



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



Certificate # 2135.01



FCC listed#

A2LA Certified

IC recognized #

3462B

CETECOM Inc.

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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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TABLE OF CONTENTS

1 ASSESSMENT	3
TECHNICAL RESPONSIBILITY FOR AREA OF TESTING:	3
2 ADMINISTRATIVE DATA	4
2.1 IDENTIFICATION OF THE TESTING LABORATORY ISSUING THE EMC TEST REPORT	4
2.2 IDENTIFICATION OF THE CLIENT	4
2.3 IDENTIFICATION OF THE MANUFACTURER	4
3 EQUIPMENT UNDER TEST (EUT)	5
3.1 SPECIFICATION OF THE EQUIPMENT UNDER TEST	5
3.2 CLASS II PERMISSIVE CHANGE LAPTOPS TO BE ADDED	5
3.3 IDENTIFICATION OF ACCESSORY EQUIPMENT	5
4 SUBJECT OF INVESTIGATION	6
4.1 MAXIMUM PEAK OUTPUT POWER § 15.247 (B) (3) & RSS-210 (A8.4)(4)	7
EIRP: 2412 MHz (802.11b)	9
EIRP: 2437 MHz (802.11b)	10
EIRP: 2462 MHz (802.11b)	11
EIRP: 2412 MHz (802.11b)	12
EIRP: 2437 MHz (802.11b)	13
EIRP: 2462 MHz (802.11b)	14
EIRP: 2412 MHz (802.11g)	15
EIRP: 2437 MHz (802.11g)	16
EIRP: 2462 MHz (802.11g)	17
EIRP: 2412 MHz (802.11g)	18
EIRP: 2437 MHz (802.11g)	19
EIRP: 2462 MHz (802.11g)	20
4.2 BAND EDGE COMPLIANCE (802.11B) §15.247 (D) & RSS-210(A8.5)	21
4.3 BAND EDGE COMPLIANCE (802.11G) §15.247 (D) & RSS-210(A8.5)	30
4.4 EMISSION LIMITATIONS §15.247 (D) & RSS-210(A8.5)	40
4.5 EMISSION LIMITATIONS - RADIATED (TRANSMITTER), 802.11B	41
LOWEST CHANNEL (2412MHz): 30MHz – 1GHz	43
LOWEST CHANNEL (2412MHz): 1GHz – 18GHz	44
MID CHANNEL (2437MHz): 1GHz – 18GHz	47
HIGHEST CHANNEL (2462MHz): 1GHz – 18GHz	50
18GHz – 26.5GHz FOR LOW, MIDDLE, AND HIGH CHANNELS	53
4.6 EMISSION LIMITATIONS - RADIATED (TRANSMITTER), 802.11G	54
LOWEST CHANNEL (2412MHz): 1GHz – 18GHz	55
MID CHANNEL (2437MHz): 1GHz – 18GHz	57
HIGHEST CHANNEL (2462MHz): 1GHz – 18GHz	59
18GHz – 26.5GHz FOR LOW, MIDDLE, AND HIGH CHANNELS	61
5 TEST EQUIPMENT AND ANCILLARIES USED FOR TESTS	65
6 BLOCK DIAGRAMS	66

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)**

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

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

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

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:	Ivaylo Tankov

2.2 Identification of the Client

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

2.3 Identification of the Manufacturer

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

3 Equipment under Test (EUT)

3.1 Specification of the Equipment under Test

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

3.2 Class II permissive change laptops to be added

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

3.3 Identification of Accessory equipment

TYPE	MANF.	MODEL
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 _{nom} (23)°C	V _{nom}	23.61	24.46	23.16
YAGEO Antenna				
T _{nom} (23)°C	V _{nom}	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 _{nom} (23)°C	V _{nom}	27.06	27.24	27.87
YAGEO Antenna				
T _{nom} (23)°C	V _{nom}	24.48	26.86	24.98
Measurement uncertainty		±0.5dBm		

LIMIT

SUBCLAUSE § 15.247 (b) (3) & RSS-210 (A8.4) (4)

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

Notes:

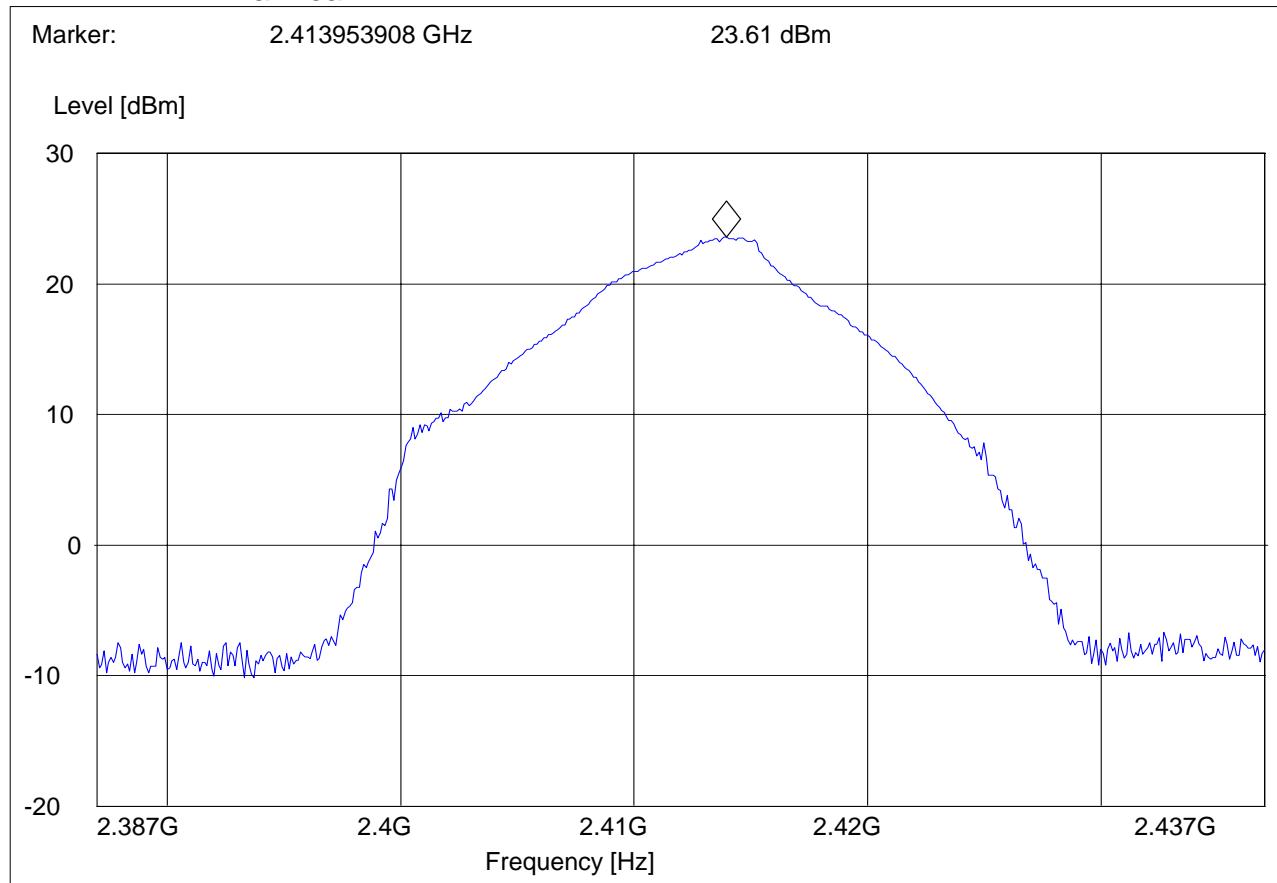
1. For 802.11b and 802.11g powers were set to transmit at the specified conducted average output power.
2. EIRP was measured with the device transmitting on either the auxiliary or the main antenna. The EIRP was highest when transmitting on the 802.11b Aux antenna for the WNC and Yageo. For 802.11g EIRP 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

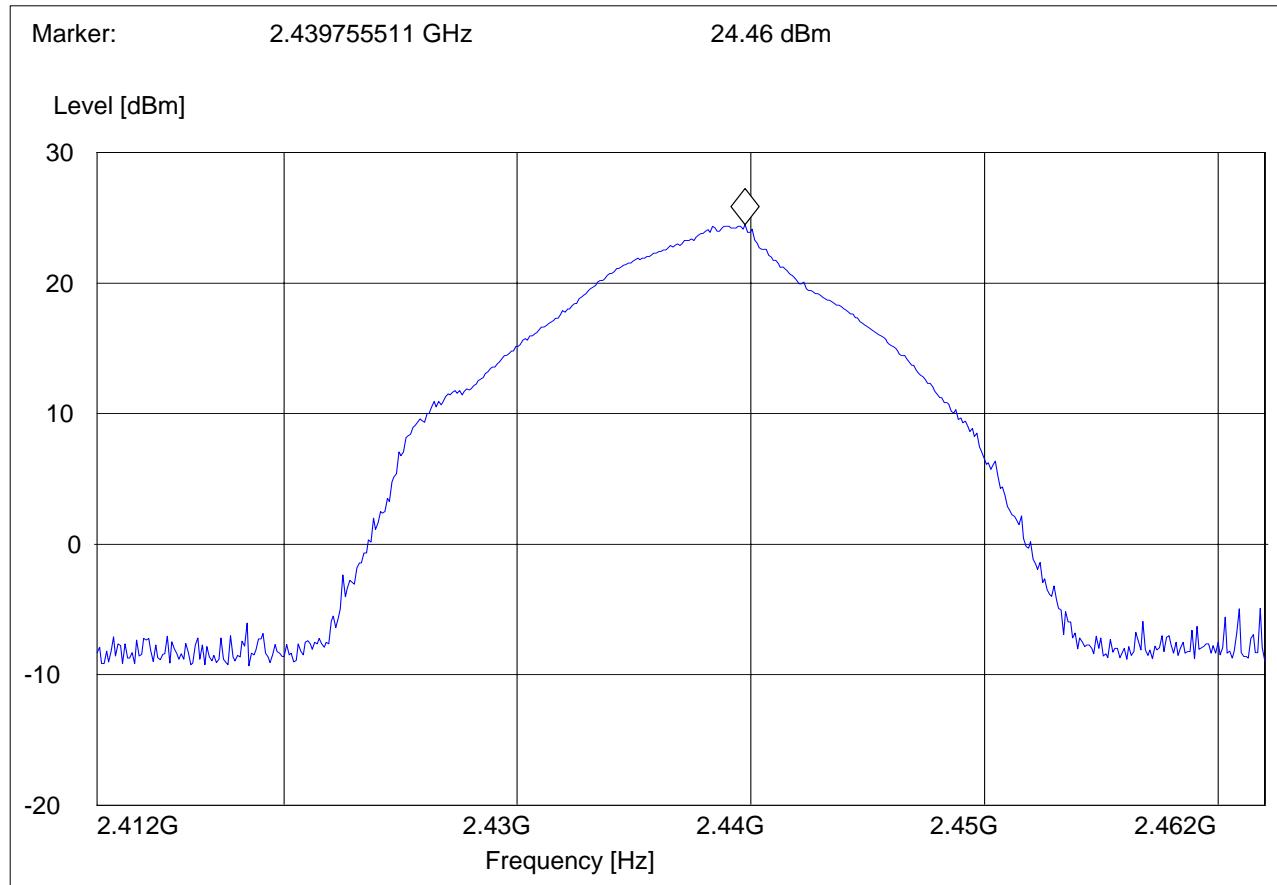


EIRP: 2437 MHz (802.11b)

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

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
		MaxPeak		

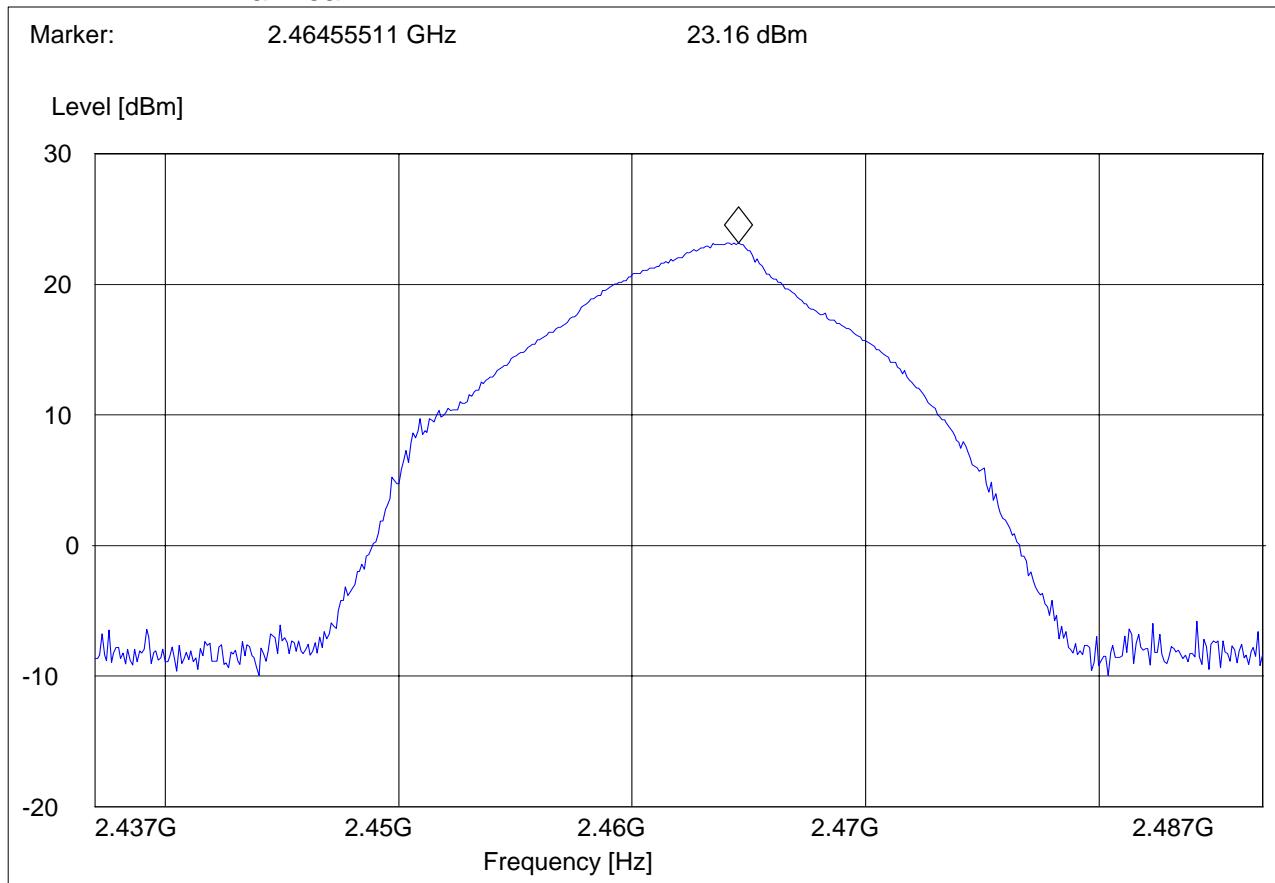


EIRP: 2462 MHz (802.11b)

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

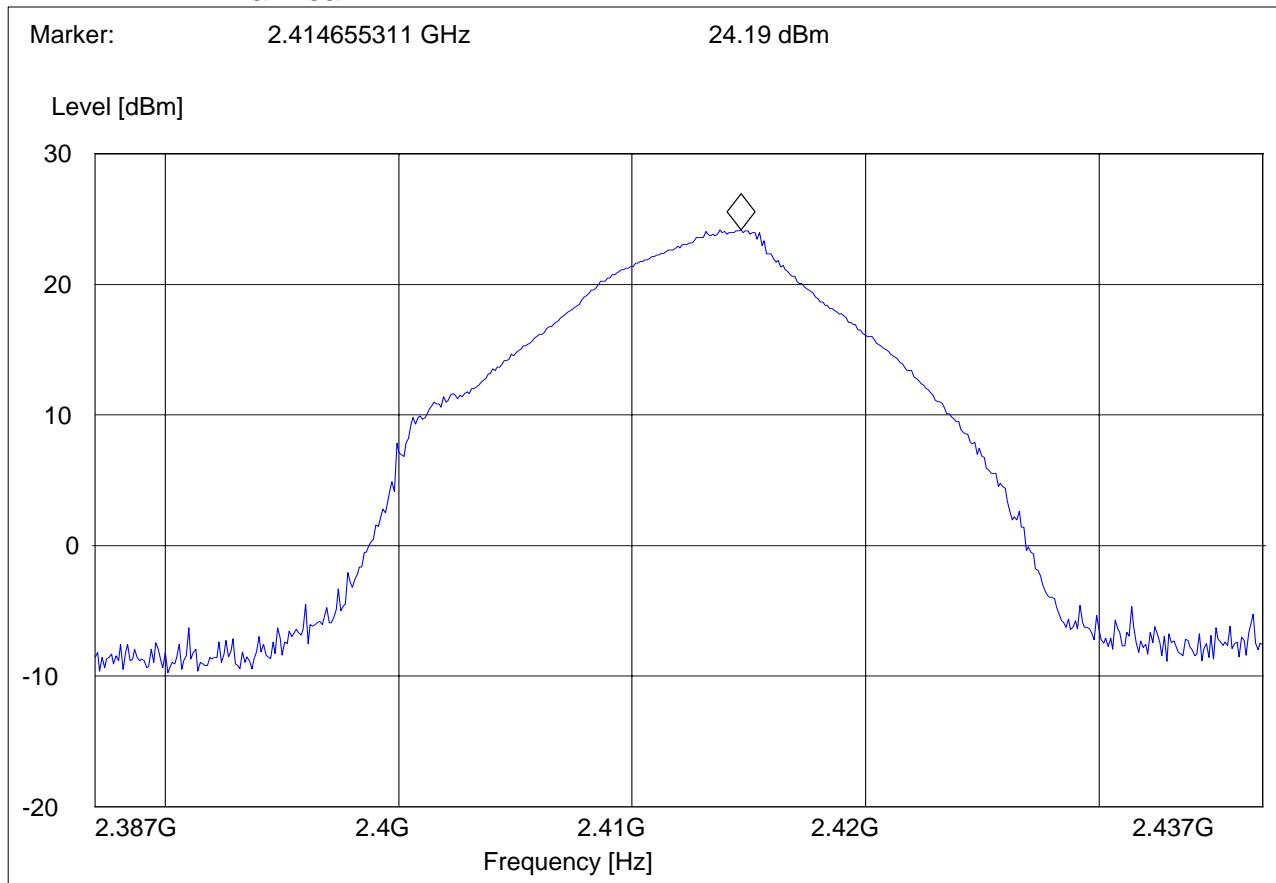


EIRP: 2412 MHz (802.11b)

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

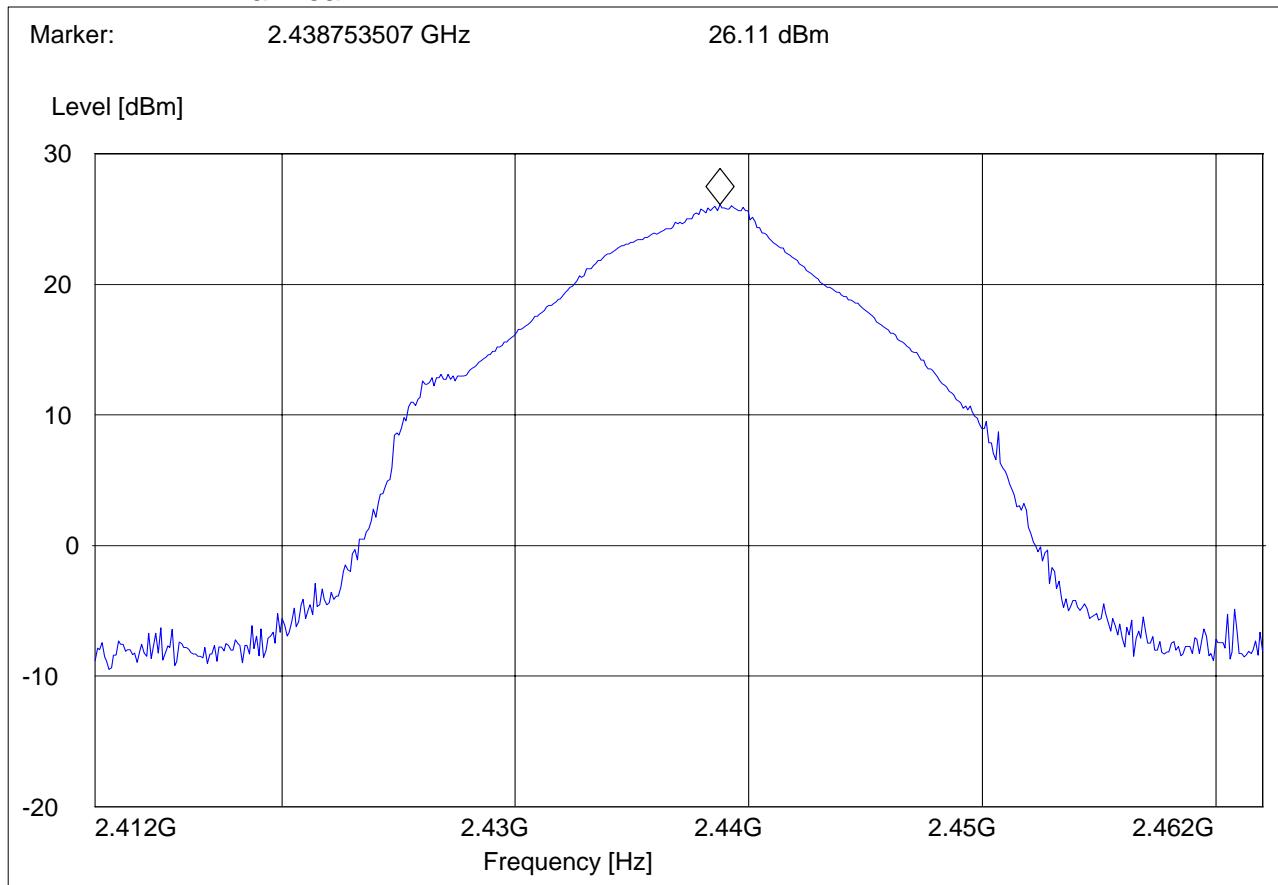


EIRP: 2437 MHz (802.11b)

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

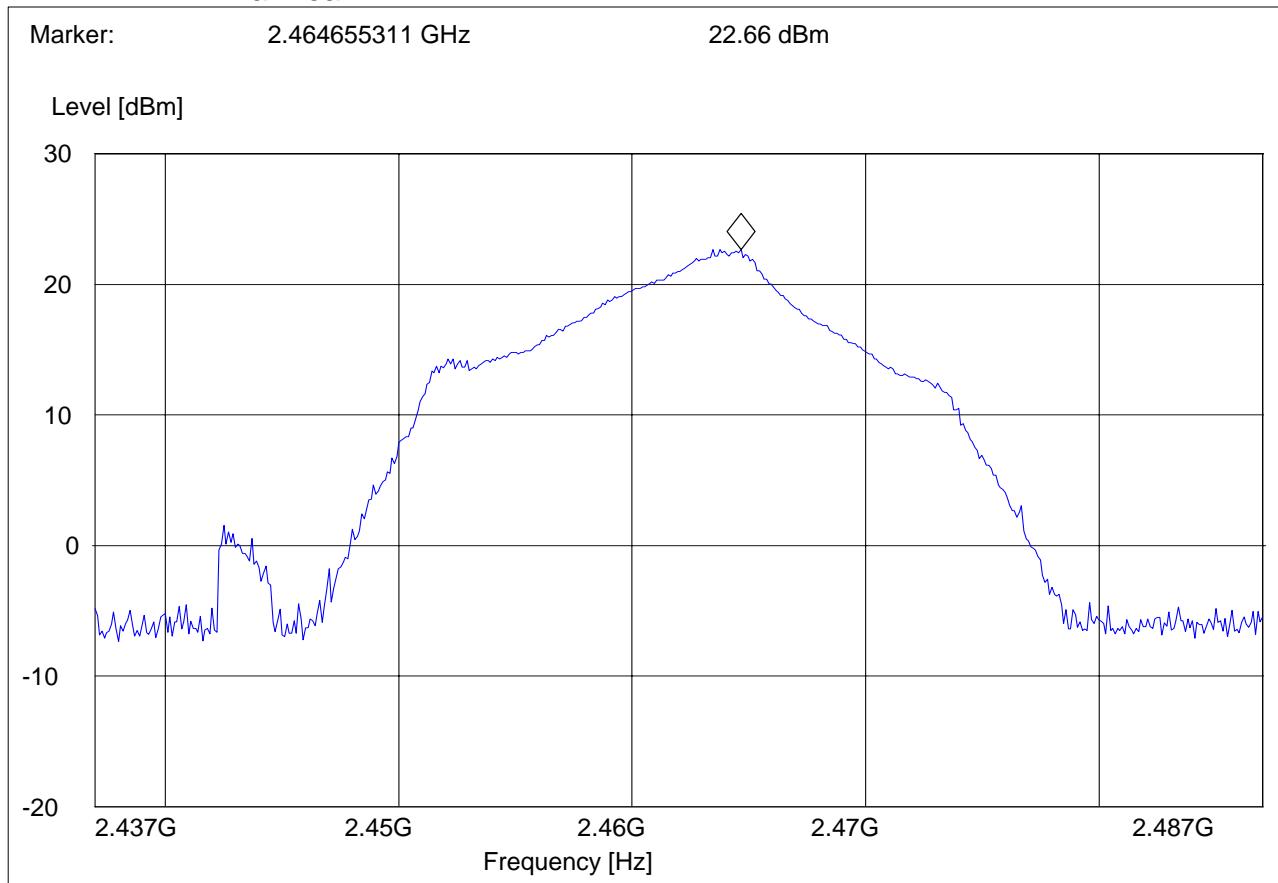


EIRP: 2462 MHz (802.11b)

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

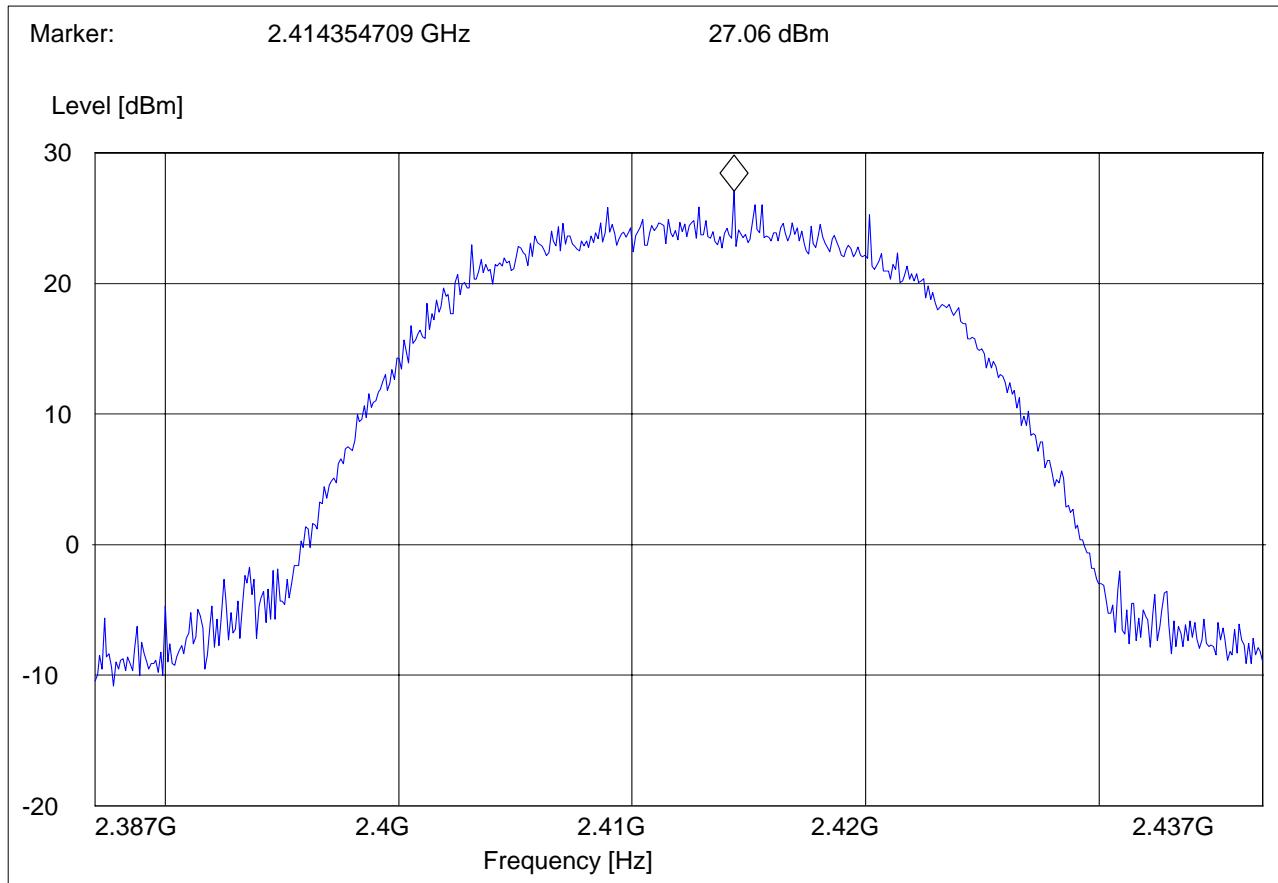


EIRP: 2412 MHz (802.11g)

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

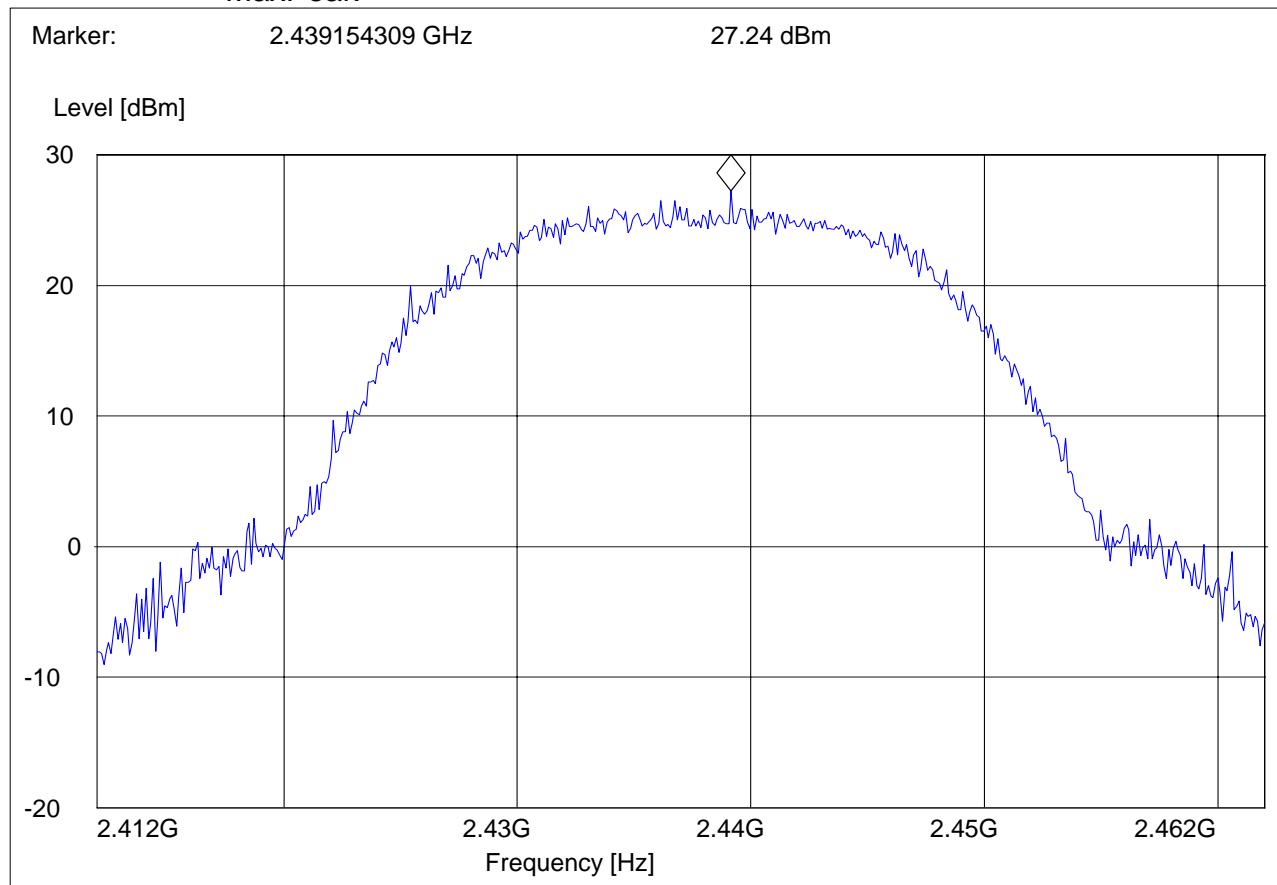


EIRP: 2437 MHz (802.11g)

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

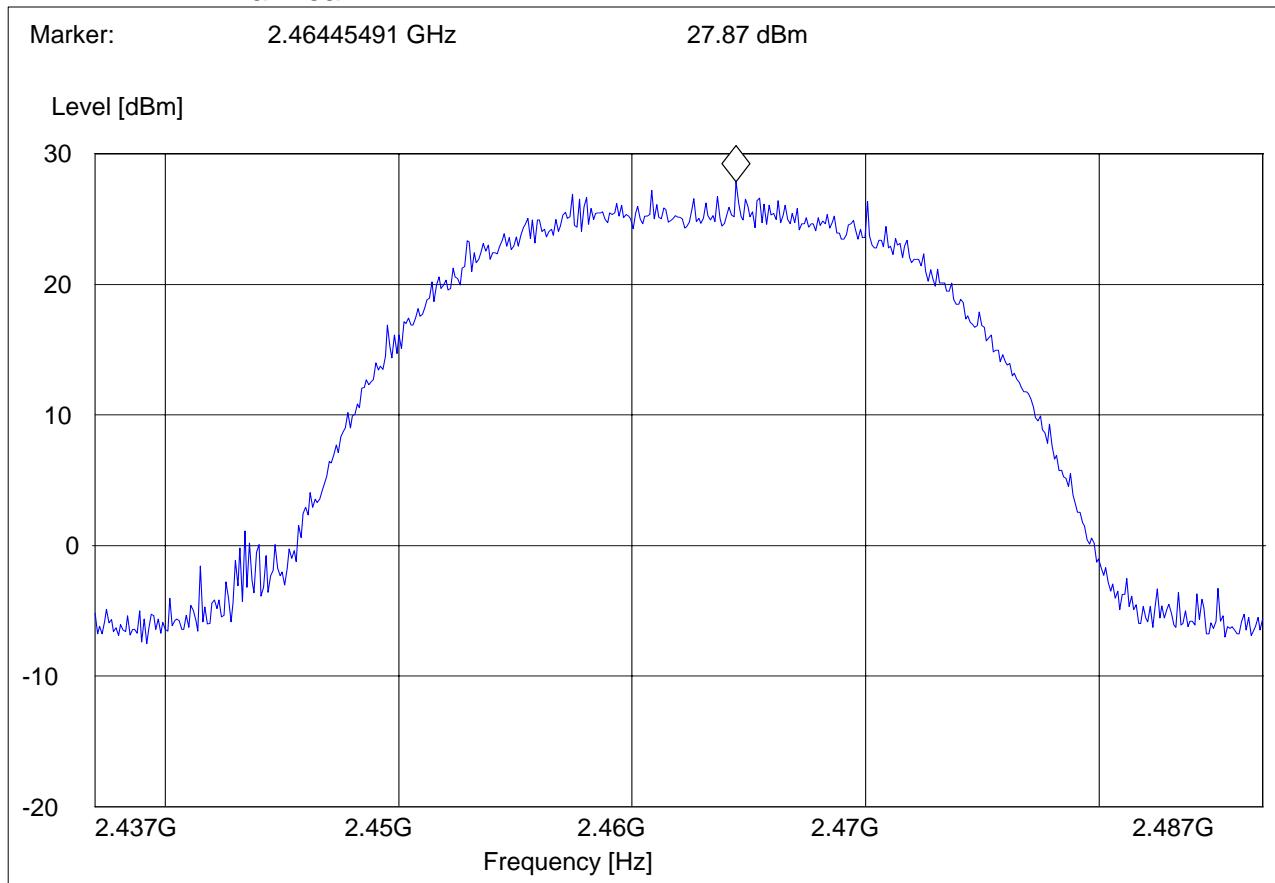


EIRP: 2462 MHz (802.11g)

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

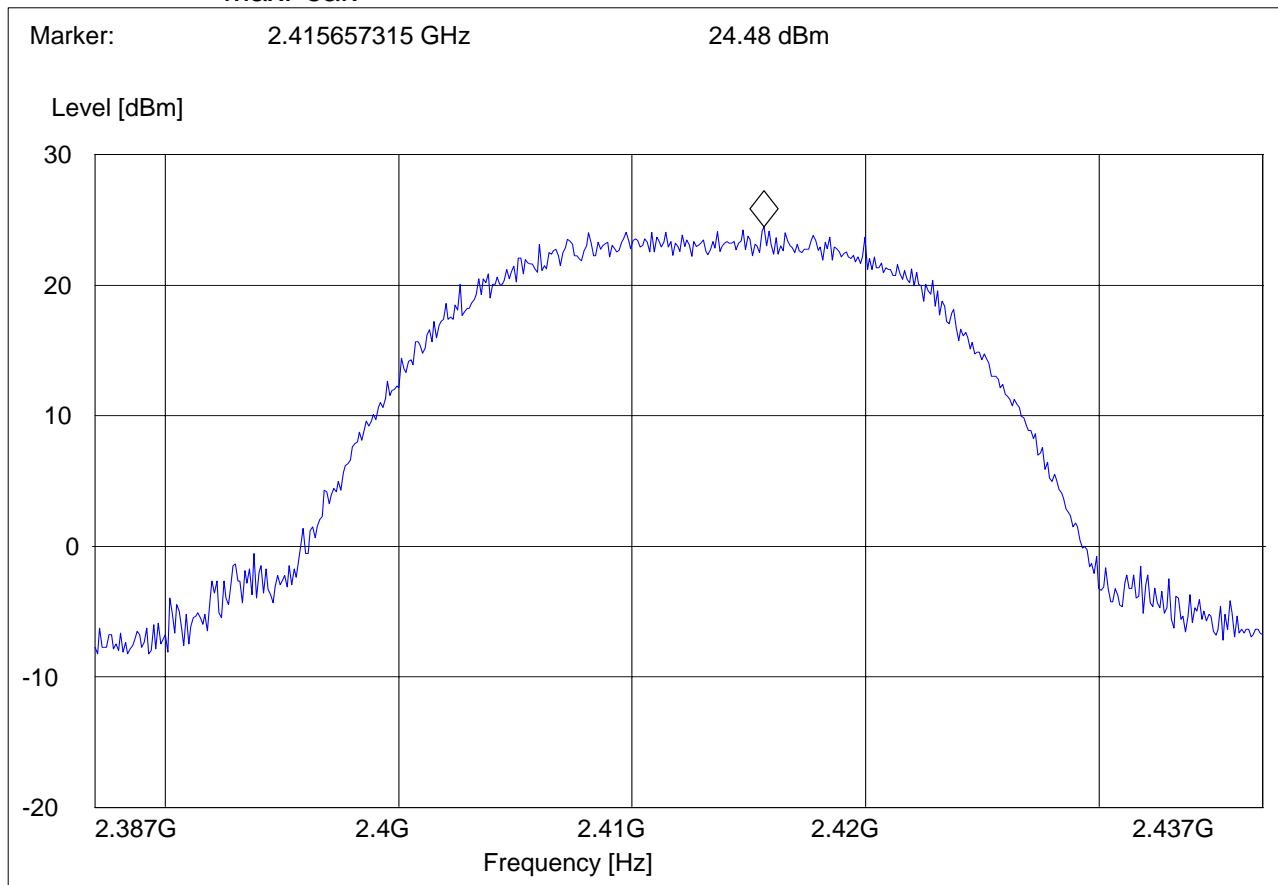


EIRP: 2412 MHz (802.11g)

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

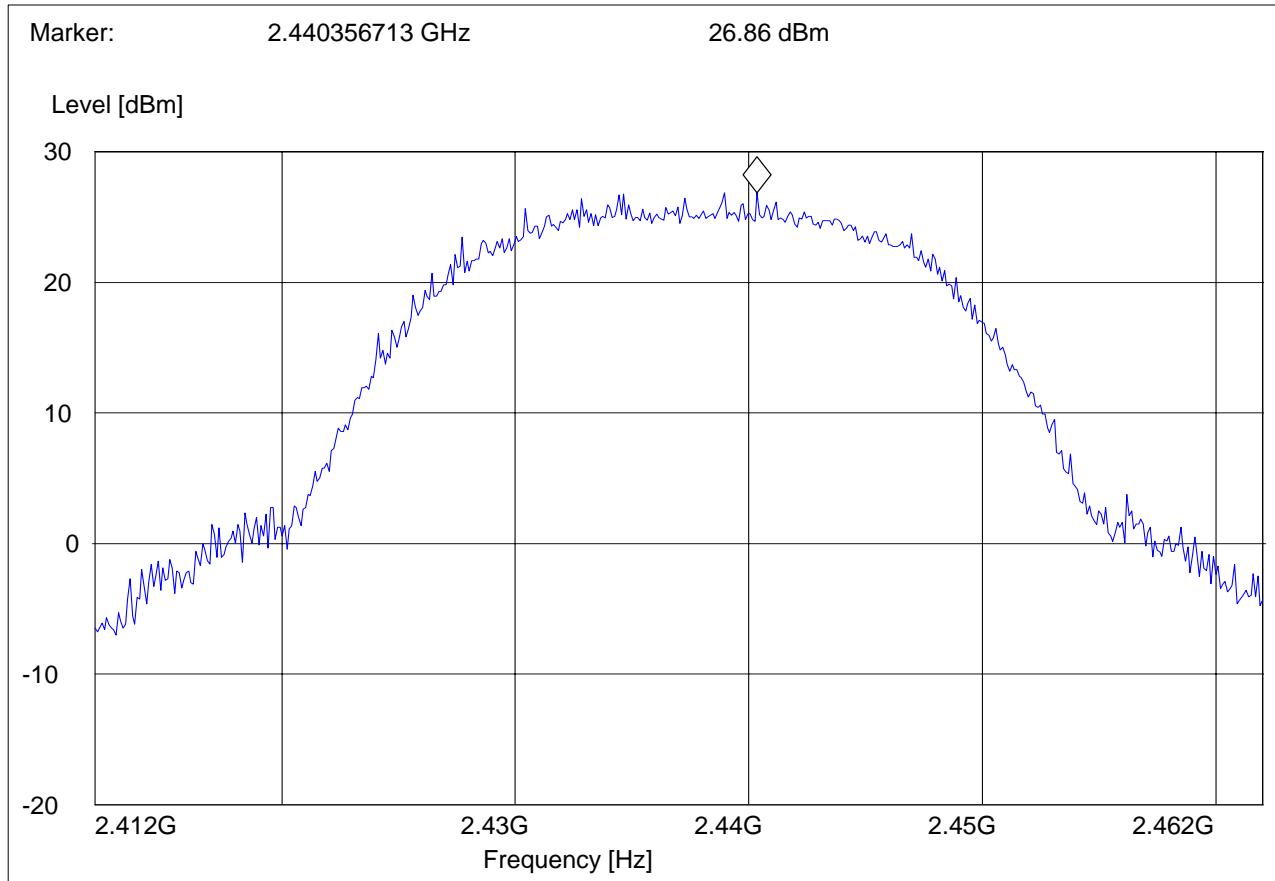


EIRP: 2437 MHz (802.11g)

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

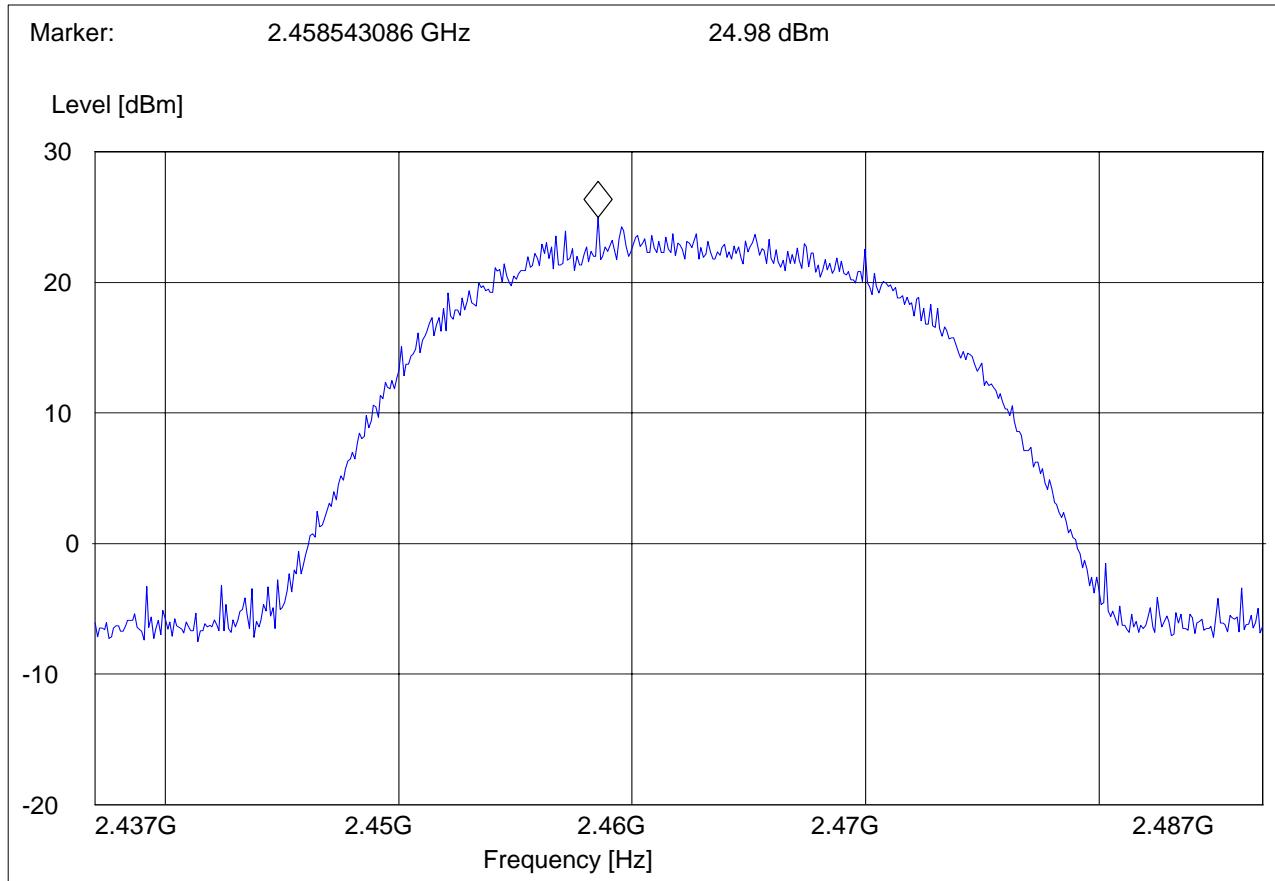


EIRP: 2462 MHz (802.11g)

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)

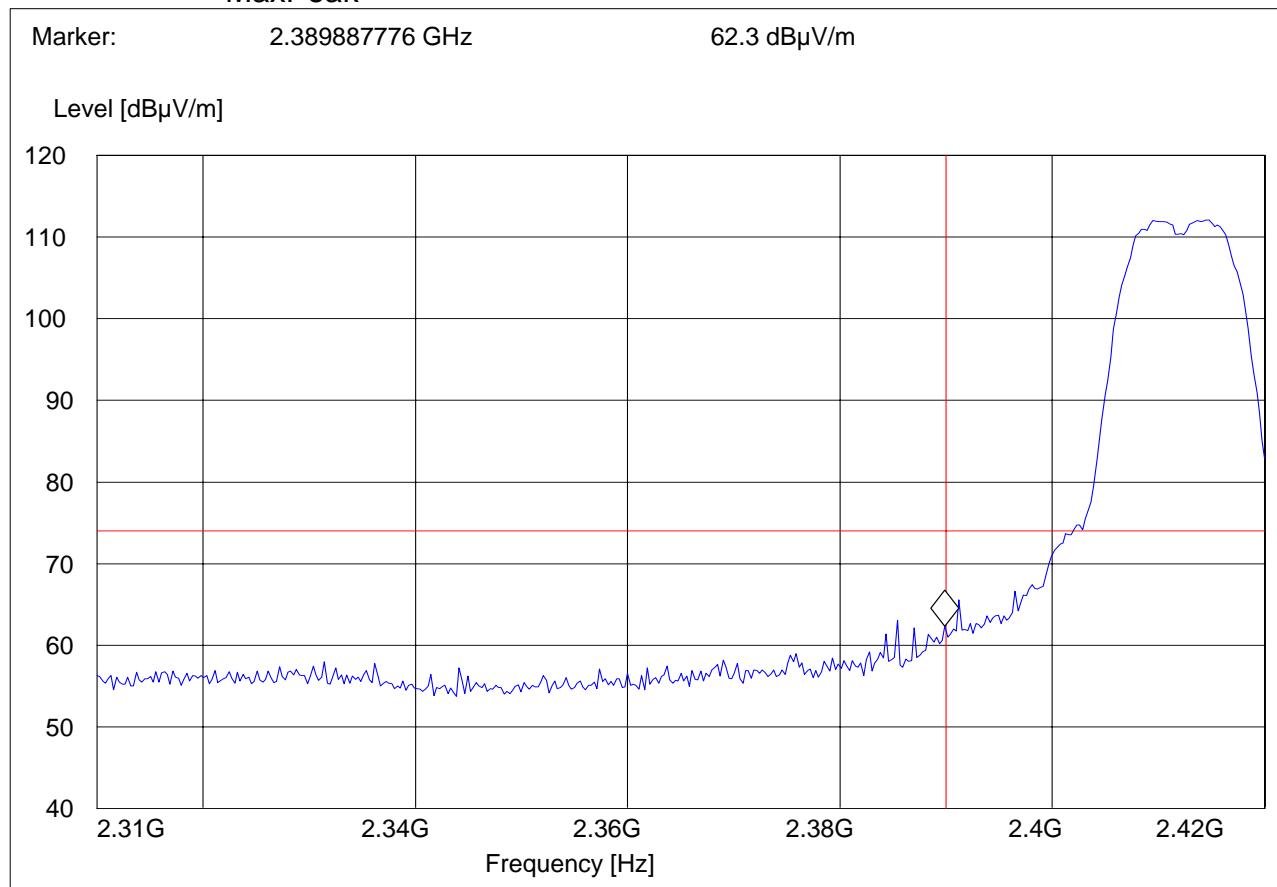
§15.247 (d) & RSS-210(A8.5)

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



BAND EDGE COMPLIANCE

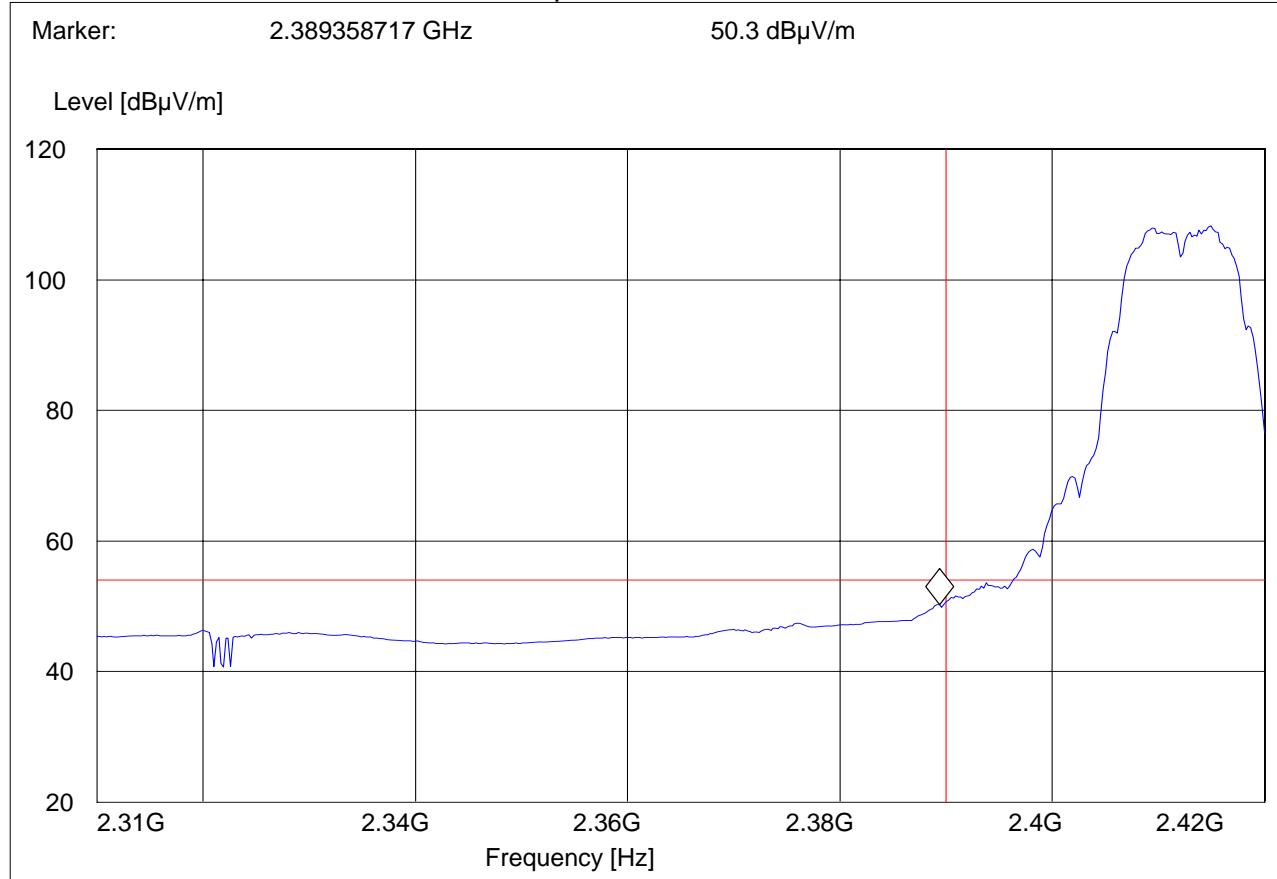
§15.247 (d) & RSS-210(A8.5)

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



BAND EDGE COMPLIANCE

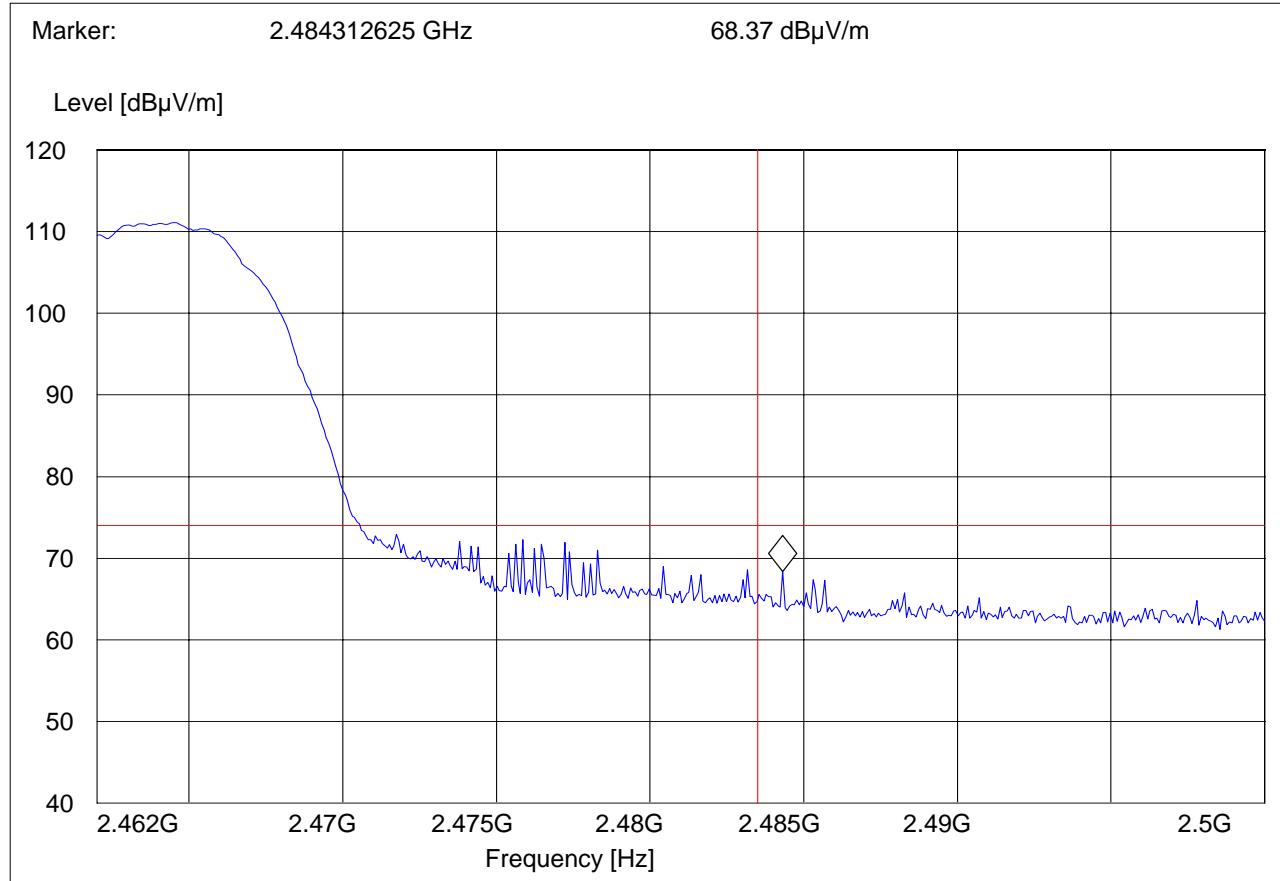
§15.247 (d) & RSS-210(A8.5)

802.11b 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 Frequency	Stop Frequency	Detector Meas.	IF Time	Transducer Bandw.
2.5 GHz	2.5 GHz	MaxPeak	Coupled	1 MHz #326horn_AF_vert
		MaxPeak		



BAND EDGE COMPLIANCE

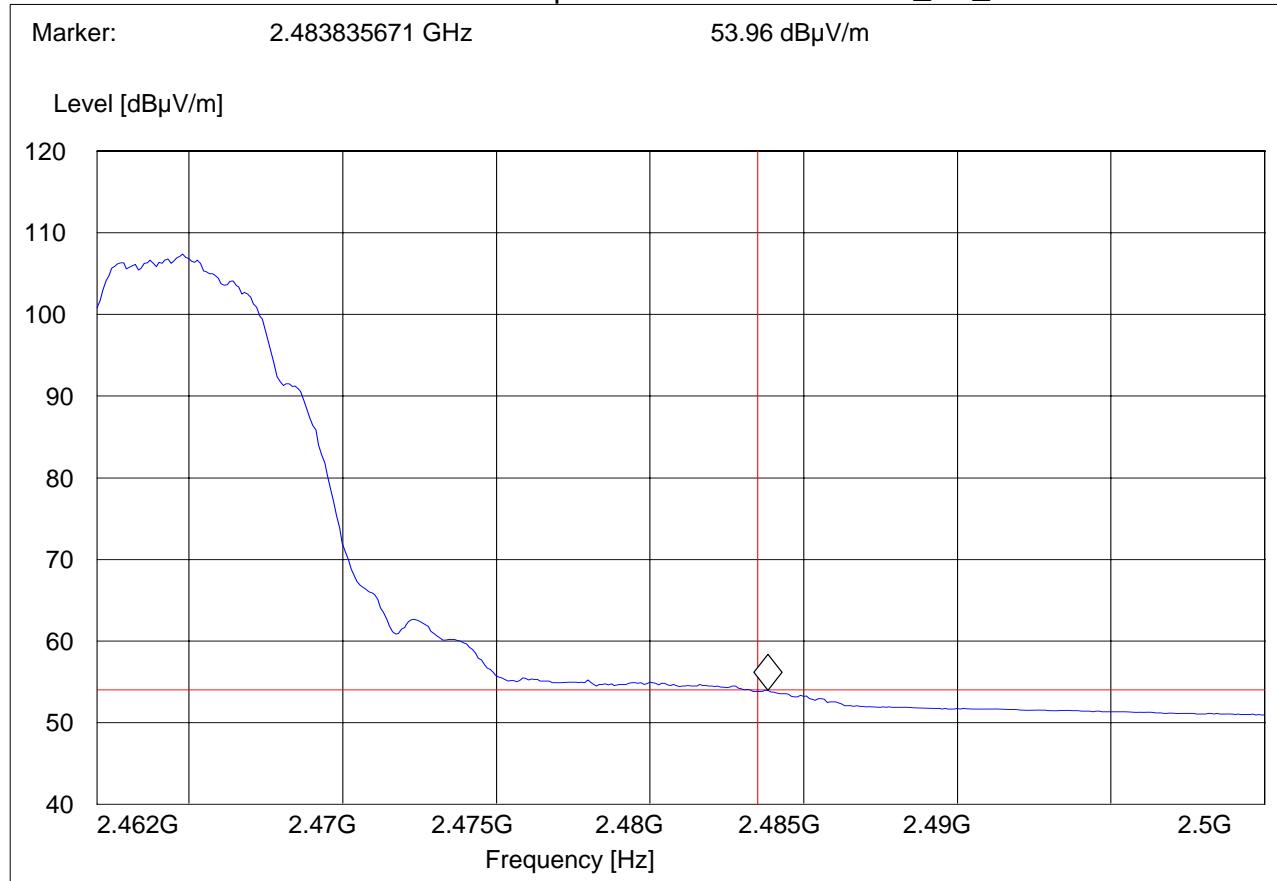
§15.247 (d) & RSS-210(A8.5)

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



Test Report #:

EMC_BROAD_051_08001_G_DTS

Date of Report:

March 18, 2008

Page 25 of 66

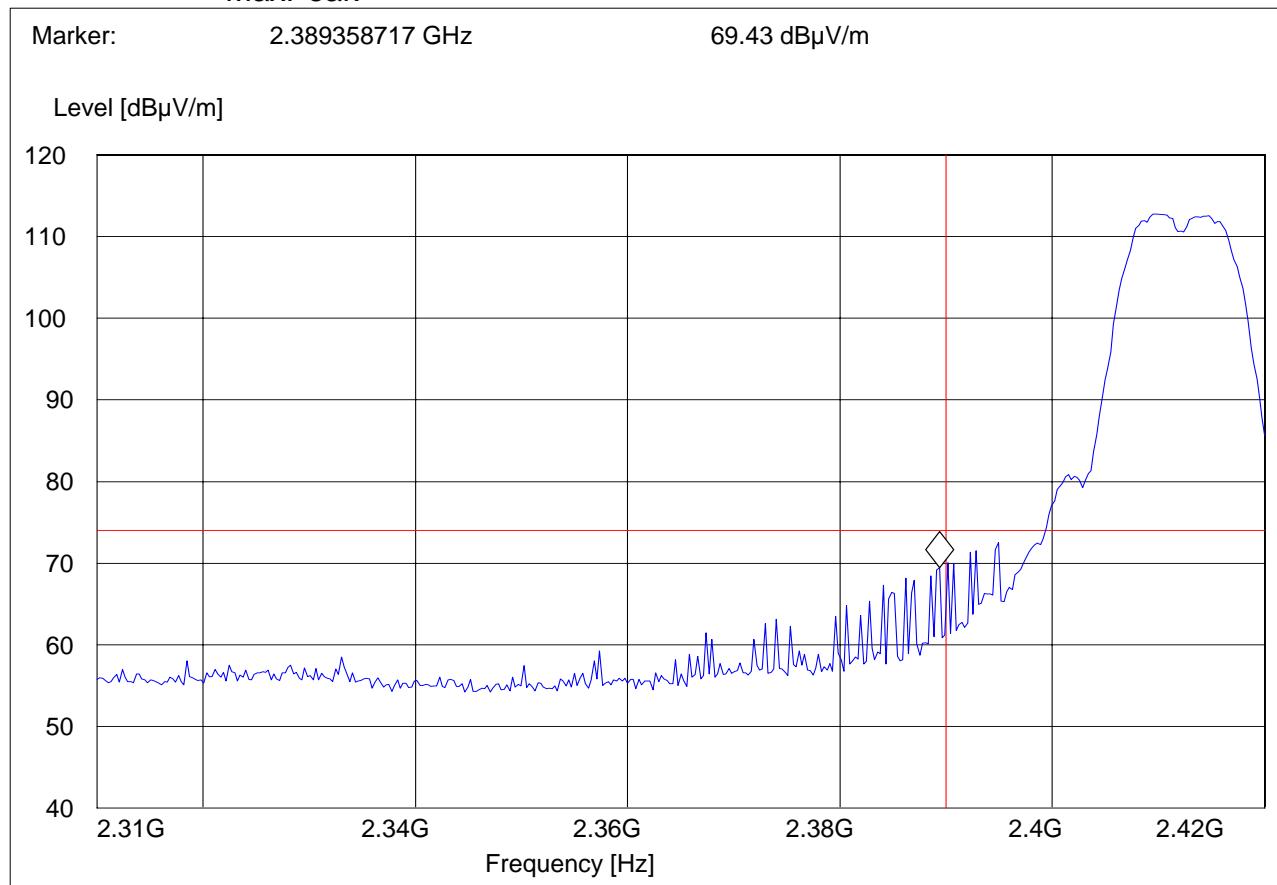


802.11b Low frequency section (spurious in the restricted band 2310 – 2390 MHz)

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 Frequency	Stop Frequency	Detector Meas.	IF Time	Transducer 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)

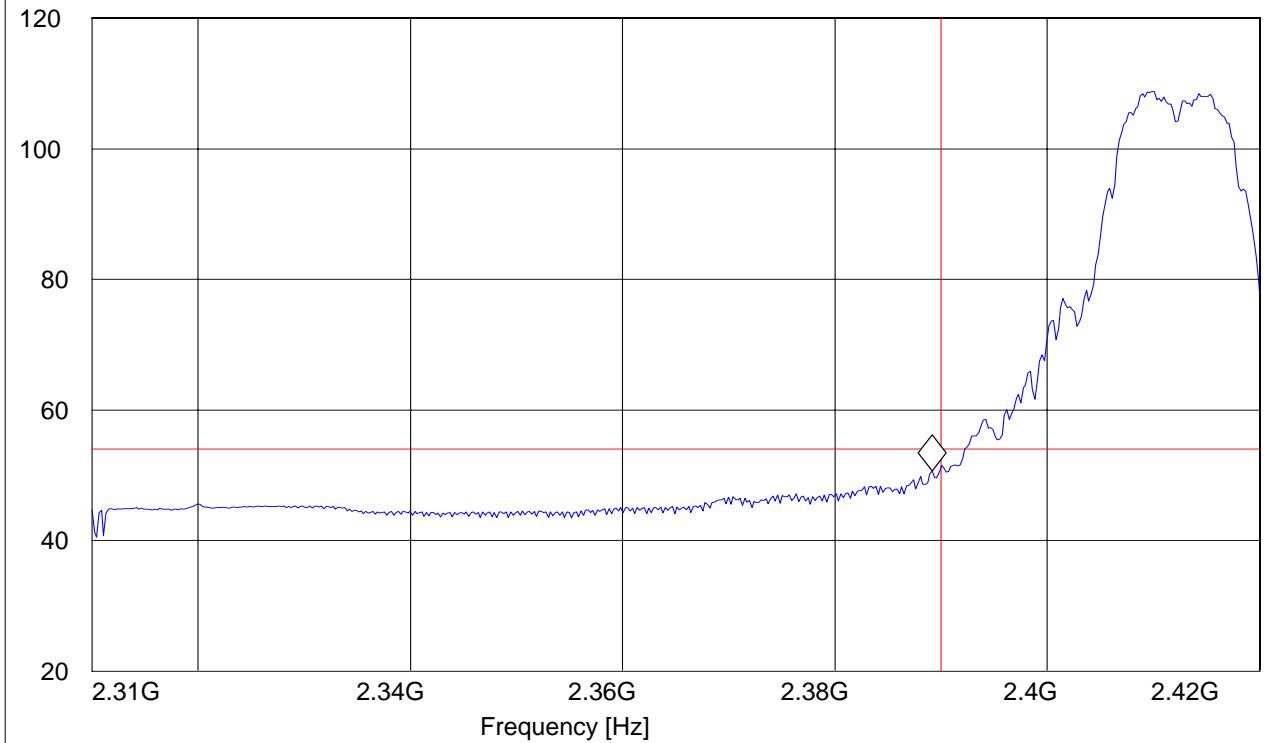
EUT: 94312MCG
Customer: Broadcom
Test Mode: 802.11b Ch.1, Aux Yageo
ANT Orientation: H
EUT Orientation: H
Test Engineer: SAM
Voltage: AC Adapter

SWEEP TABLE: "FCC15.247 LBE_AVG"

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

Marker: 2.389138277 GHz 50.64 dB μ V/m

Level [dB μ V/m]



BAND EDGE COMPLIANCE

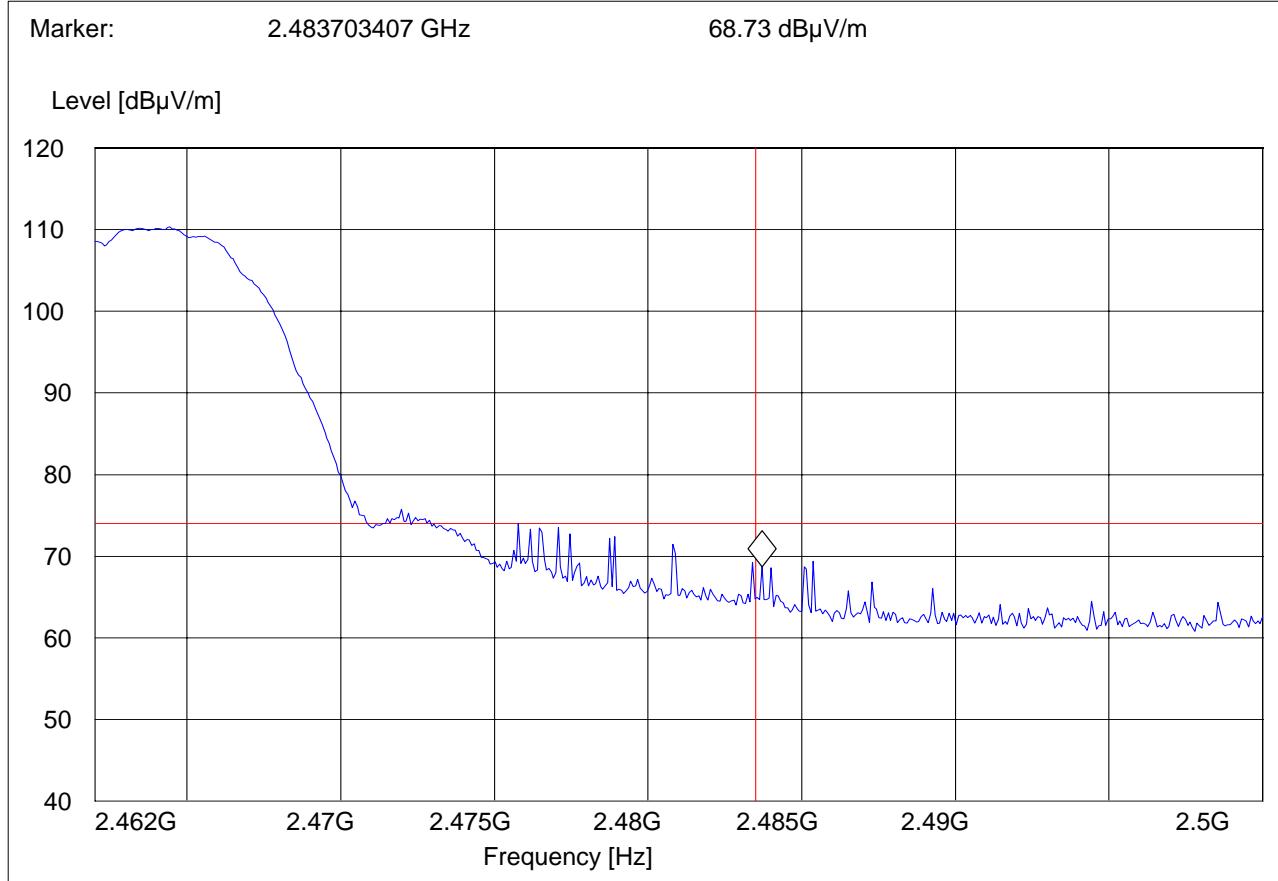
§15.247 (d) & RSS-210(A8.5)

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

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



BAND EDGE COMPLIANCE

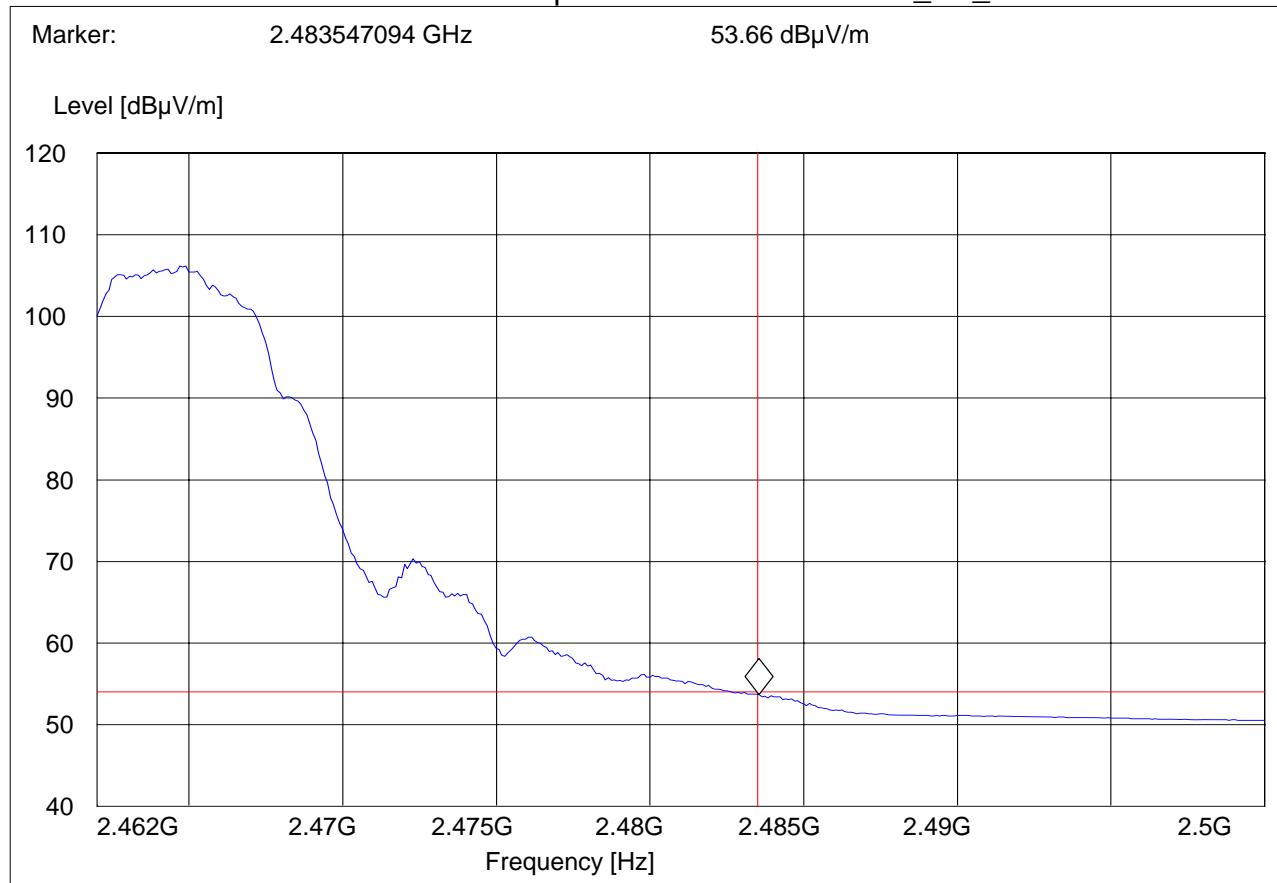
§15.247 (d) & RSS-210(A8.5)

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



4.3 BAND EDGE COMPLIANCE (802.11g)

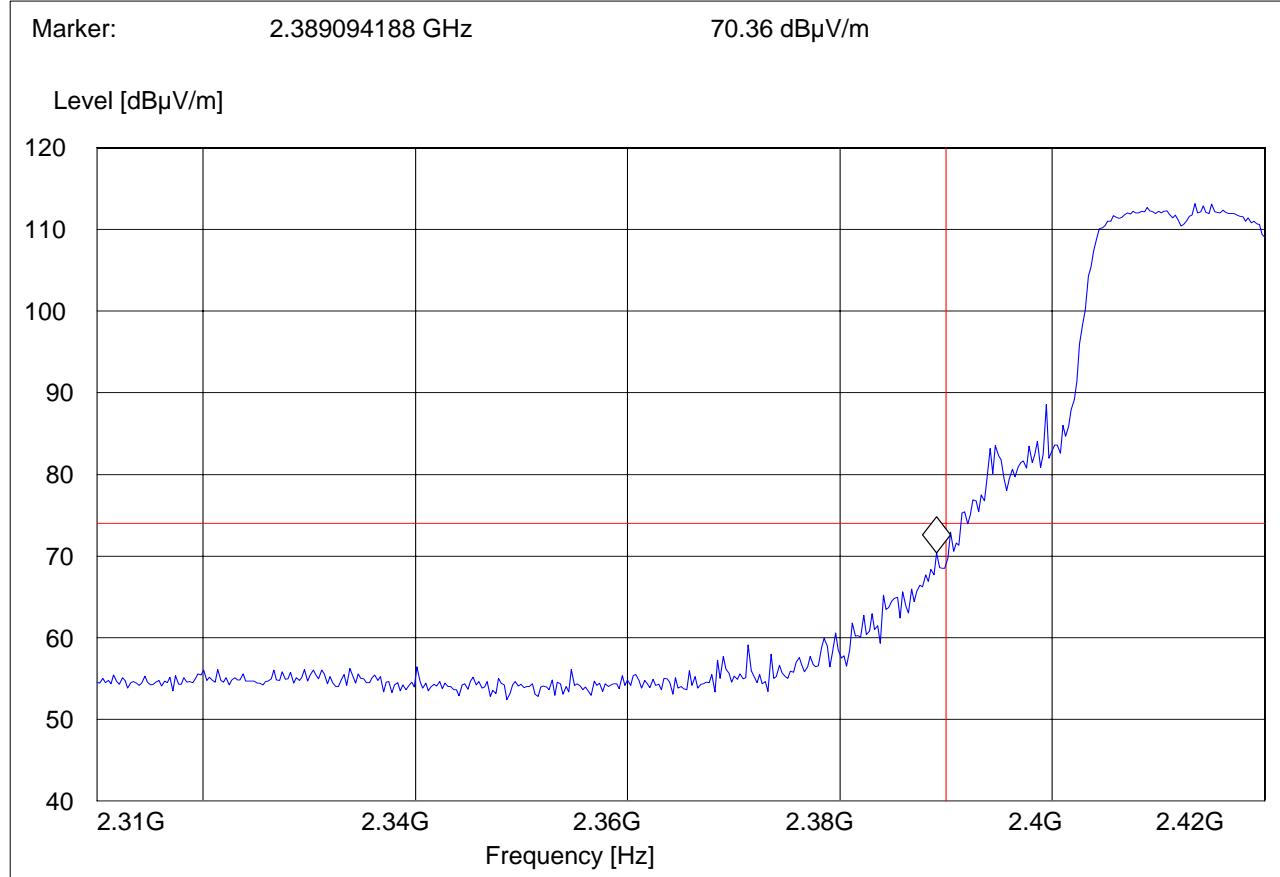
§15.247 (d) & RSS-210(A8.5)

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 Frequency	Stop Frequency	Detector Meas.	IF Time	Transducer 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)

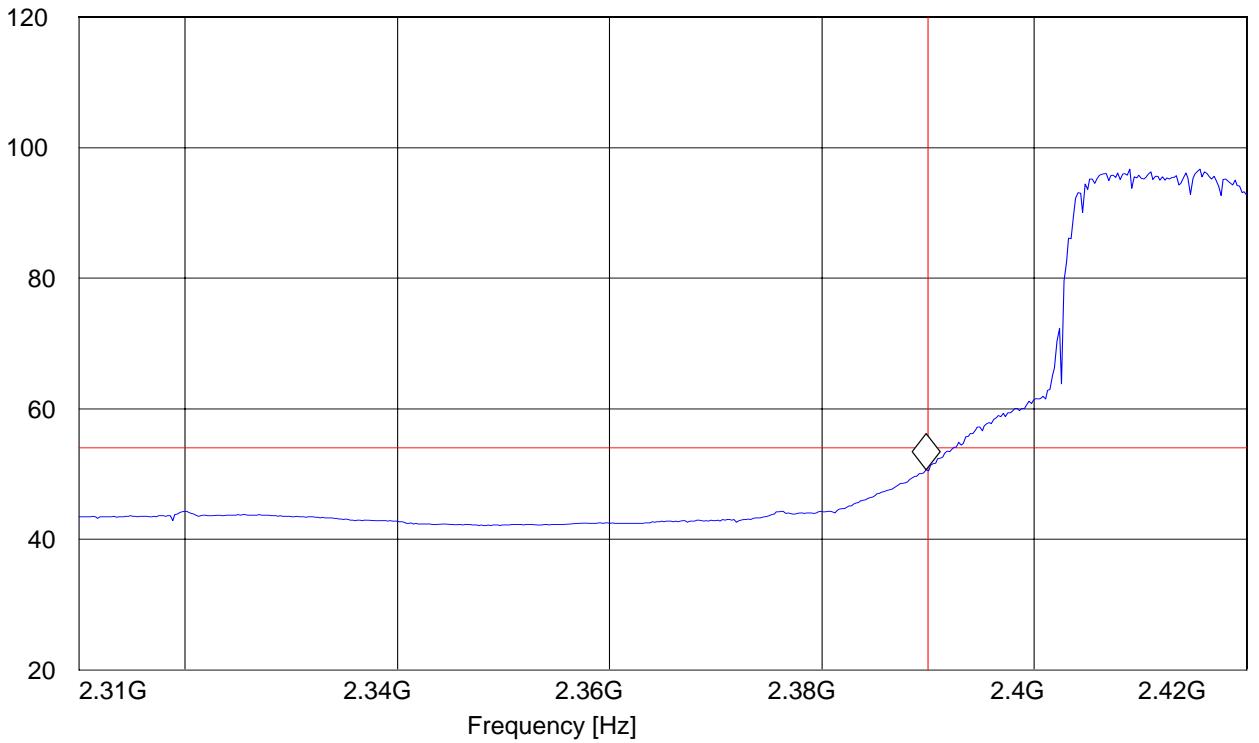
EUT: 94312MCG
Customer: Broadcom
Test Mode: 802.11g Ch.1, Aux WNC
ANT Orientation: H
EUT Orientation: H
Test Engineer: Chris
Voltage: AC Adapter

SWEEP TABLE: "FCC15.247 LBE_AVG"

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

Marker: 2.389799599 GHz 50.65 dB μ V/m

Level [dB μ V/m]



BAND EDGE COMPLIANCE

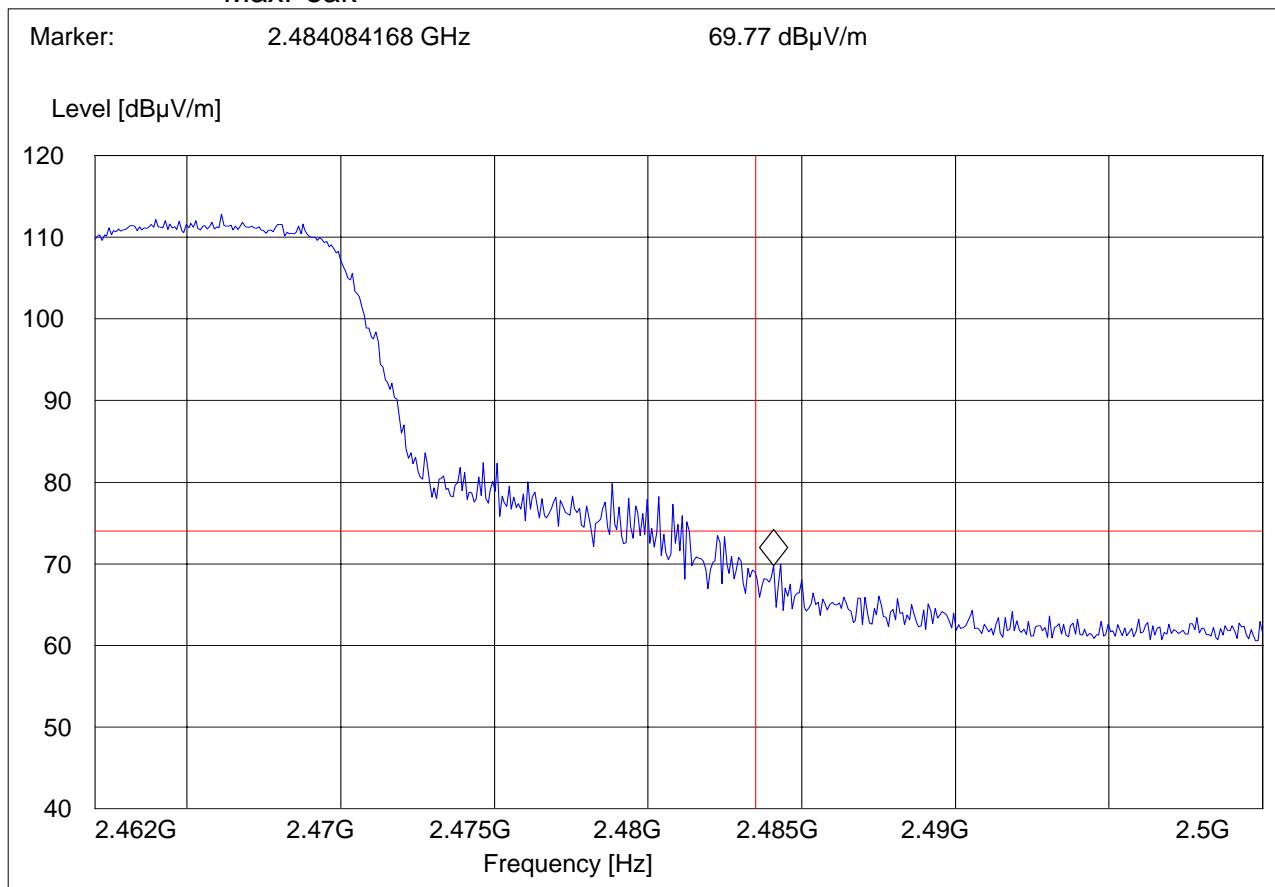
§15.247 (d) & RSS-210(A8.5)

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

EUT: 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.	IF Time	Transducer Bandw.
2.5 GHz	2.5 GHz	MaxPeak	Coupled	1 MHz #326horn_AF_vert
		MaxPeak		



BAND EDGE COMPLIANCE

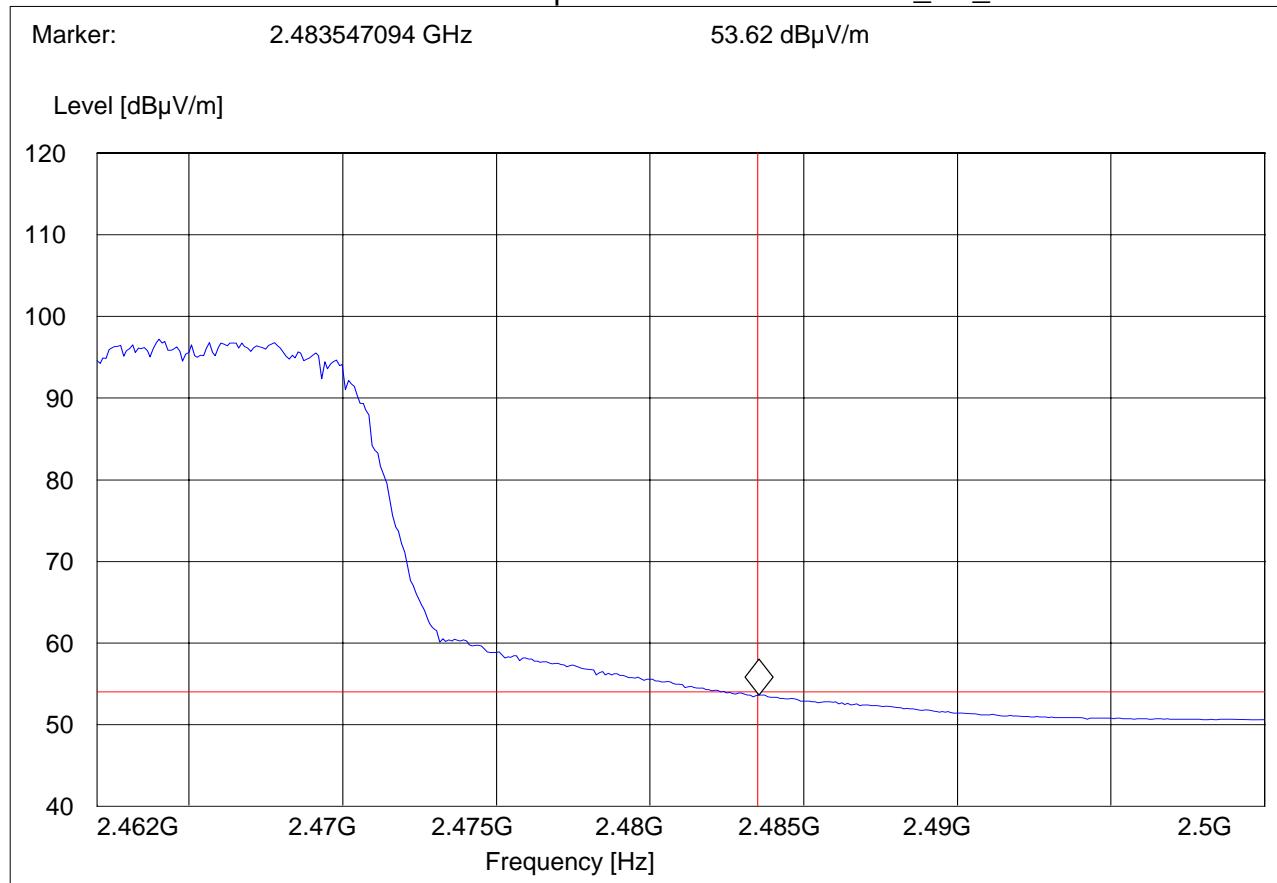
§15.247 (d) & RSS-210(A8.5)

802.11g 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



BAND EDGE COMPLIANCE

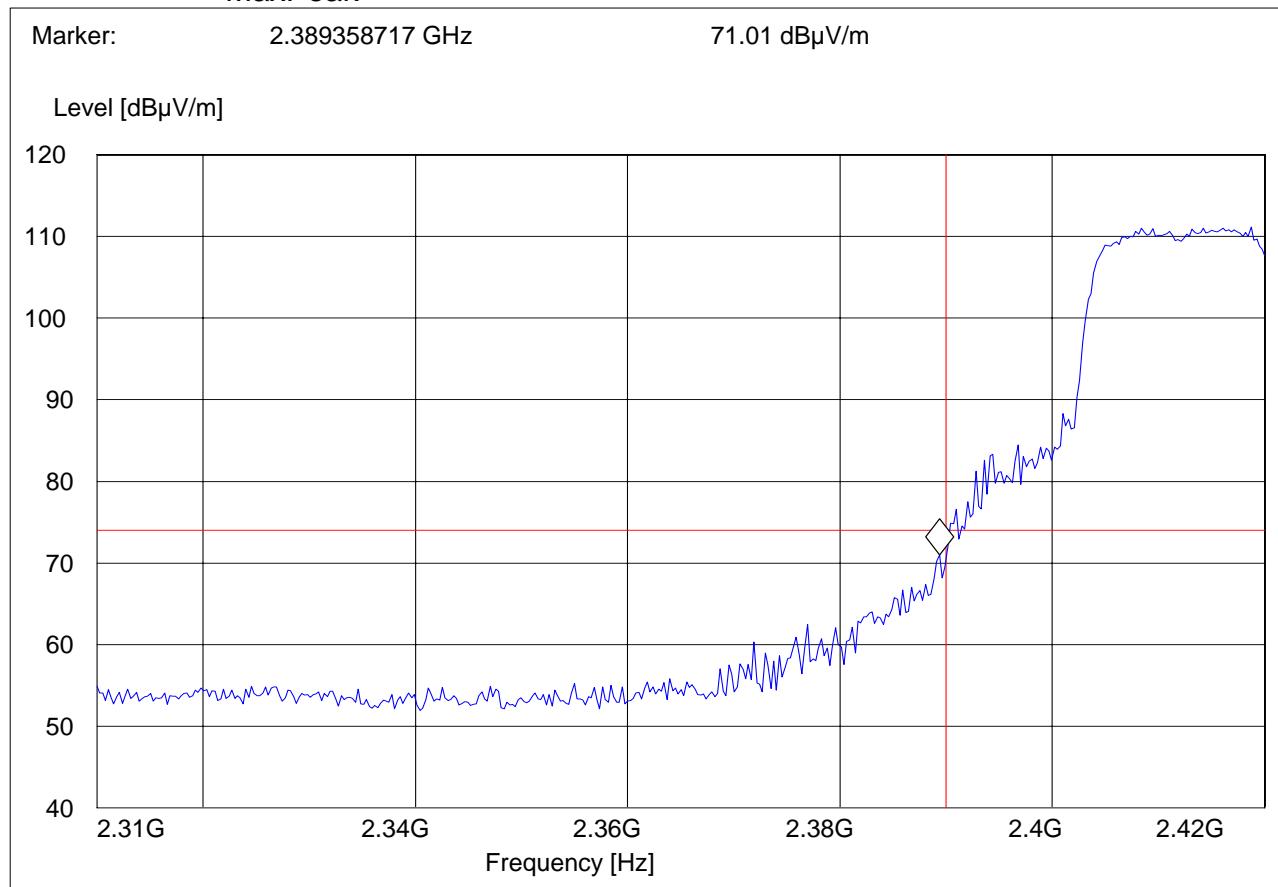
§15.247 (d) & RSS-210(A8.5)

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



Test Report #:

EMC_BROAD_051_08001_G_DTS

Date of Report:

March 18, 2008

Page 35 of 66



BAND EDGE COMPLIANCE

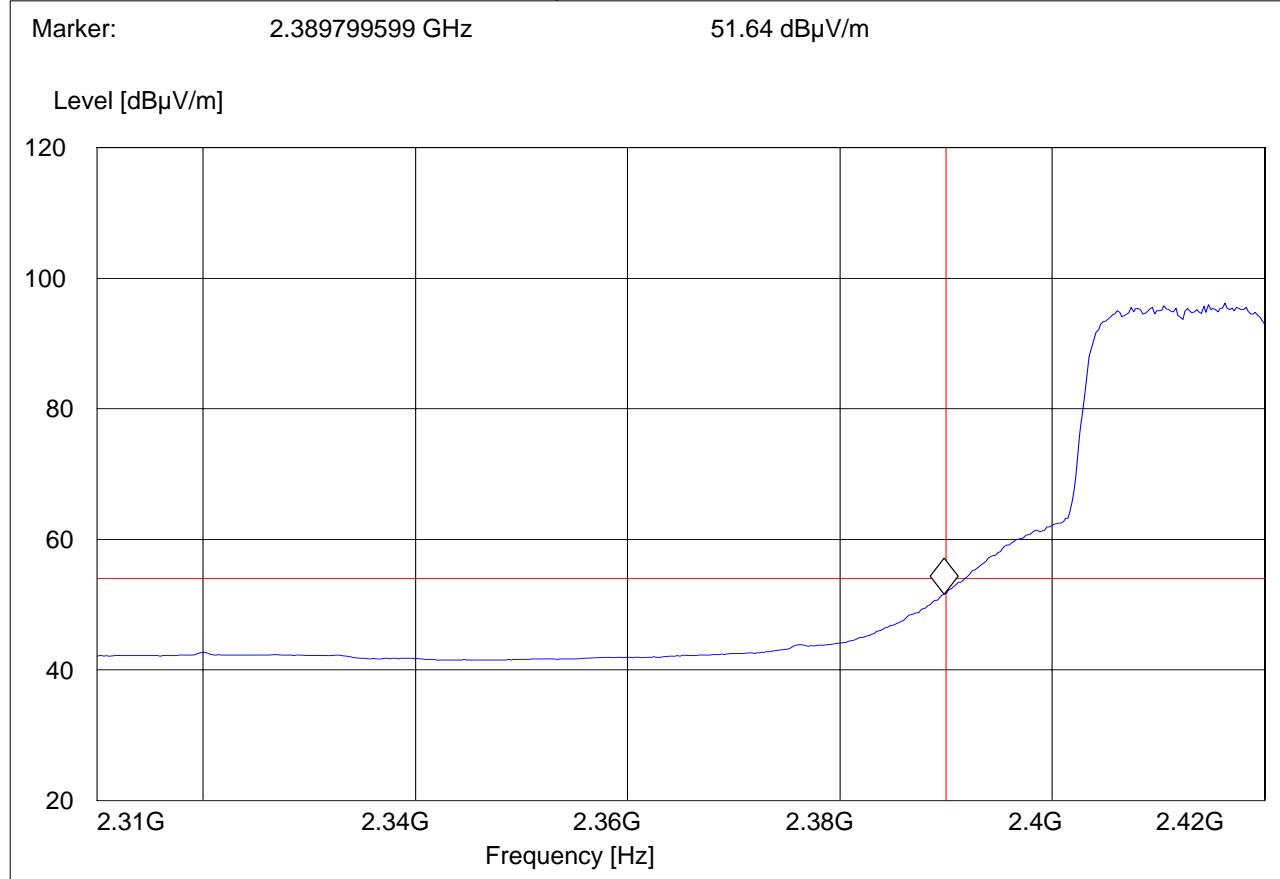
§15.247 (d) & RSS-210(A8.5)

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



BAND EDGE COMPLIANCE

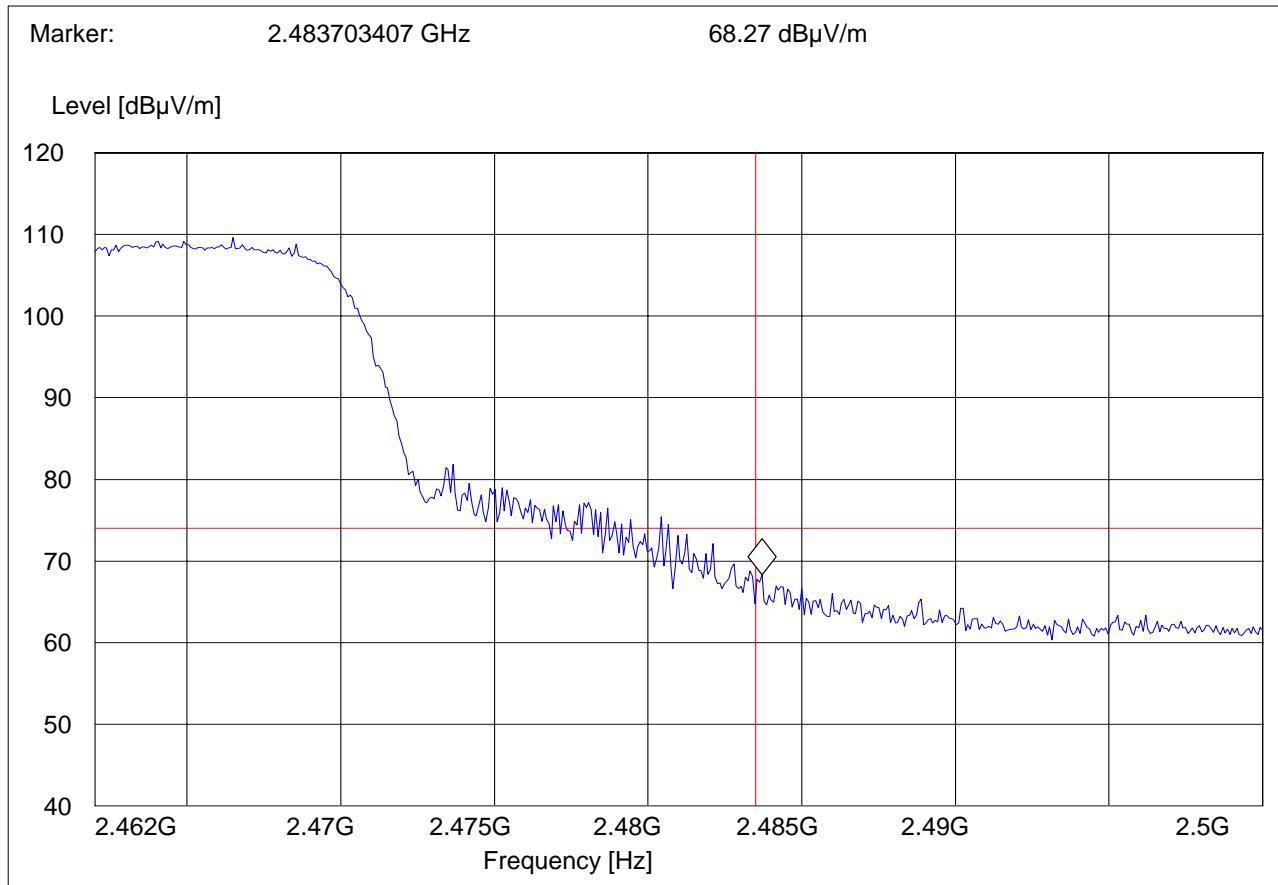
§15.247 (d) & RSS-210(A8.5)

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



Test Report #:

EMC_BROAD_051_08001_G_DTS

Date of Report:

March 18, 2008

Page 38 of 66

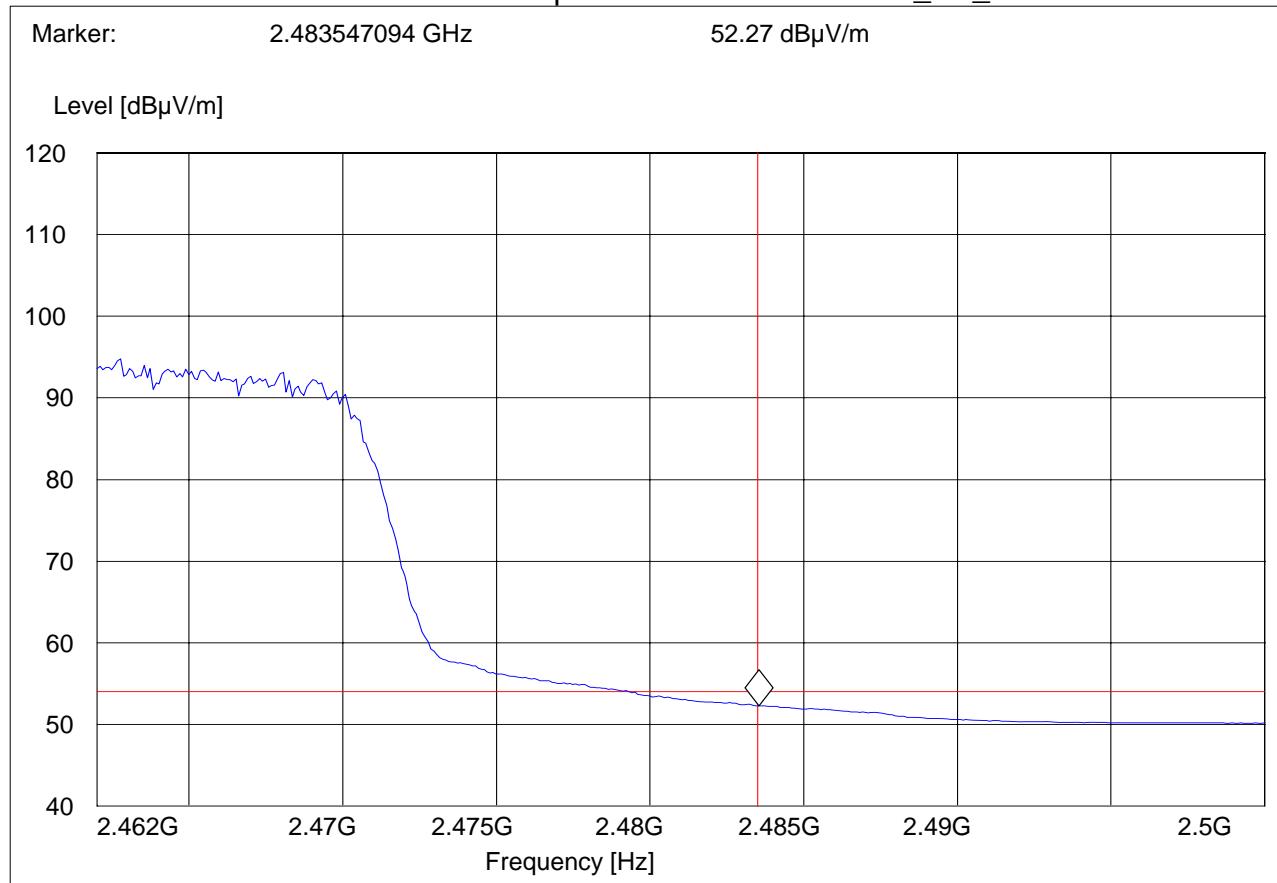


802.11g High frequency section (spurious in the restricted band 2483.5 – 2500 MHz)

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



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)

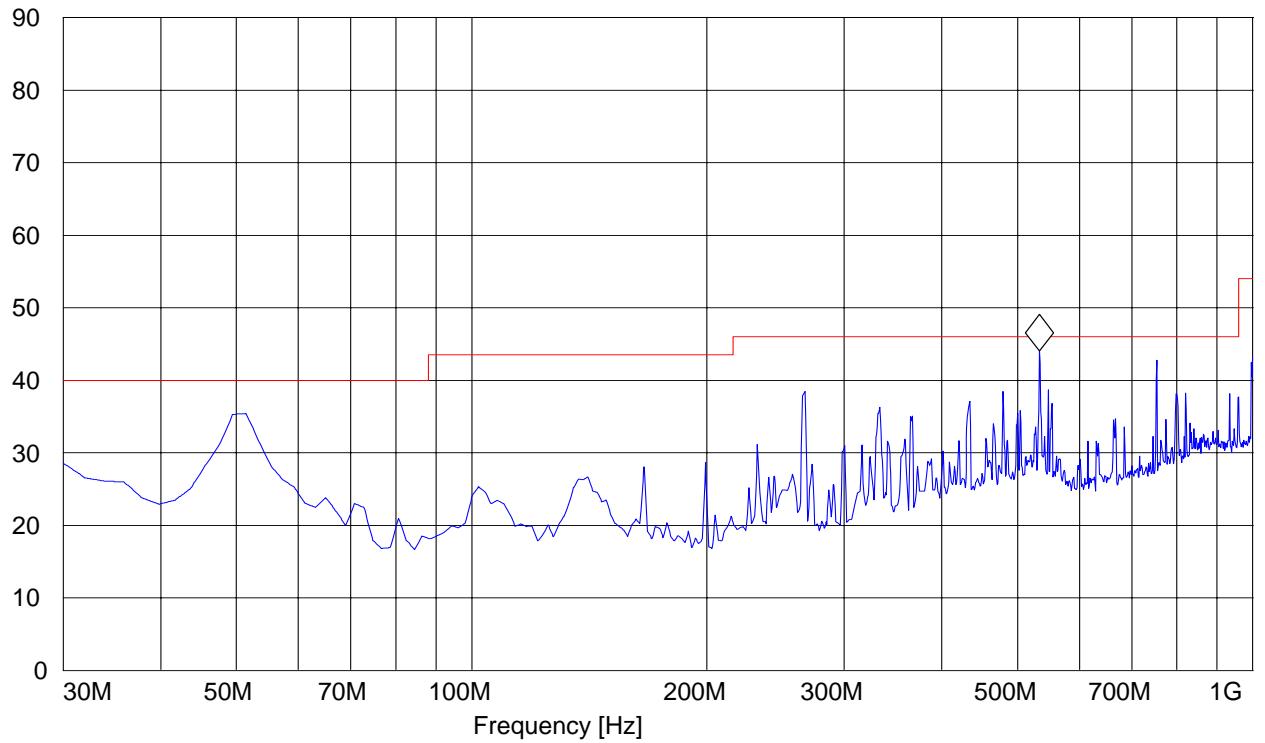
EUT: 94312MCG
Customer: Broadcom
Test Mode: 802.11b and g Ch.6, Aux WNC
ANT Orientation: V
EUT Orientation: H
Test Engineer: Sam
Voltage: AC Adapter

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

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

Marker: 533.466934 MHz 44.07 dB μ V/m

Level [dB μ V/m]

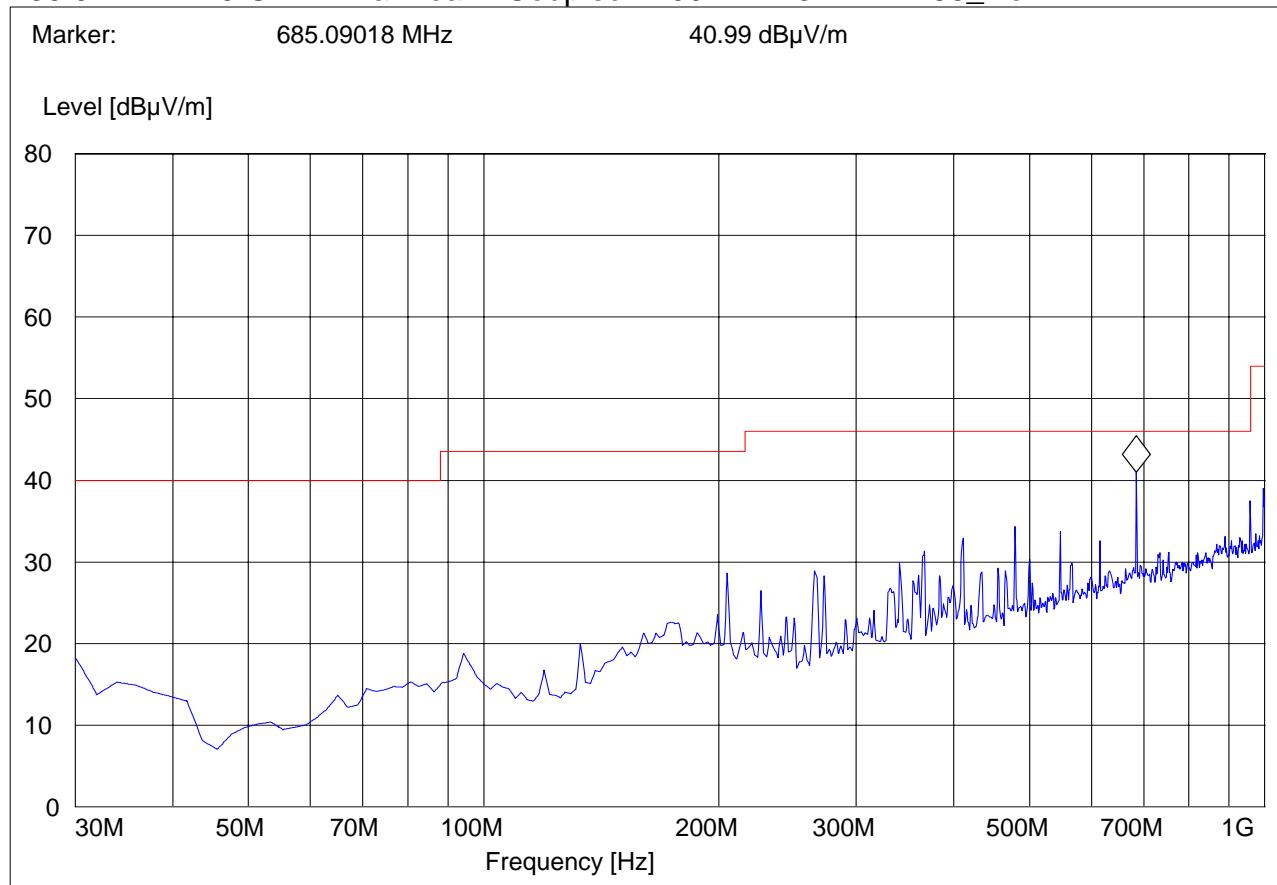


EMISSION LIMITATIONS - Radiated (Transmitter) §15.247 (d) & RSS-210(A8.5)
Lowest Channel (2412MHz): 30MHz – 1GHz

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

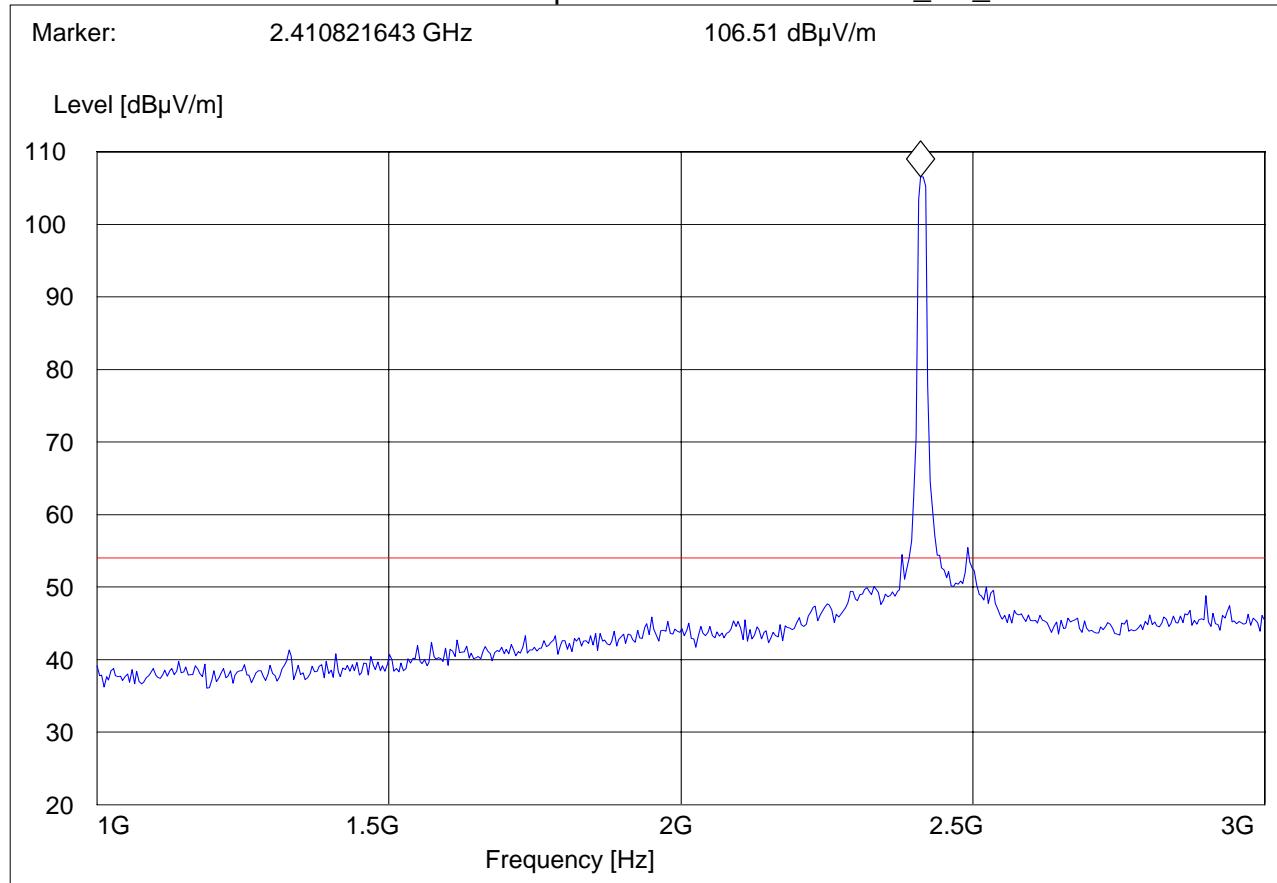


EMISSION LIMITATIONS - Radiated (Transmitter) §15.247 (d) & RSS-210(A8.5)
Lowest Channel (2412MHz): 1GHz – 18GHz

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



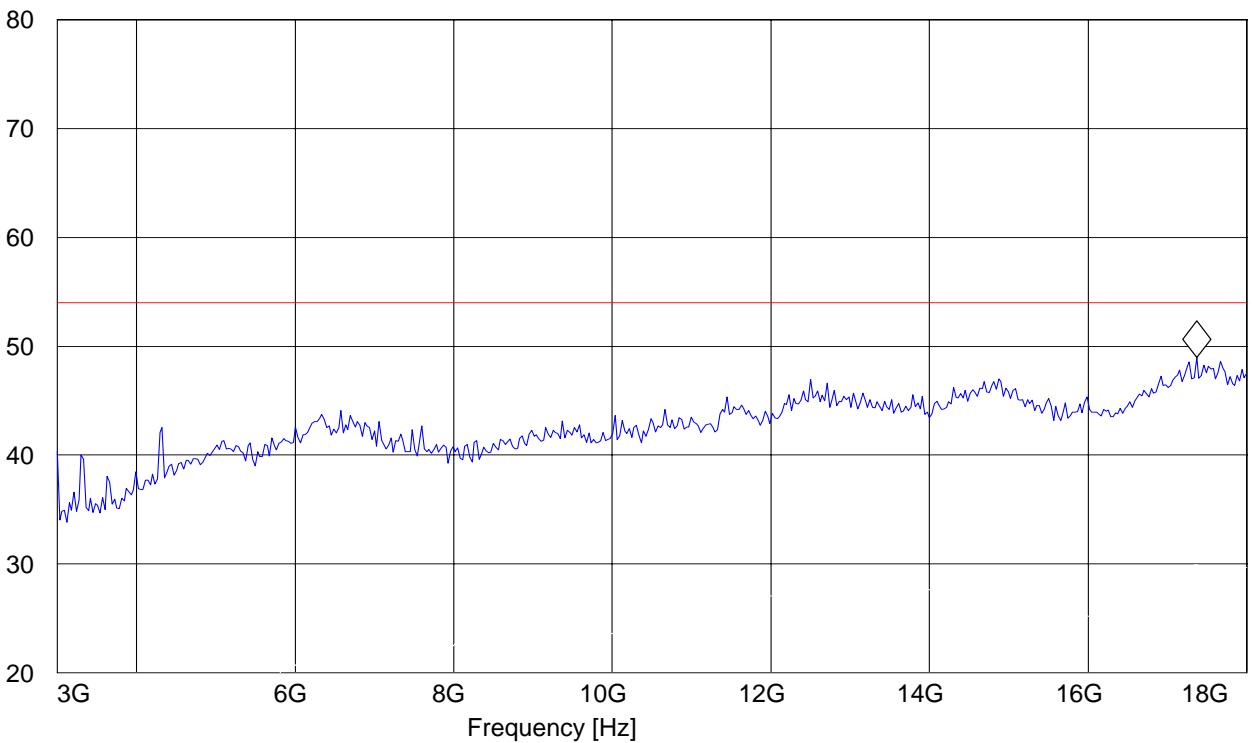
EUT: 94312MCG
Customer: Broadcom
Test Mode: 802.11b Ch.1, Aux WNC
ANT Orientation: H
EUT Orientation: H
Test Engineer: Sam
Voltage: AC Adapter

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

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

Marker: 17.368737475 GHz 48.95 dB μ V/m

Level [dB μ V/m]



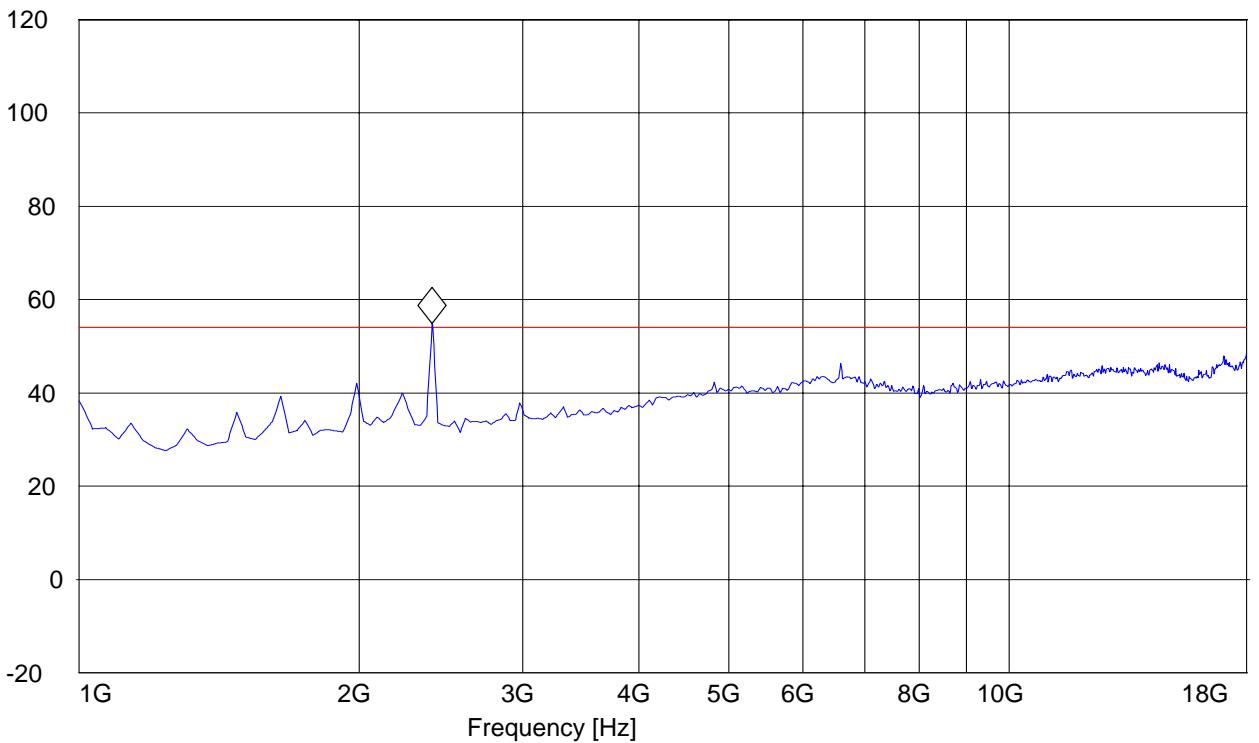
EUT / Description: 94312MCG
Manufacturer: Broadcom
Operation Mode: 802.11b Ch.1, Aux Yageo
ANT Orientation: : H
EUT Orientation: H
Test Engineer: SAM
Voltage: AC Adapter
Comments: marker on TX signal

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

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

Marker: 2.396793587 GHz 54.93 dB μ V/m

Level [dB μ V/m]

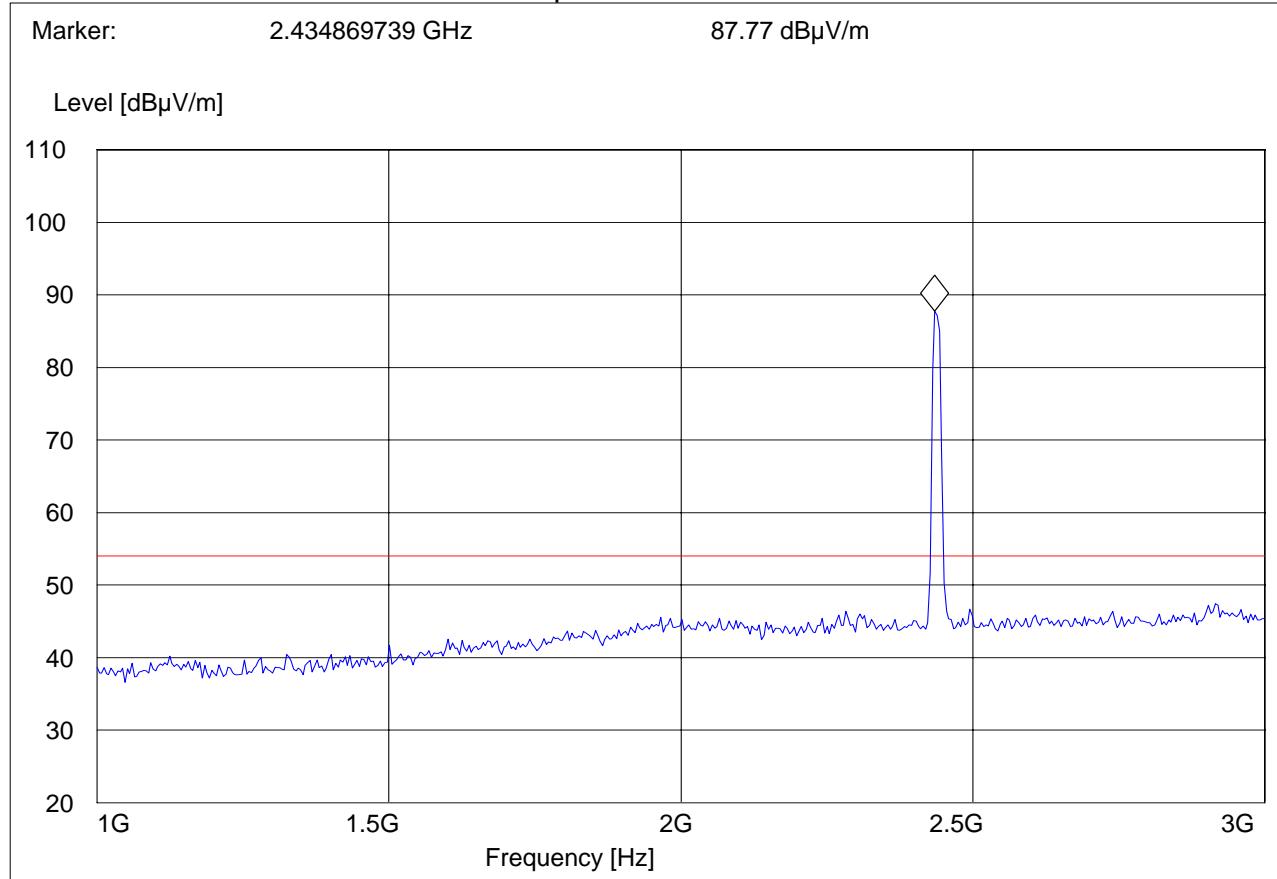


EMISSION LIMITATIONS - Radiated (Transmitter) §15.247 (d) & RSS-210(A8.5)
Mid Channel (2437MHz): 1GHz – 18GHz

EUT: 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"

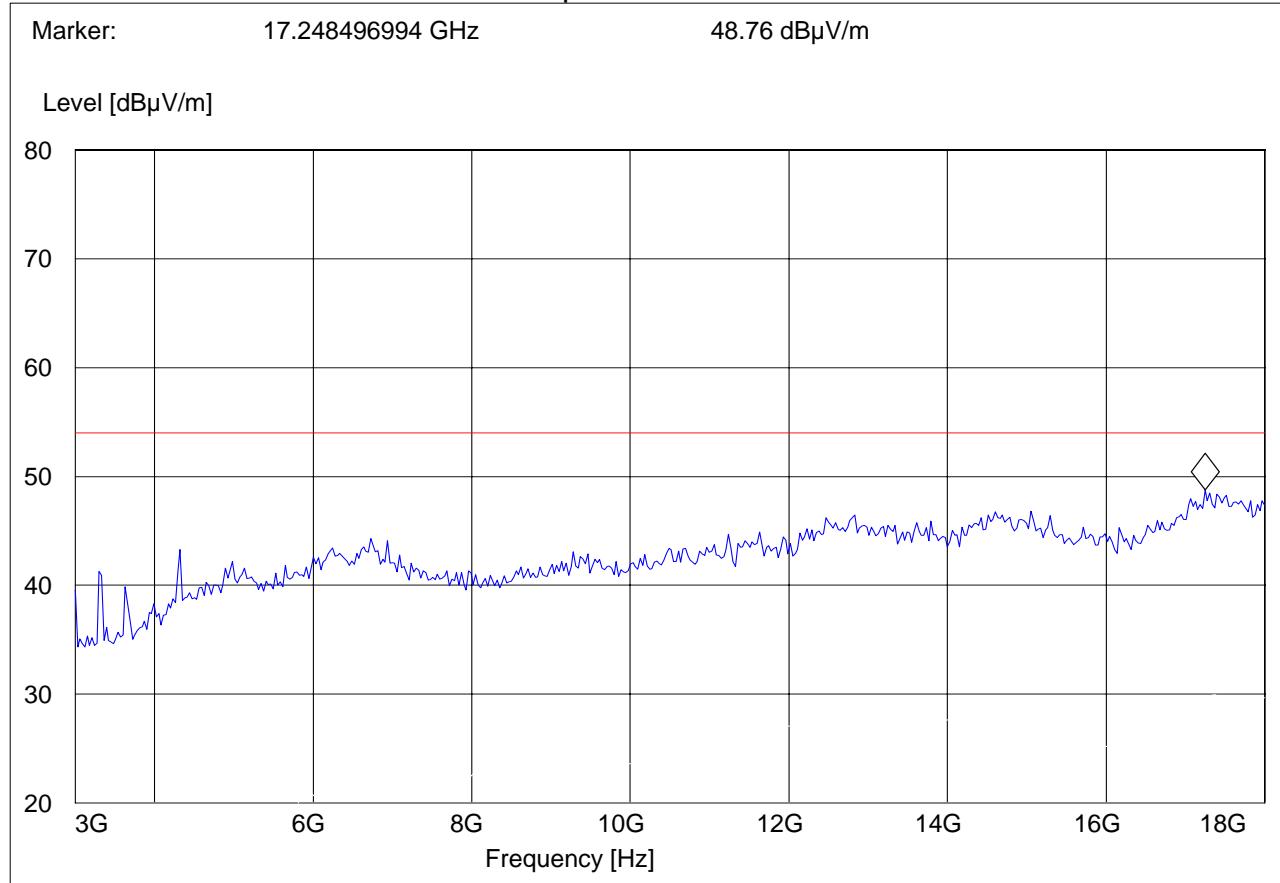
Start Frequency	Stop Frequency	Detector Meas.	IF Time	Transducer Bandw.
1.0 GHz	3.0 GHz	MaxPeak	Coupled	1 MHz #326horn_AF_vert



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"

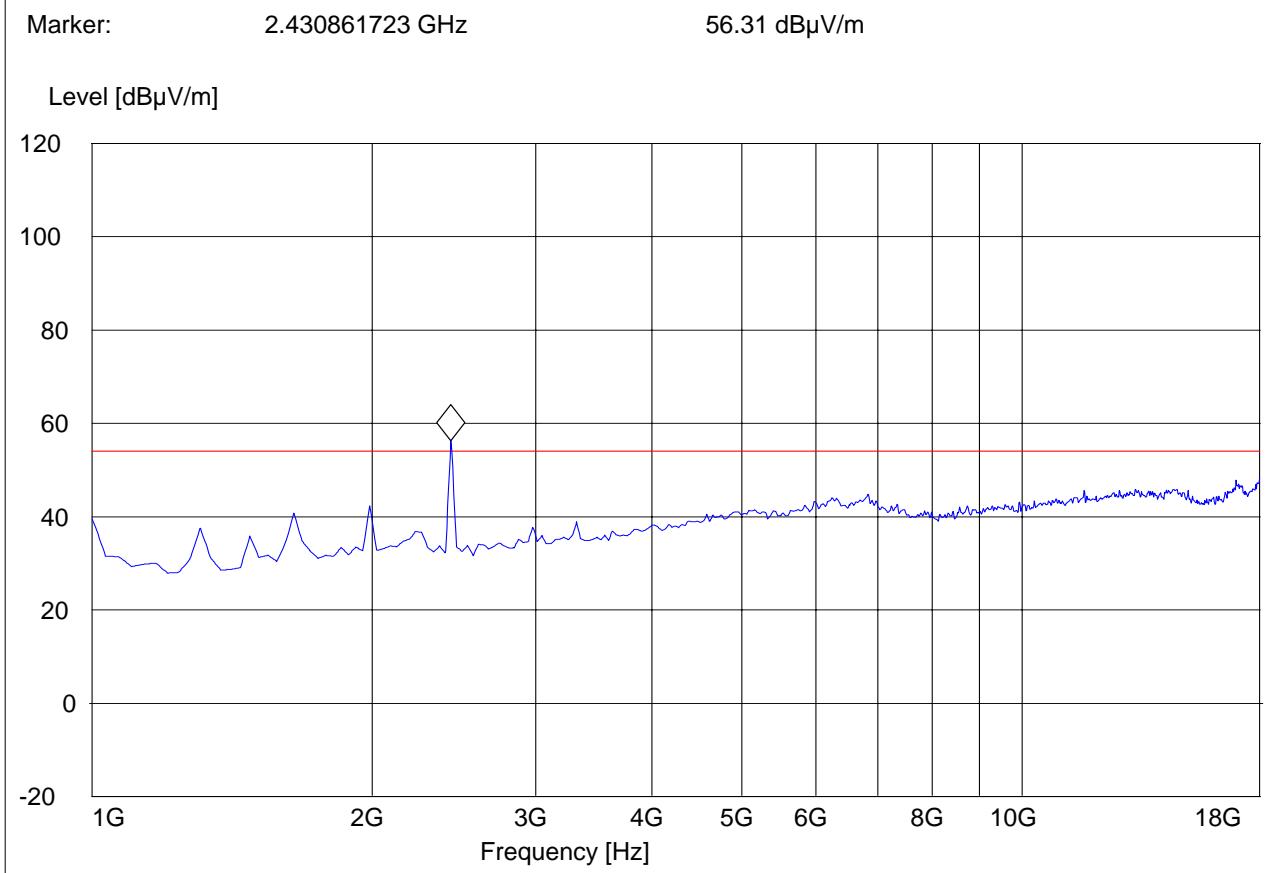
Start Frequency	Stop Frequency	Detector Meas.	IF Time	Transducer Bandw.
3.0 GHz	18.0 GHz	MaxPeak	Coupled	1 MHz #326horn_AF_vert



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

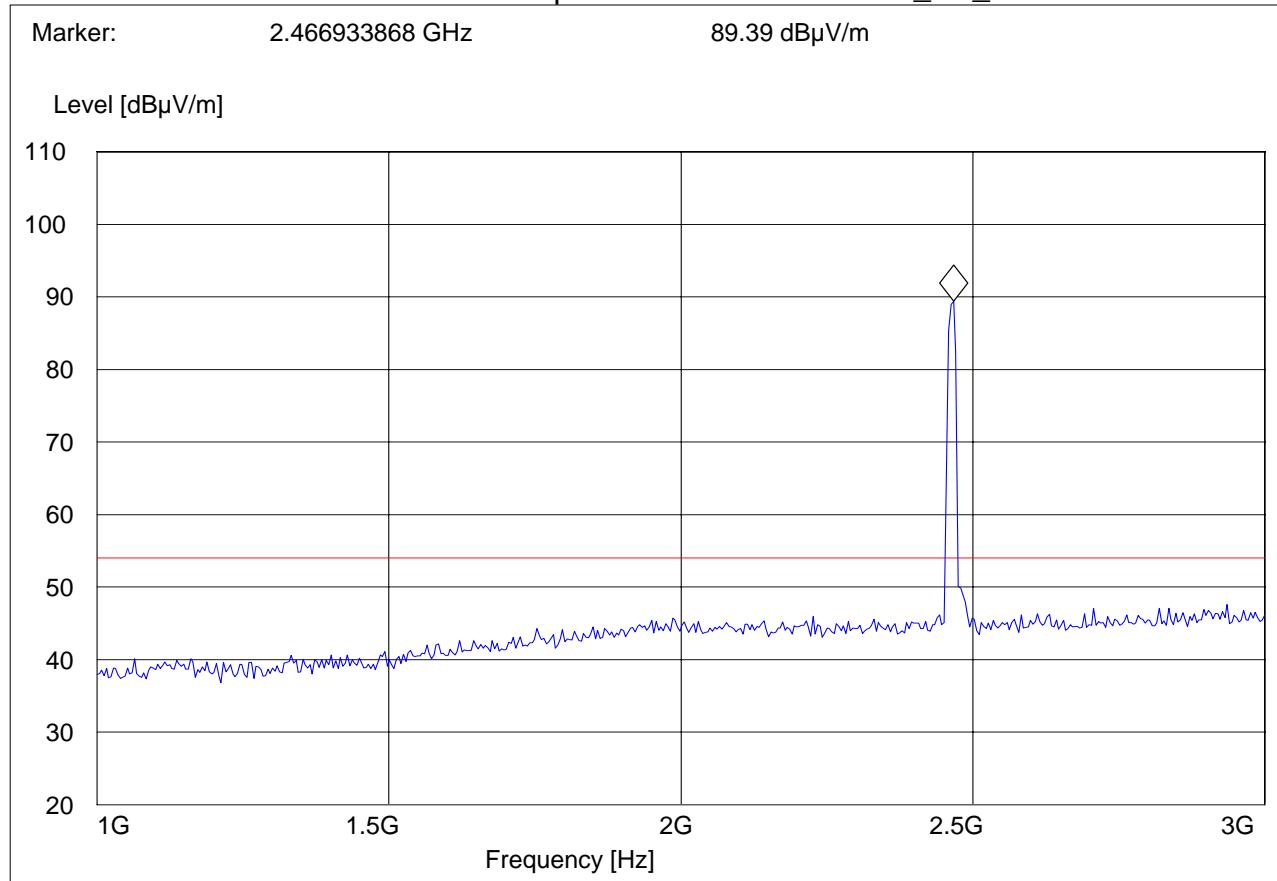


EMISSION LIMITATIONS - Radiated (Transmitter) §15.247 (d) & RSS-210(A8.5)
Highest Channel (2462MHz): 1GHz – 18GHz

EUT: 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"

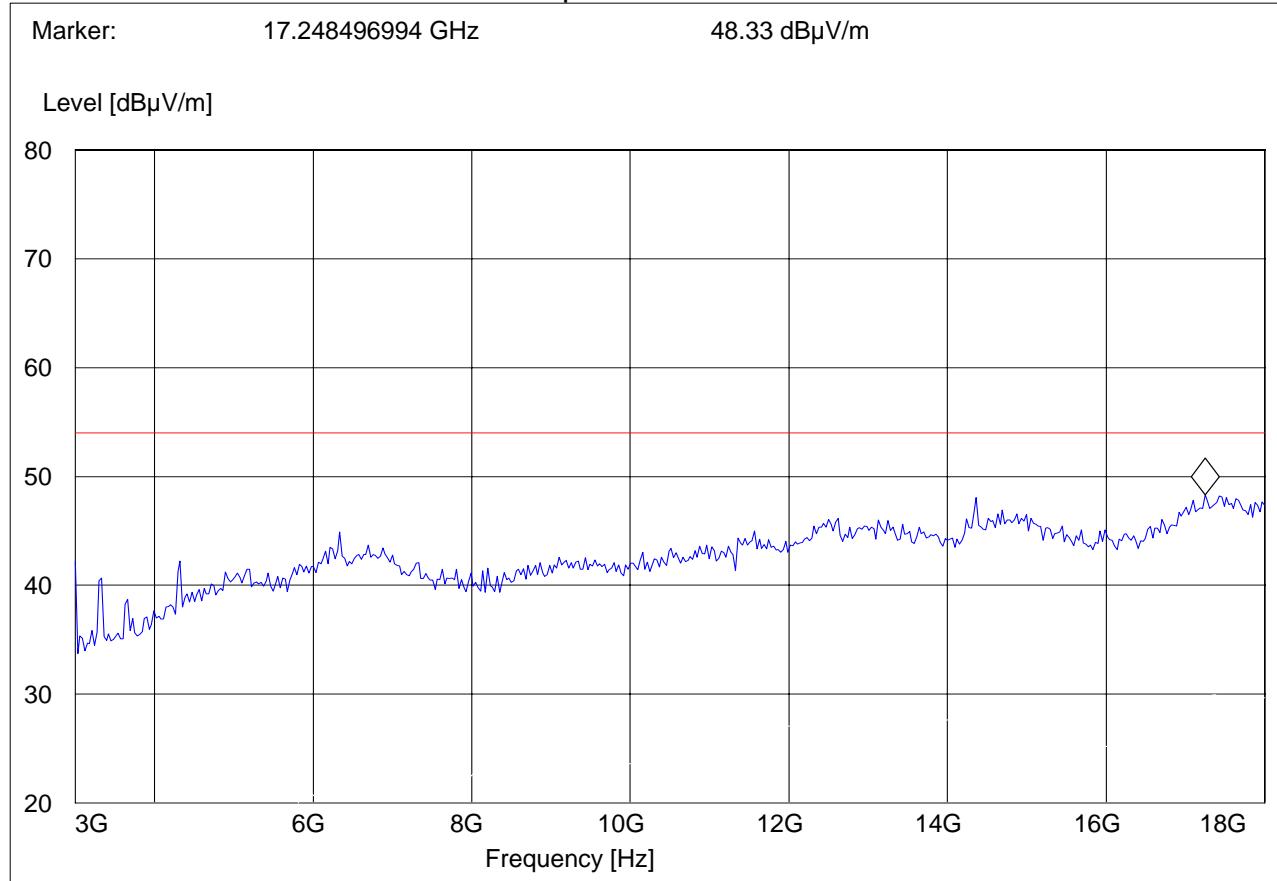
Start Frequency	Stop Frequency	Detector Meas.	IF Time	Transducer Bandw.
1.0 GHz	3.0 GHz	MaxPeak	Coupled	1 MHz #326horn_AF_vert



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.	IF Time	Transducer Bandw.
3.0 GHz	18.0 GHz	MaxPeak	Coupled	1 MHz	#326horn_AF_vert



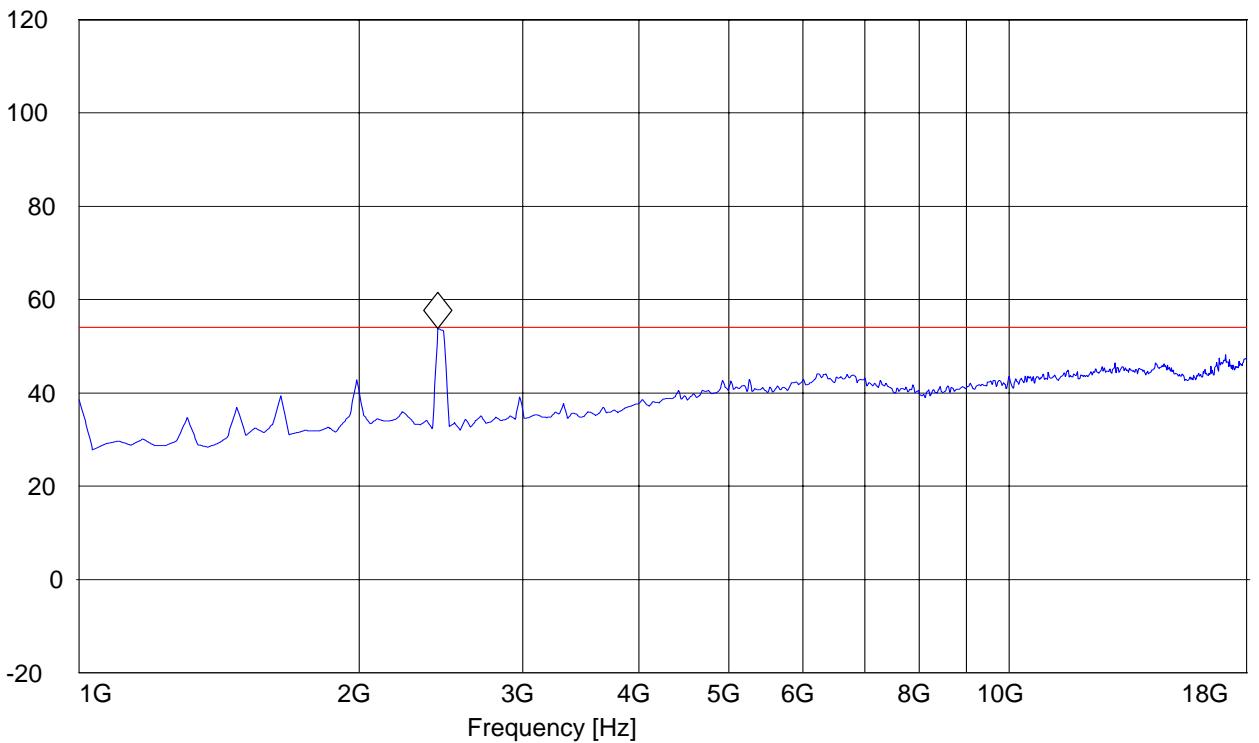
EUT / Description: 94312MCG
Manufacturer: Broadcom
Operation Mode: 802.11b Ch.11, Aux Yageo
ANT Orientation: : H
EUT Orientation: H
Test Engineer: SAM
Voltage: AC Adapter
Comments: marker on TX signal

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

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

Marker: 2.430861723 GHz 53.76 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

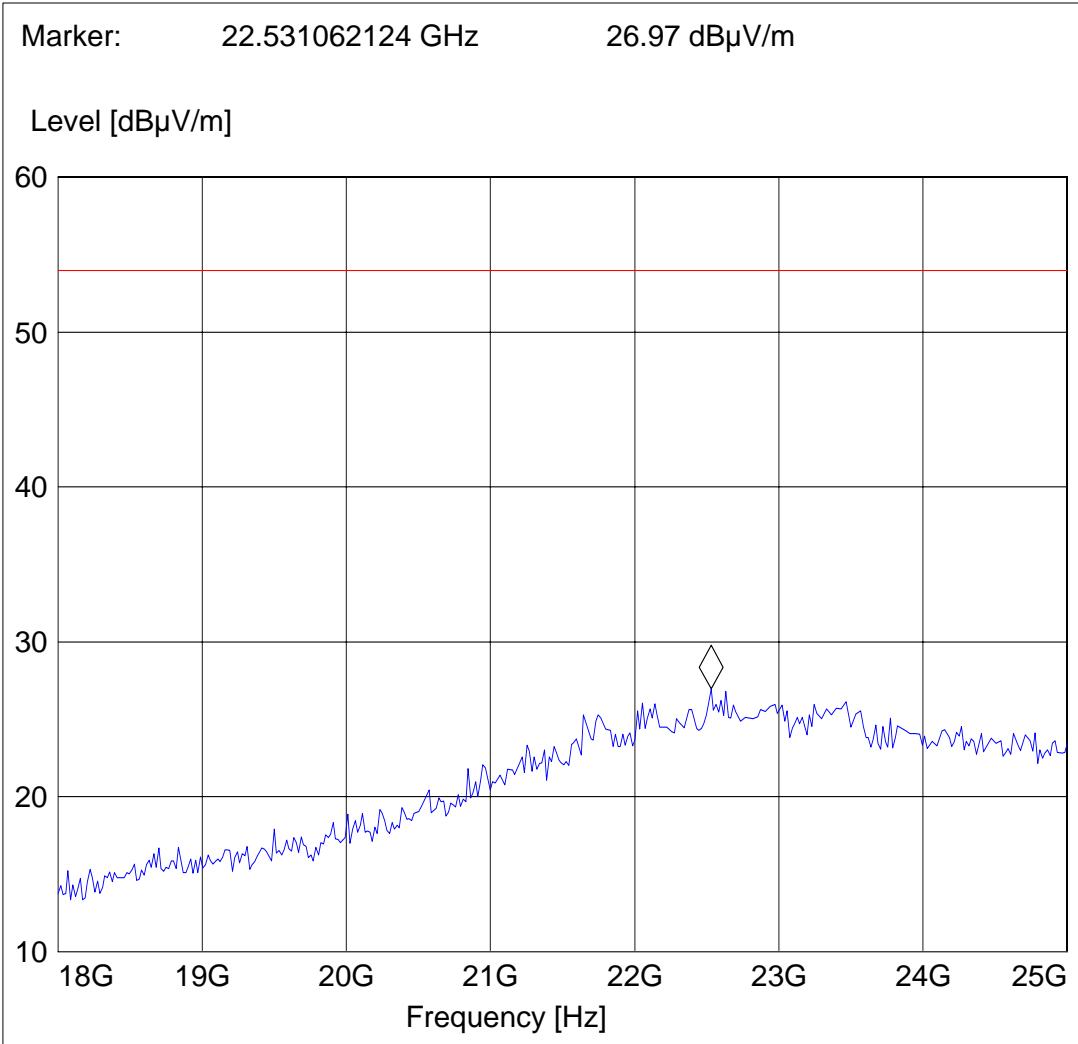
Note: This plot is valid for low, mid, high channels (worst-case plot)

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:

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



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

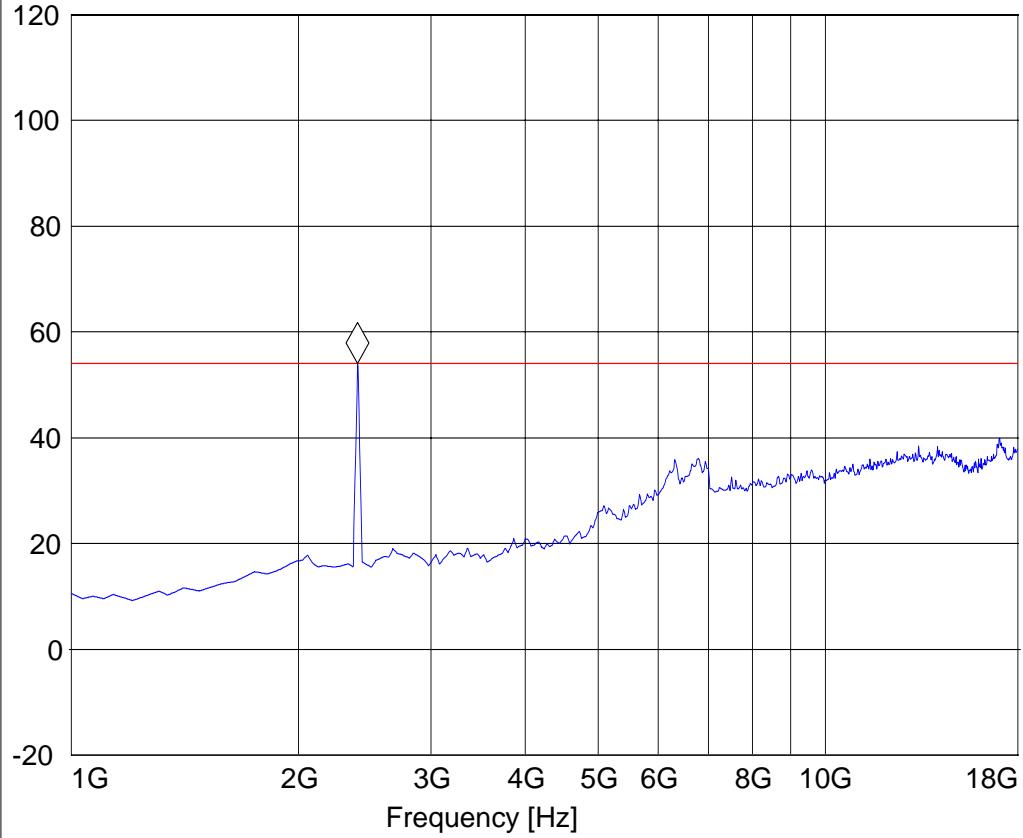
EUT / Description: BCM94311MCAG
Manufacturer: Broadcom
Test mode: 802.11g, Ch. 1 Aux WNC
ANT Orientation: H
EUT Orientation: H
Test Engineer: Chris
Voltage: AC Adapter
Comments: Marker on fundamental signal

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 54.08 dB μ V/m

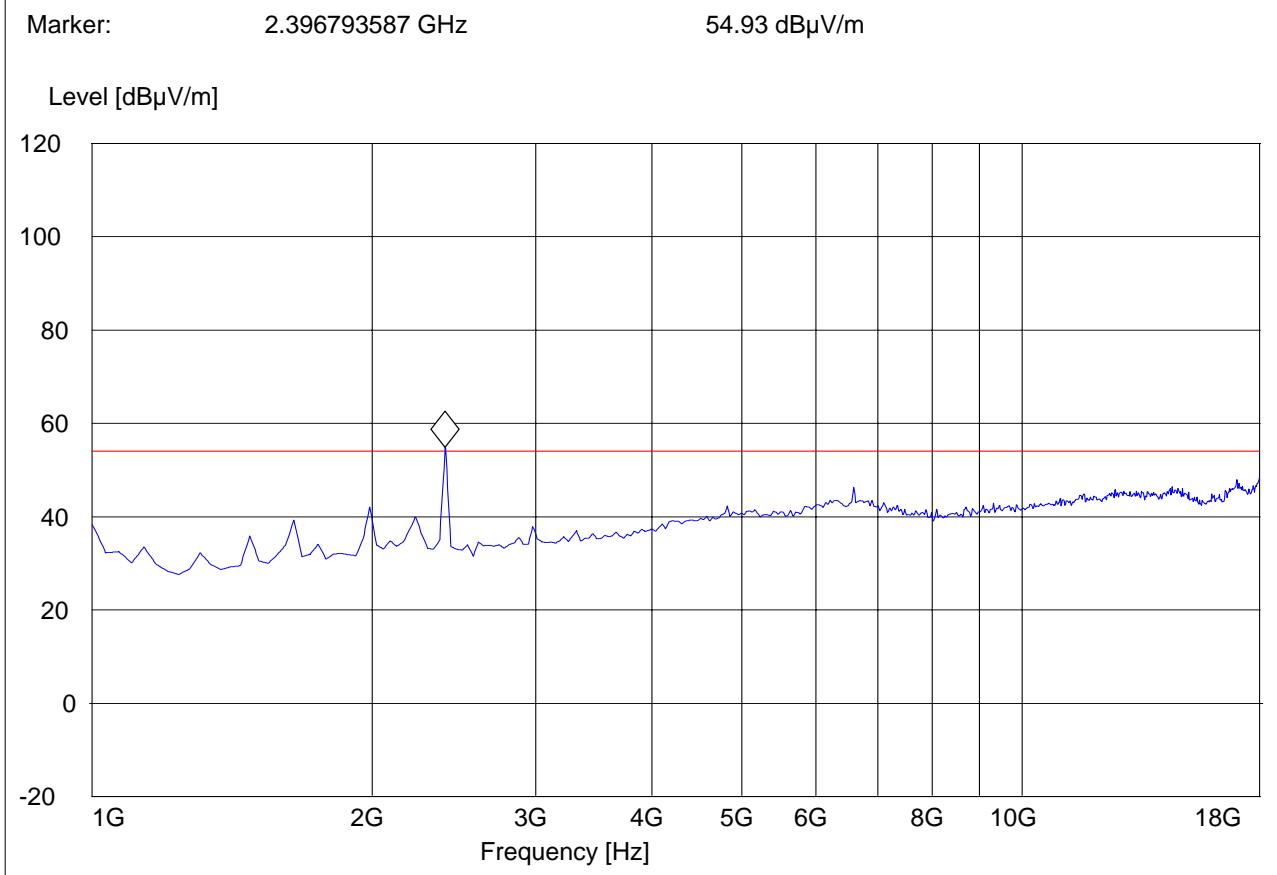
Level [dB μ V/m]



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 Frequency	Stop Frequency	Detector Meas.	IF Time	Transducer Bandw.
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

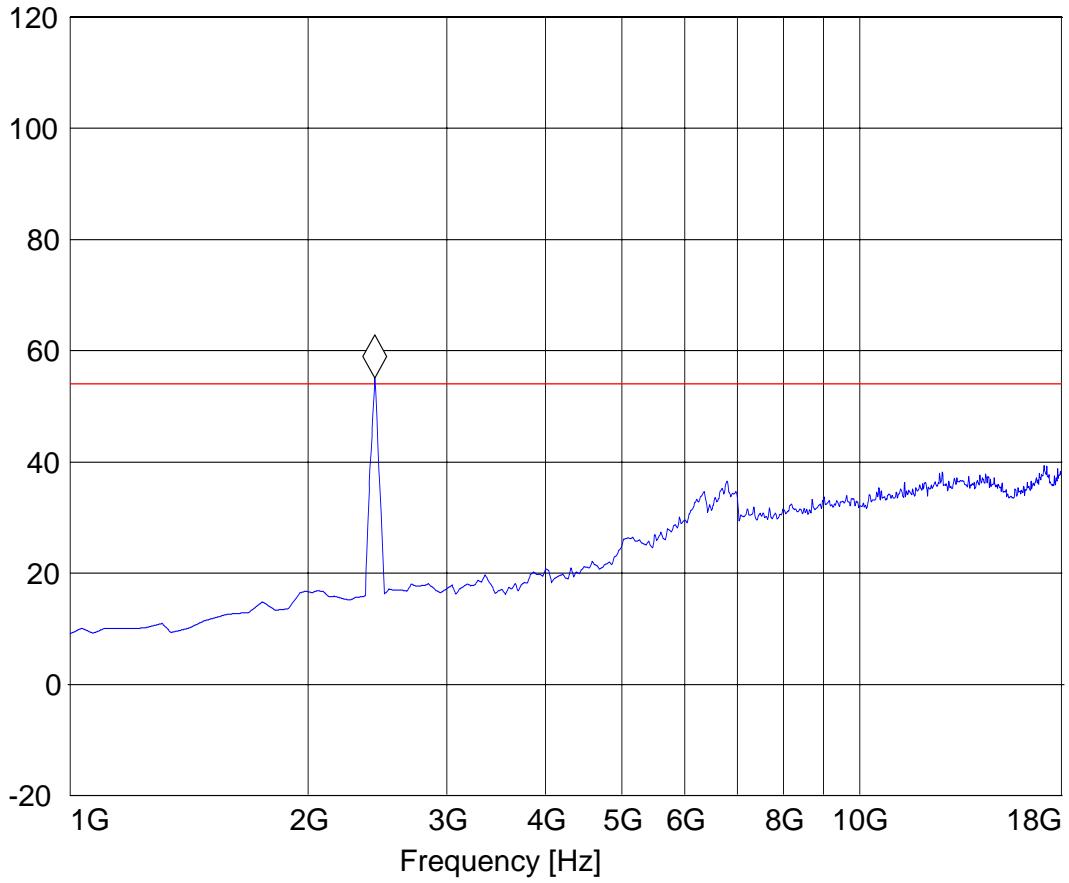
EUT / Description: BCM94312MCG
Manufacturer: Broadcom
Test mode: 802.11g, Ch. 6 Aux WNC
ANT Orientation: H
EUT Orientation: H
Test Engineer: Chris
Voltage: AC Adapter
Comments: Marker on fundamental signal

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 55.16 dB μ V/m

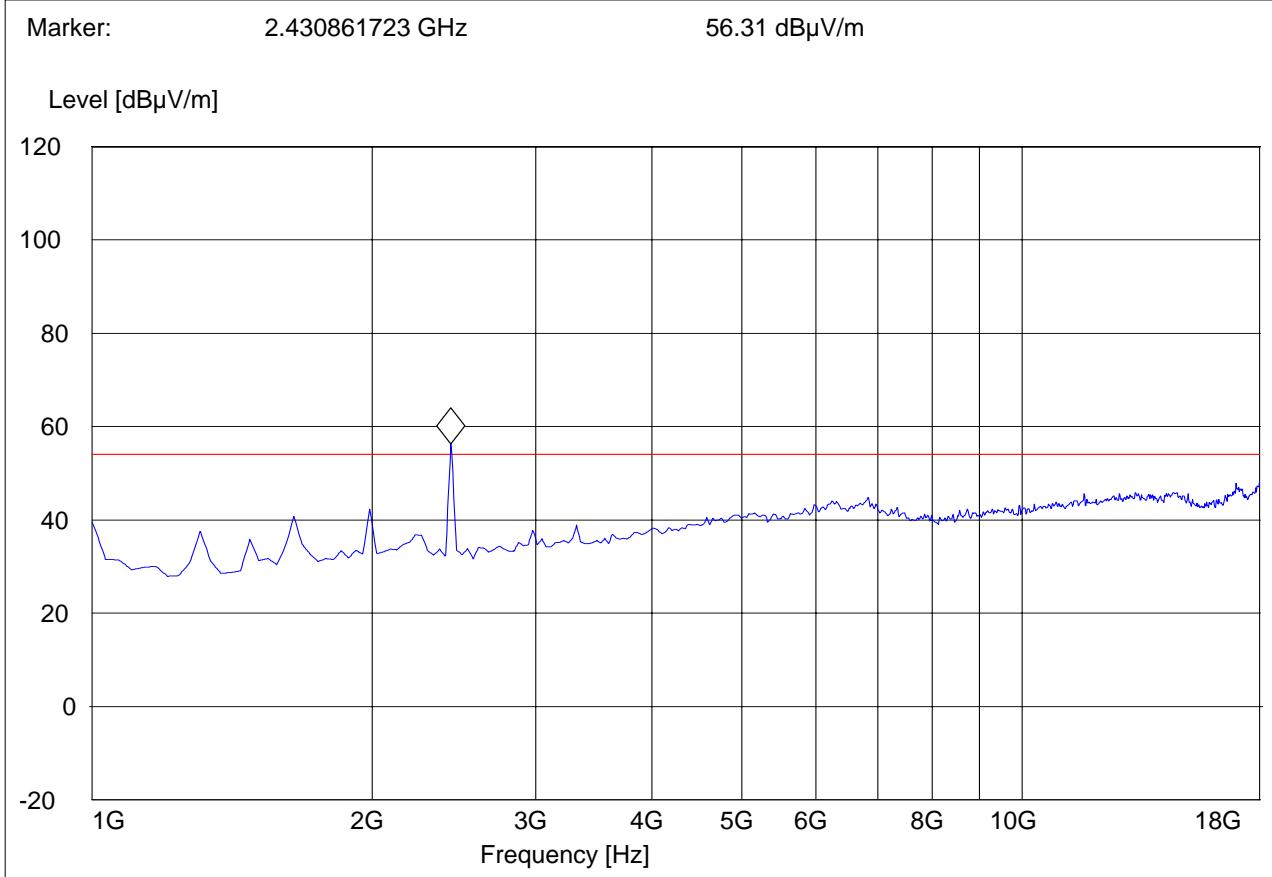
Level [dB μ V/m]



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.	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)

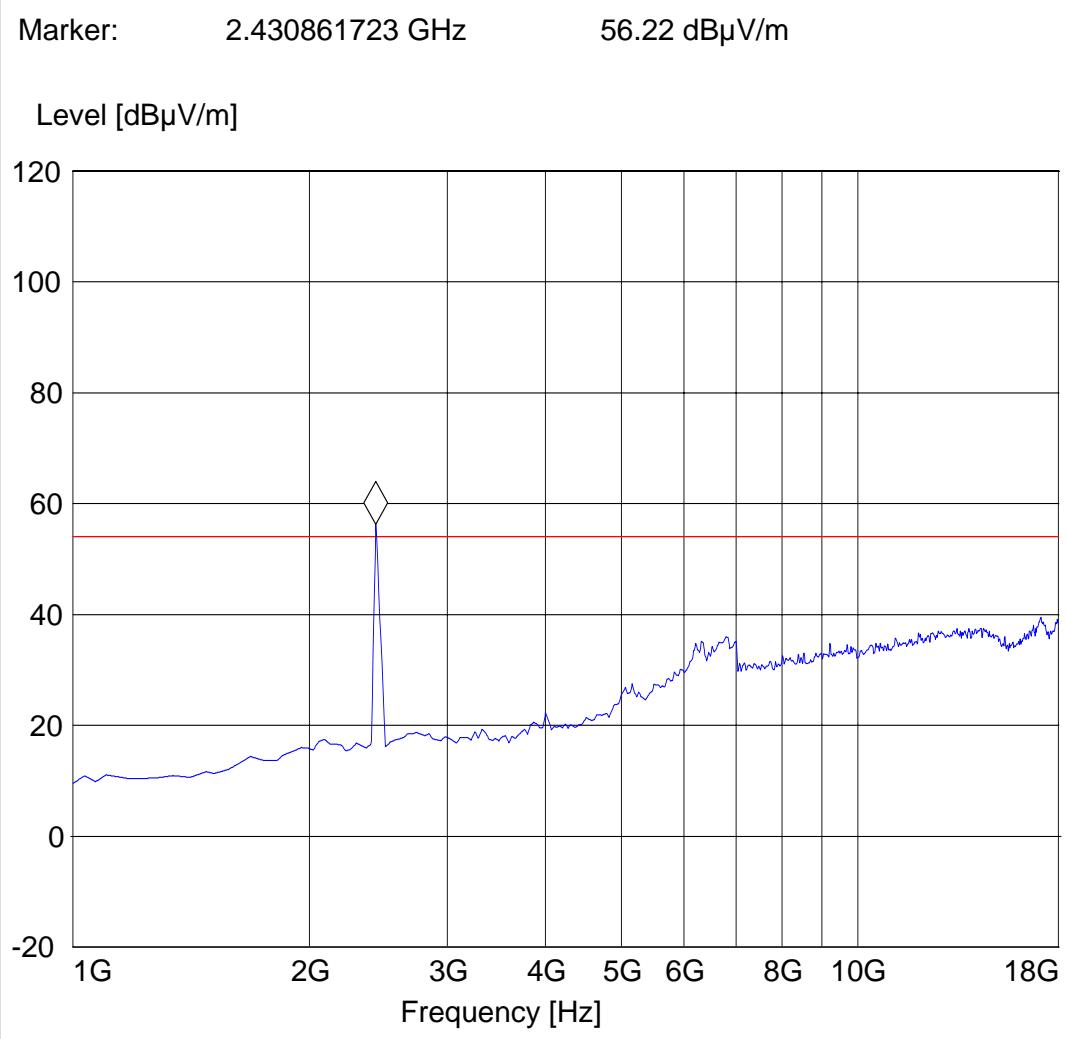
Highest Channel (2462MHz): 1GHz – 18GHz

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

EUT / Description: 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

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

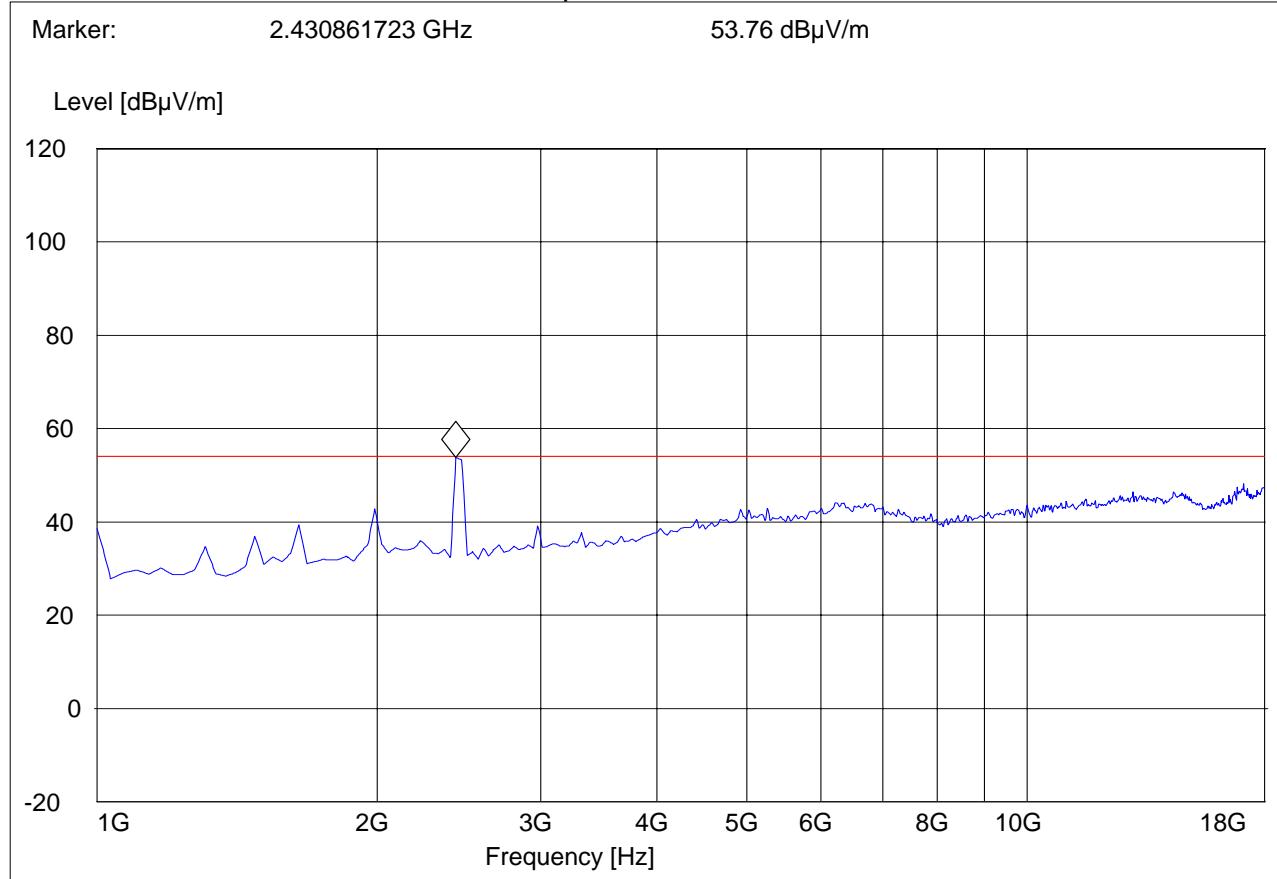
Start Frequency	Stop Frequency	Detector	Meas.	IF Time	Transducer
1.0 GHz	18.0 GHz	MaxPeak	Coupled	1 MHz	#326horn_AF_horz



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



EMISSION LIMITATIONS - Radiated (Transmitter)

§15.247 (d) & RSS-210(A8.5)

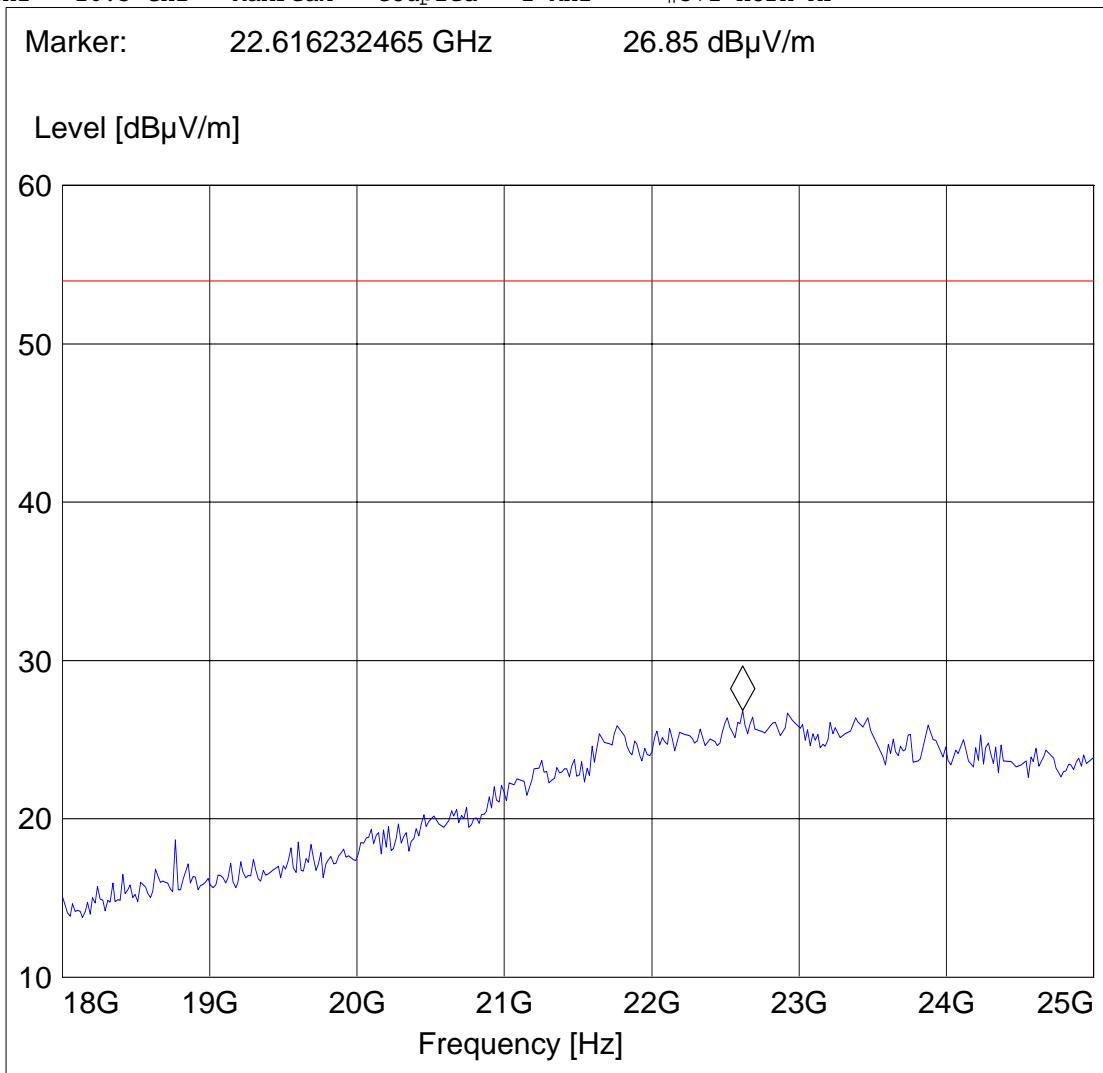
18GHz – 26.5GHz for low, middle, and high channels

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

EUT / Description: 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.	IF Time	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 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 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**

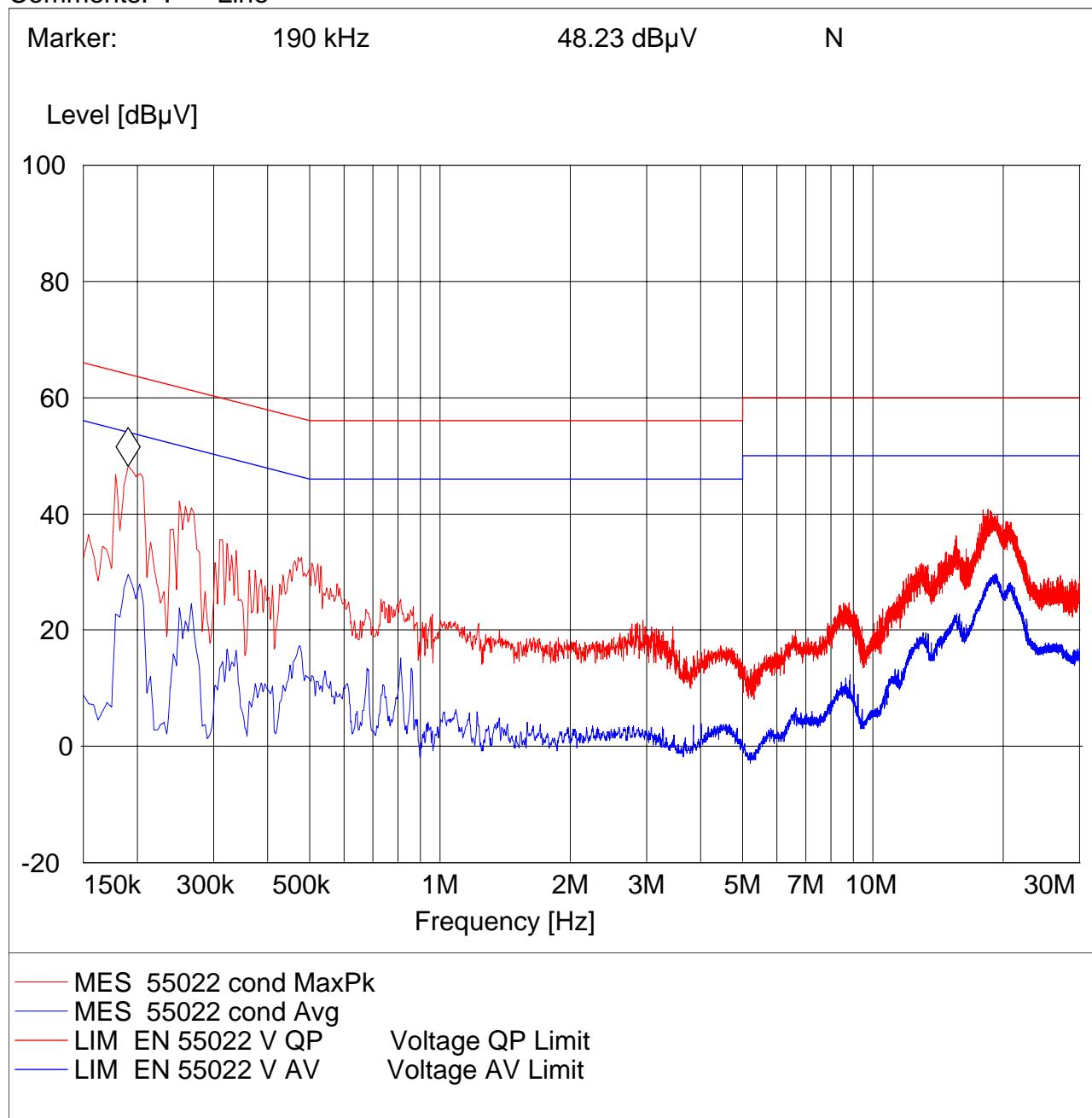
ANT Orientation:: **Conducted**

EUT Orientation:: **H**

Test Engineer:: **Juan**

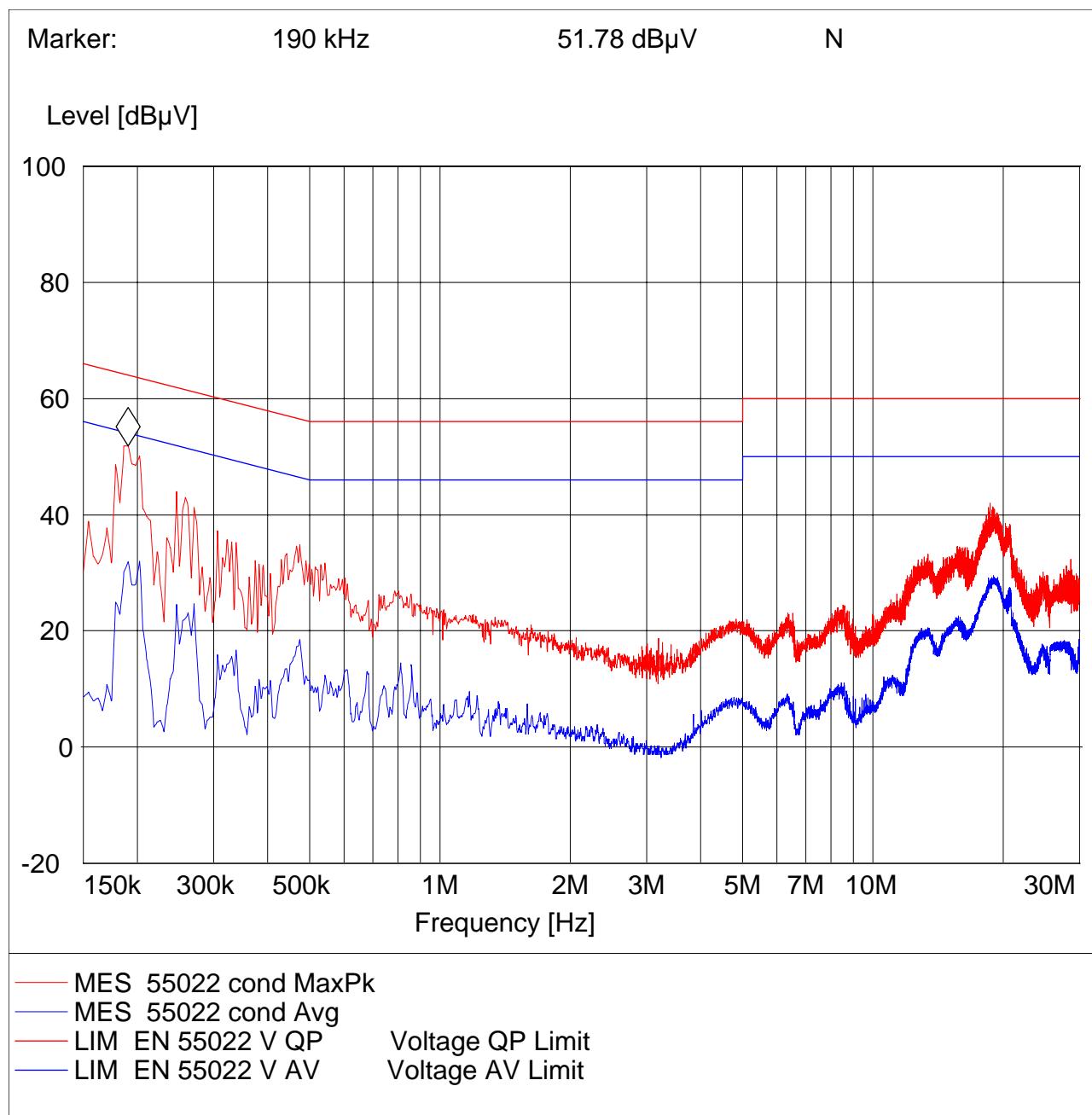
Power Supply: : **AC adapter**

Comments: : **Line**



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

No	Instrument/Ancillary	Type	Manufacturer	Serial No.	Cal Due	Interval
E4	Spectrum Analyzer	ESIB 40	Rohde & Schwarz	100107	May 2008	1 year
E46	Biconilog Antenna	3141	EMCO	0005-1186	June 2008	1 year
E134	Horn Antenna (1-18GHz)	3115	ETS Lindgren	35114	April 2008	1 year
E169	Horn Antenna (18-40GHz)	3116	ETS-Lindgren	00070497	Nov 2008	1 year
E28	High Pass Filter	5HC2700	Trilithic Inc.	9926013	n/a	n/a
E30	High Pass Filter	4HC1600	Trilithic Inc.	9922307	n/a	n/a
E170	LISN	FCC-LISN-50-25-2-08	Fisher Custom Communication	08014	Feb 2009	1 year

6 BLOCK DIAGRAMS

Radiated Testing

ANECHOIC CHAMBER

