

*EMC Test Report*

*Application for Grant of Equipment Authorization  
Class II Permissive Change/Reassessment*

*Industry Canada RSS-Gen Issue 3 / RSS 210 Issue 8  
FCC Part 15, Subpart E*

*Model: BCM943228HM4L*

IC CERTIFICATION #: 4324A-BRCM1054  
FCC ID: QDS-BRCM1054

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**REVISION HISTORY**

Rev#	Date	Comments	Modified By
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## SCOPE

An electromagnetic emissions test has been performed on the Broadcom Corporation model BCM943228HM4L, pursuant to the following rules:

Industry Canada RSS-Gen Issue 3  
RSS 210 Issue 8 “Low-power Licence-exempt Radiocommunication Devices (All Frequency Bands): Category I Equipment”  
FCC Part 15, Subpart E requirements for UNII Devices (using FCC DA 02-2138, August 30, 2002)

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 NTS Silicon Valley test procedures:

ANSI C63.4:2003  
FCC UNII test procedure KDB 789033 D01 v01r01, dated March 2012

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.

## OBJECTIVE

The primary objective of the manufacturer is compliance with the regulations outlined in the previous section.

Prior to marketing in the USA, all unlicensed transmitters and transceivers require certification. Receive-only devices operating between 30 MHz and 960 MHz are subject to either certification or a manufacturer’s declaration of conformity, with all other receive-only devices exempt from the technical requirements.

Prior to marketing in Canada, Class I transmitters, receivers and transceivers require certification. Class II devices are required to meet the appropriate technical requirements but are exempt from certification requirements.

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.).

#### ***STATEMENT OF COMPLIANCE***

The tested sample of Broadcom Corporation model BCM943228HM4L complied with the requirements of the following regulations:

RSS 210 Issue 8 “Low-power Licence-exempt Radiocommunication Devices (All Frequency Bands): Category I Equipment”  
FCC Part 15, Subpart E requirements for UNII Devices

Maintenance of compliance is the responsibility of the manufacturer. Any modifications to the product should be assessed to determine their potential impact on the compliance status of the device with respect to the standards detailed in this test report.

The test results recorded herein are based on a single type test of Broadcom Corporation model BCM943228HM4L and therefore apply only to the tested sample. The sample was selected and prepared by Anne Liang of Broadcom Corporation.

#### ***DEVIATIONS FROM THE STANDARDS***

No deviations were made from the published requirements listed in the scope of this report.

**TEST RESULTS SUMMARY**

**UNII / LELAN DEVICES**

**Operation in the 5.15 – 5.25 GHz, 5.25 0 5.35 GHz, 5.47 – 5.725 GHz Bands**

FCC Rule Part	RSS Rule Part	Description	Measured Value / Comments	Limit / Requirement	Result
15.407(e)		Indoor operation only	N/A – Change would not impact original filing		
15.407(a)(2)		26dB Bandwidth	N/A – Change would not impact original filing		
15.407 (a)(1)	A9.2(1)	Output Power	N/A – Power verified to be within 0.5dB of the original filing prior to evaluation of spurious emissions		
15.407 (a)(1)	-	Power Spectral Density	N/A – Change would not impact original filing		
-	A9.5 (2)				
KDB 443999	A9	Non-operation in 5600 – 5650 MHz sub band	N/A – Change would not impact original filing		

**Requirements for all U-NII/LELAN bands**

FCC Rule Part	RSS Rule Part	Description	Measured Value / Comments	Limit / Requirement	Result
15.407	A9.5a	Modulation	N/A – Change would not impact original filing		
15.407(b)(5) / 15.209	A9.3	Spurious Emissions	54.0 dBµV/m @ 5725.1 MHz (0.0 dB)	Refer to page 21	Complies
15.407(a)(6)	-	Peak Excursion Ratio	N/A – Change would not impact original filing		
	A9.5 (3)	Channel Selection	Spurious emissions tested at outermost channels in each band	Device was tested on the top, bottom and center channels in each band	N/A
15			Measurements on three channels in each band		Complies
15.407 (c)	A9.5(4)	Operation in the absence of information to transmit	N/A – Change would not impact original filing		
15.407 (g)	A9.5 (5)	Frequency Stability	N/A – Change would not impact original filing		
15.407 (h1)	A9.4	Transmit Power Control	N/A – Change would not impact original filing		
15.407 (h2)	A9.4	Dynamic frequency Selection (device without radar detection)	N/A – Change would not impact original filing		
	A9.9g	User Manual information	N/A – Change would not impact original filing		

**GENERAL REQUIREMENTS APPLICABLE TO ALL BANDS**

FCC Rule Part	RSS Rule part	Description	Measured Value / Comments	Limit / Requirement	Result (margin)
15.203	-	RF Connector	N/A – change would not impact original filing		
15.207	RSS GEN Table 2	AC Conducted Emissions	N/A – change would not impact original filing		
15.109	RSS GEN 7.2.3 Table 1	Receiver spurious emissions	N/A – Receiver tunes above 960MHz		
15.247 (b) (5) 15.407 (f)	RSS 102	RF Exposure Requirements	As the new antenna is lower gain than the original filing, the original RF Exposure Brief is applicable.		
-	RSP 100 RSS GEN 7.1.5	User Manual	N/A – change would not impact original filing		
-	RSP 100 RSS GEN 7.1.5	User Manual	N/A – change would not impact original filing		
-	RSP 100 RSS GEN 4.4.1	99% Bandwidth	N/A – change would not impact original filing		

**MEASUREMENT UNCERTAINTIES**

ISO/IEC 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 are based on a 95% confidence level and were calculated in accordance with UKAS document LAB 34.

Measurement Type	Measurement Unit	Frequency Range	Expanded Uncertainty
RF power, conducted (power meter)	dBm	25 to 7000 MHz	± 0.52 dB
RF power, conducted (Spectrum analyzer)	dBm	25 to 7000 MHz	± 0.7 dB
Conducted emission of transmitter	dBm	25 to 26500 MHz	± 0.7 dB
Conducted emission of receiver	dBm	25 to 26500 MHz	± 0.7 dB
Radiated emission (substitution method)	dBm	25 to 26500 MHz	± 2.5 dB
Radiated emission (field strength)	dB $\mu$ V/m	25 to 1000 MHz	± 3.6 dB
		1000 to 40000 MHz	± 6.0 dB
Conducted Emissions (AC Power)	dB $\mu$ V	0.15 to 30 MHz	± 2.4 dB



**EQUIPMENT UNDER TEST (EUT) DETAILS**

**GENERAL**

The Broadcom Corporation model BCM943228HM4L is a 2x2 WLAN PCI-E Minicard, that is designed to enable WLAN connections when installed in PCs. It supports abgn modes. 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 electrical rating of the EUT is 3.3Vdc, 800mA

The sample was received on August 28, 2012 and tested on August 28, September 4, 5, 11, 18 and 28 and October 18, 22 and 23, 2012. The EUT consisted of the following component(s):

Company	Model	Description	Serial Number	FCC ID
Broadcom	BCM943228HM4L (C2PC)	802.11abgn WLAN PCI-E Mini Card	-	QDS-BRCM1054

**OTHER EUT DETAILS**

Testing limited to worse case modes from original filing using the lower gain/different type antenna.

**ANTENNA SYSTEM**

The EUT antenna is a 802.11abgn dipole antenna.

The antenna connects to the EUT via a non-standard Hirose antenna connector, thereby meeting the requirements of FCC 15.203.

**ENCLOSURE**

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

**MODIFICATIONS**

No modifications were made to the EUT during the time the product was at NTS Silicon Valley.

**SUPPORT EQUIPMENT**

The following equipment was used as support equipment for testing:

Company	Model	Description	Serial Number	FCC ID
IBM	Lenove G560	Laptop	-	-

No remote support equipment was used during testing.

**EUT INTERFACE PORTS**

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

Port	Connected To	Description	Cable(s)	
			Shielded or Unshielded	Length(m)
PCI adaptor	PCI slot (laptop)	Direct plug in	NA	NA
J1	External antenna	Coax	Shielded	0.2
J2	External antenna	Coax	Shielded	0.2
DC power (laptop)	External pwr supply	2 wire	Unshielded	2
AC Power (pwr supply)	AC Mains	3 wire	Unshielded	1

**EUT OPERATION**

Prior to testing, the sample was configured using a gated average power meter to be within 0.5dB of the power levels listed in the operational description of the original filing. The power levels listed in the operational description are equivalent to the power levels recorded in the original test reports.

During testing, the EUT was configured to continuously transmit at the noted channel at the maximum output power. For 802.11b mode testing, the data rate was set to 1Mb/s. For 802.11g mode, the data rate was set to 6Mb/s. For 802.11n20 and 802.11n40, the data rate was set to MCS0. These data rates represent worse case, as they resulted in the highest output power.

Bandedge testing was performed for all modes, on all appropriate channels. Spurious emissions were performed on the worse case mode from the original filing.

**TEST SITE**

**GENERAL INFORMATION**

Final test measurements were taken at the test sites listed below. 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 and with industry Canada.

Site	Registration Numbers		Location
	FCC	Canada	
Chamber 3	769238	2845B-3	41039 Boyce Road Fremont, CA 94538-2435
Chamber 4	211948	2845B-4	

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. The test site(s) contain 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.

**CONDUCTED EMISSIONS CONSIDERATIONS**

Conducted emissions testing is performed in conformance with ANSI C63.4:2003. 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.

## **MEASUREMENT INSTRUMENTATION**

### **RECEIVER SYSTEM**

An EMI receiver as specified in CISPR 16-1-1 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.

### *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 loop antenna is used below 30 MHz. For the measurement range 30 MHz to 1000 MHz either a combination of a biconical antenna and a log periodic or a bi-log antenna is used. Above 1000 MHz, horn antennas are used. The antenna calibration factors to convert the received voltage to an electric field strength are included with appropriate cable loss and amplifier gain factors to determine an overall site factor, which is then 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. Measurements below 30 MHz are made with the loop antenna at a fixed height of 1m above the ground plane.

ANSI C63.4:2003 specifies 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.

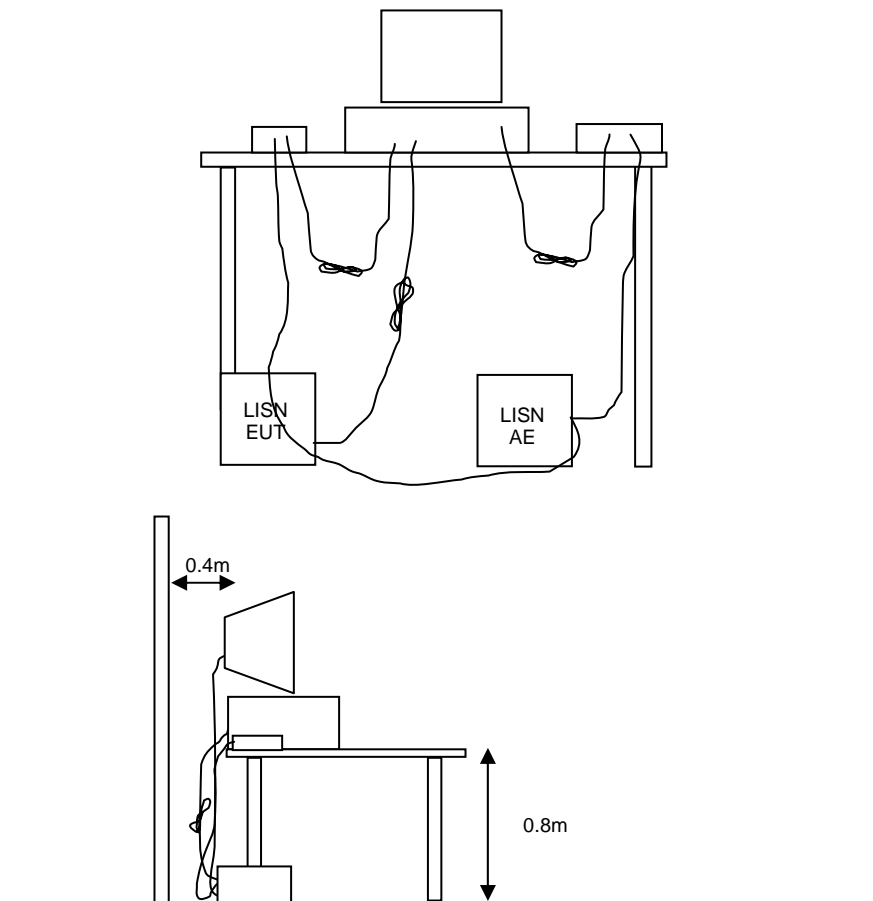
**TEST PROCEDURES**

**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.



**Figure 1 Typical Conducted Emissions Test Configuration**

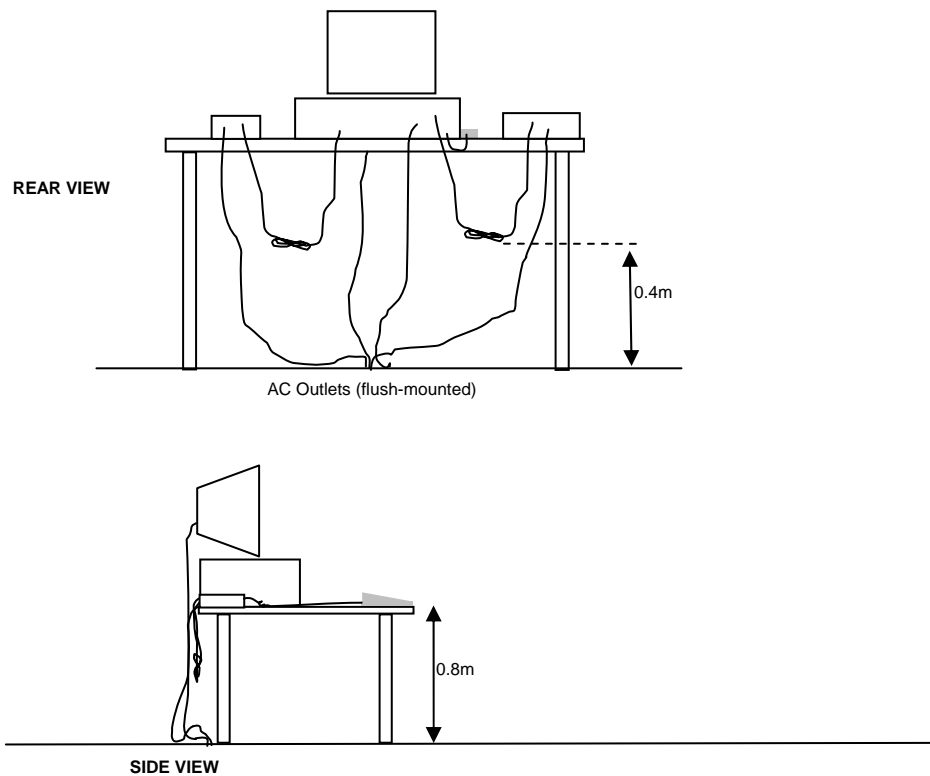
**RADIATED EMISSIONS**

A preliminary scan of the radiated emissions is performed in which all significant EUT frequencies are identified with the system in a nominal configuration. At least two scans are performed, one scan for each antenna polarization (horizontal and vertical; loop parallel and perpendicular to the EUT). During the preliminary scans, the EUT is rotated through 360°, the antenna height is varied (for measurements above 30 MHz) 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.

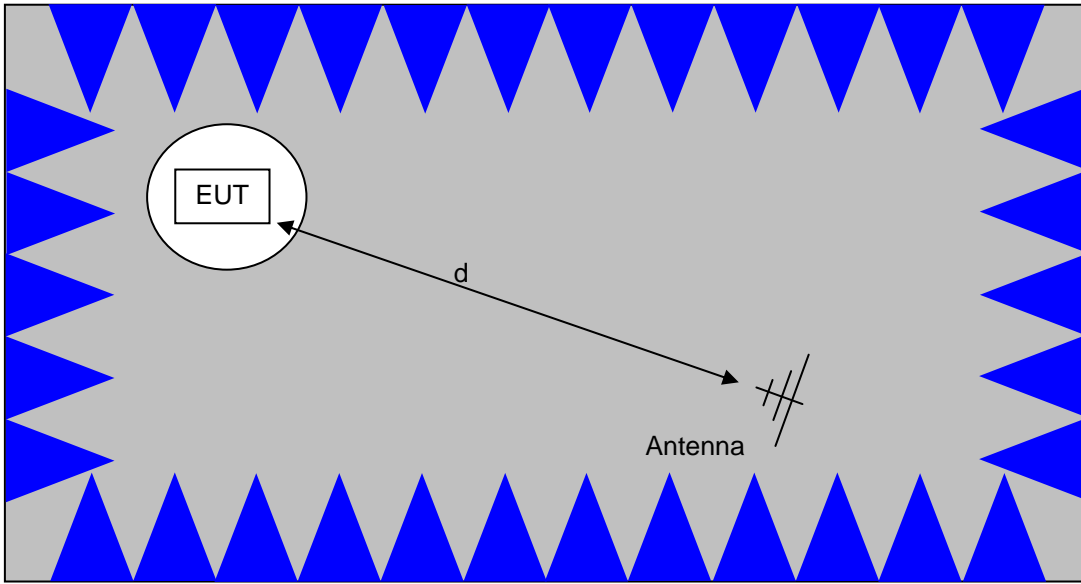
A speaker is provided in the receiver to aid in discriminating between EUT and ambient emissions. Other methods used during the preliminary scan for EUT emissions involve scanning with near field magnetic loops, monitoring I/O cables with RF current clamps, and cycling power to the EUT.

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 (for measurements above 30 MHz, measurements below 30 MHz are made with the loop antenna at a fixed height of 1m). 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.

When testing above 18 GHz, the receive antenna is located at 1meter from the EUT and the antenna height is restricted to a maximum of 2.5 meters.

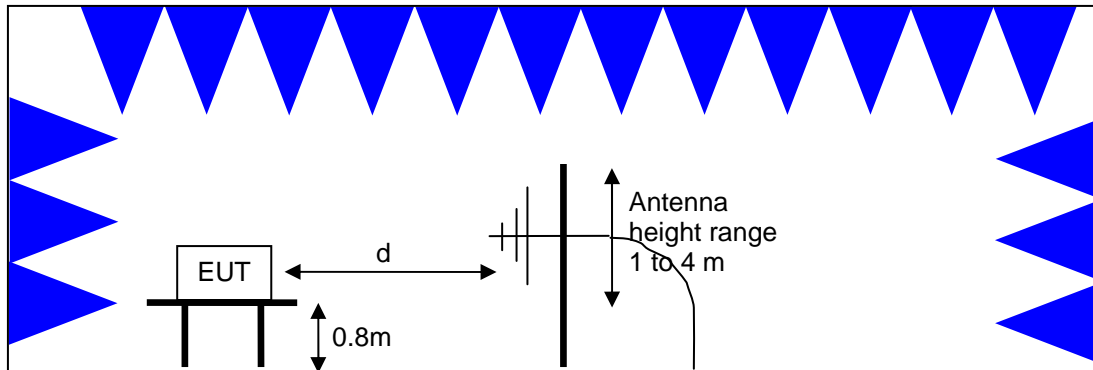


Typical Test Configuration for Radiated Field Strength Measurements



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.

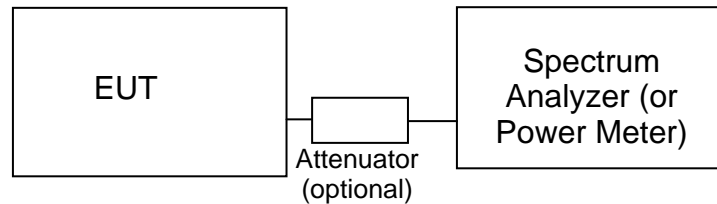


Test Configuration for Radiated Field Strength Measurements  
Semi-Anechoic Chamber, Plan and Side Views



**CONDUCTED EMISSIONS FROM ANTENNA PORT**

Direct measurements of power, bandwidth and power spectral density are performed, where possible, 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 NTS Silicon Valley's test procedures for the type of radio being tested. When power measurements are made using a resolution bandwidth less than the signal bandwidth the power is calculated by summing the power across the signal bandwidth using either the analyzer channel power function or by capturing the trace data and calculating the power using software. In both cases the summed power is corrected to account for the equivalent noise bandwidth (ENBW) of the resolution bandwidth used.

If power averaging is used (typically for certain digital modulation techniques), the EUT is configured to transmit continuously. Power averaging is performed using either the built-in function of the analyzer or, if the analyzer does not feature power averaging, using external software. In both cases the average power is calculated over a number of sweeps (typically 100). When the EUT cannot be configured to continuously transmit then either the analyzer is configured to perform a gated sweep to ensure that the power is averaged over periods that the device is transmitting or power averaging is disabled and a max-hold feature is used.

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.

**BANDWIDTH MEASUREMENTS**

The 6dB, 20dB and/or 26dB signal bandwidth is measured in using the bandwidths recommended by ANSI C63.4. When required, the 99% bandwidth is measured using the methods detailed in RSS GEN.

**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:

**GENERAL TRANSMITTER 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 RSS 210 Annex 9), the limits for all emissions from a low power device operating under the general rules of RSS 310 (tables 3 and 4), RSS 210 (table 2) and FCC Part 15 Subpart C section 15.209.

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

**RECEIVER RADIATED SPURIOUS EMISSIONS SPECIFICATION LIMITS**

The table below shows the limits for the spurious emissions from receivers as detailed in FCC Part 15.109, RSS 210 Table 2, RSS GEN Table 1 and RSS 310 Table 3. Note that receivers operating outside of the frequency range 30 MHz – 960 MHz are exempt from the requirements of 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

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

**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.

The peak excursion envelope is limited to 13dB.

**OUTPUT POWER LIMITS –LELAN 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 (MHz)	Output Power	Power Spectral Density
5150 – 5250	200mW (23 dBm) eirp	10 dBm/MHz eirp
5250 – 5350	250 mW (24 dBm) <sup>2</sup> 1W (30dBm) eirp	11 dBm/MHz
5470 – 5725	250 mW (24 dBm) <sup>3</sup> 1W (30dBm) eirp	11 dBm/MHz
5725 – 5825	1 Watts (30 dBm) 4W eirp	17 dBm/MHz

In addition, the power spectral density limit shall be reduced by 1dB for every dB the highest power spectral density exceeds the “average” power spectral density ) by more than 3dB. The “average” power spectral density is determined by dividing the output power by 10log(EBW) where EBW is the 99% power bandwidth.

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.

<sup>2</sup> If EIRP exceeds 500mW the device must employ TPC

<sup>3</sup> If EIRP exceeds 500mW the device must employ TPC

**SPURIOUS EMISSIONS LIMITS –UNII and LELAN DEVICES**

The spurious emissions limits for signals below 1GHz are the FCC/RSS-GEN general limits. For emissions above 1GHz, signals in restricted bands are subject to the FCC/RSS GEN general limits. All other signals have a limit of –27dBm/MHz, which is a field strength of 68.3dBuV/m/MHz at a distance of 3m. This is an average limit so the peak value of the emission may not exceed –7dBm/MHz (88.3dBuV/m/MHz at a distance of 3m). For devices operating in the 5725-5850Mhz bands under the LELAN/UNII rules, the limit within 10Mhz of the allocated band is increased to –17dBm/MHz.

**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:

$$F_d = 20 * \text{LOG}_{10} (D_m/D_s)$$

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:

$$F_d = 40 * \text{LOG}_{10} (D_m/D_s)$$

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.

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 d (meters) from the equipment under test:

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

where P is the eirp (Watts)

For a measurement at 3m the conversion from a logarithmic value for field strength (dBuV/m) to an eirp power (dBm) is -95.3dB.

**Appendix A Test Equipment Calibration Data**

<u>Manufacturer</u>	<u>Description</u>	<u>Model</u>	<u>Asset #</u>	<u>Cal Due</u>
<b>Radio Antenna Port (Power and Spurious Emissions), 28-Aug-12</b>				
Rohde & Schwarz	EMI Test Receiver, 20 Hz-7 GHz	ESIB7	1538	12/6/2012
EMCO	Antenna, Horn, 1-18 GHz	3115	1561	7/12/2014
<b>Radiated Emissions, 1000 - 40,000 MHz, 05-Sep-12</b>				
EMCO	Antenna, Horn, 1-18 GHz (SA40-Blu)	3115	1386	9/21/2012
Rohde & Schwarz	EMI Test Receiver, 20 Hz-7 GHz	ESIB7	1538	12/6/2012
Micro-Tronics	Band Reject Filter, 5470-5725 MHz	BRC50704-02	1681	8/31/2013
Hewlett Packard	Head (Inc W1-W4, 1742 , 1743)	84125C	1772	5/1/2013
A.H. Systems	Purple System Horn, 18-40GHz	SAS-574, p/n: 2581	2160	4/17/2013
Hewlett Packard	Microwave Preamplifier, 1- 26.5GHz	8449B	2199	2/23/2013
Micro-Tronics	Band Reject Filter, 5150-5350 MHz	BRC50703-02	2251	10/11/2012
Hewlett Packard	SpecAn 9 kHz - 40 GHz, (SA40) Purple	8564E (84125C)	2415	8/10/2013
<b>Radiated Emissions, 1,000 - 26,500 MHz, 06-Sep-12</b>				
Hewlett Packard	Microwave Preamplifier, 1- 26.5GHz	8449B	263	3/29/2013
Hewlett Packard	SpecAn 9 kHz - 40 GHz, FT (SA40) Blue	8564E (84125C)	1393	5/1/2013
EMCO	Antenna, Horn, 1-18 GHz	3115	1561	7/12/2014
Micro-Tronics	Band Reject Filter, 2400-2500 MHz	BRM50702-02	2238	10/4/2012
<b>Radiated Emissions, 1000 - 6,500 MHz, 06-Sep-12</b>				
Rohde & Schwarz	EMI Test Receiver, 20 Hz-7 GHz	ESIB7	1538	12/6/2012
EMCO	Antenna, Horn, 1-18 GHz	3115	1561	7/12/2014
<b>Radiated Emissions, 1000 - 18,000 MHz, 06-Sep-12</b>				
Hewlett Packard	SpecAn 9 KHz-26.5 GHz, Non- Program	8563E	284	1/13/2013
EMCO	Antenna, Horn, 1-18GHz	3115	868	6/19/2014
Hewlett Packard	Microwave Preamplifier, 1- 26.5GHz	8449B	870	2/23/2013
Micro-Tronics	Band Reject Filter, 5725-5875 MHz	BRC50705-02	1682	3/23/2013
Micro-Tronics	Band Reject Filter, 2400-2500 MHz	BRM50702-02	1683	8/2/2013
<b>Radiated Emissions, 30 - 26,500 MHz, 11-Sep-12</b>				
Hewlett Packard	Microwave Preamplifier, 1- 26.5GHz	8449B	263	3/29/2013
EMCO	Antenna, Horn, 1-18GHz	3115	868	6/19/2014
Hewlett Packard	SpecAn 9 kHz - 40 GHz, FT (SA40) Blue	8564E (84125C)	1393	5/1/2013
Rohde & Schwarz	EMI Test Receiver, 20 Hz-7 GHz	ESIB7	1630	5/31/2013
Micro-Tronics	Band Reject Filter, 2400-2500 MHz	BRM50702-02	2238	10/4/2012

<u>Manufacturer</u>	<u>Description</u>	<u>Model</u>	<u>Asset #</u>	<u>Cal Due</u>
<b>Radiated Emissions, 1,000 - 6,500 MHz, 18-Sep-12</b>				
EMCO	Antenna, Horn, 1-18GHz	3115	868	6/19/2014
Rohde & Schwarz	EMI Test Receiver, 20 Hz-7 GHz	ESIB7	1630	5/31/2013
<b>Band edge, 28-Sep-12</b>				
EMCO	Antenna, Horn, 1-18 GHz	3115	487	7/19/2014
Rohde & Schwarz	EMI Test Receiver, 20 Hz-7 GHz	ESIB7	1538	12/6/2012
<b>Radiated Spurious Emissions, 1000 - 6,000 MHz, 18-Oct-12</b>				
EMCO	Antenna, Horn, 1-18 GHz	3115	1142	8/23/2014
	(SA40-Red)			
Rohde & Schwarz	EMI Test Receiver, 20 Hz-7 GHz	ESIB7	1538	12/6/2012
<b>Radiated Spurious Emissions, 1000 - 6,500 MHz, 22-Oct-12</b>				
EMCO	Antenna, Horn, 1-18 GHz	3115	1142	8/23/2014
	(SA40-Red)			
Rohde & Schwarz	EMI Test Receiver, 20 Hz-7 GHz	ESIB7	1630	5/31/2013
<b>Radiated Emissions, 1000 - 6,500 MHz, 23-Oct-12</b>				
EMCO	Antenna, Horn, 1-18 GHz	3115	487	7/19/2014
Rohde & Schwarz	EMI Test Receiver, 20 Hz-40 GHz	ESIB40 (1088.7490.40)	2493	12/9/2012



## *Appendix B Test Data*

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## EMC Test Data

Client:	Broadcom Corporation	Job Number:	J88870
Product:	BRCM943228HM4L (C2PC to add new antenna)	T-Log Number:	T88992
		Account Manager:	Sheareen Jacobs
Contact:	Anne Liang		
Emissions Standard(s):	15.247, 15.E, RSS-210, LP0002	Class:	-
Immunity Standard(s):	-	Environment:	-

# EMC Test Data

For The

## Broadcom Corporation

Product

BRCM943228HM4L (C2PC to add new antenna)

Date of Last Test: 10/23/2012



# EMC Test Data

Client:	Broadcom Corporation	Job Number:	J88870
Model:	BRCM943228HM4L (C2PC to add new antenna)	T-Log Number:	T88992
		Account Manager:	Sheareen Jacobs
Contact:	Anne Liang		
Standard:	15.247, 15.E, RSS-210, LP0002	Class:	N/A

## RSS 210 and FCC 15.407 (UNII) Radiated Spurious Emissions

### Test Specific Details

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

Test Location: FT 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.

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

**Ambient Conditions:**

Temperature:	18-22 °C
Rel. Humidity:	30-40 %

### 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.

### Test Procedure Comments:

Unless otherwise noted, average measurements above 1GHz were performed as documented in FCC KDB 789033 G) 6) d) Method VB



# EMC Test Data

Client:	Broadcom Corporation	Job Number:	J88870
Model:	BRCM943228HM4L (C2PC to add new antenna)	T-Log Number:	T88992
Contact:	Anne Liang	Account Manager:	Sheareen Jacobs
Standard:	15.247, 15.E, RSS-210, LP0002	Class:	N/A

## Summary of Results

Run #	Mode	Channel	Power Setting	Measured Power	Test Performed	Limit	Result / Margin
Run #1	a mode Main	#36 5180MHz	-	-	Restricted Band Edge at 5150 MHz	15.209	47.0 dB $\mu$ V/m @ 5150.0 MHz (-7.0 dB)
	a mode Main	#64 5320MHz	-	-	Restricted Band Edge at 5350 MHz	15.209	45.6 dB $\mu$ V/m @ 5350.1 MHz (-8.4 dB)
Run # 2	HT20 Main+Aux	#36 5180MHz	-	-	Restricted Band Edge at 5150 MHz	15.209	45.6 dB $\mu$ V/m @ 5150.0 MHz (-8.4 dB)
	HT20 Main+Aux	#64 5320MHz	-	-	Restricted Band Edge at 5350 MHz	15.209	50.2 dB $\mu$ V/m @ 5350.2 MHz (-3.8 dB)
	HT20 Main+Aux	#100 5500MHz	-	-	Restricted Band Edge at 5460 MHz	15.209	44.7 dB $\mu$ V/m @ 5420.0 MHz (-9.3 dB)
					Band Edge at 5470 MHz	15 E	66.4 dB $\mu$ V/m @ 5470.0 MHz (-1.9 dB)
Run # 3	HT40 Main+Aux	#38 5190MHz	-	-	Restricted Band Edge at 5150 MHz	15.209	48.6 dB $\mu$ V/m @ 5150.0 MHz (-5.4 dB)
	HT40 Main+Aux	#62 5310MHz	-	-	Restricted Band Edge at 5350 MHz	15.209	47.2 dB $\mu$ V/m @ 5350.0 MHz (-6.8 dB)



# EMC Test Data

Client: Broadcom Corporation	Job Number: J88870
Model: BRCM943228HM4L (C2PC to add new antenna)	T-Log Number: T88992
	Account Manager: Sheareen Jacobs
Contact: Anne Liang	
Standard: 15.247, 15.E, RSS-210, LP0002	Class: N/A

## Run #1, Band Edge Field Strength - 802.11a, Chain Main

### Run #1a, EUT on Channel #36 5180MHz - 802.11a, Chain Main

Date of Test: 9/5/2012

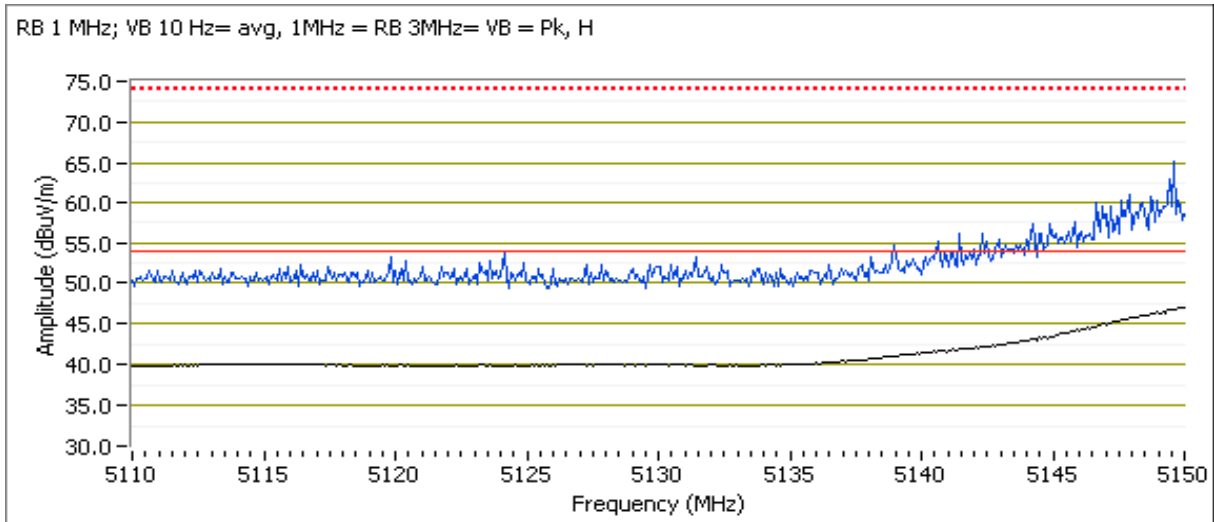
Test Location: FT Chamber#4

Test Engineer: Joseph Cadigal

Config Change: none

### 5150 MHz Band Edge Signal Radiated Field Strength

Frequency MHz	Level dB $\mu$ V/m	Pol v/h	FCC 15.209		Detector Pk/QP/Avg	Azimuth degrees	Height meters	Comments
			Limit	Margin				
5150.000	47.0	H	54.0	-7.0	AVG	0	1.0	POS; RB 1 MHz; VB: 10 Hz
5150.000	61.9	H	74.0	-12.1	PK	0	1.0	POS; RB 1 MHz; VB: 3 MHz
5150.000	45.7	V	54.0	-8.3	AVG	0	1.0	POS; RB 1 MHz; VB: 10 Hz
5149.680	57.1	V	74.0	-16.9	PK	0	1.0	POS; RB 1 MHz; VB: 3 MHz





# EMC Test Data

Client: Broadcom Corporation	Job Number: J88870
Model: BRCM943228HM4L (C2PC to add new antenna)	T-Log Number: T88992
	Account Manager: Sheareen Jacobs
Contact: Anne Liang	
Standard: 15.247, 15.E, RSS-210, LP0002	Class: N/A

## Run #1b, EUT on Channel #64 5320MHz - 802.11a, Chain Main

Date of Test: 9/5/2012

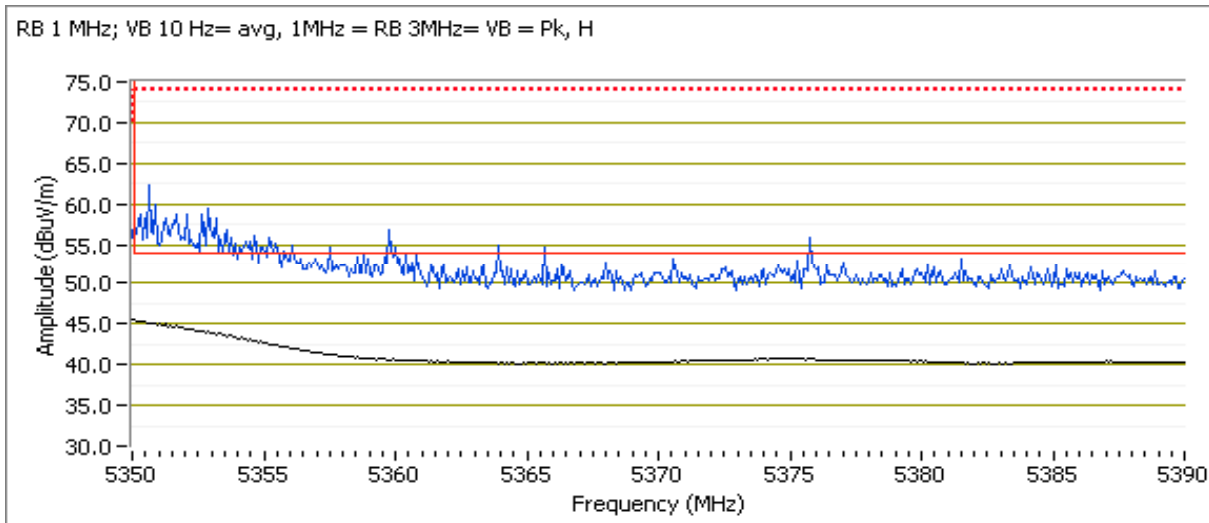
Test Location: FT Chamber#4

Test Engineer: Joseph Cadigal

Config Change: none

### 5350 MHz Band Edge Signal Radiated Field Strength

Frequency MHz	Level dB $\mu$ V/m	Pol v/h	FCC 15.209		Detector Pk/QP/Avg	Azimuth degrees	Height meters	Comments
			Limit	Margin				
5350.080	45.6	H	54.0	-8.4	AVG	0	1.1	POS; RB 1 MHz; VB: 10 Hz
5357.290	56.9	H	74.0	-17.1	PK	0	1.1	POS; RB 1 MHz; VB: 3 MHz
5370.440	39.2	V	54.0	-14.8	AVG	355	1.1	POS; RB 1 MHz; VB: 10 Hz
5371.480	52.5	V	74.0	-21.5	PK	355	1.1	POS; RB 1 MHz; VB: 3 MHz





# EMC Test Data

Client: Broadcom Corporation	Job Number: J88870
Model: BRCM943228HM4L (C2PC to add new antenna)	T-Log Number: T88992
	Account Manager: Sheareen Jacobs
Contact: Anne Liang	
Standard: 15.247, 15.E, RSS-210, LP0002	Class: N/A

## Run # 2, Band Edge Field Strength - HT20, Chain Main+Aux

### Run # 2a, EUT on Channel #36 5180MHz - HT20, Chain Main+Aux

Date of Test: 9/11/2012

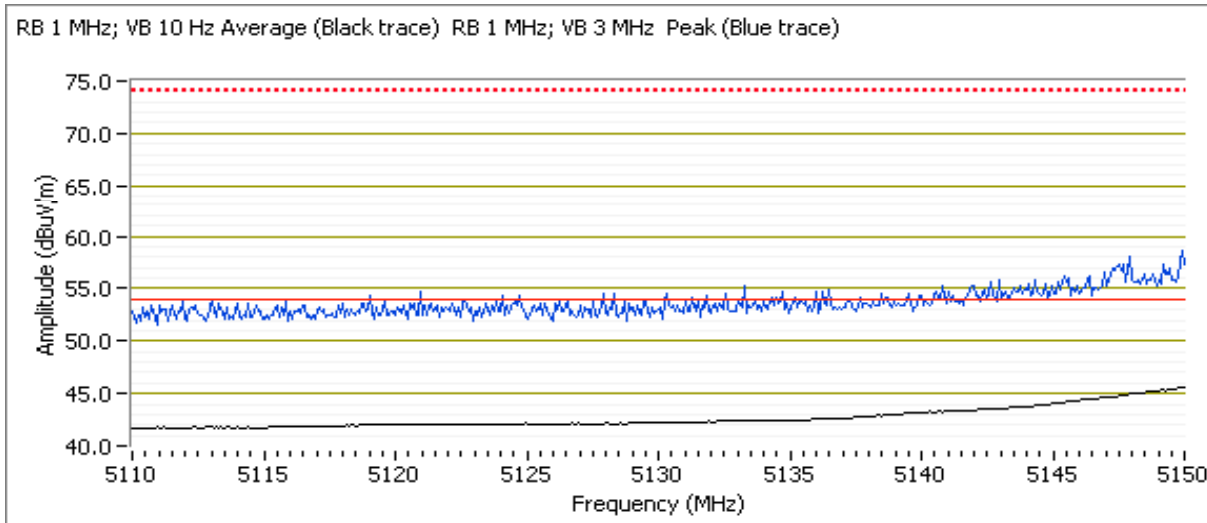
Test Location: FT Chamber#3

Test Engineer: M. Birgani

Config Change: None

### 5150 MHz Band Edge Signal Radiated Field Strength

Frequency MHz	Level dB $\mu$ V/m	Pol v/h	FCC 15.209		Detector Pk/QP/Avg	Azimuth degrees	Height meters	Comments
			Limit	Margin				
5150.000	45.6	V	54.0	-8.4	AVG	273	1.0	POS; RB 1 MHz; VB: 10 Hz
5139.420	41.6	H	54.0	-12.4	AVG	148	1.0	POS; RB 1 MHz; VB: 10 Hz
5149.920	61.0	V	74.0	-13.0	PK	273	1.0	POS; RB 1 MHz; VB: 3 MHz
5128.440	54.6	H	74.0	-19.4	PK	148	1.0	POS; RB 1 MHz; VB: 3 MHz





# EMC Test Data

Client: Broadcom Corporation	Job Number: J88870
Model: BRCM943228HM4L (C2PC to add new antenna)	T-Log Number: T88992
	Account Manager: Sheareen Jacobs
Contact: Anne Liang	
Standard: 15.247, 15.E, RSS-210, LP0002	Class: N/A

**Run # 2b, EUT on Channel #64 5320MHz - HT20, Chain Main+Aux**

Date of Test: 9/11/2012

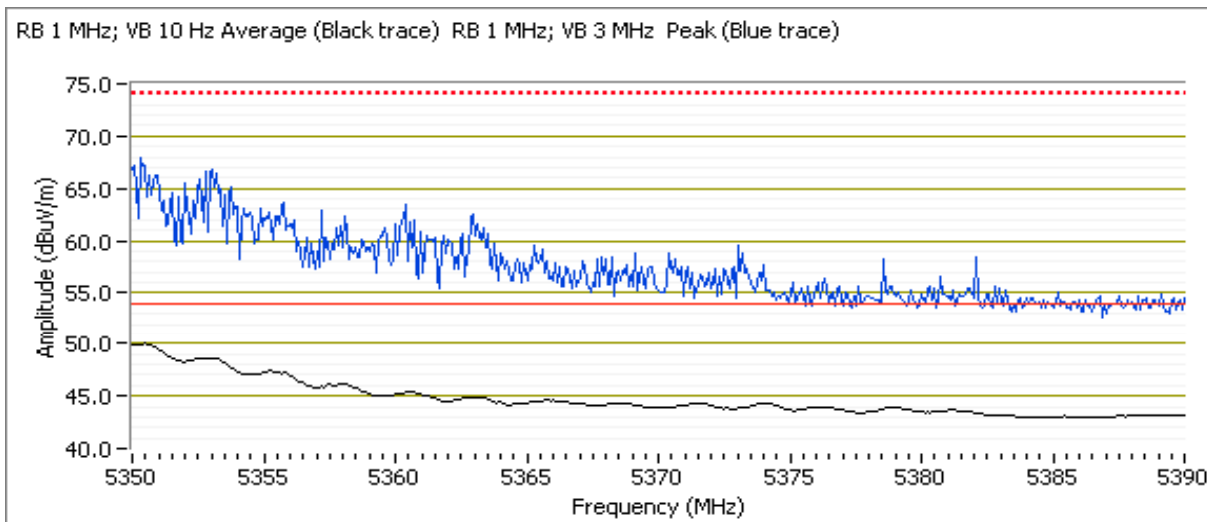
Test Location: FT Chamber#3

Test Engineer: M. Birgani

Config Change: None

**5350 MHz Band Edge Signal Radiated Field Strength**

Frequency	Level	Pol	FCC 15.209		Detector	Azimuth	Height	Comments
MHz	dB $\mu$ V/m	v/h	Limit	Margin	PK/QP/Avg	degrees	meters	
5350.240	50.2	V	54.0	-3.8	AVG	59	1.0	POS; RB 1 MHz; VB: 10 Hz
5353.290	69.0	V	74.0	-5.0	PK	59	1.0	POS; RB 1 MHz; VB: 3 MHz







# EMC Test Data

Client:	Broadcom Corporation	Job Number:	J88870
Model:	BRCM943228HM4L (C2PC to add new antenna)	T-Log Number:	T88992
Contact:	Anne Liang	Account Manager:	Sheareen Jacobs
Standard:	15.247, 15.E, RSS-210, LP0002	Class:	N/A

Run # 2c, EUT on Channel #100 5500MHz - HT20, Chain Main+Aux

Date of Test: 9/11/2012

Test Location: FT Chamber#3

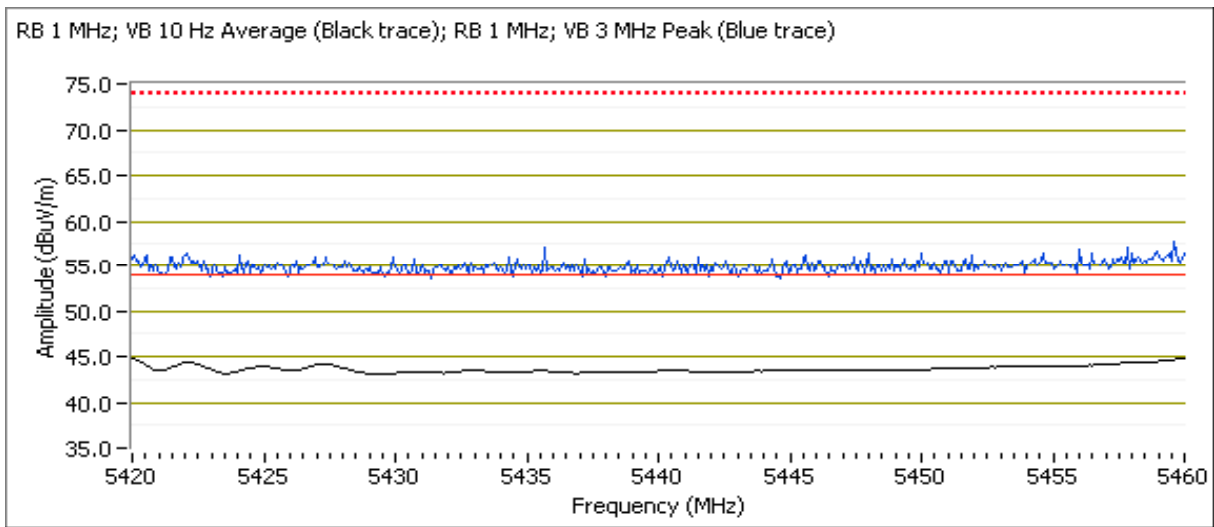
Test Engineer: M. Birgani

Config Change: None

### 5460 MHz Band Edge Radiated Field Strength

Frequency MHz	Level dB $\mu$ V/m	Pol v/h	15.209		Detector Pk/QP/Avg	Azimuth degrees	Height meters	Comments
			Limit	Margin				
5420.000	44.7	V	54.0	-9.3	AVG	13	1.1	POS; RB 1 MHz; VB: 10 Hz
5455.030	57.1	V	74.0	-16.9	PK	13	1.1	POS; RB 1 MHz; VB: 3 MHz

For emissions in the restricted band immediately below 5460MHz the 15.209/RSS GEN limits apply.

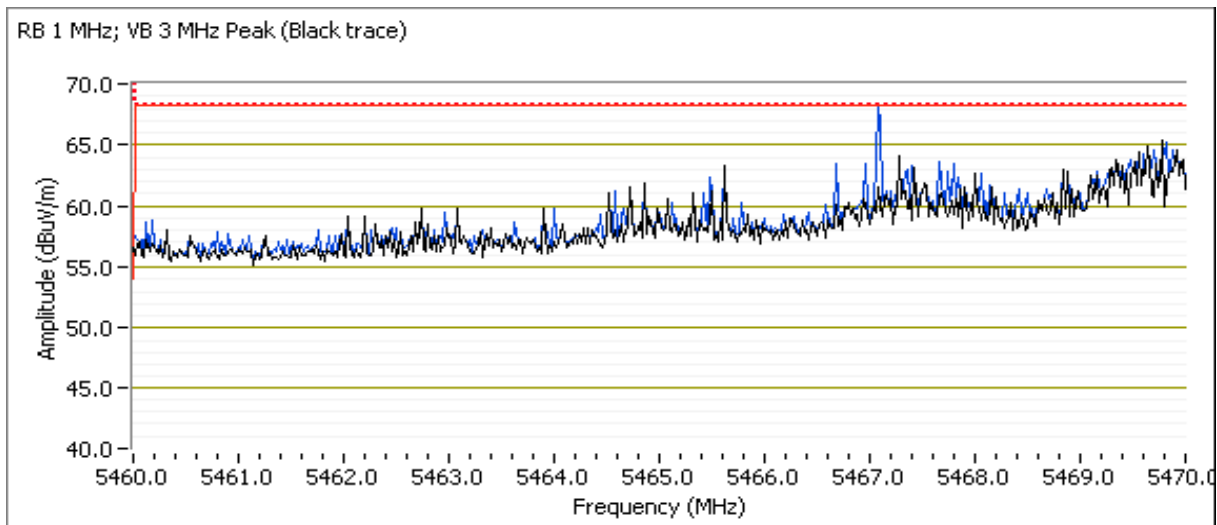


Client: Broadcom Corporation	Job Number: J88870
Model: BRCM943228HM4L (C2PC to add new antenna)	T-Log Number: T88992
	Account Manager: Sheareen Jacobs
Contact: Anne Liang	
Standard: 15.247, 15.E, RSS-210, LP0002	Class: N/A

### 5460 - 5470 MHz Band Edge Radiated Field Strength

Frequency	Level	Pol	15 E		Detector	Azimuth	Height	Comments
MHz	dB $\mu$ V/m	v/h	Limit	Margin	PK/QP/Avg	degrees	meters	
5469.980	66.4	V	68.3	-1.9	PK	13	1.1	POS; RB 1 MHz; VB: 3 MHz

Note: For emissions outside of the restricted bands the limit is -27dBm/MHz eirp (68.3dBuV/m). The measurement method required is a peak measurement (RB=1MHz, VB $\geq$ 3MHz, peak detector).





# EMC Test Data

Client: Broadcom Corporation	Job Number: J88870
Model: BRCM943228HM4L (C2PC to add new antenna)	T-Log Number: T88992
	Account Manager: Sheareen Jacobs
Contact: Anne Liang	
Standard: 15.247, 15.E, RSS-210, LP0002	Class: N/A

## Run # 3, Band Edge Field Strength - HT40, Chain Main+Aux

### Run # 3a, EUT on Channel #38 5190MHz - HT40, Chain Main+Aux

Date of Test: 9/19/2012

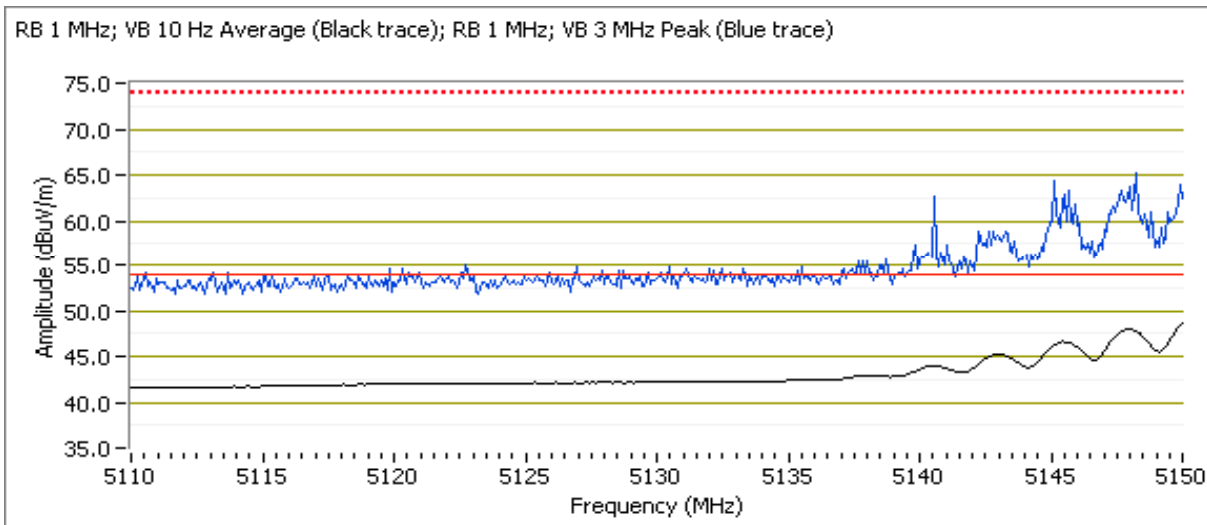
Test Location: FT Chamber#3

Test Engineer: M. Birgani

Config Change: None

### 5150 MHz Band Edge Signal Radiated Field Strength

Frequency MHz	Level dB $\mu$ V/m	Pol v/h	FCC 15.209		Detector PK/QP/Avg	Azimuth degrees	Height meters	Comments
			Limit	Margin				
5150.000	48.6	V	54.0	-5.4	AVG	360	1.1	POS; RB 1 MHz; VB: 10 Hz
5148.240	64.4	V	74.0	-9.6	PK	360	1.1	POS; RB 1 MHz; VB: 3 MHz





# EMC Test Data

Client: Broadcom Corporation	Job Number: J88870
Model: BRCM943228HM4L (C2PC to add new antenna)	T-Log Number: T88992
	Account Manager: Sheareen Jacobs
Contact: Anne Liang	
Standard: 15.247, 15.E, RSS-210, LP0002	Class: N/A

**Run # 3b, EUT on Channel #62 5310MHz - HT40, Chain Main+Aux**

Date of Test: 9/18/2012

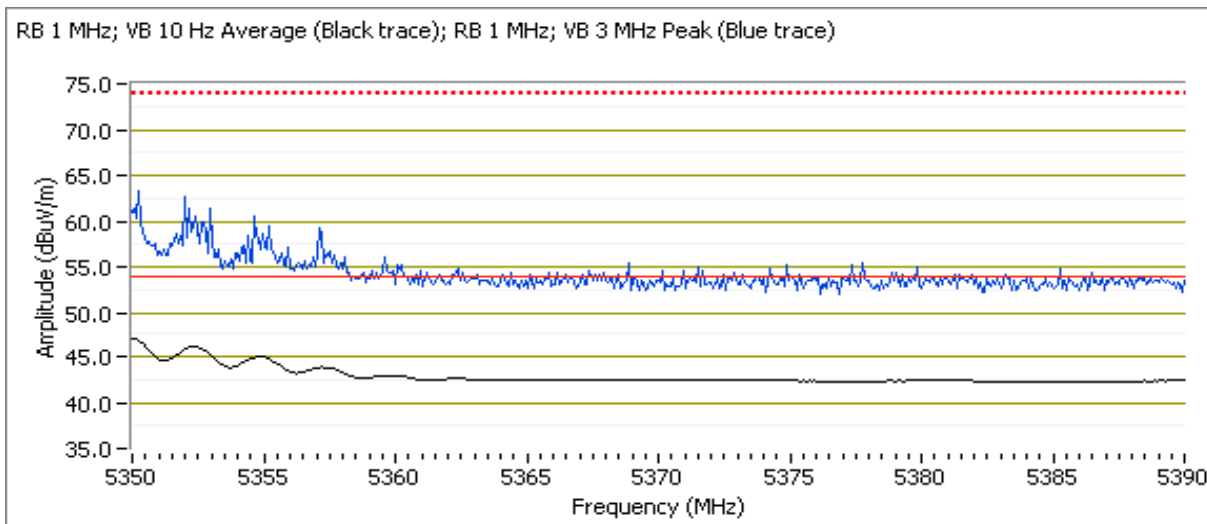
Test Location: FT Chamber#3

Test Engineer: M. Birgani

Config Change: None

**5350 MHz Band Edge Signal Radiated Field Strength**

Frequency MHz	Level dB $\mu$ V/m	Pol v/h	FCC 15.209		Detector Pk/QP/Avg	Azimuth degrees	Height meters	Comments
			Limit	Margin				
5350.000	47.2	V	54.0	-6.8	AVG	162	1.1	POS; RB 1 MHz; VB: 10 Hz
5351.920	63.8	V	74.0	-10.2	PK	162	1.1	POS; RB 1 MHz; VB: 3 MHz





# EMC Test Data

Client: Broadcom Corporation	Job Number: J88870
Model: BRCM943228HM4L (C2PC to add new antenna)	T-Log Number: T88992
	Account Manager: Sheareen Jacobs
Contact: Anne Liang	
Standard: 15.247, 15.E, RSS-210, LP0002	Class: N/A

## RSS 210 and FCC 15.407 (UNII) Radiated Spurious Emissions

### Test Specific Details

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: 10/18/2012 & 10/22/12  
 Test Engineer: John Caizzi

Test Location: FT Ch#4 & CH#3  
 Config Change: See individual runs

### General Test Configuration

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

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

**Ambient Conditions:** Temperature: 23 °C  
 Rel. Humidity: 33 %

### 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.

### Test Procedure Comments:

Unless otherwise noted, average measurements above 1GHz were performed as documented in FCC KDB 789033 G) 6) d) Method VB

### Summary of Results

Run #	Mode	Channel	Power Setting	Measured Power	Test Performed	Limit	Result / Margin
1	a mode Main	#100 5500MHz	-	-	Band Edge at 5470 MHz	15 E	49.9 dBµV/m @ 5470.0 MHz (-4.1 dB)
		#140 5700MHz	-	-	Band Edge at 5725 MHz		54.0 dBµV/m @ 5725.1 MHz (0.0 dB)
2	HT40 Main+Aux	#140 5700MHz	-	-	Band Edge at 5725 MHz		54.0 dBµV/m @ 5725.0 MHz (0.0 dB)
3	HT40 Main+Aux	#102 5510MHz	-	-	Band Edge at 5470 MHz		53.1 dBµV/m @ 5470.0 MHz (-0.9 dB)
		#134 5670MHz	-	-	Band Edge at 5725 MHz		53.1 dBµV/m @ 5726.2 MHz (-0.9 dB)



# EMC Test Data

Client: Broadcom Corporation	Job Number: J88870
Model: BRCM943228HM4L (C2PC to add new antenna)	T-Log Number: T88992
	Account Manager: Sheareen Jacobs
Contact: Anne Liang	
Standard: 15.247, 15.E, RSS-210, LP0002	Class: N/A

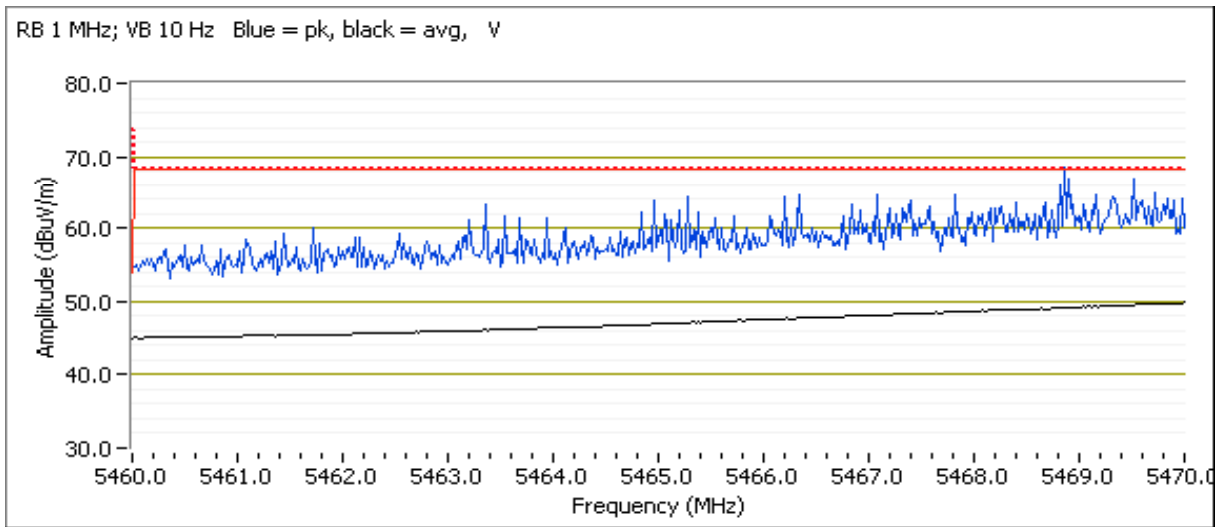
Run #1, Band Edge Field Strength - 802.11a, Chain Main

Run #1a, EUT on Channel #100 5500MHz - 802.11a, Chain Main

### 5460 - 5470 MHz Band Edge Radiated Field Strength

Frequency MHz	Level dB $\mu$ V/m	Pol v/h	15 E		Detector PK/QP/Avg	Azimuth degrees	Height meters	Comments
			Limit	Margin				
5470.000	49.9	V	54.0	-4.1	AVG	259	1.40	RB 1 MHz;VB 10 Hz;Peak
5469.700	68.4	V	74.0	-5.6	PK	259	1.40	RB 1 MHz;VB 3 MHz;Peak

Note: For emissions outside of the restricted bands the limit is -27dBm/MHz eirp (68.3dBuV/m). The measurement method required is a peak measurement (RB=1MHz, VB $\geq$ 3MHz, peak detector). Per KDB 789033, emissions in non-restricted bands that comply with the restricted band limits, comply with the requirement.





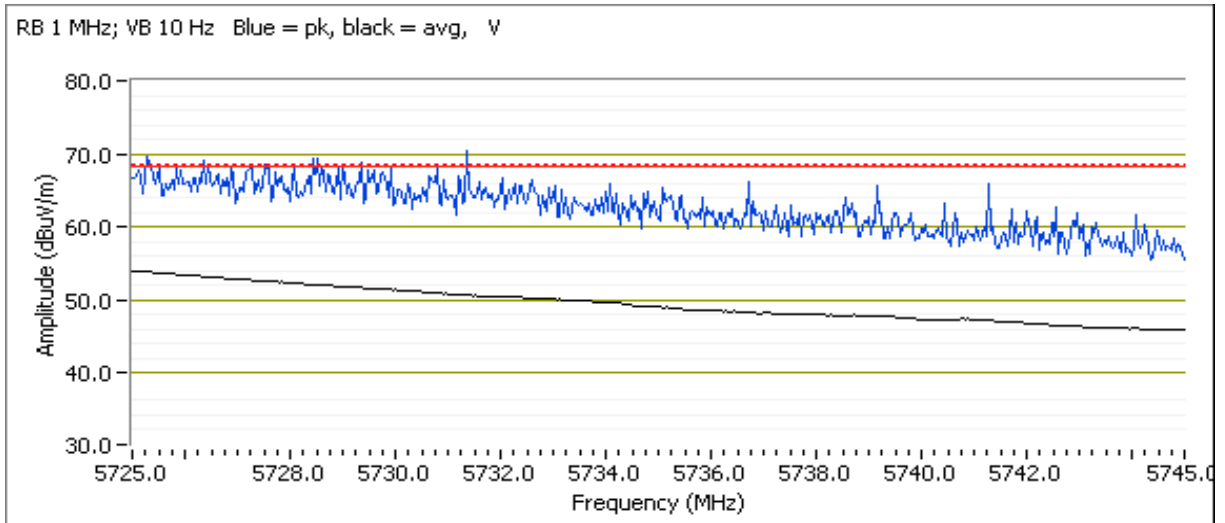
# EMC Test Data

Client: Broadcom Corporation	Job Number: J88870
Model: BRCM943228HM4L (C2PC to add new antenna)	T-Log Number: T88992
	Account Manager: Sheareen Jacobs
Contact: Anne Liang	
Standard: 15.247, 15.E, RSS-210, LP0002	Class: N/A

Run #1b, EUT on Channel #140 5700MHz - 802.11a, Chain Main

### 5725 MHz Band Edge Radiated Field Strength

Frequency	Level	Pol	15 E		Detector	Azimuth	Height	Comments
MHz	dB $\mu$ V/m	v/h	Limit	Margin	PK/QP/Avg	degrees	meters	
5725.080	54.0	V	54.0	0.0	AVG	161	1.34	RB 1 MHz;VB 10 Hz;Peak
5727.400	68.9	V	74.0	-5.1	PK	161	1.34	RB 1 MHz;VB 3 MHz;Peak





# EMC Test Data

Client: Broadcom Corporation	Job Number: J88870
Model: BRCM943228HM4L (C2PC to add new antenna)	T-Log Number: T88992
	Account Manager: Sheareen Jacobs
Contact: Anne Liang	
Standard: 15.247, 15.E, RSS-210, LP0002	Class: N/A

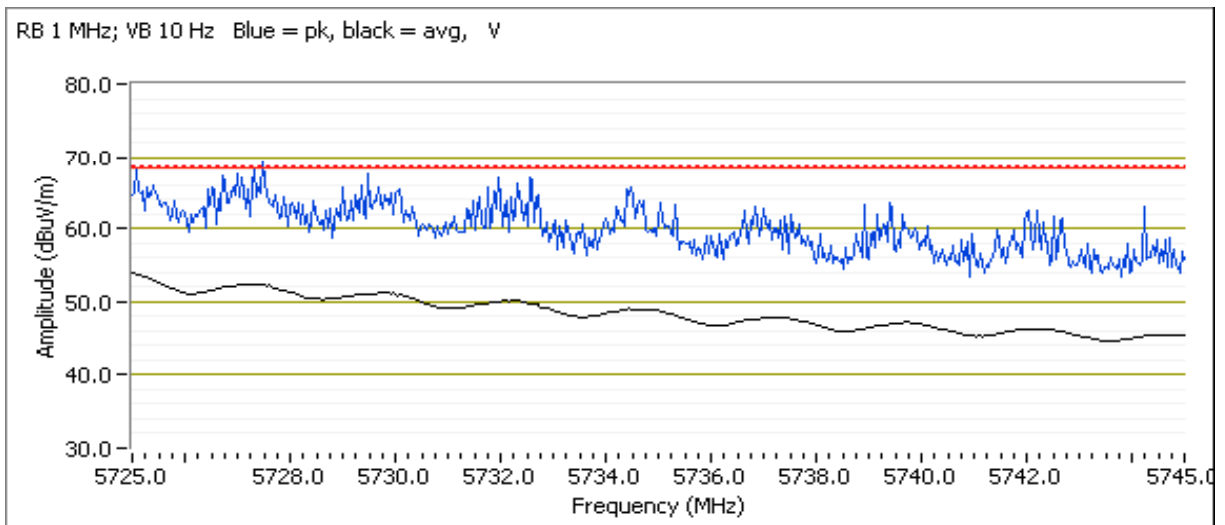
## Run # 2, Band Edge Field Strength - HT20, Chain Main+Aux

Date of Test: 10/22/2012  
 Test Engineer: John Caizzi  
 Test Location: FT Ch#3

## Run # 2b, EUT @ 5700MHz - HT20

### 5725 MHz Band Edge Radiated Field Strength

Frequency MHz	Level dB $\mu$ V/m	Pol v/h	15 E		Detector Pk/QP/Avg	Azimuth degrees	Height meters	Comments
			Limit	Margin				
5725.000	54.0	V	54.0	0.0	AVG	55	1.39	RB 1 MHz;VB 10 Hz;Peak
5727.400	68.5	V	74.0	-5.5	PK	55	1.39	RB 1 MHz;VB 3 MHz;Peak







# EMC Test Data

Client: Broadcom Corporation	Job Number: J88870
Model: BRCM943228HM4L (C2PC to add new antenna)	T-Log Number: T88992
	Account Manager: Sheareen Jacobs
Contact: Anne Liang	
Standard: 15.247, 15.E, RSS-210, LP0002	Class: N/A

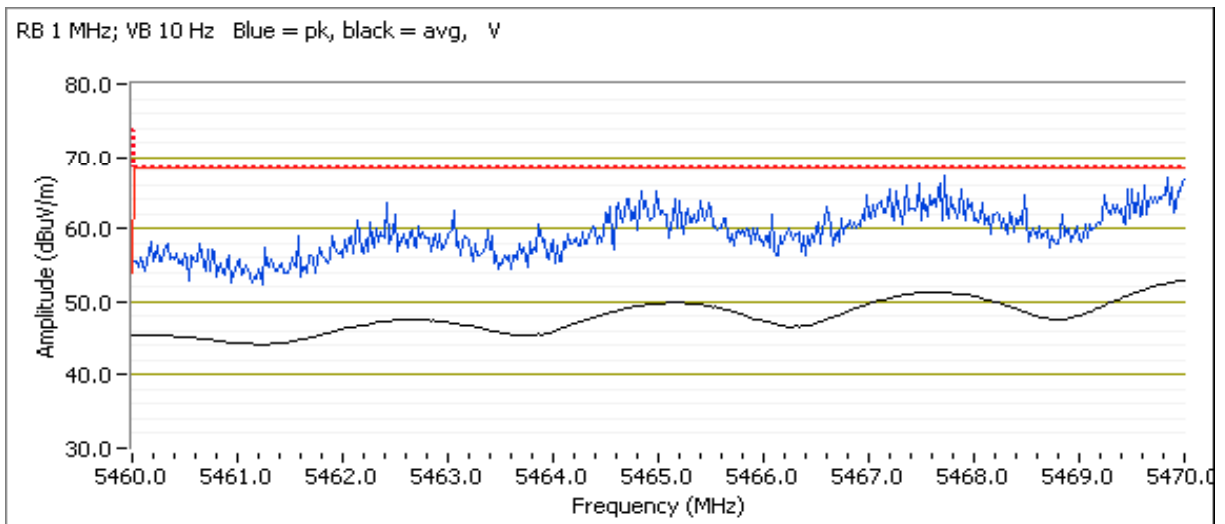
## Run # 3, Band Edge Field Strength - HT40, Chain Main+Aux

Date of Test: 10/22/2012  
 Test Engineer: John Caizzi  
 Test Location: FT Ch#3

## Run # 3a, EUT @ 5510MHz

### 5460 - 5470 MHz Band Edge Radiated Field Strength

Frequency MHz	Level dB $\mu$ V/m	Pol v/h	15 E		Detector PK/QP/Avg	Azimuth degrees	Height meters	Comments
			Limit	Margin				
5470.000	53.1	V	54.0	-0.9	AVG	21	1.25	RB 1 MHz;VB 10 Hz;Peak
5469.780	70.1	V	74.0	-3.9	PK	21	1.25	RB 1 MHz;VB 3 MHz;Peak





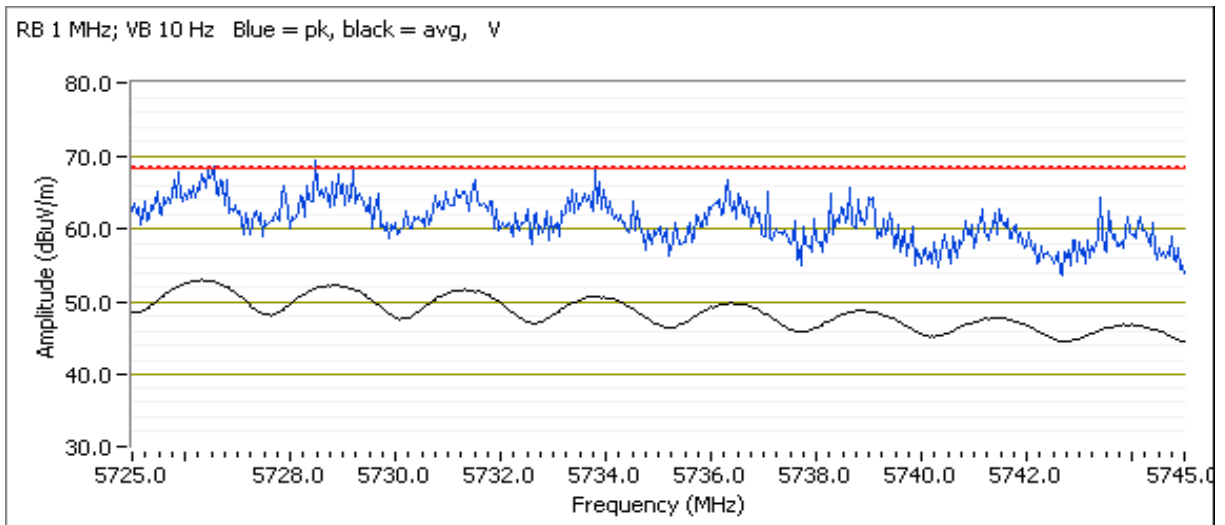
# EMC Test Data

Client: Broadcom Corporation	Job Number: J88870
Model: BRCM943228HM4L (C2PC to add new antenna)	T-Log Number: T88992
	Account Manager: Sheareen Jacobs
Contact: Anne Liang	
Standard: 15.247, 15.E, RSS-210, LP0002	Class: N/A

Run # 3b, EUT on Channel #134 5670MHz - HT40, Chain Main+Aux

### 5725 MHz Band Edge Radiated Field Strength

Frequency MHz	Level dB $\mu$ V/m	Pol v/h	15 E		Detector PK/QP/Avg	Azimuth degrees	Height meters	Comments
			Limit	Margin				
5726.200	53.1	V	54.0	-0.9	AVG	66	1.42	RB 1 MHz;VB 10 Hz;Peak
5731.250	68.5	V	74.0	-5.5	PK	66	1.42	RB 1 MHz;VB 3 MHz;Peak





# EMC Test Data

Client:	Broadcom Corporation	Job Number:	J88870
Model:	BRCM943228HM4L (C2PC to add new antenna)	T-Log Number:	T88992
Contact:	Anne Liang	Account Manager:	Sheareen Jacobs
Standard:	15.247, 15.E, RSS-210, LP0002	Class:	N/A

## RSS 210 and FCC 15.407 (UNII) Radiated Spurious Emissions

### Test Specific Details

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

Test Location: FT 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.

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

### Ambient Conditions:

Temperature: 22.4 °C  
Rel. Humidity: 36 %

### Summary of Results

Run #	Mode	Channel	Power Setting	Measured Power	Test Performed	Limit	Result / Margin
Run #1	802.11a Chain Main	#36 5180MHz	-	-	Radiated Emissions, 1 - 40 GHz	FCC 15.209 / 15 E	59.1 dBµV/m @ 2495.8 MHz (-14.9 dB)
		#40 5200MHz	-	-			59.0 dBµV/m @ 2492.3 MHz (-15.0 dB)
		#48 5240MHz	-	-			58.0 dBµV/m @ 2490.1 MHz (-16.0 dB)
Run #1	802.11a Chain Main	#52 5260MHz	-	-	Radiated Emissions, 1 - 40 GHz	FCC 15.209 / 15 E	65.1 dBµV/m @ 10523.2 MHz (-3.2 dB)
		#60 5300MHz	-	-			46.5 dBµV/m @ 10600.0 MHz (-7.5 dB)
		#64 5320MHz	-	-			46.2 dBµV/m @ 10640.0 MHz (-7.8 dB)
Run #1	802.11a Chain Main	#100 5500MHz	-	-	Radiated Emissions, 1 - 40 GHz	FCC 15.209 / 15 E	43.6 dBµV/m @ 11000.8 MHz (-10.4 dB)
		#116 5580MHz	-	-			45.7 dBµV/m @ 11161.0 MHz (-8.3 dB)
		#140 5700MHz	-	-			44.9 dBµV/m @ 11400.4 MHz (-9.1 dB)



# EMC Test Data

Client:	Broadcom Corporation	Job Number:	J88870
Model:	BRCM943228HM4L (C2PC to add new antenna)	T-Log Number:	T88992
		Account Manager:	Sheareen Jacobs
Contact:	Anne Liang		
Standard:	15.247, 15.E, RSS-210, LP0002	Class:	N/A

### 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.

### Test Procedure Comments:

Unless otherwise noted, average measurements above 1GHz were performed as documented in FCC KDB 789033 G) 6) d) Method VB



# EMC Test Data

Client: Broadcom Corporation	Job Number: J88870
Model: BRCM943228HM4L (C2PC to add new antenna)	T-Log Number: T88992
	Account Manager: Sheareen Jacobs
Contact: Anne Liang	
Standard: 15.247, 15.E, RSS-210, LP0002	Class: N/A

**Run #1, Radiated Spurious Emissions, 1-40GHz, 802.11a, Chain Main**  
 Date of Test: 9/4/2012 Test Location: FT Chamber #4  
 Test Engineer: Rafael Varelas Config Change: none

For emissions in restricted bands, the limit of 15.209 was used. For all other emissions, the limit is -27dBm eirp (68.3dBuV/m @3m). As the power measured is average power this is considered an average limit so the peak limit would be 88.3dBuV/m at 3m.

**Run #1a: EUT on Channel #36 5180MHz - 802.11a, Chain Main**

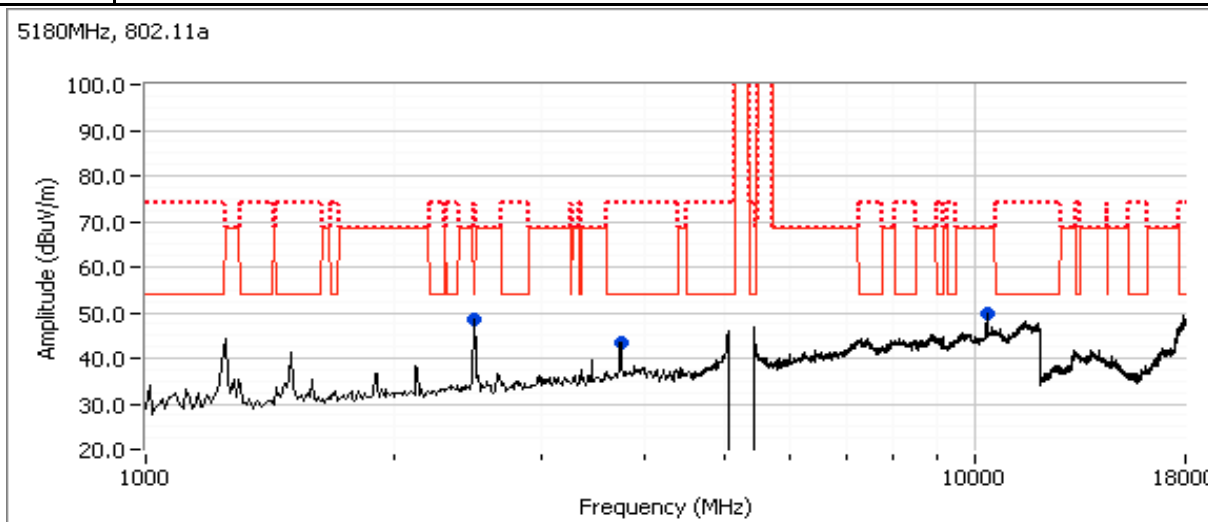
	Target (dBm)	Power Settings Measured (dBm)	Software Setting
Chain Main			q52

**Spurious Radiated Emissions:**

Frequency MHz	Level dBuV/m	Pol v/h	15.209 / 15E		Detector Pk/QP/Avg	Azimuth degrees	Height meters	Comments
			Limit	Margin				
2495.820	59.1	V	74.0	-14.9	PK	30	0.9	RB 1 MHz;VB 3 MHz;Peak
2497.250	35.2	V	54.0	-18.8	AVG	30	0.9	RB 1 MHz;VB 10 Hz;Peak
3743.400	31.6	H	54.0	-22.4	AVG	269	1.0	RB 1 MHz;VB 10 Hz;Peak
3745.330	47.0	H	74.0	-27.0	PK	269	1.0	RB 1 MHz;VB 3 MHz;Peak
10361.130	50.0	V	68.3	-18.3	Peak	100	1.3	

Note 1: For emissions in restricted bands, the limit of 15.209 was used which requires average and peak measurements.

Note 2: For emissions outside of the restricted bands the limit is -27dBm/MHz eirp (68.3dBuV/m). The measurement method required is the same measurement method used to determine the in-band power spectral density or a peak measurement (RB=1MHz, VB>1MHz).



Client:	Broadcom Corporation	Job Number:	J88870
Model:	BRCM943228HM4L (C2PC to add new antenna)	T-Log Number:	T88992
Contact:	Anne Liang	Account Manager:	Sheareen Jacobs
Standard:	15.247, 15.E, RSS-210, LP0002	Class:	N/A

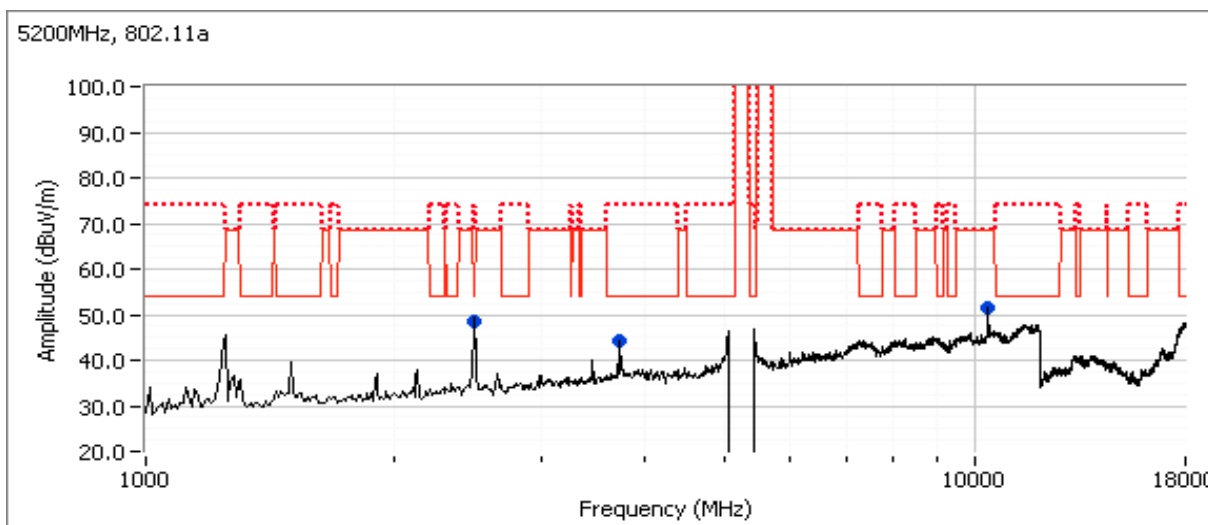
**Run #1b: EUT on Channel #40 5200MHz - 802.11a, Chain Main**

	Target (dBm)	Power Settings Measured (dBm)	Software Setting
Chain Main			q53

**Spurious Radiated Emissions:**

Frequency	Level	Pol	15.209 / 15E		Detector	Azimuth	Height	Comments
MHz	dB $\mu$ V/m	v/h	Limit	Margin	PK/QP/Avg	degrees	meters	
2492.290	59.0	V	74.0	-15.0	PK	29	0.9	1Hz;VB 3 MHz;Peak
2497.150	35.3	V	54.0	-18.7	AVG	29	0.9	1Hz;VB 10 Hz;Peak
3741.760	32.6	V	54.0	-21.4	AVG	184	1.0	1Hz;VB 10 Hz;Peak
3742.790	52.8	V	74.0	-21.2	PK	184	1.0	1Hz;VB 3 MHz;Peak
10400.000	51.5	V	68.3	-16.8	Peak	189	1.0	

- Note 1: For emissions in restricted bands, the limit of 15.209 was used which requires average and peak measurements.
- Note 2: For emissions outside of the restricted bands the limit is -27dBm/MHz eirp (68.3dBuV/m). The measurement method required is the same measurement method used to determine the in-band power spectral density or a peak measurement (RB=1MHz, VB>1MHz).
- Note 3: Scans made between 18 - 40GHz with the measurement antenna moved around the card and its antennas 20-50cm from the device indicated there were no significant emissions in this frequency range





# EMC Test Data

Client: Broadcom Corporation	Job Number: J88870
Model: BRCM943228HM4L (C2PC to add new antenna)	T-Log Number: T88992
	Account Manager: Sheareen Jacobs
Contact: Anne Liang	
Standard: 15.247, 15.E, RSS-210, LP0002	Class: N/A

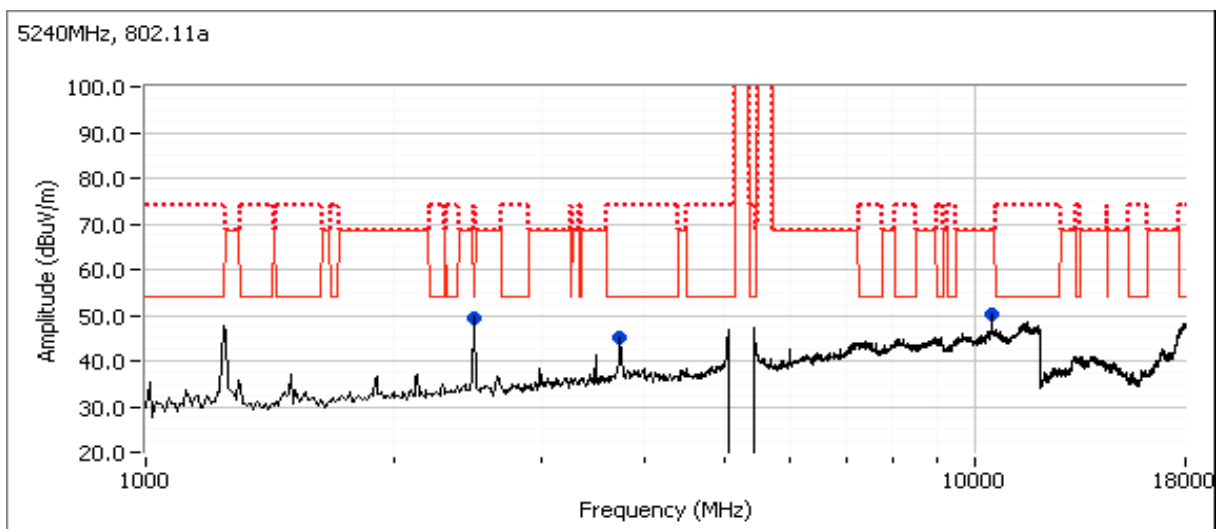
### Run #1c: EUT on Channel #48 5240MHz - 802.11a, Chain Main

	Target (dBm)	Power Settings Measured (dBm)	Software Setting
Chain Main			q54

### Spurious Radiated Emissions:

Frequency MHz	Level dB $\mu$ V/m	Pol v/h	15.209 / 15E		Detector PK/QP/Avg	Azimuth degrees	Height meters	Comments
			Limit	Margin				
2490.130	58.0	V	74.0	-16.0	PK	166	1.0	RB 1 MHz;VB 3 MHz;Peak
2489.920	37.6	V	54.0	-16.4	AVG	166	1.0	RB 1 MHz;VB 10 Hz;Peak
3732.430	32.2	V	54.0	-21.8	AVG	189	1.0	RB 1 MHz;VB 10 Hz;Peak
3734.250	51.2	V	74.0	-22.8	PK	189	1.0	RB 1 MHz;VB 3 MHz;Peak
10480.790	50.3	V	68.3	-18.0	Peak	10	1.0	

- Note 1: For emissions in restricted bands, the limit of 15.209 was used which requires average and peak measurements.
- Note 2: For emissions outside of the restricted bands the limit is -27dBm/MHz eirp (68.3dBuV/m). The measurement method required is the same measurement method used to determine the in-band power spectral density or a peak measurement (RB=1MHz, VB>1MHz).





# EMC Test Data

Client: Broadcom Corporation	Job Number: J88870
Model: BRCM943228HM4L (C2PC to add new antenna)	T-Log Number: T88992
	Account Manager: Sheareen Jacobs
Contact: Anne Liang	
Standard: 15.247, 15.E, RSS-210, LP0002	Class: N/A

**Run #1d: EUT on Channel #52 5260MHz - 802.11a, Chain Main**

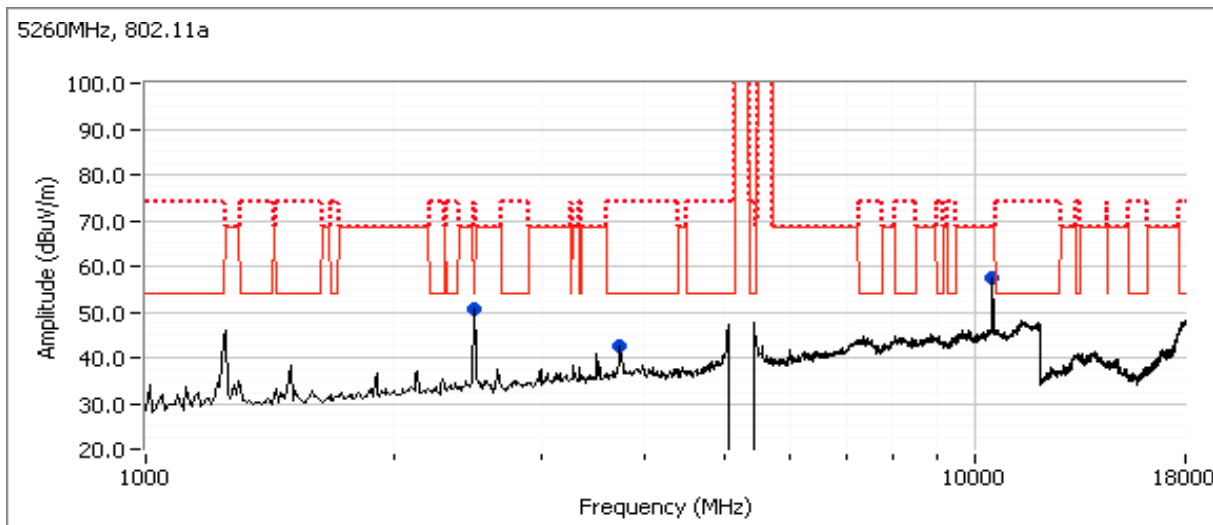
	Target (dBm)	Power Settings Measured (dBm)	Software Setting
Chain Main			q71

**Spurious Radiated Emissions:**

Frequency MHz	Level dB $\mu$ V/m	Pol v/h	15.209 / 15E		Detector PK/QP/Avg	Azimuth degrees	Height meters	Comments
			Limit	Margin				
10523.210	65.1	V	68.3	-3.2	PK	360	1.5	RB 1 MHz;VB 1 MHz;Peak
3742.510	31.8	H	54.0	-22.2	AVG	80	1.0	RB 1 MHz;VB 10 Hz;Peak
3743.460	51.6	H	74.0	-22.4	PK	80	1.0	RB 1 MHz;VB 3 MHz;Peak
2496.710	35.0	V	54.0	-19.0	AVG	35	0.9	RB 1 MHz;VB 10 Hz;Peak
2498.810	58.7	V	74.0	-15.3	PK	35	0.9	RB 1 MHz;VB 3 MHz;Peak

Note 1: For emissions in restricted bands, the limit of 15.209 was used which requires average and peak measurements.

Note 2: For emissions outside of the restricted bands the limit is -27dBm/MHz eirp (68.3dBuV/m). The measurement method required is the same measurement method used to determine the in-band power spectral density or a peak measurement (RB=1MHz, VB>1MHz).







# EMC Test Data

Client: Broadcom Corporation	Job Number: J88870
Model: BRCM943228HM4L (C2PC to add new antenna)	T-Log Number: T88992
	Account Manager: Sheareen Jacobs
Contact: Anne Liang	
Standard: 15.247, 15.E, RSS-210, LP0002	Class: N/A

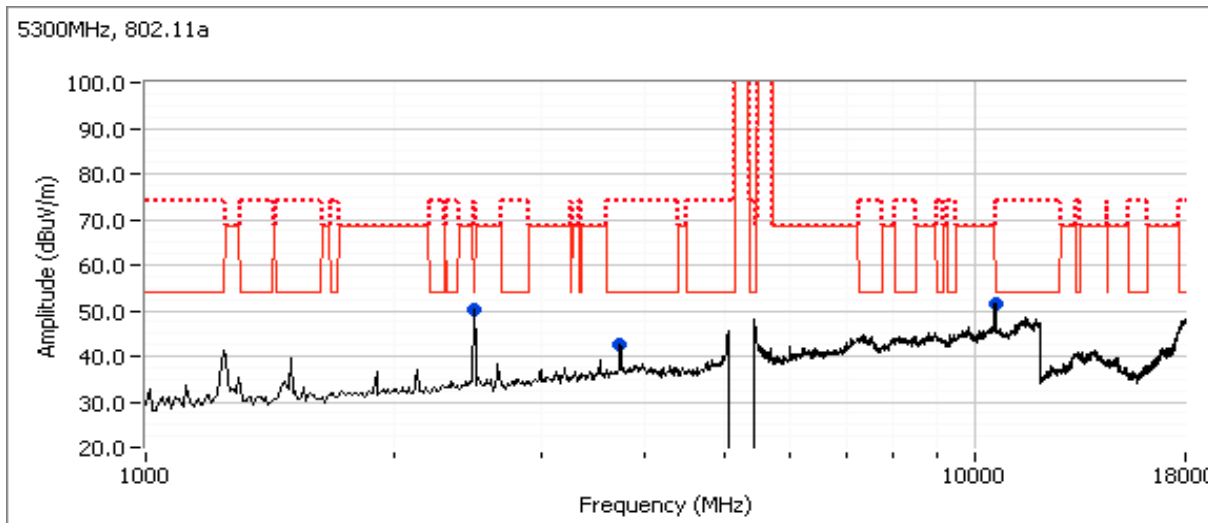
**Run #1e: EUT on Channel #60 5300MHz - 802.11a, Chain Main**

	Target (dBm)	Power Settings Measured (dBm)	Software Setting
Chain Main			q63

**Spurious Radiated Emissions:**

Frequency MHz	Level dB $\mu$ V/m	Pol v/h	15.209 / 15E		Detector PK/QP/Avg	Azimuth degrees	Height meters	Comments
			Limit	Margin				
10600.000	46.5	V	54.0	-7.5	AVG	12	1.3	RB 1 MHz;VB 10 Hz;Peak
10600.140	59.0	V	74.0	-15.0	PK	12	1.3	RB 1 MHz;VB 3 MHz;Peak
3731.140	32.4	V	54.0	-21.6	AVG	53	1.0	RB 1 MHz;VB 10 Hz;Peak
3732.910	55.3	V	74.0	-18.7	PK	53	1.0	RB 1 MHz;VB 3 MHz;Peak
2490.480	34.7	V	54.0	-19.3	AVG	33	1.2	RB 1 MHz;VB 10 Hz;Peak
2489.450	58.4	V	74.0	-15.6	PK	33	1.2	RB 1 MHz;VB 3 MHz;Peak

- Note 1: For emissions in restricted bands, the limit of 15.209 was used which requires average and peak measurements.
- Note 2: For emissions outside of the restricted bands the limit is -27dBm/MHz eirp (68.3dBuV/m). The measurement method required is the same measurement method used to determine the in-band power spectral density or a peak measurement (RB=1MHz, VB>1MHz).
- Note 3: Scans made between 18 - 40GHz with the measurement antenna moved around the card and its antennas 20-50cm from the device indicated there were no significant emissions in this frequency range



Client: Broadcom Corporation	Job Number: J88870
Model: BRCM943228HM4L (C2PC to add new antenna)	T-Log Number: T88992
	Account Manager: Sheareen Jacobs
Contact: Anne Liang	
Standard: 15.247, 15.E, RSS-210, LP0002	Class: N/A

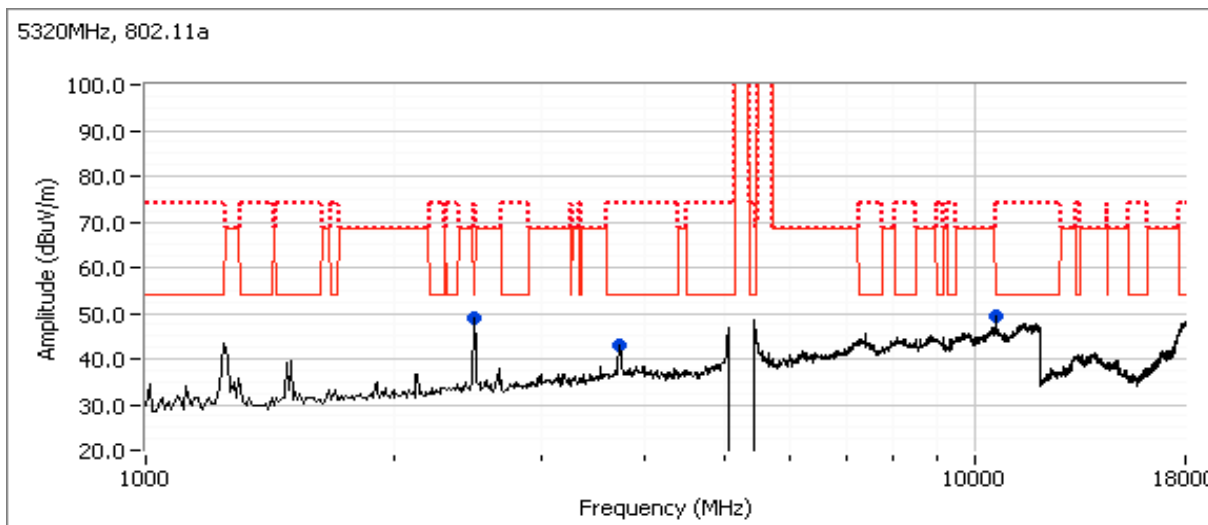
Run #1f: EUT on Channel #64 5320MHz - 802.11a, Chain Main

	Target (dBm)	Power Settings Measured (dBm)	Software Setting
Chain Main			q57

**Spurious Radiated Emissions:**

Frequency MHz	Level dBμV/m	Pol v/h	15.209 / 15E		Detector PK/QP/Avg	Azimuth degrees	Height meters	Comments
			Limit	Margin				
10640.020	46.2	V	54.0	-7.8	AVG	180	1.3	RB 1 MHz;VB 10 Hz;Peak
10645.750	57.1	V	74.0	-16.9	PK	180	1.3	RB 1 MHz;VB 3 MHz;Peak
3737.970	31.9	V	54.0	-22.1	AVG	138	1.0	RB 1 MHz;VB 10 Hz;Peak
3738.950	53.2	V	74.0	-20.8	PK	138	1.0	RB 1 MHz;VB 3 MHz;Peak
2497.090	35.3	V	54.0	-18.7	AVG	41	1.0	RB 1 MHz;VB 10 Hz;Peak
2490.990	57.7	V	74.0	-16.3	PK	41	1.0	RB 1 MHz;VB 3 MHz;Peak

- Note 1: For emissions in restricted bands, the limit of 15.209 was used which requires average and peak measurements.
- Note 2: For emissions outside of the restricted bands the limit is -27dBm/MHz eirp (68.3dBuV/m). The measurement method required is the same measurement method used to determine the in-band power spectral density or a peak measurement (RB=1MHz, VB>1MHz).



Client: Broadcom Corporation	Job Number: J88870
Model: BRCM943228HM4L (C2PC to add new antenna)	T-Log Number: T88992
	Account Manager: Sheareen Jacobs
Contact: Anne Liang	
Standard: 15.247, 15.E, RSS-210, LP0002	Class: N/A

**Run #1g: EUT on Channel #100 5500MHz - 802.11a, Chain Main**

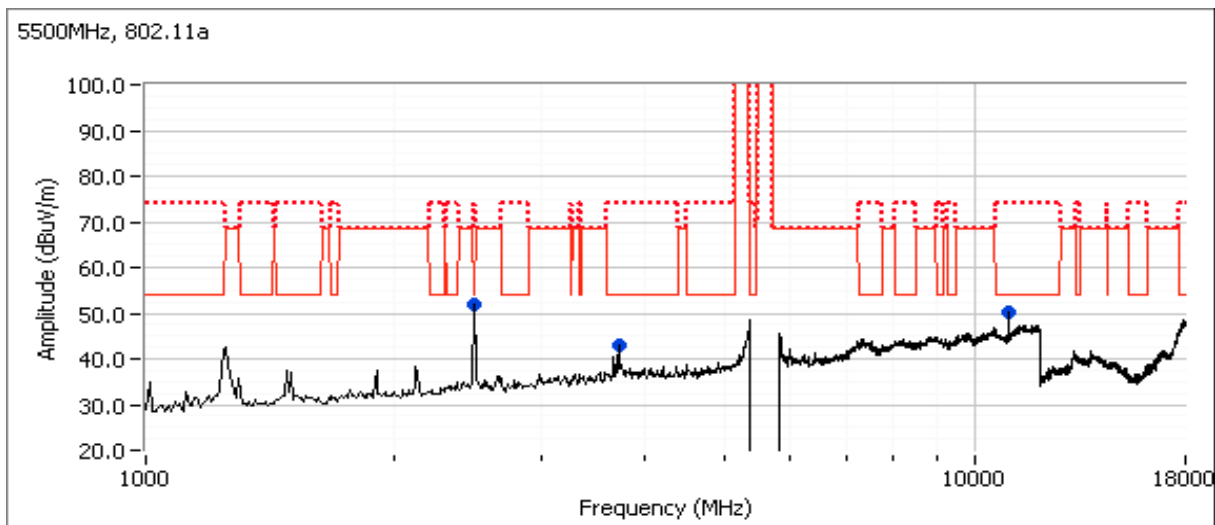
	Target (dBm)	Power Settings Measured (dBm)	Software Setting
Chain Main			q67

**Spurious Radiated Emissions:**

Frequency MHz	Level dB $\mu$ V/m	Pol v/h	15.209 / 15E		Detector PK/QP/Avg	Azimuth degrees	Height meters	Comments
			Limit	Margin				
11000.790	43.6	V	54.0	-10.4	AVG	205	1.5	RB 1 MHz;VB 10 Hz;Peak
11000.520	54.2	V	74.0	-19.8	PK	205	1.5	RB 1 MHz;VB 3 MHz;Peak
2496.370	35.6	V	54.0	-18.4	AVG	27	1.0	RB 1 MHz;VB 10 Hz;Peak
2494.840	58.8	V	74.0	-15.2	PK	27	1.0	RB 1 MHz;VB 3 MHz;Peak
3754.360	32.2	V	54.0	-21.8	AVG	34	1.0	RB 1 MHz;VB 10 Hz;Peak
3755.230	50.6	V	74.0	-23.4	PK	34	1.0	RB 1 MHz;VB 3 MHz;Peak

Note 1: For emissions in restricted bands, the limit of 15.209 was used which requires average and peak measurements.

Note 2: For emissions outside of the restricted bands the limit is -27dBm/MHz eirp (68.3dBuV/m). The measurement method required is the same measurement method used to determine the in-band power spectral density or a peak measurement (RB=1MHz, VB>1MHz).





# EMC Test Data

Client: Broadcom Corporation	Job Number: J88870
Model: BRCM943228HM4L (C2PC to add new antenna)	T-Log Number: T88992
	Account Manager: Sheareen Jacobs
Contact: Anne Liang	
Standard: 15.247, 15.E, RSS-210, LP0002	Class: N/A

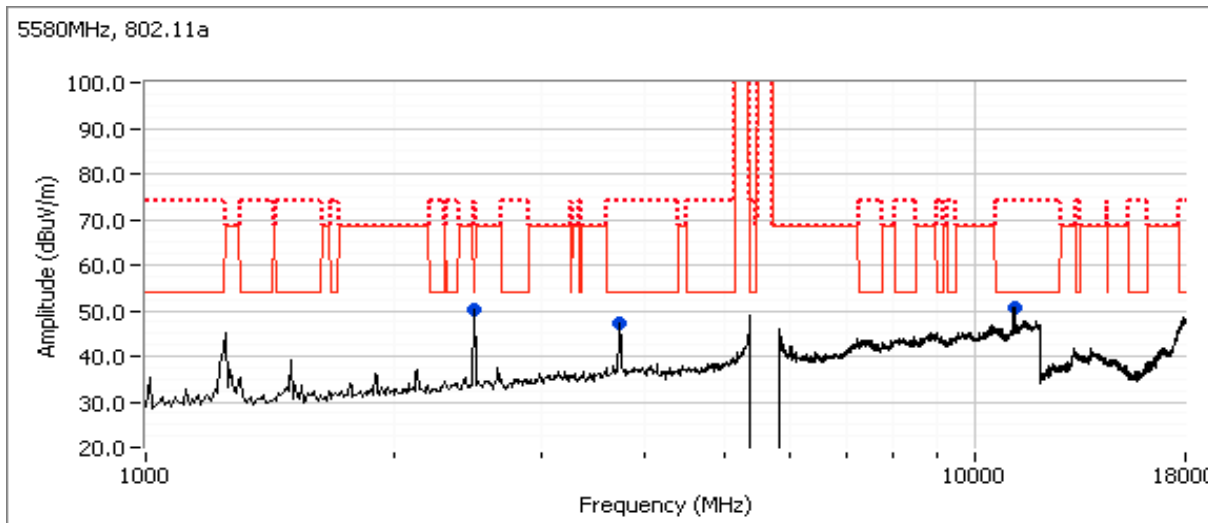
## Run #1h: EUT on Channel #116 5580MHz - 802.11a, Chain Main

	Target (dBm)	Power Settings Measured (dBm)	Software Setting
Chain Main			q70

### Spurious Radiated Emissions:

Frequency MHz	Level dBμV/m	Pol v/h	15.209 / 15E		Detector PK/QP/Avg	Azimuth degrees	Height meters	Comments
			Limit	Margin				
11161.020	45.7	V	54.0	-8.3	AVG	179	1.5	RB 1 MHz;VB 10 Hz;Peak
11161.620	56.0	V	74.0	-18.0	PK	179	1.5	RB 1 MHz;VB 3 MHz;Peak
2498.440	37.2	V	54.0	-16.8	AVG	20	0.9	RB 1 MHz;VB 10 Hz;Peak
2498.950	57.3	V	74.0	-16.7	PK	20	0.9	RB 1 MHz;VB 3 MHz;Peak
3719.930	37.9	V	54.0	-16.1	AVG	41	1.0	RB 1 MHz;VB 10 Hz;Peak
3721.140	49.0	V	74.0	-25.0	PK	41	1.0	RB 1 MHz;VB 3 MHz;Peak

- Note 1: For emissions in restricted bands, the limit of 15.209 was used which requires average and peak measurements.
- Note 2: For emissions outside of the restricted bands the limit is -27dBm/MHz eirp (68.3dBuV/m). The measurement method required is the same measurement method used to determine the in-band power spectral density or a peak measurement (RB=1MHz, VB>1MHz).
- Note 3: Scans made between 18 - 40GHz with the measurement antenna moved around the card and its antennas 20-50cm from the device indicated there were no significant emissions in this frequency range





# EMC Test Data

Client: Broadcom Corporation	Job Number: J88870
Model: BRCM943228HM4L (C2PC to add new antenna)	T-Log Number: T88992
	Account Manager: Sheareen Jacobs
Contact: Anne Liang	
Standard: 15.247, 15.E, RSS-210, LP0002	Class: N/A

**Run #1i: EUT on Channel #140 5700MHz - 802.11a, Chain Main**

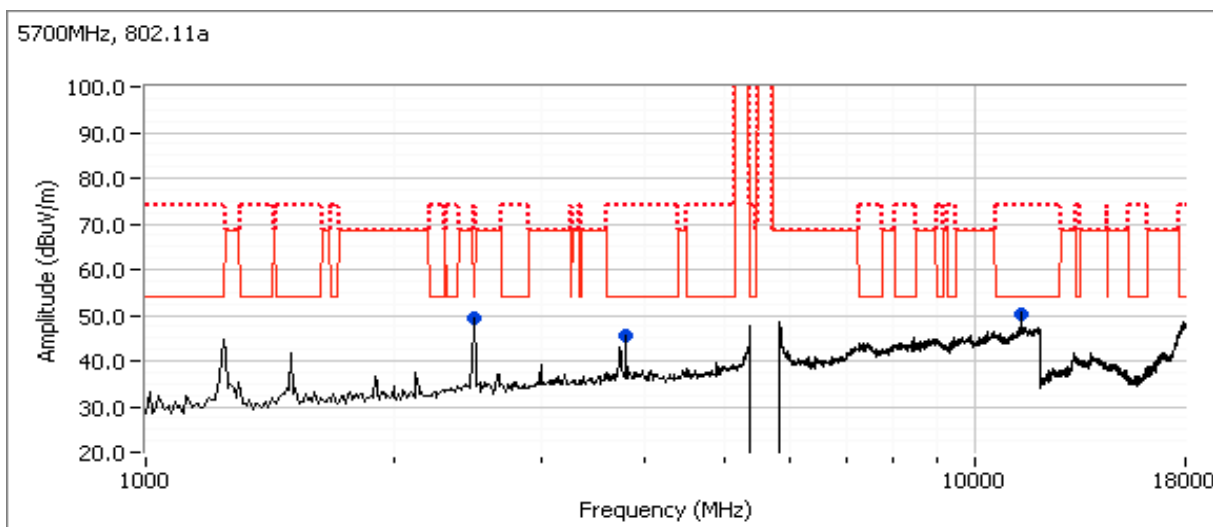
	Target (dBm)	Power Settings Measured (dBm)	Software Setting
Chain Main			q70

**Spurious Radiated Emissions:**

Frequency MHz	Level dBμV/m	Pol v/h	15.209 / 15E		Detector PK/QP/Avg	Azimuth degrees	Height meters	Comments
			Limit	Margin				
11400.370	44.9	V	54.0	-9.1	AVG	290	0.9	RB 1 MHz;VB 10 Hz;Peak
11397.710	57.2	V	74.0	-16.8	PK	290	0.9	RB 1 MHz;VB 3 MHz;Peak
3799.970	44.3	V	54.0	-9.7	AVG	254	1.6	RB 1 MHz;VB 10 Hz;Peak
3800.040	48.5	V	74.0	-25.5	PK	254	1.6	RB 1 MHz;VB 3 MHz;Peak
2497.220	38.5	V	54.0	-15.5	AVG	32	1.0	RB 1 MHz;VB 10 Hz;Peak
2498.560	59.0	V	74.0	-15.0	PK	32	1.0	RB 1 MHz;VB 3 MHz;Peak

Note 1: For emissions in restricted bands, the limit of 15.209 was used which requires average and peak measurements.

Note 2: For emissions outside of the restricted bands the limit is -27dBm/MHz eirp (68.3dBuV/m). The measurement method required is the same measurement method used to determine the in-band power spectral density or a peak measurement (RB=1MHz, VB>1MHz).





## EMC Test Data

Client:	Broadcom Corporation	Job Number:	J88870
Product:	BRCM943228HM4L (C2PC to add new antenna)	T-Log Number:	T88992
		Account Manager:	Sheareen Jacobs
Contact:	Anne Liang		
Emissions Standard(s):	15.247, 15.E, RSS-210, LP0002	Class:	-
Immunity Standard(s):	-	Environment:	-

# EMC Test Data

For The

## Broadcom Corporation

Product

BRCM943228HM4L (C2PC to add new antenna)

Date of Last Test: 10/23/2012



# EMC Test Data

Client:	Broadcom Corporation	Job Number:	J88870
Model:	BRCM943228HM4L (C2PC to add new antenna)	T-Log Number:	T88992
		Account Manager:	Sheareen Jacobs
Contact:	Anne Liang		
Standard:	15.247, 15.E, RSS-210, LP0002	Class:	N/A

## RSS 210 and FCC 15.407 (UNII) Radiated Spurious Emissions

### Test Specific Details

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

Test Location: FT 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.

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

**Ambient Conditions:**

Temperature:	18-22 °C
Rel. Humidity:	30-40 %

### 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.

### Test Procedure Comments:

Unless otherwise noted, average measurements above 1GHz were performed as documented in FCC KDB 789033 G) 6) d) Method VB



# EMC Test Data

Client:	Broadcom Corporation	Job Number:	J88870
Model:	BRCM943228HM4L (C2PC to add new antenna)	T-Log Number:	T88992
Contact:	Anne Liang	Account Manager:	Sheareen Jacobs
Standard:	15.247, 15.E, RSS-210, LP0002	Class:	N/A

## Summary of Results

Run #	Mode	Channel	Power Setting	Measured Power	Test Performed	Limit	Result / Margin
Run #1	a mode Main	#36 5180MHz	-	-	Restricted Band Edge at 5150 MHz	15.209	47.0 dBµV/m @ 5150.0 MHz (-7.0 dB)
	a mode Main	#64 5320MHz	-	-	Restricted Band Edge at 5350 MHz	15.209	45.6 dBµV/m @ 5350.1 MHz (-8.4 dB)
Run # 2	HT20 Main+Aux	#36 5180MHz	-	-	Restricted Band Edge at 5150 MHz	15.209	45.6 dBµV/m @ 5150.0 MHz (-8.4 dB)
	HT20 Main+Aux	#64 5320MHz	-	-	Restricted Band Edge at 5350 MHz	15.209	50.2 dBµV/m @ 5350.2 MHz (-3.8 dB)
	HT20 Main+Aux	#100 5500MHz	-	-	Restricted Band Edge at 5460 MHz	15.209	44.7 dBµV/m @ 5420.0 MHz (-9.3 dB)
					Band Edge at 5470 MHz	15 E	66.4 dBµV/m @ 5470.0 MHz (-1.9 dB)
Run # 3	HT40 Main+Aux	#38 5190MHz	-	-	Restricted Band Edge at 5150 MHz	15.209	48.6 dBµV/m @ 5150.0 MHz (-5.4 dB)
	HT40 Main+Aux	#62 5310MHz	-	-	Restricted Band Edge at 5350 MHz	15.209	47.2 dBµV/m @ 5350.0 MHz (-6.8 dB)





# EMC Test Data

Client: Broadcom Corporation	Job Number: J88870
Model: BRCM943228HM4L (C2PC to add new antenna)	T-Log Number: T88992
	Account Manager: Sheareen Jacobs
Contact: Anne Liang	
Standard: 15.247, 15.E, RSS-210, LP0002	Class: N/A

## Run #1, Band Edge Field Strength - 802.11a, Chain Main

### Run #1a, EUT on Channel #36 5180MHz - 802.11a, Chain Main

Date of Test: 9/5/2012

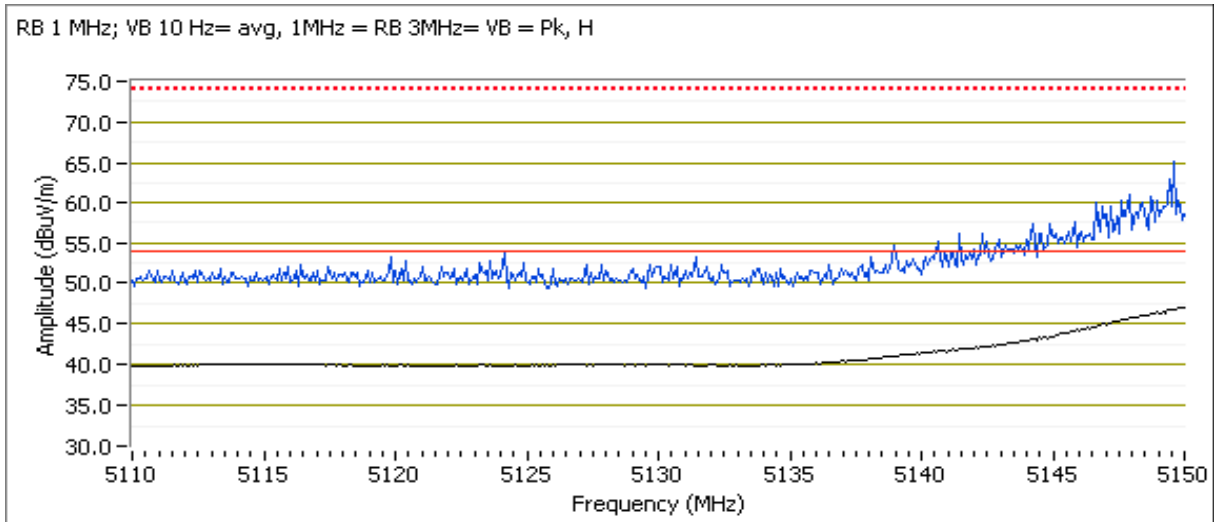
Test Location: FT Chamber#4

Test Engineer: Joseph Cadigal

Config Change: none

### 5150 MHz Band Edge Signal Radiated Field Strength

Frequency	Level	Pol	FCC 15.209		Detector	Azimuth	Height	Comments
MHz	dB $\mu$ V/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
5150.000	47.0	H	54.0	-7.0	AVG	0	1.0	POS; RB 1 MHz; VB: 10 Hz
5150.000	61.9	H	74.0	-12.1	PK	0	1.0	POS; RB 1 MHz; VB: 3 MHz
5150.000	45.7	V	54.0	-8.3	AVG	0	1.0	POS; RB 1 MHz; VB: 10 Hz
5149.680	57.1	V	74.0	-16.9	PK	0	1.0	POS; RB 1 MHz; VB: 3 MHz





# EMC Test Data

Client:	Broadcom Corporation	Job Number:	J88870
Model:	BRCM943228HM4L (C2PC to add new antenna)	T-Log Number:	T88992
Contact:	Anne Liang	Account Manager:	Sheareen Jacobs
Standard:	15.247, 15.E, RSS-210, LP0002	Class:	N/A

## Run #1b, EUT on Channel #64 5320MHz - 802.11a, Chain Main

Date of Test: 9/5/2012

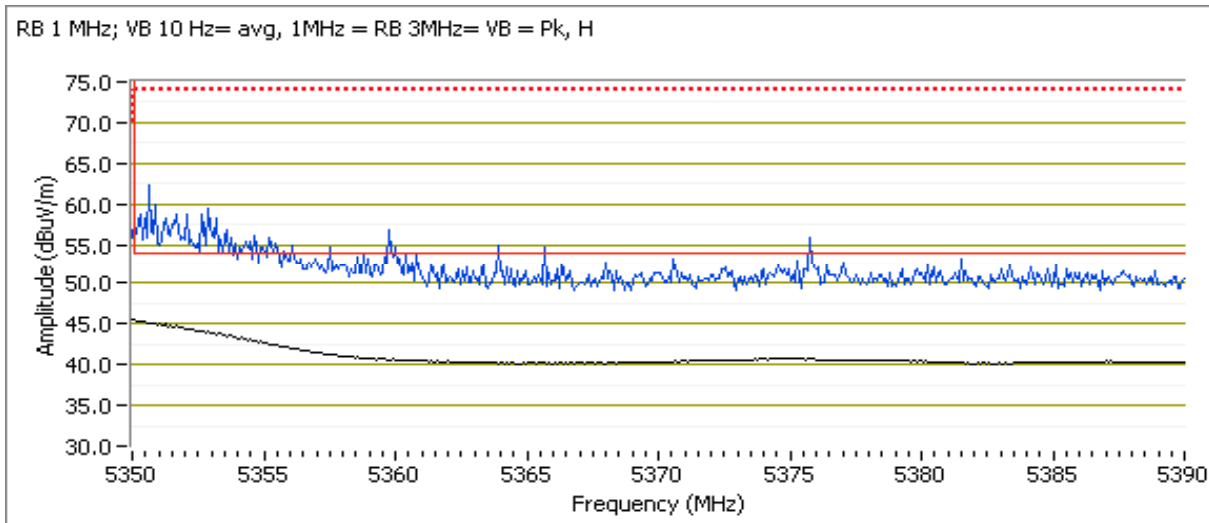
Test Location: FT Chamber#4

Test Engineer: Joseph Cadigal

Config Change: none

### 5350 MHz Band Edge Signal Radiated Field Strength

Frequency MHz	Level dB $\mu$ V/m	Pol v/h	FCC 15.209		Detector Pk/QP/Avg	Azimuth degrees	Height meters	Comments
			Limit	Margin				
5350.080	45.6	H	54.0	-8.4	AVG	0	1.1	POS; RB 1 MHz; VB: 10 Hz
5357.290	56.9	H	74.0	-17.1	PK	0	1.1	POS; RB 1 MHz; VB: 3 MHz
5370.440	39.2	V	54.0	-14.8	AVG	355	1.1	POS; RB 1 MHz; VB: 10 Hz
5371.480	52.5	V	74.0	-21.5	PK	355	1.1	POS; RB 1 MHz; VB: 3 MHz





# EMC Test Data

Client: Broadcom Corporation	Job Number: J88870
Model: BRCM943228HM4L (C2PC to add new antenna)	T-Log Number: T88992
	Account Manager: Sheareen Jacobs
Contact: Anne Liang	
Standard: 15.247, 15.E, RSS-210, LP0002	Class: N/A

## Run # 2, Band Edge Field Strength - HT20, Chain Main+Aux

### Run # 2a, EUT on Channel #36 5180MHz - HT20, Chain Main+Aux

Date of Test: 9/11/2012

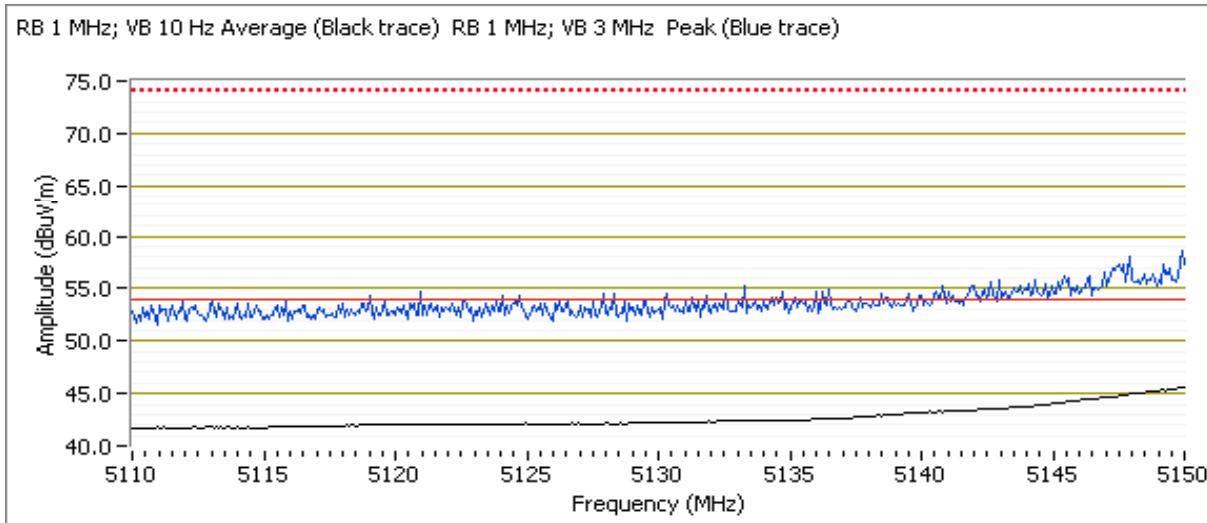
Test Location: FT Chamber#3

Test Engineer: M. Birgani

Config Change: None

### 5150 MHz Band Edge Signal Radiated Field Strength

Frequency MHz	Level dB $\mu$ V/m	Pol v/h	FCC 15.209		Detector Pk/QP/Avg	Azimuth degrees	Height meters	Comments
			Limit	Margin				
5150.000	45.6	V	54.0	-8.4	AVG	273	1.0	POS; RB 1 MHz; VB: 10 Hz
5139.420	41.6	H	54.0	-12.4	AVG	148	1.0	POS; RB 1 MHz; VB: 10 Hz
5149.920	61.0	V	74.0	-13.0	PK	273	1.0	POS; RB 1 MHz; VB: 3 MHz
5128.440	54.6	H	74.0	-19.4	PK	148	1.0	POS; RB 1 MHz; VB: 3 MHz





# EMC Test Data

Client: Broadcom Corporation	Job Number: J88870
Model: BRCM943228HM4L (C2PC to add new antenna)	T-Log Number: T88992
	Account Manager: Sheareen Jacobs
Contact: Anne Liang	
Standard: 15.247, 15.E, RSS-210, LP0002	Class: N/A

**Run # 2b, EUT on Channel #64 5320MHz - HT20, Chain Main+Aux**

Date of Test: 9/11/2012

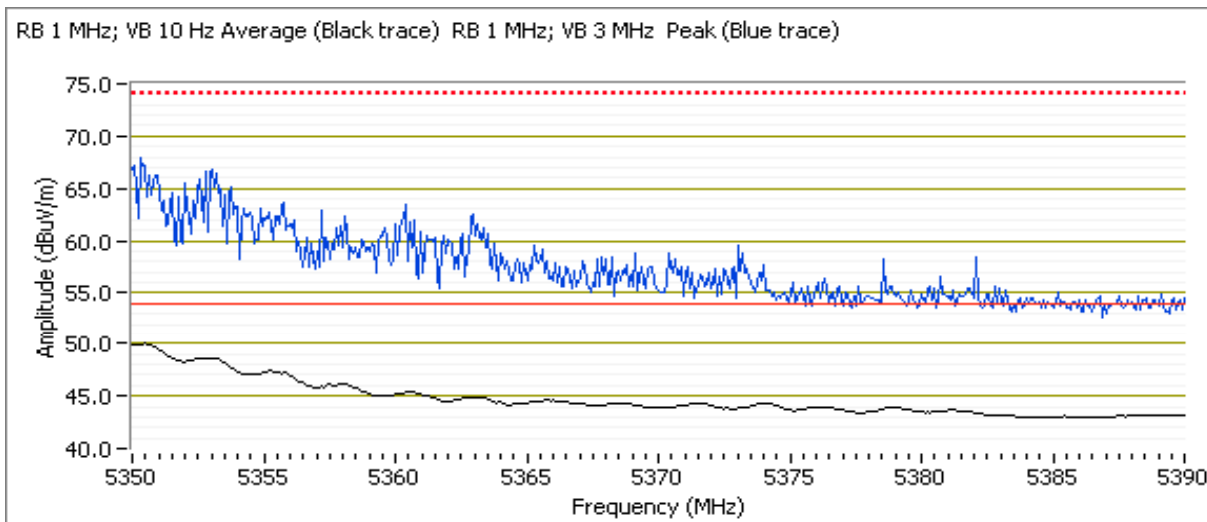
Test Location: FT Chamber#3

Test Engineer: M. Birgani

Config Change: None

**5350 MHz Band Edge Signal Radiated Field Strength**

Frequency	Level	Pol	FCC 15.209		Detector	Azimuth	Height	Comments
MHz	dB $\mu$ V/m	v/h	Limit	Margin	PK/QP/Avg	degrees	meters	
5350.240	50.2	V	54.0	-3.8	AVG	59	1.0	POS; RB 1 MHz; VB: 10 Hz
5353.290	69.0	V	74.0	-5.0	PK	59	1.0	POS; RB 1 MHz; VB: 3 MHz





# EMC Test Data

Client:	Broadcom Corporation	Job Number:	J88870
Model:	BRCM943228HM4L (C2PC to add new antenna)	T-Log Number:	T88992
Contact:	Anne Liang	Account Manager:	Sheareen Jacobs
Standard:	15.247, 15.E, RSS-210, LP0002	Class:	N/A

**Run # 2c, EUT on Channel #100 5500MHz - HT20, Chain Main+Aux**

Date of Test: 9/11/2012

Test Location: FT Chamber#3

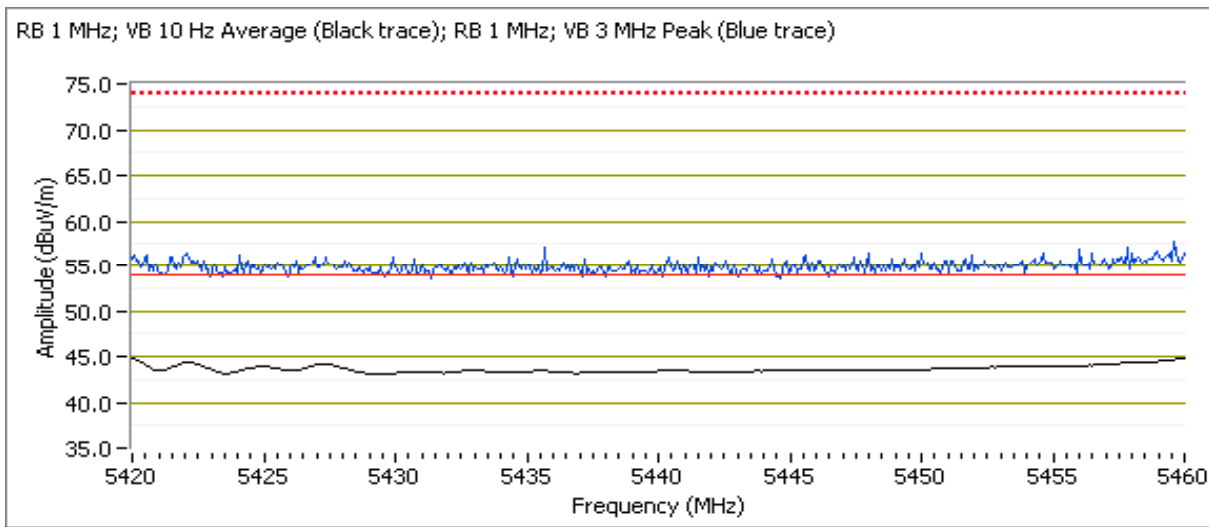
Test Engineer: M. Birgani

Config Change: None

**5460 MHz Band Edge Radiated Field Strength**

Frequency MHz	Level dB $\mu$ V/m	Pol v/h	15.209		Detector Pk/QP/Avg	Azimuth degrees	Height meters	Comments
			Limit	Margin				
5420.000	44.7	V	54.0	-9.3	AVG	13	1.1	POS; RB 1 MHz; VB: 10 Hz
5455.030	57.1	V	74.0	-16.9	PK	13	1.1	POS; RB 1 MHz; VB: 3 MHz

For emissions in the restricted band immediately below 5460MHz the 15.209/RSS GEN limits apply.

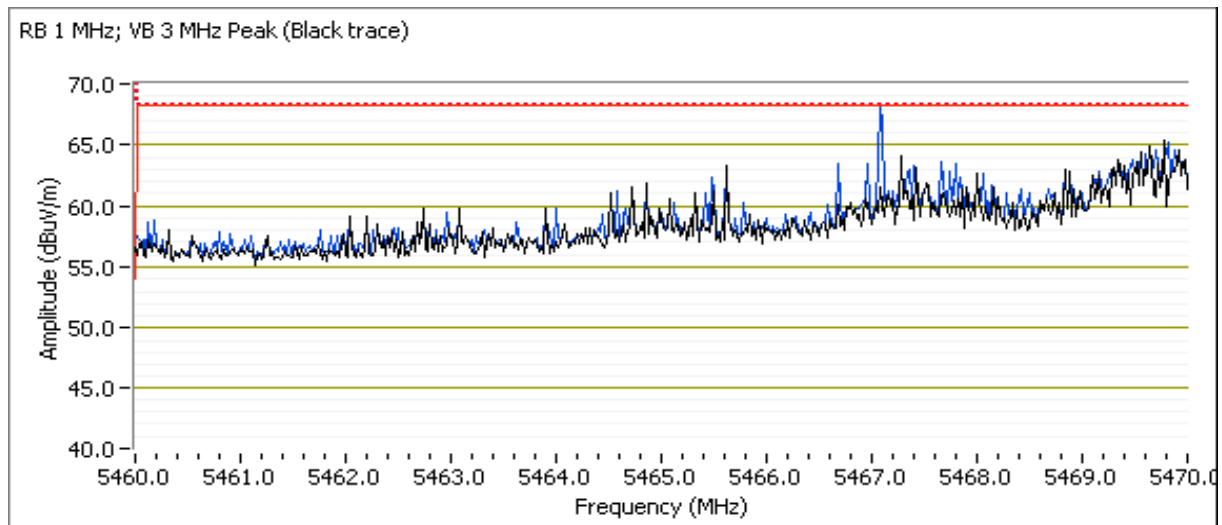


Client: Broadcom Corporation	Job Number: J88870
Model: BRCM943228HM4L (C2PC to add new antenna)	T-Log Number: T88992
	Account Manager: Sheareen Jacobs
Contact: Anne Liang	
Standard: 15.247, 15.E, RSS-210, LP0002	Class: N/A

### 5460 - 5470 MHz Band Edge Radiated Field Strength

Frequency	Level	Pol	15 E		Detector	Azimuth	Height	Comments
MHz	dB $\mu$ V/m	v/h	Limit	Margin	PK/QP/Avg	degrees	meters	
5469.980	66.4	V	68.3	-1.9	PK	13	1.1	POS; RB 1 MHz; VB: 3 MHz

Note: For emissions outside of the restricted bands the limit is -27dBm/MHz eirp (68.3dBuV/m). The measurement method required is a peak measurement (RB=1MHz, VB $\geq$ 3MHz, peak detector).





# EMC Test Data

Client: Broadcom Corporation	Job Number: J88870
Model: BRCM943228HM4L (C2PC to add new antenna)	T-Log Number: T88992
	Account Manager: Sheareen Jacobs
Contact: Anne Liang	
Standard: 15.247, 15.E, RSS-210, LP0002	Class: N/A

## Run # 3, Band Edge Field Strength - HT40, Chain Main+Aux

### Run # 3a, EUT on Channel #38 5190MHz - HT40, Chain Main+Aux

Date of Test: 9/19/2012

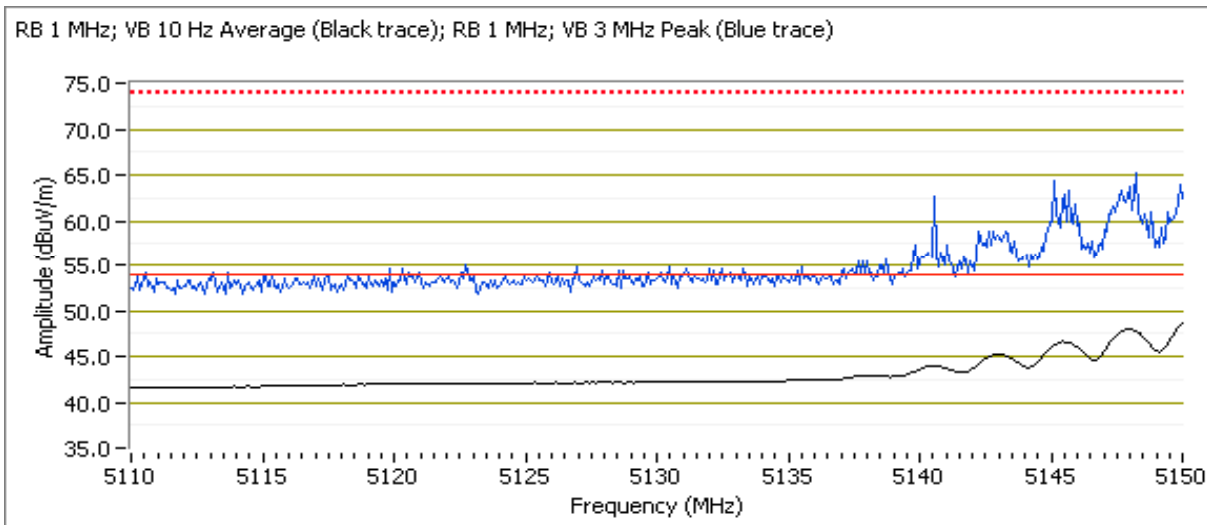
Test Location: FT Chamber#3

Test Engineer: M. Birgani

Config Change: None

### 5150 MHz Band Edge Signal Radiated Field Strength

Frequency MHz	Level dB $\mu$ V/m	Pol v/h	FCC 15.209		Detector PK/QP/Avg	Azimuth degrees	Height meters	Comments
			Limit	Margin				
5150.000	48.6	V	54.0	-5.4	AVG	360	1.1	POS; RB 1 MHz; VB: 10 Hz
5148.240	64.4	V	74.0	-9.6	PK	360	1.1	POS; RB 1 MHz; VB: 3 MHz





# EMC Test Data

Client:	Broadcom Corporation	Job Number:	J88870
Model:	BRCM943228HM4L (C2PC to add new antenna)	T-Log Number:	T88992
Contact:	Anne Liang	Account Manager:	Sheareen Jacobs
Standard:	15.247, 15.E, RSS-210, LP0002	Class:	N/A

**Run # 3b, EUT on Channel #62 5310MHz - HT40, Chain Main+Aux**

Date of Test: 9/18/2012

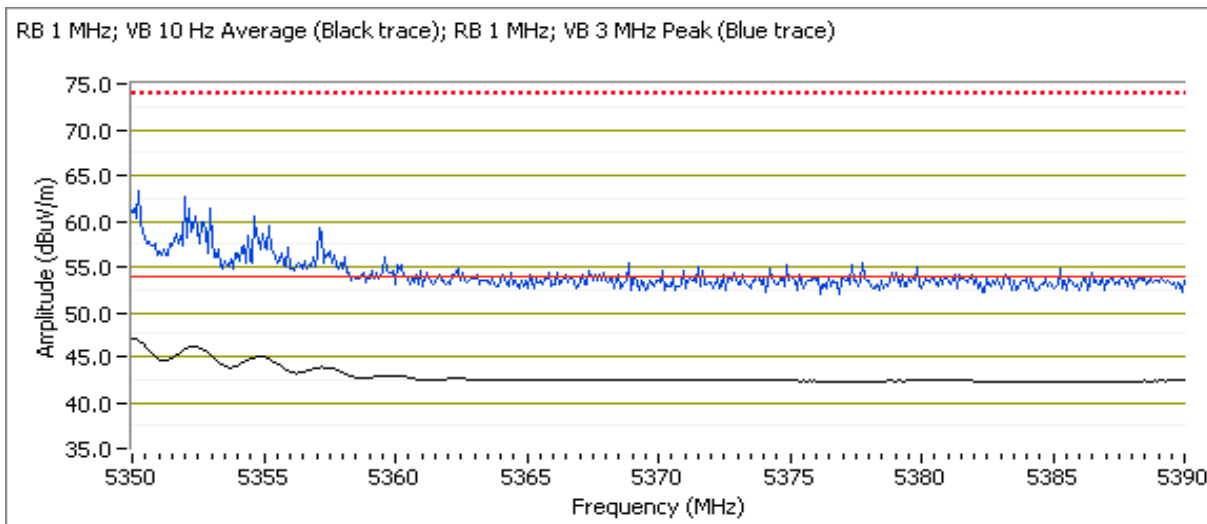
Test Location: FT Chamber#3

Test Engineer: M. Birgani

Config Change: None

**5350 MHz Band Edge Signal Radiated Field Strength**

Frequency MHz	Level dB $\mu$ V/m	Pol v/h	FCC 15.209		Detector Pk/QP/Avg	Azimuth degrees	Height meters	Comments
			Limit	Margin				
5350.000	47.2	V	54.0	-6.8	AVG	162	1.1	POS; RB 1 MHz; VB: 10 Hz
5351.920	63.8	V	74.0	-10.2	PK	162	1.1	POS; RB 1 MHz; VB: 3 MHz







# EMC Test Data

Client:	Broadcom Corporation	Job Number:	J88870
Model:	BRCM943228HM4L (C2PC to add new antenna)	T-Log Number:	T88992
		Account Manager:	Sheareen Jacobs
Contact:	Anne Liang		
Standard:	15.247, 15.E, RSS-210, LP0002	Class:	N/A

## RSS 210 and FCC 15.407 (UNII) Radiated Spurious Emissions

### Test Specific Details

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: 10/18/2012 & 10/22/12  
 Test Engineer: John Caizzi

Test Location: FT Ch#4 & CH#3  
 Config Change: See individual runs

### General Test Configuration

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

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

**Ambient Conditions:** Temperature: 23 °C  
 Rel. Humidity: 33 %

### 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.

### Test Procedure Comments:

Unless otherwise noted, average measurements above 1GHz were performed as documented in FCC KDB 789033 G) 6) d) Method VB

### Summary of Results

Run #	Mode	Channel	Power Setting	Measured Power	Test Performed	Limit	Result / Margin
1	a mode Main	#100 5500MHz	-	-	Band Edge at 5470 MHz	15 E	49.9 dBµV/m @ 5470.0 MHz (-4.1 dB)
		#140 5700MHz	-	-	Band Edge at 5725 MHz		54.0 dBµV/m @ 5725.1 MHz (0.0 dB)
2	HT40 Main+Aux	#140 5700MHz	-	-	Band Edge at 5725 MHz		54.0 dBµV/m @ 5725.0 MHz (0.0 dB)
3	HT40 Main+Aux	#102 5510MHz	-	-	Band Edge at 5470 MHz		53.1 dBµV/m @ 5470.0 MHz (-0.9 dB)
		#134 5670MHz	-	-	Band Edge at 5725 MHz		53.1 dBµV/m @ 5726.2 MHz (-0.9 dB)



# EMC Test Data

Client: Broadcom Corporation	Job Number: J88870
Model: BRCM943228HM4L (C2PC to add new antenna)	T-Log Number: T88992
	Account Manager: Sheareen Jacobs
Contact: Anne Liang	
Standard: 15.247, 15.E, RSS-210, LP0002	Class: N/A

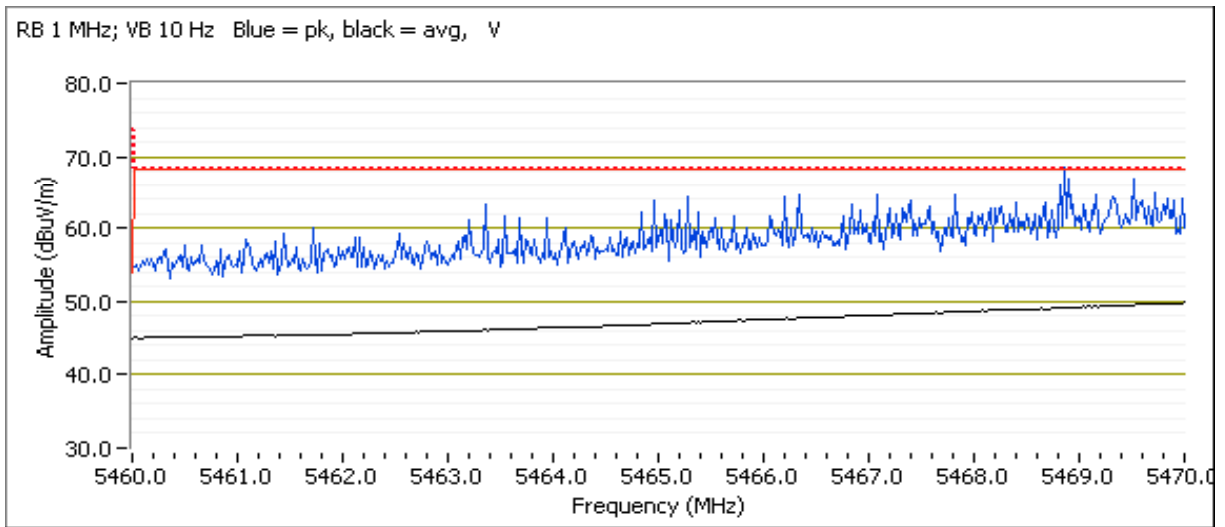
Run #1, Band Edge Field Strength - 802.11a, Chain Main

Run #1a, EUT on Channel #100 5500MHz - 802.11a, Chain Main

### 5460 - 5470 MHz Band Edge Radiated Field Strength

Frequency MHz	Level dB $\mu$ V/m	Pol v/h	15 E		Detector PK/QP/Avg	Azimuth degrees	Height meters	Comments
			Limit	Margin				
5470.000	49.9	V	54.0	-4.1	AVG	259	1.40	RB 1 MHz;VB 10 Hz;Peak
5469.700	68.4	V	74.0	-5.6	PK	259	1.40	RB 1 MHz;VB 3 MHz;Peak

Note: For emissions outside of the restricted bands the limit is -27dBm/MHz eirp (68.3dBuV/m). The measurement method required is a peak measurement (RB=1MHz, VB $\geq$ 3MHz, peak detector). Per KDB 789033, emissions in non-restricted bands that comply with the restricted band limits, comply with the requirement.





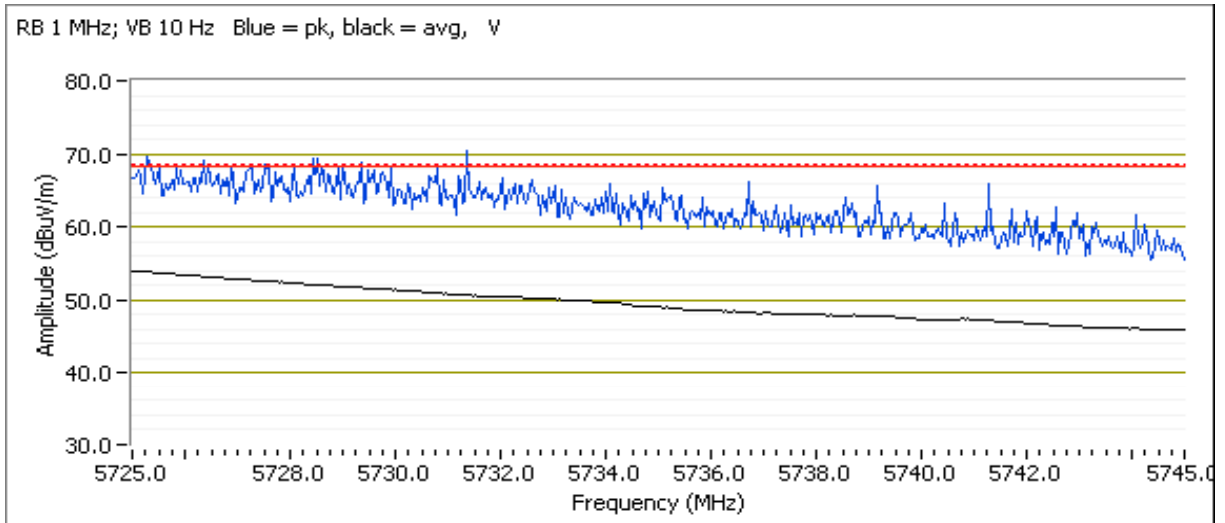
# EMC Test Data

Client: Broadcom Corporation	Job Number: J88870
Model: BRCM943228HM4L (C2PC to add new antenna)	T-Log Number: T88992
	Account Manager: Sheareen Jacobs
Contact: Anne Liang	
Standard: 15.247, 15.E, RSS-210, LP0002	Class: N/A

Run #1b, EUT on Channel #140 5700MHz - 802.11a, Chain Main

### 5725 MHz Band Edge Radiated Field Strength

Frequency	Level	Pol	15 E		Detector	Azimuth	Height	Comments
MHz	dB $\mu$ V/m	v/h	Limit	Margin	PK/QP/Avg	degrees	meters	
5725.080	54.0	V	54.0	0.0	AVG	161	1.34	RB 1 MHz;VB 10 Hz;Peak
5727.400	68.9	V	74.0	-5.1	PK	161	1.34	RB 1 MHz;VB 3 MHz;Peak





# EMC Test Data

Client: Broadcom Corporation	Job Number: J88870
Model: BRCM943228HM4L (C2PC to add new antenna)	T-Log Number: T88992
	Account Manager: Sheareen Jacobs
Contact: Anne Liang	
Standard: 15.247, 15.E, RSS-210, LP0002	Class: N/A

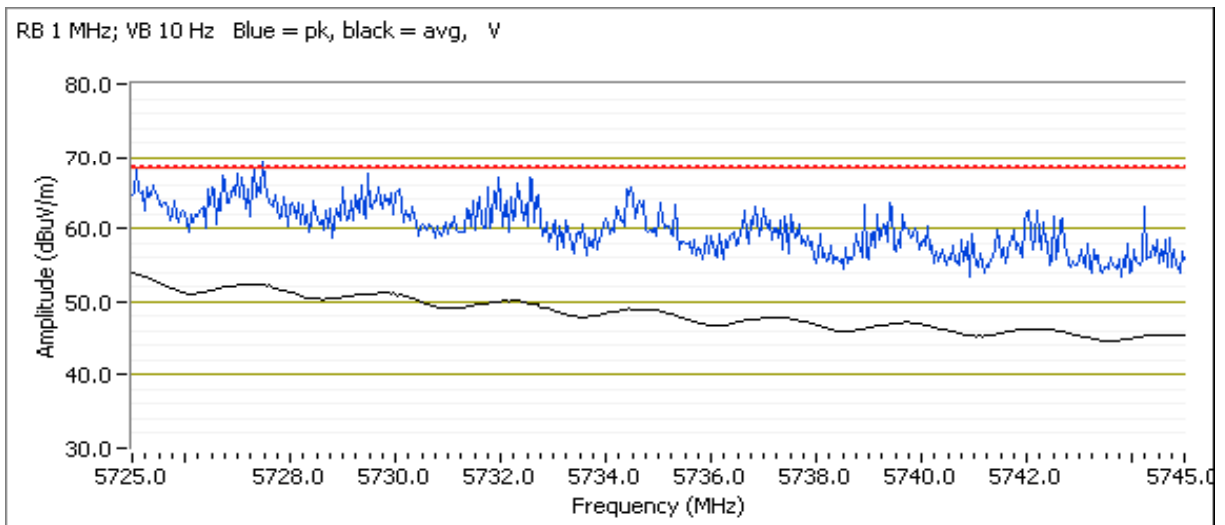
## Run # 2, Band Edge Field Strength - HT20, Chain Main+Aux

Date of Test: 10/22/2012  
 Test Engineer: John Caizzi  
 Test Location: FT Ch#3

## Run # 2b, EUT @ 5700MHz - HT20

### 5725 MHz Band Edge Radiated Field Strength

Frequency MHz	Level dB $\mu$ V/m	Pol v/h	15 E		Detector Pk/QP/Avg	Azimuth degrees	Height meters	Comments
			Limit	Margin				
5725.000	54.0	V	54.0	0.0	AVG	55	1.39	RB 1 MHz;VB 10 Hz;Peak
5727.400	68.5	V	74.0	-5.5	PK	55	1.39	RB 1 MHz;VB 3 MHz;Peak





# EMC Test Data

Client: Broadcom Corporation	Job Number: J88870
Model: BRCM943228HM4L (C2PC to add new antenna)	T-Log Number: T88992
	Account Manager: Sheareen Jacobs
Contact: Anne Liang	
Standard: 15.247, 15.E, RSS-210, LP0002	Class: N/A

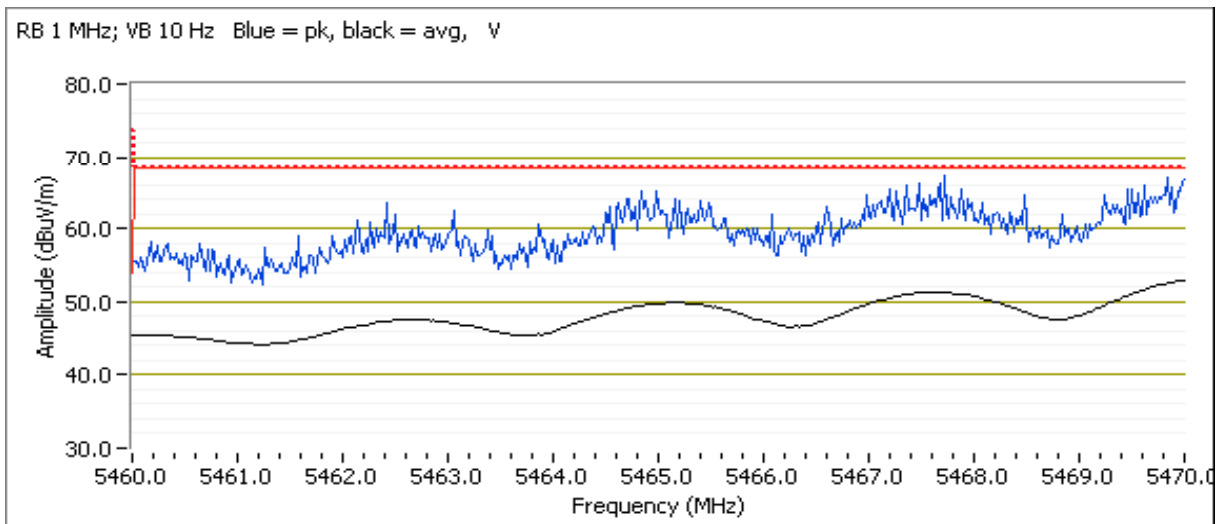
## Run # 3, Band Edge Field Strength - HT40, Chain Main+Aux

Date of Test: 10/22/2012  
 Test Engineer: John Caizzi  
 Test Location: FT Ch#3

## Run # 3a, EUT @ 5510MHz

### 5460 - 5470 MHz Band Edge Radiated Field Strength

Frequency MHz	Level dB $\mu$ V/m	Pol v/h	15 E		Detector PK/QP/Avg	Azimuth degrees	Height meters	Comments
			Limit	Margin				
5470.000	53.1	V	54.0	-0.9	AVG	21	1.25	RB 1 MHz;VB 10 Hz;Peak
5469.780	70.1	V	74.0	-3.9	PK	21	1.25	RB 1 MHz;VB 3 MHz;Peak





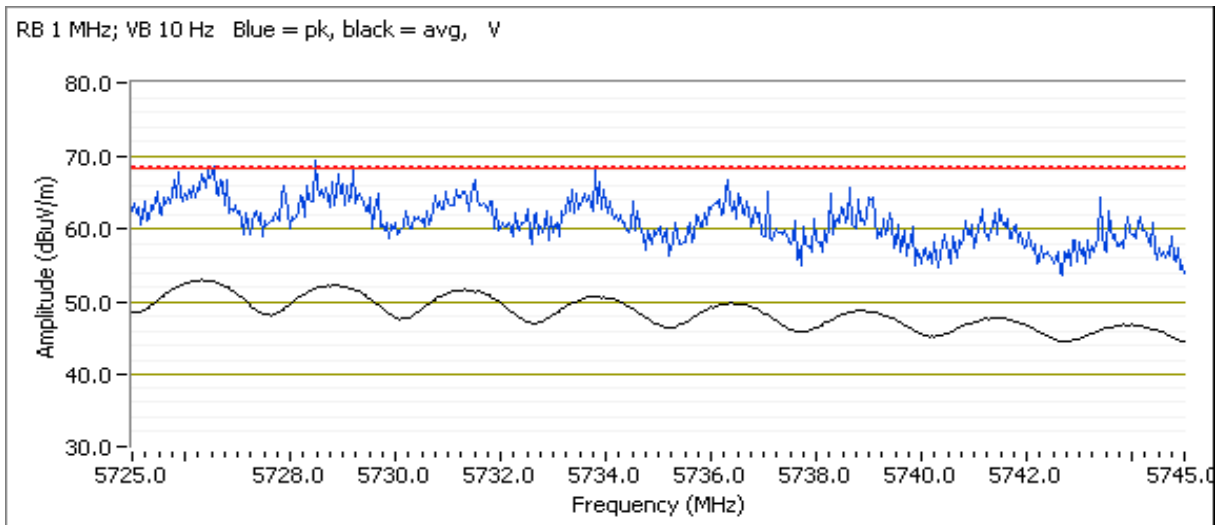
# EMC Test Data

Client: Broadcom Corporation	Job Number: J88870
Model: BRCM943228HM4L (C2PC to add new antenna)	T-Log Number: T88992
	Account Manager: Sheareen Jacobs
Contact: Anne Liang	
Standard: 15.247, 15.E, RSS-210, LP0002	Class: N/A

Run # 3b, EUT on Channel #134 5670MHz - HT40, Chain Main+Aux

### 5725 MHz Band Edge Radiated Field Strength

Frequency MHz	Level dB $\mu$ V/m	Pol v/h	15 E		Detector PK/QP/Avg	Azimuth degrees	Height meters	Comments
			Limit	Margin				
5726.200	53.1	V	54.0	-0.9	AVG	66	1.42	RB 1 MHz;VB 10 Hz;Peak
5731.250	68.5	V	74.0	-5.5	PK	66	1.42	RB 1 MHz;VB 3 MHz;Peak





# EMC Test Data

Client:	Broadcom Corporation	Job Number:	J88870
Model:	BRCM943228HM4L (C2PC to add new antenna)	T-Log Number:	T88992
Contact:	Anne Liang	Account Manager:	Sheareen Jacobs
Standard:	15.247, 15.E, RSS-210, LP0002	Class:	N/A

## RSS 210 and FCC 15.407 (UNII) Radiated Spurious Emissions

### Test Specific Details

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

Test Location: FT 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.

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

### Ambient Conditions:

Temperature: 22.4 °C  
Rel. Humidity: 36 %

### Summary of Results

Run #	Mode	Channel	Power Setting	Measured Power	Test Performed	Limit	Result / Margin
Run #1	802.11a Chain Main	#36 5180MHz	-	-	Radiated Emissions, 1 - 40 GHz	FCC 15.209 / 15 E	59.1 dBµV/m @ 2495.8 MHz (-14.9 dB)
		#40 5200MHz	-	-			59.0 dBµV/m @ 2492.3 MHz (-15.0 dB)
		#48 5240MHz	-	-			58.0 dBµV/m @ 2490.1 MHz (-16.0 dB)
Run #1	802.11a Chain Main	#52 5260MHz	-	-	Radiated Emissions, 1 - 40 GHz	FCC 15.209 / 15 E	65.1 dBµV/m @ 10523.2 MHz (-3.2 dB)
		#60 5300MHz	-	-			46.5 dBµV/m @ 10600.0 MHz (-7.5 dB)
		#64 5320MHz	-	-			46.2 dBµV/m @ 10640.0 MHz (-7.8 dB)
Run #1	802.11a Chain Main	#100 5500MHz	-	-	Radiated Emissions, 1 - 40 GHz	FCC 15.209 / 15 E	43.6 dBµV/m @ 11000.8 MHz (-10.4 dB)
		#116 5580MHz	-	-			45.7 dBµV/m @ 11161.0 MHz (-8.3 dB)
		#140 5700MHz	-	-			44.9 dBµV/m @ 11400.4 MHz (-9.1 dB)



## EMC Test Data

Client:	Broadcom Corporation	Job Number:	J88870
Model:	BRCM943228HM4L (C2PC to add new antenna)	T-Log Number:	T88992
		Account Manager:	Sheareen Jacobs
Contact:	Anne Liang		
Standard:	15.247, 15.E, RSS-210, LP0002	Class:	N/A

### 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.

### Test Procedure Comments:

Unless otherwise noted, average measurements above 1GHz were performed as documented in FCC KDB 789033 G) 6) d) Method VB





# EMC Test Data

Client: Broadcom Corporation	Job Number: J88870
Model: BRCM943228HM4L (C2PC to add new antenna)	T-Log Number: T88992
	Account Manager: Sheareen Jacobs
Contact: Anne Liang	
Standard: 15.247, 15.E, RSS-210, LP0002	Class: N/A

**Run #1, Radiated Spurious Emissions, 1-40GHz, 802.11a, Chain Main**  
 Date of Test: 9/4/2012 Test Location: FT Chamber #4  
 Test Engineer: Rafael Varelas Config Change: none

For emissions in restricted bands, the limit of 15.209 was used. For all other emissions, the limit is -27dBm eirp (68.3dBuV/m @3m). As the power measured is average power this is considered an average limit so the peak limit would be 88.3dBuV/m at 3m.

**Run #1a: EUT on Channel #36 5180MHz - 802.11a, Chain Main**

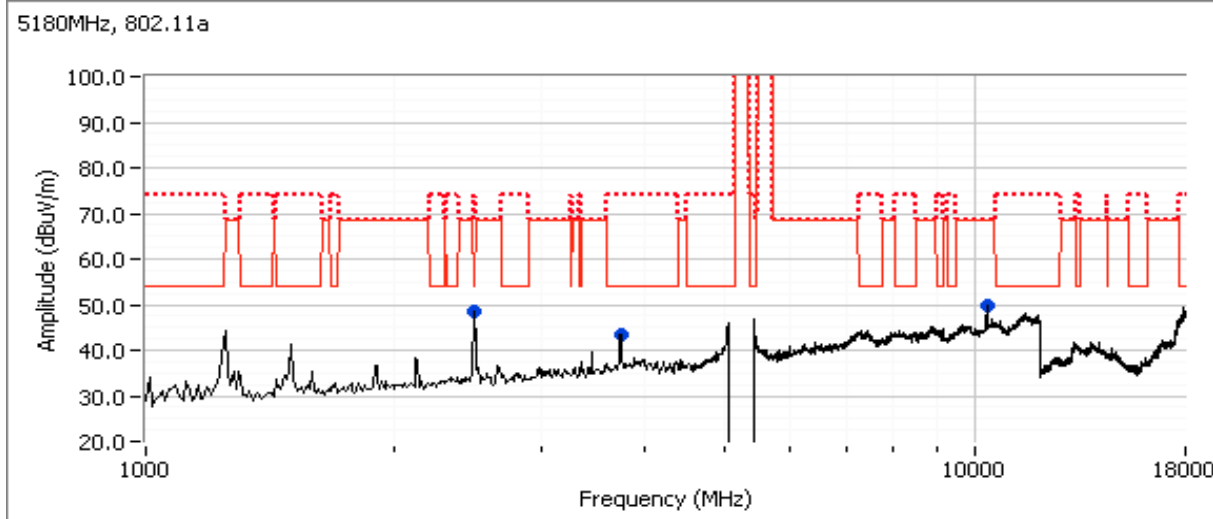
	Target (dBm)	Power Settings Measured (dBm)	Software Setting
Chain Main			q52

**Spurious Radiated Emissions:**

Frequency MHz	Level dBuV/m	Pol v/h	15.209 / 15E		Detector Pk/QP/Avg	Azimuth degrees	Height meters	Comments
			Limit	Margin				
2495.820	59.1	V	74.0	-14.9	PK	30	0.9	RB 1 MHz;VB 3 MHz;Peak
2497.250	35.2	V	54.0	-18.8	AVG	30	0.9	RB 1 MHz;VB 10 Hz;Peak
3743.400	31.6	H	54.0	-22.4	AVG	269	1.0	RB 1 MHz;VB 10 Hz;Peak
3745.330	47.0	H	74.0	-27.0	PK	269	1.0	RB 1 MHz;VB 3 MHz;Peak
10361.130	50.0	V	68.3	-18.3	Peak	100	1.3	

Note 1: For emissions in restricted bands, the limit of 15.209 was used which requires average and peak measurements.

Note 2: For emissions outside of the restricted bands the limit is -27dBm/MHz eirp (68.3dBuV/m). The measurement method required is the same measurement method used to determine the in-band power spectral density or a peak measurement (RB=1MHz, VB>1MHz).



Client: Broadcom Corporation	Job Number: J88870
Model: BRCM943228HM4L (C2PC to add new antenna)	T-Log Number: T88992
	Account Manager: Sheareen Jacobs
Contact: Anne Liang	
Standard: 15.247, 15.E, RSS-210, LP0002	Class: N/A

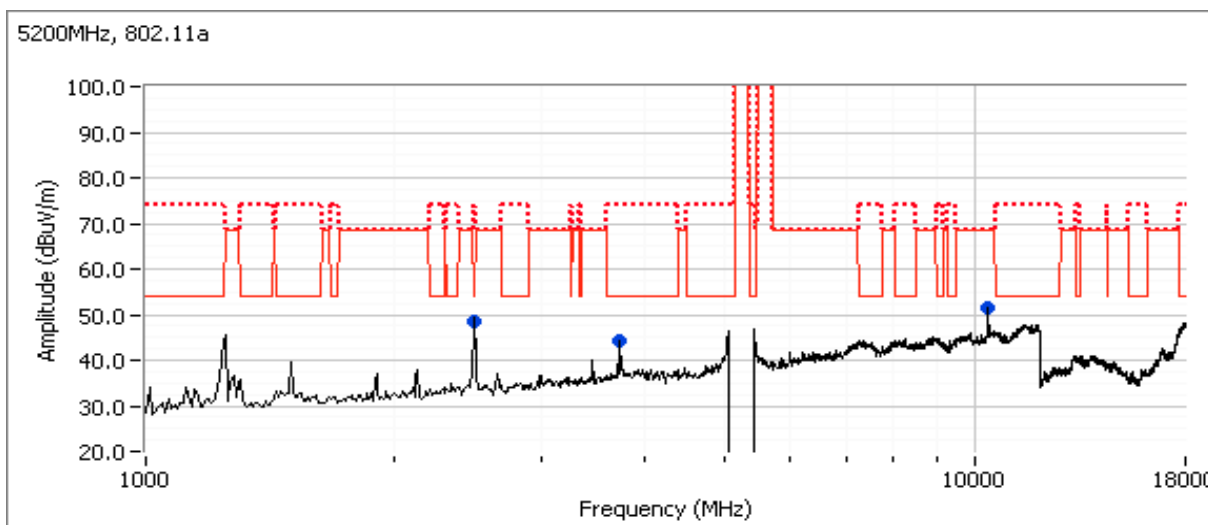
**Run #1b: EUT on Channel #40 5200MHz - 802.11a, Chain Main**

	Target (dBm)	Power Settings Measured (dBm)	Software Setting
Chain Main			q53

**Spurious Radiated Emissions:**

Frequency	Level	Pol	15.209 / 15E		Detector	Azimuth	Height	Comments
MHz	dB $\mu$ V/m	v/h	Limit	Margin	PK/QP/Avg	degrees	meters	
2492.290	59.0	V	74.0	-15.0	PK	29	0.9	1Hz;VB 3 MHz;Peak
2497.150	35.3	V	54.0	-18.7	AVG	29	0.9	1Hz;VB 10 Hz;Peak
3741.760	32.6	V	54.0	-21.4	AVG	184	1.0	1Hz;VB 10 Hz;Peak
3742.790	52.8	V	74.0	-21.2	PK	184	1.0	1Hz;VB 3 MHz;Peak
10400.000	51.5	V	68.3	-16.8	Peak	189	1.0	

- Note 1: For emissions in restricted bands, the limit of 15.209 was used which requires average and peak measurements.
- Note 2: For emissions outside of the restricted bands the limit is -27dBm/MHz eirp (68.3dBuV/m). The measurement method required is the same measurement method used to determine the in-band power spectral density or a peak measurement (RB=1MHz, VB>1MHz).
- Note 3: Scans made between 18 - 40GHz with the measurement antenna moved around the card and its antennas 20-50cm from the device indicated there were no significant emissions in this frequency range





# EMC Test Data

Client: Broadcom Corporation	Job Number: J88870
Model: BRCM943228HM4L (C2PC to add new antenna)	T-Log Number: T88992
	Account Manager: Sheareen Jacobs
Contact: Anne Liang	
Standard: 15.247, 15.E, RSS-210, LP0002	Class: N/A

## Run #1c: EUT on Channel #48 5240MHz - 802.11a, Chain Main

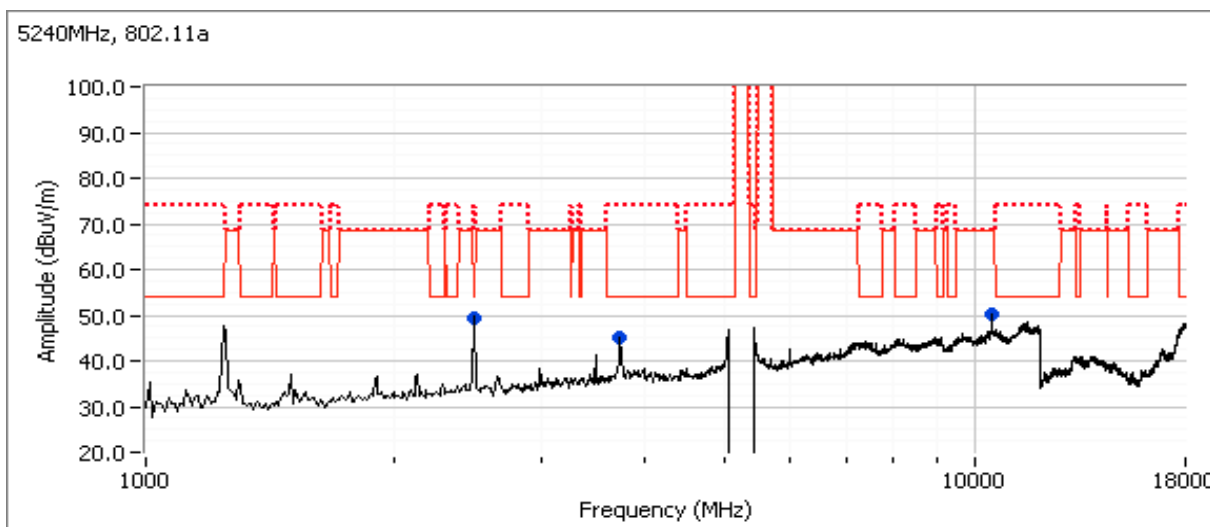
	Target (dBm)	Power Settings Measured (dBm)	Software Setting
Chain Main			q54

### Spurious Radiated Emissions:

Frequency MHz	Level dB $\mu$ V/m	Pol v/h	15.209 / 15E		Detector PK/QP/Avg	Azimuth degrees	Height meters	Comments
			Limit	Margin				
2490.130	58.0	V	74.0	-16.0	PK	166	1.0	RB 1 MHz;VB 3 MHz;Peak
2489.920	37.6	V	54.0	-16.4	AVG	166	1.0	RB 1 MHz;VB 10 Hz;Peak
3732.430	32.2	V	54.0	-21.8	AVG	189	1.0	RB 1 MHz;VB 10 Hz;Peak
3734.250	51.2	V	74.0	-22.8	PK	189	1.0	RB 1 MHz;VB 3 MHz;Peak
10480.790	50.3	V	68.3	-18.0	Peak	10	1.0	

Note 1: For emissions in restricted bands, the limit of 15.209 was used which requires average and peak measurements.

Note 2: For emissions outside of the restricted bands the limit is -27dBm/MHz eirp (68.3dBuV/m). The measurement method required is the same measurement method used to determine the in-band power spectral density or a peak measurement (RB=1MHz, VB>1MHz).





# EMC Test Data

Client: Broadcom Corporation	Job Number: J88870
Model: BRCM943228HM4L (C2PC to add new antenna)	T-Log Number: T88992
	Account Manager: Sheareen Jacobs
Contact: Anne Liang	
Standard: 15.247, 15.E, RSS-210, LP0002	Class: N/A

**Run #1d: EUT on Channel #52 5260MHz - 802.11a, Chain Main**

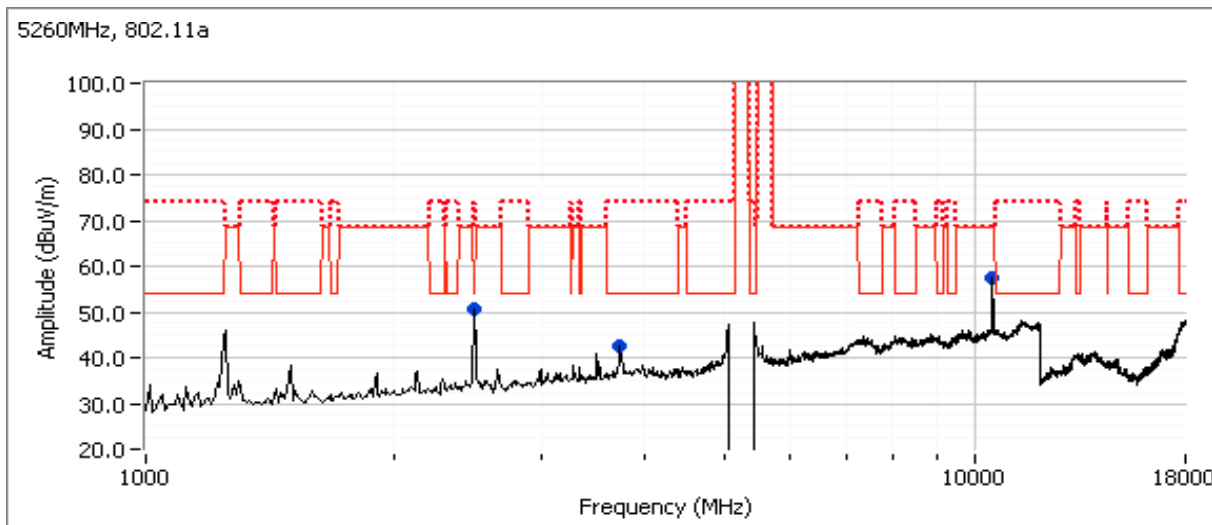
	Target (dBm)	Power Settings Measured (dBm)	Software Setting
Chain Main			q71

**Spurious Radiated Emissions:**

Frequency MHz	Level dB $\mu$ V/m	Pol v/h	15.209 / 15E		Detector PK/QP/Avg	Azimuth degrees	Height meters	Comments
			Limit	Margin				
10523.210	65.1	V	68.3	-3.2	PK	360	1.5	RB 1 MHz;VB 1 MHz;Peak
3742.510	31.8	H	54.0	-22.2	AVG	80	1.0	RB 1 MHz;VB 10 Hz;Peak
3743.460	51.6	H	74.0	-22.4	PK	80	1.0	RB 1 MHz;VB 3 MHz;Peak
2496.710	35.0	V	54.0	-19.0	AVG	35	0.9	RB 1 MHz;VB 10 Hz;Peak
2498.810	58.7	V	74.0	-15.3	PK	35	0.9	RB 1 MHz;VB 3 MHz;Peak

Note 1: For emissions in restricted bands, the limit of 15.209 was used which requires average and peak measurements.

Note 2: For emissions outside of the restricted bands the limit is -27dBm/MHz eirp (68.3dBuV/m). The measurement method required is the same measurement method used to determine the in-band power spectral density or a peak measurement (RB=1MHz, VB>1MHz).





# EMC Test Data

Client: Broadcom Corporation	Job Number: J88870
Model: BRCM943228HM4L (C2PC to add new antenna)	T-Log Number: T88992
	Account Manager: Sheareen Jacobs
Contact: Anne Liang	
Standard: 15.247, 15.E, RSS-210, LP0002	Class: N/A

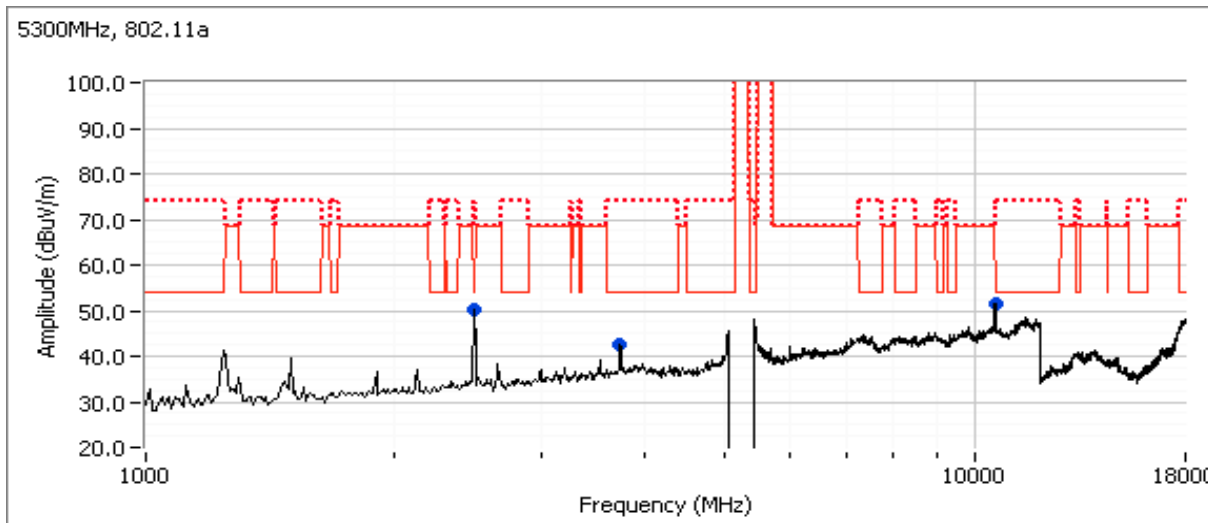
## Run #1e: EUT on Channel #60 5300MHz - 802.11a, Chain Main

	Target (dBm)	Power Settings Measured (dBm)	Software Setting
Chain Main			q63

### Spurious Radiated Emissions:

Frequency MHz	Level dB $\mu$ V/m	Pol v/h	15.209 / 15E		Detector PK/QP/Avg	Azimuth degrees	Height meters	Comments
			Limit	Margin				
10600.000	46.5	V	54.0	-7.5	AVG	12	1.3	RB 1 MHz;VB 10 Hz;Peak
10600.140	59.0	V	74.0	-15.0	PK	12	1.3	RB 1 MHz;VB 3 MHz;Peak
3731.140	32.4	V	54.0	-21.6	AVG	53	1.0	RB 1 MHz;VB 10 Hz;Peak
3732.910	55.3	V	74.0	-18.7	PK	53	1.0	RB 1 MHz;VB 3 MHz;Peak
2490.480	34.7	V	54.0	-19.3	AVG	33	1.2	RB 1 MHz;VB 10 Hz;Peak
2489.450	58.4	V	74.0	-15.6	PK	33	1.2	RB 1 MHz;VB 3 MHz;Peak

- Note 1: For emissions in restricted bands, the limit of 15.209 was used which requires average and peak measurements.
- Note 2: For emissions outside of the restricted bands the limit is -27dBm/MHz eirp (68.3dBuV/m). The measurement method required is the same measurement method used to determine the in-band power spectral density or a peak measurement (RB=1MHz, VB>1MHz).
- Note 3: Scans made between 18 - 40GHz with the measurement antenna moved around the card and its antennas 20-50cm from the device indicated there were no significant emissions in this frequency range



Client: Broadcom Corporation	Job Number: J88870
Model: BRCM943228HM4L (C2PC to add new antenna)	T-Log Number: T88992
	Account Manager: Sheareen Jacobs
Contact: Anne Liang	
Standard: 15.247, 15.E, RSS-210, LP0002	Class: N/A

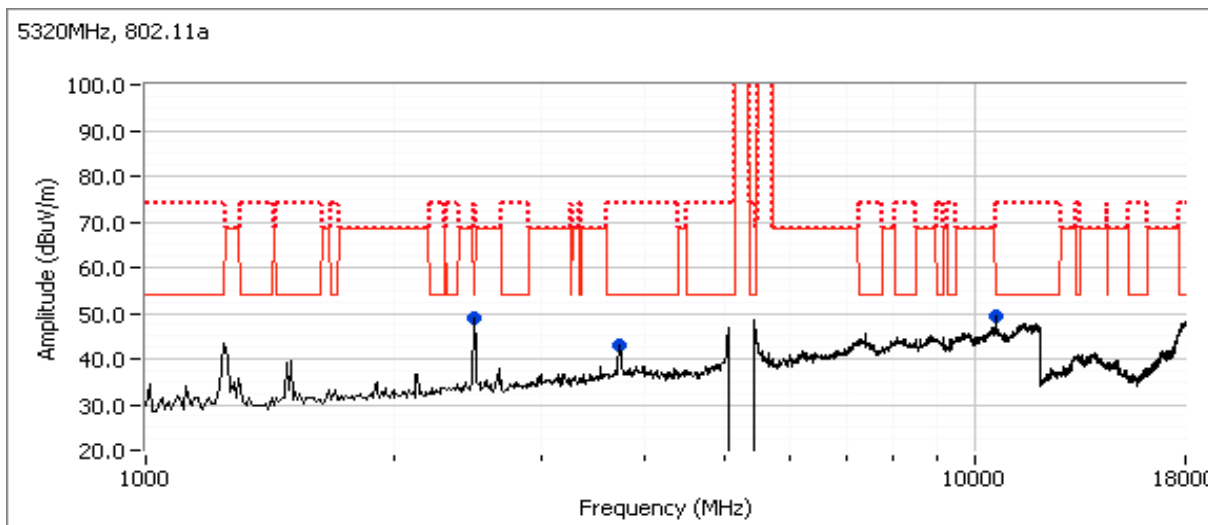
**Run #1f: EUT on Channel #64 5320MHz - 802.11a, Chain Main**

	Target (dBm)	Power Settings Measured (dBm)	Software Setting
Chain Main			q57

**Spurious Radiated Emissions:**

Frequency MHz	Level dB $\mu$ V/m	Pol v/h	15.209 / 15E		Detector PK/QP/Avg	Azimuth degrees	Height meters	Comments
			Limit	Margin				
10640.020	46.2	V	54.0	-7.8	AVG	180	1.3	RB 1 MHz;VB 10 Hz;Peak
10645.750	57.1	V	74.0	-16.9	PK	180	1.3	RB 1 MHz;VB 3 MHz;Peak
3737.970	31.9	V	54.0	-22.1	AVG	138	1.0	RB 1 MHz;VB 10 Hz;Peak
3738.950	53.2	V	74.0	-20.8	PK	138	1.0	RB 1 MHz;VB 3 MHz;Peak
2497.090	35.3	V	54.0	-18.7	AVG	41	1.0	RB 1 MHz;VB 10 Hz;Peak
2490.990	57.7	V	74.0	-16.3	PK	41	1.0	RB 1 MHz;VB 3 MHz;Peak

- Note 1: For emissions in restricted bands, the limit of 15.209 was used which requires average and peak measurements.
- Note 2: For emissions outside of the restricted bands the limit is -27dBm/MHz eirp (68.3dB $\mu$ V/m). The measurement method required is the same measurement method used to determine the in-band power spectral density or a peak measurement (RB=1MHz, VB>1MHz).



Client: Broadcom Corporation	Job Number: J88870
Model: BRCM943228HM4L (C2PC to add new antenna)	T-Log Number: T88992
	Account Manager: Sheareen Jacobs
Contact: Anne Liang	
Standard: 15.247, 15.E, RSS-210, LP0002	Class: N/A

**Run #1g: EUT on Channel #100 5500MHz - 802.11a, Chain Main**

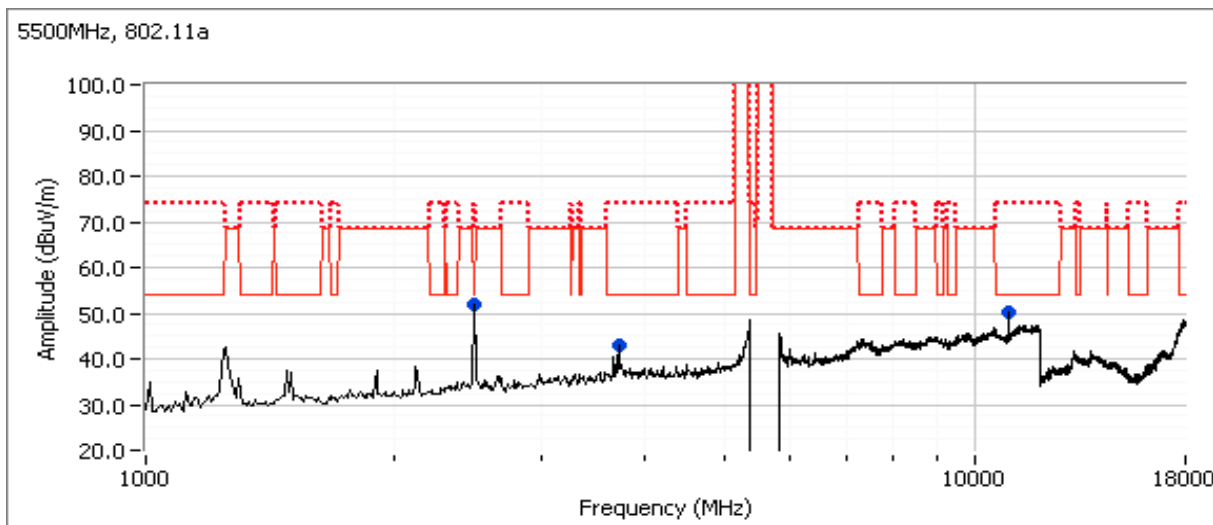
	Target (dBm)	Power Settings Measured (dBm)	Software Setting
Chain Main			q67

**Spurious Radiated Emissions:**

Frequency MHz	Level dB $\mu$ V/m	Pol v/h	15.209 / 15E		Detector PK/QP/Avg	Azimuth degrees	Height meters	Comments
			Limit	Margin				
11000.790	43.6	V	54.0	-10.4	AVG	205	1.5	RB 1 MHz;VB 10 Hz;Peak
11000.520	54.2	V	74.0	-19.8	PK	205	1.5	RB 1 MHz;VB 3 MHz;Peak
2496.370	35.6	V	54.0	-18.4	AVG	27	1.0	RB 1 MHz;VB 10 Hz;Peak
2494.840	58.8	V	74.0	-15.2	PK	27	1.0	RB 1 MHz;VB 3 MHz;Peak
3754.360	32.2	V	54.0	-21.8	AVG	34	1.0	RB 1 MHz;VB 10 Hz;Peak
3755.230	50.6	V	74.0	-23.4	PK	34	1.0	RB 1 MHz;VB 3 MHz;Peak

Note 1: For emissions in restricted bands, the limit of 15.209 was used which requires average and peak measurements.

Note 2: For emissions outside of the restricted bands the limit is -27dBm/MHz eirp (68.3dB $\mu$ V/m). The measurement method required is the same measurement method used to determine the in-band power spectral density or a peak measurement (RB=1MHz, VB>1MHz).





# EMC Test Data

Client: Broadcom Corporation	Job Number: J88870
Model: BRCM943228HM4L (C2PC to add new antenna)	T-Log Number: T88992
	Account Manager: Sheareen Jacobs
Contact: Anne Liang	
Standard: 15.247, 15.E, RSS-210, LP0002	Class: N/A

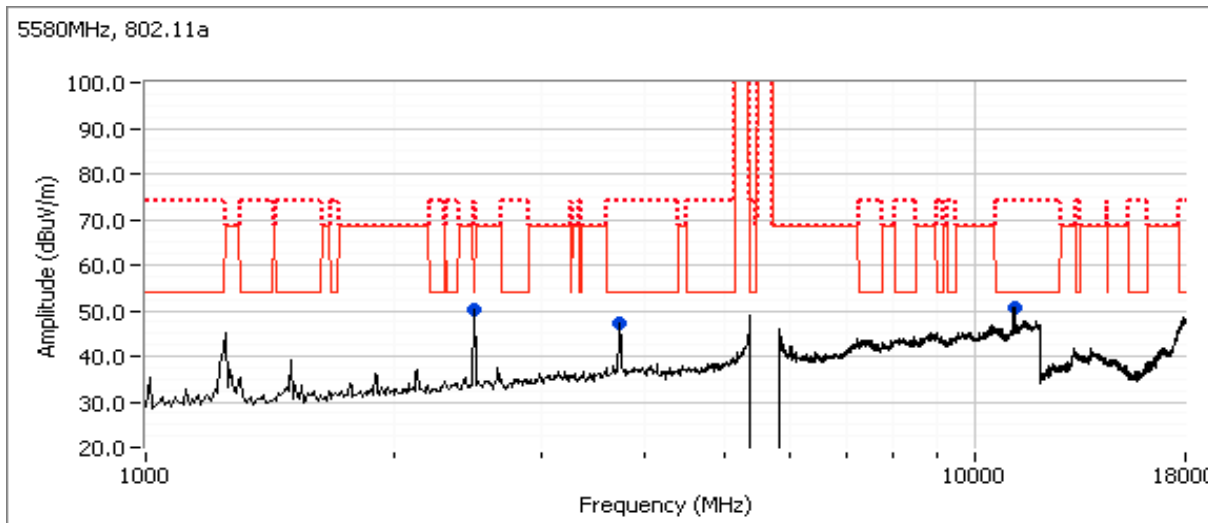
**Run #1h: EUT on Channel #116 5580MHz - 802.11a, Chain Main**

	Target (dBm)	Power Settings Measured (dBm)	Software Setting
Chain Main			q70

**Spurious Radiated Emissions:**

Frequency MHz	Level dBμV/m	Pol v/h	15.209 / 15E		Detector PK/QP/Avg	Azimuth degrees	Height meters	Comments
			Limit	Margin				
11161.020	45.7	V	54.0	-8.3	AVG	179	1.5	RB 1 MHz;VB 10 Hz;Peak
11161.620	56.0	V	74.0	-18.0	PK	179	1.5	RB 1 MHz;VB 3 MHz;Peak
2498.440	37.2	V	54.0	-16.8	AVG	20	0.9	RB 1 MHz;VB 10 Hz;Peak
2498.950	57.3	V	74.0	-16.7	PK	20	0.9	RB 1 MHz;VB 3 MHz;Peak
3719.930	37.9	V	54.0	-16.1	AVG	41	1.0	RB 1 MHz;VB 10 Hz;Peak
3721.140	49.0	V	74.0	-25.0	PK	41	1.0	RB 1 MHz;VB 3 MHz;Peak

- Note 1: For emissions in restricted bands, the limit of 15.209 was used which requires average and peak measurements.
- Note 2: For emissions outside of the restricted bands the limit is -27dBm/MHz eirp (68.3dBuV/m). The measurement method required is the same measurement method used to determine the in-band power spectral density or a peak measurement (RB=1MHz, VB>1MHz).
- Note 3: Scans made between 18 - 40GHz with the measurement antenna moved around the card and its antennas 20-50cm from the device indicated there were no significant emissions in this frequency range







# EMC Test Data

Client: Broadcom Corporation	Job Number: J88870
Model: BRCM943228HM4L (C2PC to add new antenna)	T-Log Number: T88992
	Account Manager: Sheareen Jacobs
Contact: Anne Liang	
Standard: 15.247, 15.E, RSS-210, LP0002	Class: N/A

**Run #1i: EUT on Channel #140 5700MHz - 802.11a, Chain Main**

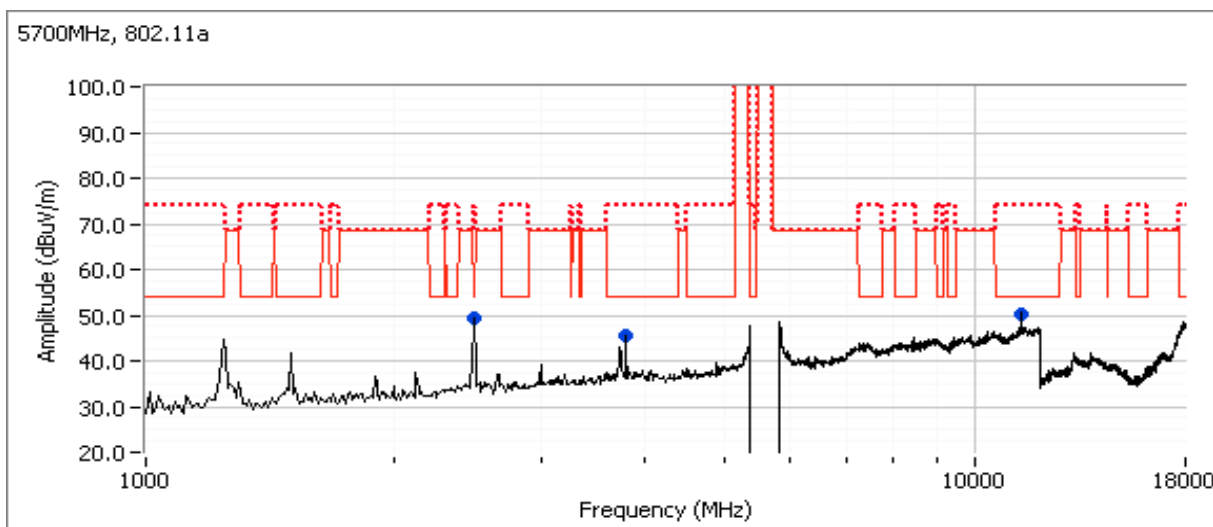
	Target (dBm)	Power Settings Measured (dBm)	Software Setting
Chain Main			q70

**Spurious Radiated Emissions:**

Frequency MHz	Level dBμV/m	Pol v/h	15.209 / 15E		Detector PK/QP/Avg	Azimuth degrees	Height meters	Comments
			Limit	Margin				
11400.370	44.9	V	54.0	-9.1	AVG	290	0.9	RB 1 MHz;VB 10 Hz;Peak
11397.710	57.2	V	74.0	-16.8	PK	290	0.9	RB 1 MHz;VB 3 MHz;Peak
3799.970	44.3	V	54.0	-9.7	AVG	254	1.6	RB 1 MHz;VB 10 Hz;Peak
3800.040	48.5	V	74.0	-25.5	PK	254	1.6	RB 1 MHz;VB 3 MHz;Peak
2497.220	38.5	V	54.0	-15.5	AVG	32	1.0	RB 1 MHz;VB 10 Hz;Peak
2498.560	59.0	V	74.0	-15.0	PK	32	1.0	RB 1 MHz;VB 3 MHz;Peak

Note 1: For emissions in restricted bands, the limit of 15.209 was used which requires average and peak measurements.

Note 2: For emissions outside of the restricted bands the limit is -27dBm/MHz eirp (68.3dBuV/m). The measurement method required is the same measurement method used to determine the in-band power spectral density or a peak measurement (RB=1MHz, VB>1MHz).



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