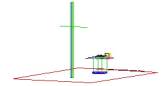




# PCTEST ENGINEERING LABORATORY, INC.

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



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

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

**Date of Testing:**  
August 13, 2010  
**Test Site/Location:**  
PCTEST Lab, Columbia, MD, USA  
**Test Report Serial No.:**  
0Y1007231224.ACJ

**FCC ID:** ACJ9TGCF-19F

**APPLICANT:** Panasonic Corporation of North America

**Application Type:** Certification  
**Model(s):** CF-19mk4  
**EUT Type:** Toughbook Model: CF-19mk4  
**Max. RF Output Power:** 196.3 mW (22.93 dBm) Peak Conducted (802.11b)  
490.9 mW (26.91 dBm) Peak Conducted (802.11g)  
528.4 mW (27.23 dBm) Peak Aggregate Conducted (20MHz 802.11n)  
339.6 mW (25.31 dBm) Peak Aggregate Conducted (40MHz 802.11n)  
**Frequency Range:** 2412 - 2462 MHz (DSSS/OFDM)  
**FCC Classification:** Digital Transmission System (DTS)  
**FCC Rule Part(s):** Part 15.247  
**Test Device Serial No.:** N/A

This equipment has been shown to be capable of compliance with the applicable technical standards as indicated in the measurement report and was tested in accordance with the measurement procedures specified in ANSI C-63.4-2003. Test results reported herein relate only to the item(s) tested.

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

*Grant Conditions: Listed output power is conducted.*

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

Randy Ortenez  
President

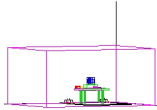


|                                      |                                |                                                                   |  |                                 |
|--------------------------------------|--------------------------------|-------------------------------------------------------------------|--|---------------------------------|
| FCC ID: ACJ9TGCF-19F                 |                                | FCC Pt. 15.247 802.11 b/g/n MEASUREMENT REPORT<br>(CERTIFICATION) |  | Reviewed by:<br>Quality Manager |
| Test Report S/N:<br>0Y1007231224.ACJ | Test Dates:<br>August 13, 2010 | EUT Type:<br>Toughbook Model: CF-19mk4                            |  | Page 1 of 73                    |

## TABLE OF CONTENTS

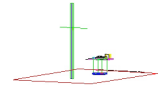
|                                                       |    |
|-------------------------------------------------------|----|
| FCC PART 15.247 MEASUREMENT REPORT .....              | 3  |
| 1.0 INTRODUCTION.....                                 | 4  |
| 1.1 SCOPE.....                                        | 4  |
| 1.2 PCTEST TEST LOCATION.....                         | 4  |
| 2.0 PRODUCT INFORMATION .....                         | 5  |
| 2.1 EQUIPMENT DESCRIPTION.....                        | 5  |
| 2.2 EMI SUPPRESSION DEVICE(S)/MODIFICATIONS.....      | 5  |
| 2.3 LABELING REQUIREMENTS.....                        | 5  |
| 3.0 DESCRIPTION OF TEST .....                         | 6  |
| 3.1 EVALUATION PROCEDURE.....                         | 6  |
| 3.2 CONDUCTED EMISSIONS.....                          | 6  |
| 3.3 RADIATED EMISSIONS .....                          | 7  |
| 4.0 ANTENNA REQUIREMENTS .....                        | 8  |
| 5.0 TEST EQUIPMENT CALIBRATION DATA.....              | 9  |
| 6.0 TEST RESULTS .....                                | 10 |
| 6.1 SUMMARY .....                                     | 10 |
| 6.2 6DB BANDWIDTH MEASUREMENT – 802.11B/G/N .....     | 11 |
| 6.3 OUTPUT POWER MEASUREMENT – 802.11B/G .....        | 17 |
| 6.4 OUTPUT POWER MEASUREMENT – 802.11N (20MHZ).....   | 21 |
| 6.5 OUTPUT POWER MEASUREMENT – 802.11N (40MHZ).....   | 24 |
| 6.6 POWER SPECTRAL DENSITY (802.11B/G/N) .....        | 27 |
| 6.7 OUT OF BAND EMISSIONS AT THE BAND EDGE .....      | 34 |
| 6.8 OUT OF BAND EMISSIONS.....                        | 50 |
| 6.9 RADIATED SPURIOUS EMISSION MEASUREMENTS.....      | 57 |
| 6.10 RADIATED RESTRICTED BAND EDGE MEASUREMENTS ..... | 61 |
| 6.11 LINE-CONDUCTED TEST DATA.....                    | 67 |
| CONCLUSION .....                                      | 73 |

|                                      |                                                                                     |                                                                   |                                                                                       |                                 |
|--------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------|---------------------------------------------------------------------------------------|---------------------------------|
| FCC ID: ACJ9TGCF-19F                 |  | FCC Pt. 15.247 802.11 b/g/n MEASUREMENT REPORT<br>(CERTIFICATION) |  | Reviewed by:<br>Quality Manager |
| Test Report S/N:<br>0Y1007231224.ACJ | Test Dates:<br>August 13, 2010                                                      | EUT Type:<br>Toughbook Model: CF-19mk4                            |                                                                                       | Page 2 of 73                    |



## MEASUREMENT REPORT

### FCC Part 15.247



#### § 2.1033 General Information

**APPLICANT:** Panasonic Corporation of North America

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

**TEST SITE:** PCTEST ENGINEERING LABORATORY, INC.

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

**FCC RULE PART(S):** Part 15.247

**MODEL NAME:** CF-19mk4

**FCC ID:** ACJ9TGCF-19F

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

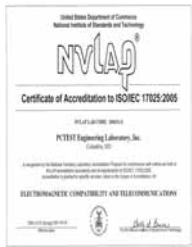
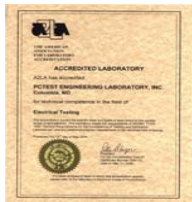
**FCC CLASSIFICATION:** Digital Transmission System (DTS)

**DATE(S) OF TEST:** August 13, 2010

**TEST REPORT S/N:** 0Y1007231224.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.

|                                             |                                                                                     |                                                                       |                                                                                       |                                        |
|---------------------------------------------|-------------------------------------------------------------------------------------|-----------------------------------------------------------------------|---------------------------------------------------------------------------------------|----------------------------------------|
| <b>FCC ID:</b> ACJ9TGCF-19F                 |  | <b>FCC Pt. 15.247 802.11 b/g/n MEASUREMENT REPORT (CERTIFICATION)</b> |  | <b>Reviewed by:</b><br>Quality Manager |
| <b>Test Report S/N:</b><br>0Y1007231224.ACJ | <b>Test Dates:</b><br>August 13, 2010                                               | <b>EUT Type:</b><br>Toughbook Model: CF-19mk4                         |                                                                                       | Page 3 of 73                           |

## 1.0 INTRODUCTION

### 1.1 Scope

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

### 1.2 PCTEST Test Location

The map below shows the location of the PCTEST LABORATORY, its proximity to the FCC Laboratory, the Columbia vicinity area, the Baltimore-Washington Intern't'l (BWI) airport, the city of Baltimore and the Washington, DC area. (see Figure 1-1).

These measurement tests were conducted at the PCTEST Engineering Laboratory, Inc. facility in New Concept Business Park, Guilford Industrial Park, Columbia, Maryland. The site address is 6660-B Dobbin Road, Columbia, MD 21045. The test site is one of the highest points in the Columbia area with an elevation of 390 feet above mean sea level. The site coordinates are 39° 11'15" N latitude and 76° 49'38" W longitude. The facility is 1.5 miles North of the FCC laboratory, and the ambient signal and ambient signal strength are approximately equal to those of the FCC laboratory. There are no FM or TV transmitters within 15 miles of the site. The detailed description of the measurement facility was found to be in compliance with the requirements of § 2.948 according to ANSI C63.4-2003 on January 27, 2006.

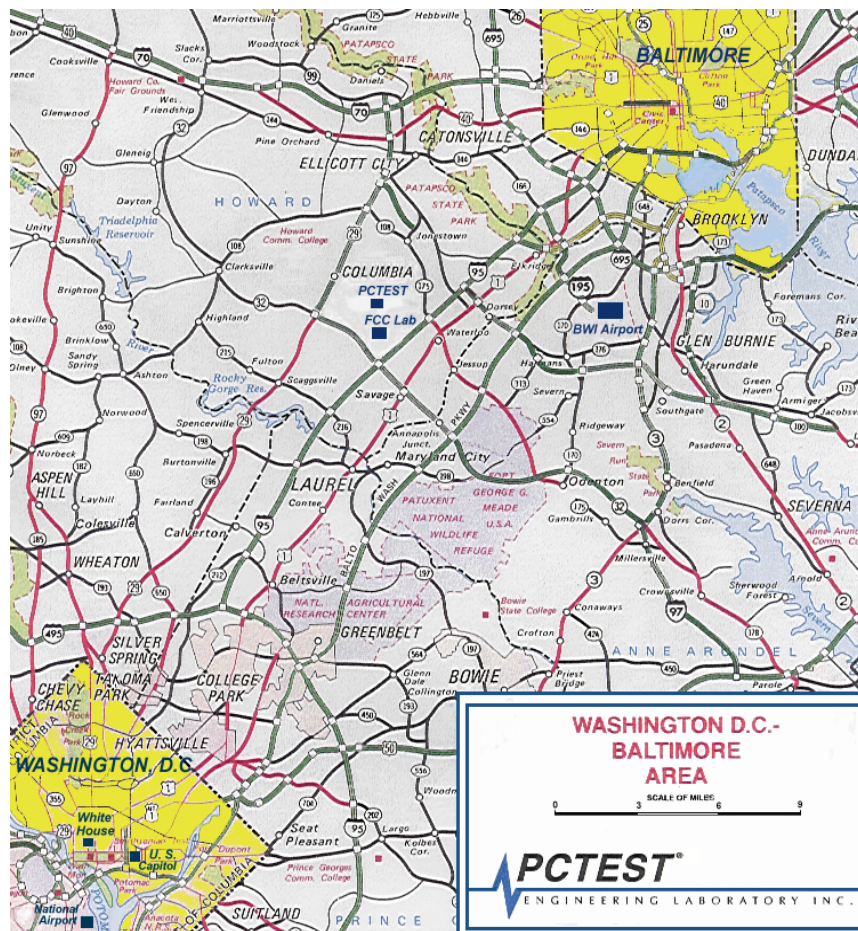


Figure 1-1. Map of the Greater Baltimore and Metropolitan Washington, D.C. area

|                                      |                                               |                                                                   |                  |                                 |
|--------------------------------------|-----------------------------------------------|-------------------------------------------------------------------|------------------|---------------------------------|
| FCC ID: ACJ9TGCF-19F                 | <b>PCTEST</b><br>ENGINEERING LABORATORY, INC. | FCC Pt. 15.247 802.11 b/g/n MEASUREMENT REPORT<br>(CERTIFICATION) | <b>Panasonic</b> | Reviewed by:<br>Quality Manager |
| Test Report S/N:<br>0Y1007231224.ACJ | Test Dates:<br>August 13, 2010                | EUT Type:<br>Toughbook Model: CF-19mk4                            |                  | Page 4 of 73                    |

## 2.0 PRODUCT INFORMATION

### 2.1 Equipment Description

The Equipment Under Test (EUT) is the **Panasonic Toughbook Model: CF-19mk4 FCC ID: ACJ9TGCF-19F**. The EUT consisted of the following component(s):

| Manufacturer / Model                         | FCC ID       | Description                     |
|----------------------------------------------|--------------|---------------------------------|
| Panasonic / Model: CF-19mk4                  | ACJ9TGCF-19F | Toughbook Model: CF-19mk4       |
| Alps / Model: UGNZA                          | N/A          | Bluetooth Module                |
| Qualcomm / Model: Gobi2000                   | N7NGOBI2     | WWAN Module                     |
| Azurewave Technologies / Model: N5HZC0000054 | N/A          | 802.11b/g/n Wireless LAN Module |

**Table 2-1. EUT Equipment Description**

### 2.2 EMI Suppression Device(s)/Modifications

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

### 2.3 Labeling Requirements

Per 2.1074 & 15.19; Docket 95-19

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

Please see attachment for FCC ID label and label location.

|                                      |                                                                                     |                                                                   |                                                                                       |                                 |
|--------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------|---------------------------------------------------------------------------------------|---------------------------------|
| FCC ID: ACJ9TGCF-19F                 |  | FCC Pt. 15.247 802.11 b/g/n MEASUREMENT REPORT<br>(CERTIFICATION) |  | Reviewed by:<br>Quality Manager |
| Test Report S/N:<br>0Y1007231224.ACJ | Test Dates:<br>August 13, 2010                                                      | EUT Type:<br>Toughbook Model: CF-19mk4                            |                                                                                       | Page 5 of 73                    |



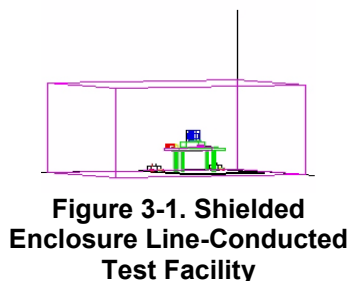
## 3.0 DESCRIPTION OF TEST

### 3.1 Evaluation Procedure

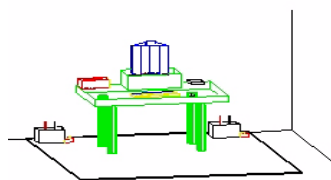
The measurement procedure described in the American National Standard for Methods of Measurement of Radio-Noise Emission from Low-Voltage Electrical and Electronic Equipment in the Range of 9kHz to 40GHz (ANSI C63.4-2003) and FCC procedure dated March 23, 2005 entitled "Measurements of Digital Transmission Systems Operating Under Section 15.247" were used in the measurement of **Panasonic Toughbook Model: CF-19mk4 FCC ID: ACJ9TGCF-19F**.

Deviation from measurement procedure.....None

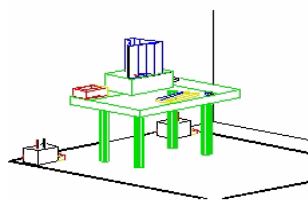
### 3.2 Conducted Emissions



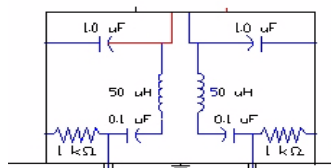
**Figure 3-1. Shielded Enclosure Line-Conducted Test Facility**



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



**Figure 3-3. Wooden Table & Bonded LISNs**



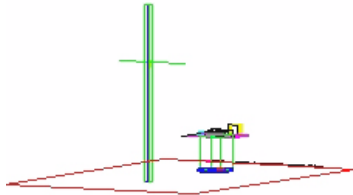
**Figure 3-4. LISN Schematic Diagram**

The line-conducted facility is located inside a 16'x20'x10' shielded enclosure, manufactured by Ray Proof Series 81 (see Figure 3-1). The shielding effectiveness of the shielded room is in accordance with MIL-Std-285 or NSA 65-5. A 1m x 1.5m wooden table 80cm high is placed 40cm away from the vertical wall and 1.5m away from the sidewall of the shielded room (see Figure 3-2). Solar Electronics and EMCO Model 3725/2 (10kHz-30MHz) 50Ω/50μH Line-Impedance Stabilization Networks (LISNs) are bonded to the shielded room (see Figure 3-3). The EUT is powered from the Solar LISN and the support equipment is powered from the EMCO LISN. Power to the LISNs are filtered by a high-current high-insertion loss Ray Proof power line filter (100dB 14Hz-10GHz). The purpose of the filter is to attenuate ambient signal interference and this filter is also bonded to the shielded enclosure. All electrical cables are shielded by braided tinned copper zipper tubing with an inner diameter of ½". If the EUT is a DC-powered device, power will be derived from the source power supply it normally will be powered from and this supply line(s) will be connected to the Solar LISN. The LISN schematic diagram is shown (see Figure 3-4). All interconnecting cables more than 1 meter were shortened to a 1 meter length by non-inductive bundling (serpentine fashion). Sufficient time for the EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating condition. The RF output of the LISN was connected to the spectrum analyzer to determine the frequency producing the maximum EME from the EUT.

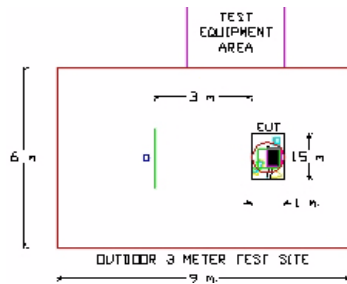
The spectrum was scanned from 150kHz to 30MHz with a spectrum analyzer. The detector function was set to CISPR quasi-peak and average mode. The bandwidth of the analyzer was set to 10kHz. The EUT, support equipment, and interconnecting cables were arranged and manipulated to maximize each EME emission. Each emission was maximized by: switching power lines; varying the mode of operation or resolution; clock or data exchange speed; scrolling H pattern to the EUT and/or support equipment, and powering the monitor from the floor mounted outlet box and the computer aux AC outlet, if applicable; whichever determined the worst-case emission. Photographs of the worst-case emission can be seen in the test setup photographs. Each EME reported was calibrated using the Agilent E8257D (250kHz – 20GHz) PSG Signal Generator.

|                                      |                                               |                                                                   |                  |                                 |
|--------------------------------------|-----------------------------------------------|-------------------------------------------------------------------|------------------|---------------------------------|
| FCC ID: ACJ9TGCF-19F                 | <b>PCTEST</b><br>ENGINEERING LABORATORY, INC. | FCC Pt. 15.247 802.11 b/g/n MEASUREMENT REPORT<br>(CERTIFICATION) | <b>Panasonic</b> | Reviewed by:<br>Quality Manager |
| Test Report S/N:<br>0Y1007231224.ACJ | Test Dates:<br>August 13, 2010                | EUT Type:<br>Toughbook Model: CF-19mk4                            |                  | Page 6 of 73                    |

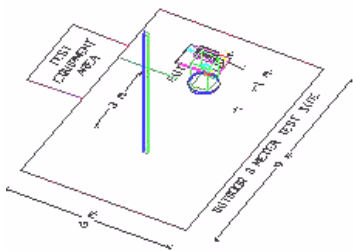
### 3.3 Radiated Emissions



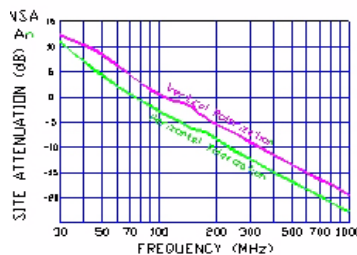
**Figure 3-5. 3-Meter Test Site**



**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<sup>TM</sup> Dipole antennas or horn antennas (see Figure 3-5). The test equipment was placed on a wooden and plastic bench situated on a 1.5m x 2m area adjacent to the measurement area (see Figure 3-6). Sufficient time for the EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating condition. The detector function was set to CISPR quasi-peak mode and the bandwidth of the spectrum analyzer was set to 100kHz for frequencies below 1GHz or 1MHz for frequencies above 1GHz. Above 1GHz the detector function was set to average mode (RBW = 1MHz, VBW = 10Hz).

The half-wave dipole antenna was tuned to the frequency found during preliminary radiated measurements. The EUT, support equipment and interconnecting cables were re-configured to the set-up producing the maximum emission for the frequency and were placed on top of a 0.8-meter high non-metallic 1 x 1.5 meter table (see Figure 3-7). The EUT, support equipment, and interconnecting cables were re-arranged and manipulated to maximize each EME emission. The turntable containing the system was rotated and the height of the receive antenna was varied 1 to 4 meters and stopped at the azimuth and height producing the maximum emission. Each emission was maximized by: varying the mode of operation or resolution; clock or data exchange speed; scrolling H pattern to the EUT and/or support equipment, and powering the monitor from the floor mounted outlet box and the computer aux AC outlet, if applicable; and changing the polarity of the antenna, whichever determined the worst-case emission. Photographs of the worst-case emission can be seen in test setup photographs. Each EME reported was calibrated using the Agilent E8257D (250kHz – 20GHz) PSG Signal Generator. The Theoretical Normalized Site Attenuation Curves for both horizontal and vertical polarization are shown in Figure 3-8.

|                                      |                                               |                                                                   |                  |                                 |
|--------------------------------------|-----------------------------------------------|-------------------------------------------------------------------|------------------|---------------------------------|
| FCC ID: ACJ9TGCF-19F                 | <b>PCTEST</b><br>ENGINEERING LABORATORY, INC. | FCC Pt. 15.247 802.11 b/g/n MEASUREMENT REPORT<br>(CERTIFICATION) | <b>Panasonic</b> | Reviewed by:<br>Quality Manager |
| Test Report S/N:<br>0Y1007231224.ACJ | Test Dates:<br>August 13, 2010                | EUT Type:<br>Toughbook Model: CF-19mk4                            |                  | Page 7 of 73                    |

## 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-19mk4 are **permanently attached**.
- There are no provisions for connection to an external antenna.

### Conclusion:

The **Panasonic Toughbook Model: CF-19mk4 FCC ID: ACJ9TGCF-19F** unit complies with the requirement of §15.203.

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

**Table 4-1. Frequency Channel Operations**

|                                      |                                                                                     |                                                                   |                                                                                       |                                 |
|--------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------|---------------------------------------------------------------------------------------|---------------------------------|
| FCC ID: ACJ9TGCF-19F                 |  | FCC Pt. 15.247 802.11 b/g/n MEASUREMENT REPORT<br>(CERTIFICATION) |  | Reviewed by:<br>Quality Manager |
| Test Report S/N:<br>0Y1007231224.ACJ | Test Dates:<br>August 13, 2010                                                      | EUT Type:<br>Toughbook Model: CF-19mk4                            |                                                                                       | Page 8 of 73                    |



## 5.0 TEST EQUIPMENT CALIBRATION DATA

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

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

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

|                                      |                                                                                     |                                                                   |                                                                                       |                                 |
|--------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------|---------------------------------------------------------------------------------------|---------------------------------|
| FCC ID: ACJ9TGCF-19F                 |  | FCC Pt. 15.247 802.11 b/g/n MEASUREMENT REPORT<br>(CERTIFICATION) |  | Reviewed by:<br>Quality Manager |
| Test Report S/N:<br>0Y1007231224.ACJ | Test Dates:<br>August 13, 2010                                                      | EUT Type:<br>Toughbook Model: CF-19mk4                            |                                                                                       | Page 9 of 73                    |

## 6.0 TEST RESULTS

### 6.1 Summary

Company Name: Panasonic Corporation of North America

FCC ID: ACJ9TGCF-19F

FCC Classification: Digital Transmission System (DTS)

Data Rate(s) Tested: 1Mbps, 2Mbps, 5.5Mbps, 11Mbps (b)  
6Mbps, 9Mbps, 12Mbps, 18Mbps, 24Mbps, 36Mbps, 48Mbps, 54Mbps (g)  
6.5/13.5Mbps, 13/27Mbps, 19.5/40.5Mbps, 26/54Mbps, 39/81Mbps,  
52/108Mbps, 58.5/121.5Mbps, 65/135Mbps (n)

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

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

|                                      |                                                                                     |                                                                |                                                                                       |                                 |
|--------------------------------------|-------------------------------------------------------------------------------------|----------------------------------------------------------------|---------------------------------------------------------------------------------------|---------------------------------|
| FCC ID: ACJ9TGCF-19F                 |  | FCC Pt. 15.247 802.11 b/g/n MEASUREMENT REPORT (CERTIFICATION) |  | Reviewed by:<br>Quality Manager |
| Test Report S/N:<br>0Y1007231224.ACJ | Test Dates:<br>August 13, 2010                                                      | EUT Type:<br>Toughbook Model: CF-19mk4                         | Page 10 of 73                                                                         |                                 |

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

### §15.247(a)(2)

The bandwidth at 6dB down from the highest in-band spectral density is measured with a spectrum analyzer connected to the receive antenna while the EUT is operating in transmission mode at the appropriate frequencies. **The minimum permissible 6dB bandwidth is 500 kHz.**

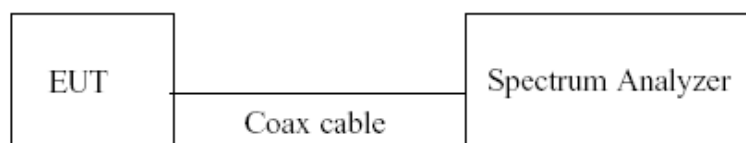
| Frequency [MHz] | Channel No. | 802.11 Mode | Data Rate [Mbps] | Measured Bandwidth [MHz] | Minimum Bandwidth [MHz] | Pass / Fail |
|-----------------|-------------|-------------|------------------|--------------------------|-------------------------|-------------|
| 2412            | 1           | b           | 1                | 12.610                   | 0.500                   | Pass        |
| 2437            | 6           | b           | 1                | 12.090                   | 0.500                   | Pass        |
| 2462            | 11          | b           | 1                | 12.130                   | 0.500                   | Pass        |
| 2412            | 1           | g           | 6                | 16.500                   | 0.500                   | Pass        |
| 2437            | 6           | g           | 6                | 16.460                   | 0.500                   | Pass        |
| 2462            | 11          | g           | 6                | 16.460                   | 0.500                   | Pass        |
| 2412            | 1           | n           | 6.5 (MCS0)       | 17.700                   | 0.500                   | Pass        |
| 2437            | 6           | n           | 6.5 (MCS0)       | 17.660                   | 0.500                   | Pass        |
| 2462            | 11          | n           | 6.5 (MCS0)       | 17.660                   | 0.500                   | Pass        |
| 2422            | 3           | n           | 13.5 (MCS0)      | 36.400                   | 0.500                   | Pass        |
| 2437            | 6           | n           | 13.5 (MCS0)      | 26.270                   | 0.500                   | Pass        |
| 2452            | 9           | n           | 13.5 (MCS0)      | 36.470                   | 0.500                   | Pass        |

**Table 6-2. Conducted Bandwidth Measurements – Main Antenna**

|                                      |                                                                                     |                                                                |                                                                                       |                                 |
|--------------------------------------|-------------------------------------------------------------------------------------|----------------------------------------------------------------|---------------------------------------------------------------------------------------|---------------------------------|
| FCC ID: ACJ9TGCF-19F                 |  | FCC Pt. 15.247 802.11 b/g/n MEASUREMENT REPORT (CERTIFICATION) |  | Reviewed by:<br>Quality Manager |
| Test Report S/N:<br>0Y1007231224.ACJ | Test Dates:<br>August 13, 2010                                                      | EUT Type:<br>Toughbook Model: CF-19mk4                         |                                                                                       | Page 11 of 73                   |

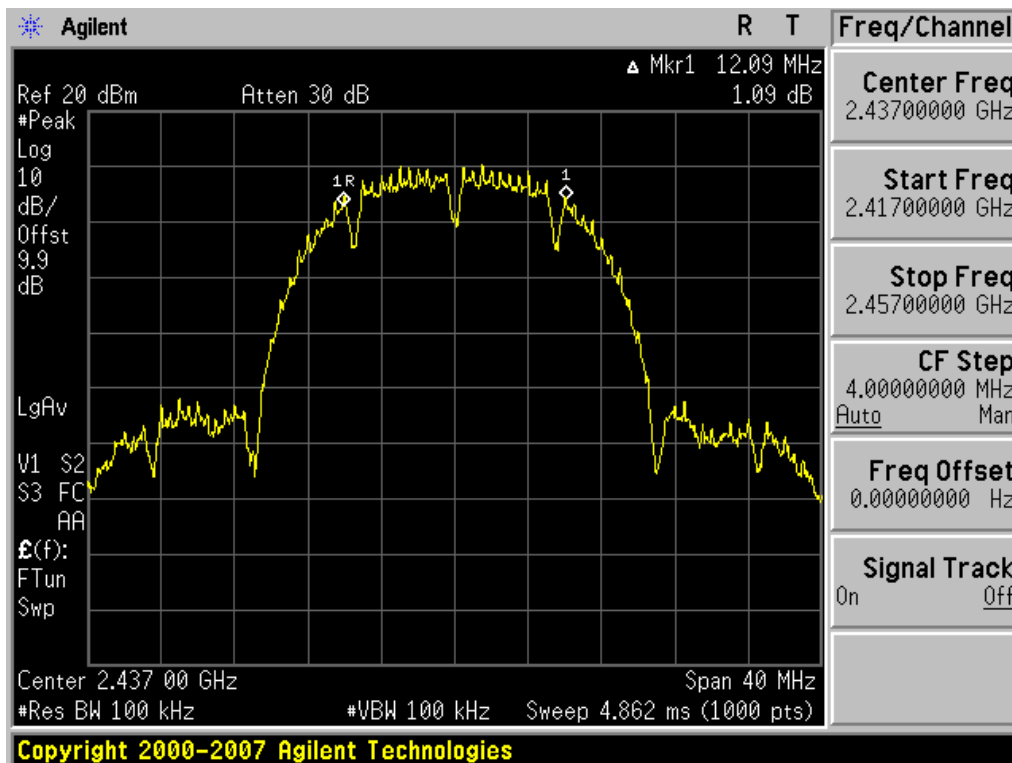
| Frequency [MHz] | Channel No. | 802.11 Mode | Data Rate [Mbps] | Measured Bandwidth [MHz] | Minimum Bandwidth [MHz] | Pass / Fail |
|-----------------|-------------|-------------|------------------|--------------------------|-------------------------|-------------|
| 2412            | 1           | b           | 1                | 12.530                   | 0.500                   | Pass        |
| 2437            | 6           | b           | 1                | 12.810                   | 0.500                   | Pass        |
| 2462            | 11          | b           | 1                | 12.170                   | 0.500                   | Pass        |
| 2412            | 1           | g           | 6                | 16.500                   | 0.500                   | Pass        |
| 2437            | 6           | g           | 6                | 16.460                   | 0.500                   | Pass        |
| 2462            | 11          | g           | 6                | 16.540                   | 0.500                   | Pass        |
| 2412            | 1           | n           | 6.5 (MCS0)       | 17.660                   | 0.500                   | Pass        |
| 2437            | 6           | n           | 6.5 (MCS0)       | 17.700                   | 0.500                   | Pass        |
| 2462            | 11          | n           | 6.5 (MCS0)       | 17.700                   | 0.500                   | Pass        |
| 2422            | 3           | n           | 13.5 (MCS0)      | 36.400                   | 0.500                   | Pass        |
| 2437            | 6           | n           | 13.5 (MCS0)      | 36.470                   | 0.500                   | Pass        |
| 2452            | 9           | n           | 13.5 (MCS0)      | 36.470                   | 0.500                   | Pass        |

**Table 6-3. Conducted Bandwidth Measurements – Aux Antenna**

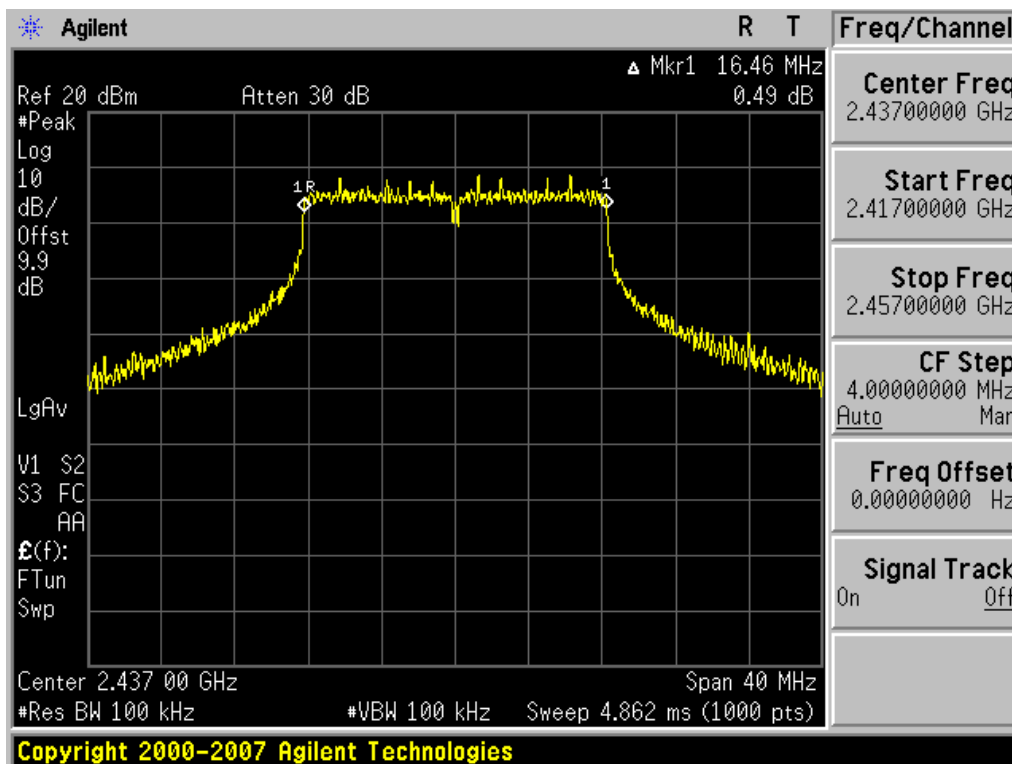


**Figure 6-1. Test Instrument & Measurement Setup**

|                                      |                                                                                     |                                                                |                                                                                       |                                 |
|--------------------------------------|-------------------------------------------------------------------------------------|----------------------------------------------------------------|---------------------------------------------------------------------------------------|---------------------------------|
| FCC ID: ACJ9TGCF-19F                 |  | FCC Pt. 15.247 802.11 b/g/n MEASUREMENT REPORT (CERTIFICATION) |  | Reviewed by:<br>Quality Manager |
| Test Report S/N:<br>0Y1007231224.ACJ | Test Dates:<br>August 13, 2010                                                      | EUT Type:<br>Toughbook Model: CF-19mk4                         |                                                                                       | Page 12 of 73                   |



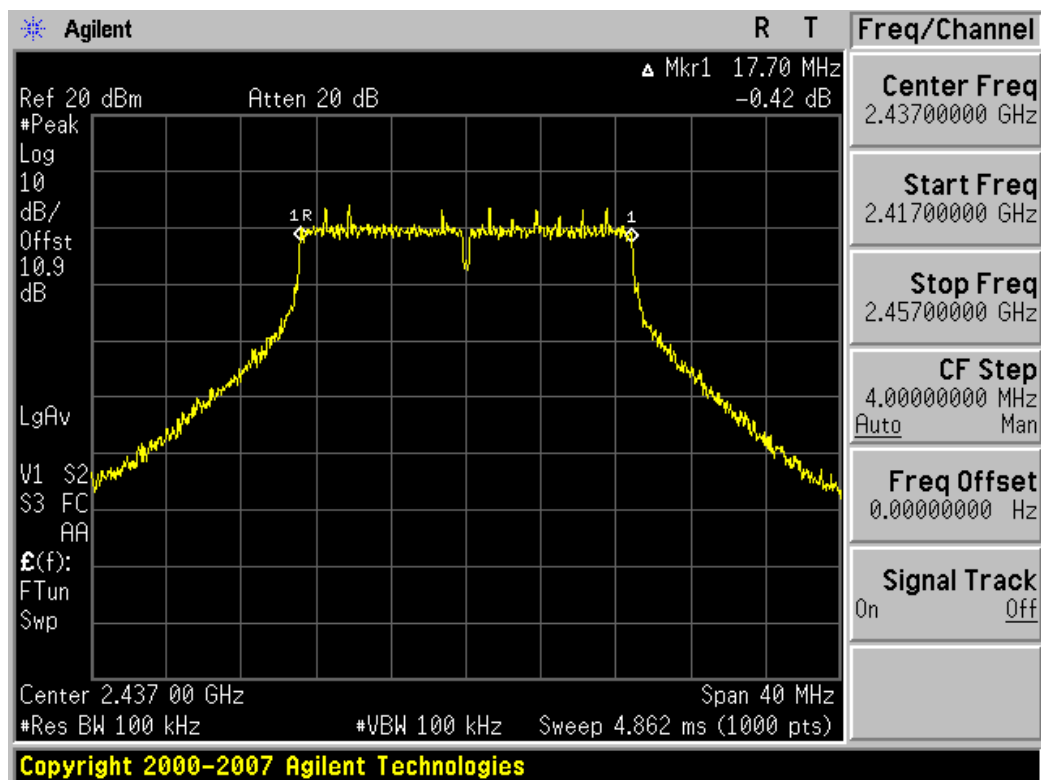
Plot 6-1. 6dB Bandwidth Plot (802.11b – Ch. 6) – Main Antenna



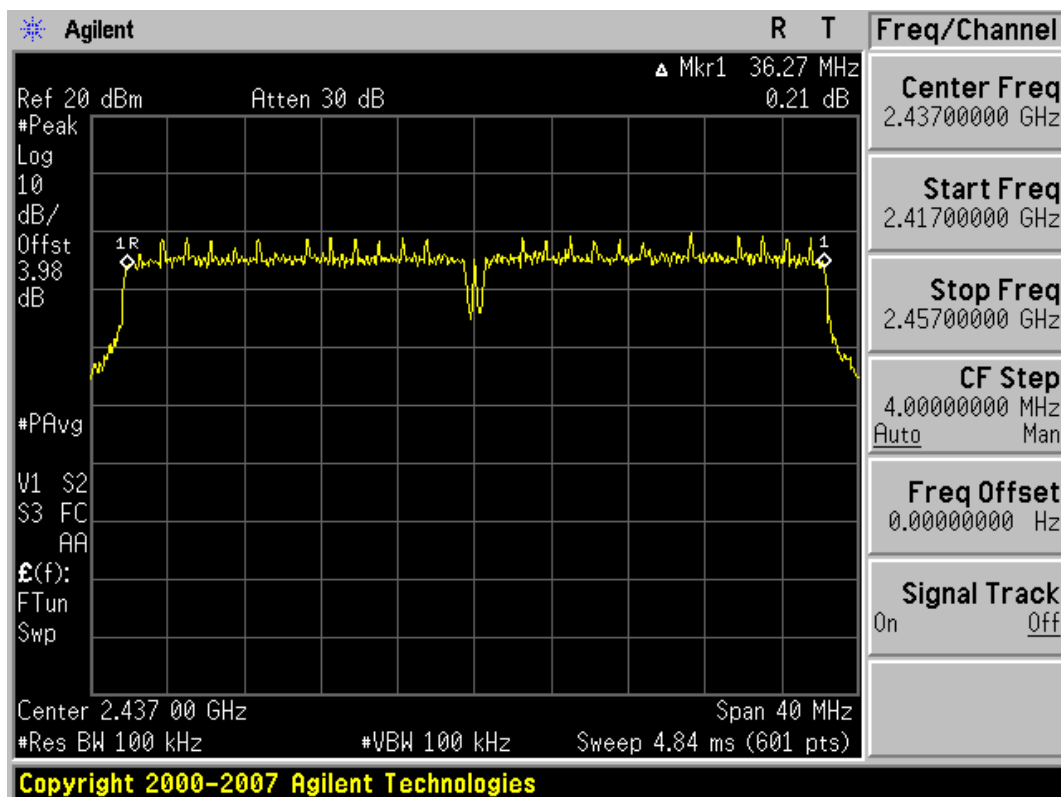
Plot 6-2. 6dB Bandwidth Plot (802.11g – Ch. 6) – Main Antenna

|                                      |                                               |                                                                   |                  |                                 |
|--------------------------------------|-----------------------------------------------|-------------------------------------------------------------------|------------------|---------------------------------|
| FCC ID: ACJ9TGCF-19F                 | <b>PCTEST</b><br>ENGINEERING LABORATORY, INC. | FCC Pt. 15.247 802.11 b/g/n MEASUREMENT REPORT<br>(CERTIFICATION) | <b>Panasonic</b> | Reviewed by:<br>Quality Manager |
| Test Report S/N:<br>0Y1007231224.ACJ | Test Dates:<br>August 13, 2010                | EUT Type:<br>Toughbook Model: CF-19mk4                            |                  | Page 13 of 73                   |



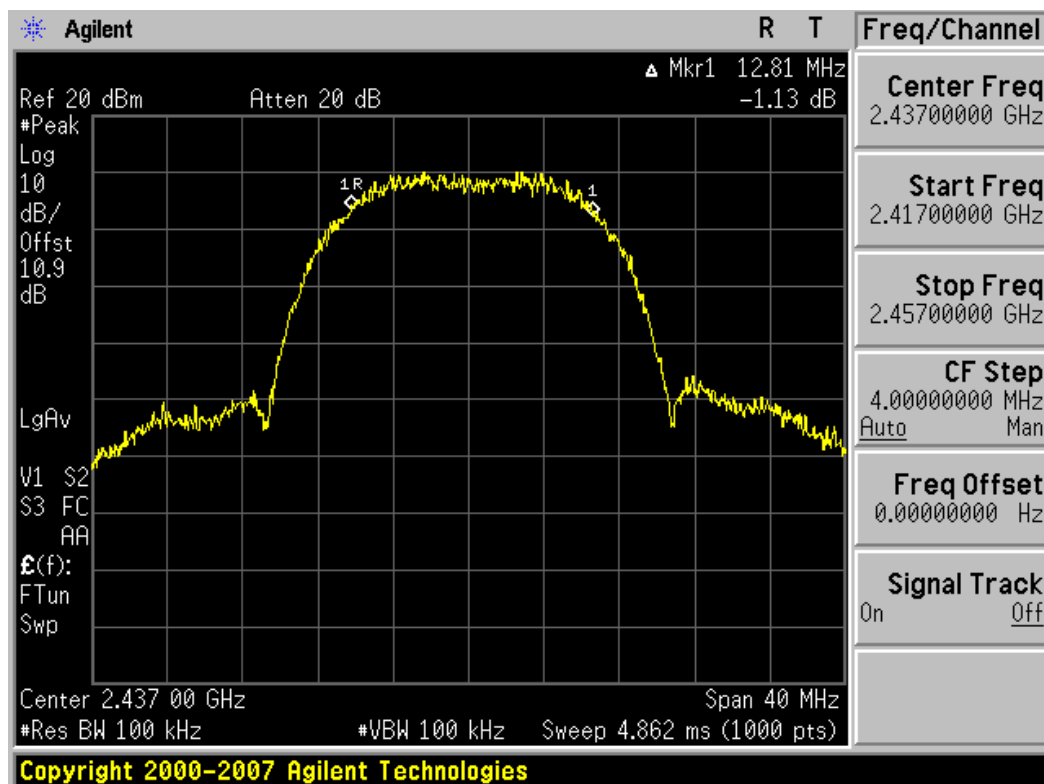


Plot 6-3. 6dB Bandwidth Plot (802.11n (20MHz) – Ch. 6) – Main Antenna

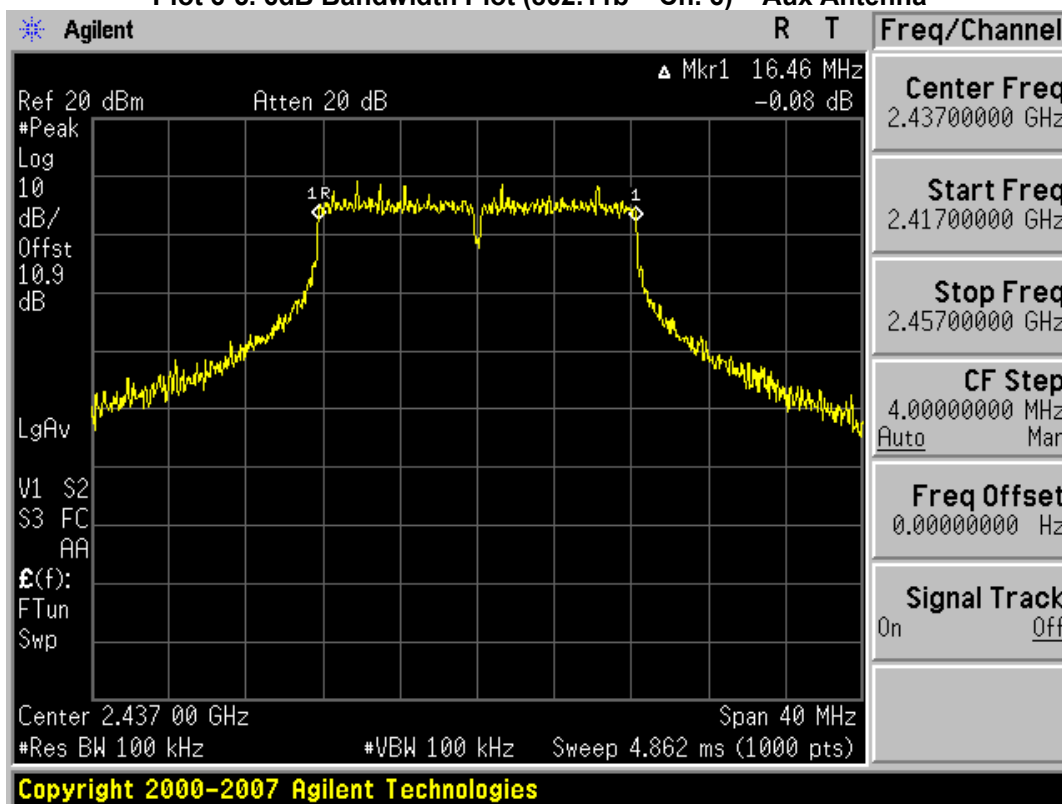


Plot 6-4. 6dB Bandwidth Plot (802.11n (40MHz) – Ch. 6) – Main Antenna

|                                      |                                               |                                                                   |                  |                                 |
|--------------------------------------|-----------------------------------------------|-------------------------------------------------------------------|------------------|---------------------------------|
| FCC ID: ACJ9TGCF-19F                 | <b>PCTEST</b><br>ENGINEERING LABORATORY, INC. | FCC Pt. 15.247 802.11 b/g/n MEASUREMENT REPORT<br>(CERTIFICATION) | <b>Panasonic</b> | Reviewed by:<br>Quality Manager |
| Test Report S/N:<br>0Y1007231224.ACJ | Test Dates:<br>August 13, 2010                | EUT Type:<br>Toughbook Model: CF-19mk4                            |                  | Page 14 of 73                   |

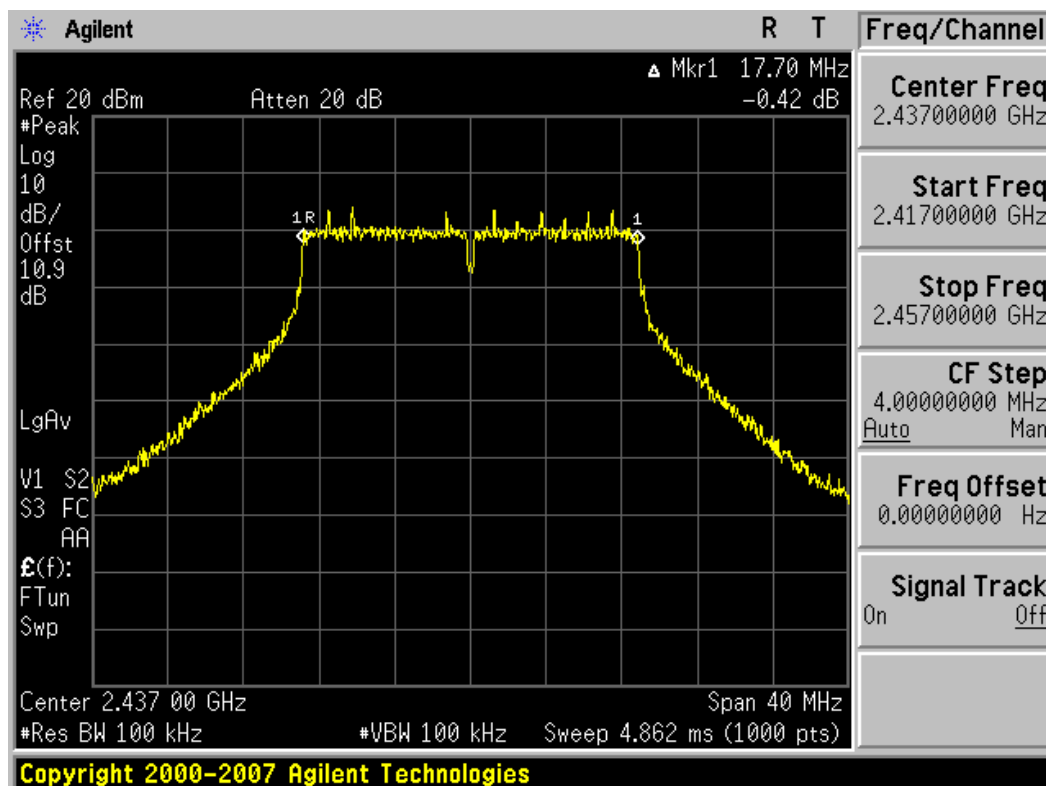


Plot 6-5. 6dB Bandwidth Plot (802.11b – Ch. 6) – Aux Antenna

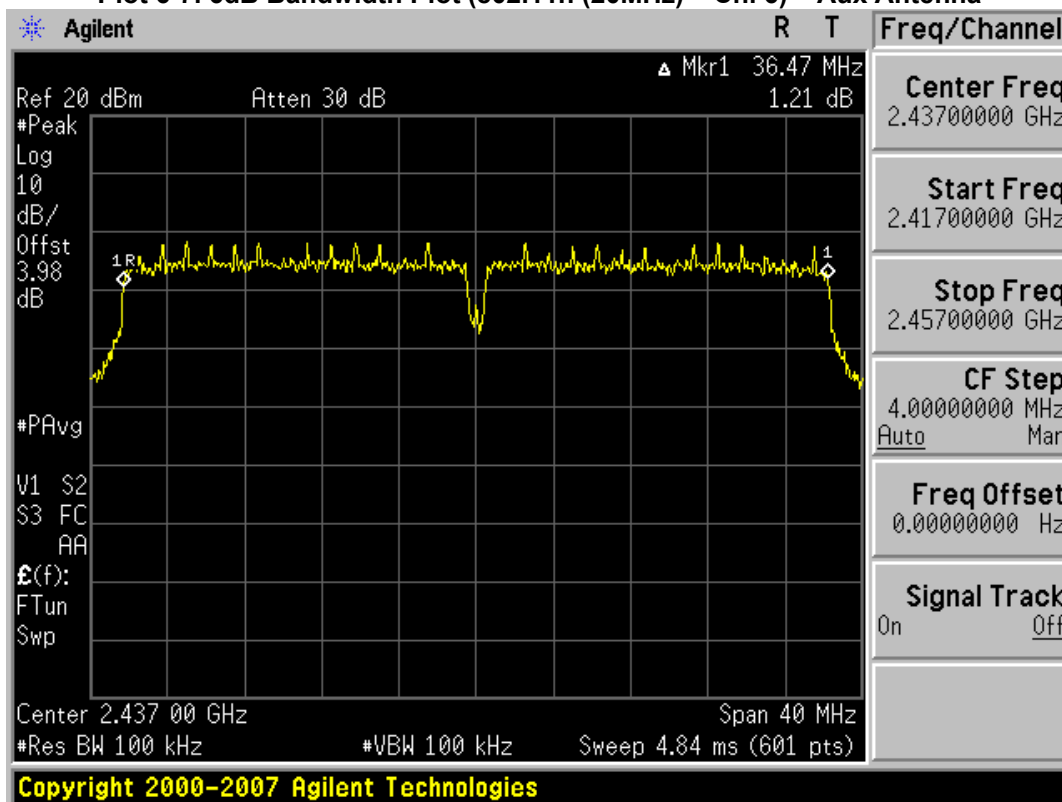


Plot 6-6. 6dB Bandwidth Plot (802.11g – Ch. 6) – Aux Antenna

|                                      |                                               |                                                                   |                  |                                 |
|--------------------------------------|-----------------------------------------------|-------------------------------------------------------------------|------------------|---------------------------------|
| FCC ID: ACJ9TGCF-19F                 | <b>PCTEST</b><br>ENGINEERING LABORATORY, INC. | FCC Pt. 15.247 802.11 b/g/n MEASUREMENT REPORT<br>(CERTIFICATION) | <b>Panasonic</b> | Reviewed by:<br>Quality Manager |
| Test Report S/N:<br>0Y1007231224.ACJ | Test Dates:<br>August 13, 2010                | EUT Type:<br>Toughbook Model: CF-19mk4                            |                  | Page 15 of 73                   |



Plot 6-7. 6dB Bandwidth Plot (802.11n (20MHz) – Ch. 6) – Aux Antenna



Plot 6-8. 6dB Bandwidth Plot (802.11n (40MHz) – Ch. 6) – Aux Antenna

|                                      |                                               |                                                                   |                  |                                 |
|--------------------------------------|-----------------------------------------------|-------------------------------------------------------------------|------------------|---------------------------------|
| FCC ID: ACJ9TGCF-19F                 | <b>PCTEST</b><br>ENGINEERING LABORATORY, INC. | FCC Pt. 15.247 802.11 b/g/n MEASUREMENT REPORT<br>(CERTIFICATION) | <b>Panasonic</b> | Reviewed by:<br>Quality Manager |
| Test Report S/N:<br>0Y1007231224.ACJ | Test Dates:<br>August 13, 2010                | EUT Type:<br>Toughbook Model: CF-19mk4                            |                  | Page 16 of 73                   |

### 6.3 Output Power Measurement – 802.11b/g

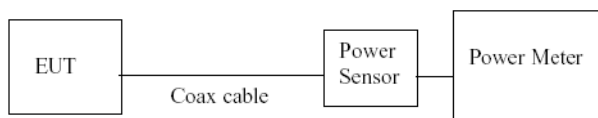
#### §15.247(b)(3)

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

#### Main Antenna

| Freq [MHz] | Chan | Data Rate [Mbps] | Measured Average Power [dBm] | Measured Peak Power [dBm] |
|------------|------|------------------|------------------------------|---------------------------|
| 2412       | 1    | 1                | 15.95                        | 18.49                     |
|            |      | 2                | 15.99                        | 18.67                     |
|            |      | 5.5              | 16.02                        | 18.48                     |
|            |      | 11               | 16.05                        | 18.66                     |
| 2437       | 6    | 1                | 19.87                        | 22.31                     |
|            |      | 2                | 19.85                        | 22.56                     |
|            |      | 5.5              | 19.80                        | 22.35                     |
|            |      | 11               | 19.82                        | 22.59                     |
| 2462       | 11   | 1                | 16.43                        | 19.01                     |
|            |      | 2                | 16.59                        | 19.25                     |
|            |      | 5.5              | 16.63                        | 19.03                     |
|            |      | 11               | 16.66                        | 19.32                     |

**Table 6-4. 802.11b Conducted Output Power Measurements**



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

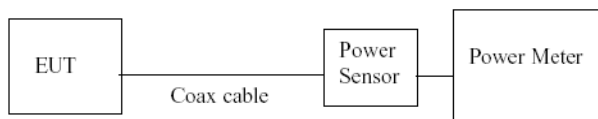
| Freq [MHz] | Chan | Data Rate [Mbps] | Measured Average Power [dBm] | Measured Peak Power [dBm] |
|------------|------|------------------|------------------------------|---------------------------|
| 2412       | 1    | 6                | 12.97                        | 22.38                     |
|            |      | 9                | 12.75                        | 22.35                     |
|            |      | 12               | 12.74                        | 22.21                     |
|            |      | 18               | 12.81                        | 21.08                     |
|            |      | 24               | 12.86                        | 21.15                     |
|            |      | 36               | 12.90                        | 21.31                     |
|            |      | 48               | 12.81                        | 21.32                     |
|            |      | 54               | 12.60                        | 21.25                     |
| 2437       | 6    | 6                | 20.04                        | 26.00                     |
|            |      | 9                | 20.04                        | 26.11                     |
|            |      | 12               | 19.99                        | 26.09                     |
|            |      | 18               | 20.01                        | 26.15                     |
|            |      | 24               | 20.00                        | 26.11                     |
|            |      | 36               | 18.90                        | 25.81                     |
|            |      | 48               | 18.09                        | 25.28                     |
|            |      | 54               | 14.69                        | 23.12                     |
| 2462       | 11   | 6                | 14.14                        | 23.01                     |
|            |      | 9                | 13.92                        | 22.89                     |
|            |      | 12               | 13.88                        | 22.76                     |
|            |      | 18               | 14.09                        | 23.01                     |
|            |      | 24               | 13.82                        | 22.89                     |
|            |      | 36               | 13.91                        | 22.30                     |
|            |      | 48               | 14.00                        | 22.42                     |
|            |      | 54               | 13.90                        | 22.35                     |

**Table 6-5. 802.11g Conducted Output Power Measurements**

**Main Antenna –channels adjacent to lowest and highest channels..**

| Freq [MHz] | Chan | Data Rate [Mbps] | Measured Average Power [dBm] | Measured Peak Power [dBm] |
|------------|------|------------------|------------------------------|---------------------------|
| 2417       | 2    | 1                | 18.43                        | 21.11                     |
|            |      | 2                | 18.45                        | 20.97                     |
|            |      | 5.5              | 18.39                        | 20.91                     |
|            |      | 11               | 18.40                        | 20.83                     |
| 2457       | 10   | 1                | 18.65                        | 21.30                     |
|            |      | 2                | 18.63                        | 21.43                     |
|            |      | 5.5              | 18.72                        | 21.30                     |
|            |      | 11               | 18.71                        | 21.46                     |

**Table 6-6. 802.11b Conducted Output Power Measurements**



**Figure 6-3. Test Instrument & Measurement Setup**

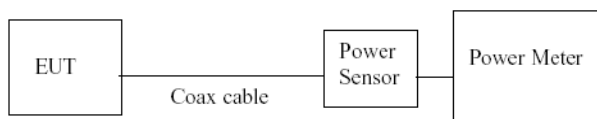
| Freq [MHz] | Chan | Data Rate [Mbps] | Measured Average Power [dBm] | Measured Peak Power [dBm] |
|------------|------|------------------|------------------------------|---------------------------|
| 2417       | 2    | 6                | 15.70                        | 23.93                     |
|            |      | 9                | 15.62                        | 23.86                     |
|            |      | 12               | 15.73                        | 23.91                     |
|            |      | 18               | 15.81                        | 23.93                     |
|            |      | 24               | 15.75                        | 23.75                     |
|            |      | 36               | 15.77                        | 23.85                     |
|            |      | 48               | 15.80                        | 23.93                     |
|            |      | 54               | 14.34                        | 22.93                     |
| 2457       | 10   | 6                | 16.15                        | 24.08                     |
|            |      | 9                | 16.18                        | 24.23                     |
|            |      | 12               | 16.14                        | 24.12                     |
|            |      | 18               | 16.16                        | 24.20                     |
|            |      | 24               | 16.20                        | 24.21                     |
|            |      | 36               | 16.05                        | 24.15                     |
|            |      | 48               | 16.06                        | 24.21                     |
|            |      | 54               | 14.88                        | 23.35                     |

**Table 6-7. 802.11g Conducted Output Power Measurements**

### Aux Antenna

| Freq [MHz] | Chan | Data Rate [Mbps] | Measured Average Power [dBm] | Measured Peak Power [dBm] |
|------------|------|------------------|------------------------------|---------------------------|
| 2412       | 1    | 1                | 15.82                        | 18.17                     |
|            |      | 2                | 15.94                        | 18.61                     |
|            |      | 5.5              | 16.11                        | 18.94                     |
|            |      | 11               | 16.08                        | 19.02                     |
| 2437       | 6    | 1                | 19.81                        | 22.93                     |
|            |      | 2                | 19.77                        | 22.70                     |
|            |      | 5.5              | 19.73                        | 22.24                     |
|            |      | 11               | 19.65                        | 21.77                     |
| 2462       | 11   | 1                | 16.46                        | 18.66                     |
|            |      | 2                | 16.50                        | 19.05                     |
|            |      | 5.5              | 16.51                        | 19.52                     |
|            |      | 11               | 16.43                        | 19.54                     |

**Table 6-8. 802.11b Conducted Output Power Measurements**



**Figure 6-4. Test Instrument & Measurement Setup**

| Freq [MHz] | Chan | Data Rate [Mbps] | Measured Average Power [dBm] | Measured Peak Power [dBm] |
|------------|------|------------------|------------------------------|---------------------------|
| 2412       | 1    | 6                | 12.67                        | 21.34                     |
|            |      | 9                | 12.77                        | 21.44                     |
|            |      | 12               | 12.74                        | 21.23                     |
|            |      | 18               | 12.68                        | 21.45                     |
|            |      | 24               | 12.75                        | 21.28                     |
|            |      | 36               | 12.81                        | 21.36                     |
|            |      | 48               | 12.32                        | 21.15                     |
|            |      | 54               | 12.22                        | 21.39                     |
| 2437       | 6    | 6                | 19.80                        | 26.80                     |
|            |      | 9                | 19.58                        | 26.85                     |
|            |      | 12               | 19.73                        | 26.73                     |
|            |      | 18               | 19.79                        | 26.81                     |
|            |      | 24               | 19.70                        | 26.91                     |
|            |      | 36               | 18.78                        | 26.35                     |
|            |      | 48               | 17.29                        | 25.70                     |
|            |      | 54               | 13.10                        | 22.08                     |
| 2462       | 11   | 6                | 13.09                        | 21.58                     |
|            |      | 9                | 13.07                        | 21.57                     |
|            |      | 12               | 13.07                        | 21.63                     |
|            |      | 18               | 13.11                        | 21.54                     |
|            |      | 24               | 13.14                        | 21.72                     |
|            |      | 36               | 13.05                        | 21.76                     |
|            |      | 48               | 12.61                        | 21.76                     |
|            |      | 54               | 12.63                        | 21.74                     |

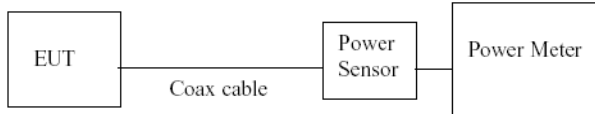
**Table 6-9. 802.11g Conducted Output Power Measurements**



**Aux Antenna – channels adjacent to lowest and highest channels..**

| Freq [MHz] | Chan | Data Rate [Mbps] | Measured Average Power [dBm] | Measured Peak Power [dBm] |
|------------|------|------------------|------------------------------|---------------------------|
| 2417       | 2    | 1                | 18.33                        | 20.81                     |
|            |      | 2                | 18.35                        | 20.98                     |
|            |      | 5.5              | 18.30                        | 21.14                     |
|            |      | 11               | 18.31                        | 21.28                     |
| 2457       | 10   | 1                | 18.16                        | 20.55                     |
|            |      | 2                | 18.22                        | 20.93                     |
|            |      | 5.5              | 18.39                        | 21.38                     |
|            |      | 11               | 18.37                        | 21.50                     |

**Table 6-10. 802.11b Conducted Output Power Measurements**



**Figure 6-5. Test Instrument & Measurement Setup**

| Freq [MHz] | Chan | Data Rate [Mbps] | Measured Average Power [dBm] | Measured Peak Power [dBm] |
|------------|------|------------------|------------------------------|---------------------------|
| 2417       | 2    | 6                | 14.95                        | 23.51                     |
|            |      | 9                | 14.90                        | 23.42                     |
|            |      | 12               | 14.94                        | 23.41                     |
|            |      | 18               | 14.96                        | 25.54                     |
|            |      | 24               | 15.00                        | 23.36                     |
|            |      | 36               | 15.00                        | 23.52                     |
|            |      | 48               | 14.46                        | 23.34                     |
|            |      | 54               | 13.24                        | 22.31                     |
| 2457       | 10   | 6                | 15.41                        | 23.92                     |
|            |      | 9                | 15.44                        | 24.01                     |
|            |      | 12               | 15.47                        | 23.90                     |
|            |      | 18               | 15.47                        | 24.00                     |
|            |      | 24               | 15.49                        | 24.02                     |
|            |      | 36               | 15.42                        | 24.10                     |
|            |      | 48               | 14.97                        | 24.07                     |
|            |      | 54               | 13.81                        | 22.78                     |

**Table 6-11. 802.11g Conducted Output Power Measurements**

## 6.4 Output Power Measurement – 802.11n (20MHz)

### §15.247(b)(3)

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

**Main Antenna**

| Freq [MHz] | Chan | MCS Index | Data Rate [Mbps] | Measured Average Power [dBm] | Measured Peak Power [dBm] |
|------------|------|-----------|------------------|------------------------------|---------------------------|
| 2412       | 1    | 0         | 6.5              | 8.32                         | 16.40                     |
|            |      | 1         | 13               | 8.14                         | 16.33                     |
|            |      | 2         | 19.5             | 8.08                         | 16.32                     |
|            |      | 3         | 26               | 7.99                         | 16.29                     |
|            |      | 4         | 39               | 8.02                         | 16.63                     |
|            |      | 5         | 52               | 7.91                         | 16.43                     |
|            |      | 6         | 58.5             | 7.81                         | 16.45                     |
|            |      | 7         | 65               | 7.57                         | 16.31                     |
| 2437       | 6    | 0         | 6.5              | 16.06                        | 23.98                     |
|            |      | 1         | 13               | 13.61                        | 21.90                     |
|            |      | 2         | 19.5             | 13.63                        | 21.85                     |
|            |      | 3         | 26               | 13.68                        | 22.05                     |
|            |      | 4         | 39               | 13.82                        | 22.17                     |
|            |      | 5         | 52               | 13.82                        | 22.02                     |
|            |      | 6         | 58.5             | 13.65                        | 22.11                     |
|            |      | 7         | 65               | 13.53                        | 22.16                     |
| 2462       | 11   | 0         | 6.5              | 9.44                         | 17.48                     |
|            |      | 1         | 13               | 9.43                         | 17.41                     |
|            |      | 2         | 19.5             | 9.32                         | 17.63                     |
|            |      | 3         | 26               | 9.26                         | 17.70                     |
|            |      | 4         | 39               | 9.35                         | 17.70                     |
|            |      | 5         | 52               | 9.28                         | 17.88                     |
|            |      | 6         | 58.5             | 9.09                         | 17.82                     |
|            |      | 7         | 65               | 8.84                         | 17.76                     |

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

**Aux Antenna**

| Freq [MHz] | Chan | MCS Index | Data Rate [Mbps] | Measured Average Power [dBm] | Measured Peak Power [dBm] |
|------------|------|-----------|------------------|------------------------------|---------------------------|
| 2412       | 1    | 0         | 6.5              | 7.02                         | 15.60                     |
|            |      | 1         | 13               | 7.93                         | 15.71                     |
|            |      | 2         | 19.5             | 8.12                         | 15.70                     |
|            |      | 3         | 26               | 8.03                         | 15.77                     |
|            |      | 4         | 39               | 8.05                         | 15.76                     |
|            |      | 5         | 52               | 8.00                         | 15.78                     |
|            |      | 6         | 58.5             | 8.05                         | 15.94                     |
|            |      | 7         | 65               | 7.74                         | 15.78                     |
| 2437       | 6    | 0         | 6.5              | 15.46                        | 23.35                     |
|            |      | 1         | 13               | 13.25                        | 21.12                     |
|            |      | 2         | 19.5             | 13.22                        | 20.97                     |
|            |      | 3         | 26               | 13.23                        | 21.11                     |
|            |      | 4         | 39               | 13.24                        | 21.24                     |
|            |      | 5         | 52               | 13.21                        | 21.40                     |
|            |      | 6         | 58.5             | 13.29                        | 21.11                     |
|            |      | 7         | 65               | 12.94                        | 21.22                     |
| 2462       | 11   | 0         | 6.5              | 9.97                         | 18.75                     |
|            |      | 1         | 13               | 9.96                         | 18.73                     |
|            |      | 2         | 19.5             | 9.93                         | 18.83                     |
|            |      | 3         | 26               | 9.71                         | 18.76                     |
|            |      | 4         | 39               | 9.85                         | 18.82                     |
|            |      | 5         | 52               | 9.80                         | 19.08                     |
|            |      | 6         | 58.5             | 9.62                         | 18.95                     |
|            |      | 7         | 65               | 9.35                         | 19.11                     |

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

# Main Antenna – channels adjacent to lowest and highest channels

| Freq [MHz] | Chan | MCS Index | Data Rate [Mbps] | Measured Average Power [dBm] | Measured Peak Power [dBm] |
|------------|------|-----------|------------------|------------------------------|---------------------------|
| 2417       | 2    | 0         | 6.5              | 11.89                        | 20.21                     |
|            |      | 1         | 13               | 11.95                        | 20.17                     |
|            |      | 2         | 19.5             | 11.81                        | 20.28                     |
|            |      | 3         | 26               | 11.70                        | 20.26                     |
|            |      | 4         | 39               | 11.82                        | 20.33                     |
|            |      | 5         | 52               | 11.76                        | 20.36                     |
|            |      | 6         | 58.5             | 11.34                        | 20.28                     |
|            |      | 7         | 65               | 11.83                        | 20.27                     |
| 2457       | 10   | 0         | 6.5              | 12.71                        | 21.00                     |
|            |      | 1         | 13               | 12.68                        | 21.02                     |
|            |      | 2         | 19.5             | 12.70                        | 20.90                     |
|            |      | 3         | 26               | 12.63                        | 21.02                     |
|            |      | 4         | 39               | 12.67                        | 21.00                     |
|            |      | 5         | 52               | 12.70                        | 21.06                     |
|            |      | 6         | 58.5             | 12.63                        | 21.26                     |
|            |      | 7         | 65               | 12.24                        | 21.20                     |

**Table 6-14. 802.11n (20MHz Bandwidth) Conducted Output Power Measurements**

# Aux Antenna– channels adjacent to lowest and highest channels

| Freq [MHz] | Chan | MCS Index | Data Rate [Mbps] | Measured Average Power [dBm] | Measured Peak Power [dBm] |
|------------|------|-----------|------------------|------------------------------|---------------------------|
| 2417       | 2    | 0         | 6.5              | 12.19                        | 20.04                     |
|            |      | 1         | 13               | 12.18                        | 20.01                     |
|            |      | 2         | 19.5             | 12.20                        | 20.09                     |
|            |      | 3         | 26               | 12.13                        | 20.09                     |
|            |      | 4         | 39               | 12.19                        | 20.04                     |
|            |      | 5         | 52               | 12.24                        | 20.22                     |
|            |      | 6         | 58.5             | 12.18                        | 20.14                     |
|            |      | 7         | 65               | 11.89                        | 20.21                     |
| 2457       | 10   | 0         | 6.5              | 12.63                        | 21.30                     |
|            |      | 1         | 13               | 12.59                        | 21.33                     |
|            |      | 2         | 19.5             | 12.50                        | 21.31                     |
|            |      | 3         | 26               | 12.39                        | 21.52                     |
|            |      | 4         | 39               | 12.42                        | 21.54                     |
|            |      | 5         | 52               | 12.24                        | 21.47                     |
|            |      | 6         | 58.5             | 12.19                        | 21.46                     |
|            |      | 7         | 65               | 12.01                        | 21.66                     |

**Table 6-15. 802.11n (20MHz Bandwidth) Conducted Output Power Measurements**

### Aggregate (Main + Aux) Antenna – 802.11n (20MHz Bandwidth)

| Freq [MHz] | Chan | MCS Index | Data Rate [Mbps] | Main Average Power [dBm] | Main Peak Power [dBm] | Aux Average Power [dBm] | Aux Peak Power [dBm] | 20MHz BW Average Aggregate Power [dBm] | 20MHz BW Peak Aggregate Power [dBm] |
|------------|------|-----------|------------------|--------------------------|-----------------------|-------------------------|----------------------|----------------------------------------|-------------------------------------|
| 2412       | 1    | 0         | 6.5              | 8.62                     | 16.92                 | 7.50                    | 16.06                | 11.11                                  | 19.52                               |
|            |      | 1         | 13               | 8.49                     | 16.93                 | 7.46                    | 15.97                | 11.02                                  | 19.49                               |
|            |      | 2         | 19.5             | 8.51                     | 16.94                 | 7.40                    | 15.89                | 11.00                                  | 19.46                               |
|            |      | 3         | 26               | 8.55                     | 17.02                 | 7.50                    | 16.05                | 11.07                                  | 19.57                               |
|            |      | 4         | 39               | 8.62                     | 17.11                 | 7.60                    | 16.04                | 11.15                                  | 19.62                               |
|            |      | 5         | 52               | 8.31                     | 17.04                 | 7.08                    | 16.04                | 10.75                                  | 19.58                               |
|            |      | 6         | 58.5             | 8.41                     | 17.10                 | 7.15                    | 16.14                | 10.84                                  | 19.66                               |
|            |      | 7         | 65               | 7.86                     | 16.87                 | 7.02                    | 16.14                | 10.47                                  | 19.53                               |
| 2437       | 6    | 0         | 6.5              | 16.21                    | 24.52                 | 15.24                   | 23.90                | 18.76                                  | 27.23                               |
|            |      | 1         | 13               | 14.08                    | 22.57                 | 12.93                   | 21.46                | 16.55                                  | 25.06                               |
|            |      | 2         | 19.5             | 13.90                    | 22.45                 | 12.89                   | 21.33                | 16.43                                  | 24.94                               |
|            |      | 3         | 26               | 13.95                    | 22.48                 | 12.96                   | 21.57                | 16.49                                  | 25.06                               |
|            |      | 4         | 39               | 13.91                    | 22.72                 | 13.03                   | 21.63                | 16.50                                  | 25.22                               |
|            |      | 5         | 52               | 13.46                    | 22.48                 | 12.56                   | 21.53                | 16.04                                  | 25.04                               |
|            |      | 6         | 58.5             | 13.42                    | 22.60                 | 12.61                   | 21.56                | 16.04                                  | 25.12                               |
|            |      | 7         | 65               | 13.23                    | 22.53                 | 12.37                   | 21.54                | 15.83                                  | 25.07                               |
| 2462       | 11   | 0         | 6.5              | 9.86                     | 18.23                 | 9.62                    | 18.12                | 12.75                                  | 21.19                               |
|            |      | 1         | 13               | 9.92                     | 18.19                 | 9.72                    | 18.22                | 12.83                                  | 21.22                               |
|            |      | 2         | 19.5             | 9.80                     | 18.17                 | 9.66                    | 18.01                | 12.74                                  | 21.10                               |
|            |      | 3         | 26               | 9.87                     | 18.23                 | 9.72                    | 18.31                | 12.81                                  | 21.28                               |
|            |      | 4         | 39               | 9.83                     | 18.21                 | 9.81                    | 18.50                | 12.83                                  | 21.37                               |
|            |      | 5         | 52               | 9.26                     | 18.08                 | 9.35                    | 18.39                | 12.32                                  | 21.25                               |
|            |      | 6         | 58.5             | 9.29                     | 18.16                 | 9.33                    | 18.28                | 12.32                                  | 21.23                               |
|            |      | 7         | 65               | 9.27                     | 18.36                 | 9.24                    | 18.44                | 12.27                                  | 21.41                               |

**Table 6-16. 802.11n (20MHz Bandwidth) Aggregate Conducted Output Power Measurements**

## 6.5 Output Power Measurement – 802.11n (40MHz)

### §15.247(b)(3)

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

**Main Antenna**

| Freq [MHz] | Chan | MCS Index | Data Rate [Mbps] | Measured Average Power [dBm] | Measured Peak Power [dBm] |
|------------|------|-----------|------------------|------------------------------|---------------------------|
| 2422       | 3    | 0         | 13.5             | 7.94                         | 16.26                     |
|            |      | 1         | 27               | 8.01                         | 16.47                     |
|            |      | 2         | 40.5             | 7.90                         | 16.41                     |
|            |      | 3         | 54               | 7.57                         | 16.56                     |
|            |      | 4         | 81               | 6.81                         | 16.85                     |
|            |      | 5         | 108              | 5.92                         | 17.14                     |
|            |      | 6         | 121.5            | 5.50                         | 16.88                     |
|            |      | 7         | 135              | 5.15                         | 16.70                     |
| 2437       | 6    | 0         | 13.5             | 14.59                        | 23.03                     |
|            |      | 1         | 27               | 14.56                        | 22.99                     |
|            |      | 2         | 40.5             | 14.54                        | 23.05                     |
|            |      | 3         | 54               | 14.13                        | 23.22                     |
|            |      | 4         | 81               | 13.16                        | 23.33                     |
|            |      | 5         | 108              | 12.48                        | 23.55                     |
|            |      | 6         | 121.5            | 12.05                        | 23.69                     |
|            |      | 7         | 135              | 11.80                        | 23.44                     |
| 2452       | 9    | 0         | 13.5             | 8.45                         | 16.90                     |
|            |      | 1         | 27               | 8.60                         | 16.93                     |
|            |      | 2         | 40.5             | 8.37                         | 16.77                     |
|            |      | 3         | 54               | 8.30                         | 17.43                     |
|            |      | 4         | 81               | 7.33                         | 17.34                     |
|            |      | 5         | 108              | 6.45                         | 17.65                     |
|            |      | 6         | 121.5            | 6.11                         | 17.62                     |
|            |      | 7         | 135              | 5.80                         | 17.42                     |

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

**Aux Antenna**

| Freq [MHz] | Chan | MCS Index | Data Rate [Mbps] | Measured Average Power [dBm] | Measured Peak Power [dBm] |
|------------|------|-----------|------------------|------------------------------|---------------------------|
| 2422       | 3    | 0         | 13.5             | 7.26                         | 15.01                     |
|            |      | 1         | 27               | 7.16                         | 14.90                     |
|            |      | 2         | 40.5             | 7.19                         | 14.86                     |
|            |      | 3         | 54               | 7.12                         | 15.05                     |
|            |      | 4         | 81               | 6.05                         | 15.09                     |
|            |      | 5         | 108              | 5.39                         | 17.04                     |
|            |      | 6         | 121.5            | 5.05                         | 16.82                     |
|            |      | 7         | 135              | 4.49                         | 16.48                     |
| 2437       | 6    | 0         | 13.5             | 13.32                        | 21.19                     |
|            |      | 1         | 27               | 11.89                        | 19.89                     |
|            |      | 2         | 40.5             | 11.90                        | 19.72                     |
|            |      | 3         | 54               | 11.92                        | 19.87                     |
|            |      | 4         | 81               | 10.67                        | 19.79                     |
|            |      | 5         | 108              | 9.47                         | 20.02                     |
|            |      | 6         | 121.5            | 9.25                         | 19.86                     |
|            |      | 7         | 135              | 9.21                         | 19.94                     |
| 2452       | 9    | 0         | 13.5             | 7.39                         | 15.44                     |
|            |      | 1         | 27               | 7.36                         | 15.37                     |
|            |      | 2         | 40.5             | 7.24                         | 15.18                     |
|            |      | 3         | 54               | 7.24                         | 15.15                     |
|            |      | 4         | 81               | 7.37                         | 15.26                     |
|            |      | 5         | 108              | 7.38                         | 15.45                     |
|            |      | 6         | 121.5            | 7.36                         | 15.32                     |
|            |      | 7         | 135              | 7.21                         | 15.32                     |

**Table 6-18. 802.11n (40MHz) Conducted Output Power Measurements**

# Main Antenna– channels adjacent to lowest and highest channels

| Freq [MHz] | Chan | MCS Index | Data Rate [Mbps] | Measured Average Power [dBm] | Measured Peak Power [dBm] |
|------------|------|-----------|------------------|------------------------------|---------------------------|
| 2427       | 4    | 0         | 13.5             | 11.23                        | 19.67                     |
|            |      | 1         | 27               | 11.01                        | 19.35                     |
|            |      | 2         | 40.5             | 11.02                        | 19.52                     |
|            |      | 3         | 54               | 10.43                        | 19.68                     |
|            |      | 4         | 81               | 10.05                        | 20.15                     |
|            |      | 5         | 108              | 9.11                         | 20.36                     |
|            |      | 6         | 121.5            | 8.78                         | 20.21                     |
|            |      | 7         | 135              | 8.32                         | 20.05                     |
| 2447       | 8    | 0         | 13.5             | 11.65                        | 19.89                     |
|            |      | 1         | 27               | 11.62                        | 19.89                     |
|            |      | 2         | 40.5             | 11.60                        | 20.03                     |
|            |      | 3         | 54               | 11.31                        | 20.22                     |
|            |      | 4         | 81               | 10.33                        | 20.29                     |
|            |      | 5         | 108              | 9.43                         | 20.61                     |
|            |      | 6         | 121.5            | 8.87                         | 20.56                     |
|            |      | 7         | 135              | 8.67                         | 20.33                     |

Table 6-19. 802.11n (40MHz) Conducted Output Power Measurements

# Aux Antenna– channels adjacent to lowest and highest channels

| Freq [MHz] | Chan | MCS Index | Data Rate [Mbps] | Measured Average Power [dBm] | Measured Peak Power [dBm] |
|------------|------|-----------|------------------|------------------------------|---------------------------|
| 2427       | 4    | 0         | 13.5             | 10.78                        | 19.50                     |
|            |      | 1         | 27               | 10.63                        | 19.67                     |
|            |      | 2         | 40.5             | 10.70                        | 19.74                     |
|            |      | 3         | 54               | 10.55                        | 10.51                     |
|            |      | 4         | 81               | 9.53                         | 20.23                     |
|            |      | 5         | 108              | 8.78                         | 20.59                     |
|            |      | 6         | 121.5            | 8.60                         | 20.39                     |
|            |      | 7         | 135              | 8.13                         | 19.92                     |
| 2447       | 8    | 0         | 13.5             | 11.36                        | 20.07                     |
|            |      | 1         | 27               | 11.12                        | 20.24                     |
|            |      | 2         | 40.5             | 11.20                        | 20.32                     |
|            |      | 3         | 54               | 10.97                        | 20.35                     |
|            |      | 4         | 81               | 10.15                        | 20.44                     |
|            |      | 5         | 108              | 9.23                         | 20.94                     |
|            |      | 6         | 121.5            | 8.87                         | 20.78                     |
|            |      | 7         | 135              | 8.64                         | 20.43                     |

Table 6-20. 802.11n (40MHz) Conducted Output Power Measurements

### Aggregate (Main + Aux) Antenna –802.11n (40MHz Bandwidth)

| Freq [MHz] | Chan | MCS Index | Data Rate [Mbps] | Main Average Power [dBm] | Main Peak Power [dBm] | Aux Average Power [dBm] | Aux Peak Power [dBm] | 20MHz BW Average Aggregate Power [dBm] | 20MHz BW Peak Aggregate Power [dBm] |
|------------|------|-----------|------------------|--------------------------|-----------------------|-------------------------|----------------------|----------------------------------------|-------------------------------------|
| 2422       | 3    | 0         | 13.5             | 7.42                     | 15.81                 | 6.57                    | 14.74                | 10.03                                  | 18.32                               |
|            |      | 1         | 27               | 7.36                     | 15.82                 | 6.66                    | 14.78                | 10.03                                  | 18.34                               |
|            |      | 2         | 40.5             | 7.39                     | 15.65                 | 6.83                    | 14.88                | 10.13                                  | 18.29                               |
|            |      | 3         | 54               | 6.87                     | 15.82                 | 6.70                    | 15.44                | 9.80                                   | 18.64                               |
|            |      | 4         | 81               | 5.96                     | 15.97                 | 5.91                    | 15.66                | 8.95                                   | 18.83                               |
|            |      | 5         | 108              | 5.02                     | 16.16                 | 4.98                    | 16.00                | 8.01                                   | 19.09                               |
|            |      | 6         | 121.5            | 4.65                     | 16.04                 | 4.61                    | 15.81                | 7.64                                   | 18.94                               |
|            |      | 7         | 135              | 4.33                     | 15.77                 | 4.01                    | 15.56                | 7.18                                   | 18.68                               |
| 2437       | 6    | 0         | 13.5             | 14.46                    | 22.89                 | 13.13                   | 21.62                | 16.86                                  | 25.31                               |
|            |      | 1         | 27               | 12.29                    | 20.64                 | 11.94                   | 20.46                | 15.13                                  | 23.56                               |
|            |      | 2         | 40.5             | 11.97                    | 20.95                 | 11.80                   | 20.12                | 14.90                                  | 23.57                               |
|            |      | 3         | 54               | 11.37                    | 20.55                 | 11.31                   | 20.41                | 14.35                                  | 23.49                               |
|            |      | 4         | 81               | 10.64                    | 20.77                 | 10.72                   | 20.72                | 13.69                                  | 23.76                               |
|            |      | 5         | 108              | 9.69                     | 21.03                 | 9.56                    | 20.94                | 12.64                                  | 24.00                               |
|            |      | 6         | 121.5            | 9.27                     | 20.82                 | 9.49                    | 20.64                | 12.39                                  | 23.74                               |
|            |      | 7         | 135              | 8.79                     | 20.59                 | 8.93                    | 20.78                | 11.87                                  | 23.70                               |
| 2452       | 9    | 0         | 13.5             | 8.33                     | 16.66                 | 8.13                    | 16.45                | 11.24                                  | 19.57                               |
|            |      | 1         | 27               | 8.21                     | 16.49                 | 8.31                    | 16.72                | 11.27                                  | 19.62                               |
|            |      | 2         | 40.5             | 8.04                     | 16.47                 | 8.34                    | 16.73                | 11.20                                  | 19.61                               |
|            |      | 3         | 54               | 7.85                     | 16.64                 | 8.02                    | 16.92                | 10.95                                  | 19.79                               |
|            |      | 4         | 81               | 6.89                     | 16.77                 | 7.29                    | 17.16                | 10.10                                  | 19.98                               |
|            |      | 5         | 108              | 6.06                     | 17.00                 | 6.44                    | 17.55                | 9.26                                   | 20.29                               |
|            |      | 6         | 121.5            | 5.67                     | 17.01                 | 5.97                    | 17.43                | 8.83                                   | 20.24                               |
|            |      | 7         | 135              | 5.41                     | 16.78                 | 5.73                    | 17.57                | 8.58                                   | 20.20                               |

**Table 6-21. 802.11n (40MHz Bandwidth) Aggregate Conducted Output Power Measurements**



## 6.6 Power Spectral Density (802.11b/g/n)

### §15.247(e)

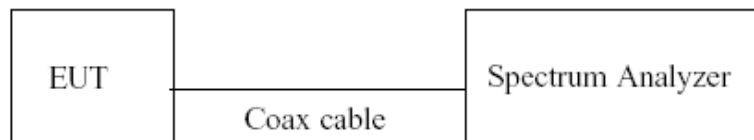
The peak power density is measured with a spectrum analyzer connected to the antenna terminal while the EUT is operating in transmission mode at the appropriate frequencies. **The maximum permissible power spectral density is 8 dBm in any 3 kHz band.**

| Frequency [MHz] | Channel No. | 802.11 Mode | Data Rate [Mbps] | Measured Power Spectral Density [dBm] | Maximum Permissible Power Density [dBm / 3kHz] | Margin [dB] |
|-----------------|-------------|-------------|------------------|---------------------------------------|------------------------------------------------|-------------|
| 2412            | 1           | b           | 1                | -6.810                                | 8.0                                            | -14.81      |
| 2437            | 6           | b           | 1                | -4.550                                | 8.0                                            | -12.55      |
| 2462            | 11          | b           | 1                | -8.160                                | 8.0                                            | -16.16      |
| 2412            | 1           | g           | 6                | -13.000                               | 8.0                                            | -21.00      |
| 2437            | 6           | g           | 6                | -4.950                                | 8.0                                            | -12.95      |
| 2462            | 11          | g           | 6                | -11.620                               | 8.0                                            | -19.62      |
| 2412            | 1           | n           | 6.5 (MCS0)       | -17.610                               | 8.0                                            | -25.61      |
| 2437            | 6           | n           | 6.5 (MCS0)       | -9.700                                | 8.0                                            | -17.70      |
| 2462            | 11          | n           | 6.5 (MCS0)       | -16.480                               | 8.0                                            | -24.48      |
| 2422            | 3           | n           | 13.5 (MCS0)      | -23.130                               | 8.0                                            | -31.13      |
| 2437            | 6           | n           | 13.5 (MCS0)      | -14.980                               | 8.0                                            | -22.98      |
| 2452            | 9           | n           | 13.5 (MCS0)      | -21.300                               | 8.0                                            | -29.30      |

**Table 6-22. Conducted Power Density Measurements – Main Antenna**

| Frequency [MHz] | Channel No. | 802.11 Mode | Data Rate [Mbps] | Measured Power Spectral Density [dBm] | Maximum Permissible Power Density [dBm / 3kHz] | Margin [dB] |
|-----------------|-------------|-------------|------------------|---------------------------------------|------------------------------------------------|-------------|
| 2412            | 1           | b           | 1                | -8.430                                | 8.0                                            | -16.43      |
| 2437            | 6           | b           | 1                | -3.290                                | 8.0                                            | -11.29      |
| 2462            | 11          | b           | 1                | -8.400                                | 8.0                                            | -16.40      |
| 2412            | 1           | g           | 6                | -11.890                               | 8.0                                            | -19.89      |
| 2437            | 6           | g           | 6                | -5.490                                | 8.0                                            | -13.49      |
| 2462            | 11          | g           | 6                | -13.520                               | 8.0                                            | -21.52      |
| 2412            | 1           | n           | 6.5 (MCS0)       | -18.020                               | 8.0                                            | -26.02      |
| 2437            | 6           | n           | 6.5 (MCS0)       | -10.690                               | 8.0                                            | -18.69      |
| 2462            | 11          | n           | 6.5 (MCS0)       | -15.450                               | 8.0                                            | -23.45      |
| 2422            | 3           | n           | 13.5 (MCS0)      | -21.630                               | 8.0                                            | -29.63      |
| 2437            | 6           | n           | 13.5 (MCS0)      | -15.840                               | 8.0                                            | -23.84      |
| 2452            | 9           | n           | 13.5 (MCS0)      | -20.930                               | 8.0                                            | -28.93      |

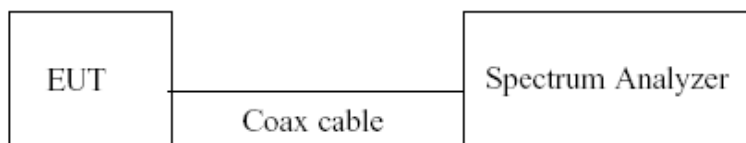
**Table 6-23. Conducted Power Density Measurements – Aux Antenna**



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

| Frequency [MHz] | Channel No. | 802.11 Mode | Data Rate [Mbps] | Measured Power Density Main Ant [dBm] | Measured Power Density Aux Ant [dBm] | Aggregate PSD Chains Main + Aux [dBm] | Maximum Permissible Power Density [dBm / 3kHz] | Margin [dB] |
|-----------------|-------------|-------------|------------------|---------------------------------------|--------------------------------------|---------------------------------------|------------------------------------------------|-------------|
| 2412            | 1           | b           | 1                | -6.81                                 | -8.43                                | -4.53                                 | 8.0                                            | -12.5       |
| 2437            | 6           | b           | 1                | -4.55                                 | -3.29                                | -0.86                                 | 8.0                                            | -8.9        |
| 2462            | 11          | b           | 1                | -8.16                                 | -8.4                                 | -5.27                                 | 8.0                                            | -13.3       |
| 2412            | 1           | g           | 6                | -13                                   | -11.89                               | -9.40                                 | 8.0                                            | -17.4       |
| 2437            | 6           | g           | 6                | -4.95                                 | -5.49                                | -2.20                                 | 8.0                                            | -10.2       |
| 2462            | 11          | g           | 6                | -11.62                                | -13.52                               | -9.46                                 | 8.0                                            | -17.5       |
| 2412            | 1           | n           | 6.5 (MCS0)       | -17.61                                | -18.02                               | -14.80                                | 8.0                                            | -22.8       |
| 2437            | 6           | n           | 6.5 (MCS0)       | -9.7                                  | -10.69                               | -7.16                                 | 8.0                                            | -15.2       |
| 2462            | 11          | n           | 6.5 (MCS0)       | -16.48                                | -15.45                               | -12.92                                | 8.0                                            | -20.9       |
| 2422            | 3           | n           | 13.5 (MCS0)      | -23.13                                | -21.63                               | -19.31                                | 8.0                                            | -27.3       |
| 2437            | 6           | n           | 13.5 (MCS0)      | -14.98                                | -15.84                               | -12.38                                | 8.0                                            | -20.4       |
| 2452            | 9           | n           | 13.5 (MCS0)      | -21.3                                 | -20.93                               | -18.10                                | 8.0                                            | -26.1       |

**Table 6-24. Conducted Power Spectral Density Measurements – Main + Aux Antenna**

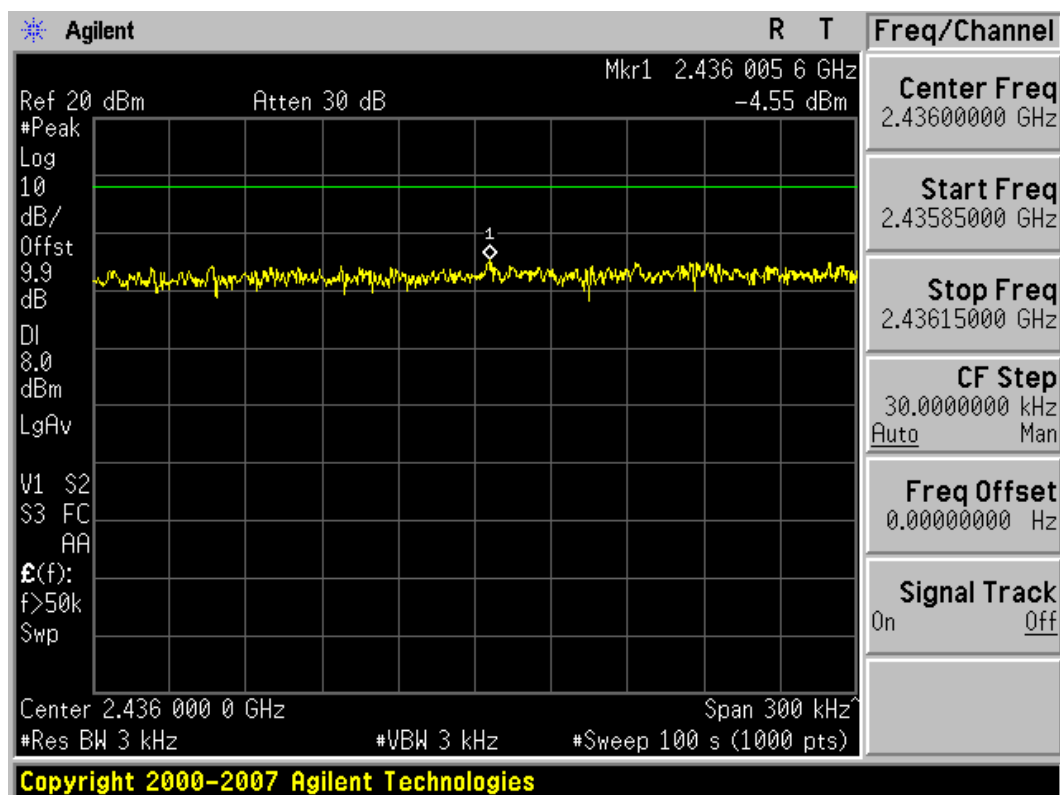


**Figure 6-7. Test Instrument & Measurement Setup**

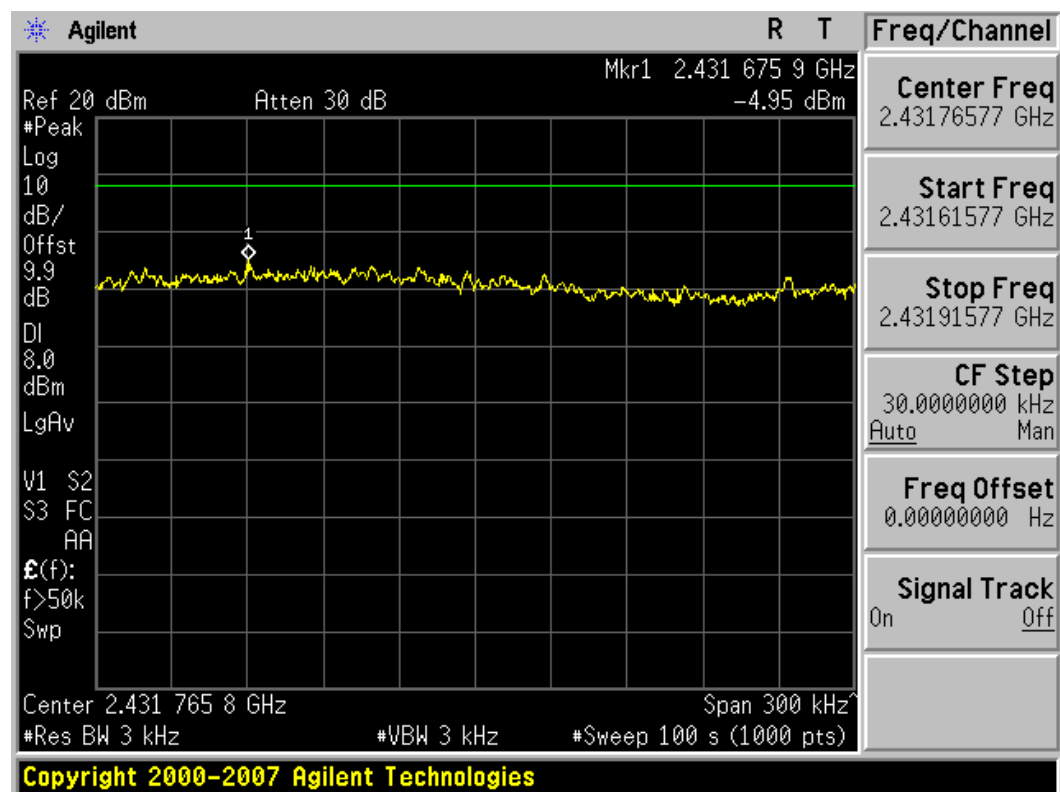
**Notes:**

- The aggregate power spectral density shown above in Table 6-24 is the summation of the power spectral density's measured in single chain transmission mode, as shown in Table 6-22 and Table 6-23.
- The plots below show only the power spectral density measured on Main and Aux Antenna on the channel that results in the highest aggregate power spectral density reported in Table 6-24 for each mode.

|                                      |                                                                                     |                                                                   |                                                                                       |                                 |
|--------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------|---------------------------------------------------------------------------------------|---------------------------------|
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| Test Report S/N:<br>0Y1007231224.ACJ | Test Dates:<br>August 13, 2010                                                      | EUT Type:<br>Toughbook Model: CF-19mk4                            |                                                                                       | Page 29 of 73                   |

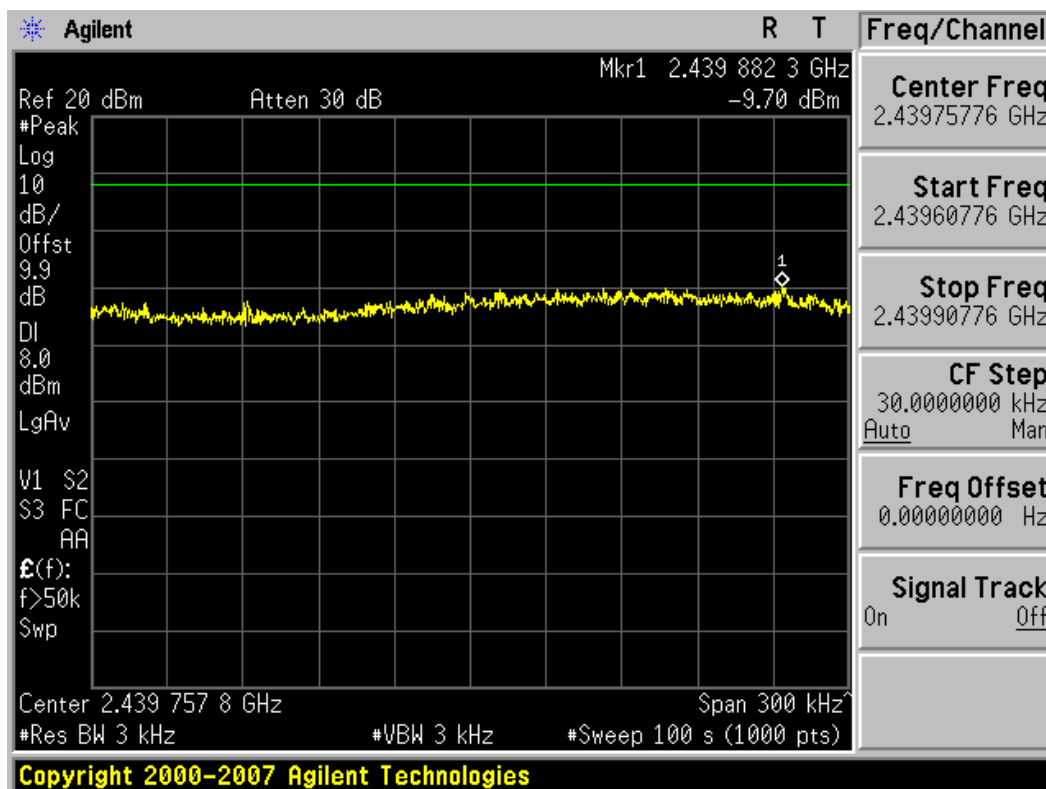


Plot 6-9. Power Spectral Density Plot (802.11b – Ch. 6) – Main Antenna

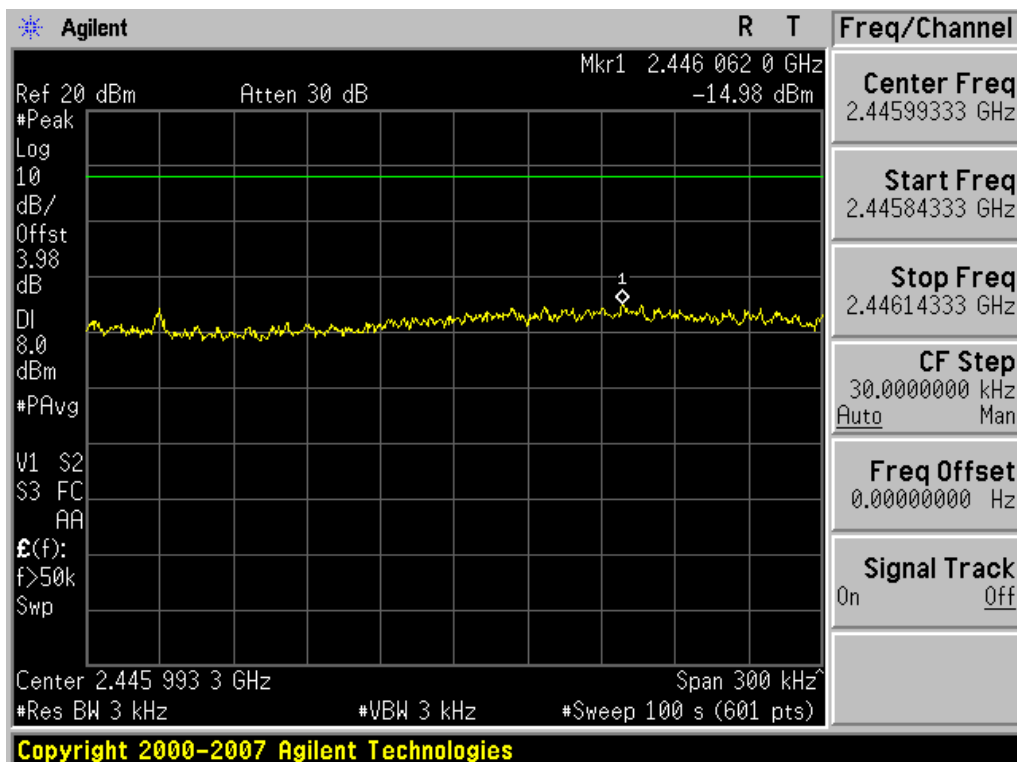


Plot 6-10. Power Spectral Density Plot (802.11g – Ch. 6) – Main Antenna

|                                      |                                               |                                                                   |                  |                                 |
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| Test Report S/N:<br>0Y1007231224.ACJ | Test Dates:<br>August 13, 2010                | EUT Type:<br>Toughbook Model: CF-19mk4                            |                  | Page 30 of 73                   |

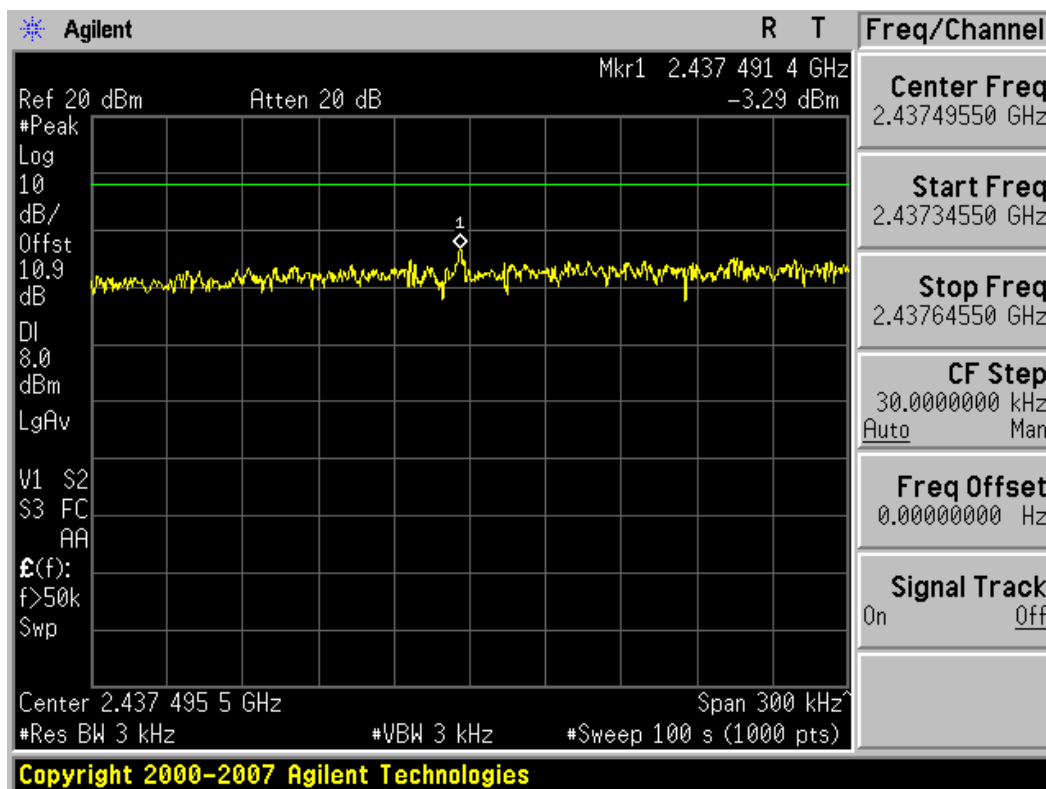


Plot 6-11. Power Spectral Density Plot (802.11n (20MHz) – Ch. 6) – Main Antenna

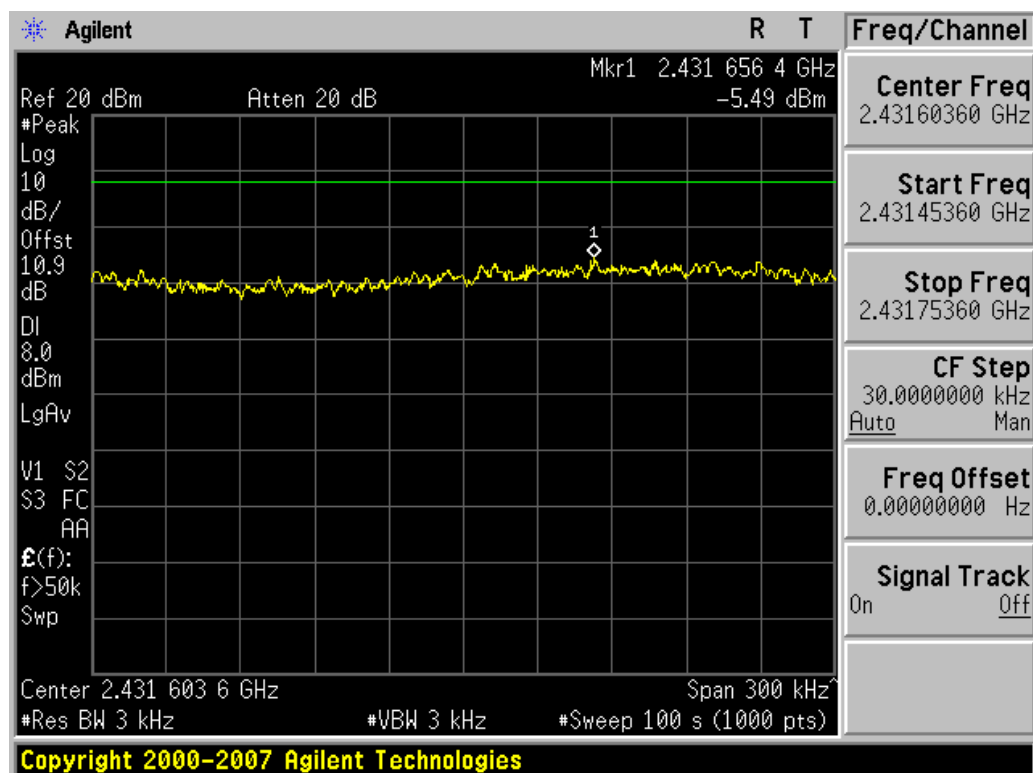


Plot 6-12. Power Spectral Density Plot (802.11n (40MHz) – Ch. 6) – Main Antenna

|                                      |                                               |                                                                   |                  |                                 |
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| Test Report S/N:<br>0Y1007231224.ACJ | Test Dates:<br>August 13, 2010                | EUT Type:<br>Toughbook Model: CF-19mk4                            |                  | Page 31 of 73                   |

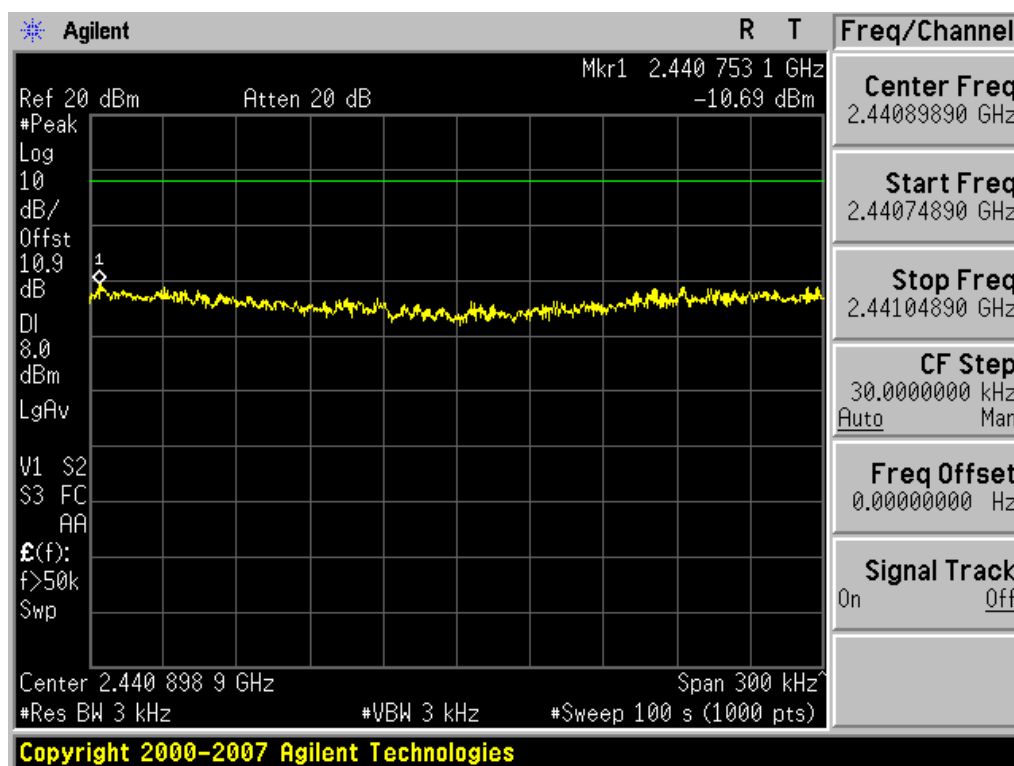


Plot 6-13. Power Spectral Density Plot (802.11b – Ch. 6) – Aux Antenna

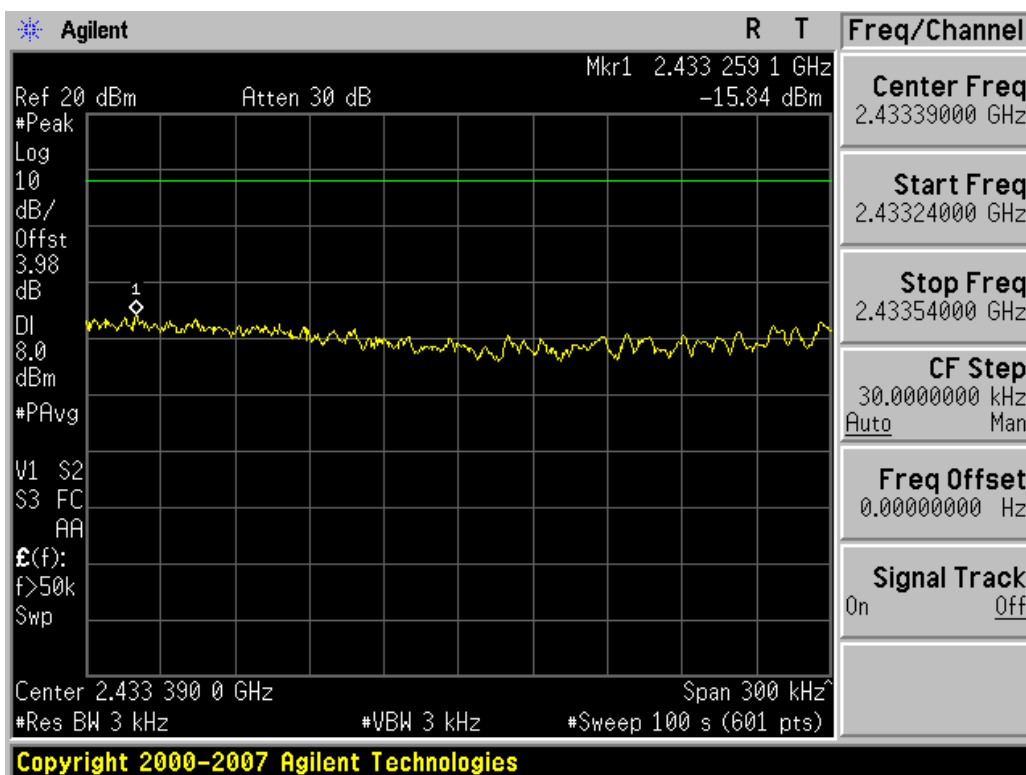


Plot 6-14. Power Spectral Density Plot (802.11g – Ch. 6) – Aux Antenna

|                                      |                                               |                                                                   |                  |                                 |
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Plot 6-15. Power Spectral Density Plot (802.11n (20MHz) – Ch. 6) – Aux Antenna



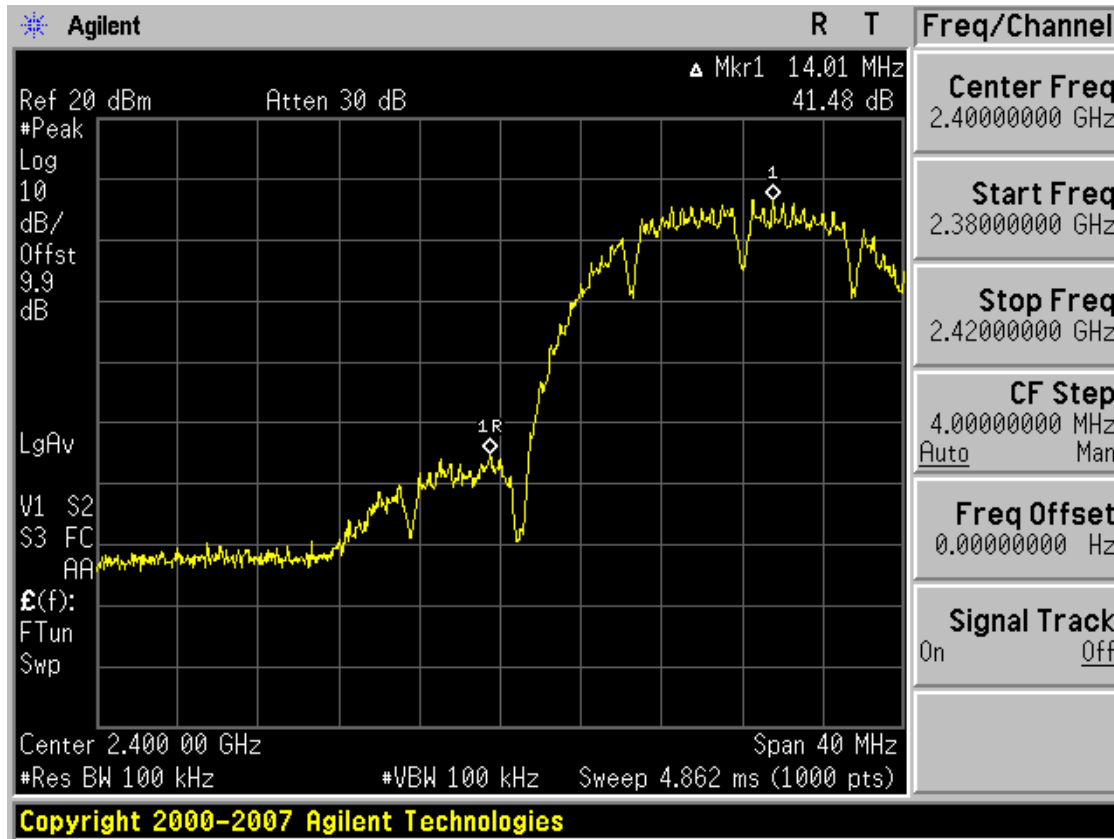
Plot 6-16. Power Spectral Density Plot (802.11n (40MHz) – Ch. 6) – Aux Antenna

|                                      |                                               |                                                                   |                  |                                 |
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| Test Report S/N:<br>0Y1007231224.ACJ | Test Dates:<br>August 13, 2010                | EUT Type:<br>Toughbook Model: CF-19mk4                            |                  | Page 33 of 73                   |

## 6.7 Out of Band Emissions at the Band Edge

### §15.247(d)

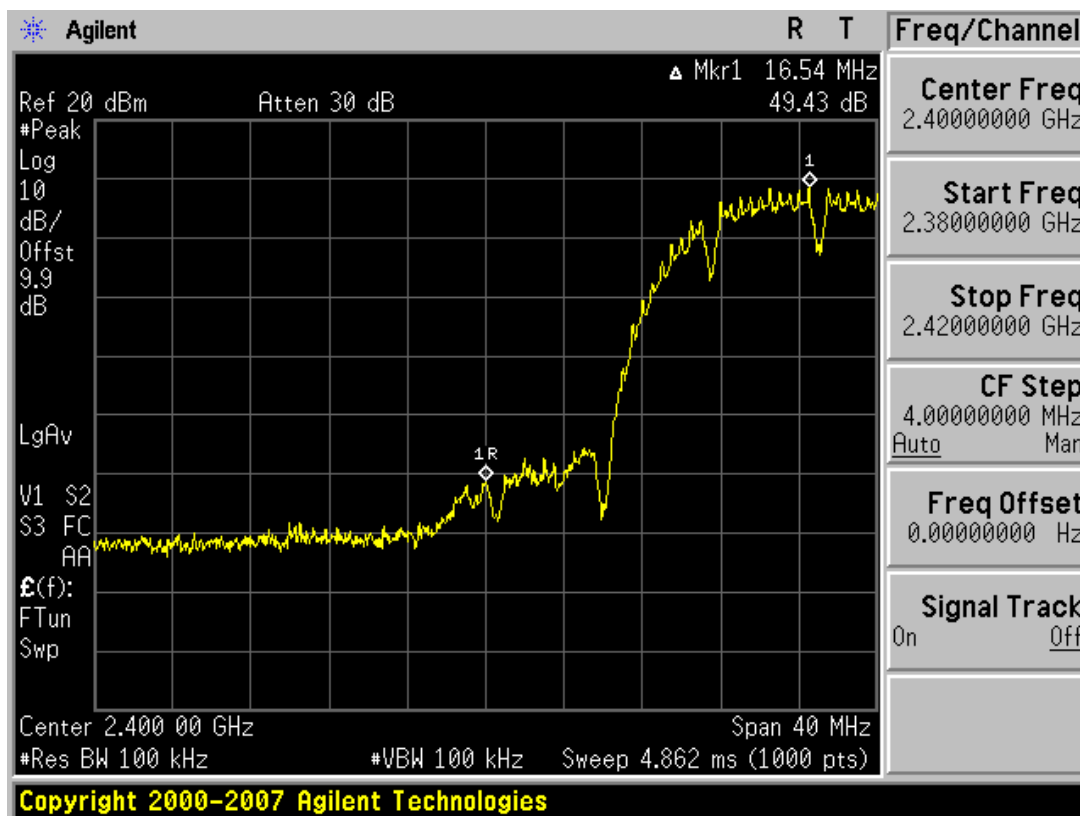
**Note:** For the following out of band conducted spurious emissions plots at the band edge, the EUT was set at a data rate of 1Mbps for “b” mode, 6Mbps for “g” mode, and 6.5/13.5 Mbps for “n” mode. Band edge compliance was also checked for inner channels as the power is increased.



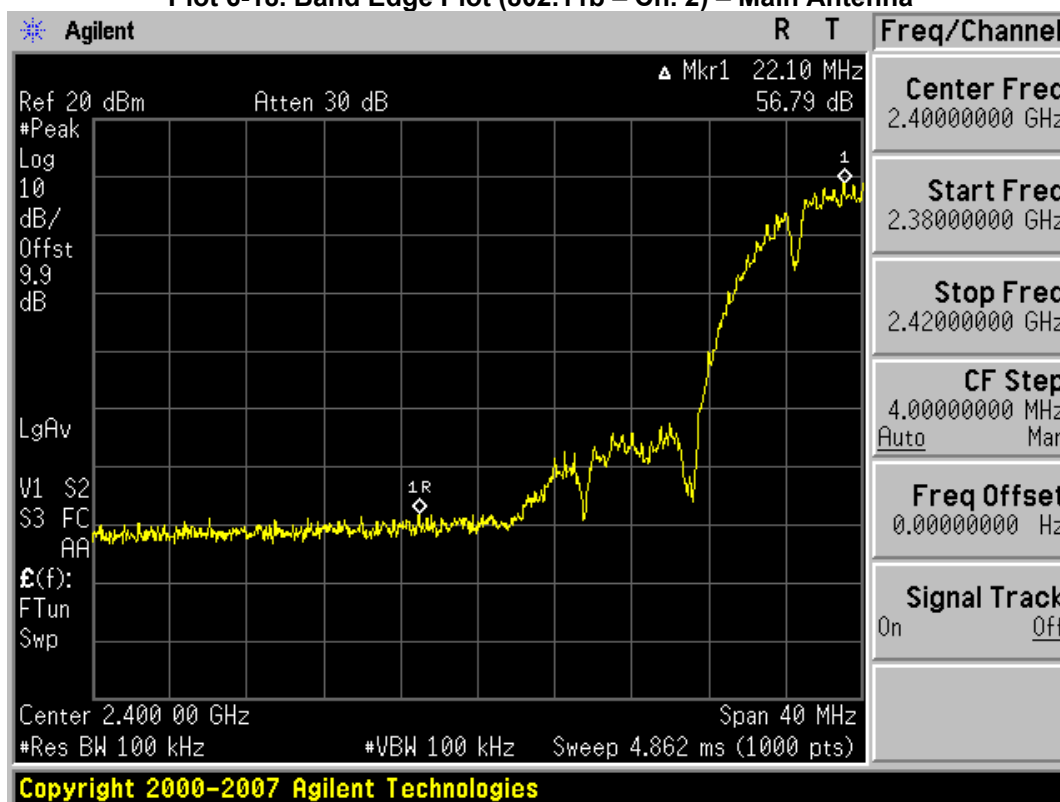
Plot 6-17. Band Edge Plot (802.11b – Ch. 1) – Main Antenna

|                                      |                                               |                                                                   |                  |                                 |
|--------------------------------------|-----------------------------------------------|-------------------------------------------------------------------|------------------|---------------------------------|
| FCC ID: ACJ9TGCF-19F                 | <b>PCTEST</b><br>ENGINEERING LABORATORY, INC. | FCC Pt. 15.247 802.11 b/g/n MEASUREMENT REPORT<br>(CERTIFICATION) | <b>Panasonic</b> | Reviewed by:<br>Quality Manager |
| Test Report S/N:<br>0Y1007231224.ACJ | Test Dates:<br>August 13, 2010                | EUT Type:<br>Toughbook Model: CF-19mk4                            |                  | Page 34 of 73                   |



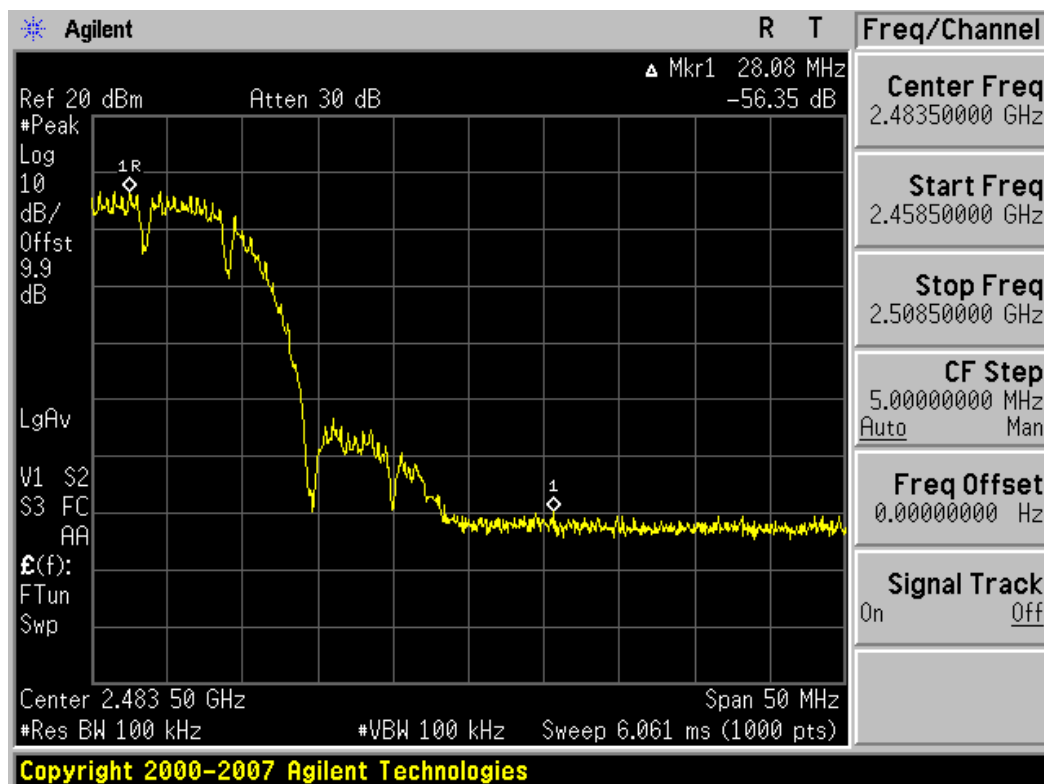


Plot 6-18. Band Edge Plot (802.11b – Ch. 2) – Main Antenna

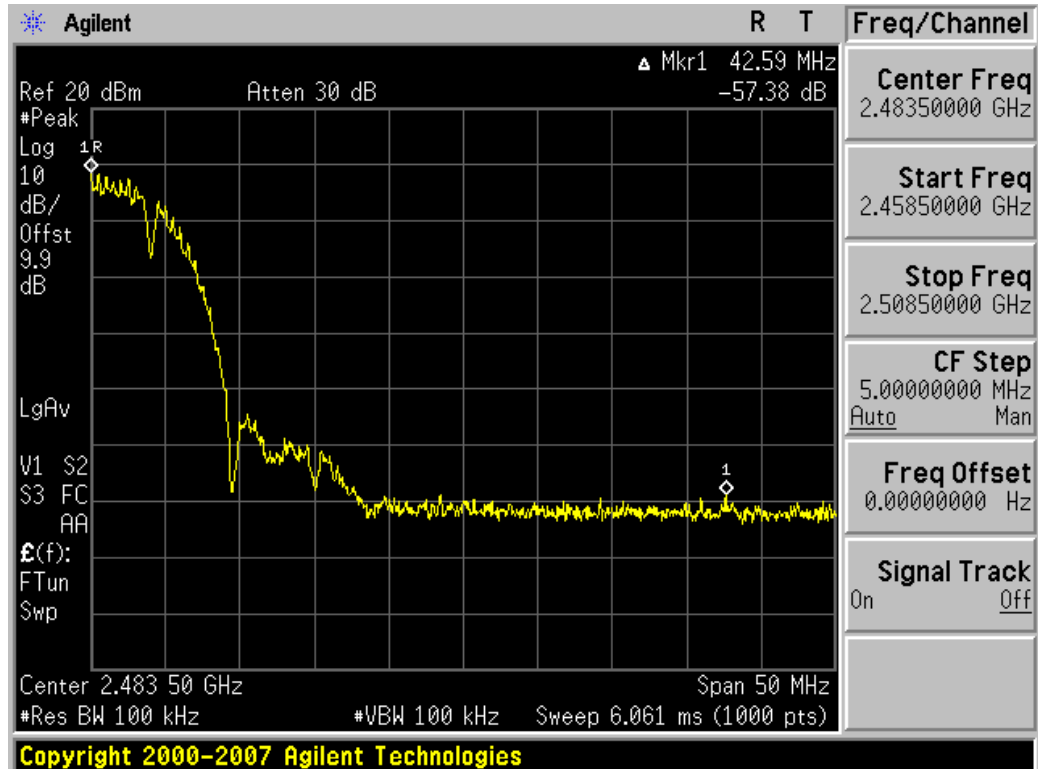


Plot 6-19. Band Edge Plot (802.11b – Ch. 3) – Main Antenna

|                                      |                                               |                                                                   |                  |                                 |
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| Test Report S/N:<br>0Y1007231224.ACJ | Test Dates:<br>August 13, 2010                | EUT Type:<br>Toughbook Model: CF-19mk4                            |                  | Page 35 of 73                   |

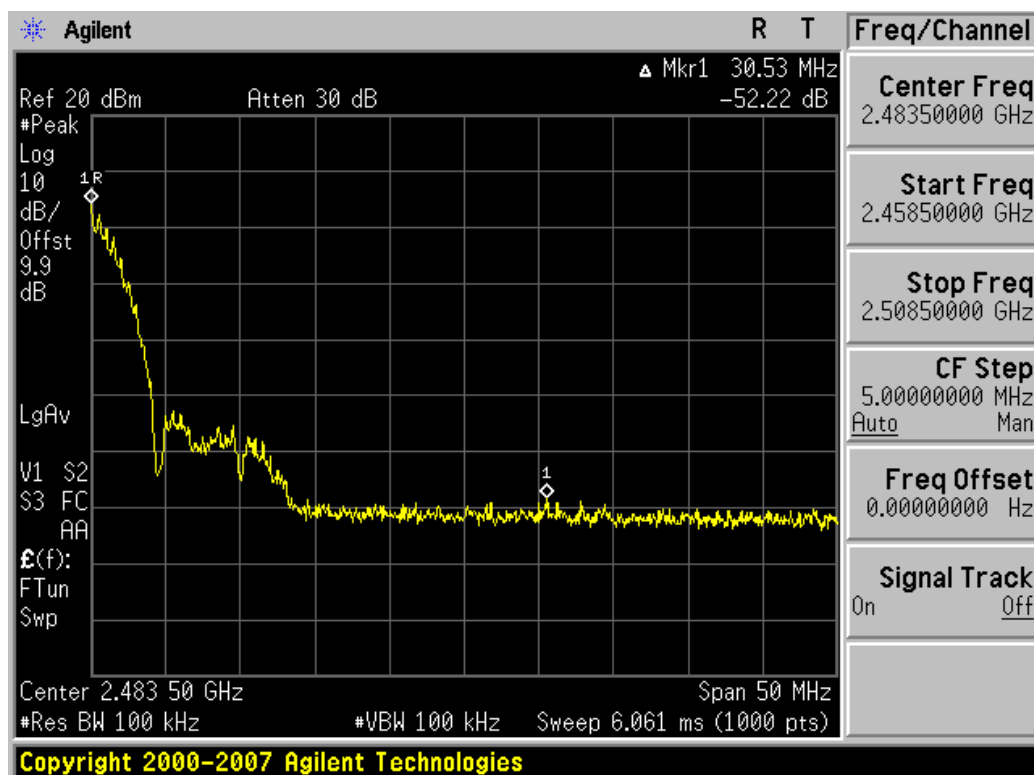


Plot 6-20. Band Edge Plot (802.11b – Ch. 11) – Main Antenna

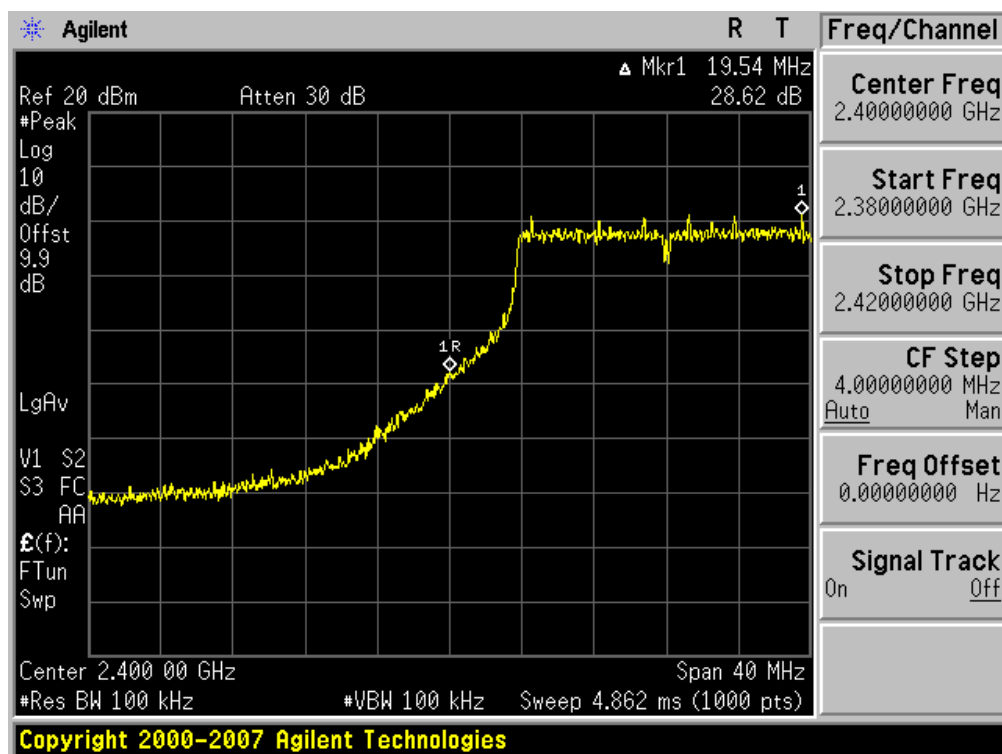


Plot 6-21. Band Edge Plot (802.11b – Ch. 10) – Main Antenna

|                                      |                                               |                                                                   |                  |                                 |
|--------------------------------------|-----------------------------------------------|-------------------------------------------------------------------|------------------|---------------------------------|
| FCC ID: ACJ9TGCF-19F                 | <b>PCTEST</b><br>ENGINEERING LABORATORY, INC. | FCC Pt. 15.247 802.11 b/g/n MEASUREMENT REPORT<br>(CERTIFICATION) | <b>Panasonic</b> | Reviewed by:<br>Quality Manager |
| Test Report S/N:<br>0Y1007231224.ACJ | Test Dates:<br>August 13, 2010                | EUT Type:<br>Toughbook Model: CF-19mk4                            |                  | Page 36 of 73                   |

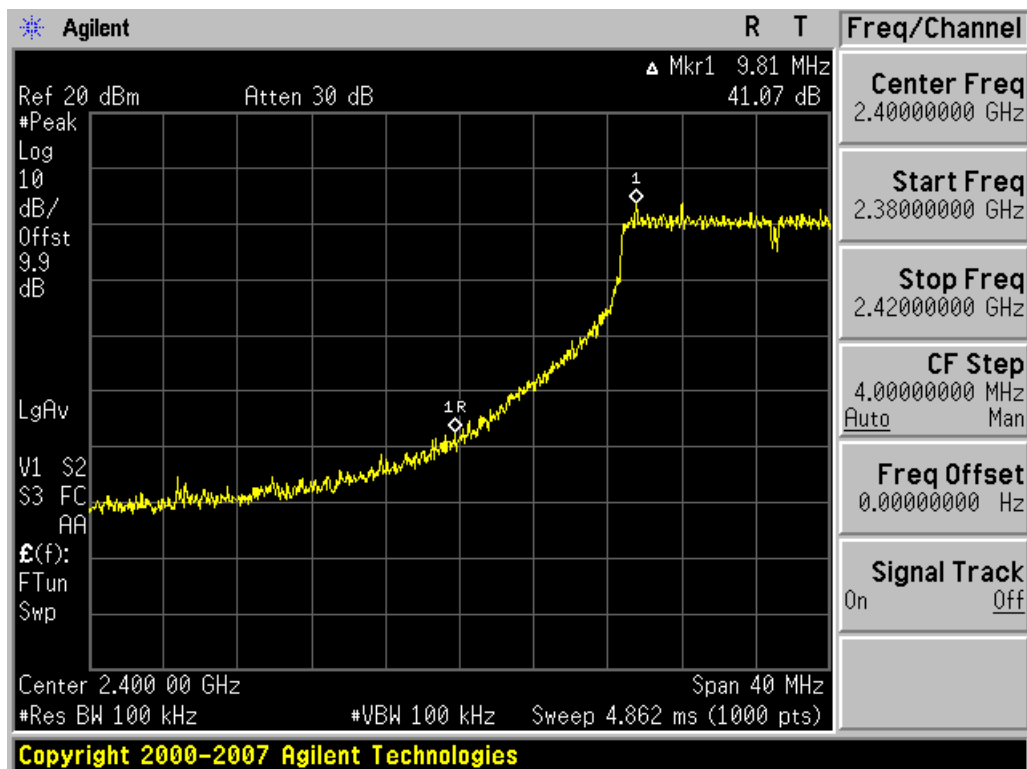


Plot 6-22. Band Edge Plot (802.11b - Ch. 9) - Main Antenna

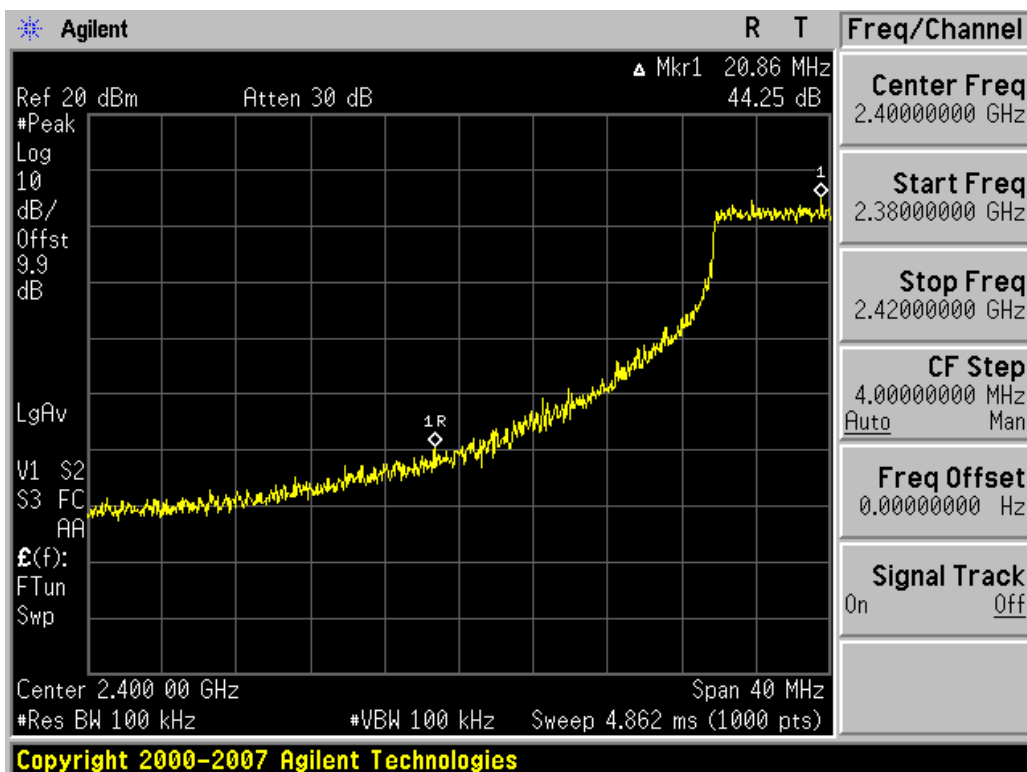


Plot 6-23. Band Edge Plot (802.11g - Ch. 1) - Main Antenna

|                                      |                                               |                                                                   |                  |                                 |
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| FCC ID: ACJ9TGCF-19F                 | <b>PCTEST</b><br>ENGINEERING LABORATORY, INC. | FCC Pt. 15.247 802.11 b/g/n MEASUREMENT REPORT<br>(CERTIFICATION) | <b>Panasonic</b> | Reviewed by:<br>Quality Manager |
| Test Report S/N:<br>0Y1007231224.ACJ | Test Dates:<br>August 13, 2010                | EUT Type:<br>Toughbook Model: CF-19mk4                            |                  | Page 37 of 73                   |

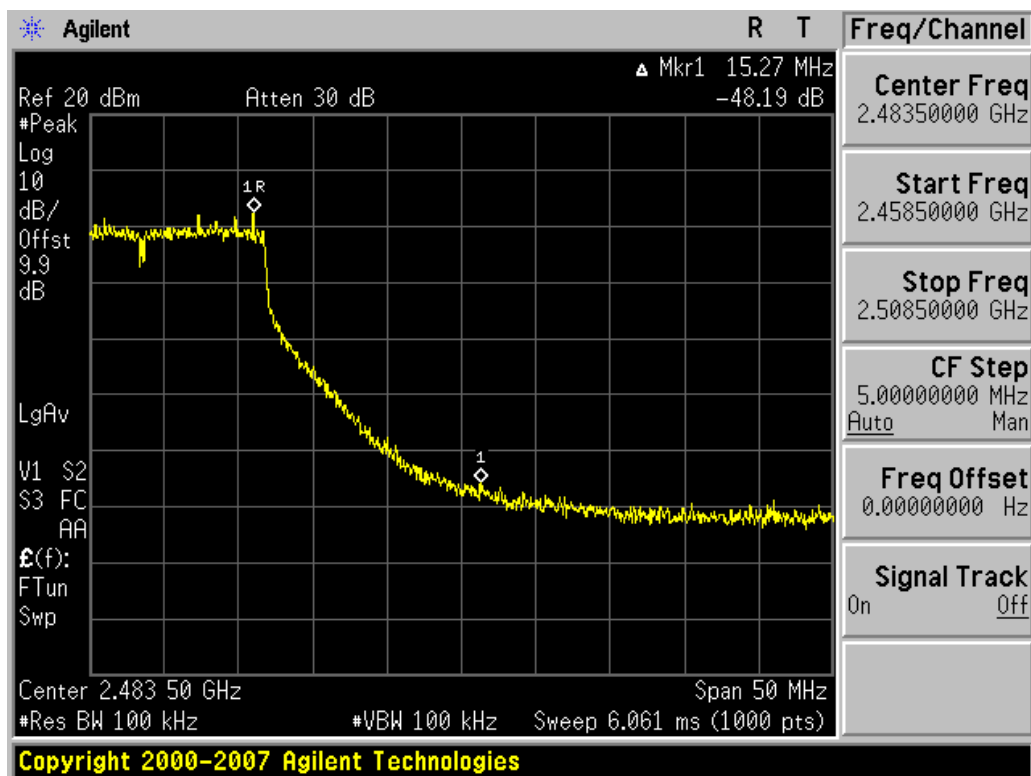


Plot 6-24. Band Edge Plot (802.11g- Ch. 2) – Main Antenna

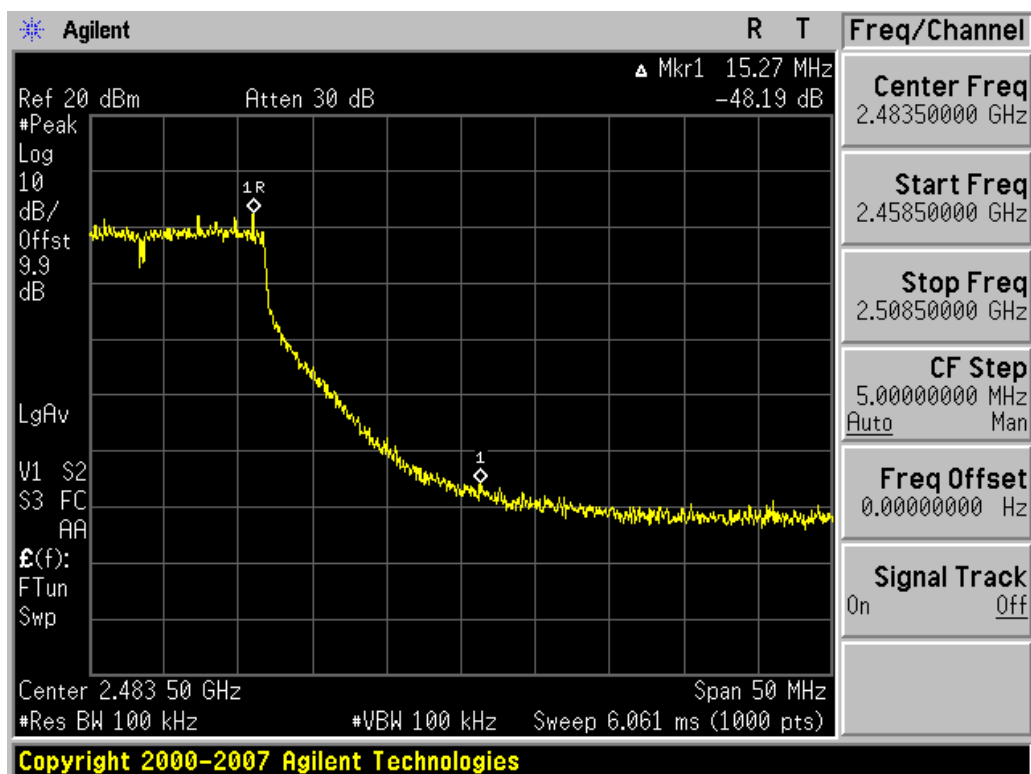


Plot 6-25. Band Edge Plot (802.11g- Ch. 3) – Main Antenna

|                                      |                                               |                                                                   |                  |                                 |
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| Test Report S/N:<br>0Y1007231224.ACJ | Test Dates:<br>August 13, 2010                | EUT Type:<br>Toughbook Model: CF-19mk4                            |                  | Page 38 of 73                   |

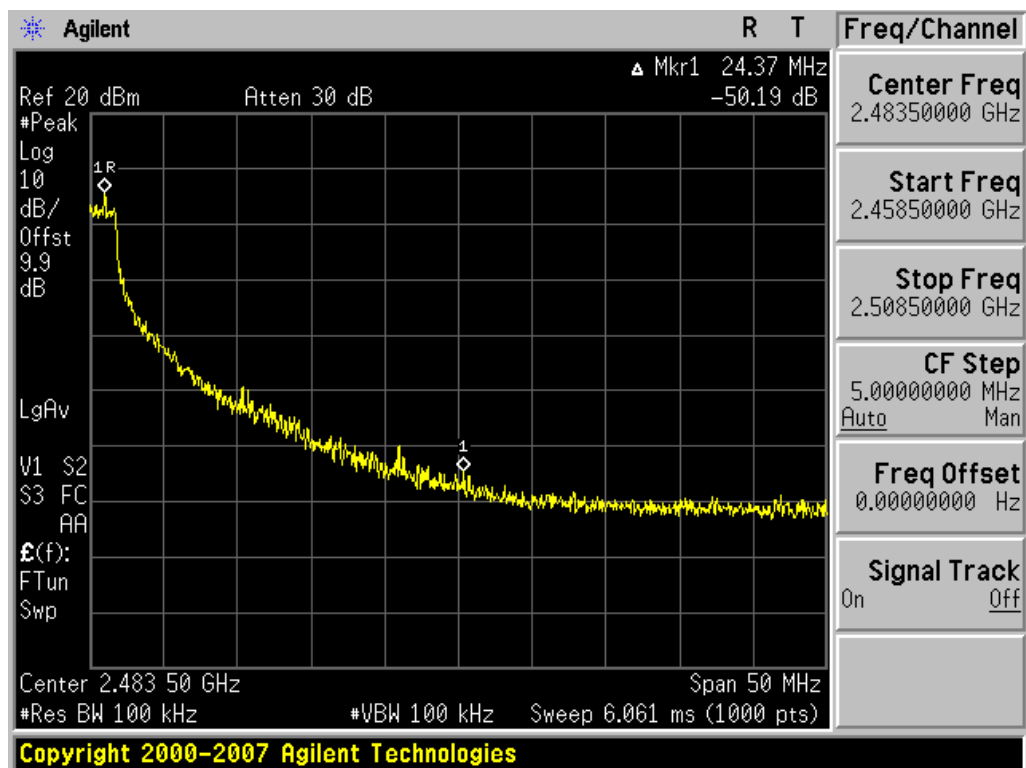


Plot 6-26. Band Edge Plot (802.11g – Ch. 11) – Main Antenna

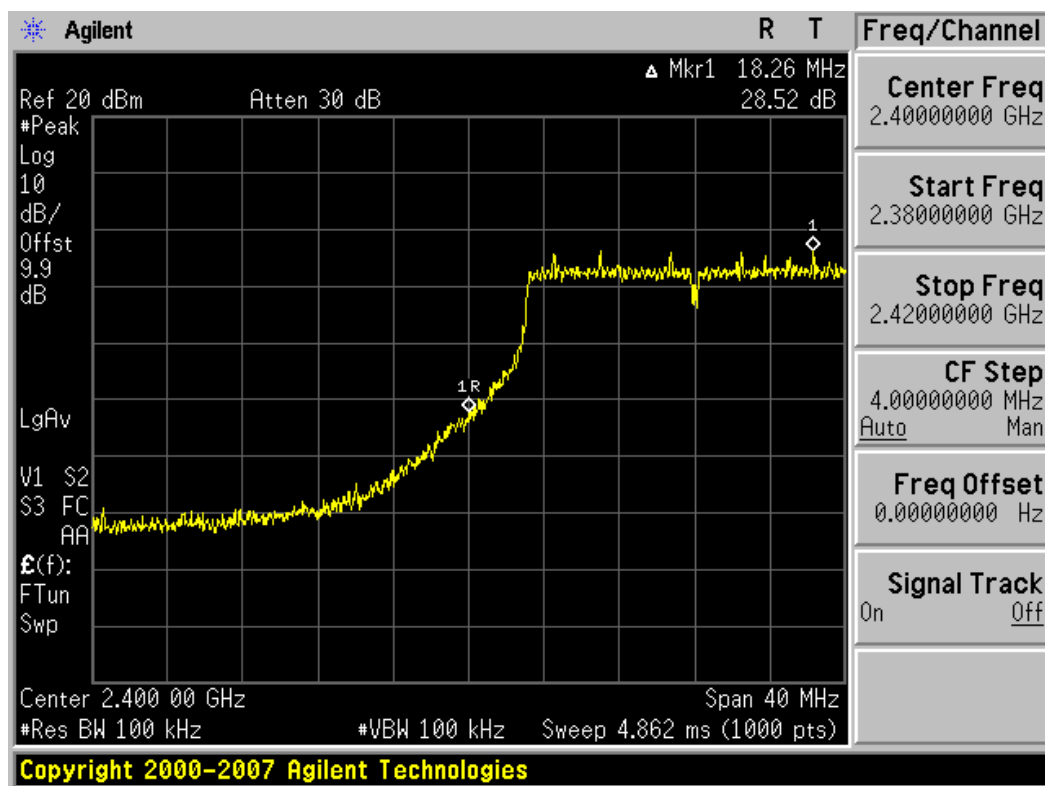


Plot 6-27. Band Edge Plot (802.11g – Ch. 10) – Main Antenna

|                                      |                                               |                                                                   |                  |                                 |
|--------------------------------------|-----------------------------------------------|-------------------------------------------------------------------|------------------|---------------------------------|
| FCC ID: ACJ9TGCF-19F                 | <b>PCTEST</b><br>ENGINEERING LABORATORY, INC. | FCC Pt. 15.247 802.11 b/g/n MEASUREMENT REPORT<br>(CERTIFICATION) | <b>Panasonic</b> | Reviewed by:<br>Quality Manager |
| Test Report S/N:<br>0Y1007231224.ACJ | Test Dates:<br>August 13, 2010                | EUT Type:<br>Toughbook Model: CF-19mk4                            |                  | Page 39 of 73                   |

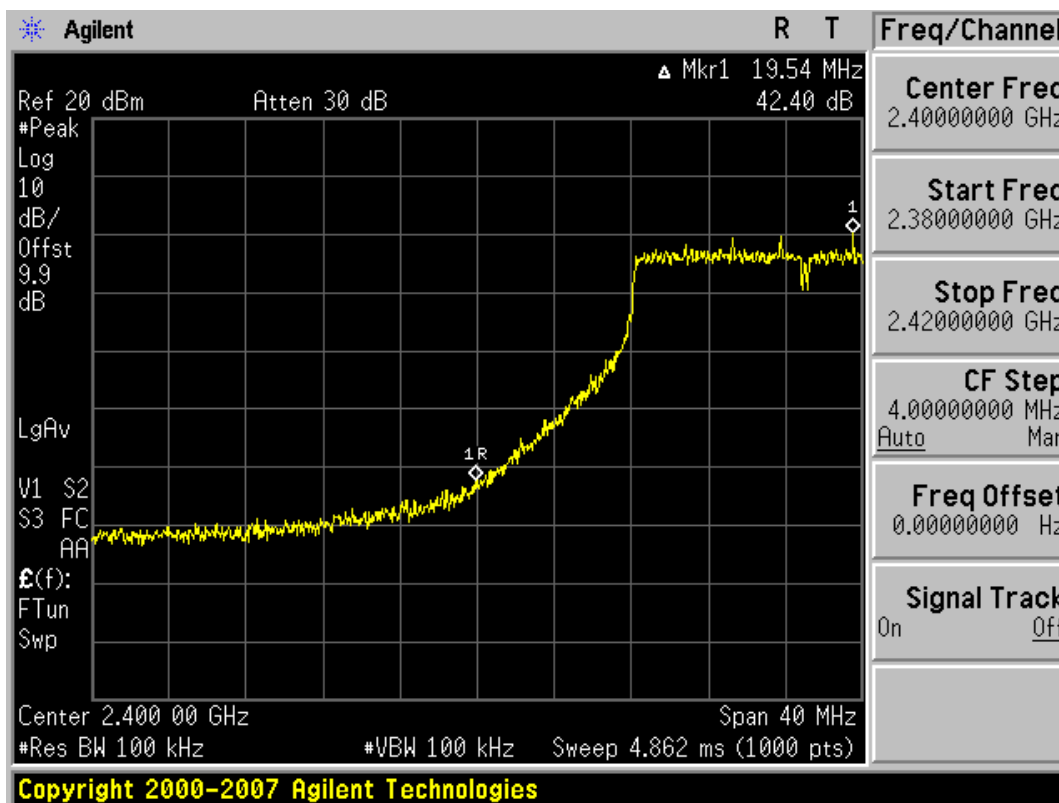


Plot 6-28. Band Edge Plot (802.11g – Ch. 9) – Main Antenna

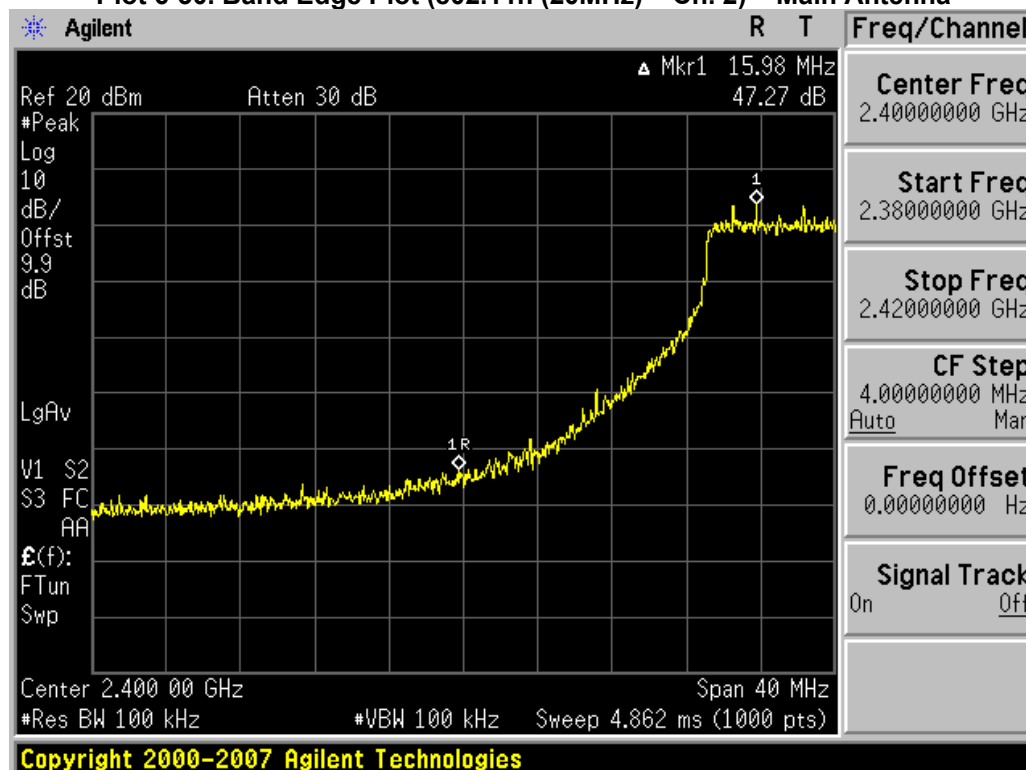


Plot 6-29. Band Edge Plot (802.11n (20MHz) – Ch. 1) – Main Antenna

|                                      |                                               |                                                                   |                  |                                 |
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| FCC ID: ACJ9TGCF-19F                 | <b>PCTEST</b><br>ENGINEERING LABORATORY, INC. | FCC Pt. 15.247 802.11 b/g/n MEASUREMENT REPORT<br>(CERTIFICATION) | <b>Panasonic</b> | Reviewed by:<br>Quality Manager |
| Test Report S/N:<br>0Y1007231224.ACJ | Test Dates:<br>August 13, 2010                | EUT Type:<br>Toughbook Model: CF-19mk4                            |                  | Page 40 of 73                   |

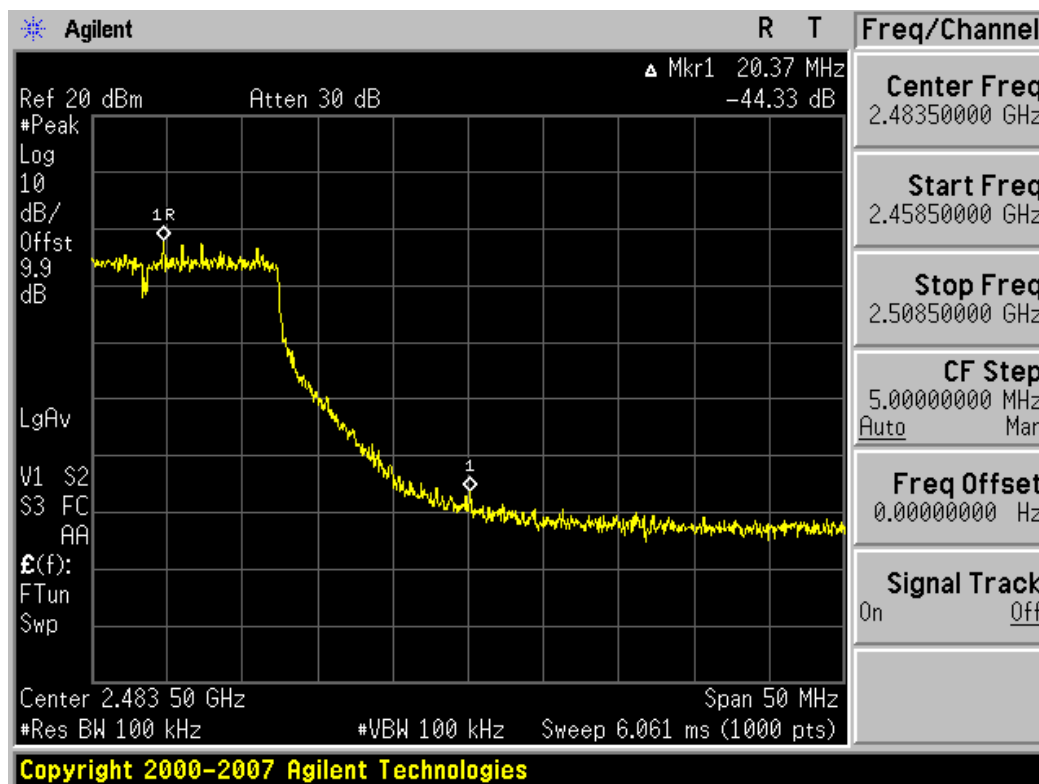


Plot 6-30. Band Edge Plot (802.11n (20MHz) – Ch. 2) – Main Antenna

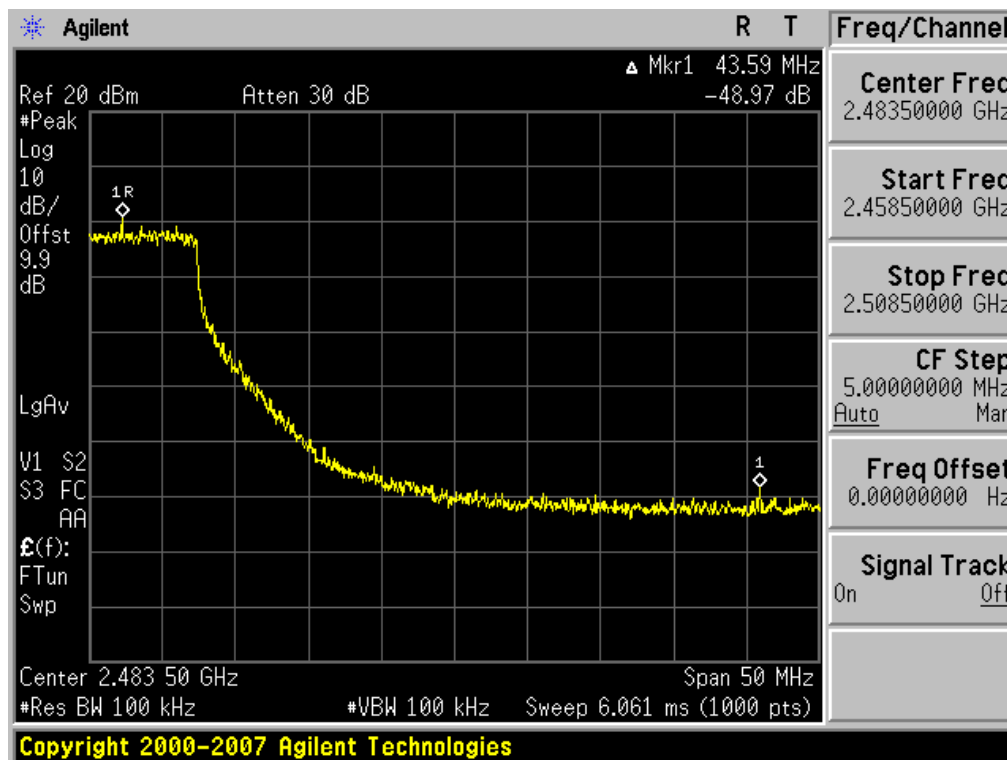


Plot 6-31. Band Edge Plot (802.11n (20MHz) – Ch. 3) – Main Antenna

|                                      |                                               |                                                                   |                  |                                 |
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| FCC ID: ACJ9TGCF-19F                 | <b>PCTEST</b><br>ENGINEERING LABORATORY, INC. | FCC Pt. 15.247 802.11 b/g/n MEASUREMENT REPORT<br>(CERTIFICATION) | <b>Panasonic</b> | Reviewed by:<br>Quality Manager |
| Test Report S/N:<br>0Y1007231224.ACJ | Test Dates:<br>August 13, 2010                | EUT Type:<br>Toughbook Model: CF-19mk4                            |                  | Page 41 of 73                   |



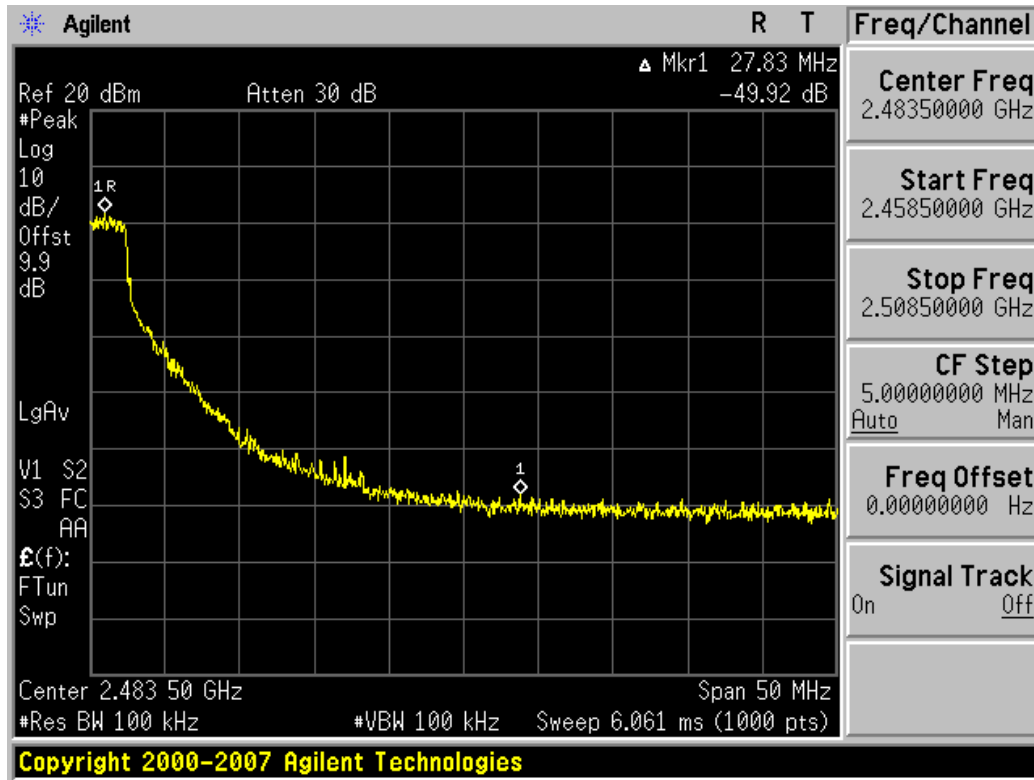
Plot 6-32. Band Edge Plot (802.11n (20MHz) – Ch. 11) – Main Antenna



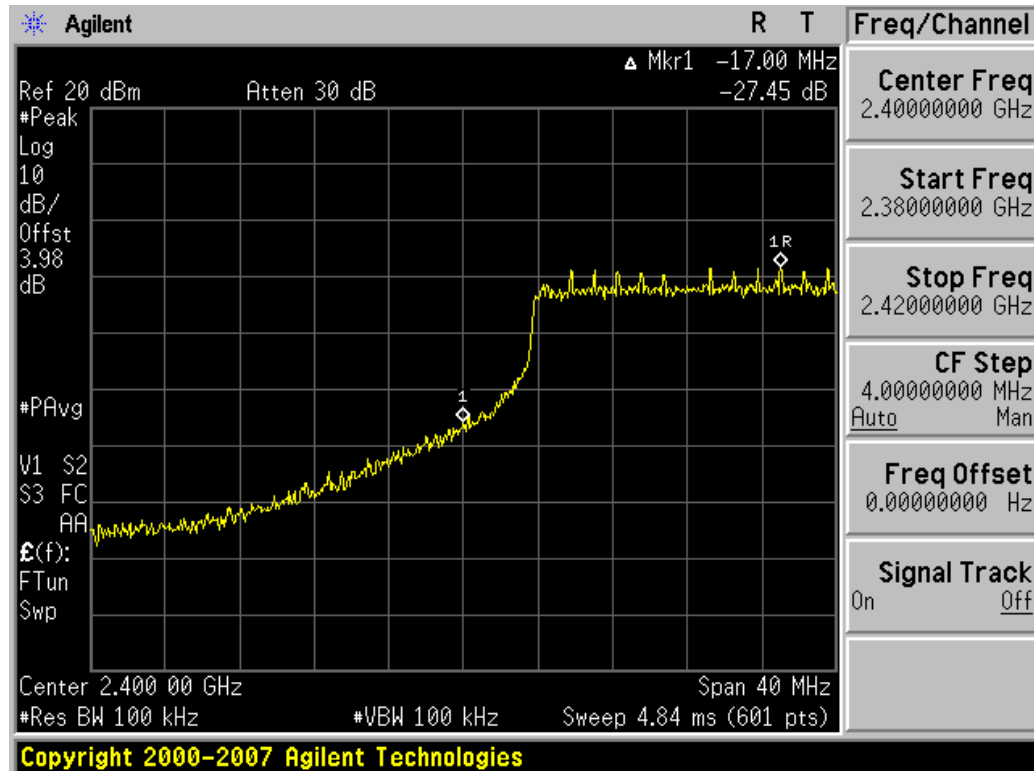
Plot 6-33. Band Edge Plot (802.11n (20MHz) – Ch. 10) – Main Antenna

|                                      |                                               |                                                                   |                  |                                 |
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| Test Report S/N:<br>0Y1007231224.ACJ | Test Dates:<br>August 13, 2010                | EUT Type:<br>Toughbook Model: CF-19mk4                            |                  | Page 42 of 73                   |



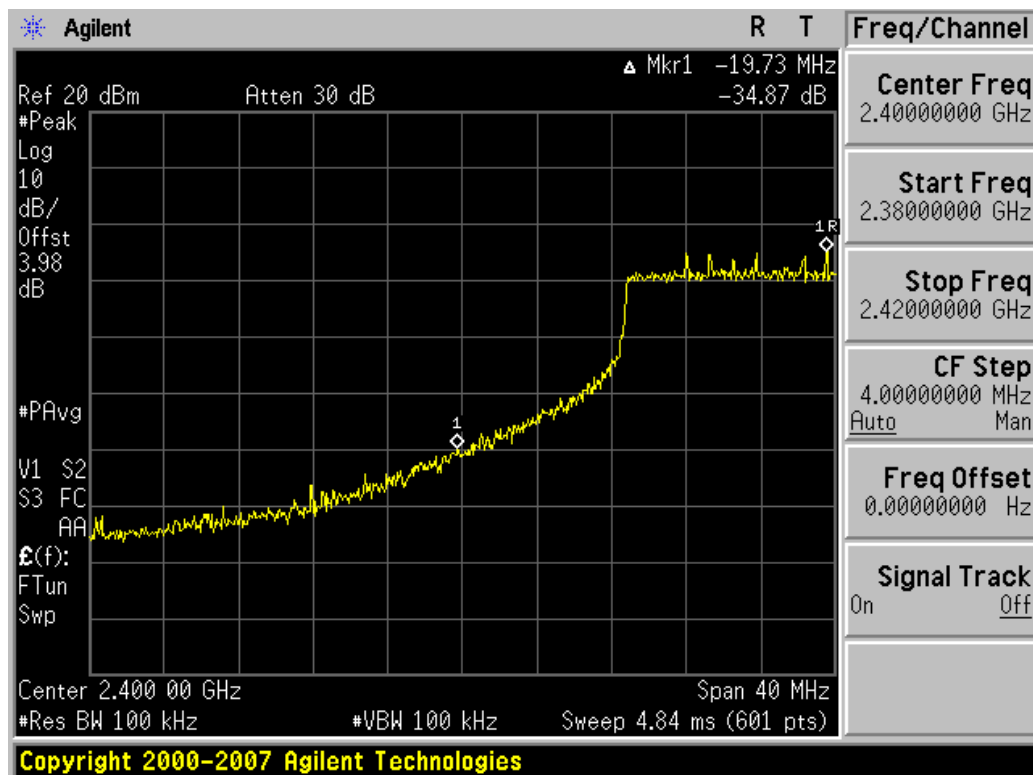


Plot 6-34. Band Edge Plot (802.11n (20MHz) – Ch. 9) – Main Antenna

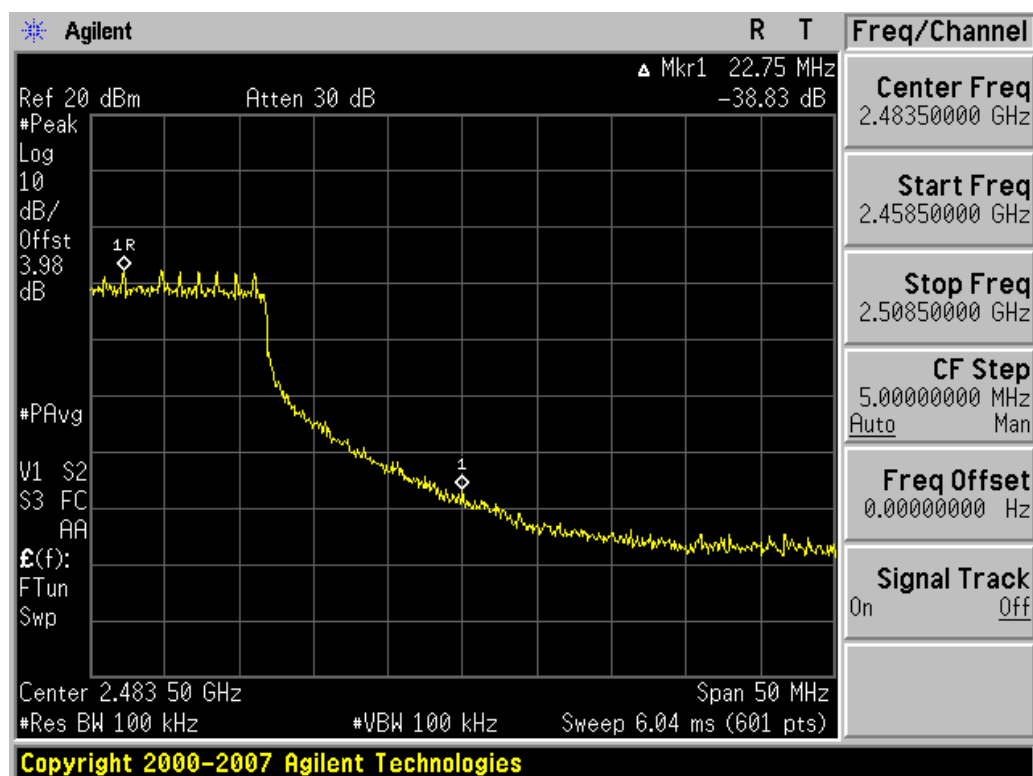


Plot 6-35. Band Edge Plot (802.11n (40MHz) – Ch. 3) – Main Antenna

|                                      |                                               |                                                                   |                  |                                 |
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| Test Report S/N:<br>0Y1007231224.ACJ | Test Dates:<br>August 13, 2010                | EUT Type:<br>Toughbook Model: CF-19mk4                            |                  | Page 43 of 73                   |

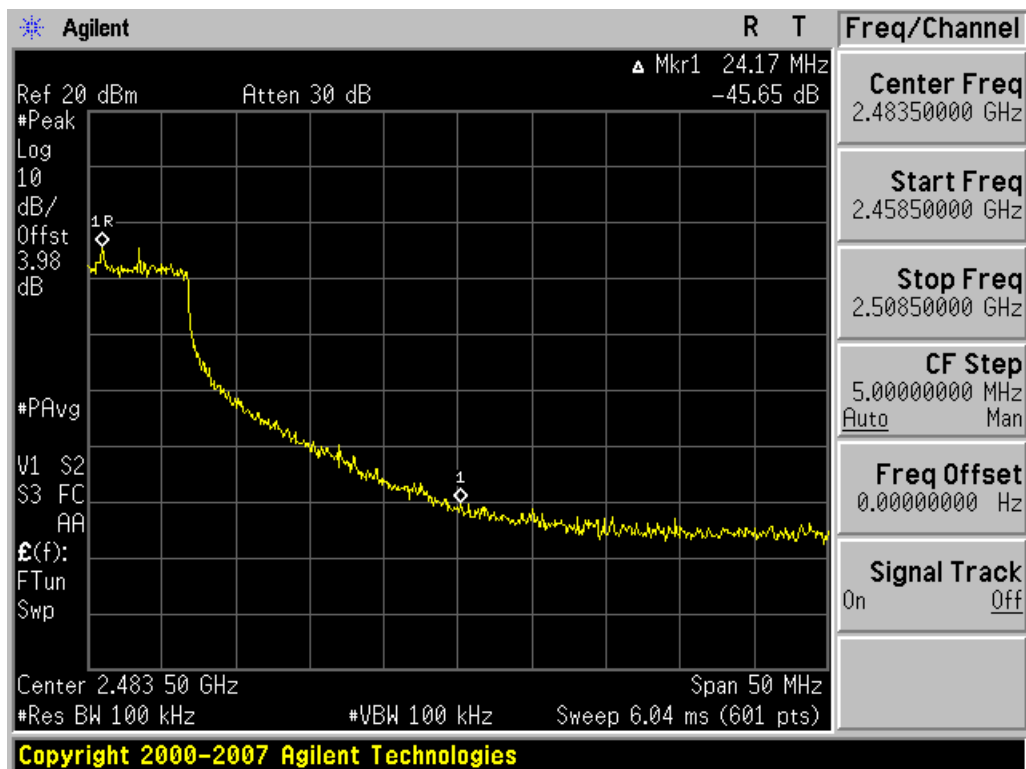


Plot 6-36. Band Edge Plot (802.11n (40MHz) – Ch. 4) – Main Antenna

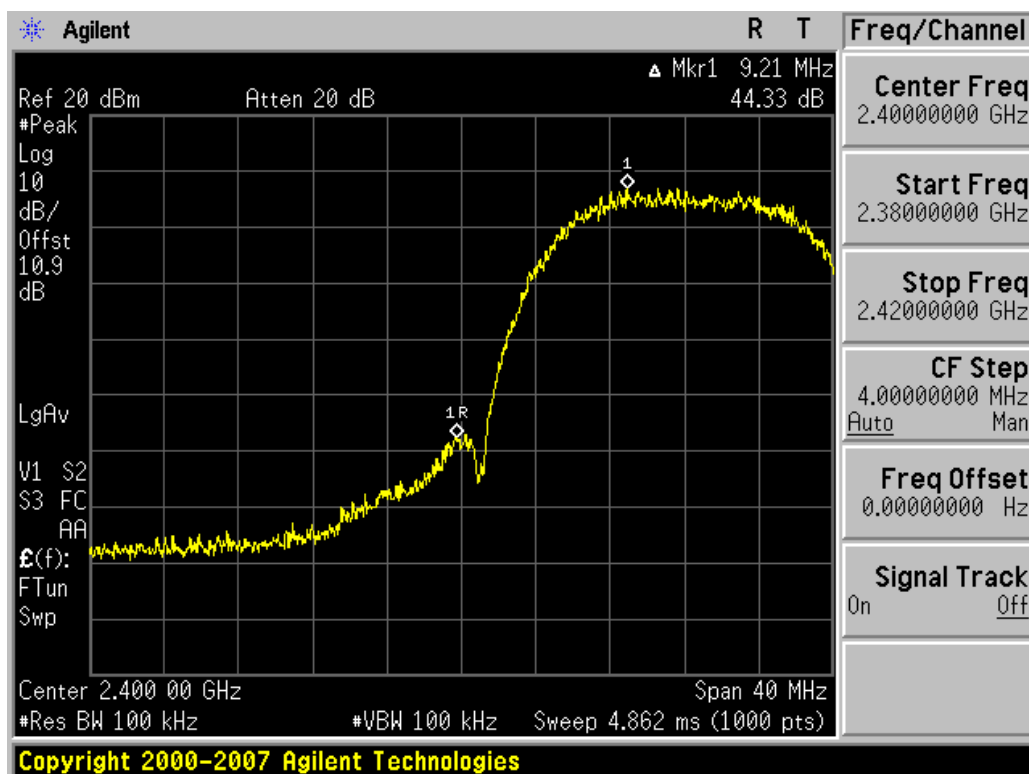


Plot 6-37. Band Edge Plot (802.11n (40MHz) – Ch. 9) – Main Antenna

|                                      |                                               |                                                                   |                  |                                 |
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| FCC ID: ACJ9TGCF-19F                 | <b>PCTEST</b><br>ENGINEERING LABORATORY, INC. | FCC Pt. 15.247 802.11 b/g/n MEASUREMENT REPORT<br>(CERTIFICATION) | <b>Panasonic</b> | Reviewed by:<br>Quality Manager |
| Test Report S/N:<br>0Y1007231224.ACJ | Test Dates:<br>August 13, 2010                | EUT Type:<br>Toughbook Model: CF-19mk4                            |                  | Page 44 of 73                   |

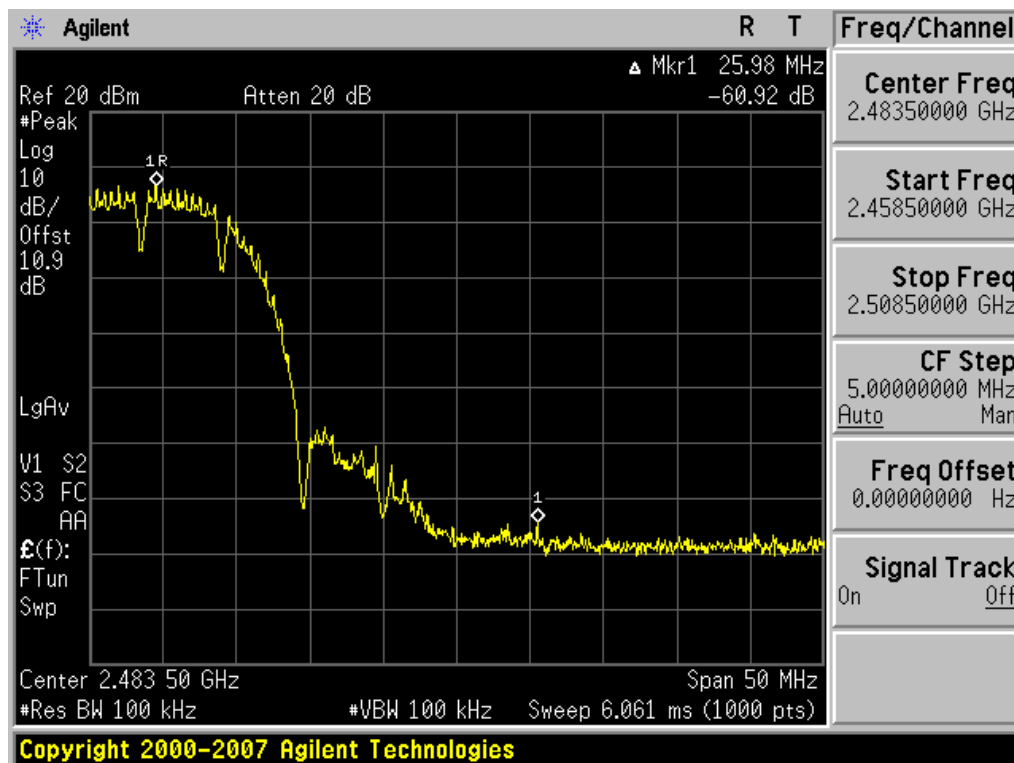


Plot 6-38. Band Edge Plot (802.11n (40MHz) – Ch. 8) – Main Antenna

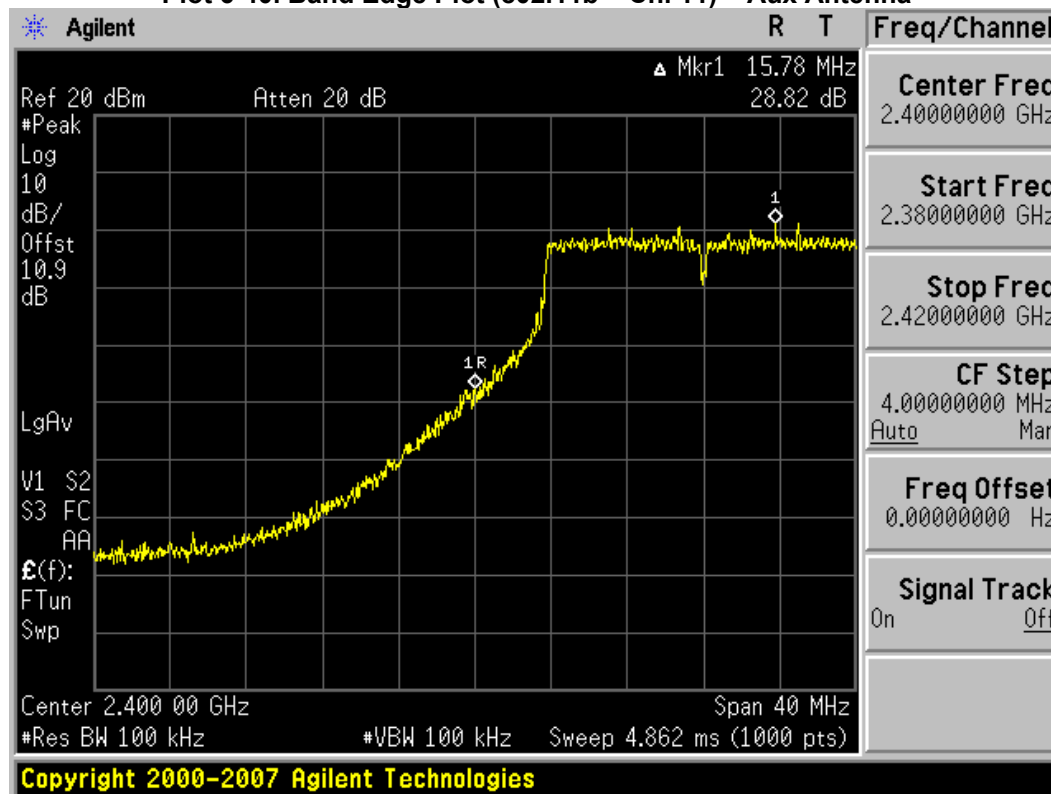


Plot 6-39. Band Edge Plot (802.11b – Ch. 1) – Aux Antenna

|                                      |                                               |                                                                   |                  |                                 |
|--------------------------------------|-----------------------------------------------|-------------------------------------------------------------------|------------------|---------------------------------|
| FCC ID: ACJ9TGCF-19F                 | <b>PCTEST</b><br>ENGINEERING LABORATORY, INC. | FCC Pt. 15.247 802.11 b/g/n MEASUREMENT REPORT<br>(CERTIFICATION) | <b>Panasonic</b> | Reviewed by:<br>Quality Manager |
| Test Report S/N:<br>0Y1007231224.ACJ | Test Dates:<br>August 13, 2010                | EUT Type:<br>Toughbook Model: CF-19mk4                            |                  | Page 45 of 73                   |

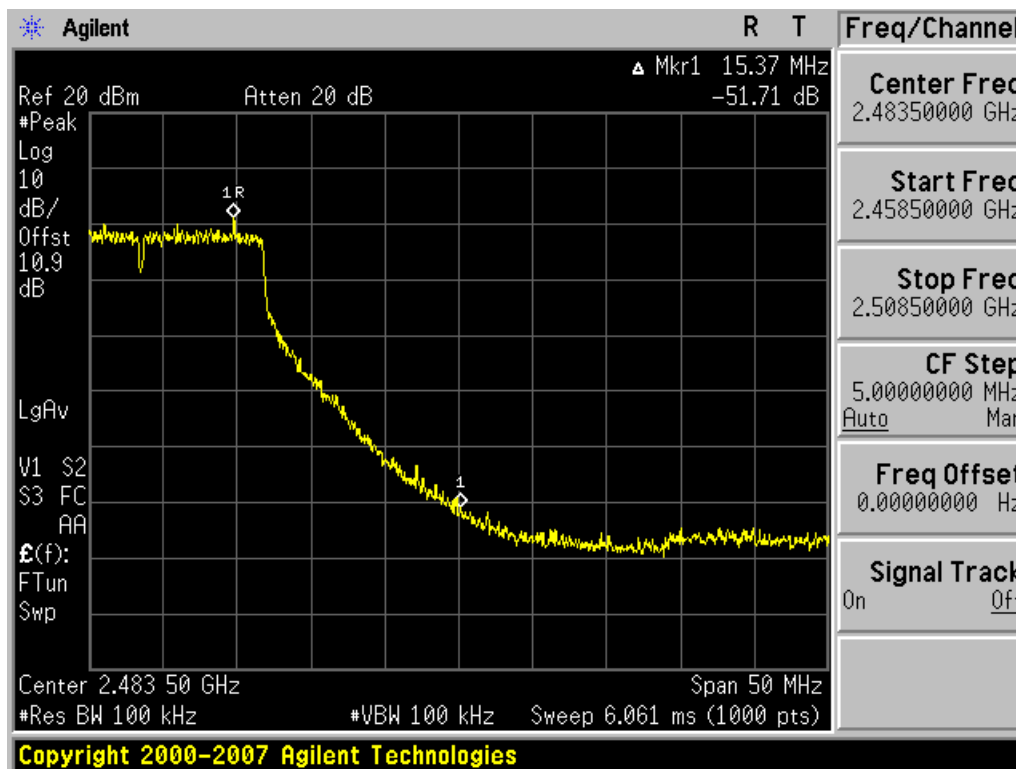


Plot 6-40. Band Edge Plot (802.11b - Ch. 11) - Aux Antenna

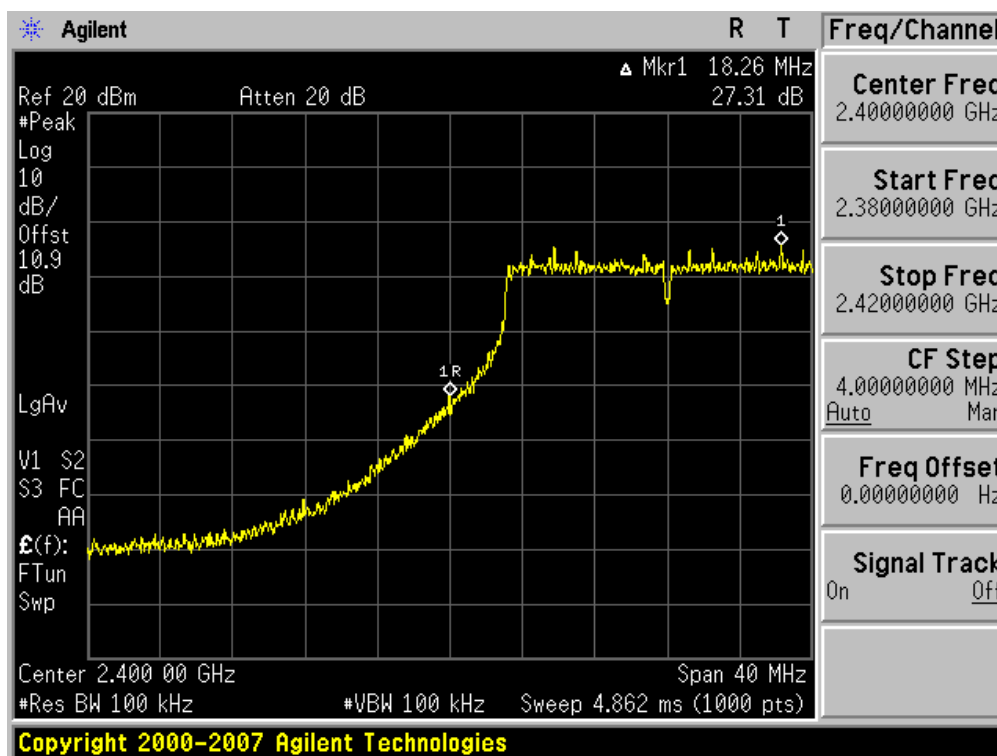


Plot 6-41. Band Edge Plot (802.11g- Ch. 1) - Aux Antenna

|                                      |                                               |                                                                   |                  |                                 |
|--------------------------------------|-----------------------------------------------|-------------------------------------------------------------------|------------------|---------------------------------|
| FCC ID: ACJ9TGCF-19F                 | <b>PCTEST</b><br>ENGINEERING LABORATORY, INC. | FCC Pt. 15.247 802.11 b/g/n MEASUREMENT REPORT<br>(CERTIFICATION) | <b>Panasonic</b> | Reviewed by:<br>Quality Manager |
| Test Report S/N:<br>0Y1007231224.ACJ | Test Dates:<br>August 13, 2010                | EUT Type:<br>Toughbook Model: CF-19mk4                            |                  | Page 46 of 73                   |

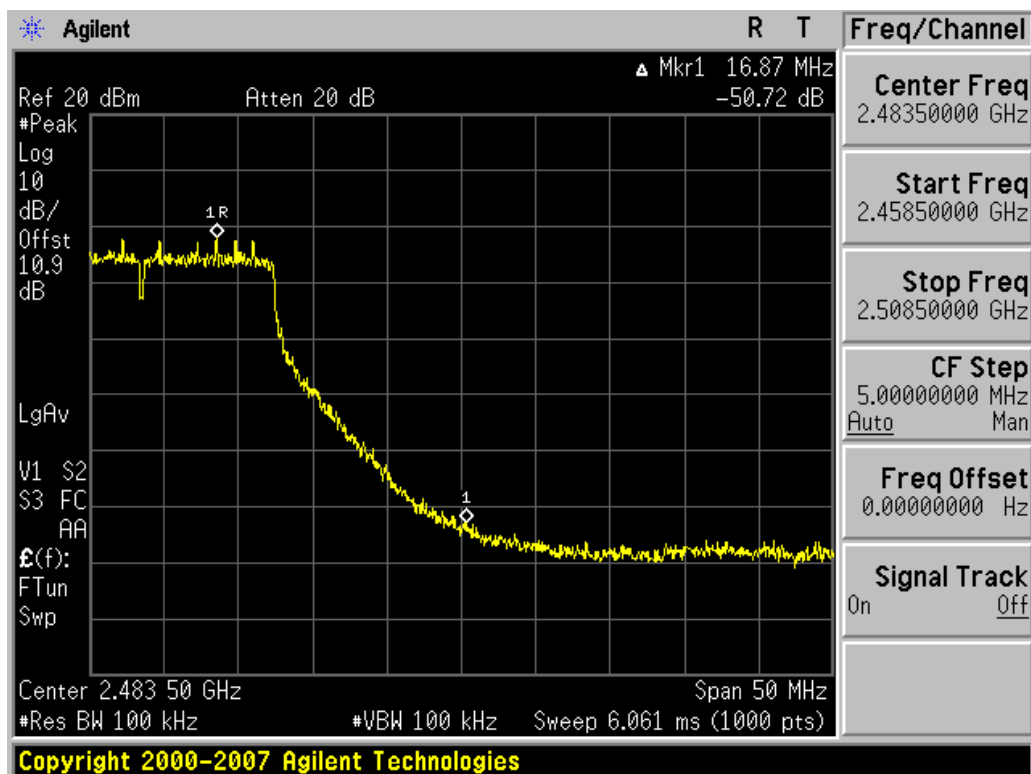


Plot 6-42. Band Edge Plot (802.11g – Ch. 11) – Aux Antenna

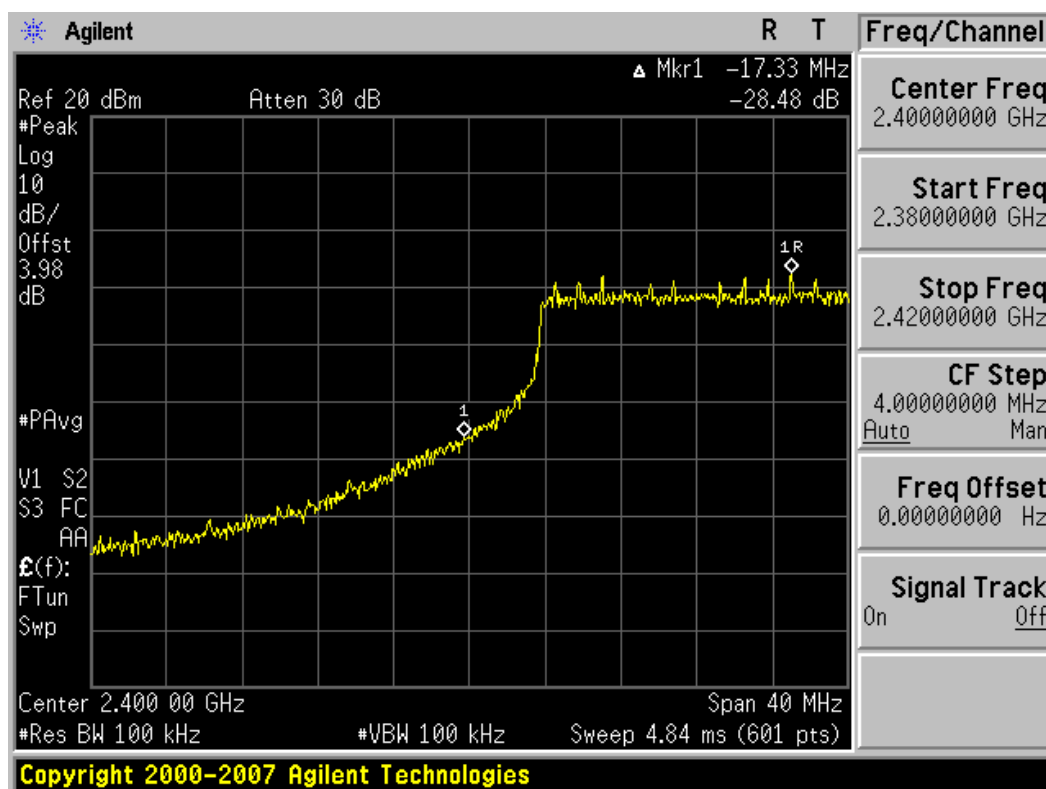


Plot 6-43. Band Edge Plot (802.11n (20MHz) – Ch. 1) – Aux Antenna

|                                      |                                               |                                                                   |                  |                                 |
|--------------------------------------|-----------------------------------------------|-------------------------------------------------------------------|------------------|---------------------------------|
| FCC ID: ACJ9TGCF-19F                 | <b>PCTEST</b><br>ENGINEERING LABORATORY, INC. | FCC Pt. 15.247 802.11 b/g/n MEASUREMENT REPORT<br>(CERTIFICATION) | <b>Panasonic</b> | Reviewed by:<br>Quality Manager |
| Test Report S/N:<br>0Y1007231224.ACJ | Test Dates:<br>August 13, 2010                | EUT Type:<br>Toughbook Model: CF-19mk4                            |                  | Page 47 of 73                   |

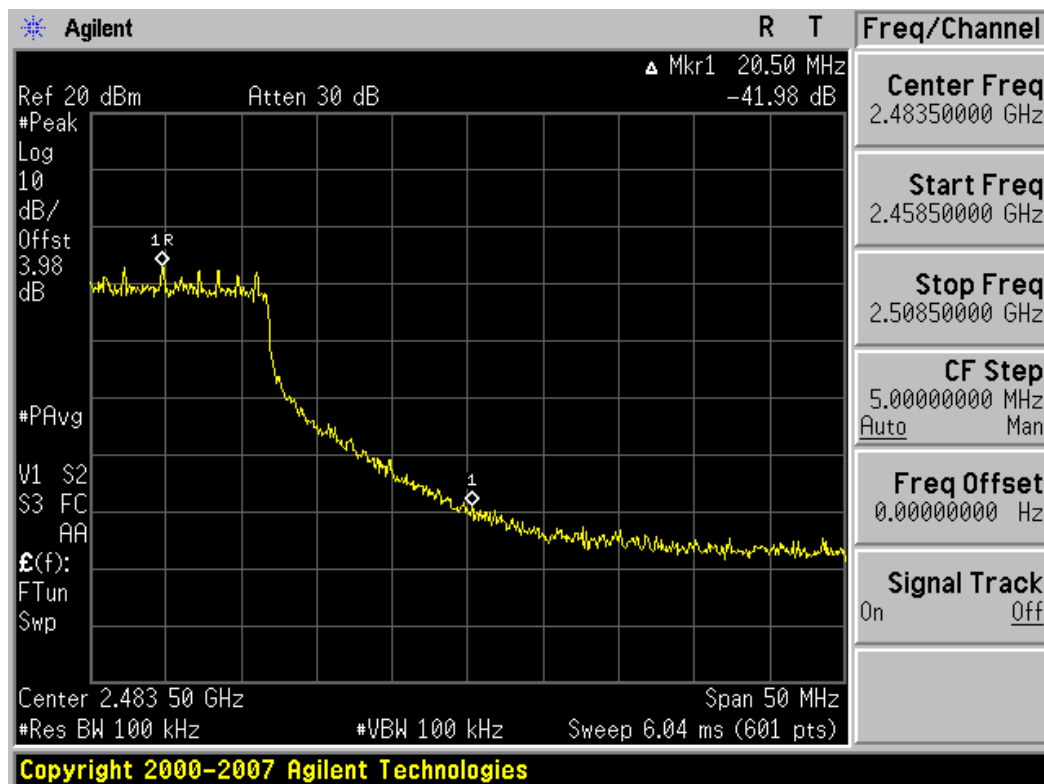


Plot 6-44. Band Edge Plot (802.11n (20MHz) – Ch. 11) – Aux Antenna



Plot 6-45. Band Edge Plot (802.11n (40MHz) – Ch. 3) – Aux Antenna

|                                      |                                               |                                                                   |                  |                                 |
|--------------------------------------|-----------------------------------------------|-------------------------------------------------------------------|------------------|---------------------------------|
| FCC ID: ACJ9TGCF-19F                 | <b>PCTEST</b><br>ENGINEERING LABORATORY, INC. | FCC Pt. 15.247 802.11 b/g/n MEASUREMENT REPORT<br>(CERTIFICATION) | <b>Panasonic</b> | Reviewed by:<br>Quality Manager |
| Test Report S/N:<br>0Y1007231224.ACJ | Test Dates:<br>August 13, 2010                | EUT Type:<br>Toughbook Model: CF-19mk4                            |                  | Page 48 of 73                   |



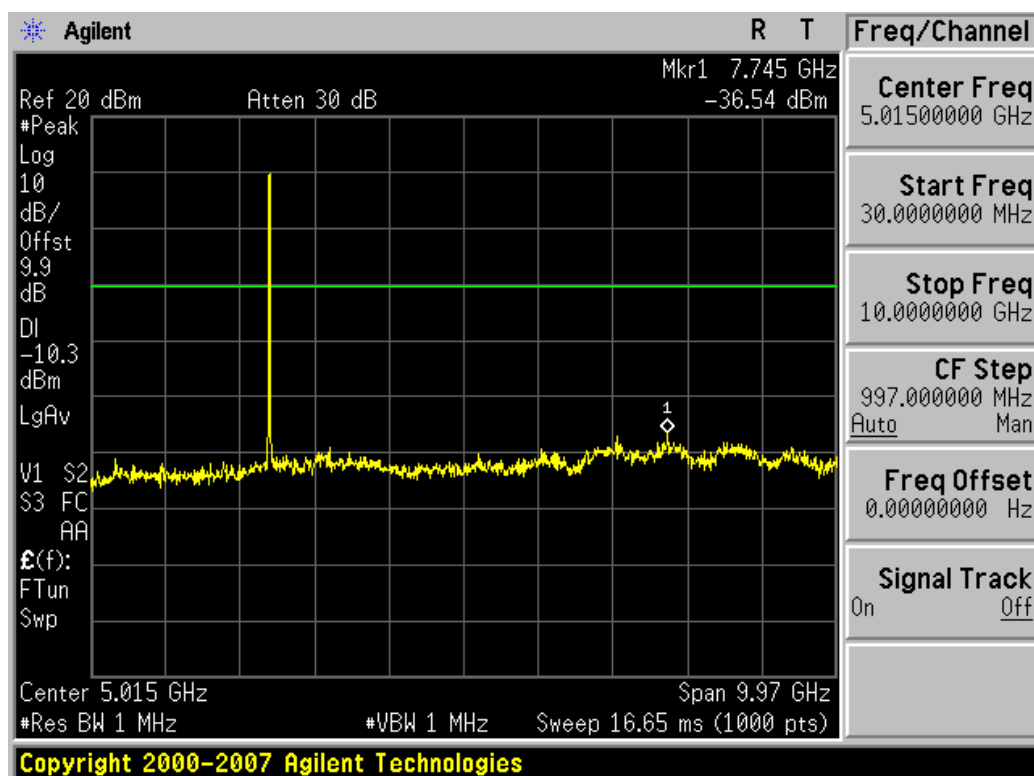
Plot 6-46. Band Edge Plot (802.11n (40MHz) – Ch. 9) – Aux Antenna

|                                      |                                               |                                                                   |                  |                                 |
|--------------------------------------|-----------------------------------------------|-------------------------------------------------------------------|------------------|---------------------------------|
| FCC ID: ACJ9TGCF-19F                 | <b>PCTEST</b><br>ENGINEERING LABORATORY, INC. | FCC Pt. 15.247 802.11 b/g/n MEASUREMENT REPORT<br>(CERTIFICATION) | <b>Panasonic</b> | Reviewed by:<br>Quality Manager |
| Test Report S/N:<br>0Y1007231224.ACJ | Test Dates:<br>August 13, 2010                | EUT Type:<br>Toughbook Model: CF-19mk4                            |                  | Page 49 of 73                   |

## 6.8 Out of Band Emissions

### §15.247(d)

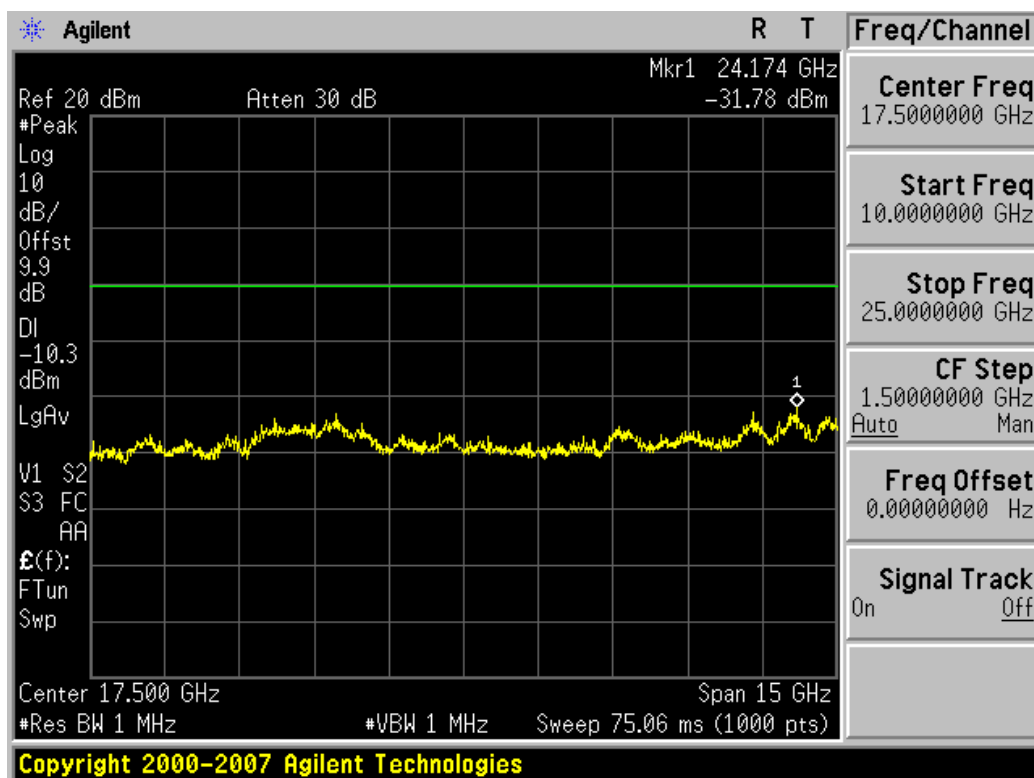
For the following out of band conducted spurious emissions plots, the EUT was investigated in all available data rates for “b”, “g”, and “n” modes. The worst case spurious emissions were found while transmitting in “b” mode at 1 Mbps and are shown in the plots below.



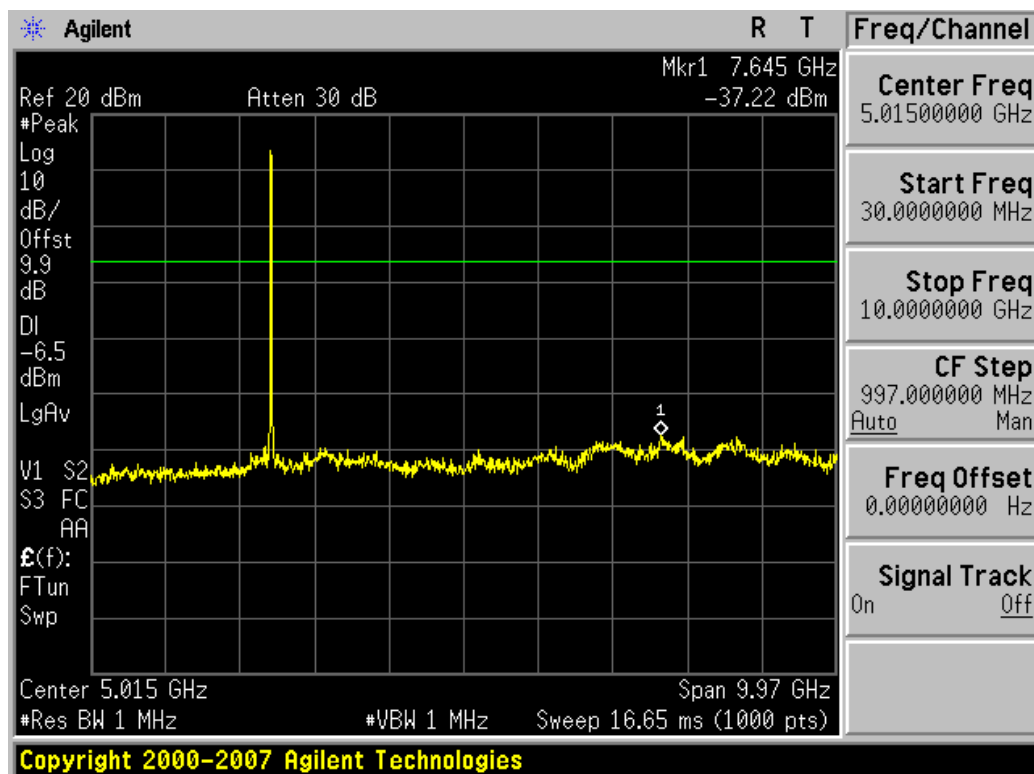
Plot 6-47. Conducted Spurious Plot (802.11b – Ch. 1) – Main Antenna

|                                      |                                               |                                                                   |                  |                                 |
|--------------------------------------|-----------------------------------------------|-------------------------------------------------------------------|------------------|---------------------------------|
| FCC ID: ACJ9TGCF-19F                 | <b>PCTEST</b><br>ENGINEERING LABORATORY, INC. | FCC Pt. 15.247 802.11 b/g/n MEASUREMENT REPORT<br>(CERTIFICATION) | <b>Panasonic</b> | Reviewed by:<br>Quality Manager |
| Test Report S/N:<br>0Y1007231224.ACJ | Test Dates:<br>August 13, 2010                | EUT Type:<br>Toughbook Model: CF-19mk4                            |                  | Page 50 of 73                   |



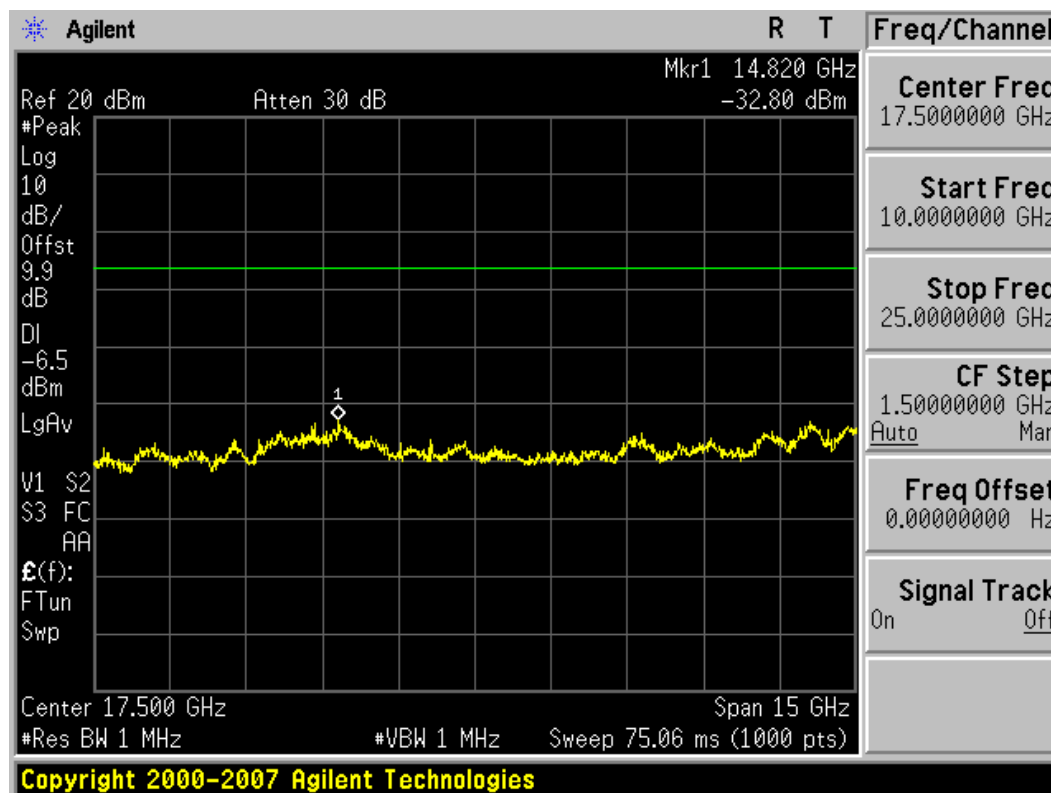


Plot 6-48. Conducted Spurious Plot (802.11b – Ch. 1) – Main Antenna

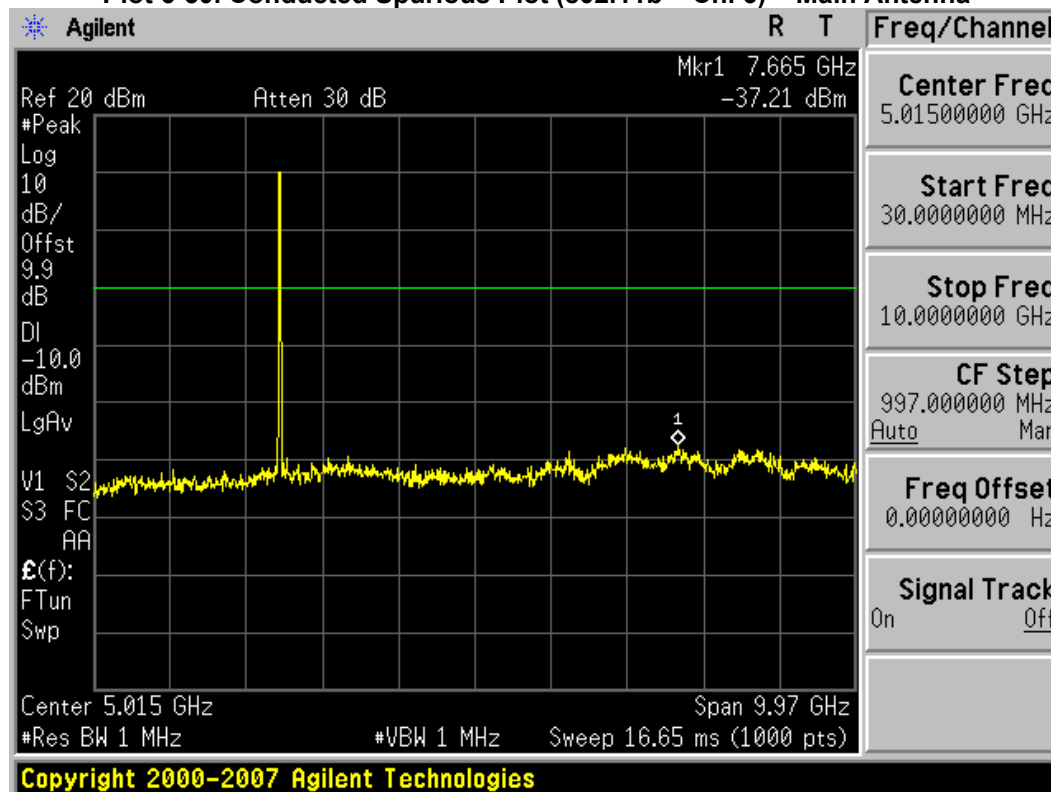


Plot 6-49. Conducted Spurious Plot (802.11b – Ch. 6) – Main Antenna

|                                      |                                               |                                                                   |                  |                                 |
|--------------------------------------|-----------------------------------------------|-------------------------------------------------------------------|------------------|---------------------------------|
| FCC ID: ACJ9TGCF-19F                 | <b>PCTEST</b><br>ENGINEERING LABORATORY, INC. | FCC Pt. 15.247 802.11 b/g/n MEASUREMENT REPORT<br>(CERTIFICATION) | <b>Panasonic</b> | Reviewed by:<br>Quality Manager |
| Test Report S/N:<br>0Y1007231224.ACJ | Test Dates:<br>August 13, 2010                | EUT Type:<br>Toughbook Model: CF-19mk4                            |                  | Page 51 of 73                   |

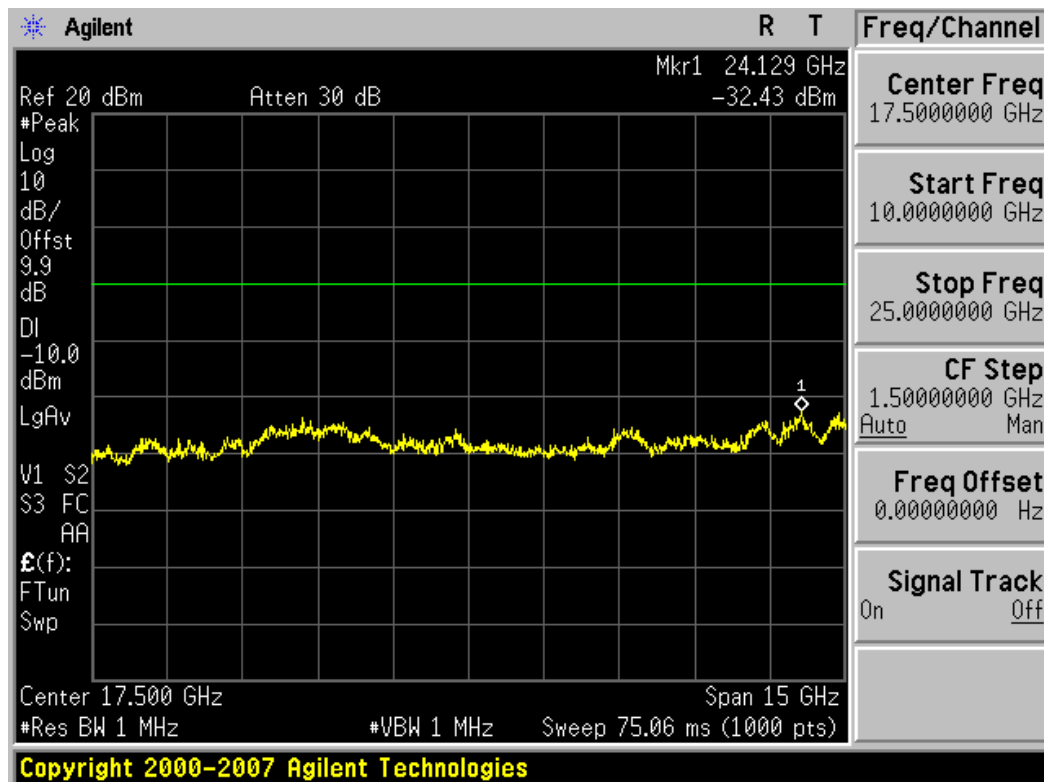


**Plot 6-50. Conducted Spurious Plot (802.11b - Ch. 6) - Main Antenna**

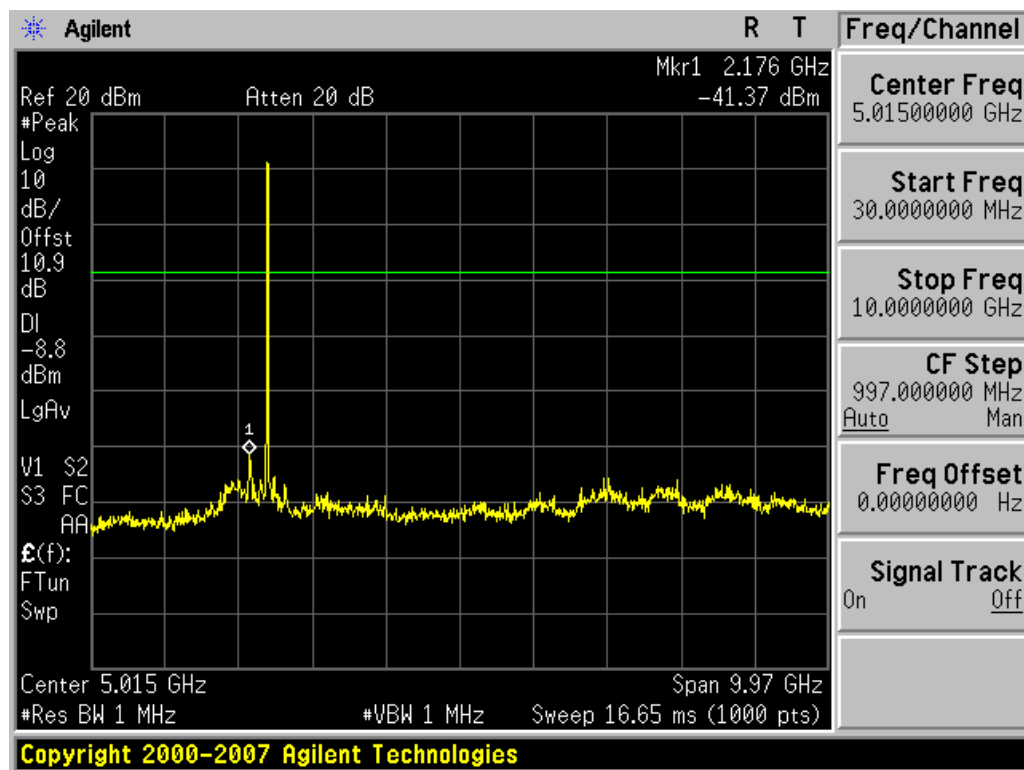


**Plot 6-51. Conducted Spurious Plot (802.11b - Ch. 11) - Main Antenna**

|                                      |                                               |                                                                   |                  |                                 |
|--------------------------------------|-----------------------------------------------|-------------------------------------------------------------------|------------------|---------------------------------|
| FCC ID: ACJ9TGCF-19F                 | <b>PCTEST</b><br>ENGINEERING LABORATORY, INC. | FCC Pt. 15.247 802.11 b/g/n MEASUREMENT REPORT<br>(CERTIFICATION) | <b>Panasonic</b> | Reviewed by:<br>Quality Manager |
| Test Report S/N:<br>0Y1007231224.ACJ | Test Dates:<br>August 13, 2010                | EUT Type:<br>Toughbook Model: CF-19mk4                            |                  | Page 52 of 73                   |

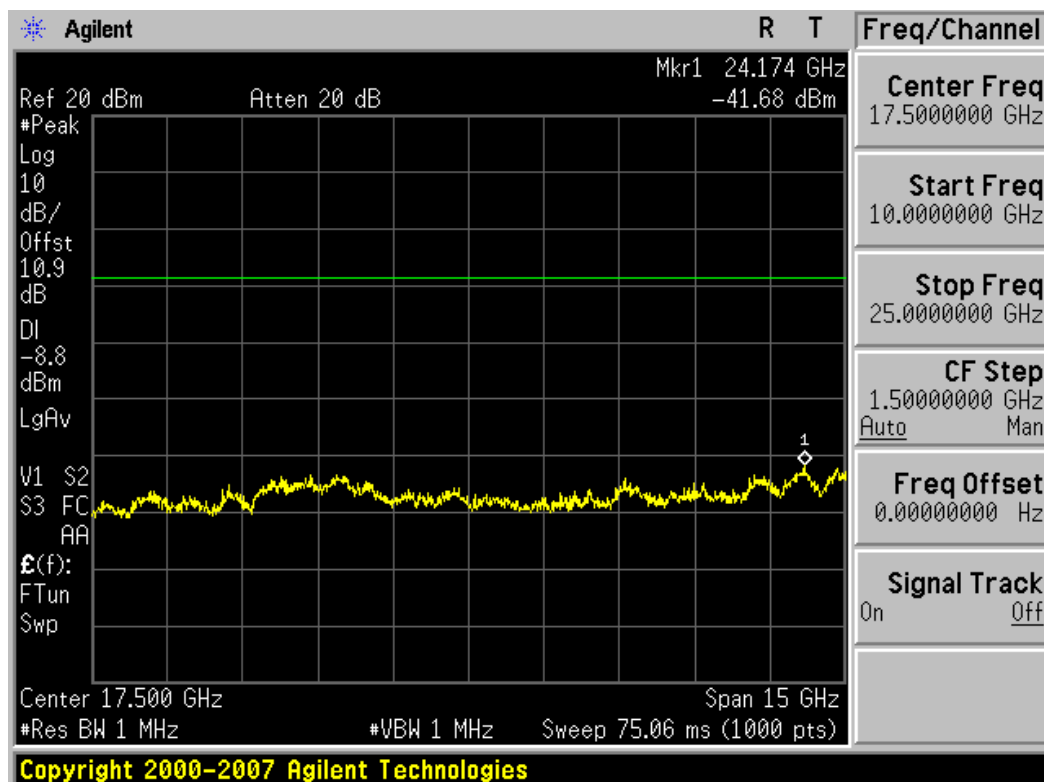


Plot 6-52. Conducted Spurious Plot (802.11b – Ch. 11) – Main Antenna

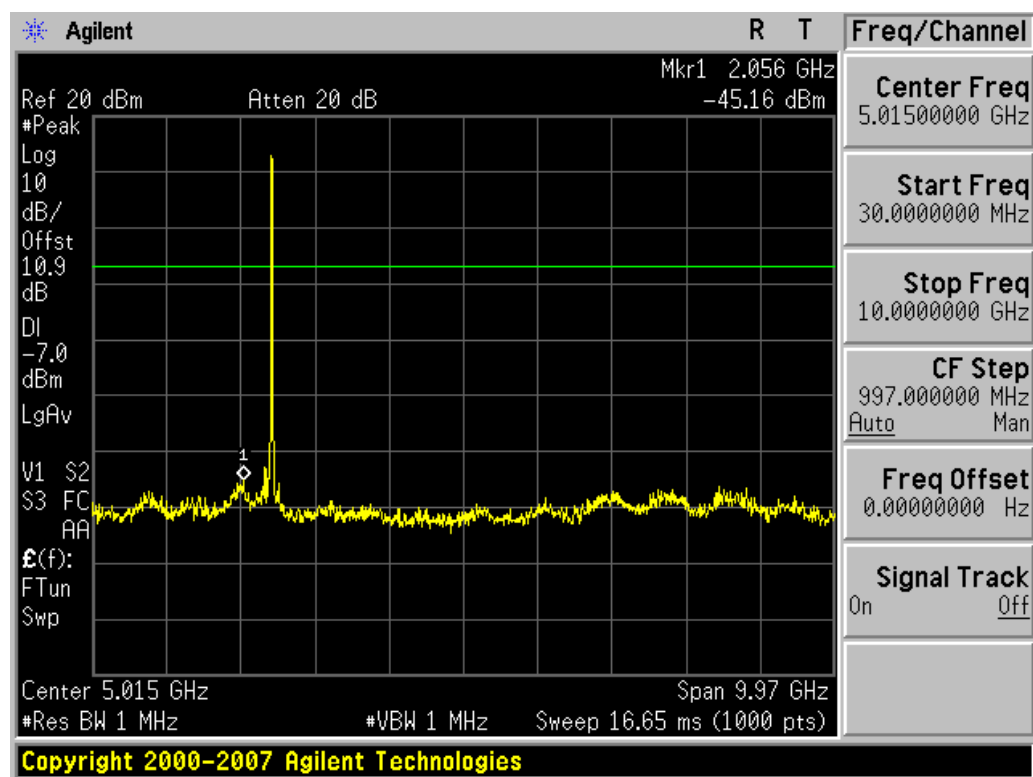


Plot 6-53. Conducted Spurious Plot (802.11b – Ch. 1) – Aux Antenna

|                                      |                                               |                                                                   |                  |                                 |
|--------------------------------------|-----------------------------------------------|-------------------------------------------------------------------|------------------|---------------------------------|
| FCC ID: ACJ9TGCF-19F                 | <b>PCTEST</b><br>ENGINEERING LABORATORY, INC. | FCC Pt. 15.247 802.11 b/g/n MEASUREMENT REPORT<br>(CERTIFICATION) | <b>Panasonic</b> | Reviewed by:<br>Quality Manager |
| Test Report S/N:<br>0Y1007231224.ACJ | Test Dates:<br>August 13, 2010                | EUT Type:<br>Toughbook Model: CF-19mk4                            |                  | Page 53 of 73                   |

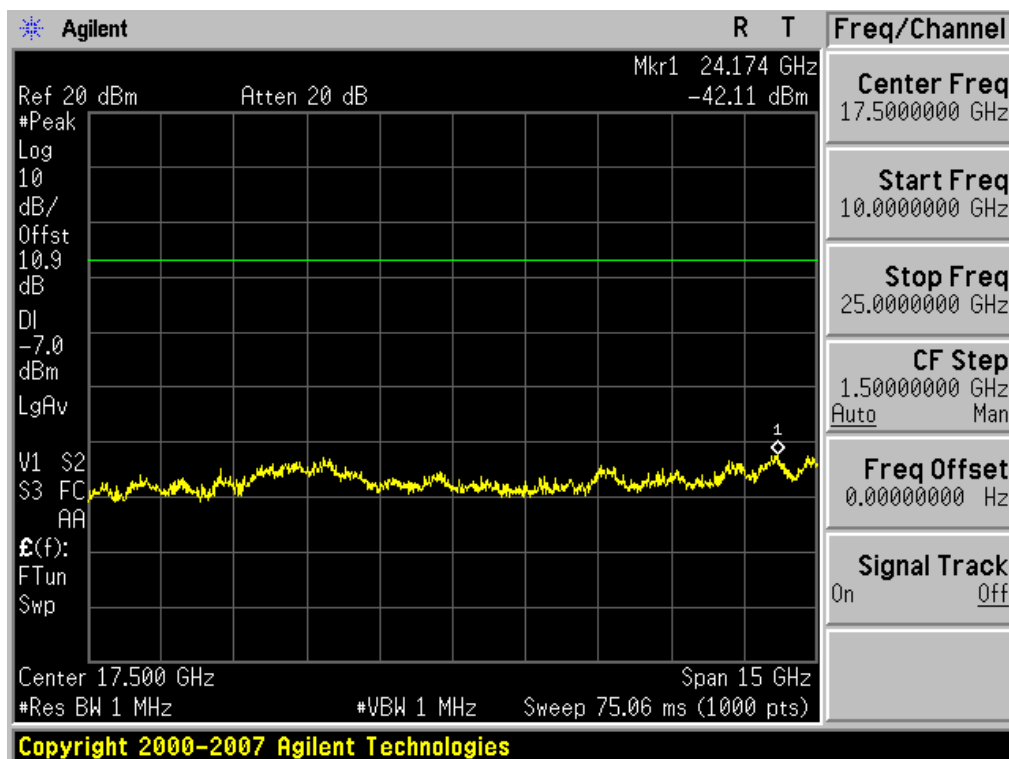


Plot 6-54. Conducted Spurious Plot (802.11b – Ch. 1) – Aux Antenna

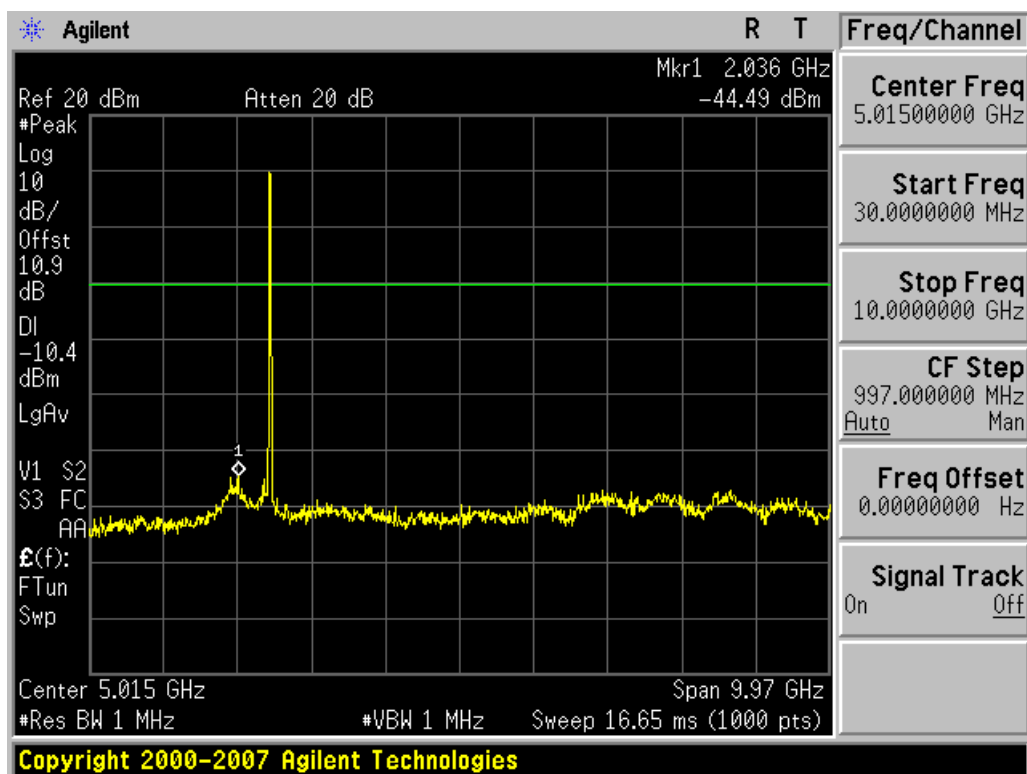


Plot 6-55. Conducted Spurious Plot (802.11b – Ch. 6) – Aux Antenna

|                                      |                                               |                                                                   |                  |                                 |
|--------------------------------------|-----------------------------------------------|-------------------------------------------------------------------|------------------|---------------------------------|
| FCC ID: ACJ9TGCF-19F                 | <b>PCTEST</b><br>ENGINEERING LABORATORY, INC. | FCC Pt. 15.247 802.11 b/g/n MEASUREMENT REPORT<br>(CERTIFICATION) | <b>Panasonic</b> | Reviewed by:<br>Quality Manager |
| Test Report S/N:<br>0Y1007231224.ACJ | Test Dates:<br>August 13, 2010                | EUT Type:<br>Toughbook Model: CF-19mk4                            |                  | Page 54 of 73                   |

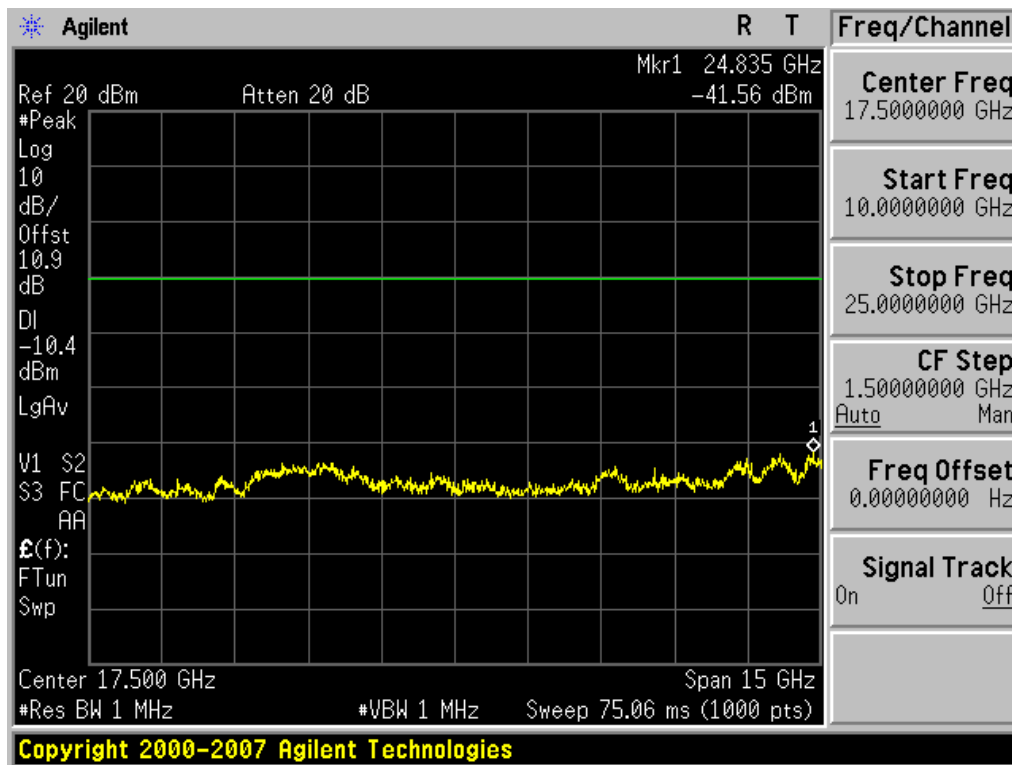


Plot 6-56. Conducted Spurious Plot (802.11b – Ch. 6) – Aux Antenna



Plot 6-57. Conducted Spurious Plot (802.11b – Ch. 11) – Aux Antenna

|                                      |                                               |                                                                   |                  |                                 |
|--------------------------------------|-----------------------------------------------|-------------------------------------------------------------------|------------------|---------------------------------|
| FCC ID: ACJ9TGCF-19F                 | <b>PCTEST</b><br>ENGINEERING LABORATORY, INC. | FCC Pt. 15.247 802.11 b/g/n MEASUREMENT REPORT<br>(CERTIFICATION) | <b>Panasonic</b> | Reviewed by:<br>Quality Manager |
| Test Report S/N:<br>0Y1007231224.ACJ | Test Dates:<br>August 13, 2010                | EUT Type:<br>Toughbook Model: CF-19mk4                            |                  | Page 55 of 73                   |



Plot 6-58. Conducted Spurious Plot (802.11b – Ch. 11) – Aux Antenna

|                                      |                                               |                                                                   |                  |                                 |
|--------------------------------------|-----------------------------------------------|-------------------------------------------------------------------|------------------|---------------------------------|
| FCC ID: ACJ9TGCF-19F                 | <b>PCTEST</b><br>ENGINEERING LABORATORY, INC. | FCC Pt. 15.247 802.11 b/g/n MEASUREMENT REPORT<br>(CERTIFICATION) | <b>Panasonic</b> | Reviewed by:<br>Quality Manager |
| Test Report S/N:<br>0Y1007231224.ACJ | Test Dates:<br>August 13, 2010                | EUT Type:<br>Toughbook Model: CF-19mk4                            |                  | Page 56 of 73                   |

## 6.9 Radiated Spurious Emission Measurements

### §15.247(d) / §15.205 & §15.209

The EUT was tested from 9kHz to the tenth harmonic of the fundamental frequency of the transmitter. Below 1GHz a CISPR quasi peak detector was used. Above 1 GHz average measurements were taken, using RBW= 1MHz, VBW= 10Hz, and linearly polarized horn antennas. In addition, peak measurements (RBW= 1MHz, VBW= 1MHz) were taken to ensure that the peak levels are not more than 20dB above the average limit. No harmonics/spurs peak emissions are more than 20dB above the average limit. Special attention is taken for the EUT's harmonic and spurious radiated emissions in the restricted bands of operations, as defined in Section 15.205.

**Note:** All modes and antennas were investigated for radiated spurious emissions. Transmitting from the Aux antenna only had the lowest emissions. Transmitting with the Main + Aux antennas also had low emissions but these emissions were close to the emissions when transmitting with the main antenna only. The worse case emissions are reported in the tables below with the EUT transmitting from the main antenna only.

| Frequency         | Field Strength<br>[μV/m] | Measured Distance<br>[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 6-25. Radiated Limits**

#### Sample Calculation

- Field Strength Level  $_{[\text{dB}\mu\text{V/m}]}$  = Analyzer Level  $_{[\text{dBm}]} + 107 + \text{AFCL}_{[\text{dB}]}$

#### Notes:

- AFCL = Antenna Factor  $_{[\text{dB}]} + \text{Cable Loss}_{[\text{dB}]}$

|                                      |                                                                                     |                                                                   |                                                                                       |                                 |
|--------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------|---------------------------------------------------------------------------------------|---------------------------------|
| FCC ID: ACJ9TGCF-19F                 |  | FCC Pt. 15.247 802.11 b/g/n MEASUREMENT REPORT<br>(CERTIFICATION) |  | Reviewed by:<br>Quality Manager |
| Test Report S/N:<br>0Y1007231224.ACJ | Test Dates:<br>August 13, 2010                                                      | EUT Type:<br>Toughbook Model: CF-19mk4                            |                                                                                       | Page 57 of 73                   |

## Radiated Spurious Emission Measurements (Cont'd)

§15.247(d) / §15.205 & §15.209

Mode: 802.11b

Transfer Rate: 1 Mbps

Distance of Measurements: 1 Meters

Operating Frequency: 2412MHz

Channel: 1

| 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] |
|-----------------|----------------------|----------|-----------|-----------|---------------------------------|-------------------------------|----------------------|-------------|
| 4824.00         | -98.20               | Avg      | V         | 37.90     | -9.54                           | 37.16                         | 53.98                | -16.82      |
| 4824.00         | -93.90               | Peak     | V         | 37.90     | -9.54                           | 41.46                         | 73.98                | -32.52      |
| 12060.00        | -135.00              | Avg      | V         | 51.95     | 0.00                            | 23.95                         | 53.98                | -30.03      |
| 12060.00        | -125.00              | Peak     | V         | 51.95     | 0.00                            | 33.95                         | 73.98                | -40.03      |

**Table 6-26. Radiated Measurements @ 1 meters**

### **NOTES:**

1. All emissions shown lie in the restricted bands specified in §15.205 are below the limit shown in Table 6-25.
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-19F                 |  | FCC Pt. 15.247 802.11 b/g/n MEASUREMENT REPORT<br>(CERTIFICATION) |  | Reviewed by:<br>Quality Manager |
| Test Report S/N:<br>0Y1007231224.ACJ | Test Dates:<br>August 13, 2010                                                      | EUT Type:<br>Toughbook Model: CF-19mk4                            |                                                                                       | Page 58 of 73                   |



## Radiated Spurious Emission Measurements (Cont'd)

§15.247(d) / §15.205 & §15.209

Mode: 802.11b

Transfer Rate: 1 Mbps

Distance of Measurements: 1 Meters

Operating Frequency: 2437 MHz

Channel: 6

| Frequency [MHz] | Analyzer Level [dBm] | Detector | Pol [H/V] | AFCL [dB] | Distance Correction Factor [dB] | Field Strength [dBμV/m] | Limit [dBμV/m] | Margin [dB] |
|-----------------|----------------------|----------|-----------|-----------|---------------------------------|-------------------------|----------------|-------------|
| 4874.00         | -96.61               | Avg      | V         | 38.01     | -9.54                           | 38.85                   | 53.98          | -15.12      |
| 4874.00         | -91.11               | Peak     | V         | 38.01     | -9.54                           | 44.35                   | 73.98          | -29.62      |
| 7311.00         | -135.00              | Avg      | V         | 42.94     | 0.00                            | 14.94                   | 53.98          | -39.04      |
| 7311.00         | -125.00              | Peak     | V         | 42.94     | 0.00                            | 24.94                   | 73.98          | -49.04      |
| 12185.00        | -135.00              | Avg      | V         | 52.18     | 0.00                            | 24.18                   | 53.98          | -29.80      |
| 12185.00        | -125.00              | Peak     | V         | 52.18     | 0.00                            | 34.18                   | 73.98          | -39.80      |

**Table 6-27. Radiated Measurements @ 1 meters**

### NOTES:

1. All emissions shown lie in the restricted bands specified in §15.205 are below the limit shown in Table 6-25.
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 μV/m (54dBμ/m) at 3 meters radiated.

|                                      |                                                                                     |                                                                |                                                                                       |                                 |
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| FCC ID: ACJ9TGCF-19F                 |  | FCC Pt. 15.247 802.11 b/g/n MEASUREMENT REPORT (CERTIFICATION) |  | Reviewed by:<br>Quality Manager |
| Test Report S/N:<br>0Y1007231224.ACJ | Test Dates:<br>August 13, 2010                                                      | EUT Type:<br>Toughbook Model: CF-19mk4                         |                                                                                       | Page 59 of 73                   |

## Radiated Spurious Emission Measurements (Cont'd)

§15.247(d) / §15.205 & §15.209

Mode: 802.11b

Transfer Rate: 1 Mbps

Distance of Measurements: 1 Meter

Operating Frequency: 2462 MHz

Channel: 11

| 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] |
|-----------------|----------------------|----------|-----------|-----------|---------------------------------|-------------------------------|----------------------|-------------|
| 4924.00         | -98.63               | Avg      | V         | 38.12     | -9.54                           | 36.95                         | 53.98                | -17.03      |
| 4924.00         | -96.13               | Peak     | V         | 38.12     | -9.54                           | 39.45                         | 73.98                | -34.53      |
| 7386.00         | -135.00              | Avg      | V         | 43.04     | 0.00                            | 15.04                         | 53.98                | -38.94      |
| 7386.00         | -125.00              | Peak     | V         | 43.04     | 0.00                            | 25.04                         | 73.98                | -48.94      |
| 12310.00        | -135.00              | Avg      | V         | 52.41     | 0.00                            | 24.41                         | 53.98                | -29.57      |
| 12310.00        | -125.00              | Peak     | V         | 52.41     | 0.00                            | 34.41                         | 73.98                | -39.57      |

**Table 6-28. Radiated Measurements @ 1 meters**

### NOTES:

1. All emissions shown lie in the restricted bands specified in §15.205 are below the limit shown in Table 6-25.
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-19F                 |  | FCC Pt. 15.247 802.11 b/g/n MEASUREMENT REPORT<br>(CERTIFICATION) |  | Reviewed by:<br>Quality Manager |
| Test Report S/N:<br>0Y1007231224.ACJ | Test Dates:<br>August 13, 2010                                                      | EUT Type:<br>Toughbook Model: CF-19mk4                            |                                                                                       | Page 60 of 73                   |

## 6.10 Radiated Restricted Band Edge Measurements

### §15.205 / §15.209

**Note:** All modes and antennas were investigated for radiated band edge emissions. Transmitting from the Aux antenna only had the lowest emissions. Transmitting with the Main + Aux antennas also had low emissions but these emissions were close to the emissions when transmitting with the main antenna only. The worse case emissions are reported in the tables below with the EUT transmitting from the main antenna only.

Mode: 802.11g

Transfer Rate: 6 Mbps

Distance of Measurements: 1 Meters

Channel 11

Operating Frequency 2462 MHz

| 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] |
|-----------------|----------------------|----------|-----------|-----------|---------------------------------|-------------------------------|----------------------|-------------|
| 2484.10         | -89.41               | Avg      | V         | 32.49     | -9.54                           | 40.54                         | 53.98                | -13.44      |
| 2484.10         | -74.01               | Peak     | V         | 32.49     | -9.54                           | 55.94                         | 73.98                | -18.04      |
| 2485.90         | -91.61               | Avg      | V         | 32.49     | -9.54                           | 38.34                         | 53.98                | -15.64      |
| 2485.90         | -75.91               | Peak     | V         | 32.49     | -9.54                           | 54.04                         | 73.98                | -19.94      |
| 2489.10         | -94.12               | Avg      | V         | 32.49     | -9.54                           | 35.84                         | 53.98                | -18.14      |
| 2489.10         | -80.32               | Peak     | V         | 32.49     | -9.54                           | 49.64                         | 73.98                | -24.34      |

**Table 6-29. Upper Radiated Restricted Band Measurements at 1-meter**

#### **NOTES:**

1. All emissions shown lie in the restricted bands specified in §15.205 are below the limit shown in Table 6-25.
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-19F                 |  | FCC Pt. 15.247 802.11 b/g/n MEASUREMENT REPORT<br>(CERTIFICATION) |  | Reviewed by:<br>Quality Manager |
| Test Report S/N:<br>0Y1007231224.ACJ | Test Dates:<br>August 13, 2010                                                      | EUT Type:<br>Toughbook Model: CF-19mk4                            |                                                                                       | Page 61 of 73                   |

## Radiated Restricted Band Edge Measurements (Cont'd)

§15.205 / §15.209

Mode: 802.11g

Transfer Rate: 6 Mbps

Distance of Measurements: 1 Meters

Channel: 10

Operating Frequency: 2457 MHz

| Frequency [MHz] | Analyzer Level [dBm] | Detector | Pol [H/V] | AFCL [dB] | Distance Correction Factor [dB] | Field Strength [dBμV/m] | Limit [dBμV/m] | Margin [dB] |
|-----------------|----------------------|----------|-----------|-----------|---------------------------------|-------------------------|----------------|-------------|
| 2484.30         | -90.64               | Avg      | V         | 31.86     | -9.54                           | 38.68                   | 53.98          | -15.30      |
| 2484.30         | -73.24               | Peak     | V         | 31.86     | -9.54                           | 56.08                   | 73.98          | -17.90      |
| 2486.50         | -92.74               | Avg      | V         | 31.86     | -9.54                           | 36.58                   | 53.98          | -17.40      |
| 2486.50         | -74.74               | Peak     | V         | 31.86     | -9.54                           | 54.58                   | 73.98          | -19.40      |
| 2488.70         | -95.02               | Avg      | V         | 31.97     | -9.54                           | 34.41                   | 53.98          | -19.57      |
| 2488.70         | -75.52               | Peak     | V         | 31.97     | -9.54                           | 53.91                   | 73.98          | -20.07      |

**Table 6-30. Upper Radiated Restricted Band Measurements at 1-meter**

### NOTES:

1. All emissions shown lie in the restricted bands specified in §15.205 are below the limit shown in Table 6-25.
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 μV/m (54dBμ/m) at 3 meters radiated.

|                                      |                                                                                     |                                                                   |                                                                                       |                                 |
|--------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------|---------------------------------------------------------------------------------------|---------------------------------|
| FCC ID: ACJ9TGCF-19F                 |  | FCC Pt. 15.247 802.11 b/g/n MEASUREMENT REPORT<br>(CERTIFICATION) |  | Reviewed by:<br>Quality Manager |
| Test Report S/N:<br>0Y1007231224.ACJ | Test Dates:<br>August 13, 2010                                                      | EUT Type:<br>Toughbook Model: CF-19mk4                            |                                                                                       | Page 62 of 73                   |

## Radiated Restricted Band Edge Measurements(Cont'd)

### §15.205 / §15.209

Mode: 802.11n

Transfer Rate: 13.5 Mbps

Distance of Measurements: 1 Meter

Operating Frequency: 2452MHz

Channel: 9

Bandwidth 40MHz

| Frequency [MHz] | Analyzer Level [dBm] | Detector | Pol [H/V] | AFCL [dB] | Distance Correction Factor [dB] | Field Strength [dBμV/m] | Limit [dBμV/m] | Margin [dB] |
|-----------------|----------------------|----------|-----------|-----------|---------------------------------|-------------------------|----------------|-------------|
| 2483.50         | -103.04              | Avg      | V         | 31.86     | -9.54                           | 26.28                   | 53.98          | -27.70      |
| 2483.50         | -87.74               | Peak     | V         | 31.86     | -9.54                           | 41.58                   | 73.98          | -32.40      |
| 2485.30         | -103.44              | Avg      | V         | 31.86     | -9.54                           | 25.88                   | 53.98          | -28.10      |
| 2485.30         | -87.44               | Peak     | V         | 31.86     | -9.54                           | 41.88                   | 73.98          | -32.10      |
| 2487.30         | -104.32              | Avg      | V         | 31.97     | -9.54                           | 25.11                   | 53.98          | -28.87      |
| 2487.30         | -90.82               | Peak     | V         | 31.97     | -9.54                           | 38.61                   | 73.98          | -35.37      |

**Table 6-31. Upper Radiated Restricted Band Measurements at 1-meter**

#### NOTES:

1. All emissions shown lie in the restricted bands specified in §15.205 are below the limit shown in Table 6-25.
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 μV/m (54dBμ/m) at 3 meters radiated.

|                                      |                                                                                     |                                                                   |                                                                                       |                                 |
|--------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------|---------------------------------------------------------------------------------------|---------------------------------|
| FCC ID: ACJ9TGCF-19F                 |  | FCC Pt. 15.247 802.11 b/g/n MEASUREMENT REPORT<br>(CERTIFICATION) |  | Reviewed by:<br>Quality Manager |
| Test Report S/N:<br>0Y1007231224.ACJ | Test Dates:<br>August 13, 2010                                                      | EUT Type:<br>Toughbook Model: CF-19mk4                            |                                                                                       | Page 63 of 73                   |

## Radiated Spurious Emission Measurements (Cont'd)

§15.247(d) / §15.205 & §15.209

Mode: 802.11g

Transfer Rate: 6 Mbps

Distance of Measurements: 1 Meter

Operating Frequency: 2412 MHz

Channel: 1

| 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] |
|-----------------|----------------------|----------|-----------|-----------|---------------------------------|-------------------------------|----------------------|-------------|
| 2331.60         | -93.74               | Avg      | V         | 31.86     | -9.54                           | 35.58                         | 53.98                | -18.40      |
| 2331.60         | -82.74               | Peak     | V         | 31.86     | -9.54                           | 46.58                         | 73.98                | -27.40      |
| 2361.20         | -91.34               | Avg      | V         | 31.86     | -9.54                           | 37.98                         | 53.98                | -16.00      |
| 2361.20         | -79.74               | Peak     | V         | 31.86     | -9.54                           | 49.58                         | 73.98                | -24.40      |
| 2390.00         | -91.92               | Avg      | V         | 31.97     | -9.54                           | 37.51                         | 53.98                | -16.47      |
| 2390.00         | -77.12               | Peak     | V         | 31.97     | -9.54                           | 52.31                         | 73.98                | -21.67      |

**Table 6-32. Lower Radiated Restricted Band Measurements at 1-meter**

### NOTES:

1. All emissions shown lie in the restricted bands specified in §15.205 are below the limit shown in Table 6-25.
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-19F                 |  | FCC Pt. 15.247 802.11 b/g/n MEASUREMENT REPORT<br>(CERTIFICATION) |  | Reviewed by:<br>Quality Manager |
| Test Report S/N:<br>0Y1007231224.ACJ | Test Dates:<br>August 13, 2010                                                      | EUT Type:<br>Toughbook Model: CF-19mk4                            |                                                                                       | Page 64 of 73                   |

## Radiated Spurious Emission Measurements (Cont'd)

§15.247(d) / §15.205 & §15.209

Mode: 802.11g

Transfer Rate: 6 Mbps

Distance of Measurements: 1 Meter

Operating Frequency: 2417 MHz

Channel: 2

| 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] |
|-----------------|----------------------|----------|-----------|-----------|---------------------------------|-------------------------------|----------------------|-------------|
| 2334.80         | -90.81               | Avg      | V         | 32.49     | -9.54                           | 39.14                         | 53.98                | -14.84      |
| 2334.80         | -79.61               | Peak     | V         | 32.49     | -9.54                           | 50.34                         | 73.98                | -23.64      |
| 2375.60         | -88.91               | Avg      | V         | 32.49     | -9.54                           | 41.04                         | 53.98                | -12.94      |
| 2375.60         | -78.51               | Peak     | V         | 32.49     | -9.54                           | 51.44                         | 73.98                | -22.54      |
| 3888.80         | -92.12               | Avg      | V         | 32.49     | -9.54                           | 37.84                         | 53.98                | -16.14      |
| 3888.80         | -77.22               | Peak     | V         | 32.49     | -9.54                           | 52.74                         | 73.98                | -21.24      |

**Table 6-33. Lower Radiated Restricted Band Measurements at 1-meter**

### NOTES:

1. All emissions shown lie in the restricted bands specified in §15.205 are below the limit shown in Table 6-25.
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-19F                 |  | FCC Pt. 15.247 802.11 b/g/n MEASUREMENT REPORT<br>(CERTIFICATION) |  | Reviewed by:<br>Quality Manager |
| Test Report S/N:<br>0Y1007231224.ACJ | Test Dates:<br>August 13, 2010                                                      | EUT Type:<br>Toughbook Model: CF-19mk4                            |                                                                                       | Page 65 of 73                   |

## Radiated Spurious Emission Measurements (Cont'd)

§15.247(d) / §15.205 & §15.209

Mode: 802.11n

Transfer Rate: 13.5 Mbps

Distance of Measurements: 1 Meter

Operating Frequency: 2422 MHz

Channel: 3

| 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] |
|-----------------|----------------------|----------|-----------|-----------|---------------------------------|-------------------------------|----------------------|-------------|
| 2347.60         | -104.51              | Avg      | V         | 32.49     | -9.54                           | 25.44                         | 53.98                | -28.54      |
| 2347.60         | -93.21               | Peak     | V         | 32.49     | -9.54                           | 36.74                         | 73.98                | -37.24      |
| 2386.60         | -103.51              | Avg      | V         | 32.49     | -9.54                           | 26.44                         | 53.98                | -27.54      |
| 2386.60         | -91.41               | Peak     | V         | 32.49     | -9.54                           | 38.54                         | 73.98                | -35.44      |
| 2390.00         | -102.62              | Avg      | V         | 32.49     | -9.54                           | 27.34                         | 53.98                | -26.64      |
| 2390.00         | -90.22               | Peak     | V         | 32.49     | -9.54                           | 39.74                         | 73.98                | -34.24      |

**Table 6-34. Lower Radiated Restricted Band Measurements at 1-meter**

### NOTES:

1. All emissions shown lie in the restricted bands specified in §15.205 are below the limit shown in Table 6-25.
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-19F                 |  | FCC Pt. 15.247 802.11 b/g/n MEASUREMENT REPORT<br>(CERTIFICATION) |  | Reviewed by:<br>Quality Manager |
| Test Report S/N:<br>0Y1007231224.ACJ | Test Dates:<br>August 13, 2010                                                      | EUT Type:<br>Toughbook Model: CF-19mk4                            |                                                                                       | Page 66 of 73                   |



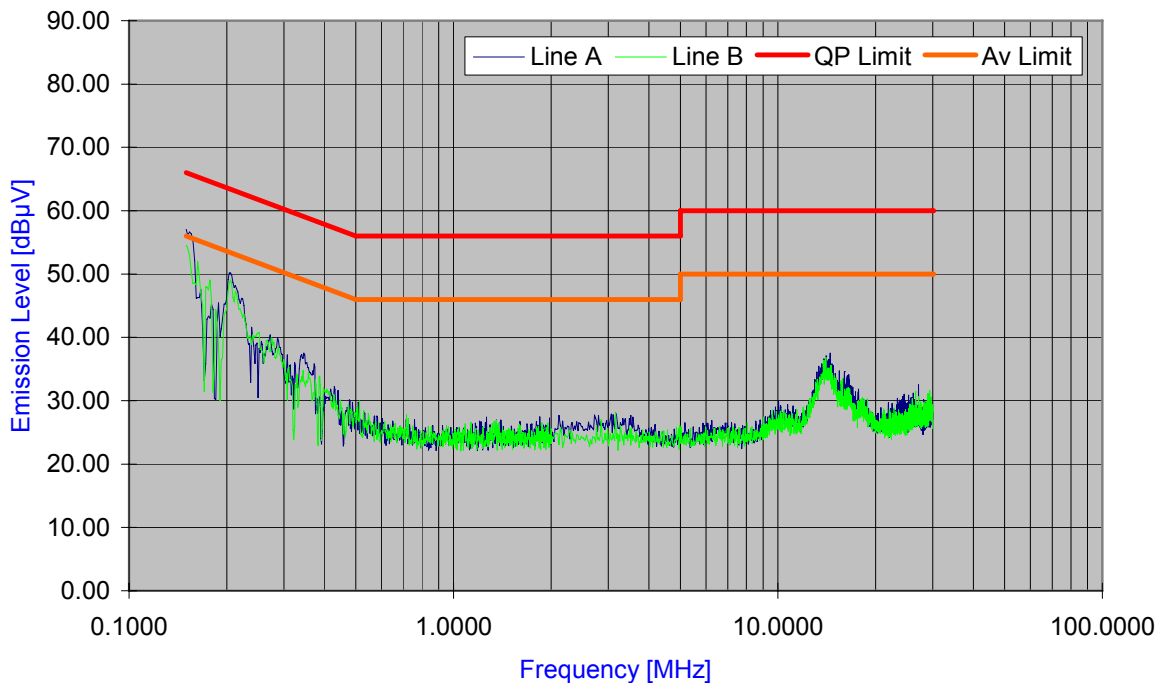
## 6.11 Line-Conducted Test Data

### §15.207

# PCTEST Engineering Laboratory Inc.

Company : Panasonic Corporation of North America Power Source : AC120V/60Hz  
Model Number : CF-19 Tested Date : 08/13/2010  
FCC ID Code : ACJ9TGCF-19F Note : Tested with WLAN b ON  
Standard : FCC Part 15C, 15.207

## Conducted Emission Measurement



Ver.1.1 ©PCTEST 2006.08

**Plot 6-59. Line Conducted Plot with 802.11b**

### 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 are made using a peak detector.
5. Deviations to the Specifications: None.

|                                      |                                               |                                                                   |                  |                                 |
|--------------------------------------|-----------------------------------------------|-------------------------------------------------------------------|------------------|---------------------------------|
| FCC ID: ACJ9TGCF-19F                 | <b>PCTEST</b><br>ENGINEERING LABORATORY, INC. | FCC Pt. 15.247 802.11 b/g/n MEASUREMENT REPORT<br>(CERTIFICATION) | <b>Panasonic</b> | Reviewed by:<br>Quality Manager |
| Test Report S/N:<br>0Y1007231224.ACJ | Test Dates:<br>August 13, 2010                | EUT Type:<br>Toughbook Model: CF-19mk4                            |                  | Page 67 of 73                   |

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

§15.207

| No. | Line | Frequency<br>[MHz] | Factor<br>[dB] | QP<br>[dBμV] | Limit<br>[dBμV] | Margin<br>[dB] | Average<br>[dBμV] | Limit<br>[dBμV] | Margin<br>[dB] |
|-----|------|--------------------|----------------|--------------|-----------------|----------------|-------------------|-----------------|----------------|
| 1   | A    | 0.150              | 6.85           | 56.96        | 66.00           | -9.04          | 41.27             | 56.00           | -14.73         |
| 2   | A    | 0.151              | 6.85           | 54.07        | 66.00           | -11.93         | 32.15             | 56.00           | -23.85         |
| 3   | A    | 0.168              | 6.86           | 41.57        | 65.07           | -23.50         | 30.21             | 55.07           | -24.86         |
| 4   | A    | 0.206              | 6.87           | 44.35        | 63.35           | -19.00         | 31.18             | 53.35           | -22.17         |
| 5   | A    | 0.272              | 6.90           | 34.82        | 61.05           | -26.23         | 23.41             | 51.05           | -27.64         |
| 6   | A    | 0.278              | 6.90           | 34.70        | 61.04           | -26.34         | 23.25             | 51.04           | -27.79         |
| 7   | A    | 0.291              | 6.91           | 32.94        | 60.49           | -27.55         | 21.10             | 50.49           | -29.39         |
| 8   | A    | 0.339              | 6.93           | 30.46        | 59.23           | -28.77         | 20.44             | 49.23           | -28.79         |
| 9   | A    | 0.350              | 6.93           | 29.82        | 58.97           | -29.15         | 20.60             | 48.97           | -28.37         |
| 10  | A    | 14.474             | 8.03           | 30.61        | 60.00           | -29.39         | 24.34             | 50.00           | -25.66         |
| 11  | B    | 0.150              | 6.84           | 54.11        | 66.00           | -11.89         | 39.07             | 56.00           | -16.93         |
| 12  | B    | 0.160              | 6.85           | 42.90        | 65.45           | -22.55         | 30.59             | 55.45           | -24.86         |
| 13  | B    | 0.168              | 6.85           | 41.89        | 65.08           | -23.19         | 29.78             | 55.08           | -25.30         |
| 14  | B    | 0.205              | 6.87           | 43.42        | 63.39           | -19.97         | 29.86             | 53.39           | -23.53         |
| 15  | B    | 0.273              | 6.90           | 34.58        | 61.04           | -26.46         | 23.87             | 51.04           | -27.17         |
| 16  | B    | 0.275              | 6.90           | 34.43        | 61.03           | -26.60         | 23.92             | 51.03           | -27.11         |
| 17  | B    | 0.341              | 6.93           | 28.99        | 59.19           | -30.20         | 20.03             | 49.19           | -29.16         |
| 18  | B    | 0.369              | 6.93           | 27.02        | 58.52           | -31.50         | 19.04             | 48.52           | -29.48         |
| 19  | B    | 14.114             | 8.05           | 29.73        | 60.00           | -30.27         | 21.50             | 50.00           | -28.50         |
| 20  | B    | 14.557             | 8.09           | 29.18        | 60.00           | -30.82         | 21.39             | 50.00           | -28.61         |

**Table 6-35. Line Conducted Data with 802.11b**

### 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 are made using a peak detector.
5. Deviations to the Specifications: None.

|                                      |                                                                                     |                                                                   |                                                                                       |                                 |
|--------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------|---------------------------------------------------------------------------------------|---------------------------------|
| FCC ID: ACJ9TGCF-19F                 |  | FCC Pt. 15.247 802.11 b/g/n MEASUREMENT REPORT<br>(CERTIFICATION) |  | Reviewed by:<br>Quality Manager |
| Test Report S/N:<br>0Y1007231224.ACJ | Test Dates:<br>August 13, 2010                                                      | EUT Type:<br>Toughbook Model: CF-19mk4                            |                                                                                       | Page 68 of 73                   |

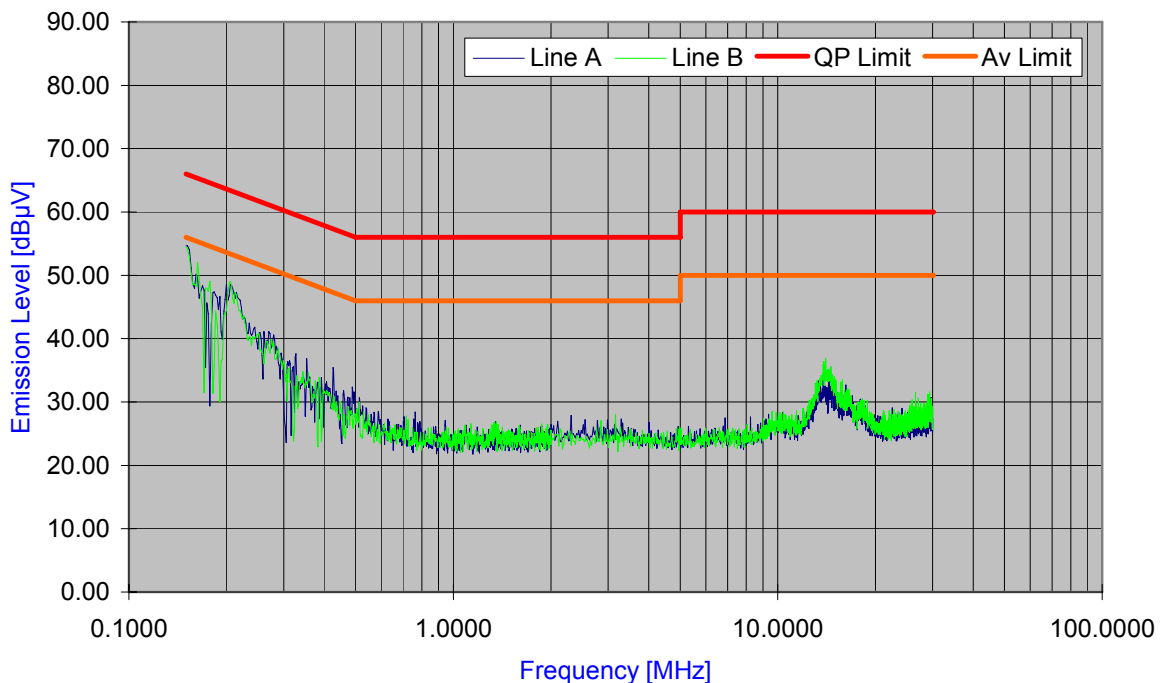
## Line-Conducted Test Data (Cont'd)

§15.207

# PCTEST Engineering Laboratory Inc.

Company : Panasonic Corporation of North America Power Source : AC120V/60Hz  
Model Number : CF-19 Tested Date : 08/13/2010  
FCC ID Code : ACJ9TGCF-19F Note : Tested with WLAN g ON  
Standard : FCC Part 15C, 15.207

### Conducted Emission Measurement



Ver.1.1 ©PCTEST 2006.08

**Plot 6-60. Line Conducted Plot with 802.11g**

#### 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 are made using a peak detector.
5. Deviations to the Specifications: None.

|                                      |                                               |                                                                   |                  |                                 |
|--------------------------------------|-----------------------------------------------|-------------------------------------------------------------------|------------------|---------------------------------|
| FCC ID: ACJ9TGCF-19F                 | <b>PCTEST</b><br>ENGINEERING LABORATORY, INC. | FCC Pt. 15.247 802.11 b/g/n MEASUREMENT REPORT<br>(CERTIFICATION) | <b>Panasonic</b> | Reviewed by:<br>Quality Manager |
| Test Report S/N:<br>0Y1007231224.ACJ | Test Dates:<br>August 13, 2010                | EUT Type:<br>Toughbook Model: CF-19mk4                            |                  | Page 69 of 73                   |

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

§15.207

| No. | Line | Frequency<br>[MHz] | Factor<br>[dB] | QP<br>[dBμV] | Limit<br>[dBμV] | Margin<br>[dB] | Average<br>[dBμV] | Limit<br>[dBμV] | Margin<br>[dB] |
|-----|------|--------------------|----------------|--------------|-----------------|----------------|-------------------|-----------------|----------------|
| 1   | A    | 0.150              | 6.85           | 53.32        | 66.00           | -12.68         | 39.41             | 56.00           | -16.59         |
| 2   | A    | 0.166              | 6.86           | 42.36        | 65.16           | -22.80         | 29.42             | 55.16           | -25.74         |
| 3   | A    | 0.205              | 6.87           | 42.68        | 63.42           | -20.74         | 29.84             | 53.42           | -23.58         |
| 4   | A    | 0.277              | 6.90           | 34.36        | 60.91           | -26.55         | 22.34             | 50.91           | -28.57         |
| 5   | A    | 0.295              | 6.91           | 31.89        | 60.37           | -28.48         | 20.43             | 50.37           | -29.94         |
| 6   | A    | 0.313              | 6.92           | 28.90        | 59.89           | -30.99         | 20.00             | 49.89           | -29.89         |
| 7   | A    | 0.340              | 6.93           | 28.78        | 59.20           | -30.42         | 20.20             | 49.20           | -29.00         |
| 8   | A    | 0.392              | 6.94           | 25.82        | 58.01           | -32.19         | 19.04             | 48.01           | -28.97         |
| 9   | A    | 0.407              | 6.95           | 25.75        | 57.71           | -31.96         | 19.11             | 47.71           | -28.60         |
| 10  | A    | 0.471              | 6.96           | 24.34        | 56.49           | -32.15         | 19.05             | 46.49           | -27.44         |
| 11  | B    | 0.150              | 6.84           | 54.11        | 66.00           | -11.89         | 39.07             | 56.00           | -16.93         |
| 12  | B    | 0.160              | 6.85           | 42.90        | 65.45           | -22.55         | 30.59             | 55.45           | -24.86         |
| 13  | B    | 0.168              | 6.85           | 41.89        | 65.08           | -23.19         | 29.78             | 55.08           | -25.30         |
| 14  | B    | 0.205              | 6.87           | 43.42        | 63.39           | -19.97         | 29.86             | 53.39           | -23.53         |
| 15  | B    | 0.273              | 6.90           | 34.58        | 61.04           | -26.46         | 23.87             | 51.04           | -27.17         |
| 16  | B    | 0.274              | 6.90           | 34.43        | 61.03           | -26.60         | 23.92             | 51.03           | -27.11         |
| 17  | B    | 0.341              | 6.93           | 28.99        | 59.19           | -30.20         | 20.03             | 49.19           | -29.16         |
| 18  | B    | 0.369              | 6.93           | 27.02        | 58.52           | -31.50         | 19.04             | 48.52           | -29.48         |
| 19  | B    | 14.114             | 8.05           | 29.73        | 60.00           | -30.27         | 21.50             | 50.00           | -28.50         |
| 20  | B    | 14.557             | 8.09           | 29.18        | 60.00           | -30.82         | 21.39             | 50.00           | -28.61         |

Table 6-36. Line Conducted Data with 802.11g

### 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 are made using a peak detector.
5. Deviations to the Specifications: None.

|                                      |                                                                                     |                                                                   |                                                                                       |                                 |
|--------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------|---------------------------------------------------------------------------------------|---------------------------------|
| FCC ID: ACJ9TGCF-19F                 |  | FCC Pt. 15.247 802.11 b/g/n MEASUREMENT REPORT<br>(CERTIFICATION) |  | Reviewed by:<br>Quality Manager |
| Test Report S/N:<br>0Y1007231224.ACJ | Test Dates:<br>August 13, 2010                                                      | EUT Type:<br>Toughbook Model: CF-19mk4                            |                                                                                       | Page 70 of 73                   |

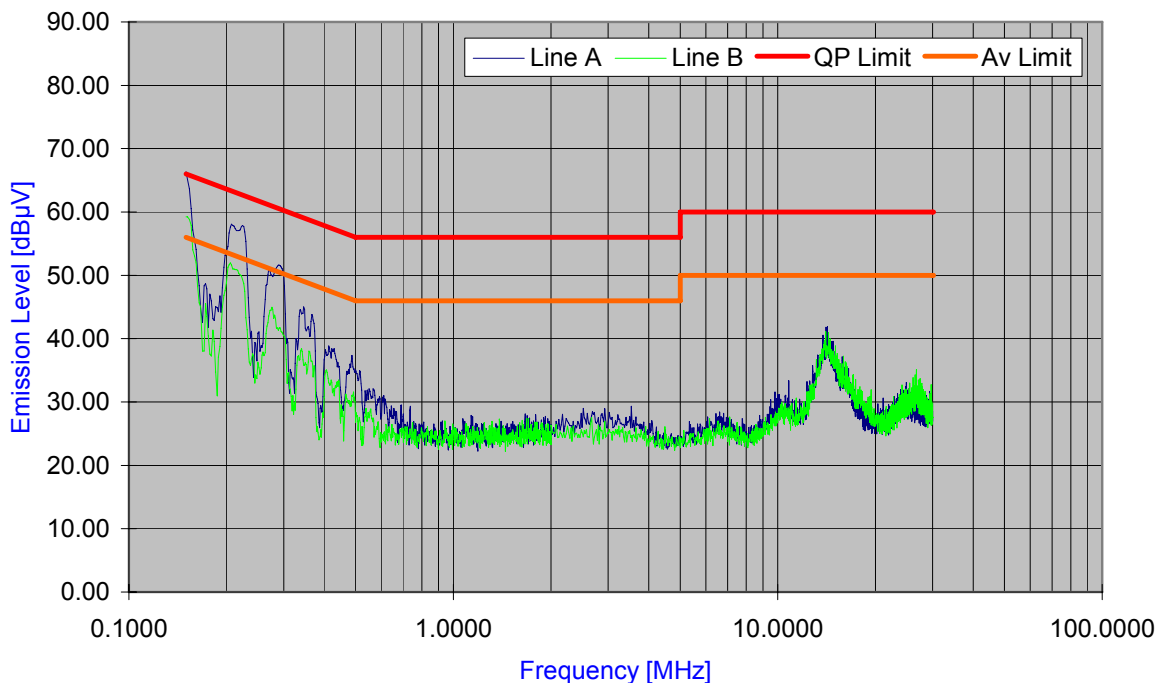
## Line-Conducted Test Data (Cont'd)

§15.207

# PCTEST Engineering Laboratory Inc.

Company : Panasonic Corporation of North America Power Source : AC120V/60Hz  
Model Number : CF-19 Tested Date : 08/13/2010  
FCC ID Code : ACJ9TGCF-19F Note : Tested with WLAN n ON  
Standard : FCC Part 15C, 15.207

### Conducted Emission Measurement



Ver.1.1 ©PCTEST 2006.08

**Plot 6-61. Line Conducted Plot with 802.11n**

#### 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 are made using a peak detector.
5. Deviations to the Specifications: None.

|                                      |                                               |                                                                   |                  |                                 |
|--------------------------------------|-----------------------------------------------|-------------------------------------------------------------------|------------------|---------------------------------|
| FCC ID: ACJ9TGCF-19F                 | <b>PCTEST</b><br>ENGINEERING LABORATORY, INC. | FCC Pt. 15.247 802.11 b/g/n MEASUREMENT REPORT<br>(CERTIFICATION) | <b>Panasonic</b> | Reviewed by:<br>Quality Manager |
| Test Report S/N:<br>0Y1007231224.ACJ | Test Dates:<br>August 13, 2010                | EUT Type:<br>Toughbook Model: CF-19mk4                            |                  | Page 71 of 73                   |

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

§15.207

| No. | Line | Frequency<br>[MHz] | Factor<br>[dB] | QP<br>[dBμV] | Limit<br>[dBμV] | Margin<br>[dB] | Average<br>[dBμV] | Limit<br>[dBμV] | Margin<br>[dB] |
|-----|------|--------------------|----------------|--------------|-----------------|----------------|-------------------|-----------------|----------------|
| 1   | A    | 0.150              | 6.85           | 64.30        | 66.00           | -1.70          | 47.52             | 56.00           | -8.48          |
| 2   | A    | 0.154              | 6.85           | 52.28        | 65.78           | -13.50         | 31.43             | 55.78           | -24.35         |
| 3   | A    | 0.207              | 6.87           | 53.29        | 63.34           | -10.05         | 32.54             | 53.34           | -20.80         |
| 4   | A    | 0.274              | 6.90           | 44.87        | 61.01           | -16.14         | 26.03             | 51.01           | -24.98         |
| 5   | A    | 0.339              | 6.93           | 39.43        | 59.22           | -19.79         | 22.47             | 49.22           | -26.75         |
| 6   | A    | 0.349              | 6.93           | 38.36        | 58.98           | -20.62         | 21.65             | 48.98           | -27.33         |
| 7   | A    | 0.406              | 6.94           | 33.00        | 57.73           | -24.73         | 20.20             | 47.73           | -27.53         |
| 8   | A    | 0.473              | 6.96           | 28.50        | 56.47           | -27.97         | 19.26             | 46.47           | -27.21         |
| 9   | A    | 14.139             | 8.00           | 33.03        | 60.00           | -26.97         | 26.94             | 50.00           | -23.06         |
| 10  | A    | 14.202             | 8.01           | 32.98        | 60.00           | -27.02         | 26.85             | 50.00           | -23.15         |
| 11  | B    | 0.150              | 6.84           | 60.32        | 66.00           | -5.68          | 41.88             | 56.00           | -14.12         |
| 12  | B    | 0.156              | 6.84           | 42.27        | 65.67           | -23.40         | 31.16             | 55.67           | -24.51         |
| 13  | B    | 0.206              | 6.87           | 47.41        | 63.38           | -15.97         | 31.74             | 53.38           | -21.64         |
| 14  | B    | 0.273              | 6.90           | 39.21        | 61.04           | -21.83         | 24.31             | 51.04           | -26.73         |
| 15  | B    | 0.339              | 6.93           | 33.46        | 59.22           | -25.76         | 21.61             | 49.22           | -27.61         |
| 16  | B    | 0.341              | 6.93           | 33.11        | 59.17           | -26.06         | 21.15             | 49.17           | -28.02         |
| 17  | B    | 14.088             | 8.05           | 33.36        | 60.00           | -26.64         | 26.86             | 50.00           | -23.14         |
| 18  | B    | 14.234             | 8.06           | 34.93        | 60.00           | -25.07         | 26.98             | 50.00           | -23.02         |
| 19  | B    | 14.429             | 8.08           | 33.20        | 60.00           | -26.80         | 26.64             | 50.00           | -23.36         |
| 20  | B    | 15.030             | 8.14           | 31.49        | 60.00           | -28.51         | 25.34             | 50.00           | -24.66         |

Table 6-37. Line Conducted Data with 802.11n

### 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 are made using a peak detector.
5. Deviations to the Specifications: None.

|                                      |                                                                                     |                                                                   |                                                                                       |                                 |
|--------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------|---------------------------------------------------------------------------------------|---------------------------------|
| FCC ID: ACJ9TGCF-19F                 |  | FCC Pt. 15.247 802.11 b/g/n MEASUREMENT REPORT<br>(CERTIFICATION) |  | Reviewed by:<br>Quality Manager |
| Test Report S/N:<br>0Y1007231224.ACJ | Test Dates:<br>August 13, 2010                                                      | EUT Type:<br>Toughbook Model: CF-19mk4                            |                                                                                       | Page 72 of 73                   |

## CONCLUSION

The data collected relate only the item(s) tested and show that the **Panasonic Toughbook Model: CF-19mk4**  
**FCC ID: ACJ9TGCF-19F** is in compliance with Part 15C of the FCC Rules.

|                                             |                                                                                     |                                                                           |                                                                                       |                                        |
|---------------------------------------------|-------------------------------------------------------------------------------------|---------------------------------------------------------------------------|---------------------------------------------------------------------------------------|----------------------------------------|
| <b>FCC ID:</b> ACJ9TGCF-19F                 |  | <b>FCC Pt. 15.247 802.11 b/g/n MEASUREMENT REPORT<br/>(CERTIFICATION)</b> |  | <b>Reviewed by:</b><br>Quality Manager |
| <b>Test Report S/N:</b><br>0Y1007231224.ACJ | <b>Test Dates:</b><br>August 13, 2010                                               | <b>EUT Type:</b><br>Toughbook Model: CF-19mk4                             |                                                                                       | Page 73 of 73                          |