

## *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: BCM943142Y***

IC CERTIFICATION #: 4324A-BRCM1079  
FCC ID: QDS-BRCM1079

APPLICANT: Broadcom Corporation  
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Sunnyvale, CA 94086

TEST SITE(S): National Technical Systems - Silicon Valley  
41039 Boyce Road.  
Fremont, CA. 94538-2435

IC SITE REGISTRATION #: 2845B-5

REPORT DATE: November 26, 2013

FINAL TEST DATES: November 6, 7 and 11, 2013

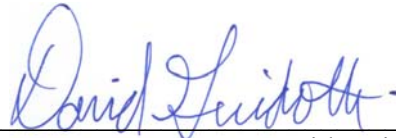
TOTAL NUMBER OF PAGES: 122

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**REVISION HISTORY**

Rev#	Date	Comments	Modified By
-	11-26-2013	First release	

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## SCOPE

An electromagnetic emissions test has been performed on the Broadcom Corporation model BCM943142Y, 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 National Technical Systems - Silicon Valley test procedures:

ANSI C63.10-2009  
FCC DTS Measurement Guidance KDB558074

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 BCM943142Y 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 BCM943142Y 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****DIGITAL TRANSMISSION SYSTEMS (2400 – 2483.5MHz)**

FCC Rule Part	RSS Rule Part	Description	Measured Value / Comments	Limit / Requirement	Result
15.247(a)	RSS 210 A8.2	Digital Modulation	Systems uses OFDM / DSSS techniques	System must utilize a digital transmission technology	Complies
15.247 (a) (2)	RSS 210 A8.2 (1)	6dB Bandwidth	11b: 7.0 MHz 11g: 15.0 MHz n20: 15.1 MHz n40: 35.1 MHz BLE: 0.697 kHz	>500kHz	Complies
15.247 (b) (3)	RSS 210 A8.2 (4)	Output Power (multipoint systems)	b: 19.0 dBm (0.080W)  g: 16.0 dBm (0.040W)  n20: 16.1 dBm (0.041W) n40: 14.4 dBm (0.028W)  BLE: 2.3 dBm (0.002W)  Max EIRP = 0.192 W Note 1	1 Watt, EIRP limited to 4 Watts.	Complies
15.247(d)	RSS 210 A8.2 (2)	Power Spectral Density	b: 2.9 dBm/10kHz g: 5.0 dBm/30kHz n20: 5.0 dBm/30kHz n40: 1.3 dBm/30kHz BLE: -3.0 dBm/30kHz	8dBm/3kHz	Complies
15.247(c)	RSS 210 A8.5	Antenna Port Spurious Emissions 30MHz – 25 GHz	All emissions below -30dBc limit	< -30dBc Note 2	Complies
15.247(c) / 15.209	RSS 210 A8.5	Radiated Spurious Emissions 30MHz – 25 GHz	54.0 dBμV/m @ 2486.8 MHz (0.0 dB)	15.207 in restricted bands, all others <-30dBc Note 2	Complies
Note 1: EIRP calculated using antenna gain of 3.8dBi for the highest EIRP system. Note 2: Limit of -30dBc used because the power was measured using the UNII test procedure (maximum power averaged over a transmission burst).					

**GENERAL REQUIREMENTS APPLICABLE TO ALL BANDS**

FCC Rule Part	RSS Rule part	Description	Measured Value / Comments	Limit / Requirement	Result (margin)
15.203	-	RF Connector	u.FL	Unique or integral antenna required	Complies
15.207	RSS GEN Table 2	AC Conducted Emissions	49.6 dB $\mu$ V @ 0.195 MHz (-14.2dB)	Refer to page 19	Complies
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	Refer to MPE calculations in Exhibit 11, for the mobile use condition.  Refer to SAR report for the portable use condition.	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	11b: 12.3MHz 11g: 17.4MHz n20: 18.3MHz n40: 36.2 MHz BLE: 1.1 MHz	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	$\pm 0.52$ dB
RF power, conducted (Spectrum analyzer)	dBm	25 to 7000 MHz	$\pm 0.7$ dB
Conducted emission of transmitter	dBm	25 to 26500 MHz	$\pm 0.7$ dB
Conducted emission of receiver	dBm	25 to 26500 MHz	$\pm 0.7$ dB
Radiated emission (substitution method)	dBm	25 to 26500 MHz	$\pm 2.5$ dB
Radiated emission (field strength)	dB $\mu$ V/m	25 to 1000 MHz	$\pm 3.6$ dB
		1000 to 40000 MHz	$\pm 6.0$ dB
Conducted Emissions (AC Power)	dB $\mu$ V	0.15 to 30 MHz	$\pm 2.4$ dB



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

The Broadcom Corporation model BCM943142Y is a Broadcom 802.11bgn WLAN + Bluetooth NGFF1630 Mini Card. Since the EUT would be installed in a host device and placed on a tabletop during operation, the EUT was treated as tabletop equipment during testing to simulate the end-user environment. The EUT is powered from the host device.

The sample was received on November 6, 2013 and tested on November 6, 7 and 11, 2013. The EUT consisted of the following component(s):

Company	Model	Description	Serial Number	FCC ID
Broadcom	BCM943142Y	Broadcom 802.11bgn WLAN + Bluetooth NGFF1630 Mini Card	001018E2EB19 (BLE/BT)	QDS-BRCM1079
			001018E2EB23 (n40 mode)	
			001018E2EB21 (bgn20)	

**OTHER EUT DETAILS**

802.11g/bn, supports 20 and 40MHz operation  
SISO operation only  
WiFi – Tx diversity supported  
Bluetooth operation limited to Aux port  
WiFi and Bluetooth simultaneous transmission supported

**ANTENNA SYSTEM**

RF testing was performed using:  
Ethertronics, model 1000802, 802.11abgn WLAN antenna, 3.8dBi @ 2.4GHz

**ENCLOSURE**

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

**MODIFICATIONS**

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

**SUPPORT EQUIPMENT – WiFi testing**

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

Company	Model	Description	Serial Number	FCC ID
Broadcom	BCM0NGFF2EC_1	WiFi test board	1679910	-
Lenovo	G560	Laptop	CB06427398	-

**SUPPORT EQUIPMENT – Bluetooth testing**

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

Company	Model	Description	Serial Number	FCC ID
Broadcom	100-124289-0040 Rev02	Bluetooth test board	1765588	-
Dell	E6400	Laptop	DP3L9K1	-

**SUPPORT EQUIPMENT – AC Conducted testing**

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

Company	Model	Description	Serial Number	FCC ID
Broadcom	BCM0NGFF2EC_1	WiFi test board	1679910	-
Lenovo	G560	Laptop	CB06427398	-
Hewlett Packard	Deskjet 5650	Printer	-	-

**EUT INTERFACE PORTS – WiFi testing**

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

Port	Connected To	Description	Cable(s)	
			Shielded or Unshielded	Length(m)
Laptop – DC	AC/DC Adapter	Multiconductor	Unshielded	1.5
AC/DC Adapter	AC Mains	3wire	Unshielded	1.5
PCIe slot	Test Fixture	-	-	-

**EUT INTERFACE PORTS – Bluetooth testing**

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

Port	Connected To	Description	Cable(s)	
			Shielded or Unshielded	Length(m)
Laptop – DC	AC/DC Adapter	Multiconductor	Unshielded	1.5
AC/DC Adapter	AC Mains	3wire	Unshielded	1.5
USB	Test Fixture	Multiconductor	Shielded	1.5

**EUT INTERFACE PORTS – AC Conducted testing**

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

Port	Connected To	Description	Cable(s)	
			Shielded or Unshielded	Length(m)
Laptop – DC	AC/DC Adapter	Multiconductor	Unshielded	1.5
AC/DC Adapter	AC Mains	3wire	Unshielded	1.5
PCIe	Test Fixture	Test Fixture	-	-
USB	Printer	Multiconductor	Shielded	1.5

**EUT OPERATION**

WiFi/Bluetooth (BLE) – during testing the EUT was configured to transmit continuously at the maximum power setting on the channel noted, at the data rate noted.

AC Conducted Emissions testing – the EUT was configured to transmit on channel 6 at 2437MHz, 802.11b mode, 1Mb/s, maximum output power setting. The computer was configured to be exercised per ANSI C63.4.

**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 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.

**CONDUCTED EMISSIONS CONSIDERATIONS**

Conducted emissions testing is performed in conformance with ANSI C63.10. 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 guidelines and meet the Normalized Site Attenuation (NSA) requirements of ANSI C63.4.

## **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 C63.10 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 as specified in ANSI C63.4. 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.

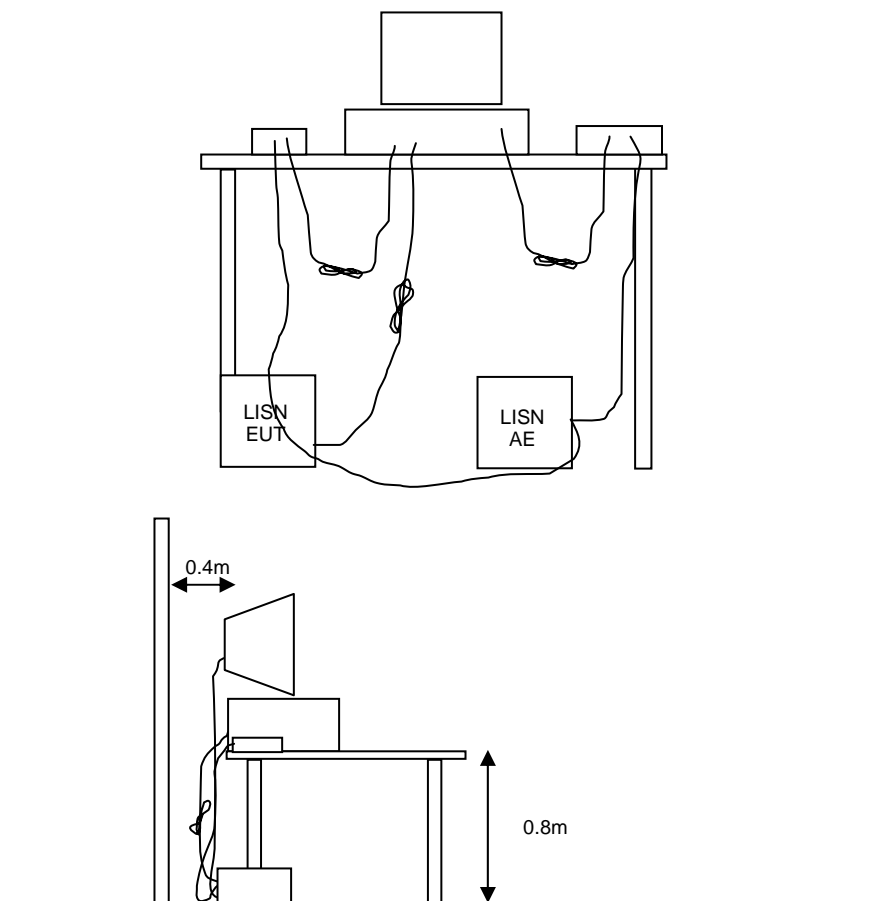
## TEST PROCEDURES

### 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 C63.10, 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**

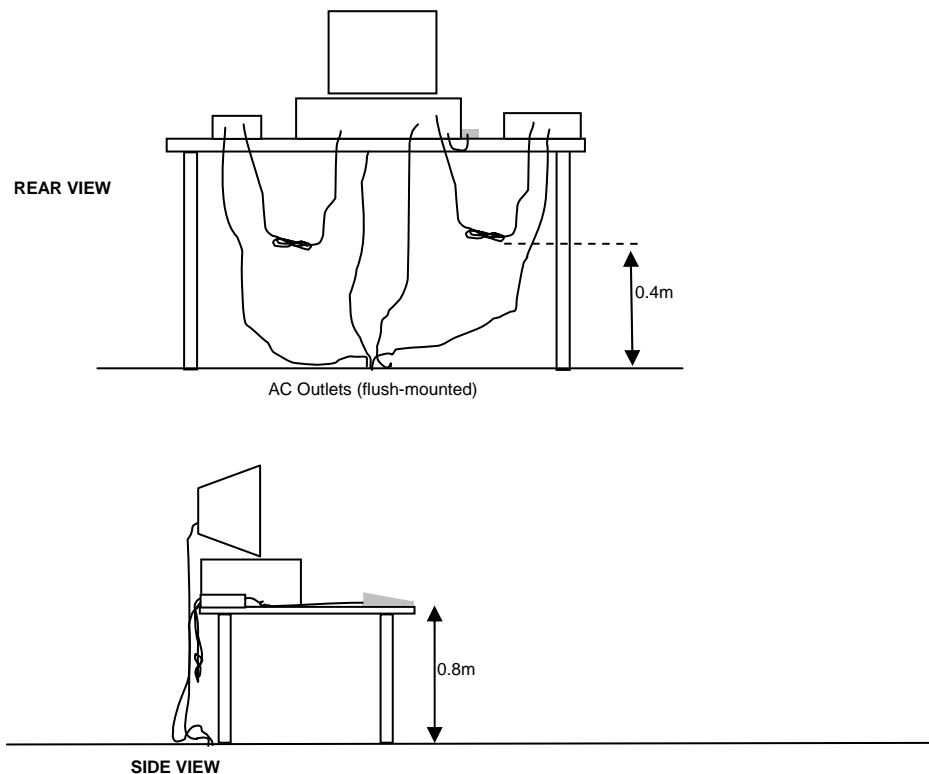
**RADIATED EMISSIONS**

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.

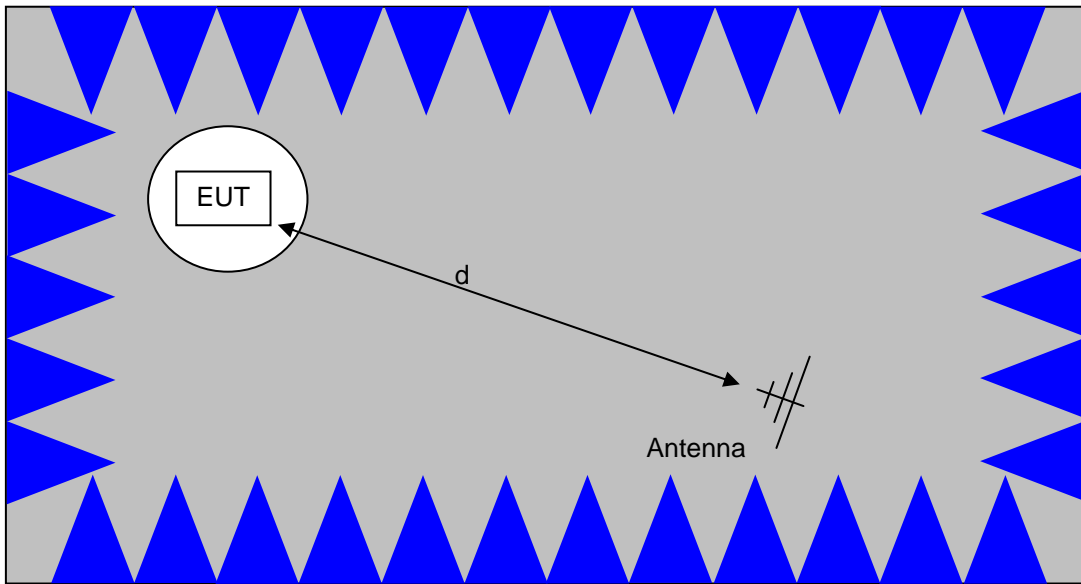
Final maximization is a phase in which the highest amplitude emissions identified in the spectral search are viewed while the EUT azimuth angle is varied from 0 to 360 degrees relative to the receiving antenna. The azimuth, which results in the highest emission is then maintained while varying the antenna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



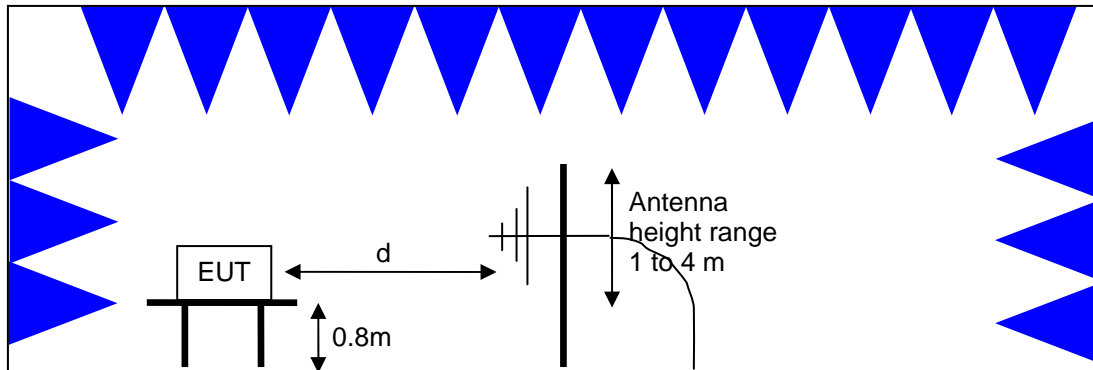
Typical Test Configuration for Radiated Field Strength Measurements





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.

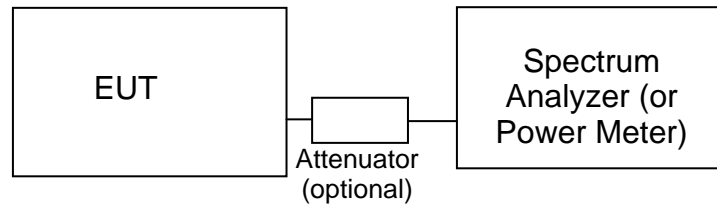
Floor-standing equipment is placed on the floor with insulating supports between the unit and the ground plane.



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 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, 26dB and/or 99% signal bandwidth are measured using the bandwidths recommended by ANSI C63.10 and 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

**OUTPUT POWER LIMITS – DIGITAL TRANSMISSION SYSTEMS**

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

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

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

**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).

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

**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**

<b><u>Manufacturer</u></b>	<b><u>Description</u></b>	<b><u>Model</u></b>	<b><u>Asset #</u></b>	<b><u>Cal Due</u></b>
<b>Radiated Bandedge, 06-Nov-13</b>				
EMCO	Antenna, Horn, 1-18GHz	3115	868	6/19/2014
Rohde & Schwarz	EMI Test Receiver, 20 Hz-40 GHz	ESIB40 (1088.7490.40)	2493	1/18/2014
<b>Radiated BE Emissions, 07-Nov-13</b>				
EMCO	Antenna, Horn, 1-18GHz	3115	868	6/19/2014
Rohde & Schwarz	EMI Test Receiver, 20 Hz-40 GHz	ESIB40 (1088.7490.40)	2493	1/18/2014
<b>Radiated Emissions, 1000 - 25,000 MHz, 07-Nov-13</b>				
EMCO	Antenna, Horn, 1-18GHz	3115	868	6/19/2014
Hewlett Packard	SpecAn 9 kHz - 40 GHz, FT (SA40) Blue	8564E (84125C)	1393	5/9/2014
Hewlett Packard	Head (Inc flex cable, (1742,1743) Blue)	84125C	1620	5/15/2014
Hewlett Packard	High Pass filter, 8.2 GHz (Purple System)	P/N 84300-80039	1767	12/5/2013
Hewlett Packard	Microwave Preamplifier, 1-26.5GHz	8449B	1780	12/5/2013
A. H. Systems	Purple System Horn, 18-40GHz	SAS-574, p/n: 2581	2160	6/28/2014
Micro-Tronics	Band Reject Filter, 2400-2500 MHz	BRM50702-02	2238	9/18/2014
<b>Radiated Emissions, 1,000 - 26,000 MHz, 08-Nov-13</b>				
EMCO	Antenna, Horn, 1-18GHz	3115	868	6/19/2014
Hewlett Packard	SpecAn 9 kHz - 40 GHz, FT (SA40) Blue	8564E (84125C)	1393	5/9/2014
Hewlett Packard	HF Amplifier, 45 MHz -50 GHz (with 1620)	83051A (84125C)	1743	5/13/2014
Hewlett Packard	Microwave Preamplifier, 1-26.5GHz	8449B	1780	12/5/2013
A. H. Systems	Purple System Horn, 18-40GHz	SAS-574, p/n: 2581	2160	6/28/2014
Micro-Tronics	Band Reject Filter, 2400-2500 MHz	BRM50702-02	2238	9/18/2014
Rohde & Schwarz	EMI Test Receiver, 20 Hz-40 GHz	ESIB40 (1088.7490.40)	2493	1/18/2014
<b>Radiated Emissions, 1,000 - 26,000 MHz, 09-Nov-13</b>				
EMCO	Antenna, Horn, 1-18GHz	3115	868	6/19/2014
Hewlett Packard	SpecAn 9 kHz - 40 GHz, FT (SA40) Blue	8564E (84125C)	1393	5/9/2014
Hewlett Packard	HF Amplifier, 45 MHz -50 GHz (with 1620)	83051A (84125C)	1743	5/13/2014
Hewlett Packard	Microwave Preamplifier, 1-26.5GHz	8449B	1780	12/5/2013
A. H. Systems	Purple System Horn, 18-40GHz	SAS-574, p/n: 2581	2160	6/28/2014
Micro-Tronics	Band Reject Filter, 2400-2500 MHz	BRM50702-02	2238	9/18/2014
Rohde & Schwarz	EMI Test Receiver, 20 Hz-40 GHz	ESIB40 (1088.7490.40)	2493	1/18/2014

<u>Manufacturer</u>	<u>Description</u>	<u>Model</u>	<u>Asset #</u>	<u>Cal Due</u>
<b>Radiated Emissions, 1,000 - 8,000 MHz, 11-Nov-13</b>				
EMCO	Antenna, Horn, 1-18GHz	3115	868	6/19/2014
Hewlett Packard	SpecAn 9 kHz - 40 GHz, FT (SA40) Blue	8564E (84125C)	1393	5/9/2014
Hewlett Packard	HF Amplifier, 45 MHz -50 GHz (with 1620)	83051A (84125C)	1743	5/13/2014
Hewlett Packard	Microwave Preamplifier, 1-26.5GHz	8449B	1780	12/5/2013
A. H. Systems	Purple System Horn, 18-40GHz	SAS-574, p/n: 2581	2160	6/28/2014
Micro-Tronics	Band Reject Filter, 2400-2500 MHz	BRM50702-02	2238	9/18/2014
Rohde & Schwarz	EMI Test Receiver, 20 Hz-40 GHz	ESIB40 (1088.7490.40)	2493	1/18/2014
<b>Radiated Emissions, 30 - 1,000 MHz, 11-Nov-13</b>				
Com-Power	Preamplifier, 30-1000 MHz	PA-103	1632	7/6/2014
Sunol Sciences	Biconilog, 30-3000 MHz	JB3	2197	2/7/2014
Rohde & Schwarz	EMI Test Receiver, 20 Hz-40 GHz	ESIB40 (1088.7490.40)	2493	1/18/2014
<b>Radiated Emissions, 30 - 1,000 MHz, 11-Nov-13</b>				
Com-Power	Preamplifier, 30-1000 MHz	PA-103	1632	7/6/2014
Sunol Sciences	Biconilog, 30-3000 MHz	JB3	2197	2/7/2014
Rohde & Schwarz	EMI Test Receiver, 20 Hz-40 GHz	ESIB40 (1088.7490.40)	2493	1/18/2014
Micro-Tronics	Band Reject Filter, 2400-2500 MHz	BRM50702-02	2238	9/18/2014
<b>Conducted Emissions - AC Power Ports, 11-Nov-13</b>				
EMCO	LISN, 10 kHz-100 MHz, 25A	3825/2	1292	2/14/2014
EMCO	LISN, 10 kHz-100 MHz	3825/2	1293	2/14/2014
Rohde & Schwarz	Pulse Limiter	ESH3 Z2	1401	5/15/2014
Rohde & Schwarz	EMI Test Receiver, 20 Hz-40 GHz	ESIB40 (1088.7490.40)	2493	1/18/2014
<b>Radio Antenna Port (Power and Spurious Emissions), 13-Nov-13</b>				
Rohde & Schwarz	Power Meter, Single Channel, +1795+1796	NRVS	1534	7/29/2014
Rohde & Schwarz	Power Sensor 100 uW - 2 Watts (w/ 20 dB pad, SN BJ5155)	NRV-Z32	1536	12/12/2013
Agilent Technologies	3Hz -44GHz PSA Spectrum Analyzer	E4446A	2796	1/28/2014
<b>Radiated Emissions, 30 - 1,000 MHz, 13-Nov-13</b>				
Com-Power	Preamplifier, 30-1000 MHz	PA-103	1632	7/6/2014
Sunol Sciences	Biconilog, 30-3000 MHz	JB3	2197	2/7/2014
Rohde & Schwarz	EMI Test Receiver, 20 Hz-40 GHz	ESIB40 (1088.7490.40)	2493	1/18/2014



## ***Appendix B Test Data***

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## EMC Test Data

Client:	Broadcom Corporation	Job Number:	J93687
Product	BCM943142Y (802.11bgn WLAN + Bluetooth NGFF1630 Mini Card)	T-Log Number:	T93842
Contact:	Anne Liang	Project Manager:	Sheareen Jacobs
Emissions Standard(s):	15.247/RSS-210	Project Coordinator:	Irene
Immunity Standard(s):	-	Class:	-
		Environment:	-

## EMC Test Data

For The

## Broadcom Corporation

Product

BCM943142Y (802.11bgn WLAN + Bluetooth NGFF1630 Mini Card)

Date of Last Test: 11/19/2013

Client:	Broadcom Corporation	Job Number:	J93687
Model:	BCM943142Y (802.11bgn WLAN + Bluetooth NGFF1630 Mini Card)	T-Log Number:	T93842
Contact:	Anne Liang	Project Manager:	Sheareen Jacobs
Standard:	15.247/RSS-210	Project Coordinator:	Irene
		Class:	N/A

## Power vs. Data Rate

In normal operating modes the card uses power settings stored on EEPROM to set the output power. For a given nominal output power the actual transmit power normally is reduced as the data rate increases, therefore testing was performed at the data rate in the mode with highest power to determine compliance with the requirements.

The following power measurements were made using a GATED average power meter and with the device configured in a continuous transmit mode on Chain 1 at the various data rates in each mode to verify the highest power mode:

### Sample Notes

Sample S/N: 001018E2EB23

Driver: 6.30.223.181

Antenna: 1000802

Laptop: (NTS 2012-3321)

Date of Test: 11/6/2013

Test Engineer: Joseph Cadigal

Test Location: FT Chamber#5

Mode	Data Rate	Power (dBm)	Power setting
802.11b	1	<b>18.1</b>	-
	2	18.1	
	5.5	18.1	
	11	18.1	
802.11g	6	<b>18.3</b>	-
	9	18.3	
	12	18.3	
	18	18.2	
	24	18.2	
	36	18.2	
	48	18.2	
	54	18.2	

Client:	Broadcom Corporation	Job Number:	J93687
Model:	BCM943142Y (802.11bgn WLAN + Bluetooth NGFF1630 Mini Card)	T-Log Number:	T93842
Contact:	Anne Liang	Project Manager:	Sheareen Jacobs
Standard:	15.247/RSS-210	Project Coordinator:	Irene
		Class:	N/A

Mode	Data Rate	Power (dBm)	Power setting
802.11n 20MHz	6.5	<b>18.5</b>	-
	13	18.5	
	19.5	18.5	
	26	18.5	
	39	18.5	
	52	18.5	
	58.5	18.5	
	65	18.5	
	78	N/A - Not supported	
802.11n/ac 40MHz	13.5	<b>15.4</b>	-
	27	15.3	
	40.5	15.2	
	54	15.2	
	81	15.2	
	108	15.2	
	121.5	15.2	
	135	15.2	
	162	N/A - Not supported	
	180	supported	
802.11ac 80MHz	29.3	N/A - not supported	
	58.5		
	87.8		
	117		
	175.5		
	234		
	266.3		
	292.5		
	351		
	390		

<<-11ac mode only

<<-11ac mode only

<<-11ac mode only

Note : Power setting - the software power setting used during testing, included for reference only.

Client:	Broadcom Corporation	Job Number:	J93687
Model:	BCM943142Y (802.11bgn WLAN + Bluetooth NGFF1630 Mini Card)	T-Log Number:	T93842
Contact:	Anne Liang	Project Manager:	Sheareen Jacobs
Standard:	15.247/RSS-210	Project Coordinator:	Irene
		Class:	N/A

## Duty Cycle

Date of Test: 10/22/2013  
 Test Engineer: John Caizzi  
 Test Location: Chamber 5

Duty cycle measurements performed on the worse case data rate for power.

Notes: Measurements taken with maximum RBW/VBW settings allowed.

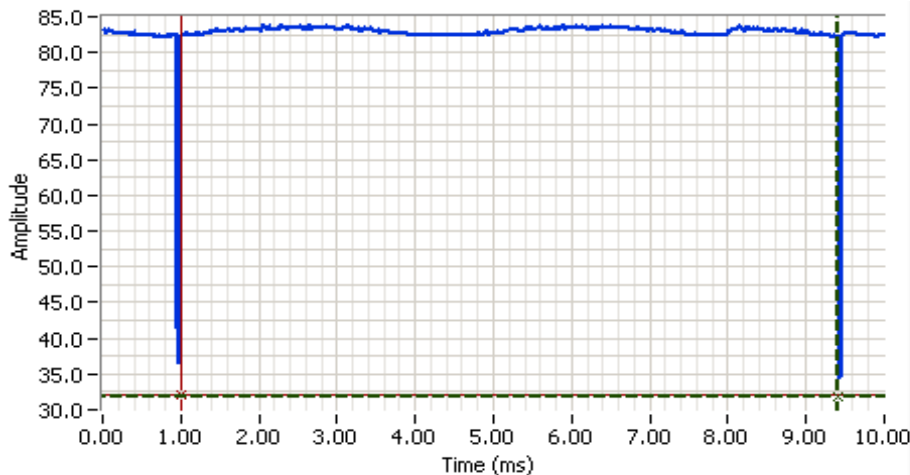
Mode	Data Rate	Duty Cycle (x)	Constant DC?	T (ms)	Pwr Cor Factor*	Lin Volt Cor Factor**	Min VBW for FS (Hz)
11b	1 Mbps	1.00	Yes	8.4	0.02	0.04	119.04762
11g	6 Mbps	0.97	Yes	1.41	0.12	0.24	709.21986
n20	MCS0	0.97	Yes	1.29	0.13	0.27	775.1938
n40	MCS0	0.95	Yes	0.62	0.24	0.48	1612.9032

\* Correction factor when using RMS/Power averaging -  $10 \cdot \log(1/x)$

\*\* Correction factor when using linear voltage average -  $20 \cdot \log(1/x)$

T = Minimum transmission duration

Client: Broadcom Corporation	Job Number: J93687
Model: BCM943142Y (802.11bgn WLAN + Bluetooth NGFF1630 Mini Card)	T-Log Number: T93842
Contact: Anne Liang	Project Manager: Sheareen Jacobs
Standard: 15.247/RSS-210	Project Coordinator: Irene
	Class: N/A



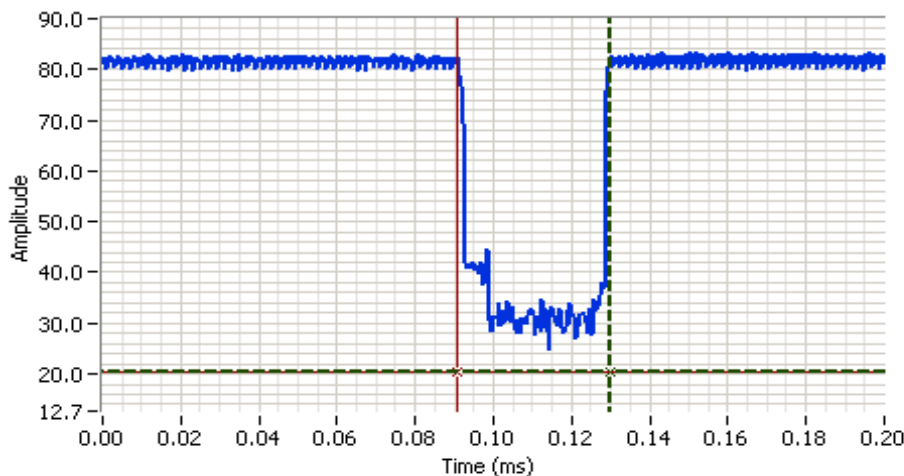
## Analyzer Settings

Rohde&Schwarz,ESI  
 CF: 2412.000 MHz  
 SPAN: 0.000 MHz  
 RB: 10.000 MHz  
 VB: 10.000 MHz  
 Detector: POS  
 Attn: 0 DB  
 RL Offset: 0.0 DB  
 Sweep Time: 10.0ms  
 Ref Lvl: 92.0 DBUV

## Comments

Duty cycle, 11b, 1 Mbps  
 On time = 8.4 ms

Cursor 1	9.4072	31.82		Delta Time (ms)	8.40
Cursor 2	1.0052	32.09		Delta Amplitude	0.26



## Analyzer Settings

Rohde&Schwarz,ESI  
 CF: 2412.000 MHz  
 SPAN: 0.000 MHz  
 RB: 10.000 MHz  
 VB: 10.000 MHz  
 Detector: POS  
 Attn: 0 DB  
 RL Offset: 0.0 DB  
 Sweep Time: 200.0us  
 Ref Lvl: 92.0 DBUV

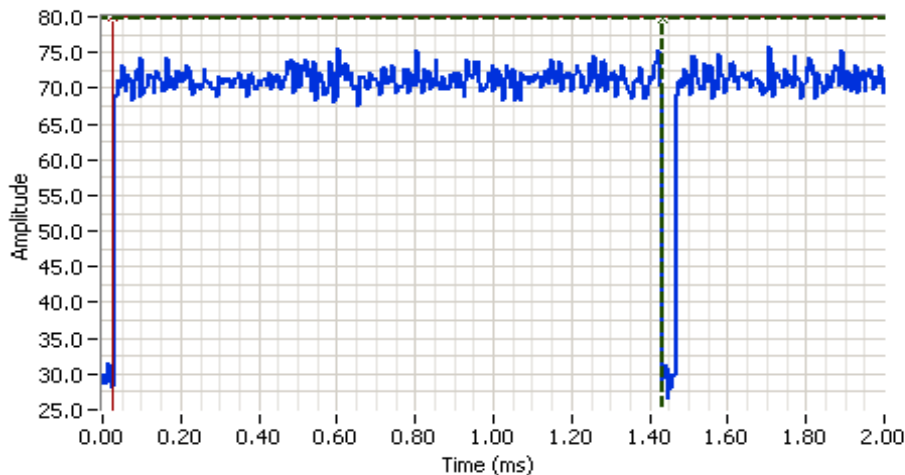
## Comments

Duty cycle, 11b, 1 Mbps  
 Off time = .04 ms

Cursor 1	0.1299	20.33		Delta Time (ms)	0.04
Cursor 2	0.0907	20.39		Delta Amplitude	0.06



Client: Broadcom Corporation	Job Number: J93687
Model: BCM943142Y (802.11bgn WLAN + Bluetooth NGFF1630 Mini Card)	T-Log Number: T93842
Contact: Anne Liang	Project Manager: Sheareen Jacobs
Standard: 15.247/RSS-210	Project Coordinator: Irene
	Class: N/A



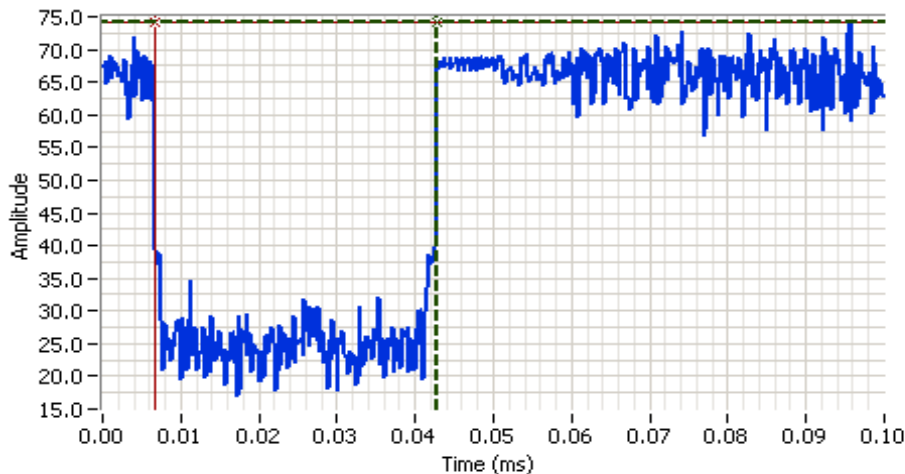
## Analyzer Settings

Rohde&Schwarz,ESI  
 CF: 2412.000 MHz  
 SPAN: 0.000 MHz  
 RB: 10.000 MHz  
 VB: 10.000 MHz  
 Detector: POS  
 Attn: 10 DB  
 RL Offset: 0.0 DB  
 Sweep Time: 2.0ms  
 Ref Lvl: 82.0 DBUV

## Comments

Duty cycle, 11g, 6 Mbps  
 On time = 1.41 ms

Cursor 1 1.4330 79.74    Delta Time (ms) 1.41  
 Cursor 2 0.0258 80.00    Delta Amplitude 0.26



## Analyzer Settings

Rohde&Schwarz,ESI  
 CF: 2412.000 MHz  
 SPAN: 0.000 MHz  
 RB: 10.000 MHz  
 VB: 10.000 MHz  
 Detector: POS  
 Attn: 10 DB  
 RL Offset: 0.0 DB  
 Sweep Time: 100.0us  
 Ref Lvl: 82.0 DBUV

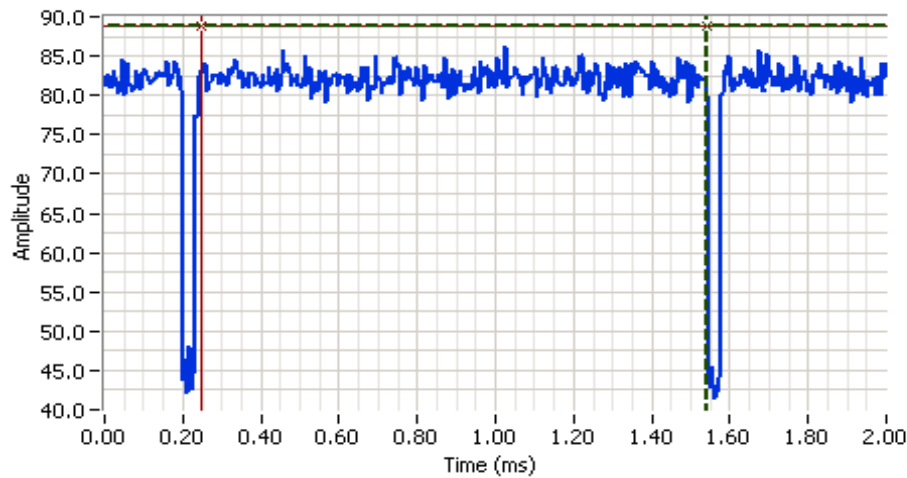
## Comments

Duty cycle, 11g, 6 Mbps  
 Off time = .04 ms

Cursor 1 0.0428 74.10    Delta Time (ms) 0.04  
 Cursor 2 0.0067 74.10    Delta Amplitude 0.00



Client: Broadcom Corporation	Job Number: J93687
Model: BCM943142Y (802.11bgn WLAN + Bluetooth NGFF1630 Mini Card)	T-Log Number: T93842
Contact: Anne Liang	Project Manager: Sheareen Jacobs
Standard: 15.247/RSS-210	Project Coordinator: Irene
	Class: N/A

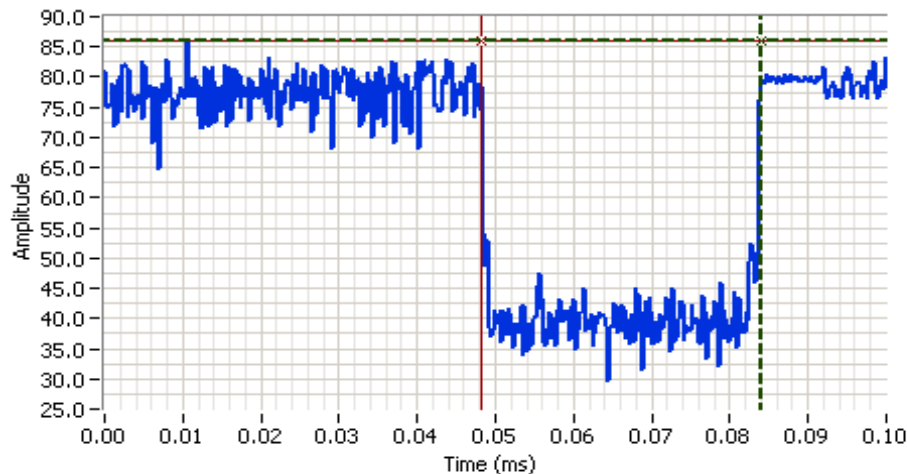


## Analyzer Settings

Rohde&Schwarz,ESI  
 CF: 2412.000 MHz  
 SPAN: 0.000 MHz  
 RB: 10.000 MHz  
 VB: 10.000 MHz  
 Detector: POS  
 Attn: 10 DB  
 RL Offset: 0.0 DB  
 Sweep Time: 2.0ms  
 Ref Lvl: 102.0 DBUV

## Comments

Duty cycle, n20, MCS0  
 On time = .04 ms



## Analyzer Settings

Rohde&Schwarz,ESI  
 CF: 2412.000 MHz  
 SPAN: 0.000 MHz  
 RB: 10.000 MHz  
 VB: 10.000 MHz  
 Detector: POS  
 Attn: 10 DB  
 RL Offset: 0.0 DB  
 Sweep Time: 100.0us  
 Ref Lvl: 102.0 DBUV

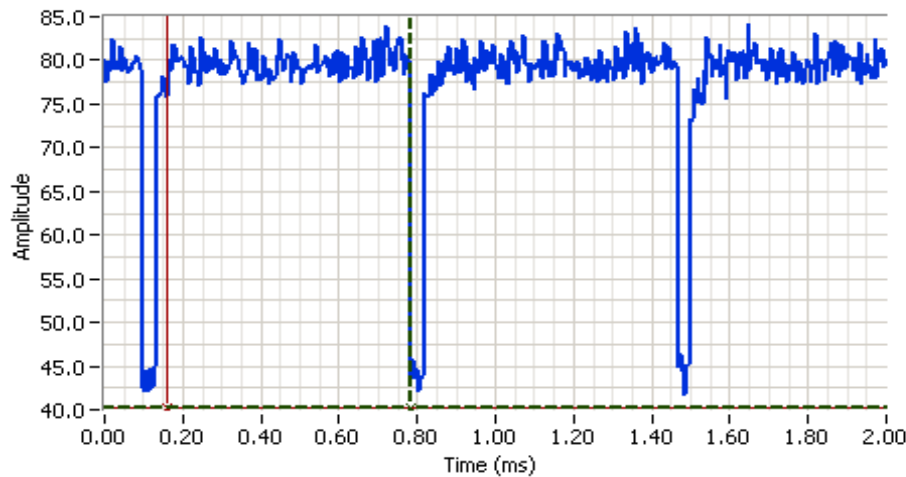
## Comments

Duty cycle, n20, MCS0  
 Off time = .04 ms





Client: Broadcom Corporation	Job Number: J93687
Model: BCM943142Y (802.11bgn WLAN + Bluetooth NGFF1630 Mini Card)	T-Log Number: T93842
Contact: Anne Liang	Project Manager: Sheareen Jacobs
Standard: 15.247/RSS-210	Project Coordinator: Irene
	Class: N/A



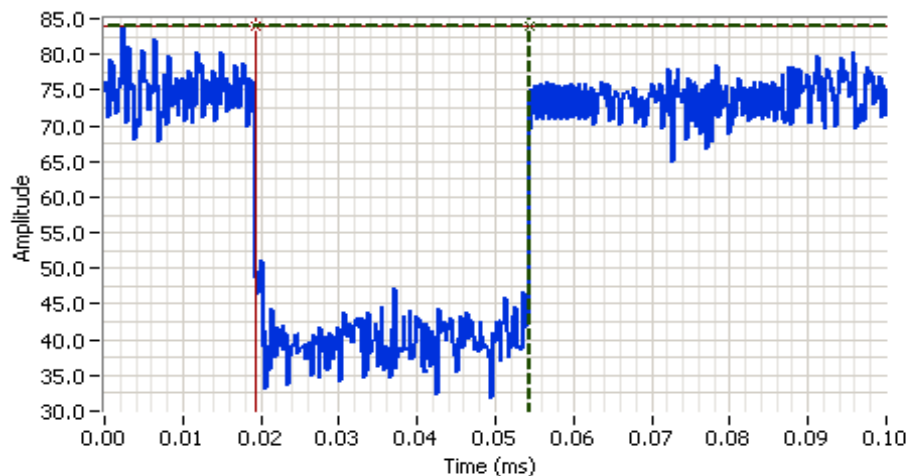
## Analyzer Settings

Rohde&Schwarz,ESI  
 CF: 2422.000 MHz  
 SPAN: 0.000 MHz  
 RB: 10.000 MHz  
 VB: 10.000 MHz  
 Detector: POS  
 Attn: 10 DB  
 RL Offset: 0.0 DB  
 Sweep Time: 2.0ms  
 Ref Lvl: 92.0 DBUV

## Comments

Duty cycle, n40, MCS0  
 On time = .62 ms

Cursor 1	0.7835	40.21		Delta Time (ms)	0.62
Cursor 2	0.1598	40.21		Delta Amplitude	0.00



## Analyzer Settings

Rohde&Schwarz,ESI  
 CF: 2422.000 MHz  
 SPAN: 0.000 MHz  
 RB: 10.000 MHz  
 VB: 10.000 MHz  
 Detector: POS  
 Attn: 10 DB  
 RL Offset: 0.0 DB  
 Sweep Time: 100.0us  
 Ref Lvl: 92.0 DBUV

## Comments

Duty cycle, n40, MCS0  
 Off time = .04 ms

Cursor 1	0.0544	83.98		Delta Time (ms)	0.04
Cursor 2	0.0193	83.98		Delta Amplitude	0.00



Client:	Broadcom Corporation	Job Number:	J93687
Model:	BCM943142Y (802.11bgn WLAN + Bluetooth NGFF1630 Mini Card)	T-Log Number:	T93842
Contact:	Anne Liang	Project Manager:	Sheareen Jacobs
Standard:	15.247/RSS-210	Project Coordinator:	Irene
		Class:	N/A

## RSS 210 and FCC 15.247 (DTS) 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.  
For radiated emissions testing the measurement antenna was located 3 meters from the EUT, unless otherwise noted.

### Ambient Conditions:

Temperature: 20.8 °C  
Rel. Humidity: 37 %

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

Run #	Mode	Channel	Target Power	Final Power	Test Performed	Limit	Result / Margin
1	b	1 - 2412MHz	19.0	-	Restricted Band Edge (2390 MHz)	FCC Part 15.209 / 15.247( c)	52.9 dBµV/m @ 2388.4 MHz (-1.1 dB)
		11 - 2462MHz		-	Restricted Band Edge (2483.5 MHz)		52.1 dBµV/m @ 2485.8 MHz (-1.9 dB)
		12 - 2467MHz		-	Restricted Band Edge (2483.5 MHz)		54.0 dBµV/m @ 2485.1 MHz (0.0 dB)
		13 - 2472MHz		-	Restricted Band Edge (2483.5 MHz)		54.0 dBµV/m @ 2486.8 MHz (0.0 dB)
2	g	1 - 2412MHz	16.0	-	Restricted Band Edge (2390 MHz)		52.9 dBµV/m @ 2390.0 MHz (-1.1 dB)
		11 - 2462MHz		-	Restricted Band Edge (2483.5 MHz)		51.9 dBµV/m @ 2483.5 MHz (-2.1 dB)
		12 - 2467MHz		-	Restricted Band Edge (2483.5 MHz)		53.3 dBµV/m @ 2483.5 MHz (-0.7 dB)
		13 - 2472MHz		-	Restricted Band Edge (2483.5 MHz)		73.6 dBµV/m @ 2485.5 MHz (-0.4 dB)

Client:	Broadcom Corporation	Job Number:	J93687
Model:	BCM943142Y (802.11bgn WLAN + Bluetooth NGFF1630 Mini Card)	T-Log Number:	T93842
Contact:	Anne Liang	Project Manager:	Sheareen Jacobs
Standard:	15.247/RSS-210	Project Coordinator:	Irene
		Class:	N/A

Run #	Mode	Channel	Target Power	Final Power	Test Performed	Limit	Result / Margin
3	n20	1 - 2412MHz	16.0	-	Restricted Band Edge (2390 MHz)	FCC Part 15.209 / 15.247( c)	53.5 dBµV/m @ 2390.0 MHz (-0.5 dB)
		10 - 2457MHz		-	Restricted Band Edge (2483.5 MHz)		53.4 dBµV/m @ 2483.6 MHz (-0.6 dB)
		11 - 2462MHz		-	Restricted Band Edge (2483.5 MHz)		53.5 dBµV/m @ 2483.5 MHz (-0.5 dB)
		12 - 2467MHz		-	Restricted Band Edge (2483.5 MHz)		53.8 dBµV/m @ 2483.5 MHz (-0.2 dB)
		13 - 2472MHz		-	Restricted Band Edge (2483.5 MHz)		53.8 dBµV/m @ 2483.5 MHz (-0.2 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 Notes

Sample S/N: 001018E2EB21

Driver: 6.30.223.181

Antenna: 1000802

The Aux port (J2) was tested. This was the worse case port based on preliminary testing.

Preliminary testing showed the horizontal polarization was the worse case orientation.

## Procedure Comments:

Measurements performed in accordance with FCC KDB 558074

Peak measurements performed with: RBW=1MHz, VBW=3MHz, peak detector, max hold, auto sweep time

Unless otherwise stated/noted, emission has duty cycle ≥ 98% and was measured using RBW=1MHz, VBW=10Hz, peak detector, linear average mode, auto sweep time, max hold.

Mode	Data Rate	Duty Cycle (x)	Constant DC?	T (ms)	Pwr Cor Factor*	Lin Volt Cor Factor**	Min VBW for FS (Hz)
11b	1 Mb/s	1.00	Yes	8.4	0.02	0.04	119.04762
11g	6 Mbps	0.97	Yes	1.41	0.12	0.24	709.21986
n20	MCS0	0.97	Yes	1.29	0.13	0.27	775.1938

Client:	Broadcom Corporation	Job Number:	J93687
Model:	BCM943142Y (802.11bgn WLAN + Bluetooth NGFF1630 Mini Card)	T-Log Number:	T93842
Contact:	Anne Liang	Project Manager:	Sheareen Jacobs
Standard:	15.247/RSS-210	Project Coordinator:	Irene
		Class:	N/A

## Measurement Specific Notes:

Note 1:	Emission in non-restricted band, but limit of 15.209 used.
Note 2:	Emission in non-restricted band, the limit was set 30dB below the level of the fundamental and measured in 100kHz.
Note 3:	Emission has duty cycle < 98%, but constant, average measurement performed: RBW=1MHz, VBW=10Hz, peak detector, linear averaging, auto sweep, trace average 100 traces, measurement corrected by Linear Voltage correction factor
Note 6:	Plots of the average and peak bandedge do not account for any duty cycle correction. Refer to the tabular results for final measurements.

Client:	Broadcom Corporation	Job Number:	J93687
Model:	BCM943142Y (802.11bgn WLAN + Bluetooth NGFF1630 Mini Card)	T-Log Number:	T93842
Contact:	Anne Liang	Project Manager:	Sheareen Jacobs
Standard:	15.247/RSS-210	Project Coordinator:	Irene
		Class:	N/A

## Run #1: Radiated Bandedge Measurements

Date of Test: 11/6/2013 & 11/7/13

Test Engineer: Joseph Cadigal & John Caizzi

Test Location: FT Chamber#5

Config. Used: 1

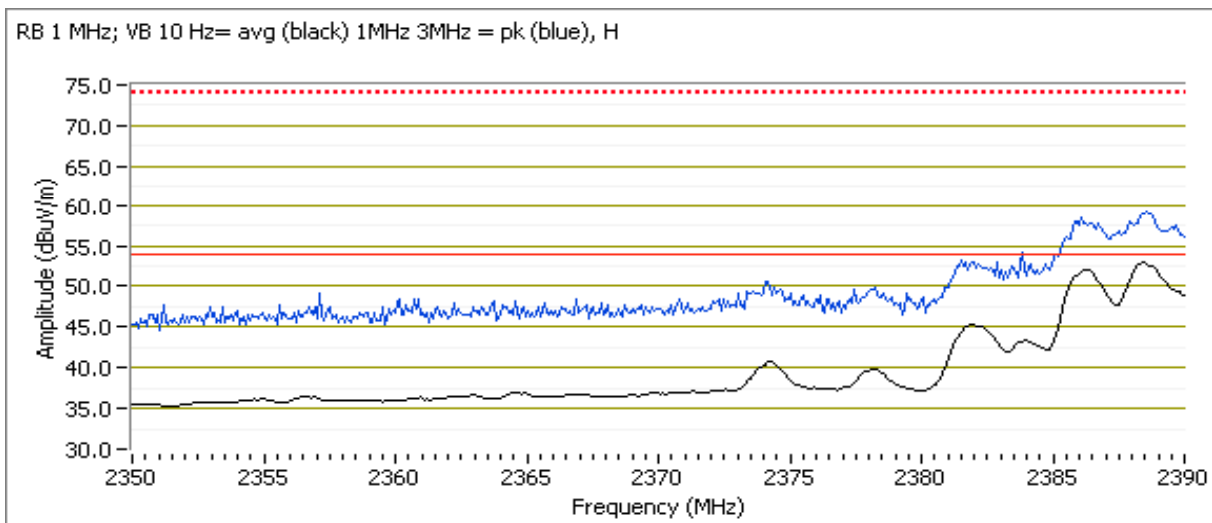
Config Change: none

EUT Voltage: 120V/60Hz

Channel: 1 Mode: b  
 Tx Chain: Aux - J2 Data Rate: 1 Mb/s

## Band Edge Signal Field Strength - Direct measurement of 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	
2388.400	52.9	H	54.0	-1.1	AVG	352	1.0	POS; RB 1 MHz; VB: 10 Hz
2389.520	66.9	H	74.0	-7.1	PK	352	1.0	POS; RB 1 MHz; VB: 3 MHz

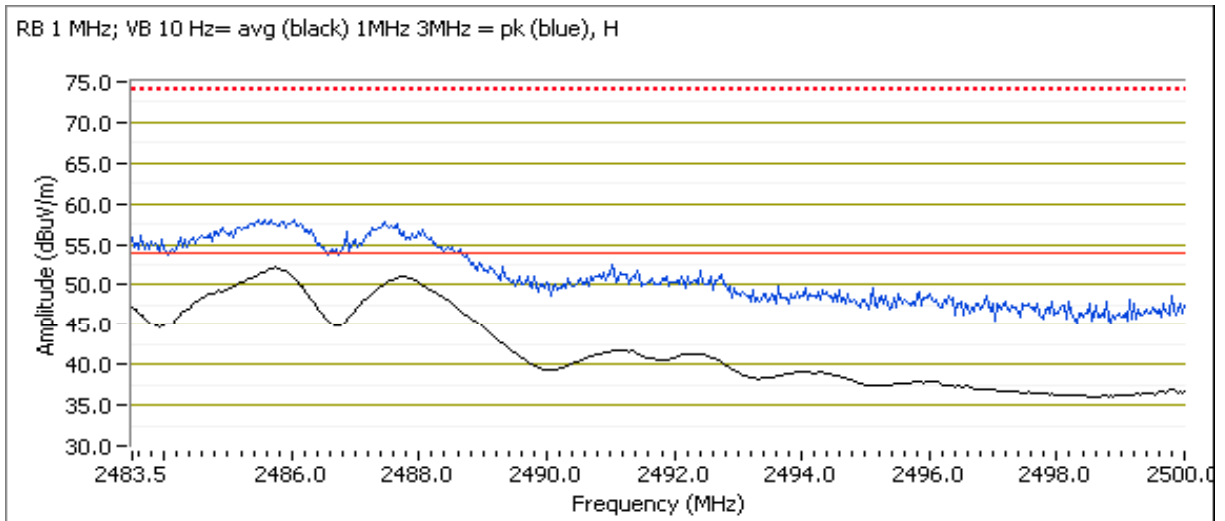


Client:	Broadcom Corporation	Job Number:	J93687
Model:	BCM943142Y (802.11bgn WLAN + Bluetooth NGFF1630 Mini Card)	T-Log Number:	T93842
Contact:	Anne Liang	Project Manager:	Sheareen Jacobs
Standard:	15.247/RSS-210	Project Coordinator:	Irene
		Class:	N/A

Channel: 11                      Mode: b  
 Tx Chain: Aux - J2              Data Rate: 1 Mb/s

## Band Edge Signal Field Strength - Direct measurement of 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	
2485.780	52.1	H	54.0	-1.9	AVG	142	1.0	POS; RB 1 MHz; VB: 10 Hz
2485.450	58.1	H	74.0	-15.9	PK	142	1.0	POS; RB 1 MHz; VB: 3 MHz

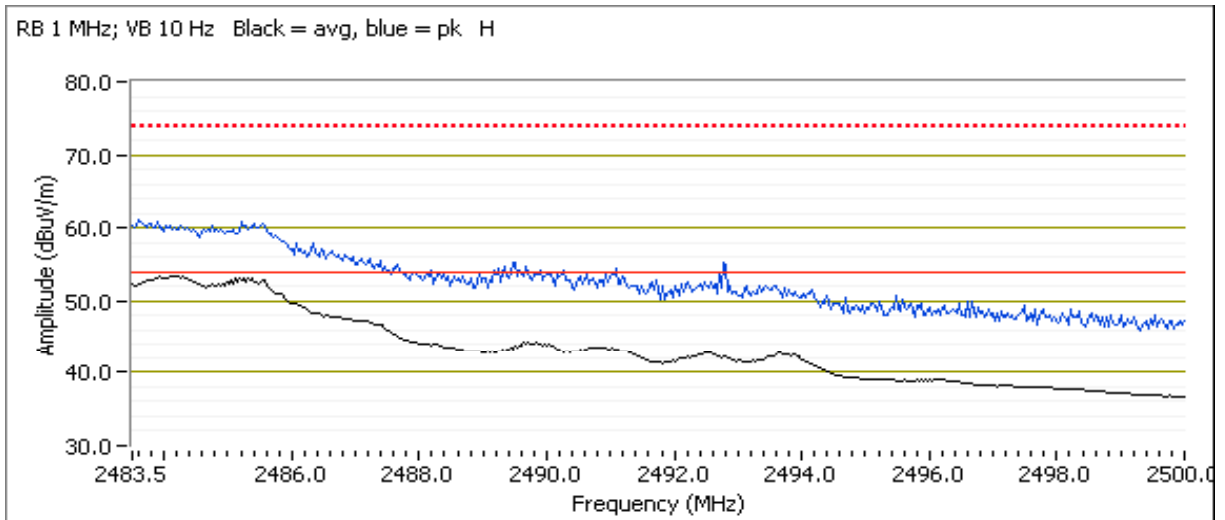


Client:	Broadcom Corporation	Job Number:	J93687
Model:	BCM943142Y (802.11bgn WLAN + Bluetooth NGFF1630 Mini Card)	T-Log Number:	T93842
Contact:	Anne Liang	Project Manager:	Sheareen Jacobs
Standard:	15.247/RSS-210	Project Coordinator:	Irene
		Class:	N/A

Channel: 12                      Mode: b  
 Tx Chain: Aux - J2              Data Rate: 1 Mb/s

## Band Edge Signal Field Strength - Direct measurement of 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	
2485.120	54.0	H	54.0	0.0	AVG	360	1.19	
2484.820	61.3	H	74.0	-12.7	PK	360	1.19	

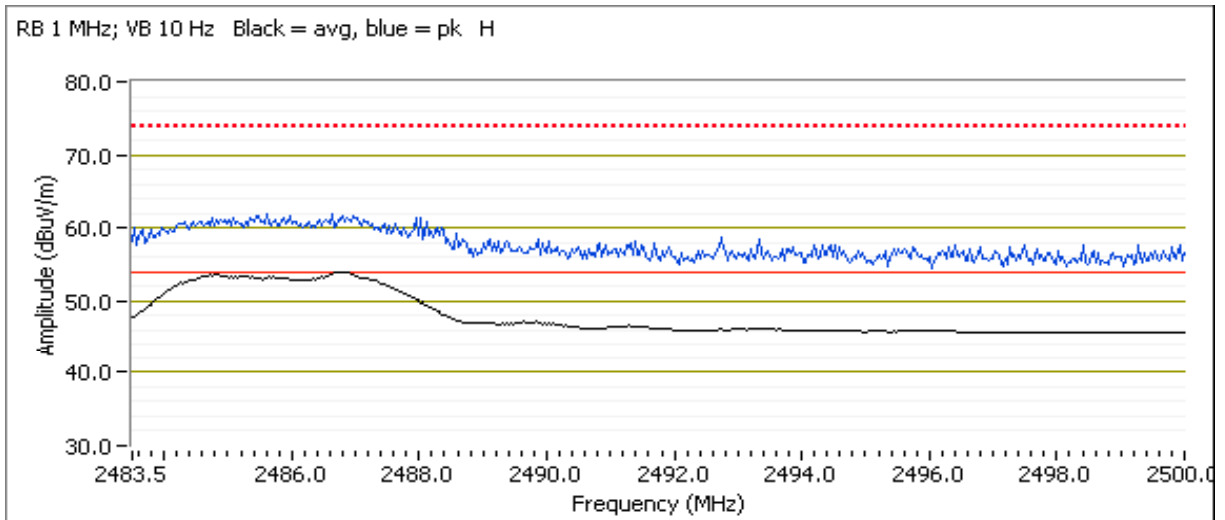


Client:	Broadcom Corporation	Job Number:	J93687
Model:	BCM943142Y (802.11bgn WLAN + Bluetooth NGFF1630 Mini Card)	T-Log Number:	T93842
Contact:	Anne Liang	Project Manager:	Sheareen Jacobs
Standard:	15.247/RSS-210	Project Coordinator:	Irene
		Class:	N/A

Channel: 13                      Mode: b  
 Tx Chain: Aux - J2              Data Rate: 1 Mb/s

## Band Edge Signal Field Strength - Direct measurement of 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	
2486.770	54.0	H	54.0	0.0	AVG	0	1.19	
2485.550	62.4	H	74.0	-11.6	PK	0	1.19	





Client:	Broadcom Corporation	Job Number:	J93687
Model:	BCM943142Y (802.11bgn WLAN + Bluetooth NGFF1630 Mini Card)	T-Log Number:	T93842
Contact:	Anne Liang	Project Manager:	Sheareen Jacobs
Standard:	15.247/RSS-210	Project Coordinator:	Irene
		Class:	N/A

## Run #2: Radiated Bandedge Measurements

Date of Test: 11/6/2013 & 11/7/13

Test Engineer: Joseph Cadigal & John Caizzi

Test Location: FT Chamber#5

Config. Used: 1

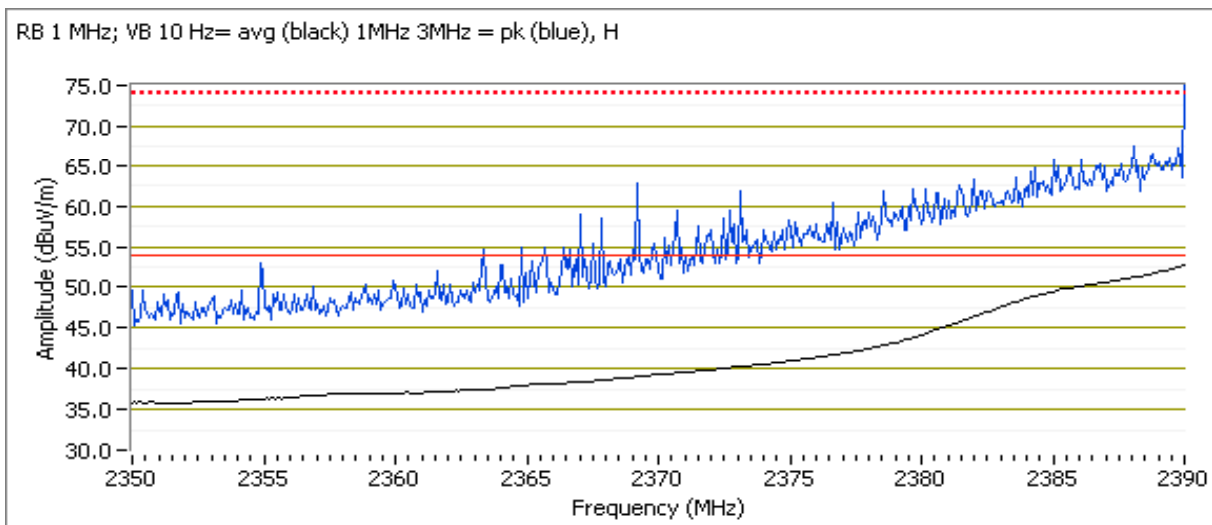
Config Change: none

EUT Voltage: 120V/60Hz

Channel: 1 Mode: g  
 Tx Chain: Aux - J2 Data Rate: 6 Mbps

## Band Edge Signal Field Strength - Direct measurement of 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	
2390.000	52.9	H	54.0	-1.1	AVG	360	1.0	POS; RB 1 MHz; VB: 10 Hz
2389.200	63.8	H	74.0	-10.2	PK	360	1.0	POS; RB 1 MHz; VB: 3 MHz



Client:	Broadcom Corporation	Job Number:	J93687
Model:	BCM943142Y (802.11bgn WLAN + Bluetooth NGFF1630 Mini Card)	T-Log Number:	T93842
Contact:	Anne Liang	Project Manager:	Sheareen Jacobs
Standard:	15.247/RSS-210	Project Coordinator:	Irene
		Class:	N/A

Channel: 11 Mode: g  
Tx Chain: Aux - J2 Data Rate: 6 Mbps

## Band Edge Signal Field Strength - Direct measurement of 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	
2483.500	51.9	H	54.0	-2.1	AVG	136	1.0	POS; RB 1 MHz; VB: 10 Hz
2483.630	69.3	H	74.0	-4.7	PK	136	1.0	POS; RB 1 MHz; VB: 3 MHz

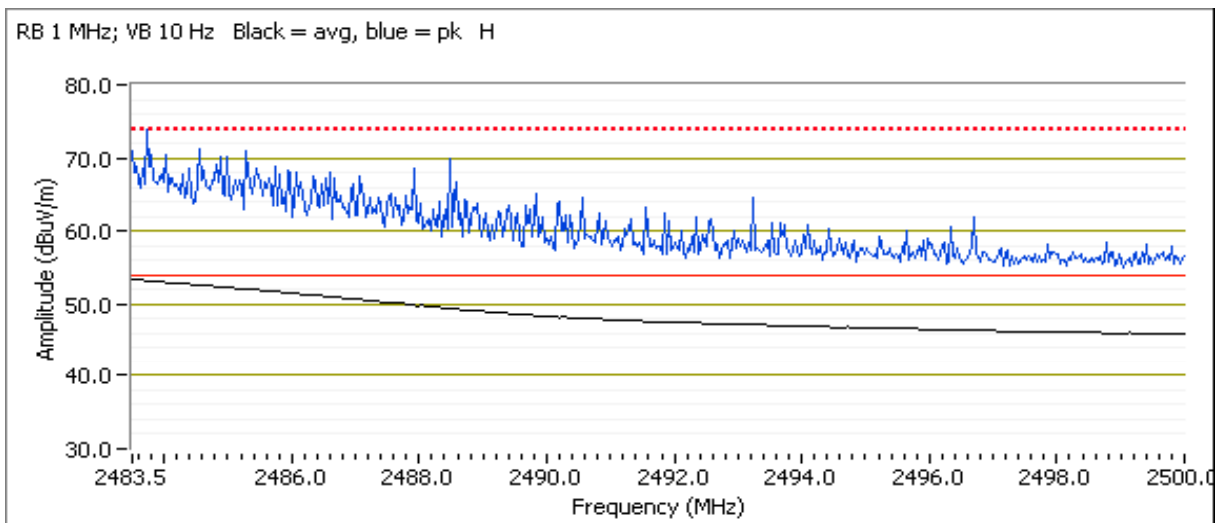
Note - No plot of bandedge measurement captured.

Client:	Broadcom Corporation	Job Number:	J93687
Model:	BCM943142Y (802.11bgn WLAN + Bluetooth NGFF1630 Mini Card)	T-Log Number:	T93842
Contact:	Anne Liang	Project Manager:	Sheareen Jacobs
Standard:	15.247/RSS-210	Project Coordinator:	Irene
		Class:	N/A

Channel: 12                      Mode: g  
 Tx Chain: Aux - J2              Data Rate: 6 Mbps

## Band Edge Signal Field Strength - Direct measurement of 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	
2483.530	53.3	H	54.0	-0.7	AVG	360	1.20	
2484.000	72.9	H	74.0	-1.1	PK	360	1.20	

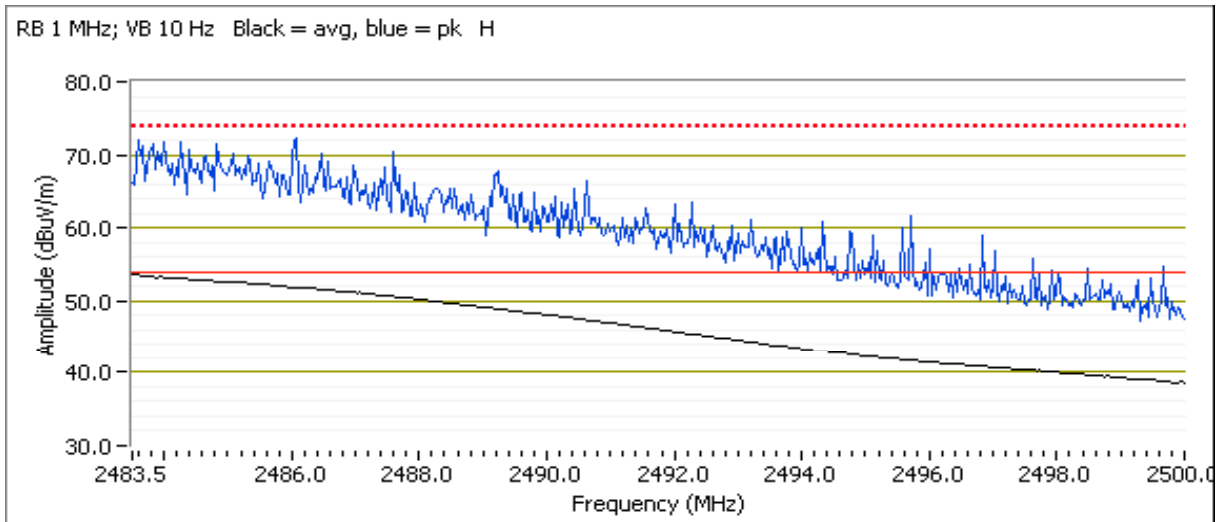


Client:	Broadcom Corporation	Job Number:	J93687
Model:	BCM943142Y (802.11bgn WLAN + Bluetooth NGFF1630 Mini Card)	T-Log Number:	T93842
Contact:	Anne Liang	Project Manager:	Sheareen Jacobs
Standard:	15.247/RSS-210	Project Coordinator:	Irene
		Class:	N/A

Channel: 13                      Mode: g  
 Tx Chain: Aux - J2              Data Rate: 6 Mbps

## Band Edge Signal Field Strength - Direct measurement of 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	
2483.530	53.5	H	54.0	-0.5	AVG	0	1.18	
2485.480	73.6	H	74.0	-0.4	PK	0	1.18	



Client:	Broadcom Corporation	Job Number:	J93687
Model:	BCM943142Y (802.11bgn WLAN + Bluetooth NGFF1630 Mini Card)	T-Log Number:	T93842
Contact:	Anne Liang	Project Manager:	Sheareen Jacobs
Standard:	15.247/RSS-210	Project Coordinator:	Irene
		Class:	N/A

## Run #3: Radiated Bandedge Measurements

Date of Test: 11/6/2013 0:00

Test Engineer: 11/6/2013 & 11/7/13

Test Location: Joseph Cadigal & John Caizzi

Config. Used: 1

Config Change: none

EUT Voltage: 120V/60Hz

Channel: 1 Mode: n20  
Tx Chain: Aux - J2 Data Rate: MCS0

## Band Edge Signal Field Strength - Direct measurement of 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	
2390.000	53.5	H	54.0	-0.5	AVG	0	1.0	POS; RB 1 MHz; VB: 10 Hz
2389.680	67.9	H	74.0	-6.1	PK	0	1.0	POS; RB 1 MHz; VB: 3 MHz

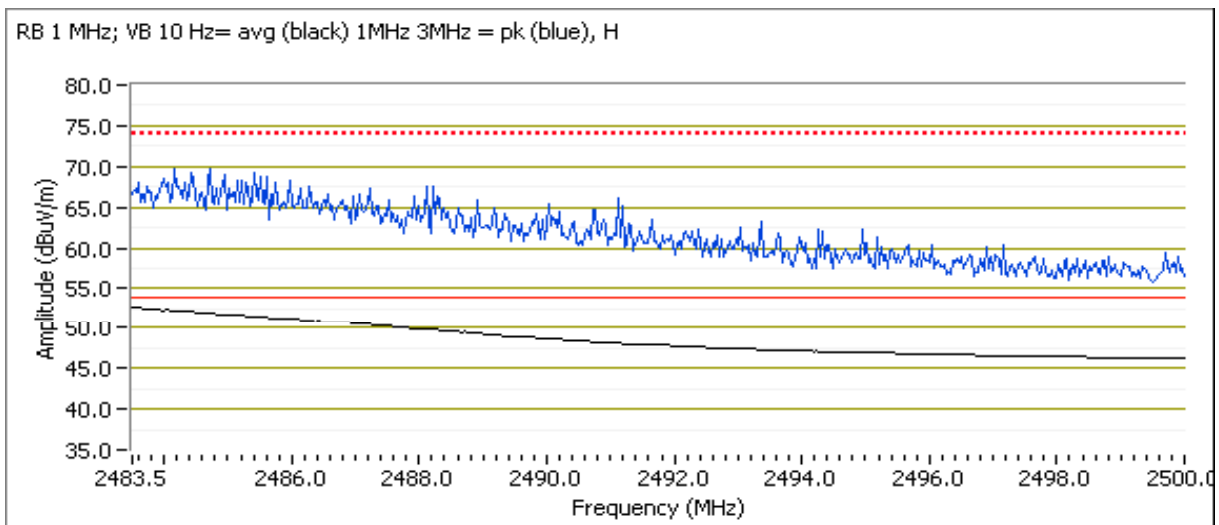
Note - No plot of bandedge measurement captured.

Client:	Broadcom Corporation	Job Number:	J93687
Model:	BCM943142Y (802.11bgn WLAN + Bluetooth NGFF1630 Mini Card)	T-Log Number:	T93842
Contact:	Anne Liang	Project Manager:	Sheareen Jacobs
Standard:	15.247/RSS-210	Project Coordinator:	Irene
		Class:	N/A

Channel: 10                      Mode: n20  
 Tx Chain: Aux - J2              Data Rate: MCS0

## Band Edge Signal Field Strength - Direct measurement of 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	
2483.600	53.4	H	54.0	-0.6	AVG	28	1.2	POS; RB 1 MHz; VB: 10 Hz
2483.960	70.3	H	74.0	-3.7	PK	28	1.2	POS; RB 1 MHz; VB: 3 MHz

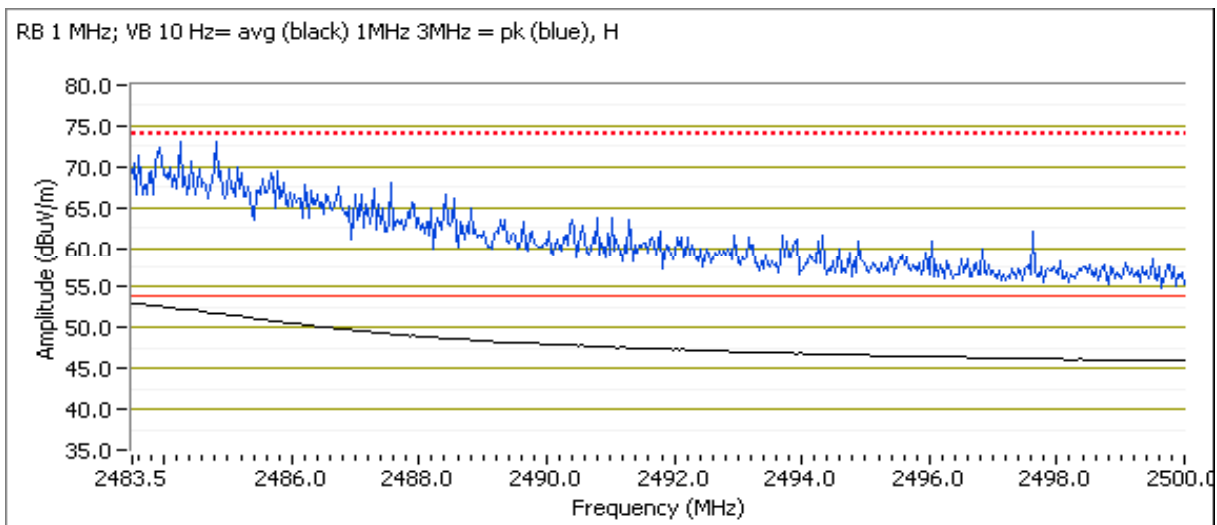


Client:	Broadcom Corporation	Job Number:	J93687
Model:	BCM943142Y (802.11bgn WLAN + Bluetooth NGFF1630 Mini Card)	T-Log Number:	T93842
Contact:	Anne Liang	Project Manager:	Sheareen Jacobs
Standard:	15.247/RSS-210	Project Coordinator:	Irene
		Class:	N/A

Channel: 11                      Mode: n20  
 Tx Chain: Aux - J2              Data Rate: MCS0

## Band Edge Signal Field Strength - Direct measurement of 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	
2483.500	53.5	H	54.0	-0.5	AVG	29	1.2	POS; RB 1 MHz; VB: 10 Hz
2483.700	72.5	H	74.0	-1.5	PK	29	1.2	POS; RB 1 MHz; VB: 3 MHz
2483.500	50.1	V	54.0	-3.9	AVG	106	1.0	POS; RB 1 MHz; VB: 10 Hz
2484.130	66.1	V	74.0	-7.9	PK	106	1.0	POS; RB 1 MHz; VB: 3 MHz

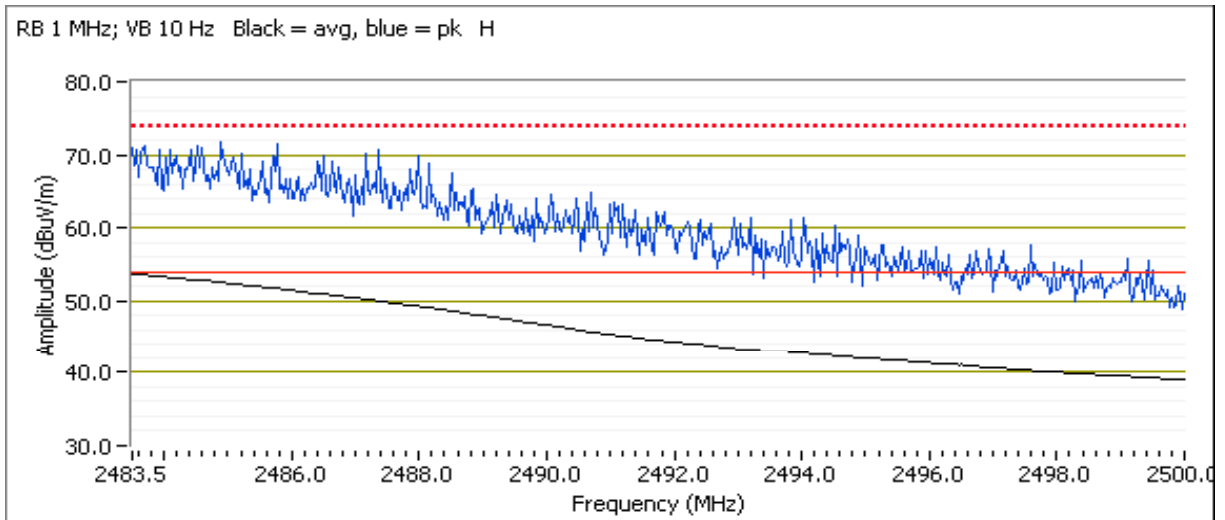


Client:	Broadcom Corporation	Job Number:	J93687
Model:	BCM943142Y (802.11bgn WLAN + Bluetooth NGFF1630 Mini Card)	T-Log Number:	T93842
Contact:	Anne Liang	Project Manager:	Sheareen Jacobs
Standard:	15.247/RSS-210	Project Coordinator:	Irene
		Class:	N/A

Channel: 12                      Mode: n20  
 Tx Chain: Aux - J2              Data Rate: MCS0

## Band Edge Signal Field Strength - Direct measurement of 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	
2483.530	53.8	H	54.0	-0.2	AVG	359	1.17	
2486.210	73.4	H	74.0	-0.6	PK	359	1.17	



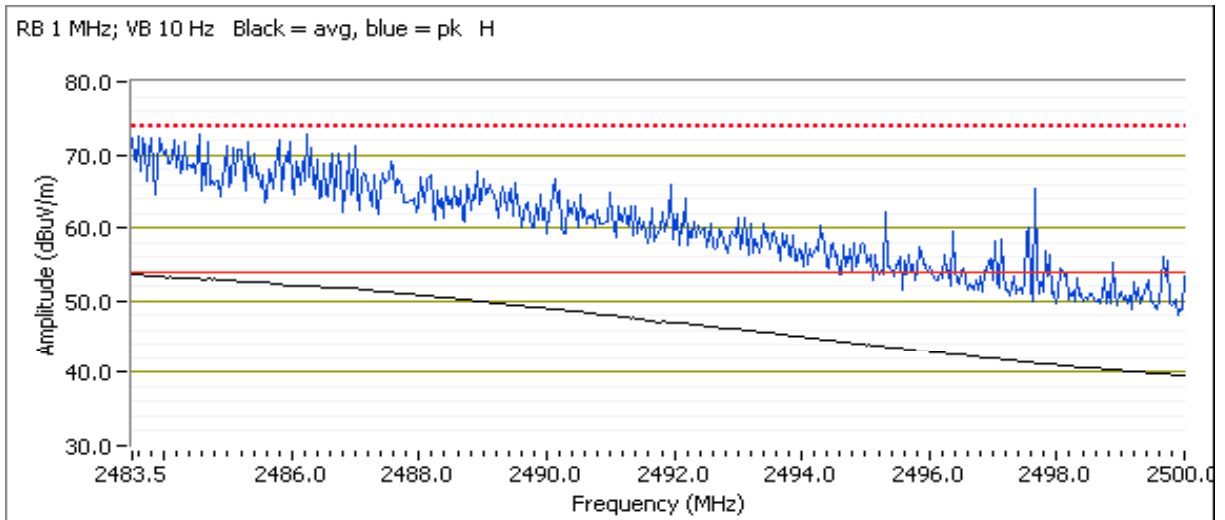


Client:	Broadcom Corporation	Job Number:	J93687
Model:	BCM943142Y (802.11bgn WLAN + Bluetooth NGFF1630 Mini Card)	T-Log Number:	T93842
Contact:	Anne Liang	Project Manager:	Sheareen Jacobs
Standard:	15.247/RSS-210	Project Coordinator:	Irene
		Class:	N/A

Channel: 13                      Mode: n20  
 Tx Chain: Aux - J2              Data Rate: MCS0

## Band Edge Signal Field Strength - Direct measurement of 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	53.8	H	54.0	-0.2	AVG	1	1.18	
2486.180	72.9	H	74.0	-1.1	PK	1	1.18	



Client:	Broadcom Corporation	Job Number:	J93687
Model:	BCM943142Y (802.11bgn WLAN + Bluetooth NGFF1630 Mini Card)	T-Log Number:	T93842
Contact:	Anne Liang	Project Manager:	Sheareen Jacobs
Standard:	15.247/RSS-210	Project Coordinator:	Irene
		Class:	N/A

## RSS 210 and FCC 15.247 (DTS) 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. For radiated emissions testing the measurement antenna was located 3 meters from the EUT, unless otherwise noted.

### Ambient Conditions:

Temperature: 20.8 °C  
 Rel. Humidity: 37 %

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

Run #	Mode	Channel	Target Power	Final Power	Test Performed	Limit	Result / Margin
4	n40	3 - 2422MHz	15.0	-	Restricted Band Edge (2390 MHz)	FCC Part 15.209 / 15.247( c)	53.9 dBµV/m @ 2389.7 MHz (-0.1 dB)
		4 - 2427MHz		-	Restricted Band Edge (2390 MHz)		53.9 dBµV/m @ 2389.6 MHz (-0.1 dB)
		8 - 2447MHz		-	Restricted Band Edge (2483.5 MHz)		53.5 dBµV/m @ 2483.6 MHz (-0.5 dB)
		9 - 2452MHz		-	Restricted Band Edge (2483.5 MHz)		53.9 dBµV/m @ 2483.6 MHz (-0.1 dB)
		10 - 2457MHz		-	Restricted Band Edge (2483.5 MHz)		53.9 dBµV/m @ 2483.5 MHz (-0.1 dB)
		11 - 2462MHz		-	Restricted Band Edge (2483.5 MHz)		53.3 dBµV/m @ 2483.5 MHz (-0.7 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.

Client:	Broadcom Corporation	Job Number:	J93687
Model:	BCM943142Y (802.11bgn WLAN + Bluetooth NGFF1630 Mini Card)	T-Log Number:	T93842
Contact:	Anne Liang	Project Manager:	Sheareen Jacobs
Standard:	15.247/RSS-210	Project Coordinator:	Irene
		Class:	N/A

## Sample Notes

Sample S/N: 001018E2EB23

Driver: 6.30.223.181

Antenna: 1000802

The Aux port (J2) was tested. This was the worse case port based on preliminary testing.

Preliminary testing showed the horizontal polarization was the worse case orientation.

## Procedure Comments:

Measurements performed in accordance with FCC KDB 558074

Peak measurements performed with: RBW=1MHz, VBW=3MHz, peak detector, max hold, auto sweep time

Unless otherwise stated/noted, emission has duty cycle  $\geq 98\%$  and was measured using RBW=1MHz, VBW=10Hz, peak detector, linear average mode, auto sweep time, max hold.

Mode	Data Rate	Duty Cycle (x)	Constant DC?	T (ms)	Pwr Cor Factor*	Lin Volt Cor Factor**	Min VBW for FS (Hz)
n40	MCS0	0.95	Yes	0.62	0.24	0.48	1612.9032

## Measurement Specific Notes:

Note 1:	Emission in non-restricted band, but limit of 15.209 used.
Note 2:	Emission in non-restricted band, the limit was set 30dB below the level of the fundamental and measured in 100kHz.
Note 3:	Emission has duty cycle $< 98\%$ , but constant, average measurement performed: RBW=1MHz, VBW=10Hz, peak detector, linear averaging, auto sweep, trace average 100 traces, measurement corrected by Linear Voltage correction factor
Note 6:	Plots of the average and peak bandedge do not account for any duty cycle correction. Refer to the tabular results for final measurements.

Client:	Broadcom Corporation	Job Number:	J93687
Model:	BCM943142Y (802.11bgn WLAN + Bluetooth NGFF1630 Mini Card)	T-Log Number:	T93842
Contact:	Anne Liang	Project Manager:	Sheareen Jacobs
Standard:	15.247/RSS-210	Project Coordinator:	Irene
		Class:	N/A

## Run #4: Radiated Bandedge Measurements

Date of Test: 11/7/2013 0:00

Test Engineer: John Caizzi

Test Location: FT Chamber #5

Config. Used: 1

Config Change: None

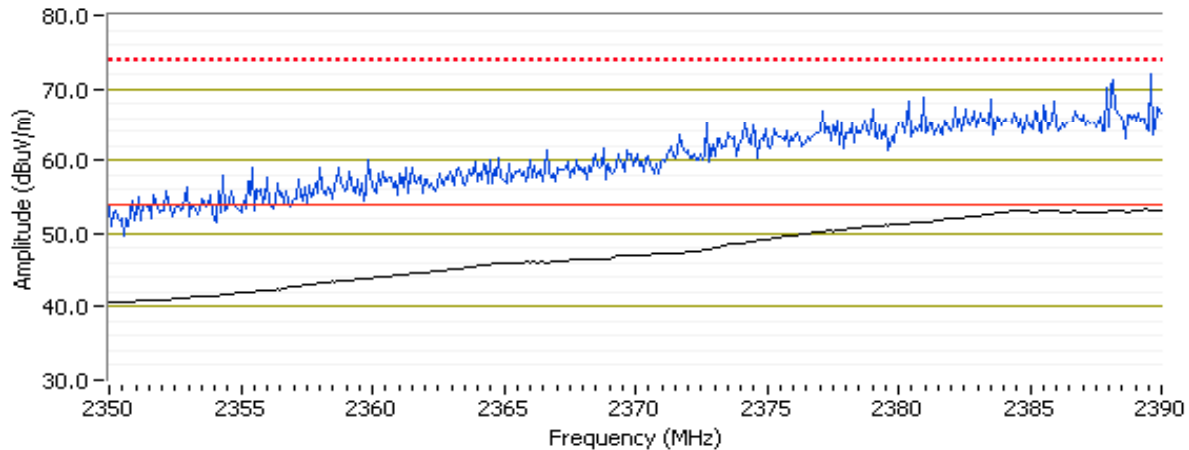
EUT Voltage: 120V/60Hz

Channel: 3 Mode: n40  
 Tx Chain: Aux - J2 Data Rate: MCS0

## Band Edge Signal Field Strength - Direct measurement of 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	
2389.680	53.9	H	54.0	-0.1	AVG	324	1.21	
2387.680	70.5	H	74.0	-3.5	PK	324	1.21	

RB 1 MHz; VB 10 Hz Black = avg, blue = pk H



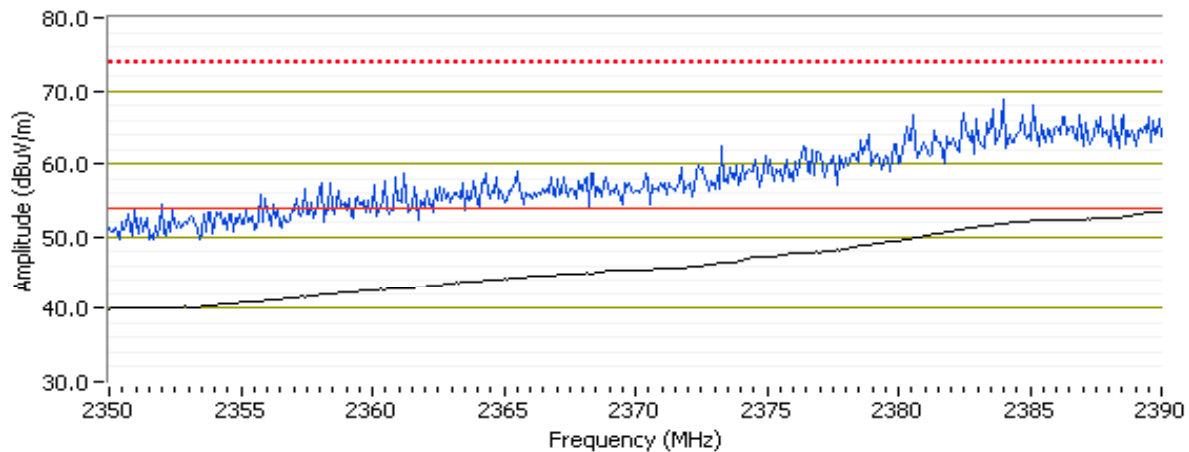
Client:	Broadcom Corporation	Job Number:	J93687
Model:	BCM943142Y (802.11bgn WLAN + Bluetooth NGFF1630 Mini Card)	T-Log Number:	T93842
Contact:	Anne Liang	Project Manager:	Sheareen Jacobs
Standard:	15.247/RSS-210	Project Coordinator:	Irene
		Class:	N/A

Channel: 4                      Mode: n40  
 Tx Chain: Aux - J2              Data Rate: MCS0

## Band Edge Signal Field Strength - Direct measurement of 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	
2389.600	53.9	H	54.0	-0.1	AVG	332	1.21	
2383.750	68.1	H	74.0	-5.9	PK	332	1.21	

RB 1 MHz; VB 10 Hz Black = avg, blue = pk H



Client:	Broadcom Corporation	Job Number:	J93687
Model:	BCM943142Y (802.11bgn WLAN + Bluetooth NGFF1630 Mini Card)	T-Log Number:	T93842
Contact:	Anne Liang	Project Manager:	Sheareen Jacobs
Standard:	15.247/RSS-210	Project Coordinator:	Irene
		Class:	N/A

Date of Test: 11/7/2013 0:00  
 Test Engineer: Rafael Varelas  
 Test Location: FT Chamber #5

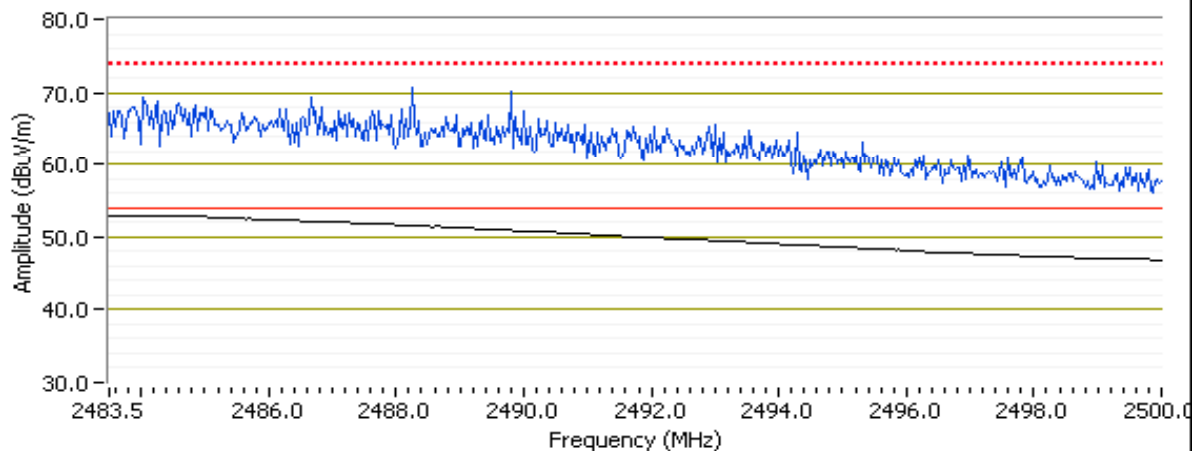
Config. Used: 1  
 Config Change: None  
 EUT Voltage: 120V/60Hz

Channel: 8 Mode: n40  
 Tx Chain: Aux - J2 Data Rate: MCS0

## Band Edge Signal Field Strength - Direct measurement of 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	
2483.600	53.5	H	54.0	-0.5	AVG	355	1.2	
2485.720	71.9	H	74.0	-2.1	PK	355	1.2	

RB 1 MHz; VB 10 Hz Black = avg, blue = pk H



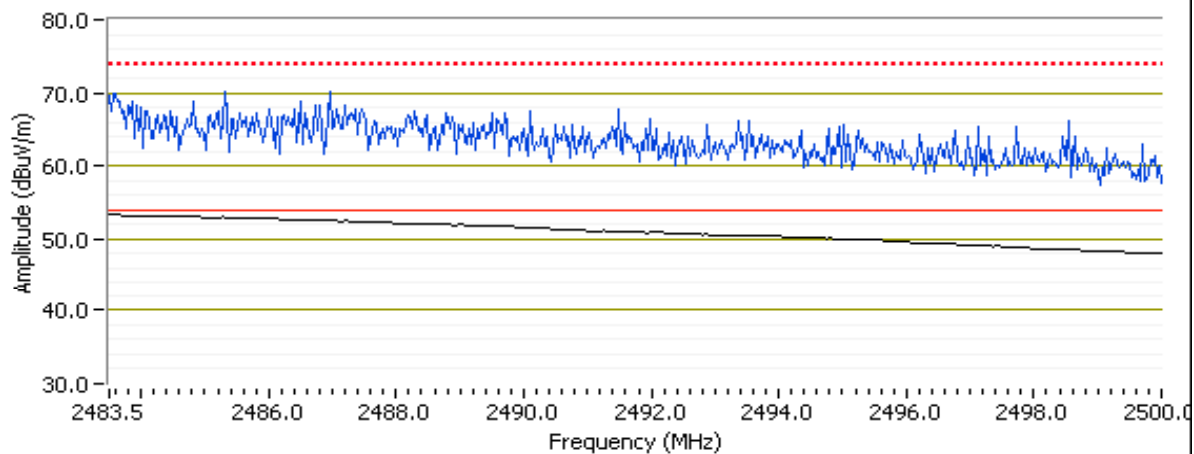
Client:	Broadcom Corporation	Job Number:	J93687
Model:	BCM943142Y (802.11bgn WLAN + Bluetooth NGFF1630 Mini Card)	T-Log Number:	T93842
Contact:	Anne Liang	Project Manager:	Sheareen Jacobs
Standard:	15.247/RSS-210	Project Coordinator:	Irene
		Class:	N/A

Channel: 9                      Mode: n40  
 Tx Chain: Aux - J2              Data Rate: MCS0

## Band Edge Signal Field Strength - Direct measurement of 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	
2483.570	53.9	H	54.0	-0.1	AVG	357	1.2	
2484.330	68.3	H	74.0	-5.7	PK	357	1.2	

RB 1 MHz; VB 10 Hz Black = avg, blue = pk H



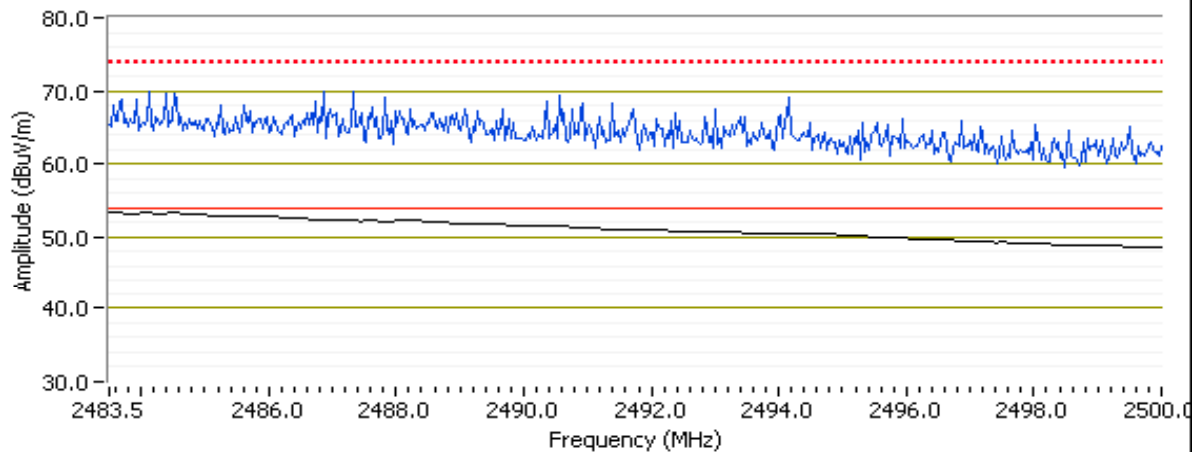
Client:	Broadcom Corporation	Job Number:	J93687
Model:	BCM943142Y (802.11bgn WLAN + Bluetooth NGFF1630 Mini Card)	T-Log Number:	T93842
Contact:	Anne Liang	Project Manager:	Sheareen Jacobs
Standard:	15.247/RSS-210	Project Coordinator:	Irene
		Class:	N/A

Channel: 10                      Mode: n40  
 Tx Chain: Aux - J2              Data Rate: MCS0

## Band Edge Signal Field Strength - Direct measurement of 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	
2483.530	53.9	H	54.0	-0.1	AVG	0	1.2	
2496.730	69.1	H	74.0	-4.9	PK	0	1.2	

RB 1 MHz; VB 10 Hz Black = avg, blue = pk H





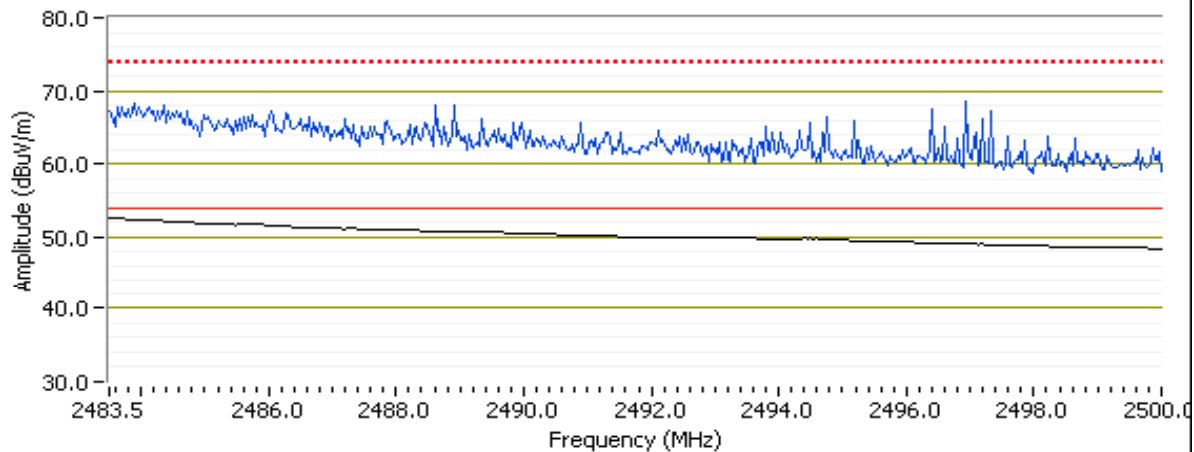
Client:	Broadcom Corporation	Job Number:	J93687
Model:	BCM943142Y (802.11bgn WLAN + Bluetooth NGFF1630 Mini Card)	T-Log Number:	T93842
Contact:	Anne Liang	Project Manager:	Sheareen Jacobs
Standard:	15.247/RSS-210	Project Coordinator:	Irene
		Class:	N/A

Channel: 11                      Mode: n40  
 Tx Chain: Aux - J2              Data Rate: MCS0

## Band Edge Signal Field Strength - Direct measurement of 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	
2483.500	53.3	H	54.0	-0.7	AVG	360	1.2	
2483.830	67.0	H	74.0	-7.0	PK	360	1.2	

RB 1 MHz; VB 10 Hz Black = avg, blue = pk H



Client:	Broadcom Corporation	Job Number:	J93687
Model:	BCM943142Y (802.11bgn WLAN + Bluetooth NGFF1630 Mini Card)	T-Log Number:	T93842
Contact:	Anne Liang	Project Manager:	Sheareen Jacobs
Standard:	15.247/RSS-210	Project Coordinator:	Irene
		Class:	N/A

## RSS 210 and FCC 15.247 (DTS) 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.

For radiated emissions testing the measurement antenna was located 3 meters from the EUT, unless otherwise noted.

### Ambient Conditions:

Temperature: 20.8 °C  
 Rel. Humidity: 37 %

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

Run #	Mode	Channel	Target Power	Power Setting	Test Performed	Limit	Result / Margin
1	b	1 - 2412MHz	19dBm	-	Radiated Emissions, 1 - 25 GHz	FCC Part 15.209 / 15.247( c)	49.7 dBµV/m @ 7236.7 MHz (-4.3 dB)
	b	6 - 2437MHz	19dBm	-	Radiated Emissions, 1 - 25 GHz	FCC Part 15.209 / 15.247( c)	53.1 dBµV/m @ 7310.0 MHz (-0.9 dB)
	b	13 - 2472MHz	19dBm	-	Radiated Emissions, 1 - 25 GHz	FCC Part 15.209 / 15.247( c)	51.0 dBµV/m @ 7416.6 MHz (-3.0 dB)

Scans on center channel in all three OFDM modes to determine the worst case mode.

2	g	6 - 2437MHz	19dBm	-	Radiated Emissions, 1 - 25 GHz	FCC Part 15.209 / 15.247( c)	47.5 dBµV/m @ 7310.3 MHz (-6.5 dB)
	n40	6 - 2437MHz	19dBm	-	Radiated Emissions, 1 - 25 GHz	FCC Part 15.209 / 15.247( c)	47.0 dBµV/m @ 2999.9 MHz (-7.0 dB)

Measurements on low and high channels in worst-case OFDM mode.

3	g	1 - 2412MHz	19dBm	-	Radiated Emissions, 1 - 25 GHz	FCC Part 15.209 / 15.247( c)	47.4 dBµV/m @ 7235.6 MHz (-6.6 dB)
	g	13 - 2472MHz	19dBm	-	Radiated Emissions, 1 - 25 GHz	FCC Part 15.209 / 15.247( c)	49.0 dBµV/m @ 7416.4 MHz (-5.0 dB)

Client:	Broadcom Corporation	Job Number:	J93687
Model:	BCM943142Y (802.11bgn WLAN + Bluetooth NGFF1630 Mini Card)	T-Log Number:	T93842
Contact:	Anne Liang	Project Manager:	Sheareen Jacobs
Standard:	15.247/RSS-210	Project Coordinator:	Irene
		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.

## Notes

For spurious emissions, as the output powers are equivalent and higher PSD, 11g was tested as representative of n20.

Testing performed at higher power levels than final power limits

## Sample Notes

Sample S/N: 001018E2EB23

Driver: 6.30.223.181

Antenna: 1000802

The Aux port (J2) was tested. This was the worse case port based on preliminary testing.

## Procedure Comments:

Measurements performed in accordance with FCC KDB 558074

Peak measurements performed with: RBW=1MHz, VBW=3MHz, peak detector, max hold, auto sweep time

Unless otherwise stated/noted, emission has duty cycle  $\geq 98\%$  and was measured using RBW=1MHz, VBW=10Hz, peak detector, linear average mode, auto sweep time, max hold.

2.4GHz band reject filter used

Mode	Data Rate	Duty Cycle (x)	Constant DC?	T (ms)	Pwr Cor Factor*	Lin Volt Cor Factor**	Min VBW for FS (Hz)
11b	1 Mb/s	1.00	Yes	8.4	0.02	0.04	119.04762
11g	6 Mbps	0.97	Yes	1.41	0.12	0.24	709.21986
n20	MCS0	0.97	Yes	1.29	0.13	0.27	775.1938
n40	MCS0	0.95	Yes	0.62	0.24	0.48	1612.9032

Client:	Broadcom Corporation	Job Number:	J93687
Model:	BCM943142Y (802.11bgn WLAN + Bluetooth NGFF1630 Mini Card)	T-Log Number:	T93842
Contact:	Anne Liang	Project Manager:	Sheareen Jacobs
Standard:	15.247/RSS-210	Project Coordinator:	Irene
		Class:	N/A

## Measurement Specific Notes:

Note 1:	Emission in non-restricted band, but limit of 15.209 used.
Note 2:	Emission in non-restricted band, the limit was set 30dB below the level of the fundamental and measured in 100kHz.
Note 2:	Emission has duty cycle $\geq 98\%$ , average measurement performed: RBW=1MHz, VBW=3MHz, RMS, Power averaging, auto sweep, trace average 100 traces
Note 3:	Emission has duty cycle $< 98\%$ , but constant, average measurement performed: RBW=1MHz, VBW=10Hz, peak detector, linear averaging, auto sweep, trace average 100 traces, measurement corrected by Linear Voltage correction factor
Note 4:	Emission has duty cycle $< 98\%$ and is NOT constant, average measurement performed: RBW=1MHz, VBW $> 1/T$ , peak detector, linear average mode, sweep time auto, max hold. Max hold for $50 \times (1/DC)$ traces
Note 5:	Emission has duty cycle $< 98\%$ , but constant, average measurement performed: RBW=1MHz, VBW=3MHz, RMS, Power averaging, auto sweep, trace average 100 traces, measurement corrected by Pwr correction factor
Note 6:	Plots of the average and peak bandedge do not account for any duty cycle correction. Refer to the tabular results for final measurements.

Client:	Broadcom Corporation	Job Number:	J93687
Model:	BCM943142Y (802.11bgn WLAN + Bluetooth NGFF1630 Mini Card)	T-Log Number:	T93842
Contact:	Anne Liang	Project Manager:	Sheareen Jacobs
Standard:	15.247/RSS-210	Project Coordinator:	Irene
		Class:	N/A

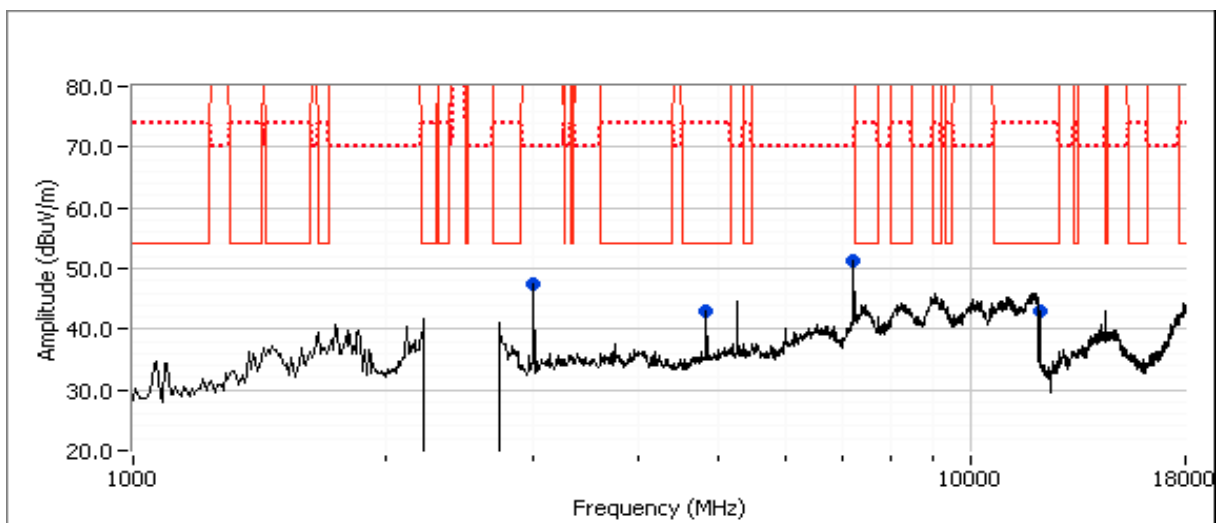
**Run #1: Radiated Spurious Emissions, 1,000 - 25000 MHz. Operating Mode: 802.11b**  
 Date of Test: 11/7/2013 0:00 Config. Used: 1  
 Test Engineer: Rafael Varelas Config Change: None  
 Test Location: FT Chamber #5 EUT Voltage: 120V/60Hz

## Run #1a: Low Channel

Channel: 1 Mode: b  
 Tx Chain: Aux - J2 Data Rate: 1 Mb/s

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBuV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
7236.680	49.7	V	54.0	-4.3	AVG	285	2.0	Note 1
7235.530	55.8	V	74.0	-18.2	PK	285	2.0	Note 1
4823.930	39.2	V	54.0	-14.8	AVG	282	1.0	RB 1 MHz;VB 10 Hz;Peak
4823.770	45.7	V	74.0	-28.3	PK	282	1.0	RB 1 MHz;VB 3 MHz;Peak
2999.910	46.7	V	54.0	-7.3	AVG	181	1.1	Note 1
2999.820	49.0	V	74.0	-25.0	PK	181	1.1	Note 1
12059.000	41.8	V	54.0	-12.2	AVG	69	1.0	RB 1 MHz;VB 10 Hz;Peak
12060.270	47.5	V	74.0	-26.5	PK	69	1.0	RB 1 MHz;VB 3 MHz;Peak

Note 1: Emission in non-restricted band, but limit of 15.209 used.



Client:	Broadcom Corporation	Job Number:	J93687
Model:	BCM943142Y (802.11bgn WLAN + Bluetooth NGFF1630 Mini Card)	T-Log Number:	T93842
Contact:	Anne Liang	Project Manager:	Sheareen Jacobs
Standard:	15.247/RSS-210	Project Coordinator:	Irene
		Class:	N/A

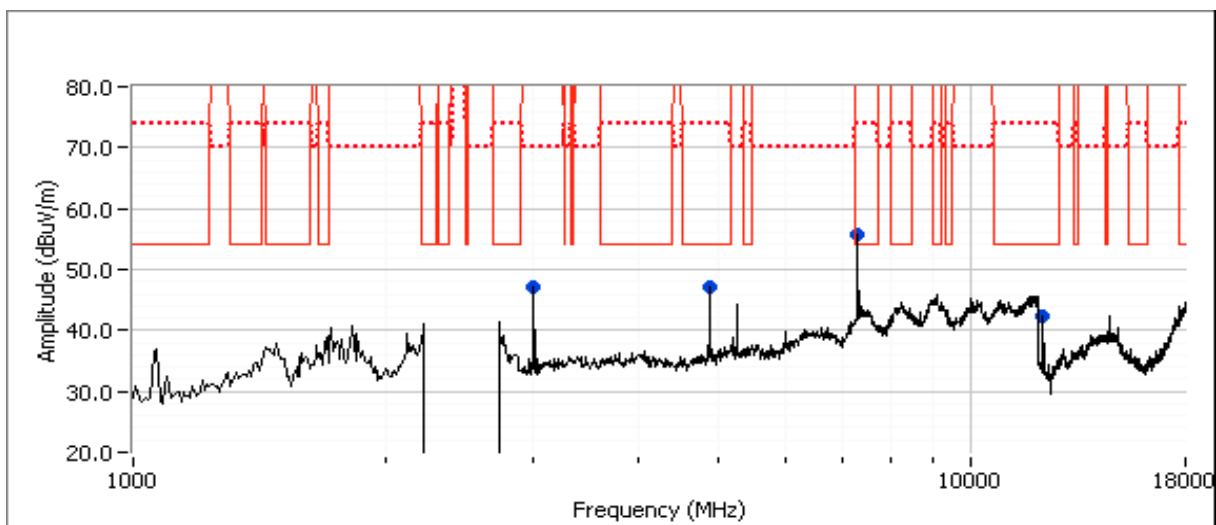
## Run #1b: Center Channel

Channel: 6                      Mode: b  
 Tx Chain: Aux - J2              Data Rate: 1 Mb/s

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	
7310.030	53.1	V	54.0	-0.9	AVG	239	1.8	RB 1 MHz;VB 10 Hz;Peak
7310.350	58.7	V	74.0	-15.3	PK	239	1.8	RB 1 MHz;VB 3 MHz;Peak
4873.930	45.3	V	54.0	-8.7	AVG	278	1.3	RB 1 MHz;VB 10 Hz;Peak
4873.940	47.9	V	74.0	-26.1	PK	278	1.3	RB 1 MHz;VB 3 MHz;Peak
2999.930	46.7	V	54.0	-7.3	AVG	178	1.1	Note 1
2999.900	48.9	V	74.0	-25.1	PK	178	1.1	Note 1
12183.890	42.2	V	54.0	-11.8	AVG	75	1.0	RB 1 MHz;VB 10 Hz;Peak
12183.820	48.2	V	74.0	-25.8	PK	75	1.0	RB 1 MHz;VB 3 MHz;Peak

Note: Scans made between 18 - 25 GHz 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

Note 1: Emission in non-restricted band, but limit of 15.209 used.



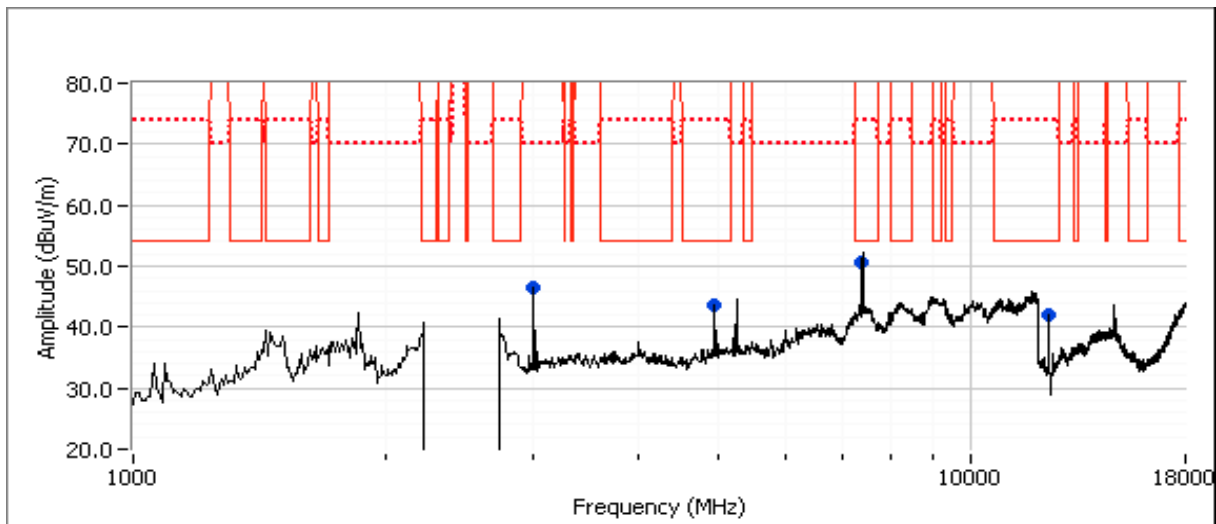
Client:	Broadcom Corporation	Job Number:	J93687
Model:	BCM943142Y (802.11bgn WLAN + Bluetooth NGFF1630 Mini Card)	T-Log Number:	T93842
Contact:	Anne Liang	Project Manager:	Sheareen Jacobs
Standard:	15.247/RSS-210	Project Coordinator:	Irene
		Class:	N/A

## Run #1c: High Channel

Channel: 13  
 Tx Chain: Aux - J2  
 Mode: b  
 Data Rate: 1 Mb/s

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	
7416.620	51.0	V	54.0	-3.0	AVG	323	1.7	RB 1 MHz;VB 10 Hz;Peak
7416.820	56.9	V	74.0	-17.1	PK	323	1.7	RB 1 MHz;VB 3 MHz;Peak
2999.930	46.3	V	54.0	-7.7	AVG	174	1.0	Note 1
2999.880	49.0	V	74.0	-25.0	PK	174	1.0	Note 1
4943.940	41.7	V	54.0	-12.3	AVG	284	1.0	RB 1 MHz;VB 10 Hz;Peak
4943.960	46.0	V	74.0	-28.0	PK	284	1.0	RB 1 MHz;VB 3 MHz;Peak
12359.190	42.5	V	54.0	-11.5	AVG	75	1.0	RB 1 MHz;VB 10 Hz;Peak
12360.620	48.5	V	74.0	-25.5	PK	75	1.0	RB 1 MHz;VB 3 MHz;Peak

Note 1: Emission in non-restricted band, but limit of 15.209 used.



Client:	Broadcom Corporation	Job Number:	J93687
Model:	BCM943142Y (802.11bgn WLAN + Bluetooth NGFF1630 Mini Card)	T-Log Number:	T93842
Contact:	Anne Liang	Project Manager:	Sheareen Jacobs
Standard:	15.247/RSS-210	Project Coordinator:	Irene
		Class:	N/A

**Run #2: Radiated Spurious Emissions, 1,000 - 25000 MHz. Operating Mode: OFDM**  
 Date of Test: 11/7/2013 0:00 Config. Used: 1  
 Test Engineer: Rafael Varelas Config Change: None  
 Test Location: FT Chamber #5 EUT Voltage: 120V/60Hz

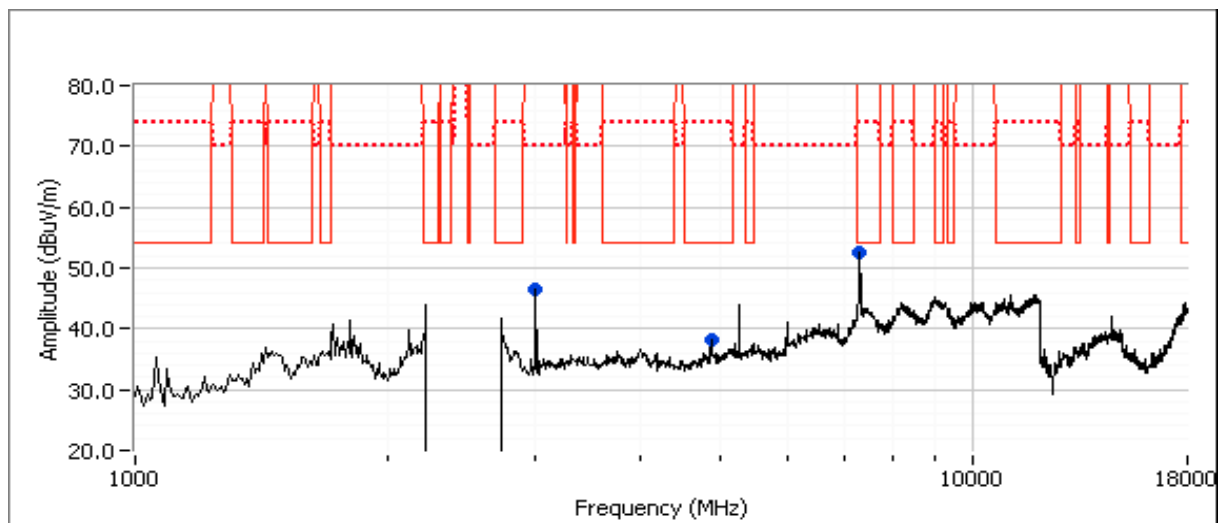
## Run #2a: Center Channel

Channel: 6 Mode: g  
 Tx Chain: Aux - J2 Data Rate: 6 Mbps

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBuV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
7310.320	47.5	V	54.0	-6.5	AVG	355	1.6	Note 3
7310.380	59.2	V	74.0	-14.8	PK	355	1.6	RB 1 MHz;VB 3 MHz;Peak
4875.520	33.6	V	54.0	-20.4	AVG	283	1.0	RB 1 MHz;VB 10 Hz;Peak
4876.700	44.3	V	74.0	-29.7	PK	283	1.0	RB 1 MHz;VB 3 MHz;Peak
2999.920	46.3	V	54.0	-7.7	AVG	177	1.1	Note 1
2999.930	49.5	V	74.0	-24.5	PK	177	1.1	Note 1

Note: Scans made between 18 - 25 GHz 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

Note 1: Emission in non-restricted band, but limit of 15.209 used.





Client:	Broadcom Corporation	Job Number:	J93687
Model:	BCM943142Y (802.11bgn WLAN + Bluetooth NGFF1630 Mini Card)	T-Log Number:	T93842
Contact:	Anne Liang	Project Manager:	Sheareen Jacobs
Standard:	15.247/RSS-210	Project Coordinator:	Irene
		Class:	N/A

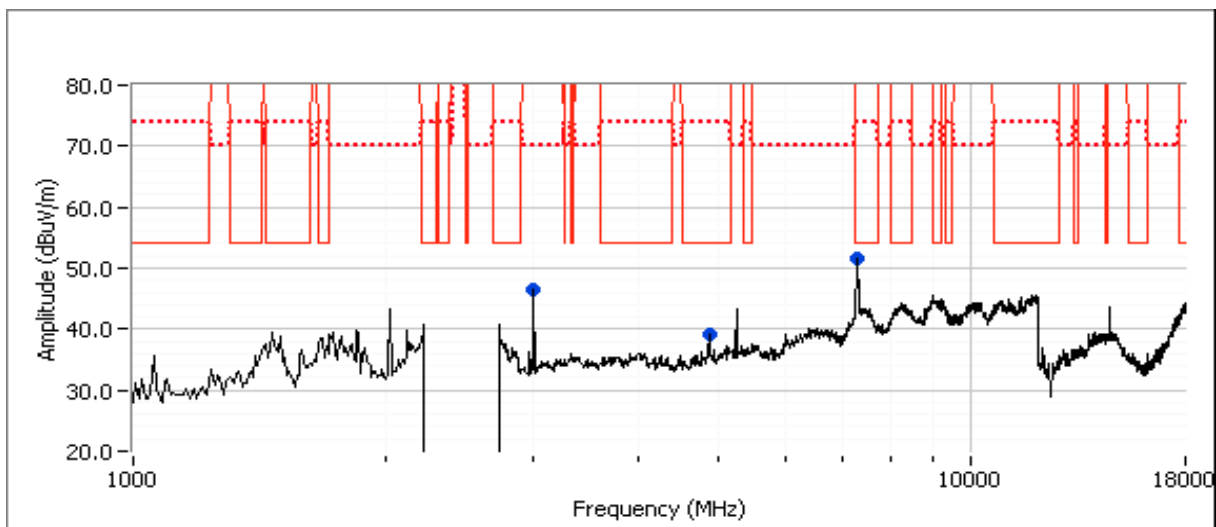
## Run #2b: Center Channel

Channel: 6 Mode: n40  
 Tx Chain: Aux - J2 Data Rate: MCS0

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	
2999.920	47.0	V	54.0	-7.0	AVG	184	1.0	Note 1, Note 3
2999.900	49.2	V	74.0	-24.8	PK	184	1.0	Note 1
7308.220	44.8	V	54.0	-9.2	AVG	356	1.6	RB 1 MHz;VB 10 Hz;Peak
7299.360	55.8	V	74.0	-18.2	PK	356	1.6	RB 1 MHz;VB 3 MHz;Peak
4881.250	32.3	V	54.0	-21.7	AVG	275	1.0	RB 1 MHz;VB 10 Hz;Peak
4876.480	42.3	V	74.0	-31.7	PK	275	1.0	RB 1 MHz;VB 3 MHz;Peak

Note: Scans made between 18 - 25 GHz 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

Note 1: Emission in non-restricted band, but limit of 15.209 used.



Client:	Broadcom Corporation	Job Number:	J93687
Model:	BCM943142Y (802.11bgn WLAN + Bluetooth NGFF1630 Mini Card)	T-Log Number:	T93842
Contact:	Anne Liang	Project Manager:	Sheareen Jacobs
Standard:	15.247/RSS-210	Project Coordinator:	Irene
		Class:	N/A

Run #3: Radiated Spurious Emissions, 1,000 - 25000 MHz. Operating Mode: Worse case from Run #2

Date of Test: 11/7/2013 0:00

Config. Used: 1

Test Engineer: Rafael Varelas

Config Change: None

Test Location: FT Chamber #5

EUT Voltage: 120V/60Hz

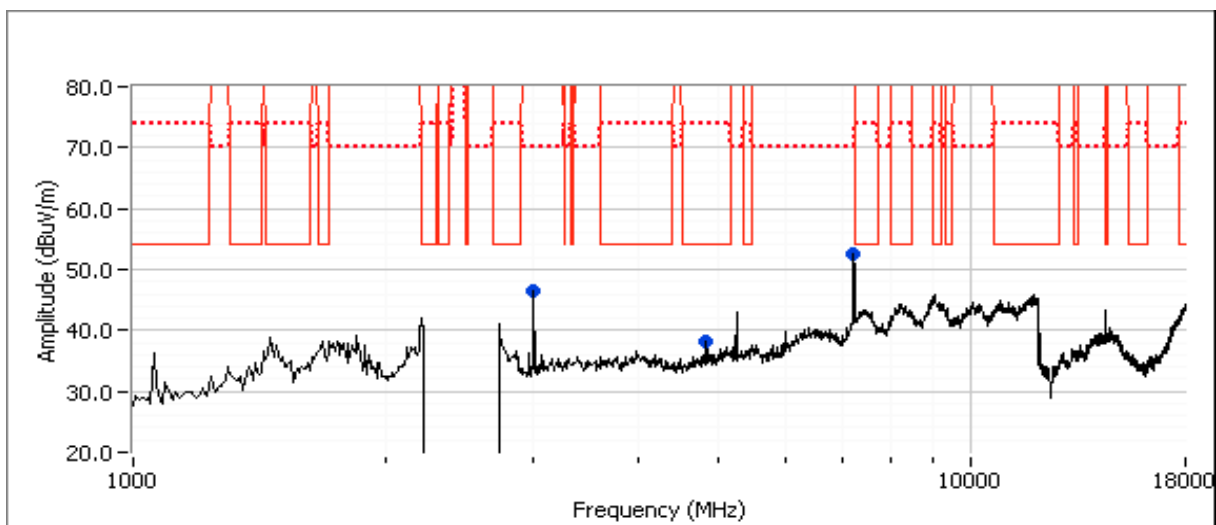
Run #3a: Low Channel

Channel: 1  
Tx Chain: Aux - J2

Mode: g  
Data Rate: 6 Mbps

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	
7235.620	47.4	V	54.0	-6.6	AVG	357	1.4	Note 1, Note 3
7234.930	59.3	V	74.0	-14.7	PK	357	1.4	Note 1
3000.040	46.7	V	54.0	-7.3	AVG	177	1.1	Note 1
2999.920	49.4	V	74.0	-24.6	PK	177	1.1	Note 1
4822.340	32.1	V	54.0	-21.9	AVG	273	1.3	RB 1 MHz;VB 10 Hz;Peak
4822.090	43.4	V	74.0	-30.6	PK	273	1.3	RB 1 MHz;VB 3 MHz;Peak

Note 1: Emission in non-restricted band, but limit of 15.209 used.



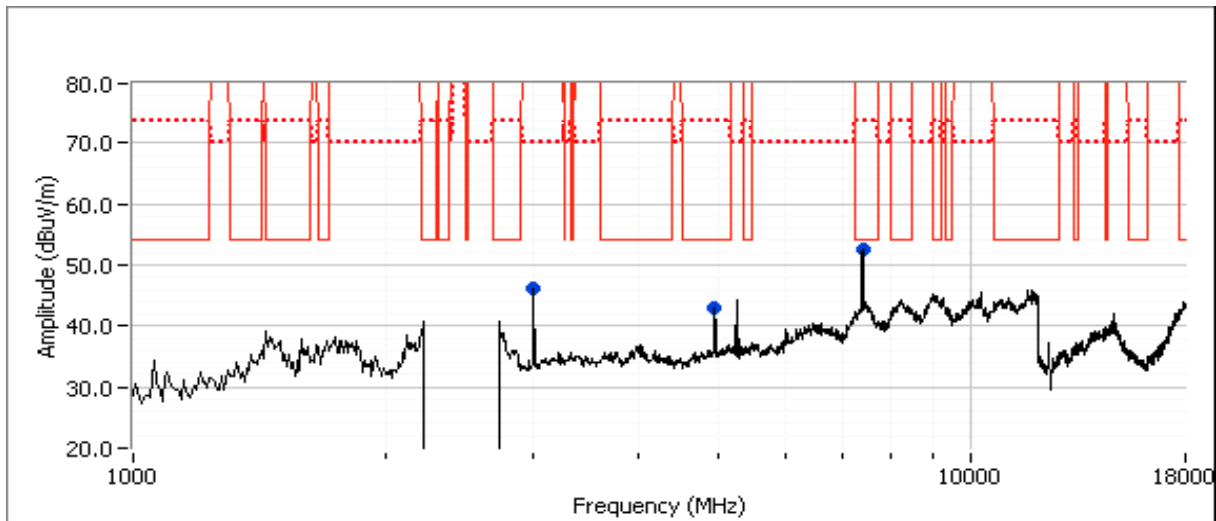
Client:	Broadcom Corporation	Job Number:	J93687
Model:	BCM943142Y (802.11bgn WLAN + Bluetooth NGFF1630 Mini Card)	T-Log Number:	T93842
Contact:	Anne Liang	Project Manager:	Sheareen Jacobs
Standard:	15.247/RSS-210	Project Coordinator:	Irene
		Class:	N/A

## Run #3b: High Channel

Channel: 13                      Mode: g  
 Tx Chain: Aux - J2              Data Rate: 6 Mbps

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	
7416.440	49.0	V	54.0	-5.0	AVG	226	1.5	Note 3
7420.140	60.9	V	74.0	-13.1	PK	226	1.5	RB 1 MHz;VB 3 MHz;Peak
4943.340	36.5	V	54.0	-17.5	AVG	282	1.0	RB 1 MHz;VB 10 Hz;Peak
4944.040	47.5	V	74.0	-26.5	PK	282	1.0	RB 1 MHz;VB 3 MHz;Peak
3000.050	46.3	V	54.0	-7.7	AVG	186	1.0	Note 1
2999.910	48.6	V	74.0	-25.4	PK	186	1.0	Note 1

Note 1: Emission in non-restricted band, but limit of 15.209 used.



Client:	Broadcom Corporation	Job Number:	J93687
Model:	BCM943142Y (802.11bgn WLAN + Bluetooth NGFF1630 Mini Card)	T-Log Number:	T93842
Contact:	Anne Liang	Project Manager:	Sheareen Jacobs
Standard:	15.247/RSS-210	Project Coordinator:	Irene
		Class:	N/A

## Radiated 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.

### 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, unless otherwise noted.

### Ambient Conditions:

Temperature: 23 °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
1a	WiFi b Mode	6 - 2437MHz	-	-	Radiated Emissions 30 MHz - 1000 MHz	FCC Part 15.209 / 15.247( c)	43.0 dBμV/m @ 199.41 MHz (-0.5 dB)
1b	WiFi g Mode	1 - 2412MHz	-	-	Radiated Emissions 30 MHz - 1000 MHz	FCC Part 15.209 / 15.247( c)	42.9 dBμV/m @ 199.41 MHz (-0.6 dB)
2a	BT Basic GFSK	2402MHz	-	-	Radiated Emissions 30 MHz - 1000 MHz	FCC Part 15.209 / 15.247( c)	29.9 dBμV/m @ 60.86 MHz (-10.1 dB)
2b	BT EDR 8PSK	2480MHz	-	-	Radiated Emissions 30 MHz - 1000 MHz	FCC Part 15.209 / 15.247( c)	29.5 dBμV/m @ 60.17 MHz (-10.5 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.

### Notes

Based on the testing, no significant radio related emissions can be observed below 1GHz. No further testing was performed.

Client:	Broadcom Corporation	Job Number:	J93687
Model:	BCM943142Y (802.11bgn WLAN + Bluetooth NGFF1630 Mini Card)	T-Log Number:	T93842
Contact:	Anne Liang	Project Manager:	Sheareen Jacobs
Standard:	15.247/RSS-210	Project Coordinator:	Irene
		Class:	N/A

## Sample Notes

### (WiFi)

Sample S/N: 001018E2EB23

Driver: 6.30.223.181

Antenna: 1000802

Test Board: BCM9NGFF2EC\_1 (S/N: 1679910)

Laptop: Lenovo G560 (S/N: CB06427398)

The Aux port (J2) was tested. This was the worse case port based on preliminary testing.

### (Bluetooth)

Sample S/N: 001018E2EB19

Software: Broadcom Blue Tool Version 1.4.3

Driver: BCM43142A0\_001.001.011.0161.0180

Antenna: 1000802

Test Board: 100-124289-0040 Rev02(S/N: 765588 )

Laptop: Dell E6400 (S/N: DP3L9K1)

All testing performed on port J2. BT operation is limited to this port.

## Procedure Comments:

Measurements performed in accordance with FCC KDB 558074

Peak measurements performed with: RBW=1MHz, VBW=3MHz, peak detector, max hold, auto sweep time

Unless otherwise stated/noted, emission has duty cycle  $\geq 98\%$  and was measured using RBW=1MHz, VBW=10Hz, peak detector, linear average mode, auto sweep time, max hold.

2.4GHz band reject filter used

	Mode	Data Rate	Duty Cycle (x)	Constant DC?	T (ms)	Pwr Cor Factor*	Lin Volt Cor Factor**	Min VBW for FS (Hz)
	11b	1 Mb/s	1.00	Yes	8.4	0.02	0.04	119.04762
	11g	6 Mbps	0.97	Yes	1.41	0.12	0.24	709.21986
	n20	MCS0	0.97	Yes	1.29	0.13	0.27	775.1938
	n40	MCS0	0.95	Yes	0.62	0.24	0.48	1612.9032
	BLE	pkg size 37	0.62	Yes	0.63	2.0827594	4.1655188	1587.3016
Basic	GFSK	PRBS9	1.00					
EDR	8PSK	PRBS9	1.00					

Client:	Broadcom Corporation	Job Number:	J93687
Model:	BCM943142Y (802.11bgn WLAN + Bluetooth NGFF1630 Mini Card)	T-Log Number:	T93842
Contact:	Anne Liang	Project Manager:	Sheareen Jacobs
Standard:	15.247/RSS-210	Project Coordinator:	Irene
		Class:	N/A

## Measurement Specific Notes:

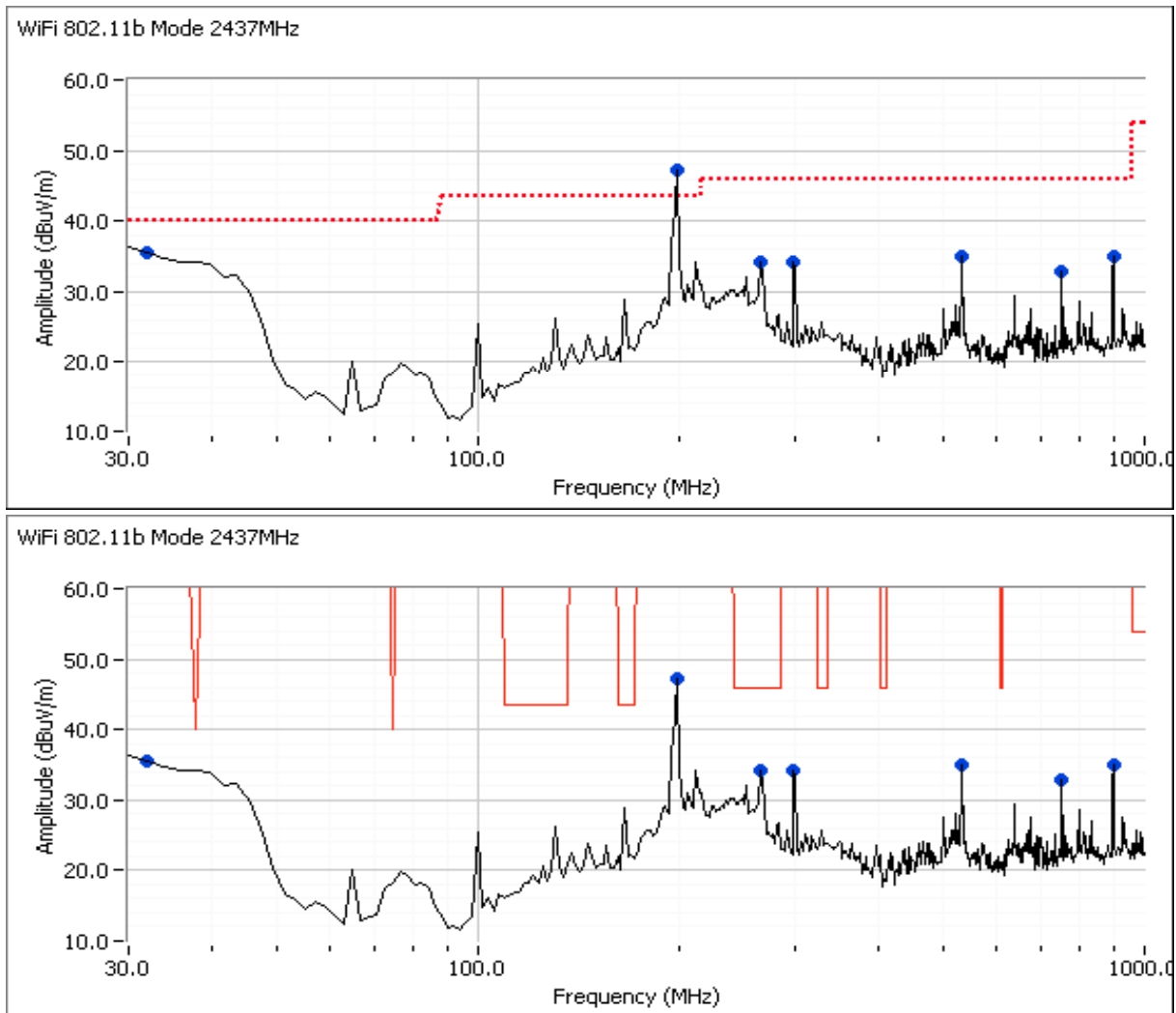
Note 1:	Emission in non-restricted band, but limit of 15.209 used.
Note 2:	Emission in non-restricted band, the limit was set 30dB below the level of the fundamental and measured in 100kHz.
Note 2:	Emission has duty cycle $\geq 98\%$ , average measurement performed: RBW=1MHz, VBW=3MHz, RMS, Power averaging, auto sweep, trace average 100 traces
Note 3:	Emission has duty cycle $< 98\%$ , but constant, average measurement performed: RBW=1MHz, VBW=10Hz, peak detector, linear averaging, auto sweep, trace average 100 traces, measurement corrected by Linear Voltage correction factor
Note 4:	Emission has duty cycle $< 98\%$ and is NOT constant, average measurement performed: RBW=1MHz, VBW $> 1/T$ , peak detector, linear average mode, sweep time auto, max hold. Max hold for $50 \cdot (1/DC)$ traces
Note 5:	Emission has duty cycle $< 98\%$ , but constant, average measurement performed: RBW=1MHz, VBW=3MHz, RMS, Power averaging, auto sweep, trace average 100 traces, measurement corrected by Pwr correction factor
Note 6:	Plots of the average and peak bandedge do not account for any duty cycle correction. Refer to the tabular results for final measurements.

Client: Broadcom Corporation	Job Number: J93687
Model: BCM943142Y (802.11bgn WLAN + Bluetooth NGFF1630 Mini Card)	T-Log Number: T93842
Contact: Anne Liang	Project Manager: Sheareen Jacobs
Standard: 15.247/RSS-210	Project Coordinator: Irene
	Class: N/A

**Run #1: Radiated Spurious Emissions, 30 - 1000 MHz. Operating Mode: WiFi Tx**  
 Date of Test: 11/11/2013 Config. Used: 1  
 Test Engineer: Rafael Varelas Config Change: none  
 Test Location: FT Chamber #5 EUT Voltage: Powered by Host

Test Parameters for Preliminary Scan(s)			
Frequency Range (MHz)	Prescan Distance (meters)	Limit Distance (meters)	Extrapolation Factor (dB, applied to data)
30 - 1000	3	3	0.0

Run #1a: Center Channel @ b mode, 2437 MHz





## EMC Test Data

Client:	Broadcom Corporation	Job Number:	J93687
Model:	BCM943142Y (802.11bgn WLAN + Bluetooth NGFF1630 Mini Card)	T-Log Number:	T93842
Contact:	Anne Liang	Project Manager:	Sheareen Jacobs
Standard:	15.247/RSS-210	Project Coordinator:	Irene
		Class:	N/A

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

Frequency	Level	Pol	FCC 15.247 / 15.209		Detector	Azimuth	Height	Comments
MHz	dB $\mu$ V/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
30.411	35.4	V	40.0	-4.6	Peak	174	1.0	
199.408	47.3	H	43.5	3.8	Peak	107	1.5	
265.812	34.1	H	46.0	-11.9	Peak	136	1.0	
298.678	34.2	V	46.0	-11.8	Peak	244	1.0	
532.954	34.9	H	46.0	-11.1	Peak	143	1.5	
749.985	32.9	H	46.0	-13.1	Peak	182	1.0	
900.006	35.0	H	46.0	-11.0	Peak	296	1.5	

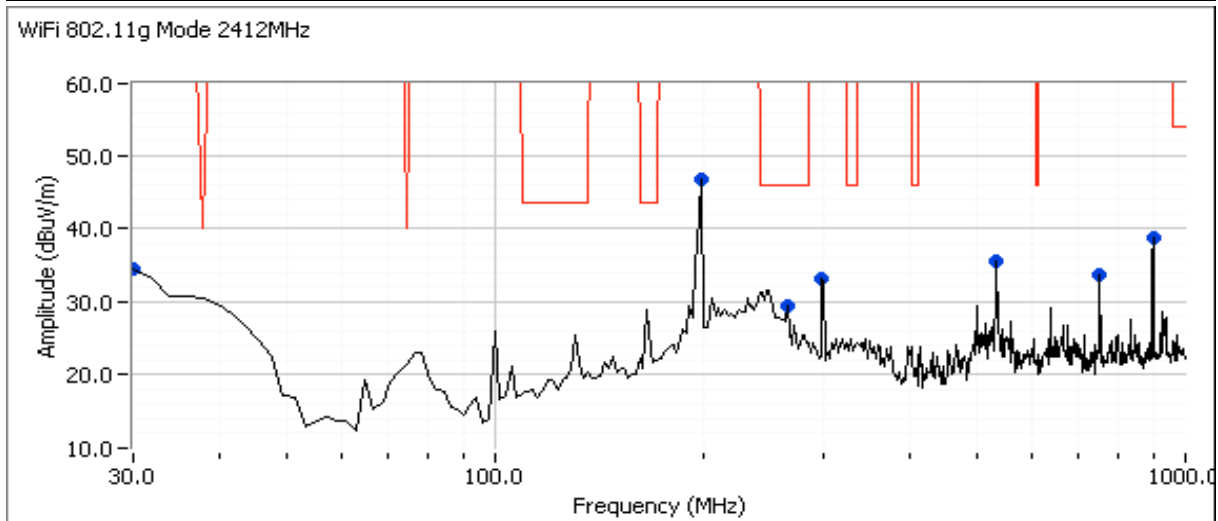
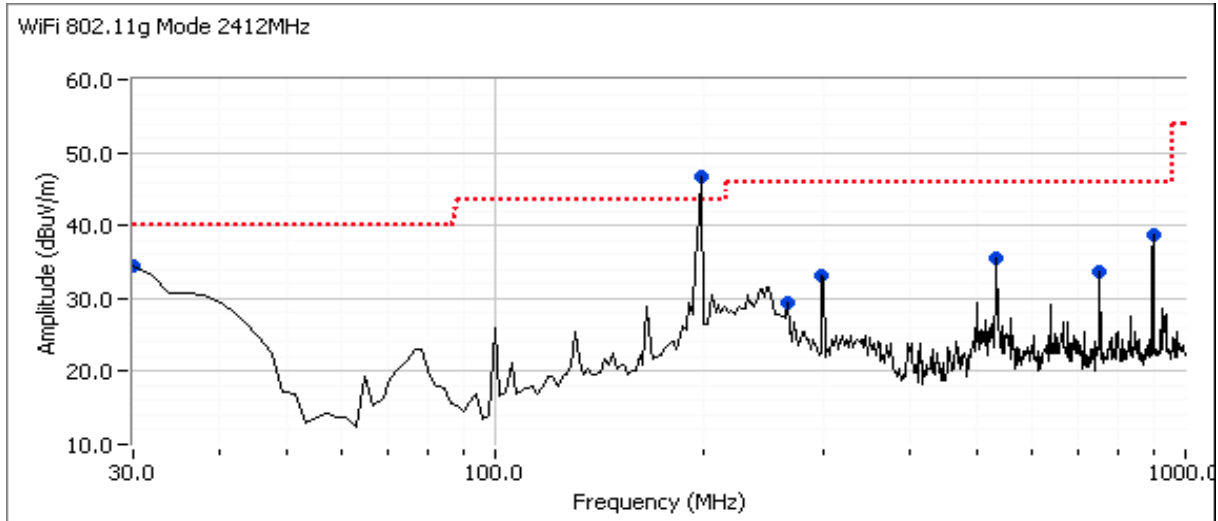
### Final peak and average readings

Frequency	Level	Pol	FCC 15.247 / 15.209		Detector	Azimuth	Height	Comments
MHz	dB $\mu$ V/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
199.408	43.0	H	43.5	-0.5	QP	120	1.6	QP (1.00s)
265.812	27.2	H	46.0	-18.8	QP	131	1.0	QP (1.00s)
532.954	26.5	H	46.0	-19.5	QP	183	1.5	QP (1.00s)
30.411	30.9	V	40.0	-9.1	QP	159	1.0	QP (1.00s)
749.985	34.1	H	46.0	-11.9	QP	181	1.0	QP (1.00s)
298.678	22.9	V	46.0	-23.1	QP	240	1.4	QP (1.00s)
900.006	20.1	H	46.0	-25.9	QP	315	1.0	QP (1.00s)



Client: Broadcom Corporation	Job Number: J93687
Model: BCM943142Y (802.11bgn WLAN + Bluetooth NGFF1630 Mini Card)	T-Log Number: T93842
Contact: Anne Liang	Project Manager: Sheareen Jacobs
Standard: 15.247/RSS-210	Project Coordinator: Irene
	Class: N/A

## Run #1b: Low Channel @ g mode, 2412 MHz



Client:	Broadcom Corporation	Job Number:	J93687
Model:	BCM943142Y (802.11bgn WLAN + Bluetooth NGFF1630 Mini Card)	T-Log Number:	T93842
Contact:	Anne Liang	Project Manager:	Sheareen Jacobs
Standard:	15.247/RSS-210	Project Coordinator:	Irene
		Class:	N/A

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

Frequency	Level	Pol	FCC 15.247 / 15.209		Detector	Azimuth	Height	Comments
MHz	dB $\mu$ V/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
30.753	34.6	V	40.0	-5.4	Peak	101	1.0	
199.183	46.8	H	43.5	3.3	Peak	121	1.5	
265.708	29.3	H	46.0	-16.7	Peak	244	1.0	
299.750	33.1	H	46.0	-12.9	Peak	279	1.5	
532.954	35.5	H	46.0	-10.5	Peak	157	1.5	
749.985	33.7	H	46.0	-12.3	Peak	174	1.0	
899.976	38.8	H	46.0	-7.2	Peak	141	1.5	

## Final peak and average readings

Frequency	Level	Pol	FCC 15.247 / 15.209		Detector	Azimuth	Height	Comments
MHz	dB $\mu$ V/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
199.408	42.9	H	43.5	-0.6	QP	123	1.6	QP (1.00s)
299.750	34.5	H	46.0	-11.5	QP	265	1.0	QP (1.00s)
265.708	26.3	H	46.0	-19.7	QP	266	1.2	QP (1.00s)
749.985	33.6	H	46.0	-12.4	QP	195	1.0	QP (1.00s)
532.954	23.4	H	46.0	-22.6	QP	190	1.9	QP (1.00s)
899.976	20.8	H	46.0	-25.2	QP	117	1.0	QP (1.00s)
30.753	29.5	V	40.0	-10.5	QP	107	1.0	QP (1.00s)

Client: Broadcom Corporation	Job Number: J93687
Model: BCM943142Y (802.11bgn WLAN + Bluetooth NGFF1630 Mini Card)	T-Log Number: T93842
Contact: Anne Liang	Project Manager: Sheareen Jacobs
Standard: 15.247/RSS-210	Project Coordinator: Irene
	Class: N/A

Run #2: Radiated Spurious Emissions, 30 - 1000 MHz. Operating Mode: BT Tx

Date of Test: 11/11/2013

Config. Used: 1

Test Engineer: Rafael Varelas

Config Change: none

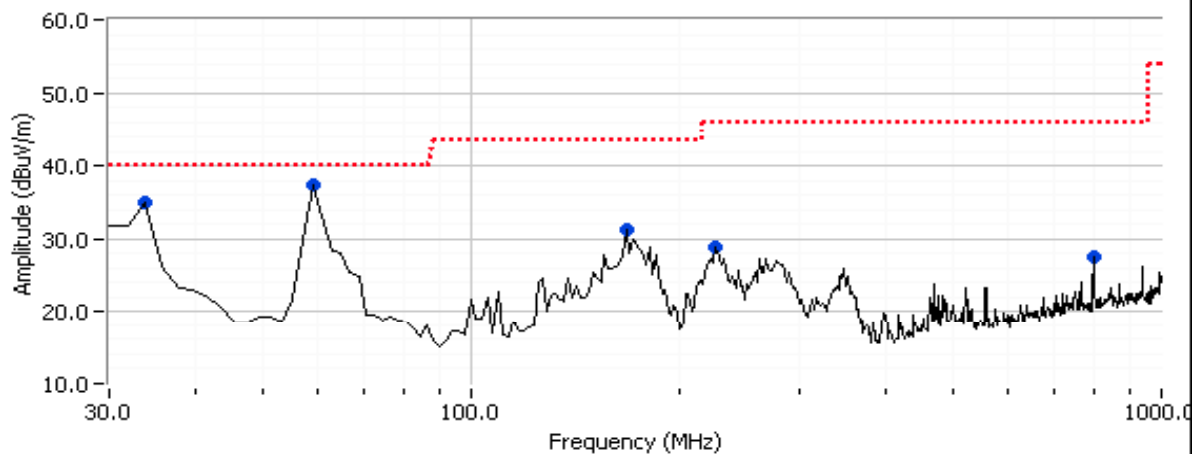
Test Location: FT Chamber #5

EUT Voltage: Powered by Host

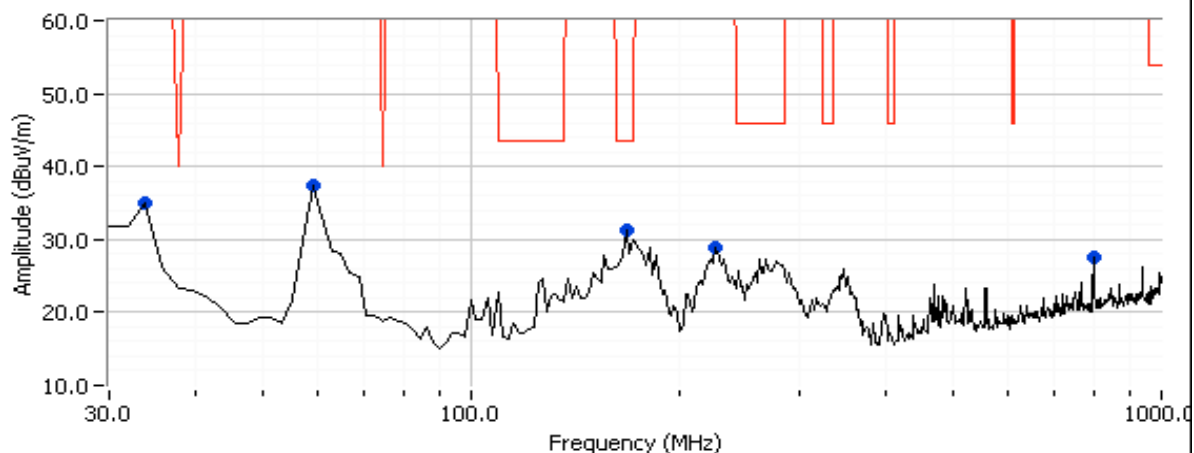
Test Parameters for Preliminary Scan(s)			
Frequency Range (MHz)	Prescan Distance (meters)	Limit Distance (meters)	Extrapolation Factor (dB, applied to data)
30 - 1000	3	3	0.0

Run #2a: Low Channel @ BT Basic mode, 2402 MHz

BT Basic Mode 2402MHz



BT Basic Mode 2402MHz



Client:	Broadcom Corporation	Job Number:	J93687
Model:	BCM943142Y (802.11bgn WLAN + Bluetooth NGFF1630 Mini Card)	T-Log Number:	T93842
Contact:	Anne Liang	Project Manager:	Sheareen Jacobs
Standard:	15.247/RSS-210	Project Coordinator:	Irene
		Class:	N/A

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

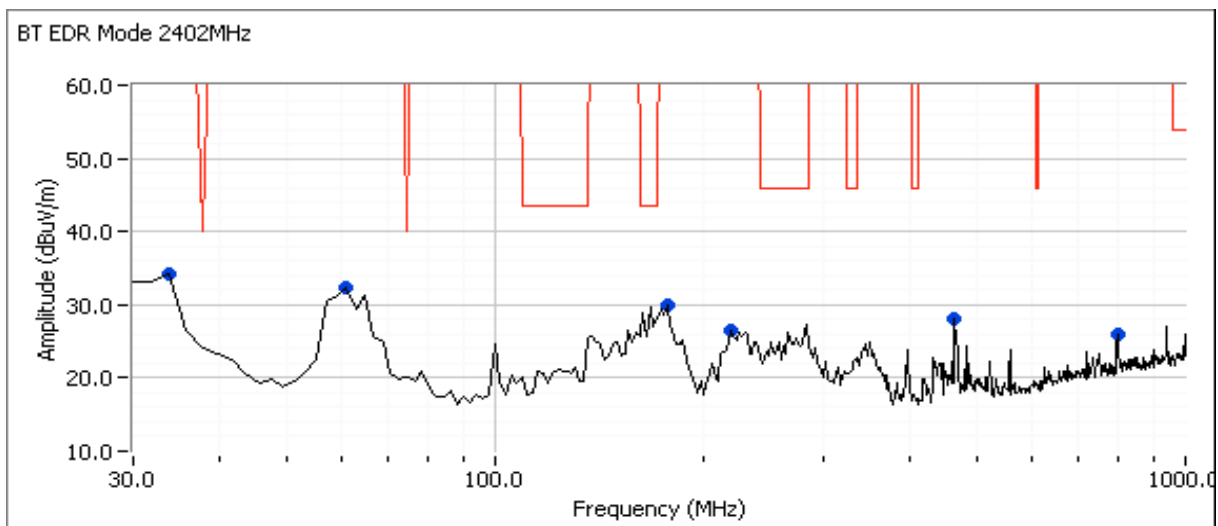
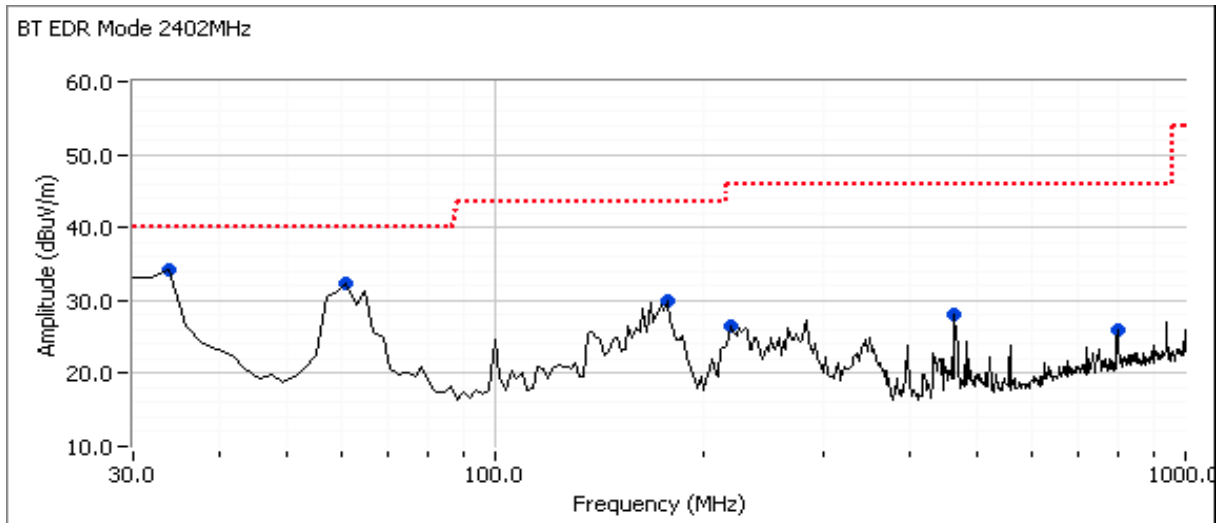
Frequency	Level	Pol	FCC 15.247 / 15.209		Detector	Azimuth	Height	Comments
MHz	dB $\mu$ V/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
33.191	35.0	V	40.0	-5.0	Peak	96	1.0	
60.859	37.3	V	40.0	-2.7	Peak	92	1.0	
167.994	31.2	H	43.5	-12.3	Peak	224	2.0	
226.909	28.8	V	46.0	-17.2	Peak	232	1.0	
798.645	27.6	V	46.0	-18.4	Peak	236	1.0	

## Final readings

Frequency	Level	Pol	FCC 15.247 / 15.209		Detector	Azimuth	Height	Comments
MHz	dB $\mu$ V/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
60.859	29.9	V	40.0	-10.1	QP	97	1.0	QP (1.00s)
798.645	23.2	V	46.0	-22.8	QP	238	1.0	QP (1.00s)
226.909	24.3	V	46.0	-21.7	QP	245	1.0	QP (1.00s)
167.994	29.0	H	43.5	-14.5	QP	206	1.5	QP (1.00s)
33.191	27.8	V	40.0	-12.2	QP	101	1.0	QP (1.00s)

Client: Broadcom Corporation	Job Number: J93687
Model: BCM943142Y (802.11bgn WLAN + Bluetooth NGFF1630 Mini Card)	T-Log Number: T93842
Contact: Anne Liang	Project Manager: Sheareen Jacobs
Standard: 15.247/RSS-210	Project Coordinator: Irene
	Class: N/A

Run #2b: High Channel @ BT EDR mode, 2480 MHz



Client:	Broadcom Corporation	Job Number:	J93687
Model:	BCM943142Y (802.11bgn WLAN + Bluetooth NGFF1630 Mini Card)	T-Log Number:	T93842
Contact:	Anne Liang	Project Manager:	Sheareen Jacobs
Standard:	15.247/RSS-210	Project Coordinator:	Irene
		Class:	N/A

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

Frequency	Level	Pol	FCC 15.247 / 15.209		Detector	Azimuth	Height	Comments
MHz	dB $\mu$ V/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
32.291	34.2	V	40.0	-5.8	Peak	24	1.5	
60.171	32.4	V	40.0	-7.6	Peak	64	1.0	
177.644	29.9	H	43.5	-13.6	Peak	2	1.5	
221.501	26.5	V	46.0	-19.5	Peak	47	1.0	
465.929	28.2	H	46.0	-17.8	Peak	208	1.0	
800.044	26.0	V	46.0	-20.0	Peak	198	1.0	

## Final peak and average readings

Frequency	Level	Pol	FCC 15.247 / 15.209		Detector	Azimuth	Height	Comments
MHz	dB $\mu$ V/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
60.171	29.5	V	40.0	-10.5	QP	67	1.0	QP (1.00s)
177.644	24.4	H	43.5	-19.1	QP	11	1.7	QP (1.00s)
32.291	26.4	V	40.0	-13.6	QP	27	1.0	QP (1.00s)
221.501	21.4	V	46.0	-24.6	QP	67	1.0	QP (1.00s)
800.044	18.8	V	46.0	-27.2	QP	221	1.0	QP (1.00s)
465.929	21.1	H	46.0	-24.9	QP	207	1.0	QP (1.00s)

Client:	Broadcom Corporation	Job Number:	J93687
Model:	BCM943142Y (802.11bgn WLAN + Bluetooth NGFF1630 Mini Card)	T-Log Number:	T93842
Contact:	Anne Liang	Project Manager:	Sheareen Jacobs
Standard:	15.247/RSS-210	Project Coordinator:	Irene
		Class:	N/A

## RSS 210 and FCC 15.247 (DTS) Antenna Port Measurements Power, PSD, 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: 11/11/ & 11/12/2013  
 Test Engineer: Rafael Varelas  
 Test Location: FT Lab #4A

Config. Used: 1  
 Config Change: None  
 EUT Voltage: 120V/60Hz

### General Test Configuration

The EUT was connected to the spectrum analyzer or power meter via a suitable attenuator. All measurements were made on a single chain.

All measurements have been corrected to allow for the external attenuators used.

### Ambient Conditions:

Temperature: 22.1 °C  
 Rel. Humidity: 38 %

### Summary of Results

Run #	Test Performed	Limit	Pass / Fail	Result / Margin
1	Output Power	15.247(b)	Pass	b: 19.0 dBm g: 16.0 dBm n20: 16.1 dBm n40: 14.4 dBm
2	Power spectral Density (PSD)	15.247(d)	Pass	b: 2.9 dBm/10kHz g: 5.0 dBm/30kHz n20: 5.0 dBm/30kHz n40: 1.3 dBm/30kHz
3	Minimum 6dB Bandwidth	15.247(a)		7.0 MHz
3	99% Bandwidth	RSS GEN	-	11b: 12.3MHz 11g: 17.4MHz n20: 18.3MHz n40: 36.2 MHz
4	Spurious emissions	15.247(b)	Pass	All emissions below -30dBc limit

Client:	Broadcom Corporation	Job Number:	J93687
Model:	BCM943142Y (802.11bgn WLAN + Bluetooth NGFF1630 Mini Card)	T-Log Number:	T93842
Contact:	Anne Liang	Project Manager:	Sheareen Jacobs
Standard:	15.247/RSS-210	Project Coordinator:	Irene
		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.

## Procedure Comments:

Measurements performed in accordance with FCC KDB 558074

Mode	Data Rate	Duty Cycle (x)	Constant DC?	T (ms)	Pwr Cor Factor*	Lin Volt Cor Factor**	Min VBW for FS (Hz)
11b	1 Mb/s	1.00	Yes	8.4	0.02	0.04	119.04762
11g	6 Mbps	0.97	Yes	1.41	0.12	0.24	709.21986
n20	MCS0	0.97	Yes	1.29	0.13	0.27	775.1938
n40	MCS0	0.95	Yes	0.62	0.24	0.48	1612.9032

## Sample Notes

Sample S/N: 001018E2EB23 (used for n40 measurements)

Driver: 6.30.223.181

Antenna: 1000802

Test Board: BCM9NGFF2EC\_1 (S/N: 1679910)

Laptop: Lenovo G560 (S/N: CB06427398)

The Aux port (J2) was tested. This was the worse case port based on preliminary testing.

Sample S/N: 001018E2EB21

Driver: 6.30.223.181

Antenna: 1000802

Test Board: BCM9NGFF2EC\_1 (S/N: 1679910)

Laptop: Lenovo G560 (S/N: CB06427398)

The Aux port (J2) was tested. This was the worse case port based on preliminary testing.



Client:	Broadcom Corporation	Job Number:	J93687
Model:	BCM943142Y (802.11bgn WLAN + Bluetooth NGFF1630 Mini Card)	T-Log Number:	T93842
Contact:	Anne Liang	Project Manager:	Sheareen Jacobs
Standard:	15.247/RSS-210	Project Coordinator:	Irene
		Class:	N/A

## Run #1: Output Power

Mode: 11b

Power Setting <sup>2</sup>	Frequency (MHz)	Output Power		Antenna Gain (dBi)	Result	EIRP		Output Power	
		(dBm) <sup>1</sup>	mW			dBm	W	(dBm) <sup>3</sup>	mW
-	2412	17.9	61.7	3.8	Pass	21.7	0.148	18.2	66.1
-	2437	19.0	80.2	3.8	Pass	22.8	0.192	19.3	85.1
-	2462	17.9	61.8	3.8	Pass	21.7	0.148	18.1	64.6
-	2467	13.5	22.3	3.8	Pass	17.3	0.054	13.7	23.4
-	2472	8.5	7.0	3.8	Pass	12.3	0.017	8.7	7.4

Note 1: Duty Cycle ≥ 98%. Output power measured using a spectrum analyzer (see plots below) with RBW= 1-5% of OBW, VB≥3\* RBW, RMS detector, power averaging on, and power integration over the OBW, trace average 100 traces (option AVGSA-1, in KDB 558074). Spurious limit becomes -30dBc.

Note 2: Power setting - the software power setting used during testing, included for reference only.

Note 3: Power measured using average power meter (non-gated) and is included for reference only.

Mode: 11g

Power Setting <sup>2</sup>	Frequency (MHz)	Output Power		Antenna Gain (dBi)	Result	EIRP		Output Power	
		(dBm) <sup>1</sup>	mW			dBm	W	(dBm) <sup>3</sup>	mW
-	2412	13.9	24.7	3.8	Pass	17.7	0.059	13.9	24.5
-	2437	16.0	39.7	3.8	Pass	19.8	0.095	16.0	39.8
-	2462	15.2	33.3	3.8	Pass	19.0	0.080	15.3	33.9
-	2467	10.2	10.6	3.8	Pass	14.0	0.025	10.3	10.7
-	2472	8.8	7.6	3.8	Pass	12.6	0.018	8.9	7.8

Mode: n20

Power Setting <sup>2</sup>	Frequency (MHz)	Output Power		Antenna Gain (dBi)	Result	EIRP		Output Power	
		(dBm) <sup>1</sup>	mW			dBm	W	(dBm) <sup>3</sup>	mW
-	2412	14.2	26.5	3.8	Pass	18.0	0.064	14.2	26.3
-	2437	16.1	40.7	3.8	Pass	19.9	0.098	16.1	40.7
-	2462	14.3	27.2	3.8	Pass	18.1	0.065	14.4	27.5
-	2467	10.6	11.5	3.8	Pass	14.4	0.028	10.6	11.5
-	2472	9.0	7.9	3.8	Pass	12.8	0.019	9.1	8.1

## EMC Test Data

Client:	Broadcom Corporation	Job Number:	J93687
Model:	BCM943142Y (802.11bgn WLAN + Bluetooth NGFF1630 Mini Card)	T-Log Number:	T93842
Contact:	Anne Liang	Project Manager:	Sheareen Jacobs
Standard:	15.247/RSS-210	Project Coordinator:	Irene
		Class:	N/A

Mode: n40

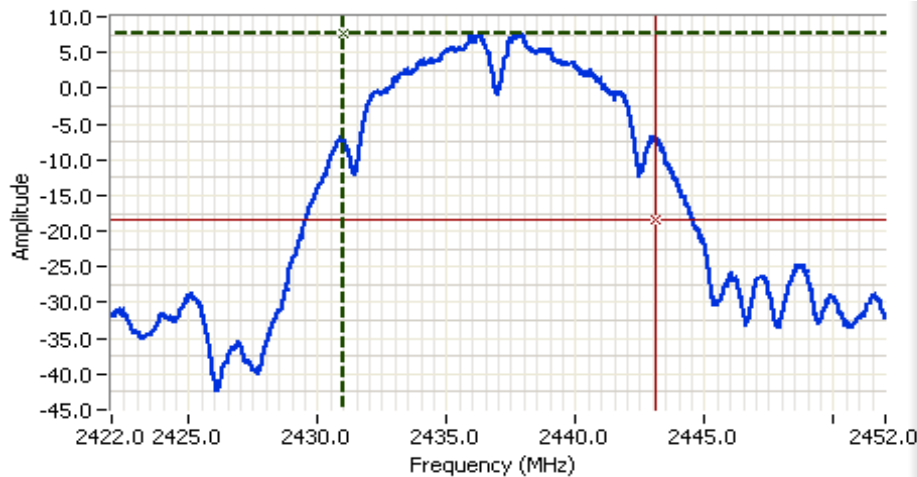
Power Setting <sup>2</sup>	Frequency (MHz)	Output Power		Antenna Gain (dBi)	Result	EIRP		Output Power	
		(dBm) <sup>1</sup>	mW			dBm	W	(dBm) <sup>3</sup>	mW
-	2422	12.6	18.2	3.8	Pass	16.4	0.044	12.5	17.8
-	2437	14.4	27.7	3.8	Pass	18.2	0.066	14.3	26.9
-	2452	12.9	19.7	3.8	Pass	16.7	0.047	12.9	19.5
-	2457	12.0	15.7	3.8	Pass	15.8	0.038	11.9	15.5
-	2462	10.1	10.1	3.8	Pass	13.9	0.024	10.0	10.0

Note 1:	Duty Cycle < 98%, constant duty cycle. Output power measured using a spectrum analyzer (see plots below) with RBW= 1-5% of OBW, VB≥3* RBW, RMS detector, power averaging on, and power integration over the OBW, trace average 100 traces (option AVGSA-1, in KDB 558074). Measurement corrected by Pwr Cor Factor. Spurious limit becomes -30dBc.
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Note 2:	Power setting - the software power setting used during testing, included for reference only.
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Note 3:	Power measured using average power meter (non-gated) and is included for reference only.
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Client: Broadcom Corporation	Job Number: J93687
Model: BCM943142Y (802.11bgn WLAN + Bluetooth NGFF1630 Mini Card)	T-Log Number: T93842
Contact: Anne Liang	Project Manager: Sheareen Jacobs
Standard: 15.247/RSS-210	Project Coordinator: Irene
	Class: N/A

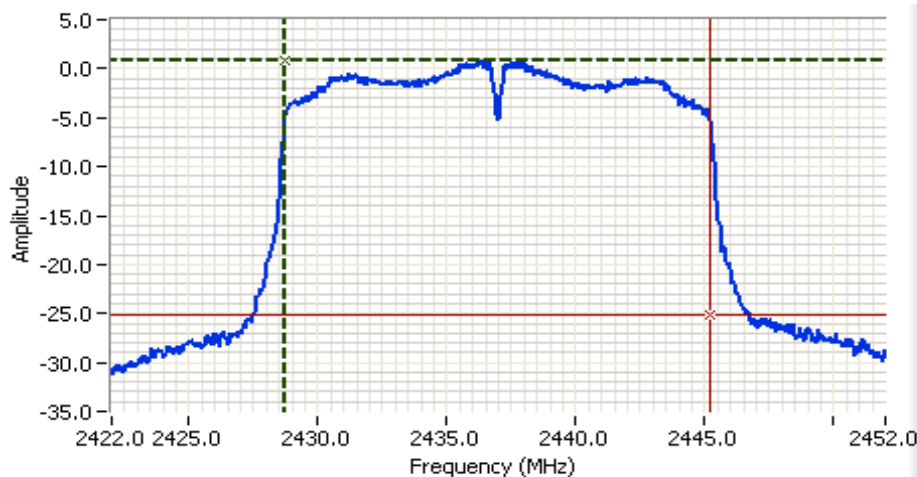


**Analyzer Settings**

Agilent Technologies, E4446A  
 CF: 2437.000 MHz  
 SPAN: 30.000 MHz  
 RB: 300 kHz  
 VB: 910 kHz  
 Detector: RMS  
 Attn: 20 DB  
 RL Offset: 10.6 DB  
 Sweep Time: 1.2ms  
 Ref Lvl: 10.6 DBM  
 RMS: 100

**Comments**

Power over span: 19.04dBm  
 802.11b



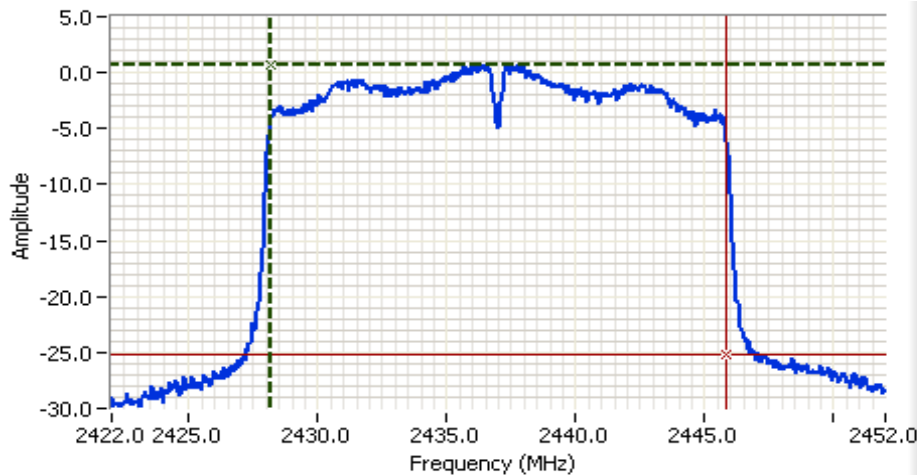
**Analyzer Settings**

Agilent Technologies, E4446A  
 CF: 2437.000 MHz  
 SPAN: 30.000 MHz  
 RB: 300 kHz  
 VB: 910 kHz  
 Detector: RMS  
 Attn: 20 DB  
 RL Offset: 10.6 DB  
 Sweep Time: 1.0ms  
 Ref Lvl: 17.1 DBM  
 RMS: 100

**Comments**

Power over span: 15.87dBm  
 802.11g

Client: Broadcom Corporation	Job Number: J93687
Model: BCM943142Y (802.11bgn WLAN + Bluetooth NGFF1630 Mini Card)	T-Log Number: T93842
Contact: Anne Liang	Project Manager: Sheareen Jacobs
Standard: 15.247/RSS-210	Project Coordinator: Irene
	Class: N/A

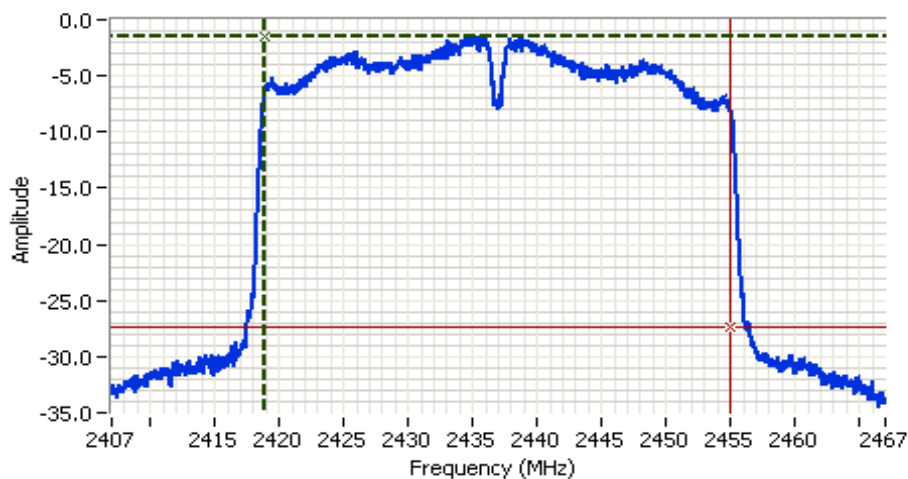


**Analyzer Settings**  
 Agilent Technologies, E4446A  
 CF: 2437.000 MHz  
 SPAN: 30.000 MHz  
 RB: 300 kHz  
 VB: 910 kHz  
 Detector: RMS  
 Attn: 20 DB  
 RL Offset: 10.6 DB  
 Sweep Time: 1.0ms  
 Ref Lvl: 17.1 DBM  
 RMS: 100

**Comments**  
 Power over span: 15.97dBm  
 802.11n20

Cursor 1 2428.1398 0.77  
 Cursor 2 2445.8103 -25.23

Delta Freq. 17.671  
 Delta Amplitude 26.00



**Analyzer Settings**  
 Agilent Technologies, E4446A  
 CF: 2437.000 MHz  
 SPAN: 60.000 MHz  
 RB: 510 kHz  
 VB: 1.500 MHz  
 Detector: RMS  
 Attn: 20 DB  
 RL Offset: 10.6 DB  
 Sweep Time: 1.0ms  
 Ref Lvl: 11.6 DBM  
 RMS: 100

**Comments**  
 Power over span: 14.18dBm  
 802.11n40

Cursor 1 2418.9000 -1.44  
 Cursor 2 2454.9600 -27.44

Delta Freq. 36.060  
 Delta Amplitude 26.00



Client:	Broadcom Corporation	Job Number:	J93687
Model:	BCM943142Y (802.11bgn WLAN + Bluetooth NGFF1630 Mini Card)	T-Log Number:	T93842
Contact:	Anne Liang	Project Manager:	Sheareen Jacobs
Standard:	15.247/RSS-210	Project Coordinator:	Irene
		Class:	N/A

## Run #2: Power spectral Density

Mode: 11b

Power Setting	Frequency (MHz)	PSD	Limit dBm/3kHz	Result
		(dBm/10kHz) <sup>Note 1</sup>		
-	2412	1.7	8.0	Pass
-	2437	2.7	8.0	Pass
-	2462	2.9	8.0	Pass

Mode: 11g

Power Setting	Frequency (MHz)	PSD	Limit dBm/3kHz	Result
		(dBm/30kHz) <sup>Note 1</sup>		
-	2412	4.5	8.0	Pass
-	2437	5.0	8.0	Pass
-	2462	4.9	8.0	Pass

Mode: n20

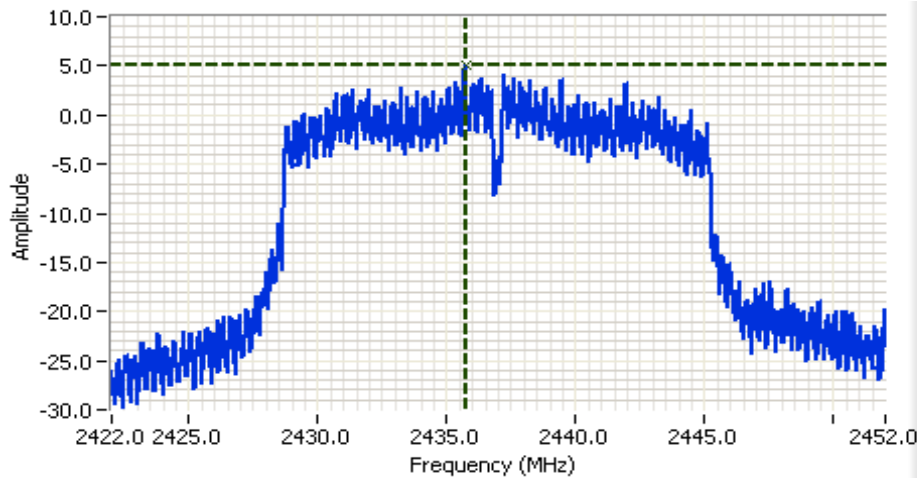
Power Setting	Frequency (MHz)	PSD	Limit dBm/3kHz	Result
		(dBm/30kHz) <sup>Note 1</sup>		
-	2412	5.0	8.0	Pass
-	2437	4.9	8.0	Pass
-	2462	4.5	8.0	Pass

Mode: n40

Power Setting	Frequency (MHz)	PSD	Limit dBm/3kHz	Result
		(dBm/30kHz) <sup>Note 1</sup>		
-	2422	1.3	8.0	Pass
-	2437	-0.4	8.0	Pass
-	2452	-1.1	8.0	Pass

Note 1: Test performed per method PKSPD, in KDB 558074. Power spectral density measured using:  $3\text{kHz} \leq \text{RBW} \leq 100\text{kHz}$ ,  $\text{VBW}=3*\text{RBW}$ , peak detector, span =  $1.5*\text{DTS BW}$ , auto sweep time, max hold.

Client: Broadcom Corporation	Job Number: J93687
Model: BCM943142Y (802.11bgn WLAN + Bluetooth NGFF1630 Mini Card)	T-Log Number: T93842
Contact: Anne Liang	Project Manager: Sheareen Jacobs
Standard: 15.247/RSS-210	Project Coordinator: Irene
	Class: N/A

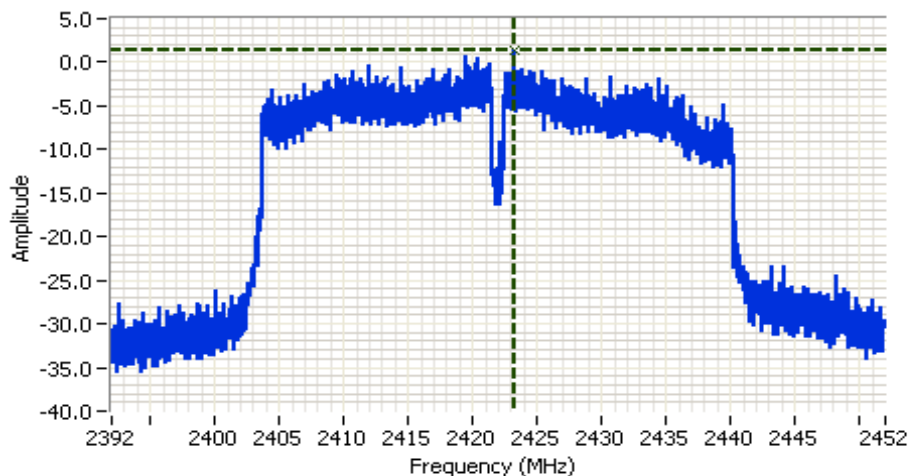
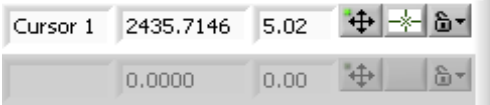


## Analyzer Settings

Agilent Technologies, E4446A  
 CF: 2437.000 MHz  
 SPAN: 30.000 MHz  
 RB: 30.0 kHz  
 VB: 100 kHz  
 Detector: POS  
 Attn: 20 DB  
 RL Offset: 10.6 DB  
 Sweep Time: 31.8ms  
 Ref Lvl: 10.6 DBM

## Comments

PSD: 5.02 dBm/30kHz  
 802.11g

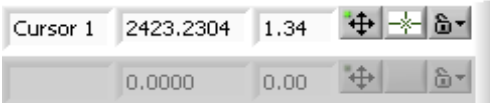


## Analyzer Settings

Agilent Technologies, E4446A  
 CF: 2422.000 MHz  
 SPAN: 60.000 MHz  
 RB: 30.0 kHz  
 VB: 100 kHz  
 Detector: POS  
 Attn: 20 DB  
 RL Offset: 10.6 DB  
 Sweep Time: 63.4ms  
 Ref Lvl: 10.6 DBM

## Comments

PSD: 1.34 dBm/30kHz



Client:	Broadcom Corporation	Job Number:	J93687
Model:	BCM943142Y (802.11bgn WLAN + Bluetooth NGFF1630 Mini Card)	T-Log Number:	T93842
Contact:	Anne Liang	Project Manager:	Sheareen Jacobs
Standard:	15.247/RSS-210	Project Coordinator:	Irene
		Class:	N/A

## Run #3: Signal Bandwidth

Mode: 11b

Power Setting	Frequency (MHz)	Bandwidth (MHz) 6dB   100kHz	RBW Setting (MHz) 99%   300kHz
-	2412	8.0	12.3
-	2437	7.04	12.1
-	2462	7.6	12.1

Mode: 11g

Power Setting	Frequency (MHz)	Bandwidth (MHz) 6dB   100kHz	RBW Setting (MHz) 99%   300kHz
-	2412	15.1	17.4
-	2437	15.7	17.3
-	2462	15.02	17.4

Mode: n20

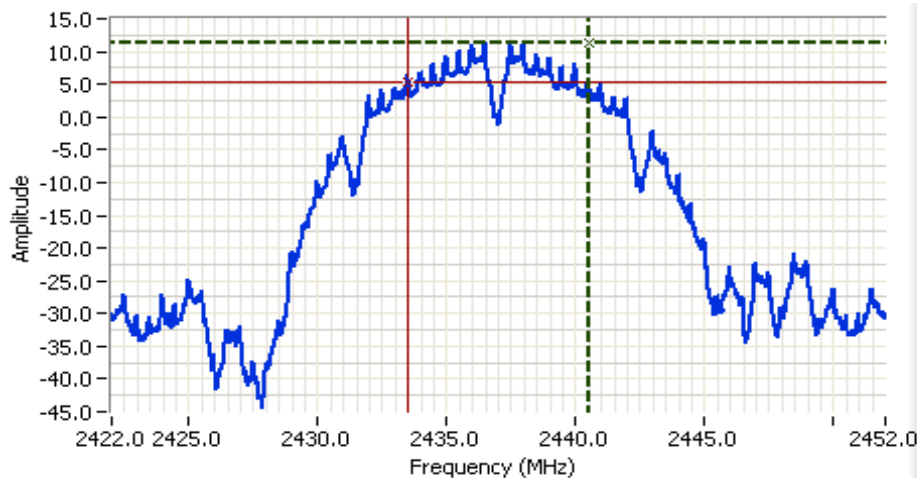
Power Setting	Frequency (MHz)	Bandwidth (MHz) 6dB   100kHz	RBW Setting (MHz) 99%   300kHz
-	2412	15.1	18.3
-	2437	15.1	18.1
-	2462	15.1	18.0

Mode: n40

Power Setting	Frequency (MHz)	Bandwidth (MHz) 6dB   100kHz	RBW Setting (MHz) 99%   500kHz
-	2422	35.1	36.2
-	2437	35.1	36.2
-	2452	35.1	36.1

Note 1: DTS BW: RBW=100kHz, VBW ≥ 3\*RBW, peak detector, max hold, auto sweep time.  
 99% BW: RBW=1-5% of of 99%BW, VBW ≥ 3\*RBW, peak detector, max hold, auto sweep time.

Client: Broadcom Corporation	Job Number: J93687
Model: BCM943142Y (802.11bgn WLAN + Bluetooth NGFF1630 Mini Card)	T-Log Number: T93842
Contact: Anne Liang	Project Manager: Sheareen Jacobs
Standard: 15.247/RSS-210	Project Coordinator: Irene
	Class: N/A

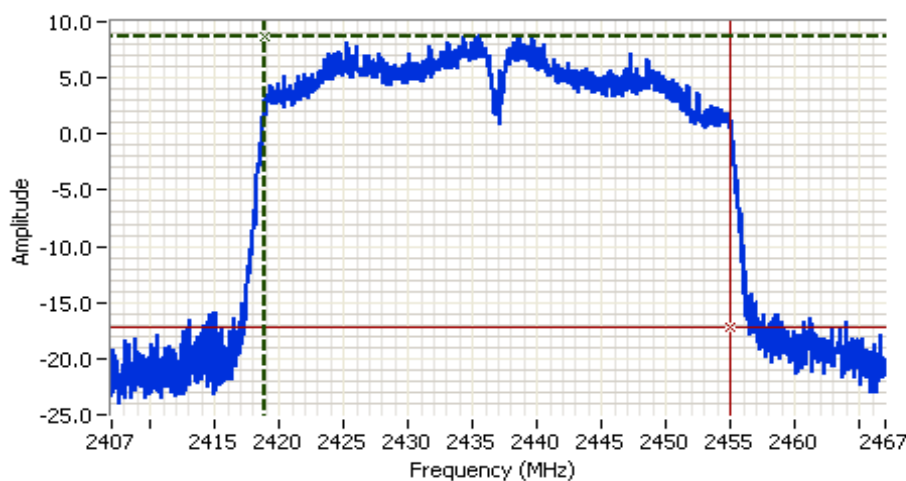


**Analyzer Settings**  
 Agilent Technologies, E4446A  
 CF: 2437.000 MHz  
 SPAN: 30.000 MHz  
 RB: 100 kHz  
 VB: 300 kHz  
 Detector: POS  
 Attn: 20 DB  
 RL Offset: 10.6 DB  
 Sweep Time: 3.0ms  
 Ref Lvl: 10.6 DBM

**Comments**  
 6dB BW: 7.042 MHz

Cursor 1 2440.5162 11.43  
 Cursor 2 2433.4738 5.43

Delta Freq. 7.042  
 Delta Amplitude 6.00



**Analyzer Settings**  
 Agilent Technologies, E4446A  
 CF: 2437.000 MHz  
 SPAN: 60.000 MHz  
 RB: 510 kHz  
 VB: 1.500 MHz  
 Detector: POS  
 Attn: 20 DB  
 RL Offset: 10.6 DB  
 Sweep Time: 1.0ms  
 Ref Lvl: 10.6 DBM

**Comments**  
 99% BW: 36.200 MHz

Cursor 1 2418.8200 8.73  
 Cursor 2 2455.0200 -17.27

Delta Freq. 36.200  
 Delta Amplitude 26.00





Client:	Broadcom Corporation	Job Number:	J93687
Model:	BCM943142Y (802.11bgn WLAN + Bluetooth NGFF1630 Mini Card)	T-Log Number:	T93842
Contact:	Anne Liang	Project Manager:	Sheareen Jacobs
Standard:	15.247/RSS-210	Project Coordinator:	Irene
		Class:	N/A

## Run #4a: Out of Band Spurious Emissions

Frequency (MHz)	Power Setting	Mode	Limit	Result
2412	-	b	-30dBc	Pass
2437	-	b	-30dBc	Pass
2462	-	b	-30dBc	Pass
2472	-	b	-30dBc	Pass

Frequency (MHz)	Power Setting	Mode	Limit	Result
2412	-	g	-30dBc	Pass
2437	-	g	-30dBc	Pass
2462	-	g	-30dBc	Pass
2472	-	g	-30dBc	Pass

Frequency (MHz)	Power Setting	Mode	Limit	Result
2412	-	n20	-30dBc	Pass

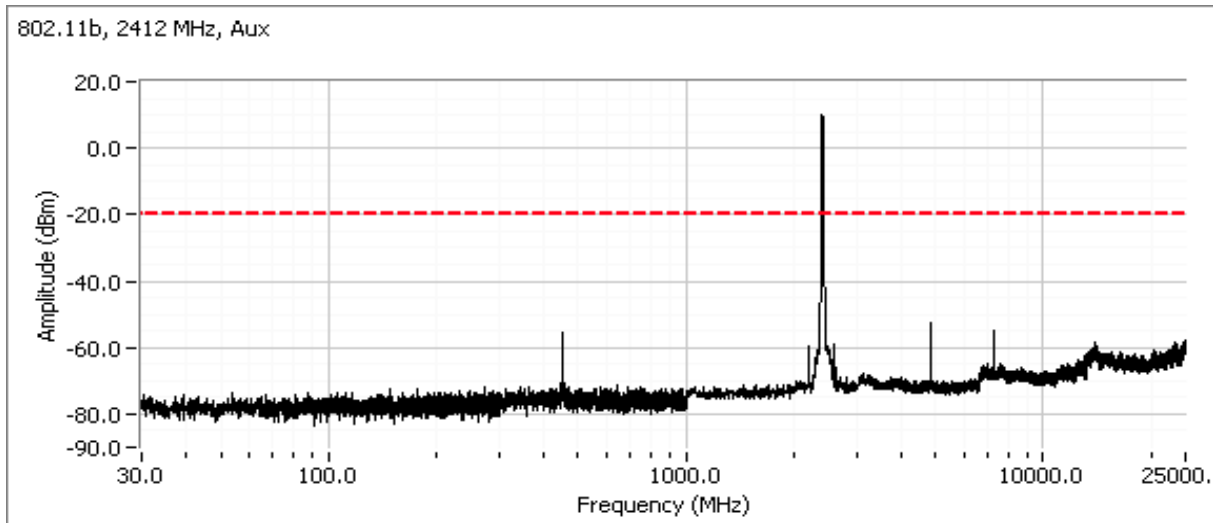
Frequency (MHz)	Power Setting	Mode	Limit	Result
2422	-	n40	-30dBc	Pass
2437	-	n40	-30dBc	Pass
2452	-	n40	-30dBc	Pass
2462	-	n40	-30dBc	Pass

Note: 802.11g was tested as representative of n20, except for a check in the 2390-2400MHz band.

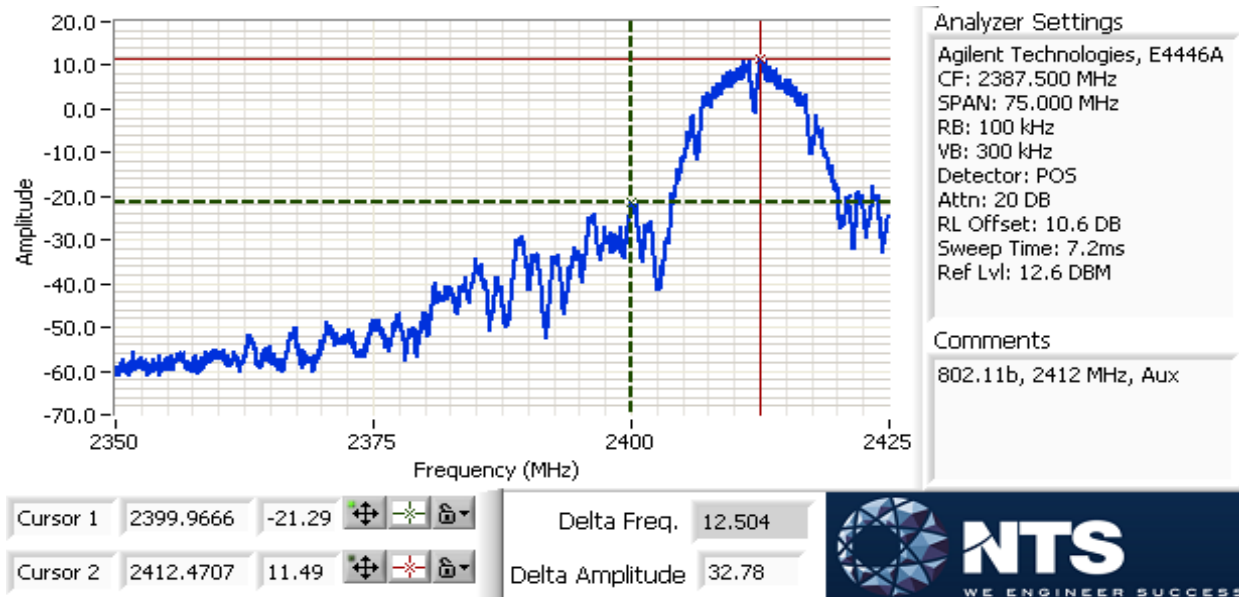
Client: Broadcom Corporation	Job Number: J93687
Model: BCM943142Y (802.11bgn WLAN + Bluetooth NGFF1630 Mini Card)	T-Log Number: T93842
Contact: Anne Liang	Project Manager: Sheareen Jacobs
Standard: 15.247/RSS-210	Project Coordinator: Irene
	Class: N/A

## 802.11b

### Plots for low channel

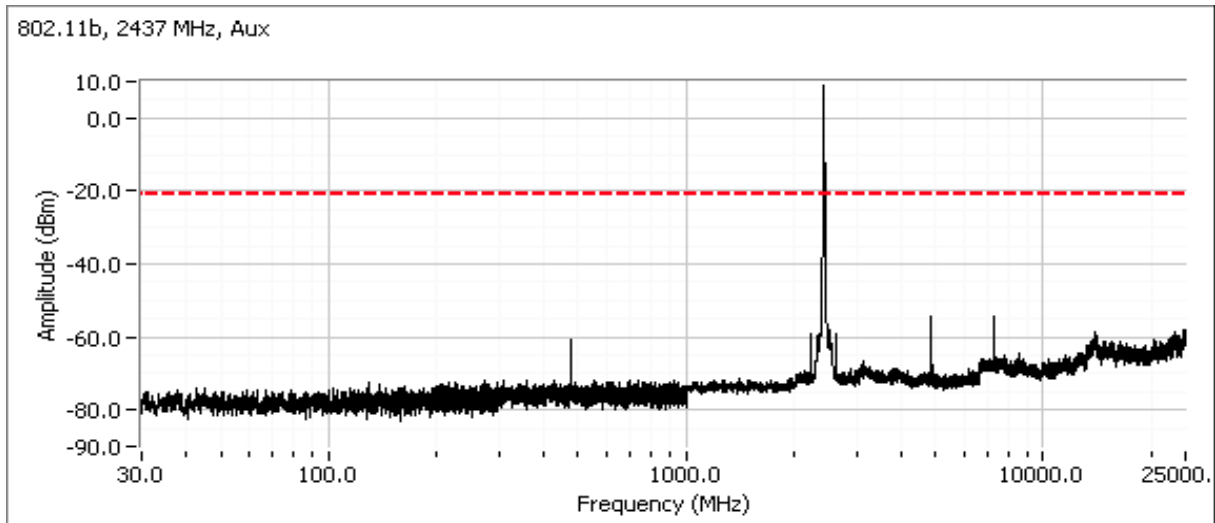


Additional plot showing compliance with -30dBc limit from 2390 MHz to 2400 MHz. Radiated measurements used to show compliance with the limits in the restricted band below 2390 MHz.

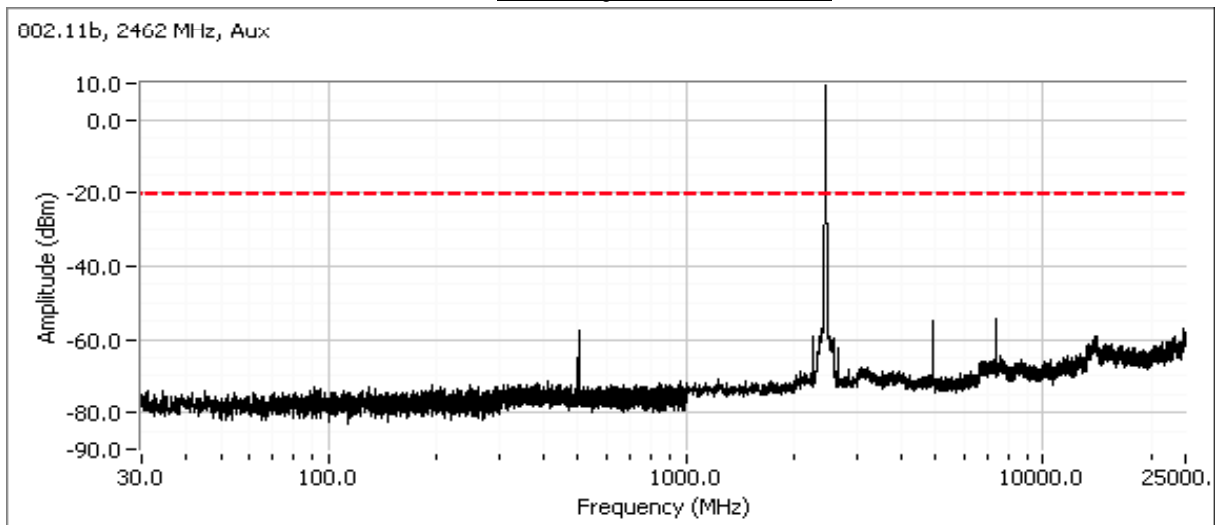


Client: Broadcom Corporation	Job Number: J93687
Model: BCM943142Y (802.11bgn WLAN + Bluetooth NGFF1630 Mini Card)	T-Log Number: T93842
Contact: Anne Liang	Project Manager: Sheareen Jacobs
Standard: 15.247/RSS-210	Project Coordinator: Irene
	Class: N/A

Plots for center channel

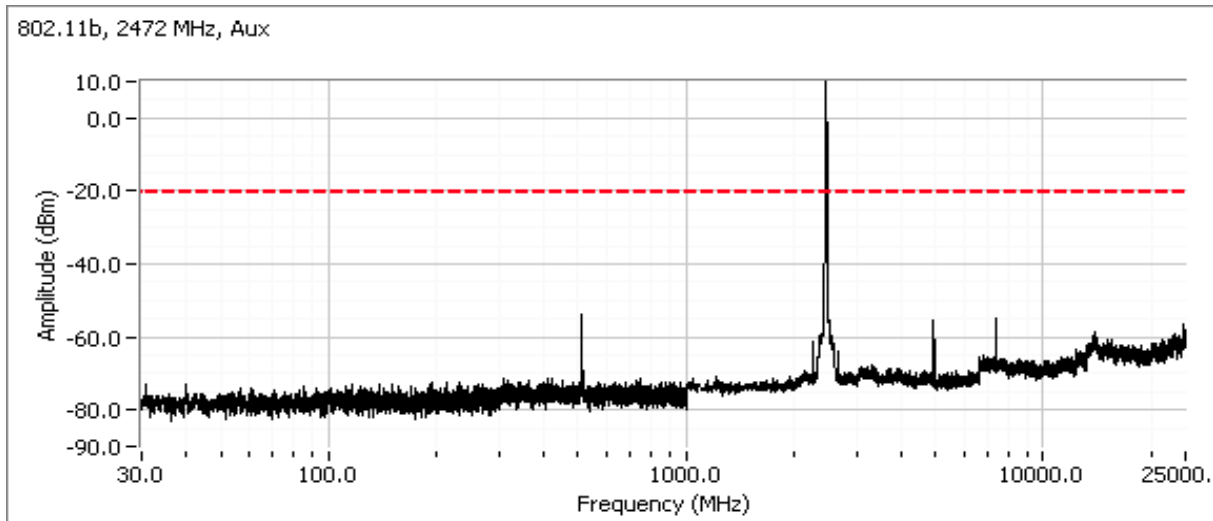


Plots for high channel = 2462 MHz



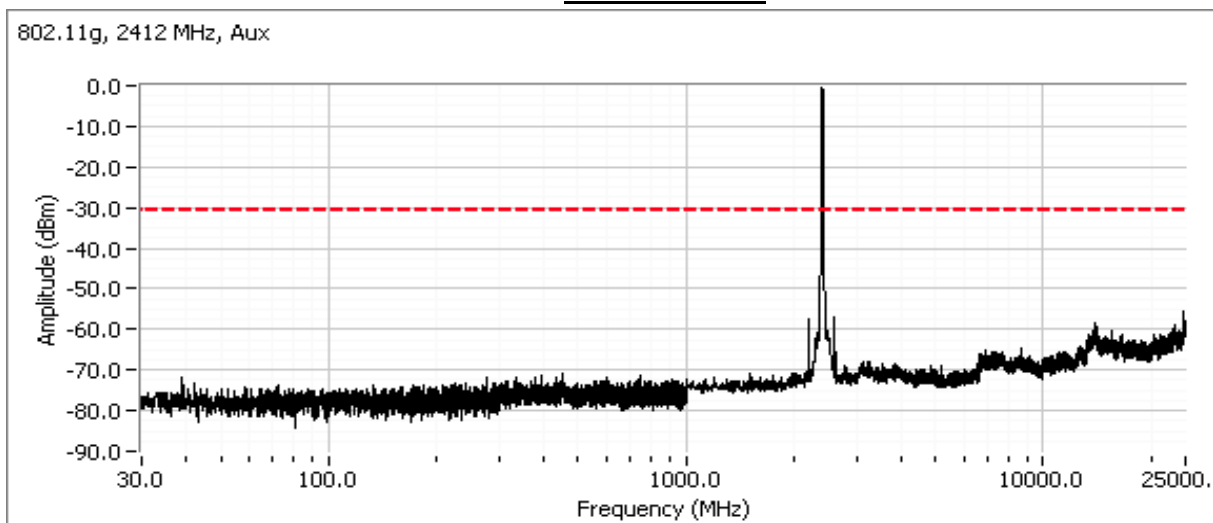
Client: Broadcom Corporation	Job Number: J93687
Model: BCM943142Y (802.11bgn WLAN + Bluetooth NGFF1630 Mini Card)	T-Log Number: T93842
Contact: Anne Liang	Project Manager: Sheareen Jacobs
Standard: 15.247/RSS-210	Project Coordinator: Irene
	Class: N/A

Plots for high channel = 2472 MHz



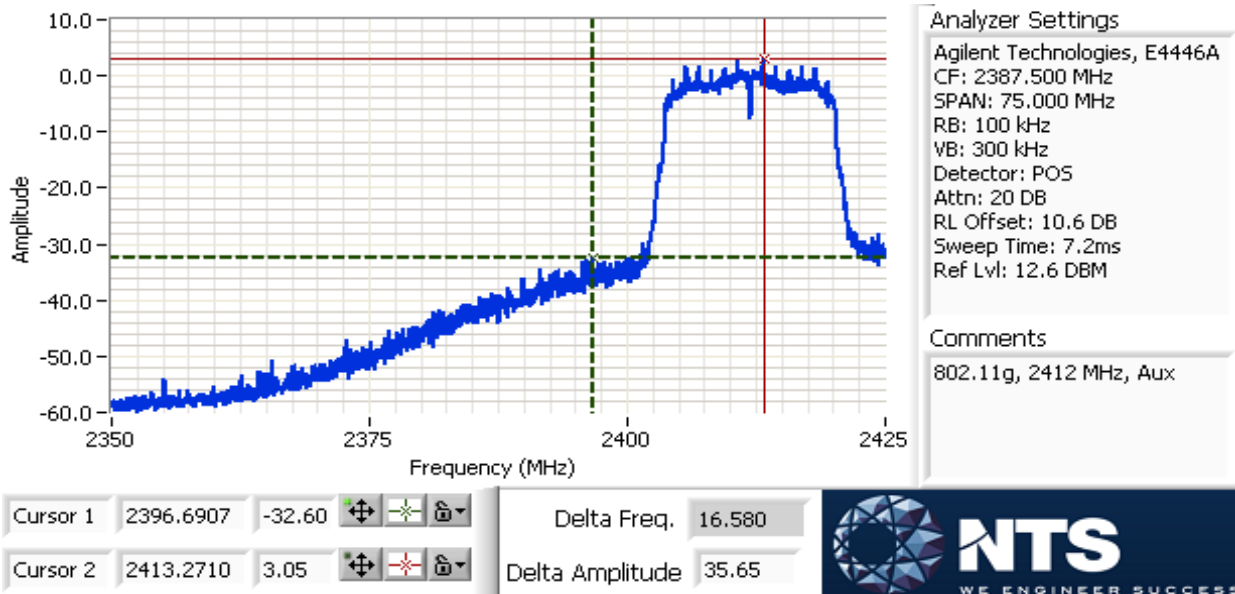
802.11g

Plots for low channel

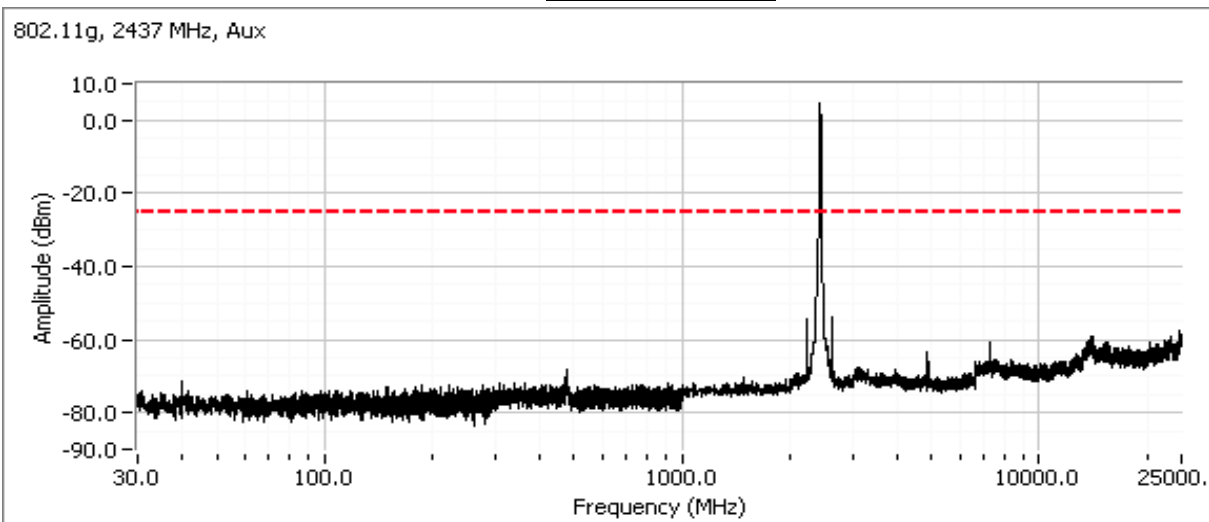


Client: Broadcom Corporation	Job Number: J93687
Model: BCM943142Y (802.11bgn WLAN + Bluetooth NGFF1630 Mini Card)	T-Log Number: T93842
Contact: Anne Liang	Project Manager: Sheareen Jacobs
Standard: 15.247/RSS-210	Project Coordinator: Irene
	Class: N/A

Additional plot showing compliance with -30dBc limit from 2390 MHz to 2400 MHz. Radiated measurements used to show compliance with the limits in the restricted band below 2390 MHz.

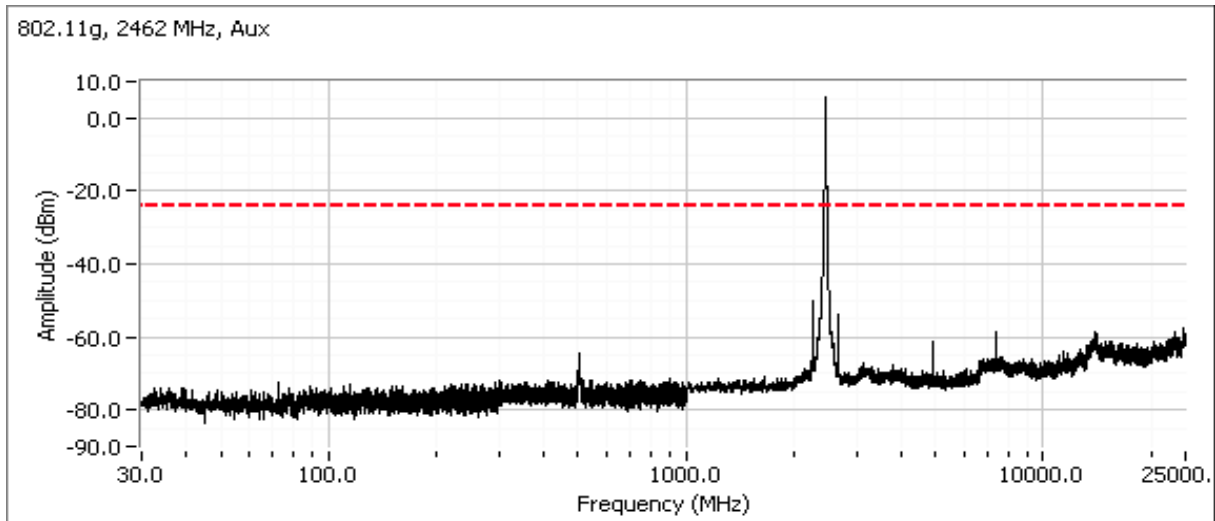


Plots for center channel

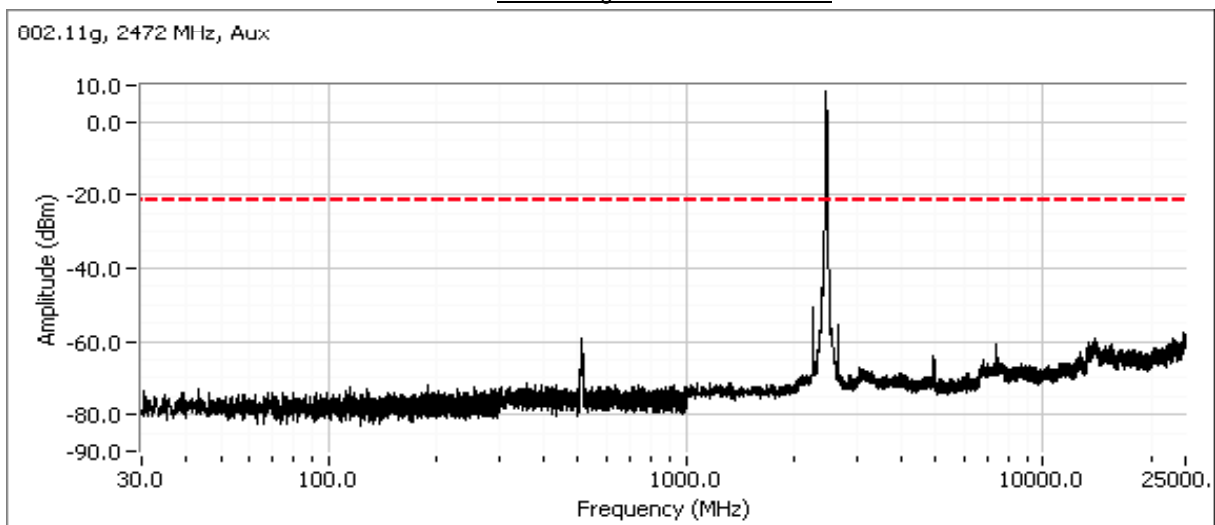


Client:	Broadcom Corporation	Job Number:	J93687
Model:	BCM943142Y (802.11bgn WLAN + Bluetooth NGFF1630 Mini Card)	T-Log Number:	T93842
Contact:	Anne Liang	Project Manager:	Sheareen Jacobs
Standard:	15.247/RSS-210	Project Coordinator:	Irene
		Class:	N/A

Plots for high channel = 2462 MHz



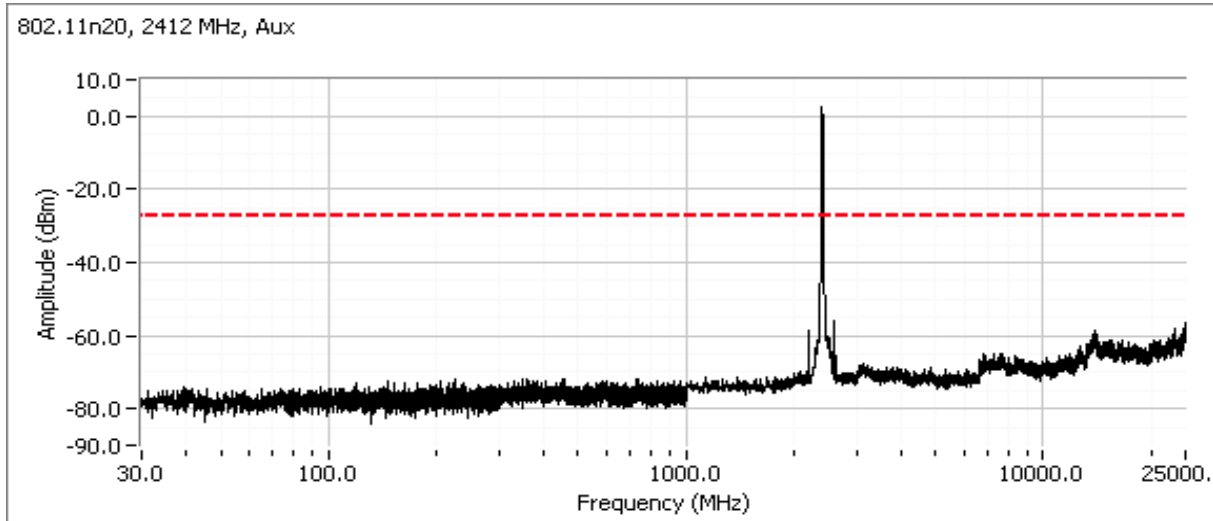
Plots for high channel = 2472 MHz



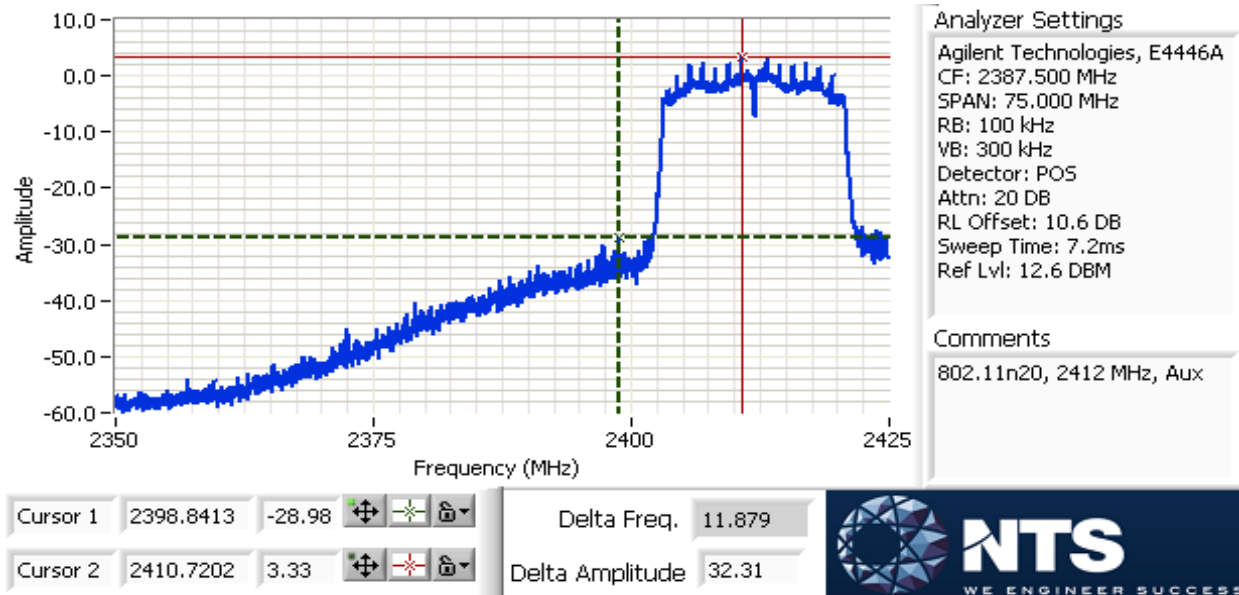
Client: Broadcom Corporation	Job Number: J93687
Model: BCM943142Y (802.11bgn WLAN + Bluetooth NGFF1630 Mini Card)	T-Log Number: T93842
Contact: Anne Liang	Project Manager: Sheareen Jacobs
Standard: 15.247/RSS-210	Project Coordinator: Irene
	Class: N/A

802.11n20

Plots for low channel



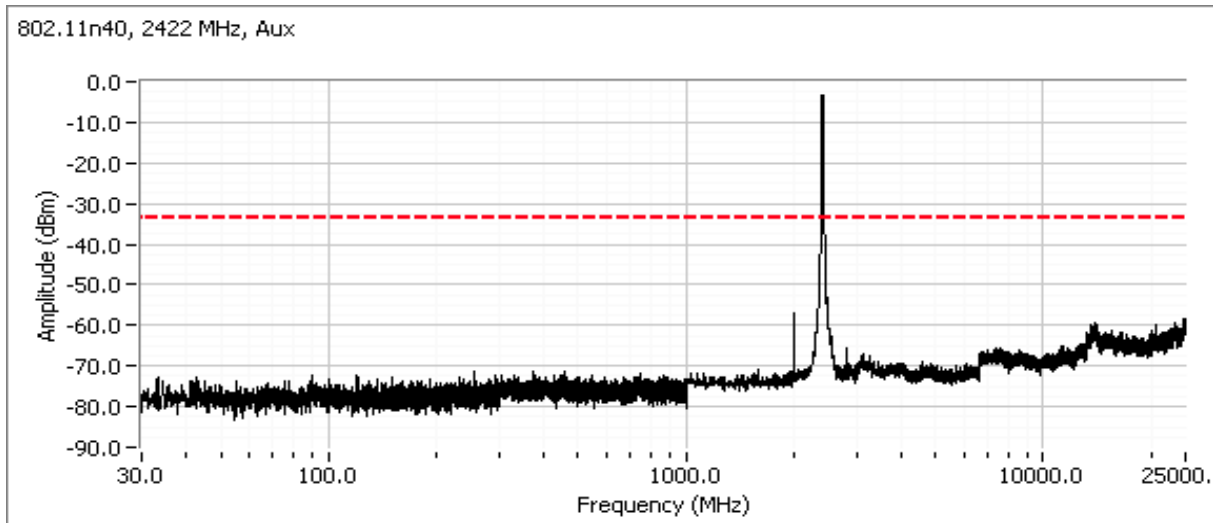
Additional plot showing compliance with -30dBc limit from 2390 MHz to 2400 MHz. Radiated measurements used to show compliance with the limits in the restricted band below 2390 MHz.



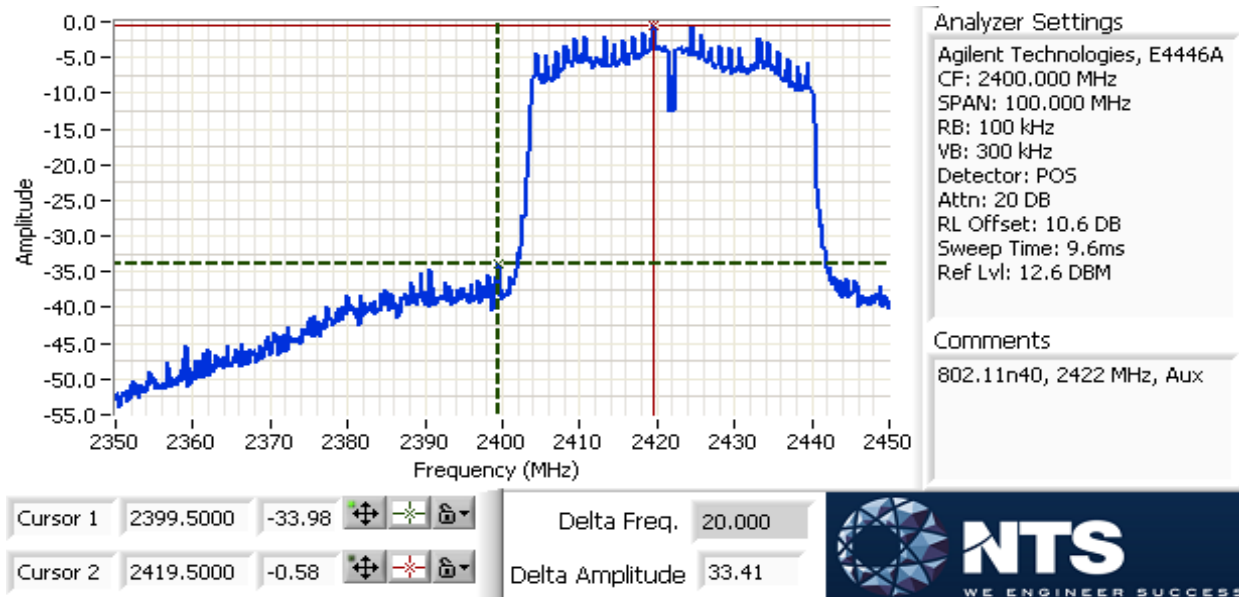
Client: Broadcom Corporation	Job Number: J93687
Model: BCM943142Y (802.11bgn WLAN + Bluetooth NGFF1630 Mini Card)	T-Log Number: T93842
Contact: Anne Liang	Project Manager: Sheareen Jacobs
Standard: 15.247/RSS-210	Project Coordinator: Irene
	Class: N/A

## 802.11n40

### Plots for low channel



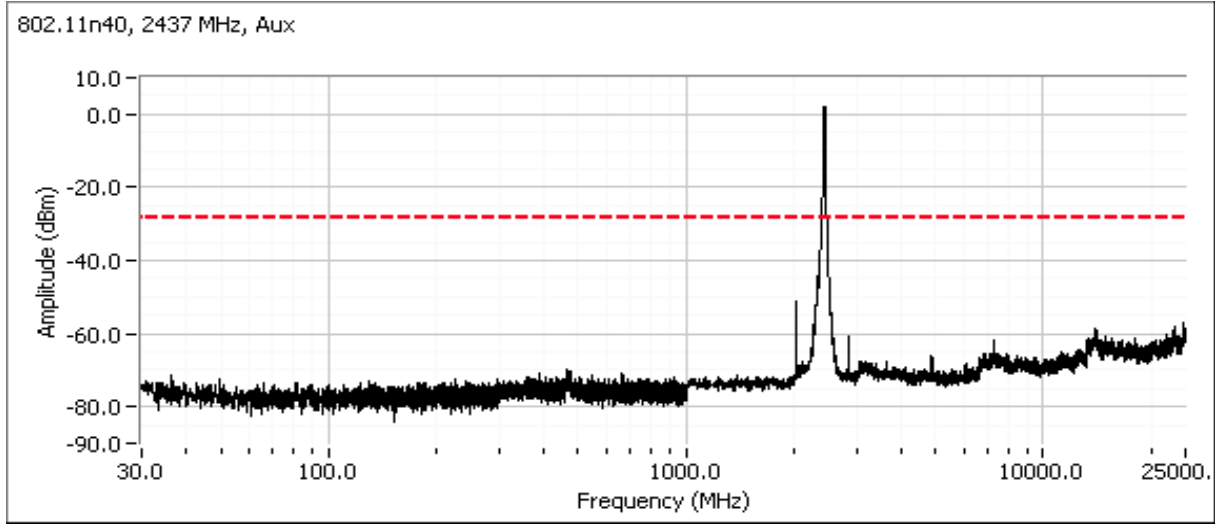
Additional plot showing compliance with -30dBc limit from 2390 MHz to 2400 MHz. Radiated measurements used to show compliance with the limits in the restricted band below 2390 MHz.



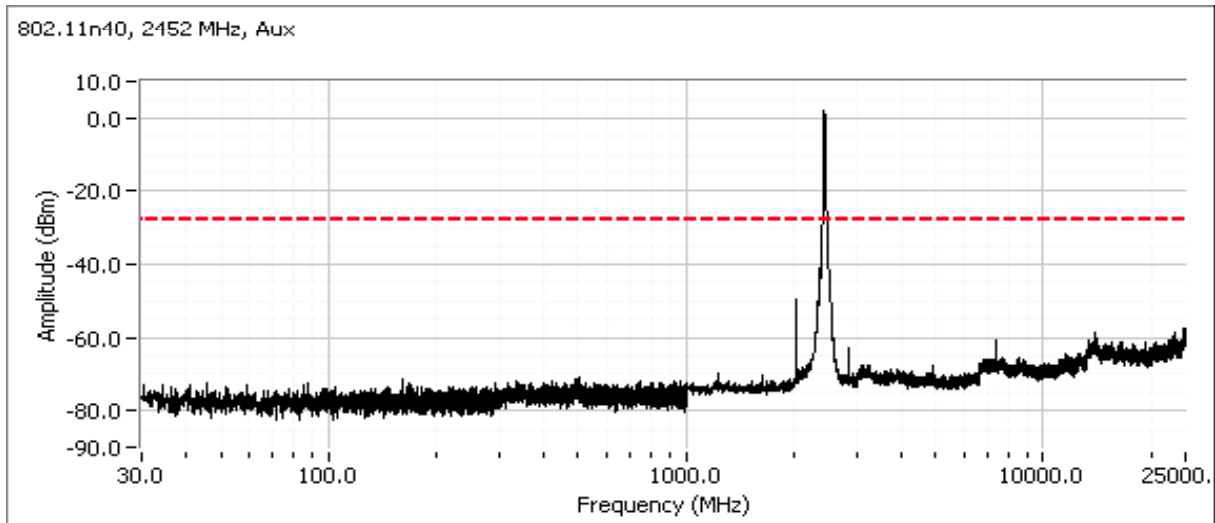


Client: Broadcom Corporation	Job Number: J93687
Model: BCM943142Y (802.11bgn WLAN + Bluetooth NGFF1630 Mini Card)	T-Log Number: T93842
Contact: Anne Liang	Project Manager: Sheareen Jacobs
Standard: 15.247/RSS-210	Project Coordinator: Irene
	Class: N/A

Plots for center channel

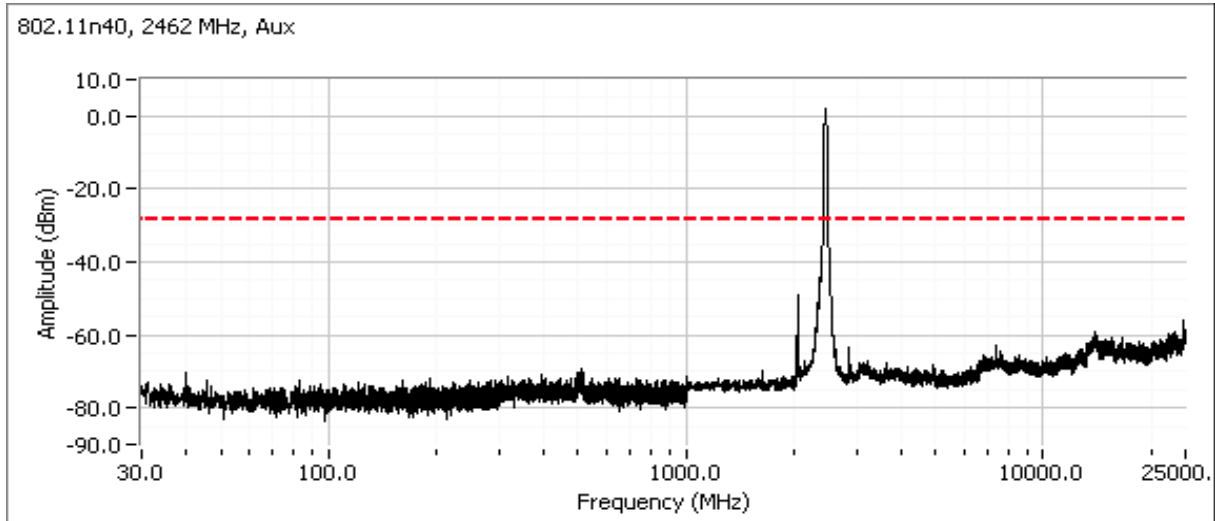


Plots for high channel = 2452MHz



Client:	Broadcom Corporation	Job Number:	J93687
Model:	BCM943142Y (802.11bgn WLAN + Bluetooth NGFF1630 Mini Card)	T-Log Number:	T93842
Contact:	Anne Liang	Project Manager:	Sheareen Jacobs
Standard:	15.247/RSS-210	Project Coordinator:	Irene
		Class:	N/A

Plots for high channel = 2462MHz



Client:	Broadcom Corporation	Job Number:	J93687
Model:	BCM943142Y (802.11bgn WLAN + Bluetooth NGFF1630 Mini Card)	T-Log Number:	T93842
Contact:	Anne Liang	Project Manager:	Sheareen Jacobs
Standard:	15.247/RSS-210	Project Coordinator:	Irene
		Class:	N/A

## RSS 210 and FCC 15.247 (DTS) Radiated Spurious Emissions (Bluetooth - BLE mode)

### 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.

For radiated emissions testing the measurement antenna was located 3 meters from the EUT, unless otherwise noted.

### Ambient Conditions:

Temperature: 23 °C  
 Rel. Humidity: 35 %

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

Run #	Mode	Channel	Target Power	Power Setting	Test Performed	Limit	Result / Margin
1	BLE	2402MHz		default	Restricted Band Edge (2390 MHz)	FCC Part 15.209 / 15.247( c)	38.7 dBµV/m @ 2344.6 MHz (-15.3 dB)
				default	Radiated Emissions, 1 - 25 GHz	FCC Part 15.209 / 15.247( c)	40.5 dBµV/m @ 4803.8 MHz (-13.5 dB)
	BLE	2440MHz		default	Radiated Emissions, 1 - 25 GHz	FCC Part 15.209 / 15.247( c)	39.7 dBµV/m @ 4883.8 MHz (-14.3 dB)
				default	Restricted Band Edge (2483.5 MHz)	FCC Part 15.209 / 15.247( c)	39.8 dBµV/m @ 2483.5 MHz (-14.2 dB)
	BLE	2480MHz		default	Radiated Emissions, 1 - 25 GHz	FCC Part 15.209 / 15.247( c)	38.0 dBµV/m @ 4959.9 MHz (-16.0 dB)
				default			

### Modifications Made During Testing

No modifications were made to the EUT during testing

### Deviations From The Standard

No deviations were made from the requirements of the standard.



## EMC Test Data

Client:	Broadcom Corporation	Job Number:	J93687
Model:	BCM943142Y (802.11bgn WLAN + Bluetooth NGFF1630 Mini Card)	T-Log Number:	T93842
Contact:	Anne Liang	Project Manager:	Sheareen Jacobs
Standard:	15.247/RSS-210	Project Coordinator:	Irene
		Class:	N/A

### Sample Notes

Sample S/N: 001018E2EB19

Software: Broadcom Blue Tool Version 1.4.3

Driver: BCM43142A0\_001.001.011.0161.0180

Antenna: 1000802

Test Board: 100-124289-0040 Rev02(S/N: 765588 )

Laptop: Dell E6400 (S/N: DP3L9K1)

All testing performed on port J2. BT operation is limited to this port.

### Procedure Comments:

Measurements performed in accordance with FCC KDB 558074

Peak measurements performed with: RBW=1MHz, VBW=3MHz, peak detector, max hold, auto sweep time

Unless otherwise stated/noted, emission has duty cycle  $\geq 98\%$  and was measured using RBW=1MHz, VBW=10Hz, peak detector, linear average mode, auto sweep time, max hold.

2.4GHz band reject filter used

Mode	Data Rate	Duty Cycle (x)	Constant DC?	T (ms)	Pwr Cor Factor*	Lin Volt Cor Factor**	Min VBW for FS (Hz)
BLE	pkg size 37	0.62	Yes	0.63	2.0827594	4.1655188	1587.3016

### Measurement Specific Notes:

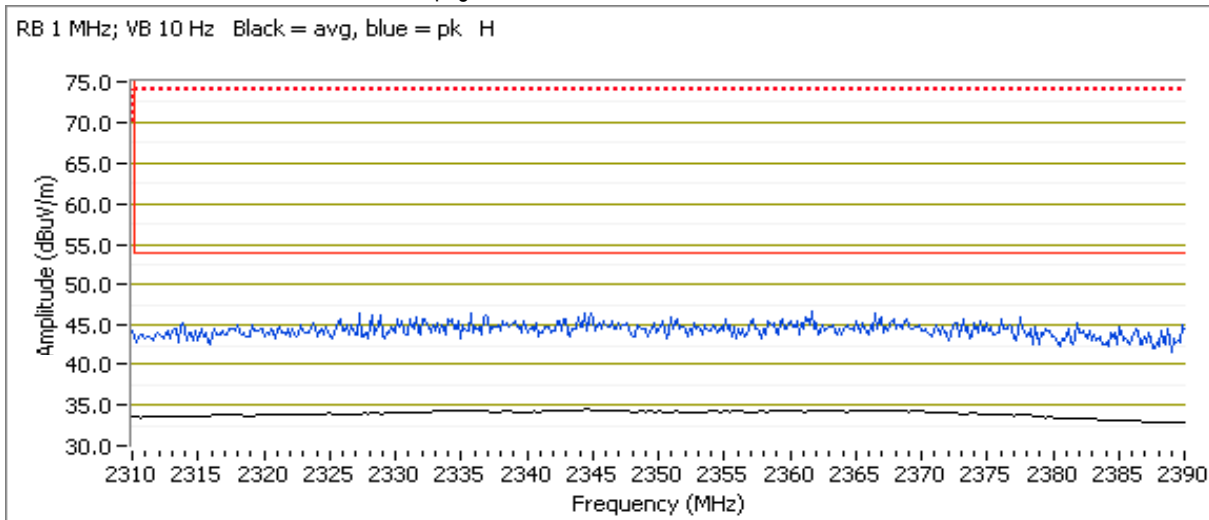
Note 1:	Emission in non-restricted band, but limit of 15.209 used.
Note 2:	Emission in non-restricted band, the limit was set 30dB below the level of the fundamental and measured in 100kHz.
Note 2:	Emission has duty cycle $\geq 98\%$ , average measurement performed: RBW=1MHz, VBW=3MHz, RMS, Power averaging, auto sweep, trace average 100 traces
Note 3:	Emission has duty cycle $< 98\%$ , but constant, average measurement performed: RBW=1MHz, VBW=10Hz, peak detector, linear averaging, auto sweep, trace average 100 traces, measurement corrected by Linear Voltage correction factor
Note 4:	Emission has duty cycle $< 98\%$ and is NOT constant, average measurement performed: RBW=1MHz, VBW $> 1/T$ , peak detector, linear average mode, sweep time auto, max hold. Max hold for $50 \times (1/DC)$ traces
Note 5:	Emission has duty cycle $< 98\%$ , but constant, average measurement performed: RBW=1MHz, VBW=3MHz, RMS, Power averaging, auto sweep, trace average 100 traces, measurement corrected by Pwr correction factor
Note 6:	Plots of the average and peak bandedge do not account for any duty cycle correction. Refer to the tabular results for final measurements.

Client:	Broadcom Corporation	Job Number:	J93687
Model:	BCM943142Y (802.11bgn WLAN + Bluetooth NGFF1630 Mini Card)	T-Log Number:	T93842
Contact:	Anne Liang	Project Manager:	Sheareen Jacobs
Standard:	15.247/RSS-210	Project Coordinator:	Irene
		Class:	N/A

Run #1: Radiated Spurious Emissions, 1,000 - 25000 MHz. Operating Mode: BLE  
 Date of Test: 11/8/2013 Config. Used: 2  
 Test Engineer: Jack Liu Config Change: None  
 Test Location: FT chamber#5 EUT Voltage: Powered by Host

## Run #1a: Low Channel

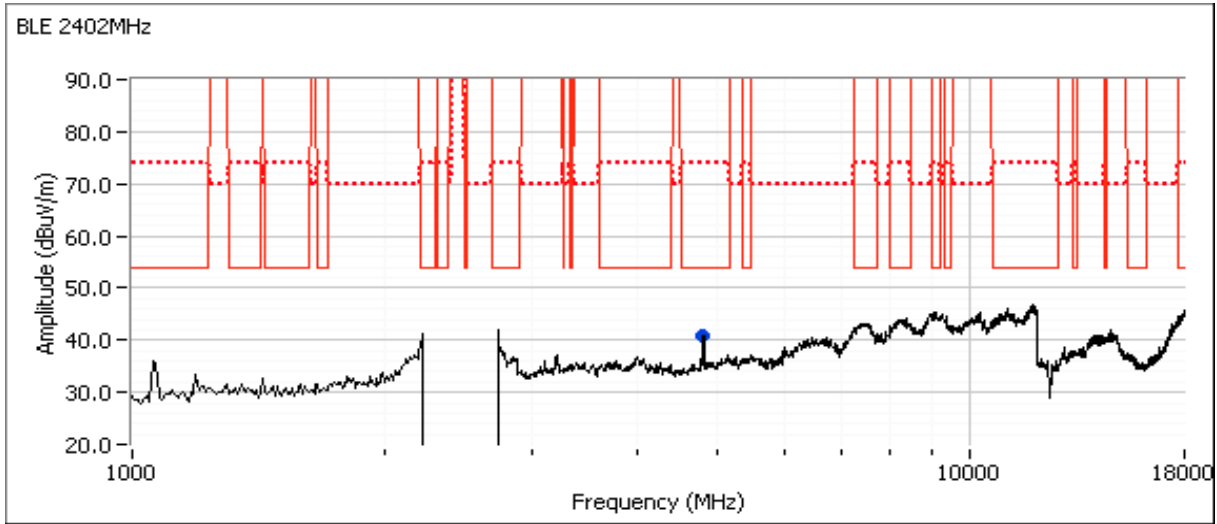
Channel: 2402MHz Mode: BLE  
 Tx Chain: Aux - J2 Data Rate: pkg size 37



## Band Edge Signal Field Strength - Direct measurement of 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	
2344.630	38.7	H	54.0	-15.3	AVG	0	1.2	Note 3
2336.610	46.4	H	74.0	-27.6	PK	0	1.2	
2335.170	38.0	V	54.0	-16.0	AVG	121	1.0	Note 3
2386.470	45.4	V	74.0	-28.6	PK	121	1.0	

Client:	Broadcom Corporation	Job Number:	J93687
Model:	BCM943142Y (802.11bgn WLAN + Bluetooth NGFF1630 Mini Card)	T-Log Number:	T93842
Contact:	Anne Liang	Project Manager:	Sheareen Jacobs
Standard:	15.247/RSS-210	Project Coordinator:	Irene
		Class:	N/A

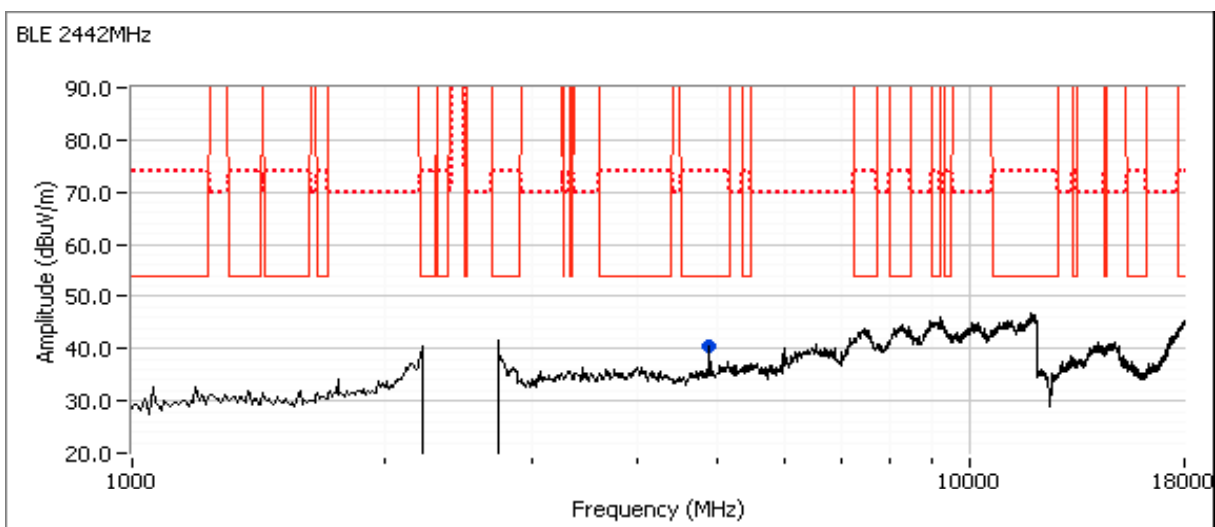


Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dB $\mu$ V/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
4803.820	40.5	V	54.0	-13.5	AVG	256	1.3	Note 3
4804.300	44.8	V	74.0	-29.2	PK	256	1.3	

Client:	Broadcom Corporation	Job Number:	J93687
Model:	BCM943142Y (802.11bgn WLAN + Bluetooth NGFF1630 Mini Card)	T-Log Number:	T93842
Contact:	Anne Liang	Project Manager:	Sheareen Jacobs
Standard:	15.247/RSS-210	Project Coordinator:	Irene
		Class:	N/A

## Run #1b: Center Channel

Channel: 2442MHz Mode: BLE  
 Tx Chain: Aux - J2 Data Rate: pkg size 37



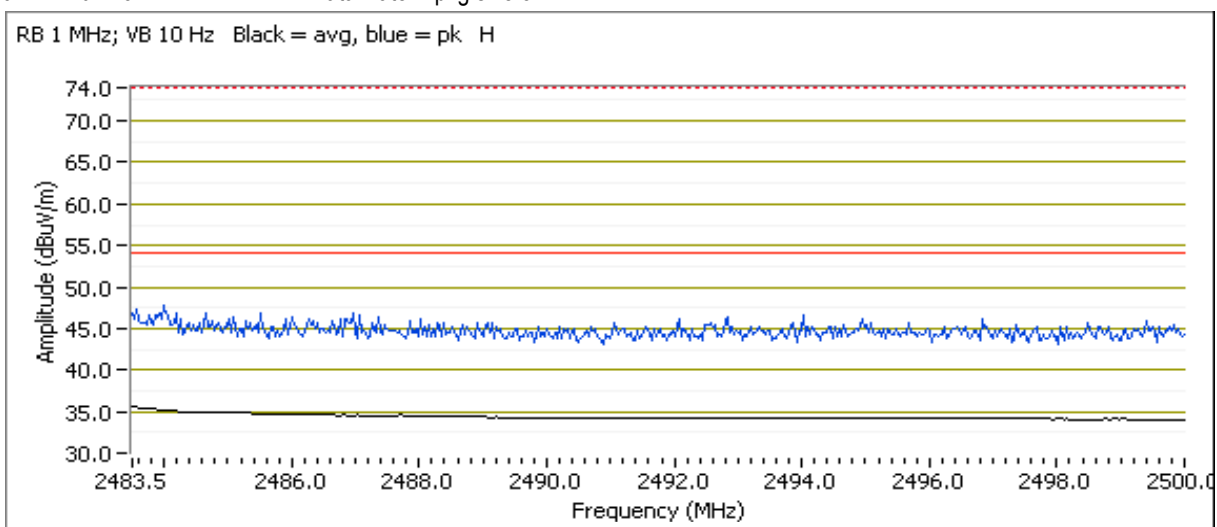
Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBuV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
4883.830	39.7	V	54.0	-14.3	AVG	108	1.5	Note 3
4883.400	44.4	V	74.0	-29.6	PK	108	1.5	

**Note:** Scans made between 18 - 25 GHz 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:	J93687
Model:	BCM943142Y (802.11bgn WLAN + Bluetooth NGFF1630 Mini Card)	T-Log Number:	T93842
Contact:	Anne Liang	Project Manager:	Sheareen Jacobs
Standard:	15.247/RSS-210	Project Coordinator:	Irene
		Class:	N/A

## Run #1c: High Channel

Channel: 2480MHz Mode: BLE  
 Tx Chain: Aux - J2 Data Rate: pkg size 37

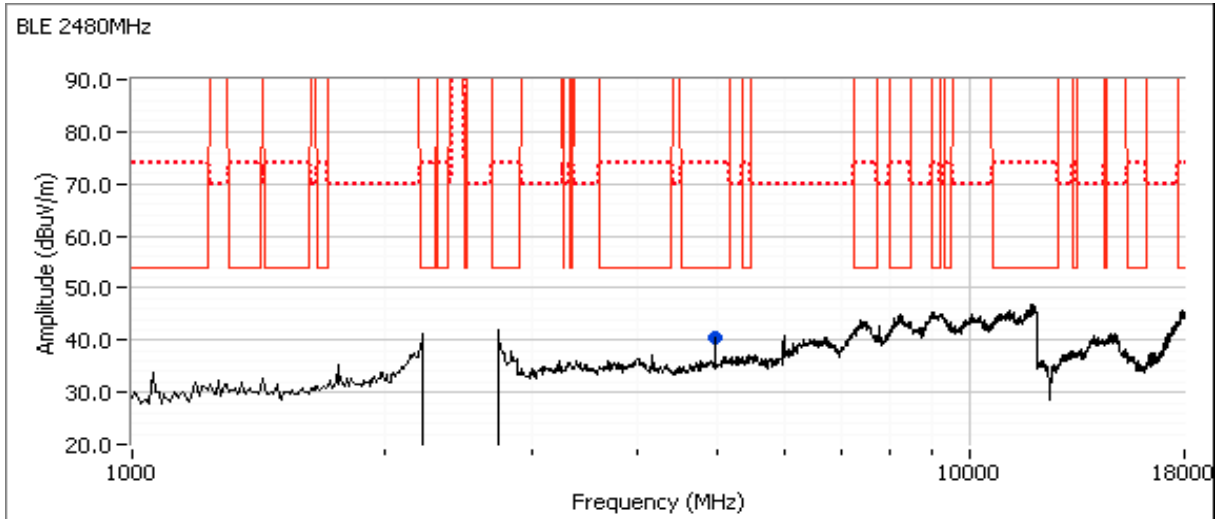


## Band Edge Signal Field Strength - Direct measurement of field strength

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBuV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
2483.530	39.8	H	54.0	-14.2	AVG	199	1.0	Note 3
2483.830	48.2	H	74.0	-25.8	PK	199	1.0	
2483.500	38.7	V	54.0	-15.3	AVG	116	1.0	Note 3
2483.960	47.0	V	74.0	-27.0	PK	116	1.0	



Client:	Broadcom Corporation	Job Number:	J93687
Model:	BCM943142Y (802.11bgn WLAN + Bluetooth NGFF1630 Mini Card)	T-Log Number:	T93842
Contact:	Anne Liang	Project Manager:	Sheareen Jacobs
Standard:	15.247/RSS-210	Project Coordinator:	Irene
		Class:	N/A



Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBuV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
4959.860	38.0	V	54.0	-16.0	AVG	123	1.7	Note 3
4960.280	43.3	V	74.0	-30.7	PK	123	1.7	

Client:	Broadcom Corporation	Job Number:	J93687
Model:	BCM943142Y (802.11bgn WLAN + Bluetooth NGFF1630 Mini Card)	T-Log Number:	T93842
Contact:	Anne Liang	Project Manager:	Sheareen Jacobs
Standard:	15.247/RSS-210	Project Coordinator:	Irene
		Class:	N/A

## RSS 210 and FCC 15.247 (DTS) Antenna Port Measurements Power, PSD, 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: 11/12/2013  
Test Engineer: Rafael Varelas  
Test Location: FT Lab #4A

Config. Used: 2  
Config Change: None  
Host Unit Voltage Host Laptop USB

### General Test Configuration

The EUT was connected to the spectrum analyzer or power meter via a suitable attenuator. All measurements were made on a single chain.

All measurements have been corrected to allow for the external attenuators used.

### Ambient Conditions:

Temperature: 20.9 °C  
Rel. Humidity: 37 %

### Summary of Results

Run #	Test Performed	Limit	Pass / Fail	Result / Margin
1	Output Power	15.247(b)	Pass	2.3 dBm
2	Power spectral Density (PSD)	15.247(d)	Pass	-3.0 dBm/30kHz
3	Minimum 6dB Bandwidth	15.247(a)	Pass	697 kHz
3	99% Bandwidth	RSS GEN	-	1.1 MHz
4	Spurious emissions	15.247(b)	Pass	All emissions below -20dBc limit

### 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:	J93687
Model:	BCM943142Y (802.11bgn WLAN + Bluetooth NGFF1630 Mini Card)	T-Log Number:	T93842
Contact:	Anne Liang	Project Manager:	Sheareen Jacobs
Standard:	15.247/RSS-210	Project Coordinator:	Irene
		Class:	N/A

## Procedure Comments:

Measurements performed in accordance with FCC KDB 558074

Mode	Data Rate	Duty Cycle (x)	Constant DC?	T (ms)	Pwr Cor Factor*	Lin Volt Cor Factor**	Min VBW for FS (Hz)
BLE	pkg size 37	0.62	Yes	0.63	2.0827594	4.1655188	1587.3016

## Sample Notes

Sample S/N: 001018E2EB19

Software: Broadcom Blue Tool Version 1.4.3

Driver: BCM43142A0\_001.001.011.0161.0180

Antenna: 1000802

Test Board: 100-124289-0040 Rev02(S/N: 765588 )

Laptop: Dell E6400 (S/N: DP3L9K1)

All testing performed on port J2. BT operation is limited to this port.

## Run #1: Output Power

Mode: BLE

Power Setting <sup>2</sup>	Frequency (MHz)	Output Power		Antenna Gain (dBi)	Result	EIRP		Output Power	
		(dBm) <sup>1</sup>	mW			dBm	W	(dBm) <sup>3</sup>	mW
Default	2402	2.0	1.6	3.8	Pass	5.8	0.004		
Default	2440	1.8	1.5	3.8	Pass	5.6	0.004		
Default	2480	2.3	1.7	3.8	Pass	6.1	0.004		

Note 1: Output power measured using a peak power meter, spurious limit is -20dBc.

Note 2: Power setting - the software power setting used during testing, included for reference only.

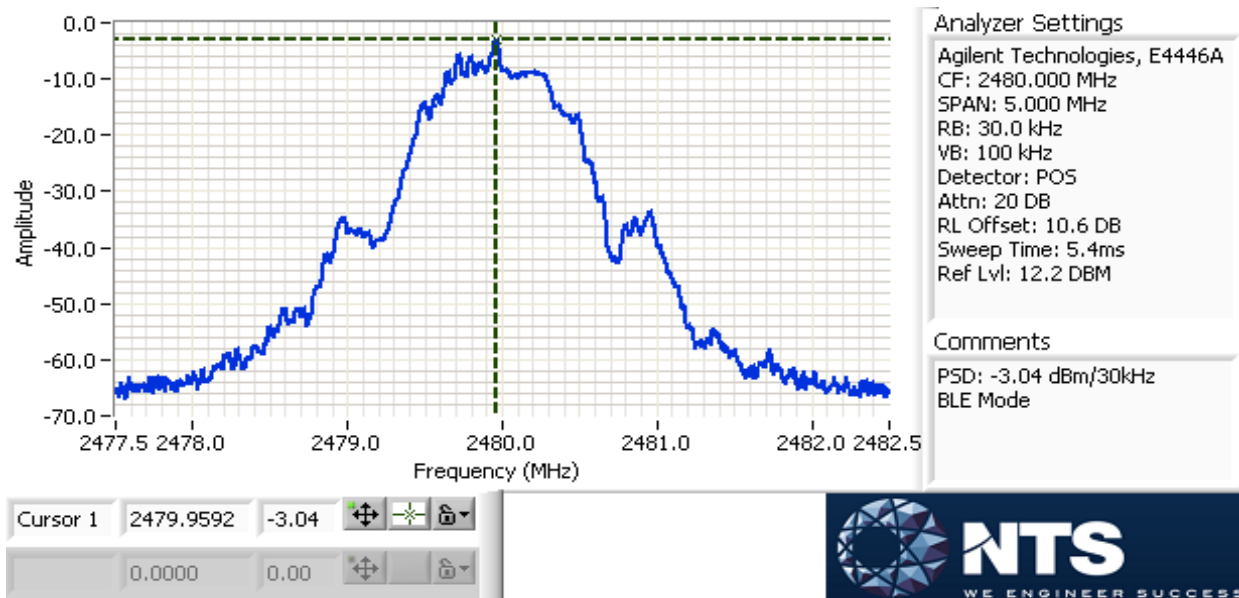
Client: Broadcom Corporation	Job Number: J93687
Model: BCM943142Y (802.11bgn WLAN + Bluetooth NGFF1630 Mini Card)	T-Log Number: T93842
Contact: Anne Liang	Project Manager: Sheareen Jacobs
Standard: 15.247/RSS-210	Project Coordinator: Irene
	Class: N/A

## Run #2: Power spectral Density

Mode: BLE

Power Setting	Frequency (MHz)	PSD (dBm/30kHz) <small>Note 1</small>	Limit dBm/3kHz	Result
Default	2402	-3.4	8.0	Pass
Default	2440	-3.6	8.0	Pass
Default	2480	-3.0	8.0	Pass

Note 1: Test performed per method PKSPD, in KDB 558074. Power spectral density measured using:  $3\text{kHz} \leq \text{RBW} \leq 100\text{kHz}$ ,  $\text{VBW}=3*\text{RBW}$ , peak detector, span =  $1.5*\text{DTS BW}$ , auto sweep time, max hold.



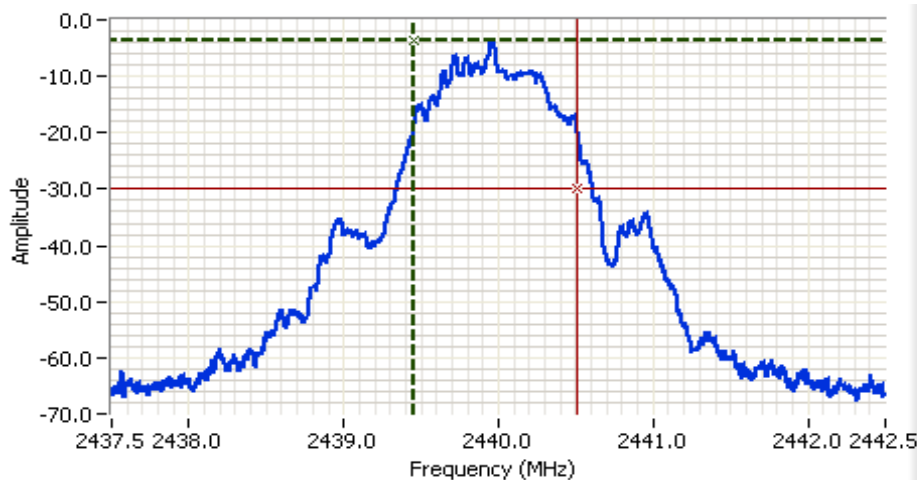
Client: Broadcom Corporation	Job Number: J93687
Model: BCM943142Y (802.11bgn WLAN + Bluetooth NGFF1630 Mini Card)	T-Log Number: T93842
Contact: Anne Liang	Project Manager: Sheareen Jacobs
Standard: 15.247/RSS-210	Project Coordinator: Irene
	Class: N/A

## Run #3: Signal Bandwidth

Mode: BLE

Power Setting	Frequency (MHz)	Bandwidth (kHz)		RBW Setting (MHz)	
		6dB	100kHz	99%	30kHz
Default	2402	697		1.1	
Default	2440	705		1.1	
Default	2480	697		1.1	

Note 1: DTS BW: RBW=100kHz, VBW  $\geq 3 \times$  RBW, peak detector, max hold, auto sweep time.  
 99% BW: RBW=1-5% of 99%BW, VBW  $\geq 3 \times$  RBW, peak detector, max hold, auto sweep time.



### Analyzer Settings

Agilent Technologies, E4446A  
 CF: 2440.000 MHz  
 SPAN: 5.000 MHz  
 RB: 30.0 kHz  
 VB: 91.0 kHz  
 Detector: POS  
 Attn: 20 DB  
 RL Offset: 10.6 DB  
 Sweep Time: 5.4ms  
 Ref Lvl: 12.2 DBM

### Comments

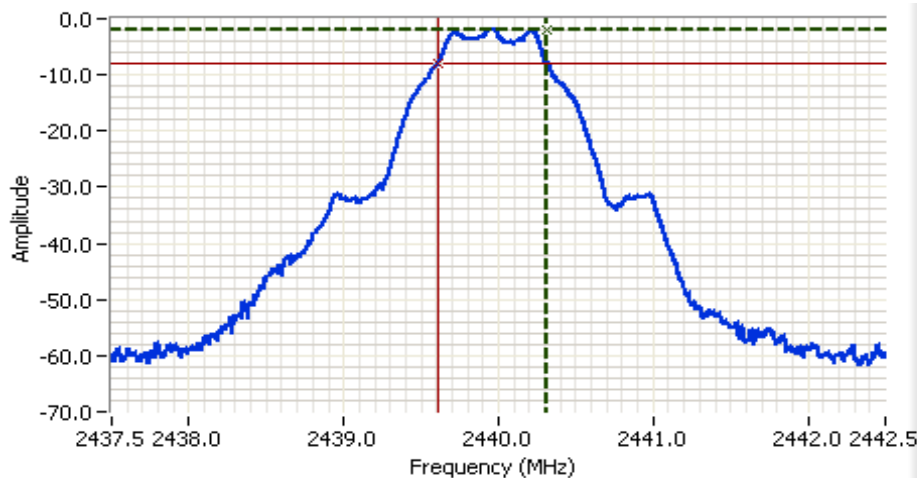
99% BW: 1.057 MHz  
 BLE Mode

Cursor 1	2439.4500	-3.70	
Cursor 2	2440.5067	-29.70	

Delta Freq. 1.057

Delta Amplitude 26.00

Client: Broadcom Corporation	Job Number: J93687
Model: BCM943142Y (802.11bgn WLAN + Bluetooth NGFF1630 Mini Card)	T-Log Number: T93842
Contact: Anne Liang	Project Manager: Sheareen Jacobs
Standard: 15.247/RSS-210	Project Coordinator: Irene
	Class: N/A








**Analyzer Settings**

Agilent Technologies, E4446A  
 CF: 2440.000 MHz  
 SPAN: 5.000 MHz  
 RB: 100 kHz  
 VB: 300 kHz  
 Detector: POS  
 Attn: 20 DB  
 RL Offset: 10.6 DB  
 Sweep Time: 1.0ms  
 Ref Lvl: 12.2 DBM

**Comments**

6dB BW: 705 kHz  
 BLE Mode

Cursor 1	2440.3176	-1.89			
Cursor 2	2439.6124	-7.89			

Delta Freq. 705 kHz

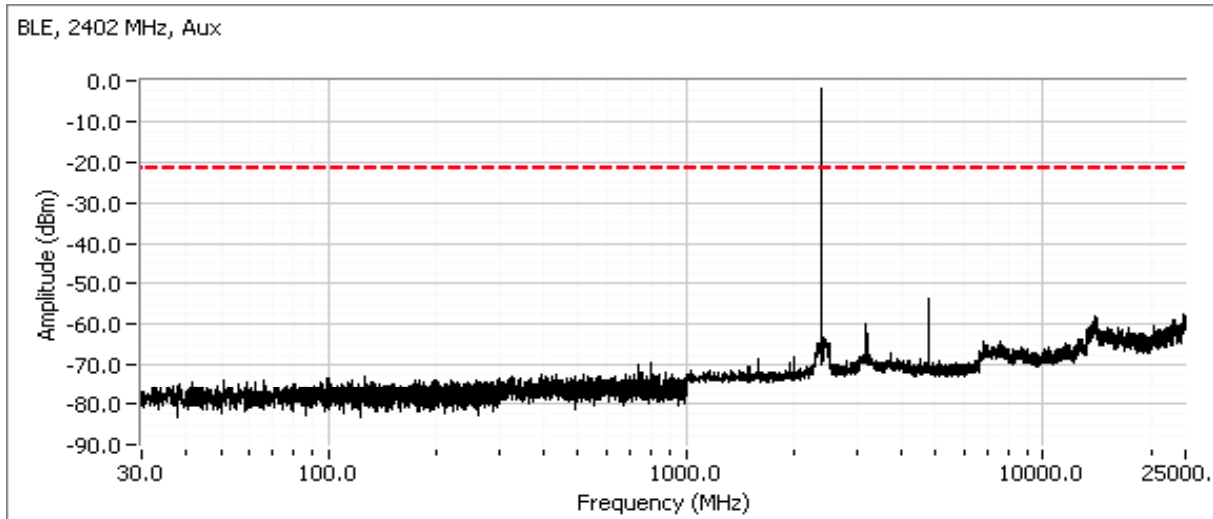
Delta Amplitude 6.00

Client: Broadcom Corporation	Job Number: J93687
Model: BCM943142Y (802.11bgn WLAN + Bluetooth NGFF1630 Mini Card)	T-Log Number: T93842
Contact: Anne Liang	Project Manager: Sheareen Jacobs
Standard: 15.247/RSS-210	Project Coordinator: Irene
	Class: N/A

## Run #4a: Out of Band Spurious Emissions

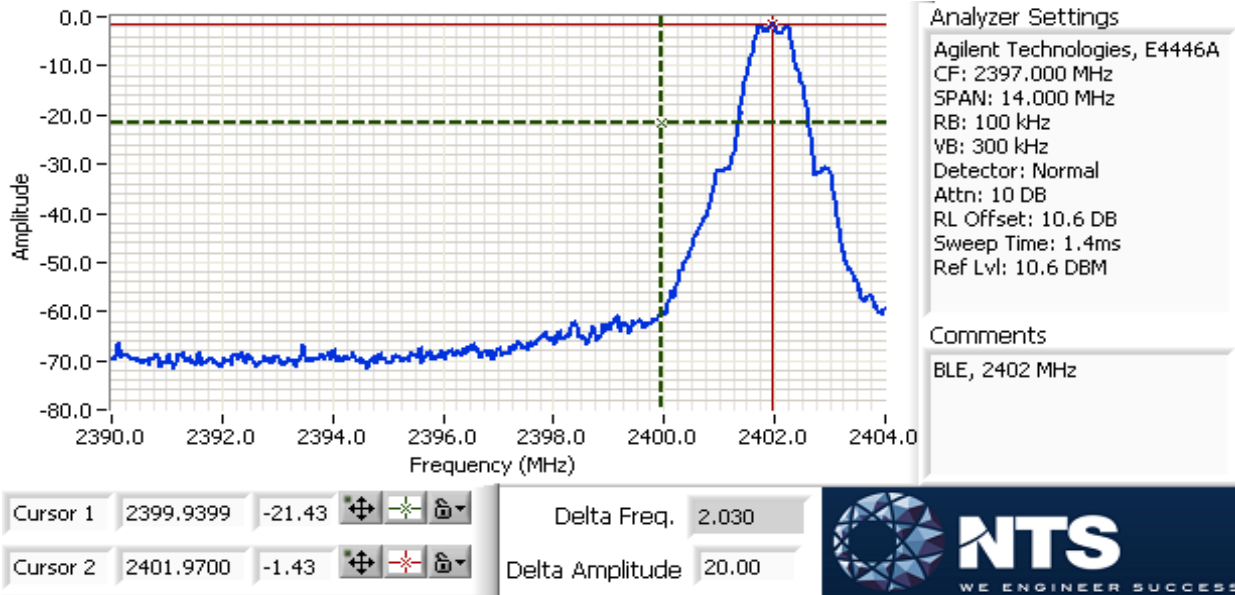
Frequency (MHz)	Power Setting	Mode	Limit	Result
2402	Default	BLE	-20dBc	Pass
2440	Default	BLE	-20dBc	Pass
2480	Default	BLE	-20dBc	Pass

### Plots for low channel

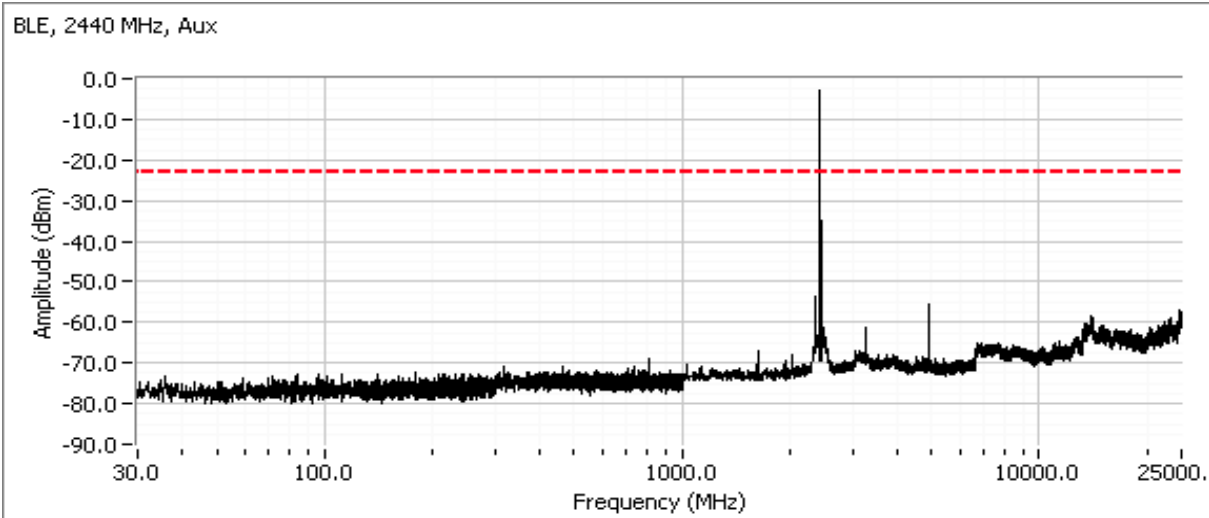


Client: Broadcom Corporation	Job Number: J93687
Model: BCM943142Y (802.11bgn WLAN + Bluetooth NGFF1630 Mini Card)	T-Log Number: T93842
Contact: Anne Liang	Project Manager: Sheareen Jacobs
Standard: 15.247/RSS-210	Project Coordinator: Irene
	Class: N/A

Additional plot showing compliance with -20dBc limit from 2390 MHz to 2400 MHz. Radiated measurements used to show compliance with the limits in the restricted band below 2390 MHz.



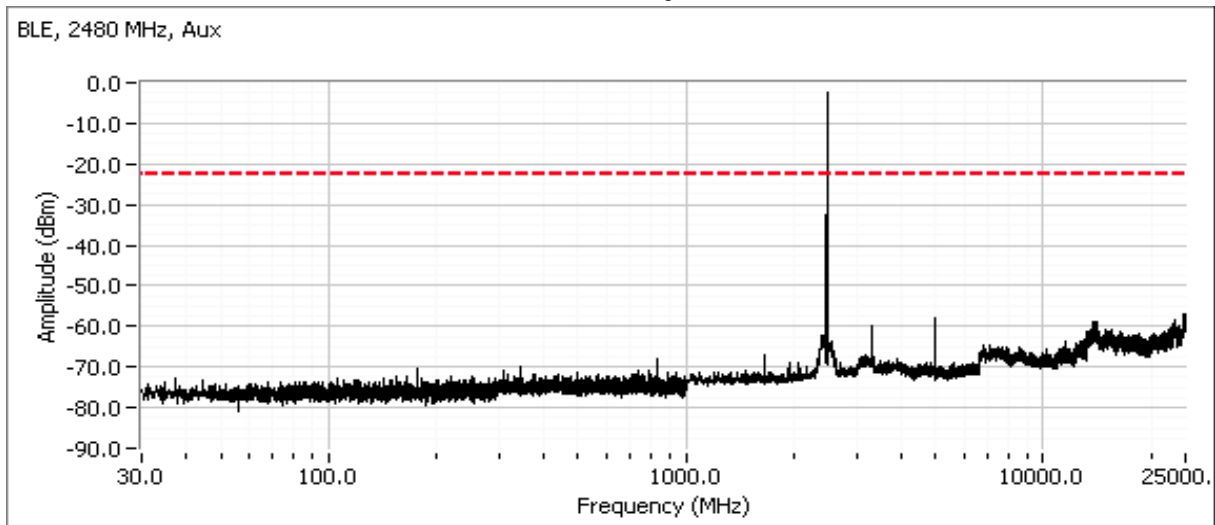
Plots for center channel





Client:	Broadcom Corporation	Job Number:	J93687
Model:	BCM943142Y (802.11bgn WLAN + Bluetooth NGFF1630 Mini Card)	T-Log Number:	T93842
Contact:	Anne Liang	Project Manager:	Sheareen Jacobs
Standard:	15.247/RSS-210	Project Coordinator:	Irene
		Class:	N/A

Plots for high channel



Client:	Broadcom Corporation	Job Number:	J93687
Model:	BCM943142Y (802.11bgn WLAN + Bluetooth NGFF1630 Mini Card)	T-Log Number:	T93842
Contact:	Anne Liang	Project Manager:	Sheareen Jacobs
Standard:	15.247/RSS-210	Project Coordinator:	Irene
		Class:	N/A

## RSS 210 and FCC 15.247 (DTS) 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.

For radiated emissions testing the measurement antenna was located 3 meters from the EUT, unless otherwise noted.

### Ambient Conditions:

Temperature: 20.5 °C  
 Rel. Humidity: 38 %

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

Run #	Mode	Channel	Target Power	Power Setting	Test Performed	Limit	Result / Margin
1	11b	2412MHz	-	-	Radiated Emissions, 1 - 25 GHz	FCC Part 15.209 / 15.247( c)	52.1 dBµV/m @ 4823.9 MHz (-1.9 dB)
	BT-Basic	2480MHz	-	-			
	11b	2472MHz	-	-	Radiated Emissions, 1 - 25 GHz	FCC Part 15.209 / 15.247( c)	52.3 dBµV/m @ 4943.9 MHz (-1.7 dB)
	BT-Basic	2402MHz	-	-			

### 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:	J93687
Model:	BCM943142Y (802.11bgn WLAN + Bluetooth NGFF1630 Mini Card)	T-Log Number:	T93842
Contact:	Anne Liang	Project Manager:	Sheareen Jacobs
Standard:	15.247/RSS-210	Project Coordinator:	Irene
		Class:	N/A

## Sample Notes

Sample S/N: 001018E2EB21

Driver: 6.30.223.181

Antenna: 1000802

The Aux port (J2) was configured for BT and the Main port (J1) was configured for WiFi.

## Procedure Comments:

Measurements performed in accordance with FCC KDB 558074

Peak measurements performed with: RBW=1MHz, VBW=3MHz, peak detector, max hold, auto sweep time

Unless otherwise stated/noted, emission has duty cycle  $\geq 98\%$  and was measured using RBW=1MHz, VBW=10Hz, peak detector, linear average mode, auto sweep time, max hold.

2.4GHz band reject filter used

	Mode	Data Rate	Duty Cycle (x)	Constant DC?	T (ms)	Pwr Cor Factor*	Lin Volt Cor Factor**	Min VBW for FS (Hz)
	11b	1 Mb/s	1.00	Yes	8.4	0.02	0.04	119.04762
Basic	GFSK	PRBS9	1.00					

## Measurement Specific Notes:

Note 1:	Emission in non-restricted band, but limit of 15.209 used.
Note 2:	Emission in non-restricted band, the limit was set 30dB below the level of the fundamental and measured in 100kHz.
Note 2:	Emission has duty cycle $\geq 98\%$ , average measurement performed: RBW=1MHz, VBW=3MHz, RMS, Power averaging, auto sweep, trace average 100 traces
Note 3:	Emission has duty cycle $< 98\%$ , but constant, average measurement performed: RBW=1MHz, VBW=10Hz, peak detector, linear averaging, auto sweep, trace average 100 traces, measurement corrected by Linear Voltage correction factor
Note 4:	Emission has duty cycle $< 98\%$ and is NOT constant, average measurement performed: RBW=1MHz, VBW $> 1/T$ , peak detector, linear average mode, sweep time auto, max hold. Max hold for $50 \times (1/DC)$ traces
Note 5:	Emission has duty cycle $< 98\%$ , but constant, average measurement performed: RBW=1MHz, VBW=3MHz, RMS, Power averaging, auto sweep, trace average 100 traces, measurement corrected by Pwr correction factor
Note 6:	Plots of the average and peak bandedge do not account for any duty cycle correction. Refer to the tabular results for final measurements.

Client:	Broadcom Corporation	Job Number:	J93687
Model:	BCM943142Y (802.11bgn WLAN + Bluetooth NGFF1630 Mini Card)	T-Log Number:	T93842
Contact:	Anne Liang	Project Manager:	Sheareen Jacobs
Standard:	15.247/RSS-210	Project Coordinator:	Irene
		Class:	N/A

## Run #1: Radiated Spurious Emissions, 1,000 - 25000 MHz. Intermodulations

Date of Test: 11/19/2013 0:00

Config. Used: 1

Test Engineer: Rafael Varelas

Config Change: None

Test Location: FT Chamber #5

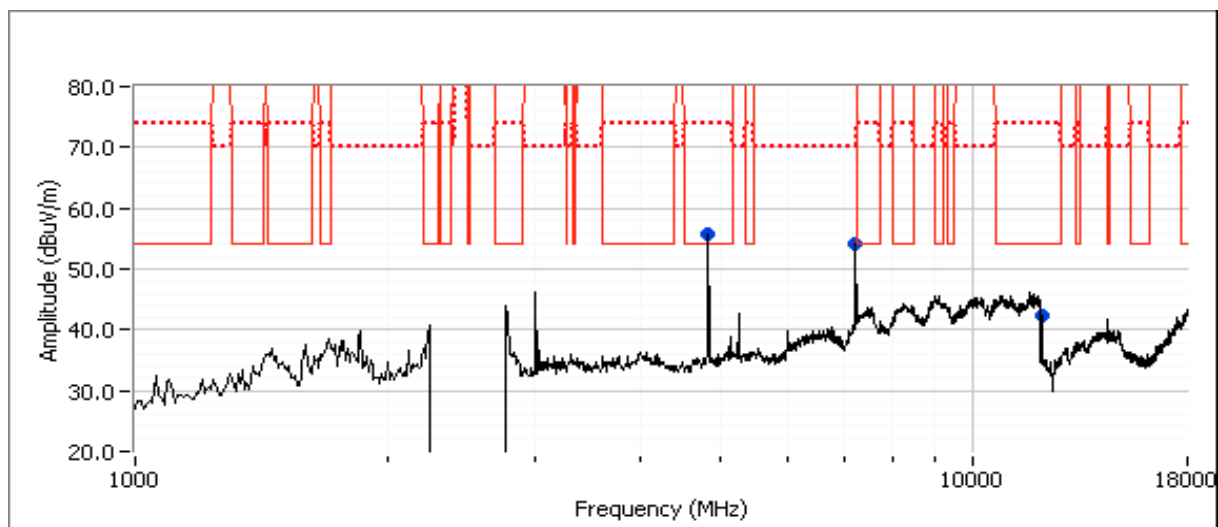
Host Unit Voltage 120V/60Hz

## Run #1a: Low Channel (WiFi) and High Channel (BT)

Channel: 1 Mode: b  
 Tx Chain: Main Data Rate: 1 Mb/s

Channel: 2480 MHz Mode: Basic  
 Tx Chain: Aux Data Rate: 1 Mb/s

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	
4823.940	52.1	V	54.0	-1.9	AVG	178	1.1	RB 1 MHz;VB 10 Hz;Peak
4823.960	55.3	V	74.0	-18.7	PK	178	1.1	RB 1 MHz;VB 3 MHz;Peak
7235.140	51.4	V	54.0	-2.6	AVG	57	1.7	Niote 1
7234.940	57.7	V	74.0	-12.3	PK	57	1.7	Niote 1
12058.950	45.7	V	54.0	-8.3	AVG	342	1.5	RB 1 MHz;VB 10 Hz;Peak
12060.450	54.4	V	74.0	-19.6	PK	342	1.5	RB 1 MHz;VB 3 MHz;Peak



Client:	Broadcom Corporation	Job Number:	J93687
Model:	BCM943142Y (802.11bgn WLAN + Bluetooth NGFF1630 Mini Card)	T-Log Number:	T93842
Contact:	Anne Liang	Project Manager:	Sheareen Jacobs
Standard:	15.247/RSS-210	Project Coordinator:	Irene
		Class:	N/A

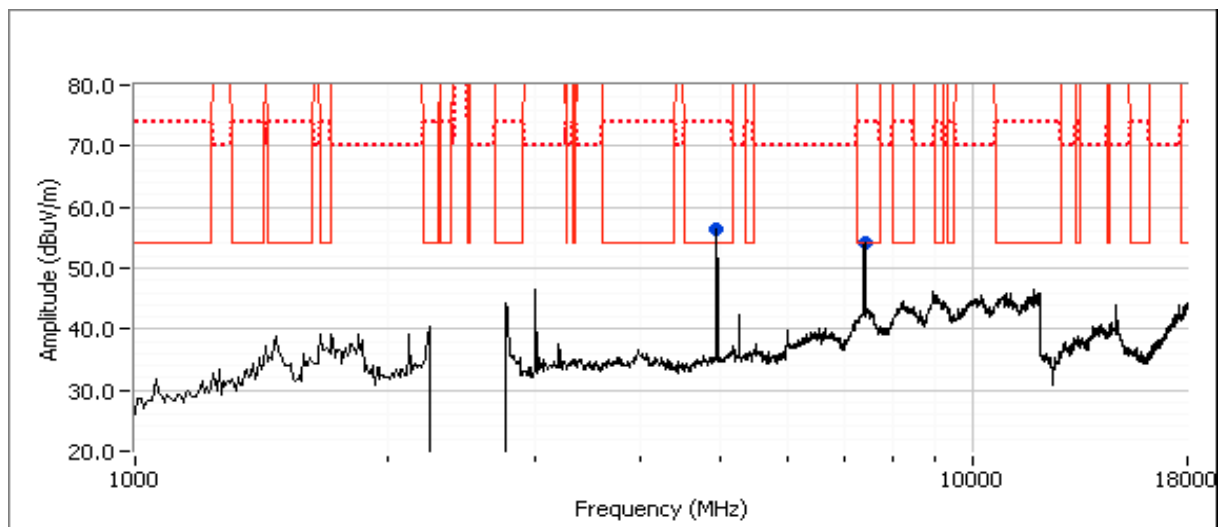
## Run #1b: High Channel (WiFi) and Low Channel (BT)

Channel: 13 Mode: b  
 Tx Chain: Main Data Rate: 1 Mb/s

Channel: 2402 Mode: Basic  
 Tx Chain: Aux Data Rate: 1 Mb/s

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	
4943.930	52.3	V	54.0	-1.7	AVG	185	1.1	
4944.000	55.5	V	74.0	-18.5	PK	185	1.1	
7415.130	51.7	V	54.0	-2.3	AVG	106	1.0	
7416.430	57.1	V	74.0	-16.9	PK	106	1.0	

Note: Scans made between 18 - 25 GHz 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:	J93687
Model:	BCM943142Y (802.11bgn WLAN + Bluetooth NGFF1630 Mini Card)	T-Log Number:	T93842
Contact:	Anne Liang	Project Manager:	Sheareen Jacobs
Standard:	15.247/RSS-210	Project Coordinator:	Irene
		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: 11/11/2013  
 Test Engineer: Rafael Varelas  
 Test Location: FT Chamber #5

Config. Used: 3  
 Config Change: None  
 Host Unit Voltage 120V/60Hz

### General Test Configuration

For tabletop equipment, the EUT and host system were 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:            21.8 °C  
    Rel. Humidity:            36 %

### Summary of Results

Run #	Test Performed	Limit	Result	Margin
1	CE, AC Power, 120V/60Hz	FCC 15.207	Pass	49.6 dBµV @ 0.195 MHz (-14.2dB)

### 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:	J93687
Model:	BCM943142Y (802.11bgn WLAN + Bluetooth NGFF1630 Mini Card)	T-Log Number:	T93842
Contact:	Anne Liang	Project Manager:	Sheareen Jacobs
Standard:	15.247/RSS-210	Project Coordinator:	Irene
		Class:	-

## Notes

EUT was configured to transmit on channel 6, 802.11b mode, maximum power

EUT is a PC peripheral, Host PC configured with two external peripheral devices of different I/O protocols, FCC H-Pattern running

## Sample Notes

(WiFi)

Sample S/N: 001018E2EB23

Driver: 6.30.223.181

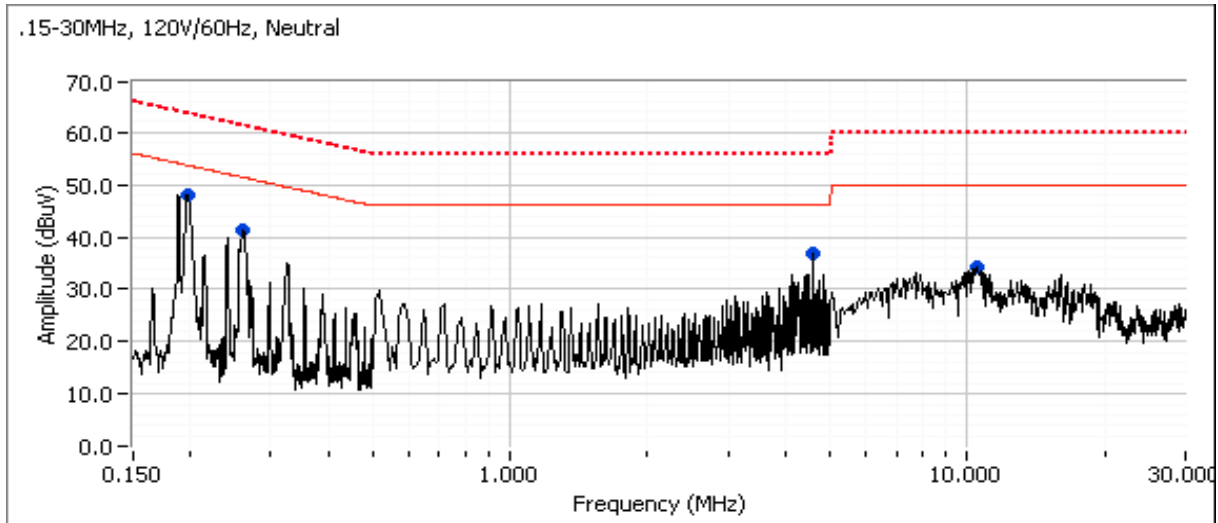
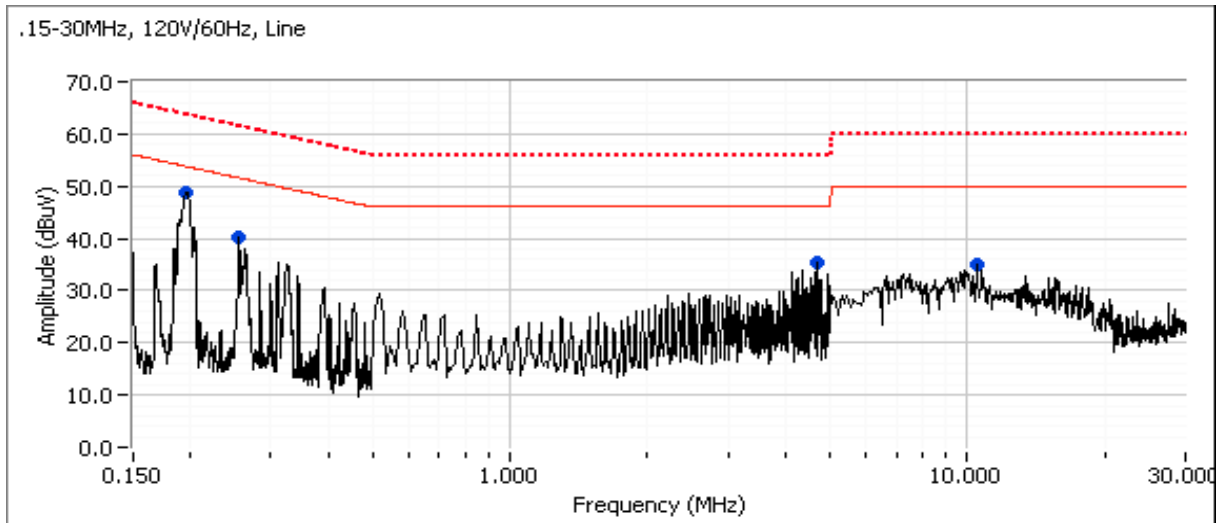
Antenna: 1000802

Test Board: BCM9NGFF2EC\_1 (S/N: 1679910)

Laptop: Lenovo G560 (S/N: CB06427398)

Client: Broadcom Corporation	Job Number: J93687
Model: BCM943142Y (802.11bgn WLAN + Bluetooth NGFF1630 Mini Card)	T-Log Number: T93842
Contact: Anne Liang	Project Manager: Sheareen Jacobs
Standard: 15.247/RSS-210	Project Coordinator: Irene
	Class: -

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





Client:	Broadcom Corporation	Job Number:	J93687
Model:	BCM943142Y (802.11bgn WLAN + Bluetooth NGFF1630 Mini Card)	T-Log Number:	T93842
Contact:	Anne Liang	Project Manager:	Sheareen Jacobs
Standard:	15.247/RSS-210	Project Coordinator:	Irene
		Class:	-

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

Frequency MHz	Level dBμV	AC Line	FCC 15.207 Limit	Margin	Detector QP/Ave	Comments
0.195	48.8	Line 1	53.8	-5.0	Peak	
0.257	40.3	Line 1	51.6	-11.3	Peak	
4.673	35.4	Line 1	46.0	-10.6	Peak	
10.704	34.9	Line 1	50.0	-15.1	Peak	
0.196	48.1	Neutral	53.7	-5.6	Peak	
0.259	41.2	Neutral	51.4	-10.2	Peak	
4.604	36.9	Neutral	46.0	-9.1	Peak	
10.447	34.1	Neutral	50.0	-15.9	Peak	

## Final quasi-peak and average readings

Frequency MHz	Level dBμV	AC Line	FCC 15.207 Limit	Margin	Detector QP/Ave	Comments
0.195	49.6	Line 1	63.8	-14.2	QP	QP (1.00s)
0.196	48.4	Neutral	63.8	-15.4	QP	QP (1.00s)
0.195	35.1	Line 1	53.8	-18.7	AVG	AVG (0.10s)
0.196	34.6	Neutral	53.8	-19.2	AVG	AVG (0.10s)
0.259	40.1	Neutral	61.5	-21.4	QP	QP (1.00s)
0.259	29.8	Neutral	51.5	-21.7	AVG	AVG (0.10s)
0.257	39.0	Line 1	61.5	-22.5	QP	QP (1.00s)
0.257	28.3	Line 1	51.5	-23.2	AVG	AVG (0.10s)
4.604	22.7	Neutral	46.0	-23.3	AVG	AVG (0.10s)
4.673	32.4	Line 1	56.0	-23.6	QP	QP (1.00s)
4.604	31.7	Neutral	56.0	-24.3	QP	QP (1.00s)
4.673	19.0	Line 1	46.0	-27.0	AVG	AVG (0.10s)
10.704	21.5	Line 1	50.0	-28.5	AVG	AVG (0.10s)
10.447	20.7	Neutral	50.0	-29.3	AVG	AVG (0.10s)
10.704	30.6	Line 1	60.0	-29.4	QP	QP (1.00s)
10.447	30.6	Neutral	60.0	-29.4	QP	QP (1.00s)

*End of Report*

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