

*EMC Test Report*

*Application for Grant of Equipment Authorization*

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

*Model: BCM94330UARTSDB (802.11bgn WLAN + BT combo  
Card (2.4GHz, SISO only)*

IC CERTIFICATION #: 4324A-BRCM1065  
FCC ID: QDS-BRCM1065

APPLICANT: Broadcom Corporation  
190 Mathilda Ave.  
Sunnyvale, CA 94086

TEST SITE(S): Elliott Laboratories  
41039 Boyce Road.  
Fremont, CA. 94538-2435

IC SITE REGISTRATION #: 2845B-5

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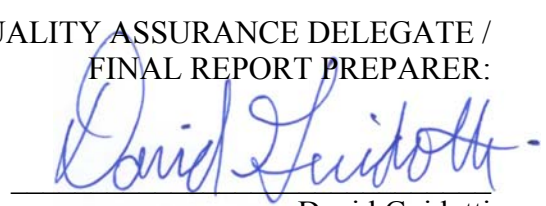
PROGRAM MGR /  
TECHNICAL REVIEWER:



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Mark E Hill  
Staff Engineer

QUALITY ASSURANCE DELEGATE /  
FINAL REPORT PREPARER:



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David Guidotti  
Senior Technical Writer



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**REVISION HISTORY**

Rev#	Date	Comments	Modified By
-	05-08-2012	First release	

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## SCOPE

An electromagnetic emissions test has been performed on the Broadcom Corporation model BCM94330UARTSDB (802.11bgn WLAN + BT combo Card (2.4GHz, SISO only), 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 C

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

ANSI C63.4:2003  
FHSS test procedure DA 00-0705A1, March 2000

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 BCM94330UARTSDB (802.11bgn WLAN + BT combo Card (2.4GHz, SISO only) complied with the requirements of the following regulations:

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 C

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 BCM94330UARTSDB (802.11bgn WLAN + BT combo Card (2.4GHz, SISO only) 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****FREQUENCY HOPPING SPREAD SPECTRUM (2400 – 2483.5 MHz, 75 channels or more)**

FCC Rule Part	RSS Rule Part	Description	Measured Value / Comments	Limit / Requirement	Result
15.247 (a) (1)	RSS 210 A8.1 (1)	20dB Bandwidth	Basic: 1056 kHz EDR: 1400 kHz	Channel spacing > 20dB bandwidth	Complies
		Channel Separation	1000 kHz		Complies
15.247 (a) (1) (iii)	RSS 210 A8.1 (4)	Channel Dwell Time ( <i>average time of occupancy</i> )	Device complies with the Bluetooth 2 specifications with a minimum of 20 hopping channels	<0.4 second within a period of 0.4 x number of channels	Complies
15.247 (a) (1) (iii)	RSS 210 A8.1 (4)	Number of Channels		75 or more	Complies
15.247 (a) (1)	RSS 210 A8.1 (1)	Channel Utilization	The system uses the Bluetooth algorithm and, therefore, meets all requirements for channel utilization.	All channels shall, on average, be used equally	Complies
15.247 (b) (3)	RSS 210 A8.4 (2)	Output Power (multipoint systems)	GFSK: 1.8 dBm (1.5mW)  8PSK: 1.6 dBm (1.4mW)  EIRP = 3.7mW <sup>Note 1</sup>	1 Watt, EIRP limited to 4 Watts.	Complies
15.247(c)	RSS 210 A8.5	Spurious Emissions – 30MHz – 25GHz	All spurious emissions < -20dBc	< -20dBc	Complies
15.247(c) / 15.209	RSS 210 A8.5 Table 2, 3	Radiated Spurious Emissions 30MHz – 25GHz	40.8 dB $\mu$ V/m @ 4881.9 MHz (-13.2 dB)	15.207 in restricted bands, all others < -20dBc	Complies (- ?? dB)
15.247 (a) (1)	RSS 210 A8.1(2)	Receiver bandwidth	Refer to operational description	Shall match the channel bandwidth	Complies
Note 1: EIRP calculated using antenna gain of 3.9 dBi					

**GENERAL REQUIREMENTS APPLICABLE TO ALL BANDS**

FCC Rule Part	RSS Rule part	Description	Measured Value / Comments	Limit / Requirement	Result (margin)
15.203	-	RF Connector	EUT uses u.FL connectors	Unique or integral antenna required	Complies
15.207	RSS GEN Table 2	AC Conducted Emissions	45.8 dB $\mu$ V @ 0.291 MHz (-4.7 dB)	Refer to page 19	Complies
15.109	RSS GEN 7.2.3 Table 1	Receiver spurious emissions	-	-	N/A
15.247 (b) (5) 15.407 (f)	RSS 102	RF Exposure Requirements	Refer to MPE calculations in Exhibit 11, RSS 102 declaration and User Manual statements.	Refer to OET 65, FCC Part 1 and RSS 102	Complies
-	RSP 100 RSS GEN 7.1.5	User Manual		Statement required regarding non-interference	Complies
-	RSP 100 RSS GEN 7.1.5	User Manual		Statement for products with detachable antenna	Complies
-	RSP 100 RSS GEN 4.4.1	99% Bandwidth	Basic: 920 kHz EDR: 1247 kHz	Information only	N/A

**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 BCM94330UARTSDB (802.11bgn WLAN + BT combo Card (2.4GHz, SISO only) is an 802.11bgn (20MHz SISO only) + Bluetooth 4.0 radio module. 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 powered from 3.3V from the host system.

The sample was received on March 20, 2011 and tested on April 12-17, 19-20, and 26, 2012. The EUT consisted of the following component(s):

Company	Model	Description	Serial Number	FCC ID
Broadcom	BCM94330UA RTSDB	802.11bgn WLAN + BT 4.0, 20MHz SISO only module	81	QDS- BRCM1065

**OTHER EUT DETAILS**

The following EUT details should be noted: 802.11g is being tested as representative of 802.11n20 SISO mode per Broadcom test plan

The Bluetooth is rev 4.0, supporting the basic, EDR and LE modes. The results for the basic and EDR modes are reported here. The results for the LE mode is reported in Elliott report R87268.

**ANTENNA SYSTEM**

The EUT antenna is a 3.9dBi WLAN antenna.

The antenna connects to the EUT via a non-standard u.FL 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 Elliott.

**SUPPORT EQUIPMENT**

The following equipment was used as local support equipment for testing (radio):

Company	Model	Description	Serial Number	FCC ID
Dell	E6400	Laptop	-	-
Broadcom	BCM9433EVB	Test Board	-	-
Broadcom	-	Support Board	-	-
-	-	PCMCIA card	-	-

No remote support equipment was used during testing.

The following equipment was used as local support equipment for testing (AC conducted emissions):

Company	Model	Description	Serial Number	FCC ID
Dell	E6400	Laptop	-	-
Broadcom	BCM9433EVB	Test Board	-	-
Broadcom	-	Support Board	-	-
-	-	PCMCIA card	-	-
HP	5650	Printer	C64904	-

The following equipment was used as remote support equipment for testing (AC conducted emissions):

Company	Model	Description	Serial Number	FCC ID
Cisco	SD2005	Switch	DNI145303V1	-

**EUT INTERFACE PORTS**

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

Port		Description	Cable(s)	
From	To		Shielded/Unshielded	Length(m)
Main	Main Antenna	-	-	-
AUX	Aux Antenna	-	-	-
EUT board	Test Board	-	-	-
Test Board	Support Board	-	-	-
Support Board	PCMCIA card	-	-	-
PCMCIA card	Laptop	-	-	-
AC Power	AC Mains	2Wire	Unshielded	1.5

The I/O cabling configuration during testing (AC conducted emissions) was as follows:

Port		Description	Cable(s)	
From	To		Shielded/Unshielded	Length(m)
Main	Main Antenna	-	-	-
AUX	Aux Antenna	-	-	-
EUT board	Test Board	-	-	-
Test Board	Support Board	-	-	-
Support Board	PCMCIA card	-	-	-
PCMCIA card	Laptop	-	-	-
Laptop - AC Power	AC Mains	2Wire	Unshielded	1.5
Laptop - USB	Printer	USB	Shielded	1.0
Laptop - Ethernet	Switch	Cat 5	Unshielded	5.0

**EUT OPERATION**

During testing, the EUT was configured to continuously transmit at the noted channel at the maximum output power.

**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 5	211948	2845B-5	41039 Boyce Road Fremont, CA 94538-2435

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.

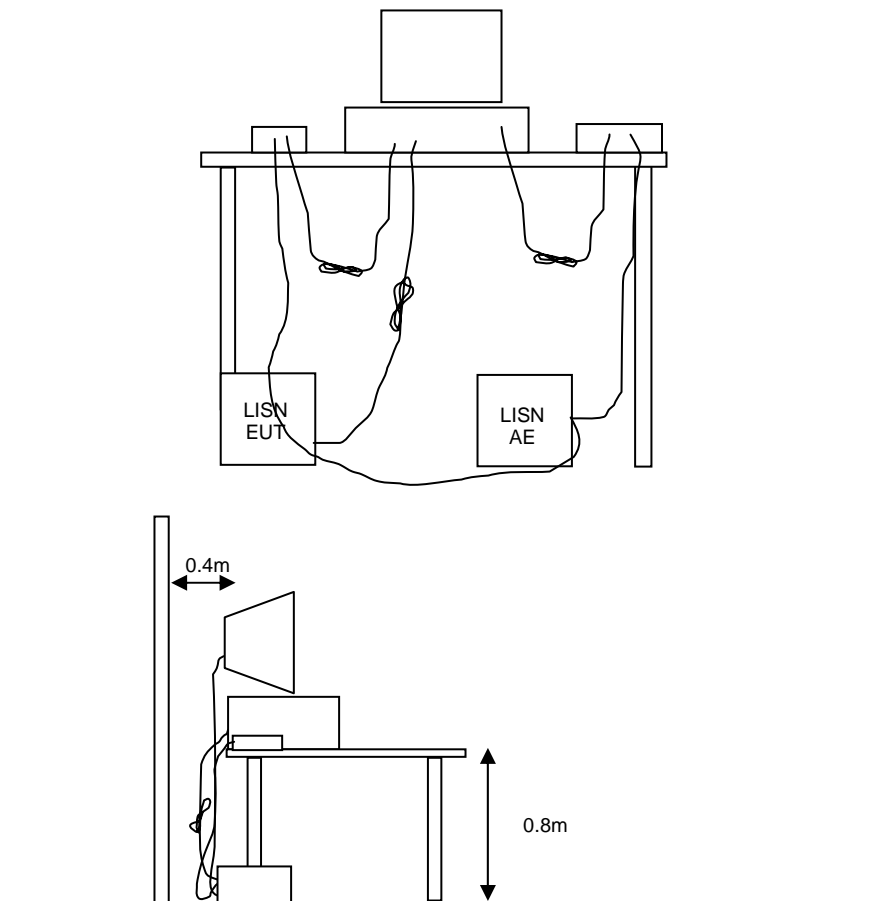
## TEST PROCEDURES

### 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**

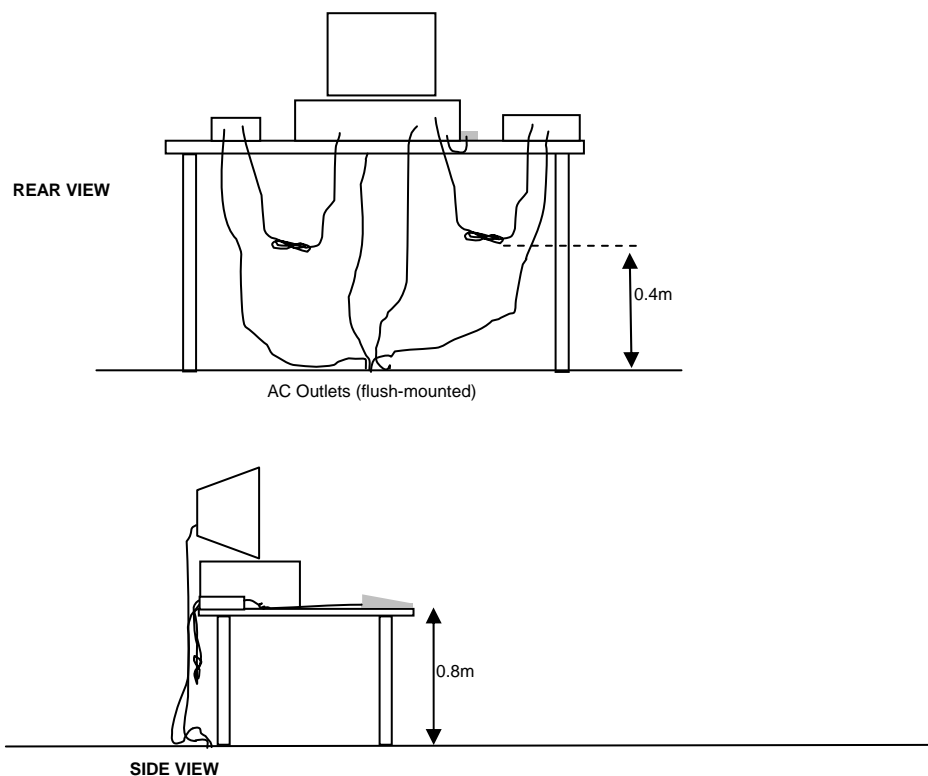
**RADIATED EMISSIONS**

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.

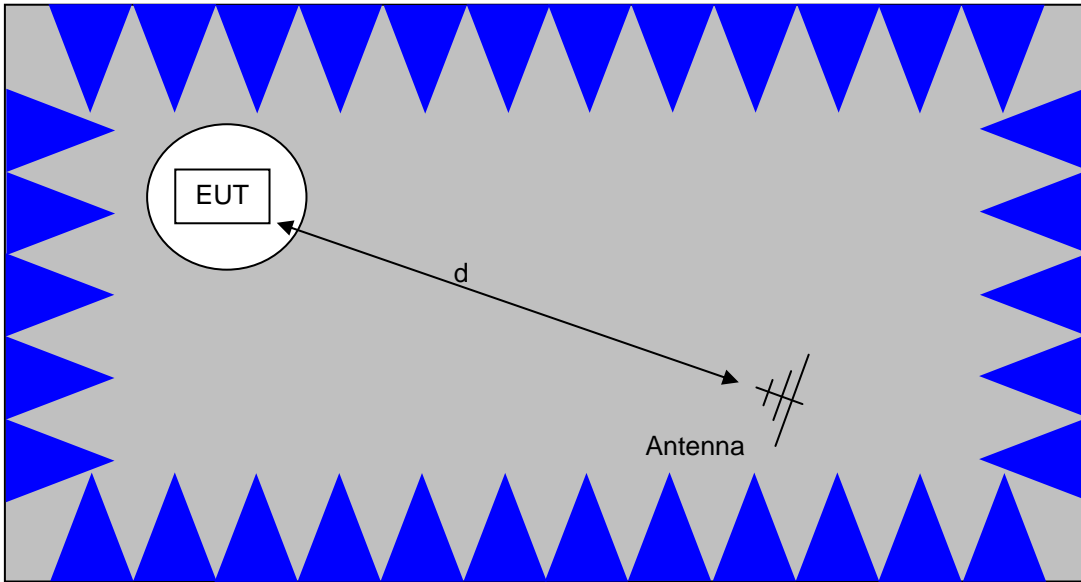
Final maximization is a phase in which the highest amplitude emissions identified in the spectral search are viewed while the EUT azimuth angle is varied from 0 to 360 degrees relative to the receiving antenna. The azimuth, which results in the highest emission is then maintained while varying the antenna 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 1 meter from the EUT and the antenna height is restricted to a maximum of 2.5 meters.



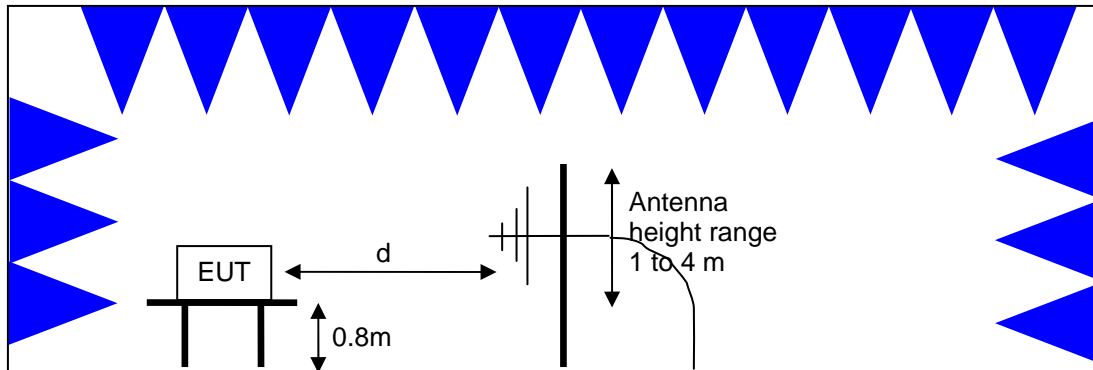
Typical Test Configuration for Radiated Field Strength Measurements





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.

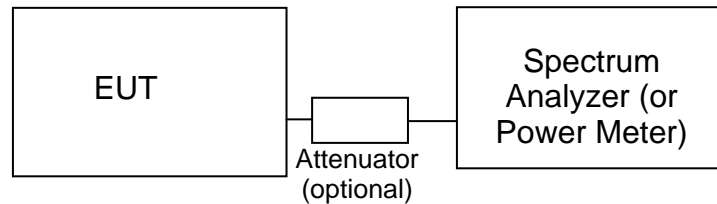
Floor-standing equipment is placed on the floor with insulating supports between the unit and the ground plane.



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 Elliott'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:

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

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

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

**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

**OUTPUT POWER LIMITS – FHSS SYSTEMS**

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

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

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

**TRANSMIT MODE SPURIOUS RADIATED EMISSIONS LIMITS – FHSS and DTS SYSTEMS**

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

**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:

$$F_d = \text{Distance Factor in dB}$$

$$D_m = \text{Measurement Distance in meters}$$

$$D_s = \text{Specification Distance in meters}$$

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:

$$R_r = \text{Receiver Reading in dBuV/m}$$

$$F_d = \text{Distance Factor in dB}$$

$$R_c = \text{Corrected Reading in dBuV/m}$$

$$L_s = \text{Specification Limit in dBuV/m}$$

$$M = \text{Margin in dB Relative to Spec}$$

---

**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>Radiated Emissions, 1,000 - 26,500 MHz, 12-Apr-12</b>				
EMCO	Antenna, Horn, 1-18 GHz (SA40-Blu)	3115	1386	9/21/2012
Micro-Tronics	Band Reject Filter, 2400-2500 MHz	BRM50702-02	1683	8/3/2012
Hewlett Packard	Microwave Preamplifier, 1- 26.5GHz	8449B	2199	2/23/2013
Hewlett Packard	SpecAn 9 kHz - 40 GHz, (SA40) Purple	8564E (84125C)	2415	7/28/2012
<b>Radiated Emissions, 1000 - 12,000 MHz, 13-Apr-12</b>				
Hewlett Packard	Microwave Preamplifier, 1- 26.5GHz	8449B	263	3/29/2013
EMCO	Antenna, Horn, 1-18 GHz	3115	786	12/19/2013
Hewlett Packard	SpecAn 30 Hz -40 GHz, SV (SA40) Red	8564E (84125C)	1148	8/15/2012
<b>Radiated Emissions, 1,000 - 18,000 MHz, 14-Apr-12</b>				
Hewlett Packard	Microwave Preamplifier, 1- 26.5GHz	8449B	263	3/29/2013
EMCO	Antenna, Horn, 1-18 GHz (SA40-Blu)	3115	1386	9/21/2012
Micro-Tronics	Band Reject Filter, 2400-2500 MHz	BRM50702-02	2249	10/11/2012
Rohde & Schwarz	EMI Test Receiver, 20 Hz-40 GHz	ESIB40 (1088.7490.40)	2493	12/9/2012
<b>Radiated Emissions, 1,000 - 18,000 MHz, 15-Apr-12</b>				
Hewlett Packard	Microwave Preamplifier, 1- 26.5GHz	8449B	263	3/29/2013
EMCO	Antenna, Horn, 1-18 GHz (SA40-Blu)	3115	1386	9/21/2012
Micro-Tronics	Band Reject Filter, 2400-2500 MHz	BRM50702-02	2249	10/11/2012
Rohde & Schwarz	EMI Test Receiver, 20 Hz-40 GHz	ESIB40 (1088.7490.40)	2493	12/9/2012
<b>Radiated Spurious Emissions, 1000 - 25,000 MHz, 16-Apr-12</b>				
Hewlett Packard	Microwave Preamplifier, 1- 26.5GHz	8449B	263	3/29/2013
EMCO	Antenna, Horn, 1-18 GHz (SA40-Blu)	3115	1386	9/21/2012
Hewlett Packard	HF Amplifier, 45 MHz -50 GHz (with 1620)	83051A (84125C)	1742	5/9/2012
Hewlett Packard	HF Amplifier, 45 MHz -50 GHz (with 1620)	83051A (84125C)	1743	5/9/2012
A.H. Systems	Blue System Horn, 18-40GHz	SAS-574, p/n: 2581	2159	4/23/2012
Micro-Tronics	Band Reject Filter, 2400-2500 MHz	BRM50702-02	2249	10/11/2012
<b>Radio Antenna Port (Power and Spurious Emissions), 17-Apr-12</b>				
Hewlett Packard	SpecAn 30 Hz -40 GHz, SV (SA40) Red	8564E (84125C)	1148	8/15/2012



<u>Manufacturer</u>	<u>Description</u>	<u>Model</u>	<u>Asset #</u>	<u>Cal Due</u>
Rohde & Schwarz	Power Sensor 100 uW - 2 Watts use with 20dB attenuator sn:100059 only	NRV-Z32	1423	9/1/2012
Rohde & Schwarz	Power Meter, Single Channel, +1795+1796	NRVS	1534	5/17/2012
<b>Radio Antenna Port (Power and Spurious Emissions), 19-Apr-12</b>				
Agilent	PSA, Spectrum Analyzer, (installed options, 111, 115, 123, 1DS, B7J, HYX,	E4446A	2139	2/23/2013
<b>Radiated Emissions, 1000 - 6,500 MHz, 19-Apr-12</b>				
EMCO	Antenna, Horn, 1-18 GHz	3115	487	7/6/2012
Hewlett Packard	Microwave Preamplifier, 1- 26.5GHz	8449B	2199	2/23/2013
Hewlett Packard	SpecAn 9 kHz - 40 GHz, (SA40) Purple	8564E (84125C)	2415	7/28/2012
<b>BLE and WiFi antenna port measurements, 20-Apr-12</b>				
Rohde & Schwarz	Power Meter, Single Channel	NRVS	1290	12/5/2012
Rohde & Schwarz	Power Sensor 100 uW - 2 Watts (w/ 20 dB pad, SN BJ5155)	NRV-Z32	1536	12/8/2012
Agilent	PSA, Spectrum Analyzer, (installed options, 111, 115, 123, 1DS, B7J, HYX,	E4446A	2139	2/23/2013
<b>Radiated Emissions, 30 - 12,000 MHz, 03-May-12</b>				
Hewlett Packard	Microwave Preamplifier, 1- 26.5GHz	8449B	263	3/29/2013
EMCO	Antenna, Horn, 1-18 GHz	3115	786	12/19/2013
Micro-Tronics	Band Reject Filter, 2400-2500 MHz	BRM50702-02	1683	8/3/2012
Hewlett Packard	SpecAn 9 kHz - 40 GHz, (SA40) Purple	8564E (84125C)	2415	7/28/2012
Rohde & Schwarz	EMI Test Receiver, 20 Hz-40 GHz	ESIB40 (1088.7490.40)	2493	12/9/2012
<b>Radio Antenna Port (Power and Spurious Emissions), 04-May-12</b>				
Hewlett Packard	SpecAn 9 kHz - 40 GHz, FT (SA40) Blue	8564E (84125C)	1393	5/1/2013
<b>Conducted Emissions - AC Power Ports, 26-Apr-12</b>				
Rohde & Schwarz	Pulse Limiter	ESH3 Z2	1594	5/17/2012
Fischer Custom Comm	LISN, 25A, 150kHz to 30MHz, 25 Amp,	FCC-LISN-50-25-2- 09	2000	10/18/2012
Fischer Custom Comm	LISN, 25A, 150kHz to 30MHz, 25 Amp,	FCC-LISN-50-25-2- 09	2001	2/15/2013
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:	J86739
Model:	BCM94330UARTSDB (802.11bg WLAN + BT 4.0, 20MHz SISO only) P103	T-Log Number:	T86804
Contact:	Anne Liang (Sachin Sawalapurkar)	Account Manager:	Sheareen Jacobs
Emissions Standard(s):	FCC 15.247, LP0002	Class:	-
Immunity Standard(s):	-	Environment:	-

# EMC Test Data

For The

## Broadcom Corporation

Model

BCM94330UARTSDB (802.11bg WLAN + BT 4.0, 20MHz SISO only) P103

Date of Last Test: 5/7/2012

Client:	Broadcom Corporation	Job Number:	J86739
Model:	BCM94330UARTSDB (802.11bg WLAN + BT 4.0, 20MHz SISO only) P103	T-Log Number:	T86804
		Account Manager:	Sheareen Jacobs
Contact:	Anne Liang (Sachin Sawalapurkar)		
Standard:	FCC 15.247, LP0002	Class:	N/A

## RSS 210 and FCC 15.247 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.

### General Test Configuration

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

### Ambient Conditions:

Temperature: 24 °C  
Rel. Humidity: 40 %

### Summary of Results - Device Operating in the 2400-2483.5 MHz Band

Run #	Mode	Channel	Power Setting	Measured Power	Test Performed	Limit	Result / Margin
Run #1	GFSK (Basic) Chain	2402	Index 0	-	Restricted Band Edge at 2390 MHz	15.209	35.5 dB $\mu$ V/m @ 2312.1 MHz (-18.5 dB)
		2480	Index 0	-	Restricted Band Edge at 2483.5 MHz	15.209	56.5 dB $\mu$ V/m @ 2486.5 MHz (-17.5 dB)
Run # 2	8PSK (EDR) Chain	2402	Index 0	-	Restricted Band Edge at 2390 MHz	15.209	34.5 dB $\mu$ V/m @ 2333.7 MHz (-19.5 dB)
		2480	Index 0	-	Restricted Band Edge at 2483.5 MHz	15.209	37.2 dB $\mu$ V/m @ 2483.5 MHz (-16.8 dB)

### 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.

### Sample Information

EUT s/n: 81  
Software driver:

### Notes

Bluetooth operation limited to Aux chain

Client:	Broadcom Corporation	Job Number:	J86739
Model:	BCM94330UARTSDB (802.11bg WLAN + BT 4.0, 20MHz SISO only) P103	T-Log Number:	T86804
		Account Manager:	Sheareen Jacobs
Contact:	Anne Liang (Sachin Sawalapurkar)		
Standard:	FCC 15.247, LP0002	Class:	N/A

**Run #1, Band Edge Field Strength - GFSK (Basic), Chain**

Date of Test: 4/14/2012

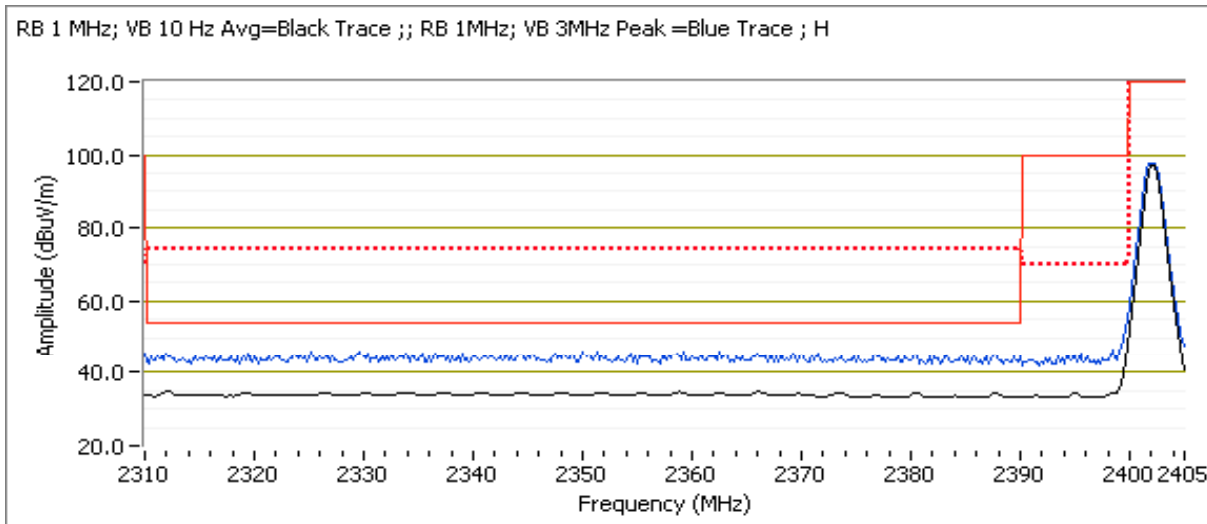
Test Location: FT5

Test Engineer: Jack Liu

Config Change: none

**Run #1a, EUT on Channel 2402 - GFSK (Basic), Chain**

	Target (dBm)	Power Settings Measured (dBm)	Software Setting
Chain			Index 0



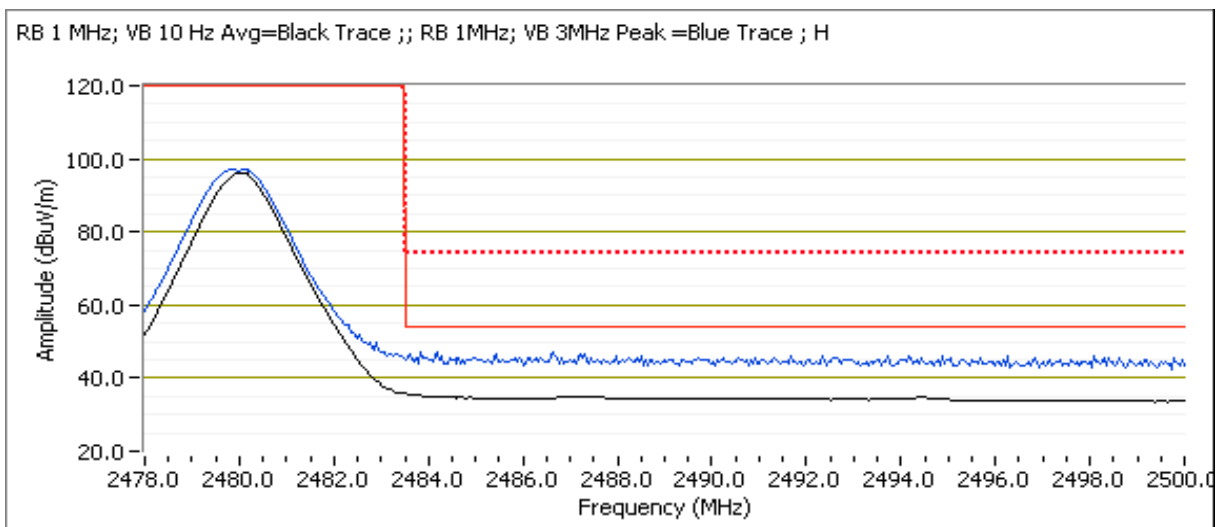
**2390 MHz Band Edge Signal Field Strength**

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dB $\mu$ V/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
2312.080	35.5	H	54.0	-18.5	AVG	109	1.1	
2333.890	34.5	V	54.0	-19.5	AVG	247	1.6	
2354.410	47.2	H	74.0	-26.8	PK	109	1.1	
2318.180	46.5	V	74.0	-27.5	PK	247	1.6	

Client:	Broadcom Corporation	Job Number:	J86739
Model:	BCM94330UARTSDB (802.11bg WLAN + BT 4.0, 20MHz SISO only) P103	T-Log Number:	T86804
		Account Manager:	Sheareen Jacobs
Contact:	Anne Liang (Sachin Sawalapurkar)		
Standard:	FCC 15.247, LP0002	Class:	N/A

**Run #1b, EUT on Channel 2480 - GFSK (Basic), Chain**

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



**2483.5 MHz Band Edge Signal Radiated Field Strength**

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBuV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
2486.540	56.5	V	74.0	-17.5	PK	0	1.9	
2483.500	36.1	H	54.0	-17.9	AVG	105	1.0	
2494.480	35.9	V	54.0	-18.1	AVG	0	1.9	
2484.490	47.9	H	74.0	-26.1	PK	105	1.0	

Client:	Broadcom Corporation	Job Number:	J86739
Model:	BCM94330UARTSDB (802.11bg WLAN + BT 4.0, 20MHz SISO only) P103	T-Log Number:	T86804
		Account Manager:	Sheareen Jacobs
Contact:	Anne Liang (Sachin Sawalapurkar)		
Standard:	FCC 15.247, LP0002	Class:	N/A

**Run # 2, Band Edge Field Strength - 8PSK (EDR), Chain**

Date of Test: 4/14/2012

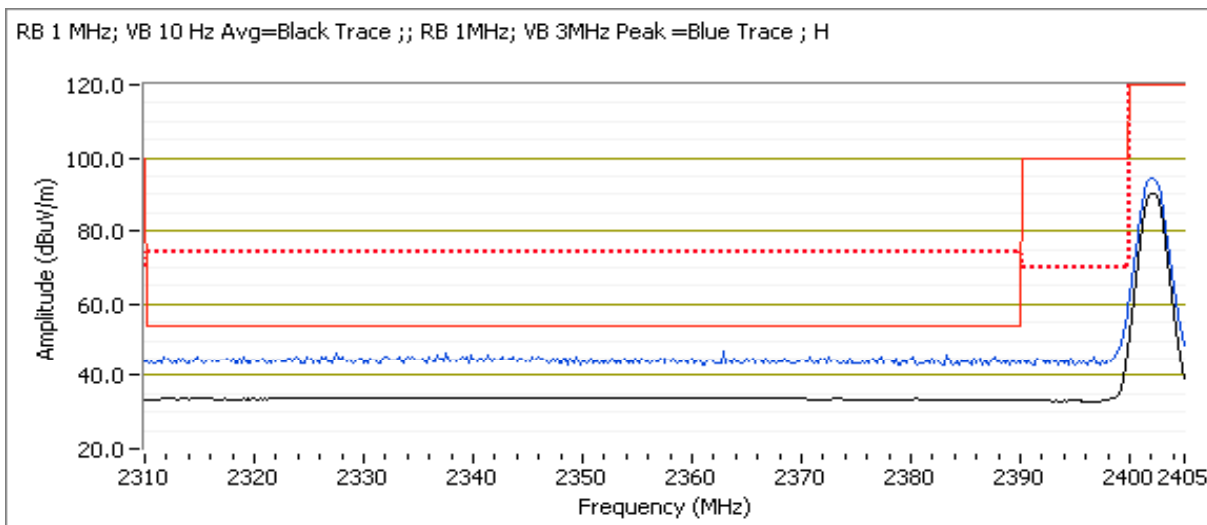
Test Location: FT5

Test Engineer: Jack Liu

Config Change: none

**Run # 2a, EUT on Channel 2402 - 8PSK (EDR), Chain**

	Target (dBm)	Power Settings Measured (dBm)	Software Setting
Chain			Index 0



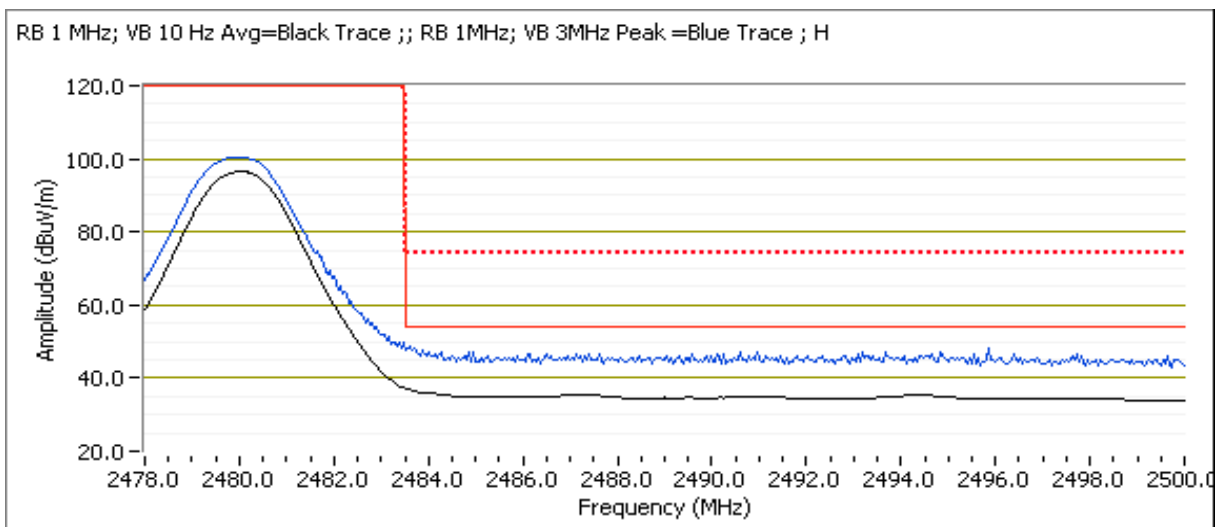
**2390 MHz Band Edge Signal Field Strength**

Frequency MHz	Level dB $\mu$ V/m	Pol v/h	15.209 / 15.247		Detector Pk/QP/Avg	Azimuth degrees	Height meters	Comments
			Limit	Margin				
2333.730	34.5	V	54.0	-19.5	AVG	52	1.6	
2334.210	34.5	H	54.0	-19.5	AVG	309	1.0	
2342.550	46.8	V	74.0	-27.2	PK	52	1.6	
2355.050	45.3	H	74.0	-28.7	PK	309	1.0	

Client:	Broadcom Corporation	Job Number:	J86739
Model:	BCM94330UARTSDB (802.11bg WLAN + BT 4.0, 20MHz SISO only) P103	T-Log Number:	T86804
		Account Manager:	Sheareen Jacobs
Contact:	Anne Liang (Sachin Sawalapurkar)		
Standard:	FCC 15.247, LP0002	Class:	N/A

Run # 2b, EUT on Channel 2480 - 8PSK (EDR), Chain

	Target (dBm)	Power Settings Measured (dBm)	Software Setting
Chain			Index 0



**2483.5 MHz Band Edge Signal Radiated Field Strength**

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBuV/m	v/h	Limit	Margin	PK/QP/Avg	degrees	meters	
2483.500	37.2	H	54.0	-16.8	AVG	123	1.0	
2489.420	35.9	V	54.0	-18.1	AVG	360	1.5	
2490.540	48.4	V	74.0	-25.6	PK	360	1.5	
2490.410	47.5	H	74.0	-26.5	PK	123	1.0	



Client:	Broadcom Corporation	Job Number:	J86739
Model:	BCM94330UARTSDB (802.11bg WLAN + BT 4.0, 20MHz SISO only) P103	T-Log Number:	T86804
		Account Manager:	Sheareen Jacobs
Contact:	Anne Liang (Sachin Sawalapurkar)		
Standard:	FCC 15.247, LP0002	Class:	N/A

### RSS 210 and FCC 15.247 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.

#### General Test Configuration

The EUT and all local support equipment were located on the turntable for radiated spurious emissions testing. All remote support equipment was located approximately 30 meters from the EUT with all I/O connections running on top of the groundplane or routed in overhead in the GR-1089 test configuration.

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

#### Ambient Conditions:

Temperature: 24 °C  
Rel. Humidity: 40 %

#### Summary of Results - Device Operating in the 2400-2483.5 MHz Band

Run #	Mode	Channel	Power Setting	Measured Power	Test Performed	Limit	Result / Margin
Run #1	GFSK (Basic) Chain	2402	index 0	-	Radiated Emissions, 1 - 26 GHz	FCC 15.209 / 15.247	39.2 dBµV/m @ 4804.0 MHz (-14.8 dB)
		2441	index 0	-			40.7 dBµV/m @ 4882.0 MHz (-13.3 dB)
		2480	index 0	-			39.9 dBµV/m @ 4960.0 MHz (-14.1 dB)
Run # 2	8PSK (EDR) Chain	2402	index 0	-	Radiated Emissions, 1 - 26 GHz	FCC 15.209 / 15.247	38.5 dBµV/m @ 4804.0 MHz (-15.5 dB)
		2441	index 0	-			40.8 dBµV/m @ 4881.9 MHz (-13.2 dB)
		2480	index 0	-			34.9 dBµV/m @ 4959.9 MHz (-19.1 dB)
Run # 3	RX Chain	2441	-	-	Radiated Emissions, 1 - 8 GHz	LP0002, Section 2.8	34.4 dBµV/m @ 2133.3 MHz (-19.6 dB)

Client:	Broadcom Corporation	Job Number:	J86739
Model:	BCM94330UARTSDB (802.11bg WLAN + BT 4.0, 20MHz SISO only) P103	T-Log Number:	T86804
		Account Manager:	Sheareen Jacobs
Contact:	Anne Liang (Sachin Sawalapurkar)		
Standard:	FCC 15.247, 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.

**Sample Information**

EUT s/n: 81

Software driver:

**Notes**

Bluetooth operation limited to Aux chain

No radio related emissions below 1GHz observed in preliminary testing.

Client:	Broadcom Corporation	Job Number:	J86739
Model:	BCM94330UARTSDB (802.11bg WLAN + BT 4.0, 20MHz SISO only) P103	T-Log Number:	T86804
		Account Manager:	Sheareen Jacobs
Contact:	Anne Liang (Sachin Sawalapurkar)		
Standard:	FCC 15.247, LP0002	Class:	N/A

**Run #1, Radiated Spurious Emissions, 1-26GHz, GFSK (Basic), Chain**

Date of Test: 4/14/2012

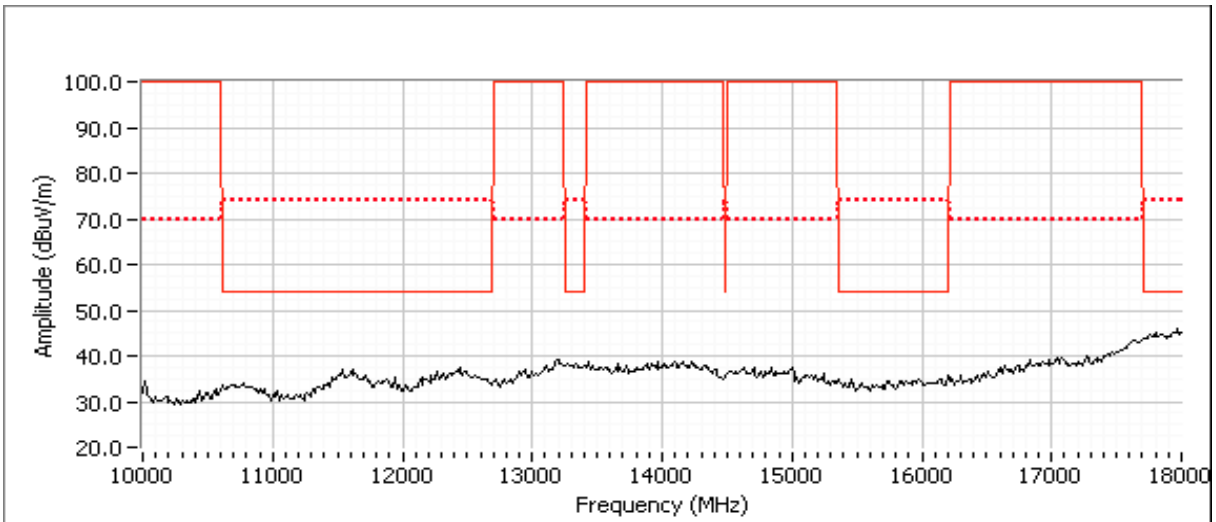
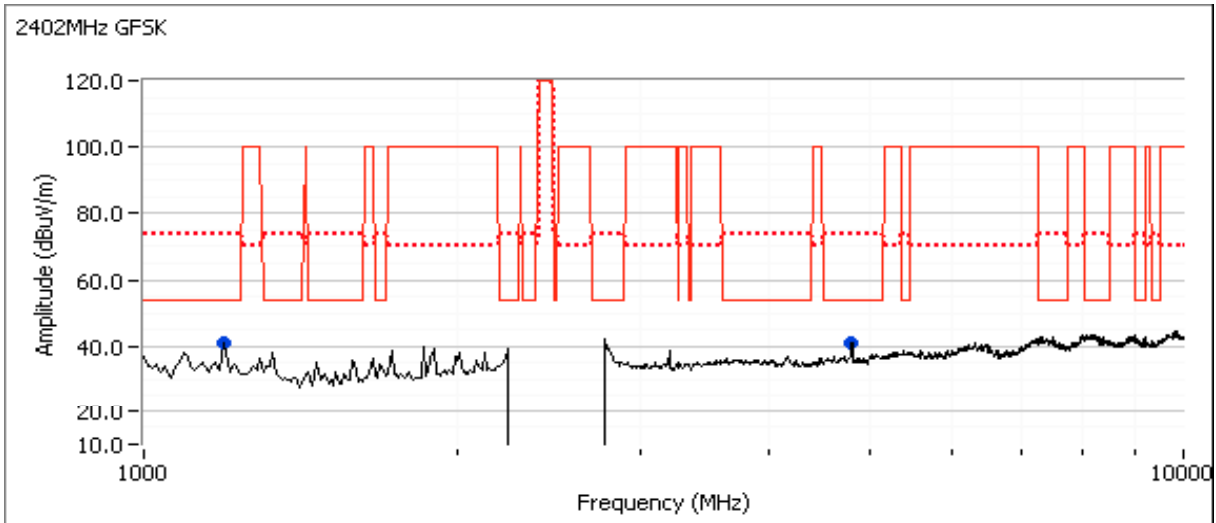
Test Location: FT5

Test Engineer: Jack Liu / R. Varelas

Config Change: none

**Run #1a, EUT on Channel 2402 - GFSK (Basic), Chain**

	Target (dBm)	Power Settings Measured (dBm)	Software Setting
Chain			Index 0



Client:	Broadcom Corporation	Job Number:	J86739
Model:	BCM94330UARTSDB (802.11bg WLAN + BT 4.0, 20MHz SISO only) P103	T-Log Number:	T86804
		Account Manager:	Sheareen Jacobs
Contact:	Anne Liang (Sachin Sawalapurkar)		
Standard:	FCC 15.247, LP0002	Class:	N/A

**Spurious Radiated Emissions:**

Frequency MHz	Level dB $\mu$ V/m	Pol v/h	15.209/15.247		Detector PK/QP/Avg	Azimuth degrees	Height meters	Comments
			Limit	Margin				
4803.970	39.2	V	54.0	-14.8	AVG	133	2.1	
4804.050	46.6	V	74.0	-27.4	PK	133	2.1	
1195.500	28.9	V	54.0	-25.1	AVG	360	1.9	
1197.100	44.6	V	74.0	-29.4	PK	360	1.9	

Note 1: For emissions in restricted bands, the limit of 15.209 was used. For all other emissions, the limit is -30dBc for peak measurements in a measurement bandwidth of 100kHz.

Client:	Broadcom Corporation	Job Number:	J86739
Model:	BCM94330UARTSDB (802.11bg WLAN + BT 4.0, 20MHz SISO only) P103	T-Log Number:	T86804
		Account Manager:	Sheareen Jacobs
Contact:	Anne Liang (Sachin Sawalapurkar)		
Standard:	FCC 15.247, LP0002	Class:	N/A

**Run #1b: , EUT on Channel 2441 - GFSK (Basic), Chain**

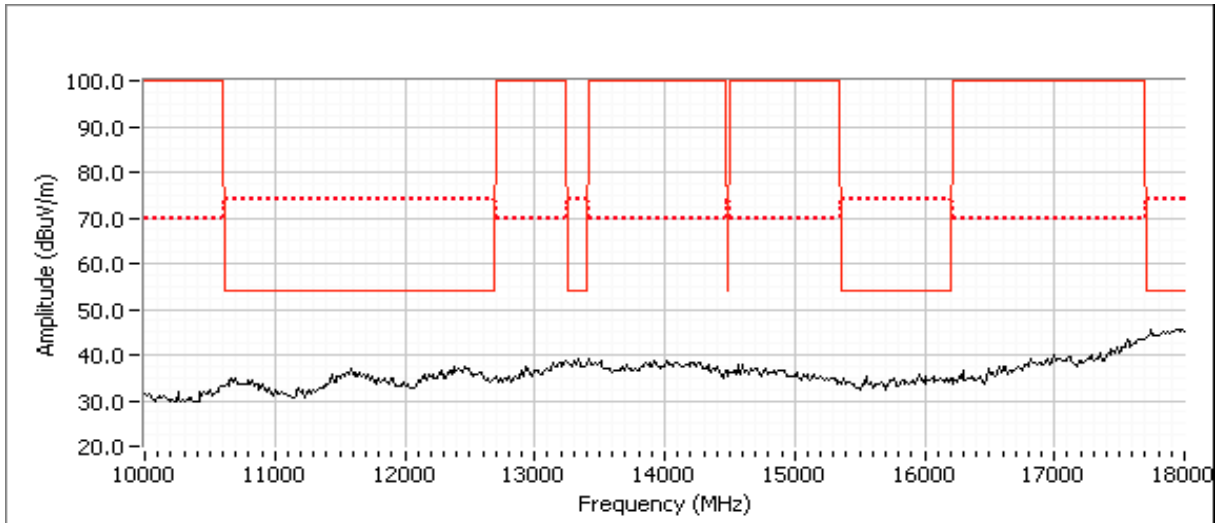
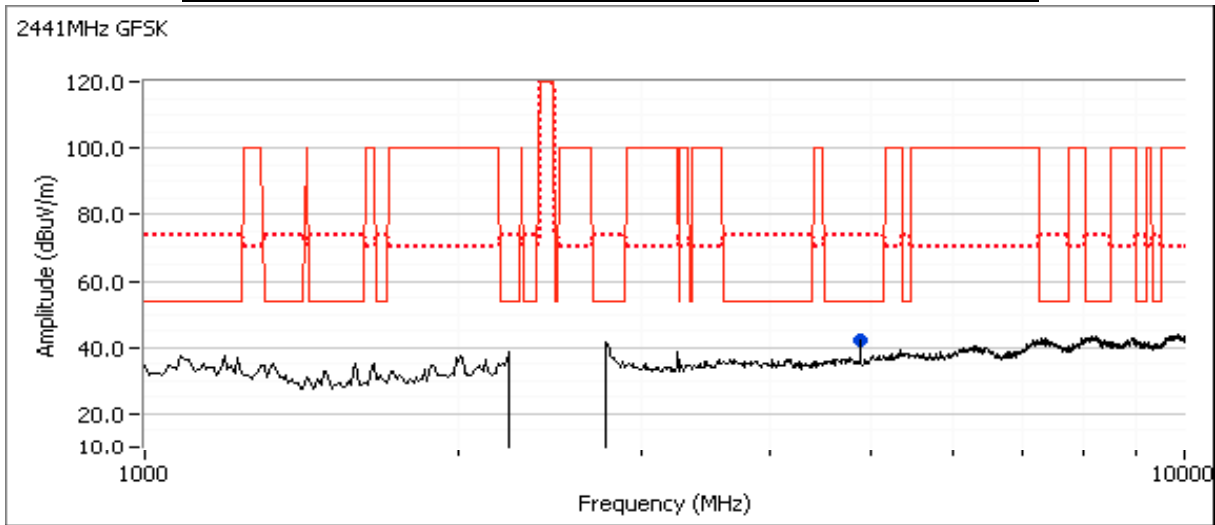
Date of Test: 4/14/2012

Test Location: FT5

Test Engineer: Jack Liu / R. Varelas

Config Change: none

	Target (dBm)	Power Settings Measured (dBm)	Software Setting
Chain			Index 0



Client:	Broadcom Corporation	Job Number:	J86739
Model:	BCM94330UARTSDB (802.11bg WLAN + BT 4.0, 20MHz SISO only) P103	T-Log Number:	T86804
		Account Manager:	Sheareen Jacobs
Contact:	Anne Liang (Sachin Sawalapurkar)		
Standard:	FCC 15.247, LP0002	Class:	N/A

**Spurious Radiated Emissions:**

Frequency MHz	Level dB $\mu$ V/m	Pol v/h	15.209/15.247		Detector PK/QP/Avg	Azimuth degrees	Height meters	Comments
			Limit	Margin				
4881.970	40.7	V	54.0	-13.3	AVG	132	1.4	
4882.000	46.7	V	74.0	-27.3	PK	132	1.4	

Note 1:	For emissions in restricted bands, the limit of 15.209 was used. For all other emissions, the limit is -30dBc for peak measurements in a measurement bandwidth of 100kHz.
Note 2:	Scans made between 18 - 25GHz 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:	J86739
Model:	BCM94330UARTSDB (802.11bg WLAN + BT 4.0, 20MHz SISO only) P103	T-Log Number:	T86804
		Account Manager:	Sheareen Jacobs
Contact:	Anne Liang (Sachin Sawalapurkar)		
Standard:	FCC 15.247, LP0002	Class:	N/A

Run #1c: , EUT on Channel 2480 - GFSK (Basic), Chain

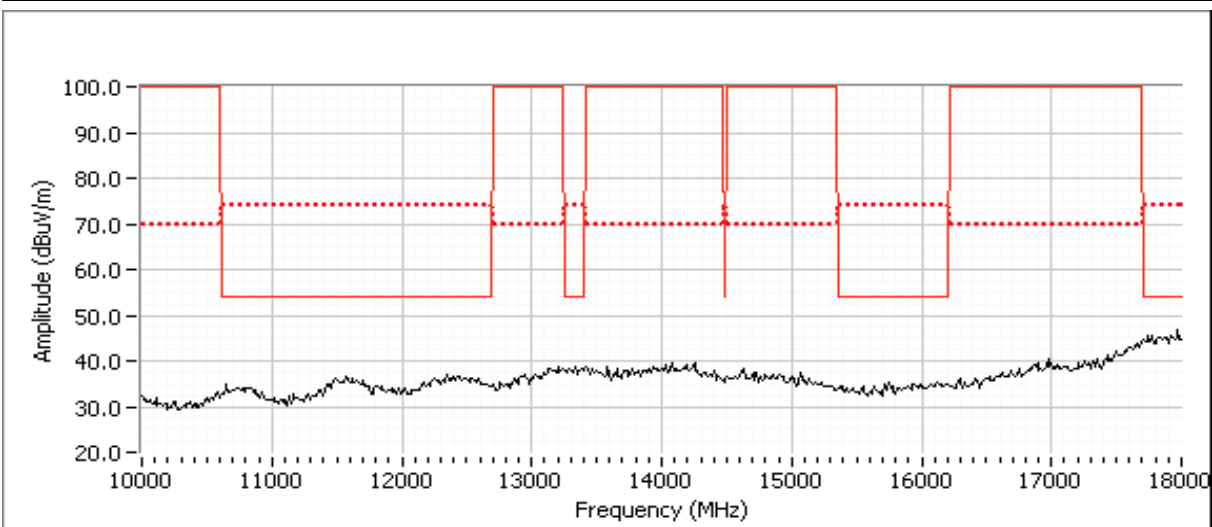
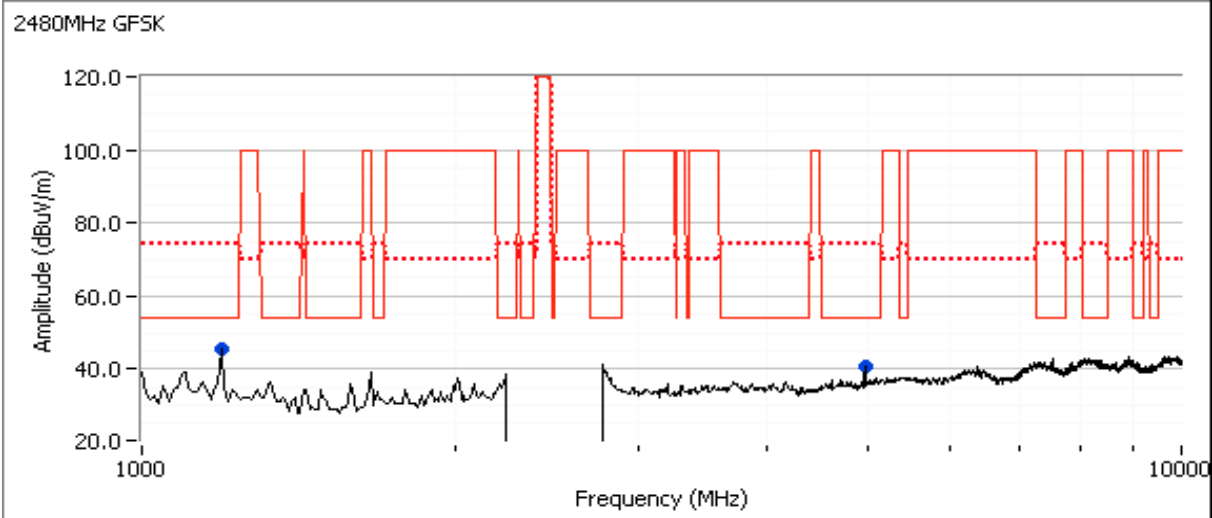
Date of Test: 4/15/2012

Test Location: FT5

Test Engineer: Rafael Varelas

Config Change: None

	Target (dBm)	Power Settings Measured (dBm)	Software Setting
Chain			Index 0



Client:	Broadcom Corporation	Job Number:	J86739
Model:	BCM94330UARTSDB (802.11bg WLAN + BT 4.0, 20MHz SISO only) P103	T-Log Number:	T86804
		Account Manager:	Sheareen Jacobs
Contact:	Anne Liang (Sachin Sawalapurkar)		
Standard:	FCC 15.247, LP0002	Class:	N/A

**Spurious Radiated Emissions:**

Frequency MHz	Level dB $\mu$ V/m	Pol v/h	15.209/15.247		Detector Pk/QP/Avg	Azimuth degrees	Height meters	Comments
			Limit	Margin				
4960.020	39.9	V	54.0	-14.1	AVG	97	1.5	RB 1 MHz;VB 10 Hz;Pk
4959.840	46.7	V	74.0	-27.3	PK	97	1.5	RB 1 MHz;VB 3 MHz;Pk
1195.750	31.7	V	54.0	-22.3	AVG	351	1.0	RB 1 MHz;VB 10 Hz;Pk
1196.010	53.4	V	74.0	-20.6	PK	351	1.0	RB 1 MHz;VB 3 MHz;Pk

Note 1: For emissions in restricted bands, the limit of 15.209 was used. For all other emissions, the limit is -30dBc for peak measurements in a measurement bandwidth of 100kHz.



Client:	Broadcom Corporation	Job Number:	J86739
Model:	BCM94330UARTSDB (802.11bg WLAN + BT 4.0, 20MHz SISO only) P103	T-Log Number:	T86804
		Account Manager:	Sheareen Jacobs
Contact:	Anne Liang (Sachin Sawalapurkar)		
Standard:	FCC 15.247, LP0002	Class:	N/A

**Run # 2, Radiated Spurious Emissions, 1-26GHz, 8PSK (EDR), Chain**

Date of Test: 4/15/2012

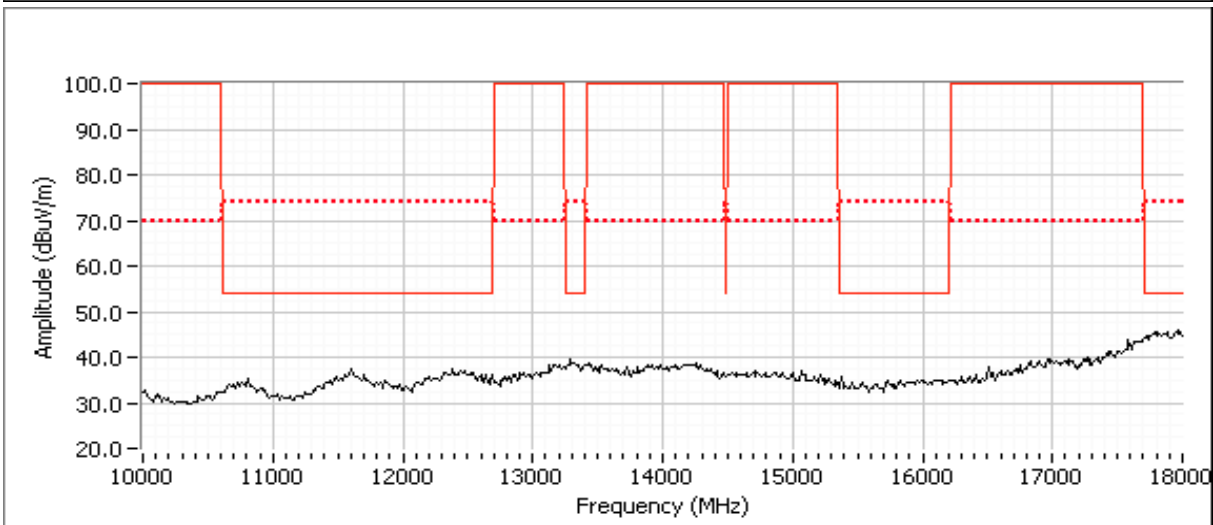
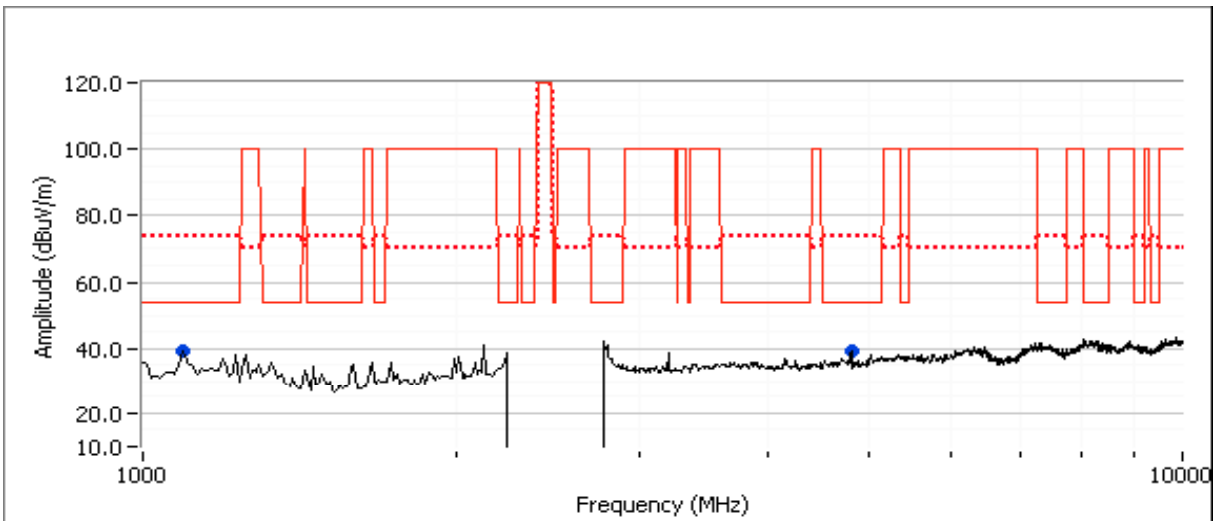
Test Location: FT5

Test Engineer: Rafael Varelas

Config Change: None

**Run # 2a, EUT on Channel 2402 - 8PSK (EDR), Chain**

	Target (dBm)	Power Settings Measured (dBm)	Software Setting
Chain			Index 0



Client:	Broadcom Corporation	Job Number:	J86739
Model:	BCM94330UARTSDB (802.11bg WLAN + BT 4.0, 20MHz SISO only) P103	T-Log Number:	T86804
		Account Manager:	Sheareen Jacobs
Contact:	Anne Liang (Sachin Sawalapurkar)		
Standard:	FCC 15.247, LP0002	Class:	N/A

**Spurious Radiated Emissions:**

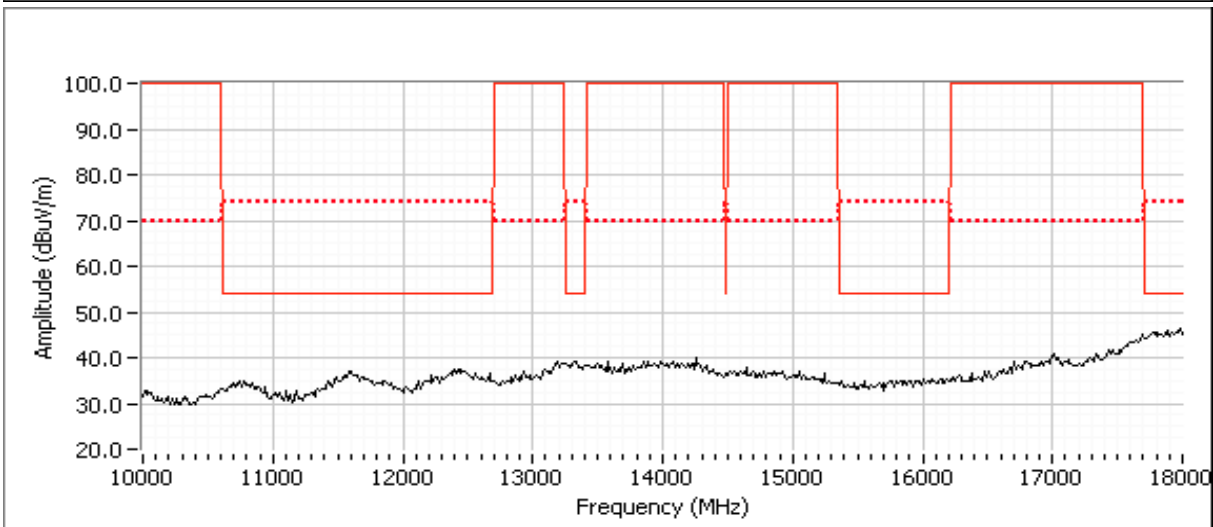
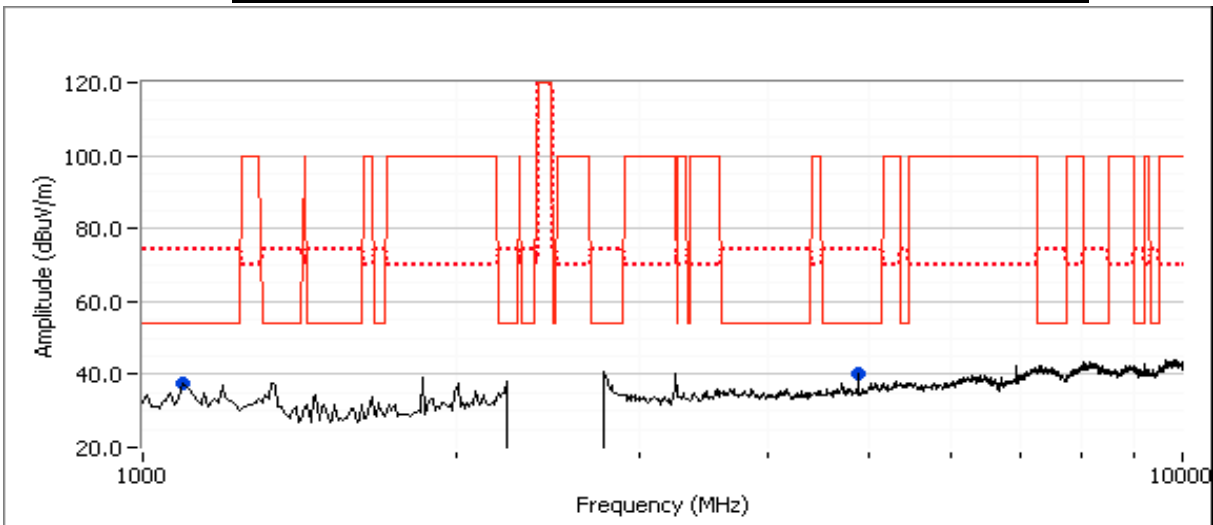
Frequency MHz	Level dB $\mu$ V/m	Pol v/h	15.209/15.247		Detector Pk/QP/Avg	Azimuth degrees	Height meters	Comments
			Limit	Margin				
4803.980	38.5	V	54.0	-15.5	AVG	259	1.0	RB 1 MHz;VB 10 Hz;Pk
4803.900	45.6	V	74.0	-28.4	PK	259	1.0	RB 1 MHz;VB 3 MHz;Pk
1092.610	34.1	V	54.0	-19.9	AVG	354	1.0	RB 1 MHz;VB 10 Hz;Pk
1093.010	46.2	V	74.0	-27.8	PK	354	1.0	RB 1 MHz;VB 3 MHz;Pk

Note 1: For emissions in restricted bands, the limit of 15.209 was used. For all other emissions, the limit is -30dBc for peak measurements in a measurement bandwidth of 100kHz.

Client:	Broadcom Corporation	Job Number:	J86739
Model:	BCM94330UARTSDB (802.11bg WLAN + BT 4.0, 20MHz SISO only) P103	T-Log Number:	T86804
		Account Manager:	Sheareen Jacobs
Contact:	Anne Liang (Sachin Sawalapurkar)		
Standard:	FCC 15.247, LP0002	Class:	N/A

Run # 2b: , EUT on Channel 2441 - 8PSK (EDR), Chain

	Target (dBm)	Power Settings Measured (dBm)	Software Setting
Chain			Index 0



Client:	Broadcom Corporation	Job Number:	J86739
Model:	BCM94330UARTSDB (802.11bg WLAN + BT 4.0, 20MHz SISO only) P103	T-Log Number:	T86804
		Account Manager:	Sheareen Jacobs
Contact:	Anne Liang (Sachin Sawalapurkar)		
Standard:	FCC 15.247, LP0002	Class:	N/A

**Spurious Radiated Emissions:**

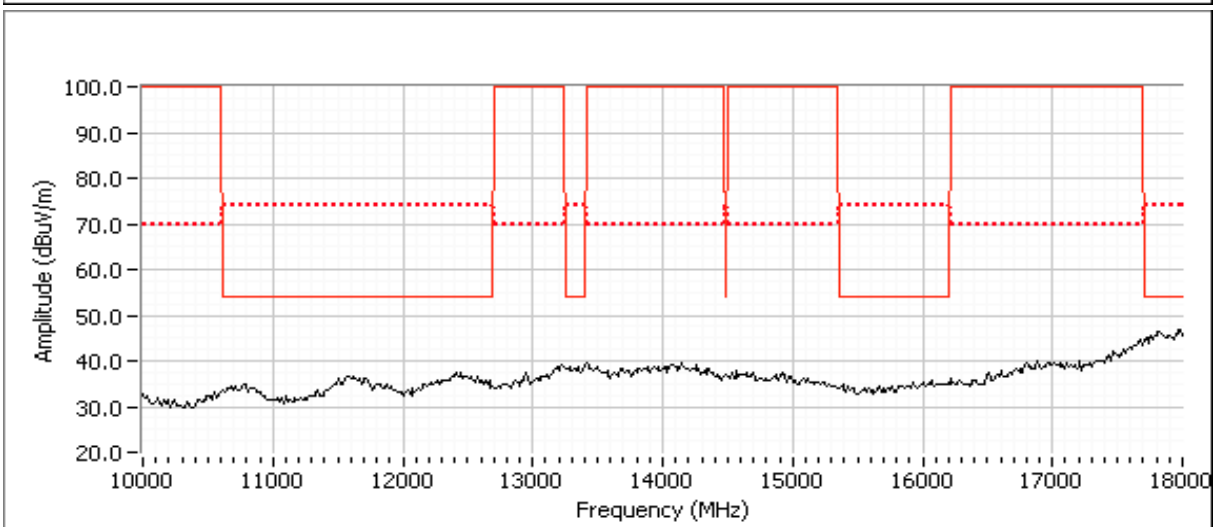
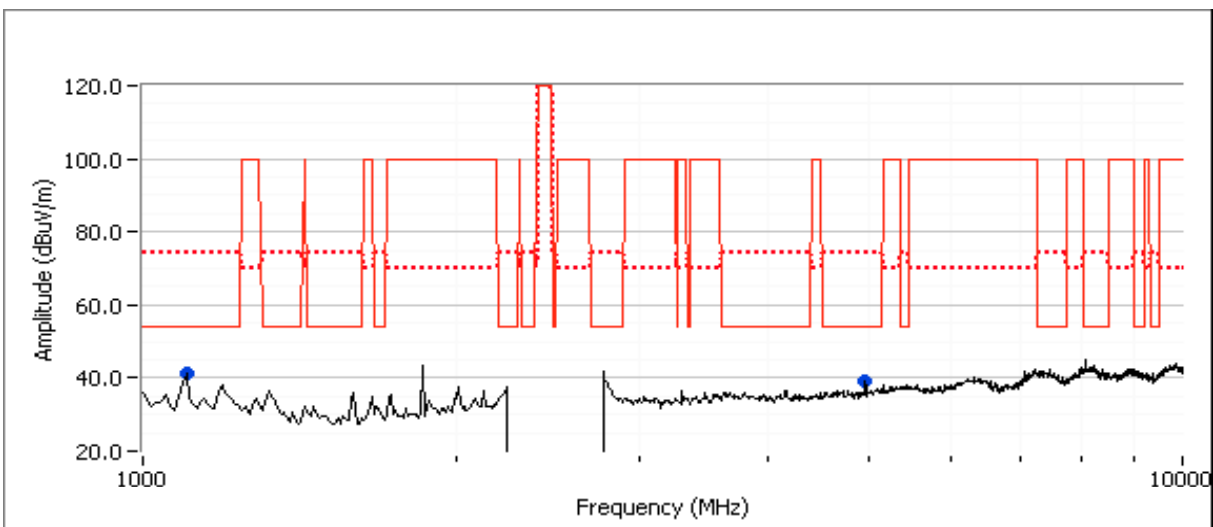
Frequency MHz	Level dB $\mu$ V/m	Pol v/h	15.209/15.247		Detector Pk/QP/Avg	Azimuth degrees	Height meters	Comments
			Limit	Margin				
4881.940	40.8	V	54.0	-13.2	AVG	137	1.5	RB 1 MHz;VB 10 Hz;Pk
4881.920	49.0	V	74.0	-25.0	PK	137	1.5	RB 1 MHz;VB 3 MHz;Pk
1089.310	32.5	V	54.0	-21.5	AVG	336	1.0	RB 1 MHz;VB 10 Hz;Pk
1089.310	45.4	V	74.0	-28.6	PK	336	1.0	RB 1 MHz;VB 3 MHz;Pk

Note 1:	For emissions in restricted bands, the limit of 15.209 was used. For all other emissions, the limit is -30dBc for peak measurements in a measurement bandwidth of 100kHz.
Note 2:	Scans made between 18 - 25GHz 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:	J86739
Model:	BCM94330UARTSDB (802.11bg WLAN + BT 4.0, 20MHz SISO only) P103	T-Log Number:	T86804
		Account Manager:	Sheareen Jacobs
Contact:	Anne Liang (Sachin Sawalapurkar)		
Standard:	FCC 15.247, LP0002	Class:	N/A

Run # 2c: , EUT on Channel 2480 - 8PSK (EDR), Chain

	Target (dBm)	Power Settings Measured (dBm)	Software Setting
Chain			Index 0



Client:	Broadcom Corporation	Job Number:	J86739
Model:	BCM94330UARTSDB (802.11bg WLAN + BT 4.0, 20MHz SISO only) P103	T-Log Number:	T86804
		Account Manager:	Sheareen Jacobs
Contact:	Anne Liang (Sachin Sawalapurkar)		
Standard:	FCC 15.247, LP0002	Class:	N/A

**Spurious Radiated Emissions:**

Frequency MHz	Level dB $\mu$ V/m	Pol v/h	15.209/15.247		Detector PK/QP/Avg	Azimuth degrees	Height meters	Comments
			Limit	Margin				
4959.890	34.9	V	54.0	-19.1	AVG	259	1.1	RB 1 MHz;VB 10 Hz;Pk
4960.130	41.8	V	74.0	-32.2	PK	259	1.1	RB 1 MHz;VB 3 MHz;Pk
1112.190	31.4	V	54.0	-22.6	AVG	3	1.0	RB 1 MHz;VB 10 Hz;Pk
1112.090	43.1	V	74.0	-30.9	PK	3	1.0	RB 1 MHz;VB 3 MHz;Pk

Note 1: For emissions in restricted bands, the limit of 15.209 was used. For all other emissions, the limit is -30dBc for peak measurements in a measurement bandwidth of 100kHz.

Client:	Broadcom Corporation	Job Number:	J86739
Model:	BCM94330UARTSDB (802.11bg WLAN + BT 4.0, 20MHz SISO only) P103	T-Log Number:	T86804
		Account Manager:	Sheareen Jacobs
Contact:	Anne Liang (Sachin Sawalapurkar)		
Standard:	FCC 15.247, LP0002	Class:	N/A

**Run # 3, Radiated Spurious Emissions, 1-8GHz, RX, Chain**

Date of Test: 4/15/2012

Test Location: FT5

Test Engineer: Rafael Varelas

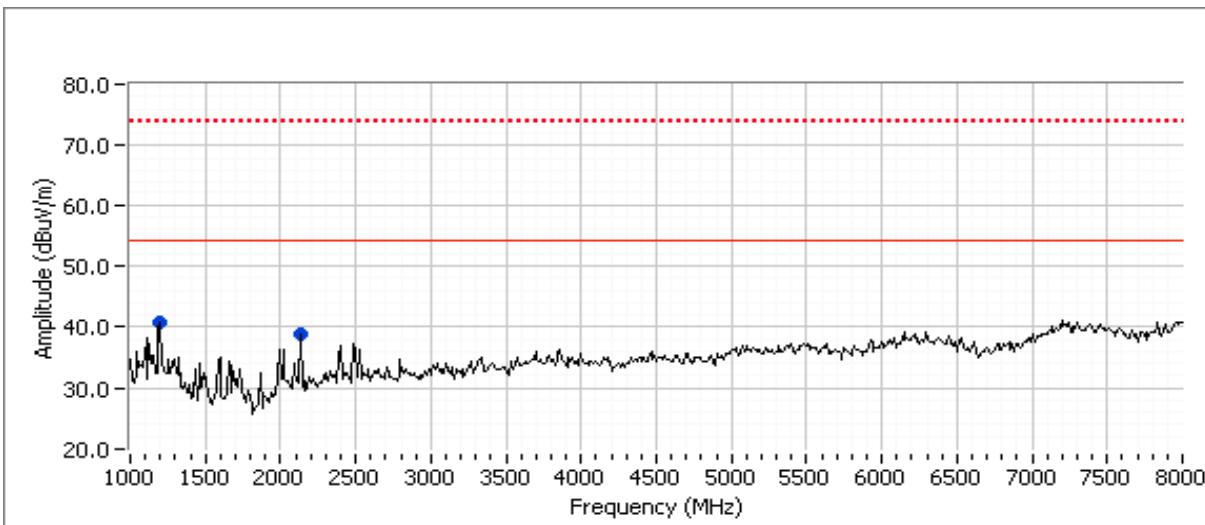
Config Change: None

**Run # 3a, EUT on Channel 2441 - RX, Chain**

**Spurious Radiated Emissions:**

Frequency MHz	Level dB $\mu$ V/m	Pol v/h	LP0002, Section 2.8		Detector PK/QP/Avg	Azimuth degrees	Height meters	Comments
			Limit	Margin				
2133.310	34.4	V	54.0	-19.6	AVG	14	1.0	RB 1 MHz;VB 10 Hz;Pk
2134.850	37.6	V	74.0	-36.4	PK	14	1.0	RB 1 MHz;VB 3 MHz;Pk
1199.950	25.4	H	54.0	-28.6	AVG	318	1.0	RB 1 MHz;VB 10 Hz;Pk
1199.270	45.2	H	74.0	-28.8	PK	318	1.0	RB 1 MHz;VB 3 MHz;Pk

Note 1: For emissions in restricted bands, the limit of 15.209 was used. For all other emissions, the limit is -30dBc for peak measurements in a measurement bandwidth of 100kHz.



Client:	Broadcom Corporation	Job Number:	J86739
Model:	BCM94330UARTSDB (802.11bg WLAN + BT 4.0, 20MHz SISO only) P103	T-Log Number:	T86804
		Account Manager:	Sheareen Jacobs
Contact:	Anne Liang (Sachin Sawalapurkar)		
Standard:	FCC 15.247, LP0002	Class:	N/A

## FCC 15.247 FHSS - Power, Bandwidth and 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: 4/17/2012 14:47  
 Test Engineer: John Caizzi  
 Test Location: Fremont EMC Lab #4

Config. Used: 1  
 Config Change: none  
 Host Unit Voltage 120V/60Hz

### General Test Configuration

When measuring the conducted emissions from the EUT's antenna port, the antenna port of the EUT was connected to the spectrum analyzer or power meter via a suitable attenuator to prevent overloading the measurement system. All measurements are corrected to allow for the external attenuators used.

Unless stated otherwise the EUT was operating such that it constantly hopped on either the low, center or high channels.

**Ambient Conditions:**  
 Temperature: 22 °C  
 Rel. Humidity: 33 %

### Summary of Results

Run #	Test Performed	Limit	Pass / Fail	Result / Margin
3	30 - 25,000 MHz - Tx Conducted Spurious Emissions, GFSK	FCC Part 15.247( c)	Pass	All spurious > -20 dBc.
3	30 - 25,000 MHz - Tx Conducted Spurious Emissions, 8PSK	FCC Part 15.247( c)	Pass	All spurious > -20 dBc.
4	Output Power, GFSK	15.247(b)	Pass	1.8 dBm ( 1.5mW)
4	Output Power, 8PSK	15.247(b)	Pass	1.6 dBm ( 1.4mW)
5	20dB Bandwidth	15.247(a)	Pass	Basic: 1056 kHz EDR: 1400 kHz
5	99% bandwidth	15.247(a)	Pass	Basic: 925 kHz EDR: 1247 kHz
5	Channel Occupancy	15.247(a)	Pass	1000 kHz
5	Number of Channels	15.247(a)	Pass	79

### Modifications Made During Testing:

No modifications were made to the EUT during testing

### Deviations From The Standard

No deviations were made from the requirements of the standard.



Client:	Broadcom Corporation	Job Number:	J86739
Model:	BCM94330UARTSDB (802.11bg WLAN + BT 4.0, 20MHz SISO only) P103	T-Log Number:	T86804
		Account Manager:	Sheareen Jacobs
Contact:	Anne Liang (Sachin Sawalapurkar)		
Standard:	FCC 15.247, LP0002	Class:	N/A

**Run #3: Antenna Conducted Spurious Emissions, 30 - 25,000 MHz.**

Date of Test: 4/17/2012

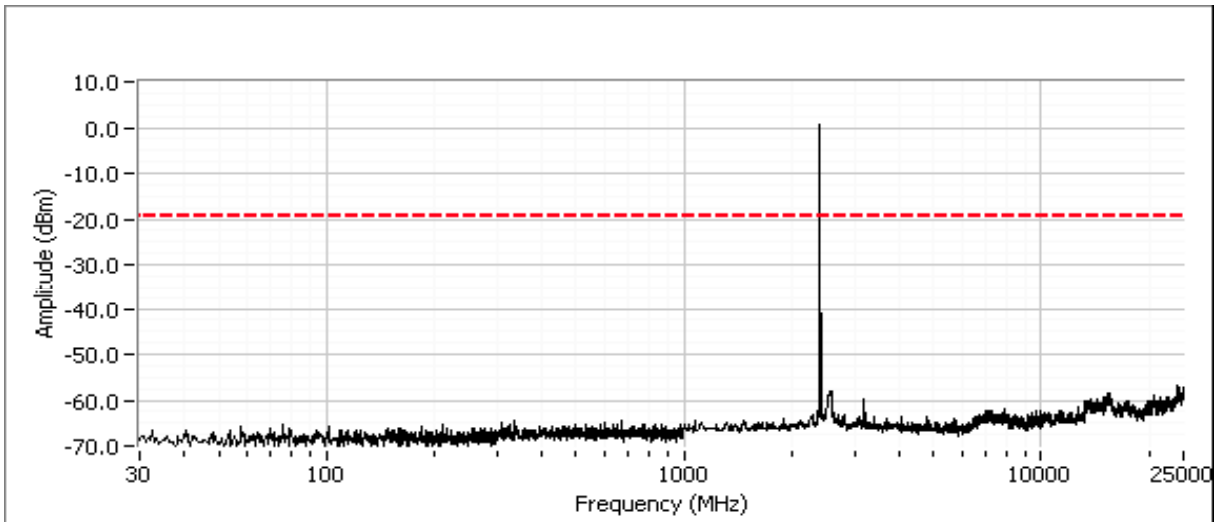
Test Engineer: John Caizzi

Test Location: FT Lab 4

Refer to plots below. Scans made using RBW=VB=100 KHz with the limit line set at 20dB below the highest in-band signal level with the hopping feature disabled.

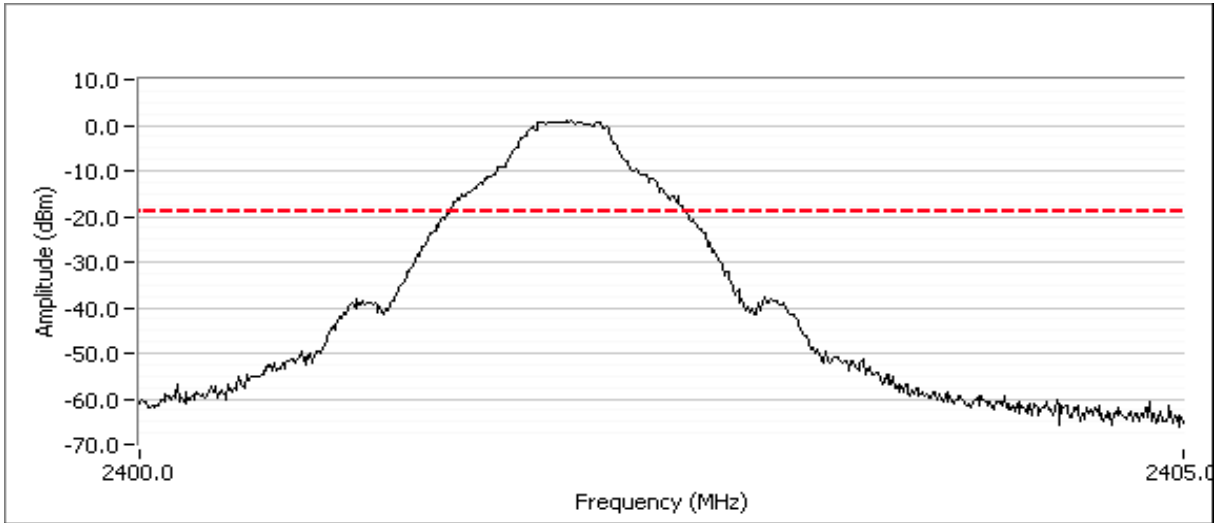
GFSK, low channel

Broadband plot

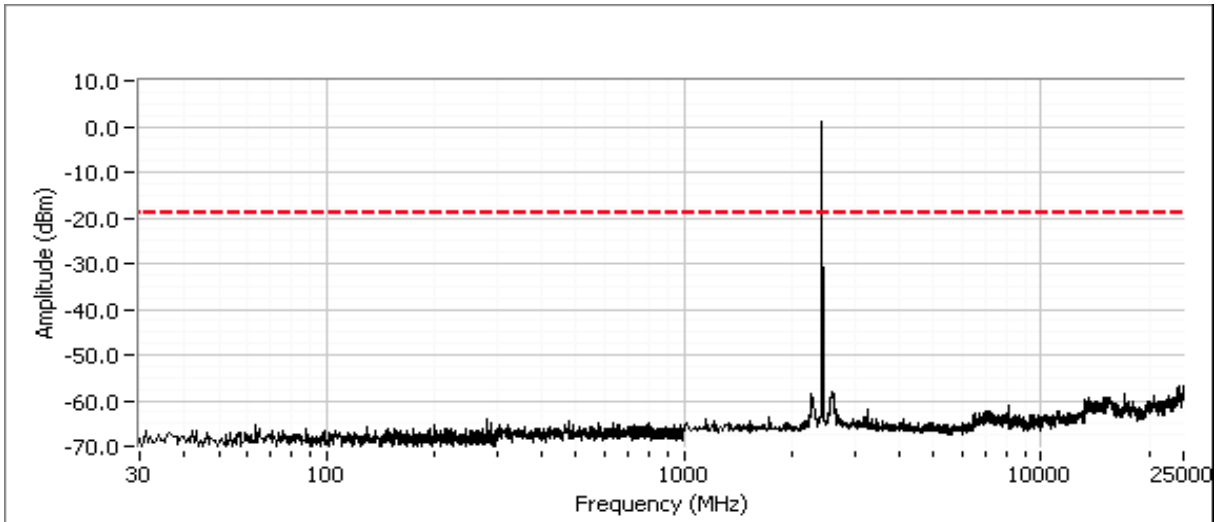


Client:	Broadcom Corporation	Job Number:	J86739
Model:	BCM94330UARTSDB (802.11bg WLAN + BT 4.0, 20MHz SISO only) P103	T-Log Number:	T86804
		Account Manager:	Sheareen Jacobs
Contact:	Anne Liang (Sachin Sawalapurkar)		
Standard:	FCC 15.247, LP0002	Class:	N/A

Plot showing -20dBc at the lower band edge

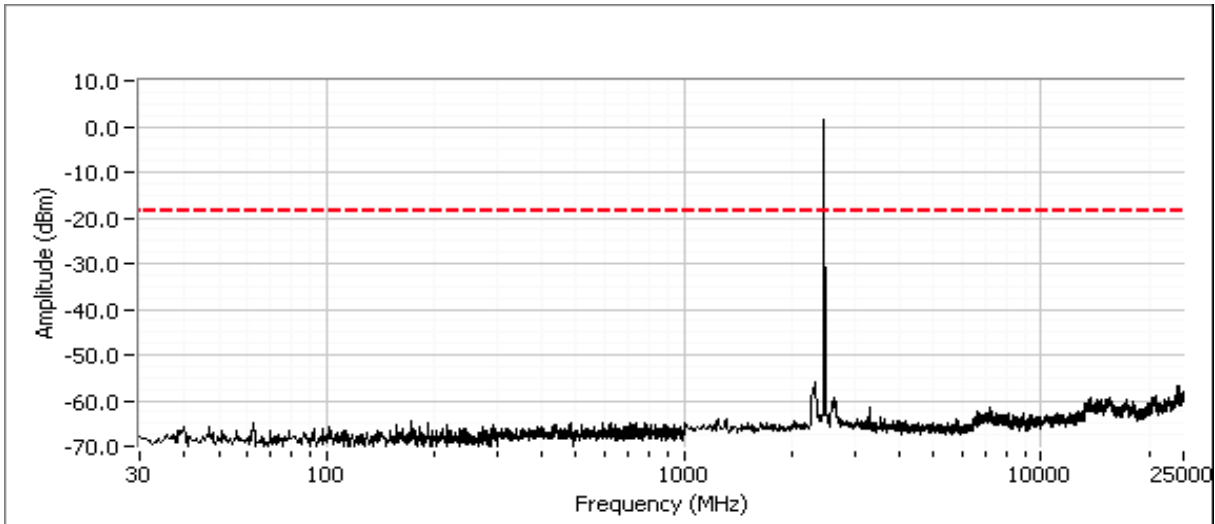


GFSK, center channel  
Broadband plot

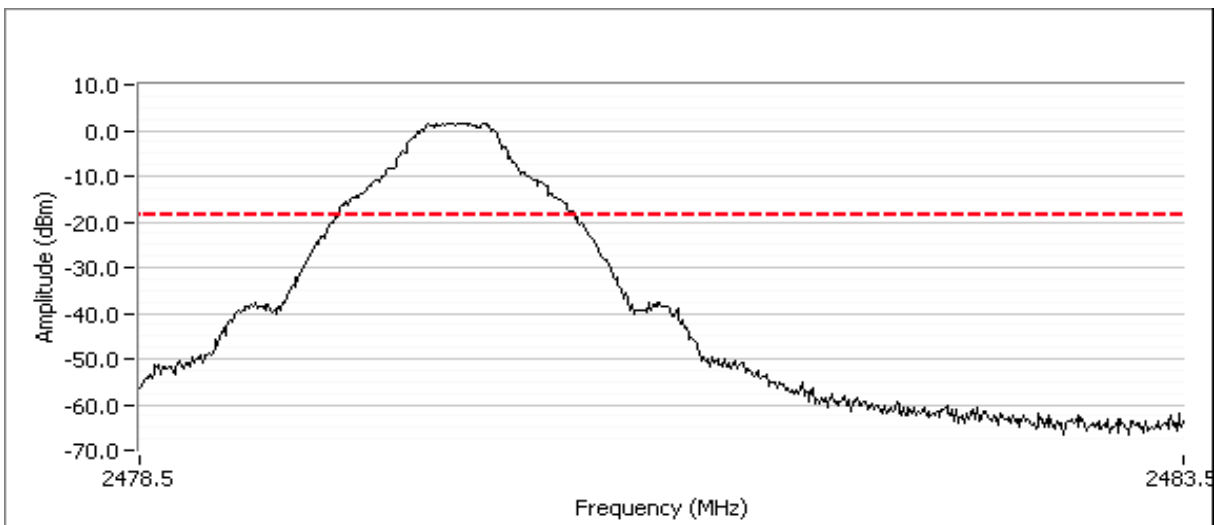


Client:	Broadcom Corporation	Job Number:	J86739
Model:	BCM94330UARTSDB (802.11bg WLAN + BT 4.0, 20MHz SISO only) P103	T-Log Number:	T86804
		Account Manager:	Sheareen Jacobs
Contact:	Anne Liang (Sachin Sawalapurkar)		
Standard:	FCC 15.247, LP0002	Class:	N/A

GFSK, high channel  
 Broadband plot

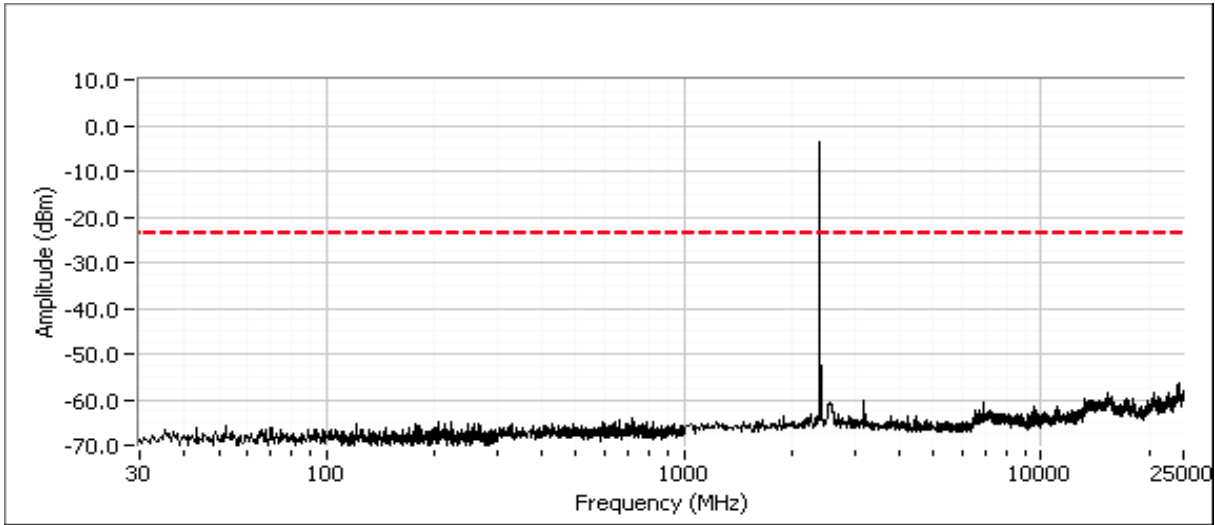


Plot showing -20dBc at the upper band edge

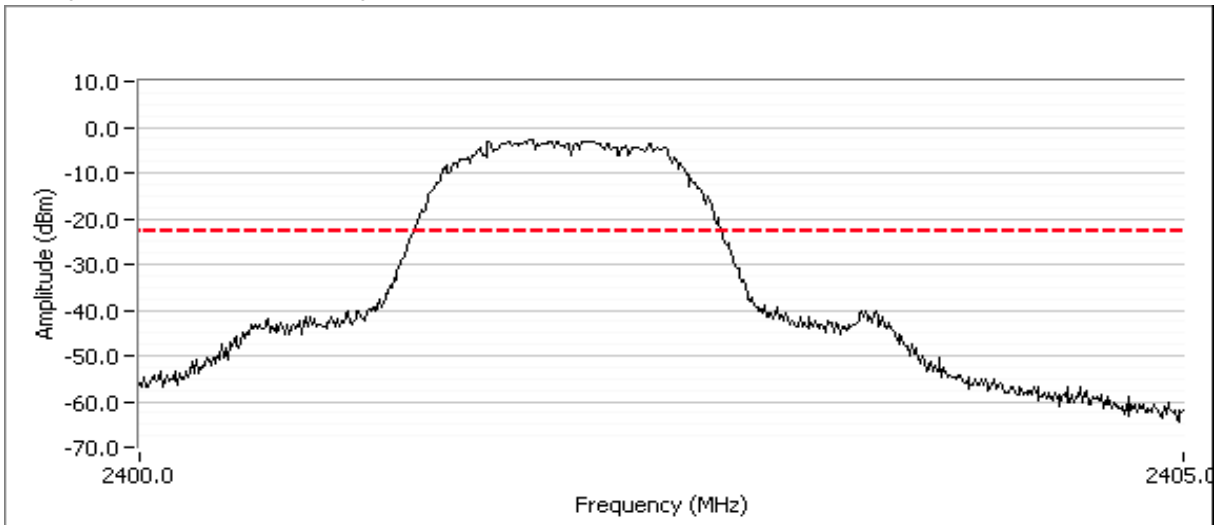


Client:	Broadcom Corporation	Job Number:	J86739
Model:	BCM94330UARTSDB (802.11bg WLAN + BT 4.0, 20MHz SISO only) P103	T-Log Number:	T86804
		Account Manager:	Sheareen Jacobs
Contact:	Anne Liang (Sachin Sawalapurkar)		
Standard:	FCC 15.247, LP0002	Class:	N/A

### 8PSK, low channel

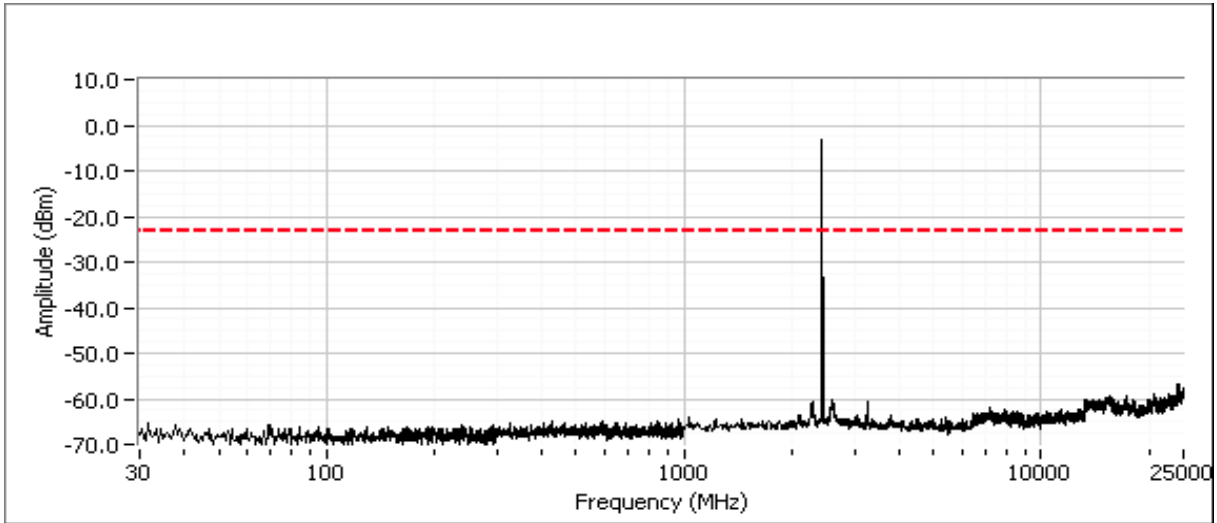


Plot showing -20dBc at the lower band edge

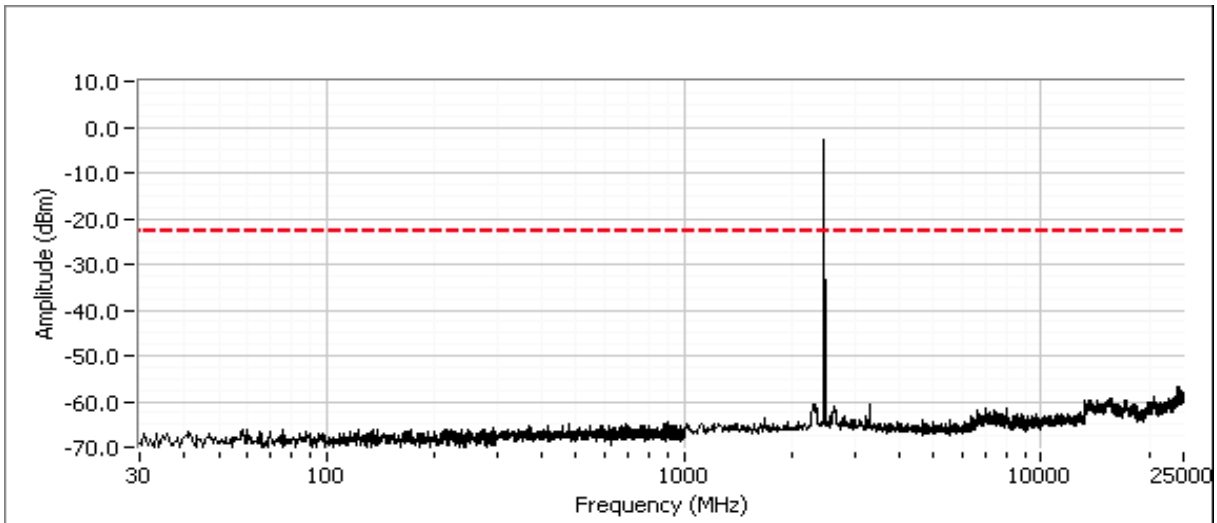


Client:	Broadcom Corporation	Job Number:	J86739
Model:	BCM94330UARTSDB (802.11bg WLAN + BT 4.0, 20MHz SISO only) P103	T-Log Number:	T86804
		Account Manager:	Sheareen Jacobs
Contact:	Anne Liang (Sachin Sawalapurkar)		
Standard:	FCC 15.247, LP0002	Class:	N/A

8PSK, center channel

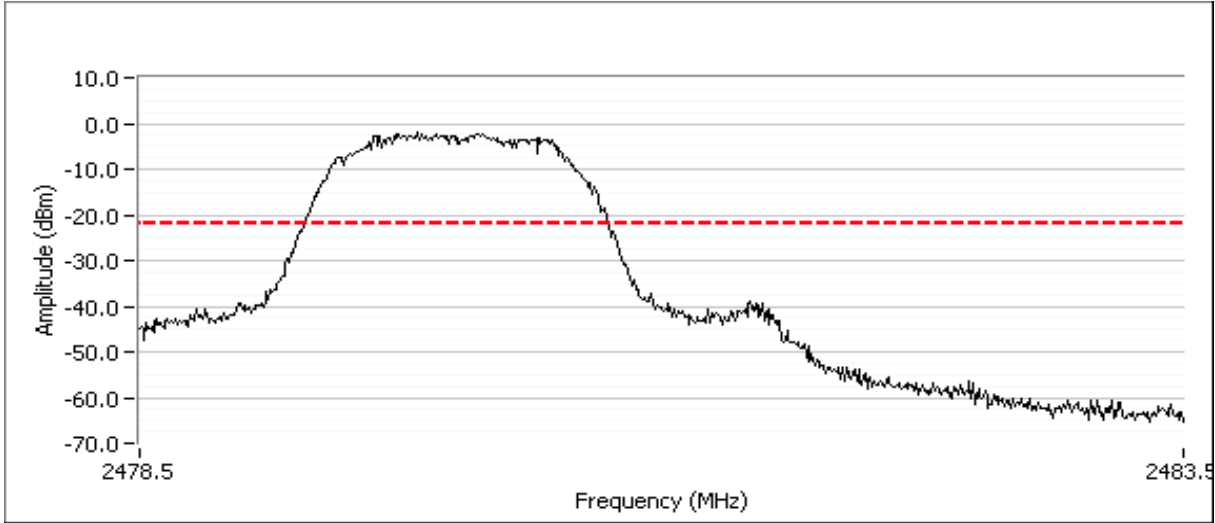


8PSK, high channel



Client:	Broadcom Corporation	Job Number:	J86739
Model:	BCM94330UARTSDB (802.11bg WLAN + BT 4.0, 20MHz SISO only) P103	T-Log Number:	T86804
		Account Manager:	Sheareen Jacobs
Contact:	Anne Liang (Sachin Sawalapurkar)		
Standard:	FCC 15.247, LP0002	Class:	N/A

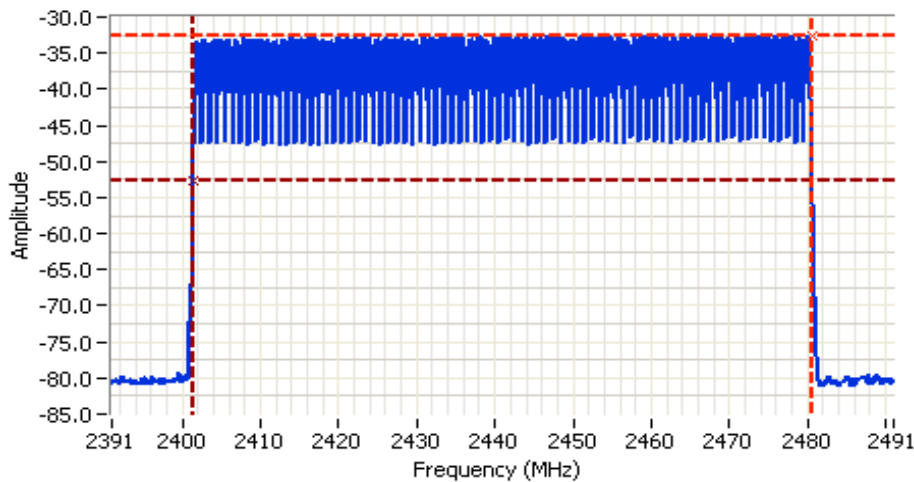
Plot showing -20dBc at the upper band edge



Client:	Broadcom Corporation	Job Number:	J86739
Model:	BCM94330UARTSDB (802.11bg WLAN + BT 4.0, 20MHz SISO only) P103	T-Log Number:	T86804
		Account Manager:	Sheareen Jacobs
Contact:	Anne Liang (Sachin Sawalapurkar)		
Standard:	FCC 15.247, LP0002	Class:	N/A

Refer to plots below. Scans made using RBW=VB=100 KHz with the limit line set at 20dB below the highest in-band signal level with the **hopping feature enabled** to show compliance with the -20dBc requirement at the allocated band edge. The spectrum analyzer is left in max hold mode until the trace stabilizes.

### Low and high channel, hopping enabled



**Analyzer Settings**  
 Agilent Technologies, E4446A  
 CF: 2441.000 MHz  
 SPAN: 100.000 MHz  
 RB: 100 kHz  
 VB: 100 kHz  
 Detector: POS  
 Attn: 10 DB  
 RL Offset: 0.0 DB  
 Sweep Time: 12.1ms  
 Ref Lvl: 0.0 DBM

**Comments**  
 20dB BW  
 Low channel: 2401.5 MHz  
 High channel: 2480.5 MHz

Cursor 1	2480.5000	-32.56	+	*	⏏
Cursor 2	2401.5000	-52.56	+	*	⏏

Delta Freq. 79.000  
 Delta Amplitude 20.00



Client:	Broadcom Corporation	Job Number:	J86739
Model:	BCM94330UARTSDB (802.11bg WLAN + BT 4.0, 20MHz SISO only) P103	T-Log Number:	T86804
		Account Manager:	Sheareen Jacobs
Contact:	Anne Liang (Sachin Sawalapurkar)		
Standard:	FCC 15.247, LP0002	Class:	N/A

**Run #4: Output Power**

Date of Test: 4/17/2012  
 Test Engineer: John Caizzi  
 Test Location: FT Lab 4

For frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 non-overlapping hopping channels, and all frequency hopping systems in the 5725-5850 MHz band: 1 watt.

For all other frequency hopping systems in the 2400-2483.5 MHz band: 0.125 watts.

Maximum antenna gain: 3.9 dBi

**GFSK**

Channel	Frequency (MHz)	Res BW	Output Power (dBm)	Output Power (W)	EIRP (W)
Low	2402	NA	0.8	0.0012	0.0030
Mid	2441	NA	1.6	0.0014	0.0035
High	2480	NA	1.8	0.0015	0.0037

**8PSK**

Channel	Frequency (MHz)	Res BW	Output Power (dBm)	Output Power (W)	EIRP (W)
Low	2402	NA	0.6	0.0011	0.0028
Mid	2441	NA	1.4	0.0014	0.0034
High	2480	NA	1.6	0.0014	0.0035

Note 1: Output power measured with a peak power meter.



Client:	Broadcom Corporation	Job Number:	J86739
Model:	BCM94330UARTSDB (802.11bg WLAN + BT 4.0, 20MHz SISO only) P103	T-Log Number:	T86804
		Account Manager:	Sheareen Jacobs
Contact:	Anne Liang (Sachin Sawalapurkar)		
Standard:	FCC 15.247, LP0002	Class:	N/A

### Run #5: Bandwidth, Channel Occupancy, Spacing and Number of Channels

Date of Test: 4/18/2012  
 Test Engineer: M. Birgani  
 Test Location: FT Lab #4

#### GFSK (Basic)

Channel	Frequency (MHz)	Resolution Bandwidth	20dB Bandwidth (kHz)	Resolution Bandwidth	99% Bandwidth (kHz)
Low	2402	51kHz	1056	51kHz	920
Mid	2441	51kHz	1056	51kHz	920
High	2480	51kHz	1056	51kHz	925

Note 1: 20dB bandwidth measured using RB = 51kHz, VB = 150kHz (VB > RB)

Note 2: 99% bandwidth measured using RB = 51kHz, VB = 150kHz (VB >=3RB)

#### 8PSK (EDR)

Channel	Frequency (MHz)	Resolution Bandwidth	20dB Bandwidth (kHz)	Resolution Bandwidth	99% Bandwidth (kHz)
Low	2402	30kHz	1387	30kHz	1247
Mid	2441	30kHz	1400	30kHz	1247
High	2480	30kHz	1388	30kHz	1247

Note 1: 20dB bandwidth measured using RB = 30kHz, VB = 100kHz (VB > RB)

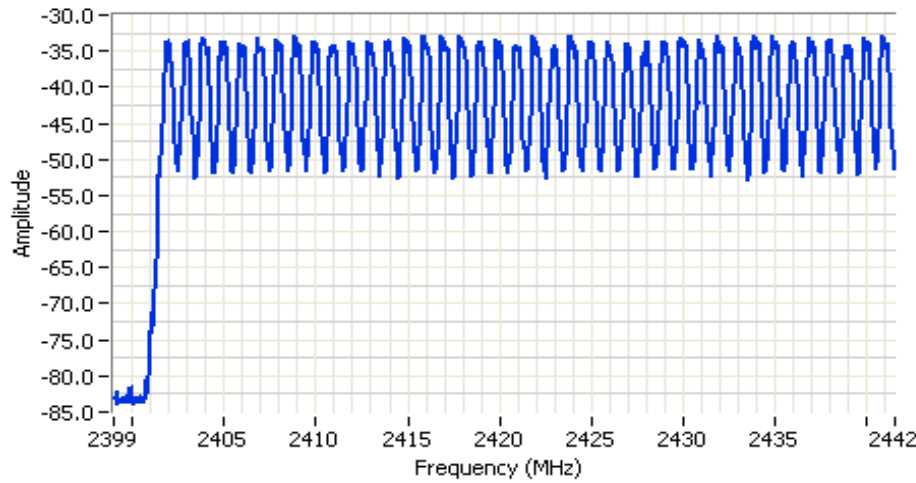
Note 2: 99% bandwidth measured using RB = 30kHz, VB = 100kHz (VB >=3RB)

Frequency hopping systems in the **2400-2483.5 MHz** band shall use at least 15 channels.

The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed. (Frequency hopping systems may avoid or suppress transmissions on a particular hopping frequency provided that a minimum of 15 channels are used.)

The channel dwell time is calculated from the transmit time on a channel multiplied by the number of times a channel could be used in a period of 0.4 times the number of channels, N (i.e. 0.4N divided by the time between successive hops, rounded up to the closest integer), unless the time between successive hops exceeds 0.4N, in which case the channel dwell time is the transmit time on a channel

Client:	Broadcom Corporation	Job Number:	J86739
Model:	BCM94330UARTSDB (802.11bg WLAN + BT 4.0, 20MHz SISO only) P103	T-Log Number:	T86804
Contact:	Anne Liang (Sachin Sawalapurkar)	Account Manager:	Sheareen Jacobs
Standard:	FCC 15.247, LP0002	Class:	N/A


**Analyzer Settings**

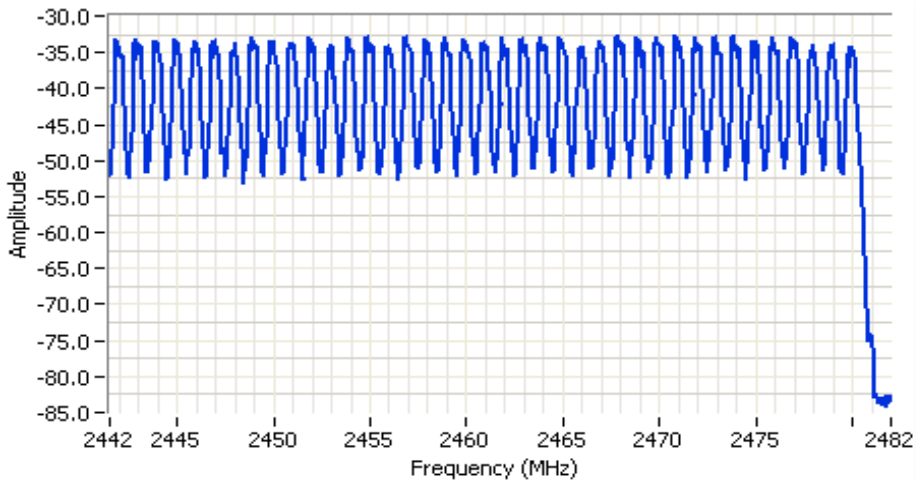
Agilent Technologies, E4446A  
 CF: 2420.250 MHz  
 SPAN: 42.500 MHz  
 RB: 100 kHz  
 VB: 30.0 kHz  
 Detector: POS  
 Attn: 10 DB  
 RL Offset: 0.0 DB  
 Sweep Time: 11.7ms  
 Ref Lvl: -15.0 DBM

**Comments**

Number of channels: 40  
 DH1

Cursor 1 2443.0495 -27.65

0.0000 0.00


**Analyzer Settings**

Agilent Technologies, E4446A  
 CF: 2461.750 MHz  
 SPAN: 40.500 MHz  
 RB: 100 kHz  
 VB: 30.0 kHz  
 Detector: POS  
 Attn: 10 DB  
 RL Offset: 0.0 DB  
 Sweep Time: 11.2ms  
 Ref Lvl: -15.0 DBM

**Comments**

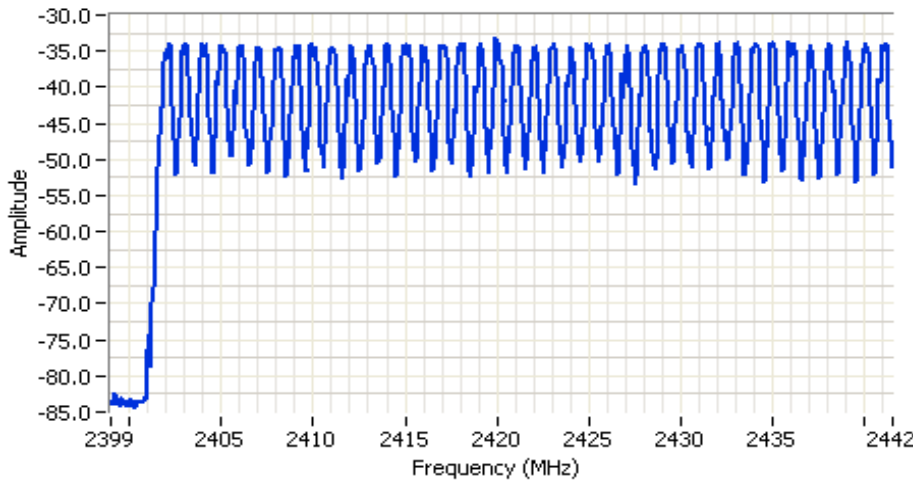
Number of channels: 39  
 DH1

Cursor 1 2482.7383 -27.39

0.0000 0.00



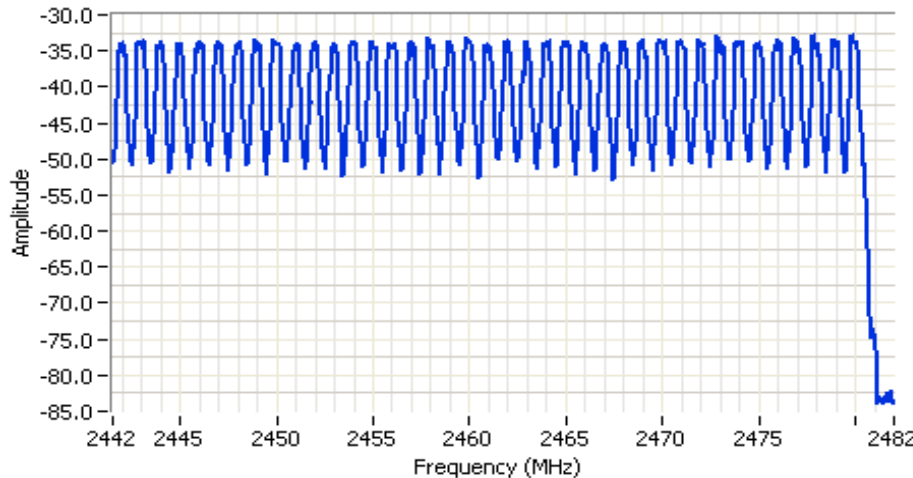
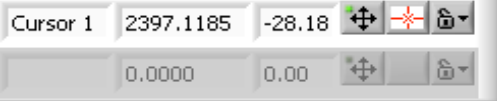
Client:	Broadcom Corporation	Job Number:	J86739
Model:	BCM94330UARTSDB (802.11bg WLAN + BT 4.0, 20MHz SISO only) P103	T-Log Number:	T86804
Contact:	Anne Liang (Sachin Sawalapurkar)	Account Manager:	Sheareen Jacobs
Standard:	FCC 15.247, LP0002	Class:	N/A


**Analyzer Settings**

Agilent Technologies, E4446A  
 CF: 2420.250 MHz  
 SPAN: 42.500 MHz  
 RB: 100 kHz  
 VB: 30.0 kHz  
 Detector: POS  
 Attn: 10 DB  
 RL Offset: 0.0 DB  
 Sweep Time: 11.7ms  
 Ref Lvl: -15.0 DBM

**Comments**

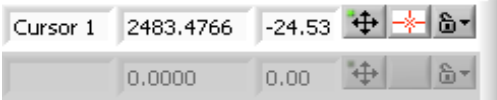
Number of channels: 40  
 DH3


**Analyzer Settings**

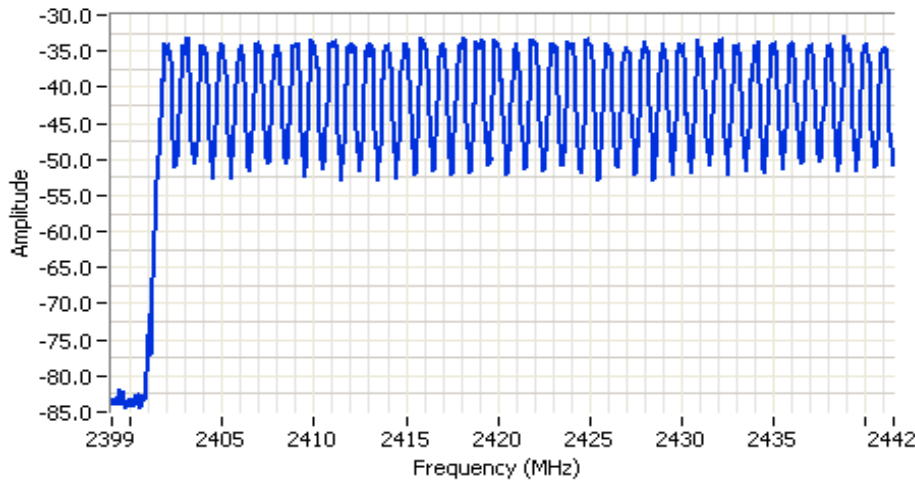
Agilent Technologies, E4446A  
 CF: 2461.750 MHz  
 SPAN: 40.500 MHz  
 RB: 100 kHz  
 VB: 30.0 kHz  
 Detector: POS  
 Attn: 10 DB  
 RL Offset: 0.0 DB  
 Sweep Time: 11.2ms  
 Ref Lvl: -15.0 DBM

**Comments**

Number of channels: 39  
 DH3



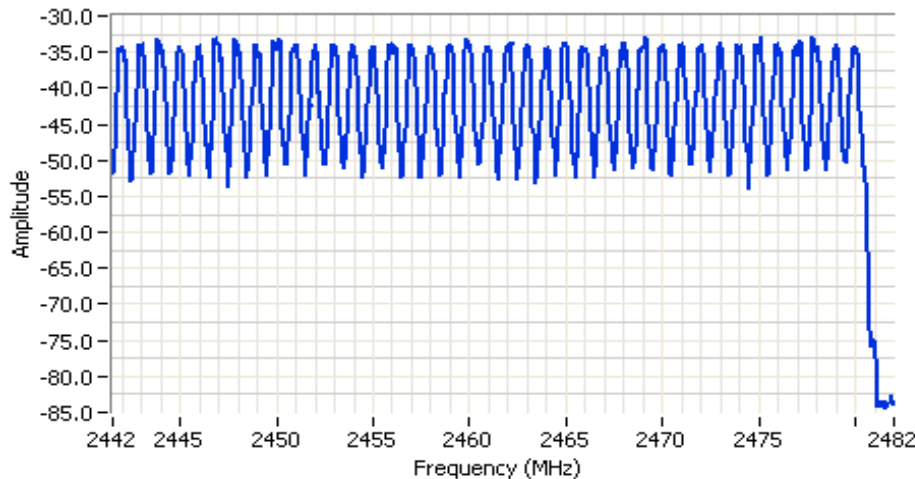
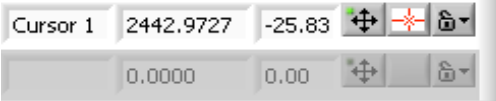
Client:	Broadcom Corporation	Job Number:	J86739
Model:	BCM94330UARTSDB (802.11bg WLAN + BT 4.0, 20MHz SISO only) P103	T-Log Number:	T86804
Contact:	Anne Liang (Sachin Sawalapurkar)	Account Manager:	Sheereen Jacobs
Standard:	FCC 15.247, LP0002	Class:	N/A


**Analyzer Settings**

Agilent Technologies, E4446A  
 CF: 2419.750 MHz  
 SPAN: 43.500 MHz  
 RB: 100 kHz  
 VB: 30.0 kHz  
 Detector: POS  
 Attn: 10 DB  
 RL Offset: 0.0 DB  
 Sweep Time: 12.1ms  
 Ref Lvl: -15.0 DBM

**Comments**

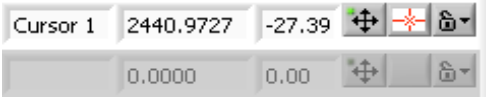
Number of channels: 40  
 DHS


**Analyzer Settings**

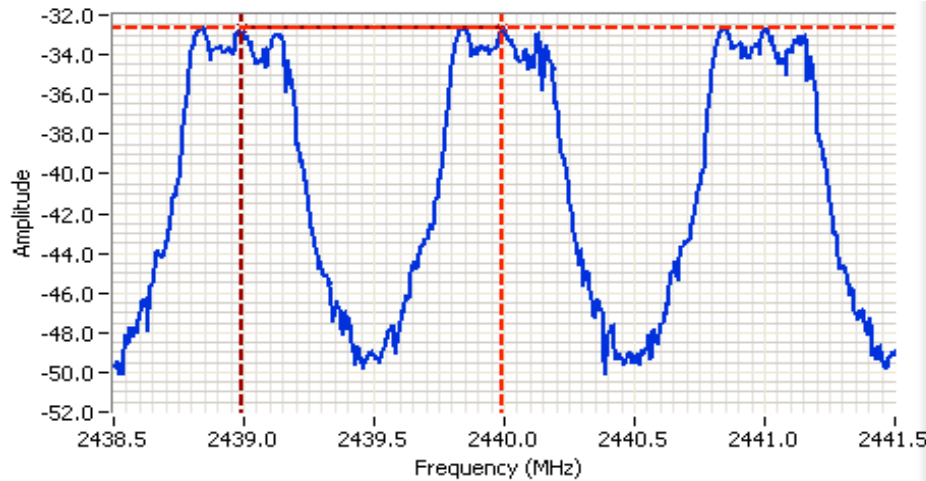
Agilent Technologies, E4446A  
 CF: 2461.750 MHz  
 SPAN: 40.500 MHz  
 RB: 100 kHz  
 VB: 30.0 kHz  
 Detector: POS  
 Attn: 10 DB  
 RL Offset: 0.0 DB  
 Sweep Time: 11.2ms  
 Ref Lvl: -15.0 DBM

**Comments**

Number of channels: 39  
 DHS



Client:	Broadcom Corporation	Job Number:	J86739
Model:	BCM94330UARTSDB (802.11bg WLAN + BT 4.0, 20MHz SISO only) P103	T-Log Number:	T86804
Contact:	Anne Liang (Sachin Sawalapurkar)	Account Manager:	Sheereen Jacobs
Standard:	FCC 15.247, LP0002	Class:	N/A



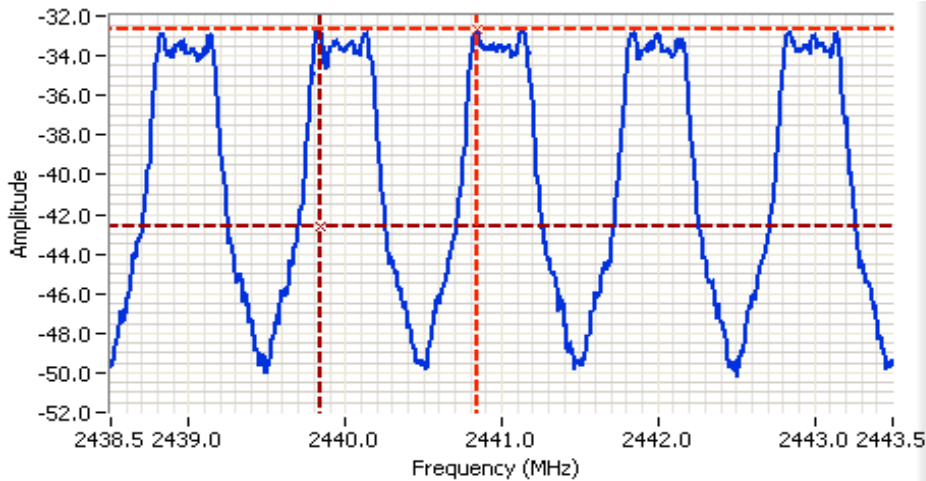
**Analyzer Settings**

Agilent Technologies, E4446A  
 CF: 2440.000 MHz  
 SPAN: 3.000 MHz  
 RB: 100 kHz  
 VB: 1.000 MHz  
 Detector: POS  
 Attn: 10 DB  
 RL Offset: 0.0 DB  
 Sweep Time: 1.1ms  
 Ref Lvl: -15.0 DBM

**Comments**

DH1 Timing: 1000 kHz

Cursor 1	2439.9922	-32.63	+	✖	🔒	Delta Freq.	1.000
Cursor 2	2438.9922	-32.63	+	✖	🔒	Delta Amplitude	0.00



**Analyzer Settings**

Agilent Technologies, E4446A  
 CF: 2441.000 MHz  
 SPAN: 5.000 MHz  
 RB: 100 kHz  
 VB: 1.000 MHz  
 Detector: POS  
 Attn: 10 DB  
 RL Offset: 0.0 DB  
 Sweep Time: 1.1ms  
 Ref Lvl: -15.0 DBM

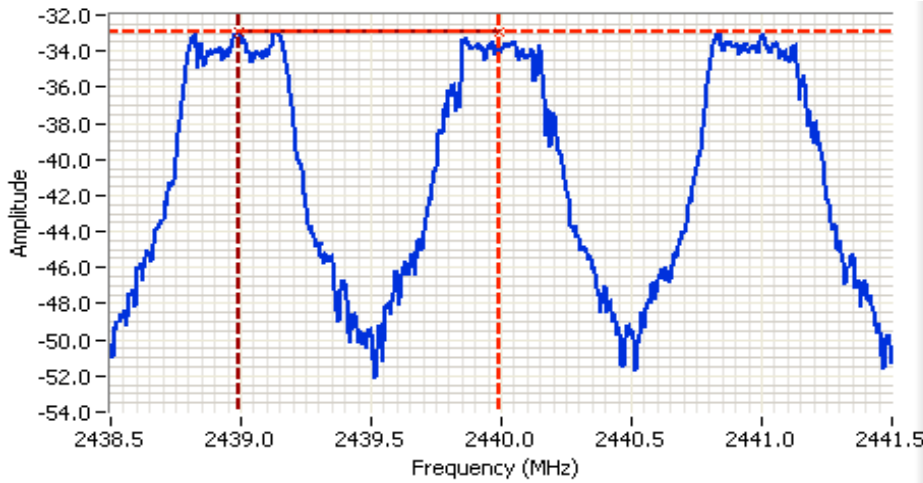
**Comments**

DH3 Timing: 1000 kHz

Cursor 1	2440.8437	-32.65	+	✖	🔒	Delta Freq.	1.000
Cursor 2	2439.8437	-42.65	+	✖	🔒	Delta Amplitude	10.00



Client:	Broadcom Corporation	Job Number:	J86739
Model:	BCM94330UARTSDB (802.11bg WLAN + BT 4.0, 20MHz SISO only) P103	T-Log Number:	T86804
		Account Manager:	Sheareen Jacobs
Contact:	Anne Liang (Sachin Sawalapurkar)		
Standard:	FCC 15.247, LP0002	Class:	N/A



**Analyzer Settings**

- Agilent Technologies, E4446A
- CF: 2440.000 MHz
- SPAN: 3.000 MHz
- RB: 100 kHz
- VB: 1.000 MHz
- Detector: POS
- Attn: 10 DB
- RL Offset: 0.0 DB
- Sweep Time: 1.1ms
- Ref Lvl: -15.0 DBM

**Comments**

- DH5 Timing: 1000 kHz

Cursor 1	2439.9922	-32.90	+	*	⏏
Cursor 2	2438.9922	-32.90	+	*	⏏

Delta Freq. 1.000  
Delta Amplitude 0.00





# EMC Test Data

Client:	Broadcom Corporation	Job Number:	J86739
Model:	BCM94330UARTSDB (802.11bgn WLAN + BT 4.0, 20MHz SISO only)	T-Log Number:	T86945
Contact:	Anne Liang (Sachin Sawalapurkar)	Account Manager:	Sheareen Jacobs
Emissions Standard(s):	EN 300 328 / FCC	Class:	-
Immunity Standard(s):	-	Environment:	-

## EMC Test Data

For The

### Broadcom Corporation

Model

BCM94330UARTSDB (802.11bgn WLAN + BT 4.0, 20MHz SISO only)

Date of Last Test: 5/7/2012

Client:	Broadcom Corporation	Job Number:	J86739
Model:	BCM94330UARTSDB (802.11bgn WLAN + BT 4.0, 20MHz SISO only)	T-Log Number:	T86945
		Account Manager:	Sheareen Jacobs
Contact:	Anne Liang (Sachin Sawalapurkar)		
Standard:	EN 300 328 / FCC	Class:	-

### Conducted Emissions

*(Elliott Laboratories Fremont Facility, Semi-Anechoic Chamber)*

#### 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: 4/26/2012	Config. Used: 1
Test Engineer: Mehran Birgani	Config Change: Laptop was used for testing (see below)
Test Location: Fremont Chamber #5	Host Unit Voltage Refer to each run

#### General Test Configuration

The host system was located on a wooden table inside the semi-anechoic chamber, 40 cm from a vertical coupling plane and 80cm from the LISN. A second LISN was used for all local support equipment. Remote support equipment was located outside of the semi-anechoic chamber. Any cables running to remote support equipment were routed through metal conduit and when possible passed through a ferrite clamp upon exiting the chamber.

**Ambient Conditions:**

Temperature:	15-18 °C
Rel. Humidity:	35-40 %

#### Summary of Results

Run #	Test Performed	Limit	Result	Margin
1	CE, AC Power, 230V/50Hz	Class B	Pass	46.3 dBµV @ 0.310 MHz (-3.7 dB)
2	CE, AC Power, 120V/60Hz	Class B	Pass	45.8 dBµV @ 0.291 MHz (-4.7 dB)

#### Modifications Made During Testing

No modifications were made to the EUT during testing

#### Deviations From The Standard

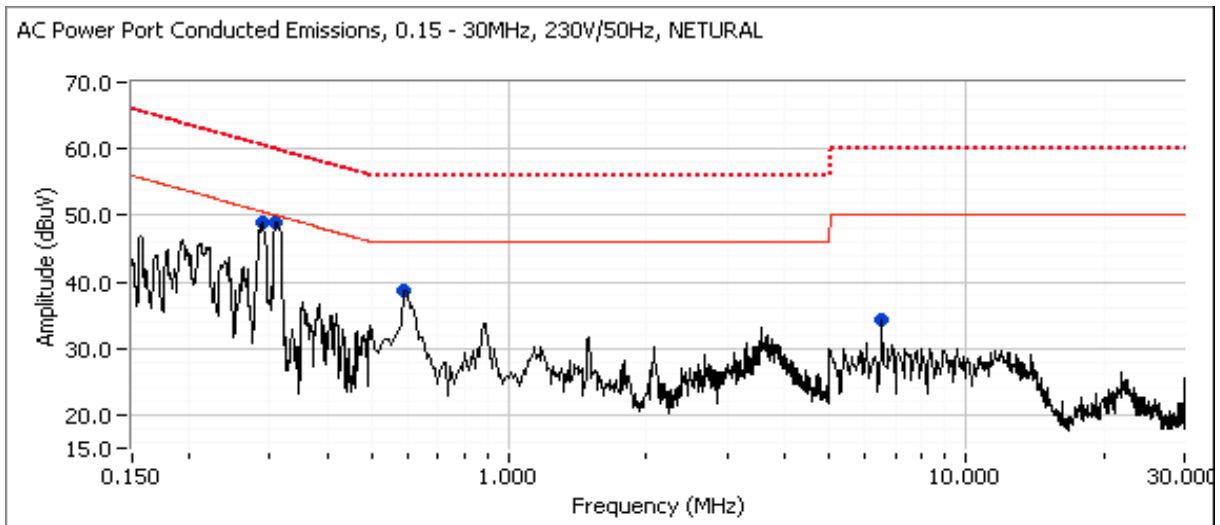
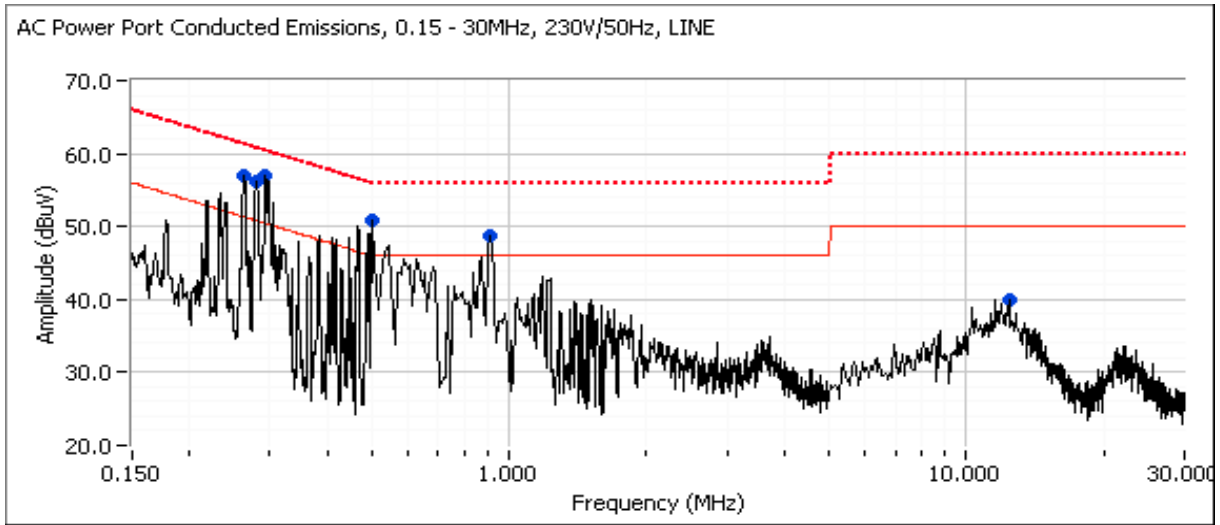
No deviations were made from the requirements of the standard.

Laptop: Dell	Model: Latitude E6400	Service Tag: 9XLB3M1
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Client: Broadcom Corporation	Job Number: J86739
Model: BCM94330UARTSDB (802.11bgn WLAN + BT 4.0, 20MHz SISO only)	T-Log Number: T86945
	Account Manager: Sheareen Jacobs
Contact: Anne Liang (Sachin Sawalapurkar)	
Standard: EN 300 328 / FCC	Class: -

Run #1: AC Power Port Conducted Emissions, 0.15 - 30MHz, 230V/50Hz



Client:	Broadcom Corporation	Job Number:	J86739
Model:	BCM94330UARTSDB (802.11bgn WLAN + BT 4.0, 20MHz SISO only)	T-Log Number:	T86945
Contact:	Anne Liang (Sachin Sawalapurkar)	Account Manager:	Sheareen Jacobs
Standard:	EN 300 328 / FCC	Class:	-

**Run #1: AC Power Port Conducted Emissions, 0.15 - 30MHz, 230V/50Hz**

**Preliminary peak readings captured during pre-scan (peak readings vs. average limit)**

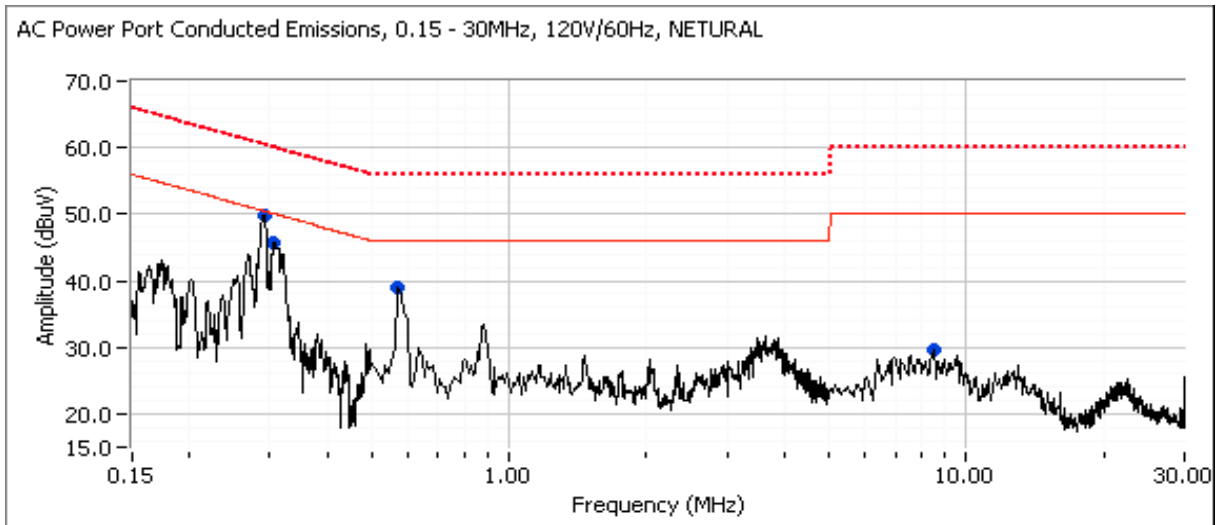
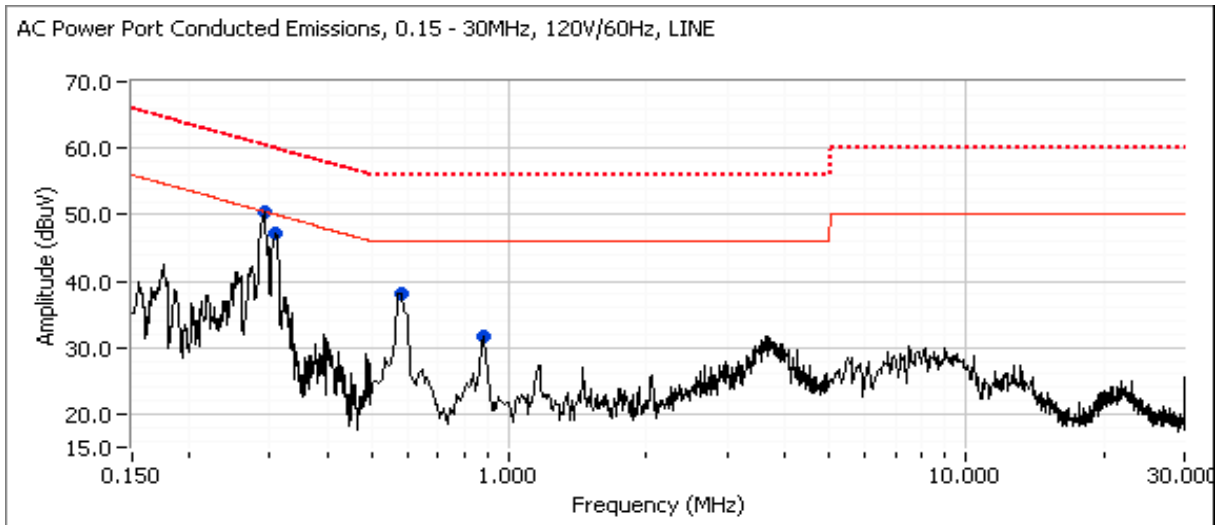
Frequency MHz	Level dB $\mu$ V	AC Line	Class B		Detector QP/Ave	Comments
			Limit	Margin		
0.294	56.9	Line	50.4	6.5	Peak	
0.264	57.0	Line	51.3	5.7	Peak	
0.281	56.2	Line	50.8	5.4	Peak	
0.500	50.8	Line	46.0	4.8	Peak	
0.906	48.8	Line	46.0	2.8	Peak	
0.310	48.9	Neutral	50.0	-1.1	Peak	
0.289	49.0	Neutral	50.6	-1.6	Peak	
0.590	38.7	Neutral	46.0	-7.3	Peak	
12.415	39.9	Line	50.0	-10.1	Peak	
6.553	34.4	Neutral	50.0	-15.6	Peak	

**Final quasi-peak and average readings**

Frequency MHz	Level dB $\mu$ V	AC Line	Class B		Detector QP/Ave	Comments
			Limit	Margin		
<b>0.310</b>	<b>46.3</b>	Neutral	50.0	<b>-3.7</b>	AVG	AVG (0.10s)
0.294	45.5	Line	50.4	-4.9	AVG	AVG (0.10s)
0.294	53.4	Line	60.4	-7.0	QP	QP (1.00s)
0.289	42.3	Neutral	50.6	-8.3	AVG	AVG (0.10s)
0.280	51.6	Line	60.8	-9.2	QP	QP (1.00s)
0.264	51.8	Line	61.3	-9.5	QP	QP (1.00s)
0.264	41.0	Line	51.3	-10.3	AVG	AVG (0.10s)
0.310	48.1	Neutral	60.0	-11.9	QP	QP (1.00s)
0.590	33.7	Neutral	46.0	-12.3	AVG	AVG (0.10s)
0.500	42.5	Line	56.0	-13.5	QP	QP (1.00s)
0.289	46.4	Neutral	60.6	-14.2	QP	QP (1.00s)
0.280	34.3	Line	50.8	-16.5	AVG	AVG (0.10s)
0.500	29.2	Line	46.0	-16.8	AVG	AVG (0.10s)
0.906	28.2	Line	46.0	-17.8	AVG	AVG (0.10s)
0.590	37.6	Neutral	56.0	-18.4	QP	QP (1.00s)
0.906	37.4	Line	56.0	-18.6	QP	QP (1.00s)
12.415	21.4	Line	50.0	-28.6	AVG	AVG (0.10s)
12.415	31.0	Line	60.0	-29.0	QP	QP (1.00s)
6.553	16.9	Neutral	50.0	-33.1	AVG	AVG (0.10s)
6.553	24.0	Neutral	60.0	-36.0	QP	QP (1.00s)

Client: Broadcom Corporation	Job Number: J86739
Model: BCM94330UARTSDB (802.11bgn WLAN + BT 4.0, 20MHz SISO only)	T-Log Number: T86945
	Account Manager: Sheareen Jacobs
Contact: Anne Liang (Sachin Sawalapurkar)	
Standard: EN 300 328 / FCC	Class: -

Run #2: AC Power Port Conducted Emissions, 0.15 - 30MHz, 120V/60Hz



Client:	Broadcom Corporation	Job Number:	J86739
Model:	BCM94330UARTSDB (802.11bgn WLAN + BT 4.0, 20MHz SISO only)	T-Log Number:	T86945
Contact:	Anne Liang (Sachin Sawalapurkar)	Account Manager:	Sheareen Jacobs
Standard:	EN 300 328 / FCC	Class:	-

**Run #2: AC Power Port Conducted Emissions, 0.15 - 30MHz, 120V/60Hz**
**Preliminary peak readings captured during pre-scan (peak readings vs. average limit)**

Frequency MHz	Level dB $\mu$ V	AC Line	Class B		Detector QP/Ave	Comments
			Limit	Margin		
0.292	50.3	Line	50.5	-0.2	Peak	
0.291	49.7	Neutral	50.5	-0.8	Peak	
0.309	47.2	Line	50.0	-2.8	Peak	
0.306	45.7	Neutral	50.1	-4.4	Peak	
0.572	39.1	Neutral	46.0	-6.9	Peak	
0.581	38.2	Line	46.0	-7.8	Peak	
0.879	31.8	Line	46.0	-14.2	Peak	
8.457	29.5	Neutral	50.0	-20.5	Peak	

**Final quasi-peak and average readings**

Frequency MHz	Level dB $\mu$ V	AC Line	Class B		Detector QP/Ave	Comments
			Limit	Margin		
<b>0.291</b>	<b>45.8</b>	Neutral	50.5	<b>-4.7</b>	AVG	AVG (0.10s)
0.292	44.0	Line	50.5	-6.5	AVG	AVG (0.10s)
0.306	43.3	Neutral	50.1	-6.8	AVG	AVG (0.10s)
0.309	41.4	Line	50.0	-8.6	AVG	AVG (0.10s)
0.291	49.0	Neutral	60.5	-11.5	QP	QP (1.00s)
0.292	48.0	Line	60.5	-12.5	QP	QP (1.00s)
0.572	32.4	Neutral	46.0	-13.6	AVG	AVG (0.10s)
0.306	45.4	Neutral	60.1	-14.7	QP	QP (1.00s)
0.309	45.2	Line	60.0	-14.8	QP	QP (1.00s)
0.581	30.4	Line	46.0	-15.6	AVG	AVG (0.10s)
0.572	36.8	Neutral	56.0	-19.2	QP	QP (1.00s)
0.879	26.7	Line	46.0	-19.3	AVG	AVG (0.10s)
0.581	36.1	Line	56.0	-19.9	QP	QP (1.00s)
0.879	30.4	Line	56.0	-25.6	QP	QP (1.00s)
8.457	18.9	Neutral	50.0	-31.1	AVG	AVG (0.10s)
8.457	24.5	Neutral	60.0	-35.5	QP	QP (1.00s)

*End of Report*

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