Engineering and Testing for EMC and Safety Compliance

# Certification Application Report
# FCC Part 15.247 & Industry Canada RSS-210

| Test Lab: | Applicant: |
|---|---|
| Rhein Tech Laboratories, Inc. Phone: 703-689-0368<br>360 Herndon Parkway Fax: 703-689-2056<br>Suite 1400 Web: www.rheintech.com<br>Herndon, VA 20170<br>E-Mail: ATCBINFO@RHEINTECH.COM | Fujitsu Transaction Solutions Inc. Phone: (858) 731-4719<br>10180 Barnes Canyon Road Fax: (858) 731-4780<br>San Diego, CA. 92121<br>Contact: Dwayne Andrejczuk<br>E-Mail: dandrejczuk@ftxs.fujitsu.com |

| | | | |
|---|---|---|---|
| **FCC ID/ IC ID:** | QL9-IPAD100-20/ 4432A-IPAD20 | **Test Report Date:** | July 9, 2006 |
| **Platform:** | N/A | **RTL Work Order #:** | 2006048 |
| **Model Name/Model #:** | iPAD/iPAD100-20 | **RTL Quote #:** | QRTL06-209C |

| | |
|---|---|
| **American National Standard Institute:** | ANSI C63.4-2003: Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz |
| **FCC Classification:** | DTS – Part 15 Digital Transmission System (WLAN portion)<br>DSS – Part 15 Spread Spectrum Transmitter (Bluetooth portion) |
| **FCC Rule Part(s):** | FCC Rules Part 15.247 (10-01-05): Operation within the bands 920-928 MHz, 2400-2483.5 MHz and 5725-5850 MHz Direct Sequence System |
| **Approved Test Methods:** | DA000705 Bluetooth Devices<br>KDB558074 DTS for WLAN Devices |
| **Industry Canada:** | RSS-210: Low Power License-Exempt Communications Devices |
| **Digital Interface Information** | Digital Interface was found to be compliant |

| Frequency Range (MHz) | Output Power (W) | Emission Designator |
|---|---|---|
| 2412-2462 | 0.089 | 15M5G7D |
| 2412-2462 | 0.074 | 19M9G7D |
| 2402-2480 | 0.002 | 1M12FXD |

I, the undersigned, hereby declare that the equipment tested and referenced in this report conforms to the identified standard(s) as described in this test report. No modifications were made to the equipment during testing in order to achieve compliance with these standards. Furthermore, there was no deviation from, additions to, or exclusions from, the applicable parts of FCC Part 2, FCC Part 15, FCC 97-114, ANSI C63.4, and Industry Canada RSS-210.

Signature: _____ Date: July 9, 2006

Typed/Printed Name: Desmond A. Fraser Position: President

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# 1 General Information

## 1.1 Scope

Applicable Standards:

- FCC Rules Part 15.247 (10-01-05): Frequency Hopping, Direct Spread Spectrum and Hybrid Systems that are in operation within the bands of 902-928 MHz, 2400-2483.5 MHz and 5725-5850 MHz.
- Industry Canada RSS-210: Low Power License-Exempt Communications Devices

## 1.2 Description of EUT

| Equipment Under Test | |
|---|---|
| **Model Name/#** | iPAD/iPAD100-20 |
| **Power Supply** | Battery operated |
| **Modulation Type** | DSSS 802.11b/g; FHSS |
| **Transfer Rate** | 1, 2, 5.5, 6, 9, 11, 12, 18, 22, 24, 54, 72 Mbps |
| **Frequency Range** | 2412 – 2462 MHz; 2402-2480 MHz |
| **Antenna Connector Type** | Internal W.FL for DSSS and U.FL for FHSS |
| **Antenna Types** | Separate internal patch for FHSS and DSSS |

## 1.3 Test Facility

The open area test site and conducted measurement facility used to collect the radiated data is located at 360 Herndon Parkway, Suite 1400, Herndon, Virginia 20170. This site has been fully described in a report and approved by the Federal Communications Commission to perform AC line conducted and radiated emissions testing (ANSI C63.4 2003).

## 1.4 Related Submittal(s)/Grant(s)

This is an original application for certification for Fujitsu Transaction Solutions Inc. Model #: iPAD100-20, FCC ID: QL9-IPAD100-20, IC: 4432A-IPAD20.

## 1.5 Modifications

No modifications were required for compliance.

# 2 Test Information

## 2.1 Description of Test Modes

In accordance with FCC 15.31(m), and because the EUT utilizes an operating band greater than 10 MHz, the following frequencies were tested:

**Table 2-1: Channels Tested - DSSS**

| Channel | Frequency |
|---|---|
| 1 | 2412 |
| 6 | 2437 |
| 11 | 2462 |

**Table 2-2: Channels Tested - FHSS**

| Channel | Frequency |
|---|---|
| 2 | 2402 |
| 41 | 2441 |
| 80 | 2480 |

## 2.2 Exercising the EUT

The EUT was tested in all three orthogonal planes in order to determine worst-case emissions. The EUT was provided with software to transmit continuously, or hopping for FHSS, during testing. The carrier was also checked to verify that information was being transmitted. There were no deviations from the test standard(s) and/or methods. The test results reported relate only to the item tested.

## 2.3 Test Result Summary

**Table 2-3: Test Result Summary – FCC Part 15, Subpart C (Section 15.247)**

| Standard | Test | Pass/Fail or N/A |
|---|---|---|
| FCC 15.207 | AC Power Conducted Emissions | Pass |
| FCC 15.209 | Radiated Emissions | Pass |
| FCC 15.247(a)(2) | 6 dB Bandwidth | Pass |
| FCC 15.247(b) | Maximum Peak Power Output | Pass |
| FCC 15.247(d) | Antenna Conducted Spurious Emissions | Pass |
| FCC 15.247(e) | Power Spectral Density | Pass |
| FCC 15.247(d) | Band Edge Measurement | Pass |
| FCC 15.247(a)(1) | Carrier Frequency Separation | Pass |
| FCC 15.247(a)(1)(ii) | 20 dB Bandwidth | Pass |
| FCC 15.247(a)(1)(iii) | Hopping Characteristics | Pass |
| FCC 15.247(a)(1)(iii) | Average Time of Occupancy | Pass |

### 2.4 Test System Details

The test sample was received on May 16, 2006. The FCC identifiers for all applicable equipment, plus descriptions of all cables used in the tested system, are identified in the following tables.

**Table 2-4: Equipment Under Test**

| Part | Manufacturer | Model | Serial Number | FCC ID | Cable Description | RTL Bar Code |
|---|---|---|---|---|---|---|
| Hand Scanner/ PIM | Fujitsu, Ltd. | iPAD100-20 | N/A | QL9-IPAD100-20 | N/A | 17234 |
| Charger Cradle | Fujitsu, Ltd. | iPAD100-20 Cradle | 70 | N/A | Unshielded | 17238 |
| Charger Cradle | Fujitsu, Ltd. | iPAD100-20 Cradle | 199 | N/A | Unshielded | 17236 |
| AC Adapter | Fujitsu, Ltd. | CQ01007-0730 | 031 02409C | N/A | 1.9 m Unshielded AC power; 1.8m Unshielded DC power | 17237 |
| AC Adapter | Fujitsu, Ltd. | CQ01007-0750 | 9921 1964E | N/A | 1.9 m Unshielded AC power; 1.8m Unshielded DC power | 17239 |

## 2.5 Configuration of Tested System

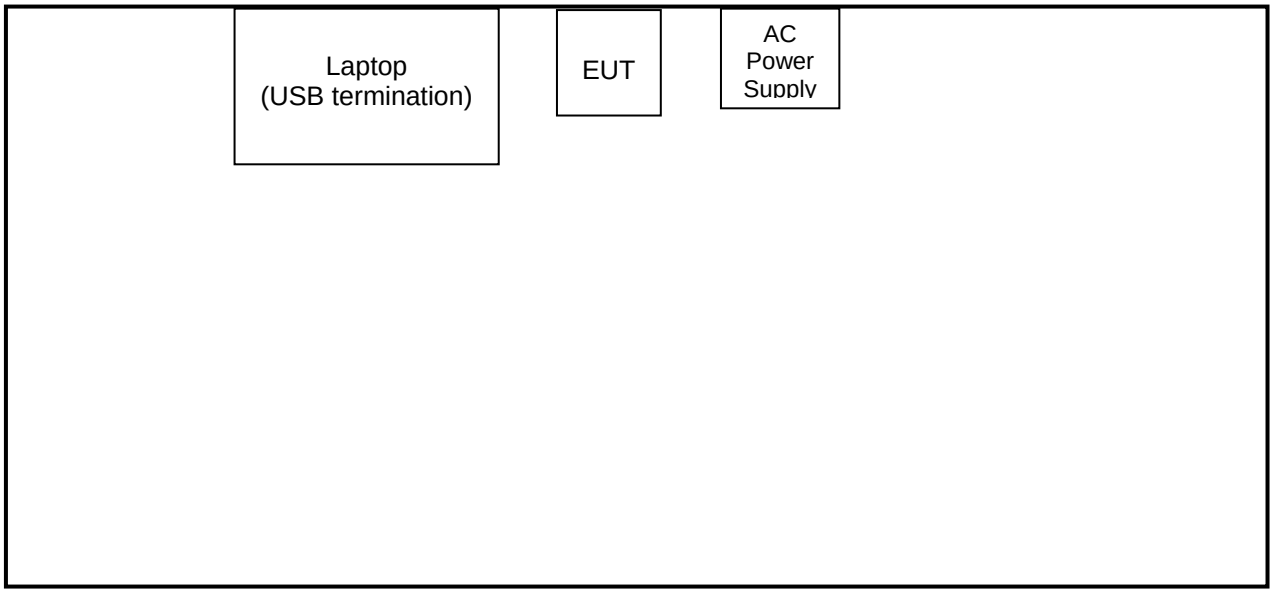



**Figure 2-1: Configuration of System Under Test**

## 3 Peak Output Power - §15.247(b)(1); RSS-210 §A8.4(4)

### 3.1 Power Output Test Procedure

A conducted power measurement of the EUT was taken using an Agilent 4416A EPM-P Series Power Meter with an E9323A Peak and Average Power Sensor.

**Table 3-1: Power Output Test Equipment**

| RTL Asset # | Manufacturer | Model | Part Type | Serial Number | Calibration Due Date |
|---|---|---|---|---|---|
| 901184 | Agilent Technologies | E4416A | EPM-P Power Meter, single channel | GB41050573 | 9/21/06 |
| 901356 | Agilent Technologies | E9323A | Power Sensor | 31764-264 | 9/21/06 |

### 3.2 Power Output Test Data

**Table 3-2: Power Output Test Data 802.11b/WLAN**

| Channel | Frequency (MHz) | Peak Power Conducted Output (dBm) |
|---|---|---|
| 1 | 2412 | 19.4 |
| 6 | 2437 | 19.5 |
| 11 | 2462 | 19.5 |

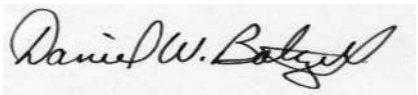
**Table 3-3: Power Output Test Data 802.11g/WLAN**

| Channel | Frequency (MHz) | Peak Power Conducted Output (dBm) |
|---|---|---|
| 1 | 2412 | 18.0 |
| 6 | 2437 | 18.3 |
| 11 | 2462 | 18.7 |

**Table 3-4: Power Output Test Data FHSS/Bluetooth**

| Channel | Frequency (MHz) | Peak Power Conducted Output (dBm) |
|---|---|---|
| 2 | 2402 | 2.5 |
| 41 | 2441 | 2.8 |
| 80 | 2480 | 2.8 |

**Test Personnel:**



| Daniel W. Baltzell | | July 7, 2006 |
|---|---|---|
| EMC Test Engineer | Signature | Date Of Test |

# 4 Compliance with the Band Edge – FCC §15.247(d); RSS-210 §2.2

## 4.1 Band Edge Test Procedure

The transmitter output was connected to its appropriate antenna. Peak (1 MHz RBW/VBW) and average (1 MHz RBW/10 Hz VBW) radiated measurements were taken with a suitable span to encompass the peak of the fundamental. A delta measurement was performed from the highest peak in the restricted band to the peak of the fundamental, and subtracted from the field strength; the result was compared to the limit in the restricted band (54 dBuV/m).

**Table 4-1: Band Edge Test Equipment**

| RTL Asset # | Manufacturer | Model | Part Type | Serial Number | Calibration Due Date |
|---|---|---|---|---|---|
| 901020 | Hewlett Packard | 8564E | Portable Spectrum Analyzer (9 kHz - 40 GHz) | 3943A01719 | 9/14/06 |
| 901215 | Hewlett Packard | 8596EM | Spectrum Analyzer (9 kHz - 12.8 GHz) | 3826A00144 | 9/22/06 |
| 900878 | Rhein Tech Labs | AM3-1197-0005 | 3 meter Antenna Mast, polarizing | Outdoor Range 1 | Not Required |
| 901231 | IW Microwave Products | KPS-1503-2400-KPS | High frequency RF cables | 240" | 9/1/06 |
| 901232 | IW Microwave Products | KPS-1503-2400-KPS | High frequency RF cables | 240" | 9/1/06 |
| 901235 | IW Microwave Products | KPS-1503-360-KPS | High frequency RF cables | 36" | 9/1/06 |
| 901242 | Rhein Tech Labs | WRT-000-0003 | Wood rotating table | N/A | Not Required |
| 900772 | EMCO | 3161-02 | Horn Antenna (2 - 4 GHz) | 9804-1044 | 5/20/07 |
| 900931 | Hewlett Packard | 8566B | Spectrum Analyzer (100 Hz - 22 GHz) | 3138A07771 | 8/3/06 |

## 4.2 Restricted Band Edge Test Results

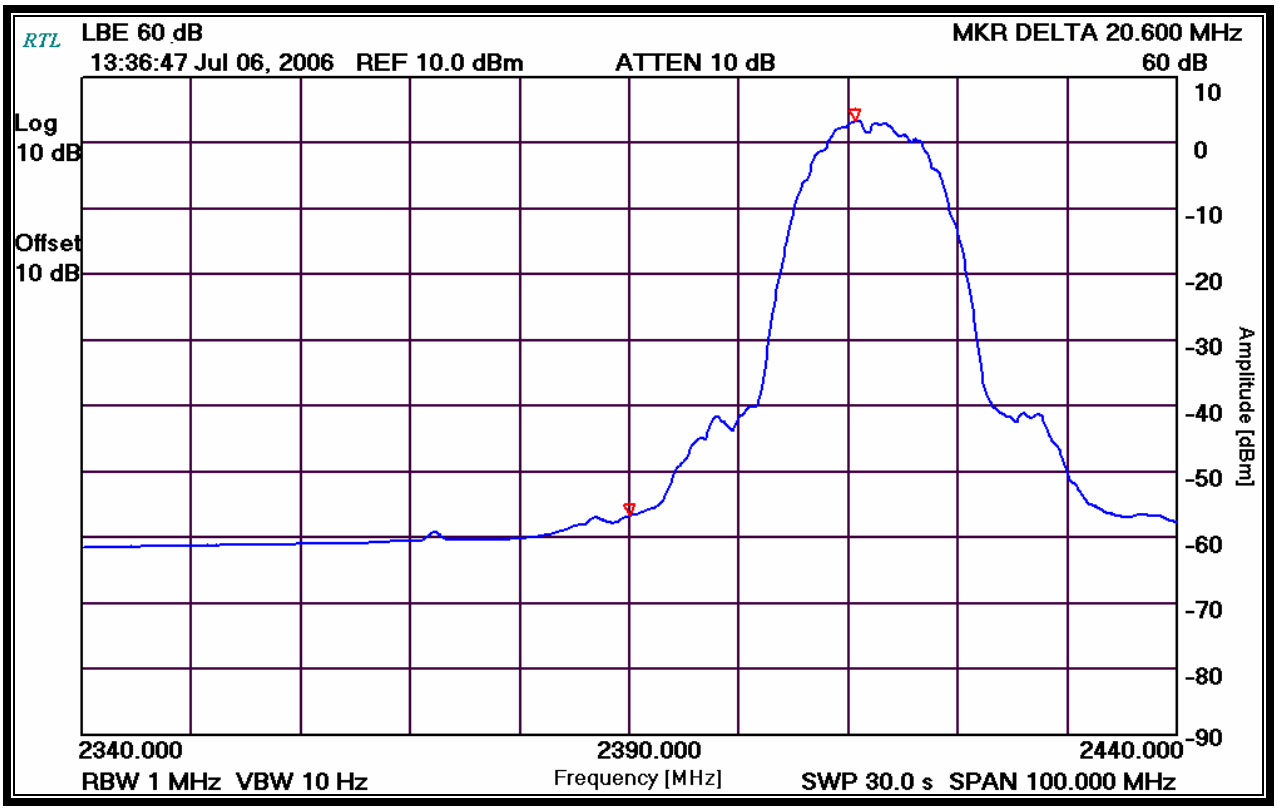
**Calculation of Lower Band Edge 802.11b**

100.4 dBuV/m is the field strength measurement, from which the delta measurement of 60.0 dB is subtracted (reference plots), resulting in a level of 40.4 dB. This level has a margin of 13.6 dB below the limit of 54 dBuV/m.

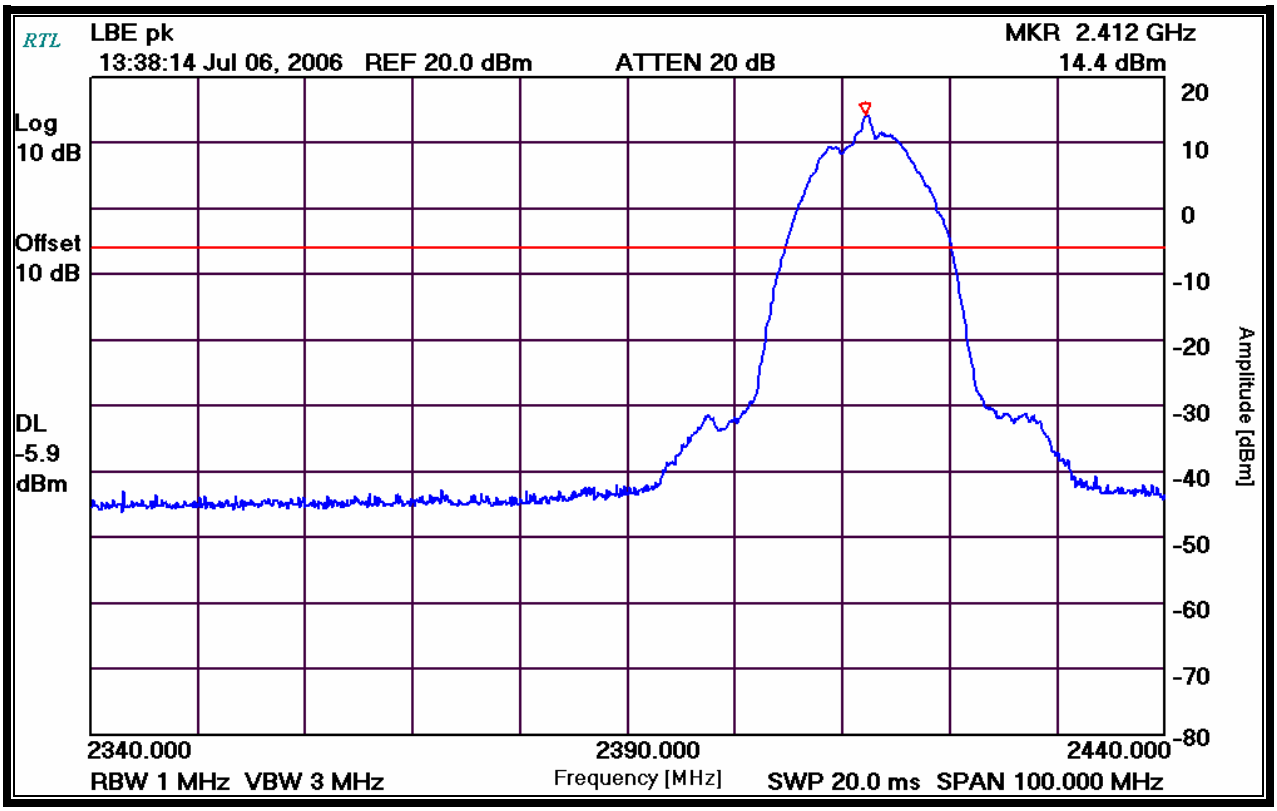
Calculation: 100.4 dBuV/m – 60.0 dB – 54 dBuV/m = -13.6 dB

Peak Field Strength of Lower Band Edge (1 MHz RBW/1 MHz VBW) = 105.4 dBuV/m
Average Field Strength of Lower Band Edge (1 MHz RBW/10 Hz VBW) = 100.4 dBuV/m
Delta measurement = 60.0 dB

**Plot 4-1: Lower Band Edge: Average Delta Measurement Channel 1 (TX Frequency: 2412 MHz) 802.11b**



**Plot 4-2: Lower Band Edge: Peak Measurement Channel 1 (TX Frequency: 2412 MHz) 802.11b**



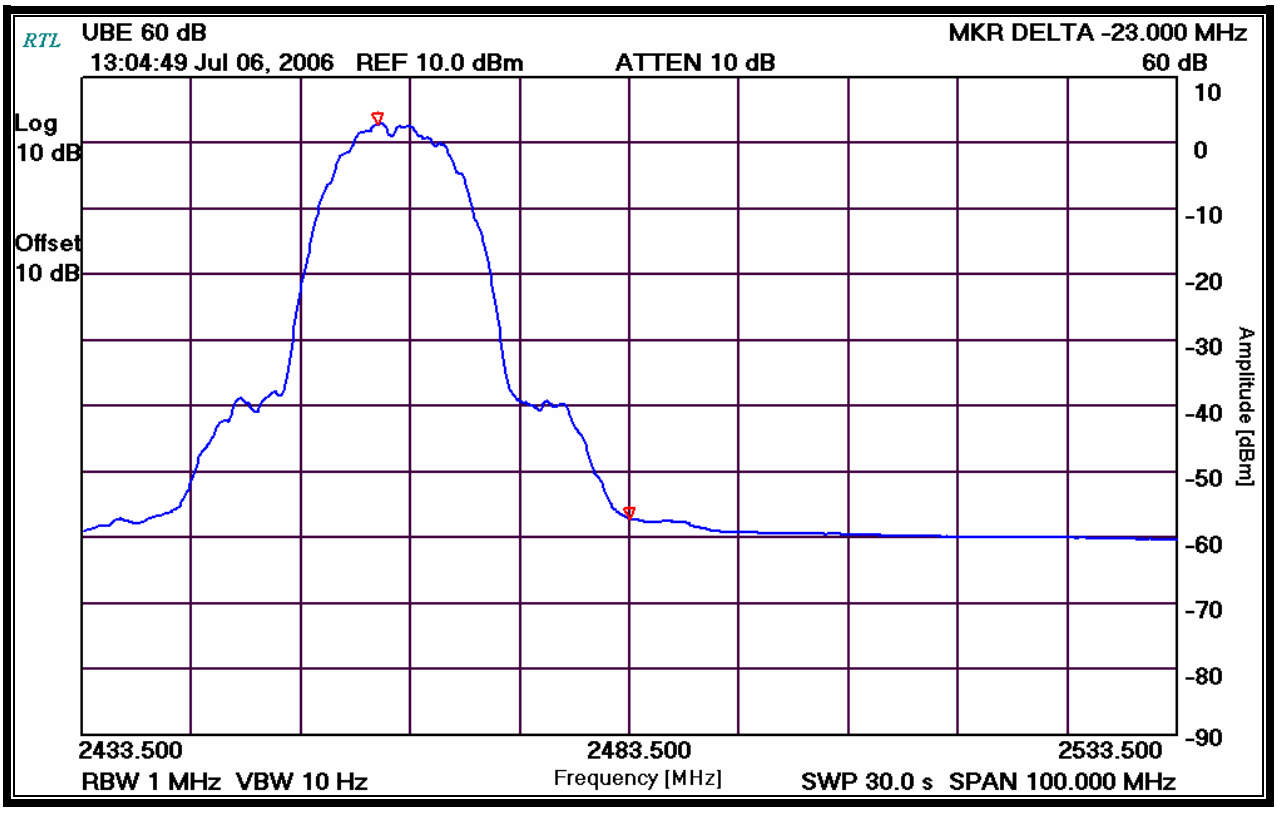
**Calculation of Upper Band Edge 802.11b**

102.1 dBuV/m is the field strength measurement, from which the delta measurement of 60.0 dB is subtracted (reference plots), resulting in a level of 42.1dB. This level has a margin of 11.9 dB below the limit of 54 dBuV/m.

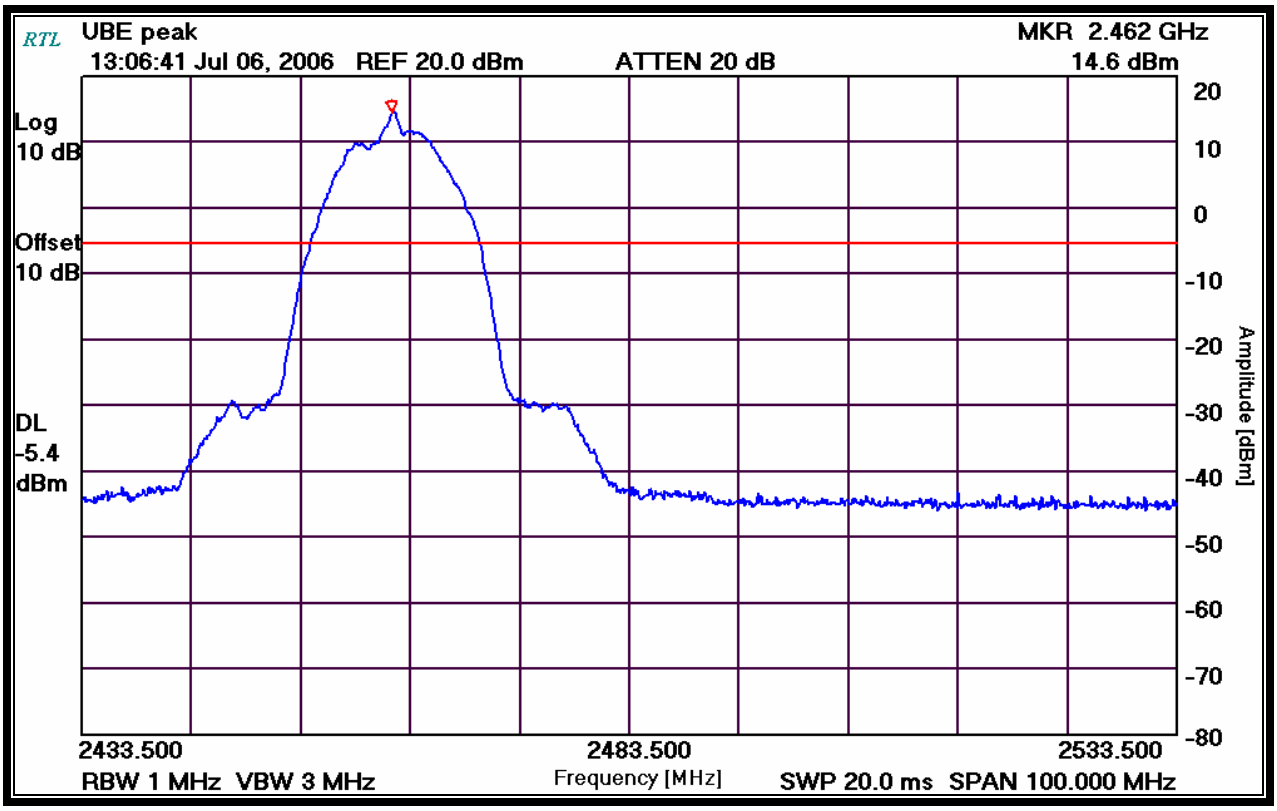
Calculation: 102.1 dBuV/m – 60.0 dB – 54 dBuV/m = -11.9 dB

Peak Field Strength of Lower Band Edge (1 MHz RBW/1 MHz VBW) = 107.1 dBuV/m
Average Field Strength of Lower Band Edge (1 MHz RBW/10 Hz VBW) = 102.1 dBuV/m
Delta measurement = 60.0 dB

**Plot 4-3: Upper Band Edge: Average Delta Measurement Channel 11 (TX Frequency: 2462 MHz) 802.11b**



**Plot 4-4: Upper Band Edge: Peak Measurement Channel 11 (TX Frequency: 2462 MHz) 802.11b**



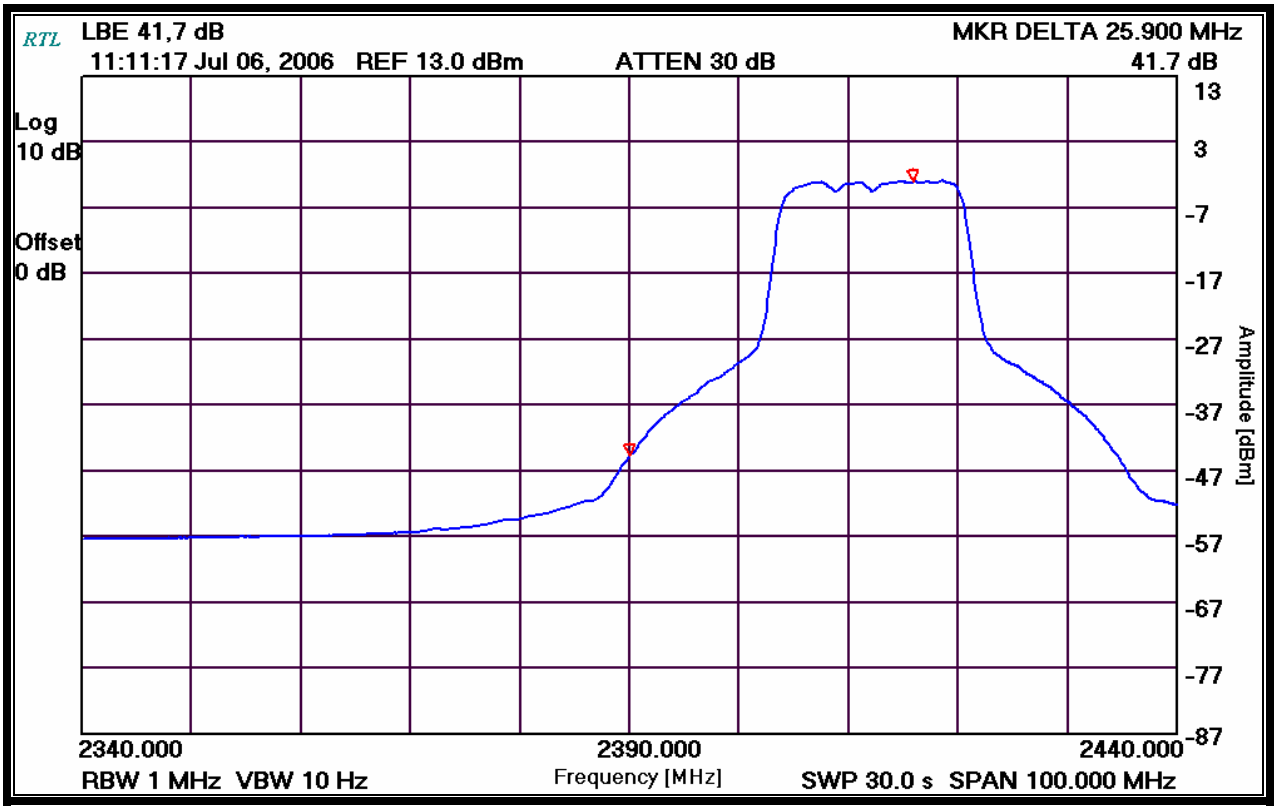
**Calculation of Lower Band Edge 802.11g**

95.1 dBuV/m is the field strength measurement, from which the delta measurement of 41.7 dB is subtracted (reference plots), resulting in a level of 53.4 dB. This level has a margin of 0.6 dB below the limit of 54 dBuV/m.

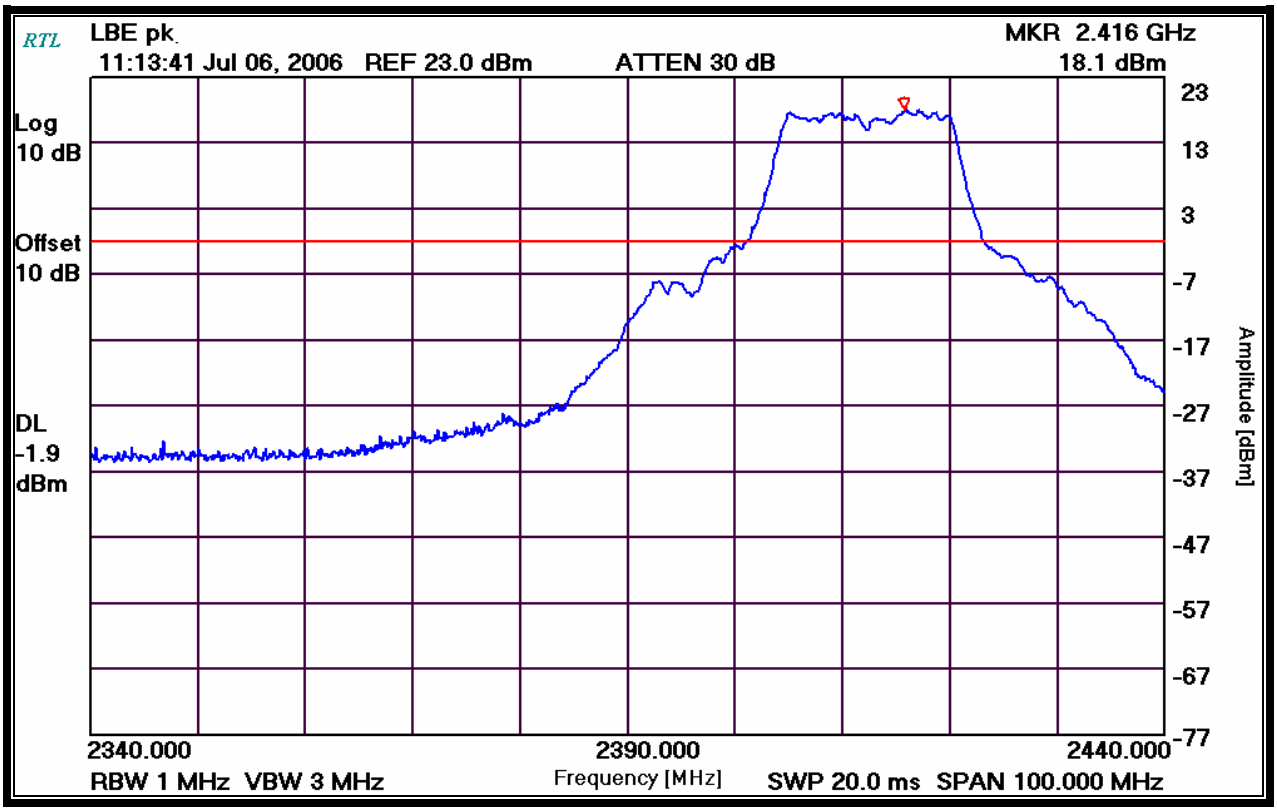
Calculation: 95.1 dBuV/m – 41.7 dB – 54 dBuV/m = -0.6 dB

Peak Field Strength of Lower Band Edge (1 MHz RBW/1 MHz VBW) = 105.9 dBuV/m
Average Field Strength of Lower Band Edge (1 MHz RBW/10 Hz VBW) = 95.1 dBuV/m
Delta measurement = 41.7 dB

**Plot 4-5: Lower Band Edge: Average Delta Measurement Channel 1 (TX Frequency: 2412 MHz) 802.11g**



**Plot 4-6: Lower Band Edge: Peak Measurement Channel 1 (TX Frequency: 2412 MHz) 802.11g**



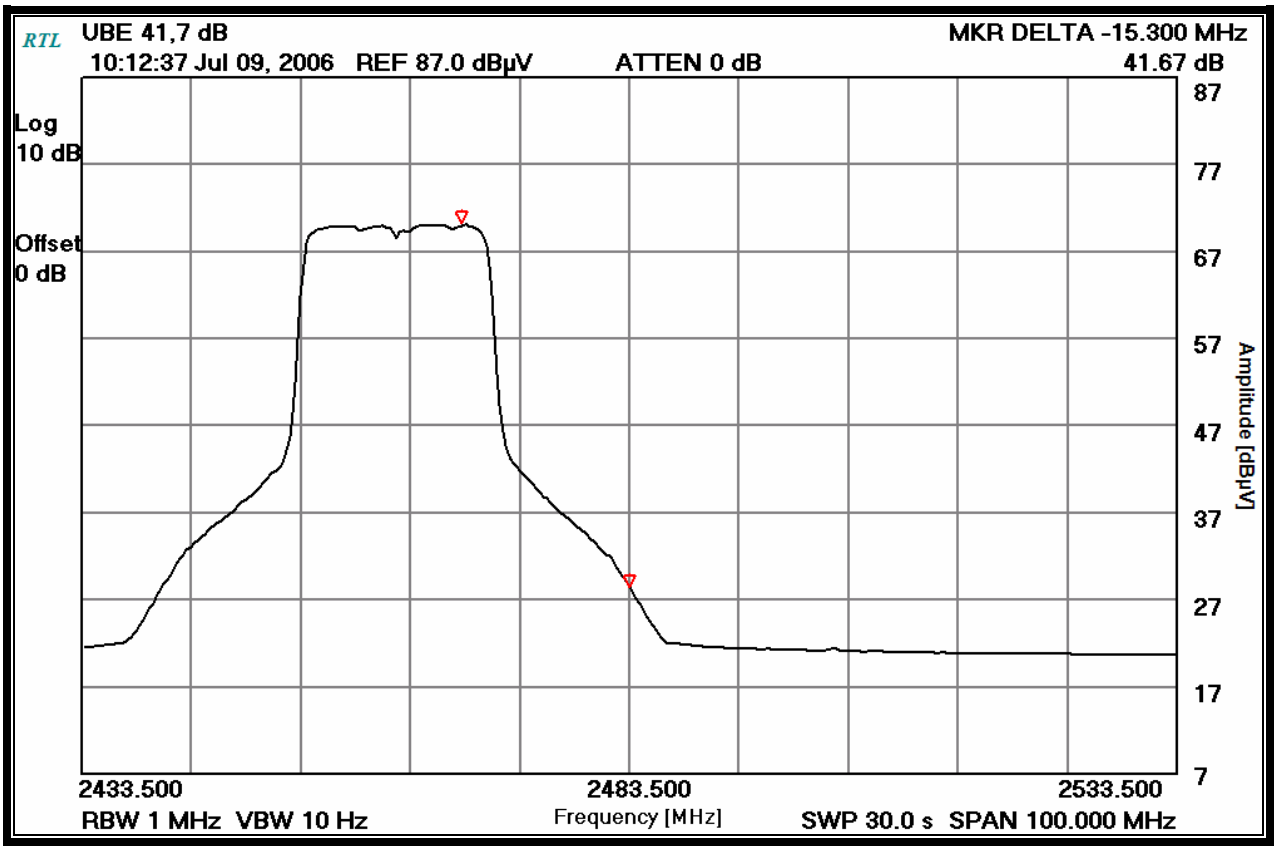
**Calculation of Upper Band Edge 802.11g**

94.3 dBuV/m is the field strength measurement, from which the delta measurement of 41.7 dB is subtracted (reference plots), resulting in a level of 52.6 dB. This level has a margin of 1.4 dB below the limit of 54 dBuV/m.

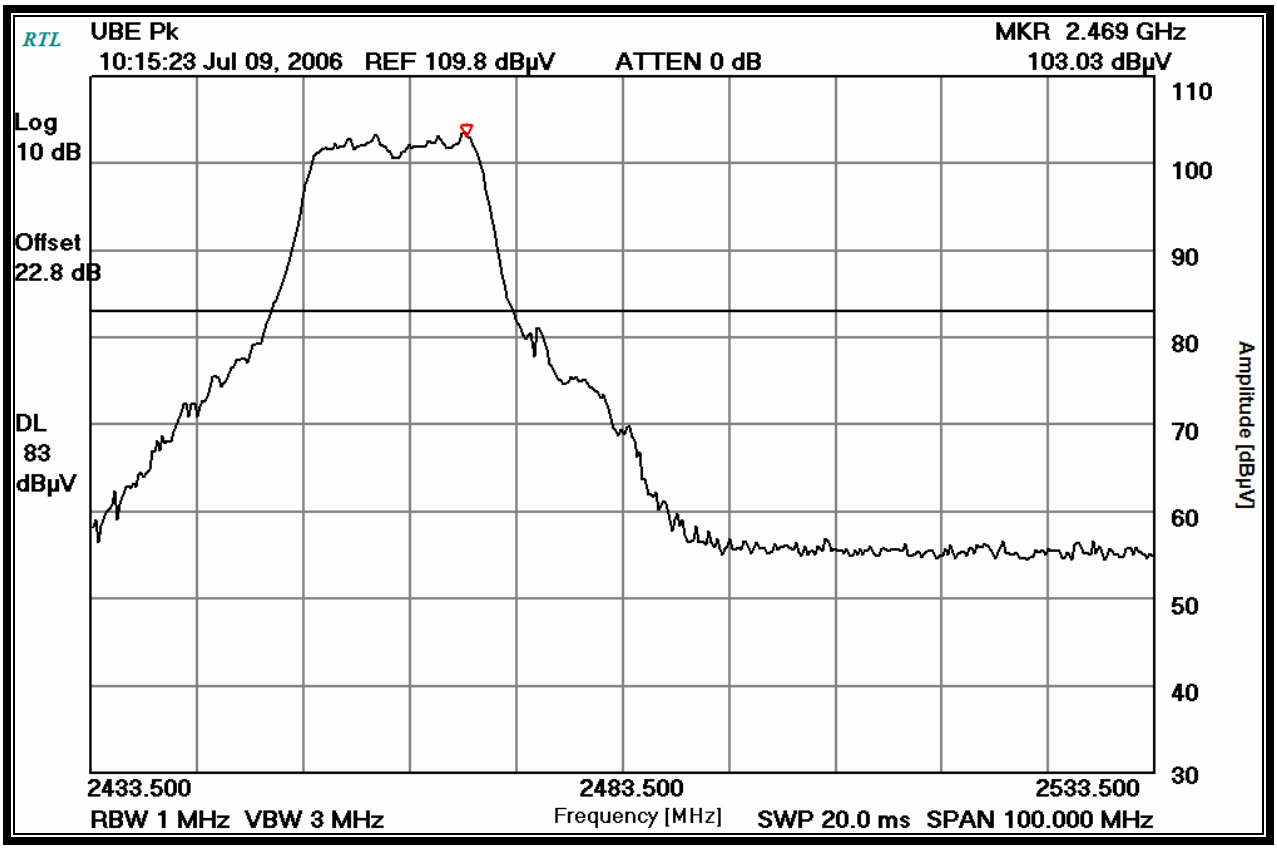
Calculation: 94.3 dBuV/m – 41.7 dB – 54 dBuV/m = -1.4 dB

Peak Field Strength of Lower Band Edge (1 MHz RBW/1 MHz VBW) = 103.0 dBuV/m
Average Field Strength of Lower Band Edge (1 MHz RBW/10 Hz VBW) = 94.3 dBuV/m
Delta measurement = 41.7 dB

**Plot 4-7: Upper Band Edge: Average Delta Measurement Channel 11 (TX Frequency: 2462 MHz) 802.11g**



**Plot 4-8: Upper Band Edge: Peak Measurement Channel 11 (TX Frequency: 2462 MHz) 802.11g**



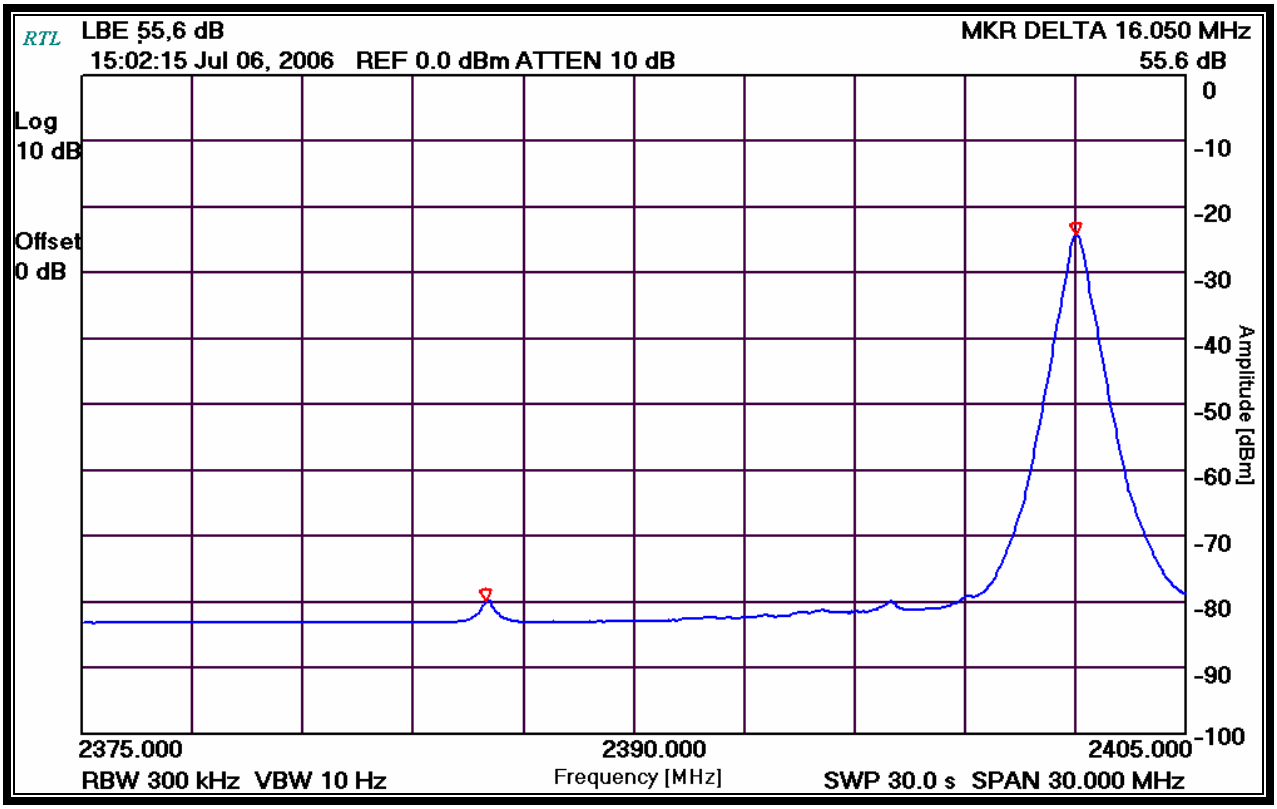
**Calculation of Lower Band Edge FHSS**

77.7 dBuV/m is the field strength measurement, from which the peak delta measurement of 55.6 dB is subtracted (reference plots), resulting in a level of 22.1 dB. This level has a margin of 31.9 dB below the limit of 54 dBuV/m.

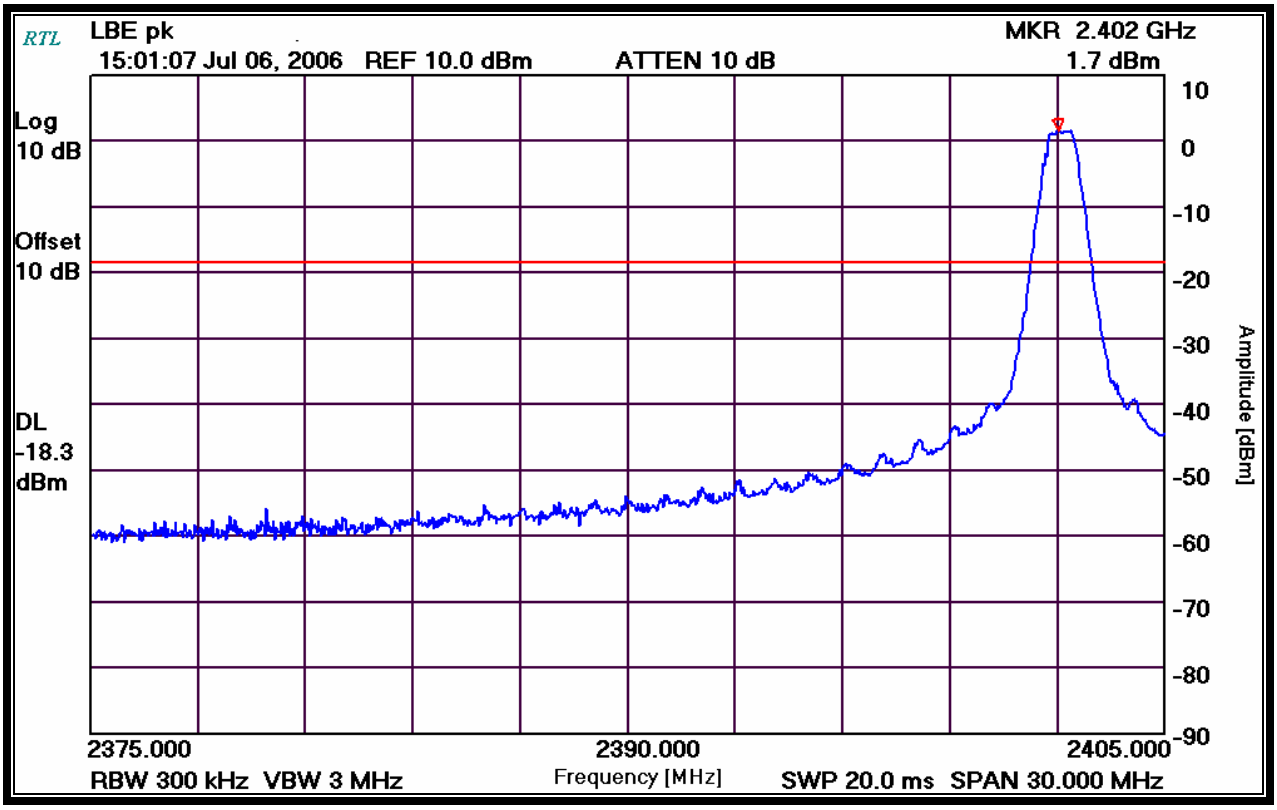
Calculation: 77.7 dBuV/m – 55.6 dB – 54 dBuV/m = -31.9 dB

Peak Field Strength of Lower Band Edge (1 MHz RBW/1 MHz VBW) = 91.2 dBuV/m
Average Field Strength of Lower Band Edge (1 MHz RBW/10 Hz VBW) = 77.7 dBuV/m
Delta measurement = 55.6 dB

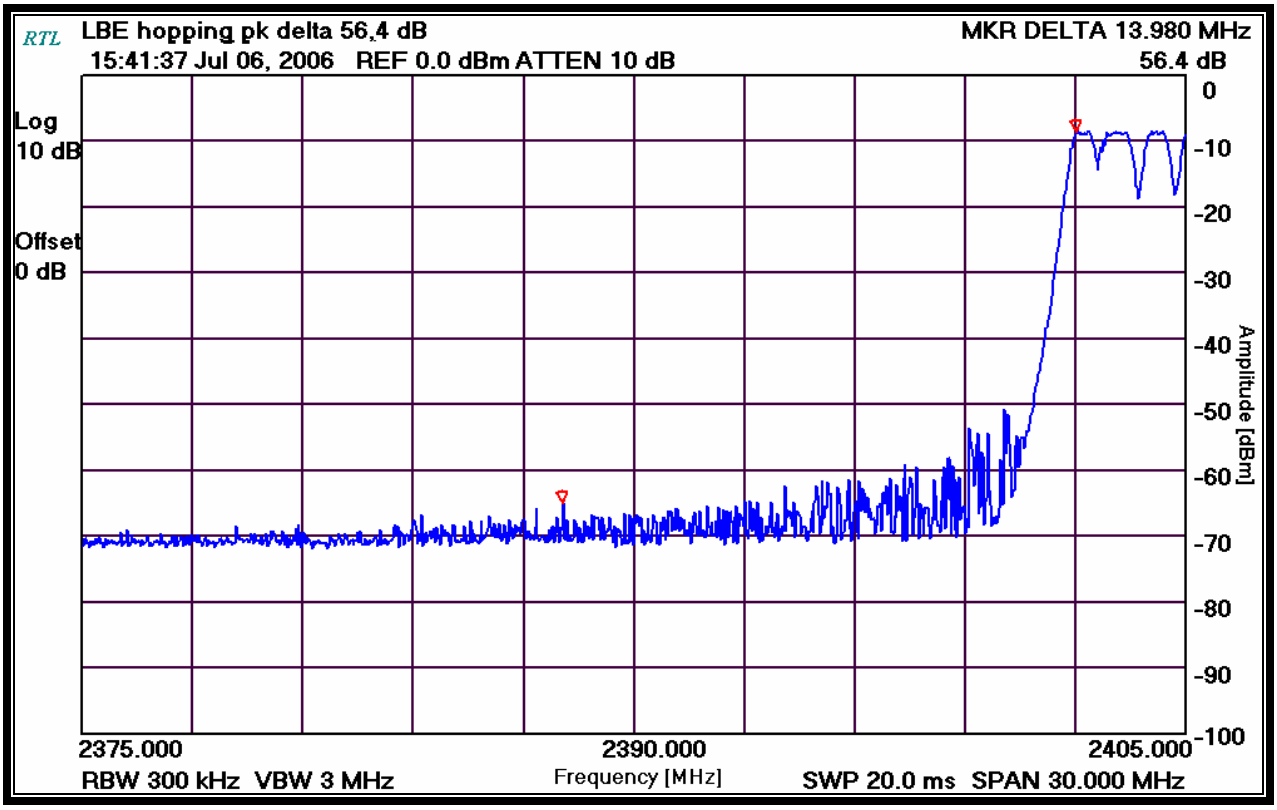
**Plot 4-9: Lower Band Edge: Average Delta Measurement Channel 1 (TX Frequency: 2402 MHz) FHSS**



**Plot 4-10: Lower Band Edge: Peak Measurement Channel 1 (TX Frequency: 2402 MHz) FHSS**



**Plot 4-11: Lower Band Edge: Average Delta Measurement (Hopping) FHSS**



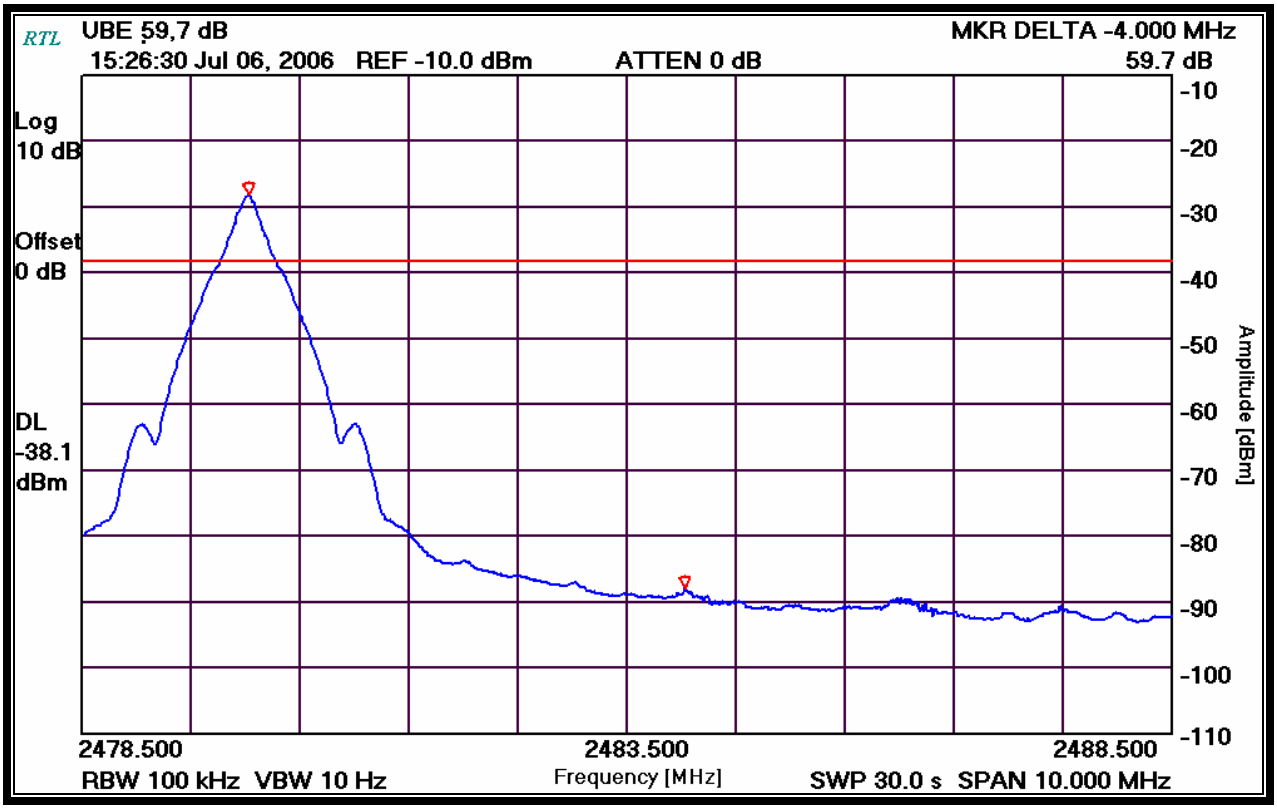
**Calculation of Upper Band Edge FHSS**

76.8 dBuV/m is the field strength measurement, from which the delta measurement of 59.7 dB is subtracted (reference plots), resulting in a level of 17.1 dB. This level has a margin of 36.9 dB below the limit of 54 dBuV/m.

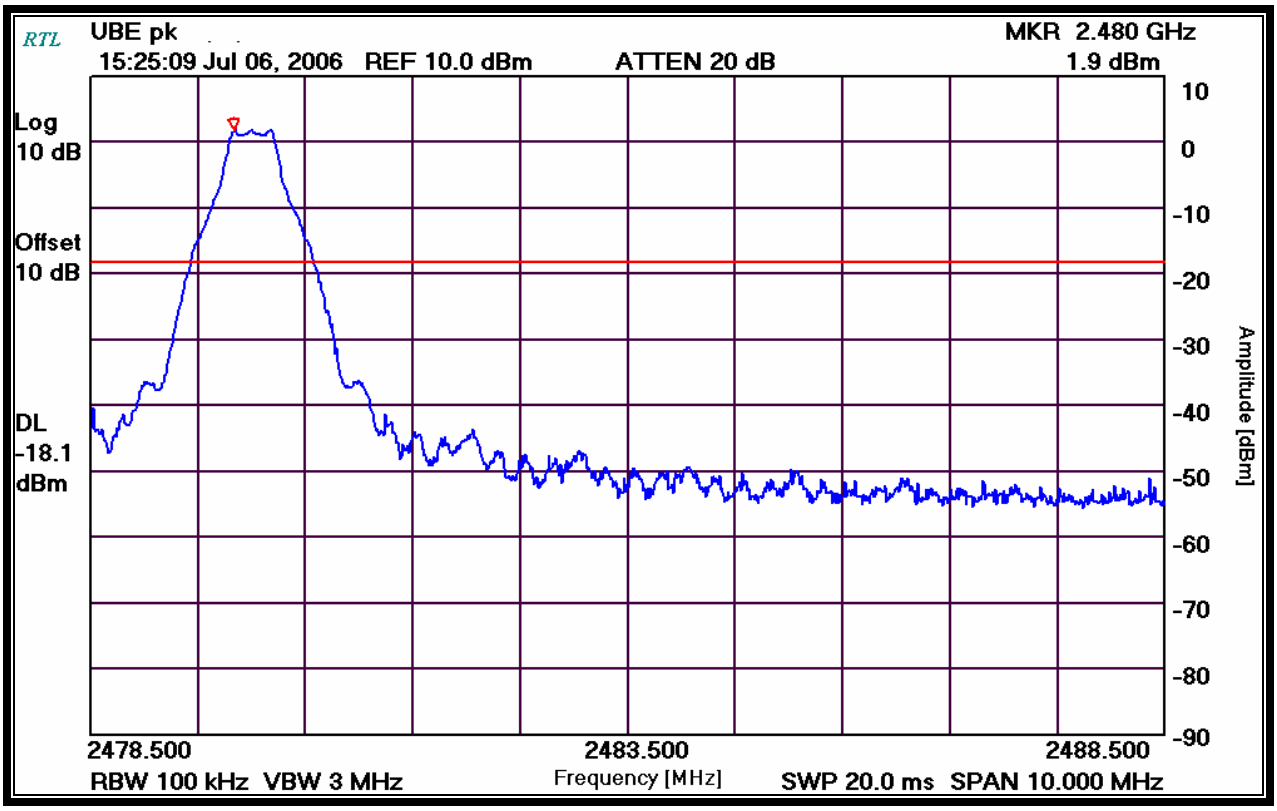
Calculation: 76.8 dBuV/m – 59.7 dB – 54 dBuV/m = -36.9 dB

Peak Field Strength of Lower Band Edge (1 MHz RBW/1 MHz VBW) = 89.8 dBuV/m
Average Field Strength of Lower Band Edge (1 MHz RBW/10 Hz VBW) = 76.8 dBuV/m
Delta measurement = 59.7 dB

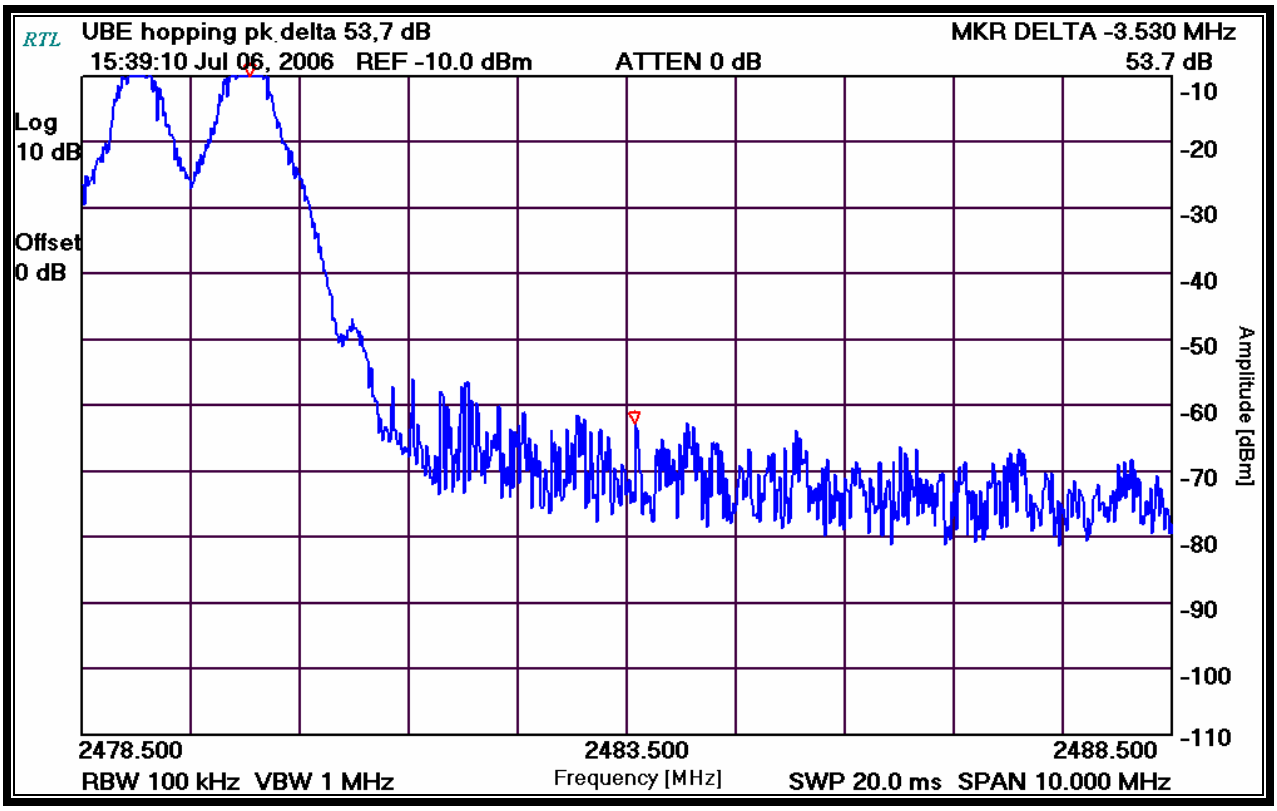
**Plot 4-12: Upper Band Edge: Average Delta Measurement Channel 11 (TX Frequency: 2480 MHz) FHSS**



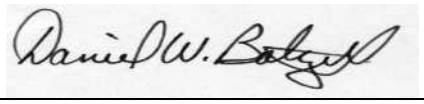
**Plot 4-13: Upper Band Edge: Peak Measurement Channel 11 (TX Frequency: 2480 MHz) FHSS**



**Plot 4-14: Upper Band Edge: Peak Measurement (Hopping) FHSS**




**Test Personnel:**

| Daniel W. Baltzell |  | July 6 and 9, 2006 |
|---|---|---|
| Test Engineer | Signature | Dates Of Test |

# 5 Antenna Conducted Spurious Emissions - §15.247(d); RSS-Gen

## 5.1 Antenna Conducted Spurious Emissions Test Procedures

Antenna spurious emissions per FCC 15.247(c) was measured from the EUT antenna port using a 50 ohm spectrum analyzer with the resolution bandwidth set at 100 kHz, and the video bandwidth set at 100 kHz. The modulated carrier was identified at the following frequencies: 2412 MHz, 2437 MHz and 2462 MHz for DSSS, and 2402, 2441, and 2480 for FHSS.

**Table 5-1: Antenna Conducted Spurious Emissions Test Equipment**

| RTL Asset # | Manufacturer | Model | Part Type | Serial Number | Calibration Due Date |
|---|---|---|---|---|---|
| 901413 | Agilent | E4448A | Spectrum Analyzer (3 Hz – 50 GHz) | US440203416 | 11/02/06 |

## 5.2 Antenna Conducted Spurious Emissions Test Results

**Table 5-2: Antenna Conducted Spurious Emissions 2412 MHz; 802.11b (5.8 dBm peak at 100k RBW)**

| Frequency (MHz) | Level (dBm) | Limit (dBm) | Margin (dB) | Result |
|---|---|---|---|---|
| 4824.0 | -63.7 | -14.2 | -49.5 | Pass |
| 7236.0 | -69.8 | -14.2 | -55.6 | Pass |
| 9648.0 | -69.7 | -14.2 | -55.5 | Pass |
| 12060.0 | -70.3 | -14.2 | -56.1 | Pass |
| 14472.0 | -66.6 | -14.2 | -52.4 | Pass |
| 16884.0 | -66.8 | -14.2 | -52.6 | Pass |

**Table 5-3: Antenna Conducted Spurious Emissions 2437 MHz; 802.11b (8 dBm peak at 100k RBW)**

| Frequency (MHz) | Level (dBm) | Limit (dBm) | Margin (dB) | Result |
|---|---|---|---|---|
| 4874.0 | -61.3 | -12.0 | -49.3 | Pass |
| 7311.0 | -79.7 | -12.0 | -67.7 | Pass |
| 9748.0 | -75.8 | -12.0 | -63.8 | Pass |
| 12185.0 | -70.7 | -12.0 | -58.7 | Pass |
| 14622.0 | -66.4 | -12.0 | -54.4 | Pass |
| 17059.0 | -66.9 | -12.0 | -54.9 | Pass |

**Table 5-4: Antenna Conducted Spurious Emissions 2462 MHz; 802.11b (5.8 dBm peak at 100k RBW)**

| Frequency (MHz) | Level (dBm) | Limit (dBm) | Margin (dB) | Result |
|---|---|---|---|---|
| 4924.0 | -74.4 | -14.2 | -60.2 | Pass |
| 7386.0 | -79.9 | -14.2 | -65.7 | Pass |
| 9848.0 | -75.8 | -14.2 | -61.6 | Pass |
| 12310.0 | -83.4 | -14.2 | -69.2 | Pass |
| 14772.0 | -79.7 | -14.2 | -65.5 | Pass |
| 17234.0 | -77.4 | -14.2 | -63.2 | Pass |

**Table 5-5: Antenna Conducted Spurious Emissions 2412 MHz; 802.11g (0.7 dBm peak at 100k RBW)**

| Frequency (MHz) | Level (dBm) | Limit (dBm) | Margin (dB) | Result |
|---|---|---|---|---|
| 4824.0 | -66.2 | -19.3 | -46.9 | Pass |
| 7236.0 | -70.0 | -19.3 | -50.7 | Pass |
| 9648.0 | -70.2 | -19.3 | -50.9 | Pass |
| 12060.0 | -70.3 | -19.3 | -51.0 | Pass |
| 14472.0 | -66.3 | -19.3 | -47.0 | Pass |
| 16884.0 | -66.8 | -19.3 | -47.5 | Pass |

**Table 5-6: Antenna Conducted Spurious Emissions 2437 MHz; 802.11g (1.5 dBm peak at 100k RBW)**

| Frequency (MHz) | Level (dBm) | Limit (dBm) | Margin (dB) | Result |
|---|---|---|---|---|
| 4874.0 | -48.5 | -18.5 | -30.0 | Pass |
| 7311.0 | -76.6 | -18.5 | -58.1 | Pass |
| 9748.0 | -69.8 | -18.5 | -51.3 | Pass |
| 12185.0 | -70.8 | -18.5 | -52.3 | Pass |
| 14622.0 | -66.1 | -18.5 | -47.6 | Pass |
| 17059.0 | -67.5 | -18.5 | -49.0 | Pass |

**Table 5-7: Antenna Conducted Spurious Emissions 2462 MHz; 802.11g (1.6 dBm peak at 100k RBW)**

| Frequency (MHz) | Level (dBm) | Limit (dBm) | Margin (dB) | Result |
|---|---|---|---|---|
| 4924.0 | -64.6 | -18.4 | -46.2 | Pass |
| 7386.0 | -74.5 | -18.4 | -56.1 | Pass |
| 9848.0 | -70.5 | -18.4 | -52.1 | Pass |
| 12310.0 | -77.2 | -18.4 | -58.8 | Pass |
| 14772.0 | -73.4 | -18.4 | -55.0 | Pass |
| 17234.0 | -73.7 | -18.4 | -55.3 | Pass |

**Table 5-8: Antenna Conducted Spurious Emissions 2402 MHz; FHSS (0.7 dBm peak at 100k RBW)**

| Frequency (MHz) | Level (dBm) | Limit (dBm) | Margin (dB) | Result |
|---|---|---|---|---|
| 4804.0 | -47.4 | -19.3 | -28.1 | Pass |
| 7206.0 | -55.6 | -19.3 | -36.3 | Pass |
| 9608.0 | -51.6 | -19.3 | -32.3 | Pass |
| 12010.0 | -68.0 | -19.3 | -48.7 | Pass |
| 14412.0 | -57.4 | -19.3 | -38.1 | Pass |
| 16814.0 | -66.4 | -19.3 | -47.1 | Pass |

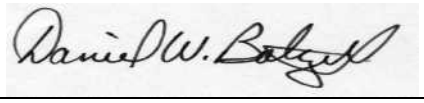
**Table 5-9: Antenna Conducted Spurious Emissions 2441 MHz; FHSS (0.8 dBm peak at 100k RBW)**

| Frequency (MHz) | Level (dBm) | Limit (dBm) | Margin (dB) | Result |
|---|---|---|---|---|
| 4882.0 | -56.9 | -19.2 | -37.7 | Pass |
| 7323.0 | -58.5 | -19.2 | -39.3 | Pass |
| 9764.0 | -53.9 | -19.2 | -34.7 | Pass |
| 12205.0 | -77.2 | -19.2 | -58.0 | Pass |
| 14646.0 | -67.0 | -19.2 | -47.8 | Pass |
| 17087.0 | -77.0 | -19.2 | -57.8 | Pass |

**Table 5-10: Antenna Conducted Spurious Emissions 2480 MHz; FHSS (0.9 dBm peak at 100k RBW)**

| Frequency (MHz) | Level (dBm) | Limit (dBm) | Margin (dB) | Result |
|---|---|---|---|---|
| 4960.0 | -62.3 | -19.1 | -43.2 | Pass |
| 7440.0 | -63.4 | -19.1 | -44.3 | Pass |
| 9920.0 | -61.7 | -19.1 | -42.6 | Pass |
| 12400.0 | -75.3 | -19.1 | -56.2 | Pass |
| 14880.0 | -70.1 | -19.1 | -51.0 | Pass |
| 17360.0 | -76.7 | -19.1 | -57.6 | Pass |

**Test Personnel:**



| Daniel W. Baltzell | | May 12, 2006 |
|---|---|---|
| EMC Test Engineer | Signature | Date Of Test |

# 6 6 dB Bandwidth - §15.247(a)(2); RSS-210 §A8.2

## 6.1 6 dB Bandwidth Test Procedure – Minimum 6 dB Bandwidth

The minimum 6 dB bandwidths per FCC 15.247(a)(2) were measured using a 50-ohm spectrum analyzer with the resolution bandwidth set at 100 kHz, and the video bandwidth set at 1 MHz. The device was modulated. The minimum 6 dB bandwidths are presented below.

**Table 6-1: 6 dB Bandwidth Test Equipment**

| RTL Asset # | Manufacturer | Model | Part Type | Serial Number | Calibration Due Date |
|---|---|---|---|---|---|
| 900931 | Hewlett Packard | 8566B | Spectrum Analyzer (100 Hz - 22 GHz) | 3138A07771 | 8/3/06 |
| 901215 | Hewlett Packard | 8596EM | Spectrum Analyzer (9 kHz - 12.8 GHz) | 3826A00144 | 9/22/06 |

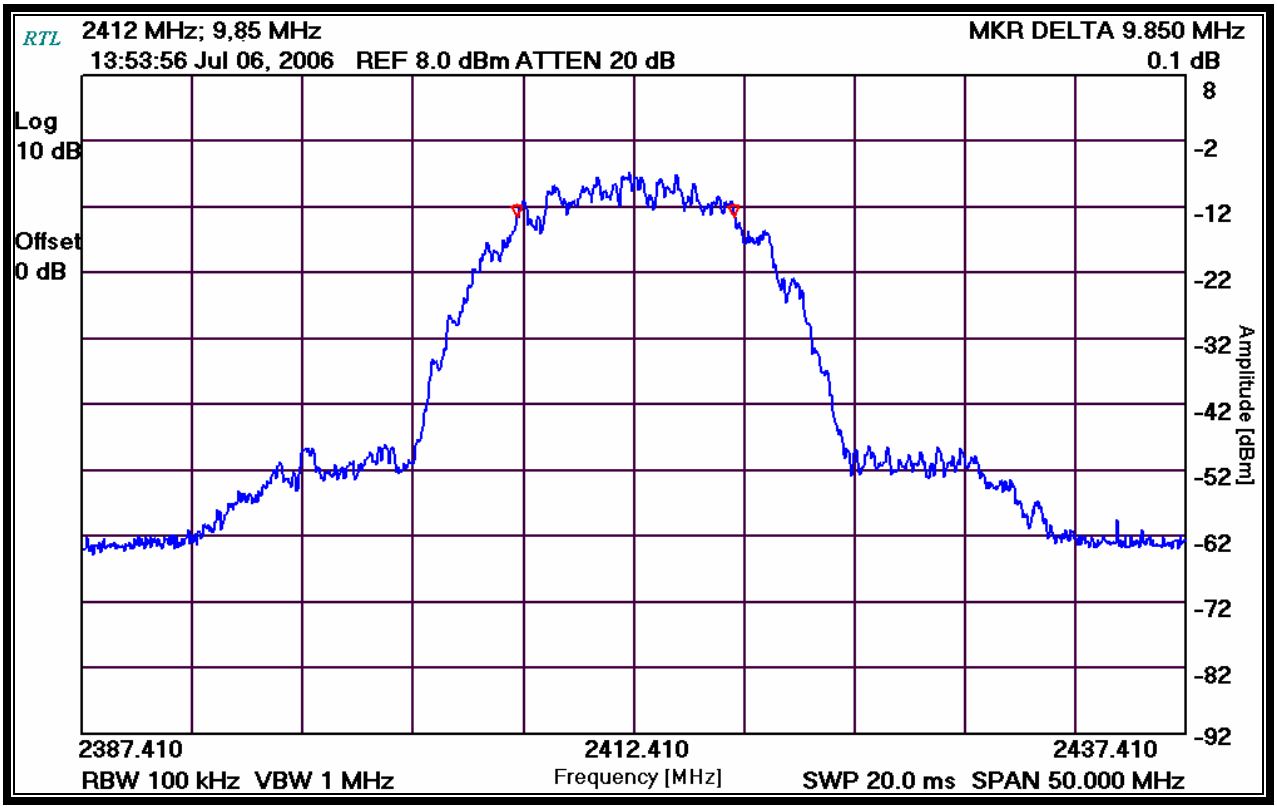
## 6.2 6 db Bandwidth Test Results

**Table 6-2: 6 db Bandwidth Test Data 802.11b**

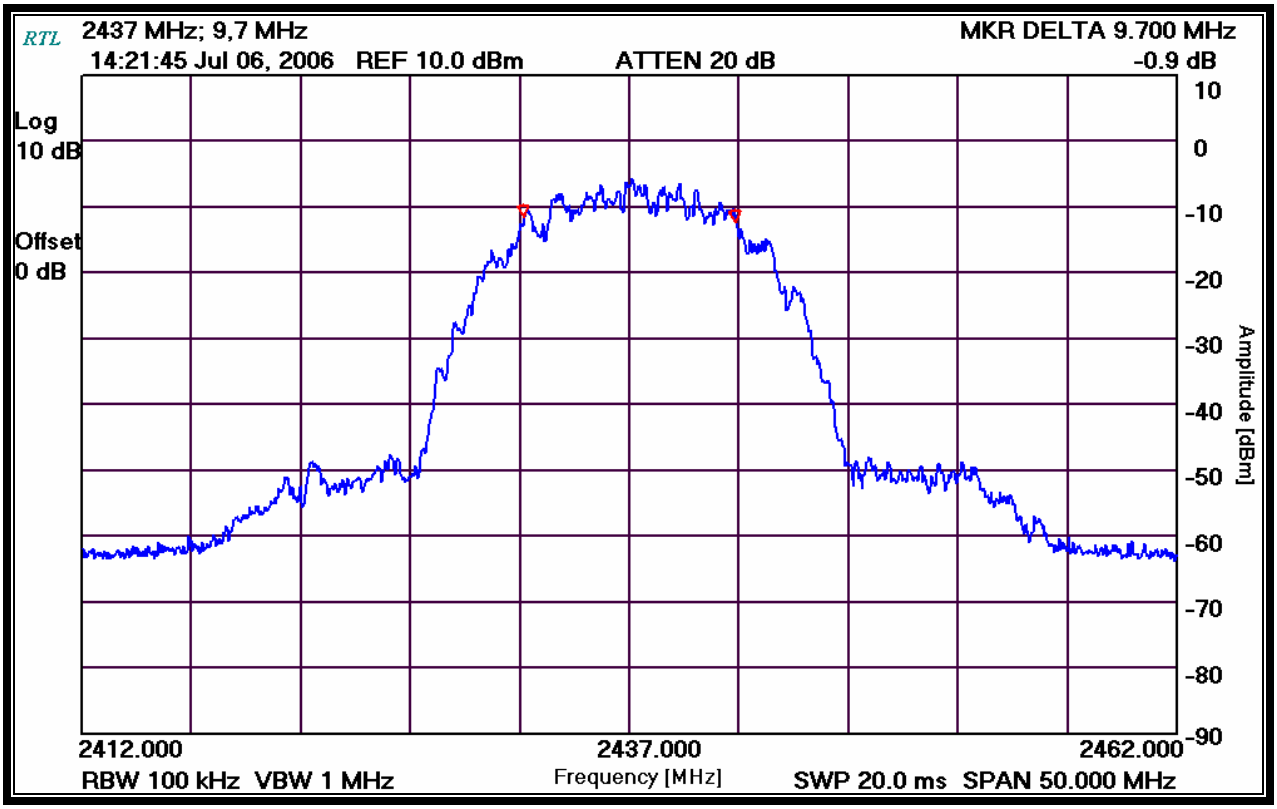
| Channel | Frequency (MHz) | 6 dB Bandwidth (MHz) | Minimum Limit (MHz) | Pass/Fail |
|---|---|---|---|---|
| 1 | 2412 | 9.85 | 0.5 | Pass |
| 6 | 2437 | 9.70 | 0.5 | Pass |
| 11 | 2462 | 9.75 | 0.5 | Pass |

**Table 6-3: 6 db Bandwidth Test Data 802.11g**

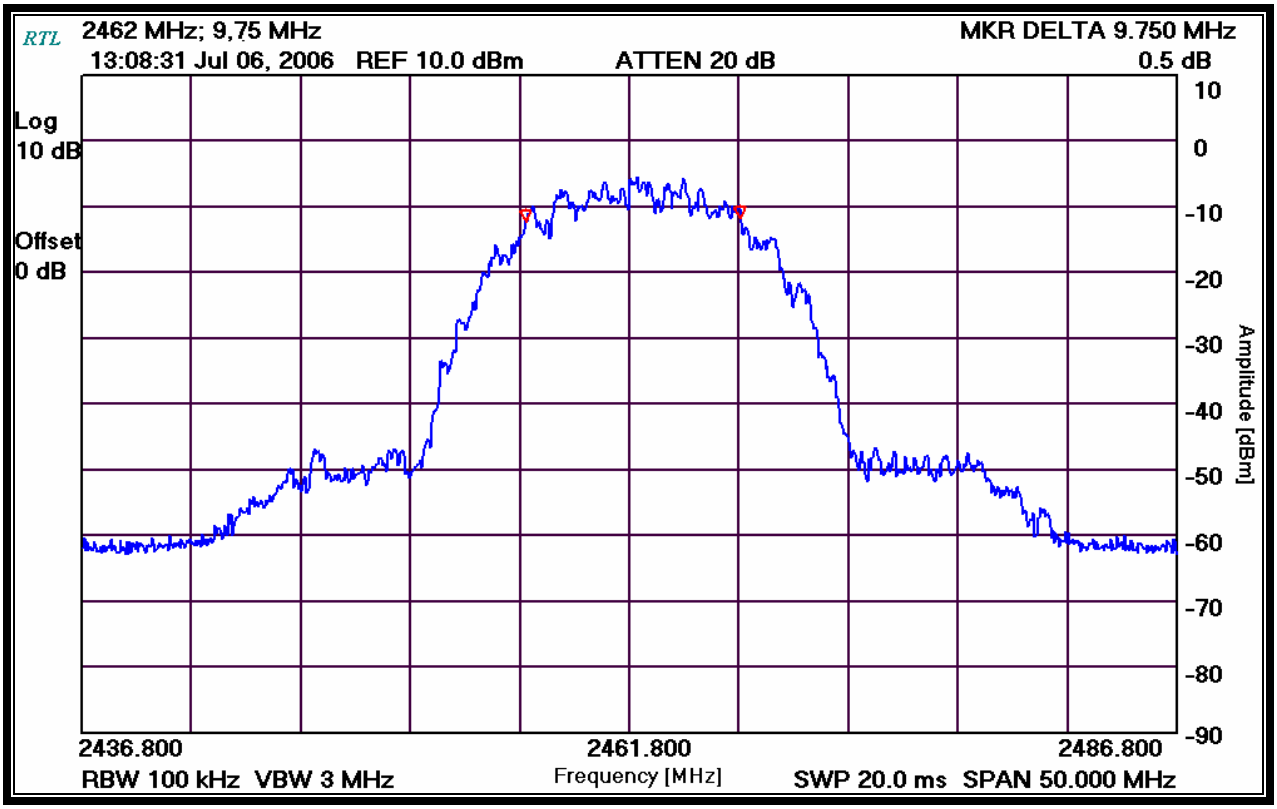
| Channel | Frequency (MHz) | 6 dB Bandwidth (MHz) | Minimum Limit (MHz) | Pass/Fail |
|---|---|---|---|---|
| 1 | 2412 | 16.65 | 0.5 | Pass |
| 6 | 2437 | 16.65 | 0.5 | Pass |
| 11 | 2462 | 16.50 | 0.5 | Pass |



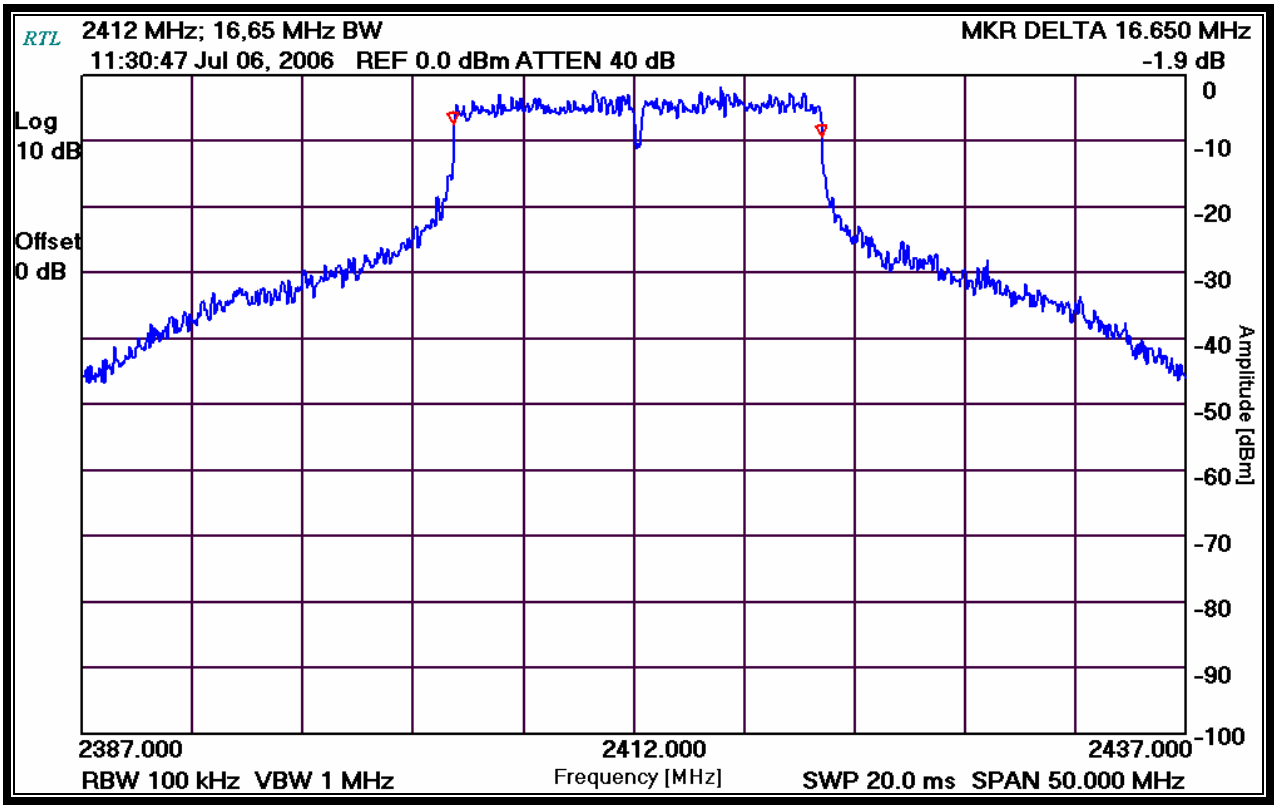

**Plot 6-1: 6 dB Bandwidth Channel 1 (TX Frequency: 2412 MHz); 802.11b**



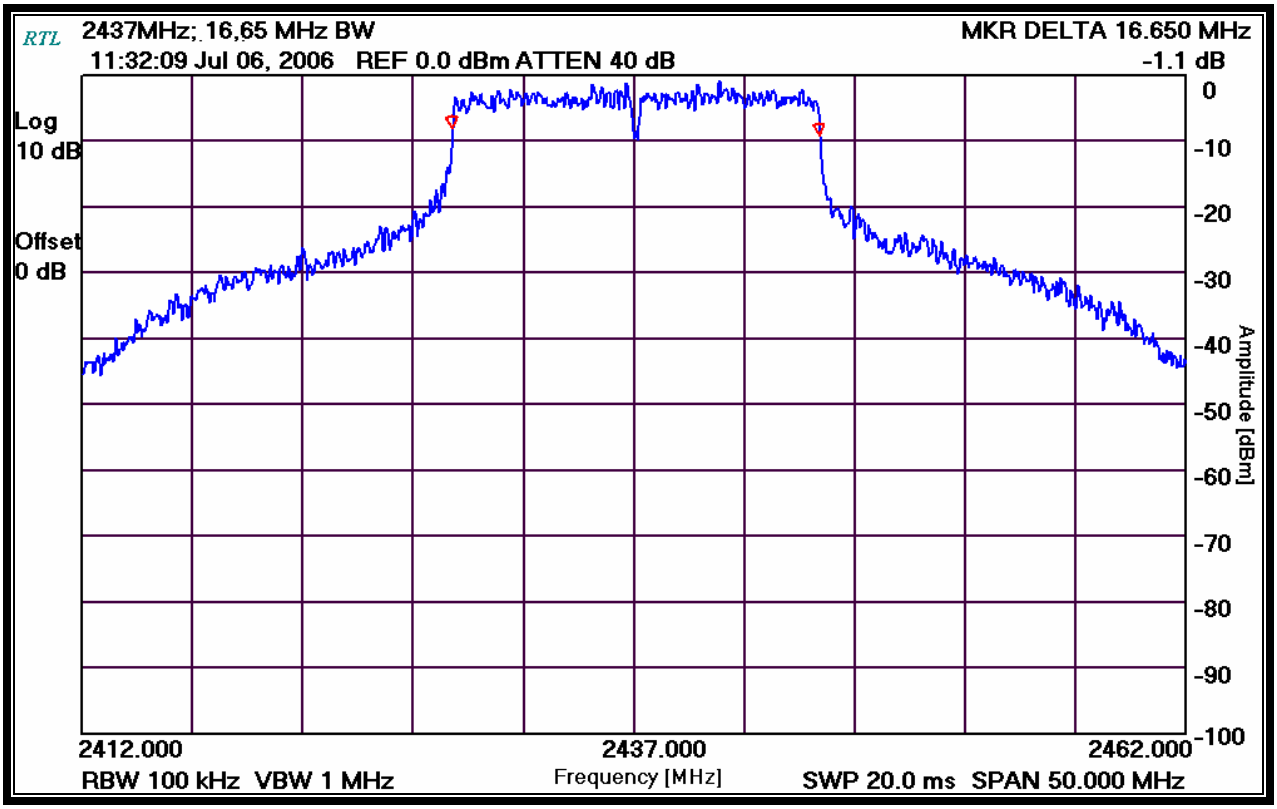

**Plot 6-2: 6 dB Bandwidth Channel 6 (TX Frequency: 2437 MHz); 802.11b**



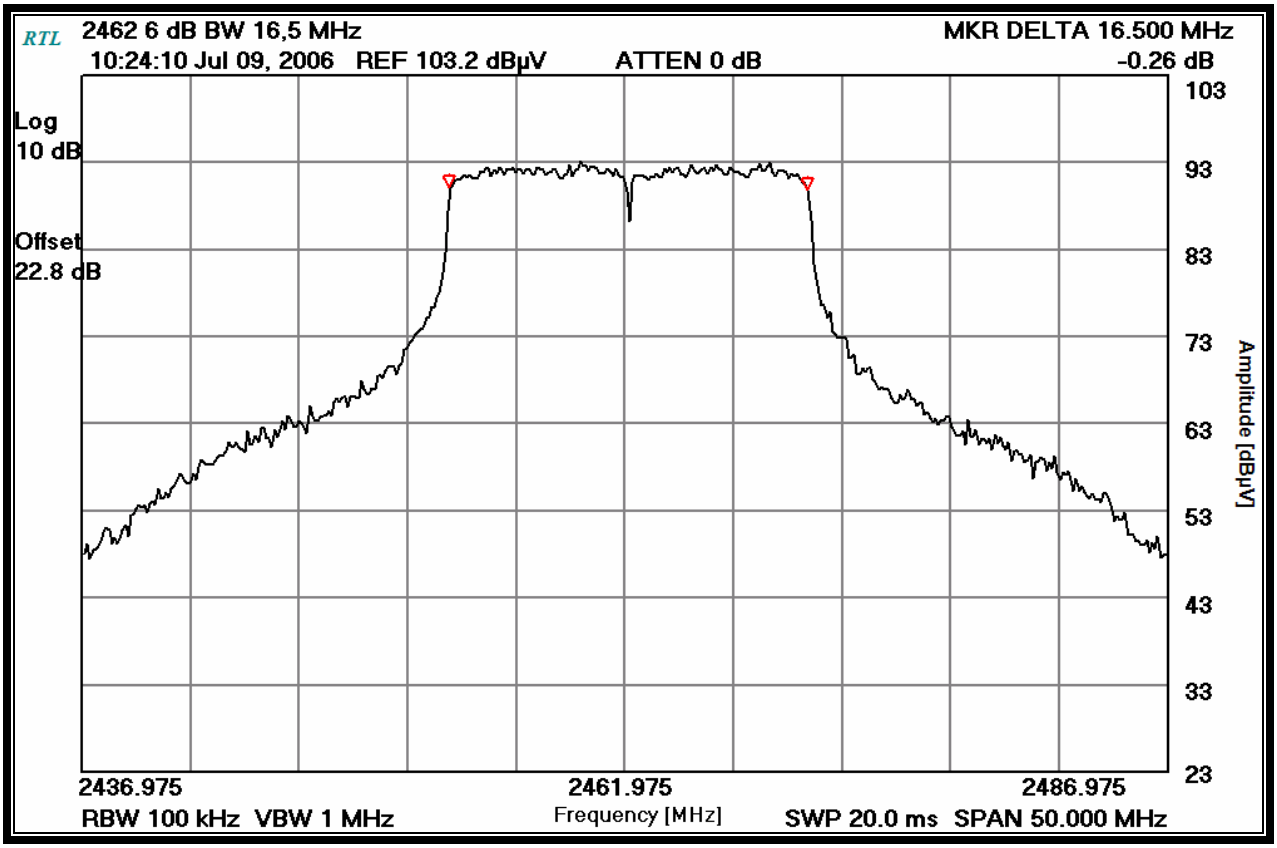

**Plot 6-3: 6 dB Bandwidth Channel 11 (TX Frequency: 2462 MHz); 802.11b**




**Plot 6-4: 6 dB Bandwidth Channel 1 (TX Frequency: 2412 MHz); 802.11g**

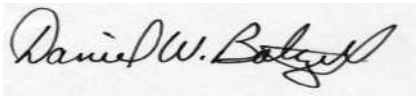



**Plot 6-5: 6 dB Bandwidth Channel 6 (TX Frequency: 2437 MHz); 802.11g**




**Plot 6-6: 6 dB Bandwidth Channel 11 (TX Frequency: 2462 MHz); 802.11g**

**Test Personnel:**

| Daniel W. Baltzell |  | July 6 and 9, 2006 |
|---|---|---|
| EMC Test Engineer | Signature | Dates Of Test |

# 7 Power Spectral Density - §15.247(e); RSS-210 §A8.2

## 7.1 Power Spectral Density Test Procedure

The power spectral density per FCC 15.247(d) was measured using a 50-ohm spectrum analyzer with the resolution bandwidth set at 3 kHz, the video bandwidth set at 30 kHz, and the sweep time set at 500 seconds. The spectral lines were resolved for the modulated carriers at 2.412 GHz, 2.437 GHz, and 2.462 GHz respectively. These levels are below the +8 dBm limit. See the power spectral density table and plots.

**Table 7-1: Power Spectral Density Test Equipment**

| RTL Asset # | Manufacturer | Model | Part Type | Serial Number | Calibration Due Date |
|---|---|---|---|---|---|
| 900931 | Hewlett Packard | 8566B | Spectrum Analyzer (100 Hz - 22 GHz) | 3138A07771 | 8/3/06 |

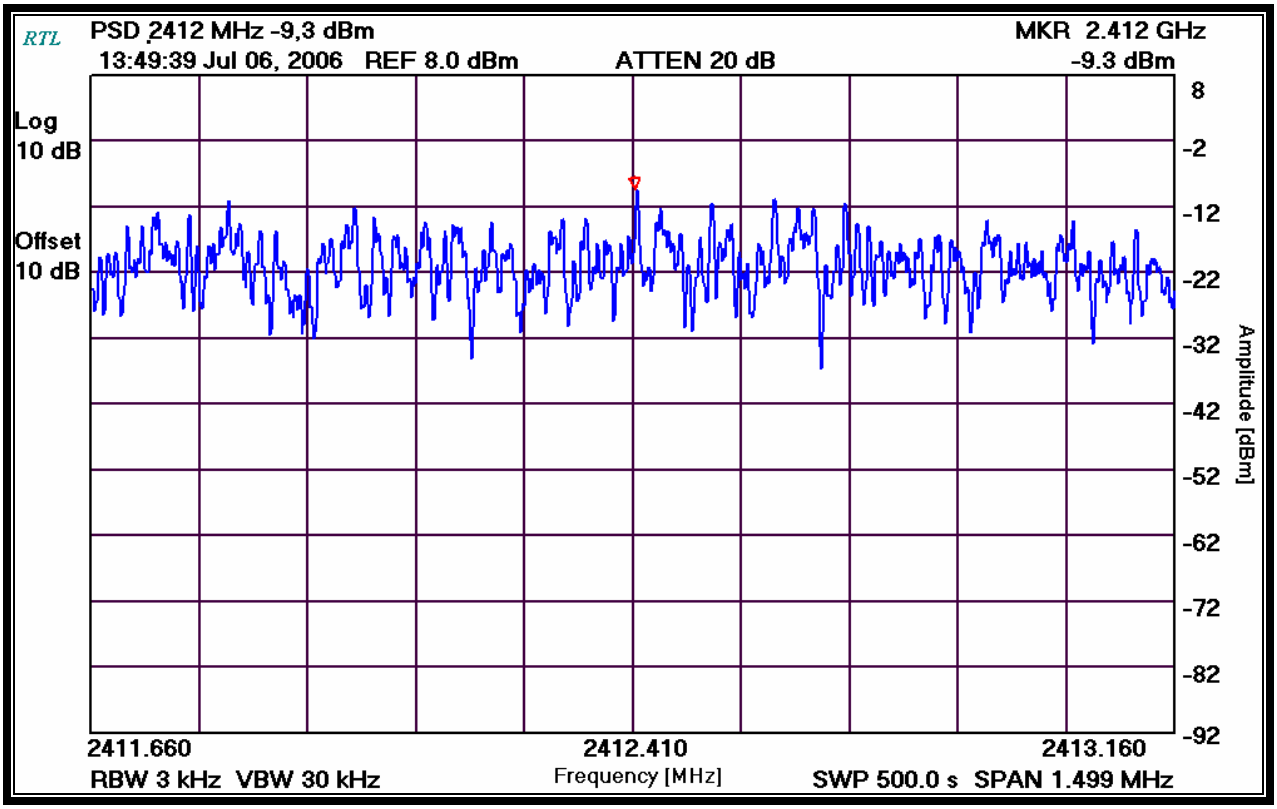
## 7.2 Power Spectral Density Test Data

**Table 7-2: Power Spectral Density Test Data; 802.11b**

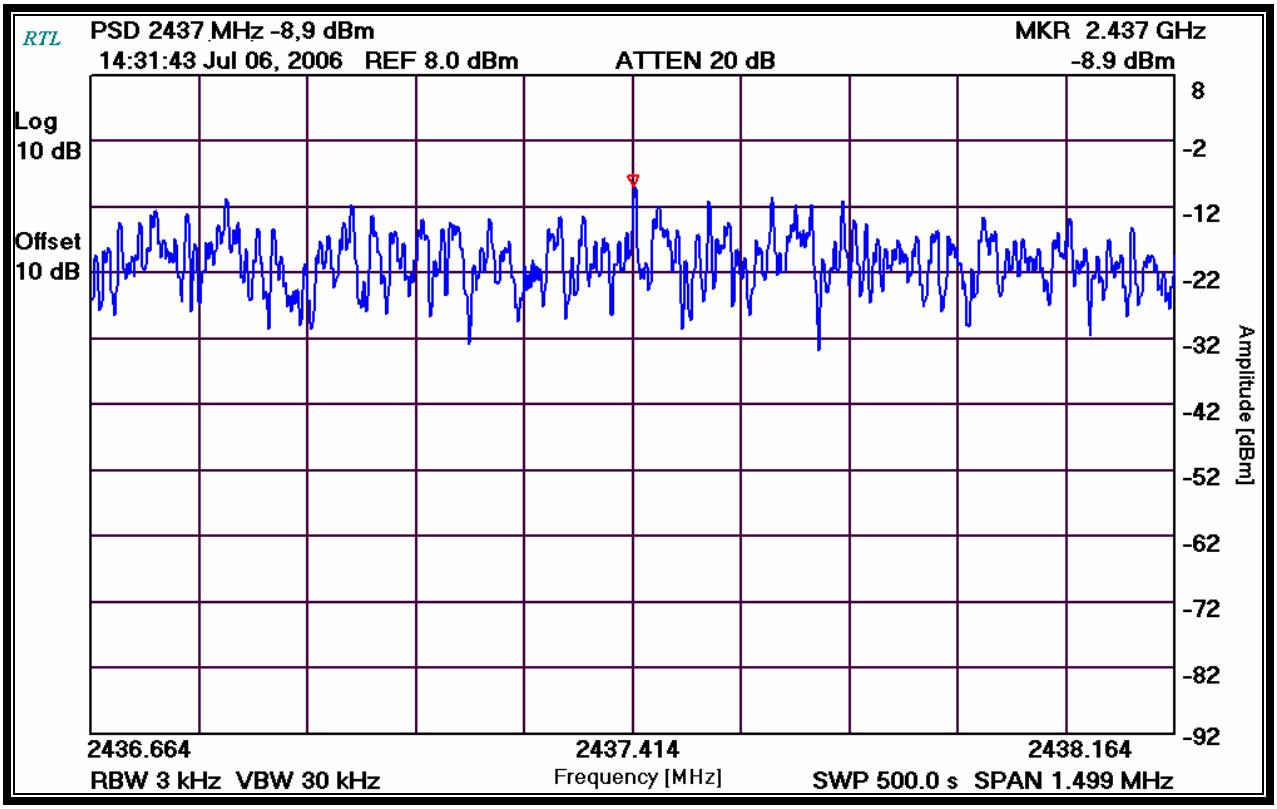
| Channel | Frequency (MHz) | RF Power Level (dBm) | Maximum Limit +8dBm | Pass/Fail |
|---|---|---|---|---|
| 1 | 2412 | -9.3 | 8 | Pass |
| 6 | 2437 | -8.9 | 8 | Pass |
| 11 | 2462 | -8.0 | 8 | Pass |

**Table 7-3: Power Spectral Density Test Data; 802.11g**

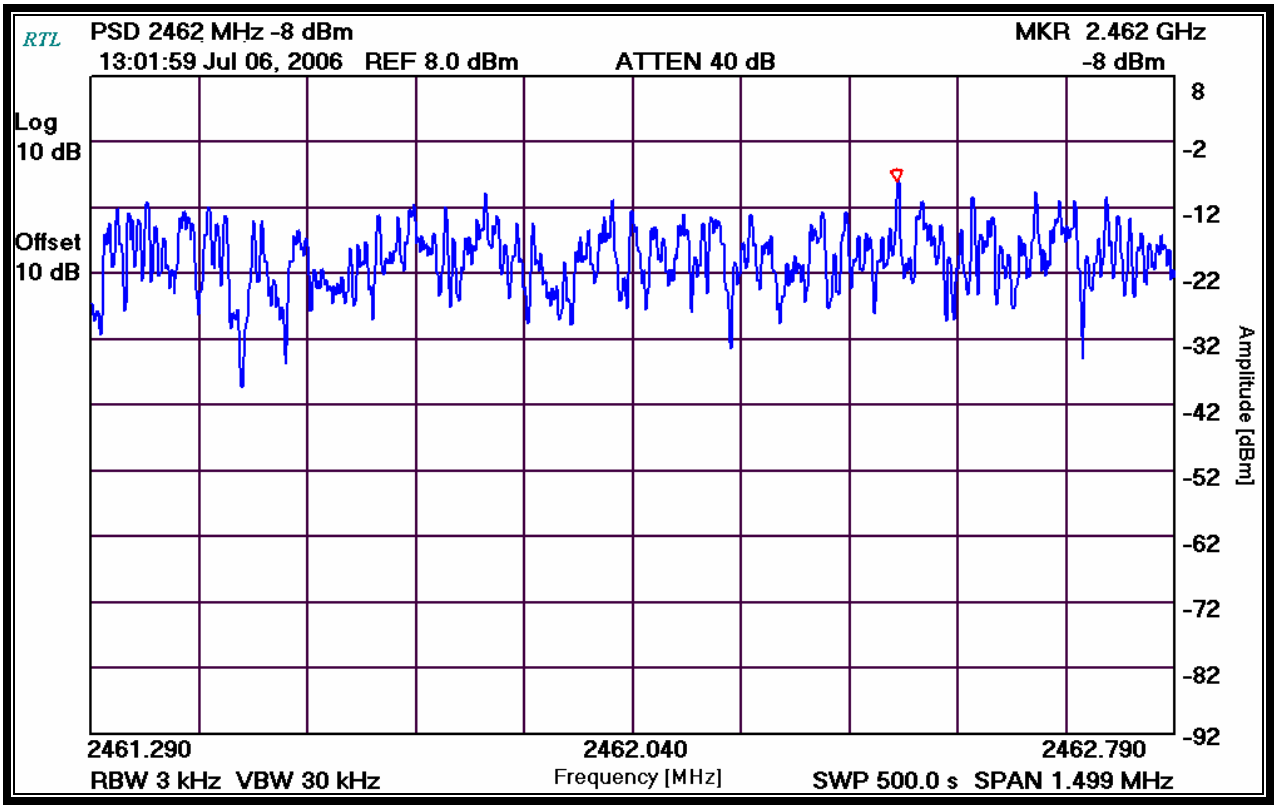
| Channel | Frequency (MHz) | RF Power Level (dBm) | Maximum Limit +8dBm | Pass/Fail |
|---|---|---|---|---|
| 1 | 2412 | -14.5 | 8 | Pass |
| 6 | 2437 | -14.3 | 8 | Pass |
| 11 | 2462 | -12.2 | 8 | Pass |



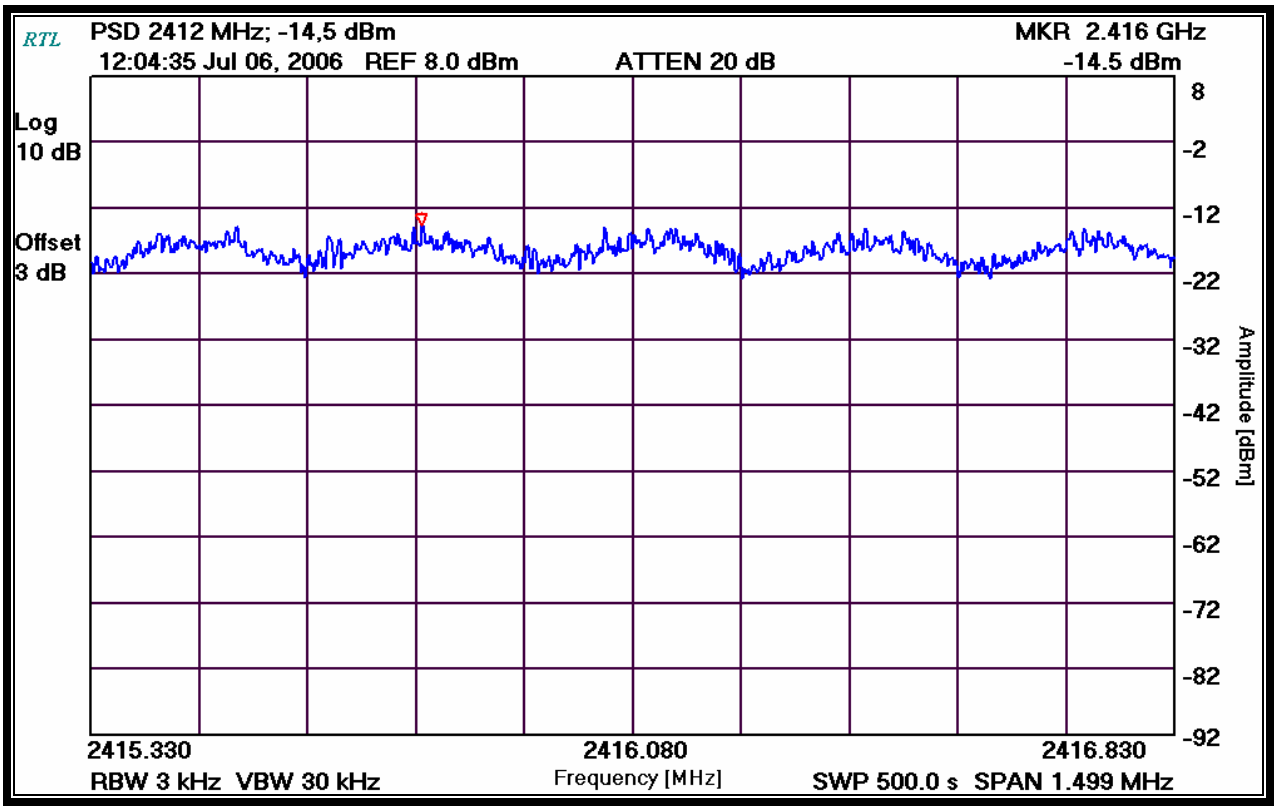

**Plot 7-1: Power Spectral Density: Channel 1 (2412 MHz); 802.11b**



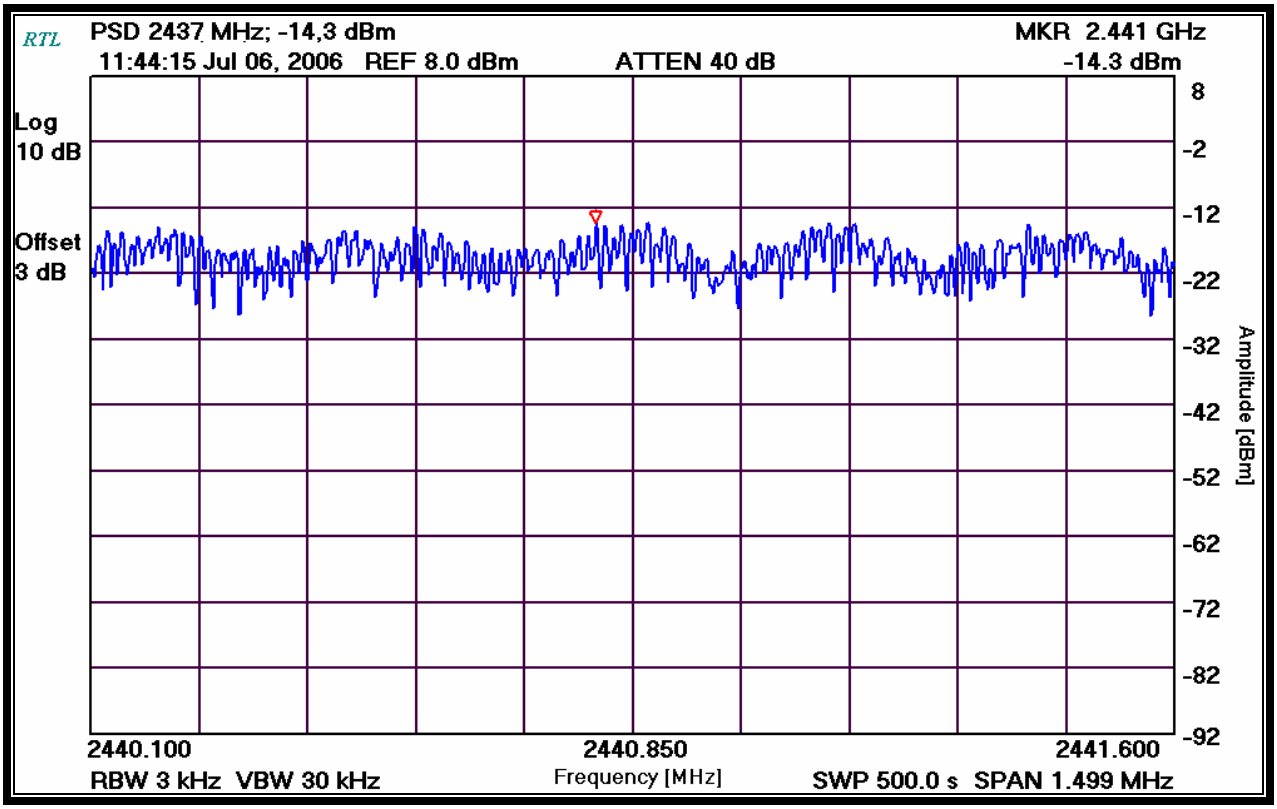

**Plot 7-2: Power Spectral Density: Channel 6 (2437 MHz); 802.11b**



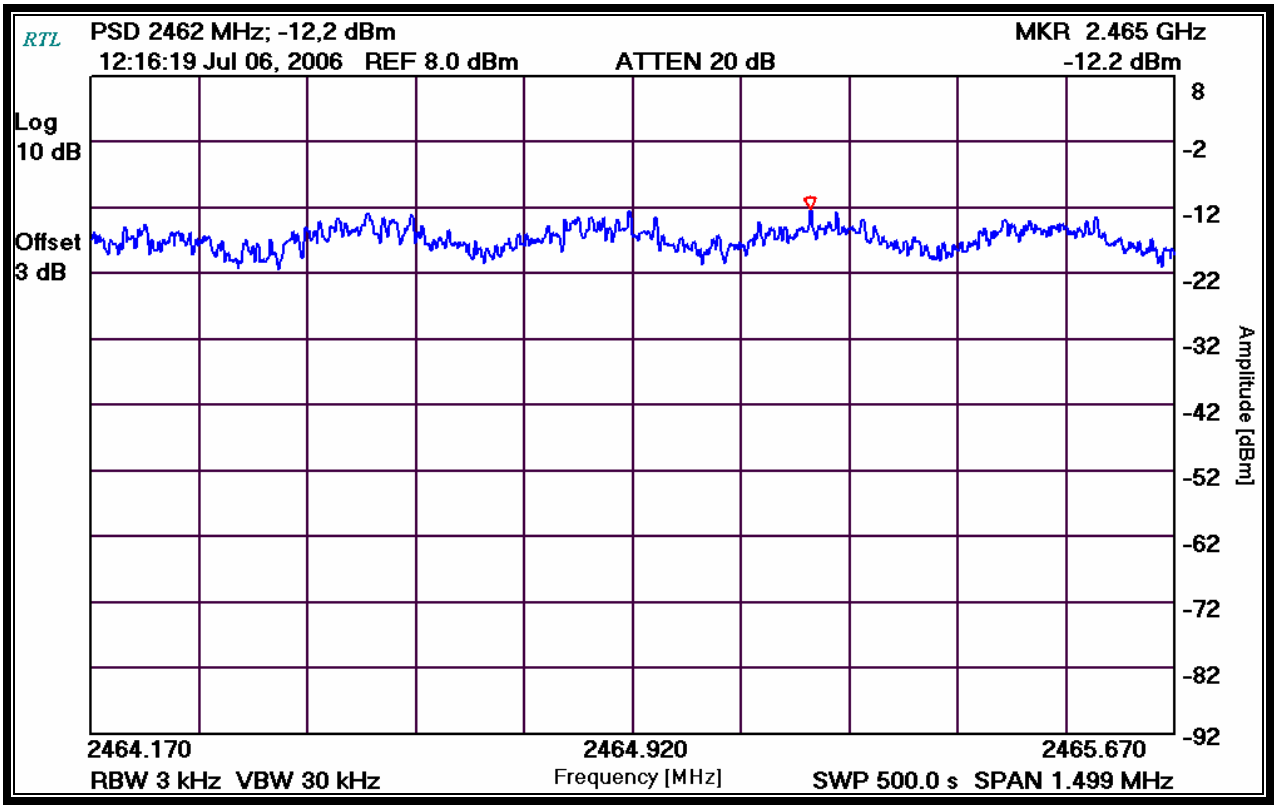

**Plot 7-3: Power Spectral Density: Channel 11 (2462 MHz); 802.11b**




**Plot 7-4: Power Spectral Density: Channel 1 (2412 MHz); 802.11g**

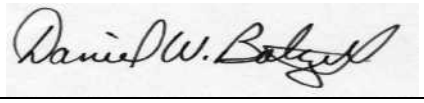



**Plot 7-5: Power Spectral Density: Channel 6 (2437 MHz); 802.11g**




**Plot 7-6: Power Spectral Density: Channel 11 (2462 MHz); 802.11g**

**Test Personnel:**

| Daniel W. Baltzell |  | July 6, 2006 |
|---|---|---|
| EMC Test Engineer | Signature | Date Of Test |

# 8 20 dB Bandwidth – FCC §15.247(a)(1)(ii); IC RSS-210 A8.1(1)

## 8.1 20 dB Bandwidth Test Procedure

The minimum 20 dB bandwidths were measured using a 50-ohm spectrum analyzer. The carrier was adjusted on the analyzer so that it was displayed entirely on the spectrum analyzer. The sweep time was set to auto with the max hold function used in peak detector mode. The resolution bandwidth was set to 100 kHz, and the video bandwidth set at 1 MHz. The minimum 20 dB bandwidths were measured using the spectrum analyzer delta marker set 20 dB down from the peak of the carrier and modulated. The table below contains the bandwidth measurement results.

**Table 8-1: 20 dB Bandwidth Test Equipment**

| RTL Asset # | Manufacturer | Model | Part Type | Serial Number | Calibration Due Date |
|---|---|---|---|---|---|
| 900931 | Hewlett Packard | 8566B | Spectrum Analyzer (100 Hz - 22 GHz) | 3138A07771 | 8/3/06 |
| 901215 | Hewlett Packard | 8596EM | Spectrum Analyzer (9 kHz - 12.8 GHz) | 3826A00144 | 9/22/06 |

## 8.2 20 dB Modulated Bandwidth Test Data

**Table 8-2: 20 db Bandwidth Test Data 802.11b**

| Frequency (MHz) | Channel | 20 dB Bandwidth (MHz) |
|---|---|---|
| 2412 | 1 | 15.3 |
| 2437 | 6 | 15.5 |
| 2462 | 11 | 15.5 |

**Table 8-3: 20 db Bandwidth Test Data 802.11g**

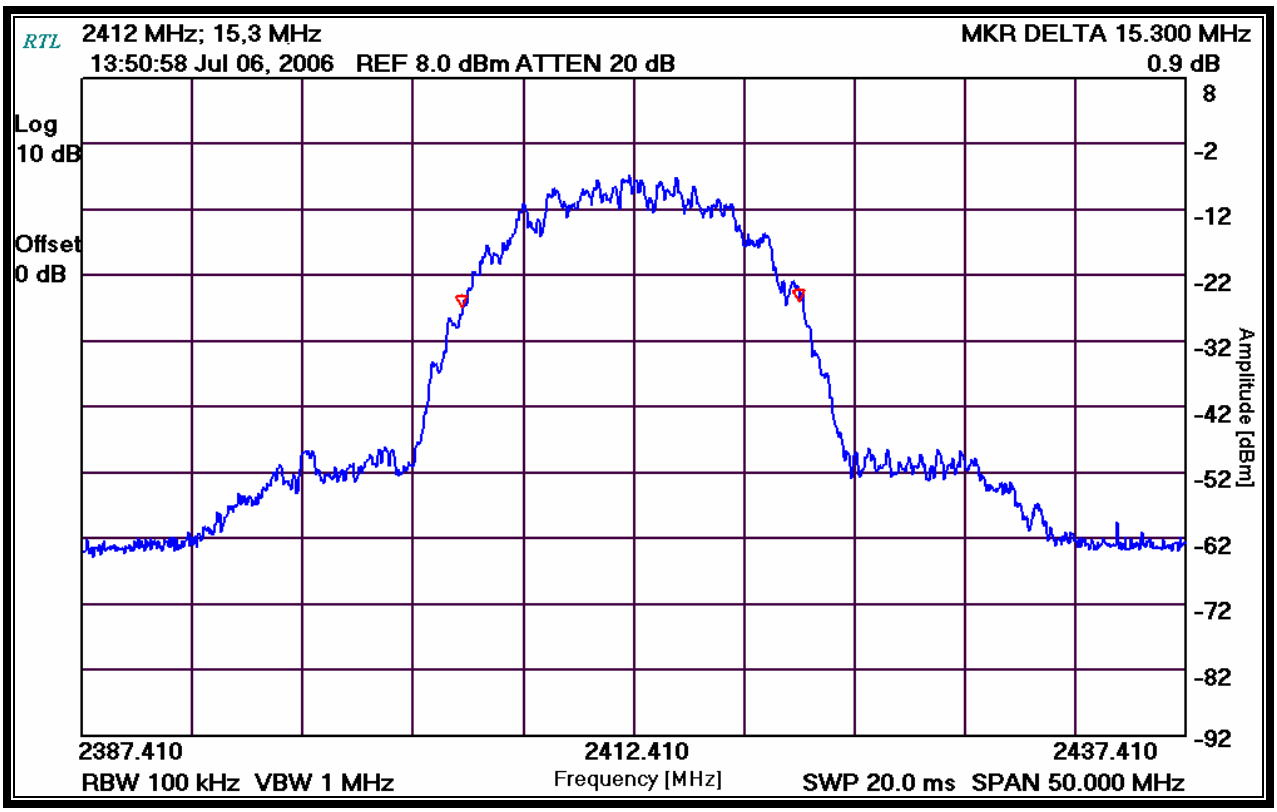
| Frequency (MHz) | Channel | 20 dB Bandwidth (MHz) |
|---|---|---|
| 2412 | 1 | 18.25 |
| 2437 | 6 | 19.85 |
| 2462 | 11 | 19.38 |

**Table 8-4: 20 dB Modulated Bandwidth Test Data FHSS**

| Frequency (MHz) | Channel | 20 dB Bandwidth (MHz) |
|---|---|---|
| 2402 | 1 | 1.105 |
| 2441 | 41 | 1.103 |
| 2480 | 80 | 1.115 |

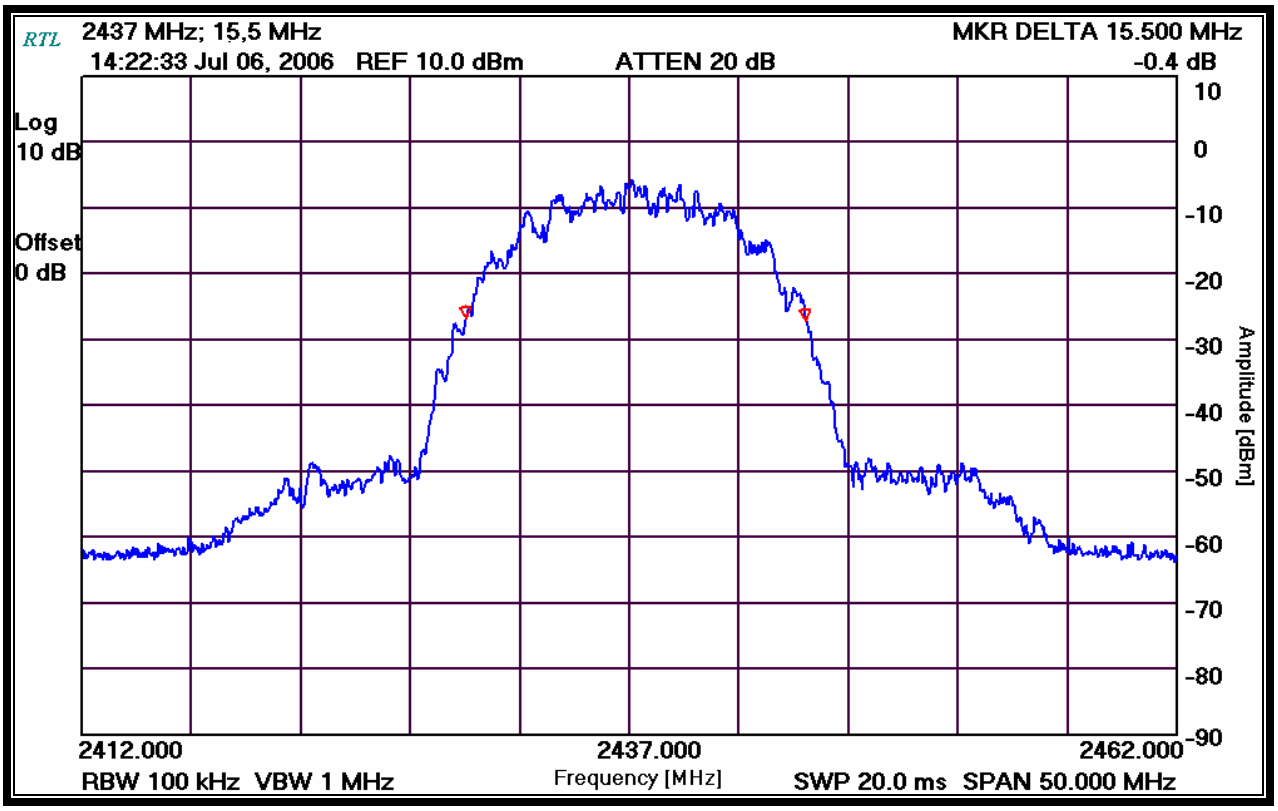
## 8.3 20 dB Bandwidth Plots - 802.11b

| | |
|---|---|
| **Channel:** | 1 |
| **Channel Frequency (MHz):** | 2412 |
| **Resolution Bandwidth (kHz):** | 100 |
| **Video Bandwidth (MHz):** | 1 |



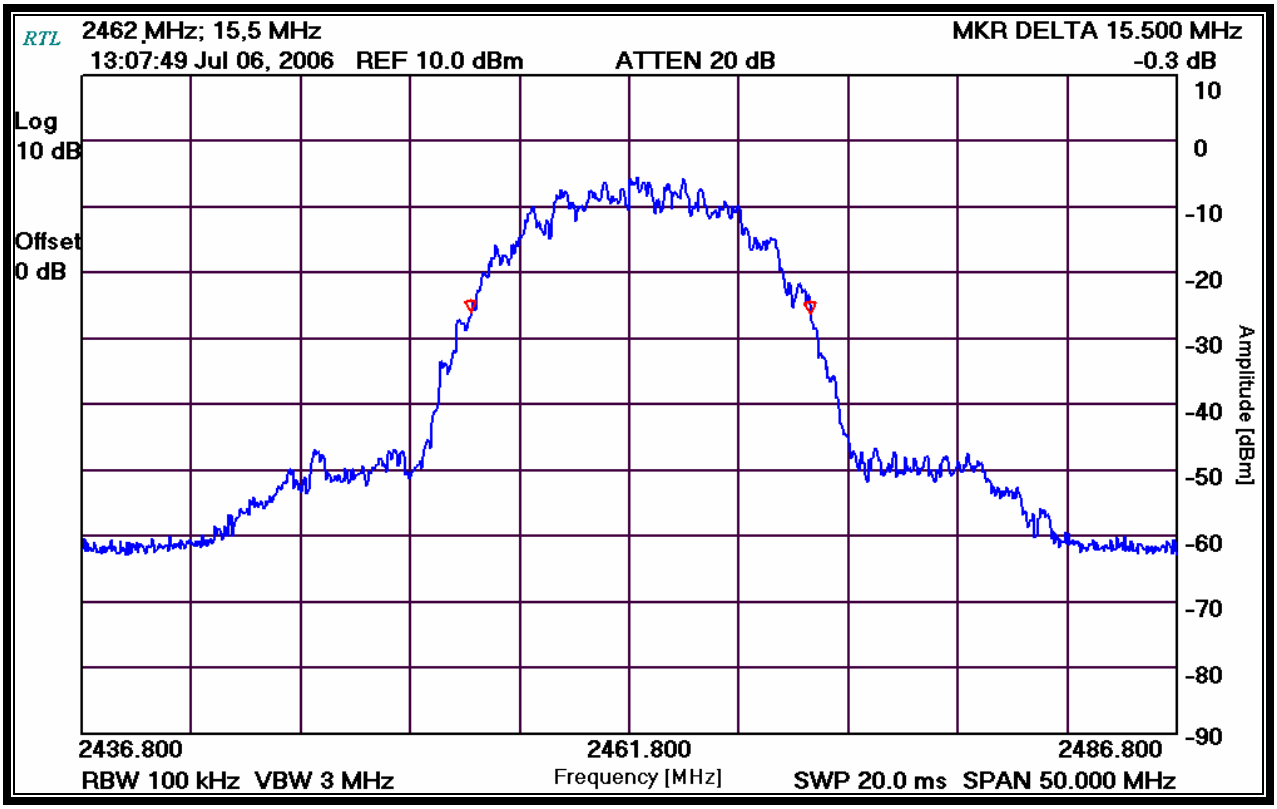

**Plot 8-1: 20 dB Bandwidth Channel 1; 802.11b**

| | |
|---|---|
| **Channel:** | 6 |
| **Channel Frequency (MHz):** | 2437 |
| **Resolution Bandwidth (kHz):** | 100 |
| **Video Bandwidth (MHz):** | 1 |




**Plot 8-2: 20 dB Bandwidth Channel 6; 802.11b**

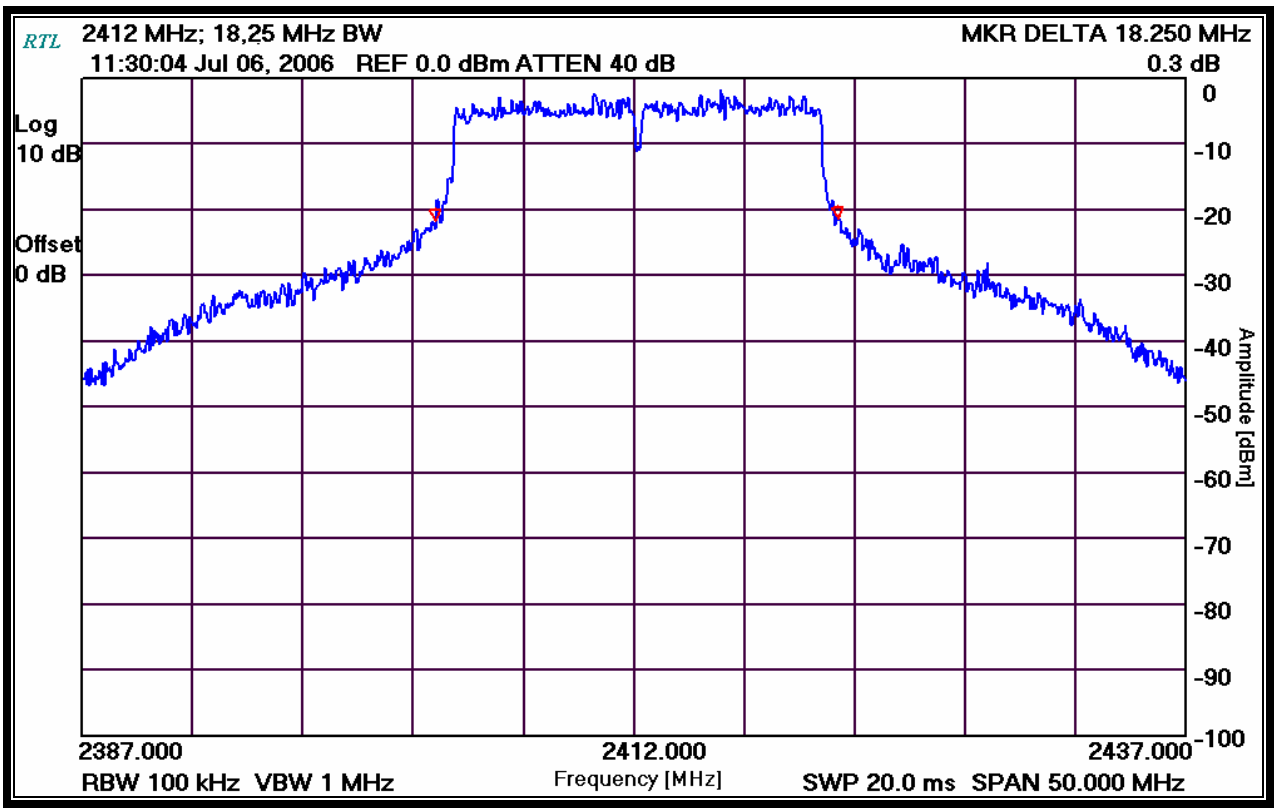
| | |
|---|---|
| **Channel:** | 11 |
| **Channel Frequency (MHz):** | 2462 |
| **Resolution Bandwidth (kHz):** | 100 |
| **Video Bandwidth (MHz):** | 3 |




**Plot 8-3: 20 dB Bandwidth Channel 11; 802.11b**

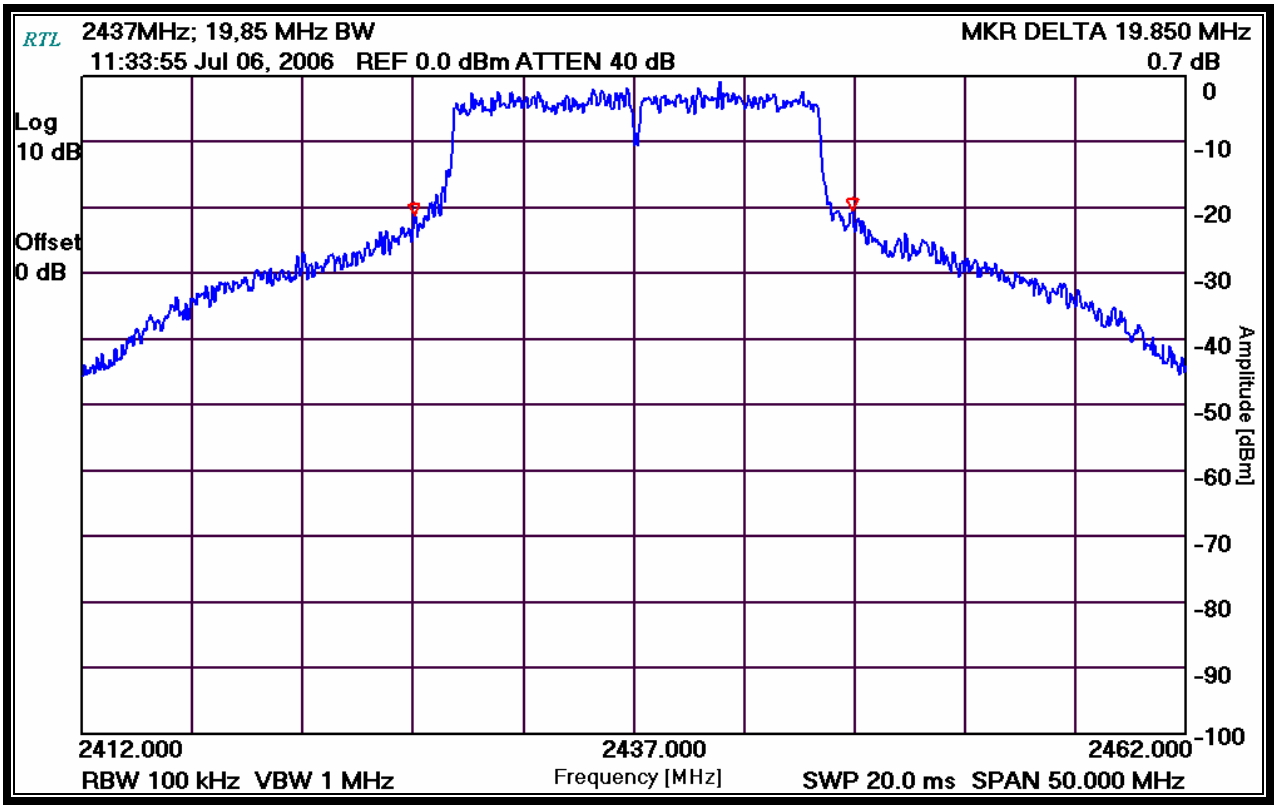
## 8.4 20 dB Bandwidth Plots - 802.11g

| | |
|---|---|
| **Channel:** | 1 |
| **Channel Frequency (MHz):** | 2412 |
| **Resolution Bandwidth (kHz):** | 100 |
| **Video Bandwidth (MHz):** | 1 |



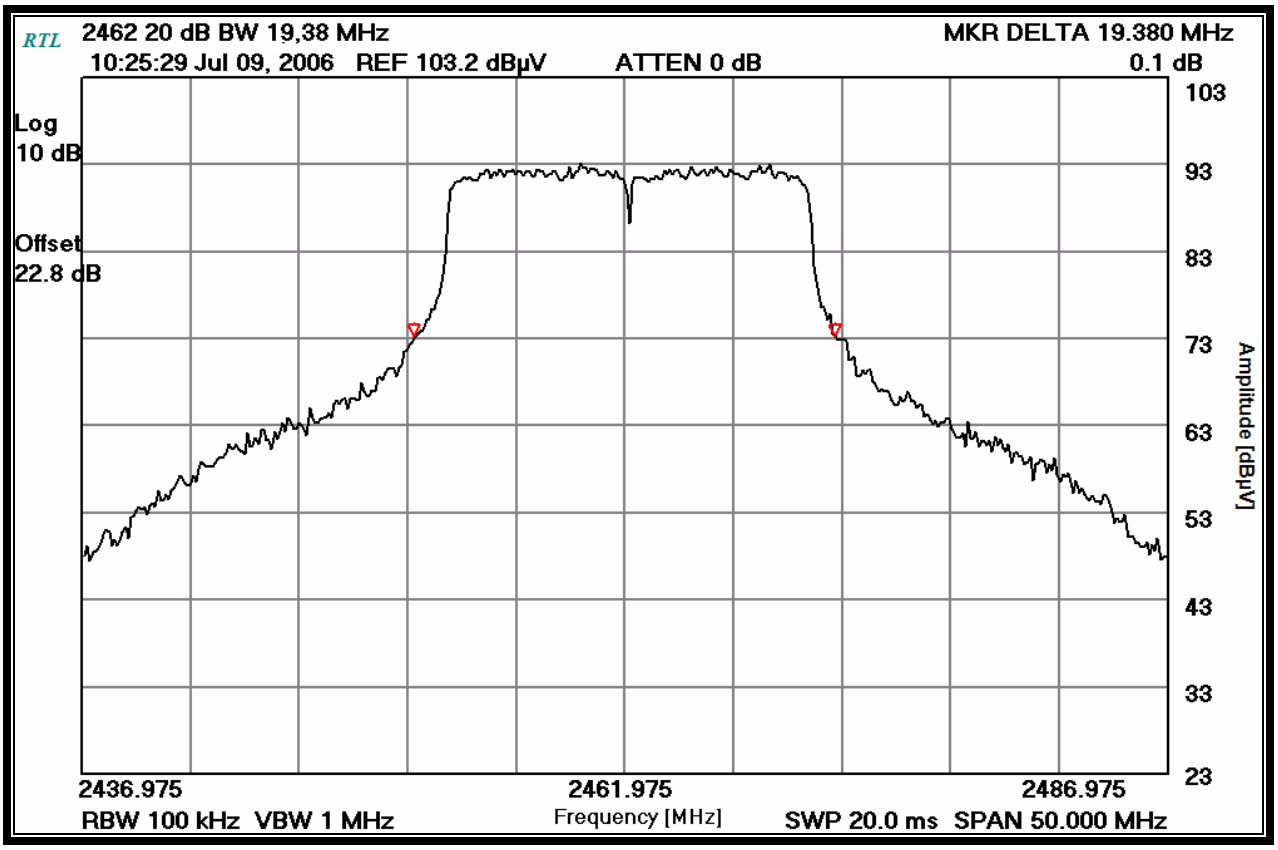

**Plot 8-4: 20 dB Bandwidth Channel 1; 802.11g**

| | |
|---|---|
| **Channel:** | 6 |
| **Channel Frequency (MHz):** | 2437 |
| **Resolution Bandwidth (kHz):** | 100 |
| **Video Bandwidth (MHz):** | 1 |




**Plot 8-5: 20 dB Bandwidth Channel 6; 802.11g**

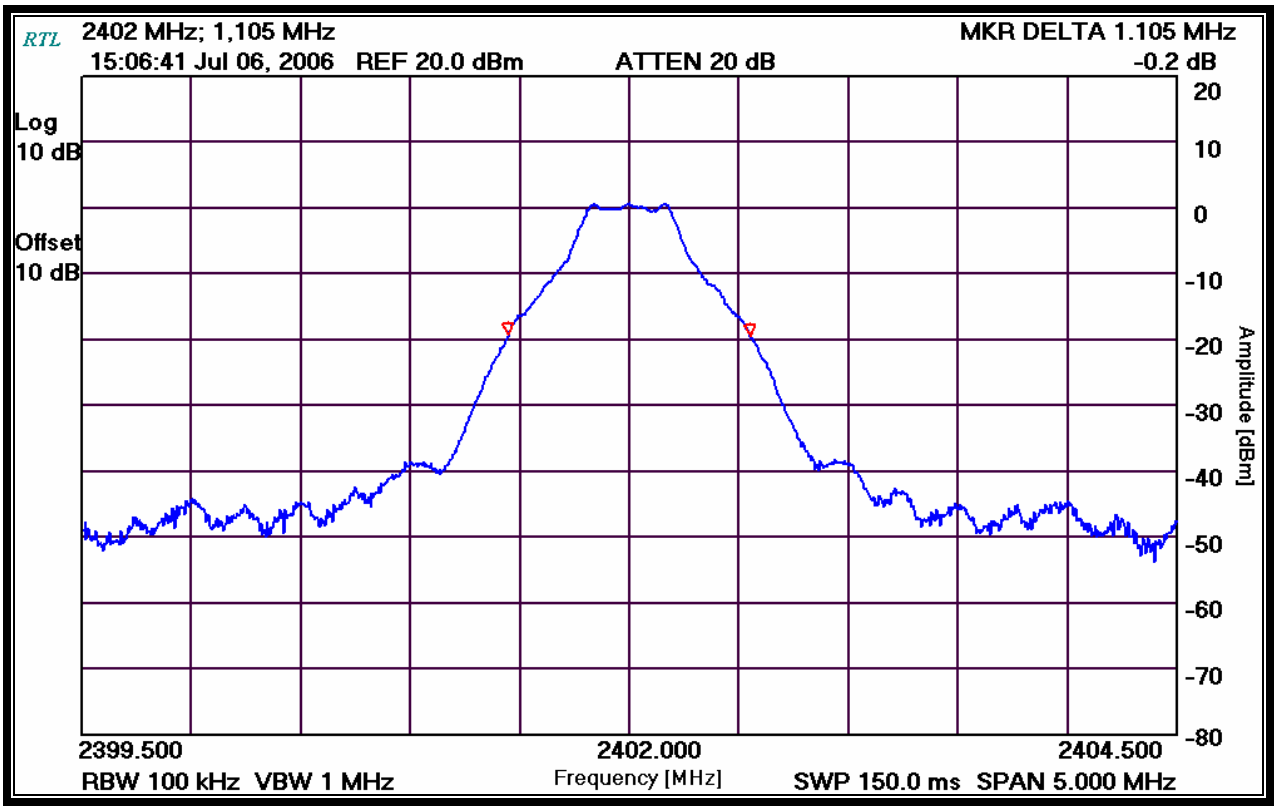
| | |
|---|---|
| **Channel:** | 11 |
| **Channel Frequency (MHz):** | 2462 |
| **Resolution Bandwidth (kHz):** | 100 |
| **Video Bandwidth (MHz):** | 1 |




**Plot 8-6: 20 dB Bandwidth Channel 11; 802.11g**

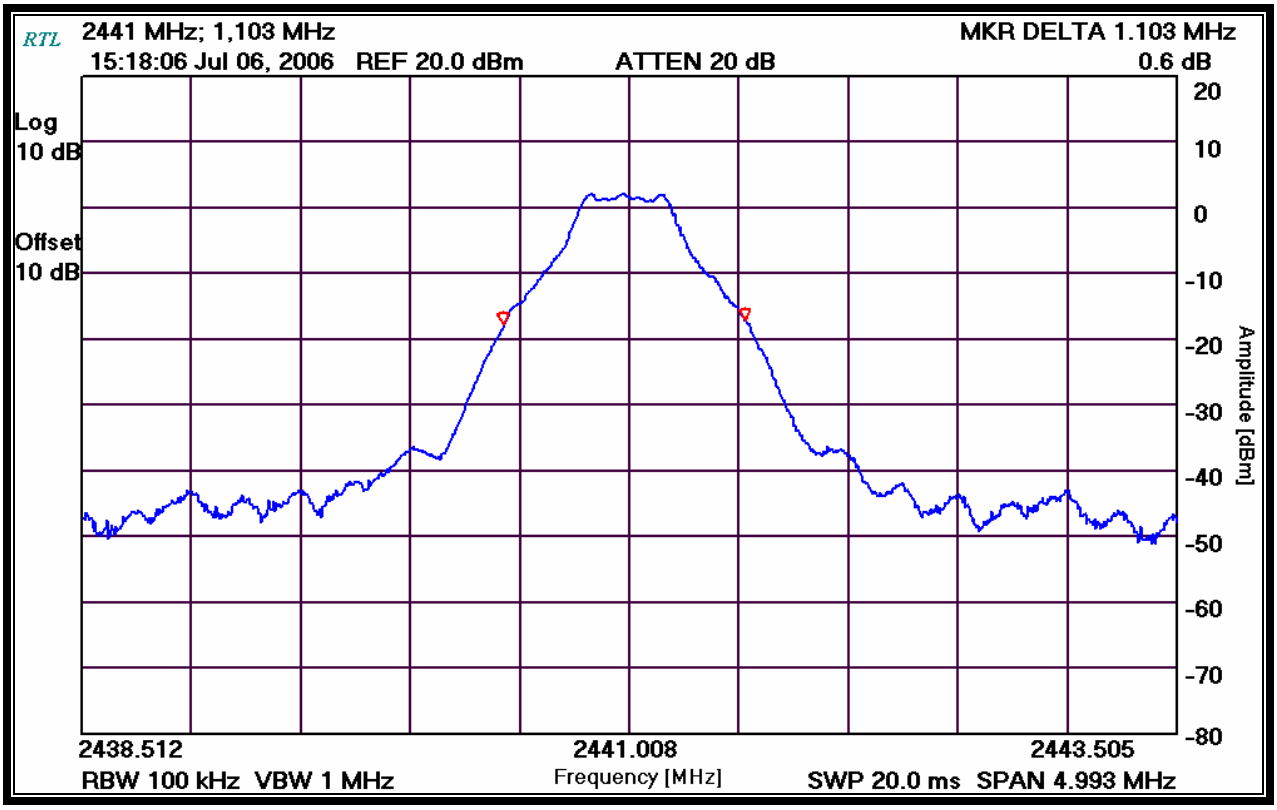
## 8.5 20 dB Bandwidth Plots - FHSS

| | |
|---|---|
| **Channel:** | 2 |
| **Channel Frequency (MHz):** | 2402 |
| **Resolution Bandwidth (kHz):** | 100 |
| **Video Bandwidth (MHz):** | 1 |



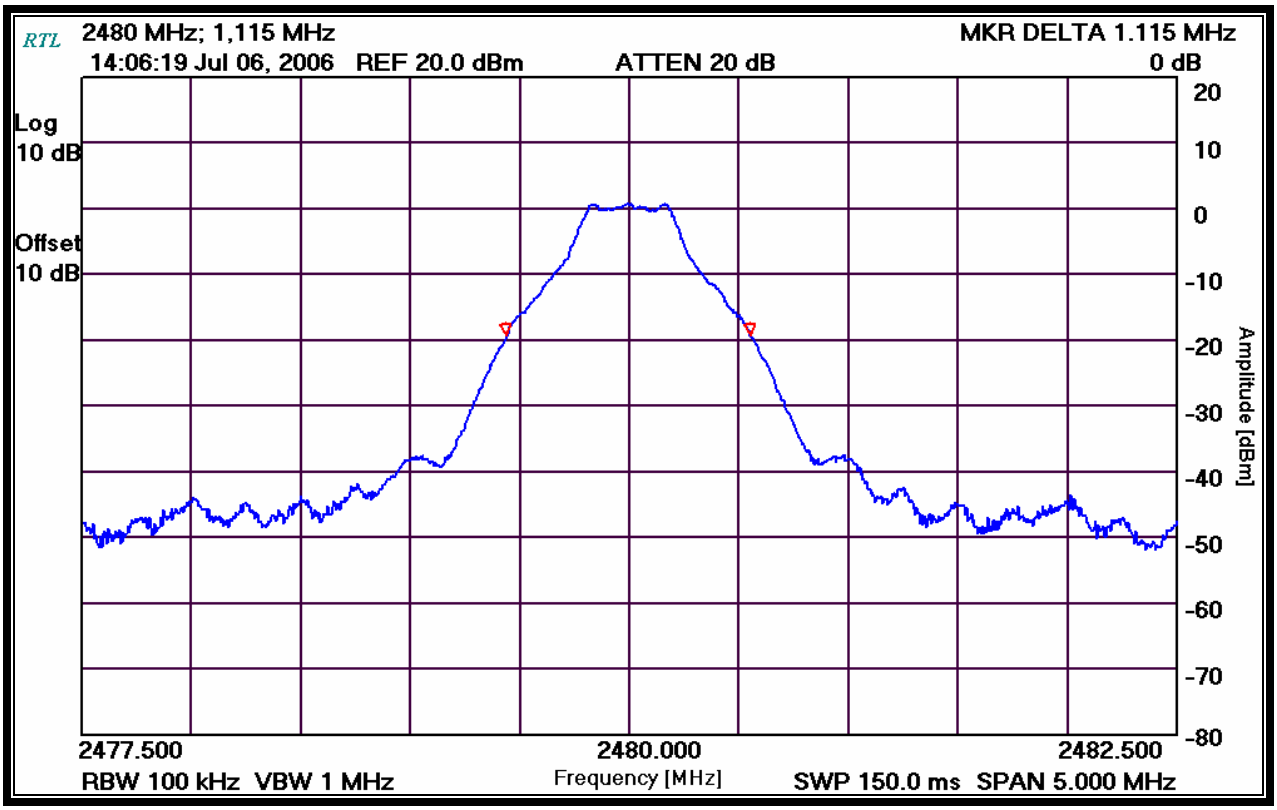

**Plot 8-7: 20 dB Bandwidth Channel 2**

| | |
|---|---|
| **Channel:** | 41 |
| **Channel Frequency (MHz):** | 2441 |
| **Resolution Bandwidth (kHz):** | 100 |
| **Video Bandwidth (MHz):** | 1 |




**Plot 8-8: 20 dB Bandwidth Channel 41**

| | |
|---|---|
| **Channel:** | 80 |
| **Channel Frequency (MHz):** | 2480 |
| **Resolution Bandwidth (kHz):** | 100 |
| **Video Bandwidth (MHz):** | 1 |




**Plot 8-9: 20 dB Bandwidth Channel 80**

**Test Personnel:**

| Daniel W. Baltzell | Daniel W. Baltzell | May 18, July 6 and 9, 2006 |
|---|---|---|
| EMC Test Engineer | Signature | Dates Of Test |

# 9 Carrier Frequency Separation - §15.247(a)(1); IC RSS-210 A8.1(2)

## 9.1 Carrier Frequency Separation Test Procedure

Frequency Hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater.

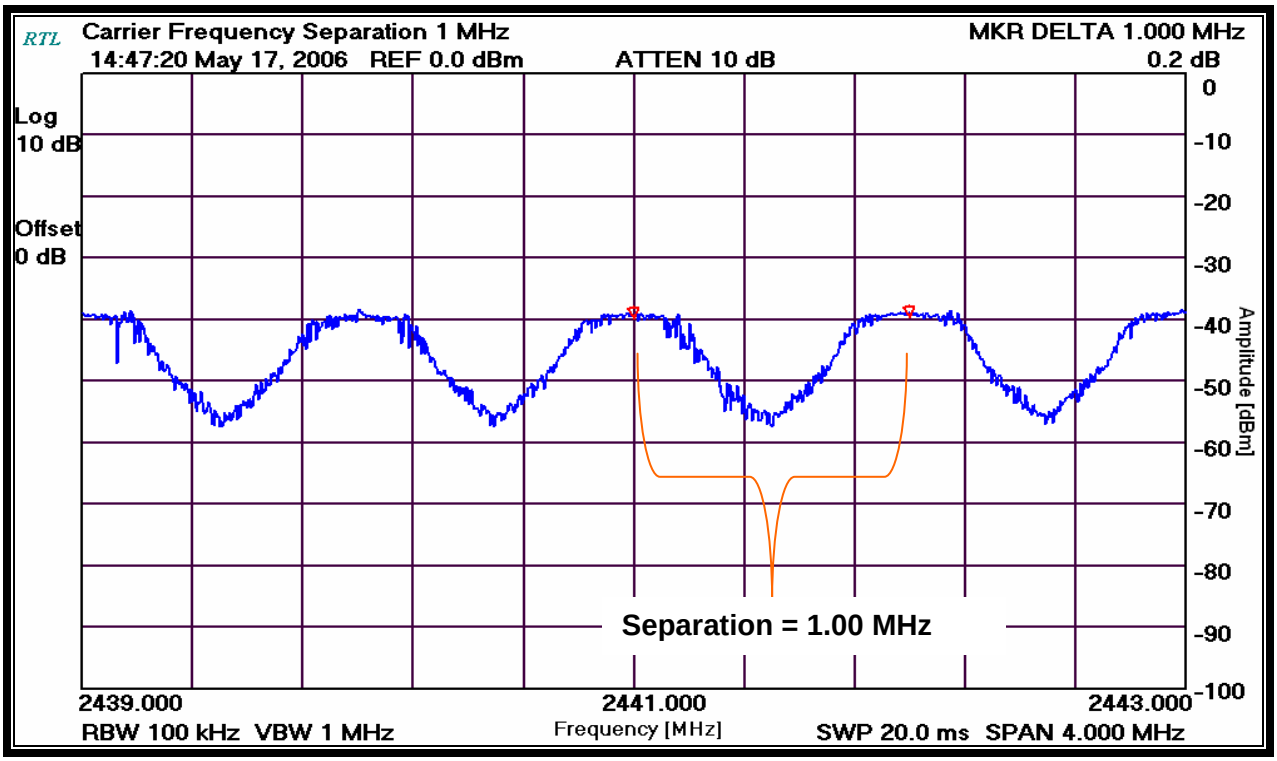
Measured frequency separation = 1.00 MHz

**Table 9-1: Carrier Frequency Separation Test Equipment**

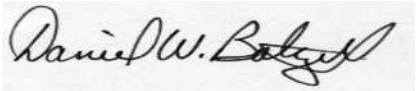
| RTL Asset # | Manufacturer | Model | Part Type | Serial Number | Calibration Due Date |
|---|---|---|---|---|---|
| 900931 | Hewlett Packard | 8566B | Spectrum Analyzer (100 Hz - 22 GHz) | 3138A07771 | 8/3/06 |

## 9.2 Carrier Frequency Separation Test Data

**Plot 9-1: Carrier Frequency Separation - Bluetooth**




**Test Personnel:**

| Daniel W. Baltzell |  | May 17, 2006 |
|---|---|---|
| EMC Test Engineer | Signature | Date Of Test |

## 10 Hopping Characteristics – FCC §15.247(a)(1)(iii); IC RSS-210 §A8.1(4)

### 10.1 Hopping Characteristics Test Procedure

Frequency hopping systems in the 2400–2483.5 MHz band shall use at least 15 channels. The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed. Frequency hopping systems may avoid or suppress transmissions on a particular hopping frequency provided that a minimum of 15 channels are used.

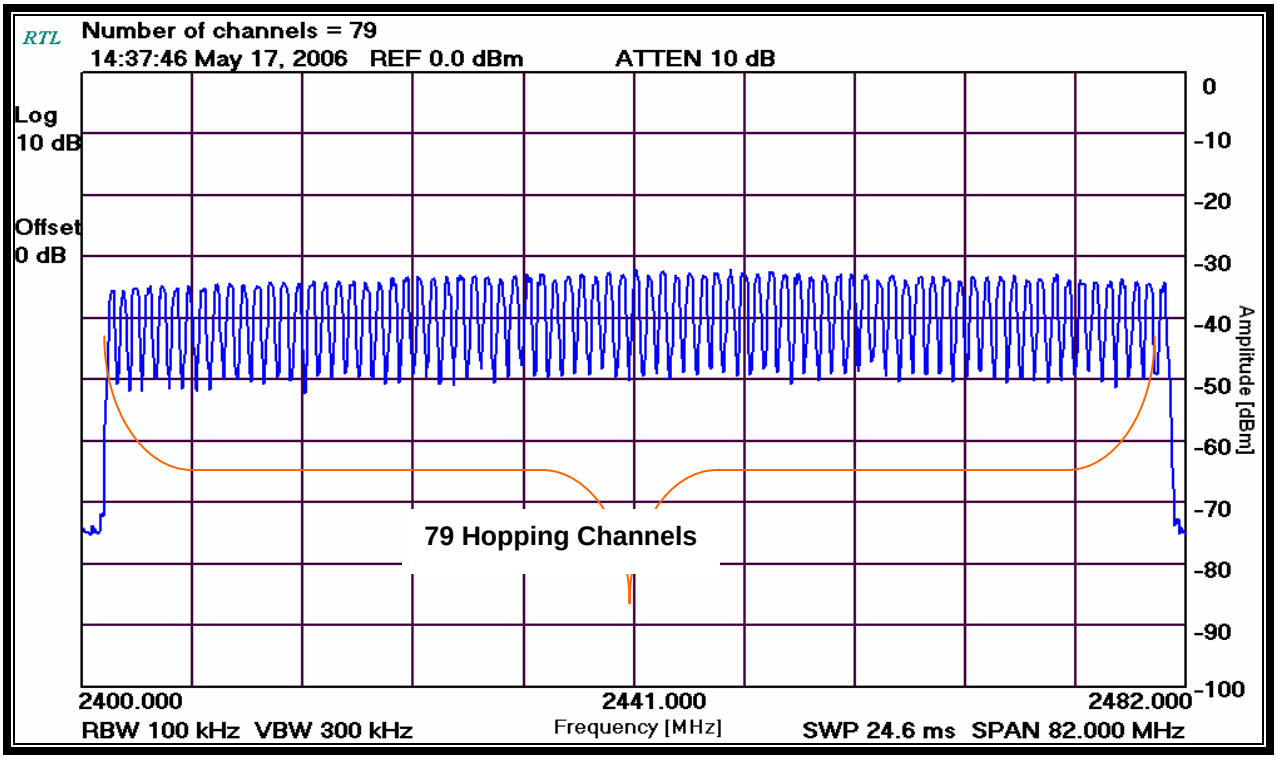
**Table 10-1: Hopping Characteristics Test Equipment**

| RTL Asset # | Manufacturer | Model | Part Type | Serial Number | Calibration Due Date |
|---|---|---|---|---|---|
| 900931 | Hewlett Packard | 8566B | Spectrum Analyzer (100 Hz - 22 GHz) | 3138A07771 | 8/3/06 |

### 10.2 Number of Hopping Frequencies - Bluetooth

Measured number of hopping frequencies = 79

**Plot 10-1: Number of Hopping Frequencies**




**Test Personnel:**

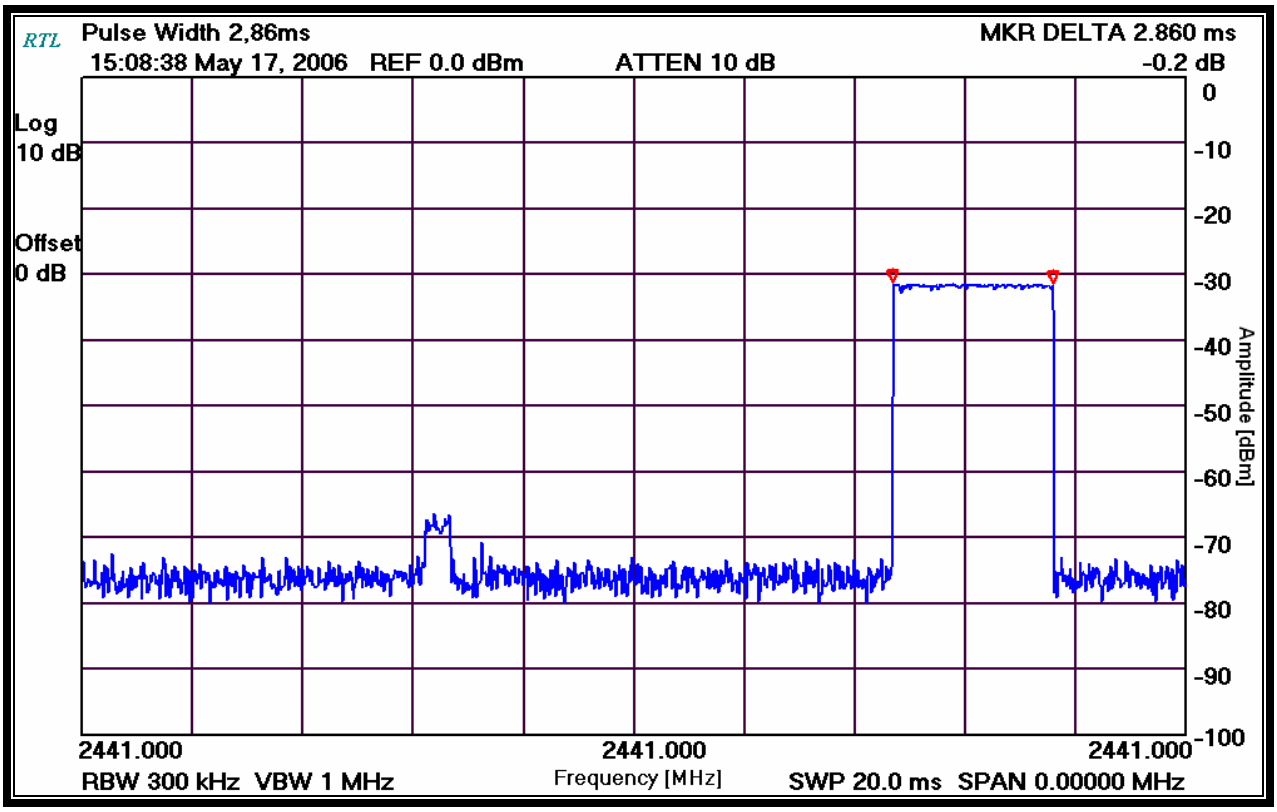
| Daniel W. Baltzell | Daniel W. Baltzell | May 17, 2006 |
|---|---|---|
| EMC Test Engineer | Signature | Date Of Test |

### 10.3 Average Time of Occupancy - Bluetooth

The spectrum analyzer sweep was set to 20 ms, with a zero span and max hold until a pulse from the device under test was captured. A marker delta was used to measure the dwell time for this pulse. The sweep was then set to single sweep for 31.6 s.

The number of pulses in 31.6 s was 93. The average time of occupancy in the above period (31.6 s) is equal to 93 pulses x 2.86 ms = 266 ms, which meets the limit as defined by 15.247(a)(1)(iii) of 0.4 seconds.

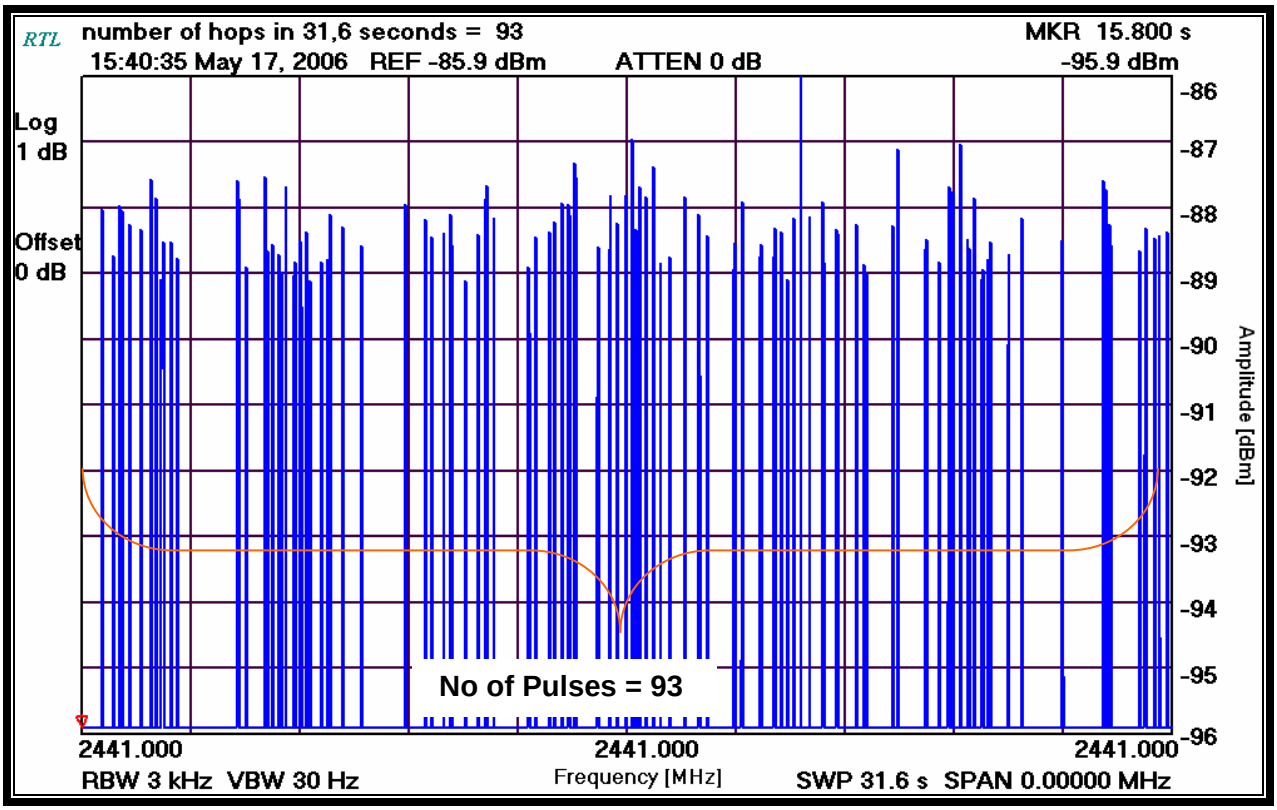
**Plot 10-2: Time of Occupancy (Dwell Time)**




**Test Personnel:**

| Daniel W. Baltzell | Signature | May 17, 2006 |
|---|---|---|
| EMC Test Engineer | | Date Of Test |

**Plot 10-3: Time of Occupancy (Dwell Time 31.6 Second Sweep)**




Number of pulses in 31.6 seconds: 93

**Test Personnel:**

| Daniel W. Baltzell | Daniel W. Baltzell | May 17, 2006 |
|---|---|---|
| EMC Test Engineer | Signature | Date Of Test |

# 11 Conducted Limits - §15.207; RSS-GEN

## 11.1 Test Methodology for Conducted Line Emissions Measurements

The power line conducted emission measurements were performed in a Series 81 type shielded enclosure manufactured by Rayproof. The EUT was assembled on a wooden table 80 centimeters high. Power was fed to the EUT through a 50 ohm / 50 micro Henry Line Impedance Stabilization Network (EUT LISN). The EUT LISN was fed power through an A.C. filter box on the outside of the shielded enclosure. The filter box and EUT LISN housing are bonded to the ground plane of the shielded enclosure. A second LISN, the peripheral LISN, provides isolation for the EUT test peripherals. This peripheral LISN was also fed A.C. power. A metal power outlet box, which is bonded to the ground plane and electrically connected to the peripheral LISN, powers the EUT host peripherals.

The spectrum analyzer was connected to the A.C. line through an isolation transformer. The 50-ohm output of the EUT LISN was connected to the spectrum analyzer input through a Solar 400 kHz high-pass filter. The filter is used to prevent overload of the spectrum analyzer from noise below 400 kHz. Conducted emission levels were measured on each current-carrying line with the spectrum analyzer operating in the CISPR quasi-peak mode (or peak mode if applicable). The analyzer's 6 dB bandwidth was set to 9 kHz. No video filter less than 10 times the resolution bandwidth was used. Average measurements are performed in linear mode using a 10 kHz resolution bandwidth, a 1 Hz video bandwidth, and by increasing the sweep time in order to obtain a calibrated measurement. The emission spectrum was scanned from (150/450) kHz to 30 MHz. The highest emission amplitudes relative to the appropriate limit were measured and have been recorded in this report.

*Note: Rhein Tech Laboratories, Inc. has implemented procedures to minimize errors that occur from test instruments, calibration, procedures, and test setups. Test instrument and calibration errors are documented from the manufacturer or calibration lab. Other errors have been defined and calculated within the Rhein Tech Quality Manual, Section 6.1. Rhein Tech implements the following procedures to minimize errors that may occur: yearly as well as daily calibration methods, technician training, and emphasis to employees on avoiding error.*

## 11.2 Conducted Line Emissions Test

The initial step in collecting conducted data is a spectrum analyzer peak scan of the measurement range. If the conducted emissions exceed the limit with the instrument set to the quasi-peak mode, then measurements are made in the average mode. If the quasi-peak measurement is at least 6 dB higher than the amplitude in the average mode, the level measured in the quasi-peak mode may be reduced by 13 dB before comparing it to the limit.

The conducted test was performed with the EUT exercise program loaded, and the emissions were scanned between 450 kHz to 30 MHz on the NEUTRAL SIDE and PHASE SIDE.

**Table 11-1: Conducted Line Emissions Test Equipment**

| RTL Asset # | Manufacturer | Model | Part Type | Serial Number | Calibration Due Date |
|---|---|---|---|---|---|
| 900931 | Hewlett Packard | 8566B | Spectrum Analyzer (100 Hz - 22 GHz) | 3138A07771 | 8/3/06 |
| 901084 | AFJ international | LS16 | 16A LISN | 16010020082 | 1/23/07 |

## 11.3 Conducted Line Emission Test Data

**Table 11-2: Conducted Emissions (Neutral Side) Transmitting**

| Emission Frequency (MHz) | Test Detector | Analyzer Reading (dBuV) | Site Correction Factor (dB) | Emission Level (dBuV) | QP Limit (dBuV) | QP Margin (dBuV) | AV Limit (dBuV) | AV Margin (dBuV) | Pass/ Fail |
|---|---|---|---|---|---|---|---|---|---|
| 0.171 | Pk | 46.6 | 0.2 | 46.8 | | | 54.9 | -8.1 | Pass |
| 0.243 | Pk | 43.4 | 0.1 | 43.5 | | | 52.0 | -8.5 | Pass |
| 0.342 | Pk | 40.5 | 0.2 | 40.7 | | | 49.2 | -8.5 | Pass |
| 0.428 | Qp | 45.5 | 0.2 | 45.7 | 57.3 | -11.6 | | | Pass |
| 0.428 | Av | 36.4 | 0.3 | 36.7 | | | 47.7 | -11.0 | Pass |
| 0.486 | Pk | 39.9 | 0.2 | 40.1 | | | 46.2 | -6.1 | Pass |
| 0.505 | Pk | 39.5 | 0.2 | 39.7 | | | 46.0 | -6.3 | Pass |
| 0.679 | Pk | 34.8 | 0.3 | 35.1 | | | 46.0 | -10.9 | Pass |
| 22.660 | Pk | 26.9 | 2.4 | 29.3 | | | 50.0 | -20.7 | Pass |

Pk = Peak; Qp = quasi-peak; Av = Average

**Table 11-3: Conducted Emissions (Phase Side) Transmitting**

| Emission Frequency (MHz) | Test Detector | Analyzer Reading (dBuV) | Site Correction Factor (dB) | Emission Level (dBuV) | QP Limit (dBuV) | QP Margin (dBuV) | AV Limit (dBuV) | AV Margin (dBuV) | Pass/ Fail |
|---|---|---|---|---|---|---|---|---|---|
| 0.161 | Pk | 47.9 | 0.2 | 48.1 | | | 55.4 | -7.3 | Pass |
| 0.259 | Pk | 43.9 | 0.1 | 44.0 | | | 51.5 | -7.5 | Pass |
| 0.325 | Pk | 36.0 | 0.3 | 36.3 | | | 49.6 | -13.3 | Pass |
| 0.418 | Qp | 46.0 | 0.3 | 46.3 | 57.5 | -11.2 | | | Pass |
| 0.418 | Av | 36.3 | 0.3 | 36.6 | | | 47.7 | -11.1 | Pass |
| 0.487 | Pk | 40.2 | 0.2 | 40.4 | | | 46.2 | -5.8 | Pass |
| 0.502 | Pk | 38.8 | 0.2 | 39.0 | | | 46.0 | -7.0 | Pass |
| 0.668 | Pk | 35.2 | 0.3 | 35.5 | | | 46.0 | -10.5 | Pass |
| 20.650 | Pk | 27.3 | 2.4 | 29.7 | | | 50.0 | -20.3 | Pass |

Pk = Peak; Qp = quasi-peak; Av = Average

**Table 11-4: Conducted Emissions (Neutral Side) Receive/Digital**

| Emission Frequency (MHz) | Test Detector | Analyzer Reading (dBuV) | Site Correction Factor (dB) | Emission Level (dBuV) | QP Limit (dBuV) | QP Margin (dBuV) | AV Limit (dBuV) | AV Margin (dBuV) | Pass/ Fail |
|---|---|---|---|---|---|---|---|---|---|
| 0.150 | Pk | 47.2 | 0.2 | 47.4 | | | 56.0 | -8.6 | Pass |
| 0.246 | Pk | 43.4 | 0.1 | 43.5 | | | 51.9 | -8.4 | Pass |
| 0.345 | Pk | 37.3 | 0.2 | 37.5 | | | 49.1 | -11.6 | Pass |
| 0.429 | Qp | 42.0 | 0.2 | 42.2 | 57.3 | -15.1 | | | Pass |
| 0.429 | Av | 34.9 | 0.3 | 35.2 | | | 47.4 | -12.2 | Pass |
| 0.487 | Pk | 39.2 | 0.2 | 39.4 | | | 46.2 | -6.8 | Pass |
| 0.509 | Pk | 39.1 | 0.2 | 39.3 | | | 46.0 | -6.7 | Pass |
| 0.680 | Pk | 33.0 | 0.3 | 33.3 | | | 46.0 | -12.7 | Pass |
| 22.610 | Pk | 25.2 | 2.4 | 27.6 | | | 50.0 | -22.4 | Pass |

Pk = Peak; Qp = quasi-peak; Av = Average

**Table 11-5: Conducted Emissions (Phase Side) Receive/Digital**

| Emission Frequency (MHz) | Test Detector | Analyzer Reading (dBuV) | Site Correction Factor (dB) | Emission Level (dBuV) | QP Limit (dBuV) | QP Margin (dBuV) | AV Limit (dBuV) | AV Margin (dBuV) | Pass/ Fail |
|---|---|---|---|---|---|---|---|---|---|
| 0.162 | Pk | 45.3 | 0.2 | 45.5 | | | 55.4 | -9.9 | Pass |
| 0.252 | Pk | 42.7 | 0.1 | 42.8 | | | 51.7 | -8.9 | Pass |
| 0.343 | Pk | 37.5 | 0.2 | 37.7 | | | 49.1 | -11.4 | Pass |
| 0.422 | Pk | 47.0 | 0.3 | 47.3 | | | 47.4 | -0.1 | Pass |
| 0.429 | Qp | 41.8 | 0.2 | 42.0 | 57.3 | -15.3 | | | Pass |
| 0.429 | Av | 34.8 | 0.3 | 35.1 | | | 47.4 | -12.3 | Pass |
| 0.486 | Pk | 40.0 | 0.2 | 40.2 | | | 46.2 | -6.0 | Pass |
| 0.515 | Pk | 39.4 | 0.2 | 39.6 | | | 46.0 | -6.4 | Pass |
| 0.686 | Pk | 30.7 | 0.3 | 31.0 | | | 46.0 | -15.0 | Pass |
| 20.700 | Pk | 27.2 | 2.4 | 29.6 | | | 50.0 | -20.4 | |

Pk = Peak; Qp = quasi-peak; Av = Average

## 12 Radiated Emissions - §15.209; RSS-210 §A8.5 and RSS-Gen

### 12.1 Limits of Radiated Emissions Measurement

| Frequency (MHz) | Field Strength (uV/m) | Measurement Distance (m) |
|---|---|---|
| 0.009-0.490 | 2400/f (kHz) | 300 |
| 0.490-1.705 | 2400/f (kHz) | 30 |
| 1.705-30.0 | 30 | 30 |
| 30-88 | 100 | 3 |
| 88-216 | 150 | 3 |
| 216-960 | 200 | 3 |
| Above 960 | 500 | 3 |

As shown in 15.35(b), for frequencies above 1000 MHz, the field strength limits are based on average detector, however the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB, under any circumstances of modulation.

### 12.2 Radiated Emissions Measurement Test Procedure

Before final measurements of radiated emissions were made on the open-field three/ten meter range, the EUT was scanned indoors at one and three meter distances. This was done in order to determine its emissions spectrum signature. The physical arrangement of the test system and associated cabling was varied in order to determine the effect on the EUT's emissions in amplitude, direction and frequency. This process was repeated during final radiated emissions measurements on the open-field range, at each frequency, in order to ensure that maximum emission amplitudes were attained.

Final radiated emissions measurements were made on the three/ten-meter, open-field test site. The EUT was placed on a nonconductive turntable 0.8 meters above the ground plane. The spectrum was examined from 9 kHz to the $10^{th}$ harmonic of the highest fundamental transmitter frequency (24.8 GHz).

At each frequency, the EUT was rotated 360°, and the antenna was raised and lowered from 1 to 4 meters in order to determine the emission's maximum level. Measurements were taken using both horizontal and vertical antenna polarizations. For frequencies between 30 and 1000 MHz, the spectrum analyzer's 6 dB bandwidth was set to 120 kHz, and the analyzer was operated in the CISPR quasi-peak detection mode. For emissions above 1000 MHz, emissions are measured using the average detector function with a minimum resolution bandwidth of 1 MHz. No video filter less than 10 times the resolution bandwidth was used. The highest emission amplitudes relative to the appropriate limit were measured and recorded in this report.

**Table 12-1: Radiated Emissions Test Equipment**

| RTL Asset # | Manufacturer | Model | Part Type | Serial Number | Calibration Due Date |
|---|---|---|---|---|---|
| 900151 | Rohde and Schwarz | HFH2-Z2 | Antenna (Loop antenna, (9 kHz - 30 MHz) | 827525/019 | 8/25/06 |
| 901365 | Miteq | JS4-00102600-41-5P | Amplifier, 15 V, 0.1-26 GHz, 28 dB gain, power 5 dB | 1094152 | 3/24/07 |
| 901020 | Hewlett Packard | 8564E | Portable Spectrum Analyzer (9 kHz - 40 GHz) | 3943A01719 | 9/14/06 |
| 900905 | Rhein Tech Labs | PR-1040 | OATS 1 Preamplifier 40 dB (30 MHz – 2 GHz) | 1006 | 3/15/07 |
| 900878 | Rhein Tech Labs | AM3-1197-0005 | 3 meter antenna mast, polarizing | Outdoor Range 1 | Not Required |
| 901231 | IW Microwave Products | KPS-1503-2400-KPS | High frequency RF cables | 240" | 9/1/06 |
| 901232 | IW Microwave Products | KPS-1503-2400-KPS | High frequency RF cables | 240" | 9/1/06 |
| 901235 | IW Microwave Products | KPS-1503-360-KPS | High frequency RF cables | 36" | 9/1/06 |
| 901242 | Rhein Tech Labs | WRT-000-0003 | Wood rotating table | N/A | Not Required |
| 900772 | EMCO | 3161-02 | Horn Antenna (2 - 4 GHz) | 9804-1044 | 5/20/07 |
| 900321 | EMCO | 3161-03 | Horn Antennas (4 - 8,2GHz) | 9508-1020 | 5/20/07 |
| 900323 | EMCO | 3160-7 | Horn Antennas (8,2 - 12,4 GHz) | 9605-1054 | 5/20/07 |
| 900356 | EMCO | 3160-08 | Horn Antenna (12.4 - 18 GHz) | 9607-1044 | 5/20/07 |
| 900325 | EMCO | 3160-9 | Horn Antennas (18 - 26.5 GHz) | 9605-1051 | 5/20/07 |
| 901218 | EMCO | 3301B | Horn Antenna (18 - 26.5 GHz) | 960281-003 | 5/20/07 |
| 900392 | Hewlett Packard | 1197OK | Harmonic Mixer (18 – 26.5 GH)z | 3525A00159 | 11/27/07 |
| 900931 | Hewlett Packard | 8566B | Spectrum Analyzer (100 Hz - 22 GHz) | 3138A07771 | 8/3/06 |
| 900930 | Hewlett Packard | 85662A | Spectrum Analyzer Display Section | 3144A20839 | 8/3/06 |
| 900889 | Hewlett Packard | 85685A | RF Preselector (20 Hz - 2 GHz) | 3146A01309 | 4/12/07 |

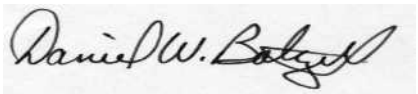
## 12.3 Radiated Emissions Test Results

### 12.3.1 Radiated Emissions - Digital

**Table 12-2: Digital Radiated Emissions**

| Temperature: 69°F Humidity: 56% | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Emission Frequency (MHz)** | **Test Detector** | **Antenna Polarity (H/V)** | **Turntable Azimuth (deg)** | **Antenna Height (m)** | **Analyzer Reading (dBuV)** | **Site Correction Factor (dB/m)** | **Emission Level (dBuV/m)** | **Limit (dBuV/m)** | **Margin (dB)** | **Pass/ Fail** |
| 146.819 | Qp | H | 120 | 1.0 | 39.0 | -17.0 | 22.0 | 43.5 | -21.5 | Pass |
| 146.820 | Qp | V | 180 | 1.0 | 42.1 | -16.9 | 25.2 | 43.5 | -18.3 | Pass |
| 159.054 | Qp | H | 120 | 1.0 | 38.6 | -17.6 | 21.0 | 43.5 | -22.5 | Pass |
| 165.172 | Qp | H | 120 | 1.0 | 48.3 | -17.9 | 30.4 | 43.5 | -13.1 | Pass |
| 165.172 | Qp | V | 180 | 1.0 | 48.2 | -17.6 | 30.6 | 43.5 | -12.9 | Pass |
| 171.289 | Qp | H | 120 | 1.0 | 46.8 | -18.1 | 28.7 | 43.5 | -14.8 | Pass |
| 189.642 | Qp | H | 120 | 1.0 | 39.2 | -18.4 | 20.8 | 43.5 | -22.7 | Pass |
| 201.877 | Qp | H | 120 | 1.0 | 39.2 | -17.4 | 21.8 | 43.5 | -21.7 | Pass |
| 214.112 | Qp | H | 120 | 1.0 | 41.9 | -17.2 | 24.7 | 43.5 | -18.8 | Pass |
| 226.347 | Qp | H | 120 | 1.0 | 42.6 | -16.9 | 25.7 | 46.0 | -20.3 | Pass |
| 238.582 | Qp | H | 120 | 1.0 | 42.9 | -15.8 | 27.1 | 46.0 | -18.9 | Pass |
| 250.817 | Qp | H | 120 | 1.0 | 40.9 | -14.6 | 26.3 | 46.0 | -19.7 | Pass |
| 250.817 | Qp | H | 120 | 1.0 | 42.1 | -14.6 | 27.5 | 46.0 | -18.5 | Pass |
| 263.052 | Qp | H | 120 | 1.0 | 37.8 | -13.6 | 24.2 | 46.0 | -21.8 | Pass |
| 269.169 | Qp | H | 120 | 1.0 | 31.1 | -13.8 | 17.3 | 46.0 | -28.7 | Pass |
| 275.287 | Qp | H | 290 | 1.0 | 28.4 | -13.9 | 14.5 | 46.0 | -31.5 | Pass |
| 287.522 | Qp | H | 180 | 1.0 | 32.1 | -13.6 | 18.5 | 46.0 | -27.5 | Pass |
| 336.465 | Qp | H | 180 | 1.0 | 26.2 | -12.2 | 14.0 | 46.0 | -32.0 | Pass |
| 599.515 | Qp | H | 120 | 1.2 | 32.8 | -5.7 | 27.1 | 46.0 | -18.9 | Pass |
| 648.455 | Qp | H | 180 | 1.0 | 30.5 | -5.2 | 25.3 | 46.0 | -20.7 | Pass |

**Test Personnel:**



| Daniel W. Baltzell | | May 18, 2006 |
|---|---|---|
| EMC Test Engineer | Signature | Date Of Test |

### 12.3.2 Radiated Emissions Harmonics/Spurious

**Table 12-3: Radiated Emissions Harmonics/Spurious Channel 1 (TX Frequency: 2412 MHz); 802.11b**

| Emission Frequency (MHz) | Peak Analyzer Reading (dBuV) (1 MHz RBW/VBW) | Average Analyzer Reading (dBuV) (1 MHz RBW/10 Hz VBW) | Site Correction Factor (dB/m) | Average Emission Level (dBuV/m) | Average Limit (dBuV/m) | Average Margin (dB) |
|---|---|---|---|---|---|---|
| 4813.2 | 39.2 | 28.2 | 0.4 | 28.6 | 54.0 | -25.4 |
| 4816.2 | 40.0 | 29.8 | 0.5 | 30.3 | 54.0 | -23.7 |
| 4820.8 | 40.3 | 31.0 | 0.5 | 31.5 | 54.0 | -22.5 |
| 4824.0 | 51.2 | 50.8 | 0.5 | 51.3 | 54.0 | -2.7 |
| 4827.5 | 41.2 | 31.5 | 0.6 | 32.1 | 54.0 | -21.9 |
| 4823.3 | 41.0 | 30.5 | 0.5 | 31.0 | 54.0 | -23.0 |
| 4835.4 | 40.8 | 28.8 | 0.6 | 29.4 | 54.0 | -24.6 |
| 7236.0 | 39.0 | 27.0 | 3.3 | 30.3 | 80.4 | -50.1 |
| 9648.0 | 35.8 | 26.5 | 8.4 | 34.9 | 80.4 | -45.5 |
| 12060.0 | 37.0 | 24.2 | 11.3 | 35.5 | 54.0 | -18.5 |
| 14472.0 | 38.3 | 26.5 | 15.3 | 41.8 | 54.0 | -12.2 |
| 16884.0 | 39.7 | 26.8 | 16.3 | 43.1 | 80.4 | -37.3 |
| 19296.0 | 36.2 | 25.3 | 21.2 | 46.5 | 54.0 | -7.5 |
| 21708.0 | 39.3 | 26.3 | 9.1 | 35.4 | 80.4 | -45.0 |
| 24120.0 | 40.3 | 27.2 | 9.1 | 36.3 | 80.4 | -44.1 |

**Table 12-4: Radiated Emissions Harmonics/Spurious Channel 6 (TX Frequency: 2437 MHz); 802.11b**

| Emission Frequency (MHz) | Peak Analyzer Reading (dBuV) (1 MHz RBW/VBW) | Average Analyzer Reading (dBuV) (1 MHz RBW/10 Hz VBW) | Site Correction Factor (dB/m) | Average Emission Level (dBuV/m) | Average Limit (dBuV/m) | Average Margin (dB) |
|---|---|---|---|---|---|---|
| 4863.4 | 40.8 | 28.7 | 0.2 | 28.9 | 54.0 | -25.1 |
| 4866.3 | 41.0 | 30.5 | 0.1 | 30.6 | 54.0 | -23.4 |
| 4871.3 | 41.3 | 32.0 | 0.1 | 32.1 | 54.0 | -21.9 |
| 4874.0 | 49.2 | 46.2 | 0.1 | 46.3 | 54.0 | -7.7 |
| 4877.3 | 42.0 | 32.2 | 0.2 | 32.4 | 54.0 | -21.6 |
| 4882.3 | 41.5 | 31.5 | 0.2 | 31.7 | 54.0 | -22.3 |
| 4885.3 | 41.3 | 29.8 | 0.2 | 30.0 | 54.0 | -24.0 |
| 7311.0 | 36.8 | 26.0 | 2.8 | 28.8 | 54.0 | -25.2 |
| 9748.0 | 36.3 | 26.2 | 8.6 | 34.8 | 81.9 | -47.1 |
| 12185.0 | 34.7 | 25.2 | 10.6 | 35.8 | 54.0 | -18.2 |
| 14622.0 | 38.0 | 26.8 | 15.7 | 42.5 | 81.9 | -39.4 |
| 17059.0 | 37.3 | 27.2 | 15.9 | 43.1 | 81.9 | -38.8 |
| 19496.0 | 41.3 | 27.2 | 20.4 | 47.6 | 54.0 | -6.4 |
| 21933.0 | 35.5 | 24.5 | 9.1 | 33.6 | 81.9 | -48.3 |
| 24370.0 | 37.7 | 24.7 | 9.1 | 33.8 | 81.9 | -48.1 |

**Table 12-5: Radiated Emissions Harmonics/Spurious Channel 11 (TX Frequency: 2462 MHz); 802.11b**

| Emission Frequency (MHz) | Peak Analyzer Reading (dBuV) (1 MHz RBW/VBW) | Average Analyzer Reading (dBuV) (1 MHz RBW/10 Hz VBW) | Site Correction Factor (dB/m) | Average Emission Level (dBuV/m) | Average Limit (dBuV/m) | Average Margin (dB) |
|---|---|---|---|---|---|---|
| 4913.3 | 41.0 | 29.5 | 0.4 | 29.9 | 54.0 | -24.1 |
| 4916.1 | 41.2 | 30.7 | 0.4 | 31.1 | 54.0 | -22.9 |
| 4921.2 | 41.5 | 32.0 | 0.4 | 32.4 | 54.0 | -21.6 |
| 4924.0 | 49.8 | 46.5 | 0.4 | 46.9 | 54.0 | -7.1 |
| 4927.3 | 42.2 | 31.8 | 0.4 | 32.2 | 54.0 | -21.8 |
| 4932.2 | 40.7 | 30.8 | 0.5 | 31.3 | 54.0 | -22.7 |
| 4935.3 | 40.3 | 29.7 | 0.5 | 30.2 | 54.0 | -23.8 |
| 7386.0 | 38.0 | 26.8 | 4.0 | 30.8 | 54.0 | -23.2 |
| 9848.0 | 36.7 | 26.2 | 9.3 | 35.5 | 82.1 | -46.6 |
| 12310.0 | 35.7 | 25.5 | 10.2 | 35.7 | 54.0 | -18.3 |
| 14772.0 | 37.5 | 26.0 | 14.7 | 40.7 | 82.1 | -41.4 |
| 17234.0 | 37.0 | 26.8 | 16.2 | 43.0 | 82.1 | -39.1 |
| 19696.0 | 37.8 | 26.3 | 20.8 | 47.1 | 54.0 | -6.9 |
| 22158.0 | 35.2 | 24.7 | 9.1 | 33.8 | 54.0 | -20.2 |
| 24620.0 | 37.8 | 26.7 | 9.1 | 35.8 | 82.1 | -46.3 |

**Table 12-6: Radiated Emissions Harmonics/Spurious Channel 1 (TX Frequency: 2412 MHz); 802.11g**

| Emission Frequency (MHz) | Peak Analyzer Reading (dBuV) (1 MHz RBW/VBW) | Average Analyzer Reading (dBuV) (1 MHz RBW/10 Hz VBW) | Site Correction Factor (dB/m) | Average Emission Level (dBuV/m) | Average Limit (dBuV/m) | Average Margin (dB) |
|---|---|---|---|---|---|---|
| 4824.0 | 46.0 | 32.0 | 0.5 | 32.5 | 54.0 | -21.5 |
| 7236.0 | 38.0 | 26.3 | 3.3 | 29.6 | 75.1 | -45.5 |
| 9648.0 | 36.2 | 25.8 | 8.4 | 34.2 | 75.1 | -40.9 |
| 12060.0 | 36.0 | 24.8 | 11.3 | 36.1 | 54.0 | -17.9 |
| 14472.0 | 37.5 | 26.7 | 15.3 | 42.0 | 54.0 | -12.0 |
| 16884.0 | 38.3 | 26.5 | 16.3 | 42.8 | 75.1 | -32.3 |
| 19296.0 | 35.5 | 25.2 | 21.2 | 46.4 | 54.0 | -7.6 |
| 21708.0 | 37.8 | 26.2 | 9.1 | 35.3 | 75.1 | -39.8 |
| 24120.0 | 39.7 | 27.5 | 9.1 | 36.6 | 75.1 | -38.5 |

**Table 12-7: Radiated Emissions Harmonics/Spurious Channel 6 (TX Frequency: 2437 MHz); 802.11g**

| Emission Frequency (MHz) | Peak Analyzer Reading (dBuV) (1 MHz RBW/VBW) | Average Analyzer Reading (dBuV) (1 MHz RBW/10 Hz VBW) | Site Correction Factor (dB/m) | Average Emission Level (dBuV/m) | Average Limit (dBuV/m) | Average Margin (dB) |
|---|---|---|---|---|---|---|
| 4874.0 | 46.5 | 32.2 | 0.1 | 32.3 | 54.0 | -21.7 |
| 7311.0 | 49.8 | 35.2 | 2.8 | 38.0 | 54.0 | -16.0 |
| 9748.0 | 38.8 | 27.3 | 8.6 | 35.9 | 75.7 | -39.8 |
| 12185.0 | 41.3 | 26.7 | 10.6 | 37.3 | 54.0 | -16.7 |
| 14622.0 | 42.3 | 28.0 | 15.7 | 43.7 | 75.7 | -32.0 |
| 17059.0 | 42.0 | 28.5 | 15.9 | 44.4 | 75.7 | -31.3 |
| 19496.0 | 41.2 | 26.3 | 20.4 | 46.7 | 54.0 | -7.3 |
| 21933.0 | 41.0 | 26.2 | 9.1 | 35.3 | 75.7 | -40.4 |
| 24370.0 | 40.0 | 26.3 | 9.1 | 35.4 | 75.7 | -40.3 |

**Table 12-8: Radiated Emissions Harmonics/Spurious Channel 11 (TX Frequency: 2462 MHz); 802.11g**

| Emission Frequency (MHz) | Peak Analyzer Reading (dBuV) (1 MHz RBW/VBW) | Average Analyzer Reading (dBuV) (1 MHz RBW/10 Hz VBW) | Site Correction Factor (dB/m) | Average Emission Level (dBuV/m) | Average Limit (dBuV/m) | Average Margin (dB) |
|---|---|---|---|---|---|---|
| 4924.0 | 49.8 | 36.8 | 0.4 | 37.2 | 54.0 | -16.8 |
| 7386.0 | 42.5 | 28.0 | 4.0 | 32.0 | 54.0 | -22.0 |
| 9848.0 | 42.0 | 27.2 | 9.3 | 36.5 | 77.4 | -40.9 |
| 12310.0 | 40.8 | 27.0 | 10.2 | 37.2 | 54.0 | -16.8 |
| 14772.0 | 41.2 | 27.2 | 14.7 | 41.9 | 77.4 | -35.5 |
| 17234.0 | 41.5 | 27.7 | 16.2 | 43.9 | 77.4 | -33.5 |
| 19696.0 | 41.0 | 27.2 | 20.8 | 48.0 | 54.0 | -6.0 |
| 22158.0 | 41.7 | 26.3 | 9.1 | 35.4 | 54.0 | -18.6 |
| 24620.0 | 40.0 | 27.3 | 9.1 | 36.4 | 77.4 | -41.0 |

**Table 12-9: Radiated Emissions Harmonics/Spurious Channel 2 (TX Frequency: 2402MHz); FHSS**

| Emission Frequency (MHz) | Peak Analyzer Reading (dBuV) (1 MHz RBW/VBW) | Average Analyzer Reading (dBuV) (1 MHz RBW/10 Hz VBW) | Site Correction Factor (dB/m) | Average Emission Level (dBuV/m) | Average Limit (dBuV/m) | Average Margin (dB) |
|---|---|---|---|---|---|---|
| 4804.0 | 48.0 | 38.7 | 0.3 | 39.0 | 54.0 | -15.0 |
| 7206.0 | 46.5 | 33.7 | 3.4 | 37.1 | 57.7 | -20.6 |
| 9608.0 | 45.2 | 33.2 | 9.0 | 42.2 | 57.7 | -15.5 |
| 12010.0 | 37.8 | 26.7 | 10.9 | 37.6 | 54.0 | -16.4 |
| 14412.0 | 40.7 | 27.8 | 15.7 | 43.5 | 57.7 | -14.2 |
| 16814.0 | 40.2 | 27.2 | 16.1 | 43.3 | 57.7 | -14.4 |

**Table 12-10: Radiated Emissions Harmonics/Spurious Channel 41 (TX Frequency: 2441 MHz); FHSS**

| Emission Frequency (MHz) | Peak Analyzer Reading (dBuV) (1 MHz RBW/VBW) | Average Analyzer Reading (dBuV) (1 MHz RBW/10 Hz VBW) | Site Correction Factor (dB/m) | Average Emission Level (dBuV/m) | Average Limit (dBuV/m) | Average Margin (dB) |
|---|---|---|---|---|---|---|
| 4882.0 | 47.5 | 37.8 | 0.2 | 38.0 | 54.0 | -16.0 |
| 7323.0 | 46.8 | 34.2 | 3.3 | 37.5 | 54.0 | -16.5 |
| 9764.0 | 41.7 | 31.0 | 8.5 | 39.5 | 59.2 | -19.7 |
| 12205.0 | 39.5 | 26.7 | 10.1 | 36.8 | 54.0 | -17.2 |
| 14646.0 | 41.3 | 28.0 | 15.6 | 43.6 | 59.2 | -15.6 |
| 17087.0 | 42.5 | 28.2 | 16.2 | 44.4 | 59.2 | -14.8 |

**Table 12-11: Radiated Emissions Harmonics/Spurious Channel 80 (TX Frequency: 2480 MHz); FHSS**

| Emission Frequency (MHz) | Peak Analyzer Reading (dBuV) (1 MHz RBW/VBW) | Average Analyzer Reading (dBuV) (1 MHz RBW/10 Hz VBW) | Site Correction Factor (dB/m) | Average Emission Level (dBuV/m) | Average Limit (dBuV/m) | Average Margin (dB) |
|---|---|---|---|---|---|---|
| 4960.0 | 49.3 | 34.2 | 0.7 | 34.9 | 54.0 | -19.1 |
| 7440.0 | 44.2 | 34.3 | 3.9 | 38.2 | 54.0 | -15.8 |
| 9920.0 | 40.7 | 28.8 | 9.4 | 38.2 | 56.8 | -18.6 |
| 12400.0 | 39.7 | 27.0 | 14.1 | 41.1 | 54.0 | -12.9 |
| 14880.0 | 37.5 | 27.8 | 15.7 | 43.5 | 56.8 | -13.3 |
| 17360.0 | 42.3 | 28.2 | 16.2 | 44.4 | 56.8 | -12.4 |

**Table 12-12: Radiated Emissions Harmonics/Spurious Hopping Mode; FHSS**

| Emission Frequency (MHz) | Peak Analyzer Reading (dBuV) (1 MHz RBW/VBW) | Average Analyzer Reading (dBuV) (1 MHz RBW/10 Hz VBW) | Site Correction Factor (dB/m) | Average Emission Level (dBuV/m) | Average Limit (dBuV/m) | Average Margin (dB) |
|---|---|---|---|---|---|---|
| 2389.900 | 44.8 | 27.2 | -5.0 | 22.2 | 54.0 | -31.8 |
| 2483.870 | 55.2 | 28.8 | -4.9 | 23.9 | 54.0 | -30.1 |
| 4803.700 | 46.8 | 27.7 | 0.3 | 28.0 | 54.0 | -26.0 |
| 4898.000 | 45.3 | 27.2 | 0.3 | 27.5 | 54.0 | -26.5 |
| 7267.000 | 43.2 | 28.2 | 3.6 | 31.8 | 54.0 | -22.2 |
| 7347.300 | 43.3 | 28.3 | 3.9 | 32.2 | 54.0 | -21.8 |

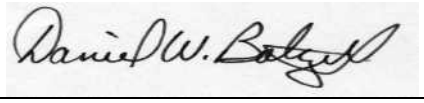
**Table 12-13: Radiated Emissions Harmonics/Spurious Collocated Mode; FHSS and 802.11b (2437 MHz)**

| Emission Frequency (MHz) | Peak Analyzer Reading (dBuV) (1 MHz RBW/VBW) | Average Analyzer Reading (dBuV) (1 MHz RBW/10 Hz VBW) | Site Correction Factor (dB/m) | Average Emission Level (dBuV/m) | Average Limit (dBuV/m) | Average Margin (dB) |
|---|---|---|---|---|---|---|
| 2387.680 | 50.8 | 33.7 | -5.0 | 28.7 | 54.0 | -25.3 |
| 2484.180 | 55.3 | 35.2 | -4.9 | 30.3 | 54.0 | -23.7 |
| 4874.700 | 44.0 | 32.7 | 0.2 | 32.9 | 54.0 | -21.1 |
| 4890.700 | 44.0 | 26.0 | 0.2 | 26.2 | 54.0 | -27.8 |
| 7309.170 | 41.5 | 32.2 | 2.9 | 35.1 | 54.0 | -18.9 |
| 7323.250 | 38.8 | 28.0 | 3.5 | 31.5 | 54.0 | -22.5 |

**Table 12-14: Radiated Emissions Harmonics/Spurious Collocated Mode; FHSS and 802.11g (2437 MHz)**

| Emission Frequency (MHz) | Peak Analyzer Reading (dBuV) (1 MHz RBW/VBW) | Average Analyzer Reading (dBuV) (1 MHz RBW/10 Hz VBW) | Site Correction Factor (dB/m) | Average Emission Level (dBuV/m) | Average Limit (dBuV/m) | Average Margin (dB) |
|---|---|---|---|---|---|---|
| 2389.970 | 52.5 | 35.8 | -5.0 | 30.8 | 54.0 | -23.2 |
| 2483.530 | 55.5 | 38.0 | -4.9 | 33.1 | 54.0 | -20.9 |
| 4874.500 | 44.2 | 32.5 | 0.1 | 32.6 | 54.0 | -21.4 |
| 4897.800 | 42.7 | 27.0 | 0.3 | 27.3 | 54.0 | -26.7 |
| 7310.920 | 40.2 | 27.7 | 2.9 | 30.6 | 54.0 | -23.4 |
| 7316.670 | 41.2 | 27.7 | 3.2 | 30.9 | 54.0 | -23.1 |

**Test Personnel:**



| Daniel W. Baltzell | | July 7, 2006 |
|---|---|---|
| EMC Test Engineer | Signature | Date Of Test |

## 13 Conclusion

The data in this measurement report shows that the EUT as tested, Fujitsu Transaction Solutions Inc. Model # iPAD100-20, FCC ID: QL9-IPAD100-20, IC: 4432A-IPAD20, complies with all the applicable requirements of Parts 2 and 15 of the FCC Rules and Regulations, and Industry Canada RSS-210 & RSS-Gen.