

# Electromagnetic Emissions Test Report Application for Grant of Equipment Authorization pursuant to

Industry Canada RSS-Gen Issue 1 / RSS 210 Issue 6 FCC Part 15, Subpart C Section 15.247(DTS)

> on the **Broadcom Corporation** Transmitter Model: BCM94321CB2

UPN: 4324A-BRCM1023

FCC ID: QDS-BRCM1023

GRANTEE: **Broadcom Corporation** 

> 190 Mathilda Avenue Sunnyvale, CA 94086

TEST SITE: Elliott Laboratories, Inc.

> 684 W. Maude Ave Sunnyvale, CA 94086

REPORT DATE: April 21, 2006

FINAL TEST DATE: April 11, April 12, April 13 and April 21, 2006

**AUTHORIZED SIGNATORY:** 

Senior EMC Engineer



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Equipment Name and Model:

Transceiver ,BCM94321CB2

#### Manufacturer:

Broadcom Corporation 190 Mathilda Avenue Sunnyvale, CA 94086

# Tested to applicable standard:

Industry Canada RSS-Gen Issue 1

RSS 210 Issue 6 "Low-power Licence-exempt Radiocommunication Devices (All

Frequency Bands): Category I Equipment"

RSS 310 Issue 1 "Low-power Licence-exempt Radiocommunication Devices (All

Frequency Bands): Category II Equipment"

# Test Report Prepared For:

David Boldy Broadcom Corporation 190 Mathilda Avenue Sunnyvale, CA 94086

Measurement Facility Description Filed With Department of Industry:

Departmental Acknowledgement Number: IC2845 SV2 Dated August 16, 2007

# **Declaration of Compliance**

I declare that the testing was performed or supervised by me; that the test measurements were made in accordance with the above mentioned departmental standards (through the use of ANSI C63.4: 2003 as referenced by FCC Part 15 and by section 1.0 of RSS-212, Issue 1, "Test Facilities and Test Methods for Radio Equipment" / RSS-Gen Issue 1); and that the equipment performed in accordance with the data submitted in this report.

Signature

Name

Chris Byleckie

Title Senior EMC Engineer

Elliott Laboratories Inc.

Address 684 W. Maude Ave

Sunnyvale, CA 94086

**USA** 

Date: April 21, 2006

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#### SCOPE

An electromagnetic emissions test has been performed on the Broadcom Corporation model BCM94321CB2 pursuant to the following rules:

Industry Canada RSS-Gen Issue 1 except for Rx spurious emissions RSS 210 Issue 6 "Low-power Licence-exempt Radiocommunication Devices (All Frequency Bands): Category I Equipment" FCC Part 15, Subpart C requirements for DTS devices

Conducted and radiated emissions data has been collected, reduced, and analyzed within this report in accordance with measurement guidelines set forth in the following reference standards and as outlined in Elliott Laboratories test procedures:

ANSI C63.4:2003 RSS-212 Issue 1 Test Facilities and Test Methods for Radio Equipment

The intentional radiator above has been tested in a simulated typical installation to demonstrate compliance with the relevant Industry Canada performance and procedural standards.

Final system data was gathered in a mode that tended to maximize emissions by varying orientation of EUT, orientation of power and I/O cabling, antenna search height, and antenna polarization.

Every practical effort was made to perform an impartial test using appropriate test equipment of known calibration. All pertinent factors have been applied to reach the determination of compliance.

The test results recorded herein are based on a single type test of the Broadcom Corporation model BCM94321CB2 and therefore apply only to the tested sample. The sample was selected and prepared by David Boldy of Broadcom Corporation

#### **OBJECTIVE**

The primary objective of the manufacturer is compliance with the regulations outlined in the previous section. Certification of these devices is required as a prerequisite to marketing in the US and Canada.

The primary objective of the manufacturer is compliance with the regulations outlined in the previous section. Certification of these devices is required as a prerequisite to marketing in the US. Devices categorized as Class II equipment do not require certification by Industry Canada.

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Certification is a procedure where the manufacturer submits test data and technical information to a certification body and receives a certificate or grant of equipment authorization upon successful completion of the certification body's review of the submitted documents. Once the equipment authorization has been obtained, the label indicating compliance must be attached to all identical units, which are subsequently manufactured.

Maintenance of compliance is the responsibility of the manufacturer. Any modification of the product which may result in increased emissions should be checked to ensure compliance has been maintained (i.e., printed circuit board layout changes, different line filter, different power supply, harnessing or I/O cable changes, etc.).

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# STATEMENT OF COMPLIANCE

The tested sample of Broadcom Corporation model BCM94321CB2 complied with the requirements of the following regulations:

Industry Canada RSS-Gen Issue 1 except for Rx emissions, which are not included in this report

RSS 210 Issue 6 "Low-power Licence-exempt Radiocommunication Devices (All Frequency Bands): Category I Equipment"

FCC Part 15, Subpart C requirements for DTS devices

Maintenance of compliance is the responsibility of the manufacturer. Any modification of the product which may result in increased emissions should be checked to ensure compliance has been maintained (i.e., printed circuit board layout changes, different line filter, different power supply, harnessing or I/O cable changes, etc.).

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# TEST RESULTS SUMMARY

# DIGITAL TRANSMISSION SYSTEMS (2400 – 2483.5MHz)

FCC Part 15 Reference	RSS Reference	Description	Measured Value / Comments	Limit / Requirement	Result
15.247(a)	RSS 210 A8.2	Digital Modulation	Systems uses MIMO / OFDM / DSSS techniques	-	Complies
15.247 (a) (2)	RSS 210 A8.2 (1)	6dB Bandwidth	10MHz Legacy 802.11b	>500kHz	Complies
15.247 (b) (3) Legacy 802.11b	RSS 210 A8.2 (4)	Output Power (multipoint systems)	18.5 dBm (0.071 Watts) EIRP = 0.94 W Note 1	1Watt, EIRP limited to 4 Watts.	Complies
15.247(d) Legacy 802.11b	RSS 210 A8.2 (2)	Power Spectral Density	-1.2 dBm / 3kHz	8dBm/3kHz	Complies
15.247 (b) (3) Legacy 802.11g	RSS 210 A8.2 (4)	Output Power (multipoint systems)	18.9 dBm (0.078 Watts) EIRP = 0.102 W Note	1Watt, EIRP limited to 4 Watts.	Complies
15.247(d) Legacy 802.11g	RSS 210 A8.2 (2)	Power Spectral Density	-2.4 dBm / 3kHz	8dBm/3kHz	Complies
15.247 (b) (3) MIMO 20MHz	RSS 210 A8.2 (4)	Output Power (multipoint systems)	21.4 dBm (0.137 Watts) EIRP = 0.18 W Note 1	1Watt, EIRP limited to 4 Watts.	Complies
15.247(d) MIMO 20MHz	RSS 210 A8.2 (2)	Power Spectral Density	5.0 dBm / 3kHz	8dBm/3kHz	Complies
15.247 (b) (3) MIMO 40MHz	RSS 210 A8.2 (4)	Output Power (multipoint systems)	18.8 dBm (0.076 Watts) EIRP = 0.1 W Note 1	1Watt, EIRP limited to 4 Watts.	Complies
15.247(d) MIMO 40MHz	RSS 210 A8.2 (2)	Power Spectral Density	-1.2 dBm / 3kHz	8dBm/3kHz	Complies
15.247(c)	RSS 210 A8.5	Antenna Port Spurious Emissions 30MHz – 25 GHz	<-30dBc	< -30dBc Note 2	Complies
15.247(c) / 15.209	RSS 210 A8.5	Radiated Spurious Emissions 30MHz – 25 GHz	53.96 dBuV/m @ 2390MHz (-0.04dB)	15.209 in restricted bands, all others <-30dBc Note 2	Complies

Note 1: EIRP calculated using antenna gain of -1.6 dBi for the highest EIRP multi-point system.

Note 2: Limit of -30dBc used because the power was measured using the UNII test procedure (maximum power averaged over a transmission burst) / RMS averaging over a time interval, as permitted under RSS 210 section A8.4(4).

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# GENERAL REQUIREMENTS APPLICABLE TO ALL BANDS

FCC Part 15 Section	RSS 210 Section	Description	Measured Value /	Limit /	Result
Section	Section		Comments	Requirement	(margin)
15.203	-	RF Connector	Integral antenna		Complies
15.109		Receiver spurious	N/A for FCC		N/A
13.109	-	emissions	requirements		IV/A
15.207		AC Conducted	49.1dBμV @ 0.161MHz	15.207	Complies
13.207		Emissions	(-6.3dB)	15.207	(- 6.3 dB)
15.247 (b) (5)		RF Exposure		Refer to OET	
15.407 (f) RSS 102		Requirements	Refer to SAR report	65, FCC Part 1	Complies
		Requirements		and RSS 102	

# **MEASUREMENT UNCERTAINTIES**

ISO Guide 17025 requires that an estimate of the measurement uncertainties associated with the emissions test results be included in the report. The measurement uncertainties given below were calculated using the approach described in CISPR 16-4-2:2003 using a coverage factor of k=2, which gives a level of confidence of approximately 95%. The levels were found to be below levels of *U*cispr and therefore no adjustment of the data for measurement uncertainty is required.

Measurement Type	Frequency Range (MHz)	Calculated Uncertainty (dB)
Conducted Emissions	0.15 to 30	± 2.4
Radiated Emissions Radiated Emissions	30 to 1000 1000 to 40000	± 3.6 ± 6.0

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# **EQUIPMENT UNDER TEST (EUT) DETAILS**

#### **GENERAL**

The Broadcom Corporation model BCM94321CB2 is a MIMO and legacy cardbus card that is designed to provide high speed wireless internet access. Since the EUT would be placed on a table top during operation, the EUT was treated as table-top equipment during testing to simulate the end-user environment. The EUT receives its power from the host computer. The electrical rating of the EUT is 120 - 240 Volts, 50/60 Hz, 1 Amps.

The sample was received on April 11, 2006 and tested on April 11, April 12, April 13 and April 21, 2006. The EUT consisted of the following component(s):

Manufacturer	Model	Description	Serial Number	FCC ID
Broadcom	BMC93321CB2	MIMO cardbus	-	

#### OTHER EUT DETAILS

The EUT is capable of operating in one of the following modes:

- **a.** Legacy 802.11b mode, only a single chain active
- b. Legacy 802.11g mode, only a single chain active
- c. MIMO mode, dual channels active, same data in each chain with CDD, 20 MHz channel
- d. MIMO mode, dual channels active, same data in each chain with CDD, 40 MHz channel
- e. MIMO mode, dual channels active, different data in each chain with SDM, 20 MHz channel
- f. MIMO mode, dual channels active, different data in each chain with SDM, 40 MHz channel

The following conditions were used for the test modes. Prior testing determined these to be the worst case for each mode

MCS –Modulation and Coding Scheme as defined by the draft 802.11n document CDD – Cyclic Delay Diversity –When the same data is sent over both chains the data is delayed :in one or both chains to reduce peaks and nulls in the antenna patterns and prevent beam forming

The UET does not support the 400nS Short Guard interval.

- a. Data rate -6Mbps, Modulation OFDM, single chain, single antenna
- b. Data rate -1Mbps, Modulation CCK, single chain, single antenna
- c. Data rate, 6.5Mbps, CDD MCS 0, Tx chains 1 and 2
- d. Data rate, 6Mbps, CDD MCS 32, Tx chains 1 and 2
- e. No testing was performed as the incoherent data on each channel would give field strength results lower than the coherent modes and Broadcom use the same power settings for both the coherent and in-coherent modes.
- f. No testing was performed as the incoherent data on each channel would give field strength results lower than the coherent modes and Broadcom use the same power settings for both the coherent and in-coherent modes.

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#### ANTENNA SYSTEM

The BCM94321CB2 has 2Tx/Rx antennas that are automatically selected for use per the MCS index and STF mode selections. Each antenna has a gain of -1.6dBi. The antennas are integral to the device.

# **ENCLOSURE**

The EUT does not have an enclosure as it is designed to be installed within the enclosure of a host computer.

#### **MODIFICATIONS**

The EUT did not require modifications during testing in order to comply with emissions specifications.

#### **SUPPORT EQUIPMENT**

The following equipment was used as local support equipment for radiated emissions testing:

Manufacturer	Model	Description	Serial Number	FCC ID
Hewlett Packard	zv6000	Laptop	CND52904S1	DoC
Hewlett Packard	Deskjet 3820	Printer	CN2451B1	DoC
Hewlett Packard	F3-0507013399C	AC/DC adaptor	CN2451B1	-

The following equipment was used as remote support equipment for radiated emissions testing:

Manufacturer	Model	Description	Serial Number	FCC ID
Netgear	EN104	Hub	ENT4B06271953	-

# **EUT INTERFACE PORTS**

The I/O cabling configuration during emissions testing was as follows:

Dort	Port Connected To		Cable(s)			
Port Connected To		Description	Shielded or Unshielded	Length(m)		
Laptop USB	Printer	Multiwire	Shielded	1.5		
Laptop Ethernet	Hub	CAT 5	Unshielded	10.0		
Laptop Power	AC Adapter	2 wire	Unshielded	2.0		
AC Adapter	AC Mains	3 wire	Unshielded	1.5		

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#### **EUT OPERATION**

During MIMO testing the EUT was transmitting simultaneously on two RF chains at either the low, 2412MHZ, the middle, 2437MHz, or the high, 2462MHz in either the 802.11b or 802.11g mode.

During legacy testing the EUT was transmitting on a single chain at either the low, 2412MHZ, the middle, 2437MHz, or the high, 2462MHz in either the 802.11b or 802.11g mode.

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#### TEST SITE

#### **GENERAL INFORMATION**

Final test measurements were taken on April 11, April 12, April 13 and April 21, 2006 at the Elliott Laboratories Open Area Test Site # located at 684 West Maude Avenue, Sunnyvale, California or 41039 Boyce Road, Fremont, California Pursuant to section 2.948 of the FCC's Rules and section 3.3 of RSP-100, construction, calibration, and equipment data has been filed with the Commission.

ANSI C63.4:2003 recommends that ambient noise at the test site be at least 6 dB below the allowable limits. Ambient levels are below this requirement with the exception of predictable local TV, radio, and mobile communications traffic. The test site contains separate areas for radiated and conducted emissions testing. Considerable engineering effort has been expended to ensure that the facilities conform to all pertinent requirements of ANSI C63.4:2003 and RSS 212.

#### **CONDUCTED EMISSIONS CONSIDERATIONS**

Conducted emissions testing is performed in conformance with ANSI C63.4:2003 and RSS 212. Measurements are made with the EUT connected to the public power network through a nominal, standardized RF impedance, which is provided by a line impedance stabilization network, known as a LISN. A LISN is inserted in series with each current-carrying conductor in the EUT power cord.

#### RADIATED EMISSIONS CONSIDERATIONS

The FCC has determined that radiation measurements made in a shielded enclosure are not suitable for determining levels of radiated emissions. Radiated measurements are performed in an open field environment or in a semi-anechoic chamber. The test sites are maintained free of conductive objects within the CISPR defined elliptical area incorporated in ANSI C63.4:2003 guidelines and meet the Normalized Site Attenuation (NSA) requirements of ANSI C63.4:2003 / RSS 212.

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#### MEASUREMENT INSTRUMENTATION

#### RECEIVER SYSTEM

An EMI receiver as specified in CISPR 16-1 is used for emissions measurements. The receivers used can measure over the frequency range of 9 kHz up to 2000 MHz. These receivers allow both ease of measurement and high accuracy to be achieved. The receivers have Peak, Average, and CISPR (Quasi-peak) detectors built into their design so no external adapters are necessary. The receiver automatically sets the required bandwidth for the CISPR detector used during measurements. If the repetition frequency of the signal being measured is below 20Hz, peak measurements are made in lieu of Quasi-Peak measurements.

For measurements above the frequency range of the receivers, a spectrum analyzer is utilized because it provides visibility of the entire spectrum along with the precision and versatility required to support engineering analysis. Average measurements above 1000MHz are performed on the spectrum analyzer using the linear-average method with a resolution bandwidth of 1 MHz and a video bandwidth of 10 Hz, unless the signal is pulsed in which case the average (or video) bandwidth of the measuring instrument is reduced to onset of pulse desensitization and then increased.

#### INSTRUMENT CONTROL COMPUTER

The receivers utilize either a Rohde & Schwarz EZM Spectrum Monitor/Controller or contain an internal Spectrum Monitor/Controller to view and convert the receiver measurements to the field strength at an antenna or voltage developed at the LISN measurement port, which is then compared directly with the appropriate specification limit. This provides faster, more accurate readings by performing the conversions described under Sample Calculations within the Test Procedures section of this report. Results are printed in a graphic and/or tabular format, as appropriate. A personal computer is used to record all measurements made with the receivers.

The Spectrum Monitor provides a visual display of the signal being measured. In addition, the controller or a personal computer run automated data collection programs which control the receivers. This provides added accuracy since all site correction factors, such as cable loss and antenna factors are added automatically.

#### LINE IMPEDANCE STABILIZATION NETWORK (LISN)

Line conducted measurements utilize a fifty microhenry Line Impedance Stabilization Network as the monitoring point. The LISN used also contains a 250 uH CISPR adapter. This network provides for calibrated radio frequency noise measurements by the design of the internal low pass and high pass filters on the EUT and measurement ports, respectively.

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#### **POWER METER**

Power measurements are made using either a power meter (typically with a peak power sensor) or as detailed in FCC KDB558074 using a spectrum analyzer and either the built-in channel power measurement function or software to integrate the power over the displayed spectrum.

When using the integration method the analyzer's internal function or software account for the equivalent noise bandwidth of the resolution bandwidth used when performing the integration. The bandwidths, detector (peak or sample) and trace data (max held or power averaging) are detailed in the test data. When using a power averaging function the device is either in a continuous transmit mode or the analyzer is configured to only sweep when the transmitter is active to ensure that the averaging is performed over a transmit burst and not over quiet periods.

#### FILTERS/ATTENUATORS

External filters and precision attenuators are often connected between the receiving antenna or LISN and the receiver. This eliminates saturation effects and non-linear operation due to high amplitude transient events.

#### **ANTENNAS**

A biconical antenna is used to cover the range from 30 MHz to 300 MHz and a log periodic antenna is utilized from 300 MHz to 1000 MHz. Narrowband tuned dipole antennas are used over the entire 30 to 1000 MHz range for precision measurements of field strength. Above 1000 MHz, a horn antenna is used. The antenna calibration factors are included in site factors programmed into the test receivers or incorporated into the test software.

#### ANTENNA MAST AND EQUIPMENT TURNTABLE

The antennas used to measure the radiated electric field strength are mounted on a non-conductive antenna mast equipped with a motor-drive to vary the antenna height.

ANSI C63.4:2003 and RSS 212 specify that the test height above ground for table mounted devices shall be 80 centimeters. Floor mounted equipment shall be placed on the ground plane if the device is normally used on a conductive floor or separated from the ground plane by insulating material from 3 to 12 mm if the device is normally used on a non-conductive floor. During radiated measurements, the EUT is positioned on a motorized turntable in conformance with this requirement.

#### INSTRUMENT CALIBRATION

All test equipment is regularly checked to ensure that performance is maintained in accordance with the manufacturer's specifications. All antennas are calibrated at regular intervals with respect to tuned half-wave dipoles. An exhibit of this report contains the list of test equipment used and calibration information.

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#### TEST PROCEDURES

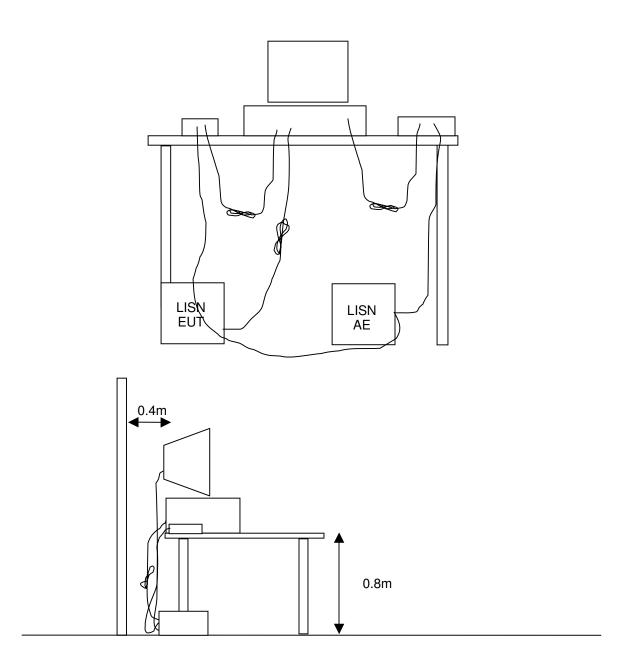
#### **EUT AND CABLE PLACEMENT**

The regulations require that interconnecting cables be connected to the available ports of the unit and that the placement of the unit and the attached cables simulate the worst case orientation that can be expected from a typical installation, so far as practicable. To this end, the position of the unit and associated cabling is varied within the guidelines of ANSI C63.4:2003, and the worst-case orientation is used for final measurements.

#### **CONDUCTED EMISSIONS**

Conducted emissions are measured at the plug end of the power cord supplied with the EUT. Excess power cord length is wrapped in a bundle between 30 and 40 centimeters in length near the center of the cord. Preliminary measurements are made to determine the highest amplitude emission relative to the specification limit for all the modes of operation. Placement of system components and varying of cable positions are performed in each mode. A final peak mode scan is then performed in the position and mode for which the highest emission was noted on all current carrying conductors of the power cord.

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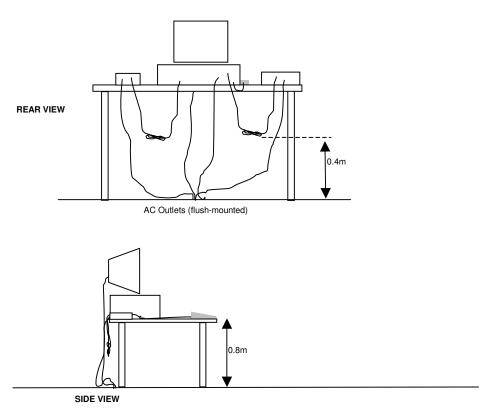
#### **RADIATED EMISSIONS**

Radiated emissions measurements are performed in two phases as well. A preliminary scan of emissions is conducted in which all significant EUT frequencies are identified with the system in a nominal configuration. At least two scans are performed from 30 MHz up to the frequency required by the regulation specified on page 1. One or more of these is with the antenna polarized vertically while the one or more of these is with the antenna polarized horizontally. During the preliminary scans, the EUT is rotated through 360°, the antenna height is varied and cable positions are varied to determine the highest emission relative to the limit. Preliminary scans may be performed in a fully anechoic chamber for the purposes of identifying the frequencies of the highest emissions from the EUT.

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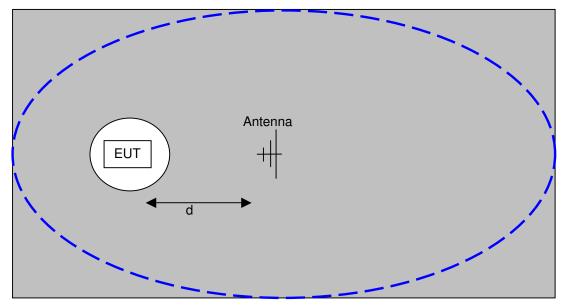
A speaker is provided in the receiver to aid in discriminating between EUT and ambient emissions. Other methods used during the preliminary scan for EUT emissions involve scanning with near field magnetic loops, monitoring I/O cables with RF current clamps, and cycling power to the EUT.

Final maximization is a phase in which the highest amplitude emissions identified in the spectral search are viewed while the EUT azimuth angle is varied from 0 to 360 degrees relative to the receiving antenna. The azimuth, which results in the highest emission is then maintained while varying the antenna height from one to four meters. The result is the identification of the highest amplitude for each of the highest peaks. Each recorded level is corrected in the receiver using appropriate factors for cables, connectors, antennas, and preamplifier gain. Emissions, which have values close to the specification limit may also be measured with a tuned dipole antenna to determine compliance.

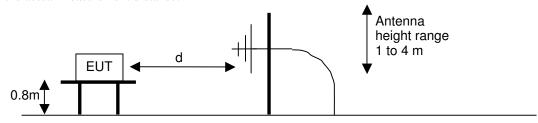


Typical Test Configuration for Radiated Field Strength Measurements

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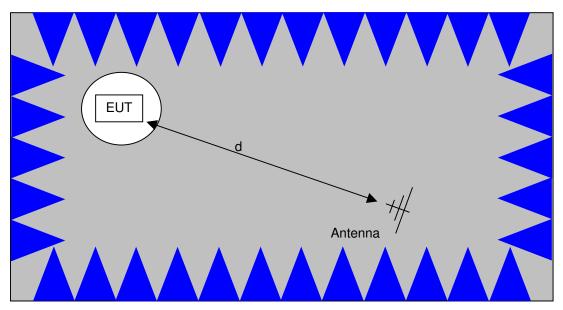


The ground plane extends beyond the ellipse defined in CISPR 16 / CISPR 22 / ANSI C63.4 and is large enough to accommodate test distances (d) of 3m and 10m. Refer to the test data tables for the actual measurement distance.



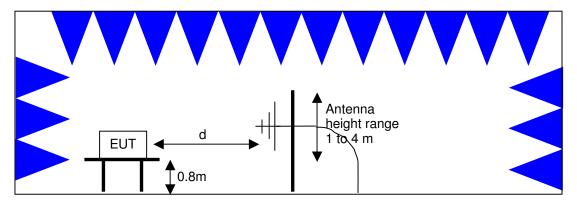
<u>Test Configuration for Radiated Field Strength Measurements</u>
<u>OATS- Plan and Side Views</u>

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The anechoic materials on the walls and ceiling ensure compliance with the normalized site attenuation requirements of CISPR 16 / CISPR 22 / ANSI C63.4 for an alternate test site at the measurement distances used.

Floor-standing equipment is placed on the floor with insulating supports between the unit and the ground plane.

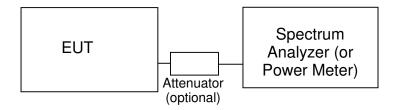


<u>Test Configuration for Radiated Field Strength Measurements</u> <u>Semi-Anechoic Chamber, Plan and Side Views</u>

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#### CONDUCTED EMISSIONS FROM ANTENNA PORT

Direct measurements of power, bandwidth and power spectral density are performed with the antenna port of the EUT connected to either the power meter or spectrum analyzer via a suitable attenuator and/or filter. These are used to ensure that the front end of the measurement instrument is not overloaded by the fundamental transmission.



Test Configuration for Antenna Port Measurements

Measurement bandwidths (video and resolution) are set in accordance with the relevant standards and Elliott's test procedures for the type of radio being tested.

If a power meter is used to make output power measurements the sensor head type (peak or average) is stated in the test data table.

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#### SPECIFICATION LIMITS AND SAMPLE CALCULATIONS

The limits for conducted emissions are given in units of microvolts, and the limits for radiated emissions are given in units of microvolts per meter at a specified test distance. Data is measured in the logarithmic form of decibels relative to one microvolt, or dB microvolts (dBuV). For radiated emissions, the measured data is converted to the field strength at the antenna in dB microvolts per meter (dBuV/m). The results are then converted to the linear forms of uV and uV/m for comparison to published specifications.

For reference, converting the specification limits from linear to decibel form is accomplished by taking the base ten logarithm, then multiplying by 20. These limits in both linear and logarithmic form are as follows:

# CONDUCTED EMISSIONS SPECIFICATION LIMITS: FCC 15.207; FCC 15.107(a), RSS GEN

The table below shows the limits for the emissions on the AC power line from an intentional radiator and a receiver.

Frequency (MHz)	Average Limit (dBuV)	Quasi Peak Limit (dBuV)
0.150 to 0.500	Linear decrease on logarithmic frequency axis between 56.0 and 46.0	Linear decrease on logarithmic frequency axis between 66.0 and 56.0
0.500 to 5.000	46.0	56.0
5.000 to 30.000	50.0	60.0

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# GENERAL RADIATED EMISSIONS SPECIFICATION LIMITS

The table below shows the limits for the spurious emissions from transmitters that fall in restricted bands<sup>1</sup> (with the exception of transmitters operating under FCC Part 15 Subpart D) and the limits for all emissions for a low power device operating under the general rules of RSS 310, RSS 210, FCC Part 15 Subpart C.

Frequency Range (MHz)	Limit (uV/m)	Limit (dBuV/m @ 3m)
0.009-0.490	2400/F <sub>KHz</sub> @ 300m	67.6-20*log <sub>10</sub> (F <sub>KHz</sub> ) @ 300m
0.490-1.705	24000/F <sub>KHz</sub> @ 30m	87.6-20*log <sub>10</sub> (F <sub>KHz</sub> ) @ 30m
1.705 to 30	30 @ 30m	29.5 @ 30m
30 to 88	100 @ 3m	40 @ 3m
88 to 216	150 @ 3m	43.5 @ 3m
216 to 960	200 @ 3m	46.0 @ 3m
Above 960	500 @ 3m	54.0 @ 3m

#### RADIATED SPURIOUS EMISSIONS - MOMENTARILY OPERATED DEVICES

The table below shows the limits for both the fundamental and spurious emissions for control signals. The limits for data signals, or signals with predetermined transmissions, are given in the second table

Operating Frequency (MHz)	Fundamental Field Strength (microvolts/m)	Spurious Emissions (microvolts/m)
70 - 130	1250	125
130 - 174	1250 - 3750	125 - 375
174 – 260	3750	375
260 – 470	3750 – 12,500	375 - 1250
Above 470	12,500	1250

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<sup>&</sup>lt;sup>1</sup> The restricted bands are detailed in FCC 15.203, RSS 210 Table 1 and RSS 310 Table 2

# Spurious Emissions Limits - Control Signals

Operating Frequency (MHz)	Fundamental Field Strength (microvolts/m)	Spurious Emissions (microvolts/m)
70 - 130	500	50
130 - 174	500 - 1500	50 - 150
174 – 260	1500	150
260 – 470	1500 – 5000	150 - 500
Above 470	5000	500

Spurious Emissions Limits – Data Signals

# RADIATED SPURIOUS LIMITS - FIELD DISTURBANCE SENSORS

The table below shows the limits for both the Fundamental and Harmonic emissions for each frequency band of operation detailed in Section 15.231 (b) and RSS 210 Annex 7.

Operating Frequency (MHz)	Fundamental Field strength (Average) (mV/m)	Field Strength of harmonics (Average) (mV/m)
902 - 928	500	1.6
2435 - 2465	500	1.6
5785 - 58150	500	1.6
10500 - 10550	2500	25
24075-24175	2500	25

Harmonics that fall in the restricted bands (with the exception of those falling in restricted bands above 17.7GHz), and all other spurious emissions are required to meet the general radiated emissions limits. The limits for harmonics above 17.7GHz are 7.5mV/m, although indoor use devices operating in the 24Ghz band are allowed to meet a relaxed limit of 25mV/m at the second and third harmonics.

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#### RECEIVER SPURIOUS EMISSIONS SPECIFICATION LIMITS

The table below shows the limits for emissions from the receiver as detailed in FCC Part 15.109.

Frequency Range (MHz)	Limit (uV/m @ 3m)	Limit (dBuV/m @ 3m)
30 to 88	100	40
88 to 216	150	43.5
216 to 960	200	46.0
Above 960	500	54.0

#### RADIATED SPURIOUS EMISSIONS SPECIFICATION LIMITS - 15.249 and RSS 210 A2.9

The table below shows the limits for the fundamental emission and for its harmonics. Harmonics that that fall in restricted bands<sup>1</sup> and all other spurious emissions are subject to the general limits of RSS 210 and FCC Part 15 Subpart C.

Frequency Range (MHz)	Limit for Fundamental @ 3m	Limit for Harmonics @ 3m
902 - 928	50,000 uV/m 94dBuV/m	500 uV/m 54dBuV/m
2400 – 2483.5	50,000 uV/m 94dBuV/m	500 uV/m 54dBuV/m
5725 - 5850	50,000 uV/m 94dBuV/m	500 uV/m 54dBuV/m

#### **OUTPUT POWER LIMITS - DIGITAL TRANSMISSION SYSTEMS**

The table below shows the limits for output power and output power density. Where the signal bandwidth is less than 20 MHz the maximum output power is reduced to the power spectral density limit plus 10 times the log of the bandwidth (in MHz).

Operating Frequency (MHz)	Output Power	Power Spectral Density
902 – 928	1 Watt (30 dBm)	8 dBm/3kHz
2400 – 2483.5	1 Watt (30 dBm)	8 dBm/3kHz
5725 – 5850	1 Watt (30 dBm)	8 dBm/3kHz

The maximum permitted output power is reduced by 1dB for every dB the antenna gain exceeds 6dBi. Fixed point-to-point applications using the 5725 – 5850 MHz band are not subject to this restriction.

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<sup>&</sup>lt;sup>1</sup> The restricted bands are detailed in FCC 15.203, RSS 210 Table 1 and RSS 310 Table 2

#### **OUTPUT POWER LIMITS - FHSS SYSTEMS**

The table below shows the limits for output power based on the number of channels available for the hopping system.

Operating Frequency (MHz)	Number of Channels	Output Power
902 – 928	≥ 50	1 Watt (30 dBm)
902 – 928	25 to 49	0.25 Watts (24 dBm)
2400 – 2483.5	≥ 75	1 Watt (30 dBm)
2400 – 2483.5	< 75	0.125 Watts (21 dBm)
5725 – 5850	75	1 Watt (30 dBm)

The maximum permitted output power is reduced by 1dB for every dB the antenna gain exceeds 6dBi. Fixed point-to-point applications using the 5725 – 5850 MHz band are not subject to this restriction.

#### TRANSMIT MODE SPURIOUS RADIATED EMISSIONS LIMITS - FHSS and DTS SYSTEMS

The limits for unwanted (spurious) emissions from the transmitter falling in the restricted bands are those specified in the general limits sections of FCC Part 15 and RSS 210. All other unwanted (spurious) emissions shall be at least 20dB below the level of the highest in-band signal level (30dB if the power is measured using the sample detector/power averaging method).

# FCC 15.407 (a) OUTPUT POWER LIMITS

The table below shows the limits for output power and output power density. Where the signal bandwidth is less than 20 MHz the maximum output power is reduced to the power spectral density limit plus 10 times the log of the bandwidth (in MHz).

Operating Frequency (MHz)	Output Power	Power Spectral Density
5150 - 5250	50mW (17 dBm)	4 dBm/MHz
5250 - 5350	250 mW (24 dBm)	11 dBm/MHz
5725 – 5825	1 Watts (30 dBm)	17 dBm/MHz

For system using antennas with gains exceeding 6dBi, the output power and power spectral density limits are reduced by 1dB for every dB the antenna gain exceeds 6dBi. Fixed point-to-point applications using the 5725 – 5825 MHz band may use antennas with gains of up to 23dBi without this limitation. If the gain exceeds 23dBi then the output power limit of 1 Watt is reduced by 1dB for every dB the gain exceeds 23dBi.

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#### **OUTPUT POWER AND SPURIOUS LIMITS -LE-LAN DEVICES**

The table below shows the limits for output power and output power density defined by RSS 210. Where the signal bandwidth is less than 20 MHz the maximum output power is reduced to the power spectral density limit plus 10 times the log of the bandwidth (in MHz).

Operating Frequency	Output Power	Power Spectral
(MHz)		Density
5150 - 5250	200mW (23 dBm) eirp	10 dBm/MHz
5250 - 5350	250 mW (24 dBm) <sup>1</sup>	11 dBm/MHz
3230 - 3330	1W (30dBm) eirp	11 UDIII/WIIIZ
5725 – 5825	1 Watts (30 dBm)	17 dBm/MHz
3123 - 3623	4W eirp	1 / UDIII/IVITIZ

Fixed point-to-point applications using the 5725 – 5825 MHz band may use antennas with gains of up to 23dBi without this limitation. If the gain exceeds 23dBi then the output power limit of 1 Watt is reduced by 1dB for every dB the gain exceeds 23dBi.

#### **OUTPUT POWER AND SPURIOUS LIMITS – UNII DEVICES**

The table below shows the limits for output power and output power density defined by FCC Part 15 Subpart E. Where the signal bandwidth is less than 20 MHz the maximum output power is reduced to the power spectral density limit plus 10 times the log of the bandwidth (in MHz).

Operating Frequency	Output Power	Power Spectral
(MHz)		Density
5150 - 5250	50mW (17 dBm)	10 dBm/MHz
5250 - 5350	250 mW (24 dBm)	11 dBm/MHz
5725 - 5825	1 Watts (30 dBm)	17 dBm/MHz

For system using antennas with gains exceeding 6dBi, the output power and power spectral density limits are reduced by 1dB for every dB the antenna gain exceeds 6dBi. Fixed point-to-point applications using the 5725 – 5825 MHz band may use antennas with gains of up to 23dBi without this limitation. If the gain exceeds 23dBi then the output power limit of 1 Watt is reduced by 1dB for every dB the gain exceeds 23dBi.

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<sup>&</sup>lt;sup>1</sup> If EIRP exceeds 500mW the device must employ TPC

#### **SAMPLE CALCULATIONS - CONDUCTED EMISSIONS**

Receiver readings are compared directly to the conducted emissions specification limit (decibel form) as follows:

$$R_r - S = M$$

where:

 $R_r$  = Receiver Reading in dBuV

S = Specification Limit in dBuV

M = Margin to Specification in +/- dB

#### SAMPLE CALCULATIONS - RADIATED EMISSIONS

Receiver readings are compared directly to the specification limit (decibel form). The receiver internally corrects for cable loss, preamplifier gain, and antenna factor. The calculations are in the reverse direction of the actual signal flow, thus cable loss is added and the amplifier gain is subtracted. The Antenna Factor converts the voltage at the antenna coaxial connector to the field strength at the antenna elements.

A distance factor, when used for electric field measurements above 30MHz, is calculated by using the following formula:

$$F_d = 20*LOG_{10} (D_m/D_s)$$

where:

 $F_d$  = Distance Factor in dB

 $D_m$  = Measurement Distance in meters

 $D_S$  = Specification Distance in meters

For electric field measurements below 30MHz the extrapolation factor is either determined by making measurements at multiple distances or a theoretical value is calculated using the formula:

$$F_d = 40*LOG_{10} (D_m/D_s)$$

Measurement Distance is the distance at which the measurements were taken and Specification Distance is the distance at which the specification limits are based. The antenna factor converts the voltage at the antenna coaxial connector to the field strength at the antenna elements.

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The margin of a given emission peak relative to the limit is calculated as follows:

$$R_c = R_r + F_d$$

and

$$M = R_c - L_s$$

where:

 $R_r$  = Receiver Reading in dBuV/m

 $F_d$  = Distance Factor in dB

 $R_c$  = Corrected Reading in dBuV/m

 $L_S$  = Specification Limit in dBuV/m

M = Margin in dB Relative to Spec

#### SAMPLE CALCULATIONS - FIELD STRENGTH TO EIRP CONVERSION

Where the radiated electric field strength is expressed in terms of the equivalent isotropic radiated power (eirp), or where a field strength measurement of output power is made in lieu of a direct measurement, the following formula is used to convert between eirp and field strength at a distance of 3m from the equipment under test:

$$E = \underline{1000000 \sqrt{30 P}} \quad \text{microvolts per meter}$$

where P is the eirp (Watts)

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# EXHIBIT 1: Test Equipment Calibration Data

2 Pages

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•	- 16,000 MHz, 11-Apr-06 and 12-Apr-06			
Engineer: Juan Martinez				
<u>Manufacturer</u>	<u>Description</u>	Model #	Asset #	Cal Due
Hewlett Packard	Microwave Preamplifier, 1-26.5GHz	8449B	263	16-Jan-07
Hewlett Packard	EMC Spectrum Analyzer 9KHz-26.5GHz, non programmable	8563E	284	22-Apr-06
EMCO	Horn Antenna, D. Ridge 1-18GHz	3115	868	20-Apr-06
Rohde & Schwarz	EMI Test Receiver, 20Hz-7GHz	ESIB7	1630	28-Dec-06
Micro-Tronics	Band Reject Filter, 2400-2500MHz	BRM50702-02	1731	09-Jun-06
Radiated Emissions, 16,00	00 - 26,500 MHz, 21-Apr-06			
Engineer: Juan Martinez				
<u>Manufacturer</u>	<u>Description</u>	Model #	Asset #	Cal Due
Hewlett Packard	Microwave Preamplifier, 1-26.5GHz	8449B	785	26-Apr-06
EMCO	Horn Antenna, D. Ridge 1-18GHz	3115	786	28-Nov-06
Hewlett Packard	EMC Spectrum Analyzer 9kHz - 40 GHz, Purple (SA40)	8564E (84125C)	1771	02-Aug-06
Hewlett Packard	Microwave EMI test system head lincludes W1 - W4 Purple	84125C	1772	04-Nov-06
EMCO	Horn antenna, 18-26.5 GHz (SA40 9kHz), Purple	3160-09 (84125C	1773	16-Nov-06
Antenna Conducted Emiss	sions, 21-Apr-06			
Engineer: Juan Martinez				
<u>Manufacturer</u>	Description  FMC Spectrum Applyment 2011 - 40CHz Supplyfulle	Model #	Asset #	Cal Due
Hewlett Packard	EMC Spectrum Analyzer 30Hz -40GHz, Sunnyvale (SA40) Red	8564E (84125C)	1148	09-Sep-06
Rohde & Schwarz	Power Meter, Single Channel	NRVS	1534	01-Mar-07
Rohde & Schwarz	Power Sensor 100uW - 10 Watts	NRV-Z53	1796	31-Jan-07

Radiated Emissions, 30 - 1,000 MHz, 13-Apr-06
Engineer: Chris Byleckie

Manufacturer **Description** Model # Asset # Cal Due Com-Power Corp. PA-103 07-Jun-06 Pre Amplifier, 30-1000MHz 1632 Rohde & Schwarz EMI Test Receiver, 20Hz-7GHz ESIB7 1630 28-Dec-06 Sunol Sciences Biconilog, 30-3000MHz JB3 1549 26-Apr-06

Conducted Emissions - AC Power Ports, 21-Apr-06

**Engineer: Juan Martinez** 

Manufacturer Asset # Cal Due **Description** Model # Elliott Laboratories FCC / CISPR LISN LISN-3, OATS 304 08-Jul-06 Rohde & Schwarz Pulse Limiter ESH3 Z2 372 06-Sep-06 LISN 08-Jul-06 Solar Electronics 8028-50-TS-24-BNC support 904 EMC Spectrum Analyzer, 9KHz - 22GHz 8593EM 17-Apr-07 Hewlett Packard 1319 Rohde & Schwarz Test Receiver, 0.009-2750 MHz **ESN** 1332 23-May-06

# EXHIBIT 2: Test Measurement Data

T63729\_radio 159 Pages T63589\_digitial 8 Pages

File: R63700 Exhibit Page 2 of 11

EMC Test Data
Job Number: J63498
T-Log Number: T63729
Account Manager: Esther Zhu
Class: Radio
Environment:

# **EMC Test Data**

For The

# **Broadcom Corporation**

Model

BCM94321CB2

Date of Last Test:

$E_{I}$	lliot	t
	Client: D	ro

# **EMC Test Data**

_			
Client:	Broadcom Corporation	Job Number:	J63498
Model:	BCM94321CB2	T-Log Number:	T63729
	BOW19432 TOB2	Account Manger:	Esther Zhu
Contact:	David Boldy		
Emissions Spec:	FCC 15.247	Class:	Radio
Immunity Spec:	Enter immunity spec on cover	Environment:	enter on cover

# **EUT INFORMATION**

# **General Description**

The EUT is a MIMO and legacy cardbus card that is designed to provide high speed wireless internet access. Since the EUT would be placed on a table top during operation, the EUT was treated as table-top equipment during testing to simulate the enduser environment. The EUT receives its power from the host computer. The electrical rating of the EUT is 120 - 240 Volts, 50/60 Hz, 1 Amps.

**Equipment Under Test** 

Manufacturer	Model	Description	Serial Number	FCC ID
Broadcom	BMC93321CB2	MIMO cardbus	-	TBD

#### Other EUT Details

#### Switch antenna

wl nphy\_txant\_config 0X0202 (Main and Middle) wl nphy\_txant\_config 0X1212 (Aux and Middle)

Use SAR folder for programing radio

# **EUT Antenna**

The EUT has 2Tx/Rx antennas that are automatically selected for use per the MCS index and STF mode selections. Each antenna has a gain of -1.6dBi. The antennas are integral to the device.

#### **EUT Enclosure**

The EUT does not have an enclosure as it is designed to be installed within the enclosure of a host computer.

# **Modification History**

Mod.#	Test	Date	Modification
1	-	-	None
2			
3			

Modifications applied are assumed to be used on subsequent tests unless otherwise stated as a further modification.

Elliot	t		EM	C Test Data
Client:	Broadcom Corporation		Job Number:	J63498
Model:	BCM94321CB2		T-Log Number:	T63729
BCM94321CB2			Account Manger:	Esther Zhu
	David Boldy			
Emissions Spec:				Radio
Immunity Spec:	Enter immunity spec on o	cover	Environment:	enter on cover
	Lo	ocal Support Equipm	nent	
	Lo	ocal Support Equipm	nent	
Manufacturer Hewlett Packard	Model	Description  Laptop	Serial Number	FCC ID DoC
Manufacturer Hewlett Packard			_	FCC ID DoC
Hewlett Packard	Model zv6000	Description	Serial Number CND52904S1  ment	DoC
Hewlett Packard  Manufacturer	Model zv6000	Description Laptop	Serial Number CND52904S1	
Hewlett Packard	Model zv6000	Description Laptop  mote Support Equip	Serial Number CND52904S1  ment	DoC
Hewlett Packard  Manufacturer	Model zv6000	Description Laptop  mote Support Equip Description	Serial Number CND52904S1  ment Serial Number	DoC
Hewlett Packard  Manufacturer	Model zv6000	Description Laptop  mote Support Equip	Serial Number CND52904S1  ment Serial Number	DoC

# **EUT Operation During Transmitter Tests**

2 wire

Unshielded

During MIMO testing the EUT was transmitting simultaneously on two RF chains at either the low, 2412MHZ, the middle, 2437MHz, or the high, 2462MHz in either the 802.11b or 802.11g mode.

During legacy testing the EUT was transmitting on a single chain at either the low, 2412MHZ, the middle, 2437MHz, or the high, 2462MHz in either the 802.11b or 802.11g mode.

Laptop Power

AC Adapter

2.0

# **Elliott**

# **EMC** Test Data

_			
Client:	Broadcom Corporation	Job Number:	J63498
Model:	BCM94321CB2	T-Log Number:	T63729
	BOW19432 TOB2	Account Manger:	Esther Zhu
Contact:	David Boldy		
Emissions Spec:	FCC 15.247	Class:	Radio
Immunity Spec:	Enter immunity spec on cover	Environment:	enter on cover

### **Test Configuration #2**

The following information was collected during the test sessions(s).

### **Local Support Equipment**

Manufacturer	Manufacturer Model Description		Serial Number	FCC ID
Hewlett Packard	zv6000	Laptop	CND52904S1	DoC
Hewlett Packard	Deskjet 3820	Printer	CN2451B1	DoC
Hewlett Packard	F3-0507013399C AC/DC adaptor		CN2451B1	-

### **Remote Support Equipment**

Manufacturer	Model	Description	Serial Number	FCC ID
Netgear	EN104	Hub	ENT4B06271953	-

### **Cabling and Ports**

	Cabinity and Forte							
Port	Connected To		Cable(s)					
		Description	Shielded or Unshielded	Length(m)				
Laptop USB	Printer	Multiwire	Shielded	1.5				
Laptop Ethernet	Hub	CAT 5	Unshielded	10.0				
Laptop Power	AC Adapter	2 wire	Unshielded	2.0				
AC adpater	AC Mains	3 wire	Unshielded	1.5				

### **EUT Operation During Transmitter Tests**

During MIMO testing the EUT was transmitting simultaneously on two RF chains at either the low, 2412MHZ, the middle, 2437MHz, or the high, 2462MHz in either the 802.11b or 802.11g mode.

During legacy testing the EUT was transmitting on a single chain at either the low, 2412MHZ, the middle, 2437MHz, or the high, 2462MHz in either the 802.11b or 802.11g mode.

C I	Elliott
Client:	Broadcom Corporation
Madalı	DCM04224CD2

# **EMC Test Data**

Client:	Broadcom Corporation	Job Number:	J63498
Model:	BCM94321CB2	T-Log Number:	T63729
	DOWI9432 TOD2	Account Manager:	Esther Zhu
Contact:	David Boldy		
Spec:	FCC 15.247	Class:	N/A

### FCC 15.247 DTS - Power, Bandwidth and Spurious Emissions

### **Test Specifics**

Objective: The objective of this test session is to perform final qualification testing of the EUT with respect to the

specification listed above.

Date of Test: 4/21/2006 Config. Used: 1
Test Engineer: Jmartinez Config Change: None
Test Location: Chamber #2 EUT Voltage: 120V, 60Hz

### General Test Configuration

The EUT was connected to the spectrum analyzer or power meter via a suitable attenuator. For the spurious emissions all transmit chains were connected simultaneously to the analyzer via a combiner. All other measurements were made on a single chain.

All measurements are corrected to allow for the external attenuators used.

Ambient Conditions: Temperature: 17 °C

Rel. Humidity: 57 %

### **Summary of Results**

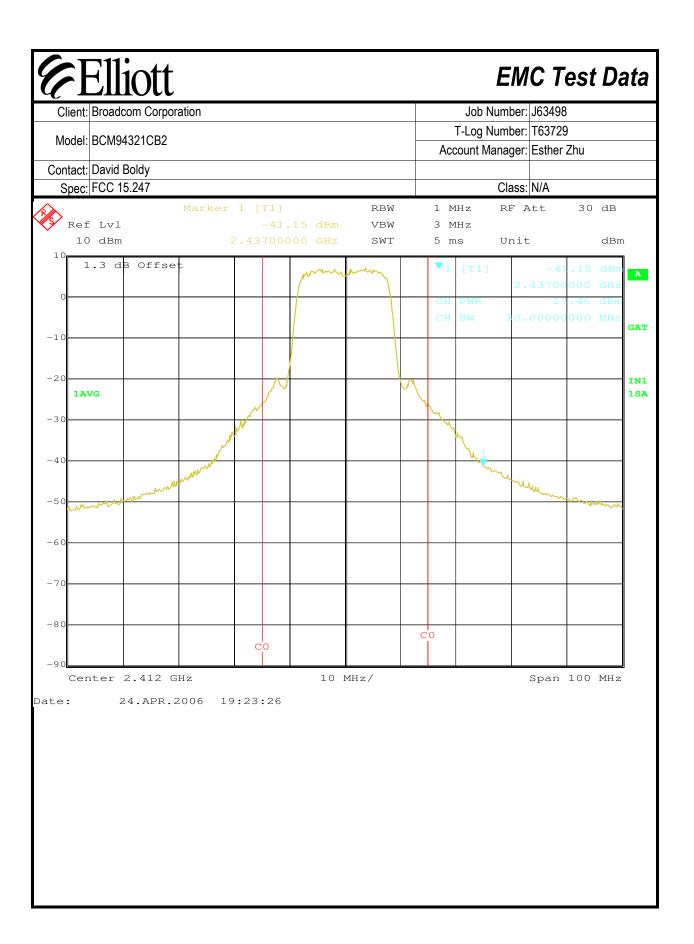
Run #	Test Performed	Limit	Pass / Fail	Result / Margin
1	Output Power	15.247(b)	Pass	Refer to run
2	Power Spectral Density (PSD)	15.247(d)	Pass	Refer to run
3	6dB Bandwidth	15.247(a)	Pass	Refer to run
4	Spurious emissions	15.247(b)	Pass	Refer to run

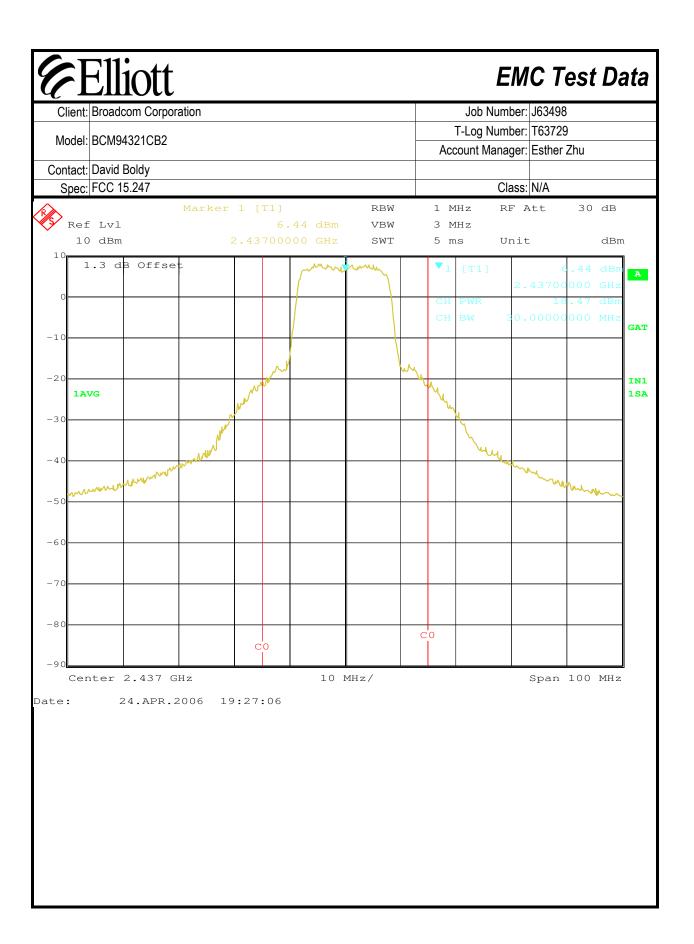
### **Modifications Made During Testing:**

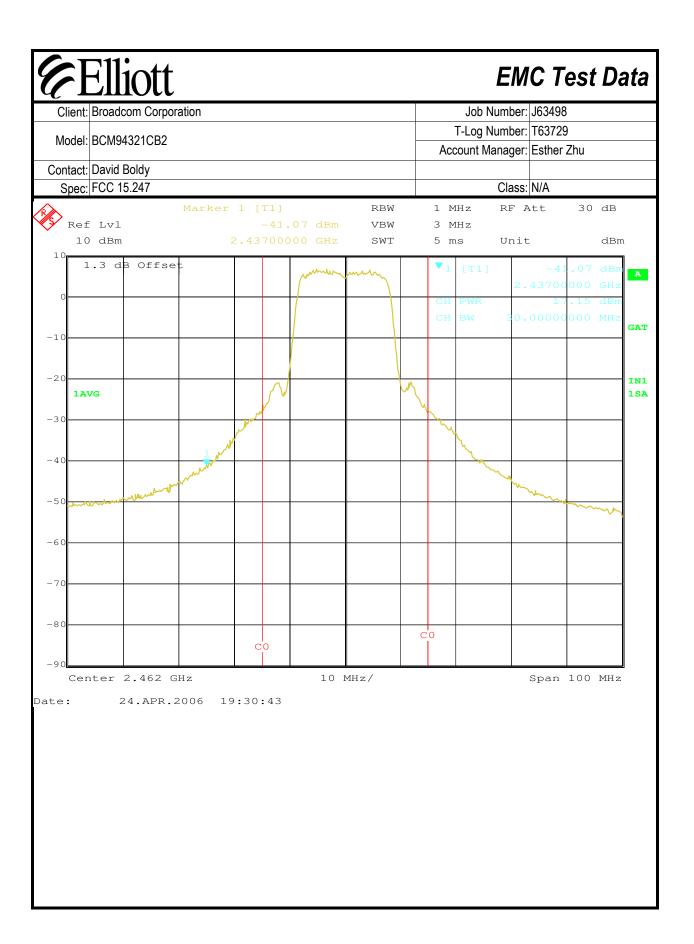
No modifications were made to the EUT during testing

### **Deviations From The Standard**

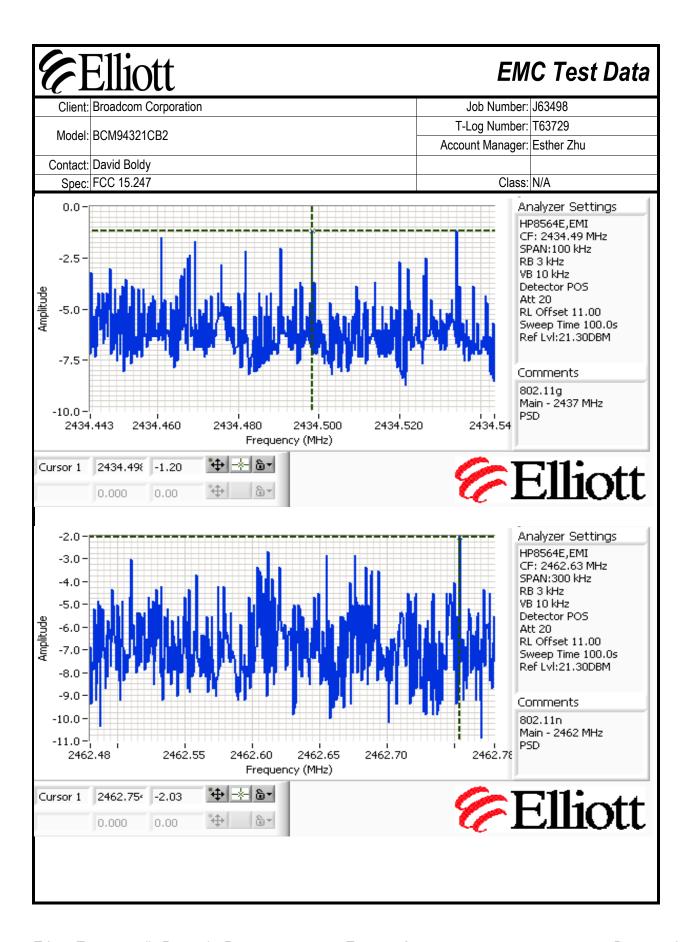
Model: BCM94321CB2    T-Log Number: Te3729   Account Manager: Esther Zhu	Cileiii	: Broadcom Corpora	ation				J	ob Number:	J63498	
Model: BCM94321CB2  Contact: David Boldy Spec: FCC 15.247  Class: N/A  Itun #1: Output Power  Transmitted signal on chain is coherent? No  Regulatory Power Measurements:  Power Setting 4 Frequency (MHz) Chain 1 Chain 2 Total Chain 1 Chain 2 Total dBm W  2412 17.4 17.4 -1.6 - 15.9 0.03  2437 18.5 18.5 -1.6 - 16.9 0.04  2462 17.1 17.1 -1.6 - 15.6 0.03  Output power measured using a spectrum analyzer (see plots below):  RBW=1MHz, VB=3 MHz, sample detector, power averaging on (transmitted signal was not continuous but the ES analyzer was configured with a gated sweep such that the analyzer was only sweeping when the device was transmisting) and power integration over 30 MHz  EIRP - if transmit chains are coherent then the EIRP is calculated from the sum of the antenna gains plus the total power (i.e. beam-forming is assumed because of coherency on the chains). If the individual chains are incoherent then the EIRP for each chain.  If the transmit chains are coherent then the total system antenna gain is not applicable as each transmit chains are incoherent then the system antenna gain is not applicable as each transmit chain and the readed independently.  Power setting - if a single number the same power setting was used for each chain. If multiple numbers the power setting for each chain is spearated by a comma (e.g. x, y would indictae power setting x for chain 1, power setting x for chai							-			
Contact: David Boldy Spec: FCC 15.247  Class: N/A  Iun #1: Output Power  fransmitted signal on chain is coherent? No  Regulatory Power Measurements:  Power Setting4  Frequency (MHz)  Chain 1 Chain 2 Total Chain 1 Chain 2 Total dBm W  2412 17.4 17.4 -1.6 - 15.9 0.03  2437 18.5 18.5 -1.6 - 16.9 0.04  2462 17.1 17.1 -1.6 - 15.6 0.03  Output power measured using a spectrum analyzer (see plots below):  RBW=1MHz, VB=3 MHz, sample detector, power averaging on (transmitted signal was not continuous but the ES analyzer was configured with a gated sweep such that the analyzer was only sweeping when the device was transmitting) and power integration over 30 MHz  EIRP - if transmit chains are coherent then the EIRP is calculated from the sum of the antenna gains plus the total power (i.e. beam-forming is assumed because of coherency on the chains). If the individual chains are incoherent then the EIRP is calculated from the sum of the numeric gains for each antenna. If the transmit chains are coherent then the total system antenna gain is the sum of the numeric gains for each antenna. If the transmit chains are incoherent then the system antenna gain is not applicable as each transmit chain be treated independently.  Power setting - if a single number the same power setting was used for each chain. If multiple numbers the power setting for each chain is spearated by a comma (e.g. x,y would indictae power setting x for chain 1, power setting	Model	: BCM94321CB2						_		
un #1: Output Power ransmitted signal on chain is coherent? No egulatory Power Measurements:  Power Setting  Frequency (MHz)  Chain 1 Chain 2 Total Chain 1 Chain 2 Total Chain 1 Chain 2 Total dBm W  2412 17.4 17.4 -1.6 - 15.9 0.03  2437 18.5 18.5 -1.6 - 16.9 0.04  2462 17.1 17.1 -1.6 - 15.6 0.03  Output power measured using a spectrum analyzer (see plots below):  RBW=1MHz, VB=3 MHz, sample detector, power averaging on (transmitted signal was not continuous but the ES analyzer was configured with a gated sweep such that the analyzer was only sweeping when the device was transmitting) and power integration over 30 MHz  EIRP - if transmit chains are coherent then the EIRP is calculated from the sum of the antenna gains plus the total power (i.e. beam-forming is assumed because of coherency on the chains). If the individual chains are incoherent then the EIRP is calculated from the sum of the numeric gains for each antenna. If the transmit chains are coherent then the total system antenna gain is not applicable as each transmit chains are incoherent then the system antenna gain is not applicable as each transmit chains are setting or each chain. If multiple numbers the power setting or each chain is spearated by a comma (e.g. x,y would indictae power setting x for chain 1, po	Contact	: David Boldy								
ransmitted signal on chain is coherent? No equilatory Power Measurements:  Power Setting Frequency (MHz) Output Power (dBm) Note 1 Chain 1 Chain 2 Total Chain 1 Chain 2 Total dBm W 2412 17.4 17.4 -1.6 - 15.9 0.03 2437 18.5 18.5 -1.6 - 16.9 0.04 2462 17.1 17.1 -1.6 - 15.6 0.03  Output power measured using a spectrum analyzer (see plots below):  RBW=1MHz, VB=3 MHz, sample detector, power averaging on (transmitted signal was not continuous but the ES analyzer was configured with a gated sweep such that the analyzer was only sweeping when the device was transmitting) and power integration over 30 MHz  EIRP - if transmit chains are coherent then the EIRP is calculated from the sum of the antenna gains plus the total power (i.e. beam-forming is assumed because of coherency on the chains). If the individual chains are incoherent then the EIRP is calculated from the sum of the numeric gains for each antenna. If the transmit chains are coherent then the total system antenna gain is not applicable as each transmit chains are incoherent then the system antenna gain is not applicable as each transmit chains are reach chain is spearated by a comma (e.g. x,y would indictae power setting x for chain 1, power setting x for chain 2, y for chain 1, power settin		•						Class:	N/A	
Power Setting <sup>4</sup> Frequency (MHz) Output Power (dBm) Note 1 Chain 1 Chain 2 Total dBm W  2412 17.4 17.4 -1.6 - 15.9 0.03  2437 18.5 18.5 -1.6 - 16.9 0.04  2462 17.1 17.1 -1.6 - 15.6 0.03  Output power measured using a spectrum analyzer (see plots below):  RBW=1MHz, VB=3 MHz, sample detector, power averaging on (transmitted signal was not continuous but the ES analyzer was configured with a gated sweep such that the analyzer was only sweeping when the device was transmitting) and power integration over 30 MHz  EIRP - if transmit chains are coherent then the EIRP is calculated from the sum of the antenna gains plus the total system antenna gain is the sum of the numeric gains for each can be treated independently.  Power setting - if a single number the same power setting was used for each chain. If multiple numbers the power setting reach chain is spearated by a comma (e.g. x,y would indictae power setting x for chain 1, power setting x for chain 1, power setting x setting x for chain 1, power setting x for chain 1, p	un #1: (	Output Power								
Frequency (MHz)  Output Power (dBm)  Chain 1 Chain 2 Total  Dutput power measured using a spectrum analyzer (see plots below):  RBW=1MHz, VB=3 MHz, sample detector, power averaging on (transmitted signal was not continuous but the EST analyzer was configured with a gated sweep such that the analyzer was only sweeping when the device was transmitting) and power integration over 30 MHz  EIRP - if transmit chains are coherent then the EIRP is calculated from the sum of the antenna gains plus the total power (i.e. beam-forming is assumed because of coherency on the chains). If the individual chains are incoherent then the EIRP is calculated from the sum of the numeric gains for each Note 3:  If the transmit chains are coherent then the total system antenna gain is the sum of the numeric gains for each antenna. If the transmit chains are incoherent then the system antenna gain is not applicable as each transmit chains are incoherent then the system antenna gain is not applicable as each transmit chain be treated independently.  Power setting - if a single number the same power setting was used for each chain. If multiple numbers the power setting for each chain is spearated by a comma (e.g. x,y would indictae power setting x for chain 1, power setting		•		No						
Setting    Chain 1   Chain 2   Total   Chain 2   Total Chain 3   Total Chain 4		y Power Measuren			. Note 1	1	<u> </u>	. Note 3		Note 2
2412 17.4 17.4 -1.6 - 15.9 0.03 2437 18.5 18.5 -1.6 - 16.9 0.04 2462 17.1 17.1 -1.6 - 15.6 0.03  Output power measured using a spectrum analyzer (see plots below): RBW=1MHz, VB=3 MHz, sample detector, power averaging on (transmitted signal was not continuous but the ES analyzer was configured with a gated sweep such that the analyzer was only sweeping when the device was transmitting) and power integration over 30 MHz  EIRP - if transmit chains are coherent then the EIRP is calculated from the sum of the antenna gains plus the total power (i.e. beam-forming is assumed because of coherency on the chains). If the individual chains are incoherent then the EIRP is calculated from the sum of the numeric gains for each Note 3:  If the transmit chains are coherent then the total system antenna gain is the sum of the numeric gains for each antenna. If the transmit chains are incoherent then the system antenna gain is not applicable as each transmit chains are treated independently.  Power setting - if a single number the same power setting was used for each chain. If multiple numbers the power setting for each chain is spearated by a comma (e.g. x,y would indictae power setting x for chain 1, power setting		Frequency (MHz)	-		11)		na Gain (dBi			
2437 18.5 18.5 -1.6 - 16.9 0.04 2462 17.1 17.1 -1.6 - 15.6 0.03  Output power measured using a spectrum analyzer (see plots below):  RBW=1MHz, VB=3 MHz, sample detector, power averaging on (transmitted signal was not continuous but the ES analyzer was configured with a gated sweep such that the analyzer was only sweeping when the device was transmitting) and power integration over 30 MHz  EIRP - if transmit chains are coherent then the EIRP is calculated from the sum of the antenna gains plus the total power (i.e. beam-forming is assumed because of coherency on the chains). If the individual chains are incoherent then the EIRP is calculated from the sum of the numeric gains for each antenna. If the transmit chains are coherent then the total system antenna gain is the sum of the numeric gains for each antenna. If the transmit chains are incoherent then the system antenna gain is not applicable as each transmit of can be treated independently.  Power setting - if a single number the same power setting was used for each chain. If multiple numbers the power setting for each chain is spearated by a comma (e.g. x,y would indictae power setting x for chain 1, power setting	Setting	, , , ,		Chain 2			Chain 2			
Output power measured using a spectrum analyzer (see plots below):  RBW=1MHz, VB=3 MHz, sample detector, power averaging on (transmitted signal was not continuous but the ES analyzer was configured with a gated sweep such that the analyzer was only sweeping when the device was transmitting) and power integration over 30 MHz  EIRP - if transmit chains are coherent then the EIRP is calculated from the sum of the antenna gains plus the total power (i.e. beam-forming is assumed because of coherency on the chains). If the individual chains are incoherent then the EIRP is calculated from the sum of the individual EIRPs for each chain.  If the transmit chains are coherent then the total system antenna gain is the sum of the numeric gains for each antenna. If the transmit chains are incoherent then the system antenna gain is not applicable as each transmit chains are setting - if a single number the same power setting was used for each chain. If multiple numbers the power setting for each chain is spearated by a comma (e.g. x,y would indictae power setting x for chain 1, power setting										
Output power measured using a spectrum analyzer (see plots below):  RBW=1MHz, VB=3 MHz, sample detector, power averaging on (transmitted signal was not continuous but the ES analyzer was configured with a gated sweep such that the analyzer was only sweeping when the device was transmitting) and power integration over 30 MHz  EIRP - if transmit chains are coherent then the EIRP is calculated from the sum of the antenna gains plus the total power (i.e. beam-forming is assumed because of coherency on the chains). If the individual chains are incoherent then the EIRP is calculated from the sum of the individual EIRPs for each chain.  If the transmit chains are coherent then the total system antenna gain is the sum of the numeric gains for each antenna. If the transmit chains are incoherent then the system antenna gain is not applicable as each transmit chain be treated independently.  Power setting - if a single number the same power setting was used for each chain. If multiple numbers the power setting for each chain is spearated by a comma (e.g. x,y would indictae power setting x for chain 1, power setting										
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If the transmit chains are coherent then the total system antenna gain is the sum of the numeric gains for each antenna. If the transmit chains are incoherent then the system antenna gain is not applicable as each transmit chains are incoherent then the system antenna gain is not applicable as each transmit chain be treated independently.  Power setting - if a single number the same power setting was used for each chain. If multiple numbers the power setting for each chain is spearated by a comma (e.g. x,y would indictae power setting x for chain 1, power setting	Note 2:	EIRP - if transmit of power (i.e. beam-fe	chains are co	oherent ther sumed beca	n the EIRP is ause of cohe	erency on the	chains). If	the individua		
Note 4: setting for each chain is spearated by a comma (e.g. x,y would indictae power setting x for chain 1, power setting	Note 3:	If the transmit chai antenna. If the tra can be treated inde	ns are cohe nsmit chains ependently.	rent then the s are incohe	e total syste erent then th	em antenna g e system ant	ain is the sui enna gain is	m of the num not applicab	le as each tra	ansmit cha
	Note 4:	setting for each ch	-			-			•	•



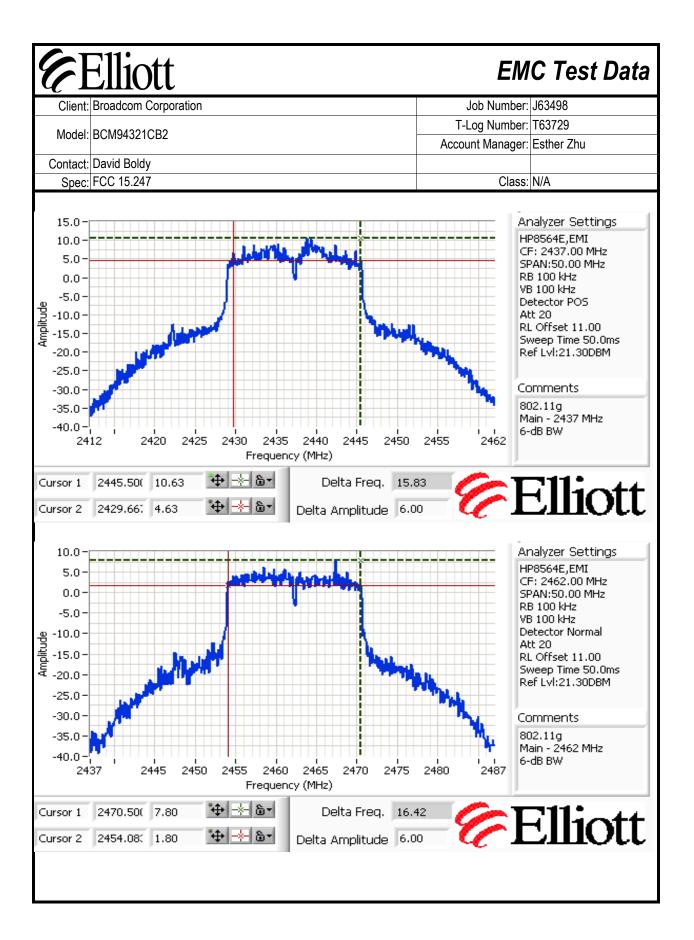




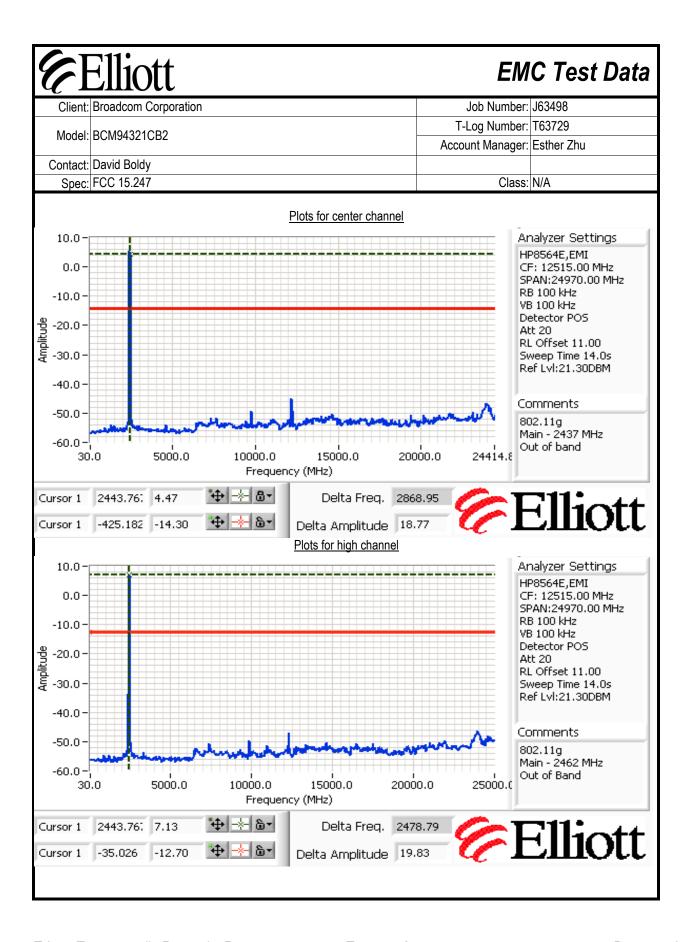
#### **EMC Test Data** Job Number: J63498 Client: Broadcom Corporation T-Log Number: T63729 Model: BCM94321CB2 Account Manager: Esther Zhu Contact: David Boldy Spec: FCC 15.247 Class: N/A Run #2: Power Spectral Density Power PSD (dBm/3kHz) Limit Result Frequency (MHz) Settina Chain 1 Chain 2 dBm/3kHz Total 2412 -2.4 8.0 Pass 2437 -1.2 8.0 **Pass** 2462 -2.0 8.0 Pass Power spectral density measured using RB=3 kHz, VB=10kHz, analyzer with peak detector and with a sweep time set to ensure a dwell time of at least 1 second per 3kHz. The measurement is made at the frequency of PPSD Note 1: determined from preliminary scans using RB=3kHz using multiple sweeps at a faster rate over the 6dB bandwidth of the signal. Analyzer Settings -2.0HP8564E,EMI -3.0 CF: 2414,46 MHz -4.0 SPAN:300 kHz RB 3 kHz -5.0 VB 10 kHz -6.0Detector POS Att 10 -7.0RL Offset 11.00 -8.0 Sweep Time 100.0s -9.0 Ref Lvl:11.30DBM -10.0Comments -11.0 802.11g -12.0 Main - 2412 MHz -13.0 PSD 2414.40 2414.31 2414.35 2414.45 2414.50 2414.55 2414.61 Frequency (MHz) **⊹-|6**-| Cursor 1 2414.56( -2.37 0.000 0.00



#### **Elliott EMC Test Data** Job Number: J63498 Client: Broadcom Corporation T-Log Number: T63729 Model: BCM94321CB2 Account Manager: Esther Zhu Contact: David Boldy Spec: FCC 15.247 Class: N/A Run #3: Signal Bandwidth 6dB Signl Bandwidth Power Resolution Frequency (MHz) 99% Signal Bandwidth Setting Bandwidth (MHz) 15.83 2412 100kHz 2437 100kHz 15.83 2462 100kHz 16.42 Note 1: Measured on a single chain 10.0 Analyzer Settings HP8564E,EMI 5.0 CF: 2412.00 MHz 0.0 SPAN:50.00 MHz RB 100 kHz -5.0· VB 100 kHz -10.0 Detector POS -15.0 Att 10 RL Offset 11.00 -20.0 Sweep Time 50.0ms Ref Lvl:11.30DBM -25.0· -30.0 Comments -35.0 802.11g -40.0 -Main - 2412 MHz -45.0 6-dB BW 2405 2410 2415 2425 2400 2420 2430 2395 Frequency (MHz) **♦** -\*- 6-2420.50( 8.30 Delta Freq. 15.83 Cursor 1 **Elliott** Cursor 2 2404.667 2.30 Delta Amplitude 6.00



### **EMC Test Data** Job Number: J63498 Client: Broadcom Corporation T-Log Number: T63729 Model: BCM94321CB2 Account Manager: Esther Zhu Contact: David Boldy Spec: FCC 15.247 Class: N/A Run #4: Out of Band Spurious Emissions Power Setting Per Chain Limit Result Frequency (MHz) 2412 -30dBc Refer to plot 2437 -30dBc Refer to plot 2462 -30dBc Refer to plot Plots for low channel Analyzer Settings 10.0 HP8564E,EMI 0.0 CF: 12515.00 MHz SPAN:24970.00 MHz -10.0 RB 100 kHz VB 100 kHz -20.0 Detector POS Att 10 -30.0 RL Offset 11.00 Sweep Time 14.0s -40.0 Ref Lvl:11.30DBM -50.0 Comments -60.0 802.11g Main - 2412 MHz -70.0 Out of Band Emission 5000.0 10000.0 15000.0 20000.0 25000.0 30.0 Frequency (MHz) **♦** -\* 6• Cursor 1 2402.15( -15.20 Delta Freq. 0.00 MHz ## <del>| \*</del>| 6 → 2402.15( 4.80 Delta Amplitude 20.00 Cursor 2



<b>Elliott</b>	EMC Test Data
Client: Broadcom Corporation	Job Number: J63498
Model: BCM94321CB2	T-Log Number: T63729
Model. BCM94321CB2	Account Manager: Esther Zhu
Contact: David Boldy	
Spec: FCC 15.247	Class: N/A

### FCC 15.247 DTS - Fundamental, Bandedge and Spurious Emissions

### **Test Specifics**

Objective: The objective of this test session is to perform final qualification testing of the EUT with respect to the

specification listed above.

Date of Test: 4/12/2006 Config. Used: 2
Test Engineer: Juan Martinez Config Change: None
Test Location: Fremont Chamber #4 EUT Voltage: 120V/60Hz

### **General Test Configuration**

The EUT and all local support equipment were located on the turntable for radiated spurious emissions testing. Remote equipment was located underneat the table.

For radiated emissions testing the measurement antenna was located 3 meters from the EUT.

Ambient Conditions: Temperature: 19.5 °C

Rel. Humidity: 50 %

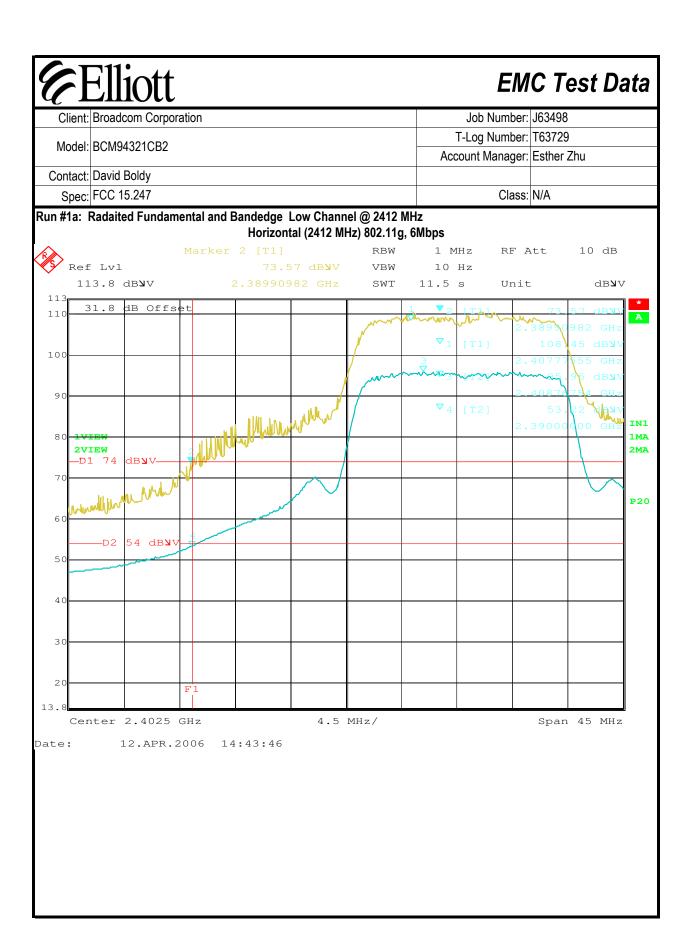
### Summary of Results

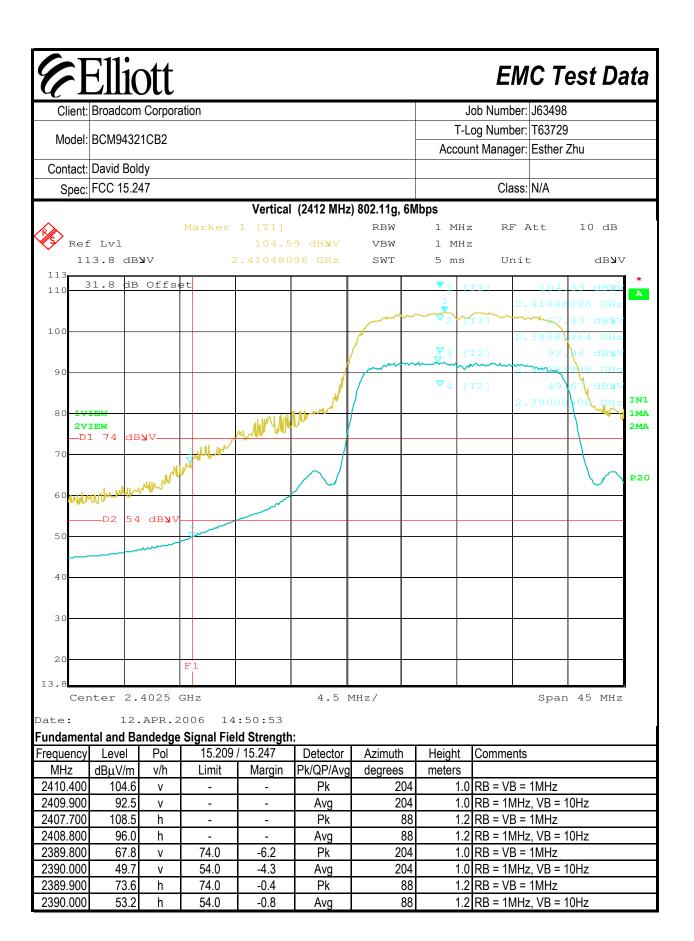
Run #	Test Performed	Limit	Pass / Fail	Result / Margin
1	Fundamental and Bandedge	FCC Part 15.209 / 15.247( c)	Pass	73.6dBµV/m (4769.8µV/m) @ 2389.9MHz (-0.4dB)
2	Radiated Spurious Emissions 1,000-26,500MHz	FCC Part 15.209 / 15.247( c)	Pass	50.9dBµV/m (350.8µV/m) @ 4823.9MHz (-3.1dB)

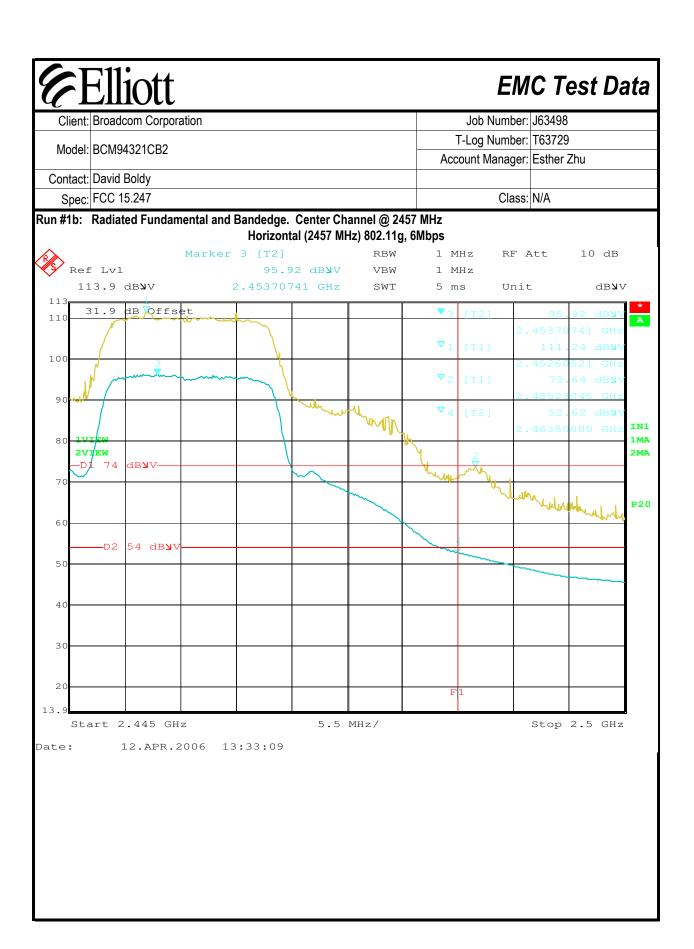
### **Modifications Made During Testing:**

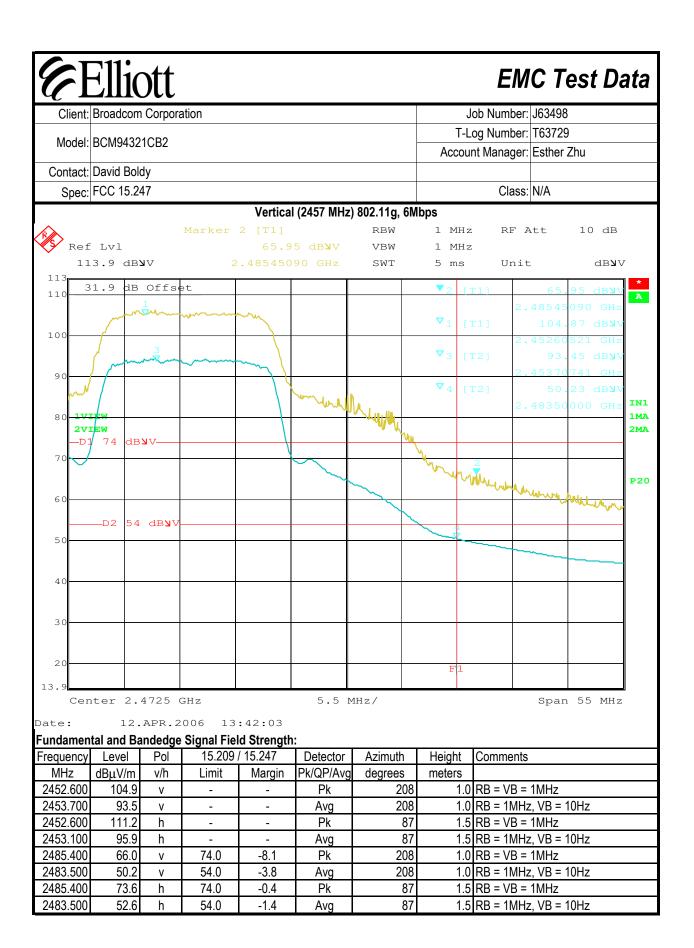
No modifications were made to the EUT during testing

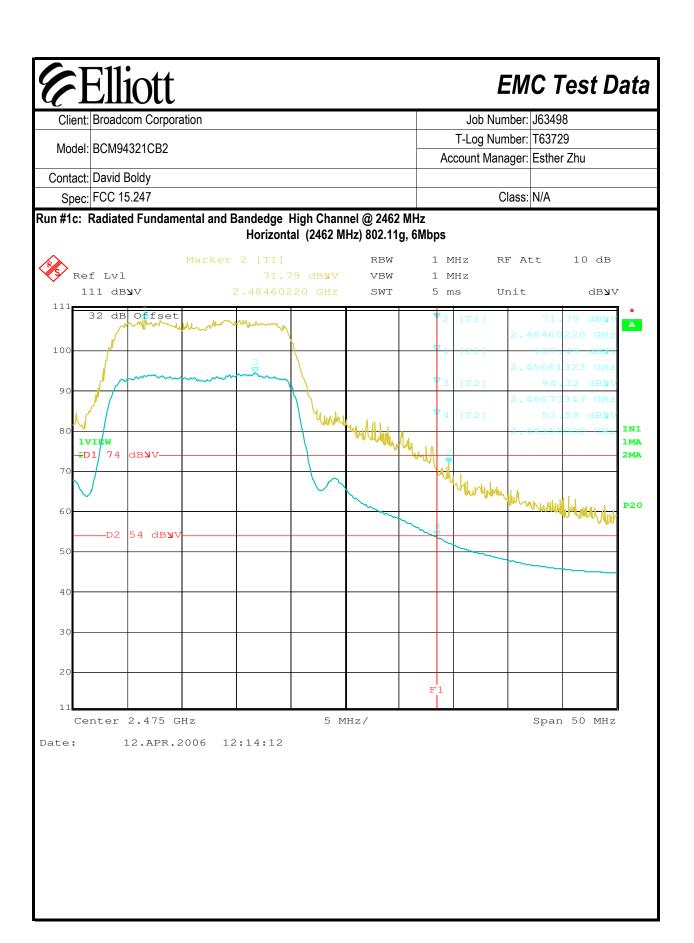
### **Deviations From The Standard**

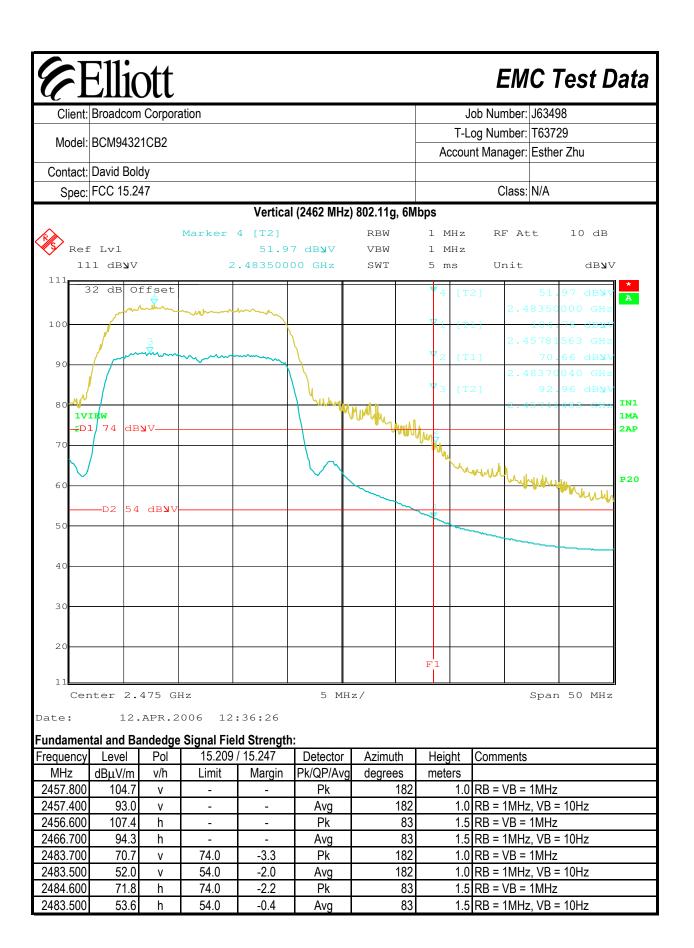












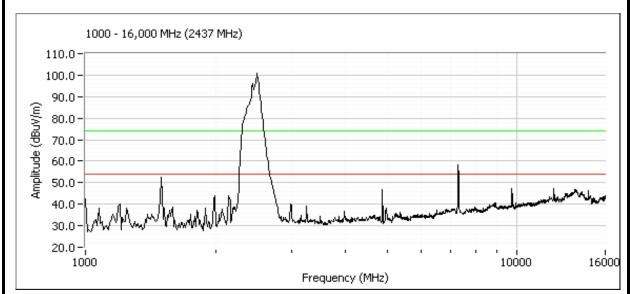
#### **Elliott EMC Test Data** Job Number: J63498 Client: Broadcom Corporation T-Log Number: T63729 Model: BCM94321CB2 Account Manager: Esther Zhu Contact: David Boldy Class: N/A Spec: FCC 15.247 Run #2a: Radiated Spurious Emissions, 1000 - 26,500 MHz. Low Channel @ 2412 MHz Other Spurious Emissions 15.209 / 15.247 Frequency Level Detector Azimuth Height Comments MHz dBμV/m Pk/QP/Avg v/h Limit Margin degrees meters 4823.925 50.9 54.0 -3.1 AVG 73 1.6 4823.960 46.4 Н 54.0 -7.6 **AVG** 31 2.0 1.1 7236.950 42.6 ٧ 54.0 -11.4 AVG 5 7236.950 62.3 74.0 -11.7 PK 5 1.1 7237.150 41.2 Η 54.0 -12.8 **AVG** 148 1.0 7237.150 74.0 -13.4 PΚ 148 60.6 Η 1.0 PK 4823.925 74.0 -18.2 55.8 73 1.6 -23.2 4823.960 50.8 Н 74.0 PΚ 31 2.0 For emissions in restricted bands, the limit of 15.209 was used. For all other emissions, the limit was set 20dB below Note 1: the level of the fundamental. No emission detected 20-dB of the limit from 16 - 18 GHz and from 18 - 26.5 GHz. Measurements were performed on Site# 2 on April 21, 2006 by Juan Martinez

# **Elliott**

# **EMC Test Data**

Client:	Broadcom Corporation	Job Number:	J63498
Madal	BCM94321CB2	T-Log Number:	T63729
wodei.	DCW94321CB2	Account Manager:	Esther Zhu
Contact:	David Boldy		
Spec:	FCC 15.247	Class:	N/A

Run #2b: Radiated Spurious Emissions, 1000 - 16,000 MHz. Middle Channel @ 2437 MHz



Other Spurious Emissions

Other Spui	IOUS EIIII	5510115						
Frequency	Level	Pol	15.209	/ 15.247	Detector	Azimuth	Height	Comments
MHz	dBμV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
Peak Read	ings.							
1000.000	42.7	V	54.0	-11.3	Peak	203	2.0	Laptop emission(refer to base line)
1495.000	52.5	V	54.0	-1.5	Peak	91	1.0	Laptop emission(refer to base line)
1999.167	42.6	V	54.0	-11.4	Peak	6	1.0	Laptop emission(refer to base line)
Peak and A	verage R	eadings						
4874.02	46.3	V	54.0	-7.8	AVG	54	2.0	
12187.07	45.2	Н	54.0	-8.8	AVG	83	1.4	
7308.29	64.2	Н	74.0	-9.8	PK	21	1.4	
7308.29	40.9	Н	54.0	-13.1	AVG	21	1.4	
12187.07	57.2	Н	74.0	-16.8	PK	83	1.4	
9747.50	50.1	V	74.0	-23.9	PK	233	1.6	Not in restricted band
4874.02	49.5	V	74.0	-24.5	PK	54	2.0	

Note 1:

For emissions in restricted bands, the limit of 15.209 was used. For all other emissions, the limit was set 20dB below the level of the fundamental.

No emission detected 20-dB of the limit from 16 - 18 GHz and from 18 - 26.5 GHz. Measurements were performed on Site# 2 on April 21, 2006 by Juan Martinez

# **Elliott**

## **EMC Test Data**

_			
Client:	Broadcom Corporation	Job Number:	J63498
Model	BCM94321CB2	T-Log Number:	T63729
MOGEI.	DOM9432 TOD2	Account Manager:	Esther Zhu
Contact:	David Boldy		
Spec:	FCC 15.247	Class:	N/A

Run #2c: Radiated Spurious Emissions, 1000 - 26,500 MHz. High Channel @ 2462 MHz

### Other Spurious Emissions

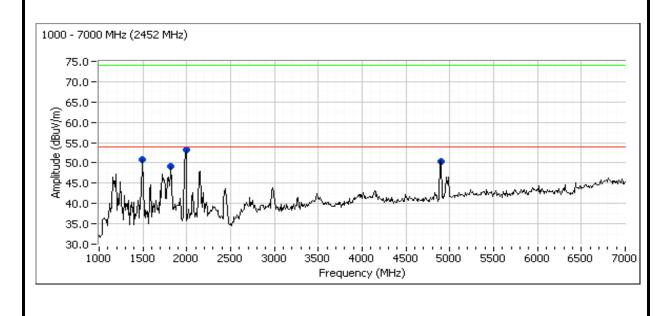
Level	Pol	15.209	/ 15.247	Detector	Azimuth	Height	Comments
dBμV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
50.5	V	54.0	-3.5	AVG	56	1.6	
48.5	Н	54.0	-5.5	AVG	360	1.4	
66.8	Н	74.0	-7.2	PK	85	1.7	
64.3	V	74.0	-9.7	PK	149	1.3	
42.4	V	54.0	-11.6	AVG	149	1.3	
41.3	Н	54.0	-12.8	AVG	85	1.7	
56.2	Н	74.0	-17.8	PK	360	1.4	
53.7	V	74.0	-20.3	PK	56	1.6	
	dBμV/m 50.5 48.5 66.8 64.3 42.4 41.3 56.2	dBμV/m V/h 50.5 V 48.5 H 66.8 H 64.3 V 42.4 V 41.3 H 56.2 H	dBμV/m         v/h         Limit           50.5         V         54.0           48.5         H         54.0           66.8         H         74.0           64.3         V         74.0           42.4         V         54.0           41.3         H         54.0           56.2         H         74.0	dBμV/m         v/h         Limit         Margin           50.5         V         54.0         -3.5           48.5         H         54.0         -5.5           66.8         H         74.0         -7.2           64.3         V         74.0         -9.7           42.4         V         54.0         -11.6           41.3         H         54.0         -12.8           56.2         H         74.0         -17.8	dBμV/m         v/h         Limit         Margin         Pk/QP/Avg           50.5         V         54.0         -3.5         AVG           48.5         H         54.0         -5.5         AVG           66.8         H         74.0         -7.2         PK           64.3         V         74.0         -9.7         PK           42.4         V         54.0         -11.6         AVG           41.3         H         54.0         -12.8         AVG           56.2         H         74.0         -17.8         PK	dBμV/m         v/h         Limit         Margin         Pk/QP/Avg         degrees           50.5         V         54.0         -3.5         AVG         56           48.5         H         54.0         -5.5         AVG         360           66.8         H         74.0         -7.2         PK         85           64.3         V         74.0         -9.7         PK         149           42.4         V         54.0         -11.6         AVG         149           41.3         H         54.0         -12.8         AVG         85           56.2         H         74.0         -17.8         PK         360	dBμV/m         v/h         Limit         Margin         Pk/QP/Avg         degrees         meters           50.5         V         54.0         -3.5         AVG         56         1.6           48.5         H         54.0         -5.5         AVG         360         1.4           66.8         H         74.0         -7.2         PK         85         1.7           64.3         V         74.0         -9.7         PK         149         1.3           42.4         V         54.0         -11.6         AVG         149         1.3           41.3         H         54.0         -12.8         AVG         85         1.7           56.2         H         74.0         -17.8         PK         360         1.4

Note 1:

For emissions in restricted bands, the limit of 15.209 was used. For all other emissions, the limit was set 20dB below the level of the fundamental.

No emission detected 20-dB of the limit from 16 - 18 GHz and from 18 - 26.5 GHz. Measurements were performed on Site# 2 on April 21, 2006 by Juan Martinez

Radiated Spurious Emissions, 1000 - 7000 MHz. Middle Channel @ 2452 MHz



<b>Elliott</b>
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## **EMC Test Data**

U			
Client:	Broadcom Corporation	Job Number:	J63498
Model	BCM94321CB2	T-Log Number:	T63729
Model.	DOM9432 TOD2	Account Manager:	Esther Zhu
Contact:	David Boldy		
Spec:	FCC 15.247	Class:	N/A

### FCC 15.247 DTS - Power, Bandwidth and Spurious Emissions

### **Test Specifics**

Objective: The objective of this test session is to perform final qualification testing of the EUT with respect to the

specification listed above.

Date of Test: 4/21/2006 Config. Used: 1
Test Engineer: Jmartinez Config Change: None
Test Location: Chamber #2 EUT Voltage: 120V, 60Hz

### General Test Configuration

The EUT was connected to the spectrum analyzer or power meter via a suitable attenuator. For the spurious emissions all transmit chains were connected simultaneously to the analyzer via a combiner. All other measurements were made on a single chain.

All measurements are corrected to allow for the external attenuators used.

Ambient Conditions: Temperature: 17 °C

Rel. Humidity: 57 %

### **Summary of Results**

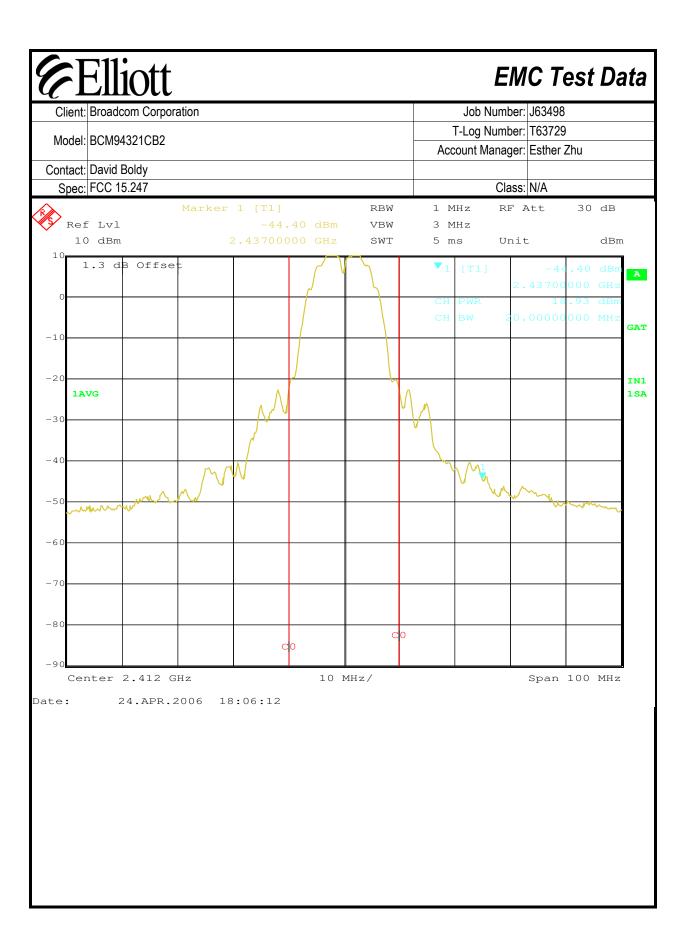
Run #	Test Performed	Limit	Pass / Fail	Result / Margin
1	Output Power	15.247(b)	Pass	Refer to run
2	Power Spectral Density (PSD)	15.247(d)	Pass	Refer to run
3	6dB Bandwidth	15.247(a)	Pass	Refer to run
4	Spurious emissions	15.247(b)	Pass	Refer to run

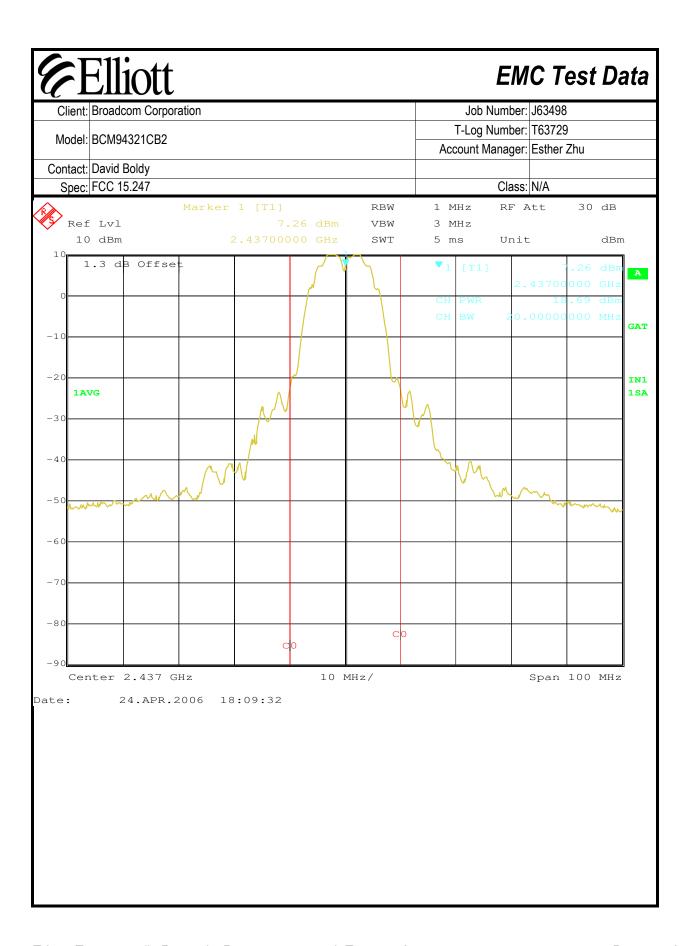
### **Modifications Made During Testing:**

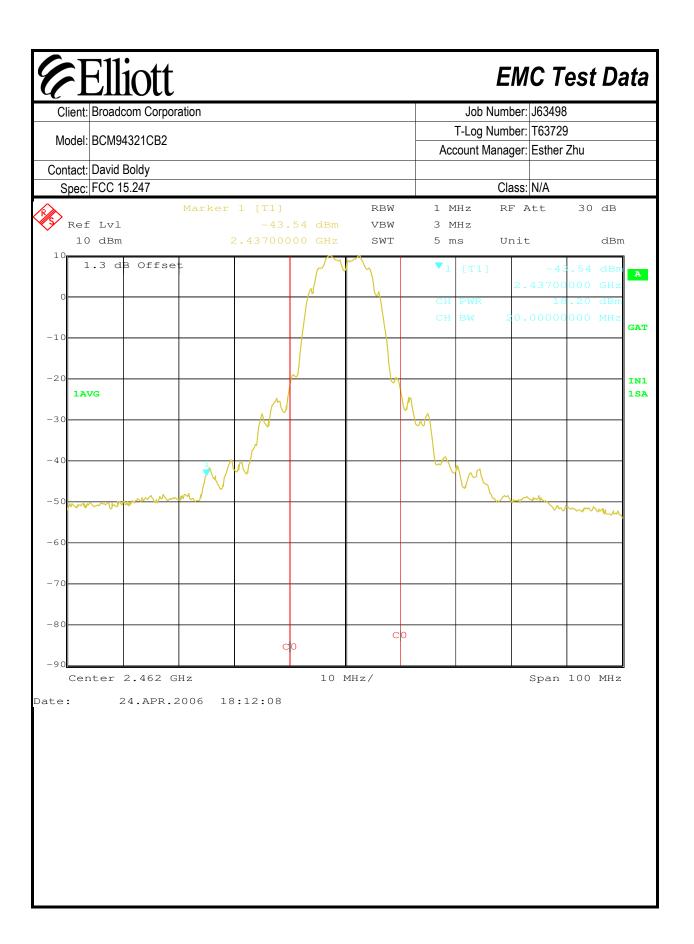
No modifications were made to the EUT during testing

### **Deviations From The Standard**

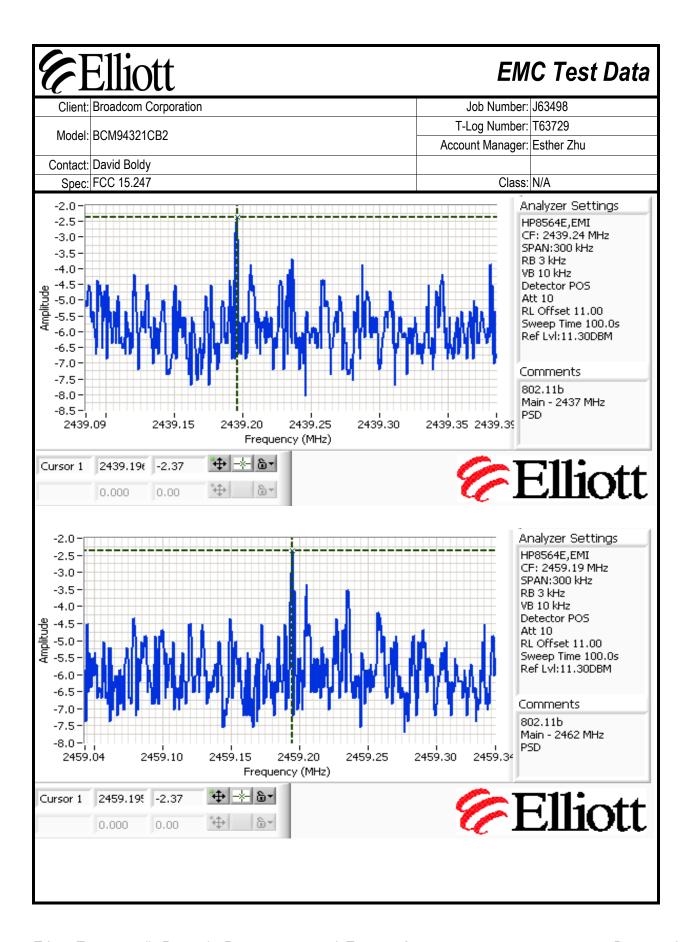
Note 1:  Output power measured using a spectrum analyzer (see plots below):  RBW=1MHz, VB=3 MHz, sample detector, power averaging on (transmitted signal was not continuous but the ES analyzer was configured with a gated sweep such that the analyzer was only sweeping when the device was transmitting) and power integration over 20 MHz  EIRP - if transmit chains are coherent then the EIRP is calculated from the sum of the antenna gains plus the tota power (i.e. beam-forming is assumed because of coherency on the chains). If the individual chains are incoherent then the EIRP is calculated from the sum of the numeric gains for each Note 3:  If the transmit chains are coherent then the total system antenna gain is the sum of the numeric gains for each antenna. If the transmit chains are incoherent then the system antenna gain is not applicable as each transmit chains are transmit chains are sech transmit chains are sech transmit chains are sech transmit chains are incoherent then the system antenna gain is not applicable as each transmit chains are sech transmit chains are incoherent then the system antenna gain is not applicable as each transmit chains are sech transmit chains are sech transmit chains are incoherent then the system antenna gain is not applicable as each transmit chains are sech transmit chains are sech transmit chains are sech transmit chains are sech transmit chains are incoherent then the system antenna gain is not applicable as each transmit chains are sech	avid Boldy CC 15.247  put Power signal on chain is of Power Measurem requency (MHz) 2412 2437 2462  autput power meas BW=1MHz, VB=3 nalyzer was configanmsitting) and po	coherent ? ents: Output Chain 1 18.9 18.7 18.2 sured using MHz, sampured with a	Power (dBn Chain 2 a spectrum ple detector,	Total 18.9 18.7 18.2 analyzer (s	Chain 1 -1.6 -1.6 -1.6	T-Lo Accour	og Number:  nt Manager:  Class:  Note 3  Total	T63729 Esther Zhu N/A EIRP dBm		
Account Manager: Esther Zhu  Contact: David Boldy Spec: FCC 15.247 Class: N/A  Itun #1: Output Power  Transmitted signal on chain is coherent? No  Regulatory Power Measurements:  Power Setting Frequency (MHz) Setting 1 Setting 2 Setting 3 Setting 4 Setting 4 Setting 4 Setting 4 Setting 4 Setting 4 Setting 5 Setting 5 Setting 6 Setting 7 Setting 7 Setting 8 Setting 8 Setting 9 Setting	avid Boldy CC 15.247  put Power signal on chain is of Power Measurem requency (MHz) 2412 2437 2462  rutput power meas BW=1MHz, VB=3 nalyzer was configanmsitting) and po	Output Chain 1 18.9 18.7 18.2 sured using MHz, samp	Power (dBn Chain 2 a spectrum ple detector,	Total 18.9 18.7 18.2 analyzer (s	Chain 1 -1.6 -1.6 -1.6	Accour	Class:	Esther Zhu  N/A  EIRP dBm		
Contact: David Boldy Spec: FCC 15.247 Class: N/A  Iun #1: Output Power  Transmitted signal on chain is coherent? No  Regulatory Power Measurements:  Power Setting4 Frequency (MHz) Chain 1 Chain 2 Total Chain 1 Chain 2 Total dBm W  2412 18.9 18.9 -1.6 - 17.3 0.054  2437 18.7 18.7 -1.6 - 17.1 0.051  2462 18.2 18.2 -1.6 - 16.7 0.046  Output power measured using a spectrum analyzer (see plots below):  RBW=1MHz, VB=3 MHz, sample detector, power averaging on (transmitted signal was not continuous but the ES analyzer was configured with a gated sweep such that the analyzer was only sweeping when the device was transmitting) and power integration over 20 MHz  EIRP - if transmit chains are coherent then the EIRP is calculated from the sum of the antenna gains plus the tota power (i.e. beam-forming is assumed because of coherency on the chains). If the individual chains are incoherent then the EIRP is calculated from the sum of the numeric gains for each whote 3:  If the transmit chains are coherent then the total system antenna gain is the sum of the numeric gains for each antenna. If the transmit chains are incoherent then the system antenna gain is not applicable as each transmit chain be treated independently.  Power setting - if a single number the same power setting was used for each chain. If multiple numbers the power setting for each chain is spearated by a comma (e.g. x, y, would indictae power setting x for chain 1, power setting	put Power signal on chain is of Power Measurem requency (MHz) 2412 2437 2462  rutput power meas BW=1MHz, VB=3 nalyzer was configanmsitting) and po	Output Chain 1 18.9 18.7 18.2 sured using MHz, samp	Power (dBn Chain 2 a spectrum ple detector,	Total 18.9 18.7 18.2 analyzer (s	Chain 1 -1.6 -1.6 -1.6	na Gain (dBi)	Class:	N/A EIRP dBm		
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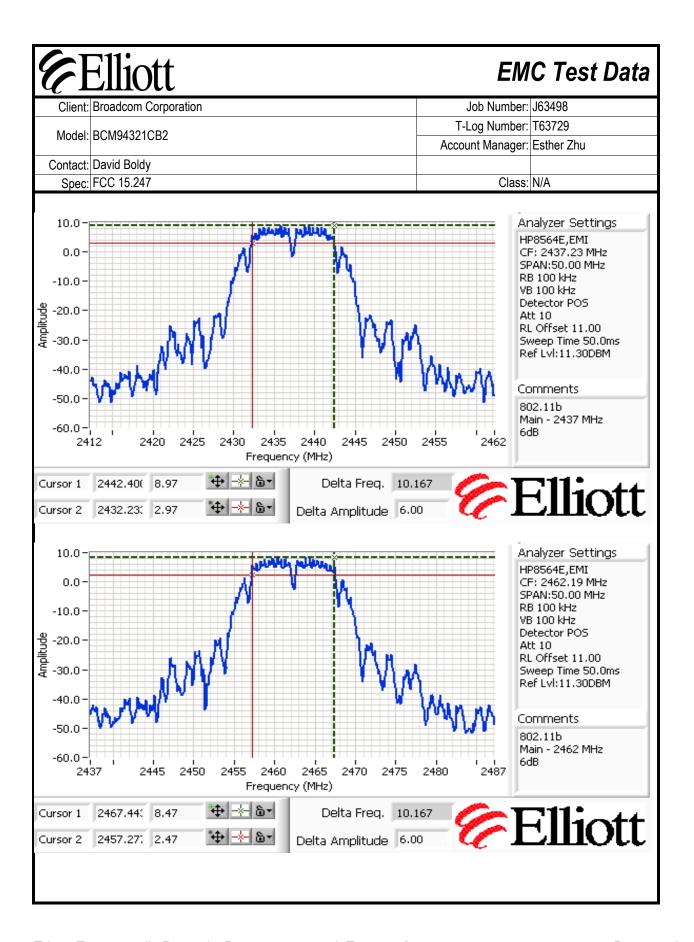




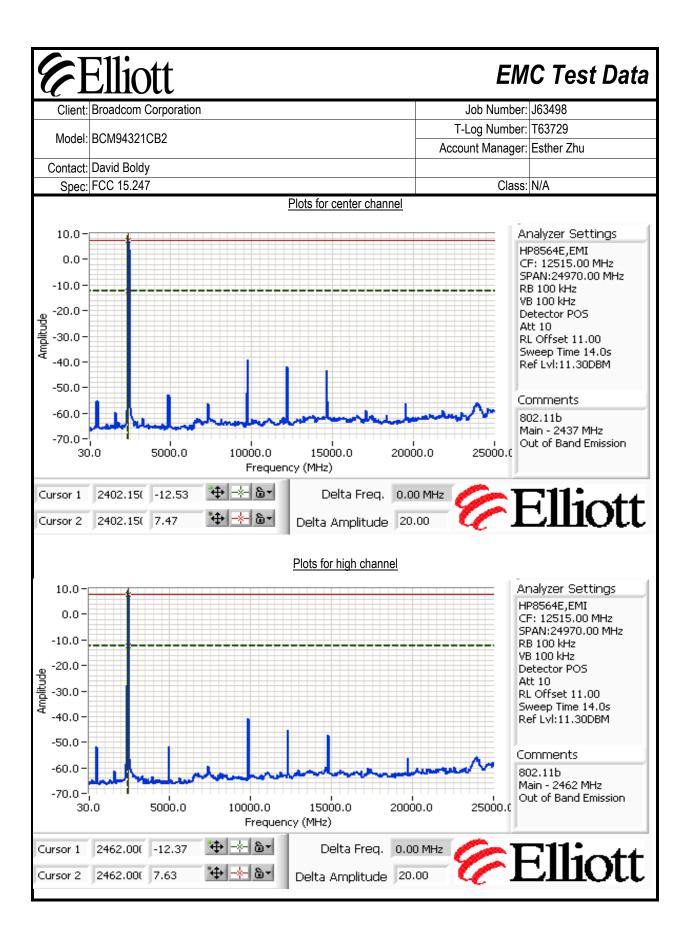
#### **EMC Test Data** Job Number: J63498 Client: Broadcom Corporation T-Log Number: T63729 Model: BCM94321CB2 Account Manager: Esther Zhu Contact: David Boldy Spec: FCC 15.247 Class: N/A Run #3: Power Spectral Density Power PSD (dBm/3kHz) Limit Result Frequency (MHz) Setting Chain 1 Chain 2 Total dBm/3kHz 2412 -3.5 8.0 Pass 2437 -2.4 8.0 **Pass** 2462 8.0 -2.4 Pass Power spectral density measured using RB=3 kHz, VB=10kHz, analyzer with peak detector and with a sweep time set to ensure a dwell time of at least 1 second per 3kHz. The measurement is made at the frequency of PPSD Note 1: determined from preliminary scans using RB=3kHz using multiple sweeps at a faster rate over the 6dB bandwidth of the signal. Analyzer Settings -3.5 HP8564E,EMI -4.0 CF: 2409,72 MHz -4.5 SPAN:300 kHz RB 3 kHz -5.0 VB 10 kHz -5.5 Detector POS Att 10 -6.0 RL Offset 11.00 -6.5 Sweep Time 100.0s Ref Lvl:11.30DBM -7.0 -7.5 Comments -8.0 802.11b -8.5 Main - 2412 MHz -9.0 **PSD** 2409.70 2409.75 2409.65 2409.80 2409.57 2409.60 2409.87 Frequency (MHz) -3.53 Cursor 1 2409.75€ 0.000 0.00



### **EMC Test Data** Job Number: J63498 Client: Broadcom Corporation T-Log Number: T63729 Model: BCM94321CB2 Account Manager: Esther Zhu Contact: David Boldy Spec: FCC 15.247 Class: N/A Run #3: Signal Bandwidth 6dB Signl Bandwidth Power Resolution 99% Signal Bandwidth Frequency (MHz) Setting Bandwidth (MHz) 10 2412 100 kHz 2437 100 kHz 10 10 2462 100 kHz Note 1: Measured on a single chain Analyzer Settings 10.0-HP8564E,EMI 0.0 CF: 2412.18 MHz SPAN:50.00 MHz RB 100 kHz -10.0 VB 100 kHz Detector POS -20.0 Att 10 RL Offset 11.00 Sweep Time 50.0ms -30.0 Ref Lvl:11.30DBM -40.0 Comments -50.0 6dB Bandwidth Main - 2412 MHz -60.0 2400 2405 2410 2415 2420 2425 2437 2387 Frequency (MHz) **♦** -\*- 6-2417.35( 8.80 Delta Freq. 10.083 Cursor 1 Cursor 2 2407.26; 2.80 Delta Amplitude 6.00



### **EMC Test Data** Job Number: J63498 Client: Broadcom Corporation T-Log Number: T63729 Model: BCM94321CB2 Account Manager: Esther Zhu Contact: David Boldy Spec: FCC 15.247 Class: N/A Run #4: Out of Band Spurious Emissions Power Setting Per Chain Frequency (MHz) Limit Result 2412 -30dBc Refer to plot -30dBc 2437 Refer to plot 2462 -30dBc Refer to plot Plots for low channel 10.0 Analyzer Settings HP8564E,EMI 0.0 CF: 12515.00 MHz SPAN:24970.00 MHz -10.0 RB 100 kHz VB 100 kHz -20.0 Detector POS Att 10 -30.0 RL Offset 11.00 Sweep Time 14.0s -40.0 Ref Lvl:11.30DBM -50.0 Comments -60.0 802.11Ь Main - 2412 MHz Out of Band Emission -70.0 25000.0 10000.0 15000.0 20000.0 5000.0 30.0 Frequency (MHz) 2402.15( -12.87 Cursor 1 Delta Freq. 0.00 MHz Cursor 2 2402.15( 8.63 Delta Amplitude 21.50



CI	Elliott	EMC Test Da	ata
Client:	Broadcom Corporation	Job Number: J63498	
Model	BCM94321CB2	T-Log Number: T63729	
iviodei.	DCW94321CD2	Account Manager: Esther Zhu	
Contact:	David Boldy		
Spec:	FCC 15.247	Class: N/A	

### FCC 15.247 DTS - Fundamental, Bandedge and Spurious Emissions

### **Test Specifics**

Objective: The objective of this test session is to perform final qualification testing of the EUT with respect to the

specification listed above.

Date of Test: 4/12/2006 Config. Used: 2

Test Engineer: Juan Martinez Config Change: None

Test Location: Fremont Chamber #4 Host Unit Voltage 120V/60Hz

### **General Test Configuration**

The EUT and all local support equipment were located on the turntable for radiated spurious emissions testing. Remote equipment was located underneat the table.

For radiated emissions testing the measurement antenna was located 3 meters from the EUT.

Ambient Conditions: Temperature: 19 °C

Rel. Humidity: 38 %

### **Summary of Results**

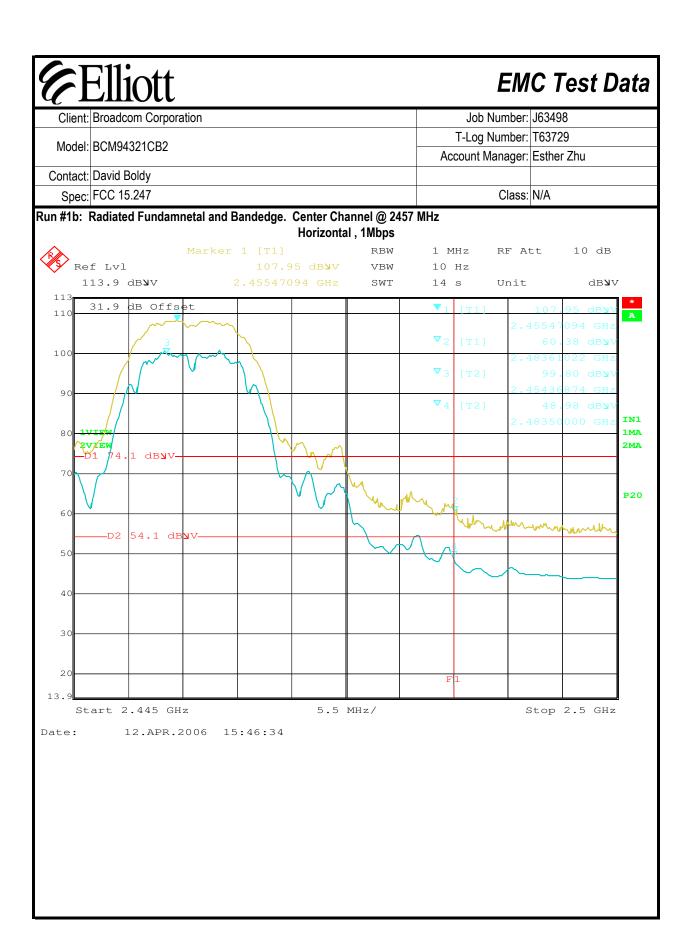
Run #	Test Performed	Limit	Pass / Fail	Result / Margin
1	Fundamental and Bandedge	FCC Part 15.209 /	Pass	53.9dBμV/m (497.7μV/m) @
	, and the second	15.247( c)		2484.8MHz (-0.1dB)
2	Radiated Spurious Emissions 1,000-26,500MHz	FCC Part 15.209 / 15.247( c)	Pass	51.3dBµV/m (367.3µV/m) @ 9847.9MHz (-2.7dB)
				9047.9WITZ (-Z.7UB)

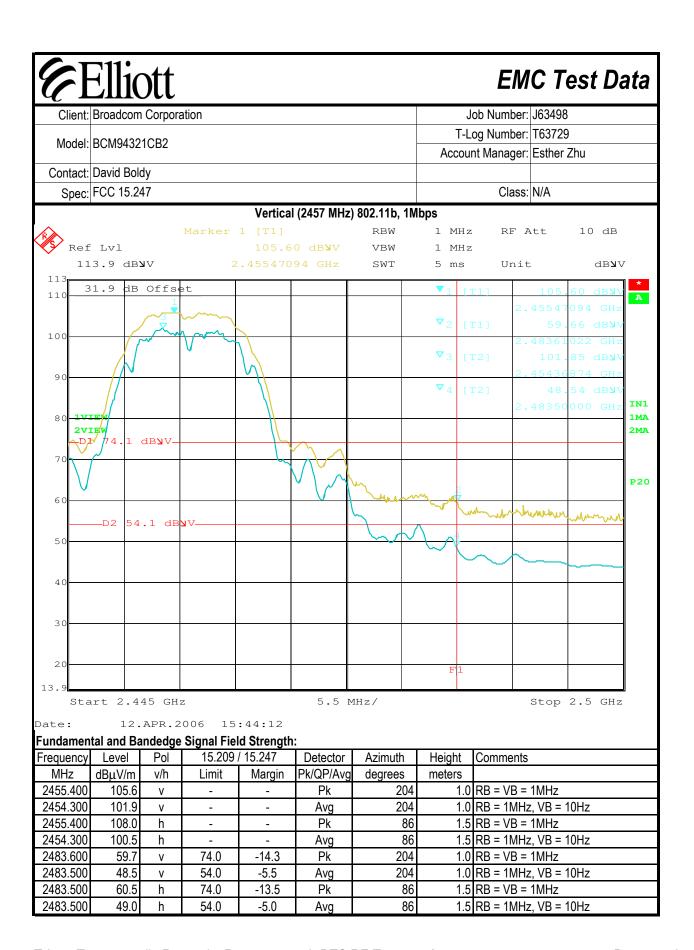
### **Modifications Made During Testing:**

No modifications were made to the EUT during testing

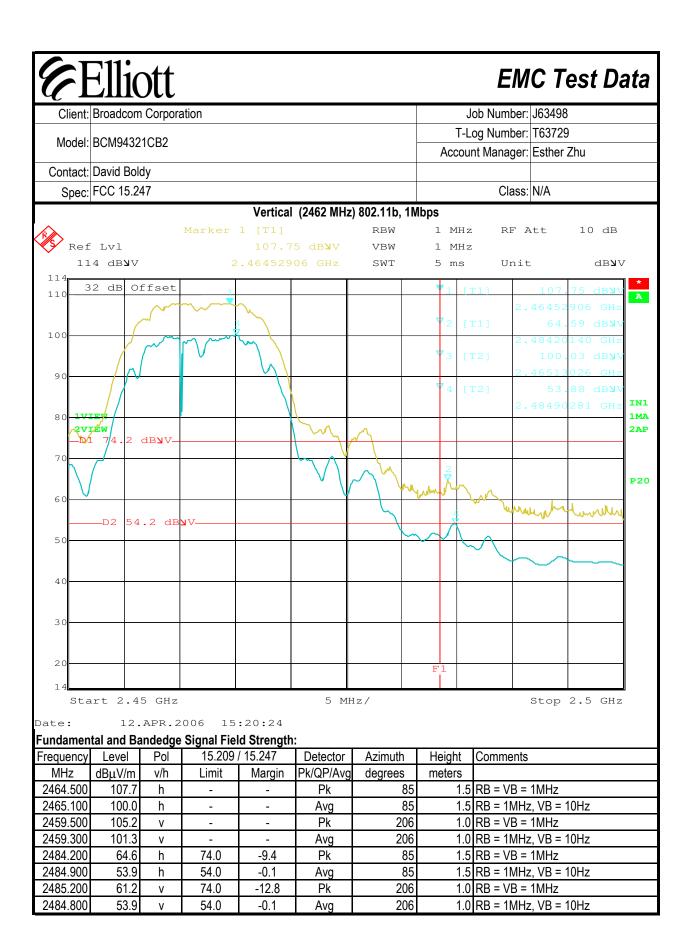
### **Deviations From The Standard**

#### **EMC Test Data** Job Number: J63498 Client: Broadcom Corporation T-Log Number: T63729 Model: BCM94321CB2 Account Manager: Esther Zhu Contact: David Boldy Spec: FCC 15.247 Class: N/A Run #1a: Radiated Funadmental and Band edge. Low Channel @ 2412 MHz Horizontal 802.11b, 1Mbps RBW 500 kHz 10 dB RF Att Ref Lvl 105.43 dB**y**V VBW 1 MHz 113.9 dB**y**V SWT Unit db**y**v 31.9 dB Offset 110 A 100 MMM IN1 1MA 2VIEW 2AP -D1 74.1 dB**y**V P20 13.9 Center 2.4025 GHz 4.5 MHz/ Span 45 MHz 12.APR.2006 15:55:12 Fundamental and Bandedge Signal Field Strength: 15.209 / 15.247 Level Detector Frequency Pol Azimuth Height Comments Pk/QP/Avg MHz $dB\mu V/m$ Limit Margin v/h degrees meters 2409.400 105.4 h Pk 1.5 RB = VB = 1MHz 89 1.5 RB = 1MHz, VB = 10Hz 2410.300 98.3 h Avg 74.0 -17.0 Pk 89 1.5 RB = VB = 1MHz 2387.600 57.0 h 1.5 RB = 1MHz, VB = 10Hz 2387.700 46.7 54.0 -7.3 Avg









#### **Elliott EMC Test Data** Job Number: J63498 Client: Broadcom Corporation T-Log Number: T63729 Model: BCM94321CB2 Account Manager: Esther Zhu Contact: David Boldy Spec: FCC 15.247 Class: N/A Run #2a: Radiated Spurious Emissions, 1000 - 26,500 MHz. Low Channel @ 2412 MHz Other Spurious Emissions 15.209 / 15.247 Frequency Level Detector Azimuth Height Comments MHz dBμV/m Pk/QP/Avg v/h Limit Margin degrees meters 4824.010 49.4 54.0 -4.6 AVG 1.4 72 9647.917 48.3 ٧ 54.0 -5.7 **AVG** 134 1.4 Not restricted (with restricted limit) 7238.300 47.1 ٧ 54.0 -6.9 AVG 44 1.6 4823.917 45.5 54.0 -8.5 AVG 17 1.5 Η 7238.333 42.9 Η 54.0 -11.1 **AVG** 136 1.4 7238.333 74.0 -12.8 PΚ 136 1.4 61.2 Н 7238.300 -14.7 44 59.3 74.0 PK 1.6 -20.7 PK 72 4824.010 53.3 ٧ 74.0 1.4 9647.917 53.2 ٧ 74.0 -20.8 PΚ 134 1.4 Not restricted (with restricted limit) 4823.917 50.5 74.0 -23.5 PΚ 17 1.5 For emissions in restricted bands, the limit of 15.209 was used. For all other emissions, the limit was set 20dB below Note 1: the level of the fundamental. No emission detected 20-dB of the limit from 16 - 18 GHz and from 18 - 26.5 GHz. Measurements were performed on

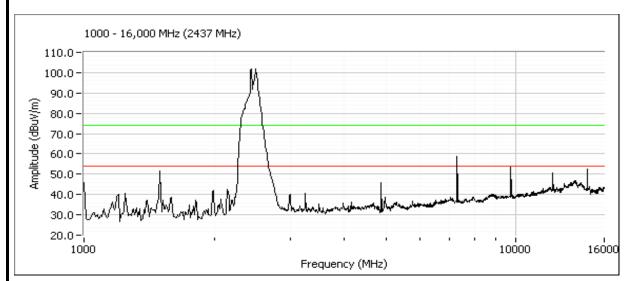
Site# 2 on April 21, 2006 by Juan Martinez

# **Elliott**

# **EMC Test Data**

_			
Client:	Broadcom Corporation	Job Number:	J63498
Model	BCM94321CB2	T-Log Number: T63729	
wodei.	DCW94321CD2	Account Manager:	Esther Zhu
Contact:	David Boldy		
Spec:	FCC 15.247	Class:	N/A

#### Run #2b: Radiated Spurious Emissions, 1000 - 26,500 MHz. Middle Channel @ 2437 MHz



Other Spurious Emissions

Other Spui	IOUS EIIIIS	5510115						
Frequency	Level	Pol	15.209	15.247	Detector	Azimuth	Height	Comments
MHz	$dB\mu V/m$	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
Peak Read	ings.							
1000.000	46.0	V	54.0	-8.0	Peak	340	1.0	Laptop emission(refer to base line)
1495.000	51.5	V	54.0	-2.5	Peak	88	1.0	Laptop emission(refer to base line)
1990.000	41.9	V	54.0	-12.1	Peak	248	1.2	Laptop emission(refer to base line)
Peak and A	verage R	eadings						
12186.02	49.1	Н	54.0	-4.9	AVG	33	1.4	
4873.86	42.6	V	54.0	-11.4	AVG	43	2.0	
7312.00	62.2	Н	74.0	-11.8	PK	48	2.0	
7312.00	38.6	Н	54.0	-15.4	AVG	48	2.0	
14621.82	56.1	Н	74.0	-17.9	PK	82	1.4	Not in a restricted band
9747.89	55.9	Н	74.0	-18.1	PK	89	1.6	Not in a restricted band
12186.02	55.5	Н	74.0	-18.5	PK	33	1.4	
4873.86	46.4	V	74.0	-27.6	PK	43	2.0	

Note 1: For emissions in restricted bands, the limit of 15.209 was used. For all other emissions, the limit was set 20dB below the level of the fundamental.

No emission detected 20-dB of the limit from 16 - 18 GHz and from 18 - 26.5 GHz. Measurements were performed on Site# 2 on April 21, 2006 by Juan Martinez

#### **Elliott EMC Test Data** Job Number: J63498 Client: Broadcom Corporation T-Log Number: T63729 Model: BCM94321CB2 Account Manager: Esther Zhu Contact: David Boldy Spec: FCC 15.247 Class: N/A Run #2c: Radiated Spurious Emissions, 1000 - 26,5600 MHz. High Channel @ 2462 MHz Other Spurious Emissions 15.209 / 15.247 Frequency Level Detector Azimuth Height Comments MHz dBμV/m Pk/QP/Avg v/h Limit Margin degrees meters 9847.887 51.3 54.0 -2.7 AVG 80 1.7 Not restricted (with restricted limit) 4924.050 49.2 Н 54.0 -4.8 **AVG** 1.4 15 4923.830 49.1 ٧ 54.0 -5.0 AVG 14 1.0 7384.066 63.9 74.0 -10.1 PK 40 1.4 Η 7386.833 43.8 ٧ 54.0 -10.2 **AVG** 137 1.6 7386.833 ٧ 74.0 -10.4 PΚ 137 63.6 1.6 7384.066 -11.2 **AVG** 40 1.4 42.8 Η 54.0 -18.9 80 9847.887 55.1 ٧ 74.0 PΚ 1.7 Not restricted (with restricted limit) 4924.050 54.6 Н 74.0 -19.4 PK 15 1.4 74.0 14 1.0 4923.830 52.9 -21.1 PK For emissions in restricted bands, the limit of 15.209 was used. For all other emissions, the limit was set 20dB below Note 1: the level of the fundamental. No emission detected 20-dB of the limit from 16 - 18 GHz and from 18 - 26.5 GHz. Measurements were performed on Site# 2 on April 21, 2006 by Juan Martinez

<b>E</b>	Elliott	EM	C Test Data
Client:	Broadcom Corporation	Job Number:	J63498
Model	BCM94321CB2	T-Log Number:	T63729
Model.	DCIVI9432 ICB2	Account Manager:	Esther Zhu
Contact:	David Boldy		

## FCC 15.247 DTS - Power, Bandwidth and Spurious Emissions

## **Test Specifics**

Spec: FCC 15.247

Objective: The objective of this test session is to perform final qualification testing of the EUT with respect to the

Class: N/A

specification listed above.

Date of Test: 4/21/2006 Config. Used: 1 Test Engineer: Jmartinez Config Change: None Test Location: Chamber #2 EUT Voltage: 120V, 60Hz

## General Test Configuration

The EUT was connected to the spectrum analyzer or power meter via a suitable attenuator. For the spurious emissions all transmit chains were connected simultaneously to the analyzer via a combiner. All other measurements were made on a single chain.

All measurements are corrected to allow for the external attenuators used.

**Ambient Conditions:** Temperature: 17 °C

> Rel. Humidity: 57 %

## **Summary of Results**

Run #	Test Performed	Limit	Pass / Fail	Result / Margin
1	Output Power	15.247(b)	Pass	Refer to run
2	Power Spectral Density (PSD)	15.247(d)	Pass	Refer to run
3	6dB Bandwidth	15.247(a)	Pass	Refer to run
4	Spurious emissions	15.247(b)	Pass	Refer to run

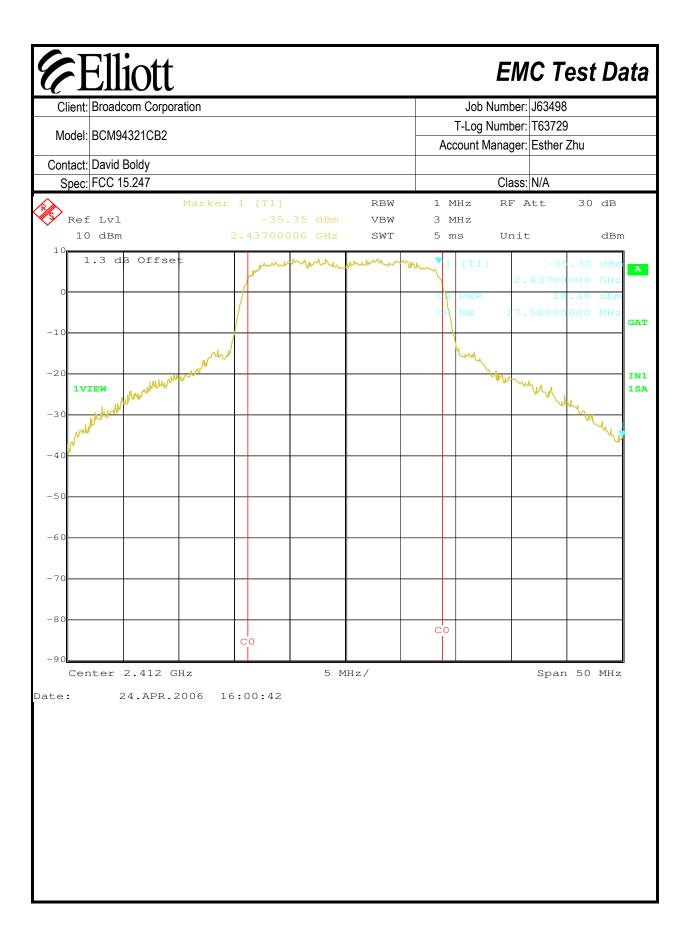
## **Modifications Made During Testing:**

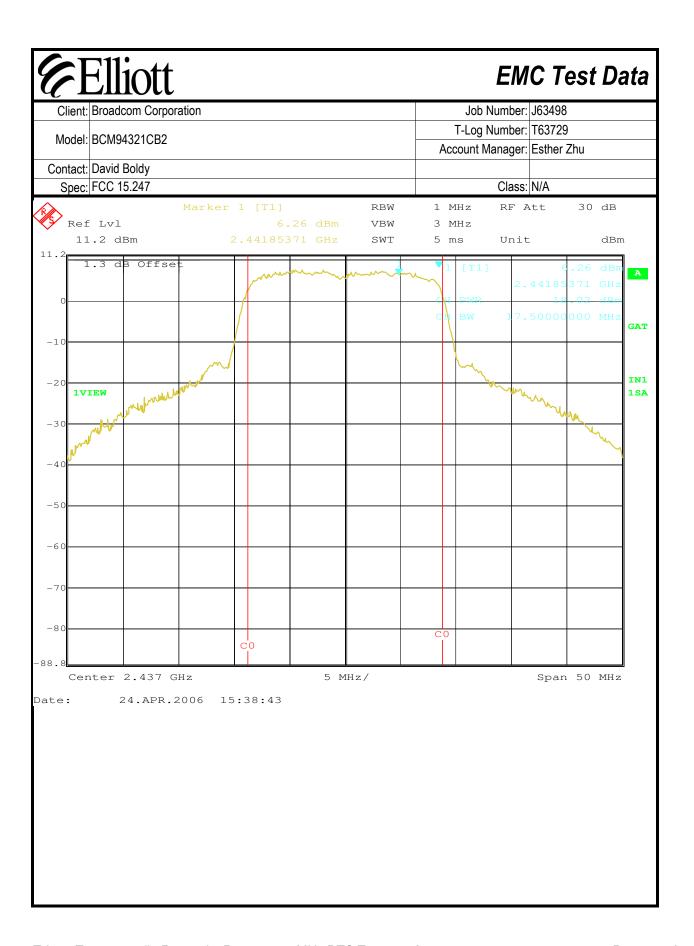
No modifications were made to the EUT during testing

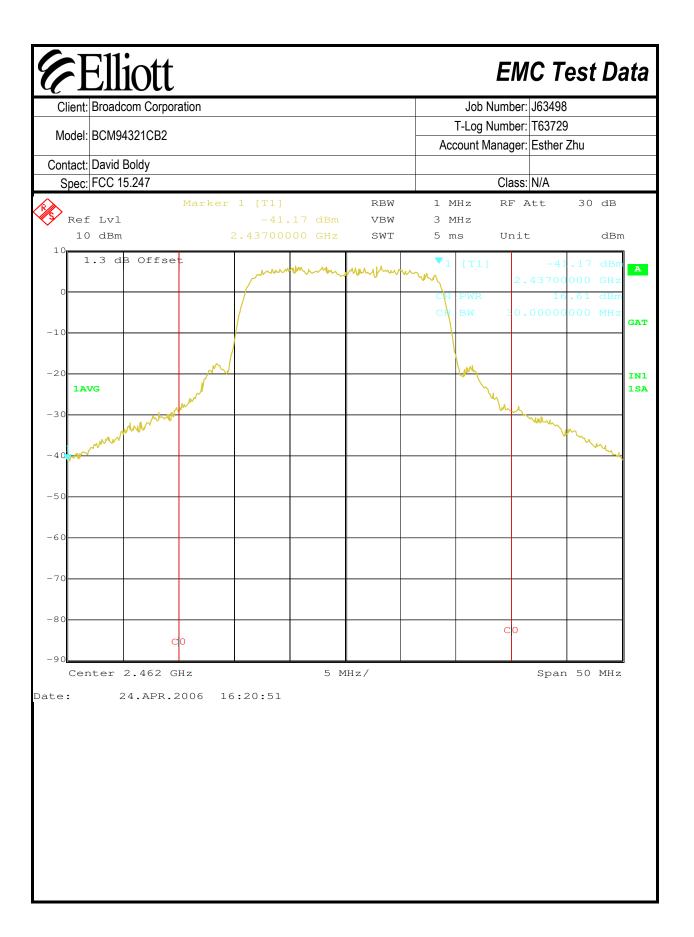
#### **Deviations From The Standard**

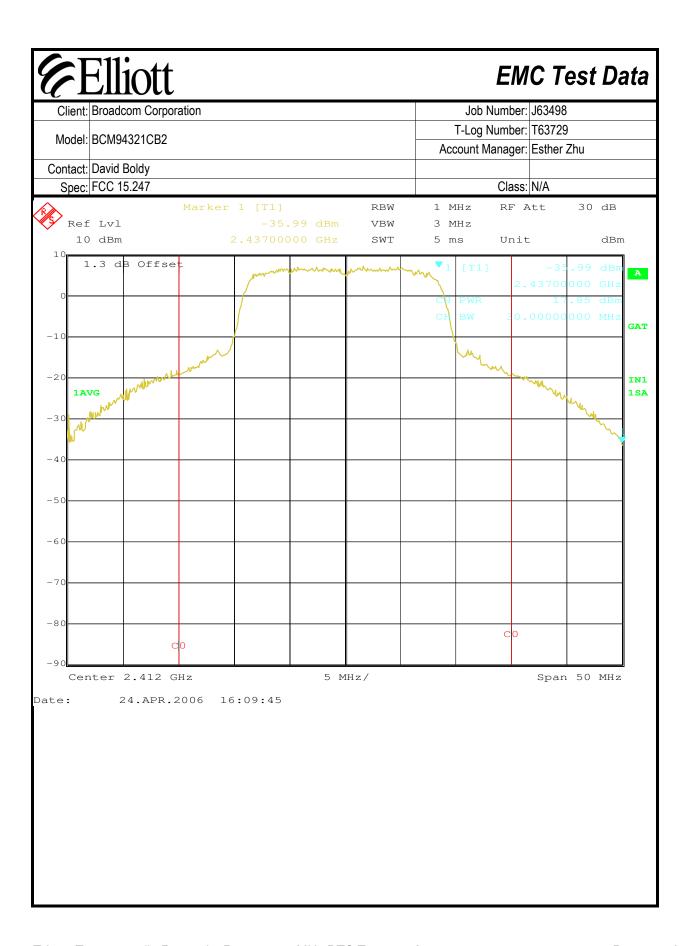
No deviations were made from the requirements of the standard.

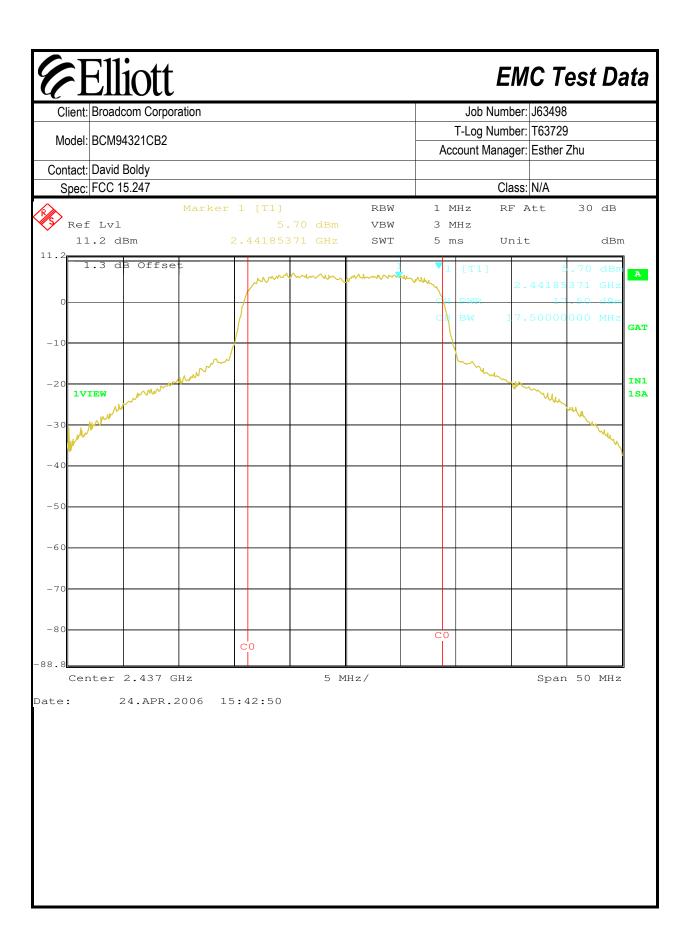
Client	: Broadcom Corpora	ation				Jo	b Number:	J63498	
Model	: BCM94321CB2					T-Lo	g Number:	T63729	
Model	. BON19432 TOB2					Accour	t Manager:	Esther Zhu	
	: David Boldy								
Spec	FCC 15.247						Class:	N/A	
			MAIN	& MIDI	DLE POR	TS			
	Output Power (MCS	•	V						
	ed signal on chain is		Yes						
Power		ower Measurements: Output Power (dBm) Note 1 Antenr			na Gain (dBi)	Note 3	EIRP Note 2		
Setting <sup>4</sup>	Frequency (MHz)	Chain 1	Chain 2	Total	Chain 1	Chain 2	Total	dBm	W
J. J.	2412	18.4	17.9	21.1	-1.6	-1.6	1.4	22.5	0.179
	2437	18.0	17.6	20.8	-1.6	-1.6	1.4	22.2	0.165
	2462	16.7	16.9	19.8	-1.6	-1.6	1.4	21.2	0.131
Note 3:	If the transmit chair antenna. If the transcan be treated inde Power setting - if a	nsmit chains ependently. single num	s are incoher	e power se	e system ante	enna gain is d for each ch	not applicab ain. If multip	le as each tr	ansmit ch
	setting for each chain is spearated by a comma (e.g. x,y would indictae power setting x for chain 1, power setting y								
Note 4:				o nower co	near and mat	er			
Note 4: Note 5:	for chain 2. Power measured u	ising Broado	coms averag	e power se	ilisoi allu illet	0.			

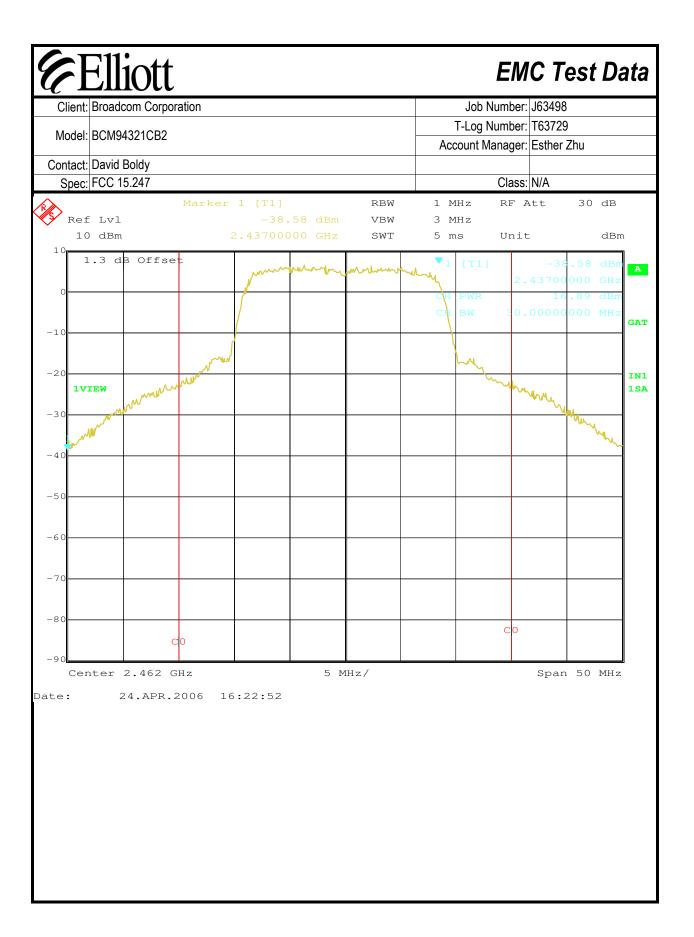




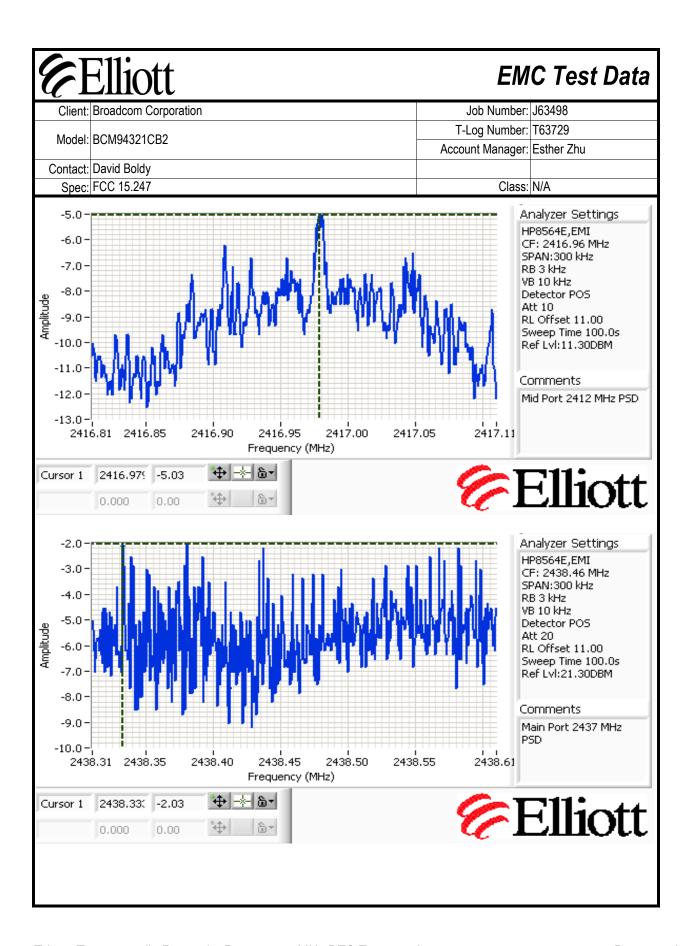


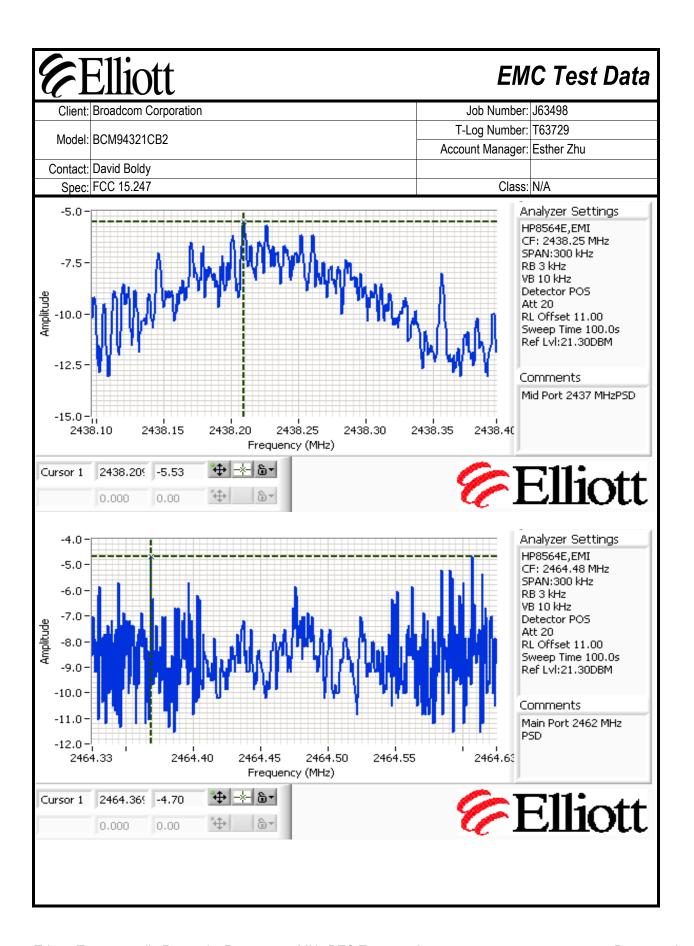


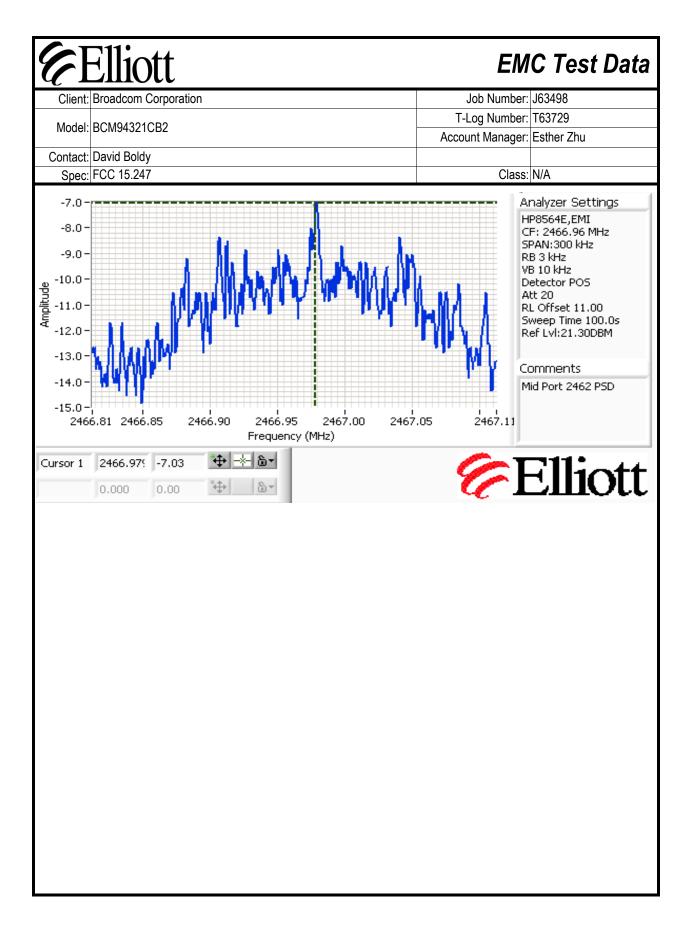




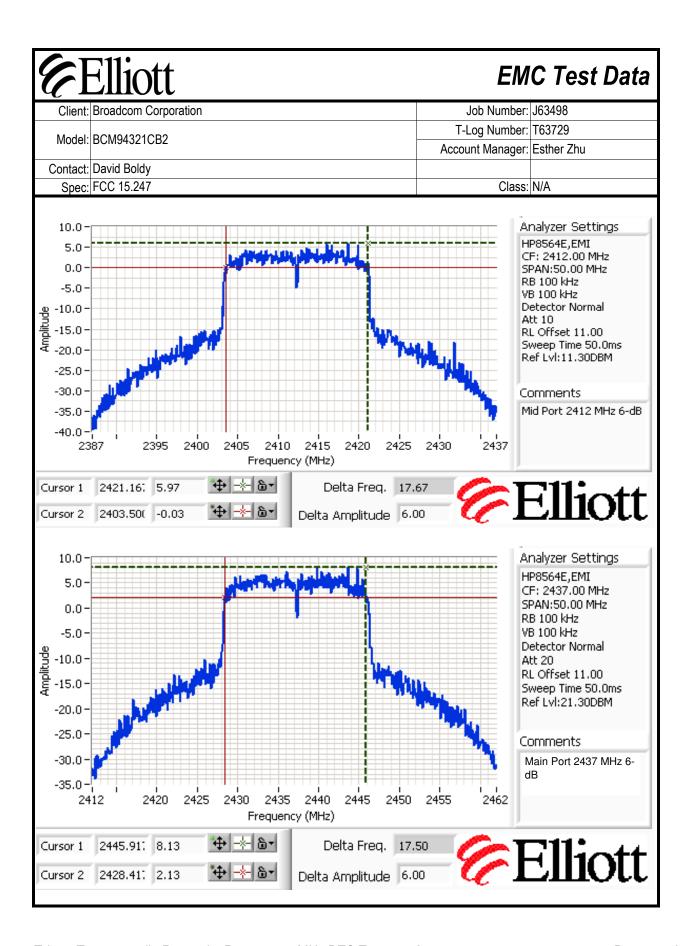
#### **EMC Test Data** Job Number: J63498 Client: Broadcom Corporation T-Log Number: T63729 Model: BCM94321CB2 Account Manager: Esther Zhu Contact: David Boldy Spec: FCC 15.247 Class: N/A Run #3: Power Spectral Density Power PSD (dBm/3kHz) Limit Result Frequency (MHz) Setting Chain 1 Chain 2 dBm/3kHz Total 2412 -3.9 -5.0 -1.4 8.0 Pass 2437 -2.0 -5.5 -0.4 8.0 **Pass** 2462 -7.0 -2.7 8.0 -4.7 Pass Power spectral density measured using RB=3 kHz, VB=10kHz, analyzer with peak detector and with a sweep time set to ensure a dwell time of at least 1 second per 3kHz. The measurement is made at the frequency of PPSD Note 1: determined from preliminary scans using RB=3kHz using multiple sweeps at a faster rate over the 6dB bandwidth of the signal. Analyzer Settings -3.0 HP8564E,EMI -4.0 CF: 2413,19 MHz SPAN:300 kHz -5.0 RB3kHz VB 10 kHz -6.0 Detector POS -7.0 Att 20 -8.0 Sweep Time 100.0s Ref Lvl:21.30DBM Comments -11.0 Main port 2412 Mhz PSD -12.0 2413.30 2413.34 2413.10 2413.15 2413.20 2413.25 2413.04 Frequency (MHz) Cursor 1 2413.208 -3.87 Elliott 0.000 0.00

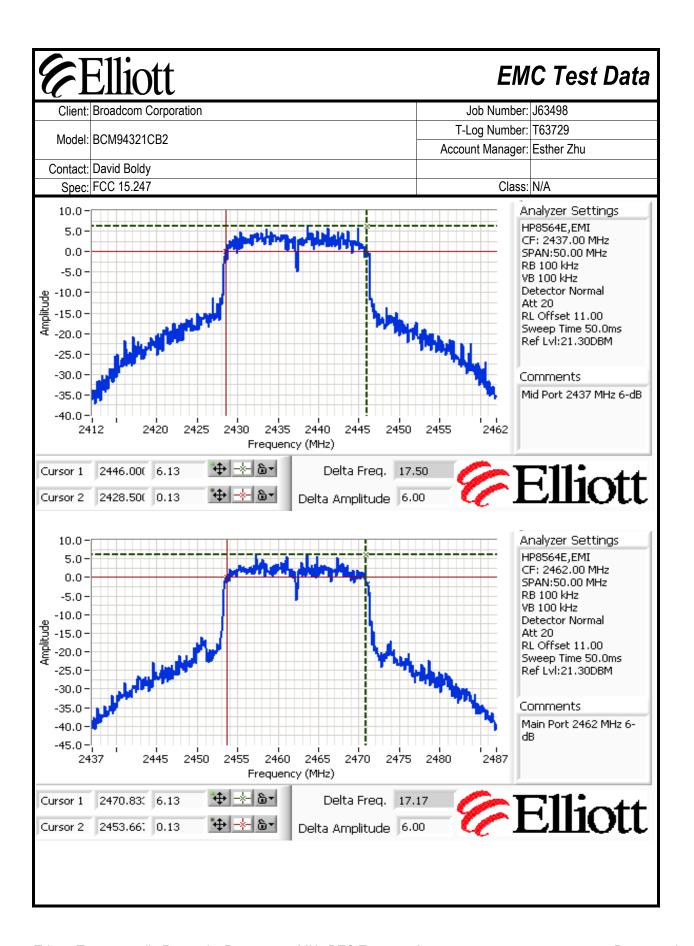


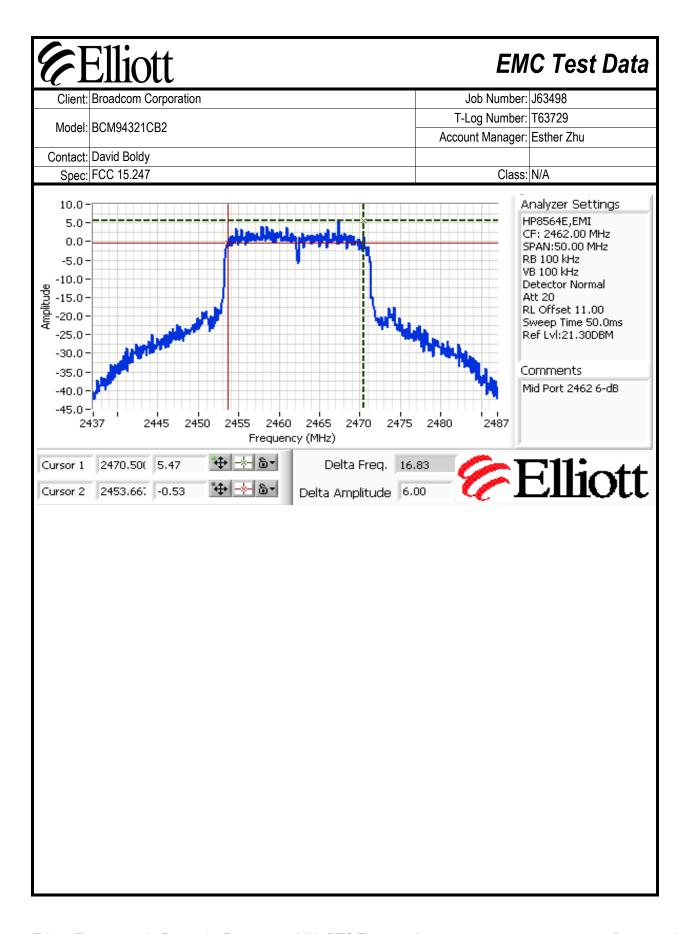




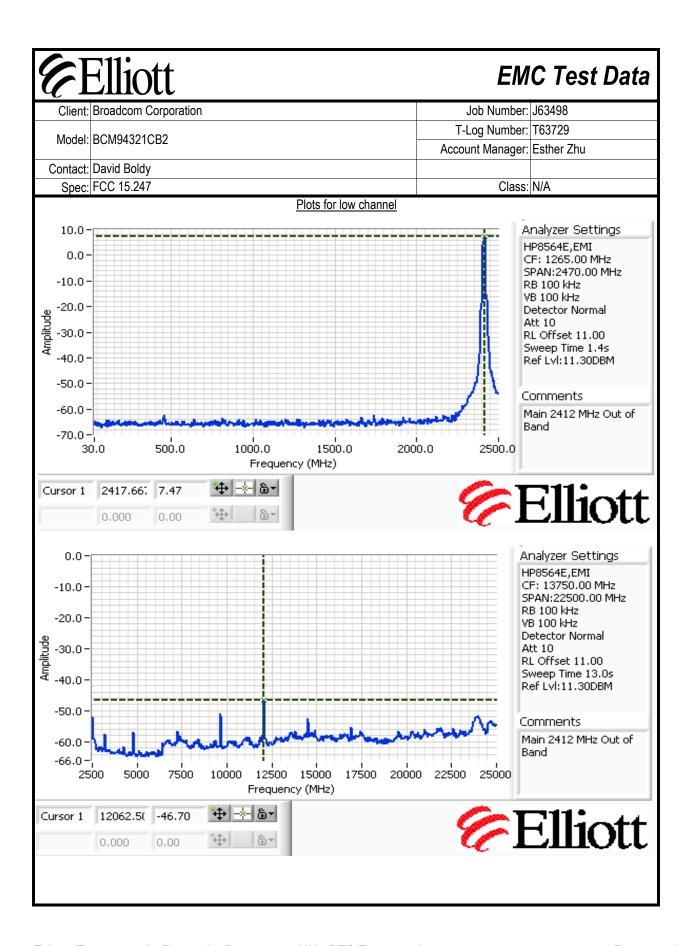
#### **Elliott EMC Test Data** Job Number: J63498 Client: Broadcom Corporation T-Log Number: T63729 Model: BCM94321CB2 Account Manager: Esther Zhu Contact: David Boldy Spec: FCC 15.247 Class: N/A Run #3: Signal Bandwidth 6dB Signal Bandwidth Power Resolution 99% Signal Bandwidth Frequency (MHz) Setting Bandwidth (MHz) 17.42 2412 100 kHz 2437 100 kHz 17.5 17.17 2462 100 kHz Note 1: Measured on a single chain Analyzer Settings 10.0 HP8564E,EMI 5.0 CF: 2412.00 MHz 0.0 SPAN:50.00 MHz RB 100 kHz -5.0 VB 100 kHz ep -10.0--15.0--20.0--10.0 Detector Normal Att 20 RL Offset 11.00 Sweep Time 50.0ms Ref Lvl:21.30DBM -25.0· -30.0 Comments Main port 2412 Mhz 6--35.0 -40.0 2420 2405 2410 2415 2425 2400 2437 2395 Frequency (MHz) **♦** -\*- 6-2421.08: 7.80 Delta Freq. 17.42 Cursor 1 **Elliott** Cursor 2 2403.66: 1.80 Delta Amplitude 6.00

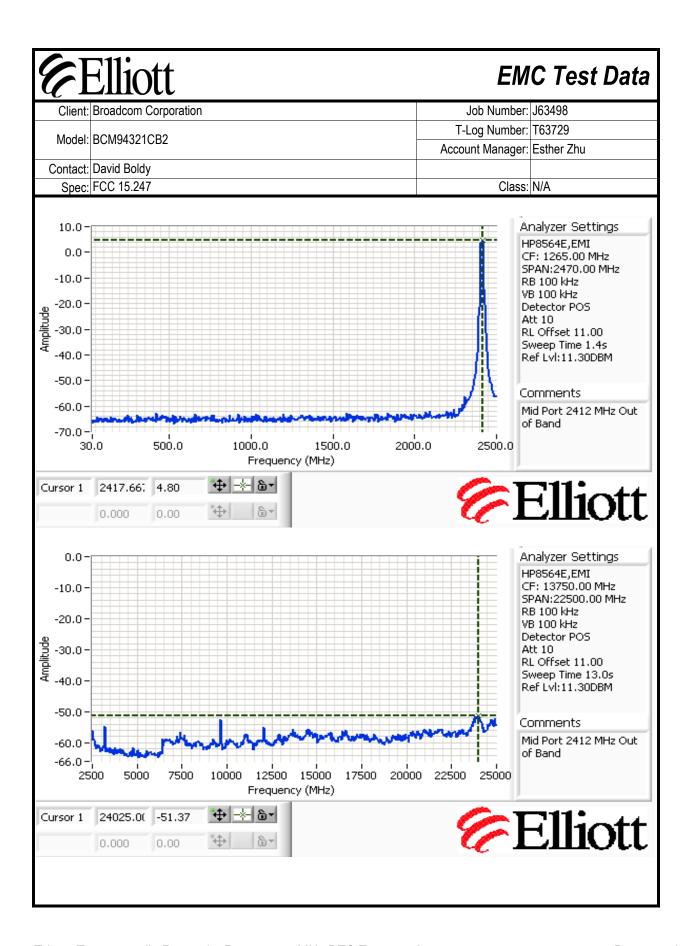


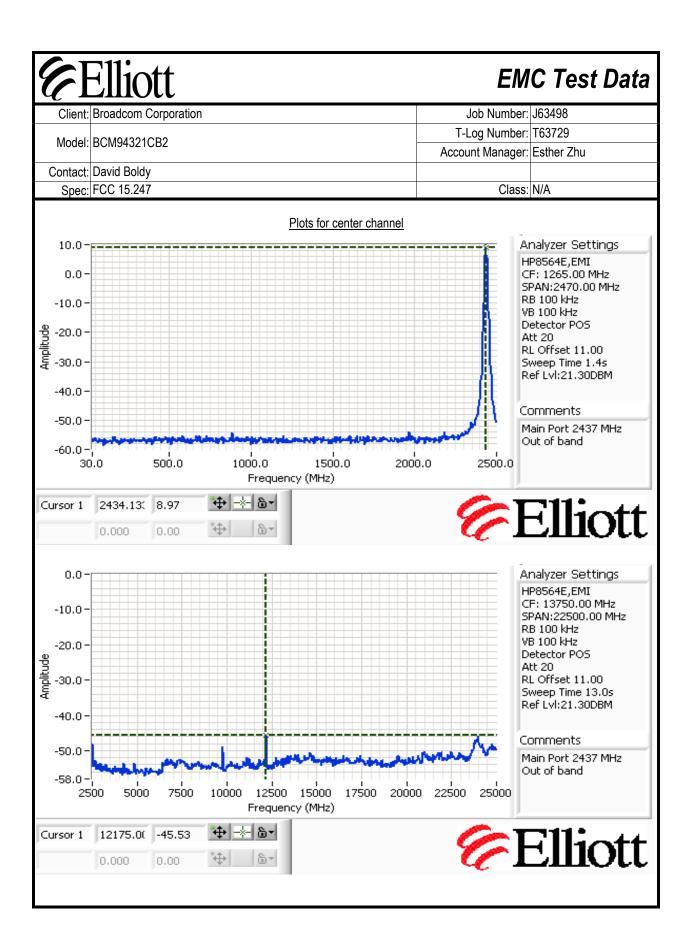


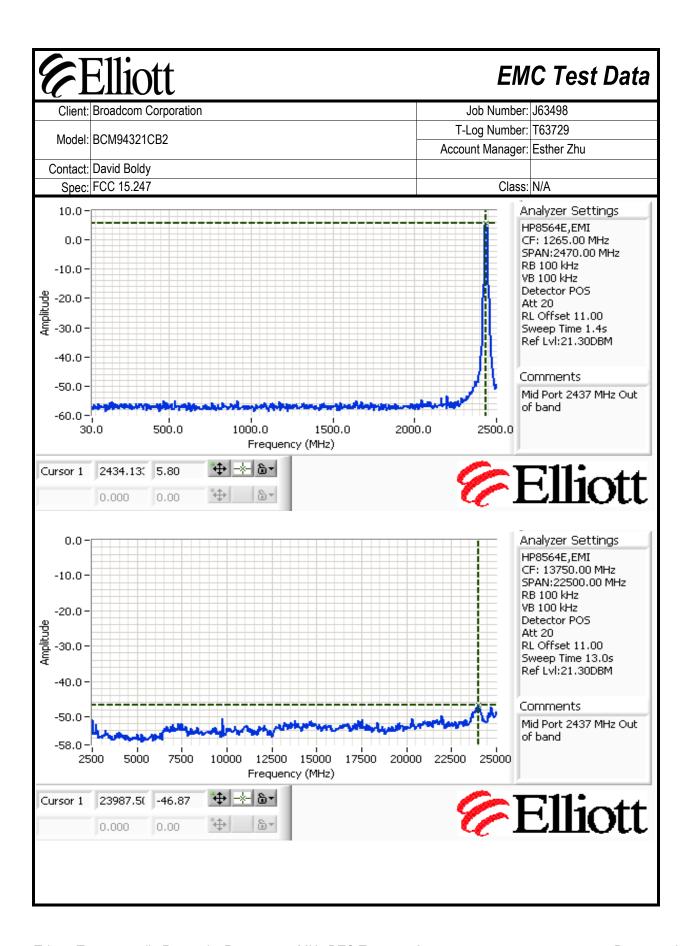


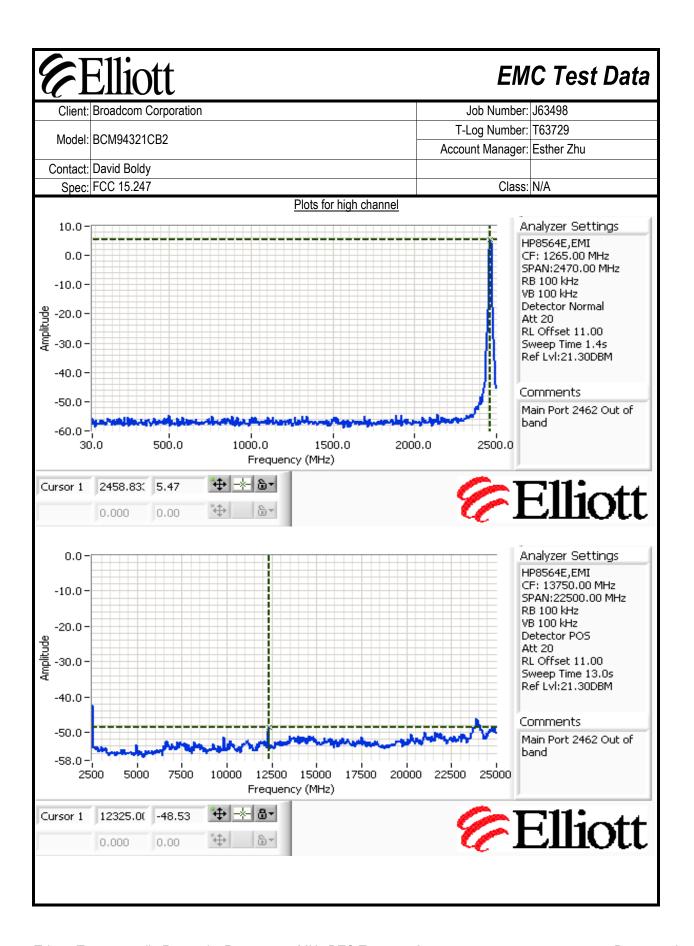
# **Elliott EMC Test Data** Job Number: J63498 Client: Broadcom Corporation T-Log Number: T63729 Model: BCM94321CB2 Account Manager: Esther Zhu Contact: David Boldy Spec: FCC 15.247 Class: N/A Run #4: Out of Band Spurious Emissions Power Setting Per Chain Frequency (MHz) Limit Result -30dBc Refer to plot 2412 2437 -30dBc Refer to plot 2462 -30dBc Refer to plot Measured with all chains connected together through a combiner, unused ports on the combiner terminated in Note 1: 50ohms.

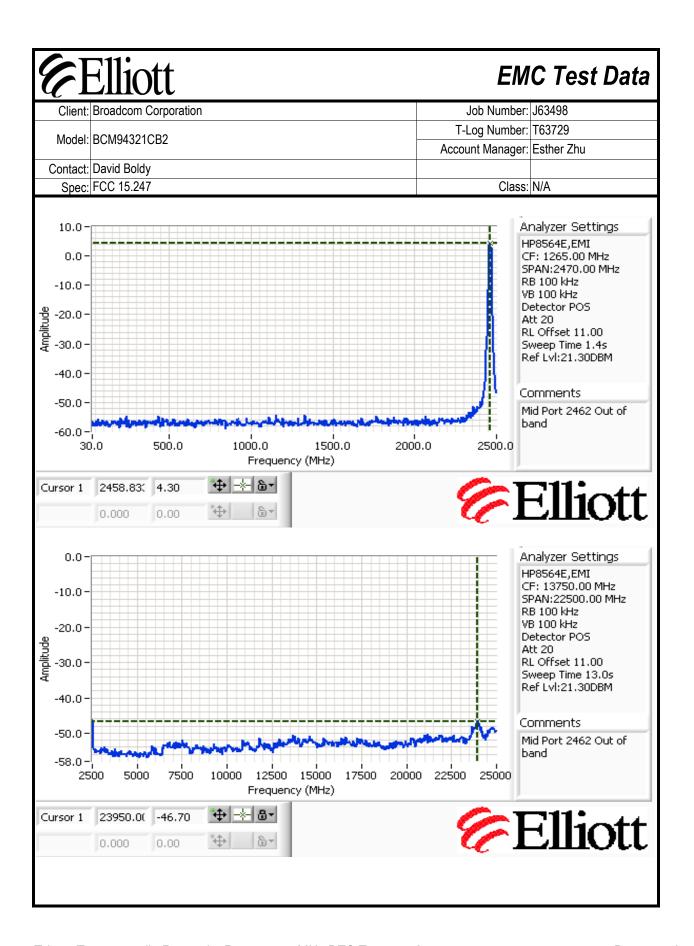




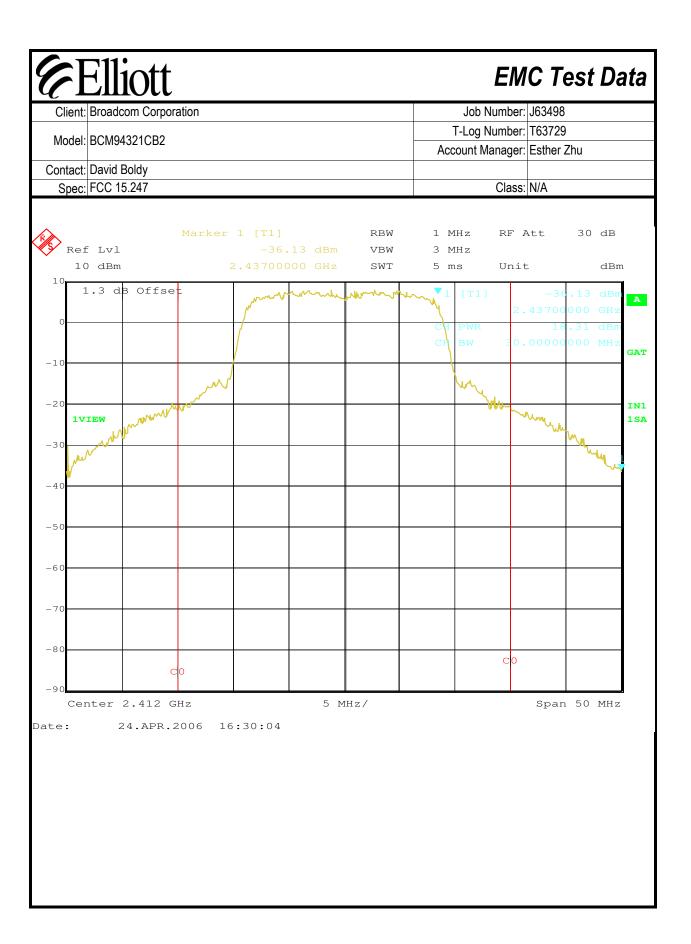


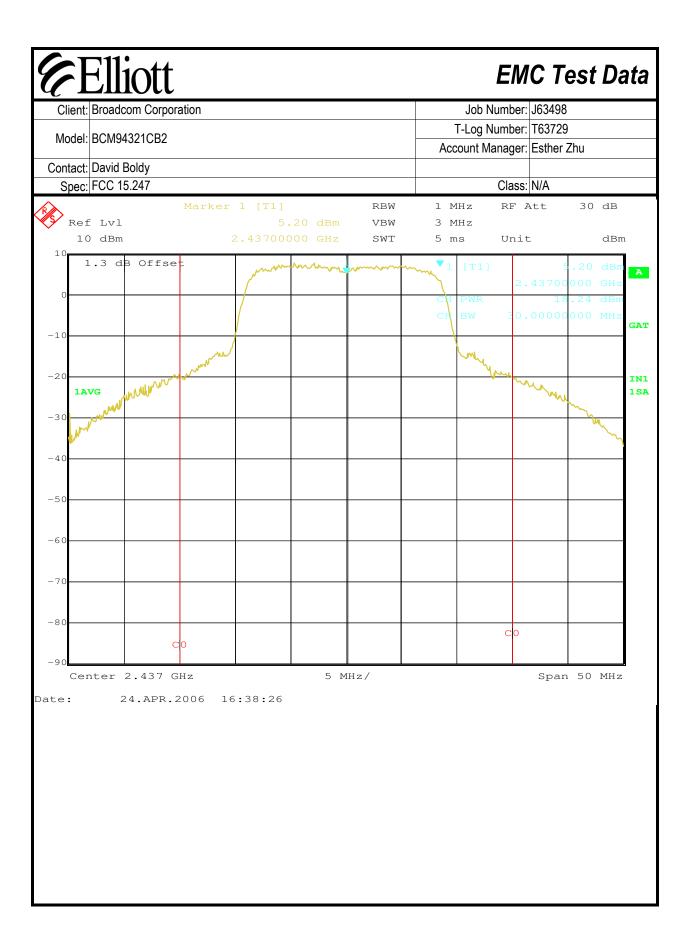


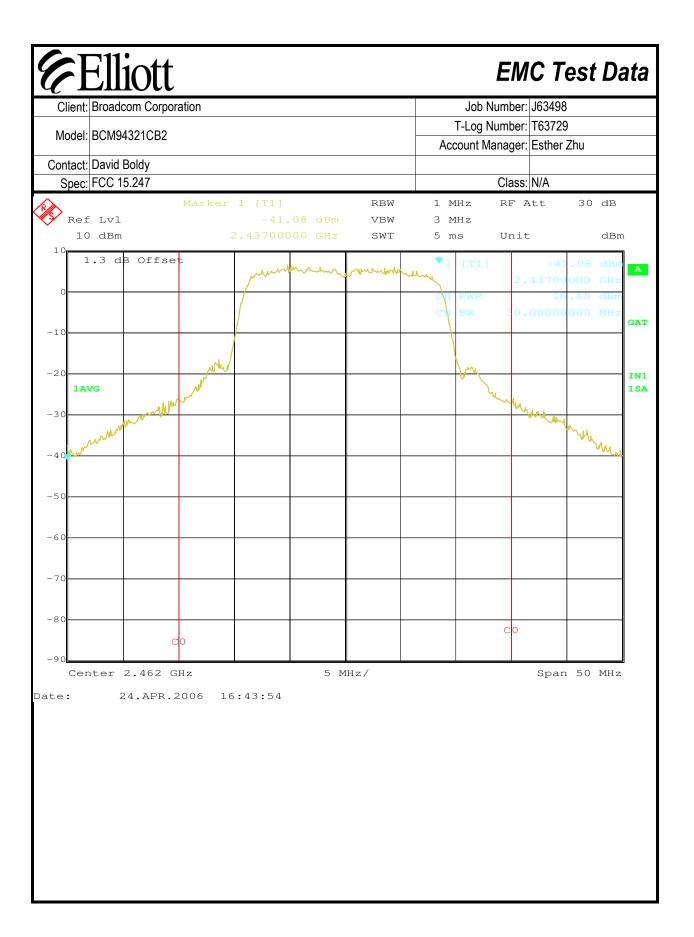


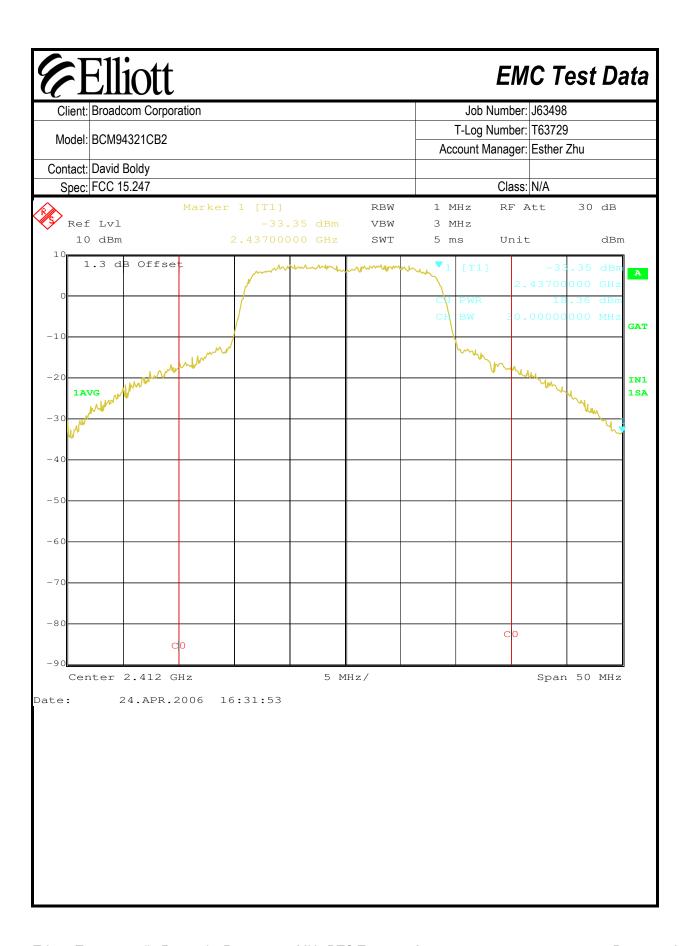


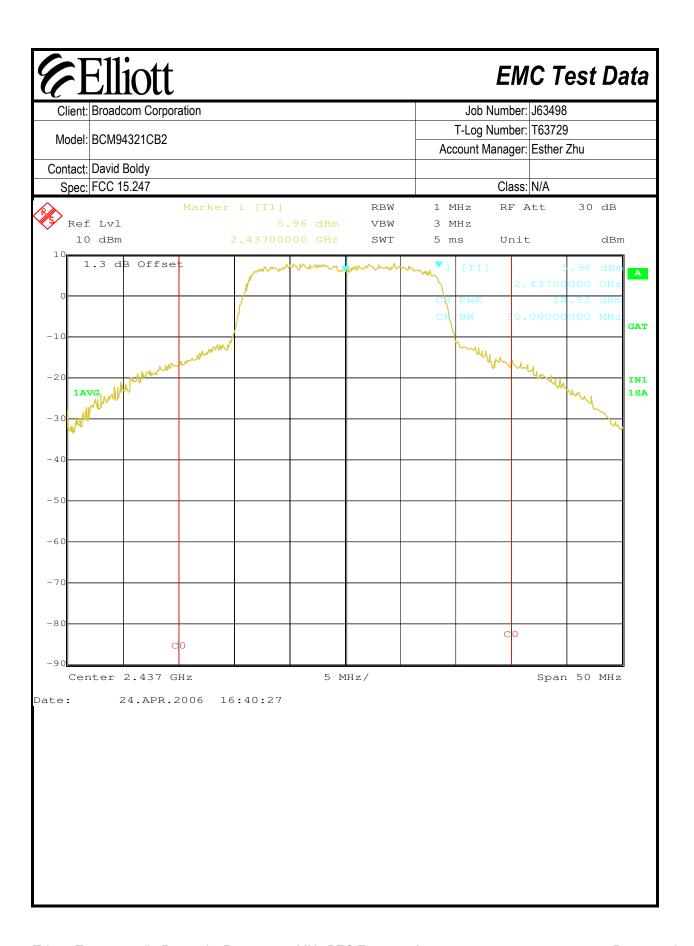
Client:	Broadcom Corpora	ition					ob Number:		
Model:	BCM94321CB2						og Number:		
<u> </u>	55					Accour	nt Manager:	Esther Zhu	
	David Boldy FCC 15.247						Class:	NI/A	
Spec:	FGC 15.247		ALIV	0.14100	LE BODI		Class:	N/A	
			AUX	& MIDD	LE PORT	15			
	utput Power (MCS	. ,							
	d signal on chain is		Yes						
eguiator <u>)</u> Power	/ Power Measuren	ents:	Power (dBr	Note 1	Antonn	na Gain (dBi)	Note 3	EIRP Note 2	
Setting <sup>4</sup>	Frequency (MHz)	Chain 1	Chain 2	Total	Chain 1	Chain (dbi)	, Total	dBm	l w
Setting	2412	18.3	18.4	21.3	-1.6	-1.6	1.4	22.74	0.188
	2437	18.2	18.5	21.4	-1.6	-1.6	1.4	22.76	0.189
	2462	16.6	16.9	19.8	-1.6	-1.6	1.4	21.1	0.130
Note 1:	Output power mea RBW=1MHz, VB=3 analyzer was confi	B MHz, sam	ple detector	, power ave	raging on (tra	nsmitted sig			

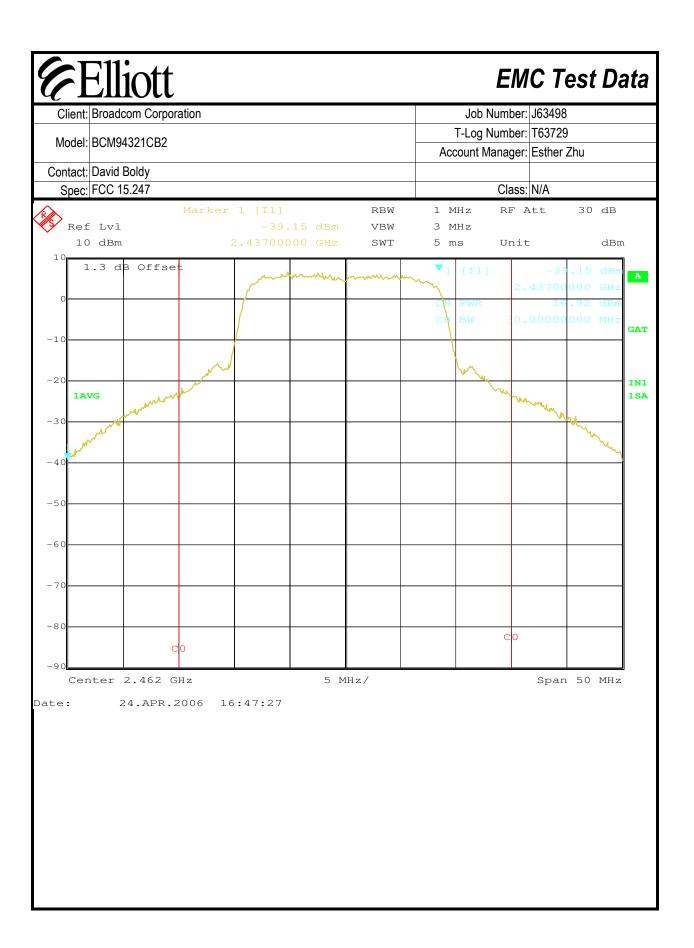




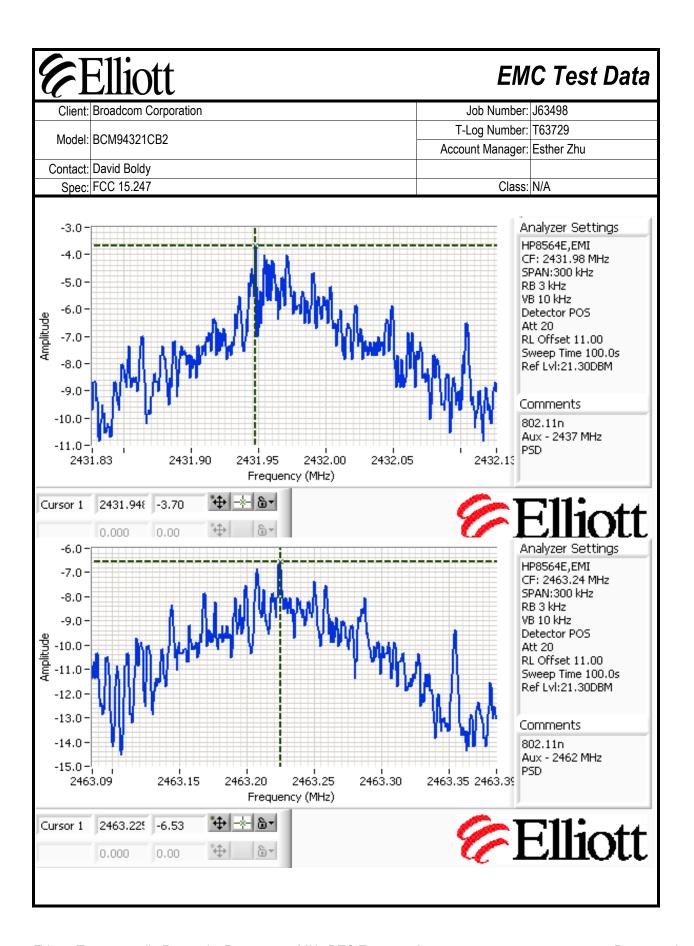


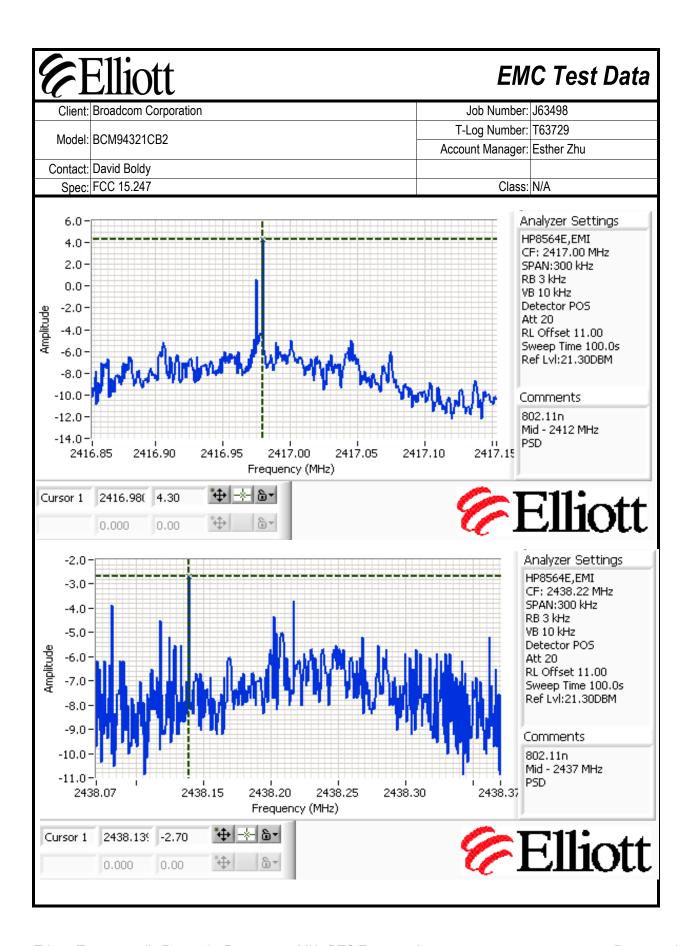


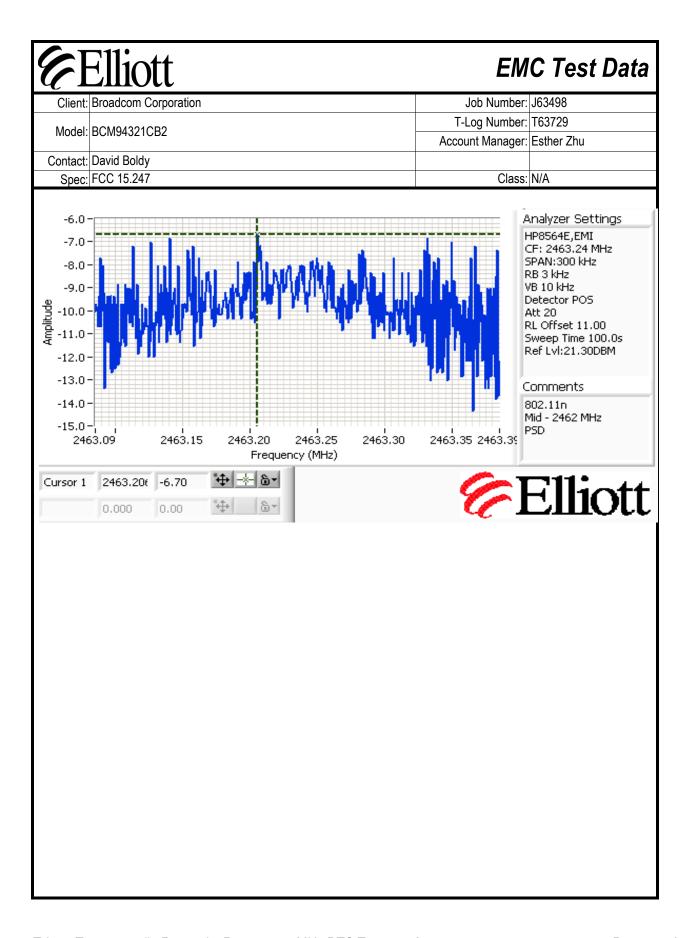




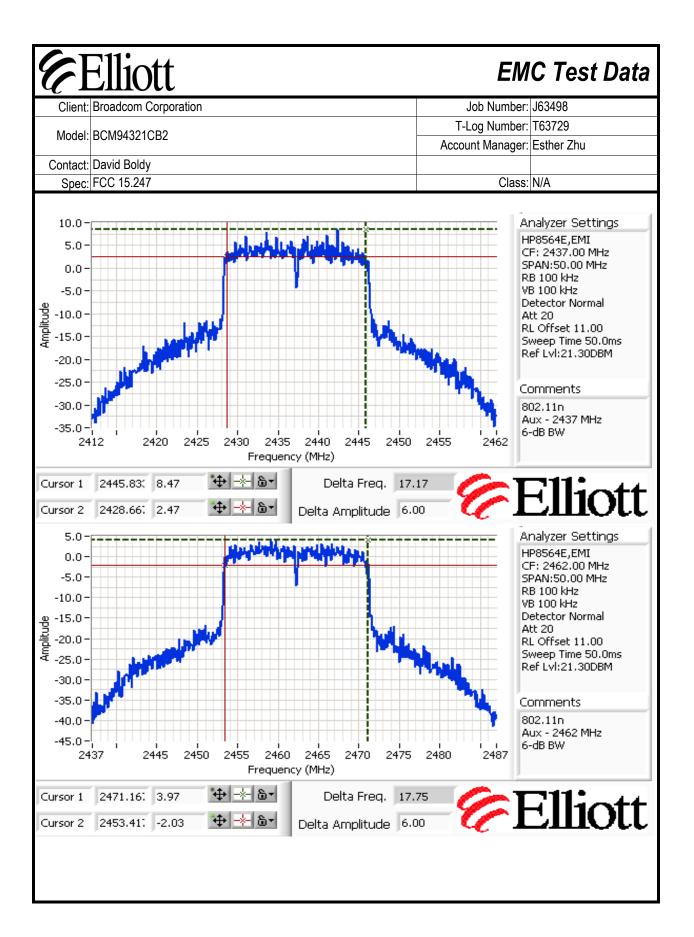
### **EMC Test Data** Job Number: J63498 Client: Broadcom Corporation T-Log Number: T63729 Model: BCM94321CB2 Account Manager: Esther Zhu Contact: David Boldy Spec: FCC 15.247 Class: N/A Run #2: Power Spectral Density Power PSD (dBm/3kHz) Limit Result Frequency (MHz) Setting Chain 1 dBm/3kHz Chain 2 Total 2412 -3.5 4.3 5.0 8.0 Pass 2437 -3.7 -2.7 -0.28.0 **Pass** 2462 -3.6 8.0 Pass -6.5 -6.7 Power spectral density measured using RB=3 kHz, VB=10kHz, analyzer with peak detector and with a sweep time set to ensure a dwell time of at least 1 second per 3kHz. The measurement is made at the frequency of PPSD Note 1: determined from preliminary scans using RB=3kHz using multiple sweeps at a faster rate over the 6dB bandwidth of the signal. Analyzer Settings -3.0HP8564E,EMI -4.0 CF: 2416.97 MHz SPAN:300 kHz -5.0 RB3kHz VB 10 kHz -6.0 Detector POS -7.0 Att 20 RL Offset 11.00 -8.0 Sweep Time 100.0s Ref Lvl:21.30DBM Comments 802.11n Aux - 2412 MHz -12.0PSD 2417.00 2417.05 2417.12 2416.82 2416.90 2416.95 Frequency (MHz) **⊹⊢6**∀ 2416.976 -3.53 Cursor 1 0.000 0.00

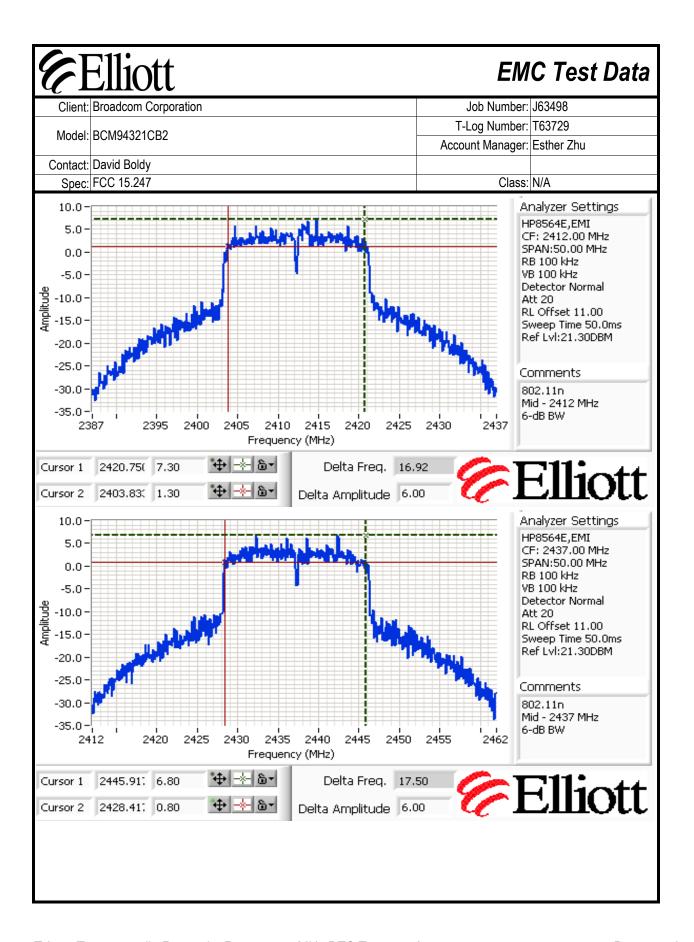


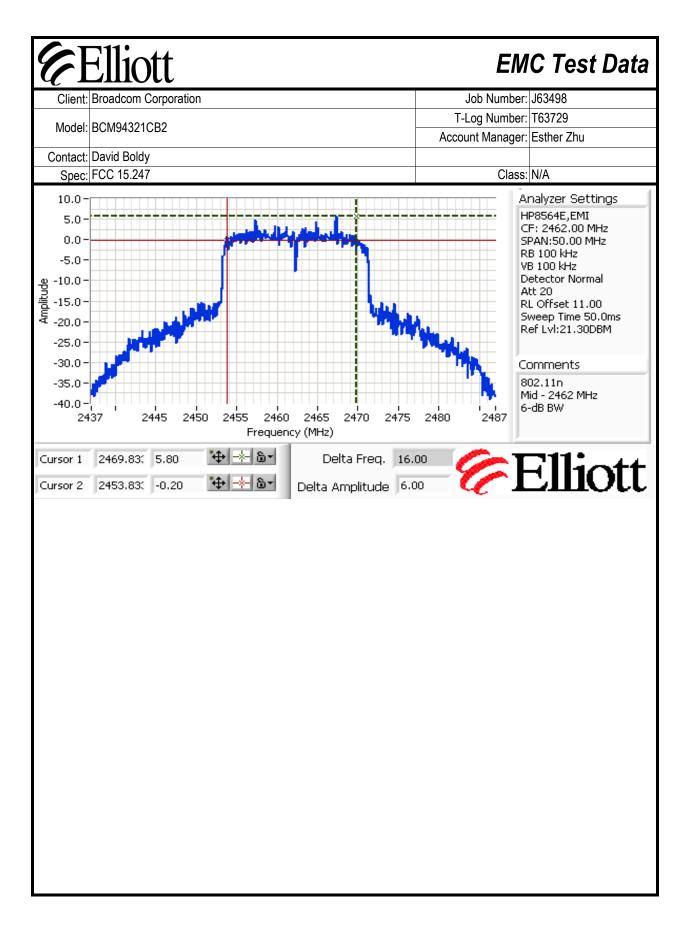




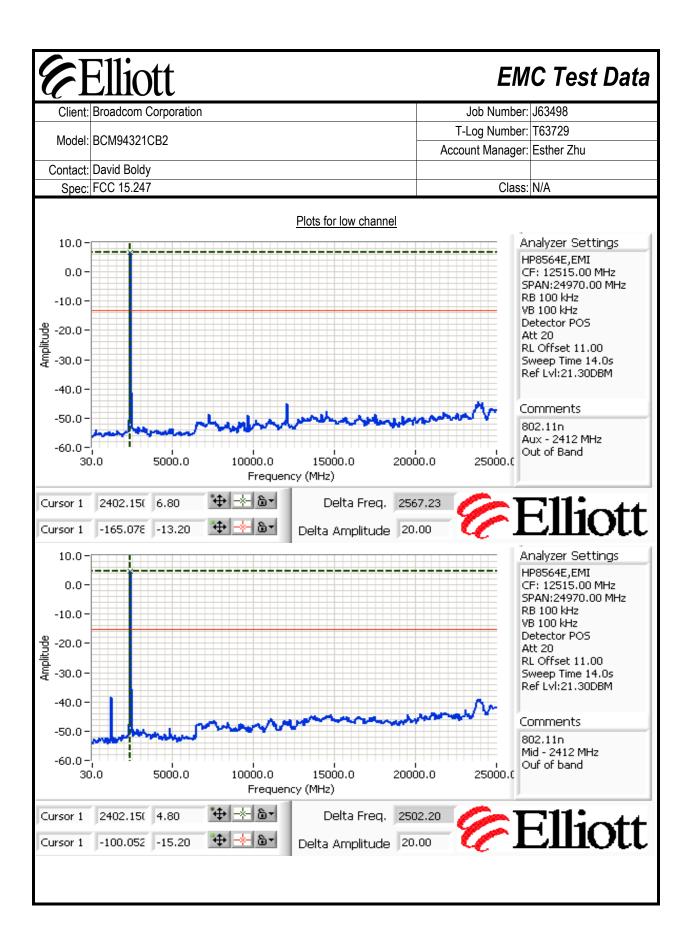
### **Elliott EMC Test Data** Job Number: J63498 Client: Broadcom Corporation T-Log Number: T63729 Model: BCM94321CB2 Account Manager: Esther Zhu Contact: David Boldy Spec: FCC 15.247 Class: N/A Run #3: Signal Bandwidth 6dB Signal Bandwidth Power Resolution 99% Signal Bandwidth Frequency (MHz) Setting Bandwidth (MHz) 2412 100 kHz 17.42 17.50 2437 100 kHz 2462 100 kHz 17.75 Note 1: Measured on a single chain Analyzer Settings 10.0 HP8564E,EMI 5.0 CF: 2412,00 MHz 0.0 SPAN:50.00 MHz RB 100 kHz -5.0· VB 100 kHz Detector Normal -10.0 Att 20 -15.0 RL Offset 11.00 Sweep Time 50.0ms -20.0 Ref Lvl:21.30DBM -25.0 -30.0 Comments 802.11n -35.0 Aux - 2412 MHz -40.0 6-dB BW 2405 2410 2415 2425 2387 2395 2400 2420 2430 Frequency (MHz) 2421.08( 7.97 Delta Freq. 17.42 Elliott Cursor 1 2403.66: 1.97 Cursor 2 Delta Amplitude 6.00

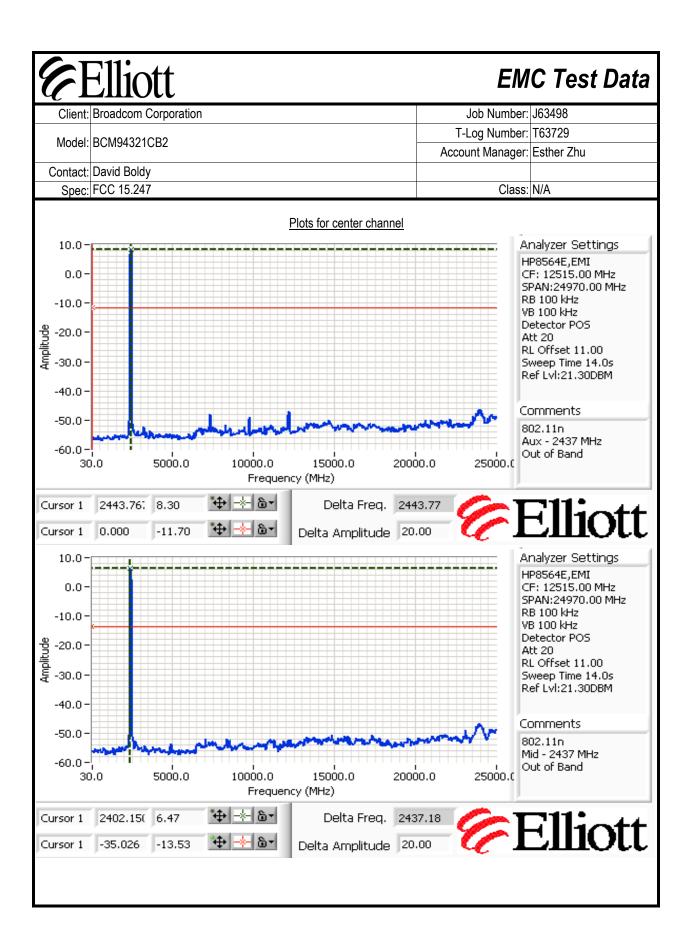


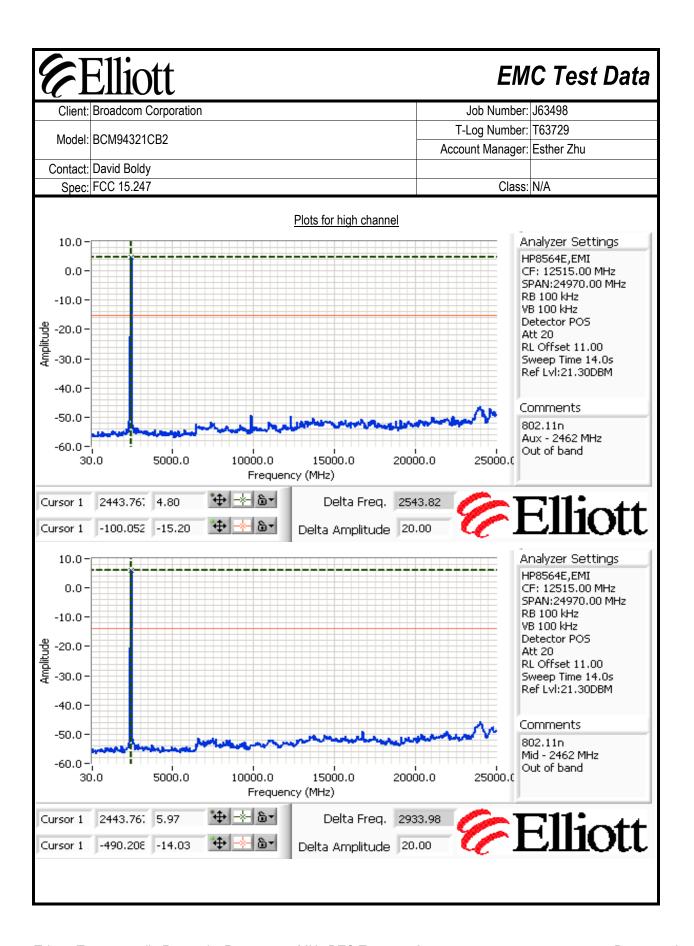




# **Elliott EMC Test Data** Job Number: J63498 Client: Broadcom Corporation T-Log Number: T63729 Model: BCM94321CB2 Account Manager: Esther Zhu Contact: David Boldy Spec: FCC 15.247 Class: N/A Run #4: Out of Band Spurious Emissions Power Setting Per Chain Frequency (MHz) Limit Result -30dBc Refer to plots 2412 2437 -30dBc Refer to plots 2462 -30dBc Refer to plots Measured with all chains connected together through a combiner, unused ports on the combiner terminated in Note 1: 50ohms.







<b>Elliott</b>	EMC Test Data
Client: Broadcom Corporation	Job Number: J63498
Model: BCM94321CB2	T-Log Number: T63729
Woder. BCW194321CB2	Account Manager: Esther Zhu
Contact: David Boldy	
Spec: FCC 15.247	Class: N/A

## FCC 15.247 DTS - Fundamental and Spurious Emissions 20MHz Signalling

### **Test Specifics**

Objective: The objective of this test session is to perform final qualification testing of the EUT with respect to the

specification listed above.

Date of Test: 4/11/2006 Config. Used: 2 Config Change: None Test Engineer: Juan Martinez Test Location: Fremont Chamber #4 EUT Voltage: 120V/60Hz

### General Test Configuration

The EUT and all local support equipment were located on the turntable for radiated spurious emissions testing. Remote equipment was located underneat the table.

For radiated emissions testing the measurement antenna was located 3 meters from the EUT.

Ambient Conditions: Temperature: 20.2 °C

> Rel. Humidity: 53 %

### **Summary of Results**

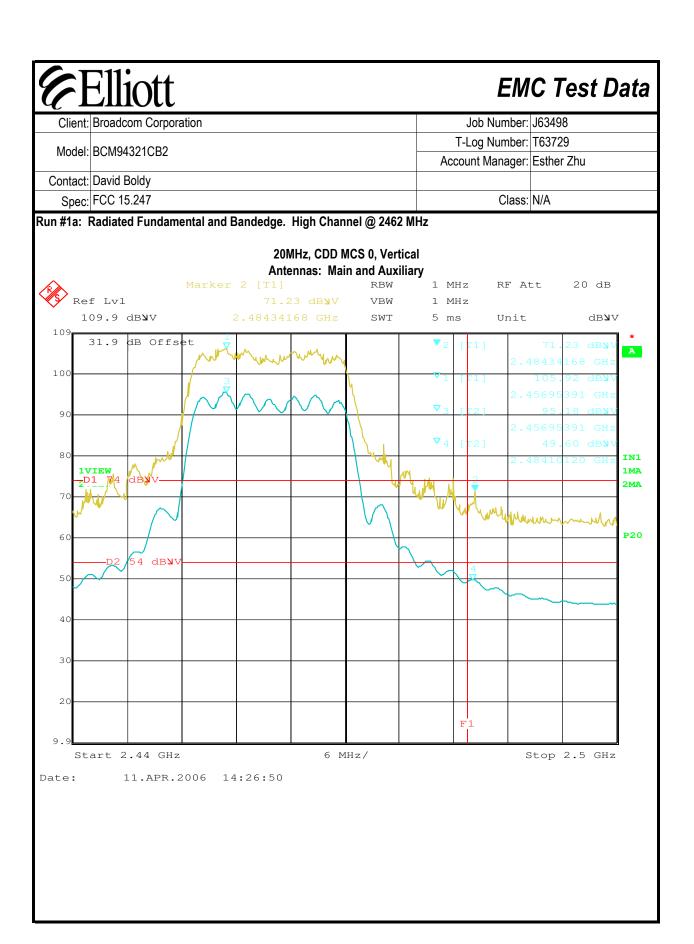
Run #	Test Performed	Limit	Pass / Fail	Result / Margin
1	Fundamental and Bandedge	FCC Part 15.209 / 15.247( c)	Pass	53.96dBµV/m (498.9µV/m) @ 2390.0MHz (-0.04dB)
2, 3, 4	Radiated Spurious Emissions 1,000-26,500MHz	FCC Part 15.209 / 15.247( c)	Pass	51.7dBµV/m (385.9µV/m) @ 1000.1MHz (-2.3dB)

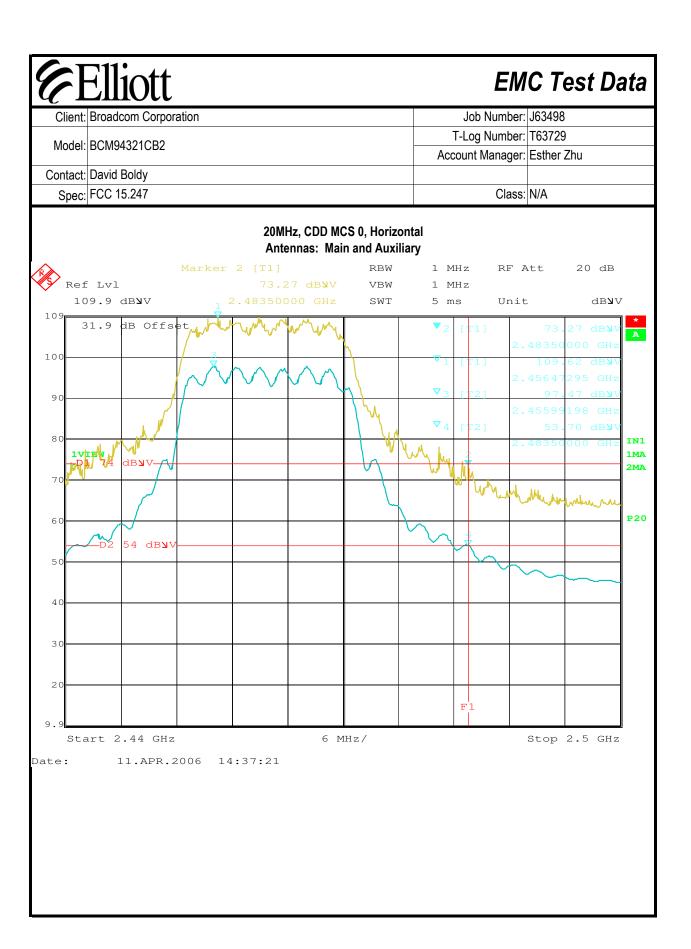
### Modifications Made During Testing:

No modifications were made to the EUT during testing

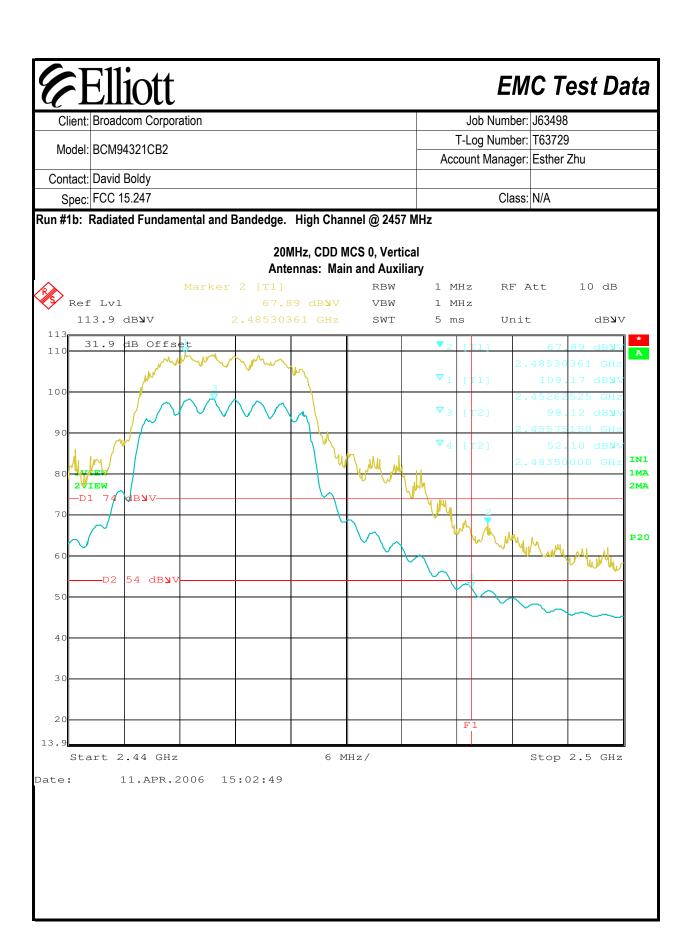
### Deviations From The Standard

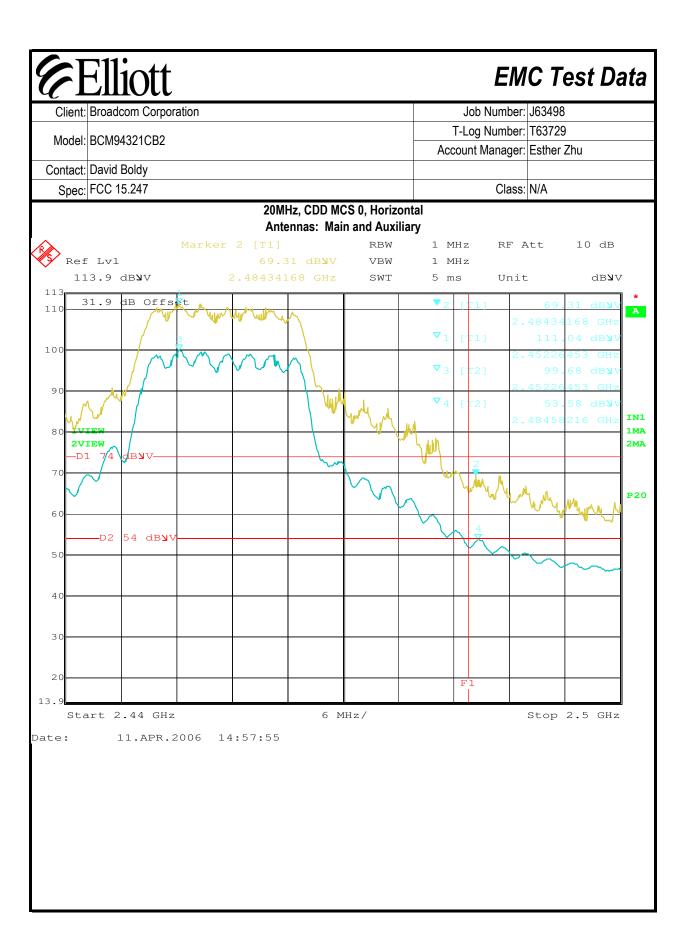
No deviations were made from the requirements of the standard.





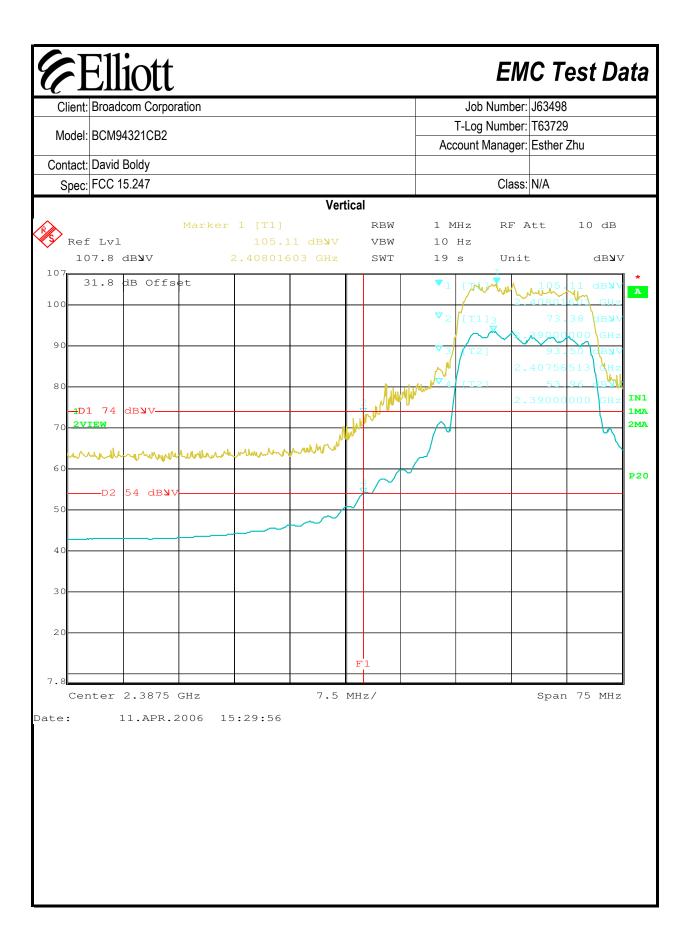
#### **Elliott EMC Test Data** Job Number: J63498 Client: Broadcom Corporation T-Log Number: T63729 Model: BCM94321CB2 Account Manager: Esther Zhu Contact: David Boldy Spec: FCC 15.247 Class: N/A Fundamental and Band Edge Field Strength: 15.209 / 15.247 Frequency Level Pol Detector Azimuth Height Comments MHz Pk/QP/Avg $dB\mu V/m$ v/h Limit degrees Margin meters 2456.950 105.9 Pk 1.1 RB = VB = 1MHz 326 ٧ -2456.950 95.2 326 1.1 RB = 1MHz, VB = 10Hz ٧ Avg 2456.470 109.5 Pk 92 1.5 RB = VB = 1MHz h 2455.990 97.5 92 1.5 RB = 1MHz, VB = 10Hz h Avg 2484.340 74.0 -2.8 Pk 326 1.1 RB = VB = 1MHz 71.2 2484.100 54.0 1.1 RB = 1MHz, VB = 10Hz 49.6 ٧ -4.4 Avg 326 2483.500 73.3 74.0 -0.7 Pk 92 1.5 RB = VB = 1MHz h 2483.500 53.7 54.0 -0.3 92 1.5 RB = 1MHz, VB = 50Hz h Avg





#### **Elliott EMC Test Data** Job Number: J63498 Client: Broadcom Corporation T-Log Number: T63729 Model: BCM94321CB2 Account Manager: Esther Zhu Contact: David Boldy Spec: FCC 15.247 Class: N/A Fundamental and Band Edge Field Strength: 15.209 / 15.247 Frequency Level Detector Azimuth Height Comments MHz $dB\mu V/m$ v/h Limit Margin Pk/QP/Avg degrees meters 2485.300 67.9 Pk 325 1.1 RB = VB = 1MHz 2455.750 98.1 325 1.1 RB = 1MHz, VB = 10Hz Avg 2452.260 111.0 Pk 92 1.5 RB = VB = 1MHz h --1.5 RB = 1MHz, VB = 10Hz 2452.260 99.7 Avg 92 h 2455.750 67.9 74.0 -6.1 Pk 325 1.1 RB = VB = 1MHz ٧ 2483.500 52.1 ٧ 54.0 -1.9 Avg 325 1.1 RB = 1MHz, VB = 10Hz 2484.340 69.3 74.0 -4.7 Pk 92 1.5 RB = VB = 1MHz h 2484.580 53.6 54.0 -0.4 1.5 RB = 1MHz, VB = 10Hz h Avg

## **EMC Test Data** Job Number: J63498 Client: Broadcom Corporation T-Log Number: T63729 Model: BCM94321CB2 Account Manager: Esther Zhu Contact: David Boldy Spec: FCC 15.247 Class: N/A Run #1c: Radiated Fundamental and Bandedge. High Channel @ 2412 MHz, 20MHz, CDD MCS 0 Antennas: Main and Auxiliary Horizontal Marker 4 [T2] RBW 1 MHz RF Att 20 dB Ref Lvl 53.66 dB**y**V VBW 1 MHz 111.8 db**y**V 2.38984970 GHz db**y**v SWT 5 ms Unit 31.8 dB Offset A 100 IN1 8 ( 1MA **1VIEW** 2MA <u>2</u>D1 73.9 dB**y**V-P20 60 53.9 dB**y**V 30 20 11.8 Center 2.3875 GHz Span 75 MHz 7.5 MHz/ 11.APR.2006 15:19:36 Date:



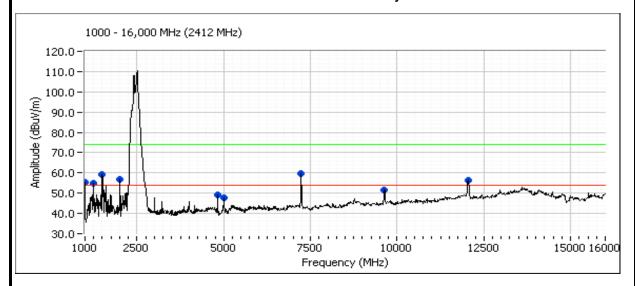
Client:	Broadcom	Corpora	ation				J	ob Number:	J63498
	DOM 40 400	4000					T-Log Number: T63729		
Model:	BCM94321CB2							nt Manager:	Esther Zhu
Contact:	David Bold	dv							
	FCC 15.24	•						Class:	N/A
			e Field Stre	nath:					·
requency		Pol	15.209		Detector	Azimuth	Height	Comments	
MHz	dBμV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters		
2408.010		٧	-	-	Pk	133	1.7	RB = VB =	1MHz
407.560	93.5	٧	-	-	Avg	133	1.7	RB = 1MHz	z, VB = 10Hz
408.000	107.8	h	-	-	Pk	132	1.9	RB = VB =	1MHz
2417.480	96.1	h	-	-	Avg	132			z, VB = 10Hz
390.000	73.4	V	74.0	-0.6	Pk	133		RB = VB =	
2390.000		V	54.0	-0.04	Avg	133			z, VB = 10Hz
2389.800		h	74.0	-2.1	Pk	132		RB = VB =	
2389.840	53.7	h	54.0	-0.3	Avg	132	1.9	RB = 1MHz	z, VB = 10Hz

# **Elliott**

# **EMC** Test Data

Client:	Broadcom Corporation	Job Number:	J63498
Model	BCM94321CB2	T-Log Number:	T63729
wodei.	BCIVIS432 I CB2	Account Manager:	Esther Zhu
Contact:	David Boldy		
Spec:	FCC 15.247	Class:	N/A

# Run #2: Radiated Spurious Emissions, 1000 - 26,500 MHz. Low Channel @ 2412 MHz, CDD MCS 0 Antennas: Main and Auxiliary



Harmonics 2412 MHz (20MHz) Highest Power

Frequency	Level	Pol	15.209	/ 15.247	Detector	Azimuth	Height	Comments
MHz	dBμV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
Peak Readi	ings.							
7228.334	59.7	Н	87.0	-27.3	Peak	148	1.4	Non-restricted
1999.167	56.9	V	87.0	-30.1	Peak	346	1.0	Non-restricted
12041.67	56.2	Н	87.0	-30.8	Peak	37	1.4	Non-restricted
1247.500	54.9	V	87.0	-32.1	Peak	267	1.0	Non-restricted
9635.000	51.3	Н	87.0	-35.7	Peak	86	1.8	Non-restricted
Peak and A	verage R	eadings	•					
1000.082	51.7	V	54.0	-2.3	AVG	19	1.2	Restricted
1500.813	47.7	V	54.0	-6.3	AVG	91	1.4	Restricted
4823.970	46.6	V	54.0	-7.4	AVG	64	1.8	Restricted
5000.242	40.4	V	54.0	-13.6	AVG	349	1.4	Restricted
1500.813	58.7	V	74.0	-15.3	PK	91	1.4	Restricted
1000.082	58.4	V	74.0	-15.6	PK	19	1.2	Restricted
4823.970	49.7	V	74.0	-24.3	PK	64	1.8	Restricted
5000.242	48.7	V	74.0	-25.3	PK	349	1.4	Restricted

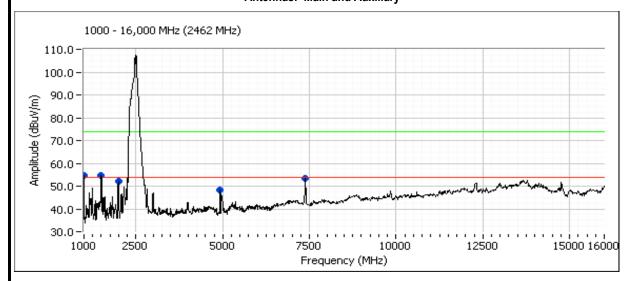
No emission detected 20-dB of the limit from 16 - 18 GHz and from 18 - 26.5 GHz. Measurements were performed on Site# 2 on April 21, 2006 by Juan Martinez

# **Elliott**

# EMC Test Data

Client:	Broadcom Corporation	Job Number:	J63498
Modal:	BCM94321CB2	T-Log Number:	T63729
wodei.	DCW94321CD2	Account Manager:	Esther Zhu
Contact:	David Boldy		
Spec:	FCC 15.247	Class:	N/A

Run #3: Radiated Spurious Emissions, 100 - 26,500 MHz. High Channel @ 2462 MHz, CDD MCS 0
Antennas: Main and Auxiliary



Harmonics 2462 (20MHz) Highest Power

		···· · / · · · · ·	,					
Frequency	Level	Pol	15.209	/ 15.247	Detector	Azimuth	Height	Comments
MHz	dBμV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
Peak Read	lings.							
1495.000	54.6	V	54.0	0.6	Peak	87	1.0	Laptop emission(refer to base line)
1000.000	54.6	V	54.0	0.6	Peak	18	1.2	Laptop emission(refer to base line)
1990.000	52.2	V	54.0	-1.8	Peak	174	1.0	Laptop emission(refer to base line)
Peak and A	Average R	eadings						
4923.802	44.8	V	54.0	-9.2	AVG	51	1.8	Restricted
4923.802	48.2	V	74.0	-25.9	PK	51	1.8	Restricted
7376.228	33.2	V	54.0	-20.9	AVG	336	1.6	Restricted
7376.228	44.4	V	74.0	-29.6	PK	336	1.6	Restricted
						•	•	

Note 1 Peak reading were 6-dB or more below the average limit, so no Average readings taken.

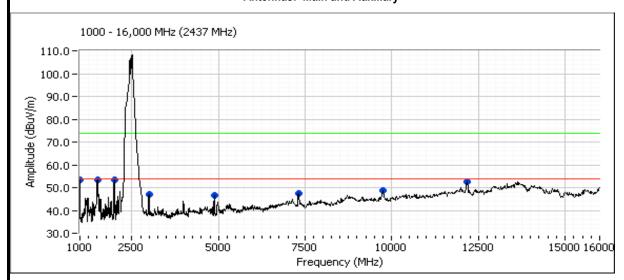
No emission detected 20-dB of the limit from 16 - 18 GHz and from 18 - 26.5 GHz. Measurements were performed on Site# 2 on April 21, 2006 by Juan Martinez

# **Elliott**

# **EMC** Test Data

Client:	Broadcom Corporation	Job Number:	J63498
Model	BCM94321CB2	T-Log Number:	T63729
wodei.	BCIVIS432 I CB2	Account Manager:	Esther Zhu
Contact:	David Boldy		
Spec:	FCC 15.247	Class:	N/A

### Run #4: Radiated Spurious Emissions, 1000 - 16,000 MHz. Middle Channel @ 2437 MHz, CDD MCS 0 Antennas: Main and Auxiliary



### Harmonics 2437 (20MHz) Highest Power

Frequency	Level	Pol	15.209	/ 15.247	Detector	Azimuth	Height	Comments
MHz	$dB\mu V/m$	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
Peak Read	ings.							
1000.000	53.4	V	54.0	-0.6	Peak	354	1.2	Laptop emission(refer to base line)
1504.167	53.6	V	54.0	-0.4	Peak	95	1.4	Laptop emission(refer to base line)
1990.000	53.4	V	54.0	-0.6	Peak	176	1.0	Laptop emission(refer to base line)
2998.333	46.9	V	54.0	-7.1	Peak	358	1.6	Laptop emission(refer to base line)
Peak and A	Average R	eadings						
4873.976	43.5	V	54.0	-10.5	AVG	50	1.2	
4873.976	47.5	V	74.0	-26.5	PK	50	1.2	
12182.28	41.7	V	54.0	-12.3	AVG	135	2.0	
12182.28	53.1	V	74.0	-20.9	PK	135	2.0	
9751.091	40.3	V	54.0	-13.7	AVG	132	1.8	
9751.091	52.8	V	74.0	-21.2	PK	132	1.8	
7307.068	36.7	V	54.0	-17.3	AVG	75	2.0	
7307.068	50.4	V	74.0	-23.6	PK	75	2.0	

No emission detected 20-dB of the limit from 16 - 18 GHz and from 18 - 26.5 GHz. Measurements were performed on Site# 2 on April 21, 2006 by Juan Martinez

<b>Elliott</b>	EMC Test Data
Client: Broadcom Corporation	Job Number: J63498
Model: BCM94321CB2	T-Log Number: T63729
Model. BCM94321CB2	Account Manager: Esther Zhu
Contact: David Boldy	

## FCC 15.247 DTS - Power, Bandwidth and Spurious Emissions

## **Test Specifics**

Spec: FCC 15.247

Objective: The objective of this test session is to perform final qualification testing of the EUT with respect to the

Class: N/A

specification listed above.

Date of Test: 4/21/2006 Config. Used: 1
Test Engineer: Jmartinez Config Change: None
Test Location: Chamber #2 EUT Voltage: 120V, 60Hz

### General Test Configuration

The EUT was connected to the spectrum analyzer or power meter via a suitable attenuator. For the spurious emissions all transmit chains were connected simultaneously to the analyzer via a combiner. All other measurements were made on a single chain.

All measurements are corrected to allow for the external attenuators used.

Ambient Conditions: Temperature: 17 °C

Rel. Humidity: 57 %

### **Summary of Results**

Run #	Test Performed	Limit	Pass / Fail	Result / Margin
1	Output Power	15.247(b)	Pass	Refer to run
2	Power Spectral Density (PSD)	15.247(d)	Pass	Refer to run
3	6dB Bandwidth	15.247(a)	Pass	Refer to run
4	Spurious emissions	15.247(b)	Pass	Refer to run

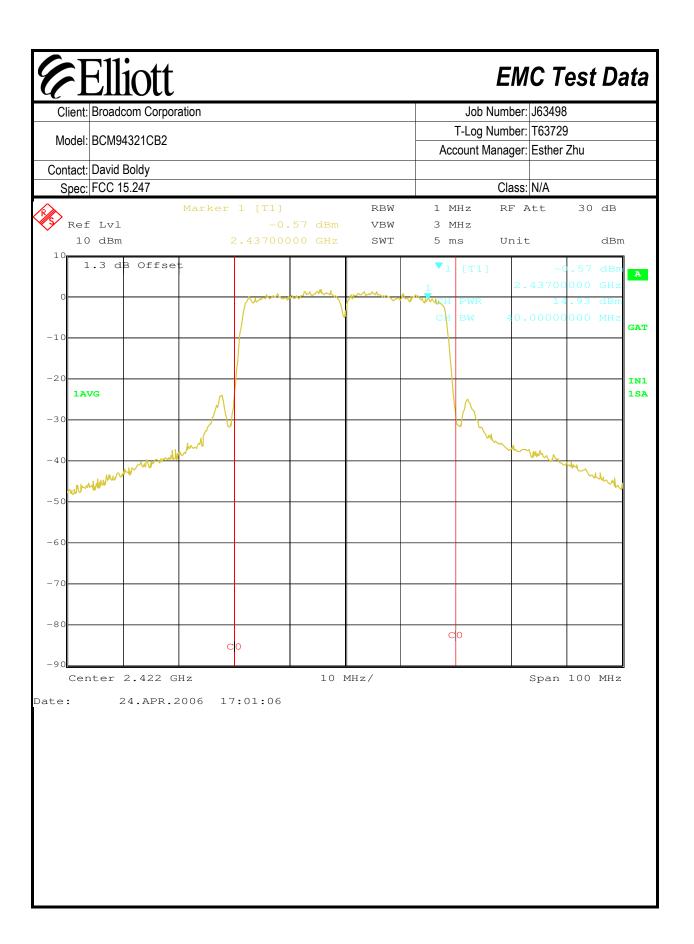
### Modifications Made During Testing:

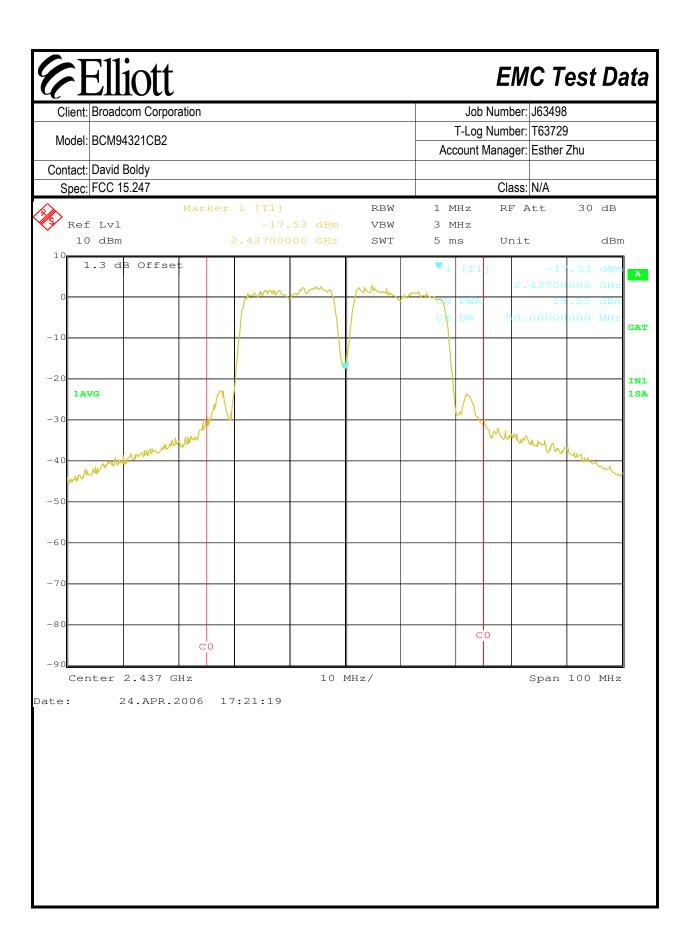
No modifications were made to the EUT during testing

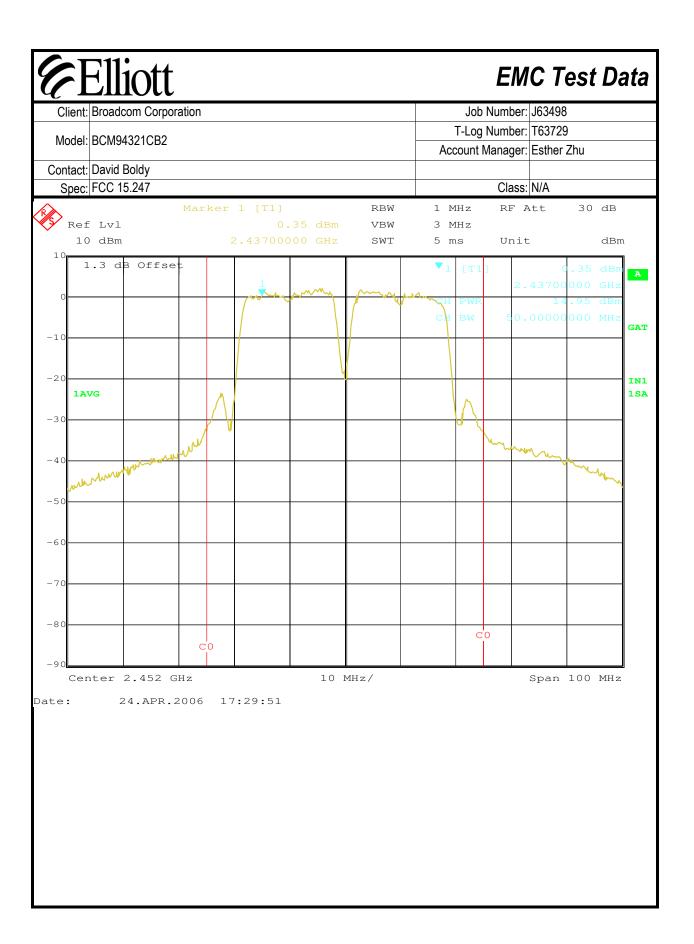
### **Deviations From The Standard**

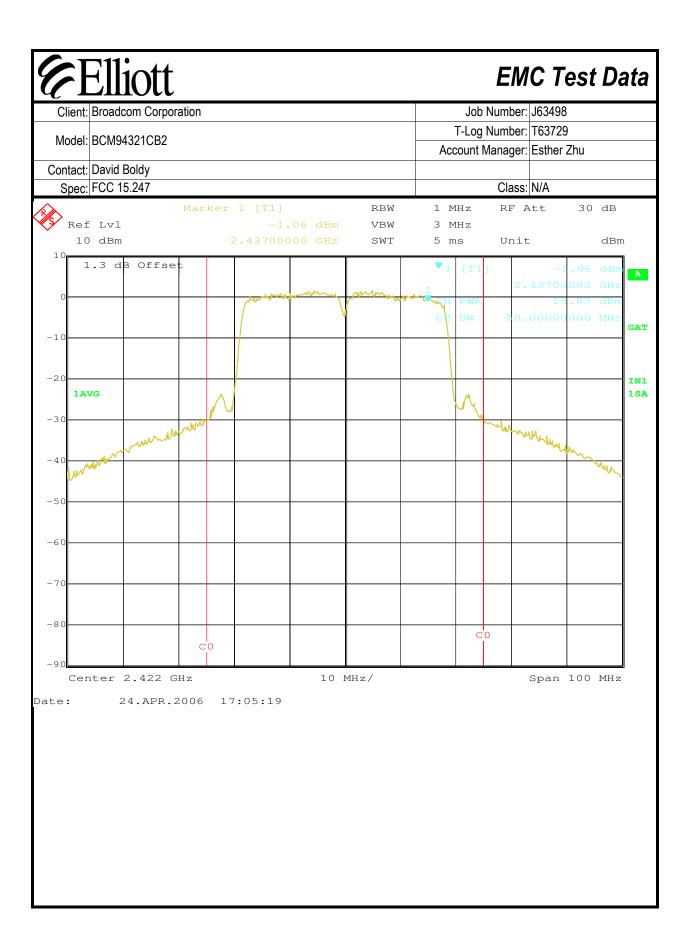
No deviations were made from the requirements of the standard.

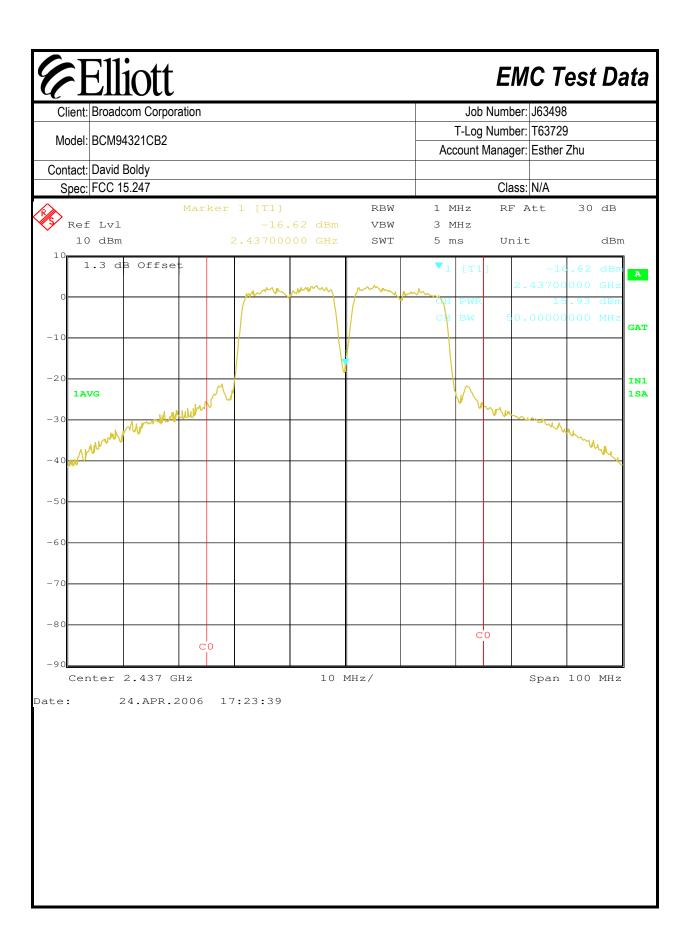
Contact		ation				Jo	b Number:	J63498	
Contact	bl: BCM94321CB2						T-Log Number: T63729		
	. DCIVI9432 TCD2					Accour	nt Manager:	Esther Zhu	
	: David Boldy								
Spec	FCC 15.247						Class:	N/A	
			MAIN	I & MIDE	DLE POR	TS			
un #1:  C	Output Power (MCS	32, CDD)							
	ed signal on chain is		Yes						
	y Power Measuren			Note 1		2	Note 3		Note 2
Power	Frequency (MHz)		Power (dBr	11)		na Gain (dBi)	1		Note 2
Setting <sup>4</sup>	2422	Chain 1	Chain 2	Total	Chain 1	Chain 2	Total	dBm	W
	2437	14.9 15.6	15.0 15.9	18.0 18.8	-1.6 -1.6	-1.6 -1.6	1.4 1.4	19.4 20.2	0.087 0.104
	2452	15.0	15.4	18.2	-1.6	-1.6	1.4	19.6	0.091
	tranmsitting) and p EIRP - if transmit of power (i.e. beam-fo	chains are co	oherent ther sumed beca	the EIRP is ause of cohe of the individ		chains). If t	he individua	• .	

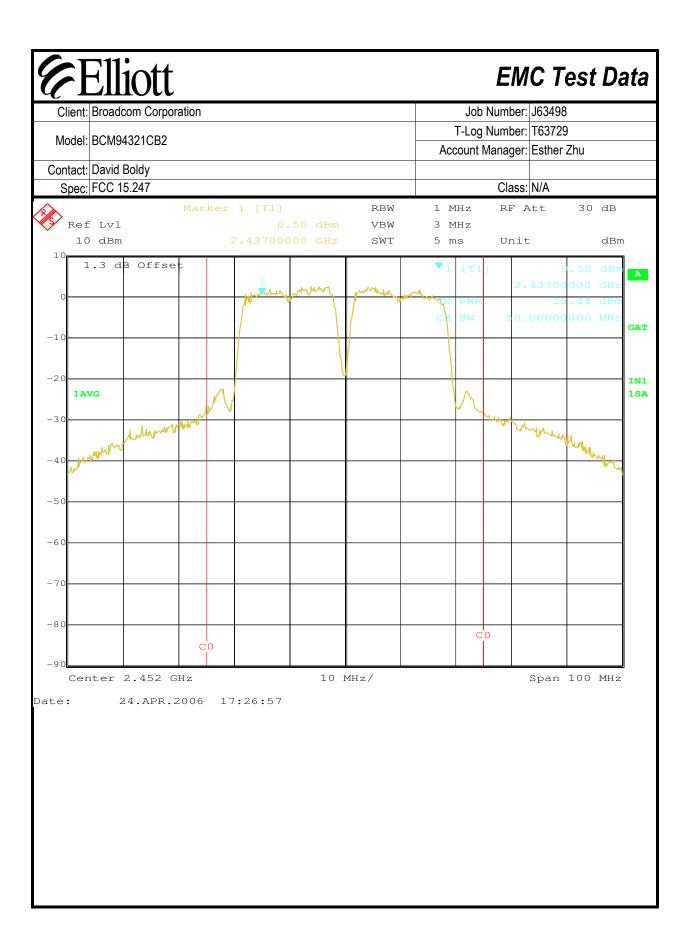




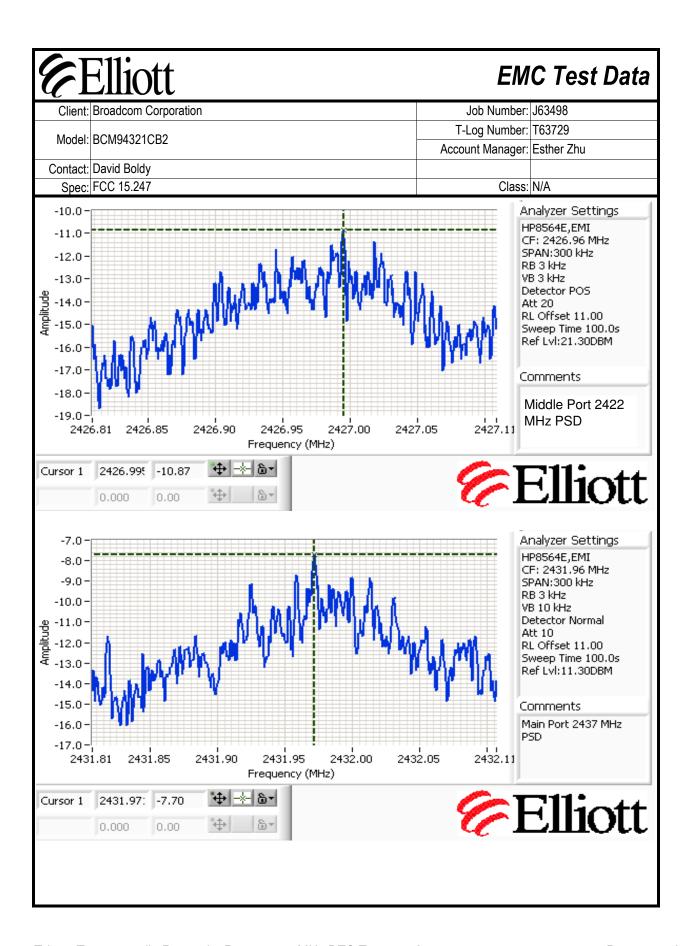


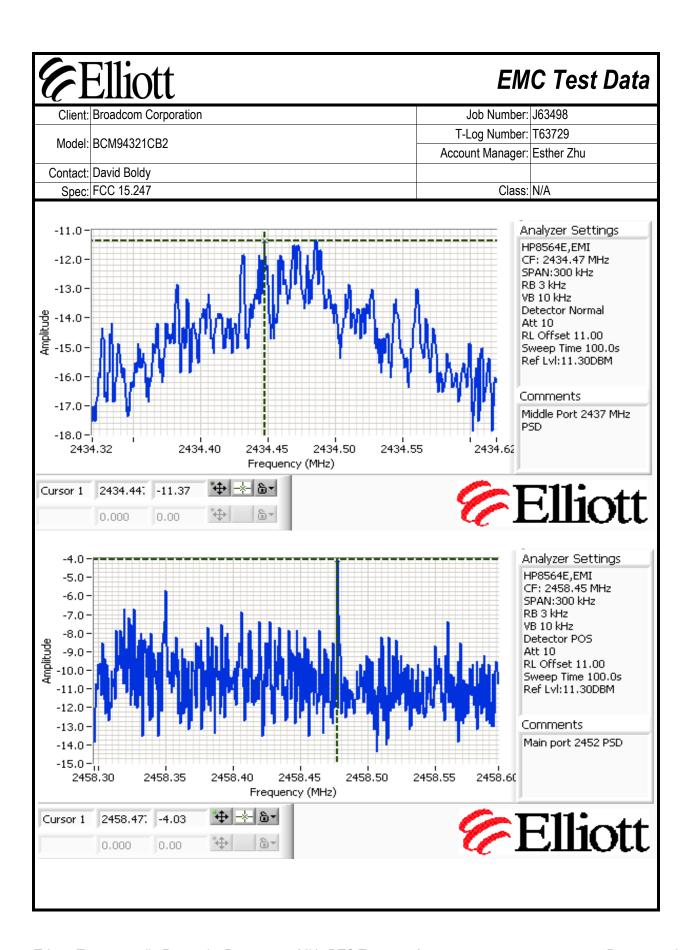


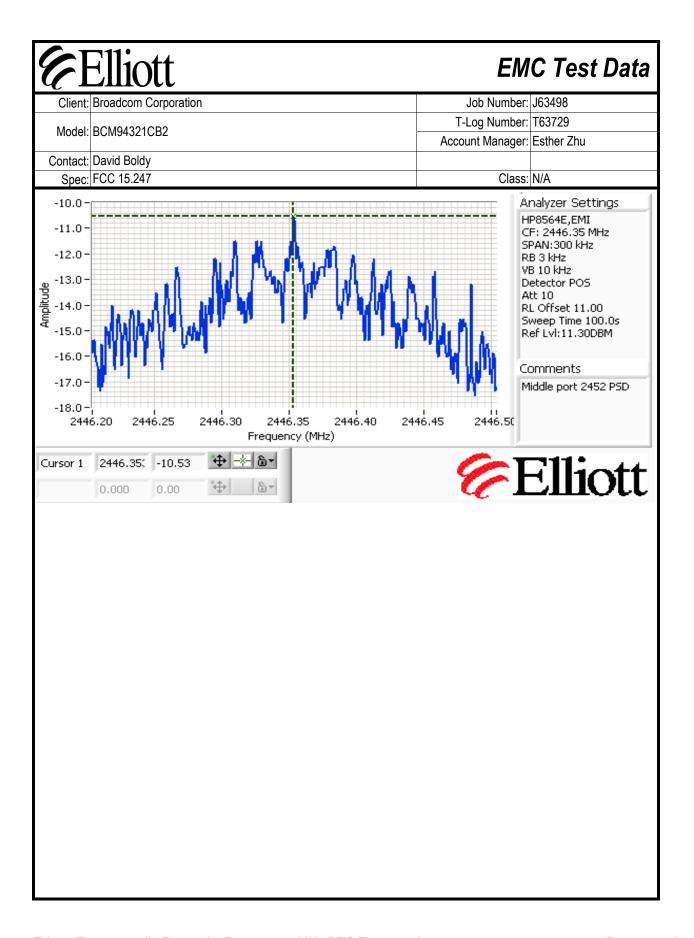




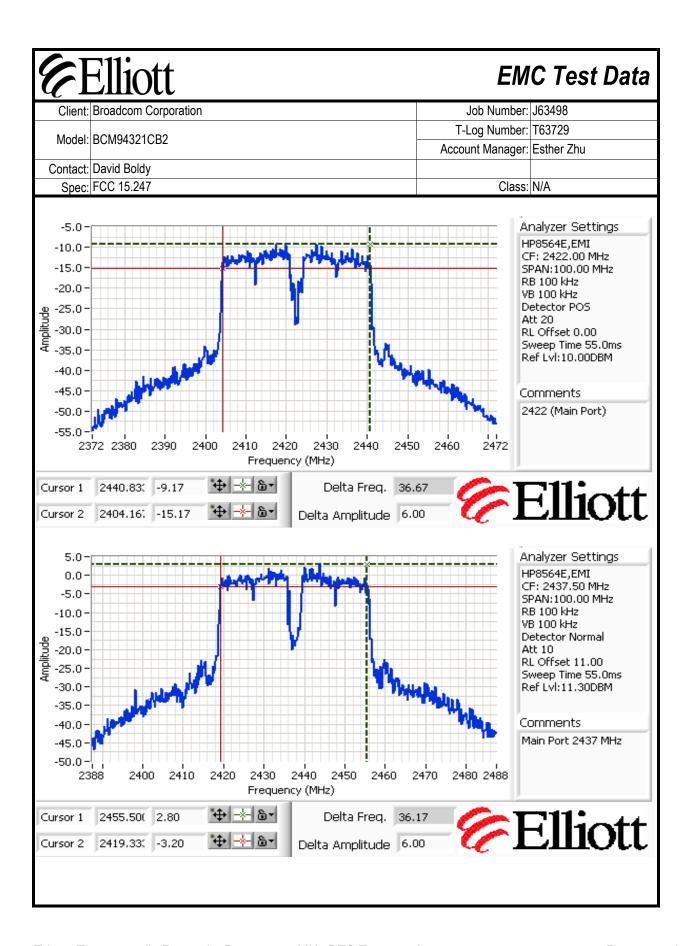
#### **EMC Test Data** Job Number: J63498 Client: Broadcom Corporation T-Log Number: T63729 Model: BCM94321CB2 Account Manager: Esther Zhu Contact: David Boldy Spec: FCC 15.247 Class: N/A Run #2: Power Spectral Density Power PSD (dBm/3kHz) Limit Result Frequency (MHz) Setting dBm/3kHz Main Middle Total 2422 -10.9 -4.0 -5.0 8.0 Pass 2437 -7.7 -11.4 -6.1 8.0 **Pass** 2452 -10.5 -3.2 8.0 -4.0 Pass Power spectral density measured using RB=3 kHz, VB=10kHz, analyzer with peak detector and with a sweep time set to ensure a dwell time of at least 1 second per 3kHz. The measurement is made at the frequency of PPSD Note 1: determined from preliminary scans using RB=3kHz using multiple sweeps at a faster rate over the 6dB bandwidth of the signal. Analyzer Settings -5.0 HP8564E,EMI -6.0 CF: 2430.96 MHz -7.0 SPAN:300 kHz RB 3 kHz -8.0 VB 3 kHz Detector POS Att 20 -10.0 RL Offset 11.00 -11.0 Sweep Time 100.0s Ref Lvl:21.30DBM -13.0Comments -14.0-15.0 Main Port 2422 -16.0 MHz PSD 2430.90 2430.95 2431.00 2431.11 2430.81 2430.85 2431.05 Frequency (MHz) 2431.067 -5.03 Cursor 1 Elliott 0.000 0.00

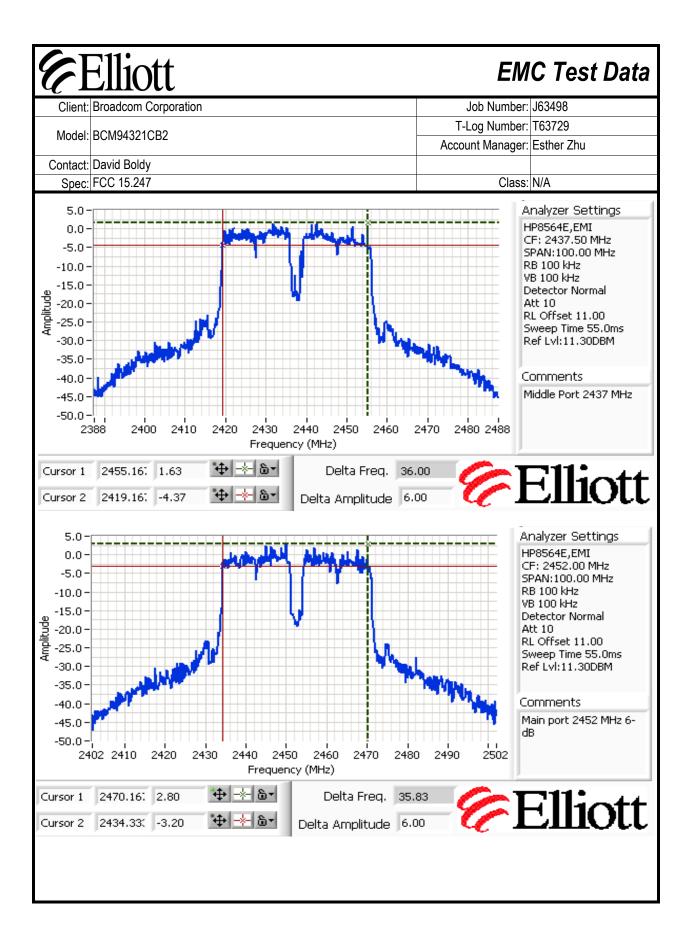


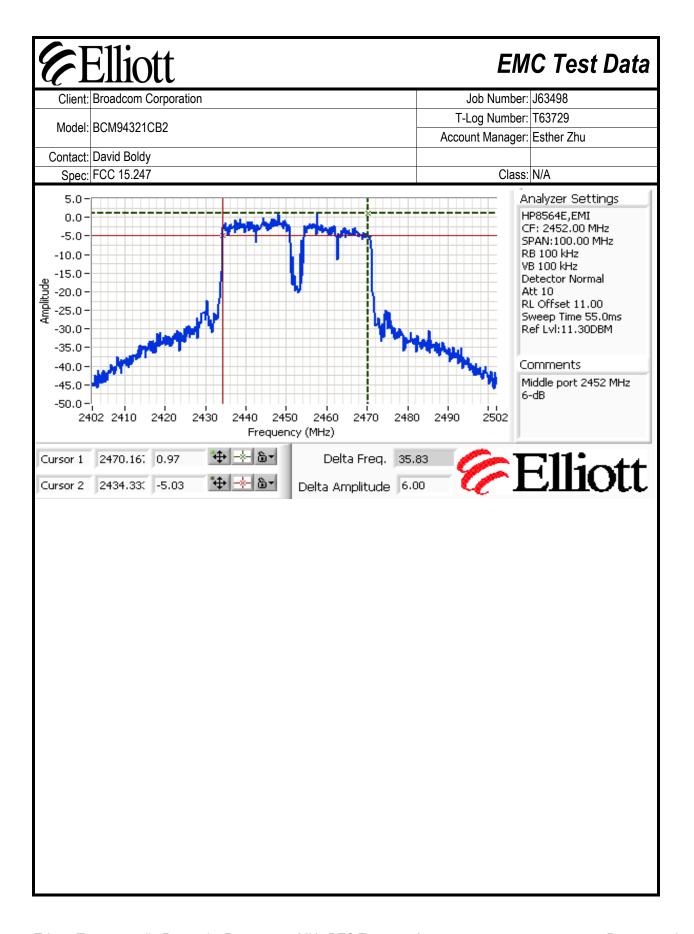




### **EMC Test Data** Job Number: J63498 Client: Broadcom Corporation T-Log Number: T63729 Model: BCM94321CB2 Account Manager: Esther Zhu Contact: David Boldy Spec: FCC 15.247 Class: N/A Run #3: Signal Bandwidth 6dB Signal Bandwidth Power Resolution 99% Signal Bandwidth Frequency (MHz) Setting Bandwidth (MHz) 36.67 2422 100 kHz 2437 100 kHz 36.17 35.83 2452 100 kHz Note 1: Measured on a single chain Analyzer Settings -5.0 HP8564E,EMI -10.0 CF: 2422.00 MHz -15.0 SPAN:100.00 MHz RB 100 kHz -20.0 VB 100 kHz -25.0 Detector POS Att 20 -30.0 RL Offset 0.00 Sweep Time 55.0ms -35.0 Ref Lvl:10.00DBM -40.0 · -45.0 Comments -50.0 -55.0· 2440 2410 2420 2430 2450 2390 2400 Frequency (MHz) 2440.83( -7.33 Delta Freq. 36.33 Cursor 1 Cursor 2 2404.50( -13.33 Delta Amplitude 6.00



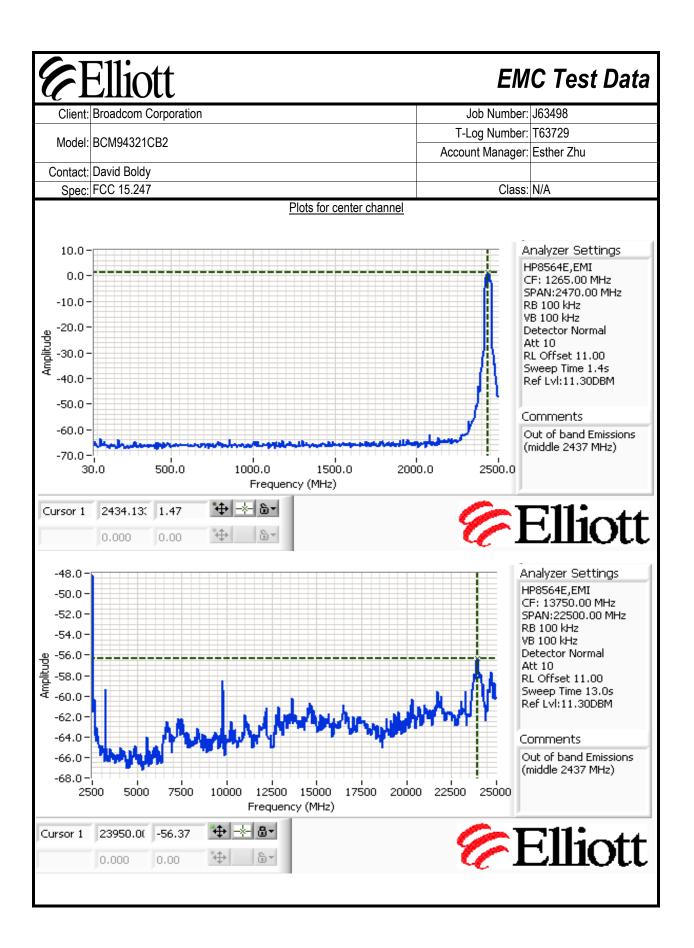


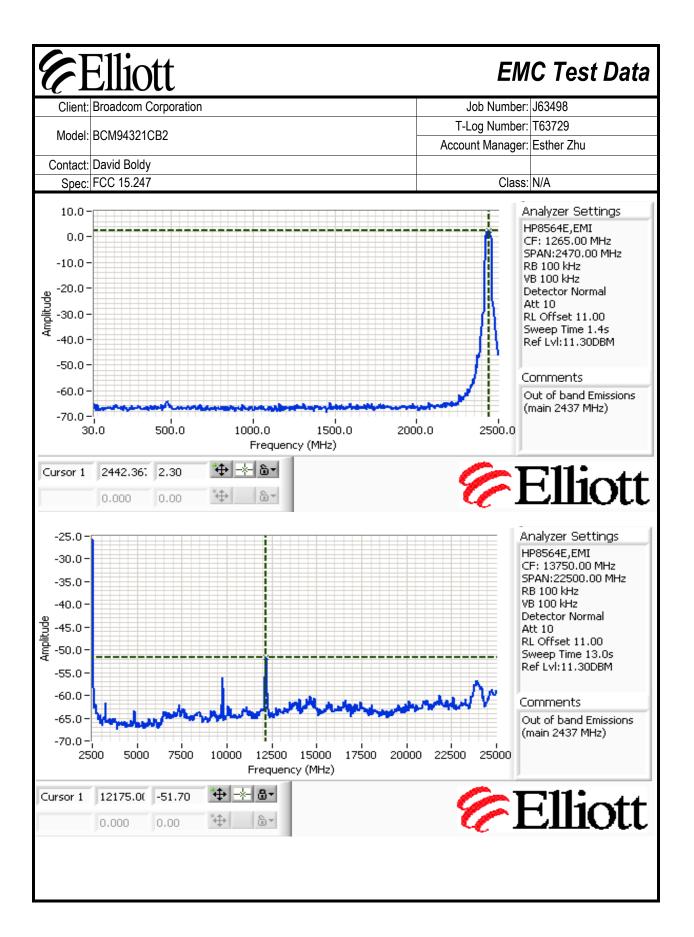


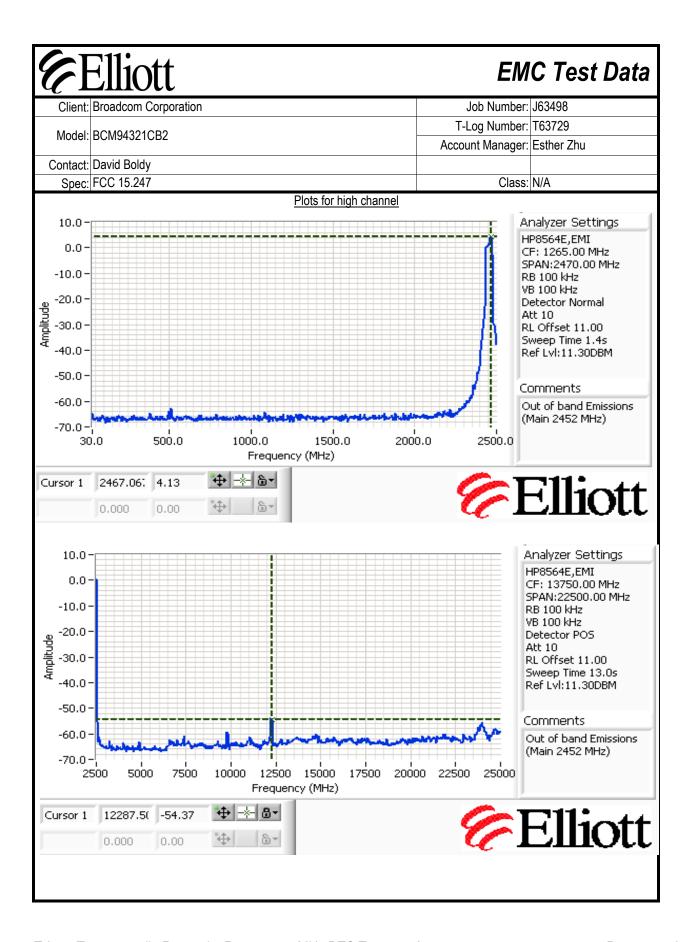
# **Elliott EMC Test Data** Job Number: J63498 Client: Broadcom Corporation T-Log Number: T63729 Model: BCM94321CB2 Account Manager: Esther Zhu Contact: David Boldy Spec: FCC 15.247 Class: N/A Run #4: Out of Band Spurious Emissions Power Setting Per Chain Frequency (MHz) Limit Result -30dBc Refer to plots 2422 2437 -30dBc Refer to plots 2452 -30dBc Refer to plots Measured with all chains connected together through a combiner, unused ports on the combiner terminated in Note 1: 50ohms.

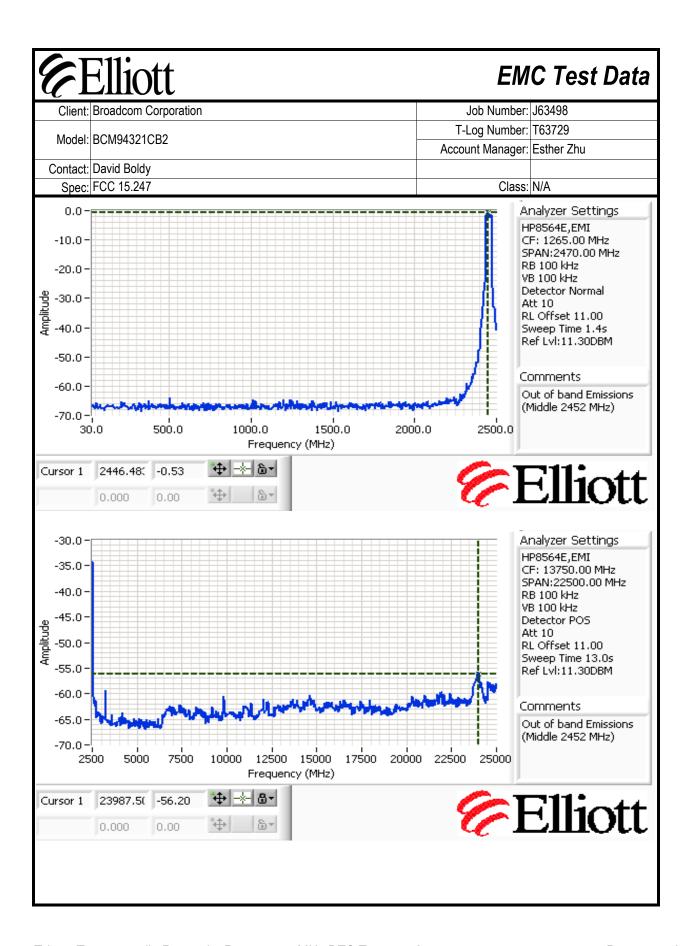
# **EMC** Test Data Job Number: J63498 Client: Broadcom Corporation T-Log Number: T63729 Model: BCM94321CB2 Account Manager: Esther Zhu Contact: David Boldy Spec: FCC 15.247 Class: N/A Plots for low channel Middle port 2422 MHz MKR .13dBm 2.418GHz ATTEN 10dB 10dB/ RL 11.3dBm R CENTER 1.265GHz \*RBW 100kHz \*VBW 100kHz SPAN 2.470GHz SWP 1.40sec MKR -57.70dBm 9.70GHz ATTEN 10dB RL 11.3dBm 10dB/ START 2.50GHz ST \*RBW 100kHz \*VBW 100kHz STOP 25.00GHz Hz SWP 13.0sec

# **EMC Test Data** Job Number: J63498 Client: Broadcom Corporation T-Log Number: T63729 Model: BCM94321CB2 Account Manager: Esther Zhu Contact: David Boldy Spec: FCC 15.247 Class: N/A Main port 2422 MHz ATTEN 10dB RL 11.3dBm MKR 5.97dBm 2.434GHz 10dB/ R START 30MHz STOP 2.500GHz \*RBW 100kHz \*VBW 100kHz SWP 1.40sec ATTEN 10dB RL 11.3dBm MKR -47.37dBm 12.10GHz 10dB/ R START 2.50GHz 51.100kHz \*VBW 100kHz STOP 25.00GHz Hz SWP 13.0sec \*RBW 100kHz

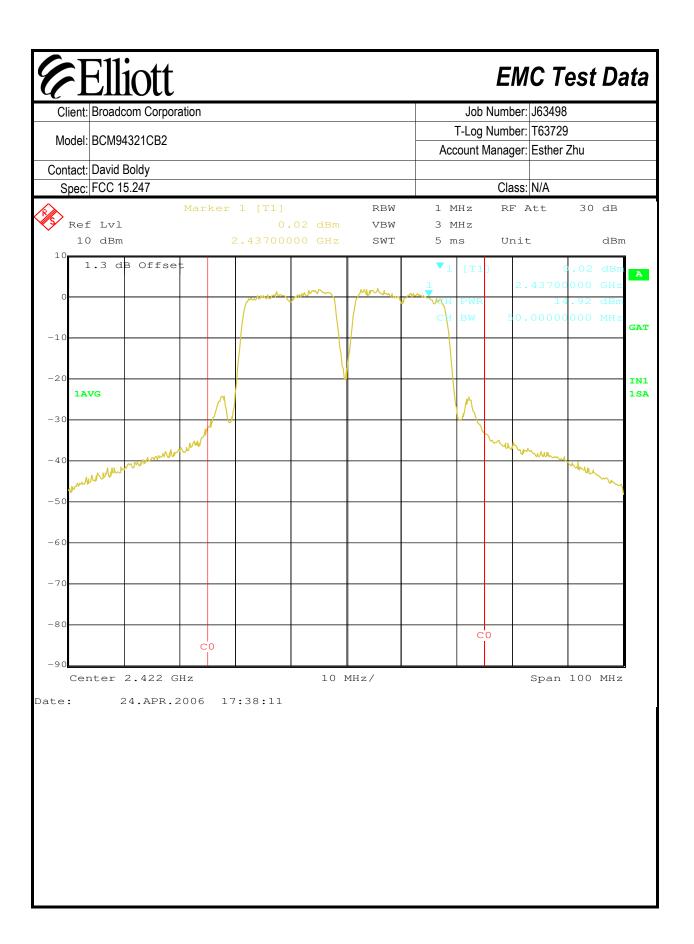


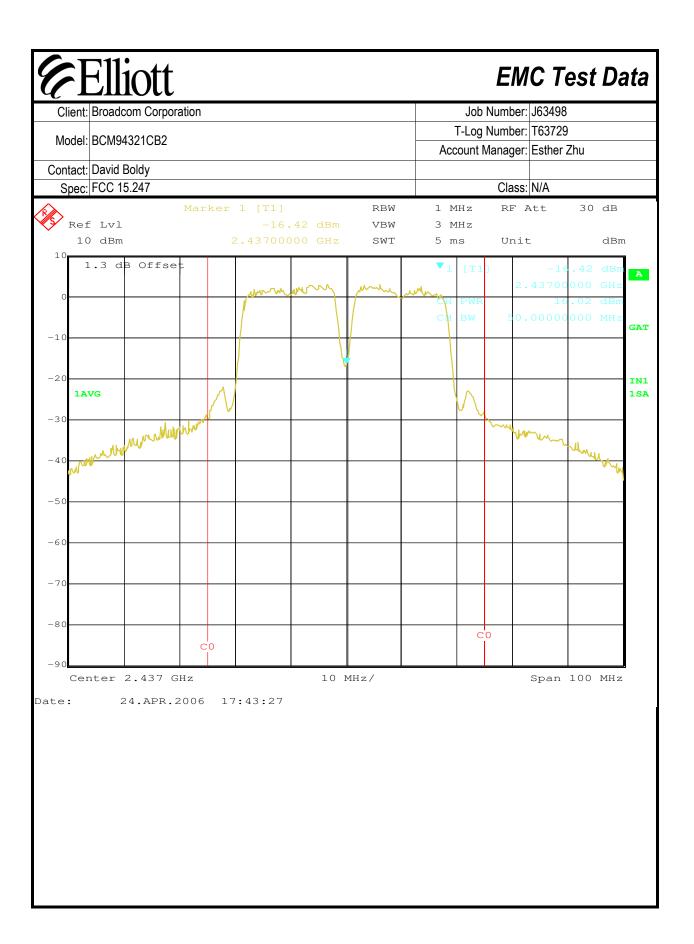


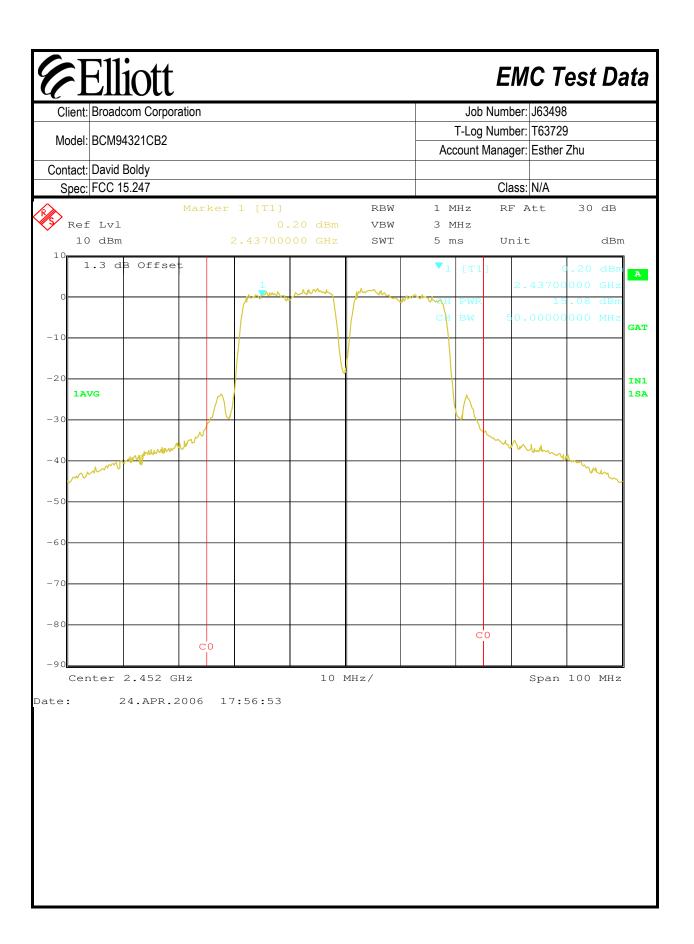


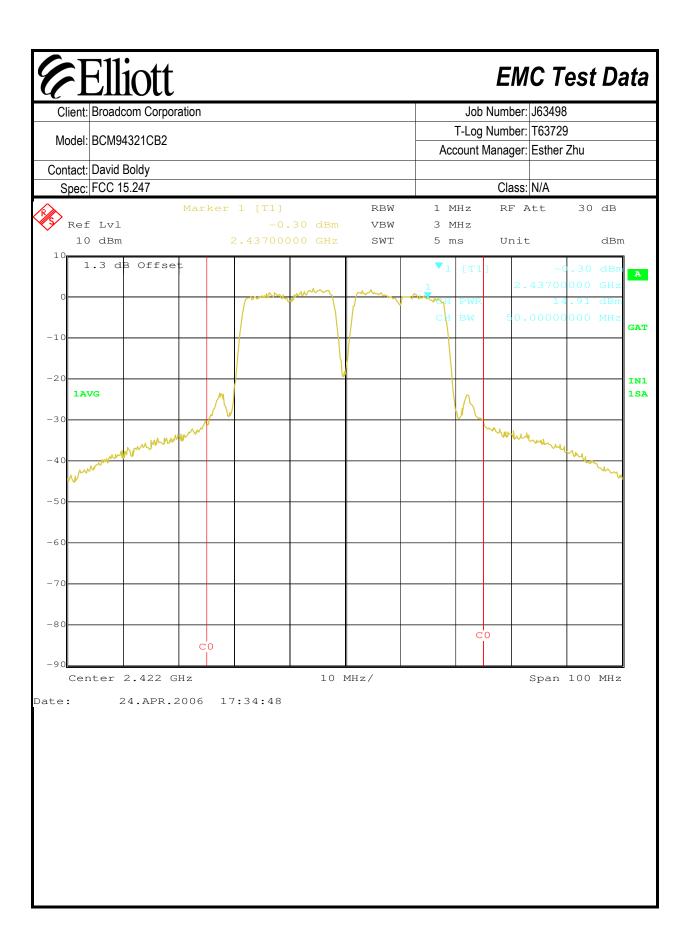


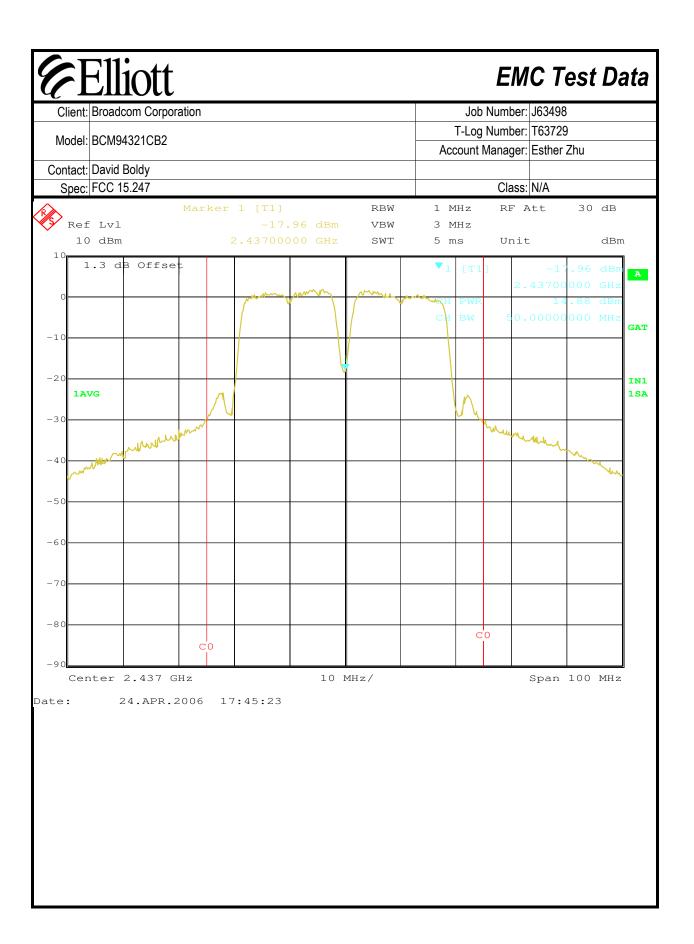
	Broadcom Corpora	ition				J	ob Number:	J63498	
		·						T63729	
Model	BCM94321CB2					Account Manager:			
Contact	David Boldy								
Spec	FCC 15.247	Class: N/A							
			AUX	& MIDD	LE PORT	S			
Run #1: C	output Power (MCS	32, CDD)							
	d signal on chain is		Yes						
Regulator	y Power Measuren	nents:							
Power	Frequency (MHz)	Output Power (dBm) Note 1		Antenna Gain (dBi) Note 3		EIRP Note 2			
Setting <sup>4</sup>	. , ,	Chain 1	Chain 2	Total	Chain 1	Chain 2	Total	dBm	W
	2422	14.9	14.9	17.9	-1.6	-1.6	1.4	19.3	0.086
	2437	16.0	14.9	18.5	-1.6	-1.6	1.4	19.9	0.098
\- <b>.</b>	2452	15.1	15.2	18.2	-1.6	-1.6	1.4	19.6	0.090
етегепсе	Power Measurem		utput Power						
Power	Frequency (MHz)	Average	(dBm) Note 5						
	riequericy (IVII IZ)	Chain 1	Chain 2	Chain 3					
0-4:4									
Setting <sup>4</sup>	2422			Ollalii					
Setting <sup>4</sup>	2422 2437	14.8	14.8	Chain 5					
Setting <sup>4</sup>	2437	14.8 16.0	14.8 14.9	Onain 3					
Setting <sup>4</sup>		14.8	14.8	Citalii					
Setting <sup>4</sup>	2437	14.8 16.0 15.0	14.8 14.9 15.0		ee plots belov	v):			
	2437 2452	14.8 16.0 15.0 sured using	14.8 14.9 15.0	analyzer (s	•	•	nal was not	continuous b	ut the ESI
Setting <sup>4</sup> Note 1:	2437 2452 Output power mea RBW=1MHz, VB=3 analyzer was confi	14.8 16.0 15.0 sured using 3 MHz, sam gured with a	14.8 14.9 15.0 a spectrum ple detector a gated swe	analyzer (s , power ave ep such tha	raging on (tra	nsmitted sig			
	2437 2452 Output power mea RBW=1MHz, VB=3 analyzer was confi tranmsitting) and p	14.8 16.0 15.0 sured using B MHz, sam gured with a ower integra	14.8 14.9 15.0 a spectrum ple detector a gated swe	analyzer (s , power ave ep such tha ) MHz	raging on (tra t the analyzer	nsmitted sig was only sv	veeping whe	en the device	was
Note 1:	2437 2452  Output power mea RBW=1MHz, VB=3 analyzer was confitranmsitting) and p EIRP - if transmit c	14.8 16.0 15.0 sured using 3 MHz, sam gured with a ower integra hains are co	14.8 14.9 15.0 a spectrum ple detector a gated sweation over 50 oberent there	analyzer (s , power ave ep such tha ) MHz o the EIRP is	raging on (tra t the analyzer s calculated fr	was only swom the sum	veeping whe	en the device	was s the total
	2437 2452  Output power mea RBW=1MHz, VB=3 analyzer was confitranmsitting) and p EIRP - if transmit of power (i.e. beam-fo	14.8 16.0 15.0 sured using B MHz, sam gured with a ower integral hains are comming is as	14.8 14.9 15.0 a spectrum ple detector a gated sweation over 50 oberent ther sumed because of the sum of the	analyzer (s , power ave ep such tha ) MHz n the EIRP is	raging on (tra t the analyzer s calculated fr erency on the	was only swom the sum chains). If the	veeping whe	en the device	was s the total
Note 1:	2437 2452  Output power mea RBW=1MHz, VB=3 analyzer was confi tranmsitting) and p EIRP - if transmit of power (i.e. beam-fot then the EIRP is ca	14.8 16.0 15.0 sured using B MHz, sam gured with a ower integrathains are coorming is as alculated fro	14.8 14.9 15.0 a spectrum ple detector a gated swe ation over 50 bherent ther sumed beca	analyzer (s , power ave ep such tha ) MHz of the EIRP is ause of cohe	raging on (tra t the analyzer s calculated fr erency on the dual EIRPs fo	was only swom the sum chains). If the cach chain	of the anter he individua	en the device nna gains plu Il chains are i	was s the total ncoherent
Note 1:	2437 2452  Output power mea RBW=1MHz, VB=3 analyzer was confitranmsitting) and p EIRP - if transmit of power (i.e. beam-fothen the EIRP is call the transmit chair	14.8 16.0 15.0 sured using B MHz, sam gured with a ower integrathains are coorming is as alculated from sare cohe	14.8 14.9 15.0 a spectrum ple detector a gated sweation over 50 oberent ther sum of the	analyzer (s , power ave ep such tha ) MHz at the EIRP is ause of cohe of the individe	raging on (tra t the analyzer s calculated fr erency on the dual EIRPs for m antenna ga	om the sum chains). If the each chain in is the sum	of the anter the individuate.	en the device nna gains plu al chains are i	was s the total ncoherent r each
Note 1:	2437 2452  Output power mea RBW=1MHz, VB=3 analyzer was confitranmsitting) and p EIRP - if transmit copower (i.e. beam-fothen the EIRP is call the transmit chair antenna. If the transmit chair antenna.	14.8 16.0 15.0 sured using B MHz, sam gured with a ower integrathains are coorming is as alculated from a re cohensmit chains	14.8 14.9 15.0 a spectrum ple detector a gated sweation over 50 oberent ther sum of the	analyzer (s , power ave ep such tha ) MHz at the EIRP is ause of cohe of the individe	raging on (tra t the analyzer s calculated fr erency on the dual EIRPs for m antenna ga	om the sum chains). If the each chain in is the sum	of the anter the individuate.	en the device nna gains plu al chains are i	was s the total ncoherent r each
Note 1:	2437 2452  Output power mea RBW=1MHz, VB=3 analyzer was confitranmsitting) and p EIRP - if transmit of power (i.e. beam-fothen the EIRP is ca If the transmit chain antenna. If the transcan be treated inde	14.8 16.0 15.0 sured using B MHz, sam gured with a ower integrathains are comming is as alculated from sare cohensmit chains ependently.	14.8 14.9 15.0  a spectrum ple detector a gated sweation over 50 oberent there sumed became the sum of the sum	analyzer (s , power ave ep such tha ) MHz hause of cohe of the individe e total syste rent then th	raging on (tra t the analyzer s calculated fr erency on the dual EIRPs for m antenna ga e system ante	nsmitted sig was only su om the sum chains). If the each chain in is the sur enna gain is	of the anter he individua m of the nun not applicab	en the device nna gains plu al chains are i neric gains fo ole as each tra	was s the total ncoherent r each ansmit cha
Note 1: Note 2: Note 3:	2437 2452  Output power mea RBW=1MHz, VB=3 analyzer was confitranmsitting) and p EIRP - if transmit of then the EIRP is call the transmit chair antenna. If the transcan be treated inder Power setting - if a	14.8 16.0 15.0 sured using B MHz, sam gured with a ower integrathains are comming is as alculated from a re cohensmit chains ependently.	14.8 14.9 15.0  a spectrum ple detector a gated swe ation over 50 bherent ther sumed beca m the sum o rent then the s are incohe	analyzer (s , power ave ep such tha ) MHz he the EIRP is ause of cohe of the individe total systement then the	raging on (tra t the analyzer s calculated fr erency on the dual EIRPs for m antenna ga e system ante	nsmitted sig was only sw om the sum chains). If the each chain in is the sum enna gain is	of the anter the individua m of the nun not applicat	en the device nna gains plu al chains are i neric gains fo ble as each tra iple numbers	s the total ncoherent r each ansmit cha
Note 1:	2437 2452  Output power mea RBW=1MHz, VB=3 analyzer was confitranmsitting) and p EIRP - if transmit of power (i.e. beam-fothen the EIRP is ca If the transmit chain antenna. If the transcan be treated inde	14.8 16.0 15.0 sured using B MHz, sam gured with a ower integrathains are comming is as alculated from a re cohensmit chains ependently.	14.8 14.9 15.0  a spectrum ple detector a gated swe ation over 50 bherent ther sumed beca m the sum o rent then the s are incohe	analyzer (s , power ave ep such tha ) MHz he the EIRP is ause of cohe of the individe total systement then the	raging on (tra t the analyzer s calculated fr erency on the dual EIRPs for m antenna ga e system ante	nsmitted sig was only sw om the sum chains). If the each chain in is the sum enna gain is	of the anter the individua m of the nun not applicat	en the device nna gains plu al chains are i neric gains fo ble as each tra iple numbers	s the total ncoherent r each ansmit cha

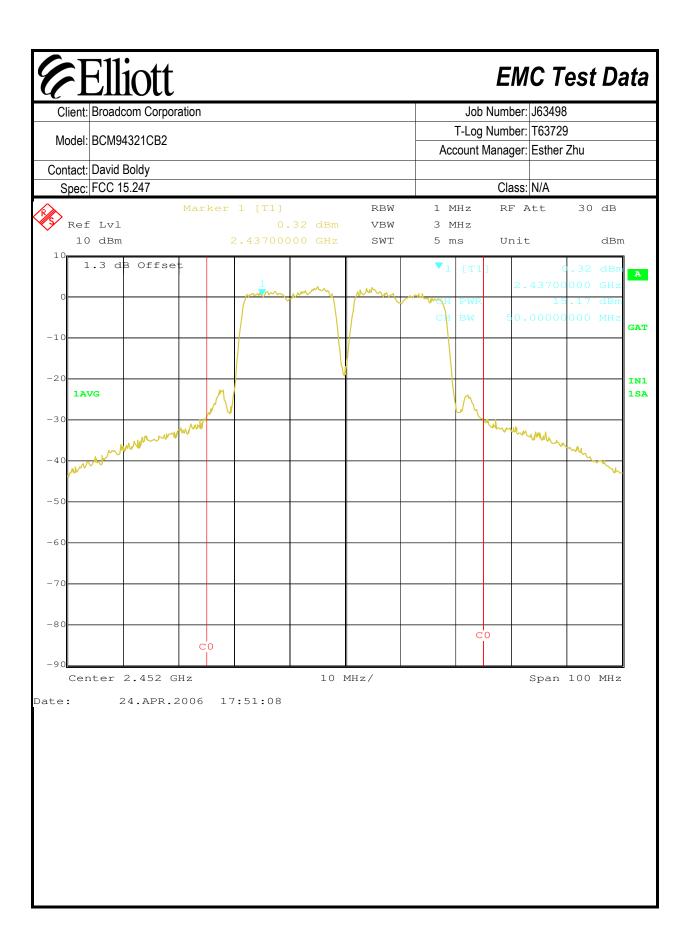




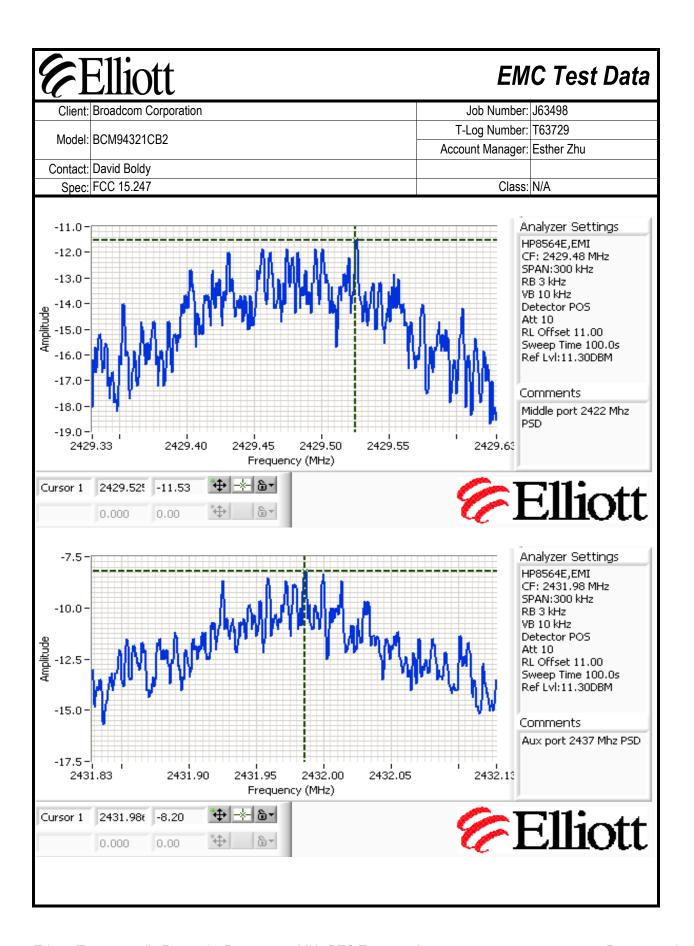


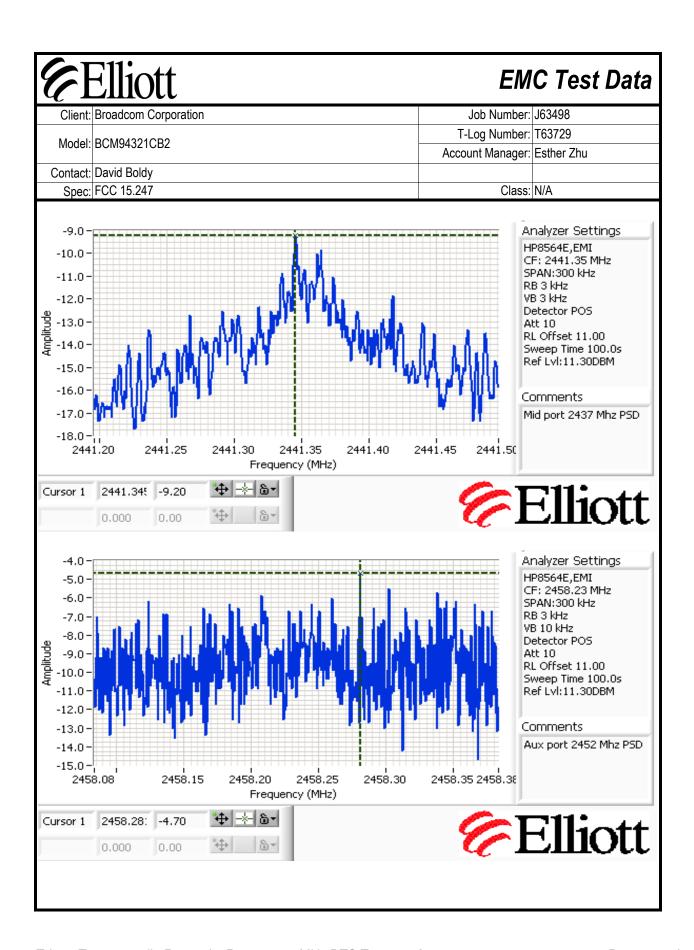


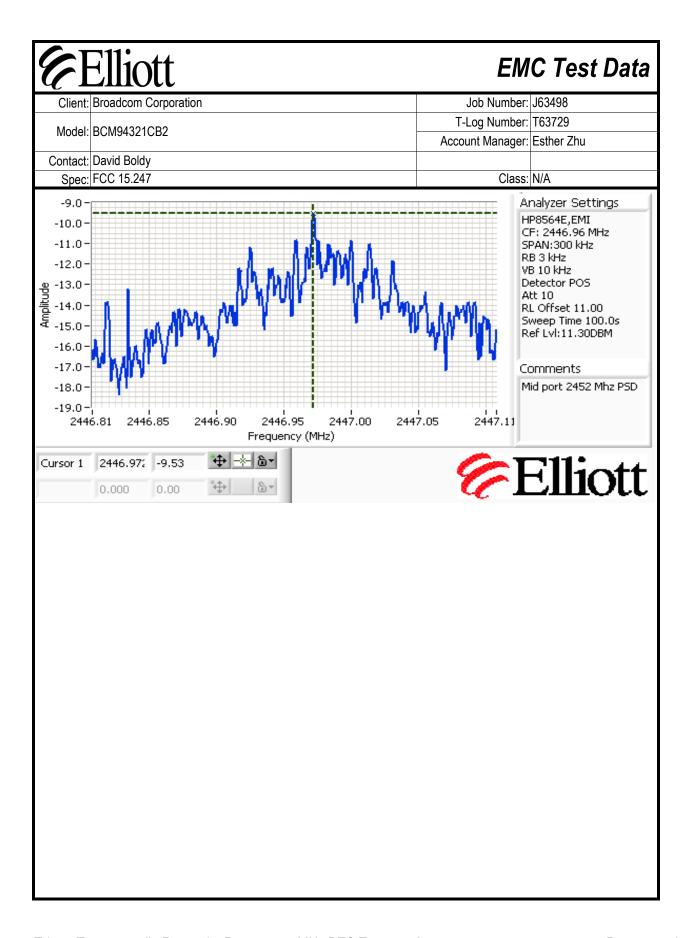




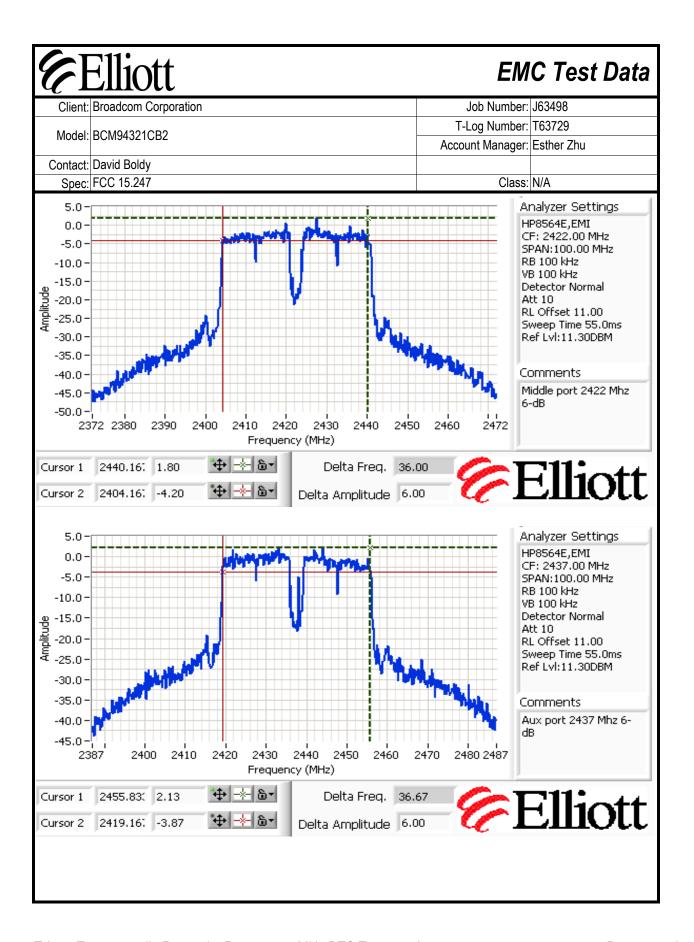
#### **EMC Test Data** Job Number: J63498 Client: Broadcom Corporation T-Log Number: T63729 Model: BCM94321CB2 Account Manager: Esther Zhu Contact: David Boldy Spec: FCC 15.247 Class: N/A Run #2: Power Spectral Density Power PSD (dBm/3kHz) Limit Result Frequency (MHz) Settina Chain 1 Chain 2 dBm/3kHz Total 2422 -7.9 -11.5 -6.3 8.0 Pass 2437 -8.2 -9.2 -5.7 8.0 Pass 2452 8.0 -4.7 -9.5 -3.5 Pass Power spectral density measured using RB=3 kHz, VB=10kHz, analyzer with peak detector and with a sweep time set to ensure a dwell time of at least 1 second per 3kHz. The measurement is made at the frequency of PPSD Note 1: determined from preliminary scans using RB=3kHz using multiple sweeps at a faster rate over the 6dB bandwidth of the signal. -7.0 Analyzer Settings HP8564E,EMI CF: 2426,35 MHz -9.0 SPAN:300 kHz RB 3 kHz -10.0VB 10 kHz Detector POS -11.0Amplitude Att 10 -12.0 RL Offset 11.00 Sweep Time 100.0s -13.0 Ref Lvl:11.30DBM Comments Aux port 2422 Mhz PSD $-17.0 \cdot$ 2426.30 2426.20 2426.25 2426.35 2426.40 2426.45 2426.50 Frequency (MHz) Cursor 1 2426.362 -7.87 0.000 0.00

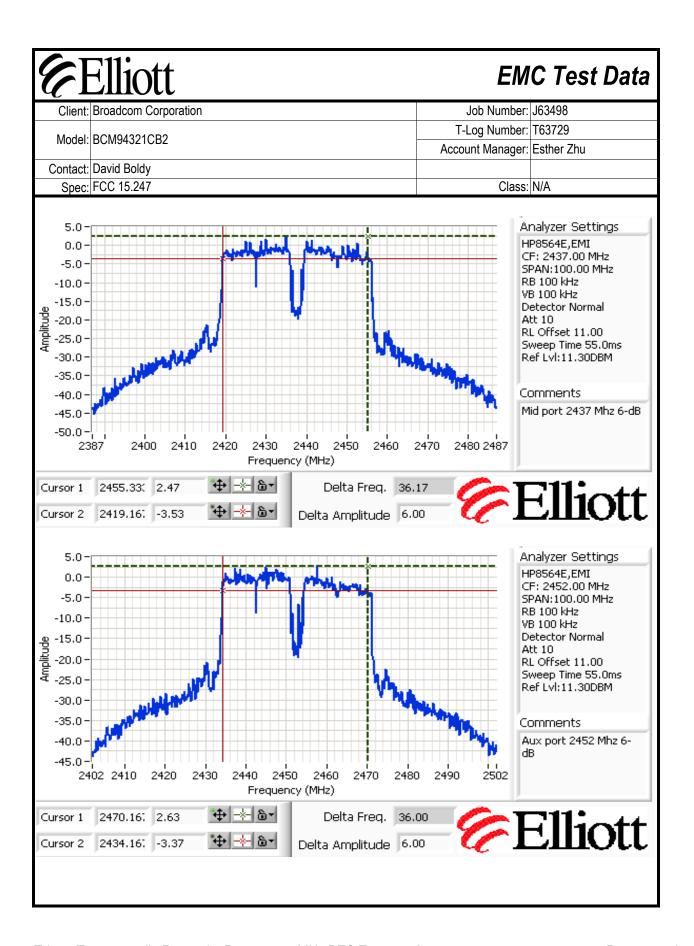


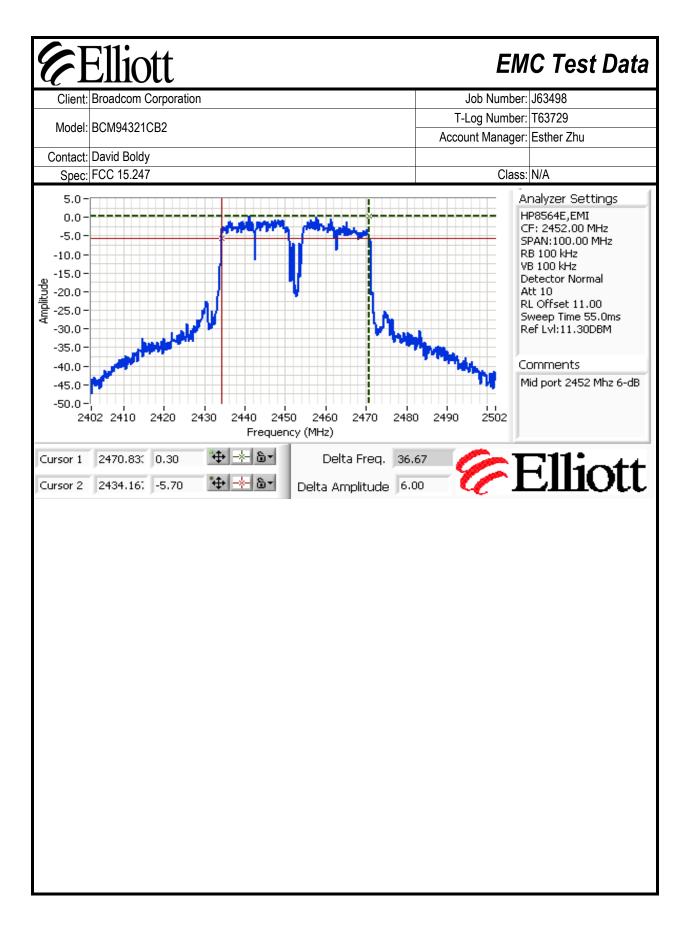




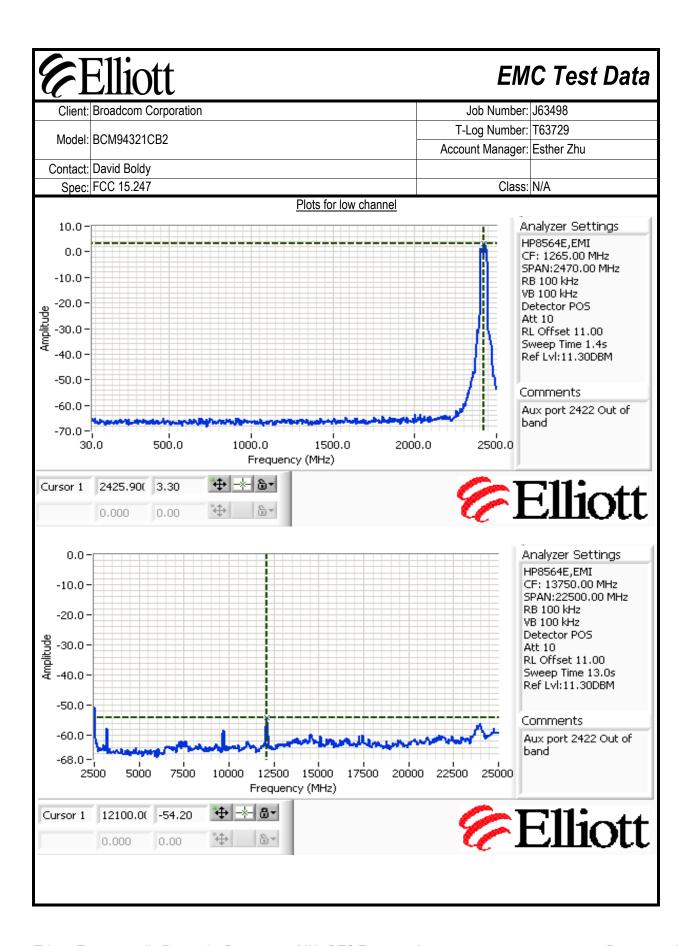
### **Elliott EMC Test Data** Job Number: J63498 Client: Broadcom Corporation T-Log Number: T63729 Model: BCM94321CB2 Account Manager: Esther Zhu Contact: David Boldy Spec: FCC 15.247 Class: N/A Run #3: Signal Bandwidth 6dB Signal Bandwidth Power Resolution 99% Signal Bandwidth Frequency (MHz) Setting Bandwidth (MHz) 36.67 2422 100 kHz 2437 100 kHz 36.17 36.67 2452 100 kHz Note 1: Measured on a single chain Analyzer Settings 5.0 HP8564E,EMI 0.0 CF: 2422.00 MHz -5.0 SPAN:100.00 MHz RB 100 kHz -10.0 VB 100 kHz -15.0 Detector Normal -20.0 Att 10 RL Offset 11.00 -25.0° Sweep Time 55.0ms Ref Lvl:11.30DBM -30.0 -35.0 Comments -40.0 Aux port 2422 Mhz 6--45.0 -50.0 2372 2380 2390 2400 2410 2420 2430 2440 2450 2460 Frequency (MHz) **♦** -×- 6-2440.83( 2.47 Delta Freq. 36.67 Elliott Cursor 1 Cursor 2 2404.16; -3.53 Delta Amplitude 6.00

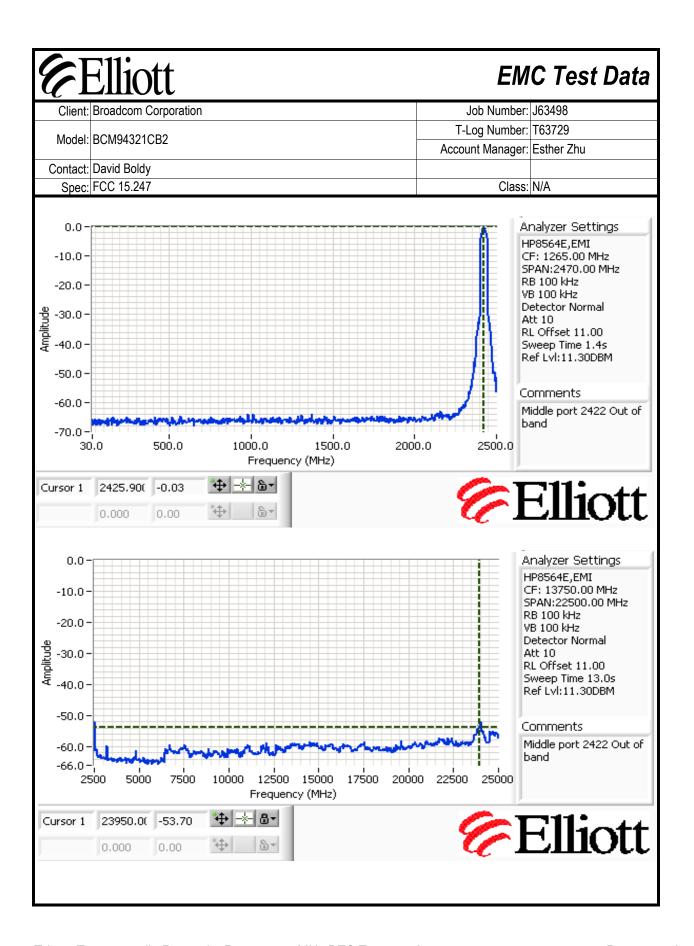


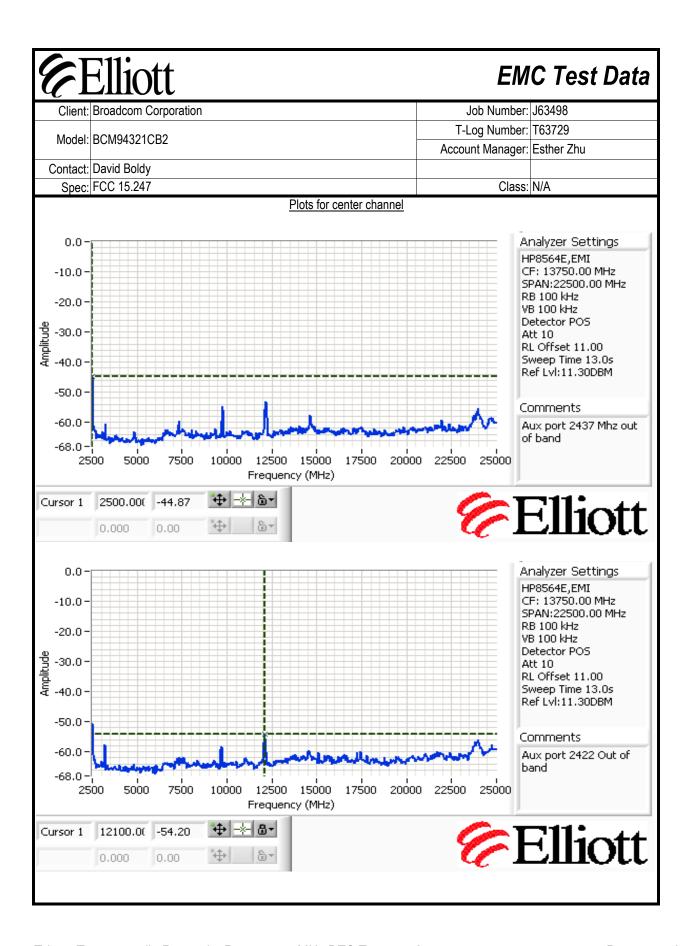


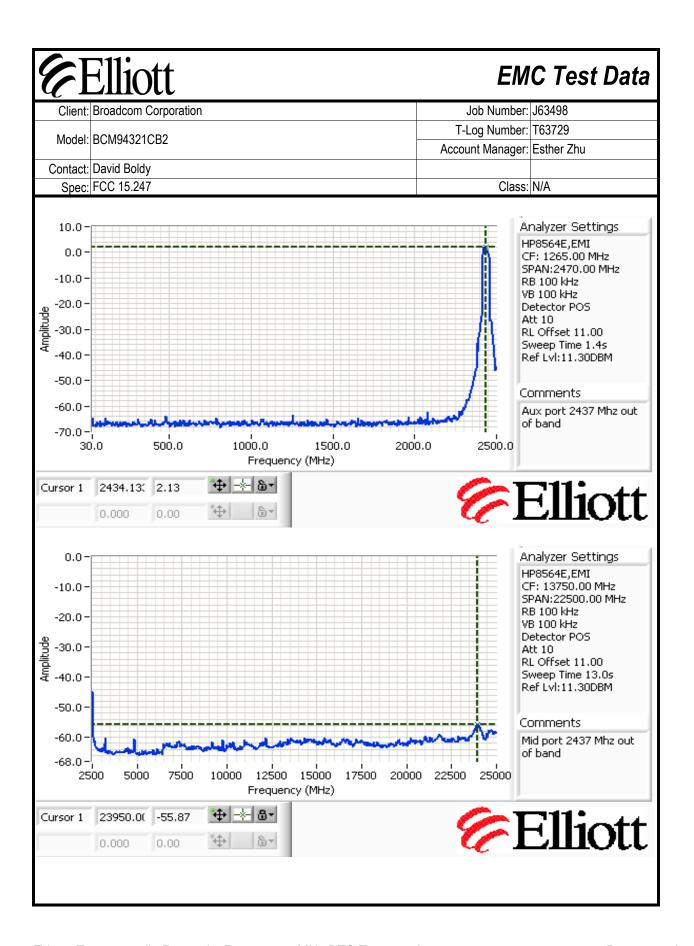


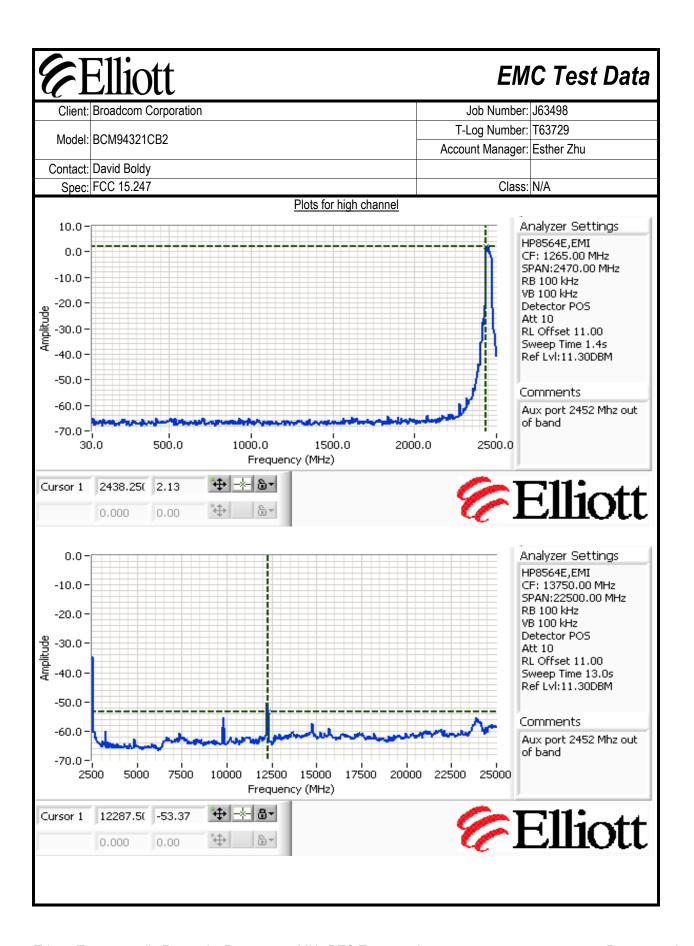
# **Elliott EMC Test Data** Job Number: J63498 Client: Broadcom Corporation T-Log Number: T63729 Model: BCM94321CB2 Account Manager: Esther Zhu Contact: David Boldy Spec: FCC 15.247 Class: N/A Run #4: Out of Band Spurious Emissions Power Setting Per Chain Frequency (MHz) Limit Result -30dBc Refer to plots 2422 2437 -30dBc Refer to plots 2452 -30dBc Refer to plots Measured with all chains connected together through a combiner, unused ports on the combiner terminated in Note 1: 50ohms.

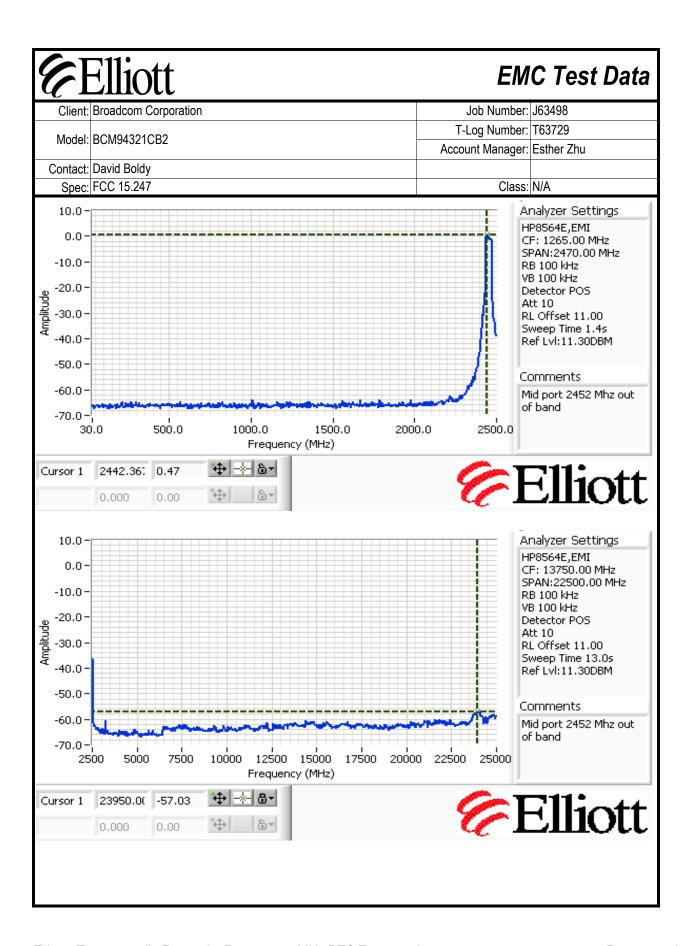












<b>Elliott</b>	EMC Test Data
Client: Broadcom Corporation	Job Number: J63498
Model: BCM94321CB2	T-Log Number: T63729
Model. BOM9432 TOB2	Account Manager: Esther Zhu
Contact: David Boldy	
Spec: FCC 15.247	Class: N/A

# FCC 15.247 DTS - Fundamental and Spurious Emissions 40MHz Signalling

## **Test Specifics**

Objective: The objective of this test session is to perform final qualification testing of the EUT with respect to the

specification listed above.

Date of Test: 4/11/2006 Config. Used: 2
Test Engineer: Juan Martinez Config Change: None
Test Location: Fremont Chamber #4 EUT Voltage: 120V/60Hz

## **General Test Configuration**

The EUT and all local support equipment were located on the turntable for radiated spurious emissions testing. Remote equipment was located underneat the table.

For radiated emissions testing the measurement antenna was located 3 meters from the EUT.

Ambient Conditions: Temperature: 20.5 53

Rel. Humidity: 53 %

## Summary of Results

Run #	Test Performed	Limit	Pass / Fail	Result / Margin
1	Fundamental and Bandedge	FCC Part 15.209 / 15.247( c)	Pass	53.9dBµV/m (494.3µV/m) @ 2483.6MHz (-0.1dB)
2, 3, 4	Radiated Spurious Emissions 1,000-26,500MHz	FCC Part 15.209 / 15.247( c)	Pass	52.7dBµV/m (432.0µV/m) @ 1500.2MHz (-1.3dB)

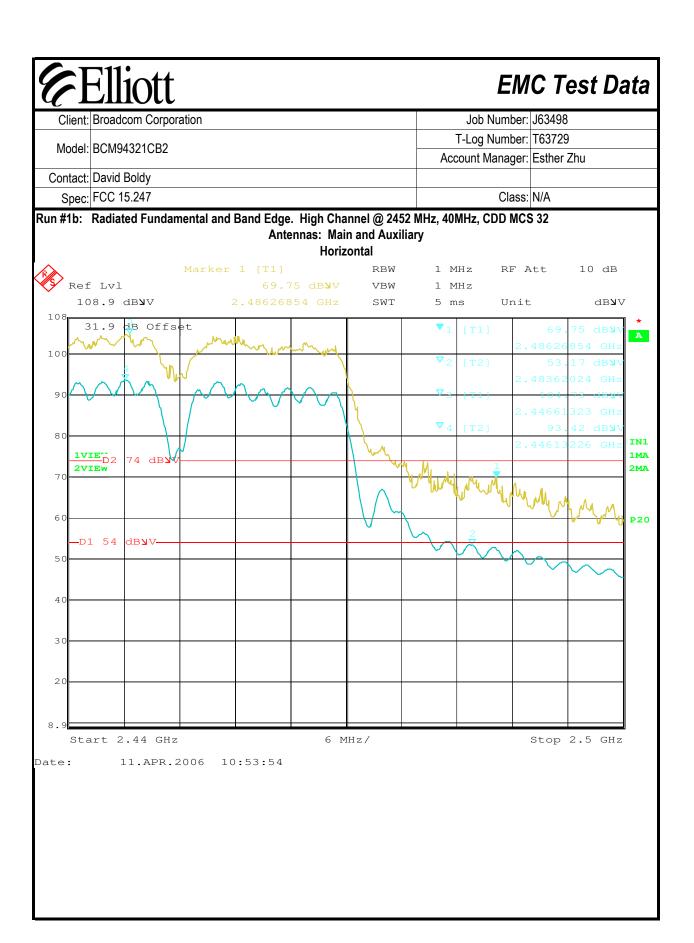
### **Modifications Made During Testing:**

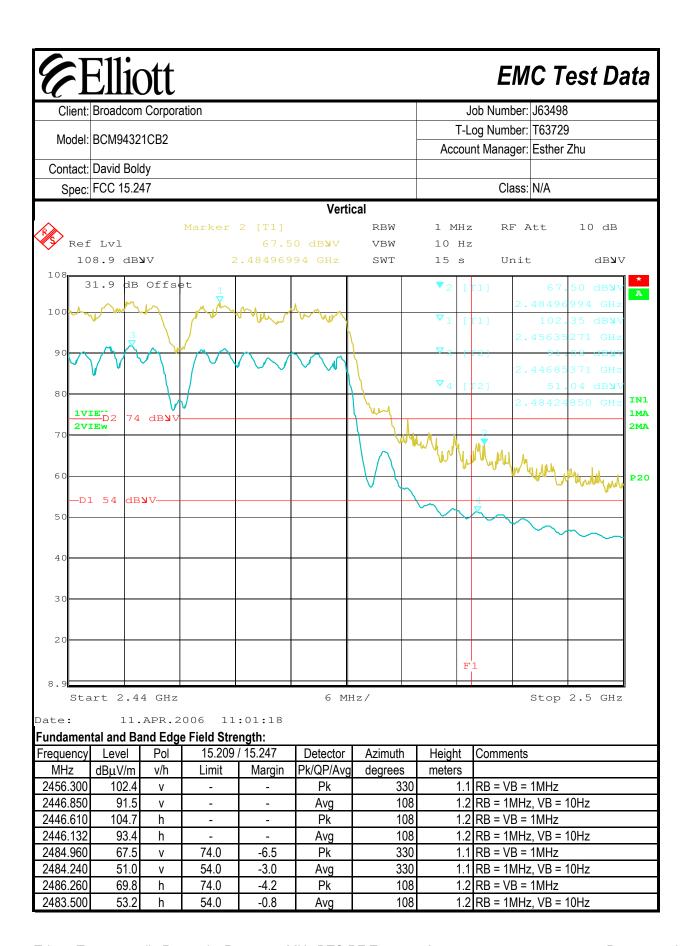
No modifications were made to the EUT during testing

### **Deviations From The Standard**

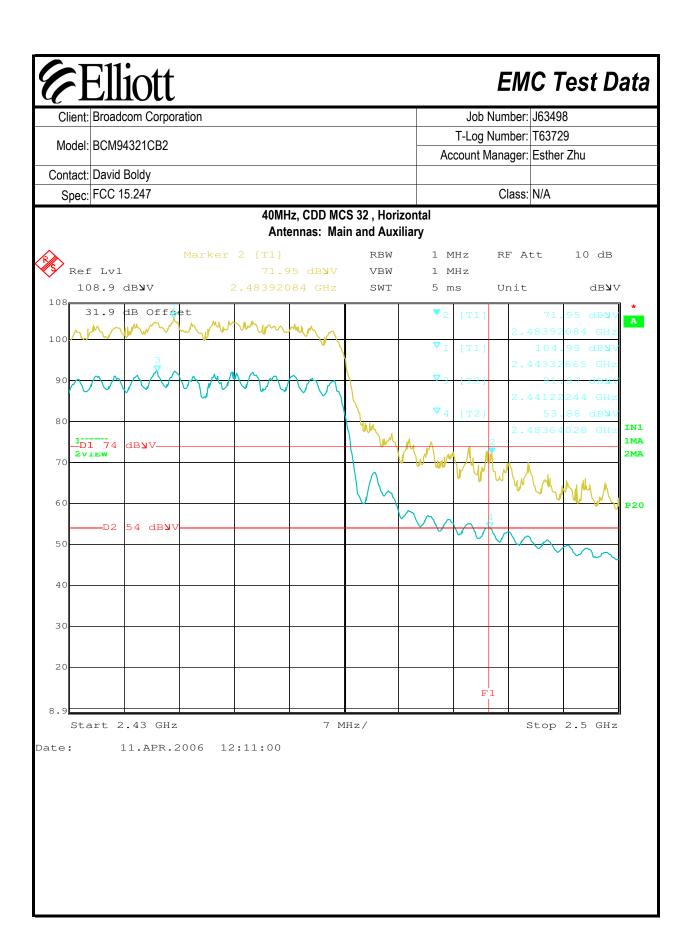
No deviations were made from the requirements of the standard.

### **EMC Test Data** Job Number: J63498 Client: Broadcom Corporation T-Log Number: T63729 Model: BCM94321CB2 Account Manager: Esther Zhu Contact: David Boldy Spec: FCC 15.247 Class: N/A Run #1a: Radiated Fundamental and Band Edge. High Channel @ 2452 MHz Reference data only, not for final qualification 40MHz, CDD MCS 0, Vertical Antennas: Main and Auxiliary RBW 1 MHz RF Att 10 dB Ref Lvl 68.93 dB**y**V VBW 50 Hz 108.9 dB**y**V db**y**v SWT 3.1 s Unit 108 dB Offset 31.9 A 100 90 80 IN1 1MA 74 dB 2VIEW 2MA 60 P20 dB**y**V-4 C 30 6.0000005 MHz/ Start 2.44 GHz Stop 2.500000005 GHz Date: 11.APR.2006 10:16:53 Fundamental and Band Edge Field Strength: 15.209 / 15.247 Frequency Level Pol Detector Azimuth Height Comments Pk/QP/Avq MHz dBuV/m v/h Limit Margin degrees meters 1.1 RB = VB = 1MHz 2491.070 68.9 74.0 -5.1 Pk 340 2485.000 49.5 54.0 -4.5 Avg 340 1.1 RB = 1MHz, VB = 50Hz





### **EMC Test Data** Job Number: J63498 Client: Broadcom Corporation T-Log Number: T63729 Model: BCM94321CB2 Account Manager: Esther Zhu Contact: David Boldy Spec: FCC 15.247 Class: N/A Run #1c: Radiated Fundamental and Band Edge. High Channel @ 2447 MHz 40MHz, CDD MCS 32, Vertical Antennas: Main and Auxiliary RBW Marker 4 [T2] 1 MHz RF Att 10 dB Ref Lvl 53.18 dB**y**V VBW 1 MHz 108.9 dB**y**V 2.48434168 GHz SWT dB**y**V 5 ms Unit 108 dB Offset 100 90 1MA dB**y**V 2MA 54 dB 40 3.0 Start 2.43 GHz 7 MHz/ Stop 2.5 GHz Date: 11.APR.2006 11:52:32



Ollelli.	Broadcom	<b>Orpora</b>	ation				J	ob Number:	J63498
							T-L	og Number:	T63729
Model:	BCM9432	1CB2						nt Manager:	
Contact:	David Bold	dv							
	FCC 15.24	,						Class:	N/A
			e Field Stre	nath:					•
requency		Pol		/ 15.247	Detector	Azimuth	Height	Comments	
MHz	dBμV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters		
2456.510	102.9	٧	-	-	Pk	330	1.1	RB = VB =	1MHz
2454.220	90.7	٧	-	-	Avg	330	1.1	RB = 1MHz	, VB = 10Hz
2443.320	105.0	h	-	-	Pk	90	1.5	RB = VB =	1MHz
2441.220	92.0	h	-	-	Avg	90			, VB = 10Hz
2484.200	71.3	٧	74.0	-2.7	Pk	330	1.1	RB = VB =	1MHz
2484.340	53.2	٧	54.0	-0.8	Avg	330			, VB = 10Hz
2483.920	72.0	h	74.0	-2.1	Pk	90	1.5	RB = VB =	1MHz
2483.640	53.9	h	54.0	-0.1	Avg	0	1.5	RB = 1MHz	, VB = 10Hz

#### **EMC Test Data** Job Number: J63498 Client: Broadcom Corporation T-Log Number: T63729 Model: BCM94321CB2 Account Manager: Esther Zhu Contact: David Boldy Spec: FCC 15.247 Class: N/A Run #1d: Radiated Fundamental and Band Edge. Low Channel @ 2422 MHz, 40MHz 40MHz, CDD MCS 32, Vertical **Antennas: Main and Auxiliary** RBW Marker 4 [T2] 1 MHz RF Att 10 dB Ref Lvl 47.26 dB**y**V VBW 10 Hz 102.9 dB**y**V 2.38943487 GHz db**y**v SWT 23.5 s Unit 102 31.9 dB Offset A 90 80 -D1 74 dB**y**V-IN1 1MA 2MA **2VIEW** 60 FALLON DE TONO P20 40 30 10 Start 2.35 GHz 9.4 MHz/ Stop 2.444 GHz Date: 11.APR.2006 12:55:13



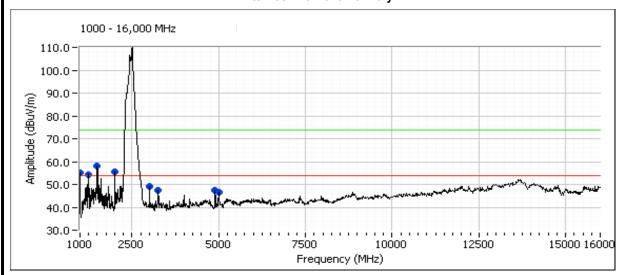
Client:	Elli(  Broadcom		ation				J	ob Number:	J63498
					T-L	og Number:	T63729		
Model:	BCM9432	1CB2				-			Esther Zhu
Contact:	David Bold	dv							
	FCC 15.24	•						Class:	N/A
			e Field Stre	nath:					
requency		Pol	15.209		Detector	Azimuth	Height	Comments	
MHz	dBμV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters		
2427.770		٧	-	-	Pk	357	1.2	RB = VB =	1MHz
2425.160	87.2	٧	-	-	Avg	357	1.2	RB = 1MHz	z, VB = 10Hz
419.510	105.7	h	-	-	Pk	90	1.3	RB = VB =	1MHz
417.430	93.6	h	-	-	Avg	90	1.3	RB = 1MHz	z, VB = 10Hz
389.430	64.3	٧	74.0	-9.7	Pk	357	1.2	RB = VB =	1MHz
2389.430	47.3	٧	54.0	-6.7	Avg	357	1.2	RB = 1MHz	z, VB = 10Hz
2389.240		h	74.0	-1.7	Pk	90		RB = VB =	
2389.810	53.2	h	54.0	-0.9	Avg	90	1.3	RB = 1MHz	z, VB = 10Hz

## **EMC Test Data**

Client:	Broadcom Corporation	Job Number:	J63498
Model:	BCM94321CB2	T-Log Number:	T63729
woder.	DCW94321CD2	Account Manager:	Esther Zhu
Contact:	David Boldy		
Spec:	FCC 15.247	Class:	N/A

Run #2: Radiated Spurious Emissions, 1000 - 16,000 MHz. High Channel @ 2452 MHz, CDD MCS 32

Antennas: Main and Auxiliary



Harmonics 2447 MHz (40MHz) Highest Power

		_ ( : • ::::: ::	<u>-,g</u>	• • .				
Frequency	Level	Pol	15.209	/ 15.247	Detector	Azimuth	Height	Comments
MHz	dBμV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
Peak Read	lings.							
4894.083	47.4	V	54.0	-6.6	Peak	59	1.4	Restricted, Note 1
5000.412	46.6	V	54.0	-7.4	Peak	161	1.2	Restricted, Note 1
1999.974	55.7	V	87.0	-31.3	Peak	173	1.0	Non-restricted
1247.500	54.4	V	87.0	-32.6	Peak	269	1.0	Non-resctricted
3007.500	49.0	V	87.0	-38.0	Peak	356	1.4	Non-restricted
3255.000	47.4	V	87.0	-39.6	Peak	215	1.0	Non-restricted
Peak and A	Average R	eadings						
1000.220	52.1	V	54.0	-1.9	AVG	22	1.2	Restricted
1999.829	49.7	V	54.0	-4.3	AVG	173	1.0	Non-restricted
1500.176	49.1	V	54.0	-4.9	AVG	90	1.4	Restricted
1500.176	59.3	V	74.0	-14.7	PK	90	1.4	Restricted
1000.220	57.6	V	74.0	-16.4	PK	22	1.2	Restricted
1999.829	56.7	V	74.0	-17.4	PK	173	1.0	Non-restricted

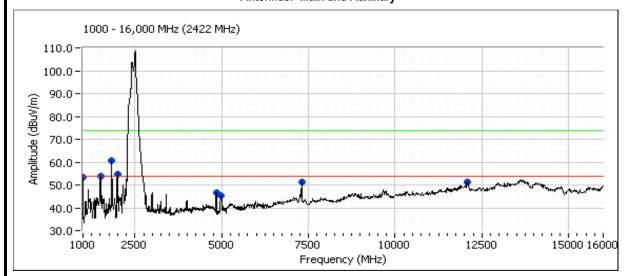
Note 1 Peak reading were 6-dB or more below the average limit, so not Average limits taken.

No emission detected 20-dB of the limit from 16 - 18 GHz and from 18 - 26.5 GHz. Measurements were performed on Site# 2 on April 21, 2006 by Juan Martinez

## **EMC Test Data**

Client:	Broadcom Corporation	Job Number:	J63498
Model:	BCM94321CB2	T-Log Number:	T63729
woder.	DCW94321CD2	Account Manager:	Esther Zhu
Contact:	David Boldy		
Spec:	FCC 15.247	Class:	N/A

## Run #3: Radiated Spurious Emissions, 1000 - 16,000 MHz. Low Channel @ 2422 MHz, CDD MCS 32 Antennas: Main and Auxiliary



#### Harmonics 2422 MHz (40MHz) Highest Power

		_ ( : • ::::: :	<u>-,</u>	• • .				
Frequency	Level	Pol	15.209	/ 15.247	Detector	Azimuth	Height	Comments
MHz	dBμV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
Peak Readings.								
4843.894	46.5	V	54.0	-7.5	Peak	57	2.0	Restricted, Note 1
4974.039	45.2	V	54.0	-8.8	Peak	349	1.6	Restricted, Note 1
1825.289	60.8	V	87.0	-26.2	Peak	190	1.4	Non-restricted
1994.675	54.7	V	87.0	-32.3	Peak	178	1.0	Non-restricted
Peak and A	Average R	Readings	) <u>.</u>					
1500.160	52.7	V	54.0	-1.3	AVG	91	1.0	Restricted
12100.10	41.6	Н	54.0	-12.4	AVG	43	1.6	Restricted
1500.160	56.9	V	74.0	-17.1	PK	91	1.0	Restricted
12100.10	53.5	Н	74.0	-20.6	PK	43	1.6	Restricted
7290.742	32.6	V	54.0	-21.5	AVG	135	2.0	Restricted
7290.742	41.4	V	74.0	-32.6	PK	135	2.0	Restricted
								-

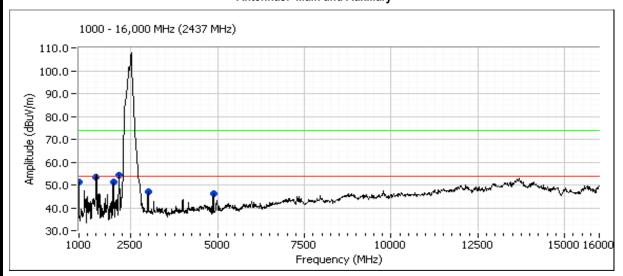
Note 1 Peak reading were 6-dB or more below the average limit, so no Average readings taken.

No emission detected 20-dB of the limit from 16 - 18 GHz and from 18 - 26.5 GHz. Measurements were performed on Site# 2 on April 21, 2006 by Juan Martinez

## EMC Test Data

Client:	Broadcom Corporation	Job Number:	J63498
Model:	BCM94321CB2	T-Log Number:	T63729
woder.	DCW94321CD2	Account Manager:	Esther Zhu
Contact:	David Boldy		
Spec:	FCC 15.247	Class:	N/A

#### Run #4: Radiated Spurious Emissions, 1000 - 16,000 MHz. Middle Channel @ 2437 MHz, CDD MCS 32 Antennas: Main and Auxiliary



Harmonics 2437 MHz (40MHz) Highest Power

Frequency	Level	Pol	15.209	/ 15.247	Detector	Azimuth	Height	Comments
MHz	dBμV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
Peak Read	Peak Readings.							
1825.289	51.2	V	87.0	-35.8	Peak	252	1.2	non-restricted
2164.167	54.3	V	87.0	-32.7	Peak	176	1.2	non-restricted
4873.571	46.2	V	54.0	-7.8	Peak	63	1.8	Restricted, Note 1
2998.333	46.9	V	87.0	-40.1	Peak	358	1.6	non-restricted
Peak and A	Peak and Average Readings.							
1500.157	51.6	V	54.0	-2.5	AVG	87	1.0	Restricted
1500.157	57.0	V	74.0	-17.0	PK	87	1.0	Restricted

Note 1 Peak reading were 6-dB or more below the average limit, so no Average readings taken.

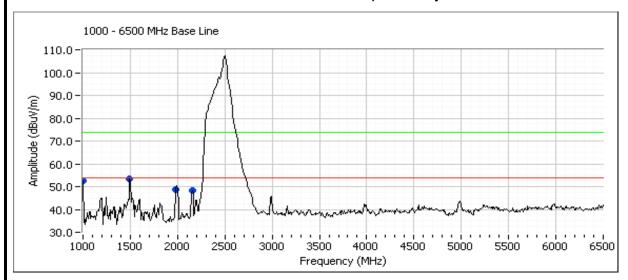
No emission detected 20-dB of the limit from 16 - 18 GHz and from 18 - 26.5 GHz. Measurements were performed on Site# 2 on April 21, 2006 by Juan Martinez

## **EMC** Test Data

•			
Client:	Broadcom Corporation	Job Number:	J63498
Madal	BCM94321CB2	T-Log Number:	T63729
wodei.	DCW94321CD2	Account Manager:	Esther Zhu
Contact:	David Boldy		
Spec:	FCC 15.247	Class:	N/A

#### Run #6: Radiated Spurious Emissions, 1000 - 6,500 MHz

#### Card Removed base line with computer on only



Harmonics 2437 MHz (40MHz) Highest Power

· iai ilioilioc	2 - 107 10111	- (-10111111	<i>-,</i> gcc	0110.				
Frequency	Level	Pol	15.209	/ 15.247	Detector	Azimuth	Height	Comments
MHz	dBμV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
Peak Read	lings.							
1495.000	53.4	V	54.0	-0.6	Peak	89	1.4	
1000.000	52.6	V	54.0	-1.4	Peak	3	1.2	
1980.833	48.9	V	54.0	-5.1	Peak	260	1.2	
2155.000	48.5	V	54.0	-5.5	Peak	359	1.2	

<b>Elliott</b>	EMC Test Data
Client: Broadcom	Job Number: J63498
Model: BCM94321CB	Test-Log Number: T63589
	Project Manager: Esther Zhu
Contact: David Boldy	
Emissions Spec: FCC 15.247, EN55022	Class: Radio
Immunity Spec: -	Environment: -

### **EMC Test Data**

For The

### **Broadcom**

Model

#### BCM94321CB

Date of Last Test: 4/24/2006

<b>Elliot</b>	t	EM	C Test Data
Client:	Broadcom	Job Number:	J63498
Model:	BCM94321CB	Test-Log Number:	T63589
		Project Manager:	Esther Zhu
Contact:	David Boldy		
Emissions Spec:	FCC 15.247, EN55022	Class:	Radio
Immunity Spec:	-	Environment:	-

#### **EUT INFORMATION**

The following information was collected during the test sessions(s).

#### **General Description**

The EUT is a MIMO and legacy cardbus card that is designed to provide high speed wireless internet access. Since the EUT would be placed on a table top during operation, the EUT was treated as table-top equipment during testing to simulate the enduser environment. The EUT receives it power from the host computer system. The electrical rating of the host computer is 120 -

**Equipment Under Test** 

Manufacturer	Model	Description	Serial Number	FCC ID
Braodcom	BMC93321CB	MIMO cardbus	-	TBD

#### Other EUT Details

#### **EUT Antenna (Intentional Radiators Only)**

The antenna is integral to the device.

#### **EUT Enclosure**

The EUT has no enclosure. It is designed to be installed within the enclosure of a host computer.

**Modification History** 

Mod.#	Test	Date	Modification
1	-	-	None
2			
3			

Modifications applied are assumed to be used on subsequent tests unless otherwise stated as a further modification.



### **EMC Test Data**

Client:	Broadcom	Job Number:	J63498
Model:	BCM94321CB	T-Log Number:	T63589
		Project Manager:	Esther Zhu
Contact:	David Boldy		
Emissions Spec:	FCC 15.247, EN55022	Class:	Radio
Immunity Spec:	-	Environment:	-

#### **Test Configuration #1**

The following information was collected during the test sessions(s).

#### **Local Support Equipment**

Manufacturer	Model	Description	Serial Number	FCC ID
Hewlett Packard	zv6000	Laptop	CND52904S1	DoC
Hewlett Packard	Deskjet 3820	Printer	CN2451B1	DoC
Hewlett Packard	F3-0507013399C	AC/DC adaptor	CN2451B1	-

#### **Remote Support Equipment**

Manufacturer	Model	Description	Serial Number	FCC ID
Netgear	EN104	Hub	ENT4B06271953	-

#### **Cabling and Ports**

Port	Connected To	Cable(s)		
		Description	Shielded or Unshielded	Length(m)
Laptop USB	Printer	Multiwire	Shielded	1.5
Laptop Ethernet	Hub	CAT 5	Unshielded	10.0
Laptop Power	AC Adapter	2 wire	Unshielded	2.0
AC adpater	AC Mains	3 wire	Unshielded	1.5

#### **EUT Operation During Transmitter Tests**

During MIMO testing the EUT was transmitting simultaneously on two RF chains at either the low, 2412MHZ, the middle, 2437MHz, or the high, 2462MHz in either the 802.11b or 802.11g mode.

During legacy testing the EUT was transmitting on a single chain at either the low, 2412MHZ, the middle, 2437MHz, or the high, 2462MHz in either the 802.11b or 802.11g mode.

#### **EUT Operation During Emissions Tests**

During emissions testing the EUT was transmitting at full power on channel #6, 2437MHz in either MIMO, multiple transmitters, mode or 802.11b legacy mode, single transmitter

C	Elliott	EMC Test Data		
Client:	Broadcom	Job Number:	J63498	
Model	BCM94321CB	T-Log Number:	T63589	
iviodei.	DOM9432 TOD	Account Manager:	Esther Zhu	
Contact:	David Boldv			

#### **Conducted Emissions - Power Ports**

#### **Test Specifics**

Objective: The objective of this test session is to perform final qualification testing of the EUT with respect to the

Class: Radio

specification listed above.

Date of Test: 4/21/2006 Config. Used: 1
Test Engineer: Juan Martinez Config Change: None

Test Location: SVOATS #2 EUT Voltage: Refer to individual run

#### General Test Configuration

Spec: FCC 15.247, EN55022

The EUT was located on a wooden table, 40 cm from a vertical coupling plane and 80cm from the LISN. A second LISN was used for all local support equipment.

Ambient Conditions: Temperature: 12 °C

Rel. Humidity: 80 %

#### **Summary of Results**

Run #	Test Performed	Limit	Result	Margin
1	CE, AC Power,120V/60Hz	EN55022 B	Pass	49.1dBµV @ 0.161MHz (-6.3dB)
2	CE, AC Power,120V/60Hz	EN55022 B	Pass	49.2dBµV @ 0.154MHz (-6.6dB)

#### **Modifications Made During Testing:**

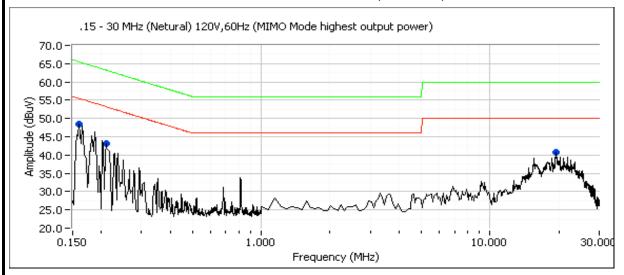
No modifications were made to the EUT during testing

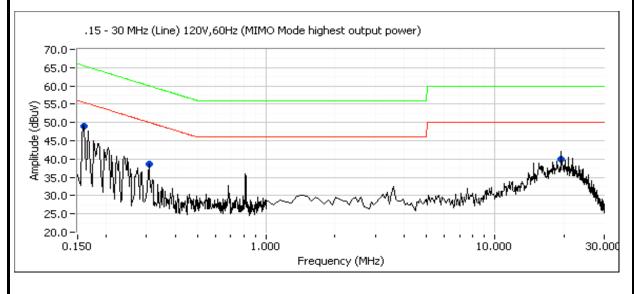
#### **Deviations From The Standard**

No deviations were made from the requirements of the standard.

<b>E</b>	Elliott	EMC Test Date		
Client:	Broadcom	Job Number:	J63498	
Model	BCM94321CB	T-Log Number:	T63589	
woder.	BCW94321CB	Account Manager:	Esther Zhu	
Contact:	David Boldy			
Spec:	FCC 15.247, EN55022	Class:	Radio	
		·		

#### Run #1: AC Power Port Conducted Emissions, 0.15 - 30MHz, 120V/60Hz (MIMO Mode)





F	Ellic	ott					EM	C Test Dat
	Broadcon						Job Number:	J63498
Model.	BCM9432	21CR					T-Log Number:	
							Account Manager:	Esther Zhu
	David Bol							
Spec:	FCC 15.2	47, EN550	)22				Class:	Radio
quency	Level	AC	EN55	022 B	Detector	Comments		
MHz	dBμV	Line	Limit	Margin	QP/Ave	Comments		
1606	49.1	Line 1	55.4	-6.3	Peak	Note 1		
1606	48.4	Neutral	55.4	-7.1	Peak	Note 1		
9.488	40.6	Neutral	50.0	-9.4	Peak	Note 1		
.210	43.1	Neutral	53.2	-10.1	Peak	Note 1		
9.488	39.9	Line 1	50.0	-10.1	Peak	Note 1		
.307	38.7	Line 1	50.0	-11.4	Peak	Note 1		
	l							
e 1:	No QP re	adings tak	en. Peak r	eadings are	more then	6-an below tr	ne average limit.	

Oliveti Droodoom				C Test Da
Client: Broadcom			Job Number: T-Log Number:	
Model: BCM94321CB			count Manager:	
ontact: David Boldy				
Spec: FCC 15.247, EN55022			Class:	Radio
#2: AC Power Port Conducted Emis	ssions, 0.15 - 30MHz, 1	20V/60Hz (802.11b)	)	
.15 - 30 MHz (Line) 120V,6	60Hz (802.11b Mode hig	jhest output power	)	
70.0 -				
65.0 - 60.0 -				
50.0-		- I		
55.0 - 50.0 - 45.0 - 40.0 - 35.0 -				
35 0 - W W W	ı			Alexandrian.
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45	CU- (000 44b M-d-bi-	h h h		
.15 - 30 MHz (Line) 120V,6	UHZ (802.11b Mode nig	nest output power)	,	
70.0 - 65.0 -				
65.0 - 60.0 -		<del></del>		
65.0 - 60.0 -				
65.0 - 60.0 - 55.0 - 50.0 -				
65.0 - 60.0 - 55.0 - 50.0 -				20.1
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65.0 - 60.0 - 55.0 - 50.0 - 45.0 - 40.0 - 35.0 - 30.0 - 25.0 -	1.000	~~~/~/////////////////////////////////	10.000	Man.
65.0 - 60.0 - 55.0 - 50.0 - 45.0 - 40.0 - 35.0 - 30.0 - 25.0 - 20.0 -	1.000	~~~√~~√~~ ncy (MHz)	10.000	Man.
65.0 - 60.0 - 55.0 - 50.0 - 45.0 - 40.0 - 35.0 - 30.0 - 25.0 - 20.0 -	1.000	~~~√~√√√√√√√√√√√√√√√√√√√√√√√√√√√√√√√√	10.000	Man.

_	Ellic	Ott					EM	C Test Da
	Broadcon						Job Number:	J63498
Madalı	BCM9432	10D					T-Log Number:	T63589
							Account Manager:	Esther Zhu
	David Bol							
Spec:	FCC 15.2	47, EN550	)22				Class:	Radio
quency	Level	AC	FN55	022 B	Detector	Comments		
MHz	dΒμV	Line	Limit	Margin	QP/Ave	Commonto		
).154	49.2	Line 1	55.8	-6.6	Peak	Note 1		
.152	48.8	Neutral	55.9	-7.1	Peak	Note 1		
.167	46.8	Line 1	55.1	-8.3	Peak	Note 1		
5.573	41.4	Line 1	50.0	-8.6	Peak	Note 1		
9.488	40.7	Neutral	50.0	-9.3	Peak	Note 1		
0.193	43.2	Neutral	53.9	-10.8	Peak	Note 1		
		•			•	•		

### **EXHIBIT 3: Photographs of Test Configurations**

4 Pages

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### EXHIBIT 4: Proposed FCC ID Label & Label Location

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# EXHIBIT 5: Detailed Photographs of Broadcom Corporation Model BCM94321CB2Construction

Pages

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# EXHIBIT 6: Operator's Manual for Broadcom Corporation Model BCM94321CB2

Pages

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## EXHIBIT 7: Block Diagram of Broadcom Corporation Model BCM94321CB2

Pages

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# EXHIBIT 8: Schematic Diagrams for Broadcom Corporation Model BCM94321CB2

Pages

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# EXHIBIT 9: Theory of Operation for Broadcom Corporation Model BCM94321CB2

Pages

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### **EXHIBIT 10: Advertising Literature**

Pages

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### **EXHIBIT 11: RF Exposure Information**

Pages

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