



PCTEST ENGINEERING LABORATORY, INC.

6660-B Dobbin Road, Columbia, MD 21045 USA
Tel. 410.290.6652 / Fax 410.290.6554
http://www.pctestlab.com



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

Applicant Name:
Panasonic Corporation of North America
One Panasonic Way, 4B-8
Secaucus, NJ 07094
United States

Date of Testing:
April 23, 2010
Test Site/Location:
PCTEST Lab, Columbia, MD, USA
Test Report Serial No.:
0Y1003170437.ACJ

FCC ID:	ACJ9TGCF-19D
IC CERTIFICATION NO:	216A-CF19D
APPLICANT:	Panasonic Corporation of North America

Application Type: Certification

Model(s): CF-19

IC Model(s): CF-19D

EUT Type: ToughBook Model: CF-19

Max. RF Output Power: 41.5 mW (16.18 dBm) Peak Conducted (b)
264.1 mW (24.22 dBm) Peak Aggregate Conducted (g)
143.26 mW (21.56 dBm) Peak Aggregate Conducted (a)
255.87 mW (24.08 dBm) Peak Aggregate Conducted (n) - 2.4GHz
161.55 mW (22.08 dBm) Peak Aggregate Conducted (n) - 5.8GHz

Frequency Range: 2412 - 2462 MHz (DSSS/OFDM)
5745 – 5825 MHz (OFDM)

FCC Classification: Digital Transmission System (DTS)

FCC Rule Part(s): Part 15.247

Test Device Serial No.: N/A

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 C-63.4-2003. 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.

Grant Conditions: Listed output power is conducted.

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



Randy Ortanez
President



FCC ID: ACJ9TGCF-19D		FCC Pt. 15.247 802.11a/b/g/n MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1003170437.ACJ	Test Dates: April 23, 2010	EUT Type: ToughBook Model: CF-19		Page 1 of 89

TABLE OF CONTENTS

FCC PART 15.247 MEASUREMENT REPORT		3
1.0 INTRODUCTION		4
1.1 SCOPE.....		4
1.2 PCTEST TEST LOCATION		4
2.0 PRODUCT INFORMATION.....		5
2.1 EQUIPMENT DESCRIPTION		5
2.2 EMI SUPPRESSION DEVICE(S)/MODIFICATIONS		5
2.3 LABELING REQUIREMENTS.....		5
3.0 DESCRIPTION OF TEST.....		6
3.1 EVALUATION PROCEDURE.....		6
3.2 CONDUCTED EMISSIONS.....		6
3.3 RADIATED EMISSIONS		7
4.0 ANTENNA REQUIREMENTS		8
5.0 TEST EQUIPMENT CALIBRATION DATA		9
6.0 TEST RESULTS		10
6.1 SUMMARY		10
6.2 6DB BANDWIDTH MEASUREMENT – 802.11A/B/G/N.....		11
6.3 OUTPUT POWER MEASUREMENT – 802.11B/G		18
6.4 OUTPUT POWER MEASUREMENT – 802.11A (5.8GHZ).....		21
6.5 OUTPUT POWER MEASUREMENT – 802.11N (2.4GHZ)		23
6.6 OUTPUT POWER MEASUREMENT – 802.11N (5.8GHZ).....		25
6.7 POWER SPECTRAL DENSITY (802.11A/B/G/N)		27
6.8 OUT OF BAND EMISSIONS AT THE BAND EDGE		40
6.9 OUT OF BAND EMISSIONS		50
6.10 RADIATED SPURIOUS EMISSION MEASUREMENTS.....		64
6.11 RADIATED RESTRICTED BAND EDGE MEASUREMENTS		77
6.12 LINE-CONDUCTED TEST DATA.....		81
7.0 CONCLUSION		89

FCC ID: ACJ9TGCF-19D		FCC Pt. 15.247 802.11a/b/g/n MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1003170437.ACJ	Test Dates: April 23, 2010	EUT Type: ToughBook Model: CF-19	Page 2 of 89	



MEASUREMENT REPORT

FCC Part 15.247



§ 2.1033 General Information

APPLICANT: Panasonic Corporation of North America

APPLICANT ADDRESS: One Panasonic Way, 4B-8
Secaucus, NJ 07094

TEST SITE: PCTEST ENGINEERING LABORATORY, INC.

TEST SITE ADDRESS: 6660-B Dobbin Road, Columbia, MD 21045 USA

FCC RULE PART(S): Part 15.247

MODEL NAME: CF-19

FCC ID: ACJ9TGCF-19D

Test Device Serial No.: N/A Production Pre-Production Engineering

FCC CLASSIFICATION: Digital Transmission System (DTS)

DATE(S) OF TEST: April 23, 2010

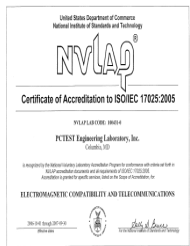
TEST REPORT S/N: 0Y1003170437.ACJ


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 (IC-2451).
- 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 (IC-2451) 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.



FCC ID: ACJ9TGCF-19D		FCC Pt. 15.247 802.11a/b/g/n MEASUREMENT REPORT (CERTIFICATION)	Reviewed by: Quality Manager
Test Report S/N: 0Y1003170437.ACJ	Test Dates: April 23, 2010	EUT Type: ToughBook Model: CF-19	Page 3 of 89

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.

1.2 PCTEST Test Location

The map below shows the location of the PCTEST LABORATORY, its proximity to the FCC Laboratory, the Columbia vicinity area, the Baltimore-Washington Intern't'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 27, 2006.

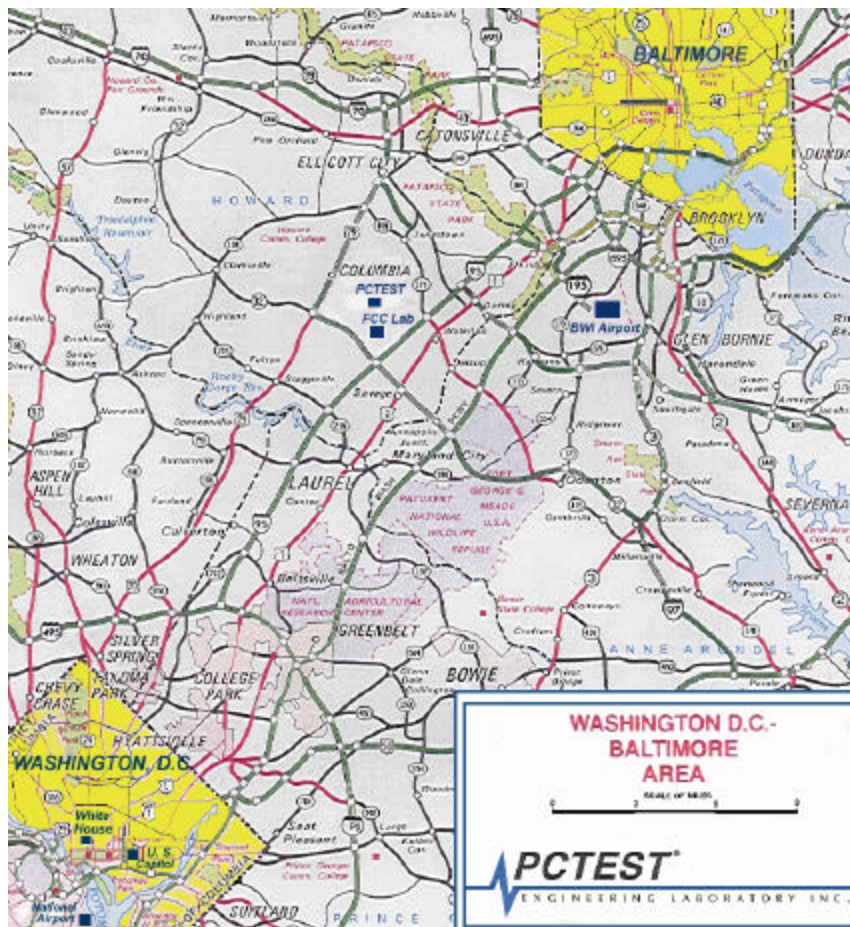




Figure 1-1. Map of the Greater Baltimore and Metropolitan Washington, D.C. area

FCC ID: ACJ9TGCF-19D		FCC Pt. 15.247 802.11a/b/g/n MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1003170437.ACJ	Test Dates: April 23, 2010	EUT Type: ToughBook Model: CF-19		Page 4 of 89

2.0 PRODUCT INFORMATION

2.1 Equipment Description

The Equipment Under Test (EUT) is the **Panasonic ToughBook Model: CF-19 FCC ID: ACJ9TGCF-19D**. The EUT consisted of the following component(s):

Manufacturer / Model	FCC ID	Description
Panasonic / Model: CF-19	ACJ9TGCF-19D	ToughBook Model: CF-19
Alps / Model: UGNZA	N/A	Bluetooth Module
Qualcomm / Model: Gobi2000	N7NGOBI2	WWAN Module
Intel / Model: 622ANHMW	PD9622ANH	802.11a/b/g/n Wireless LAN Module

Table 2-1. EUT Equipment Description

Note: The testing in this report covers one additional model of the 622ANHMW. The additional model is the 622BGHMW (802.11b/g) which has both 11n and 11a function disabled by EEPROM setting. There are no electrical differences between the modules.

2.2 EMI Suppression Device(s)/Modifications



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

2.3 Labeling Requirements

Per 2.1074 & 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.

FCC ID: ACJ9TGCF-19D		FCC Pt. 15.247 802.11a/b/g/n MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1003170437.ACJ	Test Dates: April 23, 2010	EUT Type: ToughBook Model: CF-19	Page 5 of 89	

3.0 DESCRIPTION OF TEST

3.1 Evaluation Procedure

The measurement procedure 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 FCC procedure dated March 23, 2005 entitled "Measurements of Digital Transmission Systems Operating Under Section 15.247" were used in the measurement of **Panasonic ToughBook Model: CF-19 FCC ID: ACJ9TGCF-19D**.

Deviation from measurement procedure.....None

3.2 Conducted Emissions

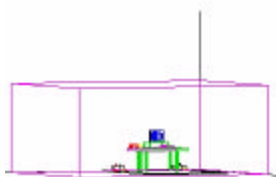


Figure 3-1. Shielded Enclosure Line-Conducted Test Facility

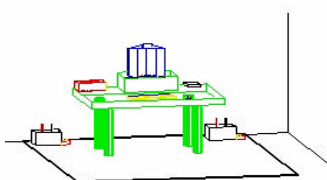


Figure 3-2. Line Conducted Emission Test Set-Up

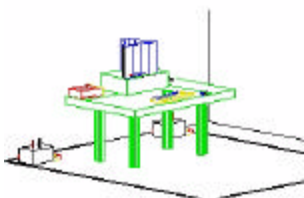


Figure 3-3. Wooden Table & Bonded LISNs



Figure 3-4. LISN Schematic Diagram

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). Solar Electronics and EMCO Model 3725/2 (10kHz-30MHz) 50Ω/50μH Line-Impedance Stabilization Networks (LISNs) are bonded to the shielded room (see Figure 3-3). The EUT is powered from the Solar LISN and the support equipment is powered from the EMCO LISN. 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". 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). 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 to determine the frequency producing the maximum EME from the EUT.

The spectrum was scanned from 150kHz to 30MHz with a spectrum analyzer. The detector function was set to CISPR quasi-peak and average mode. The bandwidth of the analyzer was set to 10kHz. The EUT, support equipment, and interconnecting cables were arranged and manipulated to maximize each EME emission. Each emission was maximized by: switching power lines; varying 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. Photographs of the worst-case emission can be seen in the test setup photographs. Each EME reported was calibrated using the Agilent E8257D (250kHz – 20GHz) PSG Signal Generator.

FCC ID: ACJ9TGCF-19D	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 15.247 802.11a/b/g/n MEASUREMENT REPORT (CERTIFICATION)	Panasonic	Reviewed by: Quality Manager
Test Report S/N: 0Y1003170437.ACJ	Test Dates: April 23, 2010	EUT Type: ToughBook Model: CF-19	Page 6 of 89	

3.3 Radiated Emissions

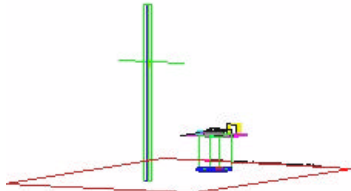


Figure 3-5. 3-Meter Test Site

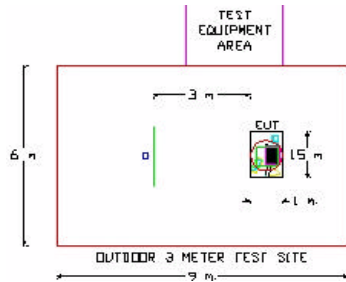


Figure 3-6. Dimensions of Outdoor Test Site

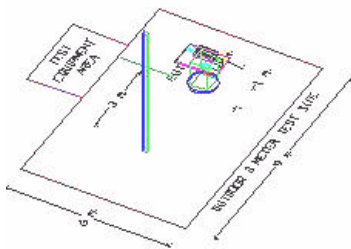


Figure 3-7. Turntable and System Setup

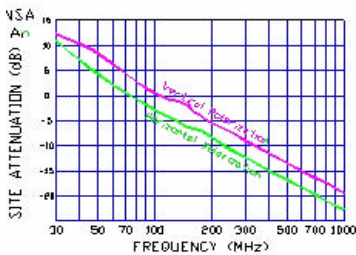


Figure 3-8. Normalized Site Attenuation Curves (H&V)

Preliminary measurements were made indoors at 1-meter using broadband antennas, broadband amplifiers, and spectrum analyzers to determine the frequency producing the maximum EME. Appropriate precaution was taken to ensure that all EME from the EUT were maximized and investigated. The system configuration, clock speed, mode of operation or video resolution, and turntable azimuth with respect to the antenna was noted for each frequency found. The spectrum was scanned from 30 to 200 MHz using a bi-conical antenna and from 200 to 1000 MHz using a log-spiral antenna. Above 1 GHz, linearly polarized double ridge horn antennas were used.

Final measurements were made outdoors at 3-meter test range using Roberts™ Dipole antennas or horn antennas (see Figure 3-5). The test equipment was placed on a wooden and plastic bench situated on a 1.5m x 2m area adjacent to the measurement area (see Figure 3-6). 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 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. Above 1GHz the detector function was set to average mode (RBW = 1MHz, VBW = 10Hz).

The half-wave dipole antenna was tuned to the frequency found during preliminary radiated measurements. The EUT, support equipment and interconnecting cables were re-configured to the set-up producing the maximum emission for the frequency and were 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 re-arranged and manipulated to maximize each EME emission. The turntable containing the system was rotated 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 maximized by: varying 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; and changing the polarity of the antenna, whichever determined the worst-case emission. Photographs of the worst-case emission can be seen in test setup photographs. Each EME reported was calibrated using the Agilent E8257D (250kHz – 20GHz) PSG Signal Generator. The Theoretical Normalized Site Attenuation Curves for both horizontal and vertical polarization are shown in Figure 3-8.

FCC ID: ACJ9TGCF-19D	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 15.247 802.11a/b/g/n MEASUREMENT REPORT (CERTIFICATION)	Panasonic	Reviewed by: Quality Manager
Test Report S/N: 0Y1003170437.ACJ	Test Dates: April 23, 2010	EUT Type: ToughBook Model: CF-19	Page 7 of 89	

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 antennas of the ToughBook Model: CF-19 are **permanently attached**.
- There are provisions for connection to an external antenna requiring professional installation. Please refer to Panasonic’s application cover letter for details.

Conclusion:

The **Panasonic ToughBook Model: CF-19 FCC ID: ACJ9TGCF-19D** unit complies with the requirement of §15.203.

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

Ch.	Frequency (MHz)	Ch.	Frequency (MHz)
149	a 5745	159	a/n 5795
151	a/n 5755	161	a/n 5805
153	a/n 5765	163	a/n 5815
155	a/n 5775	165	a 5825
157	a/n 5785		



Table 4-1. Frequency/ Channel Operations

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
-	No.165	(30MHz - 1000MHz) RG58 Coax Cable	N/A		N/A	N/A
-	No.166	(1000-26500MHz) Microwave RF Cable	N/A		N/A	N/A
-	No.167	(100kHz - 100MHz) RG58 Coax Cable	N/A		N/A	N/A
Agilent	11713A	Attenuation/Switch Driver	12/2/2009	Annual	12/2/2010	3439A02645
Agilent	8447D	Broadband Amplifier	3/18/2010	Annual	3/18/2011	1937A03348
Agilent	8447D	Broadband Amplifier	3/18/2010	Annual	3/18/2011	2443A01900
Agilent	8449B	(1-26.5GHz) Pre-Amplifier	12/2/2009	Annual	12/2/2010	3008A00985
Agilent	85650A	Quasi-Peak Adapter	12/2/2009	Annual	12/2/2010	3303A01872
Agilent	85650A	Quasi-Peak Adapter	3/30/2010	Annual	3/30/2011	2043A00301
Agilent	8566B	(100Hz-22GHz) Spectrum Analyzer	3/30/2010	Annual	3/30/2011	2618A02866
Agilent	8566B	(100Hz-22GHz) Spectrum Analyzer	3/30/2010	Annual	3/30/2011	2542A11898
Agilent	8566B	(100Hz-22GHz) Spectrum Analyzer	12/2/2009	Annual	12/2/2010	3638A08713
Agilent	E4407B	ESA Spectrum Analyzer	3/30/2010	Annual	3/30/2011	US39210313
Agilent	E4448A	PSA (3Hz-50GHz) Spectrum Analyzer	10/1/2009	Annual	10/1/2010	US42510244
Agilent	E8257D	(250kHz-20GHz) Signal Generator	3/30/2010	Annual	3/30/2011	MY45470194
Agilent	N9020A	MXA Signal Analyzer	10/22/2009	Annual	10/22/2010	US46470561
Anritsu	ML2495A	Power Meter	10/12/2009	Annual	10/12/2010	941001
Emco	3115	Horn Antenna (1-18GHz)	10/14/2009	Biennial	10/14/2011	9704-5182
Emco	3115	Horn Antenna (1-18GHz)	4/8/2010	Biennial	4/8/2012	9205-3874
Emco	3116	Horn Antenna (18 - 40GHz)	9/9/2008	Triennial	9/9/2011	9203-2178
Emco	3816/2	LISN	9/8/2008	Biennial	9/8/2010	9707-1077
Emco	3816/2	LISN	9/8/2008	Biennial	9/8/2010	9707-1079
Gigatronics	80701A	(0.05-18GHz) Power Sensor	9/9/2009	Annual	9/9/2010	1833460
Gigatronics	8651A	Universal Power Meter	9/9/2009	Annual	9/9/2010	8650319
MiniCircuits	VHF-3100+	High Pass Filter	N/A		N/A	30721
Rohde & Schwarz	FSQ 26	Spectrum Analyzer	9/19/2009	Annual	9/19/2010	200452
Sunol	DRH-118	Horn Antenna (1 - 18GHz)	5/14/2009	Biennial	5/14/2011	A050307
Sunol	JB5	Bi-Log Antenna (30M - 5GHz)	7/17/2009	Biennial	7/17/2011	A051107

Table 5-1. Annual Test Equipment Calibration Schedule

FCC ID: ACJ9TGCF-19D		FCC Pt. 15.247 802.11a/b/g/n MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1003170437.ACJ	Test Dates: April 23, 2010	EUT Type: ToughBook Model: CF-19	Page 9 of 89	



6.0 TEST RESULTS

6.1 Summary

Company Name: Panasonic Corporation of North America
 FCC ID: ACJ9TGCF-19D
 FCC Classification: Digital Transmission System (DTS)
 Data Rate(s) Tested: 1Mbps, 2Mbps, 5.5Mbps, 11Mbps (b)
6Mbps, 9Mbps, 12Mbps, 18Mbps, 24Mbps, 36Mbps, 48Mbps, 54Mbps (a/g)
13.5/15Mbps, 27/30Mbps, 40/45Mbps, 54/60Mbps, 81/90Mbps, 108/120Mbps,
121.5/135Mbps, 135/150Mbps (n)

FCC Part Section(s)	Test Description	Test Limit	Test Condition	Test Result	Reference
TRANSMITTER MODE (TX)					
15.247(a)(2)	6dB Bandwidth	> 500kHz	CONDUCTED	PASS	Section 6.2
15.247(b)(3)	Transmitter Output Power	< 1 Watt		PASS	Sections 6.3, 6.4, 6.5, 6.6
15.247(e)	Transmitter Power Spectral Density	< 8dBm / 3kHz Band		PASS	Section 6.7
15.247(d)	Band Edge / Out-of-Band Emissions	Conducted < 20dBc		PASS	Sections 6.8, 6.9
15.205 15.209	General Field Strength Limits (Restricted Bands and Radiated Emission Limits)	Emissions in restricted bands must meet the radiated limits detailed in 15.209	RADIATED	PASS	Sections 6.10, 6.11
15.207	AC Conducted Emissions 150kHz – 30MHz	< FCC 15.207 limits	LINE CONDUCTED	PASS	Section 6.12

Table 6-1. Summary of Test Results



FCC ID: ACJ9TGCF-19D		FCC Pt. 15.247 802.11a/b/g/n MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1003170437.ACJ	Test Dates: April 23, 2010	EUT Type: ToughBook Model: CF-19	Page 10 of 89	

6.2 6dB Bandwidth Measurement – 802.11a/b/g/n §15.247(a)(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	Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
2412	1	b	10.36	0.500	Pass
2437	6	b	10.32	0.500	Pass
2462	11	b	10.36	0.500	Pass
2412	1	g	16.32	0.500	Pass
2437	6	g	15.96	0.500	Pass
2462	11	g	16.28	0.500	Pass
5745	149	a	34.96	0.500	Pass
5785	157	a	34.96	0.500	Pass
5825	165	a	34.96	0.500	Pass
2422	3	n	16.16	0.500	Pass
2437	6	n	16.44	0.500	Pass
2452	9	n	16.28	0.500	Pass
5755	151	n	33.08	0.500	Pass
5795	159	n	34.08	0.500	Pass

Table 6-2. Conducted Bandwidth Measurements – Chain A

FCC ID: ACJ9TGCF-19D		FCC Pt. 15.247 802.11a/b/g/n MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1003170437.ACJ	Test Dates: April 23, 2010	EUT Type: ToughBook Model: CF-19		Page 11 of 89

Frequency [MHz]	Channel No.	802.11 Mode	Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
2412	1	b	12.10	0.500	Pass
2437	6	b	12.10	0.500	Pass
2462	11	b	12.10	0.500	Pass
2412	1	g	15.14	0.500	Pass
2437	6	g	15.14	0.500	Pass
2462	11	g	15.12	0.500	Pass
5745	149	a	16.36	0.500	Pass
5785	157	a	16.32	0.500	Pass
5825	165	a	16.32	0.500	Pass
2422	3	n	32.61	0.500	Pass
2437	6	n	32.60	0.500	Pass
2452	9	n	32.62	0.500	Pass
5755	151	n	32.60	0.500	Pass
5795	159	n	32.61	0.500	Pass

Table 6-3. Conducted Bandwidth Measurements – Chain B

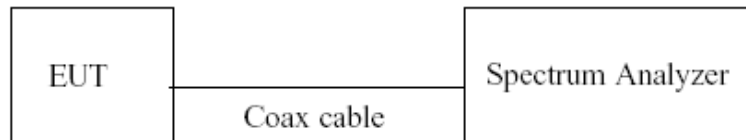
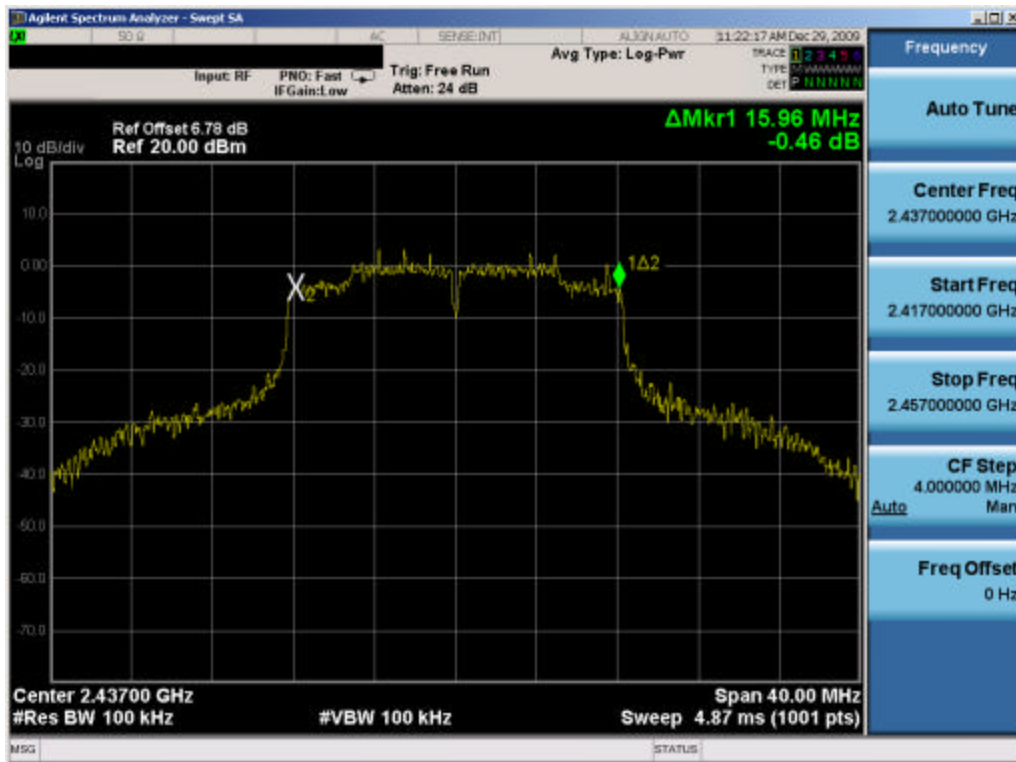


Figure 6-1. Test Instrument & Measurement Setup

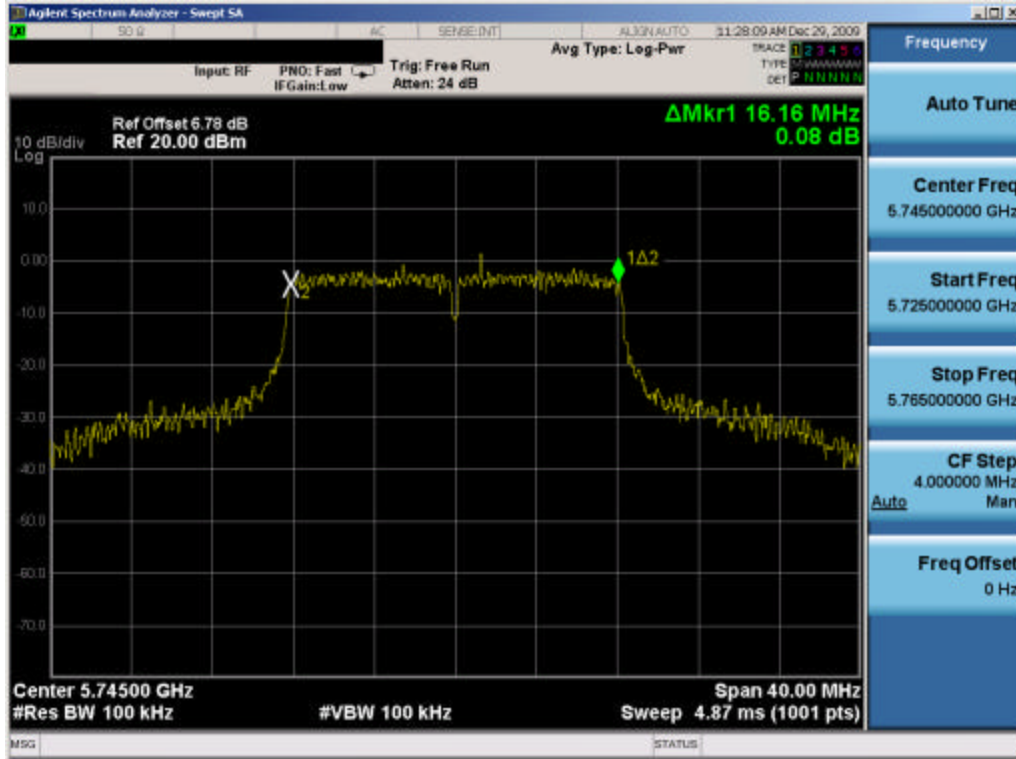


Plot 6-1. 6dB Bandwidth Plot (802.11b – Ch. 6) – Chain A

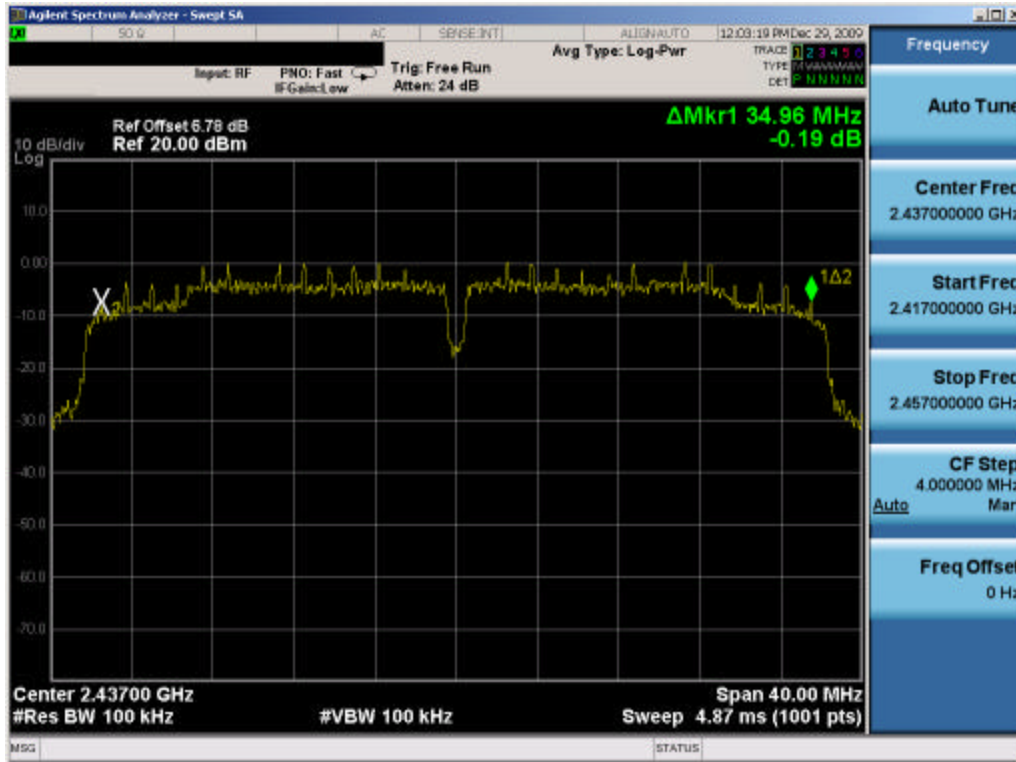


Plot 6-2. 6dB Bandwidth Plot (802.11g – Ch. 6) – Chain A

FCC ID: ACJ9TGCF-19D	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 15.247 802.11a/b/g/n MEASUREMENT REPORT (CERTIFICATION)	Panasonic	Reviewed by: Quality Manager
Test Report S/N: 0Y1003170437.ACJ	Test Dates: April 23, 2010	EUT Type: ToughBook Model: CF-19		Page 13 of 89

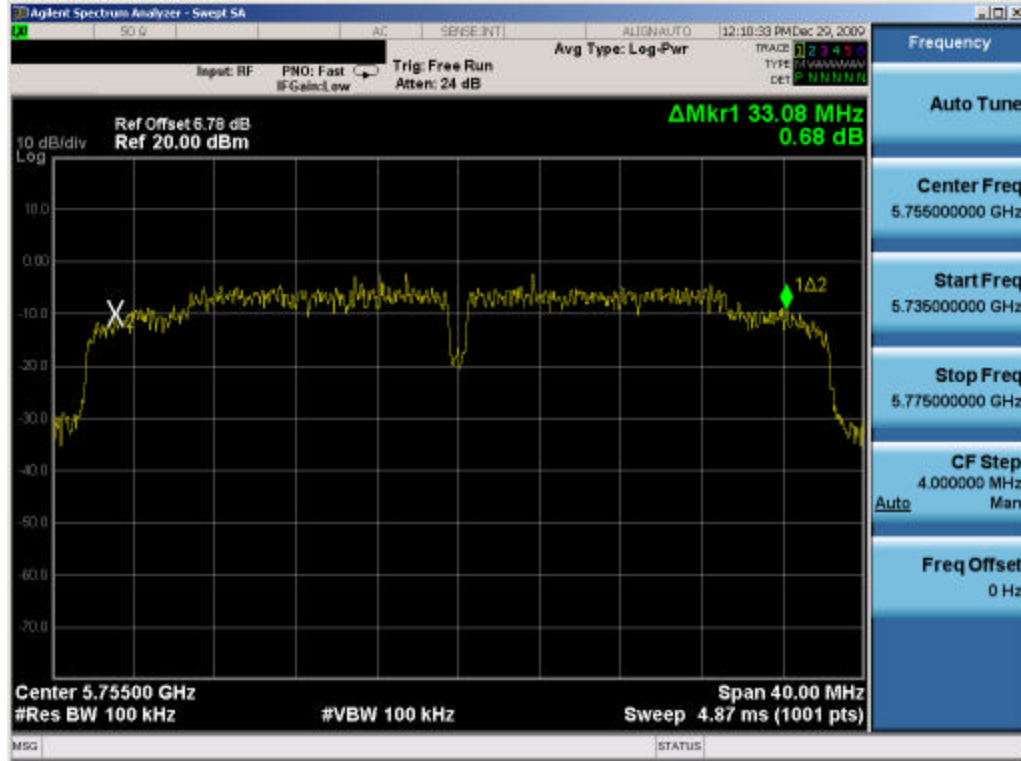


Plot 6-3. 6dB Bandwidth Plot (802.11a – Ch. 149) – Chain A

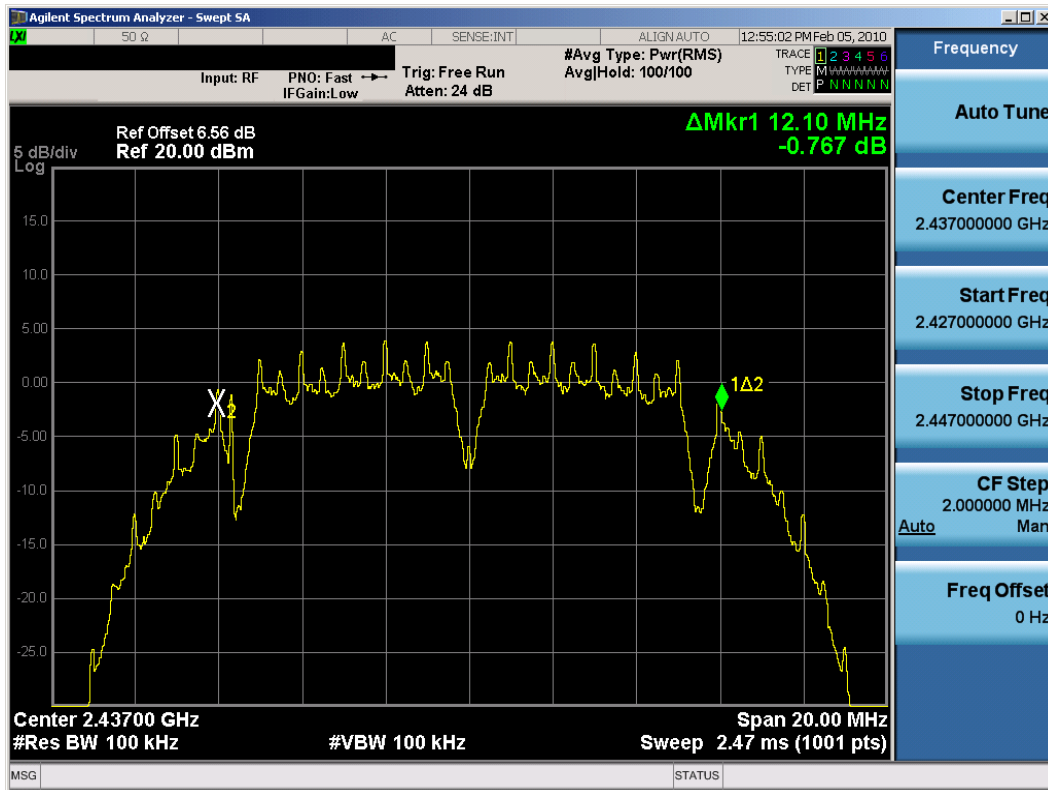


Plot 6-4. 6dB Bandwidth Plot (802.11n (2.4GHz) – Ch. 6) – Chain A

FCC ID: ACJ9TGCF-19D		FCC Pt. 15.247 802.11a/b/g/n MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1003170437.ACJ	Test Dates: April 23, 2010	EUT Type: ToughBook Model: CF-19		Page 14 of 89

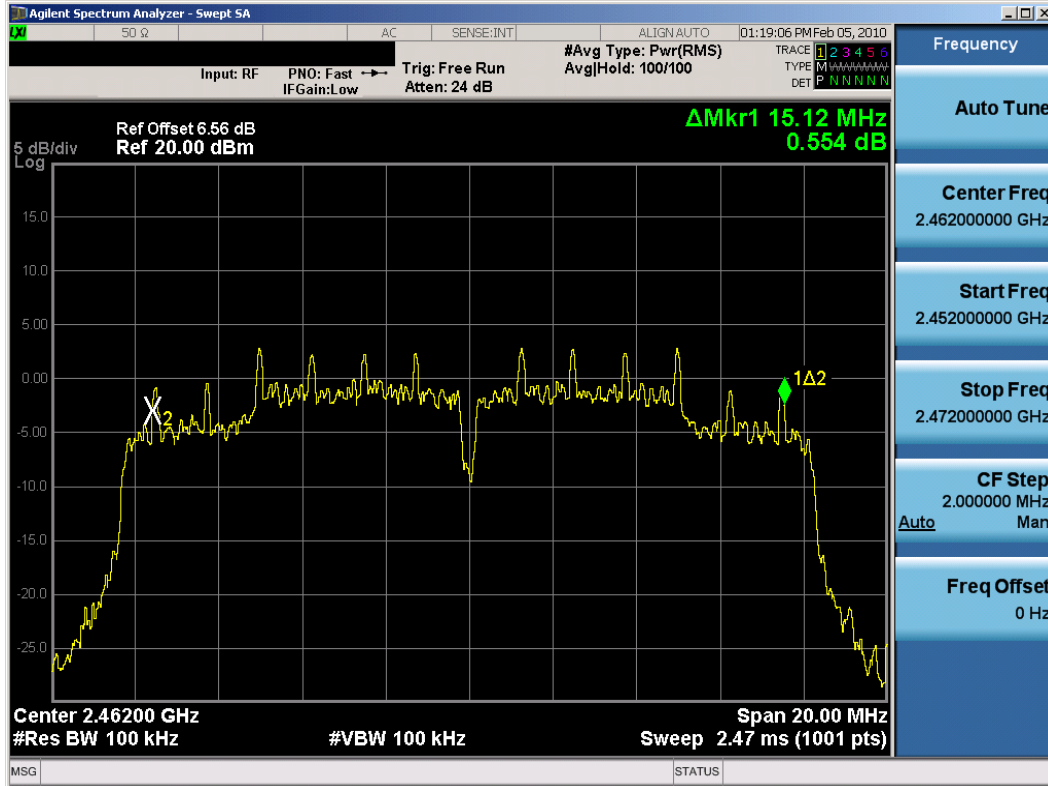


Plot 6-5. 6dB Bandwidth Plot (802.11n (5.8GHz) – Ch. 151) – Chain A

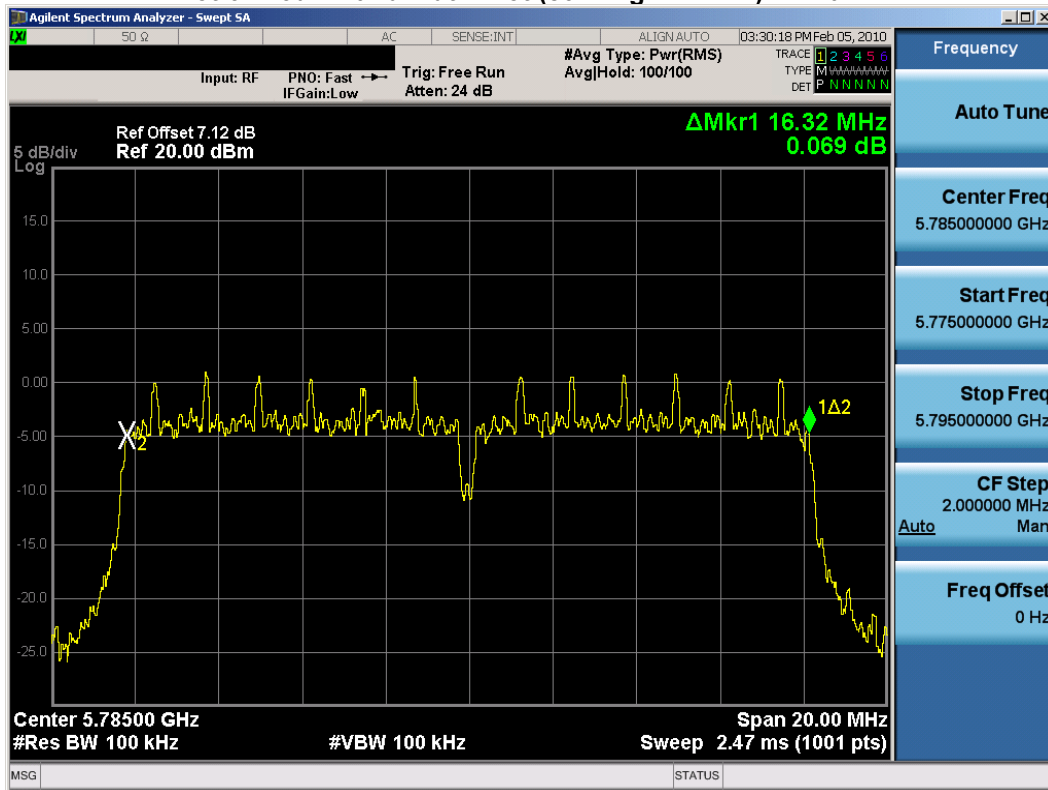


Plot 6-6. 6dB Bandwidth Plot (802.11b – Ch. 6) – Chain B

FCC ID: ACJ9TGCF-19D		FCC Pt. 15.247 802.11a/b/g/n MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1003170437.ACJ	Test Dates: April 23, 2010	EUT Type: ToughBook Model: CF-19		Page 15 of 89

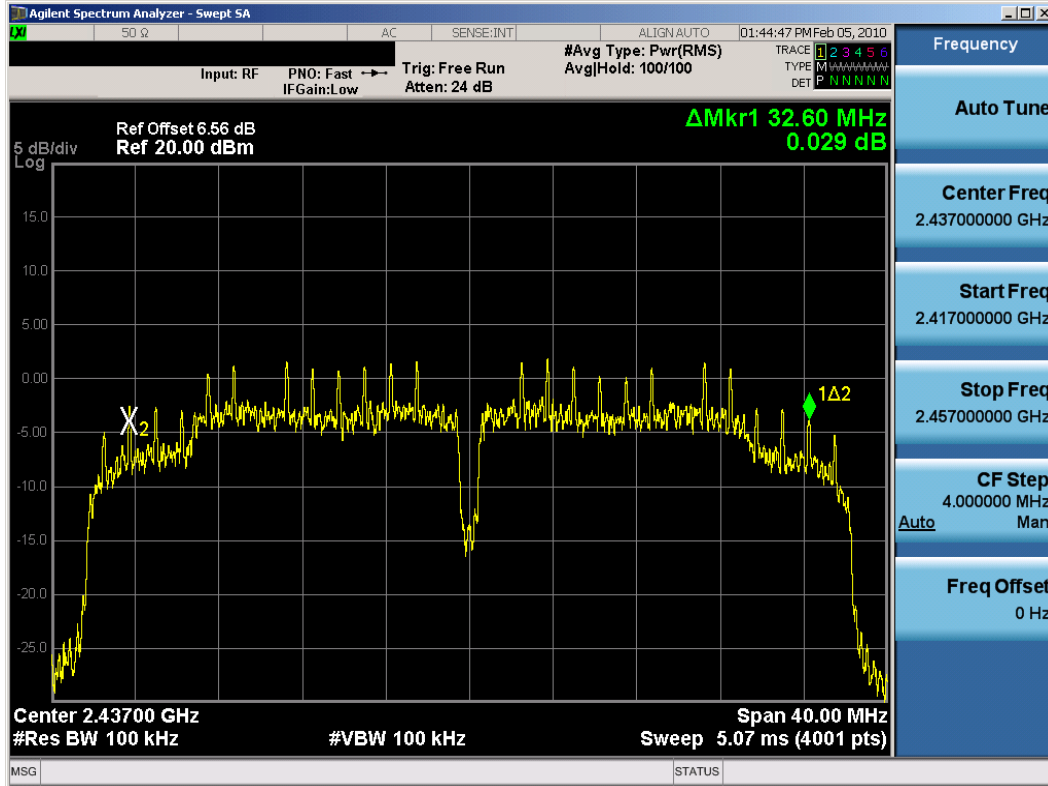


Plot 6-7. 6dB Bandwidth Plot (802.11g – Ch. 11) – Chain B

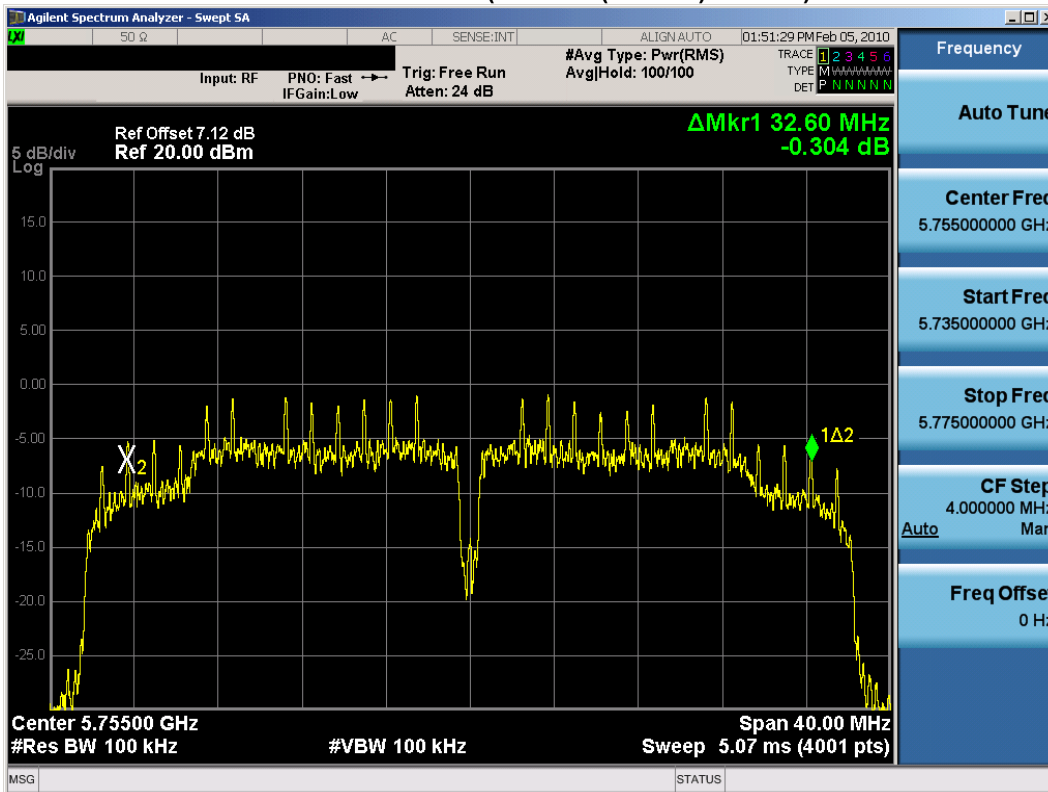


Plot 6-8. 6dB Bandwidth Plot (802.11a – Ch. 157) – Chain B

FCC ID: ACJ9TGCF-19D		FCC Pt. 15.247 802.11a/b/g/n MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1003170437.ACJ	Test Dates: April 23, 2010	EUT Type: ToughBook Model: CF-19		Page 16 of 89



Plot 6-9. 6dB Bandwidth Plot (802.11n (2.4GHz) – Ch. 6) – Chain B



Plot 6-10. 6dB Bandwidth Plot (802.11n (5.8GHz) – Ch. 151) – Chain B

FCC ID: ACJ9TGCF-19D		FCC Pt. 15.247 802.11a/b/g/n MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1003170437.ACJ	Test Dates: April 23, 2010	EUT Type: ToughBook Model: CF-19		Page 17 of 89

6.3 Output Power Measurement – 802.11b/g §15.247(b)(3)

A transmitter antenna terminal of EUT is connected to the input of a RF power sensor. Measurement is made while the EUT is operating in transmission mode at the appropriate frequencies. **The maximum permissible conducted output power is 1 Watt.**

Chain A

Freq [MHz]	Channel	Data Rate [Mbps]	Main Ant Measured Avg Power [dBm]	Main Ant Measured Peak Power [dBm]
2412	1	1	13.44	16.01
		2	13.48	15.98
		5.5	13.44	16.03
		11	13.45	16.11
2437	6	1	13.51	16.10
		2	13.57	16.07
		5.5	13.61	16.08
		11	13.51	16.18
2462	11	1	13.30	16.00
		2	13.39	15.97
		5.5	13.44	16.01
		11	13.42	16.05

Table 6-4. 802.11b Conducted Output Power Measurements

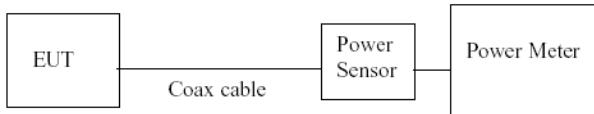


Figure 6-2. Test Instrument & Measurement Setup

Freq [MHz]	Channel	Data Rate [Mbps]	20MHz BW Measured Average Power [dBm]	20MHz BW Measured Peak Power [dBm]		
2412	1	6	12.61	21.41		
		9	12.59	21.39		
		12	12.60	21.40		
		18	12.61	21.38		
		24	12.57	21.45		
		36	12.44	21.33		
		48	12.55	21.38		
		54	11.19	19.95		
		2437	6	6	14.20	21.77
				9	14.39	21.66
				12	14.47	21.67
				18	14.15	21.70
24	14.25			21.80		
36	13.13			20.75		
2462	11	48	13.19	21.02		
		54	11.23	18.65		
		6	14.41	21.26		
		9	14.08	20.85		
		12	14.45	21.26		
		18	13.08	19.95		
		24	14.35	21.20		
		36	14.33	21.05		
		48	12.72	19.50		
		54	10.42	18.38		

Table 6-5. 802.11g Conducted Output Power Measurements

FCC ID: ACJ9TGCF-19D	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 15.247 802.11a/b/g/n MEASUREMENT REPORT (CERTIFICATION)	Panasonic	Reviewed by: Quality Manager
Test Report S/N: 0Y1003170437.ACJ	Test Dates: April 23, 2010	EUT Type: ToughBook Model: CF-19	Page 18 of 89	

Chain B

Freq [MHz]	Channel	Data Rate [Mbps]	Main Ant Measured Power [dBm]	Main Ant Measured Peak Power [dBm]
2412	1	1	13.54	16.18
		2	13.00	15.75
		5.5	13.50	16.17
		11	13.05	15.68
2437	6	1	13.54	15.88
		2	13.52	15.89
		5.5	13.55	15.87
		11	13.25	15.62
2462	11	1	12.84	15.78
		2	13.25	15.92
		5.5	13.23	15.85
		11	13.10	15.74

Table 6-6. 802.11b Conducted Output Power Measurements

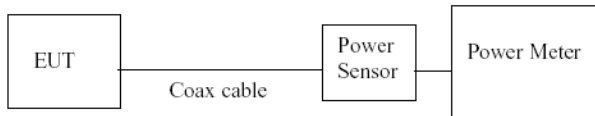




Figure 6-3. Test Instrument & Measurement Setup

Freq [MHz]	Channel	Data Rate [Mbps]	20MHz BW Measured Average Power [dBm]	20MHz BW Measured Peak Power [dBm]		
2412	1	6	11.91	20.89		
		9	11.78	20.80		
		12	11.77	20.68		
		18	11.78	20.64		
		24	11.68	20.56		
		36	11.00	20.11		
		48	11.54	20.16		
		54	10.30	18.56		
		2437	6	6	14.22	21.60
				9	14.16	21.43
				12	14.03	21.23
				18	14.01	21.20
24	13.84			20.90		
36	13.80			20.76		
2462	11	48	12.50	19.95		
		54	10.70	18.82		
		6	12.56	21.22		
		9	12.50	20.86		
		12	12.45	20.74		
		18	12.44	20.76		
2462	11	24	12.28	20.65		
		36	12.20	20.59		
		48	12.22	20.57		
		54	11.15	19.46		

Table 6-7. 802.11g Conducted Output Power Measurements

FCC ID: ACJ9TGCF-19D		FCC Pt. 15.247 802.11a/b/g/n MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1003170437.ACJ	Test Dates: April 23, 2010	EUT Type: ToughBook Model: CF-19	Page 19 of 89	

Chain AB – 2.4GHz 802.11g (20MHz Bandwidth)

Freq [MHz]	Channel	MCS Index	Data Rate [Mbps]	Chain A Average Power [dBm]	Chain A Peak Power [dBm]	Chain B Average Power [dBm]	Chain B Peak Power [dBm]	20MHz BW Average Aggregate Power [dBm]	20MHz BW Peak Aggregate Power [dBm]
2412	1	HT8	13/14.4	12.43	20.18	13.07	20.49	15.77	23.35
		HT9	26/28.9	12.51	20.23	13.02	20.63	15.78	23.44
		HT10	39/43.3	12.52	20.15	13.06	20.40	15.81	23.29
		HT11	52/57.8	12.49	20.25	13.09	20.54	15.81	23.41
		HT12	78/86.7	12.38	20.43	13.01	20.39	15.72	23.42
		HT13	104/115.6	12.46	20.42	13.12	21.26	15.81	23.87
		HT14	117/130	12.47	20.37	13.18	20.27	15.85	23.33
		HT15	130/144.4	11.41	18.83	11.74	18.86	14.59	21.86
2437	6	HT8	13/14.4	12.76	20.32	13.85	21.03	16.35	23.70
		HT9	26/28.9	13.11	20.87	13.98	21.31	16.58	24.11
		HT10	39/43.3	12.85	20.34	14.03	20.99	16.49	23.69
		HT11	52/57.8	12.82	20.09	14.43	21.32	16.71	23.76
		HT12	78/86.7	12.86	20.64	14.30	21.28	16.65	23.98
		HT13	104/115.6	12.92	21.06	13.58	21.35	16.27	24.22
		HT14	117/130	12.42	20.21	13.23	20.32	15.85	23.28
		HT15	130/144.4	11.61	19.01	12.23	19.29	14.94	22.16
2462	11	HT8	13/14.4	12.74	20.40	13.33	20.69	16.06	23.56
		HT9	26/28.9	12.78	20.55	13.55	20.93	16.19	23.75
		HT10	39/43.3	12.75	20.47	13.25	20.52	16.02	23.51
		HT11	52/57.8	12.71	20.92	13.40	20.73	16.08	23.84
		HT12	78/86.7	12.79	20.38	13.64	20.85	16.25	23.63
		HT13	104/115.6	12.76	20.52	13.47	21.49	16.14	24.04
		HT14	117/130	12.68	20.48	13.42	20.43	16.08	23.47
		HT15	130/144.4	11.63	19.11	12.08	19.23	14.87	22.18

Table 6-8. 802.11g (20MHz Bandwidth) Conducted Output Power Measurements

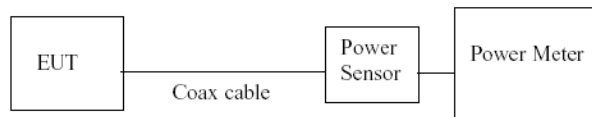




Figure 6-4. Test Instrument & Measurement Setup

FCC ID: ACJ9TGCF-19D		FCC Pt. 15.247 802.11a/b/g/n MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1003170437.ACJ	Test Dates: April 23, 2010	EUT Type: ToughBook Model: CF-19		Page 20 of 89

6.4 Output Power Measurement – 802.11a (5.8GHz)

§15.247(b)(3)

A transmitter antenna terminal of EUT is connected to the input of a RF power sensor. Measurement is made while the EUT is operating in transmission mode at the appropriate frequencies. **The maximum permissible conducted output power is 1 Watt.**

Chain A



Freq [MHz]	Channel	Data Rate [Mbps]	20MHz BW Measured Average Power [dBm]	20MHz BW Measured Peak Power [dBm]
5745	149	6	14.12	20.66
		9	14.01	20.60
		12	14.00	20.58
		18	14.04	20.54
		24	13.85	20.33
		36	13.82	20.29
		48	12.98	20.04
		54	10.81	18.11
5785	157	6	14.08	20.61
		9	14.35	20.60
		12	13.89	20.59
		18	13.92	20.57
		24	13.74	20.35
		36	13.70	20.33
		48	13.17	19.82
		54	11.43	17.03
5825	165	6	13.99	20.57
		9	13.88	20.54
		12	13.98	20.58
		18	14.19	20.59
		24	14.04	20.60
		36	14.02	20.53
		48	13.55	20.14
		54	11.05	17.54

Table 6-9. 802.11a (5.8GHz) Conducted Output Power Measurements

Chain B

Freq [MHz]	Channel	Data Rate [Mbps]	20MHz BW Measured Power [dBm]	20MHz BW Measured Peak Power [dBm]
5745	149	6	11.82	18.80
		9	12.04	19.10
		12	12.00	18.21
		18	12.03	18.30
		24	11.84	17.95
		36	11.76	17.92
		48	10.85	17.05
		54	8.50	15.01
5785	157	6	12.31	18.92
		9	12.35	18.81
		12	12.10	18.34
		18	12.20	18.55
		24	12.03	18.35
		36	11.95	18.29
		48	11.10	17.58
		54	8.76	15.26
5825	165	6	12.92	19.00
		9	12.80	18.84
		12	12.40	18.40
		18	12.62	18.61
		24	12.10	18.11
		36	12.10	18.13
		48	11.25	17.10
		54	8.85	15.29

Table 6-10. 802.11a (5.8GHz) Conducted Output Power Measurements

FCC ID: ACJ9TGCF-19D	 PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 15.247 802.11a/b/g/n MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1003170437.ACJ	Test Dates: April 23, 2010	EUT Type: ToughBook Model: CF-19	Page 21 of 89	

Chain AB – 5.8GHz 802.11a (20MHz Bandwidth)

Freq [MHz]	Channel	MCS Index	Data Rate [Mbps]	Chain A Average Power [dBm]	Chain A Peak Power [dBm]	Chain B Average Power [dBm]	Chain B Peak Power [dBm]	20MHz BW Average Aggregate Power [dBm]	20MHz BW Peak Aggregate Power [dBm]
5745	149	HT8	13/14.4	11.83	18.71	10.57	18.02	14.26	21.39
		HT9	26/28.9	12.05	18.61	10.74	18.21	14.45	21.42
		HT10	39/43.3	12.02	18.60	10.69	18.02	14.42	21.33
		HT11	52/57.8	12.05	18.41	10.67	17.84	14.42	21.14
		HT12	78/86.7	12.01	18.56	10.74	18.13	14.43	21.36
		HT13	104/115.6	12.03	18.64	10.79	18.46	14.46	21.56
		HT14	117/130	12.03	18.66	10.32	17.51	14.27	21.13
		HT15	130/144.4	8.62	16.31	7.78	15.51	11.23	18.94
5785	157	HT8	13/14.4	11.81	18.41	10.61	17.72	14.26	21.09
		HT9	26/28.9	12.05	18.67	10.70	17.95	14.44	21.34
		HT10	39/43.3	12.01	18.72	10.58	17.97	14.36	21.37
		HT11	52/57.8	12.03	18.77	10.57	18.11	14.37	21.46
		HT12	78/86.7	12.02	18.94	10.45	18.05	14.32	21.53
		HT13	104/115.6	12.05	18.85	10.73	18.01	14.45	21.46
		HT14	117/130	12.01	18.91	10.36	17.87	14.27	21.43
		HT15	130/144.4	8.96	16.51	8.23	15.82	11.62	19.19
5825	165	HT8	13/14.4	12.11	18.37	10.70	17.76	14.47	21.09
		HT9	26/28.9	12.04	18.74	10.65	18.12	14.41	21.45
		HT10	39/43.3	12.05	18.62	10.66	17.95	14.42	21.31
		HT11	52/57.8	12.01	18.58	10.59	17.91	14.37	21.27
		HT12	78/86.7	12.08	18.54	10.73	18.04	14.47	21.31
		HT13	104/115.6	12.03	18.67	10.70	18.20	14.43	21.45
		HT14	117/130	12.06	18.62	10.42	18.17	14.33	21.41
		HT15	130/144.4	9.56	17.05	9.15	16.53	12.37	19.81

Table 6-11. 802.11a (20MHz Bandwidth) Conducted Output Power Measurements

6.5 Output Power Measurement – 802.11n (2.4GHz)

§15.247(b)(3)

A transmitter antenna terminal of EUT is connected to the input of a RF power sensor. Measurement is made while the EUT is operating in transmission mode at the appropriate frequencies. **The maximum permissible conducted output power is 1 Watt.**

Chain A



Freq [MHz]	Channel	MCS Index	Data Rate [Mbps]	40MHz BW Measured Avg Power [dBm]	40MHz BW Measured Peak Power [dBm]
2422	3	HT0	13.5/15	7.31	16.43
		HT1	27/30	7.42	16.50
		HT2	40/45	5.93	15.18
		HT3	54/60	6.90	16.22
		HT4	81/90	6.93	16.18
		HT5	108/120	7.03	16.33
		HT6	121.5/135	6.71	15.95
		HT7	135/150	6.86	16.10
2437	6	HT0	13.5/15	14.40	21.70
		HT1	27/30	14.02	21.68
		HT2	40/45	14.72	21.60
		HT3	54/60	14.25	21.59
		HT4	81/90	14.16	21.55
		HT5	108/120	12.95	20.20
		HT6	121.5/135	11.23	18.50
		HT7	135/150	9.56	16.71
2452	9	HT0	13.5/15	8.16	18.10
		HT1	27/30	7.81	17.90
		HT2	40/45	7.52	17.66
		HT3	54/60	8.08	18.16
		HT4	81/90	8.08	18.14
		HT5	108/120	8.18	18.12
		HT6	121.5/135	8.00	17.95
		HT7	135/150	7.81	17.85

Table 6-12. 802.11n (20MHz Bandwidth) Conducted Output Power Measurements

Chain B

Freq [MHz]	Channel	MCS Index	Data Rate [Mbps]	40MHz BW Measured Average Power [dBm]	40MHz BW Measured Peak Power [dBm]
2422	3	HT0	13.5/15	7.42	17.40
		HT1	27/30	7.43	17.38
		HT2	40/45	7.77	17.25
		HT3	54/60	7.15	16.80
		HT4	81/90	7.08	16.90
		HT5	108/120	7.00	17.00
		HT6	121.5/135	7.01	17.02
		HT7	135/150	6.90	16.95
2437	6	HT0	13.5/15	14.05	21.62
		HT1	27/30	14.00	21.58
		HT2	40/45	13.93	21.52
		HT3	54/60	13.68	21.16
		HT4	81/90	13.61	21.11
		HT5	108/120	12.20	19.85
		HT6	121.5/135	10.49	17.05
		HT7	135/150	8.80	15.06
2452	9	HT0	13.5/15	7.73	17.16
		HT1	27/30	7.78	17.10
		HT2	40/45	8.14	17.15
		HT3	54/60	7.50	16.50
		HT4	81/90	7.46	16.54
		HT5	108/120	7.84	16.84
		HT6	121.5/135	7.38	16.35
		HT7	135/150	7.31	16.29

Table 6-13. 802.11n (20MHz Bandwidth) Conducted Output Power Measurements

FCC ID: ACJ9TGCF-19D		FCC Pt. 15.247 802.11a/b/g/n MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1003170437.ACJ	Test Dates: April 23, 2010	EUT Type: ToughBook Model: CF-19	Page 23 of 89	

Chain AB – 2.4GHz 802.11n (40MHz Bandwidth)

Freq [MHz]	Channel	MCS Index	Data Rate [Mbps]	Chain A Average Power [dBm]	Chain A Peak Power [dBm]	Chain B Average Power [dBm]	Chain B Peak Power [dBm]	20MHz BW Average Aggregate Power [dBm]	20MHz BW Peak Aggregate Power [dBm]		
2422	1	HT8	27/30	6.55	15.95	8.97	17.80	10.94	19.98		
		HT9	54/60	6.44	15.52	9.04	17.49	10.94	19.63		
		HT10	80/90	6.38	15.16	9.07	17.29	10.94	19.36		
		HT11	108/120	6.45	16.58	9.05	17.35	10.95	19.99		
		HT12	162/180	6.52	15.55	9.11	17.42	11.02	19.60		
		HT13	216/240	6.55	15.38	9.02	17.55	10.97	19.61		
		HT14	243/270	6.61	16.13	8.97	17.28	10.96	19.75		
		HT15	270/300	6.65	16.99	8.86	18.40	10.90	20.76		
		2437	6	HT8	27/30	12.93	20.76	13.47	20.96	16.22	23.87
				HT9	54/60	12.56	20.27	13.48	20.67	16.05	23.48
				HT10	80/90	12.98	20.54	13.42	20.64	16.22	23.60
				HT11	108/120	12.58	20.86	13.53	21.27	16.09	24.08
				HT12	162/180	12.65	20.45	14.01	21.11	16.39	23.80
				HT13	216/240	12.71	20.48	13.57	20.81	16.17	23.66
				HT14	243/270	12.27	20.48	13.19	20.84	15.76	23.67
2452	9	HT8	27/30	6.88	16.23	8.86	17.82	10.99	20.11		
		HT9	54/60	6.87	15.92	8.91	17.43	11.02	19.75		
		HT10	80/90	6.51	15.32	8.95	17.25	10.91	19.40		
		HT11	108/120	6.56	16.73	8.64	18.21	10.73	20.54		
		HT12	162/180	6.62	15.67	9.01	17.74	10.99	19.84		
		HT13	216/240	6.67	15.51	8.68	17.23	10.80	19.46		
		HT14	243/270	6.73	16.27	8.69	17.75	10.83	20.08		
		HT15	270/300	6.77	17.12	8.70	18.35	10.85	20.79		

Table 6-14. 802.11n (40MHz Bandwidth) Conducted Output Power Measurements

6.6 Output Power Measurement – 802.11n (5.8GHz)

§15.247(b)(3)

A transmitter antenna terminal of EUT is connected to the input of a RF power sensor. Measurement is made while the EUT is operating in transmission mode at the appropriate frequencies. **The maximum permissible conducted output power is 1 Watt.**

Chain A

Freq [MHz]	Channel	MCS Index	Data Rate [Mbps]	40MHz BW Measured Average Power [dBm]	40MHz BW Measured Peak Power [dBm]
5755	151	HT0	13.5/15	14.23	20.61
		HT1	27/30	14.15	20.60
		HT2	40/45	14.19	20.59
		HT3	54/60	14.09	20.63
		HT4	81/90	14.15	20.64
		HT5	108/120	13.71	20.54
		HT6	121.5/135	11.51	18.66
		HT7	135/150	7.34	14.52
5795	159	HT0	13.5/15	14.22	20.62
		HT1	27/30	13.89	20.60
		HT2	40/45	13.89	20.63
		HT3	54/60	13.15	20.64
		HT4	81/90	13.92	19.50
		HT5	108/120	13.50	19.17
		HT6	121.5/135	11.56	17.18
		HT7	135/150	7.56	13.23

Table 6-15. 802.11n (5.8GHz) Conducted Output Power Measurements

Chain B



Freq [MHz]	Channel	MCS Index	Data Rate [Mbps]	40MHz BW Measured Power [dBm]	40MHz BW Measured Peak Power [dBm]
5755	151	HT0	13.5/15	11.35	18.83
		HT1	27/30	11.66	18.96
		HT2	40/45	11.54	18.80
		HT3	54/60	11.35	18.62
		HT4	81/90	11.30	18.59
		HT5	108/120	10.72	17.95
		HT6	121.5/135	8.60	15.94
		HT7	135/150	5.60	12.91
5795	159	HT0	13.5/15	12.00	19.04
		HT1	27/30	11.90	18.98
		HT2	40/45	11.76	18.76
		HT3	54/60	11.56	18.54
		HT4	81/90	11.40	18.49
		HT5	108/120	11.00	18.05
		HT6	121.5/135	8.81	15.36
		HT7	135/150	6.01	13.27

Table 6-16. 802.11n (5.8GHz) Conducted Output Power Measurements

Chain AB – 5.8GHz 802.11n (40MHz Bandwidth)

Freq [MHz]	Channel	MCS Index	Data Rate [Mbps]	Chain A Average Power [dBm]	Chain A Peak Power [dBm]	Chain B Average Power [dBm]	Chain B Peak Power [dBm]	20MHz BW Average Aggregate Power [dBm]	20MHz BW Peak Aggregate Power [dBm]
5755	151	HT8	27/30	12.58	19.28	10.73	17.94	14.76	21.67
		HT9	54/60	12.67	19.34	10.71	17.82	14.81	21.66
		HT10	80/90	12.54	19.05	10.65	17.99	14.71	21.56
		HT11	108/120	12.59	19.11	10.68	18.03	14.75	21.61
		HT12	162/180	12.65	19.18	10.72	18.12	14.80	21.69
		HT13	216/240	12.63	19.20	10.69	17.97	14.78	21.64
		HT14	243/270	12.61	19.22	10.66	18.03	14.75	21.68
		HT15	270/300	7.52	17.22	7.14	16.72	10.34	19.99
5795	159	HT8	27/30	12.63	19.63	11.02	18.01	14.91	21.91
		HT9	54/60	12.73	19.83	10.62	17.75	14.81	21.92
		HT10	80/90	12.77	19.70	10.63	17.78	14.84	21.86
		HT11	108/120	12.75	19.74	10.78	17.85	14.89	21.91
		HT12	162/180	12.72	19.84	10.73	18.11	14.85	22.07
		HT13	216/240	12.70	19.90	10.65	18.05	14.81	22.08
		HT14	243/270	12.62	19.91	10.71	17.92	14.78	22.04
		HT15	270/300	8.27	17.76	7.62	17.06	10.97	20.43

Table 6-17. 802.11n (40MHz Bandwidth) Conducted Output Power Measurements



FCC ID: ACJ9TGCF-19D		FCC Pt. 15.247 802.11a/b/g/n MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1003170437.ACJ	Test Dates: April 23, 2010	EUT Type: ToughBook Model: CF-19		Page 26 of 89

6.7 Power Spectral Density (802.11a/b/g/n) §15.247(e)

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.**

Frequency [MHz]	Channel No.	802.11 Mode	Measured Power Spectral Density [dBm]	Maximum Permissible Power Density [dBm / 3kHz]	Margin [dB]
2412	1	b	-13.720	8.0	-21.7
2437	6	b	-14.480	8.0	-22.5
2462	11	b	-14.390	8.0	-22.4
2412	1	g	-12.300	8.0	-20.3
2437	6	g	-10.980	8.0	-19.0
2462	11	g	-13.270	8.0	-21.3
5745	149	a	-12.240	8.0	-20.2
5785	157	a	-13.060	8.0	-21.1
5825	165	a	-13.240	8.0	-21.2
2422	3	n	-21.550	8.0	-29.6
2437	6	n	-13.330	8.0	-21.3
2452	9	n	-20.050	8.0	-28.1
5755	151	n	-15.170	8.0	-23.2
5795	159	n	-15.860	8.0	-23.9

Table 6-18. Conducted Power Density Measurements – Chain A

FCC ID: ACJ9TGCF-19D		FCC Pt. 15.247 802.11a/b/g/n MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1003170437.ACJ	Test Dates: April 23, 2010	EUT Type: ToughBook Model: CF-19		Page 27 of 89

Frequency [MHz]	Channel No.	802.11 Mode	Measured Power Spectral Density [dBm]	Maximum Permissible Power Density [dBm / 3kHz]	Margin [dB]
2412	1	b	-13.810	8.0	-21.8
2437	6	b	-13.510	8.0	-21.5
2462	11	b	-7.010	8.0	-15.0
2412	1	g	-12.130	8.0	-20.1
2437	6	g	-10.220	8.0	-18.2
2462	11	g	-12.060	8.0	-20.1
5745	149	a	-12.640	8.0	-20.6
5785	157	a	-13.690	8.0	-21.7
5825	165	a	-13.510	8.0	-21.5
2422	3	n	-19.920	8.0	-27.9
2437	6	n	-12.830	8.0	-20.8
2452	9	n	-19.580	8.0	-27.6
5755	151	n	-16.000	8.0	-24.0
5795	159	n	-16.040	8.0	-24.0

Table 6-19. Conducted Power Density Measurements – Chain B

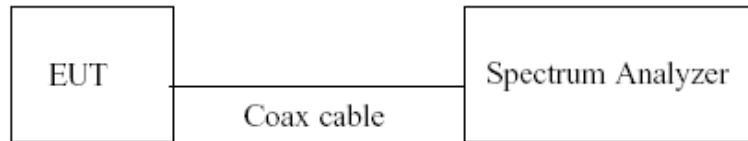


Figure 6-5. Test Instrument & Measurement Setup

Frequency [MHz]	Channel No.	802.11 Mode	Measured Power Spectral Density Chain A [dBm]	Measured Power Spectral Density Chain B [dBm]	Aggregate PSD Chain AB [dBm]	Maximum Permissible Power Density [dBm/3kHz]	Margin [dB]
2412	1	b	-13.720	-13.810	-10.754	8.0	-18.75
2437	6	b	-14.480	-13.510	-10.958	8.0	-18.96
2462	11	b	-14.390	-7.010	-6.281	8.0	-14.28
2412	1	g	-11.880	-12.330	-9.089	8.0	-17.09
2437	6	g	-11.750	-11.830	-8.780	8.0	-16.78
2462	11	g	-11.650	-10.500	-8.027	8.0	-16.03
5745	149	a	-13.710	-15.740	-11.597	8.0	-19.60
5785	157	a	-15.990	-16.080	-13.024	8.0	-21.02
5825	165	a	-15.980	-14.970	-12.435	8.0	-20.44
2422	3	n	-19.410	-19.580	-16.484	8.0	-24.48
2437	6	n	-14.530	-12.540	-10.412	8.0	-18.41
2452	9	n	-19.730	-17.860	-15.685	8.0	-23.68
5755	151	n	-16.560	-15.900	-13.207	8.0	-21.21
5795	159	n	-16.910	-16.800	-13.844	8.0	-21.84

Table 6-20. Conducted Power Spectral Density Measurements – Chain A/B

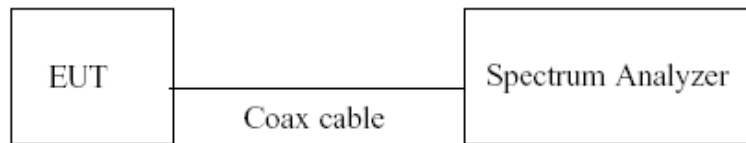


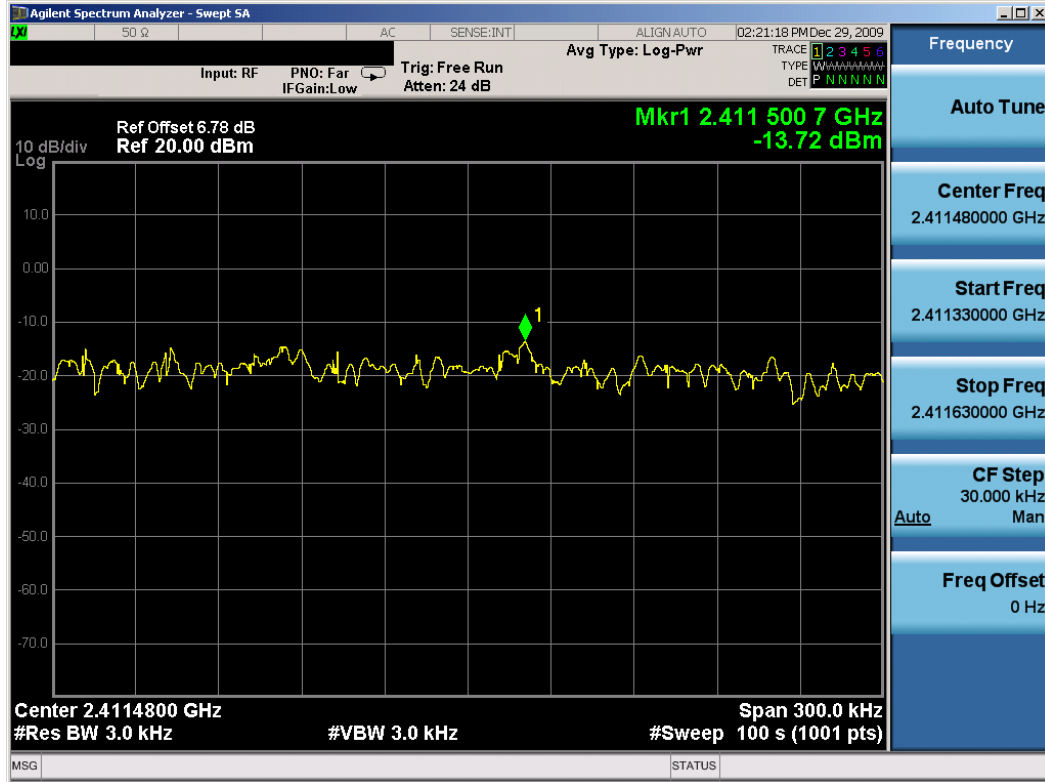


Figure 6-6. Test Instrument & Measurement Setup

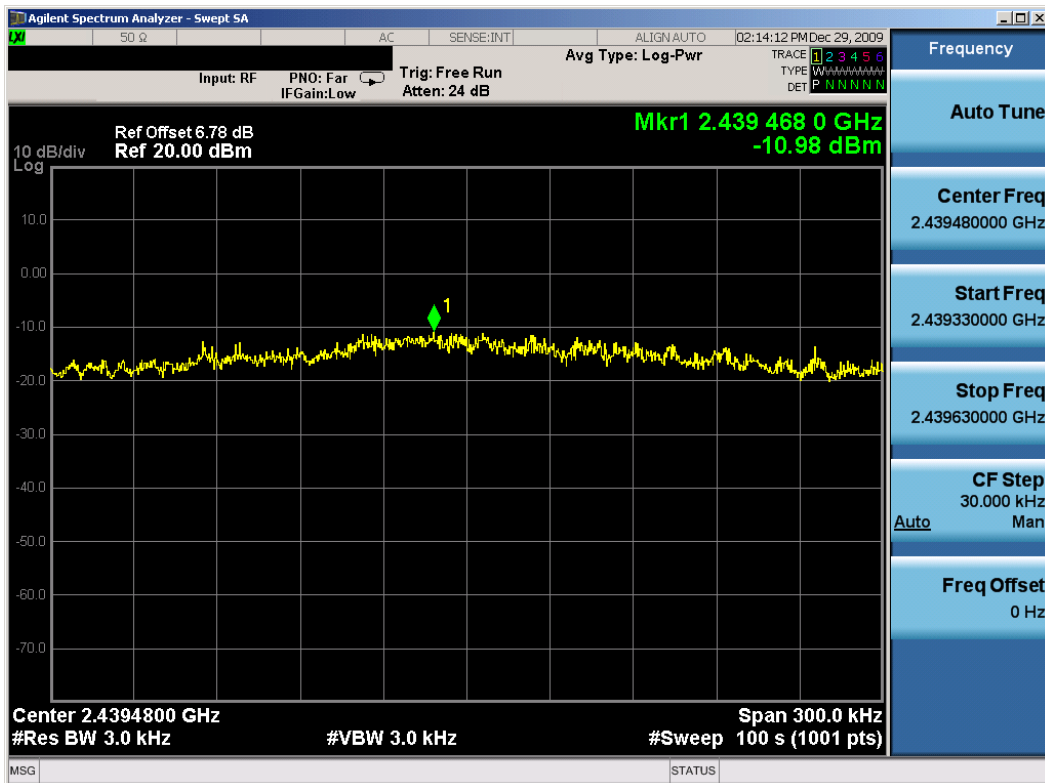
Notes:

- MIMO operation is not possible while operating in 802.11b mode, so the aggregate power spectral density shown above in Table 6-20 for 802.11b is the summation of the power spectral density's measured in single chain transmission mode, as shown in Table 6-18 and Table 6-19.
- The plots below show only the power spectral density measured on Chain A/B on the channel that results in the highest aggregate power spectral density reported in Table 6-20.

FCC ID: ACJ9TGCF-19D		FCC Pt. 15.247 802.11a/b/g/n MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1003170437.ACJ	Test Dates: April 23, 2010	EUT Type: ToughBook Model: CF-19		Page 29 of 89

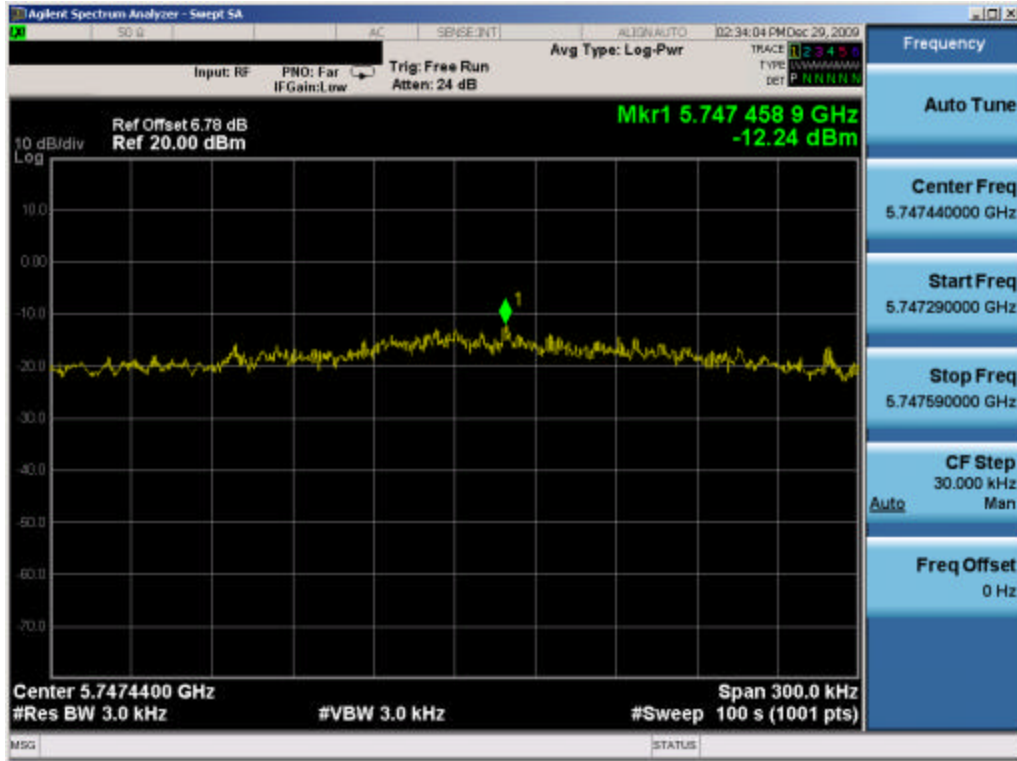


Plot 6-11. Power Spectral Density Plot (802.11b – Ch. 1) – Chain A

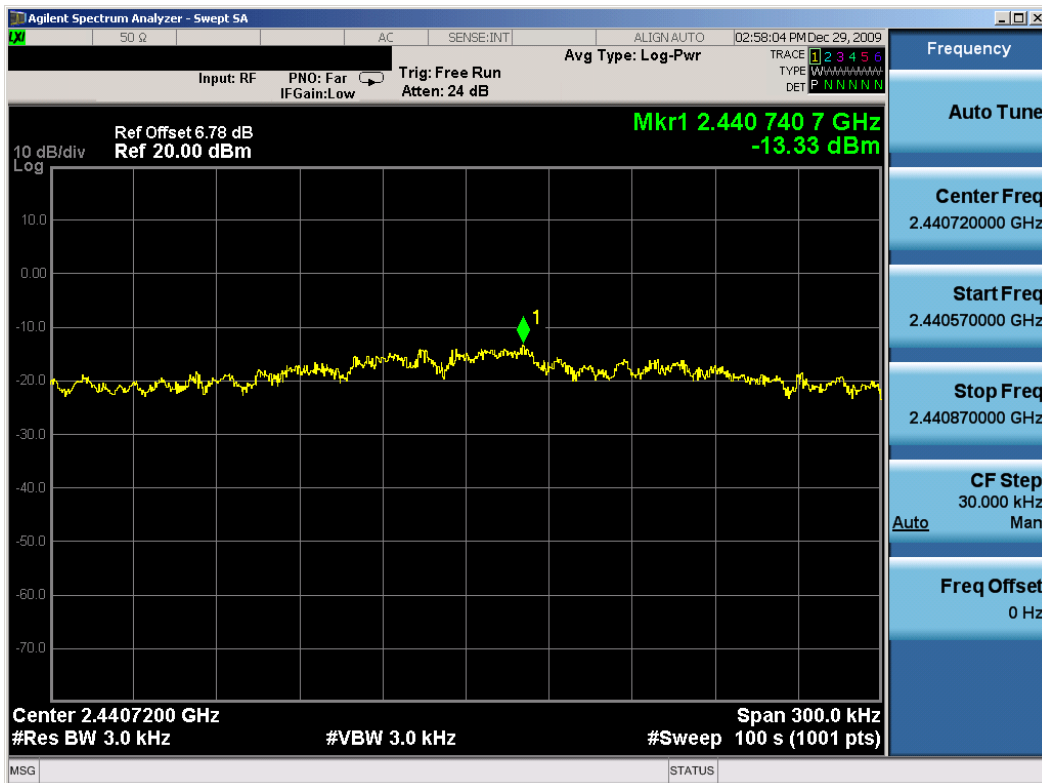


Plot 6-12. Power Spectral Density Plot (802.11g – Ch. 6) – Chain A

FCC ID: ACJ9TGCF-19D		FCC Pt. 15.247 802.11a/b/g/n MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1003170437.ACJ	Test Dates: April 23, 2010	EUT Type: ToughBook Model: CF-19		Page 30 of 89

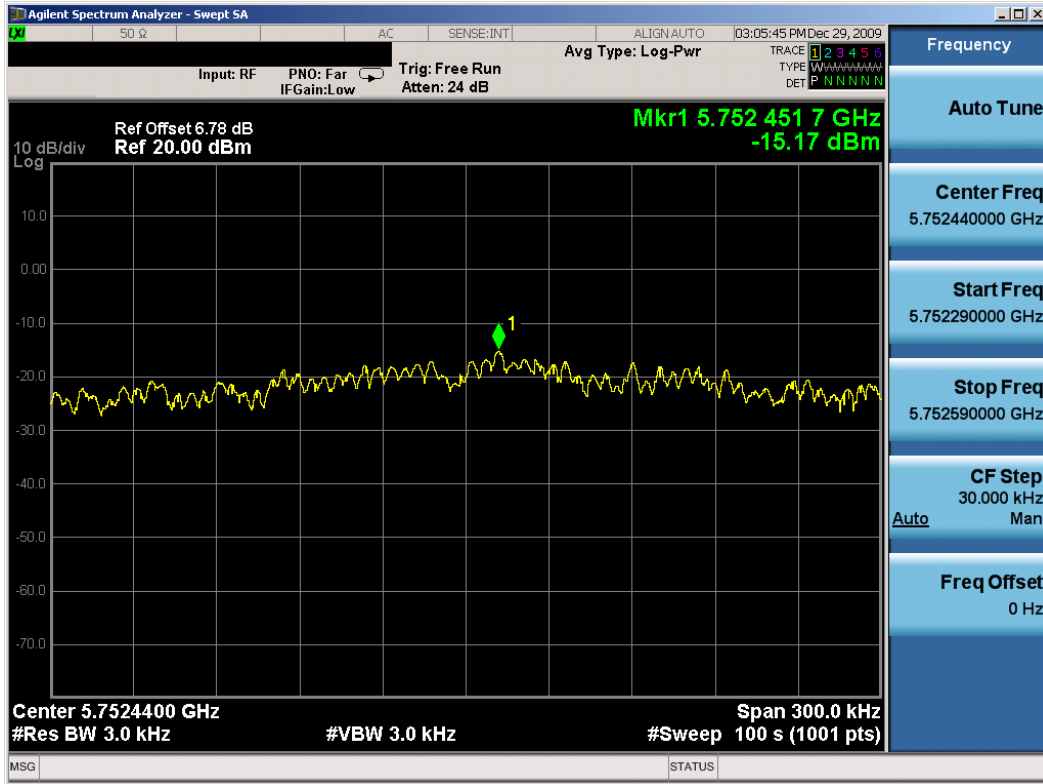


Plot 6-13. Power Spectral Density Plot (802.11a – Ch. 149) – Chain A

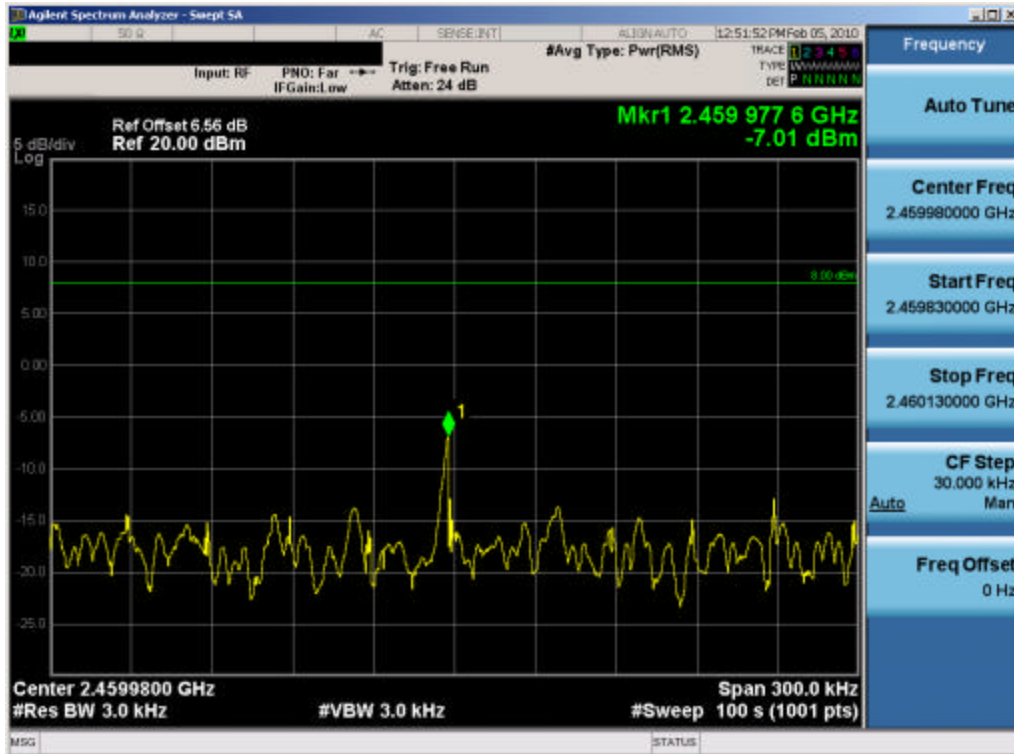


Plot 6-14. Power Spectral Density Plot (802.11n (2.4GHz) – Ch. 6) – Chain A

FCC ID: ACJ9TGCF-19D		FCC Pt. 15.247 802.11a/b/g/n MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1003170437.ACJ	Test Dates: April 23, 2010	EUT Type: ToughBook Model: CF-19		Page 31 of 89

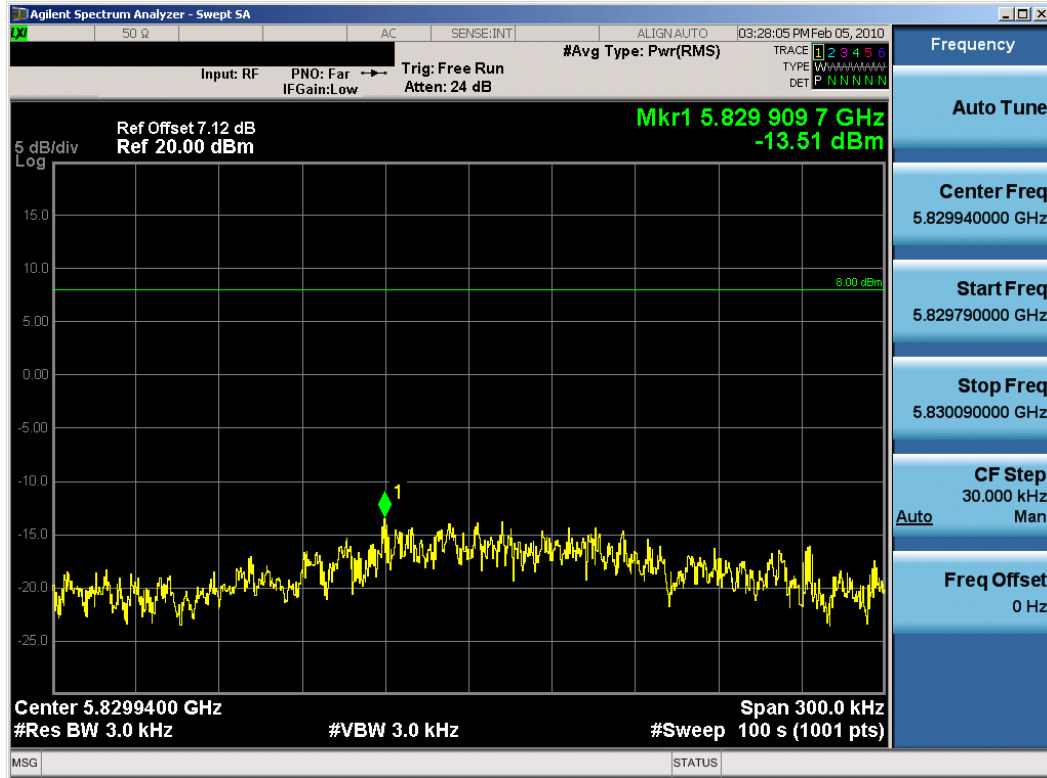


Plot 6-15. Power Spectral Density Plot (802.11n (5.8GHz) – Ch. 151) – Chain A

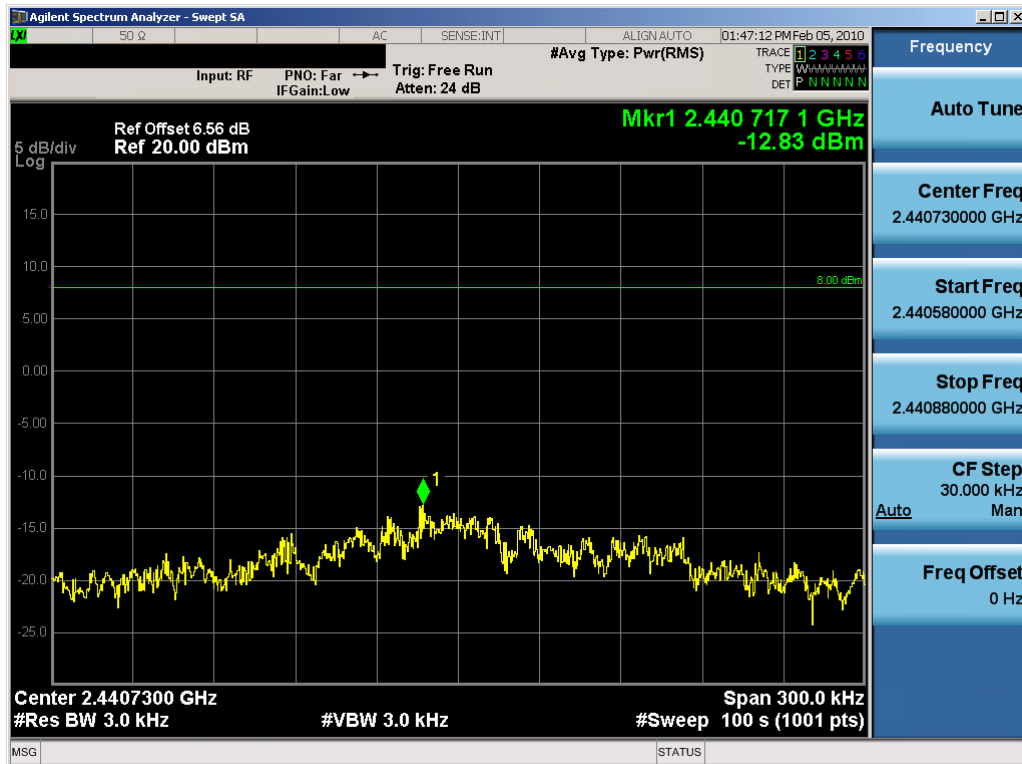


Plot 6-16. Power Spectral Density Plot (802.11b – Ch. 11) – Chain B

FCC ID: ACJ9TGCF-19D		FCC Pt. 15.247 802.11a/b/g/n MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1003170437.ACJ	Test Dates: April 23, 2010	EUT Type: ToughBook Model: CF-19		Page 32 of 89

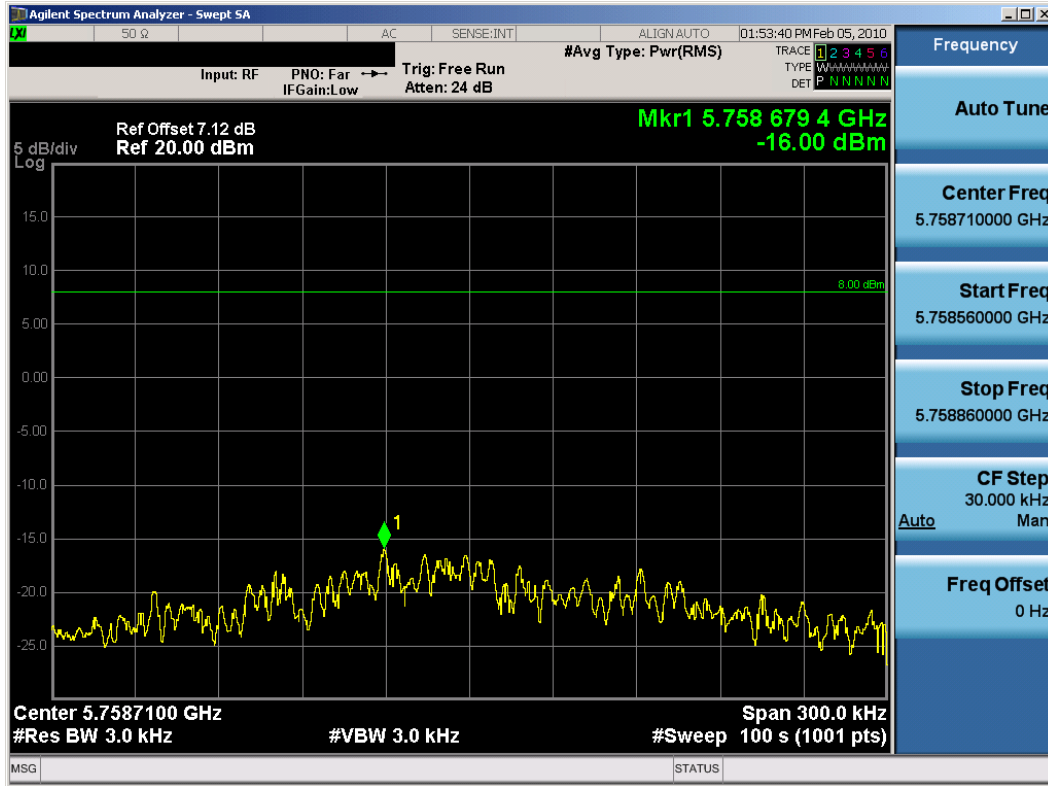


Plot 6-19. Power Spectral Density Plot (802.11a – Ch. 165) – Chain B

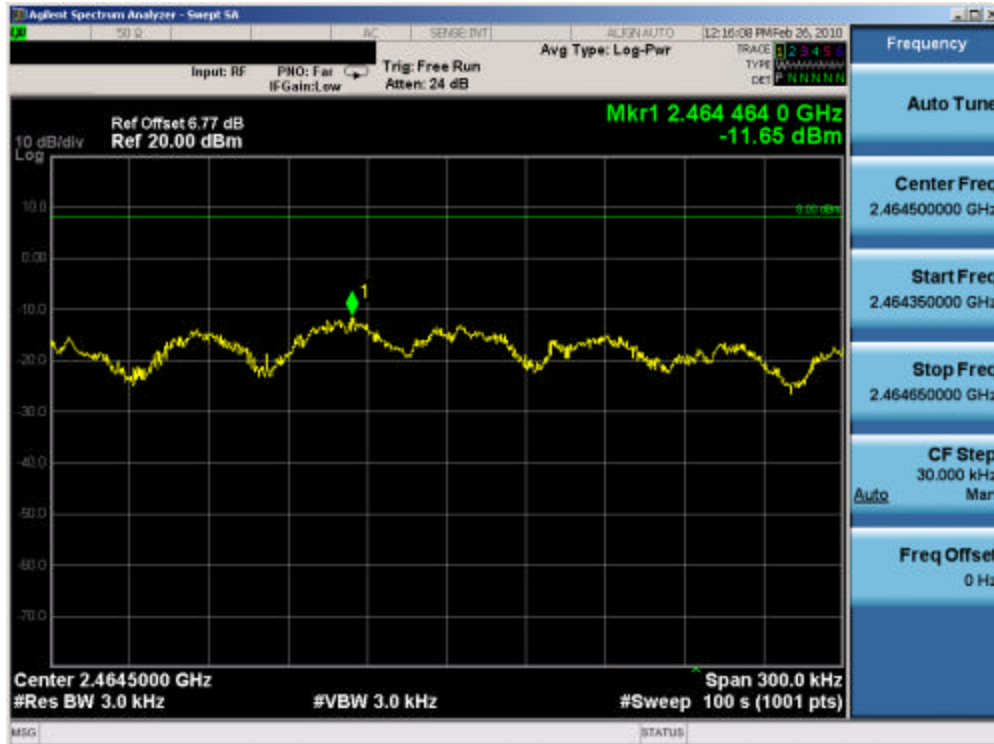


Plot 6-20. Power Spectral Density Plot (802.11n (2.4GHz) – Ch. 6) – Chain B

FCC ID: ACJ9TGCF-19D		FCC Pt. 15.247 802.11a/b/g/n MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1003170437.ACJ	Test Dates: April 23, 2010	EUT Type: ToughBook Model: CF-19		Page 34 of 89

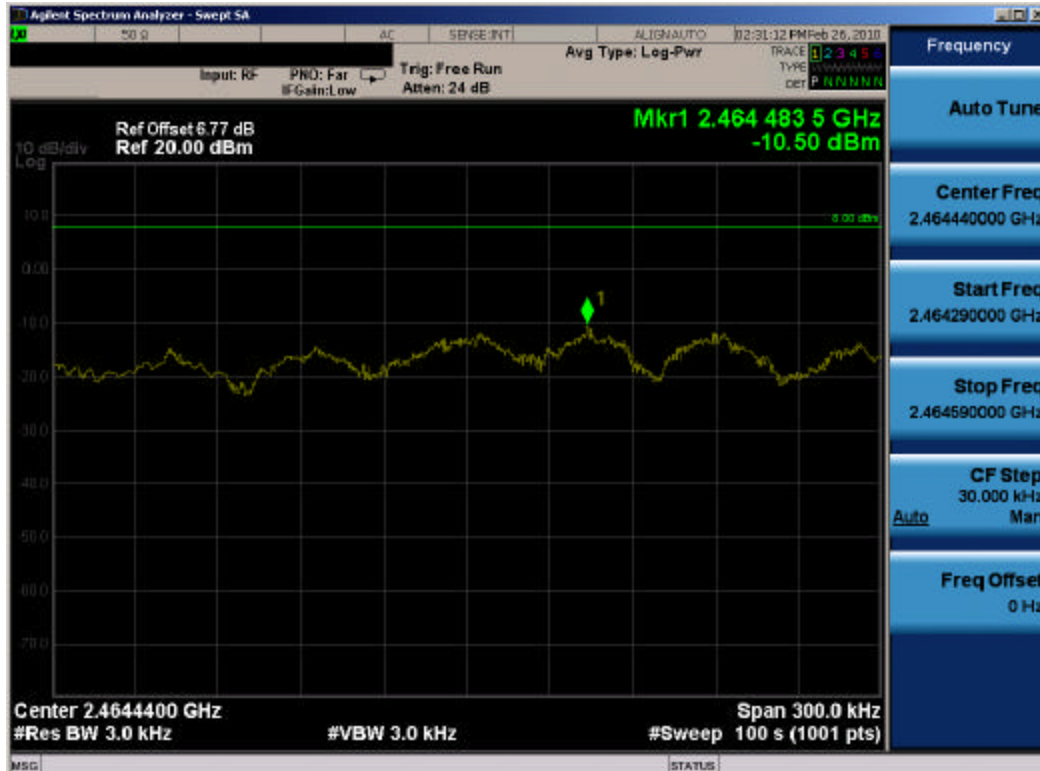


Plot 6-21. Power Spectral Density Plot (802.11n (5.8GHz) – Ch. 151) – Chain B

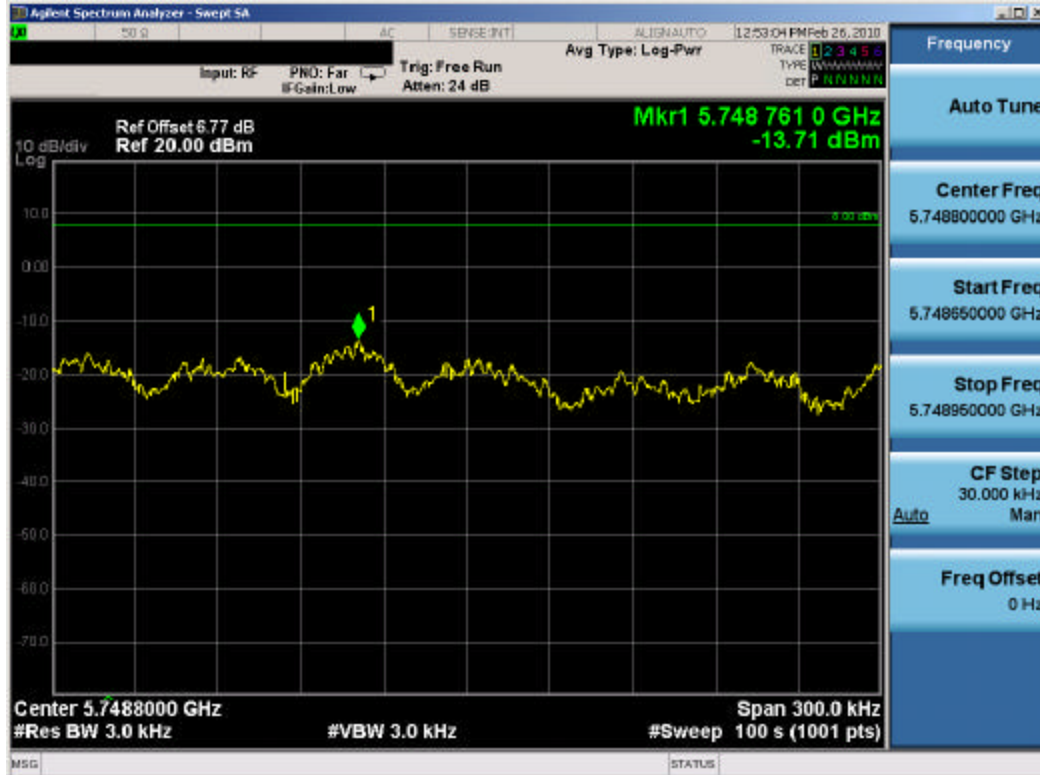


Plot 6-22. Power Spectral Density (802.11g Dual Transmit Mode – Ch. 11) – Chain A

FCC ID: ACJ9TGCF-19D		FCC Pt. 15.247 802.11a/b/g/n MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1003170437.ACJ	Test Dates: April 23, 2010	EUT Type: ToughBook Model: CF-19		Page 35 of 89

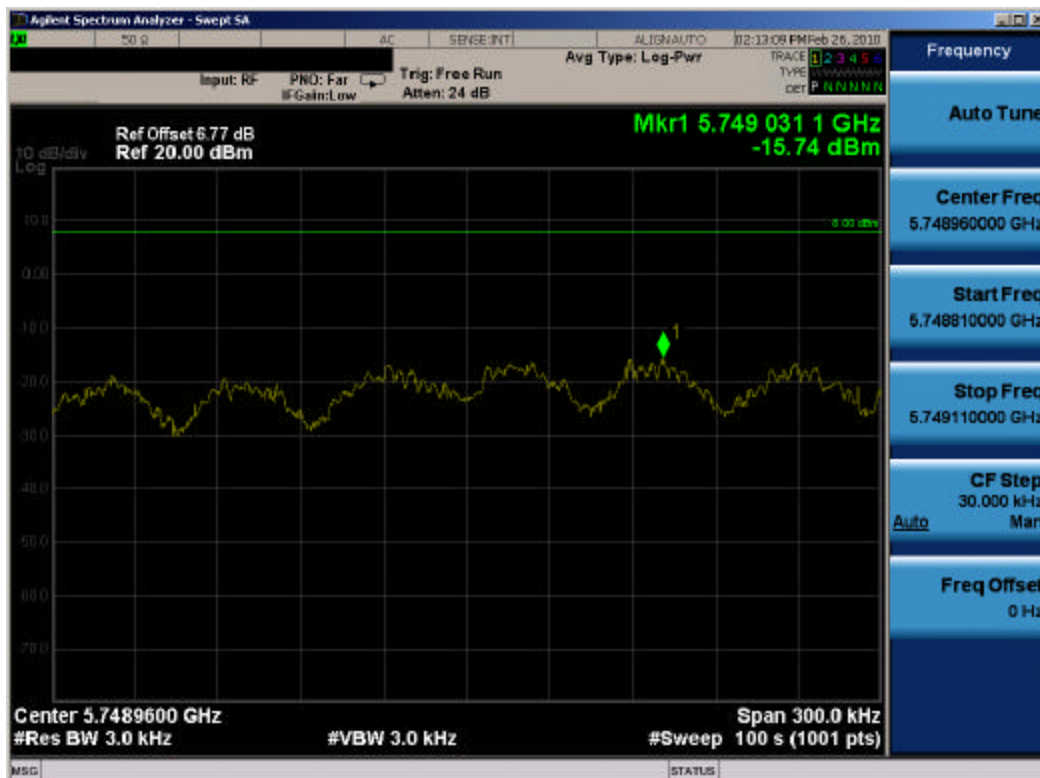


Plot 6-23. Power Spectral Density (802.11g Dual Transmit Mode – Ch. 11) – Chain B

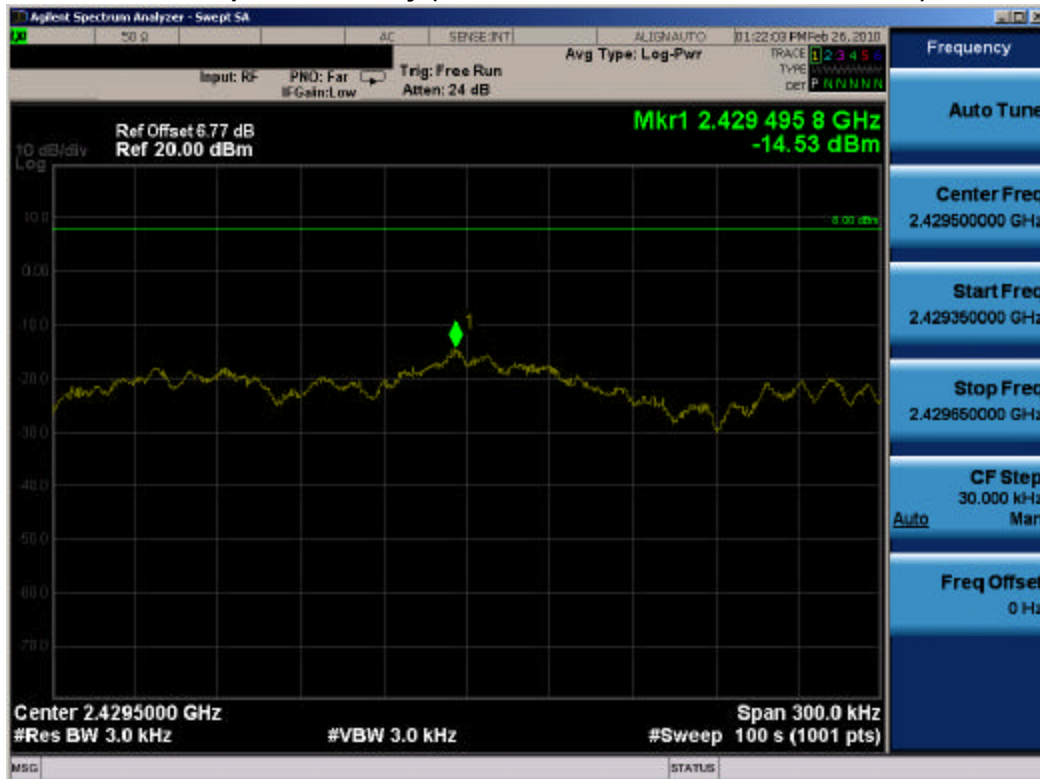


Plot 6-24. Power Spectral Density (802.11a Dual Transmit Mode – Ch. 149) – Chain A

FCC ID: ACJ9TGCF-19D	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 15.247 802.11a/b/g/n MEASUREMENT REPORT (CERTIFICATION)	Panasonic	Reviewed by: Quality Manager
Test Report S/N: 0Y1003170437.ACJ	Test Dates: April 23, 2010	EUT Type: ToughBook Model: CF-19		Page 36 of 89



Plot 6-25. Power Spectral Density (802.11a Dual Transmit Mode – Ch. 149) – Chain B

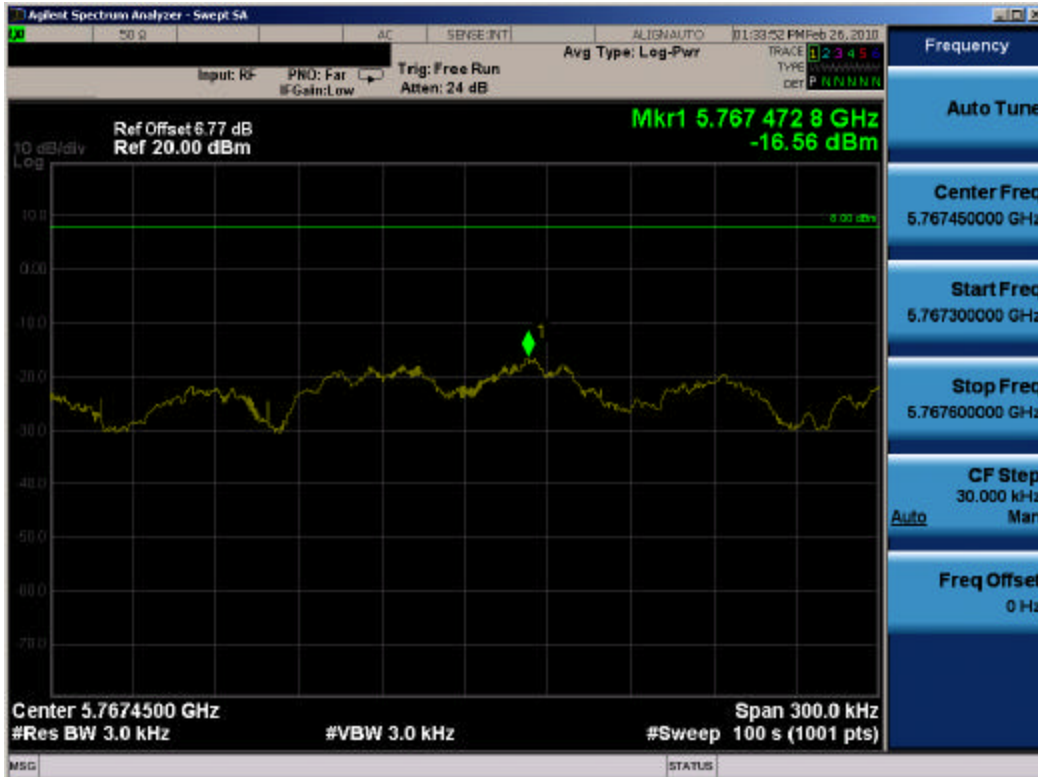


Plot 6-26. Power Spectral Density (802.11n (2.4GHz) Dual Transmit Mode – Ch. 6) – Chain A

FCC ID: ACJ9TGCF-19D		FCC Pt. 15.247 802.11a/b/g/n MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1003170437.ACJ	Test Dates: April 23, 2010	EUT Type: ToughBook Model: CF-19		Page 37 of 89



Plot 6-27. Power Spectral Density (802.11n (2.4GHz) Dual Transmit Mode – Ch. 6) – Chain B





Plot 6-28. Power Spectral Density (802.11n (5.8GHz) Dual Transmit Mode – Ch. 151) – Chain A

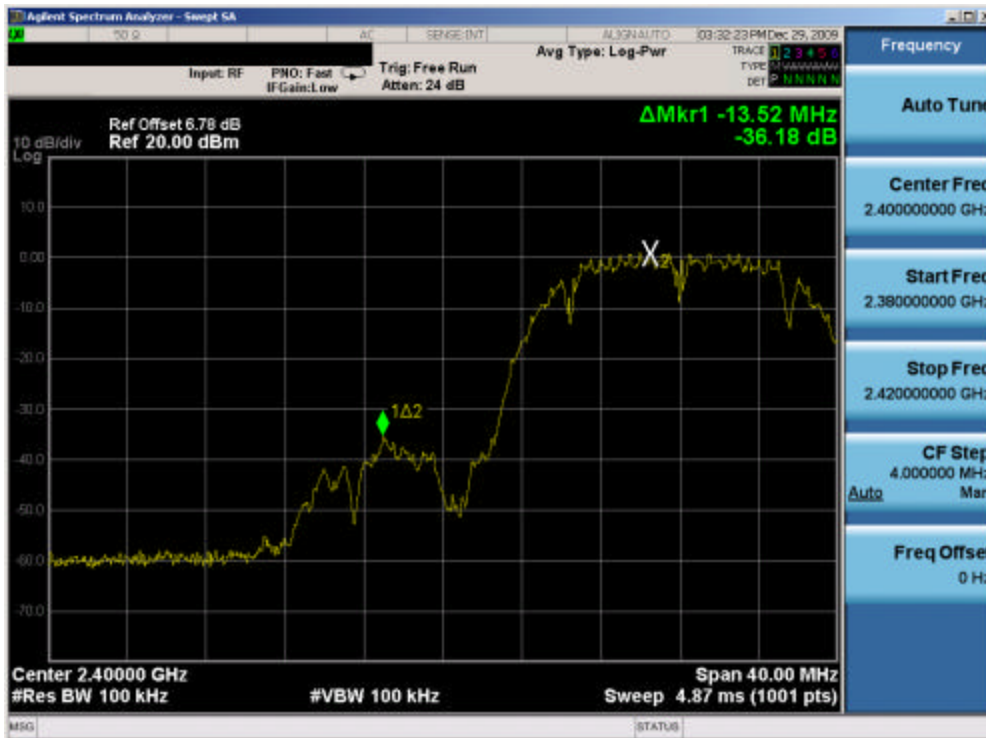
FCC ID: ACJ9TGCF-19D		FCC Pt. 15.247 802.11a/b/g/n MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1003170437.ACJ	Test Dates: April 23, 2010	EUT Type: ToughBook Model: CF-19		Page 38 of 89



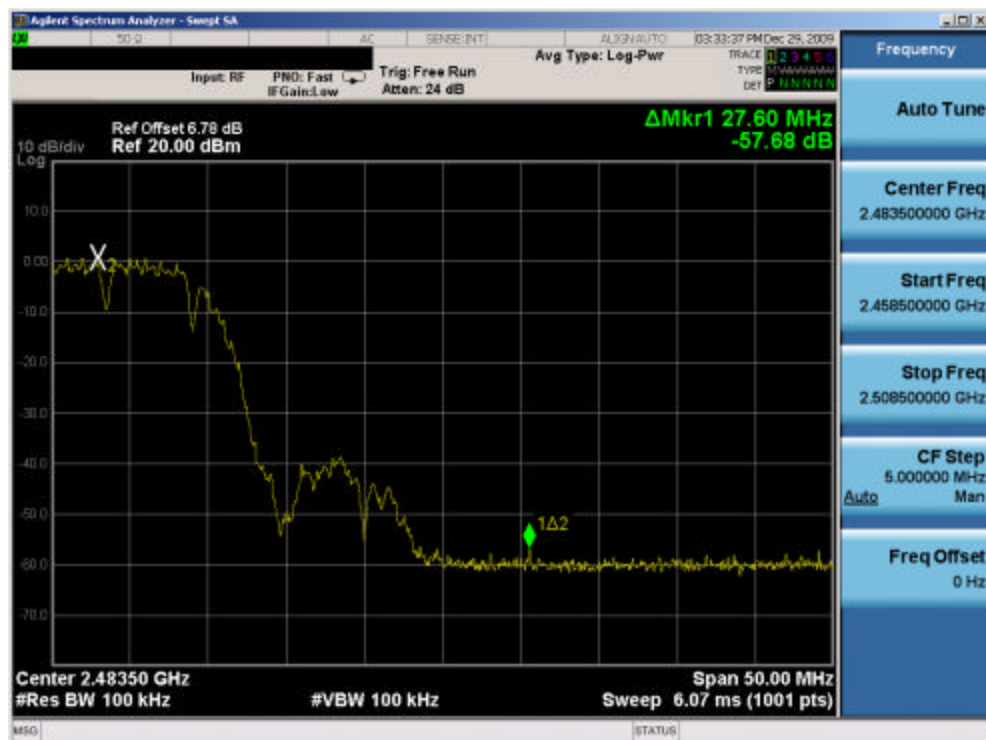
Plot 6-29. Power Spectral Density (802.11n (5.8GHz) Dual Transmit Mode – Ch. 151) – Chain B

FCC ID: ACJ9TGCF-19D		FCC Pt. 15.247 802.11a/b/g/n MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1003170437.ACJ	Test Dates: April 23, 2010	EUT Type: ToughBook Model: CF-19		Page 39 of 89

6.8 Out of Band Emissions at the Band Edge §15.247(d)



Plot 6-30. Band Edge Plot (802.11b – Ch. 1) – Chain A



Plot 6-31. Band Edge Plot (802.11b – Ch. 1) – Chain A

FCC ID: ACJ9TGCF-19D		FCC Pt. 15.247 802.11a/b/g/n MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1003170437.ACJ	Test Dates: April 23, 2010	EUT Type: ToughBook Model: CF-19		Page 40 of 89