



# PCTEST ENGINEERING LABORATORY, INC.

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## CERTIFICATE OF COMPLIANCE FCC PART 15.407 Certification

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

**Date of Testing:**  
12/21/2009 - 02/24/2010  
**Test Site/Location:**  
PCTEST Lab, Columbia, MD, USA  
**Test Report Serial No.:**  
0912152266.ACJ

<b>FCC ID:</b>	<b>ACJ9TGCF-311</b>
<b>APPLICANT:</b>	<b>Panasonic Corporation of North America</b>

**Model(s):** CF-31

**EUT Type:** Toughbook Model: CF-31

**Max. RF Output Power:** 21.55 mW (13.33 dBm) Maximum Aggregate Conducted (802.11a UNII Band I)  
28.47 mW (14.54 dBm) Maximum Aggregate Conducted (802.11a UNII Band II)  
28.82 mW (14.6 dBm) Maximum Aggregate Conducted (802.11a UNII Band III)  
21.83 mW (13.39 dBm) Maximum Aggregate Conducted (802.11n UNII Band I)  
24.96 mW (13.97 dBm) Maximum Aggregate Conducted (802.11n UNII Band II)  
26.46 mW (14.23 dBm) Maximum Aggregate Conducted (802.11n UNII Band III)

**Frequency Range:** 5180MHz – 5240MHz (UNII Band I), 5260MHz – 5320MHz (UNII Band II),  
5500MHz – 5700MHz (UNII Band III)

**FCC Classification:** Unlicensed National Information Infrastructure (UNII)

**FCC Rule Part(s):** Part 15.407

**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. Radiated data was taken with the highest gain antenna.

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



<b>FCC ID:</b> ACJ9TGCF-311		<b>FCC Pt. 15.407 802.11a/n UNII MEASUREMENT REPORT (CERTIFICATION)</b>		<b>Reviewed by:</b> Quality Manager
<b>Test Report S/N:</b> 0912152266.ACJ	<b>Test Dates:</b> 12/21/2009 - 02/24/2010	<b>EUT Type:</b> Toughbook Model: CF-31		Page 1 of 121

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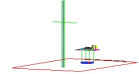
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# MEASUREMENT REPORT

## FCC Part 15.407



### § 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 15.407

**MODEL NAME:** CF-31

**FCC ID:** ACJ9TGCF-311

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

**FCC CLASSIFICATION:** Unlicensed National Information Infrastructure (UNII)

**DATE(S) OF TEST:** 12/21/2009 - 02/24/2010



**TEST REPORT S/N:** 0912152266.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.

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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.

## 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'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 and Industry Canada.

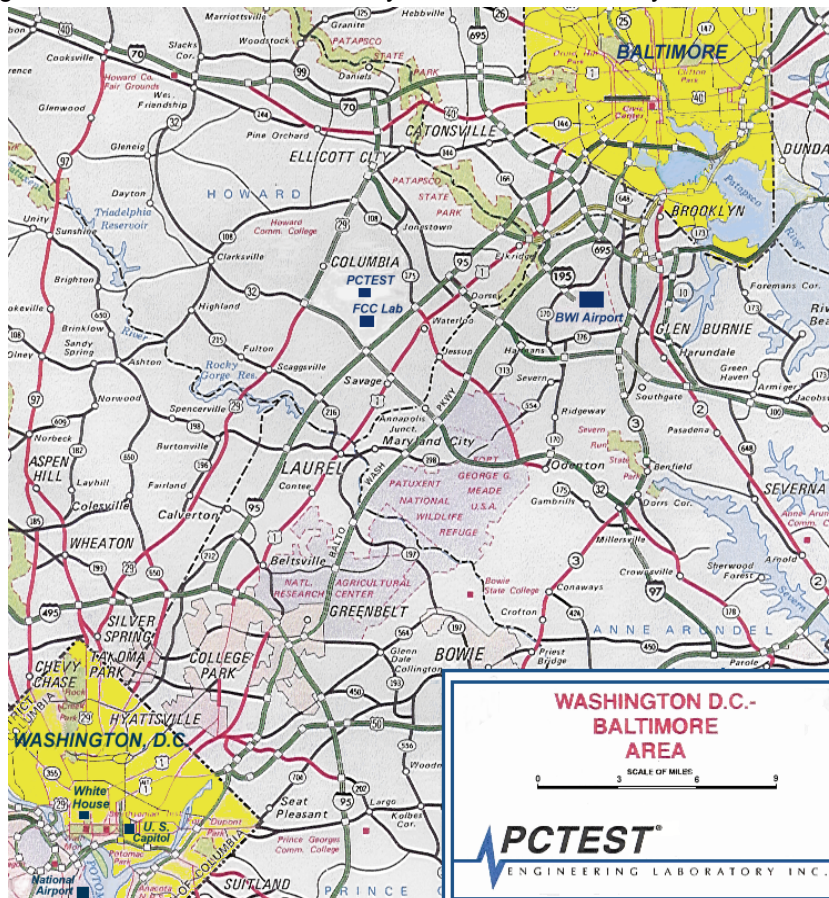




Figure 1-1. Map of the Greater Baltimore and Metropolitan Washington, D.C. area

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## 2.0 PRODUCT INFORMATION

### 2.1 Equipment Description

The Equipment Under Test (EUT) is the **Panasonic Toughbook Model: CF-31 FCC ID: ACJ9TGCF-311**. The EUT consisted of the following component(s):

Manufacturer / Model	FCC ID	Description
Panasonic / Model: CF-31	ACJ9TGCF-311	Toughbook Model: CF-31
Alps / Model: UGNZA	N/A	Bluetooth Module
Sierra / Model: Gobi2000	N7NGOBI2	WWAN Module
Intel / Model: 622ANHMW	PD9622ANH, PD9622BGH	802.11a/b/g/n Wireless LAN Module with Chain A and Chain B antennas

**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.

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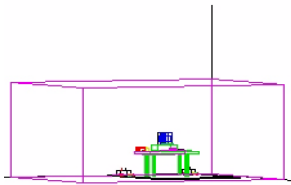
## 3.0 DESCRIPTION OF TEST

### 3.1 Evaluation Procedure

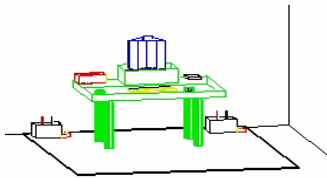
The measurement procedure described in the American National Standard for Methods of Measurement of Radio-Noise Emission from Low-Voltage Electrical and Electronic Equipment in the Range of 9kHz to 40GHz (ANSI C63.4-2003) and FCC Public Notice DA 02-2138 dated August 30, 2002 entitled "Measurement Procedure Updated for Peak Transmit Power in the Unlicensed National Information Infrastructure (U-NII) Bands" were used in the measurement of **Panasonic Toughbook Model: CF-31 FCC ID: ACJ9TGCF-311**.

Deviation from measurement procedure.....None.

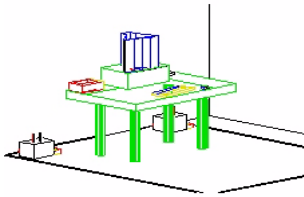
### 3.2 Conducted Emissions



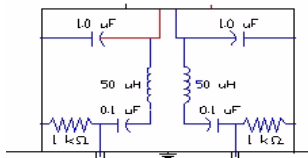
**Figure 3-1. Shielded Enclosure Line-Conducted Test Facility**



**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.

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### 3.3 Radiated Emissions



Figure 3-5. 3-Meter Test Site



Figure 3-6. Dimensions of Outdoor Test Site

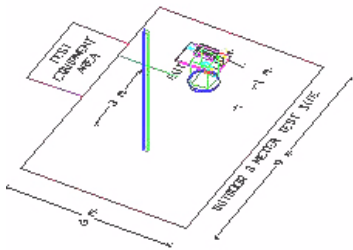


Figure 3-7. Turntable and System Setup



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 the 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.

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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 antennas of the Toughbook Model: CF-31 are **permanently attached**.
- There are no provisions for connection to an external antenna for UNII Band operation.

**Conclusion:**

The **Panasonic Toughbook Model: CF-31 FCC ID: ACJ9TGCF-311** unit complies with the requirement of §15.203.

UNII Band	Ch.	Frequency (MHz)
1	36	5180
1	40	5200
1	44	5220
1	48	5240
2	52	5260
2	56	5280
2	60	5300
2	64	5320
3	100	5500
:	:	:
3	120	5600
:	:	:
3	140	5700

**Table 4-1. 802.11a Frequency / Channel Operations**

UNII Band	Ch.	Frequency (MHz)
1	38	5190
1	46	5230
2	54	5270
2	62	5310
3	102	5510
:	:	:
3	118	5590
:	:	:
3	134	5670



**Table 4-2. 802.11n 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	N/A		N/A	1937A03348
Agilent	8447D	Broadband Amplifier	N/A		N/A	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	3/24/2009	Annual	3/24/2010	2043A00301
Agilent	8566B	(100Hz-22GHz) Spectrum Analyzer	3/24/2009	Annual	3/24/2010	2618A02866
Agilent	8566B	(100Hz-22GHz) Spectrum Analyzer	3/24/2009	Annual	3/24/2010	2542A11898
Agilent	8566B	(100Hz-22GHz) Spectrum Analyzer	12/2/2009	Annual	12/2/2010	3638A08713
Agilent	E4407B	ESA Spectrum Analyzer	9/28/2009	Annual	9/28/2010	US39210313
Agilent	E4448A	PSA (3Hz-50GHz) Spectrum Analyzer	10/1/2009	Annual	10/1/2010	US42510244
Agilent	E8257D	(250kHz-20GHz) Signal Generator	3/25/2009	Biennial	3/25/2011	MY45470194
Agilent	N9020A	MXA Signal Analyzer	10/22/2009	Annual	10/22/2010	US46470561
Emco	3115	Horn Antenna (1-18GHz)	10/14/2009	Biennial	10/14/2011	9704-5182
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
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
Rohde & Schwarz	FSQ 26	Spectrum Analyzer	9/19/2009	Annual	9/19/2010	200452
Anritsu	ML2495A	Power Meter	10/12/2009	Annual	10/12/2010	941001

**Table 5-1. Annual Test Equipment Calibration Schedule**

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## 6.0 TEST RESULTS

### 6.1 Summary

Company Name: Panasonic Corporation of North America  
 FCC ID: ACJ9TGCF-311  
 Method/System: Unlicensed National Information Infrastructure (UNII)  
 Data Rate(s) Tested: 6, 9, 12, 18, 24, 36, 48, 54Mbps (802.11a)  
13.5/15, 27/30, 40/45, 54/60, 81/90, 108/120, 121.5/135, 135/150Mbps (802.11n)

FCC Part Section(s)	Test Description	Test Limit	Test Condition	Test Result	Reference
<b>TRANSMITTER MODE (Tx)</b>					
N/A	26 dB Bandwidth	> 500kHz	CONDUCTED	PASS	Section 6.2
15.407 (a)(1)	Maximum Conducted Output Power	< 4 + 10log <sub>10</sub> (BW) dBm (5150-5250) < 11 + 10log <sub>10</sub> (B) dBm (5250-5350) < 11 + 10log <sub>10</sub> (B) dBm (5470-5725)		PASS	Section 6.3
15.407 (a)(1), (5)	Peak Power Spectral Density	< 4 dBm/MHz (5150-5250) < 11dBm/MHz (5250-5725) < 11dBm/MHz (5470-5725)		PASS	Section 6.6
15.407(a)(6)	Peak Excursion	< 13 dB/MHz maximum difference		PASS	Section 6.7
15.407(g)	Frequency Stability	N/A		PASS	Section 6.8
15.407(b)(1), (6)	Undesirable Emissions	< -27 dBm/MHz EIRP (5150-5725)	RADIATED	PASS	Section 6.9
15.205, 15.407(b)(1), (5), (6)	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)		PASS	Section 6.10
15.207	AC Conducted Emissions 150kHz – 30MHz	< FCC 15.207 limits or < RSS-Gen table 2 limits	LINE CONDUCTED	PASS	Section 6.11
<b>RECEIVER MODE (Rx) / DIGITAL DEVICE</b>					
15.107	AC Conducted Emissions 150kHz – 30MHz	< FCC 15.107 limits or < RSS-Gen table 2 limits	LINE CONDUCTED	PASS	Part 15B Test Report
15.109	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
<b>RF EXPOSURE</b>					
15.407(f), 2.1091/2.1093	SAR Test	1.6 W/kg (SAR Limit)	SAR	PASS	SAR Report

**Table 6-1. Summary of Test Results**



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## 6.2 26dB Bandwidth Measurement

The bandwidth at 26dB down from the highest in-band spectral 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 26dB bandwidth is used to determine the conducted power limits.**

	Frequency [MHz]	Channel No.	802.11 Mode	Measured 26dB Bandwidth [MHz]
Band I	5180	36	a	19.99
	5200	40	a	22.80
	5240	48	a	22.44
	5190	38	n	37.95
	5230	46	n	38.80
Band II	5260	52	a	22.40
	5280	56	a	20.86
	5320	64	a	20.71
	5270	54	n	38.52
	5310	62	n	37.96
Band III	5500	100	a	20.09
	5600	120	a	20.10
	5700	140	a	20.75
	5510	102	n	38.00
	5590	118	n	38.12
	5670	134	n	37.82

Table 6-2. Conducted Bandwidth Measurements – Chain A

FCC ID: ACJ9TGCF-311		FCC Pt. 15.407 802.11a/n UNII MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0912152266.ACJ	Test Dates: 12/21/2009 - 02/24/2010	EUT Type: Toughbook Model: CF-31		Page 11 of 121

	Frequency [MHz]	Channel No.	802.11 Mode	Measured 26dB Bandwidth [MHz]
Band I	5180	36	a	19.67
	5200	40	a	20.10
	5240	48	a	19.97
	5190	38	n	38.00
	5230	46	n	38.10
Band II	5260	52	a	19.94
	5280	56	a	20.07
	5320	64	a	20.14
	5270	54	n	37.91
	5310	62	n	37.94
Band III	5500	100	a	20.17
	5600	120	a	20.24
	5700	140	a	21.17
	5510	102	n	37.94
	5590	118	n	38.10
	5670	134	n	38.27

Table 6-3. Conducted Bandwidth Measurements – Chain B

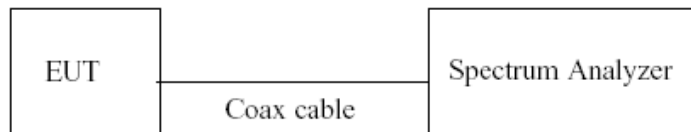


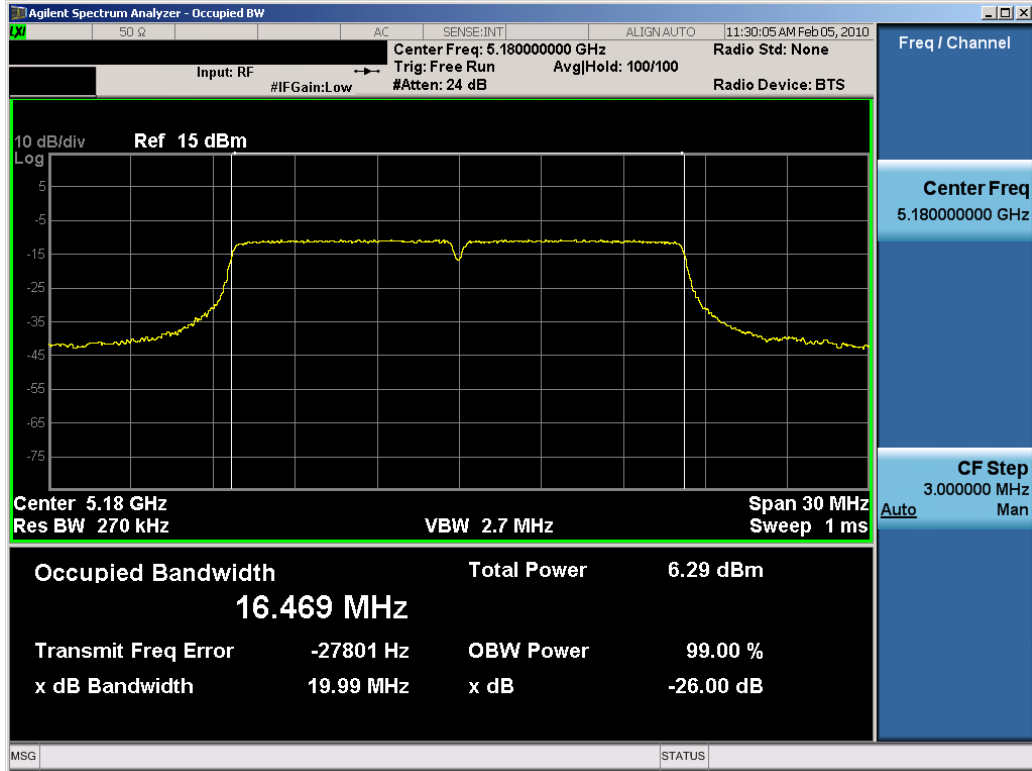
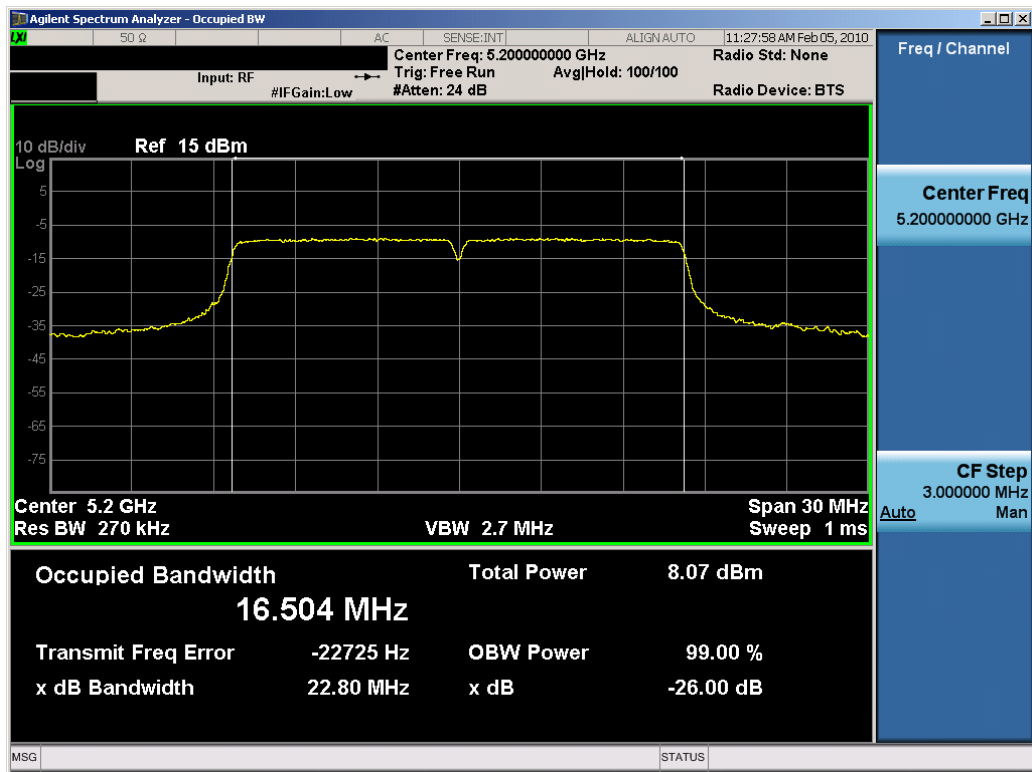


Figure 6-1. Test Instrument & Measurement Setup

FCC ID: ACJ9TGCF-311		FCC Pt. 15.407 802.11a/n UNII MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0912152266.ACJ	Test Dates: 12/21/2009 - 02/24/2010	EUT Type: Toughbook Model: CF-31	Page 12 of 121	

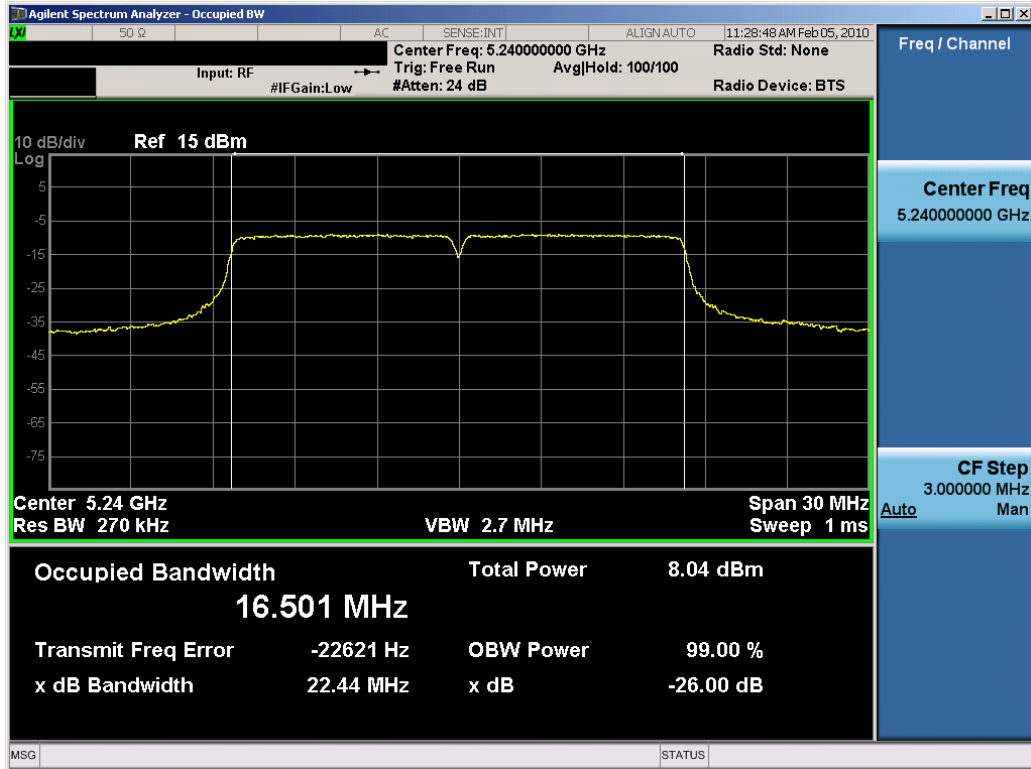


Plot 6-1. 26dB Bandwidth Plot (802.11a (UNII) – Ch. 36) – Chain A

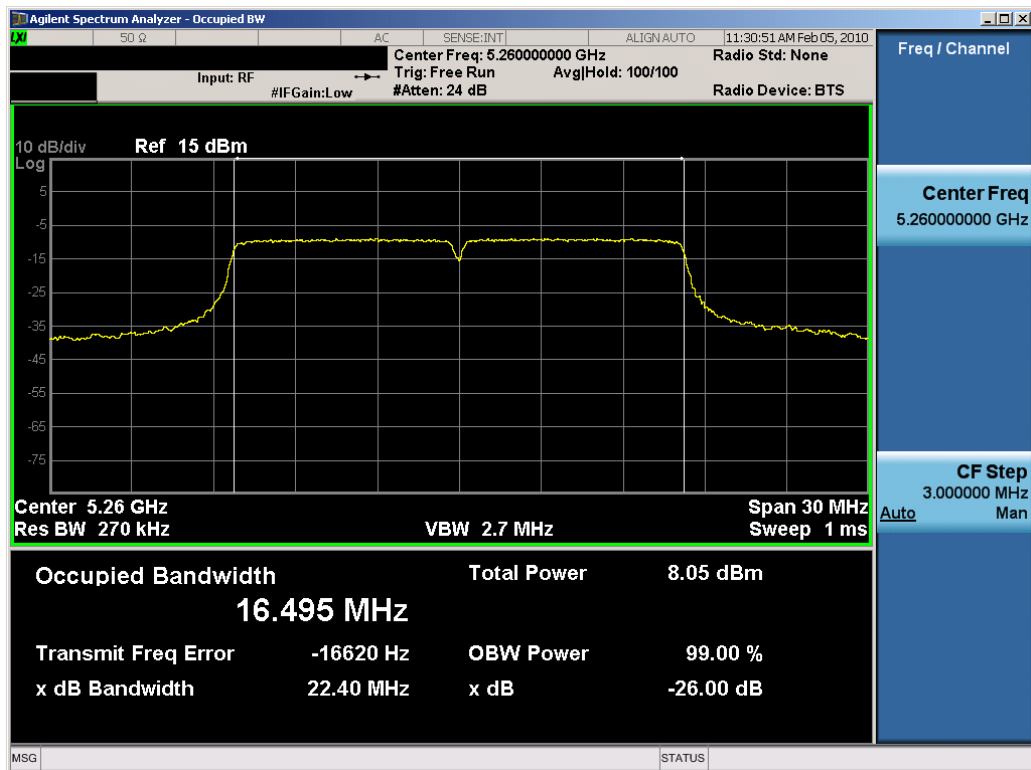


Plot 6-2. 26dB Bandwidth Plot (802.11a (UNII) – Ch. 40) – Chain A

FCC ID: ACJ9TGCF-311		FCC Pt. 15.407 802.11a/n UNII MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0912152266.ACJ	Test Dates: 12/21/2009 - 02/24/2010	EUT Type: Toughbook Model: CF-31		Page 13 of 121

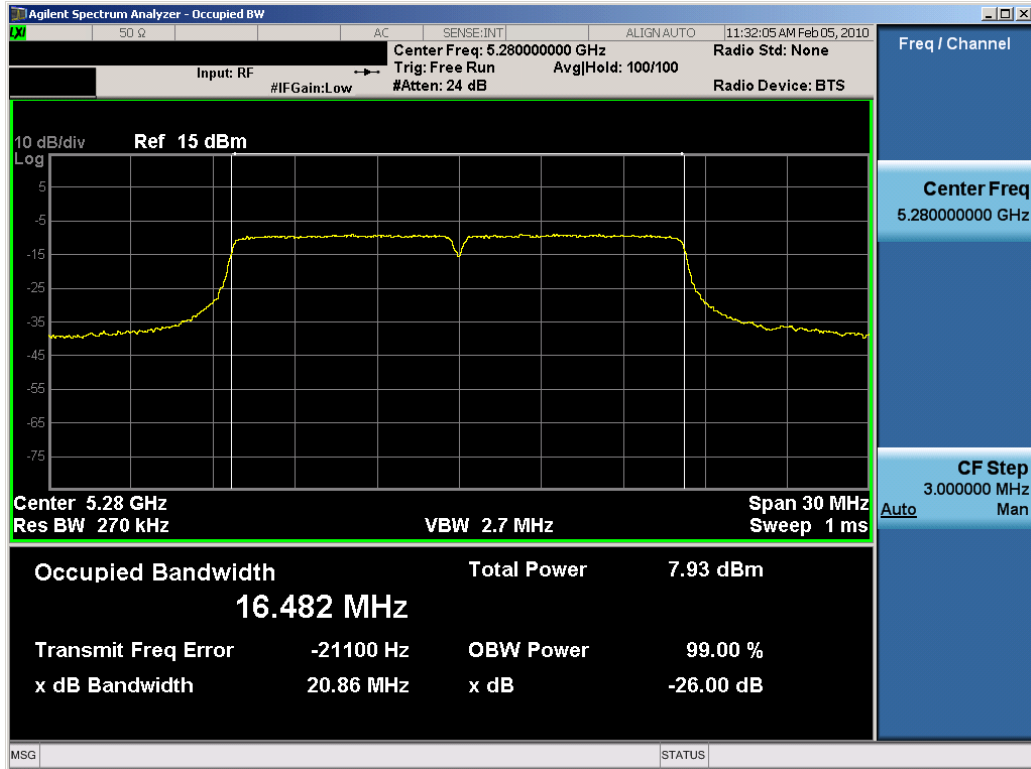


Plot 6-3. 26dB Bandwidth Plot (802.11a (UNII) – Ch. 48) – Chain A

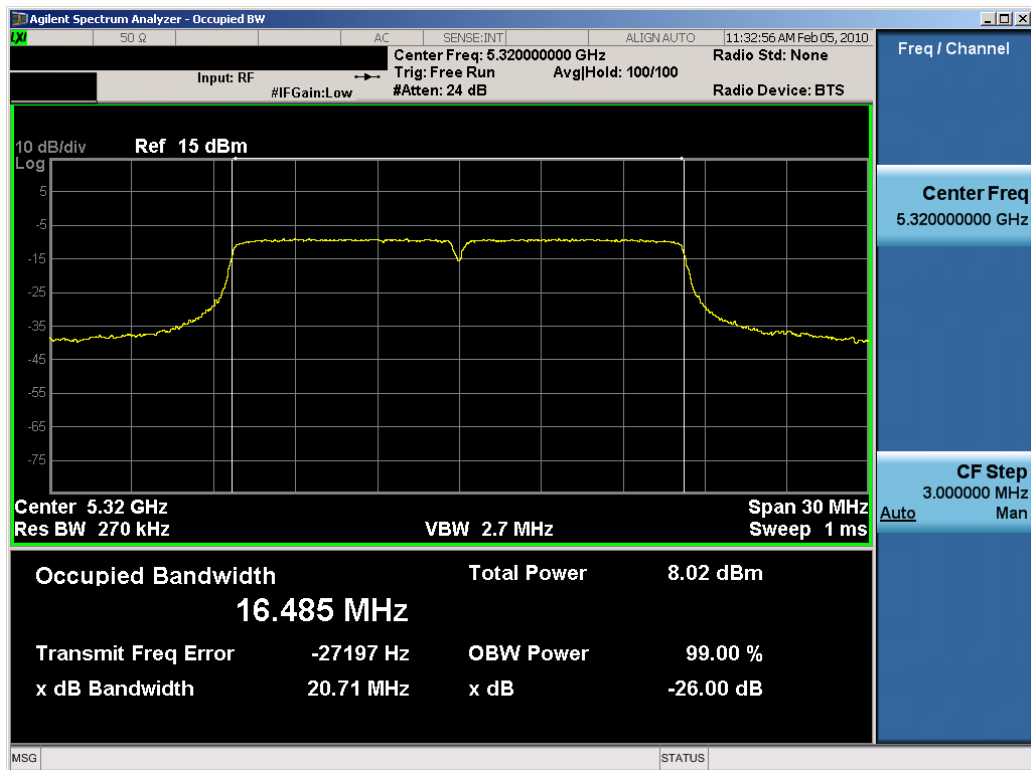


Plot 6-4. 26dB Bandwidth Plot (802.11a (UNII) – Ch. 52) – Chain A

FCC ID: ACJ9TGCF-311	<b>PCTEST</b> ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11a/n UNII MEASUREMENT REPORT (CERTIFICATION)	<b>Panasonic</b>	Reviewed by: Quality Manager
Test Report S/N: 0912152266.ACJ	Test Dates: 12/21/2009 - 02/24/2010	EUT Type: Toughbook Model: CF-31		Page 14 of 121

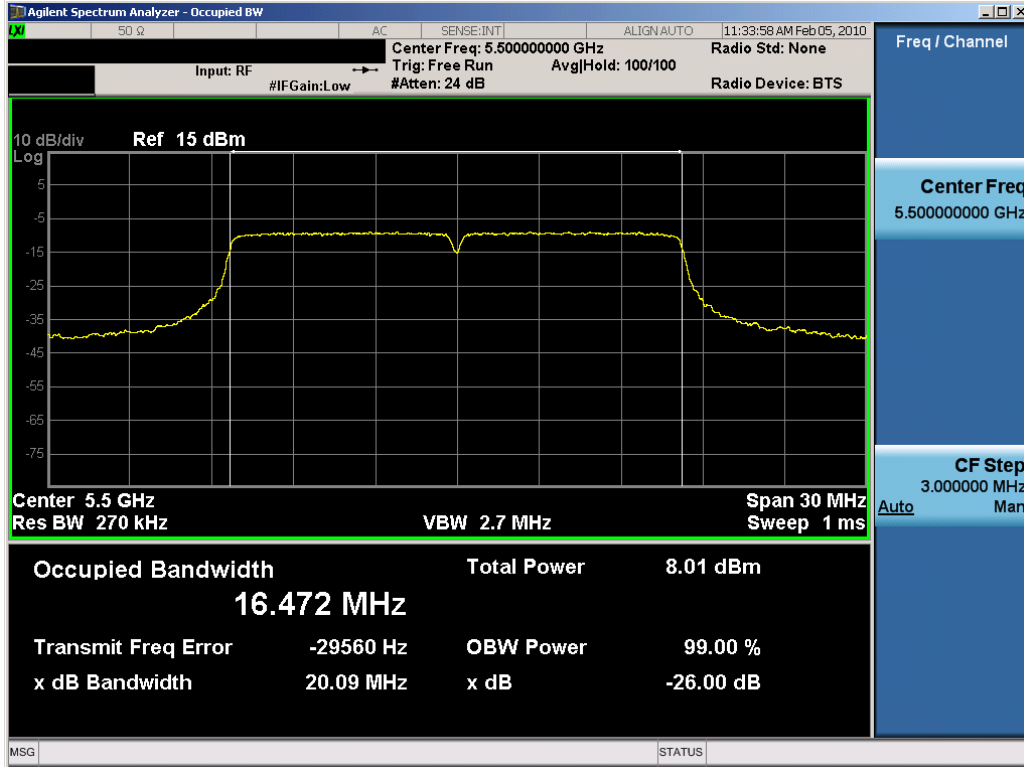


Plot 6-5. 26dB Bandwidth Plot (802.11a (UNII) – Ch. 56) – Chain A

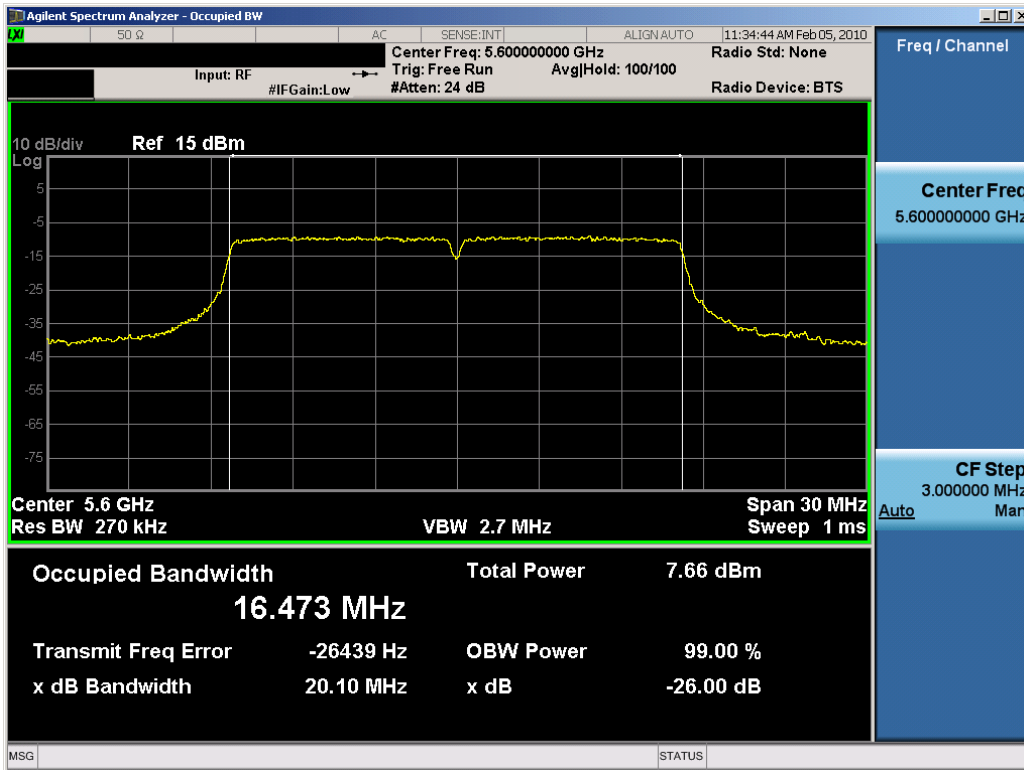


Plot 6-6. 26dB Bandwidth Plot (802.11a (UNII) – Ch. 64) – Chain A

FCC ID: ACJ9TGCF-311	<b>PCTEST</b> ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11a/n UNII MEASUREMENT REPORT (CERTIFICATION)	<b>Panasonic</b>	Reviewed by: Quality Manager
Test Report S/N: 0912152266.ACJ	Test Dates: 12/21/2009 - 02/24/2010	EUT Type: Toughbook Model: CF-31		Page 15 of 121

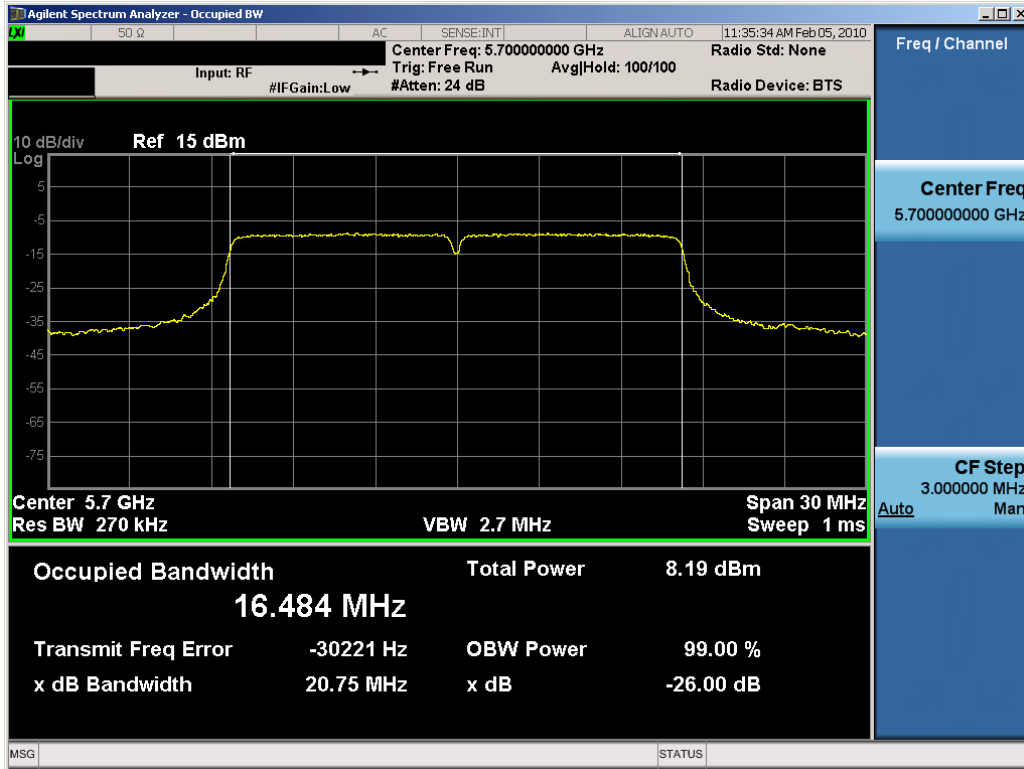


Plot 6-7. 26dB Bandwidth Plot (802.11a (UNII) – Ch. 100) – Chain A

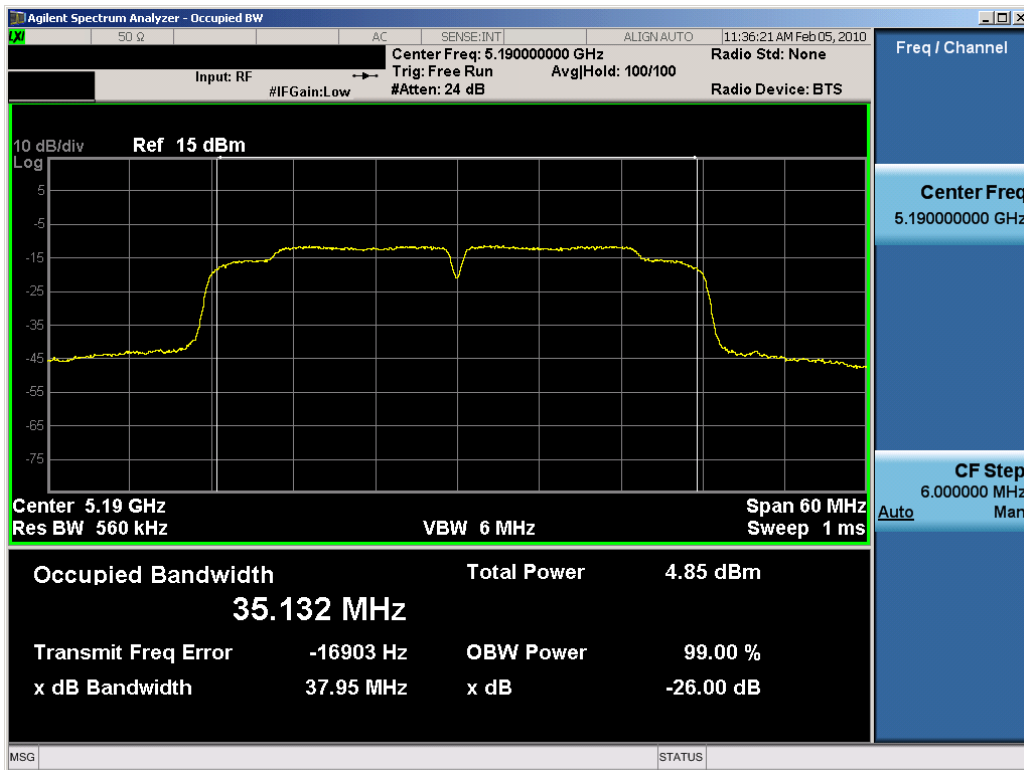


Plot 6-8. 26dB Bandwidth Plot (802.11a (UNII) – Ch. 120) – Chain A

FCC ID: ACJ9TGCF-311	<b>PCTEST</b> ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11a/n UNII MEASUREMENT REPORT (CERTIFICATION)	<b>Panasonic</b>	Reviewed by: Quality Manager
Test Report S/N: 0912152266.ACJ	Test Dates: 12/21/2009 - 02/24/2010	EUT Type: Toughbook Model: CF-31		Page 16 of 121

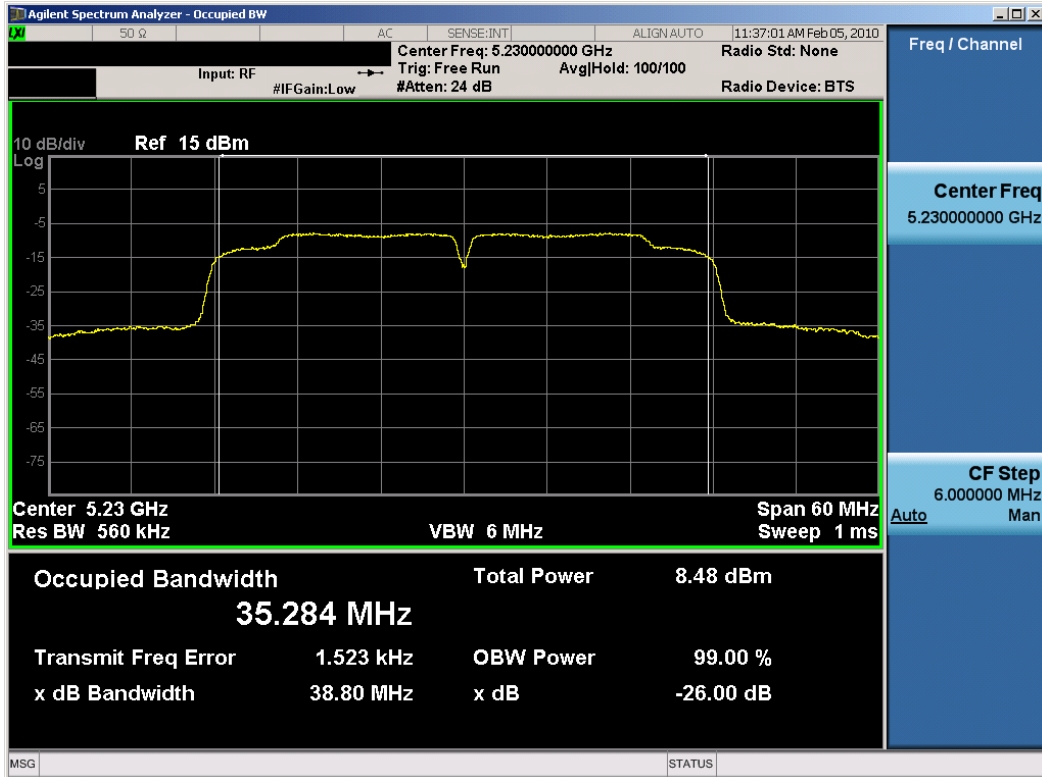


Plot 6-9. 26dB Bandwidth Plot (802.11a (UNII) – Ch. 140) – Chain A

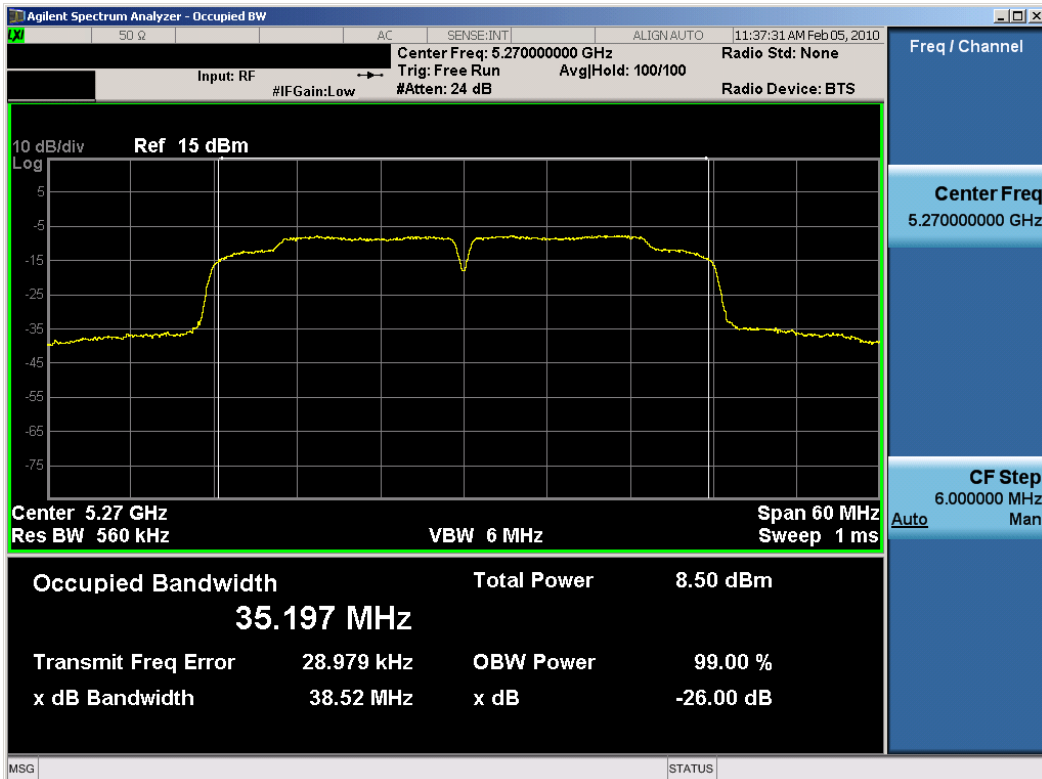


Plot 6-10. 26dB Bandwidth Plot (802.11n (UNII) – Ch. 38) – Chain A

FCC ID: ACJ9TGCF-311	<b>PCTEST</b> ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11a/n UNII MEASUREMENT REPORT (CERTIFICATION)	<b>Panasonic</b>	Reviewed by: Quality Manager
Test Report S/N: 0912152266.ACJ	Test Dates: 12/21/2009 - 02/24/2010	EUT Type: Toughbook Model: CF-31		Page 17 of 121

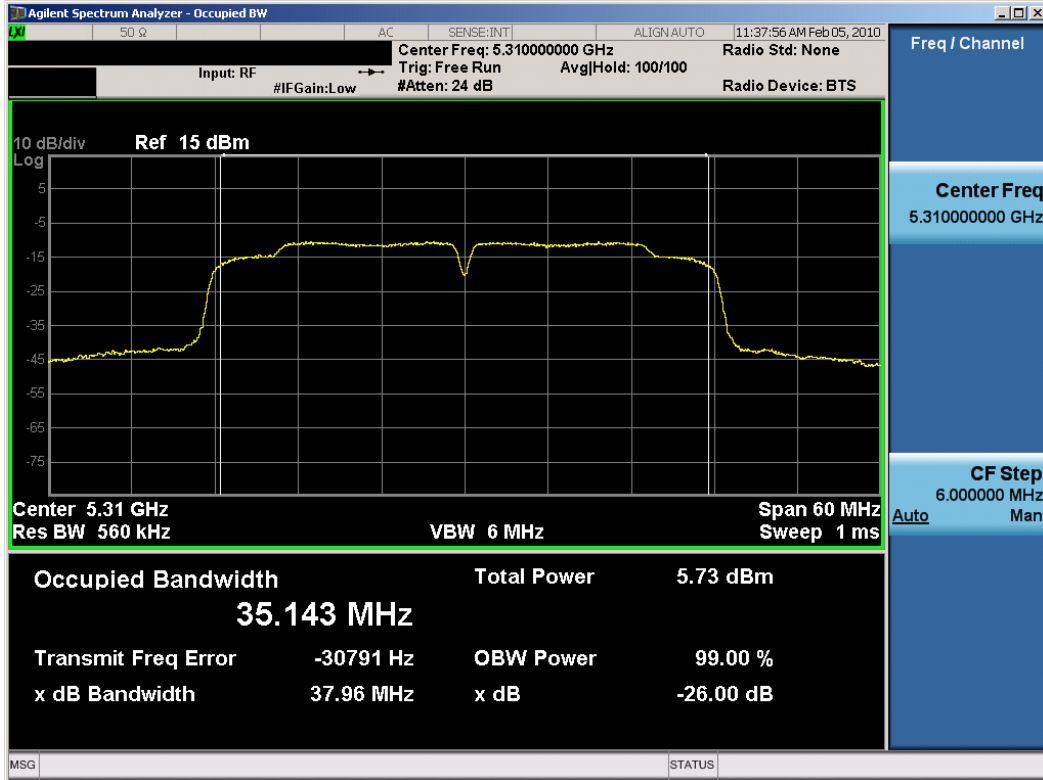


Plot 6-11. 26dB Bandwidth Plot (802.11n (UNII) – Ch. 46) – Chain A

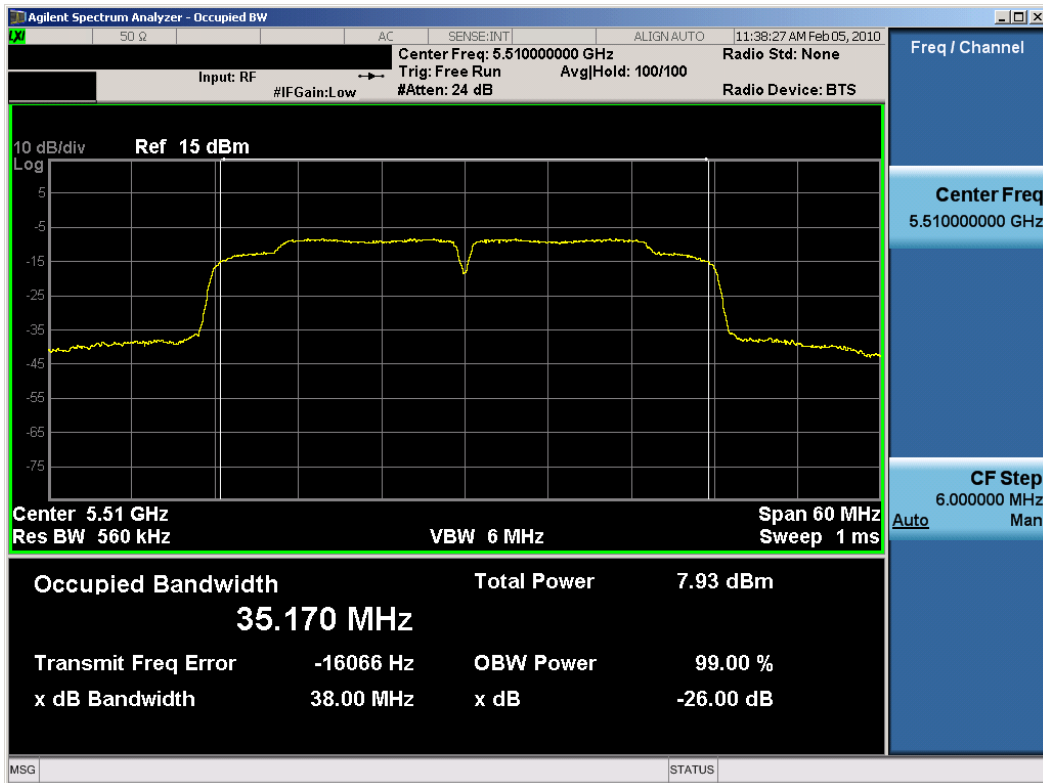


Plot 6-12. 26dB Bandwidth Plot (802.11n (UNII) – Ch. 54) – Chain A

FCC ID: ACJ9TGCF-311		FCC Pt. 15.407 802.11a/n UNII MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0912152266.ACJ	Test Dates: 12/21/2009 - 02/24/2010	EUT Type: Toughbook Model: CF-31		Page 18 of 121

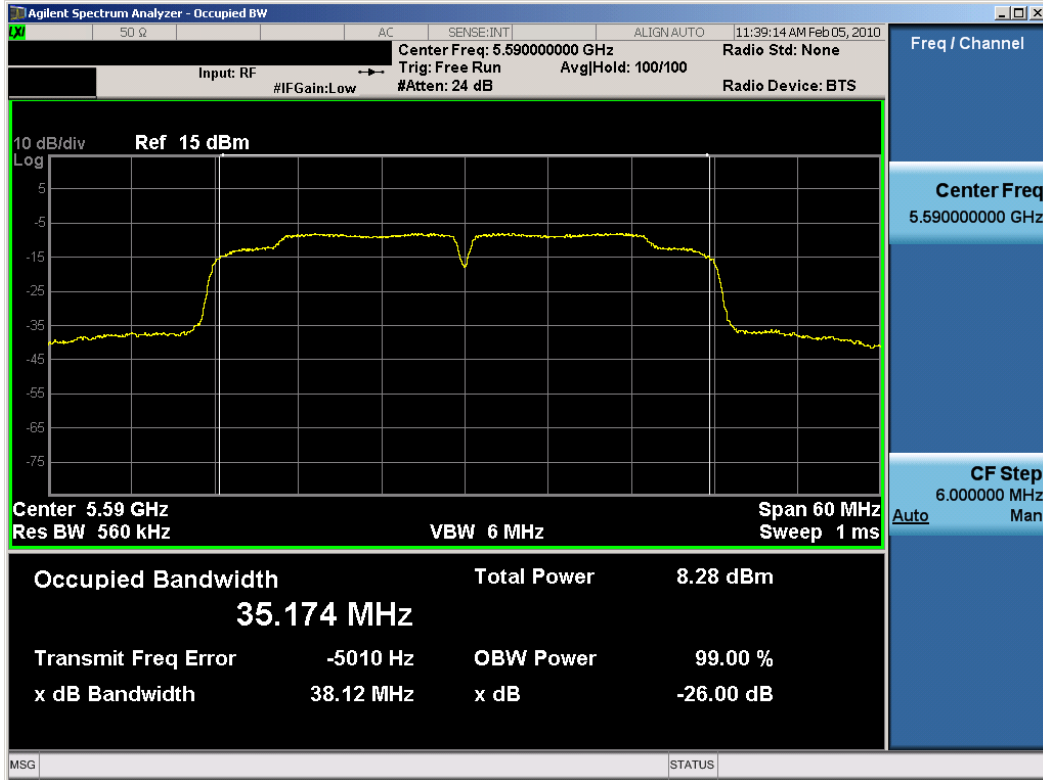


Plot 6-13. 26dB Bandwidth Plot (802.11n (UNII) – Ch. 62) – Chain A

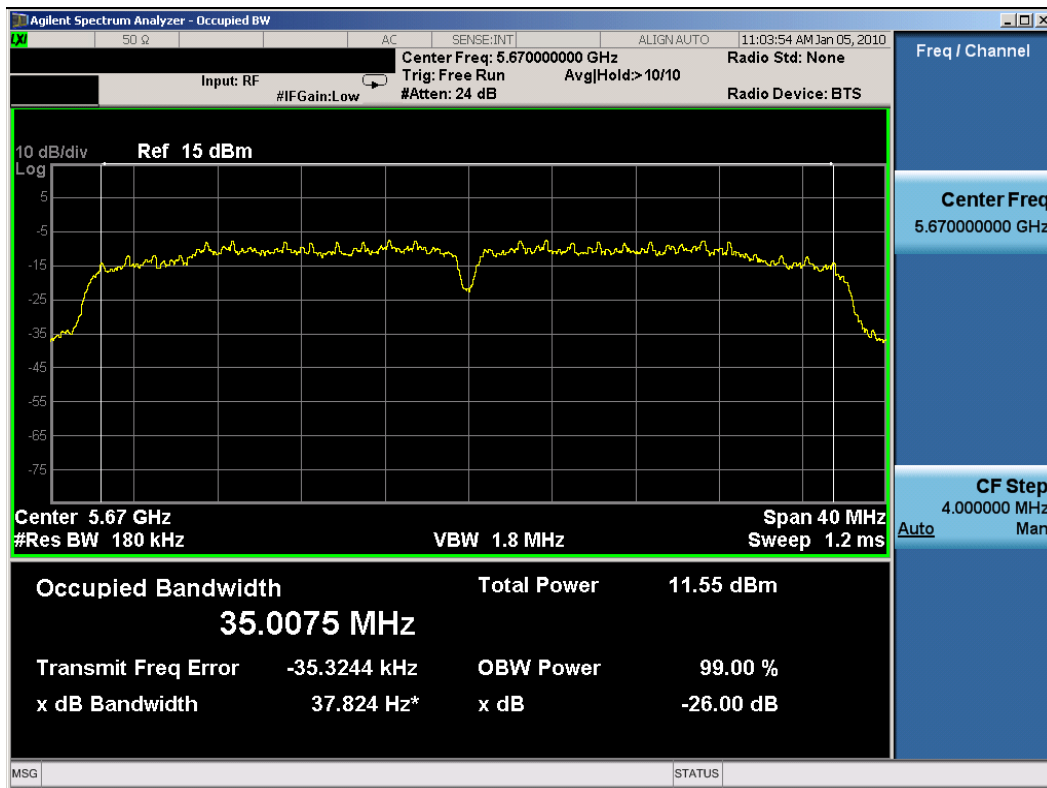


Plot 6-14. 26dB Bandwidth Plot (802.11n (UNII) – Ch. 102) – Chain A

FCC ID: ACJ9TGCF-311	<b>PCTEST</b> ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11a/n UNII MEASUREMENT REPORT (CERTIFICATION)	<b>Panasonic</b>	Reviewed by: Quality Manager
Test Report S/N: 0912152266.ACJ	Test Dates: 12/21/2009 - 02/24/2010	EUT Type: Toughbook Model: CF-31		Page 19 of 121

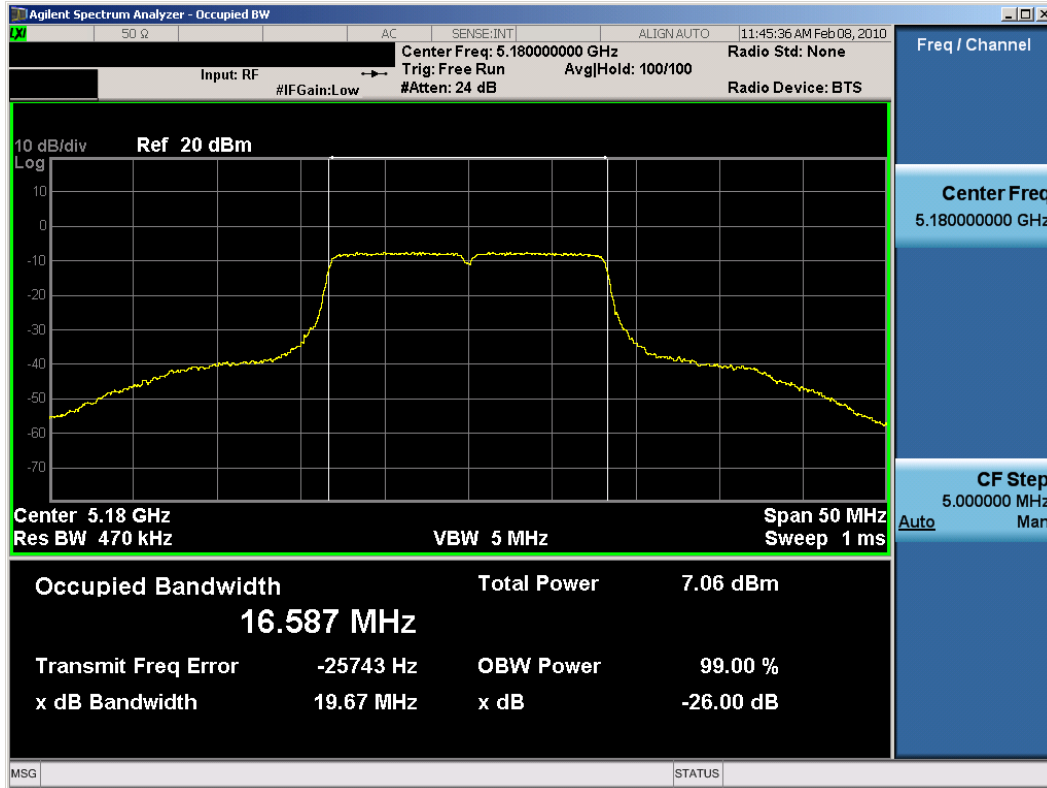


Plot 6-15. 26dB Bandwidth Plot (802.11n (UNII) – Ch. 118) – Chain A

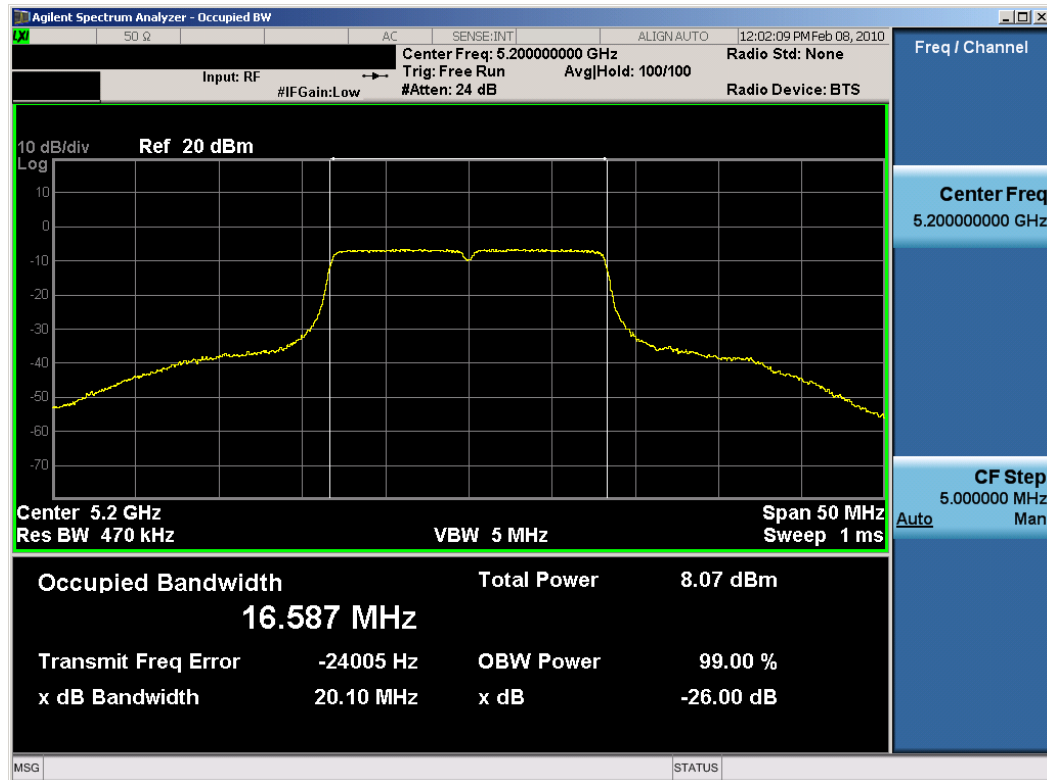


Plot 6-16. 26dB Bandwidth Plot (802.11n (UNII) – Ch. 134) - Chain A

FCC ID: ACJ9TGCF-311	<b>PCTEST</b> ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11a/n UNII MEASUREMENT REPORT (CERTIFICATION)	<b>Panasonic</b>	Reviewed by: Quality Manager
Test Report S/N: 0912152266.ACJ	Test Dates: 12/21/2009 - 02/24/2010	EUT Type: Toughbook Model: CF-31		Page 20 of 121

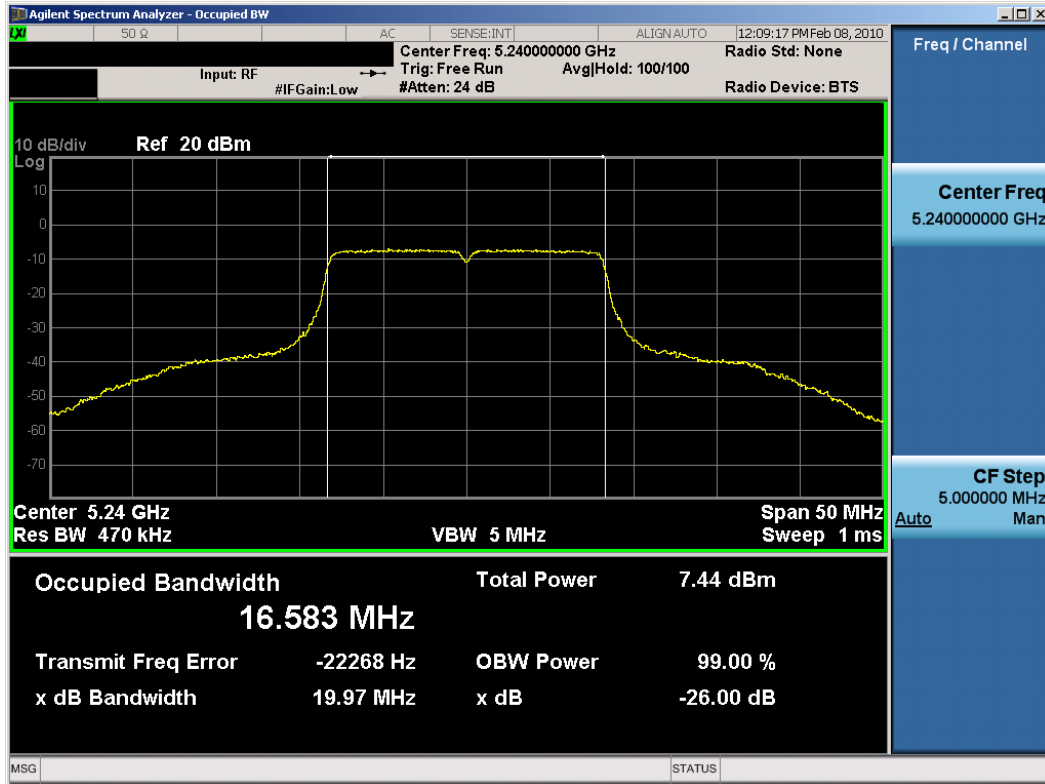


Plot 6-17. 26dB Bandwidth Plot (802.11a (UNII) – Ch. 36) – Chain B

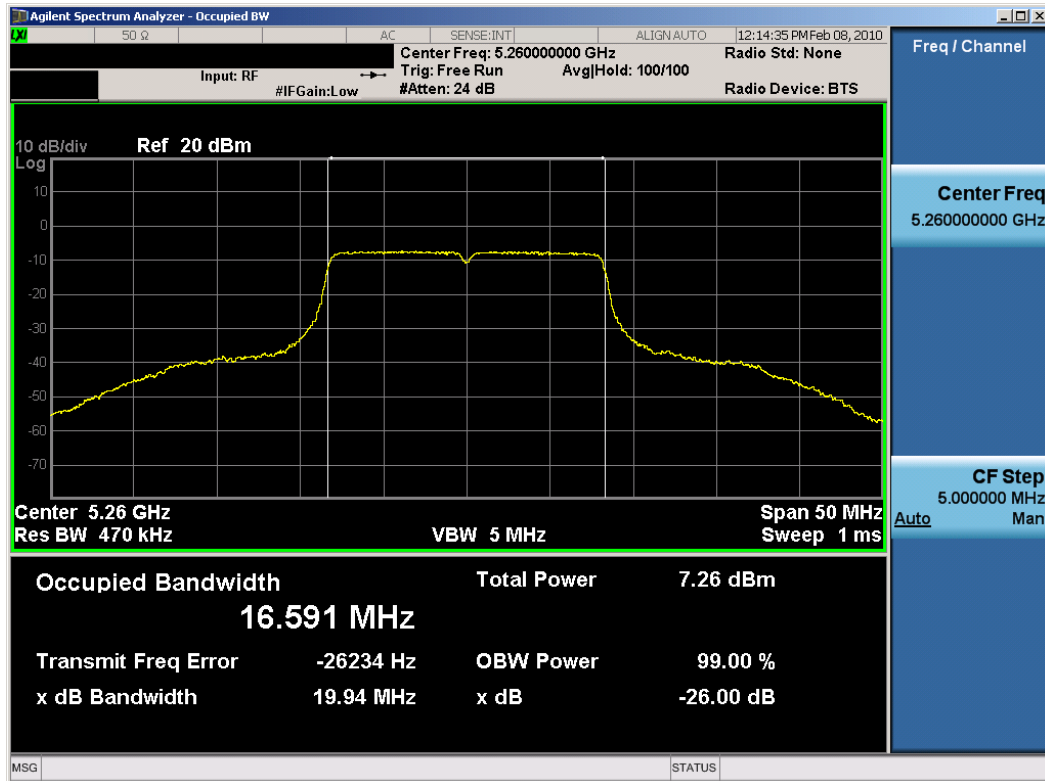


Plot 6-18. 26dB Bandwidth Plot (802.11a (UNII) – Ch. 40) – Chain B

FCC ID: ACJ9TGCF-311	<b>PCTEST</b> ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11a/n UNII MEASUREMENT REPORT (CERTIFICATION)	<b>Panasonic</b>	Reviewed by: Quality Manager
Test Report S/N: 0912152266.ACJ	Test Dates: 12/21/2009 - 02/24/2010	EUT Type: Toughbook Model: CF-31		Page 21 of 121

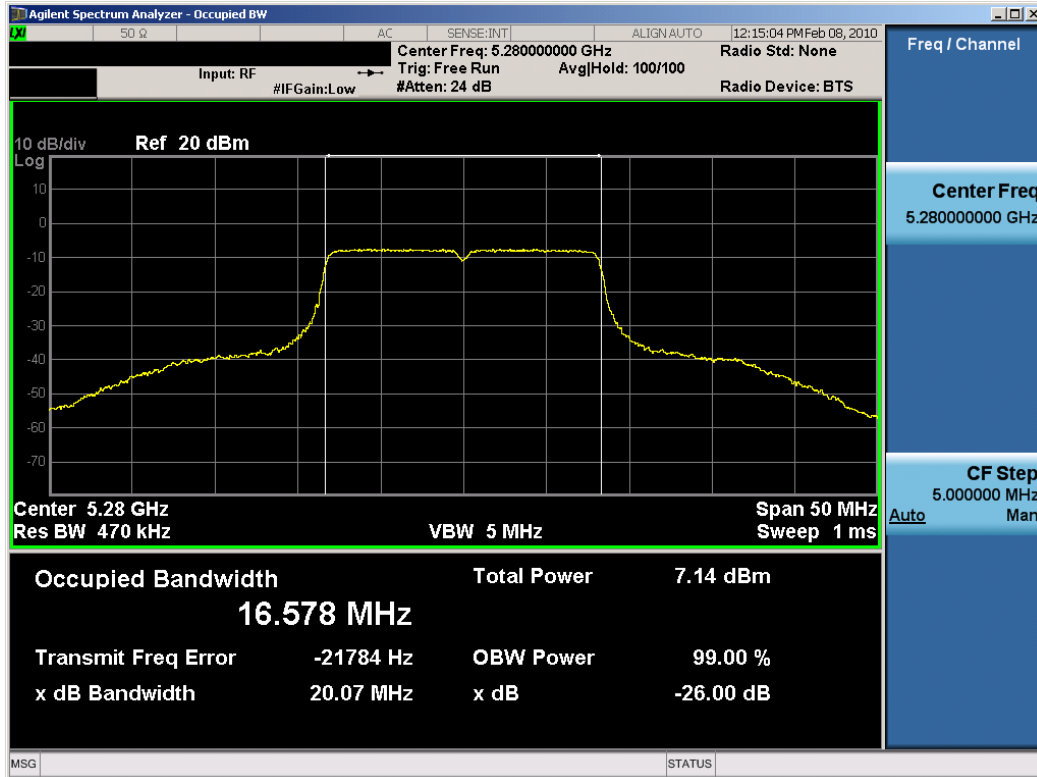


Plot 6-19. 26dB Bandwidth Plot (802.11a (UNII) – Ch. 48) – Chain B

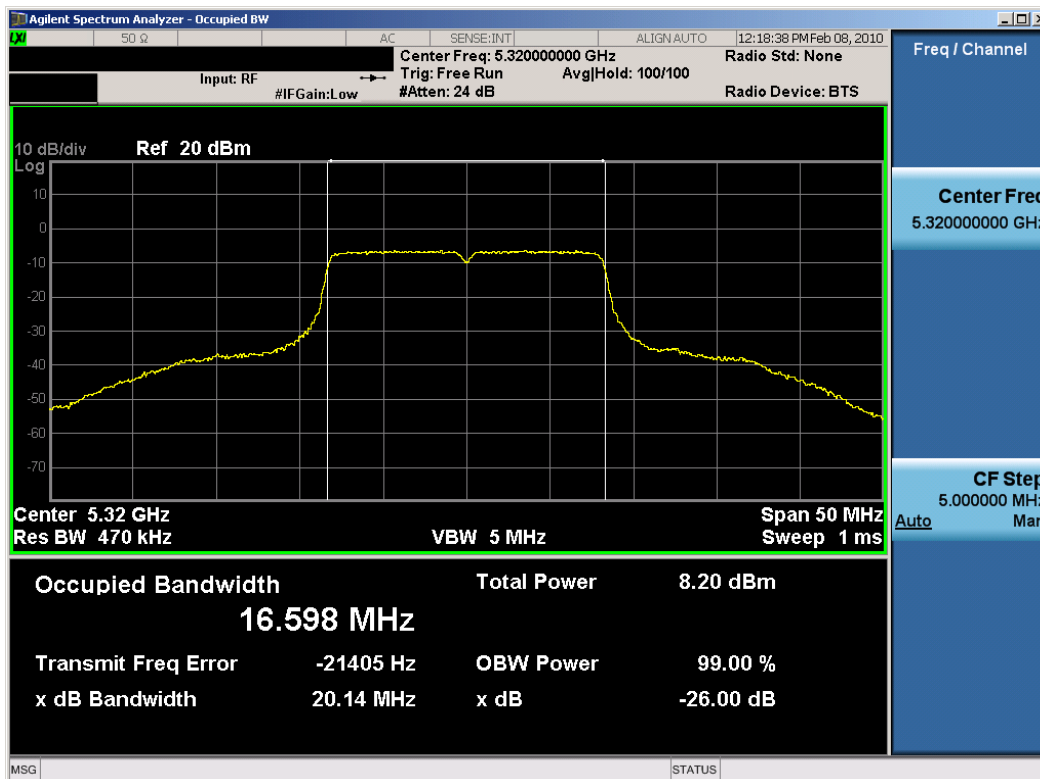


Plot 6-20. 26dB Bandwidth Plot (802.11a (UNII) – Ch. 52) – Chain B

FCC ID: ACJ9TGCF-311	<b>PCTEST</b> ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11a/n UNII MEASUREMENT REPORT (CERTIFICATION)	<b>Panasonic</b>	Reviewed by: Quality Manager
Test Report S/N: 0912152266.ACJ	Test Dates: 12/21/2009 - 02/24/2010	EUT Type: Toughbook Model: CF-31		Page 22 of 121

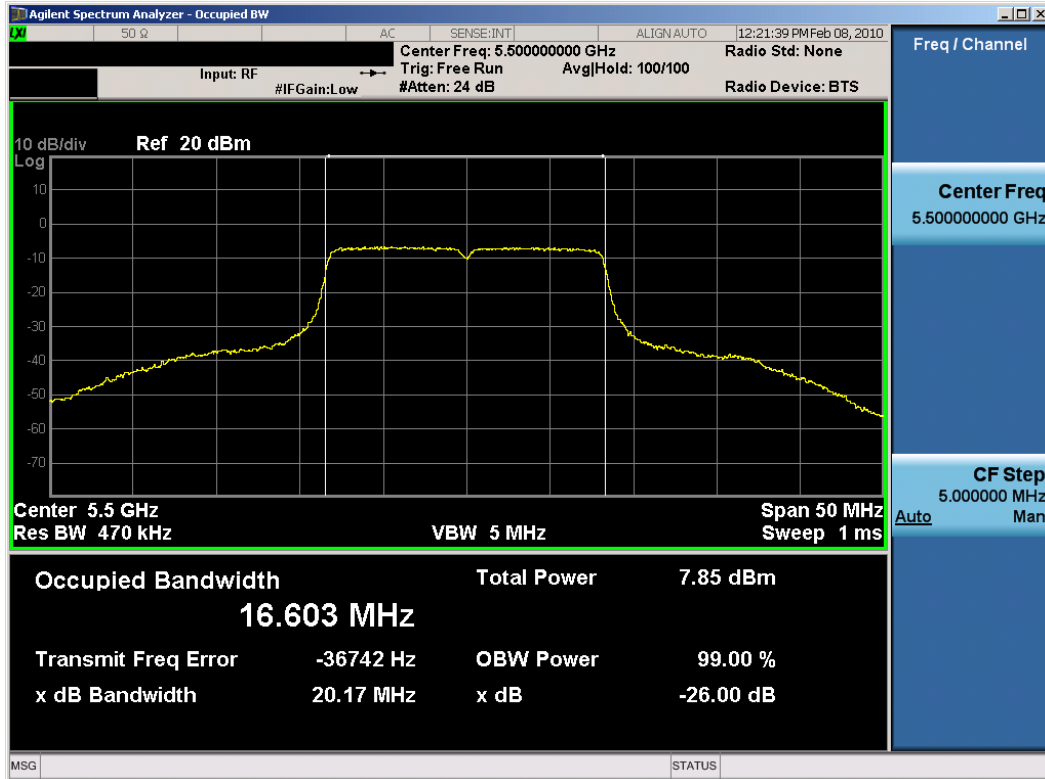


Plot 6-21. 26dB Bandwidth Plot (802.11a (UNII) – Ch. 56) – Chain B

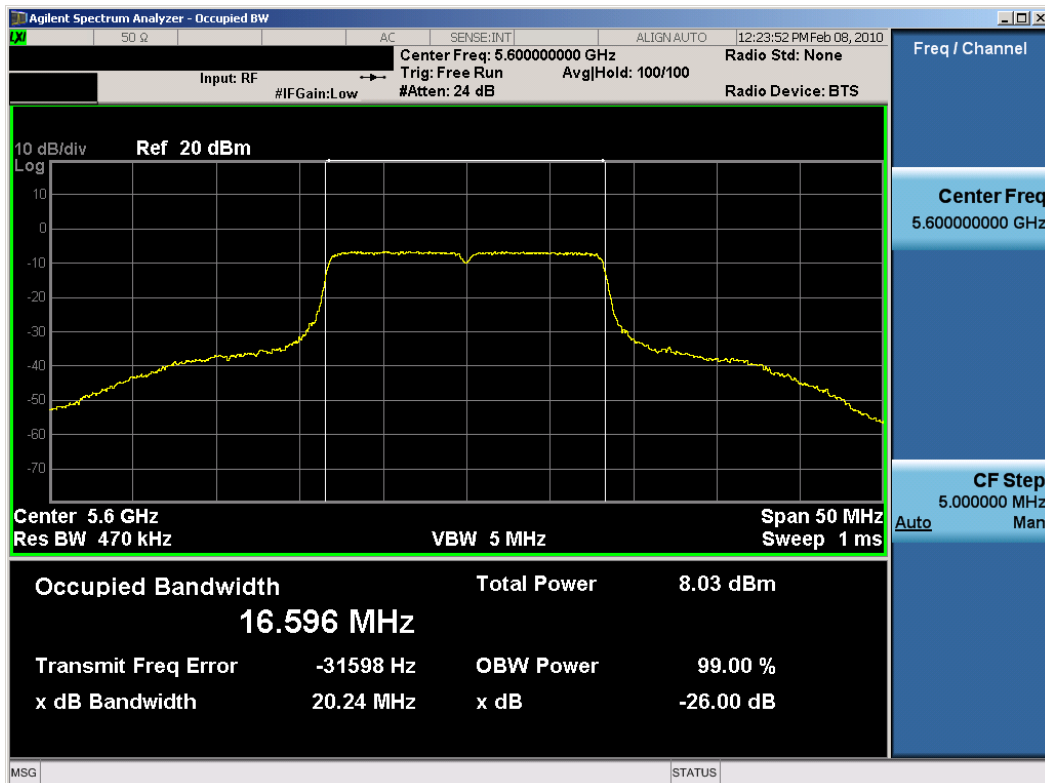


Plot 6-22. 26dB Bandwidth Plot (802.11a (UNII) – Ch. 64) – Chain B

FCC ID: ACJ9TGCF-311	<b>PCTEST</b> ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11a/n UNII MEASUREMENT REPORT (CERTIFICATION)	<b>Panasonic</b>	Reviewed by: Quality Manager
Test Report S/N: 0912152266.ACJ	Test Dates: 12/21/2009 - 02/24/2010	EUT Type: Toughbook Model: CF-31		Page 23 of 121

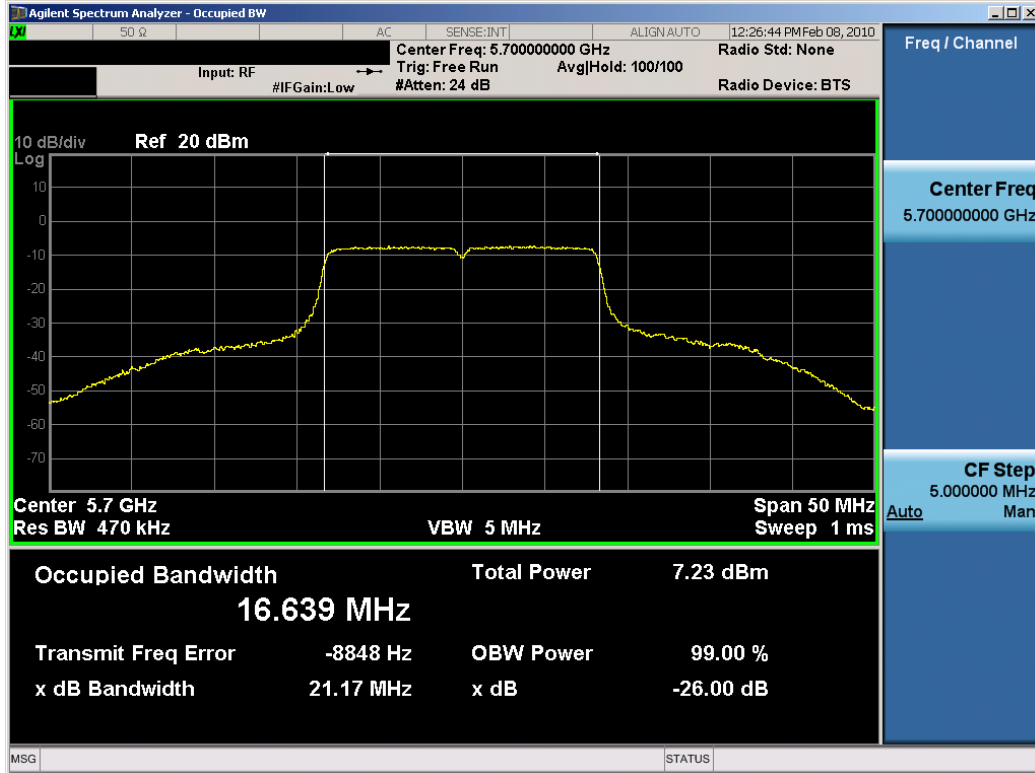


Plot 6-23. 26dB Bandwidth Plot (802.11a (UNII) – Ch. 100) – Chain B

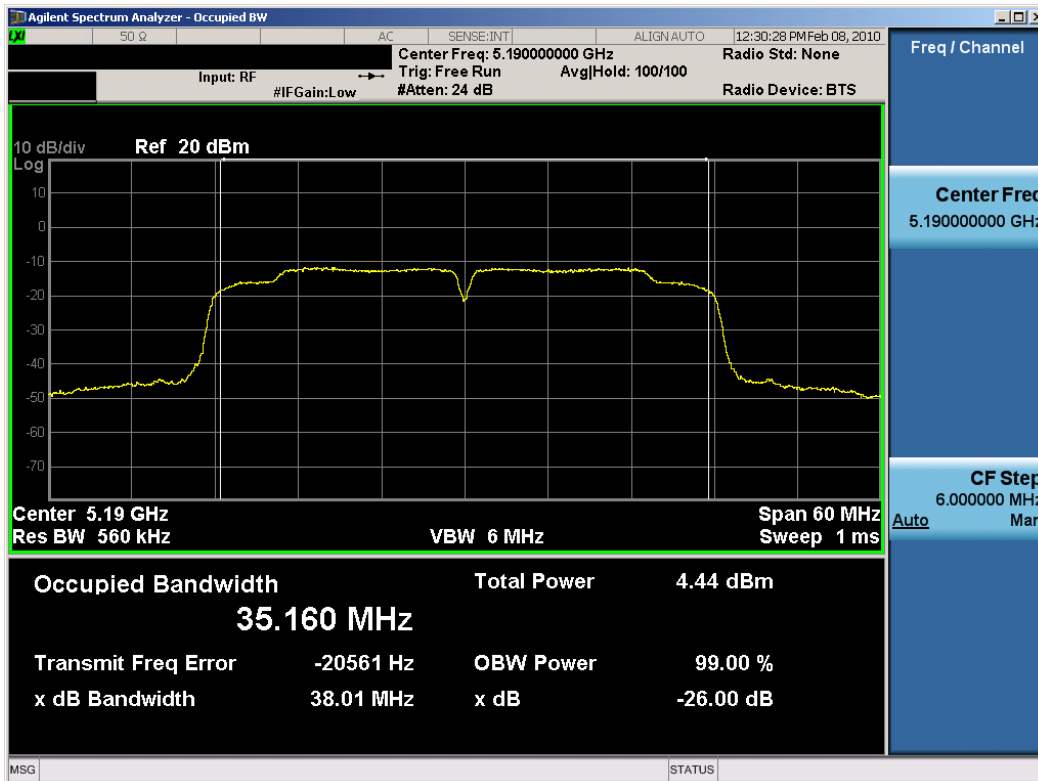


Plot 6-24. 26dB Bandwidth Plot (802.11a (UNII) – Ch. 120) – Chain B

FCC ID: ACJ9TGCF-311	<b>PCTEST</b> ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11a/n UNII MEASUREMENT REPORT (CERTIFICATION)	<b>Panasonic</b>	Reviewed by: Quality Manager
Test Report S/N: 0912152266.ACJ	Test Dates: 12/21/2009 - 02/24/2010	EUT Type: Toughbook Model: CF-31		Page 24 of 121

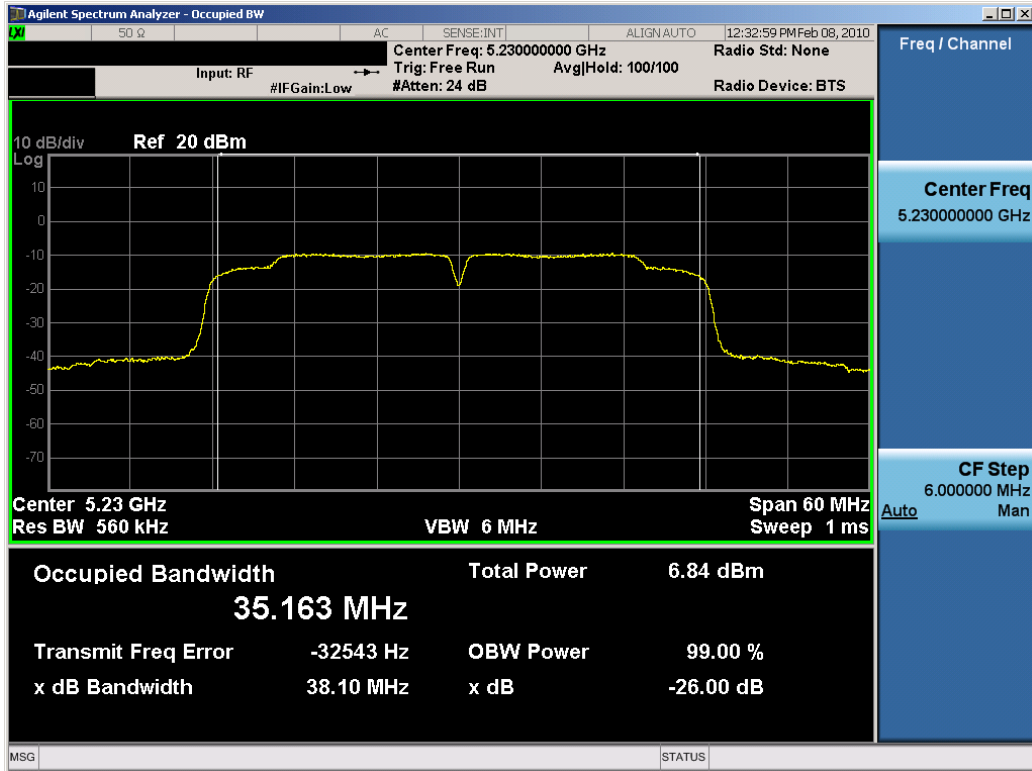


Plot 6-25. 26dB Bandwidth Plot (802.11a (UNII) – Ch. 140) – Chain B

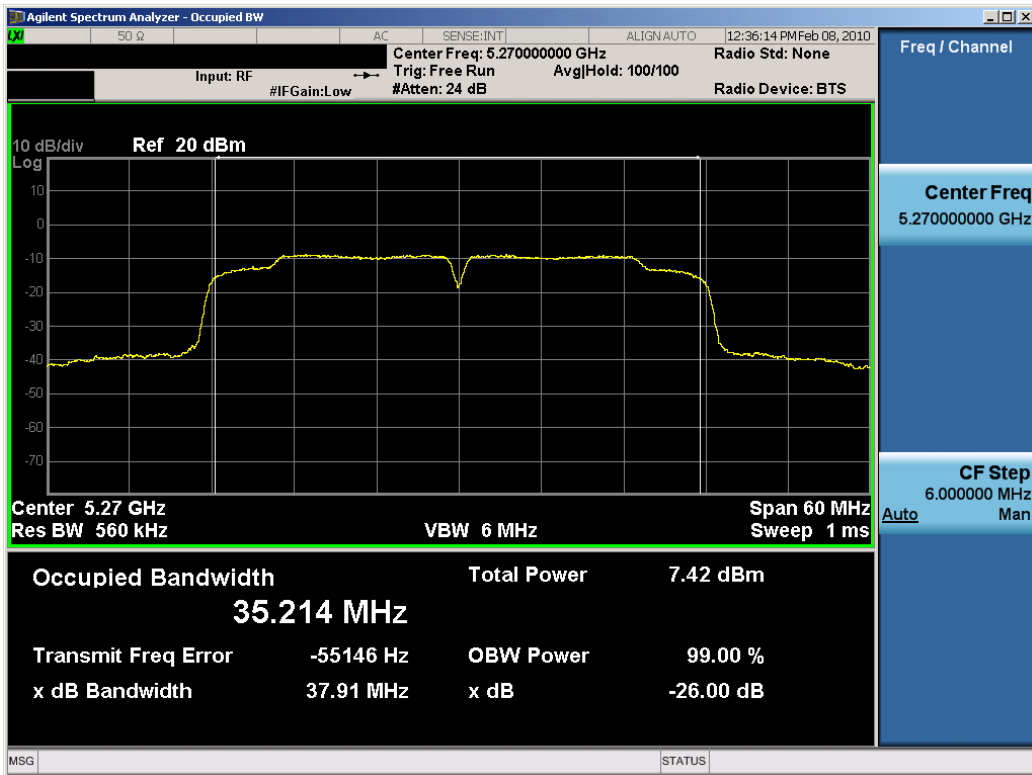


Plot 6-26. 26dB Bandwidth Plot (802.11n (UNII) – Ch. 38) – Chain B

FCC ID: ACJ9TGCF-311	<b>PCTEST</b> ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11a/n UNII MEASUREMENT REPORT (CERTIFICATION)	<b>Panasonic</b>	Reviewed by: Quality Manager
Test Report S/N: 0912152266.ACJ	Test Dates: 12/21/2009 - 02/24/2010	EUT Type: Toughbook Model: CF-31		Page 25 of 121

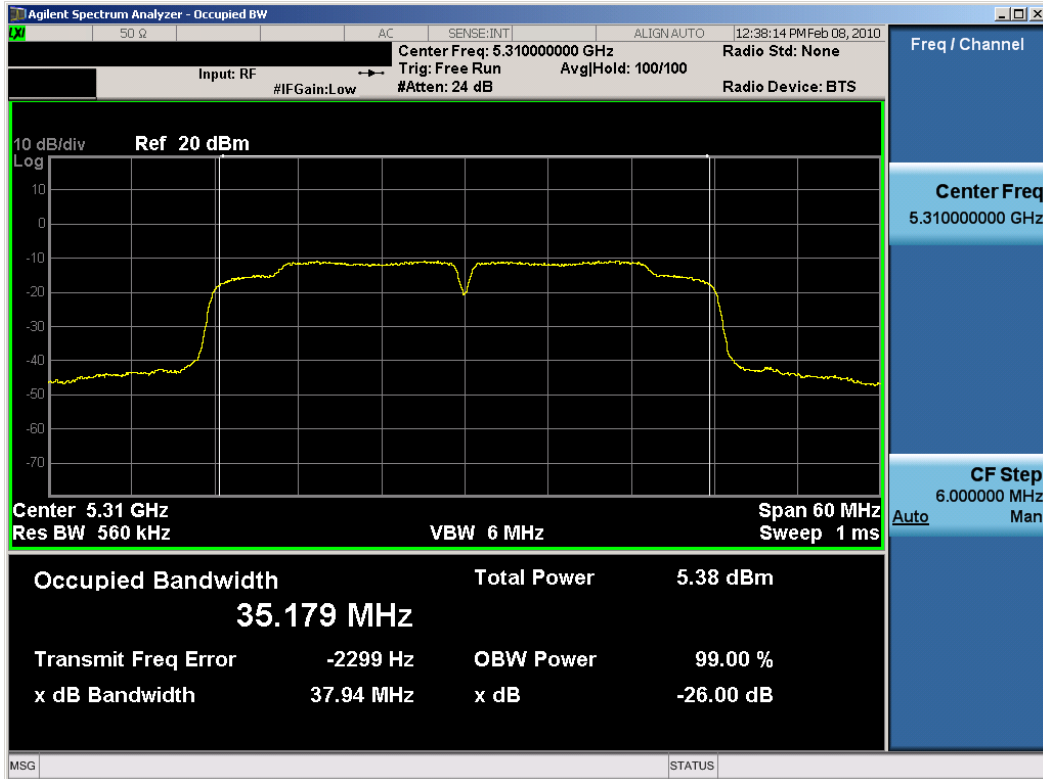


Plot 6-27. 26dB Bandwidth Plot (802.11n (UNII) – Ch. 46) – Chain B

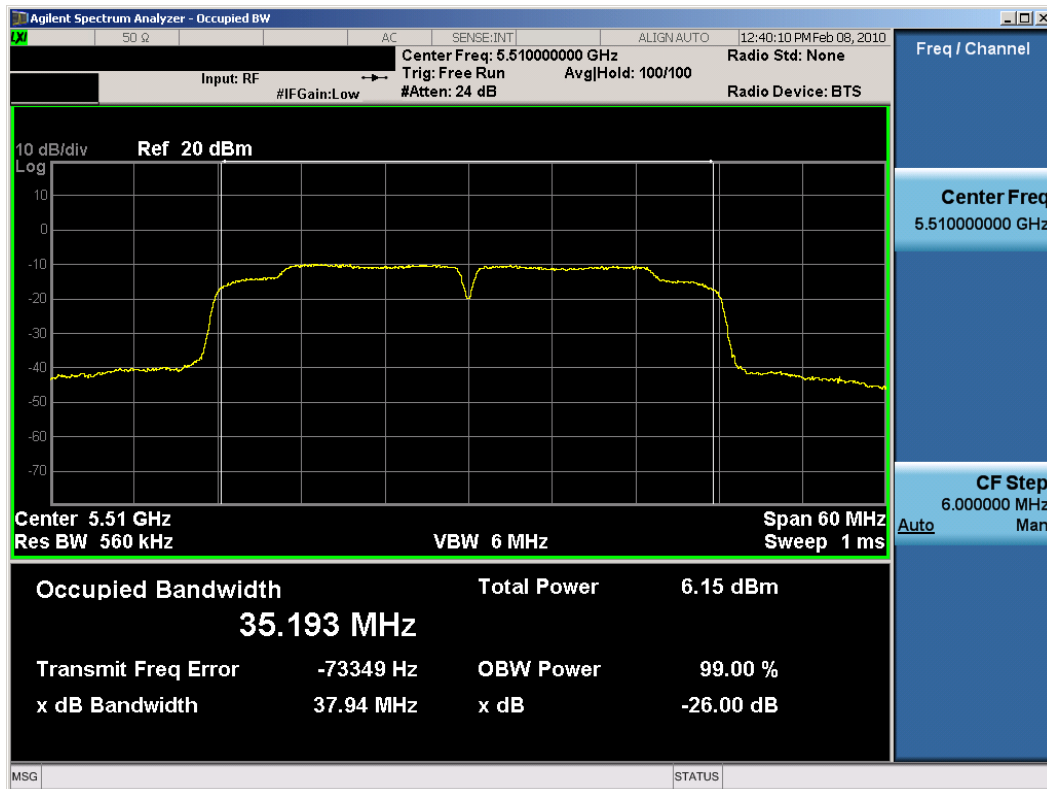


Plot 6-28. 26dB Bandwidth Plot (802.11n (UNII) – Ch. 54) – Chain B

FCC ID: ACJ9TGCF-311	<b>PCTEST</b> ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11a/n UNII MEASUREMENT REPORT (CERTIFICATION)	<b>Panasonic</b>	Reviewed by: Quality Manager
Test Report S/N: 0912152266.ACJ	Test Dates: 12/21/2009 - 02/24/2010	EUT Type: Toughbook Model: CF-31		Page 26 of 121

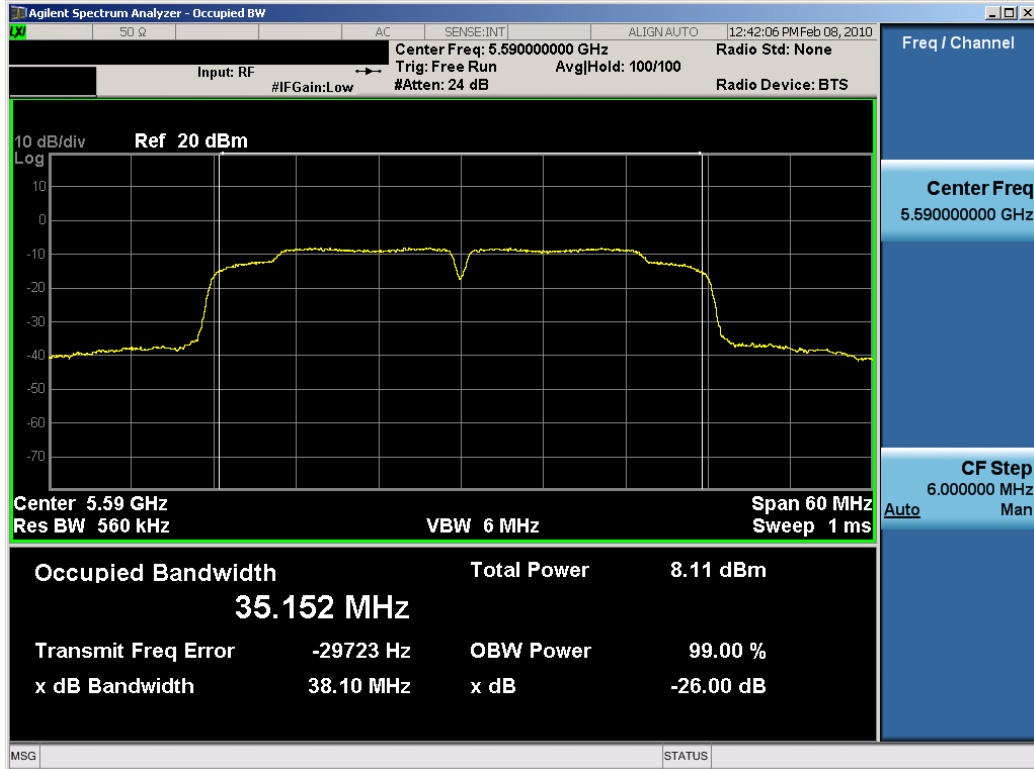


Plot 6-29. 26dB Bandwidth Plot (802.11n (UNII) – Ch. 62) – Chain B

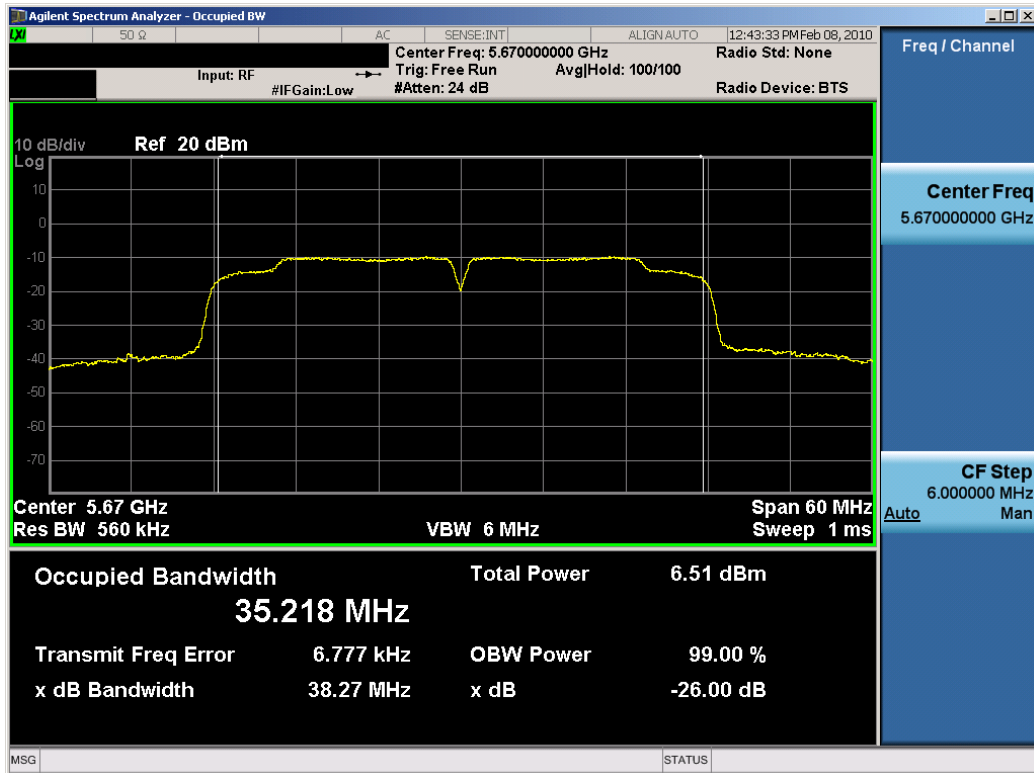


Plot 6-30. 26dB Bandwidth Plot (802.11n (UNII) – Ch. 102) – Chain B

FCC ID: ACJ9TGCF-311	<b>PCTEST</b> ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11a/n UNII MEASUREMENT REPORT (CERTIFICATION)	<b>Panasonic</b>	Reviewed by: Quality Manager
Test Report S/N: 0912152266.ACJ	Test Dates: 12/21/2009 - 02/24/2010	EUT Type: Toughbook Model: CF-31		Page 27 of 121



Plot 6-31. 26dB Bandwidth Plot (802.11n (UNII) – Ch. 118) – Chain B



Plot 6-32. 26dB Bandwidth Plot (802.11n (UNII) – Ch. 134) - Chain B

FCC ID: ACJ9TGCF-311	<b>PCTEST</b> ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11a/n UNII MEASUREMENT REPORT (CERTIFICATION)	<b>Panasonic</b>	Reviewed by: Quality Manager
Test Report S/N: 0912152266.ACJ	Test Dates: 12/21/2009 - 02/24/2010	EUT Type: Toughbook Model: CF-31		Page 28 of 121

### 6.3 Output Power Measurement – 802.11a (UNII Band 1 and 2) §15.407 (a)(1)

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. ***In the 5.15 – 5.25GHz band, the maximum permissible conducted output power is the lesser of 50mW (16.99dBm) or 4 dBm + 10log<sub>10</sub>(26dB BW). In the 5.25 – 5.35GHz band, the maximum permissible conducted output power is the lesser of 250mW (23.98dBm) or 11 dBm + 10log<sub>10</sub>(26dB BW).***

Based on the 26dB bandwidth measurements the maximum permissible conducted output power is calculated as follows:

**5.15 – 5.25GHz:** Minimum 26dB BW = 19.67MHz

$$\text{Limit} = \text{Lesser of } 16.99\text{dBm or } 4\text{dBm} + 10\log(19.67) = 16.93\text{dBm}$$


Therefore the maximum permissible output power for the frequency range of 5.15 – 5.25GHz is 16.93dBm (49.32mW).

**5.25 – 5.35GHz:** Minimum 26dB BW = 19.94MHz

$$\text{Limit} = \text{Lesser of } 23.98\text{dBm or } 11\text{dBm} + 10\log(19.94) = 23.99\text{dBm}$$

Therefore the maximum permissible output power for the frequency range of 5.25 – 5.35GHz is 23.98dBm (250mW).

The following powers measured for both transmit chains A and B comply with the maximum conducted output power requirements.

FCC ID: ACJ9TGCF-311		FCC Pt. 15.407 802.11a/n UNII MEASUREMENT REPORT (CERTIFICATION)	Reviewed by: Quality Manager
Test Report S/N: 0912152266.ACJ	Test Dates: 12/21/2009 - 02/24/2010	EUT Type: Toughbook Model: CF-31	Page 29 of 121

**Chain A**

Freq [MHz]	Channel	Data Rate [Mbps]	20MHz BW Measured Power [dBm]
5180	36	6	12.51
		9	12.36
		12	12.32
		18	12.38
		24	12.26
		36	12.20
		48	12.22
		54	10.85
5200	40	6	14.14
		9	14.08
		12	14.00
		18	14.05
		24	13.95
		36	13.89
		48	12.90
		54	11.13
5240	48	6	14.42
		9	14.46
		12	14.01
		18	14.42
		24	13.89
		36	13.85
		48	13.20
		54	11.03

**Table 6-4. UNII Band I Conducted Output Power Measurements**

Freq [MHz]	Channel	Data Rate [Mbps]	20MHz BW Measured Power [dBm]
5260	52	6	14.02
		9	14.12
		12	13.97
		18	14.08
		24	13.88
		36	13.88
		48	13.00
		54	11.30
5280	56	6	14.31
		9	14.25
		12	13.92
		18	14.12
		24	13.96
		36	13.76
		48	12.80
		54	11.18
5320	64	6	13.99
		9	14.15
		12	14.00
		18	14.19
		24	13.79
		36	13.70
		48	12.86
		54	11.22

**Table 6-5. UNII Band II Conducted Output Power Measurements**

**Chain B**

Freq [MHz]	Channel	Data Rate [Mbps]	20MHz BW Measured Power [dBm]
5180	36	6	12.28
		9	12.20
		12	12.11
		18	12.12
		24	12.00
		36	11.94
		48	11.96
		54	9.80
		5200	40
9	12.92		
12	12.80		
18	12.84		
24	12.72		
36	12.62		
48	11.85		
54	10.03		
5240	48		
		9	13.11
		12	13.04
		18	13.05
		24	12.92
		36	12.83
		48	11.63
		54	10.23

**Table 6-6. UNII Band I Conducted Output Power Measurements**

Freq [MHz]	Channel	Data Rate [Mbps]	20MHz BW Measured Power [dBm]
5260	52	6	12.84
		9	13.24
		12	12.80
		18	12.83
		24	12.70
		36	12.66
		48	11.85
		54	10.04
		5280	56
9	13.10		
12	13.10		
18	13.14		
24	12.97		
36	12.91		
48	11.71		
54	10.23		
5320	64		
		9	13.18
		12	12.94
		18	12.92
		24	12.73
		36	13.02
		48	11.78
		54	9.95

**Table 6-7. UNII Band II Conducted Output Power Measurements**



The following table lists the aggregate (summed) powers when the device is transmitting on chains A/B simultaneously.

Freq [MHz]	Channel	MCS Index	Data Rate [Mbps]	Chain A [dBm]	Chain B [dBm]	20MHz BW Aggregate Power [dBm]
5180	36	HT8	13/14.4	10.51	8.73	12.72
		HT9	26/28.9	10.47	8.96	12.79
		HT10	39/43.3	10.45	8.97	12.78
		HT11	52/57.8	10.41	8.89	12.73
		HT12	78/86.7	10.49	8.81	12.74
		HT13	104/115.6	10.57	8.97	12.85
		HT14	117/130	10.46	8.81	12.72
		HT15	130/144.4	9.27	7.54	11.50
5200	40	HT8	13/14.4	10.46	9.16	12.87
		HT9	26/28.9	10.62	9.21	12.98
		HT10	39/43.3	10.83	9.19	13.10
		HT11	52/57.8	10.78	9.22	13.08
		HT12	78/86.7	10.84	9.14	13.08
		HT13	104/115.6	10.56	9.41	13.03
		HT14	117/130	10.97	8.62	12.96
		HT15	130/144.4	9.31	7.33	11.44
5240	48	HT8	13/14.4	10.99	9.26	13.22
		HT9	26/28.9	10.96	9.25	13.20
		HT10	39/43.3	10.92	9.27	13.18
		HT11	52/57.8	10.93	9.35	13.22
		HT12	78/86.7	10.91	9.34	13.21
		HT13	104/115.6	10.87	9.41	13.21
		HT14	117/130	11.10	9.38	<b>13.33</b>
		HT15	130/144.4	9.46	7.66	11.66

**Table 6-8. UNII Band I Conducted Output Power Measurements**

Freq [MHz]	Channel	MCS Index	Data Rate [Mbps]	Chain A [dBm]	Chain B [dBm]	20MHz BW Aggregate Power [dBm]
5260	52	HT8	13/14.4	11.65	9.29	13.64
		HT9	26/28.9	11.56	9.31	13.59
		HT10	39/43.3	11.47	9.25	13.51
		HT11	52/57.8	11.51	9.33	13.57
		HT12	78/86.7	11.49	9.34	13.56
		HT13	104/115.6	11.92	9.55	13.91
		HT14	117/130	11.64	9.49	13.71
5280	56	HT8	13/14.4	11.45	10.04	13.81
		HT9	26/28.9	11.51	10.02	13.84
		HT10	39/43.3	11.42	10.08	13.81
		HT11	52/57.8	11.46	10.07	13.83
		HT12	78/86.7	11.52	10.43	14.02
		HT13	104/115.6	11.67	10.23	14.02
		HT14	117/130	11.68	9.78	13.84
5320	64	HT8	13/14.4	11.69	10.94	14.34
		HT9	26/28.9	12.08	10.91	14.54
		HT10	39/43.3	11.73	10.97	14.38
		HT11	52/57.8	12.06	10.93	14.54
		HT12	78/86.7	11.77	10.87	14.35
		HT13	104/115.6	11.84	10.91	14.41
		HT14	117/130	12.06	10.26	14.26
		HT15	130/144.4	10.54	9.07	12.88

**Table 6-9. UNII Band II Conducted Output Power Measurements**

FCC ID: ACJ9TGCF-311		FCC Pt. 15.407 802.11a/n UNII MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
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## 6.4 Output Power Measurement – 802.11n (UNII Band 1,2)

### §15.407 (a)(1)

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. ***In the 5.15 – 5.25GHz band, the maximum permissible conducted output power is the lesser of 50mW (16.99dBm) or 4 dBm + 10log<sub>10</sub>(26dB BW). In the 5.25 – 5.35GHz band, the maximum permissible conducted output power is the lesser of 250mW (23.98dBm) or 11 dBm + 10log<sub>10</sub>(26dB BW).***

Based on the 26dB bandwidth measurements the maximum permissible conducted output power is calculated as follows:

**5.15 – 5.25GHz:** Minimum 26dB BW = 19.67MHz

$$\text{Limit} = \text{Lesser of } 16.99\text{dBm or } 4\text{dBm} + 10\log(19.67) = 16.93\text{dBm}$$


Therefore the maximum permissible output power for the frequency range of 5.15 – 5.25GHz is 16.93dBm (49.32mW).

**5.25 – 5.35GHz:** Minimum 26dB BW = 19.94MHz

$$\text{Limit} = \text{Lesser of } 23.98\text{dBm or } 11\text{dBm} + 10\log(19.94) = 23.99\text{dBm}$$

Therefore the maximum permissible output power for the frequency range of 5.25 – 5.35GHz is 23.98dBm (250mW).

The following powers measured for both transmit chains A and B comply with the maximum conducted output power requirements.

FCC ID: ACJ9TGCF-311		FCC Pt. 15.407 802.11a/n UNII MEASUREMENT REPORT (CERTIFICATION)	Reviewed by: Quality Manager
Test Report S/N: 0912152266.ACJ	Test Dates: 12/21/2009 - 02/24/2010	EUT Type: Toughbook Model: CF-31	Page 34 of 121

**Chain A:**

Freq [MHz]	Channel	MCS Index	Data Rate [Mbps]	40MHz Measured Power [dBm]
5190	38	HT0	13.5/15	9.62
		HT1	27/30	9.63
		HT2	40/45	9.41
		HT3	54/60	9.37
		HT4	81/90	9.25
		HT5	108/120	9.18
		HT6	121.5/135	9.25
		HT7	135/150	9.15
5230	46	HT0	13.5/15	13.85
		HT1	27/30	13.75
		HT2	40/45	13.71
		HT3	54/60	13.47
		HT4	81/90	13.4
		HT5	108/120	12.9
		HT6	121.5/135	11.2
		HT7	135/150	9.82

**Table 6-10. UNII Band I Conducted Output Power Measurements**

Freq [MHz]	Channel	MCS Index	Data Rate [Mbps]	40MHz Measured Power [dBm]
5270	54	HT0	13.5/15	13.51
		HT1	27/30	13.72
		HT2	40/45	13.63
		HT3	54/60	13.22
		HT4	81/90	13.20
		HT5	108/120	12.91
		HT6	121.5/135	11.14
		HT7	135/150	9.62
5310	62	HT0	13.5/15	11.02
		HT1	27/30	11.02
		HT2	40/45	10.98
		HT3	54/60	10.62
		HT4	81/90	10.73
		HT5	108/120	10.67
		HT6	121.5/135	10.63
		HT7	135/150	9.67

**Table 6-11. UNII Band II Conducted Output Power Measurements**

**Chain B**

Freq [MHz]	Channel	MCS Index	Data Rate [Mbps]	40MHz Measured Power [dBm]
5190	38	HT0	13.5/15	9.06
		HT1	27/30	9.01
		HT2	40/45	8.97
		HT3	54/60	8.81
		HT4	81/90	8.67
		HT5	108/120	8.73
		HT6	121.5/135	8.68
		HT7	135/150	8.63
5230	46	HT0	13.5/15	12.82
		HT1	27/30	12.41
		HT2	40/45	12.72
		HT3	54/60	12.40
		HT4	81/90	12.08
		HT5	108/120	11.56
		HT6	121.5/135	9.81
		HT7	135/150	7.97

**Table 6-12. UNII Band I Conducted Output Power Measurements**



Freq [MHz]	Channel	MCS Index	Data Rate [Mbps]	40MHz Measured Power [dBm]
5270	54	HT0	13.5/15	12.22
		HT1	27/30	12.60
		HT2	40/45	12.52
		HT3	54/60	12.32
		HT4	81/90	12.22
		HT5	108/120	11.76
		HT6	121.5/135	10.01
		HT7	135/150	8.25
5310	62	HT0	13.5/15	10.03
		HT1	27/30	10.01
		HT2	40/45	9.96
		HT3	54/60	9.78
		HT4	81/90	9.71
		HT5	108/120	9.69
		HT6	121.5/135	9.73
		HT7	135/150	8.35

**Table 6-13. UNII Band II Conducted Output Power Measurements**

The following table lists the aggregate (summed) powers when the device is transmitting on chains A/B simultaneously.



Freq [MHz]	Channel	MCS Index	Data Rate [Mbps]	Chain A [dBm]	Chain B [dBm]	40MHz Aggregate Power [dBm]
5190	38	HT8	27/30	8.93	7.25	11.18
		HT9	54/60	9.14	6.95	11.19
		HT10	80/90	9.23	7.11	11.31
		HT11	108/120	9.24	7.34	11.40
		HT12	162/180	9.12	6.71	11.09
		HT13	216/240	9.01	6.87	11.08
		HT14	243/270	9.01	6.97	11.12
		HT15	270/300	9.03	7.30	11.26
5230	46	HT8	27/30	10.91	9.48	13.26
		HT9	54/60	10.99	9.52	13.33
		HT10	80/90	10.93	9.51	13.29
		HT11	108/120	11.02	9.61	13.38
		HT12	162/180	10.99	9.67	<b>13.39</b>
		HT13	216/240	11.03	9.36	13.29
		HT14	243/270	10.81	9.24	13.11
		HT15	270/300	9.52	7.77	11.74

**Table 6-14. UNII Band I Conducted Output Power Measurements**

FCC ID: ACJ9TGCF-311		FCC Pt. 15.407 802.11a/n UNII MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
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Freq [MHz]	Channel	MCS Index	Data Rate [Mbps]	Chain A [dBm]	Chain B [dBm]	40MHz Aggregate Power [dBm]
5270	54	HT8	27/30	11.81	9.82	13.94
		HT9	54/60	11.84	9.86	<b>13.97</b>
		HT10	80/90	11.67	9.44	13.71
		HT11	108/120	11.62	9.57	13.73
		HT12	162/180	11.65	9.65	13.77
		HT13	216/240	11.28	9.64	13.55
		HT14	243/270	11.29	9.28	13.41
		HT15	270/300	10.18	7.56	12.07
5310	62	HT8	27/30	9.94	8.68	12.37
		HT9	54/60	10.03	8.32	12.27
		HT10	80/90	10.01	8.33	12.26
		HT11	108/120	10.07	7.98	12.16
		HT12	162/180	10.02	8.04	12.15
		HT13	216/240	10.01	8.05	12.15
		HT14	243/270	9.95	8.12	12.14
		HT15	270/300	10.21	8.24	12.35

**Table 6-15. UNII Band II Conducted Output Power Measurements**

FCC ID: ACJ9TGCF-311		FCC Pt. 15.407 802.11a/n UNII MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0912152266.ACJ	Test Dates: 12/21/2009 - 02/24/2010	EUT Type: Toughbook Model: CF-31		Page 38 of 121

## 6.5 Output Power Measurement – 802.11a/n (UNII Band 3)

### §15.407 (a)(1)

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. ***In the 5.47 – 5.725GHz band, the maximum permissible conducted output power is the lesser of 250mW (23.98dBm) and 11 dBm + 10log<sub>10</sub>(26dB BW).***



Based on the 26dB bandwidth measurements the maximum permissible conducted output power is calculated as follows:

**5.47 – 5.725GHz:** Minimum 26dB BW = 20.09MHz

$$\text{Limit} = \text{Lesser of } 23.98\text{dBm or } 11\text{dBm} + 10\log(20.09) = 24.03\text{dBm}$$

Therefore the maximum permissible output power for the frequency range of 5.25 – 5.35GHz is 23.98dBm (250mW).

The following powers measured for both transmit chains A and B comply with the maximum conducted output power requirements.

FCC ID: ACJ9TGCF-311		FCC Pt. 15.407 802.11a/n UNII MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0912152266.ACJ	Test Dates: 12/21/2009 - 02/24/2010	EUT Type: Toughbook Model: CF-31		Page 39 of 121

**Chain A:**

Freq [MHz]	Channel	Data Rate [Mbps]	20MHz BW Measured Power [dBm]
5500	100	6	13.28
		9	13.50
		12	13.40
		18	13.42
		24	13.20
		36	13.10
		48	12.45
		54	10.98
5600	120	6	13.79
		9	13.66
		12	13.65
		18	13.71
		24	13.56
		36	13.45
		48	12.62
		54	10.81
5700	140	6	13.77
		9	13.68
		12	13.65
		18	13.71
		24	13.51
		36	13.47
		48	12.71
		54	10.83

**Table 6-16. 802.11a UNII Band III Conducted Output Power Measurements**

Freq [MHz]	Channel	MCS Index	Data Rate [Mbps]	40MHz Measured Power [dBm]
5510	102	13.5/15	HT0	13.02
		27/30	HT1	13.00
		40/45	HT2	13.17
		54/60	HT3	12.71
		81/90	HT4	12.61
		108/120	HT5	12.18
		121.5/135	HT6	10.50
		135/150	HT7	9.35
5590	118	13.5/15	HT0	13.36
		27/30	HT1	13.34
		40/45	HT2	13.20
		54/60	HT3	13.08
		81/90	HT4	12.99
		108/120	HT5	12.43
		121.5/135	HT6	10.80
		135/150	HT7	9.38
5670	134	13.5/15	HT0	13.22
		27/30	HT1	13.21
		40/45	HT2	13.07
		54/60	HT3	12.94
		81/90	HT4	12.87
		108/120	HT5	12.27
		121.5/135	HT6	10.60
		135/150	HT7	5.90

**Table 6-17. 802.11n UNII Band III Conducted Output Power Measurements**



**Chain B**

Freq [MHz]	Channel	Data Rate [Mbps]	20MHz BW Measured Power [dBm]
5500	100	6	13.10
		9	13.32
		12	13.24
		18	13.31
		24	12.81
		36	12.80
		48	12.30
		54	10.64
5600	120	6	12.74
		9	12.67
		12	12.62
		18	12.72
		24	12.56
		36	12.54
		48	11.74
		54	9.49
5700	140	6	12.47
		9	12.43
		12	12.06
		18	12.12
		24	12.00
		36	11.93
		48	11.10
		54	9.28

**Table 6-18. 802.11a UNII Band III Conducted Output Power Measurements**

Freq [MHz]	Channel	MCS Index	Data Rate [Mbps]	40MHz Measured Power [dBm]
5510	102	13.5/15	HT0	11.47
		27/30	HT1	11.43
		40/45	HT2	11.36
		54/60	HT3	11.16
		81/90	HT4	11.10
		108/120	HT5	10.63
		121.5/135	HT6	10.27
		135/150	HT7	8.48
5590	118	13.5/15	HT0	12.59
		27/30	HT1	12.57
		40/45	HT2	12.45
		54/60	HT3	11.93
		81/90	HT4	11.81
		108/120	HT5	11.43
		121.5/135	HT6	10.00
		135/150	HT7	8.25
5670	134	13.5/15	HT0	11.80
		27/30	HT1	11.79
		40/45	HT2	11.69
		54/60	HT3	11.47
		81/90	HT4	11.42
		108/120	HT5	11.24
		121.5/135	HT6	9.17
		135/150	HT7	5.06



**Table 6-19. 802.11n UNII Band III Conducted Output Power Measurements**

FCC ID: ACJ9TGCF-311		FCC Pt. 15.407 802.11a/n UNII MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
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The following table lists the aggregate (summed) powers when the device is transmitting on chains A/B simultaneously.



Freq [MHz]	Channel	MCS Index	Data Rate [Mbps]	Chain A [dBm]	Chain B [dBm]	20MHz BW Aggregate Power [dBm]
5500	100	HT8	13/14.4	11.21	11.03	14.13
		HT9	26/28.9	11.24	11.04	14.15
		HT10	39/43.3	11.09	11.11	14.11
		HT11	52/57.8	11.15	11.24	14.21
		HT12	78/86.7	11.42	11.18	14.31
		HT13	104/115.6	11.68	11.25	14.48
		HT14	117/130	11.95	11.19	<b>14.60</b>
		HT15	130/144.4	10.86	10.02	13.47
5600	120	HT8	13/14.4	11.52	10.91	14.24
		HT9	26/28.9	11.55	10.92	14.26
		HT10	39/43.3	11.57	10.93	14.27
		HT11	52/57.8	11.51	10.89	14.22
		HT12	78/86.7	11.54	10.91	14.25
		HT13	104/115.6	11.66	10.86	14.29
		HT14	117/130	11.65	10.69	14.21
		HT15	130/144.4	7.97	7.05	10.54
5700	140	HT8	13/14.4	11.69	10.81	14.28
		HT9	26/28.9	11.72	10.78	14.29
		HT10	39/43.3	11.68	10.85	14.30
		HT11	52/57.8	11.65	10.82	14.27
		HT12	78/86.7	11.74	10.81	14.31
		HT13	104/115.6	12.05	10.76	14.46
		HT14	117/130	11.91	10.64	14.33
		HT15	130/144.4	8.01	7.62	10.83

**Table 6-20. 802.11a UNII Band III Conducted Output Power Measurements**

FCC ID: ACJ9TGCF-311		FCC Pt. 15.407 802.11a/n UNII MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
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Freq [MHz]	Channel	MCS Index	Data Rate [Mbps]	Chain A [dBm]	Chain B [dBm]	40MHz Aggregate Power [dBm]
5510	102	HT8	27/30	9.14	9.41	12.29
		HT9	54/60	9.36	9.49	12.44
		HT10	80/90	9.69	9.54	12.63
		HT11	108/120	9.54	9.51	12.54
		HT12	162/180	9.77	9.52	12.66
		HT13	216/240	9.93	9.55	12.75
		HT14	243/270	10.51	9.71	13.14
		HT15	270/300	10.53	9.22	12.93
5590	118	HT8	27/30	11.24	10.36	13.83
		HT9	54/60	11.25	10.41	13.86
		HT10	80/90	11.29	10.42	13.89
		HT11	108/120	11.14	10.38	13.79
		HT12	162/180	11.28	10.35	13.85
		HT13	216/240	11.33	10.32	13.86
		HT14	243/270	11.25	11.18	<b>14.23</b>
		HT15	270/300	10.44	9.24	12.89
5670	134	HT8	27/30	11.34	10.51	13.96
		HT9	54/60	11.29	10.49	13.92
		HT10	80/90	11.26	10.52	13.92
		HT11	108/120	11.35	10.55	13.98
		HT12	162/180	11.54	10.47	14.05
		HT13	216/240	11.42	10.50	13.99
		HT14	243/270	11.48	10.44	14.00
		HT15	270/300	6.99	6.92	9.97

**Table 6-21. 802.11n UNII Band III Conducted Output Power Measurements**

FCC ID: ACJ9TGCF-311		FCC Pt. 15.407 802.11a/n UNII MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
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## 6.6 Peak Power Spectral Density

§15.407 (a)(1),(5)

The spectrum analyzer was connected to the antenna terminal while the EUT was operating in a continuous transmission mode at the appropriate center frequencies. **The maximum permissible peak power spectral density is 4dBm/MHz in the 5.15GHz – 5.25GHz band and 11dBm/MHz in the 5.25GHz – 5.35 GHz band.**



	Frequency [MHz]	Channel No.	802.11 Mode	Measured Power Density [dBm]	Maximum Permissible Power Density [dBm/MHz]	Margin [dB]
Band I	5180	36	a	-0.886	4.0	-4.9
	5200	40	a	0.105	4.0	-3.9
	5240	48	a	-0.115	4.0	-4.1
	5190	38	n	-6.167	4.0	-10.2
	5230	46	n	-2.914	4.0	-6.9
Band II	5260	52	a	0.097	11.0	-10.9
	5280	56	a	0.381	11.0	-10.6
	5320	64	a	0.277	11.0	-10.7
	5270	54	n	-2.705	11.0	-13.7
	5310	62	n	-5.064	11.0	-16.1
Band III	5500	100	a	-0.19	11.0	-11.2
	5600	120	a	-0.09	11.0	-11.1
	5700	140	a	0.80	11.0	-10.2
	5510	102	n	-2.47	11.0	-13.5
	5590	118	n	-2.80	11.0	-13.8
	5670	134	n	-2.77	11.0	-13.8

Table 6-22. Conducted Power Spectral Density Measurements – Chain A

FCC ID: ACJ9TGCF-311		FCC Pt. 15.407 802.11a/n UNII MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
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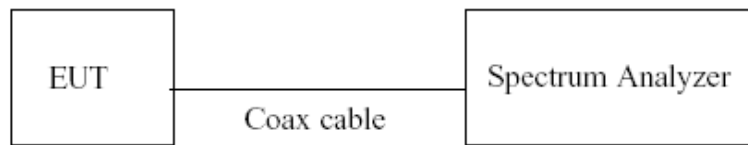
	Frequency [MHz]	Channel No.	802.11 Mode	Measured Power Density [dBm]	Maximum Permissible Power Density [dBm/MHz]	Margin [dB]
Band I	5180	36	a	1.491	4.0	-2.5
	5200	40	a	2.326	4.0	-1.7
	5240	48	a	1.528	4.0	-2.5
Band II	5260	52	a	1.268	11.0	-9.7
	5280	56	a	1.275	11.0	-9.7
	5320	64	a	2.472	11.0	-8.5
Band III	5500	100	a	2.207	11.0	-8.8
	5600	120	a	2.486	11.0	-8.5
	5700	140	a	1.233	11.0	-9.8

Table 6-23. Conducted Power Spectral Density Measurements – Chain B



FCC ID: ACJ9TGCF-311		FCC Pt. 15.407 802.11a/n UNII MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0912152266.ACJ	Test Dates: 12/21/2009 - 02/24/2010	EUT Type: Toughbook Model: CF-31		Page 45 of 121

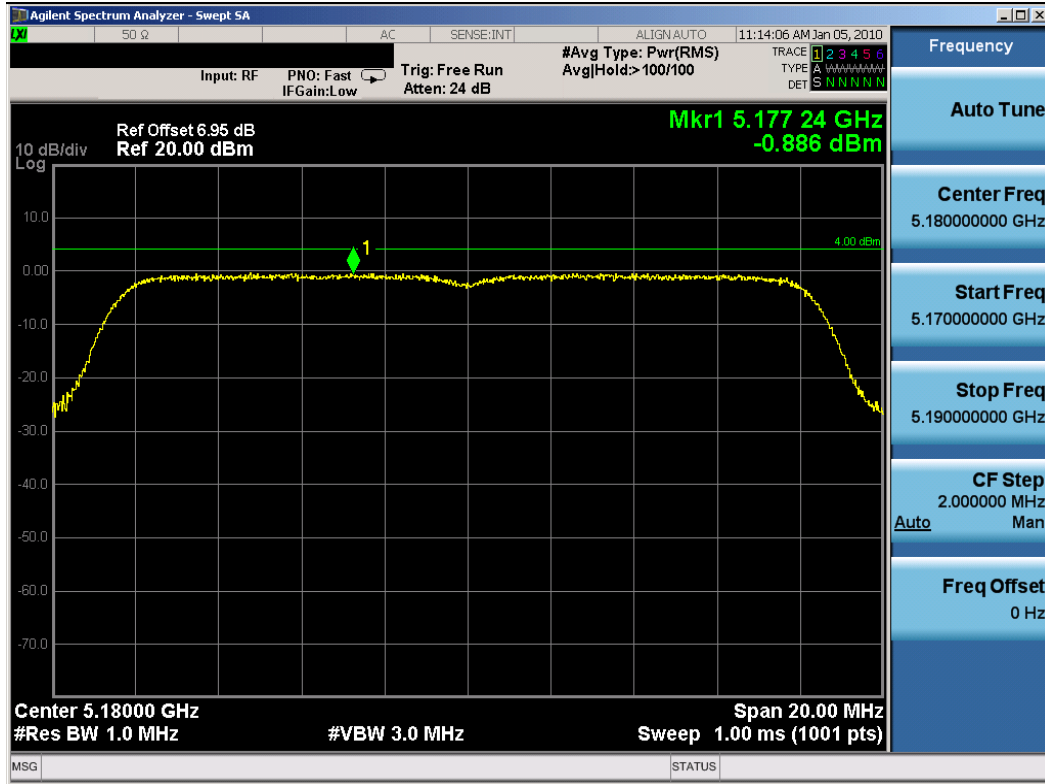
	Frequency [MHz]	Channel No.	802.11 Mode	Measured Power Density Chain A [dBm]	Measured Power Density Chain B [dBm]	Aggregate PSD Chains A/B [dBm]	Maximum Permissible Power Density	Margin [dB]
Band I	5180	36	a	-3.275	-6.096	-1.450	4.0	-5.5
	5200	40	a	-3.939	-6.209	-1.917	4.0	-5.9
	5240	48	a	-4.596	-5.264	-1.907	4.0	-5.9
	5190	38	n	-8.061	-10.158	-5.974	4.0	-10.0
	5230	46	n	-6.271	-8.097	-4.078	4.0	-8.1
Band II	5260	52	a	-3.309	-5.318	-1.188	11.0	-12.2
	5280	56	a	-3.418	-5.023	-1.136	11.0	-12.1
	5320	64	a	-2.454	-4.588	-0.381	11.0	-11.4
	5270	54	n	-5.505	-7.550	-3.398	11.0	-14.4
	5310	62	n	-7.478	-8.287	-4.853	11.0	-15.9
Band III	5500	100	a	-2.980	-2.929	0.056	11.0	-10.9
	5600	120	a	-2.859	-3.832	-0.308	11.0	-11.3
	5700	140	a	-3.078	-3.643	-0.341	11.0	-11.3
	5510	102	n	-7.106	-7.106	-4.096	11.0	-15.1
	5590	118	n	-5.952	-6.177	-3.053	11.0	-14.1
	5670	134	n	-5.445	-5.827	-2.622	11.0	-13.6

**Table 6-24. Conducted Power Spectral Density Measurements – Chains A/B**

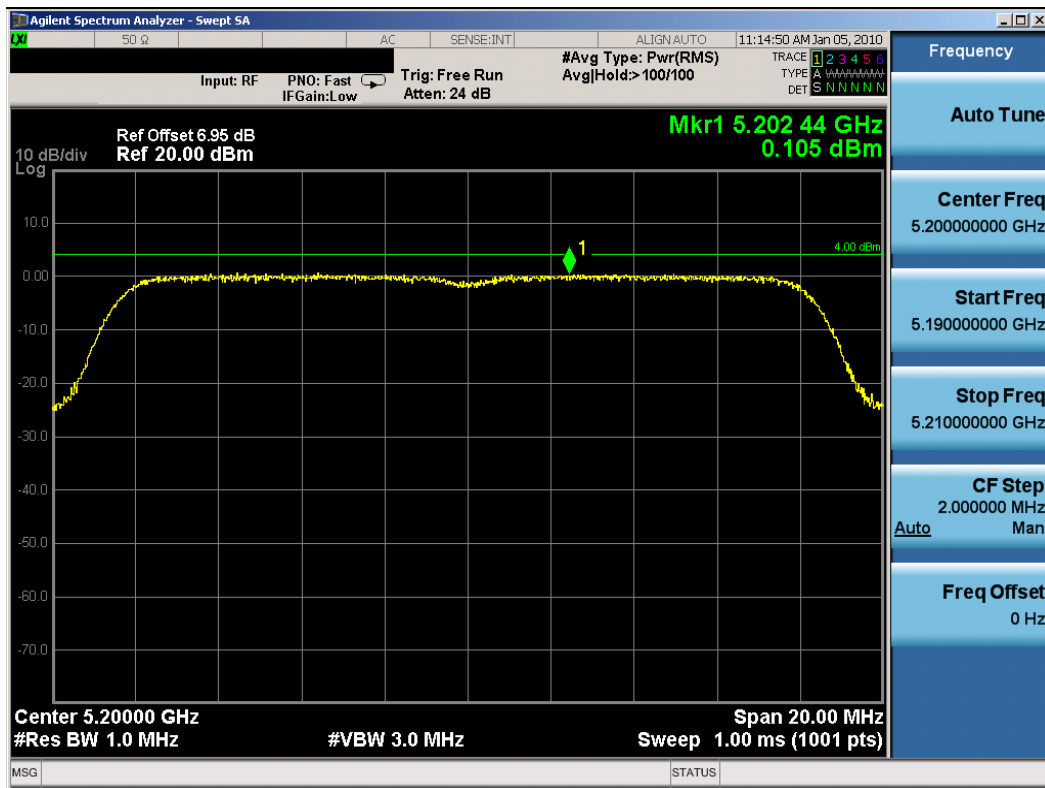


**Figure 6-2. Test Instrument & Measurement Setup**

FCC ID: ACJ9TGCF-311		FCC Pt. 15.407 802.11a/n UNII MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0912152266.ACJ	Test Dates: 12/21/2009 - 02/24/2010	EUT Type: Toughbook Model: CF-31	Page 46 of 121	

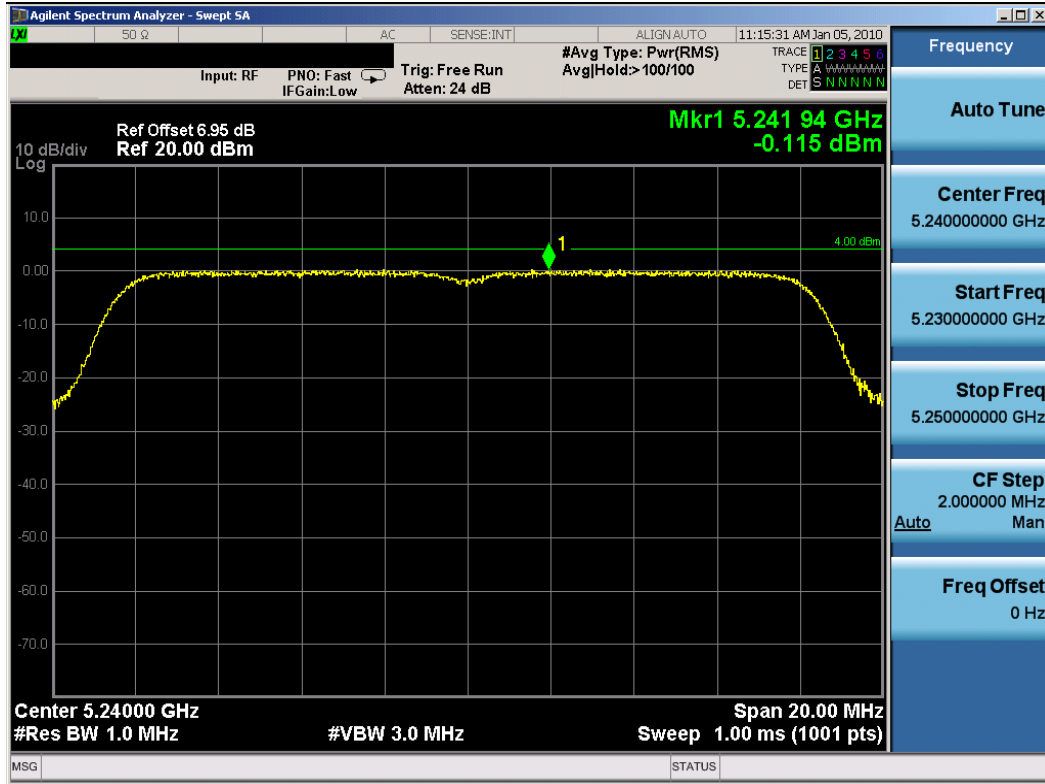


Plot 6-33. Peak Power Spectral Density Plot (802.11a (UNII) – Ch. 36) – Chain A

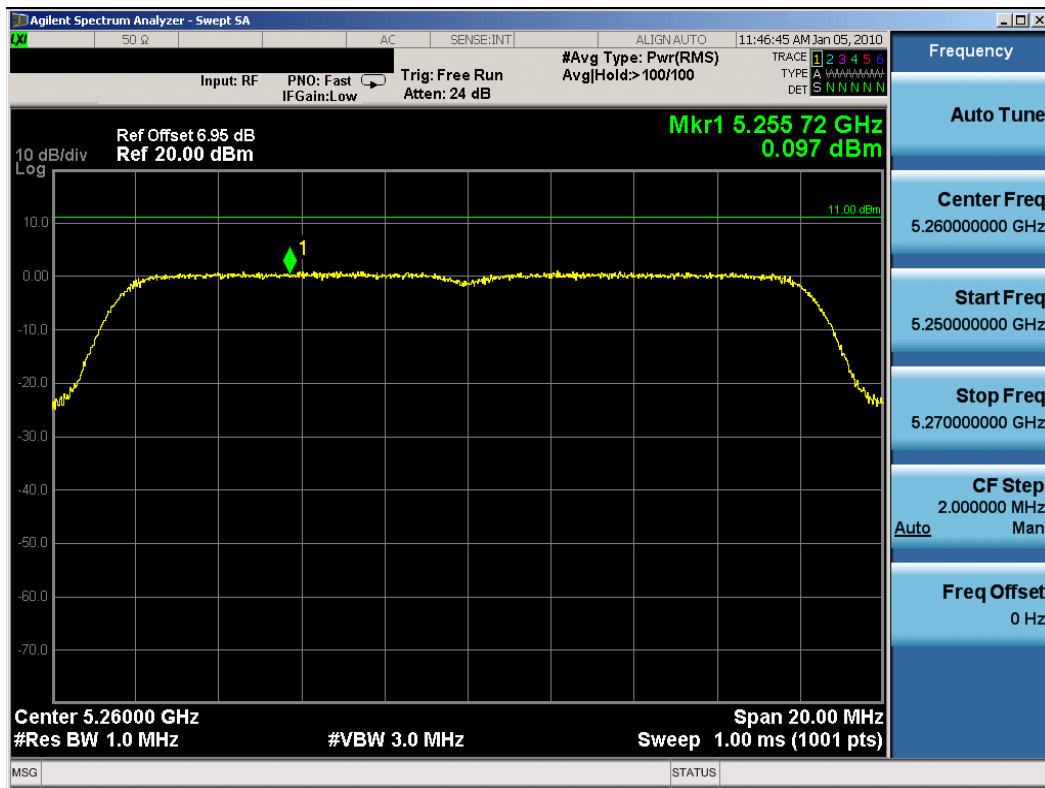


Plot 6-34. Peak Power Spectral Density Plot (802.11a (UNII) – Ch. 40) – Chain A

FCC ID: ACJ9TGCF-311	<b>PCTEST</b> ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11a/n UNII MEASUREMENT REPORT (CERTIFICATION)	<b>Panasonic</b>	Reviewed by: Quality Manager
Test Report S/N: 0912152266.ACJ	Test Dates: 12/21/2009 - 02/24/2010	EUT Type: Toughbook Model: CF-31		Page 47 of 121

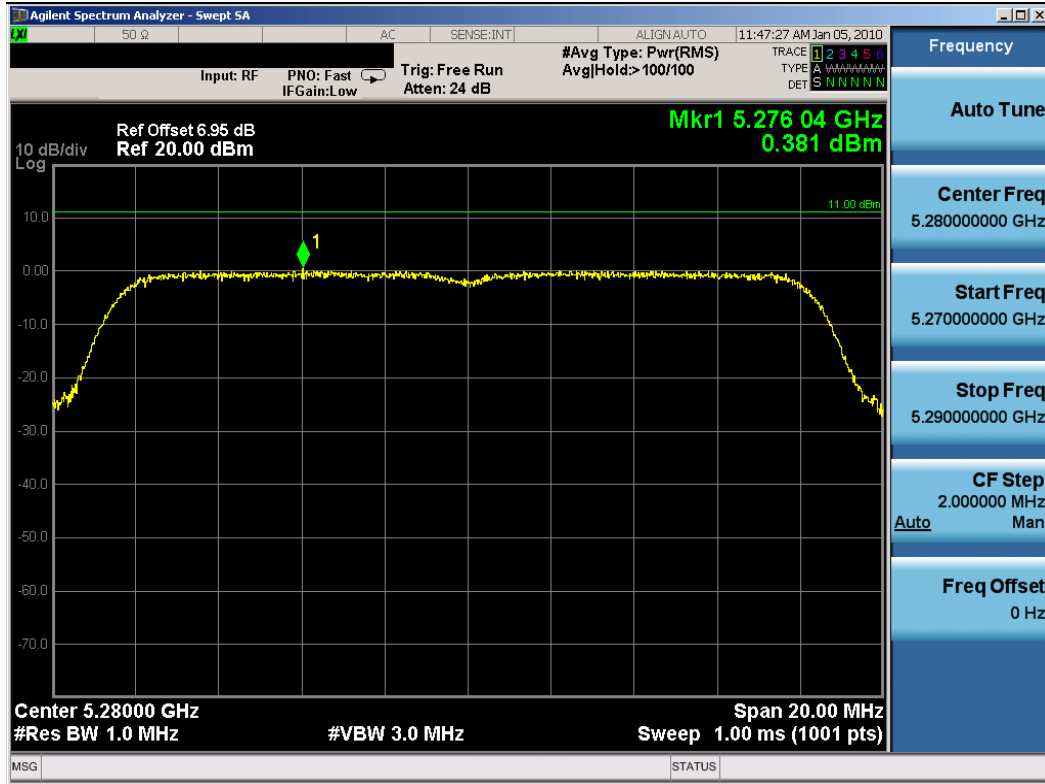


Plot 6-35. Peak Power Spectral Density Plot (802.11a (UNII) – Ch. 48) – Chain A

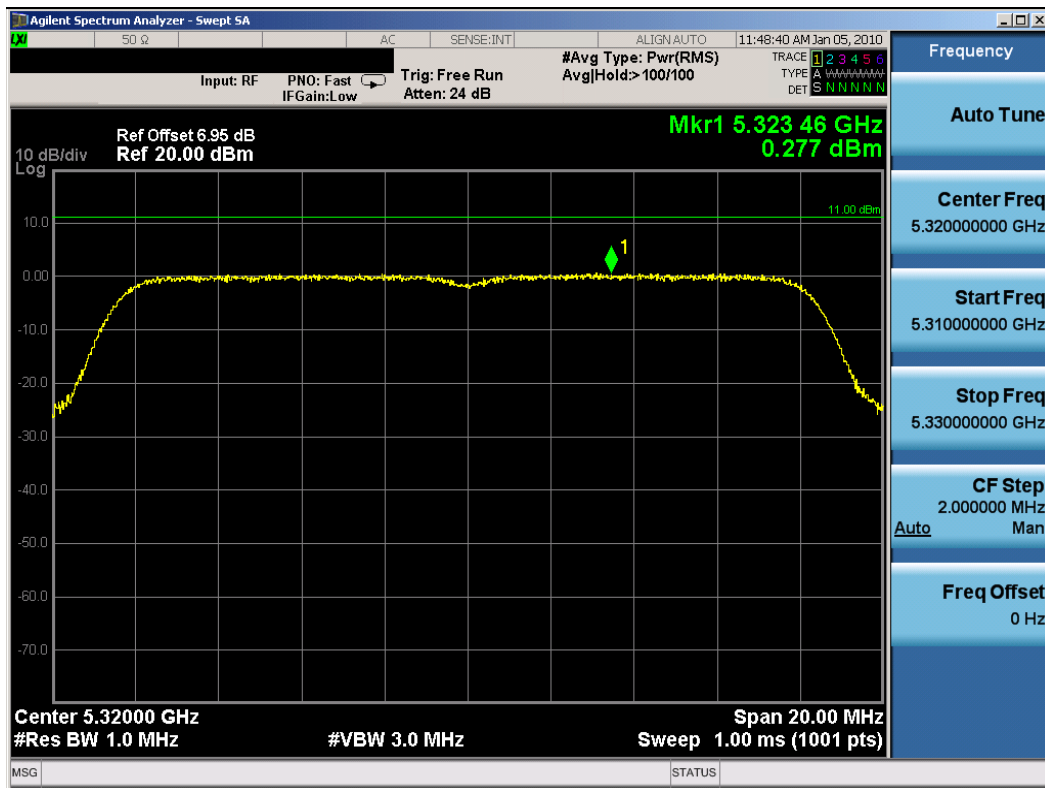


Plot 6-36. Peak Power Spectral Density Plot (802.11a (UNII) – Ch. 52) – Chain A

FCC ID: ACJ9TGCF-311	<b>PCTEST</b> ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11a/n UNII MEASUREMENT REPORT (CERTIFICATION)	<b>Panasonic</b>	Reviewed by: Quality Manager
Test Report S/N: 0912152266.ACJ	Test Dates: 12/21/2009 - 02/24/2010	EUT Type: Toughbook Model: CF-31		Page 48 of 121

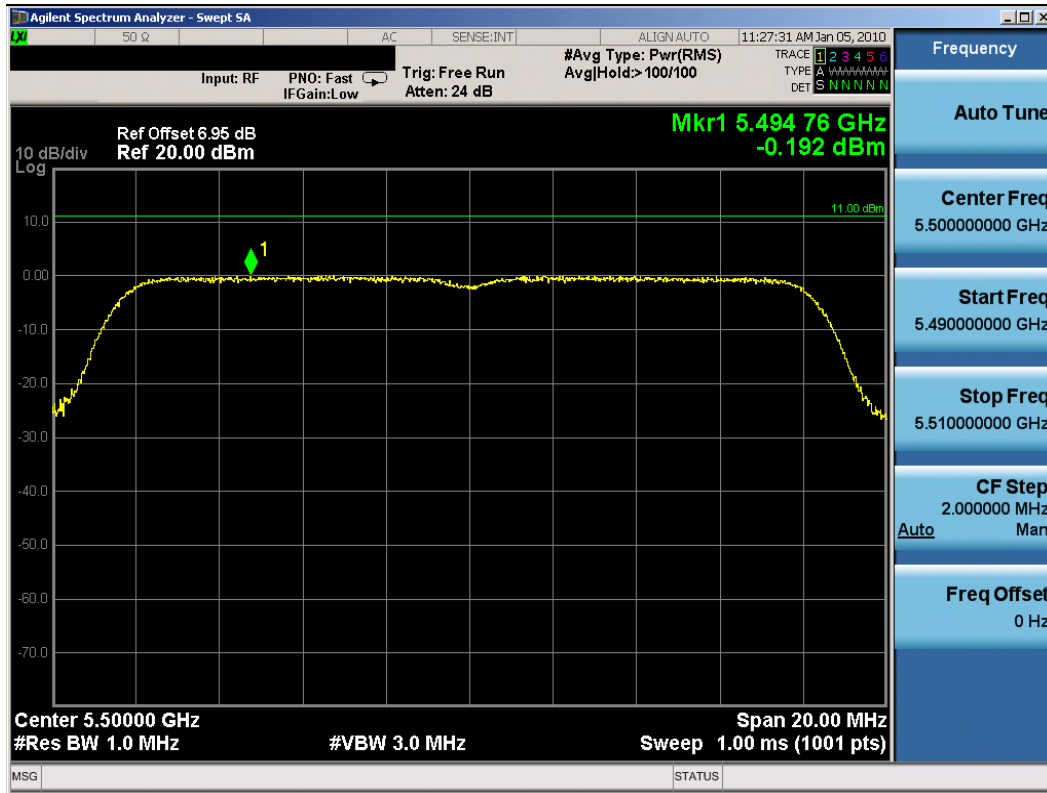


Plot 6-37. Peak Power Spectral Density Plot (802.11a (UNII) – Ch. 56) – Chain A

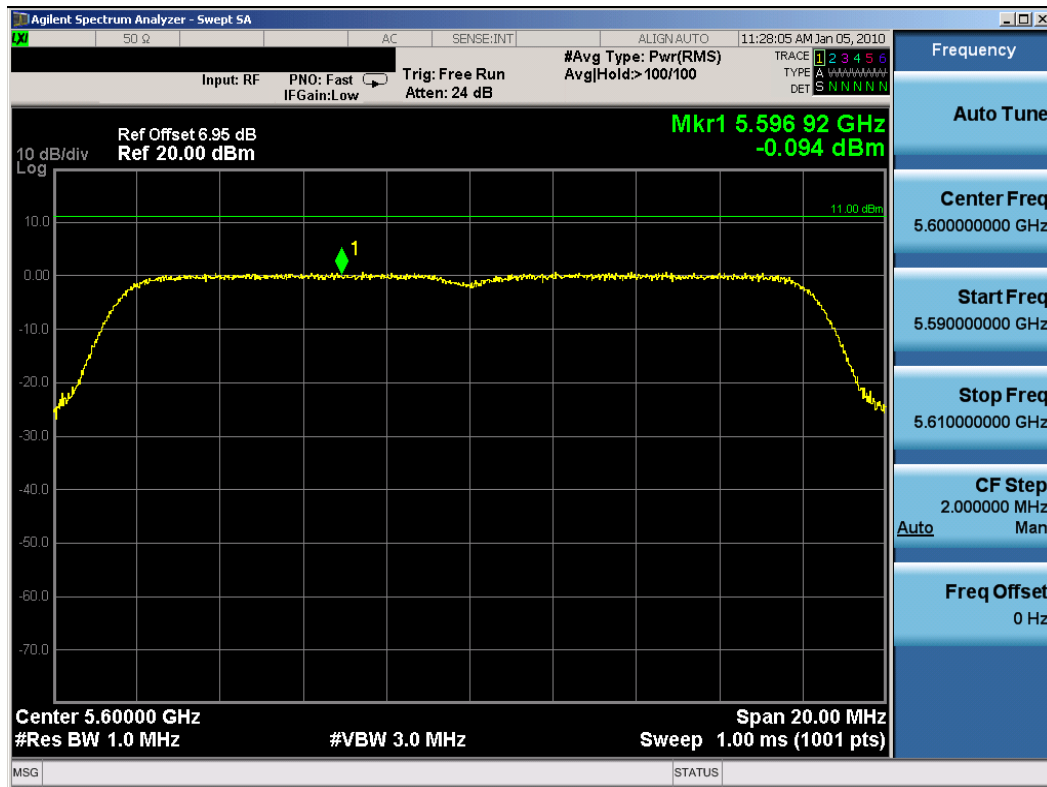


Plot 6-38. Peak Power Spectral Density Plot (802.11a (UNII) – Ch. 64) – Chain A

FCC ID: ACJ9TGCF-311	<b>PCTEST</b> ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11a/n UNII MEASUREMENT REPORT (CERTIFICATION)	<b>Panasonic</b>	Reviewed by: Quality Manager
Test Report S/N: 0912152266.ACJ	Test Dates: 12/21/2009 - 02/24/2010	EUT Type: Toughbook Model: CF-31		Page 49 of 121

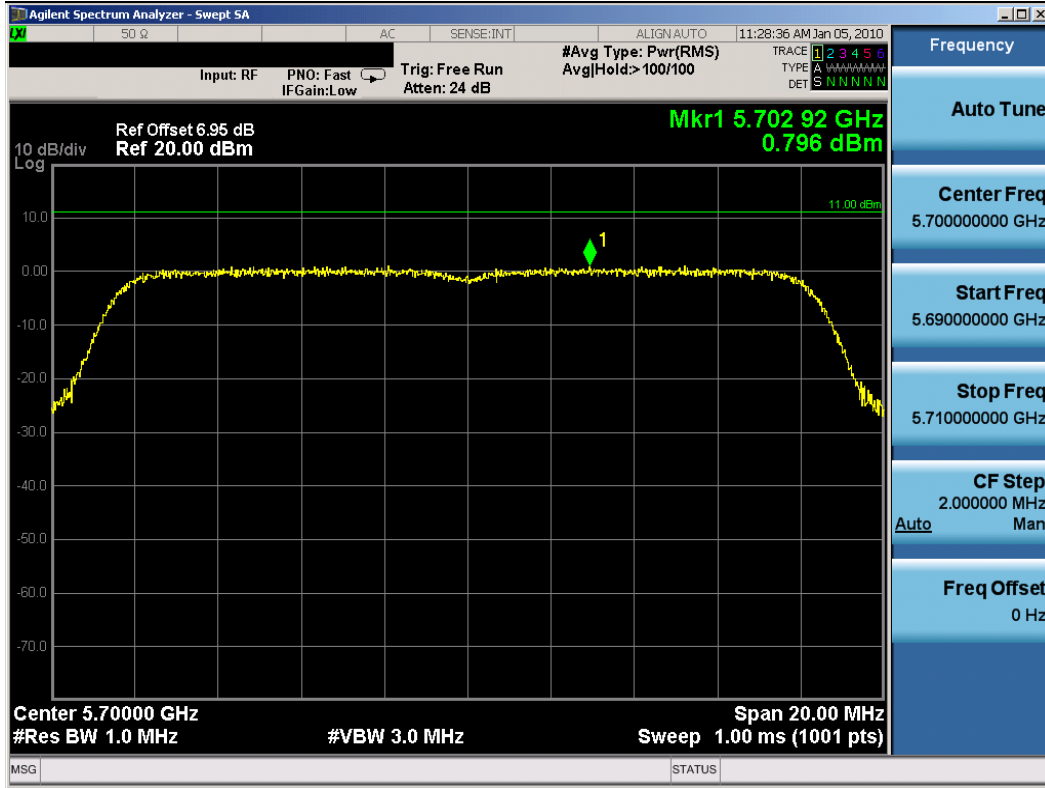


Plot 6-39. Peak Power Spectral Density Plot (802.11a (UNII) – Ch. 100) – Chain A

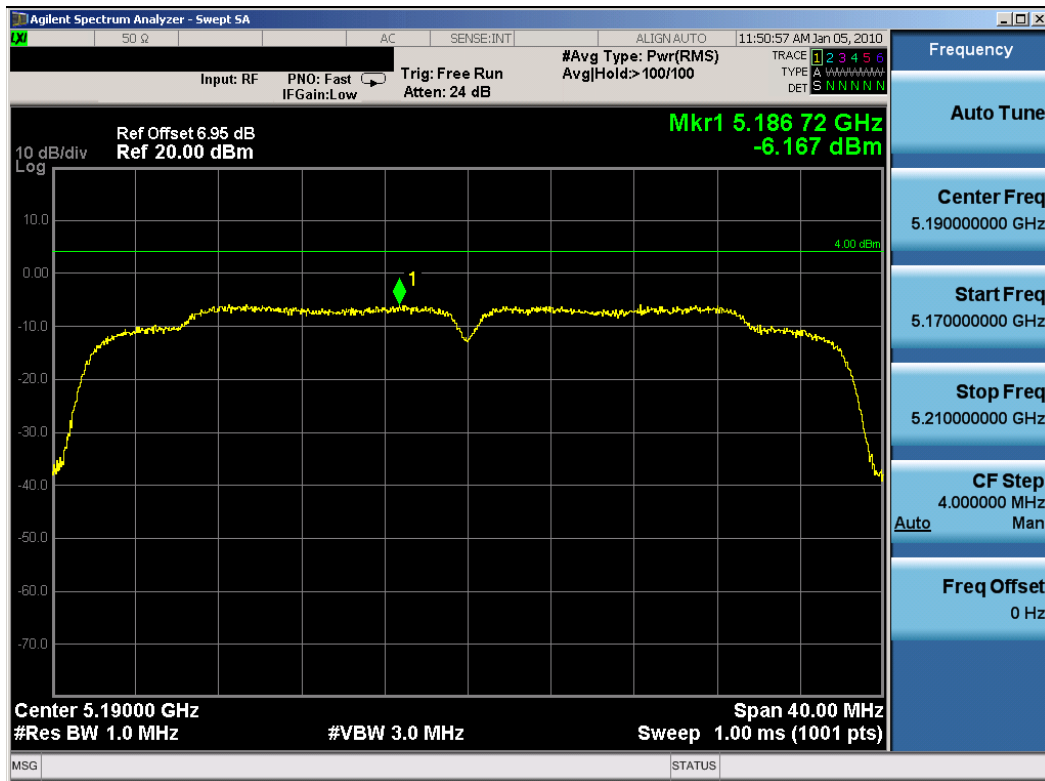


Plot 6-40. Peak Power Spectral Density Plot (802.11a (UNII) – Ch. 120) – Chain A

FCC ID: ACJ9TGCF-311	<b>PCTEST</b> ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11a/n UNII MEASUREMENT REPORT (CERTIFICATION)	<b>Panasonic</b>	Reviewed by: Quality Manager
Test Report S/N: 0912152266.ACJ	Test Dates: 12/21/2009 - 02/24/2010	EUT Type: Toughbook Model: CF-31		Page 50 of 121

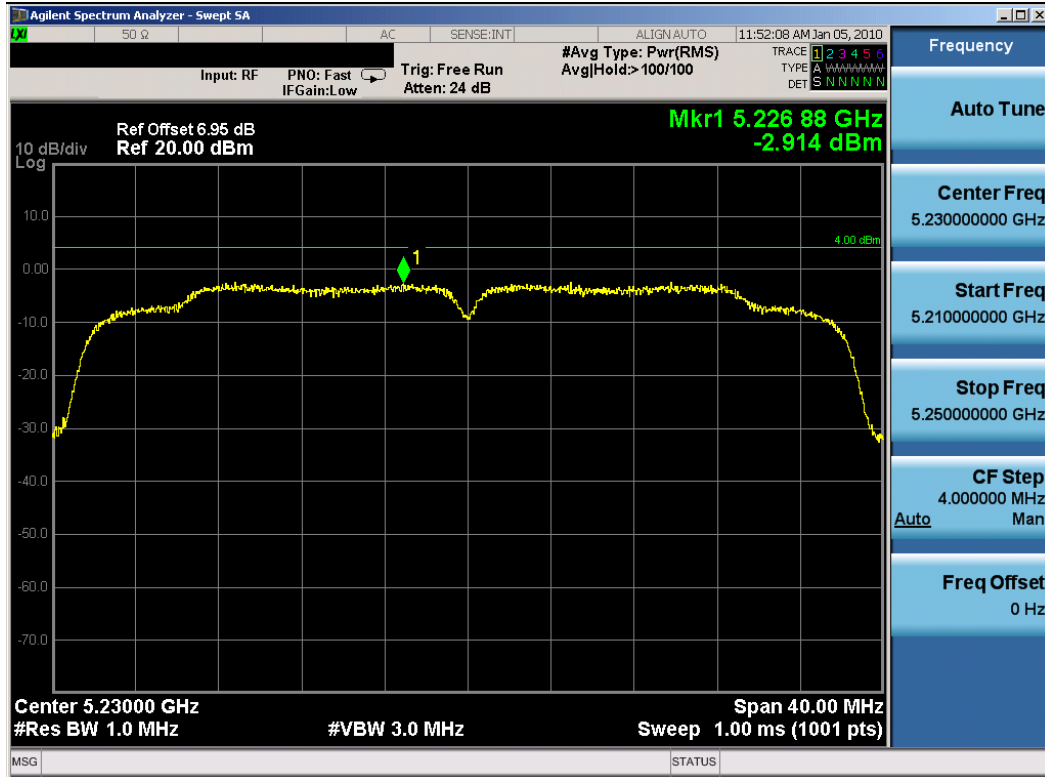


Plot 6-41. Peak Power Spectral Density Plot (802.11a (UNII) - Ch. 140) - Chain A

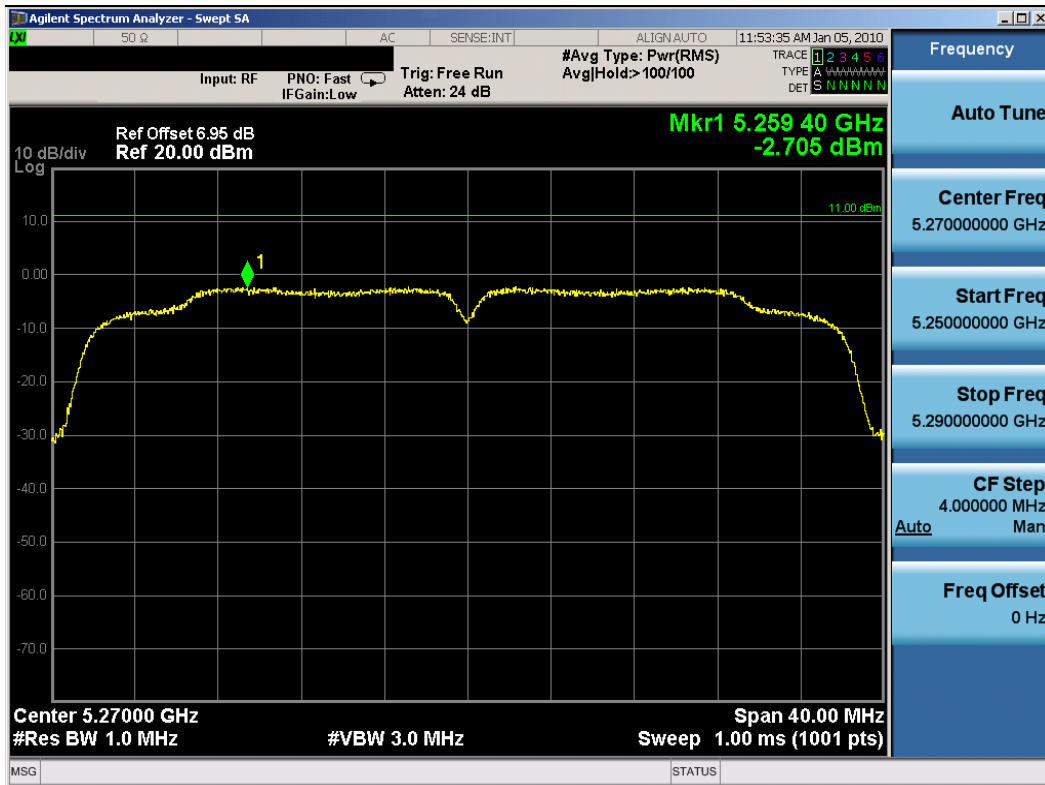


Plot 6-42. Peak Power Spectral Density Plot (802.11n (UNII) - Ch. 38) - Chain A

FCC ID: ACJ9TGCF-311	<b>PCTEST</b> ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11a/n UNII MEASUREMENT REPORT (CERTIFICATION)	<b>Panasonic</b>	Reviewed by: Quality Manager
Test Report S/N: 0912152266.ACJ	Test Dates: 12/21/2009 - 02/24/2010	EUT Type: Toughbook Model: CF-31		Page 51 of 121

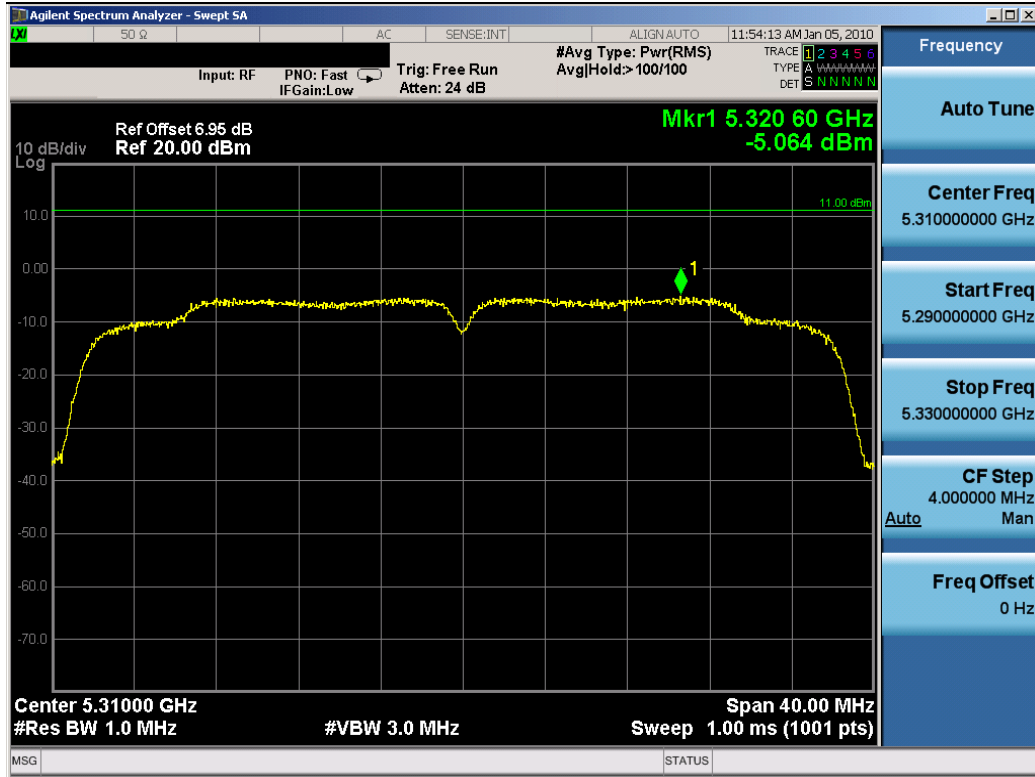


Plot 6-43. Peak Power Spectral Density Plot (802.11n (UNII) – Ch. 46) – Chain A

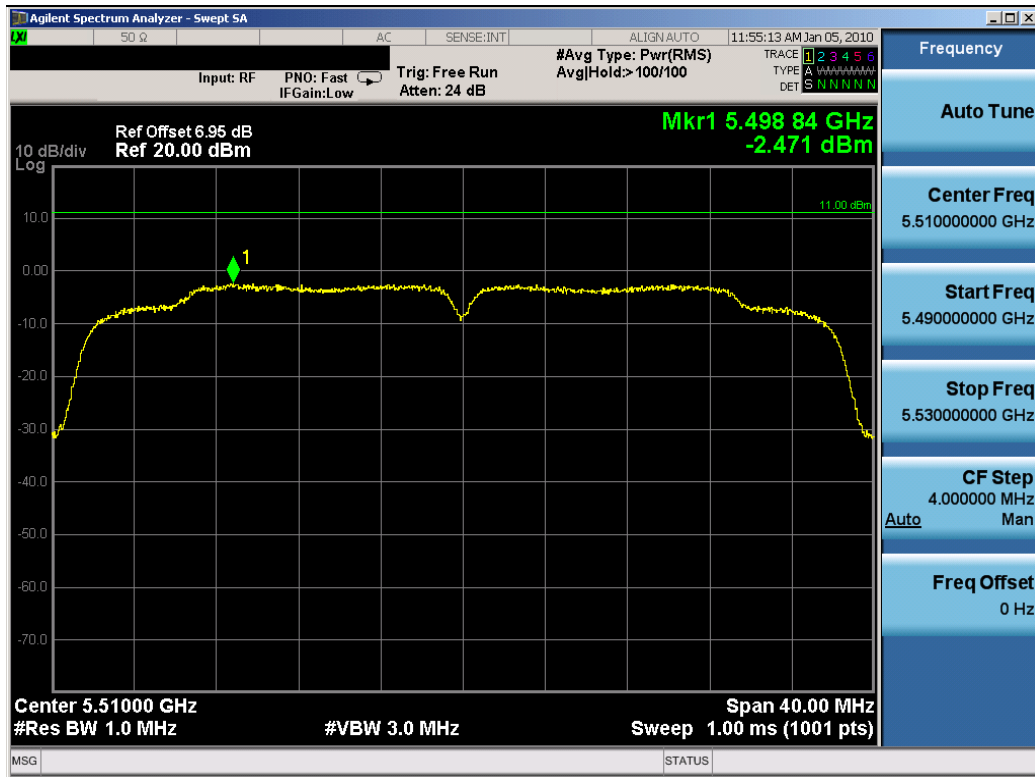


Plot 6-44. Peak Power Spectral Density Plot (802.11n (UNII) – Ch. 54) – Chain A

FCC ID: ACJ9TGCF-311	<b>PCTEST</b> ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11a/n UNII MEASUREMENT REPORT (CERTIFICATION)	<b>Panasonic</b>	Reviewed by: Quality Manager
Test Report S/N: 0912152266.ACJ	Test Dates: 12/21/2009 - 02/24/2010	EUT Type: Toughbook Model: CF-31		Page 52 of 121

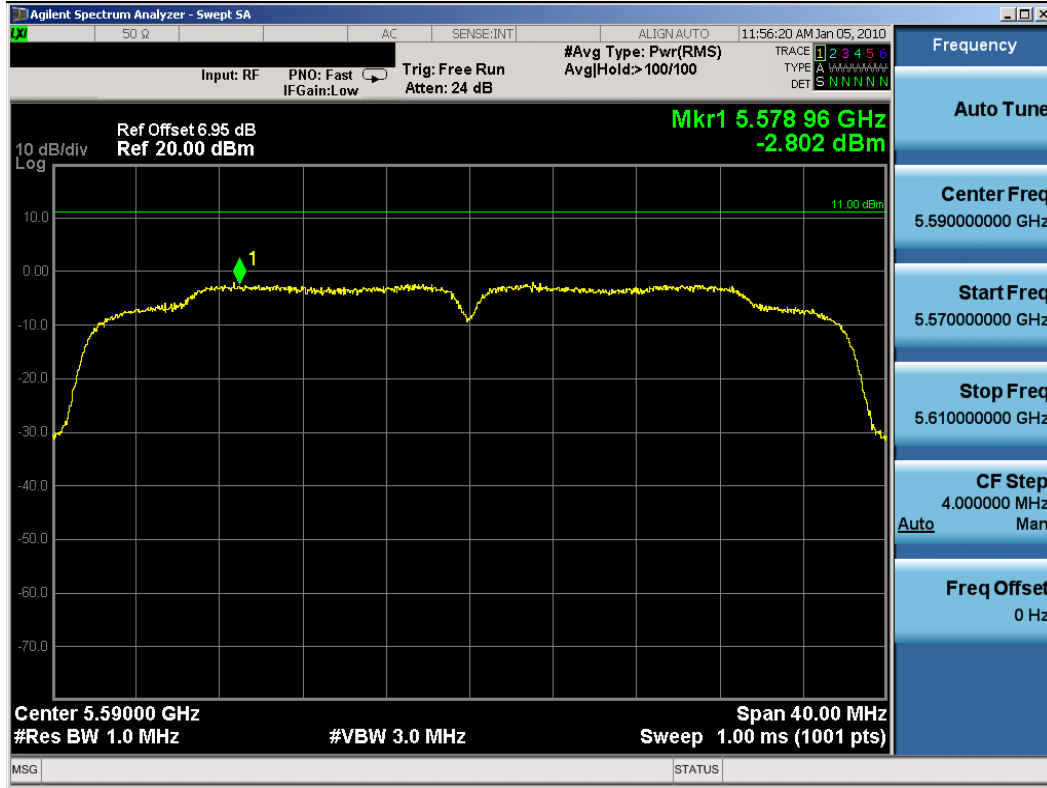


Plot 6-45. Peak Power Spectral Density Plot (802.11n (UNII) – Ch. 62) – Chain A

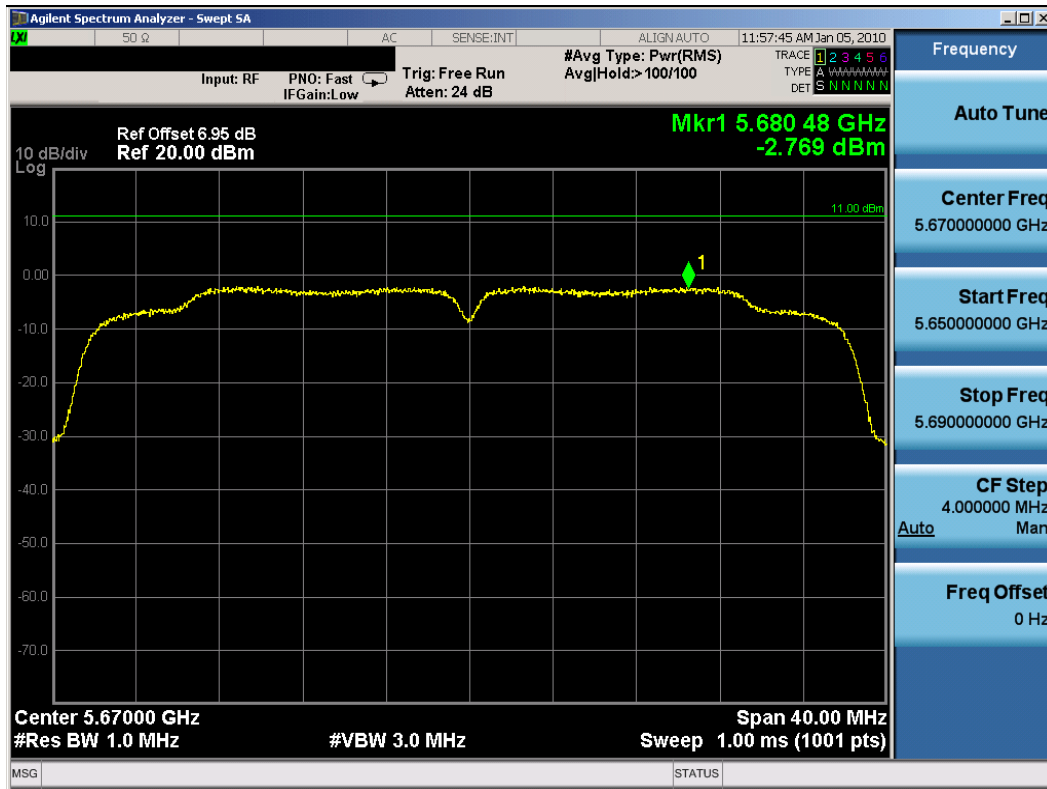


Plot 6-46. Peak Power Spectral Density Plot (802.11n (UNII) – Ch. 102) – Chain A

FCC ID: ACJ9TGCF-311	<b>PCTEST</b> ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11a/n UNII MEASUREMENT REPORT (CERTIFICATION)	<b>Panasonic</b>	Reviewed by: Quality Manager
Test Report S/N: 0912152266.ACJ	Test Dates: 12/21/2009 - 02/24/2010	EUT Type: Toughbook Model: CF-31		Page 53 of 121

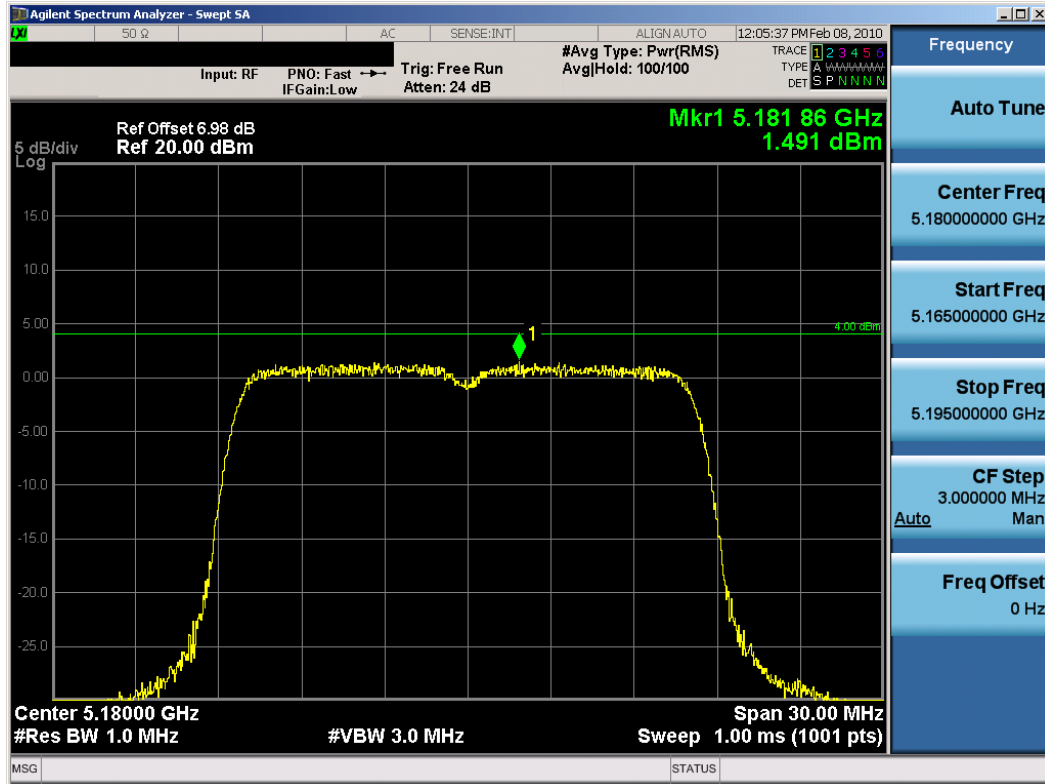


Plot 6-47. Peak Power Spectral Density Plot (802.11n (UNII) – Ch. 118) – Chain A

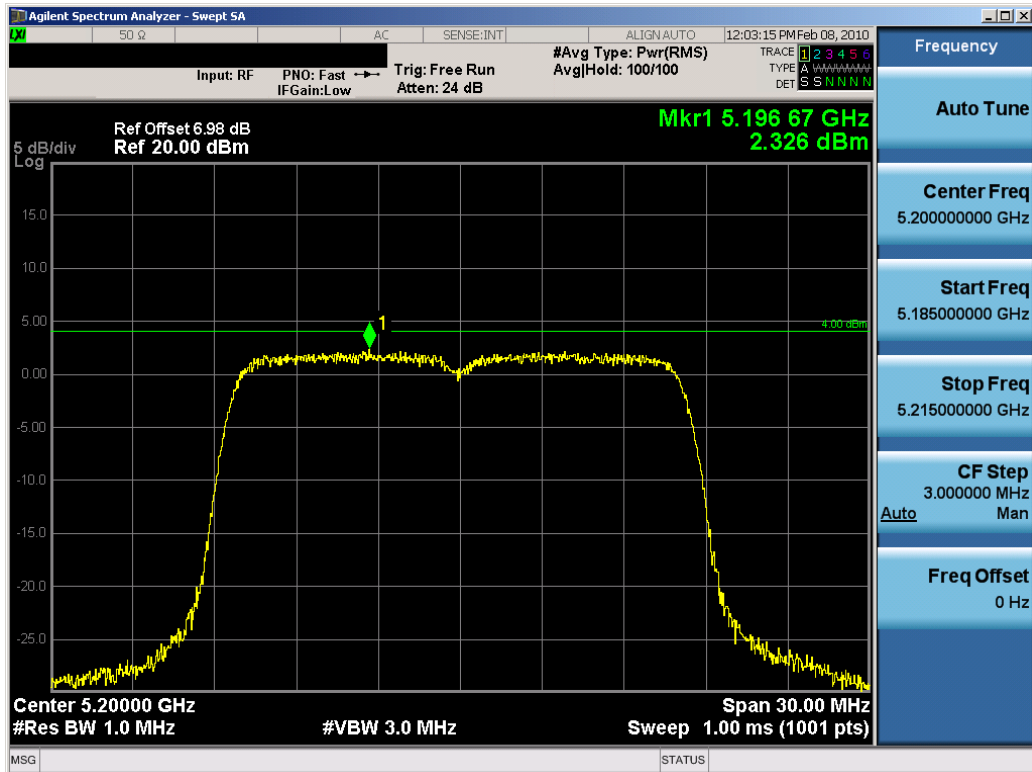


Plot 6-48. Peak Power Spectral Density Plot (802.11n (UNII) – Ch. 134) - Chain A

FCC ID: ACJ9TGCF-311	<b>PCTEST</b> ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11a/n UNII MEASUREMENT REPORT (CERTIFICATION)	<b>Panasonic</b>	Reviewed by: Quality Manager
Test Report S/N: 0912152266.ACJ	Test Dates: 12/21/2009 - 02/24/2010	EUT Type: Toughbook Model: CF-31		Page 54 of 121

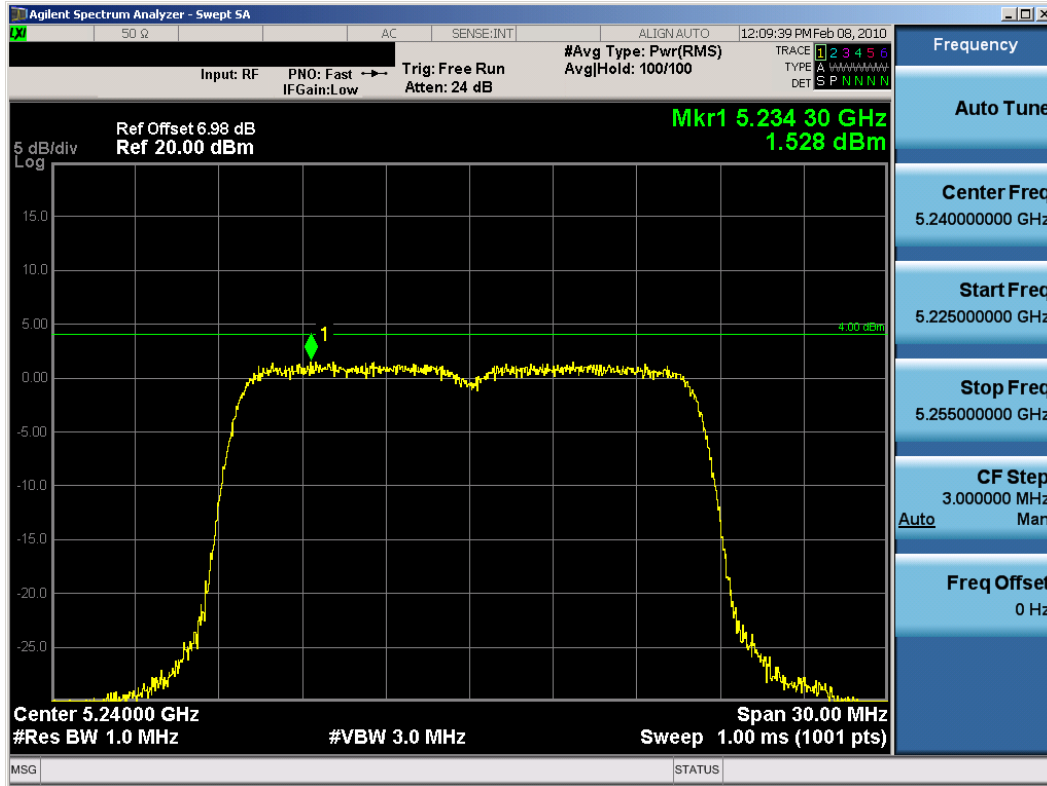


Plot 6-49. Peak Power Spectral Density Plot (802.11a (UNII) – Ch. 36) – Chain B

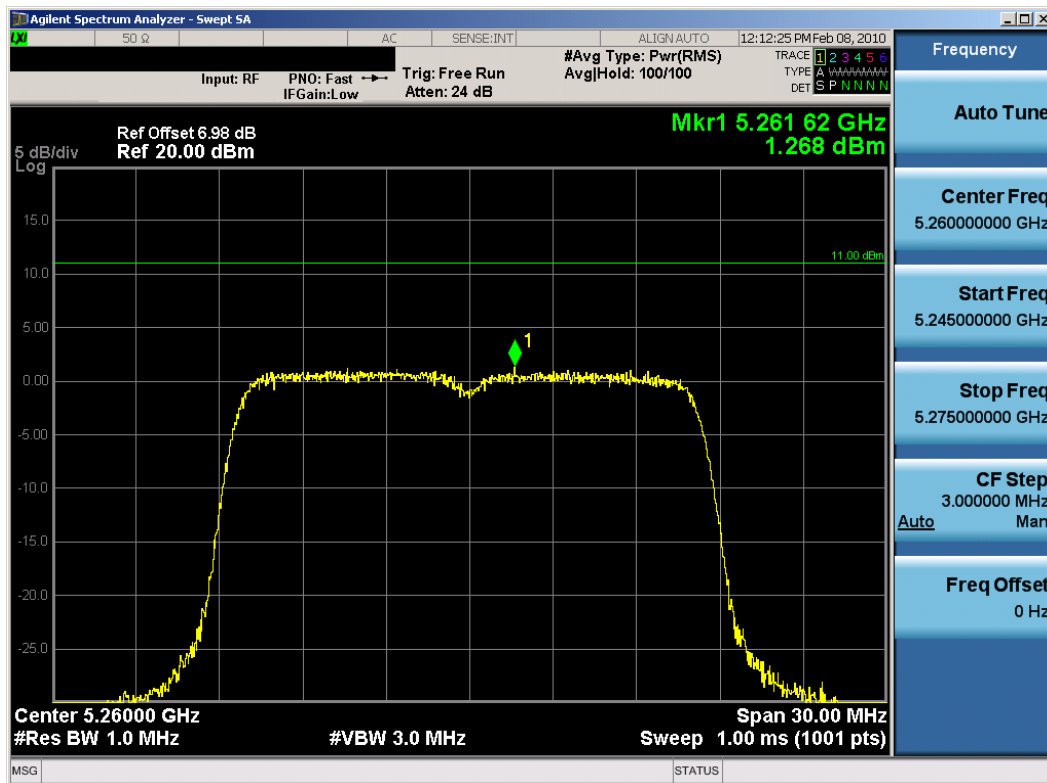


Plot 6-50. Peak Power Spectral Density Plot (802.11a (UNII) – Ch. 40) – Chain B

FCC ID: ACJ9TGCF-311	<b>PCTEST</b> ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11a/n UNII MEASUREMENT REPORT (CERTIFICATION)	<b>Panasonic</b>	Reviewed by: Quality Manager
Test Report S/N: 0912152266.ACJ	Test Dates: 12/21/2009 - 02/24/2010	EUT Type: Toughbook Model: CF-31		Page 55 of 121

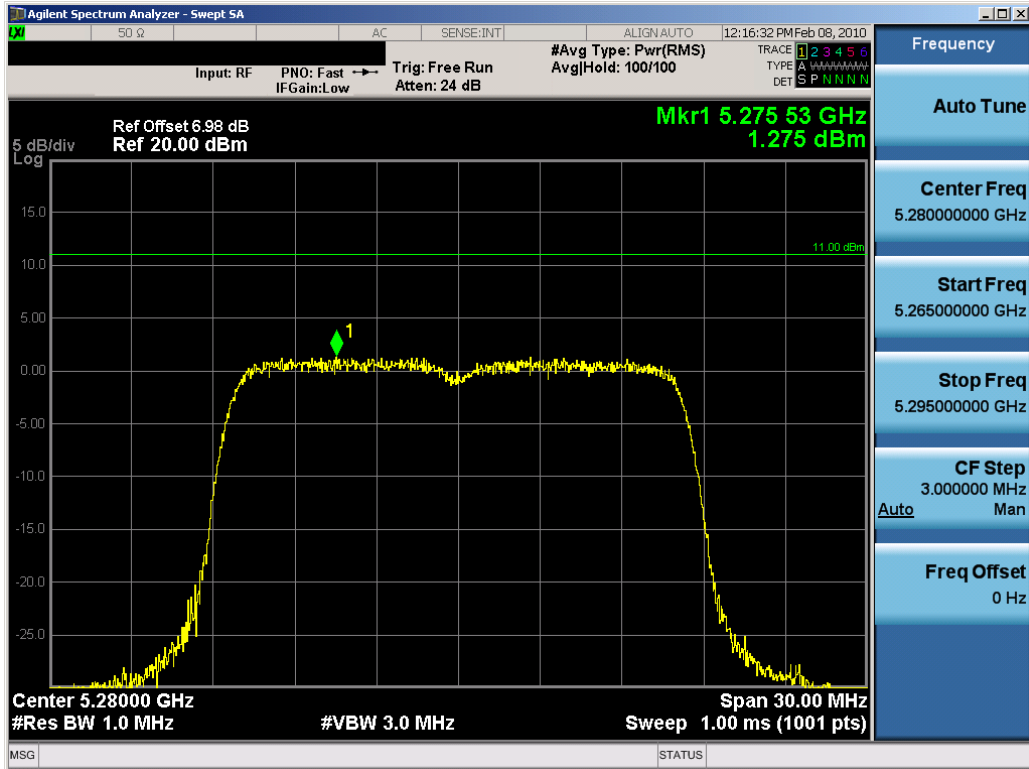


Plot 6-51. Peak Power Spectral Density Plot (802.11a (UNII) – Ch. 48) – Chain B

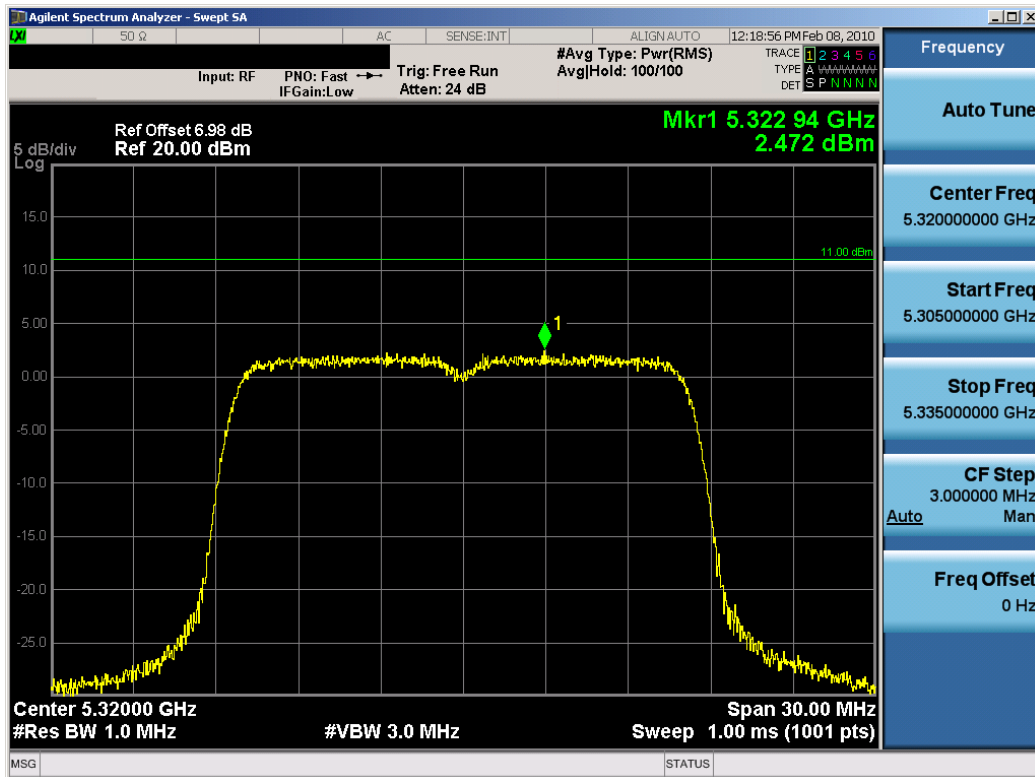


Plot 6-52. Peak Power Spectral Density Plot (802.11a (UNII) – Ch. 52) – Chain B

FCC ID: ACJ9TGCF-311	<b>PCTEST</b> ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11a/n UNII MEASUREMENT REPORT (CERTIFICATION)	<b>Panasonic</b>	Reviewed by: Quality Manager
Test Report S/N: 0912152266.ACJ	Test Dates: 12/21/2009 - 02/24/2010	EUT Type: Toughbook Model: CF-31		Page 56 of 121

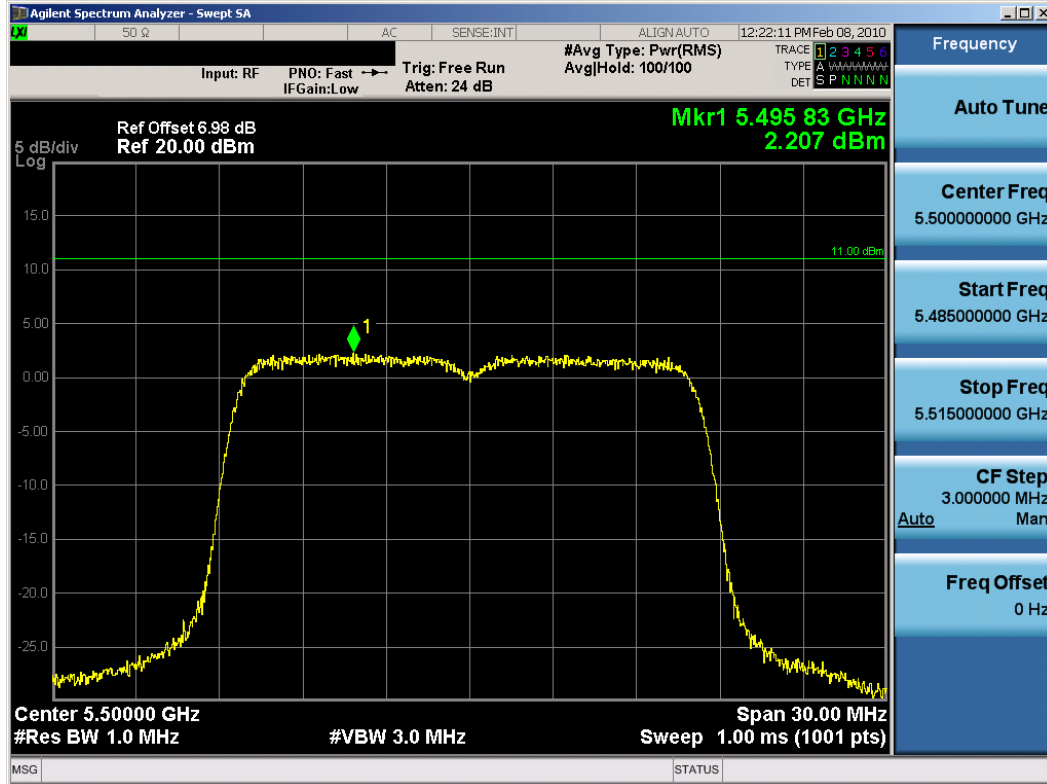


Plot 6-53. Peak Power Spectral Density Plot (802.11a (UNII) – Ch. 56) – Chain B

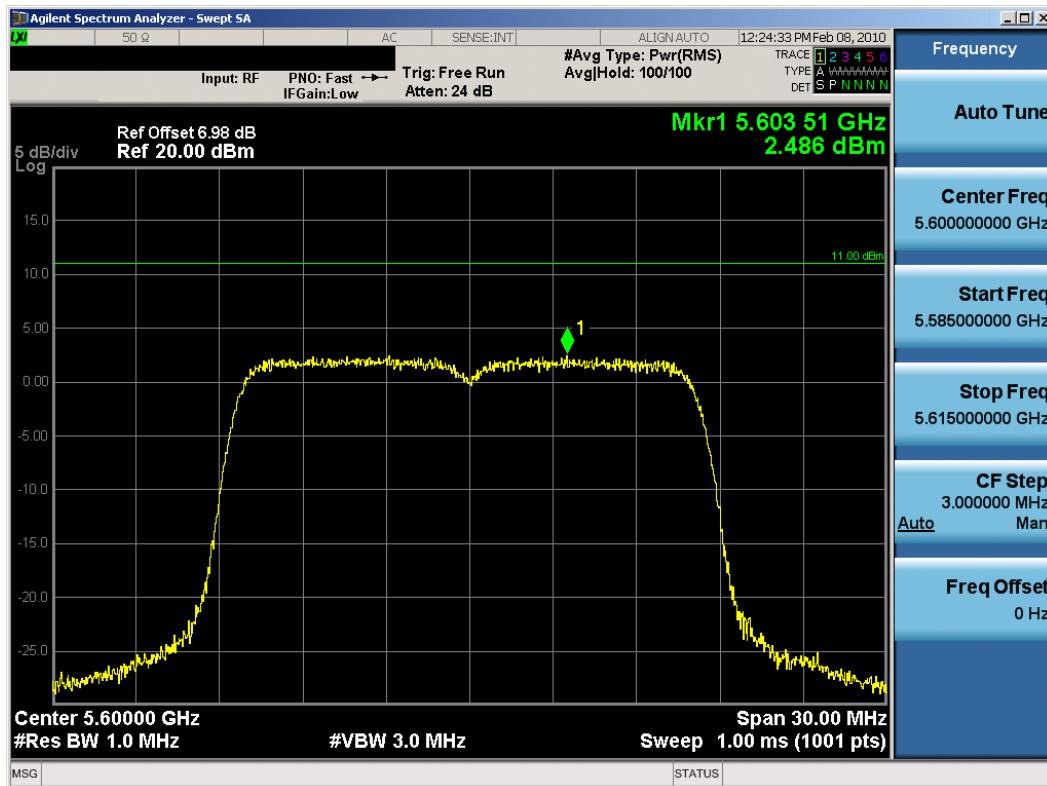


Plot 6-54. Peak Power Spectral Density Plot (802.11a (UNII) – Ch. 64) – Chain B

FCC ID: ACJ9TGCF-311	<b>PCTEST</b> ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11a/n UNII MEASUREMENT REPORT (CERTIFICATION)	<b>Panasonic</b>	Reviewed by: Quality Manager
Test Report S/N: 0912152266.ACJ	Test Dates: 12/21/2009 - 02/24/2010	EUT Type: Toughbook Model: CF-31		Page 57 of 121

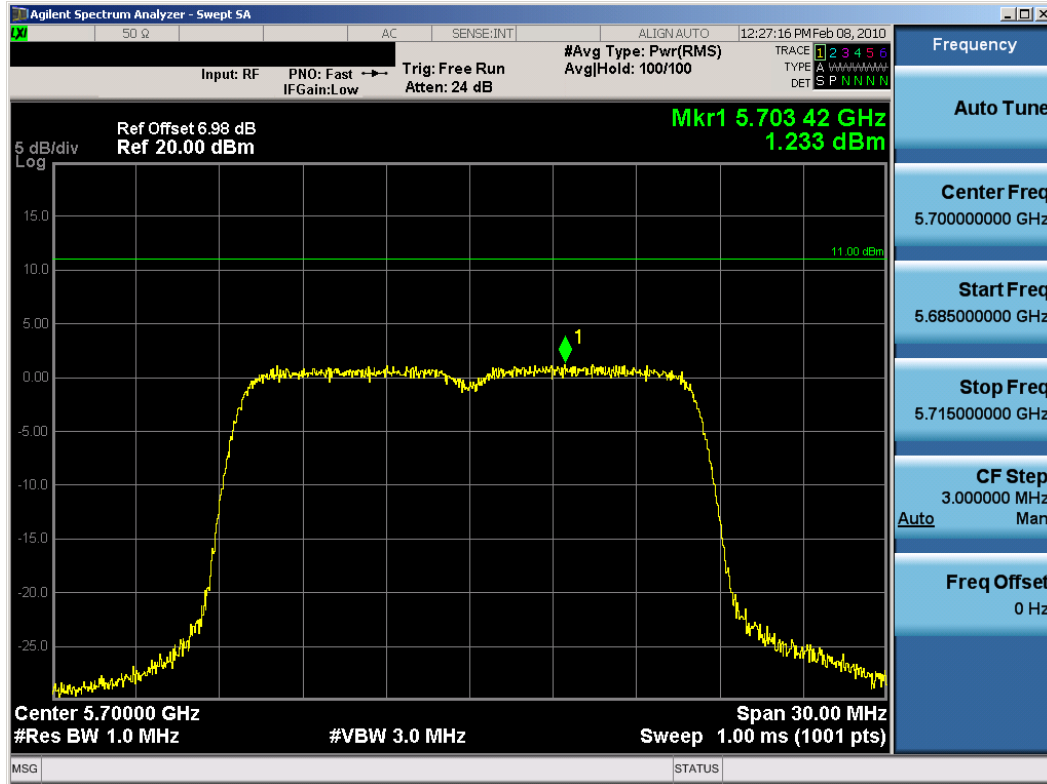


Plot 6-55. Peak Power Spectral Density Plot (802.11a (UNII) – Ch. 100) – Chain B

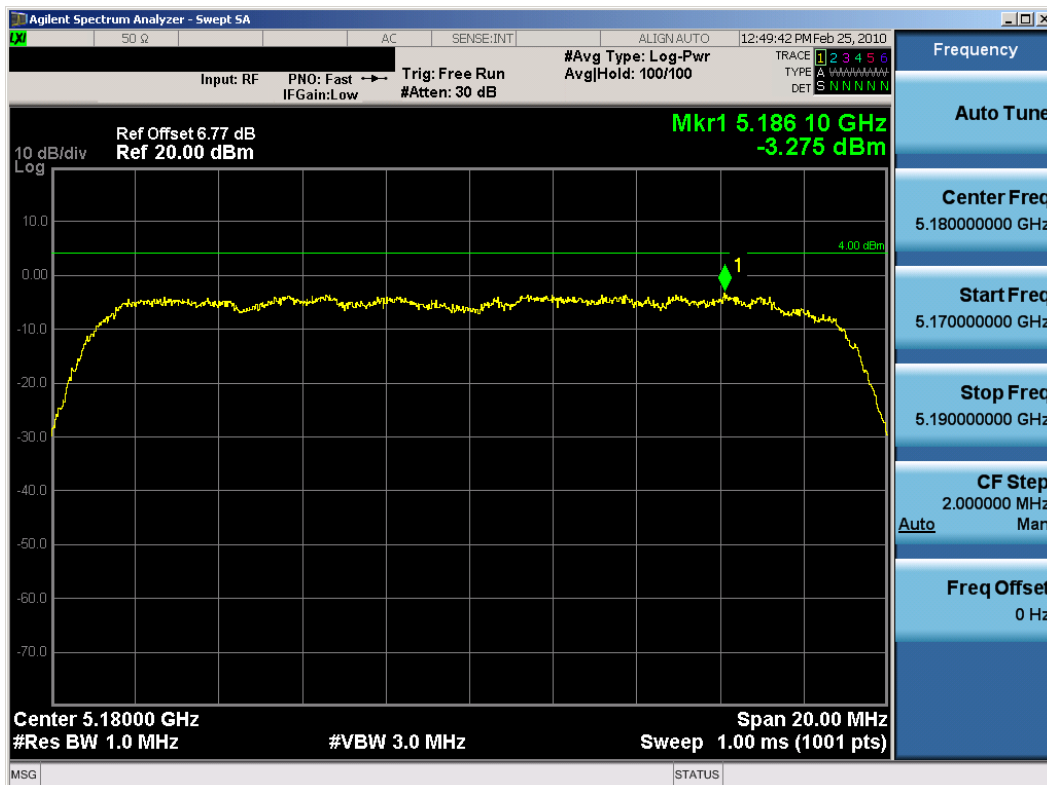


Plot 6-56. Peak Power Spectral Density Plot (802.11a (UNII) – Ch. 120) – Chain B

FCC ID: ACJ9TGCF-311	<b>PCTEST</b> ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11a/n UNII MEASUREMENT REPORT (CERTIFICATION)	<b>Panasonic</b>	Reviewed by: Quality Manager
Test Report S/N: 0912152266.ACJ	Test Dates: 12/21/2009 - 02/24/2010	EUT Type: Toughbook Model: CF-31		Page 58 of 121

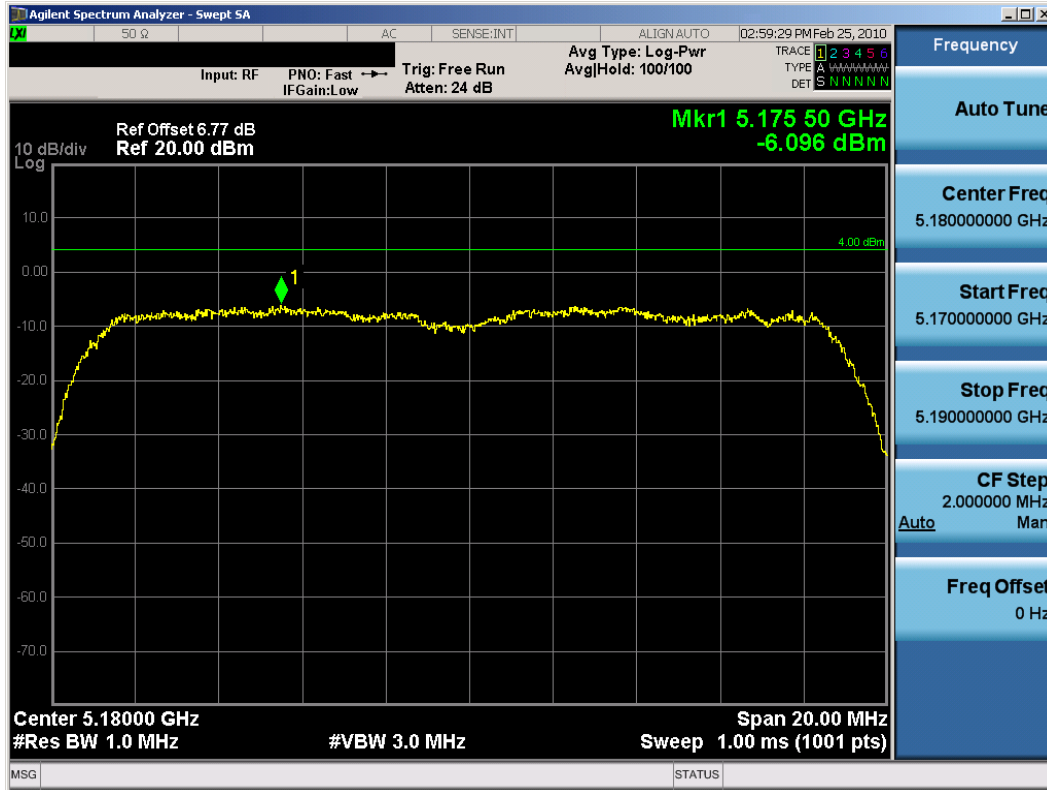


Plot 6-57. Peak Power Spectral Density Plot (802.11a (UNII) – Ch. 140) – Chain B

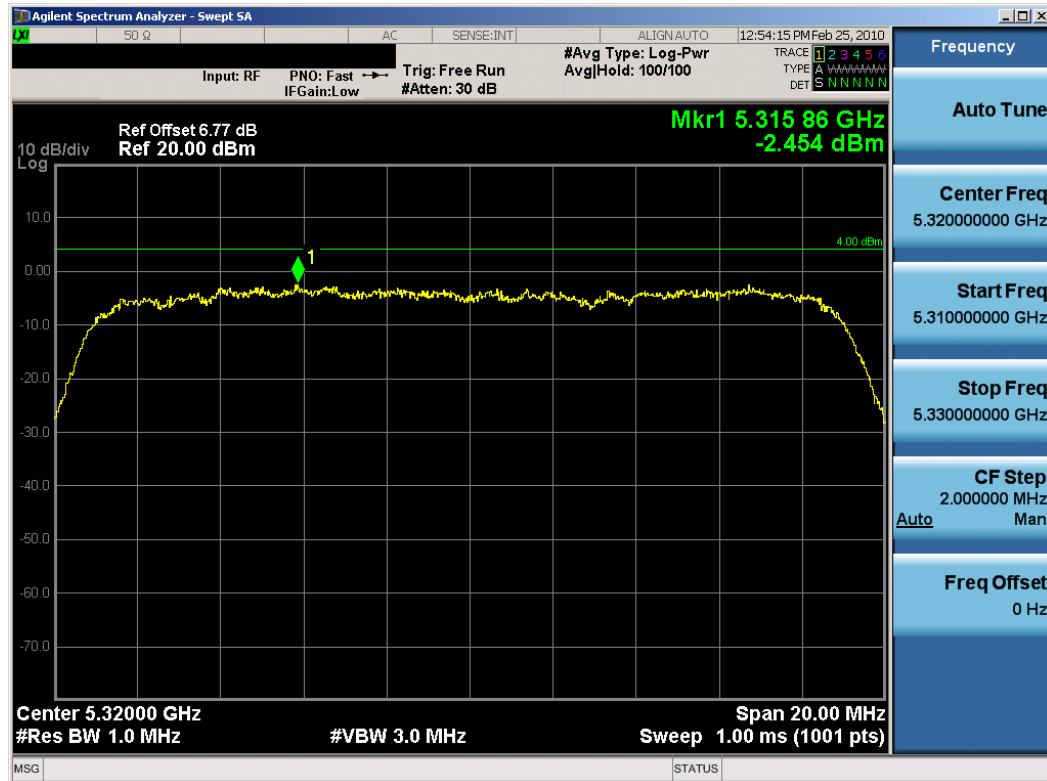


Plot 6-58. Peak Power Spectral Density (802.11a Dual Transmit Mode – Ch. 36) – Chain A

FCC ID: ACJ9TGCF-311	<b>PCTEST</b> ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11a/n UNII MEASUREMENT REPORT (CERTIFICATION)	<b>Panasonic</b>	Reviewed by: Quality Manager
Test Report S/N: 0912152266.ACJ	Test Dates: 12/21/2009 - 02/24/2010	EUT Type: Toughbook Model: CF-31		Page 59 of 121

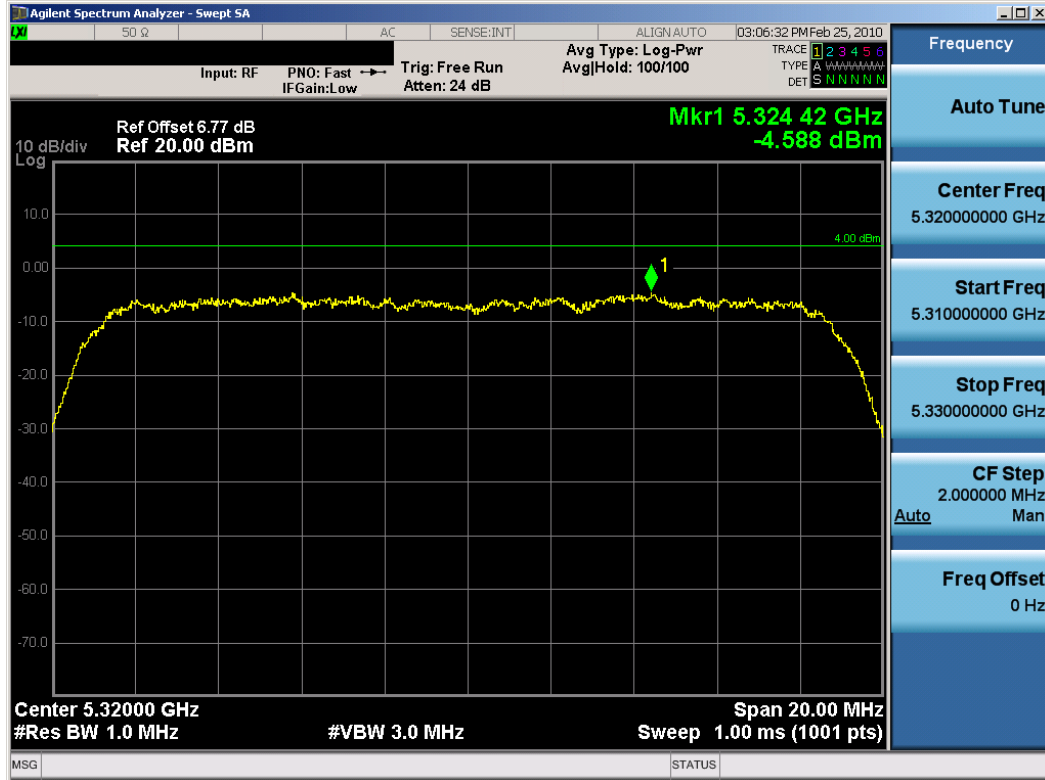


Plot 6-59. Peak Power Spectral Density (802.11a Dual Transmit Mode – Ch. 36) – Chain B

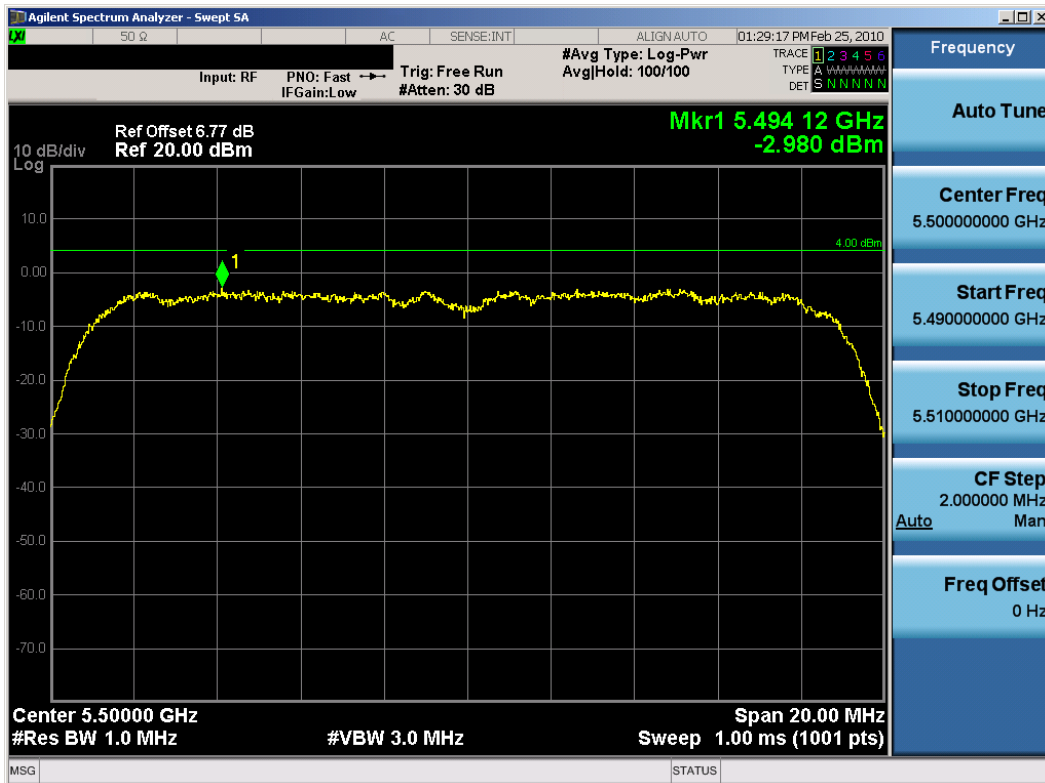


Plot 6-60. Peak Power Spectral Density (802.11a Dual Transmit Mode – Ch. 64) – Chain A

FCC ID: ACJ9TGCF-311	<b>PCTEST</b> ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11a/n UNII MEASUREMENT REPORT (CERTIFICATION)	<b>Panasonic</b>	Reviewed by: Quality Manager
Test Report S/N: 0912152266.ACJ	Test Dates: 12/21/2009 - 02/24/2010	EUT Type: Toughbook Model: CF-31		Page 60 of 121

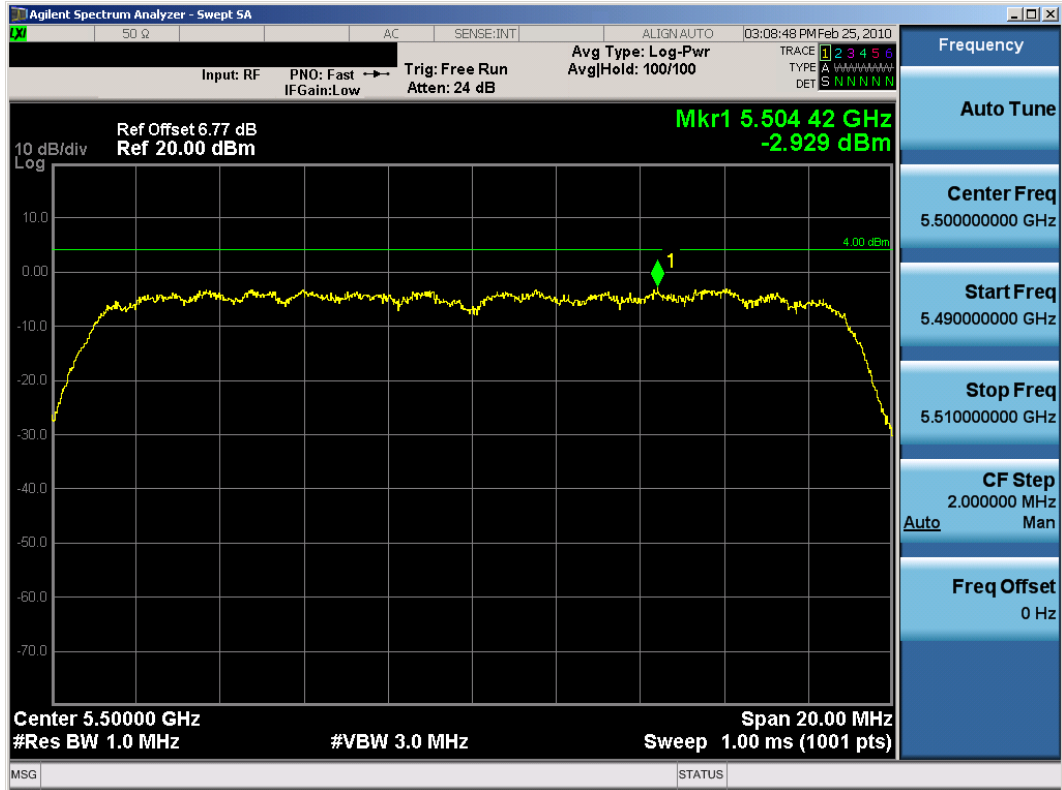


Plot 6-61. Peak Power Spectral Density (802.11a Dual Transmit Mode – Ch. 64) – Chain B



Plot 6-62. Peak Power Spectral Density (802.11a Dual Transmit Mode – Ch. 100) – Chain A

FCC ID: ACJ9TGCF-311	<b>PCTEST</b> ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11a/n UNII MEASUREMENT REPORT (CERTIFICATION)	<b>Panasonic</b>	Reviewed by: Quality Manager
Test Report S/N: 0912152266.ACJ	Test Dates: 12/21/2009 - 02/24/2010	EUT Type: Toughbook Model: CF-31		Page 61 of 121



Plot 6-63. Peak Power Spectral Density (802.11a Dual Transmit Mode – Ch. 100) – Chain B

FCC ID: ACJ9TGCF-311	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11a/n UNII MEASUREMENT REPORT (CERTIFICATION)	Panasonic	Reviewed by: Quality Manager
Test Report S/N: 0912152266.ACJ	Test Dates: 12/21/2009 - 02/24/2010	EUT Type: Toughbook Model: CF-31		Page 62 of 121



## 6.7 Peak Excursion Ratio

### §15.407(a)(6)

The spectrum analyzer was connected to the antenna terminal while the EUT was operating in the continuous transmission mode at the appropriate center frequencies. **The largest permissible difference between the modulation envelope (measured using a peak hold function) and the maximum conducted output power is 13 dBm/MHz.**

	Frequency [MHz]	Channel No.	802.11 Mode	Measured Peak Excursion Ratio [dBm]	Maximum Permissible Peak Excursion Ratio [dBm/MHz]	Margin [dB]
Band I	5180	36	a	7.98	13.0	-5.0
	5200	40	a	7.78	13.0	-5.2
	5240	48	a	8.32	13.0	-4.7
	5190	38	n	10.12	13.0	-2.9
	5230	46	n	8.29	13.0	-4.7
Band II	5260	52	a	9.07	13.0	-3.9
	5280	56	a	8.99	13.0	-4.0
	5320	64	a	8.80	13.0	-4.2
	5270	54	n	8.07	13.0	-4.9
	5310	62	n	8.65	13.0	-4.4
Band III	5500	100	a	8.88	13.0	-4.1
	5600	120	a	8.55	13.0	-4.5
	5700	140	a	9.20	13.0	-3.8
	5510	102	n	8.61	13.0	-4.4
	5590	118	n	8.43	13.0	-4.6
	5670	134	n	8.49	13.0	-4.5

**Table 6-25. Conducted Peak Excursion Ratio Measurements – Chain A**

FCC ID: ACJ9TGCF-311		FCC Pt. 15.407 802.11a/n UNII MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0912152266.ACJ	Test Dates: 12/21/2009 - 02/24/2010	EUT Type: Toughbook Model: CF-31		Page 63 of 121

	Frequency [MHz]	Channel No.	802.11 Mode	Measured Peak Excursion Ratio [dBm]	Maximum Permissible Peak Excursion Ratio [dBm/MHz]	Margin [dB]
Band I	5180	36	a	7.15	13.0	-5.9
	5200	40	a	7.29	13.0	-5.7
	5240	48	a	7.37	13.0	-5.6
	5190	38	n	7.25	13.0	-5.8
	5230	46	n	7.29	13.0	-5.7
Band II	5260	52	a	7.70	13.0	-5.3
	5280	56	a	7.58	13.0	-5.4
	5320	64	a	7.01	13.0	-6.0
	5270	54	n	7.34	13.0	-5.7
	5310	62	n	6.73	13.0	-6.3
Band III	5500	100	a	7.14	13.0	-5.9
	5600	120	a	6.89	13.0	-6.1
	5700	140	a	7.00	13.0	-6.0
	5510	102	n	6.46	13.0	-6.5
	5590	118	n	7.66	13.0	-5.3
	5670	134	n	7.02	13.0	-6.0

Table 6-26. Conducted Peak Excursion Ratio Measurements – Chain B

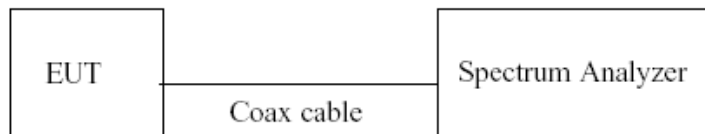


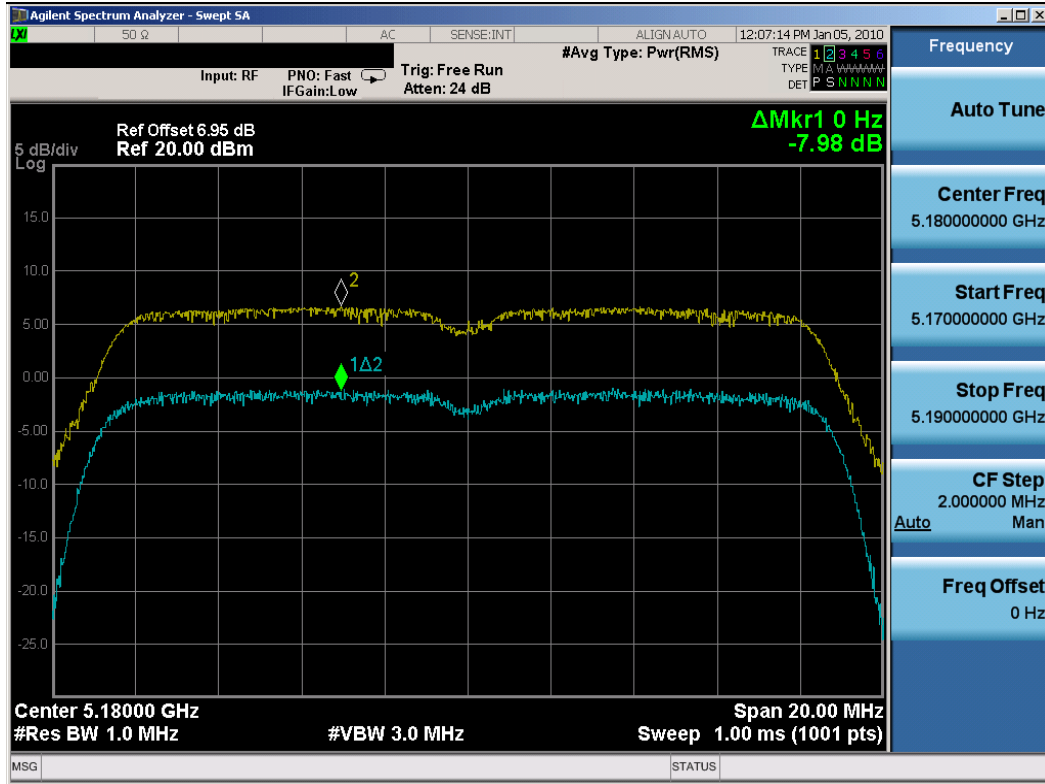
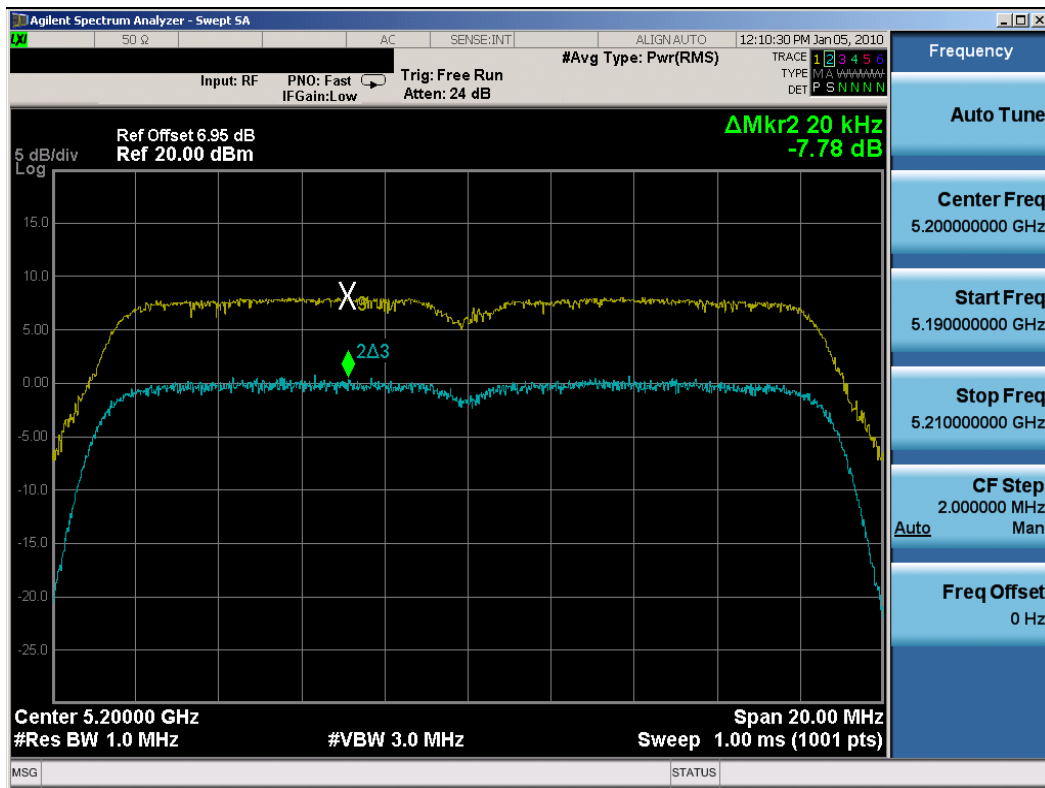


Figure 6-3. Test Instrument & Measurement Setup

FCC ID: ACJ9TGCF-311		FCC Pt. 15.407 802.11a/n UNII MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0912152266.ACJ	Test Dates: 12/21/2009 - 02/24/2010	EUT Type: Toughbook Model: CF-31	Page 64 of 121	

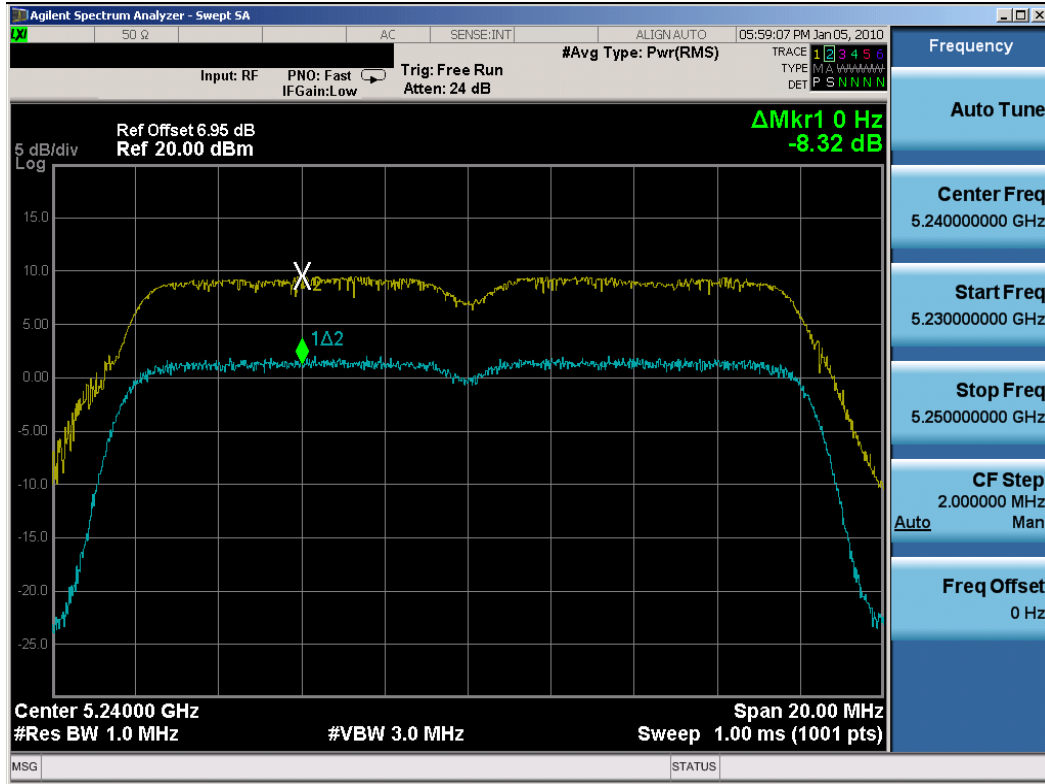


Plot 6-64. Peak Excursion Ratio Plot (802.11a (UNII) – Ch. 36) – Chain A

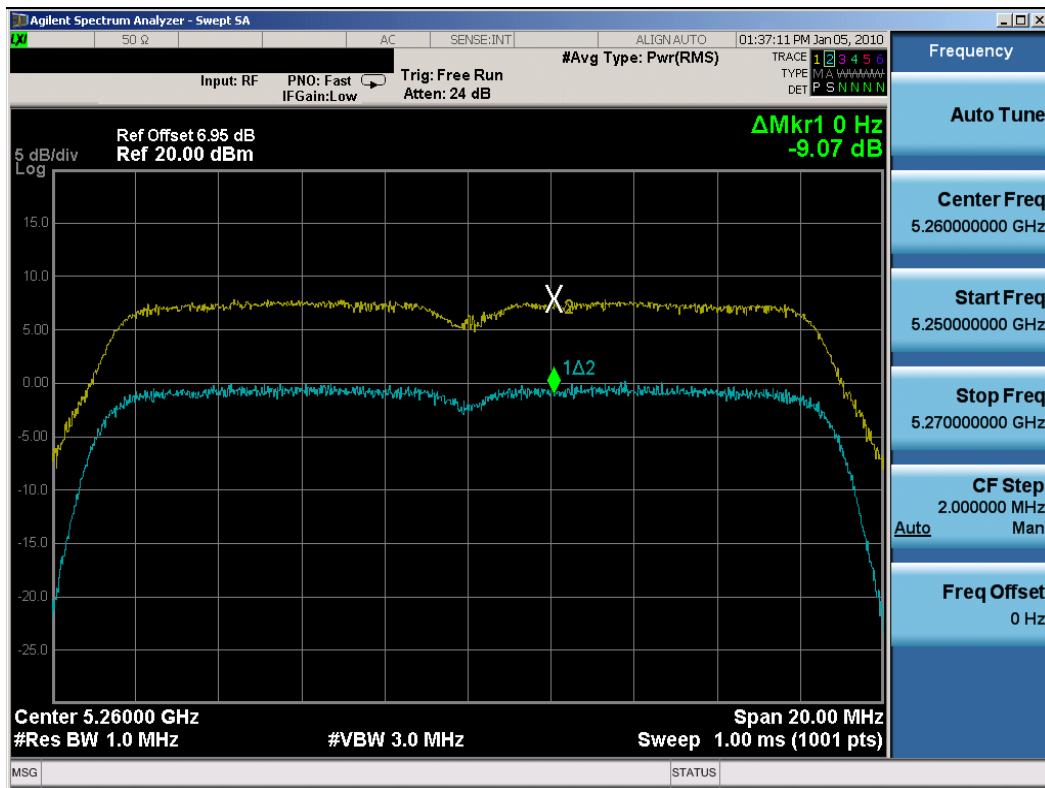


Plot 6-65. Peak Excursion Ratio Plot (802.11a (UNII) – Ch. 40) – Chain A

FCC ID: ACJ9TGCF-311	<b>PCTEST</b> ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11a/n UNII MEASUREMENT REPORT (CERTIFICATION)	<b>Panasonic</b>	Reviewed by: Quality Manager
Test Report S/N: 0912152266.ACJ	Test Dates: 12/21/2009 - 02/24/2010	EUT Type: Toughbook Model: CF-31		Page 65 of 121

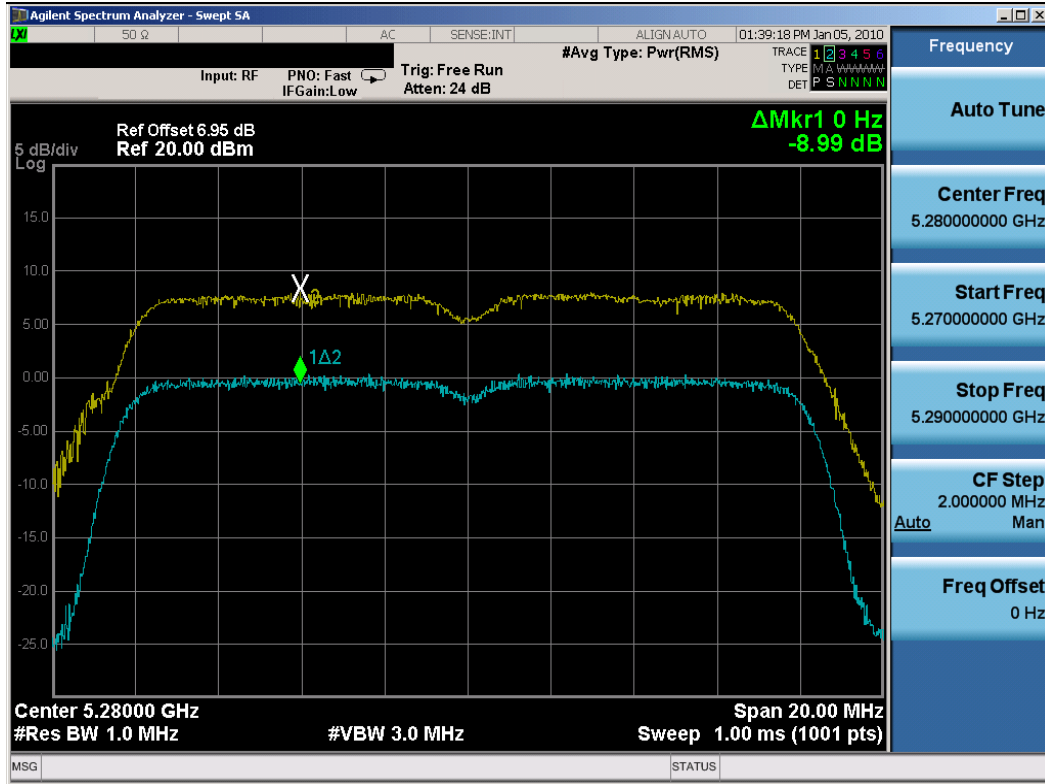


**Plot 6-66. Peak Excursion Ratio Plot (802.11a (UNII) – Ch. 48) – Chain A**

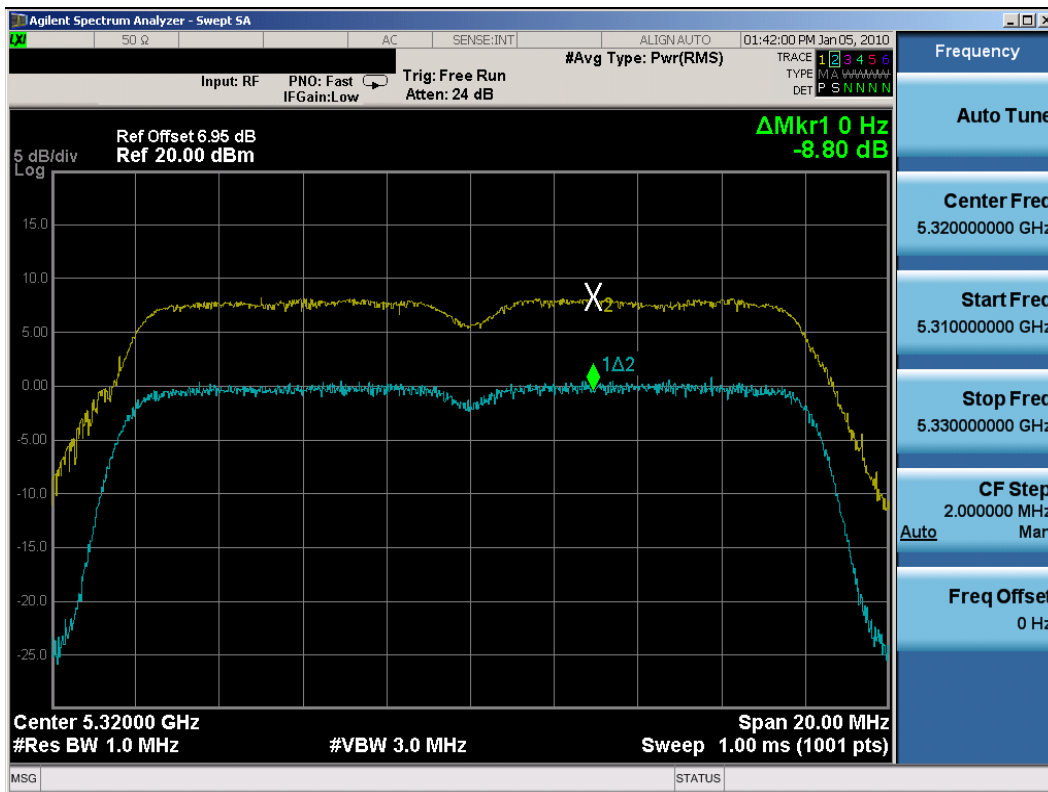


**Plot 6-67. Peak Excursion Ratio Plot (802.11a (UNII) – Ch. 52) – Chain A**

FCC ID: ACJ9TGCF-311	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11a/n UNII MEASUREMENT REPORT (CERTIFICATION)	Panasonic	Reviewed by: Quality Manager
Test Report S/N: 0912152266.ACJ	Test Dates: 12/21/2009 - 02/24/2010	EUT Type: Toughbook Model: CF-31		Page 66 of 121

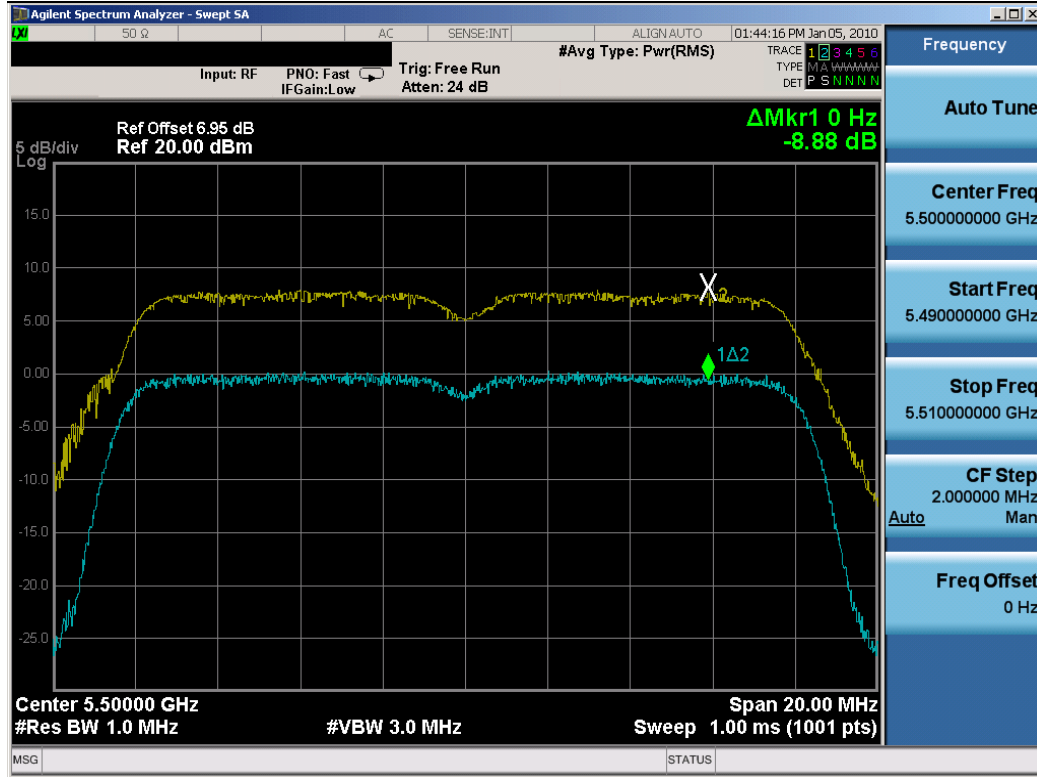


Plot 6-68. Peak Excursion Ratio Plot (802.11a (UNII) – Ch. 56) – Chain A

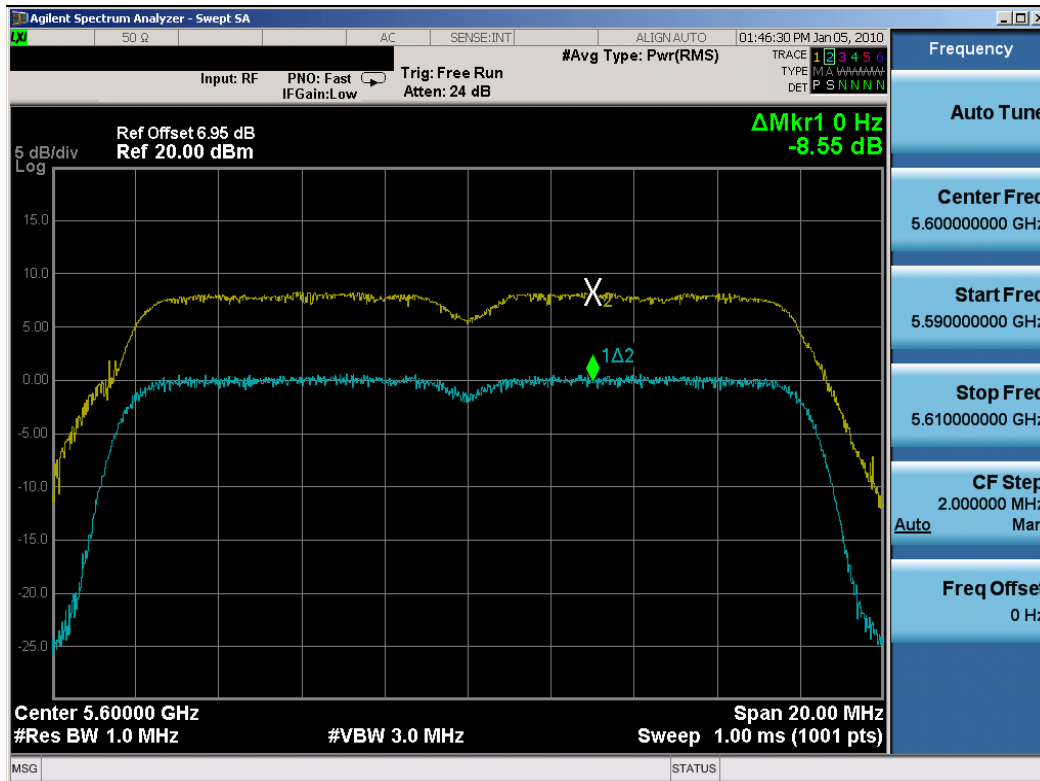


Plot 6-69. Peak Excursion Ratio Plot (802.11a (UNII) – Ch. 64) – Chain A

FCC ID: ACJ9TGCF-311	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11a/n UNII MEASUREMENT REPORT (CERTIFICATION)	Panasonic	Reviewed by: Quality Manager
Test Report S/N: 0912152266.ACJ	Test Dates: 12/21/2009 - 02/24/2010	EUT Type: Toughbook Model: CF-31		Page 67 of 121

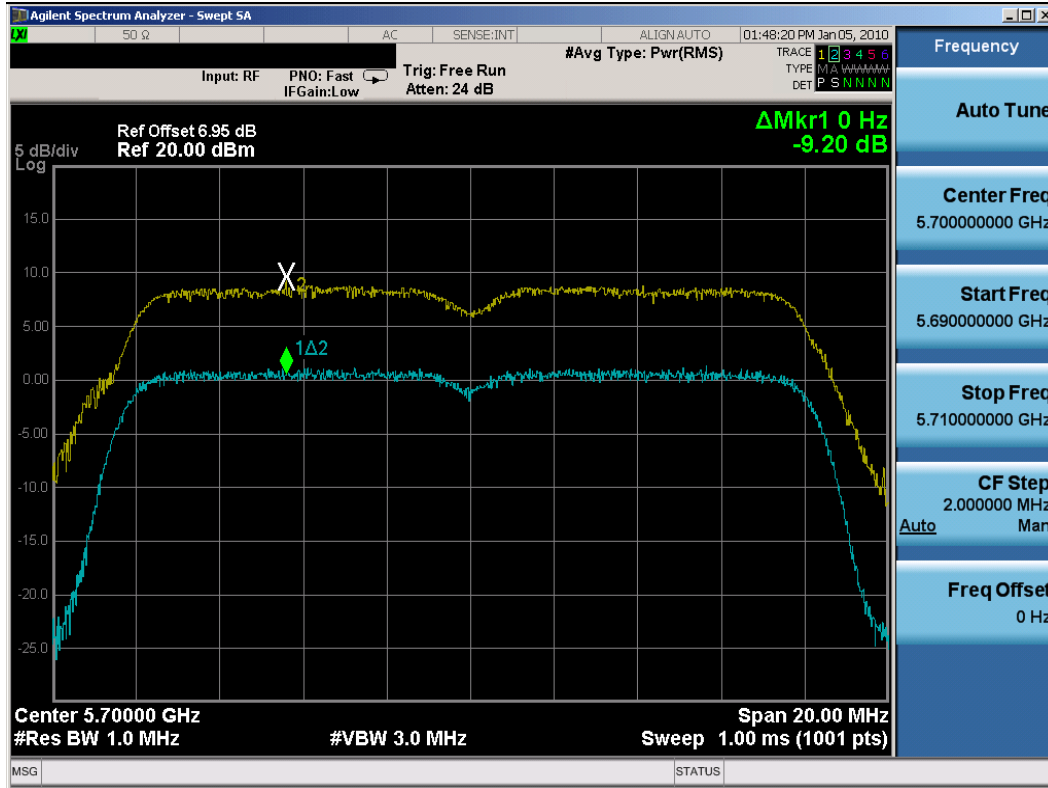


Plot 6-70. Peak Excursion Ratio Plot (802.11a (UNII) – Ch. 100) – Chain A

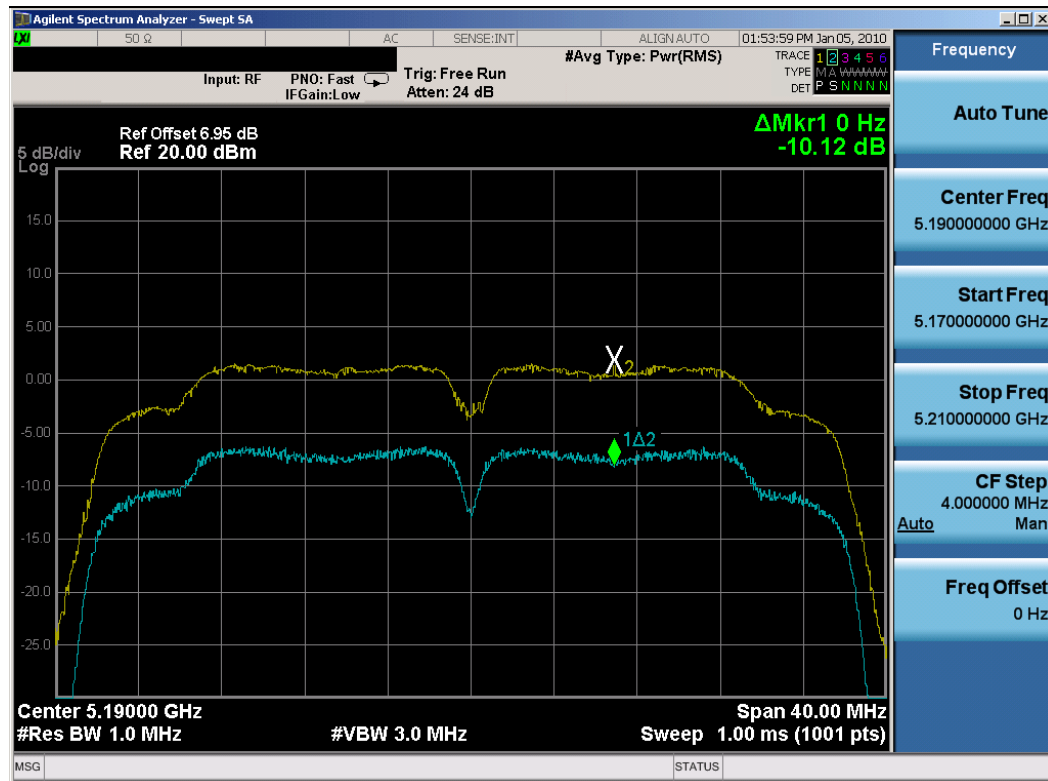


Plot 6-71. Peak Excursion Ratio Plot (802.11a (UNII) – Ch. 120) – Chain A

FCC ID: ACJ9TGCF-311	<b>PCTEST</b> ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11a/n UNII MEASUREMENT REPORT (CERTIFICATION)	<b>Panasonic</b>	Reviewed by: Quality Manager
Test Report S/N: 0912152266.ACJ	Test Dates: 12/21/2009 - 02/24/2010	EUT Type: Toughbook Model: CF-31		Page 68 of 121

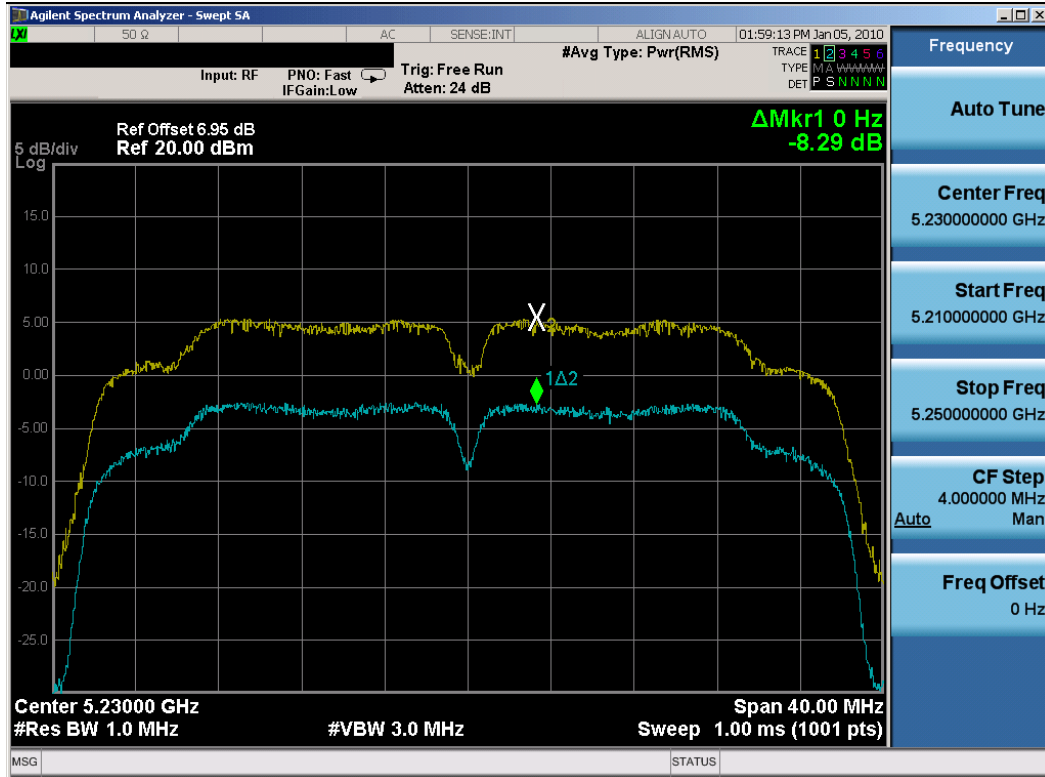


Plot 6-72. Peak Excursion Ratio Plot (802.11a (UNII) – Ch. 140) – Chain A

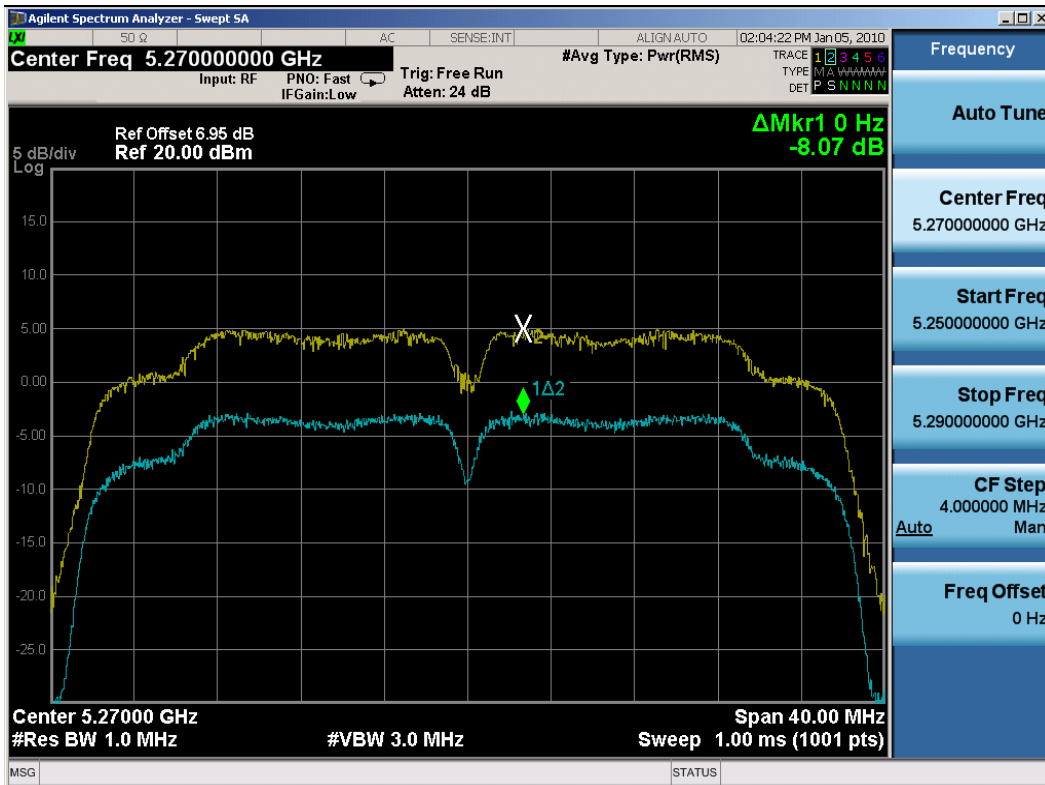


Plot 6-73. Peak Excursion Ratio Plot (802.11n (UNII) – Ch. 38) – Chain A

FCC ID: ACJ9TGCF-311	<b>PCTEST</b> ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11a/n UNII MEASUREMENT REPORT (CERTIFICATION)	<b>Panasonic</b>	Reviewed by: Quality Manager
Test Report S/N: 0912152266.ACJ	Test Dates: 12/21/2009 - 02/24/2010	EUT Type: Toughbook Model: CF-31		Page 69 of 121

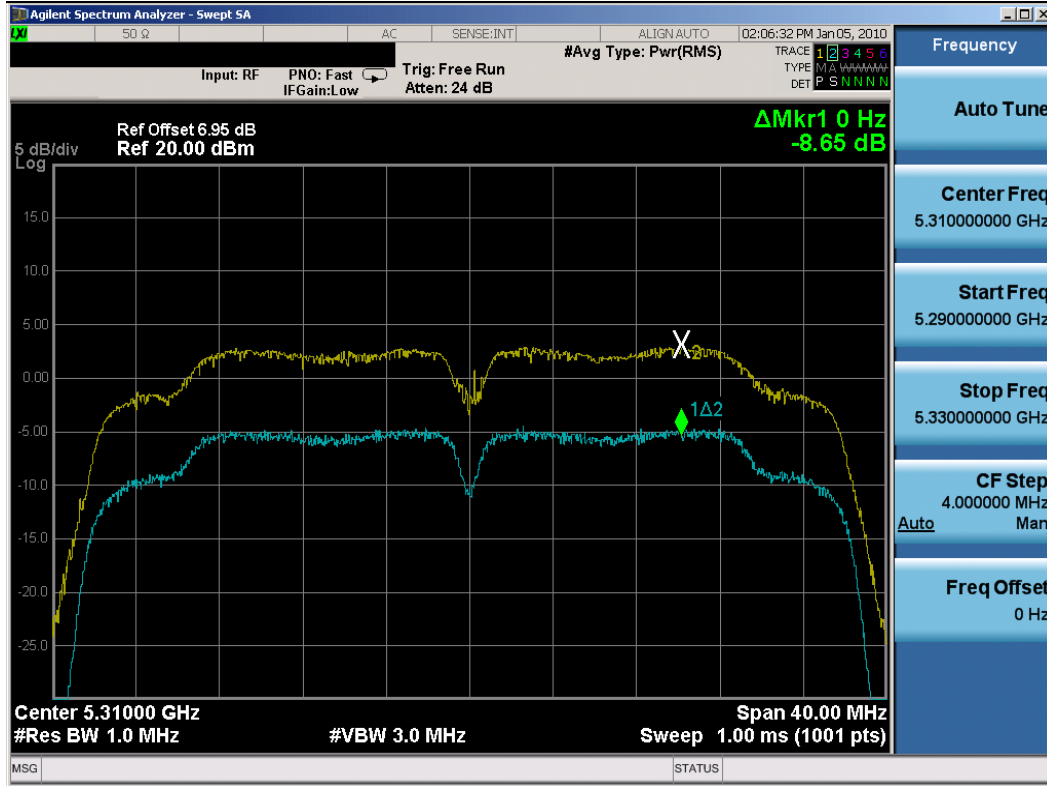


Plot 6-74. Peak Excursion Ratio Plot (802.11n (UNII) – Ch. 46) – Chain A

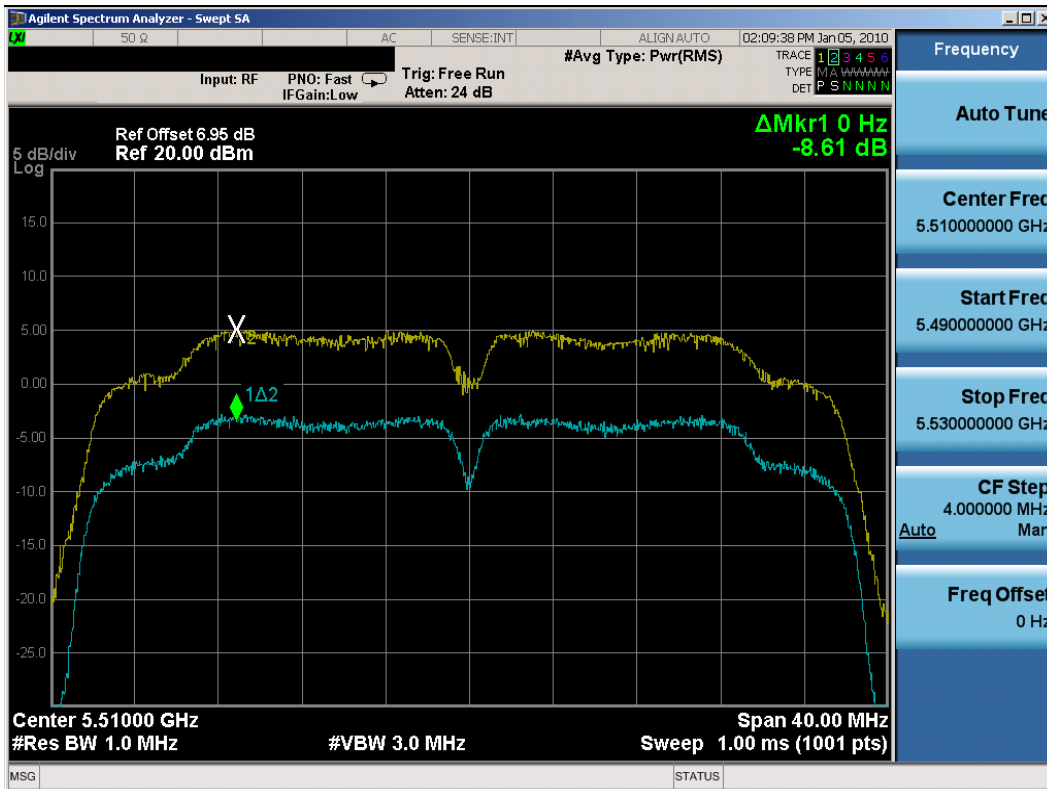


Plot 6-75. Peak Excursion Ratio Plot (802.11n (UNII) – Ch. 54) – Chain A

FCC ID: ACJ9TGCF-311	<b>PCTEST</b> ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11a/n UNII MEASUREMENT REPORT (CERTIFICATION)	<b>Panasonic</b>	Reviewed by: Quality Manager
Test Report S/N: 0912152266.ACJ	Test Dates: 12/21/2009 - 02/24/2010	EUT Type: Toughbook Model: CF-31		Page 70 of 121

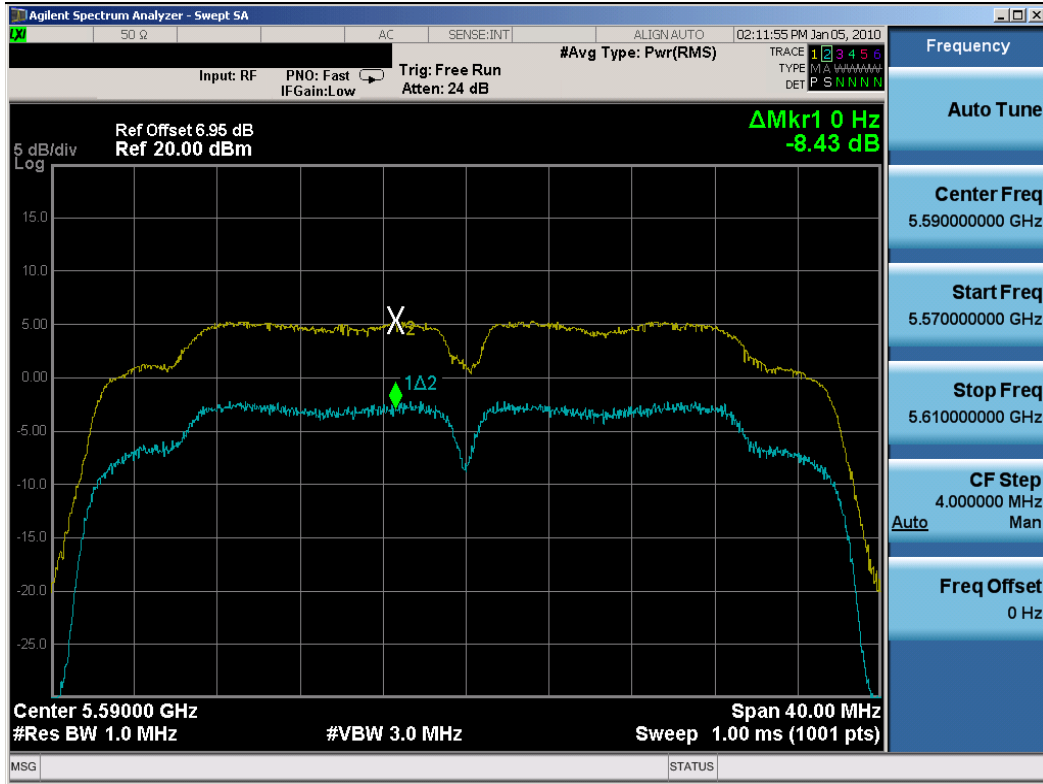


Plot 6-76. Peak Excursion Ratio Plot (802.11n (UNII) – Ch. 62) – Chain A

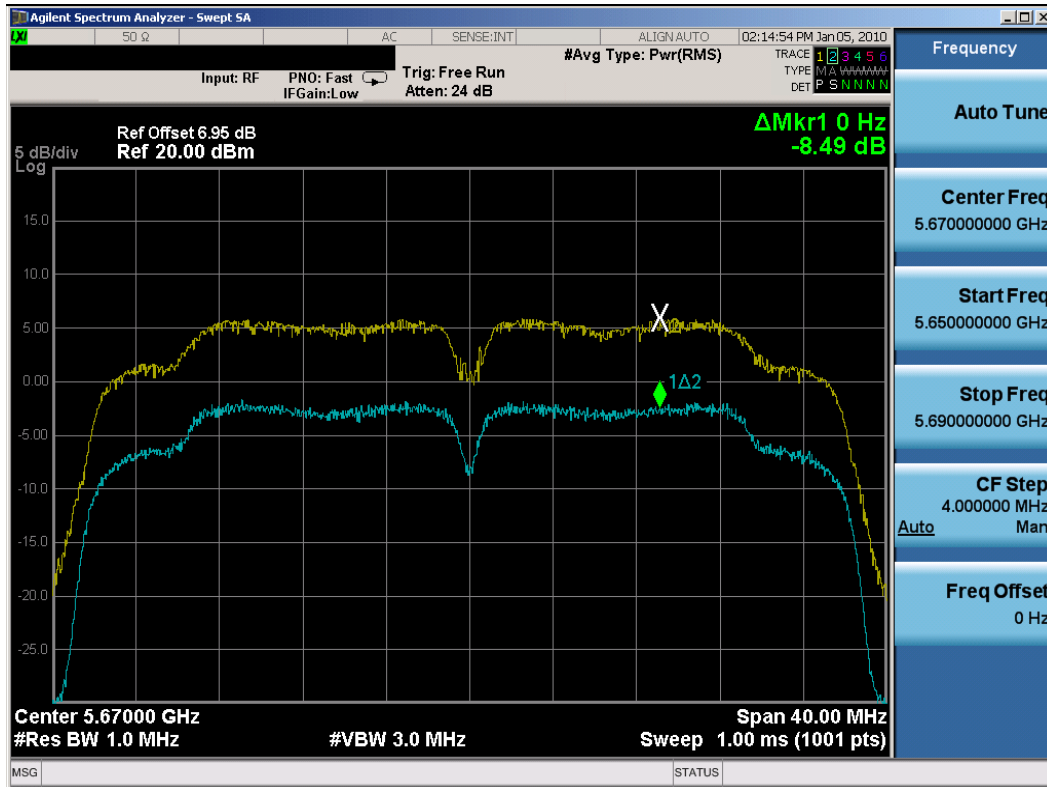


Plot 6-77. Peak Excursion Ratio Plot (802.11n (UNII) – Ch. 102) – Chain A

FCC ID: ACJ9TGCF-311	<b>PCTEST</b> ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11a/n UNII MEASUREMENT REPORT (CERTIFICATION)	<b>Panasonic</b>	Reviewed by: Quality Manager
Test Report S/N: 0912152266.ACJ	Test Dates: 12/21/2009 - 02/24/2010	EUT Type: Toughbook Model: CF-31		Page 71 of 121



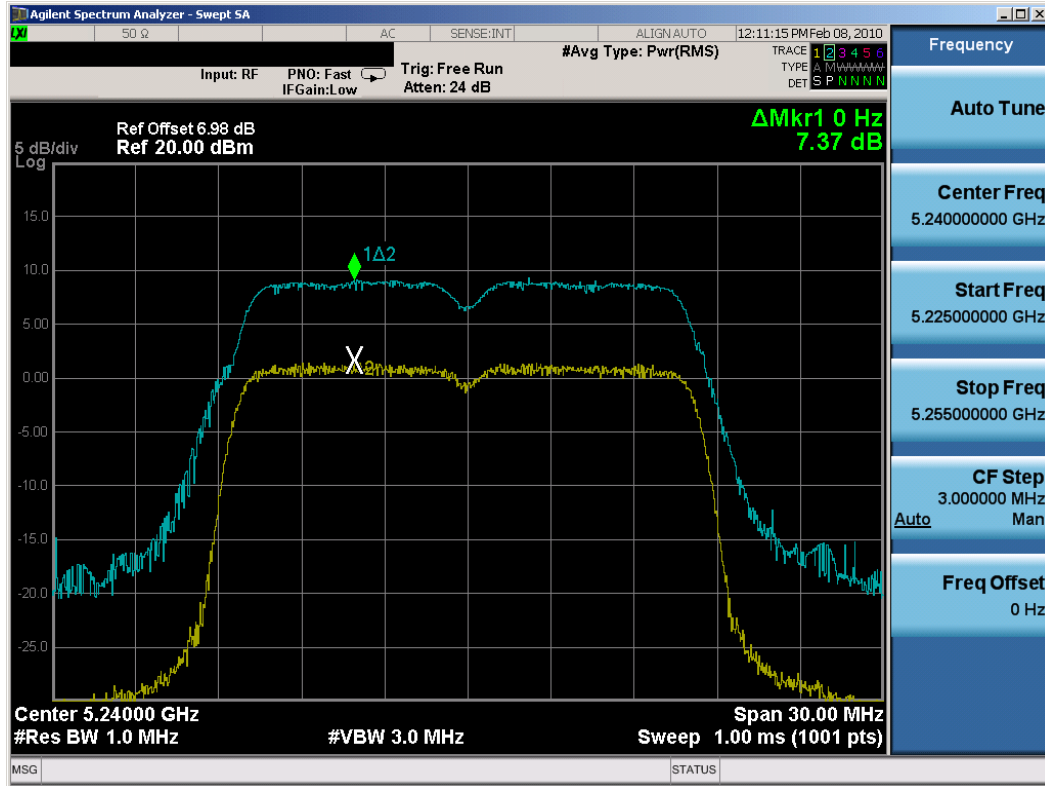
Plot 6-78. Peak Excursion Ratio Plot (802.11n (UNII) – Ch. 118) – Chain A



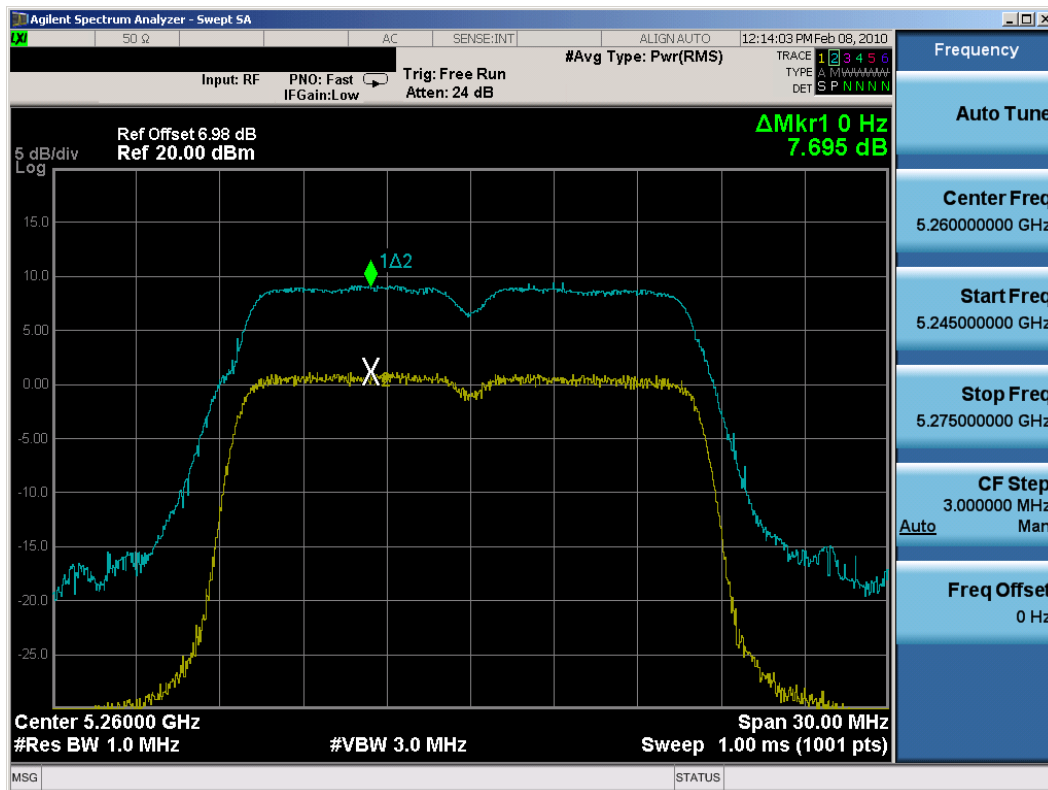
Plot 6-79. Peak Excursion Ratio Plot (802.11n (UNII) – Ch. 134) – Chain A

FCC ID: ACJ9TGCF-311	<b>PCTEST</b> ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11a/n UNII MEASUREMENT REPORT (CERTIFICATION)	<b>Panasonic</b>	Reviewed by: Quality Manager
Test Report S/N: 0912152266.ACJ	Test Dates: 12/21/2009 - 02/24/2010	EUT Type: Toughbook Model: CF-31		Page 72 of 121



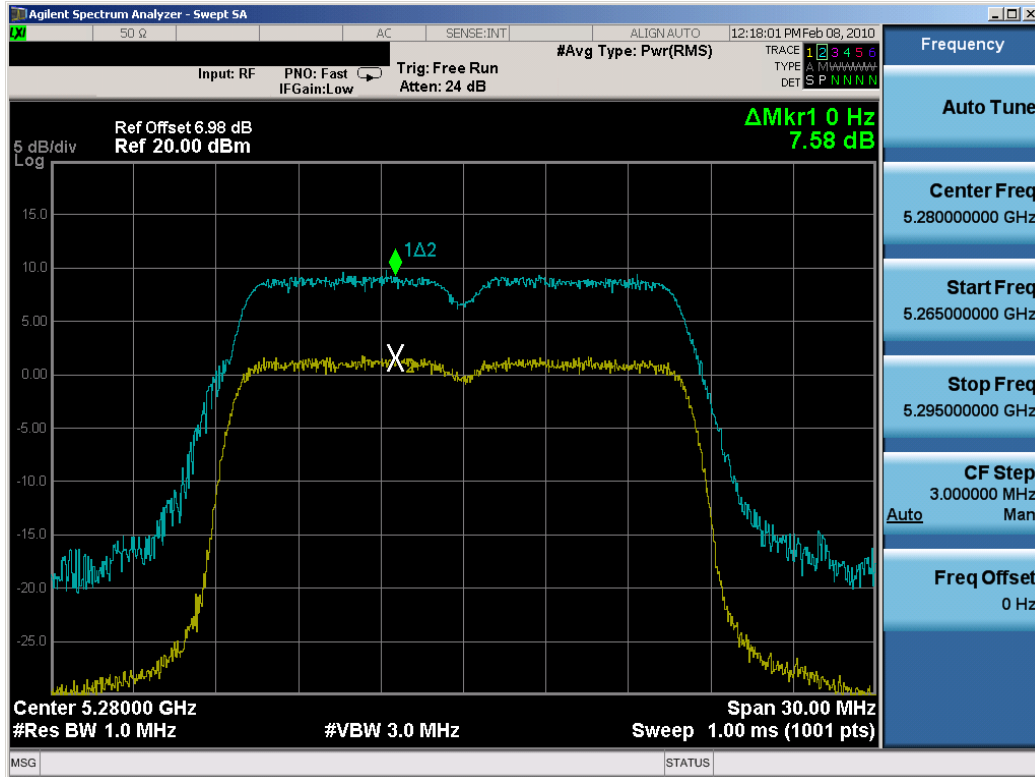


Plot 6-82. Peak Excursion Ratio Plot (802.11a (UNII) – Ch. 48) – Chain B

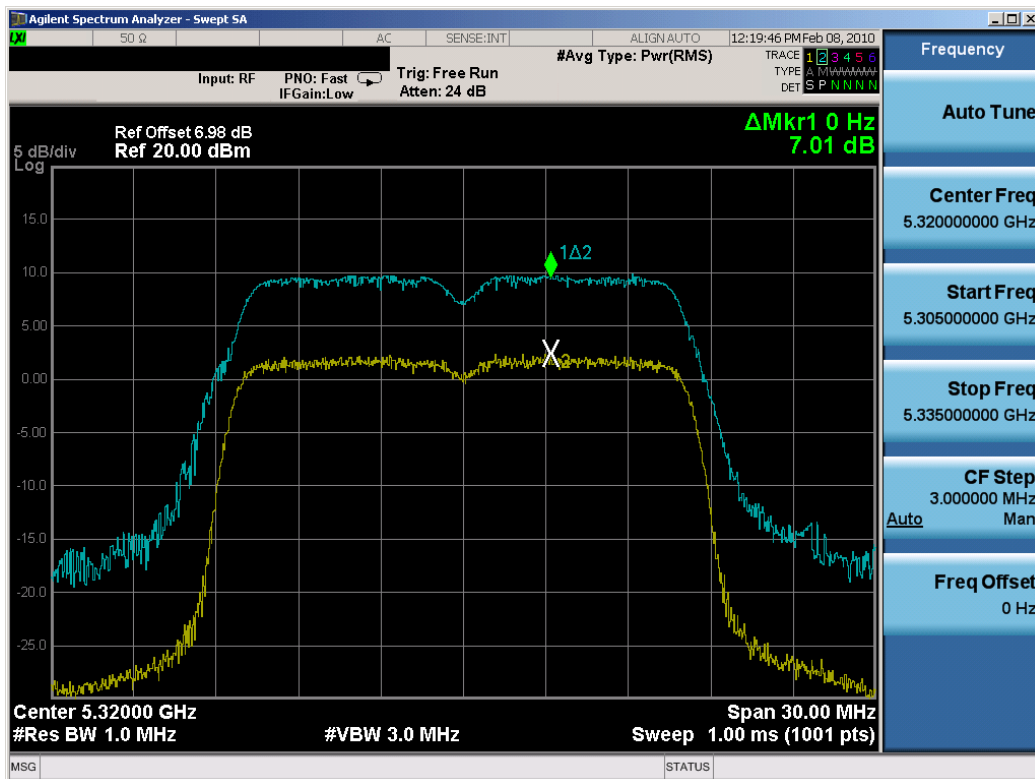


Plot 6-83. Peak Excursion Ratio Plot (802.11a (UNII) – Ch. 52) – Chain B

FCC ID: ACJ9TGCF-311	<b>PCTEST</b> ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11a/n UNII MEASUREMENT REPORT (CERTIFICATION)	<b>Panasonic</b>	Reviewed by: Quality Manager
Test Report S/N: 0912152266.ACJ	Test Dates: 12/21/2009 - 02/24/2010	EUT Type: Toughbook Model: CF-31		Page 74 of 121

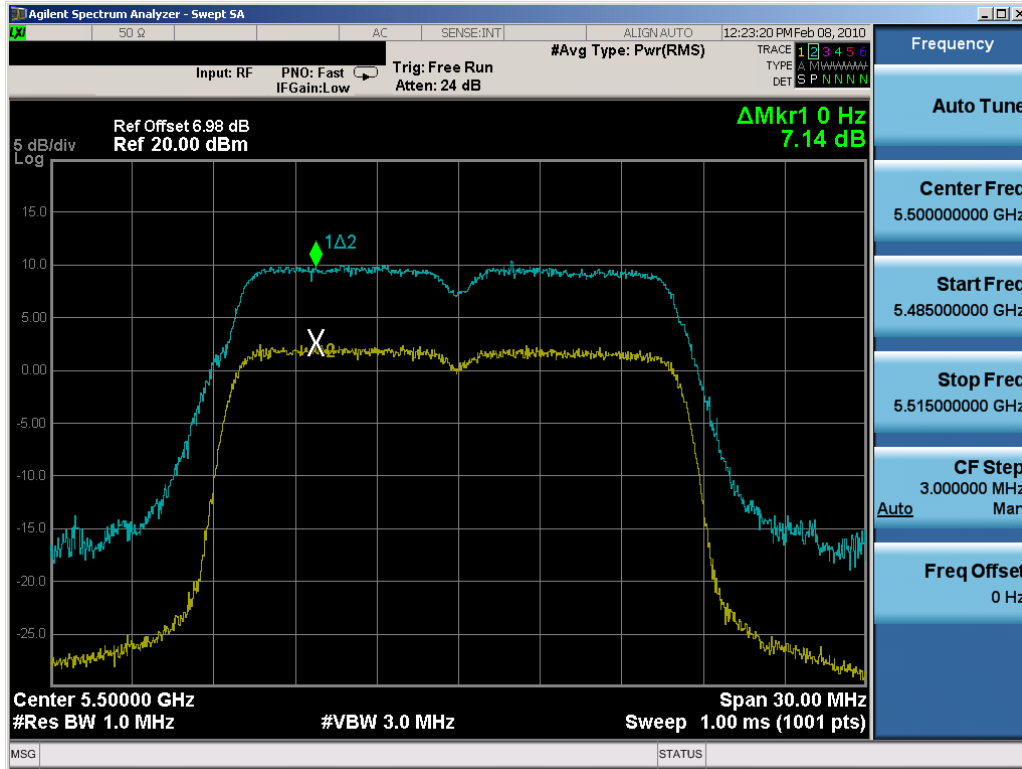


Plot 6-84. Peak Excursion Ratio Plot (802.11a (UNII) – Ch. 56) – Chain B

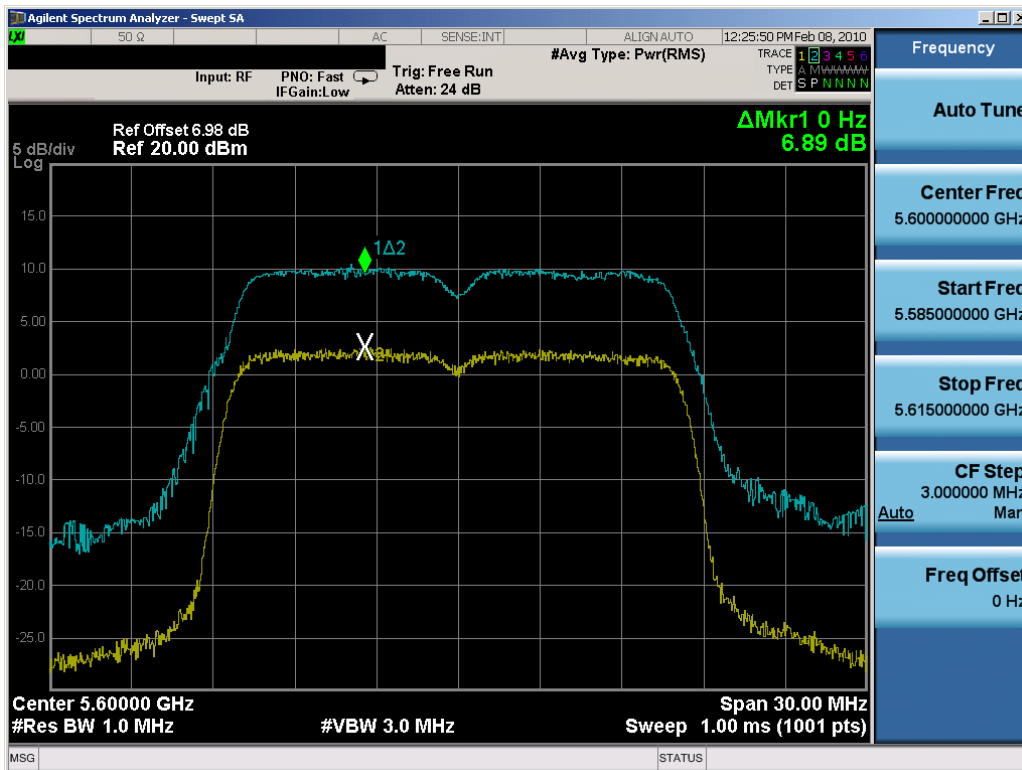


Plot 6-85. Peak Excursion Ratio Plot (802.11a (UNII) – Ch. 64) – Chain B

FCC ID: ACJ9TGCF-311	<b>PCTEST</b> ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11a/n UNII MEASUREMENT REPORT (CERTIFICATION)	<b>Panasonic</b>	Reviewed by: Quality Manager
Test Report S/N: 0912152266.ACJ	Test Dates: 12/21/2009 - 02/24/2010	EUT Type: Toughbook Model: CF-31		Page 75 of 121

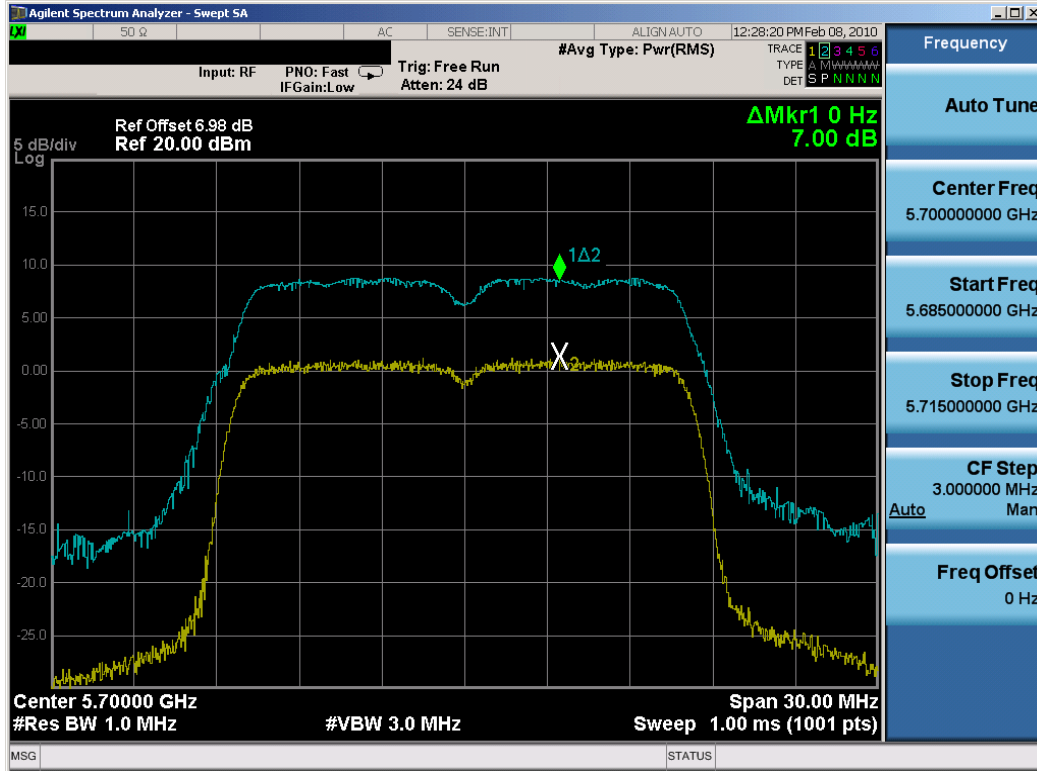


Plot 6-86. Peak Excursion Ratio Plot (802.11a (UNII) – Ch. 100) – Chain B

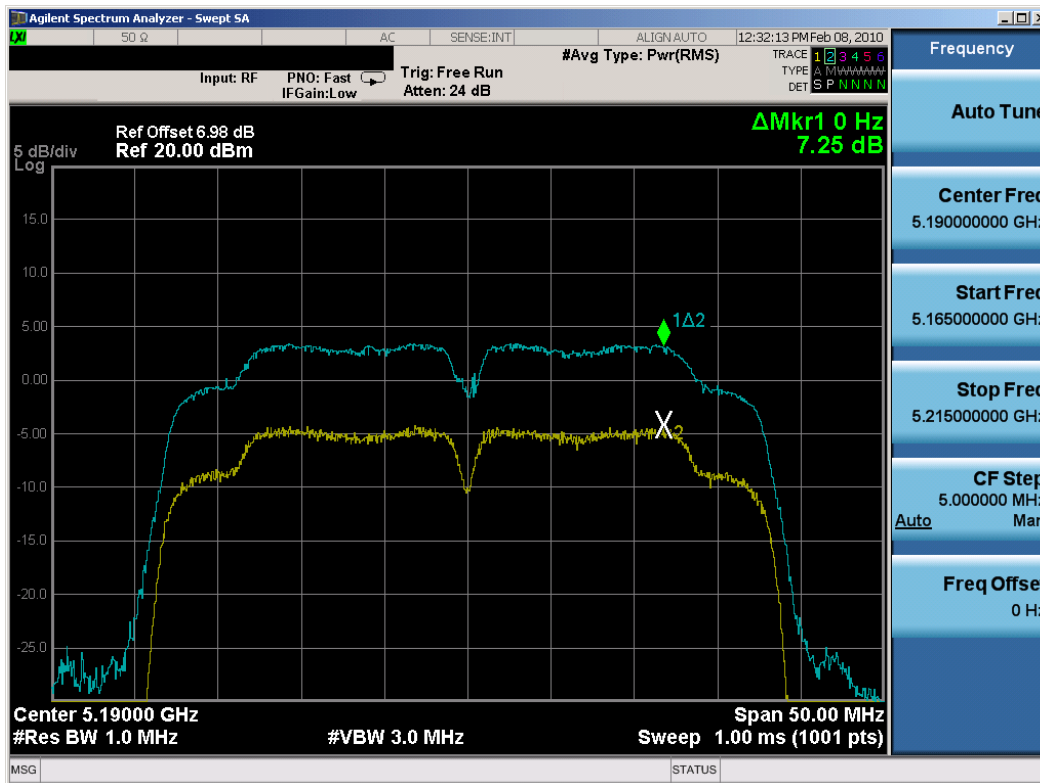


Plot 6-87. Peak Excursion Ratio Plot (802.11a (UNII) – Ch. 120) – Chain B

FCC ID: ACJ9TGCF-311	<b>PCTEST</b> ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11a/n UNII MEASUREMENT REPORT (CERTIFICATION)	<b>Panasonic</b>	Reviewed by: Quality Manager
Test Report S/N: 0912152266.ACJ	Test Dates: 12/21/2009 - 02/24/2010	EUT Type: Toughbook Model: CF-31		Page 76 of 121



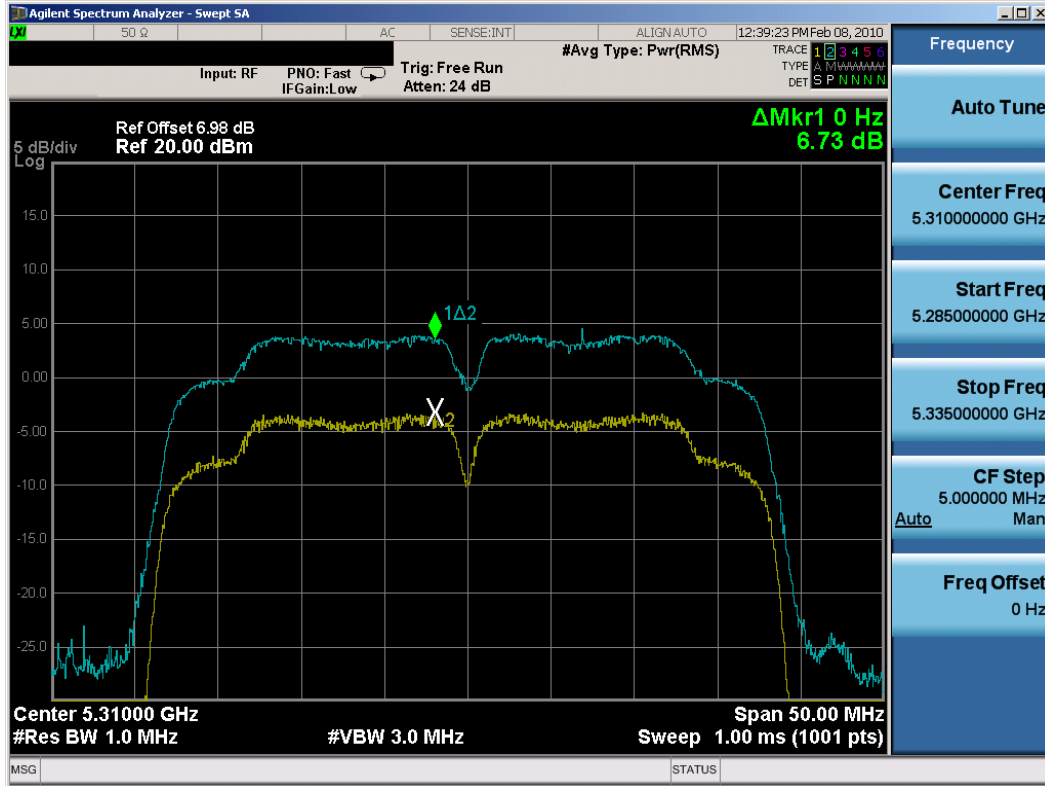
Plot 6-88. Peak Excursion Ratio Plot (802.11a (UNII) – Ch. 140) – Chain B



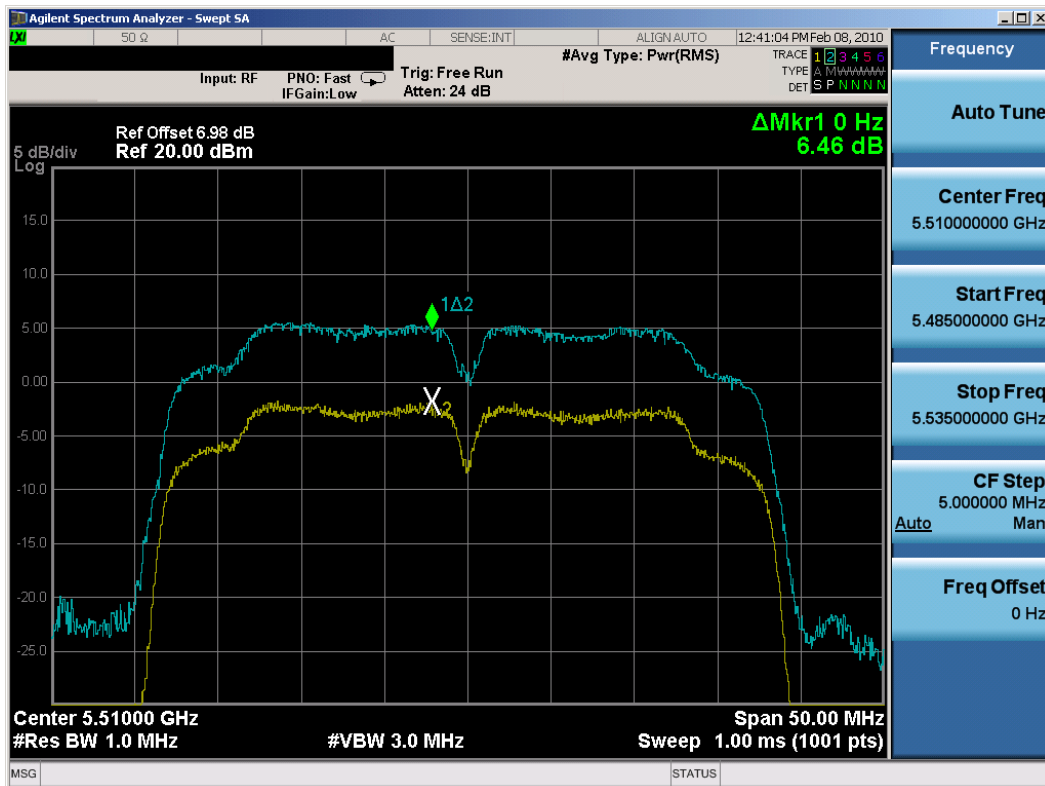
Plot 6-89. Peak Excursion Ratio Plot (802.11n (UNII) – Ch. 38) – Chain B

FCC ID: ACJ9TGCF-311	<b>PCTEST</b> ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11a/n UNII MEASUREMENT REPORT (CERTIFICATION)	<b>Panasonic</b>	Reviewed by: Quality Manager
Test Report S/N: 0912152266.ACJ	Test Dates: 12/21/2009 - 02/24/2010	EUT Type: Toughbook Model: CF-31		Page 77 of 121



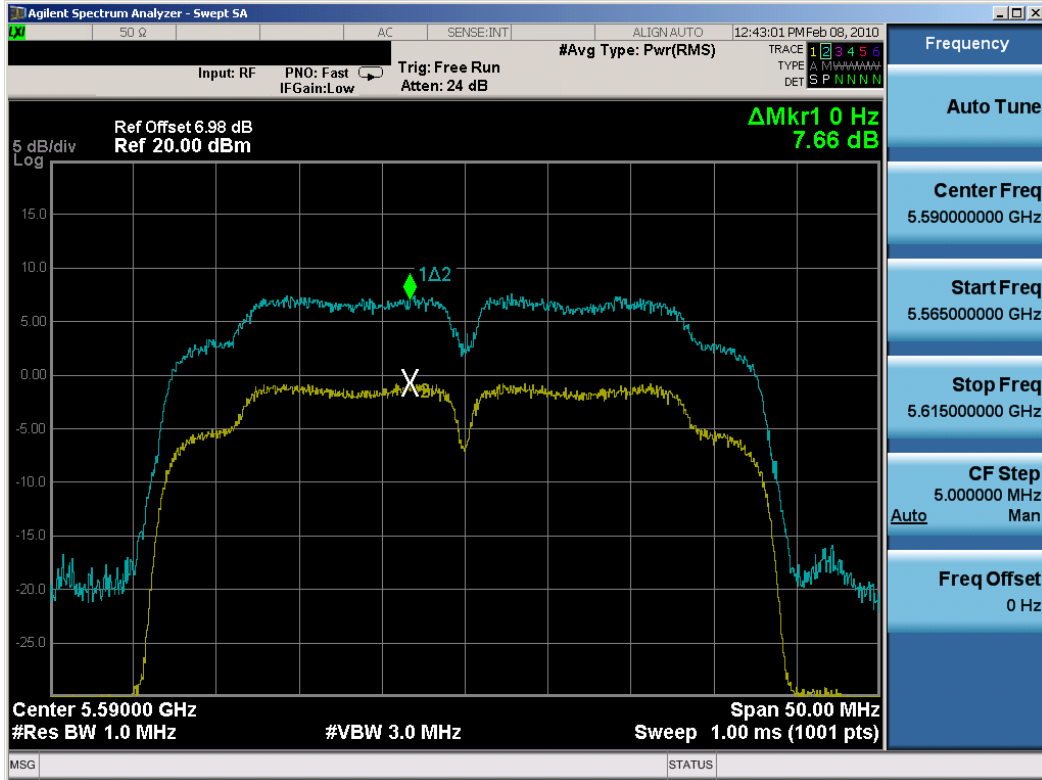


Plot 6-92. Peak Excursion Ratio Plot (802.11n (UNII) – Ch. 62) – Chain B

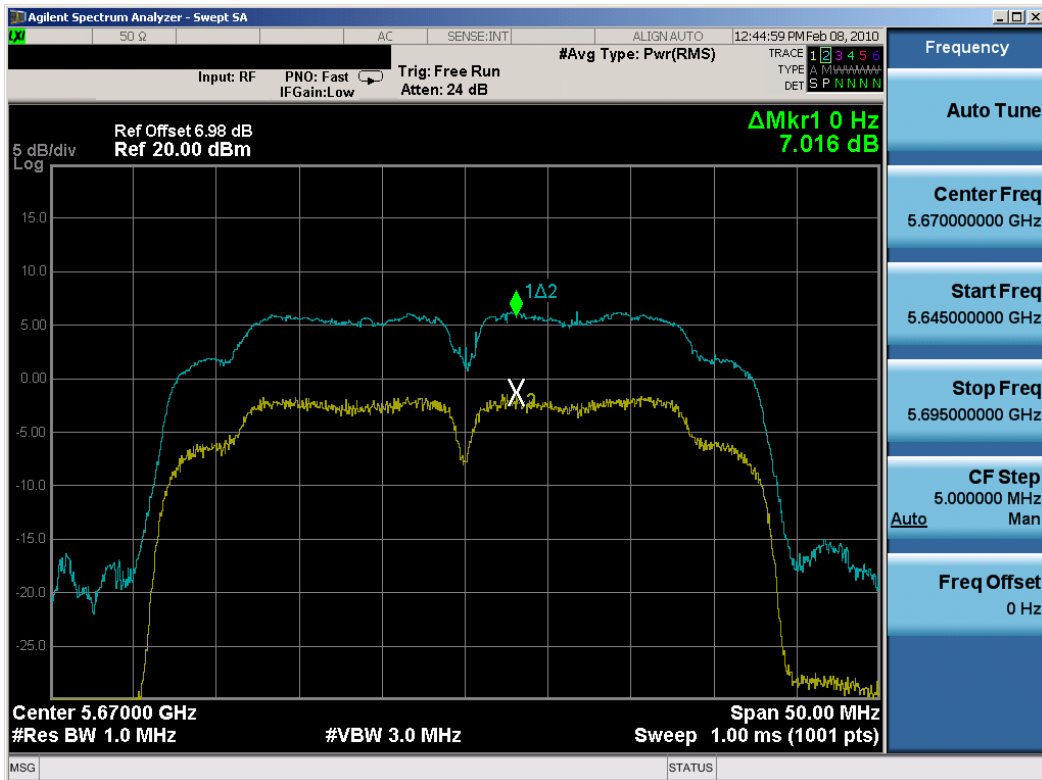


Plot 6-93. Peak Excursion Ratio Plot (802.11n (UNII) – Ch. 102) – Chain B

FCC ID: ACJ9TGCF-311	<b>PCTEST</b> ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11a/n UNII MEASUREMENT REPORT (CERTIFICATION)	<b>Panasonic</b>	Reviewed by: Quality Manager
Test Report S/N: 0912152266.ACJ	Test Dates: 12/21/2009 - 02/24/2010	EUT Type: Toughbook Model: CF-31		Page 79 of 121



Plot 6-94. Peak Excursion Ratio Plot (802.11n (UNII) – Ch. 118) – Chain B



Plot 6-95. Peak Excursion Ratio Plot (802.11n (UNII) – Ch. 134) – Chain B

FCC ID: ACJ9TGCF-311	<b>PCTEST</b> ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11a/n UNII MEASUREMENT REPORT (CERTIFICATION)	<b>Panasonic</b>	Reviewed by: Quality Manager
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## 6.8 Frequency Stability

### §15.407(g)

The EUT was placed inside of an environmental chamber as the temperature in the chamber was varied between -30°C and +50°C. The temperature was incremented by 10° intervals and the unit was allowed to stabilize at each temperature before each measurement. The center frequency of the transmitting channel was evaluated at each temperature and the frequency deviation from the channel's center frequency was recorded.



OPERATING FREQUENCY: 5,200,000,000 Hz

CHANNEL: 40

REFERENCE VOLTAGE: 7.2 VDC

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	7.20	+ 20 (Ref)	5,200,003,201	3,201	0.000062
100 %		- 30	5,200,006,454	6,454	0.000124
100 %		- 20	5,200,003,701	3,701	0.000071
100 %		- 10	5,200,006,154	6,154	0.000118
100 %		0	5,199,997,220	-2,780	-0.000053
100 %		+ 10	5,200,004,257	4,257	0.000082
100 %		+ 20	5,200,003,201	3,201	0.000062
100 %		+ 30	5,199,998,035	-1,965	-0.000038
100 %		+ 40	5,200,002,475	2,475	0.000048
100 %		+ 50	5,200,001,689	1,689	0.000032
115 %		8.28	+ 20	5,199,992,876	-7,124
BATT. ENDPOINT	6.45	+ 20	5,199,993,376	-6,624	-0.000127

**Table 6-27. Frequency Stability Measurements for UNII Band Ch. 40**

FCC ID: ACJ9TGCF-311		FCC Pt. 15.407 802.11a/n UNII MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
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### Frequency Stability (Cont'd)

§15.407(g)

The EUT was placed inside of an environmental chamber as the temperature in the chamber was varied between -30°C and +50°C. The temperature was incremented by 10° intervals and the unit was allowed to stabilize at each temperature before each measurement. The center frequency of the transmitting channel was evaluated at each temperature and the frequency deviation from the channel's center frequency was recorded.



OPERATING FREQUENCY: 5,280,000,000 Hz

CHANNEL: 56

REFERENCE VOLTAGE: 7.2 VDC

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	7.20	+ 20 (Ref)	5,280,003,564	3,564	0.000068
100 %		- 30	5,279,998,075	-1,925	-0.000036
100 %		- 20	5,279,995,268	-4,732	-0.000090
100 %		- 10	5,279,994,468	-5,532	-0.000105
100 %		0	5,279,995,249	-4,751	-0.000090
100 %		+ 10	5,280,004,220	4,220	0.000080
100 %		+ 20	5,280,003,564	3,564	0.000068
100 %		+ 30	5,280,001,867	1,867	0.000035
100 %		+ 40	5,280,004,321	4,321	0.000082
100 %		+ 50	5,279,993,573	-6,427	-0.000122
115 %	8.28	+ 20	5,280,004,677	4,677	0.000089
BATT. ENDPOINT	6.45	+ 20	5,279,995,106	-4,894	-0.000093

Table 6-28. Frequency Stability Measurements for UNII Band Ch. 56

FCC ID: ACJ9TGCF-311		FCC Pt. 15.407 802.11a/n UNII MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
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## Frequency Stability (Cont'd)



### §15.407(g)

The EUT was placed inside of an environmental chamber as the temperature in the chamber was varied between -30°C and +50°C. The temperature was incremented by 10° intervals and the unit was allowed to stabilize at each temperature before each measurement. The center frequency of the transmitting channel was evaluated at each temperature and the frequency deviation from the channel's center frequency was recorded.

OPERATING FREQUENCY: 5,600,000,000 Hz  
 CHANNEL: 120  
 REFERENCE VOLTAGE: 7.2 VDC

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	7.20	+ 20 (Ref)	5,600,004,421	4,421	0.000079
100 %		- 30	5,599,994,318	-5,682	-0.000101
100 %		- 20	5,599,996,206	-3,794	-0.000068
100 %		- 10	5,599,993,575	-6,425	-0.000115
100 %		0	5,600,004,215	4,215	0.000075
100 %		+ 10	5,599,995,648	-4,352	-0.000078
100 %		+ 20	5,600,004,421	4,421	0.000079
100 %		+ 30	5,599,998,012	-1,988	-0.000036
100 %		+ 40	5,599,993,959	-6,041	-0.000108
100 %		+ 50	5,599,995,575	-4,425	-0.000079
115 %		8.28	+ 20	5,599,994,626	-5,374
BATT. ENDPOINT	6.45	+ 20	5,599,994,016	-5,984	-0.000107

**Table 6-29. Frequency Stability Measurements for UNII Band Ch. 120**

FCC ID: ACJ9TGCF-311		FCC Pt. 15.407 802.11a/n UNII MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
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## 6.9 Radiated Spurious Emission Measurements

§15.407(b)(1), (6), §15.205, §15.209

The EUT was tested from 9kHz and up to the 10<sup>th</sup> harmonic of the fundamental frequency of the transmitter using CISPR quasi peak detector below 1GHZ. Above 1 GHz, peak measurements were taken using RBW = VBW = 1MHz and 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 6-30 per Section 15.209.

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 6-30. Radiated Limits**

### Sample Calculation

- Field Strength Level [dBμV/m] = Analyzer Level [dBm] + 107 + AFCL [dB]

### Notes:

- AFCL = Antenna Factor [dB] + Cable Loss [dB]

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**Radiated Spurious Emission Measurements (Cont'd)**  
**§15.407(b)(1) and (2), §15.205 & §15.209**

Mode: 802.11a  
 Transfer Rate: 9 Mbps  
 Distance of Measurements: 1 Meter  
 Operating Frequency: 5180MHz  
 Channel: 36

Frequency [MHz]	Analyzer Level [dBm]	Detector	Pol. [H/V]	AFCL [dB]	Distance Correction Factor [dB]	Field Strength [dBμV/m]	Limit [dBμV/m]	Margin [dB]
10360.00	-88.36	Peak	H	48.83	-9.54	57.93	68.20	-10.27
* 15540.00	-135.00	Average	H	51.58	0.00	23.58	53.98	-30.40
* 15540.00	-125.00	Peak	H	51.58	0.00	33.58	73.98	-40.40
* 20720.00	-135.00	Average	H	57.04	0.00	29.04	53.98	-24.94
* 20720.00	-125.00	Peak	H	57.04	0.00	39.04	73.98	-34.94
25900.00	-125.00	Peak	H	56.66	0.00	38.66	68.20	-29.54

**Table 6-31. Radiated Measurements @ 1 meter – Chain A**

Frequency [MHz]	Analyzer Level [dBm]	Detector	Pol. [H/V]	AFCL [dB]	Distance Correction Factor [dB]	Field Strength [dBμV/m]	Limit [dBμV/m]	Margin [dB]
10360.00	-87.61	Peak	H	48.83	-9.54	58.68	68.20	-9.52
* 15540.00	-135.00	Average	H	51.58	0.00	23.58	53.98	-30.40
* 15540.00	-125.00	Peak	H	51.58	0.00	33.58	73.98	-40.40
* 20720.00	-135.00	Average	H	57.04	0.00	29.04	53.98	-24.94
* 20720.00	-125.00	Peak	H	57.04	0.00	39.04	73.98	-34.94
25900.00	-125.00	Peak	H	56.66	0.00	38.66	68.20	-29.54



**Table 6-32. Radiated Measurements @ 1 meter – Chain B**

Frequency [MHz]	Analyzer Level [dBm]	Detector	Pol. [H/V]	AFCL [dB]	Distance Correction Factor [dB]	Field Strength [dBμV/m]	Limit [dBμV/m]	Margin [dB]
10360.00	-88.41	Peak	H	48.83	-9.54	57.88	68.20	-10.32
* 15540.00	-135.00	Average	H	51.58	0.00	23.58	53.98	-30.40
* 15540.00	-125.00	Peak	H	51.58	0.00	33.58	73.98	-40.40
* 20720.00	-135.00	Average	H	57.04	0.00	29.04	53.98	-24.94
* 20720.00	-125.00	Peak	H	57.04	0.00	39.04	73.98	-34.94
25900.00	-125.00	Peak	H	56.66	0.00	38.66	68.20	-29.54

**Table 6-33. Radiated Measurements @ 1 meter – Chain A+B**

**NOTES:**

1. All harmonics that do not lie in a restricted band are subject to a peak limit of -27dBm/MHz.
2. All emissions that lie in the restricted bands (denoted by a \* next to the frequency) specified in §15.205 are below the limit shown in Table 6-30.
3. Peak Measurements > 1GHz using RBW = VBW = 1MHz.
4. The antenna is manipulated through typical positions, polarity and length during the tests. The EUT is manipulated through three orthogonal planes.
5. The EUT is supplied with nominal AC voltage and/or a new/fully-recharged battery.
6. The spectrum is measured from 9kHz to the 10<sup>th</sup> harmonic and the worst-case emissions are reported. No significant emissions were found beyond the fifth harmonic for this device.
7. Levels at - 135 dBm represent the analyzer noise floor and signify that no emission was detected.
8. Above 960MHz the limit is 500 μV/m (54dBμ/m) at 3 meters radiated.

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### Radiated Spurious Emission Measurements (Cont'd)

§15.407(b)(1) and (2), §15.205 & §15.209

Mode: 802.11a

Transfer Rate: 9 Mbps

Distance of Measurements: 1 Meter

Operating Frequency: 5200MHz



Channel: 40

Frequency [MHz]	Analyzer Level [dBm]	Detector	Pol. [H/V]	AFCL [dB]	Distance Correction Factor [dB]	Field Strength [dBμV/m]	Limit [dBμV/m]	Margin [dB]
10400.00	-89.63	Peak	H	48.97	-9.54	56.80	68.20	-11.40
* 15600.00	-135.00	Average	H	51.91	0.00	23.91	53.98	-30.07
* 15600.00	-125.00	Peak	H	51.91	0.00	33.91	73.98	-40.07
* 20800.00	-135.00	Average	H	56.98	0.00	28.98	53.98	-24.99
* 20800.00	-125.00	Peak	H	56.98	0.00	38.98	73.98	-34.99
26000.00	-125.00	Peak	H	56.81	0.00	38.81	68.20	-29.39

**Table 6-34. Radiated Measurements @ 1 meter – Chain A**

Frequency [MHz]	Analyzer Level [dBm]	Detector	Pol. [H/V]	AFCL [dB]	Distance Correction Factor [dB]	Field Strength [dBμV/m]	Limit [dBμV/m]	Margin [dB]
10400.00	-88.03	Peak	H	48.97	-9.54	58.40	68.20	-9.80
* 15600.00	-135.00	Average	H	51.91	0.00	23.91	53.98	-30.07
* 15600.00	-125.00	Peak	H	51.91	0.00	33.91	73.98	-40.07
* 20800.00	-135.00	Average	H	56.98	0.00	28.98	53.98	-24.99
* 20800.00	-125.00	Peak	H	56.98	0.00	38.98	73.98	-34.99
26000.00	-125.00	Peak	H	56.81	0.00	38.81	68.20	-29.39

**Table 6-35. Radiated Measurements @ 1 meter – Chain B**



FCC ID: ACJ9TGCF-311		FCC Pt. 15.407 802.11a/n UNII MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
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Frequency [MHz]	Analyzer Level [dBm]	Detector	Pol. [H/V]	AFCL [dB]	Distance Correction Factor [dB]	Field Strength [dB $\mu$ V/m]	Limit [dB $\mu$ V/m]	Margin [dB]
10400.00	-89.55	Peak	H	48.97	-9.54	56.88	68.20	-11.32
* 15600.00	-135.00	Average	H	51.91	0.00	23.91	53.98	-30.07
* 15600.00	-125.00	Peak	H	51.91	0.00	33.91	73.98	-40.07
* 20800.00	-135.00	Average	H	56.98	0.00	28.98	53.98	-24.99
* 20800.00	-125.00	Peak	H	56.98	0.00	38.98	73.98	-34.99
26000.00	-125.00	Peak	H	56.81	0.00	38.81	68.20	-29.39

**Table 6-36. Radiated Measurements @ 1 meter – Chain A+B**

**NOTES:**

- All harmonics that do not lie in a restricted band are subject to a peak limit of -27dBm/MHz.
- All emissions that lie in the restricted bands (denoted by a \* next to the frequency) specified in §15.205 are below the limit shown in Table 6-30.
- Peak Measurements > 1GHz using RBW = VBW = 1MHz.
- The antenna is manipulated through typical positions, polarity and length during the tests. The EUT is manipulated through three orthogonal planes.
- The EUT is supplied with nominal AC voltage and/or a new/fully-recharged battery.
- The spectrum is measured from 9kHz to the 10<sup>th</sup> harmonic and the worst-case emissions are reported. No significant emissions were found beyond the fifth harmonic for this device.
- Levels at - 135 dBm represent the analyzer noise floor and signify that no emission was detected.
- Above 960MHz the limit is 500  $\mu$ V/m (54dB $\mu$ /m) at 3 meters radiated.

FCC ID: ACJ9TGCF-311		FCC Pt. 15.407 802.11a/n UNII MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
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**Radiated Spurious Emission Measurements (Cont'd)**  
**§15.407(b)(1) and (2), §15.205 & §15.209**



Mode: 802.11a  
 Transfer Rate: 9 Mbps  
 Distance of Measurements: 1 Meter  
 Operating Frequency: 5240MHz  
 Channel: 48

Frequency [MHz]	Analyzer Level [dBm]	Detector	Pol. [H/V]	AFCL [dB]	Distance Correction Factor [dB]	Field Strength [dBμV/m]	Limit [dBμV/m]	Margin [dB]
10480.00	-89.32	Peak	H	49.02	-9.54	57.15	68.20	-11.05
* 15720.00	-135.00	Average	H	52.16	0.00	24.16	53.98	-29.82
* 15720.00	-125.00	Peak	H	52.16	0.00	34.16	73.98	-39.82
* 20960.00	-135.00	Average	H	56.96	0.00	28.96	53.98	-25.02
* 20960.00	-125.00	Peak	H	56.96	0.00	38.96	73.98	-35.02
26200.00	-125.00	Peak	H	56.78	0.00	38.78	68.20	-29.42

**Table 6-37. Radiated Measurements @ 1 meter – Chain A**

Frequency [MHz]	Analyzer Level [dBm]	Detector	Pol. [H/V]	AFCL [dB]	Distance Correction Factor [dB]	Field Strength [dBμV/m]	Limit [dBμV/m]	Margin [dB]
10480.00	-86.92	Peak	H	49.02	-9.54	59.55	68.20	-8.65
* 15720.00	-135.00	Average	H	52.16	0.00	24.16	53.98	-29.82
* 15720.00	-125.00	Peak	H	52.16	0.00	34.16	73.98	-39.82
* 20960.00	-135.00	Average	H	56.96	0.00	28.96	53.98	-25.02
* 20960.00	-125.00	Peak	H	56.96	0.00	38.96	73.98	-35.02
26200.00	-125.00	Peak	H	56.78	0.00	38.78	68.20	-29.42

**Table 6-38. Radiated Measurements @ 1 meter – Chain B**



FCC ID: ACJ9TGCF-311		FCC Pt. 15.407 802.11a/n UNII MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
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Frequency [MHz]	Analyzer Level [dBm]	Detector	Pol. [H/V]	AFCL [dB]	Distance Correction Factor [dB]	Field Strength [dBμV/m]	Limit [dBμV/m]	Margin [dB]
10480.00	-89.32	Peak	H	49.02	-9.54	57.15	68.20	-11.05
* 15720.00	-135.00	Average	H	52.16	0.00	24.16	53.98	-29.82
* 15720.00	-125.00	Peak	H	52.16	0.00	34.16	73.98	-39.82
* 20960.00	-135.00	Average	H	56.96	0.00	28.96	53.98	-25.02
* 20960.00	-125.00	Peak	H	56.96	0.00	38.96	73.98	-35.02
26200.00	-125.00	Peak	H	56.78	0.00	38.78	68.20	-29.42

**Table 6-39. Radiated Measurements @ 1 meter – Chain A+B**

**NOTES:**

1. All harmonics that do not lie in a restricted band are subject to a peak limit of -27dBm/MHz.
2. All emissions that lie in the restricted bands (denoted by a \* next to the frequency) specified in §15.205 are below the limit shown in Table 6-30.
3. Peak Measurements > 1GHz using RBW = VBW = 1MHz.
4. The antenna is manipulated through typical positions, polarity and length during the tests. The EUT is manipulated through three orthogonal planes.
5. The EUT is supplied with nominal AC voltage and/or a new/fully-recharged battery.
6. The spectrum is measured from 9kHz to the 10<sup>th</sup> harmonic and the worst-case emissions are reported. No significant emissions were found beyond the fifth harmonic for this device.
7. Levels at - 135 dBm represent the analyzer noise floor and signify that no emission was detected.
8. Above 960MHz the limit is 500 μV/m (54dBμ/m) at 3 meters radiated.

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**Radiated Spurious Emission Measurements (Cont'd)**  
**§15.407(b)(1) and (2), §15.205 & §15.209**

Mode: 802.11a  
 Transfer Rate: 9 Mbps  
 Distance of Measurements: 1 Meter  
 Operating Frequency: 5260MHz  
 Channel: 52

Frequency [MHz]	Analyzer Level [dBm]	Detector	Pol. [H/V]	AFCL [dB]	Distance Correction Factor [dB]	Field Strength [dBμV/m]	Limit [dBμV/m]	Margin [dB]
10520.00	-88.96	Peak	H	48.83	-9.54	57.33	68.20	-10.87
* 15780.00	-135.00	Average	H	51.58	0.00	23.58	53.98	-30.40
* 15780.00	-125.00	Peak	H	51.58	0.00	33.58	73.98	-40.40
* 21040.00	-135.00	Average	H	57.04	0.00	29.04	53.98	-24.94
* 21040.00	-125.00	Peak	H	57.04	0.00	39.04	73.98	-34.94
26300.00	-125.00	Peak	H	56.66	0.00	38.66	68.20	-29.54

**Table 6-40. Radiated Measurements @ 1 meter – Chain A**

Frequency [MHz]	Analyzer Level [dBm]	Detector	Pol. [H/V]	AFCL [dB]	Distance Correction Factor [dB]	Field Strength [dBμV/m]	Limit [dBμV/m]	Margin [dB]
10520.00	-88.41	Peak	H	48.83	-9.54	57.88	68.20	-10.32
* 15780.00	-135.00	Average	H	51.58	0.00	23.58	53.98	-30.40
* 15780.00	-125.00	Peak	H	51.58	0.00	33.58	73.98	-40.40
* 21040.00	-135.00	Average	H	57.04	0.00	29.04	53.98	-24.94
* 21040.00	-125.00	Peak	H	57.04	0.00	39.04	73.98	-34.94
26300.00	-125.00	Peak	H	56.66	0.00	38.66	68.20	-29.54



**Table 6-41. Radiated Measurements @ 1 meter – Chain B**

Frequency [MHz]	Analyzer Level [dBm]	Detector	Pol. [H/V]	AFCL [dB]	Distance Correction Factor [dB]	Field Strength [dBμV/m]	Limit [dBμV/m]	Margin [dB]
10520.00	-87.83	Peak	H	48.83	-9.54	58.46	68.20	-9.74
* 15780.00	-135.00	Average	H	51.58	0.00	23.58	53.98	-30.40
* 15780.00	-125.00	Peak	H	51.58	0.00	33.58	73.98	-40.40
* 21040.00	-135.00	Average	H	57.04	0.00	29.04	53.98	-24.94
* 21040.00	-125.00	Peak	H	57.04	0.00	39.04	73.98	-34.94
26300.00	-125.00	Peak	H	56.66	0.00	38.66	68.20	-29.54

**Table 6-42. Radiated Measurements @ 1 meter – Chain A+B**

**NOTES:**

- All harmonics that do not lie in a restricted band are subject to a peak limit of -27dBm/MHz.
- All emissions that lie in the restricted bands (denoted by a \* next to the frequency) specified in §15.205 are below the limit shown in Table 6-30.
- Peak Measurements > 1GHz using RBW = VBW = 1MHz.
- The antenna is manipulated through typical positions, polarity and length during the tests. The EUT is manipulated through three orthogonal planes.
- The EUT is supplied with nominal AC voltage and/or a new/fully-recharged battery.
- The spectrum is measured from 9kHz to the 10<sup>th</sup> harmonic and the worst-case emissions are reported. No significant emissions were found beyond the fifth harmonic for this device.
- Levels at - 135 dBm represent the analyzer noise floor and signify that no emission was detected.
- Above 960MHz the limit is 500 μV/m (54dBμ/m) at 3 meters radiated.

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**Radiated Spurious Emission Measurements (Cont'd)**  
§15.407(b)(1) and (2), §15.205 & §15.209



Mode: 802.11a  
 Transfer Rate: 9 Mbps  
 Distance of Measurements: 1 Meter  
 Operating Frequency: 5280MHz  
 Channel: 56

Frequency [MHz]	Analyzer Level [dBm]	Detector	Pol. [H/V]	AFCL [dB]	Distance Correction Factor [dB]	Field Strength [dBμV/m]	Limit [dBμV/m]	Margin [dB]
10560.00	-87.48	Peak	H	48.97	-9.54	58.95	68.20	-9.25
* 15840.00	-135.00	Average	H	51.91	0.00	23.91	53.98	-30.07
* 15840.00	-125.00	Peak	H	51.91	0.00	33.91	73.98	-40.07
* 21120.00	-135.00	Average	H	56.98	0.00	28.98	53.98	-24.99
* 21120.00	-125.00	Peak	H	56.98	0.00	38.98	73.98	-34.99
26400.00	-125.00	Peak	H	56.81	0.00	38.81	68.20	-29.39

**Table 6-43. Radiated Measurements @ 1 meter – Chain A**

Frequency [MHz]	Analyzer Level [dBm]	Detector	Pol. [H/V]	AFCL [dB]	Distance Correction Factor [dB]	Field Strength [dBμV/m]	Limit [dBμV/m]	Margin [dB]
10560.00	-88.98	Peak	H	48.97	-9.54	57.45	68.20	-10.75
* 15840.00	-135.00	Average	H	51.91	0.00	23.91	53.98	-30.07
* 15840.00	-125.00	Peak	H	51.91	0.00	33.91	73.98	-40.07
* 21120.00	-135.00	Average	H	56.98	0.00	28.98	53.98	-24.99
* 21120.00	-125.00	Peak	H	56.98	0.00	38.98	73.98	-34.99
26400.00	-125.00	Peak	H	56.81	0.00	38.81	68.20	-29.39

**Table 6-44. Radiated Measurements @ 1 meter – Chain B**



FCC ID: ACJ9TGCF-311		FCC Pt. 15.407 802.11a/n UNII MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
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Frequency [MHz]	Analyzer Level [dBm]	Detector	Pol. [H/V]	AFCL [dB]	Distance Correction Factor [dB]	Field Strength [dBμV/m]	Limit [dBμV/m]	Margin [dB]
10560.00	-87.89	Peak	H	48.97	-9.54	58.54	68.20	-9.66
* 15840.00	-135.00	Average	H	51.91	0.00	23.91	53.98	-30.07
* 15840.00	-125.00	Peak	H	51.91	0.00	33.91	73.98	-40.07
* 21120.00	-135.00	Average	H	56.98	0.00	28.98	53.98	-24.99
* 21120.00	-125.00	Peak	H	56.98	0.00	38.98	73.98	-34.99
26400.00	-125.00	Peak	H	56.81	0.00	38.81	68.20	-29.39

**Table 6-45. Radiated Measurements @ 1 meter – Chain A+B**

**NOTES:**

1. All harmonics that do not lie in a restricted band are subject to a peak limit of -27dBm/MHz.
2. All emissions that lie in the restricted bands (denoted by a \* next to the frequency) specified in §15.205 are below the limit shown in Table 6-30.
3. Peak Measurements > 1GHz using RBW = VBW = 1MHz.
4. The antenna is manipulated through typical positions, polarity and length during the tests. The EUT is manipulated through three orthogonal planes.
5. The EUT is supplied with nominal AC voltage and/or a new/fully-recharged battery.
6. The spectrum is measured from 9kHz to the 10<sup>th</sup> harmonic and the worst-case emissions are reported. No significant emissions were found beyond the fifth harmonic for this device.
7. Levels at - 135 dBm represent the analyzer noise floor and signify that no emission was detected.
8. Above 960MHz the limit is 500 μV/m (54dBμ/m) at 3 meters radiated.

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### Radiated Spurious Emission Measurements (Cont'd)

§15.407(b)(1) and (2), §15.205 & §15.209

Mode: 802.11a

Transfer Rate: 9 Mbps

Distance of Measurements: 1 Meter

Operating Frequency: 5320MHz



Channel: 64

Frequency [MHz]	Analyzer Level [dBm]	Detector	Pol. [H/V]	AFCL [dB]	Distance Correction Factor [dB]	Field Strength [dBμV/m]	Limit [dBμV/m]	Margin [dB]
* 10640.00	-100.87	Average	H	49.02	-9.54	45.60	53.98	-8.38
* 10640.00	-90.17	Peak	H	49.02	-9.54	56.30	73.98	-17.68
* 15960.00	-135.00	Average	H	52.16	0.00	24.16	53.98	-29.82
* 15960.00	-125.00	Peak	H	52.16	0.00	34.16	73.98	-39.82
* 21280.00	-135.00	Average	H	56.96	0.00	28.96	53.98	-25.02
* 21280.00	-125.00	Peak	H	56.96	0.00	38.96	73.98	-35.02
26600.00	-125.00	Peak	H	56.78	0.00	38.78	68.20	-29.42

**Table 6-46. Radiated Measurements @ 1 meter – Chain A**

Frequency [MHz]	Analyzer Level [dBm]	Detector	Pol. [H/V]	AFCL [dB]	Distance Correction Factor [dB]	Field Strength [dBμV/m]	Limit [dBμV/m]	Margin [dB]
* 10640.00	-101.67	Average	H	49.02	-9.54	44.80	53.98	-9.18
* 10640.00	-87.72	Peak	H	49.02	-9.54	58.75	73.98	-15.23
* 15960.00	-135.00	Average	H	52.16	0.00	24.16	53.98	-29.82
* 15960.00	-125.00	Peak	H	52.16	0.00	34.16	73.98	-39.82
* 21280.00	-135.00	Average	H	56.96	0.00	28.96	53.98	-25.02
* 21280.00	-125.00	Peak	H	56.96	0.00	38.96	73.98	-35.02
26600.00	-125.00	Peak	H	56.78	0.00	38.78	68.20	-29.42

**Table 6-47. Radiated Measurements @ 1 meter – Chain B**



FCC ID: ACJ9TGCF-311		FCC Pt. 15.407 802.11a/n UNII MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
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Frequency [MHz]	Analyzer Level [dBm]	Detector	Pol. [H/V]	AFCL [dB]	Distance Correction Factor [dB]	Field Strength [dB $\mu$ V/m]	Limit [dB $\mu$ V/m]	Margin [dB]
* 10640.00	-100.17	Average	H	49.02	-9.54	46.30	53.98	-7.68
* 10640.00	-87.88	Peak	H	49.02	-9.54	58.59	73.98	-15.39
* 15960.00	-135.00	Average	H	52.16	0.00	24.16	53.98	-29.82
* 15960.00	-125.00	Peak	H	52.16	0.00	34.16	73.98	-39.82
* 21280.00	-135.00	Average	H	56.96	0.00	28.96	53.98	-25.02
* 21280.00	-125.00	Peak	H	56.96	0.00	38.96	73.98	-35.02
26600.00	-125.00	Peak	H	56.78	0.00	38.78	68.20	-29.42

**Table 6-48. Radiated Measurements @ 1 meter – Chain A+B**

**NOTES:**

- All harmonics that do not lie in a restricted band are subject to a peak limit of -27dBm/MHz.
- All emissions that lie in the restricted bands (denoted by a \* next to the frequency) specified in §15.205 are below the limit shown in Table 6-30.
- Peak Measurements > 1GHz using RBW = VBW = 1MHz.
- The antenna is manipulated through typical positions, polarity and length during the tests. The EUT is manipulated through three orthogonal planes.
- The EUT is supplied with nominal AC voltage and/or a new/fully-recharged battery.
- The spectrum is measured from 9kHz to the 10<sup>th</sup> harmonic and the worst-case emissions are reported. No significant emissions were found beyond the fifth harmonic for this device.
- Levels at - 135 dBm represent the analyzer noise floor and signify that no emission was detected.
- Above 960MHz the limit is 500  $\mu$ V/m (54dB $\mu$ /m) at 3 meters radiated.

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**Radiated Spurious Emission Measurements (Cont'd)**  
§15.407(b)(1) and (2), §15.205 & §15.209



Mode: 802.11a  
 Transfer Rate: 9 Mbps  
 Distance of Measurements: 1 Meter  
 Operating Frequency: 5500MHz  
 Channel: 100

Frequency [MHz]	Analyzer Level [dBm]	Detector	Pol. [H/V]	AFCL [dB]	Distance Correction Factor [dB]	Field Strength [dBμV/m]	Limit [dBμV/m]	Margin [dB]
* 11000.00	-100.56	Average	H	49.16	-9.54	46.06	53.98	-7.92
* 11000.00	-89.96	Peak	H	49.16	-9.54	56.66	73.98	-17.32
16500.00	-125.00	Peak	H	52.09	0.00	34.09	68.20	-34.11
22000.00	-125.00	Peak	H	56.81	0.00	38.81	68.20	-29.39
27500.00	-125.00	Peak	H	56.44	0.00	38.44	68.20	-29.76

**Table 6-49. Radiated Measurements @ 1 meter – Chain A**

Frequency [MHz]	Analyzer Level [dBm]	Detector	Pol. [H/V]	AFCL [dB]	Distance Correction Factor [dB]	Field Strength [dBμV/m]	Limit [dBμV/m]	Margin [dB]
* 11000.00	-100.76	Average	H	49.16	-9.54	45.86	53.98	-8.12
* 11000.00	-87.26	Peak	H	49.16	-9.54	59.36	73.98	-14.62
16500.00	-125.00	Peak	H	52.09	0.00	34.09	68.20	-34.11
22000.00	-125.00	Peak	H	56.81	0.00	38.81	68.20	-29.39
27500.00	-125.00	Peak	H	56.44	0.00	38.44	68.20	-29.76

**Table 6-50. Radiated Measurements @ 1 meter – Chain B**



FCC ID: ACJ9TGCF-311		FCC Pt. 15.407 802.11a/n UNII MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0912152266.ACJ	Test Dates: 12/21/2009 - 02/24/2010	EUT Type: Toughbook Model: CF-31		Page 97 of 121

Frequency [MHz]	Analyzer Level [dBm]	Detector	Pol. [H/V]	AFCL [dB]	Distance Correction Factor [dB]	Field Strength [dBμV/m]	Limit [dBμV/m]	Margin [dB]
* 11000.00	-99.56	Average	H	49.16	-9.54	47.06	53.98	-6.92
* 11000.00	-89.46	Peak	H	49.16	-9.54	57.16	73.98	-16.82
16500.00	-125.00	Peak	H	52.09	0.00	34.09	68.20	-34.11
22000.00	-125.00	Peak	H	56.81	0.00	38.81	68.20	-29.39
27500.00	-125.00	Peak	H	56.44	0.00	38.44	68.20	-29.76

**Table 6-51. Radiated Measurements @ 1 meter – Chain A+B**

**NOTES:**

1. All harmonics that do not lie in a restricted band are subject to a peak limit of -27dBm/MHz.
2. All emissions that lie in the restricted bands (denoted by a \* next to the frequency) specified in §15.205 are below the limit shown in Table 6-30.
3. Peak Measurements > 1GHz using RBW = VBW = 1MHz.
4. The antenna is manipulated through typical positions, polarity and length during the tests. The EUT is manipulated through three orthogonal planes.
5. The EUT is supplied with nominal AC voltage and/or a new/fully-recharged battery.
6. The spectrum is measured from 9kHz to the 10<sup>th</sup> harmonic and the worst-case emissions are reported. No significant emissions were found beyond the fifth harmonic for this device.
7. Levels at - 135 dBm represent the analyzer noise floor and signify that no emission was detected.
8. Above 960MHz the limit is 500 μV/m (54dBμ/m) at 3 meters radiated.

FCC ID: ACJ9TGCF-311		FCC Pt. 15.407 802.11a/n UNII MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
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**Radiated Spurious Emission Measurements (Cont'd)**  
§15.407(b)(1) and (2), §15.205 & §15.209



Mode: 802.11a  
 Transfer Rate: 9 Mbps  
 Distance of Measurements: 1 Meter  
 Operating Frequency: 5600MHz  
 Channel: 120

Frequency [MHz]	Analyzer Level [dBm]	Detector	Pol. [H/V]	AFCL [dB]	Distance Correction Factor [dB]	Field Strength [dBμV/m]	Limit [dBμV/m]	Margin [dB]
* 11200.00	-100.68	Average	H	49.47	-9.54	46.25	53.98	-7.73
* 11200.00	-89.38	Peak	H	49.47	-9.54	57.55	73.98	-16.43
16800.00	-125.00	Peak	H	53.69	0.00	35.69	68.20	-32.51
* 22400.00	-135.00	Average	H	56.92	0.00	28.92	53.98	-25.06
* 22400.00	-125.00	Peak	H	56.92	0.00	38.92	73.98	-35.06
28000.00	-125.00	Peak	H	56.20	0.00	38.20	68.20	-30.00

**Table 6-52. Radiated Measurements @ 1 meter – Chain A**

Frequency [MHz]	Analyzer Level [dBm]	Detector	Pol. [H/V]	AFCL [dB]	Distance Correction Factor [dB]	Field Strength [dBμV/m]	Limit [dBμV/m]	Margin [dB]
* 11200.00	-101.43	Average	H	49.47	-9.54	45.50	53.98	-8.48
* 11200.00	-88.08	Peak	H	49.47	-9.54	58.85	73.98	-15.13
16800.00	-125.00	Peak	H	53.69	0.00	35.69	68.20	-32.51
* 22400.00	-135.00	Average	H	56.92	0.00	28.92	53.98	-25.06
* 22400.00	-125.00	Peak	H	56.92	0.00	38.92	73.98	-35.06
28000.00	-125.00	Peak	H	56.20	0.00	38.20	68.20	-30.00

**Table 6-53. Radiated Measurements @ 1 meter – Chain B**



FCC ID: ACJ9TGCF-311		FCC Pt. 15.407 802.11a/n UNII MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
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Frequency [MHz]	Analyzer Level [dBm]	Detector	Pol. [H/V]	AFCL [dB]	Distance Correction Factor [dB]	Field Strength [dBμV/m]	Limit [dBμV/m]	Margin [dB]
* 11200.00	-99.93	Average	H	49.47	-9.54	47.00	53.98	-6.98
* 11200.00	-90.48	Peak	H	49.47	-9.54	56.45	73.98	-17.53
16800.00	-125.00	Peak	H	53.69	0.00	35.69	68.20	-32.51
* 22400.00	-135.00	Average	H	56.92	0.00	28.92	53.98	-25.06
* 22400.00	-125.00	Peak	H	56.92	0.00	38.92	73.98	-35.06
28000.00	-125.00	Peak	H	56.20	0.00	38.20	68.20	-30.00

**Table 6-54. Radiated Measurements @ 1 meter – Chain A+B**

**NOTES:**

1. All harmonics that do not lie in a restricted band are subject to a peak limit of -27dBm/MHz.
2. All emissions that lie in the restricted bands (denoted by a \* next to the frequency) specified in §15.205 are below the limit shown in Table 6-30.
3. Peak Measurements > 1GHz using RBW = VBW = 1MHz.
4. The antenna is manipulated through typical positions, polarity and length during the tests. The EUT is manipulated through three orthogonal planes.
5. The EUT is supplied with nominal AC voltage and/or a new/fully-recharged battery.
6. The spectrum is measured from 9kHz to the 10<sup>th</sup> harmonic and the worst-case emissions are reported. No significant emissions were found beyond the fifth harmonic for this device.
7. Levels at - 135 dBm represent the analyzer noise floor and signify that no emission was detected.
8. Above 960MHz the limit is 500 μV/m (54dBμ/m) at 3 meters radiated.

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**Radiated Spurious Emission Measurements (Cont'd)**  
§15.407(b)(1) and (2), §15.205 & §15.209



Mode: 802.11a  
 Transfer Rate: 9 Mbps  
 Distance of Measurements: 1 Meter  
 Operating Frequency: 5700MHz  
 Channel: 140

Frequency [MHz]	Analyzer Level [dBm]	Detector	Pol. [H/V]	AFCL [dB]	Distance Correction Factor [dB]	Field Strength [dBμV/m]	Limit [dBμV/m]	Margin [dB]
* 11400.00	-100.50	Average	H	49.78	-9.54	46.74	53.98	-7.24
* 11400.00	-90.70	Peak	H	49.78	-9.54	56.54	73.98	-17.44
17100.00	-125.00	Peak	H	55.56	0.00	37.56	68.20	-30.64
* 22800.00	-135.00	Average	H	56.74	0.00	28.74	53.98	-25.24
* 22800.00	-125.00	Peak	H	56.74	0.00	38.74	73.98	-35.24
28500.00	-125.00	Peak	H	55.61	0.00	37.61	68.20	-30.59

**Table 6-55. Radiated Measurements @ 1 meter – Chain A**

Frequency [MHz]	Analyzer Level [dBm]	Detector	Pol. [H/V]	AFCL [dB]	Distance Correction Factor [dB]	Field Strength [dBμV/m]	Limit [dBμV/m]	Margin [dB]
* 11400.00	-100.55	Average	H	49.78	-9.54	46.69	53.98	-7.29
* 11400.00	-87.75	Peak	H	49.78	-9.54	59.49	73.98	-14.49
17100.00	-125.00	Peak	H	55.56	0.00	37.56	68.20	-30.64
* 22800.00	-135.00	Average	H	56.74	0.00	28.74	53.98	-25.24
* 22800.00	-125.00	Peak	H	56.74	0.00	38.74	73.98	-35.24
28500.00	-125.00	Peak	H	55.61	0.00	37.61	68.20	-30.59

**Table 6-56. Radiated Measurements @ 1 meter – Chain B**



FCC ID: ACJ9TGCF-311		FCC Pt. 15.407 802.11a/n UNII MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
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Frequency [MHz]	Analyzer Level [dBm]	Detector	Pol. [H/V]	AFCL [dB]	Distance Correction Factor [dB]	Field Strength [dBμV/m]	Limit [dBμV/m]	Margin [dB]
* 11400.00	-99.70	Average	H	49.78	-9.54	47.54	53.98	-6.44
* 11400.00	-89.50	Peak	H	49.78	-9.54	57.74	73.98	-16.24
17100.00	-125.00	Peak	H	55.56	0.00	37.56	68.20	-30.64
* 22800.00	-135.00	Average	H	56.74	0.00	28.74	53.98	-25.24
* 22800.00	-125.00	Peak	H	56.74	0.00	38.74	73.98	-35.24
28500.00	-125.00	Peak	H	55.61	0.00	37.61	68.20	-30.59

**Table 6-57. Radiated Measurements @ 1 meter – Chain A+B**

**NOTES:**

1. All harmonics that do not lie in a restricted band are subject to a peak limit of -27dBm/MHz.
2. All emissions that lie in the restricted bands (denoted by a \* next to the frequency) specified in §15.205 are below the limit shown in Table 6-30.
3. Peak Measurements > 1GHz using RBW = VBW = 1MHz.
4. The antenna is manipulated through typical positions, polarity and length during the tests. The EUT is manipulated through three orthogonal planes.
5. The EUT is supplied with nominal AC voltage and/or a new/fully-recharged battery.
6. The spectrum is measured from 9kHz to the 10<sup>th</sup> harmonic and the worst-case emissions are reported. No significant emissions were found beyond the fifth harmonic for this device.
7. Levels at - 135 dBm represent the analyzer noise floor and signify that no emission was detected.
8. Above 960MHz the limit is 500 μV/m (54dBμ/m) at 3 meters radiated.

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## 6.10 Radiated Restricted Band Edge Measurements §15.407(b)(1) and (2), §15.205 & §15.209



Mode: 802.11n  
 Transfer Rate: 13.5/15 Mbps  
 Distance of Measurements: 1 Meter  
 Operating Frequency: 5190MHz  
 Channel: 38

Frequency [MHz]	Analyzer Level [dBm]	Detector	Pol. [H/V]	AFCL [dB]	Distance Correction Factor [dB]	Field Strength [dBμV/m]	Limit [dBμV/m]	Margin [dB]
5138.50	-112.16	Average	V	42.95	-9.54	28.24	53.98	-25.74
5138.50	-94.16	Peak	V	42.95	-9.54	46.24	73.98	-27.74
5147.60	-107.66	Average	V	42.95	-9.54	32.74	53.98	-21.24
5147.60	-90.96	Peak	V	42.95	-9.54	49.44	73.98	-24.54
5149.20	-106.46	Average	V	42.97	-9.54	33.97	53.98	-20.01
5149.20	-90.96	Peak	V	42.97	-9.54	49.47	73.98	-24.51

**Table 6-58. Radiated Restricted Band Measurements at 1-meter – Chain A**

Frequency [MHz]	Analyzer Level [dBm]	Detector	Pol. [H/V]	AFCL [dB]	Distance Correction Factor [dB]	Field Strength [dBμV/m]	Limit [dBμV/m]	Margin [dB]
5096.60	-99.27	Average	H	42.83	-9.54	41.02	53.98	-12.96
5096.60	-84.61	Peak	H	42.83	-9.54	55.68	73.98	-18.30
5142.10	-98.66	Average	H	42.83	-9.54	41.63	53.98	-12.35
5142.10	-84.23	Peak	H	42.83	-9.54	56.06	73.98	-17.92
5146.60	-97.22	Average	H	42.96	-9.54	43.19	53.98	-10.79
5146.60	-80.11	Peak	H	42.96	-9.54	60.30	73.98	-13.68

**Table 6-59. Radiated Restricted Band Measurements at 1-meter– Chain B**



FCC ID: ACJ9TGCF-311		FCC Pt. 15.407 802.11a/n UNII MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
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Frequency [MHz]	Analyzer Level [dBm]	Detector	Pol. [H/V]	AFCL [dB]	Distance Correction Factor [dB]	Field Strength [dB $\mu$ V/m]	Limit [dB $\mu$ V/m]	Margin [dB]
5125.70	-97.36	Average	H	42.91	-9.54	43.01	53.98	-10.97
5125.70	-84.02	Peak	H	42.91	-9.54	56.35	73.98	-17.63
5138.60	-94.03	Average	H	42.91	-9.54	46.34	53.98	-7.64
5138.60	-80.74	Peak	H	42.91	-9.54	59.63	73.98	-14.35
5145.80	-91.22	Average	H	42.95	-9.54	49.18	53.98	-4.80
5145.80	-77.36	Peak	H	42.95	-9.54	63.04	73.98	-10.94

**Table 6-60. Radiated Restricted Band Measurements at 1-meter – Chain A+B**

**NOTES:**

1. All emissions that lie in the restricted bands (denoted by a \* next to the frequency) specified in §15.205 are below the limit shown in Table 6-30.
2. Average Measurements > 1GHz using RBW = 1MHz VBW = 10Hz.
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 10<sup>th</sup> 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  $\mu$ V/m (54dB $\mu$ /m) at 3 meters radiated.

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**Radiated Restricted Band Edge Measurements (Cont'd)**  
§15.407(b)(1) and (2), §15.205 & §15.209



Mode: 802.11n  
 Transfer Rate: 13.5/15 Mbps  
 Distance of Measurements: 1 Meter  
 Operating Frequency: 5310MHz  
 Channel: 62

Frequency [MHz]	Analyzer Level [dBm]	Detector	Pol. [H/V]	AFCL [dB]	Distance Correction Factor [dB]	Field Strength [dBμV/m]	Limit [dBμV/m]	Margin [dB]
5350.90	-106.83	Average	V	43.53	-9.54	34.15	53.98	-19.83
5350.90	-91.53	Peak	V	43.53	-9.54	49.45	73.98	-24.53
5354.00	-109.43	Average	V	43.54	-9.54	31.56	53.98	-22.42
5354.00	-93.33	Peak	V	43.54	-9.54	47.66	73.98	-26.32
5357.00	-106.83	Average	V	43.54	-9.54	34.16	53.98	-19.82
5357.00	-91.53	Peak	V	43.54	-9.54	49.46	73.98	-24.52

**Table 6-61. Radiated Restricted Band Measurements at 1-meter – Chain A**

Frequency [MHz]	Analyzer Level [dBm]	Detector	Pol. [H/V]	AFCL [dB]	Distance Correction Factor [dB]	Field Strength [dBμV/m]	Limit [dBμV/m]	Margin [dB]
5352.20	-95.70	Average	H	43.53	-9.54	45.28	53.98	-8.70
5352.20	-82.14	Peak	H	43.53	-9.54	58.84	73.98	-15.14
5353.80	-96.31	Average	H	43.56	-9.54	44.71	53.98	-9.27
5353.80	-84.47	Peak	H	43.56	-9.54	56.55	73.98	-17.43
5365.70	-98.01	Average	H	43.56	-9.54	43.01	53.98	-10.97
5365.70	-85.47	Peak	H	43.56	-9.54	55.55	73.98	-18.43

**Table 6-62. Radiated Restricted Band Measurements at 1-meter – Chain B**



FCC ID: ACJ9TGCF-311		FCC Pt. 15.407 802.11a/n UNII MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
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Frequency [MHz]	Analyzer Level [dBm]	Detector	Pol. [H/V]	AFCL [dB]	Distance Correction Factor [dB]	Field Strength [dB $\mu$ V/m]	Limit [dB $\mu$ V/m]	Margin [dB]
5352.70	-96.63	Average	H	43.53	-9.54	44.35	53.98	-9.63
5352.70	-83.39	Peak	H	43.53	-9.54	57.59	73.98	-16.39
5354.80	-97.03	Average	H	43.55	-9.54	43.98	53.98	-10.00
5354.80	-84.05	Peak	H	43.55	-9.54	56.96	73.98	-17.02
5361.90	-97.79	Average	H	43.55	-9.54	43.22	53.98	-10.76
5361.90	-85.33	Peak	H	43.55	-9.54	55.68	73.98	-18.30

**Table 6-63. Radiated Restricted Band Measurements at 1-meter – Chain A+B**

**NOTES:**

1. All emissions that lie in the restricted bands (denoted by a \* next to the frequency) specified in §15.205 are below the limit shown in Table 6-30.
2. Average Measurements > 1GHz using RBW = 1MHz VBW = 10Hz.
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 10<sup>th</sup> 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  $\mu$ V/m (54dB $\mu$ /m) at 3 meters radiated.

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**Radiated Restricted Band Edge Measurements (Cont'd)**  
**§15.407(b)(1) and (2), §15.205 & §15.209**

Mode: 802.11n

Transfer Rate: 13.5/15 Mbps

Distance of Measurements: 1 Meter

Operating Frequency: 5510MHz



Channel: 102

Frequency [MHz]	Analyzer Level [dBm]	Detector	Pol. [H/V]	AFCL [dB]	Distance Correction Factor [dB]	Field Strength [dBμV/m]	Limit [dBμV/m]	Margin [dB]
5452.50	-109.28	Average	V	43.79	-9.54	31.97	53.98	-22.01
5452.50	-94.48	Peak	V	43.79	-9.54	46.77	73.98	-27.21
5454.70	-108.57	Average	V	43.80	-9.54	32.68	53.98	-21.30
5454.70	-93.87	Peak	V	43.80	-9.54	47.38	73.98	-26.60
5458.30	-106.57	Average	V	43.80	-9.54	34.68	53.98	-19.30
5458.30	-91.57	Peak	V	43.80	-9.54	49.68	73.98	-24.30

**Table 6-64. Radiated Restricted Band Measurements at 1-meter - Chain A**

Frequency [MHz]	Analyzer Level [dBm]	Detector	Pol. [H/V]	AFCL [dB]	Distance Correction Factor [dB]	Field Strength [dBμV/m]	Limit [dBμV/m]	Margin [dB]
5452.60	-98.32	Average	H	43.79	-9.54	42.93	53.98	-11.05
5452.60	-86.62	Peak	H	43.79	-9.54	54.63	73.98	-19.35
5454.70	-98.17	Average	H	43.80	-9.54	43.08	53.98	-10.90
5454.70	-85.76	Peak	H	43.80	-9.54	55.49	73.98	-18.49
5457.40	-97.57	Average	H	43.80	-9.54	43.68	53.98	-10.30
5457.40	-85.39	Peak	H	43.80	-9.54	55.86	73.98	-18.12

**Table 6-65. Radiated Restricted Band Measurements at 1-meter – Chain B**



FCC ID: ACJ9TGCF-311		FCC Pt. 15.407 802.11a/n UNII MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
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Frequency [MHz]	Analyzer Level [dBm]	Detector	Pol. [H/V]	AFCL [dB]	Distance Correction Factor [dB]	Field Strength [dB $\mu$ V/m]	Limit [dB $\mu$ V/m]	Margin [dB]
5407.32	-98.34	Average	H	43.77	-9.54	42.88	53.98	-11.10
5407.32	-85.59	Peak	H	43.77	-9.54	55.64	73.98	-18.34
5445.12	-98.48	Average	H	43.80	-9.54	42.77	53.98	-11.21
5445.12	-86.21	Peak	H	43.80	-9.54	55.04	73.98	-18.94
5457.70	-98.01	Average	H	43.80	-9.54	43.24	53.98	-10.74
5457.70	-84.81	Peak	H	43.80	-9.54	56.44	73.98	-17.53

**Table 6-66. Radiated Restricted Band Measurements at 1-meter – Chain A+B**

**NOTES:**

1. All emissions that lie in the restricted bands (denoted by a \* next to the frequency) specified in §15.205 are below the limit shown in Table 6-30.
2. Average Measurements > 1GHz using RBW = 1MHz VBW = 10Hz.
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 10<sup>th</sup> 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  $\mu$ V/m (54dB $\mu$ /m) at 3 meters radiated.

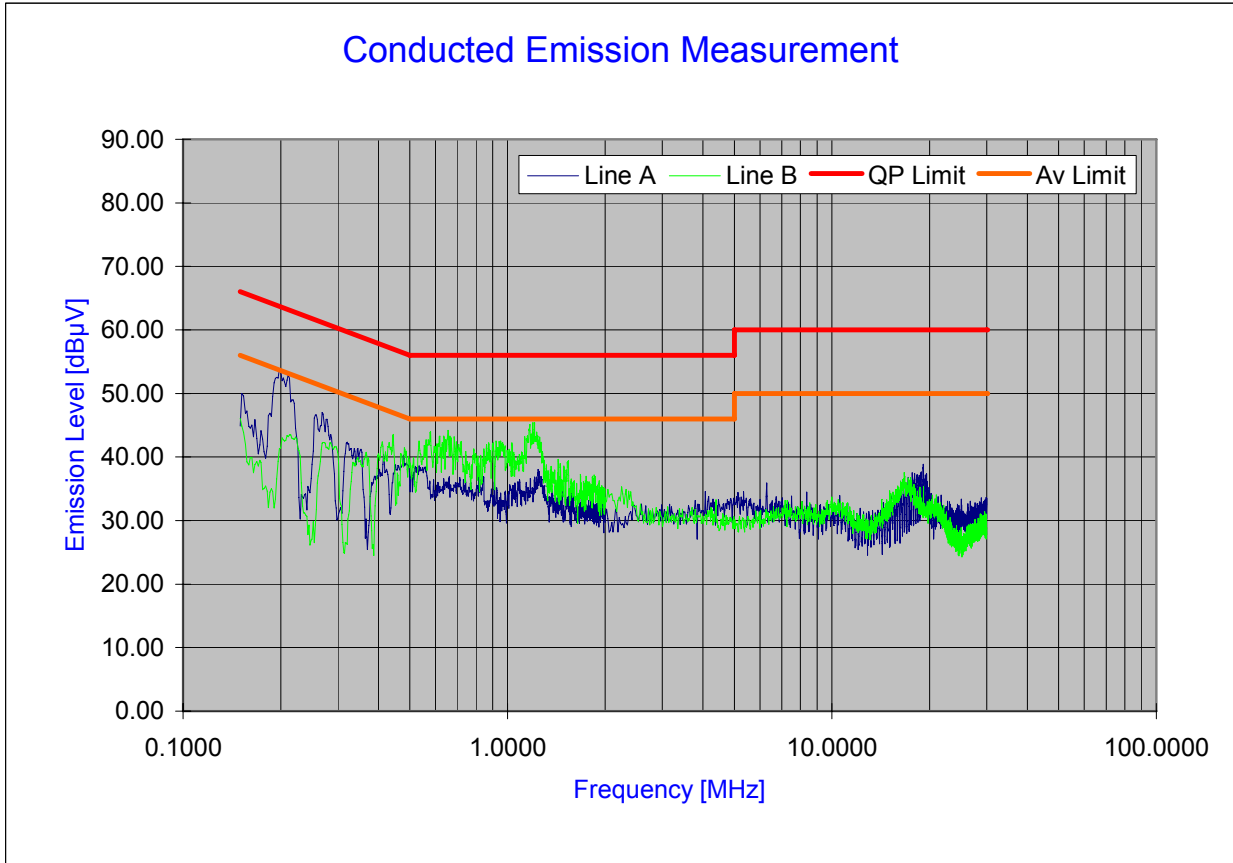
FCC ID: ACJ9TGCF-311		FCC Pt. 15.407 802.11a/n UNII MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0912152266.ACJ	Test Dates: 12/21/2009 - 02/24/2010	EUT Type: Toughbook Model: CF-31	Page 108 of 121	

**6.11 Line-Conducted Test Data**  
**§15.207**

# PCTEST Engineering Laboratory Inc.

Company : Panasonic Corporation  
 Model Number : CF-31  
 FCC ID Code : ACJ9TGCF-311  
 Standard : FCC Part 15C, 15.207

Power Source : AC120V/60Hz  
 Tested Date : 12/21/2009  
 Note : Tested with 802.11a  
 UNII Band 1 ON





Ver.1.1 ©PCTEST 2006.08

**Plot 6-96. Line Conducted Plot with 802.11a (UNII Band I)**

**Notes:**

1. All Modes of operation were investigated and the worst-case emissions are reported.
2. The limit for Class B device(s) from 150kHz to 30MHz are specified in Section 15.207 of the Title 47 CFR.
3. Line A = Phase; Line B = Neutral
4. Traces shown in plot made using a peak detector.
5. Deviations to the Specifications: None.

FCC ID: ACJ9TGCF-311	 <small>ENGINEERING LABORATORY, INC.</small>	<b>FCC Pt. 15.407 802.11a/n UNII MEASUREMENT REPORT          (CERTIFICATION)</b>		Reviewed by: Quality Manager
Test Report S/N: 0912152266.ACJ	Test Dates: 12/21/2009 - 02/24/2010	EUT Type: Toughbook Model: CF-31	Page 109 of 121	



**Line-Conducted Test Data (Cont'd)**  
**§15.207**

No.	Line	Frequency [MHz]	Factor [dB]	QP [dBµV]	Limit [dBµV]	Margin [dB]	Average [dBµV]	Limit [dBµV]	Margin [dB]
1	A	0.150	8.20	54.58	66.00	-11.42	43.29	56.00	-12.71
2	A	0.198	7.94	50.59	63.68	-13.09	36.85	53.68	-16.83
3	A	0.261	7.71	43.12	61.38	-18.26	32.96	51.38	-18.42
4	A	0.262	7.71	43.36	61.38	-18.02	34.88	51.38	-16.50
5	A	0.325	7.55	39.42	59.58	-20.16	29.84	49.58	-19.74
6	A	0.326	7.55	39.55	59.57	-20.02	29.69	49.57	-19.88
7	A	0.340	7.54	37.91	59.21	-21.30	27.96	49.21	-21.25
8	A	0.422	7.48	36.43	57.42	-20.99	24.35	47.42	-23.07
9	A	0.469	7.44	36.28	56.52	-20.24	25.21	46.52	-21.31
10	A	1.236	7.33	32.03	56.00	-23.97	24.10	46.00	-21.90
11	B	0.542	7.41	36.48	56.00	-19.52	23.80	46.00	-22.20
12	B	0.584	7.40	36.98	56.00	-19.02	22.54	46.00	-23.46
13	B	0.617	7.40	35.98	56.00	-20.02	22.92	46.00	-23.08
14	B	0.656	7.39	36.06	56.00	-19.94	22.78	46.00	-23.22
15	B	0.657	7.39	36.34	56.00	-19.66	22.86	46.00	-23.14
16	B	0.682	7.38	35.18	56.00	-20.82	23.10	46.00	-22.90
17	B	1.139	7.32	36.55	56.00	-19.45	25.34	46.00	-20.66
18	B	1.170	7.32	38.85	56.00	-17.15	27.05	46.00	-18.95
19	B	1.195	7.32	39.60	56.00	-16.40	28.57	46.00	-17.43
20	B	1.260	7.33	38.35	56.00	-17.65	27.73	46.00	-18.27

**Table 6-67. Line Conducted Data with 802.11a (UNII Band I)**

**Notes:**

1. All Modes of operation were investigated and the worst-case emissions are reported.
2. The limit for Class B device(s) from 150kHz to 30MHz are specified in Section 15.207 of the Title 47 CFR.
3. Line A = Phase; Line B = Neutral
4. Traces shown in plot made using a peak detector.
5. Deviations to the Specifications: None.

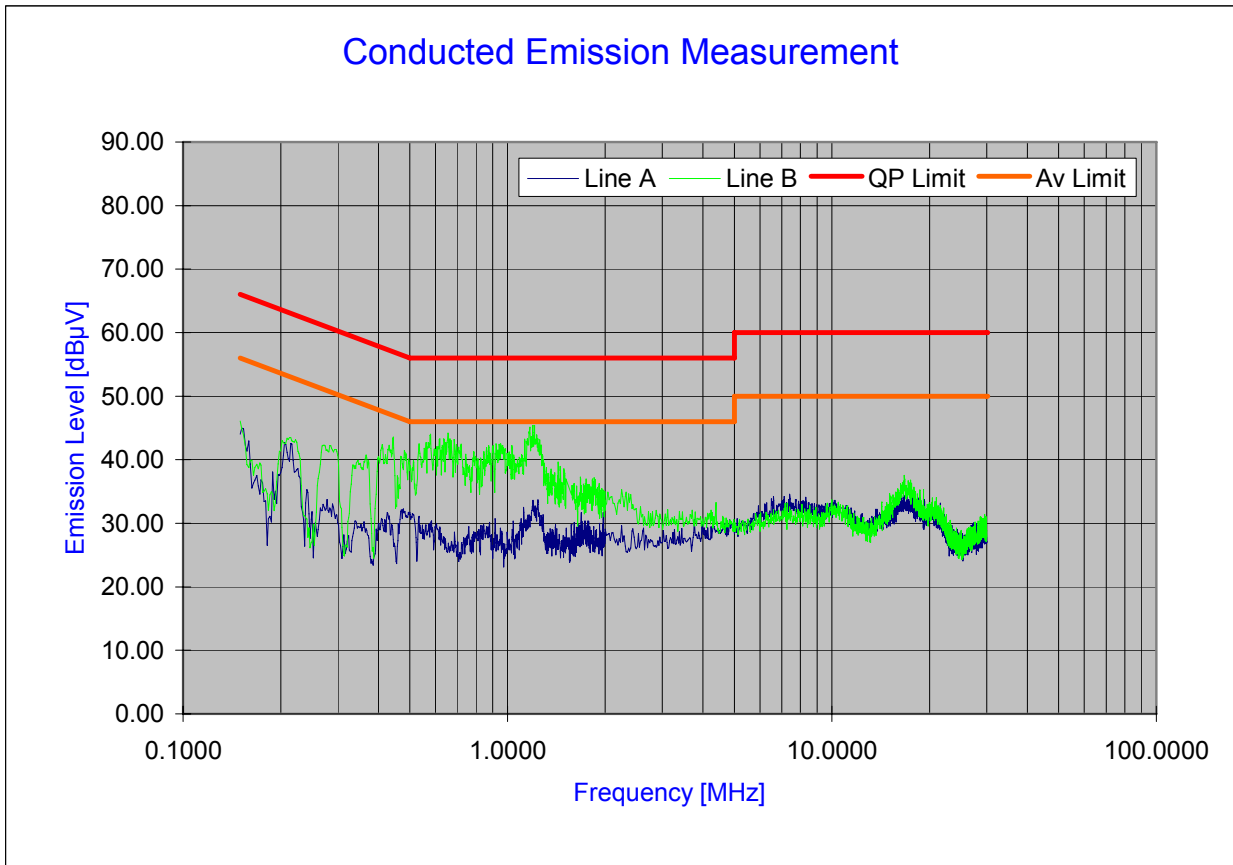
<b>FCC ID:</b> ACJ9TGCF-311		<b>FCC Pt. 15.407 802.11a/n UNII MEASUREMENT REPORT (CERTIFICATION)</b>		<b>Reviewed by:</b> Quality Manager
<b>Test Report S/N:</b> 0912152266.ACJ	<b>Test Dates:</b> 12/21/2009 - 02/24/2010	<b>EUT Type:</b> Toughbook Model: CF-31		Page 110 of 121

**Line-Conducted Test Data (Cont'd)**  
**§15.207**

# PCTEST Engineering Laboratory Inc.

Company : Panasonic Corporation  
 Model Number : CF-31  
 FCC ID Code : ACJ9TGCF-311  
 Standard : FCC Part 15C, 15.207

Power Source : AC120V/60Hz  
 Tested Date : 12/21/2009  
 Note : Tested with 802.11a  
 UNII Band 2 ON





Ver.1.1 ©PCTEST 2006.08

**Plot 6-97. Line Conducted Plot with 802.11a (UNII Band II)**

**Notes:**

1. All Modes of operation were investigated and the worst-case emissions are reported.
2. The limit for Class B device(s) from 150kHz to 30MHz are specified in Section 15.207 of the Title 47 CFR.
3. Line A = Phase; Line B = Neutral
4. Traces shown in plot made using a peak detector.
5. Deviations to the Specifications: None.

FCC ID: ACJ9TGCF-311		<b>FCC Pt. 15.407 802.11a/n UNII MEASUREMENT REPORT (CERTIFICATION)</b>		Reviewed by: Quality Manager
Test Report S/N: 0912152266.ACJ	Test Dates: 12/21/2009 - 02/24/2010	EUT Type: Toughbook Model: CF-31	Page 111 of 121	

## Line-Conducted Test Data (Cont'd)



### §15.207

No.	Line	Frequency [MHz]	Factor [dB]	QP [dBμV]	Limit [dBμV]	Margin [dB]	Average [dBμV]	Limit [dBμV]	Margin [dB]
1	A	0.150	8.20	43.12	66.00	-22.88	36.99	56.00	-19.01
2	A	0.205	7.91	38.94	63.39	-24.45	32.13	53.39	-21.26
3	A	0.207	7.90	38.70	63.32	-24.62	30.94	53.32	-22.38
4	A	0.208	7.90	39.09	63.31	-24.22	32.12	53.31	-21.19
5	A	0.467	7.45	28.58	56.56	-27.98	20.33	46.56	-26.23
6	A	1.130	7.32	26.14	56.00	-29.86	19.38	46.00	-26.62
7	A	1.206	7.32	27.73	56.00	-28.27	20.79	46.00	-25.21
8	A	1.217	7.33	28.00	56.00	-28.00	20.86	46.00	-25.14
9	A	1.227	7.33	28.05	56.00	-27.95	20.77	46.00	-25.23
10	A	1.238	7.33	28.23	56.00	-27.77	20.62	46.00	-25.38
11	B	0.542	7.41	36.48	56.00	-19.52	23.80	46.00	-22.20
12	B	0.584	7.40	36.98	56.00	-19.02	22.54	46.00	-23.46
13	B	0.617	7.40	35.98	56.00	-20.02	22.92	46.00	-23.08
14	B	0.657	7.39	36.06	56.00	-19.94	22.78	46.00	-23.22
15	B	0.658	7.39	36.34	56.00	-19.66	22.86	46.00	-23.14
16	B	0.682	7.38	35.18	56.00	-20.82	23.10	46.00	-22.90
17	B	1.139	7.32	36.55	56.00	-19.45	25.34	46.00	-20.66
18	B	1.170	7.32	38.85	56.00	-17.15	27.05	46.00	-18.95
19	B	1.195	7.32	39.60	56.00	-16.40	28.57	46.00	-17.43
20	B	1.260	7.33	38.35	56.00	-17.65	27.73	46.00	-18.27

Table 6-68. Line Conducted Data with 802.11a (UNII Band II)

**Notes:**

1. All Modes of operation were investigated and the worst-case emissions are reported.
2. The limit for Class B device(s) from 150kHz to 30MHz are specified in Section 15.207 of the Title 47 CFR.
3. Line A = Phase; Line B = Neutral
4. Traces shown in plot made using a peak detector.
5. Deviations to the Specifications: None.

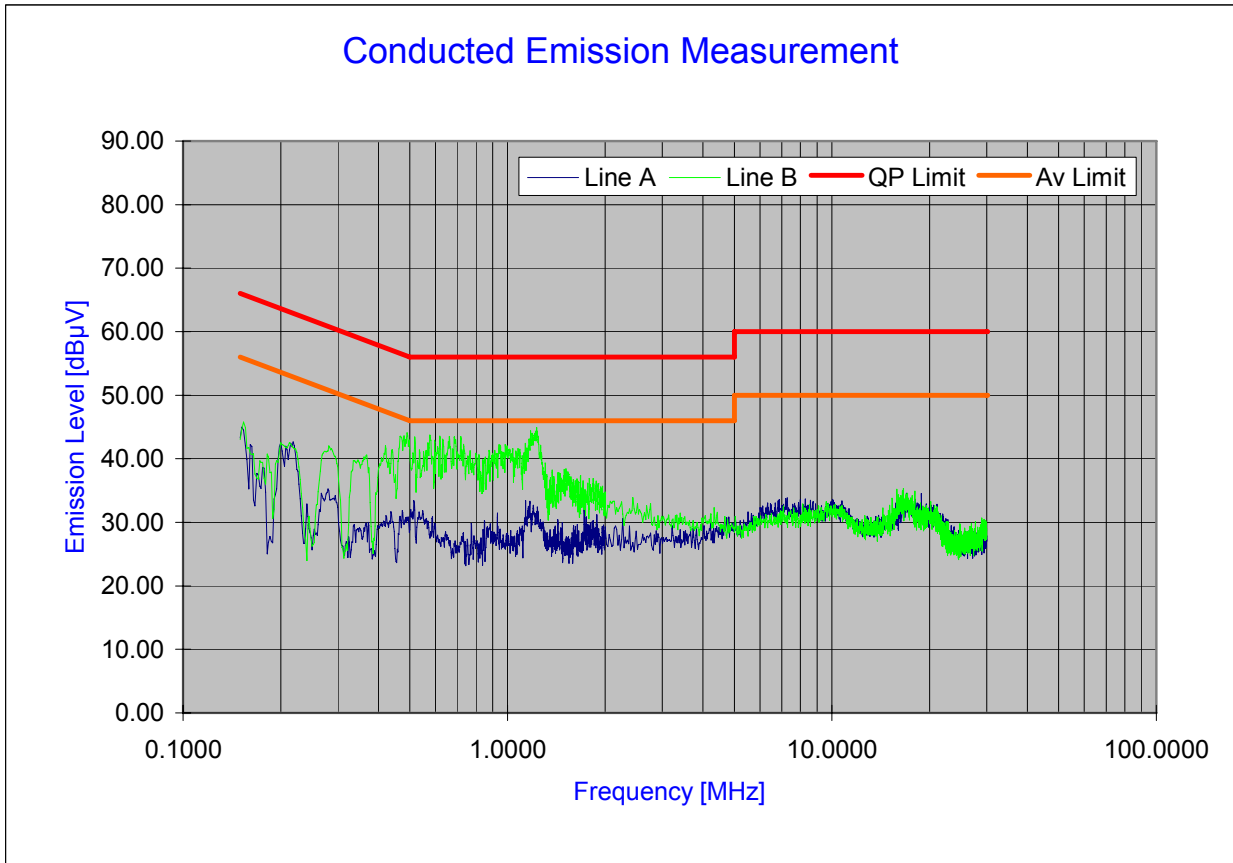
FCC ID: ACJ9TGCF-311		FCC Pt. 15.407 802.11a/n UNII MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0912152266.ACJ	Test Dates: 12/21/2009 - 02/24/2010	EUT Type: Toughbook Model: CF-31	Page 112 of 121	

**Line-Conducted Test Data (Cont'd)**  
**§15.207**

# PCTEST Engineering Laboratory Inc.

Company : Panasonic Corporation  
 Model Number : CF-31  
 FCC ID Code : ACJ9TGCF-311  
 Standard : FCC Part 15C, 15.207

Power Source : AC120V/60Hz  
 Tested Date : 12/21/2009  
 Note : Tested with 802.11a  
 UNII Band 3 ON





Ver.1.1 ©PCTEST 2006.08

**Plot 6-98. Line Conducted Plot with 802.11a (UNII Band III)**

**Notes:**

1. All Modes of operation were investigated and the worst-case emissions are reported.
2. The limit for Class B device(s) from 150kHz to 30MHz are specified in Section 15.207 of the Title 47 CFR.
3. Line A = Phase; Line B = Neutral
4. Traces shown in plot made using a peak detector.
5. Deviations to the Specifications: None.

FCC ID: ACJ9TGCF-311		FCC Pt. 15.407 802.11a/n UNII MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0912152266.ACJ	Test Dates: 12/21/2009 - 02/24/2010	EUT Type: Toughbook Model: CF-31		Page 113 of 121

## Line-Conducted Test Data (Cont'd)



### §15.207

No.	Line	Frequency [MHz]	Factor [dB]	QP [dBμV]	Limit [dBμV]	Margin [dB]	Average [dBμV]	Limit [dBμV]	Margin [dB]
1	A	0.150	8.20	42.45	66.00	-23.55	36.87	56.00	-19.13
2	A	0.205	7.91	38.82	63.41	-24.59	30.96	53.41	-22.45
3	A	0.206	7.91	38.63	63.38	-24.75	31.03	53.38	-22.35
4	A	0.467	7.45	26.40	56.56	-30.16	20.00	46.56	-26.56
5	A	0.512	7.42	27.65	56.00	-28.35	19.89	46.00	-26.11
6	A	0.534	7.42	28.10	56.00	-27.90	20.86	46.00	-25.14
7	A	0.949	7.33	25.17	56.00	-30.83	19.72	46.00	-26.28
8	A	1.149	7.32	26.14	56.00	-29.86	19.82	46.00	-26.18
9	A	1.217	7.33	27.42	56.00	-28.58	20.49	46.00	-25.51
10	A	1.722	7.37	24.67	56.00	-31.33	19.64	46.00	-26.36
11	B	0.491	7.43	36.93	56.14	-19.21	25.79	46.14	-20.35
12	B	0.512	7.42	37.19	56.00	-18.81	24.12	46.00	-21.88
13	B	0.572	7.41	36.05	56.00	-19.95	22.54	46.00	-23.46
14	B	0.600	7.40	36.22	56.00	-19.78	23.29	46.00	-22.71
15	B	0.658	7.39	36.17	56.00	-19.83	22.45	46.00	-23.55
16	B	0.694	7.38	35.36	56.00	-20.64	22.34	46.00	-23.66
17	B	0.731	7.37	36.60	56.00	-19.40	22.39	46.00	-23.61
18	B	1.168	7.32	37.79	56.00	-18.21	26.06	46.00	-19.94
19	B	1.169	7.32	37.83	56.00	-18.17	26.74	46.00	-19.26
20	B	1.223	7.33	39.26	56.00	-16.74	28.60	46.00	-17.40

Table 6-69. Line Conducted Data with 802.11a (UNII Band III)

**Notes:**

1. All Modes of operation were investigated and the worst-case emissions are reported.
2. The limit for Class B device(s) from 150kHz to 30MHz are specified in Section 15.207 of the Title 47 CFR.
3. Line A = Phase; Line B = Neutral
4. Traces shown in plot made using a peak detector.
5. Deviations to the Specifications: None.

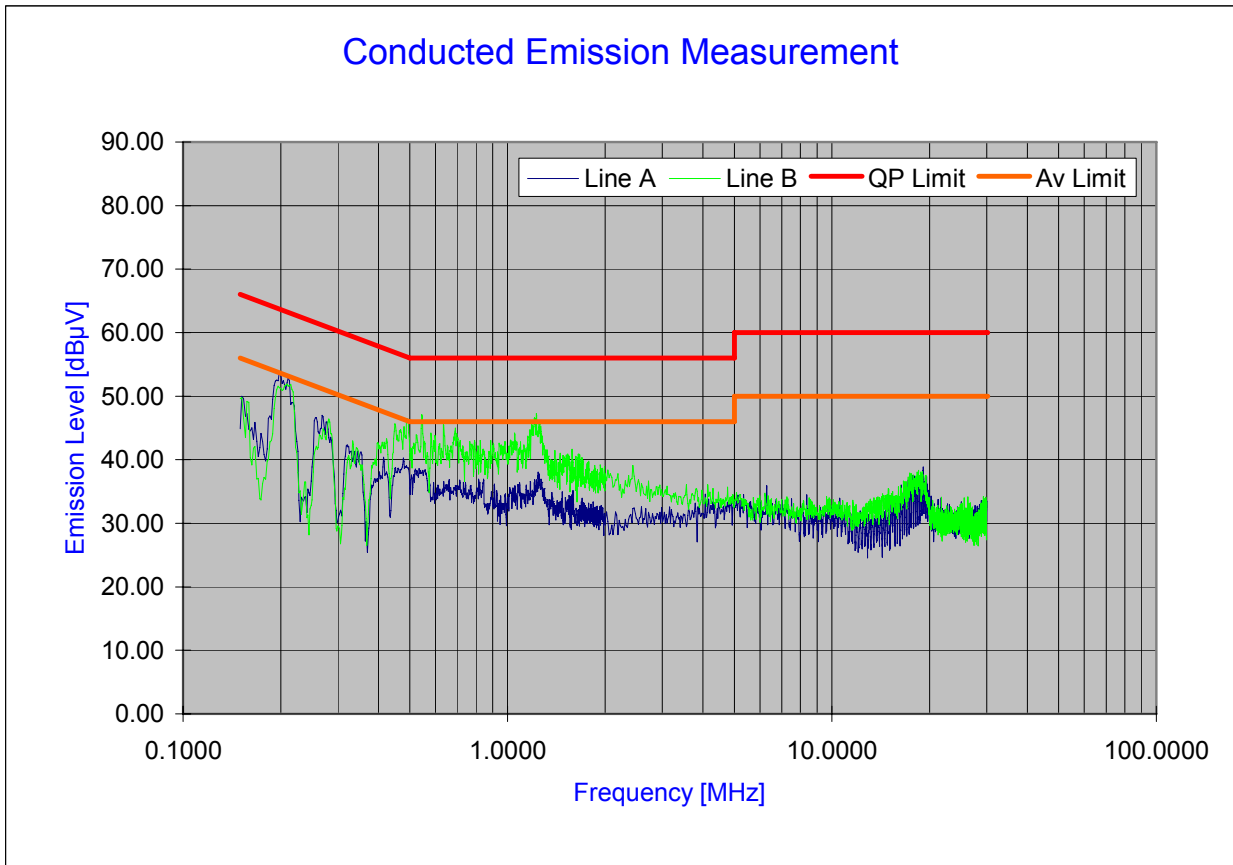
FCC ID: ACJ9TGCF-311		FCC Pt. 15.407 802.11a/n UNII MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0912152266.ACJ	Test Dates: 12/21/2009 - 02/24/2010	EUT Type: Toughbook Model: CF-31	Page 114 of 121	

**Line-Conducted Test Data (Cont'd)**  
**§15.207**

# PCTEST Engineering Laboratory Inc.

Company : Panasonic Corporation  
 Model Number : CF-31  
 FCC ID Code : ACJ9TGCF-311  
 Standard : FCC Part 15C, 15.207

Power Source : AC120V/60Hz  
 Tested Date : 12/21/2009  
 Note : Tested with 802.11n  
 UNII Band 1 ON





Ver.1.1 ©PCTEST 2006.08

**Plot 6-99. Line Conducted Plot with 802.11n (UNII Band I)**

**Notes:**

1. All Modes of operation were investigated and the worst-case emissions are reported.
2. The limit for Class B device(s) from 150kHz to 30MHz are specified in Section 15.207 of the Title 47 CFR.
3. Line A = Phase; Line B = Neutral
4. Traces shown in plot made using a peak detector.
5. Deviations to the Specifications: None.

FCC ID: ACJ9TGCF-311		<b>FCC Pt. 15.407 802.11a/n UNII MEASUREMENT REPORT (CERTIFICATION)</b>		Reviewed by: Quality Manager
Test Report S/N: 0912152266.ACJ	Test Dates: 12/21/2009 - 02/24/2010	EUT Type: Toughbook Model: CF-31	Page 115 of 121	



**Line-Conducted Test Data (Cont'd)**  
**§15.207**

No.	Line	Frequency [MHz]	Factor [dB]	QP [dBμV]	Limit [dBμV]	Margin [dB]	Average [dBμV]	Limit [dBμV]	Margin [dB]
1	A	0.150	8.20	54.58	66.00	-11.42	43.29	56.00	-12.71
2	A	0.198	7.94	50.59	63.68	-13.09	36.85	53.68	-16.83
3	A	0.261	7.71	43.12	61.38	-18.26	32.96	51.38	-18.42
4	A	0.262	7.71	43.36	61.38	-18.02	34.88	51.38	-16.50
5	A	0.325	7.55	39.42	59.58	-20.16	29.84	49.58	-19.74
6	A	0.326	7.55	39.55	59.57	-20.02	29.69	49.57	-19.88
7	A	0.340	7.54	37.91	59.21	-21.30	27.96	49.21	-21.25
8	A	0.422	7.48	36.43	57.42	-20.99	24.35	47.42	-23.07
9	A	0.469	7.44	36.28	56.52	-20.24	25.21	46.52	-21.31
10	A	1.236	7.33	32.03	56.00	-23.97	24.10	46.00	-21.90
11	B	0.203	7.92	49.15	63.51	-14.36	36.02	53.51	-17.49
12	B	0.461	7.45	39.59	56.67	-17.08	28.82	46.67	-17.85
13	B	0.492	7.43	40.74	56.14	-15.40	26.32	46.14	-19.82
14	B	0.529	7.42	39.05	56.00	-16.95	26.73	46.00	-19.27
15	B	0.632	7.39	37.98	56.00	-18.02	23.71	46.00	-22.29
16	B	0.703	7.38	38.74	56.00	-17.26	25.12	46.00	-20.88
17	B	1.191	7.32	39.38	56.00	-16.62	28.53	46.00	-17.47
18	B	1.193	7.32	39.75	56.00	-16.25	28.81	46.00	-17.19
19	B	1.212	7.33	40.58	56.00	-15.42	29.63	46.00	-16.37
20	B	1.223	7.33	40.50	56.00	-15.50	30.52	46.00	-15.48

**Table 6-70. Line Conducted Data with 802.11n (UNII Band I)**

**Notes:**

1. All Modes of operation were investigated and the worst-case emissions are reported.
2. The limit for Class B device(s) from 150kHz to 30MHz are specified in Section 15.207 of the Title 47 CFR.
3. Line A = Phase; Line B = Neutral
4. Traces shown in plot made using a peak detector.
5. Deviations to the Specifications: None.

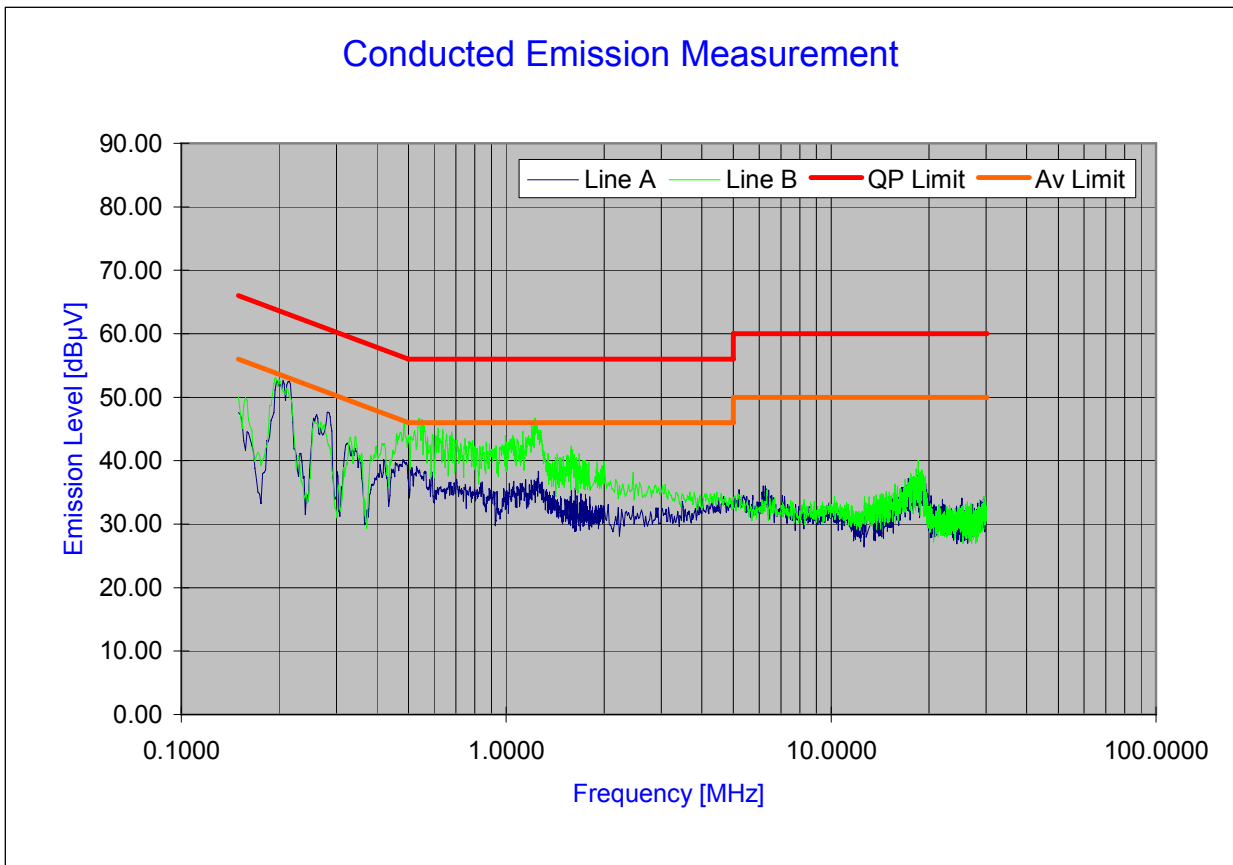
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Test Report S/N: 0912152266.ACJ	Test Dates: 12/21/2009 - 02/24/2010	EUT Type: Toughbook Model: CF-31		Page 116 of 121

**Line-Conducted Test Data (Cont'd)**  
**§15.207**

# PCTEST Engineering Laboratory Inc.

Company : Panasonic Corporation  
 Model Number : CF-31  
 FCC ID Code : ACJ9TGCF-311  
 Standard : FCC Part 15C, 15.207

Power Source : AC120V/60Hz  
 Tested Date : 12/21/2009  
 Note : Tested with 802.11n  
 UNII Band 2 ON





Ver.1.1 ©PCTEST 2006.08

**Plot 6-100. Line Conducted Plot with 802.11n (UNII Band II)**

**Notes:**

1. All Modes of operation were investigated and the worst-case emissions are reported.
2. The limit for Class B device(s) from 150kHz to 30MHz are specified in Section 15.207 of the Title 47 CFR.
3. Line A = Phase; Line B = Neutral
4. Traces shown in plot made using a peak detector.
5. Deviations to the Specifications: None.

FCC ID: ACJ9TGCF-311	 PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11a/n UNII MEASUREMENT REPORT (CERTIFICATION)	 Panasonic	Reviewed by: Quality Manager
Test Report S/N: 0912152266.ACJ	Test Dates: 12/21/2009 - 02/24/2010	EUT Type: Toughbook Model: CF-31	Page 117 of 121	

## Line-Conducted Test Data (Cont'd)



### §15.207

No.	Line	Frequency [MHz]	Factor [dB]	QP [dBμV]	Limit [dBμV]	Margin [dB]	Average [dBμV]	Limit [dBμV]	Margin [dB]
1	A	0.197	7.94	50.59	63.73	-13.14	37.79	53.73	-15.94
2	A	0.262	7.71	43.79	61.37	-17.58	34.77	51.37	-16.60
3	A	0.268	7.68	42.94	61.17	-18.23	34.33	51.17	-16.84
4	A	0.325	7.55	39.76	59.57	-19.81	29.80	49.57	-19.77
5	A	0.422	7.48	36.68	57.42	-20.74	25.69	47.42	-21.73
6	A	0.481	7.44	36.97	56.33	-19.36	24.13	46.33	-22.20
7	A	0.531	7.42	34.63	56.00	-21.37	24.38	46.00	-21.62
8	A	0.532	7.42	35.12	56.00	-20.88	24.57	46.00	-21.43
9	A	0.575	7.41	32.39	56.00	-23.61	22.92	46.00	-23.08
10	A	1.243	7.33	32.26	56.00	-23.74	23.97	46.00	-22.03
11	B	0.198	7.94	49.56	63.68	-14.12	37.53	53.68	-16.15
12	B	0.489	7.43	40.56	56.19	-15.63	29.04	46.19	-17.15
13	B	0.523	7.42	39.18	56.00	-16.82	26.59	46.00	-19.41
14	B	0.548	7.41	38.72	56.00	-17.28	24.50	46.00	-21.50
15	B	0.558	7.41	38.74	56.00	-17.26	25.93	46.00	-20.07
16	B	0.632	7.39	37.93	56.00	-18.07	23.62	46.00	-22.38
17	B	0.633	7.39	37.93	56.00	-18.07	23.87	46.00	-22.13
18	B	1.183	7.32	40.00	56.00	-16.00	28.61	46.00	-17.39
19	B	1.223	7.33	40.44	56.00	-15.56	30.07	46.00	-15.93
20	B	1.224	7.33	40.66	56.00	-15.34	29.33	46.00	-16.67

Table 6-71. Line Conducted Data with 802.11a (UNII Band II)

**Notes:**

1. All Modes of operation were investigated and the worst-case emissions are reported.
2. The limit for Class B device(s) from 150kHz to 30MHz are specified in Section 15.207 of the Title 47 CFR.
3. Line A = Phase; Line B = Neutral
4. Traces shown in plot made using a peak detector.
5. Deviations to the Specifications: None.

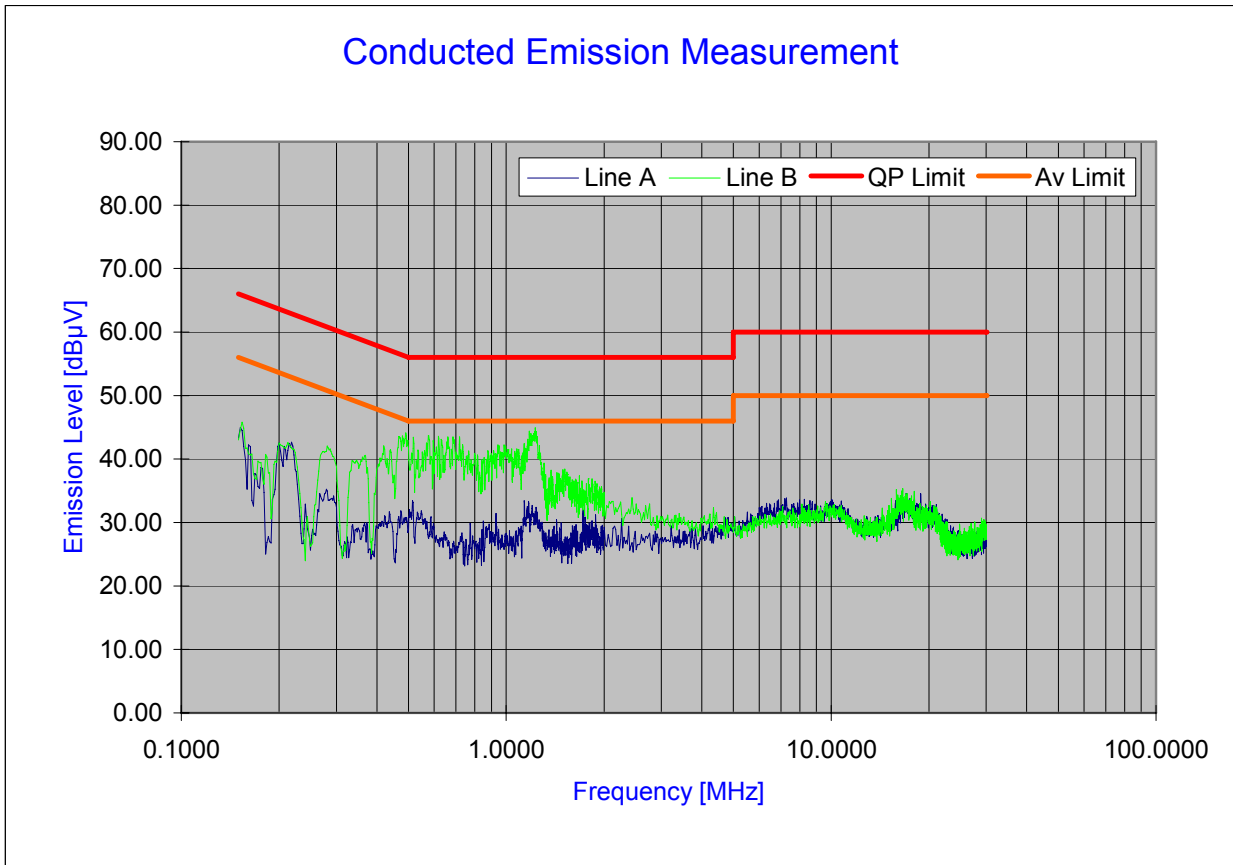
FCC ID: ACJ9TGCF-311		FCC Pt. 15.407 802.11a/n UNII MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0912152266.ACJ	Test Dates: 12/21/2009 - 02/24/2010	EUT Type: Toughbook Model: CF-31	Page 118 of 121	

**Line-Conducted Test Data (Cont'd)**  
**§15.207**

# PCTEST Engineering Laboratory Inc.

Company : Panasonic Corporation  
 Model Number : CF-31  
 FCC ID Code : ACJ9TGCF-311  
 Standard : FCC Part 15C, 15.207

Power Source : AC120V/60Hz  
 Tested Date : 12/21/2009  
 Note : Tested with 802.11n  
 UNII Band 3 ON





Ver.1.1 ©PCTEST 2006.08

**Plot 6-101. Line Conducted Plot with 802.11n (UNII Band III)**

**Notes:**

1. All Modes of operation were investigated and the worst-case emissions are reported.
2. The limit for Class B device(s) from 150kHz to 30MHz are specified in Section 15.207 of the Title 47 CFR.
3. Line A = Phase; Line B = Neutral
4. Traces shown in plot made using a peak detector.
5. Deviations to the Specifications: None.

FCC ID: ACJ9TGCF-311	 PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11a/n UNII MEASUREMENT REPORT (CERTIFICATION)	 <b>Panasonic</b>	Reviewed by: Quality Manager
Test Report S/N: 0912152266.ACJ	Test Dates: 12/21/2009 - 02/24/2010	EUT Type: Toughbook Model: CF-31	Page 119 of 121	



**Line-Conducted Test Data (Cont'd)**  
**§15.207**

No.	Line	Frequency [MHz]	Factor [dB]	QP [dBµV]	Limit [dBµV]	Margin [dB]	Average [dBµV]	Limit [dBµV]	Margin [dB]
1	A	0.150	8.20	42.45	66.00	-23.55	36.87	56.00	-19.13
2	A	0.205	7.91	38.82	63.41	-24.59	30.96	53.41	-22.45
3	A	0.206	7.91	38.63	63.38	-24.75	31.03	53.38	-22.35
4	A	0.467	7.45	26.40	56.56	-30.16	20.00	46.56	-26.56
5	A	0.512	7.42	27.65	56.00	-28.35	19.89	46.00	-26.11
6	A	0.534	7.42	28.10	56.00	-27.90	20.86	46.00	-25.14
7	A	0.949	7.33	25.17	56.00	-30.83	19.72	46.00	-26.28
8	A	1.149	7.32	26.14	56.00	-29.86	19.82	46.00	-26.18
9	A	1.217	7.33	27.42	56.00	-28.58	20.49	46.00	-25.51
10	A	1.722	7.37	24.67	56.00	-31.33	19.64	46.00	-26.36
11	B	0.491	7.43	36.93	56.14	-19.21	25.79	46.14	-20.35
12	B	0.512	7.42	37.19	56.00	-18.81	24.12	46.00	-21.88
13	B	0.572	7.41	36.05	56.00	-19.95	22.54	46.00	-23.46
14	B	0.600	7.40	36.22	56.00	-19.78	23.29	46.00	-22.71
15	B	0.658	7.39	36.17	56.00	-19.83	22.45	46.00	-23.55
16	B	0.694	7.38	35.36	56.00	-20.64	22.34	46.00	-23.66
17	B	0.731	7.37	36.60	56.00	-19.40	22.39	46.00	-23.61
18	B	1.168	7.32	37.79	56.00	-18.21	26.06	46.00	-19.94
19	B	1.169	7.32	37.83	56.00	-18.17	26.74	46.00	-19.26
20	B	1.223	7.33	39.26	56.00	-16.74	28.60	46.00	-17.40

**Table 6-72. Line Conducted Data with 802.11n (UNII Band III)**



**Notes:**

1. All Modes of operation were investigated and the worst-case emissions are reported.
2. The limit for Class B device(s) from 150kHz to 30MHz are specified in Section 15.207 of the Title 47 CFR.
3. Line A = Phase; Line B = Neutral
4. Traces shown in plot made using a peak detector.
5. Deviations to the Specifications: None.

<b>FCC ID:</b> ACJ9TGCF-311		<b>FCC Pt. 15.407 802.11a/n UNII MEASUREMENT REPORT (CERTIFICATION)</b>		<b>Reviewed by:</b> Quality Manager
<b>Test Report S/N:</b> 0912152266.ACJ	<b>Test Dates:</b> 12/21/2009 - 02/24/2010	<b>EUT Type:</b> Toughbook Model: CF-31		Page 120 of 121

## 7.0 CONCLUSION

The data collected relate only the item(s) tested and show that the **Panasonic Toughbook Model: CF-31** **FCC ID: ACJ9TGCF-311** is in compliance with Part 15E of the FCC Rules.

FCC ID: ACJ9TGCF-311		FCC Pt. 15.407 802.11a/n UNII MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0912152266.ACJ	Test Dates: 12/21/2009 - 02/24/2010	EUT Type: Toughbook Model: CF-31		Page 121 of 121