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MEASUREMENT REPORT
FCC PART 15.247 / IC RSS-210 WLAN 802.11b/g/n

Applicant Name:
Samsung Electronics, Co. Ltd.
18600 Broadwick St.
Rancho Dominguez, CA 90220
United States

Date of Testing:
April 2-10, 2012
Test Site/Location:
PCTEST Lab, Columbia, MD, USA
Test Report Serial No.:
0Y1203270325.A3L

FCC ID:	**A3LGTI8160L**
APPLICANT:	**Samsung Electronics, Co. Ltd.**

Application Type:	Certification
Model(s):	GT-I8160L
EUT Type:	Portable Handset
FCC Classification:	Digital Transmission System (DTS)
FCC Rule Part(s):	Part 15.247
IC Specification(s):	RSS-210 Issue 8
Test Procedure(s):	ANSI C63.4-2003, KDB 558074

Mode	Tx Frequency (MHz)	Avg Conducted		Peak Conducted	
		Max. Power (mW)	Max. Power (dBm)	Max. Power (mW)	Max. Power (dBm)
802.11b	2412 - 2462	24.831	13.95	35.810	15.54
802.11g	2412 - 2462	18.408	12.65	51.286	17.10
802.11n	2412 - 2462	13.122	11.18	34.754	15.41

This equipment has been shown to be capable of compliance with the applicable technical standards as indicated in the measurement report and was tested in accordance with the measurement procedures specified in ANSI C63.4-2003. Test results reported herein relate only to the item(s) tested.

I attest to the accuracy of data. All measurements reported herein were performed by me or were made under my supervision and are correct to the best of my knowledge and belief. I assume full responsibility for the completeness of these measurements and vouch for the qualifications of all persons taking them.

PCTEST certifies that no party to this application has been subject to a denial of Federal benefits that includes FCC benefits pursuant to Section 5301 of the Anti-Drug Abuse Act of 1988, 21 U.S.C. 862.

Randy Ortanez
President

ACCREDITED
TESTING LABORATORY
CERTIFICATE #2041.01

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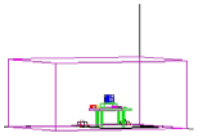

MEASUREMENT REPORT
FCC Part 15.247

§ 2.1033 General Information

APPLICANT:	Samsung Electronics, Co. Ltd.
APPLICANT ADDRESS:	18600 Broadwick St.
	Rancho Dominguez, CA 90220, United States
TEST SITE:	PCTEST ENGINEERING LABORATORY, INC.
TEST SITE ADDRESS:	6660-B Dobbin Road, Columbia, MD 21045 USA
FCC RULE PART(S):	Part 15.247
IC SPECIFICATION(S):	RSS-210 Issue 8
MODEL NAME:	GT-I8160L
FCC ID:	A3LGTI8160L
Test Device Serial No.:	6APR-1, 6APR-2 ☐ Production ☒ Pre-Production ☐ Engineering
FCC CLASSIFICATION:	Digital Transmission System (DTS)
DATE(S) OF TEST:	April 2-10, 2012
TEST REPORT S/N:	0Y1203270325.A3L

Test Facility / Accreditations

Measurements were performed at PCTEST Engineering Lab located in Columbia, MD 21045, U.S.A.

- PCTEST facility is an FCC registered (PCTEST Reg. No. 90864) test facility with the site description report on file and has met all the requirements specified in Section 2.948 of the FCC Rules and Industry Canada (2451A-1).
- PCTEST Lab is accredited to ISO 17025 by U.S. National Institute of Standards and Technology (NIST) under the National Voluntary Laboratory Accreditation Program (NVLAP Lab code: 100431-0) in EMC, FCC and Telecommunications.
- PCTEST Lab is accredited to ISO 17025-2005 by the American Association for Laboratory Accreditation (A2LA) in Specific Absorption Rate (SAR) testing, Hearing Aid Compatibility (HAC) testing, CTIA Test Plans, and wireless testing for FCC and Industry Canada Rules.

- PCTEST Lab is a recognized U.S. Conformity Assessment Body (CAB) in EMC and R&TTE (n.b. 0982) under the U.S.-EU Mutual Recognition Agreement (MRA).
- PCTEST TCB is a Telecommunication Certification Body (TCB) accredited to ISO/IEC Guide 65 by the American National Standards Institute (ANSI) in all scopes of FCC Rules and Industry Canada Standards (RSS).
- PCTEST facility is an IC registered (2451A-1) test laboratory with the site description on file at Industry Canada.
- PCTEST is a CTIA Authorized Test Laboratory (CATL) for AMPS, CDMA, and EvDO wireless devices and for Over-the-Air (OTA) Antenna Performance testing for AMPS, CDMA, GSM, GPRS, EGPRS, UMTS (W-CDMA), CDMA 1xEVDO, and CDMA 1xRTT.

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1.0 INTRODUCTION

1.1 Scope

Measurement and determination of electromagnetic emissions (EMC) of radio frequency devices including intentional and/or unintentional radiators for compliance with the technical rules and regulations of the Federal Communications Commission and the Industry Canada Certification and Engineering Bureau.

1.2 PCTEST Test Location

The map below shows the location of the PCTEST LABORATORY, its proximity to the FCC Laboratory, the Columbia vicinity, the Baltimore-Washington Internt'l (BWI) airport, the city of Baltimore and the Washington, DC area. (*See Figure 1-1*).

These measurement tests were conducted at the PCTEST Engineering Laboratory, Inc. facility in New Concept Business Park, Guilford Industrial Park, Columbia, Maryland. The site address is 6660-B Dobbin Road, Columbia, MD 21045. The test site is one of the highest points in the Columbia area with an elevation of 390 feet above mean sea level. The site coordinates are 39° 11'15" N latitude and 76° 49'38" W longitude. The facility is 1.5 miles North of the FCC laboratory, and the ambient signal and ambient signal strength are approximately equal to those of the FCC laboratory. There are no FM or TV transmitters within 15 miles of the site. The detailed description of the measurement facility was found to be in compliance with the requirements of § 2.948 according to ANSI C63.4-2003 on January 10, 2012

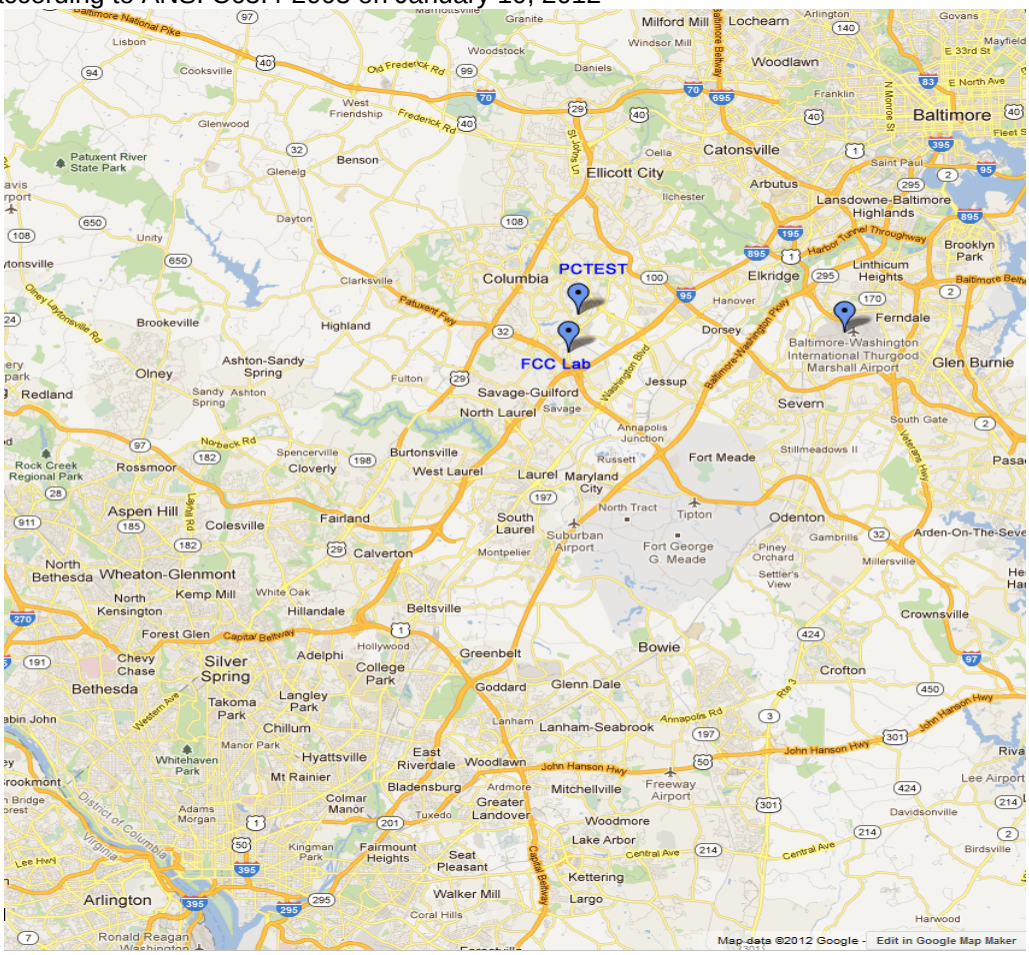

Figure 1-1. Map of the Greater Baltimore and Metropolitan Washington, D.C. area

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2.0 PRODUCT INFORMATION

2.1 Equipment Description

The Equipment Under Test (EUT) is the **Samsung Portable Handset FCC ID: A3LGTI8160L**. The test data contained in this report pertains only to the emissions due to the EUT's WLAN transmitter.

2.2 Device Capabilities

This device contains the following capabilities:

850/1900 GSM/GPRS/EDGE, 850/1900 WCDMA/HSPA, 802.11b/g/n WLAN, Bluetooth (1x,EDR)

2.3 Test Configuration

The Samsung Portable Handset FCC ID: A3LGTI8160L was tested per the guidance of KDB 558074. See Sections 3.2, 3.3, and 6.1 of this test report for a description of the AC line conducted emissions, radiated emissions, and antenna port conducted emissions test setups, respectively.

2.4 EMI Suppression Device(s)/Modifications

No EMI suppression device(s) were added and/or no modifications were made during testing.

2.5 Labeling Requirements

Per 15.19; Docket 95-19

The label shall be permanently affixed at a conspicuous location on the device; instruction manual or pamphlet supplied to the user and be readily visible to the purchaser at the time of purchase. However, when the device is so small wherein placement of the label with specified statement is not practical, only the trade name and FCC ID must be displayed on the device per Section 15.19(b)(2).

Please see attachment for FCC ID label and label location.

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3.0 DESCRIPTION OF TEST

3.1 Evaluation Procedure

The measurement procedures described in the American National Standard for Methods of Measurement of Radio-Noise Emission from Low-Voltage Electrical and Electronic Equipment in the Range of 9kHz to 40GHz (ANSI C63.4-2003) and the guidance provided in KDB 558074 were used in the measurement of the **Samsung Portable Handset FCC ID: A3LGTI8160L.**

Deviation from measurement procedure…….....None

3.2 AC Line Conducted Emissions

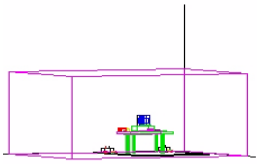

Figure 3-1. Shielded Enclosure Line-Conducted Test Facility

The line-conducted facility is located inside a 16'x20'x10' shielded enclosure, manufactured by Ray Proof Series 81 (*see Figure 3-1*). The shielding effectiveness of the shielded room is in accordance with MIL-Std-285 or NSA 65-5. A 1m x 1.5m wooden table 80cm high is placed 40cm away from the vertical wall and 1.5m away from the sidewall of the shielded room (*see Figure 3-2*). Two 10kHz-30MHz, 50Ω/50μH Line-Impedance Stabilization Networks (LISNs) are bonded to the shielded room (*see Figure 3-3*). Power to the LISNs are filtered by a high-current high-insertion loss Ray Proof power line filter (100dB 14Hz-10GHz). The purpose of the filter is to attenuate ambient signal interference and this filter is also bonded to the shielded enclosure. All electrical cables are shielded by braided tinned copper zipper tubing with an inner diameter of ½".

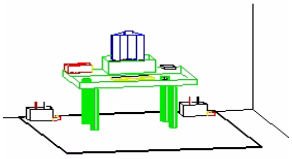

Figure 3-2. Line Conducted Emission Test Set-Up

The EUT is powered from one LISN and the support equipment is powered from the second LISN. If the EUT is a DC-powered device, power will be derived from the source power supply it normally will be powered from and this supply line(s) will be connected to the Solar LISN. The LISN schematic diagram is shown (*see Figure 3-4*). All interconnecting cables more than 1 meter were shortened to a 1 meter length by non-inductive bundling (serpentine fashion) and draped over the back edge of the test table. All cables were at least 40cm above the horizontal reference groundplane. Power cables for support equipment were routed down to the second LISN while ensuring that that cables were not draped over the second LISN.

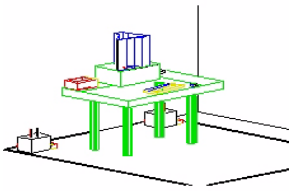

Figure 3-3. Wooden Table & Bonded LISNs

Sufficient time for the EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating condition. The RF output of the LISN was connected to the spectrum analyzer and exploratory measurements were made to determine the frequencies producing the maximum emission from the EUT. The spectrum was scanned from 150kHz to 30MHz with a spectrum analyzer. The detector function was set to peak mode for exploratory measurements. The bandwidth of the analyzer was set to 10kHz. The EUT, support equipment, and interconnecting cables were arranged and manipulated to maximize each emission emission. Each emission was maximized by varying: power lines, the mode of operation or resolution, clock or data exchange speed, scrolling H pattern to the EUT and/or support equipment, and powering the monitor from the floor mounted outlet box and the computer aux AC outlet, if applicable; whichever determined the worst-case emission. Once the worst case emissions have been identified, the one EUT cable configuration/arrangement and mode of operation that produced these emissions is used for final measurements on the same test site. The analyzer is set to CISPR quasi-peak and average detectors with a 9kHz bandwidth for final measurements. Each emission reported was calibrated using a signal generator.

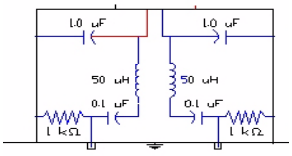

Figure 3-4. LISN Schematic Diagram

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3.3 Radiated Emissions

The radiated test facilities consisted of an indoor semi-anechoic chamber used for exploratory measurements and an open area test site (OATS) used for final measurements. For all measurements, the spectrum was scanned through all EUT azimuths and from 1 to 4 meter receive antenna height using a broadband antenna from 30MHz up to the upper frequency shown in 15.33(b)(1) depending on the highest frequency generated or used in the device or on which the device operates or tunes. For frequencies higher than the upper frequency range of the broadband antenna used for testing, linearly polarized double ridge horn antennas were used. For frequencies below 30MHz, a calibrated loop antenna was used.

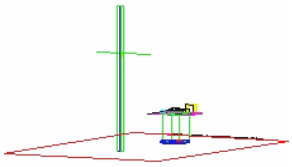

Figure 3-5. 3-Meter Test Site

Exploratory measurements were performed at 1 meter test distance inside the semi-anechoic chamber using broadband antennas, broadband amplifiers, and spectrum analyzers to determine the frequencies producing the maximum emissions. Sufficient time for the EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating condition. The test set-up was placed on top of a 0.8 meter high non-metallic 1 x 1.5 meter table (*see Figure 3-7*). The EUT, support equipment, and interconnecting cables were arranged and manipulated to maximize each emission. Appropriate precaution was taken to ensure that all emissions from the EUT were maximized and investigated. The system configuration, clock speed, mode of operation or video resolution, turntable azimuth, and receive antenna height was noted for each frequency found. To record the exploratory measurements, the analyzers' detector function was set to peak mode and the bandwidth was set to 100kHz.

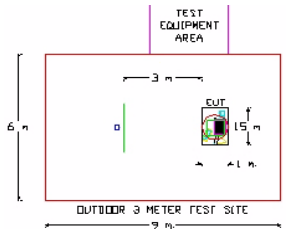

Figure 3-6. Dimensions of Outdoor Test Site

Final measurements were made on the OATS at 3 meter test range using calibrated, linearly polarized broadband or horn antennas (*see Figure 3-5*). The measurement area is situated on an 18 meter x 20 meter galvanized 1/2" hardware cloth as the conducting ground plane. This material is sewn together in sections 4 feet wide and 60 feet long. A total of eighteen sections are required to cover the entire measurement area. Sections are laid across the width of the pad, overlapped 1" and sewn and soldered together at intervals of 3" (7.6 cm.) The terrain of the test site is reasonably flat and level. Power and cable to the test site are buried 18" deep into the ground outside the perimeter of the site. An all-weather non-metallic housing is situated on a 2 x 3 meter area adjacent to the measurement area to house the test equipment (*see Figure 3-6*). The test set-up was again placed on top of the same a 0.8 meter high non-metallic 1 x 1.5 meter table on the OATS as used for exploratory measurements in the indoor chamber. The test set-up was re-configured to the same setup that was previously determined through exploratory measurements to have produced the worst case emissions. The spectrum analyzer was set to the frequencies found to have caused the highest radiated disturbances with respect to the limit during preliminary radiated measurements. The turntable containing the system was rotated through 360 degrees and the height of the receive antenna was varied 1 to 4 meters and stopped at the azimuth and height producing the maximum emission. Each emission was re-maximized by varying: the mode of operation or resolution, clock or data exchange speed, scrolling H pattern to the EUT and/or support equipment, powering the monitor from the floor mounted outlet box and the computer aux AC outlet, if applicable, and changing the polarity of the receive antenna, whichever produced the worst-case emissions. To record the final measurements, the analyzer detector function was set to CISPR quasi-peak mode and the bandwidth of the spectrum analyzer was set to 100kHz for frequencies below 1GHz or 1MHz for frequencies above 1GHz. For average measurements above 1GHz, the analyzer was set to peak detector with a reduced VBW setting (RBW = 1MHz, VBW = 10Hz). Each emission reported was calibrated using a signal generator. The Theoretical Normalized Site Attenuation Curves for both horizontal and vertical polarization are shown in Figure 3-8.

Figure 3-7. Turntable and System Setup

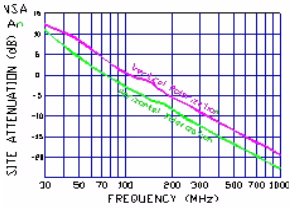

Figure 3-8. Normalized Site Attenuation Curves (H&V)

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4.0 ANTENNA REQUIREMENTS

Excerpt from §15.203 of the FCC Rules/Regulations:
"An intentional radiator antenna shall be designed to ensure that no antenna other than that furnished by the responsible party can be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section."

- The antenna(s) of the Portable Handset are **permanently attached.**
- There are no provisions for connection to an external antenna.

Conclusion:

The **Samsung Portable Handset FCC ID: A3LGTI8160L** unit complies with the requirement of §15.203.

Ch.	Frequency (MHz)	Ch.	Frequency (MHz)
1	2412	7	2442
2	2417	8	2447
3	2422	9	2452
4	2427	10	2457
5	2432	11	2462
6	2437		

Table 4-1. Frequency / Channel Operations

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5.0 TEST EQUIPMENT CALIBRATION DATA

Test Equipment Calibration is traceable to the National Institute of Standards and Technology (NIST).

Manufacturer	Model	Description	Cal Date	Cal Interval	Cal Due	Serial Number
-	RE1	Radiated Emissions Cable Set (UHF/EHF)	6/7/2011	Annual	6/7/2012	N/A
-	WL25-1	WLAN Cable Set (25GHz)	2/13/2012	Annual	2/13/2013	N/A
-	RE2	Radiated Emissions Cable Set (VHF/UHF)	2/13/2012	Annual	2/13/2013	N/A
-	40G-1R	40GHz Radiated Cable Set	2/23/2012	Annual	2/23/2013	N/A
-	WL40-1	WLAN Cable Set (40GHz)	2/24/2012	Annual	2/24/2013	N/A
Agilent	8447D	Broadband Amplifier	4/17/2011	Annual	4/17/2012	2443A01900
Agilent	8449B	(1-26.5GHz) Pre-Amplifier	2/15/2012	Annual	2/15/2013	3008A00985
Agilent	E4448A	PSA (3Hz-50GHz) Spectrum Analyzer	2/15/2012	Annual	2/15/2013	US42510244
Agilent	E8257D	(250kHz-20GHz) Signal Generator	4/8/2011	Annual	4/8/2012	MY45470194
Agilent	N9020A	MXA Signal Analyzer	10/10/2011	Annual	10/10/2012	US46470561
Agilent	N9038A	MXE EMI Receiver	8/5/2011	Annual	8/5/2012	MY51210133
Anritsu	MA2411B	Pulse Sensor	10/13/2011	Annual	10/13/2012	1027293
Anritsu	ML2495A	Power Meter	10/13/2011	Annual	10/13/2012	1039008
Mini-Circuits	VHF-3100+	High Pass Filter	2/7/2012	Annual	2/7/2013	31144
Mini-Circuits	VHF-8400+	3.4GHz - 9.9GHz High Pass Filter	2/28/2012	Annual	2/28/2013	31048
Solar Electronics	8012-50-R-24-BNC	LISN	6/23/2011	Biennial	6/23/2013	310233
Sunol	DRH-118	Horn Antenna (1 - 18GHz)	7/5/2011	Biennial	7/5/2013	A050307
Sunol	JB5	Bi-Log Antenna (30M - 5GHz)	1/26/2012	Biennial	1/26/2014	A051107

Table 5-1. Annual Test Equipment Calibration Schedule

Note: Although the Agilent Signal Generator has a calibration due date that is within the test dates, it was utilized for testing prior to the calibration due date.

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6.0 TEST RESULTS

6.1 Summary

Company Name: Samsung Electronics, Co. Ltd.

FCC ID: A3LGTI8160L

FCC Classification: Digital Transmission System (DTS)

Data Rate(s) Tested: 1Mbps, 2Mbps, 5.5Mbps, 11Mbps (b)

6Mbps, 9Mbps, 12Mbps, 18Mbps, 24Mbps, 36Mbps, 48Mbps, 54Mbps (g)

6.5/7.2Mbps, 13/14.4Mbps, 19.5/21.7Mbps, 26/28.9Mbps, 39/43.3Mbps, 52/57.8Mbps, 58.5/65Mbps, 65/72.2Mbps (n – 20MHz)

FCC Part Section(s)	RSS Section(s)	Test Description	Test Limit	Test Condition	Test Result	Reference
TRANSMITTER MODE (TX)						
15.247(a)(2)	RSS-210 [A8.2]	6dB Bandwidth	> 500kHz	CONDUCTED	PASS	Section 6.2
15.247(b)(3)	RSS-210 [A8.4]	Transmitter Output Power	< 1 Watt		PASS	Section 6.3
15.247(e)	RSS-210 [A8.2]	Transmitter Power Spectral Density	< 8dBm / 3kHz Band		PASS	Section 6.4
15.247(d)	RSS-210 [A8.5]	Band Edge / Out-of-Band Emissions	< 30dBc (Average)		PASS	Sections 6.5, 6.6
15.205 15.209	RSS-210 [A8.5]	General Field Strength Limits (Restricted Bands and Radiated Emission Limits)	Emissions in restricted bands must meet the radiated limits detailed in 15.209 (RSS-210 table 3 limits)	RADIATED	PASS	Sections 6.7, 6.8
15.207	RSS-Gen [7.2.2]	AC Conducted Emissions 150kHz – 30MHz	< FCC 15.207 limits or < RSS-Gen table 2 limits	LINE CONDUCTED	PASS	Section 6.9
RECEIVER MODE (RX) / DIGITAL EMISSIONS						
15.107	RSS-Gen [7.2.2]	AC Conducted Emissions 150kHz – 30MHz	< FCC 15.107 limits or < RSS-Gen table 2 limits	LINE CONDUCTED	PASS	Part 15B Test Report
15.109	RSS-Gen [7.2.3.2]	General Field Strength Limits (Restricted Bands and Radiated Emissions Limits)	< FCC 15.109 limits or < RSS-210 table 3 limits	RADIATED (30MHz-1GHz) (1-25 GHz)	PASS	Part 15B Test Report

Table 6-1. Summary of Test Results

Notes:

1) All modes of operation and data rates were investigated. The test results shown in the following sections represent the worst case emissions.
2) The analyzer plots shown in this section were all taken with a correction table loaded into the analyzer. The correction table was used to account for the losses of the cables and attenuators used as part of the system to connect the EUT to the analyzer at all frequencies of interest.
3) All antenna port conducted emissions testing was performed on a test bench with the antenna port of the EUT connected to the spectrum analyzer through calibrated cables and attenuators.

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6.2 6dB Bandwidth Measurement – 802.11b/g/n

§15.247(a)(2); RSS-210 [A8.2]

The bandwidth at 6dB down from the highest in-band spectral density is measured with a spectrum analyzer connected to the receive antenna while the EUT is operating in transmission mode at the appropriate frequencies.

The minimum permissible 6dB bandwidth is 500 kHz.

Frequency [MHz]	Channel No.	802.11 Mode	Data Rate [Mbps]	Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
2412	1	b	1	7.133	0.500	Pass
2437	6	b	1	7.960	0.500	Pass
2462	11	b	1	7.771	0.500	Pass
2412	1	g	6	16.190	0.500	Pass
2437	6	g	6	16.020	0.500	Pass
2462	11	g	6	15.810	0.500	Pass
2412	1	n	6.5/7.2 (MCS0)	17.560	0.500	Pass
2437	6	n	6.5/7.2 (MCS0)	17.530	0.500	Pass
2462	11	n	6.5/7.2 (MCS0)	17.350	0.500	Pass

Table 6-2. Conducted Bandwidth Measurements

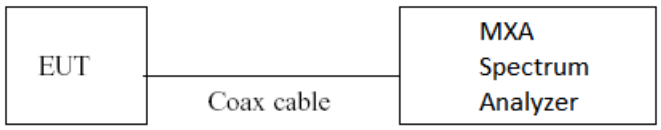

Figure 6-1. Test Instrument & Measurement Setup

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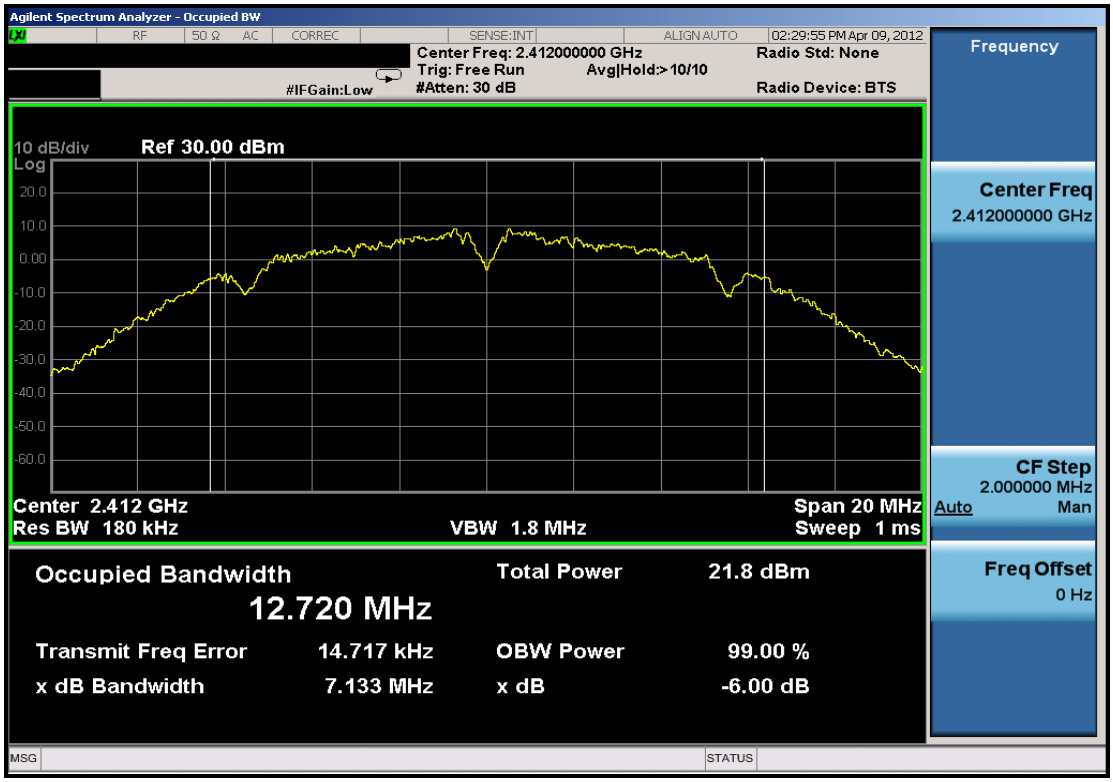
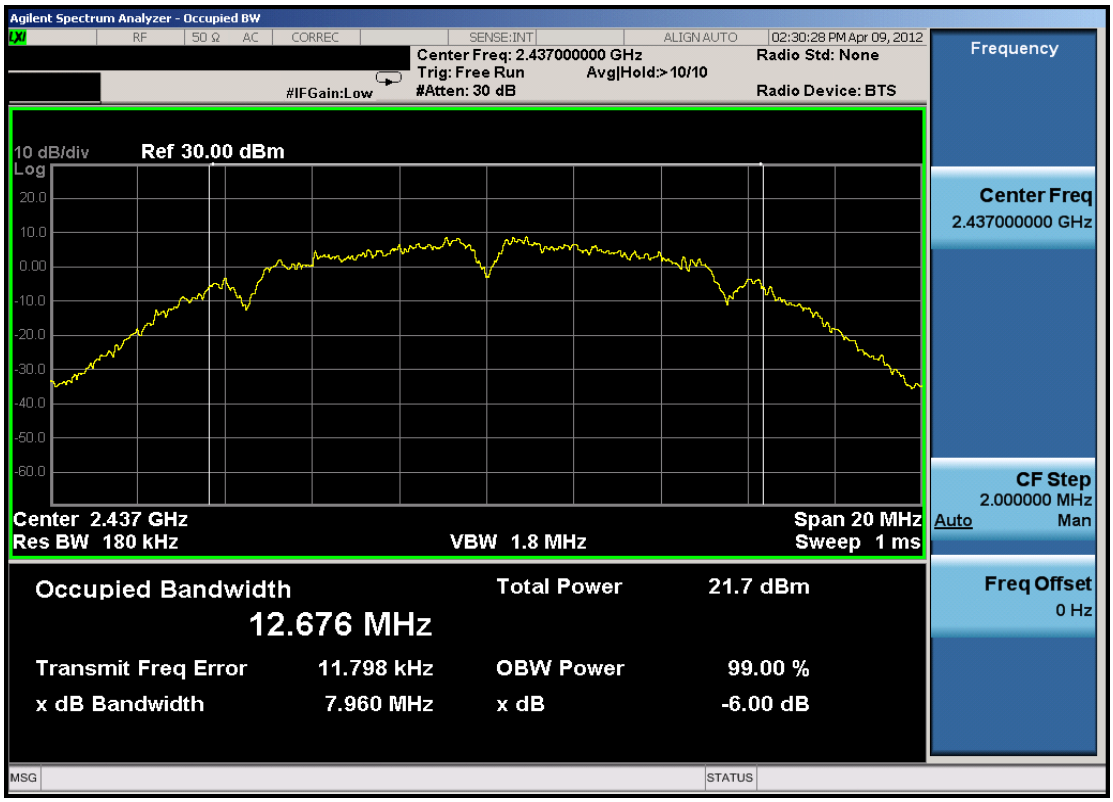


Plot 6-1. 6dB Bandwidth Plot (802.11b – Ch. 1)



Plot 6-2. 6dB Bandwidth Plot (802.11b – Ch. 6)

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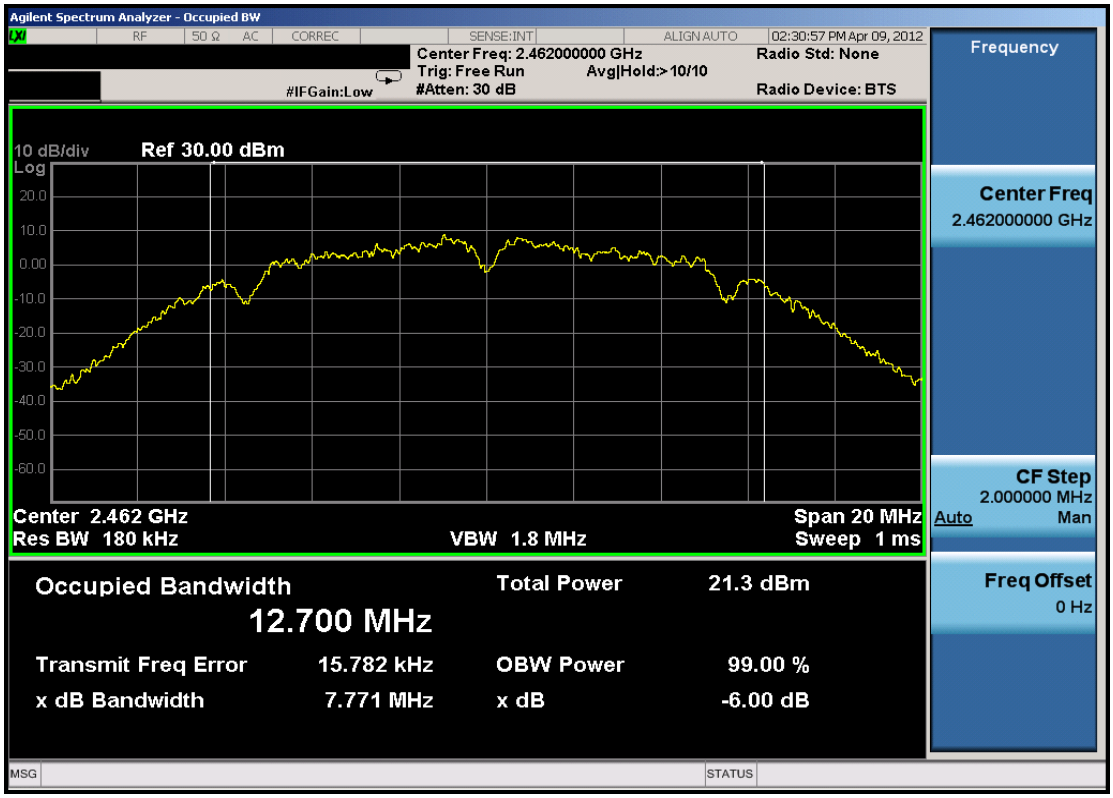
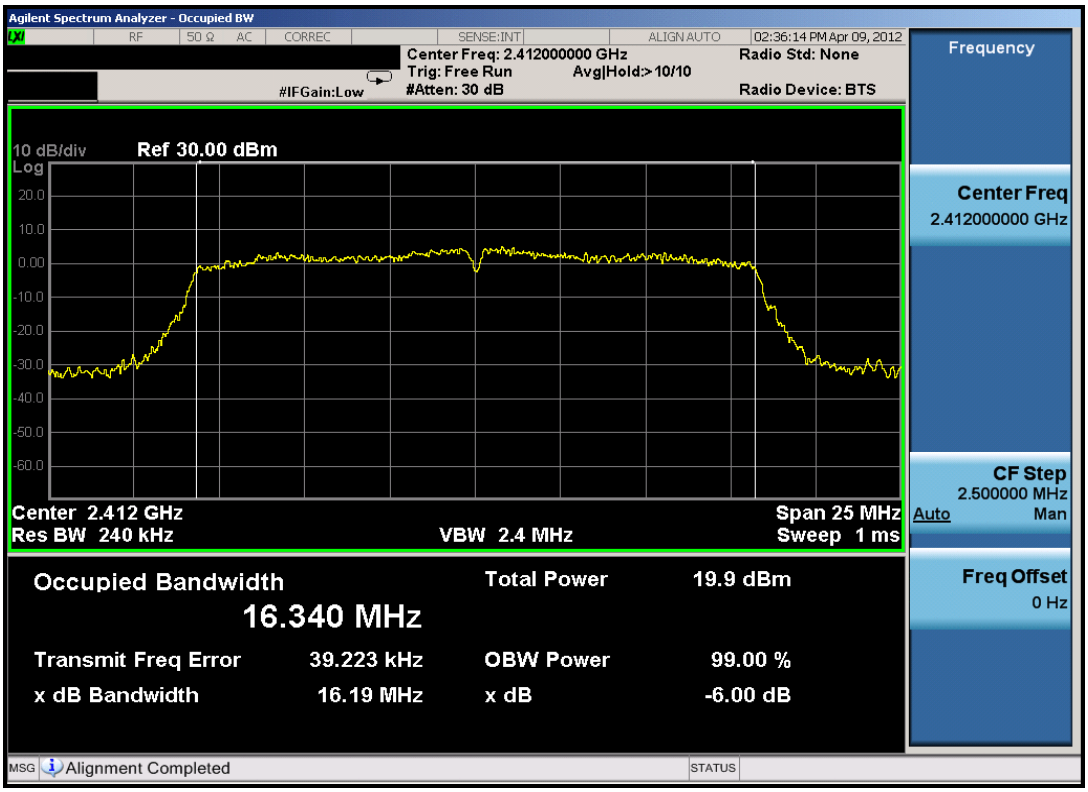


Plot 6-3. 6dB Bandwidth Plot (802.11b – Ch. 11)



Plot 6-4. 6dB Bandwidth Plot (802.11g – Ch. 1)

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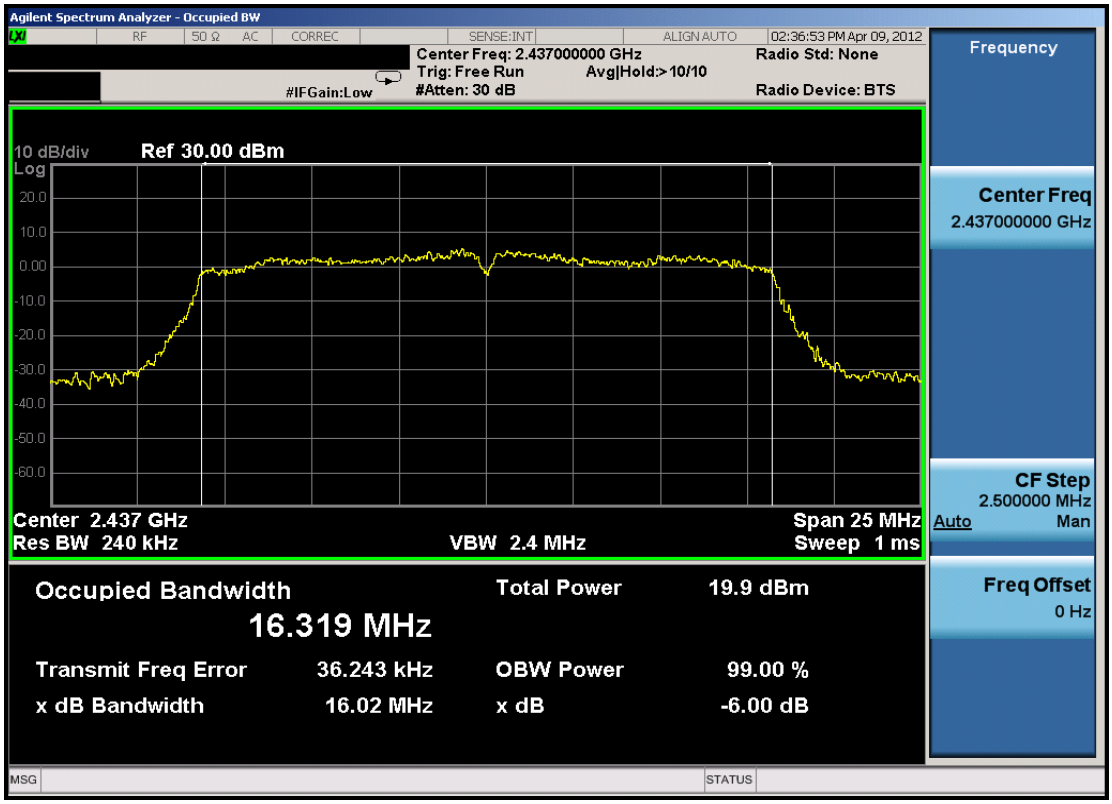
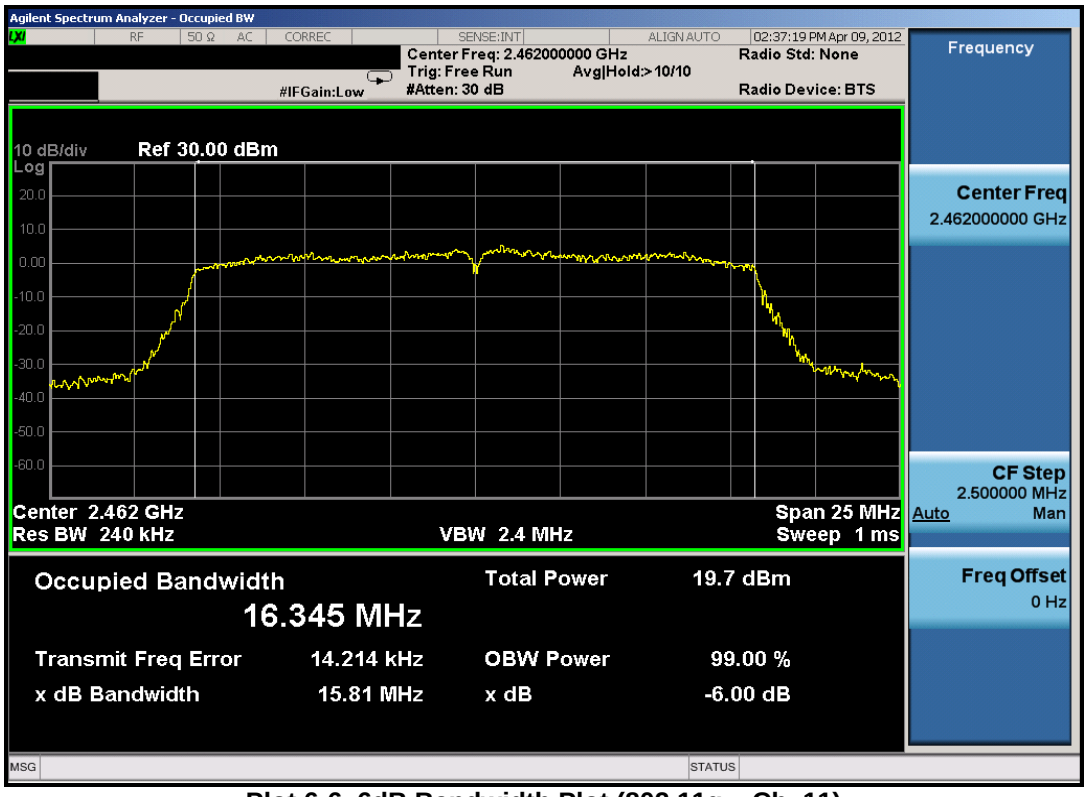


Plot 6-5. 6dB Bandwidth Plot (802.11g – Ch. 6)



Plot 6-6. 6dB Bandwidth Plot (802.11g – Ch. 11)

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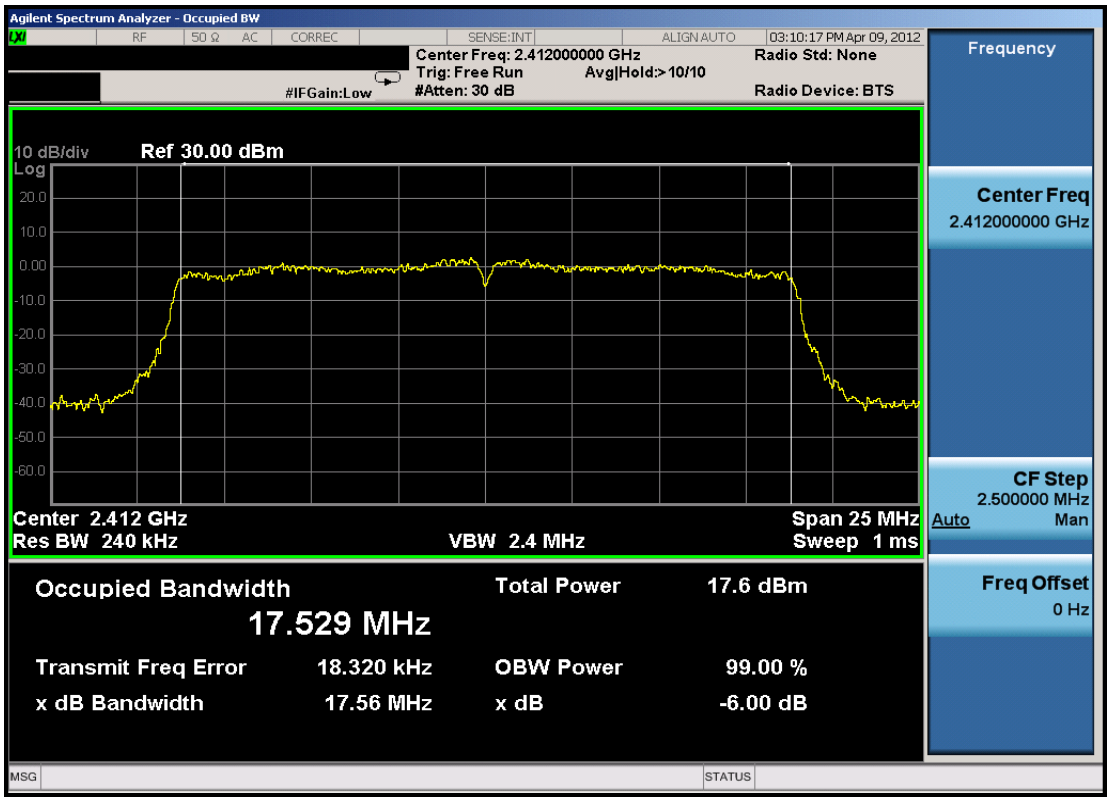
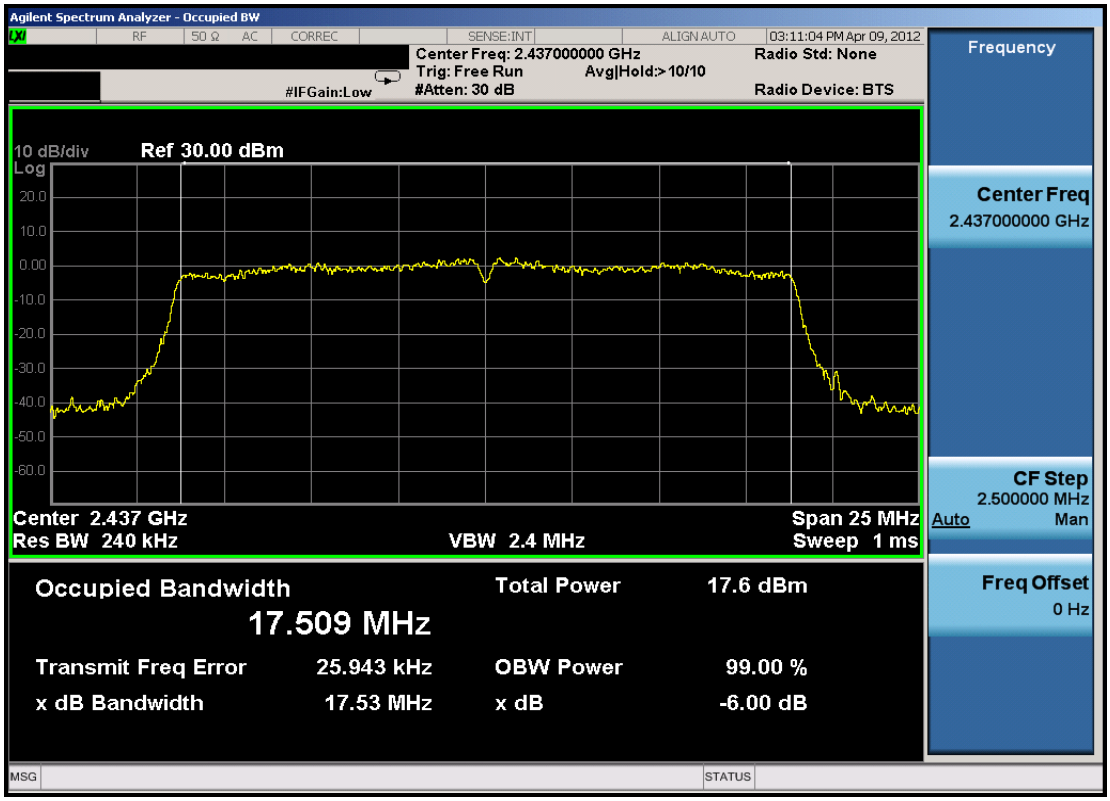


Plot 6-7. 6dB Bandwidth Plot (802.11n – Ch. 1)



Plot 6-8. 6dB Bandwidth Plot (802.11n – Ch. 6)

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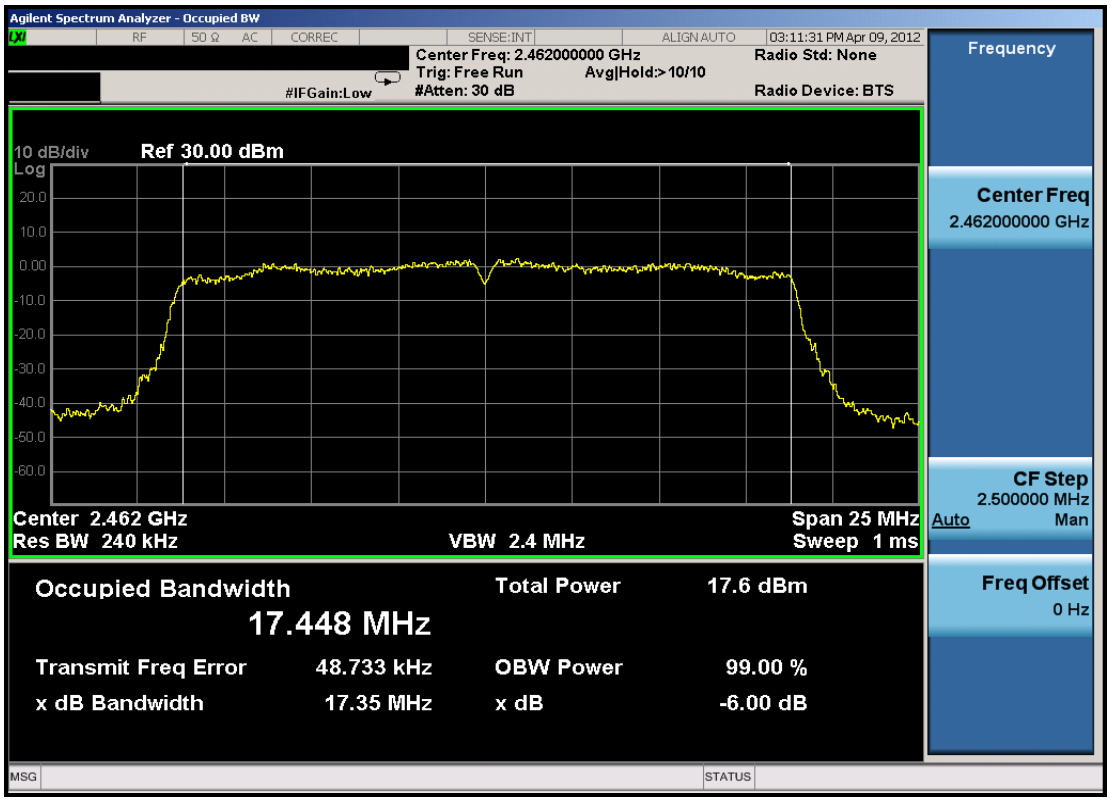

Plot 6-9. 6dB Bandwidth Plot (802.11n – Ch. 11)

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6.3 Output Power Measurement – 802.11b/g/n

§15.247(b)(3); RSS-210 [A8.4]

The transmit antenna terminal of the EUT is connected to the input of an RF power sensor. Measurement is made using a broadband power meter capable of making peak and average power measurements while the EUT is operating in transmission mode at the appropriate frequencies. ***The maximum permissible conducted output power is 1 Watt.***

Mode	Freq [MHz]	Channel	Detector	802.11b Conducted Power [dBm] Data Rate [Mbps]			
				1	2	5.5	11
802.11b	2412	1	AVG	13.94	13.91	13.94	13.95
			PEAK	15.52	15.52	15.53	15.54
802.11b	2437	6	AVG	13.77	13.78	13.79	13.77
			PEAK	15.33	15.33	15.33	15.30
802.11b	2462	11	AVG	13.63	13.62	13.59	13.62
			PEAK	15.14	15.14	15.14	15.16

Table 6-3. Conducted Output Power Measurements (802.11b)

Mode	Freq [MHz]	Channel	Detector	802.11g Conducted Power [dBm] Data Rate [Mbps]							
				6	9	12	18	24	36	48	54
802.11g	2412	1	AVG	12.63	12.64	12.65	12.63	12.65	12.63	12.61	12.60
			PEAK	16.92	16.99	17.08	17.10	16.98	16.93	16.92	17.02
802.11g	2437	6	AVG	12.50	12.52	12.50	12.47	12.48	12.50	12.45	12.47
			PEAK	16.71	16.76	16.72	16.90	16.74	16.93	16.75	16.79
802.11g	2462	11	AVG	12.30	12.29	12.39	12.33	12.25	12.31	12.32	12.31
			PEAK	16.51	16.42	16.63	16.59	16.43	16.35	16.56	16.40

Table 6-4. 802.11g Conducted Output Power Measurements

Mode	Freq [MHz]	Channel	Detector	802.11n (2.4GHz) Conducted Power [dBm] Data Rate [Mbps]							
				6.5/7.2	13/14.4	19.5/21.7	26/28.9	39/43.4	52/57.8	58.5/65	65/72.2
802.11n	2412	1	AVG	11.17	11.13	11.14	11.17	11.09	11.18	11.14	11.14
			PEAK	15.41	15.27	15.19	15.26	15.15	15.19	15.13	15.30
802.11n	2437	6	AVG	10.98	11.00	11.01	10.98	10.94	10.99	10.97	10.97
			PEAK	14.86	15.18	15.00	15.21	15.05	15.05	15.09	15.13
802.11n	2462	11	AVG	10.84	10.86	10.80	10.85	10.82	10.79	10.83	10.84
			PEAK	14.71	14.89	14.89	14.85	15.07	14.93	15.05	15.00

Table 6-5. 802.11n (2.4GHz) Conducted Output Power Measurements

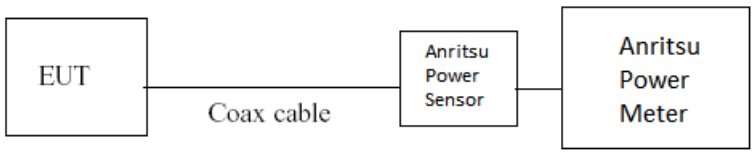

Figure 6-2. Test Instrument & Measurement Setup

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6.4 Power Spectral Density (802.11b/g/n)

§15.247(e); RSS-210 [A8.2]

The peak power density is measured with a spectrum analyzer connected to the antenna terminal while the EUT is operating in transmission mode at the appropriate frequencies. ***The maximum permissible power spectral density is 8 dBm in any 3 kHz band.***

Per the guidance on power spectral density measurements given in KDB 558074 Section 5.3.2, the resolution bandwidth is set to 100kHz, the video bandwidth is set to 300kHz and a power average (RMS) detector is used. The span is set to a value between 5% and 30% greater than the EBW. The number of measurement points is greater than 2 x span/RBW (2 x (15MHz/100kHz) = 300). Sweep time of 100s is utilized to ensure accurate measurement. A peak marker function is used over a single sweep to determine the maximum level. The measured spectrum is compared to the 8dBm/3kHz limit given in 15.247(e) by applying a bandwidth correction factor equal to 10log(3kHz/100kHz) = -15.23dB.

Frequency [MHz]	Channel No.	802.11 Mode	Data Rate [Mbps]	Measured Power Spectral Density [dBm]	Bandwidth Correction Factor [dB]	Corrected Power Spectral Density [dBm]	Maximum Permissible Power Density [dBm / 3kHz]	Margin [dB]
2412	1	b	1	4.32	-15.23	-10.91	8.0	-18.91
2437	6	b	1	4.33	-15.23	-10.90	8.0	-18.90
2462	11	b	1	4.20	-15.23	-11.03	8.0	-19.03
2412	1	g	6	-0.17	-15.23	-15.40	8.0	-23.40
2437	6	g	6	-0.11	-15.23	-15.34	8.0	-23.34
2462	11	g	6	-0.20	-15.23	-15.43	8.0	-23.43
2412	1	n	6.5/7.2 (MCS0)	-2.43	-15.23	-17.66	8.0	-25.66
2437	6	n	6.5/7.2 (MCS0)	-2.46	-15.23	-17.69	8.0	-25.69
2462	11	n	6.5/7.2 (MCS0)	-2.51	-15.23	-17.74	8.0	-25.74

Table 6-6. Conducted Power Density Measurements

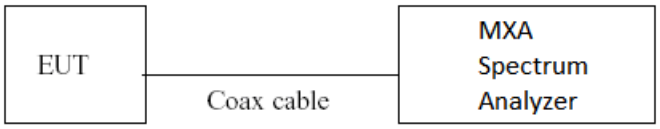

Figure 6-3. Test Instrument & Measurement Setup

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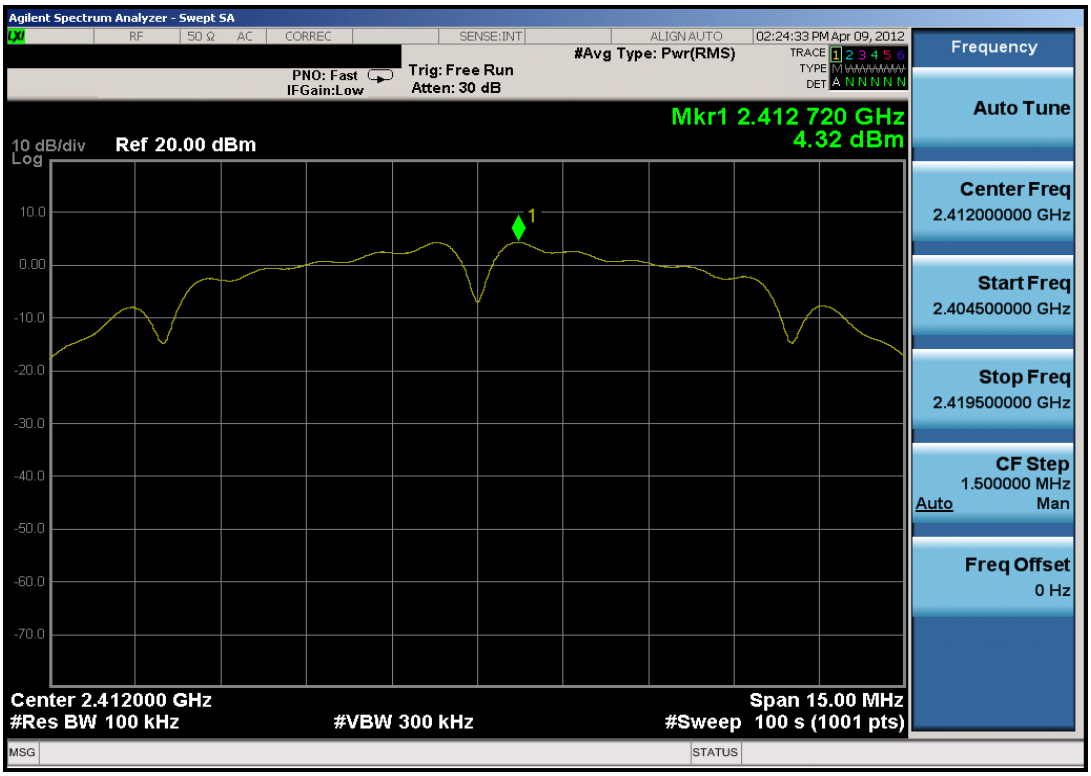
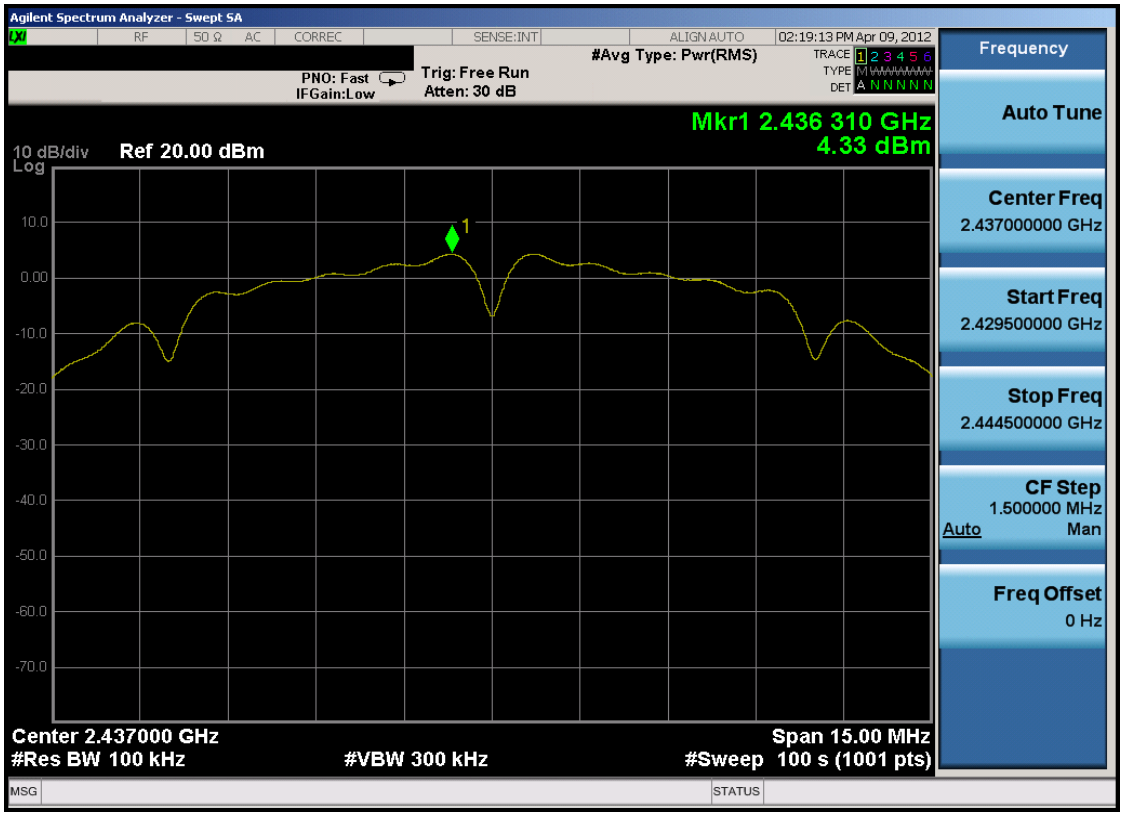


Plot 6-10. Power Spectral Density Plot (802.11b – Ch. 1)



Plot 6-11. Power Spectral Density Plot (802.11b – Ch. 6)

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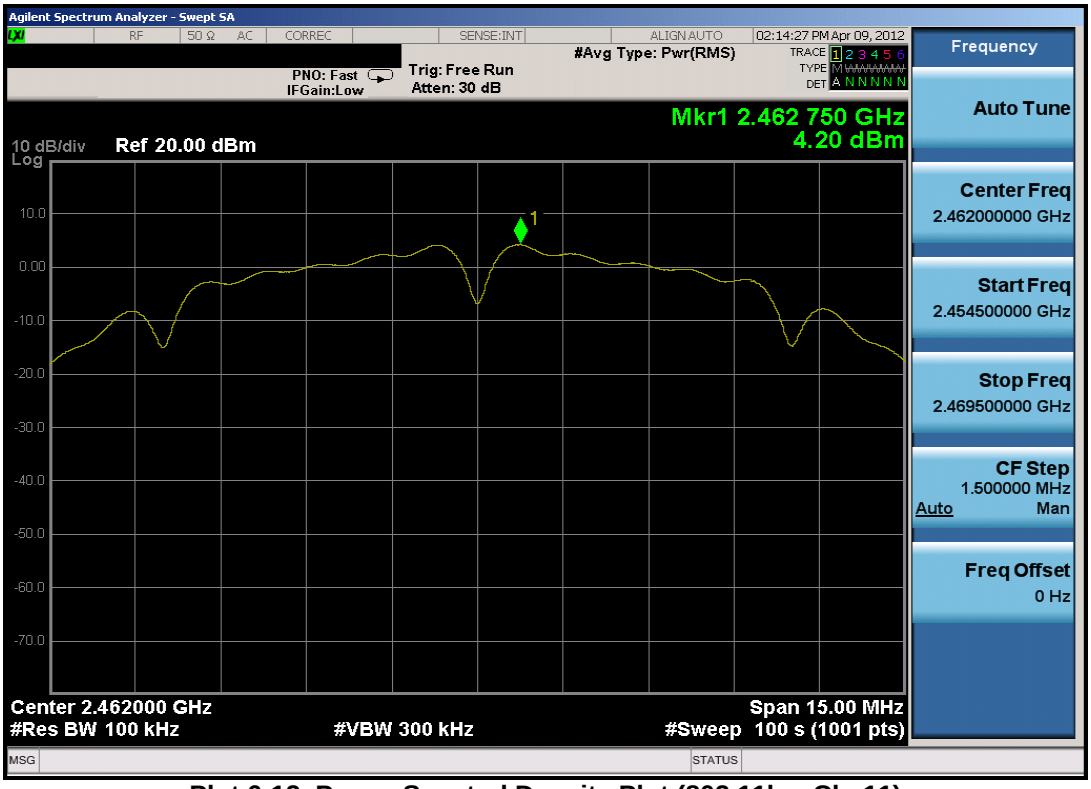
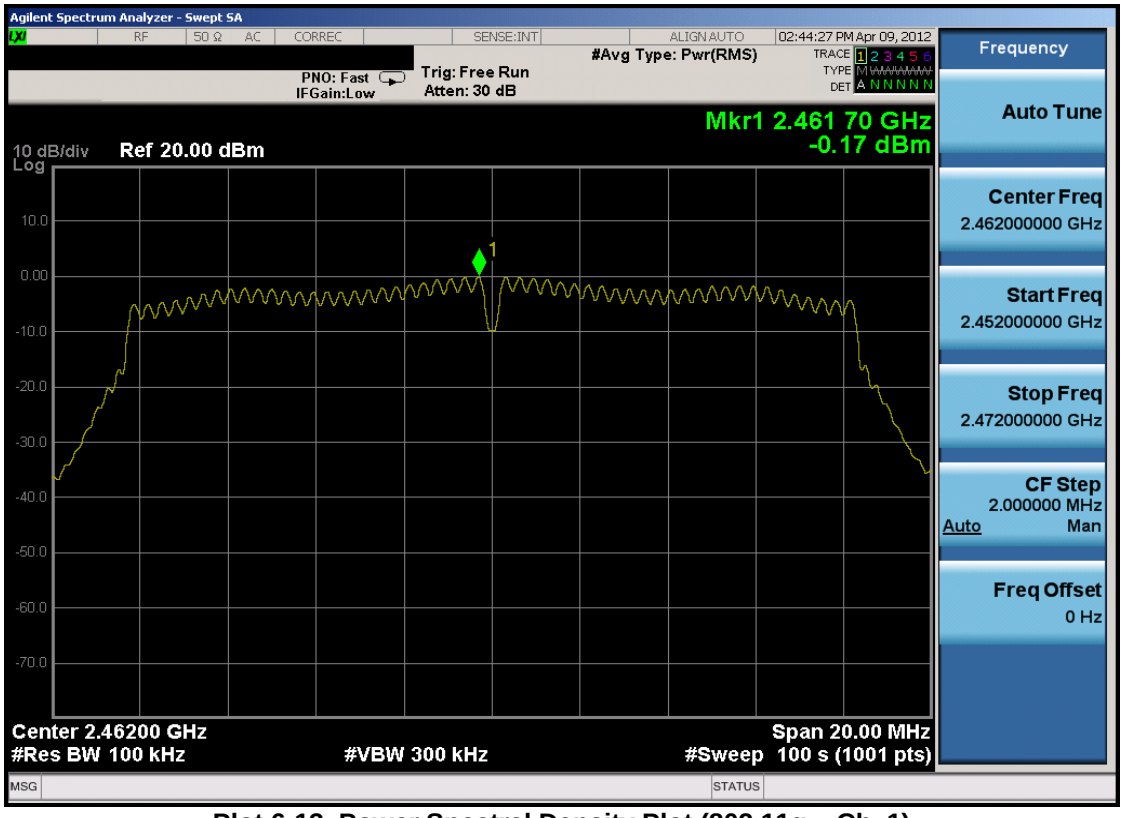


Plot 6-12. Power Spectral Density Plot (802.11b – Ch. 11)



Plot 6-13. Power Spectral Density Plot (802.11g – Ch. 1)

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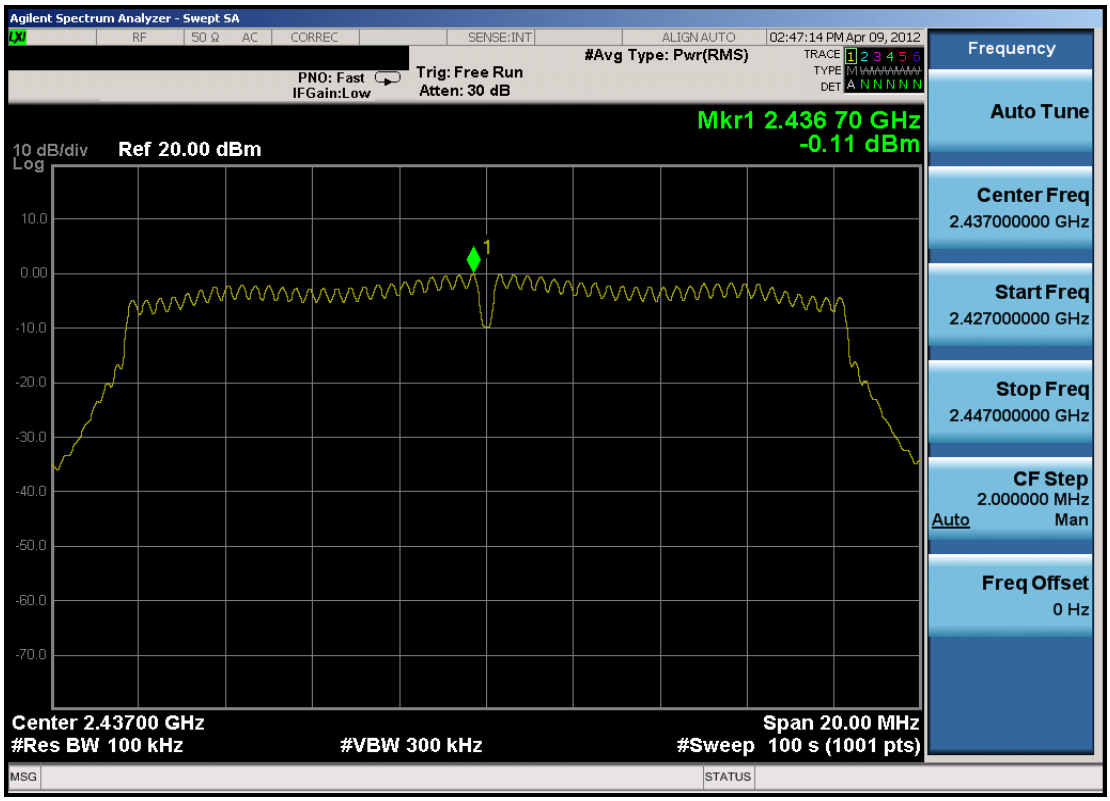
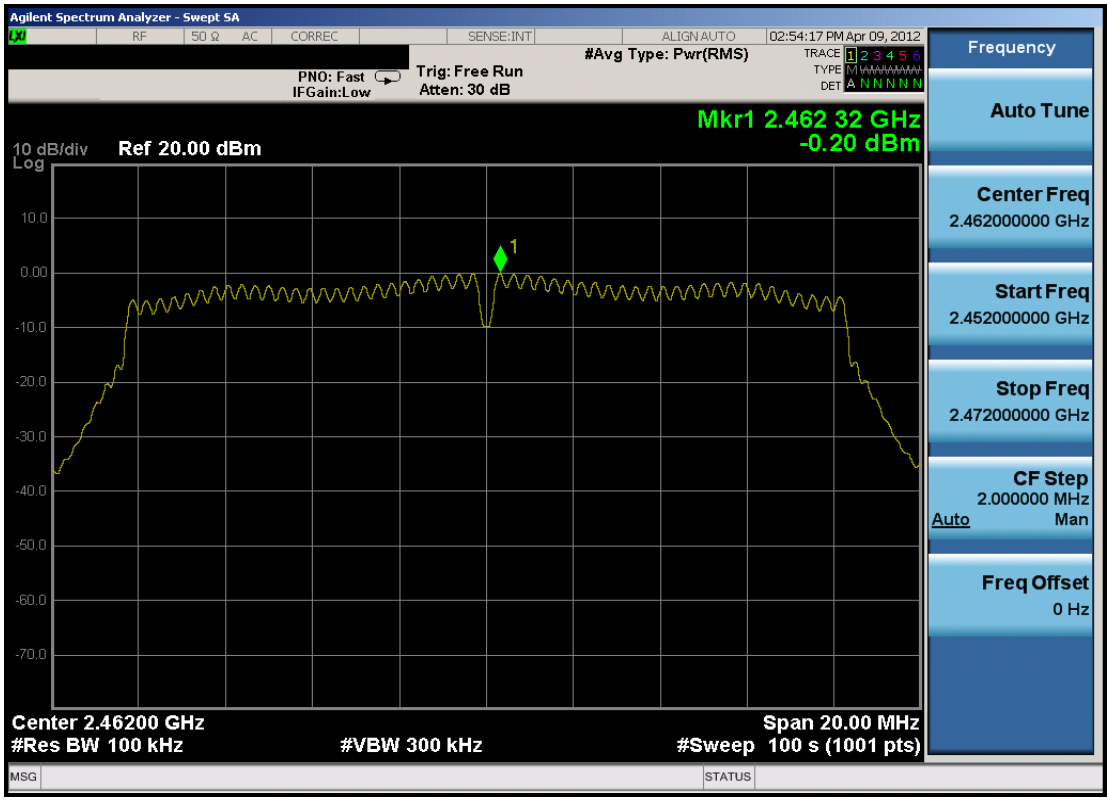


Plot 6-14. Power Spectral Density Plot (802.11g – Ch. 6)



Plot 6-15. Power Spectral Density Plot (802.11g – Ch. 11)

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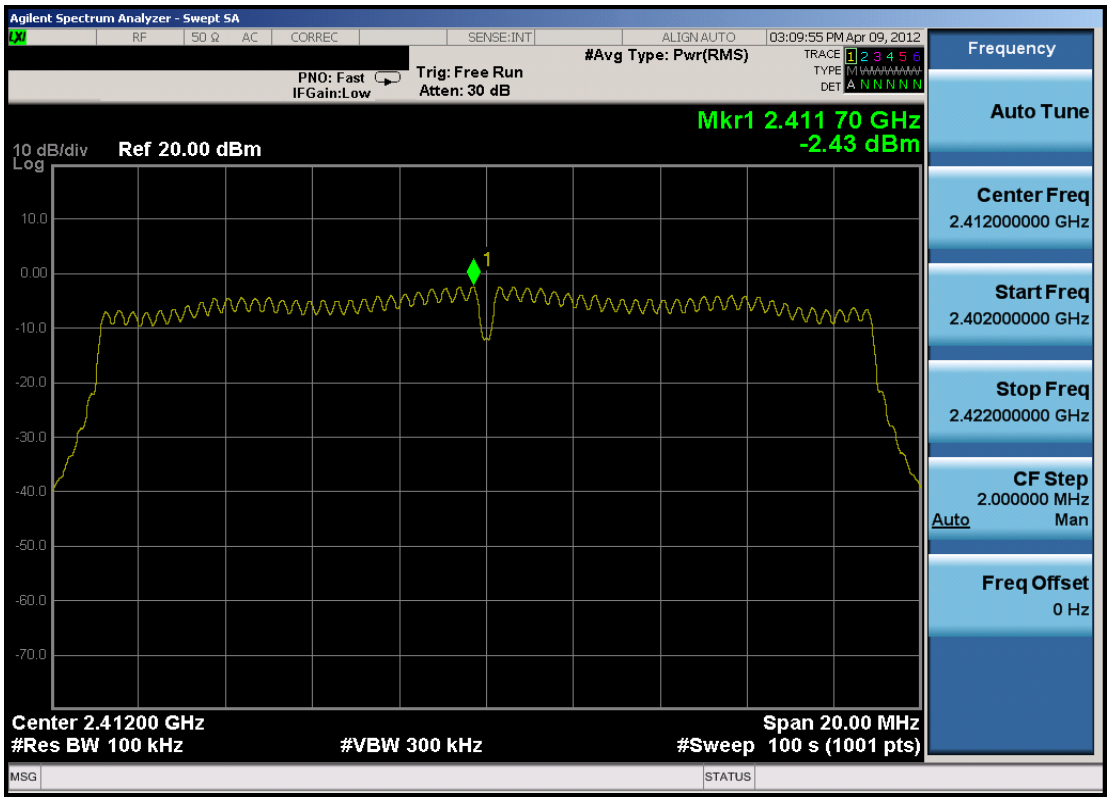
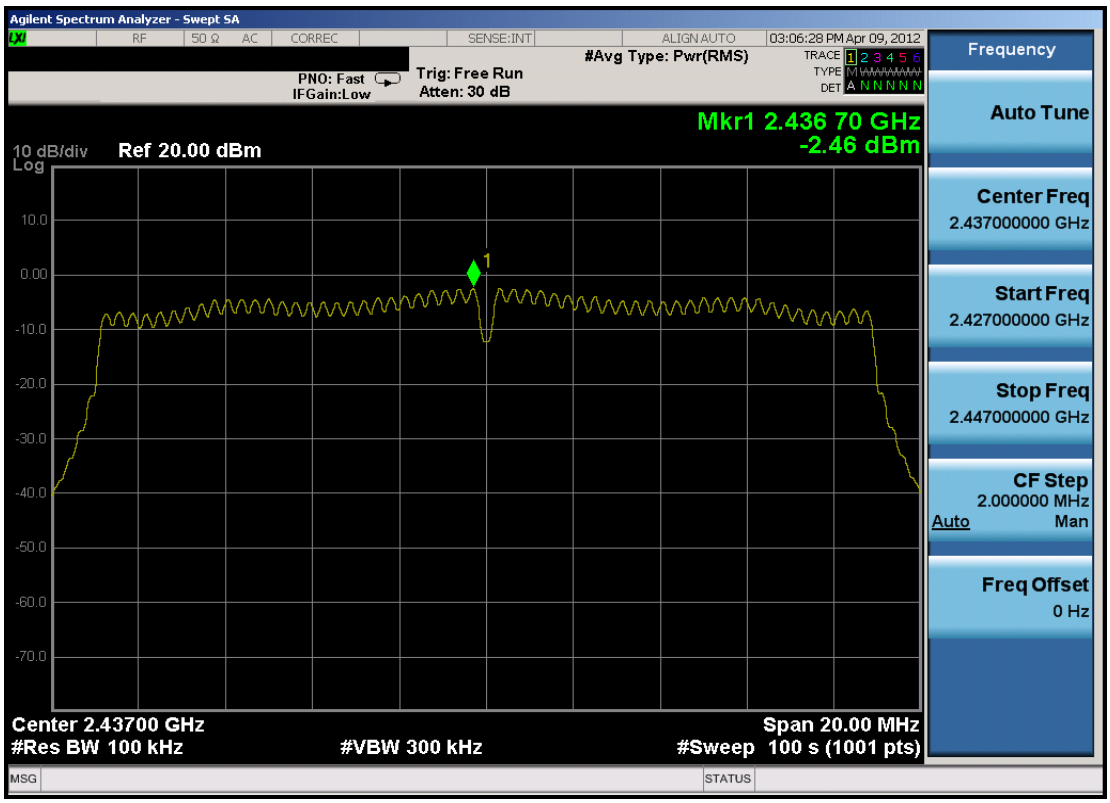


Plot 6-16. Power Spectral Density Plot (802.11n – Ch. 1)



Plot 6-17. Power Spectral Density Plot (802.11n – Ch. 6)

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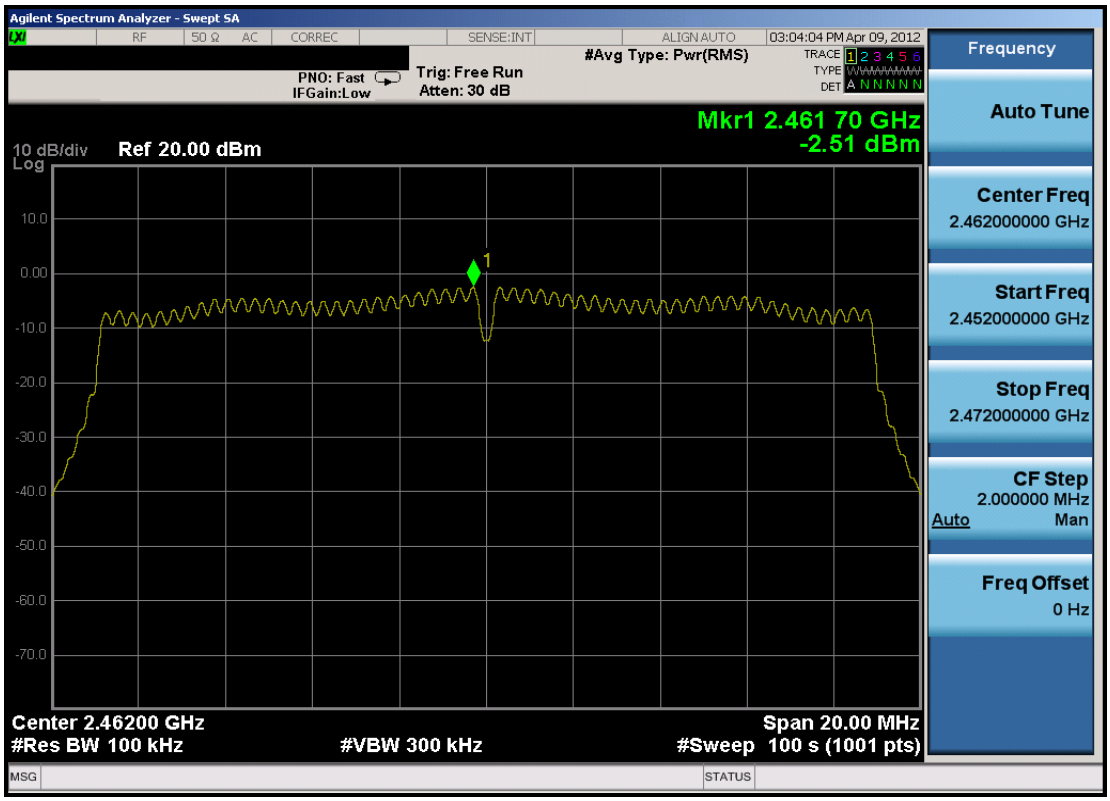

Plot 6-18. Power Spectral Density Plot (802.11n – Ch. 11)

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6.5 Conducted Emissions at the Band Edge

§15.247(d); RSS-210 [A8.5]

For the following out of band conducted spurious emissions plots at the band edge, the EUT was set at a data rate of 1Mbps for "b" mode, 6 Mbps for "g" mode and 6.5/7.2Mbps for "n" mode. These settings produced the worst-case emissions.

Per the guidance of KDB 558074, section 5.4.1.1, the reference level for out of band emissions is established from the plots of this section since the band edge emissions are measured with a RBW of 100kHz. This reference level is then used as the limit in subsequent plots for out of band spurious emissions shown in Section 6.6.

Plot 6-19. Band Edge Plot (802.11b – Ch. 1)

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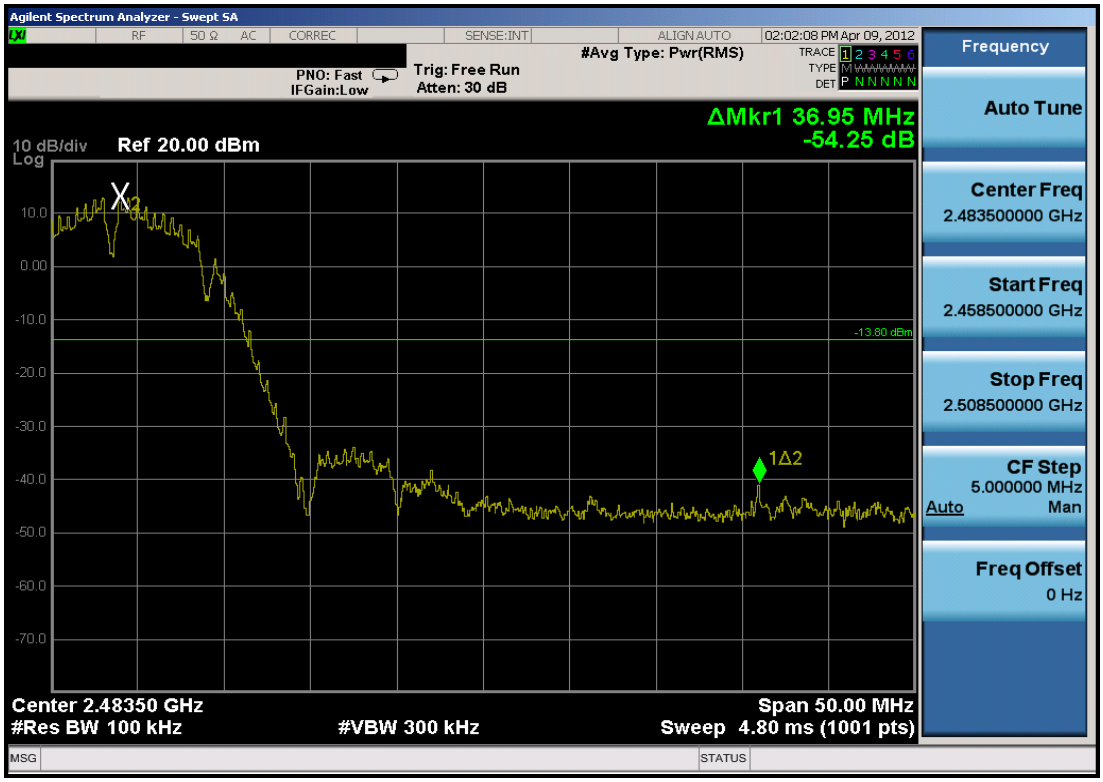
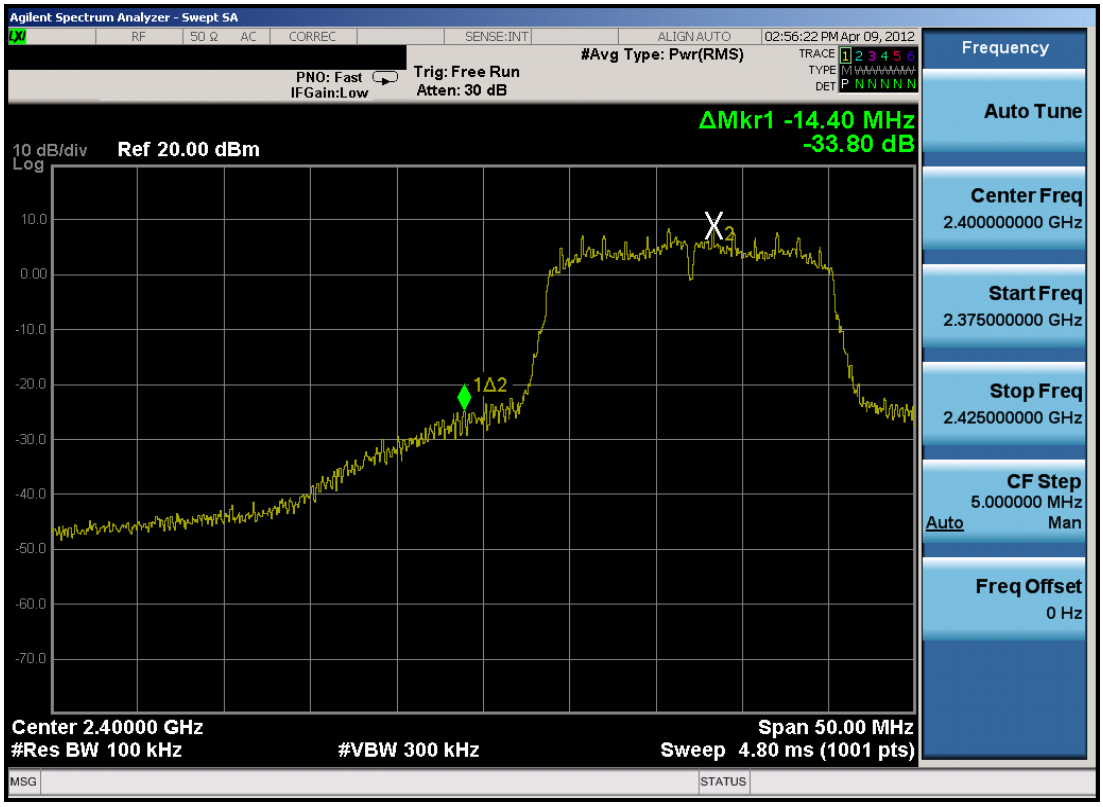


Plot 6-20. Band Edge Plot (802.11b – Ch. 11)



Plot 6-21. Band Edge Plot (802.11g – Ch. 1)

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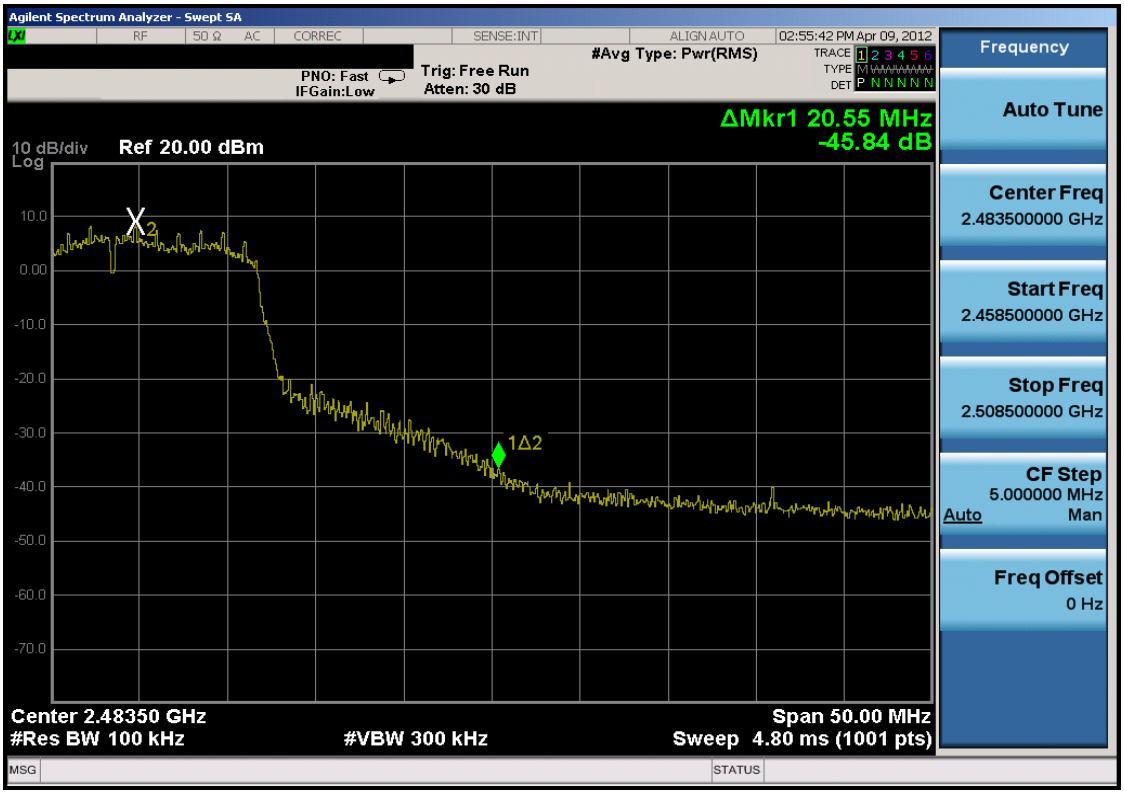

Plot 6-22. Band Edge Plot (802.11g – Ch. 11)

Plot 6-23. Band Edge Plot (802.11n – Ch. 1)

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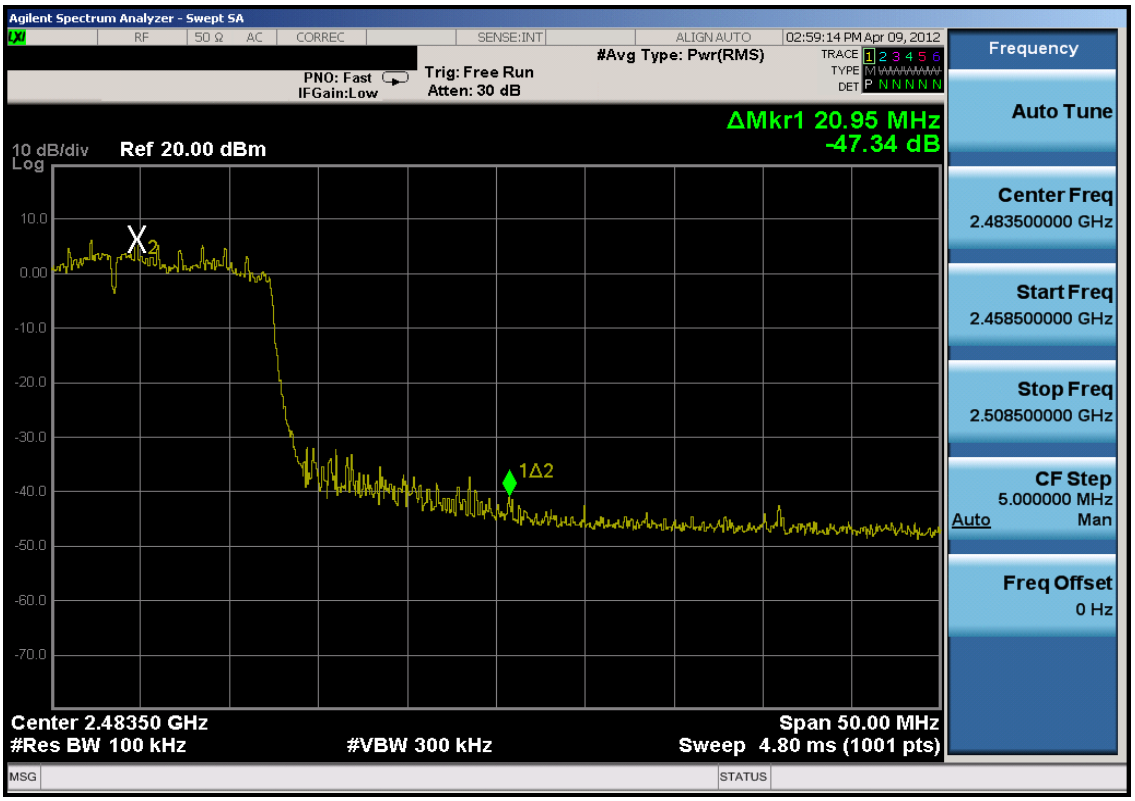

Plot 6-24. Band Edge Plot (802.11n – Ch. 11)

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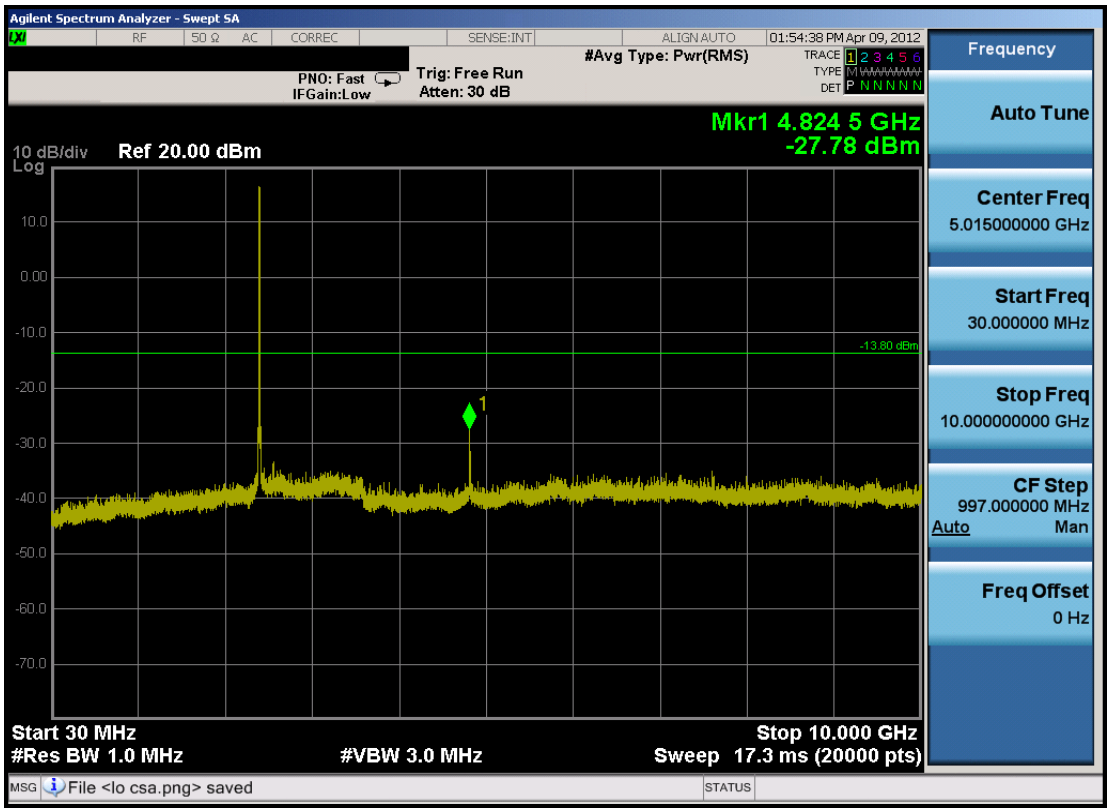
6.6 Conducted Spurious Emissions

§15.247(d); RSS-210 [A8.5]

For the following out of band conducted spurious emissions plots, the EUT was investigated in all available data rates for "b", "g", and "n" modes. The worst case spurious emissions were found while transmitting in "b" mode at 1 Mbps and are shown in the plots below.

The display line shown in the following plots denotes the limit at 30dB below the fundamental emission level measured in a 100kHz bandwidth, as determined in Section 6.5 of this report. However, since the traces in the following plots are measured with a 1MHz RBW, the display line may not necessarily appear to be 30dB below the level of the fundamental in a 1MHz bandwidth.



Plot 6-25. Conducted Spurious Plot (802.11b – Ch. 1)

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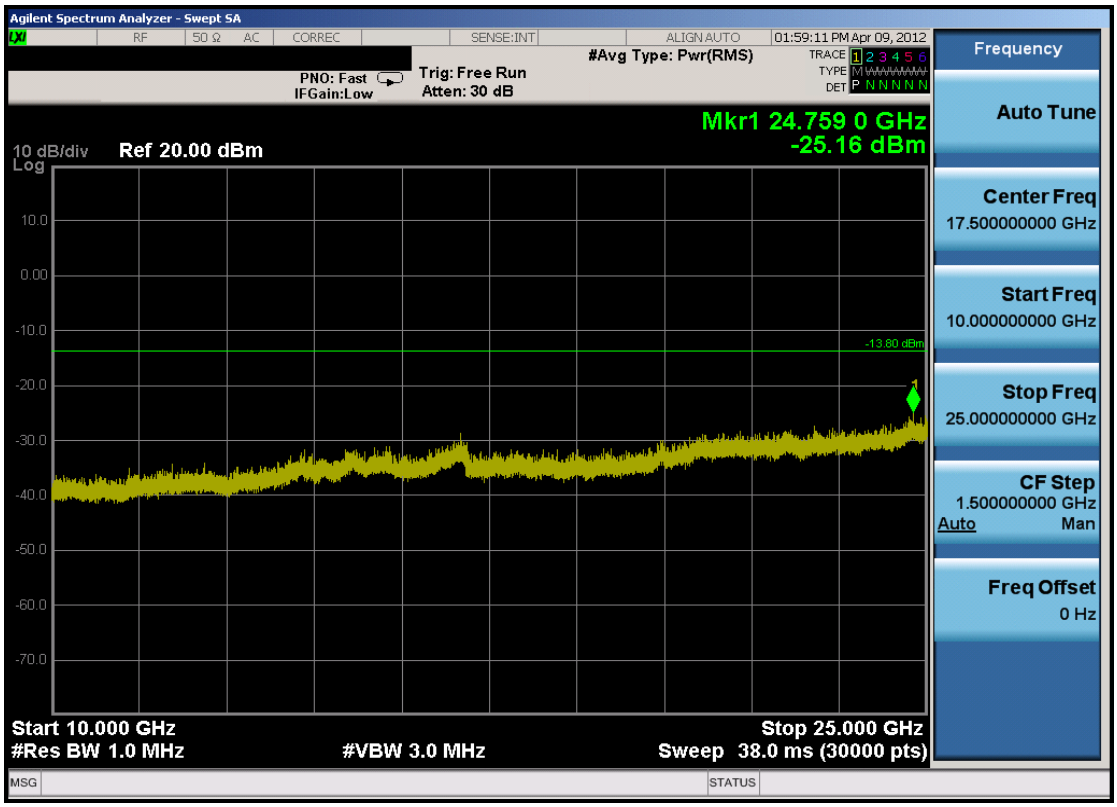
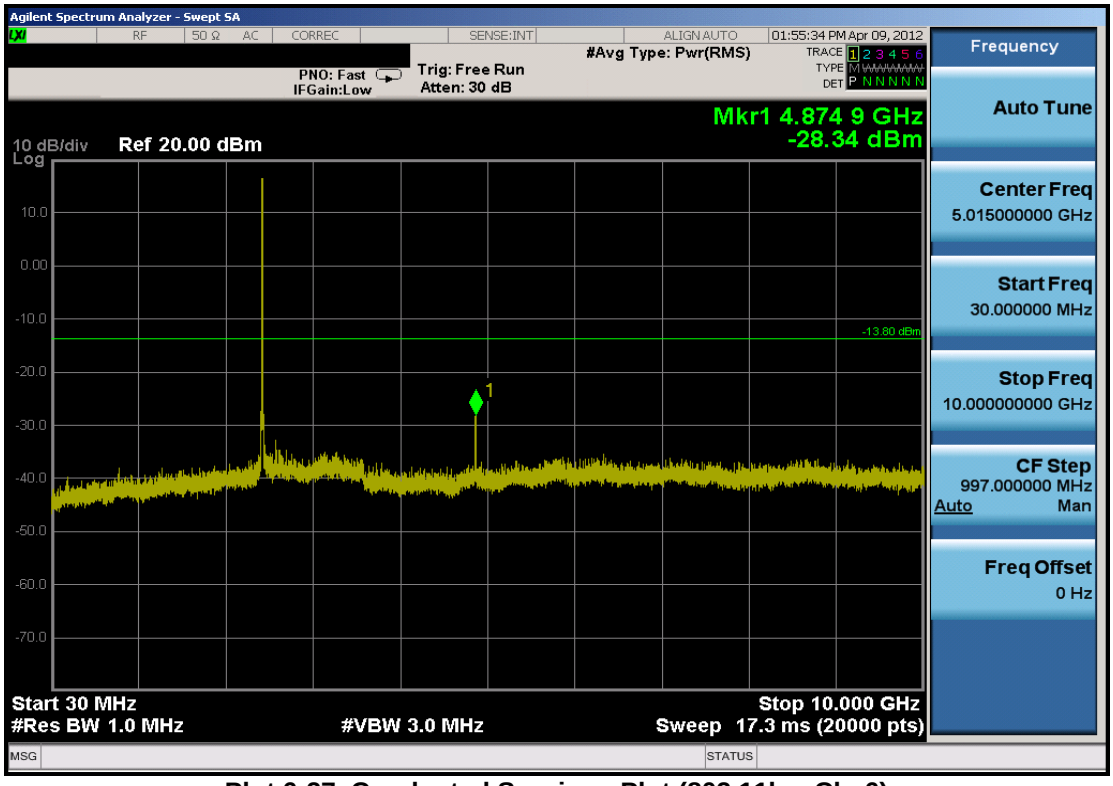


Plot 6-26. Conducted Spurious Plot (802.11b – Ch. 1)



Plot 6-27. Conducted Spurious Plot (802.11b – Ch. 6)

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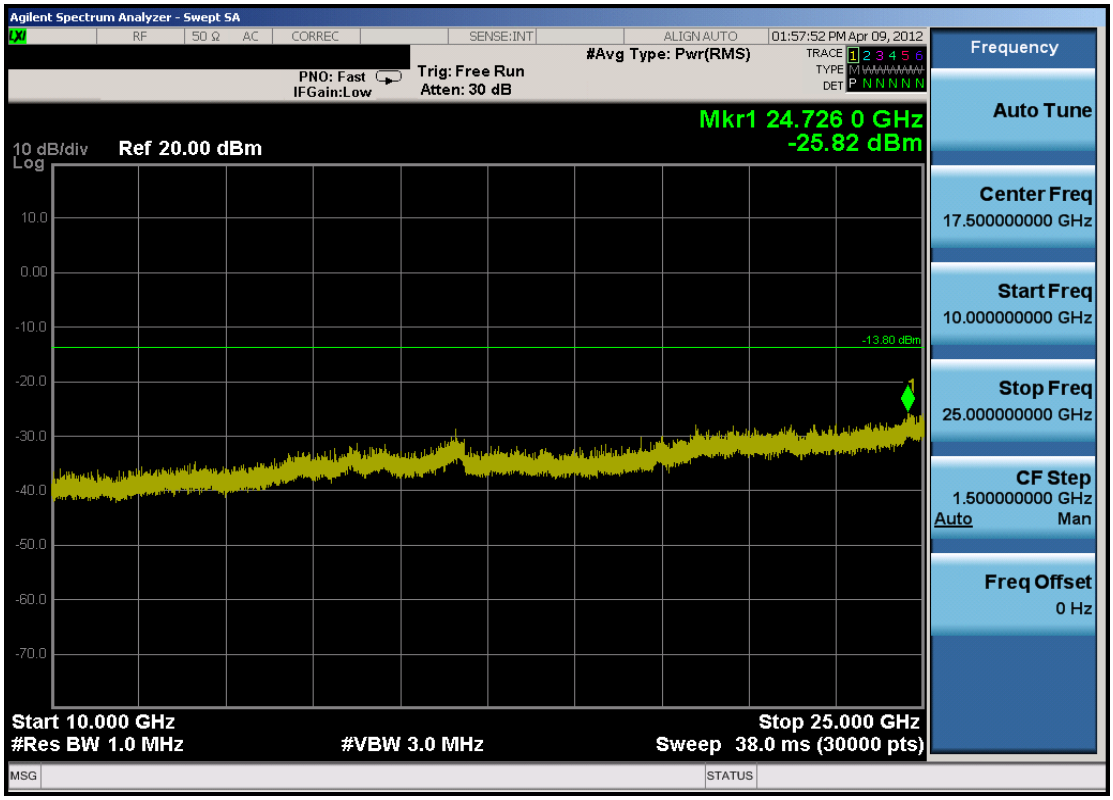
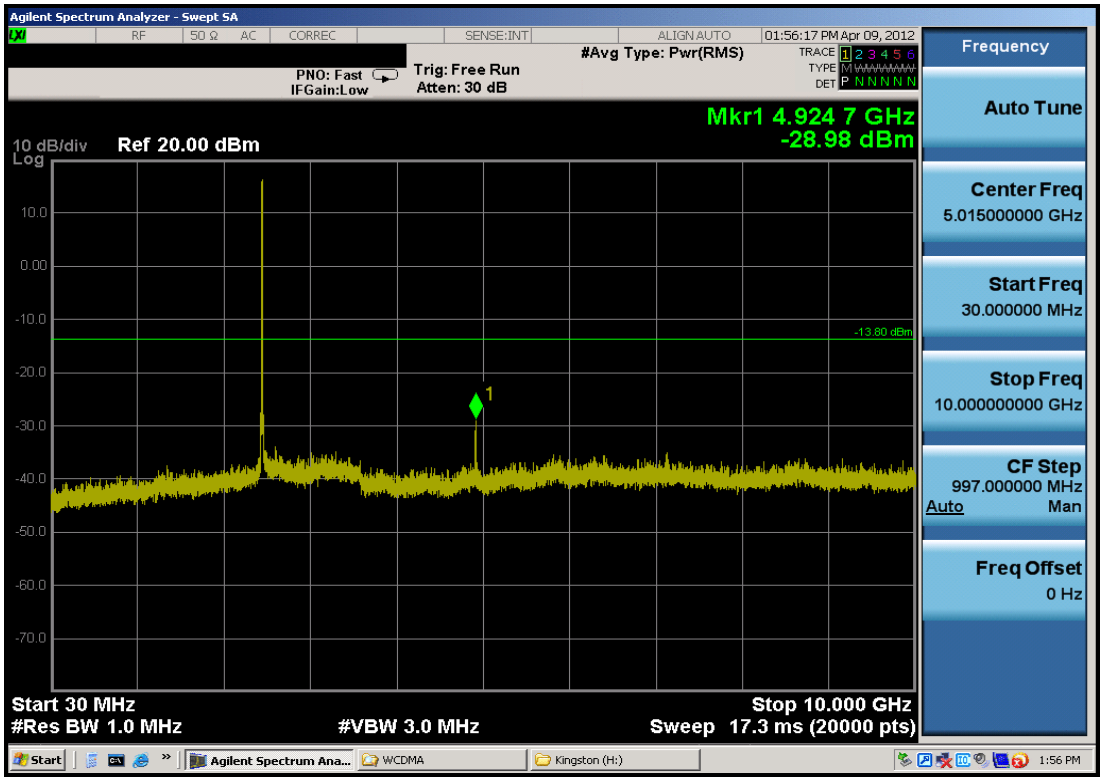


Plot 6-28. Conducted Spurious Plot (802.11b – Ch. 6)



Plot 6-29. Conducted Spurious Plot (802.11b – Ch. 11)

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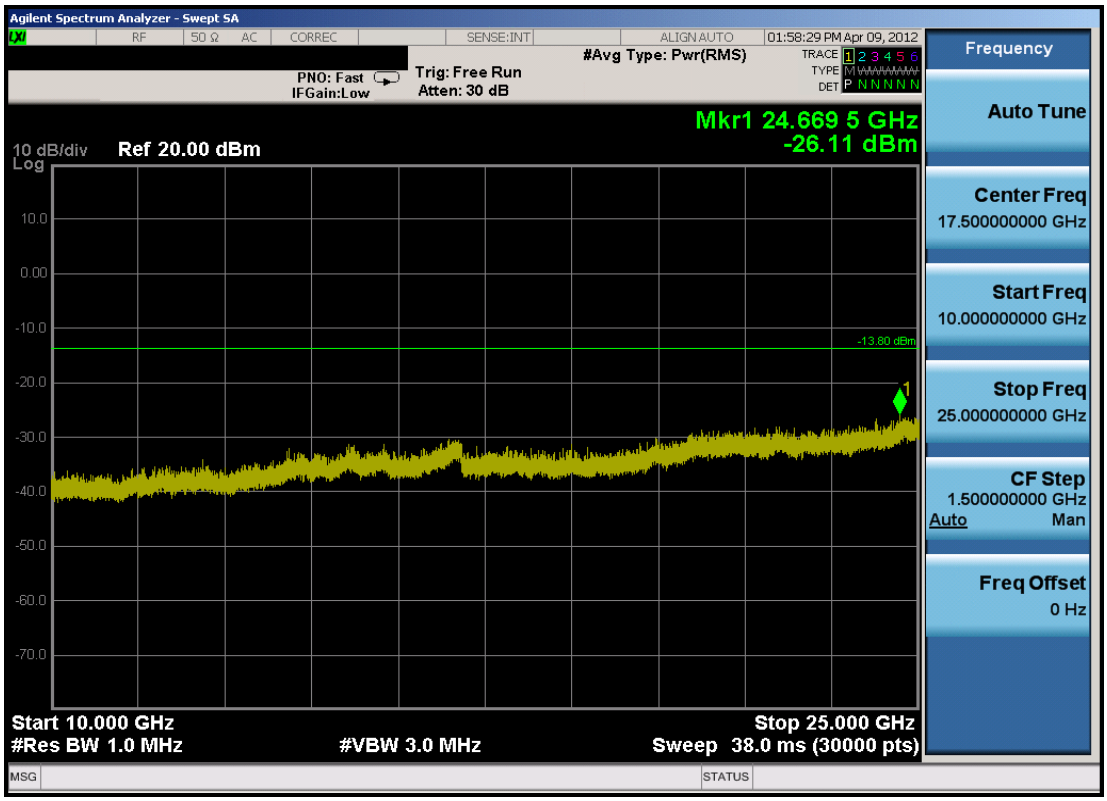

Plot 6-30. Conducted Spurious Plot (802.11b – Ch. 11)

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6.7 Radiated Spurious Emission Measurements

§15.205, §15.209, §15.247(d); RSS-210 [A8.5]

The EUT was tested from 9kHz up to the tenth harmonic of the fundamental frequency of the transmitter using CISPR quasi peak detector below 1GHz. Above 1 GHz, average and peak measurements were taken using linearly polarized horn antennas. All out of band emissions appearing in a restricted band as specified in Section 15.205 of the Title 47 CFR must not exceed the limits shown in Table 6-7 per Section 15.209.

All data rates and modes were investigated for radiated spurious emissions. Only the radiated emissions of the configuration that produced the worst case emissions are reported in this section. The optional test procedures for antenna port conducted measurements of unwanted emissions per the guidance of KDB 558074 were not used to evaluate this device.

Frequency	Field Strength [μV/m]	Measured Distance [Meters]
0.009 – 0.490 MHz	2400/F (kHz)	300
0.490 – 1.705 MHz	24000/F (kHz)	30
1.705 – 30.00 MHz	30	30
30.00 – 88.00 MHz	100	3
88.00 – 216.0 MHz	150	3
216.0 – 960.0 MHz	200	3
Above 960.0 MHz	500	3

Table 6-7. Radiated Limits

Sample Calculations

- Field Strength Level $_{[dB\mu V/m]}$ = Analyzer Level $_{[dBm]}$ + 107 + AFCL $_{[dB/m]}$
- AFCL $_{[dB/m]}$ = Antenna Factor $_{[dB/m]}$ + Cable Loss $_{[dB]}$
- Margin $_{[dB]}$ = Field Strength Level $_{[dB\mu V/m]}$ – Limit $_{[dB\mu V/m]}$

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Radiated Spurious Emission Measurements (Cont'd)

§15.205, §15.209, §15.247(d); RSS-210 [A8.5]

Worst Case Mode: 802.11b

Worst Case Transfer Rate: 1 Mbps

Distance of Measurements: 3 Meters

Operating Frequency: 2412MHz

Channel: 01

Frequency [MHz]	Analyzer Level [dBm]	Detector	Pol [H/V]	AFCL [dB/m]	Field Strength [dBμV/m]	Limit [dBμV/m]	Margin [dB]
4824.00	-110.28	Avg	H	39.05	35.77	53.98	-18.21
4824.00	-99.08	Peak	H	39.05	46.97	73.98	-27.01
12060.00	-135.00	Avg	H	50.20	22.20	53.98	-31.78
12060.00	-125.00	Peak	H	50.20	32.20	73.98	-41.78

Table 6-8. Radiated Measurements @ 3 meters

NOTES:

1. All emissions shown lie in the restricted bands specified in §15.205 and RSS-210 section 2.7, Table 1 and are below the limit shown in Table 6-7.
2. For frequencies> 1GHz, average measurements are recorded using RBW = 1MHz, VBW = 10Hz. Peak measurements are recorded using RBW = 1MHz, VBW = 3MHz.
3. The antenna is manipulated through typical positions, polarity and length during the tests. The EUT is manipulated through three orthogonal planes.
4. The EUT is supplied with nominal AC voltage and/or a new/fully-recharged battery.
5. The spectrum is measured from 9kHz to the 10th harmonic and the worst-case emissions are reported. No significant emissions were found beyond the fifth harmonic for this device.
6. Levels at - 135 dBm represent the analyzer noise floor and signify that no emission was detected.
7. Above 960MHz the limit is 500 μV/m (54dBμ/m) at 3 meters radiated.

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Radiated Spurious Emission Measurements (Cont'd)

§15.205, §15.209, §15.247(d); RSS-210 [A8.5]

Worst Case Mode: 802.11b

Worst Case Transfer Rate: 1 Mbps

Distance of Measurements: 3 Meters

Operating Frequency: 2437MHz

Channel: 06

Frequency [MHz]	Analyzer Level [dBm]	Detector	Pol [H/V]	AFCL [dB/m]	Field Strength [dBμV/m]	Limit [dBμV/m]	Margin [dB]
4874.00	-103.62	Avg	H	39.09	42.47	53.98	-11.51
4874.00	-96.12	Peak	H	39.09	49.97	73.98	-24.01
7311.00	-113.12	Avg	H	42.19	36.07	53.98	-17.91
7311.00	-99.22	Peak	H	42.19	49.97	73.98	-24.01
12185.00	-135.00	Avg	H	50.51	22.51	53.98	-31.47
12185.00	-125.00	Peak	H	50.51	32.51	73.98	-41.47

Table 6-9. Radiated Measurements @ 3 meters

NOTES:

1. All emissions shown lie in the restricted bands specified in §15.205 and RSS-210 section 2.7, Table 1 and are below the limit shown in Table 6-7.
2. For frequencies> 1GHz, average measurements are recorded using RBW = 1MHz, VBW = 10Hz. Peak measurements are recorded using RBW = 1MHz, VBW = 3MHz.
3. The antenna is manipulated through typical positions, polarity and length during the tests. The EUT is manipulated through three orthogonal planes.
4. The EUT is supplied with nominal AC voltage and/or a new/fully-recharged battery.
5. The spectrum is measured from 9kHz to the 10th harmonic and the worst-case emissions are reported. No significant emissions were found beyond the fifth harmonic for this device.
6. Levels at - 135 dBm represent the analyzer noise floor and signify that no emission was detected.
7. Above 960MHz the limit is 500 μV/m (54dBμ/m) at 3 meters radiated.

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Radiated Spurious Emission Measurements (Cont'd)

§15.205, §15.209, §15.247(d); RSS-210 [A8.5]

Worst Case Mode: 802.11b

Worst Case Transfer Rate: 1 Mbps

Distance of Measurements: 3 Meters

Operating Frequency: 2462MHz

Channel: 11

Frequency [MHz]	Analyzer Level [dBm]	Detector	Pol [H/V]	AFCL [dB/m]	Field Strength [dBμV/m]	Limit [dBμV/m]	Margin [dB]
4924.00	-104.59	Avg	H	39.08	41.49	53.98	-12.49
4924.00	-95.59	Peak	H	39.08	50.49	73.98	-23.49
7386.00	-113.16	Avg	H	42.28	36.12	53.98	-17.86
7386.00	-99.36	Peak	H	42.28	49.92	73.98	-24.06
12310.00	-135.00	Avg	H	50.76	22.76	53.98	-31.22
12310.00	-125.00	Peak	H	50.76	32.76	73.98	-41.22

Table 6-10. Radiated Measurements @ 3 meters

NOTES:

1. All emissions shown lie in the restricted bands specified in §15.205 and RSS-210 section 2.7, Table 1 and are below the limit shown in Table 6-7.
2. For frequencies> 1GHz, average measurements are recorded using RBW = 1MHz, VBW = 10Hz. Peak measurements are recorded using RBW = 1MHz, VBW = 3MHz.
3. The antenna is manipulated through typical positions, polarity and length during the tests. The EUT is manipulated through three orthogonal planes.
4. The EUT is supplied with nominal AC voltage and/or a new/fully-recharged battery.
5. The spectrum is measured from 9kHz to the 10th harmonic and the worst-case emissions are reported. No significant emissions were found beyond the fifth harmonic for this device.
6. Levels at - 135 dBm represent the analyzer noise floor and signify that no emission was detected.
7. Above 960MHz the limit is 500 μV/m (54dBμ/m) at 3 meters radiated.

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6.8 Radiated Restricted Band Edge Measurements

§15.205, §15.209, §15.247(d); RSS-210 [A8.5]

Worst Case Mode: 802.11g

Worst Case Transfer Rate: 6 Mbps

Distance of Measurements: 3 Meters

Operating Frequency: 2412MHz

Channel: 1

Frequency [MHz]	Analyzer Level [dBm]	Detector	Pol [H/V]	AFCL [dB/m]	Field Strength [dBμV/m]	Limit [dBμV/m]	Margin [dB]
2374.60	-104.91	Avg	H	35.32	37.40	53.98	-16.57
2374.60	-91.81	Peak	H	35.32	50.50	73.98	-23.47
2382.10	-104.41	Avg	H	35.32	37.90	53.98	-16.07
2382.10	-85.31	Peak	H	35.32	57.00	73.98	-16.97
2390.00	-98.99	Avg	H	35.39	43.40	53.98	-10.58
2390.00	-75.69	Peak	H	35.39	66.70	73.98	-7.28

Table 6-11. Radiated Restricted Band Edge Measurements (2310 – 2390MHz)

NOTES:

1. All emissions shown lie in the restricted bands specified in §15.205 and RSS-210 section 2.7, Table 1 and are below the limit shown in Table 6-7.
2. For frequencies> 1GHz, average measurements are recorded using RBW = 1MHz, VBW = 10Hz. Peak measurements are recorded using RBW = 1MHz, VBW = 3MHz.
3. The antenna is manipulated through typical positions, polarity and length during the tests. The EUT is manipulated through three orthogonal planes.
4. The EUT is supplied with nominal AC voltage and/or a new/fully-recharged battery.
5. The spectrum is measured from 9kHz to the 10th harmonic and the worst-case emissions are reported. No significant emissions were found beyond the fifth harmonic for this device.
6. Levels at - 135 dBm represent the analyzer noise floor and signify that no emission was detected.
7. Above 960MHz the limit is 500 μV/m (54dBμ/m) at 3 meters radiated.

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Radiated Restricted Band Edge Measurements (Cont'd)

§15.205, §15.209, §15.247(d); RSS-210 [A8.5]

Worst Case Mode: 802.11g

Worst Case Transfer Rate: 6 Mbps

Distance of Measurements: 3 Meters

Operating Frequency: 2462MHz

Channel: 11

Frequency [MHz]	Analyzer Level [dBm]	Detector	Pol [H/V]	AFCL [dB/m]	Field Strength [dBμV/m]	Limit [dBμV/m]	Margin [dB]
2483.50	-95.37	Avg	H	36.39	48.02	53.98	-5.96
2483.50	-71.37	Peak	H	36.39	72.02	73.98	-1.96
2485.10	-98.87	Avg	H	36.40	44.53	53.98	-9.45
2485.10	-77.67	Peak	H	36.40	65.73	73.98	-8.25
2486.70	-100.87	Avg	H	36.42	42.55	53.98	-11.43
2486.70	-84.27	Peak	H	36.42	59.15	73.98	-14.83

Table 6-12. Radiated Restricted Band Edge Measurements (2483.5 – 2500MHz)

NOTES:

1. All emissions shown lie in the restricted bands specified in §15.205 and RSS-210 section 2.7, Table 1 and are below the limit shown in Table 6-7.
2. For frequencies> 1GHz, average measurements are recorded using RBW = 1MHz, VBW = 10Hz. Peak measurements are recorded using RBW = 1MHz, VBW = 3MHz.
3. The antenna is manipulated through typical positions, polarity and length during the tests. The EUT is manipulated through three orthogonal planes.
4. The EUT is supplied with nominal AC voltage and/or a new/fully-recharged battery.
5. The spectrum is measured from 9kHz to the 10th harmonic and the worst-case emissions are reported. No significant emissions were found beyond the fifth harmonic for this device.
6. Levels at - 135 dBm represent the analyzer noise floor and signify that no emission was detected.
7. Above 960MHz the limit is 500 μV/m (54dBμ/m) at 3 meters radiated.

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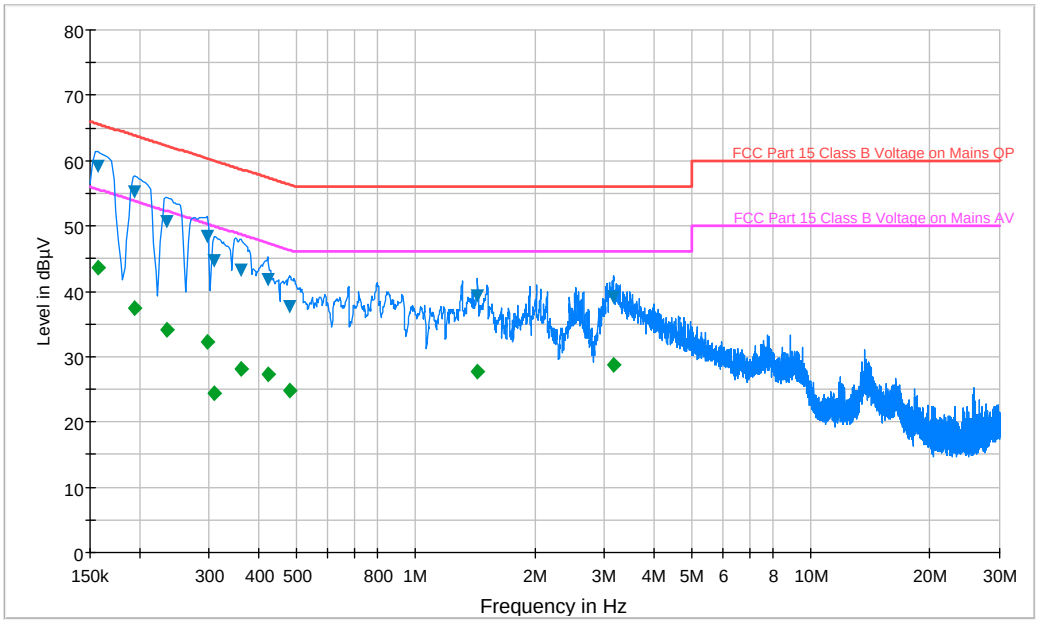
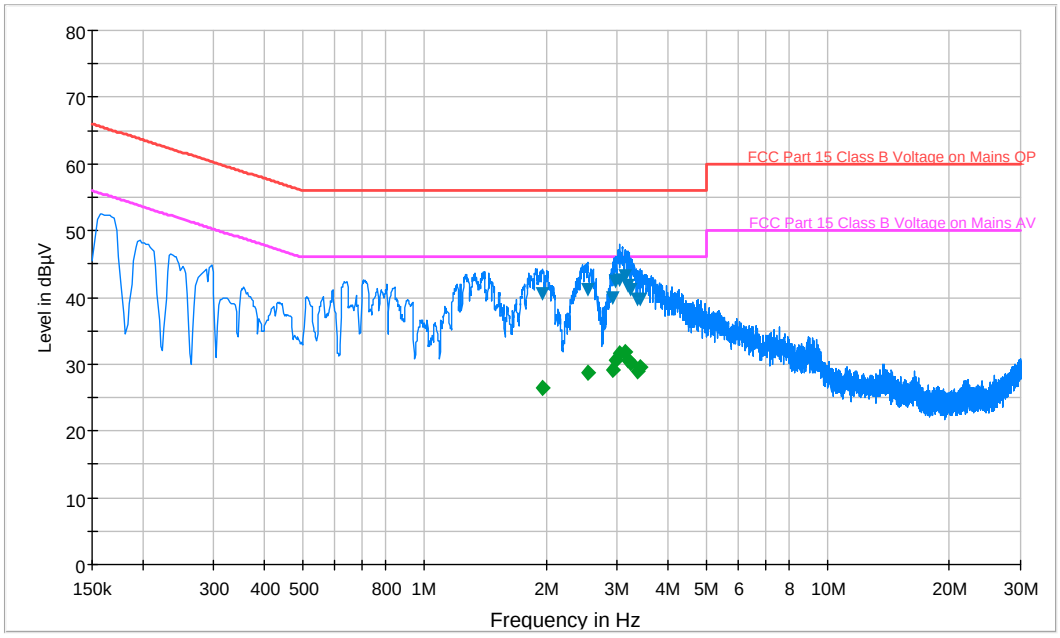
6.9 Line-Conducted Test Data

§15.207; RSS-Gen [7.2.2]

ACLC LINE 1



ACLC LINE N



Plot 6-31. Line Conducted Plot with 802.11b

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Line-Conducted Test Data (Cont'd)

§15.207; RSS-Gen [7.2.2]

Frequency (MHz)	Line	QuasiPeak (dBµV)	Limit (dBµV)	Margin (dB)	Average (dBµV)	Limit (dBµV)	Margin (dB)
0.156750	L1	59.2	65.6	6.5	43.7	55.6	12.0
0.195000	L1	55.2	63.8	8.7	37.4	53.8	16.4
0.235500	L1	50.6	62.3	11.6	34.2	52.3	18.1
0.296250	L1	48.4	60.3	12.0	32.2	50.3	18.1
0.309750	L1	44.6	60.0	15.4	24.5	50.0	25.5
0.361500	L1	43.3	58.7	15.4	28.2	48.7	20.5
0.422250	L1	41.8	57.4	15.6	27.3	47.4	20.1
0.478500	L1	37.7	56.4	18.7	24.8	46.4	21.5
1.434750	L1	39.3	56.0	16.7	27.7	46.0	18.3
3.169500	L1	39.1	56.0	16.9	28.8	46.0	17.2
Frequency	**Line**	**QuasiPeak**	**Limit**	**Margin**	**Average**	**Limit**	**Margin**
1.954500	N	40.6	56.0	15.4	26.5	46.0	19.5
2.532750	N	41.1	56.0	14.9	28.8	46.0	17.2
2.926500	N	40.0	56.0	16.0	29.1	46.0	16.9
2.969250	N	42.3	56.0	13.7	30.7	46.0	15.3
3.054750	N	42.6	56.0	13.4	31.7	46.0	14.4
3.138000	N	43.2	56.0	12.8	31.8	46.0	14.2
3.194250	N	41.8	56.0	14.2	30.6	46.0	15.4
3.255000	N	41.0	56.0	15.0	30.2	46.0	15.8
3.383250	N	39.7	56.0	16.3	28.8	46.0	17.2
3.432750	N	39.7	56.0	16.3	29.6	46.0	16.4

Table 6-13. Line Conducted Data with 802.11b

Notes:

1. All modes of operation, data rates, and test channels were investigated and the worst-case emissions are reported in 802.11b mode using 1Mbps on Channel 6. The emissions found were not affected by the choice of channel used during testing.
2. The limit for Class B device(s) from 150kHz to 30MHz are specified in Section 15.207 of the Title 47 CFR.
3. Traces shown in plot are made using a peak detector.
4. Deviations to the Specifications: None.
5. Factor (dB) = Cable loss (dB) + LISN insertion factor (dB)
6. QP/AV Level (dBµV) = QP/AV Analyzer/Receiver Level (dBµV) + Factor (dB)
7. Margin (dB) = Limit (dBµV) - QP/AV Level (dBµV)

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7.0 CONCLUSION

The data collected relate only the item(s) tested and show that the **Samsung Portable Handset FCC ID: A3LGTI8160L** is in compliance with Part 15C of the FCC Rules and RSS-210 of the Industry Canada Rules.

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