EMC Test Report
Application for Grant of Equipment Authorization
Industry Canada RSS-Gen Issue 3 / RSS 210 Issue 8
FCC Part 15 Subpart C
Digital Transmission System Device

Model: Bluetooth module, BCM92070MD_REF12

IC CERTIFICATION #:	4324A-BRCM1049
FCC ID:	QDS-BRCM1049LE
APPLICANT:	Broadcom Corporation 190 Mathilda Ave Sunnyvale, CA 94086
TEST SITE(S):	Elliott Laboratories 41039 Boyce Road. Fremont, CA. 94538-2435
IC SITE REGISTRATION #:	2845B-3; 2845B-4, 2845B-5, 2845B-7
REPORT DATE:	July 14, 2011
FINAL TEST DATES:	June 15, 22, 23, 24, and 27, 2011

AUTHORIZED SIGNATORY:

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A2LA ACCREDITED
Testing Cert #2016.01

REVISION HISTORY

Rev#	Date	Comments	Modified By
-	07-07-2011	First release	
1	07-11-2011	Added additional test equipment used on June 24 for measuring power	David Bare
2	07-14-2011	corrected highest transmit spurious emissions level in summary page	David Bare

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SCOPE

An electromagnetic emissions test has been performed on the Broadcom Corporation model Bluetooth module, BCM92070MD_REF12, pursuant to the following rules:

Industry Canada RSS-Gen Issue 3
RSS 210 Issue 8 "Low-power Licence-exempt Radiocommunication Devices (All Frequency Bands): Category I Equipment"
FCC Part 15 Subpart C

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

ANSI C63.4:2003
FCC DTS Measurement Procedure KDB558074, March 2005

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 Bluetooth module, BCM92070MD_REF12 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 Bluetooth module, BCM92070MD_REF12 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 DSSS techniques	System must utilize a digital transmission technology	Complies
15.247 (a) (2)	RSS 210 A8.2 (1)	6dB Bandwidth	575 kHz	>500kHz	Complies
15.247 (b) (3)	RSS 210 A8.2 (4)	Output Power (multipoint systems)	1.6 dBm (1.4 mWatts) EIRP = 0.004 W Note 1	1Watt, EIRP limited to 4 Watts.	Complies
15.247(d)	RSS 210 A8.2 (2)	Power Spectral Density	-15.2 dBm / 3kHz	8dBm/3kHz	Complies
15.247(c)	RSS 210 A8.5	Antenna Port Spurious Emissions 30MHz – 25 GHz	All emissions below -20dBc	< -20dBc	Complies
15.247(c) / 15.209	RSS 210 A8.5	Radiated Spurious Emissions 30MHz – 25 GHz	External Antenna: 49.4dBµV/m @ 3256.0MHz (-4.6dB) Internal Antenna: 52.5dBµV/m @ 2498.8MHz (-1.5dB)	15.207 in restricted bands, all others < -20dBc	Complies
Note 1: EIRP calculated using antenna gain of 3.9 dBi for the highest EIRP system.					

GENERAL REQUIREMENTS APPLICABLE TO ALL BANDS

FCC Rule Part	RSS Rule part	Description	Measured Value / Comments	Limit / Requirement	Result (margin)
15.203	-	RF Connector	unique I-PEX antenna connector	Unique or integral antenna required	Complies
15.207	RSS GEN Table 2	AC Conducted Emissions	37.8dBµV @ 16.899MHz (-12.2dB)	Refer to page 17	Complies
15.109	RSS GEN 7.2.3 Table 1	Receiver spurious emissions	38.9dBµV/m @ 1700.1MHz (-15.1dB)	Refer to page 18	Complies
15.247 (b) (5) 15.407 (f)	RSS 102	RF Exposure Requirements	Refer to MPE calculations in Exhibit 11, RSS 102 declaration and User Manual statements.	Refer to OET 65, FCC Part 1 and RSS 102	Complies
-	RSP 100 RSS GEN 7.1.5	User Manual	Refer to statement in User's Guide	Statement required regarding non-interference	Complies
-	RSP 100 RSS GEN 7.1.5	User Manual	Refer to statement in User's Guide	Statement for products with detachable antenna	Complies
-	RSP 100 RSS GEN 4.4.1	99% Bandwidth	1.065 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	± 0.52 dB
RF power, conducted (Spectrum analyzer)	dBm	25 to 7000 MHz	± 0.7 dB
Conducted emission of transmitter	dBm	25 to 26500 MHz	± 0.7 dB
Conducted emission of receiver	dBm	25 to 26500 MHz	± 0.7 dB
Radiated emission (substitution method)	dBm	25 to 26500 MHz	± 2.5 dB
Radiated emission (field strength)	dBµV/m	25 to 1000 MHz	± 3.6 dB
		1000 to 40000 MHz	± 6.0 dB
Conducted Emissions (AC Power)	dBµV	0.15 to 30 MHz	± 2.4 dB

EQUIPMENT UNDER TEST (EUT) DETAILS

GENERAL

The Broadcom Corporation model Bluetooth module, BCM92070MD_REF12 is a Bluetooth radio module that is designed to be installed in other equipment. Since the EUT would normally be placed in a product used on a table during operation, the EUT was treated as table-top equipment during testing to simulate the end-user environment. The electrical rating of the EUT is 3.3 Volts DC.

The sample was received on June 15, 2011 and tested on June 15, 22, 23, 24, and 27, 2011. The EUT consisted of the following component(s):

Company	Model	Description	Serial Number	FCC ID
Broadcom	BRC92070MD_ REF12	Bluetooth radio module	-	QDS-BRCM1049LE

OTHER EUT DETAILS

List any items from the test log.

ANTENNA SYSTEM

There are two antennas being evaluated: one internal trace antenna and one external antenna
Internal antenna gain = 1.75 dBi.
External antenna gain = 3.9 dBi
The antenna connects to the EUT via a non-standard unique I-PEX antenna connector, thereby meeting the requirements of FCC 15.203.

ENCLOSURE

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

MODIFICATIONS

No modifications were made to the EUT during the time the product was at Elliott.

SUPPORT EQUIPMENT

The following equipment was used as support equipment for testing:

Company	Model	Description	Serial Number	FCC ID
Hewlett Packard	Pavillion dv6000	Laptop	CNF7120Y9G	-

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

Company	Model	Description	Serial Number	FCC ID
Netgear	RP614v3	Network Switch	RP6114A0B039 891	-

EUT INTERFACE PORTS

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

Port	Connected To	Cable(s)		
		Description	Shielded or Unshielded	Length(m)
Antenna	Antenna	Coax	Shielded	0.3
Power/Data	Adapter board	Multiwire	Unshielded	0.2
USB	Adapter board	Multiwire	Shielded	1.5
Laptop Network	Remote Switch	CAT 5	Unshielded	15
Laptop DC Power	AC Adapter	Two wire with ferrite	Unshielded	1.5
AC Adapter Power	AC Mains	Three wire	Unshielded	1.5

EUT OPERATION

During radio emissions testing the EUT was set to constantly transmit a modulated signal at the highest power (setting 0) and frequency or set to receive on the center channel.

TEST SITE

GENERAL INFORMATION

Final test measurements were taken at the test sites listed below. Pursuant to section 2.948 of the FCC's Rules and section 3.3 of RSP-100, construction, calibration, and equipment data has been filed with the Commission and with industry Canada.

Site	Registration Numbers		Location
	FCC	Canada	
Chamber 3	769238	2845B-3	41039 Boyce Road Fremont, CA 94538-2435
Chamber 4	211948	2845B-4	
Chamber 5	211948	2845B-5	
Chamber 7	A2LA accreditation	2845B-7	

ANSI C63.4:2003 recommends that ambient noise at the test site be at least 6 dB below the allowable limits. Ambient levels are below this requirement. The test site(s) contain separate areas for radiated and conducted emissions testing. Considerable engineering effort has been expended to ensure that the facilities conform to all pertinent requirements of ANSI C63.4:2003.

CONDUCTED EMISSIONS CONSIDERATIONS

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

RADIATED EMISSIONS CONSIDERATIONS

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

MEASUREMENT INSTRUMENTATION

RECEIVER SYSTEM

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

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

INSTRUMENT CONTROL COMPUTER

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

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

LINE IMPEDANCE STABILIZATION NETWORK (LISN)

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

FILTERS/ATTENUATORS

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

ANTENNAS

A loop antenna is used below 30 MHz. For the measurement range 30 MHz to 1000 MHz either a combination of a biconical antenna and a log periodic or a bi-log antenna is used. Above 1000 MHz, horn antennas are used. The antenna calibration factors to convert the received voltage to an electric field strength are included with appropriate cable loss and amplifier gain factors to determine an overall site factor, which is then programmed into the test receivers or incorporated into the test software.

ANTENNA MAST AND EQUIPMENT TURNTABLE

The antennas used to measure the radiated electric field strength are mounted on a non-conductive antenna mast equipped with a motor-drive to vary the antenna height. Measurements below 30 MHz are made with the loop antenna at a fixed height of 1m above the ground plane.

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

INSTRUMENT CALIBRATION

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

TEST PROCEDURES

EUT AND CABLE PLACEMENT

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

CONDUCTED EMISSIONS

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

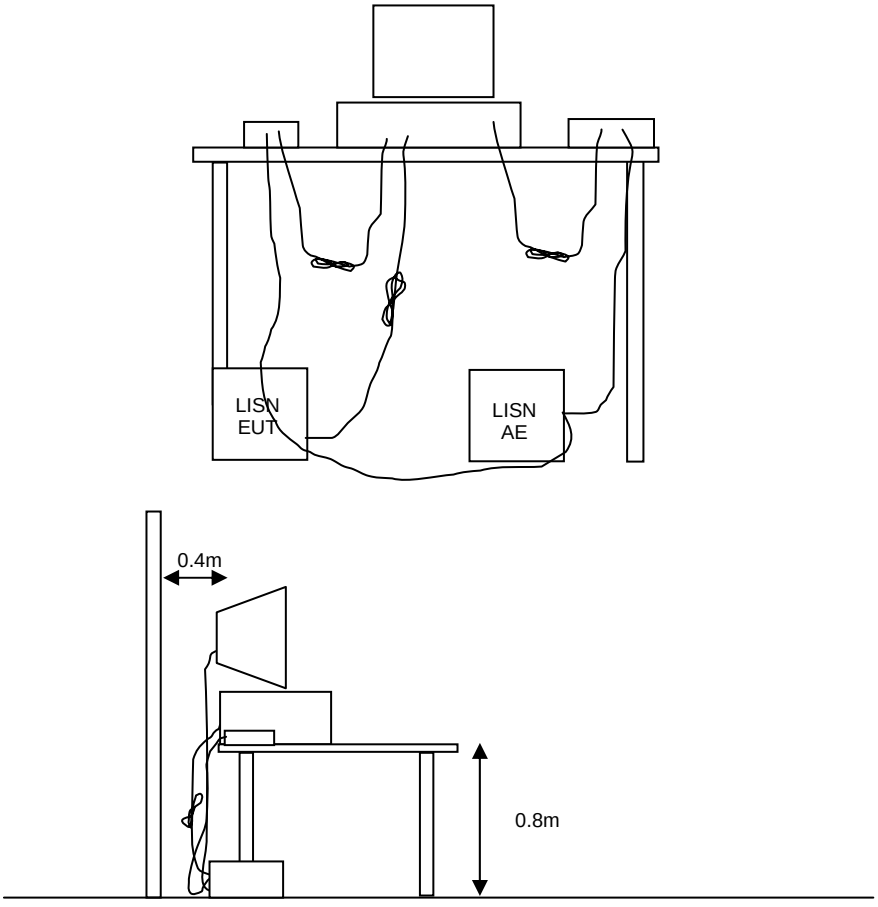


Figure 1 Typical Conducted Emissions Test Configuration

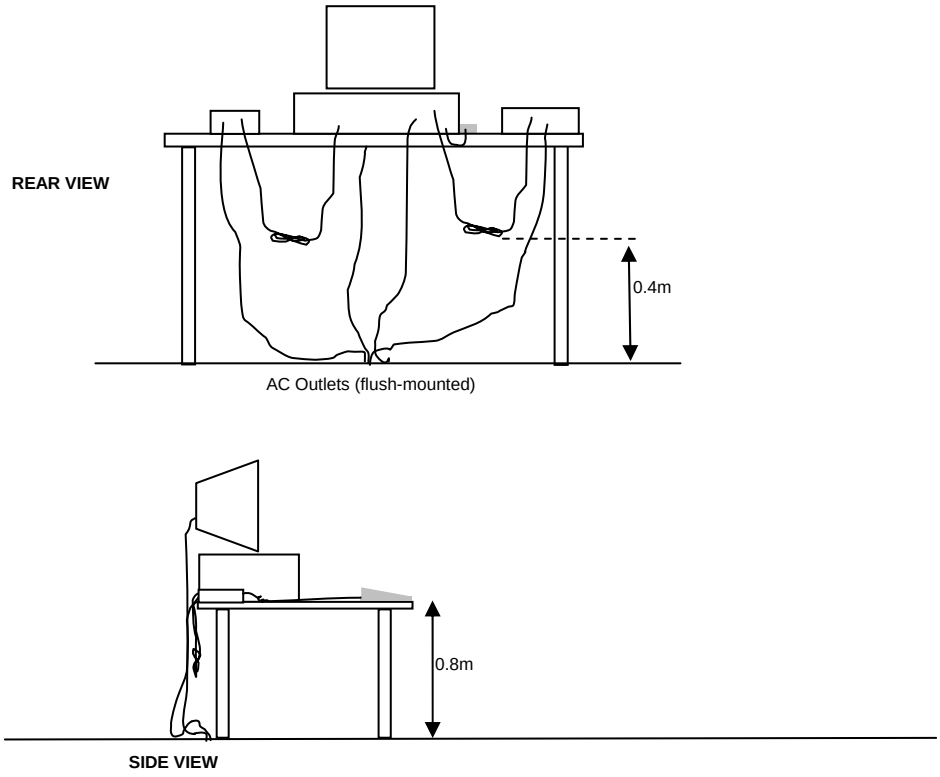
RADIATED EMISSIONS

A preliminary scan of the radiated emissions is performed in which all significant EUT frequencies are identified with the system in a nominal configuration. At least two scans are performed, one scan for each antenna polarization (horizontal and vertical; loop parallel and perpendicular to the EUT). During the preliminary scans, the EUT is rotated through 360˚, the antenna height is varied (for measurements above 30 MHz) and cable positions are varied to determine the highest emission relative to the limit. Preliminary scans may be performed in a fully anechoic chamber for the purposes of identifying the frequencies of the highest emissions from the EUT.

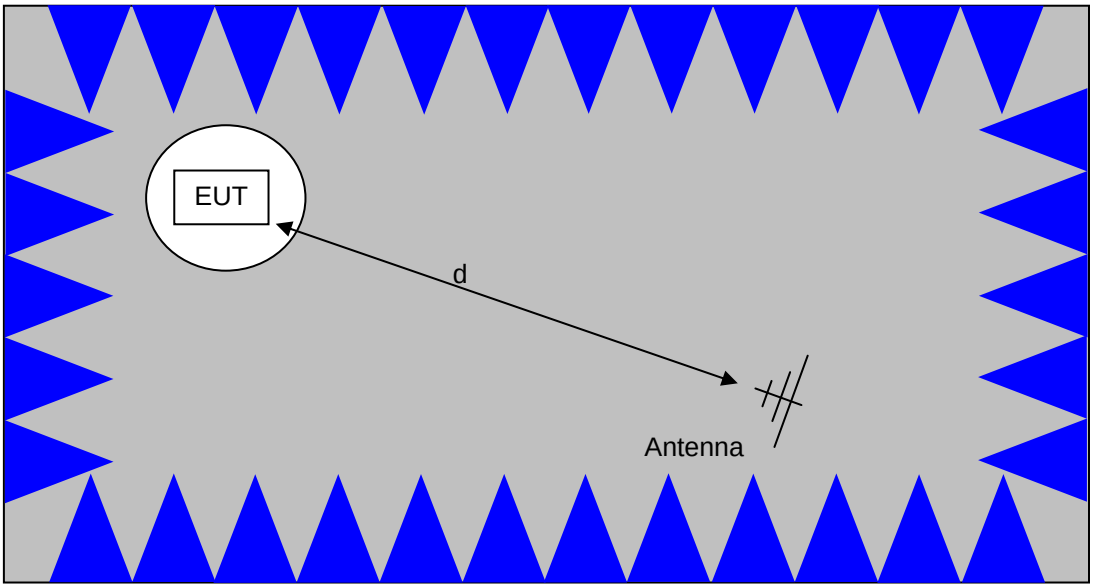
A speaker is provided in the receiver to aid in discriminating between EUT and ambient emissions. Other methods used during the preliminary scan for EUT emissions involve scanning with near field magnetic loops, monitoring I/O cables with RF current clamps, and cycling power to the EUT.

Final maximization is a phase in which the highest amplitude emissions identified in the spectral search are viewed while the EUT azimuth angle is varied from 0 to 360 degrees relative to the receiving antenna. The azimuth, which results in the highest emission is then maintained while varying the antenna height from one to four meters (for measurements above 30 MHz, measurements below 30 MHz are made with the loop antenna at a fixed height of 1m). The result is the identification of the highest amplitude for each of the highest peaks. Each recorded level is corrected in the receiver using appropriate factors for cables, connectors, antennas, and preamplifier gain.

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

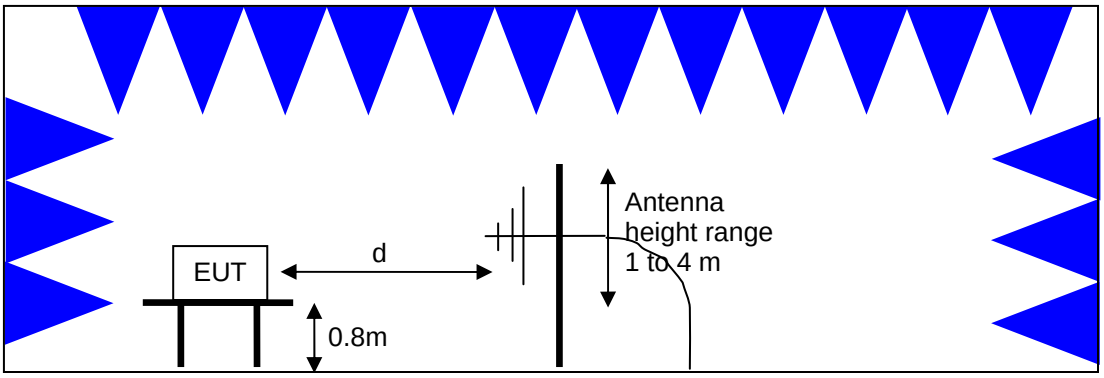


Typical Test Configuration for Radiated Field Strength Measurements



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

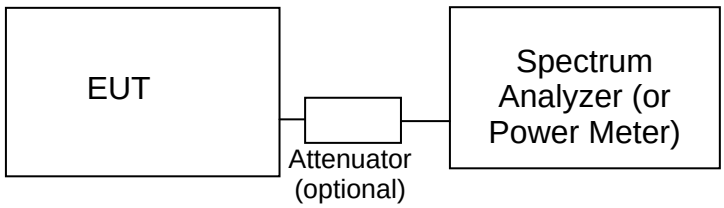
Floor-standing equipment is placed on the floor with insulating supports between the unit and the ground plane.



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

CONDUCTED EMISSIONS FROM ANTENNA PORT

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



Test Configuration for Antenna Port Measurements

Measurement bandwidths (video and resolution) are set in accordance with the relevant standards and Elliott's test procedures for the type of radio being tested. When power measurements are made using a resolution bandwidth less than the signal bandwidth the power is calculated by summing the power across the signal bandwidth using either the analyzer channel power function or by capturing the trace data and calculating the power using software. In both cases the summed power is corrected to account for the equivalent noise bandwidth (ENBW) of the resolution bandwidth used.

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

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

BANDWIDTH MEASUREMENTS

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

SPECIFICATION LIMITS AND SAMPLE CALCULATIONS

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

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

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

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

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

GENERAL TRANSMITTER RADIATED EMISSIONS SPECIFICATION LIMITS

The table below shows the limits for the spurious emissions from transmitters that fall in restricted bands[1] (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	$2400/F_{KHz}$ @ 300m	$67.6-20*\log_{10}(F_{KHz})$ @ 300m
0.490-1.705	$24000/F_{KHz}$ @ 30m	$87.6-20*\log_{10}(F_{KHz})$ @ 30m
1.705 to 30	30 @ 30m	29.5 @ 30m
30 to 88	100 @ 3m	40 @ 3m
88 to 216	150 @ 3m	43.5 @ 3m
216 to 960	200 @ 3m	46.0 @ 3m
Above 960	500 @ 3m	54.0 @ 3m

RECEIVER RADIATED SPURIOUS EMISSIONS SPECIFICATION LIMITS

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

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

[1] The restricted bands are detailed in FCC 15.203, RSS 210 Table 1 and RSS 310 Table 2

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).

SAMPLE CALCULATIONS - CONDUCTED EMISSIONS

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

$$R_r - S = M$$

where:

R_r = Receiver Reading in dBuV

S = Specification Limit in dBuV

M = Margin to Specification in +/- dB

SAMPLE CALCULATIONS - RADIATED EMISSIONS

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

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

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

where:

F_d = Distance Factor in dB

D_m = Measurement Distance in meters

D_s = Specification Distance in meters

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

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

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

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:

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

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

Radiated Emissions, 1,000 - 18,000 MHz, 15-Jun-11

Manufacturer	Description	Model	Asset #	Cal Due
Hewlett Packard	Microwave Preamplifier, 1-26.5GHz	8449B	263	12/8/2011
EMCO	Antenna, Horn, 1-18 GHz	3115	487	7/6/2012
Hewlett Packard	SpecAn 30 Hz -40 GHz, SV (SA40) Red	8564E (84125C)	1148	7/12/2011
Micro-Tronics	Band Reject Filter, 2400-2500 MHz	BRM50702-02	2238	10/1/2011

DTS Spurs, 17-Jun-11

Manufacturer	Description	Model	Asset #	Cal Due
Hewlett Packard	Microwave Preamplifier, 1-26.5GHz	8449B	785	5/18/2012
EMCO	Antenna, Horn, 1-18GHz	3115	868	6/8/2012
Hewlett Packard	High Pass filter, 8.2 GHz	P/N 84300-80039	1156	6/25/2011
Hewlett Packard	SpecAn 9 kHz - 40 GHz, FT (SA40) Blue	8564E (84125C)	1393	7/14/2011
Micro-Tronics	Band Reject Filter, 2400-2500 MHz	BRM50702-02	2249	10/11/2011

Radiated Spurious Emissions, 1000 - 25,000 MHz, 21-Jun-11

Manufacturer	Description	Model	Asset #	Cal Due
Hewlett Packard	Microwave Preamplifier, 1-26.5GHz	8449B	263	12/8/2011
EMCO	Antenna, Horn, 1-18 GHz	3115	487	7/6/2012
Hewlett Packard	Head (Inc flex cable, 1143, 2198) Red	84125C	1145	2/17/2012
Hewlett Packard	SpecAn 30 Hz -40 GHz, SV (SA40) Red	8564E (84125C)	1148	7/12/2011
Micro-Tronics	Band Reject Filter, 2400-2500 MHz	BRM50702-02	1683	8/10/2011
A.H. Systems	Purple System Horn, 18-40GHz	SAS-574, p/n: 2581	2160	2/9/2012

Radiated Emissions, 30 - 1,000 MHz, 22-Jun-11

Manufacturer	Description	Model	Asset #	Cal Due
Rohde & Schwarz	EMI Test Receiver, 20 Hz-7 GHz	ESIB7	1538	11/2/2011
Hewlett Packard	Preamplifier, 100 kHz - 1.3 GHz	8447D OPT 010	1826	5/17/2012
Sunol Sciences	Biconilog, 30-3000 MHz	JB3	2197	12/29/2011

Conducted Emissions - AC Power Ports, 22-Jun-11

Manufacturer	Description	Model	Asset #	Cal Due
EMCO	LISN, 10 kHz-100 MHz	3825/2	1292	3/1/2012
Rohde & Schwarz	EMI Test Receiver, 20 Hz-7 GHz	ESIB7	1538	11/2/2011
Rohde & Schwarz	Pulse Limiter	ESH3 Z2	1594	5/17/2012

Radiated Emissions, 1000 - 8,000 MHz, 23-Jun-11

Manufacturer	Description	Model	Asset #	Cal Due
Hewlett Packard	Microwave Preamplifier, 1-26.5GHz	8449B	263	12/8/2011
EMCO	Antenna, Horn, 1-18 GHz	3115	487	7/6/2012
Hewlett Packard	SpecAn 30 Hz -40 GHz, SV (SA40) Red	8564E (84125C)	1148	7/12/2011

Radio Antenna Port (Power and Spurious Emissions), 24-Jun-11

Manufacturer	Description	Model #	Asset #	Cal Due
Hewlett Packard	EMC Spectrum Analyzer, 9 KHz - 22 GHz	8593EM	1319	22-Nov-11
Rohde & Schwarz	Power Meter, Single Channel	NRVS	1422	01-Dec-11
Rohde & Schwarz	Power Sensor 100 uW - 2 Watts use with #1994 20dB attenuator	NRV-Z32	1423	19-Jul-11

Radiated Emissions, 1000 - 18,000 MHz, 24-Jun-11

Manufacturer	Description	Model	Asset #	Cal Due
Hewlett Packard	Microwave Preamplifier, 1-26.5GHz	8449B	785	5/18/2012
EMCO	Antenna, Horn, 1-18GHz	3115	868	6/8/2012
Hewlett Packard	SpecAn 30 Hz -40 GHz, SV (SA40) Red	8564E (84125C)	1148	7/12/2011
Micro-Tronics	Band Reject Filter, 2400-2500 MHz	BRM50702-02	1683	8/10/2011

Radiated Emissions, 1,000 - 25,000 MHz, 27-Jun-11

Manufacturer	Description	Model	Asset #	Cal Due
Hewlett Packard	Microwave Preamplifier, 1-26.5GHz	8449B	785	5/18/2012
EMCO	Antenna, Horn, 1-18GHz	3115	868	6/8/2012
Hewlett Packard	SpecAn 9 kHz - 40 GHz, FT (SA40) Blue	8564E (84125C)	1393	7/14/2011
Micro-Tronics	Band Reject Filter, 2400-2500 MHz	BRM50702-02	1683	8/10/2011

Radio Antenna Port (Power and Spurious Emissions), 28-Jun-11

Manufacturer	Description	Model	Asset #	Cal Due
Hewlett Packard	EMC Spectrum Analyzer, 9 KHz - 22 GHz	8593EM	1319	11/22/2011

Appendix B Test Data

T83604 Pages 24 - 59

Client:	Broadcom	Job Number:	J83573
Model:	BRC92070MD_REF12	T-Log Number:	T83604
		Account Manager:	Sheareen Washington
Contact:	Juan Martinez		-
Emissions Standard(s):	FCC 15.247, RSS-210, LP0002	Class:	B
Immunity Standard(s):	-	Environment:	-

EMC Test Data

For The

Broadcom

Model

BRC92070MD_REF12

Date of Last Test: 6/28/2011

Client:	Broadcom	Job Number:	J83573
Model:	BRC92070MD_REF12	T-Log Number:	T83604
		Account Manager:	Sheareen Washington
Contact:	Juan Martinez		
Standard:	FCC 15.247, RSS-210, LP0002	Class:	N/A

RSS 210 and FCC 15.247 (DTS) Antenna Port Measurements

PSD and Bandwidth

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: 6/27/2011
Test Engineer: Suresh Kondapalli
Test Location: Fremont Chamber #3

Config. Used: 1
Config Change: No remote switch or LAN cable
EUT Voltage: 3.3V from Host

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 °C
Rel. Humidity: 39 %

Summary of Results

Run #	Pwr setting	Test Performed	Limit	Pass / Fail	Result / Margin
1	Max	Power spectral Density (PSD)	15.247(d)	Pass	-15.2dBm/3kHz
2	Max	Minimum 6dB Bandwidth	15.247(a)	Pass	575 kHz

Modifications Made During Testing

No modifications were made to the EUT during testing

Deviations From The Standard

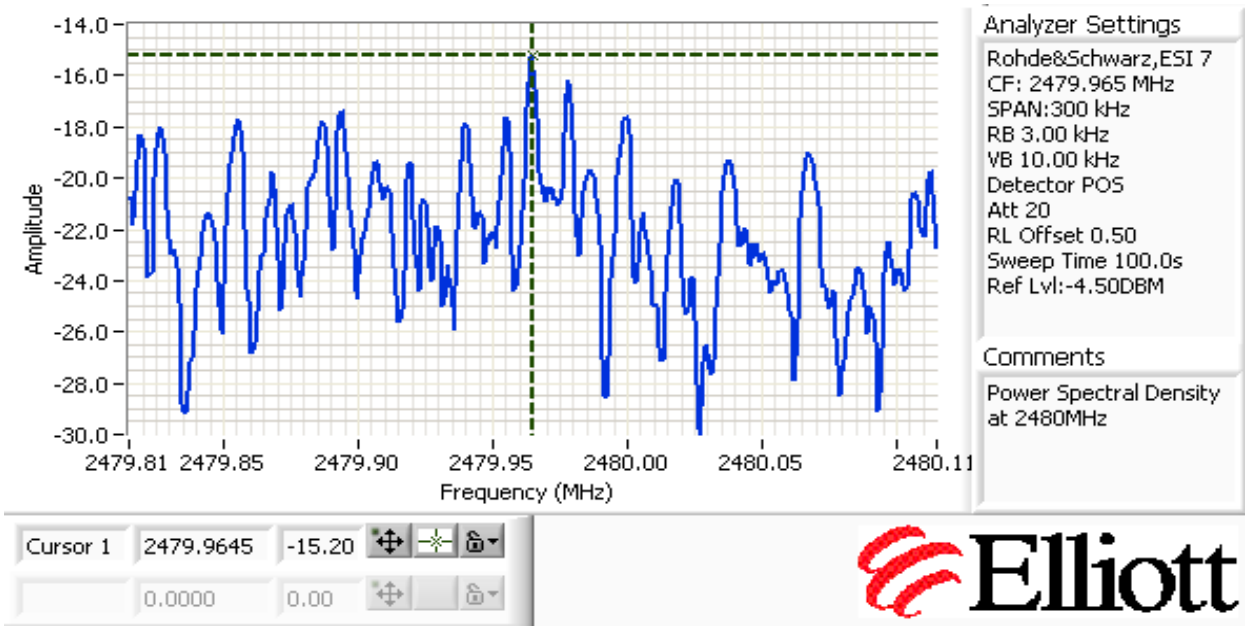
No deviations were made from the requirements of the standard.

Client:	Broadcom	Job Number:	J83573
Model:	BRC92070MD_REF12	T-Log Number:	T83604
		Account Manager:	Sheareen Washington
Contact:	Juan Martinez		
Standard:	FCC 15.247, RSS-210, LP0002	Class:	N/A

Run #1: Power spectral Density

Power Setting	Frequency (MHz)	PSD (dBm/3kHz) Note 1	Limit dBm/3kHz	Result
max	2402	-19.1	8.0	Pass
max	2442	-15.4	8.0	Pass
max	2480	-15.2	8.0	Pass

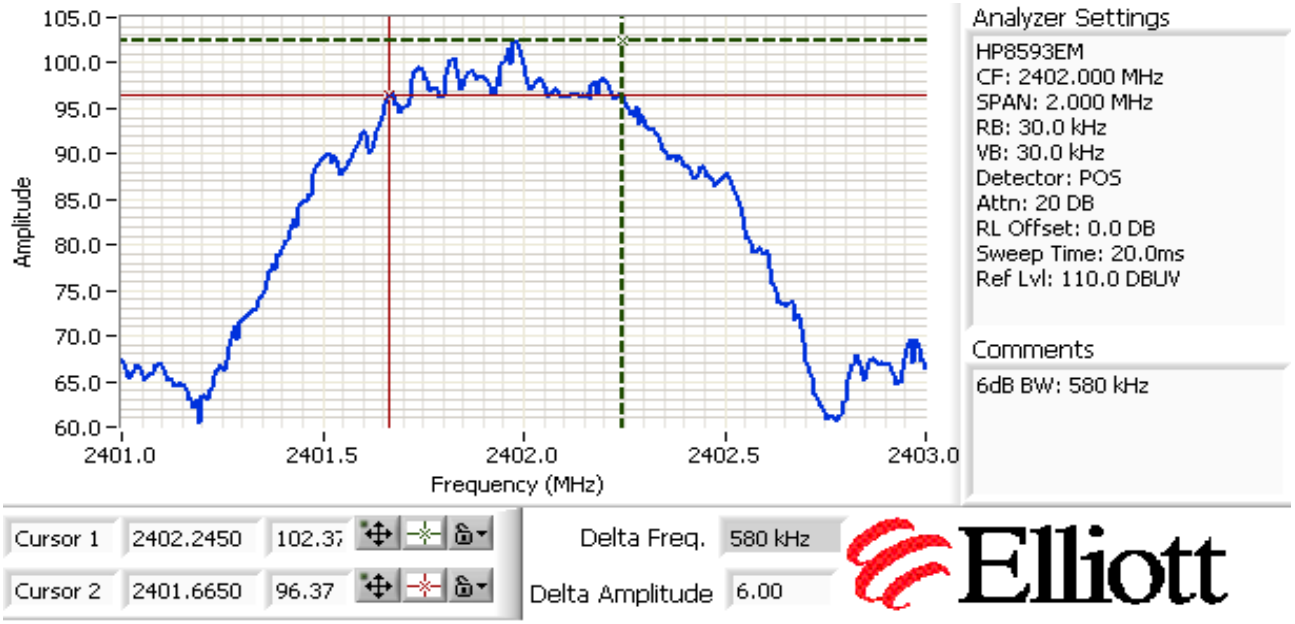
Note 1:	Power spectral density measured using RB=3 kHz, VB=10kHz, analyzer with peak detector and with a sweep time set to ensure a dwell time of at least 1 second per 3kHz. The measurement is made at the frequency of PPSD determined from preliminary scans using RB=3kHz using multiple sweeps at a faster rate over the 6dB bandwidth of the signal.



Client:	Broadcom	Job Number:	J83573
Model:	BRC92070MD_REF12	T-Log Number:	T83604
		Account Manager:	Sheareen Washington
Contact:	Juan Martinez		
Standard:	FCC 15.247, RSS-210, LP0002	Class:	N/A

Run #3: Signal Bandwidth

Power Setting	Frequency (MHz)	Resolution Bandwidth	Bandwidth (kHz) 6dB	
Max	2402	30 kHz	580	
Max	2442	30 kHz	575	
Max	2480	30 kHz	575	



Client:	Broadcom	Job Number:	J83573
Model:	BRC92070MD_REF12	T-Log Number:	T83604
		Account Manager:	Sheareen Washington
Contact:	Juan Martinez		
Standard:	FCC 15.247, RSS-210, LP0002	Class:	N/A

FCC 15.247 DTS - Power, Bandwidth and Spurious Emissions

Test Specific Details

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

Date of Test: 6/24/2011 2:42
Test Engineer: Rafael Varelas
Test Location: FT Chmaber #5

Config. Used: 1
Config Change: No remote switch or LAN cable
EUT Voltage: 3.3Vdc from Host

General Test Configuration

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

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

Ambient Conditions:

Temperature: 20.6 °C
Rel. Humidity: 35 %

Summary of Results

Run #	Test Performed	Limit	Pass / Fail	Result / Margin
1	30 - 25,000 MHz - Conducted Spurious Emissions	FCC Part 15.247(c)	Pass	All emissions below -20dBc
2	Output Power	15.247(b)	Pass	1.6 dBm (1.4 mW)
3	20dB Bandwidth	15.247(a)	Pass	1183 kHz
3	99% bandwidth	15.247(a)	Pass	1065 kHz

Modifications Made During Testing:

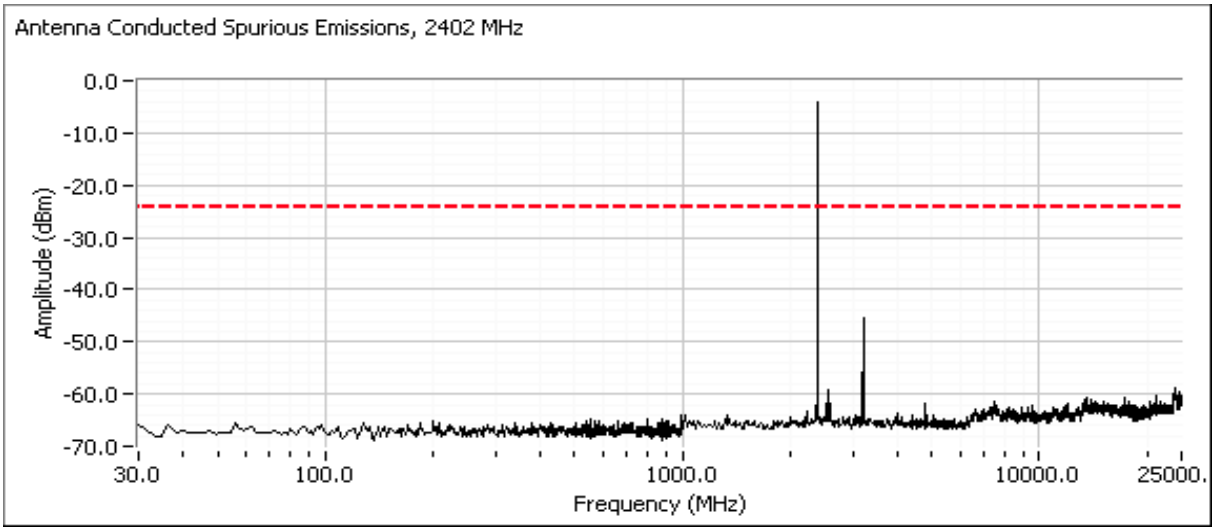
No modifications were made to the EUT during testing

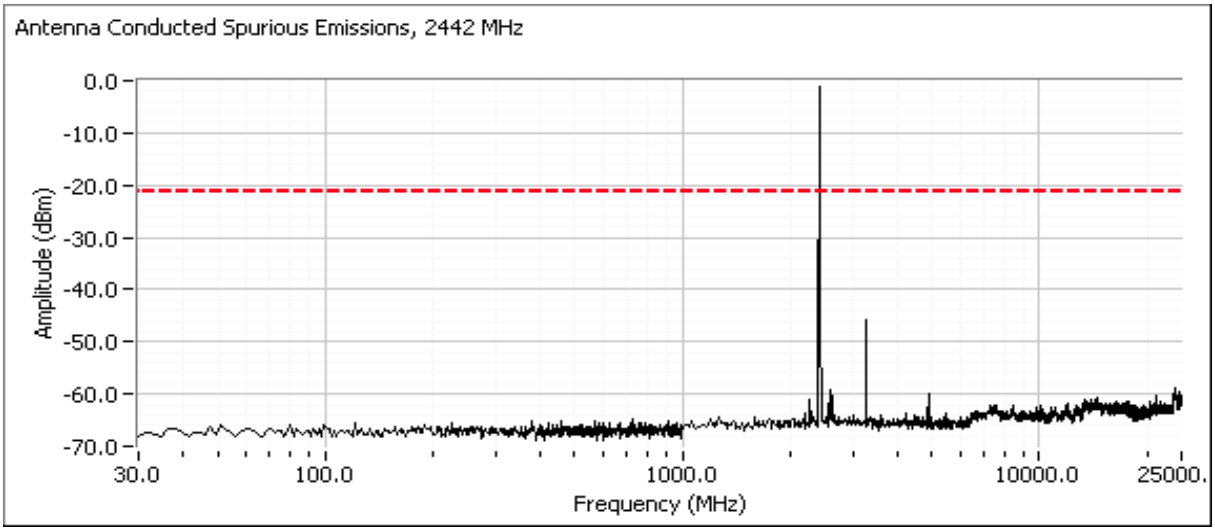
Deviations From The Standard

No deviations were made from the requirements of the standard.

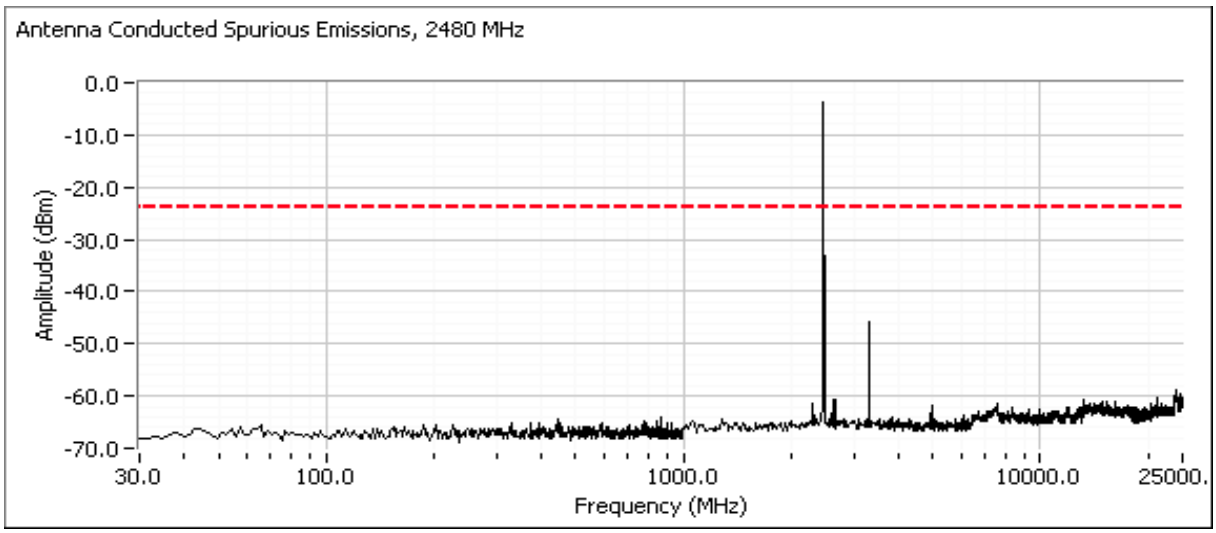
Client:	Broadcom	Job Number:	J83573
Model:	BRC92070MD_REF12	T-Log Number:	T83604
		Account Manager:	Sheareen Washington
Contact:	Juan Martinez		
Standard:	FCC 15.247, RSS-210, LP0002	Class:	N/A

Run #1: Antenna Conducted Spurious Emissions, 30 - 25,000 MHz.
Refer to plots below. Scans made using RBW=VB=100 KHz with the limit line set at 20dB below the highest in-band signal level.





Client:	Broadcom	Job Number:	J83573
Model:	BRC92070MD_REF12	T-Log Number:	T83604
		Account Manager:	Sheareen Washington
Contact:	Juan Martinez		
Standard:	FCC 15.247, RSS-210, LP0002	Class:	N/A



Run #2: Output Power

For systems operating in the 2400-2483.5 MHz band: 1 watt.

Maximum antenna gain: 3.9 dBi

Channel	Frequency (MHz)	Res BW	Output Power (dBm)	Output Power (W)	EIRP (W)
Low	2402	-	0.6	0.0011	0.0028
Mid	2442	-	1.1	0.0013	0.0032
High	2480	-	1.6	0.0014	0.0035

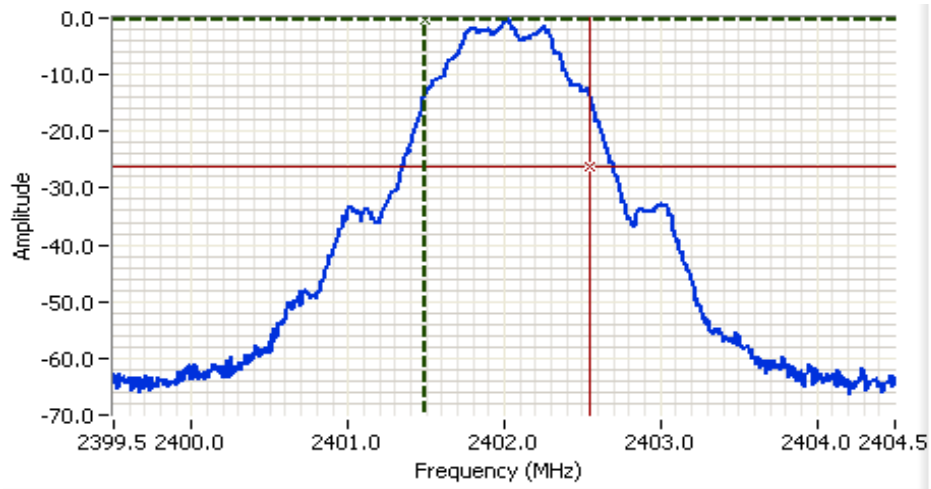
Note 1:	Output power measured using a peak power meter.

Client:	Broadcom	Job Number:	J83573
Model:	BRC92070MD_REF12	T-Log Number:	T83604
		Account Manager:	Sheareen Washington
Contact:	Juan Martinez		
Standard:	FCC 15.247, RSS-210, LP0002	Class:	N/A

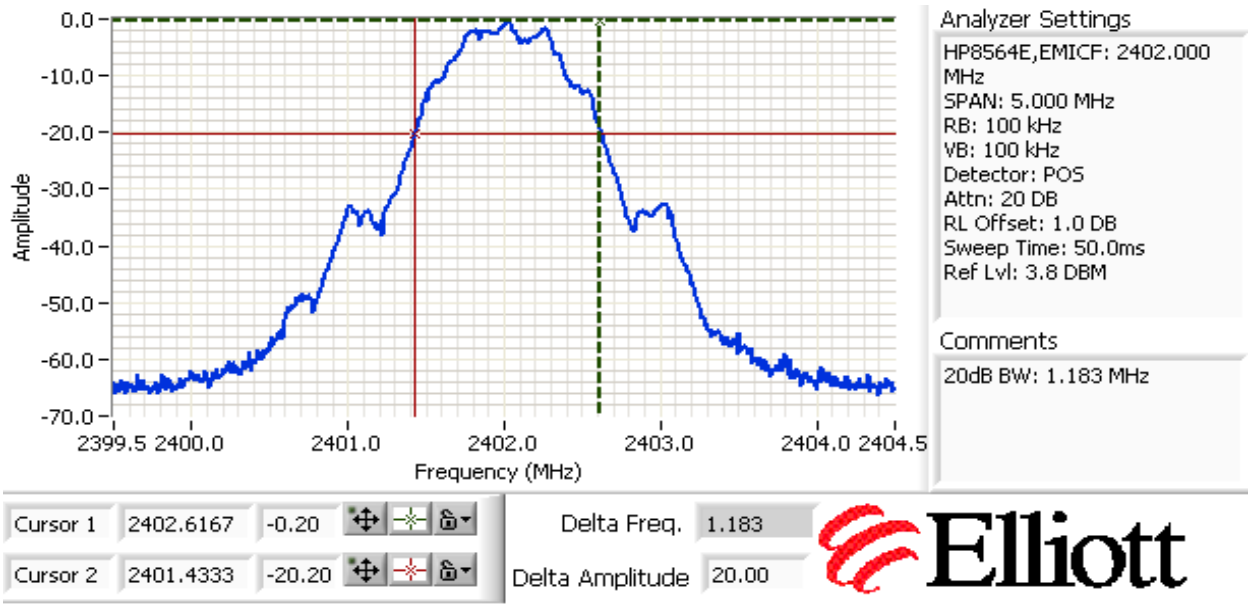
Run #3: Bandwidth

Channel	Frequency (MHz)	Resolution Bandwidth	20dB Bandwidth (kHz)	Resolution Bandwidth	99% Bandwidth (kHz)
Low	2402	100kHz	1183	100kHz	1065
Mid	2442	100kHz	1183	100kHz	1065
High	2480	100kHz	1175	100kHz	1065

Note 1:	20dB bandwidth measured using RB = 100kHz, VB = 100kHz (VB > RB)
Note 2:	99% bandwidth measured using RB = 100kHz, VB = 300kHz (VB >=3RB)



Client:	Broadcom	Job Number:	J83573
Model:	BRC92070MD_REF12	T-Log Number:	T83604
		Account Manager:	Sheareen Washington
Contact:	Juan Martinez		
Standard:	FCC 15.247, RSS-210, LP0002	Class:	N/A



Client:	Broadcom	Job Number:	J83573
Model:	BRC92070MD_REF12	T-Log Number:	T83604
		Account Manager:	Sheareen Washington
Contact:	Juan Martinez		
Standard:	FCC 15.247, RSS-210, LP0002	Class:	N/A

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.

Ambient Conditions:

Temperature: 20-25 °C

Rel. Humidity: 30-40 %

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	BLE	Low	Max		Restricted Band Edge (2390 MHz)	FCC Part 15.209 / 15.247(c)	44.8dBµV/m @ 2389.3MHz (-9.2dB)
			Max		Radiated Emissions, 1 - 18 GHz	FCC Part 15.209 / 15.247(c)	42.8dBµV/m @ 4803.8MHz (-11.2dB)
1b	BLE	Center	Max		Radiated Emissions, 1 - 18 GHz	FCC Part 15.209 / 15.247(c)	49.4dBµV/m @ 3256.0MHz (-4.6dB)
1c	BLE	High	Max		Restricted Band Edge (2483.5 MHz)	FCC Part 15.209 / 15.247(c)	45.9dBµV/m @ 2500.0MHz (-8.1dB)
			Max		Radiated Emissions, 1 - 18 GHz	FCC Part 15.209 / 15.247(c)	47.9dBµV/m @ 4959.9MHz (-6.1dB)

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.

Note 1:	No emissions were observed above 18GHz.
Note 2:	As all emisisons observed below 1000 MHz were independent of the channel and mode selected, no additional scan was performed in this band for this mode as all the emissions that would be obseved were during the scan for BT Basic mode.

Client:	Broadcom	Job Number:	J83573
Model:	BRC92070MD_REF12	T-Log Number:	T83604
		Account Manager:	Sheareen Washington
Contact:	Juan Martinez		
Standard:	FCC 15.247, RSS-210, LP0002	Class:	N/A

Run #1: Radiated Spurious Emissions, 30 - 26500 MHz. Operating Mode: BLE

Date of Test: 6/24/2011 Test Location: FT Chamber #5

Test Engineer: Rafael Varelas

Run #1a: Low Channel @ 2402 MHz

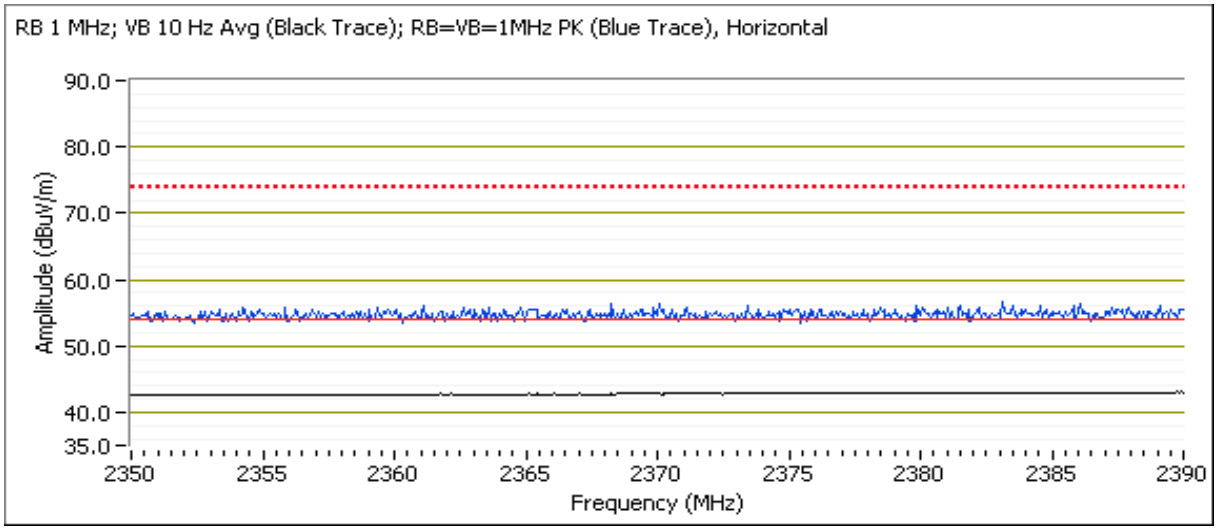
Fundamental Signal Field Strength: Peak and average values measured in 1 MHz, and peak value measured in 100kHz

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
2402.000	96.7	H	-	-	AVG	146	1.0	RB 1 MHz;VB 10 Hz;Pk
2402.220	100.1	H	-	-	PK	146	1.0	RB 1 MHz;VB 3 MHz;Pk
2402.010	99.0	H	-	-	PK	146	1.0	RB 100 kHz;VB 100 kHz;Pk
2401.990	93.1	V	-	-	AVG	268	1.0	RB 1 MHz;VB 10 Hz;Pk
2401.750	96.4	V	-	-	PK	268	1.0	RB 1 MHz;VB 3 MHz;Pk

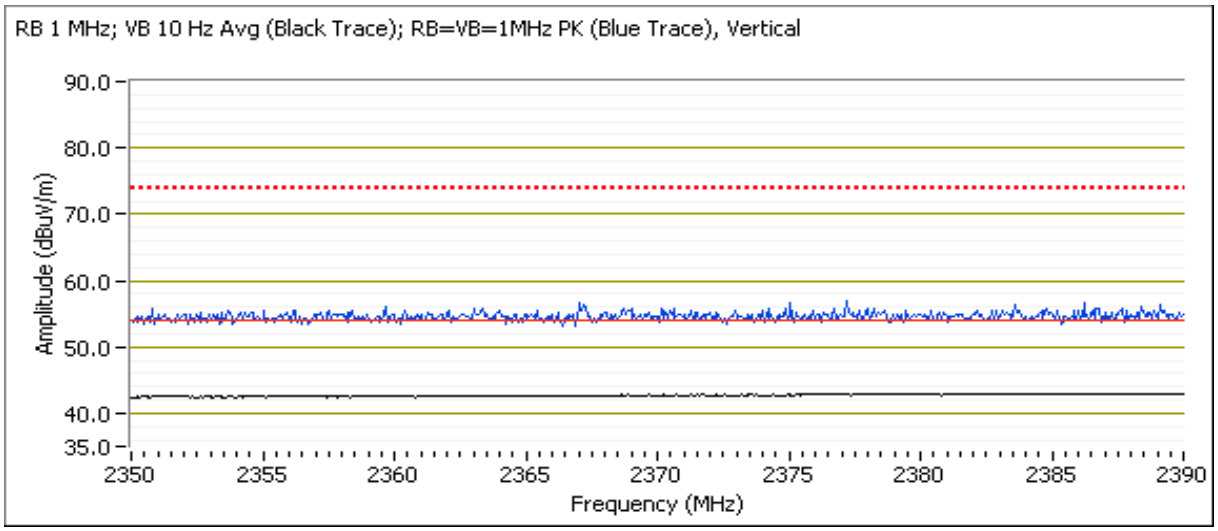
Fundamental emission level @ 3m in 100kHz RBW:	99.0 dBµV/m	
Limit for emissions outside of restricted bands:	79.0 dBµV/m	Limit is -20dBc

Band Edge Signal Field Strength - Direct measurement of field strength

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
2389.330	44.8	H	54.0	-9.2	AVG	235	1.0	RB 1 MHz;VB 10 Hz;Pk
2370.130	56.3	H	74.0	-17.7	PK	235	1.0	RB 1 MHz;VB 3 MHz;Pk
2384.670	44.7	V	54.0	-9.3	AVG	0	1.0	RB 1 MHz;VB 10 Hz;Pk
2381.200	55.4	V	74.0	-18.6	PK	0	1.0	RB 1 MHz;VB 3 MHz;Pk



Client:	Broadcom	Job Number:	J83573
Model:	BRC92070MD_REF12	T-Log Number:	T83604
		Account Manager:	Sheareen Washington
Contact:	Juan Martinez		
Standard:	FCC 15.247, RSS-210, LP0002	Class:	N/A

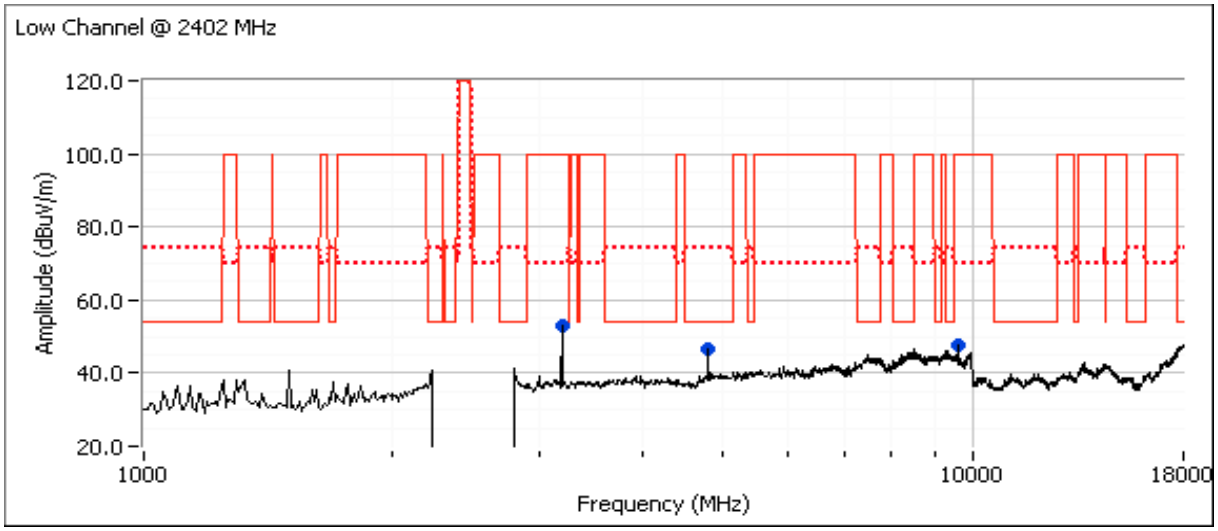


Client:	Broadcom	Job Number:	J83573
Model:	BRC92070MD_REF12	T-Log Number:	T83604
		Account Manager:	Sheareen Washington
Contact:	Juan Martinez		
Standard:	FCC 15.247, RSS-210, LP0002	Class:	N/A

Spurious Emissions:

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
4803.840	42.8	H	54.0	-11.2	AVG	303	1.0	RB 1 MHz;VB 10 Hz;Pk
4803.520	51.6	H	74.0	-22.4	PK	303	1.0	RB 1 MHz;VB 3 MHz;Pk
3202.840	52.9	H	79.0	-26.1	Peak	17	1.0	
9608.160	47.8	H	79.0	-31.2	Peak	280	1.0	

Note 1:	For emissions in restricted bands, the limit of 15.209 was used. For all other emissions, the limit was set 20dB below the level of the fundamental and measured in 100kHz.

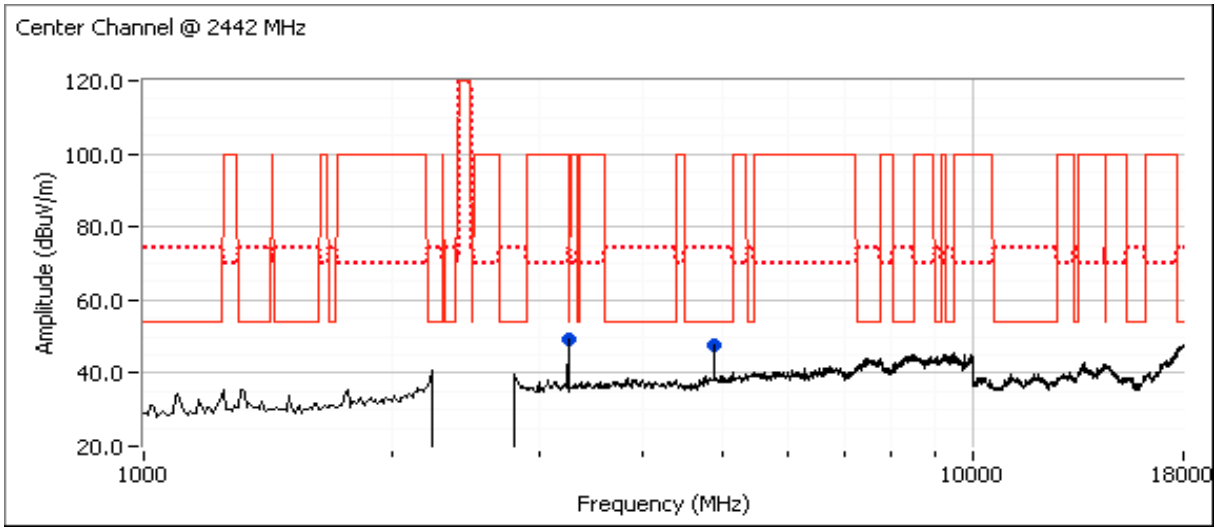


Client:	Broadcom	Job Number:	J83573
Model:	BRC92070MD_REF12	T-Log Number:	T83604
		Account Manager:	Sheareen Washington
Contact:	Juan Martinez		
Standard:	FCC 15.247, RSS-210, LP0002	Class:	N/A

Run #1b: Center Channel @ 2442 MHz

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
3256.010	49.4	H	54.0	-4.6	Peak	331	1.0	Note 2
4883.840	42.5	H	54.0	-11.5	AVG	308	1.0	RB 1 MHz;VB 10 Hz;Pk
4884.440	50.6	H	74.0	-23.4	PK	308	1.0	RB 1 MHz;VB 3 MHz;Pk

Note 1:	For emissions in restricted bands, the limit of 15.209 was used. For all other emissions, the limit was set 20dB below the level of the fundamental and measured in 100kHz.
Note 2:	Signal is not in a restricted band but the more stringent restricted band limit was used.



Client:	Broadcom	Job Number:	J83573
Model:	BRC92070MD_REF12	T-Log Number:	T83604
		Account Manager:	Sheareen Washington
Contact:	Juan Martinez		
Standard:	FCC 15.247, RSS-210, LP0002	Class:	N/A

Run #1c: High Channel @ 2480 MHz

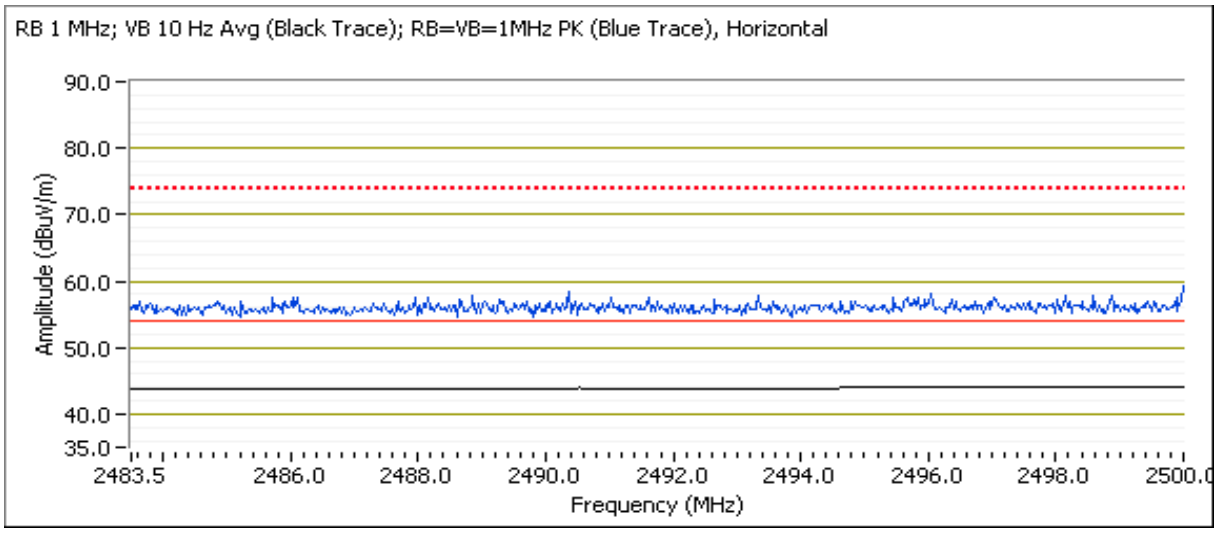
Fundamental Signal Field Strength: Peak and average values measured in 1 MHz, and peak value measured in 100kHz

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
2479.980	89.8	V	-	-	AVG	261	0.9	RB 1 MHz;VB 10 Hz;Pk
2479.840	93.2	V	-	-	PK	261	0.9	RB 1 MHz;VB 3 MHz;Pk
2479.980	95.2	H	-	-	AVG	161	1.2	RB 1 MHz;VB 10 Hz;Pk
2480.270	98.7	H	-	-	PK	161	1.2	RB 1 MHz;VB 3 MHz;Pk
2480.000	97.8	H	-	-	PK	161	1.2	RB 100 kHz;VB 100 kHz;Pk

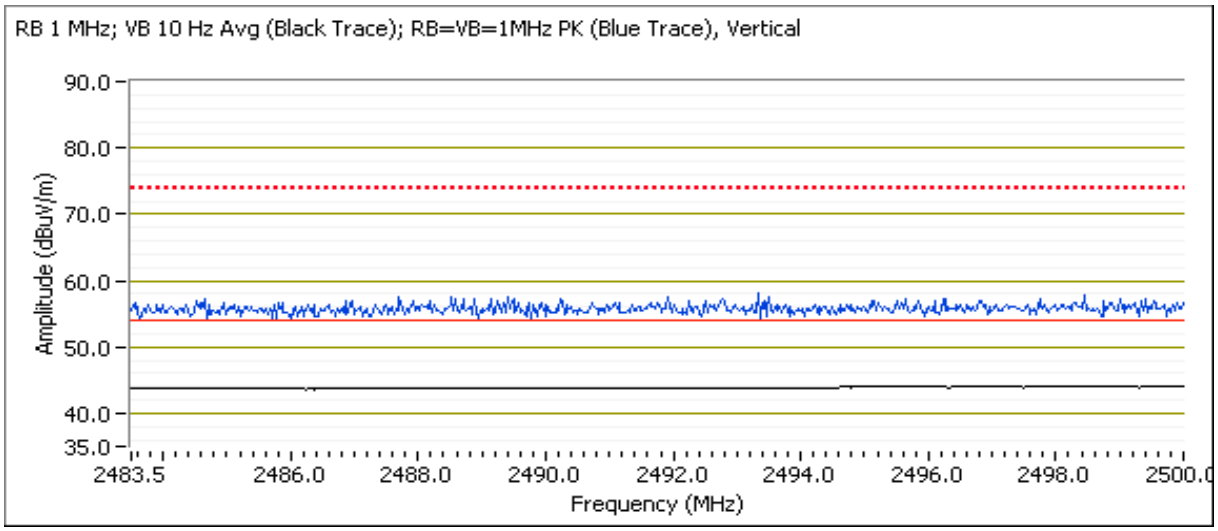
Fundamental emission level @ 3m in 100kHz RBW:	97.8 dBµV/m	
Limit for emissions outside of restricted bands:	77.8 dBµV/m	Limit is -20dBc

Band Edge Signal Field Strength - Direct measurement of field strength

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
2499.970	45.9	H	54.0	-8.1	AVG	171	1.2	RB 1 MHz;VB 10 Hz;Pk
2490.540	57.8	H	74.0	-16.2	PK	171	1.2	RB 1 MHz;VB 3 MHz;Pk
2499.560	45.9	V	54.0	-8.1	AVG	130	1.6	RB 1 MHz;VB 10 Hz;Pk
2494.170	57.0	V	74.0	-17.0	PK	130	1.6	RB 1 MHz;VB 3 MHz;Pk



Client:	Broadcom	Job Number:	J83573
Model:	BRC92070MD_REF12	T-Log Number:	T83604
		Account Manager:	Sheareen Washington
Contact:	Juan Martinez		
Standard:	FCC 15.247, RSS-210, LP0002	Class:	N/A

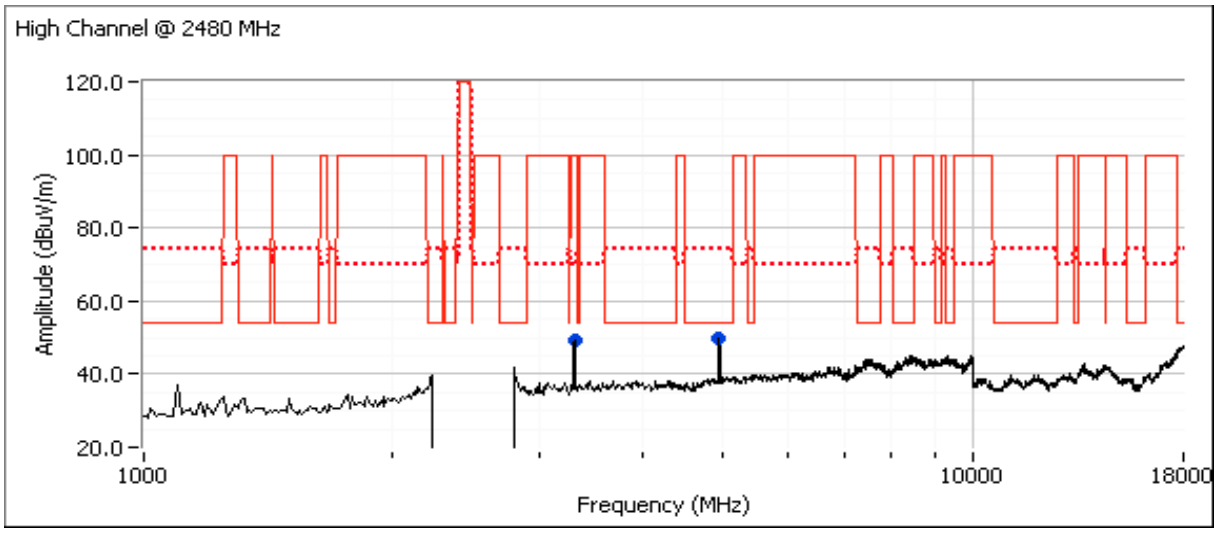


Client:	Broadcom	Job Number:	J83573
Model:	BRC92070MD_REF12	T-Log Number:	T83604
		Account Manager:	Sheareen Washington
Contact:	Juan Martinez		
Standard:	FCC 15.247, RSS-210, LP0002	Class:	N/A

Spurious Emissions:

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
4959.920	47.9	H	54.0	-6.1	AVG	326	1.0	RB 1 MHz;VB 10 Hz;Pk
4960.370	55.0	H	74.0	-19.0	PK	326	1.0	RB 1 MHz;VB 3 MHz;Pk
3306.710	49.0	H	77.8	-28.8	Peak	324	1.0	

Note 1:	For emissions in restricted bands, the limit of 15.209 was used. For all other emissions, the limit was set 20dB below the level of the fundamental and measured in 100kHz.



Client:	Broadcom	Job Number:	J83573
Model:	BRC92070MD_REF12	T-Log Number:	T83604
		Account Manager:	Sheareen Washington
Contact:	Juan Martinez		
Standard:	FCC 15.247, RSS-210, LP0002	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.

Ambient Conditions:

Temperature: 20-25 °C

Rel. Humidity: 30-40 %

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	BLE	Low	Max		Restricted Band Edge (2390 MHz)	FCC Part 15.209 / 15.247(c)	38.6dBµV/m @ 2382.2MHz (-15.4dB)
			Max		Radiated Emissions, 1 - 26 GHz	FCC Part 15.209 / 15.247(c)	43.0dBµV/m @ 7500.0MHz (-11.0dB)
1b	BLE	Center	Max		Radiated Emissions, 1 - 26 GHz	FCC Part 15.209 / 15.247(c)	47.1dBµV/m @ 4884.0MHz (-6.9dB)
1c	BLE	High	Max		Restricted Band Edge (2483.5 MHz)	FCC Part 15.209 / 15.247(c)	52.5dBµV/m @ 2498.8MHz (-1.5dB)
			Max		Radiated Emissions, 1 - 26 GHz	FCC Part 15.209 / 15.247(c)	47.2dBµV/m @ 4959.9MHz (-6.8dB)

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.

Note: No emission found above 18GHz.

Client:	Broadcom	Job Number:	J83573
Model:	BRC92070MD_REF12	T-Log Number:	T83604
		Account Manager:	Sheareen Washington
Contact:	Juan Martinez		
Standard:	FCC 15.247, RSS-210, LP0002	Class:	N/A

Run #1: Radiated Spurious Emissions, 30 - 26500 MHz. Operating Mode: BLE

Date of Test: 6/15/2011 Test Location: FT chamber #3

Test Engineer: M. Birgani

Run #1a: Low Channel @ 2402 MHz

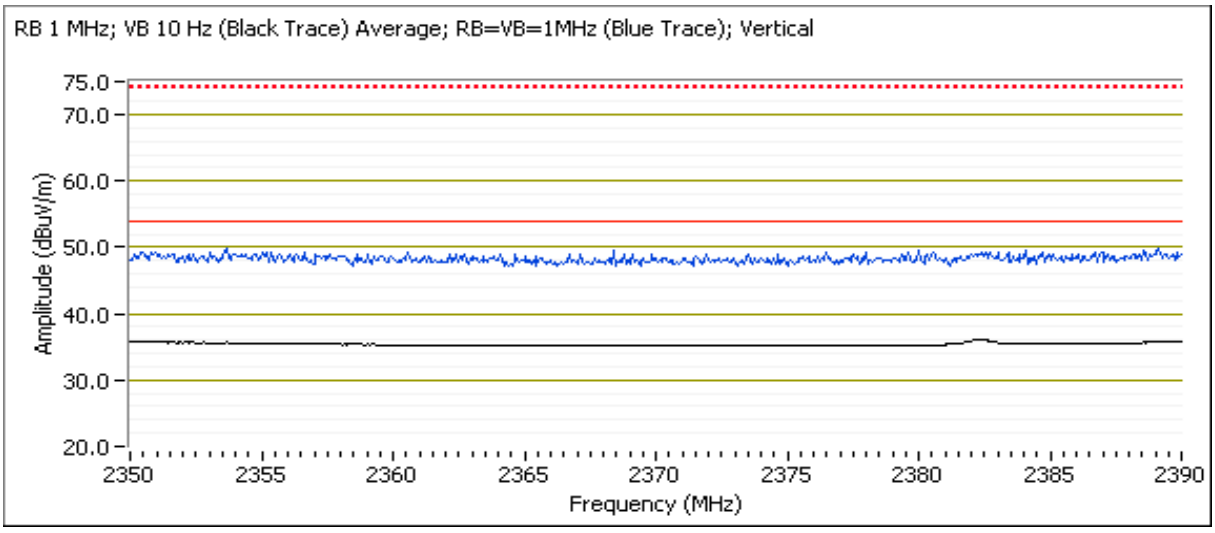
Fundamental Signal Field Strength: Peak and average values measured in 1 MHz, and peak value measured in 100kHz

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
2402.030	96.0	H	-	-	-	101	1.0	RB 100 kHz;VB 100 kHz;Pk
2402.010	93.8	H	-	-	AVG	101	1.0	RB 1 MHz;VB 10 Hz;Pk
2402.230	97.0	H	-	-	PK	101	1.0	RB 1 MHz;VB 3 MHz;Pk
2401.810	93.6	V	-	-	-	114	1.0	RB 100 kHz;VB 100 kHz;Pk
2401.980	90.5	V	-	-	AVG	114	1.0	RB 1 MHz;VB 10 Hz;Pk
2402.230	93.7	V	-	-	PK	114	1.0	RB 1 MHz;VB 3 MHz;Pk

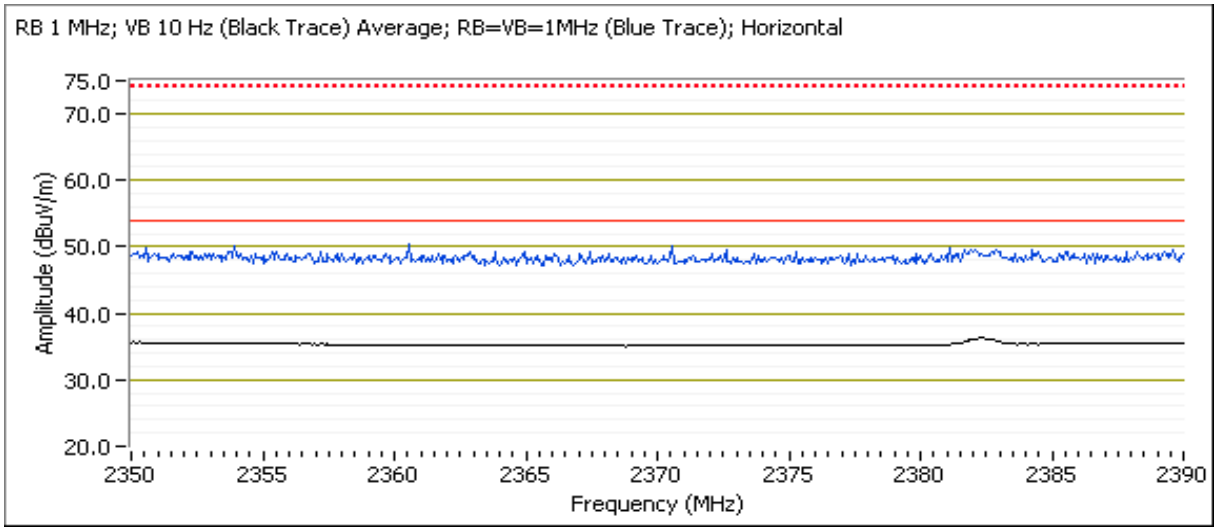
Fundamental emission level @ 3m in 100kHz RBW:	96.0 dBµV/m	
Limit for emissions outside of restricted bands:	66.0 dBµV/m	Limit is -30dBc (UNII power measurement)

Band Edge Signal Field Strength - Direct measurement of field strength

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
2382.200	38.6	H	54.0	-15.4	AVG	101	1.0	RB 1 MHz;VB 10 Hz;Pk
2382.270	38.0	V	54.0	-16.0	AVG	114	1.0	RB 1 MHz;VB 10 Hz;Pk
2371.270	49.4	H	74.0	-24.6	PK	101	1.0	RB 1 MHz;VB 3 MHz;Pk
2369.730	48.9	V	74.0	-25.1	PK	114	1.0	RB 1 MHz;VB 3 MHz;Pk



Client:	Broadcom	Job Number:	J83573
Model:	BRC92070MD_REF12	T-Log Number:	T83604
		Account Manager:	Sheareen Washington
Contact:	Juan Martinez		
Standard:	FCC 15.247, RSS-210, LP0002	Class:	N/A

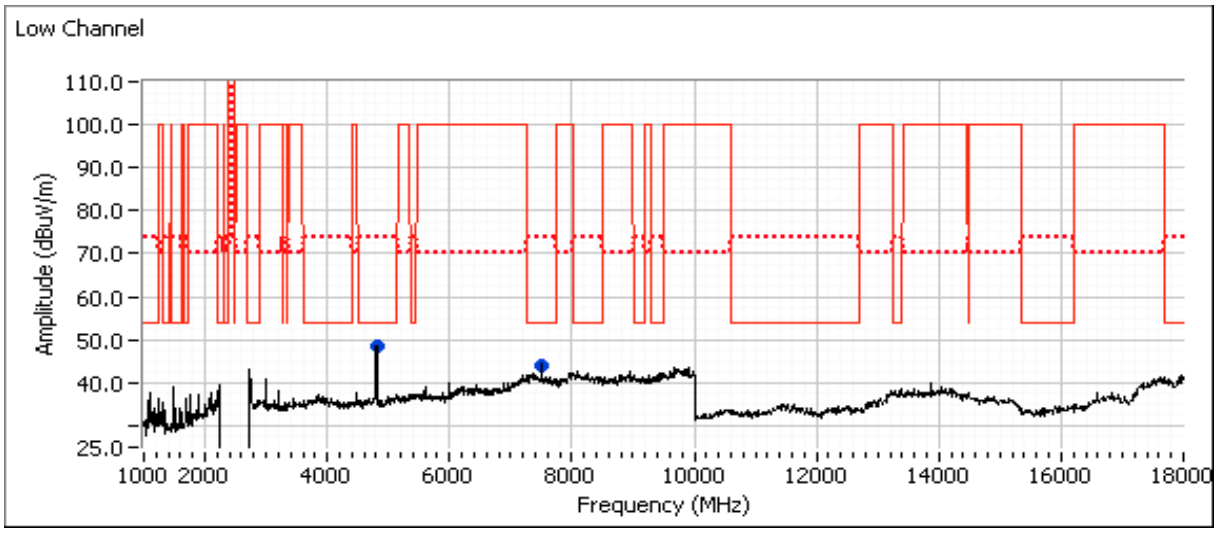


Client:	Broadcom	Job Number:	J83573
Model:	BRC92070MD_REF12	T-Log Number:	T83604
		Account Manager:	Sheareen Washington
Contact:	Juan Martinez		
Standard:	FCC 15.247, RSS-210, LP0002	Class:	N/A

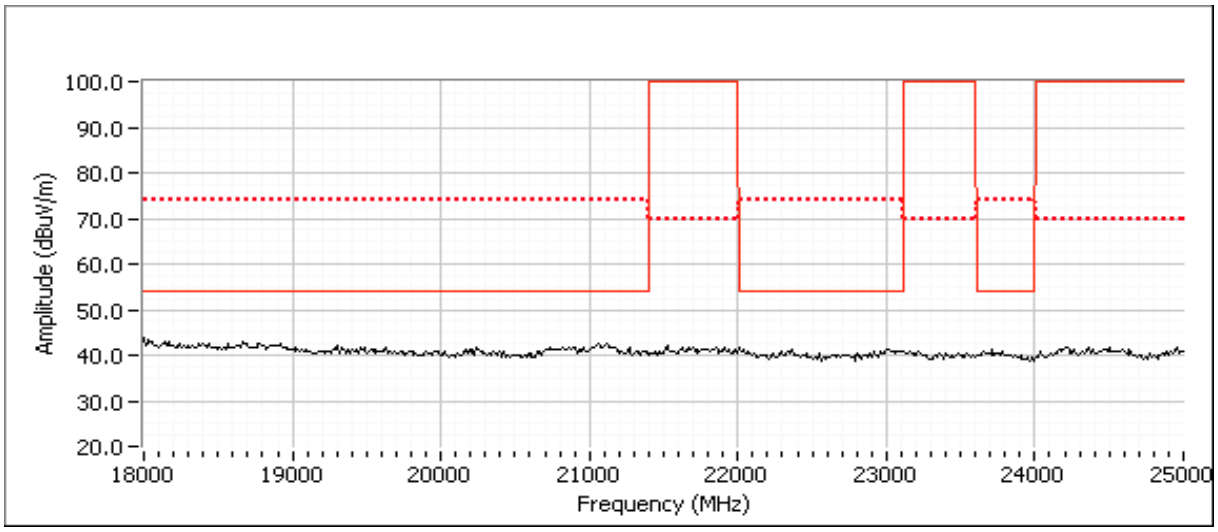
Other Spurious Emissions

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
4803.880	45.7	H	54.0	-8.3	AVG	279	1.0	RB 1 MHz;VB 10 Hz;Pk
7500.010	43.0	V	54.0	-11.0	AVG	320	1.0	RB 1 MHz;VB 10 Hz;Pk
4803.600	52.2	H	74.0	-21.8	PK	279	1.0	RB 1 MHz;VB 3 MHz;Pk
7500.110	50.8	V	74.0	-23.2	PK	320	1.0	RB 1 MHz;VB 3 MHz;Pk

Note 1:	For emissions in restricted bands, the limit of 15.209 was used. For all other emissions, the limit was set 30dB below the level of the fundamental and measured in 100kHz.
Note 2:	Signal is not in a restricted band but the more stringent restricted band limit was used.



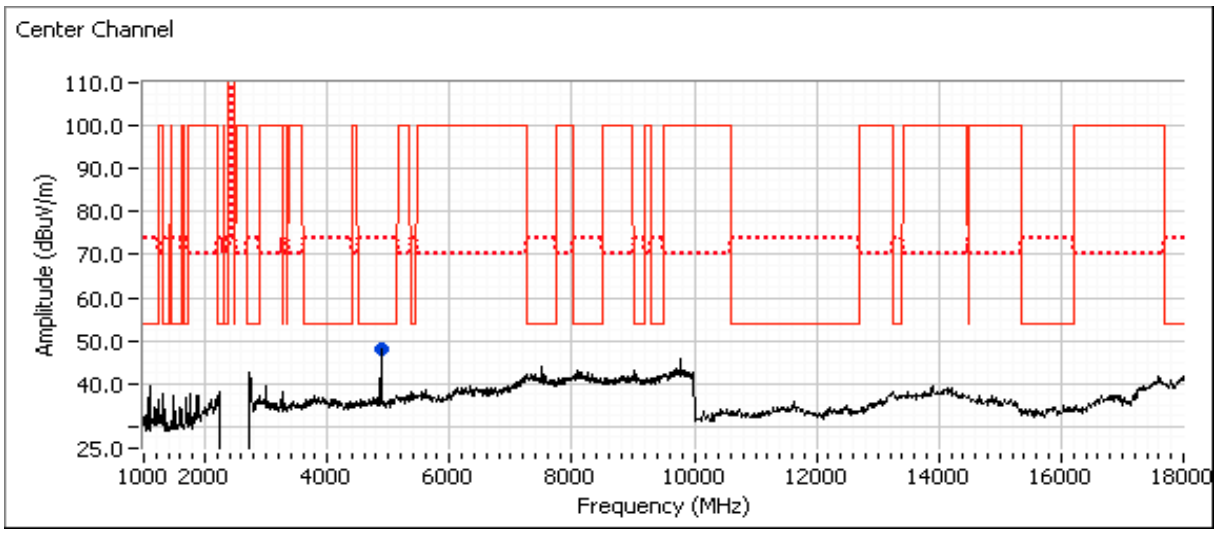
Client:	Broadcom	Job Number:	J83573
Model:	BRC92070MD_REF12	T-Log Number:	T83604
		Account Manager:	Sheareen Washington
Contact:	Juan Martinez		
Standard:	FCC 15.247, RSS-210, LP0002	Class:	N/A



Run #1b: Center Channel @ 2442 MHz

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
4883.990	47.1	H	54.0	-6.9	AVG	272	1.0	
4883.630	53.4	H	74.0	-20.6	PK	272	1.0	

Note 1:	For emissions in restricted bands, the limit of 15.209 was used. For all other emissions, the limit was set 30dB below the level of the fundamental and measured in 100kHz.
Note 2:	Signal is not in a restricted band but the more stringent restricted band limit was used.



Client:	Broadcom	Job Number:	J83573
Model:	BRC92070MD_REF12	T-Log Number:	T83604
		Account Manager:	Sheareen Washington
Contact:	Juan Martinez		
Standard:	FCC 15.247, RSS-210, LP0002	Class:	N/A

Run #1c: High Channel @ 2480 MHz

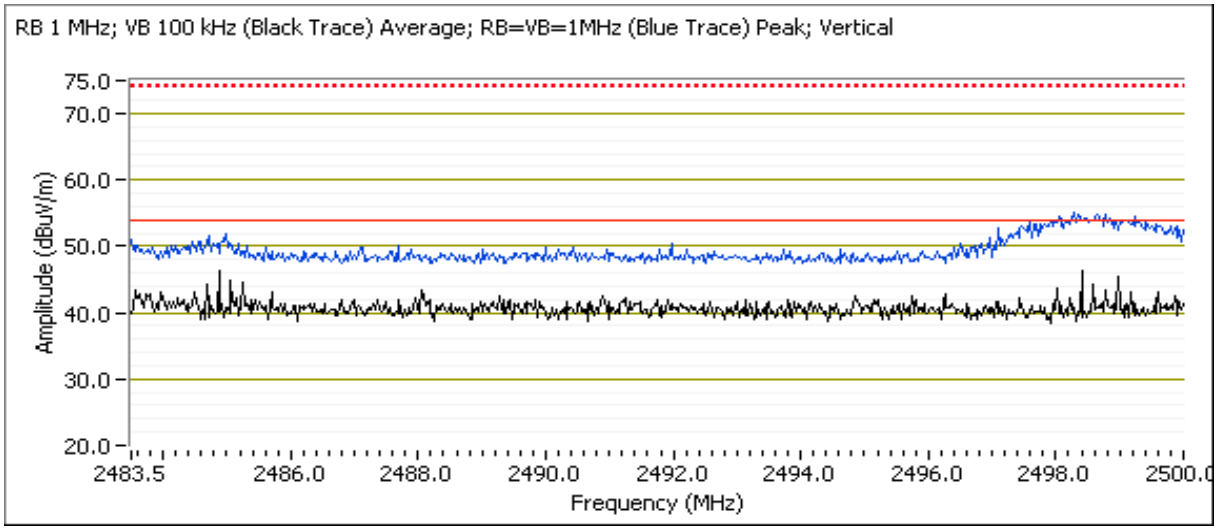
Fundamental Signal Field Strength: Peak and average values measured in 1 MHz, and peak value measured in 100kHz

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
2479.990	99.3	H	-	-	-	231	1.0	RB 100 kHz;VB 100 kHz;Pk
2479.950	97.1	H	-	-	AVG	231	1.0	RB 1 MHz;VB 10 Hz;Pk
2480.070	100.2	H	-	-	PK	231	1.0	RB 1 MHz;VB 3 MHz;Pk
2480.000	91.6	V	-	-	-	51	1.0	RB 100 kHz;VB 100 kHz;Pk
2479.950	89.3	V	-	-	AVG	51	1.0	RB 1 MHz;VB 10 Hz;Pk
2479.750	92.5	V	-	-	PK	51	1.0	RB 1 MHz;VB 3 MHz;Pk

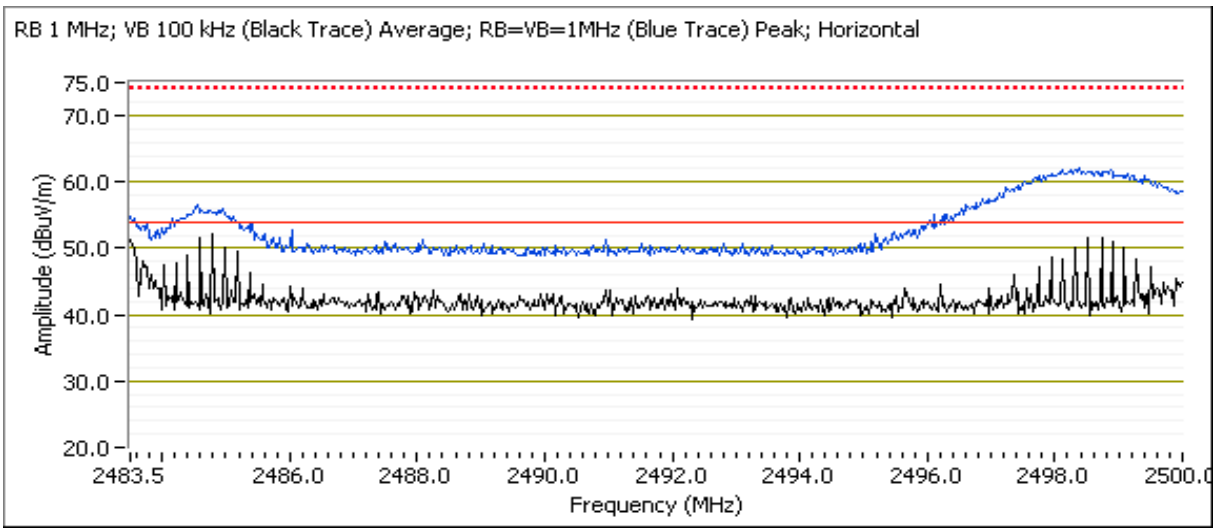
Fundamental emission level @ 3m in 100kHz RBW:	99.3 dBµV/m	
Limit for emissions outside of restricted bands:	69.3 dBµV/m	Limit is -30dBc (UNII power measurement)

Band Edge Signal Field Strength - Direct measurement of field strength

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
2498.790	52.5	H	54.0	-1.5	AVG	231	1.0	RB 1 MHz;VB 100 kHz;Pk
2483.500	46.1	H	54.0	-7.9	AVG	231	1.0	RB 1 MHz;VB 10 Hz;Pk
2498.160	61.5	H	74.0	-12.5	PK	231	1.0	RB 1 MHz;VB 3 MHz;Pk
2484.900	46.2	V	54.0	-7.8	AVG	51	1.0	RB 1 MHz;VB 100 kHz;Pk
2483.500	40.9	V	54.0	-13.1	AVG	51	1.0	RB 1 MHz;VB 10 Hz;Pk
2498.210	54.1	V	74.0	-19.9	PK	51	1.0	RB 1 MHz;VB 3 MHz;Pk



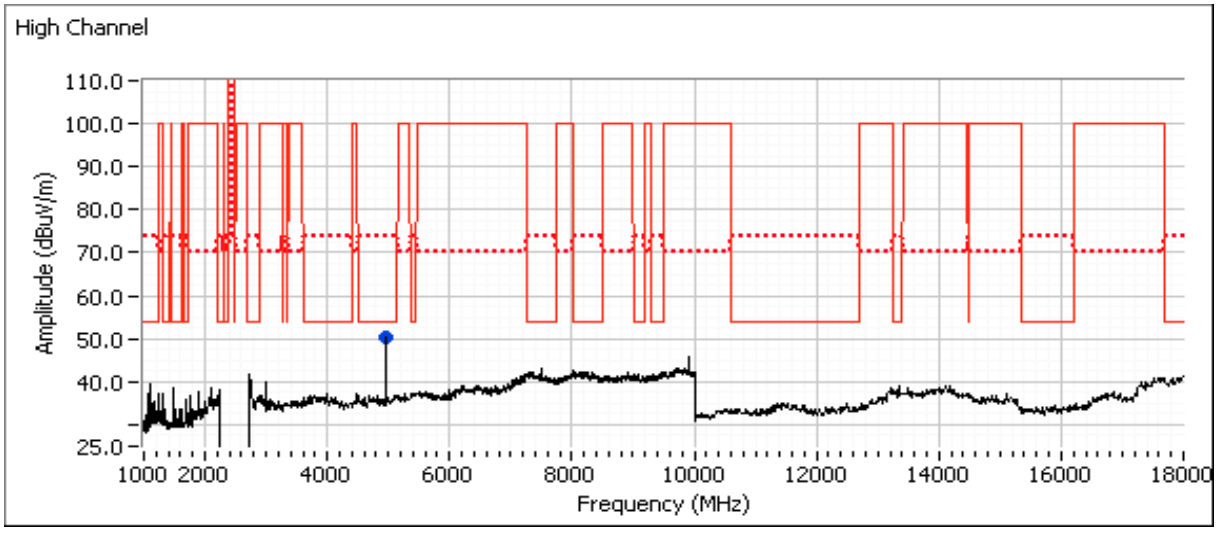
Client:	Broadcom	Job Number:	J83573
Model:	BRC92070MD_REF12	T-Log Number:	T83604
		Account Manager:	Sheareen Washington
Contact:	Juan Martinez		
Standard:	FCC 15.247, RSS-210, LP0002	Class:	N/A



Other Spurious Emissions

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
4959.920	47.2	H	54.0	-6.8	AVG	276	1.0	RB 1 MHz;VB 10 Hz;Pk
4960.380	53.1	H	74.0	-20.9	PK	276	1.0	RB 1 MHz;VB 3 MHz;Pk

Note 1:	For emissions in restricted bands, the limit of 15.209 was used. For all other emissions, the limit was set 30dB below the level of the fundamental and measured in 100kHz.
Note 2:	Signal is not in a restricted band but the more stringent restricted band limit was used.



Client:	Broadcom	Job Number:	J83573
Model:	BRC92070MD_REF12	T-Log Number:	T83604
		Account Manager:	Sheareen Washington
Contact:	Juan Martinez		
Standard:	FCC 15.247, RSS-210, LP0002	Class:	N/A

FCC 15.247 FHSS - Rx 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: 6/23/2011 3:12
Test Engineer: Rafael Varelas
Test Location: Fremont Chamber #5
Config. Used: 1
Config Change: None
EUT Voltage: 3.3V from Host Device

General Test Configuration

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

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

Ambient Conditions:

Temperature: 20.7 °C
Rel. Humidity: 35 %

Summary of Results

Run #	Test Performed	Limit	Pass / Fail	Result / Margin
1a - Low Channel	1000 - 8,000 MHz - Radiated Spurious Emissions	FCC Part 15.247(c) / RSS-210	Pass	38.5dBµV/m @ 1700.1MHz (-15.5dB)
1b - Center Channel	1000 - 8,000 MHz - Radiated Spurious Emissions	FCC Part 15.247(c) / RSS-210	Pass	38.9dBµV/m @ 1700.1MHz (-15.1dB)
1c - High Channel	1000 - 8,000 MHz - Radiated Spurious Emissions	FCC Part 15.247(c) / RSS-210	Pass	38.8dBµV/m @ 1700.0MHz (-15.2dB)

Modifications Made During Testing:

No modifications were made to the EUT during testing

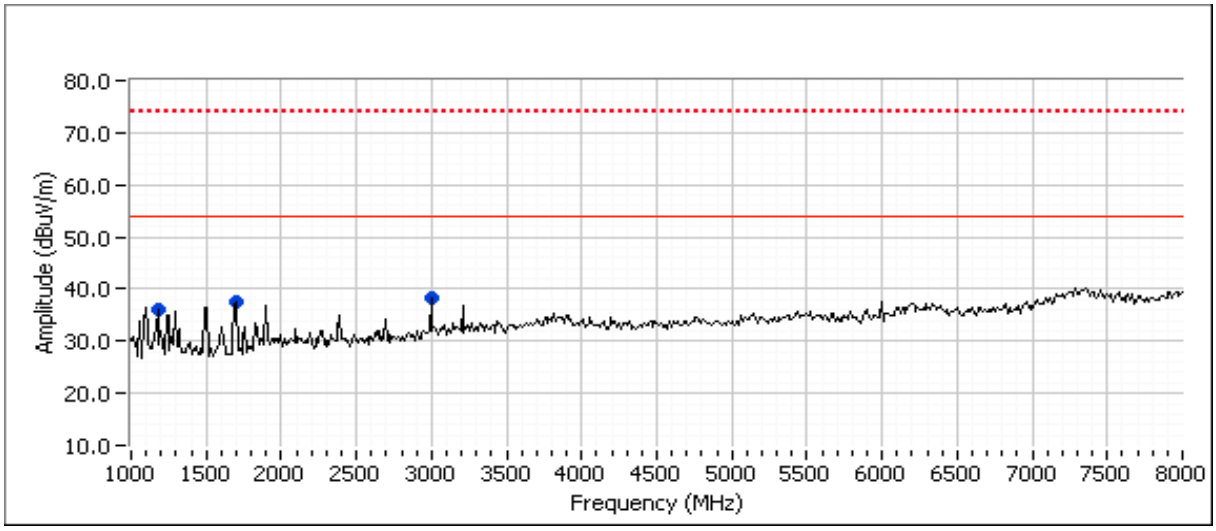
Deviations From The Standard

No deviations were made from the requirements of the standard.

Client:	Broadcom	Job Number:	J83573
Model:	BRC92070MD_REF12	T-Log Number:	T83604
		Account Manager:	Sheareen Washington
Contact:	Juan Martinez		
Standard:	FCC 15.247, RSS-210, LP0002	Class:	N/A

Run #1: Radiated Spurious Emissions, 1000 - 8,000 MHz.
Run #1a: Radiated Spurious Emissions, 1000 - 8000 MHz. Low Channel @ 2402 MHz
External 3.9dBi antenna

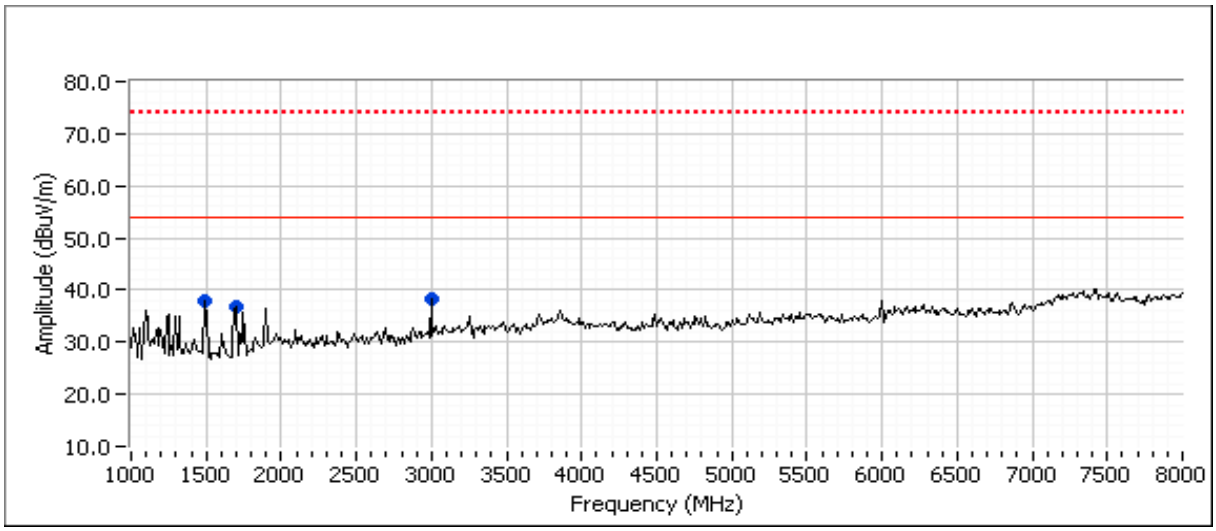
Frequency	Level	Pol	15.247 / RSS-210		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
1700.080	38.5	V	54.0	-15.5	AVG	154	1.0	MHz;VB 10 Hz;Pk
1699.890	43.4	V	74.0	-30.6	PK	154	1.0	MHz;VB 3 MHz;Pk
1151.970	27.8	V	54.0	-26.2	AVG	289	1.0	MHz;VB 10 Hz;Pk
1151.790	38.8	V	74.0	-35.2	PK	289	1.0	MHz;VB 3 MHz;Pk
3000.070	37.6	V	54.0	-16.4	AVG	129	1.0	MHz;VB 10 Hz;Pk
3000.030	44.8	V	74.0	-29.2	PK	129	1.0	MHz;VB 3 MHz;Pk



Client:	Broadcom	Job Number:	J83573
Model:	BRC92070MD_REF12	T-Log Number:	T83604
		Account Manager:	Sheareen Washington
Contact:	Juan Martinez		
Standard:	FCC 15.247, RSS-210, LP0002	Class:	N/A

Run #1b: Radiated Spurious Emissions, 1000 - 8000 MHz. Center Channel @ 2442 MHz

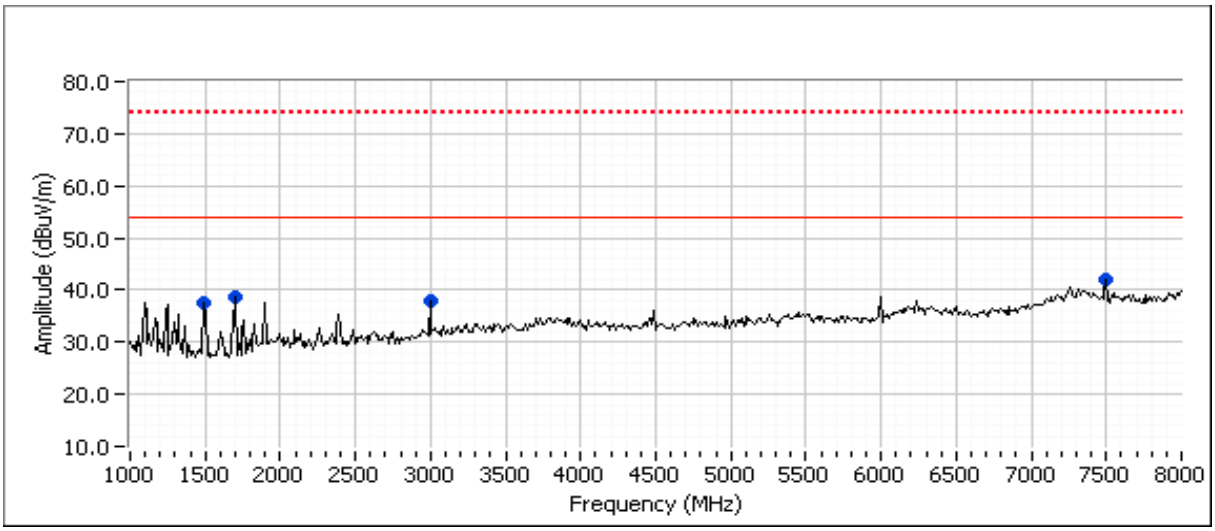
Frequency	Level	Pol	15.247 / RSS-210		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
1700.100	38.9	V	54.0	-15.1	AVG	150	1.0	MHz;VB 10 Hz;Pk
1700.260	43.7	V	74.0	-30.3	PK	150	1.0	MHz;VB 3 MHz;Pk
1500.070	37.7	V	54.0	-16.3	AVG	72	1.0	MHz;VB 10 Hz;Pk
1500.040	44.5	V	74.0	-29.5	PK	72	1.0	MHz;VB 3 MHz;Pk
3000.000	37.9	V	54.0	-16.1	AVG	107	1.0	MHz;VB 10 Hz;Pk
2999.860	45.1	V	74.0	-28.9	PK	107	1.0	MHz;VB 3 MHz;Pk



Client:	Broadcom	Job Number:	J83573
Model:	BRC92070MD_REF12	T-Log Number:	T83604
		Account Manager:	Sheareen Washington
Contact:	Juan Martinez		
Standard:	FCC 15.247, RSS-210, LP0002	Class:	N/A

Run #1c: Radiated Spurious Emissions, 1000 - 8000 MHz. High Channel @ 2480 MHz

Frequency	Level	Pol	15.247 / RSS-210		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
1700.020	38.8	V	54.0	-15.2	AVG	150	1.0	MHz;VB 10 Hz;Pk
1699.940	39.5	V	74.0	-34.5	PK	150	1.0	MHz;VB 3 MHz;Pk
1499.990	36.7	V	54.0	-17.3	AVG	76	1.0	MHz;VB 10 Hz;Pk
1500.210	42.7	V	74.0	-31.3	PK	76	1.0	MHz;VB 3 MHz;Pk
7499.970	38.3	V	54.0	-15.7	AVG	98	1.0	MHz;VB 10 Hz;Pk
7499.270	49.1	V	74.0	-24.9	PK	98	1.0	MHz;VB 3 MHz;Pk
3000.070	37.7	V	54.0	-16.3	AVG	122	1.0	MHz;VB 10 Hz;Pk
2999.860	44.8	V	74.0	-29.2	PK	122	1.0	MHz;VB 3 MHz;Pk



Client:	Broadcom	Job Number:	J83573
Model:	BRC92070MD_REF12	T-Log Number:	T83604
		Account Manager:	Sheareen Washington
Contact:	Juan Martinez		
Standard:	FCC 15.247, RSS-210, LP0002	Class:	B

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.

Date of Test: 6/22/2011
Test Engineer: Suresh Kondapalli
Test Location: Ch #4
Config. Used: 1
Config Change: None
EUT Voltage: 3.3V DC from Host

General Test Configuration

The EUT and any local support equipment were located on the turntable for radiated emissions testing. Any remote support equipment was located outside the semi-anechoic chamber. Any cables running to remote support equipment where routed through metal conduit and when possible passed through a ferrite clamp upon exiting the chamber.

The test distance and extrapolation factor (if applicable) are detailed under each run description.

Note, preliminary testing indicates that the emissions were maximized by orientation of the EUT and elevation of the measurement antenna. Maximized testing indicated that the emissions were maximized by orientation of the EUT, elevation of the measurement antenna, and manipulation of the EUT's interface cables.

Ambient Conditions:

Temperature: 23 °C
Rel. Humidity: 42 %

Summary of Results

Run #	Test Performed	Limit	Result	Margin
1	Radiated Emissions 30 - 1000 MHz, Preliminary	Class B	Eval	-
2	Radiated Emissions 30 - 1000 MHz, Maximized	Class B	Pass	37.6dBµV/m @ 41.37MHz (-2.4dB)

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.

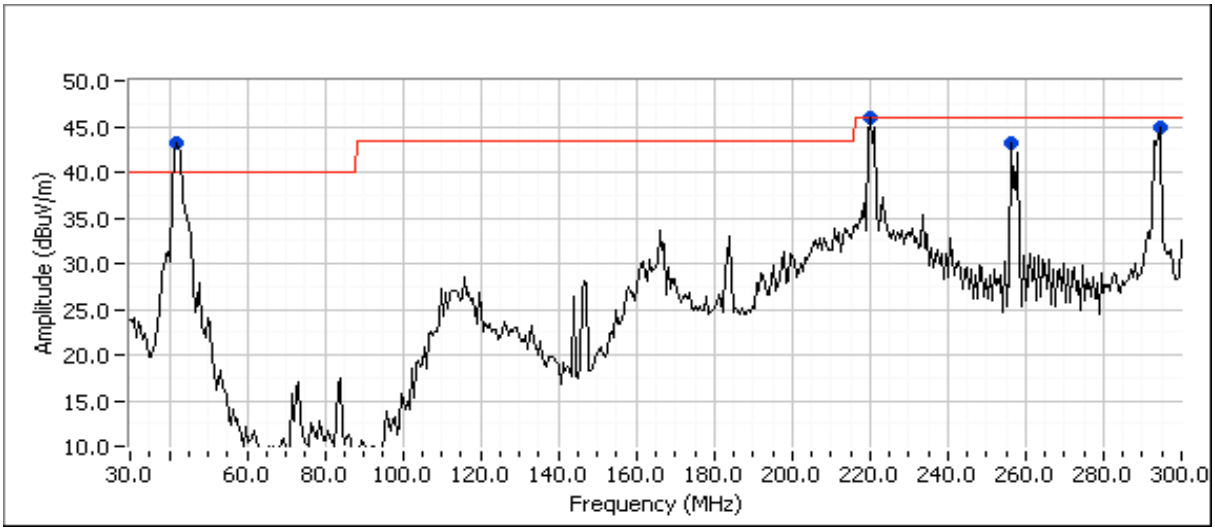
Client:	Broadcom	Job Number:	J83573
Model:	BRC92070MD_REF12	T-Log Number:	T83604
		Account Manager:	Sheareen Washington
Contact:	Juan Martinez		
Standard:	FCC 15.247, RSS-210, LP0002	Class:	B

Run #1: Preliminary Radiated Emissions, 30 - 1000 MHz Digital device/ Receive mode at Center channel 2440

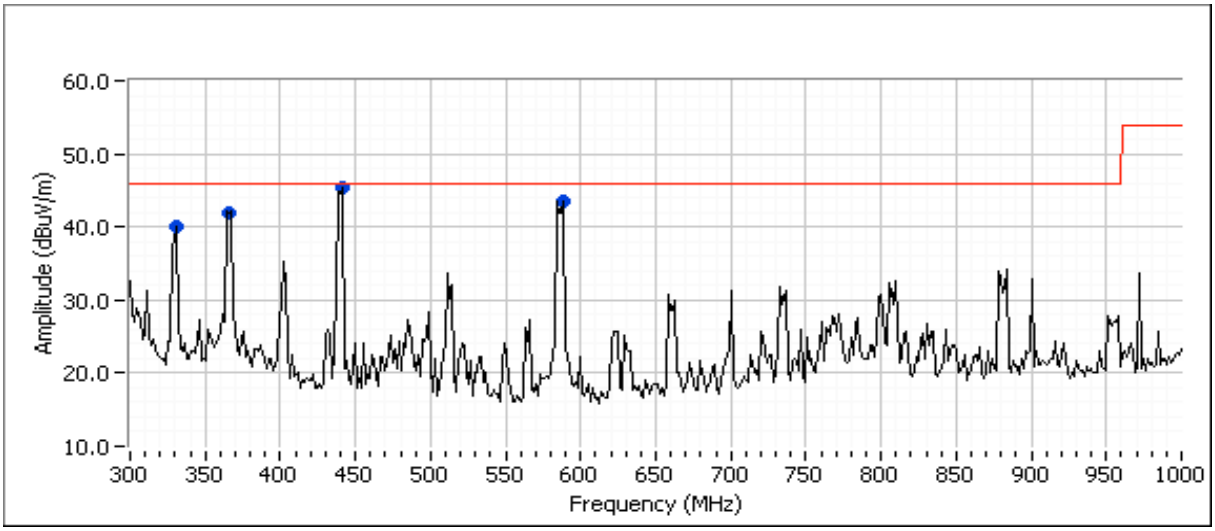
Frequency Range	Test Distance	Limit Distance	Extrapolation Factor
30 - 1000 MHz	3	3	0.0

Preliminary peak readings captured during pre-scan

Frequency	Level	Pol	Class B		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
41.904	43.2	H	40.0	3.2	Peak	323	1.0	
219.920	45.9	H	46.0	-0.1	Peak	196	1.0	
441.683	45.4	H	46.0	-0.6	Peak	191	1.0	
294.589	45.0	H	46.0	-1.0	Peak	215	1.0	
588.978	43.4	H	46.0	-2.6	Peak	208	1.0	
256.172	43.2	H	46.0	-2.8	Peak	183	1.0	
365.932	41.9	H	46.0	-4.1	Peak	223	1.0	
330.862	40.1	H	46.0	-5.9	Peak	236	1.0	



Client:	Broadcom	Job Number:	J83573
Model:	BRC92070MD_REF12	T-Log Number:	T83604
		Account Manager:	Sheareen Washington
Contact:	Juan Martinez		
Standard:	FCC 15.247, RSS-210, LP0002	Class:	B



Preliminary quasi-peak readings (no manipulation of EUT interface cables)

Frequency	Level	Pol	Class B		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
41.368	37.6	H	40.0	-2.4	QP	347	1.0	QP (1.00s)
219.941	42.3	H	46.0	-3.7	QP	211	1.0	QP (1.00s)
440.771	41.5	H	46.0	-4.5	QP	196	1.0	QP (1.00s)
294.049	41.2	H	46.0	-4.8	QP	184	1.0	QP (1.00s)
588.122	39.4	H	46.0	-6.6	QP	207	1.0	QP (1.00s)
367.332	37.9	H	46.0	-8.1	QP	217	1.0	QP (1.00s)
256.004	33.8	H	46.0	-12.2	QP	185	1.0	QP (1.00s)
330.713	31.4	H	46.0	-14.6	QP	236	1.0	QP (1.00s)

Client:	Broadcom	Job Number:	J83573
Model:	BRC92070MD_REF12	T-Log Number:	T83604
		Account Manager:	Sheareen Washington
Contact:	Juan Martinez		
Standard:	FCC 15.247, RSS-210, LP0002	Class:	B

Run #2: Maximized Readings From Run #1

Maximized quasi-peak readings (includes manipulation of EUT interface cables)

Frequency Range	Test Distance	Limit Distance	Extrapolation Factor
30 - 1000 MHz	3	3	0.0

Frequency	Level	Pol	Class B		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
41.368	37.6	H	40.0	-2.4	QP	347	1.0	QP (1.00s)
219.941	42.3	H	46.0	-3.7	QP	211	1.0	QP (1.00s)
440.771	41.5	H	46.0	-4.5	QP	196	1.0	QP (1.00s)
294.049	41.2	H	46.0	-4.8	QP	184	1.0	QP (1.00s)
588.122	39.4	H	46.0	-6.6	QP	207	1.0	QP (1.00s)
367.332	37.9	H	46.0	-8.1	QP	217	1.0	QP (1.00s)
256.004	33.8	H	46.0	-12.2	QP	185	1.0	QP (1.00s)
330.713	31.4	H	46.0	-14.6	QP	236	1.0	QP (1.00s)

Client:	Broadcom	Job Number:	J83573
Model:	BRC92070MD_REF12	T-Log Number:	T83604
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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: 6/22/2011
Test Engineer: Michael Findley
Test Location: Fremont Chamber #4
Config. Used: 1
Config Change: none
Host Voltage: 120V/60Hz

General Test Configuration

For tabletop equipment, the host system was located on a styro foam table inside the semi-anechoic chamber, 40 cm from a vertical coupling plane and 80cm from the LISN.

Ambient Conditions:

Temperature: 19 °C
Rel. Humidity: 35 %

Summary of Results

Run #	Test Performed	Limit	Result	Margin
1	CE, AC Power,120V/60Hz	Class B	Pass	37.8dBµV @ 16.899MHz (-12.2dB)

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	Job Number:	J83573
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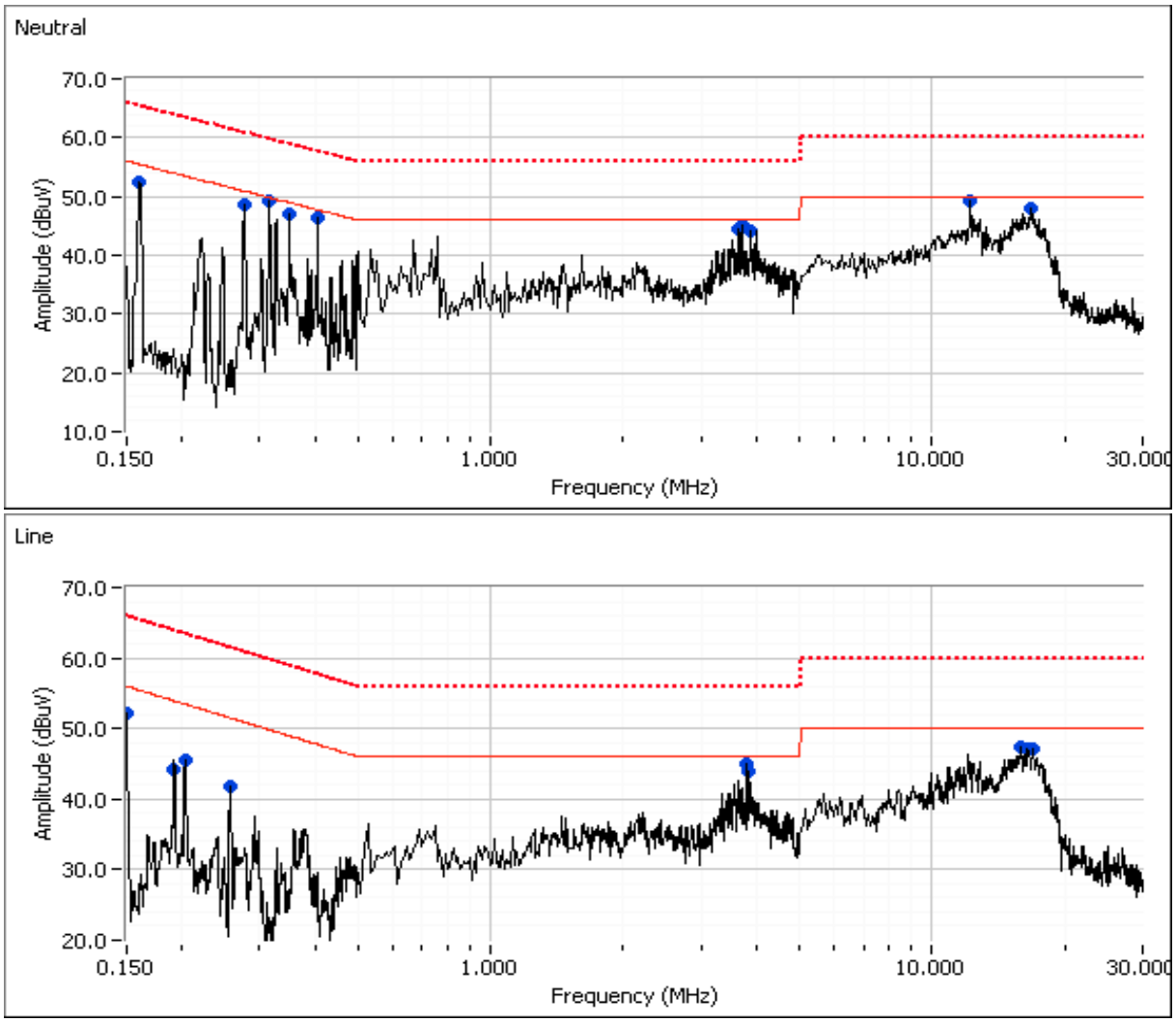
Run #1: AC Power Port Conducted Emissions, 0.15 - 30MHz, 120V/60Hz



Client:	Broadcom	Job Number:	J83573
Model:	BRC92070MD_REF12	T-Log Number:	T83604
		Account Manager:	Sheareen Washington
Contact:	Juan Martinez		
Standard:	FCC 15.247, RSS-210, LP0002	Class:	B

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

Frequency	Level	AC	Class B		Detector	Comments
MHz	dBµV	Line	Limit	Margin	QP/Ave	
0.313	49.2	Neutral	49.8	-0.6	Peak	
0.348	47.1	Neutral	48.9	-1.8	Peak	
0.408	46.3	Neutral	47.7	-1.4	Peak	
0.280	48.7	Neutral	50.9	-2.2	Peak	
0.158	52.5	Neutral	55.4	-2.9	Peak	
3.612	44.4	Neutral	46.0	-1.6	Peak	
3.706	45.0	Neutral	46.0	-1.0	Peak	
3.887	44.3	Neutral	46.0	-1.7	Peak	
12.125	49.1	Neutral	50.0	-0.9	Peak	
16.663	47.9	Neutral	50.0	-2.1	Peak	
0.152	52.1	Line	56.0	-3.9	Peak	
0.192	44.2	Line	54.0	-9.8	Peak	
0.206	45.4	Line	53.4	-8.0	Peak	
0.260	41.7	Line	51.5	-9.8	Peak	
3.846	44.0	Line	46.0	-2.0	Peak	
3.786	45.0	Line	46.0	-1.0	Peak	
15.941	47.3	Line	50.0	-2.7	Peak	
16.233	47.0	Line	50.0	-3.0	Peak	
16.899	47.0	Line	50.0	-3.0	Peak	

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Final quasi-peak and average readings

Frequency	Level	AC	Class B		Detector	Comments
MHz	dBµV	Line	Limit	Margin	QP/Ave	
16.899	37.8	Line	50.0	-12.2	AVG	AVG (0.10s)
16.233	37.3	Line	50.0	-12.7	AVG	AVG (0.10s)
16.663	37.2	Neutral	50.0	-12.8	AVG	AVG (0.10s)
0.408	44.9	Neutral	57.7	-12.8	QP	QP (1.00s)
15.941	36.9	Line	50.0	-13.1	AVG	AVG (0.10s)
12.125	36.2	Neutral	50.0	-13.8	AVG	AVG (0.10s)
0.152	51.5	Line	65.9	-14.4	QP	QP (1.00s)
3.612	30.9	Neutral	46.0	-15.1	AVG	AVG (0.10s)
3.706	30.8	Neutral	46.0	-15.2	AVG	AVG (0.10s)
3.887	30.4	Neutral	46.0	-15.6	AVG	AVG (0.10s)
3.786	30.4	Line	46.0	-15.6	AVG	AVG (0.10s)
0.280	45.0	Neutral	60.8	-15.8	QP	QP (1.00s)
3.846	30.0	Line	46.0	-16.0	AVG	AVG (0.10s)
0.348	42.9	Neutral	59.0	-16.1	QP	QP (1.00s)
3.612	39.8	Neutral	56.0	-16.2	QP	QP (1.00s)
3.706	39.7	Neutral	56.0	-16.3	QP	QP (1.00s)
16.899	43.7	Line	60.0	-16.3	QP	QP (1.00s)
16.663	43.2	Neutral	60.0	-16.8	QP	QP (1.00s)
16.233	43.1	Line	60.0	-16.9	QP	QP (1.00s)
15.941	43.0	Line	60.0	-17.0	QP	QP (1.00s)
0.158	48.1	Neutral	65.6	-17.5	QP	QP (1.00s)
3.887	38.4	Neutral	56.0	-17.6	QP	QP (1.00s)
12.125	42.4	Neutral	60.0	-17.6	QP	QP (1.00s)
3.786	38.2	Line	56.0	-17.8	QP	QP (1.00s)
3.846	38.1	Line	56.0	-17.9	QP	QP (1.00s)
0.313	41.8	Neutral	59.9	-18.1	QP	QP (1.00s)
0.348	28.3	Neutral	49.0	-20.7	AVG	AVG (0.10s)
0.408	24.7	Neutral	47.7	-23.0	AVG	AVG (0.10s)
0.260	38.3	Line	61.4	-23.1	QP	QP (1.00s)
0.192	40.0	Line	63.9	-23.9	QP	QP (1.00s)
0.206	38.8	Line	63.4	-24.6	QP	QP (1.00s)
0.313	24.4	Neutral	49.9	-25.5	AVG	AVG (0.10s)
0.206	27.9	Line	53.4	-25.5	AVG	AVG (0.10s)
0.192	28.2	Line	53.9	-25.7	AVG	AVG (0.10s)
0.280	22.9	Neutral	50.8	-27.9	AVG	AVG (0.10s)
0.260	22.3	Line	51.4	-29.1	AVG	AVG (0.10s)

End of Report

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