

# **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\_054\_08001\_DTS DATE: 2008-04-29





**Qualification Test Facility** (BQTF)



FCC listed# **A2LA Certified** 

IC recognized # 3462B

#### CETECOM Inc.

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

CETECOM Inc. is a Delaware Corporation with Corporation number: 2113686 Board of Directors: Dr. Harald Ansorge, Dr. Klaus Matkey, Hans Peter May © Copyright by CETECOM Test Report #: EMC

EMC\_BROAD\_054\_08001\_DTS

Date of Report: **2008-04-29** Page 2 of 51



# **TABLE OF CONTENTS**

1 A	SSESSMENT	3
TECH	NICAL RESPONSIBILITY FOR AREA OF TESTING:	3
2 A	DMINISTRATIVE DATA	4
2.1 2.2	IDENTIFICATION OF THE TESTING LABORATORY ISSUING THE EMC TEST REPORT	
2.3	IDENTIFICATION OF THE CLIENT	·
3 E	QUIPMENT 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 S	UBJECT OF INVESTIGATION	6
4.1	MAXIMUM PEAK OUTPUT POWER § 15.247 (B) (3) & RSS-210 (A8.4)(4)	7
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)	25
4.4	EMISSION LIMITATIONS §15.247 (D) & RSS-210(A8.5)	29
	.4.1 EMISSION LIMITATIONS - Radiated (Transmitter)	
4.	.4.2 EMISSION LIMITATIONS - Radiated (Receiver)	40
4.5	AC POWER LINE CONDUCTED EMISSIONS § 15.207 & RSS-GEN (7.2.2)	45
5 T	TEST EQUIPMENT AND ANCILLARIES USED FOR TESTS	50
6 B	SLOCK DIAGRAMS	51



2008-04-29 Date of Report: Page 3 of 51

## <u>Assessment</u>

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:** 

2008-04-29	EMC & Radio	Val Tankov (EMC Project Engineer)	
Date	Section	Name	Signature
Responsibl	le for test report an	d project leader:	
		Marc Douat	
2008-04-29	EMC & Radio	(EMC Test Engineer)	
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.

Date of Report: 2008-04-29 Page 4 of 51



# 2 Administrative Data

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

<b>Company Name:</b>	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:	Marc Douat
<b>Responsible Test Lab Manager:</b>	Val 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

Date of Report: 2008-04-29 Page 5 of 51



# 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 (2.30dBi) & Aux (1.604Bi)

(1.60dBi)

## 3.2 Class II permissive change laptops to be added

EUT#	TYPE	MANF.	MODEL	SERIAL#
1	Tablet	HP	HSTNN-W47C	N/A

## 3.3 Identification of Accessory equipment

ТҮРЕ	MANF.	MODEL
AC ADAPTOR	НР	N/A

Date of Report: 2008-04-29 Page 6 of 51



### 4 Subject Of Investigation

All testing were performed on the HP HSTNN-W47C laptop with the BCM94312MCG pre-approved module. The data presented in this report was collected for a Class II permissive change to add the host tablet 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.

Test Report #:

EMC\_BROAD\_054\_08001\_DTS

Date of Report: **2008-04-29** 

Page 7 of 51



# 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)		
Frequenc	Frequency (MHz)		2437	2462
	Main Antenna			
T <sub>nom</sub> (23)°C	$\mathbf{V}_{\mathrm{nom}}$	22.21	21.58	21.67
Aux Antenna				
T <sub>nom</sub> (23)°C	$\mathbf{V}_{\mathrm{nom}}$	21.06	22.07	21.92
Measurement uncertainty			±0.5dBm	

# 802.11g

TEST CONDITIONS		MAXIMUM PEAK OUTPUT POWER (dBm)		
Frequenc	y (MHz)	2412	2437	2462
	Main Antenna			
T <sub>nom</sub> (23)°C	$\mathbf{V}_{ ext{nom}}$	24.14	25.03	23.65
Aux Antenna				
T <sub>nom</sub> (23)°C	$\mathbf{V}_{\mathrm{nom}}$	23.29	25.61	23.76
Measurement uncertainty			±0.5dBm	

Test Report #:

EMC\_BROAD\_054\_08001\_DTS

Date of Report: 2008-04-29 Page 8 of 51



# **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. Both vertical and horizontal were measured. Worst case polarization was horizontal for all modes.

2008-04-29 Page 9 of 51 Date of Report:



# EIRP: 2412 MHz (802.11b) Main

Olifant w/ BCM94312MCG

Customer:: Broadcom

Test Mode: b mode; ch.1; Main

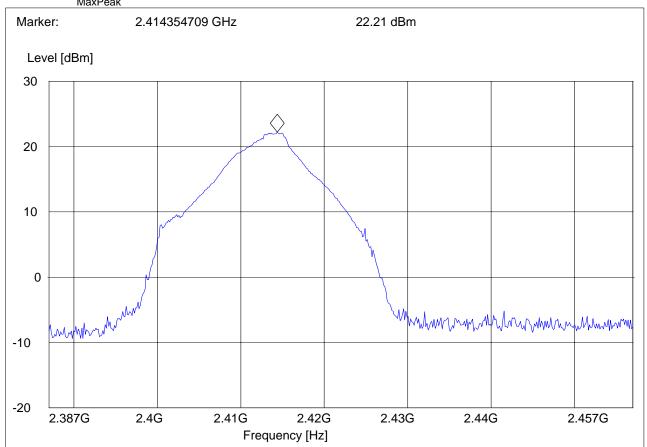
ANT Orientation: H **EUT Orientation: H** Test Engineer: Chris Voltage: AC Comments:

#### SWEEP TABLE: "EIRP RLAN CH1"

Short Description: EIRP RLAN channel-2412 MHz Start Stop Detector Meas. IF Transducer

Time Bandw. Frequency Frequency

2.4 GHz 2.5 GHz MaxPeak Coupled 10 MHz DUMMY-DBM



Date of Report: 2008-04-29 Page 10 of 51



# EIRP: 2437 MHz (802.11b) Main

EUT: Olifant w/ BCM94312MCG

Customer:: Broadcom

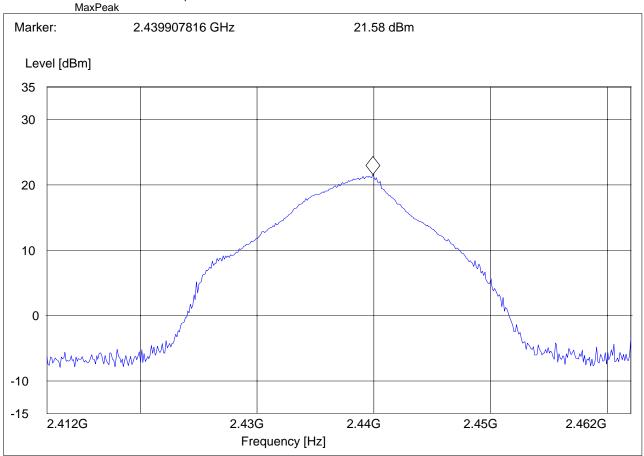
Test Mode: b mode; ch.6; Main

ANT Orientation: H **EUT Orientation: H** Test Engineer: Chris Voltage: AC Comments:

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

Short Description: EIRP RLAN channel-2437 MHz Start Stop Detector Meas. IF Tra Frequency Frequency Time Bandw. Transducer

2.4 GHz 2.5 GHz MaxPeak Coupled 10 MHz DUMMY-DBM



2008-04-29 Page 11 of 51 Date of Report:



# EIRP: 2462 MHz (802.11b) Main

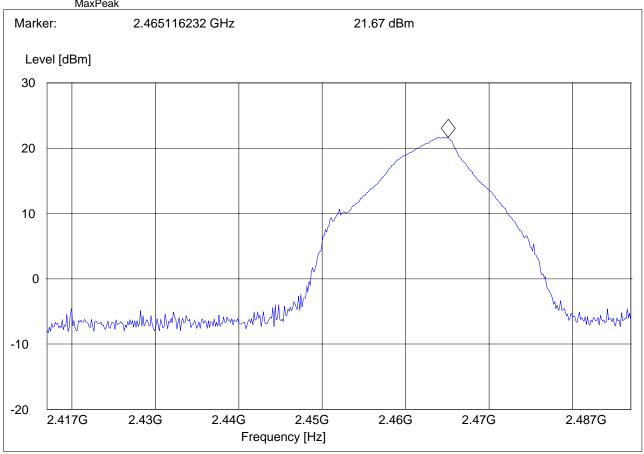
EUT: Olifant w/ BCM94312MCG

Customer:: Broadcom Test Mode: b mode; ch.11; Main

ANT Orientation: H EUT Orientation: H Test Engineer: Chris Voltage: AC Comments:

#### 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



2008-04-29 Page 12 of 51 Date of Report:



EIRP: 2412 MHz (802.11b) Aux EUT: Olifant w/ BCM94312MCG

Customer:: Broadcom

b mode; ch.1; Aux Test Mode:

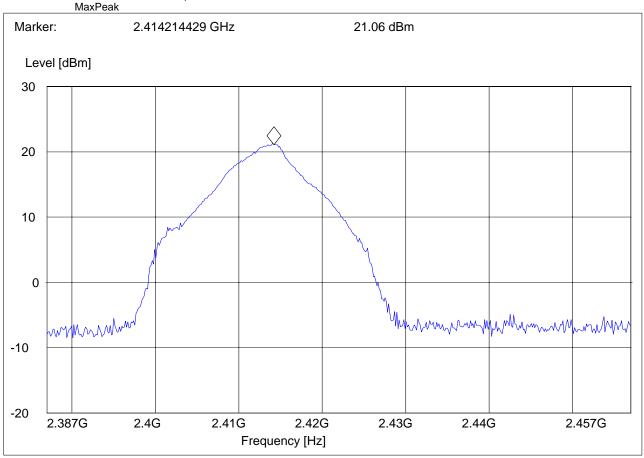
ANT Orientation: H EUT Orientation: H Test Engineer: Chris Voltage: AC Comments:

#### SWEEP TABLE: "EIRP RLAN CH1"

EIRP RLAN channel-2412 MHz Short Description: Start Stop Detector Meas. IF Transducer

Time Bandw. Frequency Frequency

2.4 GHz 2.5 GHz MaxPeak Coupled 10 MHz DUMMY-DBM



2008-04-29 Page 13 of 51 Date of Report:



EIRP: 2437 MHz (802.11b) Aux EUT: Olifant w/ BCM94312MCG

Customer:: Broadcom

b mode; ch.6; Aux Test Mode:

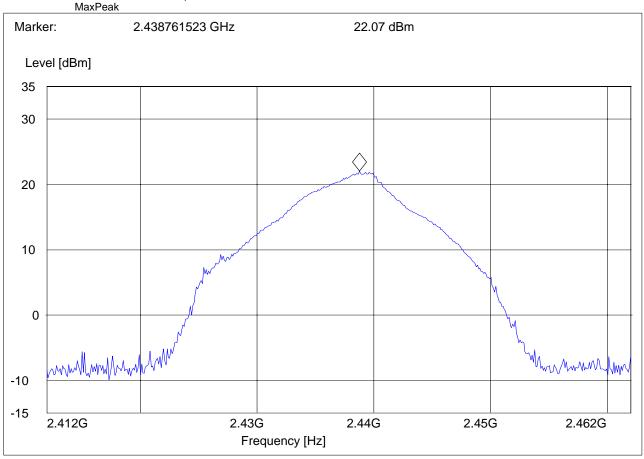
ANT Orientation: H **EUT Orientation: H** Test Engineer: Chris Voltage: AC Comments:

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

EIRP RLAN channel-2437 MHz Short Description: Start Stop Detector Meas. IF Transducer

Time Bandw. Frequency Frequency

2.4 GHz 2.5 GHz MaxPeak Coupled 10 MHz DUMMY-DBM



2008-04-29 Page 14 of 51 Date of Report:



# EIRP: 2462 MHz (802.11b) Aux

Olifant w/ BCM94312MCG

Customer:: Broadcom

Test Mode: b mode; ch.11; Aux

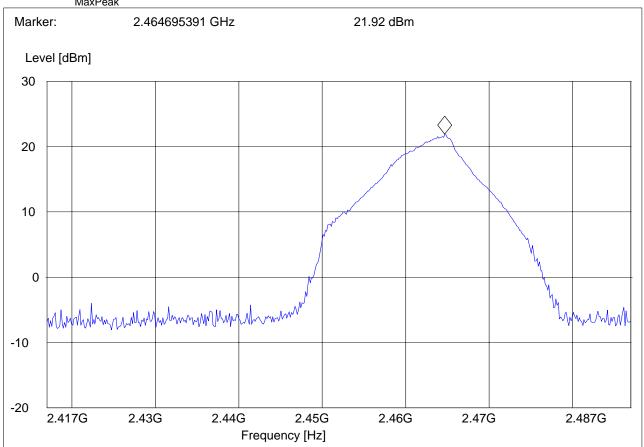
ANT Orientation: H **EUT Orientation: H** Test Engineer: Chris Voltage: AC Comments:

#### SWEEP TABLE: "EIRP RLAN CH11"

Short Description: EIRP RLAN channel-2462 MHz Start Stop Detector Meas. IF Transducer

Time Bandw. Frequency Frequency

2.4 GHz 2.5 GHz MaxPeak Coupled 10 MHz DUMMY-DBM



2008-04-29 Page 15 of 51 Date of Report:



EIRP: 2412 MHz (802.11g) Main EUT: Olifant w/ BCM94312MCG

Customer:: Broadcom

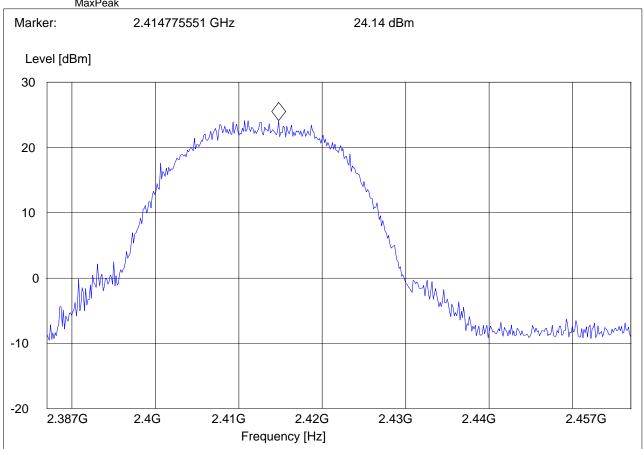
g mode; ch.1; Main Test Mode:

ANT Orientation: H EUT Orientation: H Test Engineer: Chris Voltage: AC Comments:

#### SWEEP TABLE: "EIRP RLAN CH1"

Short Description: EIRP RLAN channel-2412 MHz Start Stop Detector Meas. IF Transducer Frequency Frequency Time Bandw.

Frequency Frequency Time Bandw. 2.4 GHz 2.5 GHz MaxPeak Coupled 10 MHz DUMMY-DBM



2008-04-29 Page 16 of 51 Date of Report:



EIRP: 2437 MHz (802.11g) Main EUT: Olifant w/ BCM94312MCG

Customer:: Broadcom

Test Mode: g mode; ch.6; Main

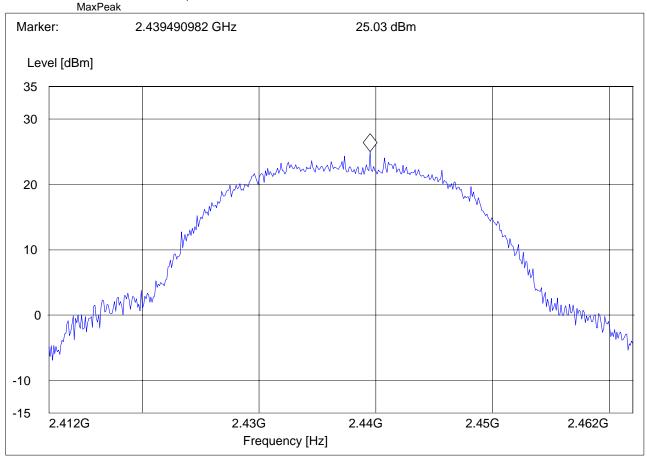
ANT Orientation: H **EUT Orientation: H** Test Engineer: Chris Voltage: AC Comments:

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

EIRP RLAN channel-2437 MHz Short Description: Start Stop Detector Meas. IF Transducer

Time Bandw. Frequency Frequency

2.4 GHz 2.5 GHz MaxPeak Coupled 10 MHz DUMMY-DBM



Date of Report: 2008-04-29 Page 17 of 51



# EIRP: 2462 MHz (802.11g) Main

EUT: Olifant w/ BCM94312MCG

Customer:: Broadcom

Test Mode: g mode; ch.11; Main

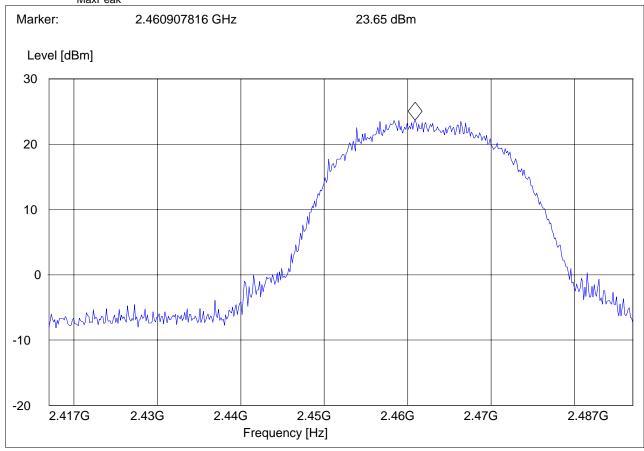
ANT Orientation: H EUT Orientation: H Test Engineer: Chris Voltage: AC Comments:

#### 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



2008-04-29 Page 18 of 51 Date of Report:



EIRP: 2412 MHz (802.11g) Aux EUT: Olifant w/ BCM94312MCG

Customer:: Broadcom

Test Mode: g mode; ch.1; Aux

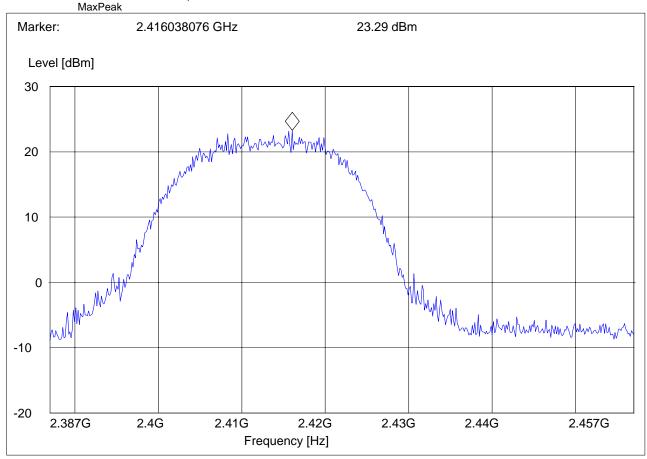
ANT Orientation: H **EUT Orientation: H** Test Engineer: Chris Voltage: AC Comments:

#### SWEEP TABLE: "EIRP RLAN CH1"

EIRP RLAN channel-2412 MHz Short Description: Start Stop Detector Meas. IF Transducer

Time Bandw. Frequency Frequency

2.4 GHz 2.5 GHz MaxPeak Coupled 10 MHz DUMMY-DBM



2008-04-29 Page 19 of 51 Date of Report:



# EIRP: 2437 MHz (802.11g) Aux

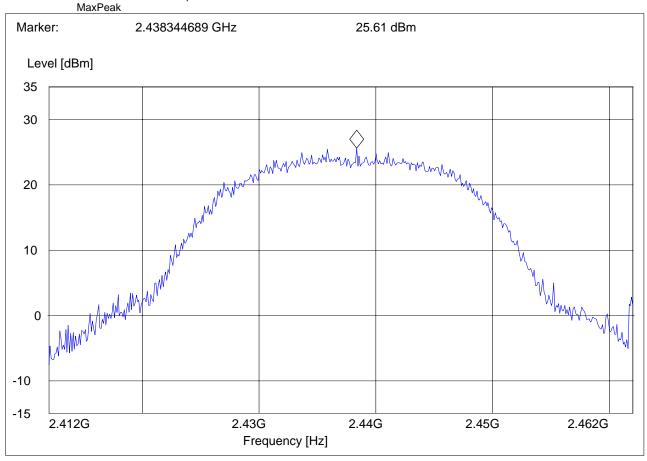
EUT: Olifant w/ BCM94312MCG

Customer:: Broadcom g mode; ch.6; Aux Test Mode:

ANT Orientation: H EUT Orientation: H Test Engineer: Chris Voltage: AC Comments:

#### 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



2008-04-29 Page 20 of 51 Date of Report:



# EIRP: 2462 MHz (802.11g) Aux

Olifant w/ BCM94312MCG

Customer:: Broadcom

g mode; ch.11; Aux Test Mode:

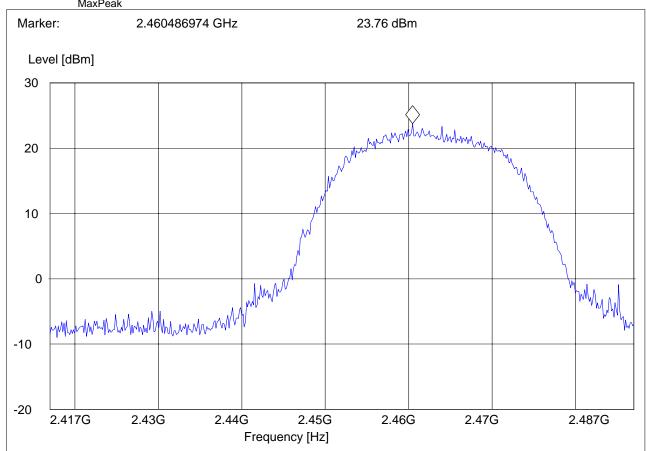
ANT Orientation: H **EUT Orientation: H** Test Engineer: Chris Voltage: AC Comments:

#### SWEEP TABLE: "EIRP RLAN CH11"

Short Description: EIRP RLAN channel-2462 MHz Start Stop Detector Meas. IF Transducer

Time Bandw. Frequency Frequency

2.4 GHz 2.5 GHz MaxPeak Coupled 10 MHz DUMMY-DBM



2008-04-29 Page 21 of 51 Date of Report:



## **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) Peak

Olifant w/ BCM94312MCG

Customer:: Broadcom

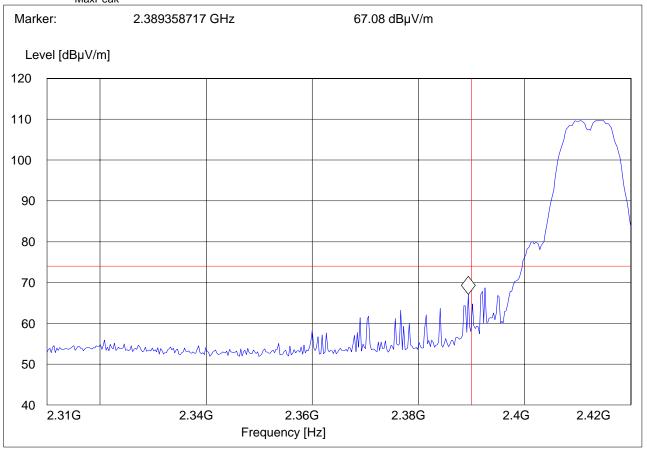
Test Mode: b mode; ch.1; Main

ANT Orientation: H **EUT Orientation: H** Test Engineer: Chris Voltage: Comments:

#### 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



2008-04-29 Date of Report: Page 22 of 51



## **BAND EDGE COMPLIANCE**

§15.247 (d) & RSS-210(A8.5)

# 802.11b Low frequency section (spurious in the restricted band 2310 – 2390 MHz) AVG $_{\hbox{\scriptsize EUT:}}$ Olifant w/ BCM94312MCG

Customer:: Broadcom Test Mode: b mode; ch.1; Main

ANT Orientation: H EUT Orientation: H Test Engineer: Chris Voltage: AC Comments:

### 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 46.3 dBµV/m Level [dBµV/m] 120 100 80 60 40 20 2.31G 2.34G 2.38G 2.4G 2.42G 2.36G Frequency [Hz]

2008-04-29 Page 23 of 51 Date of Report:



### **BAND EDGE COMPLIANCE**

§15.247 (d) & RSS-210(A8.5)

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

EUT: Olifant w/ BCM94312MCG

Customer:: Broadcom

Test Mode: b mode; ch.11; Aux

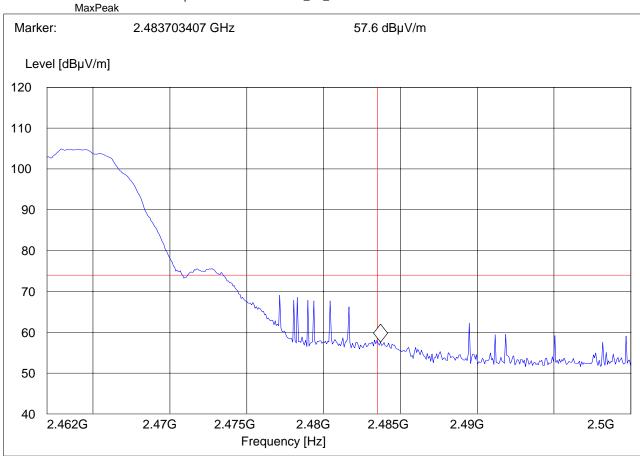
ANT Orientation: H EUT Orientation: H Test Engineer: Chris Voltage: AC Comments:

#### 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



2008-04-29 Page 24 of 51 Date of Report:



## **BAND EDGE COMPLIANCE**

§15.247 (d) & RSS-210(A8.5)

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

EUT: Olifant w/ BCM94312MCG

Customer:: Broadcom

Test Mode: b mode; ch.11; Aux

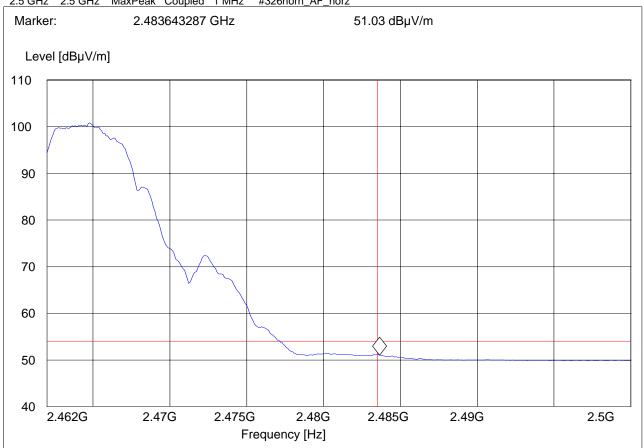
ANT Orientation: H **EUT Orientation: H** Test Engineer: Chris Voltage: AC Comments:

#### 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



2008-04-29 Page 25 of 51 Date of Report:



#### **BAND EDGE COMPLIANCE (802.11g)** 4.3

§15.247 (d) & RSS-210(A8.5)

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

Olifant w/ BCM94312MCG

Customer:: Broadcom

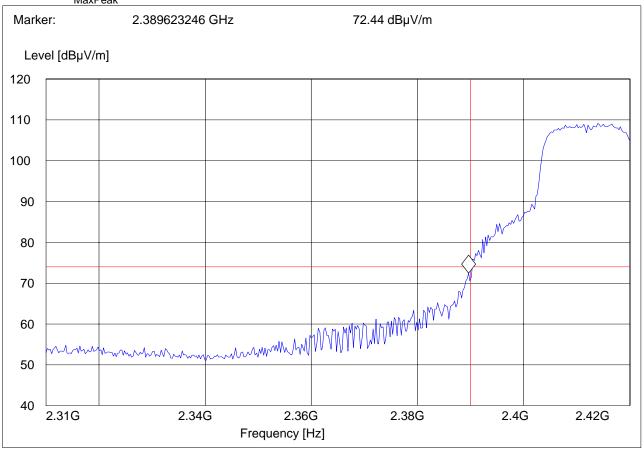
g mode; ch.1; Main Test Mode:

ANT Orientation: H EUT Orientation: H Test Engineer: Chris Voltage: AC Comments:

### 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



Date of Report: 2008-04-29 Page 26 of 51



### **BAND EDGE COMPLIANCE**

§15.247 (d) & RSS-210(A8.5)

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

EUT: Olifant w/ BCM94312MCG

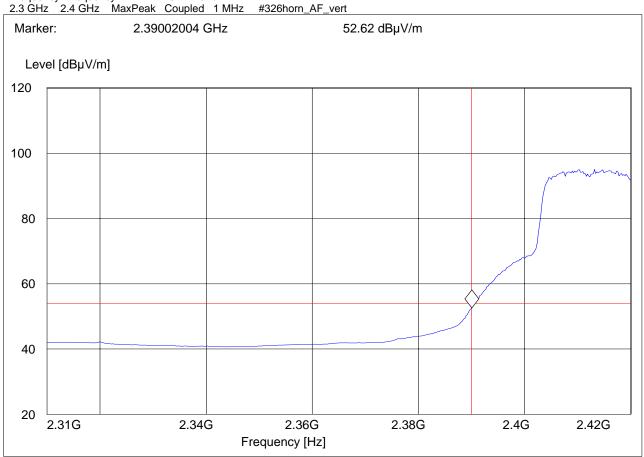
Customer:: Broadcom
Test Mode: g mode; ch.1; Main

ANT Orientation: H EUT Orientation: H Test Engineer: Chris Voltage: AC Comments:

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

Start Stop Detector Meas. IF Transducer

Frequency Time Bandw.



Date of Report: 2008-04-29 Page 27 of 51



## **BAND EDGE COMPLIANCE**

§15.247 (d) & RSS-210(A8.5)

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

EUT: Olifant w/ BCM94312MCG

Customer:: Broadcom

Test Mode: g mode; ch.11; Aux

ANT Orientation: H EUT Orientation: H Test Engineer: Chris Voltage: AC Comments:

#### 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 Marker: 2.483931864 GHz 69.9 dBµV/m Level [dBµV/m] 120 110 100 90 80 70 60 50 40 2.47G 2.462G 2.475G 2.48G 2.485G 2.49G 2.5G Frequency [Hz]

Date of Report: 2008-04-29 Page 28 of 51



## **BAND EDGE COMPLIANCE**

§15.247 (d) & RSS-210(A8.5)

# 802.11g High frequency section (spurious in the restricted band 2483.5 - 2500 MHz) AVG

EUT: Olifant w/ BCM94312MCG

Customer:: Broadcom

Test Mode: g mode; ch.11; Aux

ANT Orientation: H EUT Orientation: H Test Engineer: Chris Voltage: AC Comments:

#### 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 2.483547094 GHz 52.44 dBµV/m Marker: Level [dBµV/m] 100 90 80 70 60 50 40 2.462G 2.47G 2.475G 2.48G 2.485G 2.49G 2.5G Frequency [Hz]

Date of Report: 2008-04-29 Page 29 of 51



# **4.4 EMISSION LIMITATIONS** (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 operating in the mode and antenna that produced the highest EIRP

Results for the radiated measurements below 30MHz according § 15.33

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

Date of Report: **2008-04-29** Page 30 of 51



# **4.4.1 EMISSION LIMITATIONS - Radiated (Transmitter)**

§15.247 (d) & RSS-210(A8.5):

Transmit at Low	est channel Freq	uency 2412MHz (802	.11b)
Frequency (MHz)	Level (dBµV/m)		
	Peak	Quasi-Peak	Average
	SEE PLO	ΓS	
Transmit at Middle channel Frequency 2437MHz (802.11b)			
Frequency (MHz)	Level (dBµV/m)		
	Peak	Quasi-Peak	Average
	SEE PLO	ΓS	
Transmit at High	est channel Freq	  uency 2462MHz (802	2.11b)
Frequency (MHz)	Level (dBµV/m)		
	Peak	Quasi-Peak	Average
,	SEE PLO	ΓS	

Date of Report: **2008-04-29** Page 31 of 51



# EMISSION LIMITATIONS - Radiated (Transmitter) §15.247 (d) & RSS-210(A8.5) Horizontal: 30 MHz - 1 GHz

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

EUT: Olifant w/ BCM94312MCG

Customer:: Broadcom

Test Mode: G mode; ch.6; Main

ANT Orientation: H EUT Orientation: H Test Engineer: Chris

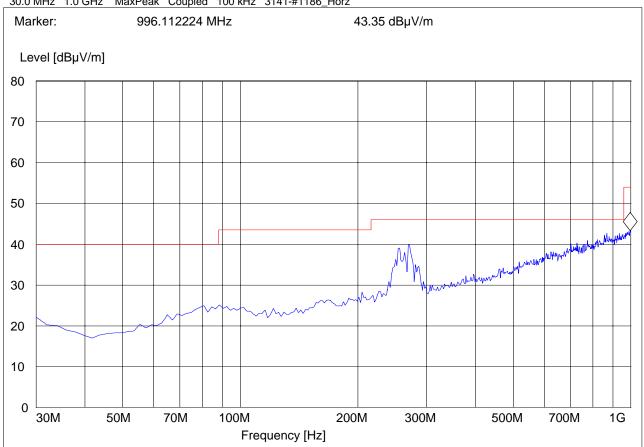
Voltage: Without AC Adapter

Comments:

#### 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



Date of Report: 2008-04-29 Page 32 of 51



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

**Vertical: 30MHz – 1GHz** 

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

EUT: Olifant w/ BCM94312MCG

Customer:: Broadcom

Test Mode: G mode; ch.6; Main

ANT Orientation: V EUT Orientation: H Test Engineer: Chris

Voltage: Without AC Adapter

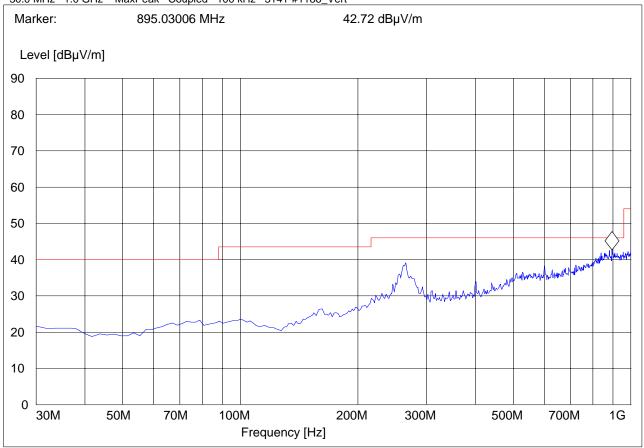
Comments:

#### 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\_Vert



Date of Report: 2008-04-29 Page 33 of 51



# EMISSION LIMITATIONS - Radiated (Transmitter) §15.247 (d) & RSS-210(A8.5) Lowest Channel (2412 MHz): 1GHz - 3GHz

EUT: Olifant w/ BCM94312MCG

Customer:: Broadcom

Test Mode: G mode; ch.1; Main

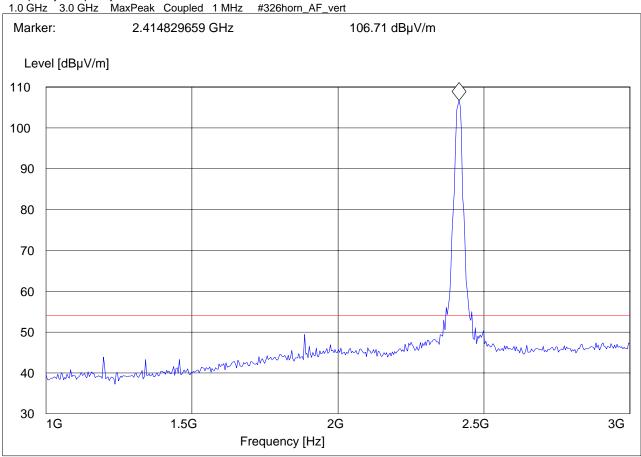
ANT Orientation: H EUT Orientation: H Test Engineer: Chris Voltage: AC

Comments: Marker at TX signal

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

Start Stop Detector Meas. IF Transducer

Frequency Frequency Time Bandw.



Date of Report: 2008-04-29 Page 34 of 51



# EMISSION LIMITATIONS - Radiated (Transmitter) §15.247 (d) & RSS-210(A8.5) Mid Channel (2437MHz): $1 \mathrm{GHz} - 3 \mathrm{GHz}$

EUT: Olifant w/ BCM94312MCG

Customer:: Broadcom

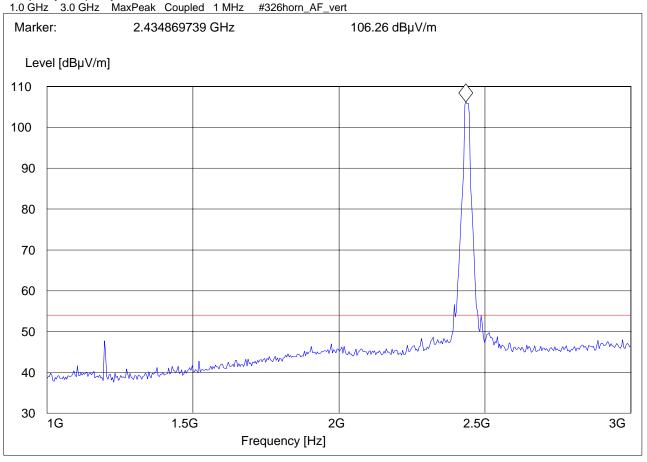
Test Mode: G mode; ch.6; Main

ANT Orientation: H EUT Orientation: H Test Engineer: Chris Voltage: AC

Comments: Marker at TX signal

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

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



Date of Report: 2008-04-29 Page 35 of 51



# EMISSION LIMITATIONS - Radiated (Transmitter) §15.247 (d) & RSS-210(A8.5) Highest Channel (2462MHz): 1 GHz - 3 GHz

EUT: Olifant w/ BCM94312MCG

Customer:: Broadcom

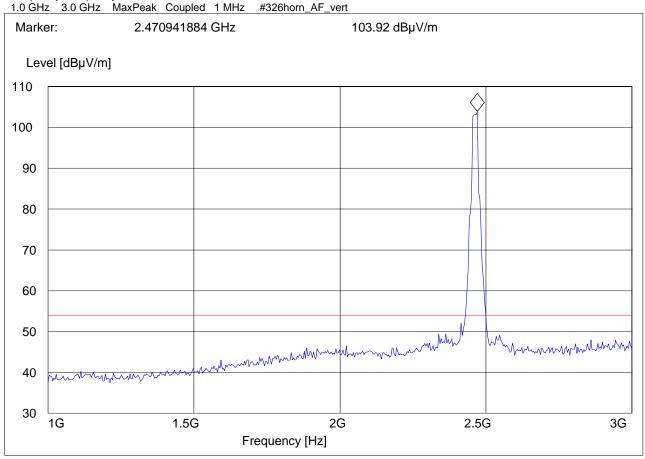
Test Mode: G mode; ch.11; Main

ANT Orientation: H EUT Orientation: H Test Engineer: Chris Voltage: AC

Comments: Marker at TX signal

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

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



2008-04-29 Date of Report: Page 36 of 51



# EMISSION LIMITATIONS - Radiated (Transmitter) §15.247 (d) & RSS-210(A8.5) **Lowest Channel (2412MHz): 3GHz – 18GHz**

EUT: Olifant w/ BCM94312MCG

Customer:: Broadcom

Test Mode: G mode; ch.1; Main

ANT Orientation: H EUT Orientation: H Test Engineer: Chris Voltage: AC

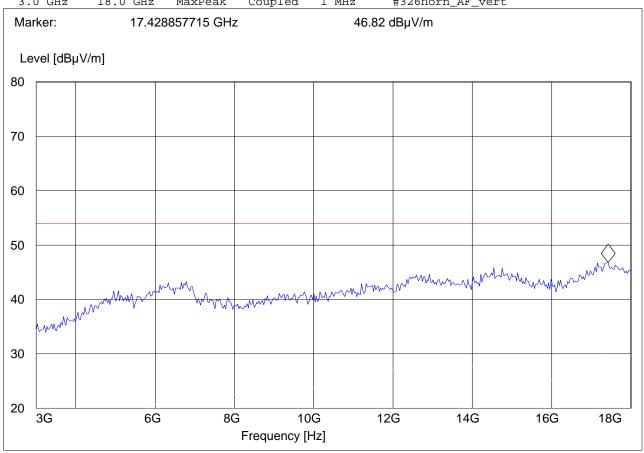
with 2.4 GHz notch filter Comments:

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

Start Stop Detector Meas. Transducer

Frequency Frequency Time Bandw.

3.0 GHz Coupled 1 MHz #326horn\_AF\_vert 18.0 GHz MaxPeak



EMC\_BROAD\_054\_08001\_DTS Test Report #:

2008-04-29 Date of Report: Page 37 of 51



# EMISSION LIMITATIONS - Radiated (Transmitter) §15.247 (d) & RSS-210(A8.5) Mid Channel (2437MHz): 3GHz – 18GHz

Olifant w/ BCM94312MCG EUT:

Customer:: Broadcom

G mode; ch.6; Main Test Mode:

ANT Orientation: H EUT Orientation: H Test Engineer: Chris Voltage: AC

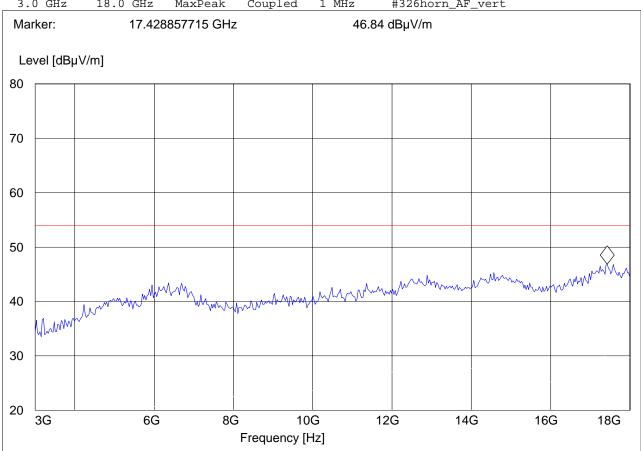
with 2.4 GHz notch filter Comments:

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

Start Stop Detector Meas. IF Transducer

Time Frequency Frequency Bandw.

3.0 GHz 18.0 GHz MaxPeak Coupled 1 MHz #326horn\_AF\_vert



2008-04-29 Date of Report: Page 38 of 51



# EMISSION LIMITATIONS - Radiated (Transmitter) §15.247 (d) & RSS-210(A8.5) Highest Channel (2462MHz): 3GHz – 18GHz

Olifant w/ BCM94312MCG EUT:

Customer:: Broadcom

Test Mode: G mode; ch.11; Main

ANT Orientation: H EUT Orientation: H Test Engineer: Chris Voltage: AC

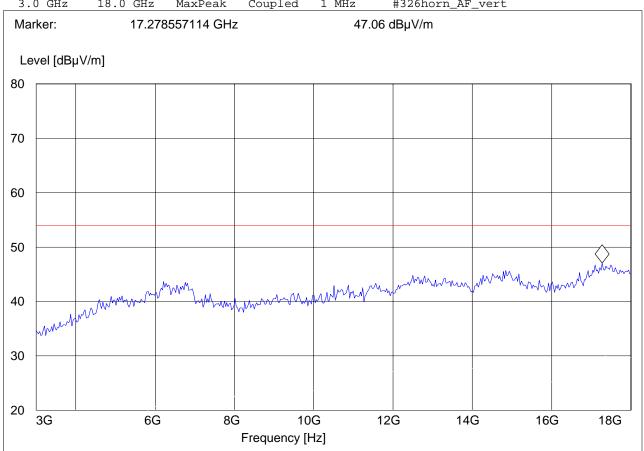
with 2.4 GHz notch filter Comments:

### 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



Date of Report: 2008-04-29 Page 39 of 51



# 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: Olifant w/ BCM94312MCG

Customer:: Broadcom

Test Mode: G mode; ch.6; Main

ANT Orientation: H EUT Orientation: H Test Engineer: Chris Voltage: AC

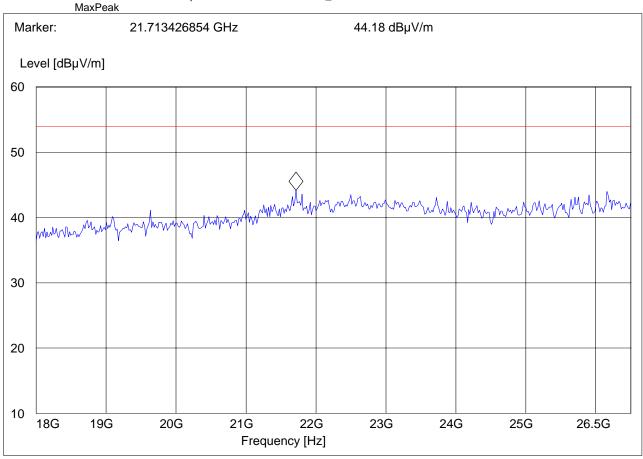
Comments: with 2.4 GHz notch filter

#### SWEEP TABLE: "FCC15.247\_18-26.5G"

Start Stop Detector Meas. IF Transducer

Frequency Frequency Time Bandw.

18.0 GHz 26.5 GHz MaxPeak Coupled 100 kHz Horn # 3116\_18-40G



Date of Report: 2008-04-29 Page 40 of 51



# **4.4.2 EMISSION LIMITATIONS - Radiated (Receiver)**

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

Date of Report: 2008-04-29 Page 41 of 51



# EMISSION LIMITATIONS - Radiated (Receiver) §15.247 (d) & RSS-210(A8.5) Horizontal: 30MHz – 1GHz

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

EUT: Olifant w/ BCM94312MCG

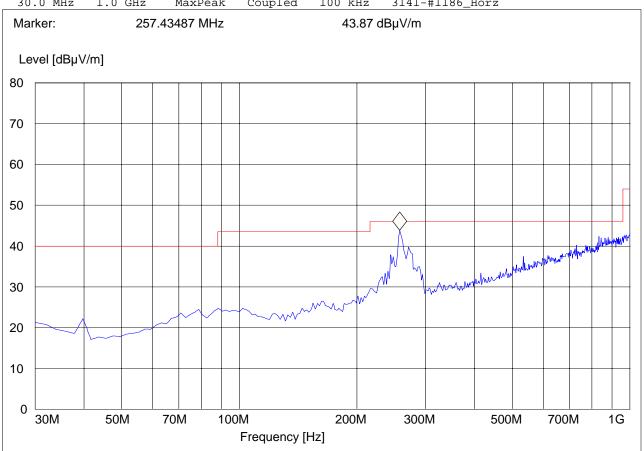
Customer:: Broadcom
Test Mode: CH 6; IDLE

ANT Orientation: H
EUT Orientation: H
Test Engineer: sam
Voltage: AC

Comments:

### 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



Date of Report: 2008-04-29 Page 42 of 51



# EMISSION LIMITATIONS - Radiated (Receiver) §15.247 (d) & RSS-210(A8.5)

**Vertical: 30MHz – 1GHz** 

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

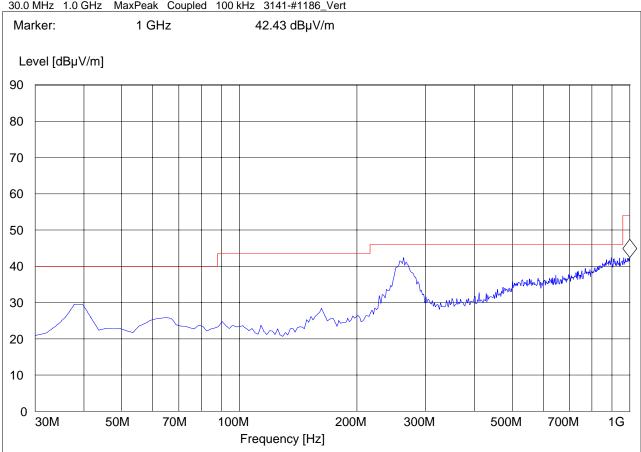
EUT: Olifant w/ BCM94312MCG

Customer:: Broadcom
Test Mode: CH 6; IDLE
ANT Orientation: V
EUT Orientation: H
Test Engineer: sam
Voltage: AC
Comments:

### 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\_Vert



2008-04-29 Date of Report: Page 43 of 51



#### **EMISSION LIMITATIONS - Radiated (Receiver)** §15.247 (d) & RSS-210(A8.5) 1GHz - 3GHz

EUT: Olifant w/ BCM94312MCG

Customer:: Broadcom CH 6; IDLE Test Mode: ANT Orientation: H EUT Orientation: H Test Engineer: sam Voltage: AC Comments:

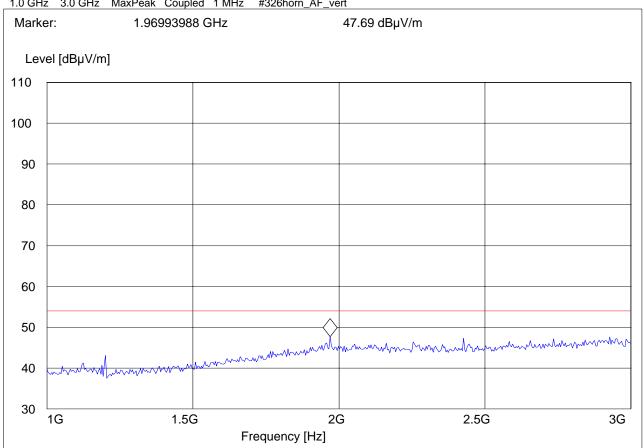
### SWEEP TABLE: "FCC15.247\_1-3G"

Start Stop Detector Meas. IF Transducer

Time Bandw.

Frequency Frequency Time Bandw.

1.0 GHz 3.0 GHz MaxPeak Coupled 1 MHz #326horn\_AF\_vert



Date of Report: 2008-04-29 Page 44 of 51



# EMISSION LIMITATIONS - Radiated (Receiver) §15.247 (d) & RSS-210(A8.5) $3 \mathrm{GHz} - 18 \mathrm{GHz}$

EUT: Olifant w/ BCM94312MCG

Customer:: Broadcom
Test Mode: CH 6; IDLE
ANT Orientation: H
EUT Orientation: H
Test Engineer: sam
Voltage: AC
Comments:

### 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 47.44 dBµV/m Level [dBµV/m] 70 60 50 40 30 20 3G 6G 8G 12G 14G 16G 18G 10G Frequency [Hz]

Date of Report: 2008-04-29 Page 45 of 51



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

### **LIMITS**

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

 $\S15.107$  (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 (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.

Date of Report: 2008-04-29 Page 46 of 51

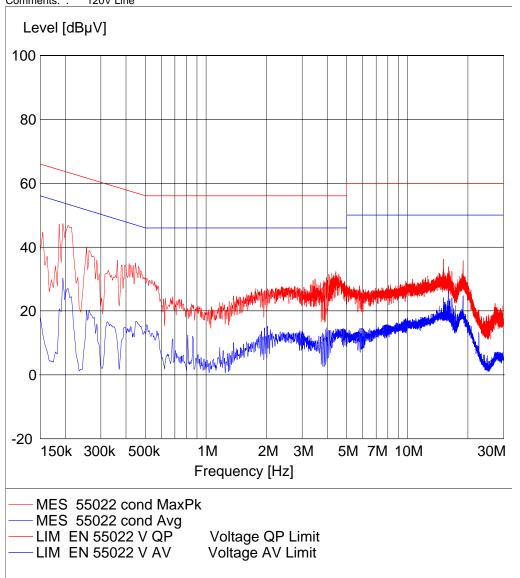


## Voltage Mains Test (Line) Tx

EUT: Olifant w/ BCM94312MCG

Manufacturer: Broadcom
Test Mode: G mode; ch.6; Main

ANT Orientation:: Conducted EUT Orientation:: H
Test Engineer:: Chris
Power Supply:: AC Adapter
Comments:: 120V Line



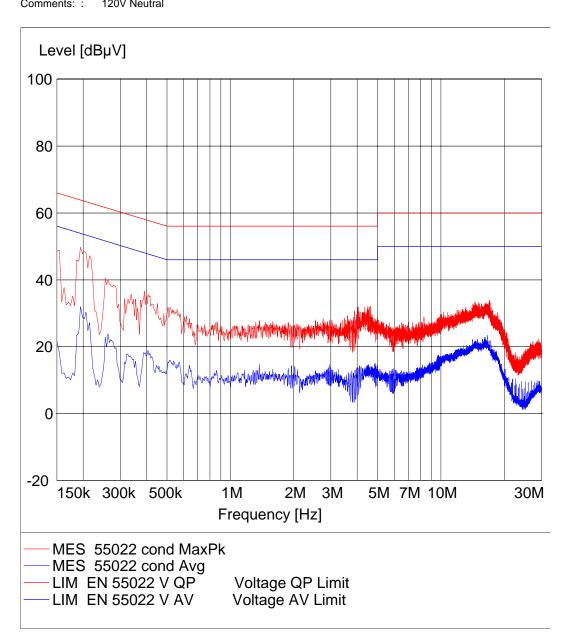
Date of Report: 2008-04-29 Page 47 of 51



## Voltage Mains Test (Neutral) Tx

EUT: Olifant w/ BCM94312MCG

Manufacturer: Broadcom
Test Mode: G mode; ch.6; Main
ANT Orientation:: Conducted
EUT Orientation:: H
Test Engineer:: Chris
Power Supply: CAC Adapter
Comments: 120V Neutral



Date of Report: 2008-04-29 Page 48 of 51



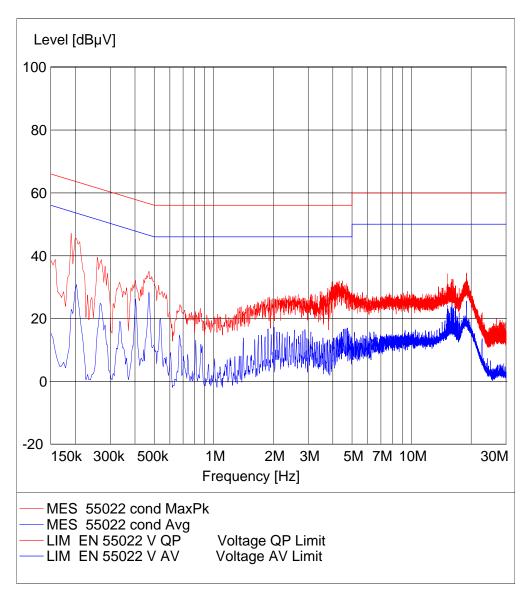
## Voltage Mains Test (Line) Rx

EUT: Olifant w/ BCM94312MCG

Manufacturer: Broadcom

Test Mode: G mode; ch.6; Main; Rx

ANT Orientation:: Conducted EUT Orientation:: H
Test Engineer:: Chris
Power Supply:: AC Adapter
Comments:: 120V Line



Date of Report: 2008-04-29 Page 49 of 51



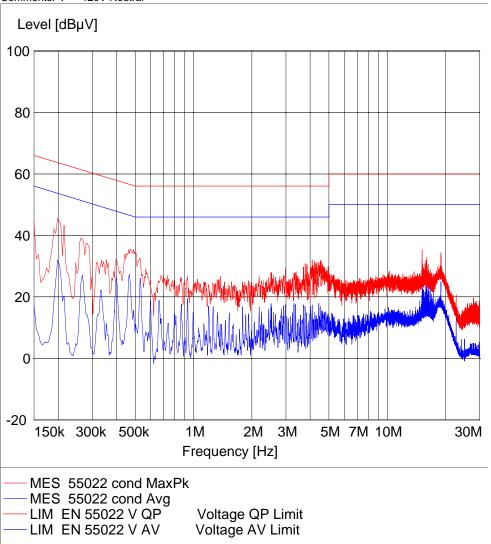
## Voltage Mains Test (Neutral) Rx

EUT: Olifant w/ BCM94312MCG

Manufacturer: Broadcom

Test Mode: G mode; ch.6; Main; Rx

ANT Orientation:: Conducted EUT Orientation:: H
Test Engineer:: Chris
Power Supply:: AC Adapter
Comments:: 120V Neutral



Date of Report: **2008-04-29** Page 50 of 51



# 5 TEST EQUIPMENT AND ANCILLARIES USED FOR TESTS

No	Instrument/Ancillary	Туре	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

Test Report #:

EMC\_BROAD\_054\_08001\_DTS

Date of Report: 2008-04-29 Page 51 of 51



# 6 BLOCK DIAGRAMS Radiated Testing

### ANECHOIC CHAMBER

