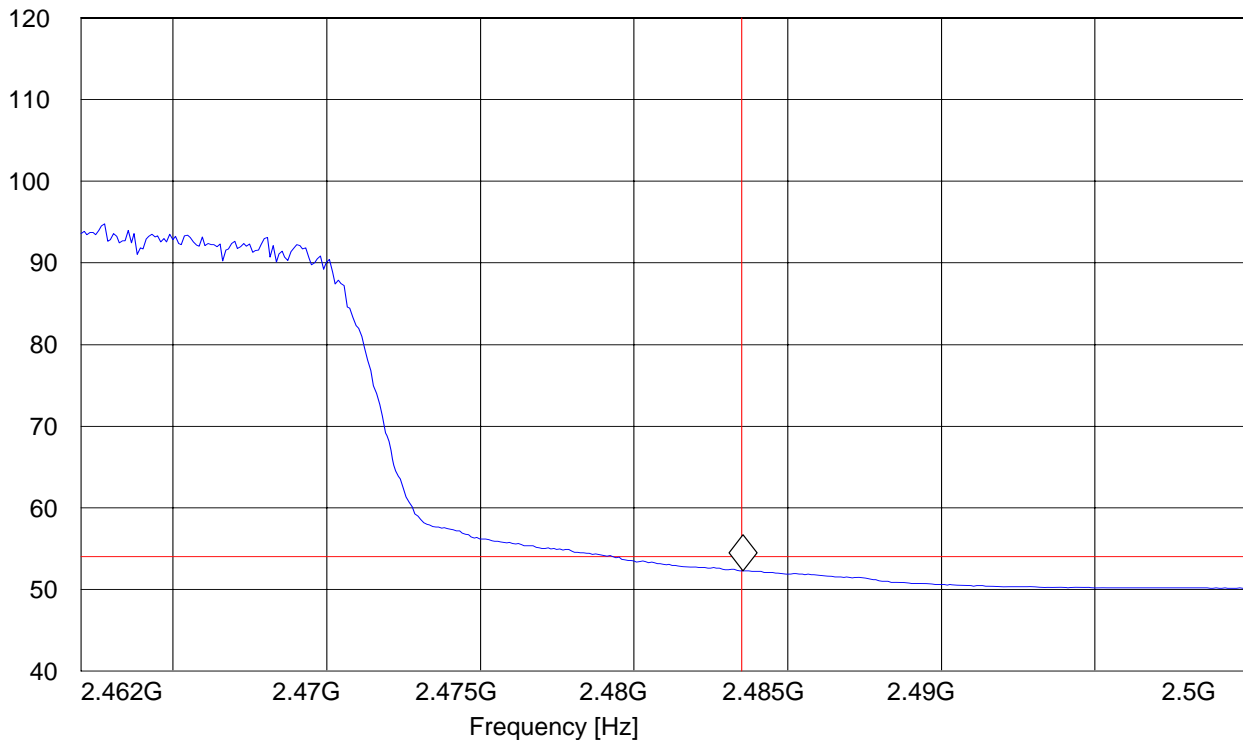
EUT: 94312MCG  
Customer:: Broadcom  
Test Mode: 802.11g Ch.11, MAIN Yageo  
ANT Orientation: H  
EUT Orientation: H  
Test Engineer: SAM  
Voltage: AC Adapter  
Comments: TT@61°

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

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

Marker: 2.483547094 GHz 52.27 dB $\mu$ V/m

Level [dB $\mu$ V/m]



#### 4.4 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



#### 4.5 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			

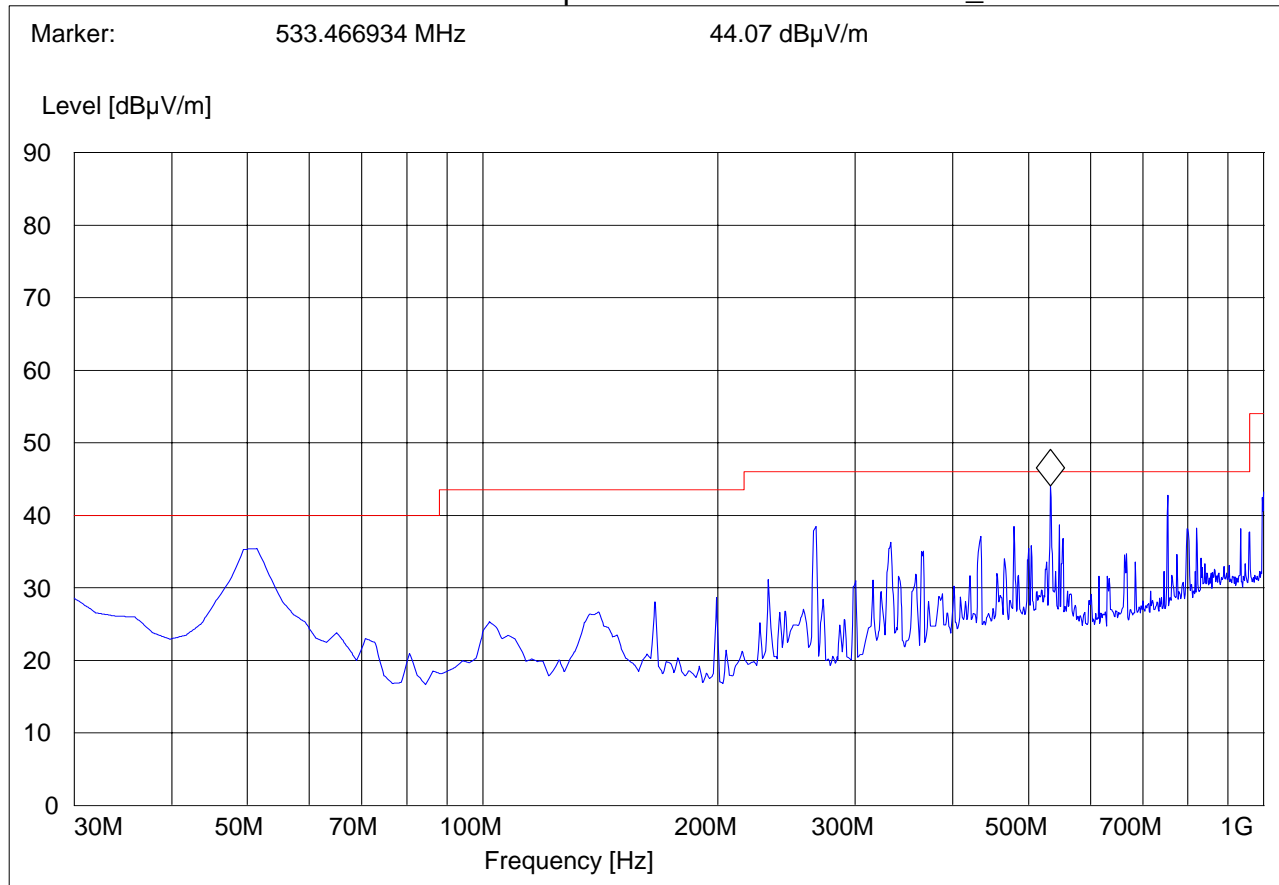
**EMISSION LIMITATIONS - Radiated (Transmitter) §15.247 (d) & RSS-210(A8.5)**  
**Lowest Channel (2412MHz): 30MHz – 1GHz**

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

EUT: 94312MCG  
Customer:: Broadcom  
Test Mode: 802.11b and g Ch.6, Aux WNC  
ANT Orientation: V  
EUT Orientation: H  
Test Engineer: Sam  
Voltage: AC Adapter

***SWEEP TABLE: "FCC15.247\_30M-1G\_Ver"***

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

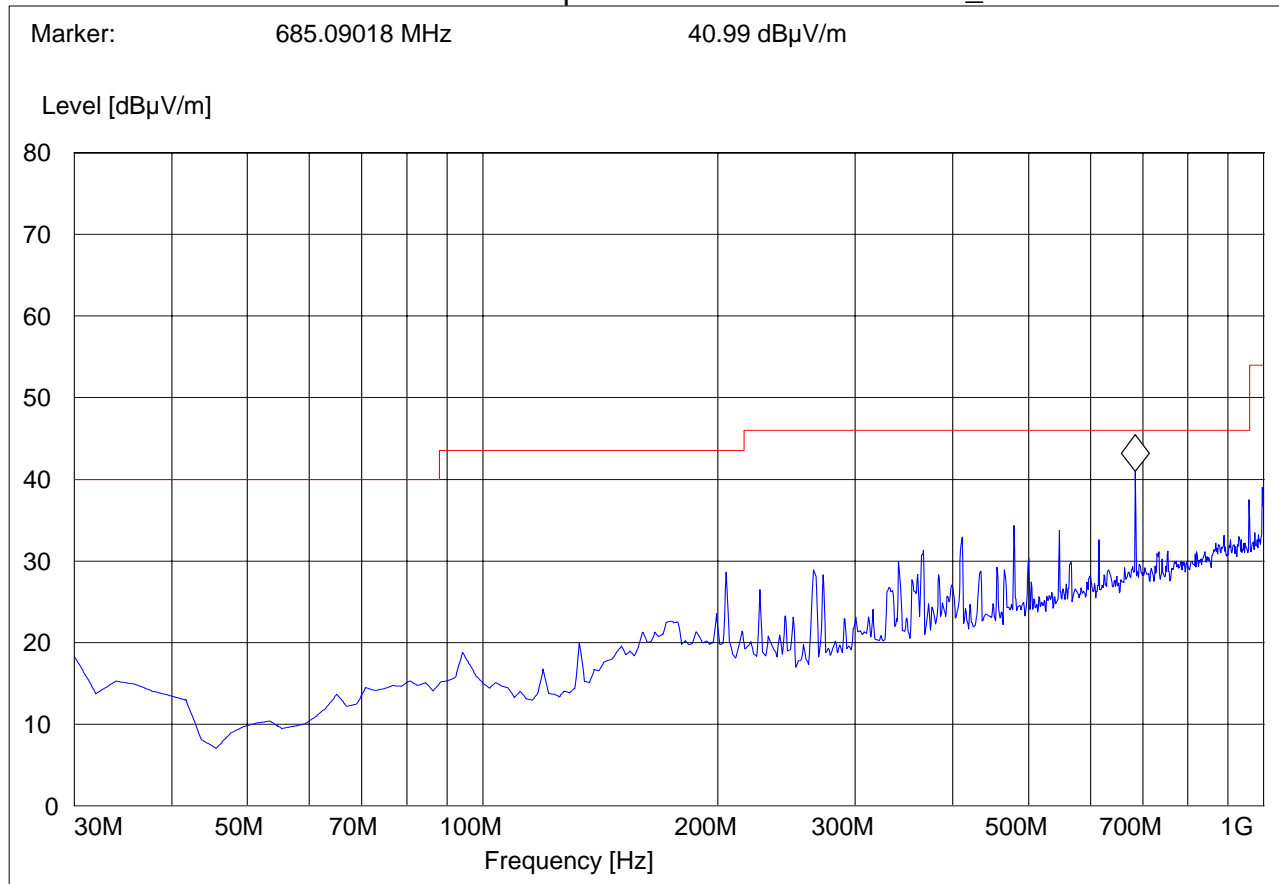


**EMISSION LIMITATIONS - Radiated (Transmitter) §15.247 (d) & RSS-210(A8.5)**  
**Lowest Channel (2412MHz): 30MHz – 1GHz**

EUT: 94312MCG  
Customer:: Broadcom  
Test Mode: 802.11b and g Ch.6, Aux Yageo  
ANT Orientation: H  
EUT Orientation: H  
Test Engineer: SAM  
Voltage: AC Adapter

***SWEEP TABLE: "FCC15.247\_30M-1G\_Hor"***

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



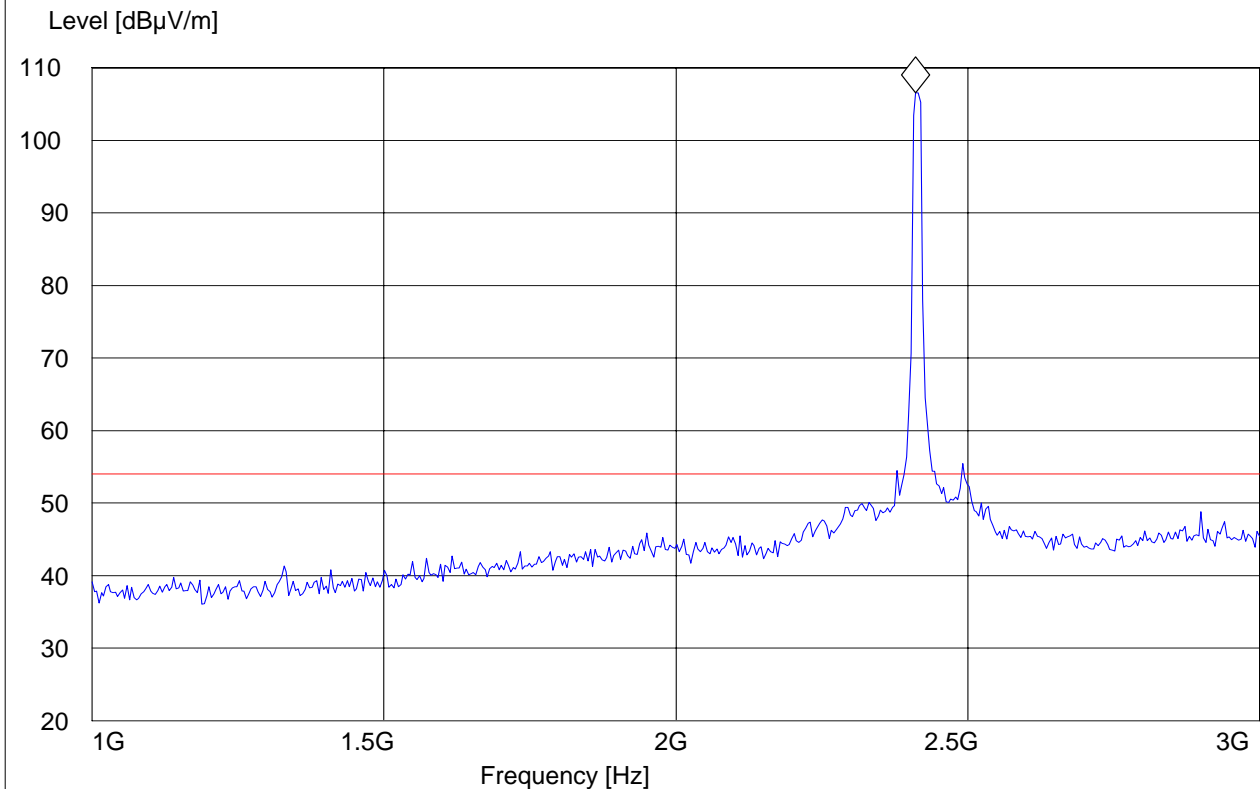
**EMISSION LIMITATIONS - Radiated (Transmitter) §15.247 (d) & RSS-210(A8.5)**  
**Lowest Channel (2412MHz): 1GHz – 18GHz**

EUT: 94312MCG  
Customer:: Broadcom  
Test Mode: 802.11b Ch.1, Aux WNC  
ANT Orientation: H  
EUT Orientation: H  
Test Engineer: Chris  
Voltage: AC Adapter

***SWEEP TABLE: "FCC15.247\_1-3G"***

Start	Stop	Detector	Meas.	IF	Transducer
Frequency	Frequency		Time	Bandw.	
1.0 GHz	3.0 GHz	MaxPeak	Coupled	1 MHz	#326horn_AF_vert

Marker: 2.410821643 GHz 106.51 dBμV/m



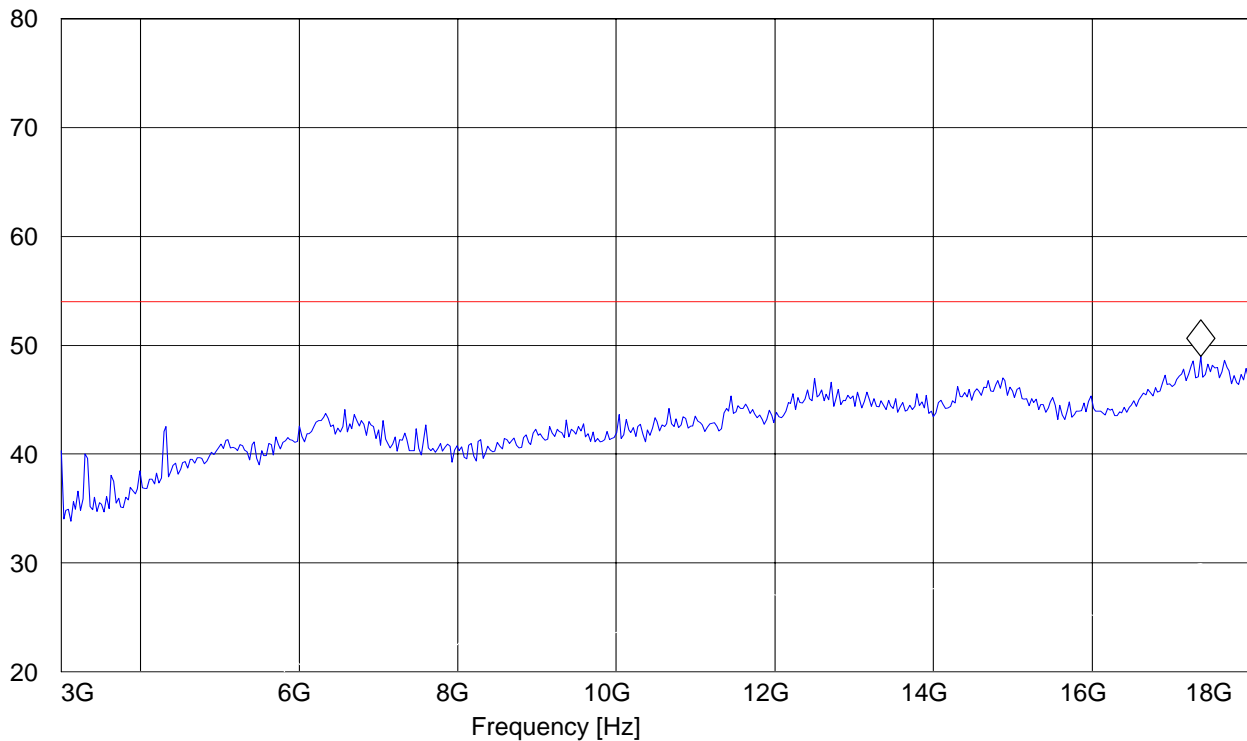
EUT: 94312MCG  
Customer:: Broadcom  
Test Mode: 802.11b Ch.1, Aux WNC  
ANT Orientation: H  
EUT Orientation: H  
Test Engineer: Sam  
Voltage: AC Adapter

***SWEEP TABLE: "FCC15.247\_3-18G"***

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

Marker: 17.368737475 GHz 48.95 dB $\mu$ V/m

Level [dB $\mu$ V/m]

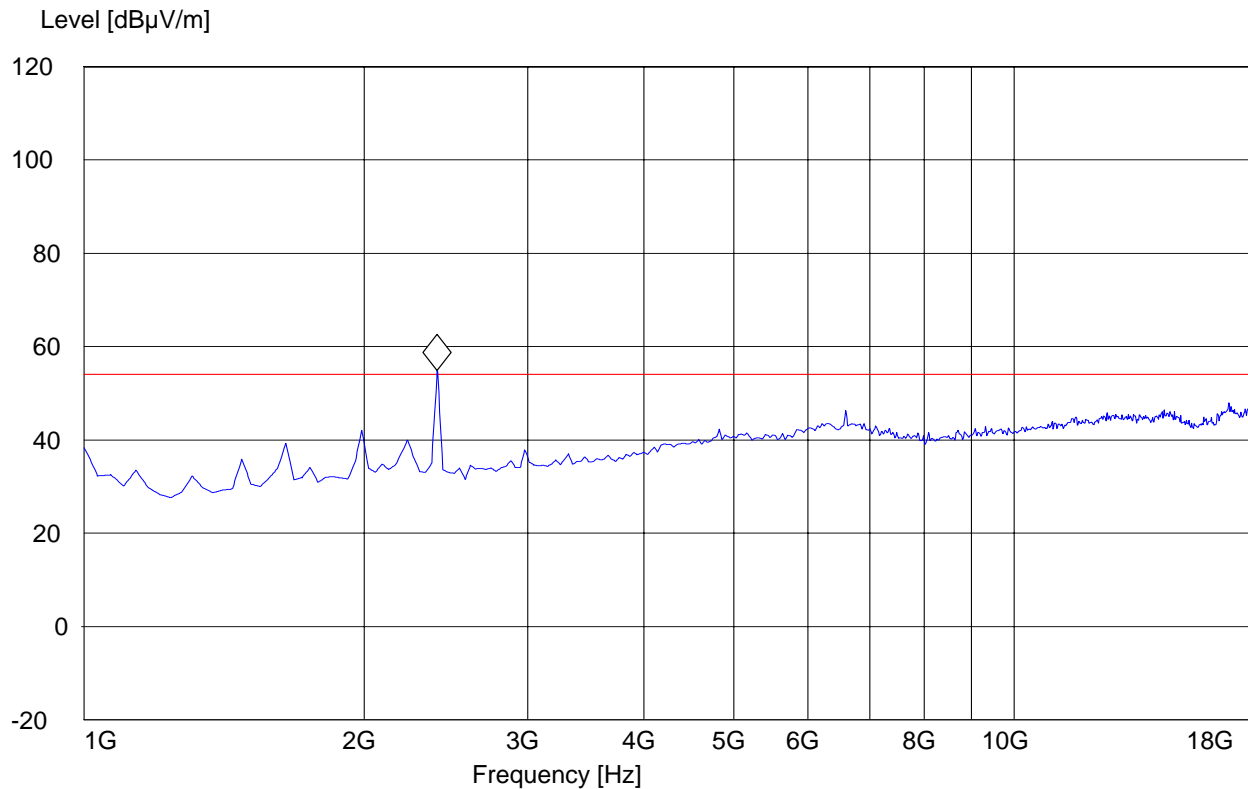


EUT / Description: 94312MCG  
Manufacturer: Broadcom  
Operation Mode: 802.11b Ch.1, Aux Yageo  
ANT Orientation: : H  
EUT Orientation:: H  
Test Engineer: SAM  
Voltage: AC Adapter  
Comments:: marker on TX signal

***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

Marker: 2.396793587 GHz 54.93 dB $\mu$ V/m



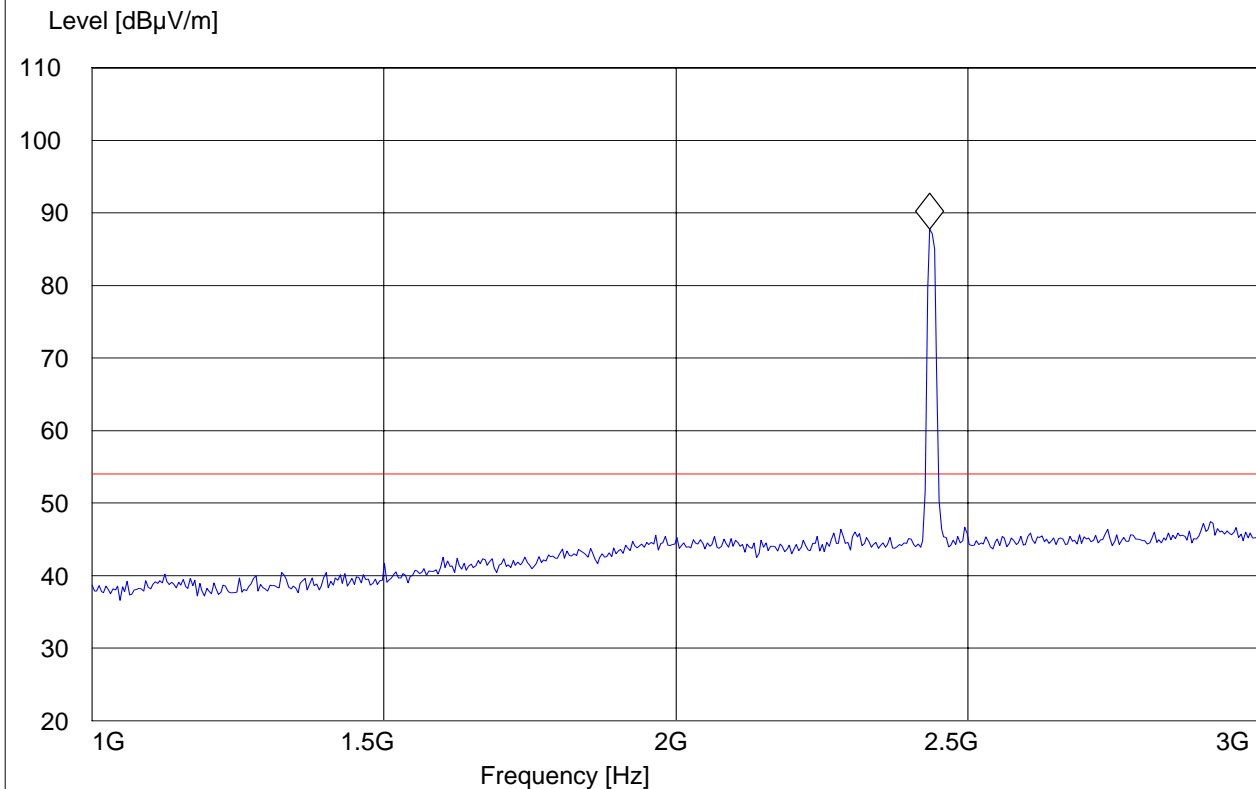
**EMISSION LIMITATIONS - Radiated (Transmitter) §15.247 (d) & RSS-210(A8.5)  
Mid Channel (2437MHz): 1GHz – 18GHz**

EUT: 94312MCG  
Customer:: Broadcom  
Test Mode: 802.11b Ch.6, Aux WNC  
ANT Orientation: H  
EUT Orientation: H  
Test Engineer: Sam  
Voltage: AC Adapter

***SWEEP TABLE: "FCC15.247\_1-3G"***

Start	Stop	Detector	Meas.	IF	Transducer
Frequency	Frequency		Time	Bandw.	
1.0 GHz	3.0 GHz	MaxPeak	Coupled	1 MHz	#326horn_AF_vert

Marker: 2.434869739 GHz 87.77 dBμV/m



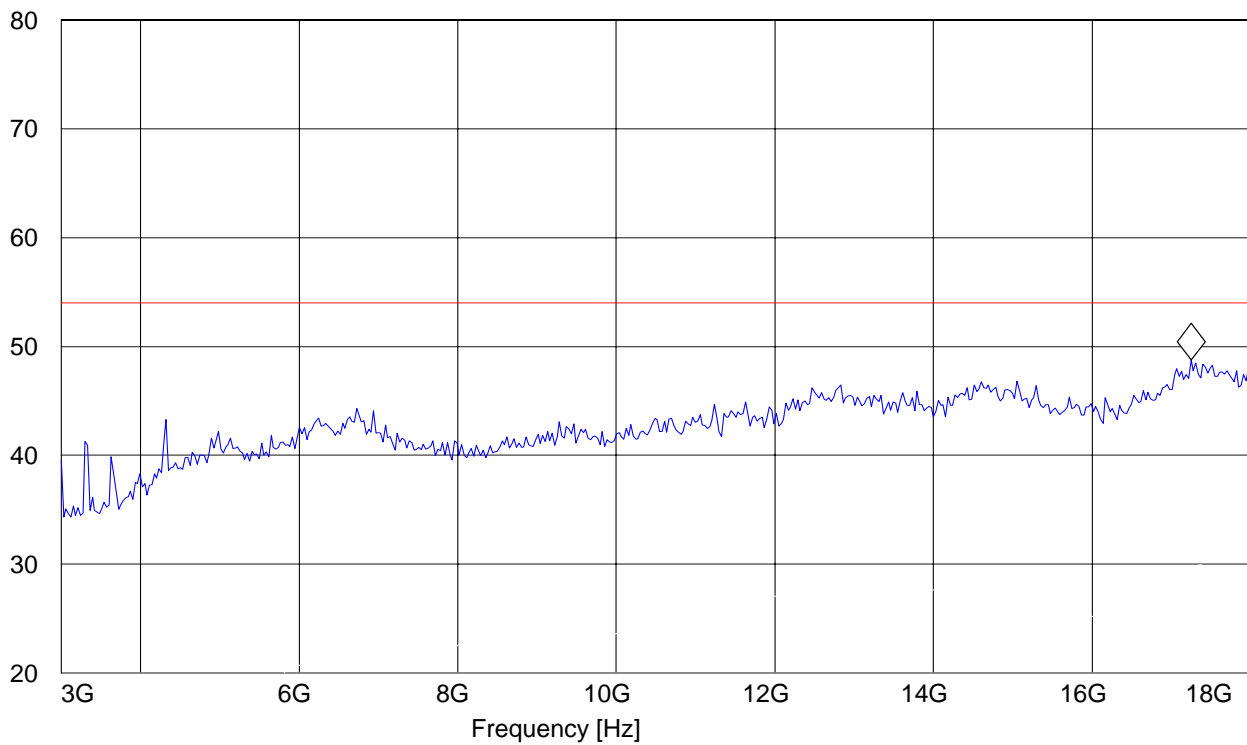
EUT: 94312MCG  
Customer:: Broadcom  
Test Mode: 802.11b Ch.6, Aux WNC  
ANT Orientation: H  
EUT Orientation: H  
Test Engineer: Sam  
Voltage: AC Adapter

***SWEEP TABLE: "FCC15.247\_3-18G"***

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

Marker: 17.248496994 GHz 48.76 dBμV/m

Level [dBμV/m]



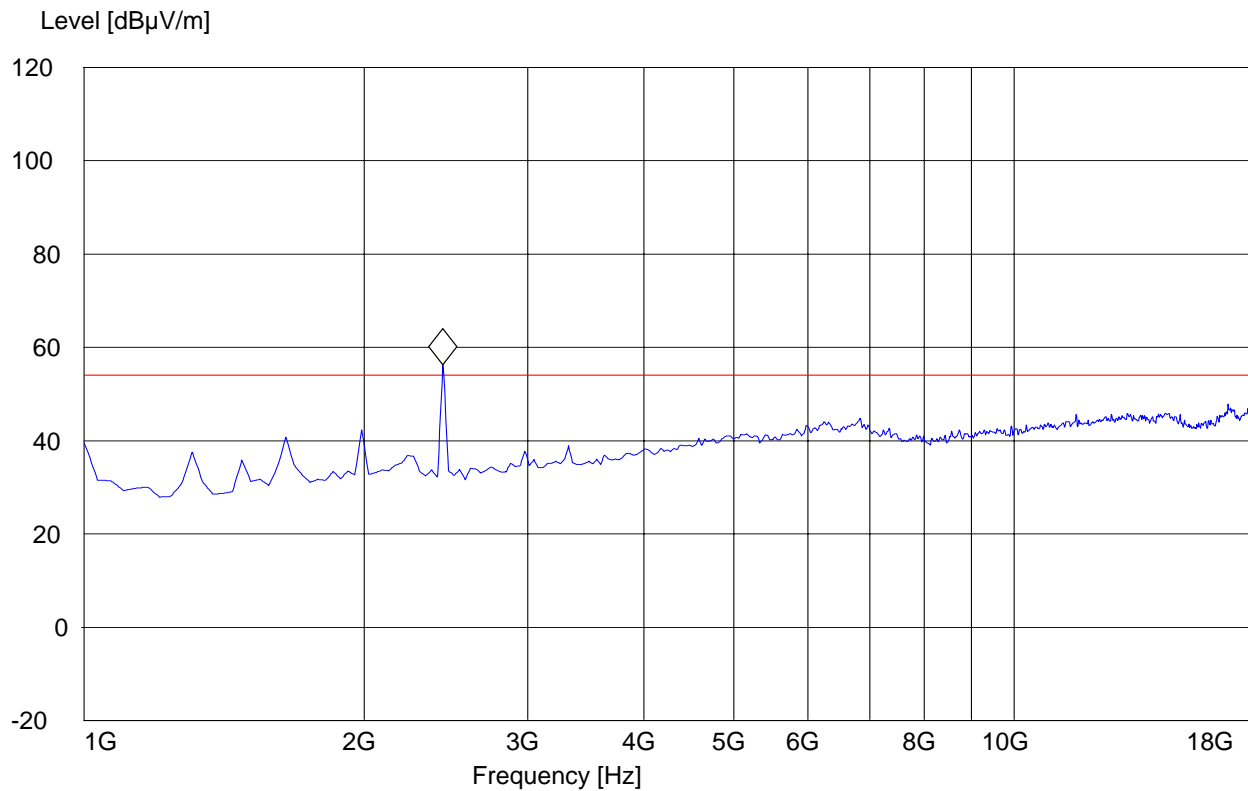


EUT / Description: 94312MCG  
Manufacturer: Broadcom  
Operation Mode: 802.11b Ch.6, Aux Yageo  
ANT Orientation: : H  
EUT Orientation:: H  
Test Engineer: SAM  
Voltage: AC Adapter  
Comments:: marker on TX signal

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

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

Marker: 2.430861723 GHz 56.31 dB $\mu$ V/m





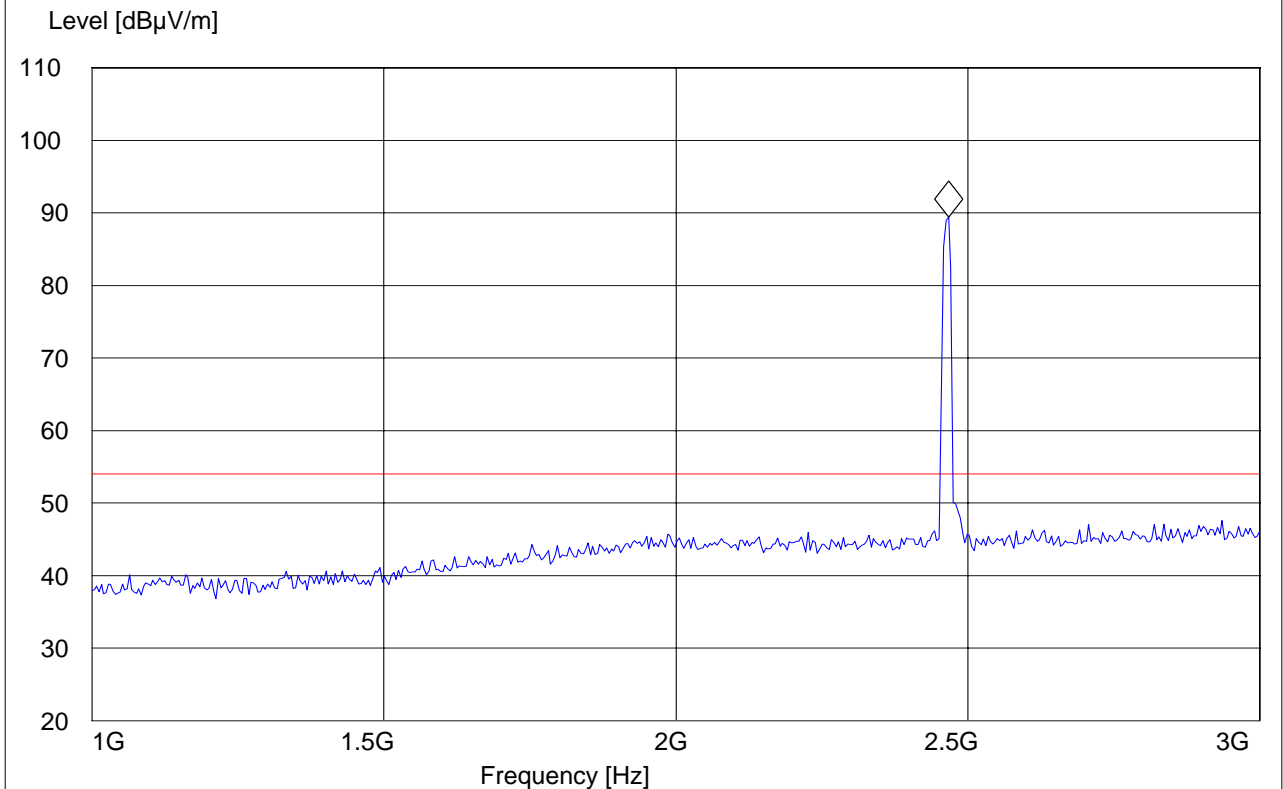
**EMISSION LIMITATIONS - Radiated (Transmitter) §15.247 (d) & RSS-210(A8.5)**  
**Highest Channel (2462MHz): 1GHz – 18GHz**

EUT: 94312MCG  
Customer:: Broadcom  
Test Mode: 802.11b Ch.11, Aux WNC  
ANT Orientation: H  
EUT Orientation: H  
Test Engineer: Sam  
Voltage: AC Adapter

***SWEEP TABLE: "FCC15.247\_1-3G"***

Start	Stop	Detector	Meas.	IF	Transducer
Frequency	Frequency		Time	Bandw.	
1.0 GHz	3.0 GHz	MaxPeak	Coupled	1 MHz	#326horn_AF_vert

Marker: 2.466933868 GHz 89.39 dBμV/m





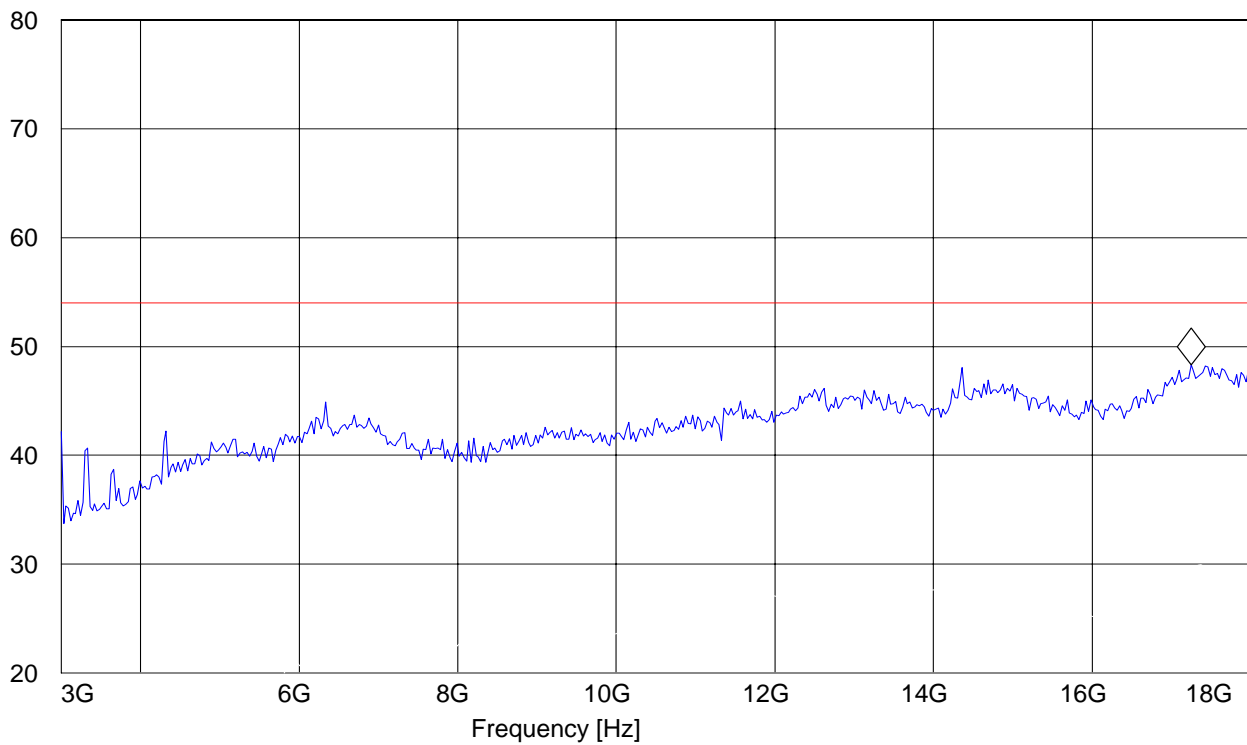
EUT: 94312MCG  
Customer:: Broadcom  
Test Mode: 802.11b Ch.11, Aux WNC  
ANT Orientation: H  
EUT Orientation: H  
Test Engineer: Sam  
Voltage: AC Adapter

***SWEEP TABLE: "FCC15.247\_3-18G"***

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

Marker: 17.248496994 GHz 48.33 dB $\mu$ V/m

Level [dB $\mu$ V/m]

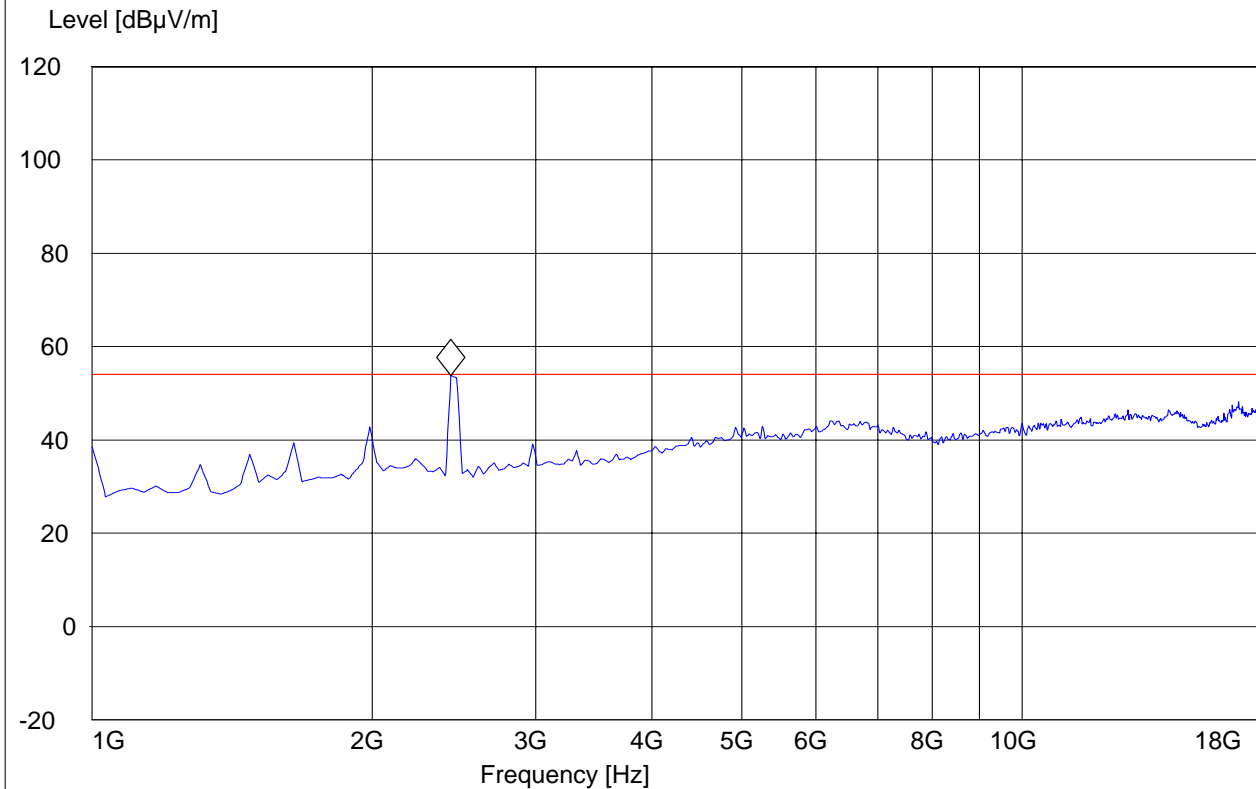


EUT / Description: 94312MCG  
Manufacturer: Broadcom  
Operation Mode: 802.11b Ch.11, Aux Yageo  
ANT Orientation: : H  
EUT Orientation:: H  
Test Engineer: SAM  
Voltage: AC Adapter  
Comments:: marker on TX signal

***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

Marker: 2.430861723 GHz 53.76 dB $\mu$ V/m





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

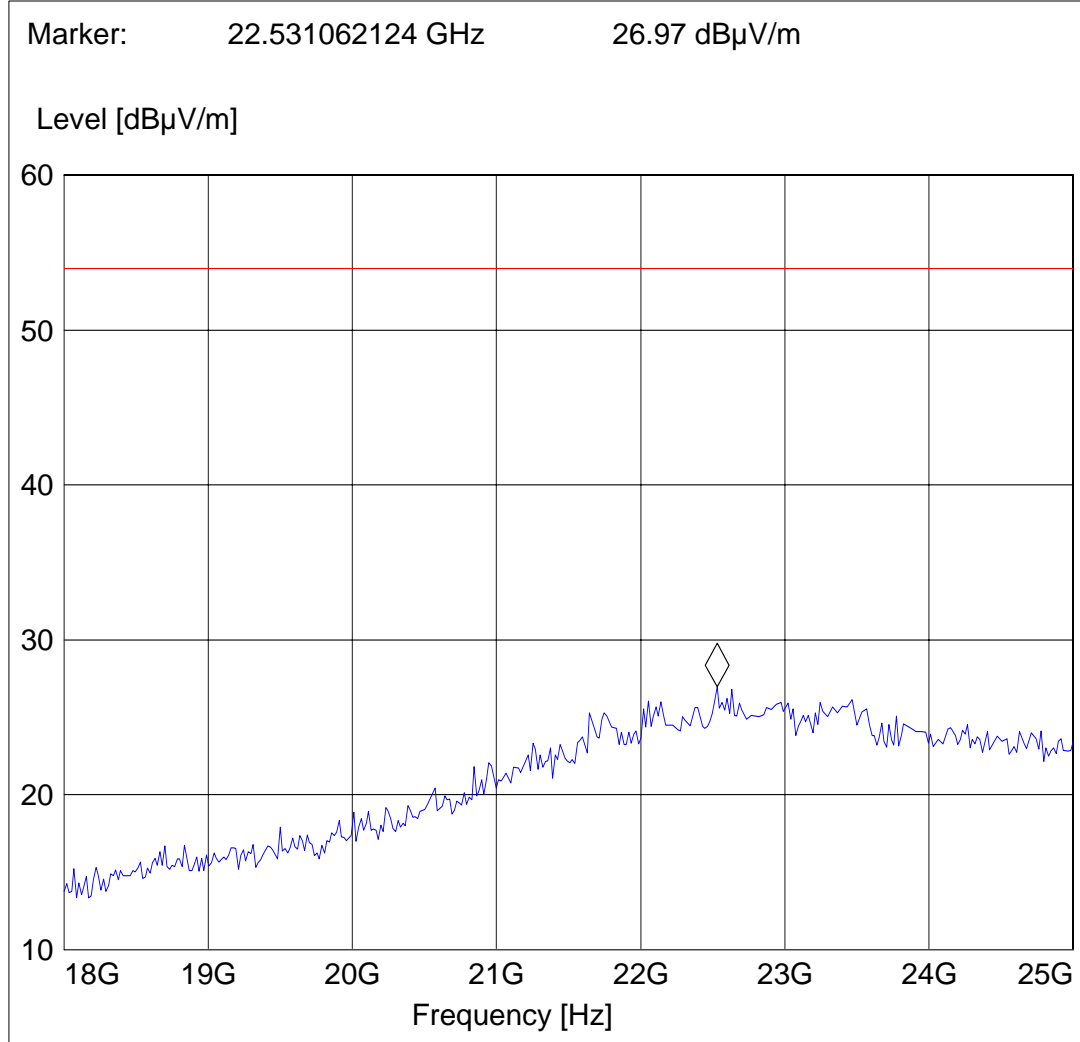
**Note: This plot is valid for low, mid, high channels (worst-case plot)**

**CETECOM Inc., 411 Dixon Landing Road, Milpitas CA 95035, USA**

EUT / Description: BCM94312MCG  
 Manufacturer: Broadcom  
 Test Mode: 802.11b, Measurement for low, middle, and high channels  
 ANT Orientation: V  
 EUT Orientation: H  
 Test Engineer: SAM  
 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



#### 4.6 EMISSION LIMITATIONS - Radiated (Transmitter), 802.11g

§15.247 (d) & RSS-210(A8.5):

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

**EMISSION LIMITATIONS - Radiated (Transmitter)**

**§15.247 (d) & RSS-210(A8.5)**

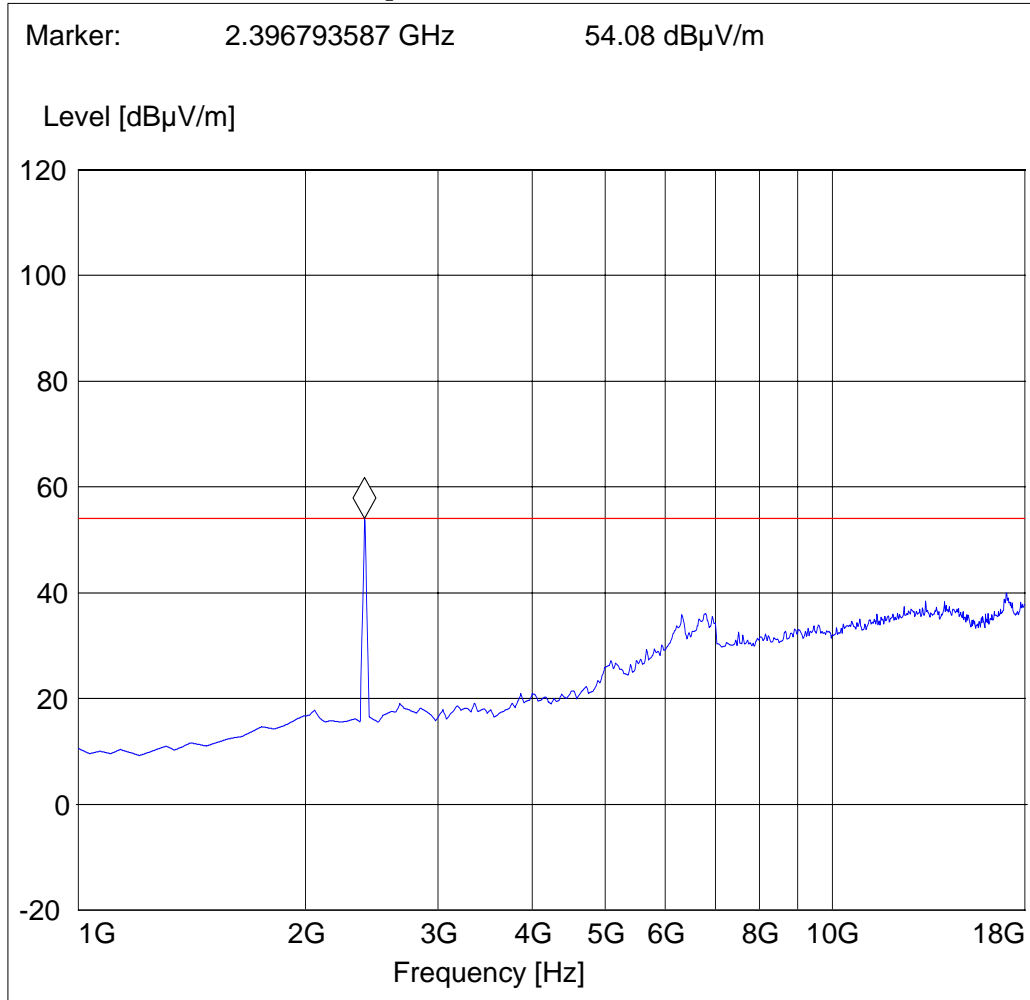
**Lowest Channel (2412MHz): 1GHz – 18GHz**

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

EUT / Description: BCM94311MCAG  
Manufacturer: Broadcom  
Test mode: 802.11g, Ch. 1 Aux WNC  
ANT Orientation: H  
EUT Orientation: H  
Test Engineer: Chris  
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



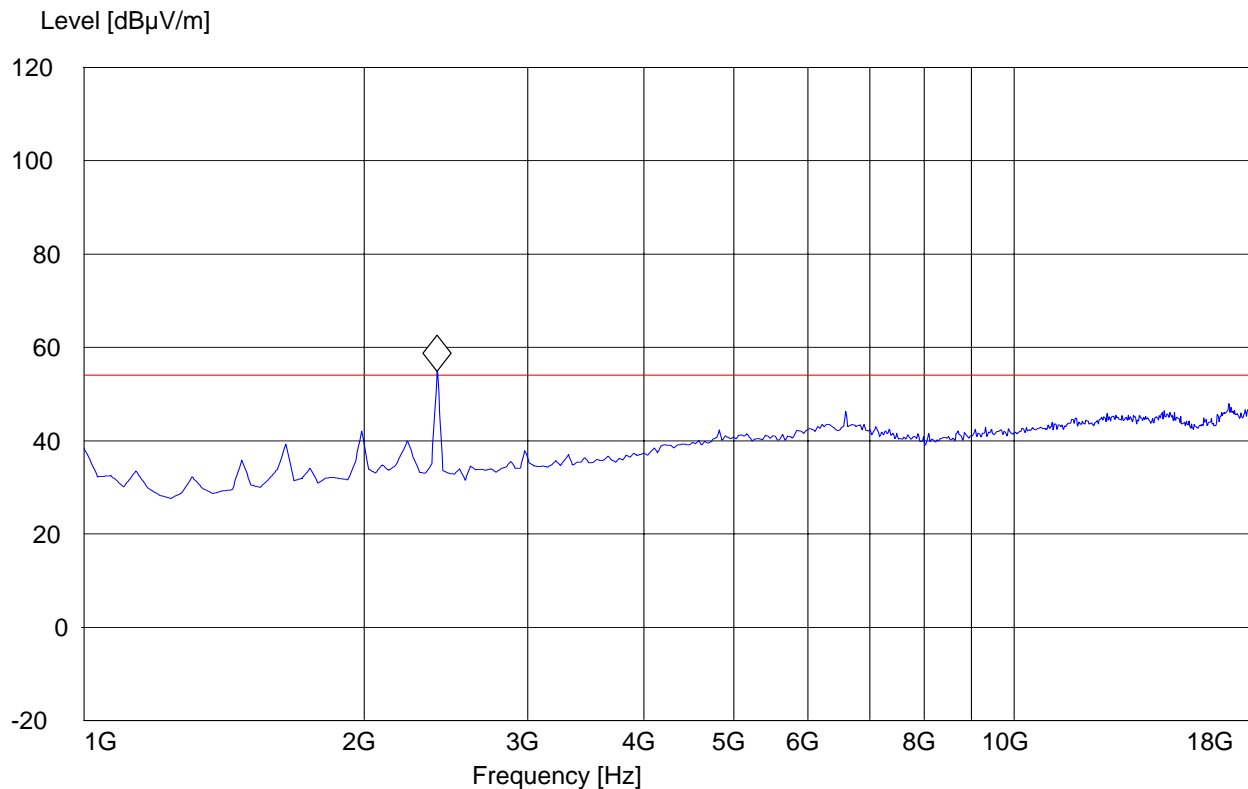


EUT / Description: 94312MCG  
Manufacturer: Broadcom  
Operation Mode: 802.11g Ch.1, Main Yageo  
ANT Orientation: : H  
EUT Orientation:: H  
Test Engineer: SAM  
Voltage: AC Adapter  
Comments:: marker on TX signal

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

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

Marker: 2.396793587 GHz 54.93 dB $\mu$ V/m





**EMISSION LIMITATIONS - Radiated (Transmitter)**  
**Mid Channel (2437MHz): 1GHz – 18GHz**

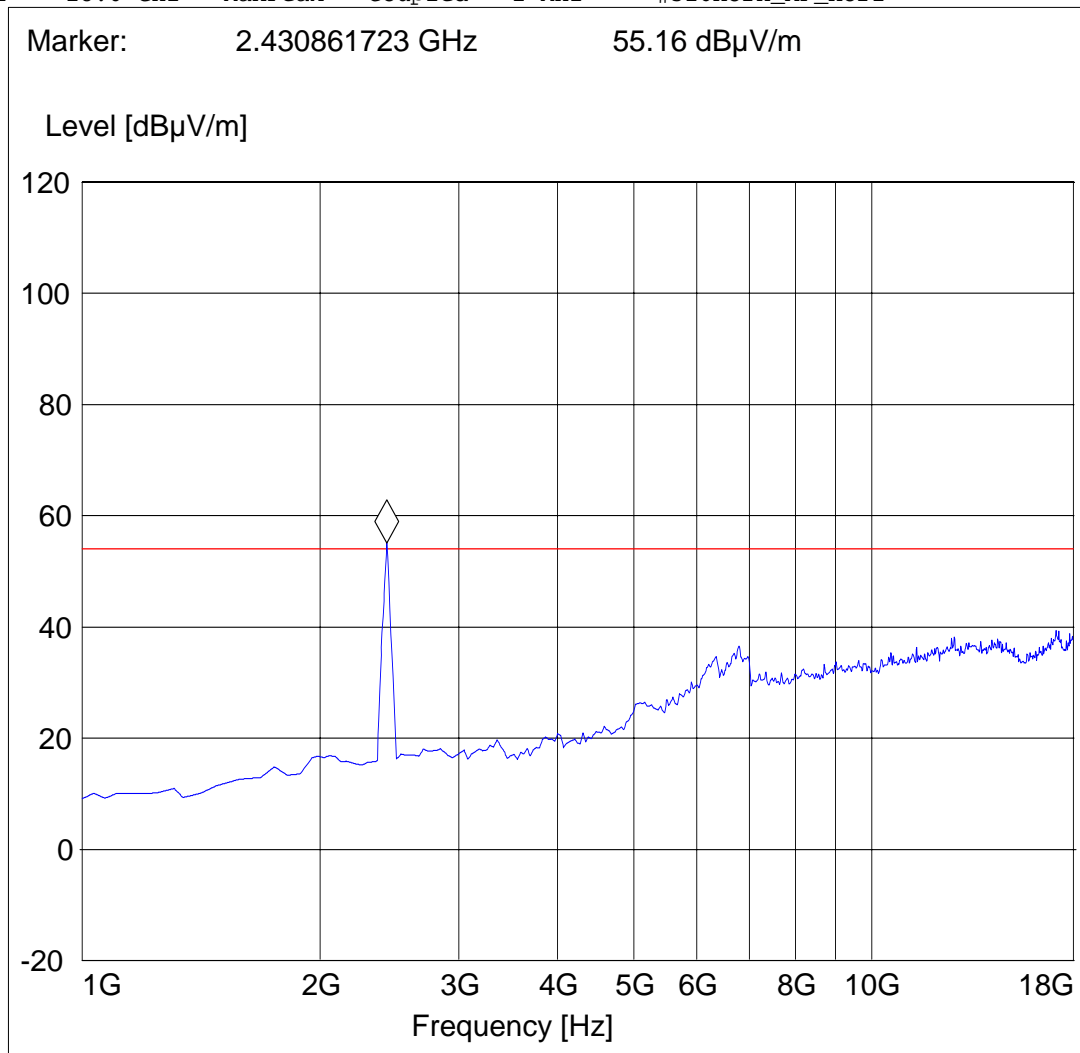
**§15.247 (d) & RSS-210(A8.5)**

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

EUT / Description: BCM94312MCG  
Manufacturer: Broadcom  
Test mode: 802.11g, Ch. 6 Aux WNC  
ANT Orientation: H  
EUT Orientation: H  
Test Engineer: Chris  
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

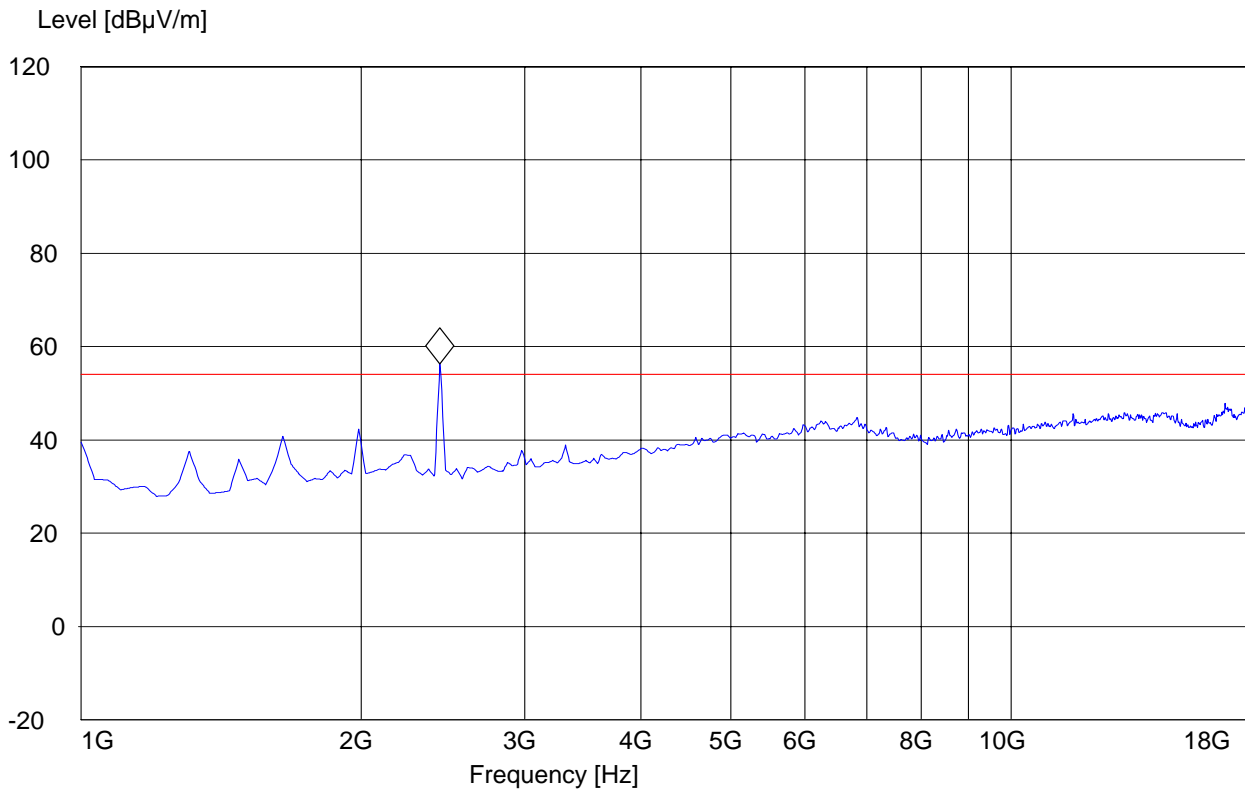


EUT / Description: 94312MCG  
Manufacturer: Broadcom  
Operation Mode: 802.11g Ch.6, Main Yageo  
ANT Orientation: : H  
EUT Orientation:: H  
Test Engineer: SAM  
Voltage: AC Adapter  
Comments:: marker on TX signal

***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

Marker: 2.430861723 GHz 56.31 dB $\mu$ V/m



**EMISSION LIMITATIONS - Radiated (Transmitter)**  
**Highest Channel (2462MHz): 1GHz – 18GHz**

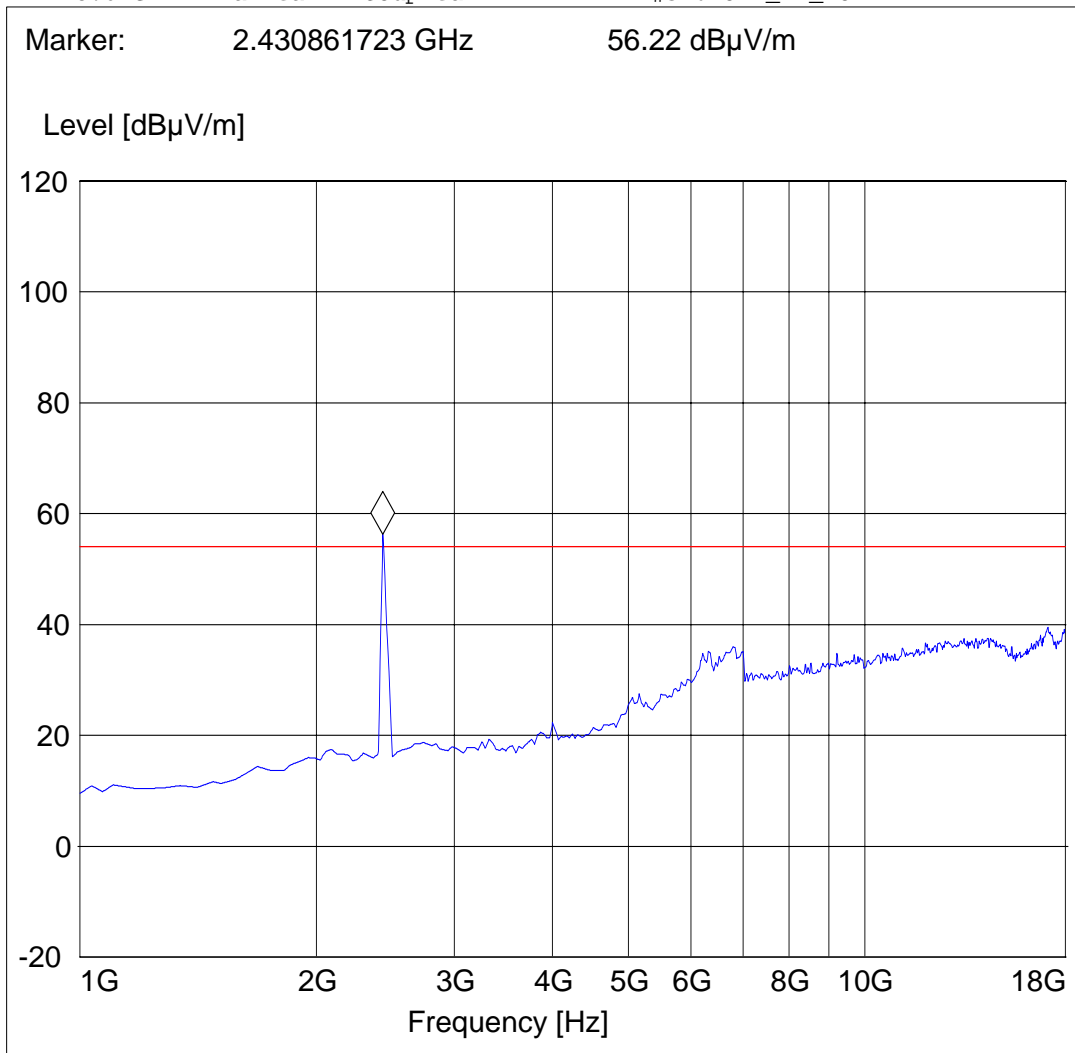
**§15.247 (d) & RSS-210(A8.5)**

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

EUT / Description: BCM94312MCG  
Manufacturer: Broadcom  
Test mode: 802.11g, Ch. 11 Aux WNC  
ANT Orientation: H  
EUT Orientation: H  
Test Engineer: Chris  
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

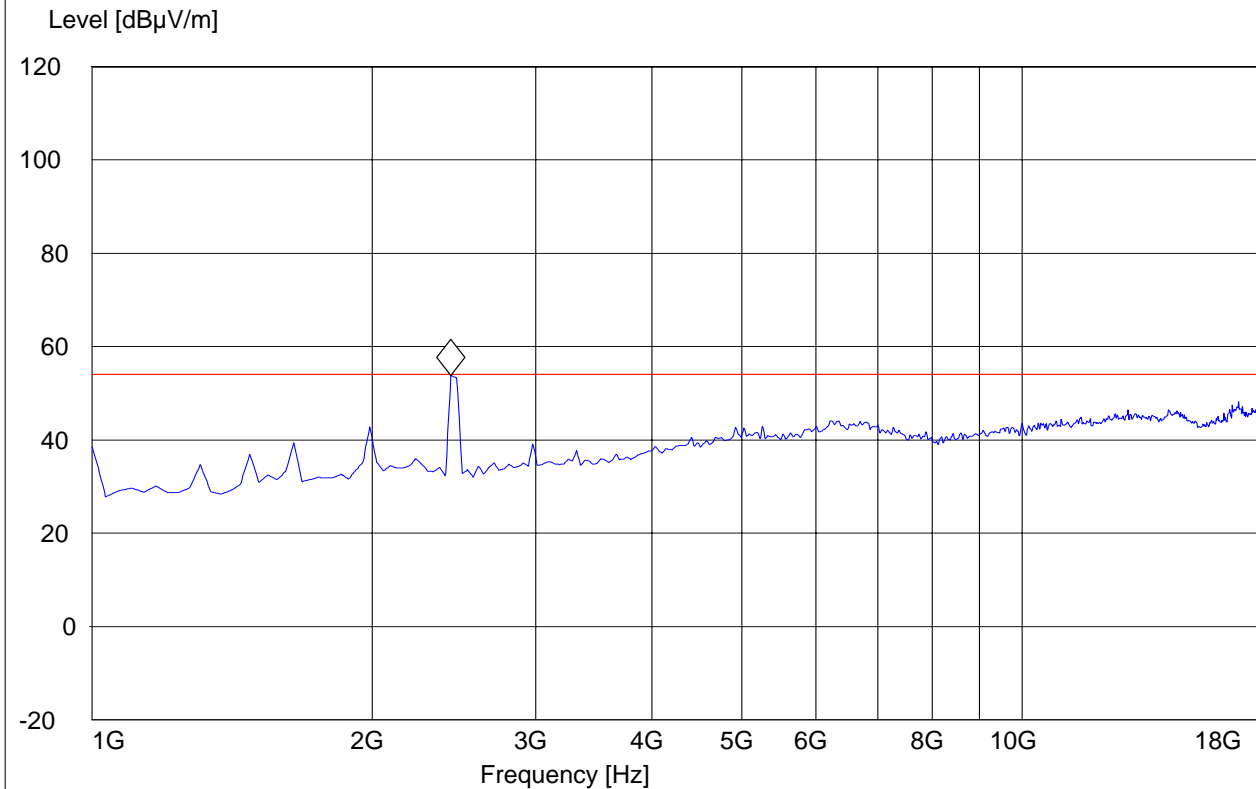


EUT / Description: 94312MCG  
Manufacturer: Broadcom  
Operation Mode: 802.11b Ch.11, Main Yageo  
ANT Orientation: : H  
EUT Orientation:: H  
Test Engineer: SAM  
Voltage: AC Adapter

***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

Marker: 2.430861723 GHz 53.76 dB $\mu$ V/m



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

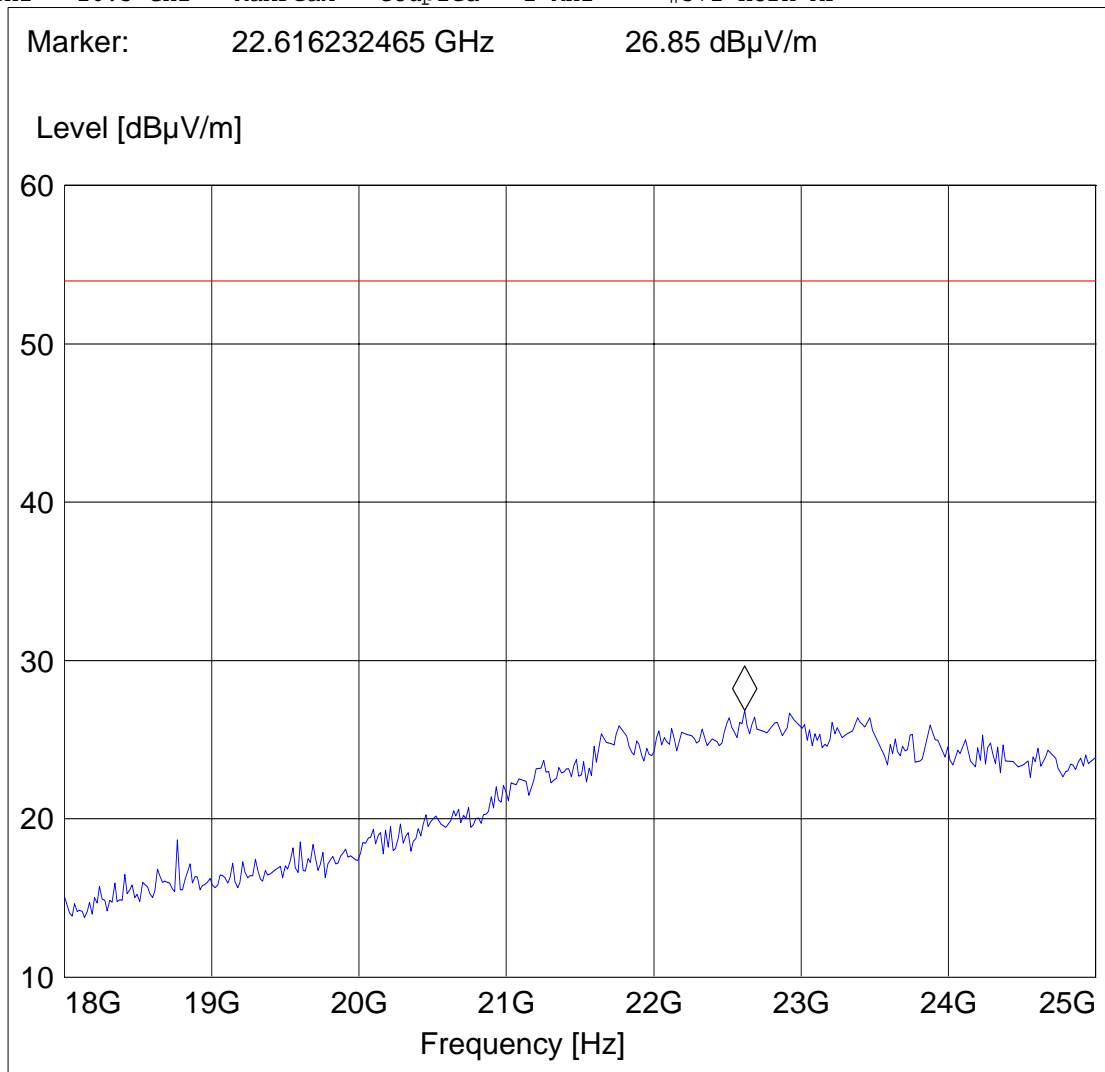
**§15.247 (d) & RSS-210(A8.5)**

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

EUT / Description: BCM94312MCG  
Manufacturer: Broadcom  
Test Mode: 802.11g, Measurement for low, middle, and high channels  
ANT Orientation: V  
EUT Orientation: H  
Test Engineer: Sam  
Power Supply: AC Adapter

***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



## 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 µH/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 (dBµV)	
	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**

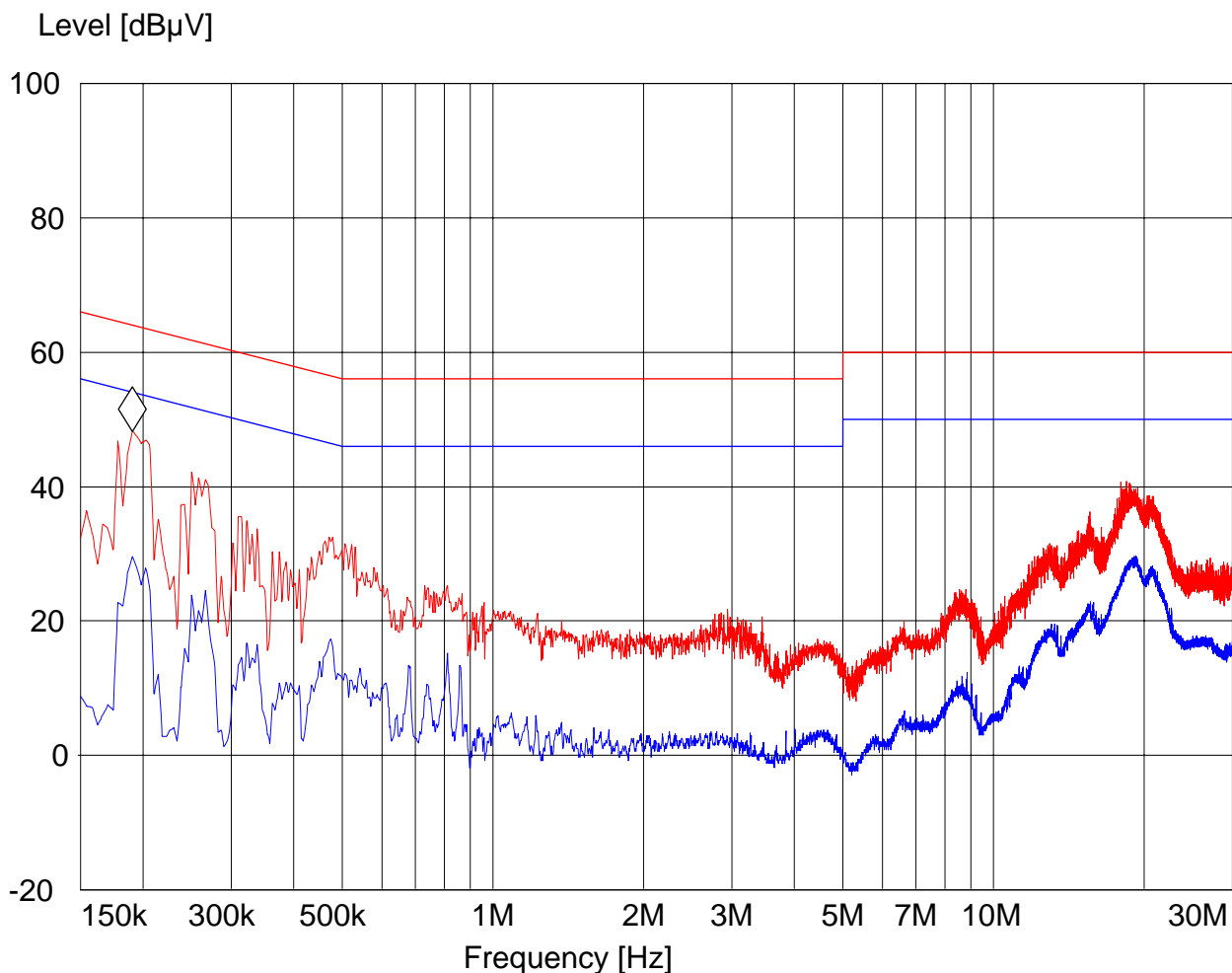
### OPERATING MODE

Conducted AC emissions testing were performed with 120 VAC @ 60 Hz with the EUT in the mode that produced the highest power.

***Voltage Mains Test (Line)***

EUT: BCM94312MCG  
Manufacturer: Broadcom  
Test Mode: 802.11b (Channel 6) Tx mode  
ANT Orientation:: Conducted  
EUT Orientation:: H  
Test Engineer:: Juan  
Power Supply: : AC adapter  
Comments: : Line

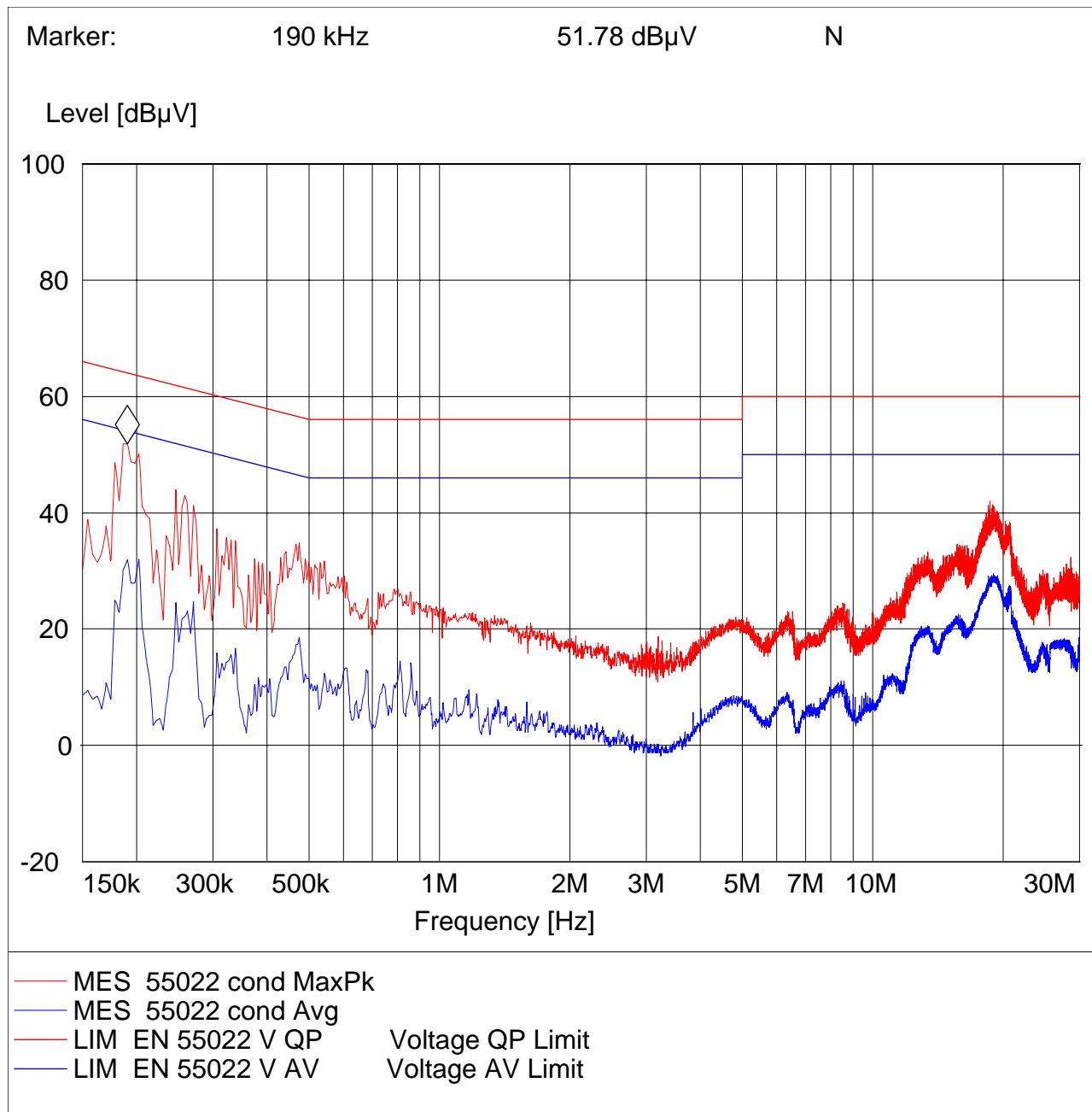
Marker: 190 kHz 48.23 dBμV N



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: BCM94312MCG  
Manufacturer: Broadcom  
Test Mode: 802.11b (Channel 6) Tx mode  
ANT Orientation:: Conducted  
EUT Orientation:: H  
Test Engineer:: Juan  
Power Supply: : AC adapter  
Comments: : NEUTRAL





## **5 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>E4</b>	Spectrum Analyzer	ESIB 40	Rohde & Schwarz	100107	May 2008	1 year
<b>E46</b>	Biconilog Antenna	3141	EMCO	0005-1186	June 2008	1 year
<b>E134</b>	Horn Antenna (1-18GHz)	3115	ETS Lindgren	35114	April 2008	1 year
<b>E169</b>	Horn Antenna (18-40GHz)	3116	ETS-Lindgren	00070497	Nov 2008	1 year
<b>E28</b>	High Pass Filter	5HC2700	Trilithic Inc.	9926013	n/a	n/a
<b>E30</b>	High Pass Filter	4HC1600	Trilithic Inc.	9922307	n/a	n/a
<b>E170</b>	LISN	FCC-LISN-50-25-2-08	Fisher Custom Communication	08014	Feb 2009	1 year

## 6 BLOCK DIAGRAMS

### Radiated Testing

#### ANECHOIC CHAMBER

